NISSAN
STANZA
ALTIMA
MODEL U13 SERIES

QUICK REFERENCE INDEX

FOREWORD

This manual contains maintenance and repair procedures for the 1993 Nissan STANZA ALTIMA.

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

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

IMPORTANT SAFETY NOTICE

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

NISSAN NORTH AMERICA, INC.
Technical Information Department
Torrance, California

SECTION GI

CONTENTS

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

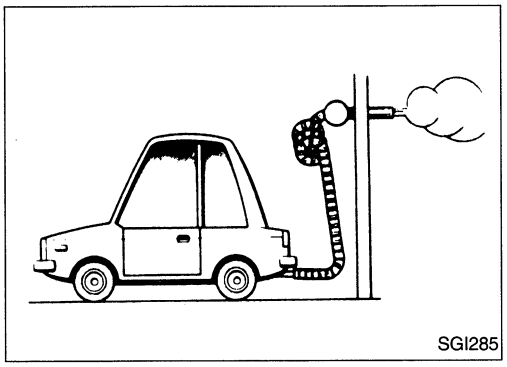

SGI646

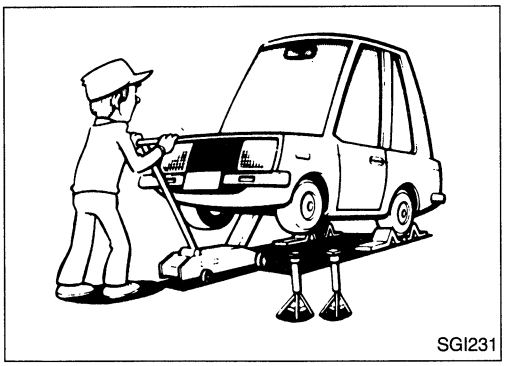
Precautions for Supplemental Restraint System "AIR BAG"

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 control module, warning lamp, wiring harness and spiral cables. 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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

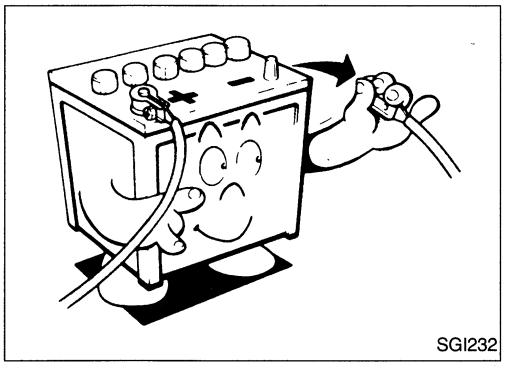

SGI285


SGI231

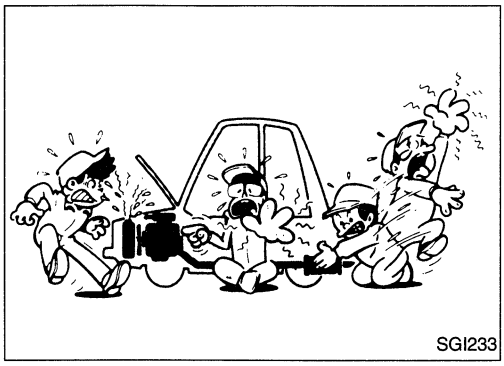
General Precautions

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

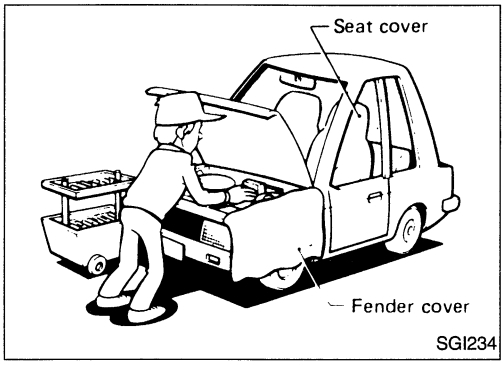
General Precautions (Cont'd)


SGI232

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


SGI233

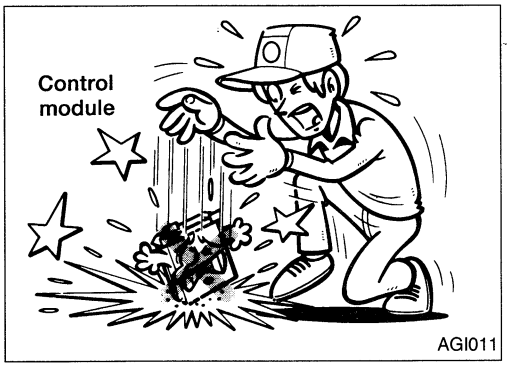
5. To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe and muffler. Do not remove the radiator cap when the engine is hot.



SGI234

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

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



Precautions for Multiport Fuel Injection System or ECM Controlled Engine

1. Before connecting or disconnecting multiport fuel injection system or ECM (ECCS control module) harness connector to or from any multiport fuel injection system or ECM, 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 Catalytic Converter

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

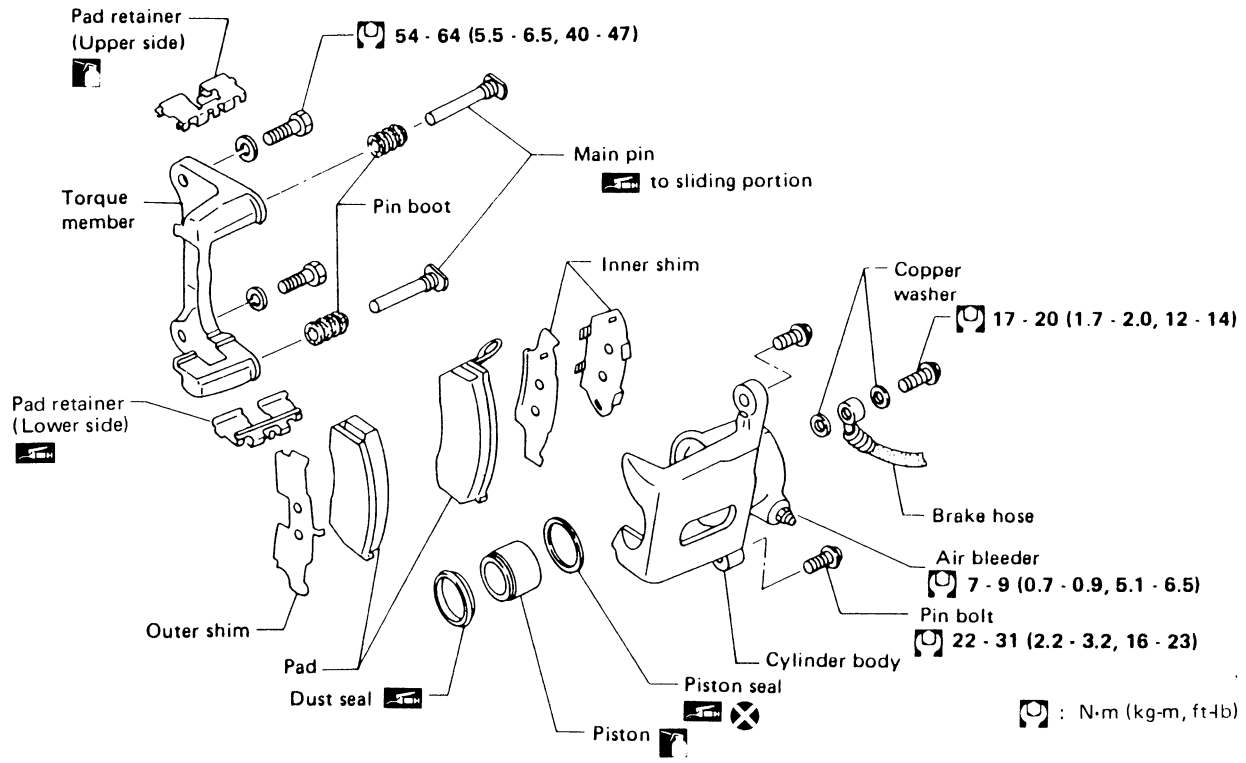
Precautions for Fuel

Use unleaded premium gasoline with an octane rating of at least 91 AKI (Anti-Knock Index) number (research octane number 96). If unleaded premium gasoline is not available, unleaded regular gasoline with an octane rating of at least 87 AKI (research octane number 91) can be used.
However, for maximum vehicle performance, the use of unleaded premium gasoline is recommended.

CAUTION:
Do not use leaded gasoline. Using leaded gasoline will damage the three way catalytic converter.

1. **A QUICK REFERENCE INDEX,** a black tab (e.g. BR) is provided on the first page. You can quickly find each section by mating it to the section's black tabs.
2. **THE CONTENTS** are listed on the first page of each section.
3. **THE TITLE** is indicated on the upper portion of each page and shows the part or system.
4. **THE PAGE NUMBER** of each section consists of two letters which designate the particular section and a number (e.g. "BR-5").
5. **THE LARGE ILLUSTRATIONS** are exploded views (See below) and contain tightening torques, lubrication points and other information necessary to perform repairs.
   The illustrations should be used in reference to service matters only. When ordering parts, refer to the appropriate **PARTS CATALOG**.

"Example"



6. **THE SMALL ILLUSTRATIONS** show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations.
   Assembly, inspection and adjustment procedures for the 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:

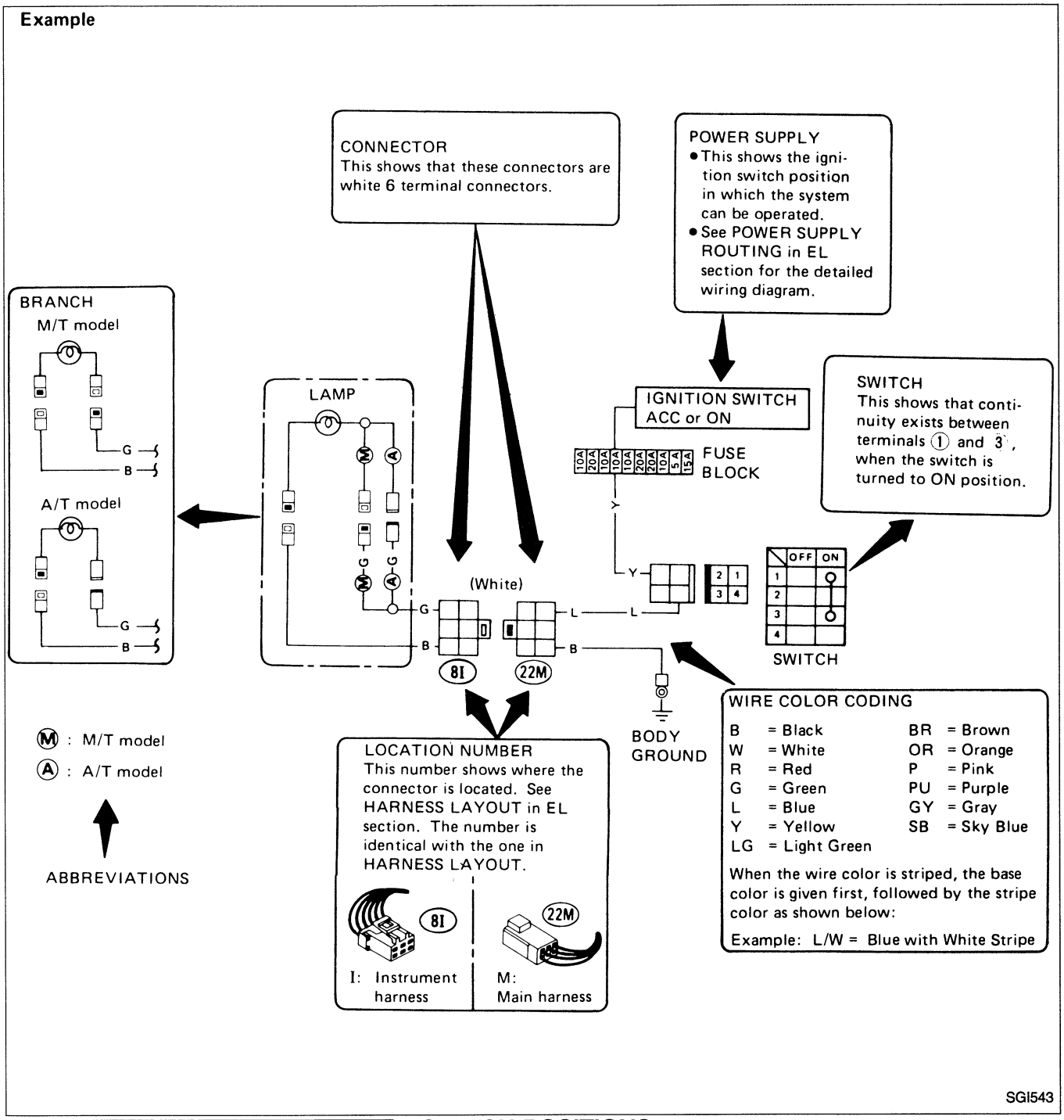
	:	Tightening torque	M/T	:	Manual Transaxle/Transmission
	:	Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.	A/T	:	Automatic Transaxle/Transmission
			Tool	:	Special Service Tools
			LHD	:	Left-Hand Drive
			RHD	:	Right-Hand Drive
	:	Should be lubricated with oil.	ATF	:	Automatic Transmission Fluid
	:	Sealing point	D_1	:	Drive range 1st gear
	:	Checking point	D_2	:	Drive range 2nd gear
	:	Always replace after every disassembly.	D_3	:	Drive range 3rd gear
			D_4	:	Drive range 4th gear
Ⓟ	:	Apply petroleum jelly.	OD	:	Overdrive
ATF	:	Apply ATF	2_2	:	2nd range 2nd gear
★	:	Select with proper thickness.	2_1	:	2nd range 1st gear
☆	:	Adjustment is required.	1_2	:	1st range 2nd gear
SDS	:	Service Data and Specifications	1_1	:	1st range 1st gear
LH, RH	:	Left-Hand, Right-Hand			

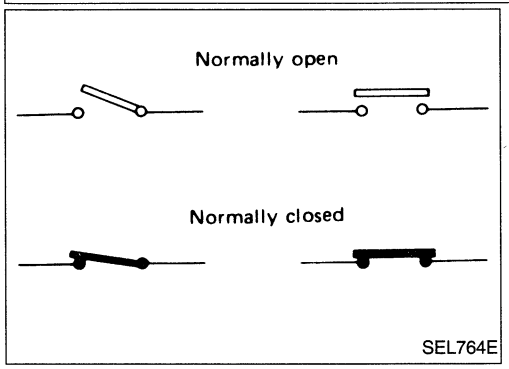
8. The **UNITS** given in this manual are primarily expressed as the SI UNIT (International System of Unit), and alternatively expressed in the metric system and in the yard/pound system.
   "Example"
   Tightening torque:
   59 - 78 N•m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)
9. **TROUBLE DIAGNOSES** are included in sections dealing with complicated components.
10. **SERVICE DATA AND SPECIFICATIONS** are contained at the end of each section for quick reference of data.
11. The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.

- **WARNING** indicates the possibility of personal injury if instructions are not followed.
- **CAUTION** indicates the possibility of component damage if instructions are not followed.
- **BOLD TYPED STATEMENTS** except **WARNING** and **CAUTION** give you helpful information.

WIRING DIAGRAM

Symbols used in WIRING DIAGRAM are shown below:



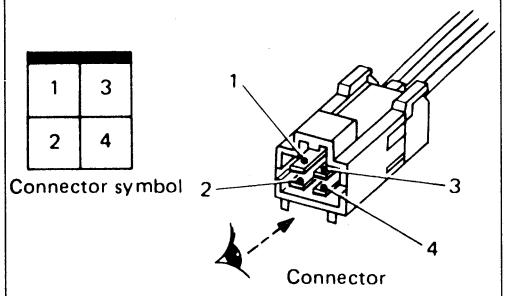


SWITCH POSITIONS

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

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

Example



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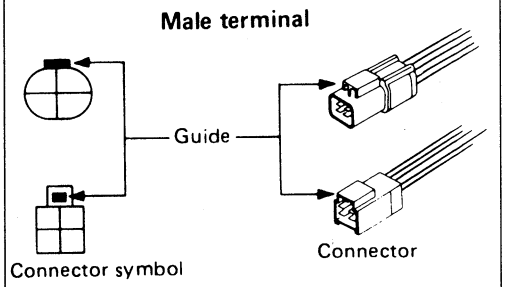
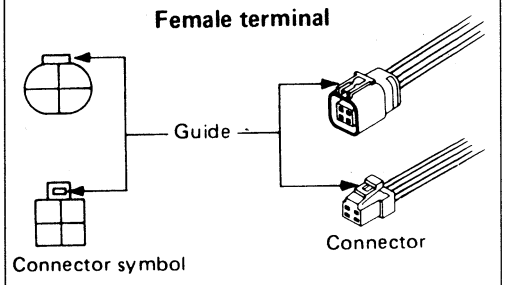
CONNECTOR SYMBOLS

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

Example





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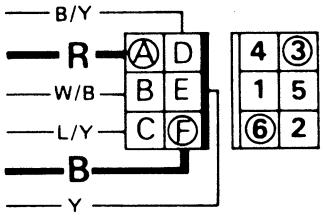
- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

MULTIPLE SWITCH

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

Example



WIPER SWITCH

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

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

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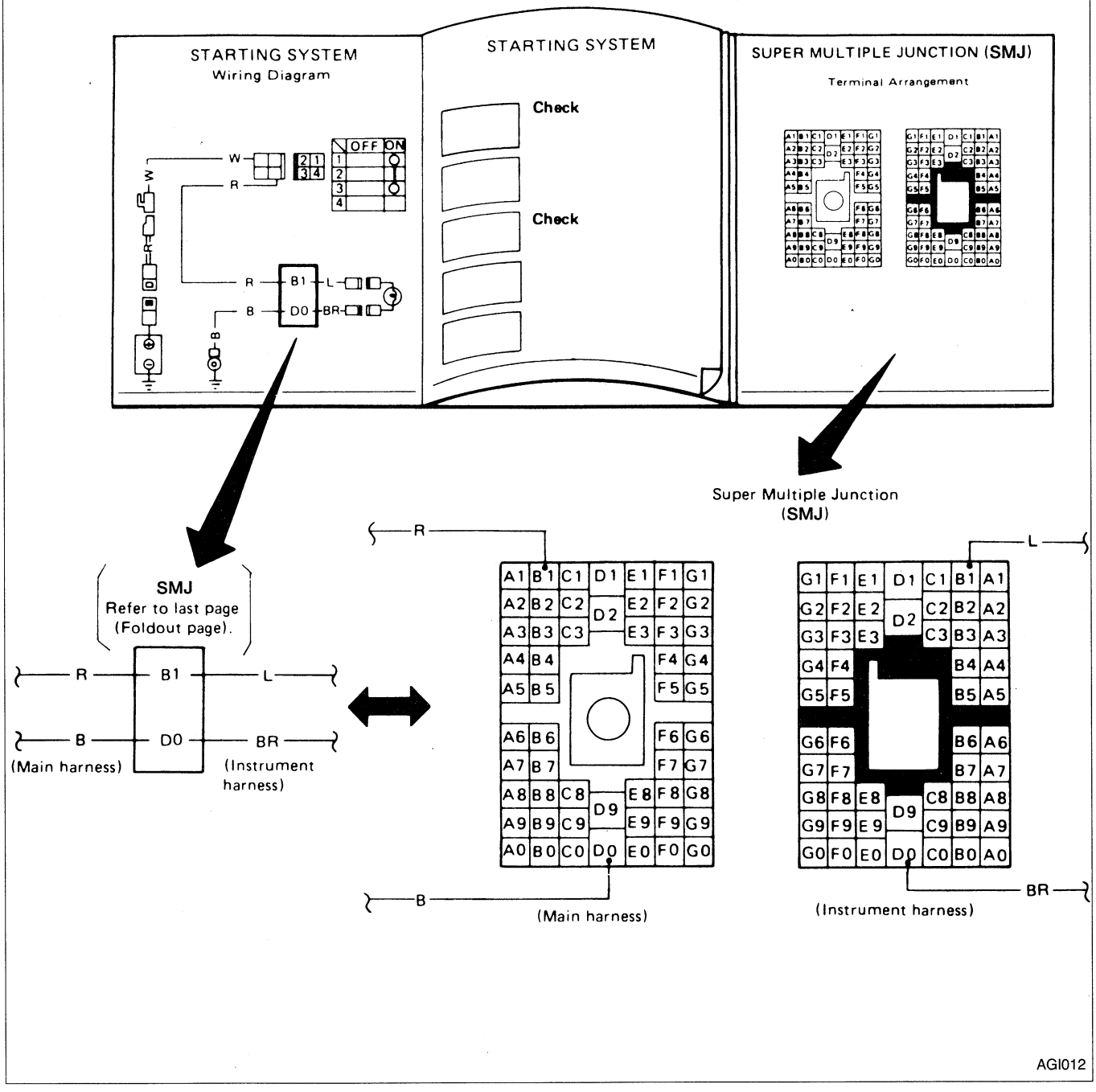
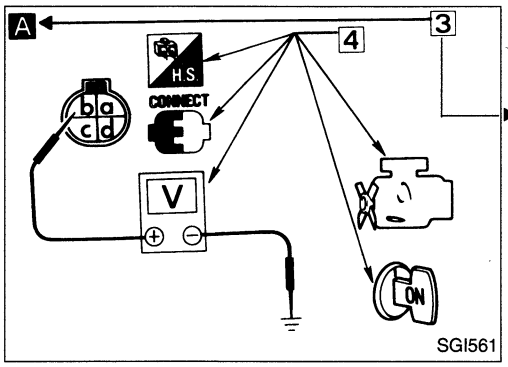
SUPER MULTIPLE JUNCTION (SMJ)

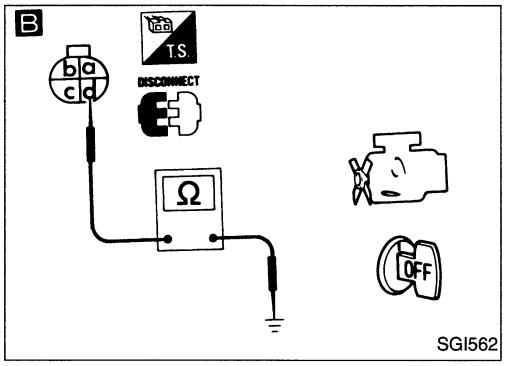
- The "SMJ" indicated in wiring diagrams is shown in a simplified form. The terminal arrangement should therefore be referred to in the foldout at the end of the Service Manual.
- The foldout should be spread to read the entire wiring diagram.

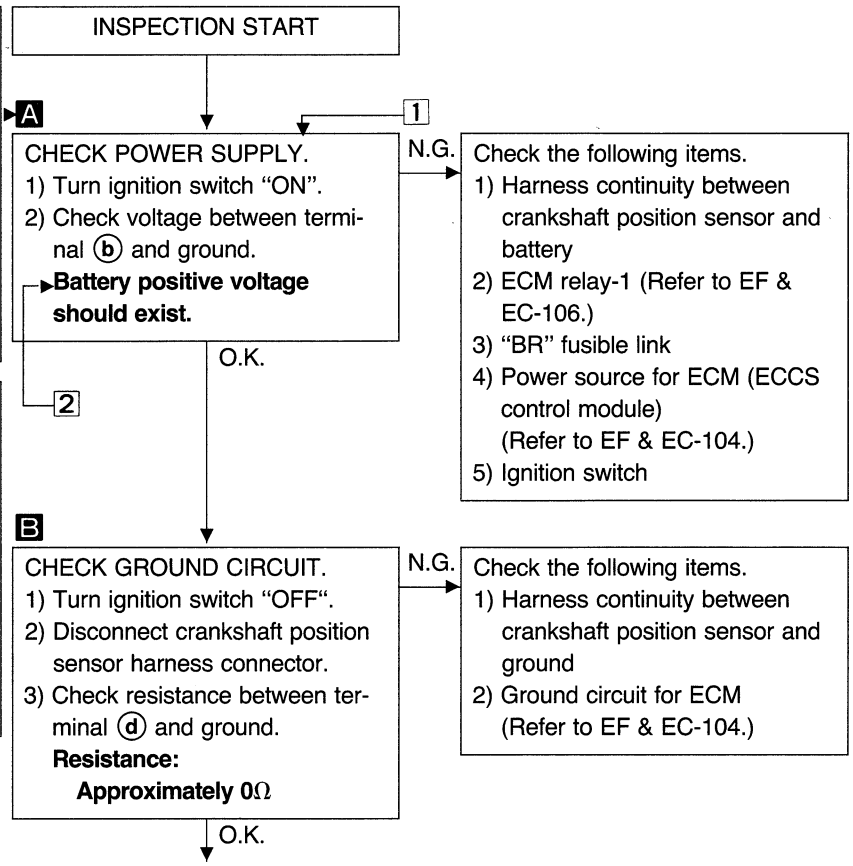
Example



Example







NOTICE

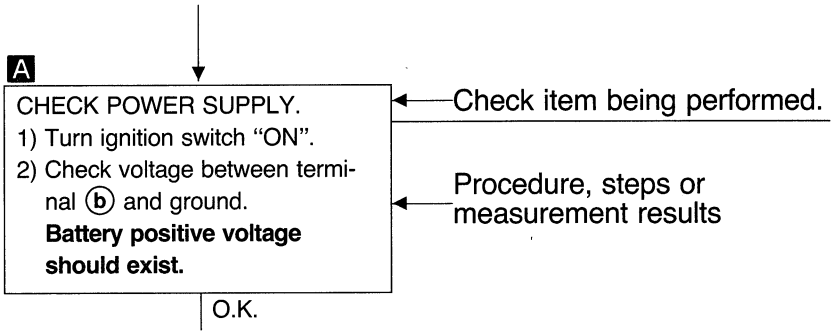
The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

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 positive 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:

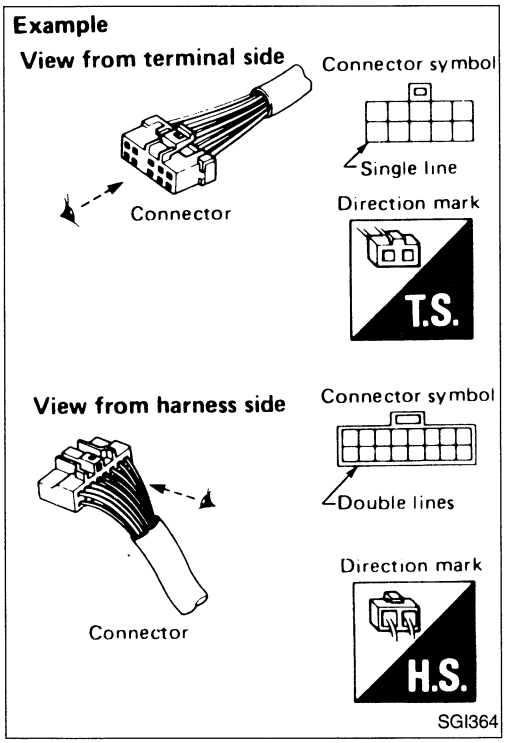
Battery positive voltage → 11 - 14V or approximately 12V Voltage: Approximately 0V → Less than 1V

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.

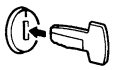
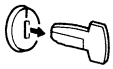
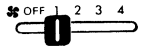
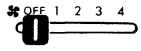
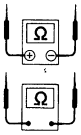
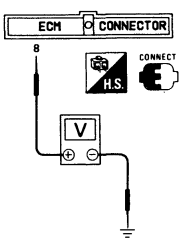
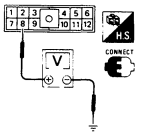
T.S. : **View from terminal side ... T.S.**

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

H.S. : **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.		Procedure with CONSULT
	Check after connecting the connector to be measured.		Procedure with CONSULT
	Insert key into ignition switch.		A/C switch is "OFF".
	Remove key from ignition switch.		A/C switch is "ON".
	Turn ignition switch to "OFF" position.		REC switch is "ON".
	Turn ignition switch to "ON" position.		REC switch is "OFF".
	Turn ignition switch to "START" position.		DEF switch is "ON".
	Turn ignition switch from "OFF" to "ACC" position.		VENT switch is "ON".
	Turn ignition switch from "ACC" to "OFF" position.		Fan switch is "ON". (At any position except for "OFF" position)
	Turn ignition switch from "OFF" to "ON" position.		Fan switch is "OFF".
	Turn ignition switch from "ON" to "OFF" position.		Apply fused battery positive voltage directly to components.
	Do not start engine, or check with engine stopped.		Drive vehicle.
	Start engine, or check with engine running.		Disconnect battery negative cable.
	Apply parking brake.		Depress brake pedal.
	Release parking brake.		Release brake pedal.
	Check after engine is warmed up sufficiently.		Depress accelerator pedal.
	Voltage should be measured with a voltmeter.		Release accelerator pedal.
	Circuit resistance should be measured with an ohmmeter.		Pin terminal check for SMJ type ECM and TCM connectors. **For details regarding the terminal arrangement, refer to the foldout page.** 
	Current should be measured with an ammeter.		

Function and System Application

Diagnostic test mode	Function	ECCS	A/T	Air bag
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.	X	–	–
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	X	X	X
Data monitor	Input/Output data in the ECM can be read.	X	X	–
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.	X	–	–
ECM part number	ECM part number can be read.	X	X	–
Function test	ECCS faults can be isolated to a general area, semi-automatically and in a short time, by following the directions on the screen.	X	–	–

X: Applicable

Lithium Battery Replacement

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

WARNING:

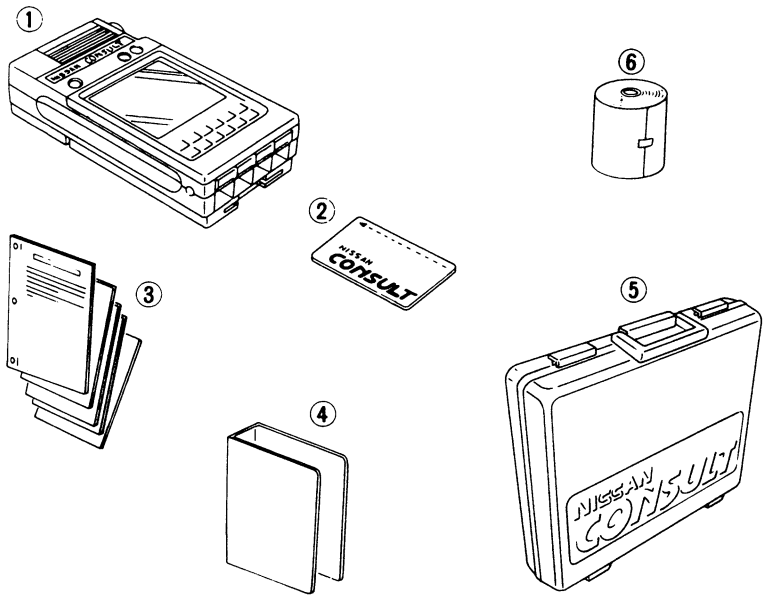
Replace the lithium battery with SANYO Electric Co., Ltd., CR2032 only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated.

Do not recharge, disassemble or dispose of in fire.

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

Checking Equipment

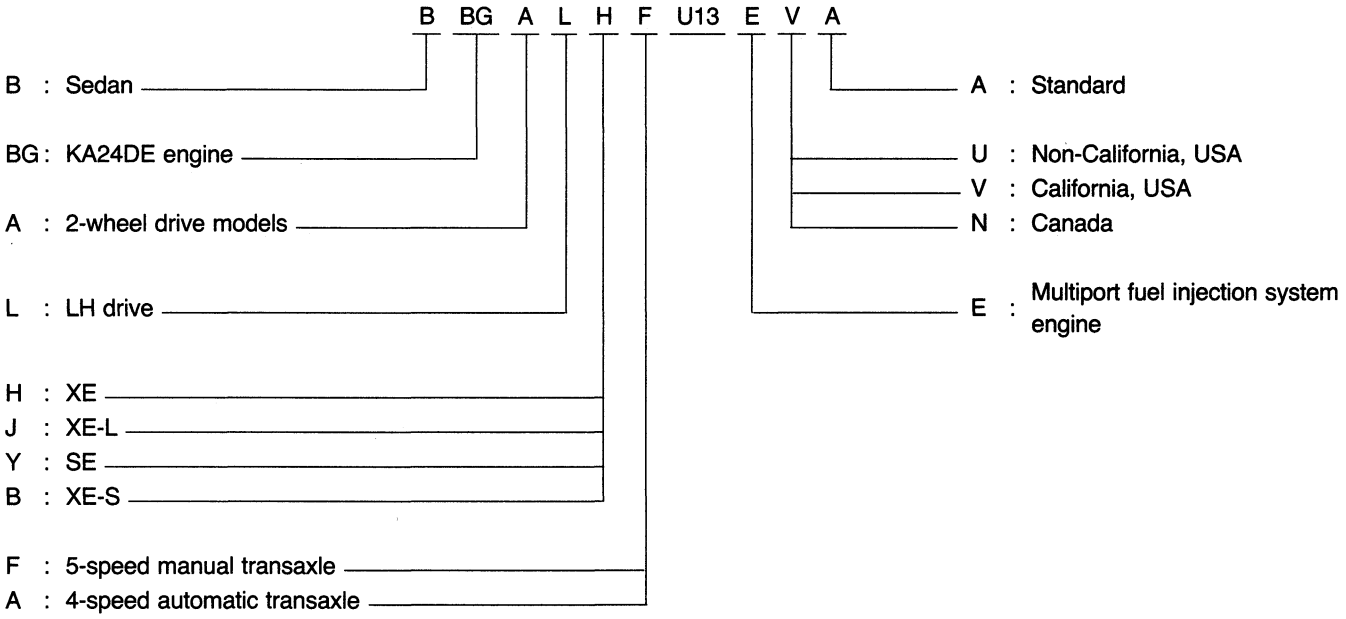
When ordering the below equipment, contact your NISSAN distributor.

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

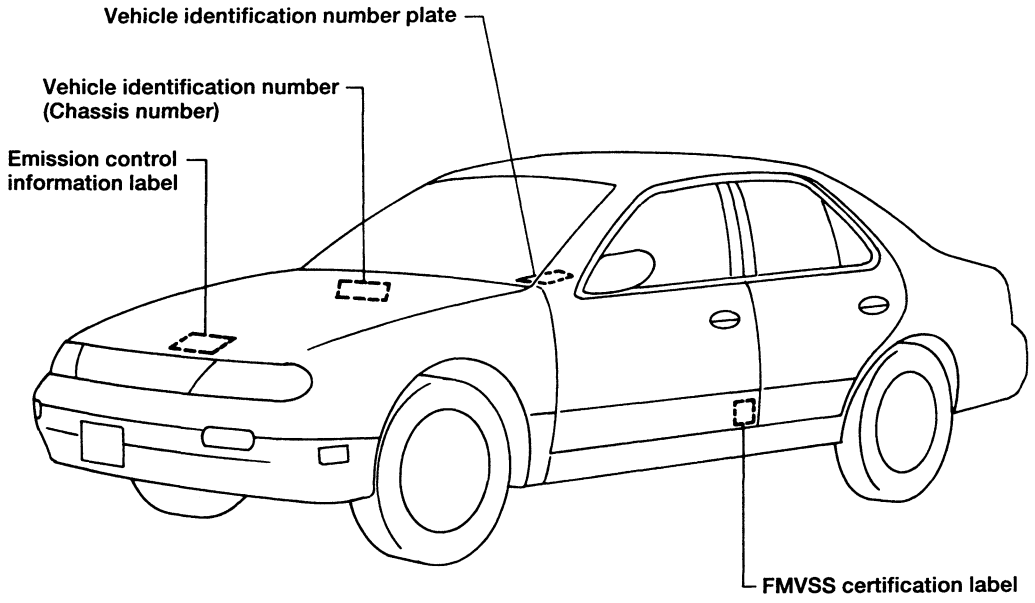
Model Variation

Destination	Body	Engine	Grade	Transaxle	
				RS5F50A	RE4F04A
Non-California, USA	Sedan	KA24DE	XE	BBGALHF-EUA	BBGALHA-EUA
			XE-L	—	BBGALJA-EUA
			SE	BBGALYF-EUA	BBGALYA-EUA
			XE-S	BBGALBF-EUA	BBGALBA-EUA
California, USA			XE	BBGALHF-EVA	BBGALHA-EVA
			XE-L	—	BBGALJA-EVA
			SE	BBGALYF-EVA	BBGALYA-EVA
			XE-S	BBGALBF-EVA	BBGALBA-EVA
Canada			XE	BBGALHF-ENA	BBGALHA-ENA
			XE-L	—	BBGALJA-ENA
			SE	BBGALYF-ENA	BBGALYA-ENA
			XE-S	BBGALBF-ENA	BBGALBA-ENA

Prefix and suffix designations:



Identification Number



VEHICLE IDENTIFICATION NUMBER ARRANGEMENT

1N4 B U 3 1 P * P C 000001

Manufacturer
1N4 : USA produced passenger vehicle

Engine type
B : KA24DE engine

Vehicle line
U : Nissan Stanza Altima

Model change

Body type
1 : 4-door Sedan

Vehicle serial number (Chassis number)

Manufacturing plant
C : Smyrna, Tennessee

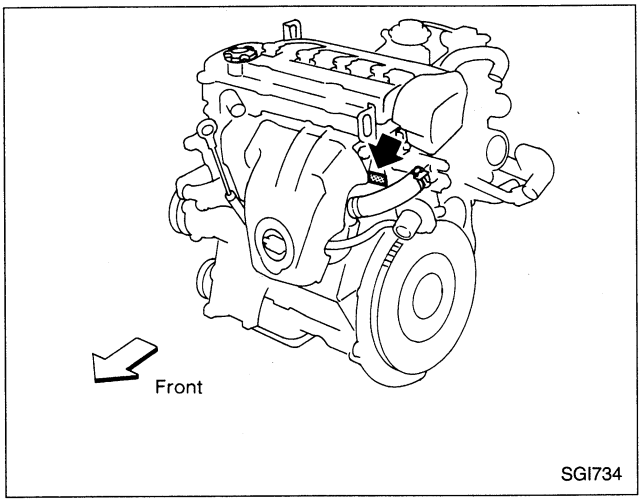
Model year
P : 1993 year model

Check digit (0 to 9 or X)
The diagnostic trouble code for the check digit is determined by mathematical computation.

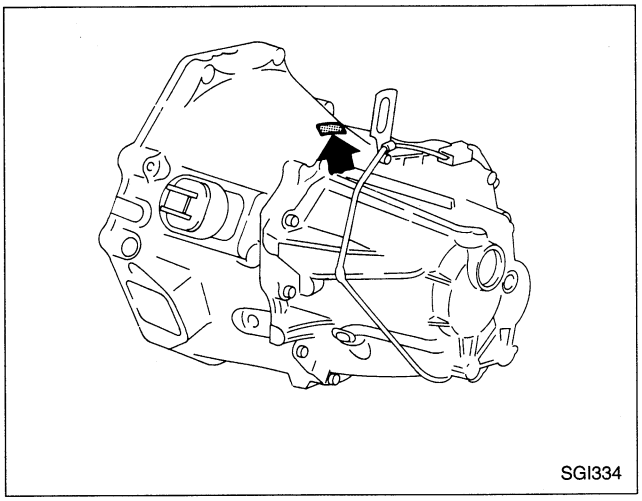
Restraint system
S : Standard
P : Automatic
F : Air bag system for USA
C : Air bag system for Canada

Identification Number (Cont'd)

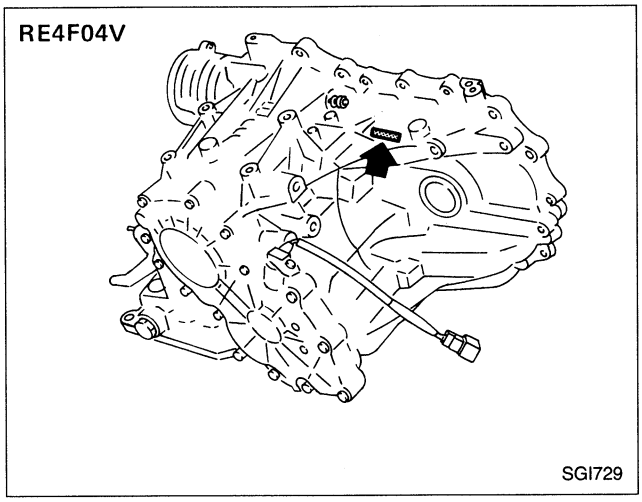
ENGINE SERIAL NUMBER



MANUAL TRANSAXLE NUMBER



AUTOMATIC TRANSAXLE NUMBER



Dimensions

Unit: mm (in)

Overall length	4,585 (180.5)
Overall width	1,695 (66.7)
Overall height	1,420 (55.9)
Front tread	1,465 (57.7)
Rear tread	1,455 (57.3)
Wheelbase	2,620 (103.1)

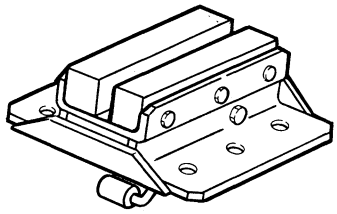
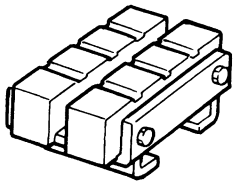
Wheels and Tires

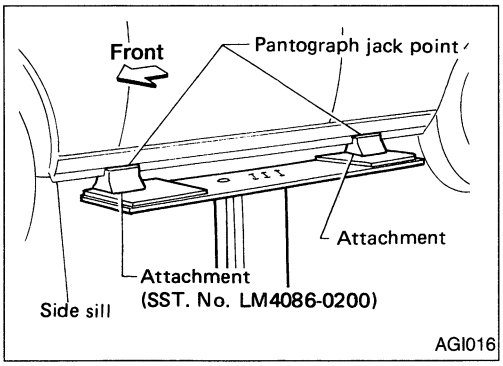
		Conventional	T type
Road wheel			
Steel		15 x 6JJ	15 x 4T
Aluminum		15 x 6JJ	15 x 4T
Offset	mm (in)	45 (1.77)	40 (1.57)
Tire size		P205/60R15 90H	T125/70D15 T135/90D15*

* With viscous L.S.D.

Preparation

SPECIAL SERVICE TOOLS

Tool number Tool name	Description
LM4086-0200 Board-on lift attachment	
LM4519-0000 Safety stand attachment	



Board-on Lift

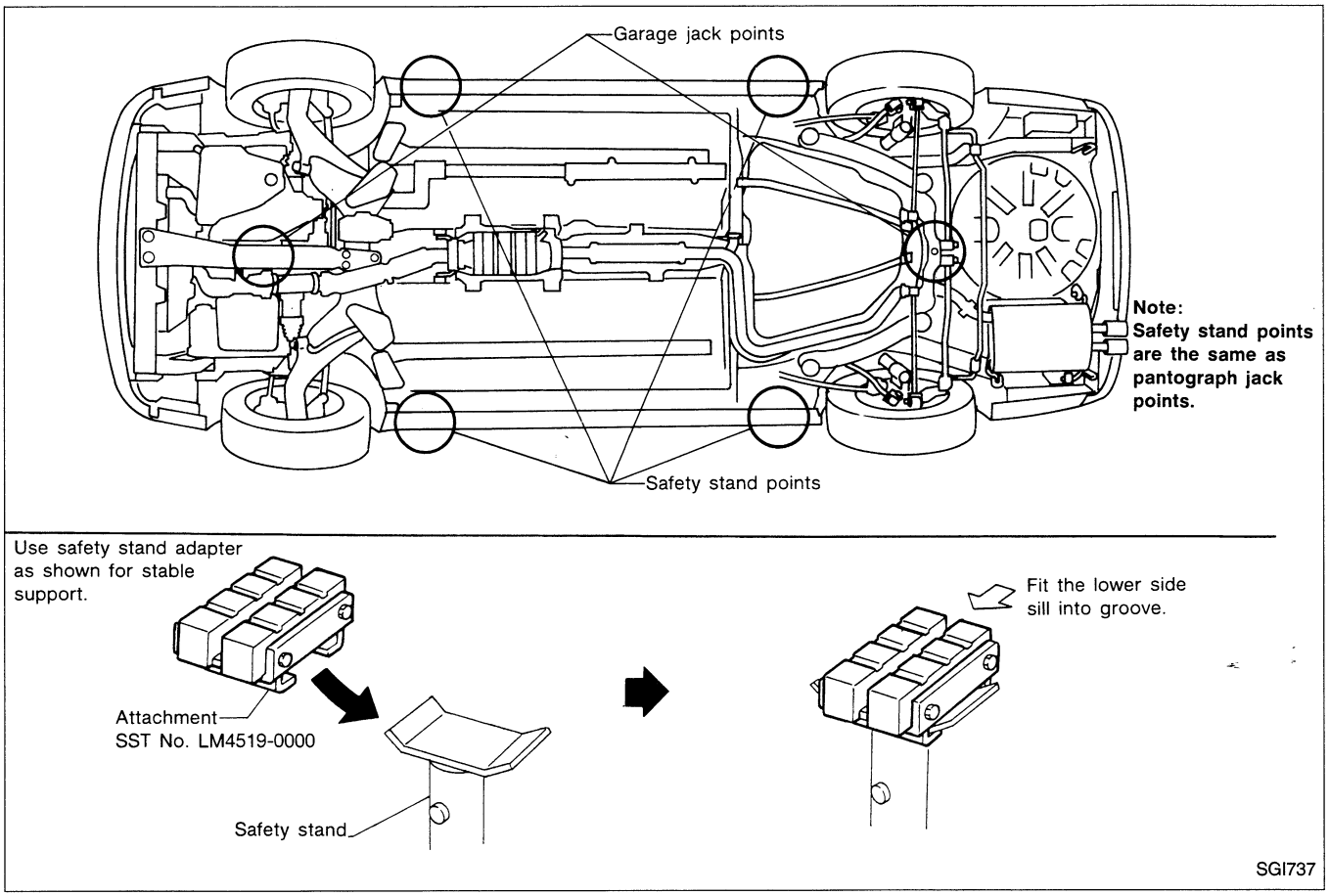
CAUTION:
Make sure vehicle is empty when lifting.

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

Garage Jack and Safety Stand

WARNING:

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

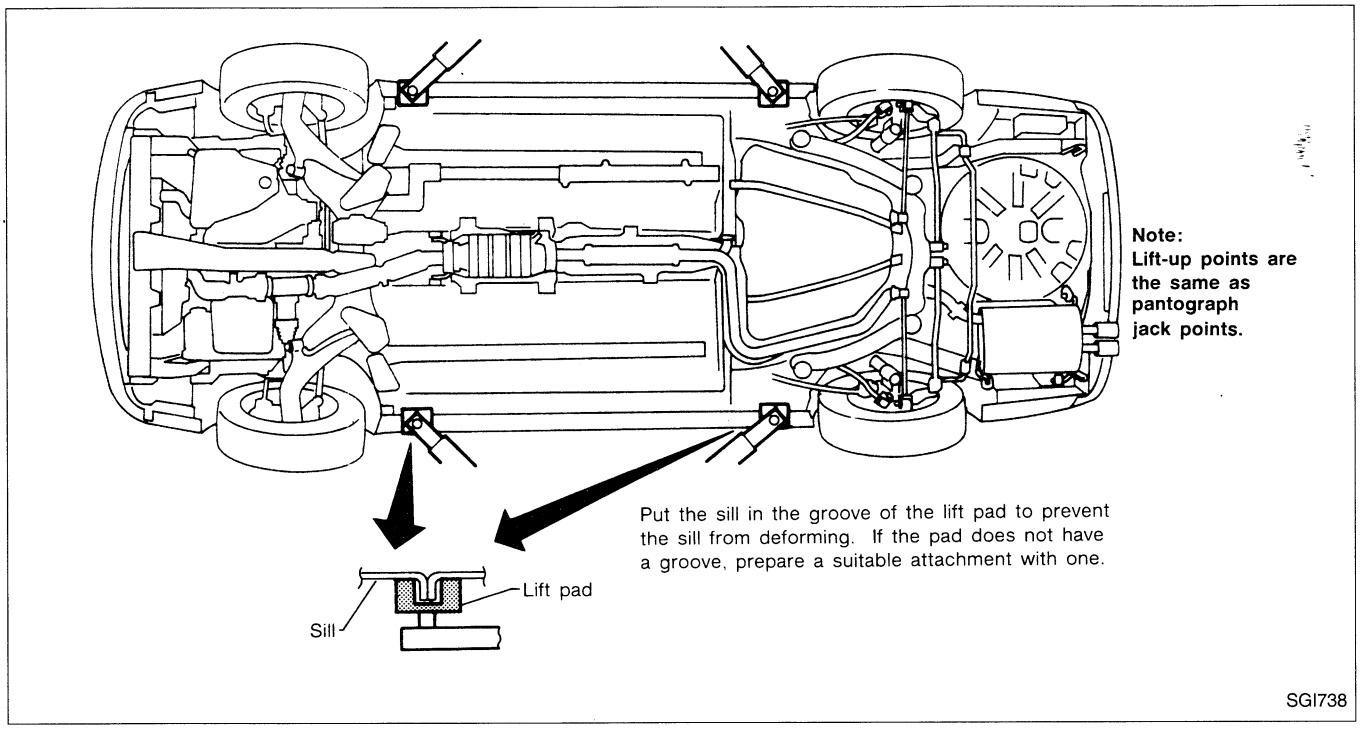


2-pole Lift

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.

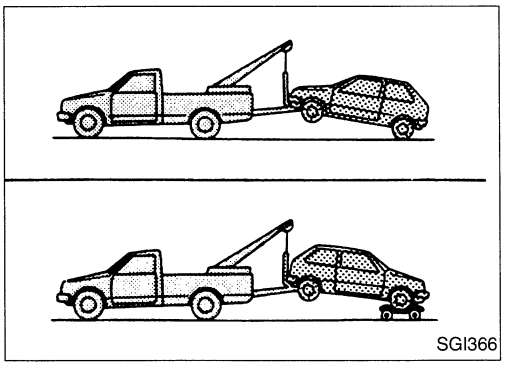
When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines.



Tow Truck Towing

CAUTION:

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



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

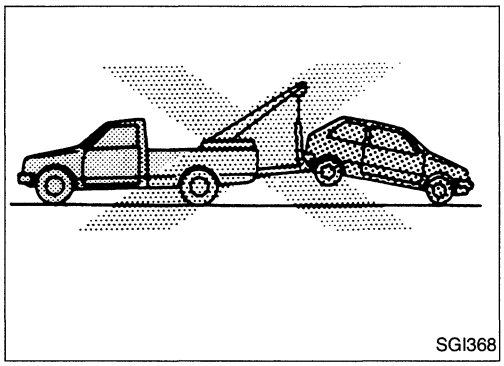
Tow Truck Towing (Cont'd)

TOWING AN AUTOMATIC TRANSAXLE MODEL WITH FOUR WHEELS ON GROUND

Observe the following restricted towing speeds and distances.

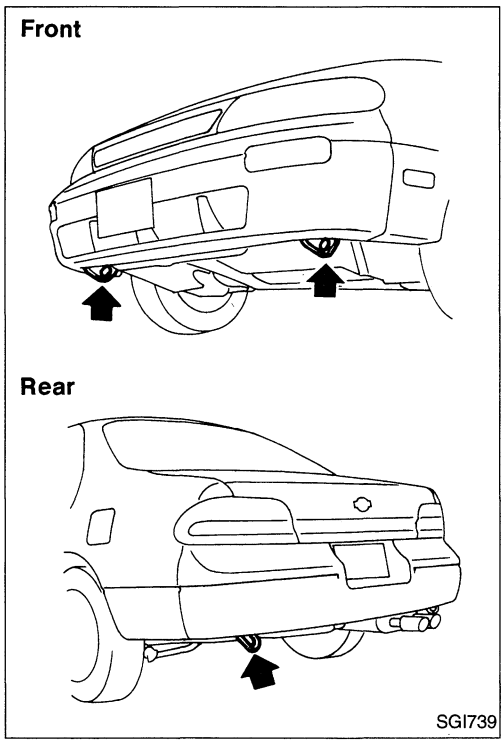
Speed: Below 50 km/h (30 MPH)
Distance: Less than 65 km (40 miles)

CAUTION:
Never tow an automatic transaxle model from the rear (i.e., backward) with four wheels on the ground as this may cause serious and expensive damage to the transaxle.


SGI368

TOWING AN AUTOMATIC TRANSAXLE MODEL WITH REAR WHEELS RAISED (With front wheels on ground)

Never tow an automatic transaxle model with rear wheels raised (with front wheels on ground) as this may cause serious and expensive damage to the transaxle. If it is necessary to tow it with rear wheels raised, always use a towing dolly under the front wheels.



SGI739

TOWING POINT

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

TIGHTENING TORQUE OF STANDARD BOLTS

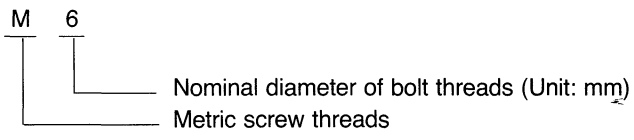
Grade	Bolt size	Bolt diameter* mm	Pitch mm	Tightening torque (Without lubricant)					
				Hexagon head bolt			Hexagon flange bolt		
				N•m	kg-m	ft-lb	N•m	kg-m	ft-lb
4T	M6	6.0	1.0	5.1	0.52	3.8	6.1	0.62	4.5
	M8	8.0	1.25	13	1.3	9	15	1.5	11
			1.0	13	1.3	9	16	1.6	12
	M10	10.0	1.5	25	2.5	18	29	3.0	22
			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.

*: Nominal diameter

Grade		Mark
4T	.....	4
7T	.....	7
9T	.....	9



The "Glossary of Acronyms" and the "Glossary of Technical Terms and Component Part Names" Related to SAE J1930

The glossary is a list comprising the acronyms and technical terms that are described in SAE J1930 and original Nissan technical terms that were described in pre-1993 model year Service Manuals or are described in Parts Catalogs as part names.
This glossary is provided to indicate correspondence between acronyms and two kinds of technical terms. Thus, this glossary is not intended for use as a dictionary of components and their functions.

SAE J1930 ACRONYMS	SAE J1930 TECHNICAL TERMS	NISSAN TECHNICAL TERMS OR COMPONENT PART NAMES
A/C	**Air Conditioning**	Air Conditioner
ACL	**Air Cleaner**	Air Cleaner
AIR	**Secondary Air Injection**	Air Pump
AP	**Accelerator Pedal**	Accelerator Pedal
BARO	**Barometric Pressure**	Altitude Compensator & BCDD
B+	**Battery Positive Voltage**	Battery Voltage
CAC	**Charge Air Cooler**	Inter Cooler
CARB	**Carburetor**	Carburetor
CFI	**Continuous Fuel Injection**	—
CL	**Closed Loop**	Closed Loop and Closed Loop Control
CKP	**Crankshaft Position**	Crank Angle Sensor
CMP	**Camshaft Position**	—
CPP	**Clutch Pedal Position**	Clutch Switch
CTOX	**Continuous Trap Oxidizer**	—
CTP	**Closed Throttle Position**	Idle Switch
DFI	**Direct Fuel Injection**	—
DI	**Distributor Ignition**	Ignition Timing Control
DLC	**Data Link Connector**	Diagnostic Connector for CONSULT or Diagnostic Connector
DTC	**Diagnostic Trouble Code**	Malfunction code or Code
DTM	**Diagnostic Test Mode**	Mode
ECM	**Engine Control Module**	ECCS Control Unit, Control Unit (EF & EC). ECU (ECCS Control Unit) or ECCS Control Unit (ECCS)
ECT	**Engine Coolant Temperature**	Engine Temperature Sensor, Engine Temperature or Coolant Temperature
EEPROM	**Electrically Erasable Programmable Read Only Memory**	ROM
EFE	**Early Fuel Evaporation**	Heat Control Valve Mixture Heater
EGR	**Exhaust Gas Recirculation**	Exhaust Gas Recirculation, Exhaust Gas Temperature Sensor, EGR System, EGR Valve, EGR Control Valve, BPT Valve or EGR Control Solenoid Valve
EI	**Electronic Ignition**	Ignition Timing Control
EM	**Engine Modification**	—
EPROM	**Erasable Programmable Read Only Memory**	ROM
EVAP	**Evaporative Emission**	Evaporative Emission Control System
FC	**Fan Control**	Radiator Fan Control or Condenser Fan Control

The "Glossary of Acronyms" and the "Glossary of Technical Terms and Component Part Names" Related to SAE J1930 (Cont'd)

SAE J1930 ACRONYMS	SAE J1930 TECHNICAL TERMS	NISSAN TECHNICAL TERMS OR COMPONENT PART NAMES
FEEPROM	**Flash Electrically Erasable Programmable Read Only Memory**	ROM
FEPROM	**Flash Erasable Programmable Read Only Memory**	ROM
FF	**Flexible Fuel**	—
FP	**Fuel Pump**	Fuel Pump
GEN	**Generator**	Alternator
GND	**Ground**	Ground or Earth
HO2S	**Heated Oxygen Sensor**	Exhaust Gas Sensor
IAT	**Intake Air Temperature**	—
ICM	**Ignition Control Module**	—
IFI	**Indirect Fuel Injection**	—
IFS	**Inertia Fuel Shutoff**	—
ISC	**Idle Speed Control**	FI Pot
KS	**Knock Sensor**	Detonation Sensor
MAF	**Mass Air Flow**	Air Flow Meter
MAP	**Manifold Absolute Pressure**	—
MC	**Mixture Control**	Air-Fuel Ratio Solenoid Valve
MDP	**Manifold Differential Pressure**	—
MIL	**Malfunction Indicator Lamp**	Check Engine Light
MFI	**Multiport Fuel Injection**	Fuel Injection Control
MST	**Manifold Surface Temperature**	—
MVZ	**Manifold Vacuum Zone**	—
NVRAM	**Non-Volatile Random Access Memory**	—
O2S	**Oxygen Sensor**	Exhaust Gas Sensor
OBD	**On-Board Diagnostic**	Self-diagnosis
OC	**Oxidation Catalytic Converter**	Catalyst
OL	**Open Loop**	Open Loop
PAIR	**Pulsed Secondary Air Injection**	AIV (Air Induction Valve)
PCM	**Powertrain Control Module**	—
PNP	**Park/Neutral Position**	Neutral Switch
PROM	**Programmable Read Only Memory**	ROM
PSP	**Power Steering Pressure**	—
PTOX	**Periodic Trap Oxidizer**	—
RAM	**Random Access Memory**	—
RM	**Relay Module**	—
ROM	**Read Only Memory**	ROM
RPM	**Engine Speed**	Engine Revolution or Engine rpm
SC	**Supercharger**	—
SCB	**Supercharger Bypass**	—
SFI	**Sequential Multiport Fuel Injection**	Sequential Injection
SPL	**Smoke Puff Limiter**	—

The "Glossary of Acronyms" and the "Glossary of Technical Terms and Component Part Names" Related to SAE J1930 (Cont'd)

SAE J1930 ACRONYMS	SAE J1930 TECHNICAL TERMS	NISSAN TECHNICAL TERMS OR COMPONENT PART NAMES
SRI	**Service Reminder Indicator**	—
SRT	**System Readiness Test**	—
ST	**Scan Tool**	—
TB	**Throttle Body**	Throttle Chamber or SPI Body
TBI	**Throttle Body Fuel Injection**	Fuel Injection Control
TC	**Turbocharger**	Turbocharger
TCC	**Torque Converter Clutch**	Lock-up Solenoid or Lock-up Cancel Solenoid
TCM	**Transmission Control Module**	A/T Control Unit
TP	**Throttle Position**	Throttle Sensor, Soft/Hard Idle Switch, Throttle Position of Throttle Valve Switch
TR	**Transmission Range**	—
TW	**Thermal Vacuum Valve**	Thermal Vacuum Valve (TVV)
TWC	**Three Way Catalytic Converter**	Catalyst
TWC + OC	**Three Way + Oxidation Catalytic Converter**	Catalyst
VAF	**Volume Air Flow**	Air Flow Meter
VR	**Voltage Regulator**	Voltage Regulator or IC Voltage Regulator
VSS	**Vehicle Speed Sensor**	Vehicle Speed Sensor
WOT	**Wide Open Throttle**	Full Switch or Full Throttle Switch
WU-OC	**Warm Up Oxidation Catalytic Converter**	Catalyst or Pre Cat
WU-TWC	**Warm Up Three Way Catalytic Converter**	Catalyst or Pre Cat
3GR	**Third Gear**	—
4GR	**Fourth Gear**	—

—: Not issued as NISSAN TECHNICAL TERMS OR COMPONENT PART NAMES

SECTION MA

CONTENTS

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

Item	Reference page
OUTSIDE THE VEHICLE The maintenance items listed here should be performed from time to time, unless otherwise specified.	
Tires Check the pressure with a gauge periodically when at a service station, including the spare, and adjust to the specified pressure if necessary. Check carefully for damage, cuts or excessive wear.	—
Wheel nuts When checking the tires, make sure no nuts are missing, and check for any loose nuts. Tighten if necessary.	—
Tire rotation Tires should be rotated every 12,000 km (7,500 miles.)	MA-17
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-17, FA-6
Windshield wiper blades Check for cracks or wear if they do not wipe properly.	—
Doors and engine hood Check that all doors and the engine hood operate smoothly as well as the trunk lid and back hatch. Also, ensure that all latches lock securely. Lubricate if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check 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.	
Lamps Make sure that the headlamps, stop lamps, tail lamps, turn signal lamps, and other lamps are all operating properly and installed securely. Also, check headlamp aim.	—
Warning lamps and buzzers/chimes Make sure that all warning lamps and buzzers/chimes are operating properly.	—
Windshield wiper and washer Check that the wipers and washer operate properly and that the wipers do not streak.	—
Windshield defroster Check that the air comes out of the defroster outlets properly and in sufficient quantity when operating the heater or air conditioning.	—
Steering wheel Check that it has the specified 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)**	ST-5
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
Clutch pedal Make sure the pedal operates smoothly and check that it has the proper free travel.	CL-4
Brakes Check that the brake does not pull the vehicle to one side when applied.	—
Brake pedal and booster Check the pedal for smooth operation and make sure it has the proper distance under it when depressed fully. Check the brake booster function. Be certain to keep the floor mats away from the pedal.	BR-9, 14

Item	Reference page
Parking brake Check that the lever has the proper travel and confirm that the vehicle is held securely on a fairly steep hill when only the parking brake is applied.	BR-33
Automatic transmission "Park" mechanism Check that the lock release button on the selector lever operates properly and smoothly. On a fairly steep hill check that 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-20
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.	LC-8
Brake and clutch fluid levels Make sure that the brake and clutch fluid levels are between the "MAX" and "MIN" lines on the reservoir.	MA-14, 15
Battery Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines.	EL-10
Engine drive belts Make sure that no belt is frayed, worn, cracked or oily.	MA-8
Engine oil level Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	MA-11
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-18
Automatic transaxle 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-18
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 conditioning after use is normal. If you should notice any leaks or if 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 include 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 if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	MAINTENANCE INTERVAL 3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	Reference page
Emission control system maintenance																		
Drive belts	See NOTE (1)																I*	MA-8
Air cleaner filter	See NOTE (2)								[R]								[R]	MA-11
Vapor lines									I*								I*	MA-13
Fuel lines									I*								I*	MA-10
Fuel filter	See NOTE (3)*																	MA-10
Engine coolant	See NOTE (4)																R*	MA-9
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-11
Engine oil filter (Use Nissan PREMIUM type or equivalent)		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-12
Spark plugs									[R]								[R]	MA-13
Intake & exhaust valve clearance	See NOTE (5)*																	EM-36
Chassis and body maintenance																		
Brake lines & cables					I				I				I				I	MA-16
Brake pads, discs, drums & linings			I		I		I		I		I		I		I		I	MA-16
Manual & automatic transaxle oil	See NOTE (6)				I				I				I				I	MA-14, 15
Steering gear & linkage, axle & suspension parts			I		I		I		I		I		I		I		I	MA-17, FA-4, RA-4
Steering linkage ball joints & front suspension ball joints			I		I		I		I		I		I		I		I	MA-17, FA-5
Exhaust system			I		I		I		I		I		I		I		I	MA-18
Drive shaft boots			I		I		I		I		I		I		I		I	FA-8
Air bag system	See NOTE (7)																	BF-85

NOTE: (1) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months.
(2) If operating mainly in dusty conditions, more frequent maintenance may be required.
(3) 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.
(4) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
(5) If valve noise increases, inspect valve clearance.
(6) 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.
(7) Inspect the air bag system 10 years after the date of manufacture as noted on the F.M.V.S.S. certification label.
(8) Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

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

MAINTENANCE OPERATION Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	MAINTENANCE INTERVAL 7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	Reference page
Emission control system maintenance										
Drive belts	See NOTE (1)								I*	MA-8
Air cleaner filter					[R]				[R]	MA-11
Vapor lines					I*				I*	MA-13
Fuel lines					I*				I*	MA-10
Fuel filter	See NOTE (2)*									MA-10
Engine coolant	See NOTE (3)								R*	MA-9
Engine oil		R	R	R	R	R	R	R	R	MA-11
Engine oil filter (Use Nissan PREMIUM type or equivalent)			R		R		R		R	MA-12
Spark plugs					[R]				[R]	MA-13
Intake & exhaust valve clearance	See NOTE (4)*									EM-36
Chassis and body maintenance										
Brake lines & cables			I		I		I		I	MA-16
Brake pads, discs, drums & linings			I		I		I		I	MA-16
Manual & automatic transaxle oil			I		I		I		I	MA-14, 15
Steering gear linkage, axle & suspension parts					I				I	MA-17, FA-4, RA-4
Exhaust system					I				I	MA-18
Drive shaft boots			I		I		I		I	FA-8
Air bag system	See NOTE (5)									BF-85

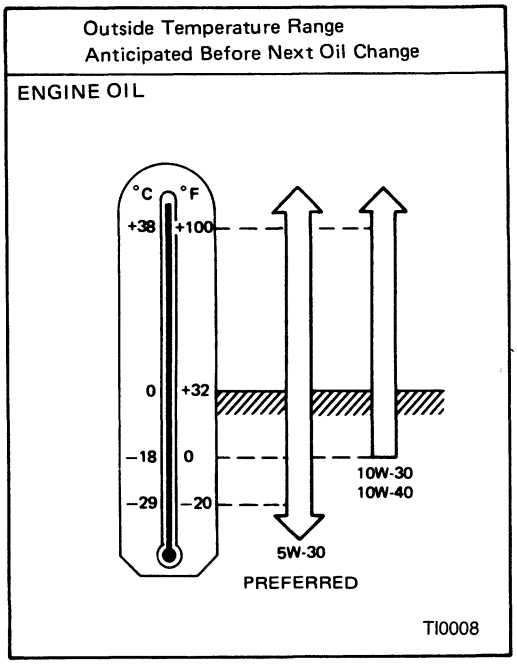
NOTE: (1) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months.
(2) If vehicle is operated under extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high, the filters might become clogged. In such an event, replace them immediately.
(3) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
(4) If valve noise increases, inspect valve clearance.
(5) Inspect the air bag system 10 years after the date of manufacture as noted on the F.M.V.S.S. certification label.
(6) Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

Fluids and Lubricants

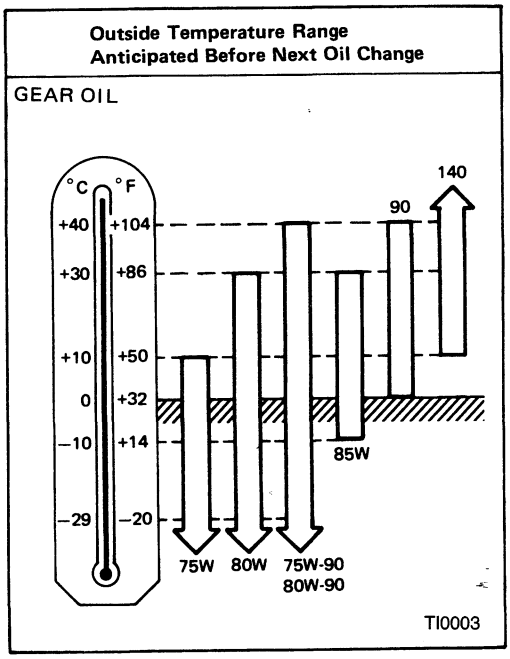
	Capacity (Approximate)			Recommended fluids and lubricants
	US measure	Imp measure	Liter	
Engine oil (Refill)				
With oil filter	4-1/8 qt	3-3/8 qt	3.9	Energy Conserving Oils of API SG*2, *3
Without oil filter	3-3/4 qt	3-1/8 qt	3.5	
Cooling system (Reservoir tank included)	8-1/4 qt	6-7/8 qt	7.8	Anti-freeze coolant (Ethylene glycol base)
Manual transaxle gear oil	10 pt	8-1/4 pt	4.7	API GL-4*2
Automatic transaxle fluid	10 qt	8-1/4 qt	9.4	Genuine Nissan ATF*1 or equivalent type DEXRON II E™
Power steering fluid	1 qt	3/4 qt	0.9	Type DEXRON II™ or equivalent
Brake & Clutch fluid	—	—	—	Genuine Nissan Brake Fluid*1 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease	—	—	—	NLGI No. 2 (Lithium soap base)

*1: Available in mainland USA through your Nissan dealer.
*2: For further details, see "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

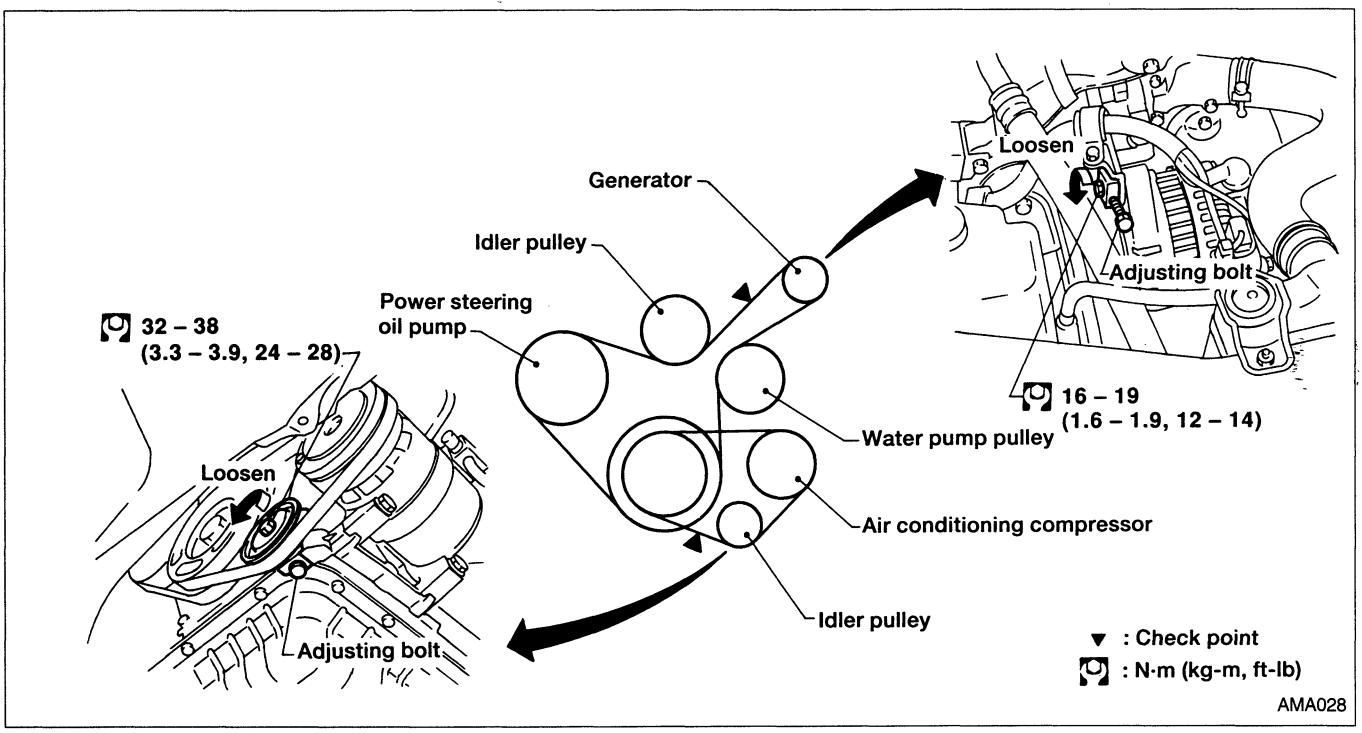


5W-30 is preferable for all ambient temperatures. 20W-40 and 20W-50 are usable for ambient temperatures above 10°C (50°F) for all seasons.



80W-90 is preferable for ambient temperatures below 40°C (104°F).

Checking Drive Belts



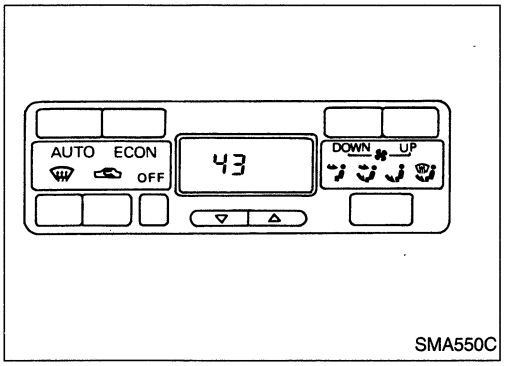
1. Inspect for cracks, fraying, wear or oil adhesion. If necessary, replace with a new one.
2. Inspect drive belt deflections by pushing on the belt midway between pulleys.

Adjust if belt deflections exceed the limit.

Belt deflection:
Inspect drive belt deflections when engine is cold.

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Generator & Power steering oil pump	8 (0.31)	6 - 7 (0.24 - 0.28)	5 - 6 (0.20 - 0.24)
Air conditioning compressor	10 (0.39)	7 - 8 (0.28 - 0.31)	6 - 7 (0.24 - 0.28)
Applied pushing force	98 N (10 kg, 22 lb)		



SMA550C

Changing Engine Coolant

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

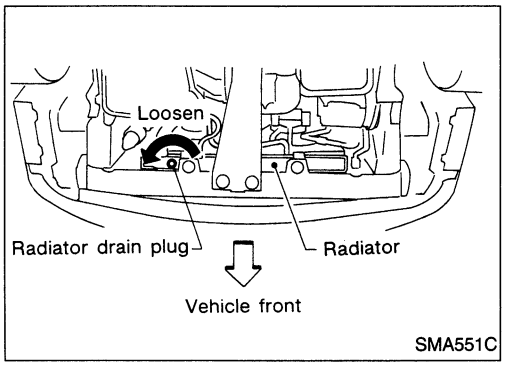
AUTOMATIC AIR CONDITIONING

1. Perform self-diagnosis step 4 of Automatic Air Conditioning system, referring to the following notes. Refer to HA section ("Self-diagnosis", "TROUBLE DIAGNOSES — Auto Air Conditioning").

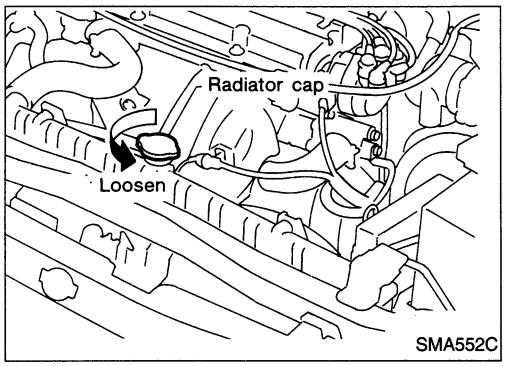
1) Turn ignition switch from "OFF" to "ON".
2) Within 10 seconds after ignition switch is turned "ON", press OFF switch and hold in for at least 5 seconds.
3) Press ▲ (HOT) switch 3 times.
4) Press ▼ (DEF) switch 2 times.
5) Confirm indication of the A/C display shown at left.
6) Wait 10 seconds before turning ignition switch off.
This step is necessary to allow heater water cock to open wide.

MANUAL AIR CONDITIONING

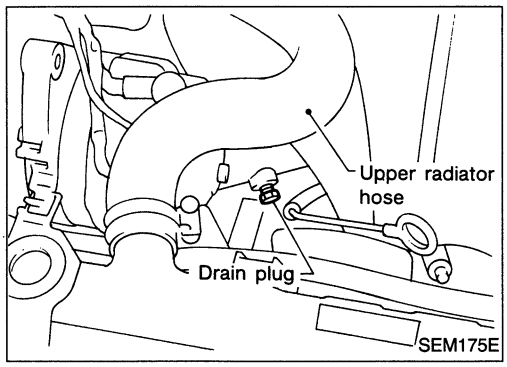
1. Turn ignition switch "ON" and set temperature controller to maximum hot position.
2. Open drain plug at the bottom of radiator, and remove radiator cap.



SMA551C



SMA552C

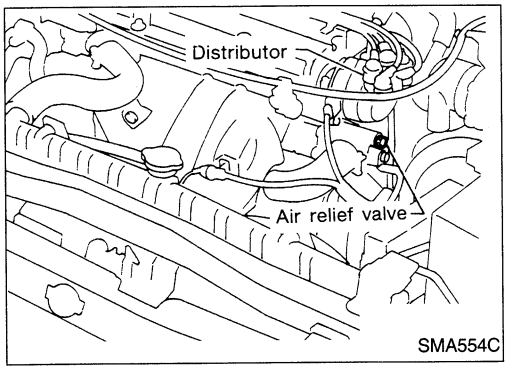


SEM175E

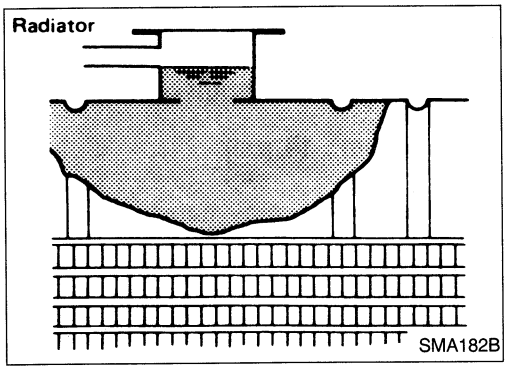
3. Remove drain plug on water pipe.
4. Close radiator drain plug and tighten drain plug on water pipe securely.

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

Changing Engine Coolant (Cont'd)



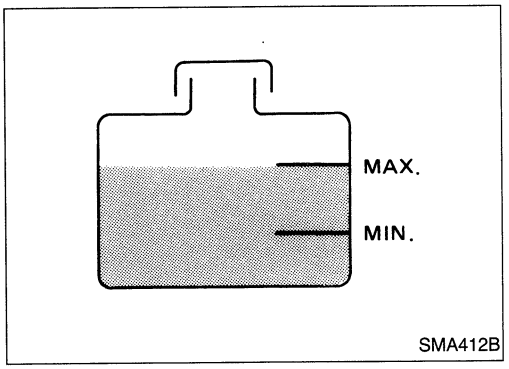
5. Open air relief plug.
6. Fill radiator with water until water spills from the air relief hole, then reinstall air relief plug. fill radiator and reservoir tank with water and reinstall radiator cap.
7. Run engine and warm it up sufficiently.
8. Race engine 2 or 3 times under no-load.
9. Stop engine and wait until it cools down.
10. Drain water.
11. Repeat step 1 through step 10 until clear water begins to drain from radiator.



12. Open radiator cap and air relief plug.
13. Fill radiator with coolant up to specified level following step 1 though step 9.
    Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.
    Engine coolant level (With reservoir tank):
    7.8 ℓ (8-1/4 US qt, 6-7/8 Imp qt)
    Reservoir tank:
    0.7 ℓ (3/4 US qt, 5/8 Imp qt)

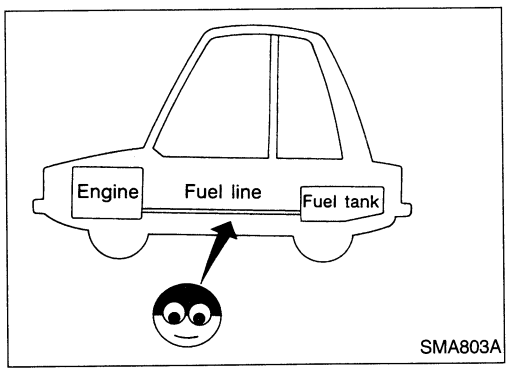
Pour coolant through coolant filler neck slowly to allow air in system to escape.

14. If necessary, add coolant.

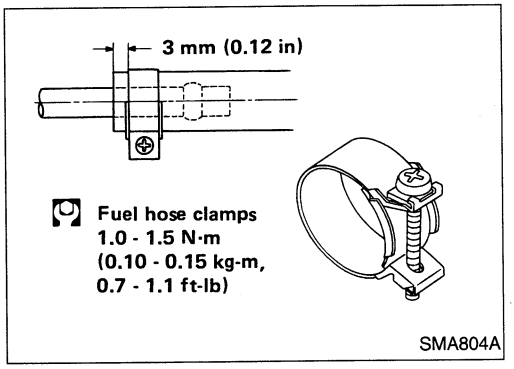


Checking Fuel Lines

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

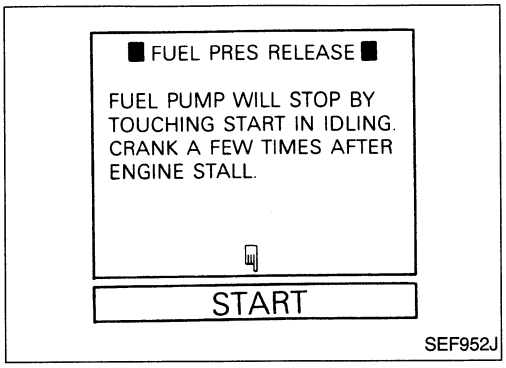


Changing Fuel Filter



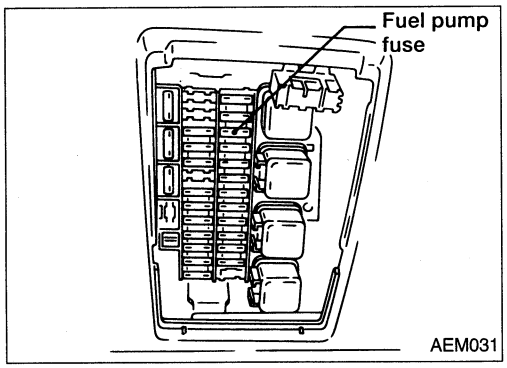
CAUTION:
Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end.
Ensure that screw does not contact adjacent parts.

Changing Fuel Filter (Cont'd)

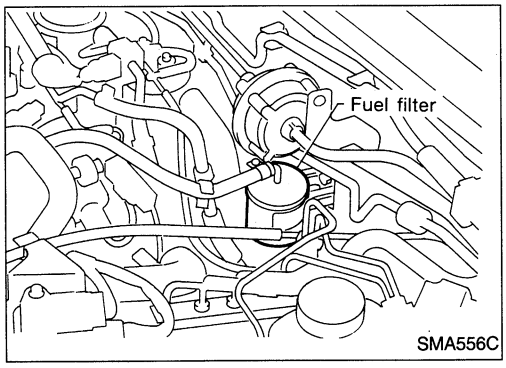


WARNING:
Before removing fuel filter, release fuel pressure from fuel line.

1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode to release fuel pressure to zero.
3. After engine stalls, crank engine two or three times to make sure that fuel pressure is released.
4. Turn ignition switch off.



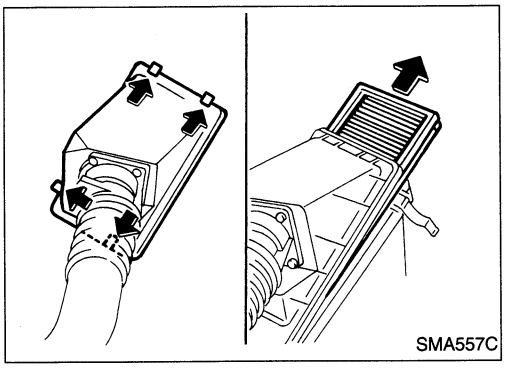
1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank engine two or three times to make sure that fuel pressure is released.
4. Turn ignition switch off and install fuse for fuel pump.



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

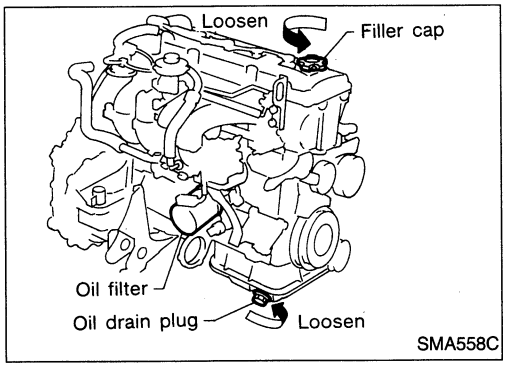
- **Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel.**
- **Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.**
- **When tightening fuel hose clamps, refer to MA-10.**

Changing Air Cleaner Filter



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

Changing Engine Oil



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

1. Warm up engine, and check for oil leakage from engine components.
2. Remove drain plug and oil filler cap.
3. Drain oil and refill with new engine oil.

Oil grade: API SG
Viscosity: See MA-7.

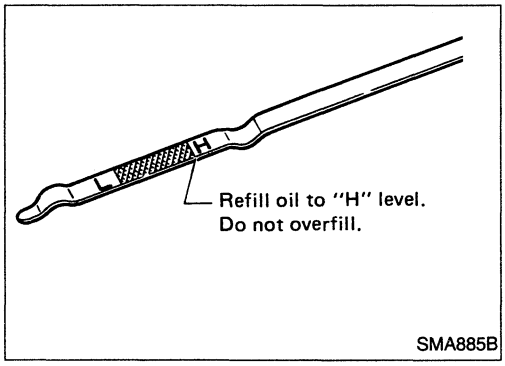
Changing Engine Oil (Cont'd)

Refill oil capacity (Approximately):

With oil filter change	3.9 ℓ (4-1/8 US qt, 3-3/8 Imp qt)
Without oil filter change	3.5 ℓ (3-3/4 US qt, 3-1/8 Imp qt)

CAUTION:

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



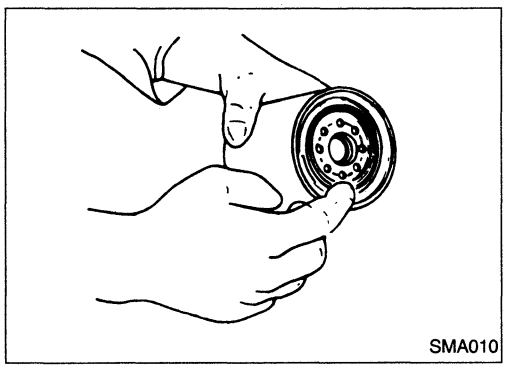
4. Check oil level.
5. Start engine and check area around drain plug and oil filter for oil leakage.
6. Run engine for a few minutes, then turn it off. After several minutes, check oil level.

Changing Oil Filter

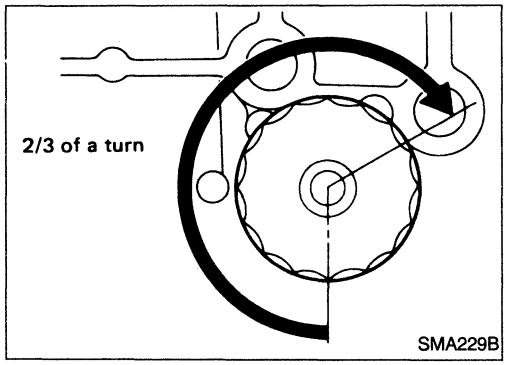
1. Remove oil filter with a suitable tool.

WARNING:

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

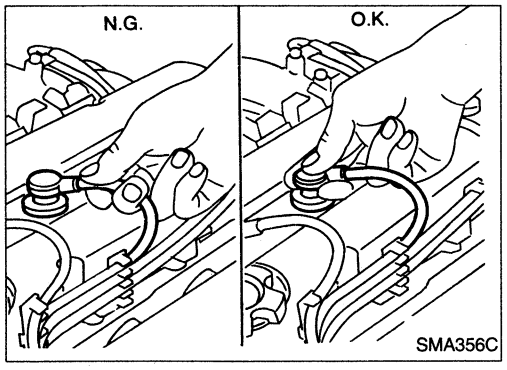


2. Before installing new oil filter, clean the oil filter mounting surface on the cylinder block, and coat the rubber seal of the oil filter with a little engine oil.



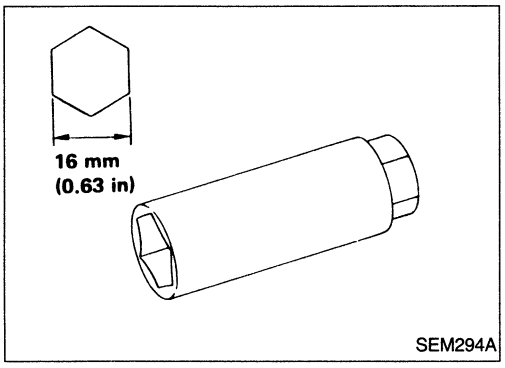
3. Screw in the oil filter until a slight resistance is felt, then tighten additionally more than 2/3 turn.
4. Add engine oil.

Refer to MA-11.

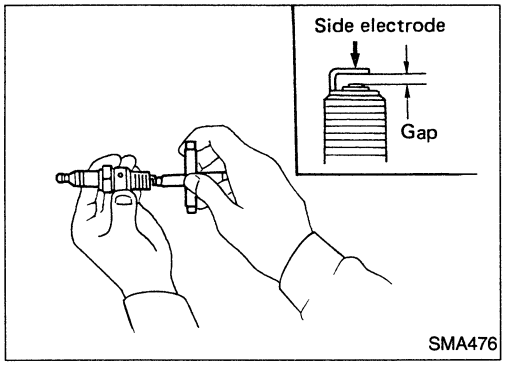


Changing Spark Plugs

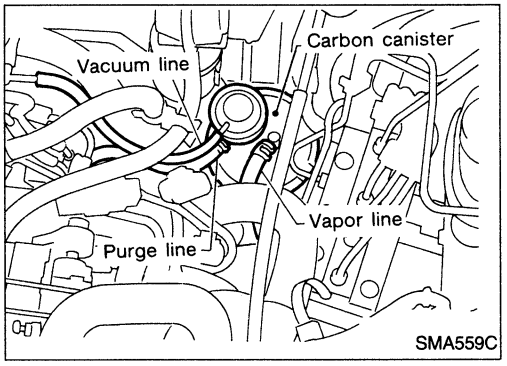
1. Disconnect ignition wires from spark plugs at boot. Do not pull on the wire.



2. Remove spark plugs with spark plug wrench.
   Spark plug:
   Standard type
   BKR5E-11
   Cold type
   BKR6E-11
   BKR7E-11



3. Check plug gap of each new spark plug.
   Gap: 1.0 - 1.1 mm (0.039 - 0.043 in)
4. Install spark plugs. Reconnect ignition wires according to Nos. indicated on them.
   Spark plug:
   ⧉: 20 - 29 N•m
   (2.0 - 3.0 kg-m, 14 - 22 ft-lb)

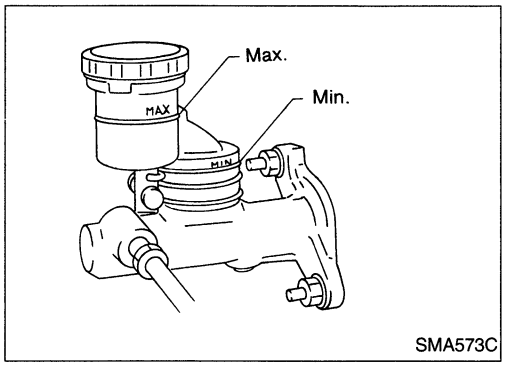


Checking Vapor Lines

1. Visually inspect vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc.
   Refer to EF & EC section ("Inspection", "EVAPORATIVE EMISSION (EVAP) SYSTEM").

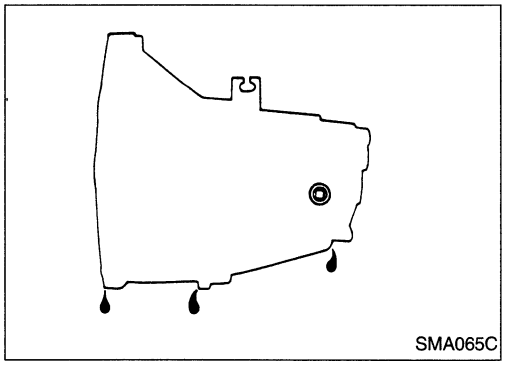
Checking Valve Clearance

If engine runs with unusual mechanical noise, refer to EM section ("Inspection", "CYLINDER HEAD").



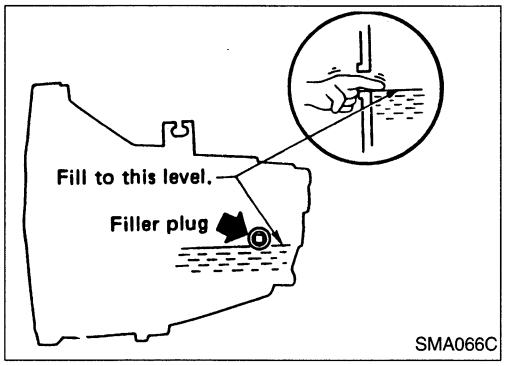
Checking Clutch Fluid Level and Leaks

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



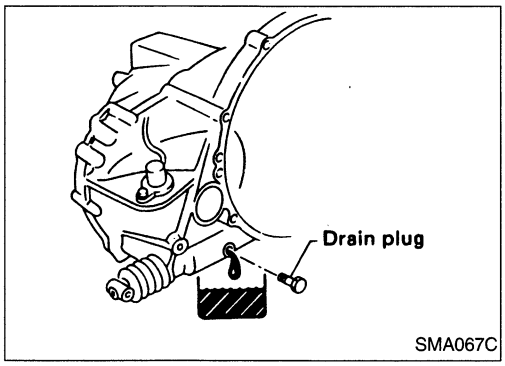
Checking M/T Oil

1. Check for oil leaks.



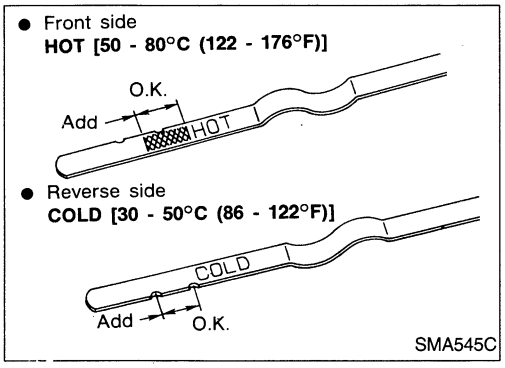
2. Check oil level.

Never start engine while checking oil level.



Changing M/T Oil

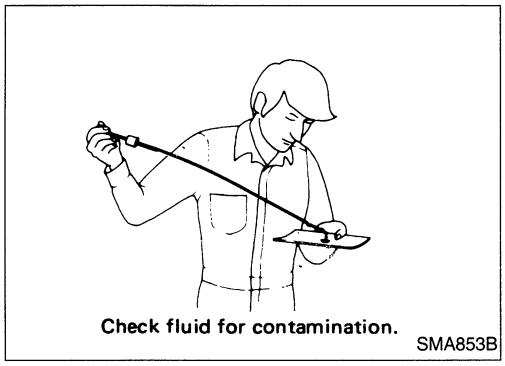
Oil grade: API GL-4
Oil viscosity:
See MA-7.
Oil capacity:
4.7 liters (10 US pt, 8-1/4 Imp pt)



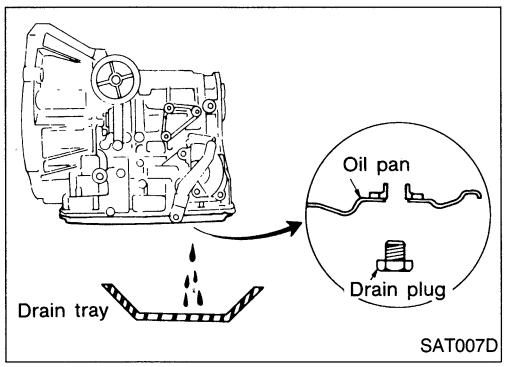
Checking A/T Fluid Level

1. Check for fluid leakage.
2. Check fluid level.
   Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) after vehicle has been driven approximately 5 minutes in urban areas after engine is warmed up. But it can be checked at fluid temperatures of 30 to 50°C (86 to 122°F) using "COLD" range on dipstick for reference after engine is warmed up and before driving. However, fluid level must be rechecked using "HOT" range.
   1) Park vehicle on level surface and set parking brake.
   2) Start engine and then move selector lever through each gear range, ending in "P".
   3) Check fluid level with engine idling.
   4) Remove dipstick and wipe it clean with lint-free paper.
   5) Re-insert dipstick into charging pipe as far as it will go.
   6) Remove dipstick and note reading. If level is at low side of either range, add fluid to the charging pipe.

Do not overfill.

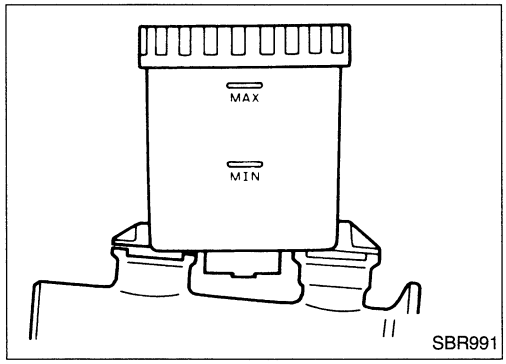


3. Check fluid condition.
   Check fluid for contamination. If fluid is very dark or smells burned, or contains frictional material (clutches, band, etc.), check operation of A/T.
   Refer to AT section for checking operation of A/T.



Changing A/T Fluid

Oil grade:
Genuine Nissan ATF or equivalent DEXRON II E™ type fluid
Oil capacity (With torque converter):
RE4F04A
8.3 liters (8-3/4 US qt, 7-1/4 Imp qt)
RE4F04V
8.5 liters (9 US qt, 7-1/2 Imp qt)

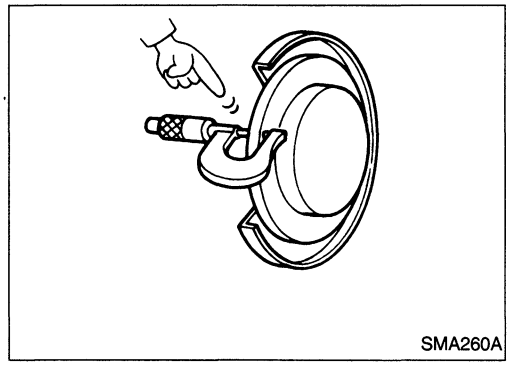


Checking Brake Fluid Level and Leaks

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

Checking Brake Lines and Cables

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


SMA260A

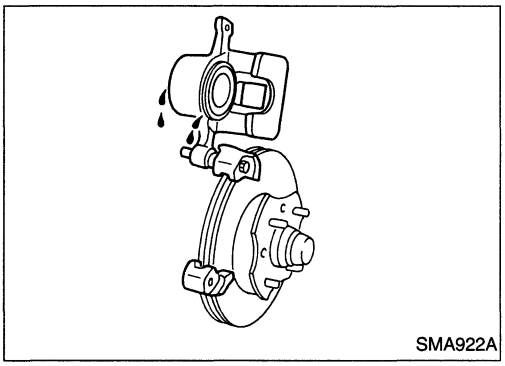
Checking Disc Brake

ROTOR

Check condition and thickness.

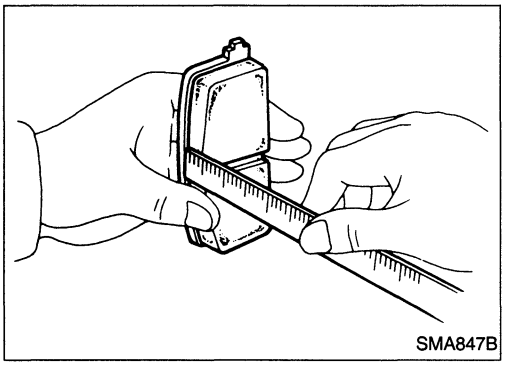
Unit: mm (in)

	CL25VB	CL9HA
Standard	22.0 (0.866)	9.0 (0.354)
Minimum	20.0 (0.787)	8.0 (0.315)


SMA922A

CALIPER

Check operation and for leakage.

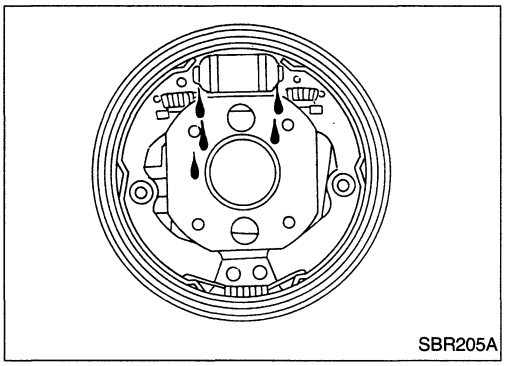

SMA847B

PAD

Check for wear or damage.

Unit: mm (in)

	CL25VB	CL9HA
Standard	11.0 (0.433)	10.0 (0.394)
Minimum	2.0 (0.079)	1.5 (0.059)

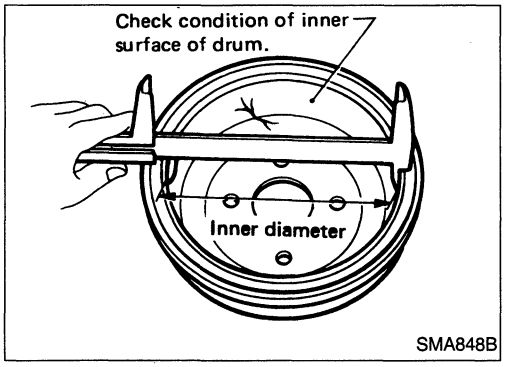

SBR205A

Checking Drum Brake

WHEEL CYLINDER

Check operation and for leakage.

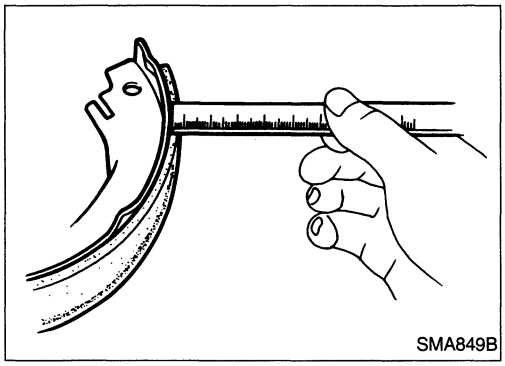
Checking Drum Brake (Cont'd)



DRUM

Check condition of inner surface.

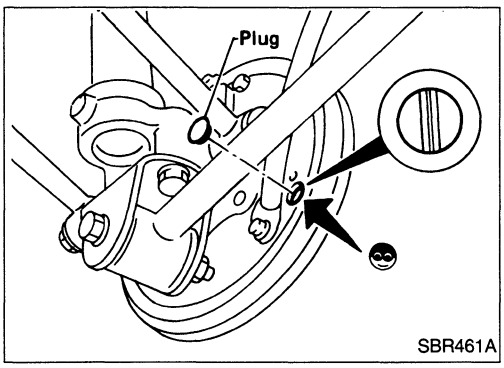
Standard inner diameter:
228.6 mm (9 in)
Maximum diameter:
230.0 mm (9.06 in)



LINING

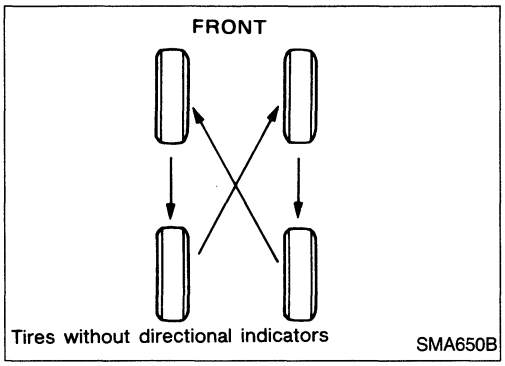
Check for wear or damage.

Standard thickness:
4.1 mm (0.161 in)
Minimum thickness:
1.5 mm (0.059 in)



TEMPORARY METHOD FOR CHECKING LINING WEAR

Remove inspection hole plug and check for lining wear.

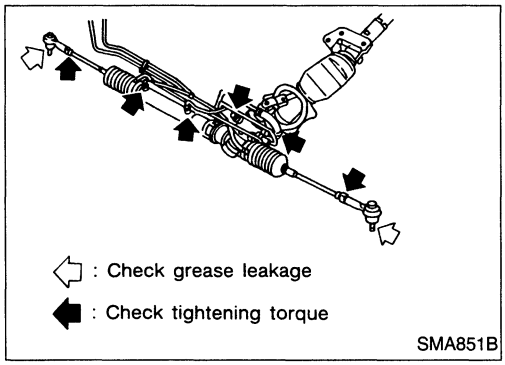


Balancing Wheels

- Adjust wheel balance using road wheel center.
  Wheel balance (Maximum allowable unbalance):
  Refer to MA-21.

Tire Rotation

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



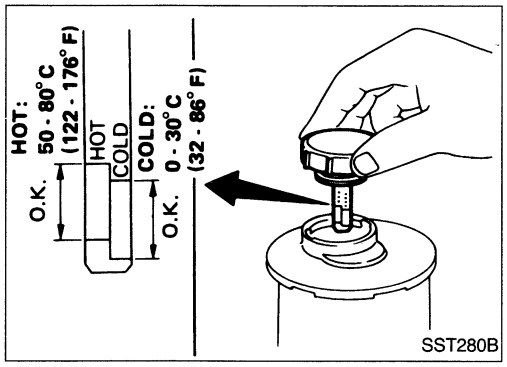
Checking Steering Gear and Linkage

STEERING GEAR

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

STEERING LINKAGE

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



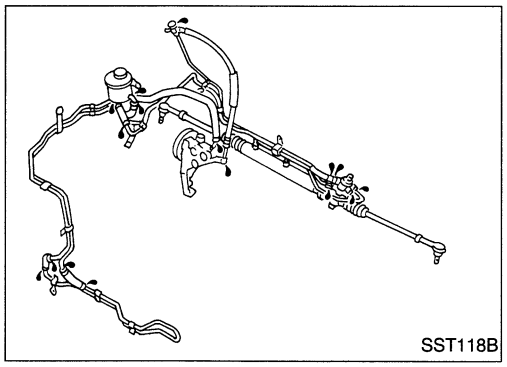
Checking Power Steering Fluid and Lines

Check fluid level.

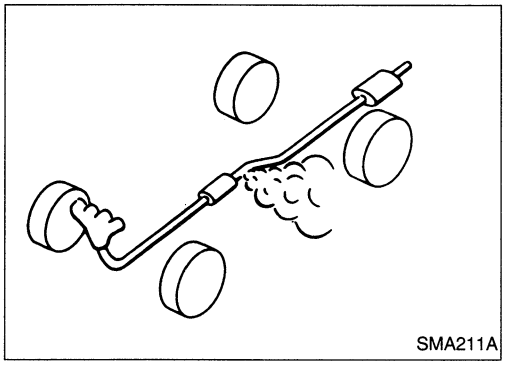
Fluid level should be checked using "HOT" range on dipstick at fluid temperatures of 50 to 80°C (122 to 176°F) or using "COLD" range on dipstick at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION:

- **Do not overfill.**
- **Recommended fluid is type DEXRON II™ or equivalent.**



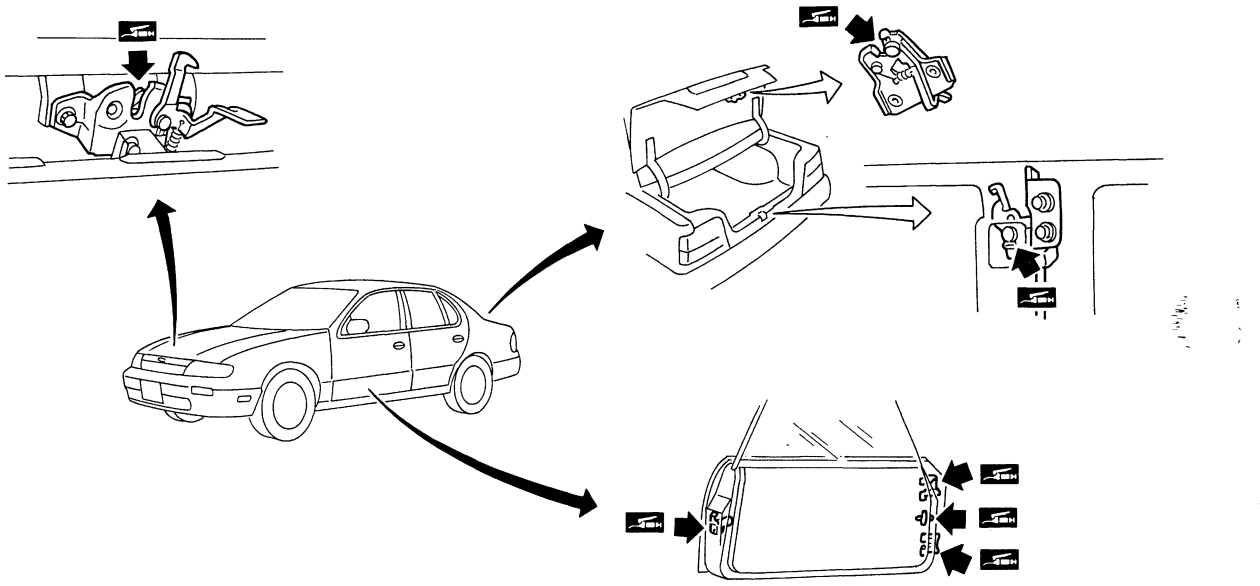
- Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



Checking Exhaust System

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

Lubricating Locks, Hinges and Hood Latches

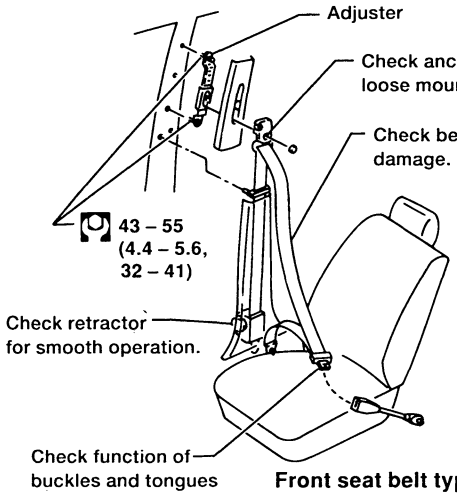


MMA045A

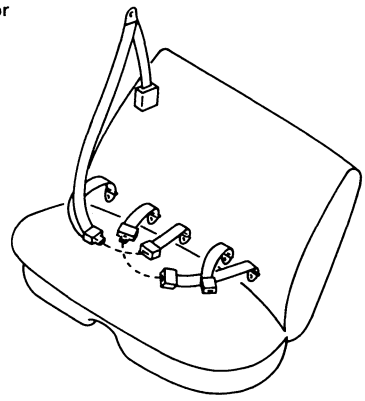
Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

CAUTION:

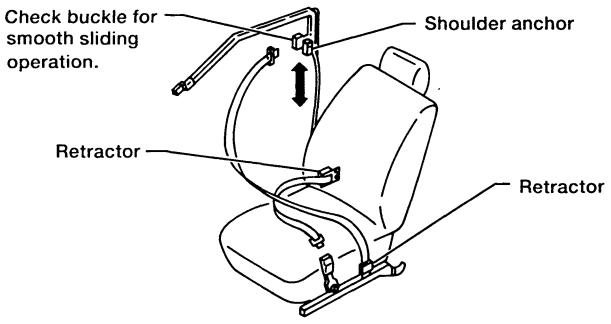
1. **All seat belt assemblies, including retractors and attaching hardwares such as guide rail set, etc., should be inspected after any collision. Nissan recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Seat belt assembiies 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.**



Front seat belt type 1



Rear seat belt



Front seat belt type 2

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

: N•m (kg-m, ft-lb)

AMA030

Engine Maintenance

INSPECTION AND ADJUSTMENT

Drive belt deflection

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Generator & Power steering oil pump	8 (0.31)	6 - 7 (0.24 - 0.28)	5 - 6 (0.20 - 0.24)
Air conditioning compressor	10 (0.39)	7 - 8 (0.28 - 0.31)	6 - 7 (0.24 - 0.28)
Applied pushing force	98 N (10 kg, 22 lb)		

Oil capacity (Refill)

Unit: ℓ (US qt, Imp qt)

With oil filter	3.9 (4-1/8, 3-3/8)
Without oil filter	3.5 (3-3/4, 3-1/8)

Engine coolant level

Unit: ℓ (US qt, Imp qt)

With reservoir tank	7.8 (8-1/4, 6-7/8)
Reservoir tank	0.7 (3/4, 5/8)

Spark plug

Standard type	BKR5E-11
Cold type	BKR6E-11
	BKR7E-11
Plug gap	1.0 - 1.1 mm (0.039 - 0.043 in)

Chassis and Body Maintenance

INSPECTION AND ADJUSTMENT

Clutch

Unit: mm (in)

Pedal free height	163 - 173 (6.42 - 6.81)
Pedal free play	1 - 3 (0.04 - 0.12)

Front axle and front suspension (Unladen)*

Camber	degree	−0°50′ to 0°40′
Caster	degree	1°55′ - 3°25′
Kingpin inclination	degree	13°20′ - 14°50′
Toe-in		
A − B	mm (in)	0 - 2 (0 - 0.08)
Front wheel turning angle		
Full turn Inside/outside	degree	31°30′ - 35°30′/ 25°36′ - 29°36′

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

Rear axle and rear suspension (Unladen)*

Camber	degree	−2°00′ to −0°30′
Toe-in		
A − B	mm (in)	1 to 3 (0.04 to 0.12)

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

Brake

Disc brake mm (in)	
Pad	
Standard thickness	
CL25VB	11.0 (0.433)
CL9HA	10.0 (0.394)
Minimum thickness	
CL25VB	2.0 (0.079)
CL9HA	1.5 (0.059)
Rotor	
Standard thickness	
CL25VB	22.0 (0.866)
CL9HA	9.0 (0.354)
Minimum thickness	
CL25VB	20.0 (0.787)
CL9HA	8.0 (0.315)

Drum brake	mm (in)	
Lining		
Standard thickness		4.1 (0.161)
Minimum thickness		1.5 (0.059)
Drum		
Standard diameter		228.6 (9)
Maximum diameter		230.0 (9.06)

Wheel balance

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

Wheel bearing

	Front	Rear
Wheel bearing axle end play mm (in)	0.05 (0.0020) or less	
Wheel bearing lock nut Tightening torque N•m (kg-m, ft-lb)	235 - 314 (24 - 32, 174 - 231)	186 - 255 (19 - 26, 137 - 188)

TIGHTENING TORQUE

Unit	N•m	kg-m	ft-lb
Clutch			
Pedal stopper lock nut	16 - 22	1.6 - 2.2	12 - 16
Clutch switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Manual transaxle			
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	20 - 29	2.0 - 3.0	14 - 22
Automatic transaxle			
Drain plug	29 - 39	3.0 - 4.0	22 - 29
Front axle and front suspension			
Tie-rod lock nut	78 - 98	8.0 - 10.0	58 - 72
Rear axle and rear suspension			
Toe adjusting lock nut	78 - 98	8.0 - 10.0	58 - 72
Brake system			
Air bleed valve	7 - 9	0.7 - 0.9	5.1 - 6.5
Wheel and tire			
Wheel nut	98 - 118	10 - 12	72 - 87

SECTION EM

CONTENTS

CONTENTS (Cont'd.)

Precautions for Supplemental Restraint System "AIR BAG"

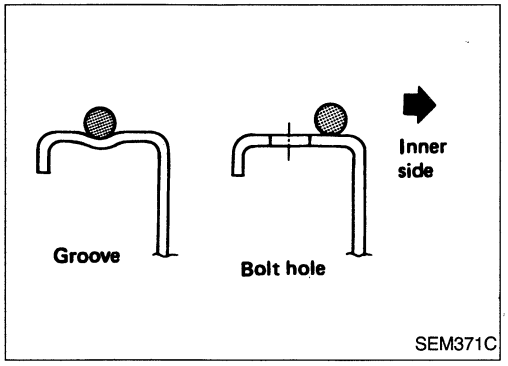
The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a control module, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

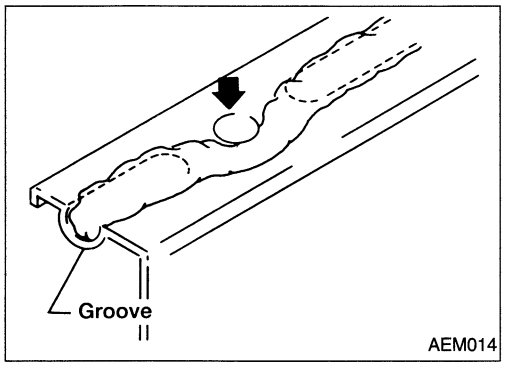
WARNING:

- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

Parts Requiring Angular Tightening

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





Liquid Gasket Application Procedure

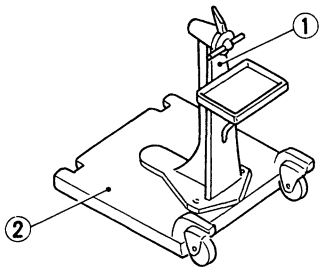
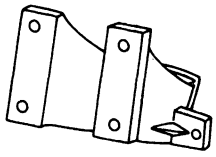
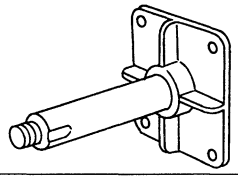
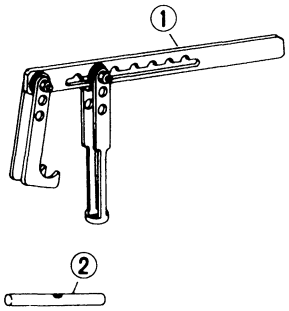
a. Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves, and then completely clean any oil stains from these portions.

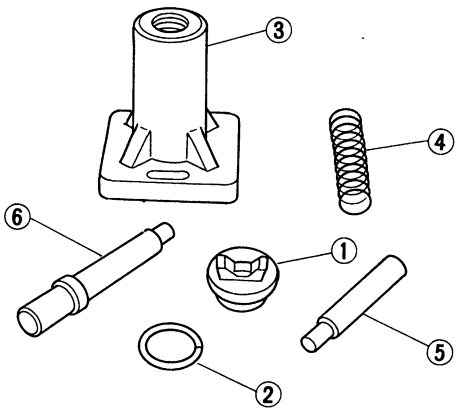
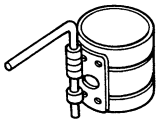
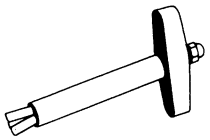
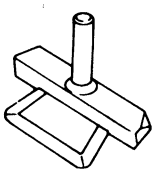
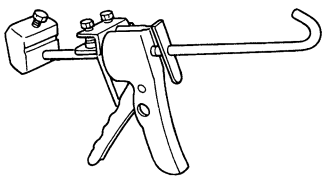
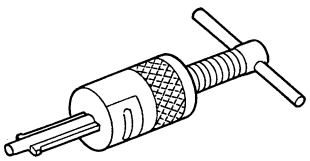
b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
   - Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide (for oil pan).
   - Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).

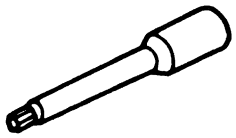
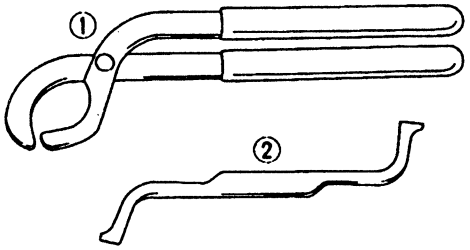
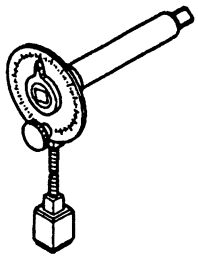
c. Apply liquid gasket to inner surface around hole perimeter area.
   (Assembly should be done within 5 minutes after coating.)

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

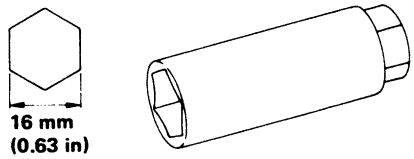
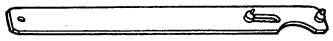
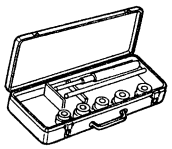
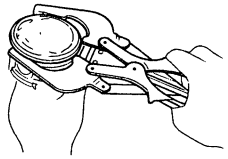
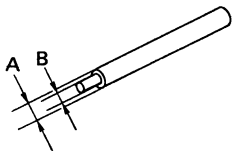
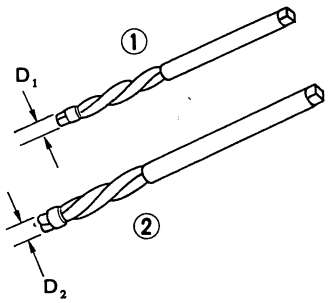
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
ST0501S000 (—) Engine stand assembly ① ST05011000 (—) Engine stand ② ST05012000 (—) Base		Disassembling and assembling
KV10114300 (—) Engine sub-attachment		
KV101065001 (—) Engine stand shaft		
KV101092S0 (—) Valve spring compressor ① KV10109210 (—) Compressor ② KV10109220 (—) Adapter		Disassembling and assembling valve components
KV10116300 (J-38955) Valve oil seal drift		Installing valve oil seal

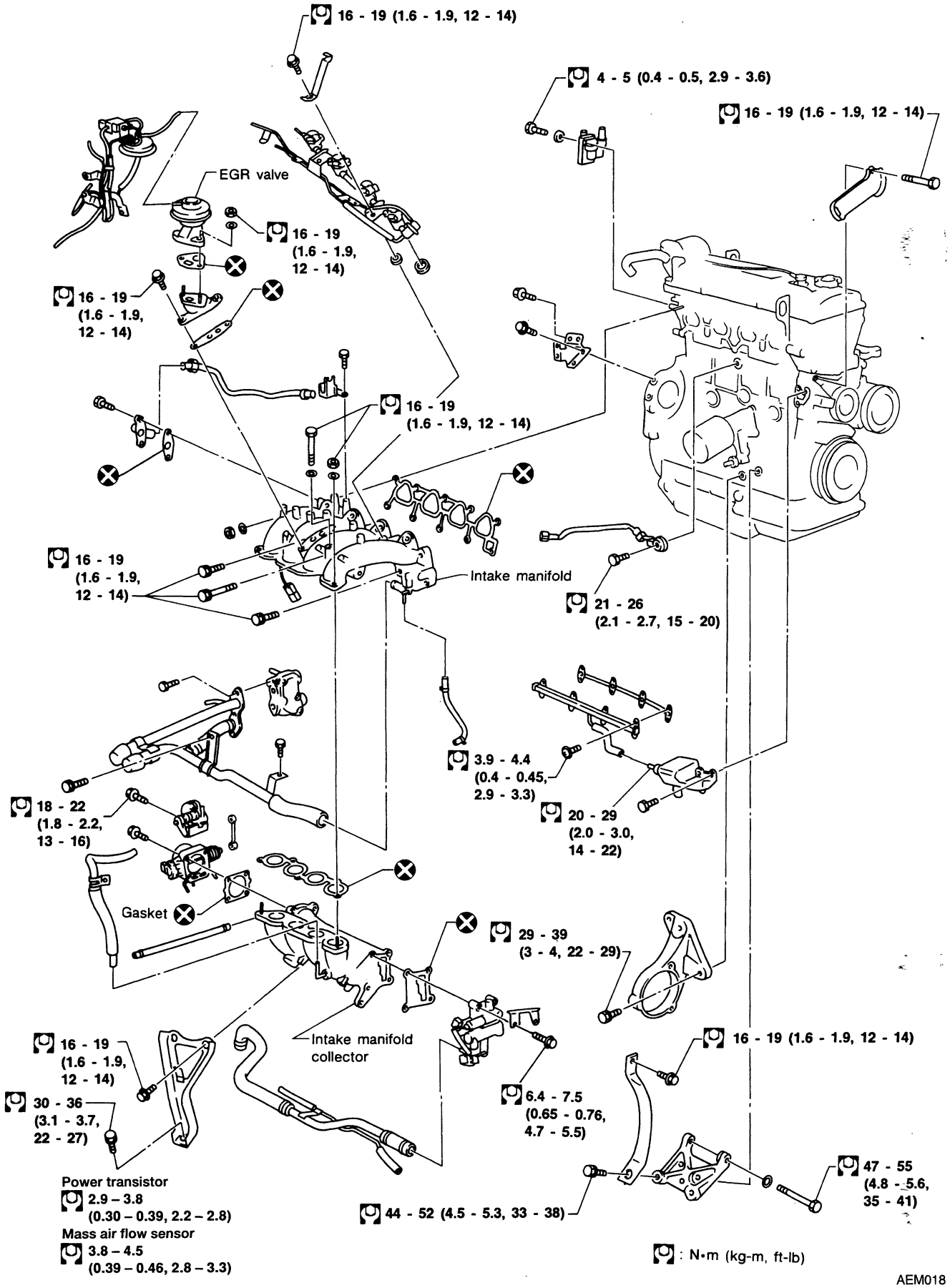
Tool number (Kent-Moore No.) Tool name	Description	
KV10110300 (—) Piston pin press stand assembly ① KV10110310 (—) Cap ② KV10110330 (—) Spacer ③ ST13030020 (—) Press stand ④ ST13030030 (—) Spring ⑤ KV10110340 (—) Drift ⑥ KV10110320 (—) Center shaft		Disassembling and assembling piston with connecting rod
EM03470000 (J8037) Piston ring compressor		Installing piston assembly into cylinder bore
(J36467) Valve oil seal remover		Displacement valve oil seal
KV10111100 (J37228) Seal cutter		Removing oil pan
WS39930000 (—) Tube presser		Pressing the tube of liquid gasket
ST16610001 (J23907) Pilot bushing puller		

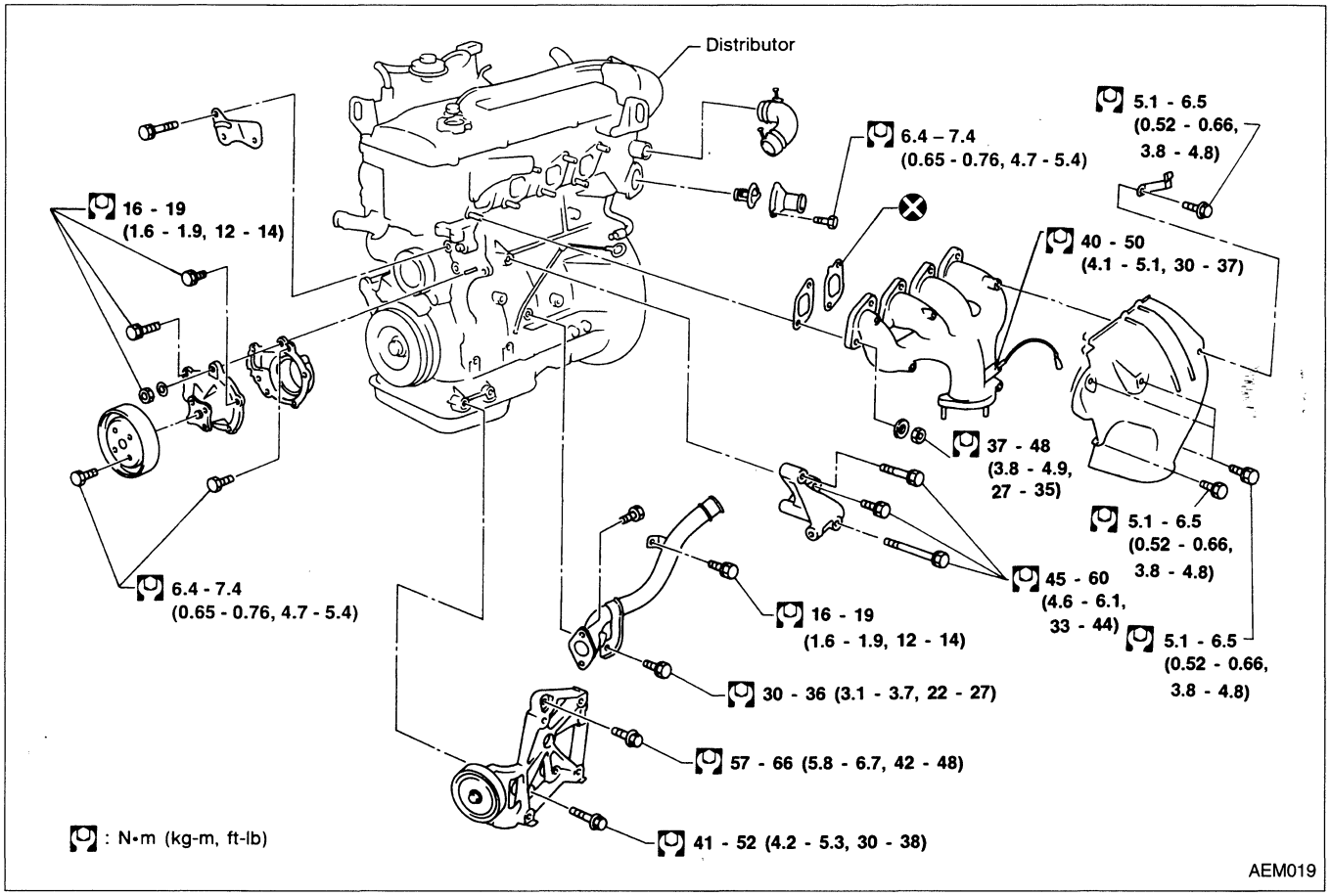
Tool number (Kent-Moore No.) Tool name	Description	
ST10120000 (J-24239-01) Cylinder head bolt wrench		Loosening and tightening cylinder head bolt
KV101151S0 Lifter stopper set ① KV10115110 Camshaft pliers ② KV10115120 Lifter stopper		Changing shims
KV10112100 Angle wrench		Tightening bolts for bearing cap, cylinder head, etc.

COMMERCIAL SERVICE TOOLS

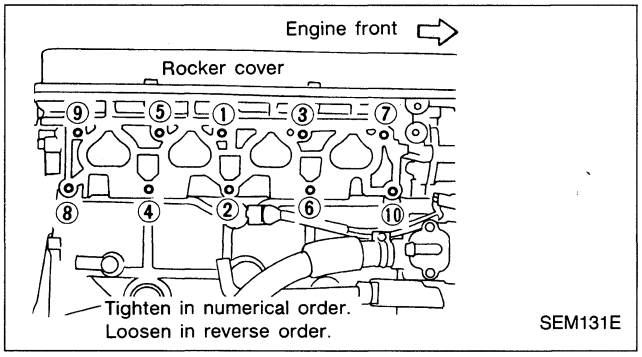
Tool name	Description	
Spark plug wrench		Removing and installing spark plug
Pulley holder		Holding camshaft pulley while tightening or loosening camshaft bolt
Valve seat cutter set		Finishing valve seat dimensions
Piston ring expander		Removing and installing piston ring
Valve guide drift		Removing and installing valve guide **Diameter:** mm (in) Intake & Exhaust: A 10.5 (0.413), B 6.6 (0.260)
Valve guide reamer		Reaming valve guide (①) or hole for oversize valve guide (②) **Diameter:** mm (in) Intake & Exhaust: D_1 7 (0.28), D_2 11.175 (0.4400)

OUTER COMPONENT PARTS

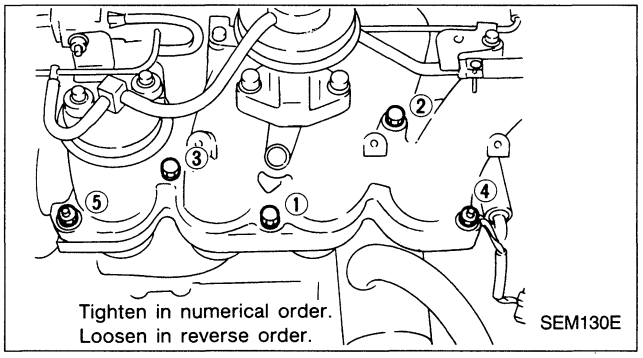




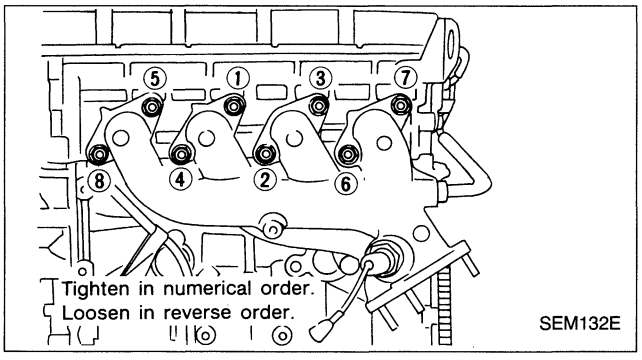
Intake manifold tightening procedure



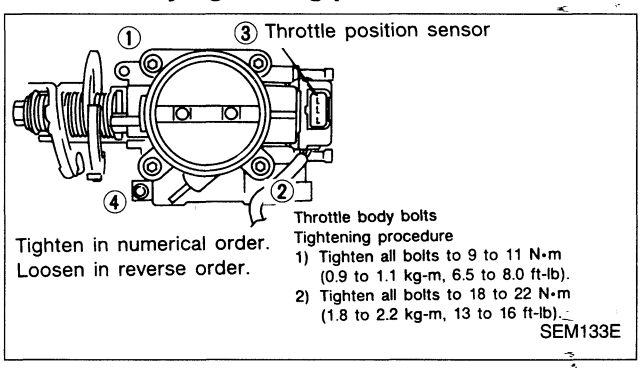
Intake manifold collector tightening procedure

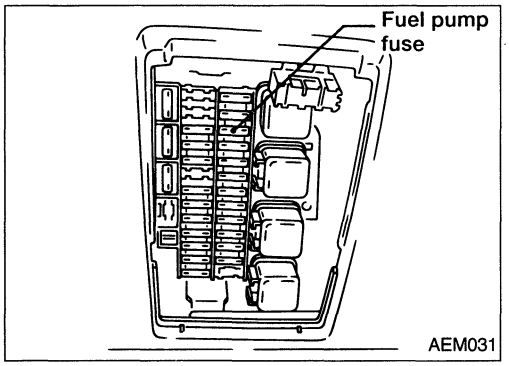


Exhaust manifold tightening procedure



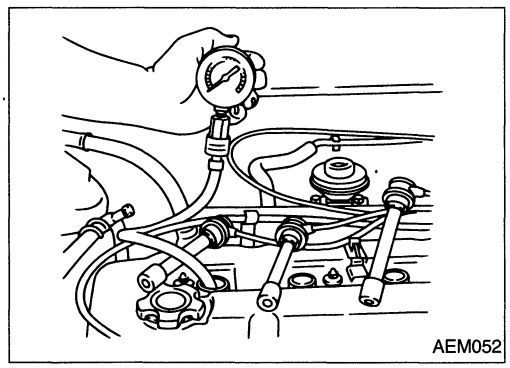
Throttle body tightening procedure





Measurement of Compression Pressure

1. Warm up engine.
2. Turn ignition switch off.
3. Release fuel pressure.
   Refer to EF & EC section ("Releasing Fuel Pressure", "MULTIPORT FUEL INJECTION SYSTEM INSPECTION").
4. Remove all spark plugs.
5. Disconnect distributor center cable.



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

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

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

Standard

1,226 (12.5, 178)/300

Minimum

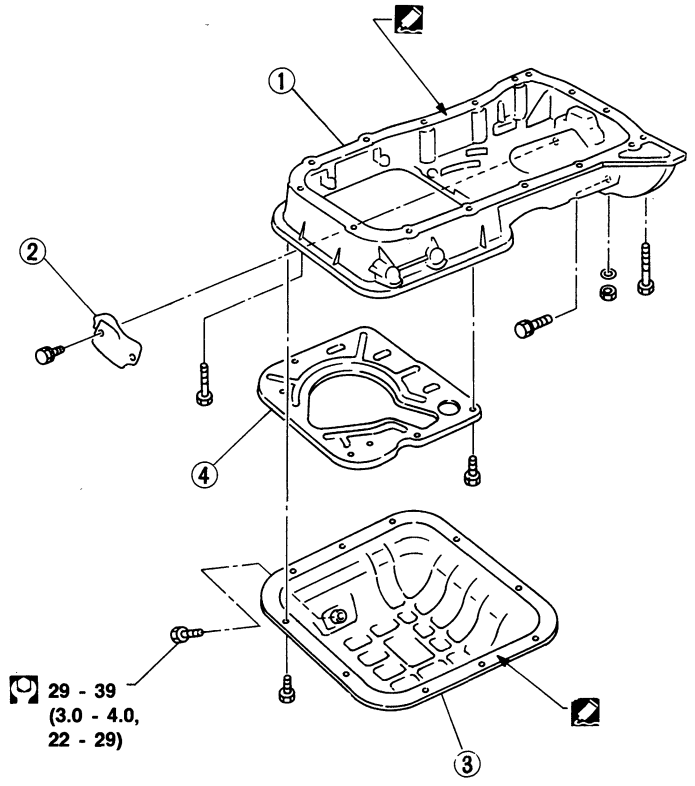
1,030 (10.5, 149)/300

Difference limit between cylinders

98 (1.0, 14)/300

10. If cylinder compression 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. If so, replace piston rings after checking piston.**
- **If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to SDS) If valve or valve seat is damaged excessively, replace them.**
- **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.**



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

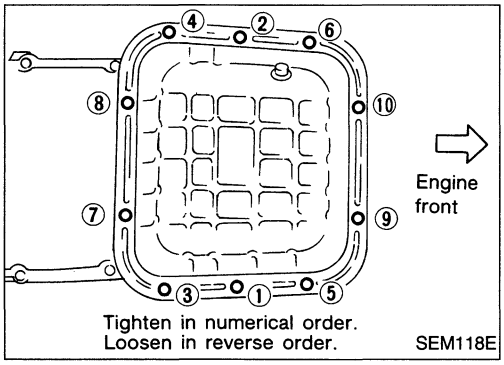
M6: 6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
M8.M10: 16 - 19 (1.6 - 1.9, 12 - 14)

① Aluminum oil pan
② Rear cover plate
③ Steel oil pan
④ Baffle plate

SEM117E

Removal

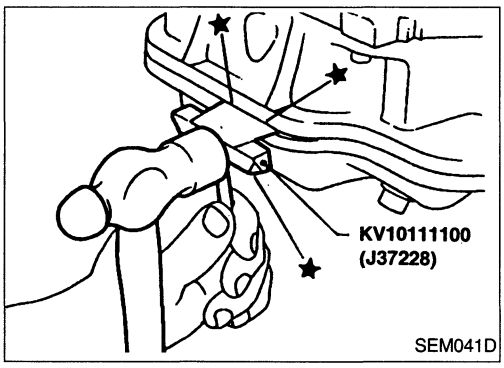
1. Remove engine under cover.
2. Drain engine oil.



Tighten in numerical order.
Loosen in reverse order.

SEM118E

3. Remove steel oil pan bolts.

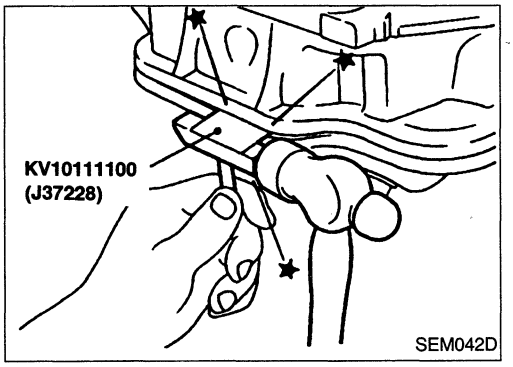


SEM041D

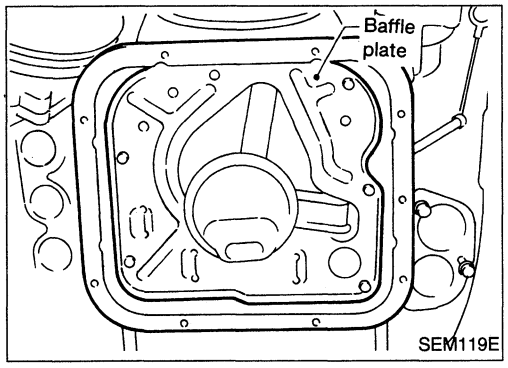
4. Remove steel oil pan.
(1) Insert Tool between aluminum oil pan and steel oil pan.

- **Be careful not to damage aluminum mating surface.**
- **Do not insert screwdriver, or oil pan flange will be deformed.**

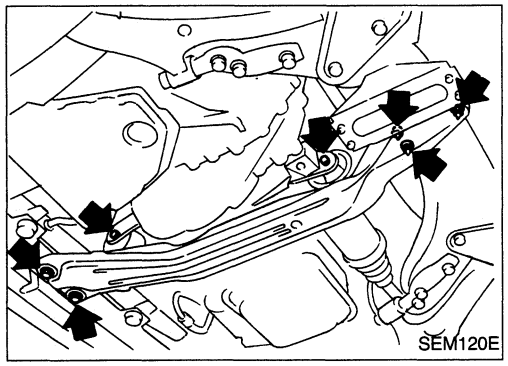
Removal (Cont'd)



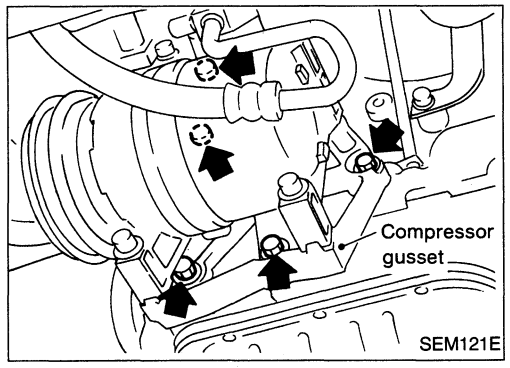
(2) Slide Tool by tapping on the side of the Tool with a hammer.



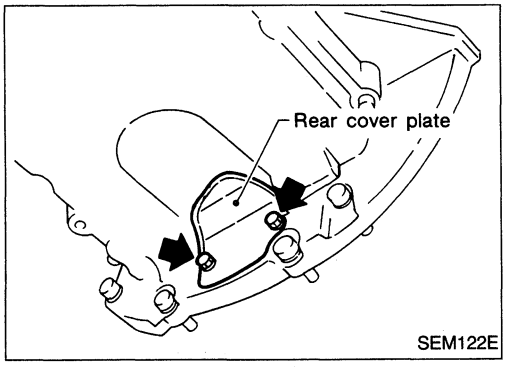
(3) Remove steel oil pan.
5. Remove baffle plate.
6. Remove oil strainer.



7. Remove front tube.
8. Set a suitable transmission jack under transaxle and hoist engine with engine slinger.
9. Remove center member.

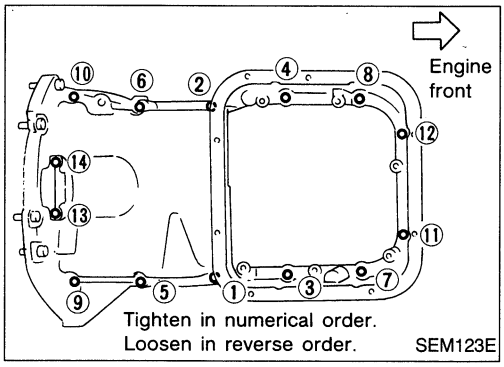


10. Remove compressor gussets.

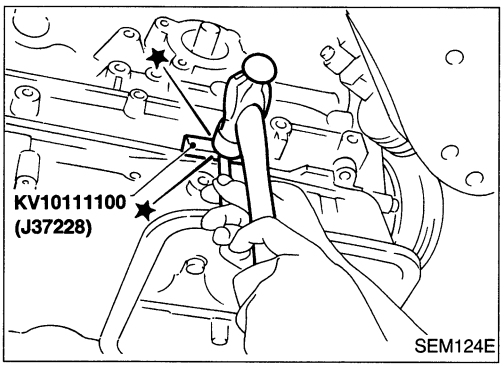


11. Remove rear cover plate.

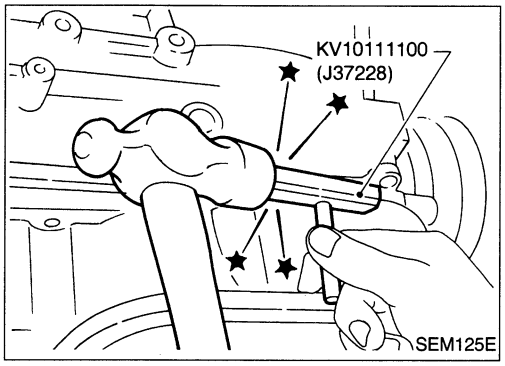
Removal (Cont'd)



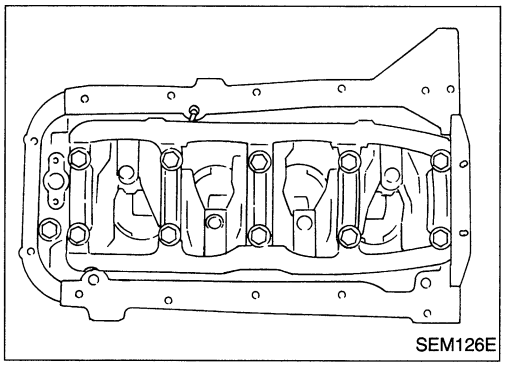
12. Remove aluminum oil pan nuts and bolts.



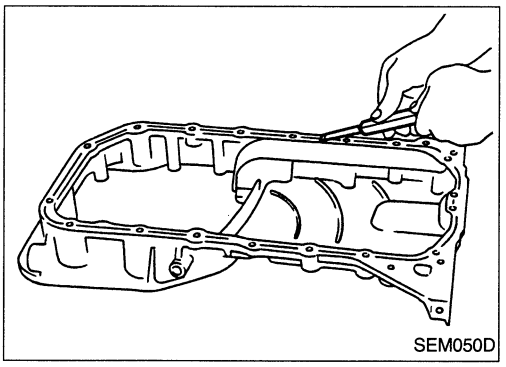
13. Remove aluminum oil pan.
(1) Insert Tool between cylinder block and aluminum oil pan.
- **Be careful not to damage aluminum mating surface.**
- **Do not insert screwdriver, or oil pan flange will be deformed.**



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



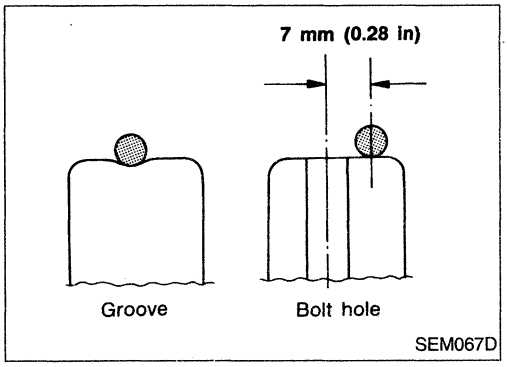
(3) Remove aluminum oil pan.



Installation

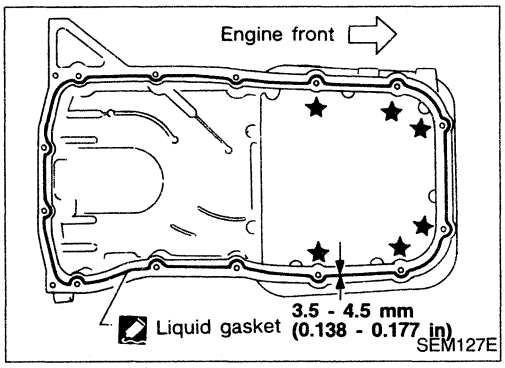
1. Install aluminum oil pan.
(1) Before installing aluminum oil pan, remove all traces of liquid gasket from mating surfaces using a scraper.
- Also remove traces of liquid gasket from mating surfaces of cylinder block, front cover and steel oil pan.

Installation (Cont'd)

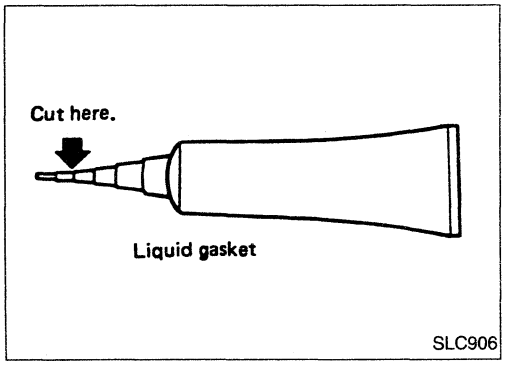


(2) Apply a continuous bead of liquid gasket to mating surface of aluminum oil pan.

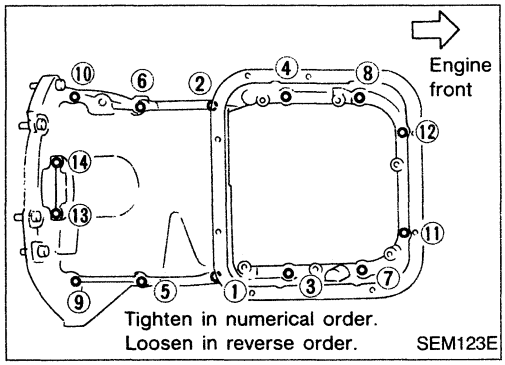
- **Use Genuine Liquid Gasket or equivalent.**



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

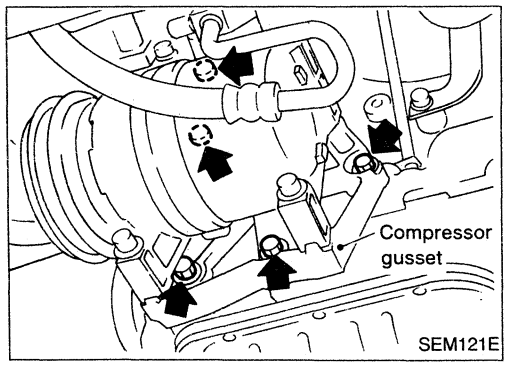


- **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide.**
- **Attaching should be done within 5 minutes after coating.**



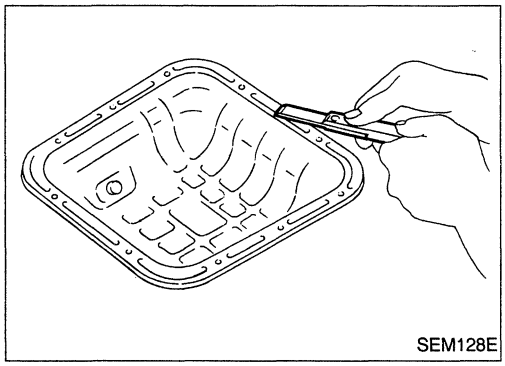
(3) Install aluminum oil pan.

- Install bolts in the reverse order of removal.

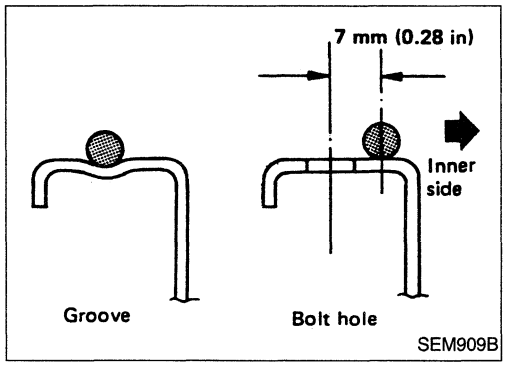


2. Install compressor gussets.
3. Install center member.
4. Install front tube.
   Install oil strainer baffle plate.

Installation (Cont'd)

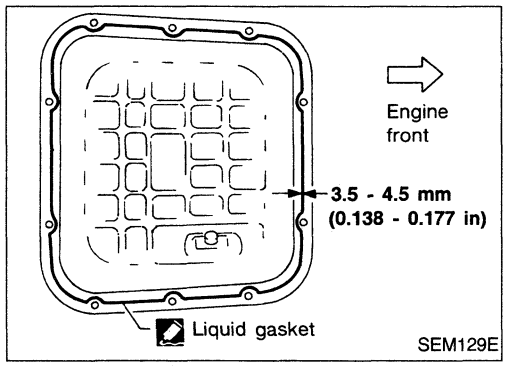

SEM128E

5. Install steel oil pan.
(1) Before installing steel oil pan, remove all traces of liquid gasket from mating surfaces using a scraper.
- Also remove traces of liquid gasket from mating surface of aluminum oil pan.



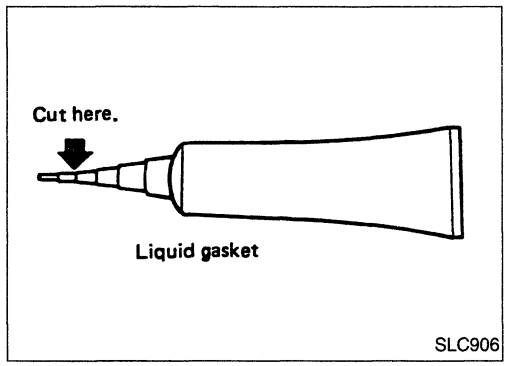
SEM909B

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

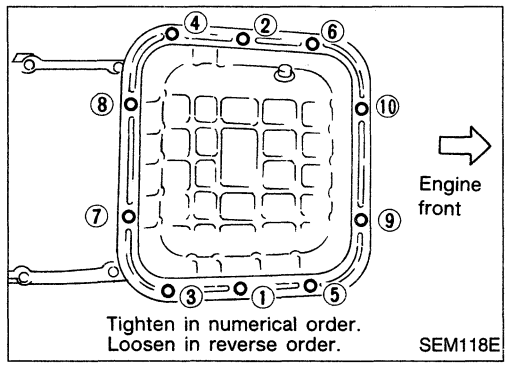


SEM129E

- **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide.**
- **Attaching should be done within 5 minutes after coating.**

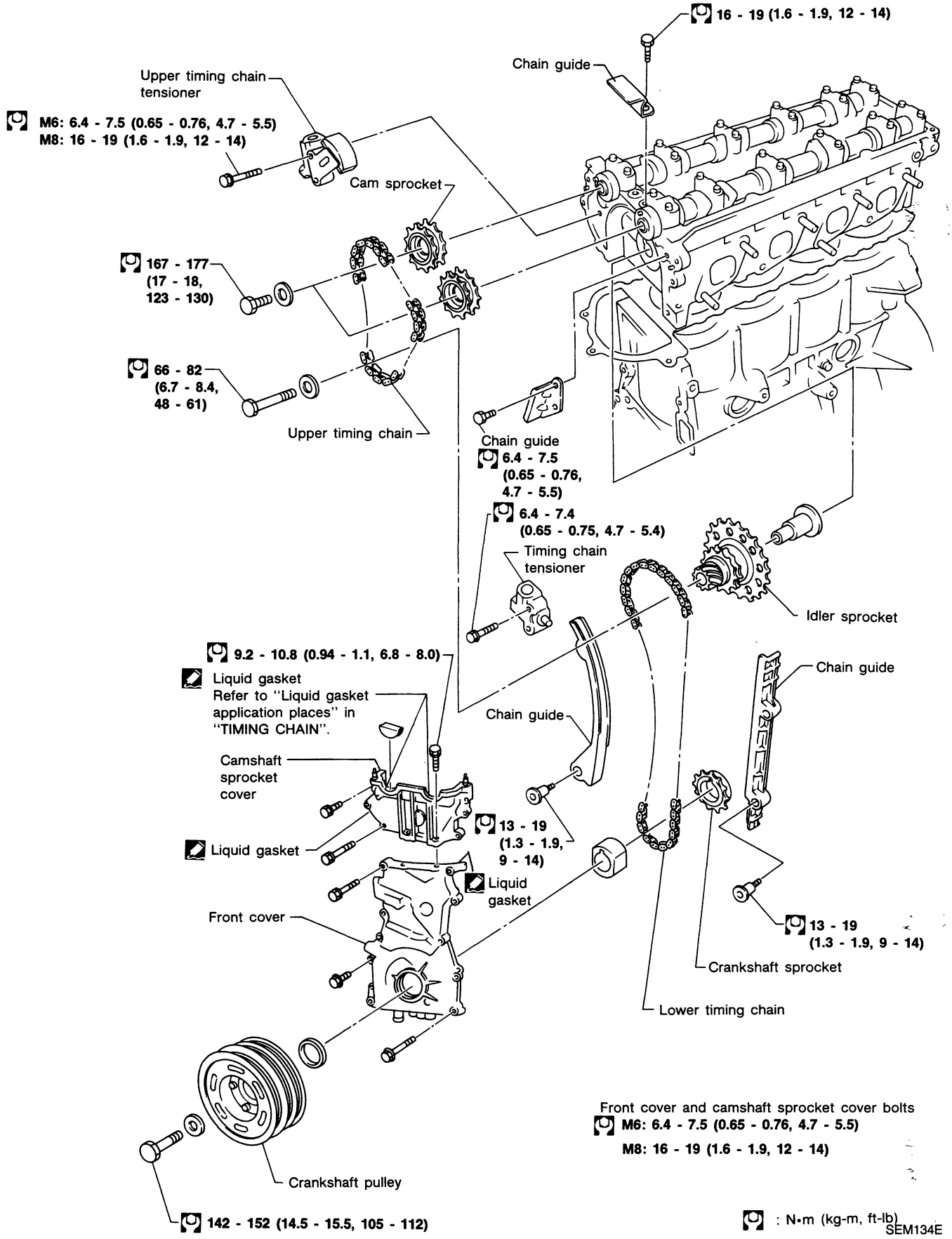


SLC906

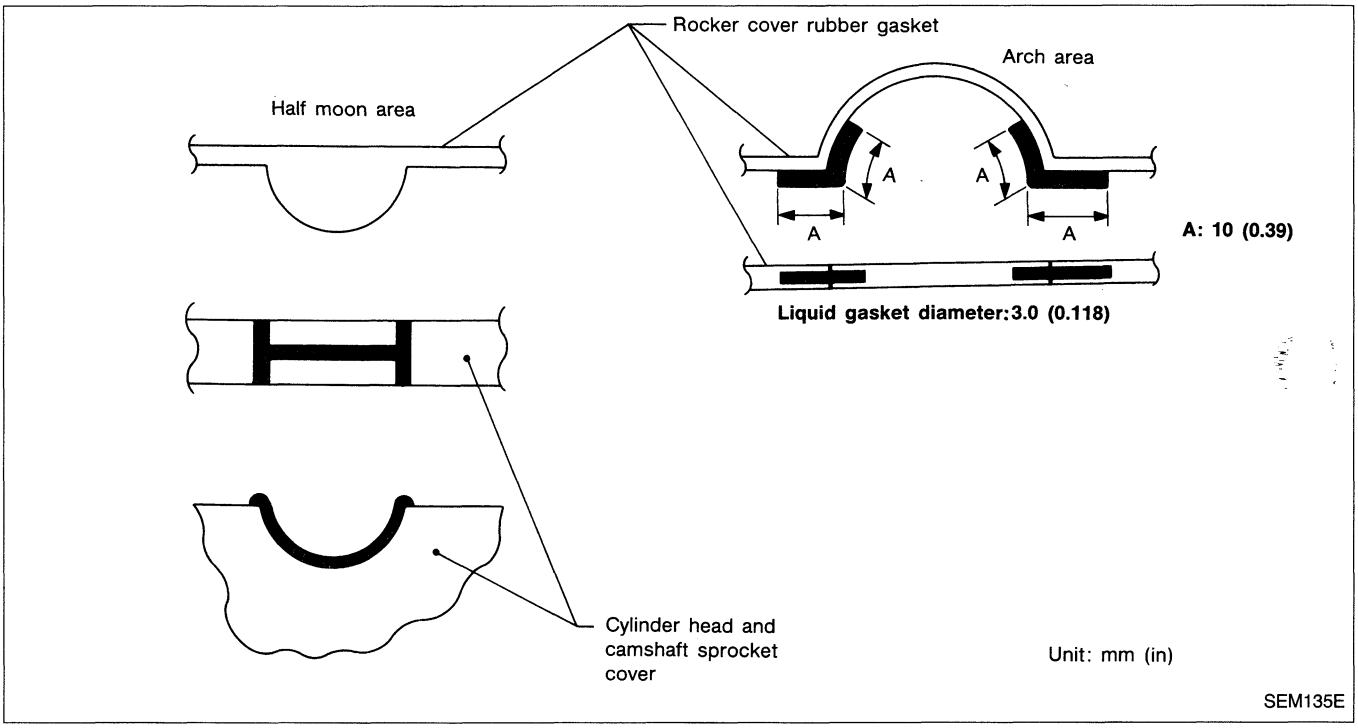


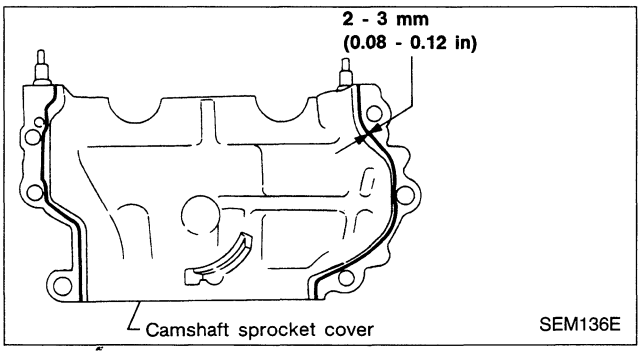
SEM118E

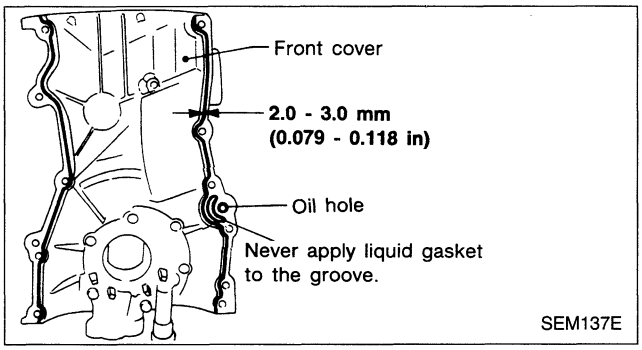
(3) Install steel oil pan.
- Install bolts in the reverse order of removal together with oxygen sensor harness bracket.
- Wait at least 30 minutes before refilling engine oil.

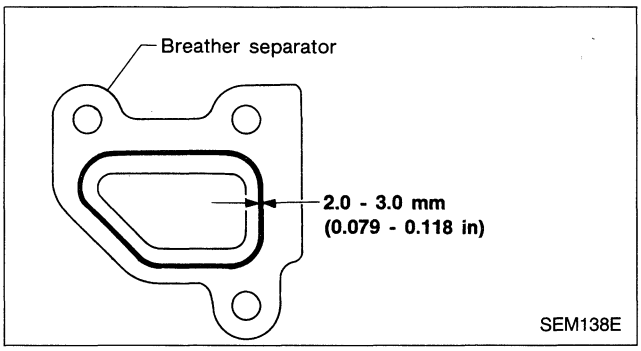

16 - 19 (1.6 - 1.9, 12 - 14)
Chain guide
Upper timing chain tensioner
M6: 6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
M8: 16 - 19 (1.6 - 1.9, 12 - 14)
Cam sprocket
167 - 177 (17 - 18, 123 - 130)
66 - 82 (6.7 - 8.4, 48 - 61)
Upper timing chain
Chain guide
6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
6.4 - 7.4 (0.65 - 0.75, 4.7 - 5.4)
Timing chain tensioner
Idler sprocket
9.2 - 10.8 (0.94 - 1.1, 6.8 - 8.0)
Liquid gasket
Refer to "Liquid gasket application places" in "TIMING CHAIN".
Chain guide
Chain guide
Camshaft sprocket cover
13 - 19 (1.3 - 1.9, 9 - 14)
Liquid gasket
Liquid gasket
Front cover
13 - 19 (1.3 - 1.9, 9 - 14)
Crankshaft sprocket
Lower timing chain
Front cover and camshaft sprocket cover bolts
M6: 6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
M8: 16 - 19 (1.6 - 1.9, 12 - 14)
Crankshaft pulley
142 - 152 (14.5 - 15.5, 105 - 112)
: N•m (kg-m, ft-lb)
SEM134E

Liquid gasket application places



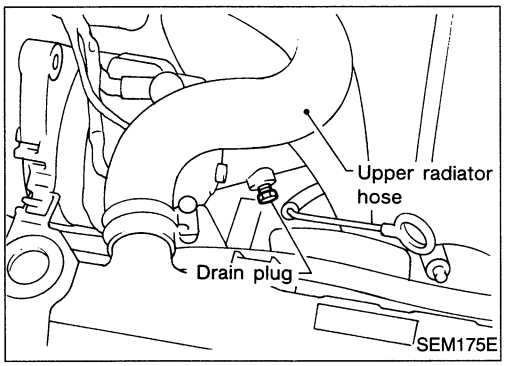






CAUTION:

- **After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.**
- **When installing sliding parts such as camshafts, chain tensioner and oil seal, be sure to apply new engine oil on their sliding surfaces.**
- **When tightening cylinder head bolts, camshaft sprocket bolts, crankshaft pulley bolt and camshaft bracket bolts, apply new engine oil to thread portions and seat surfaces of bolts.**
- **Before disconnecting fuel hose, release fuel pressure from fuel line.**
  Refer to EF & EC section ("Releasing Fuel Pressure", "MULTIPORT FUEL INJECTION SYSTEM INSPECTION").

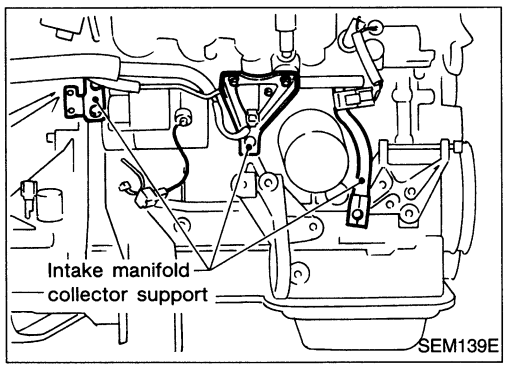


Removal

UPPER TIMING CHAIN

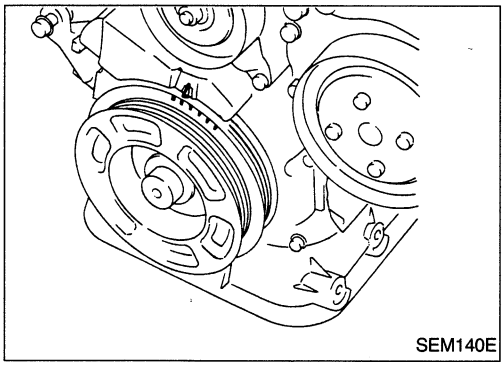
1. Drain coolant from drain plug on water pipe and radiator drain cock. Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").
2. Remove vacuum hoses, fuel hoses, wires, harness and connectors and so on.
3. Remove the following parts.

- Generator and bracket
- Upper radiator hose
- Air duct
- Front exhaust tube

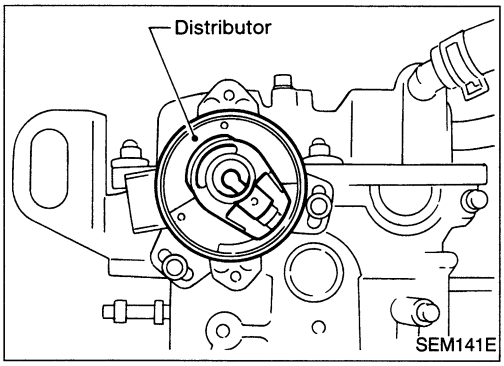


4. Remove intake manifold collector supports, intake manifold collector and exhaust manifold.

Removal (Cont'd)

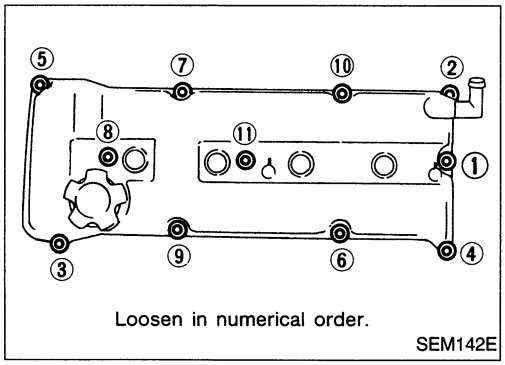

SEM140E

5. Set No. 1 piston at TDC on its compression stroke.
6. Remove distributor.
7. Set a suitable transmission jack under aluminum oil pan and remove front engine mounting.



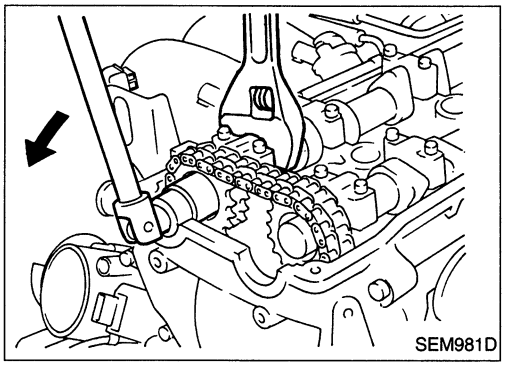
SEM141E

8. Remove rocker cover.

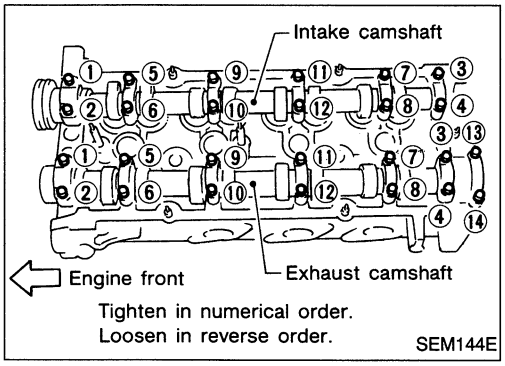


Loosen in numerical order.
SEM142E

9. Remove cam sprocket.

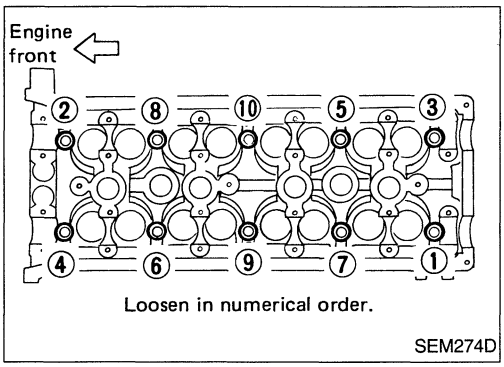

SEM981D

10. Remove cam brackets and camshafts.
- These parts should be reassembled in their original positions.

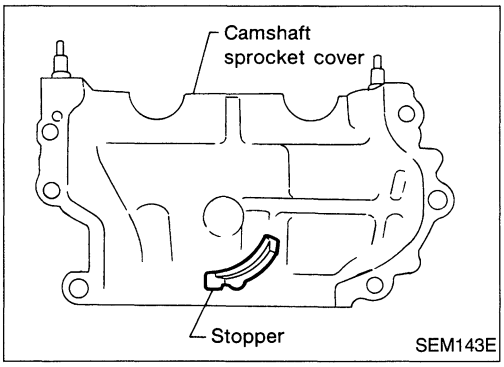


Tighten in numerical order.
Loosen in reverse order.
SEM144E

Removal (Cont'd)



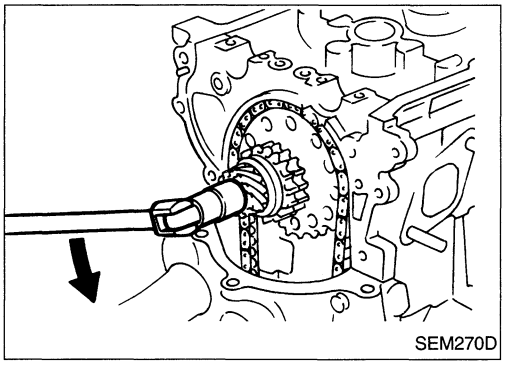
11. Loosen cylinder head bolts.
- A warped or cracked cylinder head could result from removing in incorrect order.
- Cylinder head bolts should be loosened in two or three steps.



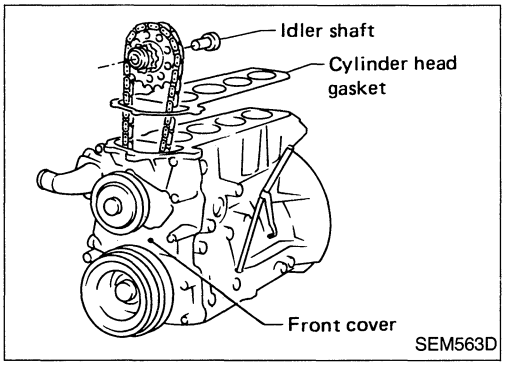
12. Remove cam sprocket cover
- Upper timing chain will not be disengaged from idler sprocket. For this reason, a stopper need not be used.

Cast portion of cam sprocket cover is located on lower side of idler sprocket so upper timing chain need not be disengaged from idler sprocket.

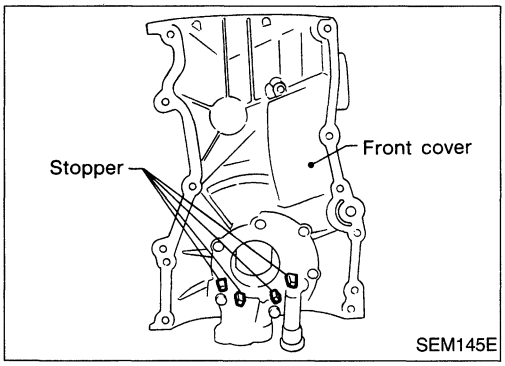
13. Remove upper chain tensioner and upper chain guides.



14. Remove upper timing chain.
15. Remove idler sprocket bolt.



16. Remove cylinder head with intake manifold, intake manifold collector and exhaust manifold assembly.
17. Remove cylinder head gasket.

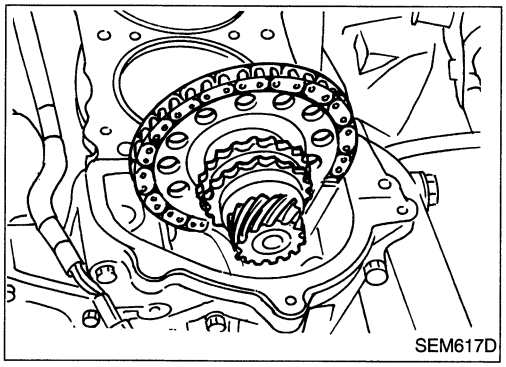


- Lower timing chain will not be disengaged from crankshaft sprocket. For this reason, a stopper need not be used.

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

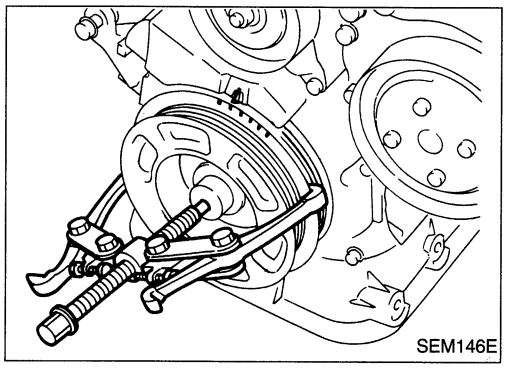
Removal (Cont'd)

LOWER TIMING CHAIN


SEM617D

1. Remove upper timing chain.

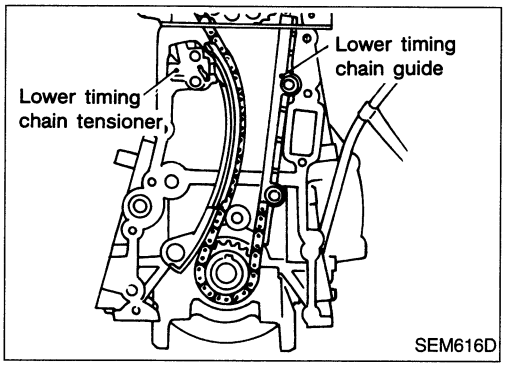
Refer to EM-18.


SEM146E

2. Remove oil pan.

Refer to EM-11.

3. Remove crankshaft pulley.
4. Remove front cover



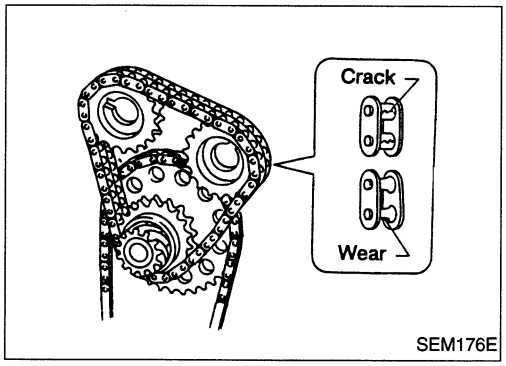
SEM616D

5. Remove the following parts.
- Lower timing chain tensioner
- Tension arm
- Lower timing chain guide

6. Remove lower timing chain and idler sprocket.

Inspection

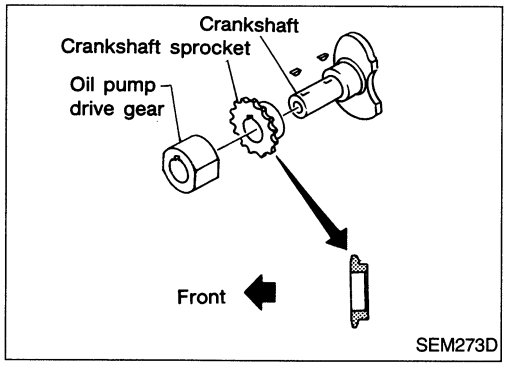
Check for cracks and excessive wear at roller links. Replace chain if necessary.



SEM176E

Installation

LOWER TIMING CHAIN

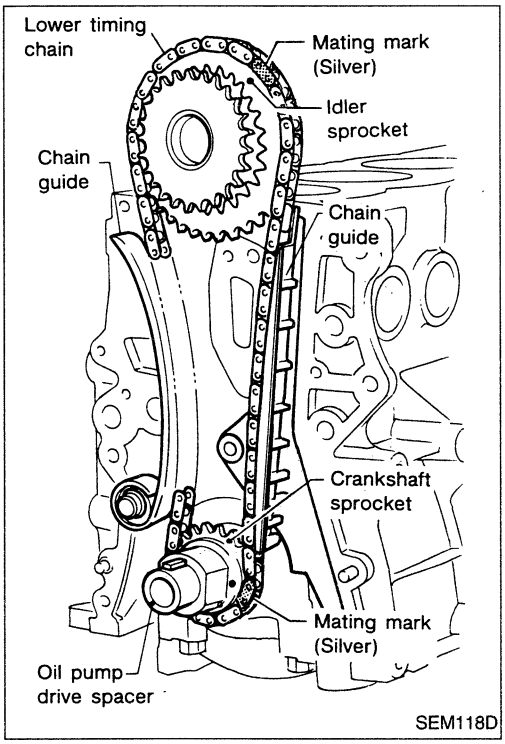


SEM273D

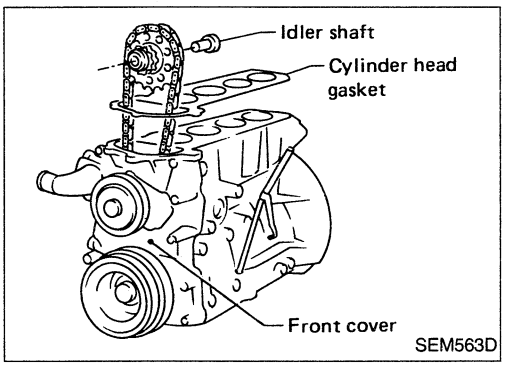
1. Install crankshaft sprocket.
- **Make sure that mating marks of crankshaft sprocket face front of engine.**

2. Position crankshaft so that No. 1 piston is set at TDC.

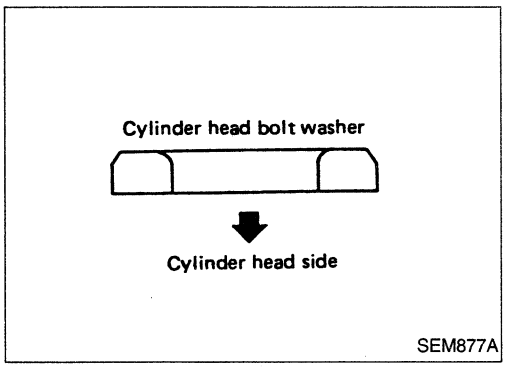
Installation (Cont'd)



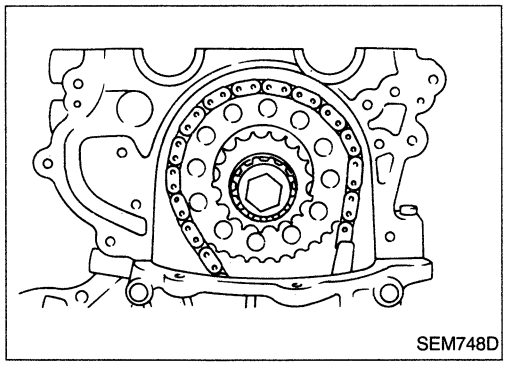
3. Install idler sprocket and lower timing chain.
- **Set lower timing chain on the sprockets, aligning mating marks.**
- **Be careful not to damage cylinder head gasket when installing lower timing chain.**
4. Install chain tension arm and chain guide.
5. Install lower timing chain tensioner.



6. Install front cover.
- **Apply a continuous bead of liquid gasket to front cover.**
- **Be careful not to damage cylinder head gasket.**
- **Be sure to install oil seal.**
7. Install the following parts:
- Crankshaft pulley
- Oil strainer
- Oil pan
- New cylinder head gasket



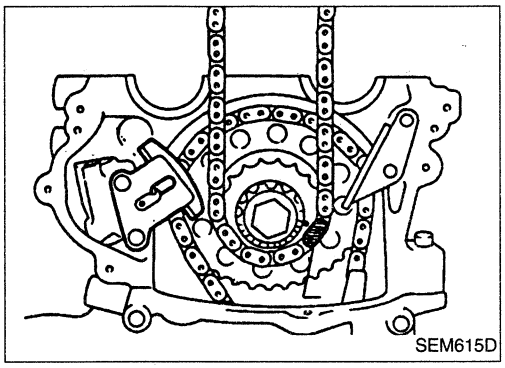
8. Install cylinder head and temporarily tighten cylinder head bolts when installing front cover.
- **Temporarily tighten cylinder head bolts. This is necessary to avoid damaging cylinder head gasket.**
- **Be sure to install washers between bolts and cylinder head.**



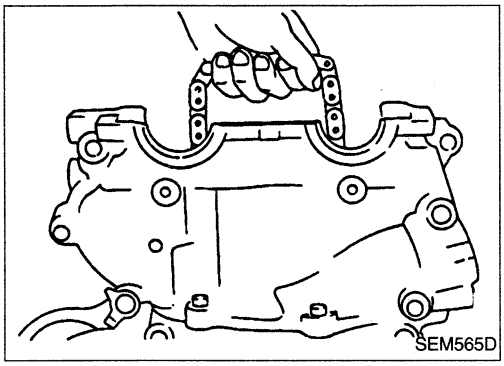
UPPER TIMING CHAIN

1. Install lower timing chain.
   Refer to EM-21.

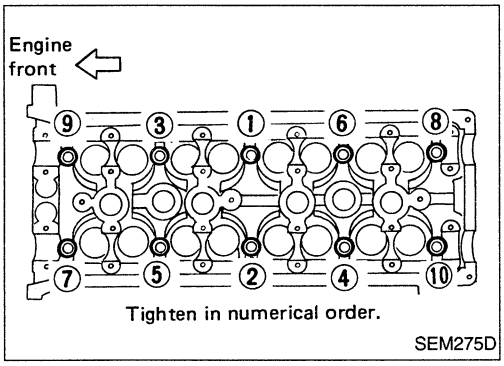
Installation (Cont'd)



2. Install upper timing chain, chain tensioner and chain guide.
- **Set upper timing chain on the idler sprockets, aligning mating marks.**

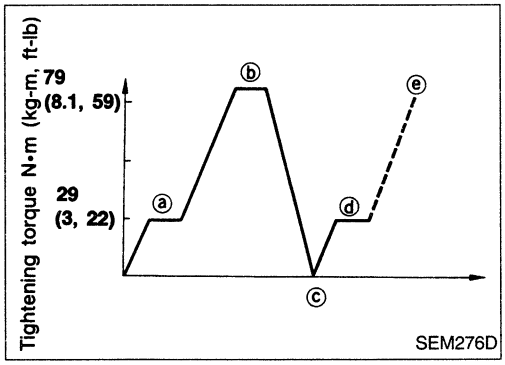


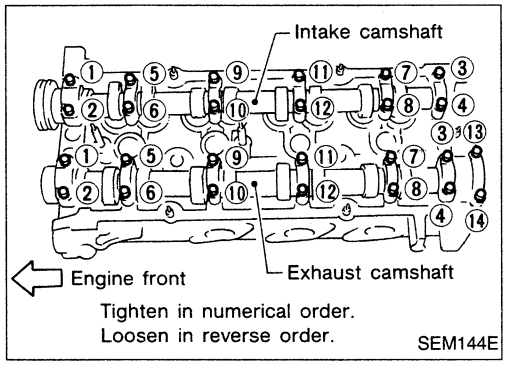
3. Install cam sprocket cover.
- **Apply a continuous bead of liquid gasket to front cover.**
- **Be careful not to damage cylinder head gasket.**
- **Be careful upper timing chain does not slip or jump when installing cam sprocket cover.**



4. Tighten cylinder head bolts.
- **Tightening procedure**

ⓐ **Tighten all bolts to 29 N•m (3.0 kg-m, 22 ft-lb).**
ⓑ **Tighten all bolts to 79 N•m (8.1 kg-m, 59 ft-lb).**
ⓒ **Loosen all bolts completely**
ⓓ **Tighten all bolts to 25 to 34 N•m (2.5 to 3.5 kg-m, 18 to 25 ft-lb).**
ⓔ **Turn all bolts 86 to 91 degrees clockwise, or if an angle wrench is not available, tighten bolts to 75 to 84 N•m (7.6 to 8.6 kg-m, 55 to 62 ft-lb).**

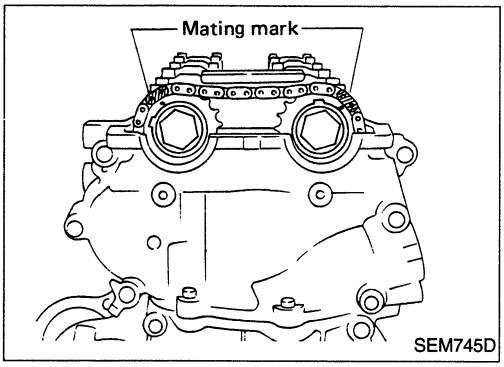




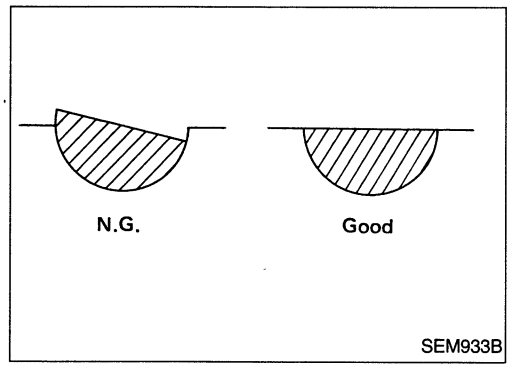
5. Install camshafts and camshaft brackets.
- **Camshaft bracket bolts tightening procedure**

ⓐ **Tighten all bolts to 2 N•m (0.2 kg-m, 1.4 ft-lb).**
ⓑ **Tighten all bolts to 9.0 to 11.8 N•m (0.92 to 1.2 kg-m, 6.7 to 8.7 ft-lb).**

Installation (Cont'd)

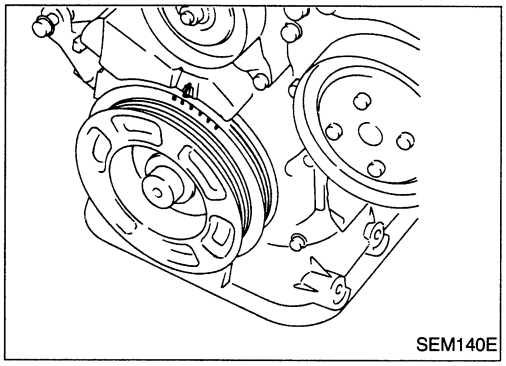


6. Install camshaft sprockets.
7. Install chain guide between both camshaft sprockets.

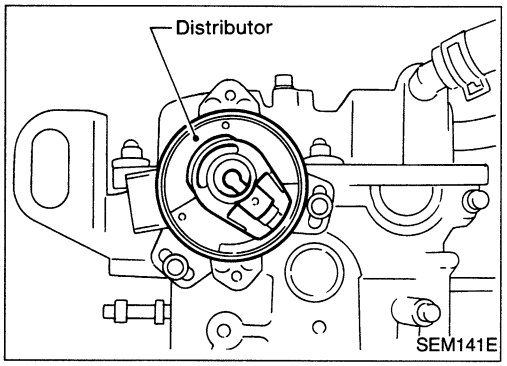


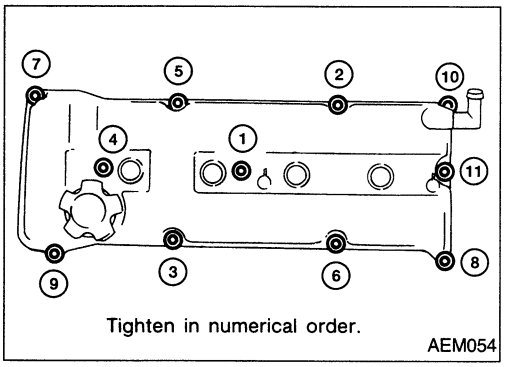
8. Install rubber plugs as follows.
(1) Apply liquid gasket to rubber plugs.
(2) Install rubber plugs, then move them by hand to uniformly spread the gasket on cam sprocket cover surface.
- Mating surfaces of liquid gasket should be installed flush.

9. Install chain guide between both camshaft sprockets.



10. Install distributor.
- Make sure that No. 1 piston is set at TDC and that distributor rotor is set at No. 1 cylinder spark position.





11. Install rocker cover.
- **Tightening procedure**

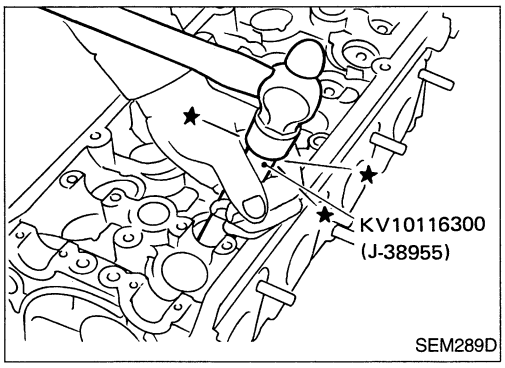
ⓐ **Tighten nuts ①-⑤-⑥-④ in that order to to 4 N•m (0.4 kg-m, 2.9 ft-lb).**
ⓑ **Tighten nuts ① to ⑪ as indicated in figure to 8 to 11 N•m (0.8 to 1.1 kg-m, 5.8 to 8.0 ft-lb).**

12. Install all spark plugs with high-tension cords.
13. Install vacuum hoses, fuel tubes, wires, harness and connectors and so on.

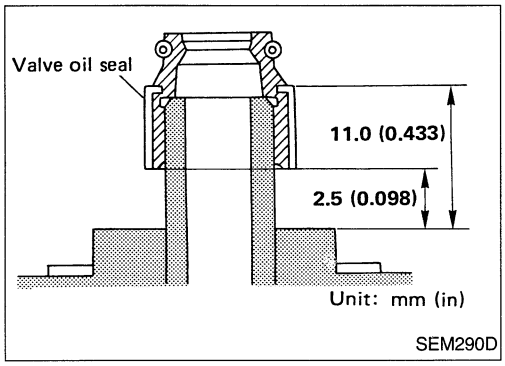
VALVE OIL SEAL

1. Remove rocker cover.
2. Remove camshaft. Refer to EM-18.
3. Remove valve spring and valve oil seal with Tool or a suitable tool.

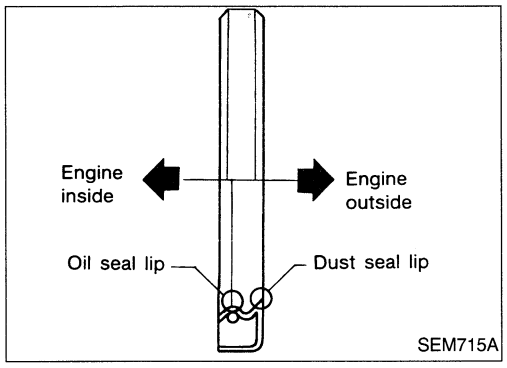
Piston concerned should be set at TDC to prevent valve from falling.



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



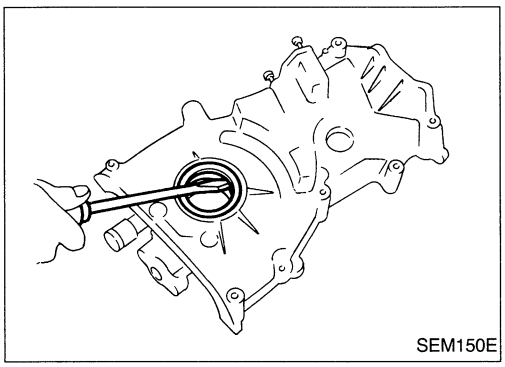
OIL SEAL INSTALLING DIRECTION

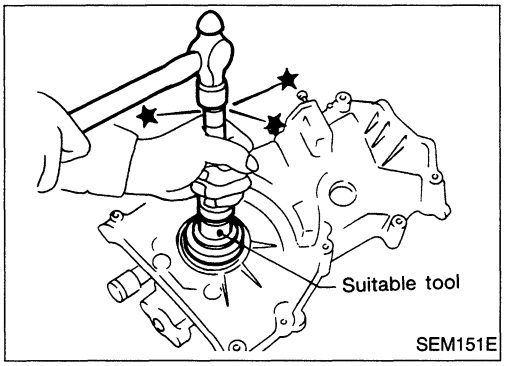


FRONT OIL SEAL

1. Remove radiator shroud and crankshaft pulley.
2. Remove front oil seal

- **Be careful not to damage crankshaft.**

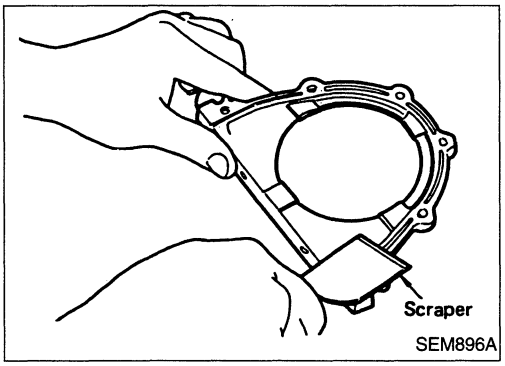


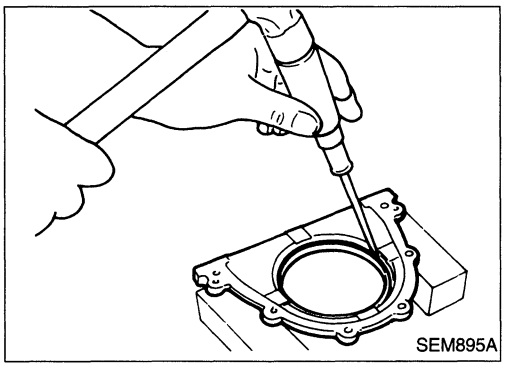


3. Apply engine oil to new oil seal and install it using a suitable tool.

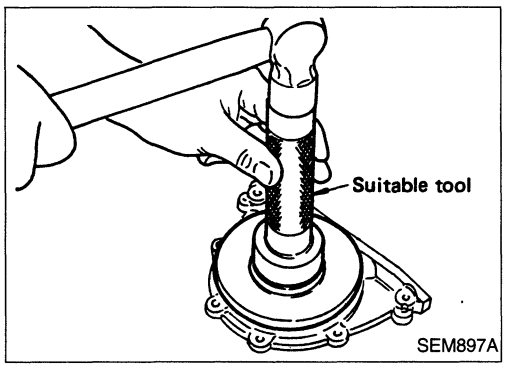
REAR OIL SEAL

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

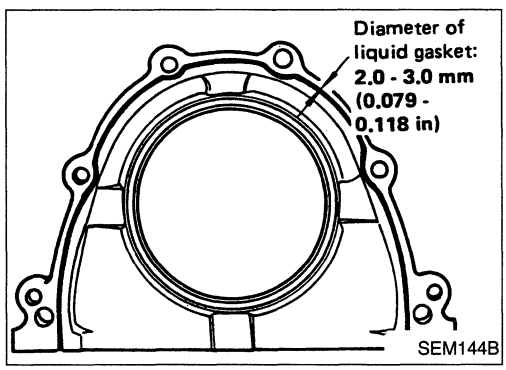




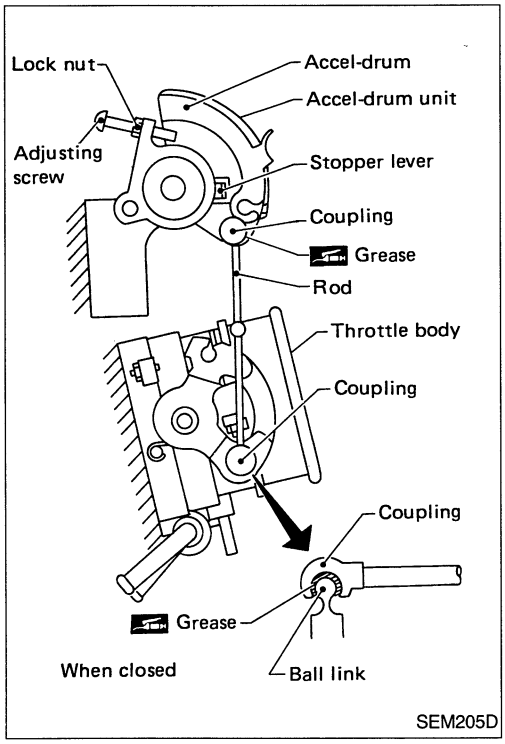
4. Remove rear oil seal from rear oil seal retainer.



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



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



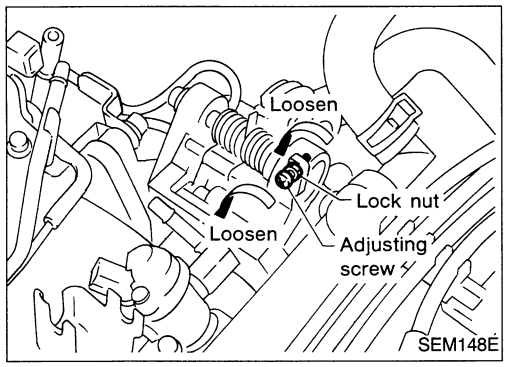
Adjust accel-drum unit whenever any of the following parts (new or old) are installed:

- **Accel-drum unit**
- **Throttle body**
- **Rod (Always replace with a new one after removal.)**

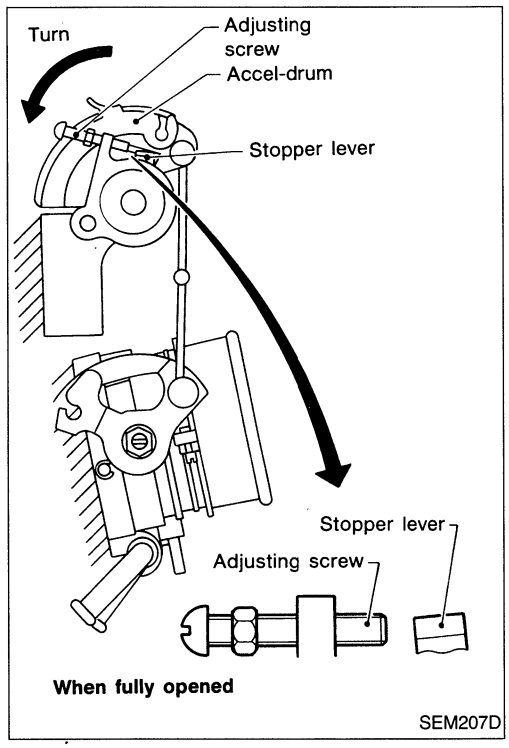
1. Install accel-drum unit and throttle body.
2. Apply grease all over the inside of the rod couplings.

Use genuine Nissan grease or equivalent.

3. Insert each one coupling to ball links of throttle body and accel-drum unit.

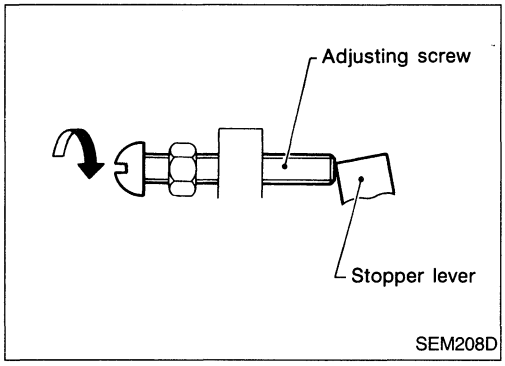


4. Loosen lock nut.
5. Loosen adjusting screw enough.

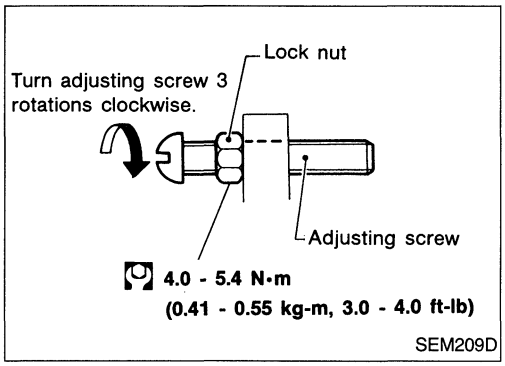


6. Manually turn accel-drum until throttle valve is fully open.

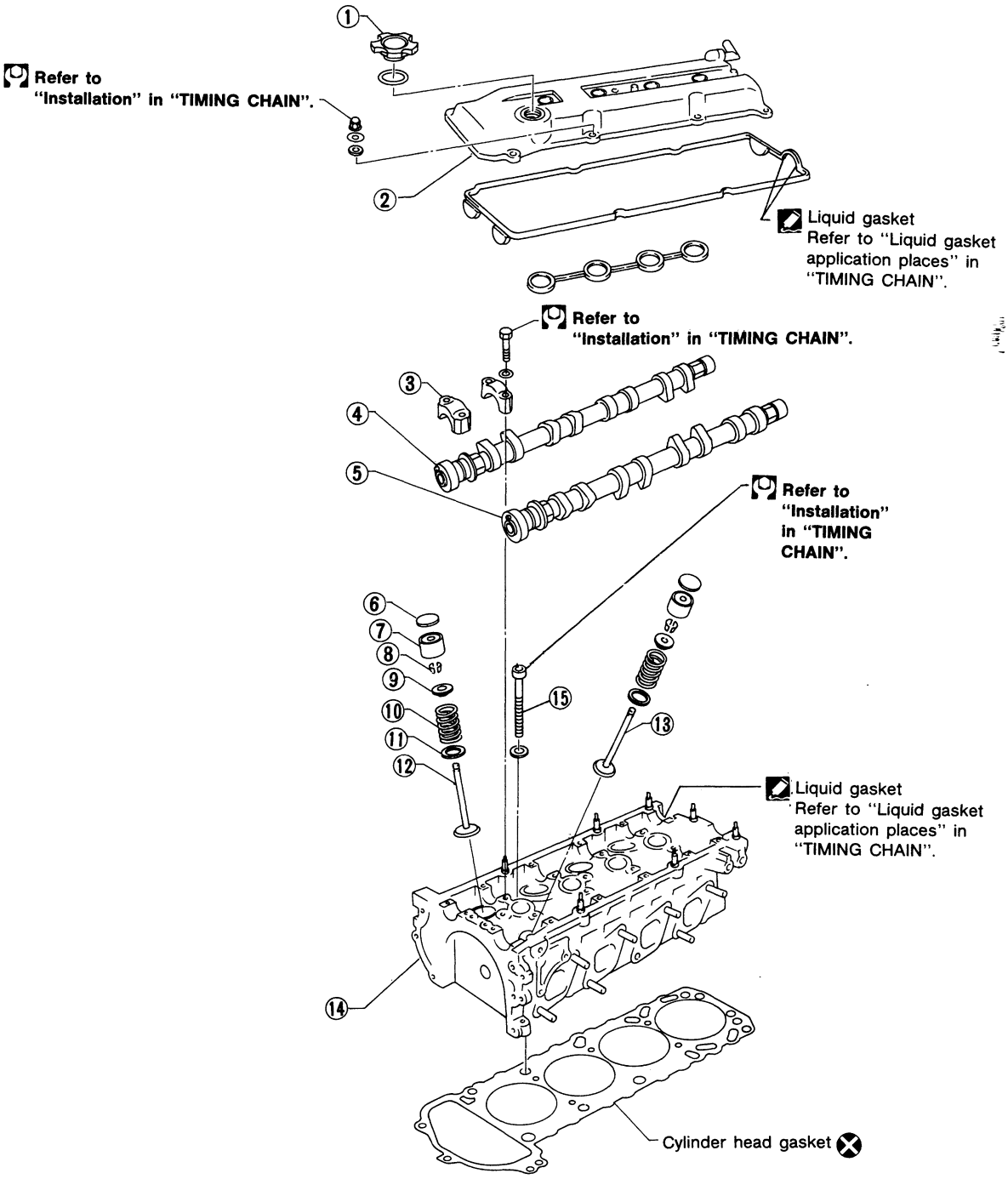
- Check that stopper lever is not touching adjusting screw. If it is, loosen adjusting screw to maintain clearance between the two.



7. Turn adjusting screw until it touches stopper lever.
8. Back off accel-drum.



9. Turn adjusting screw 3 rotations clockwise.
10. Tighten lock nut.



SEM149E

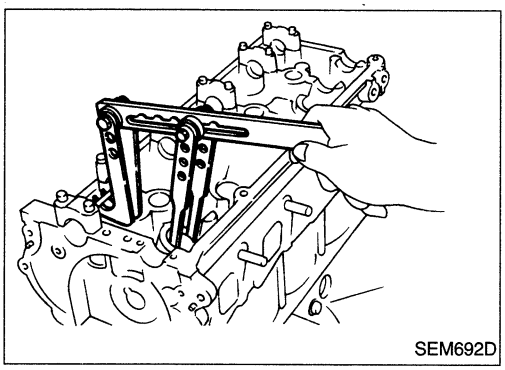
① Oil filler cap
② Rocker cover
③ Camshaft bracket
④ Intake camshaft
⑤ Exhaust camshaft
⑥ Shim
⑦ Valve lifter
⑧ Valve cotter
⑨ Spring retainer
⑩ Valve spring
⑪ Spring seat
⑫ Intake valve
⑬ Exhaust valve
⑭ Cylinder head
⑮ Cylinder head bolt

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.**
- **Attach tags to valve lifters so as not to mix them up.**

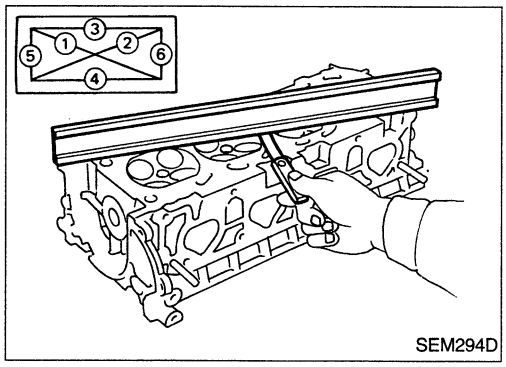
Removal and Installation

- Removal and installation procedures are the same as those for timing chain. Refer to EM-18.


SEM692D

Disassembly

1. Remove intake manifold, collector assembly and exhaust manifold. Refer to EM-8.
2. Remove valve components with Tool.
3. Remove valve oil seal with a suitable tool.



SEM294D

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 cylinder block resurfacing in an engine.

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

The maximum limit is as follows:

A + B = 0.2 mm (0.008 in)

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

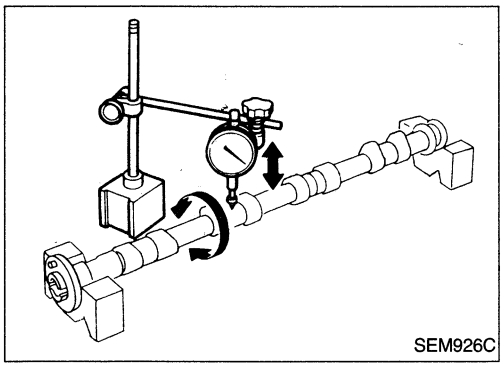
Nominal cylinder head height:

126.3 - 126.5 mm (4.972 - 4.980 in)

CAMSHAFT VISUAL CHECK

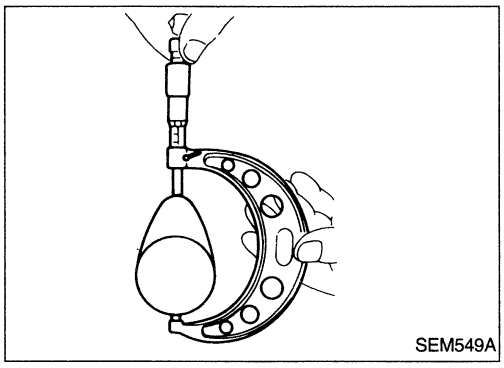
Check camshaft for scratches, seizure and wear.

Inspection (Cont'd)


SEM926C

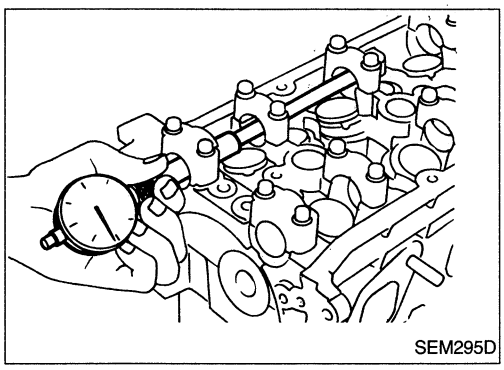
CAMSHAFT RUNOUT

1. Measure camshaft runout at the center journal.
   Runout (Total indicator reading):
   Standard
   Less than 0.02 mm (0.0008 in)
   Limit
   0.04 mm (0.0016 in)
2. If it exceeds the limit, replace camshaft.


SEM549A

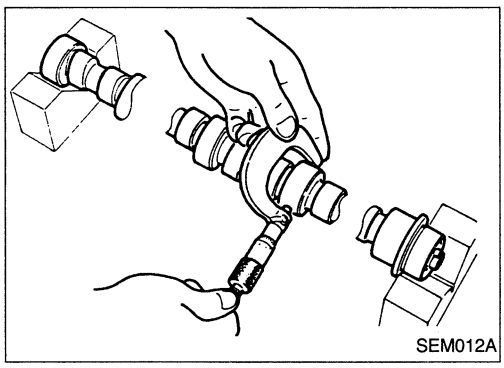
CAMSHAFT CAM HEIGHT

1. Measure camshaft cam height.
   Standard cam height:
   Intake
   42.415 - 42.605 mm (1.6699 - 1.6774 in)
   Exhaust
   42.415 - 43.005 mm (1.6699 - 1.6931 in)
   Cam wear limit:
   Intake & Exhaust
   0.2 mm (0.008 in)
2. If wear is beyond the limit, replace camshaft.

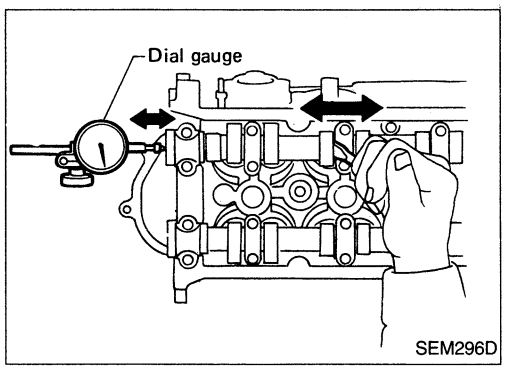

SEM295D

CAMSHAFT JOURNAL CLEARANCE

1. Install camshaft bracket and tighten bolts to the specified torque.
2. Measure inner diameter of camshaft bearing.
   Standard inner diameter:
   #1 journal
   28.000 - 28.025 mm (1.1024 - 1.1033 in)
   #2 to #5 journals
   24.000 - 24.025 mm (0.9449 - 0.9459 in)


SEM012A

3. Measure outer diameter of camshaft journal.
   Standard outer diameter:
   #1 journal
   27.935 - 27.955 mm (1.0998 - 1.1006 in)
   #2 to #5 journals
   23.935 - 23.955 mm (0.9423 - 0.9431 in)
4. If clearance exceeds the limit, replace camshaft and/or cylinder head.
   Camshaft journal clearance:
   Standard 0.045 - 0.090 mm (0.0018 - 0.0035 in)
   Limit 0.12 mm (0.0047 in)

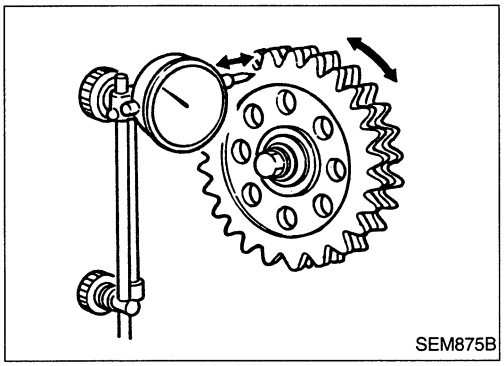


SEM296D

CAMSHAFT END PLAY

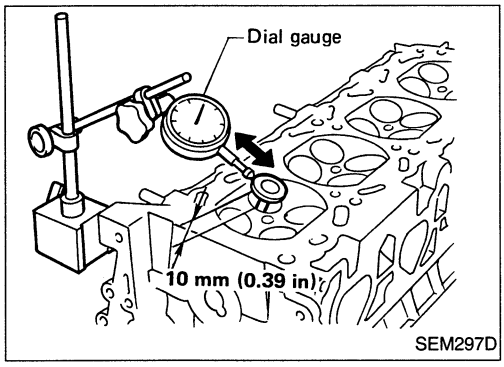
1. Install camshaft and thermostat housing in cylinder head.
2. Measure camshaft end play.
   Camshaft end play:
   Standard
   0.070 - 0.15 mm (0.0028 - 0.0059 in)
   Limit
   0.20 mm (0.0079 in)

Inspection (Cont'd)


SEM875B

CAMSHAFT SPROCKET RUNOUT

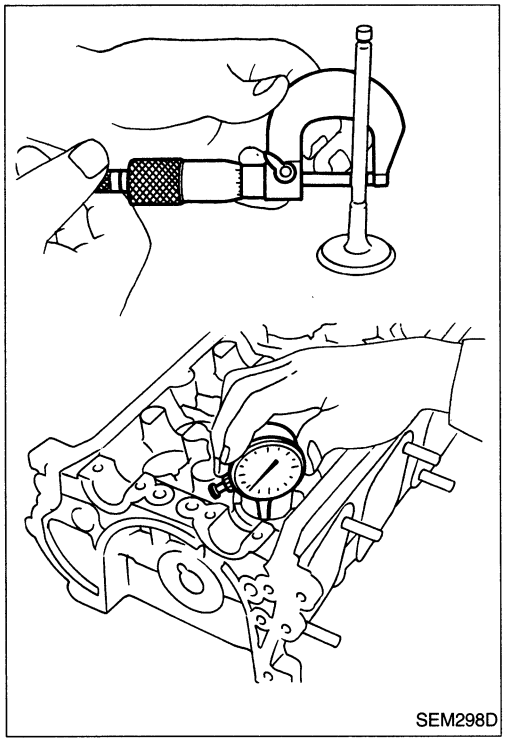
1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.
   Runout (Total indicator reading):
   Limit 0.12 mm (0.0047 in)
3. If it exceeds the limit, replace camshaft sprocket.



SEM297D

VALVE GUIDE CLEARANCE

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


SEM298D

2. If it exceeds the limit, check valve to valve guide clearance.

a. Measure valve stem diameter and valve guide inner diameter.

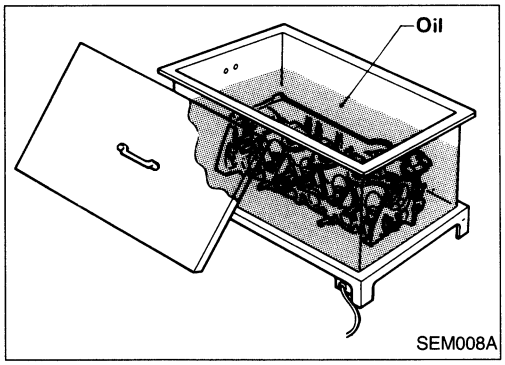
b. Check that clearance is within specification.

Valve to valve guide clearance:

Unit: mm (in)

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

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

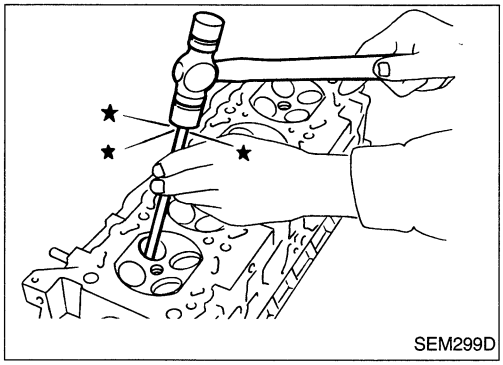


SEM008A

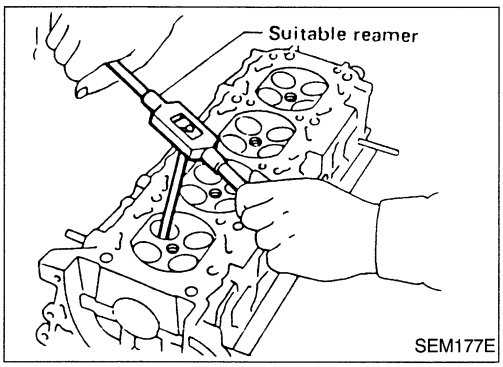
VALVE GUIDE REPLACEMENT

1. To remove valve guide, heat cylinder head to 120 to 140°C (248 to 284°F).

Inspection (Cont'd)

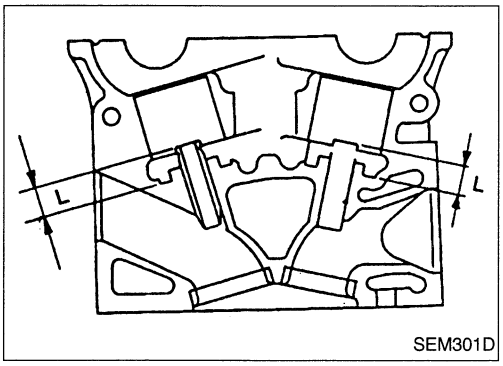

SEM299D

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.



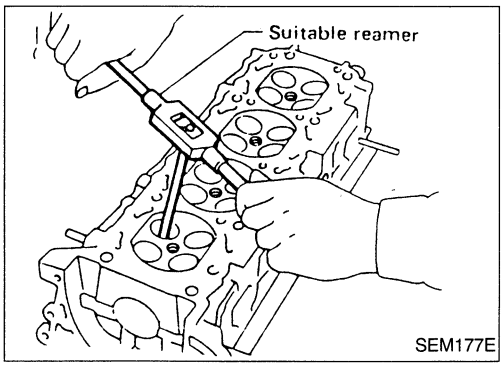
SEM177E

3. Ream cylinder head valve guide hole.
   Valve guide hole diameter
   (for service parts):
   Intake & Exhaust
   11.175 - 11.196 mm (0.4400 - 0.4408 in)



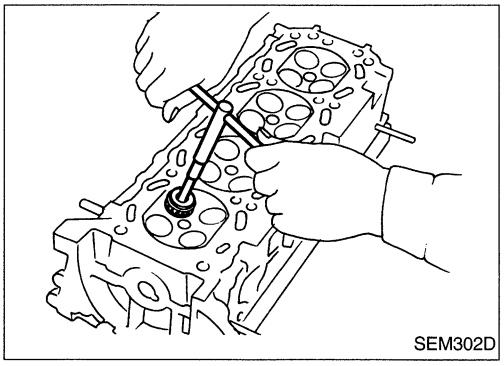
SEM301D

4. Heat cylinder head to 120 to 140°C (230 to 266°F) and press service valve guide onto cylinder head.
   Projection "L":
   13.3 - 13.9 mm (0.524 - 0.547 in)



SEM177E

5. Ream valve guide.
   Finished size:
   Intake & Exhaust
   7.000 - 7.018 mm (0.2756 - 0.2763 in)

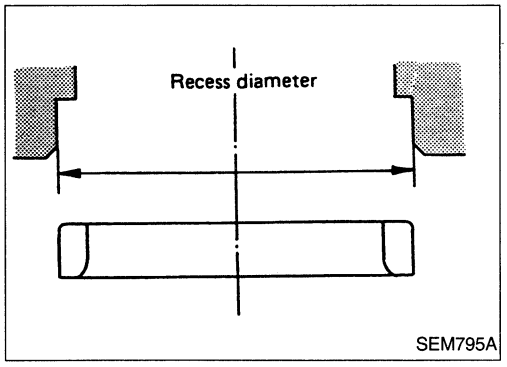

SEM302D

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.**

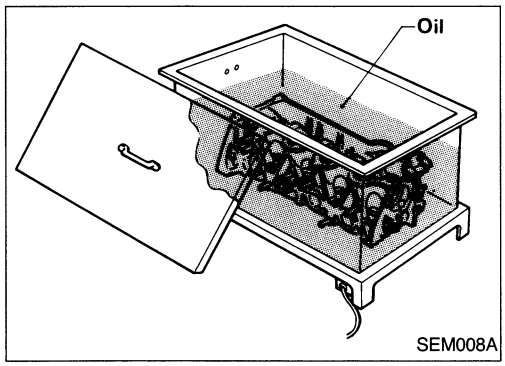
Inspection (Cont'd)



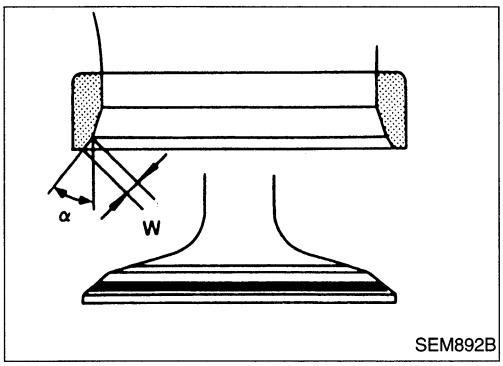
REPLACING VALVE SEAT FOR SERVICE PARTS

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 38.000 - 38.016 mm (1.4961 - 1.4967 in)
   Exhaust 32.700 - 32.716 mm (1.2874 - 1.2880 in)

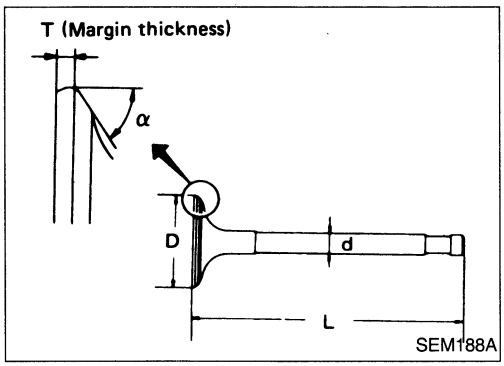
Reaming should be done in circles concentric to the valve guide center so that valve seat will have the correct fit.



3. Heat cylinder head to 120 to 140°C (248 to 284°F).
4. Press fit valve seat until it seats on the bottom.



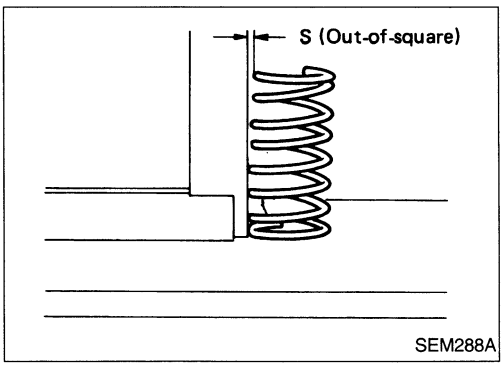
5. Cut or grind valve seat using suitable tool at the specified dimensions as shown in SDS.
6. After cutting, lap valve seat with abrasive compound.
7. Check valve seating condition.
   Seat face angle "α":
   44°53′ - 45°07′
   Contacting width "W":
   Intake
   1.48 - 1.63 mm (0.0583 - 0.0642 in)
   Exhaust
   1.8 - 2.0 mm (0.071 - 0.079 in)



VALVE DIMENSIONS

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

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

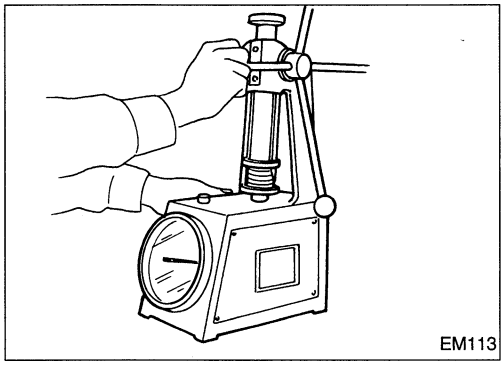


VALVE SPRING

Squareness

1. Measure "S" dimension.
   Out-of-square:
   Less than 2.0 mm (0.079 in)
2. If it exceeds the limit, replace spring.

Inspection (Cont'd)


EM113

Pressure

Check valve spring pressure.

Pressure: N (kg, lb) at height mm (in)

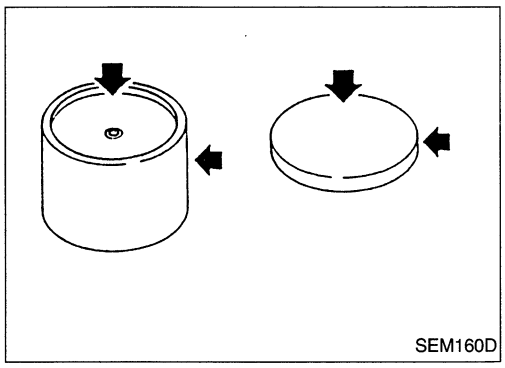
Standard

471.7 (48.1, 106.1) at 26.06 (1.0260)

Limit

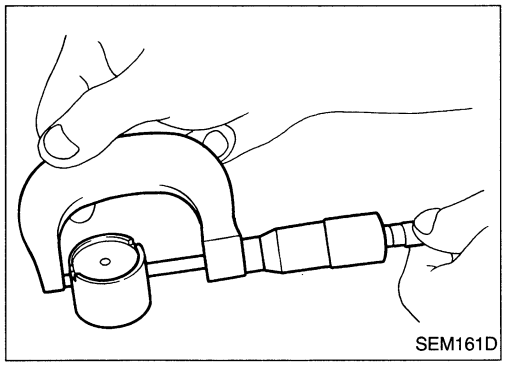
More than 421.31 (42.96, 94.73) at 26.06 (1.0260)

If it exceeds the limit, replace spring.


SEM160D

VALVE LIFTER AND VALVE SHIM

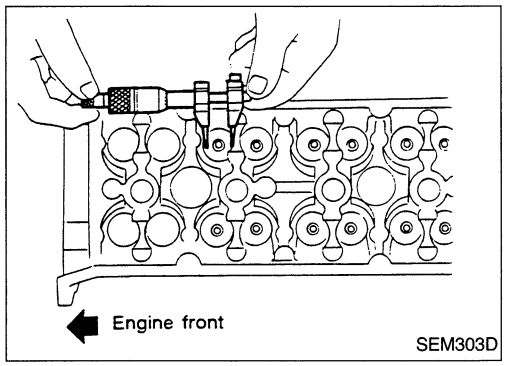
1. Visually check contact and sliding surfaces for wear or scratches.


SEM161D

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

Valve lifter diameter:

33.960 - 33.975 mm (1.3370 - 1.3376 in)



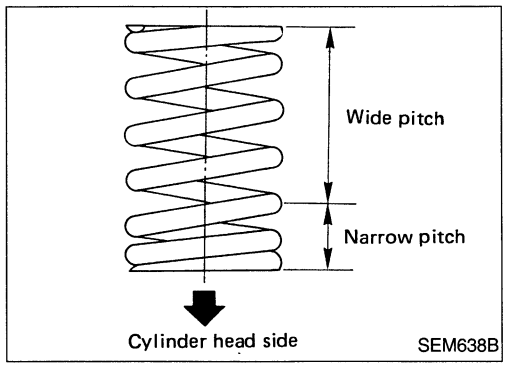
SEM303D

Lifter guide bore diameter:

34.000 - 34.021 mm (1.3386 - 1.3394 in)

Valve lifter to valve lifter guide clearance:

0.025 - 0.061 mm (0.0010 - 0.0024 in)

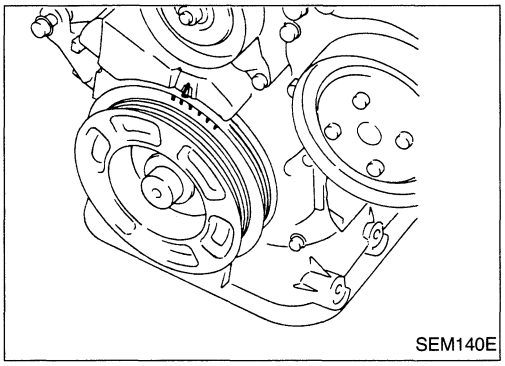


SEM638B

Assembly

1. Install valve component parts.

- **Always use new valve oil seal. Refer to EM-25.**
- **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.**


SEM140E

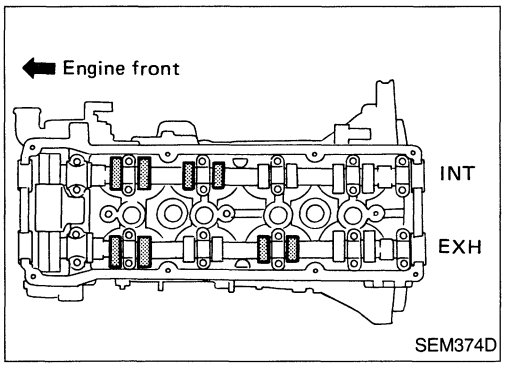
Valve Clearance

CHECKING

Check valve clearance while engine is warm but not running.

1. Remove rocker cover and all spark plugs.
2. Set No. 1 cylinder at TDC on its compression stroke.
- Align pointer with TDC mark on crankshaft pulley.
- Check that valve lifters on No. 1 cylinder are loose and valve lifters on No. 4 are tight.
  If not, turn crankshaft one revolution (360°) and align as above.

3. Check only those valves shown in the figure.



SEM374D

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

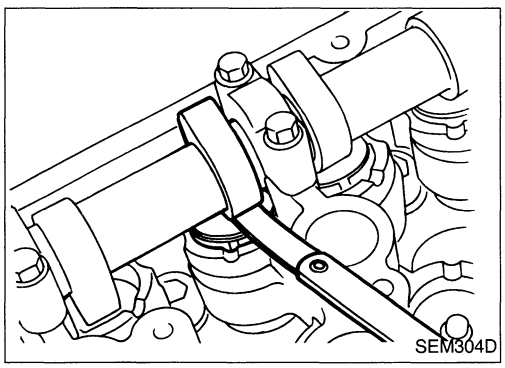
Valve clearance (Hot):

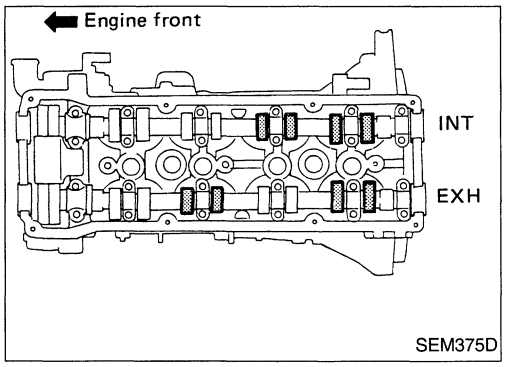
Intake

0.31 - 0.39 mm (0.012 - 0.015 in)

Exhaust

0.33 - 0.41 mm (0.013 - 0.016 in)


SEM304D



SEM375D

4. Turn crankshaft one revolution (360°) and align mark on crankshaft pulley with pointer.
5. Check those valves shown in the figure.
- Use the same procedure as mentioned in step 4.

6. If all valve clearances are within specification, install the following parts.
- Rocker cover
- All spark plugs

ADJUSTING

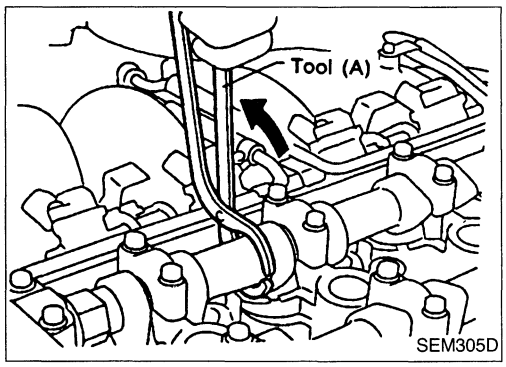
Adjust valve clearance while engine is cold.

1. Turn crankshaft, to position cam lobe on camshaft of valve that must be adjusted upward.
2. Place Tool (A) around camshaft as shown in figure.
3. Rotate Tool (A) so that lifter is pushed down.

Before placing Tool (A), rotate notch toward center of cylinder head (See figure.), to simplify shim removal later.

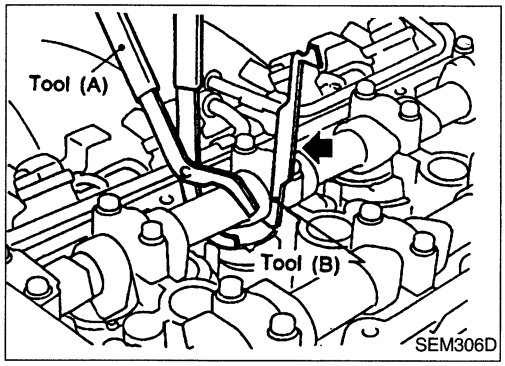
CAUTION:

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



SEM305D

Valve Clearance (Cont'd)

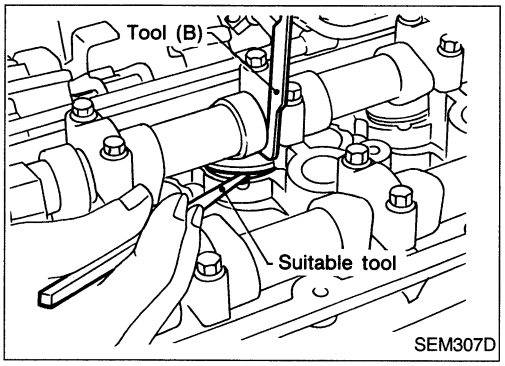


4. Place Tool (B) between camshaft and valve lifter to retain valve lifter.

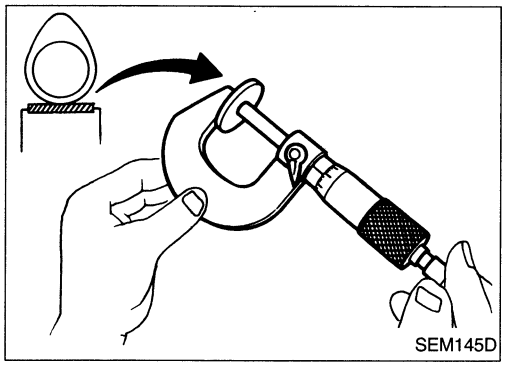
CAUTION:

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

5. Remove Tool (A).



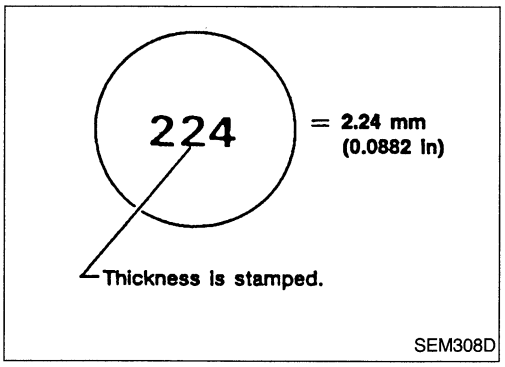
6. Remove adjusting shim using a small screwdriver and a magnetic finger.



7. Determine replacement adjusting shim size following formula.
- Using a micrometer determine thickness of removed shim.
- Calculate thickness of new adjusting shim so valve clearance comes within specified values.

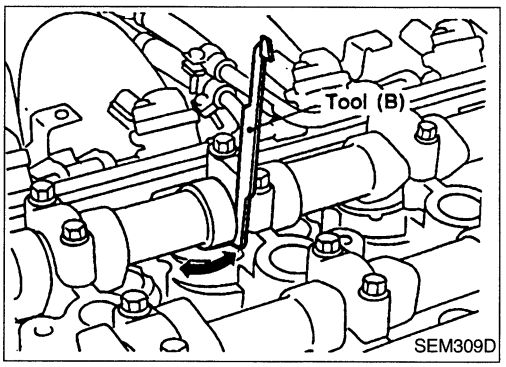
R = Thickness of removed shim
N = Thickness of new shim
M = Measured valve clearance

Intake: N = R + [M − 0.35 mm (0.0138 in)]
Exhaust: N = R + [M − 0.37 mm (0.0146 in)]



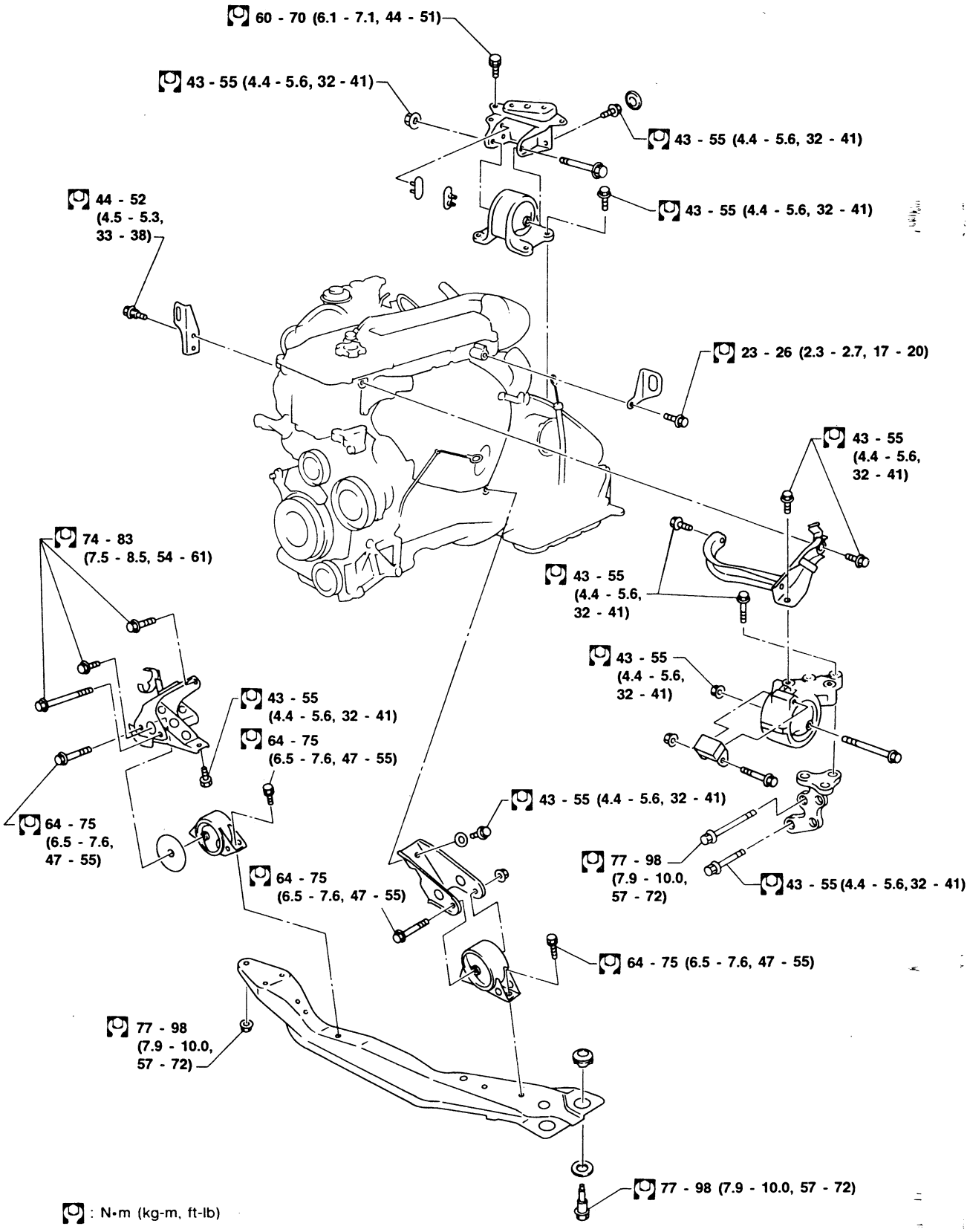
Shims are available in 37 sizes from 1.96 mm (0.0772 in) to 2.68 mm (0.1055 in), in steps of 0.02 mm (0.0008 in).

- Select new shim with thickness as close as possible to calculated value.



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

9. Place Tool (A) as mentioned in steps 2 and 3.
10. Remove Tool (B).
11. Remove Tool (A).
12. Recheck valve clearance.
Refer to EM-36.


60 - 70 (6.1 - 7.1, 44 - 51)
43 - 55 (4.4 - 5.6, 32 - 41)
43 - 55 (4.4 - 5.6, 32 - 41)
43 - 55 (4.4 - 5.6, 32 - 41)
44 - 52 (4.5 - 5.3, 33 - 38)
23 - 26 (2.3 - 2.7, 17 - 20)
43 - 55 (4.4 - 5.6, 32 - 41)
74 - 83 (7.5 - 8.5, 54 - 61)
43 - 55 (4.4 - 5.6, 32 - 41)
43 - 55 (4.4 - 5.6, 32 - 41)
43 - 55 (4.4 - 5.6, 32 - 41)
64 - 75 (6.5 - 7.6, 47 - 55)
64 - 75 (6.5 - 7.6, 47 - 55)
43 - 55 (4.4 - 5.6, 32 - 41)
64 - 75 (6.5 - 7.6, 47 - 55)
77 - 98 (7.9 - 10.0, 57 - 72)
43 - 55 (4.4 - 5.6, 32 - 41)
64 - 75 (6.5 - 7.6, 47 - 55)
77 - 98 (7.9 - 10.0, 57 - 72)
77 - 98 (7.9 - 10.0, 57 - 72)
: N•m (kg-m, ft-lb)

AEM055

WARNING:

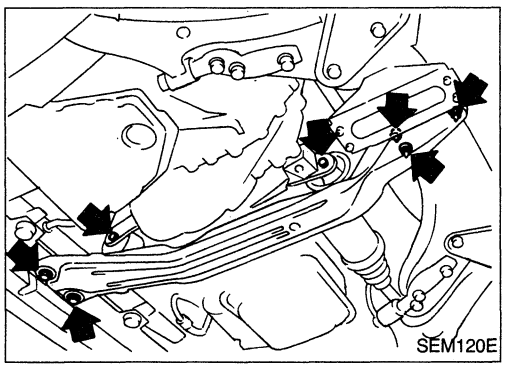
a. Position vehicle on a flat and solid surface.
b. Place chocks at front and back of rear wheels.
c. Do not remove engine until exhaust system has completely cooled off.
Otherwise, you may burn yourself and/or fire may break out in fuel line.
d. For safety during subsequent steps, the tension of wires should be slackened against the engine.
e. Before disconnecting fuel hose, release fuel pressure from fuel line.
Refer to EF & EC section ("Releasing Fuel Pressure", "MULTIPORT FUEL INJECTION SYSTEM INSPECTION").
f. Before removing front axle from transaxle, place safety stands under designated front supporting points. Refer to GI section for lifting points and towing.
g. Be sure to hoist engine and transaxle in a safe manner.
h. 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.**
- **In removing drive shaft, be careful not to damage grease seal of transaxle.**

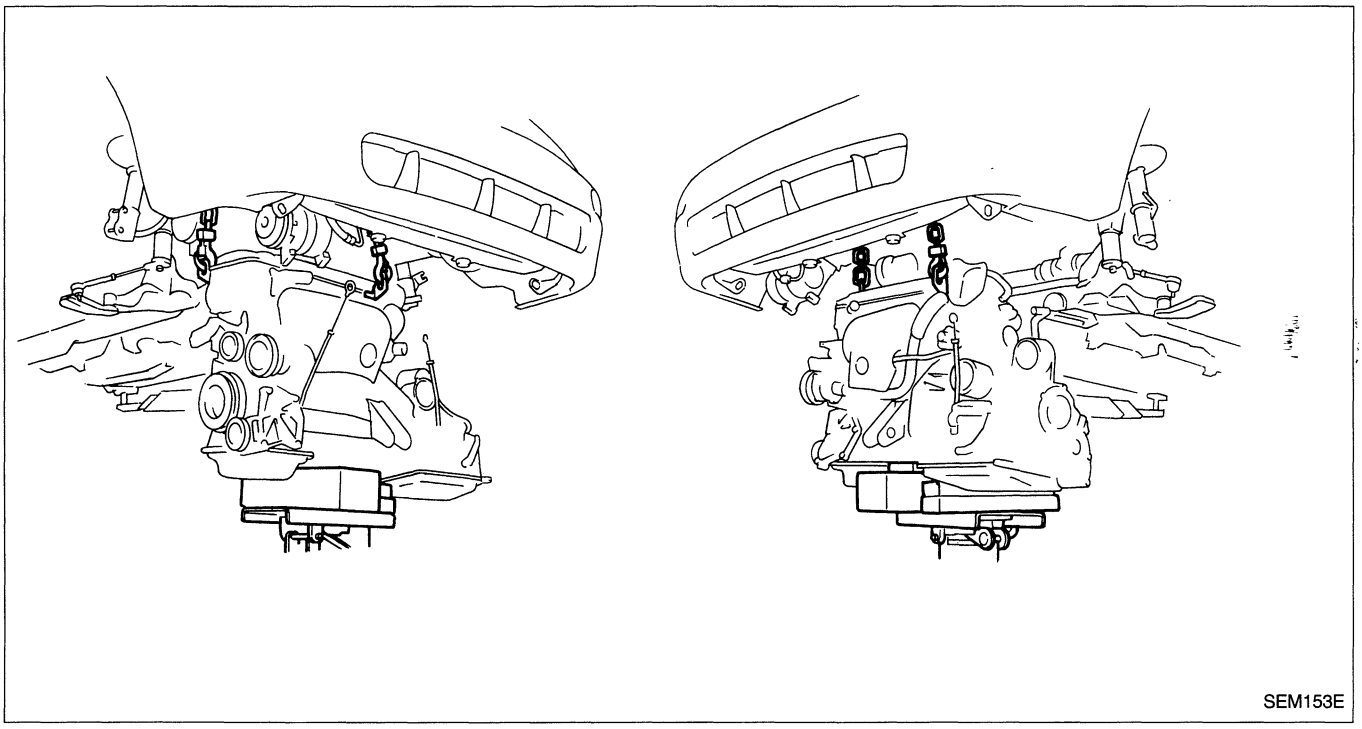
Removal

1. Remove engine under cover and hood.
2. Drain coolant from drain plug on water pipe, and radiator.
3. Remove vacuum hoses, fuel hoses, wires, harnesses and connectors and so on.
4. Remove front exhaust tube and drive shafts.
5. Remove drive belts.
6. Remove generator, compressor and power steering oil pump from engine.
7. Set a suitable transmission jack under transaxle. Hoist engine with engine slinger.
8. Remove RH and LH engine mountings and center member.
9. Remove front and rear engine mountings.


SEM120E

Removal (Cont'd)

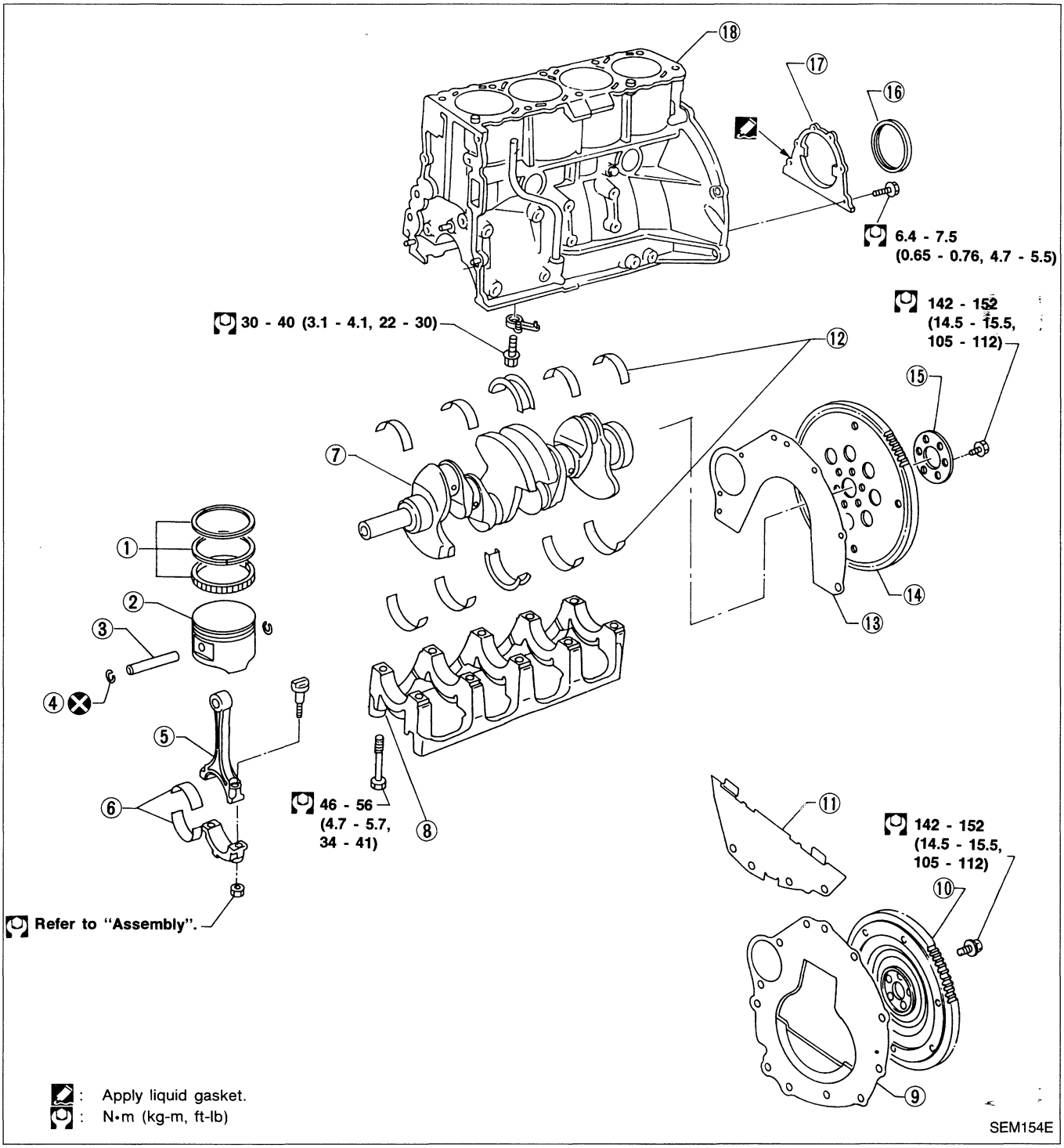
10. Remove engine with transaxle as shown.



SEM153E

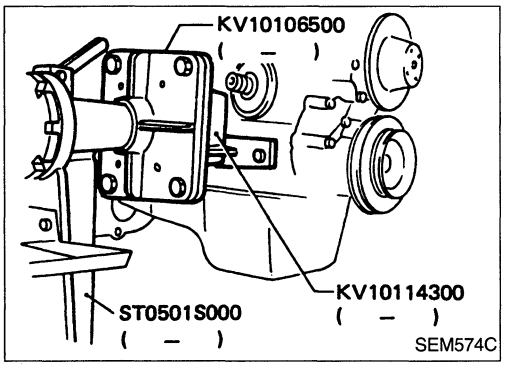
Installation

Installation is in the reverse order of removal.



① Piston rings
② Piston
③ Piston pin
④ Snap ring
⑤ Connecting rod
⑥ Connecting rod bearing
⑦ Crankshaft
⑧ Main bearing cap
⑨ Rear plate (M/T)
⑩ Flywheel (M/T)
⑪ Dust cover (A/T)
⑫ Main bearing
⑬ Rear plate (A/T)
⑭ Drive plate (A/T)
⑮ Drive plate reinforcement
⑯ Rear oil seal
⑰ Rear oil seal retainer
⑱ Cylinder block

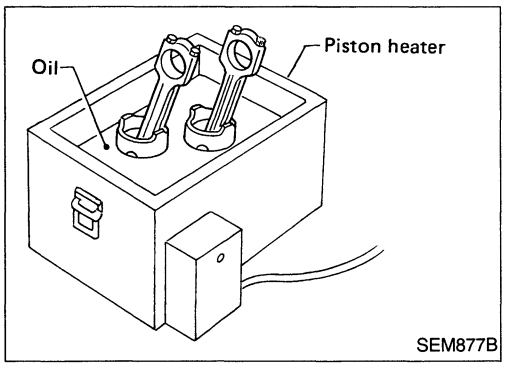
CAUTION:
- **When installing sliding parts such as bearings and pistons, be sure to apply engine oil on the sliding surfaces.**
- **Place removed parts such as bearings and bearing caps in their proper order and direction.**
- **When tightening connecting rod bolts and main bearing cap bolts, apply engine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



Disassembly

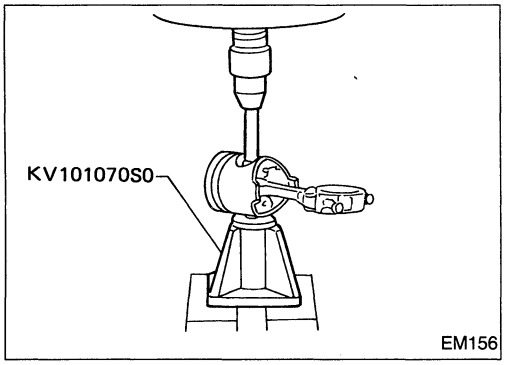
PISTON AND CRANKSHAFT

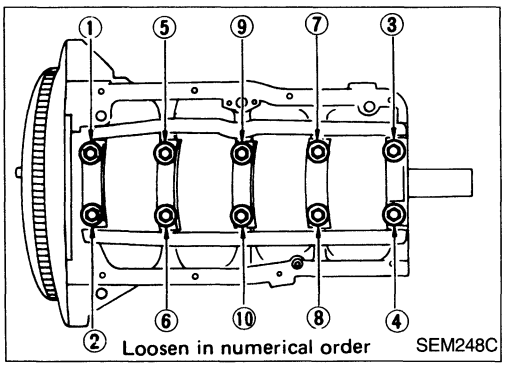
1. Place engine on a work stand.
2. Remove timing chain.
   Refer to EM-18.



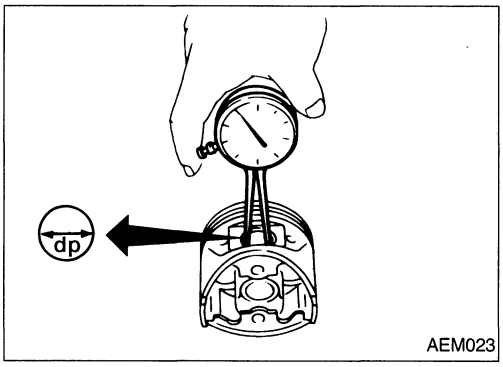
3. Remove pistons with connecting rods.
- When disassembling piston and connecting rod, remove snap rings, then heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature.

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.**

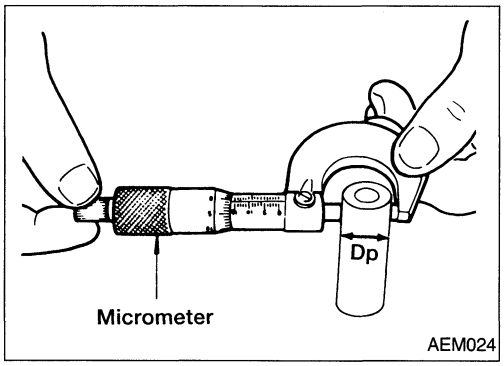




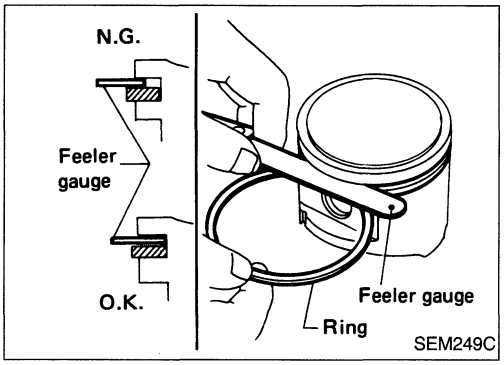
4. Remove main bearing beam and crankshaft.
- **Before removing main bearing beam, measure crankshaft end play.**
- **Bolts should be loosened in two or three steps.**



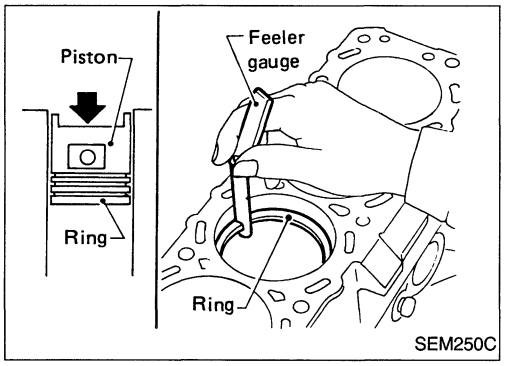
AEM023



AEM024



SEM249C



SEM250C

Inspection

PISTON AND PISTON PIN CLEARANCE

1. Measure inner diameter of piston pin hole "dp".
   Standard diameter "dp":
   20.987 - 20.999 mm (0.8263 - 0.8267 in)

2. Measure outer diameter of piston pin "Dp".
   Standard diameter "Dp":
   20.989 - 21.001 mm (0.8263 - 0.8268 in)
3. Calculate interference fit of piston pin to piston.
   dp − Dp = 0 - 0.004 mm (0 - 0.0002 in)
   If it exceeds the above value, replace piston assembly with pin.

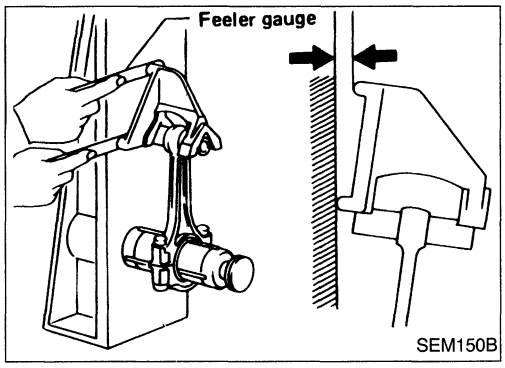
PISTON RING SIDE CLEARANCE

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
0.28 - 0.52 mm (0.0110 - 0.0205 in)
2nd ring
0.45 - 0.69 mm (0.0177 - 0.0272 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 EM-58.

Inspection (Cont'd)

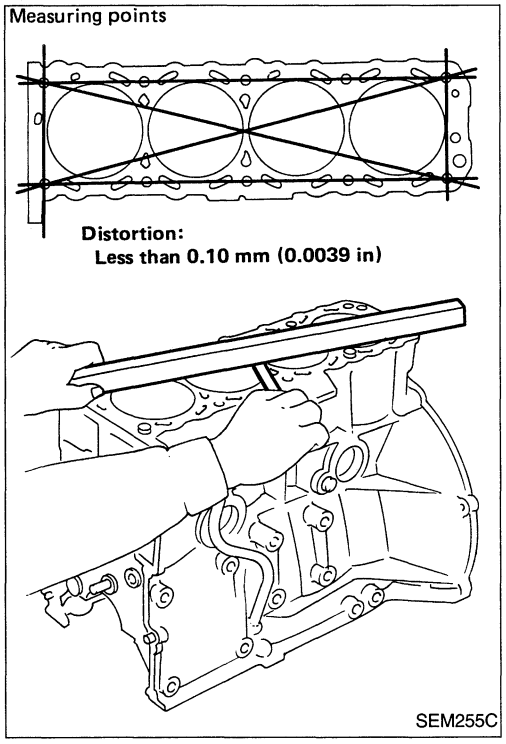


CONNECTING ROD BEND AND TORSION

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

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

If it exceeds the limit, replace connecting rod assembly.



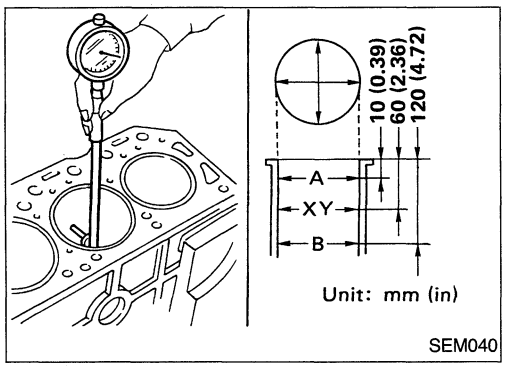
CYLINDER BLOCK DISTORTION AND WEAR

1. Clean upper face of cylinder block and measure the distortion.
   Limit:
   0.10 mm (0.0039 in)
2. If out of specification, resurface it.
   The resurfacing limit is determined by cylinder head resurfacing in engine.

Amount of cylinder head resurfacing is "A"

Amount of cylinder block resurfacing is "B"
The maximum limit is as follows:
A + B = 0.2 mm (0.008 in)
Nominal cylinder block height
from crankshaft center:
246.95 - 247.05 mm (9.7224 - 9.7264 in)

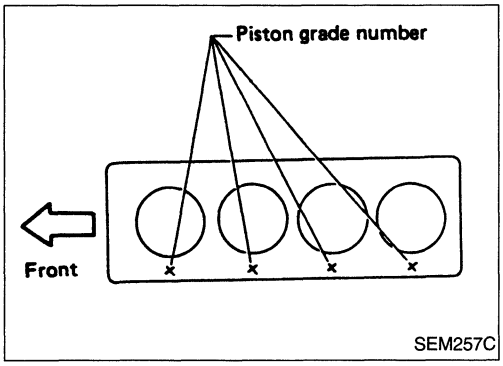
3. If necessary, replace cylinder block.



PISTON-TO-BORE CLEARANCE

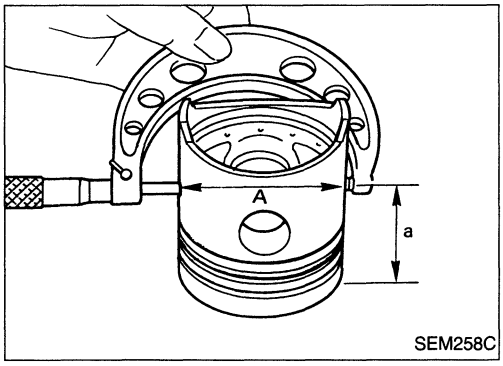
1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper.
   Standard inner diameter:
   89.000 - 89.030 mm (3.5039 - 3.5051 in)
   Wear limit:
   0.2 mm (0.008 in)
   Out-of-round (X − Y):
   Less than 0.015 mm (0.0006 in)
   Taper (A − B):
   Less than 0.01 mm (0.0004 in)
   If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.
2. Check for scratches and seizure. If seizure is found, hone it.

Inspection (Cont'd)



SEM257C

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



SEM258C

3. Measure piston skirt diameter.
   Piston diameter "A":
   Refer to EM-58.
   Measuring point "a" (Distance from the top):
   52 mm (2.05 in)
4. Check that piston-to-bore clearance is within specification.
   Piston-to-bore clearance "B":
   0.020 - 0.040 mm (0.0008 - 0.0016 in)
5. Determine piston oversize according to amount of cylinder wear.

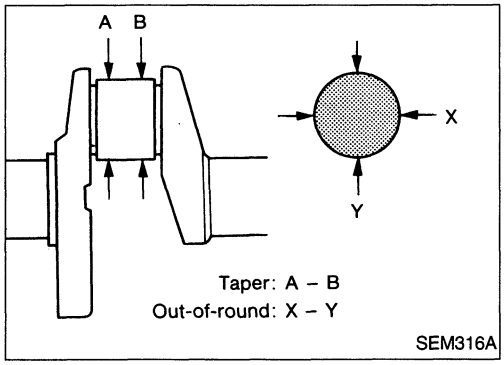
Oversize pistons are available for service. Refer to EM-58.

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.**

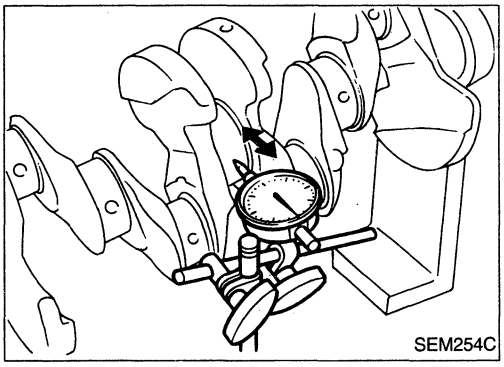


SEM316A

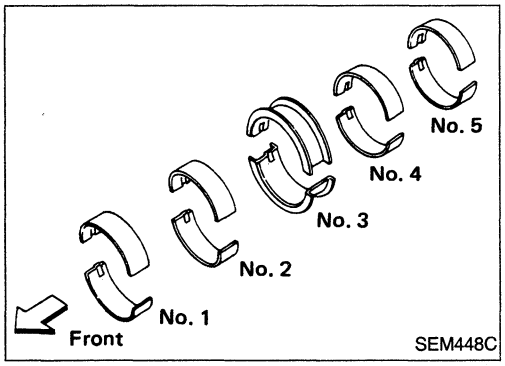
CRANKSHAFT

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 0.002 mm (0.0001 in)

Inspection (Cont'd)


SEM254C

3. Measure crankshaft runout.
   Runout (Total indicator reading):
   Less than 0.04 mm (0.0016 in)



SEM448C

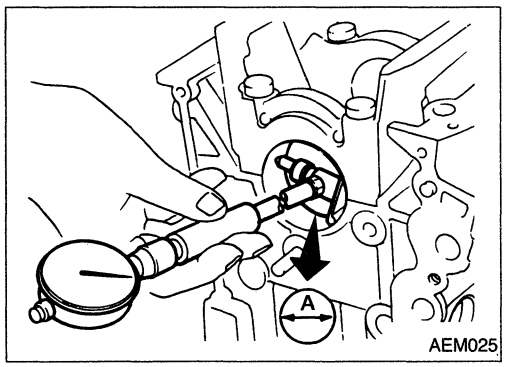
BEARING CLEARANCE

- 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.

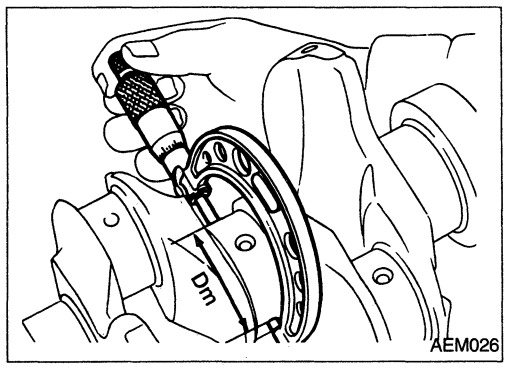


AEM025

2. Install main bearing cap to cylinder block.

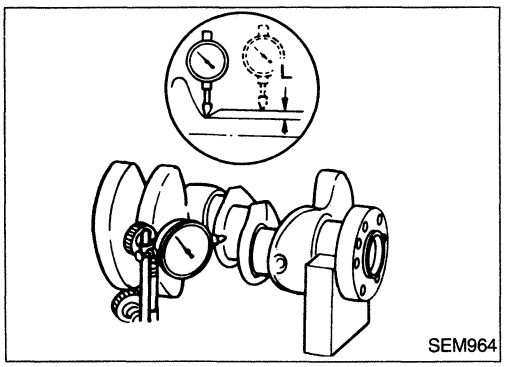
Tighten all bolts in correct order in two or three stages. Refer to EM-50.

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



AEM026

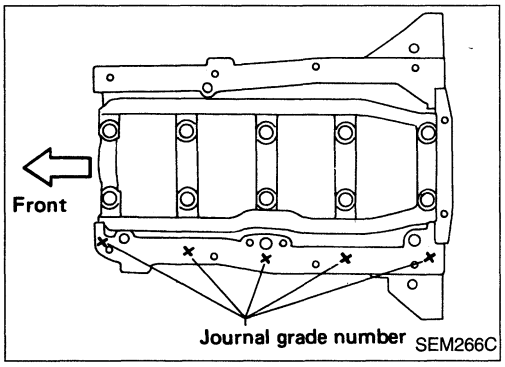
4. Measure outer diameter "Dm" of each crankshaft main journal.
5. Calculate main bearing clearance.
   Main bearing clearance = A − Dm
   Standard:
   0.020 - 0.047 mm (0.0008 - 0.0019 in)
   Limit: 0.1 mm (0.004 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing.



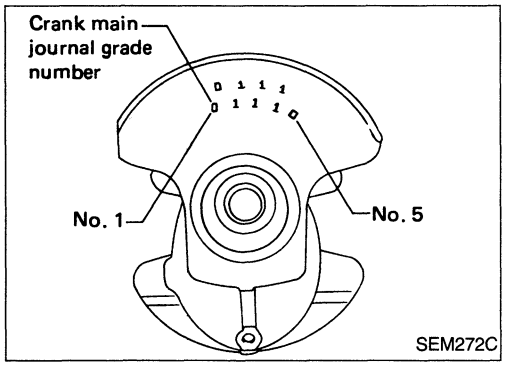
SEM964

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 EM-59 for grinding crankshaft and available service parts.

Inspection (Cont'd)



8. If crankshaft is reused, measure main bearing clearance and select thickness of main bearing.
   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. These numbers are punched in either Arabic or Roman numerals.



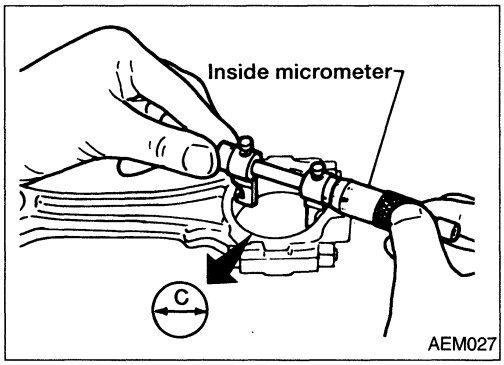
b. Grade number of each crankshaft main journal is punched on crankshaft. These numbers are punched in either Arabic or Roman numerals.

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

Main bearing grade number:

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

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



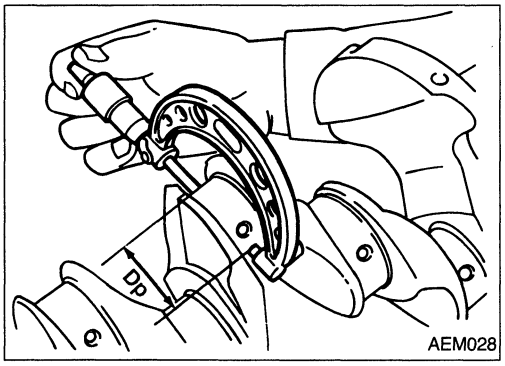
Connecting rod bearing (Big end)

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

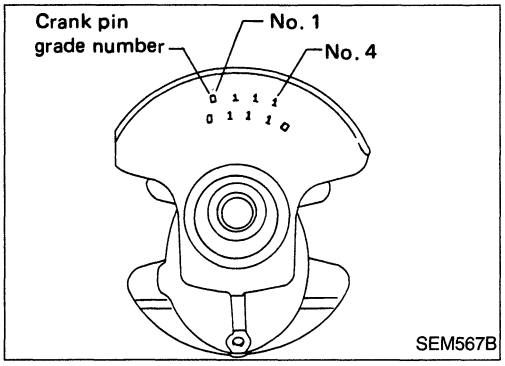
Tighten bolts to the specified torque.

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

Inspection (Cont'd)



4. Measure outer diameter "Dp" of each crankshaft pin journal.
5. Calculate connecting rod bearing clearance.
   Connecting rod bearing clearance = C − Dp
   Standard: 0.010 - 0.035 mm (0.0004 - 0.0014 in)
   Limit: 0.09 mm (0.0035 in)
6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing. Refer to step 7 on EM-46.

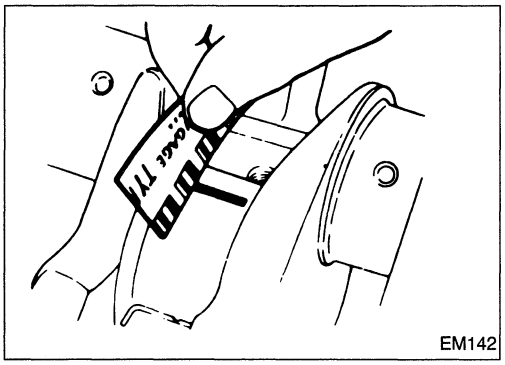


8. If crankshaft is replaced with a new one, select connecting rod bearing according to the following table.

Connecting rod bearing grade number:

These numbers are punched in either Arabic or Roman numerals.

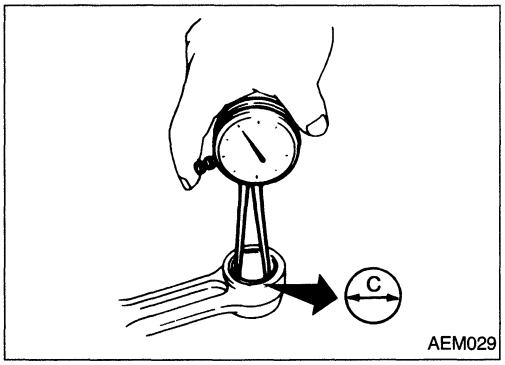
Crank pin grade number	Connecting rod bearing grade number
0	0
1	1
2	2



Method B (Using plastigage)

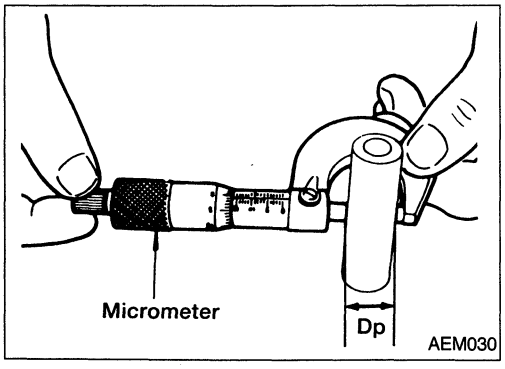
CAUTION:

- **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.**



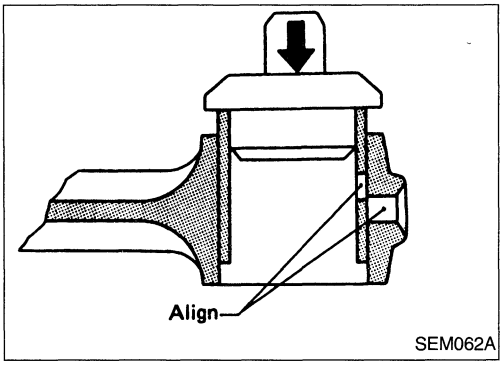
CONNECTING ROD BUSHING CLEARANCE (Small end)

1. Measure inner diameter "C" of bushing.



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

Inspection (Cont'd)



SEM062A

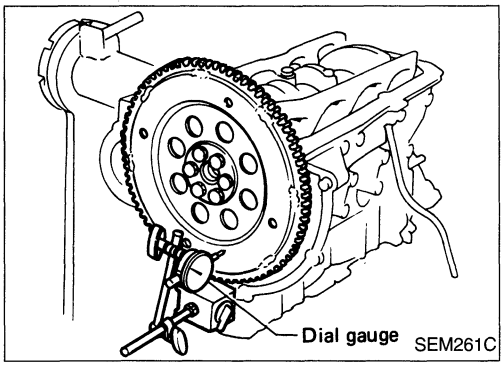
REPLACEMENT OF CONNECTING ROD BUSHING (Small end)

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

Be sure to align the oil holes.

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

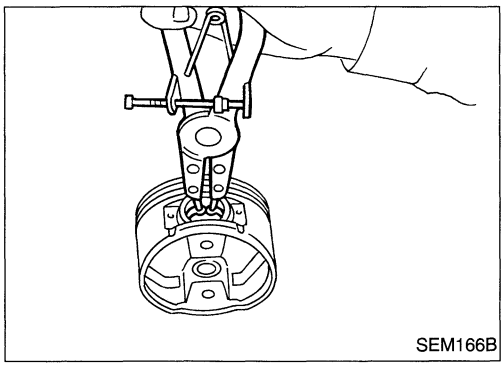
Clearance between small end bushing and piston pin:
0.005 - 0.017 mm (0.0002 - 0.0007 in)



SEM261C

FLYWHEEL/DRIVE PLATE RUNOUT

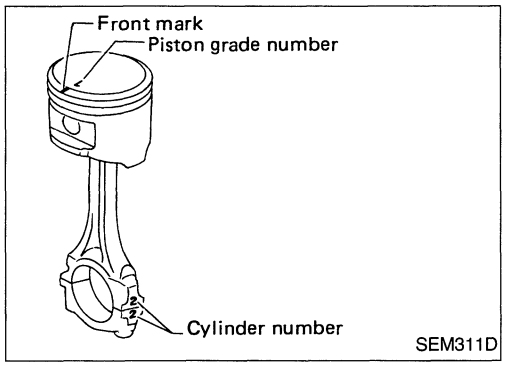
Runout (Total indicator reading):
Flywheel (M/T model)
Less than 0.15 mm (0.0059 in)
Drive plate (A/T model)
Less than 0.15 mm (0.0059 in)


SEM166B

Assembly

PISTON

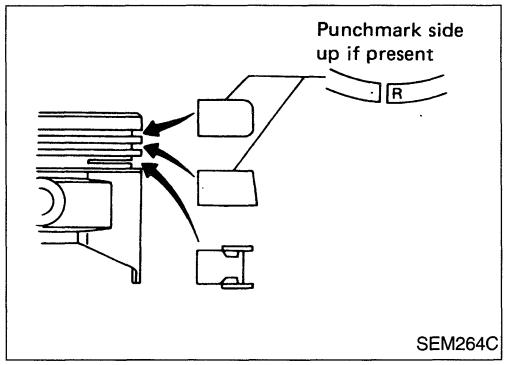
1. Install new snap ring on one side of piston pin hole.



SEM311D

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.**

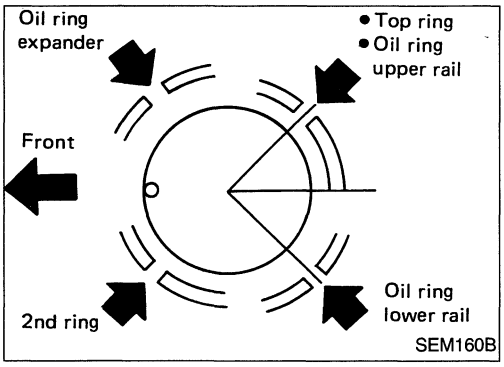


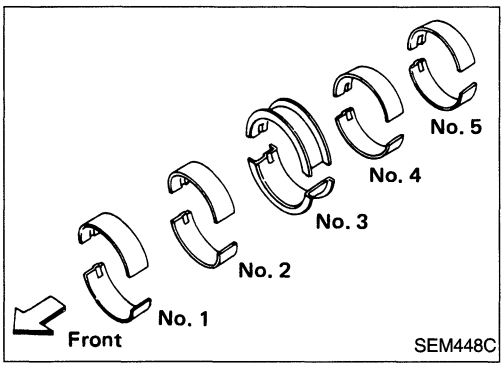
SEM264C

3. Set piston rings as shown.

CAUTION:

- **When piston rings are not being 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.**

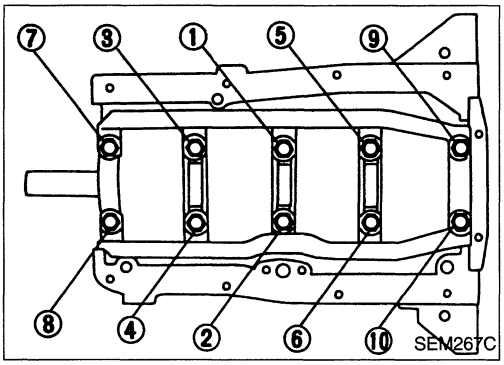




CRANKSHAFT

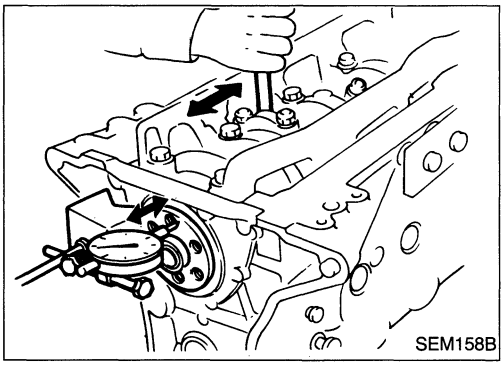
1. Set main bearings in their proper positions on cylinder block and main bearing beam.

- **Confirm that correct main bearings are used. Refer to EM-45.**



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

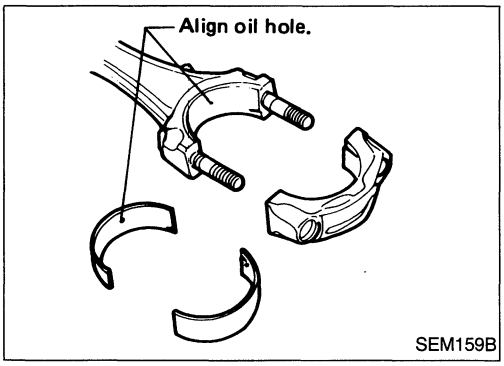
- **Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial direction.**
- **Tighten bearing cap bolts gradually in two or three stages. Start with center bearing and move outward sequentially.**
- **After securing bearing cap bolts, make sure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



3. Measure crankshaft end play.

Crankshaft end play:
Standard
0.05 - 0.18 mm (0.0020 - 0.0071 in)
Limit
0.3 mm (0.012 in)

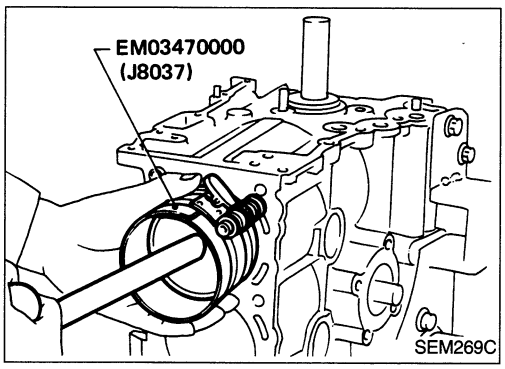
If beyond the limit, replace bearing with a new one.



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

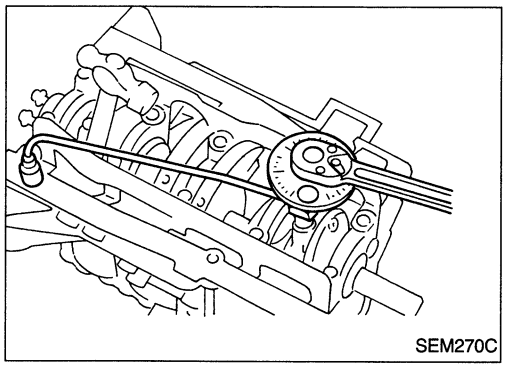
- Confirm that correct bearings are used. Refer to EM-47.
- Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.

Assembly (Cont'd)



5. Install pistons with connecting rods.
a. Install them into corresponding cylinders with Tool.

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

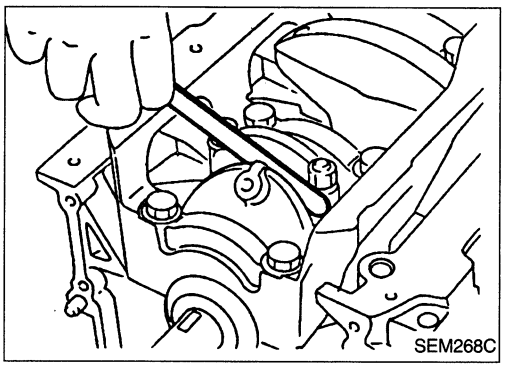


b. Install connecting rod bearing caps.
Tighten connecting rod bearing cap nuts to the specified torque.

Connecting rod bearing nut:

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

(2) Tighten bolts 60 to 65 degrees clockwise with an angle wrench, or if an angle wrench is not available, tighten them 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

0.2 - 0.4 mm (0.008 - 0.016 in)

Limit

0.6 mm (0.024 in)

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

General Specifications

Cylinder arrangement		In-line 4
Displacement	cm^3 (cu in)	2,389 (145.78)
Bore and stroke	mm (in)	89 x 96 (3.50 x 3.78)
Valve arrangement		D.O.H.C.
Firing order		1-3-4-2
Number of piston rings		
Compression		2
Oil		1
Number of main bearings		5
Compression ratio		9.2

COMPRESSION PRESSURE

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

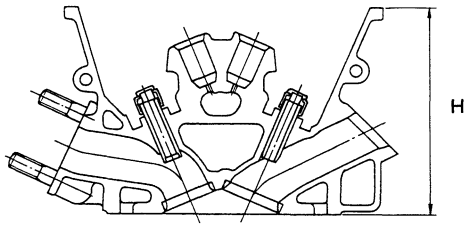
Compression pressure	
Standard	1,226 (12.5, 178)
Minimum	1,030 (10.5, 149)
Differential limit between cylinders	98 (1.0, 14)

Inspection and Adjustment

CYLINDER HEAD

Unit: mm (in)

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

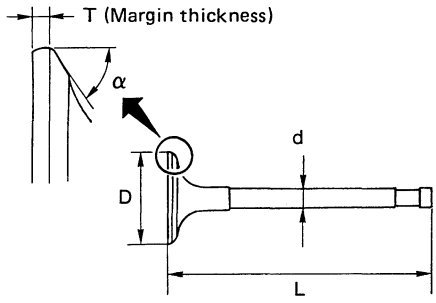


Nominal cylinder head height:
H = 126.3 - 126.5 (4.972 - 4.980)

SEM956C

VALVE

Unit: mm (in)



SEM188

Valve head diameter "D"	
Intake	36.5 - 36.7 (1.437 - 1.445)
Exhaust	31.2 - 31.4 (1.228 - 1.236)
Valve length "L"	
Intake	101.02 - 101.62 (3.9772 - 4.0008)
Exhaust	98.52 - 99.72 (3.8787 - 3.9260)
Valve stem diameter "d"	
Intake	6.965 - 6.980 (0.2742 - 0.2748)
Exhaust	6.945 - 6.960 (0.2734 - 0.2740)
Valve seat angle "α"	
Intake	45°15' - 45°45'
Exhaust	
Valve margin "T"	
Intake	0.95 - 1.25 (0.0374 - 0.0492)
Exhaust	1.15 - 1.45 (0.0453 - 0.0571)
Valve margin "T" limit	More than 0.5 (0.020)
Valve stem end surface grinding limit	Less than 0.2 (0.008)

Inspection and Adjustment (Cont'd)

Valve spring

Free height	mm (in)	45.79 (1.8028)
Pressure N (kg, lb) at height mm (in)		
Standard		471.7 (48.1, 106.1) at 26.06 (1.0260)
Limit		421.31 (42.96, 94.73) at 26.06 (1.0260)
Out-of-square	mm (in)	Less than 2.0 (0.079)

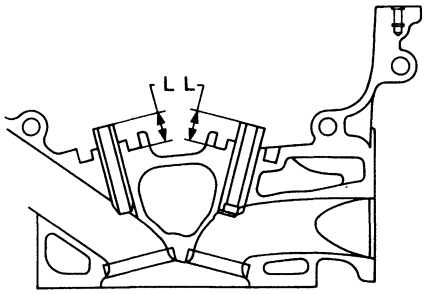
Valve lifter

Unit: mm (in)

Valve lifter outer diameter	33.960 - 33.975 (1.3370 - 1.3376)
Lifter guide inner diameter	34.000 - 34.021 (1.3386 - 1.3394)
Clearance between lifter and filter guide	0.025 - 0.061 (0.0010 - 0.0024)

Valve guide

Unit: mm (in)



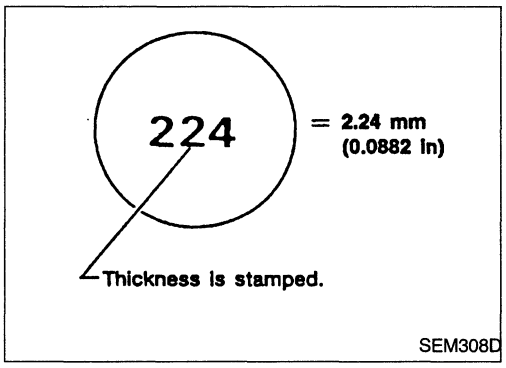
SEM301D

		Standard	Service
Valve guide Outer diameter	Intake & Exhaust	11.023 - 11.034 (0.4340 - 0.4344)	11.223 - 11.234 (0.4418 - 0.4423)
Valve guide Inner diameter (Finished size)	Intake	7.000 - 7.018 (0.2756 - 0.2763)	
	Exhaust	7.000 - 7.018 (0.2756 - 0.2763)	
Cylinder head valve guide hole diameter	Intake & Exhaust	10.975 - 10.996 (0.4321 - 0.4329)	11.175 - 11.196 (0.4400 - 0.4408)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	Limit
Stem to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	0.08 (0.0031)
	Exhaust	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
Valve deflection limit		0.2 (0.008)	
Projection length "L"		13.3 - 13.9 (0.524 - 0.547)	

Valve clearance adjustment

Unit: mm (in)

Valve clearance	
Intake	0.31 - 0.39 (0.012 - 0.015)
Exhaust	0.33 - 0.41 (0.013 - 0.016)



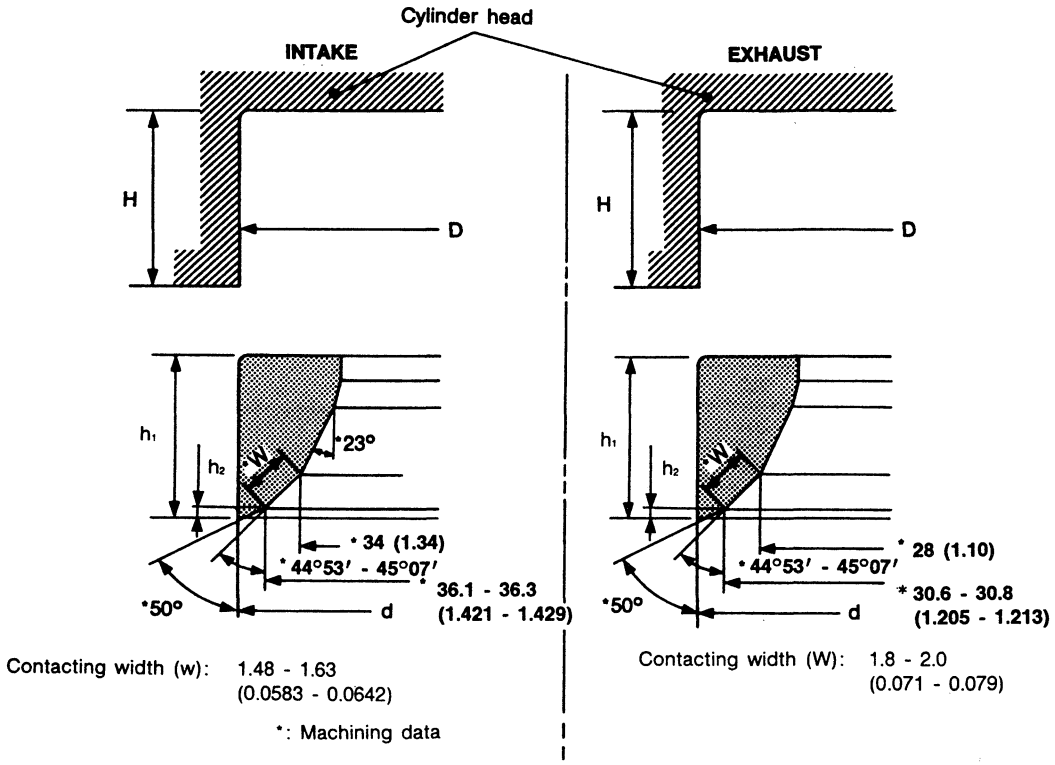
Available shims

Thickness mm (in)	Identification mark
1.96 (0.0772)	196
1.98 (0.0780)	198
2.00 (0.0787)	200
2.02 (0.0795)	202
2.04 (0.0803)	204
2.06 (0.0811)	206
2.08 (0.0819)	208
2.10 (0.0827)	210
2.12 (0.0835)	212
2.14 (0.0843)	214
2.16 (0.0850)	216
2.18 (0.0858)	218
2.20 (0.0866)	220
2.22 (0.0874)	222
2.24 (0.0882)	224
2.26 (0.0890)	226
2.28 (0.0898)	228
2.30 (0.0906)	230
2.32 (0.0913)	232
2.34 (0.0921)	234
2.36 (0.0929)	236
2.38 (0.0937)	238
2.40 (0.0945)	240
2.42 (0.0953)	242
2.44 (0.0961)	244
2.46 (0.0969)	246
2.48 (0.0976)	248
2.50 (0.0984)	250
2.52 (0.0992)	252
2.54 (0.1000)	254
2.56 (0.1008)	256
2.58 (0.1016)	258
2.60 (0.1024)	260
2.62 (0.1031)	262
2.64 (0.1039)	264
2.66 (0.1047)	266
2.68 (0.1055)	268

Inspection and Adjustment (Cont'd)

Valve seat

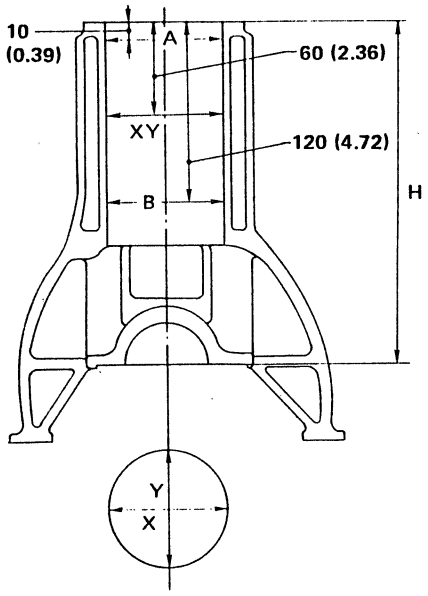
Unit: mm (in)



		Standard	Service
Cylinder head seat recess diameter (D)	In.	37.500 - 37.516 (1.4764 - 1.4770)	38.000 - 38.016 (1.4961 - 1.4967)
	Ex.	32.200 - 32.216 (1.2677 - 1.2683)	32.700 - 32.716 (1.2874 - 1.2880)
Valve seat interference fit	In.	0.064 - 0.096 (0.0025 - 0.0038)	
	Ex.	0.064 - 0.096 (0.0025 - 0.0038)	
Valve seat outer diameter (d)	In.	37.580 - 37.596 (1.4795 - 1.4802)	38.080 - 38.096 (1.4992 - 1.4998)
	Ex.	32.280 - 32.296 (1.2709 - 1.2715)	32.780 - 32.796 (1.2905 - 1.2912)
Depth (H)	In.	6.19 - 6.21 (0.2437 - 0.2445)	
	Ex.	6.1 - 6.3 (0.240 - 0.248)	
Height (h_1)		5.9 - 6.0 (0.232 - 0.236)	
Height (h_2)	In.	0.44 - 0.64 (0.0173 - 0.0252)	
	Ex.	0.53 - 0.73 (0.0209 - 0.0287)	

Inspection and Adjustment (Cont'd)

CYLINDER BLOCK



SEM447C

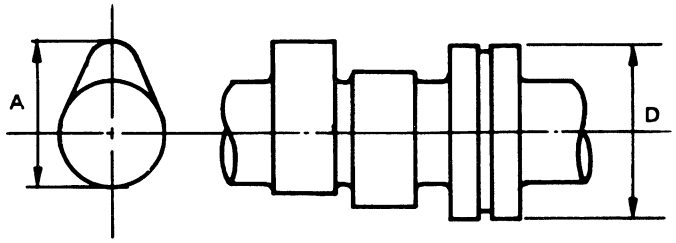
Unit: mm (in)

			Standard	Limit
Distortion			Less than 0.03 (0.0012)	0.1 (0.004)
Cylinder bore	Inner diameter	Grade 1	89.000 - 89.010 (3.5039 - 3.5043)	0.2 (0.008)
		Grade 2	89.010 - 89.020 (3.5043 - 3.5047)	
		Grade 3	89.020 - 89.030 (3.5047 - 3.5051)	
	Out-of-round (X − Y)		Less than 0.015 (0.0006)	—
	Taper (A − B)		Less than 0.010 (0.0004)	—
Difference in inner diameter between cylinders			Less than 0.03 (0.0012)	0.2 (0.008)
Cylinder block height : H (From crankshaft center)			246.95 - 247.05 (9.7224 - 9.7264)	0.2 (0.008)*

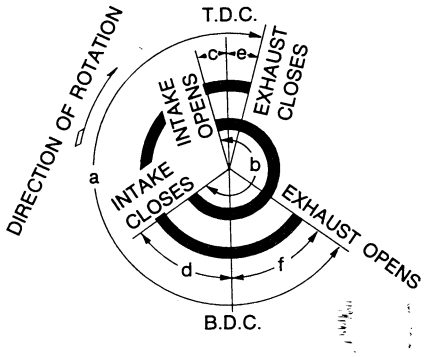
* Total amount of cylinder head resurfacing and cylinder block resurfacing

Inspection and Adjustment (Cont'd)

CAMSHAFT AND CAMSHAFT BEARING



SEM568A



EM120

Unit: mm (in)

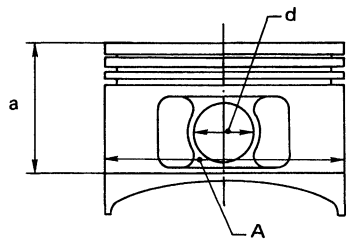
		Standard	Limit
Cam height (A)	Intake	42.415 - 42.605 (1.6699 - 1.6774)	—
	Exhaust	42.415 - 43.005 (1.6699 - 1.6931)	—
Wear limit of cam height		—	0.2 (0.008)
Camshaft journal to bearing clearance		0.045 - 0.090 (0.0018 - 0.0035)	0.12 (0.0047)
Inner diameter of camshaft bearing	#1 journal	28.000 - 28.025 (1.1024 - 1.1033)	—
	#2 to #5 journal	24.000 - 24.025 (0.9449 - 0.9459)	
Outer diameter of camshaft journal (D)	#1 journal	27.935 - 27.955 (1.0998 - 1.1006)	—
	#1 to #5 journal	23.935 - 23.955 (0.9423 - 0.9431)	
Camshaft runout*		Less than 0.02 (0.0008)	0.04 (0.0016)
Camshaft end play		0.07 - 0.15 (0.0028 - 0.0059)	0.20 (0.0079)
Valve timing (Degree on crankshaft)	a	248	—
	b	240	—
	c	−1	—
	d	61	—
	e	8	—
	f	60	—

* Total indicator reading

Inspection and Adjustment (Cont'd)

PISTON, PISTON RING AND PISTON PIN

Piston



SEM444C

Unit: mm (in)

Piston skirt diameter (A)	Standard	Grade No. 1	88.970 - 88.980 (3.5027 - 3.5031)
		Grade No. 2	88.980 - 88.990 (3.5031 - 3.5035)
		Grade No. 3	88.990 - 89.000 (3.5035 - 3.5039)
	Service (Oversize)	0.5 (0.020)	89.470 - 89.500 (3.5224 - 3.5236)
		1.0 (0.039)	89.970 - 90.000 (3.5421 - 3.5433)
Dimension (a)		Approximately 52 (2.05)	
Piston pin hole diameter (d)		20.987 - 20.999 (0.8263 - 0.8267)	
Piston-to-cylinder bore clearance		0.020 - 0.040 (0.0008 - 0.0016)	

Piston pin

Unit: mm (in)

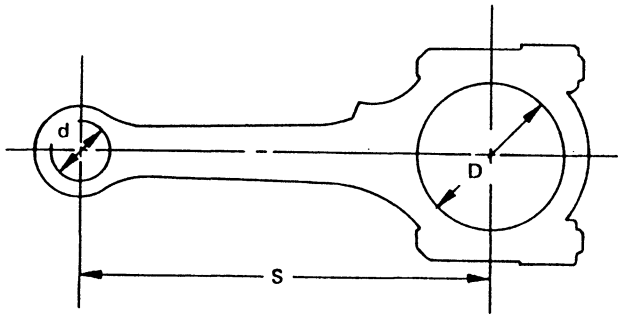
	Standard	Limit
Piston pin outer diameter	20.989 - 21.001 (0.8263 - 0.8268)	—
Interference fit of piston pin to piston pin hole	0 - 0.004 (0 - 0.0002)	—
Piston pin to connecting rod bearing clearance	0.005 - 0.017 (0.0002 - 0.0007)	0.023 (0.0009)

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)	0.1 (0.004)
Ring gap	Top	0.28 - 0.52 (0.0110 - 0.0205)	1.0 (0.039)
	2nd	0.45 - 0.69 (0.0177 - 0.0272)	1.0 (0.039)
	Oil (rail ring)	0.20 - 0.69 (0.0079 - 0.0272)	1.0 (0.039)

CONNECTING ROD



SEM180E

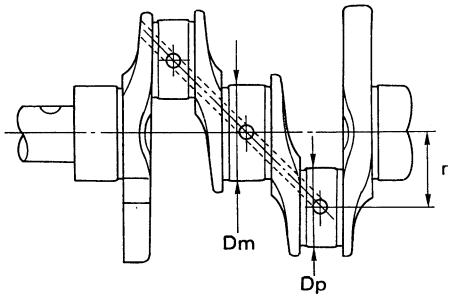
Unit: mm (in)

	Standard	Limit
Center distance (S)	164.95 - 165.05 (6.4941 - 6.4980)	—
Bend [per 100 mm (3.94 in)]	—	0.15 (0.0059)
Torsion [per 100 mm (3.94 in)]	—	0.30 (0.0118)
Piston pin bushing inner diameter (d)*	21.000 - 21.012 (0.8268 - 0.8272)	—
Connecting rod big end inner diameter (D)*	53.000 - 53.013 (2.0866 - 2.0871)	—
Side clearance	0.2 - 0.4 (0.008 - 0.016)	0.6 (0.024)

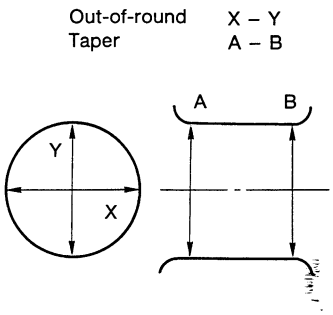
* Without bearing

Inspection and Adjustment (Cont'd)

CRANKSHAFT



SEM394



EM715

Unit: mm (in)

Main journal diameter (Dm)	Grade	No. 0	59.967 - 59.975 (2.3609 - 2.3612)
		No. 1	59.959 - 59.967 (2.3606 - 2.3609)
		No. 2	59.951 - 59.959 (2.3603 - 2.3606)
Pin journal diameter (Dp)	Grade	No. 0	49.968 - 49.974 (1.9672 - 1.9675)
		No. 1	49.962 - 49.968 (1.9670 - 1.9672)
		No. 2	49.956 - 49.962 (1.9668 - 1.9670)
Center distance (r)			47.97 - 48.05 (1.8886 - 1.8917)

	Standard	Limit
Taper of journal and pin [Ⓐ – Ⓑ]	Less than 0.002 (0.0001)	—
Out-of-round of journal and pin [Ⓧ – Ⓨ]	Less than 0.005 (0.0002)	—
Runout [T.I.R.]*	Less than 0.04 (0.0016)	—
Free end play	0.05 - 0.18 (0.0020 - 0.0071)	0.3 (0.012)
Fillet roil	More than 0.1 (0.004)	

* Total indicator reading

BEARING CLEARANCE

Unit: mm (in)

	Standard	Limit
Main bearing clearance	0.020 - 0.047 (0.0008 - 0.0019)	0.1 (0.004)
Connecting rod bearing clearance	0.010 - 0.035 (0.0004 - 0.0014)	0.09 (0.0035)

AVAILABLE MAIN BEARING

Standard

Grade number	Thickness mm (in)	Identification color
0	1.821 - 1.825 (0.0717 - 0.0719)	Black
1	1.825 - 1.829 (0.0719 - 0.0720)	Brown
2	1.829 - 1.833 (0.0720 - 0.0722)	Green
3	1.833 - 1.837 (0.0722 - 0.0723)	Yellow
4	1.837 - 1.841 (0.0723 - 0.0725)	Blue

Inspection and Adjustment (Cont'd)

Undersize (service)

Unit: mm (in)

	Thickness	Main journal diameter "Dm"
0.25 (0.0098)	1.952 - 1.960 (0.0769 - 0.0772)	Grind so that bearing clearance is the specified value.

AVAILABLE CONNECTING ROD BEARING

Standard

Grade number	Thickness mm (in)	Identification color
0	1.505 - 1.508 (0.0593 - 0.0594)	—
1	1.508 - 1.511 (0.0594 - 0.0595)	Brown
2	1.511 - 1.514 (0.0595 - 0.0596)	Green

Undersize (service)

Unit: mm (in)

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

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Camshaft sprocket runout	[T.I.R.]*	Less than 0.12 (0.0047)
Flywheel runout	[T.I.R.]*	Less than 0.15 (0.0059)
Drive plate runout	[T.I.R.]*	Less than 0.15 (0.0059)

* Total indicator reading

ENGINE LUBRICATION AND COOLING SYSTEM

SECTION LC

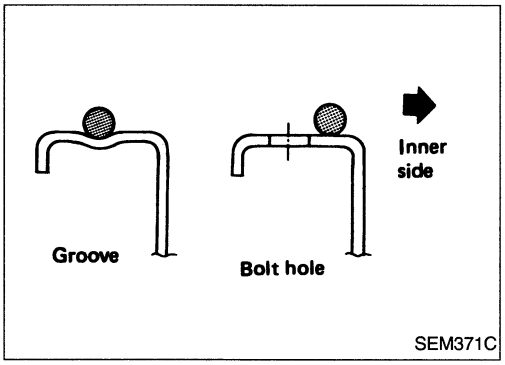
CONTENTS

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 control module, 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:

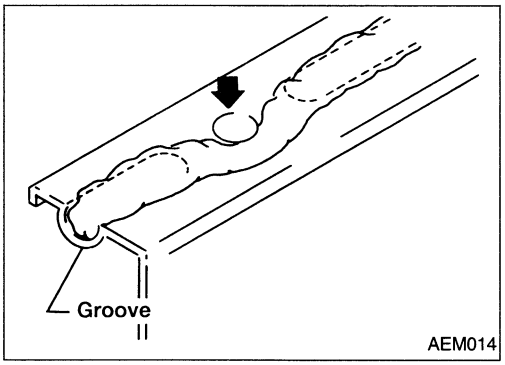
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "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.

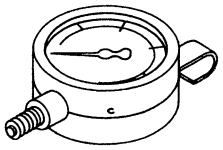
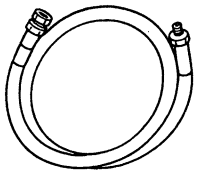
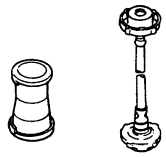
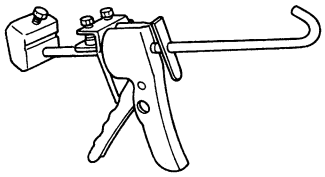
b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
   - Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide (for oil pan).
   - Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).



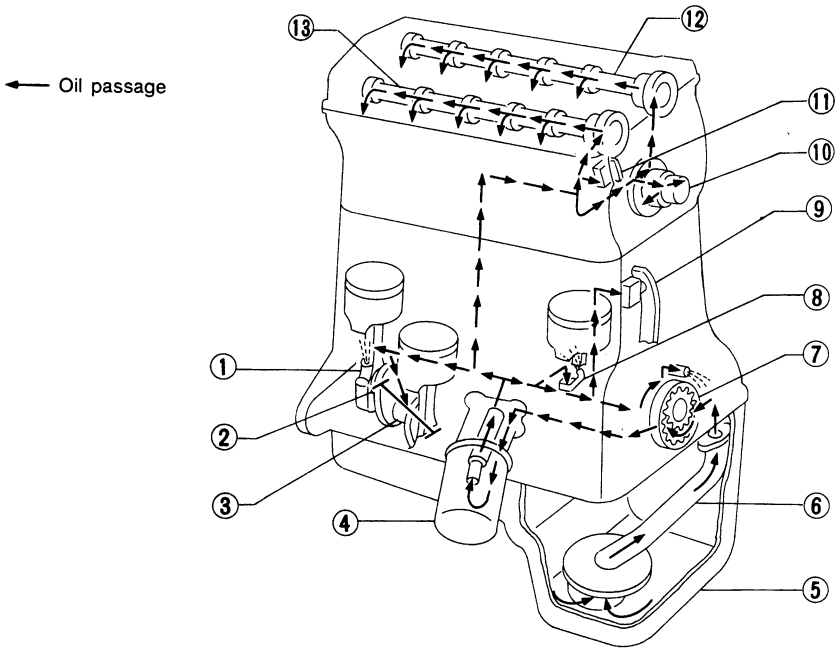
c. Apply liquid gasket to inner surface around hole perimeter area.
   (Assembly should be done within 5 minutes after coating.)

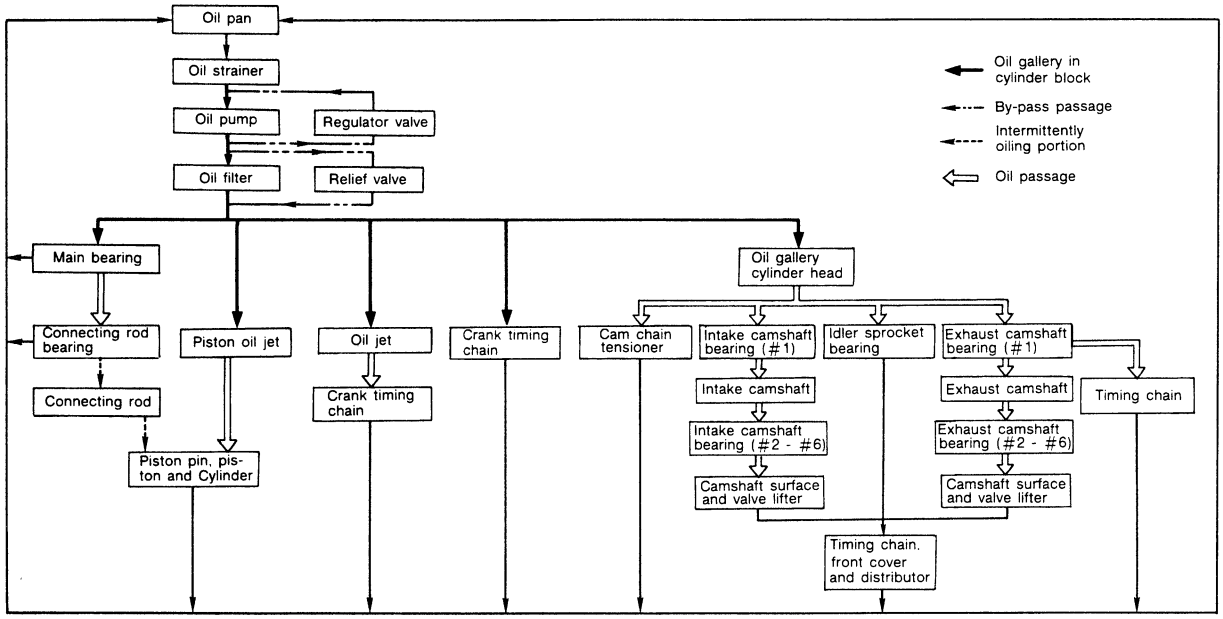
d. Wait at least 30 minutes before refilling engine oil and engine coolant.

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
EG17650301 (J33984-A) Radiator cap tester adapter		Adapting radiator cap tester to radiator filler neck
WS39930000 (—) Tube presser		Pressing the tube of liquid gasket

Lubrication Circuit





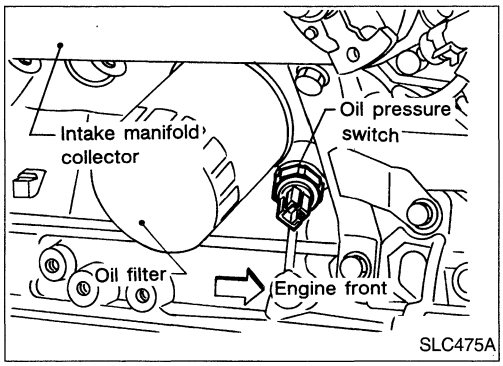
SLC749A

① Connecting rod
② Connecting rod bearing
③ Main bearing
④ Oil filter
⑤ Oil pan
⑥ Oil strainer
⑦ Oil pump
⑧ Piston oil jet
⑨ Timing chain tensioner
⑩ Idler sprocket
⑪ Upper timing chain tensioner
⑫ Exhaust camshaft
⑬ Intake camshaft

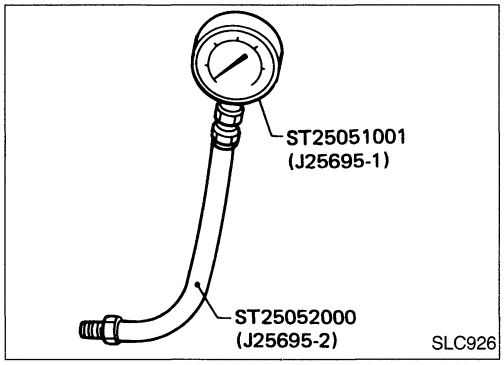
Oil Pressure Check

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.

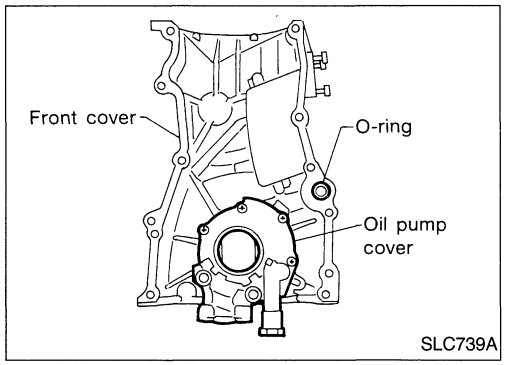


3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000 rpm	412 - 481 (4.2 - 4.9, 60 - 70)

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

6. Install oil pressure switch with sealant.



Oil Pump

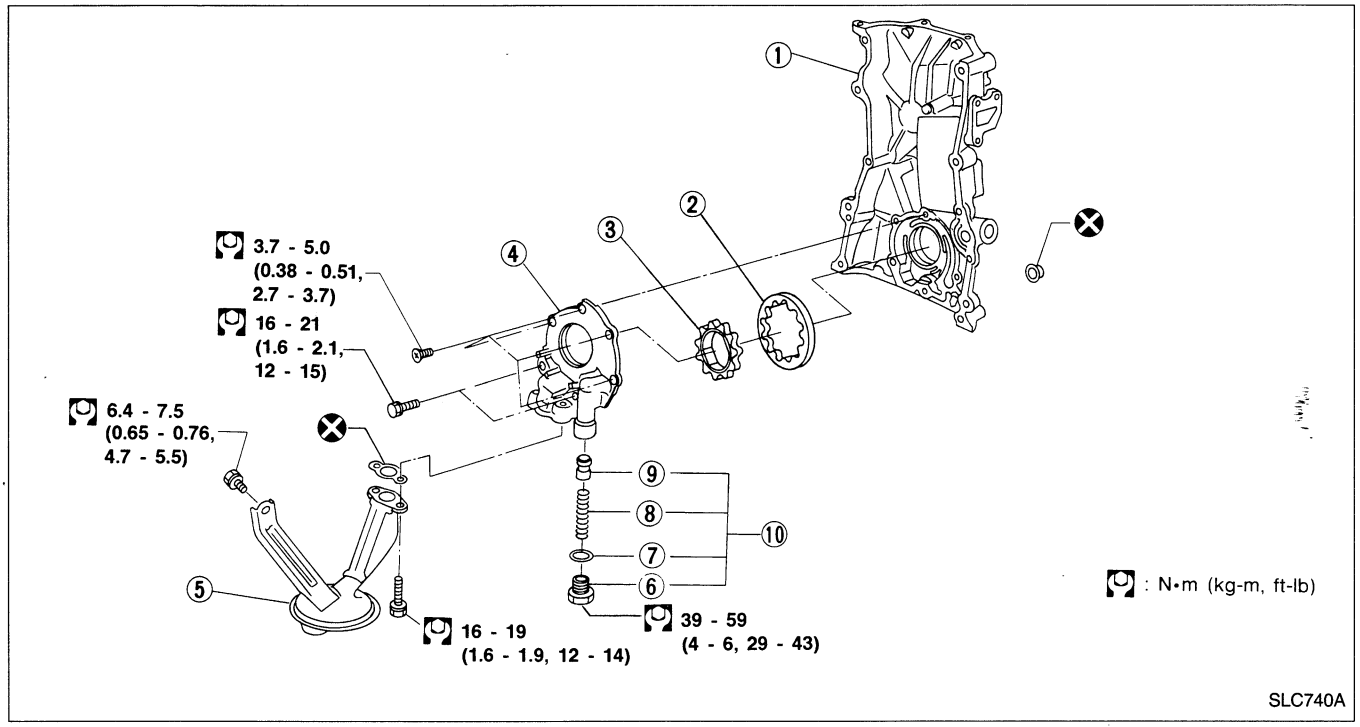
REMOVAL

1. Remove front cover.

Refer to EM section ("Removal", "TIMING CHAIN").

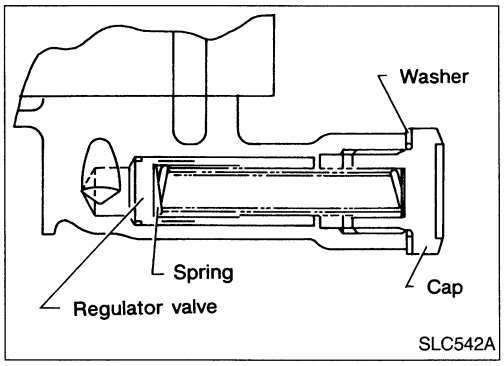
2. Remove oil pump cover.

Oil Pump (Cont'd)



① Front cover
② Outer gear
③ Inner gear
④ Oil pump cover
⑤ Oil strainer
⑥ Cap
⑦ Washer
⑧ Spring
⑨ Regulator valve
⑩ Regulator valve assembly

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

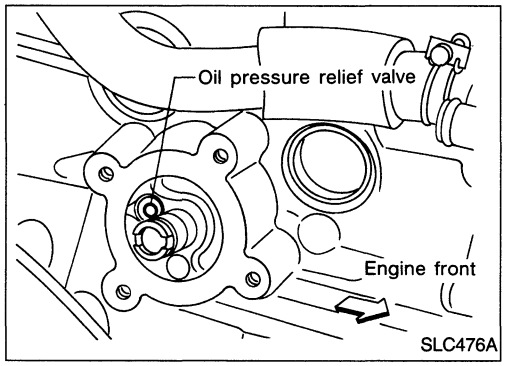


REGULATOR VALVE INSPECTION

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.

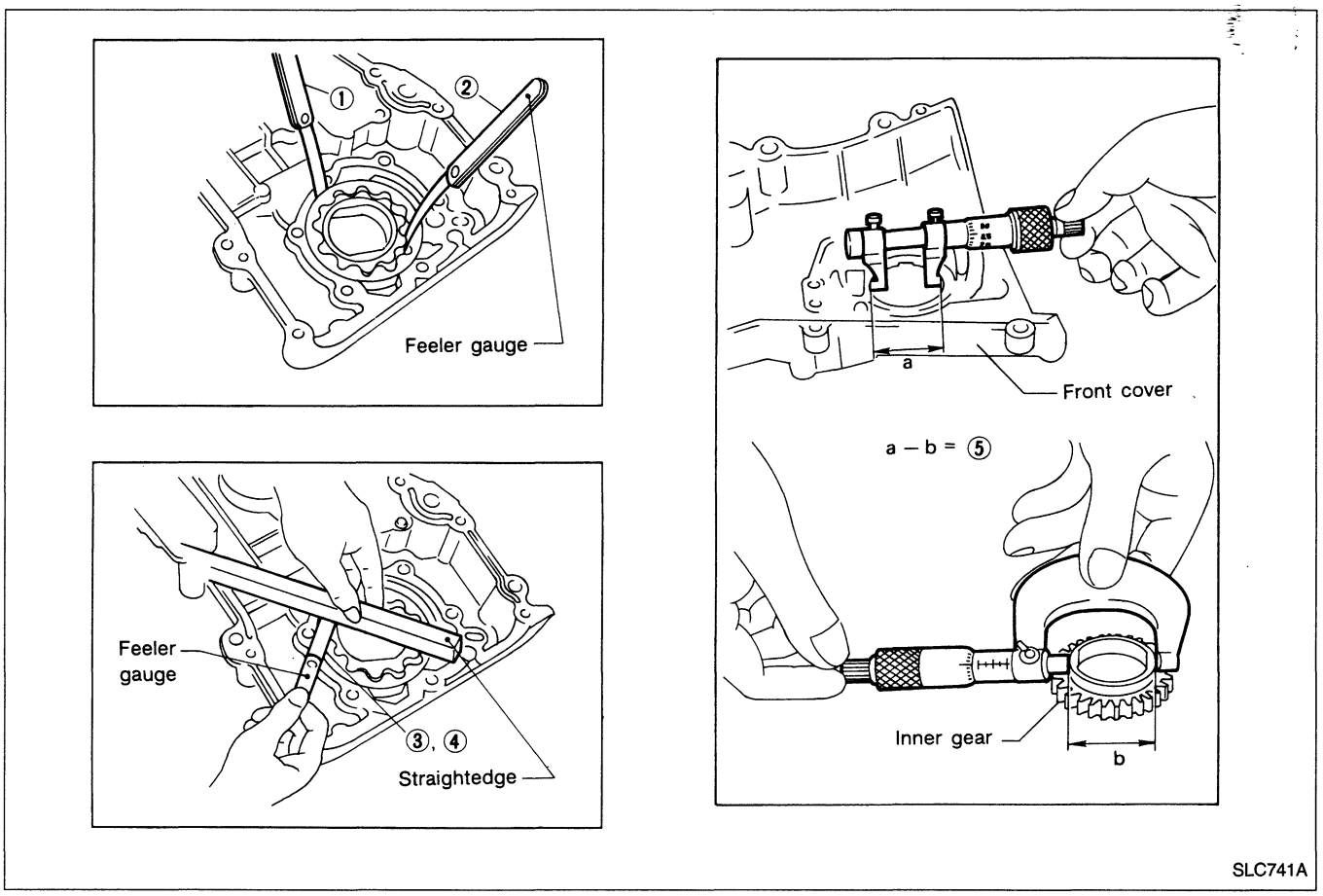
If damaged, replace regulator valve set or oil pump assembly.

Oil Pump (Cont'd)



OIL PRESSURE RELIEF VALVE INSPECTION

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



OIL PUMP INSPECTION

Using a feeler gauge, check the following clearances.

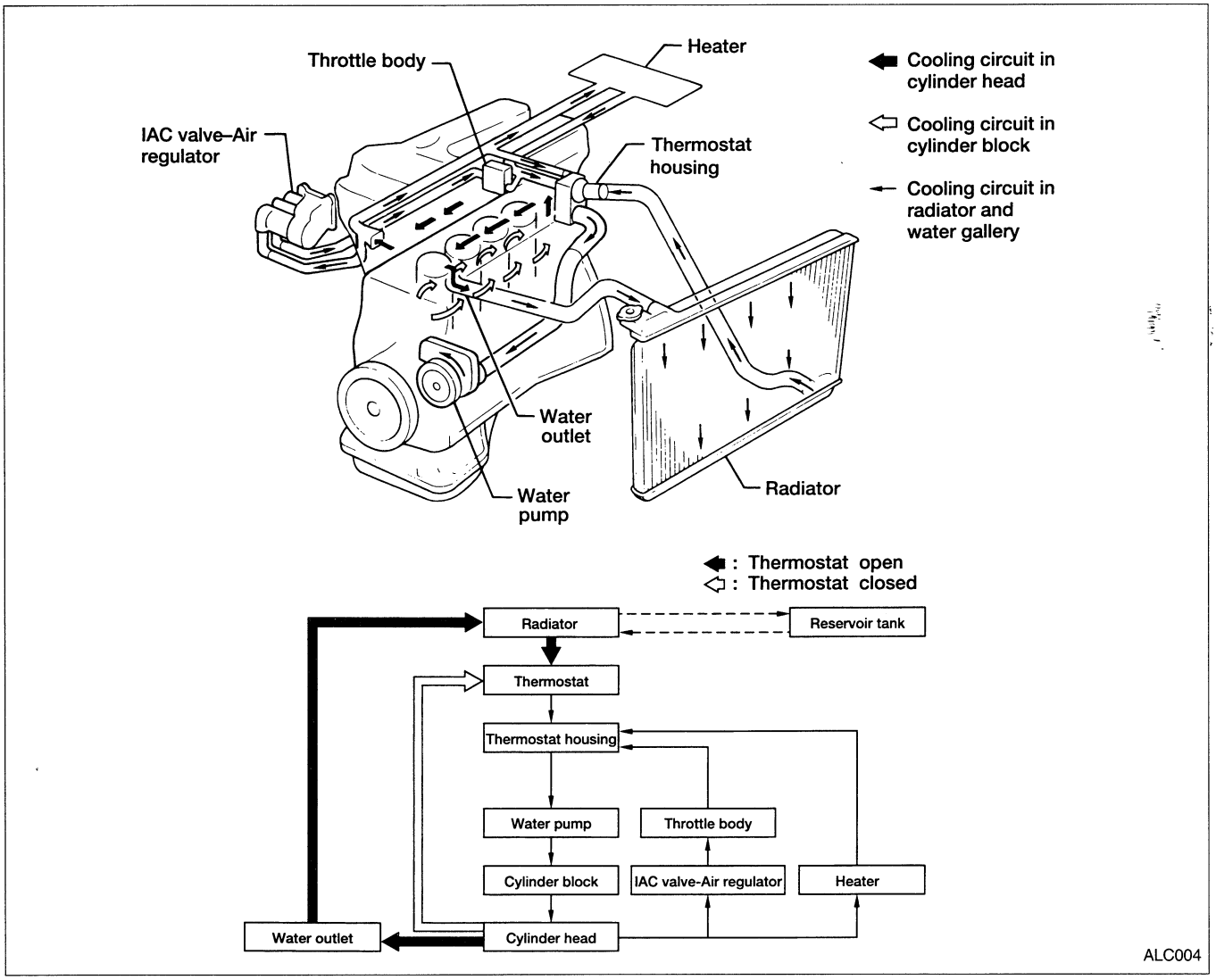
Standard clearance:

Unit: mm (in)

Body to outer gear clearance ①	0.114 - 0.20 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance ②	0.04 - 0.18 (0.0016 - 0.0071)
Cover to inner gear clearance ③	0.05 - 0.09 (0.0020 - 0.0035)
Cover to outer gear clearance ④	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion clearance ⑤	0.045 - 0.091 (0.0018 - 0.0036)

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

Cooling Circuit



System Check

WARNING:

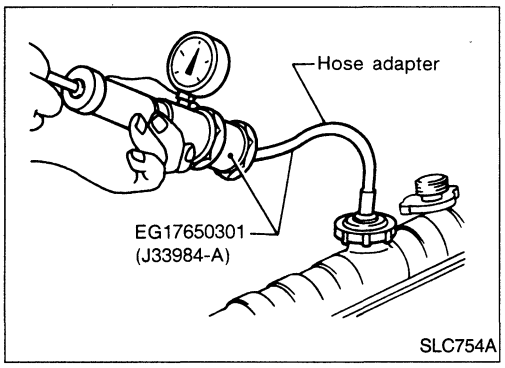
Never remove the radiator cap when the engine is hot; serious burns could be caused by high pressure fluid escaping from the radiator.

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.

CHECKING COOLING SYSTEM HOSES

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

System Check (Cont'd)

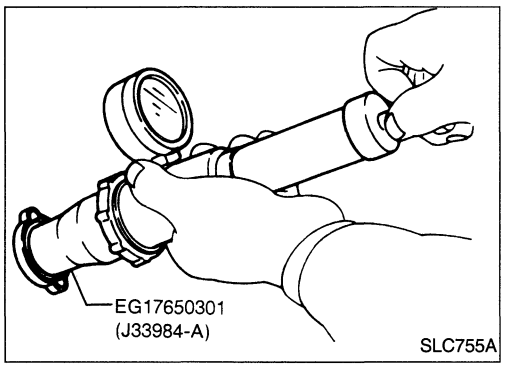


CHECKING COOLING SYSTEM FOR LEAKS

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

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

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

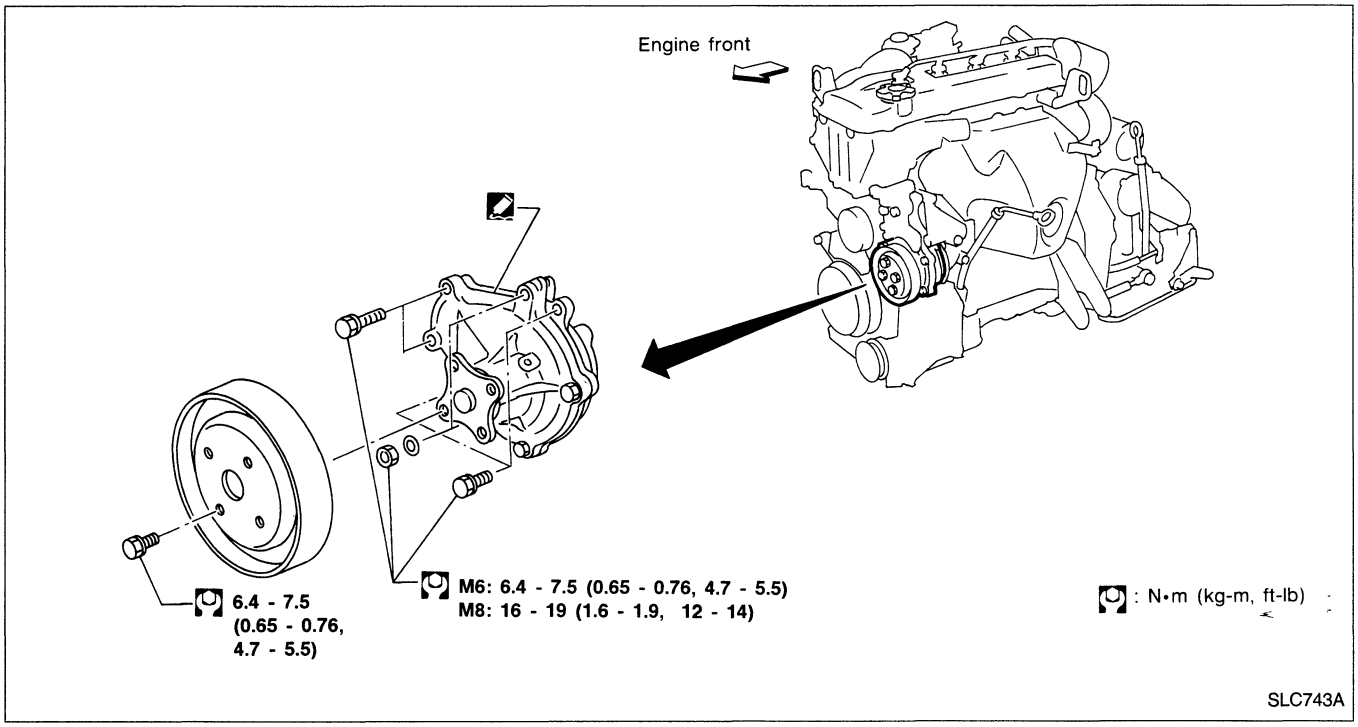


CHECKING RADIATOR CAP

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

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

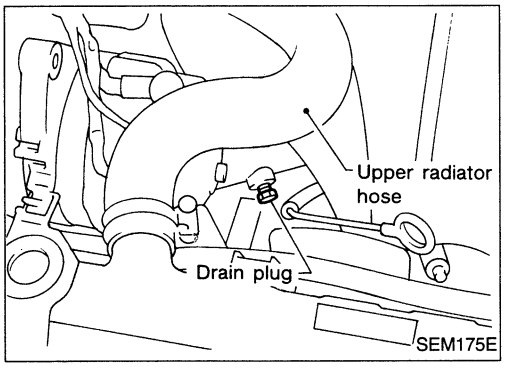
Water Pump



CAUTION:

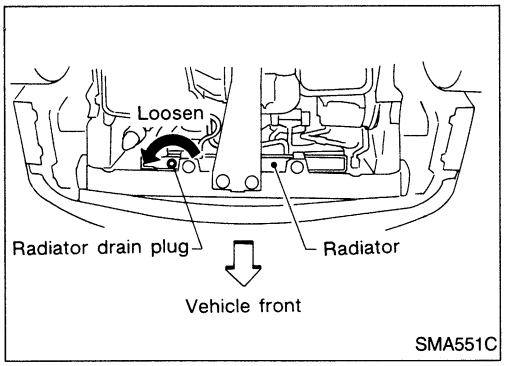
- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

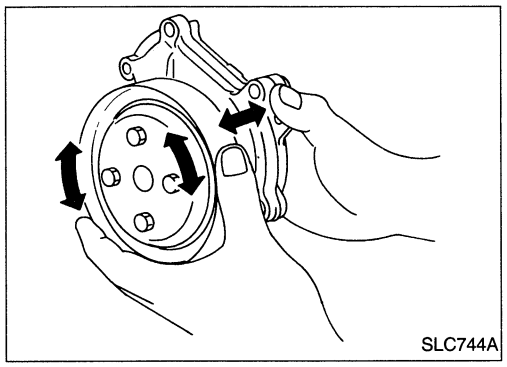
Water Pump (Cont'd)



REMOVAL

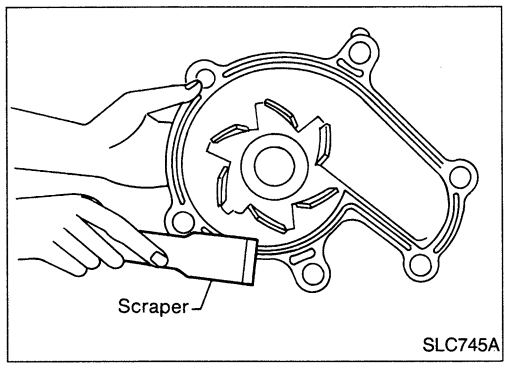
1. Drain coolant from drain plug on water pipe and radiator.
2. Remove generator and air compressor.
3. Remove water pump.





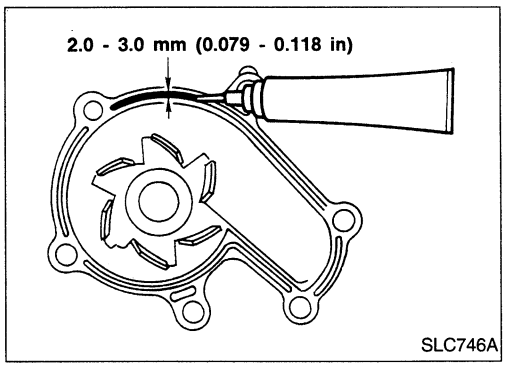
INSPECTION

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



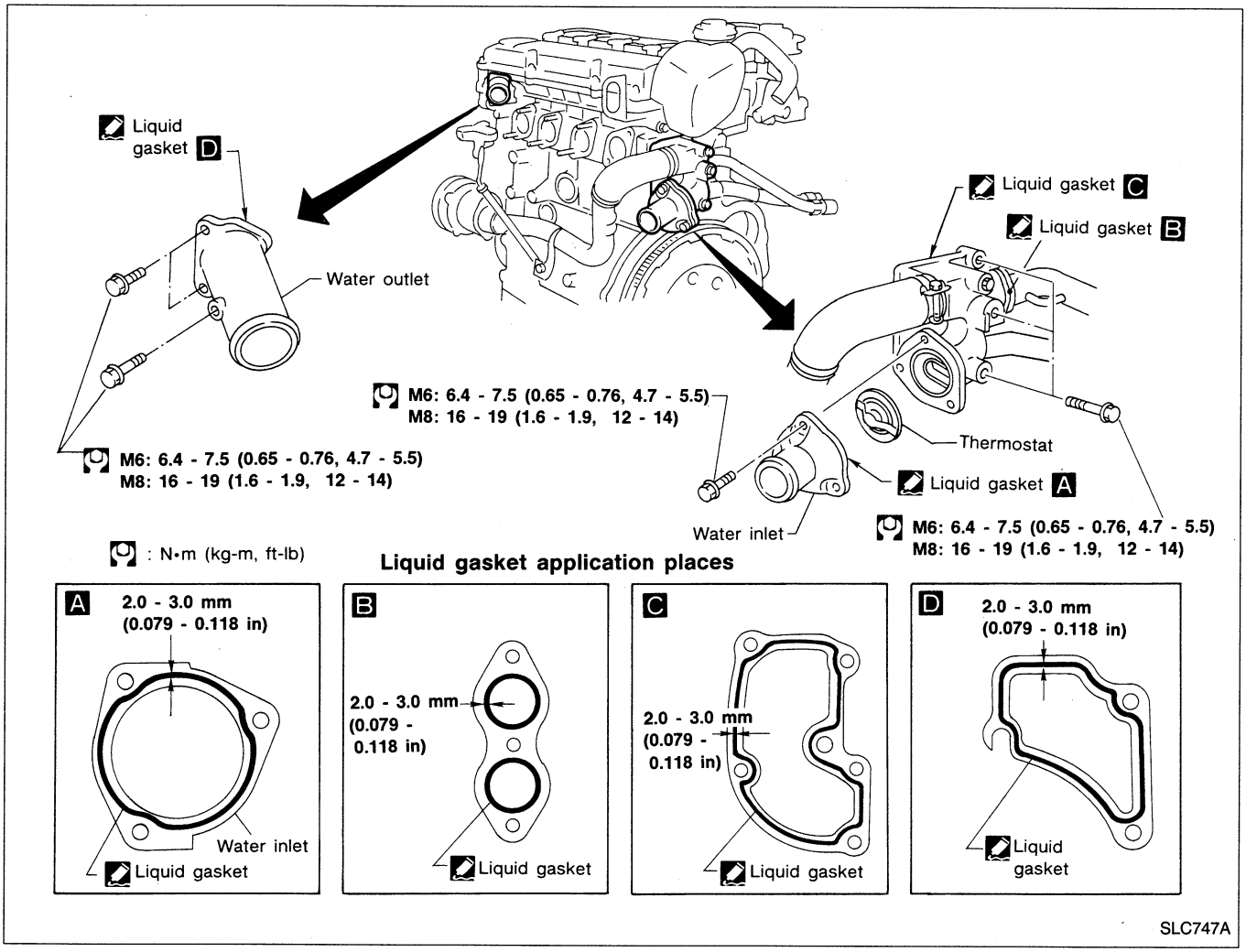
INSTALLATION

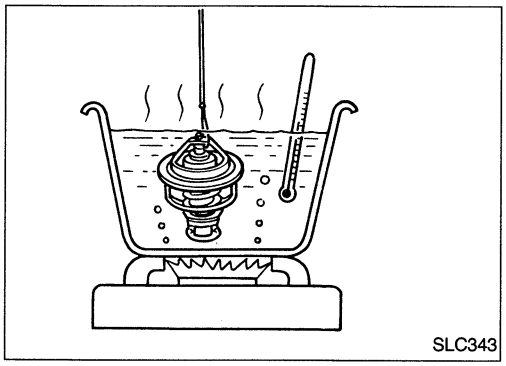
1. Before installing water pump, remove all traces of liquid gasket from mating surface using a scraper.
- Also remove traces of liquid gasket from mating surface of cylinder block.



2. Apply a continuous bead of liquid gasket to mating surface of water pump.
- Use genuine liquid gasket or equivalent.

Thermostat





INSPECTION

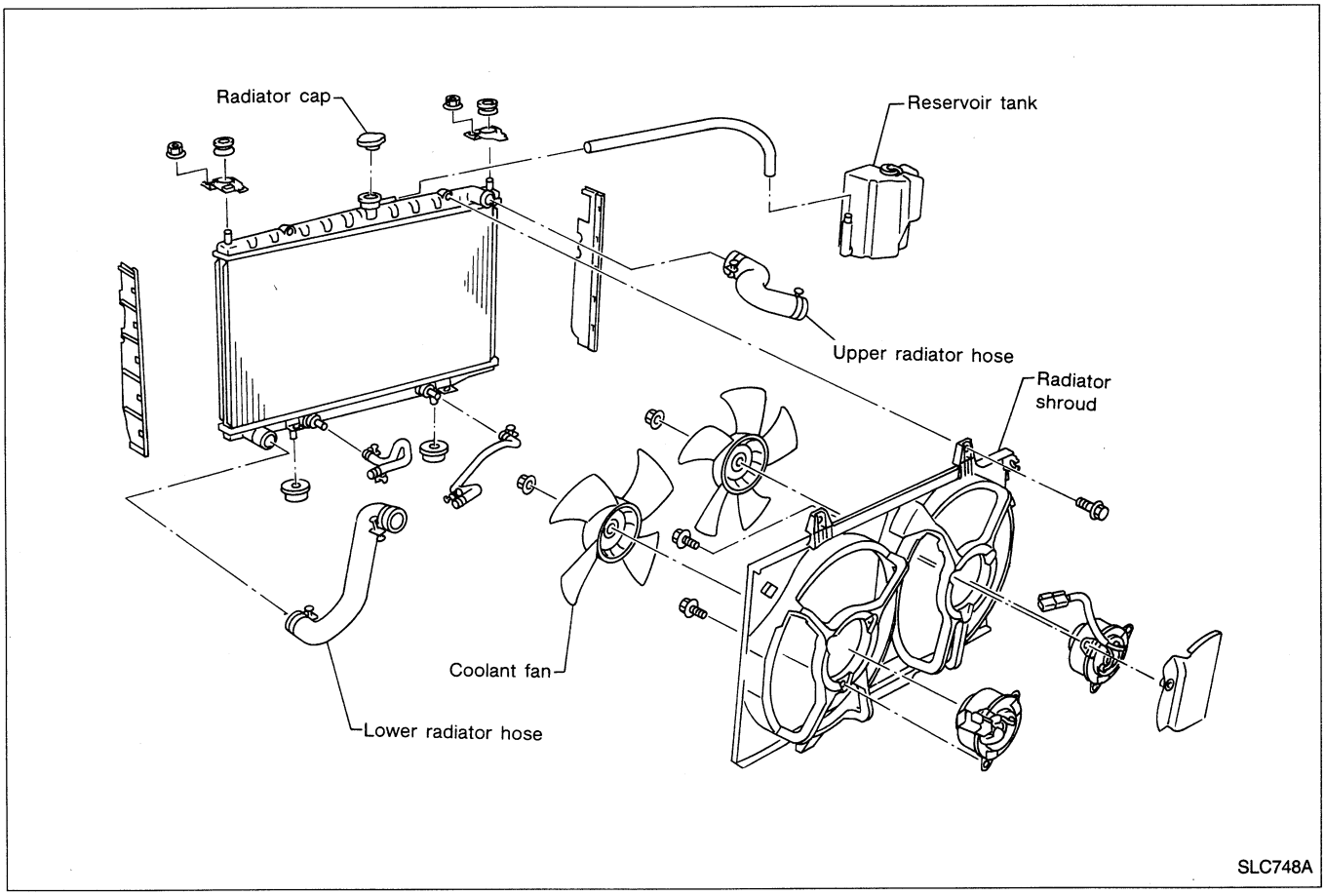
1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

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

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

- **Apply a continuous bead of liquid gasket to mating surface of water inlet.**
- **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



CAUTION:
When filling radiator with coolant, refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").

Engine Lubrication System

Oil pressure check

Engine speed	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed	More than 78 (0.8, 11)
3,000 rpm	412 - 481 (4.2 - 4.9, 60 - 70)

Oil pump

Unit: mm (in)

Body to outer gear clearance	.....	0.114 - 0.20 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance	.....	0.04 - 0.18 (0.0016 - 0.0071)
Cover to inner gear clearance	.....	0.05 - 0.09 (0.0020 - 0.0035)
Cover to outer gear clearance	.....	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion clearance	.....	0.045 - 0.091 (0.0018 - 0.0036)

Engine Cooling System

Thermostat

Valve opening temperature	°C (°F)	76.5 (170)
Max. 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 AND EMISSION CONTROL SYSTEM

SECTION EF & EC

CONTENTS

CONTENTS (Cont'd.)

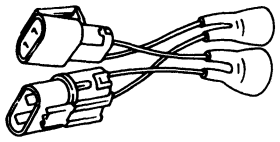
CONTENTS (Cont'd.)

Note: Refer to Foldout page for "ECCS 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".

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.) Tool name	Description
EG11160000 (—) Ignition coil adapter harness	 Measuring engine speed

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 control module, 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:

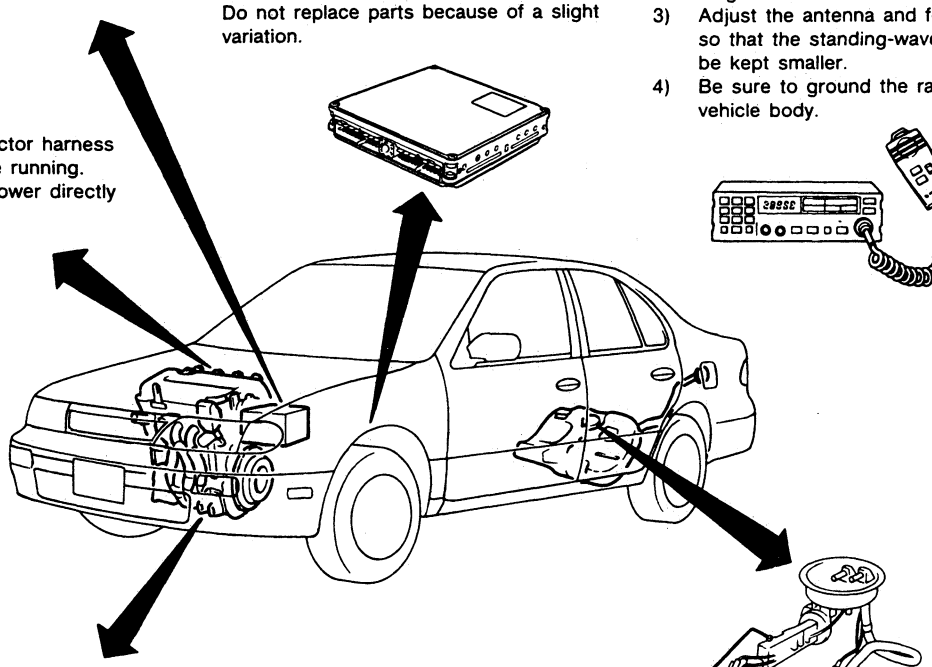
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

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.

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 IAC valve-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the crankshaft position sensor.

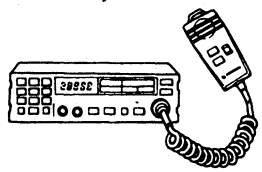
ECM
- Do not disassemble ECM (ECCS control module).
- Do not turn on-board diagnostic test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the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

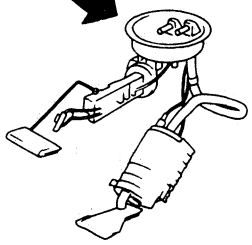


WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

WIRELESS EQUIPMENT
- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

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



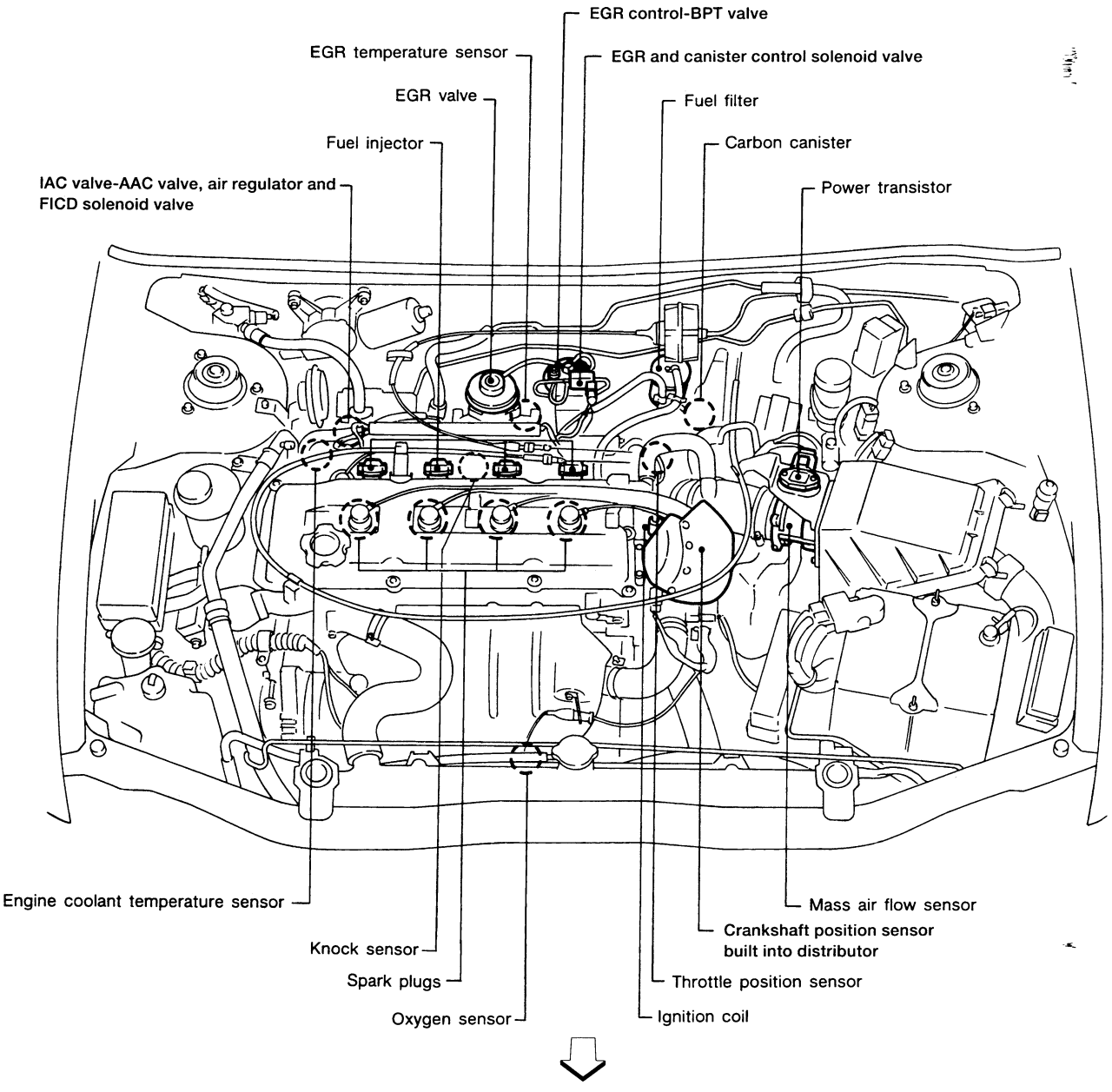


FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

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.

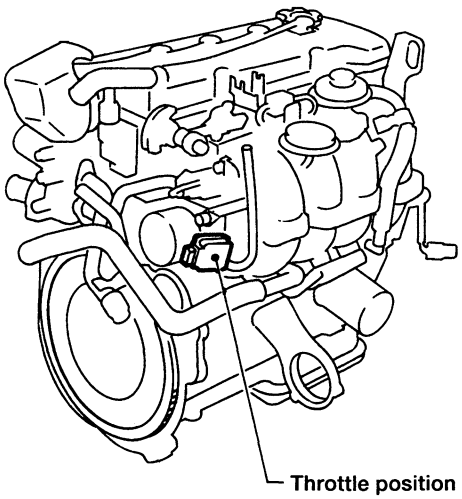
AEC200

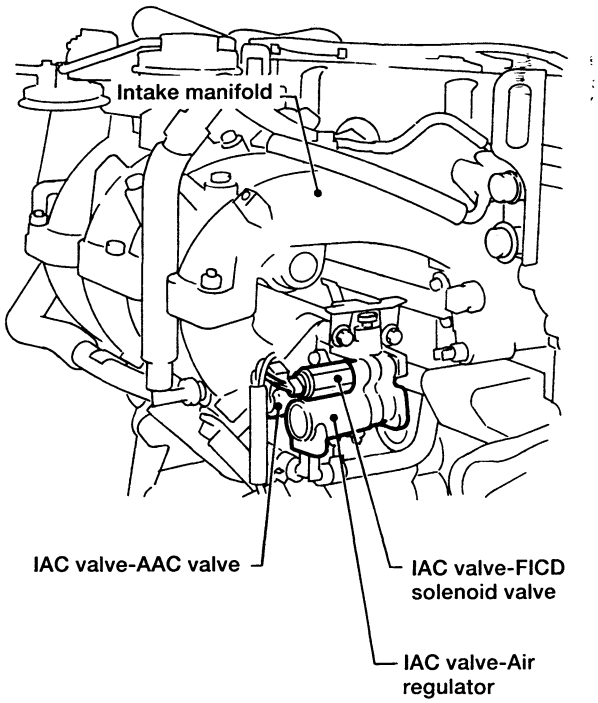
ECCS Component Parts Location

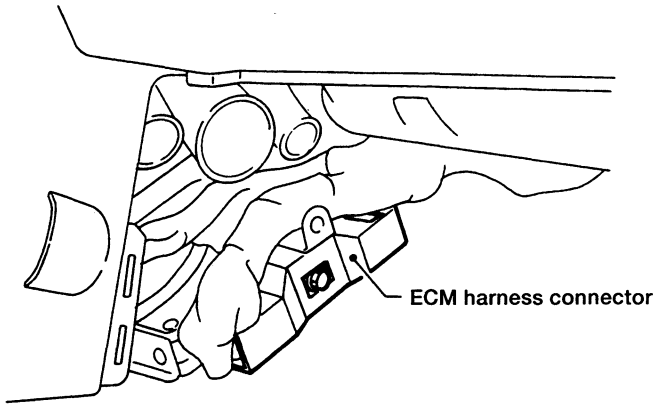


AEC201

ECCS Component Parts Location (Cont'd)

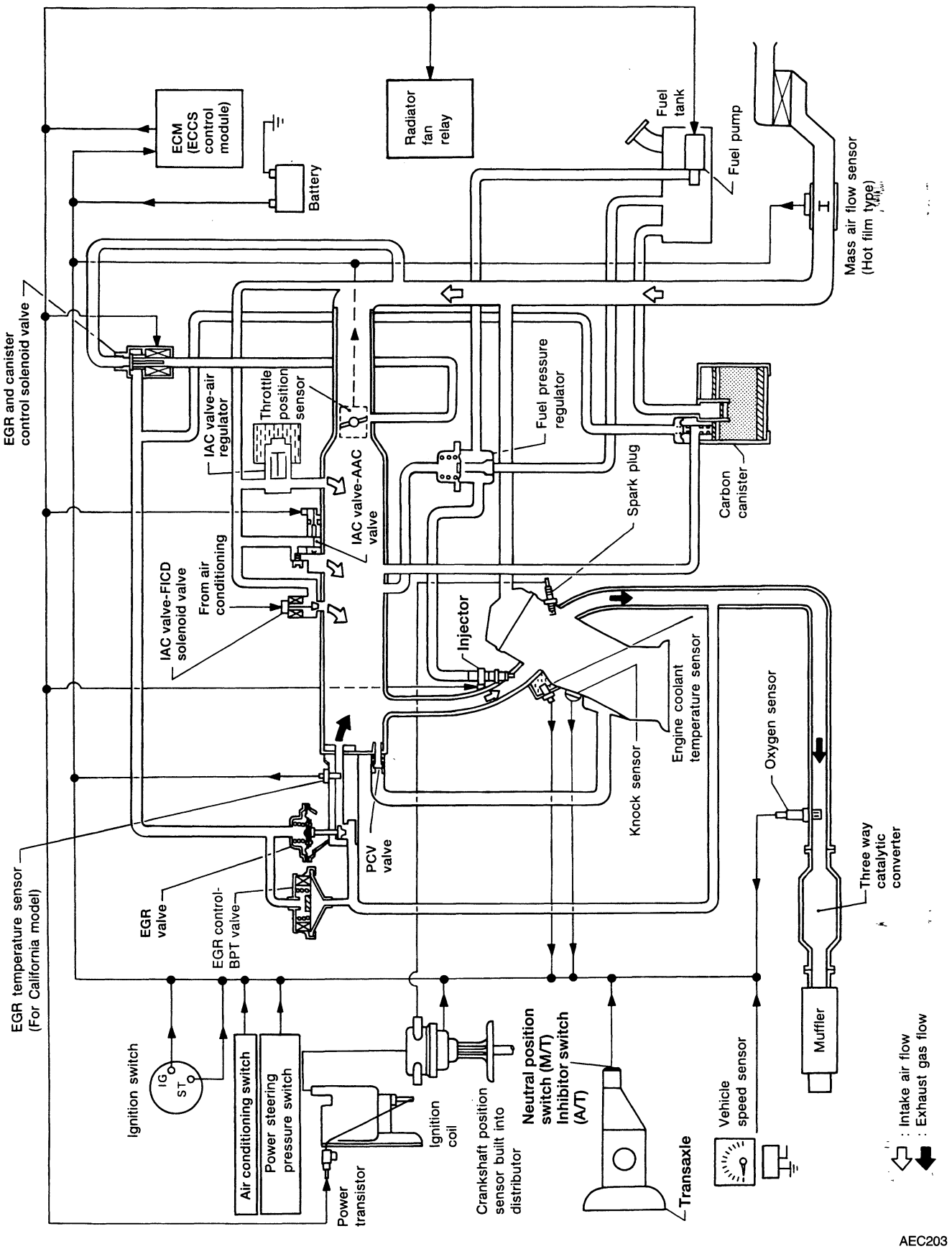






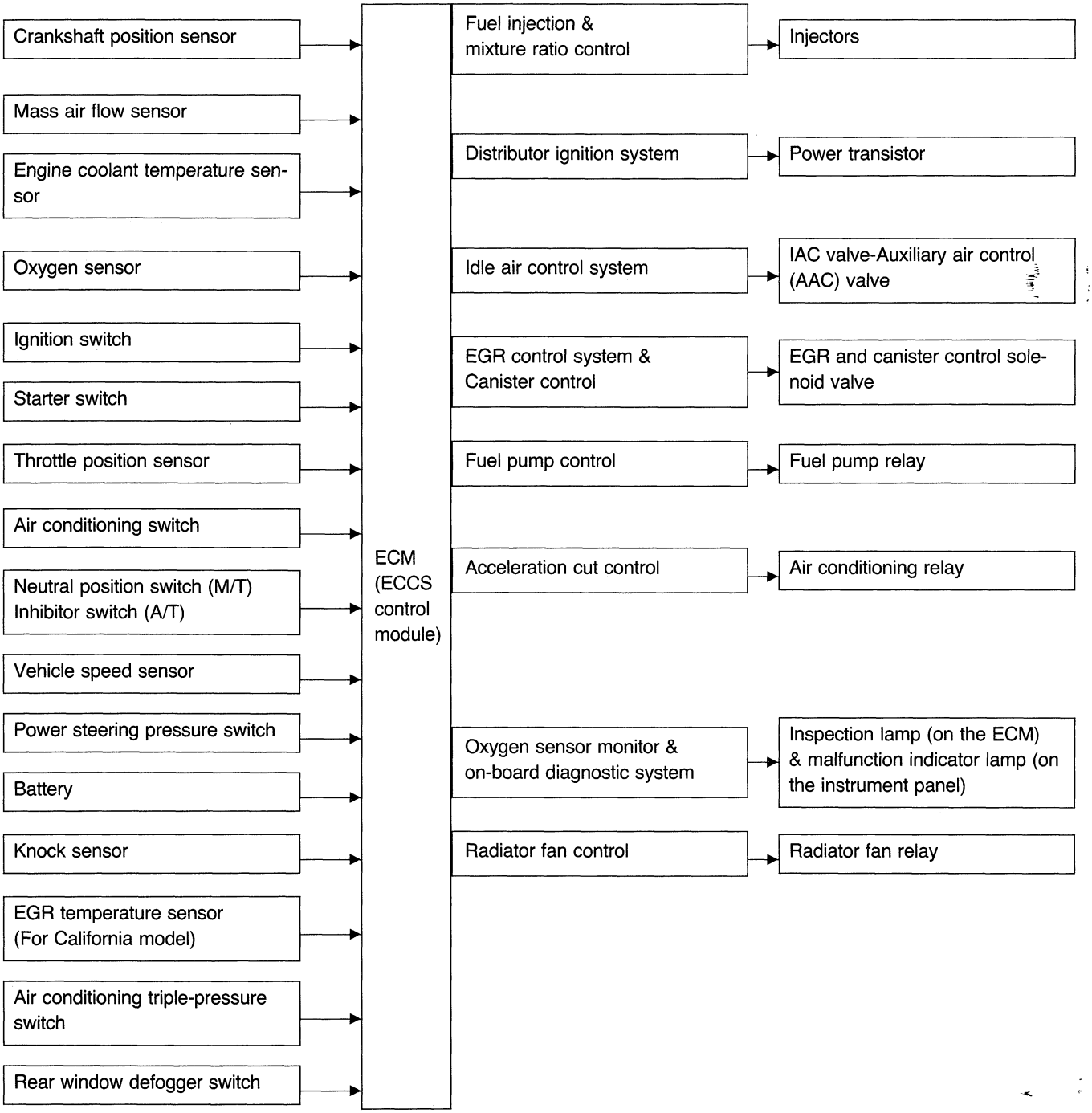
AEC202

System Diagram

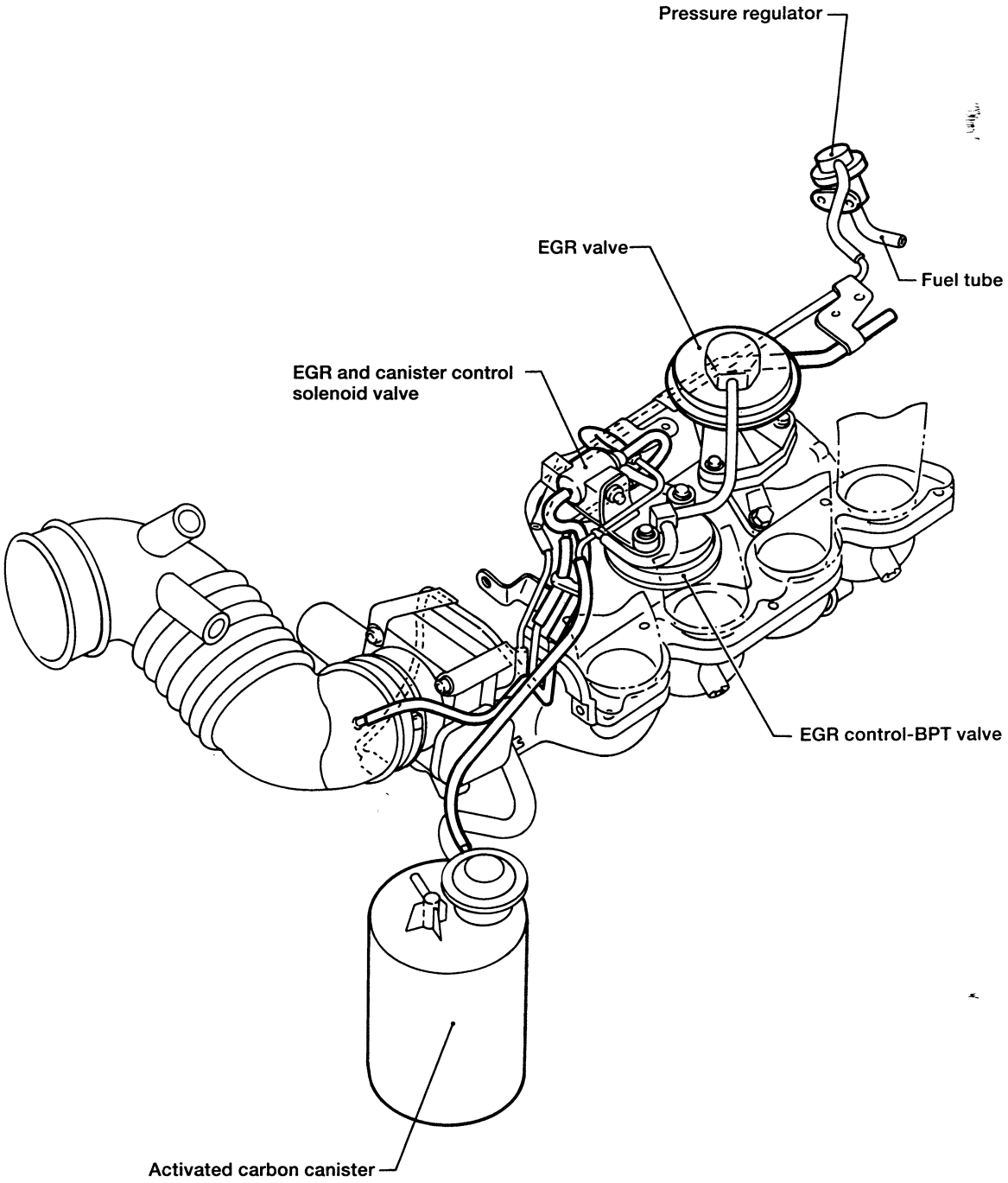


AEC203

System Chart

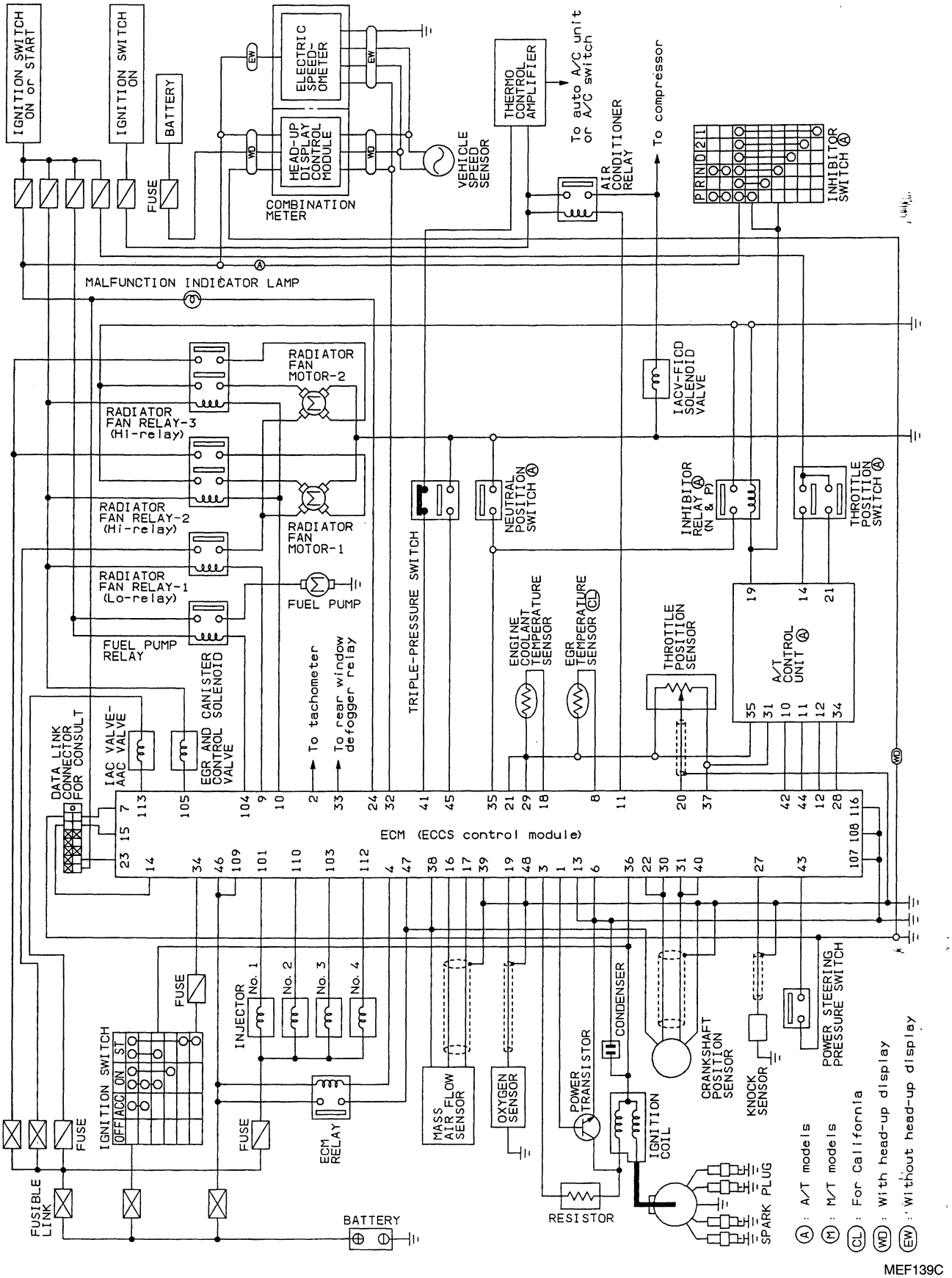


Vacuum Hose Drawing

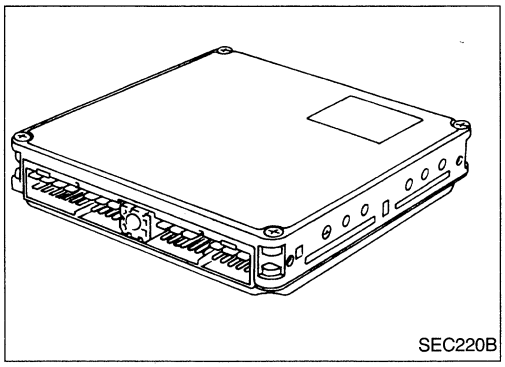


AEC204

Circuit Diagram

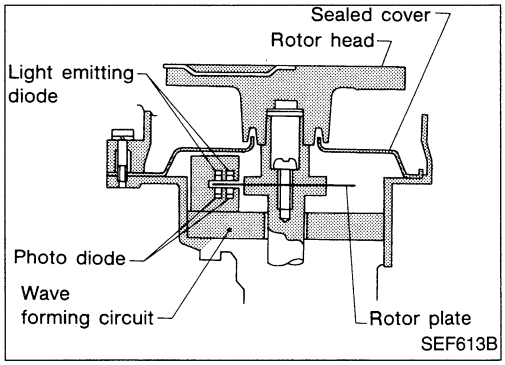


MEF139C


SEC220B

Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, an inspection lamp, an on-board diagnostic test mode selector, and connectors for signal input and output and for power supply. The module controls the engine. For diagnosis, refer to EF & EC-108.



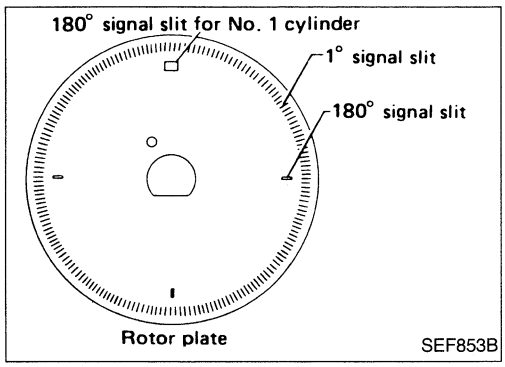
SEF613B

Crankshaft Position (CKP) Sensor

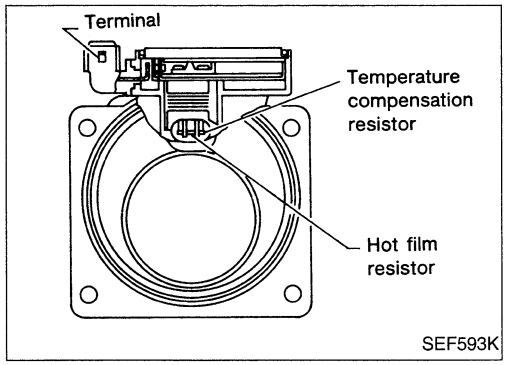
The crankshaft position sensor is a basic component of the entire ECCS. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

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

When the rotor plate passes between the LED and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the LED This generates rough-shaped pulses which are converted into on-off signals by the wave-forming circuit, which are then sent to the ECM. For diagnosis, refer to EF & EC-94.



SEF853B



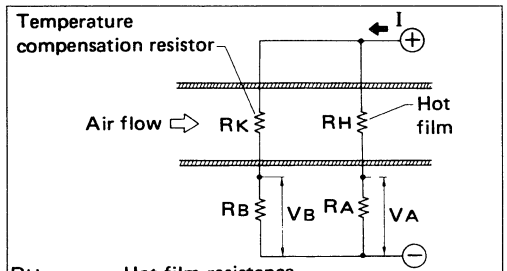
SEF593K

Mass Air Flow (MAF) Sensor

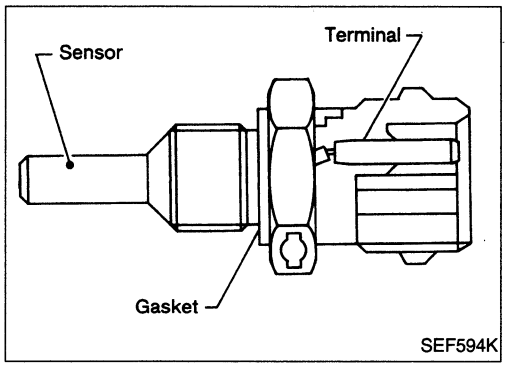
The mass air flow sensor measures the intake air flow rate by measuring a part of the entire flow. Measurements are made in such a way that the ECM receives electrical output signals varied by the amount of heat emitting from the hot film placed in the stream of the intake air.

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

Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The ECM detects the air flow by means of this current change. For diagnosis, refer to EF & EC-97.

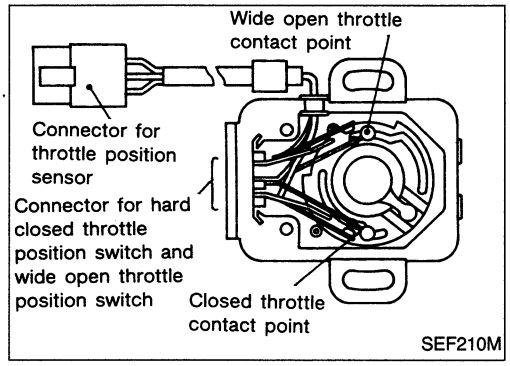


SEF967K



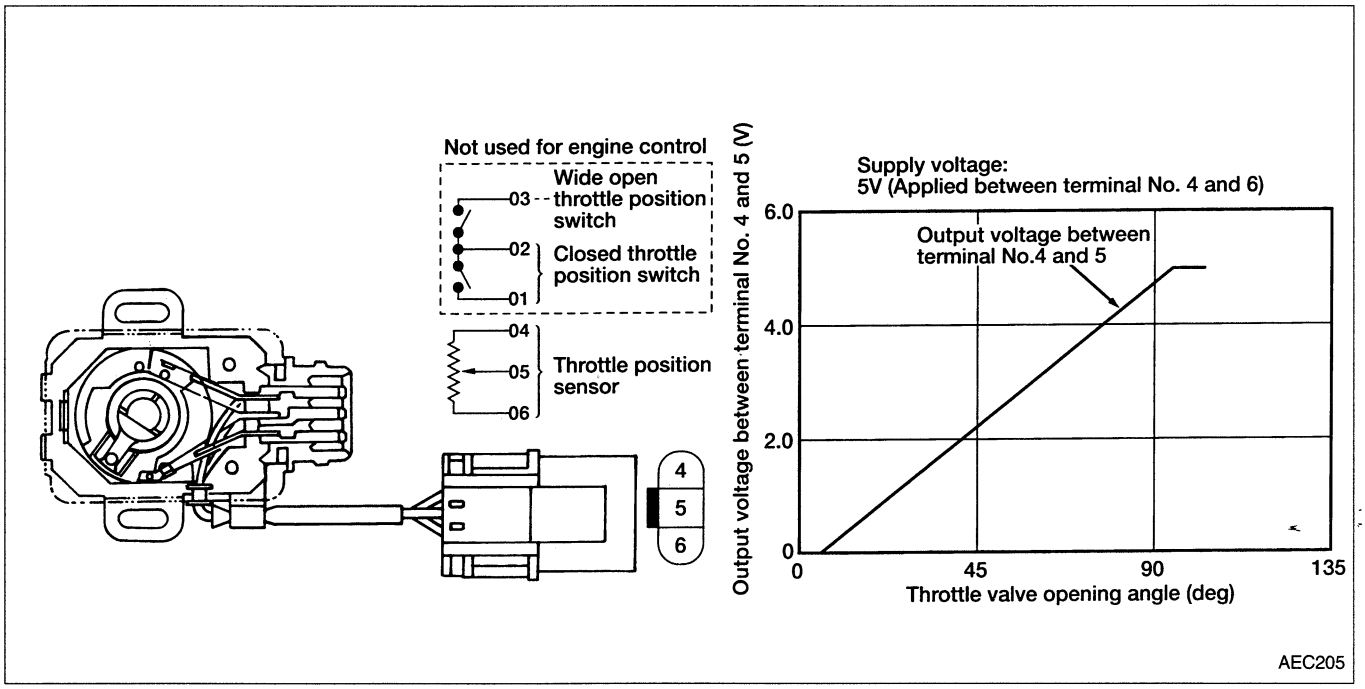
Engine Coolant Temperature (ECT) Sensor

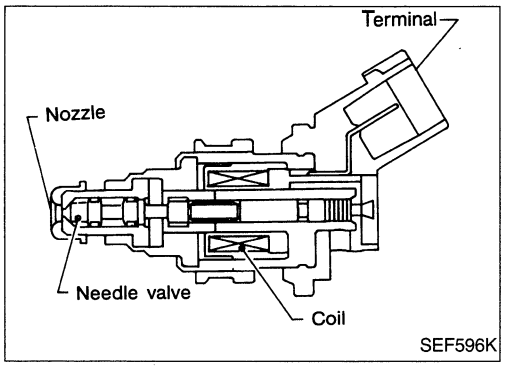
The engine coolant temperature sensor detects the engine coolant temperature, which is dependent on engine coolant temperature, and transmits a signal to the ECM.
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise. For diagnosis, refer to EF & EC-100.



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

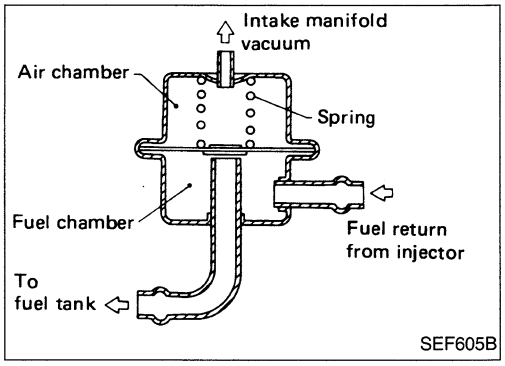
The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch" and controls engine operation such as fuel cut. On the other hand, "hard closed throttle position switch", which is built into the throttle position sensor unit on A/T equipped models, is used not for engine control. For diagnosis, refer to EF & EC-123.





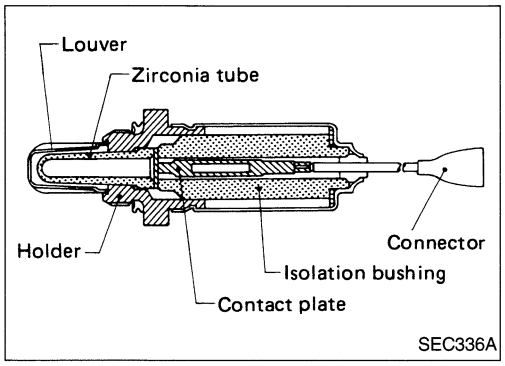
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration. For diagnosis, refer to EF & EC-126 or EF & EC-132.



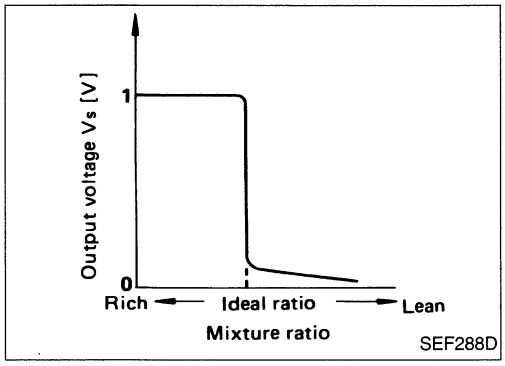
Pressure Regulator

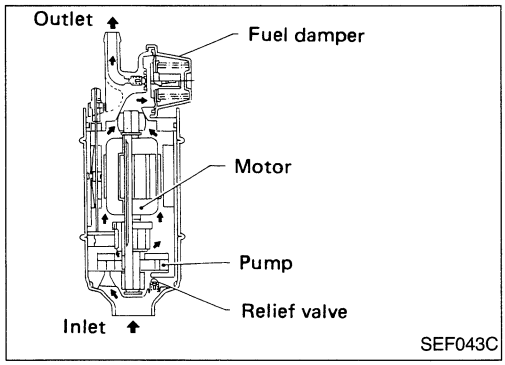
The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value. For diagnosis, refer to EF & EC-167.



Oxygen Sensor (O2S)

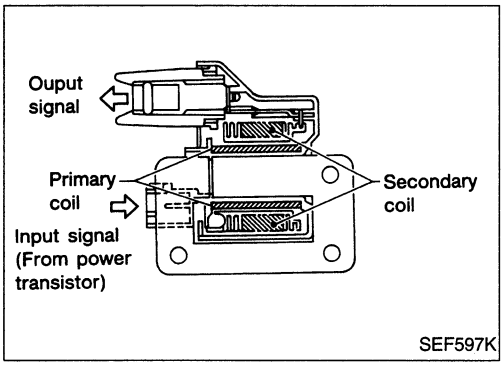
The oxygen sensor, which is placed into the exhaust manifold, monitors the amount of oxygen in the exhaust gas.
The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares the oxygen density of exhaust gas with that of atmosphere, and generates electricity. In order to improve the 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 oxygen sensor detects the amount of oxygen in the exhaust gas and sends the signal of approximately 1V or 0V to the ECM. For diagnosis, refer to EF & EC-115.





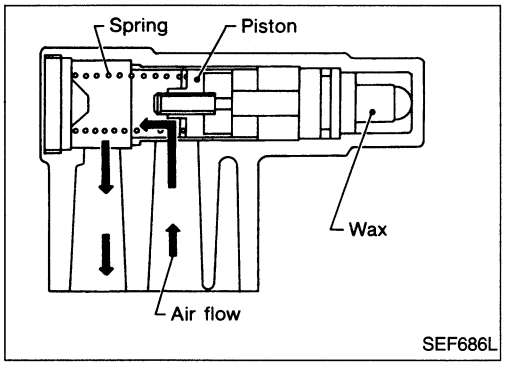
Fuel Pump

The fuel pump with a fuel damper is a submergible type, and are located in the fuel tank. For diagnosis, refer to EF & EC-134.



Ignition Coil with Power Transistor

The ignition signal from the ECM is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type. For diagnosis, refer to EF & EC-106.

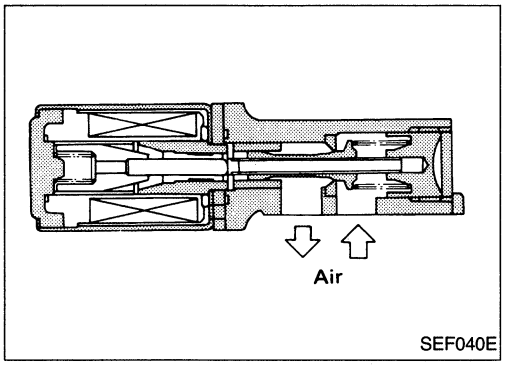


Idle Air Control (IAC) Valve-Air Regulator

The IAC valve-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.
Wax, piston and spring are built into the IAC valve-air regulator. When the coolant temperature is low, the air by-pass port opens. When the coolant temperature is high, the wax expands, moving the piston up and closing the air by-pass port, which decreases the idle speed.

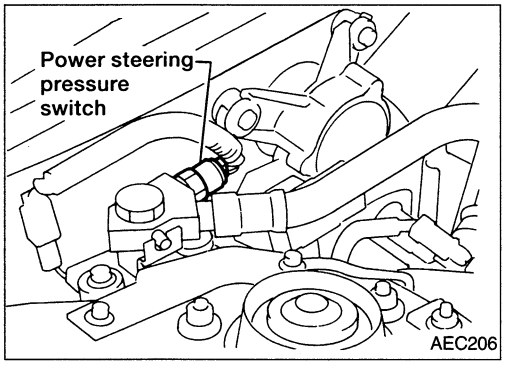
Idle Air Control (IAC) Valve-Fast Idle Control Device (FICD) Solenoid Valve

When the air conditioning switch is on, additional air is supplied by the IAC valve-FICD solenoid valve.



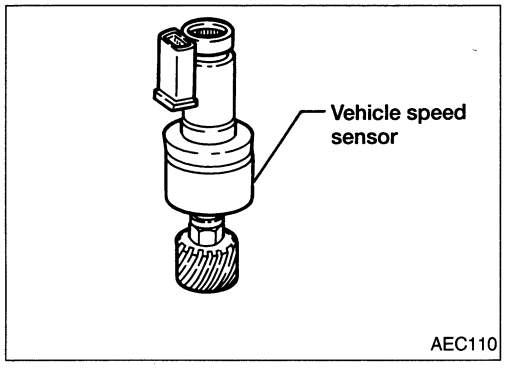
Idle Air Control (IAC) Valve-Auxiliary Air Control (AAC) Valve

The ECM actuates the IAC valve-AAC valve by an ON/OFF pulse. The longer that ON pulse is received, the larger the amount of air that will flow through the IAC valve-AAC valve. For diagnosis, refer to EF & EC-137.



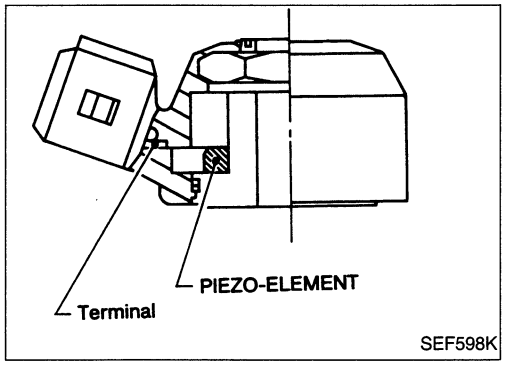
Power Steering Pressure Switch

The power steering 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 IAC valve-AAC valve. For diagnosis, refer to EF & EC-146.



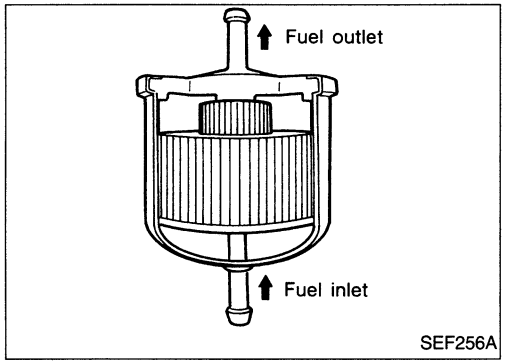
Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the speedometer and the speedometer sends a signal to the ECM. The speed sensor consists of a pulse generator, which is installed in the transaxle. For diagnosis, refer to EF & EC-103.



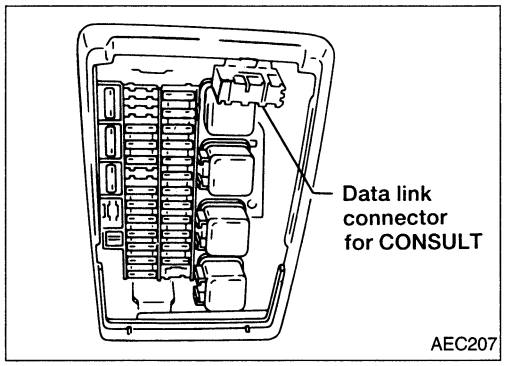
Knock Sensor (KS)

The knock sensor is attached to the cylinder block and senses engine knocking conditions.
A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is sent to the ECM. For diagnosis, refer to EF & EC-118.



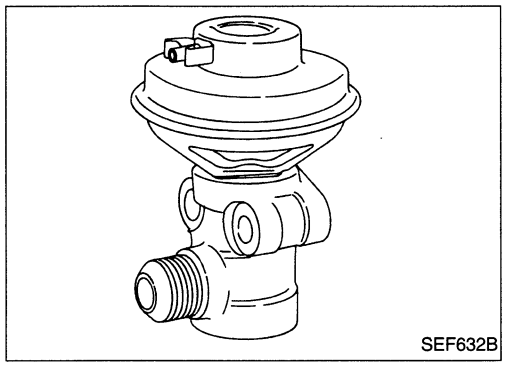
Fuel Filter

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



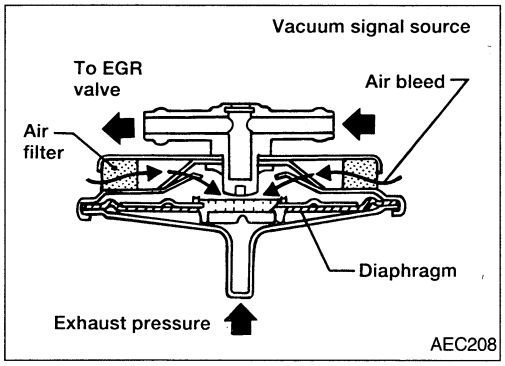
Data Link Connector (DLC) for CONSULT

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



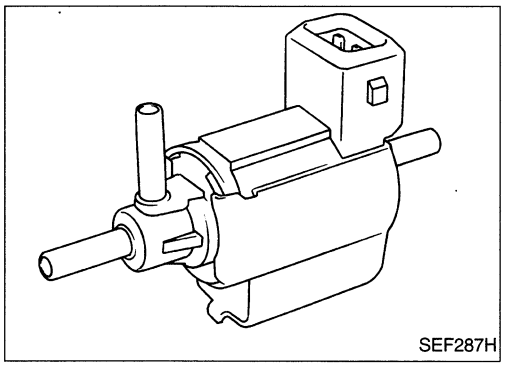
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve. For diagnosis, refer to EF & EC-109.



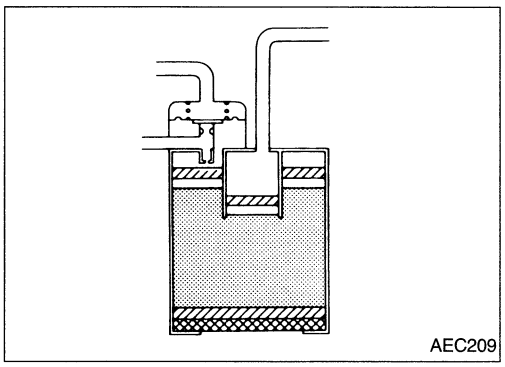
EGR Control-BPT Valve

The EGR control-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation. For diagnosis, refer to EF & EC-109.



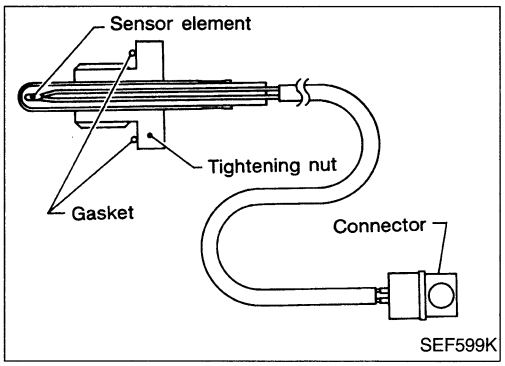
EGR and Canister Control Solenoid Valve

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 EGR valve. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal. For diagnosis, refer to EF & EC-109.



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.
The vacuum in the intake passage upstream of the throttle valve increases in response to the amount of the intake air.
When the vacuum of the intake passage is higher than a preset value, the 2nd purge control valve opens and the absorbed gases are sucked into the intake passage for combustion purposes. For diagnosis, refer to EF & EC-169.

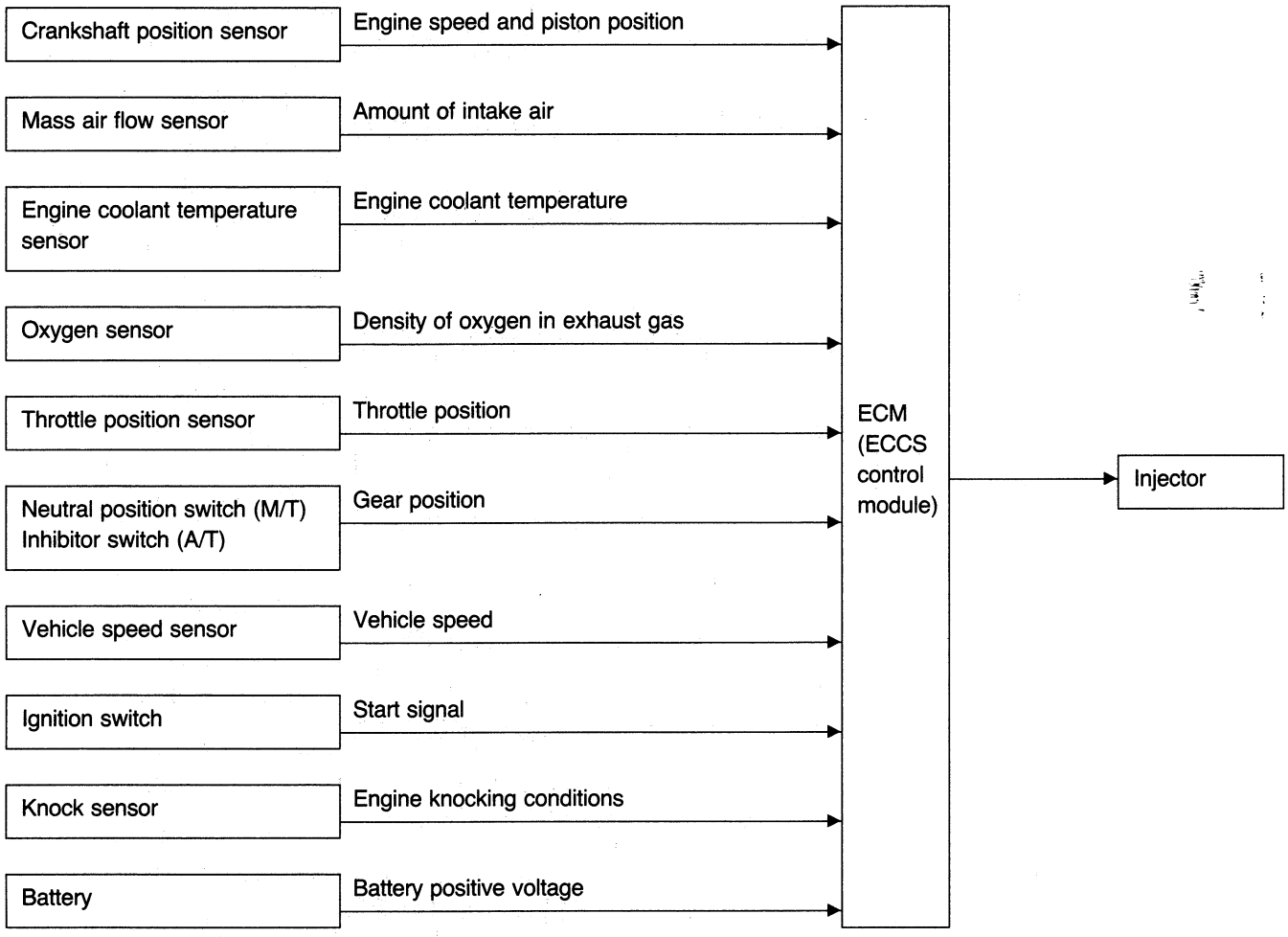


EGR Temperature Sensor (For California models)

The EGR temperature sensor monitors in 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. For diagnosis, refer to EF & EC-120.

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.

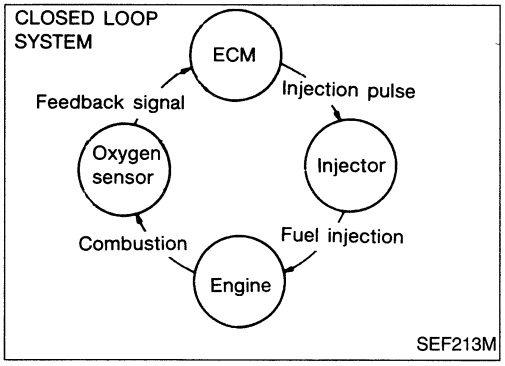
⟨Fuel increase⟩

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

⟨Fuel decrease⟩

1) During deceleration
2) During high engine speed operation

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 catalytic converter can reduce CO, HC and NOx emissions. This system uses an oxygen sensor in the exhaust manifold to check the air- fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.
This stage refers to the closed loop control condition.

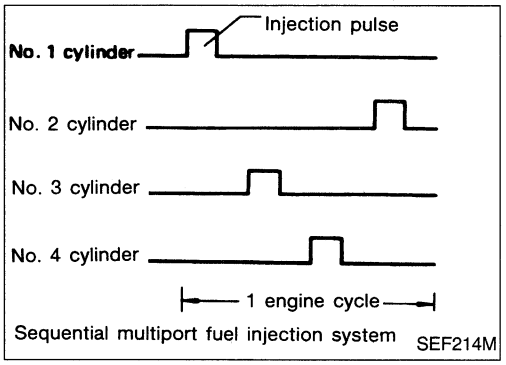
OPEN LOOP CONTROL

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

1) Deceleration and acceleration
2) High-load, high-speed operation
3) Engine idling
4) Malfunction of oxygen sensor or its circuit
5) Insufficient activation of oxygen sensor at low engine coolant temperature
6) Engine starting
7) High-engine coolant temperature
8) After shifting from "N" to "D"

MIXTURE RATIO SELF-LEARNING CONTROL

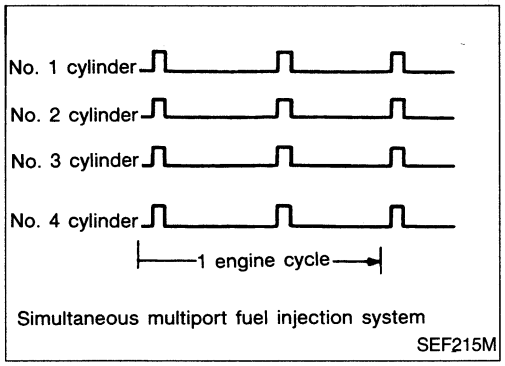
The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the oxygen sensor. This feedback signal is then sent to the ECM to control the amount of fuel injection to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic 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 ECCS 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 — sequential multiport fuel injection system and simultaneous multiport fuel injection system. In the former, fuel is injected into each cylinder during each engine cycle according to the firing order.

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



Simultaneous multiport fuel injection system

SEF215M

In the simultaneous multiport fuel injection system, fuel is injected into all four cylinders simultaneously twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the four injectors two times for each engine cycle.

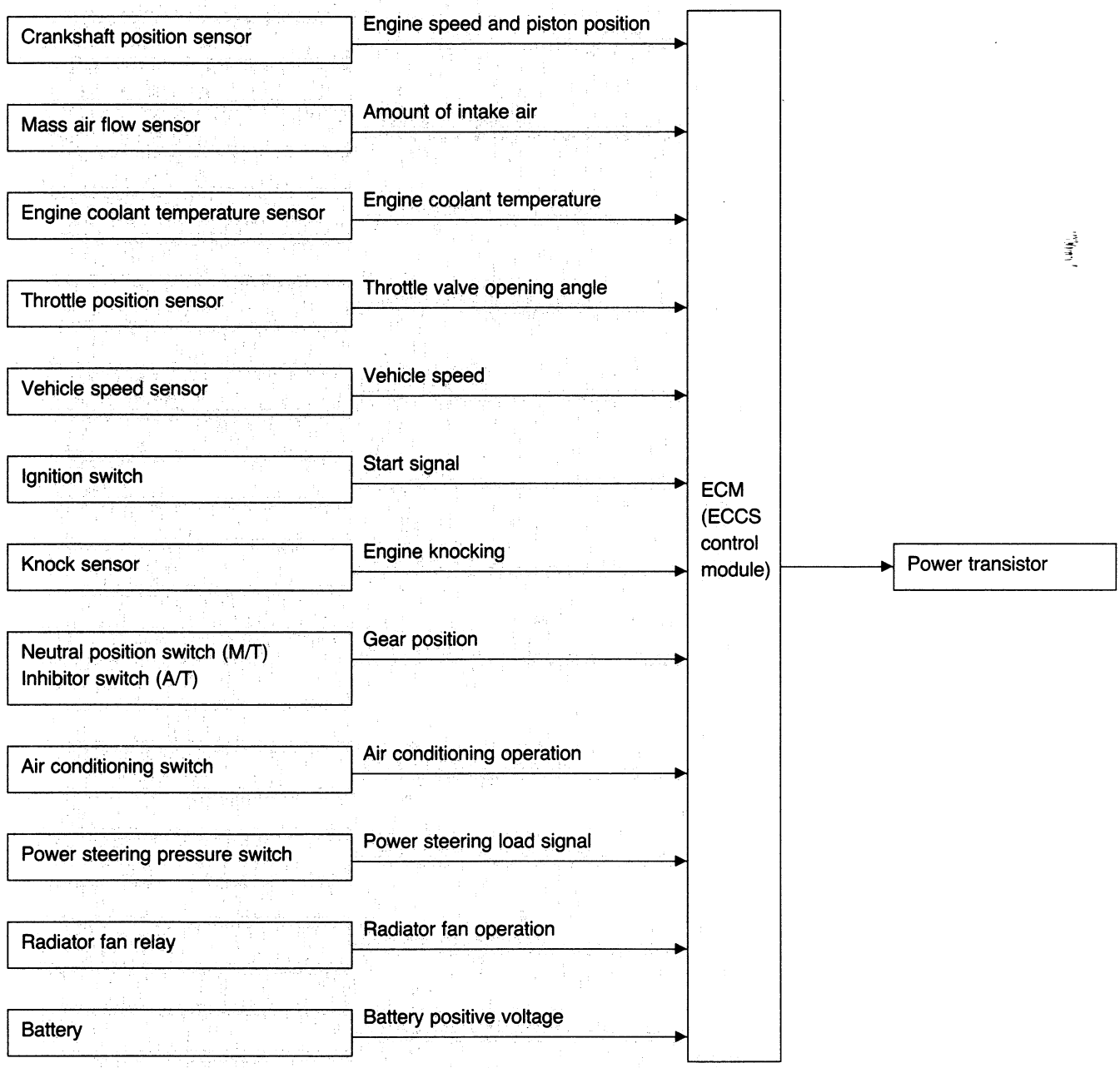
When the engine is being started and/or if the fail-safe system (CPU) is operating, simultaneous multiport fuel injection system is used. When the engine is running sequential multiport fuel injection system is used.

FUEL SHUT-OFF

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

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



Distributor Ignition (DI) 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 located in the ECM. This data forms the map shown below.

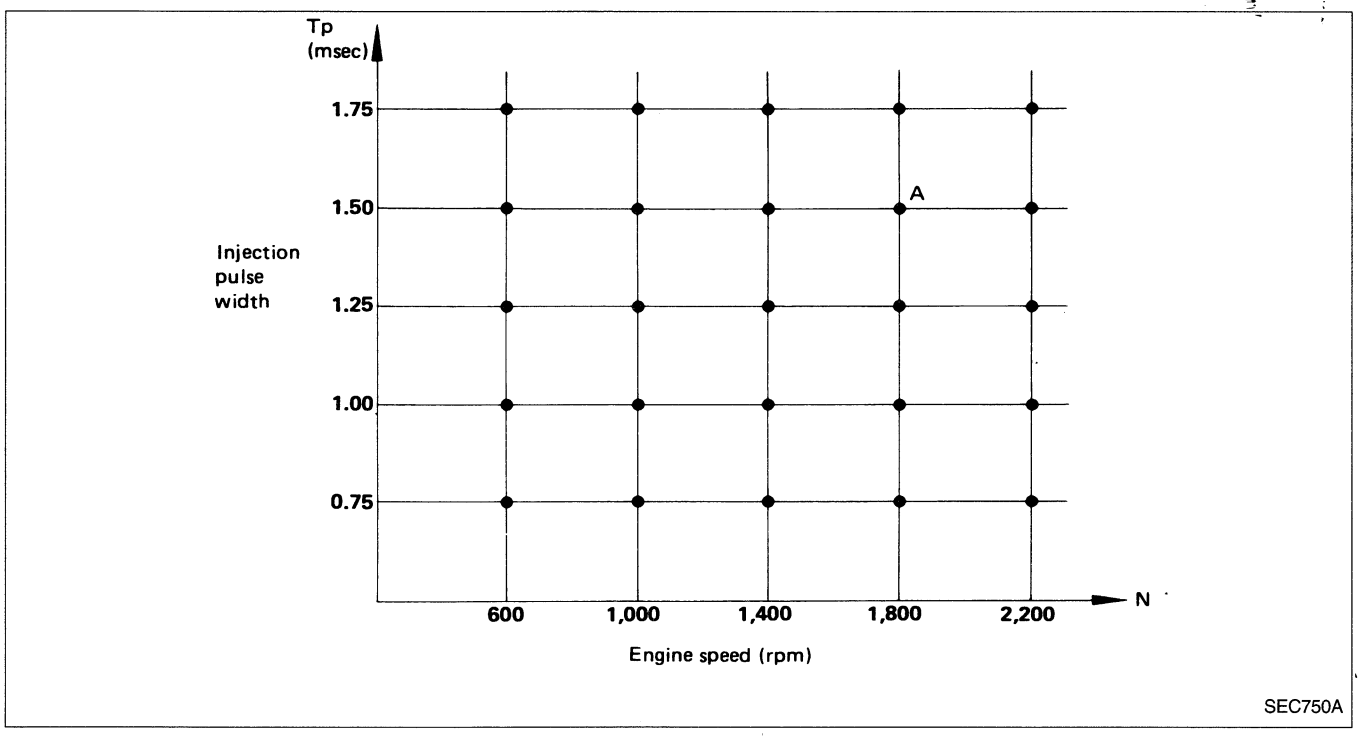
The ECM detects information such as the injection pulse width and crankshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

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

In addition to this,

1 At starting
2 During warm-up
3 At idle
4 Hot engine operation
5 At acceleration

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

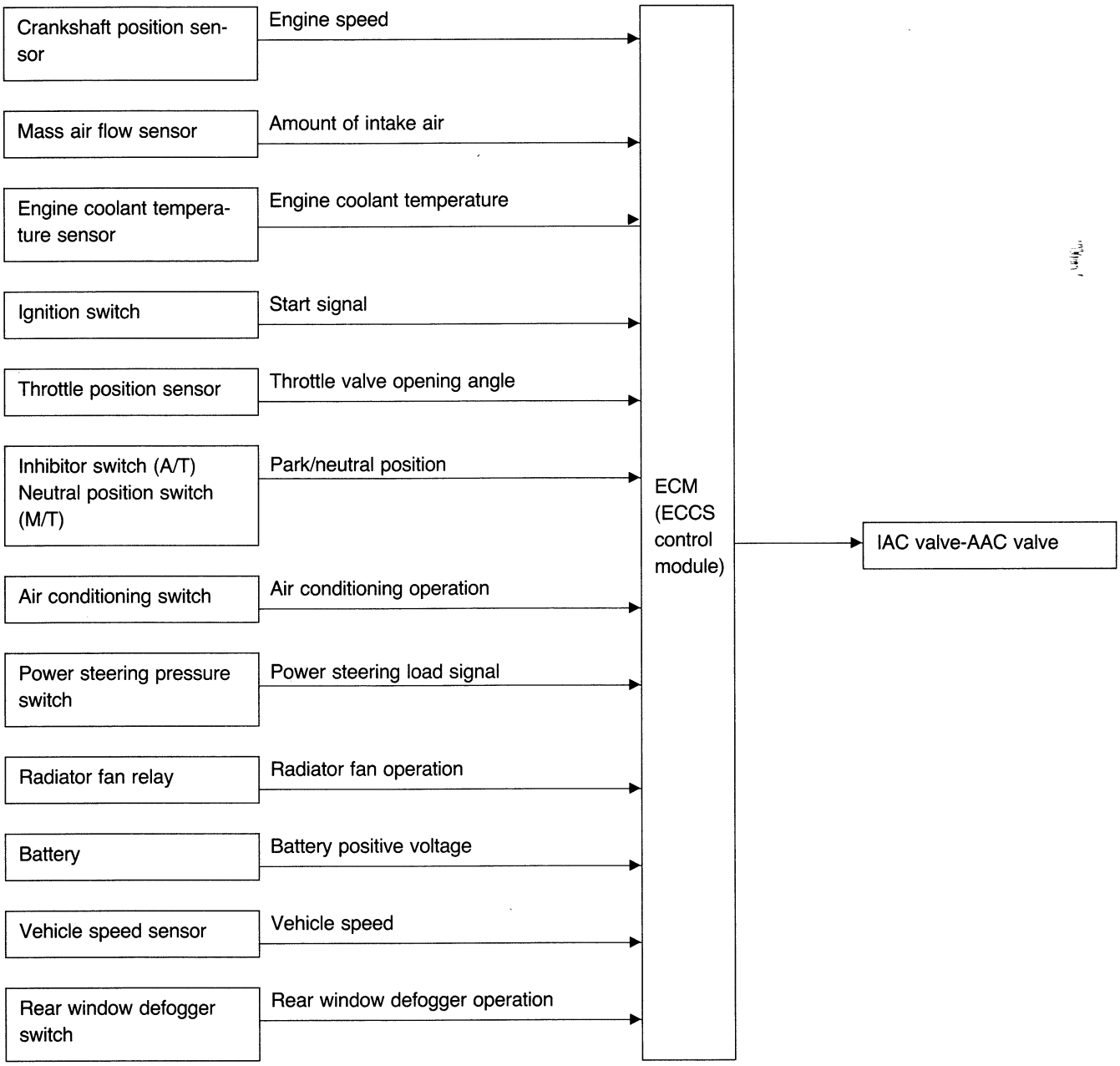


The knock sensor retard system is designed only for emergencies. The basic ignition timing is pre-programmed within the anti- knocking zone, if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

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 (IAC) System

INPUT/OUTPUT SIGNAL LINE



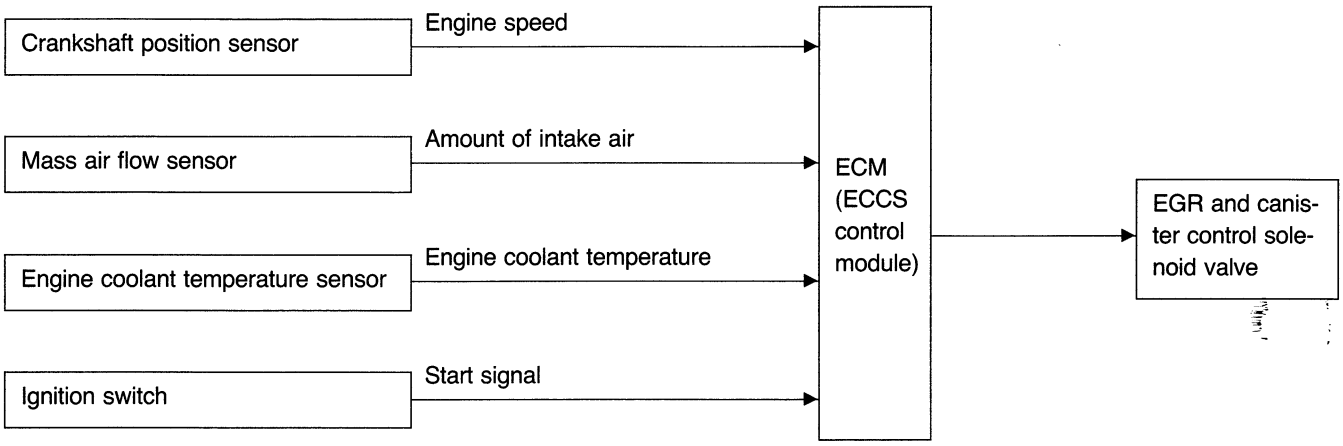
SYSTEM DESCRIPTION

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via the IAC valve-AAC valve. The IAC valve-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 IAC valve-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.

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



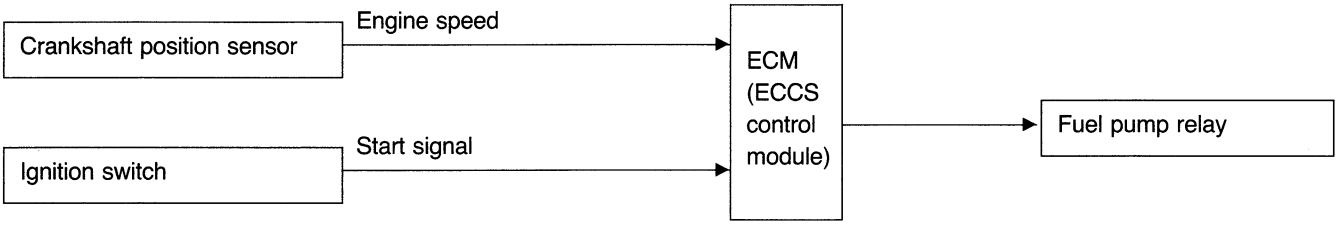
SYSTEM DESCRIPTION

In addition, a system is provided which precisely cuts and controls port vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the EGR control system vacuum line. This causes the port vacuum to be discharged into the atmosphere so that the EGR valve remains closed.

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

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



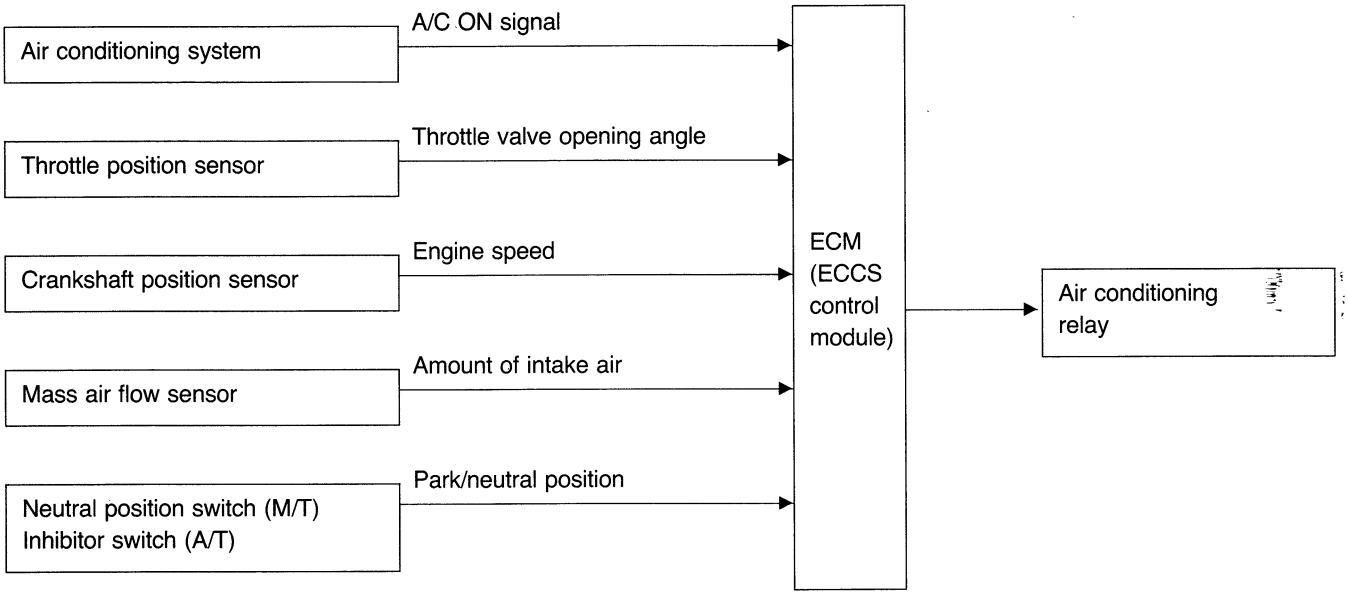
SYSTEM DESCRIPTION

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 second
Except as shown above	Stops

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



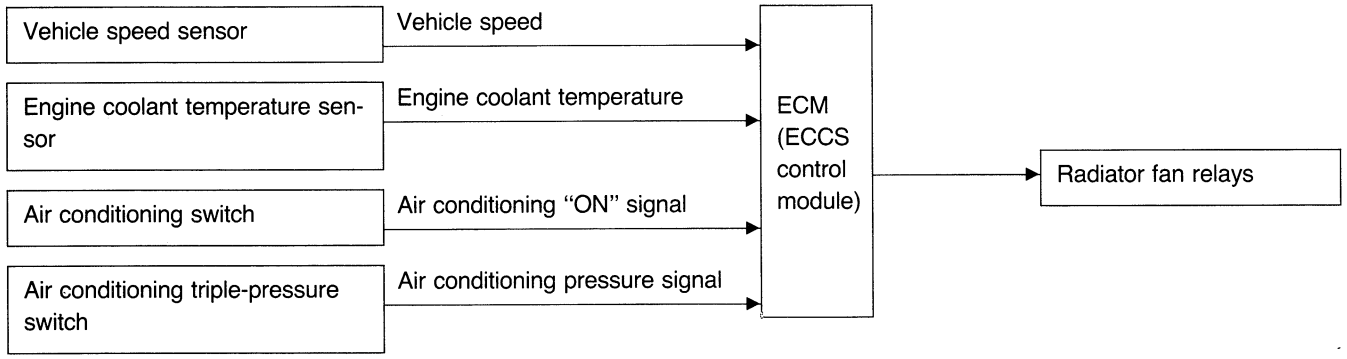
SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed or the engine is running at high speed, the air conditioning is turned off for a few seconds.

This system improves acceleration when the air conditioning is used.

Radiator Fan Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The ECM controls the radiator fan corresponding to the vehicle speed, engine coolant temperature, air conditioning discharge side pressure and air conditioning ON signal.

The control system has 3-step control [HIGH/LOW/OFF].

Radiator Fan Control (Cont'd)

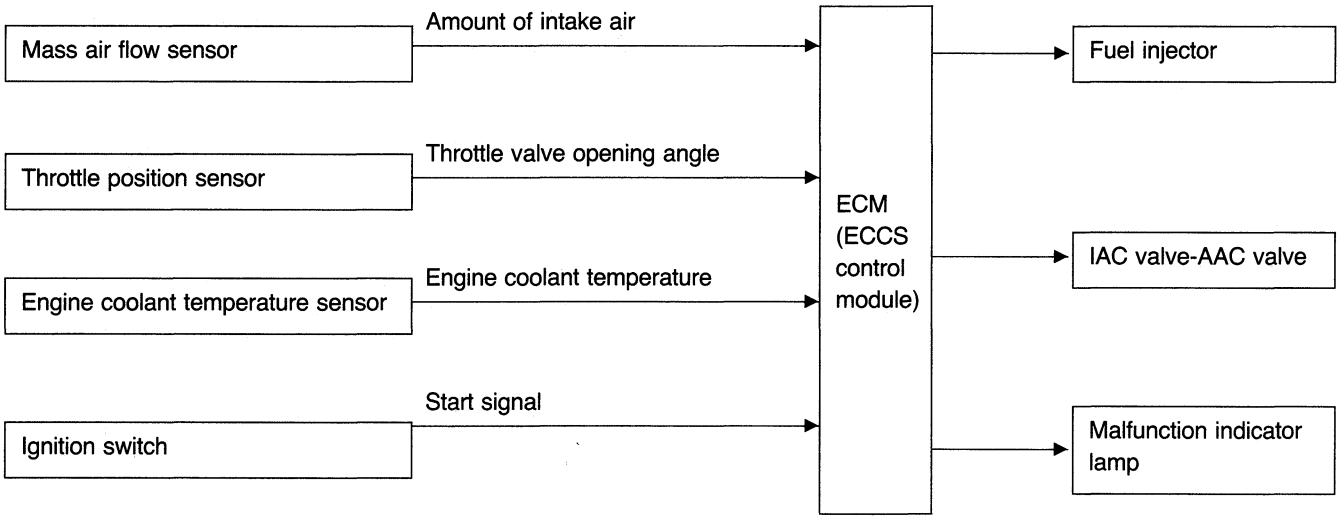
OPERATION

Vehicle speed km/h (MPH)	Air conditioning switch	Air conditioning triple-pressure switch	Engine coolant temperature °C(°F)		
			95 (203)	100 (212)	105 (221)
0 - 20 (0 - 12)	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	LOW		HIGH
		ON	HIGH		
20 -80 (12 - 50)	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	LOW		HIGH
		ON	LOW		HIGH
80 (50) or more	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	OFF	LOW	HIGH
		ON	OFF	LOW	HIGH

Fail-safe System

CPU MALFUNCTION

Input/output signal line



Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's CPU circuit.
In former models, engine starting was difficult under the previously mentioned conditions. But with the provisions in this fail-safe system, it is possible to start the engine.

Fail-safe system activating condition when ECM is malfunctioning

The fail-safe mode operates when the computing function of the ECM is judged to be malfunctioning. When the fail-safe system activates, i.e. if a malfunction condition is detected in the CPU of the ECM, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.

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

When the fail-safe system is operating, fuel injection, ignition timing, 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.

Fail-safe System (Cont'd)

MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value when the starter switch is being turned OFF, the ECM senses a mass air flow sensor malfunction. In the case of a malfunction, the fuel injection operates without the mass air flow sensor signal.

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

Operation (Mass air flow sensor malfunction)

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON		
Running	OFF	Operates	Engine speed will not rise above 2,400 rpm

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

When the 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	40 (104)
Running	80 (176)

KNOCK SENSOR MALFUNCTION

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

THROTTLE POSITION SENSOR MALFUNCTION

When the throttle position sensor output voltage is below or above the specified value, the throttle valve opening is fixed at a specified value. In this condition the ECM does not use the throttle position sensor output. The idle position is decided by the mass air flow sensor, crankshaft position sensor output signals.

Operation	Driving condition
While idling	Low engine speed
While accelerating	Poor acceleration

START SIGNAL FOR MALFUNCTION

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

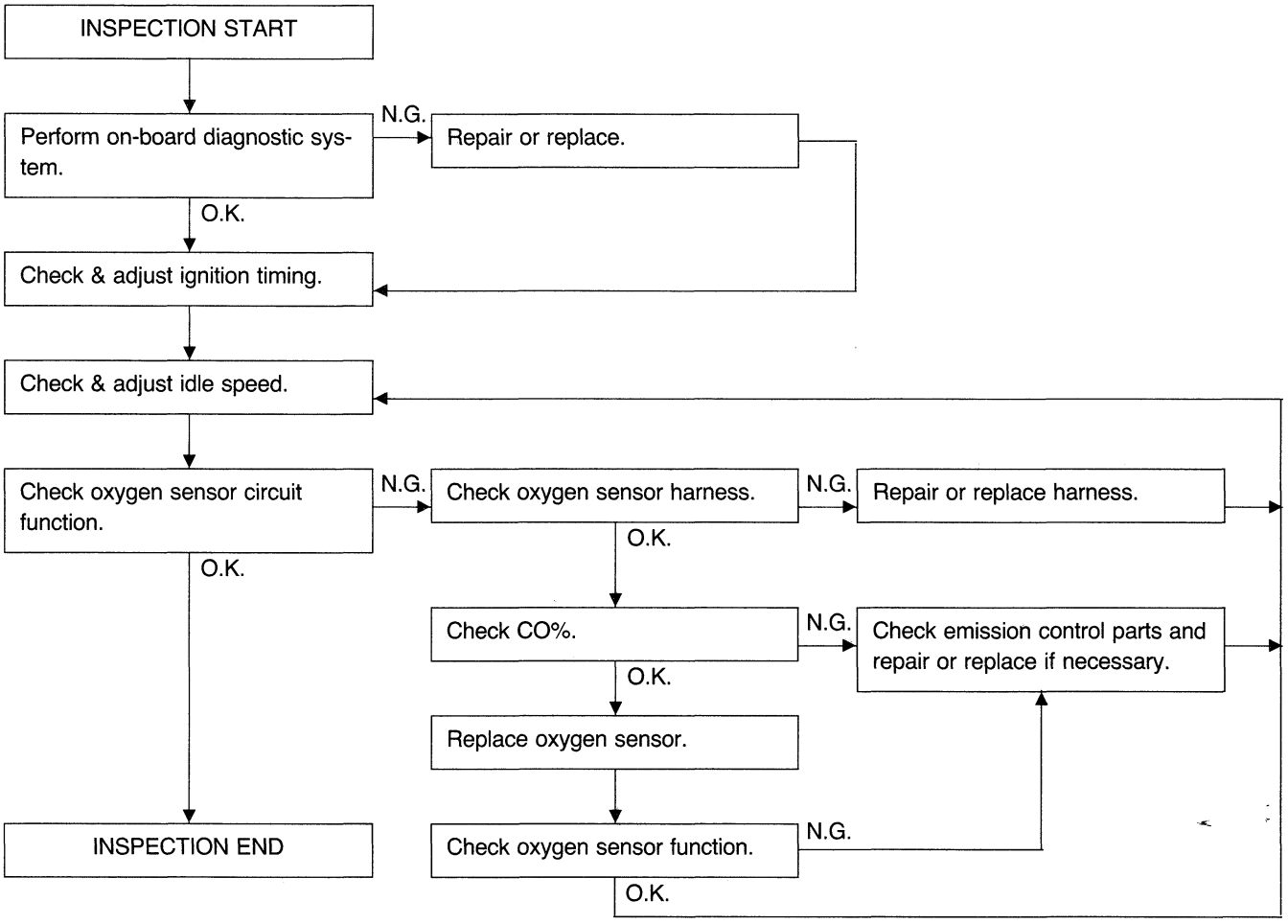
After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.

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

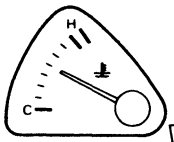
2. On air conditioning equipped models, checks should be carried out while the air conditioning is "OFF".
3. On automatic transaxle equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage,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

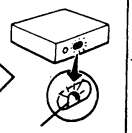
Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gaskets
- Throttle valve and throttle position sensor operations



Start engine and warm it up until water temperature indicator points to the middle of gauge and ensure that engine speed is below 1,000 rpm.

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

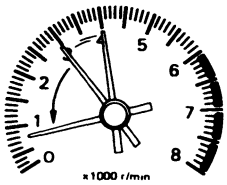
Perform on-board diagnostic test mode II (self-diagnostic results).


RED LED

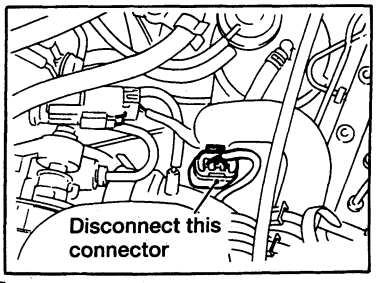
Malfunction indicator lamp

O.K. N.G

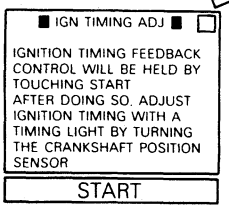
Repair or replace components as necessary.



Run engine at about 2,000 rpm for about 2 minutes under no-load.
Race engine two or three times under no-load, then run engine for about 1 minute at idle speed.



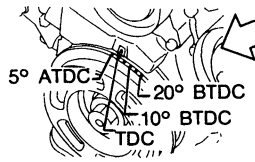
1) Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
2) Touch "START".



1) Stop engine and disconnect throttle position sensor harness connector.
2) Start engine.

Race engine (2,000 – 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

Check ignition timing with a timing light.



O.K. 20° ± 2° B.T.D.C. (A/T in "N" position)

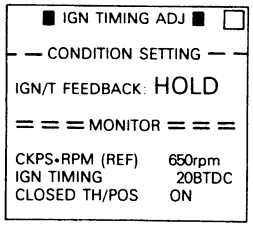
N.G

Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.

20° ± 2° B.T.D.C. (A/T in "N" position)

Ⓐ

AEC254



Ⓐ

Check idle speed.

Read idle speed in "IGN TIMING ADJ" mode with CONSULT.

Check idle speed.

650° ± 50 rpm (A/T in "N" position)

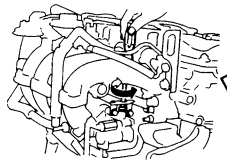
O.K.

Ⓓ

1) Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
2) Touch "START".

1) Stop engine and disconnect throttle position sensor harness connector.
2) Start engine.

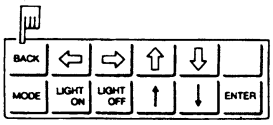
N.G.



Race engine (2,000 – 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

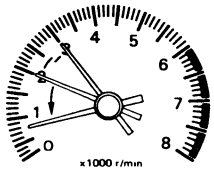
Adjust idle speed by turning idle speed adjusting screw.

650 ± 50 rpm (A/T in "N" position)

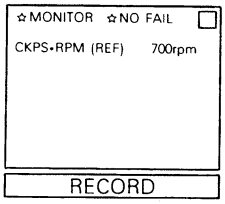


Touch "Back".

1) Stop engine and connect throttle position sensor harness connector.
2) Start engine.



Race engine (2,000 – 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.



Check idle speed.

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

OR

Check idle speed.

700° ± 50 rpm (A/T in "N" position)

O.K.

N.G

Check IAC valve–AAC valve and replace if necessary.

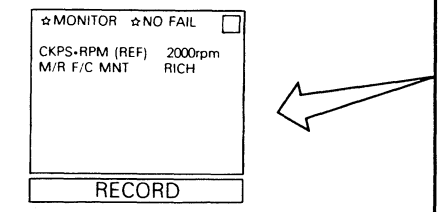
Check IAC valve-AAC valve harness and repair if necessary.

Check ECM function* by substituting another known good ECM.

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

Ⓑ

AEC255



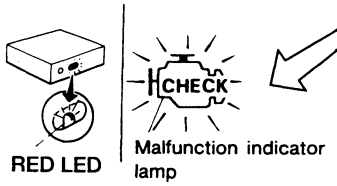
Ⓑ

Check oxygen sensor signal:
1) See "M/R F/C MNT" 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

1) Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. (See page EF & EC 37).
2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently), check to make sure that malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

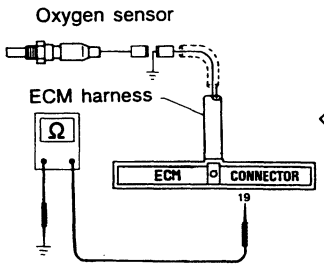


O.K. N.G.

INSPECTION END

Check oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM harness connector from ECM.
3) Disconnect oxygen sensor harness connector and connect terminal for oxygen sensor to ground with a jumper wire.
4) Check for continuity between terminal No. 19 of ECM harness connector and ground metal on vehicle body.

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



O.K. N.G.

Connect ECM harness connector to ECM.

Repair harness

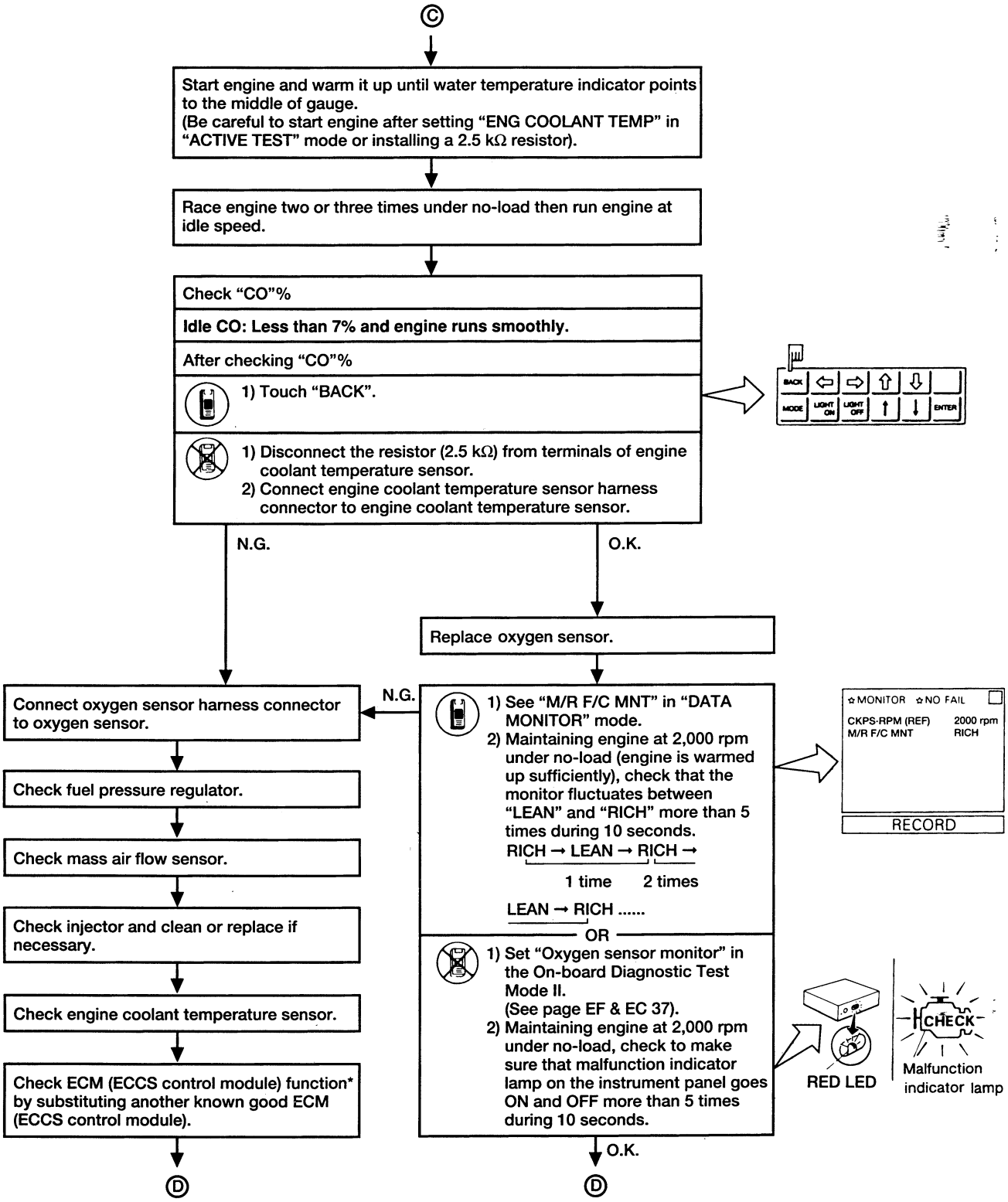
Ⓓ

1) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
2) Set "ENGINE TEMP" at 20°C (68°F).

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

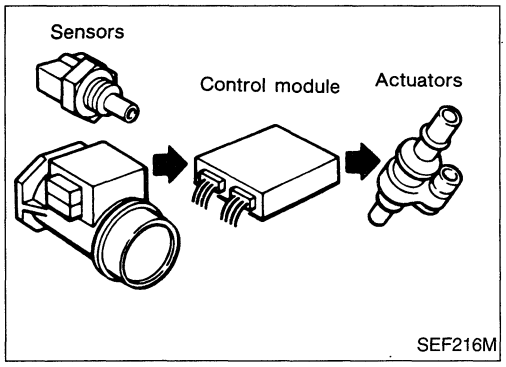
Ⓒ

AEC256

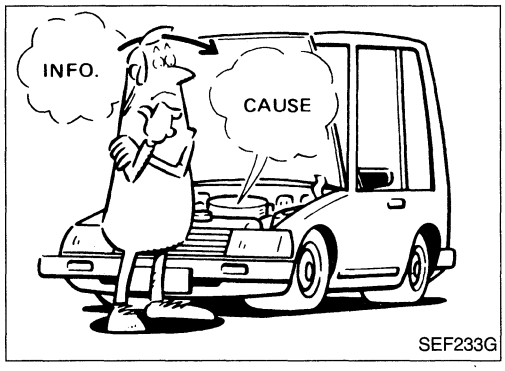


*ECM (ECCS control module) may be the cause of a problem, but this is rarely the case.

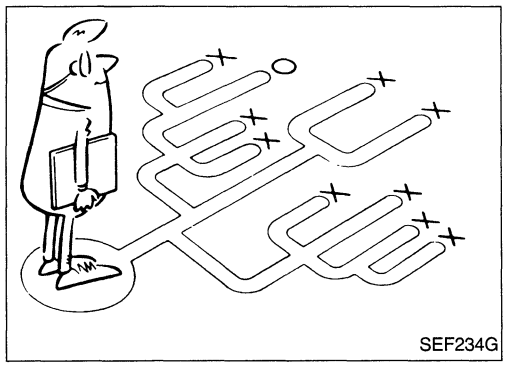
AEC257



SEF216M



SEF233G


SEF234G

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.

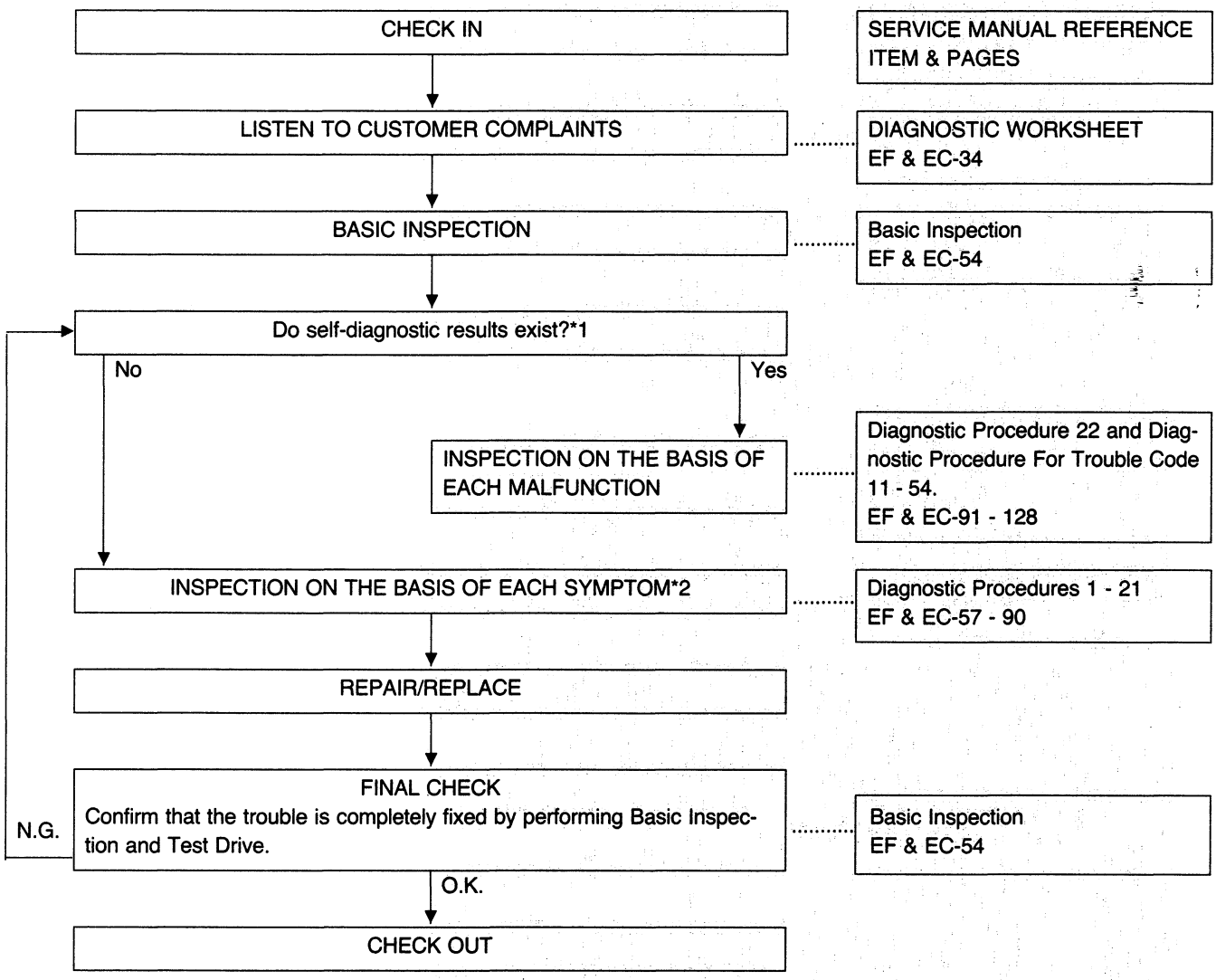
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present 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.

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

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. (Refer to EF & EC-91.)**

***2: If the trouble is not duplicated, refer to EF & EC-35.**

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

KEY POINTS

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

SEF907L

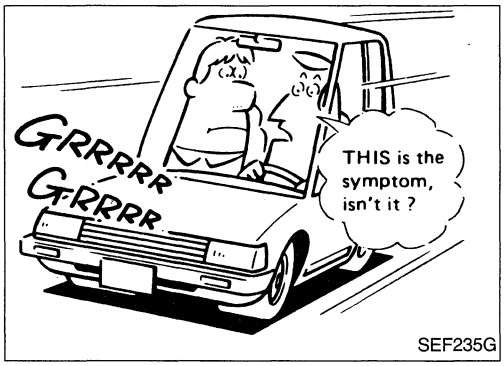
DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to malfunctions on engine components.
A good grasp of such conditions can make trouble-shooting faster and more accurate. Ask your service advisor to collect this information.
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 conditions 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		☐ Not affected ☐ 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)



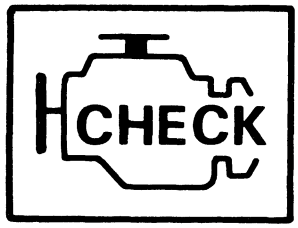
SEF235G

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 clockwise.
			Retarded	Rotate distributor counterclockwise.
3	Mixture ratio feedback control	Oxygen sensor	Suspended	Disconnect oxygen sensor harness connector.
		ECM	Operation check	Perform on-board diagnostic system (On-board Diagnostic Test Mode II) at 2,000 rpm.
4	Idle speed	IAC valve-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 conditioning, rear defogger, etc.
9	Closed throttle position switch condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark position	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (SST).

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



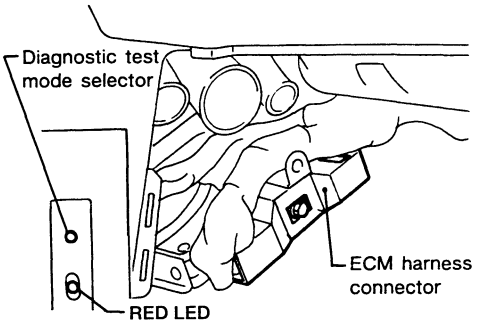
MALFUNCTION INDICATOR LAMP

SEF217M

On-board Diagnostic System

MALFUNCTION INDICATOR LAMP (MIL)

A malfunction indicator lamp has been adopted on all models. This lamp blinks simultaneously with the RED LED on the ECM. Malfunction indicator lamp is located on the instrument panel.



AEC210

ECM LED

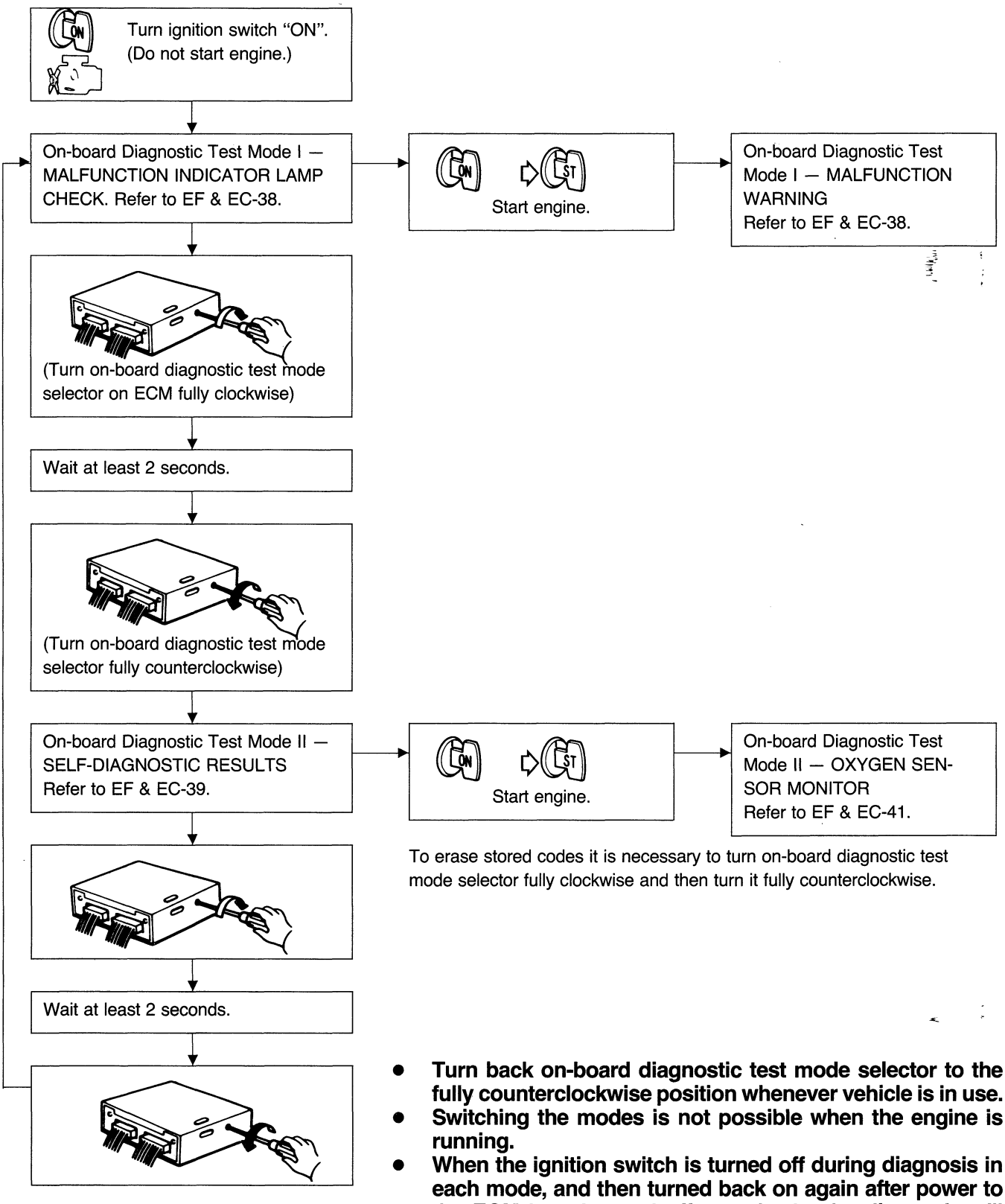
The ECM has only one RED LED.

ON-BOARD DIAGNOSTIC SYSTEM MODES

Condition		On-board Diagnostic Test Mode	
		On-board Diagnostic Test Mode I	On-board Diagnostic Test Mode II
Ignition switch in "ON" position 	Engine stopped 	MALFUNCTION INDICATOR LAMP CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	OXYGEN SENSOR MONITOR

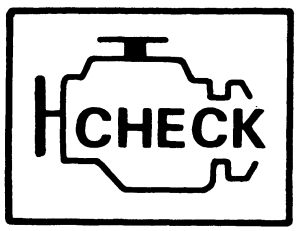
On-board Diagnostic System (Cont'd)

HOW TO SWITCH ON-BOARD DIAGNOSTIC TEST MODES (Without CONSULT)



To erase stored codes it is necessary to turn on-board diagnostic test mode selector fully clockwise and then turn it fully counterclockwise.

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



MALFUNCTION INDICATOR LAMP

SEF217M

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

ON-BOARD DIAGNOSTIC TEST MODE I — MALFUNCTION INDICATOR LAMP CHECK

In this mode, the RED LED 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 LED.

ON-BOARD DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

FOR CALIFORNIA MODELS

MALFUNCTION INDICATOR LAMP and RED LED	Condition
ON	When the following malfunctions (malfunction indicator lamp item) are detected or the ECM's CPU 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	Oxygen sensor circuit
35	EGR temperature sensor circuit
43	Throttle position sensor circuit
45	Injector leak

- **These Diagnostic trouble code Numbers are clarified in On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS. Refer to EF & EC-39.**
- **The RED LED and the MALFUNCTION INDICATOR LAMP will turn off when operation returns to normal. But, the On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS memory will hold the diagnostic trouble code until the memory is cleared. To clear SELF-DIAGNOSTIC RESULTS memory, refer to EF & EC-37 (Without CONSULT). To clear SELF-DIAGNOSTIC RESULTS memory (With CONSULT), refer to CONSULT Operation Manual — Engine.**

FOR NON-CALIFORNIA MODELS

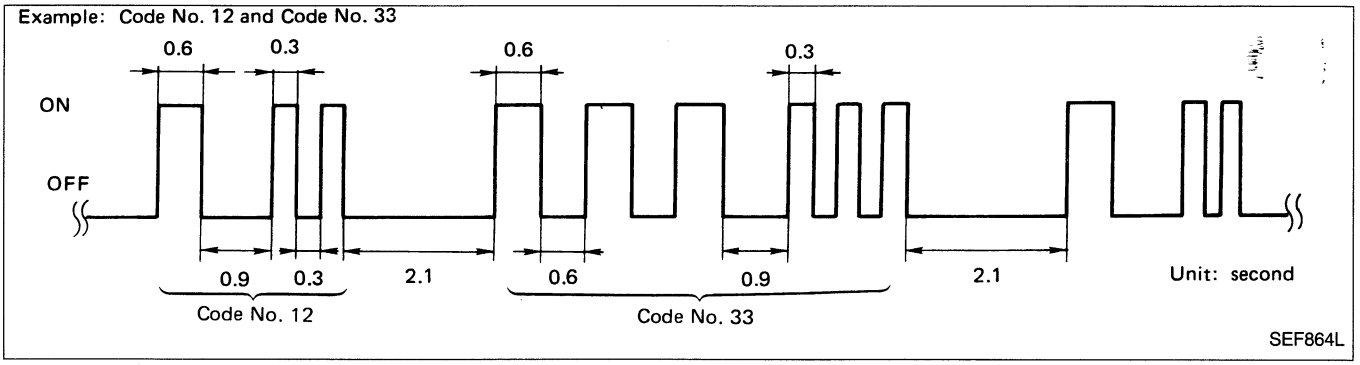
MALFUNCTION INDICATOR LAMP and RED LED	Condition
ON	When the ECM's CPU is malfunctioning.
OFF	O.K.

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

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

DESCRIPTION

In this mode, a diagnostic trouble code is indicated by the number of flashes from the RED LED 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 LED 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 mass air flow sensor. In this way, all the problems are classified by their diagnostic trouble code numbers.
The diagnostic results will remain in ECM memory.

Display diagnostic trouble code table

Diagnostic trouble code No.	Detected items	California models	Non-California models	Diagnostic Procedure page
11*	Crankshaft position sensor circuit	X	X	EF & EC-94
12 CHECK	Mass air flow sensor circuit	X	X	EF & EC-97
13 CHECK	Engine coolant temperature sensor circuit	X	X	EF & EC-100
14 CHECK	Vehicle speed sensor circuit	X	X	EF & EC-103
21*	Ignition signal circuit	X	X	EF & EC-106
31 CHECK	ECM	X	X	EF & EC-108
32 CHECK	EGR function	X	—	EF & EC-109
33 CHECK	Oxygen sensor circuit	X	X	EF & EC-115
34	Knock sensor circuit	X	X	EF & EC-118
35 CHECK	EGR temperature sensor circuit	X	—	EF & EC-120
43 CHECK	Throttle position sensor circuit	X	X	EF & EC-123
45 CHECK	Injector leak	X	—	EF & EC-126
54	Signal circuit from A/T control module to ECM (A/T only)	X	X	EF & EC-128
55	No malfunction in the above circuits	X	X	EF & EC-33

X: Available —: Not available CHECK : Malfunction indicator lamp item
*: Inspect items causing a malfunction of crankshaft position sensor circuit first, if both diagnostic trouble code No. 11 and 21 are displayed at the same time.

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

Diagnostic trouble code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
11*	Crankshaft position sensor circuit	• Either 1° or 180° signal is not entered for the first few seconds during engine cranking. • Either 1° or 180° 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 (pulse generator)
21*	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 • EGR and canister control solenoid valve
33	Oxygen sensor circuit	• The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Oxygen sensor • Fuel pressure • Injectors • Intake air leaks
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
54	Signal circuit from TCM (A/T control module) to ECM (A/T only)	• The A/T communication line is open or shorted.	• Harness and connector
55	None	• None of the above items detected.	Refer to EF & EC-33.

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

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

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

The diagnostic trouble code is erased from the backup memory on the ECM when the on-board diagnostic test mode is changed from On-board Diagnostic Test Mode II to On-board Diagnostic Test Mode I. Refer to EF & EC-37.

- **When the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **Before starting On-board Diagnostic Test Mode II (Self-diagnostic results), do not erase the stored memory.**
  - **Refer to CONSULT Operation Manual — Engine.**

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

DESCRIPTION

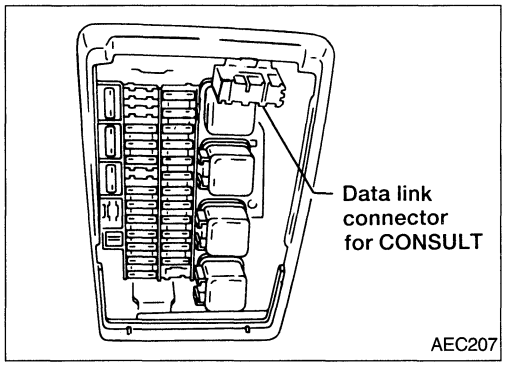
In this mode, the MALFUNCTION INDICATOR LAMP and RED LED display the condition of the fuel mixture (lean or rich) which is monitored by the oxygen sensor.

MALFUNCTION INDICATOR LAMP and RED LED	Fuel mixture condition in the exhaust gas	②Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
①Remains ON or OFF	Any condition	Open loop system

①: Maintains the mixture condition present just before switching to open loop.
②: Refer to EF & EC-18 for description of mixture ratio feedback system and open loop system.

HOW TO CHECK OXYGEN SENSOR

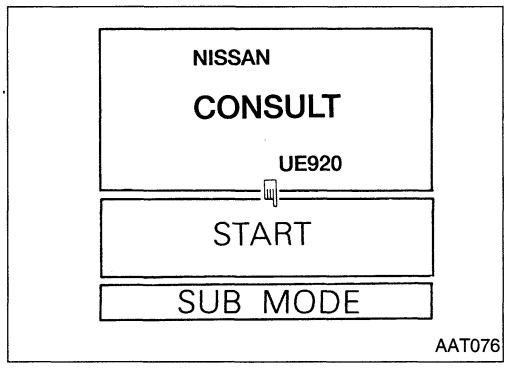
1. Set On-board Diagnostic Test Mode II. Refer to EF & EC-37.
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED LED or MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.



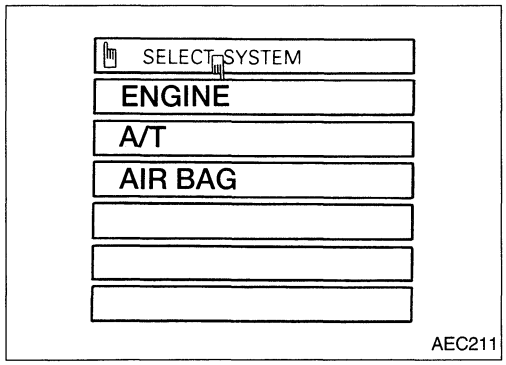
Consult

CONSULT INSPECTION PROCEDURE

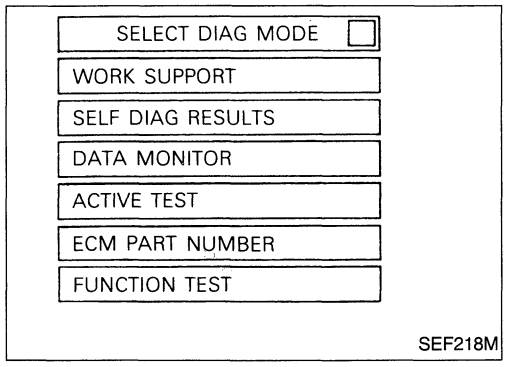
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located beside the fuse lid.)



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, see the CONSULT Operation Manual — Engine.

FUNCTION

Diagnostic test mode	Function	Page
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.	EF & EC-44
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	EF & EC-45
Data monitor	Input/Output data in the ECM can be read.	EF & EC-46
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the control modules and also shifts some parameters in a specified range.	EF & EC-48
ECM part number	ECM part number can be read.	—
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".	EF & EC-49

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 (REF)		X	X		
	Mass air flow sensor		X	X		
	Engine coolant temperature sensor		X	X	X	
	Oxygen sensor		X	X		X
	Vehicle speed sensor		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 conditioning switch			X		
	Neutral position switch (M/T)			X		X
	Inhibitor switch (A/T)			X		X
	Power steering pressure switch			X		X
	Soft closed throttle position switch			X		
	Battery			X		
OUTPUT	Injectors		X	X	X	X
	Power transistor (ignition timing)	X	X (Ignition signal)	X	X	X
	IAC valve-AAC valve	X		X	X	X
	EGR and canister control solenoid valve		X	X	X	X
	Air conditioning relay			X		
	Fuel pump relay	X		X	X	X
	Radiator fan relay			X	X	X

: The ECCS component part marked "" is applicable to vehicles for California only. X: Applicable

Consult (Cont'd)

WORK SUPPORT DIAGNOSTIC TEST MODE

WORK ITEM	CONDITION	USAGE
CLOSED TH/SW 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 Refer to EF & EC-54.
IGN TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing Refer to EF & EC-27.
IACV-AAC/V ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting idle speed
FUEL PRES RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" WHEN IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line Refer to EF & EC-167.

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANKSHAFT POSITION SEN*	• Either 1° or 180° signal is not entered for the first few seconds during engine cranking. • Either 1° or 180° 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 (pulse generator)
IGN SIGNAL-PRIMARY*	• The ignition signal in primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
EGR SYSTEM**	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGR and canister control solenoid valve
OXYGEN SEN	• The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • 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

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

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

DATA MONITOR DIAGNOSTIC TEST MODE

Remarks :
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by ECM at the connector.
  *Specification data may not be directly related to their components signals/values/operations.
  ie. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing being not adjusted to the specification data. This IGN TIMING monitors the calculated data by ECM according to the input signals from crankshaft position sensor and other ignition timing related sensors.
- If the real-time diagnosis results are NG and the on-board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.
- The monitor item marked "★★" is applicable to vehicles for California only.
- If the A/F ALPHA is below 100, the ECM is compensating for a rich signal from the oxygen sensor. If it is above 100, the ECM is compensating for a lean signal from the oxygen sensor.

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CKPS, RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.	• Harness and connector • Crankshaft position sensor
MAS AIR/FL SE	• Engine: After warming up, idle the engine • A/C switch "OFF" • Shift lever "N"	Idle	0.85 - 1.35V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.3 - 1.8V	
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)	• Harness and connector • Engine coolant temperature sensor
O2 SEN	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V	• Harness and connector • Oxygen sensor • Intake air leaks • Injectors
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.	
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	0.3 - 0.7V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve fully opened	Approx. 4.0V	
EGR TEMP SEN★★	• Engine: After warming up		Less than 5.0V	• Harness and connector • EGR temperature sensor
START SIGNAL	• Ignition switch: ON → START		OFF → ON	• Harness and connector • Starter switch
CLOSED TH/POS	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve: Slightly open	OFF	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	• Harness and connector • Air conditioning switch
		A/C switch "ON"	ON	
NEUT POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON	• Harness and connector • Neutral position/Inhibitor switch
		Except above	OFF	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in park/ neutral position (forward direction)	OFF	• Harness and connector • Power steering pressure switch
		The steering wheel is turned.	ON	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger is operating.	ON	• Harness and connector • Rear window defogger system Refer to EL section ("REAR WINDOW DEFOGGER").
		Rear window defogger is not operating.	OFF	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	2.3 - 3.3 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
		2,000 rpm	2.4 - 3.3 msec.	
IGN TIMING	ditto	Idle	20° B.T.D.C.	• Harness and connector • Crankshaft position sensor
		2,000 rpm	More than 30° B.T.D.C.	
IACV-AAC/V	ditto	Idle	10 - 40%	• Harness and connector • IAC valve-AAC valve
		2,000 rpm	—	
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Oxygen sensor • Canister purge line • Intake air system
AIR COND RLY	• Air conditioning switch OFF → ON		OFF → ON	• Harness and connector • Air conditioning switch • Air conditioning 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	
RADIATOR FAN	• After warming up engine, idle the engine. • A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	• Harness and connector • Radiator fan relays • Radiator fan
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F).	LOW	
		Engine coolant temperature is 105°C (221°F) or more	HIGH	
EGRC SOL/V	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGR and canister control solenoid valve
		2,000 rpm	OFF	

Consult (Cont'd)

ACTIVE TEST DIAGNOSTIC TEST MODE

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION TEST	• Engine: Return to the original trouble condition • Change the amount of fuel injection with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Oxygen sensors
IACV-AAC/V OPENING TEST	• Engine: After warming up, idle the engine. • Change the IAC valve-AAC valve opening percent with the CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • IAC valve-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
IGN TIMING TEST	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time with the CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
RADIATOR FAN TEST	• Ignition switch: ON • Turn the radiator fan "ON" and "OFF" with the CONSULT.	Radiator fan moves and stops.	• Harness and connector • Radiator fan motor
FUEL PUMP RLY TEST	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Each solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARN CONT TEST	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		

Consult (Cont'd)

FUNCTION TEST DIAGNOSTIC TEST MODE

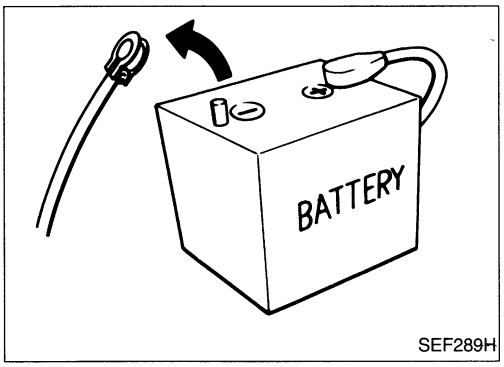
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on-board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI (SOFT CLOSED THROTTLE POS SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Soft closed 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 (Soft closed throttle position switch) • Throttle position sensor (Soft 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/ inhibitor switch circuit is tested when shift lever is manipulated.	OUT OF N/P-RANGE	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-RANGE	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR control-solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGR control-solenoid valve
RADIATOR FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Radiator fan circuit is tested by checking radiator fan operation.	• The radiator fan rotates and stops every 3 seconds		• Harness and connector • Radiator fan motor • Radiator fan relay

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
START SIGNAL CKT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery positive voltage and water temperature before cranking, and average battery positive 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 pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Electric speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving crankshaft position sensor or distributor) • Crankshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the oxygen sensor output at 2,000 rpm under non-loaded state.	• OXYGEN SENSOR 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) • Oxygen sensor circuit • 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. • IAC valve-AAC valve system is tested by detecting change in engine speed when IAC valve-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 • IAC valve-AAC valve • Air passage restriction between air inlet and IAC valve-AAC valve • IAS (Idle adjusting screw) adjustment

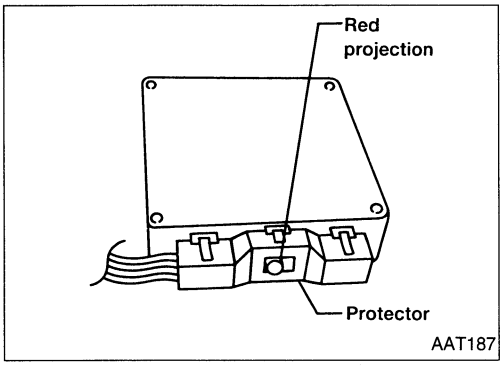


SEF289H

Diagnostic Procedure

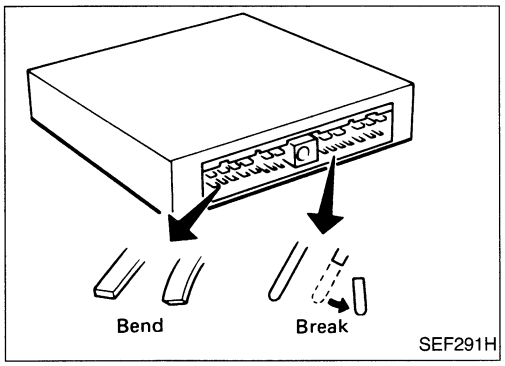
CAUTION:

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 positive voltage is applied to ECM even if ignition switch is turned off. Failure to do so may damage the ECM.**



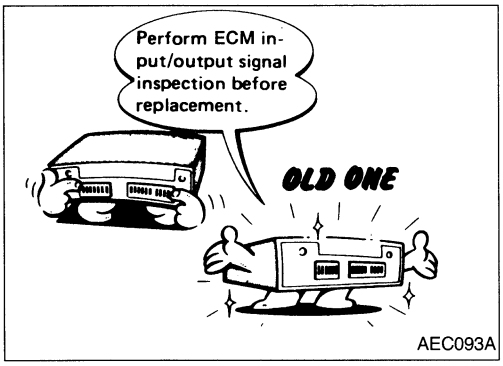
AAT187

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



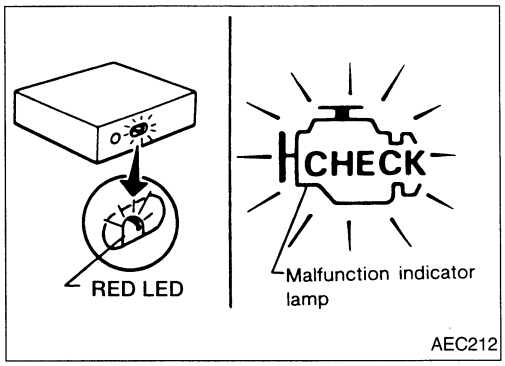
SEF291H

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.**



AEC093A

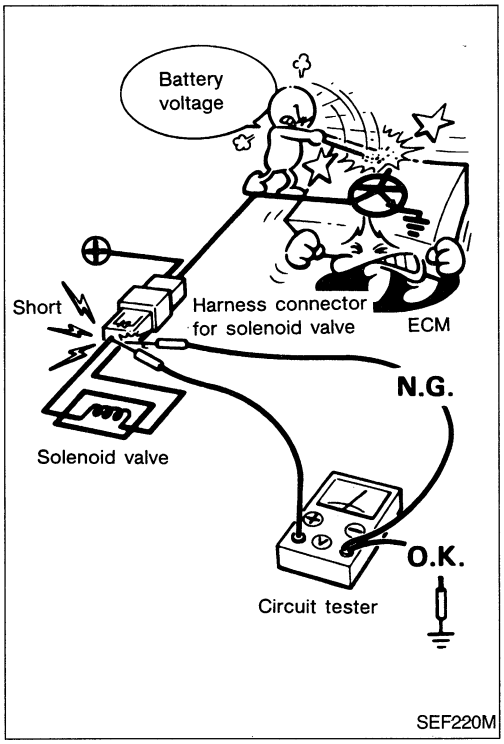
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. Refer to EF & EC-154.**



AEC212

6. **After reviewing the above items, perform On-board Diagnostic Test Mode II (Self-diagnostic results) and driving test.**

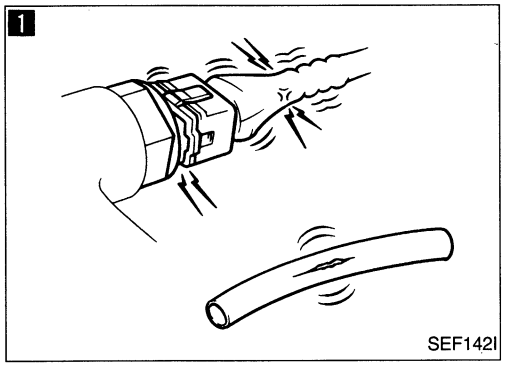
Diagnostic Procedure (Cont'd)



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

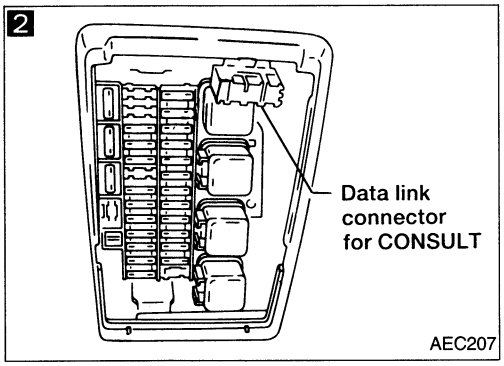
Basic Inspection

1



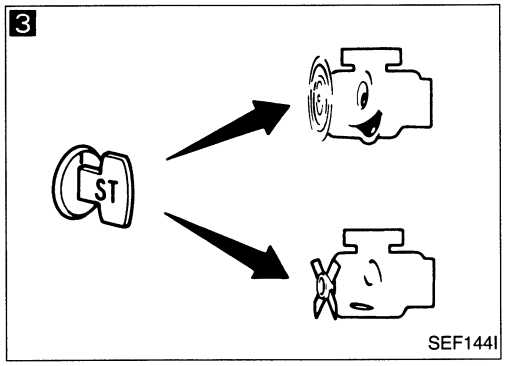
SEF142I

2



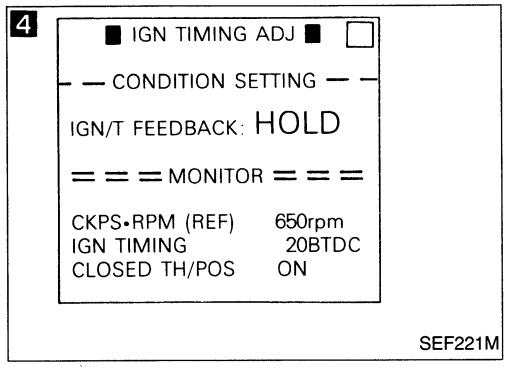
AEC207

3



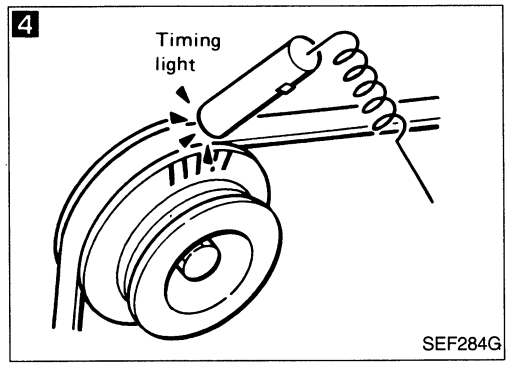
SEF144I

4



SEF221M

4



SEF284G

1

BEFORE STARTING

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

- Harness connectors for proper connections
- Vacuum hoses for splits, kinks, and proper connections
- Wiring for proper connections, pinches, and cuts

2

CONNECT CONSULT TO THE VEHICLE.

Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. Refer to EF & EC-42.

3

DOES ENGINE START?

No → Go to 6

Yes

4

CHECK IGNITION TIMING.

1. Warm up engine sufficiently.
2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing at idle using timing light.

Ignition timing:
20° ± 2° B.T.D.C.

N.G. → Adjust ignition timing by turning crankshaft position sensor. Refer to EF & EC-27.

1. Warm up engine sufficiently.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Check ignition timing at idle using timing light.

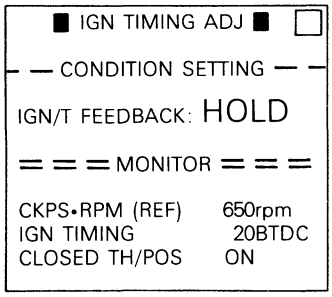
Ignition timing:
20° ± 2° B.T.D.C.

O.K.

(Go to Ⓐ on next page.)

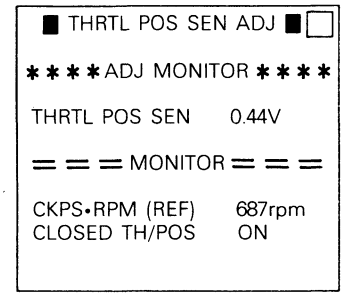
Basic Inspection (Cont'd)

5



SEF221M

6



SEF222M

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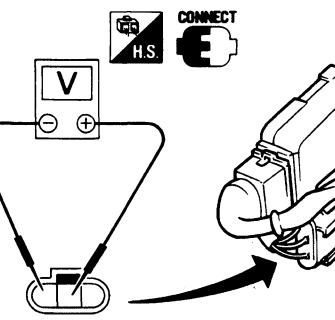
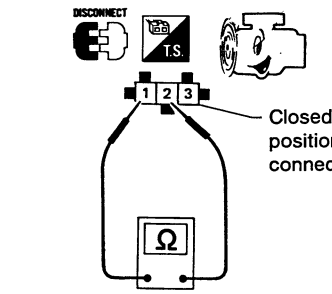


SEF148I

7



SEF096M

Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine speed fall to 650 ± 50 rpm (A/T in "N" position)?

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

OR

When disconnecting throttle position sensor harness connector, does engine speed fall to 650 ± 50 rpm (A/T in "N" position)?

O.K.

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION. (MT model only).

1. Perform "THRTL POS SEN. ADJ." in "WORK SUPPORT" mode.
2. Check that output voltage of throttle position sensor is approx. 0.3 to 0.7V. (Throttle valve fully closes.) and "CLOSED TH/POS" stays "ON".

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

OR

Measure output voltage of throttle position sensor using voltmeter, and check that it is approx. 0.3 to 0.7V. (Throttle valve fully closed.)

O.K.

7

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (AT model only).

Check closed throttle position switch OFF → ON engine speed with circuit tester, closing throttle valve manually.

Closed throttle position switch OFF → ON engine speed
900 ± 150 rpm ("N" position)

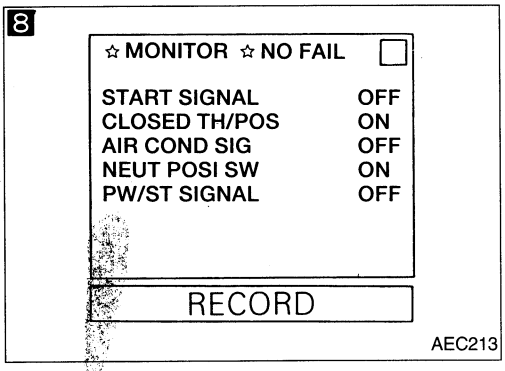
N.G. →
1. Adjust continuity signal by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "CLOSED TH/POS" stays "ON" using CONSULT.

O.K.

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)

8



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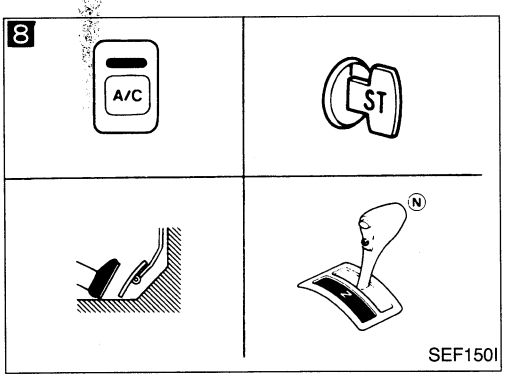

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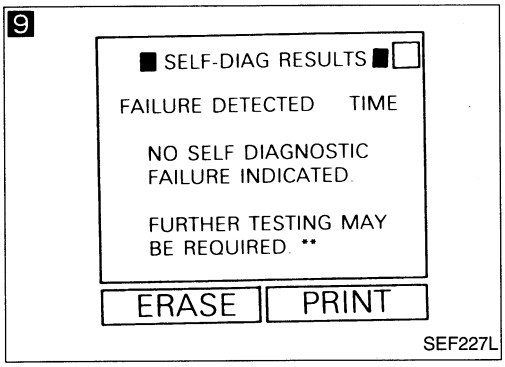

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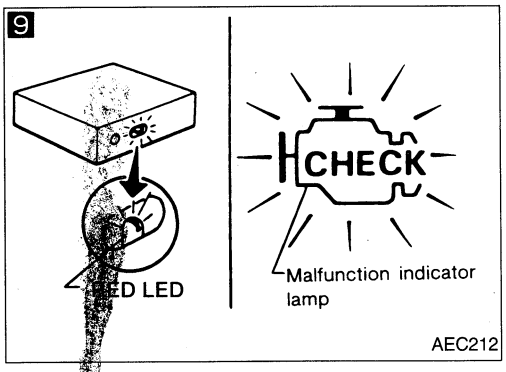


Ⓑ

8

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Closed throttle position,
c) Air conditioning signal,
d) Neutral position/Inhibitor
e) Power steering pressure switch, and check the switches' ON-OFF operation.

OR

Perform ECM INPUT/OUTPUT SIGNAL INSPECTION. Refer to EF & EC-154 and test terminals 20, 34, 41, and 43.

N.G. → Repair or replace the malfunctioning switch or its circuit. For start signal, refer to EF & EC-130. For closed throttle position, refer to EF & EC-123. For Neutral position/ Inhibitor switch, refer to EF & EC- 148. For power steering pressure switch, refer to EF & EC- 146. For air conditioning signal, refer to HA section.

O.K. ↓

9

READ SELF-DIAGNOSTIC RESULTS.

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

OR

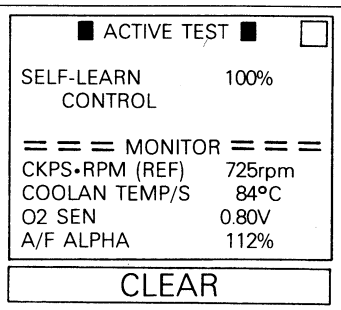
1. Set "SELF-DIAG RESULTS" mode in On-board Diagnostic Test Mode II. (Refer to EF & EC-37.)
2. Count the number of RED LED or malfunction indicator lamp flashes and read out the diagnostic trouble code.
3. Are the diagnostic trouble code being output?

Yes → Go to the relevant inspection procedure. Refer to EF & EC-39.

No ↓

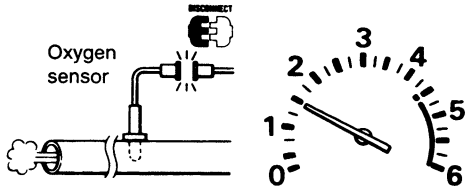
INSPECTION END

1



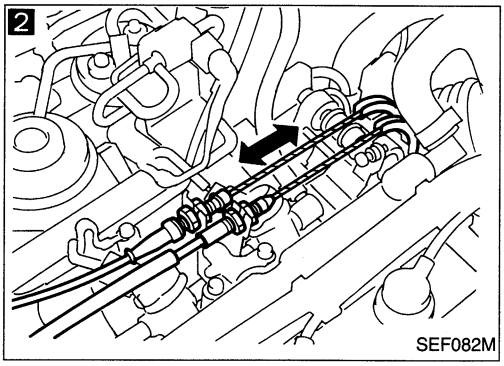
SEF225M

1



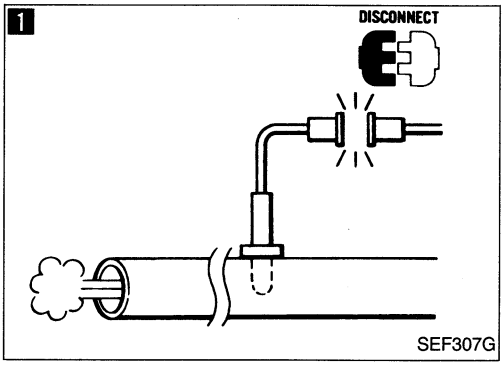
SEF226M

2



SEF082M

1



SEF307G

Diagnostic Procedure 1 — High Idling after Warm-up

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 oxygen sensor harness connectors.
2. After racing engine at 2,000 rpm under no load for about 30 seconds, does the engine speed drop?

No

2

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 2 — Hunting

1

CHECK OXYGEN SENSOR.

When disconnecting oxygen sensor harness connector, is the hunting fixed?

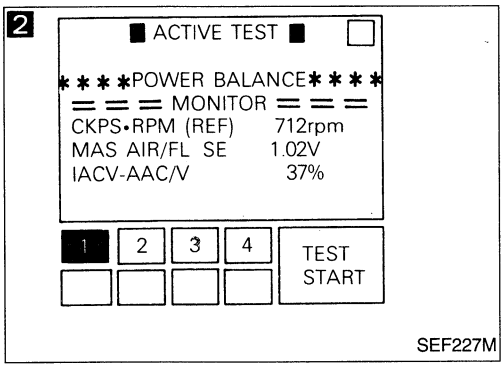
Yes → Check oxygen sensor. Refer to EF & EC-115.

No

(Go to Ⓐ on next page.)

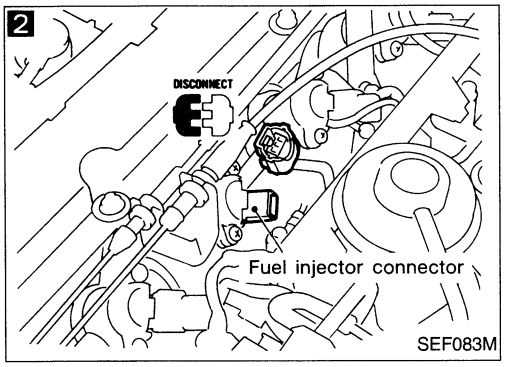
Diagnostic Procedure 2 — Hunting (Cont'd)

2



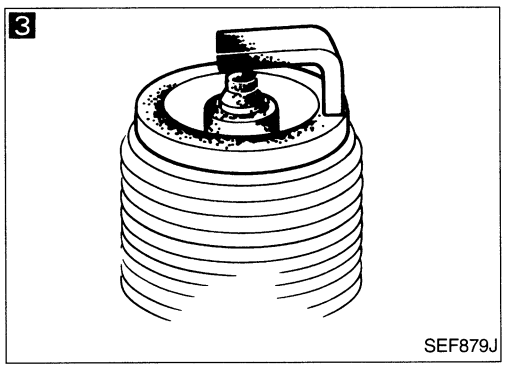
SEF227M

2



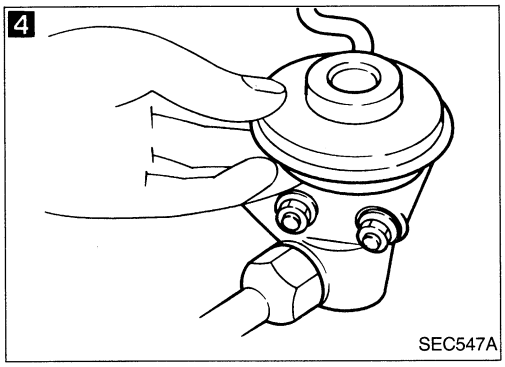
SEF083M

3



SEF879J

4



SEC547A

Ⓐ

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 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

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 EGR VALVE.

Check EGR valve for sticking.

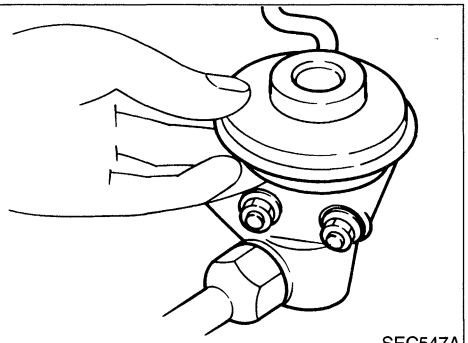
N.G. → Repair or replace.

O.K.

INSPECTION END

Diagnostic Procedure 3 — Unstable Idle

1



SEC547A

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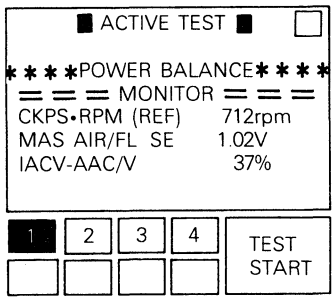

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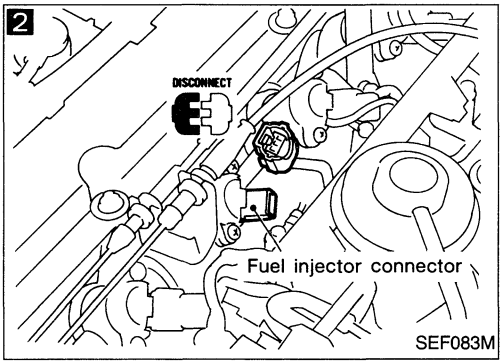

SEF083M

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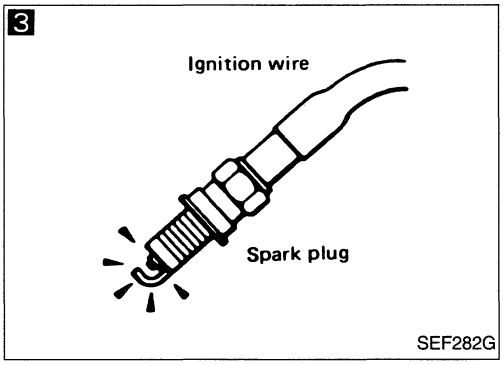
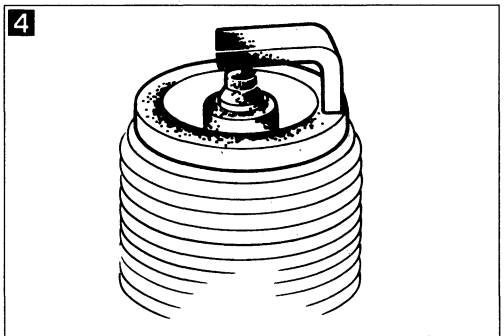


SEF282G

4



SEF879J

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 IGNITION SPARK.

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

N.G. → Check ignition wire, distributor cap and connections.

O.K. ↓

4

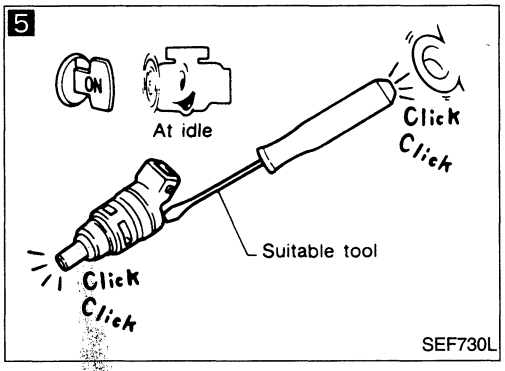
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

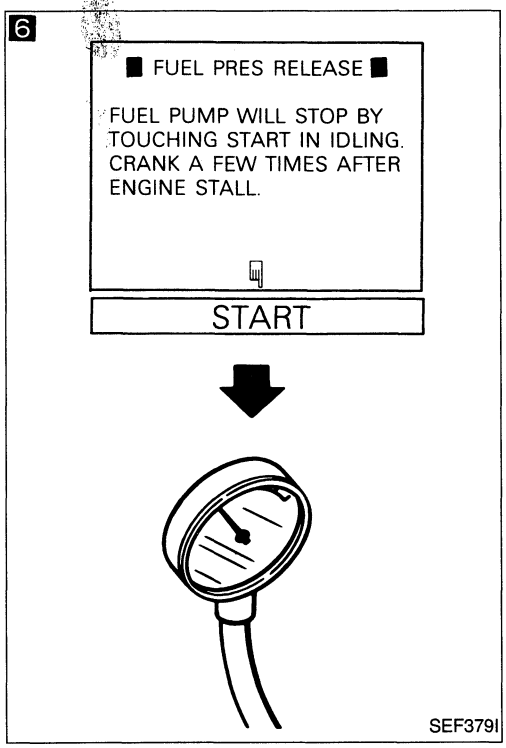
N.G. → Repair or replace spark plug(s).

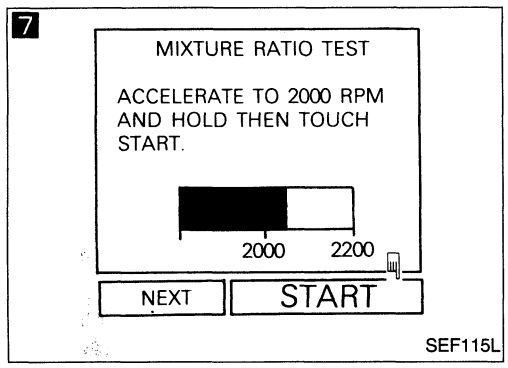
O.K. ↓

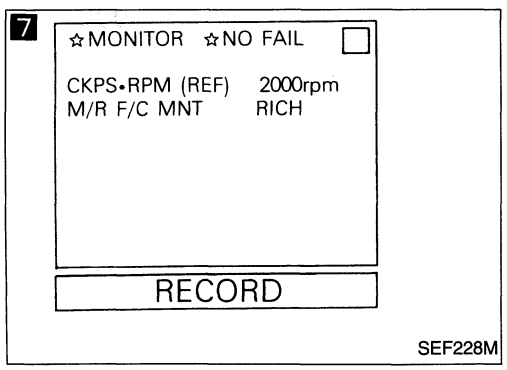
(Go to Ⓐ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)









Ⓐ

5

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

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 pressure regulator, fuel pump and circuit. Refer to EF & EC-134 and 167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-167.
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

7

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

1. See "M/R F/C MNT" 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.....

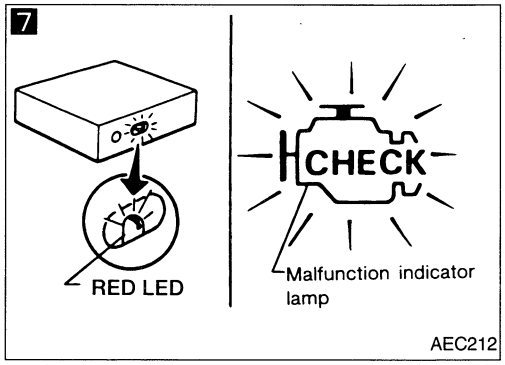
OR

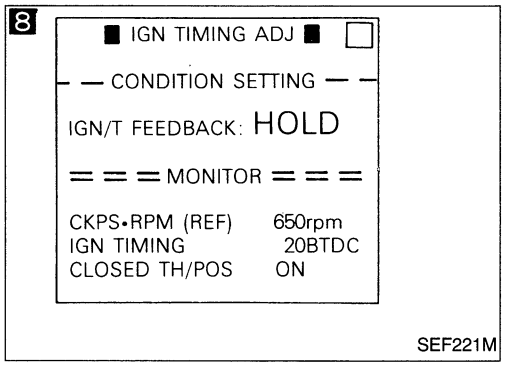
1. Set "Oxygen sensor monitor" in On-board Diagnostic Test Mode II. Refer to EF & EC-37.
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

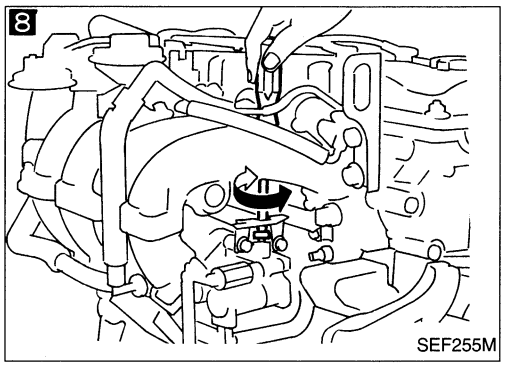
O.K. ↓

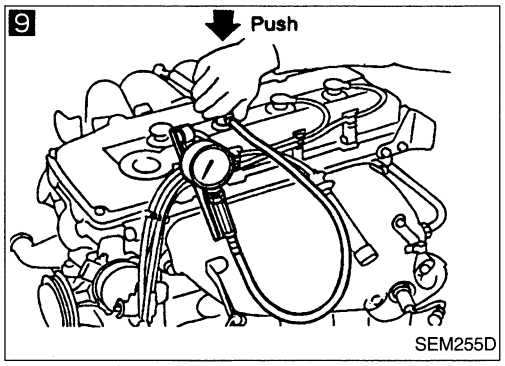
(Go to Ⓑ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)









Ⓑ

8 **CHECK IDLE ADJ. SCREW CLOGGING.**

1. Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode and touch "START".
2. Can you set engine speed at 650 ± 50 rpm (in "N" position) by turning idle adjusting screw?

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

OR

1. Disconnect throttle position sensor harness connector.
2. Can you set engine speed at 650 ± 50 rpm (in "N" position) by turning idle adjusting screw?

Yes ↓

9 **CHECK COMPRESSION PRESSURE.**

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,226 (12.5, 178)
Minimum: kPa (kg/cm², psi)/300 rpm
1,030 (10.5, 149)
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. ↓

10 **CHECK ECM HARNESS CONNECTOR.**

Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

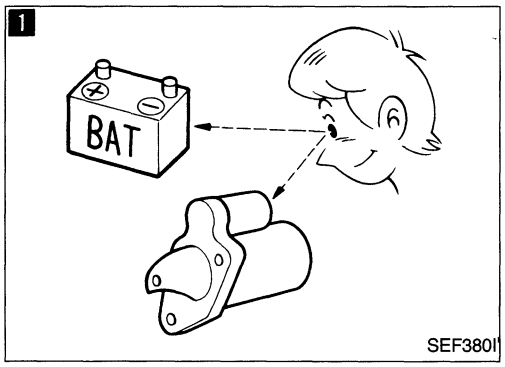
11 **TRY A KNOWN GOOD ECM***

O.K. ↓

INSPECTION END

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

Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold

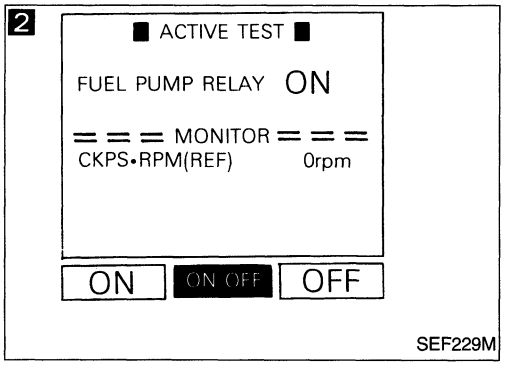


1

CHECK BATTERY AND STARTER.
Check battery and starter condition. Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("SDS", "STARTING SYSTEM — Starter — ").

N.G. → Repair or replace.

O.K. ↓



2

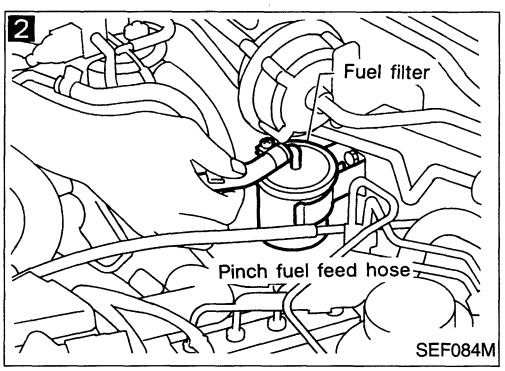
CHECK FUEL PRESSURE.

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. Refer to EF & EC-134.

OR

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



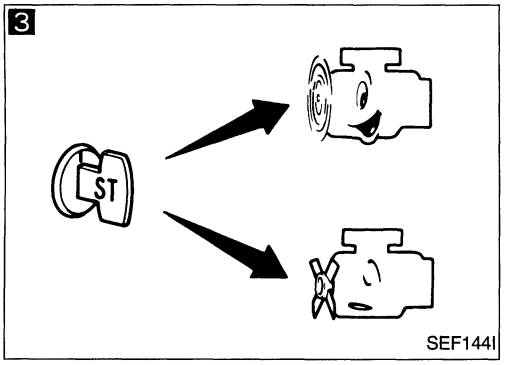
Yes ↓

3

CHECK IAC VALVE-AAC VALVE.
When pressing accelerator pedal 1/4 open, can you start the engine.

Yes → Check IAC valve-AAC valve and circuit. Refer to EF & EC-137.

No ↓



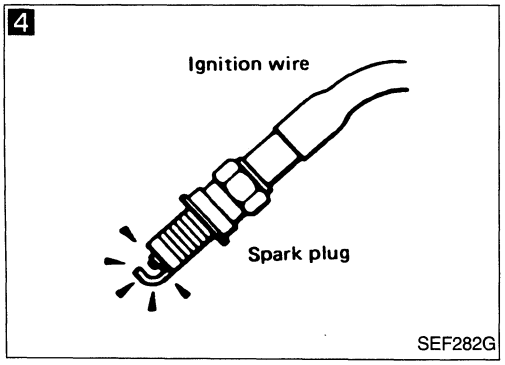
4

CHECK IGNITION SPARK.

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

N.G. → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-106.

O.K. ↓



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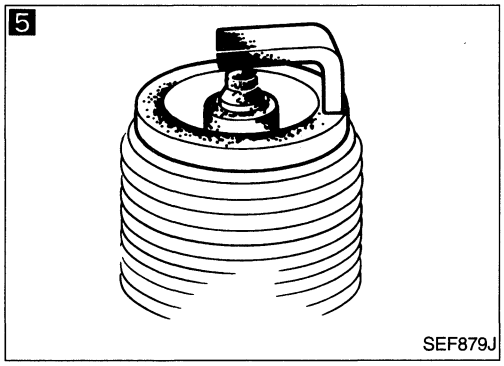
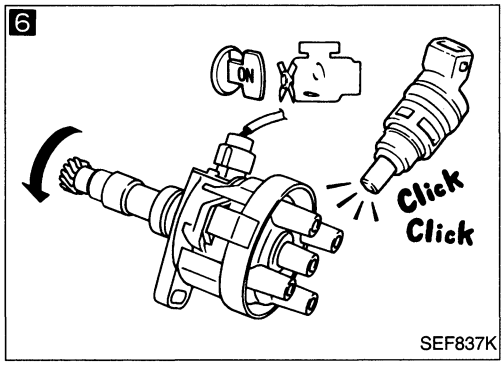
Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)

5



SEF879J

6



SEF837K

Ⓐ

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 INJECTOR.**
1. Remove crankshaft position sensor from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Disconnect ignition coil 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). Refer to EF & EC-132.

Yes ↓

7 **CHECK ECM HARNESS CONNECTOR.**
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

8 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to EF & EC-91.

N.G. → Repair or replace.

O.K. ↓

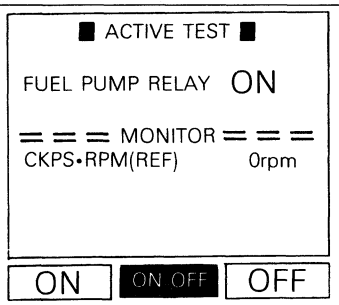
9 **TRY A KNOWN GOOD ECM***

↓

INSPECTION END

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

1



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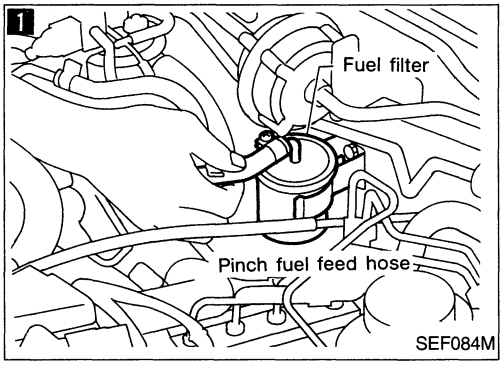
1



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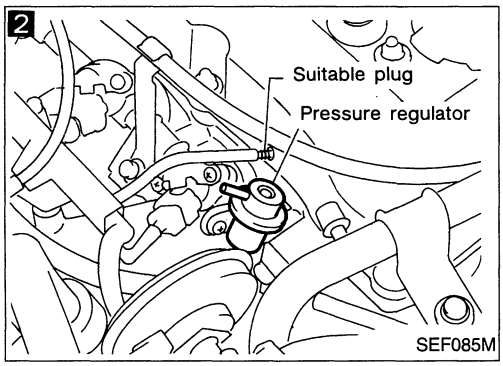

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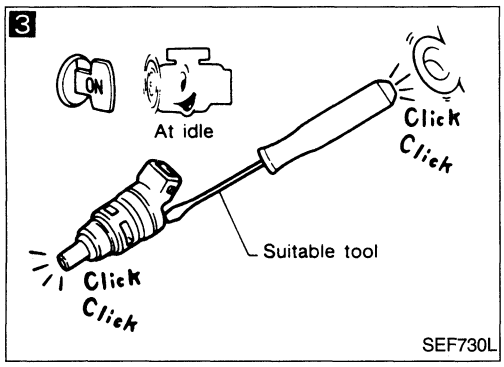
3



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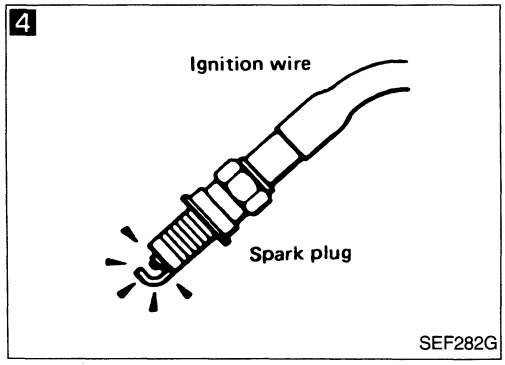
4



SEF282G

Diagnostic Procedure 5 — 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. Refer to EF & EC-134.

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 sound like it is operating at idling?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

4

CHECK IGNITION SPARK.

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

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

O.K. ↓

5

CHECK ECM HARNESS CONNECTOR.

Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

6

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.

Refer to EF & EC-91.

N.G. → Repair or replace.

O.K. ↓

7

TRY A KNOWN GOOD ECM*

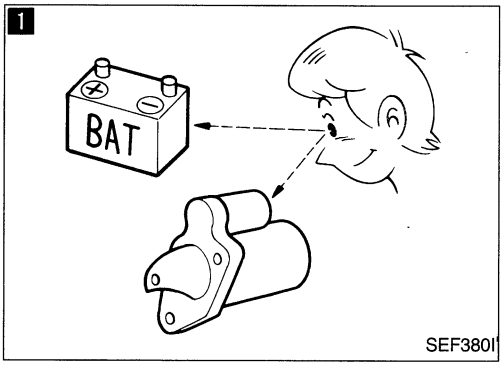
↓

INSPECTION END

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

Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions

1



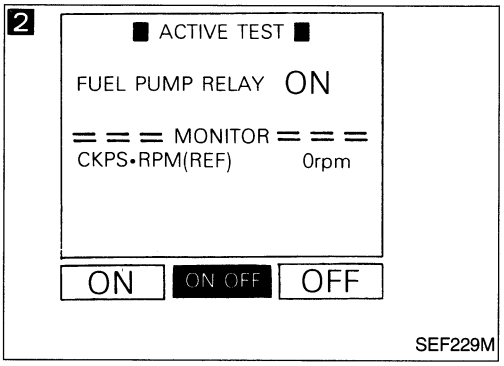
SEF380I

CHECK BATTERY AND STARTER.
Check battery and starter operation.
Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("SDS", "STARTING SYSTEM — Starter — ").

N.G. → Repair or replace.

O.K. ↓

2



SEF229M

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?

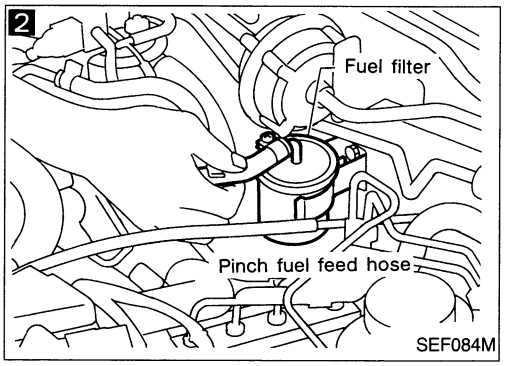
No → Check fuel pump and circuit. Refer to EF & EC-134.

— OR —

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

Yes ↓

2



SEF084M

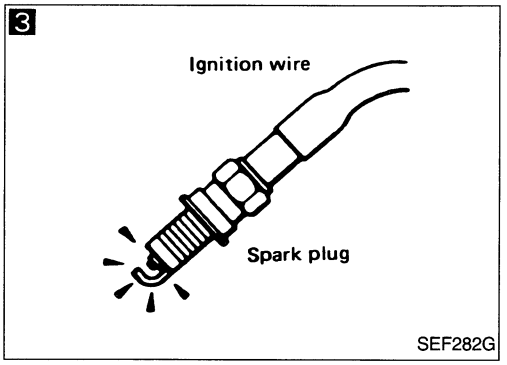
3

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

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

O.K. ↓

3



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4

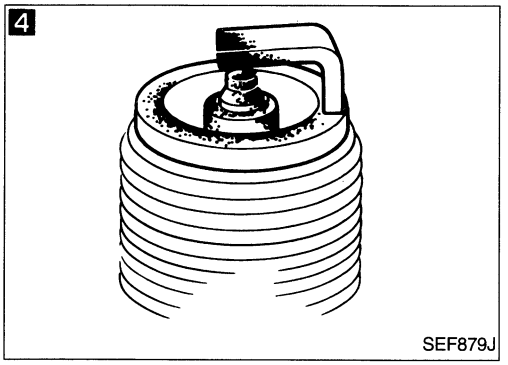
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

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

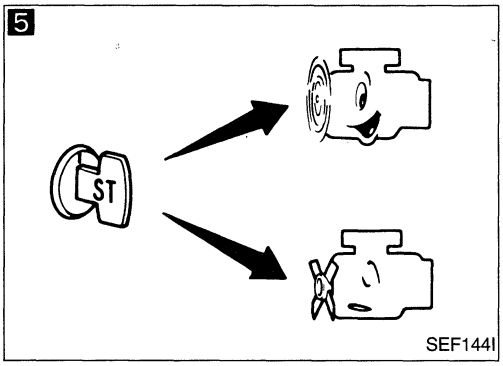
O.K. ↓

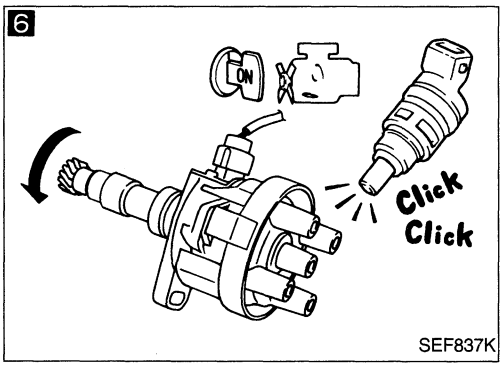
(Go to Ⓐ on next page.)

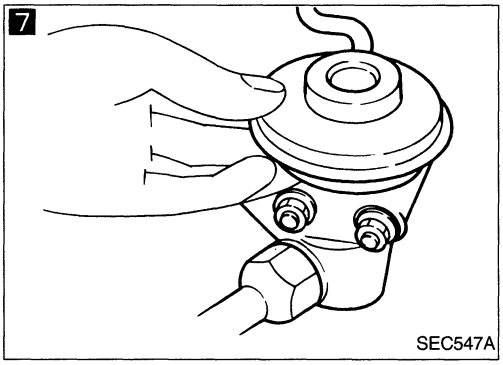
4


SEF879J

Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)







Ⓐ

5

CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage. Refer to EF & EC-126.

No ↓

6

CHECK INJECTOR.
1. Remove crankshaft position sensor from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Disconnect ignition coil 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. Refer to EF & EC-132.

Yes ↓

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. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

9

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-91.

N.G. → Repair or replace.

O.K. ↓

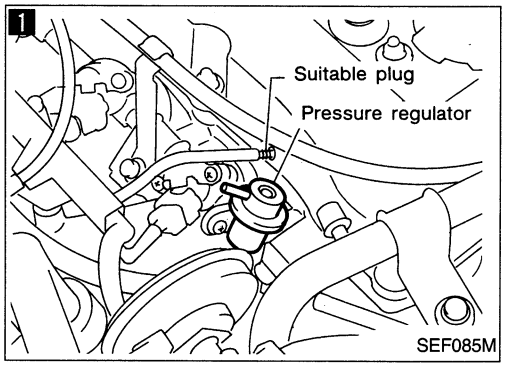
10

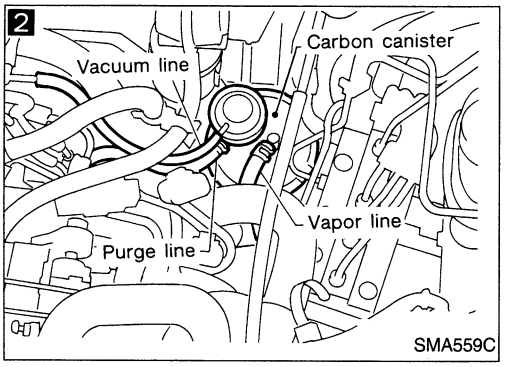
TRY A KNOWN GOOD ECM*

↓

INSPECTION END

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





Diagnostic Procedure 7 — 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

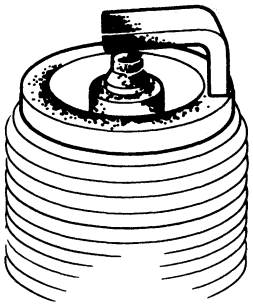
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines. Refer to EF & EC-106.

No ↓

INSPECTION END

1



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Diagnostic Procedure 8 — 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

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

Trouble is not fixed. ↓

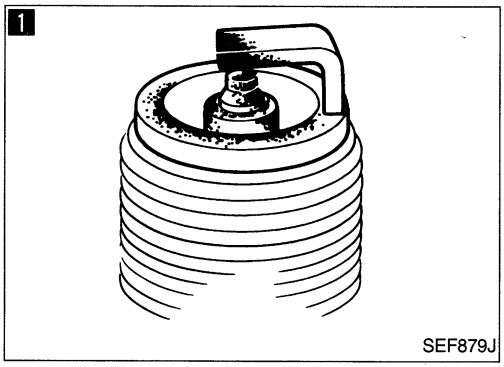
3

CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END

Diagnostic Procedure 9 — Hesitation under Normal Conditions


SEF879J

1

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

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

O.K.

2

CHECK OXYGEN SENSOR.

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

— OR —

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

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

— OR —

1. Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC- 37.
2. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

Yes → Replace oxygen sensor(s).

No

3

CHECK CANISTER PURGE.

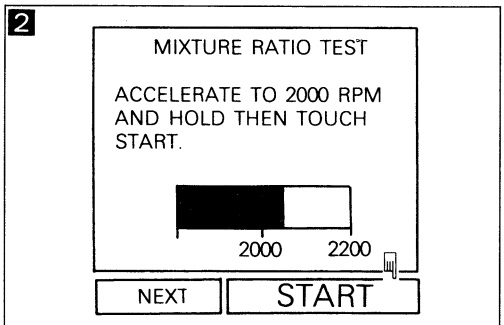
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines. Refer to EF & EC-169.

No

INSPECTION END

2



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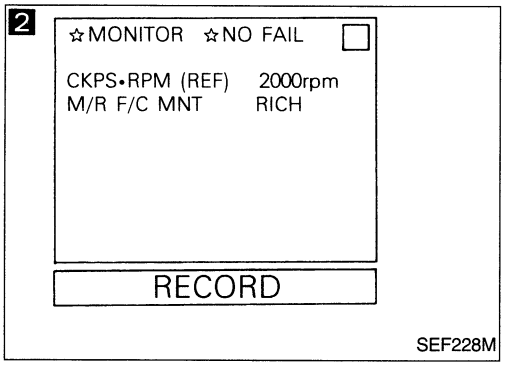
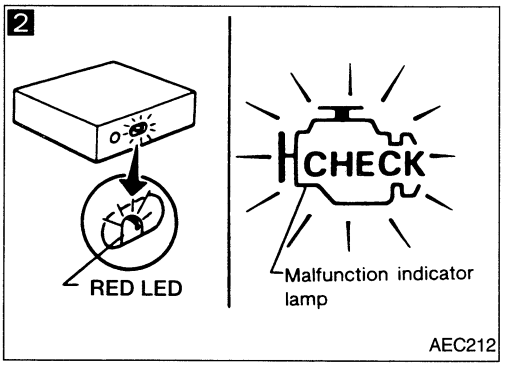
2



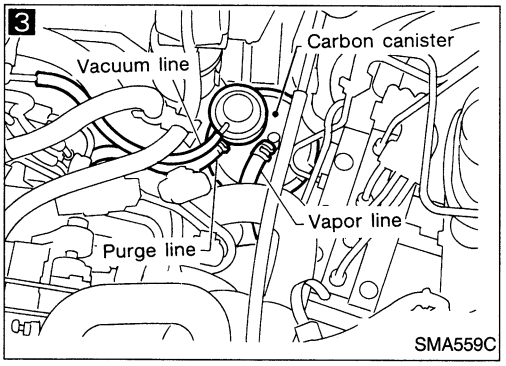
SEF228M

2



AEC212

3

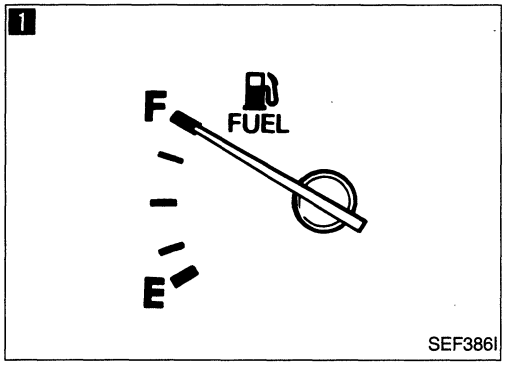


SMA559C

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

Diagnostic Procedure 10 — Engine Stalls when Turning

1



SEF386I

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?

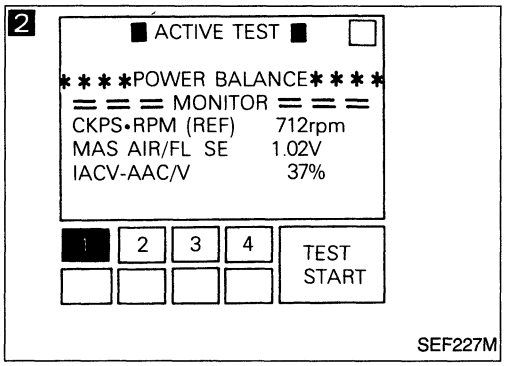
— OR —

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

No → Go to **5** .

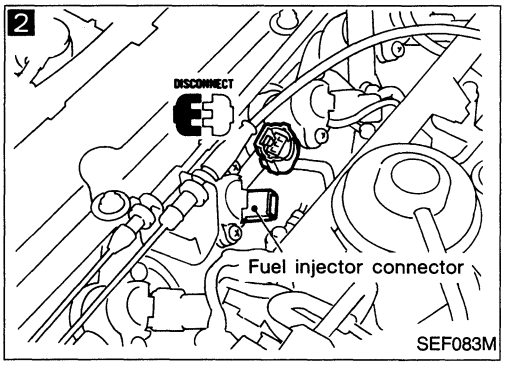
Yes ↓

2



SEF227M

2



SEF083M

3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

4

CHECK IGNITION SPARK.

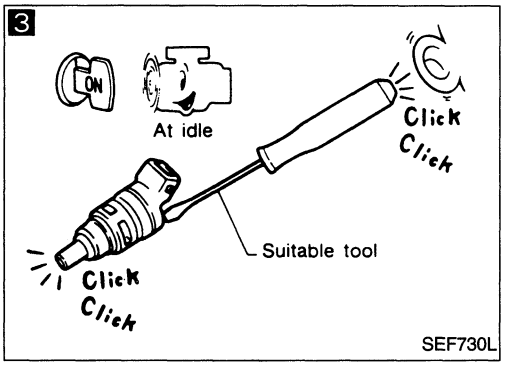
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

O.K. ↓

(Go to Ⓐ on next page.)

3



SEF730L

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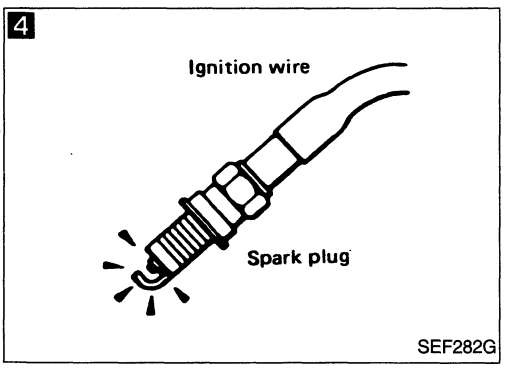


SEF282G

Diagnostic Procedure 10 — Engine Stalls when Turning (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF379I

Ⓐ

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.

A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

— OR —

1. Release fuel pressure to zero. Refer to EF & EC-167.
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. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-91.

N.G. → Repair or replace.

O.K.

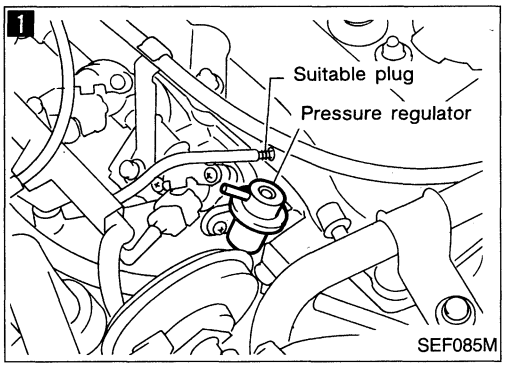
8

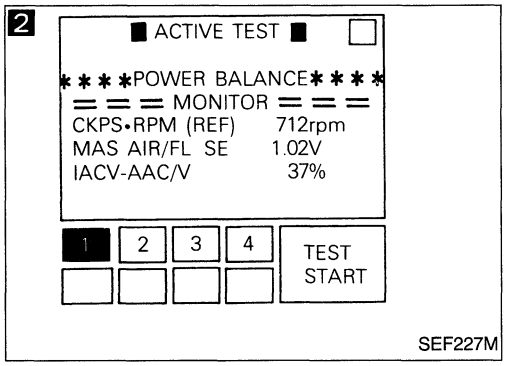
TRY A KNOWN GOOD ECM*

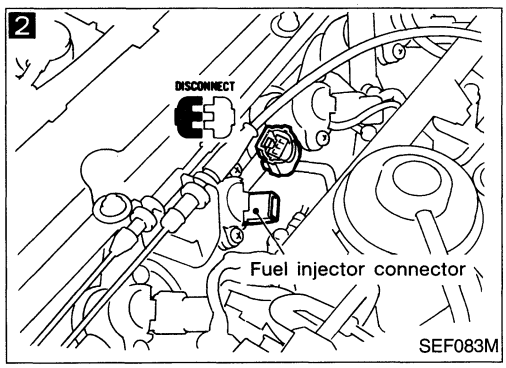
INSPECTION END

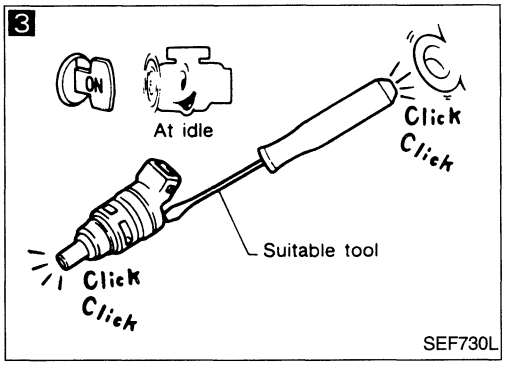
*: ECM may be the cause of a problem, but this is rarely the case.

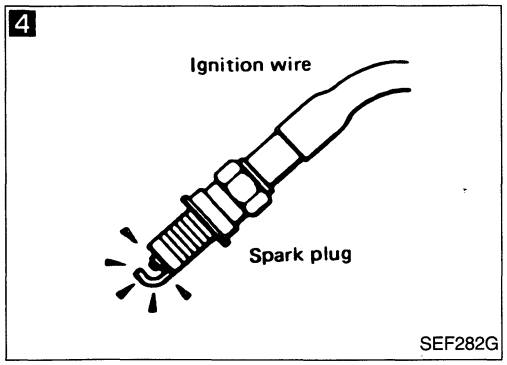
Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot











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 sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

4

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

N.G. → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-106.

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF379I

Ⓐ

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.

A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

— OR —

1. Release fuel pressure to zero. Refer to EF & EC-167.
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. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-91.

N.G. → Repair or replace.

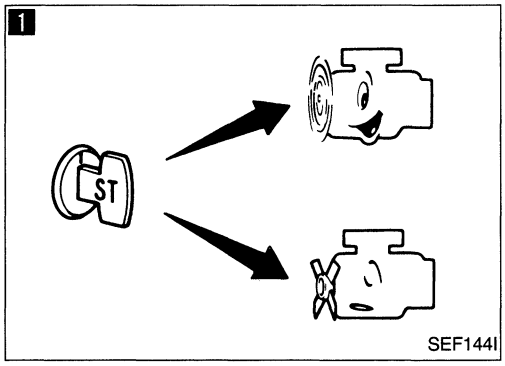
O.K.

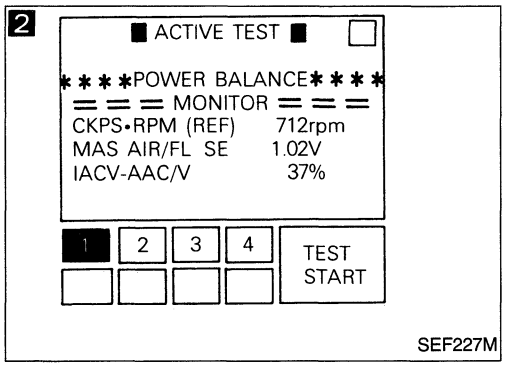
8

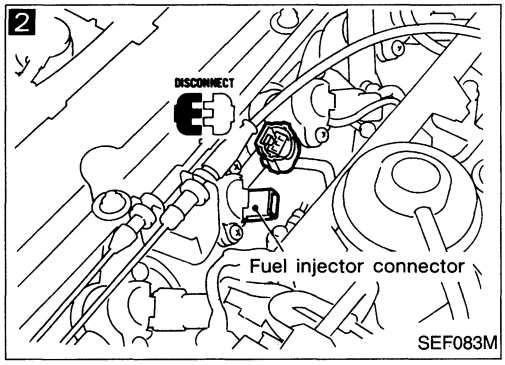
TRY A KNOWN GOOD ECM*

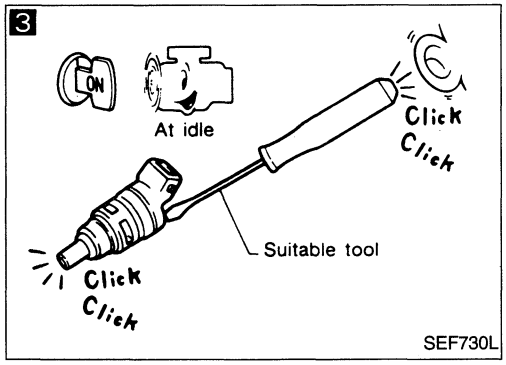
INSPECTION END

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









Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

1

CHECK IAC VALVE-AAC VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal 1/4 open?

Yes → Check IAC valve-AAC valve and circuits. Refer to EF & EC-137.

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?

N.G. → Go to 6

OR

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

O.K. ↓

3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

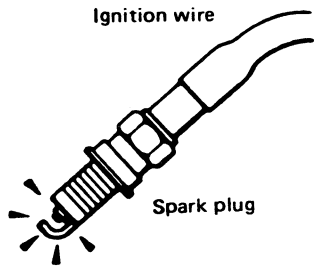
N.G. → Check injector(s) and circuit(s). Refer to EF & EC-132.

O.K. ↓

(Go to Ⓐ on next page.)

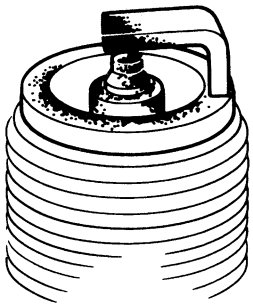
Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold (Cont'd)

4



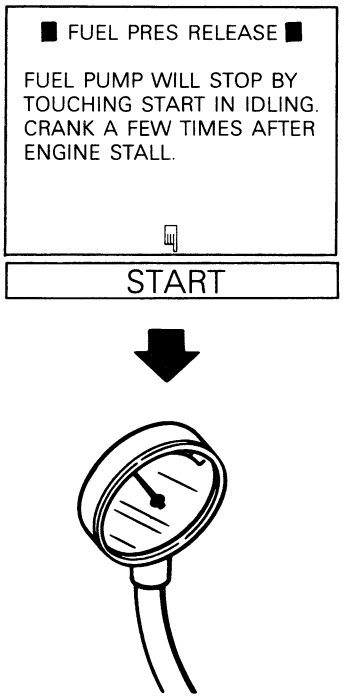
SEF282G

5



SEF879J

6



SEF379I

Ⓐ

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

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

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.
   A few seconds after ignition switch is turned OFF to ON:
   Approx.
   294 kPa (3.0 kg/cm², 43 psi)
   At idle:
   Approx.
   235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

OR

1. Release fuel pressure to zero. Refer to EF & EC-167.
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

7 **CHECK ECM HARNESS CONNECTOR.**
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

8 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to EF & EC-91.

N.G. → Repair or replace.

O.K. ↓

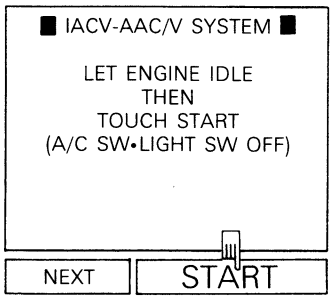
9 **TRY A KNOWN GOOD ECM***

↓

INSPECTION END

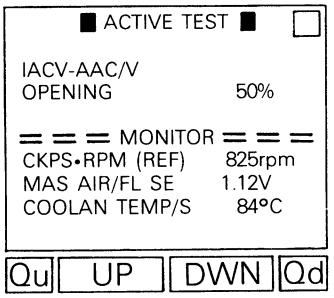
*: ECM may be the cause of a problem, but this is rarely the case.

1



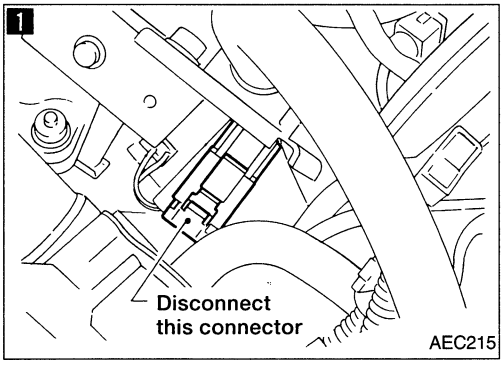
SEF249M

1



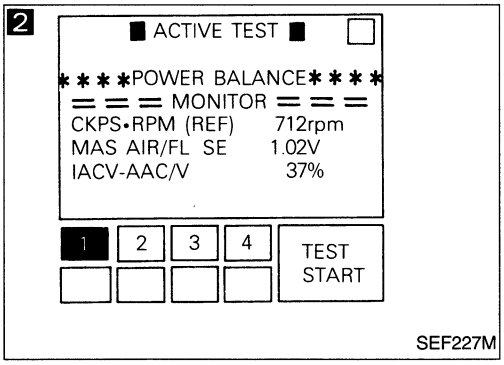
SEF250M

1



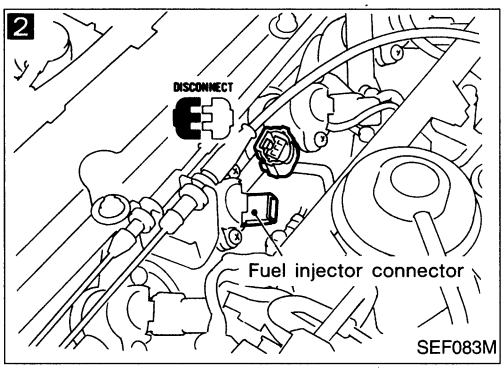
AEC215

2



SEF227M

2



SEF083M

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily

1

CHECK IAC VALVE-AAC VALVE.

1) Start engine and warm it up sufficiently.
2) Check idle speed.
   700 ± 50 rpm
   (A/T in "N" position)

3) Perform "IACV AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

— OR —

3) Select "IACV AAC/V OPENING" in "ACTIVE TEST" mode.
4) When touching "Qu" and "Qd", does the engine speed change according to the percent of IAC valve-AAC valve opening?

— OR —

3) When disconnecting IAC valve-AAC valve harness connector, does the engine speed drop?

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-137.

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 —

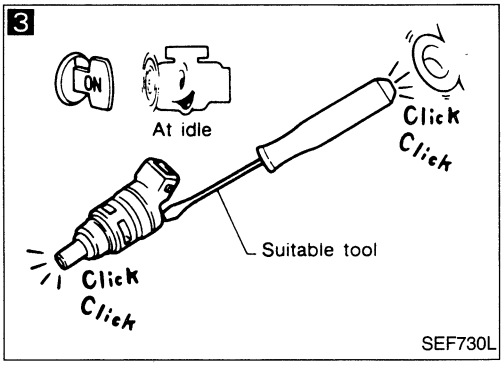
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

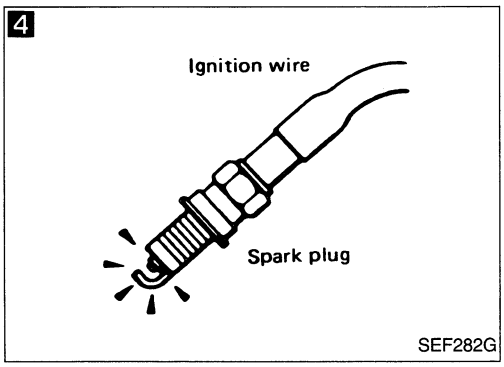
No → Go to **5** .

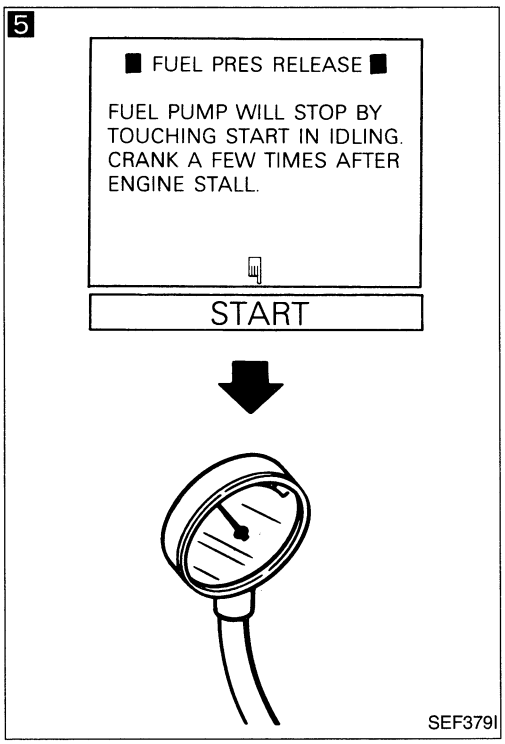
Yes ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)







Ⓐ

3 **CHECK INJECTOR.**
Does each injector sound like it is operating at idle?

No → Check injector(s) and their circuit(s). Refer to EF & EC-132.

Yes ↓

4 **CHECK IGNITION SPARK.**
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against an ground point with engine cranking.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-106.

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.

A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

OR

1. Release fuel pressure to zero. Refer to EF & EC-167.
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. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

7 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to EF & EC-91.

N.G. → Repair or replace.

O.K. ↓

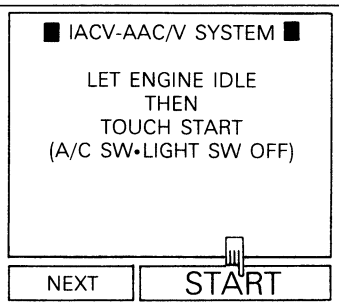
8 **TRY A KNOWN GOOD ECM***

↓

INSPECTION END

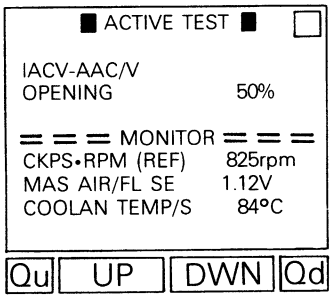
*: ECM may be the cause of a problem, but this is rarely the case.

1



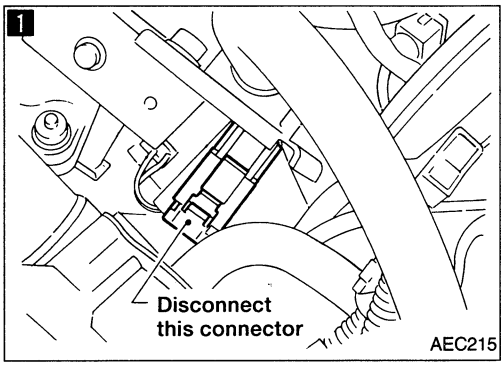
SEF249M

1



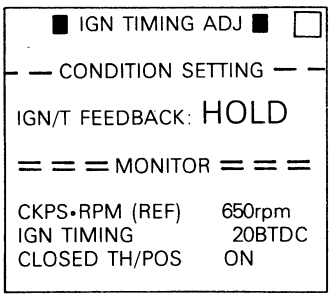
SEF250M

1



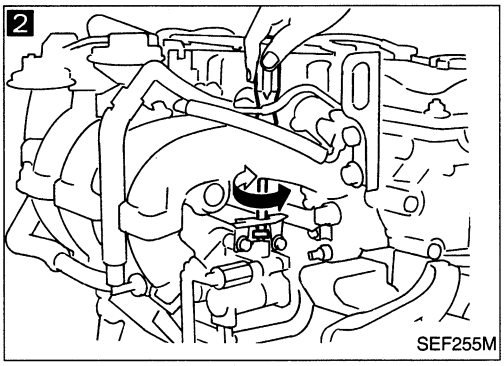
AEC215

2



SEF221M

2



SEF255M

Diagnostic Procedure 14 — Engine Stalls after Decelerating

1

CHECK IAC VALVE-AAC VALVE.

1) Start engine and warm it up sufficiently.
2) Check idle speed.
   700 ± 50 rpm
   (A/T in "N" position)

3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

3) Select "IACV-AAC/V OPENING" in "ACTIVE TEST" mode.
4) When touching "Qu" and "Qd", does the engine speed change according to the percent of IAC valve-AAC valve opening?

OR

3) When disconnecting IAC valve-AAC valve harness connector, does the engine speed drop?

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-137.

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode and touch "START".
2. Can you set engine speed at 650 ± 50 rpm (in "N" position) by turning idle adjusting screw?

OR

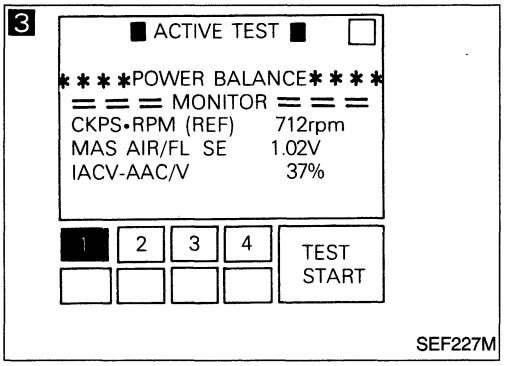
1. Disconnect throttle position sensor harness connector.
2. Can you set engine speed at 650 ± 50 rpm (in "N" position) by turning idle adjusting screw?

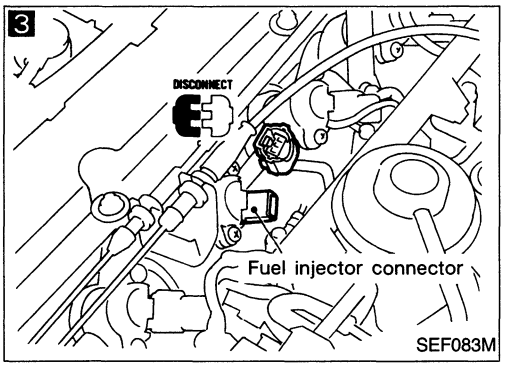
No → Check for IAC valve-AAC valve clogging or throttle body passages clogging.

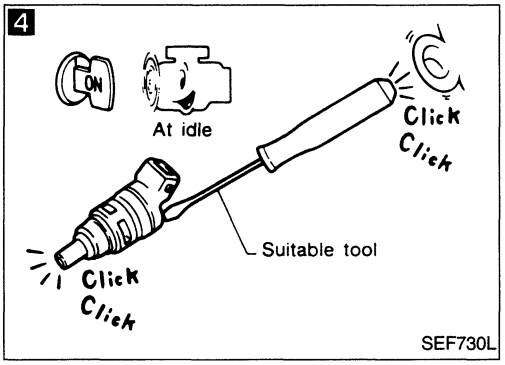
Yes ↓

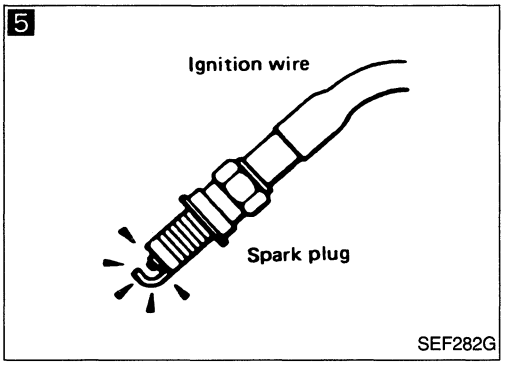
(Go to Ⓐ on next page.)

Diagnostic Procedure 14 — 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.

Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes

5

CHECK IGNITION SPARK.

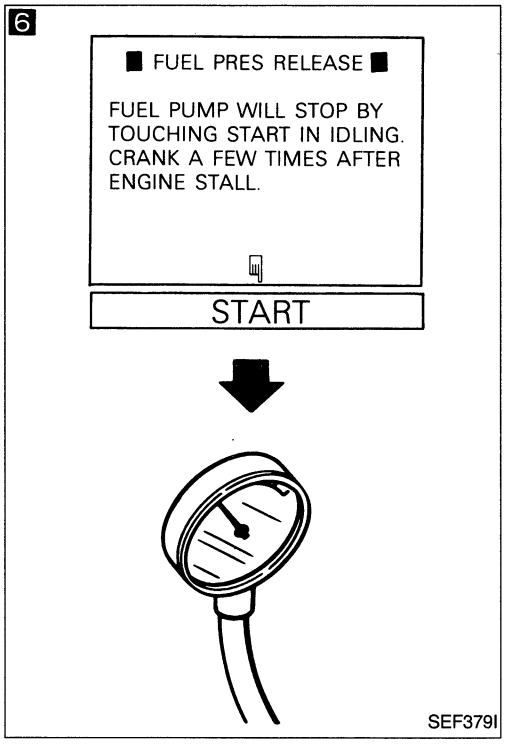
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

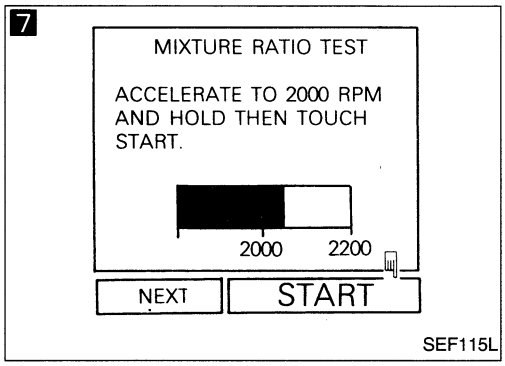
N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

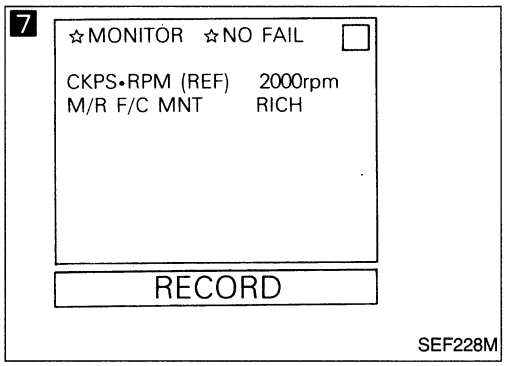
O.K.

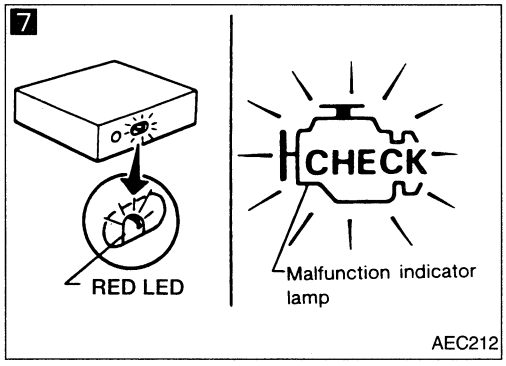
(Go to Ⓑ on next page.)

Diagnostic Procedure 14 — 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.
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa (3.0 kg/cm², 43 psi)
   At idle:
   Approx. 235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

OR

1. Release fuel pressure to zero. Refer to EF & EC-167.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   RICH→LEAN→RICH→
   (1 time, 2 times)
   LEAN→RICH.....

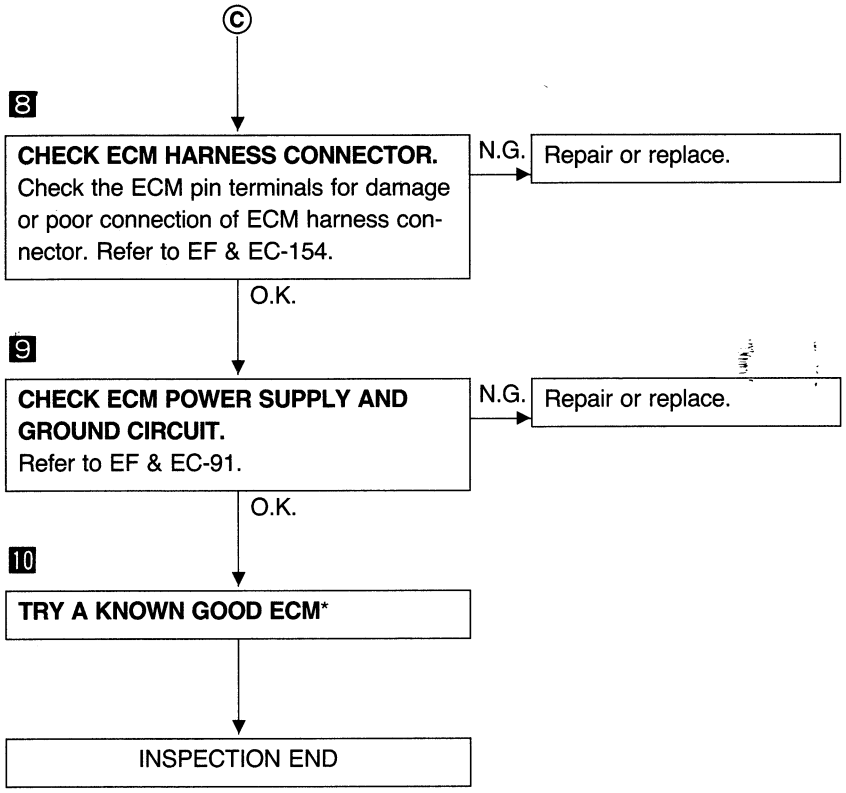
OR

1. Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC-37.
2. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K.

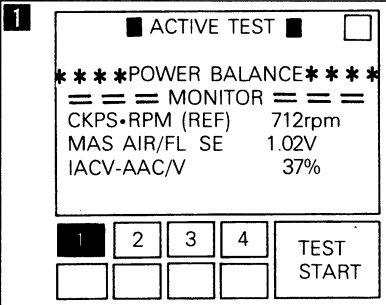
(Go to Ⓒ on next page.)

Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)



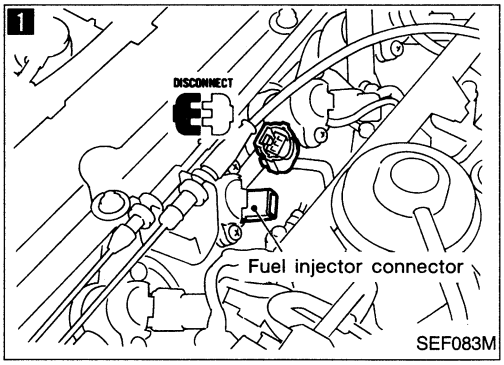
*: ECM may be the cause of a problem, but this is rarely the case.

1



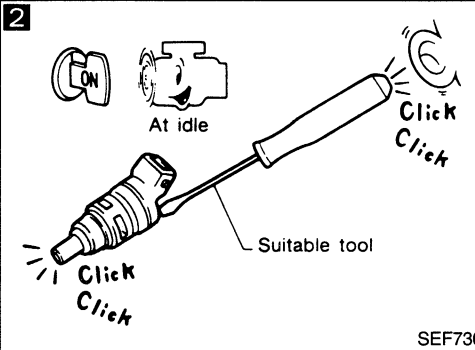
SEF227M

1



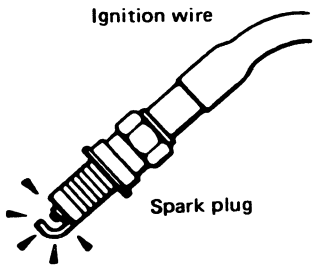
SEF083M

2



SEF730L

3



SEF282G

Diagnostic Procedure 15 — 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 sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

3

CHECK IGNITION SPARK.

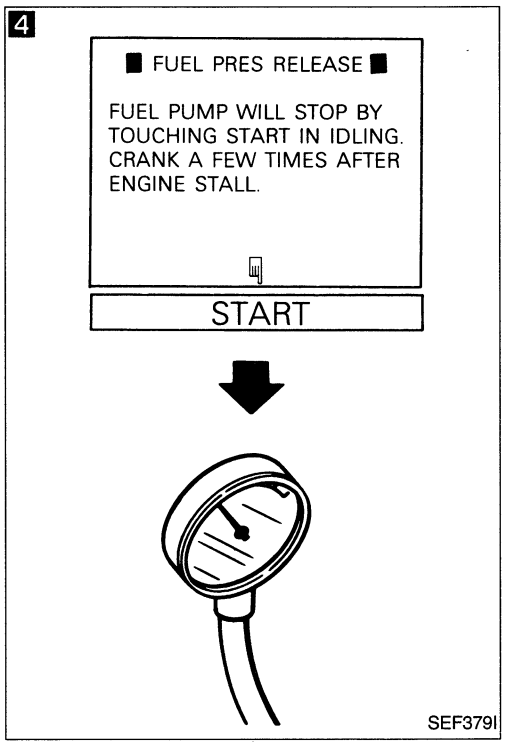
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 15 — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)



Ⓐ

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.
   A few seconds after ignition switch is turned OFF to ON:
   Approx. 294 kPa (3.0 kg/cm^2, 43 psi)
   At idle:
   Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

N.G. → Check fuel pump fluid circuit and fuel pressure regulator. Refer to EF & EC-168.

OR

1. Release fuel pressure to zero. Refer to EF & EC-167.
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

5

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K. ↓

6

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-91.

Yes → Repair or replace.

No ↓

7

TRY A KNOWN GOOD ECM*

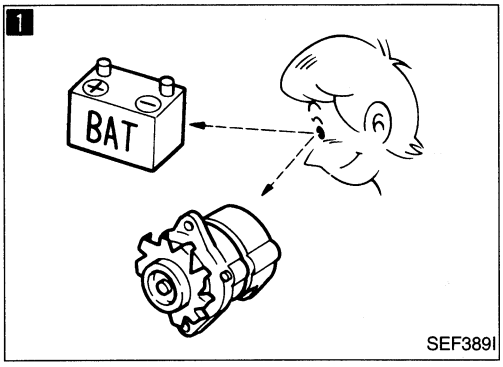
↓

INSPECTION END

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

Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy

1



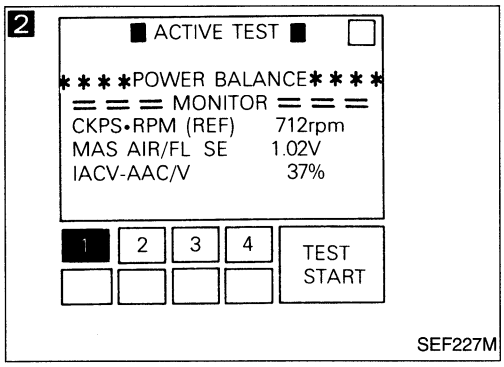
SEF389I

CHECK BATTERY AND GENERATOR.
Check battery and generator condition. Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("Trouble-shooting", "CHARGING SYSTEM").

N.G. → Repair or replace.

O.K. ↓

2



SEF227M

PERFORM POWER BALANCE TEST.

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

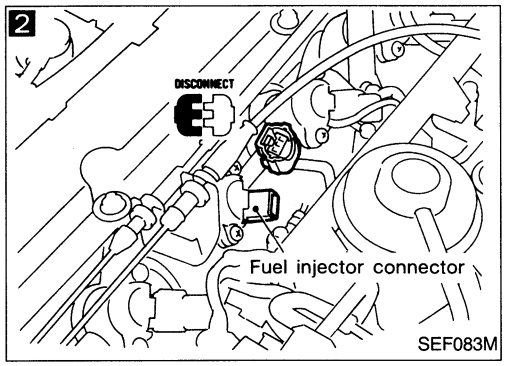
No → Go to 5 .

— OR —

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

Yes ↓

2



SEF083M

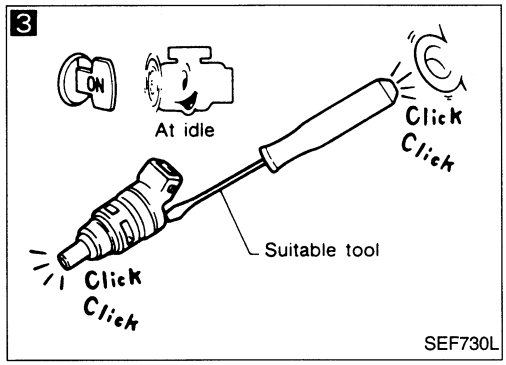
3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-132.

Yes ↓

3



SEF730L

4

CHECK IGNITION SPARK.

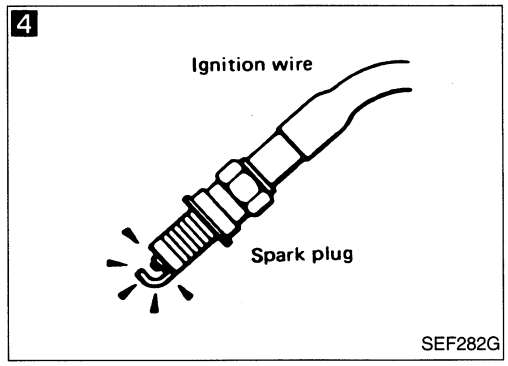
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

O.K. ↓

(Go to Ⓐ on next page.)

4



SEF282G

Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy (Cont'd)

5

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF379I

Ⓐ

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.

A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

— OR —

1. Release fuel pressure to zero. Refer to EF & EC-167.
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. Refer to EF & EC-154.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-91.

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.

1

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF379I

Diagnostic Procedure 17 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

A few seconds after ignition switch is turned OFF to ON:

Approx.

294 kPa (3.0 kg/cm^2, 43 psi)

At idle:

Approx.

235 kPa (2.4 kg/cm^2, 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-168.

OR

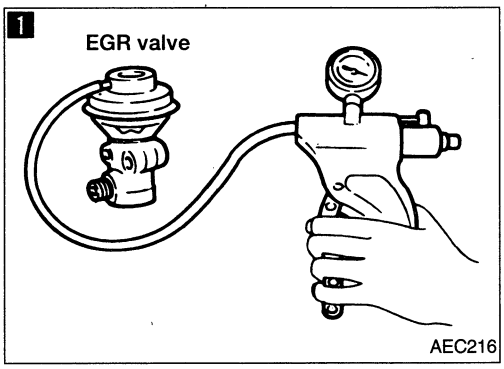
1. Release fuel pressure to zero. Refer to EF & EC-167.
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

INSPECTION END

Diagnostic Procedure 18 — Knock

1



1

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 ↓

2

CHECK EGR & CANISTER CONTROL SOLENOID VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode.

— OR —

1. Select "EGRC SOL/V " in "ACTIVE TEST" mode.
2. Turn EGR and canister control solenoid valve ON and OFF.
3. Check operating sound.

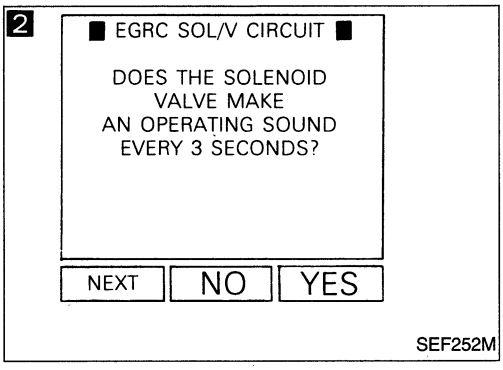
— OR —

1. Disconnect EGR and canister control solenoid valve harness connector.
2. Supply EGR and canister control solenoid valve terminals with battery current and check operating sound.

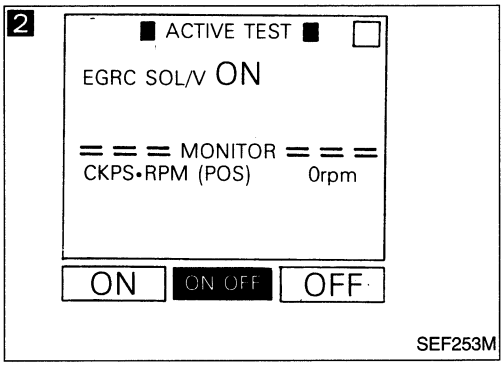
N.G. → Check solenoid valve and circuit. Refer to EF & EC-109.

O.K. ↓

2



2



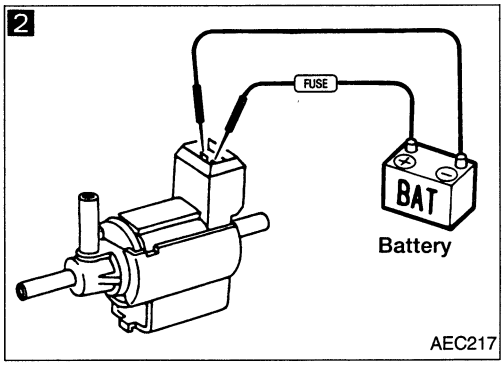
3

CHECK VACUUM HOSES.
Check the following vacuum hoses for clogging, cracks and poor connection.
a) Vacuum hose between EGR valve and EGR and canister control solenoid valve.
b) Vacuum hose between EGR and canister control solenoid valve and throttle body port.
c) Vacuum hose between EGR and canister control solenoid valve and air duct. Refer to EF & EC-9.

N.G. → Repair or replace.

O.K. ↓

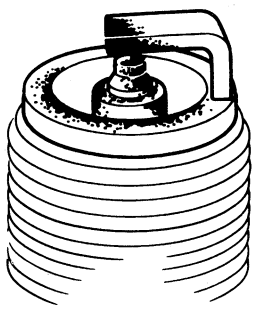
2



(Go to Ⓐ on next page.)

Diagnostic Procedure 18 — Knock (Cont'd)

4



SEF879J

Ⓐ

4

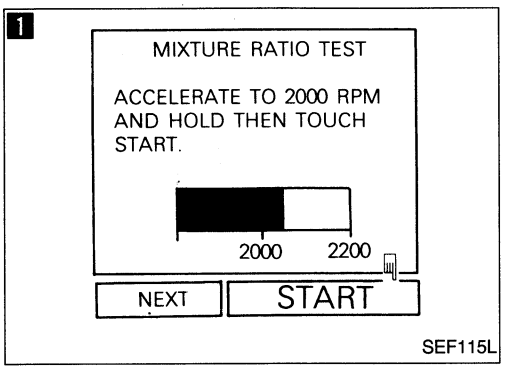
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

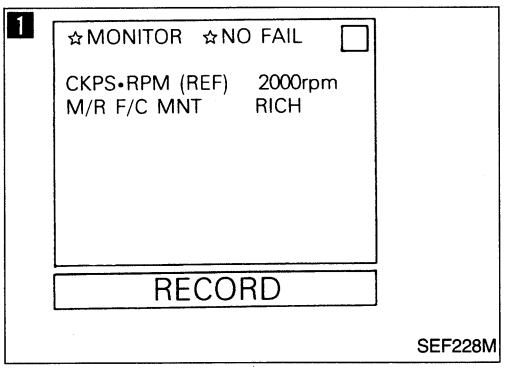
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

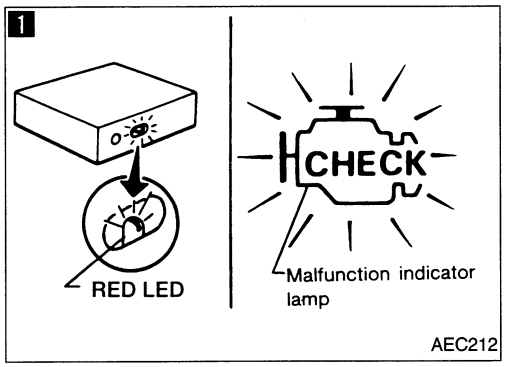
No ↓

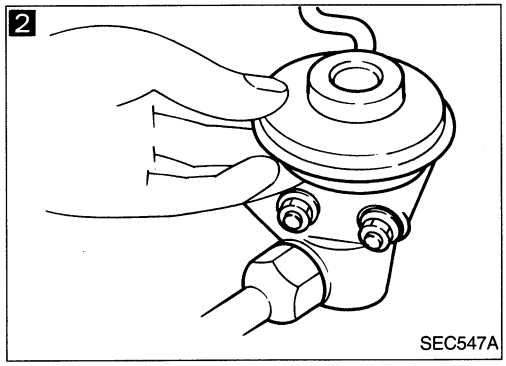
INSPECTION END

Diagnostic Procedure 19 — Surge









1

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

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

OR

1. Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC- 37.
2. Maintaining engine at 2,000 rpm under no-load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K.

2

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

3

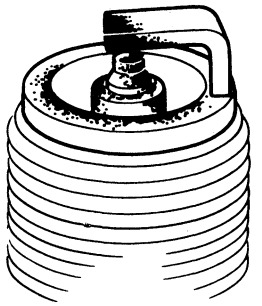
TRY A KNOWN GOOD ECM*

O.K.

INSPECTION END

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

1



SEF879J

Diagnostic Procedure 20 — Backfire through the Intake

1

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

N.G. → Repair or replace spark plug.

O.K. ↓

2

CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END

Diagnostic Procedure 21 — Backfire through the Exhaust on Deceleration

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. Refer to EF & EC-100.

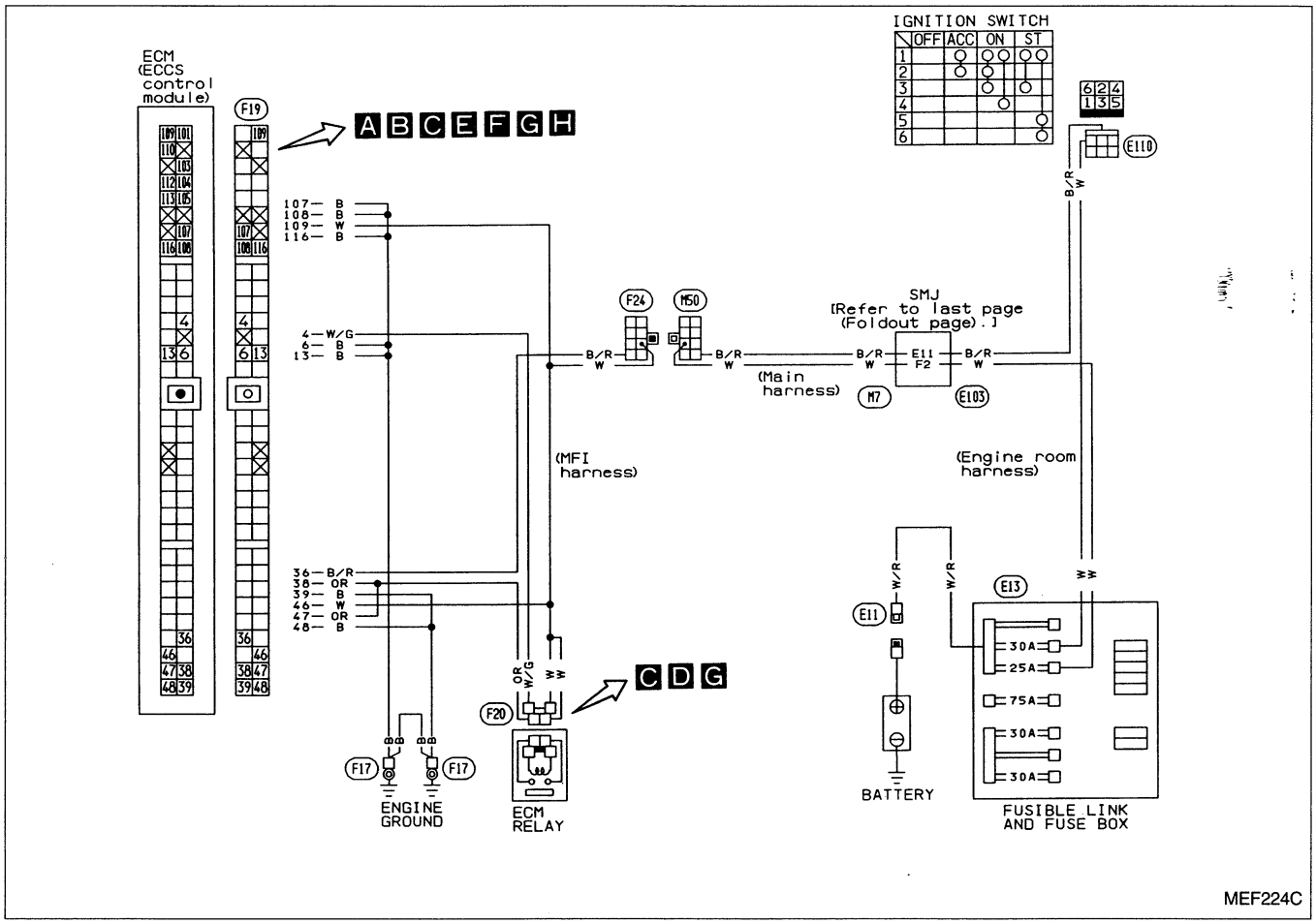
N.G. → Replace or repair.

O.K. ↓

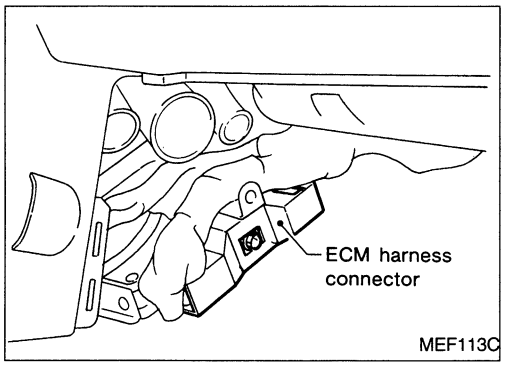
INSPECTION END

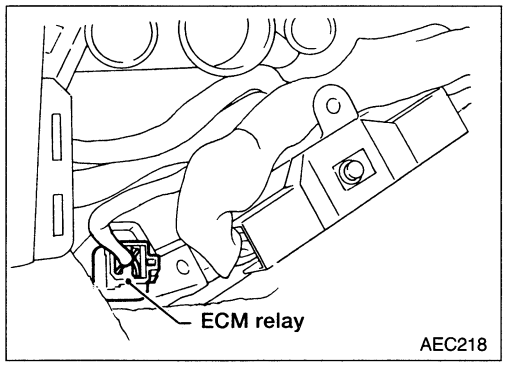
Diagnostic Procedure 22

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

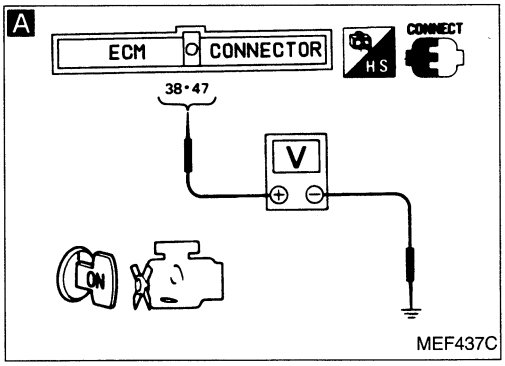


Harness layout





Diagnostic Procedure 22 (Cont'd)



INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminals (38), (47) and ground.
Voltage: Battery positive voltage

O.K. → **B**

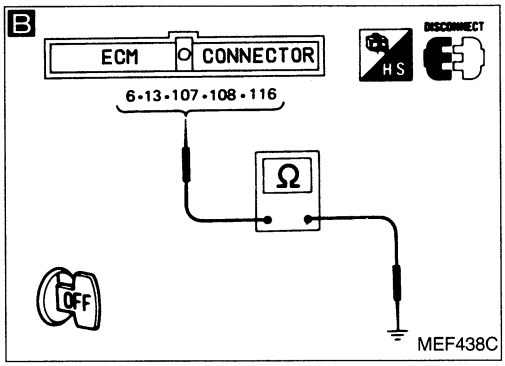
B

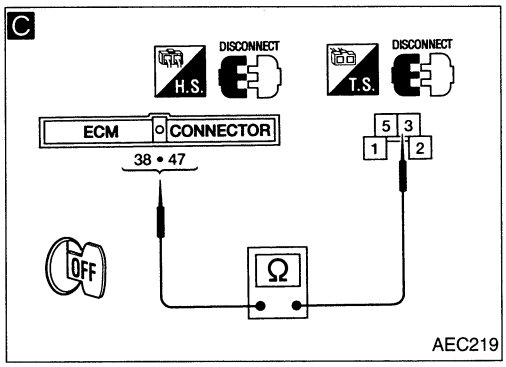
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminals (6), (13), (107), (108), (116) and engine ground.
Continuity should exist.
If N.G., repair harness or connectors.

O.K. ↓

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

N.G. ↓



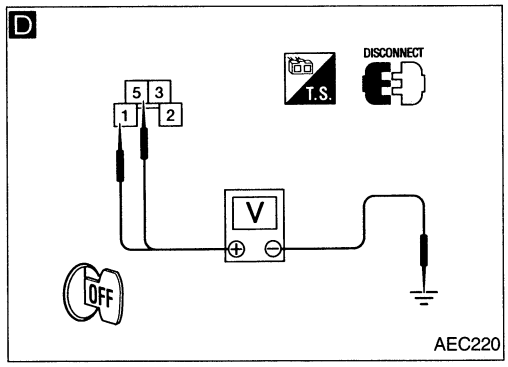


C

CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect ECM relay.
4) Check harness continuity between ECM terminals (38), (47) and terminal (3).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓



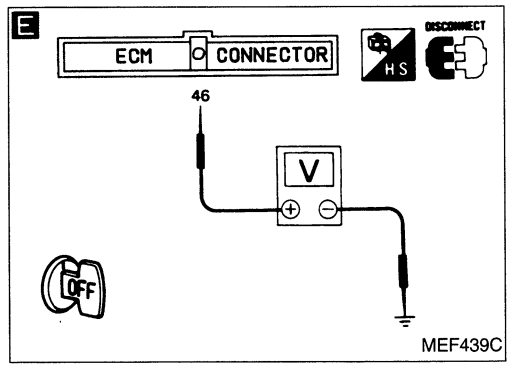
D

CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND.
1) Check voltage between terminals (1), (5) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM relay and battery

If N.G., repair harness or connectors.

O.K. ↓



E

CHECK VOLTAGE BETWEEN ECM AND GROUND.
1) Check voltage between ECM terminal (46) and ground.
Voltage: Battery positive voltage

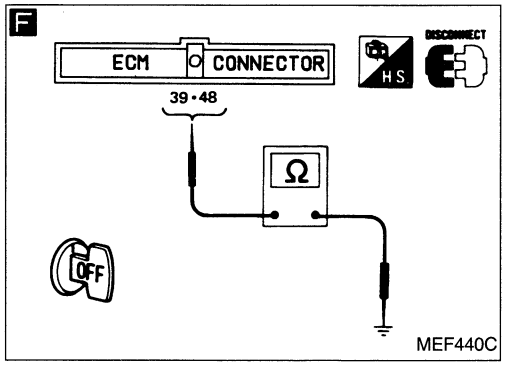
N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM and battery

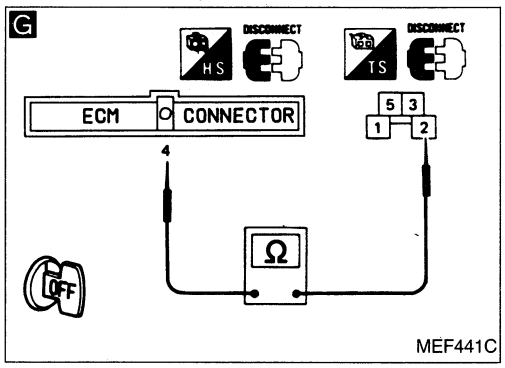
If N.G., repair harness or connectors.

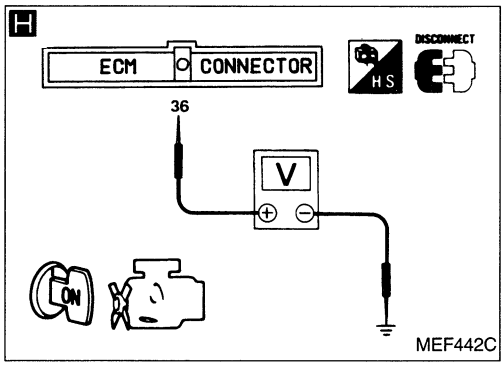
O.K. ↓

Ⓐ

Diagnostic Procedure 22 (Cont'd)







Ⓐ

F

CHECK GROUND CIRCUIT.
1) Check harness continuity between ECM terminals ㊴, ㊽ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

G

CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal ④ and terminal ②.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

H

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㊱ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- Harness continuity between ECM and ignition switch

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (ECM relay).
Refer to EF & EC-165.

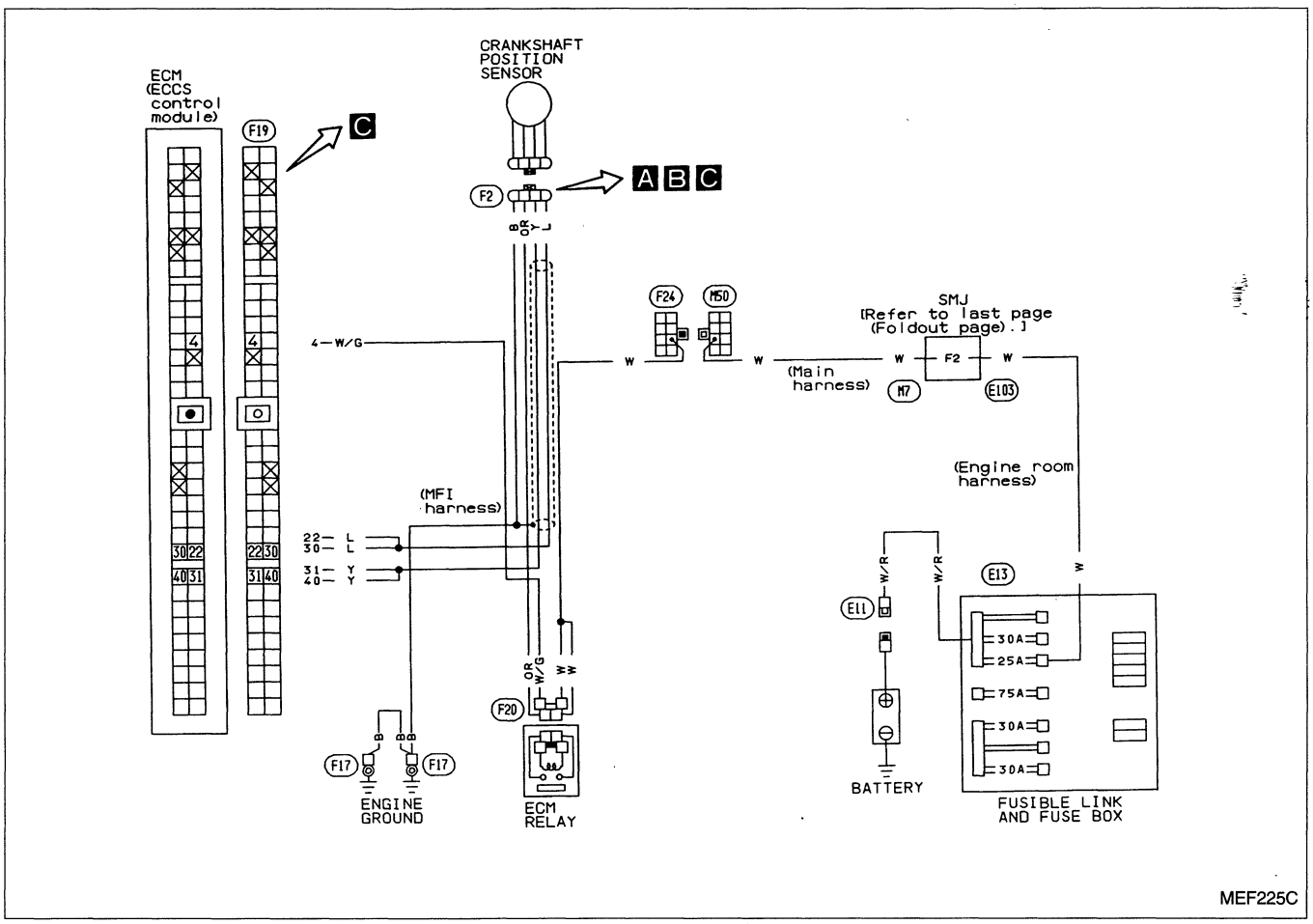
N.G. → Replace ECM relay.

O.K.

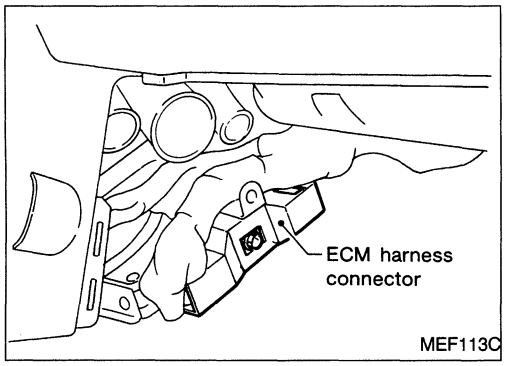
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

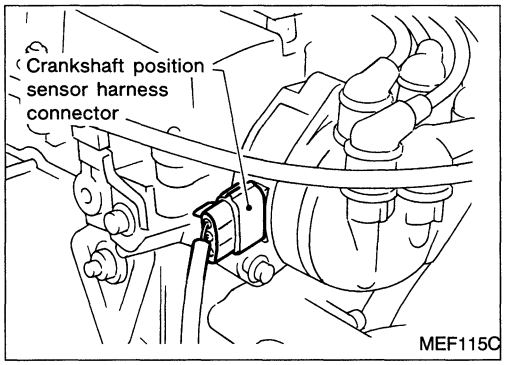
Diagnostic Procedure For Trouble Code 11

CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

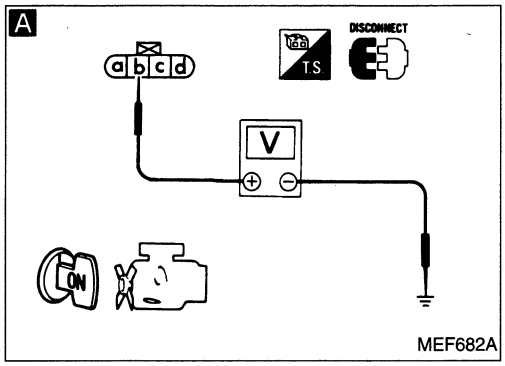


Harness layout

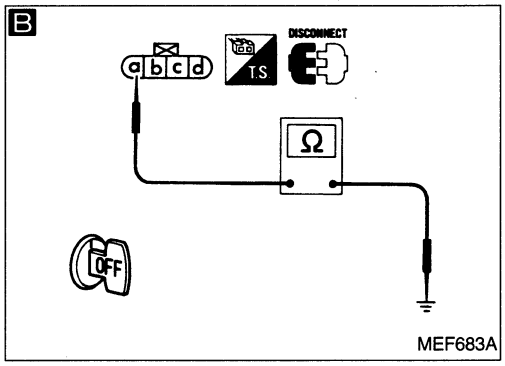




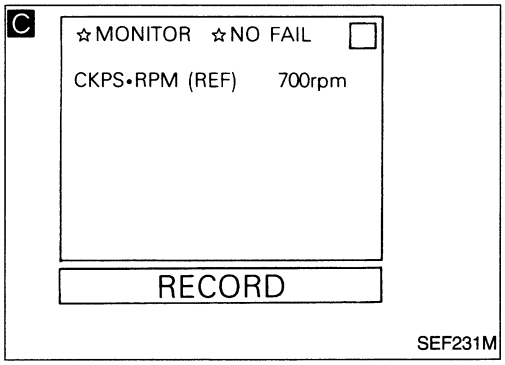
Diagnostic Procedure For Trouble Code 11 (Cont'd)



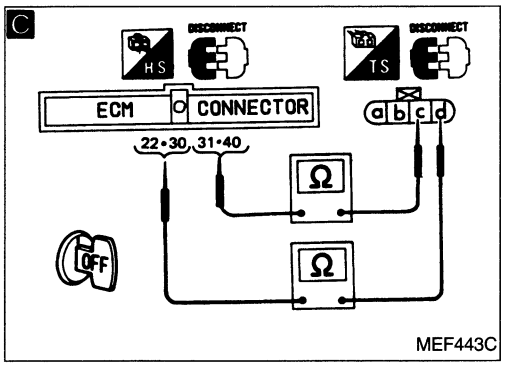
MEF682A



MEF683A



SEF231M



MEF443C

INSPECTION START

A

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

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.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect crankshaft position sensor harness connector.
2) Start engine.
3) Read crankshaft position sensor signals in "DATA MONITOR" mode with CONSULT.
rpm: 700 ± 50

OR

1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓒ and ECM terminals ㉛, ㊵ (1° signal), terminal ⓓ and ECM terminals ㉒, ㉚ (180° signal).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Crankshaft position sensor).
Refer to EF & EC-159.

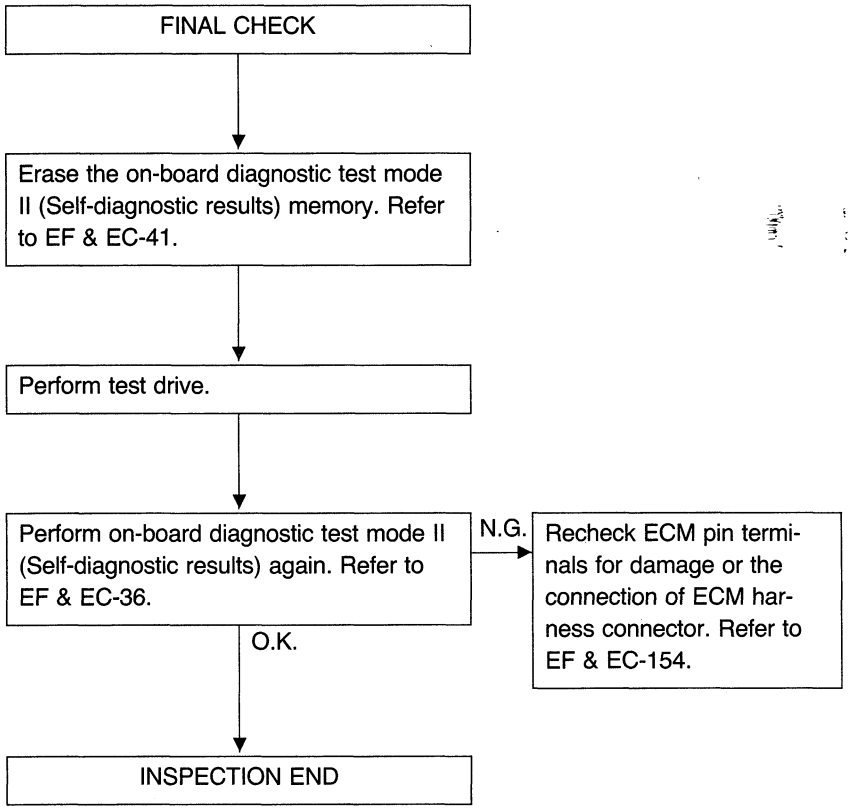
N.G. → Replace crankshaft position sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

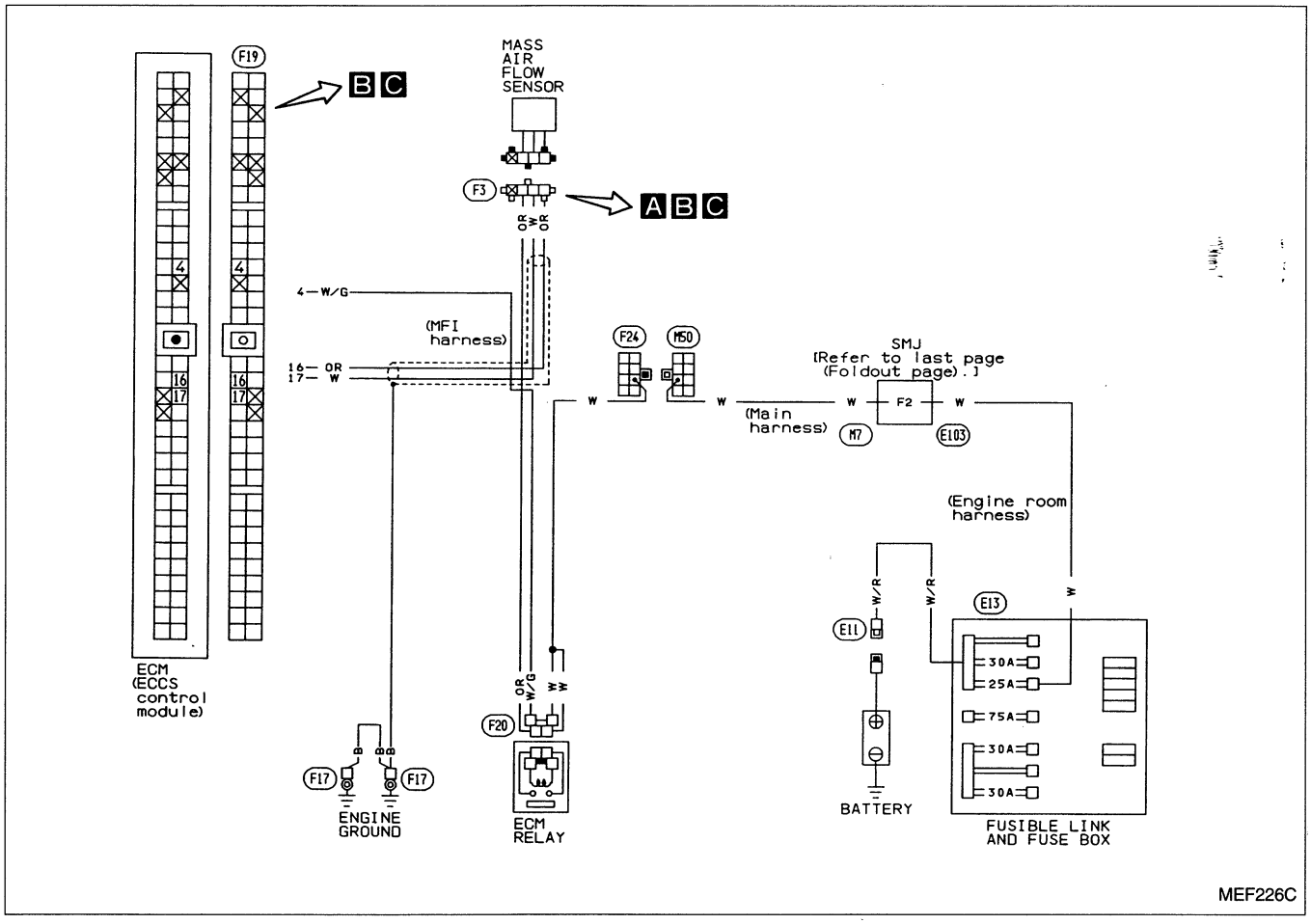
Diagnostic Procedure For Trouble Code 11 (Cont'd)

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

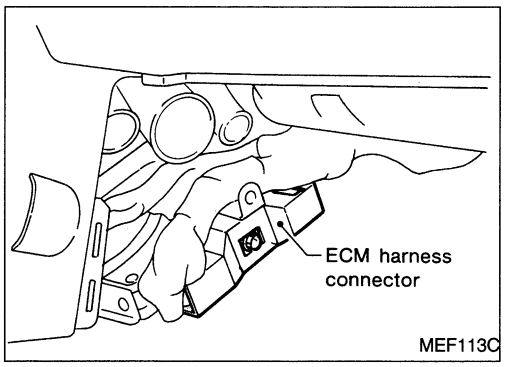


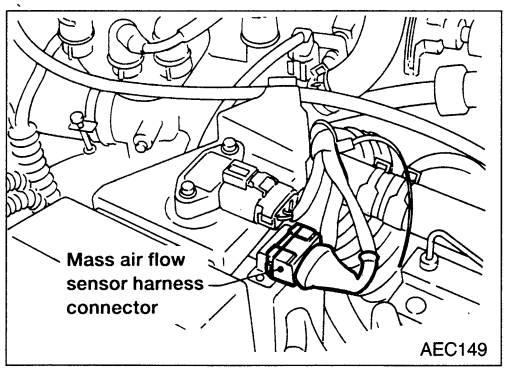
Diagnostic Procedure For Trouble Code 12

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

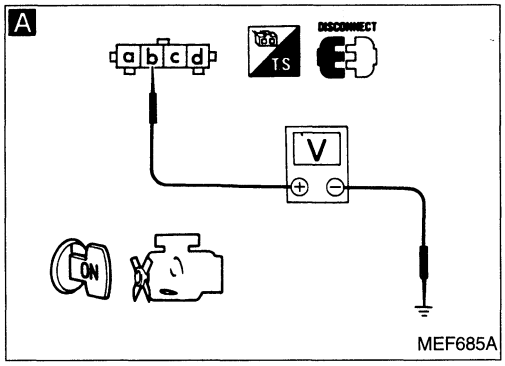


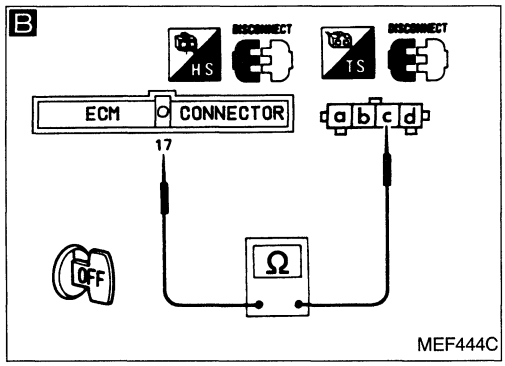
Harness layout

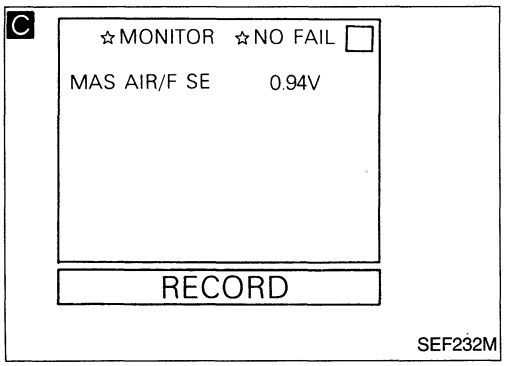


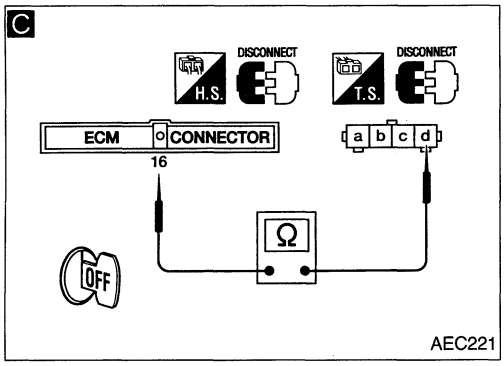


Diagnostic Procedure For Trouble Code 12 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect mass air flow sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal (b) and ground.
Voltage: Battery positive voltage

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 (c) and ECM terminal (17).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect mass air flow sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
3) Read mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.
Voltage:
0.85 - 1.35V (At idle)

OR

1) Check harness continuity between terminal (d) and ECM terminal (16).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Mass air flow sensor).
Refer to EF & EC-159.

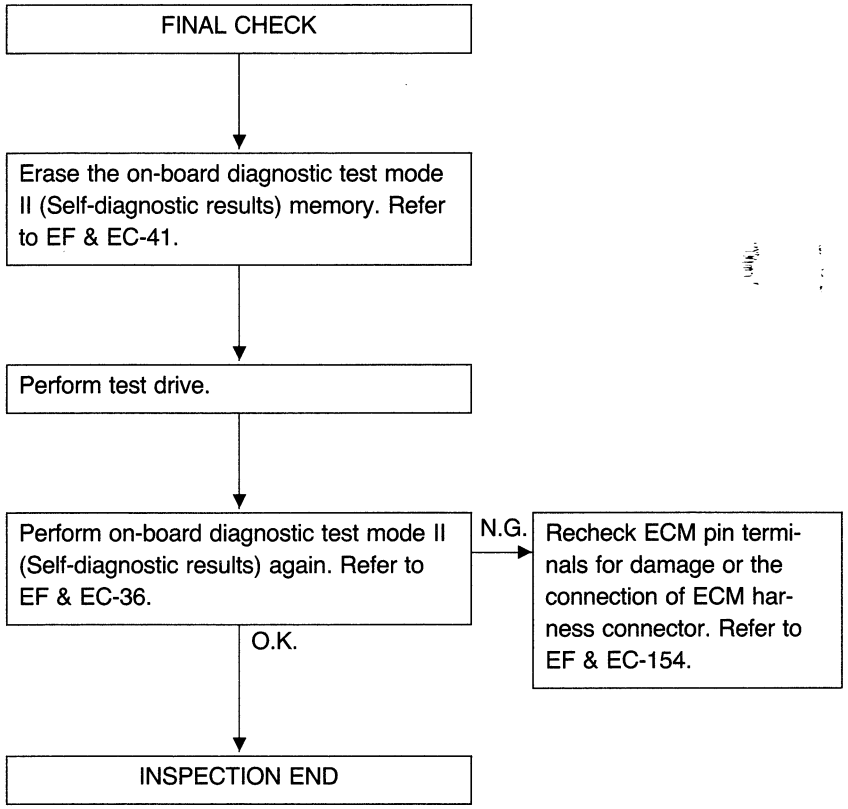
N.G. → Replace mass air flow sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

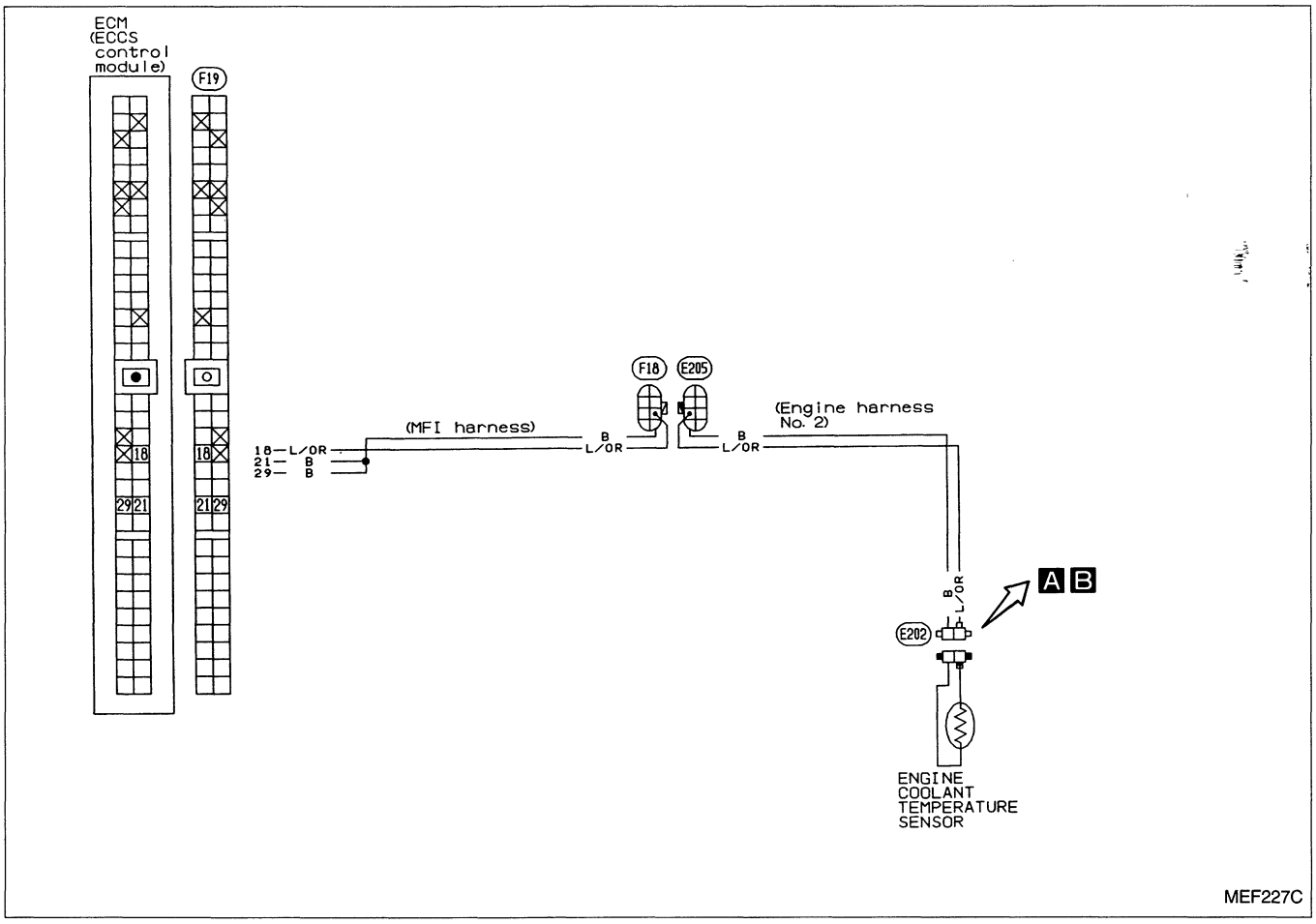
Diagnostic Procedure For Trouble Code 12 (Cont'd)

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

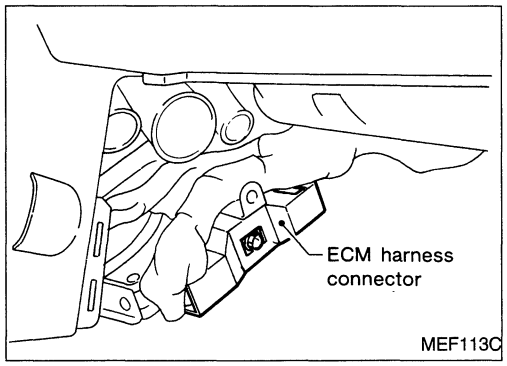


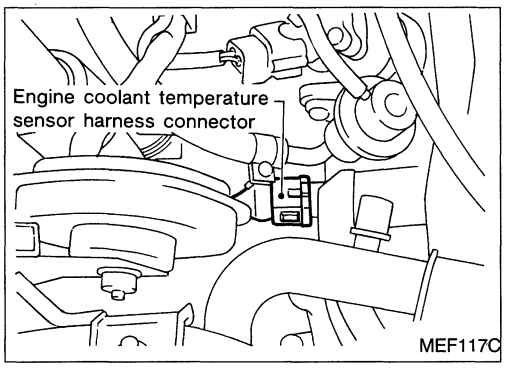
Diagnostic Procedure For Trouble Code 13

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(MALFUNCTION INDICATOR LAMP ITEM)



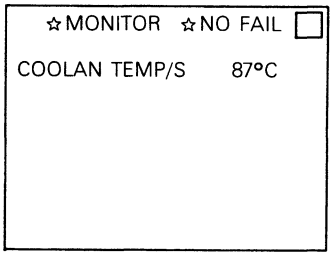
Harness layout





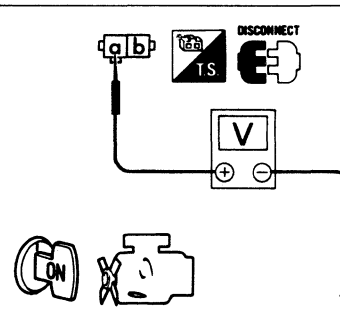
Diagnostic Procedure For Trouble Code 13 (Cont'd)

A



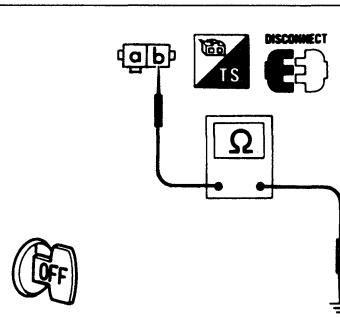
SEF254M

A



MEF688A

B



MEF689A

INSPECTION START

A

CHECK POWER SUPPLY.

1) Start engine.
2) Read engine coolant temperature sensor signal in "DATA MONITOR" mode with CONSULT.
Engine coolant temperature should gradually rise and reach more than 70°C (158°F) after engine warm-up.

OR

1) Disconnect engine coolant temperature sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage:
Approximately 5V

N.G. → Check the following.
- Harness connectors (F18), (E205)
- Harness continuity between ECM and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K.

B

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

N.G. → Check the following.
- Harness connectors (F18), (E205)
- Harness continuity between ECM and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to EF & EC-160.

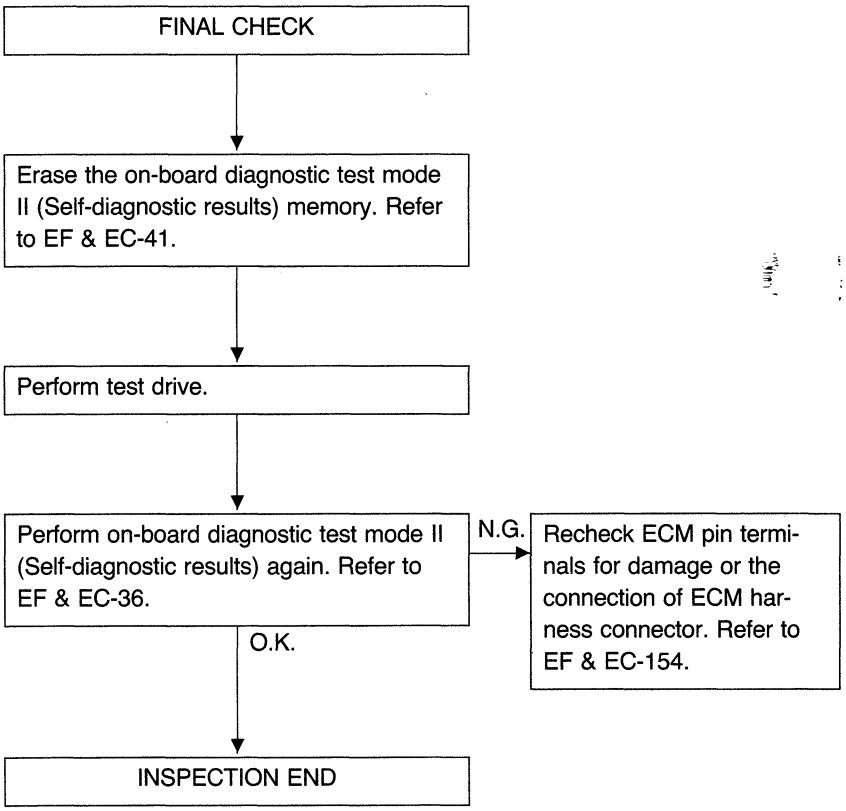
N.G. → Replace engine coolant temperature sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

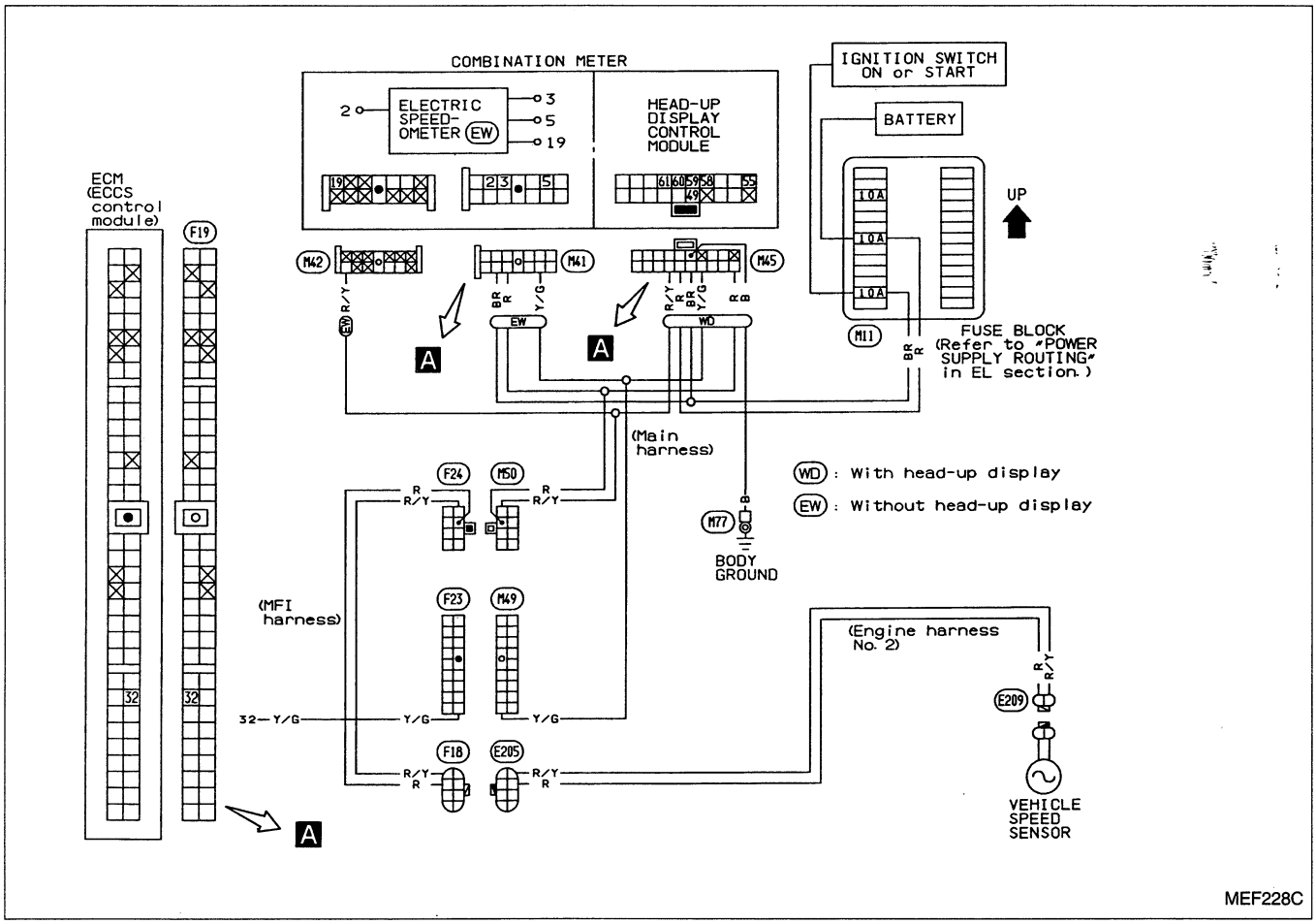
Diagnostic Procedure For Trouble Code 13 (Cont'd)

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

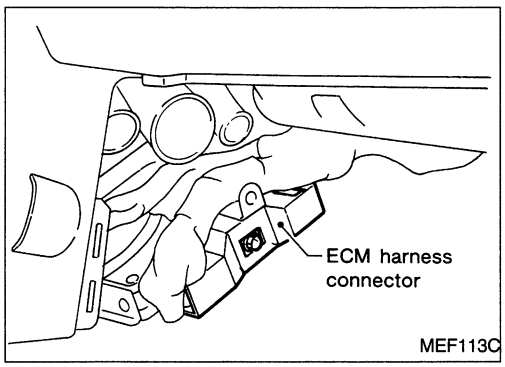


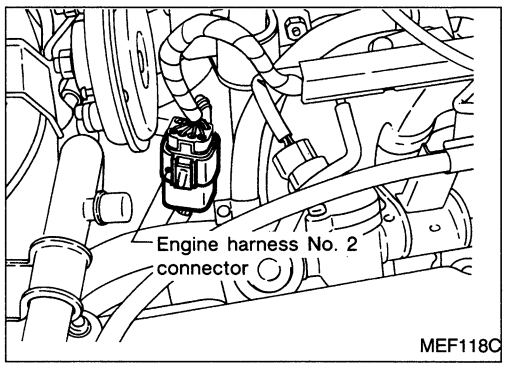
Diagnostic Procedure For Trouble Code 14

VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

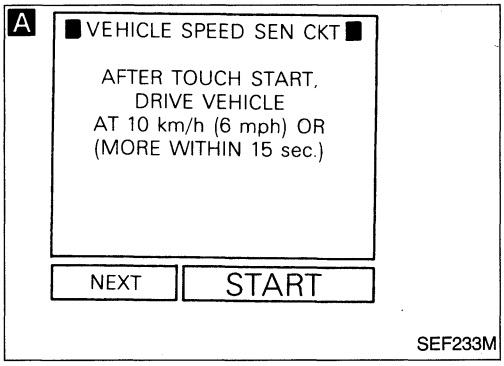


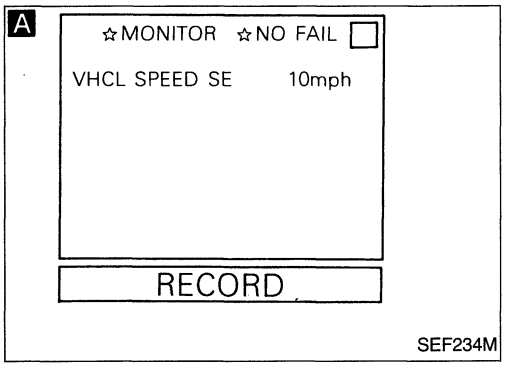
Harness layout

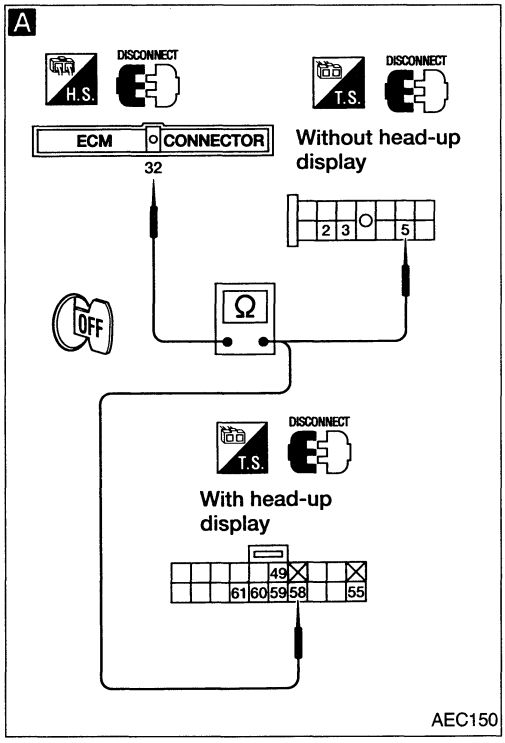




Diagnostic Procedure For Trouble Code 14 (Cont'd)







INSPECTION START

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

N.G. → Check vehicle speed sensor and circuit.
Refer to EL section ("Vehicle Speed Sensor Signal Check", "METER AND GAUGES").

O.K.

A

CHECK INPUT SIGNAL CIRCUIT.

Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.
CONSULT value should be the same as the speedometer indication.

OR

1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and combination meter harness connector.
3) Check harness continuity between ECM terminal (32) and terminal (5) (Models without head-up display), (58) (Models with head-up display).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness continuity between ECM and combination meter

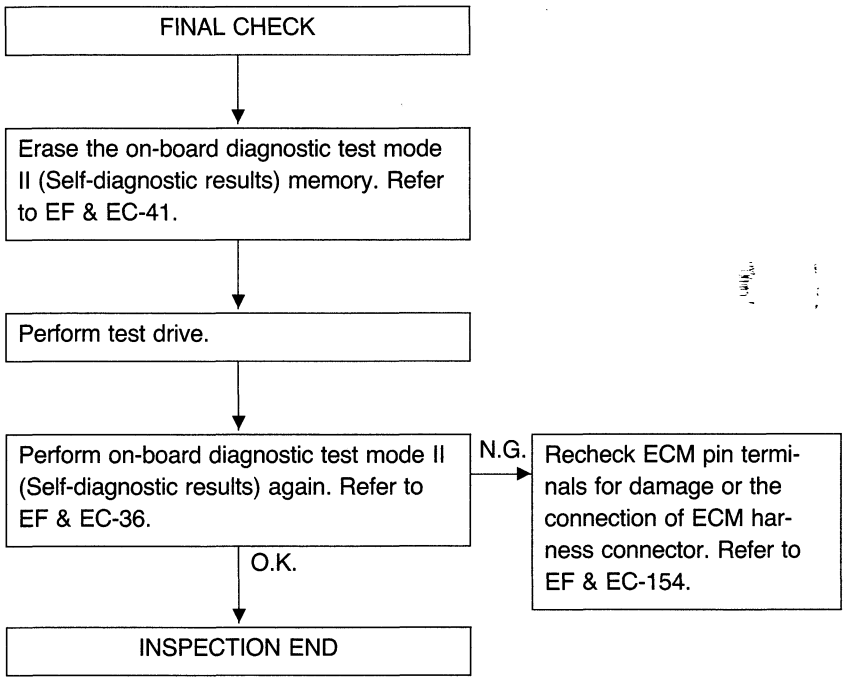
If N.G., repair harness or connectors.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

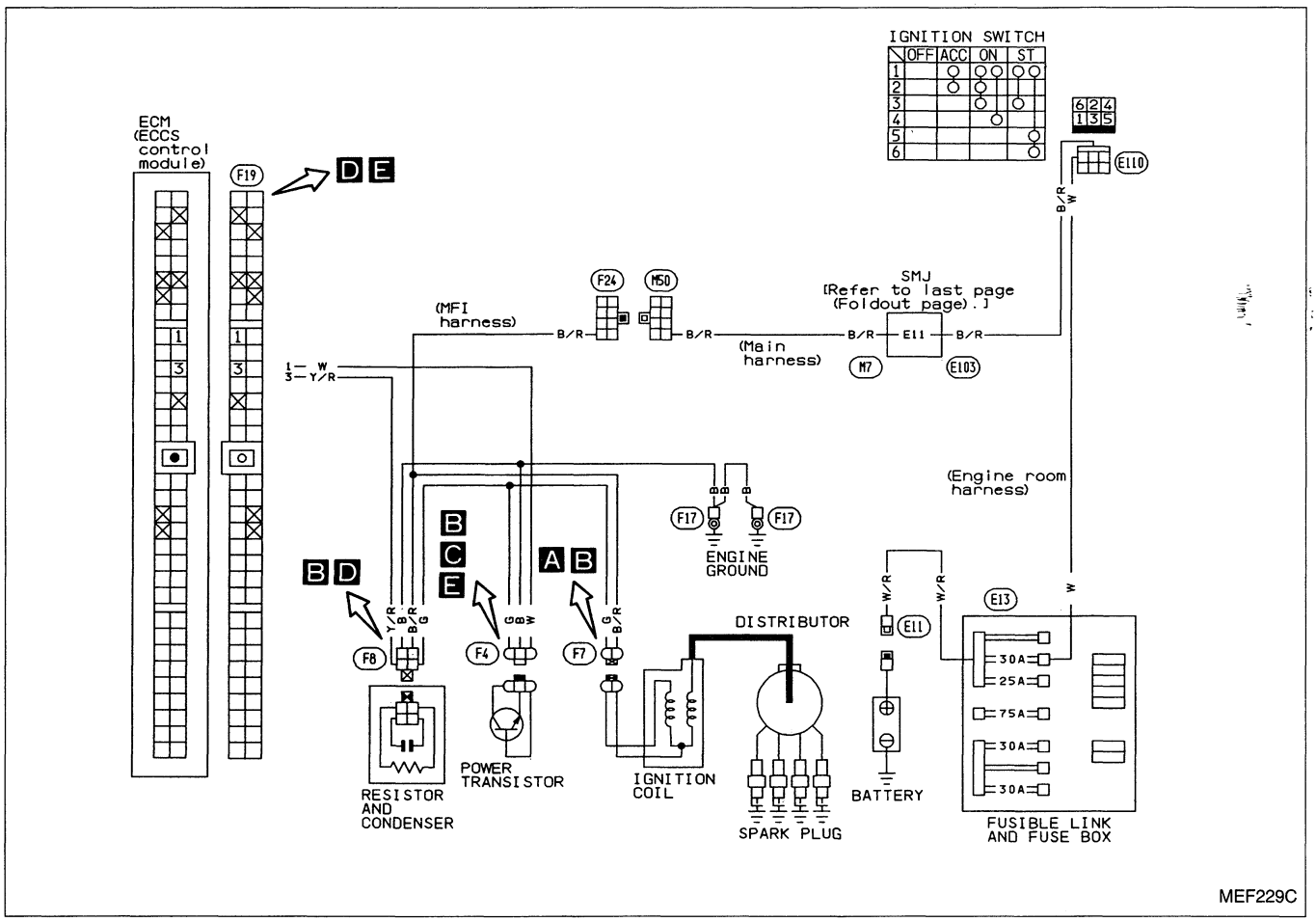
Diagnostic Procedure For Trouble Code 14 (Cont'd)

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

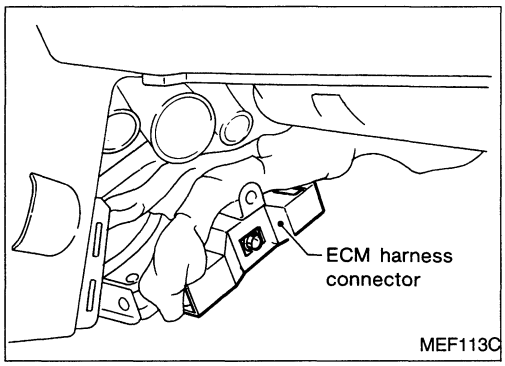


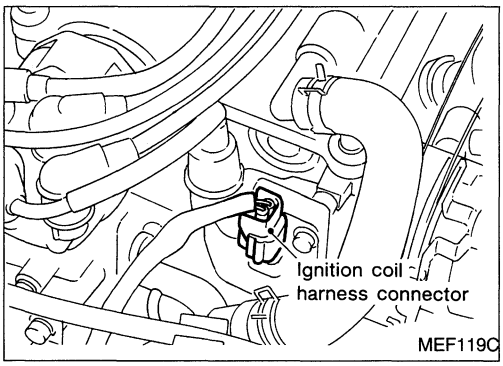
Diagnostic Procedure For Trouble Code 21

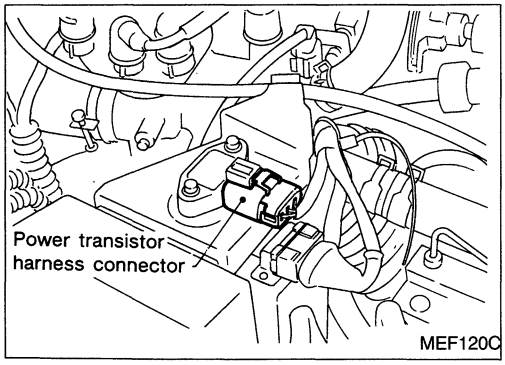
IGNITION SIGNAL (Diagnostic trouble code No. 21)

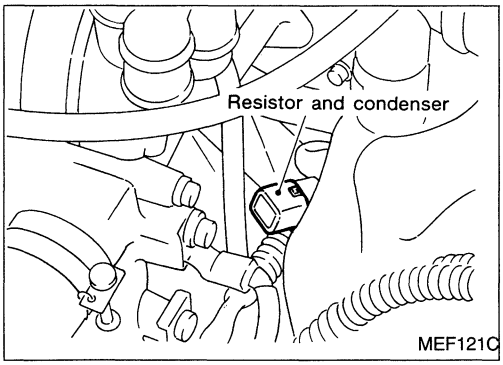


Harness layout

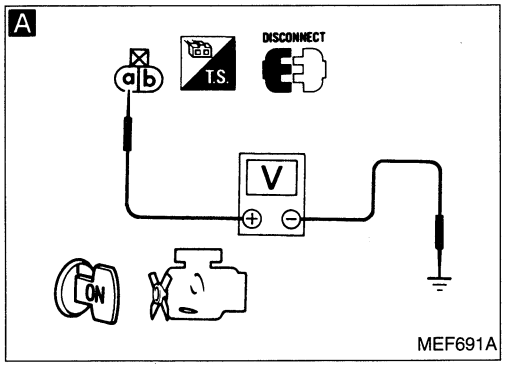


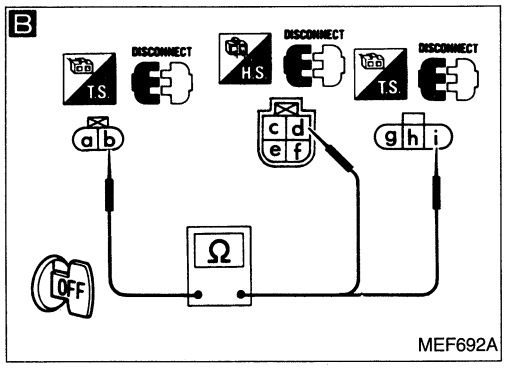


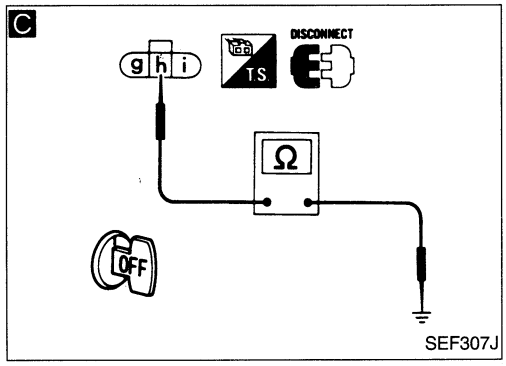


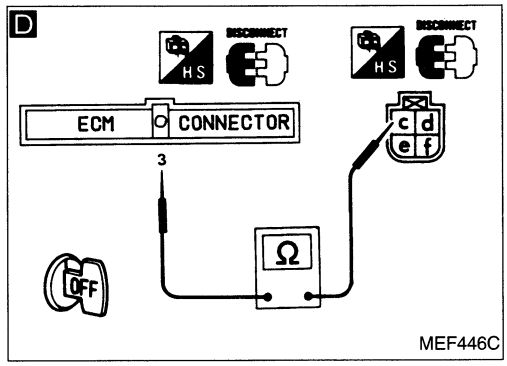


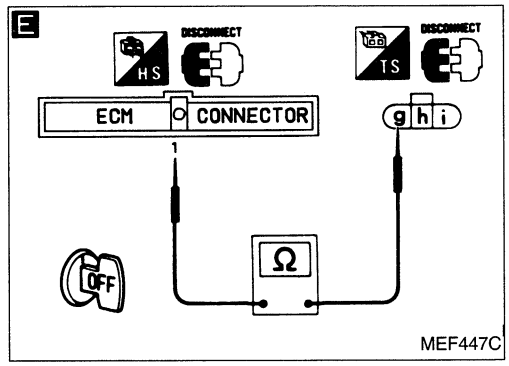
Diagnostic Procedure For Trouble Code 21 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect ignition coil harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- Harness continuity between ignition coil and ignition switch

If N.G., repair harness or connectors.

O.K. ↓

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect resistor and condenser harness connector.
3) Disconnect power transistor harness connector.

B 4) Check harness continuity between terminal ⓑ and terminals ⓓ, ⓘ.
Continuity should exist.

C 5) Check harness continuity between terminal ⓗ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

D

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓒ and ECM terminal ③.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

E

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

N.G. → Repair harness or connectors.

O.K. ↓

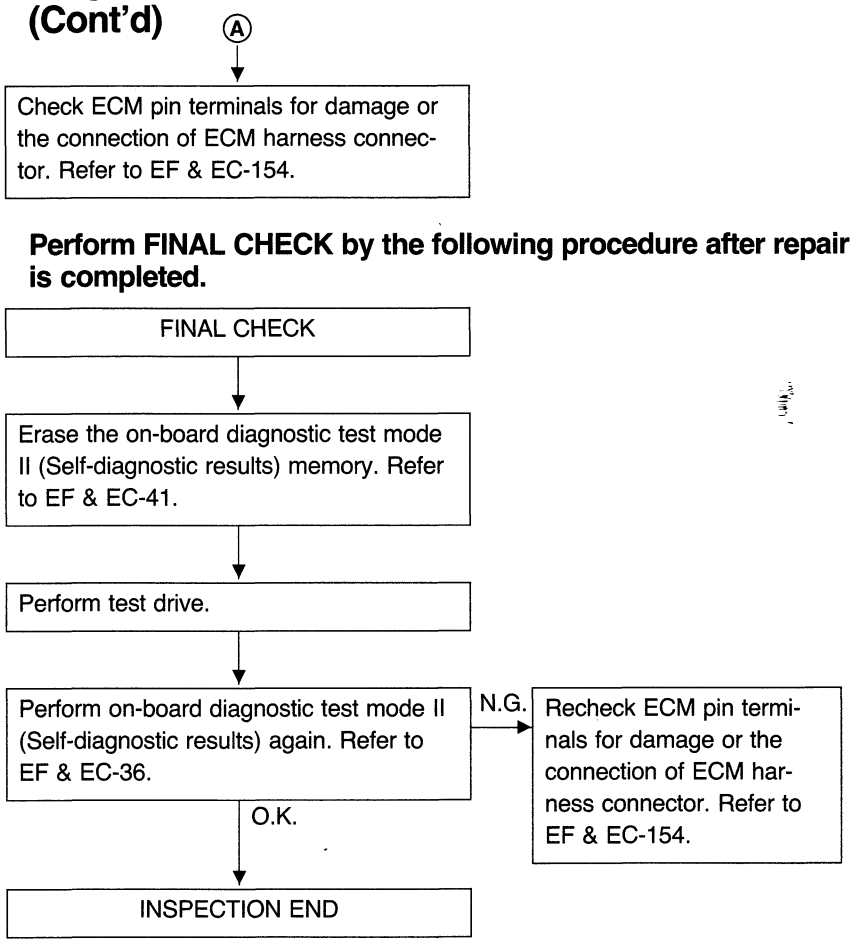
CHECK COMPONENTS
(Ignition coil, resistor and power transistor).
Refer to EF & EC-160, 161, 166.

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

O.K. ↓

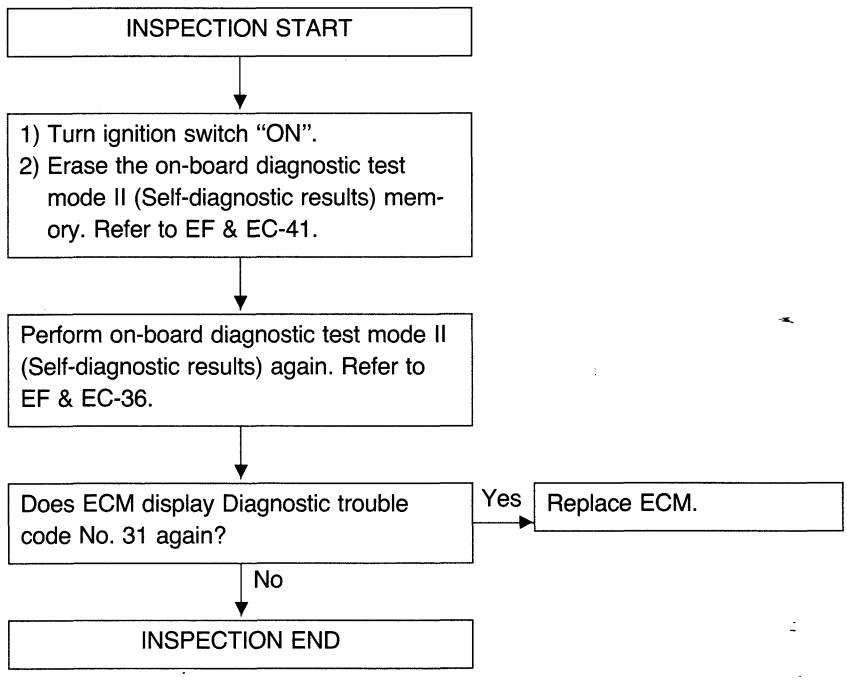
Ⓐ

Diagnostic Procedure For Trouble Code 21 (Cont'd)



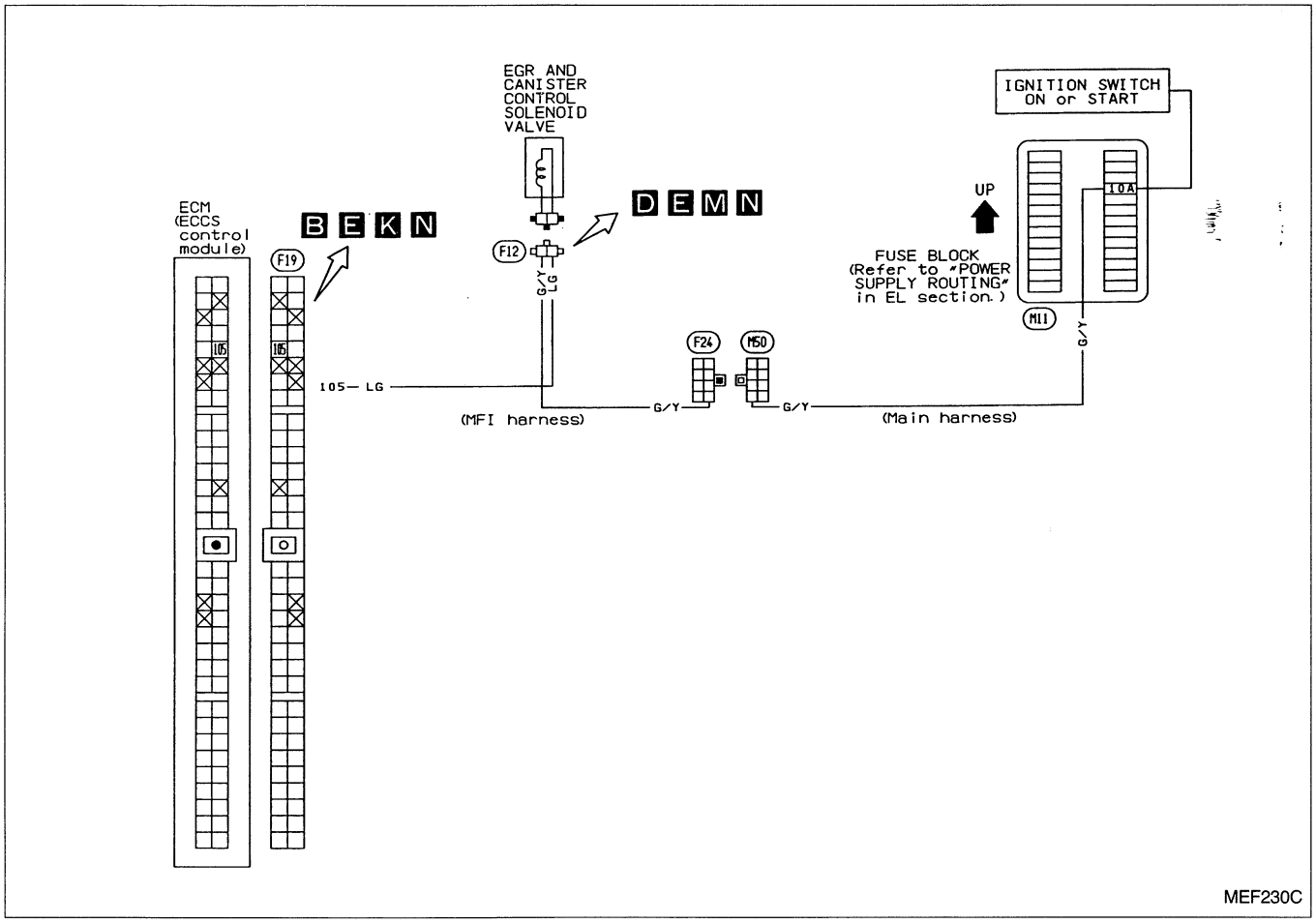
Diagnostic Procedure For Trouble Code 31

ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31) (MALFUNCTION INDICATOR LAMP ITEM)

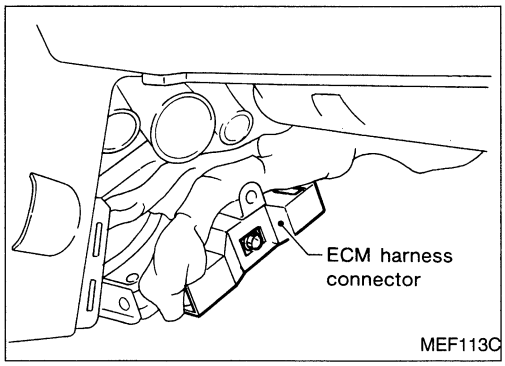


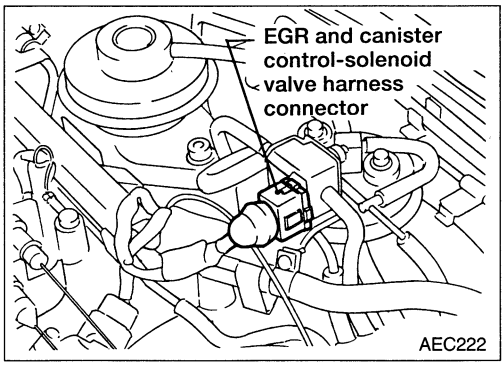
Diagnostic Procedure For Trouble Code 32

EGR FUNCTION (Diagnostic trouble code No. 32) CHECK (MALFUNCTION INDICATOR LAMP ITEM): CALIFORNIA MODEL
EGR CONTROL SYSTEM (Not self-diagnostic item): NON-CALIFORNIA MODEL



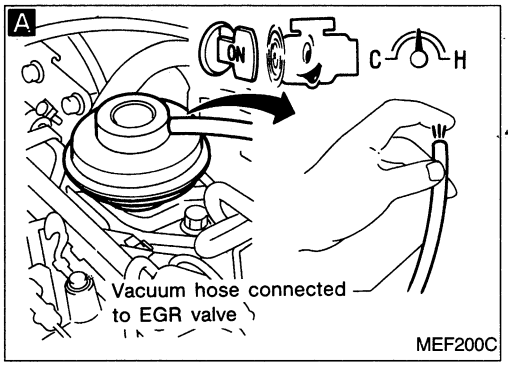
Harness layout





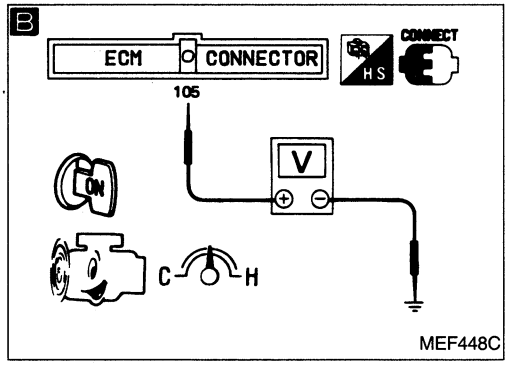
Diagnostic Procedure For Trouble Code 32 (Cont'd)

A



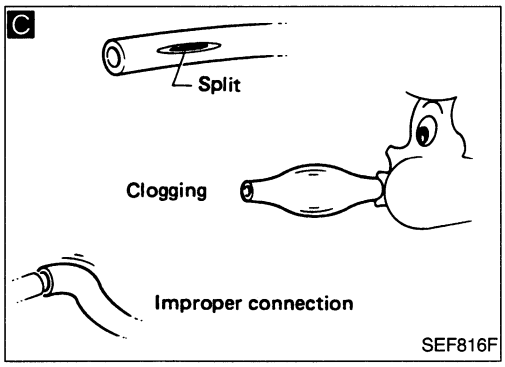
MEF200C

B



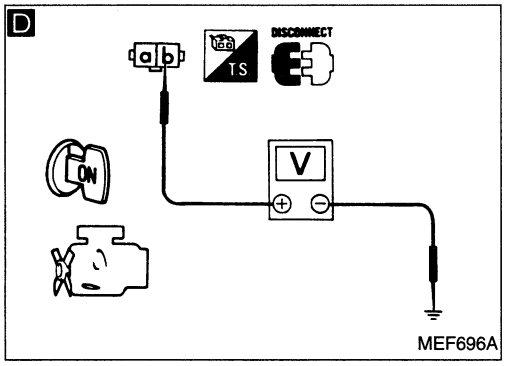
MEF448C

C



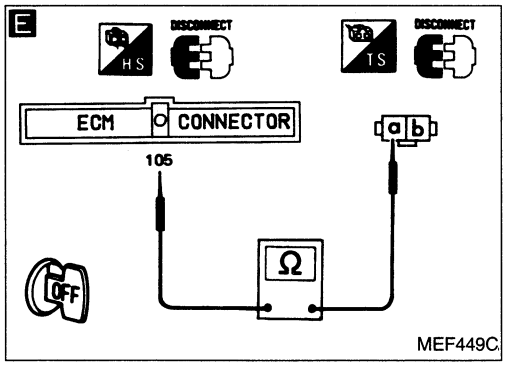
SEF816F

D



MEF696A

E



MEF449C

California model

INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Perform on-board diagnostic test mode II (Self-diagnostic results). Make sure that none of the diagnostic trouble code No. 12, No. 13, No. 35 or No. 43 are displayed.
3) Keep engine speed at about 2,000 rpm.
4) Disconnect vacuum hose to EGR valve.
5) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine is racing (2,000 rpm):
Vacuum should exist.

O.K. → CHECK COMPONENTS (EGR valve, EGR control-BPT valve and EGR temperature sensor). Refer to EF & EC-161.

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

N.G.

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (105) and ground under the following conditions.
Voltage:
At idle
Approximately 0V
Engine is racing (2,000 rpm)
Battery positive voltage

O.K. → C

C

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

N.G.

D

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGR & canister control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.
Voltage: Battery positive voltage

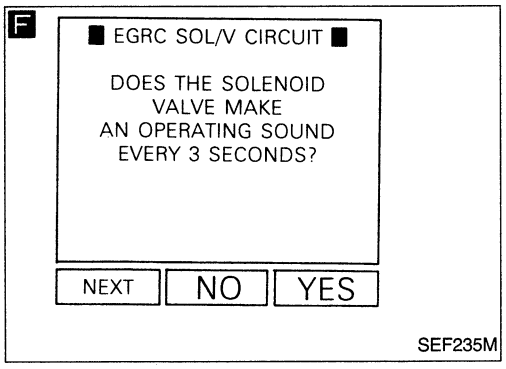
N.G. → Check the following.
- Harness connectors (F24), (M50)
- 10A fuse
- Harness continuity between EGR & canister control solenoid valve and fuse

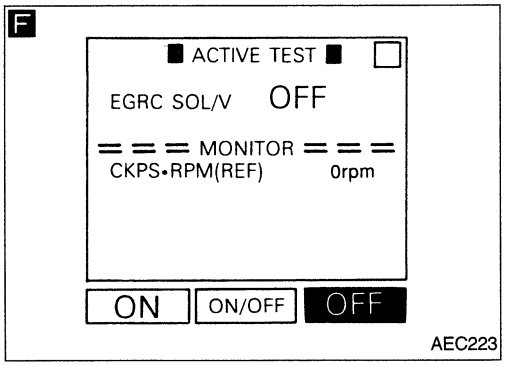
If N.G., repair harness or connectors.

O.K.

(A)

Diagnostic Procedure For Trouble Code 32 (Cont'd)





Ⓐ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (105) and terminal (a).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

F

CHECK COMPONENT
(EGR & canister control solenoid valve).

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

OR

3) Turn EGR control-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to EF & EC-161.

N.G. → Replace EGR & canister control solenoid valve.

O.K.

Check resistance of EGR temperature sensor.
Refer to EF & EC-162.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

Diagnostic Procedure For Trouble Code 32 (Cont'd)

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

FINAL CHECK

↓

Erase the on-board diagnostic test mode II (Self-diagnostic results) memory. Refer to EF & EC-41.

↓

G

Perform test drive under the following conditions.
1) Warm up engine sufficiently.
2) Use test driving modes indicated in figure G .

↓

H

Make sure that malfunction indicator lamp does not come on during test drive.

Comes on. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

Does not come on.

↓

INSPECTION END

G

ROAD TEST

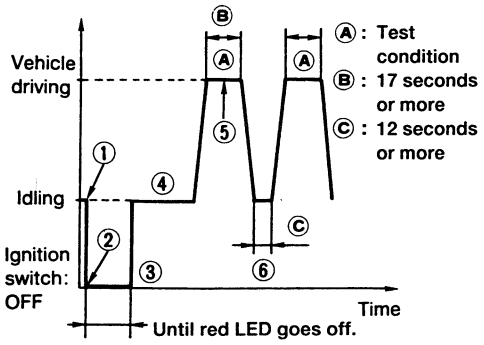
Test condition

Drive vehicle under the following conditions with suitable shift position.

(1) Engine speed:
2600 ± 600 rpm

(2) Intake manifold vacuum:
-40.0 ± 6.7 kPa
(-300 ± 50 mmHg, -11.81 ± 1.97 inHg)

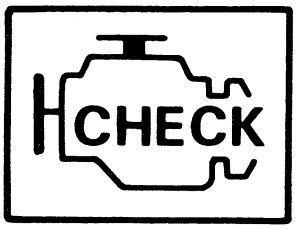
Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and make sure that air conditioning switch and rear defogger are turned "OFF" during test drive.
④ Keep engine running for at least 12 seconds.
⑤ Shift to suitable gear position and drive in "Test condition" for at least 17 seconds.
⑥ Decrease engine revolutions to idle speed for at least 12 seconds.
⑦ Repeat steps ⑤ through ⑥ at least 1 more time.

AEC224

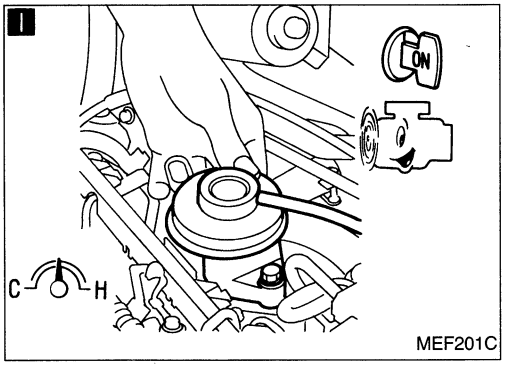
H

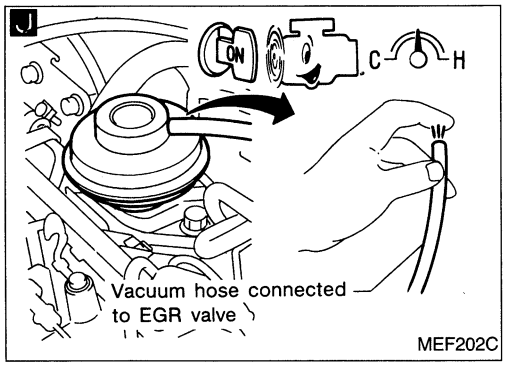


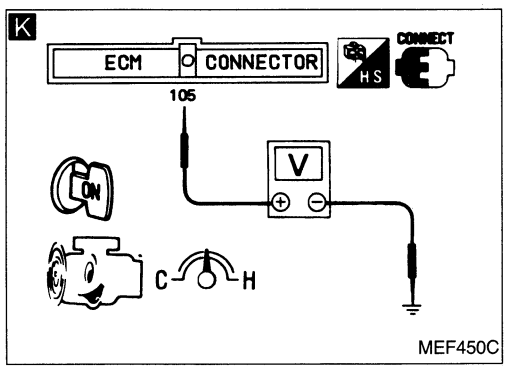
MALFUNCTION INDICATOR LAMP

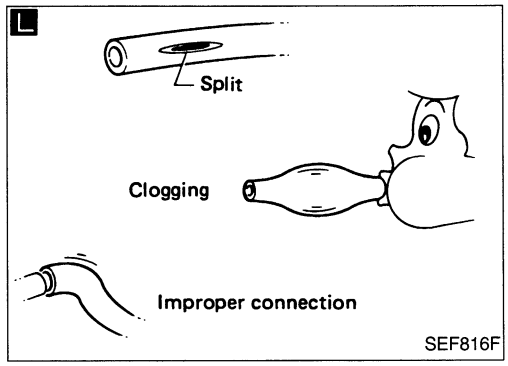
SEF217M

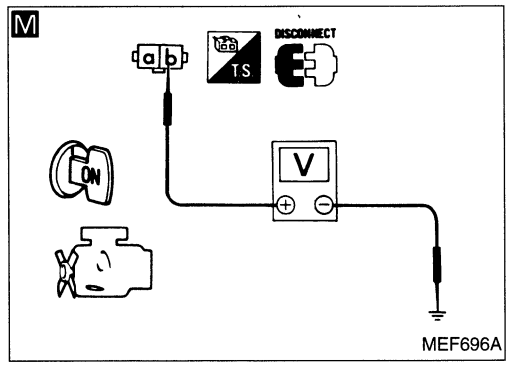
Diagnostic Procedure For Trouble Code 32 (Cont'd)











Non-California model

INSPECTION START

I CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) 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.

J CHECK VACUUM SOURCE TO EGR VALVE.
1) Disconnect vacuum hose to EGR valve.
2) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine is racing (2,000 rpm):
Vacuum should exist.

O.K. → CHECK COMPONENTS (EGR valve and EGR control-BPT valve). Refer to EF & EC-161.

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

N.G.

K CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (105) and ground under the following conditions.
Voltage:
At idle
Approximately 0V
Engine is racing (2,000 rpm)
Battery positive voltage

O.K. → **L** CHECK VACUUM HOSE.
1) Check vacuum hose for clogging, cracks and proper connection.

N.G.

M CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGR & canister control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.
Voltage: Battery positive voltage

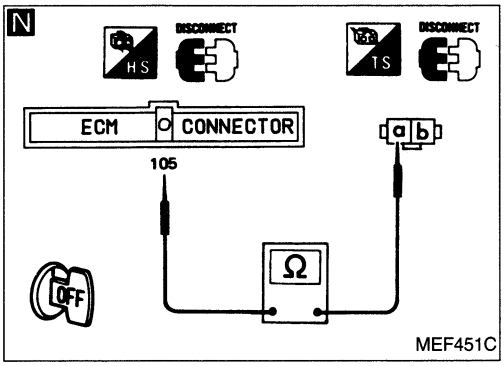
N.G. → Check the following.
- Harness connectors (F24), (M50)
- 10A fuse
- Harness continuity between EGR & canister control solenoid valve and fuse

If N.G., repair harness or connectors.

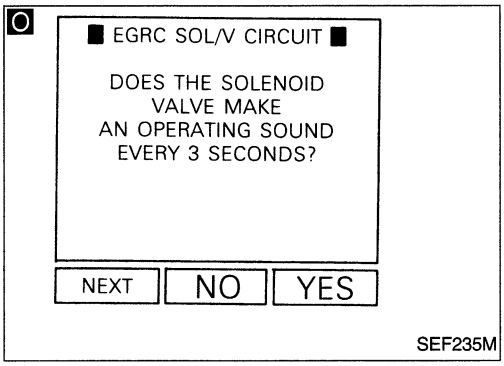
O.K.

(A)

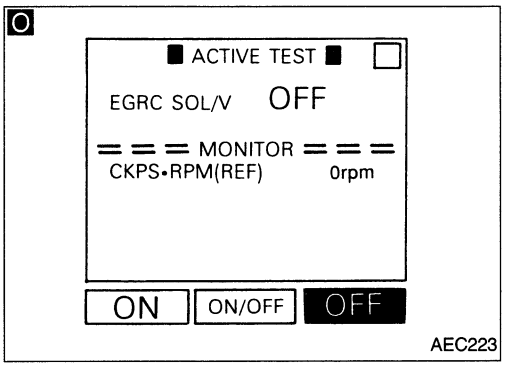
Diagnostic Procedure For Trouble Code 32 (Cont'd)



MEF451C



SEF235M



AEC223

Ⓐ

N

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (105) and terminal ⓐ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

O

CHECK COMPONENT
(EGR & canister control solenoid valve).

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

OR

3) Turn EGR control-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to EF & EC-161.

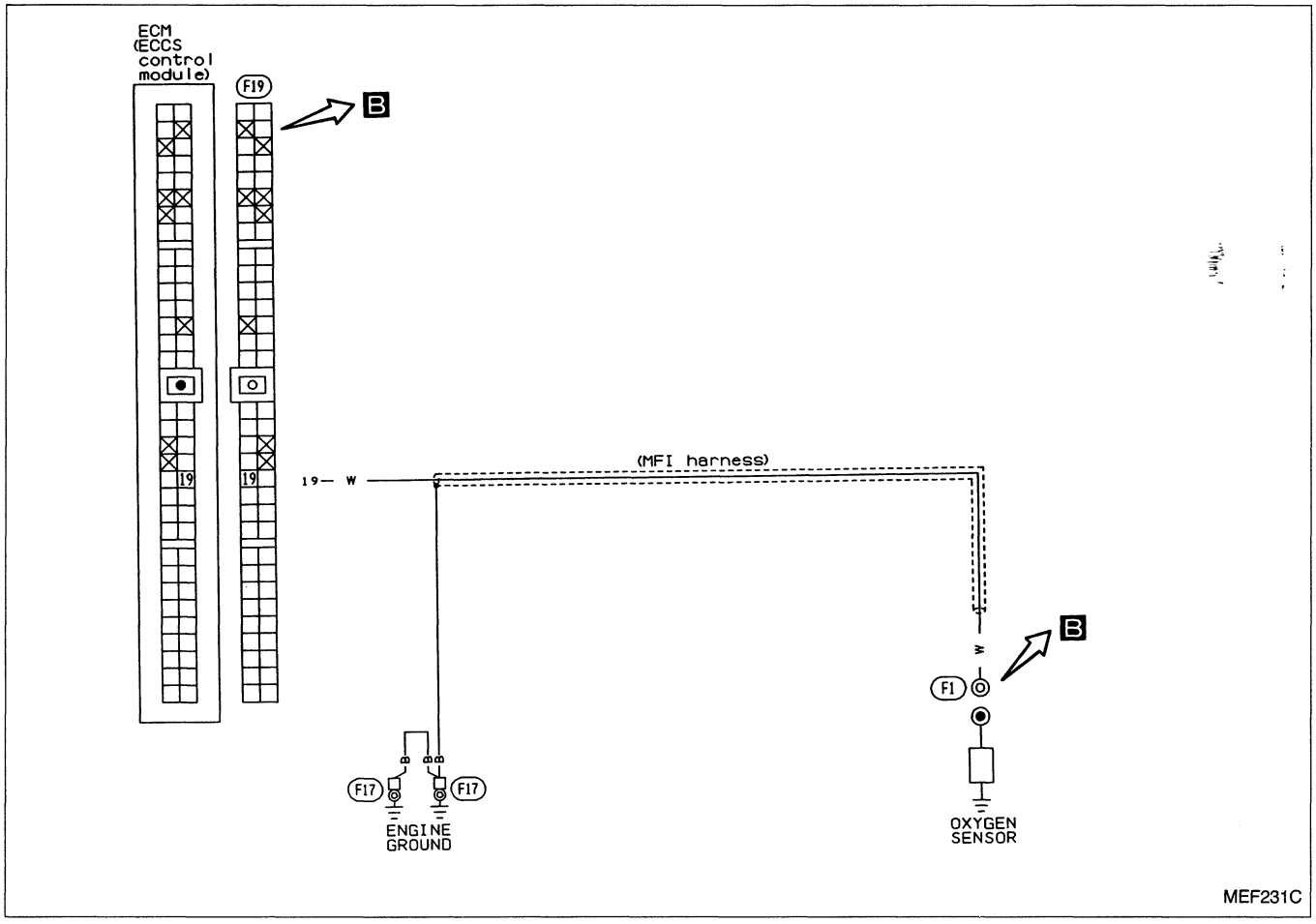
N.G. → Replace EGR & canister control solenoid valve.

O.K. ↓

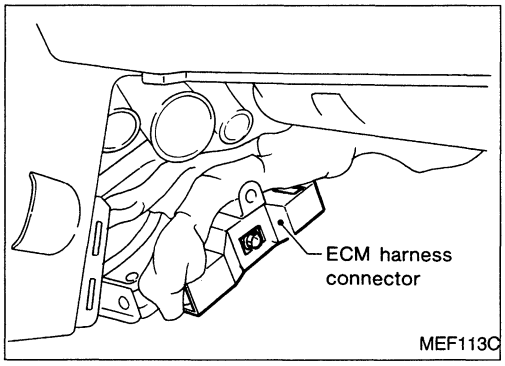
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

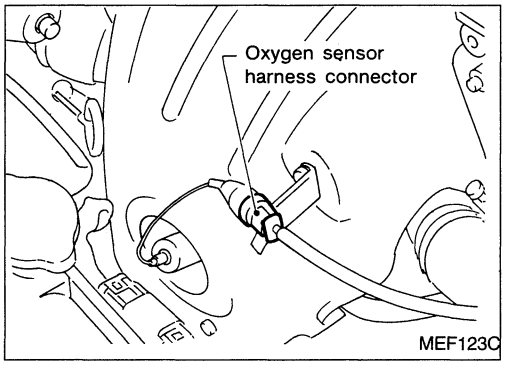
Diagnostic Procedure For Trouble Code 33

OXYGEN SENSOR (Diagnostic trouble code No. 33) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

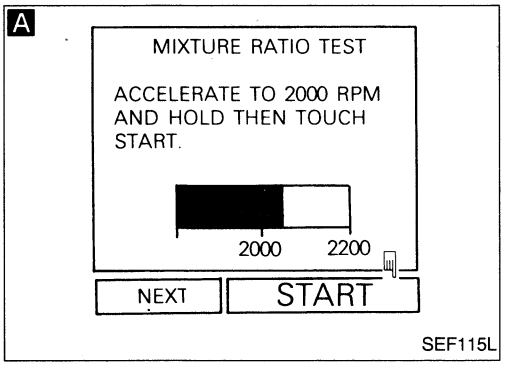


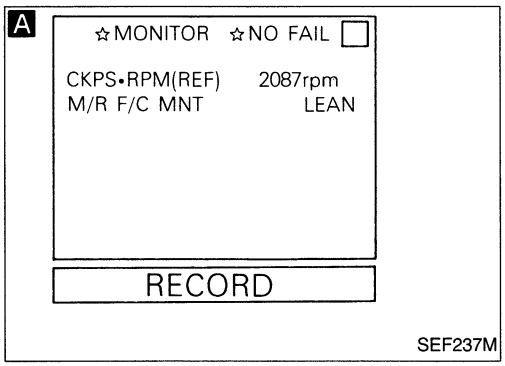
Harness layout

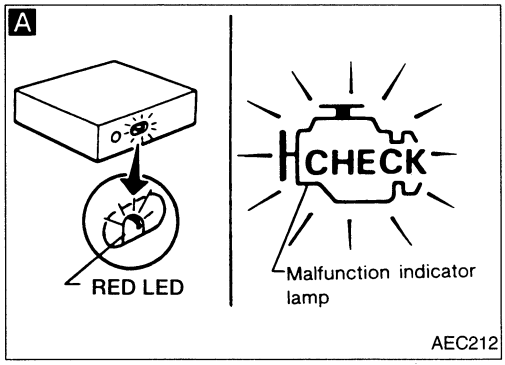


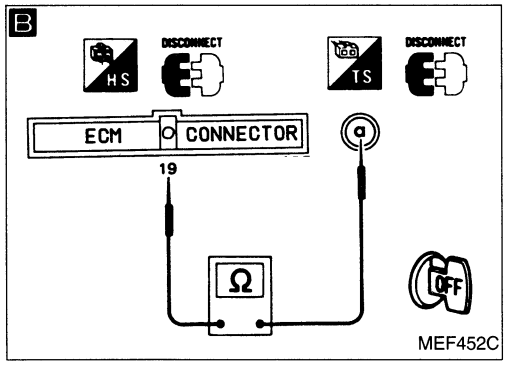


Diagnostic Procedure For Trouble Code 33 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.

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

O.K. → INSPECTION END.

OR

1) Start engine and warm it up sufficiently.
2) Make sure that "M/R F/C MNT" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm.

OR

1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Set ECM diagnosis mode to On-board Diagnostic Test Mode II. Refer to EF & EC-37.
4) Keep engine speed at 2,000 rpm and make sure that RED LED on ECM and malfunction indicator lamp on instrument panel go on and off more than 5 times during 10 seconds.

N.G. ↓

B

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF".
2) Disconnect oxygen sensor harness connector and ECM harness connector.
3) Check harness continuity between terminal (a) and ECM terminal (19).
Continuity should exist.

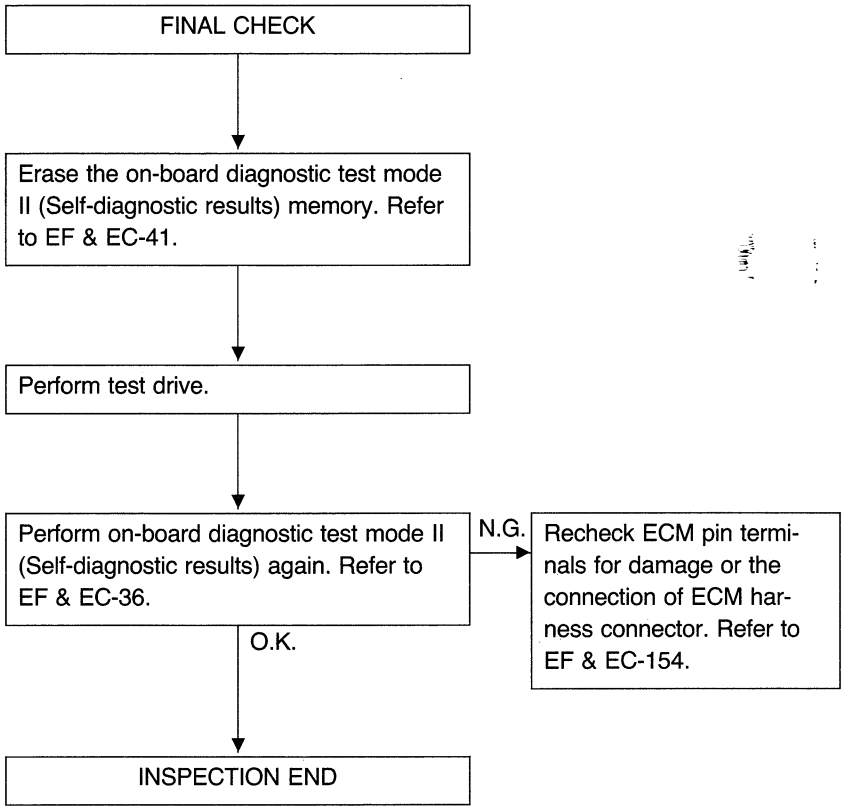
N.G. → Repair harness or connectors.

O.K. ↓

Replace oxygen sensor.

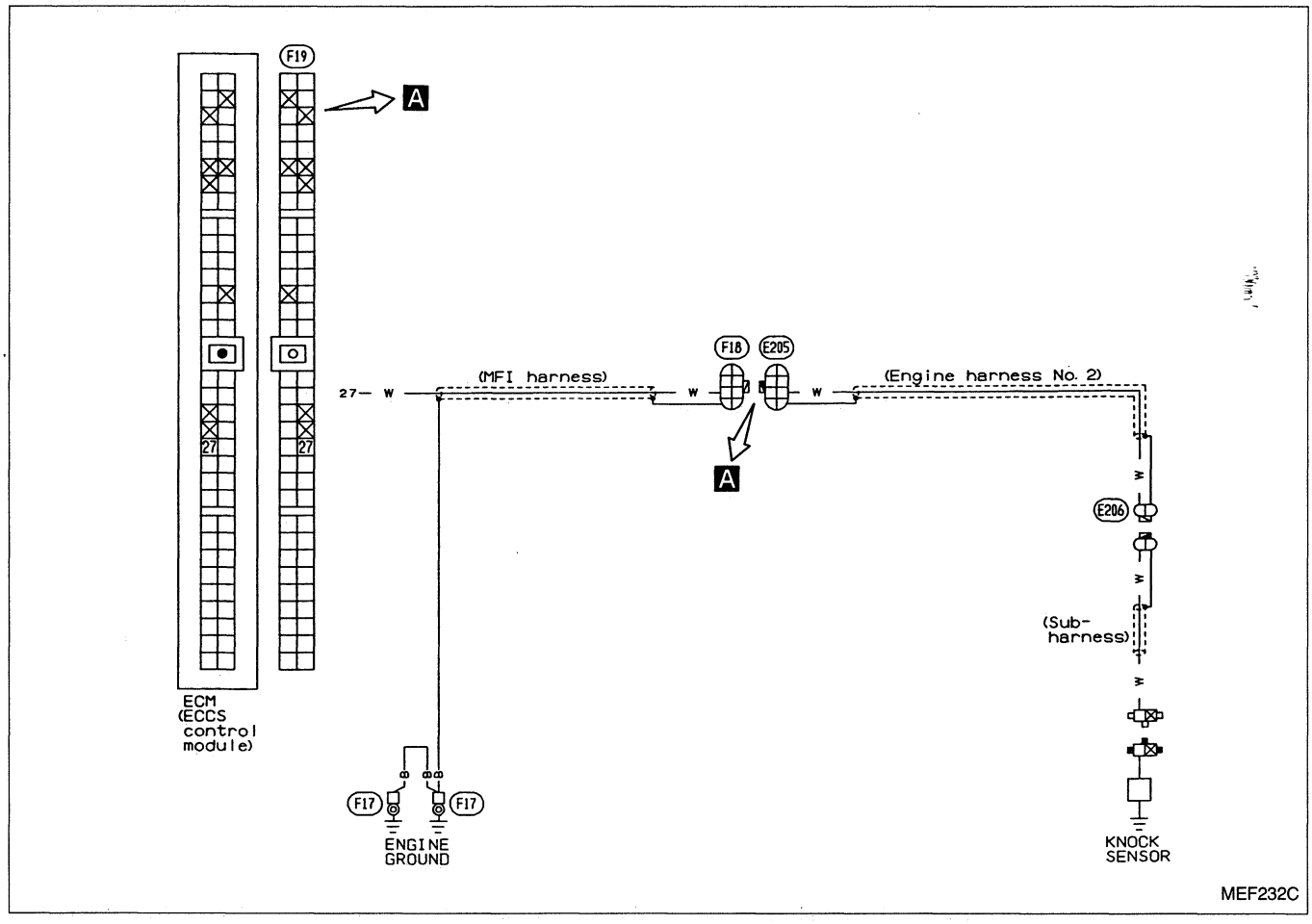
Diagnostic Procedure For Trouble Code 33 (Cont'd)

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

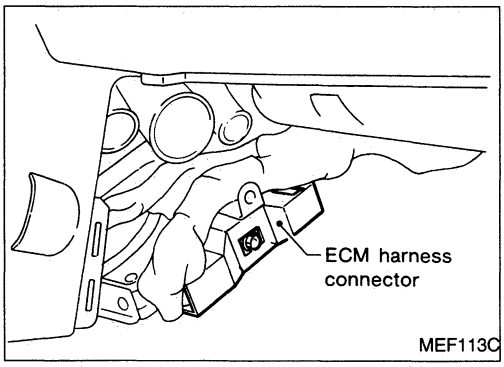


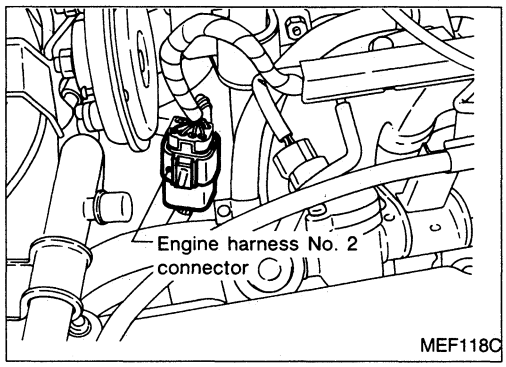
Diagnostic Procedure For Trouble Code 34

KNOCK SENSOR (Diagnostic trouble code No. 34)

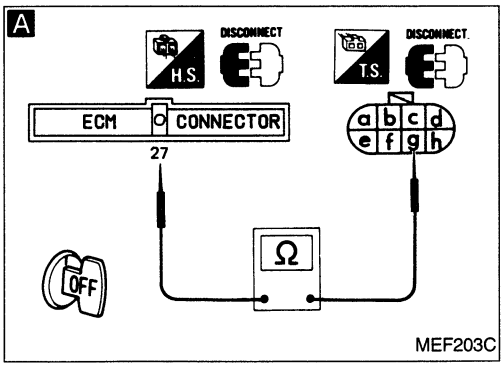


Harness layout





Diagnostic Procedure For Trouble Code 34 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and engine harness No. 2 connector (E205).
2) Check harness continuity between terminal (g) and ECM terminal (27).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENT (Knock sensor).
Refer to EF & EC-118.

N.G. → Replace knock sensor.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

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

FINAL CHECK

↓

Erase the on-board diagnostic test mode II (Self-diagnostic results) memory. Refer to EF & EC-41.

↓

Perform test drive.

↓

Perform on-board diagnostic test mode II (Self-diagnostic results) again. Refer to EF & EC-36.

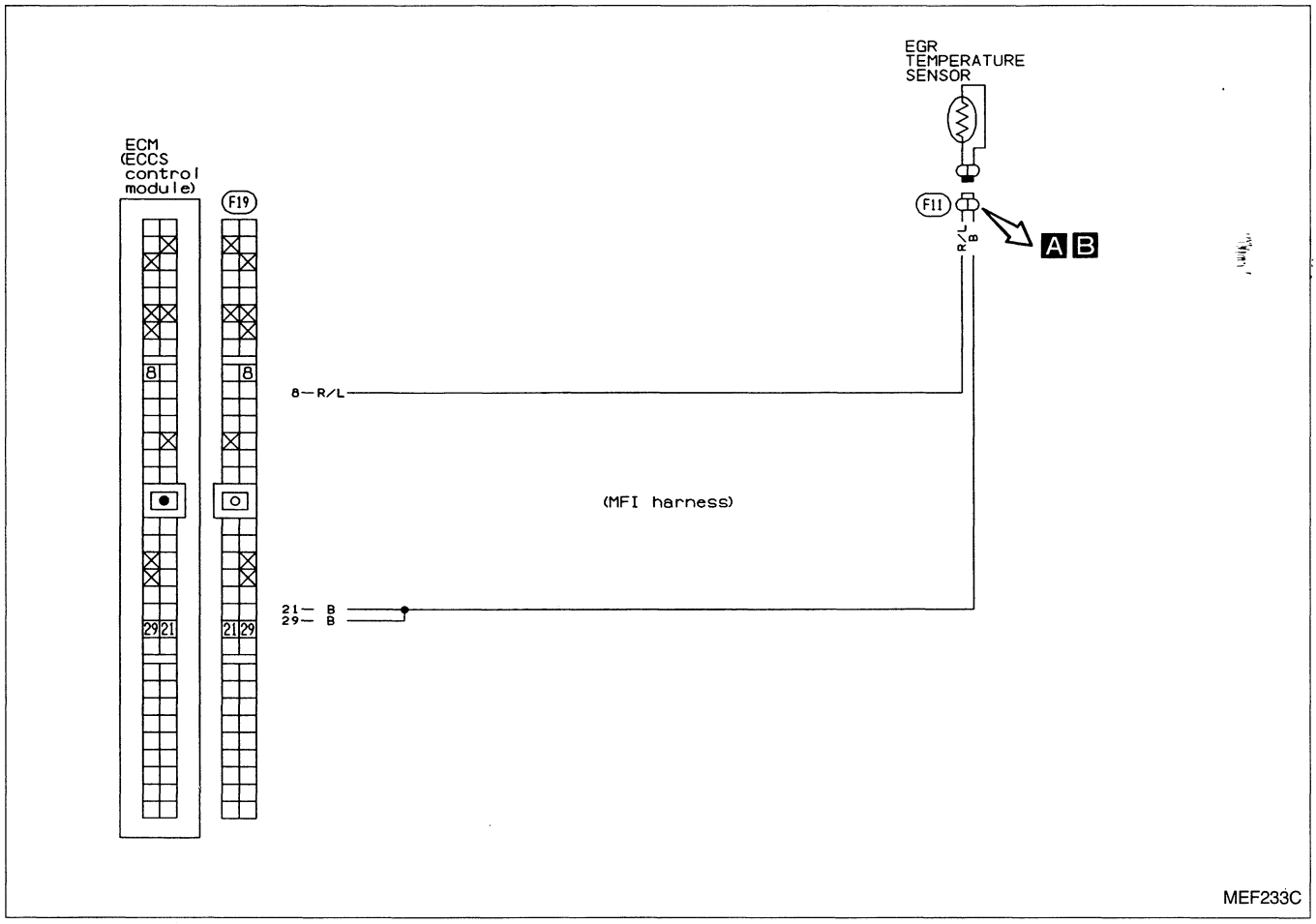
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

O.K. ↓

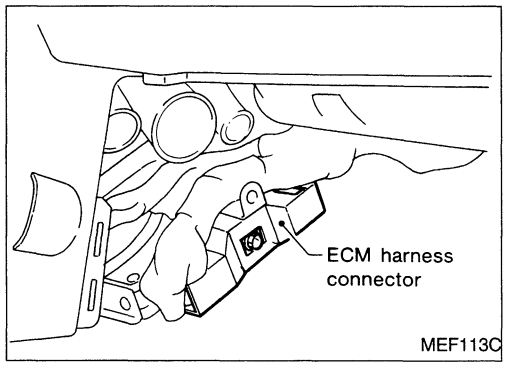
INSPECTION END

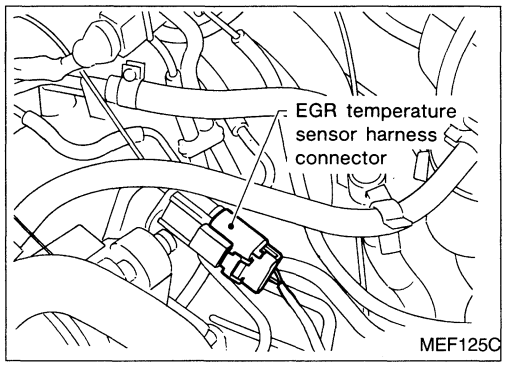
Diagnostic Procedure For Trouble Code 35

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) CHECK (MALFUNCTION INDICATOR LAMP ITEM): CALIFORNIA MODEL ONLY

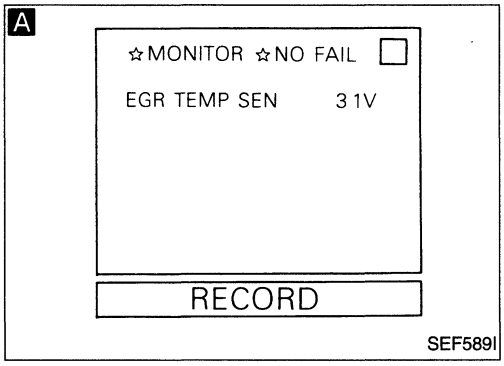


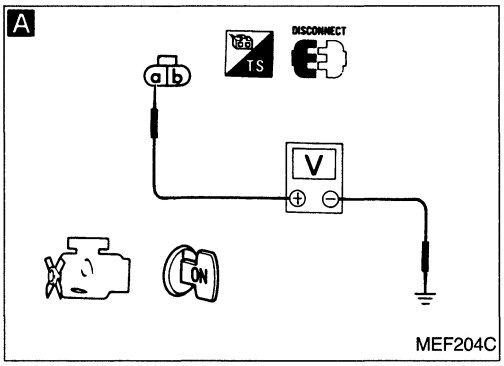
Harness layout

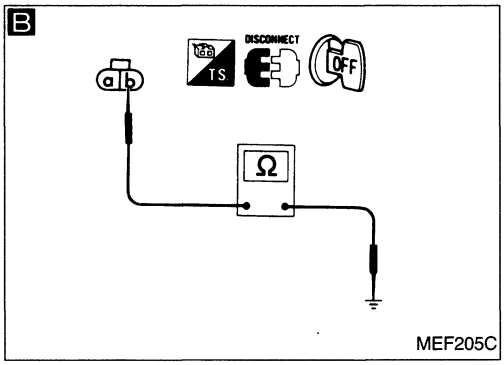




Diagnostic Procedure For Trouble Code 35 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Start engine and warm it up sufficiently.
2) Read EGR temperature sensor signal in "DATA MONITOR" mode with CONSULT.
Voltage:
Less than 5V (at idle)

N.G. → Repair harness or connectors.

OR

2) Stop engine.
3) Disconnect EGR temperature sensor connector.
4) Turn ignition switch "ON".
5) Check voltage between terminal ⓐ and ground.
Voltage:
Less than 5V (at idle)

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 EF & EC-162.

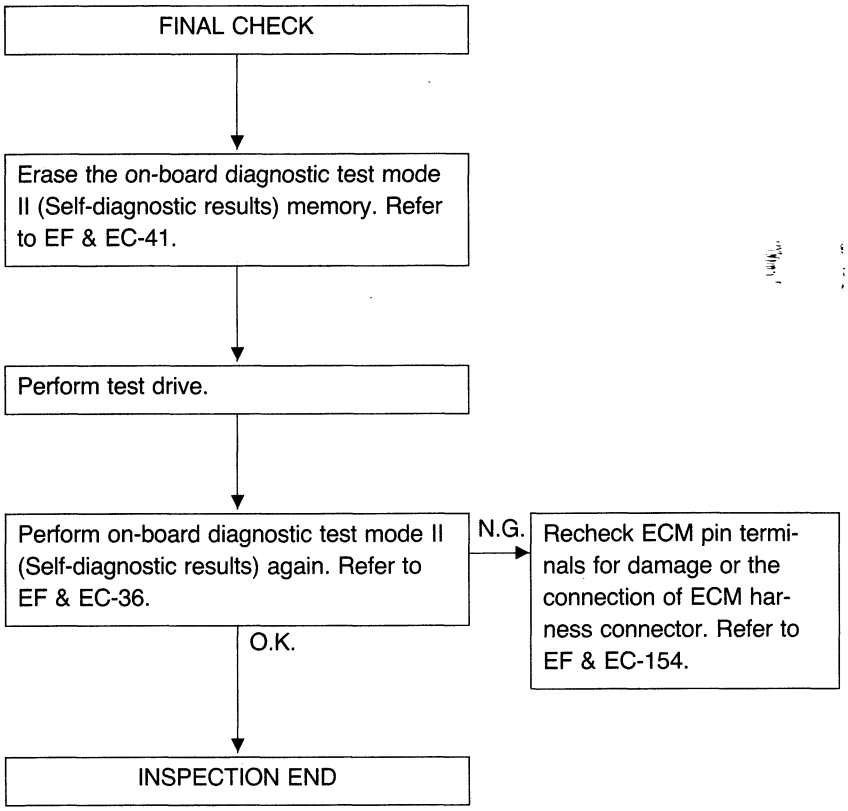
N.G. → Replace EGR temperature sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

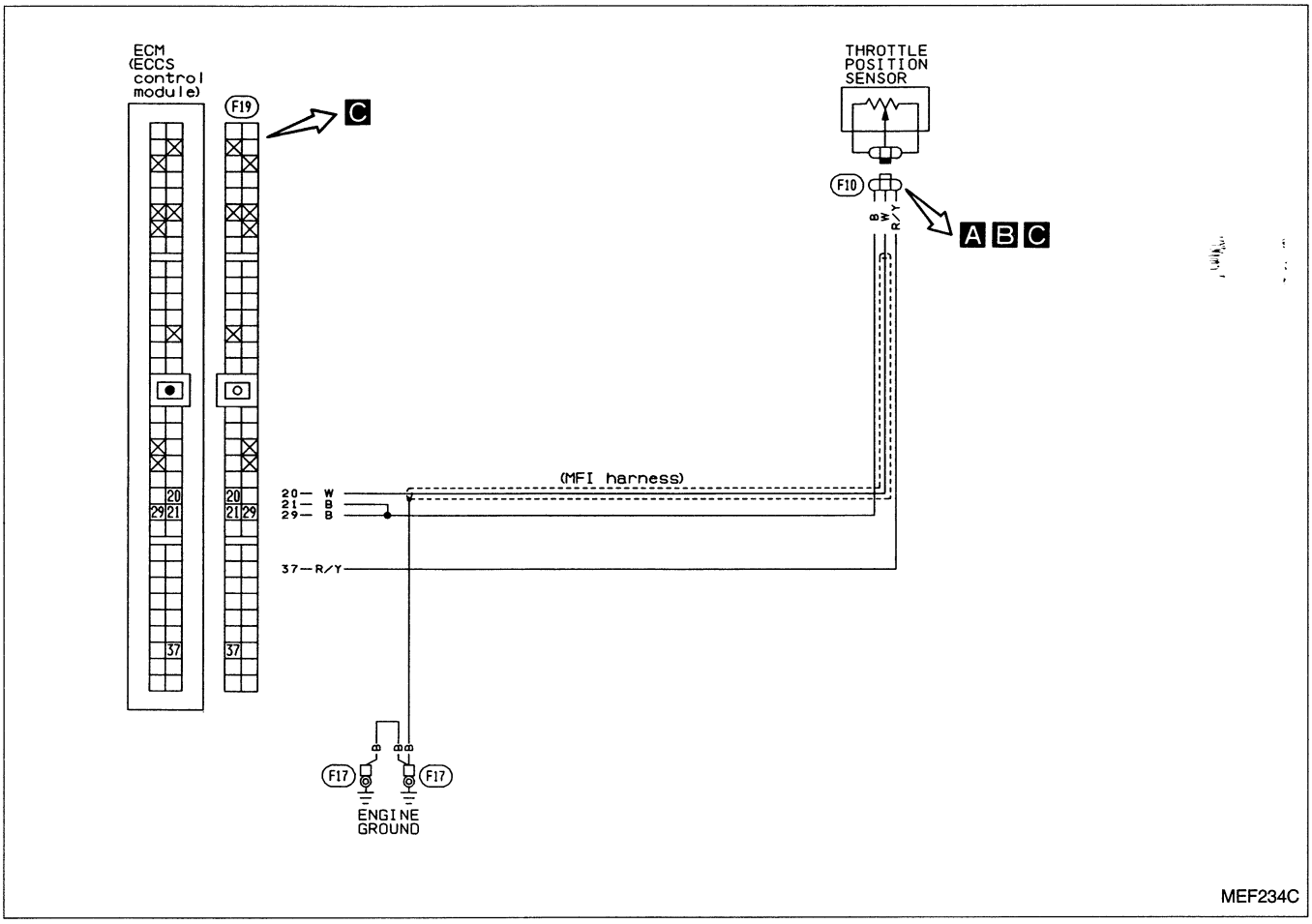
Diagnostic Procedure For Trouble Code 35 (Cont'd)

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

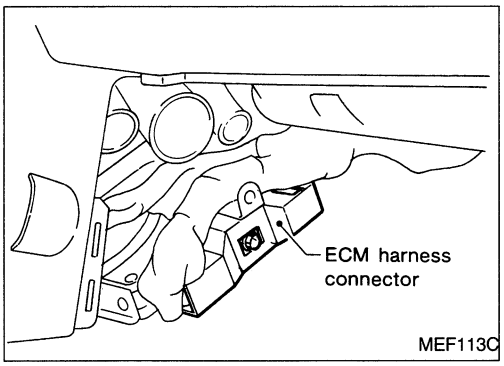


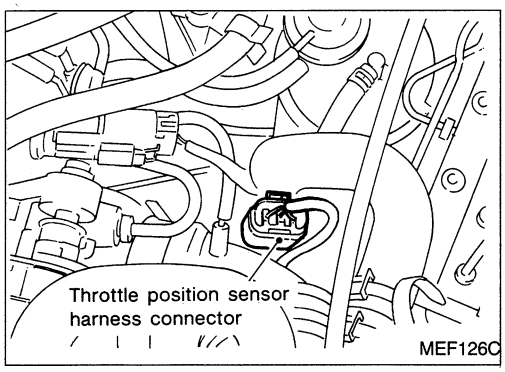
Diagnostic Procedure For Trouble Code 43

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



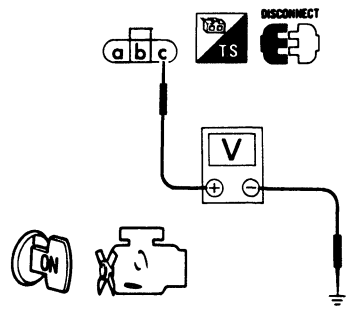
Harness layout





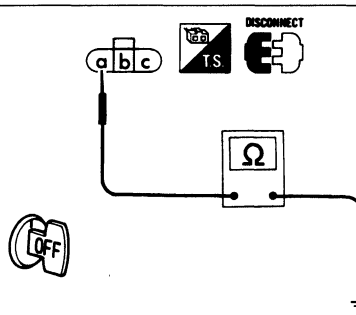
Diagnostic Procedure For Trouble Code 43 (Cont'd)

A



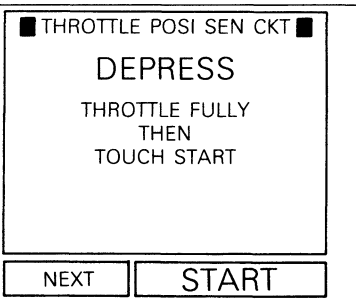
MEF701A

B



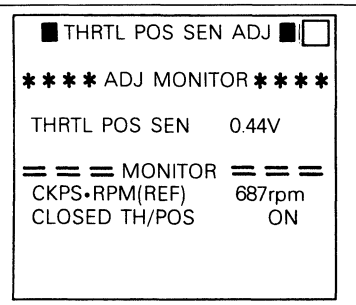
MEF702A

C



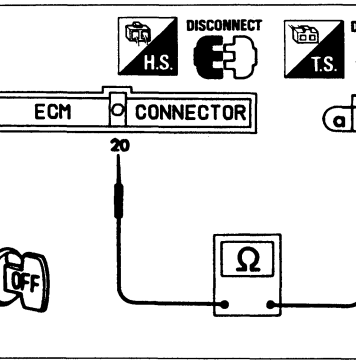
SEF238M

C



SEF239M

C



MEF453C

INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect throttle position sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓒ and ground.
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.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect throttle position sensor harness connector.
2) Turn ignition switch "ON".
3) Perform "THROTTLE POSI SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

3) Read throttle position sensor output voltage in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed:
Approx. 0.3 - 0.7V
Throttle valve fully open:
Approx. 4.0V

OR

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑳ and terminal ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Throttle position sensor).
Refer to EF & EC-163.

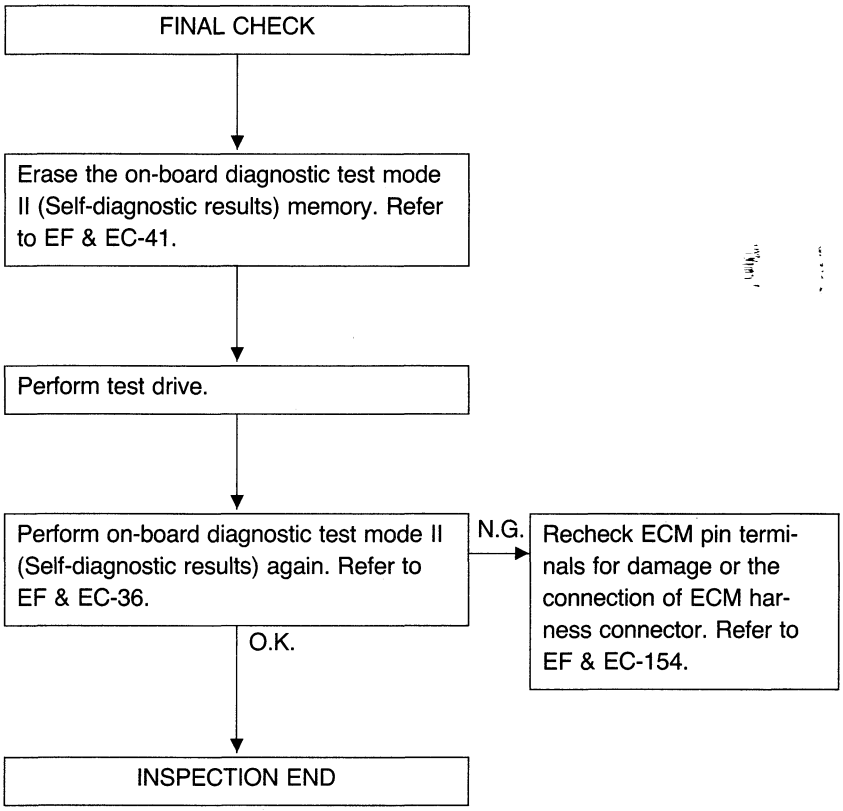
N.G. → Replace throttle position sensor.

O.K.

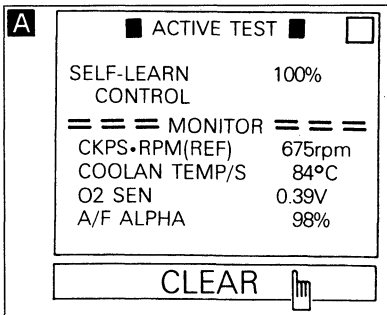
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

Diagnostic Procedure For Trouble Code 43 (Cont'd)

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

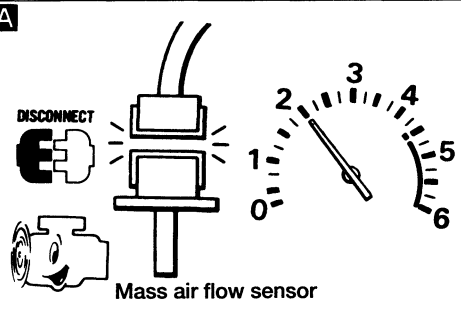


A



SEF240M

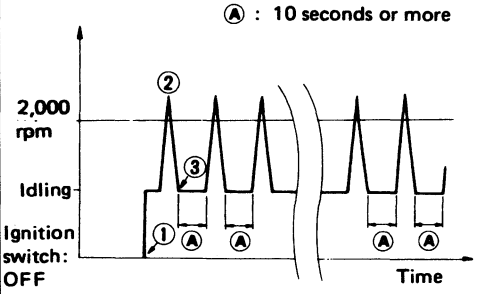
A



AEC147

B

Engine racing mode



① Start engine and warm it up sufficiently.
② Race engine revolution higher than 2,000 rpm under no-load.
③ Keep engine at idle speed for at least 10 seconds.
④ Repeat steps ② through ③ at least 10 times.

SEF329G

Diagnostic Procedure For Trouble Code 45

INJECTOR LEAK (Diagnostic trouble code No. 45) (MALFUNCTION INDICATOR LAMP ITEM); CALIFORNIA MODEL ONLY

INSPECTION START

A

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

OR

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

B

PERFORM ON-BOARD DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).

O.K. → INSPECTION END

N.G.

Remove injector assembly.
Refer to EF & EC-168.
Keep fuel hose and all injectors connected to injector gallery.

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

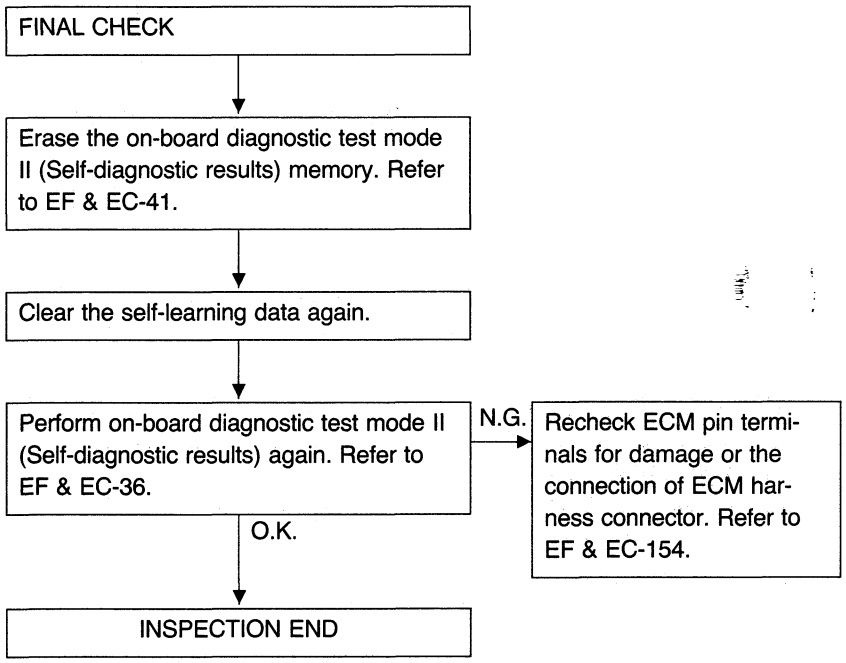
Drips → Replace the injectors from which fuel is dripping.

Do not drip

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

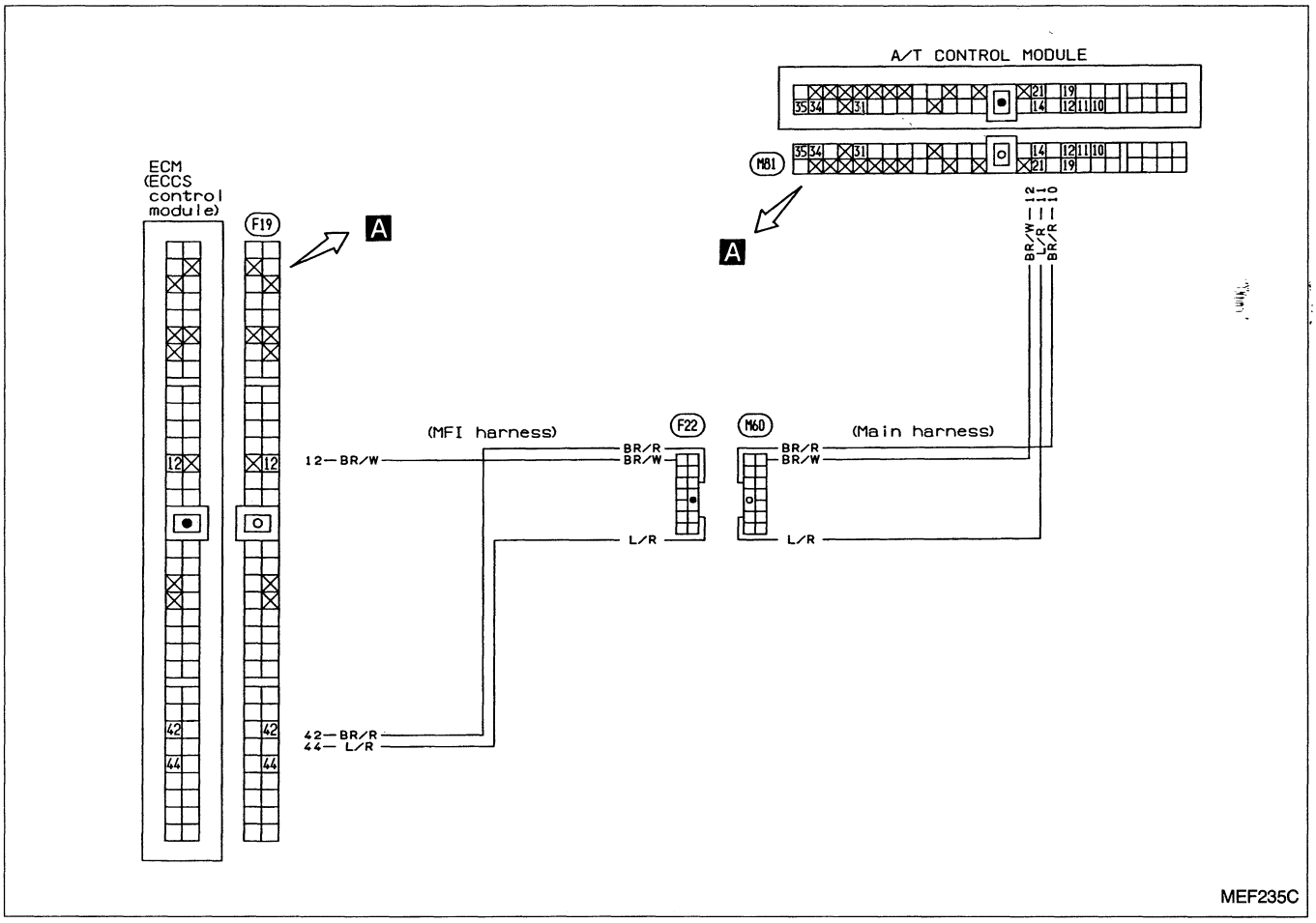
Diagnostic Procedure For Trouble Code 45 (Cont'd)

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

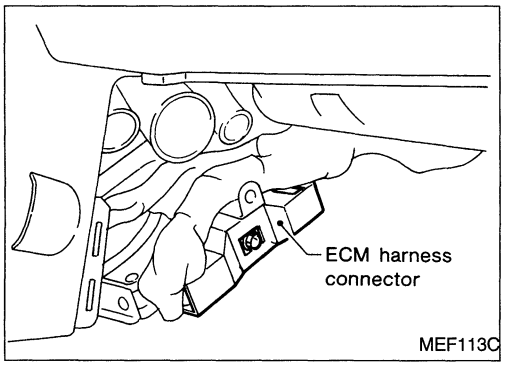


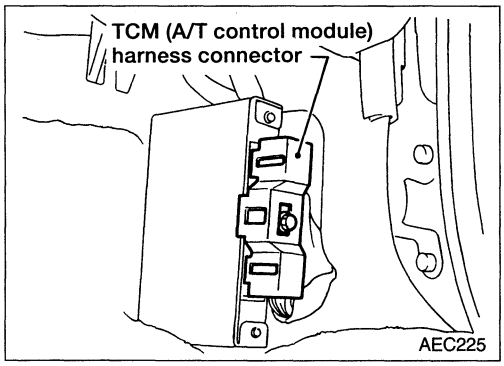
Diagnostic Procedure For Trouble Code 54

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

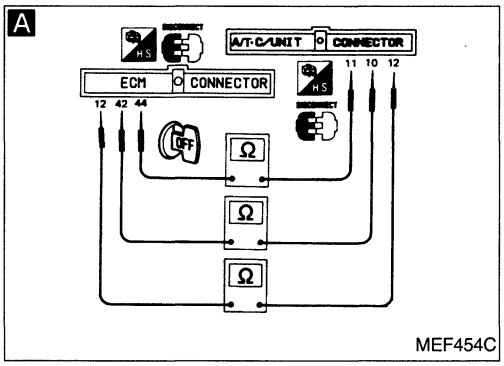


Harness layout





Diagnostic Procedure For Trouble Code 54 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and A/T control module harness connector.
2) Check harness continuity between ECM terminal (12) and terminal (12), ECM terminal (42) and terminal (10), ECM terminal (44) and terminal (11).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F22), (M60)
- Harness continuity between ECM and A/T control module

If N.G., repair harness or connectors.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

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

FINAL CHECK

↓

Erase the on-board diagnostic test mode II (Self-diagnostic results) memory. Refer to EF & EC-41.

↓

Perform test drive.

↓

Perform on-board diagnostic test mode II (Self-diagnostic results) again. Refer to EF & EC-36.

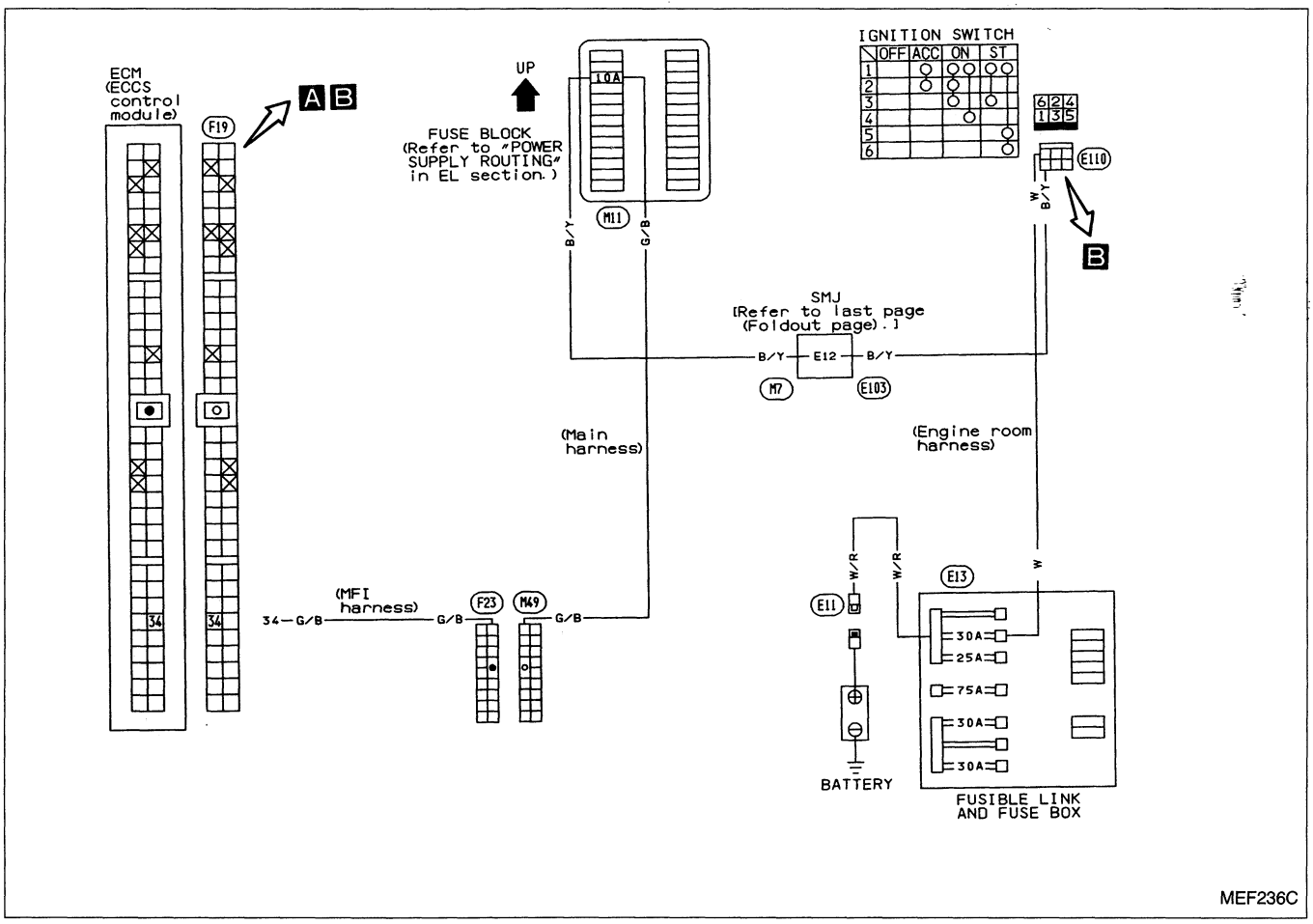
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

O.K. ↓

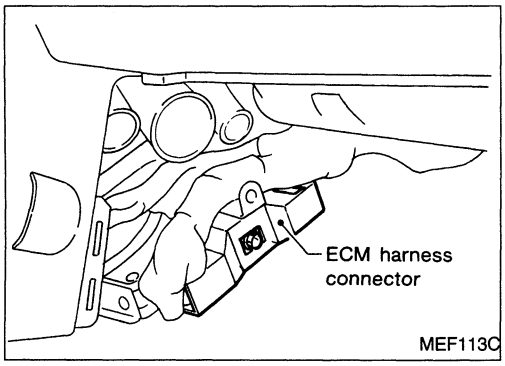
INSPECTION END

Diagnostic Procedure 23

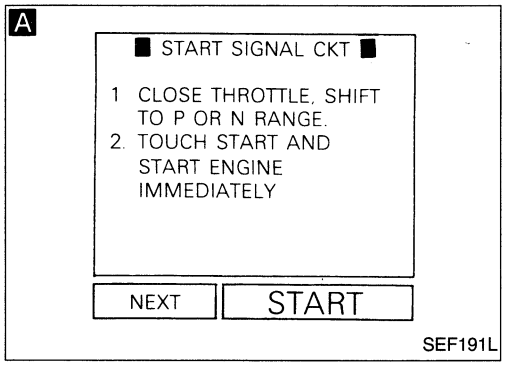
START SIGNAL (Not self-diagnostic item)

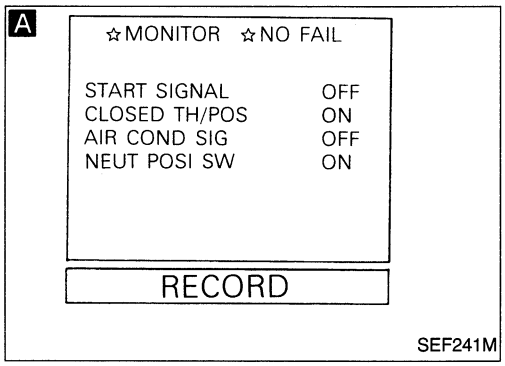


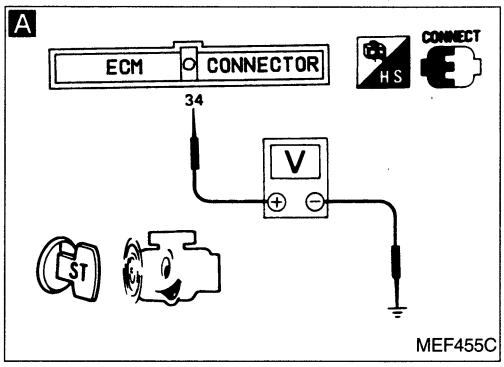
Harness layout

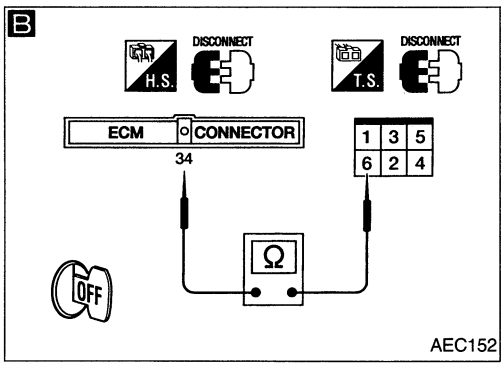


Diagnostic Procedure 23 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "START SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

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 (34) and ground.

Voltage:
Ignition switch "START"
Battery positive voltage
Except above
Approximately 0V

O.K. → INSPECTION END

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 (34) and terminal (6).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness connectors (M7), (E103)
- 10A fuse
- Harness continuity between ECM and ignition switch

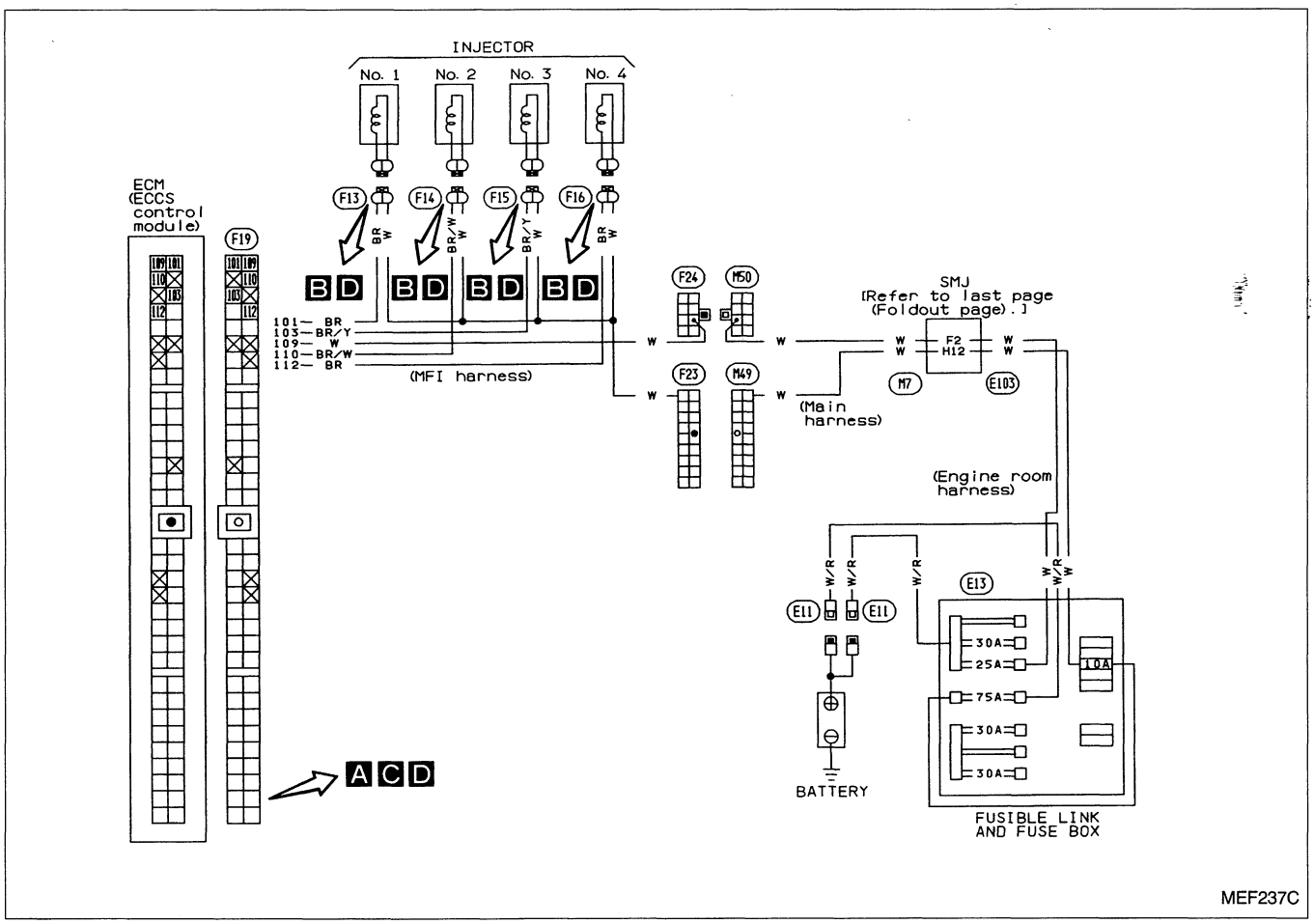
If N.G., repair harness or connectors.

O.K.

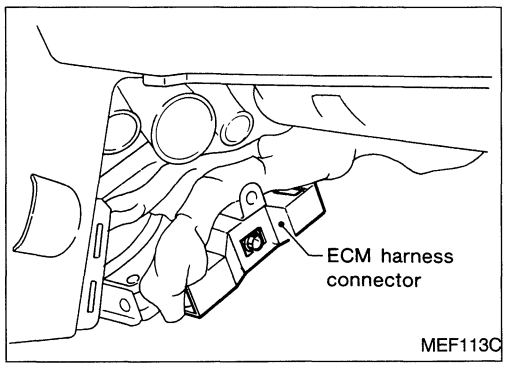
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

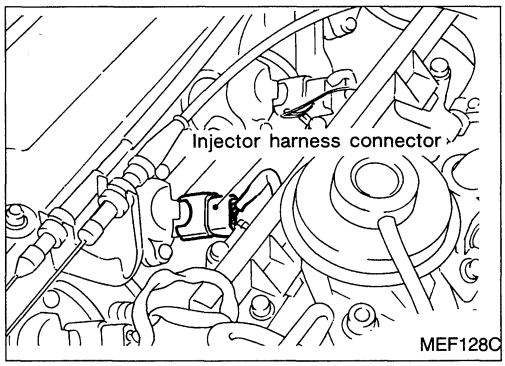
Diagnostic Procedure 24

INJECTOR (Not self-diagnostic item)



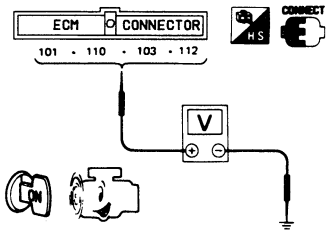
Harness layout





Diagnostic Procedure 24 (Cont'd)

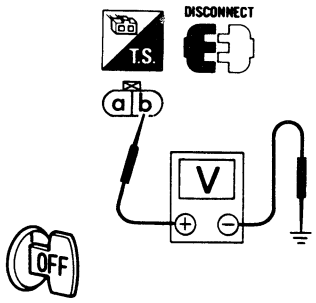
A



(101) : No. 1 cylinder (103) : No. 3 cylinder
(110) : No. 2 cylinder (112) : No. 4 cylinder

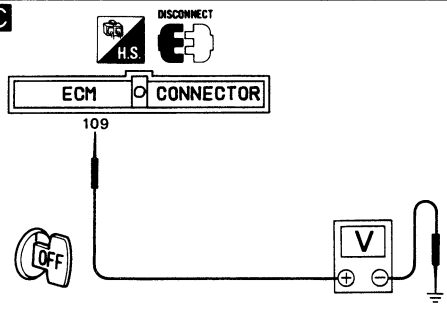
MEF456C

B



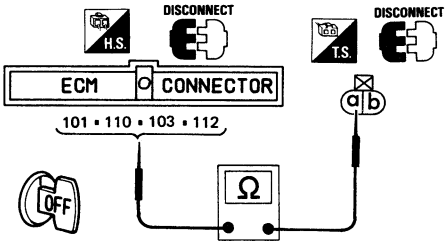
MEF207C

C



MEF208C

D



MEF209C

INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine.
2) Check voltage between ECM terminals (101), (110), (103), (112) and ground.
Voltage: Battery positive voltage

O.K. → INSPECTION END

N.G.

B

CHECK POWER SUPPLY 1.
1) Stop engine.
2) Disconnect each injector harness connector.
3) Check voltage between terminal (b) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness connectors (M7), (E103)
- 10A fuse
- 75A fusible link
- Harness continuity between injector and battery

If N.G., repair harness or connectors.

O.K.

C

CHECK POWER SUPPLY 2.
1) Disconnect ECM harness connector.
2) Check voltage between ECM terminal (109) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM and battery

If N.G., repair harness or connectors.

O.K.

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal (a) and ECM terminals (101), (110), (103), (112).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to EF & EC-164.

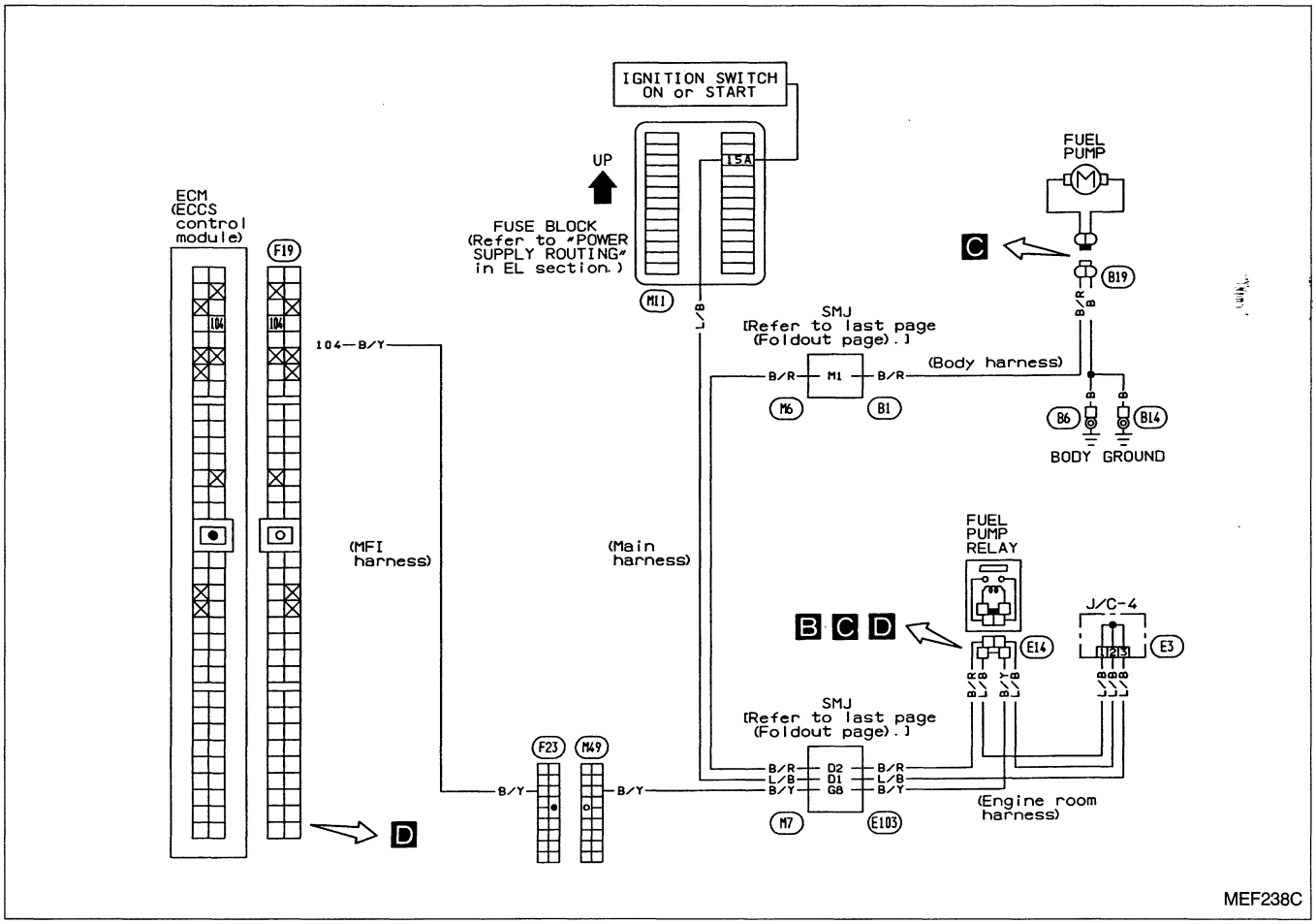
N.G. → Replace injector.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

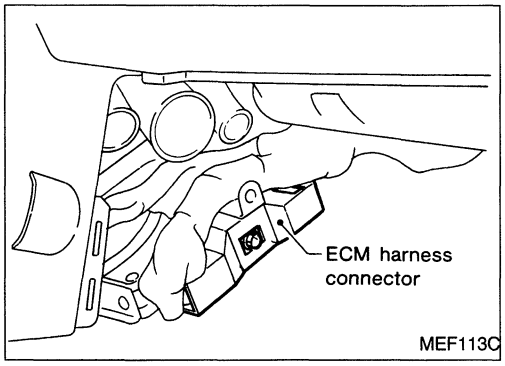
Diagnostic Procedure 25

FUEL PUMP (Not self-diagnostic item)

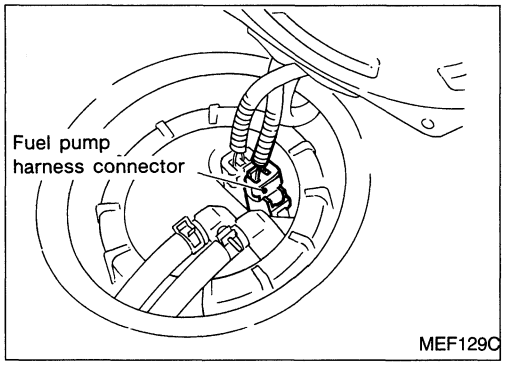


MEF238C

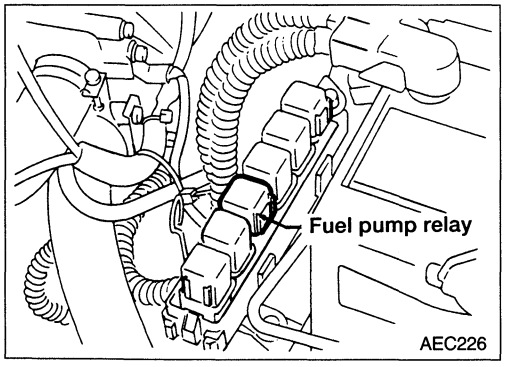
Harness layout



MEF113C

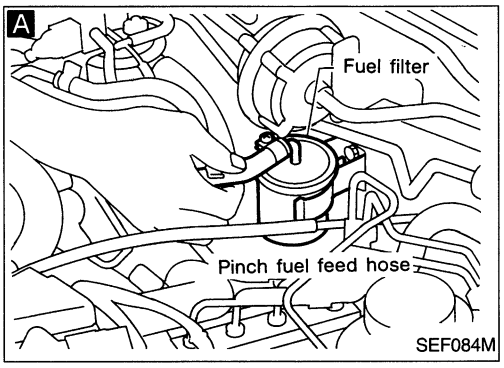


MEF129C



AEC226

Diagnostic Procedure 25 (Cont'd)



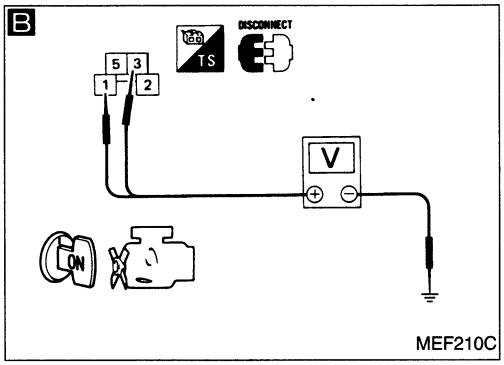
INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt for 5 seconds after ignition switch is turned "ON".

O.K. → INSPECTION END

N.G.



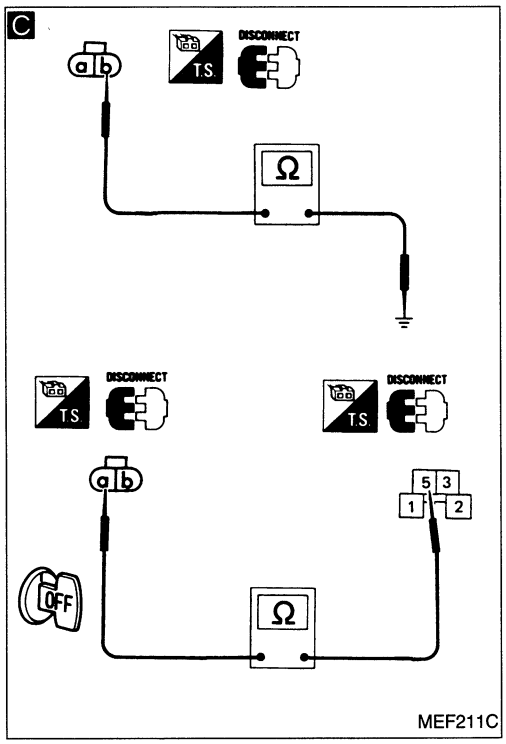
B

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

N.G. → Check the following.
- Harness connectors (E103) , (M7)
- Joint connector (E3)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

If N.G., repair harness or connectors.

O.K.



C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminal (b) and body ground, terminal (a) and terminal ⑤.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (B1) , (M6)
- Harness connectors (M7) , (E103)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If N.G., repair harness or connectors.

O.K.

D

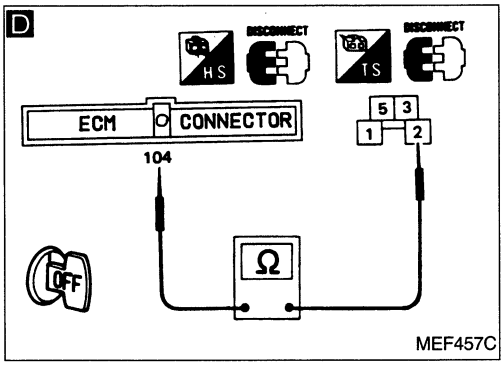
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (104) and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M7) , (E103)
- Harness connectors (M49) , (F23)
- Harness continuity between ECM and fuel pump relay

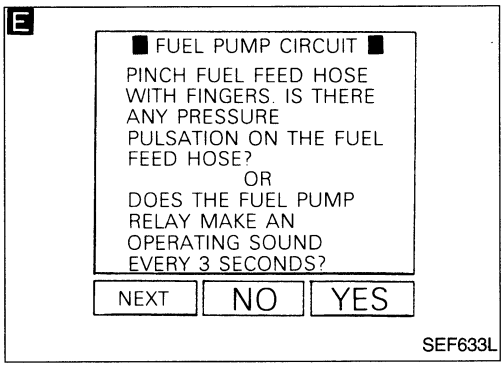
If N.G., repair harness or connectors.

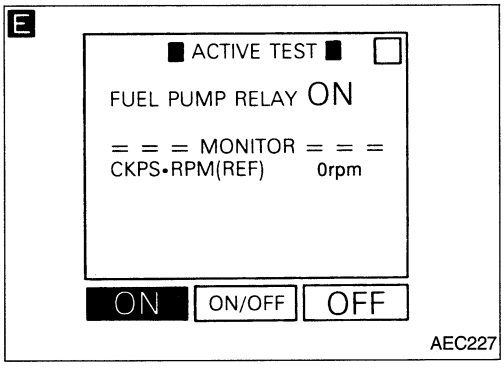
O.K.

Ⓐ



Diagnostic Procedure 25 (Cont'd)





Ⓐ

E

CHECK COMPONENT
(Fuel pump relay).

1) Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2) Ignition switch "ON".
3) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

3) Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to EF & EC-165.

N.G. → Replace fuel pump relay.

O.K. ↓

CHECK COMPONENT
(Fuel pump).
Refer to EF & EC-161.

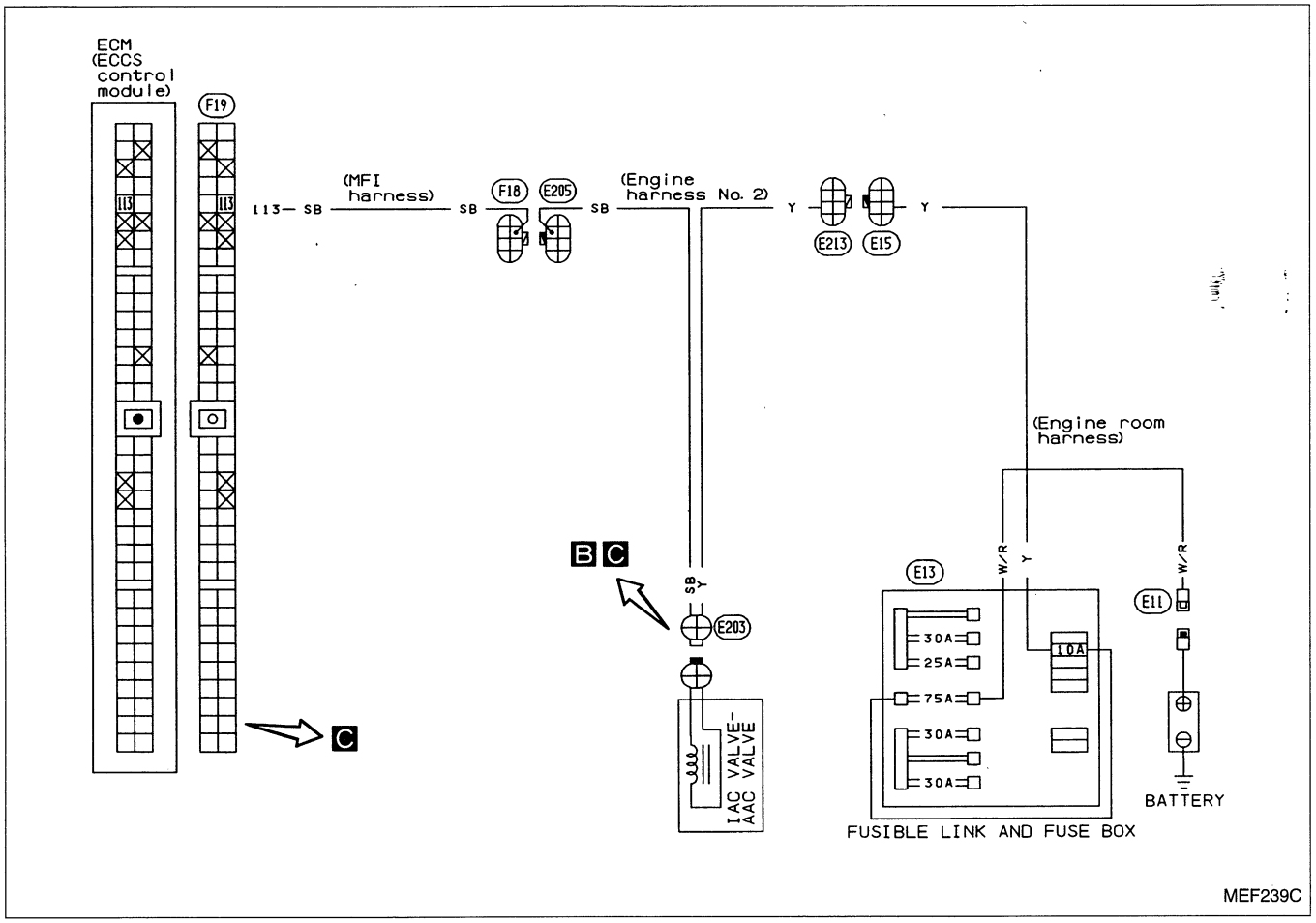
N.G. → Replace fuel pump.

O.K. ↓

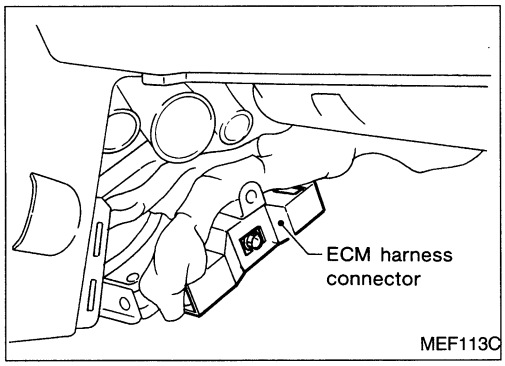
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

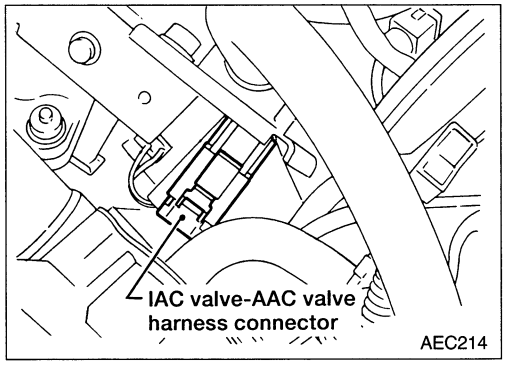
Diagnostic Procedure 26

IAC VALVE-AAC VALVE (Not self-diagnostic item)

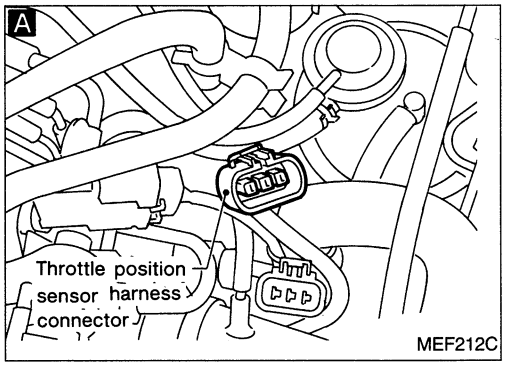


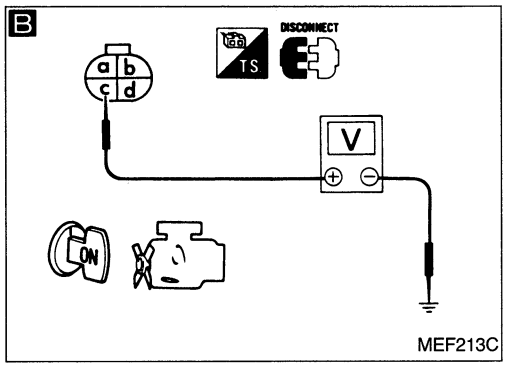
Harness layout

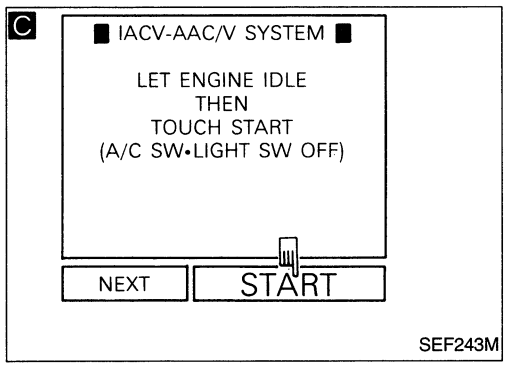


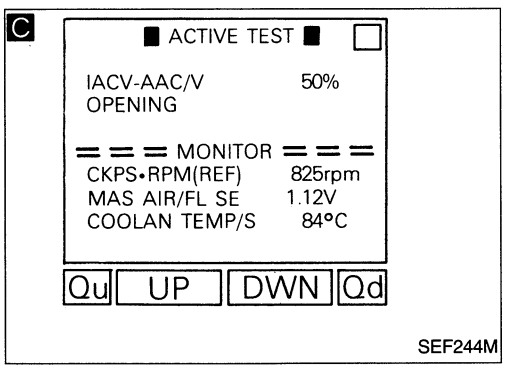


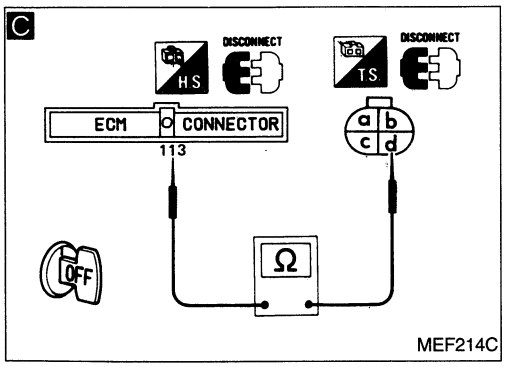
Diagnostic Procedure 26 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
   700 ± 50 rpm
   If N.G., adjust idle speed.
3) Perform on-board diagnostic system.
   Make sure that diagnostic trouble code No. 43 is not displayed.
   Make sure that throttle position sensor is not in "fail-safe" state.
4) Disconnect throttle position sensor harness connector.
5) Make sure that idle speed drops.

Drops → INSPECTION END

Does not drop ↓

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IAC valve-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓒ and ground.
   Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (E213) , (E15)
- 10A fuse
- 75A fusible link
- Harness continuity between IAC valve-AAC valve harness connector and fuse

If N.G., repair harness or connectors.

O.K. ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.

1) Reconnect throttle position sensor harness connector and IAC valve-AAC valve harness connector.
2) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

— OR —

2) Perform "IACV-AAC/V OPENING TEST" in "ACTIVE TEST" mode with CONSULT.

— OR —

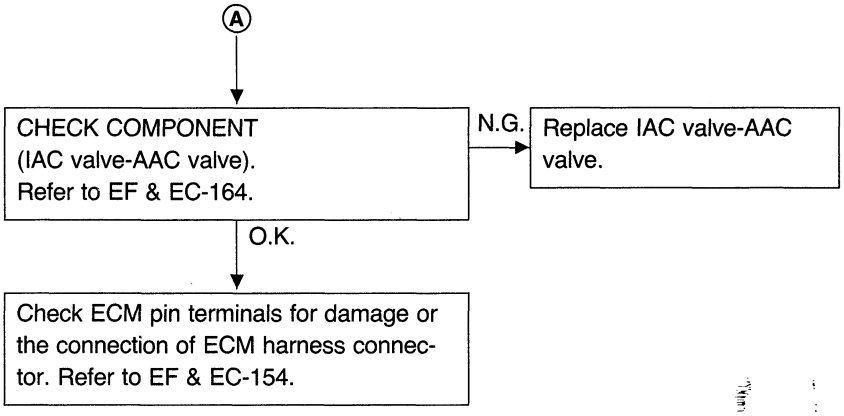
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (113) and terminal ⓓ.
   Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

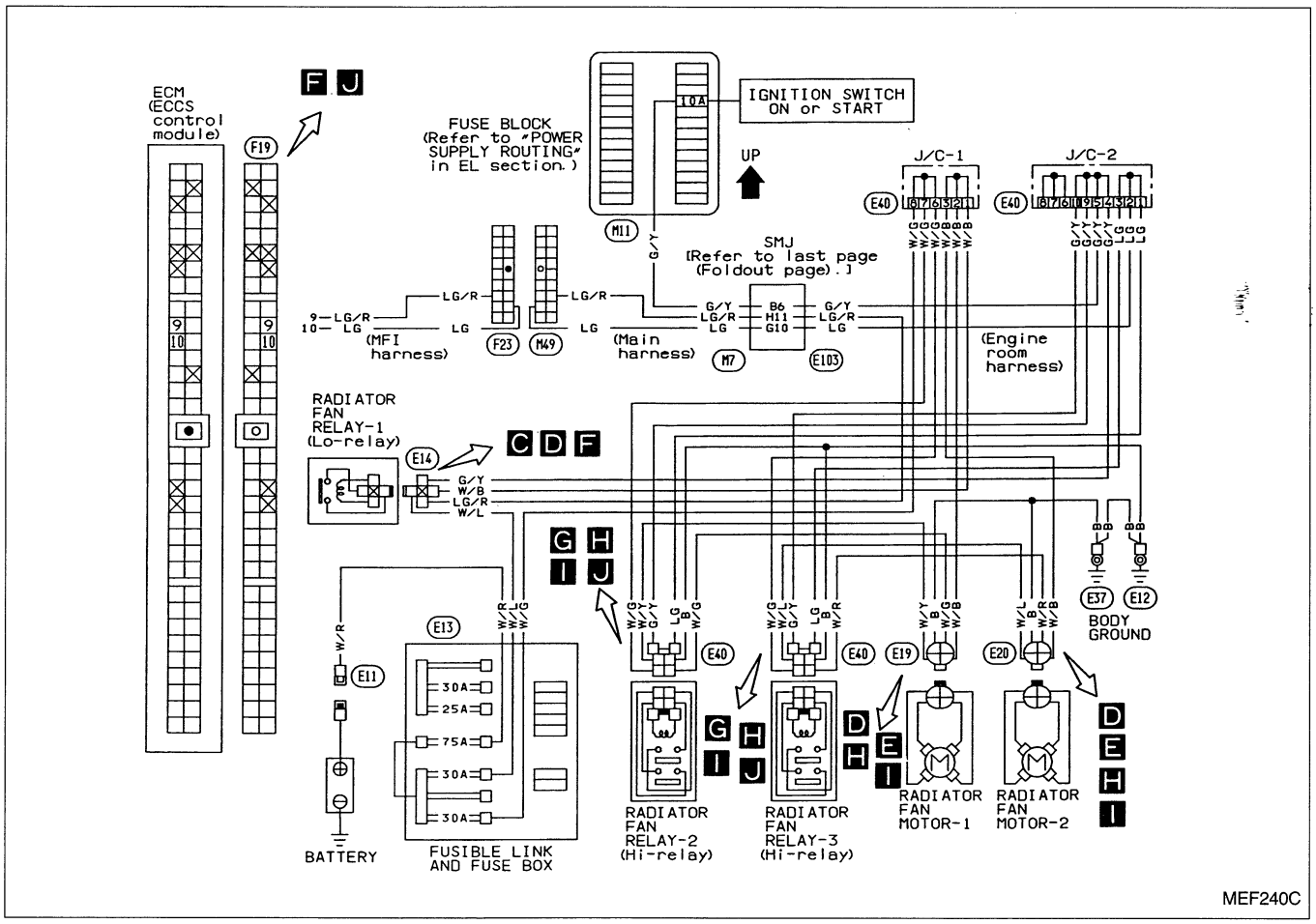
Ⓐ

Diagnostic Procedure 26 (Cont'd)

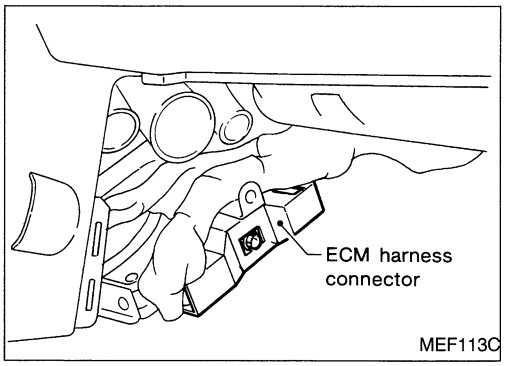


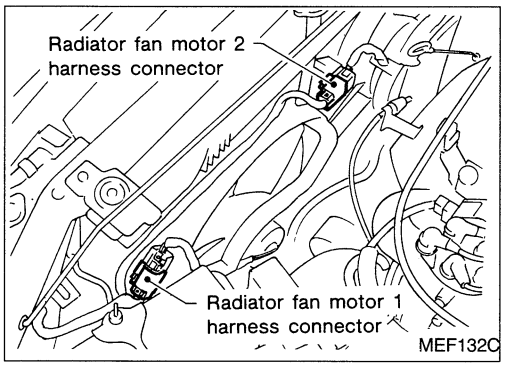
Diagnostic Procedure 27

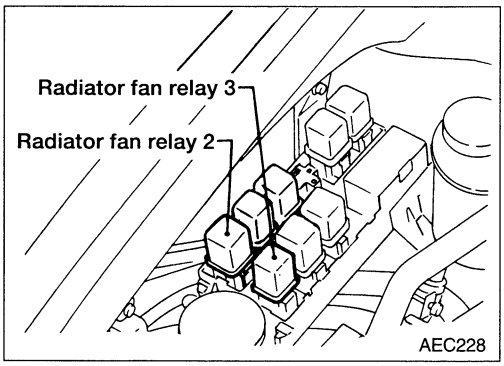
RADIATOR FAN CONTROL (Not self-diagnostic item)

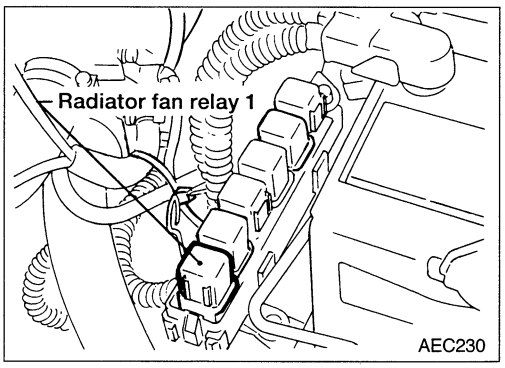


Harness layout



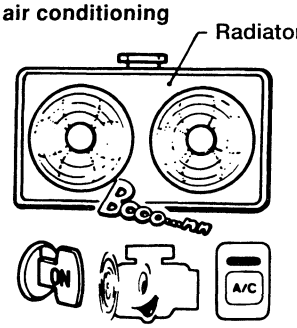




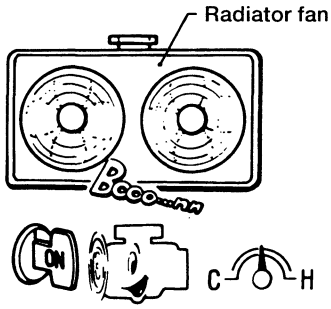


Diagnostic Procedure 27 (Cont'd)

A With air conditioning

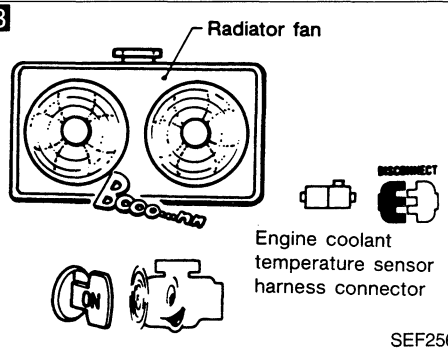


Without air conditioning



AEC231

B



Engine coolant temperature sensor harness connector

SEF256M

INSPECTION START

A

CHECK RADIATOR FAN LOW SPEED OPERATION.

With air conditioning

1) Start engine.
2) Set temperature lever at full cold position.
3) Turn air conditioning switch "ON".
4) Turn blower fan switch "ON".
5) Run engine at idle for a few minutes with air conditioning operating.
6) Make sure that radiator fan operates at low speed.

Without air conditioning

1) Start engine.
2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
3) Make sure that radiator fan begins to operate at low speed during warm-up.

N.G. → Check radiator fan low speed control circuit. (Perform PROCEDURE A .)

O.K.

B

CHECK RADIATOR FAN HIGH SPEED OPERATION.

1) Turn air conditioning switch "OFF".
2) Turn blower fan switch "OFF". (Steps 1) and 2) are only performed for models with air conditioning.)
3) Stop engine.
4) Disconnect engine coolant temperature sensor harness connector.
5) Restart engine and make sure that radiator fan operates at high speed.

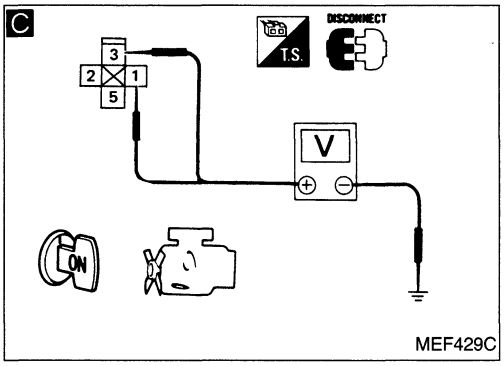
N.G. → Check radiator fan high speed control circuit. (Perform PROCEDURE B .)

O.K.

INSPECTION END

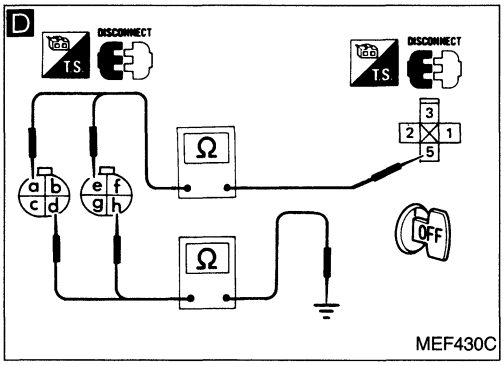
Diagnostic Procedure 27 (Cont'd)

C



MEF429C

D



MEF430C

PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect radiator fan relay-1.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ③ and ground.
Voltage: Battery positive voltage

N.G. →
Check the following.
- Harness connectors (M7), (E103)
- 10A fuse
- 30A fusible link
- 75A fusible link
- Joint connector-2
- Harness continuity between radiator fan relay-1 and fuse
- Harness continuity between radiator fan relay-1 and battery

If N.G., repair harness or connectors.

O.K. ↓

D

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect radiator fan motor-1 harness connector and radiator fan motor-2 harness connector.
3) Check harness continuity between terminals ⓐ, ⓔ and terminal ⑤, terminals ⓓ, ⓗ and body ground.
Continuity should exist.

N.G. →
Repair harness or connectors.
Check the following.
- Joint connector-1
- Harness continuity between radiator fan relay-1 and radiator fan motor-1, 2.

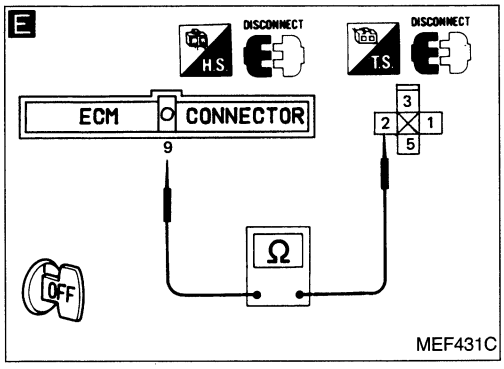
If N.G., repair harness or connectors.

O.K. ↓

Ⓐ

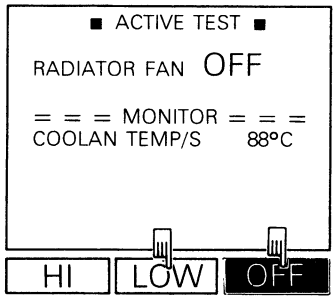
Diagnostic Procedure 27 (Cont'd)

E



MEF431C

F



SEF245M

Ⓐ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑨ and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M7), (E103)
- Harness connectors (F23), (M49)
- Harness continuity between radiator fan relay-1 and ECM

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Radiator fan relay-1).
Refer to EF & EC-165.

N.G. → Replace radiator fan relay.

O.K. ↓

F

CHECK COMPONENTS
(Radiator fan motors-1 and -2).

1) Reconnect radiator fan relay-1, radiator fan motor harness connector and ECM harness connector.
2) Start engine.
3) Perform "RADIATOR FAN TEST" in "ACTIVE TEST" mode with CONSULT.

— OR —

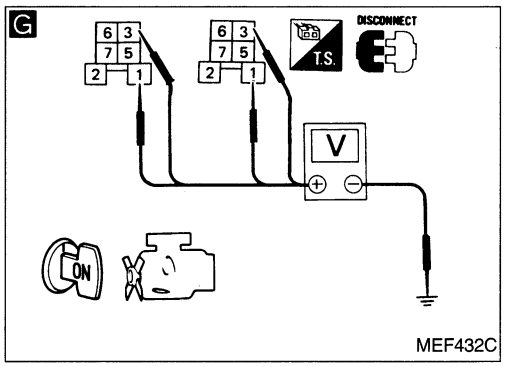
Refer to EF & EC-166.

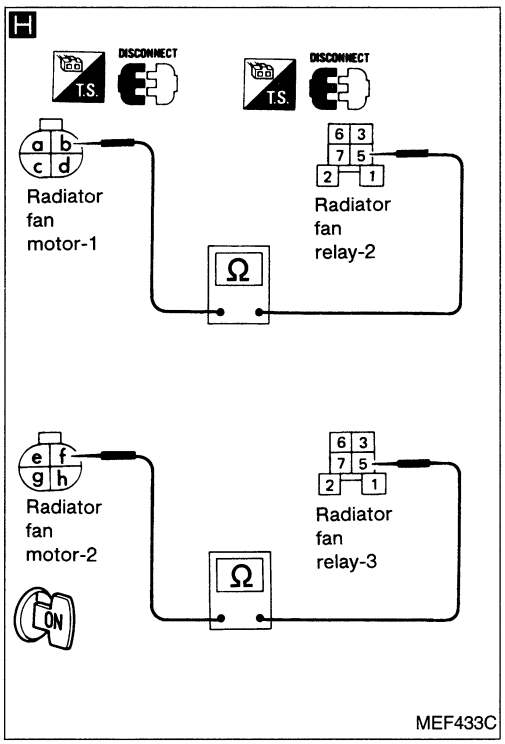
N.G. → Replace radiator fan motors.

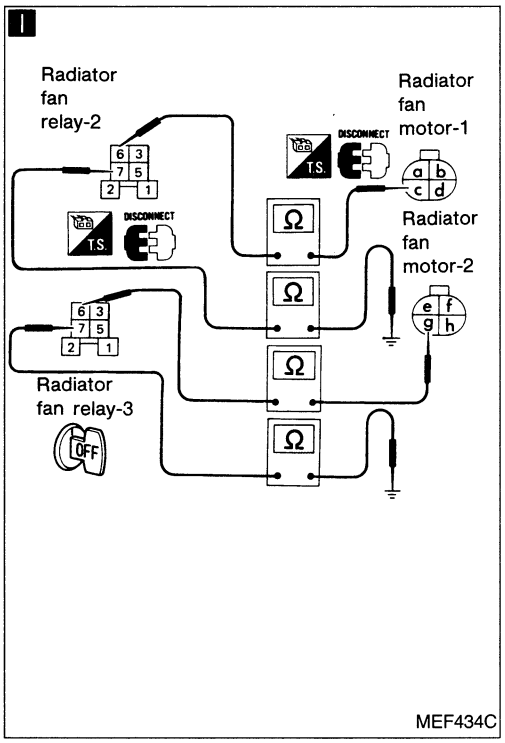
O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

Diagnostic Procedure 27 (Cont'd)







PROCEDURE B

INSPECTION START

G

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect radiator fan relays-2 and 3.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ③ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (M7), (E103)
- 10A fuse
- 30A fusible link
- 75A fusible link
- Joint connector-1
- Joint connector-2
- Harness continuity between radiator fan relays-2 and 3 and fuse
- Harness continuity between radiator fan relays-2 and 3 and battery

If N.G., repair harness or connectors.

O.K. ↓

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect radiator fan motor harness connector.
H 3) Check harness continuity between terminal ⑤ and terminals ⓑ, ⓕ.
Continuity should exist.
I 4) Check harness continuity between terminal ⑥ and terminals ⓒ, ⓖ, terminal ⑦ and body ground.
Continuity should exist.

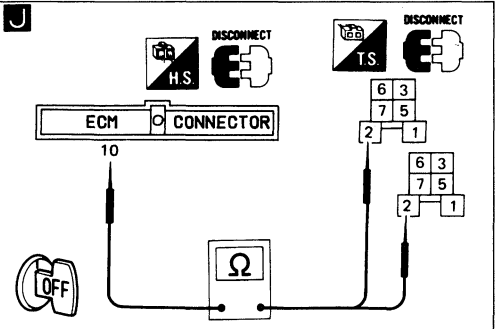
N.G. → Repair harness or connectors.

O.K. ↓

Ⓐ

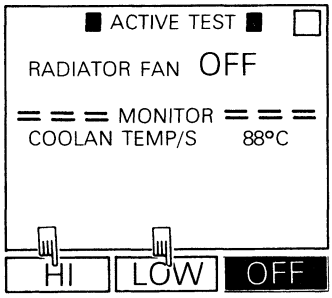
Diagnostic Procedure 27 (Cont'd)

J



MEF435C

K



SEF246M

Ⓐ

J

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑩ and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M7) , (E103)
- Harness connectors (F23) , (M49)
- Joint connector-2
- Harness continuity between ECM and radiator fan relays-2 and 3

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Radiator fan relays-2 and 3).
Refer to EF & EC-165.

N.G. → Replace radiator fan relay.

O.K. ↓

K

CHECK COMPONENTS
(Radiator fan motors-1 and -2).
1) Reconnect radiator fan relay-2, -3, radiator fan motor harness connector, engine coolant temperature sensor harness connector and ECM harness connector.
2) Start engine.
3) Perform "RADIATOR FAN TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to EF & EC-166.

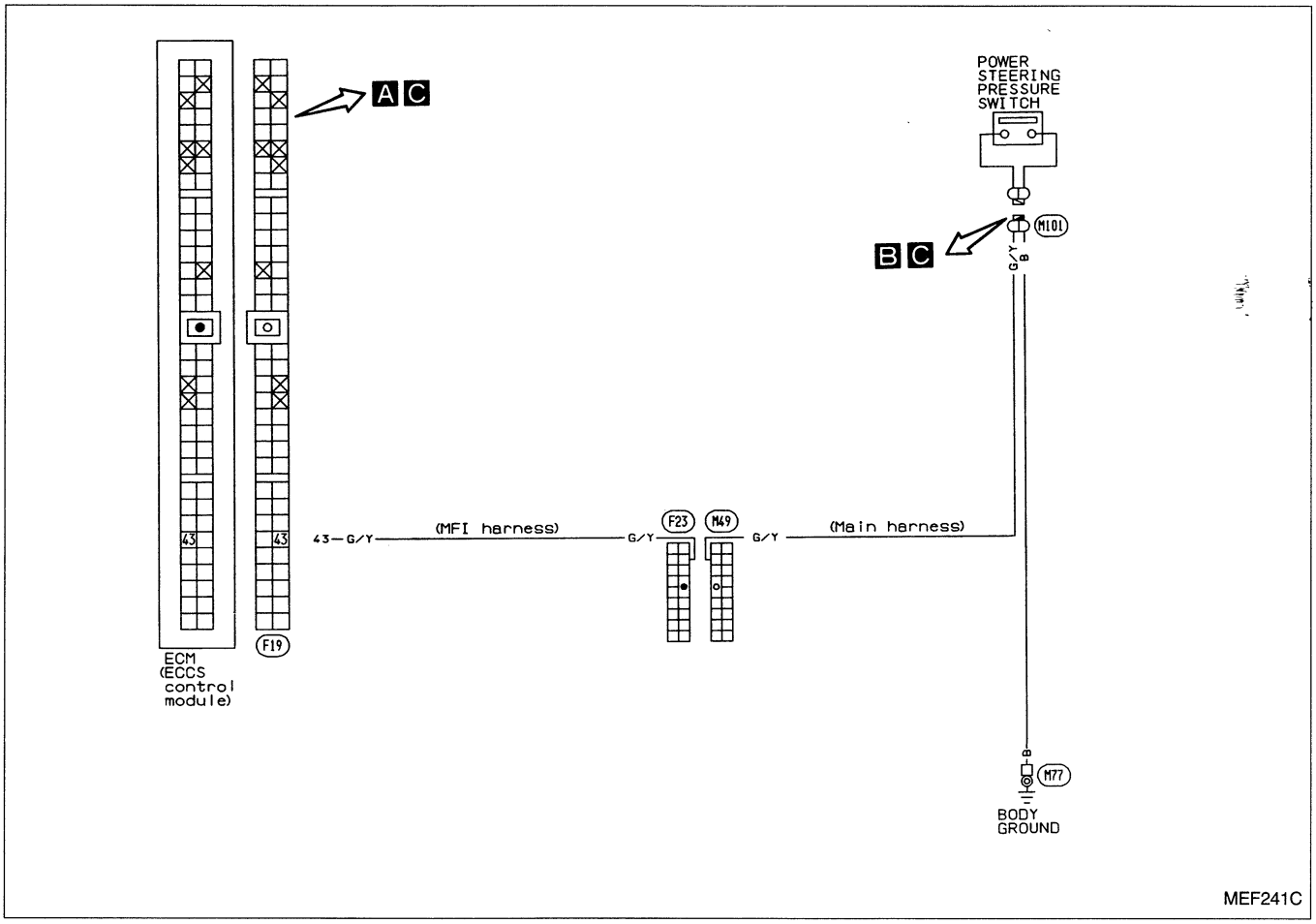
N.G. → Replace radiator fan motors.

O.K. ↓

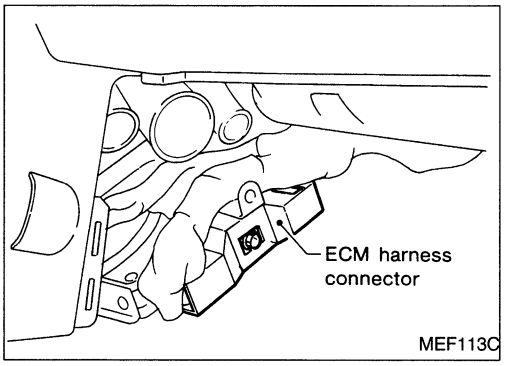
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

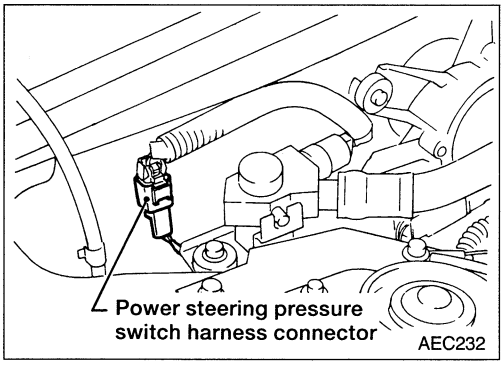
Diagnostic Procedure 28

POWER STEERING PRESSURE SWITCH (Not self-diagnostic item)



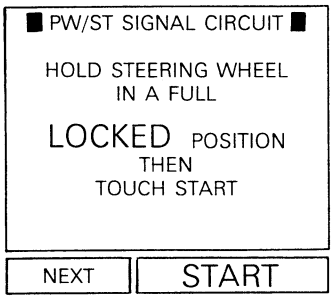
Harness layout





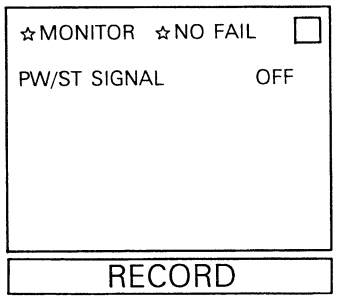
Diagnostic Procedure 28 (Cont'd)

A



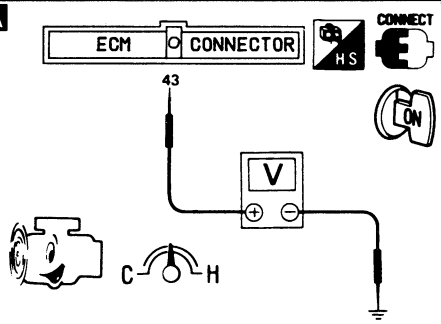
SEF200L

A



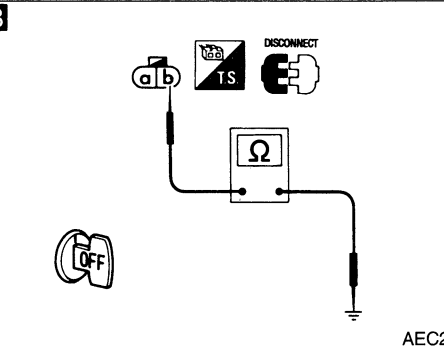
SEF591I

A



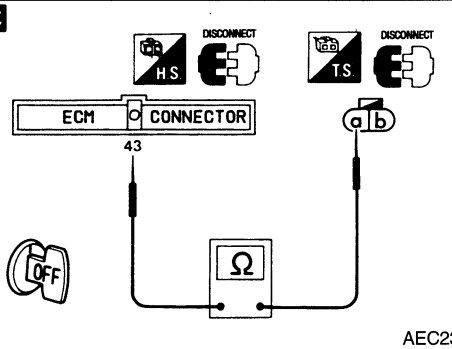
MEF458C

B



AEC233

C



AEC234

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine.
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Start engine.
2) Check power steering pressure switch signal in "DATA MONITOR" mode with CONSULT.
Steering is neutral position: OFF
Steering is turned: ON

OR

1) Start engine.
2) Check voltage between ECM terminal (43) and ground with CONSULT or tester.
Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 7 - 9V

O.K. → INSPECTION END

N.G.

B

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect power steering pressure switch harness connector.
3) Check harness continuity between terminal (b) 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 (43) and terminal (a).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Power steering pressure switch).
Refer to EF & EC-165.

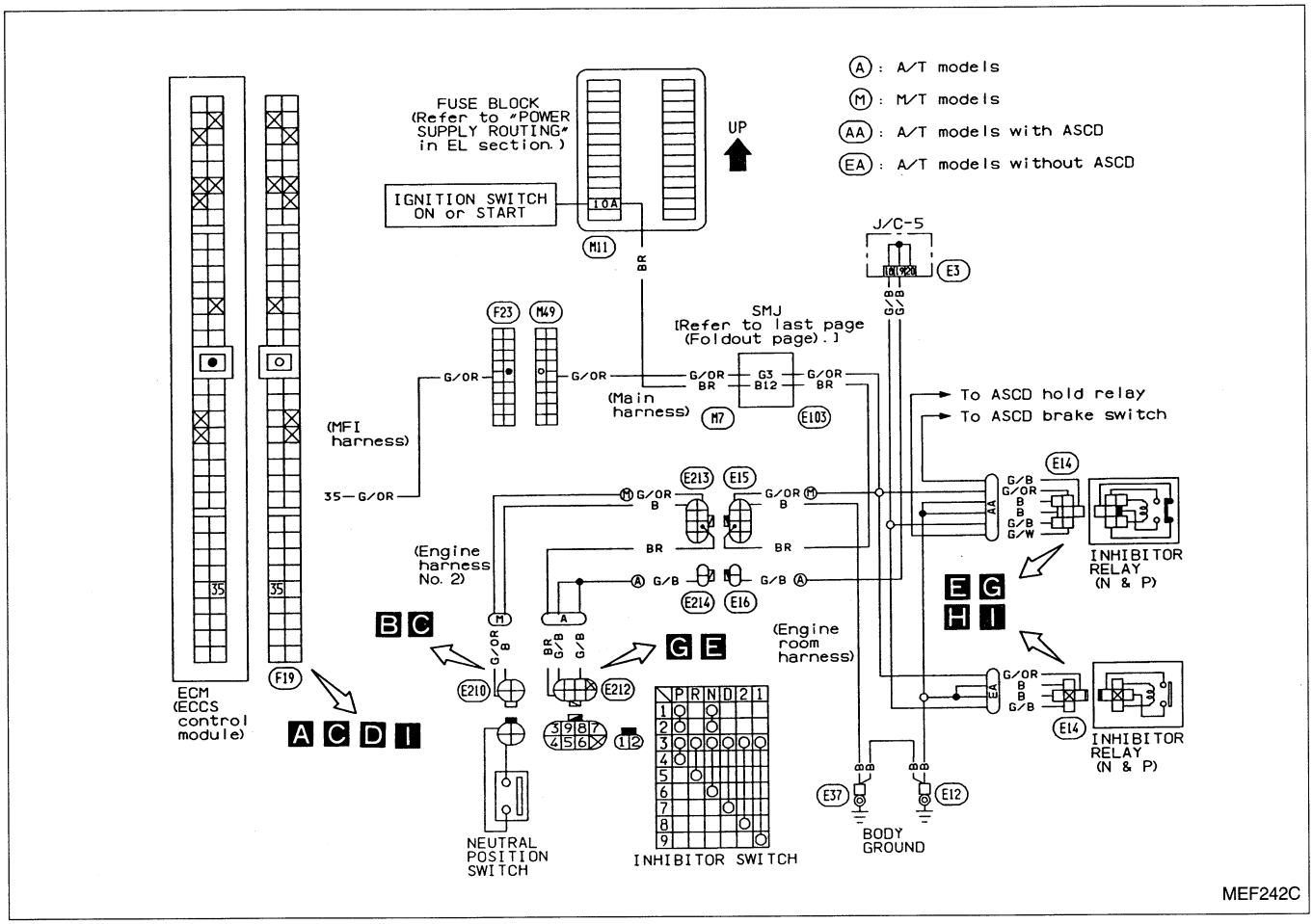
N.G. → Replace power steering pressure switch.

O.K.

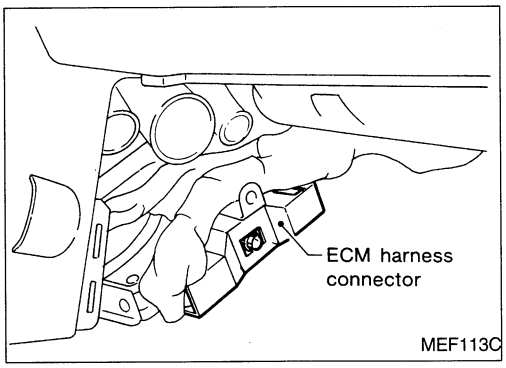
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

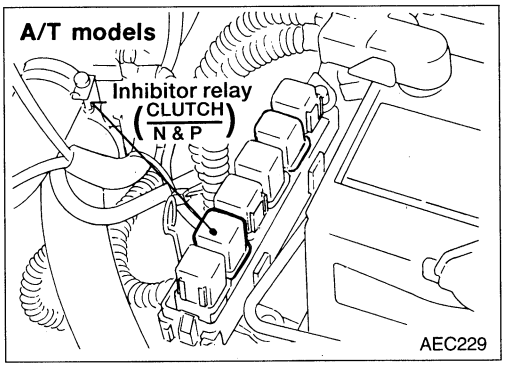
Diagnostic Procedure 29

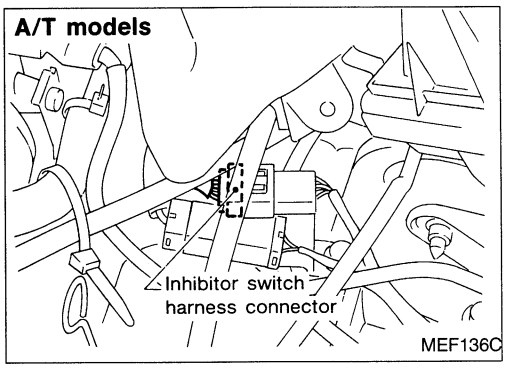
NEUTRAL POSITION SWITCH/INHIBITOR SWITCH (Not self-diagnostic item)

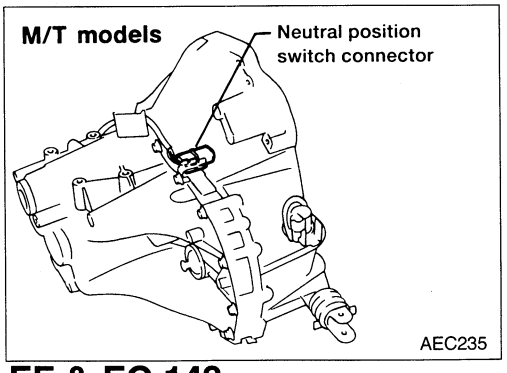


Harness layout

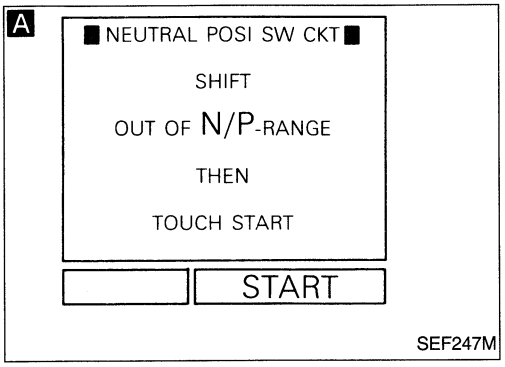


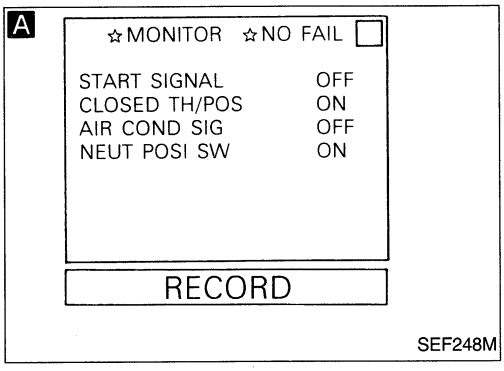


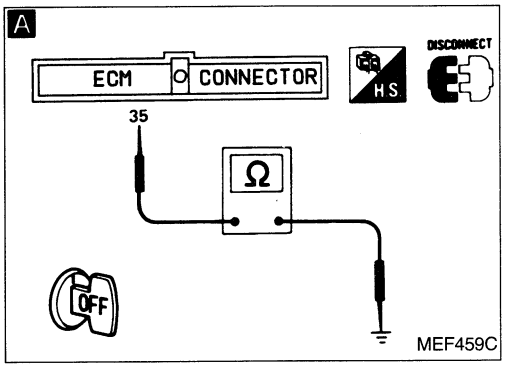


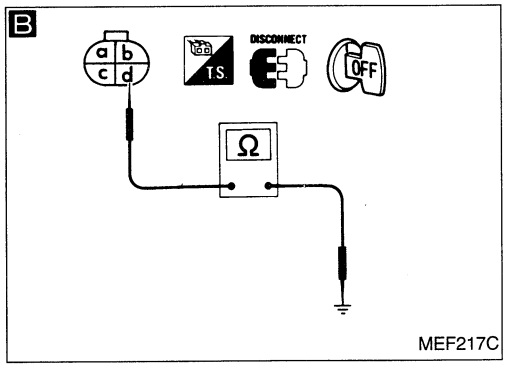


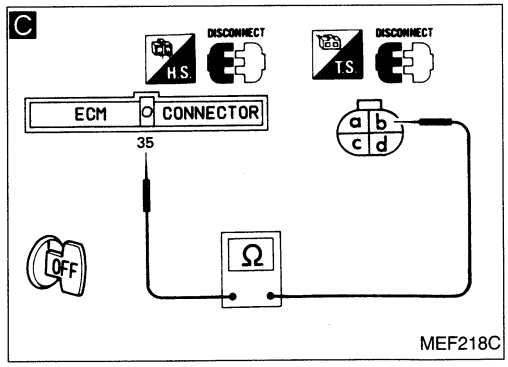
Diagnostic Procedure 29 (Cont'd)











Neutral position switch (M/T)

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Perform "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

— OR —

1) Turn ignition switch "ON".
2) Check neutral position switch signal in "DATA MONITOR" mode with CONSULT.
Neutral position: ON
Except above: OFF

— OR —

1) Set shift lever to the neutral position.
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (35) and body ground.
Continuity should exist.

N.G.

Turn ignition switch "OFF".

B

CHECK GROUND CIRCUIT.
1) Disconnect neutral position switch harness connector.
2) Check harness continuity between terminal (d) and body ground.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (E213), (E15)
- Harness continuity between neutral position switch and body ground.

If N.G., repair harness or connectors.

O.K.

Disconnect ECM harness connector.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal (35) and terminal (b).
Continuity should exist.

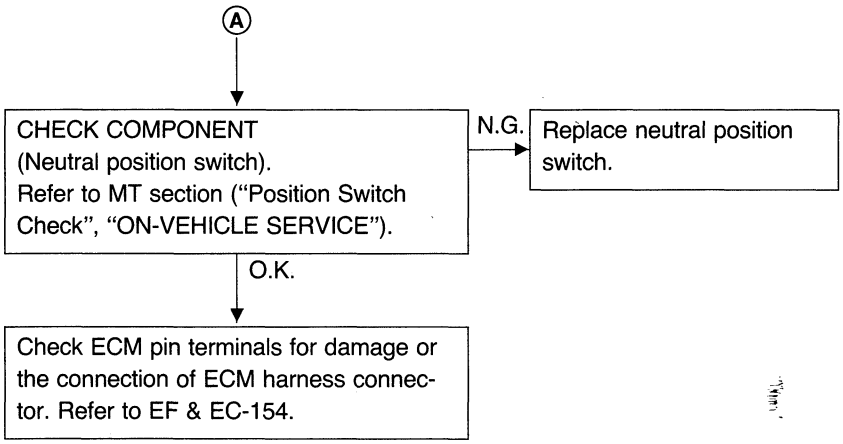
N.G. → Check the following.
- Harness connectors (E213), (E15)
- Harness connectors (E103), (M7)
- Harness connectors (M49), (F23)
- Harness continuity between ECM and neutral position switch

If N.G., repair harness or connectors.

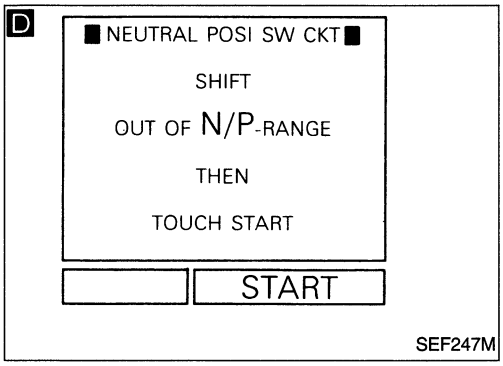
O.K.

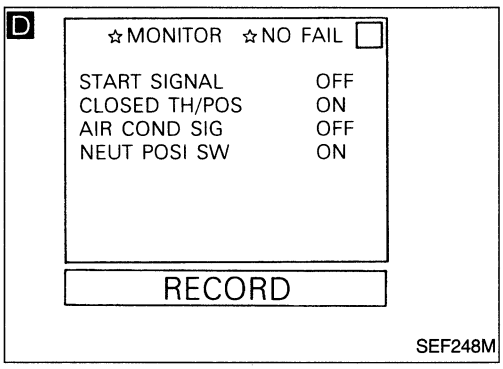
(A)

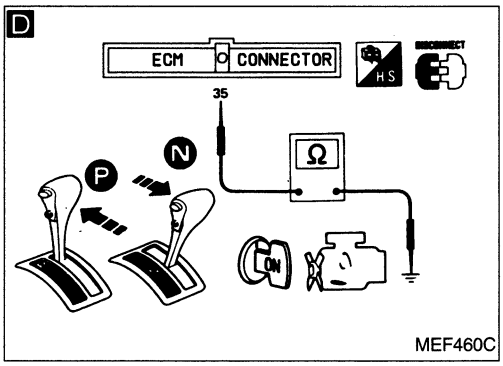
Diagnostic Procedure 29 (Cont'd)



Diagnostic Procedure 29 (Cont'd)







Inhibitor switch (A/T)

INSPECTION START

D

CHECK OVERALL FUNCTION.

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

O.K. → INSPECTION END

OR

1) Turn ignition switch "ON".
2) Check park/neutral position switch signal in "DATA MONITOR" mode with CONSULT.
   "N" or "P": ON
   Except above: OFF

OR

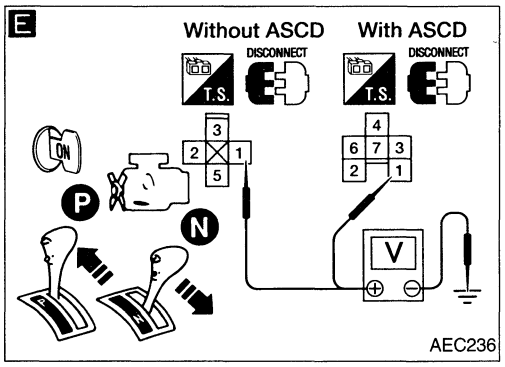
1) Make sure that inhibitor switch circuit functions properly. Refer to AT section ("INHIBITOR SWITCH, OVERDRIVE SWITCH AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS", "Self-diagnosis", "TROUBLE DIAGNOSES").
2) Disconnect ECM harness connector.
3) Shift selector lever to "P" range.
4) Turn ignition switch "ON".
5) Check harness continuity between ECM terminal (35) and body ground.
   Continuity should exist.
6) Shift selector lever to "N" range.
7) Check harness continuity between ECM terminal (35) and body ground.
   Continuity should exist.

N.G.

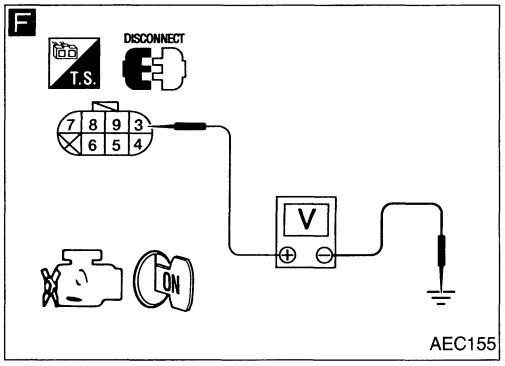
(A)

Diagnostic Procedure 29 (Cont'd)

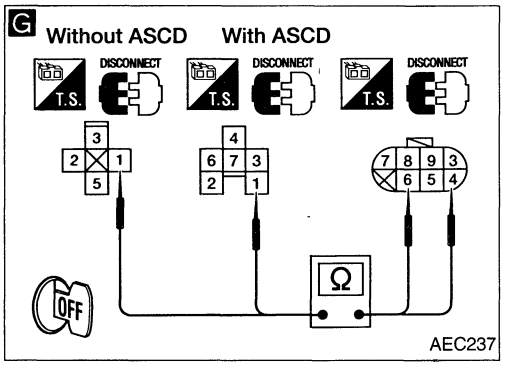
E



F



G



Ⓐ

E

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect inhibitor relay.
3) Make sure that selector lever is in "P" or "N" range.
4) Turn ignition switch "ON".
5) Check voltage between terminal ① and ground.
Voltage: Battery positive voltage

O.K. → Ⓑ

N.G.

F

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 ③ and ground.
Voltage: Battery positive voltage

N.G. →
Check the following.
- Harness connectors (E213), (E15)
- Harness connectors (M7), (E103)
- 10A fuse
- Harness continuity between fuse and inhibitor switch

If N.G. repair harness or connectors.

O.K.

G

CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND INHIBITOR RELAY.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ① and ⑥.
Continuity should exist.
3) Check harness continuity between terminals ① and ④.
Continuity should exist.

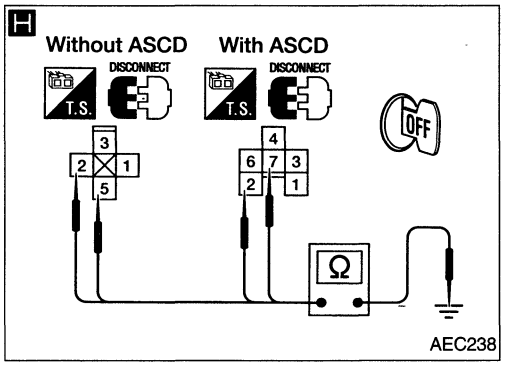
N.G. →
Check the following.
- Joint connector (E3)
- Harness connectors (E214), (E16)
- Harness continuity between inhibitor switch and inhibitor relay

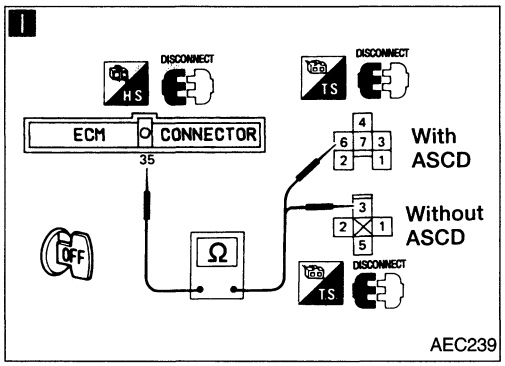
If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT (Inhibitor switch).
Refer to AT section ("INHIBITOR SWITCH", "Electrical Components Inspection", "TROUBLE DIAGNOSES").

Diagnostic Procedure 29 (Cont'd)





Ⓑ

H

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) With ASCD:
Check harness continuity between terminals ②, ⑦ and body ground.
Without ASCD:
Check harness continuity between terminals ②, ⑤ and body ground.

N.G. → Repair harness or connectors.

O.K. ↓

I

CHECK INPUT SIGNAL CIRCUIT.
1) With ASCD:
Check harness continuity between ECM terminal ㉟ and terminal ⑥.
Without ASCD:
Check harness continuity between ECM terminal ㉟ and terminal ③.

N.G. → Check the following.
- Harness connectors (M7), (E103)
- Harness connectors (M49), (F23)
- Harness continuity between ECM and inhibitor relay

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Inhibitor relay).
Refer to EF & EC-165.

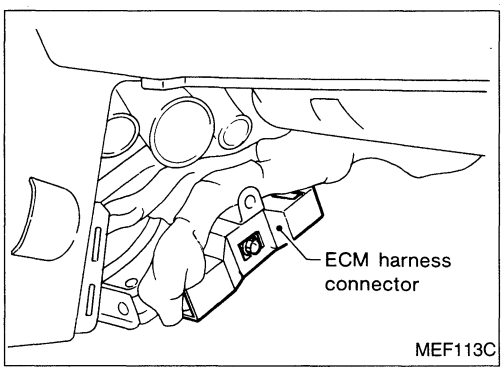
N.G. → Replace inhibitor relay.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-154.

↓

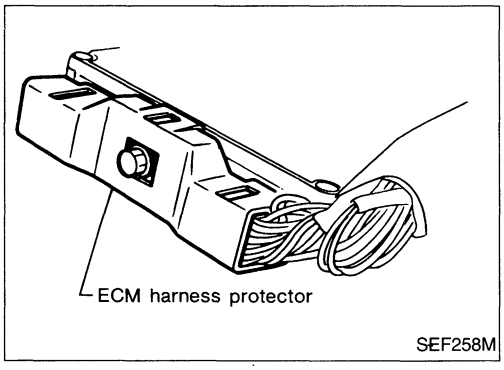
INSPECTION END



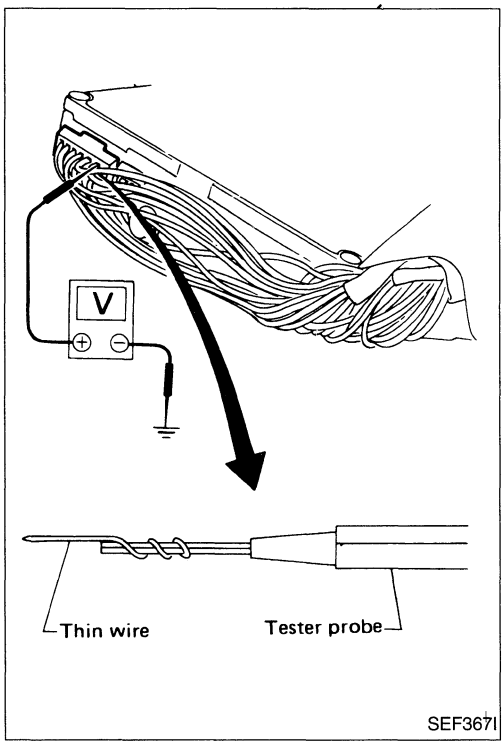
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located behind the center console panel. For this inspection, remove the center console under cover.

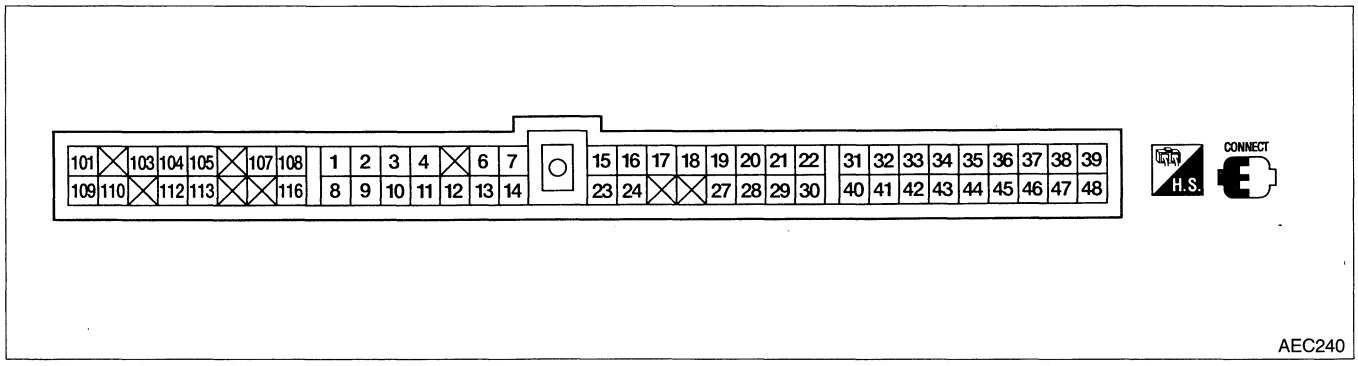


2. Remove ECM harness protector.



3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT



ECM inspection table

TERMINAL NO.	ITEM	CONDITION	DATA
1	Ignition signal	Engine is running. └ Idle speed	0.2 - 0.3V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.8V
3	Ignition check	Engine is running. └ Idle speed	BATTERY POSITIVE VOLTAGE (11 - 14V)
4	ECM relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For approximately 1 second after turning ignition switch "OFF"	0 - 1V
		Ignition switch "OFF" └ Approximately 1 second after turning ignition switch "OFF"	BATTERY POSITIVE VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ EGR system is not operating.	Less than 5V
		Engine is running. └ EGR system is operating.	0 - 1.0V
9	Radiator fan relay (Low speed)	Engine is running. └ Radiator fans are not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Radiator fans are operating at low speed.	Approximately 0.7V
10	Radiator fan relay (High speed)	Engine is running. └ Radiator fans are not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Radiator fans are operating at high speed.	Approximately 0.7V
11	Air conditioning relay	Engine is running. └ Both A/C switch and blower switch are "ON".	Approximately 0.7V
		Engine is running. └ A/C switch is "OFF".	BATTERY POSITIVE VOLTAGE (11 - 14V)
16	Mass air flow sensor	Engine is running. └ Idle speed	0.8 - 3.0V Output voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine water temperature.

Electrical Components Inspection (Cont'd)

TERMINAL NO.	ITEM	CONDITION	DATA
19	Oxygen sensor	Engine is running. └ After warming up sufficiently	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.3 - Approximately 4V Output voltage varies with the throttle valve opening angle.
22 30	Crankshaft position sensor (Reference signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	0.1 - 1.3V
24	Malfunction indicator lamp	Ignition switch "ON"	Approximately 1.5V
		Engine is running.	BATTERY POSITIVE VOLTAGE (11 - 14V)
27	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
31 40	Crankshaft position sensor (Position signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	2.0 - 3.0V
32	Vehicle speed sensor	Ignition switch "ON" └ Engine stopped and gear position is "Neutral". └ While rotating front wheel by hand	Varies from 0 to 10V
33	Rear window defogger switch	Engine is running. └ Rear window defogger switch is "ON".	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Rear window defogger switch is "OFF".	0V
34	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY POSITIVE VOLTAGE (11 - 14V)
35	Park/neutral position switch	Ignition switch "ON" └ Park/neutral position	0V
		Ignition switch "ON" └ Except the above gear position	Approximately 6V
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V

Electrical Components Inspection (Cont'd)

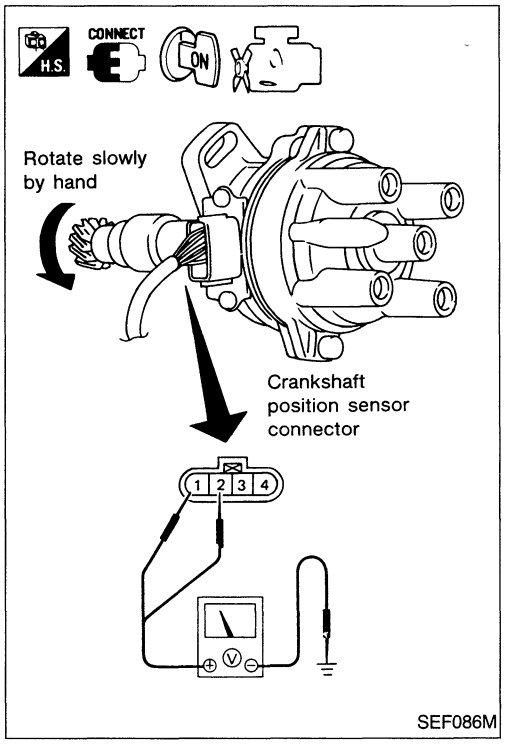
TER-MINAL NO.	ITEM	CONDITION	DATA
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
41	Air conditioning switch	Engine is running. └ Both air conditioning switch and blower switch are "ON".	Approximately 0V
		Engine is running. └ Air conditioning switch is "OFF".	BATTERY POSITIVE VOLTAGE (11 - 14V)
43	Power steering pressure switch	Engine is running. └ Steering wheel is being turned.	0V
		Engine is running. └ Steering wheel is not being turned.	Approximately 8V
45	Air conditioning triple-pressure switch	Engine is running. └ Air conditioning switch is "ON". └ Air conditioning triple-pressure switch is "ON".	Approximately 0V
		Engine is running. └ Air conditioning switch is "ON". └ Air conditioning triple-pressure switch is "OFF".	Approximately 7V
46 109	Power supply (Back-up)	Ignition switch "OFF"	BATTERY POSITIVE VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY POSITIVE VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	Approximately 0.8V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

TER-MINAL NO.	ITEM	CONDITION	DATA
105	EGR & canister control solenoid valve	Engine is running. └ Engine is cold [Water temperature is below 60° (140°F)]	Approximately 0.7V
		Engine is racing (2,000 rpm) └ After warming up [Water temperature is between 60°F (140°C) and 105°C (221°F)]	BATTERY POSITIVE VOLTAGE (11 - 14V)
113	IAC valve-AAC valve	Engine is running. └ Idle speed	9 - 14V
		Engine is running. — Steering wheel is being turned. — Air conditioning is operating. — Rear defogger is "ON". └ Headlamp are in high position.	5 - 9V

Electrical Components Inspection (Cont'd)

CRANKSHAFT POSITION SENSOR

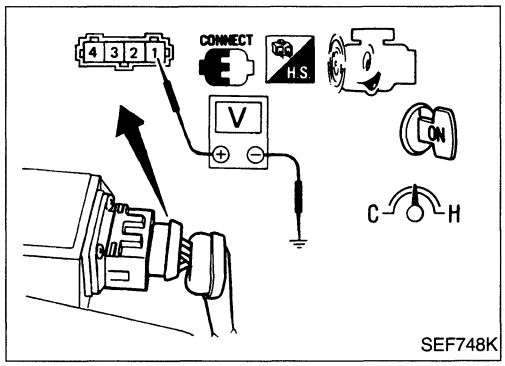


1. Remove distributor assembly from engine. Disconnect ignition wires and center cable from distributor. (Crankshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

Terminal	Voltage
① (180° signal)	Voltage fluctuates between 5V and 0V.
② (1° signal)	

4. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② 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.

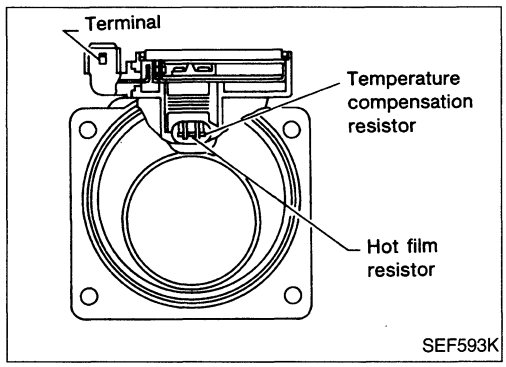
After this inspection, diagnostic trouble code No. 11 might be displayed though the crankshaft position sensor is functioning properly. In this case erase the stored memory.



MASS AIR FLOW SENSOR

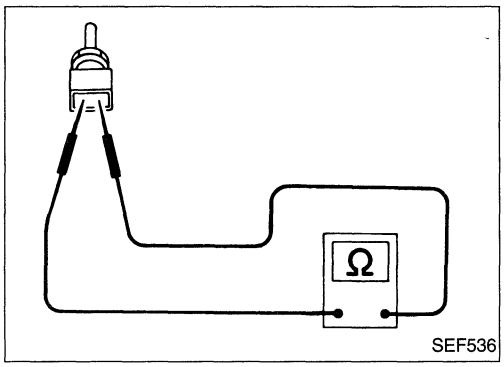
1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ① and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.2
Idle (Engine is warmed-up sufficiently.)	Approximately 0.85 - 1.35



5. If N.G., remove mass air flow sensor from air duct. Check hot film for damage or dust.

Electrical Components Inspection (Cont'd)

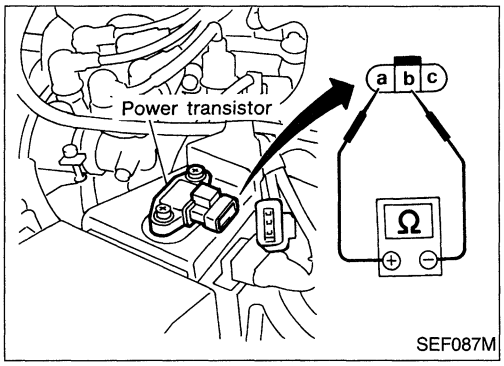


ENGINE COOLANT TEMPERATURE SENSOR

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.



POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals with a digital tester as shown in the figure.

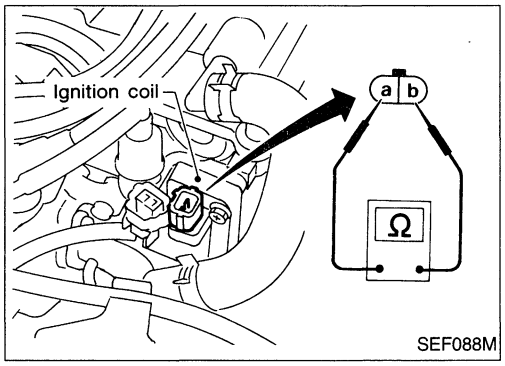
- The digital tester must have a diode check position to perform this test.

⊕ terminal side	⊖ terminal side					
	Terminal ⓐ		Terminal ⓑ		Terminal ⓒ	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ⓐ	—	—	∞	O.K.	∞	O.K.
	—	—	Not ∞ or 0	N.G.	Not ∞ or 0	N.G.
	—	—	0	N.G.	0	N.G.
Terminal ⓑ	∞	N.G.	—	—	∞	N.G.
	Not ∞ or 0	O.K.	—	—	Not ∞ or 0	O.K.
	0	N.G.	—	—	0	N.G.
Terminal ⓒ	∞	N.G.	∞	N.G.	—	—
	Not ∞ or 0	O.K.	Not ∞ or 0	O.K.	—	—
	0	N.G.	0	N.G.	—	—

∞ : Infinity resistance

If N.G., replace power transistor.

Electrical Components Inspection (Cont'd)

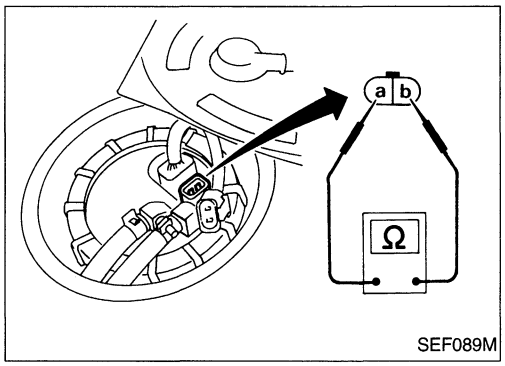


IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
ⓐ - ⓑ	Approximately 1.0Ω

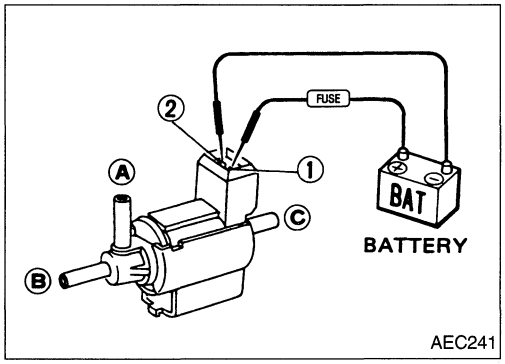
If N.G., replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 0.5Ω

If N.G., replace fuel pump.

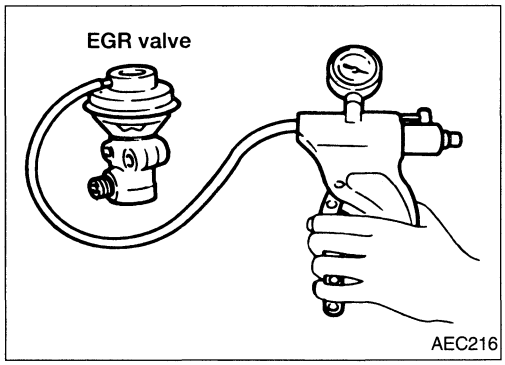


EGR AND CANISTER CONTROL SOLENOID VALVE

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

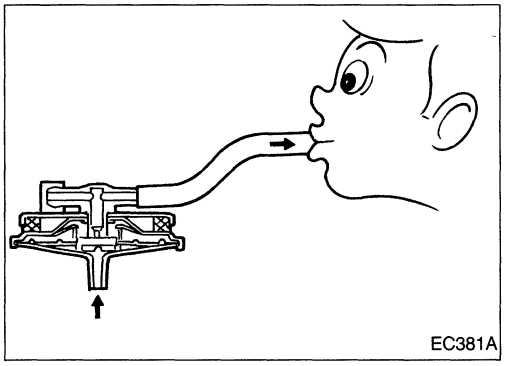
If N.G., replace solenoid valve.



EGR VALVE

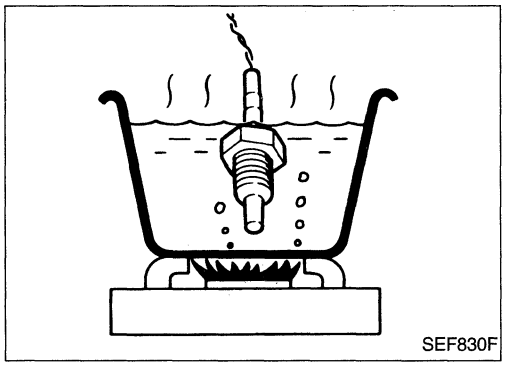
Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If N.G., replace EGR valve.

Electrical Components Inspection (Cont'd)


EC381A

EGR CONTROL-BPT VALVE

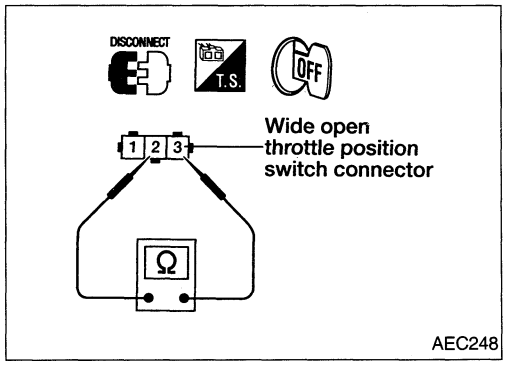
Plug one of two ports of EGR control-BPT valve.
Apply a pressure above 0.490 kPa (50 mmH_2O, 1.97 inH_2O) to check for leakage. If a leak is noted, replace valve.


SEF830F

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.



AEC248

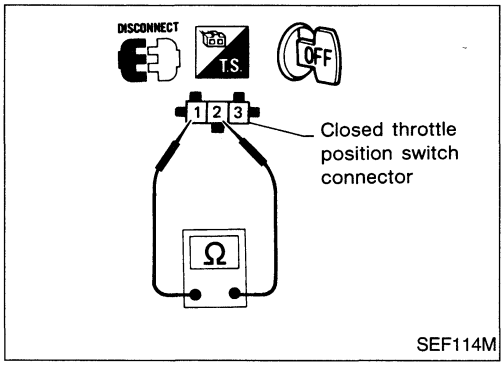
WIDE OPEN THROTTLE POSITION SWITCH — A/T model only

1. Disconnect wide open throttle position switch harness connector.
2. Check continuity between terminals ② and ③.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If N.G., replace wide open throttle position switch.

Electrical Components Inspection (Cont'd)

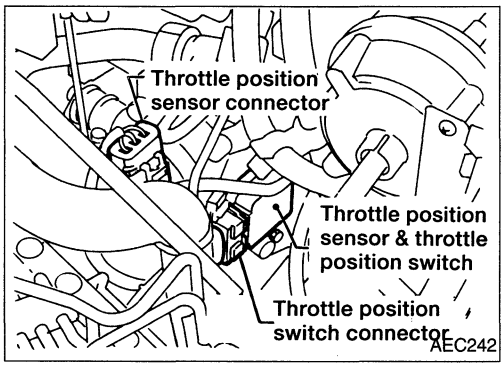


CLOSED THROTTLE POSITION SWITCH (Idle position) — A/T model only

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between terminals ① and ②.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace closed throttle position switch.

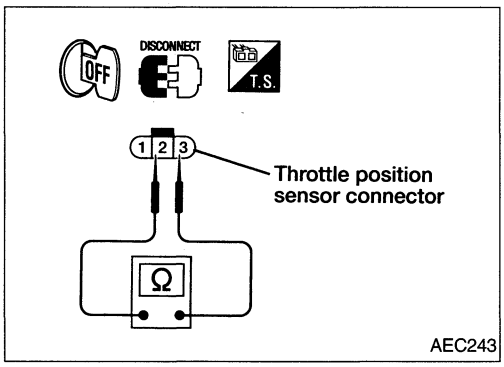


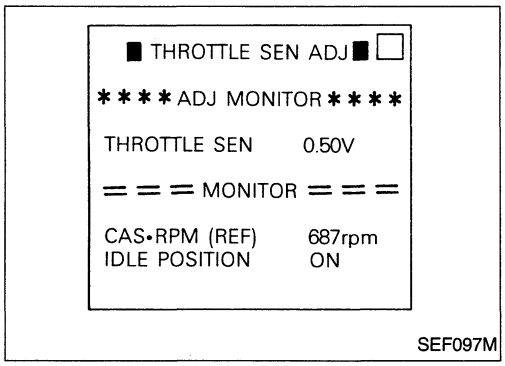
THROTTLE POSITION SENSOR

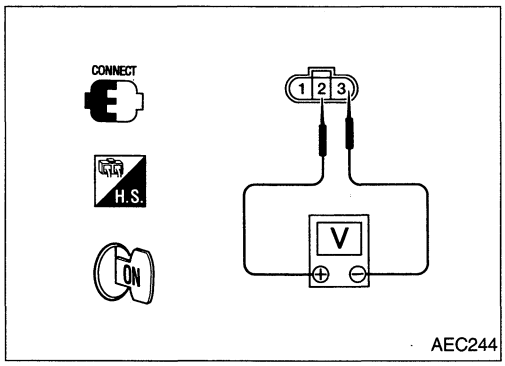
1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 2
Partially released	2 - 10
Completely depressed	Approximately 10

If N.G., replace throttle position sensor.







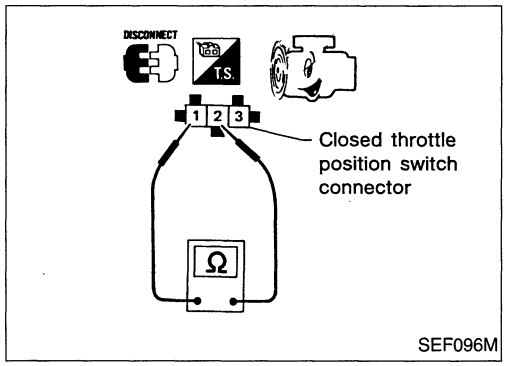
Adjustment

If throttle position sensor, closed throttle position switch or wide open throttle position switch is replaced or removed, it is necessary to install in proper position, by following the procedure as shown below:

MT model;

1. Install throttle position sensor body in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.
   Measure output voltage of throttle position sensor using voltmeter.
5. Adjust by rotating throttle position sensor body so that output voltage is 0.3 to 0.7V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.

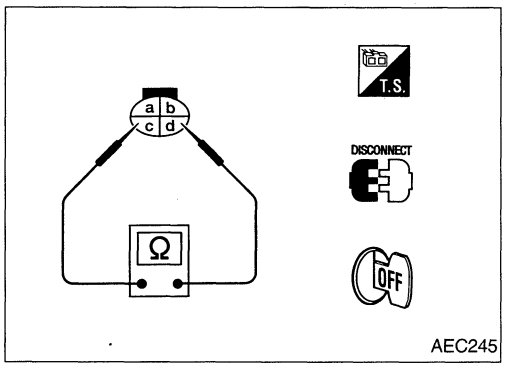
Electrical Components Inspection (Cont'd)



AT model;

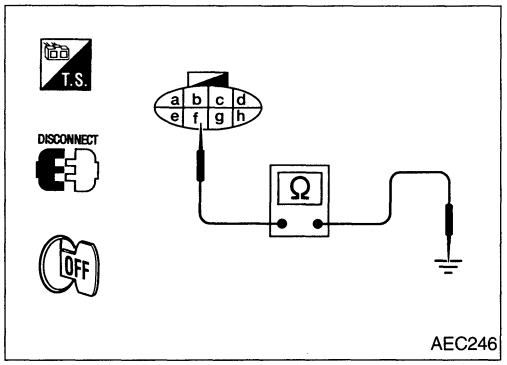
1. Install throttle position sensor in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Disconnect closed throttle position switch harness connector.
5. Check closed throttle position switch OFF → ON engine speed with circuit tester, closing throttle valve manually.

   Closed throttle position switch continuity OFF → ON engine speed (in "N" position):
   900 ± 150 rpm



IAC VALVE-AAC VALVE

- Check IAC valve-AAC valve resistance.
  Resistance:
  Approximately 10Ω
- Check plunger for seizing or sticking.
- Check for broken spring.



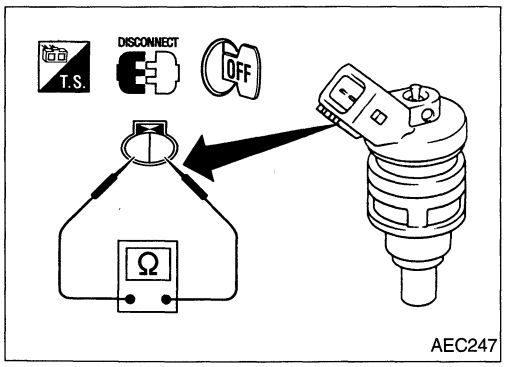
KNOCK SENSOR

1. Disconnect engine harness No. 2 connector (E205).
2. Check continuity between terminal ⓕ and ground.

Continuity should exist.

- It is necessary to use an ohmmeter which can measure more than 10 MΩ.

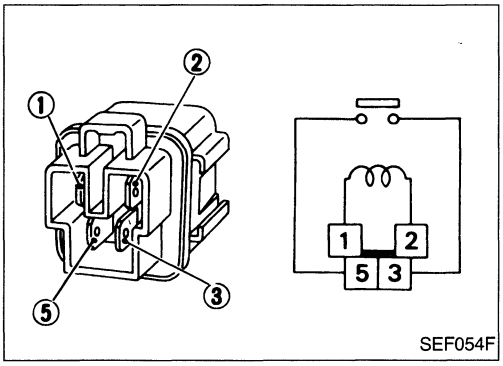
CAUTION:
Discard any knock sensor which has been dropped or undergone shocks; use a new one.



INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: Approximately 11Ω [at 20°C (68°F)]
   If N.G., replace injector.

Electrical Components Inspection (Cont'd)



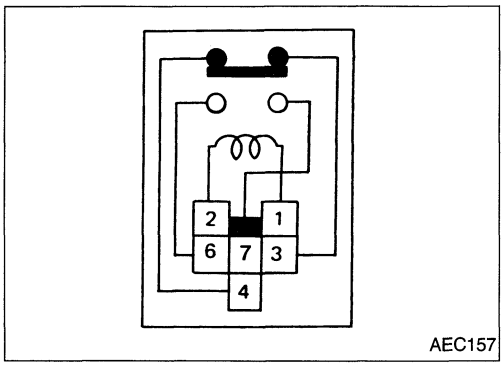
SEF054F

ECM RELAY AND FUEL PUMP 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.



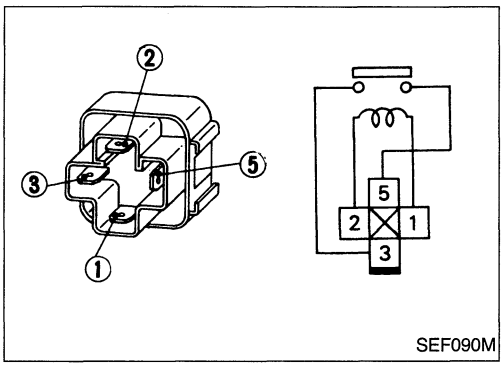
AEC157

INHIBITOR RELAY (A/T models with ASCD)

Check continuity between terminals ⑥ and ⑦.

Conditions	Continuity
12V direct current supply between terminals ① and ②.	Yes
No current supply	No

If N.G., replace relay.



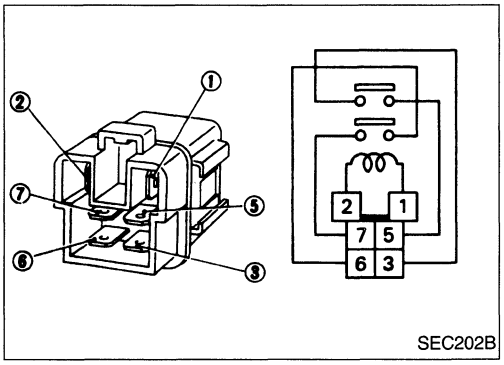
SEF090M

INHIBITOR RELAY (A/T models without ASCD) AND RADIATOR FAN RELAY-1

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.



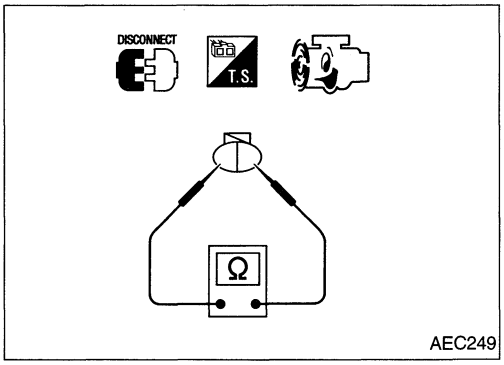
SEC202B

RADIATOR FAN RELAYS-2 AND -3

Check continuity between terminals ③ and ⑤, ⑥ and ⑦.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If N.G., replace relay.



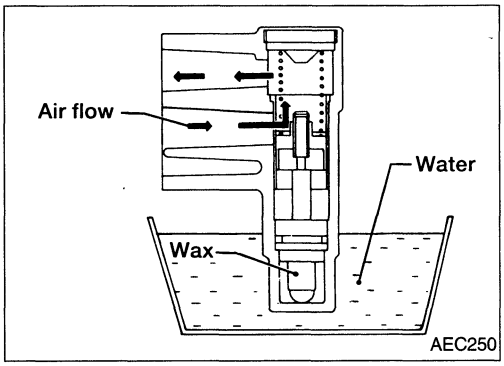
AEC249

POWER STEERING PRESSURE SWITCH

1. Disconnect power steering pressure switch harness connector.
2. Check continuity between terminals.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

Electrical Components Inspection (Cont'd)

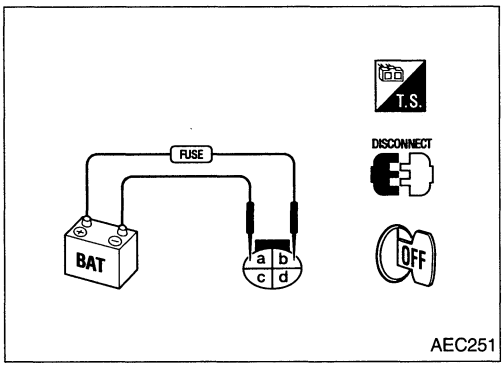


IAC VALVE-AIR REGULATOR

1. Remove IAC valve unit from engine.
2. Immerse IAC valve unit in cold or hot water as shown, and check air flow.

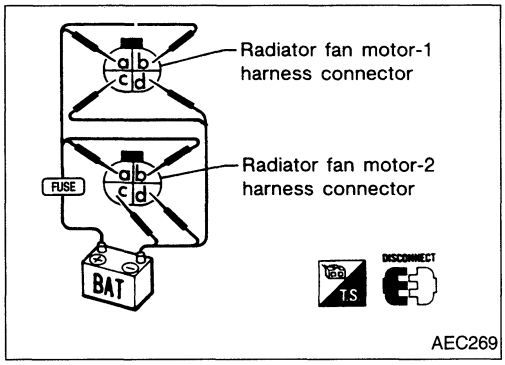
Water temperature	When blowing from air inlet hole
20°C (68°F)	Air flows
80°C (176°F) or more	Almost no air flows

If N.G., replace IAC valve unit.



IAC VALVE-FICD SOLENOID VALVE

- Check that clicking sound is heard when applying 12V direct current to terminals.
- Check plunger for seizure or sticking.
- Check for broken spring.



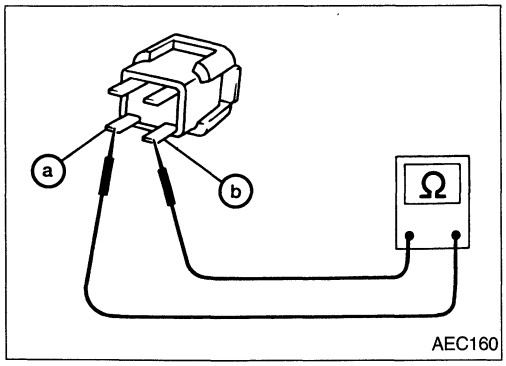
RADIATOR FAN MOTORS-1 AND -2

1. Disconnect radiator fan motor harness connectors.
2. Supply radiator fan motor terminals with battery positive voltage and check operation.

	Speed	Terminals	
		(⊕)	(⊖)
Radiator fan motor-1	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ
Radiator fan motor-2	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ

Radiator fan motor should operate.

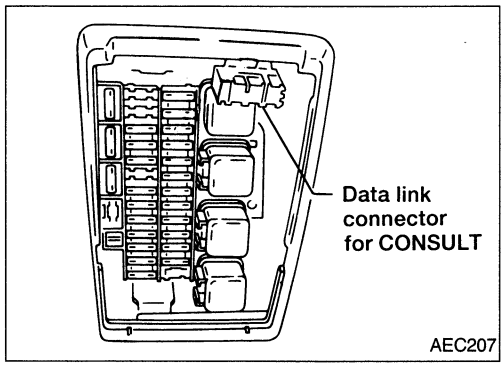
If N.G., replace radiator fan motor.

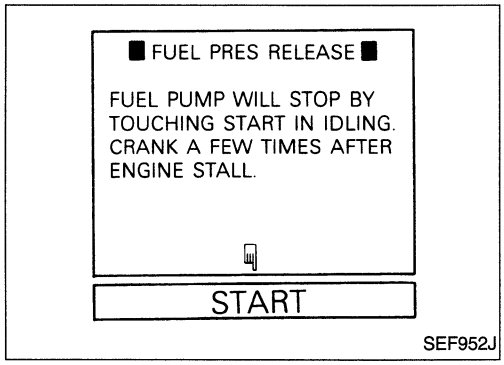


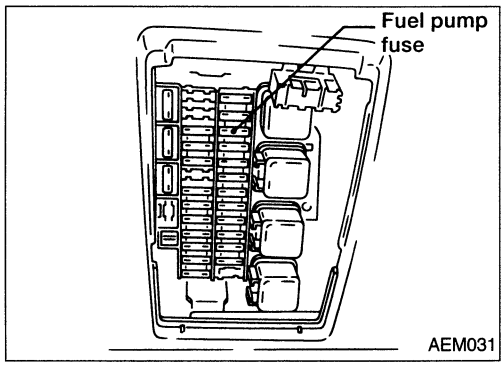
RESISTOR

1. Disconnect resistor harness connector (F8).
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 2.2kΩ

If N.G., replace resistor.







Releasing Fuel Pressure

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

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

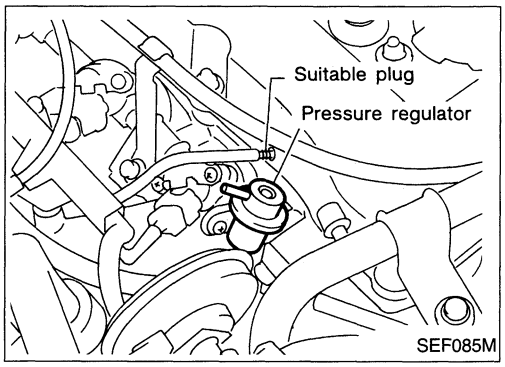
1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF" and reconnect fuel pump fuse.

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)

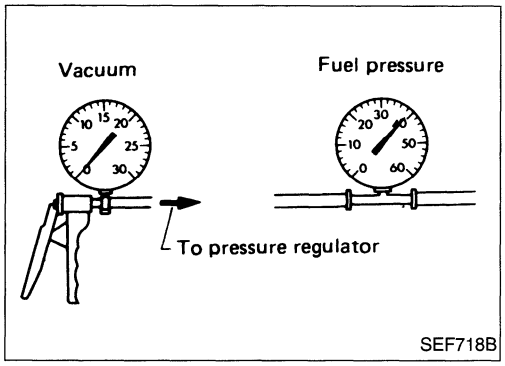
When fuel pressure regulator valve vacuum hose is disconnected.

Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

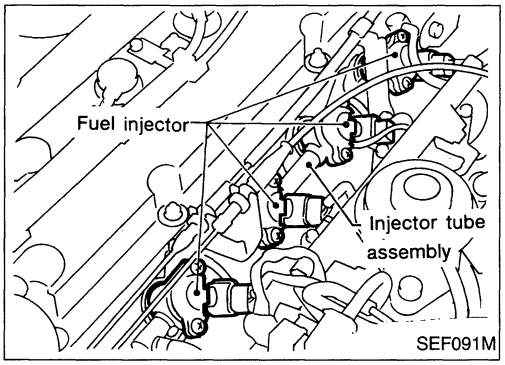
Fuel Pressure Regulator Check

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.

- Push injector tail piece.
- Do not pull on the connector.

4. Install injectors as follows:

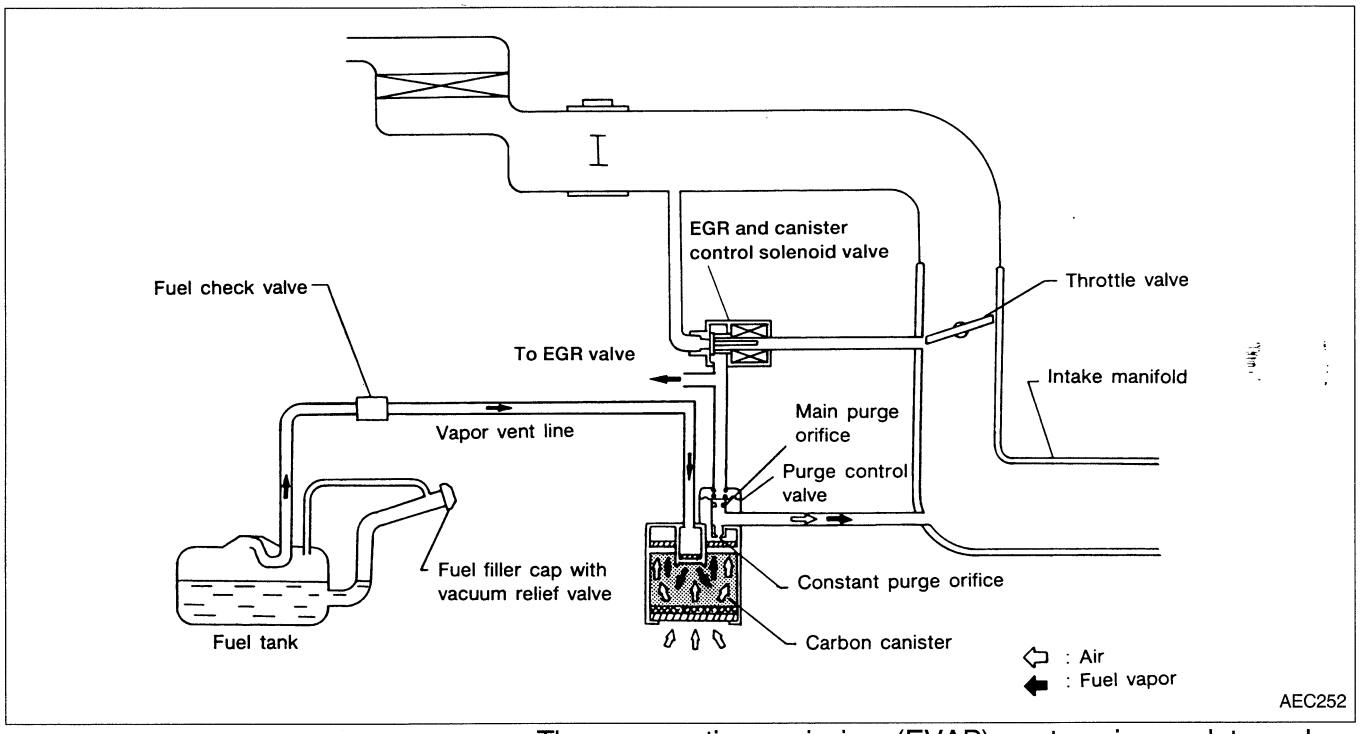
- Clean exterior of injector tail piece.
- Use new O-rings

5. Assemble injectors to injector tube assembly.

CAUTION:

After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

Description

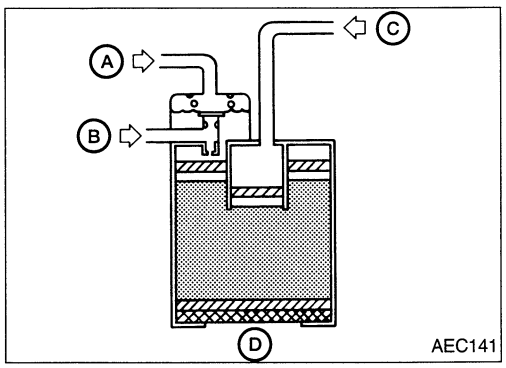


The evaporative emission (EVAP) system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum rises higher, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



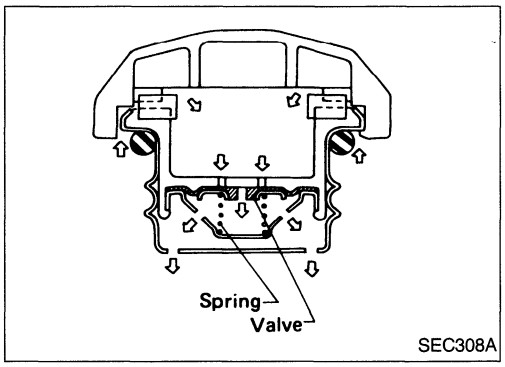
Inspection

CARBON CANISTER

Check carbon canister as follows:

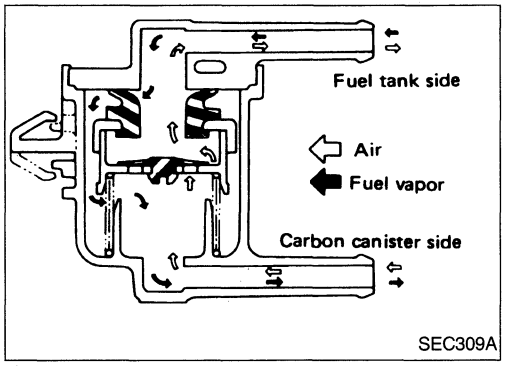
1. Blow air in port Ⓐ and ensure that there is no leakage.
2. • Apply vacuum to port Ⓐ
   • Cover port Ⓓ with your hand.
   • Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

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.

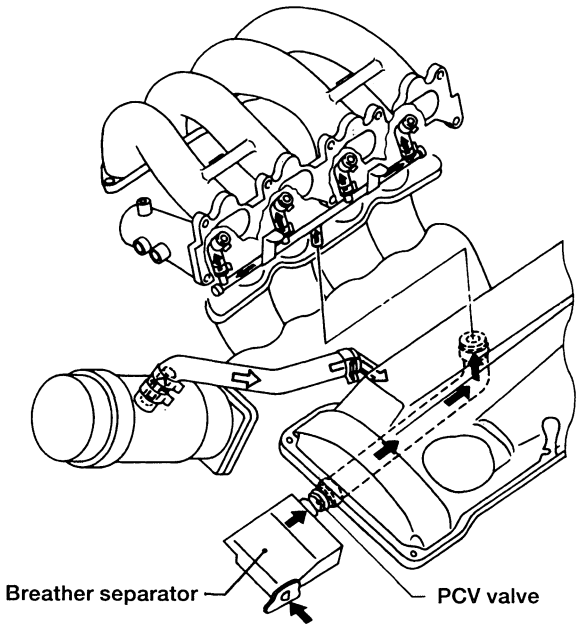


FUEL CHECK VALVE

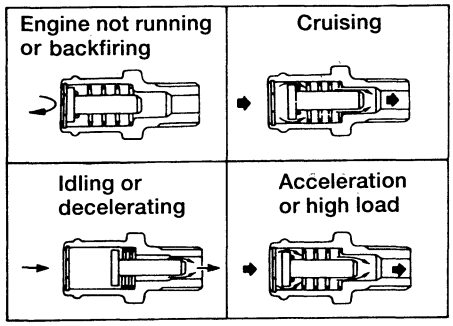
1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank.
3. If fuel check valve is suspected 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 (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air 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.

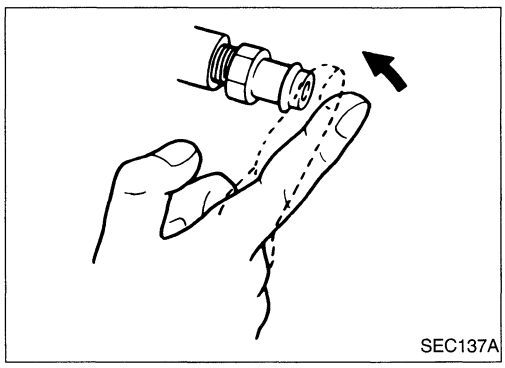


PCV valve operation



⇦ : Fresh air
⇦ : Blow-by gas

AEC253

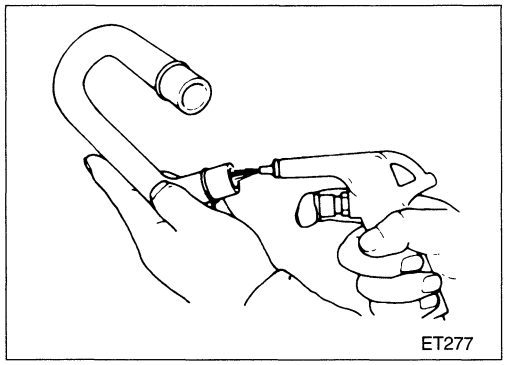


SEC137A

Inspection

PCV (Positive Crankcase Ventilation) VALVE

With engine running at idle, remove PCV valve from breather separator; 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.



ET277

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 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2 (in "N" position)	700 ± 50
Air conditioning: ON (in "N" position)	800 ± 50
Ignition timing	20° ± 2° B.T.D.C.
Throttle position sensor idle position V	0.3 - 0.7

*1: Feedback controlled and needs no adjustments
*2: Under the following conditions:
- Air conditioning switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	Battery positive voltage (11 - 14)
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10.0

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

EGR TEMPERATURE SENSOR

Resistance [at 100°C (212°F)]	kΩ	85.3 ± 8.53

FUEL PUMP

Resistance	Ω	Approximately 0.5

IAC VALVE-AAC VALVE

Resistance	Ω	Approximately 10.0

INJECTOR

Resistance	Ω	Approximately 11

RESISTOR

Resistance	kΩ	Approximately 2.2

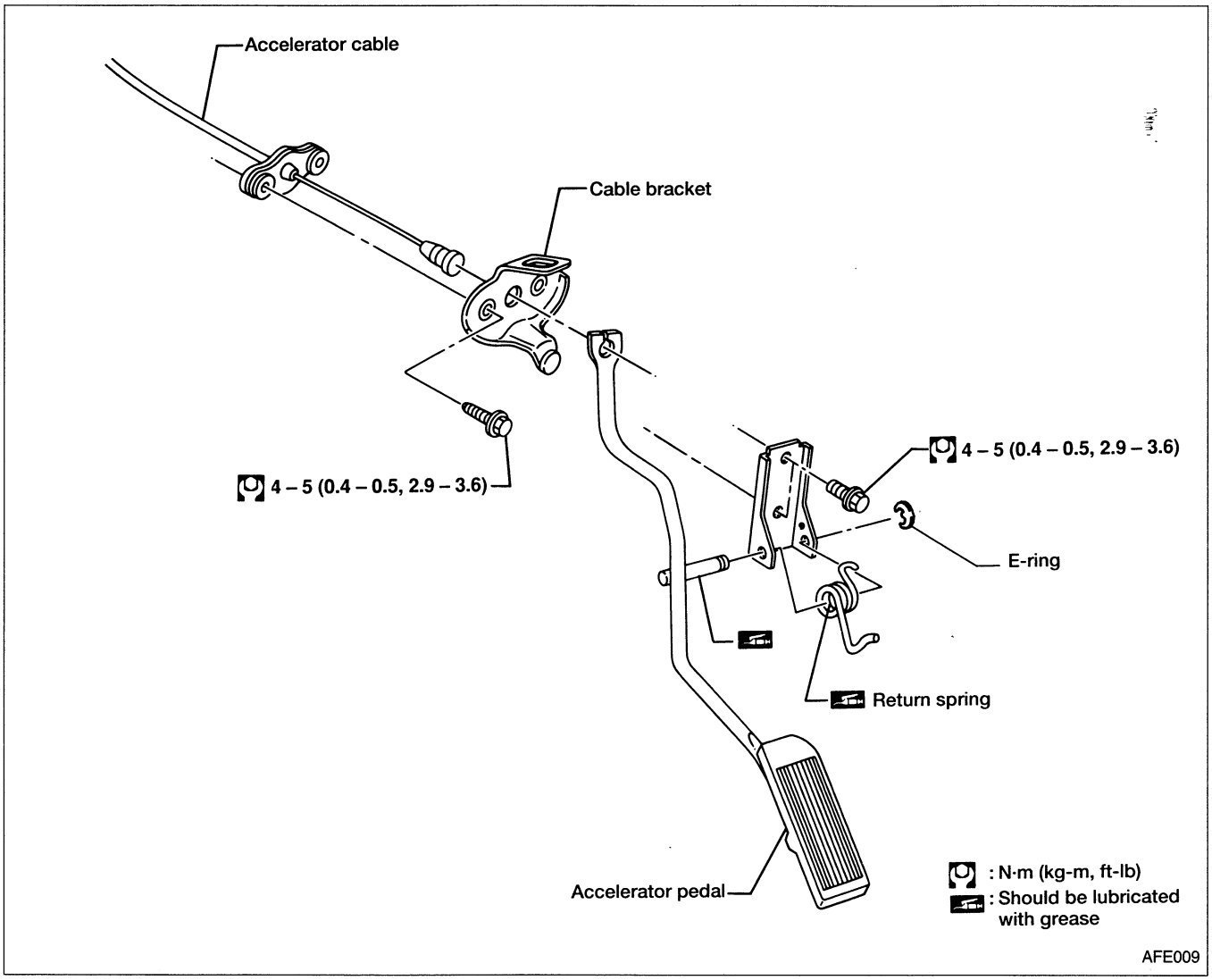
ACCELERATOR CONTROL, FUEL AND EXHAUST SYSTEMS

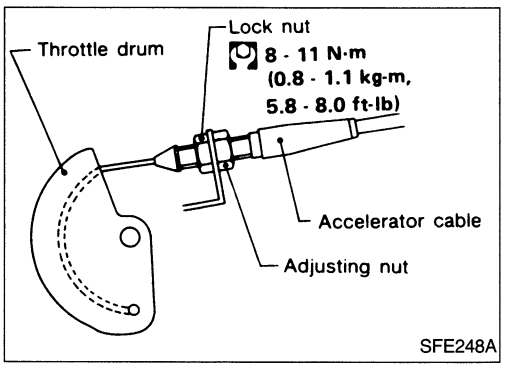
SECTION FE

CONTENTS

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.**
- **For ASCD cable adjustment, refer to EL section ("ASCD WIRE ADJUSTMENT", "Trouble Diagnoses", "AUTOMATIC SPEED CONTROL DEVICE").**





Adjusting Accelerator Cable

1. Loosen lock nut and tighten adjusting nut until throttle drum starts to move.
2. From that position turn back adjusting nut 1.5 to 2 turns, and secure lock nut.

Fuel Tank

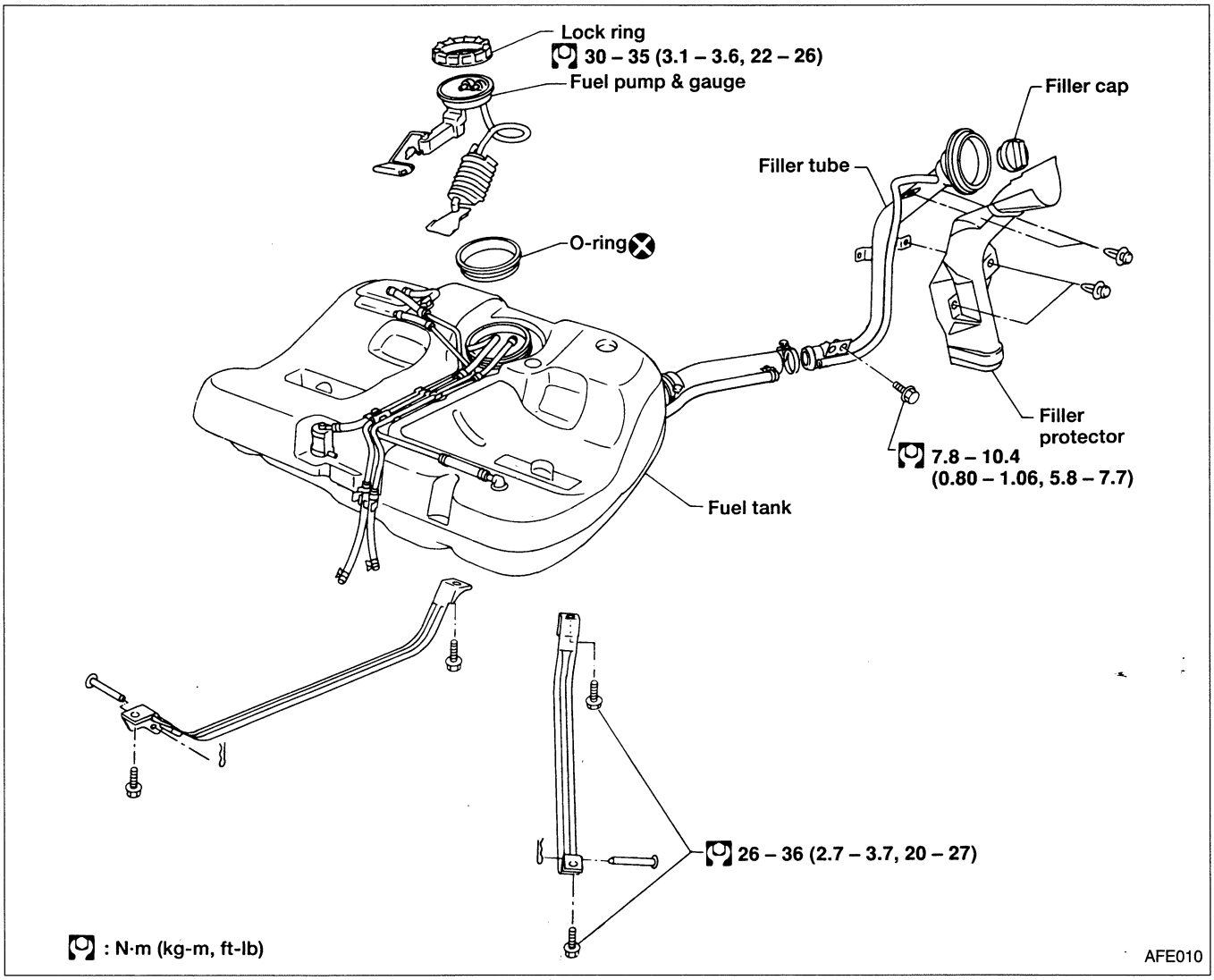
WARNING:

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.**

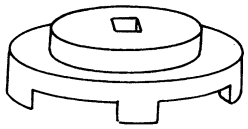
CAUTION:

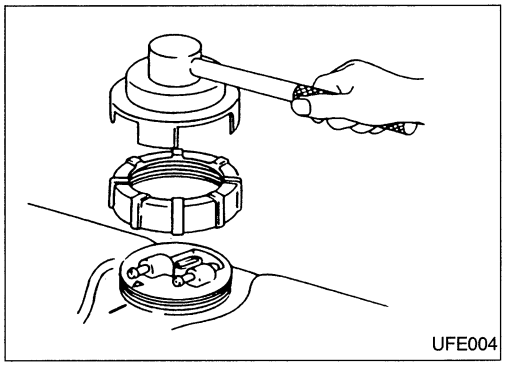
- **Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to MA section ("Changing Fuel Filter", "ENGINE MAINTENANCE").**
- **Do not disconnect any fuel line unless absolutely necessary.**
- **Plug hose and pipe openings to prevent entry of dust or dirt.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose clamps excessively to avoid damaging hoses.**
- **When installing fuel check valve, be careful of its designated direction. Refer to EF & EC section ("Inspection", "EVAPORATIVE EMISSION (EVAP) SYSTEM").**
- **Tighten bolts to specified torque.**
- **After installation, run engine and check for leaks at connections.**



Fuel Tank (Cont'd)

SPECIAL SERVICE TOOL

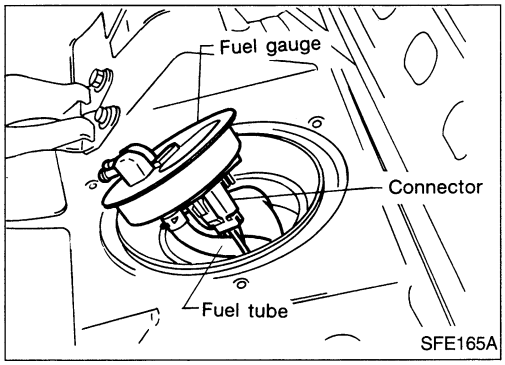
Tool number (Kent-Moore No.) Tool name	Description
KV999G0010 (X38879) Fuel tank lock ring socket	



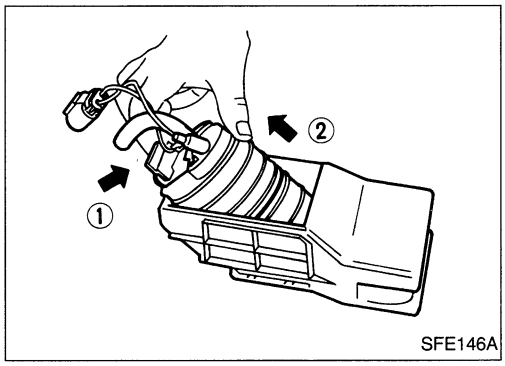
FUEL PUMP AND GAUGE

Removal

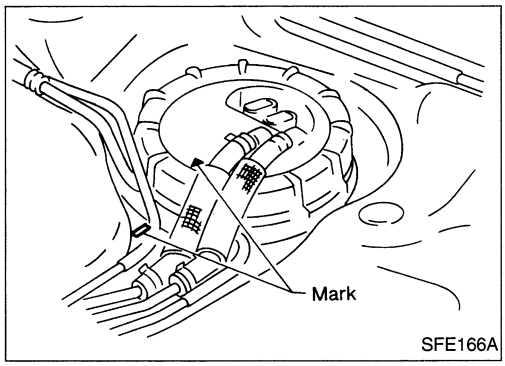
1. Release fuel pressure from fuel line.
   Refer to MA section ("Changing Fuel Filter", "ENGINE MAINTENANCE").
2. Remove inspection hole cover located under rear seat.
3. Disconnect connectors and fuel tubes.
4. Remove lock ring (Use S.S.T. X38879).



5. Remove fuel gauge assembly and disconnect tubes and connector.



6. Remove fuel pump as shown in the figure.

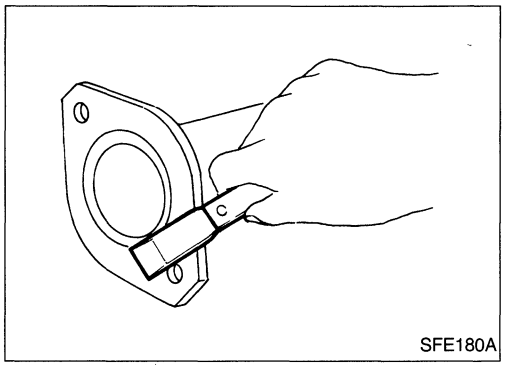


Installation

- **Installation procedure is basically the reverse order of removal.**

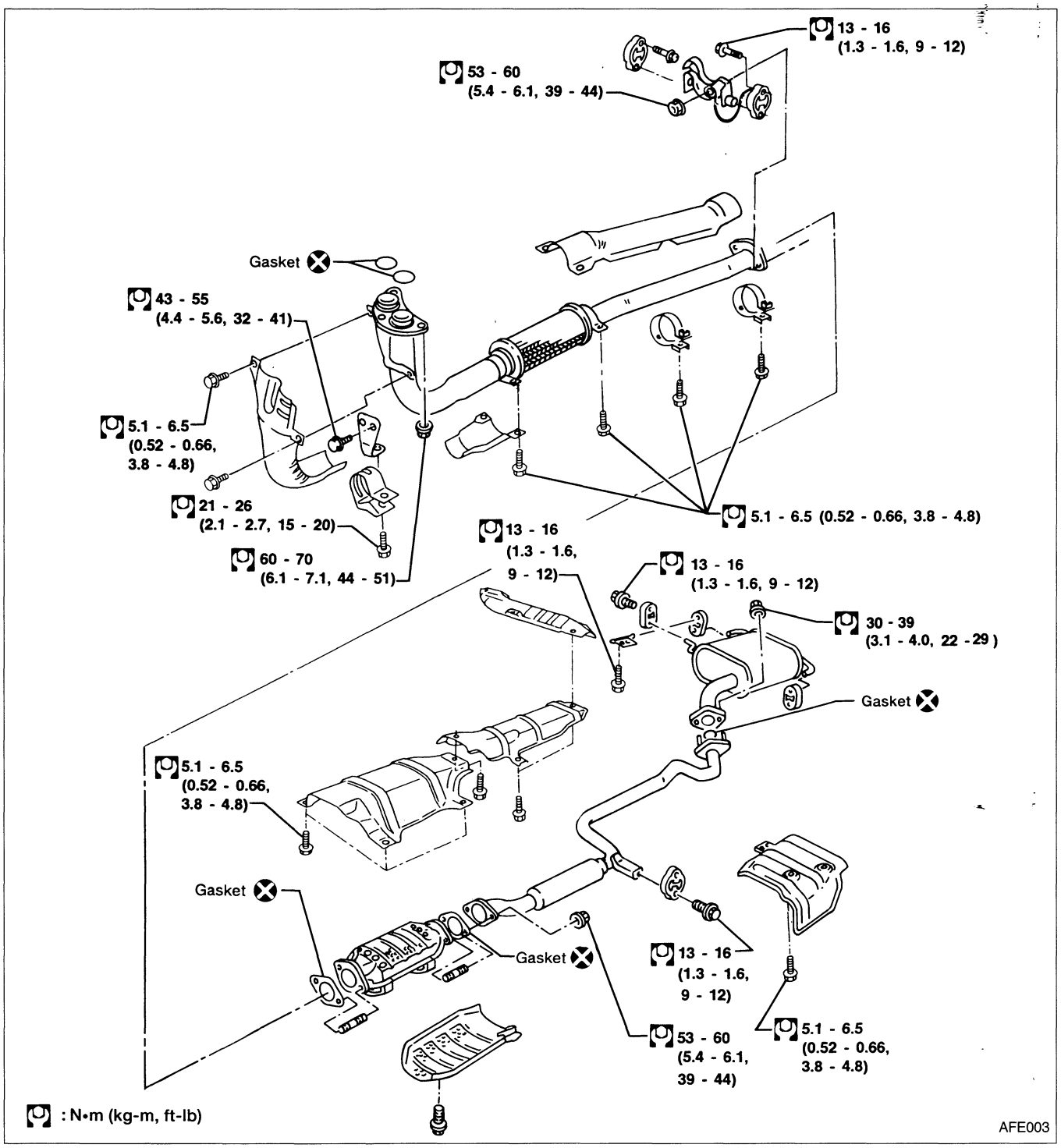
CAUTION:

- **Always replace O-ring with a new one.**
- **Align parts with alignment marks.**
- **Tighten lock ring to specified torque.**
- **After installation, run engine and check for leaks at connections.**



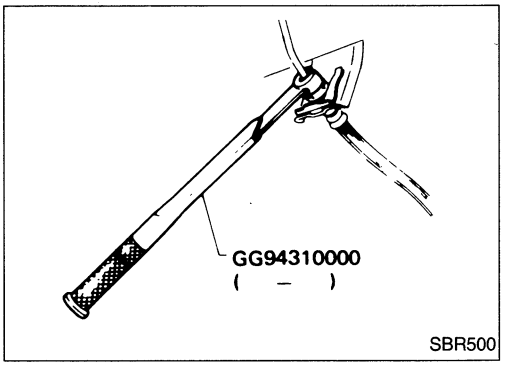
CAUTION:

- **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.**



SECTION CL

CONTENTS



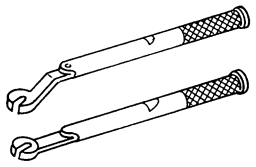
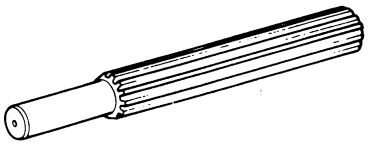
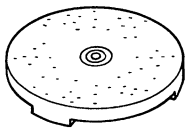
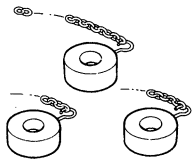
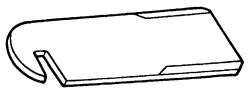
Precautions

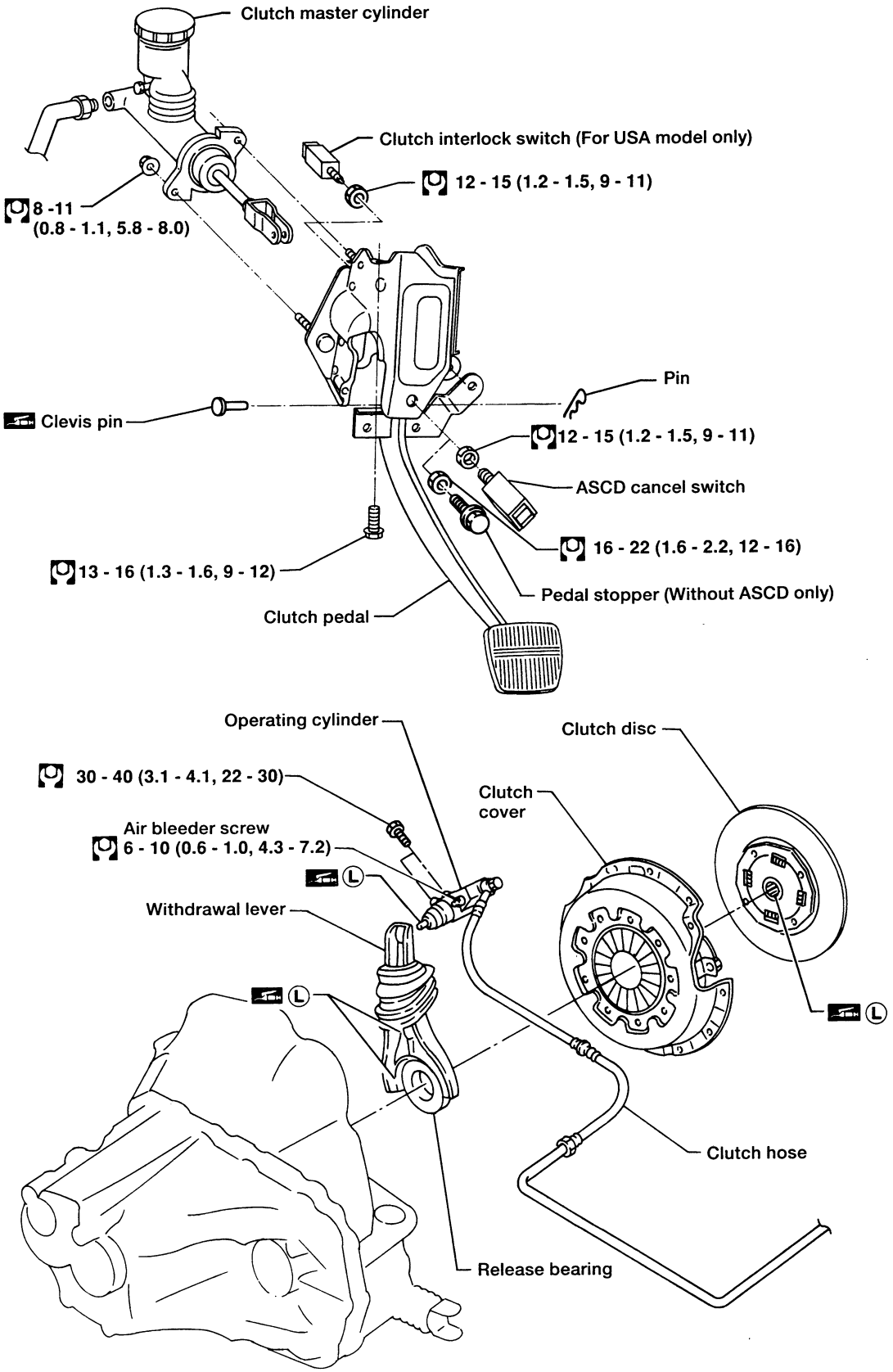
- **Recommended fluid is brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **When removing and installing clutch piping, use Tool.**
- **Use new brake fluid to clean or wash all parts of master cylinder, operating cylinder and clutch damper.**
- **Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.**

WARNING:
After cleaning clutch disc, wipe it with a dust collector. Do not use compressed air.

Preparation

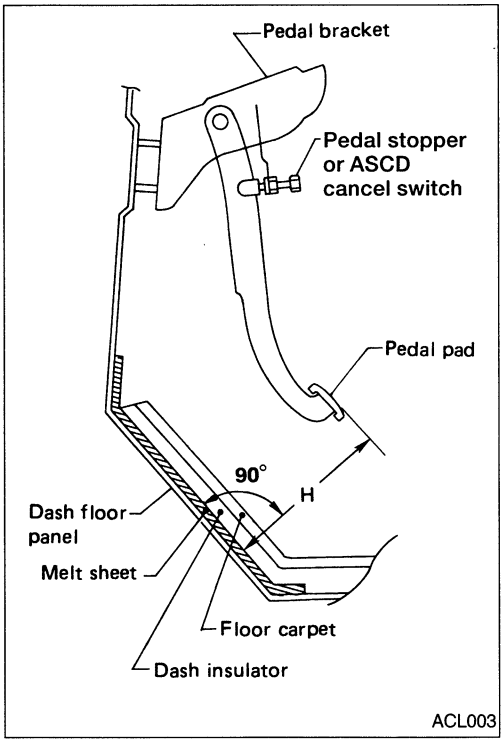
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
GG94310000 (—) Flare nut torque wrench	Removing and installing clutch piping	
KV30101000 (J33213) Clutch aligning bar	Installing clutch cover and clutch disc	
ST20050010 (—) Base plate	Inspecting diaphragm spring of clutch cover	
ST20050100 (—) Distance piece	Inspecting diaphragm spring of clutch cover	
ST20050240 (—) Diaphragm spring adjusting wrench	Adjusting unevenness of diaphragm spring of clutch cover	



: Apply lithium-based grease including molybdenum disulphide.
: N•m (kg-m, ft-lb)

ACL001

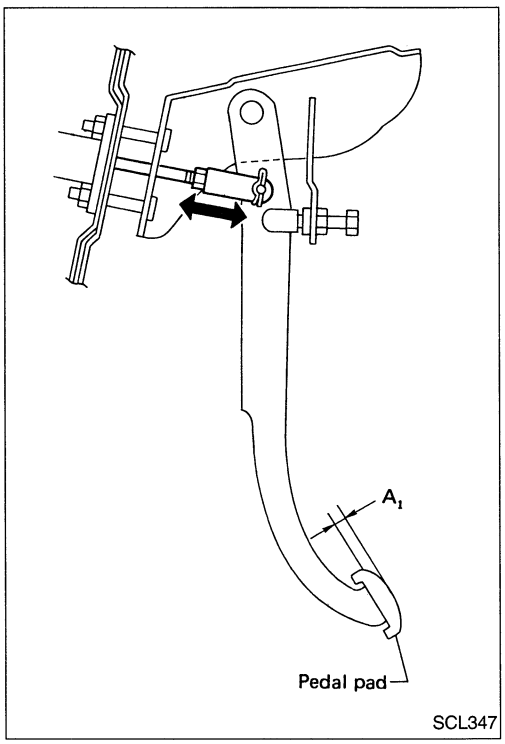


Adjusting Clutch Pedal

1. Adjust pedal height with pedal stopper or ASCD cancel switch.

   Pedal height "H":

   165 - 175 mm (6.50 - 6.89 in)



2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.

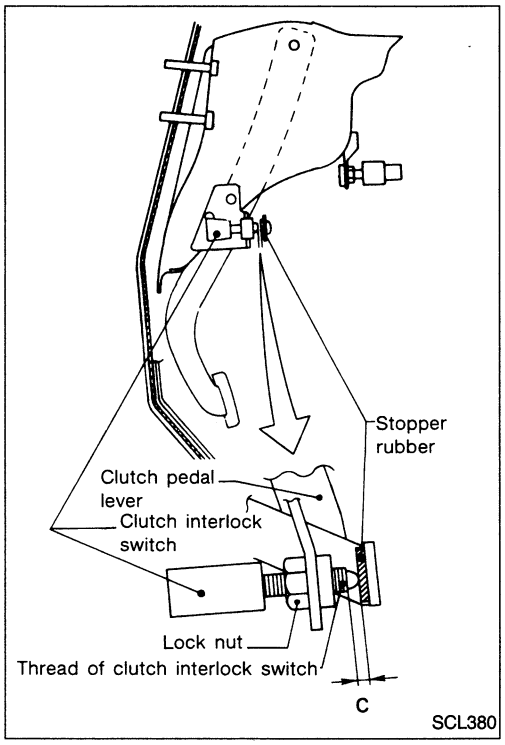
   Pedal free play "A_1":

   1.0 - 3.0 mm (0.039 - 0.118 in)

Pedal free play means the following total, measured at position of pedal pad.

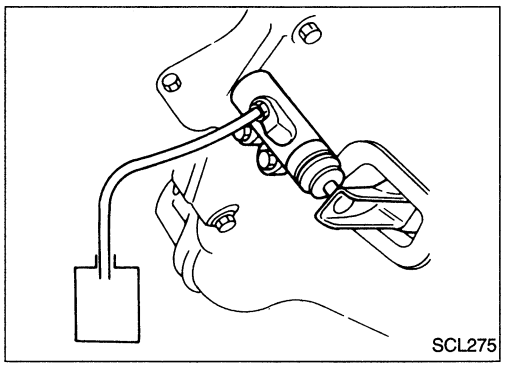
- **Play due to clevis pin and clevis pin hole in clutch pedal.**

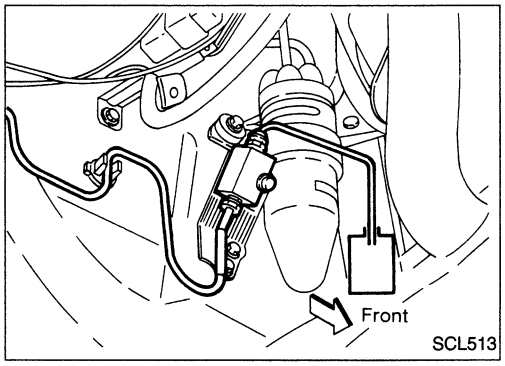
Adjusting Clutch Pedal (Cont'd)



For USA model only

3. Adjust clearance "C" between stopper rubber and threaded end of clutch interlock switch while depressing clutch pedal fully.
   Clearance C:
   0.1 - 1.0 mm (0.004 - 0.039 in)





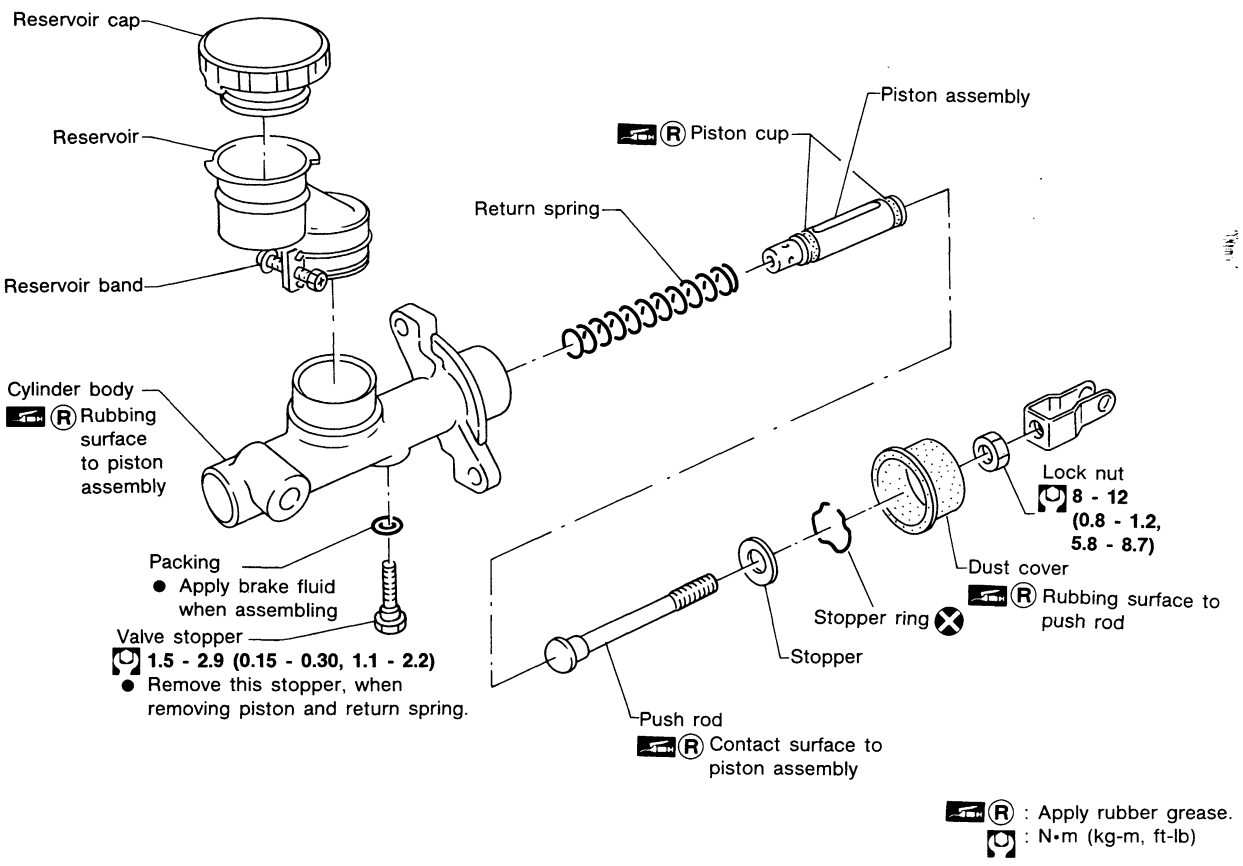
Bleeding Procedure

Bleed air according to the following procedure.

- **Carefully monitor fluid level at master cylinder during bleeding operation.**

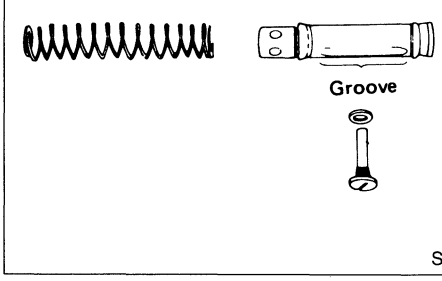
1. Top up reservoir with recommended brake fluid.
2. Connect a transparent vinyl tube to air bleeder valve of clutch operating cylinder.
3. Fully depress clutch pedal several times.
4. With clutch pedal depressed, open bleeder valve to release air.
5. Close bleeder valve.
6. Repeat steps 3 through 5 above until clear brake fluid comes out of air bleeder valve.

Clutch Master Cylinder



DISASSEMBLY AND ASSEMBLY

- Push piston into cylinder body with screwdriver when removing and installing valve stopper.



- Align piston assembly groove and valve stopper when installing valve stopper.
- Check direction of piston cups.

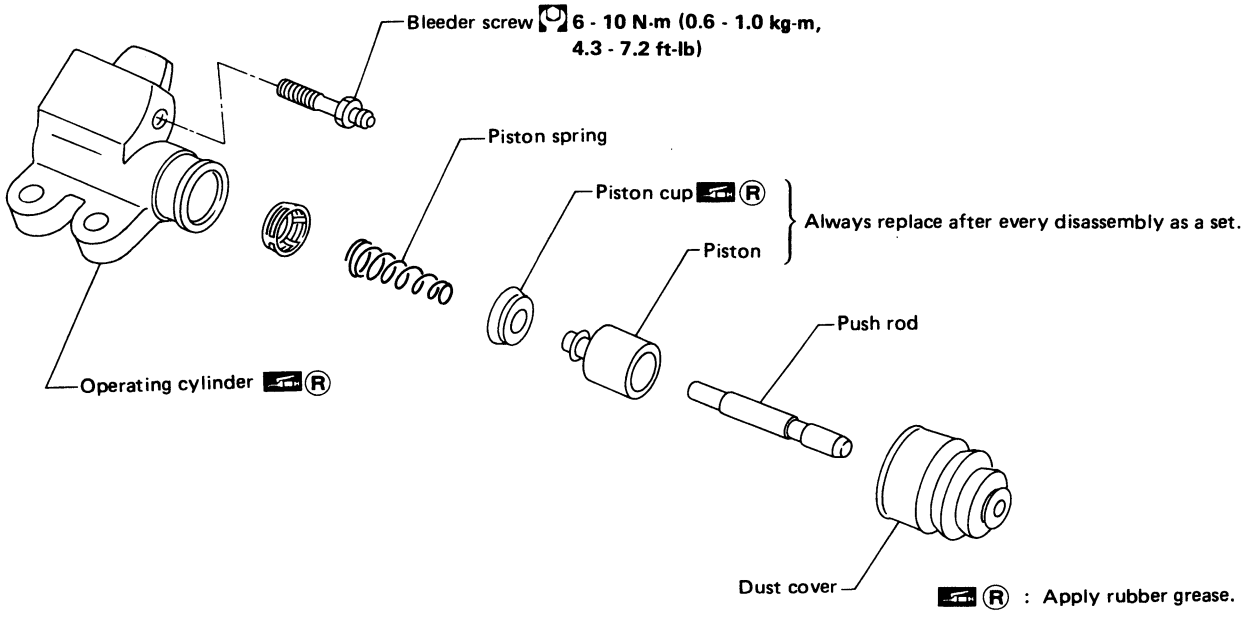
Clutch Master Cylinder (Cont'd)

INSPECTION

Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Return spring, for wear or damage
- Dust cover, for cracks, deformation or damage
- Reservoir, for deformation or damage

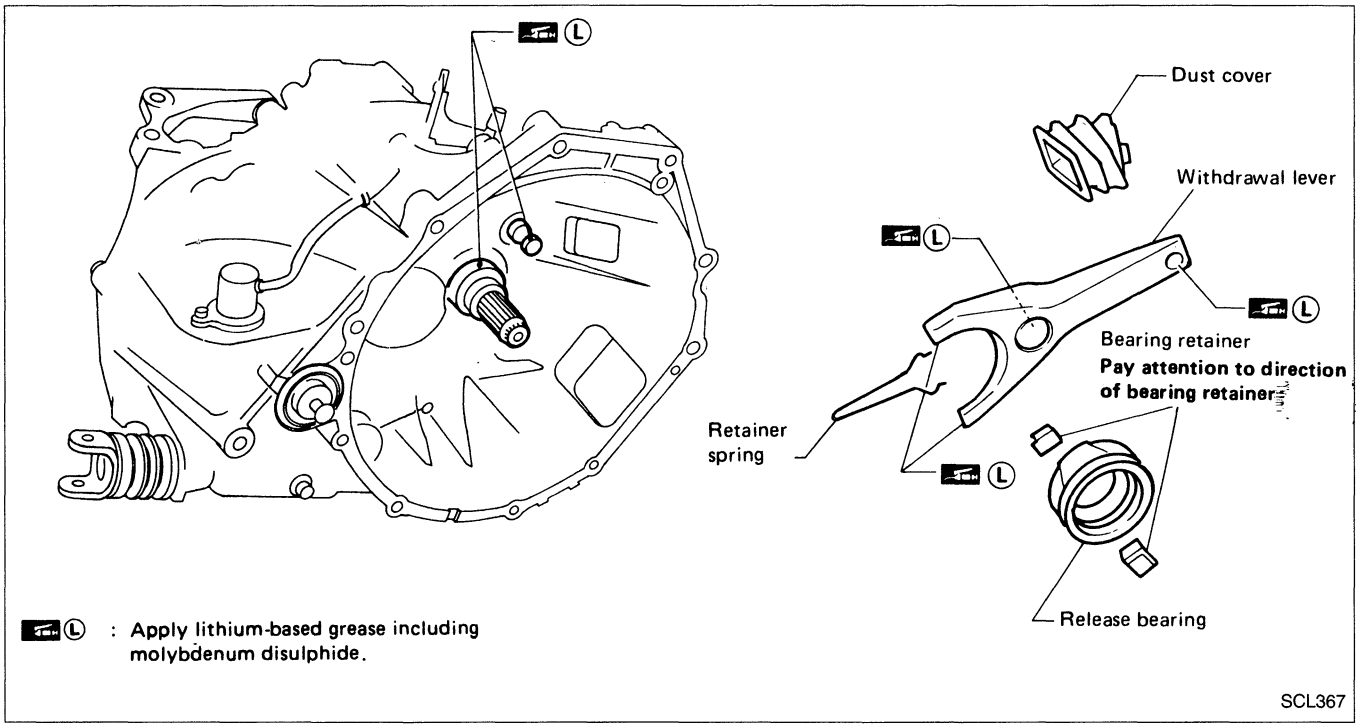
Operating Cylinder



INSPECTION

Check the following items, and replace if necessary.

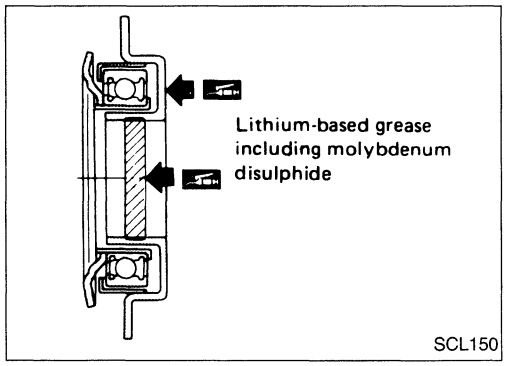
- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Piston spring, for wear or damage
- Dust cover, for cracks, deformation or damage



INSPECTION

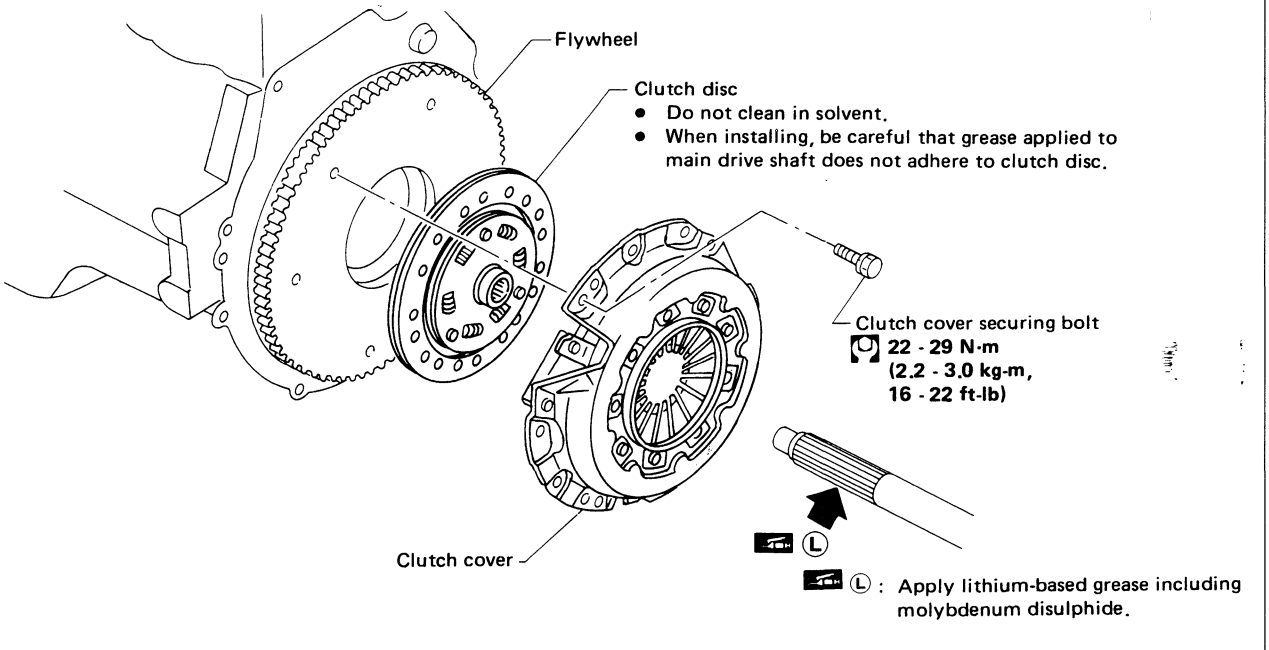
Check the following items, and replace if necessary.

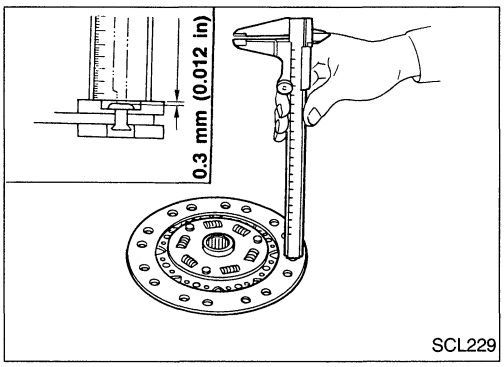
- Release bearing, to see that it rolls freely and is free from noise, cracks, pitting or wear
- Release sleeve and withdrawal lever rubbing surface, for wear, rust or damage

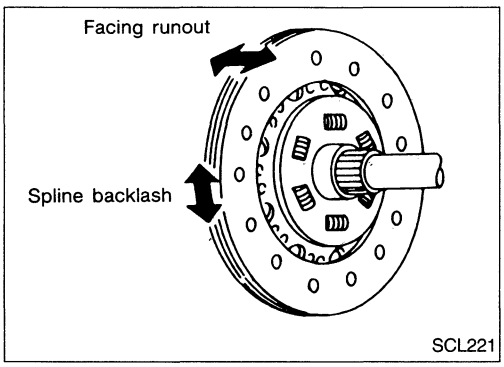


LUBRICATION

- Apply recommended grease to contact surface and rubbing surface.
- **Too much lubricant might damage clutch disc facing.**







Clutch Disc

INSPECTION

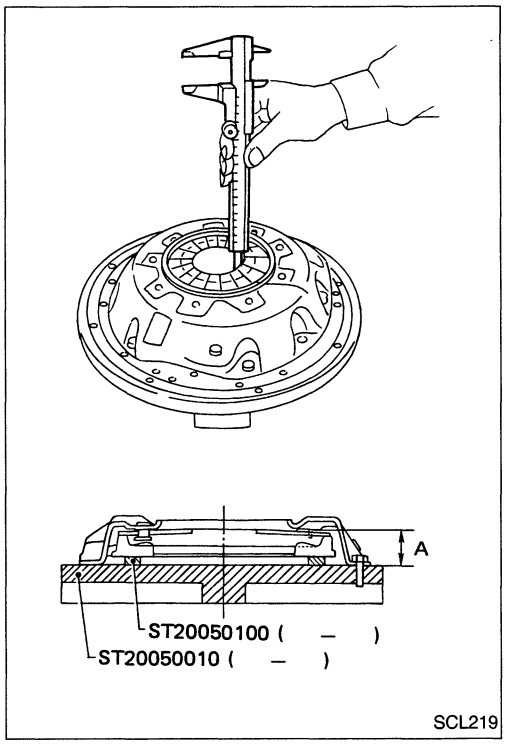
Check the following items, and replace if necessary.

- Clutch disc, for burns, discoloration, oil or grease leakage
- Clutch disc, for wear of facing
  Wear limit of facing surface to rivet head:
  0.3 mm (0.012 in)

- Check clutch disc for backlash of spline and runout of facing.
  Maximum backlash of spline (at outer edge of disc):
  0.9 mm (0.035 in)
  Runout limit:
  1.0 mm (0.039 in)
  Distance of runout check point (from hub center)
  107.5 mm (4.23 in)

INSTALLATION

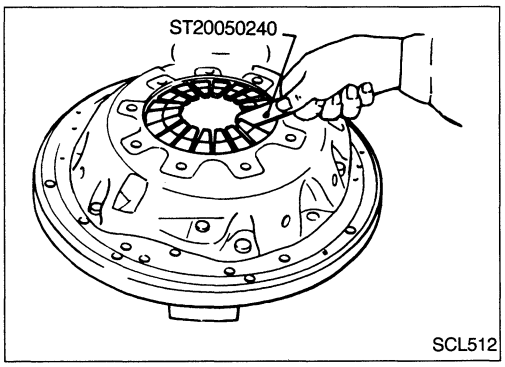
- Apply recommended grease to contact surface of spline portion.
- **Too much lubricant might damage clutch facing.**



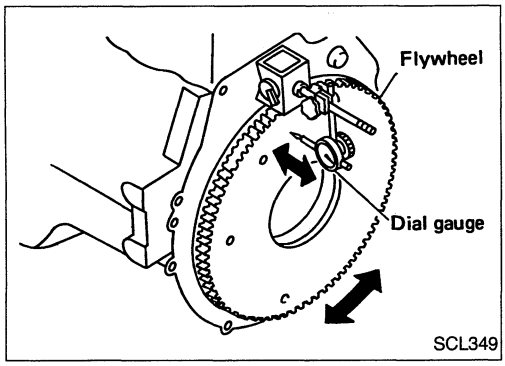
Clutch Cover and Flywheel

INSPECTION AND ADJUSTMENT

- Set Tool and check height and unevenness of diaphragm spring.
- Set 0.4 mm (0.016 in) feeler gauges on distance pieces (ST20050100) when checking diaphragm spring height.
  Diaphragm spring height "A":
  33.0 - 35.0 mm (1.299 - 1.378 in)
- Check thrust rings for wear or damage by shaking cover assembly and listening for chattering noise, or lightly hammering on rivets for a slightly cracked noise. Replace clutch cover assembly if necessary.
- Check pressure plate and clutch disc contact surface for slight burns or discoloration. Clean pressure plate with emery paper.
- Check pressure plate and clutch disc contact surface for deformation or damage. Replace if necessary.

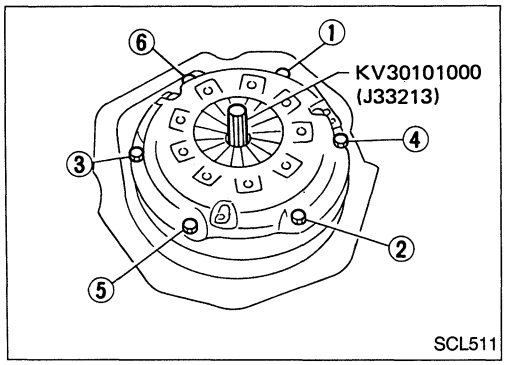


- Adjust unevenness of diaphragm spring with Tool.
  Uneven limit:
  0.7 mm (0.028 in)



FLYWHEEL INSPECTION

- Check contact surface of flywheel for slight burns or discoloration. Clean flywheel with emery paper.
- Check flywheel runout.
  Runout (Total indicator reading):
  Flywheel
  Refer to EM section ("Inspection", "CYLINDER BLOCK").



INSTALLATION

- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Tighten bolts in numerical order.
- Be careful not to allow grease to contaminate clutch facing.

General Specifications

CLUTCH CONTROL SYSTEM

Type of clutch control	Hydraulic

CLUTCH MASTER CYLINDER

Inner diameter	mm (in)	15.87 (5/8)

CLUTCH OPERATING CYLINDER

Inner diameter	mm (in)	19.05 (3/4)

CLUTCH DISC

Unit: mm (in)

Model	225TBL
Facing size (Outer dia. x inner dia. x thickness)	225 x 150 x 3.5 (8.86 x 5.91 x 0.138)
Thickness of disc assembly With load	7.9 - 8.3 (0.311 - 0.327) with 4,904 N (500 kg, 1,103 lb)

CLUTCH COVER

Model		T225S
Full-load	N (kg, lb)	4,904 (500, 1,103)

Inspection and Adjustment

CLUTCH PEDAL

Unit: mm (in)

Pedal height*	165 - 175 (6.50 - 6.89)
Pedal free play	1.0 - 3.0 (0.039 - 0.118)
Clearance between pedal stopper rubber and clutch interlock switch threaded end while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)

*: Measured from surface of melt sheet to pedal pad

CLUTCH DISC

Unit: mm (in)

Model	225TBL
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	1.0 (0.039)
Distance of runout check point (from the hub center)	107.5 (4.23)
Maximum backlash of spline (at outer edge disc)	0.9 (0.035)

CLUTCH COVER

Unit: mm (in)

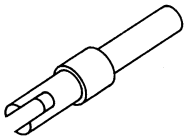
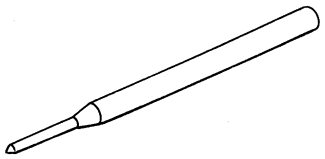
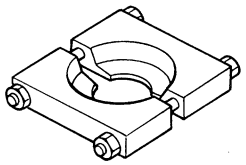
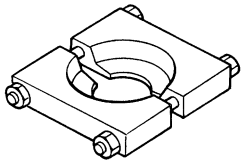
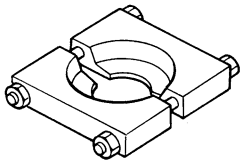
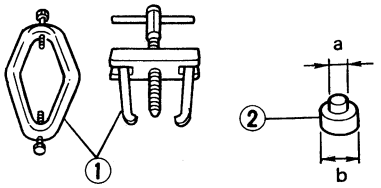
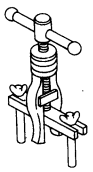
Model	C225S
Diaphragm spring height	33.0 - 35.0 (1.299 - 1.378)
Uneven limit of diaphragm spring toe height	0.7 (0.028)

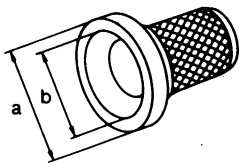
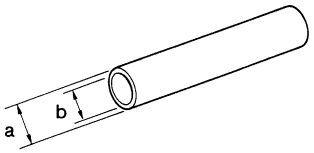
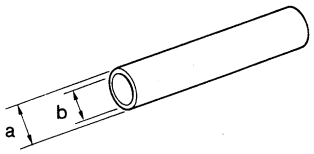
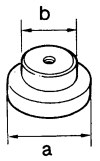
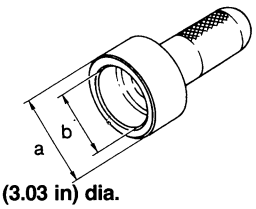
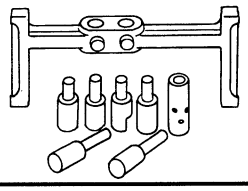
MANUAL TRANSAXLE

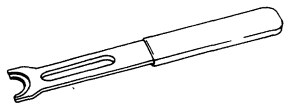
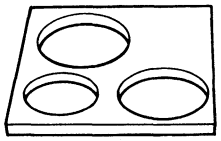
SECTION MT

CONTENTS

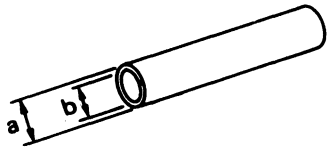
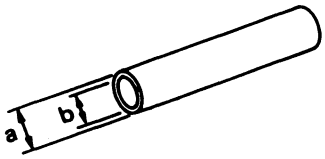
SPECIAL SERVICE TOOLS

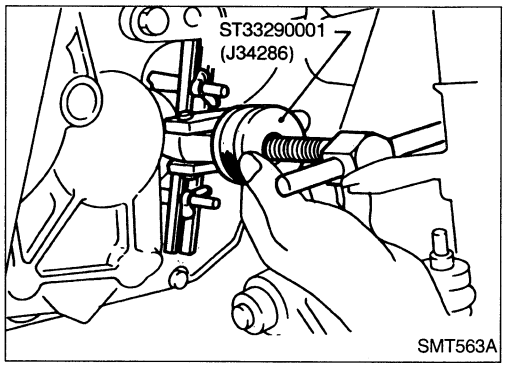
Tool number (Kent-Moore No.) Tool name	Description
KV38106500 (J34284) Preload adapter	Measuring turning torque of final drive assembly Measuring total turning torque Measuring clearance between side gear and differential case with washer Selecting differential side bearing adjusting shim 
KV32101000 (J25689-A) Pin punch	Removing and installing retaining pin 
ST22730000 (J25681) Puller	Removing mainshaft front and rear bearing inner race 
ST30031000 (J22912-01) Puller	Removing input shaft front and rear bearing Removing 4th & 5th main gear 
ST30021000 (J22912-01) Puller	Removing 5th synchronizer Removing 3rd & 4th synchronizer Removing 2nd & 3rd main gear 
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter	Removing differential side bearing inner race  **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**
ST33290001 (J34286) Puller	Removing differential oil seal Removing mainshaft rear bearing outer race Removing differential side bearing outer race 

Tool number (Kent-Moore No.) Tool name	Description
ST33400001 (J26082) Drift	Installing differential oil seal  **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
ST30600000 (J25863-01) Drift	Installing input shaft front bearing  **a: 36 mm (1.42 in) dia.** **b: 31 mm (1.22 in) dia.**
ST22452000 (—) Drift	Installing 3rd, 4th and 5th main gear  **a: 45 mm (1.77 in) dia.** **b: 36 mm (1.42 in) dia.**
ST30621000 (J25742-5) Drift	Installing mainshaft rear bearing outer race (Use with ST30611000.)  **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30611000 (J25742-1) Drift	Installing mainshaft rear bearing outer race (Use with ST30621000.) 
ST307200000 (—) Drift	Installing differential side bearing outer race  **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
(J34290) Shim selecting tool set	Selecting differential side bearing adjusting shim 

Tool number (Kent-Moore No.) Tool name	Description
(J34305) Snap ring remover and installer	Removing and installing stopper ring of shift fork 
(J25407-2)	Measuring reverse baulk ring wear 

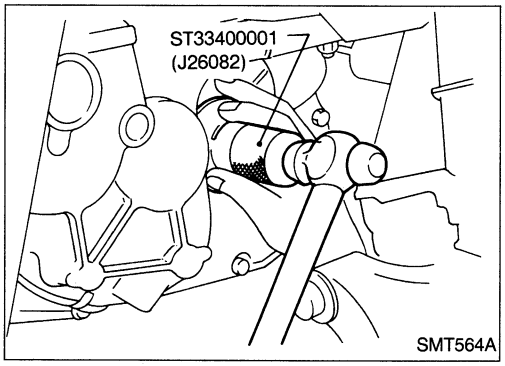
COMMERCIAL SERVICE TOOLS

Tool name	Description
Drift	Installing differential side bearing inner race  **a: 45 mm (1.77 in) dia.** **b: 41 mm (1.61 in) dia.**
Drift	Installing striking rod oil seal  **a: 38 mm (1.50 in) dia.** **b: 20 mm (0.79 in) dia.**



Differential Side Oil Seal Replacement

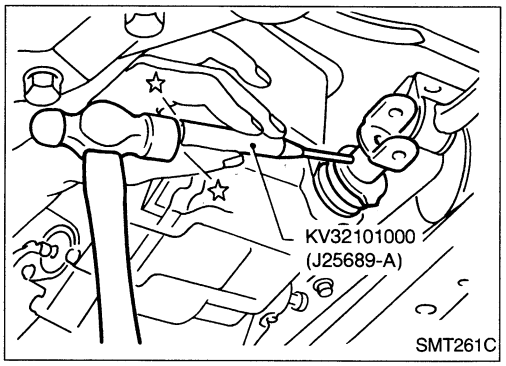
1. Drain gear oil from transaxle.
2. Remove drive shafts — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
3. Remove differential oil seal.



4. Install differential oil seal.

- **Apply multi-purpose grease to seal lip of oil seal before installing.**

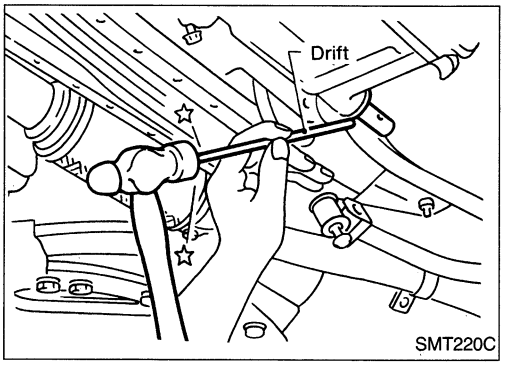
5. Install drive shafts — Refer to FA section ("Installation", "FRONT AXLE — Drive Shaft").



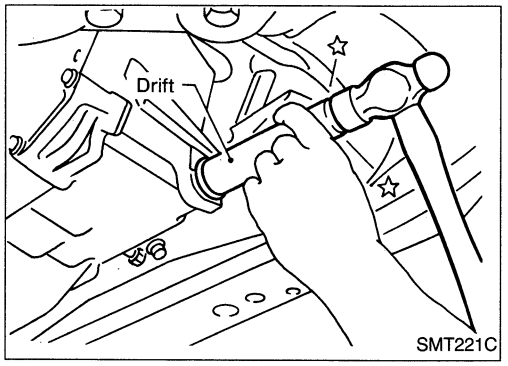
Striking Rod Oil Seal Replacement

1. Remove transaxle control rod from yoke.
2. Remove yoke retaining pin.

- **Be careful not to damage boot.**

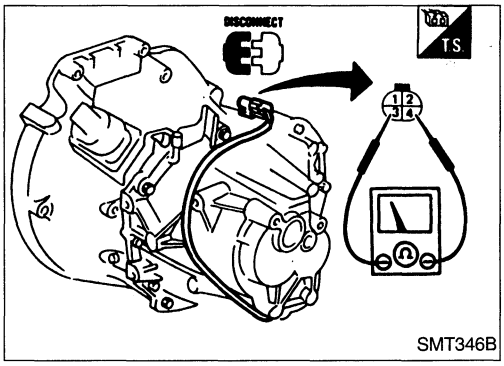


3. Remove striking rod oil seal.



4. Install striking rod oil seal.

- **Apply multi-purpose grease to seal lip of oil seal before installing.**



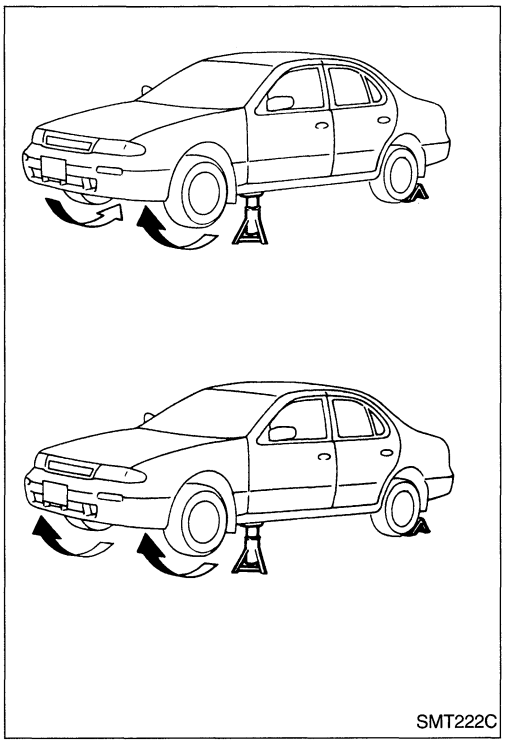
SMT346B

Position Switch Check

BACK-UP LAMP SWITCH AND NEUTRAL POSITION SWITCH

- Check continuity.

Gear position	Continuity
Reverse	② – ④
Neutral	① – ③
Except reverse and neutral	No


SMT222C

Viscous Coupling Check

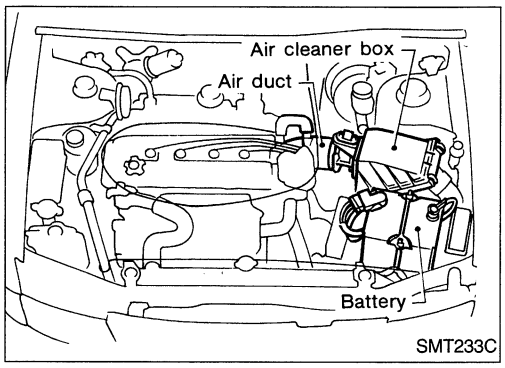
1. Apply parking brake firmly and place shift lever in the neutral position.
2. Jack up front wheels.
3. Rotate one front wheel and check turning direction of the other front wheel.

Turning direction of the two wheels is opposite:

The viscous coupling is not functioning normally.

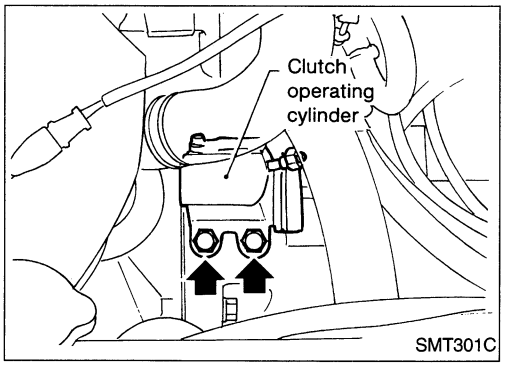
Turning direction of the two wheels is the same:

If differential side gear and pinion mate gear thrust washers are O.K., viscous coupling is functioning normally.

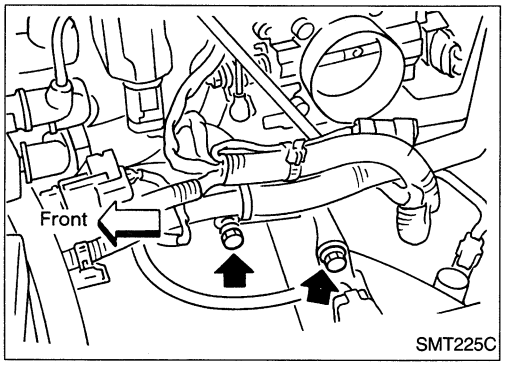


Removal

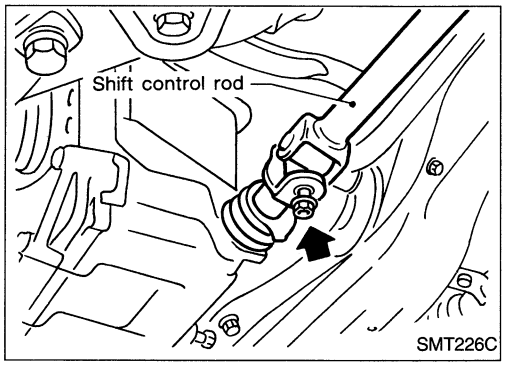
1. Remove battery and bracket.
2. Remove air cleaner box with mass air flow sensor.
3. Remove air duct.



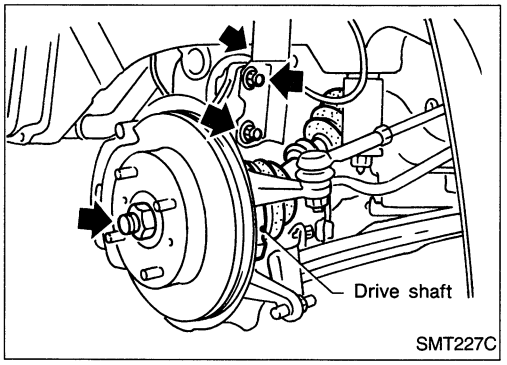
4. Remove clutch operating cylinder from transaxle.
5. Disconnect back-up lamp switch harness connectors.



6. Remove starter motor from transaxle.

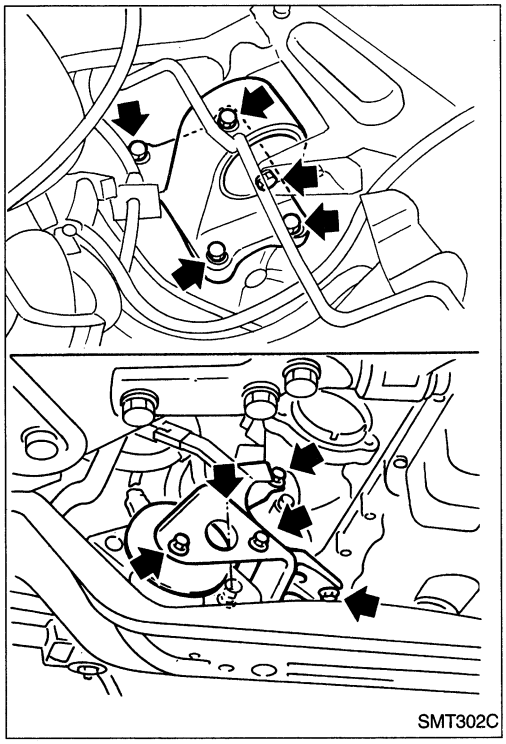


7. Remove shift control rod from transaxle.
8. Drain gear oil from transaxle.



9. Draw out drive shafts from transaxle — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").

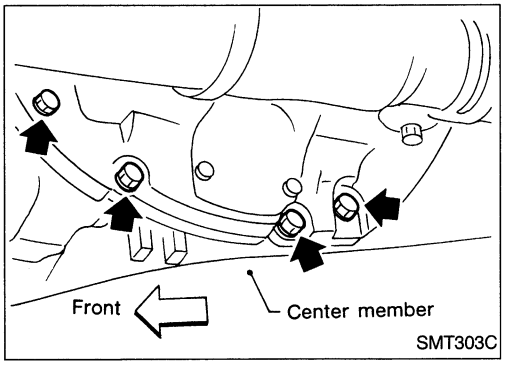
Removal (Cont'd)


SMT302C

10. Support engine by placing a jack under oil pan.

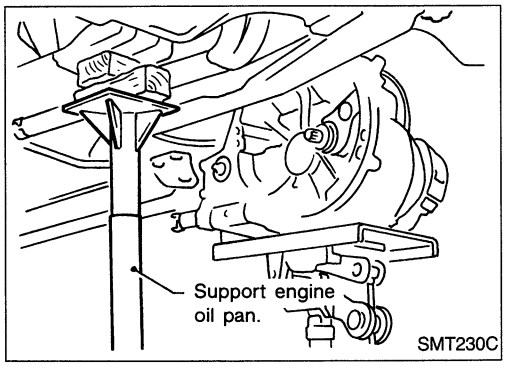
CAUTION:
Do not place jack under oil pan drain plug.

11. Remove rear and LH mounts.



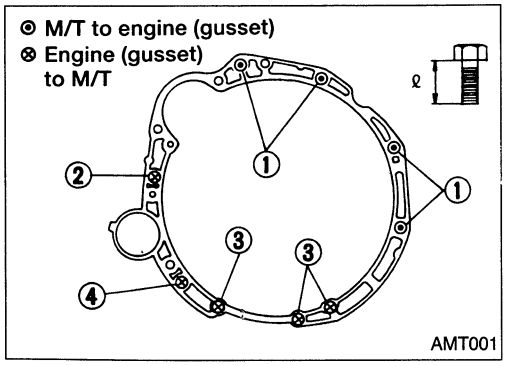
SMT303C

12. Raise jack for access to lower housing bolts. Remove bolts. Lower jack.



SMT230C

13. Remove bolts securing transaxle.
14. Lower transaxle while supporting it with a jack.

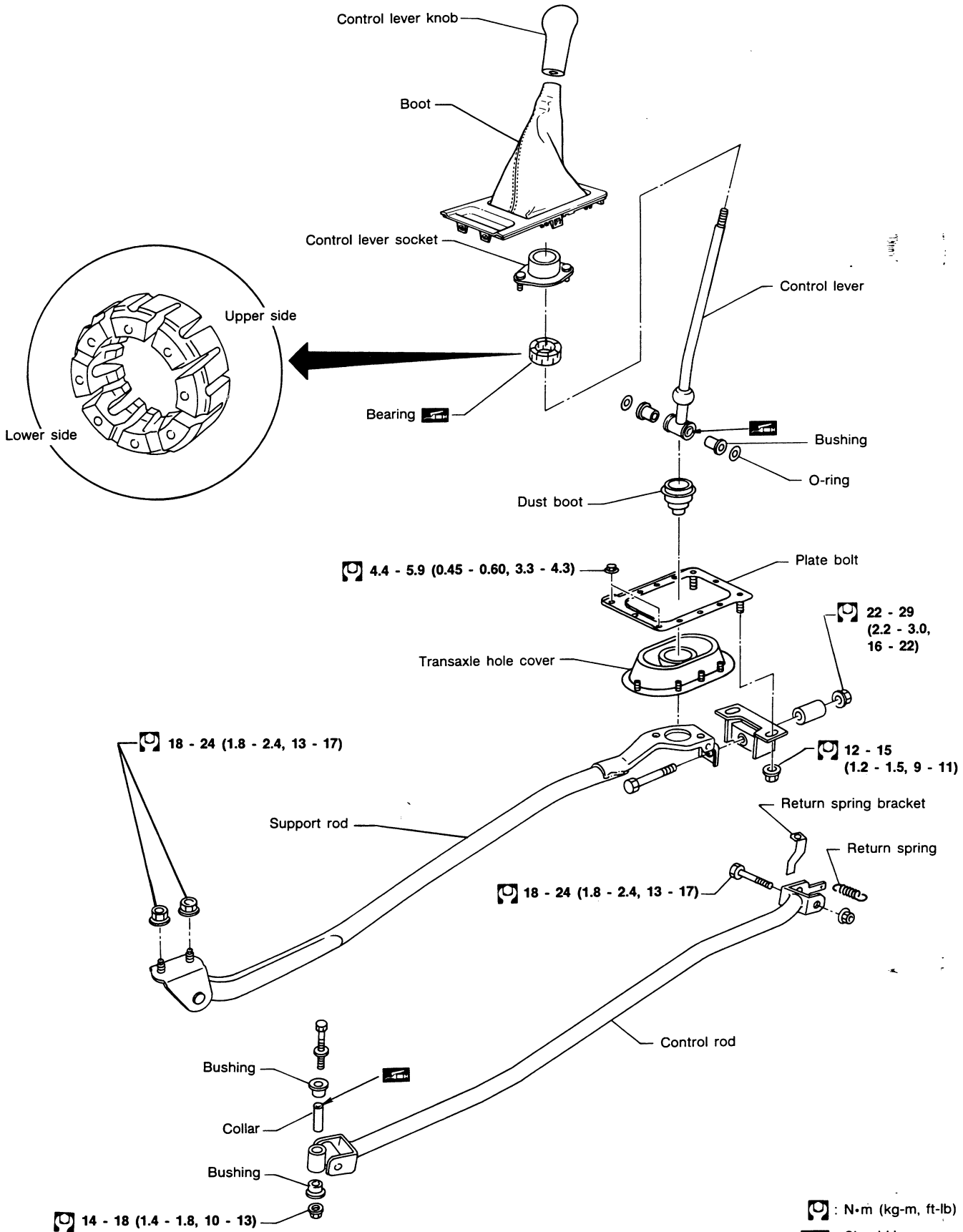


AMT001

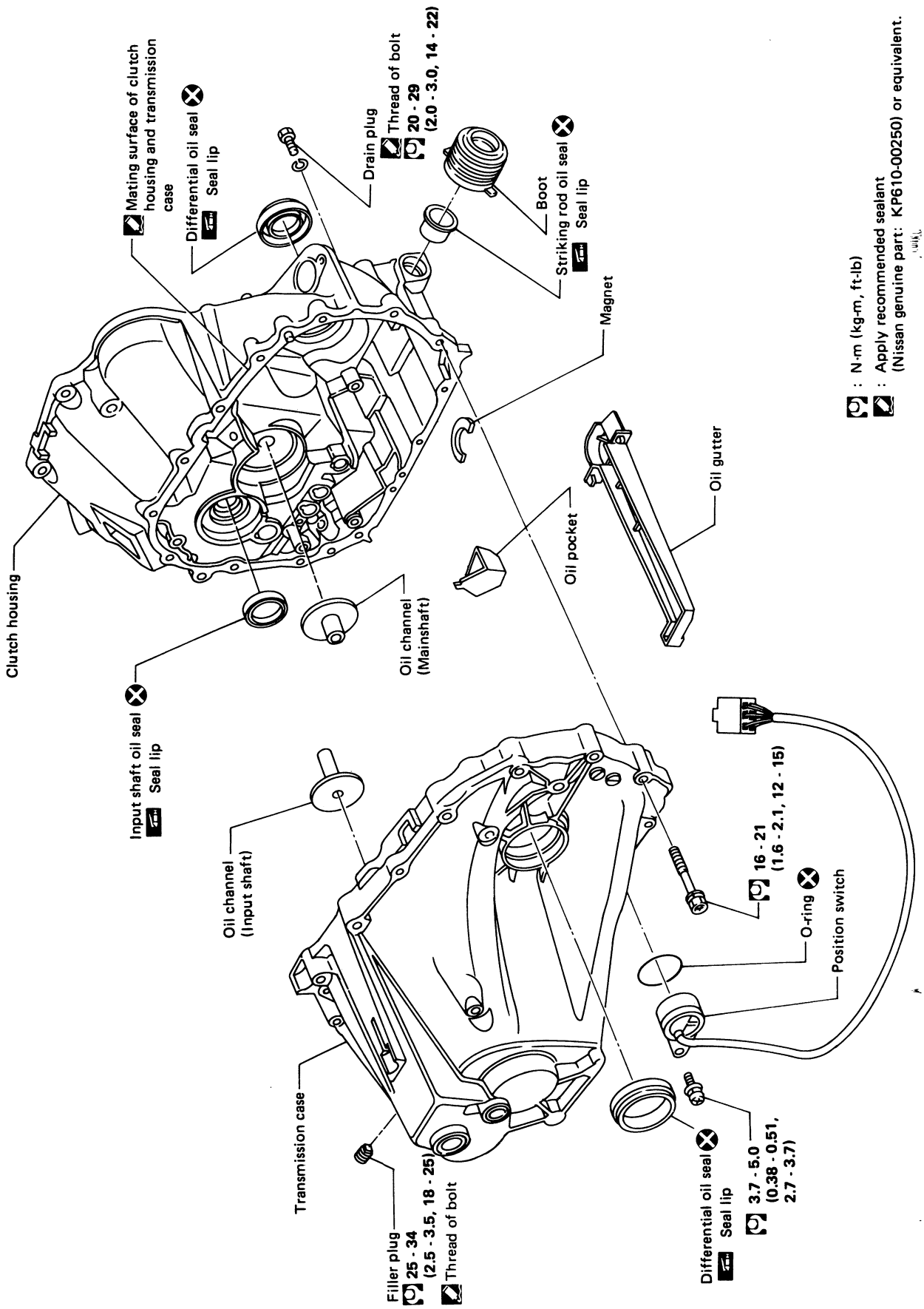
Installation

1. Tighten bolts securing transaxle.

Bolt No.	Tightening torque N•m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
2	39 - 49 (4.0 - 5.0, 29 - 36)	48 (1.89)
3	30 - 40 (3.1 - 4.1, 22 - 30)	30 (1.18)
4	30 - 40 (3.1 - 4.1, 22 - 30)	40 (1.57)

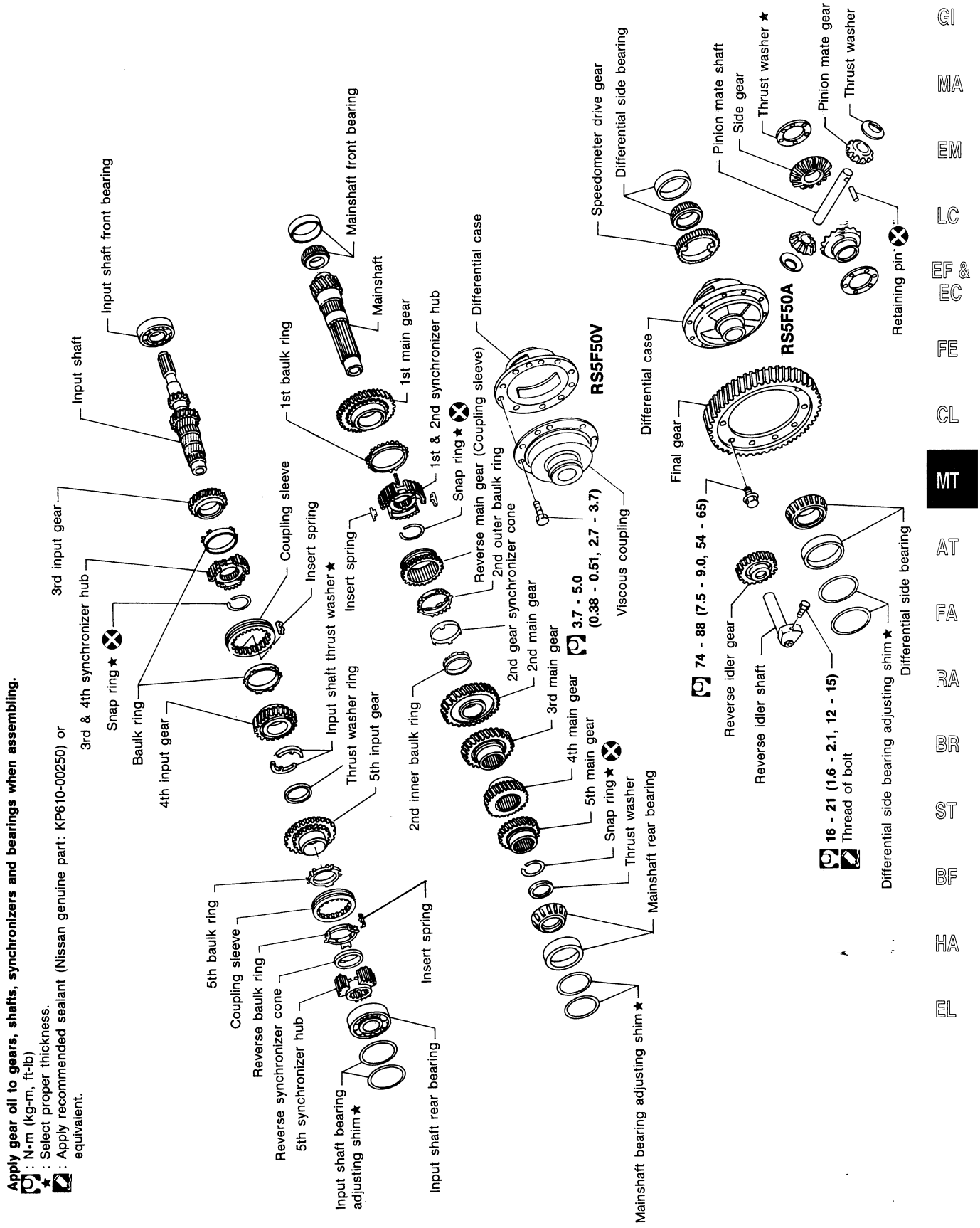

Control lever knob
Boot
Control lever socket
Upper side
Lower side
Bearing
Control lever
Bushing
O-ring
Dust boot
4.4 - 5.9 (0.45 - 0.60, 3.3 - 4.3)
Plate bolt
22 - 29 (2.2 - 3.0, 16 - 22)
Transaxle hole cover
18 - 24 (1.8 - 2.4, 13 - 17)
12 - 15 (1.2 - 1.5, 9 - 11)
Return spring bracket
Support rod
Return spring
18 - 24 (1.8 - 2.4, 13 - 17)
Control rod
Bushing
Collar
Bushing
14 - 18 (1.4 - 1.8, 10 - 13)
: N•m (kg-m, ft-lb)
: Should be lubricated with grease
AMT002

Case Components



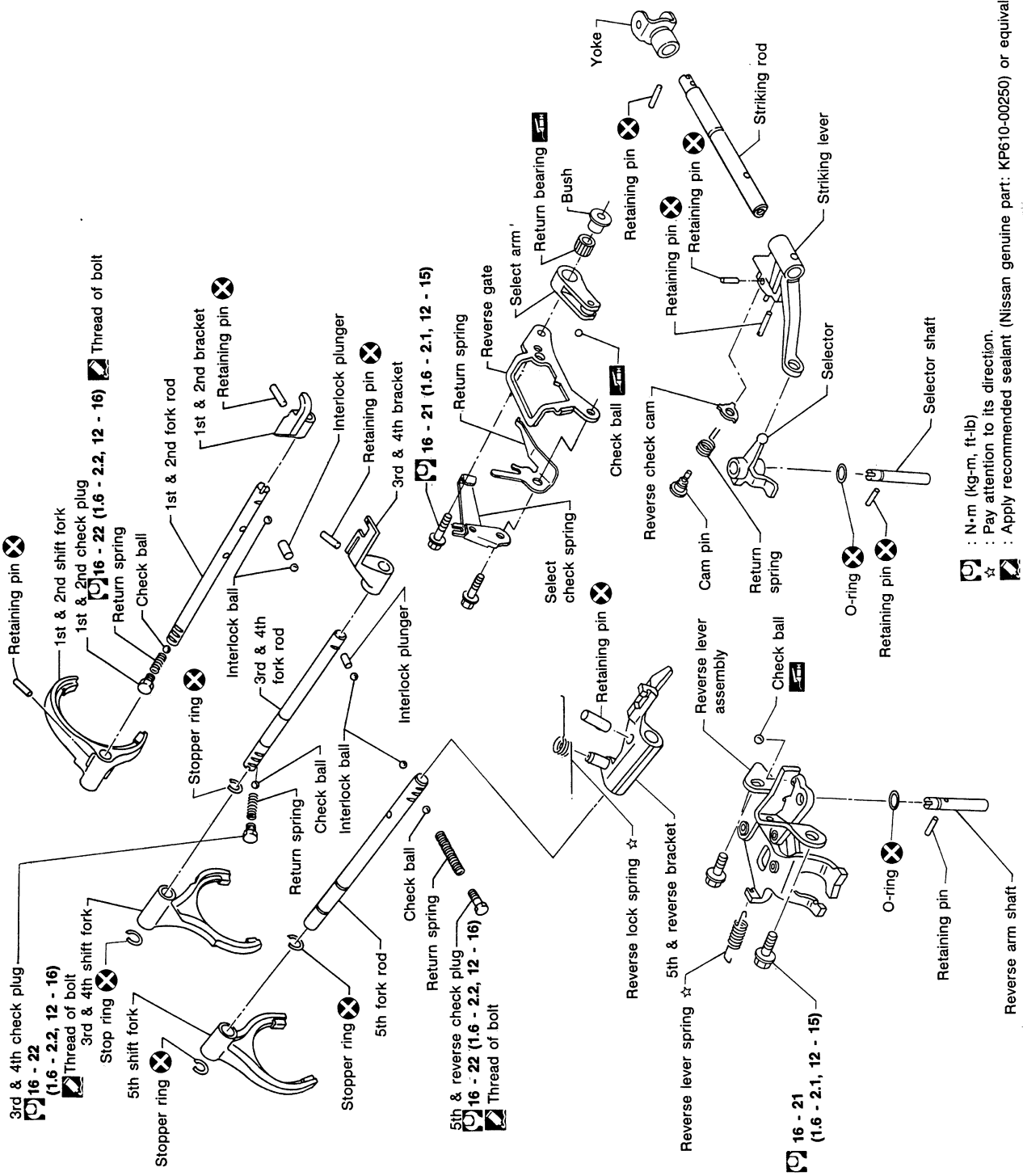
SMT463B

Gear Components

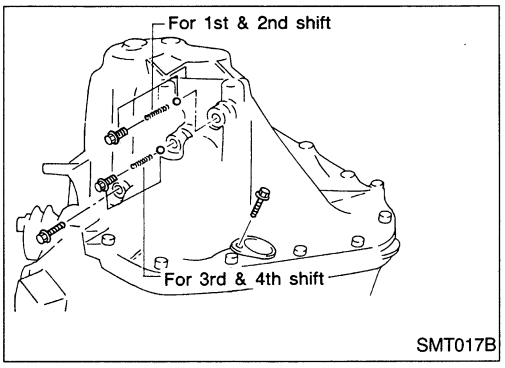


SMT232C

Shift Control Components

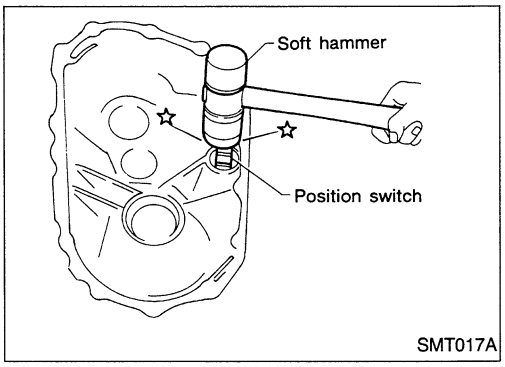


SMT465B



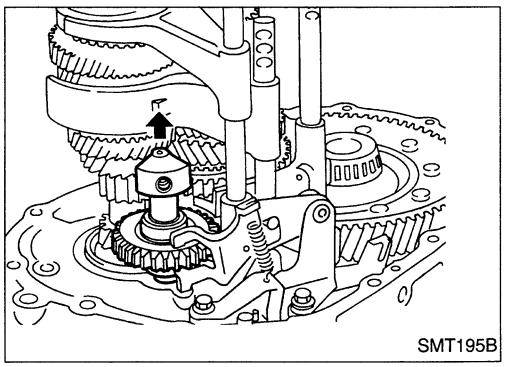
SMT017B

1. Before removing transmission case, remove bolts and plugs as shown left.
2. Remove transmission case.

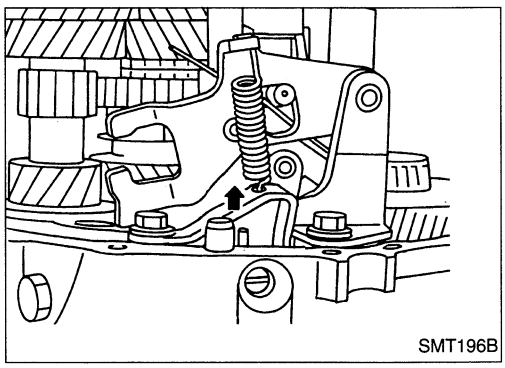


SMT017A

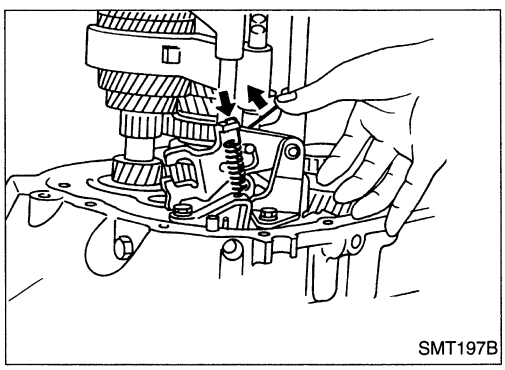
3. Remove position switch.


SMT195B

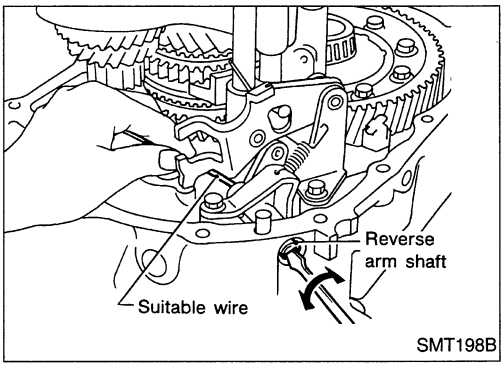
4. Mesh 4th gear, and then remove reverse idler shaft and reverse idler gear.


SMT196B

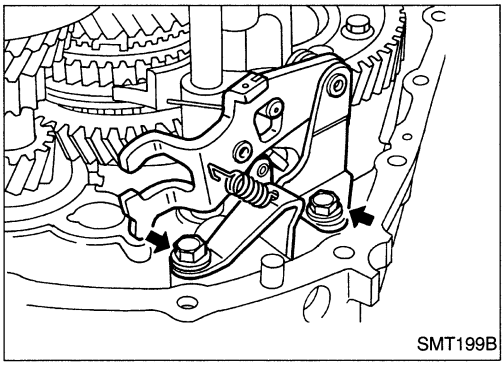
5. Pull out retaining pin from clutch housing.


SMT197B

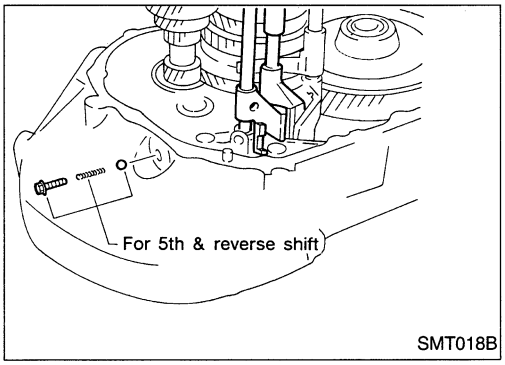
6. Remove reverse lever spring and reverse lock spring from reverse lever assembly.



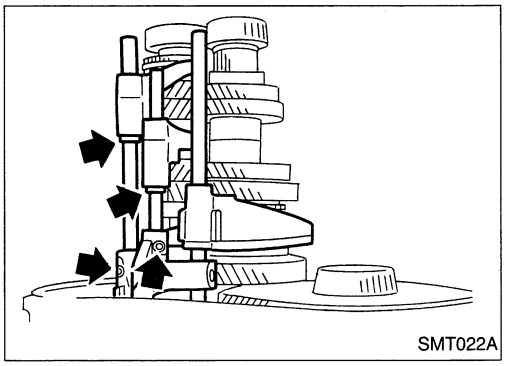
7. Remove reverse arm shaft while rotating it.



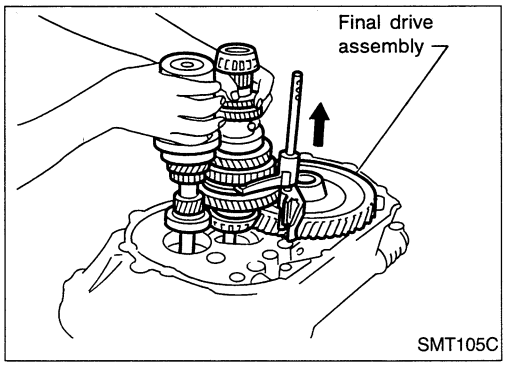
8. Remove reverse lever assembly.



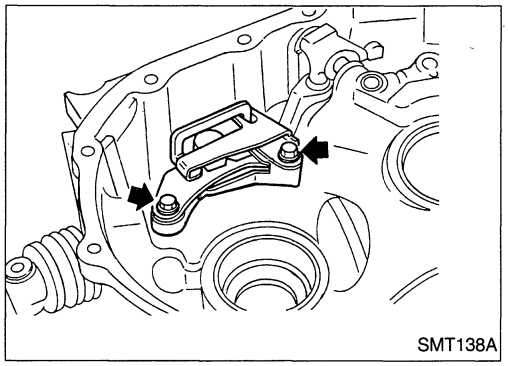
9. Remove 5th & reverse check plug, spring and ball.



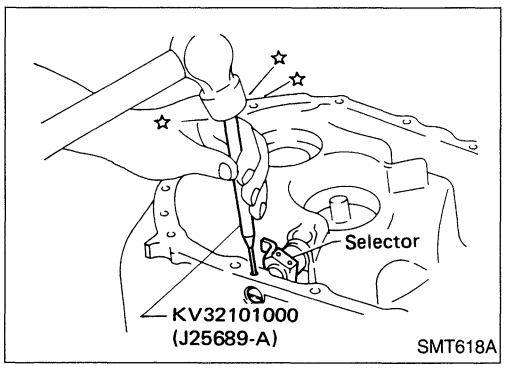
10. Remove stopper rings and retaining pins from 5th & reverse and 3rd & 4th fork rods.
11. Remove 5th & reverse and 3rd & 4th fork rods. Then remove forks and brackets.



12. Remove both input and mainshafts with 1st & 2nd fork and fork rod as a set.
13. Remove final drive assembly.

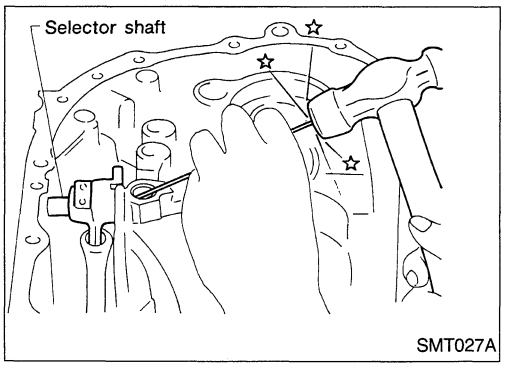

SMT138A

14. Remove reverse check assembly.

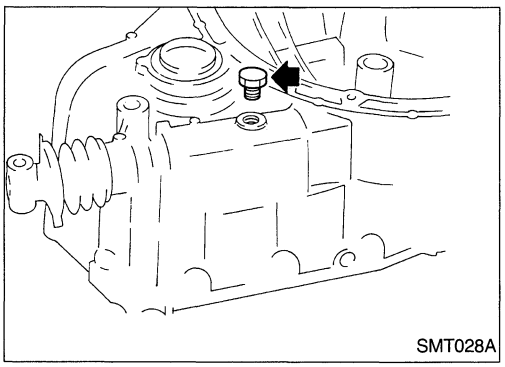


SMT618A

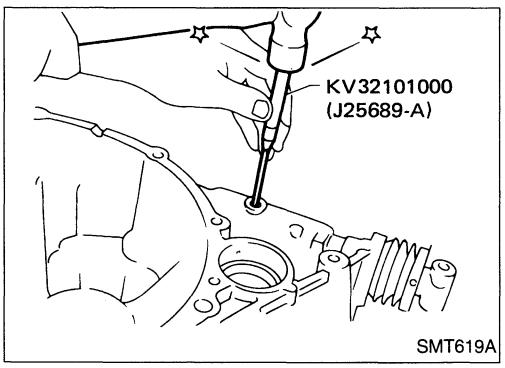
15. Remove retaining pin and detach the selector.



SMT027A

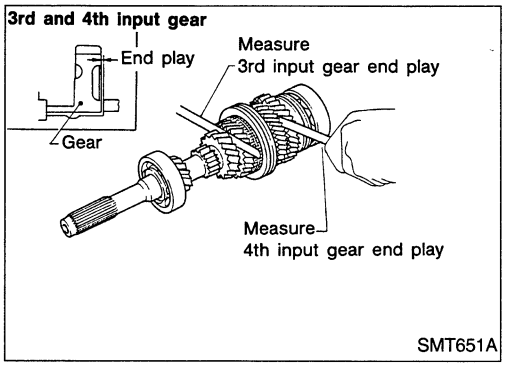

SMT028A

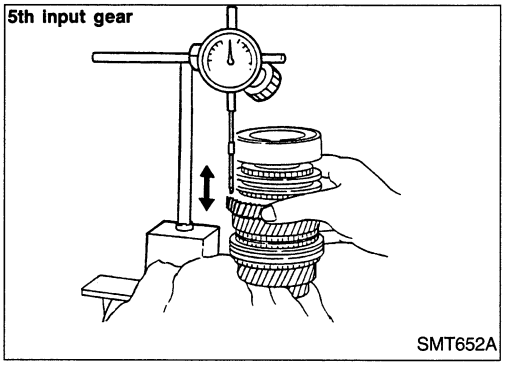
16. Remove drain plug for convenience in removing retaining pin which holds striking lever to striking rod.

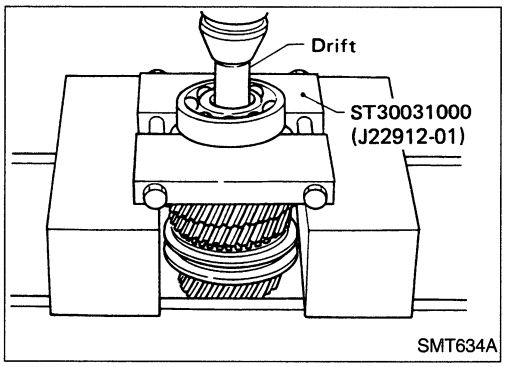


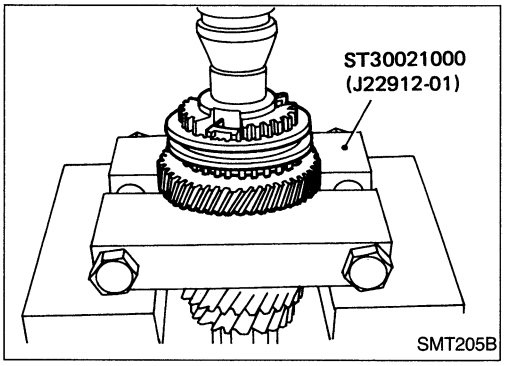
SMT619A

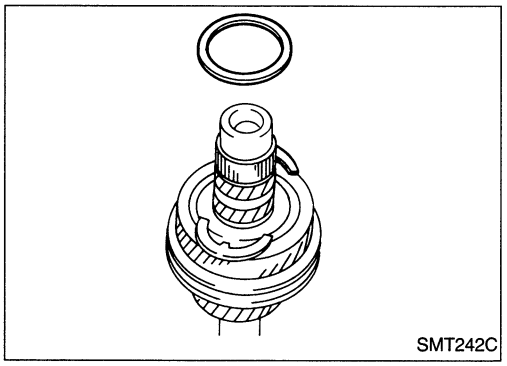
17. Remove retaining pin and then withdraw striking lever and striking rod.











Input Shaft and Gears

DISASSEMBLY

1. Before disassembly, check 3rd, 4th and 5th input gear end plays.

Gear end play

Gears	End play mm (in)
3rd input gear	0.23 - 0.43 (0.0091 - 0.0169)
4th input gear	0.25 - 0.55 (0.0098 - 0.0217)
5th input gear	0.23 - 0.48 (0.0091 - 0.0189)

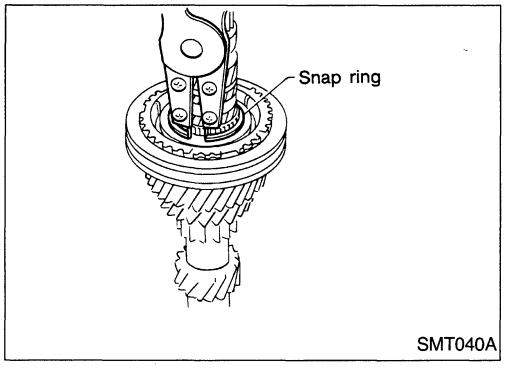
- If not within specification, disassemble and check contact surface of gear, shaft and hub. Then check clearance of snap ring and thrust washer — Refer to MT-18.

2. Remove input shaft rear bearing.

3. Remove 5th & reverse synchronizer and 5th input gear.

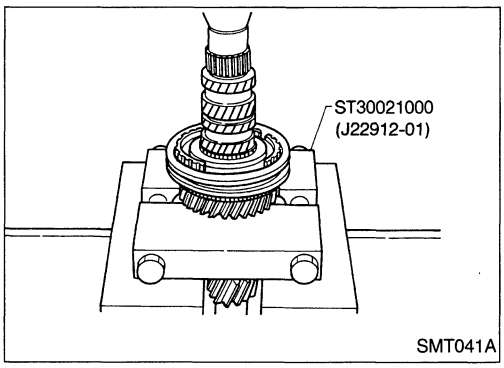
4. Remove thrust washer ring, thrust washers and 4th input gear.

Input Shaft and Gears (Cont'd)



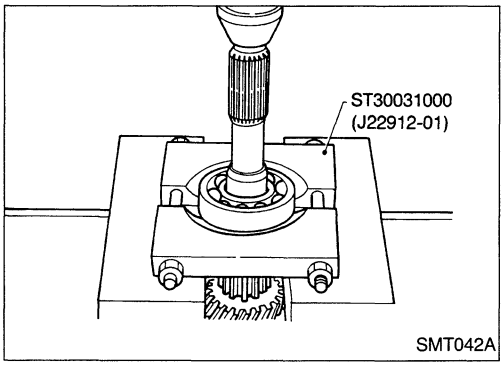
SMT040A

5. Remove snap ring.



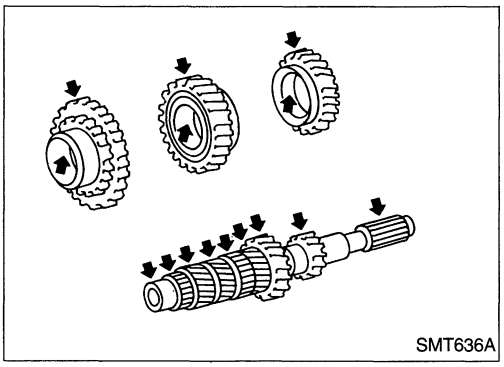
SMT041A

6. Remove 3rd & 4th synchronizer and 3rd input gear.



SMT042A

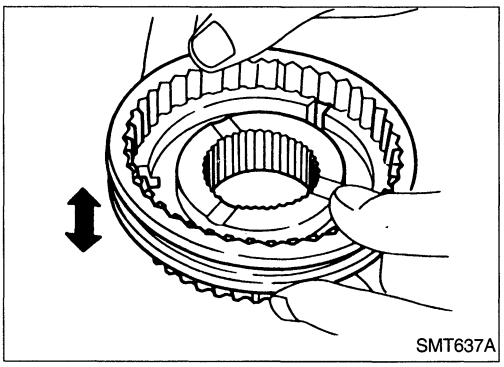
7. Remove input shaft front bearing.


SMT636A

INSPECTION

Gear and shaft

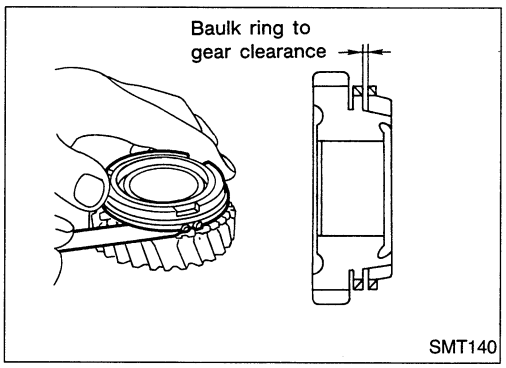
- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.


SMT637A

Synchronizer

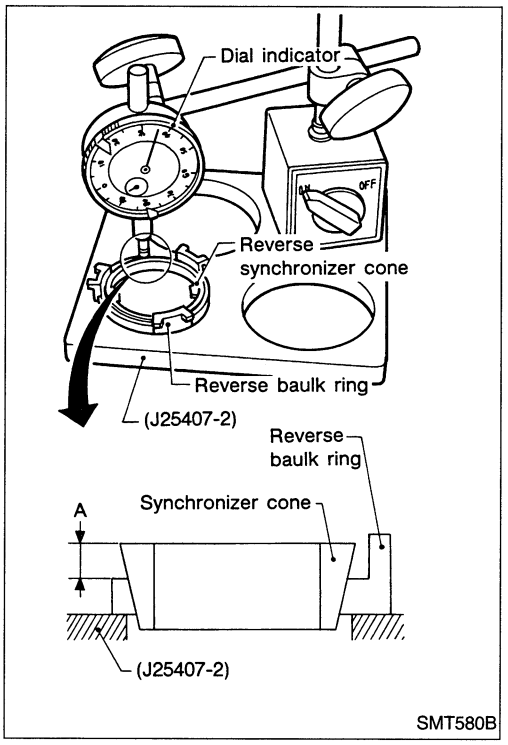
- Check spline portion of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check insert springs for wear or deformation.

Input Shaft and Gears (Cont'd)



- Measure clearance between baulk ring and gear (4th and 5th).

Clearance between baulk ring and gear:
Standard
1.0 - 1.35 mm (0.0394 - 0.0531 in)
Wear limit
0.7 mm (0.028 in)



- **Measure wear of reverse baulk ring.**

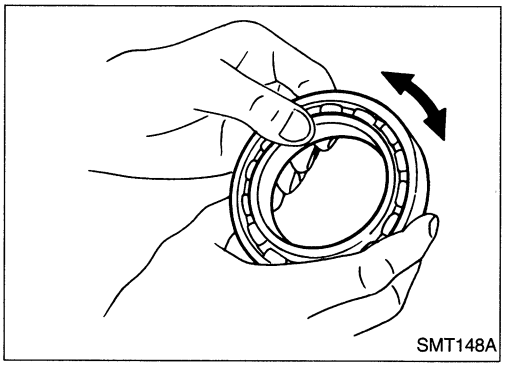
a. Place reverse baulk ring on Tool and then place reverse synchronizer cone on reverse baulk ring.

- **Make sure projection of synchronizer cone is positioned over the recess on Tool.**

b. While holding reverse synchronizer cone against reverse baulk ring as firmly as possible, measure dimension "A" with dial indicator.

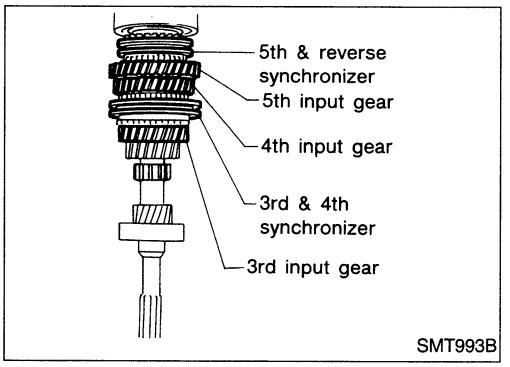
Wear limit:
Dimension "A"
1.2 mm (0.047 in)

c. If dimension "A" is smaller than the wear limit, replace baulk ring.



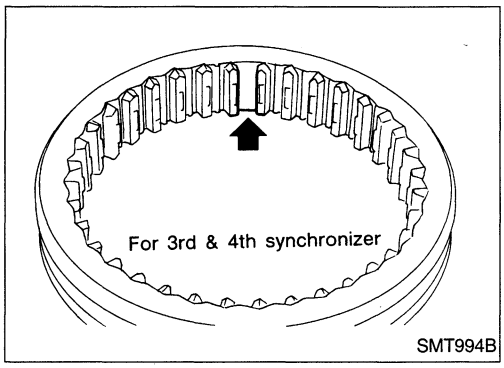
Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



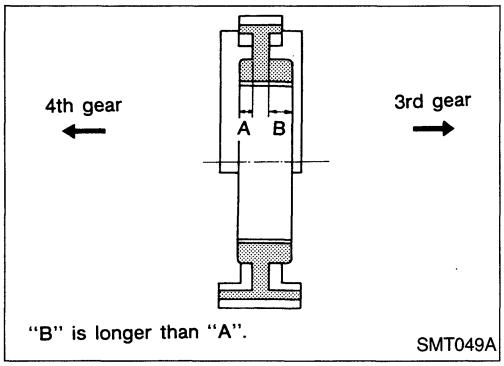
ASSEMBLY

Input Shaft and Gears (Cont'd)



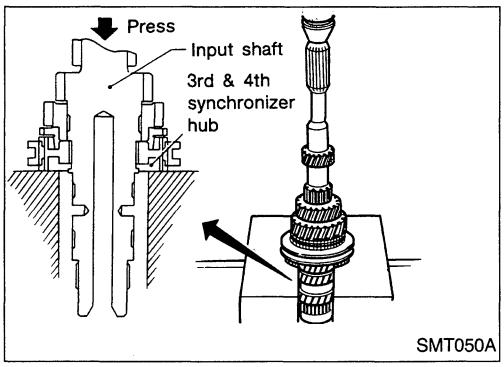
SMT994B

1. Place inserts in three grooves on coupling sleeve (3rd & 4th synchronizer).

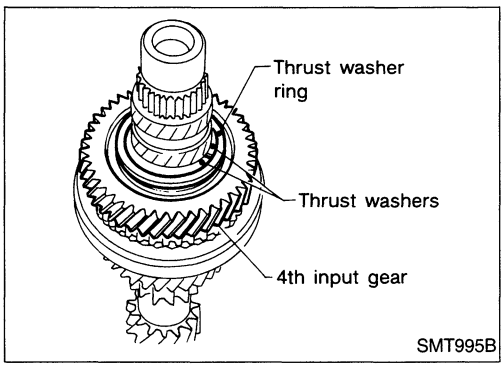


"B" is longer than "A".
SMT049A

2. Install 3rd input gear and 3rd baulk ring.
3. Press on 3rd & 4th synchronizer hub.
   - **Pay attention to its direction.**
4. Select proper snap ring of 3rd & 4th synchronizer hub to minimize clearance of groove, and then install it.
   Allowable clearance of groove:
   0 - 0.1 mm (0 - 0.004 in)
   Snap ring of 3rd & 4th synchronizer hub:
   Refer to MT-41.

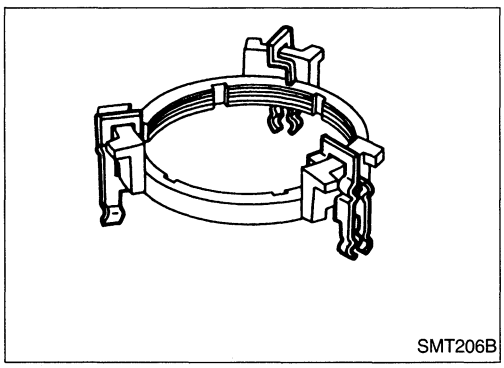


SMT050A



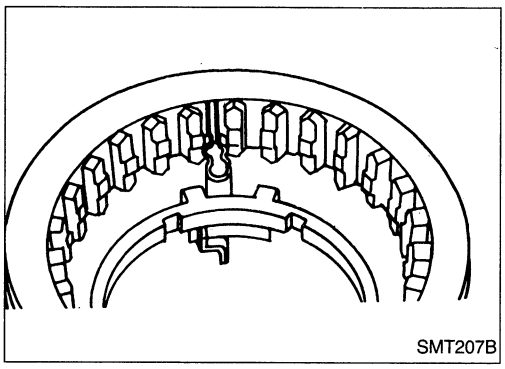
SMT995B

5. Install 4th input gear.
6. Select proper thrust washers to minimize clearance of groove.
   Then install them and thrust washer ring.
   Allowable clearance of groove:
   0 - 0.06 mm (0 - 0.0024 in)
   Input shaft thrust washer:
   Refer to MT-42.


SMT206B

7. Install 5th & reverse synchronizer assembly.
a. Hook insert springs on reverse baulk ring.

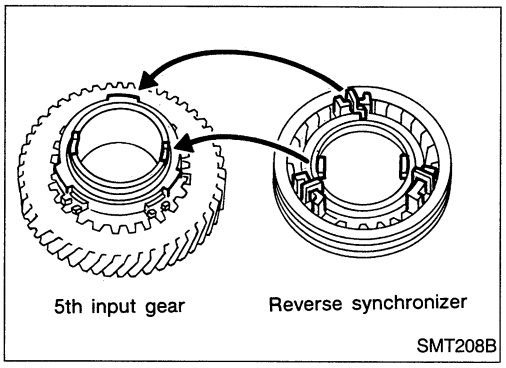
Input Shaft and Gears (Cont'd)


SMT207B

b. Install insert springs with reverse baulk ring onto coupling sleeve.

- **Pay attention to position of insert springs.**

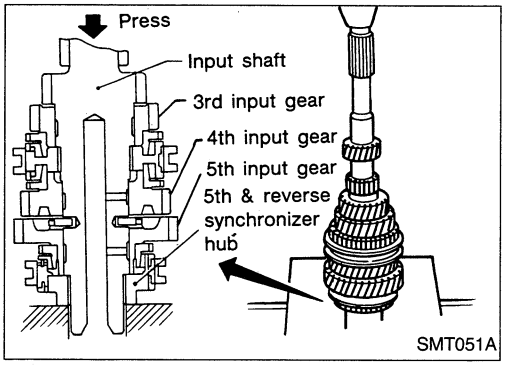
c. Place 5th baulk ring on 5th input gear.
d. Install reverse synchronizer cone on reverse baulk ring.



SMT208B

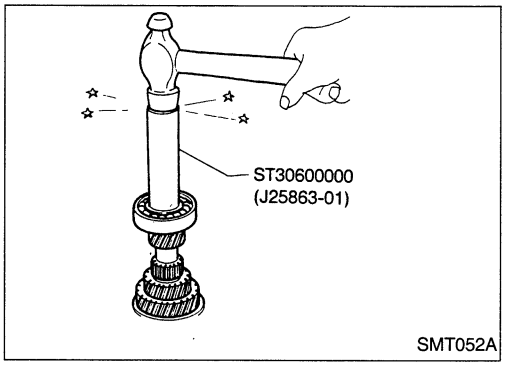
e. Place reverse synchronizer assembly on 5th input gear.

- **Mesh recesses of 5th input gear with projections of reverse synchronizer cone.**
- **Put insert spring mounts on reverse baulk ring upon those on 5th baulk ring.**



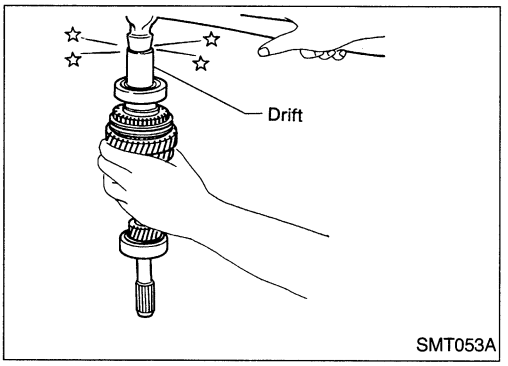
SMT051A

f. Press on 5th & reverse synchronizer assembly with 5th input gear.

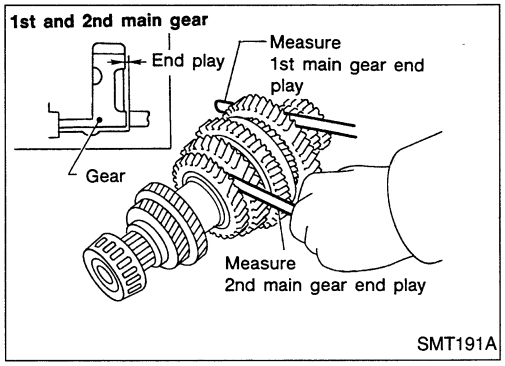


SMT052A

8. Install input shaft front and rear bearings.
9. Measure gear end play as the final check — Refer to MT-16.



SMT053A



Mainshaft and Gears

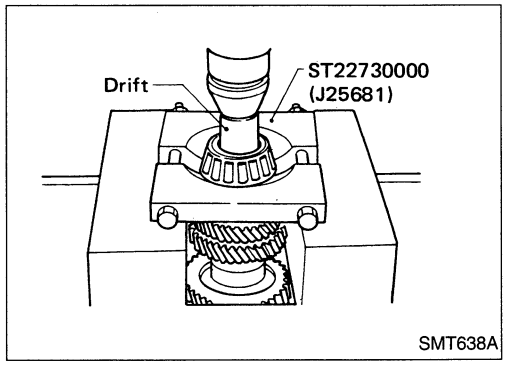
DISASSEMBLY

1. Before disassembly, check 1st and 2nd main gear end plays.

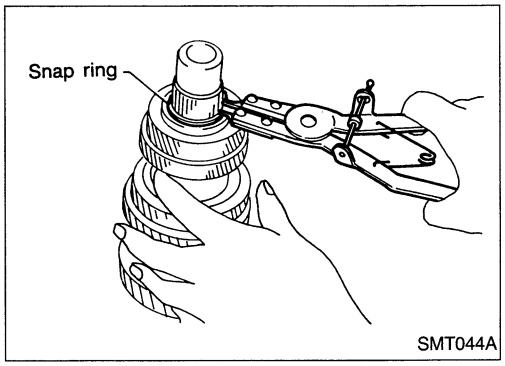
Gear end play

Gears	End play mm (in)
1st main gear	0.23 - 0.43 (0.0091 - 0.0169)
2nd main gear	0.23 - 0.58 (0.0091 - 0.0228)

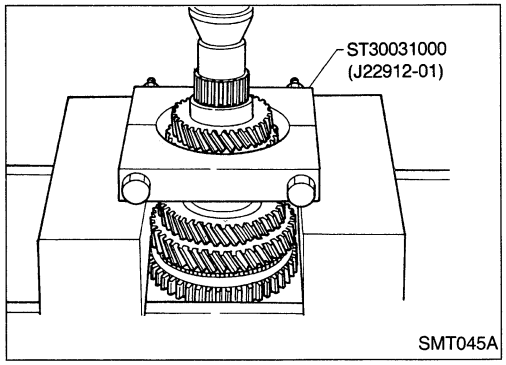
If not within specification, disassemble and check contact surface of gear, shaft and hub. Then check clearance of snap ring — Refer to MT-24.



2. Press out mainshaft rear bearing.

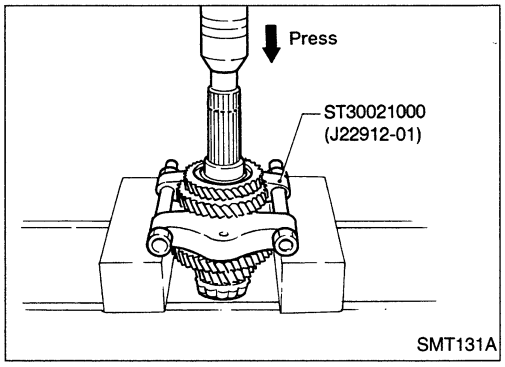


3. Remove thrust washer and snap ring.

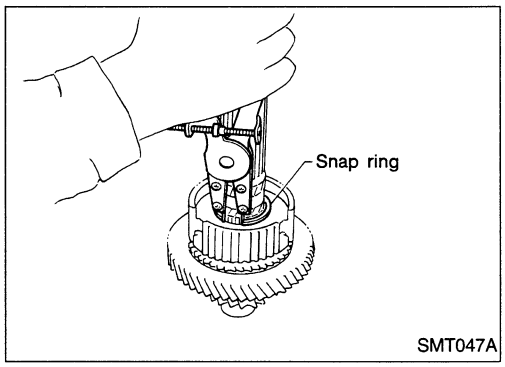


4. Press out 5th main gear and 4th main gear.

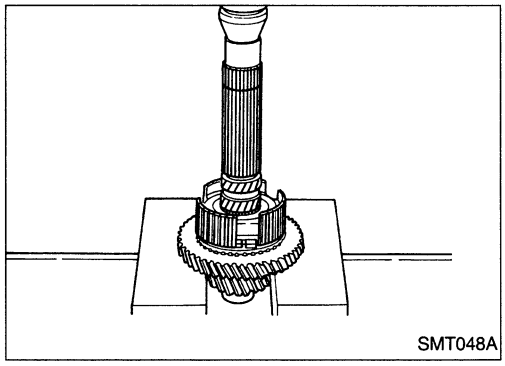
Mainshaft and Gears (Cont'd)



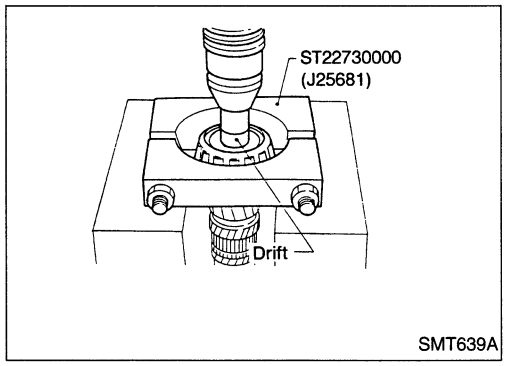
5. Press out 3rd main gear and 2nd main gear.



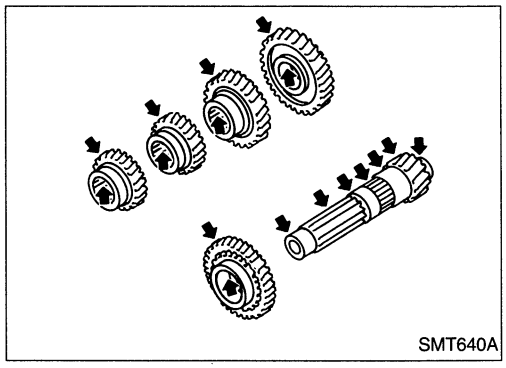
6. Remove snap ring.



7. Remove 1st & 2nd synchronizer and 1st main gear.



8. Remove mainshaft front bearing.

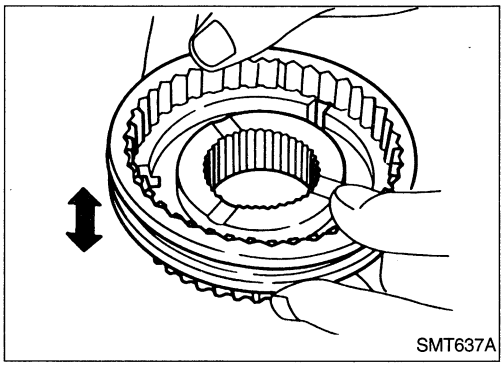


INSPECTION

Gear and shaft

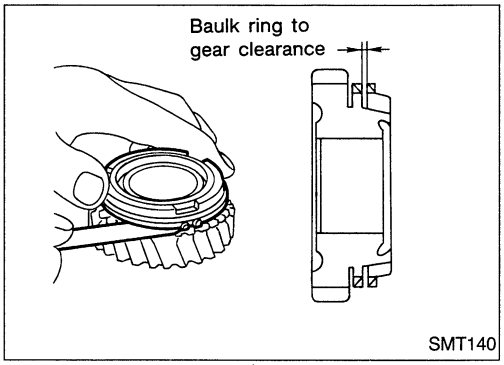
- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.

Mainshaft and Gears (Cont'd)


SMT637A

Synchronizer

- Check spline portion of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check insert springs for deformation.



SMT140

- Measure clearance between baulk ring and gear (1st).

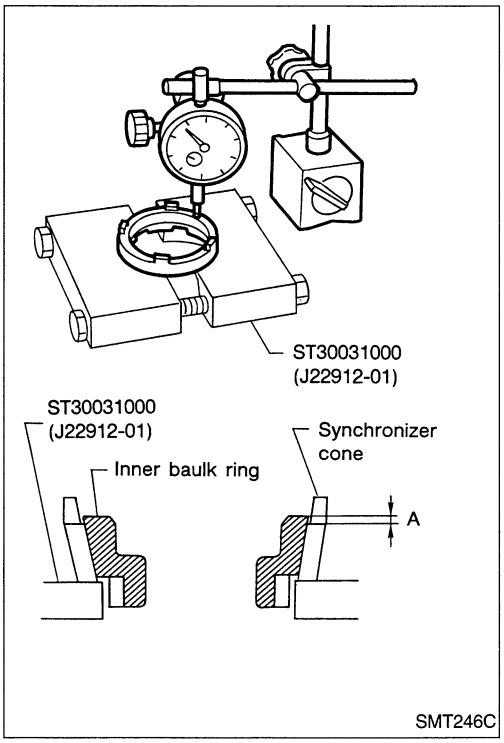
Clearance between baulk ring and gear:

Standard

1.0 - 1.35 mm (0.0394 - 0.0531 in)

Wear limit

0.7 mm (0.028 in)



SMT246C

- Measure wear of 2nd baulk rings.

a. Place baulk rings in position on synchronizer cone.

b. While holding baulk ring against synchronizer cone as far as it will go, measure dimensions "A" and "B".

Standard:

A 0.6 - 0.8 mm (0.024 - 0.031 in)

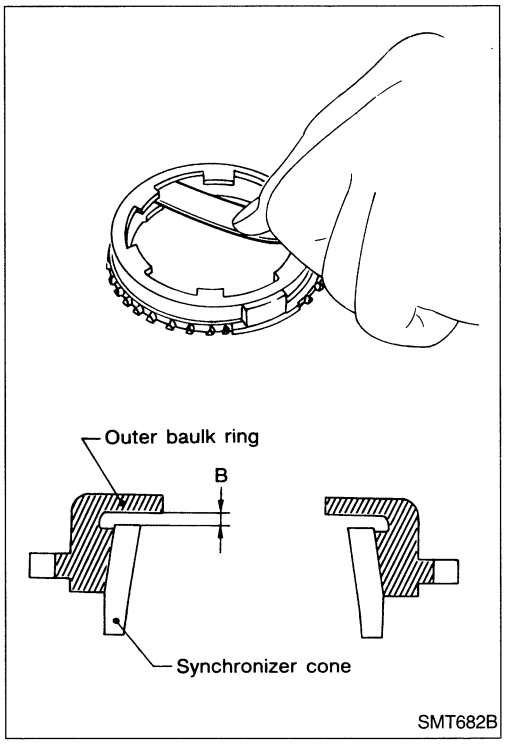
B 0.6 - 1.1 mm (0.024 - 0.043 in)

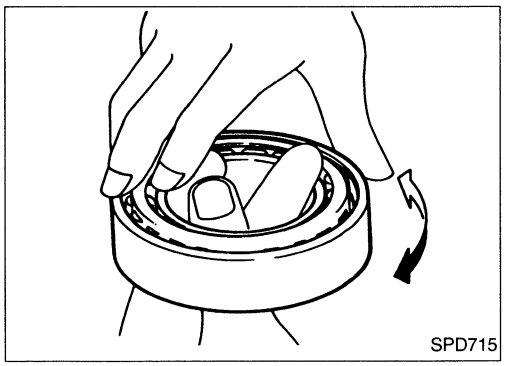
Wear limit:

0.2 mm (0.008 in)

c. If dimension "A" or "B" is smaller than the wear limit, replace baulk ring.

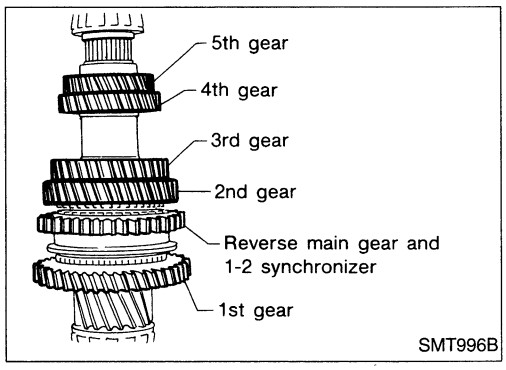
Mainshaft and Gears (Cont'd)



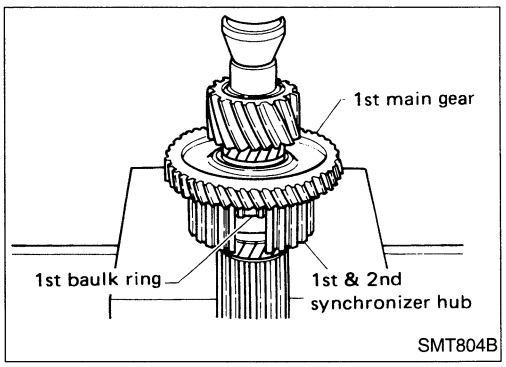


Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing tapered roller bearing, replace outer and inner race as a set.**



ASSEMBLY

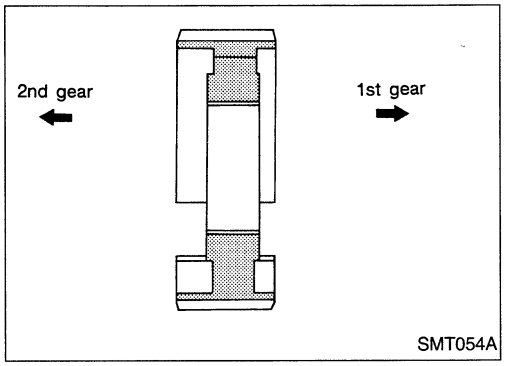


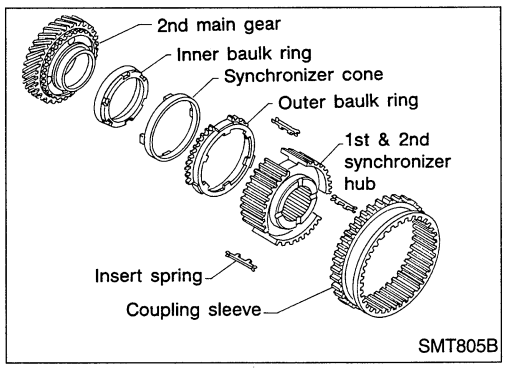
1. Press on 1st main gear, 1st baulk ring and 1st & 2nd synchronizer hub.

- **Pay attention to direction of 1st & 2nd synchronizer hub.**

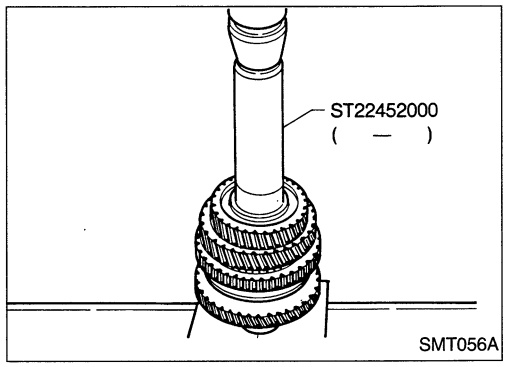
2. Select proper snap ring of 1st & 2nd synchronizer hub to minimize clearance of groove and then install it.

Allowable clearance of groove:
0 - 0.1 mm (0 - 0.004 in)
Snap ring of 1st & 2nd synchronizer hub:
Refer to MT-41.

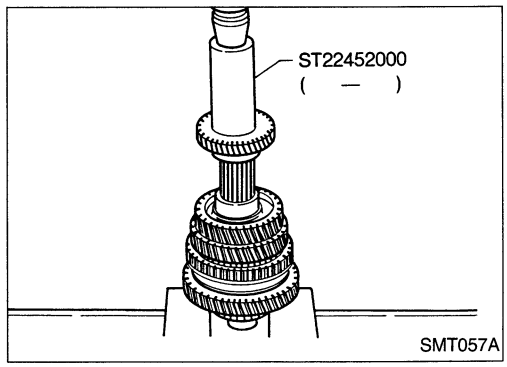




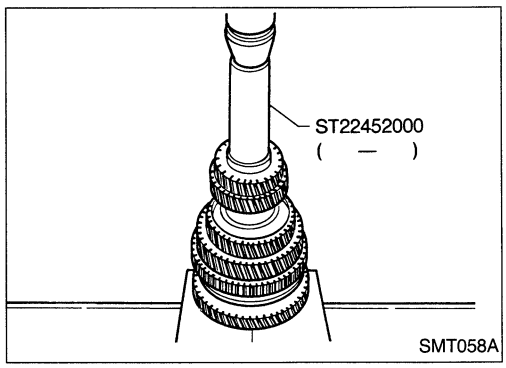
3. Install 2nd synchronizer cone, inner & outer baulk rings. Insert springs and 1st & 2nd coupling sleeve.
4. Install 2nd main gear.
- Ensure four protrusions of 2nd synchronizer cone are set in 2nd main gear holes.



5. Press on 3rd main gear.



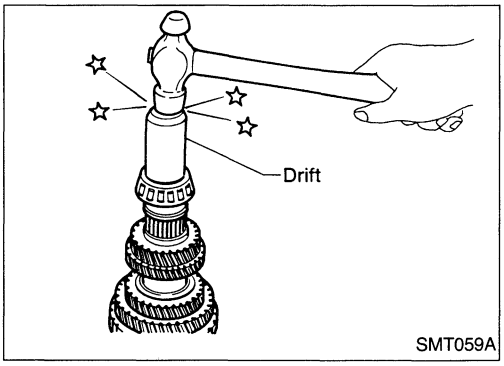
6. Press on 4th main gear.



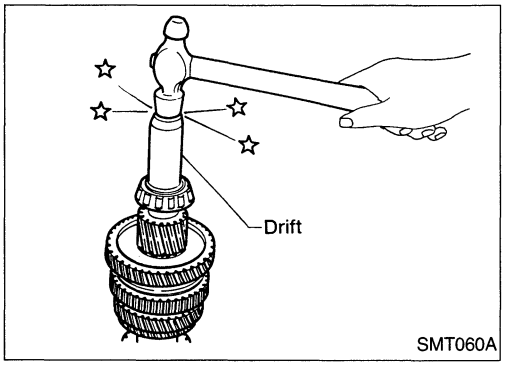
7. Press on 5th main gear.
8. Select proper snap ring of 5th main gear to minimize clearance of groove and then install it.

Allowable clearance of groove:
0 - 0.15 mm (0 - 0.0059 in)
Snap ring of 5th main gear:
Refer to MT-41.

Mainshaft and Gears (Cont'd)



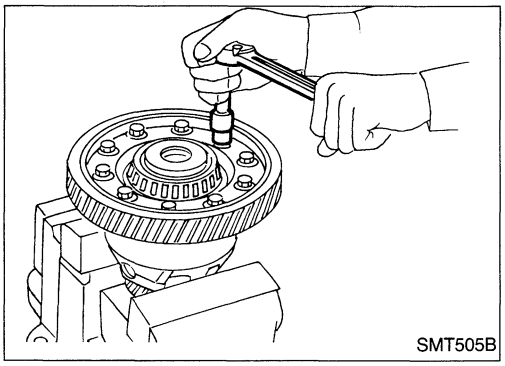
9. Press on thrust washer and press on mainshaft rear bearing.



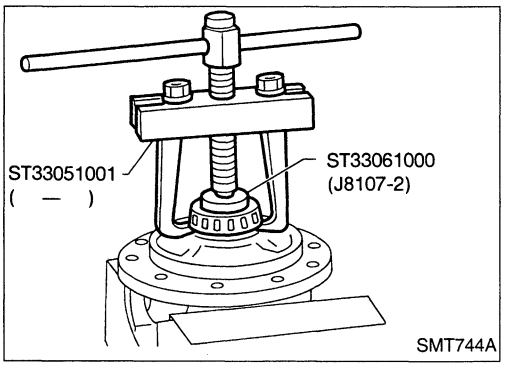
10. Press on mainshaft front bearing.
11. Measure gear end play as the final check — Refer to MT-21.

Final Drive

DISASSEMBLY

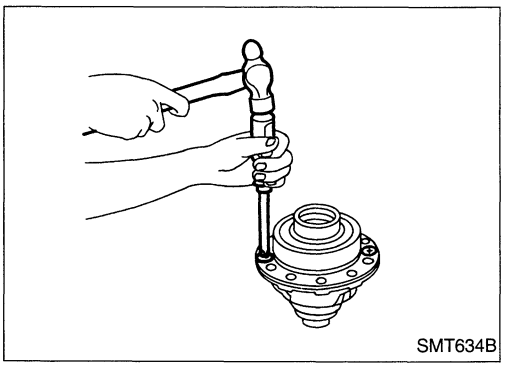


1. Remove final gear.
2. Remove speedometer drive gear by cutting it.



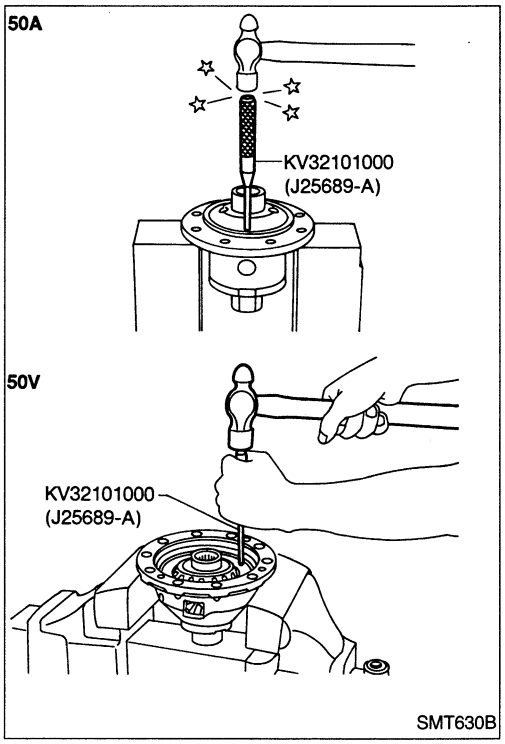
3. Press out differential side bearings.

- **Be careful not to mix up the right and left bearings.**

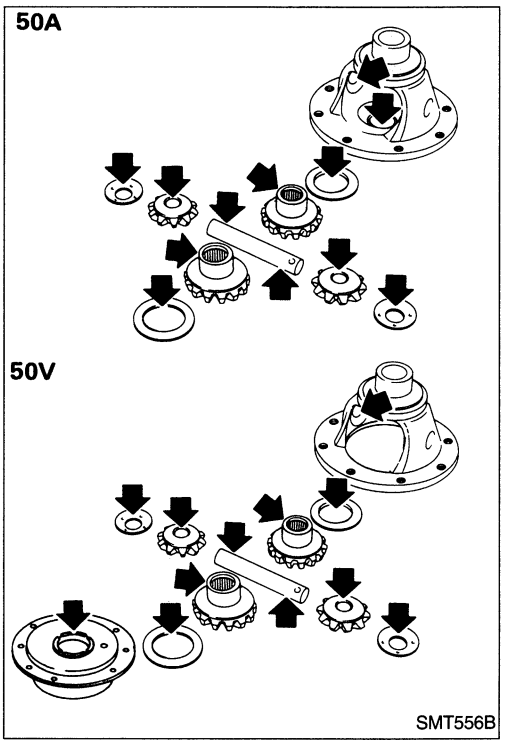


4. Remove viscous coupling — Models with viscous coupling.

Final Drive (Cont'd)



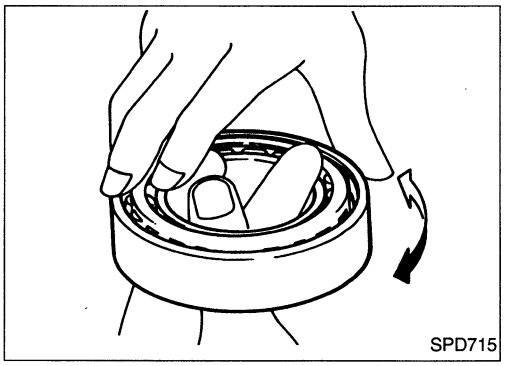
5. Drive out retaining pin and draw out pinion mate shaft.
6. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

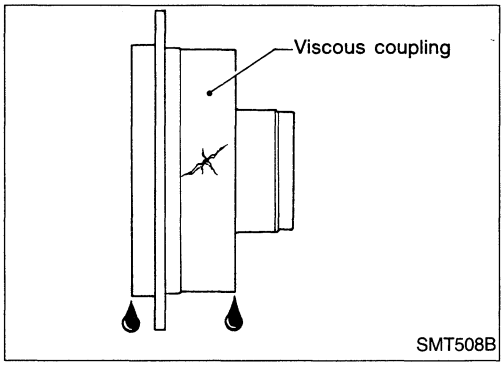
- Check mating surfaces of differential case, viscous coupling, side gears and pinion mate gears.
- Check washers for wear.



Bearing

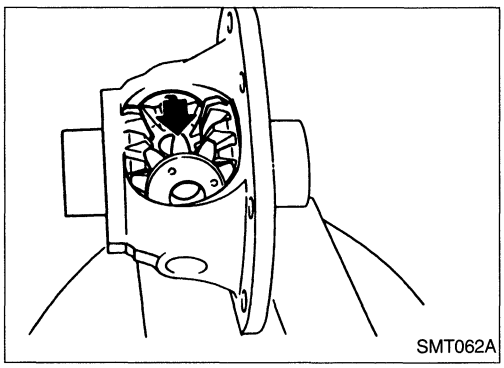
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing tapered roller bearing, replace outer and inner race as a set.**

Final Drive (Cont'd)



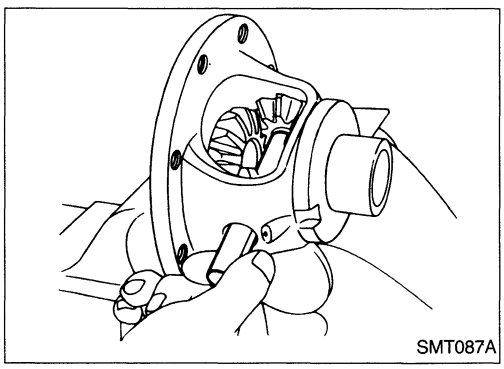
Viscous coupling

- Check case for cracks.
- Check silicone oil for leakage.



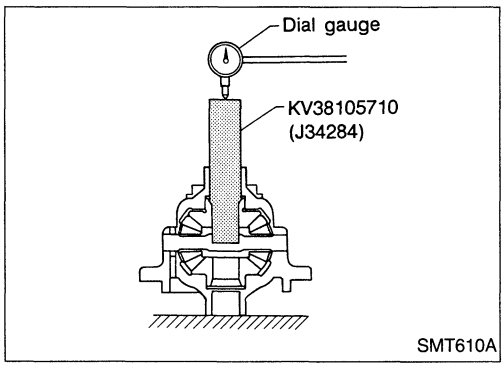
ASSEMBLY

1. Attach side gear thrust washers to side gears, then install pinion mate washers and pinion mate gears in place.



2. Insert pinion mate shaft.

- **When inserting, be careful not to damage pinion mate thrust washers.**



3. Measure clearance between side gear and differential case with washers following the procedure below:

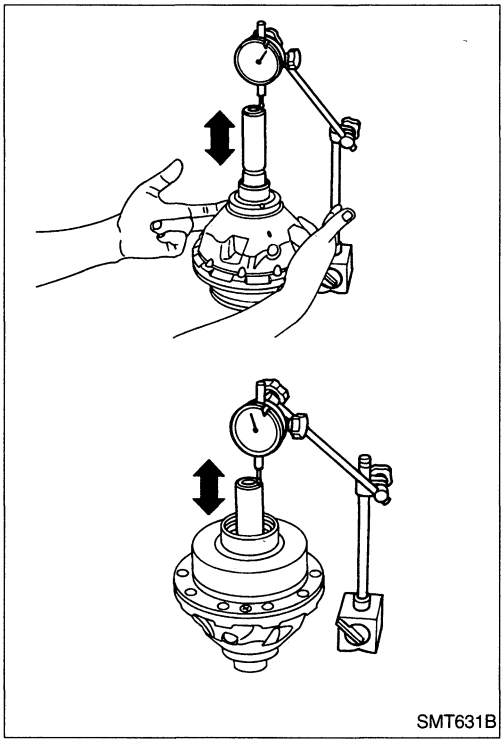
a. Set Tool and dial indicator on side gear.

b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

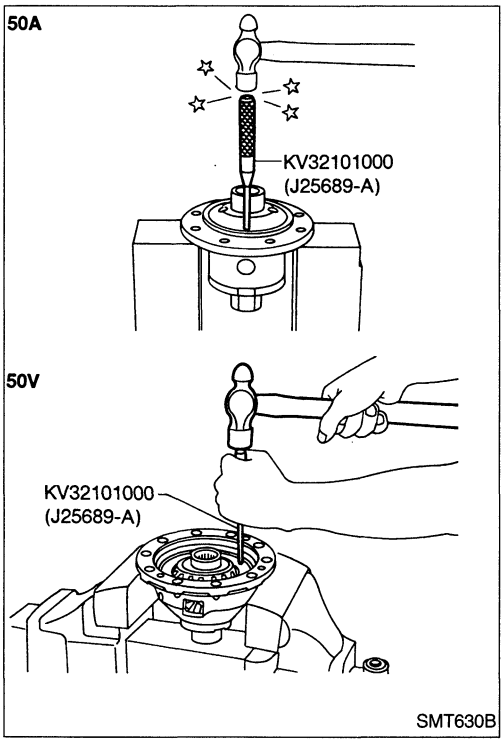
Clearance between side gear and differential case with washers:

0.1 - 0.2 mm (0.004 - 0.008 in)

Final Drive (Cont'd)

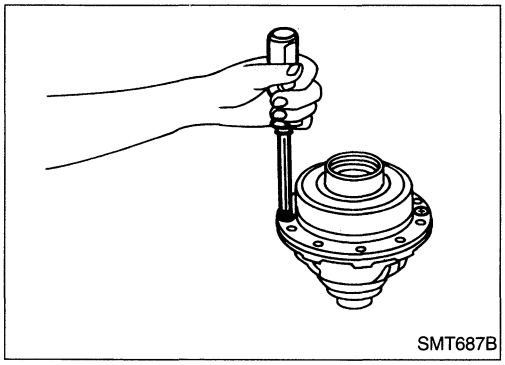

SMT631B

c. If not within specification, adjust clearance by changing thickness of side gear thrust washers.
Side gear thrust washer:
Refer to MT-42.



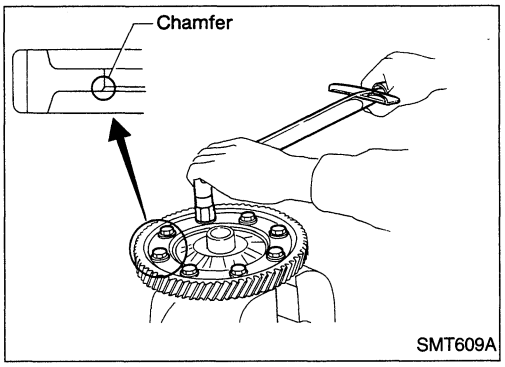
SMT630B

4. Install retaining pin.
- **Make sure that retaining pin is flush with case.**

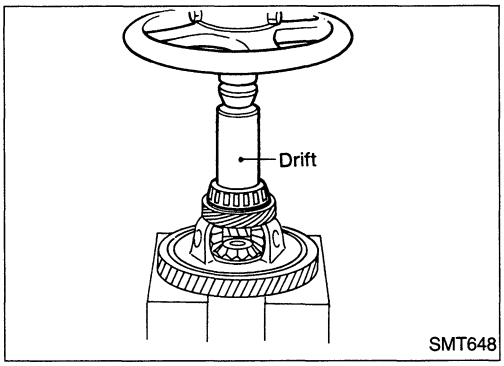

SMT687B

5. Install viscous coupling — Models with viscous coupling.

Final Drive (Cont'd)



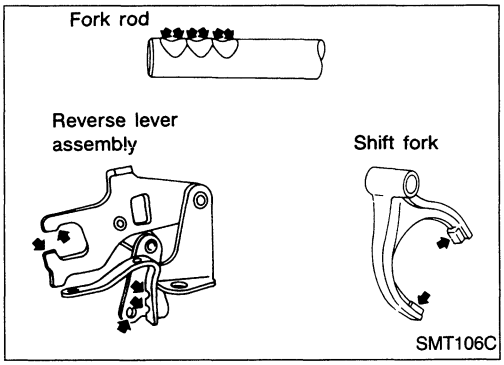
6. Install final gear.
7. Install speedometer drive gear.



8. Press on differential side bearings.

Shift Control Components

INSPECTION

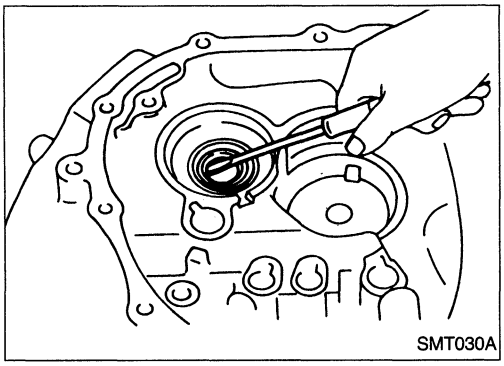


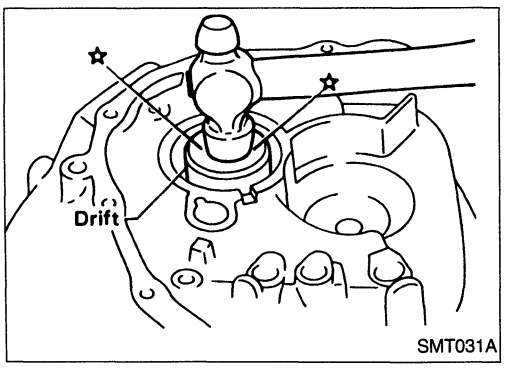
- Check contact surface and sliding surface for wear, scratches, projections or other damage.

Case Components

REMOVAL AND INSTALLATION

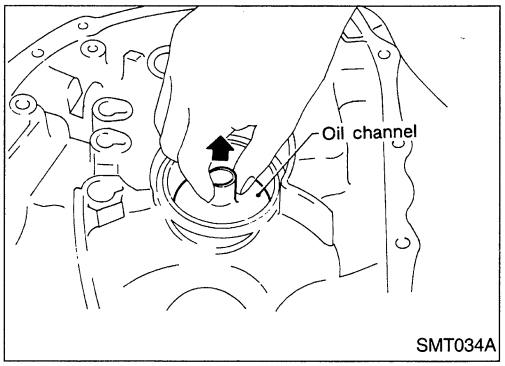
Input shaft oil seal





- **Apply multi-purpose grease to seal lip of oil seal before installing.**

Case Components (Cont'd)



Mainshaft front bearing outer race

Mainshaft rear bearing outer race — Refer to MT-33.
Differential side bearing outer race — Refer to MT-32.

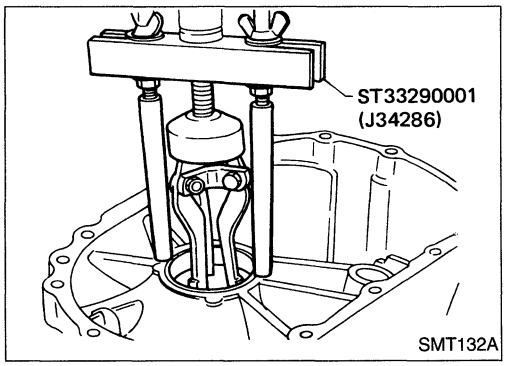
Input Shaft End Play and Differential Side Bearing Preload

If any of the following parts are replaced, adjust input shaft end play.

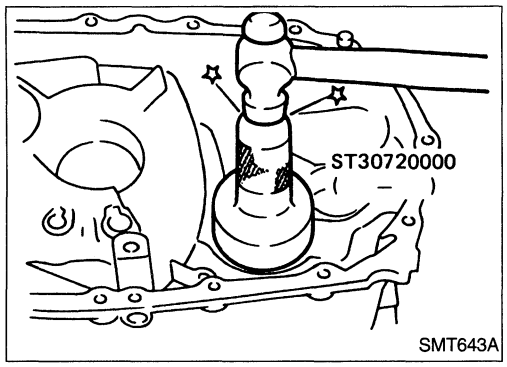
- **Input shaft**
- **Input shaft bearing**
- **Clutch housing**
- **Transmission case**

If any of the following parts are replaced, adjust differential side bearing preload.

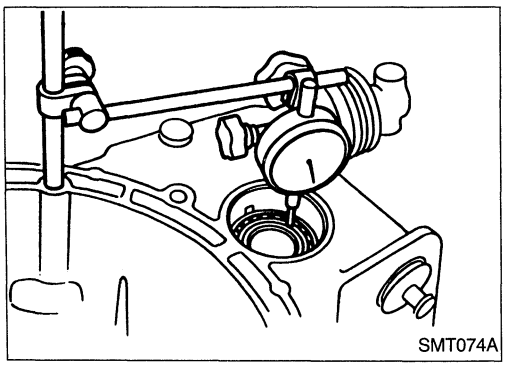
- **Differential case**
- **Differential side bearing**
- **Clutch housing**
- **Transmission case**



1. Remove differential side bearing outer race (transmission case side) and shim(s).



2. Reinstall differential side bearing outer race without shim(s).
3. Install input shaft and final drive assembly on clutch housing.
4. Install transmission case without input shaft bearing shim(s). Tighten it to the specified torque.

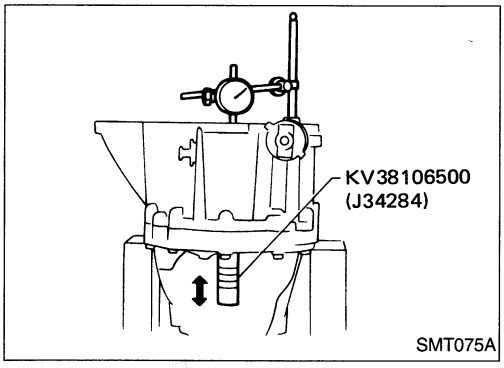


5. Using the following procedures, measure clearance between bearings and transmission case.

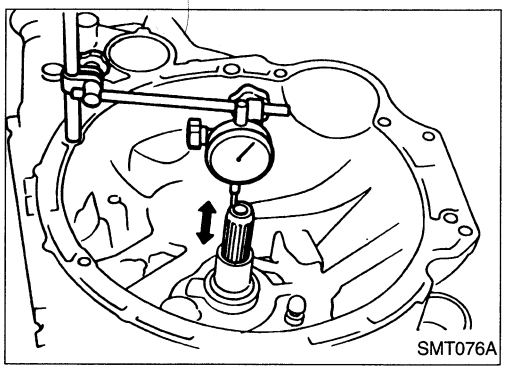
- **Differential side**

a. Attach dial indicator. If clamp diameter of dial indicator is too small or too large, attach dial indicator using a magnetic stand.

Input Shaft End Play and Differential Side Bearing Preload (Cont'd)

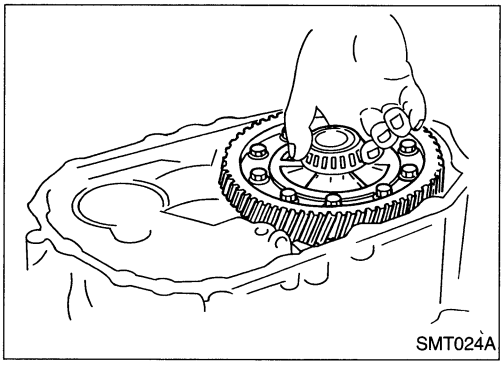


b. Insert Tool all the way into differential side gear. Move Tool up and down and measure dial indicator deflection.

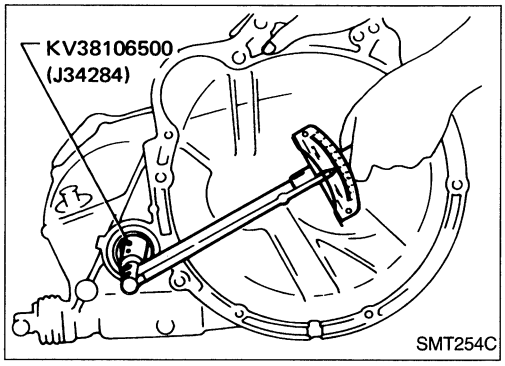


- **Input shaft side**

a. Set dial indicator on rear end of input shaft.
b. Move input shaft up and down and measure dial indicator deflection.
6. Select shims with proper thickness with SDS table as a guide. Refer to MT-43.
7. Install selected differential side bearing adjusting shim and differential side bearing outer race.



8. Check differential side bearing turning torque.
a. Install final drive assembly on clutch housing.
b. Install transmission case on clutch housing.
- **Tighten transmission case fixing bolts to the specified torque.**



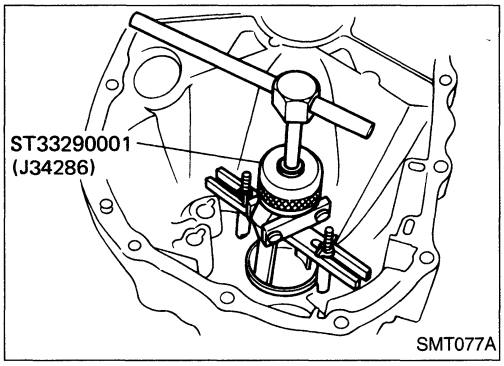
c. Measure turning torque of final drive assembly.
Turning torque of final drive assembly (New bearing):
4.9 - 7.8 N•m (50 - 80 kg-cm, 43 - 69 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

Mainshaft Bearing Preload

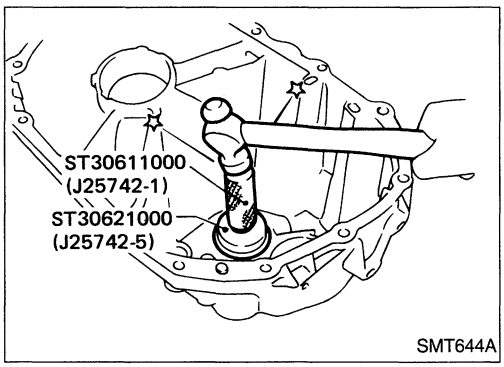
If any of the following parts are replaced, adjust mainshaft bearing preload.

- **Mainshaft**
- **Mainshaft bearings**
- **Clutch housing**
- **Transmission case**

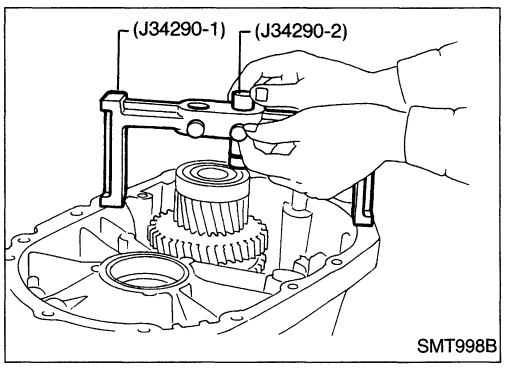
Mainshaft Bearing Preload (Cont'd)



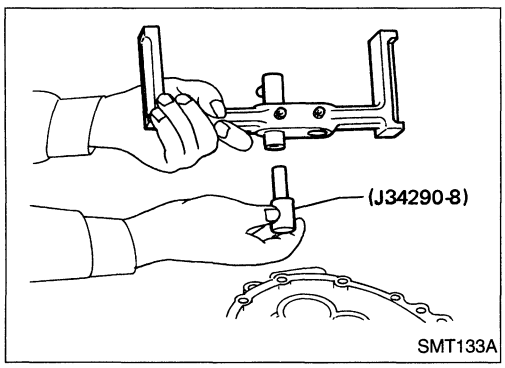
1. Remove mainshaft rear bearing outer race and shim(s).



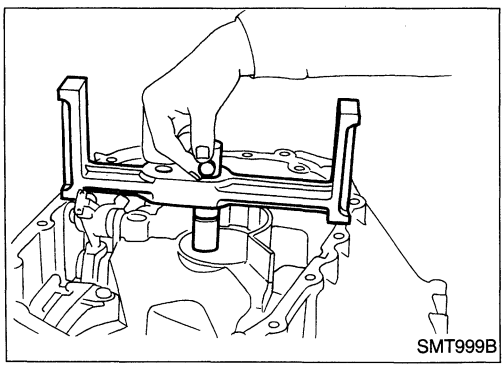
2. Reinstall mainshaft rear bearing outer race without shims.
3. Clean mating surfaces of clutch housing and transmission case with solvent.
4. Install mainshaft and mainshaft front bearing outer race into transmission case. Turn mainshaft while holding bearing outer race so that bearings are properly seated.



5. Place Tools (bridge and gauging cylinder) onto machined surface of transmission case, allowing gauging cylinder to rest on surface of mainshaft front bearing outer race. Use proper screw in bridge to lock gauging cylinder in place.

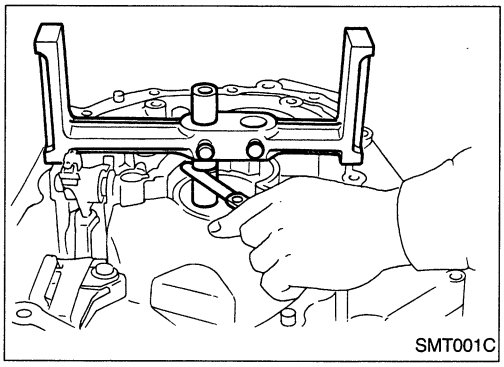


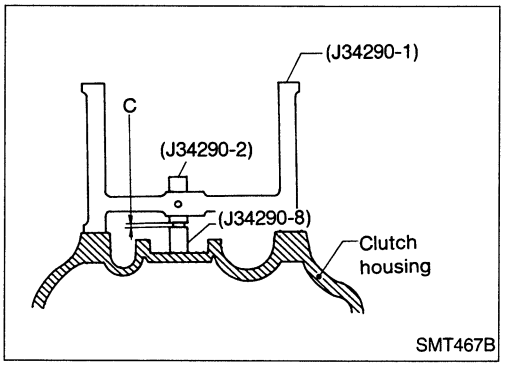
6. Turn bridge over and place Tool (gauging plunger) into gauging cylinder.



7. Place bridge, legs up, onto machined surface of clutch housing and allow gauging plunger to rest upon mating surface where mainshaft front bearing outer race fits.

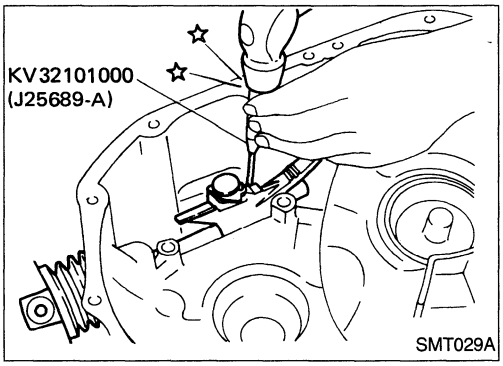
Mainshaft Bearing Preload (Cont'd)


SMT001C

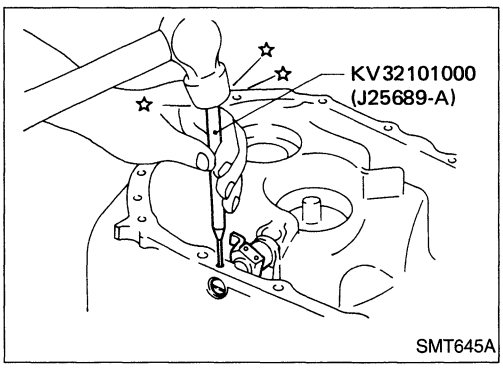


SMT467B

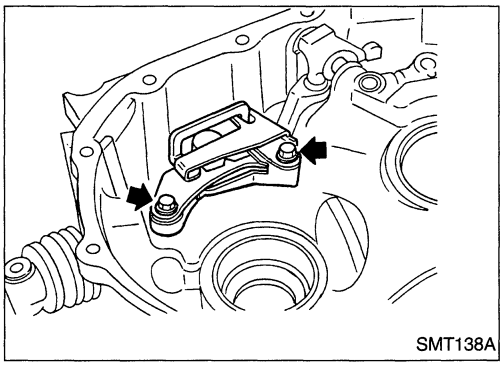
8. Measure with feeler gauge distance between gauging cylinder and shoulder of gauging plunger.
9. Use feeler gauge reading to select correct mainshaft preload shim(s).
   Mainshaft bearing adjusting shim:
   Refer to MT-42.
10. Install selected mainshaft bearing adjusting shim and mainshaft bearing outer race.
11. Check total turning torque after assembly — Refer to MT-36.



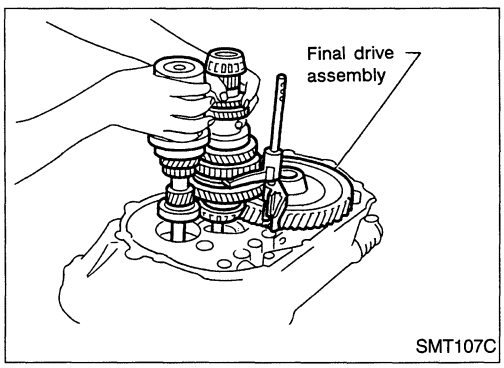
1. Install striking lever and striking rod.



2. Install selector and retaining pin.

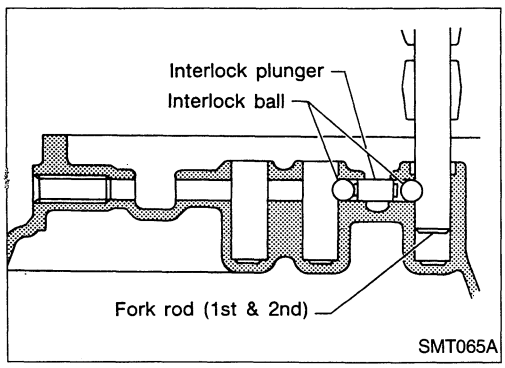


3. Install reverse gate assembly.

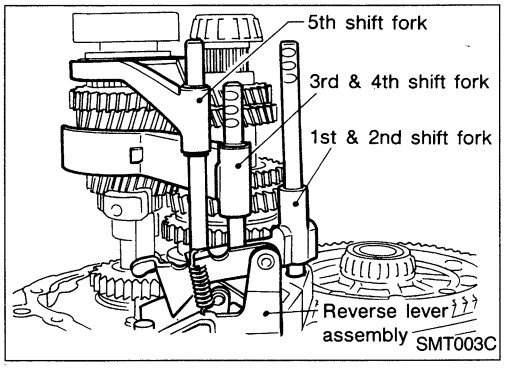


4. Install final drive assembly.
5. Install input shaft and mainshaft with 1st & 2nd shift fork assembly.

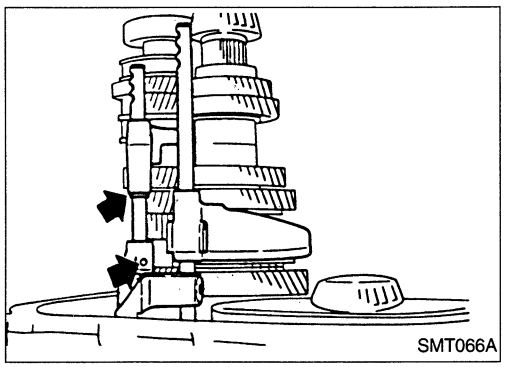
- **Be careful not to damage input shaft oil seal.**

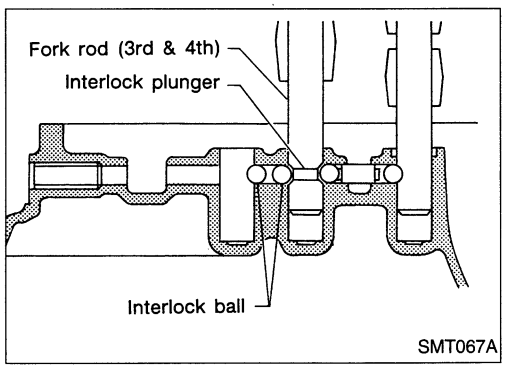


6. Install interlock balls and plunger.

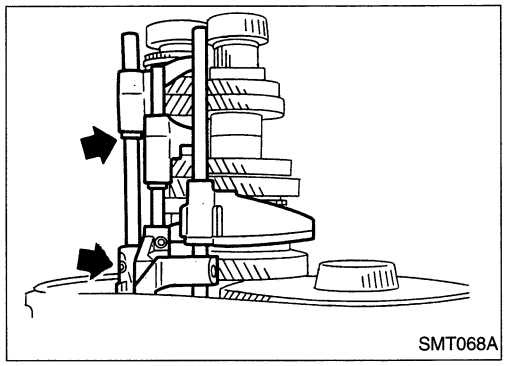


7. Install 3rd & 4th shift fork and bracket, then install 3rd & 4th shift rod, stopper ring and retaining pin.

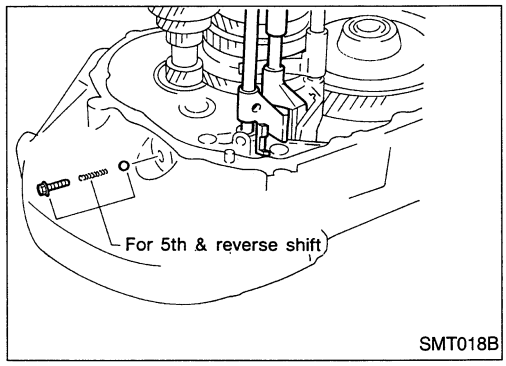




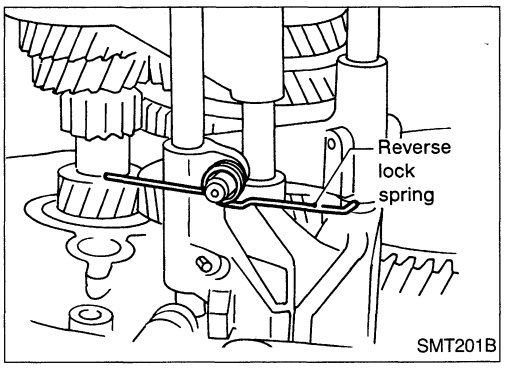
8. Install interlock balls.



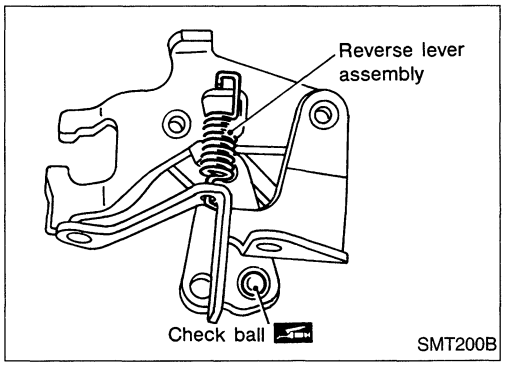
9. Install 5th shift fork and bracket, then install shift rod, stopper ring and retaining pin.



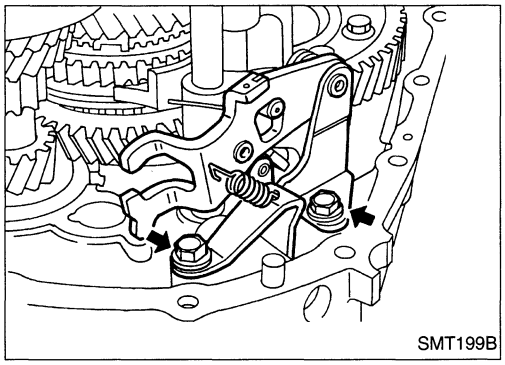
10. Install 5th & reverse check plug, spring and ball.



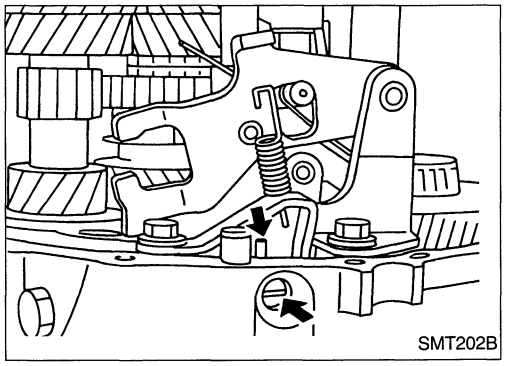
11. Install reverse lock spring on 5th & reverse bracket.
- **Pay attention to its direction.**



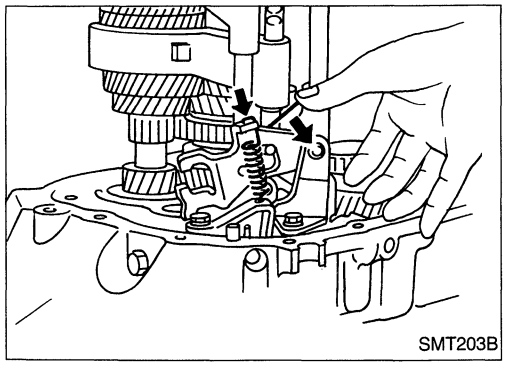
12. Install check ball and reverse lever spring on reverse lever assembly.
- **Apply multi-purpose grease to check ball.**
- **Pay attention to direction of reverse lever spring.**



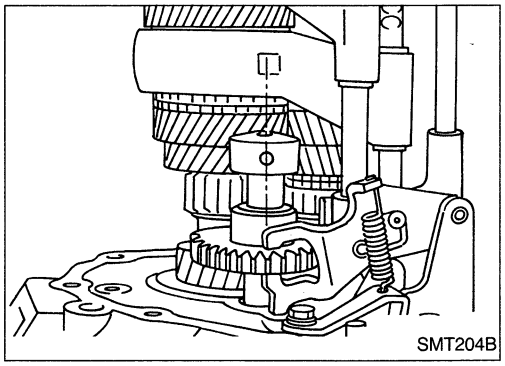
13. Install reverse lever assembly on clutch housing.



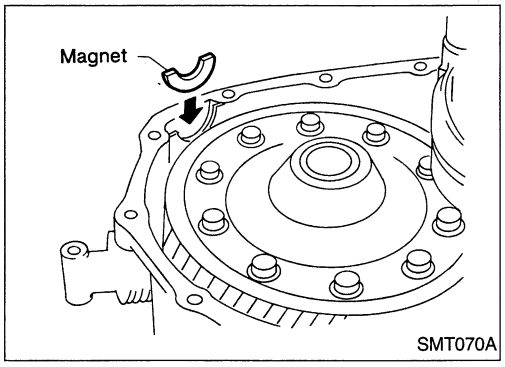
14. Install reverse arm shaft and retaining pin.



15. Hook reverse lock spring and reverse lever spring on reverse lever assembly.

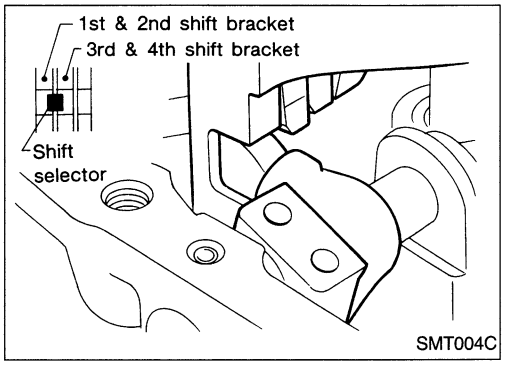

SMT204B

16. Mesh 4th gear, then install reverse idler gear and shaft.
- **Pay attention to direction of tapped hole.**



SMT070A

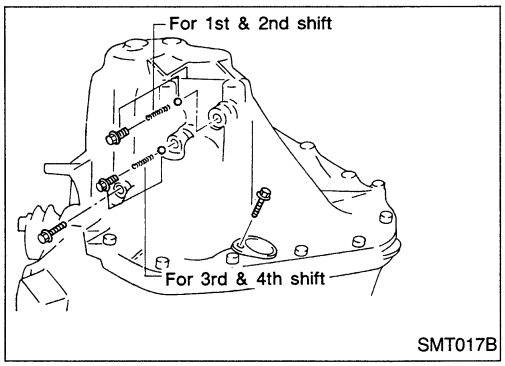
17. Place magnet on clutch housing.



SMT004C

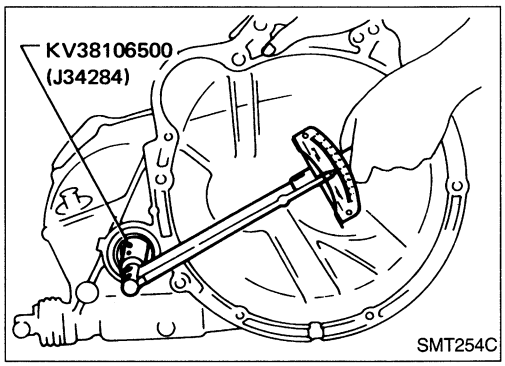
18. If bearing preload was adjusted, install selected shim(s) into transmission case.
- **To aid in installation of transmission case, place shift selector in the 1st & 2nd shift bracket or between 1st & 2nd bracket and 3rd & 4th bracket.**

19. Apply sealant to mating surface of transmission case and install it.
20. Install position switch.



SMT017B

21. Apply sealant to threads of check plugs. Install balls, springs and plugs.
22. After assembly, check that you can shift into each gear smoothly.



SMT254C

23. Measure total turning torque.
Total turning torque (New bearing):
8.8 - 21.6 N•m (90 - 220 kg-cm, 78 - 191 in-lb)
- **When old bearing is used again, preload will be slightly less than the above. Make sure torque is close to the specified range.**

General Specifications

TRANSAXLE

Engine			KA24DE	
Transaxle model			RS5F50A	RS5F50V
Number of speeds			5	
Synchromesh type			Warner	
Shift pattern				
Gear ratio		1st	3.285	
		2nd	1.850	
		3rd	1.206	
		4th	0.954	
		5th	0.740	
		Rev.	3.428	
Number of teeth	Input gear	1st	14	
		2nd	20	
		3rd	29	
		4th	44	
		5th	50	
		Rev.	14	
	Main gear	1st	46	
		2nd	37	
		3rd	35	
		4th	42	
		5th	37	
		Rev.	48	
	Reverse idler gear		29	
Oil capacity ℓ (US pt, Imp pt)			4.7 (10, 8-1/4)	

FINAL GEAR

Transaxle model	RS5F50A	RS5F50V, RS5F50A
Final gear ratio	3.650	3.895
Number of teeth		
Final gear/Pinion	73/20	74/19
Side gear/Pinion	16/10	16/10

Inspection and Adjustment

GEAR END PLAY

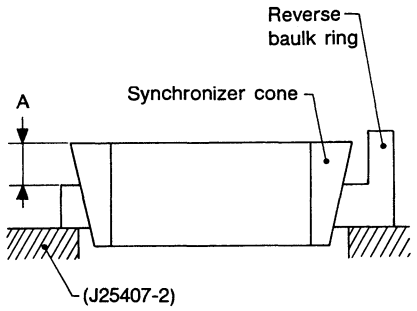
Gear	End play mm (in)
1st main gear	0.23 - 0.43 (0.0091 - 0.0169)
2nd main gear	0.23 - 0.58 (0.0091 - 0.0228)
3rd input gear	0.23 - 0.43 (0.0091 - 0.0169)
4th input gear	0.25 - 0.55 (0.0098 - 0.0217)
5th input gear	0.23 - 0.48 (0.0091 - 0.0189)

CLEARANCE BETWEEN BAULK RING AND GEAR 1ST, 3RD, 4TH, & 5TH

Unit: mm (in)

	Standard	Wear limit
1st	1.0 - 1.35 (0.0394 - 0.0531)	0.7 (0.028)
3rd & 4th	1.0 - 1.35 (0.0394 - 0.0531)	0.7 (0.028)
5th	1.0 - 1.35 (0.0394 - 0.0531)	0.7 (0.028)

REVERSE BAULK RING

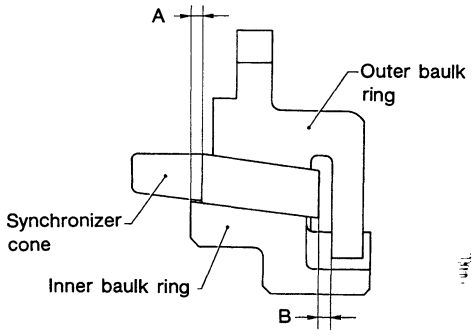


SMT581B

Dimension	Wear limit
A	1.2 mm (0.047 in)

2nd baulk ring

Unit: mm (in)



SMT806B

Dimension	Standard	Wear limit
A	0.6 - 0.8 (0.024 - 0.031)	0.2 (0.008)
B	0.6 - 1.1 (0.024 - 0.043)	

AVAILABLE SNAP RING

3rd & 4th synchronizer hub (At input shaft)

Allowable clearance	0 - 0.1 mm (0 - 0.004 in)
Thickness mm (in)	Part number
1.95 (0.0768)	32269-03E03
2.00 (0.0787)	32269-03E00
2.05 (0.0807)	32269-03E01
2.10 (0.0827)	32269-03E02

1st & 2nd synchronizer hub

Allowable clearance	0 - 0.1 mm (0 - 0.004 in)
Thickness mm (in)	Part number
1.95 (0.0768)	32269-03E03
2.00 (0.0787)	32269-03E00
2.05 (0.0807)	32269-03E01
2.10 (0.0827)	32269-03E02

5th main gear

Allowable clearance	0 - 0.15 mm (0 - 0.0059 in)
Thickness mm (in)	Part number
1.95 (0.0768)	32348-05E00
2.05 (0.0807)	32348-05E01
2.15 (0.0846)	32348-05E02
2.55 (0.1004)	32348-05E03

Inspection and Adjustment (Cont'd)

AVAILABLE WASHER

Input shaft thrust washer

Allowable clearance	0 - 0.06 mm (0 - 0.0024 in)
Thickness mm (in)	Part number
4.500 (0.1772)	32278-03E01
4.525 (0.1781)	32278-03E02
4.550 (0.1791)	32278-03E03
4.575 (0.1801)	32278-03E04

Differential side gear thrust washer — RS5F50A

Allowable clearance between side gear and differential case with washer	0.1 - 0.2 mm (0.004 - 0.008 in)
Thickness mm (in)	Part number
0.75 (0.0295)	38424-E3020
0.80 (0.0315)	38424-E3021
0.85 (0.0335)	38424-E3022
0.90 (0.0354)	38424-E3023

Differential side gear thrust washer — RS5F50V

Allowable clearance between side gear and (differential case or viscous coupling) with washer		0.1 - 0.2 mm (0.004 - 0.008 in)
	Thickness mm (in)	Part number
Differential case side	0.75 - 0.80 (0.0295 - 0.0315)	38424-E3000
	0.80 - 0.85 (0.0315 - 0.0335)	38424-E3001
	0.85 - 0.90 (0.0335 - 0.0354)	38424-E3002
	0.90 - 0.95 (0.0354 - 0.0374)	38424-E3003
Viscous coupling side	0.43 - 0.45 (0.0169 - 0.0177)	38424-51E10
	0.52 - 0.54 (0.0205 - 0.0213)	38424-51E11
	0.61 - 0.63 (0.0240 - 0.0248)	38424-51E12
	0.70 - 0.72 (0.0276 - 0.0283)	38424-51E13
	0.79 - 0.81 (0.0311 - 0.0319)	38424-51E14

AVAILABLE SHIM

— INPUT SHAFT END PLAY AND MAINSHAFT AND DIFFERENTIAL SIDE BEARING PRELOAD AND ADJUSTING SHIM

Bearing preload and end play

Unit: mm (in)

Mainshaft bearing preload	0.25 - 0.30 (0.0098 - 0.0118)
Input shaft end play	0 - 0.06 (0 - 0.0024)
Differential side bearing preload	0.40 - 0.45 (0.0157 - 0.0177)

Turning torque (New bearing)

Unit: N•m (kg-cm, in-lb)

Final drive only	4.9 - 7.8 (50 - 80, 43 - 69)
Total	8.8 - 21.6 (90 - 220, 78 - 191)

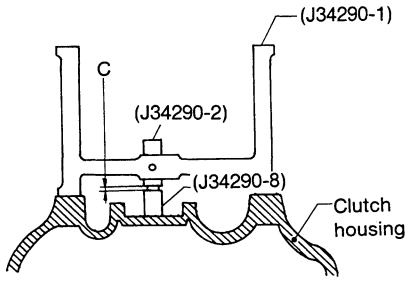
Mainshaft bearing adjusting shim

Thickness mm (in)	Part number
0.40 (0.0157)	32139-03E11
0.44 (0.0173)	32139-03E00
0.48 (0.0189)	32139-03E01
0.52 (0.0205)	32139-03E12
0.56 (0.0220)	32139-03E02
0.60 (0.0236)	32139-03E03
0.64 (0.0252)	32139-03E04
0.68 (0.0268)	32139-03E05
0.72 (0.0283)	32139-03E06
0.76 (0.0299)	32139-03E07
0.80 (0.0315)	32139-03E08
1.20 (0.0472)	32139-03E13

Inspection and Adjustment (Cont'd)

Table for selecting mainshaft adjusting shim

Unit: mm (in)



SMT467B

Dimension "C"	Suitable shim(s)
0.30 - 0.34 (0.0118 - 0.0134)	0.60 (0.0236)
0.34 - 0.38 (0.0134 - 0.0150)	0.64 (0.0252)
0.38 - 0.42 (0.0150 - 0.0165)	0.68 (0.0268)
0.42 - 0.46 (0.0165 - 0.0181)	0.72 (0.0283)
0.46 - 0.50 (0.0181 - 0.0197)	0.76 (0.0299)
0.50 - 0.54 (0.0197 - 0.0213)	0.80 (0.0315)
0.54 - 0.58 (0.0213 - 0.0228)	0.40 + 0.44 (0.0157 + 0.0173)
0.58 - 0.62 (0.0228 - 0.0244)	0.44 + 0.44 (0.0173 + 0.0173)
0.62 - 0.66 (0.0244 - 0.0260)	0.44 + 0.48 (0.0173 + 0.0189)
0.66 - 0.70 (0.0260 - 0.0276)	0.48 + 0.48 (0.0189 + 0.0189)
0.70 - 0.74 (0.0276 - 0.0291)	0.48 + 0.52 (0.0189 + 0.0205)
0.74 - 0.78 (0.0291 - 0.0307)	0.52 + 0.52 (0.0205 + 0.0205)
0.78 - 0.82 (0.0307 - 0.0323)	0.52 + 0.56 (0.0205 + 0.0220)
0.82 - 0.86 (0.0323 - 0.0339)	0.56 + 0.56 (0.0220 + 0.0220)
0.86 - 0.90 (0.0339 - 0.0354)	0.56 + 0.60 (0.0220 + 0.0236)
0.90 - 0.94 (0.0354 - 0.0370)	0.60 + 0.60 (0.0236 + 0.0236)
0.94 - 0.98 (0.0370 - 0.0386)	0.60 + 0.64 (0.0236 + 0.0252)
0.98 - 1.02 (0.0386 - 0.0402)	0.64 + 0.64 (0.0252 + 0.0252)
1.02 - 1.06 (0.0402 - 0.0417)	0.64 + 0.68 (0.0252 + 0.0268)
1.06 - 1.10 (0.0417 - 0.0433)	0.68 + 0.68 (0.0268 + 0.0268)
1.10 - 1.14 (0.0433 - 0.0449)	0.68 + 0.72 (0.0268 + 0.0283)
1.14 - 1.18 (0.0449 - 0.0465)	0.72 + 0.72 (0.0283 + 0.0283)
1.18 - 1.22 (0.0465 - 0.0480)	0.72 + 0.76 (0.0283 + 0.0299)
1.22 - 1.26 (0.0480 - 0.0496)	0.76 + 0.76 (0.0299 + 0.0299)
1.26 - 1.30 (0.0496 - 0.0512)	0.76 + 0.80 (0.0299 + 0.0315)
1.30 - 1.34 (0.0512 - 0.0528)	0.80 + 0.80 (0.0315 + 0.0315)
1.34 - 1.38 (0.0528 - 0.0543)	0.44 + 1.20 (0.0173 + 0.0472)
1.38 - 1.42 (0.0543 - 0.0559)	0.48 + 1.20 (0.0189 + 0.0472)
1.42 - 1.46 (0.0559 - 0.0575)	0.52 + 1.20 (0.0205 + 0.0472)
1.46 - 1.50 (0.0575 - 0.0591)	0.56 + 1.20 (0.0220 + 0.0472)

Input shaft bearing adjusting shim

Thickness mm (in)	Part number
0.40 (0.0157)	32225-08E00
0.44 (0.0173)	32225-08E01
0.48 (0.0189)	32225-08E02
0.52 (0.0205)	32225-08E03
0.56 (0.0220)	32225-08E04
0.60 (0.0236)	32225-08E05
0.64 (0.0252)	32225-08E06
0.68 (0.0268)	32225-08E07
0.72 (0.0283)	32225-08E08
0.76 (0.0299)	32225-08E09
0.80 (0.0315)	32225-08E10
1.20 (0.0472)	32225-08E11

Table for selecting input shaft bearing adjusting shim

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.65 - 0.69 (0.0256 - 0.0272)	0.64 (0.0252)
0.69 - 0.73 (0.0272 - 0.0287)	0.68 (0.0268)
0.73 - 0.77 (0.0287 - 0.0303)	0.72 (0.0283)
0.77 - 0.81 (0.0303 - 0.0319)	0.76 (0.0299)
0.81 - 0.85 (0.0319 - 0.0335)	0.80 (0.0315)
0.85 - 0.89 (0.0335 - 0.0350)	0.40 + 0.44 (0.0157 + 0.0173)
0.89 - 0.93 (0.0350 - 0.0366)	0.44 + 0.44 (0.0173 + 0.0173)
0.93 - 0.97 (0.0366 - 0.0382)	0.44 + 0.48 (0.0173 + 0.0189)
0.97 - 1.01 (0.0382 - 0.0398)	0.48 + 0.48 (0.0189 + 0.0189)
1.01 - 1.05 (0.0398 - 0.0413)	0.48 + 0.52 (0.0189 + 0.0205)
1.05 - 1.09 (0.0413 - 0.0429)	0.52 + 0.52 (0.0205 + 0.0205)
1.09 - 1.13 (0.0429 - 0.0445)	0.52 + 0.56 (0.0205 + 0.0220)
1.13 - 1.17 (0.0445 - 0.0461)	0.56 + 0.56 (0.0220 + 0.0220)
1.17 - 1.21 (0.0461 - 0.0476)	0.56 + 0.60 (0.0220 + 0.0236)
1.21 - 1.25 (0.0476 - 0.0492)	0.60 + 0.60 (0.0236 + 0.0236)
1.25 - 1.29 (0.0492 - 0.0508)	0.60 + 0.64 (0.0236 + 0.0252)
1.29 - 1.33 (0.0508 - 0.0524)	0.64 + 0.64 (0.0252 + 0.0252)
1.33 - 1.37 (0.0524 - 0.0539)	0.64 + 0.68 (0.0252 + 0.0268)
1.37 - 1.41 (0.0539 - 0.0555)	0.68 + 0.68 (0.0268 + 0.0268)
1.41 - 1.45 (0.0555 - 0.0571)	0.68 + 0.72 (0.0268 + 0.0283)
1.45 - 1.49 (0.0571 - 0.0587)	0.72 + 0.72 (0.0283 + 0.0283)
1.49 - 1.53 (0.0587 - 0.0602)	0.72 + 0.76 (0.0283 + 0.0299)
1.53 - 1.57 (0.0602 - 0.0618)	0.76 + 0.76 (0.0299 + 0.0299)
1.57 - 1.61 (0.0618 - 0.0634)	0.76 + 0.80 (0.0299 + 0.0315)
1.61 - 1.65 (0.0634 - 0.0650)	0.80 + 0.80 (0.0315 + 0.0315)
1.65 - 1.69 (0.0650 - 0.0665)	0.44 + 1.20 (0.0173 + 0.0472)

Inspection and Adjustment (Cont'd)

Differential side bearing adjusting shim — RS5F50A

Thickness mm (in)	Part number
0.40 (0.0157)	38453-03E11
0.44 (0.0173)	38453-03E00
0.48 (0.0189)	38453-03E01
0.52 (0.0205)	38453-03E12
0.56 (0.0220)	38453-03E02
0.60 (0.0236)	38453-03E03
0.64 (0.0252)	38453-03E04
0.68 (0.0268)	38453-03E05
0.72 (0.0283)	38453-03E06
0.76 (0.0299)	38453-03E07
0.80 (0.0315)	38453-03E08
1.20 (0.0472)	38453-03E13

Table for selecting differential side bearing adjusting shim(s) — RS5F50A

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.47 - 0.51 (0.0185 - 0.0201)	0.44 + 0.48 (0.0173 + 0.0189)
0.51 - 0.55 (0.0201 - 0.0217)	0.48 + 0.48 (0.0189 + 0.0189)
0.55 - 0.59 (0.0217 - 0.0232)	0.48 + 0.52 (0.0189 + 0.0205)
0.59 - 0.63 (0.0232 - 0.0248)	0.52 + 0.52 (0.0205 + 0.0205)
0.63 - 0.67 (0.0248 - 0.0264)	0.52 + 0.56 (0.0205 + 0.0220)
0.67 - 0.71 (0.0264 - 0.0280)	0.56 + 0.56 (0.0220 + 0.0220)
0.71 - 0.75 (0.0280 - 0.0295)	0.56 + 0.60 (0.0220 + 0.0236)
0.75 - 0.79 (0.0295 - 0.0311)	0.60 + 0.60 (0.0236 + 0.0236)
0.79 - 0.83 (0.0311 - 0.0327)	0.60 + 0.64 (0.0236 + 0.0252)
0.83 - 0.87 (0.0327 - 0.0343)	0.64 + 0.64 (0.0252 + 0.0252)
0.87 - 0.91 (0.0343 - 0.0358)	0.64 + 0.68 (0.0252 + 0.0268)
0.91 - 0.95 (0.0358 - 0.0374)	0.68 + 0.68 (0.0268 + 0.0268)
0.95 - 0.99 (0.0374 - 0.0390)	0.68 + 0.72 (0.0268 + 0.0283)
0.99 - 1.03 (0.0390 - 0.0406)	0.72 + 0.72 (0.0283 + 0.0283)
1.03 - 1.07 (0.0406 - 0.0421)	0.72 + 0.76 (0.0283 + 0.0299)
1.07 - 1.11 (0.0421 - 0.0437)	0.76 + 0.76 (0.0299 + 0.0299)
1.11 - 1.15 (0.0437 - 0.0453)	0.76 + 0.80 (0.0299 + 0.0315)
1.15 - 1.19 (0.0453 - 0.0469)	0.80 + 0.80 (0.0315 + 0.0315)
1.19 - 1.23 (0.0469 - 0.0484)	0.44 + 1.20 (0.0173 + 0.0472)
1.23 - 1.27 (0.0484 - 0.0500)	0.48 + 1.20 (0.0189 + 0.0472)
1.27 - 1.31 (0.0500 - 0.0516)	0.52 + 1.20 (0.0205 + 0.0472)

Differential side bearing adjusting shim — RS5F50V

Thickness mm (in)	Part number
0.36 (0.0142)	38753-56E00
0.40 (0.0157)	38753-56E01
0.44 (0.0173)	38753-56E02
0.48 (0.0189)	38753-56E03
0.52 (0.0205)	38753-56E04
0.56 (0.0220)	38753-56E05
0.60 (0.0236)	38753-56E06
0.64 (0.0252)	38753-56E07
0.68 (0.0268)	38753-56E08
0.72 (0.0283)	38753-56E09
0.76 (0.0299)	38753-56E10
0.80 (0.0315)	38753-56E11
0.84 (0.0331)	38753-56E12
0.88 (0.0346)	38753-56E13
0.92 (0.0362)	38753-56E14

Table for selecting differential side bearing adjusting shim(s) — RS5F50V

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.47 - 0.51 (0.0185 - 0.0201)	0.44 + 0.48 (0.0173 + 0.0189)
0.51 - 0.55 (0.0201 - 0.0217)	0.48 + 0.48 (0.0189 + 0.0189)
0.55 - 0.59 (0.0217 - 0.0232)	0.48 + 0.52 (0.0189 + 0.0205)
0.59 - 0.63 (0.0232 - 0.0248)	0.52 + 0.52 (0.0205 + 0.0205)
0.63 - 0.67 (0.0248 - 0.0264)	0.52 + 0.56 (0.0205 + 0.0220)
0.67 - 0.71 (0.0264 - 0.0280)	0.56 + 0.56 (0.0220 + 0.0220)
0.71 - 0.75 (0.0280 - 0.0295)	0.56 + 0.60 (0.0220 + 0.0236)
0.75 - 0.79 (0.0295 - 0.0311)	0.60 + 0.60 (0.0236 + 0.0236)
0.79 - 0.83 (0.0311 - 0.0327)	0.60 + 0.64 (0.0236 + 0.0252)
0.83 - 0.87 (0.0327 - 0.0343)	0.64 + 0.64 (0.0252 + 0.0252)
0.87 - 0.91 (0.0343 - 0.0358)	0.64 + 0.68 (0.0252 + 0.0268)
0.91 - 0.95 (0.0358 - 0.0374)	0.68 + 0.68 (0.0268 + 0.0268)
0.95 - 0.99 (0.0374 - 0.0390)	0.68 + 0.72 (0.0268 + 0.0283)
0.99 - 1.03 (0.0390 - 0.0406)	0.72 + 0.72 (0.0283 + 0.0283)
1.03 - 1.07 (0.0406 - 0.0421)	0.72 + 0.76 (0.0283 + 0.0299)
1.07 - 1.11 (0.0421 - 0.0437)	0.76 + 0.76 (0.0299 + 0.0299)
1.11 - 1.15 (0.0437 - 0.0453)	0.76 + 0.80 (0.0299 + 0.0315)
1.15 - 1.19 (0.0453 - 0.0469)	0.80 + 0.80 (0.0315 + 0.0315)
1.19 - 1.23 (0.0469 - 0.0484)	0.72 + 0.92 (0.0283 + 0.0362)
1.23 - 1.27 (0.0484 - 0.0500)	0.76 + 0.92 (0.0299 + 0.0362)
1.27 - 1.31 (0.0500 - 0.0516)	0.80 + 0.92 (0.0315 + 0.0362)

SECTION AT

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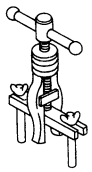
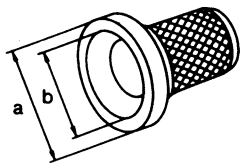
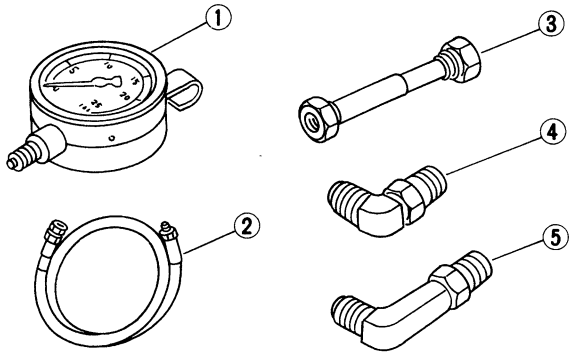
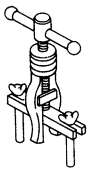
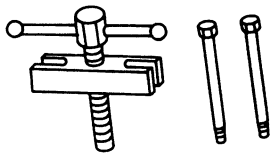
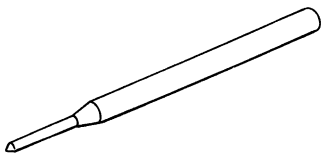
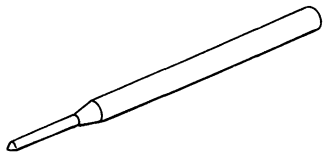
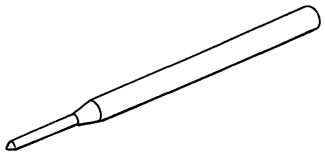
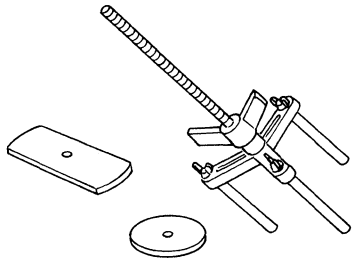
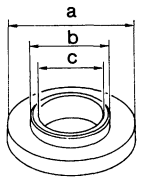
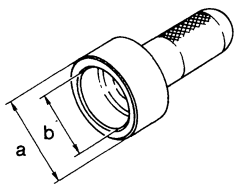
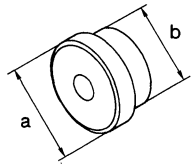
CONTENTS (Cont'd.)

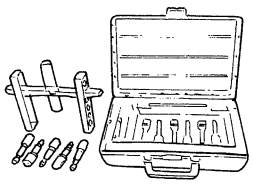
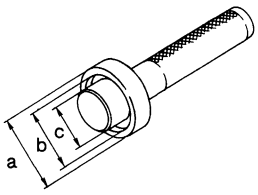
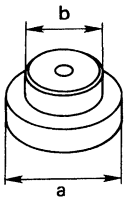
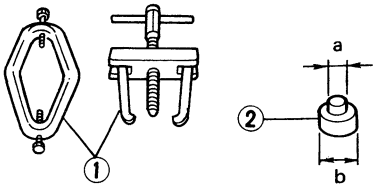
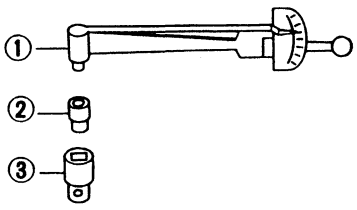
When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

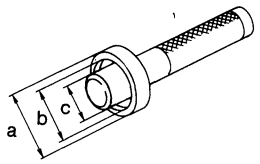
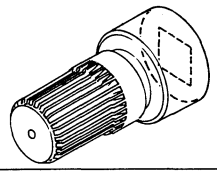
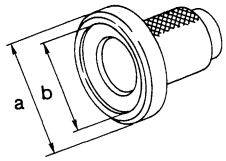
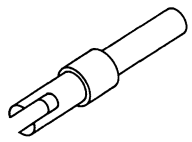
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

SPECIAL SERVICE TOOLS

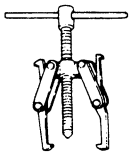
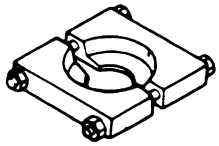
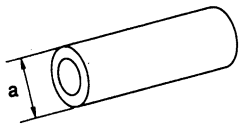
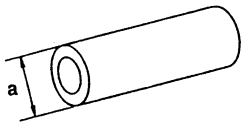
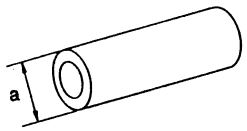
Tool number (Kent-Moore No.) Tool name	Description
ST33290001 (J34286) Puller	 Removing differential side oil seals
ST33400001 (J26082) Drift	 Installing differential side oil seal (RH side) Installing oil seal on oil pump housing **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
ST2505S001 (J25695-A) Oil pressure gauge set ① ST25051001 (J25695-1) Oil pressure gauge ② ST25052000 (J25695-2) Hose ③ ST25053000 (J25695-3) Joint pipe ④ ST25054000 (J25695-4) Adapter ⑤ ST25055000 (J25695-5) Adapter	Measuring line pressure. 
KV381054S0 (—) Puller	 • Removing differential side bearing outer race • Removing idler gear bearing outer race
ST27180001 (—) Puller	 Removing idler gear
ST23540000 (—) Pin punch	 Removing and installing parking rod plate and manual plate pins.

Tool number (Kent-Moore No.) Tool name	Description	
ST25710000 (—) Pin punch		Aligning groove of manual shaft and hole of transmission case.
KV32101000 (J25689-A) Pin punch		Installing manual shaft retaining pin
KV31102400 (J34285 and J34285-87) Clutch spring compressor		• Removing and installing clutch return springs • Installing low and reverse brake piston
KV40100630 (—) Drift	 **a: 67.5 mm (2.657 in) dia.** **b: 44 mm (1.73 in) dia.** **c: 38.5 mm (1.516 in) dia.**	• Installing reduction gear bearing inner race • Installing idler gear bearing inner race
ST30720000 (J34331)	 **a: 55.5 mm (2.185 in) dia.** **b: 77 mm (3.03 in) dia.**	• Installing idler gear bearing outer race
ST35321000 (—) Drift	 **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**	• Installing output shaft bearing

Tool number (Kent-Moore No.) Tool name	Description	
(J34291) Shim setting gauge set		● Selecting oil pump cover bearing race and oil pump thrust washer ● Selecting side gear thrust washer
KV38100300 (—)	 **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**	Installing differential side bearing inner race (RH side)
ST30613000 (—)	 **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**	Installing differential side bearing inner race (LH side)
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter	 **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**	Removing differential side bearing inner race
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter		Checking differential side bearing preload

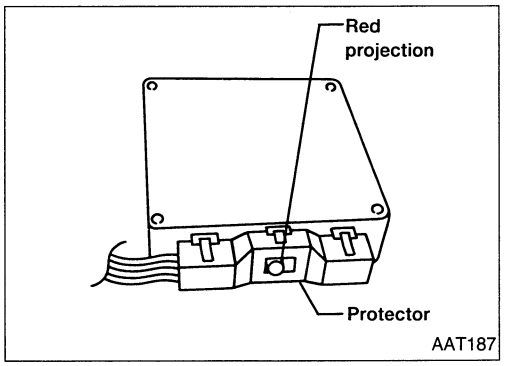
Tool number (Kent-Moore No.) Tool name	Description	
ST33220000 (—) Drift	 **a: 37 mm (1.46 in) dia.** **b: 31 mm (1.22 in) dia.** **c: 22 mm (0.87 in) dia.**	Selecting differential side bearing adjusting shim (F04V)
KV38105210 (—) Preload adapter		• Selecting differential side bearing adjusting shim (F04V) • Checking differential side bearing preload (F04V)
ST35271000 (—) Drift	 **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**	Installing idler gear
(J39713) Preload adapter		• Selecting differential side bearing adjusting shim (F04A) • Checking differential side bearing preload (F04A)

COMMERCIAL SERVICE TOOLS

Tool name	Description	
Puller		• Removing idler gear bearing inner race • Removing and installing band servo piston snap ring
Puller		Removing reduction gear bearing inner race
Drift	 **a: 90 mm (3.54 in) dia.**	Installing differential side oil seal (Left side)
Drift	 **a: 36 mm (1.42 in) dia.**	Installing needle bearing on bearing retainer
Drift	 **a: 33.5 mm (1.319 in) dia.**	Removing needle bearing from bearing retainer

Service Notice

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. 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 transaxle.
- 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 transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- Valve bodies contain 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 vales, sleeves, plugs, etc. will slide along their bores in the valve bodies under their own weight.
- Before assembly, apply a coat of recommended ATF 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 transaxle with new ATF.



- When connecting TCM (A/T control module) harness connector, tighten securing bolt until red projection is in line with connector face.

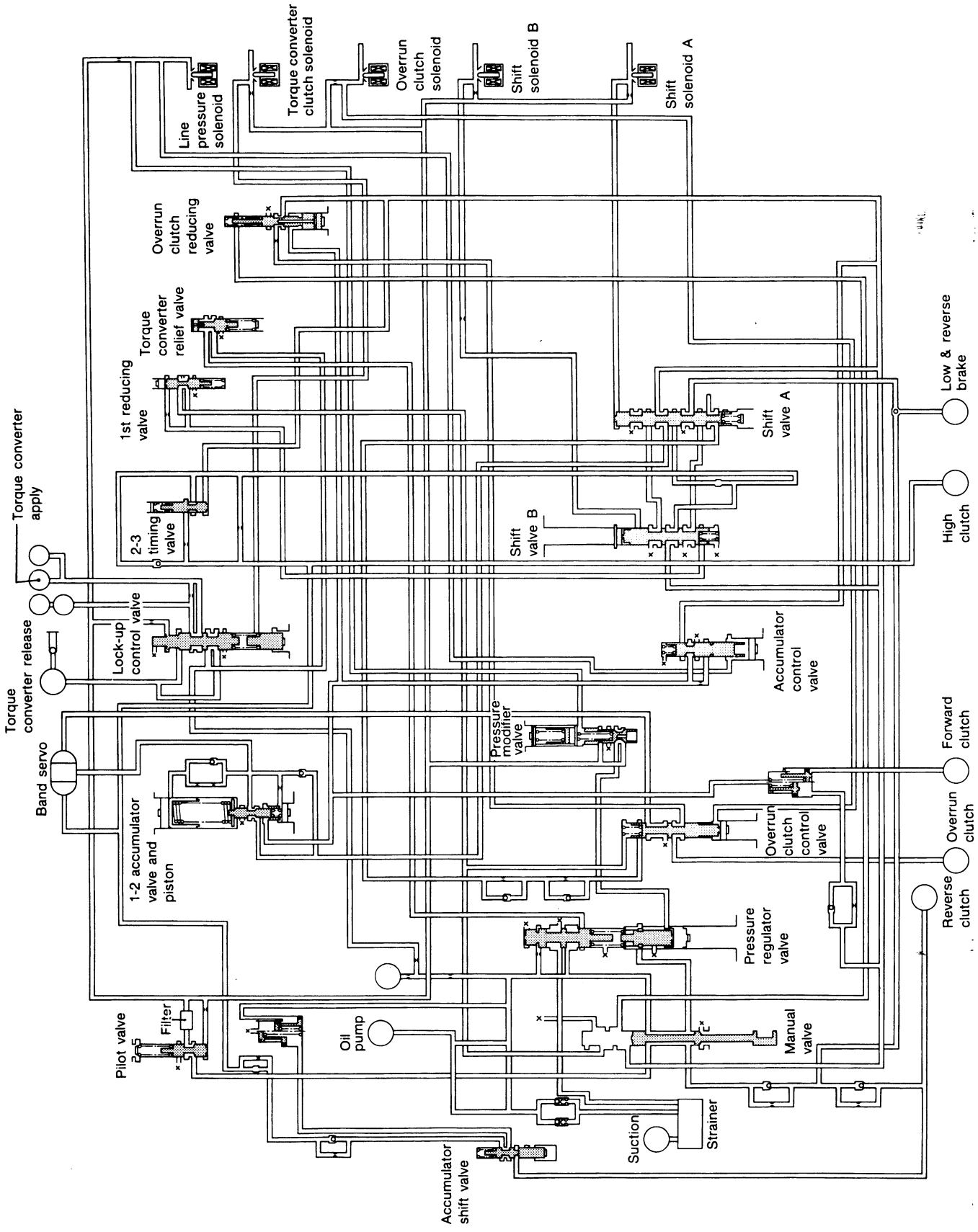
Precautions for Supplemental Restraint System "AIR BAG"

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 control module, 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:

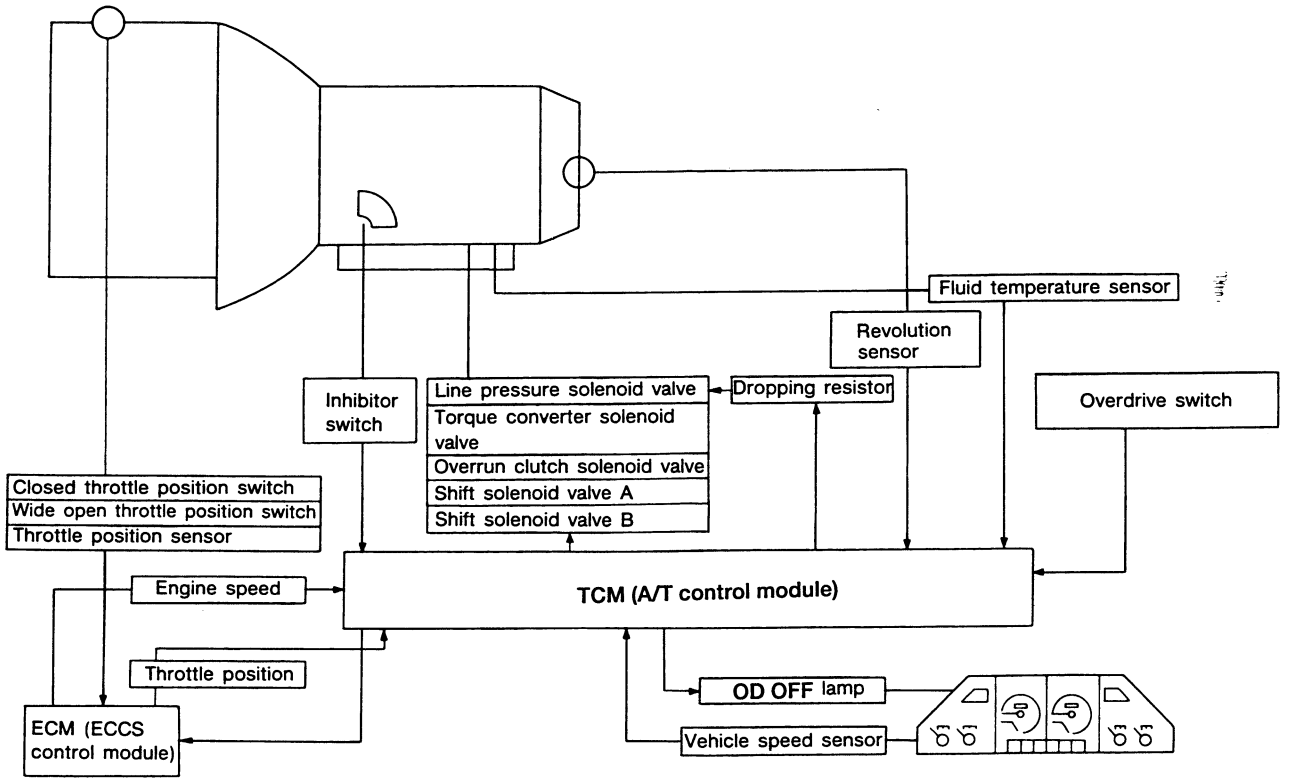
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

Hydraulic Control Circuits



AAT022

Electrical Control Chart

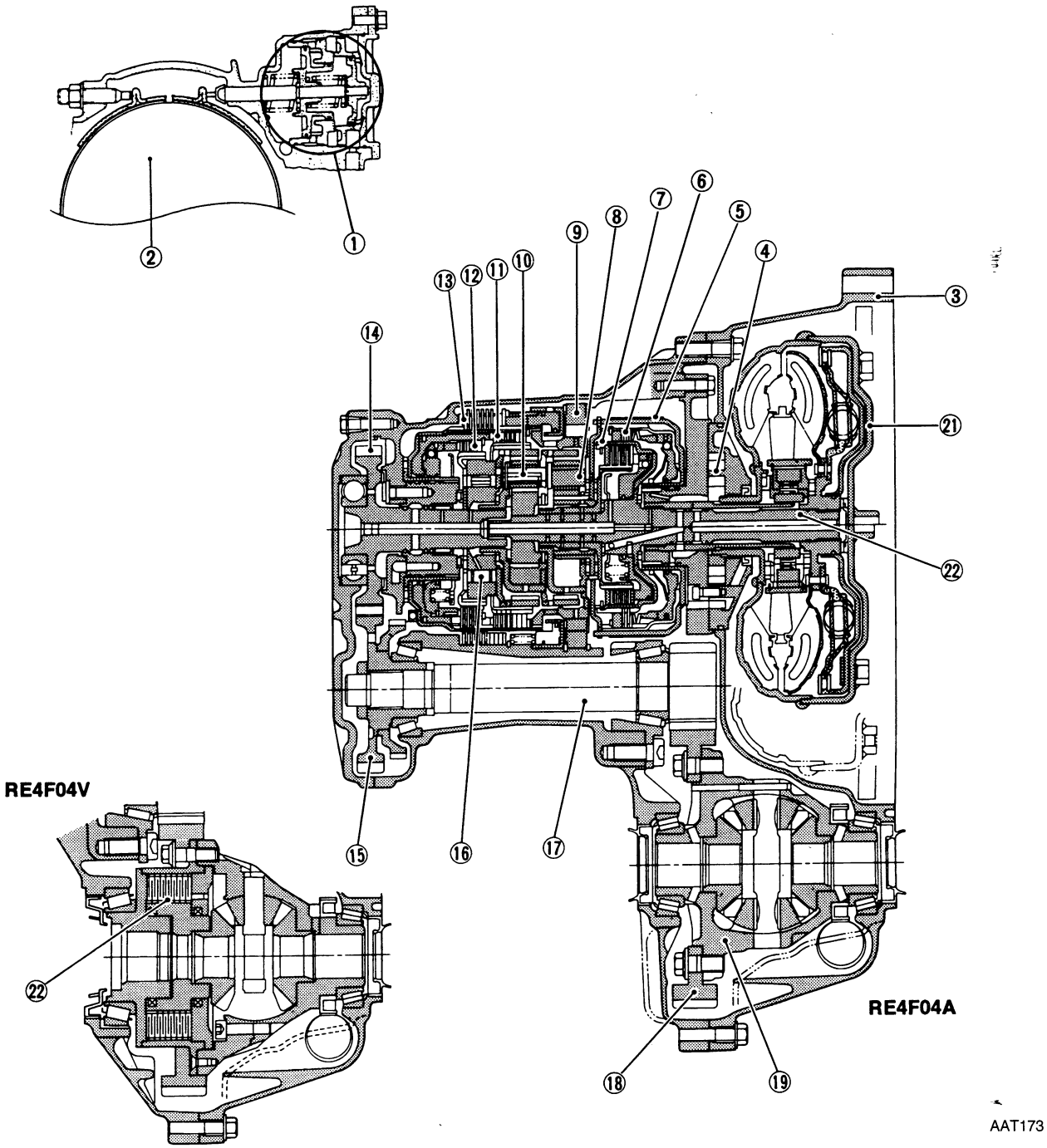


Mechanical Operation

Shift position		Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo 2nd apply	Band servo 3rd release	Band servo 4th apply	Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
P													PARK
R		○									○		REVERSE
N													NEUTRAL
D*4	1st			○	*1◎				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○	*1◎	○			●				
	3rd		○	○	*1◎	*2Ⓧ	Ⓧ		●			○	
	4th		○	Ⓧ		*3Ⓧ	Ⓧ	○				○	
2	1st			○	○				●	●			Automatic shift 1 ↔ 2 ← 3
	2nd			○	○	○			●				
1	1st			○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2 ← 3
	2nd			○	○	○			●				

*1: Operates when overdrive switch is in "OFF" position.
*2: Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.
*3: Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.
*4: A/T will not shift to 4th when overdrive switch is in "OFF" position.
○: Operates
◎: Operates when throttle position is less than 3/16.
●: Operates during "progressive" acceleration.
Ⓧ: Operates but does not affect power transmission.

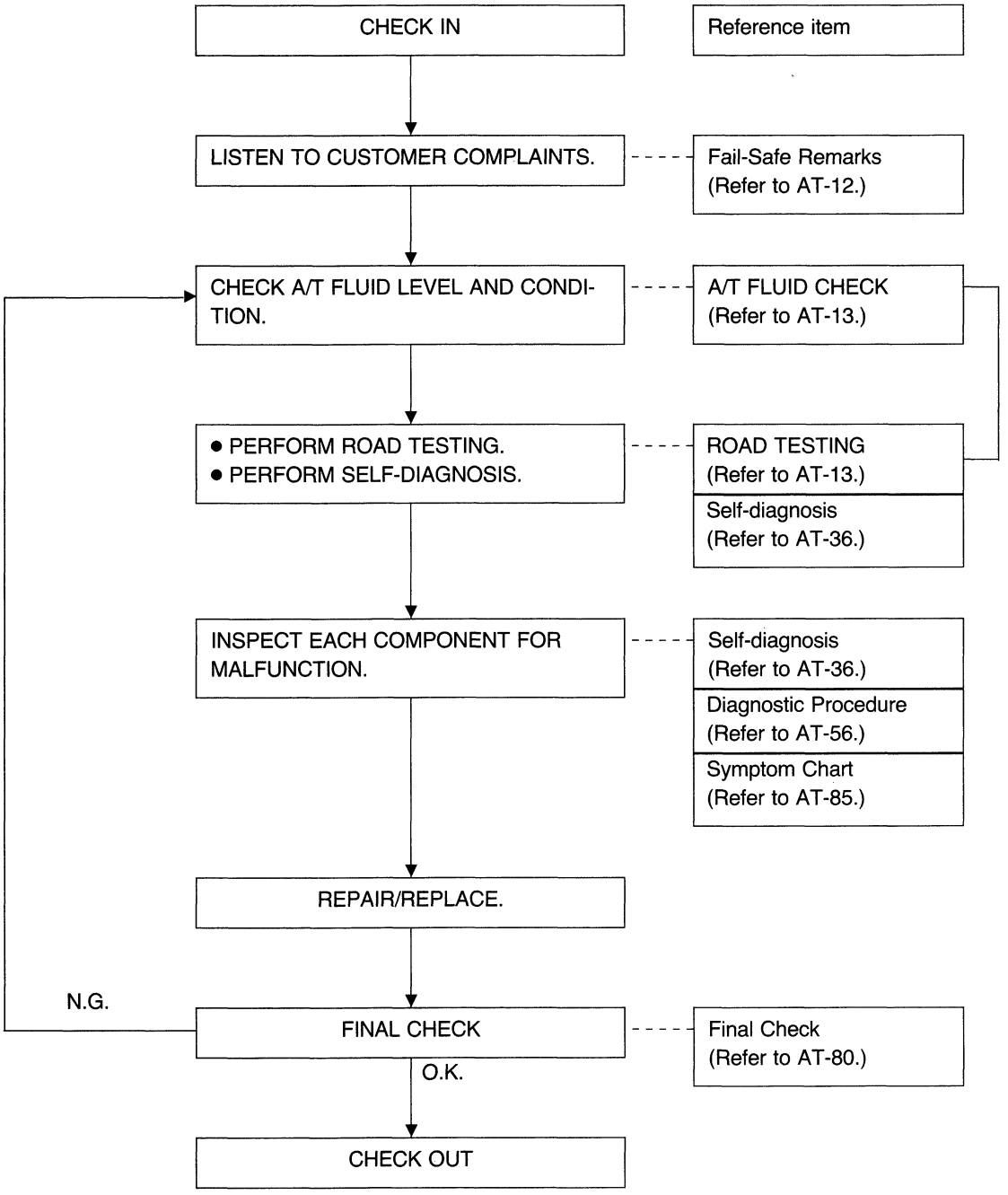
Cross-Sectional View



① Band servo piston
② Reverse clutch drum
③ Converter housing
④ Oil pump
⑤ Brake band
⑥ Reverse clutch
⑦ High clutch
⑧ Front planetary gear
⑨ Low one-way clutch
⑩ Rear planetary gear
⑪ Forward clutch
⑫ Overrun clutch
⑬ Low & reverse brake
⑭ Output gear
⑮ Idler gear
⑯ Forward one-way clutch
⑰ Pinion reduction gear
⑱ Final gear
⑲ Differential case
⑳ Input shaft
㉑ Torque converter
㉒ Viscous coupling

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



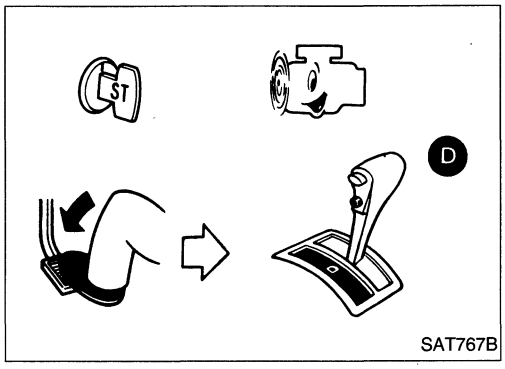
Fail-Safe Remarks

The TCM (A/T control module) has an electronic Fail-Safe (limp home mode) to allow the vehicle to be driven even in the event of damage to 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 OD OFF lamp will blink for about 8 seconds. For diagnosis, refer to AT-13.

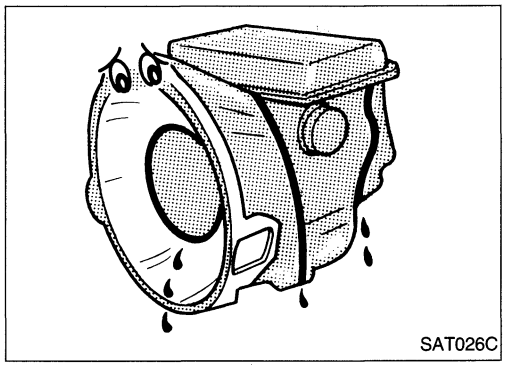
Remarks

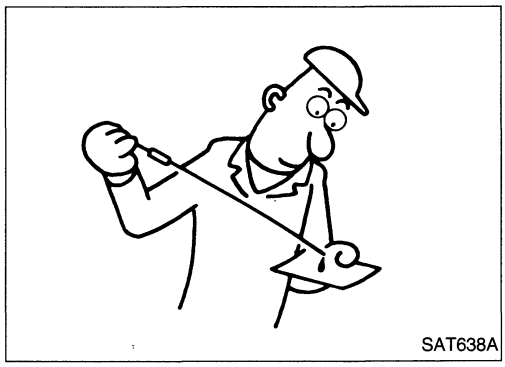
If the vehicle is driven under extreme conditions such as excessive wheel spinning and emergency braking suddenly after, Fail-Safe may be activated even if all electrical circuits are undamaged.
In this case, normal shift pattern can be returned by turning the ignition key OFF for 3 seconds and then back ON.
The blinking of the OD OFF lamp for about 8 seconds 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 sensors, no damages will be indicated.



SAT767B


SAT026C


SAT638A

Preliminary Check

A/T FLUID CHECK

Fluid leakage check

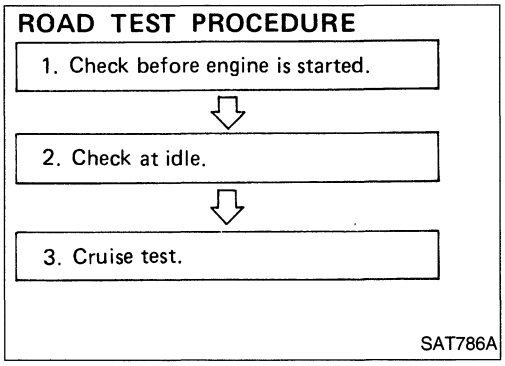
1. Clean area suspected of leaking. — for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in "D" position and wait a few minutes.
3. Stop engine.
4. Check for fresh leakage.

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 MA section ("Checking A/T Fluid Level", "CHASSIS AND BODY MAINTENANCE").



SAT786A

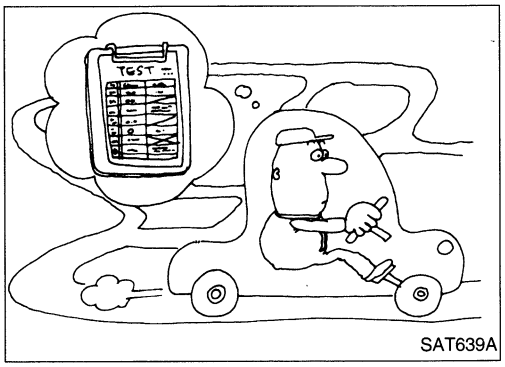
ROAD TESTING

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

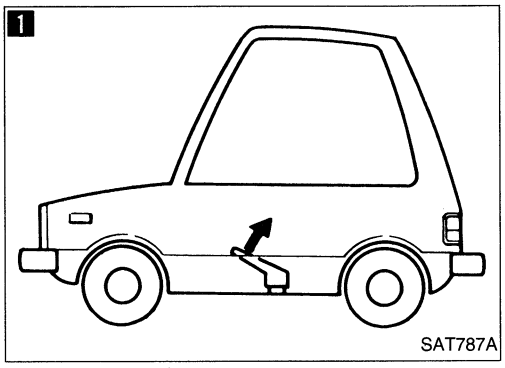
Preliminary Check (Cont'd)



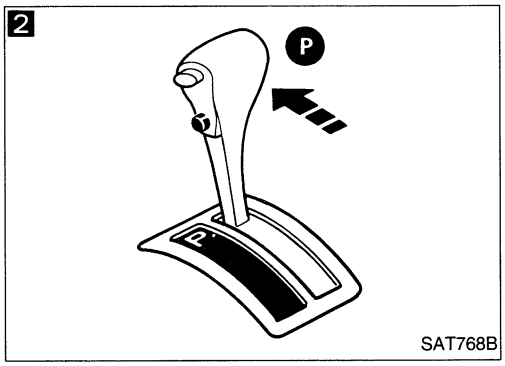
SAT639A

- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to AT-36 and AT-56.

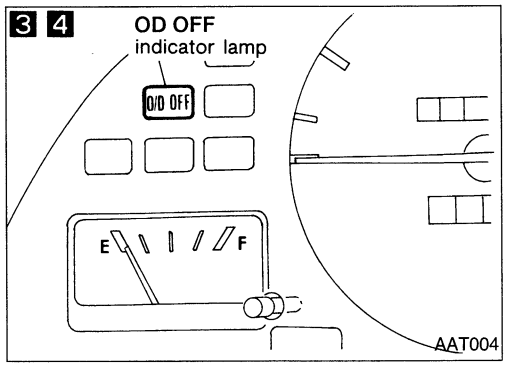
1. Check before engine is started



SAT787A



SAT768B



AAT004

1

Park vehicle on flat surface.

↓

↓ **2**

Move selector lever to "P" position.

↓

↓ **3**

Does OD OFF indicator lamp come on for about 2 seconds?

No → Perform Diagnostic Procedure 1. Refer to AT-56.

Yes ↓ **4**

Does OD OFF indicator lamp flicker for about 8 seconds?

Yes → Perform self-diagnosis. See SELF-DIAGNOSIS PROCEDURE. Refer to AT-36 with CONSULT. Refer to AT-37 without CONSULT.

No ↓

↓

Perform self-diagnosis.
— Refer to SELF-DIAGNOSIS PROCEDURE and note N.G. items. Refer to AT-36 with CONSULT. Refer to AT-37 without CONSULT.

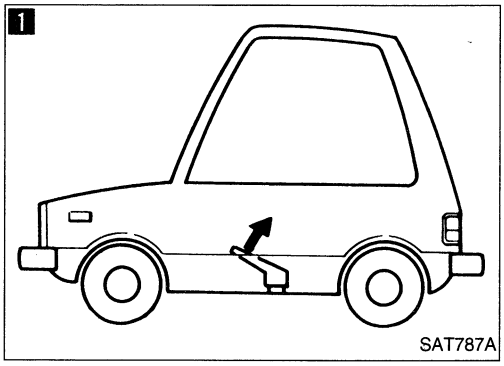
↓

Perform "ROAD TESTING — 2. Check at idle". Refer to AT-15.

Preliminary Check (Cont'd)

2. Check at idle

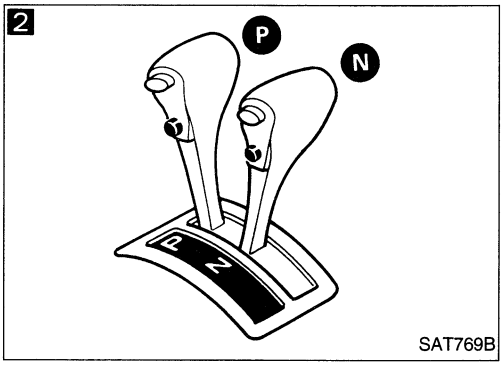
1


SAT787A

Park vehicle on flat surface.

2

Move selector lever to "P" or "N" position.



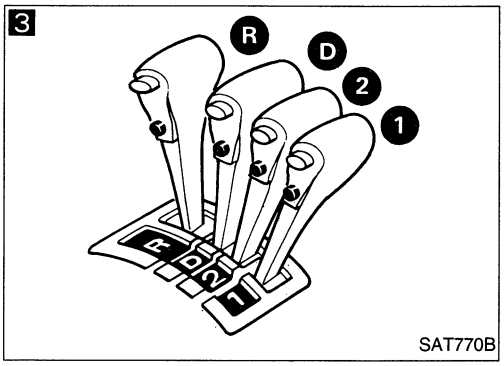
SAT769B

Is engine started? — No → Perform Diagnostic Procedure 2. Refer to AT-57.

Yes

3

Move selector lever to "D", "1", "2" or "R" position.



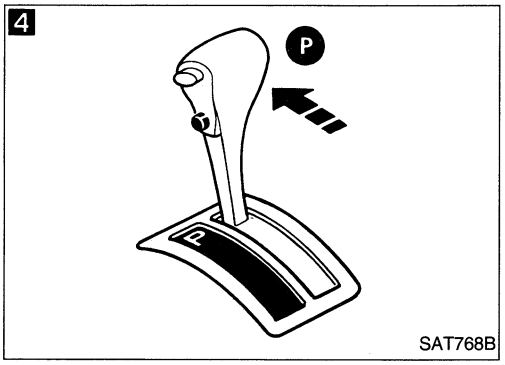
SAT770B

Is engine started? — Yes → Perform Diagnostic Procedure 2. Refer to AT-57.

No

4

Move selector lever to "P" position.



SAT768B

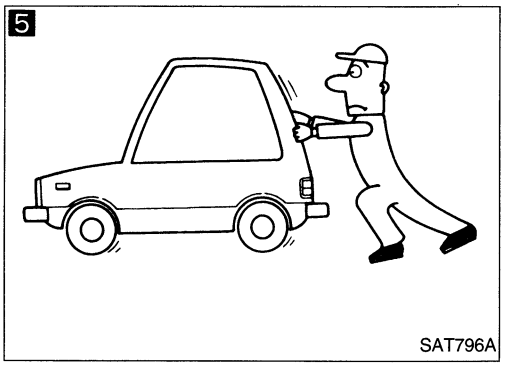
5

Push vehicle forward or backward.

Does vehicle move when it is pushed forward or backward? — Yes → Peform Diagnostic Procedure 3. Refer to AT-57.

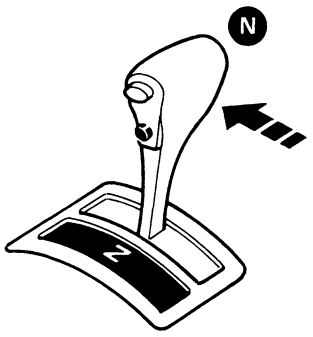
No

Ⓐ


SAT796A

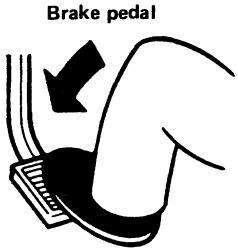
Preliminary Check (Cont'd)

6



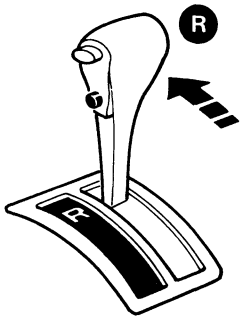
SAT771B

7



SAT797A

8

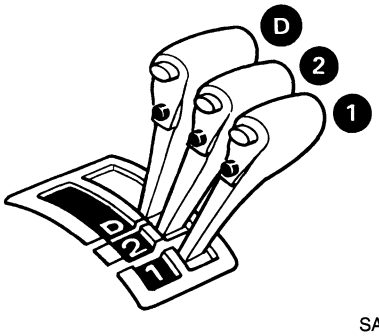


SAT772B

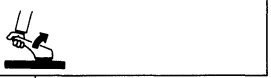
9

SAT799A

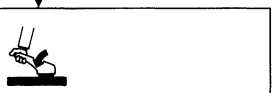
10



SAT773B



6 Move selector lever to "N" position.



Does vehicle move forward or backward? — Yes → Perform Diagnostic Procedure 4. Refer to AT-58.

No

7 Apply foot brake.

8 Move selector lever to "R" position.

Is there large shock when changing from "N" to "R" position? — Yes → Perform Diagnostic Procedure 5. Refer to AT-59.

No

9 Release service brake for several seconds.

Does vehicle creep backward when foot brake is released? — No → Perform Diagnostic Procedure 6. Refer to AT-60.

Yes

10 Move selector lever to "D", "1" and "2" positions and check if vehicle creeps forward.

Does vehicle creep forward in all three positions? — Yes → Perform Cruise test. Refer to AT-17.

No

Perform Diagnostic Procedure 7. Refer to AT-61.

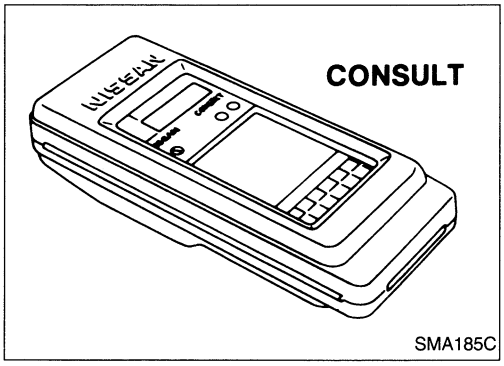
Preliminary Check (Cont'd)

3. Cruise test

- Check all items listed in Parts 1 through 3.

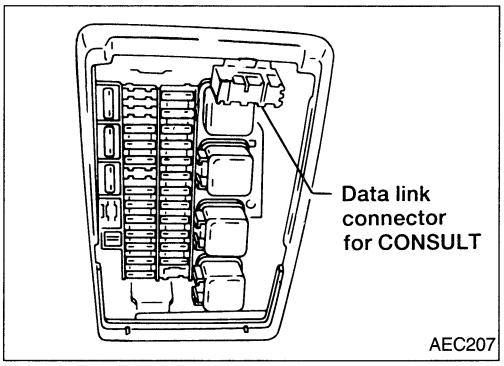
With CONSULT

- 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."

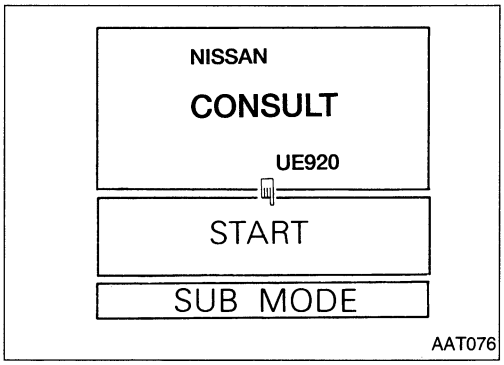


CONSULT setting procedure

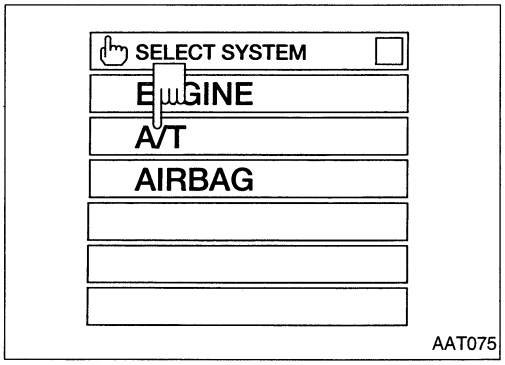
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



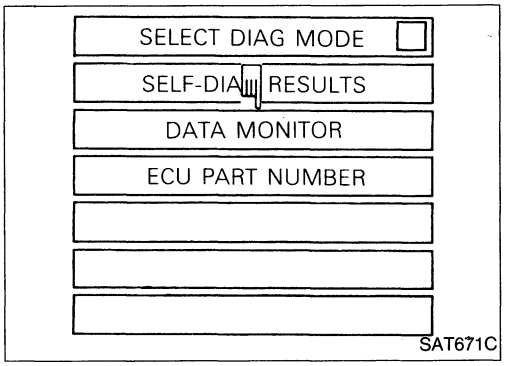
3. Turn on ignition switch.
4. Touch "START".



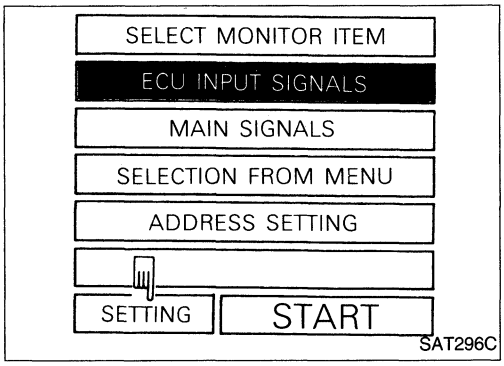
5. Touch "A/T".



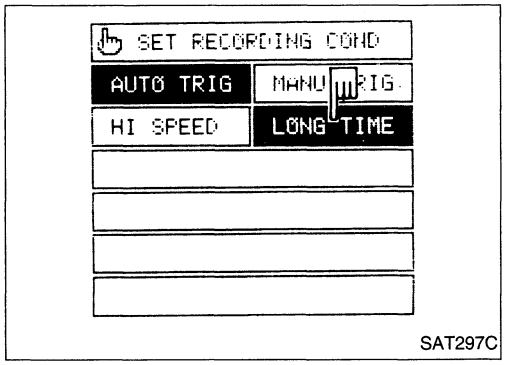
Preliminary Check (Cont'd)



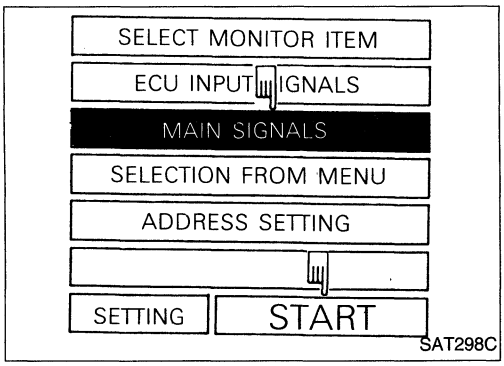
6. Touch "DATA MONITOR".



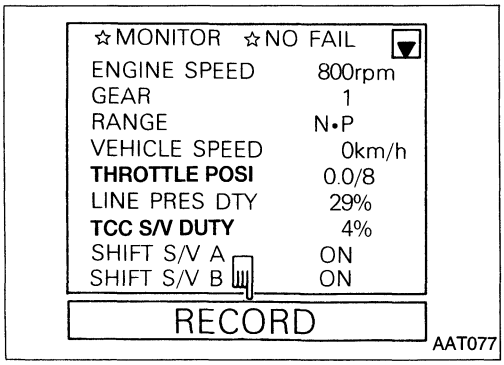
7. Touch "SETTING" to set recording condition.



8. Touch "LONG TIME" and "ENTER" key.

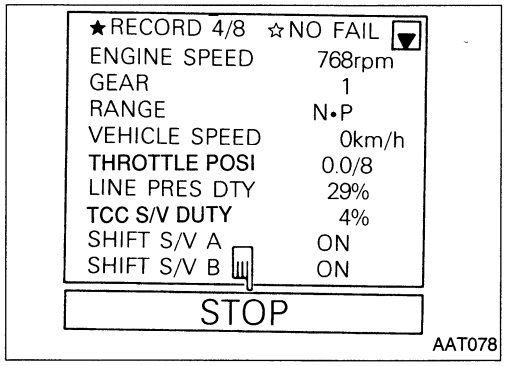


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".
10. Touch "START".

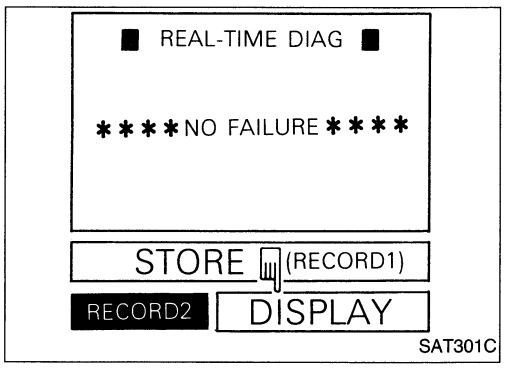


11. When performing cruise test, touch "RECORD".

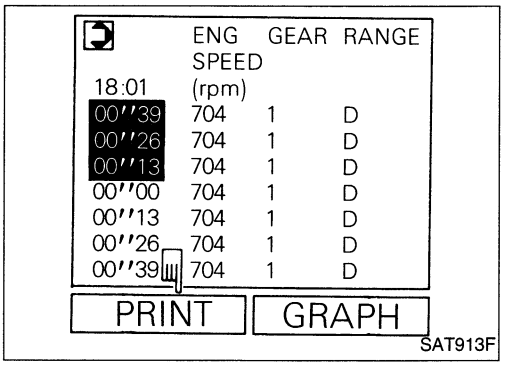
Preliminary Check (Cont'd)



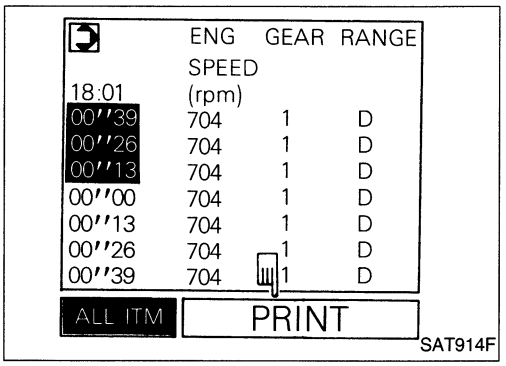
12. After finishing cruise test part 1, touch "STOP".



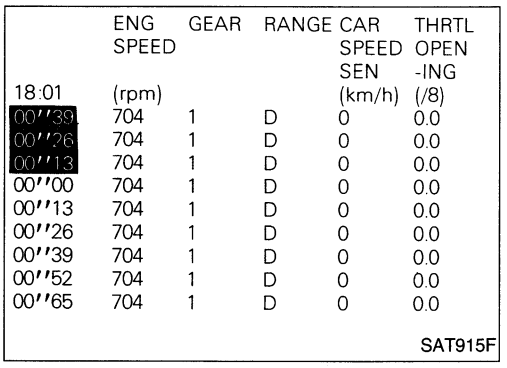
13. Touch "DISPLAY".



14. Touch "PRINT".

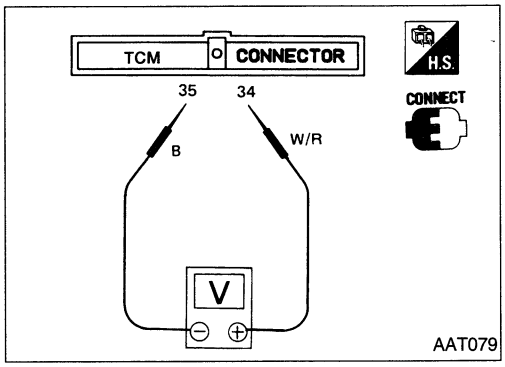


15. Touch "PRINT" again.



16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.

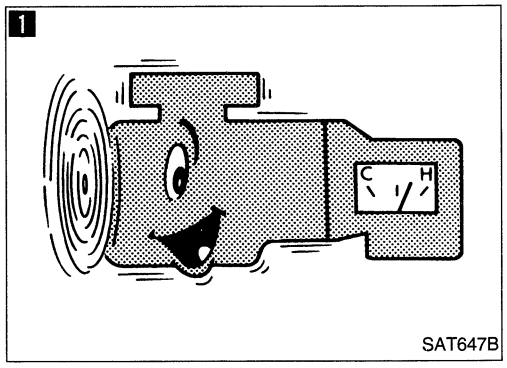
Preliminary Check (Cont'd)

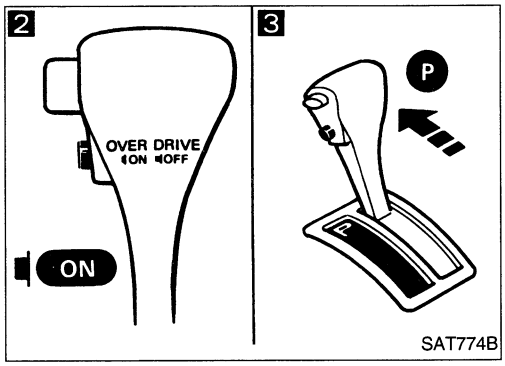


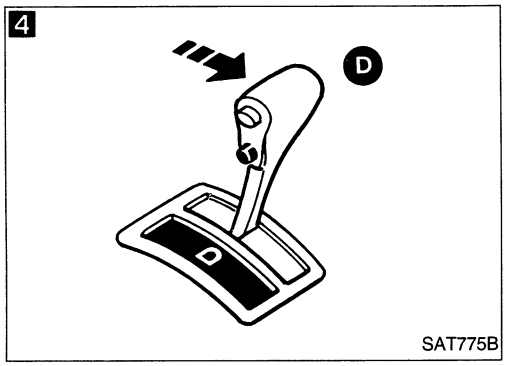
Without CONSULT

- Throttle position can be controlled by voltage across terminals ㉞ and ㉟ of TCM (A/T control module).

Cruise test — Part 1







1

Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.

ATF operating temperature:
50 - 80°C (122 - 176°F)

↓

Park vehicle on flat surface.

↓

2

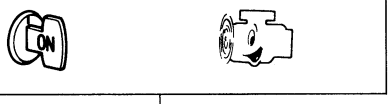
Set overdrive switch to "ON" position.

↓

3

Move selector lever to "P" position.

↓



↓

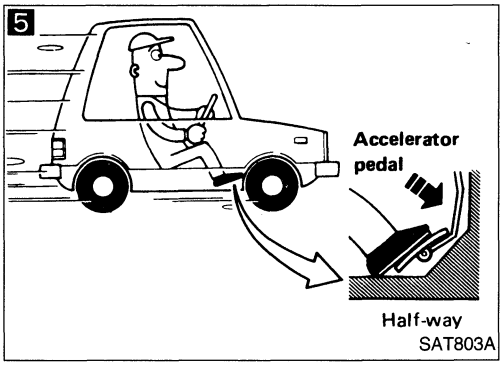
4

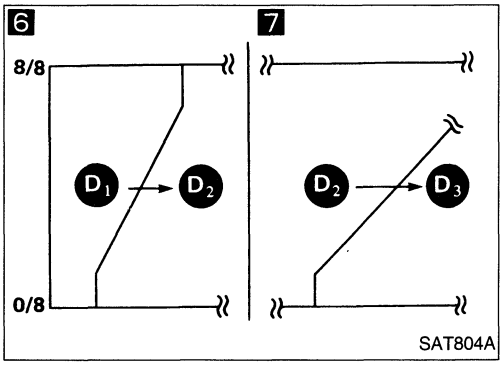
Move selector lever to "D" position.

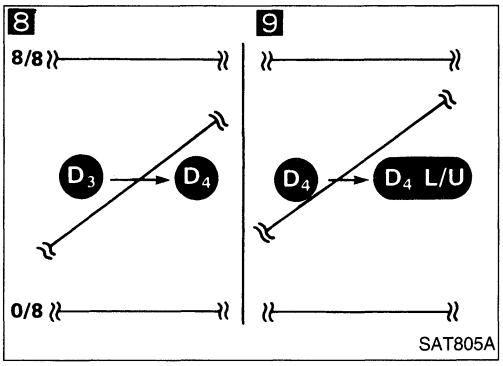
↓

Ⓐ

Preliminary Check (Cont'd)







Ⓐ

5

Accelerate vehicle keeping accelerator pedal depressed halfway.

Does vehicle start from D_1?
Read gear position.
No → Perform Diagnostic Procedure 8. Refer to AT-62.

Yes

6

Does A/T shift from D_1 to D_2 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_1 to D_2:
Refer to Shift schedule on AT-27.
No → Perform Diagnostic Procedure 9. Refer to AT-63.

Yes

7

Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule on AT-27.
No → Perform Diagnostic Procedure 10. Refer to AT-65.

Yes

8

Does A/T shift from D_3 to D_4 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_3 to D_4:
Refer to Shift schedule on AT-27.
No → Perform Diagnostic Procedure 11. Refer to AT-66.

Yes

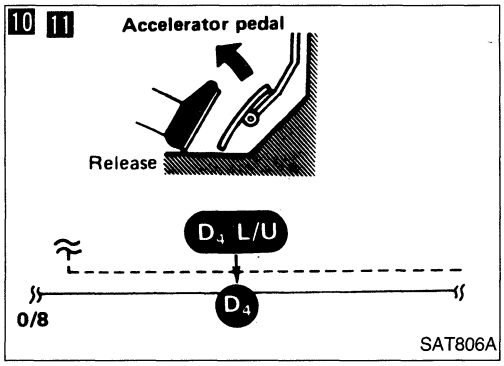
9

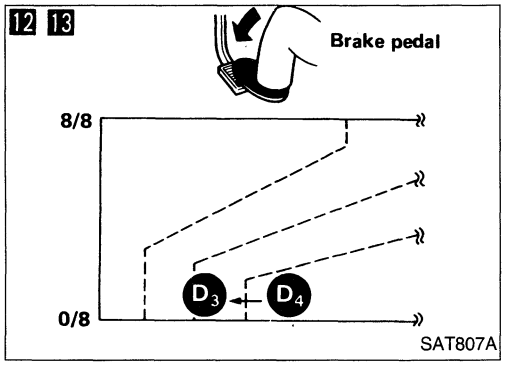
Does A/T perform lock-up at the specified speed?
Read vehicle speed, throttle position when lock-up duty becomes 94%.
Specified speed when lock-up occurs:
Refer to Shift schedule on AT-27.
No → Perform Diagnostic Procedure 12. Refer to AT-67.

Yes

Ⓑ

Preliminary Check (Cont'd)





Ⓑ

Does A/T hold lock-up for more than 30 seconds? — No → Perform Diagnostic Procedure 13. Refer to AT-68.

Yes

10

Release accelerator pedal.

11

Is lock-up released when accelerator pedal is released? — No → Perform Diagnostic Procedure 14. Refer to AT-69.

Yes

12

Decelerate vehicle by applying foot brake lightly.

13

Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3? — No → Perform Diagnostic Procedure 15. Refer to AT-70.

Read gear position and engine speed.

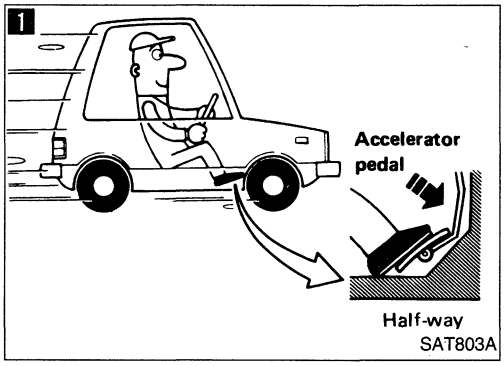
Yes

Stop vehicle.

Perform "Cruise test — Part 2". Refer to AT-23.

Preliminary Check (Cont'd)

Cruise test — Part 2



Confirm overdrive switch is in "ON" position.

Confirm selector lever is in "D" position.

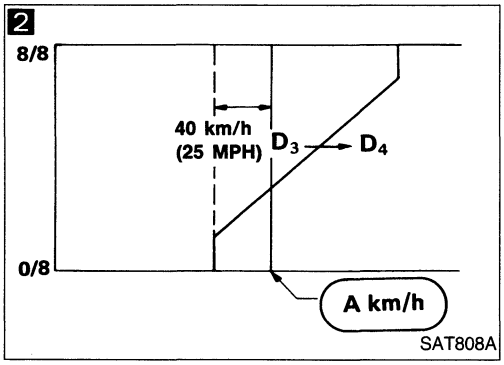
1

Accelerate vehicle by half throttle again.

Does vehicle start from D_1?
Read gear position.

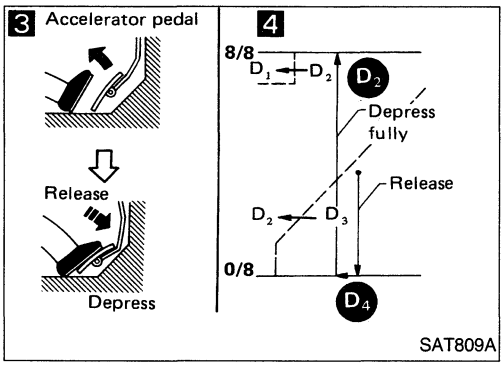
No → Perform Diagnostic Procedure 16. Refer to AT-71.

Yes



2

Accelerate vehicle to A km/h as shown in illustration.



3

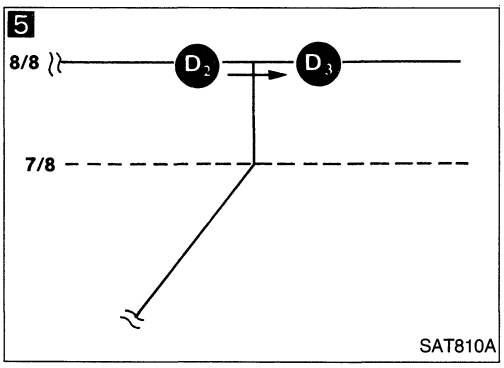
Release accelerator pedal and then quickly depress it fully.

4

Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?
Read gear position and throttle position

No → Perform Diagnostic Procedure 9. Refer to AT-63.

Yes

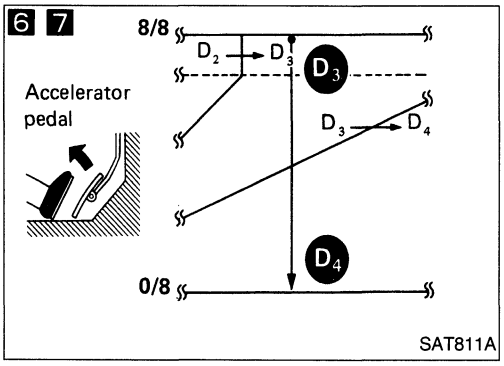


5

Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule on AT-27.

No → Perform Diagnostic Procedure 10. Refer to AT-65.

Yes

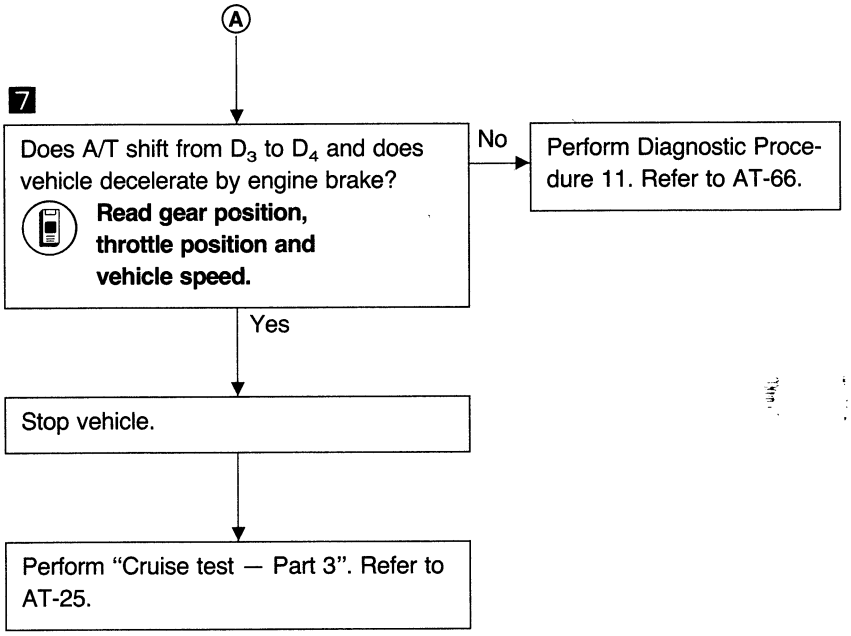


6

Release accelerator pedal after shifting from D_2 to D_3.

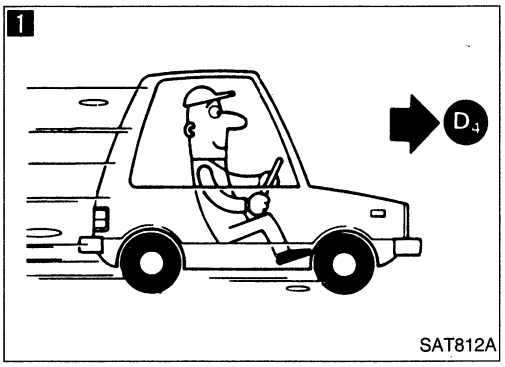
Ⓐ

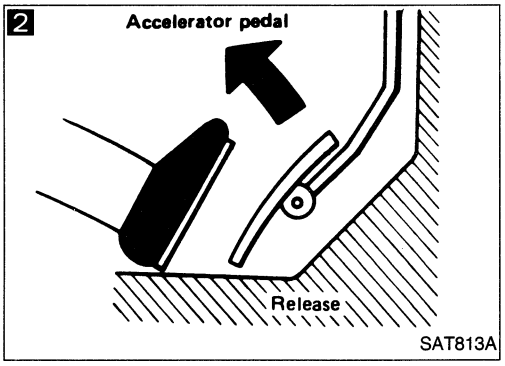
Preliminary Check (Cont'd)

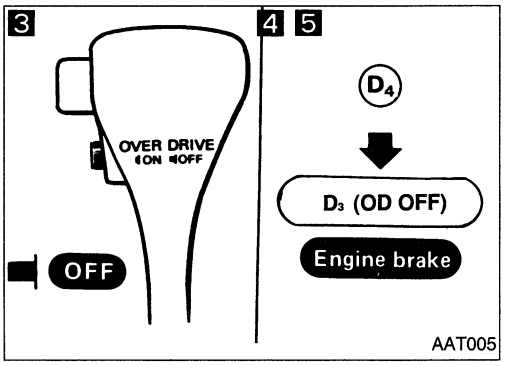


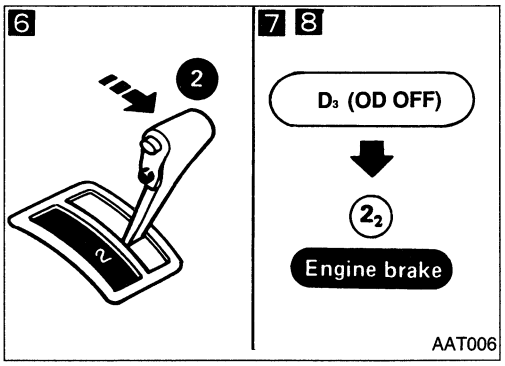
Preliminary Check (Cont'd)

Cruise test — Part 3









Confirm overdrive switch is in "ON" position.

↓

Confirm selector lever is in "D" position.

↓

1 Accelerate vehicle using half-throttle to D_4.

↓

2 Release accelerator pedal.

↓

3 Set overdrive switch to "OFF" position while driving in D_4.

↓

4 Does A/T shift from D_4 to D_3? **Read gear position and vehicle speed.**

No → Perform Diagnostic Procedure 17. Refer to AT-71.

Yes ↓

5 Does vehicle decelerate by engine brake?

No → Perform Diagnostic Procedure 15. Refer to AT-70.

Yes ↓

6 Move selector lever from "D" to "2" position while driving in D_3.

↓

7 Does A/T shift from D_3 to 2_2? **Read gear position.**

No → Perform Diagnostic Procedure 18. Refer to AT-72.

Yes ↓

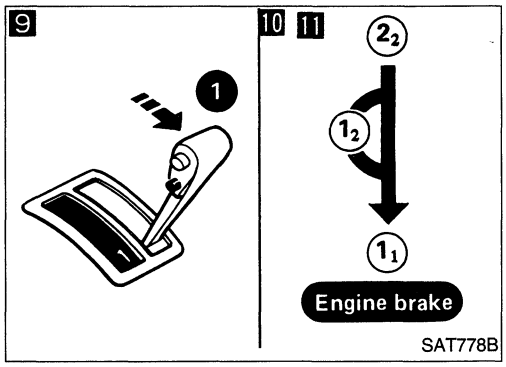
8 Does vehicle decelerate by engine brake?

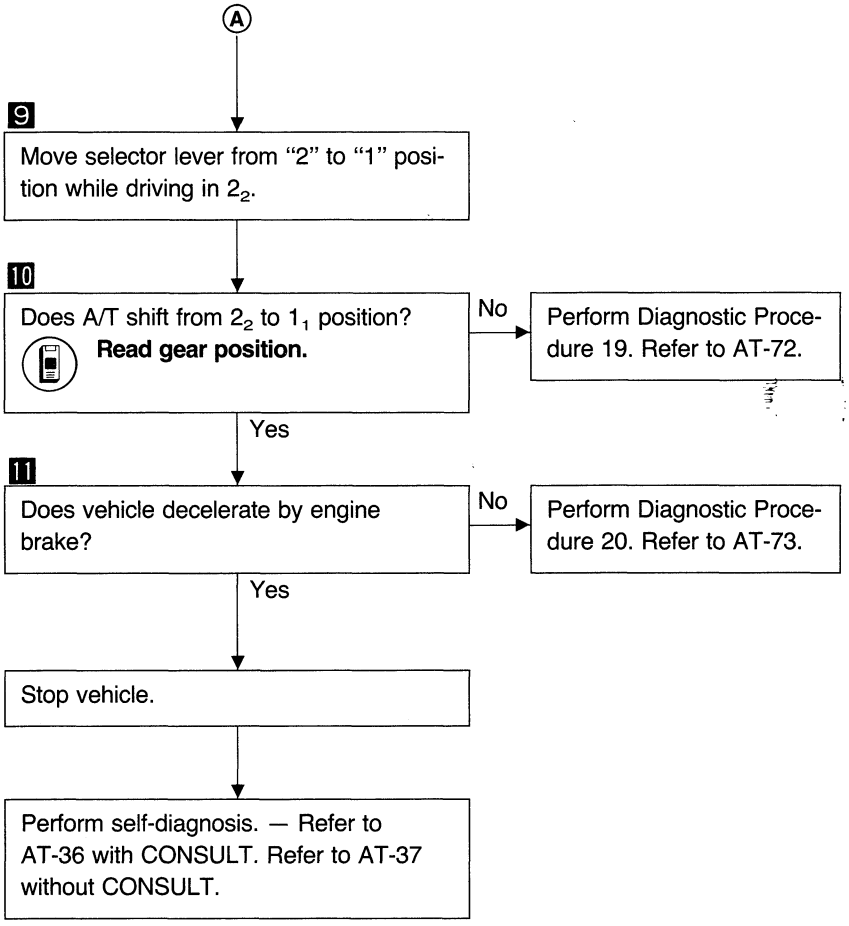
No → Perform Diagnostic Procedure 15. Refer to AT-70.

Yes ↓

Ⓐ

Preliminary Check (Cont'd)





Vehicle speed when shifting gears

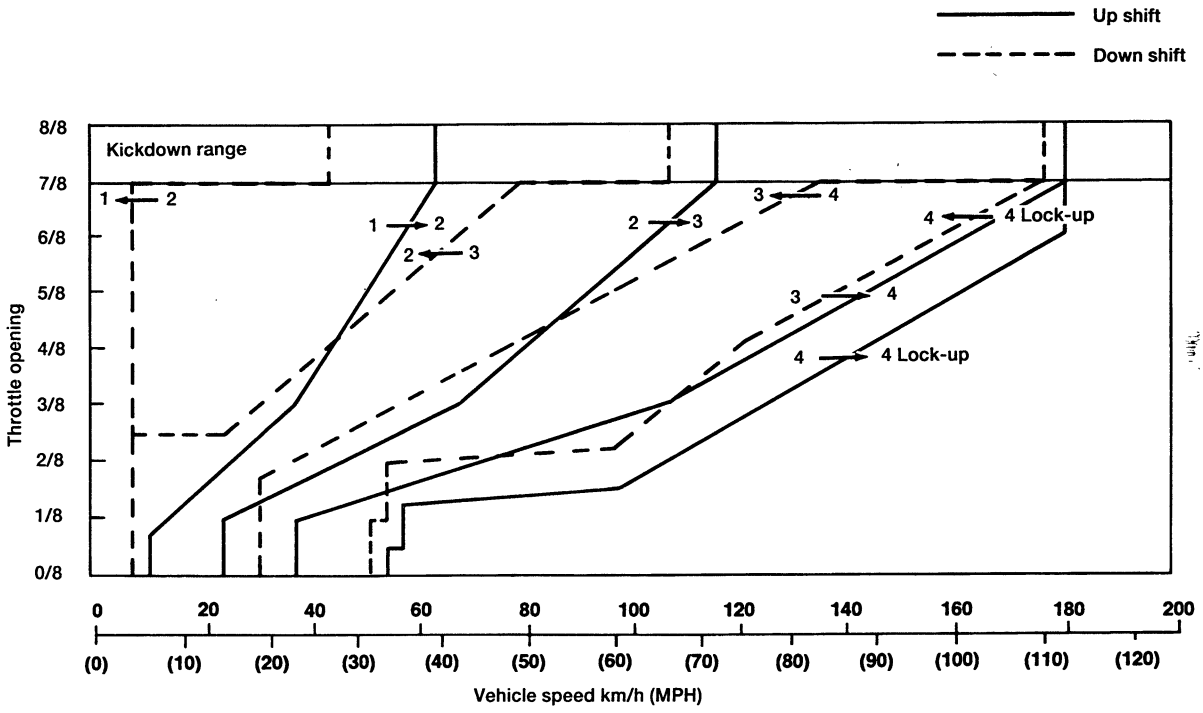
Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	62 - 70 (39 - 43)	114 - 122 (71 - 76)	179 - 187 (111 - 116)	175 - 183 (109 - 114)	105 - 113 (65 - 70)	41 - 49 (25 - 30)	62 - 70 (39 - 43)
	Auto power	62 - 70 (39 - 43)	114 - 122 (71 - 76)	179 - 187 (111 - 116)	175 - 183 (109 - 114)	105 - 113 (65 - 70)	41 - 49 (25 - 30)	62 - 70 (39 - 43)
Half throttle	Comfort	42 - 50 (26 - 31)	78 - 86 (48 - 53)	124 - 132 (77 - 82)	74 - 82 (46 - 51)	40 - 48 (25 - 30)	5 - 13 (3 - 8)	62 - 70 (39 - 43)
	Auto power	45 - 53 (28 - 33)	84 - 92 (52 - 57)	132 - 140 (82 - 87)	86 - 94 (53 - 58)	52 - 60 (32 - 37)	5 - 13 (3 - 8)	62 - 70 (39 - 43)

Vehicle speed when performing lock-up

Throttle position	Shift pattern	OD switch (shift range)	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	Comfort	ON [D_4]	105 - 113 (65 - 70)	53 - 61 (33 - 38)
		OFF [D_3]	86 - 94 (53 - 58)	83 - 91 (52 - 57)
	Auto power	ON [D_4]	108 - 116 (67 - 72)	53 - 61 (33 - 38)
		OFF [D_3]	88 - 94 (55 - 58)	83 - 91 (52 - 57)

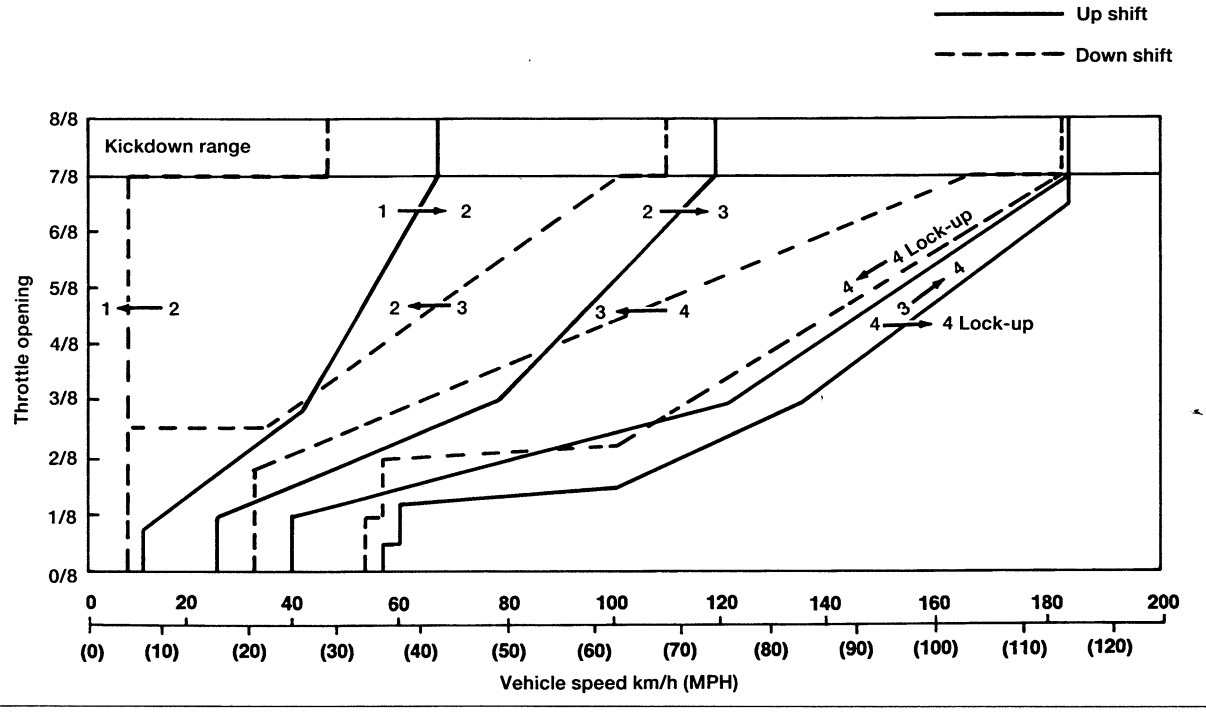
Preliminary Check (Cont'd)

Shift schedule (Comfort pattern)



AAT185

Shift schedule (Auto power pattern)



AAT186

Diagnosis by CONSULT

NOTICE

1. The CONSULT displays shift timing and lock-up timing (that is, operation timing of each solenoid). When a noticeable time difference occurs between shift timing (indicated by shift shock) and the CONSULT display, then mechanical parts (except solenoid valves, 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 than design specification.
   - Shift schedule indicated in Service Manual refers to the point where shifts starts, and gear position displayed on CONSULT indicates the point where shifts are completed.
3. Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting, while gear position is displayed upon completion of shifting [which is computed by TCM (A/T control module)].
4. Additional CONSULT information can be found in Operation Manual supplied with CONSULT unit.

A/T COMPONENT PARTS APPLICATION

DIAGNOSTIC ITEM		MODE	
		SELF-DIAGNOSTIC RESULTS	DATA MONITOR
INPUT	Vehicle speed sensor 1 (A/T)	X	X
	Vehicle speed sensor 2 (meter)	X	X
	Throttle position sensor	X	X
	Fluid temperature sensor	X	X
	Battery positive voltage	X	X
	Engine speed (rpm)	X	X
	Selector lever switch (overdrive switch)	—	X
	ASCD — cruise signal	—	X
	ASCD — OD cut signal	—	X
	Kickdown switch	—	—
	Power shift switch	—	—
	Closed throttle position switch	—	X
	Wide open throttle position switch	—	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
	"D" position switch	—	X
	Park/Neutral position switch	—	X
	"R" position switch	—	X
DATA	Gear position	—	X
	Range position	—	X
	Vehicle speed	—	X
	Throttle position	—	X
OUTPUT	Shift solenoid valve A	X	X
	Shift solenoid valve B	X	X
	Overrun clutch solenoid valve	X	X
	Line-pressure solenoid valve	X	X
	Torque converter clutch solenoid valve	X	X

X: Applicable —: Not applicable
DATA = internal TCM calculation

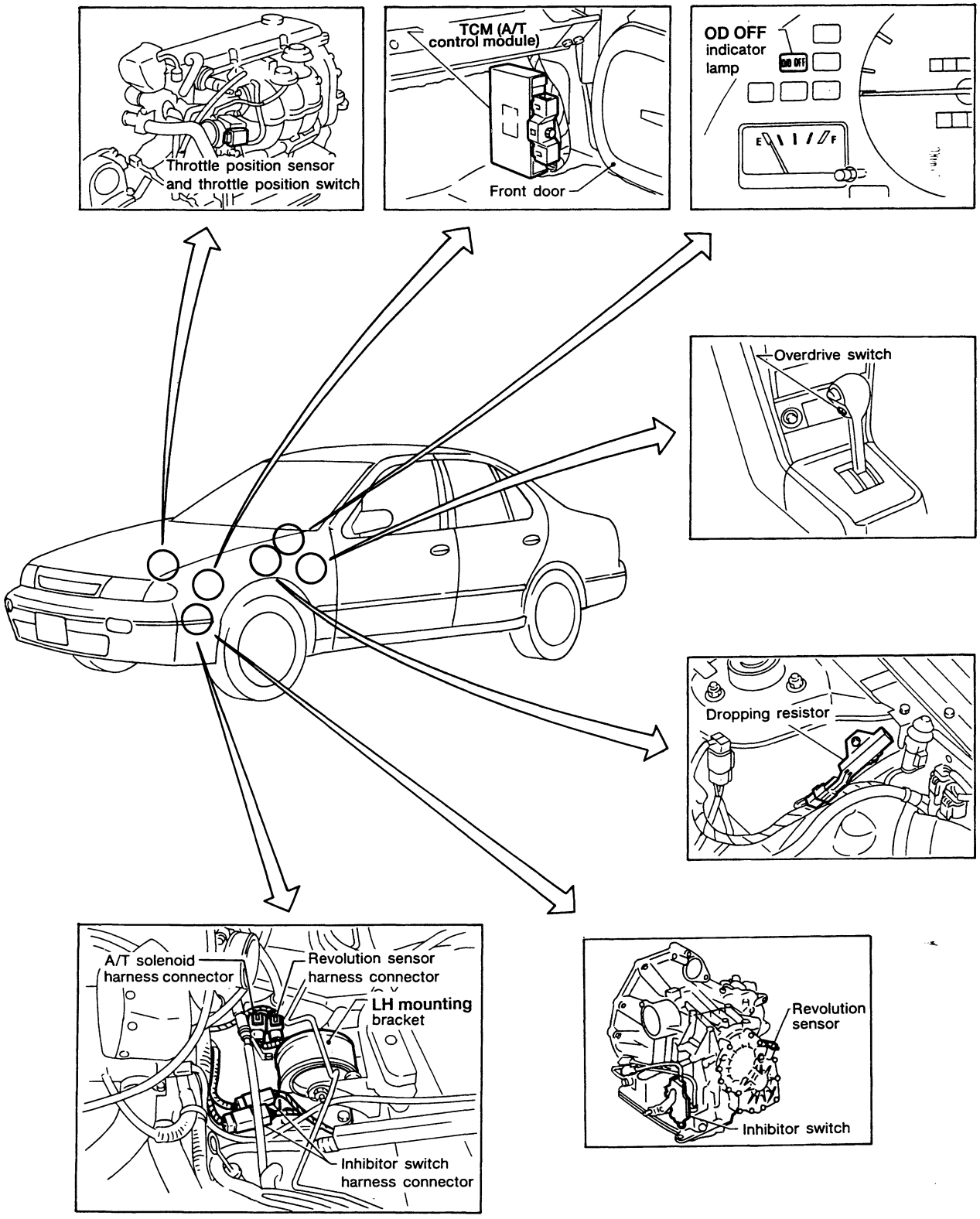
Diagnosis by CONSULT (Cont'd)

DATA ANALYSIS

Item	Display	Condition
Torque converter clutch solenoid valve valve duty	Approximately 4% ↓ Approximately 94%	Lock-up "OFF" ↓ Lock-up "ON"
Line pressure solenoid valve 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)]

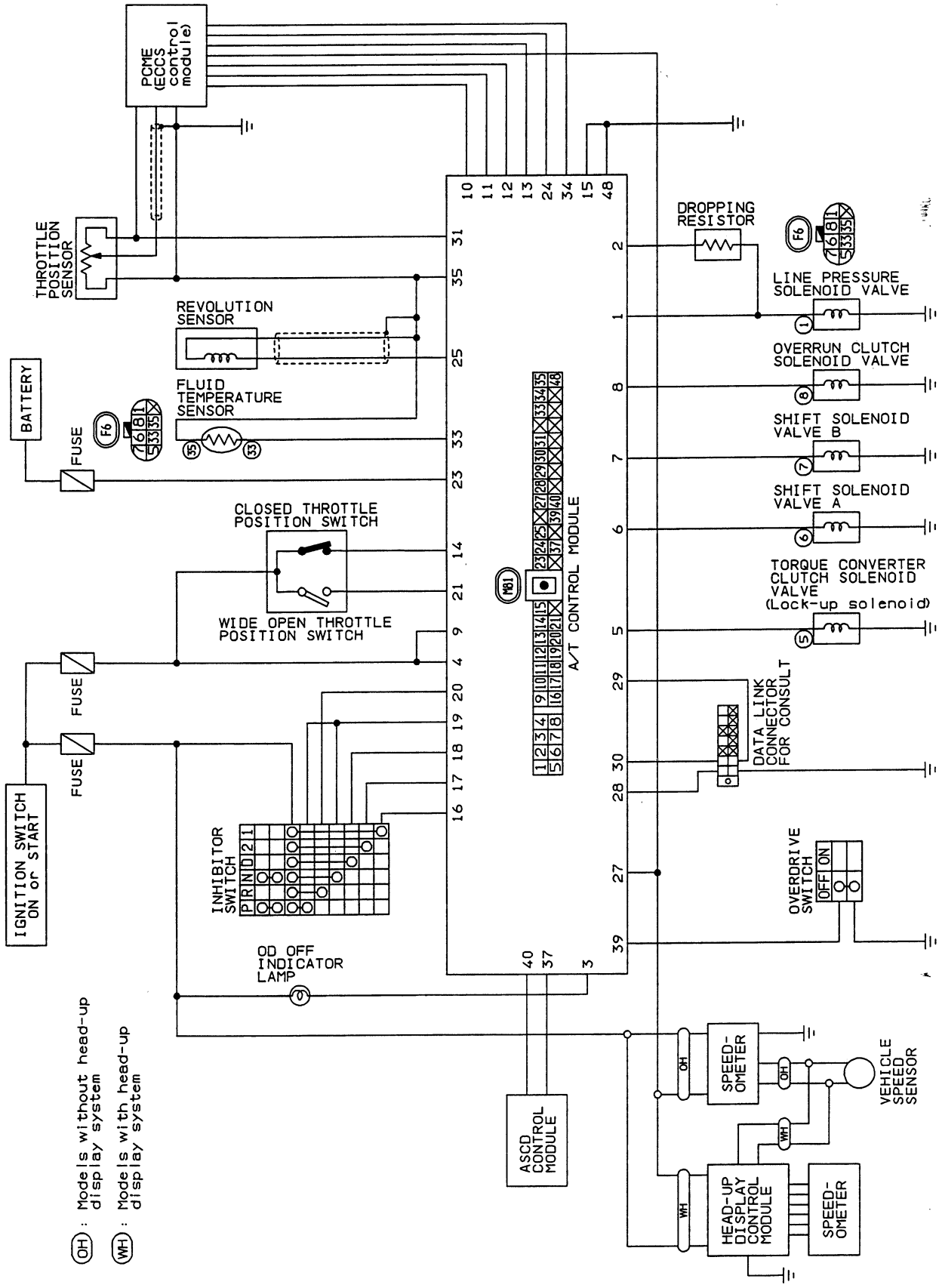
Gear position	1	2	3	4
Shift solenoid valve A	ON	OFF	OFF	ON
Shift solenoid valve B	ON	ON	OFF	OFF

A/T Electrical Parts Location



AAT007

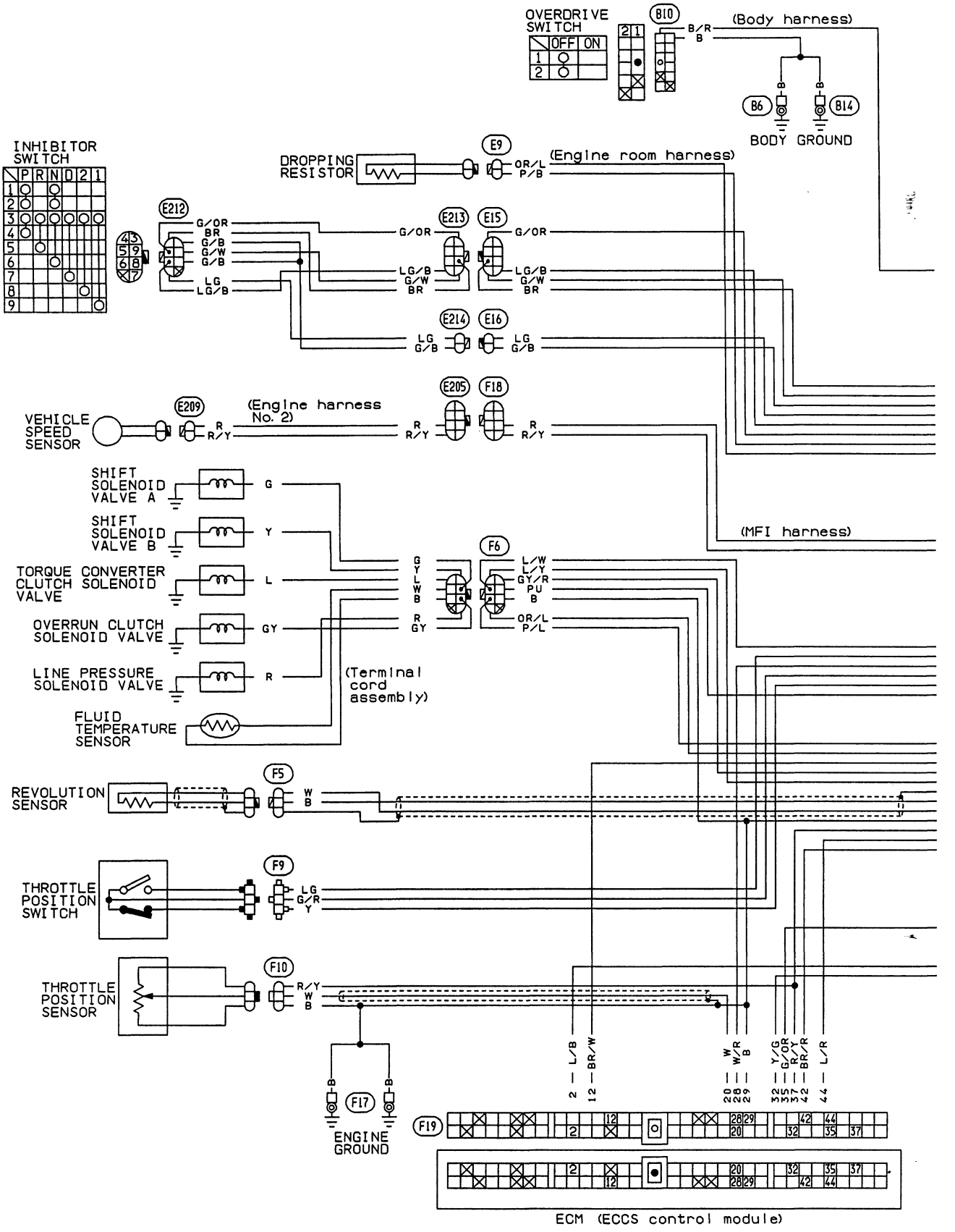
Circuit Diagram for Quick Pinpoint Check



MAT049A

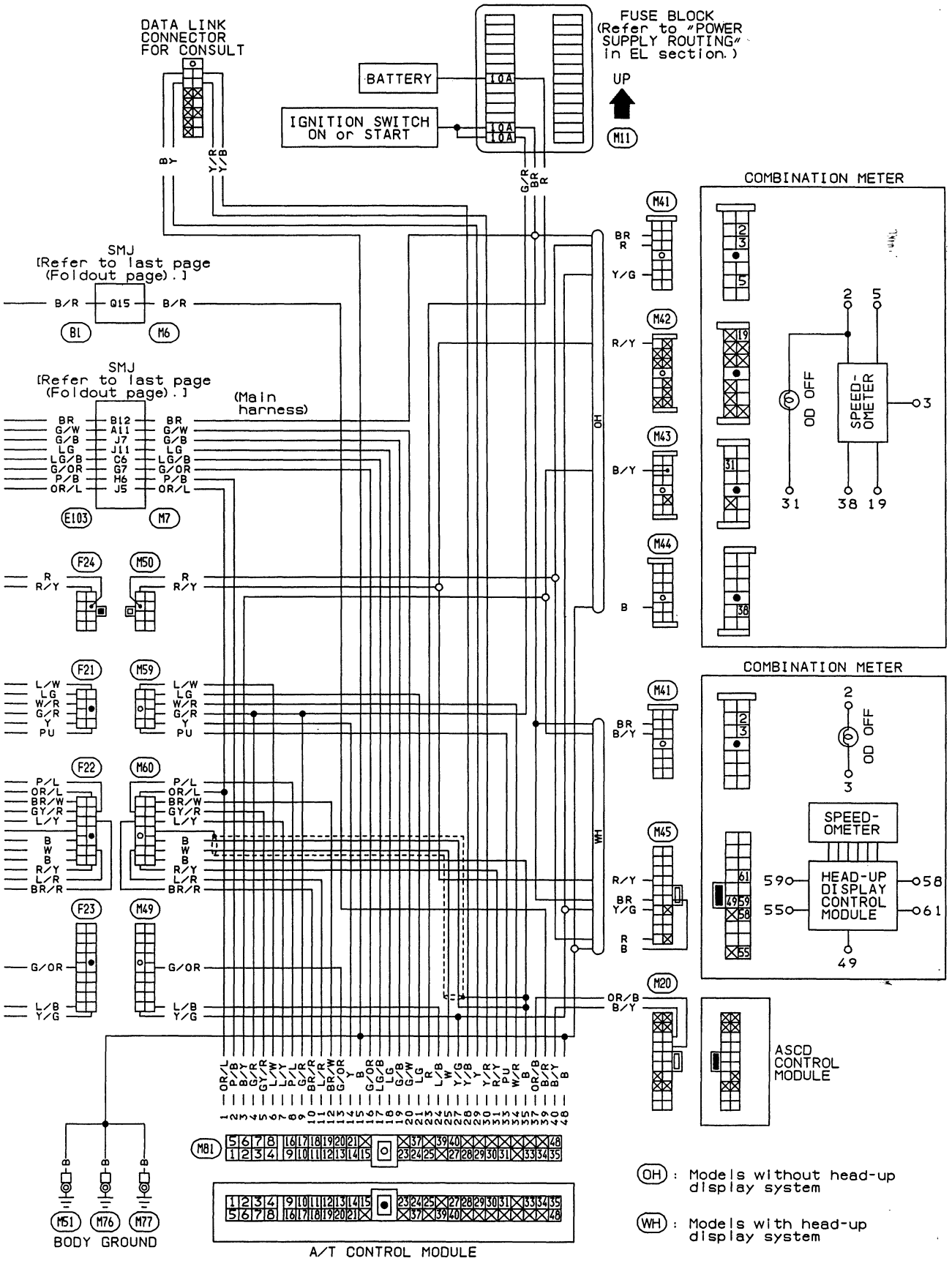
NOTE

Wiring Diagram

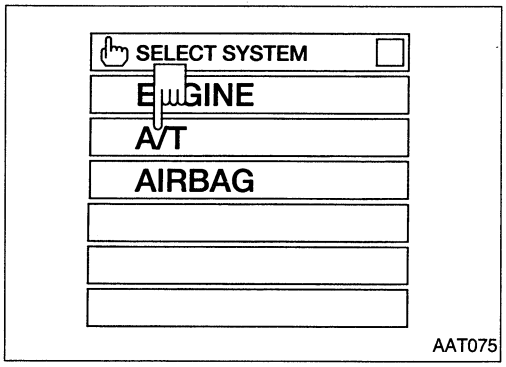


MAT050A-1

Wiring Diagram (Cont'd)



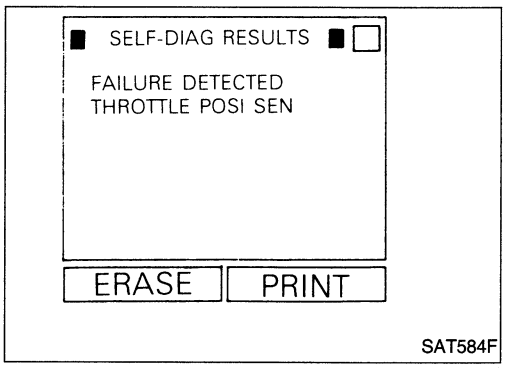
MAT050A



Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

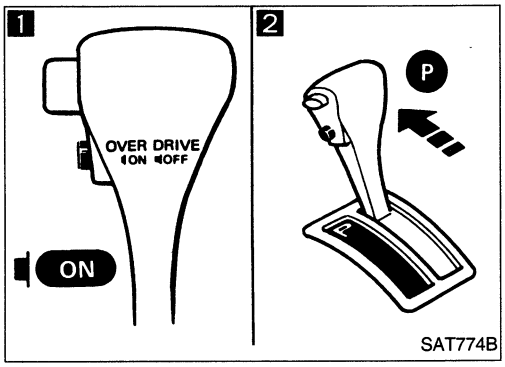
1. Turn on CONSULT.
2. Touch "A/T".

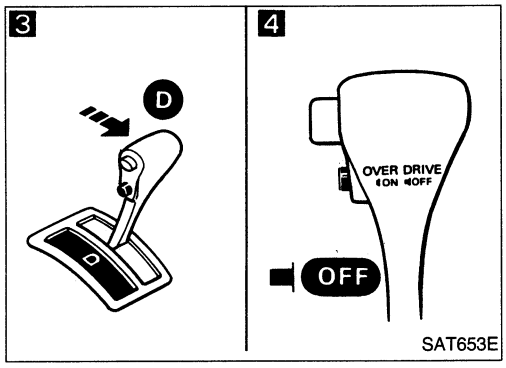


3. Touch "SELF-DIAG RESULTS".
   CONSULT performs self-diagnosis.

Self-diagnosis (Cont'd)

SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)





DIAGNOSIS START

Start engine and warm it up to normal engine operating temperature.

1 Set overdrive switch to "ON" position.

2 Move selector lever to "P" position.

Does OD OFF indicator lamp come on for about 2 seconds?

No → Perform Diagnostic Procedure 1. Refer to AT-56.

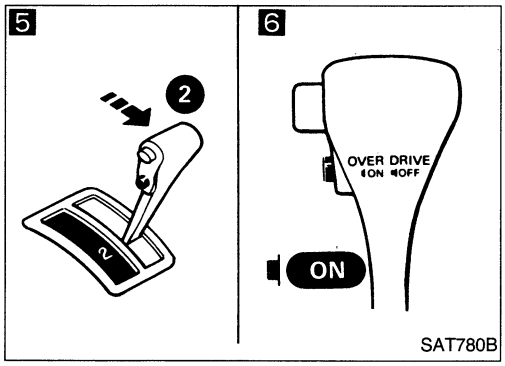
Yes

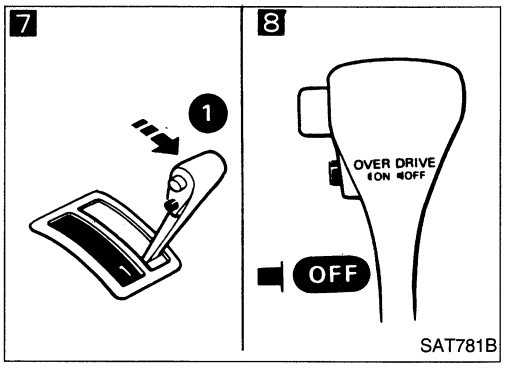
3 Move selector lever to "D" range.

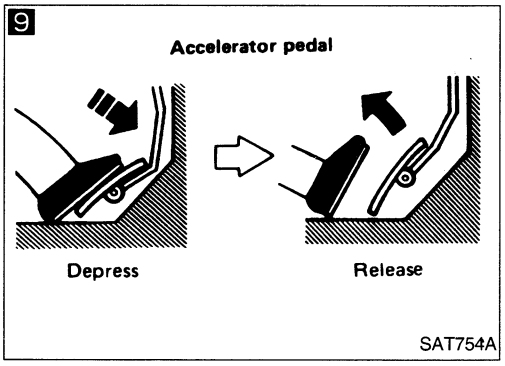
4 Set overdrive switch to "OFF" position.

Ⓐ

Self-diagnosis (Cont'd)







Ⓐ

Wait for more than 2 seconds after ignition switch "ON".

5 Move selector lever to "2" position.

6 Set overdrive switch to "ON" position.

7 Move selector lever to "1" position.

8 Set overdrive switch to "OFF" position.

9 Depress accelerator pedal fully and release it.

Check OD OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE on next page.

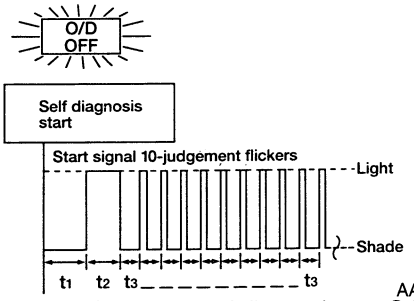
DIAGNOSIS END

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

Flickers of OD OFF indicator lamp: Damaged circuit

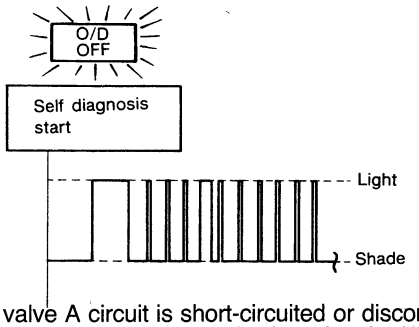
All judgement flickers are same.



AAT131

All circuits that can be confirmed by self-diagnosis are O.K.

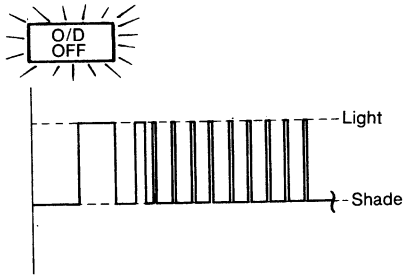
4th judgement flicker is longer than others.



SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.
Go to SHIFT SOLENOID VALVE A CIRCUIT CHECK (AT-44).

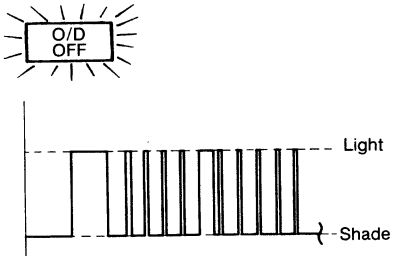
1st judgement flicker is longer than others.



SAT437F

Revolution sensor circuit is short-circuited or disconnected.
Go to REVOLUTION SENSOR CIRCUIT CHECK (AT-41).

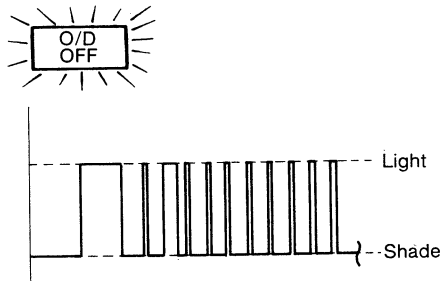
5th judgement flicker is longer than others.



SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.
Go to SHIFT SOLENOID VALVE B CIRCUIT CHECK (AT-45).

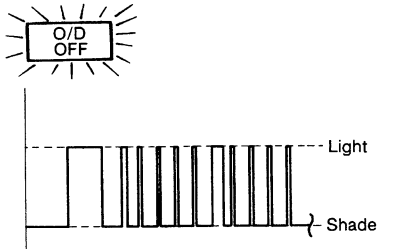
2nd judgement flicker is longer than others.



SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.
Go to VEHICLE SPEED SENSOR CIRCUIT CHECK (AT-42).

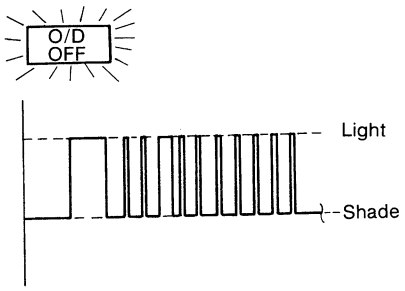
6th judgement flicker is longer than others.



SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
Go to OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK (AT-46).

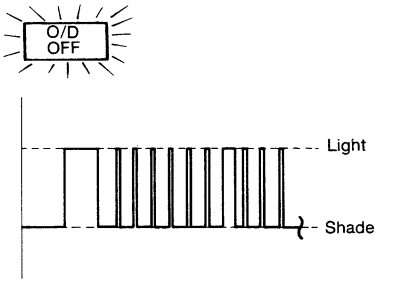
3rd judgement flicker is longer than others.



SAT441F

Throttle position sensor circuit is short-circuited or disconnected.
Go to THROTTLE POSITION SENSOR CIRCUIT CHECK (AT-43).

7th judgement flicker is longer than others.



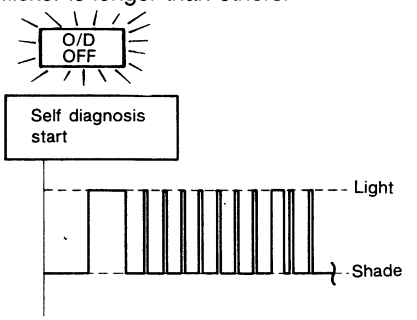
SAT449F

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK (AT-47).

t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second

Flickers of OD OFF indicator lamp: Damaged circuit

8th judgement flicker is longer than others.

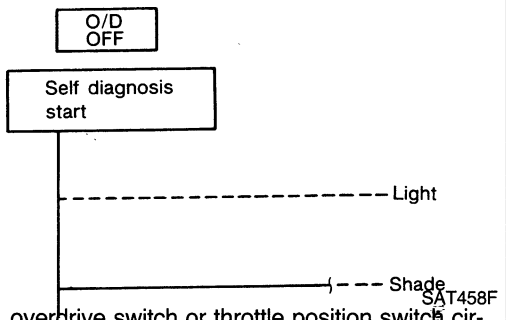


SAT451F

Fluid temperature sensor is disconnected or TCM (A/T control module) power source circuit is damaged.

Go to FLUID TEMPERATURE SENSOR AND TCM (A/T CONTROL MODULE) POWER SOURCE CIRCUIT CHECKS (AT-48).

Does not come on.

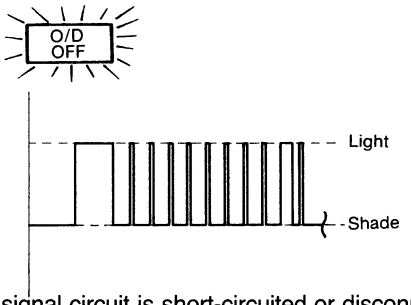


SAT458F

Inhibitor switch, overdrive switch or throttle position switch circuit is disconnected or TCM (A/T control module) is damaged.

Go to INHIBITOR SWITCH, OVERDRIVE SWITCH AND THROTTLE POSITION SWITCH CIRCUIT CHECKS (AT-52).

9th judgement flicker is longer than others.

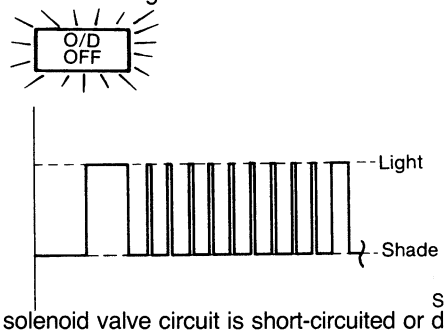


SAT453F

Engine speed signal circuit is short-circuited or disconnected.

Go to ENGINE SPEED SIGNAL CIRCUIT CHECK (AT-50).

10th judgement flicker is longer than others.

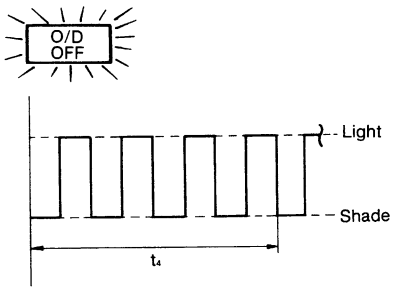


SAT455F

Line pressure solenoid valve circuit is short-circuited or disconnected.

Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK (AT-51).

Flickers as shown below.



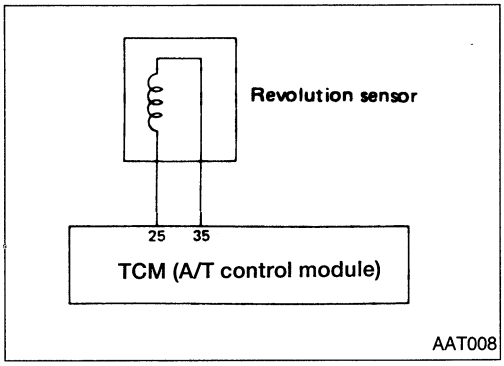
SAT457F

Battery power is low.
Battery has been disconnected for a long time.
Battery is conversely connected.
(When reconnecting TCM (A/T control module) connectors. — This is not a problem.)

t_4 = 1.0 second

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK



CHECK REVOLUTION SENSOR. — Refer to AT-79.

N.G. → Repair or replace revolution sensor.

O.K. ↓

A

CHECK INPUT SIGNAL.

1. 

2.

- Select "ECU INPUT SIGNALS".
- Read out the value of "REVOLUTION SENSOR" while driving.
- Check the value changes according to driving speed.

N.G. → Check the following items.
- Harness continuity between TCM (A/T control module) and revolution sensor (Main harness)
- Harness continuity between revolution sensor and ECM (ECCS control module) (Main harness)
- Ground circuit for ECM — Refer to EF & EC section ("Diagnostic Procedure 22", "TROUBLE DIAGNOSES").

OR

Check voltage between TCM (A/T control module) terminal (25) and ground while driving.
(Measure with A.C. range.)
Voltage:
At 0 km/h (0 MPH):
0V
At 30 km/h (19 MPH):
1V or more
(Voltage rises gradually in response to vehicle speed.)

A

☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT916F

O.K. ↓

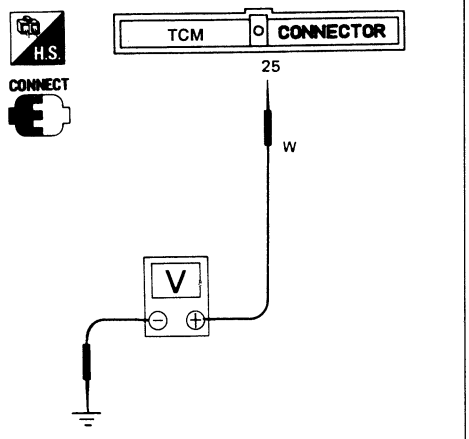
Perform self-diagnosis again after driving for a while.

N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

A



Self-diagnosis (Cont'd)

VEHICLE SPEED SENSOR CIRCUIT CHECK

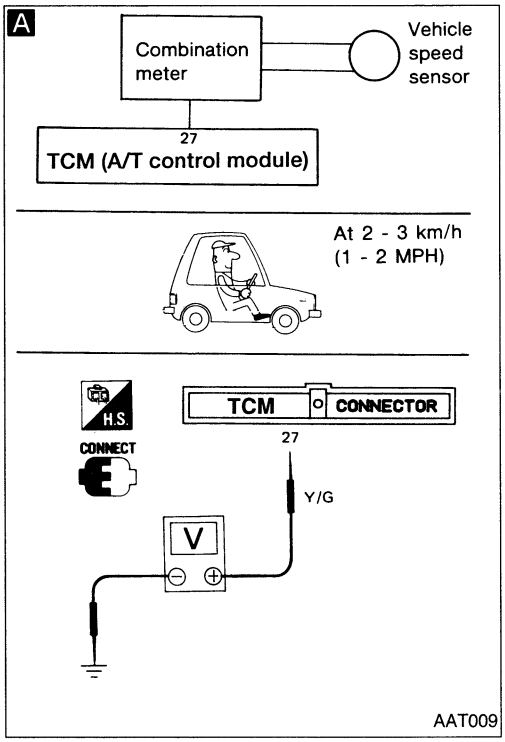
A

☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT917F

A

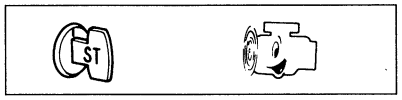


AAT009

A

CHECK INPUT SIGNAL.

1.



2.

- Select "ECU INPUT SIGNALS".
- Read out the value of "VEHICLE SPEED SENSOR" while driving.
- Check the value changes according to driving speed.

OR

Check voltage between TCM (A/T control module) 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 EL section ("Speed Sensor Signal Check", "METER AND GAUGES").
- Harness continuity between TCM and speed sensor (Main harness)

O.K. ↓

Perform self-diagnosis again after driving for a while.

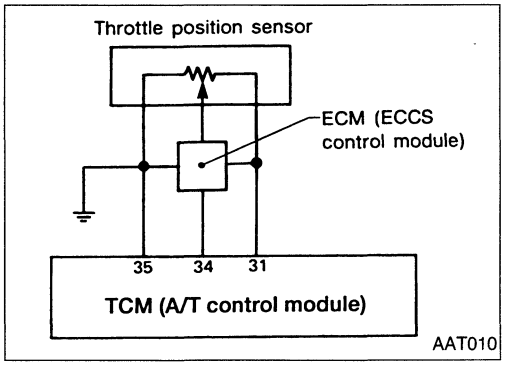
N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK



Perform diagnostic test mode II for engine control.

N.G. → Check throttle position sensor circuit for engine control. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

O.K.

A

☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT951F

CHECK INPUT SIGNAL.

1. 

2. ● Select "ECU INPUT SIGNALS".
● Read out the value of "THROTTLE POSITION SENSOR".
Voltage:
Fully-closed throttle:
0.2 - 0.6V
Fully-open throttle:
2.9 - 3.9V

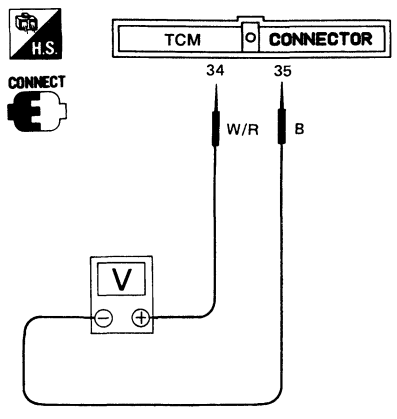
N.G. → Check harness continuity between ECM (ECCS control module) and TCM (A/T control module) regarding throttle position sensor circuit. (Main harness)

OR

● Check voltage between TCM (A/T control module) terminals ㉞ and ㉟ while accelerator pedal is depressed slowly.
Voltage:
Fully-closed throttle:
0.2 - 0.6V
Fully-open throttle:
2.9 - 3.9V
(Voltage rises gradually in response to throttle position.)

O.K.

A



AAT102

Perform self-diagnosis again after driving for a while.

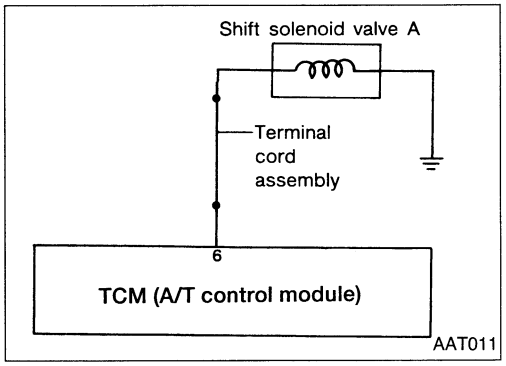
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM pin terminals for damage or connection of TCM harness connector.

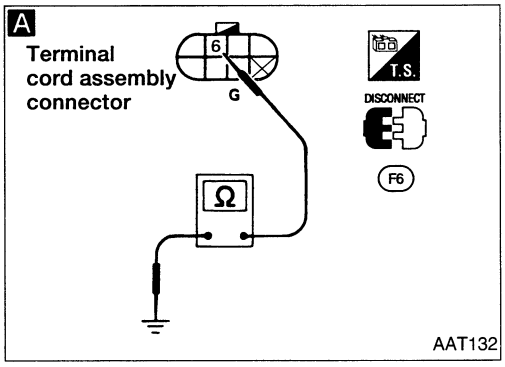
O.K.

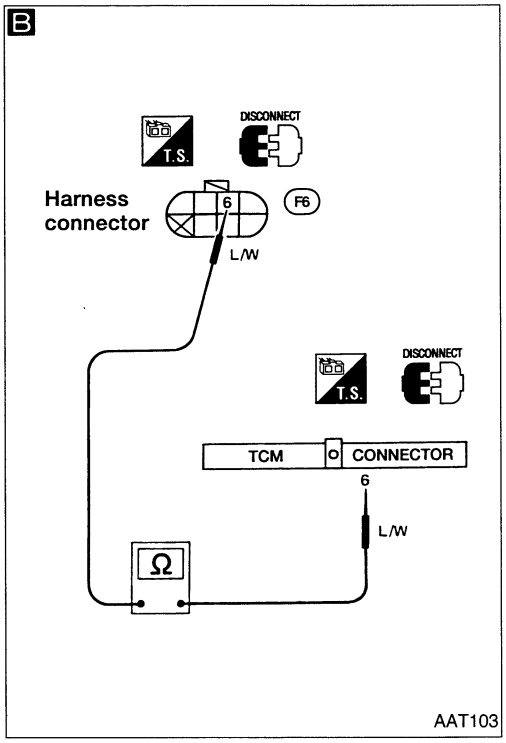
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK

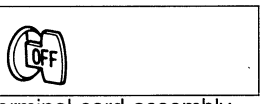






A

CHECK GROUND CIRCUIT.

1. 

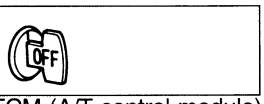
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Shift solenoid A — Refer to AT-79.
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between terminal ⑥ and TCM terminal ⑥.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between TCM (A/T control module) and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis again after driving for a while.

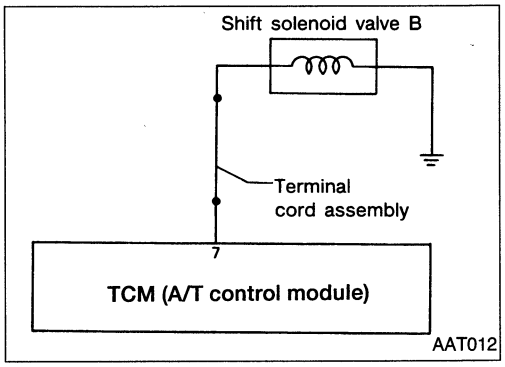
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

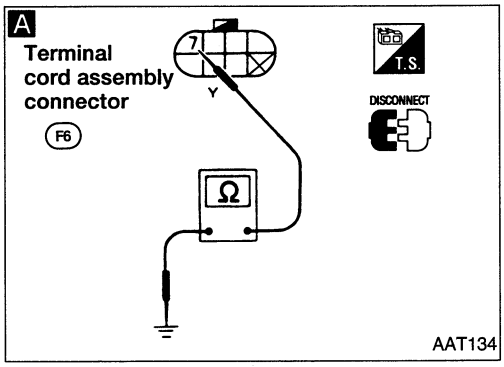
O.K. ↓

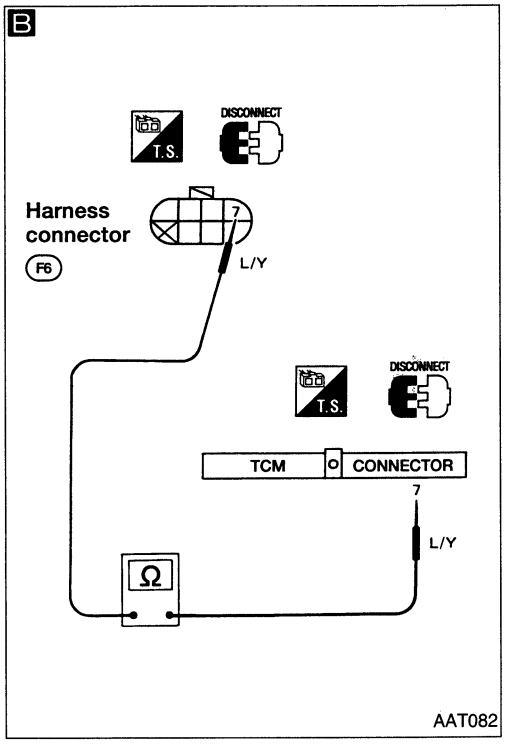
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Shift solenoid valve B — Refer to AT-79.
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between terminal ⑦ and TCM terminal ⑦.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between TCM (A/T control module) and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis again after driving for a while.

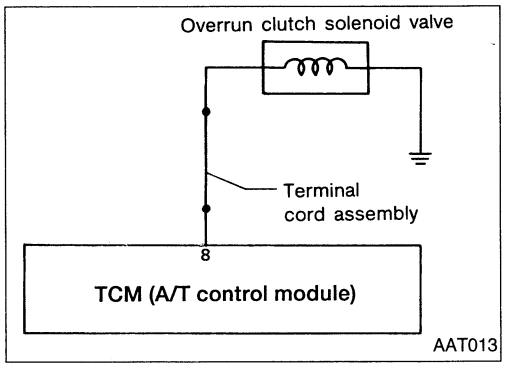
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

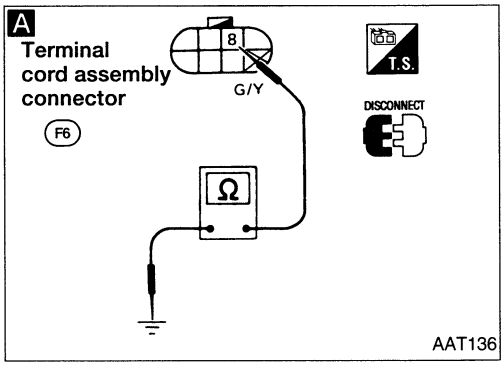
O.K. ↓

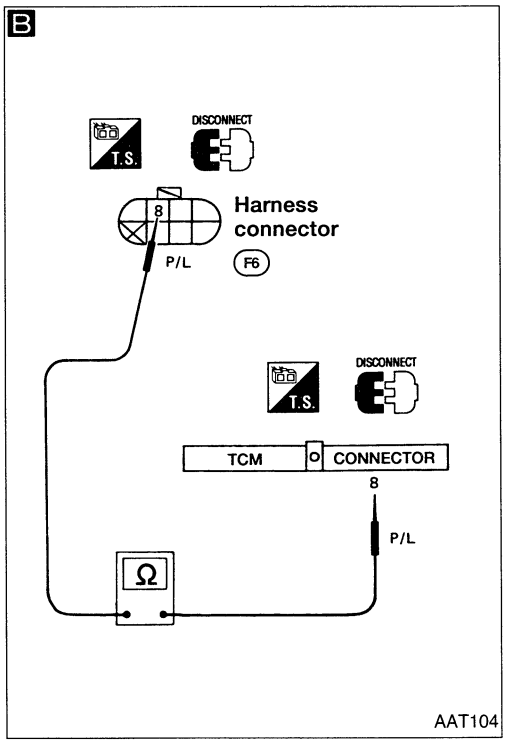
INSPECTION END

Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK

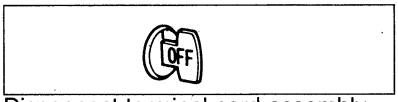






A

CHECK GROUND CIRCUIT.

1. 

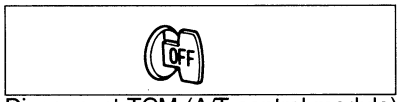
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑧ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Overrun clutch solenoid valve. — Refer to AT-79.
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between terminal ⑧ and TCM terminal ⑧.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between TCM (A/T control module) and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis again after driving for a while.

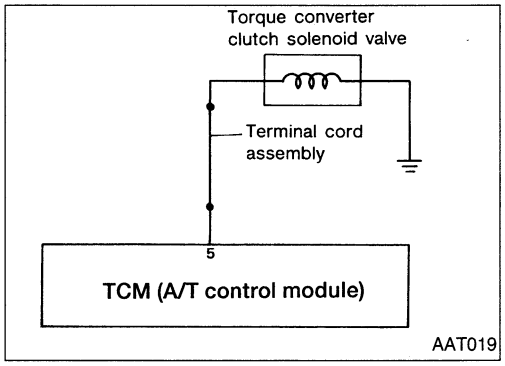
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

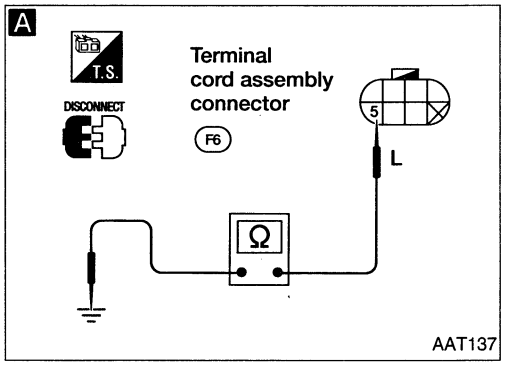
O.K. ↓

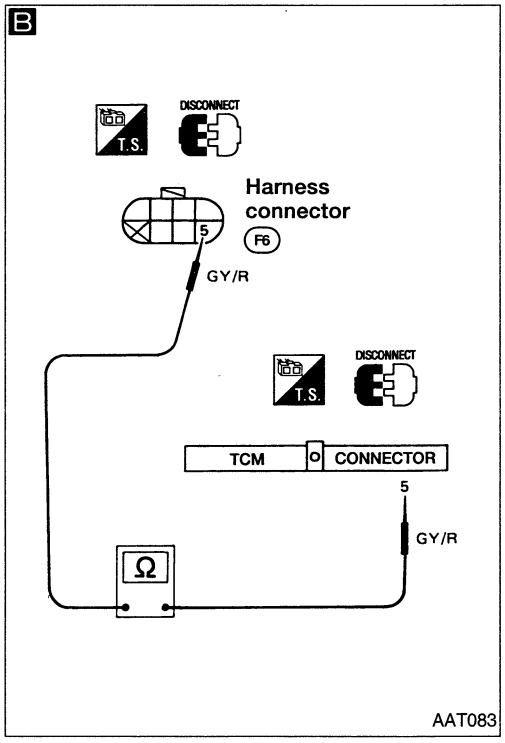
INSPECTION END

Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   Resistance: 2.5 - 5Ω

N.G. →
1. Remove oil pan. — Refer to AT-88.
2. Check the following items.
- Torque converter clutch solenoid valve — Refer to AT-79.
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between terminal ⑤ and TCM terminal ⑤.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between TCM (A/T control module) and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis again after driving for a while.

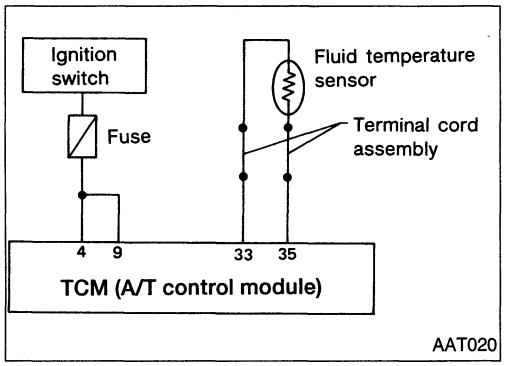
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

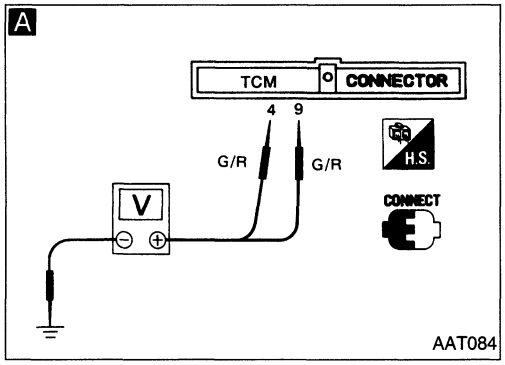
O.K. ↓

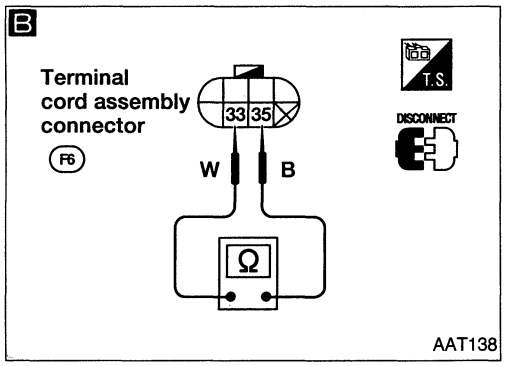
INSPECTION END

Self-diagnosis (Cont'd)

FLUID TEMPERATURE SENSOR CIRCUIT AND TCM (A/T CONTROL MODULE) POWER SOURCE CIRCUIT CHECKS

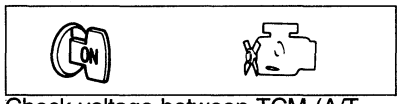






A

CHECK TCM (A/T CONTROL MODULE) POWER SOURCE.

1. 

2. Check voltage between TCM (A/T control module) terminals ④, ⑨ and ground.
   Battery positive voltage should exist.

N.G. →
- Check the following items.
- Harness continuity between ignition switch and TCM (A/T control module) (Main harness)
- Ignition switch and fuse — Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K. ↓

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ㉝ and ㉟ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

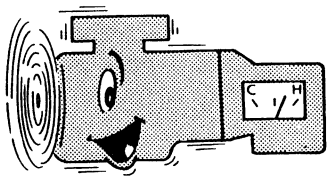
N.G. →
1. Remove oil pan.
2. Check the following items.
- Fluid temperature sensor — Refer to AT-80.
- Harness continuity of terminal cord assembly

O.K. ↓

Ⓐ

Self-diagnosis (Cont'd)

C

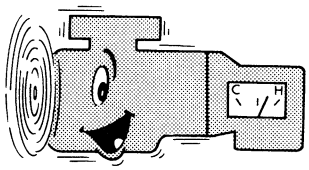


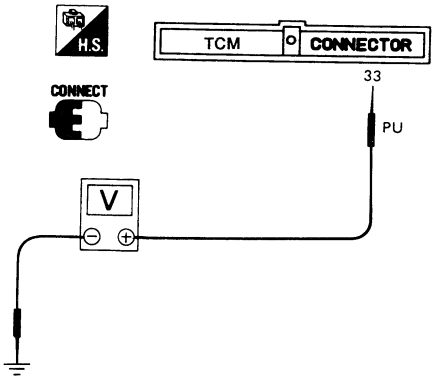
☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT952F

C



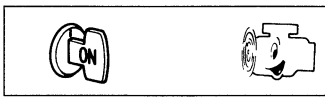


AAT084A

Ⓐ

C

CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.

1. 

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 TCM (A/T control module) 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 the following items.
● Harness continuity between TCM (A/T control module) and terminal cord assembly (Main harness)

O.K.

Perform self-diagnosis again after driving for a while.

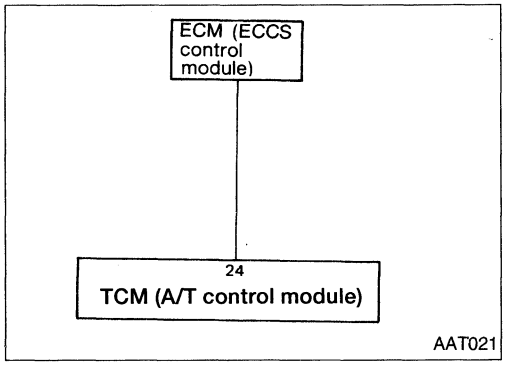
N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K.

INSPECTION END

Self-diagnosis (Cont'd)

ENGINE SPEED SIGNAL CIRCUIT CHECK

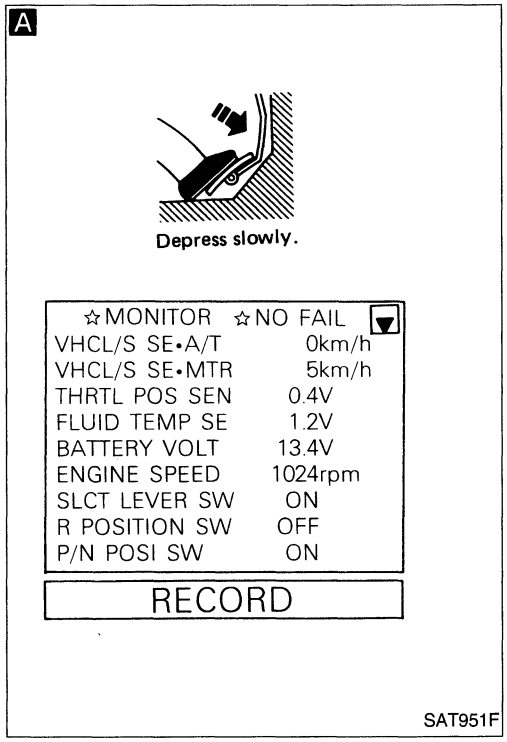


Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit.

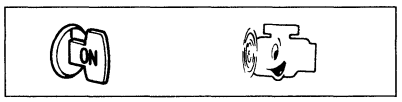
N.G. → Check ignition signal circuit for engine control. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 21", "TROUBLE DIAGNOSES").

O.K.

A



CHECK INPUT SIGNAL.

1. 

2. 
   - Select "ECU INPUT SIGNALS".
   - Read out the value of "ENGINE SPEED".
   - Check engine speed changes according to throttle opening.

OR


- Check voltage between TCM (A/T control module) terminal (24) and ground.
  Voltage: 0.9 - 4.5V

N.G. → Check the following items.
- Harness continuity between TCM (A/T control module) and ignition coil.
- Resistor
- Ignition coil — Refer to EF & EC section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

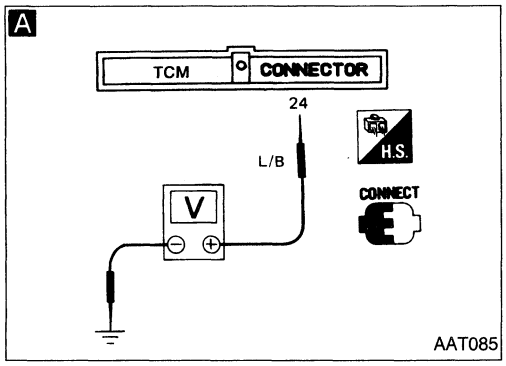
O.K.

Perform self-diagnosis again after driving for a while.

N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

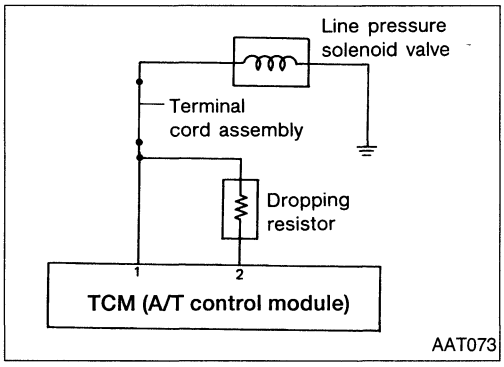
O.K.

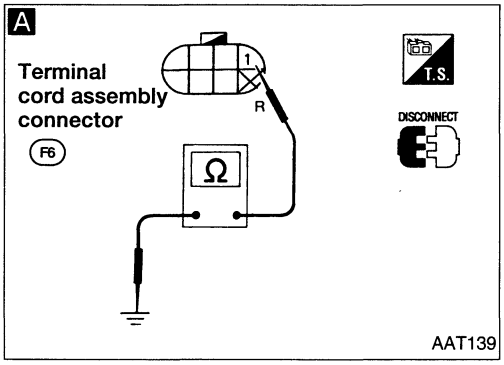
INSPECTION END

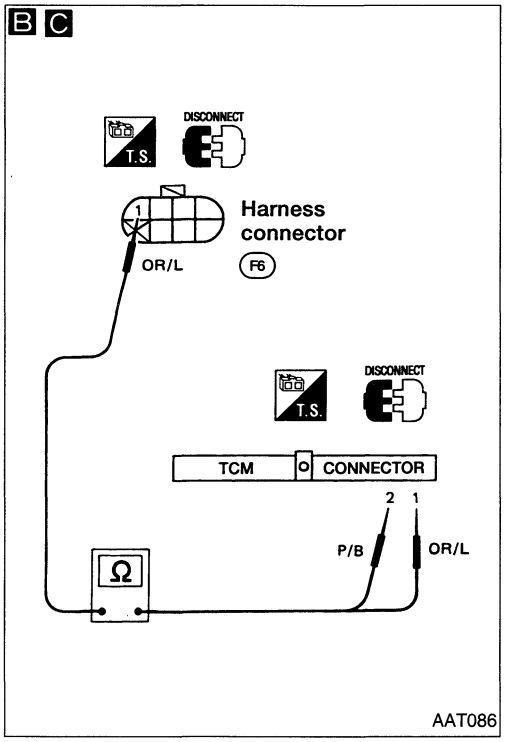


Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK







A

CHECK GROUND CIRCUIT.

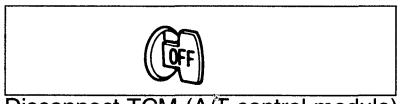
1. 
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.
   Resistance: 2.5 - 5Ω

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Line pressure solenoid valve — Refer to AT-79.
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT.

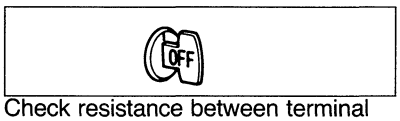
1. 
2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between terminal ① and TCM terminal ②.
   Resistance: 11.2 - 12.8Ω

N.G. →
Check the following items.
- Dropping resistor — Refer to AT-80.
- Harness continuity between TCM (A/T control module) ② and terminal cord assembly (Main harness)

O.K. ↓

C

CHECK POWER SOURCE CIRCUIT.

1. 
2. Check resistance between terminal ① and TCM (A/T control module) terminal ①
   Resistance:
   Approximately 0Ω
3. Reinstall any part removed.

N.G. →
Repair or replace harness between TCM (A/T control module) ① and terminal cord assembly.

O.K. ↓

Perform self-diagnosis again after driving for a while.

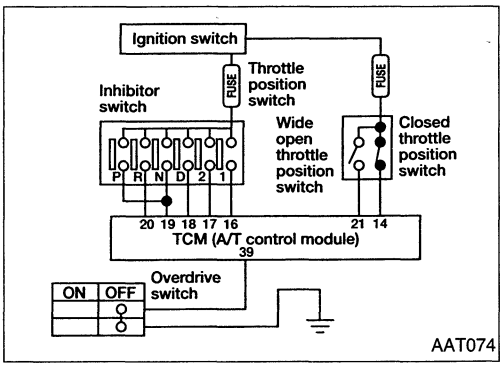
N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

Self-diagnosis (Cont'd)

INHIBITOR SWITCH, OVERDRIVE SWITCH AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS



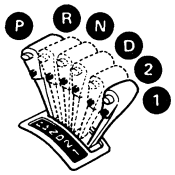
A

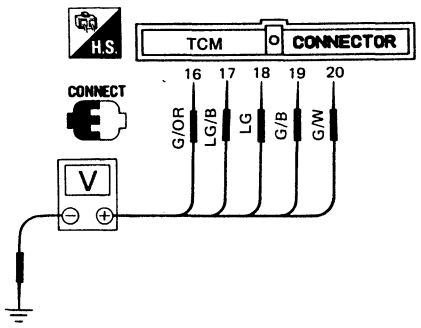
☆MONITOR ☆NO FAIL	
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT953F

A





AAT087

A

CHECK INHIBITOR SWITCH CIRCUIT.

1. 

2. ● Select "ECU INPUT SIGNALS".
● Read out "R", "N", "D", "1" and "2" POSITION SWITCH moving selector lever to each position.
● Check the selector lever position is indicated properly.

N.G. → Check the following items.
- Inhibitor switch — Refer to AT-78.
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and TCM (A/T control module) (Main harness)

OR

Check voltage between TCM (A/T control module) terminals ⑯, ⑰, ⑱, ⑲, ⑳ and ground while moving selector lever through each position .

Voltage:

B: Battery positive voltage

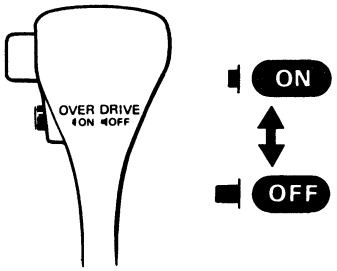
0: 0V

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
2	0	0	0	B	0
1	0	0	0	0	B

O.K. → Ⓐ

Self-diagnosis (Cont'd)

B

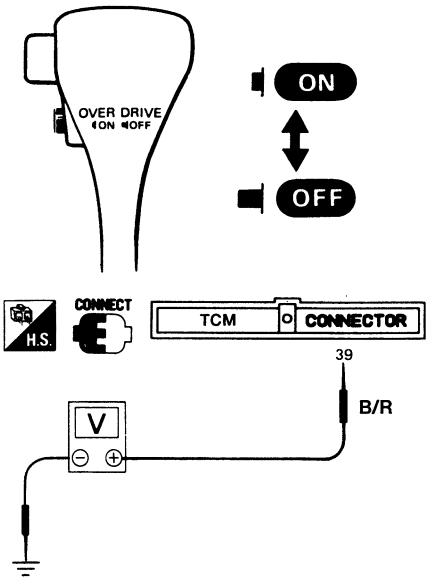


☆MONITOR ☆NO FAIL	
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
SLCT LEVER SW	ON
R POSITION SW	OFF
P/N POSI SW	ON

RECORD

SAT954F

B



AAT088

Ⓐ

B

CHECK OVERDRIVE SWITCH CIRCUIT.

1.

2.

- Select "ECU INPUT SIGNALS".
- Read out "SELECTOR LEVER SWITCH (Overdrive switch)".
- Check the position is indicated properly. (Selector lever switch "ON" displayed on CONSULT means overdrive "OFF".)

OR

- Check voltage between TCM (A/T control module) terminal (39) and ground when overdrive switch is in "ON" position and in "OFF" position.

Switch position	Voltage
ON	Battery positive voltage
OFF	1V or less

O.K.

Ⓑ

N.G.

Check the following items.

- Overdrive switch — Refer to AT-78.
- Harness continuity between TCM (A/T control module) and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

Self-diagnosis (Cont'd)

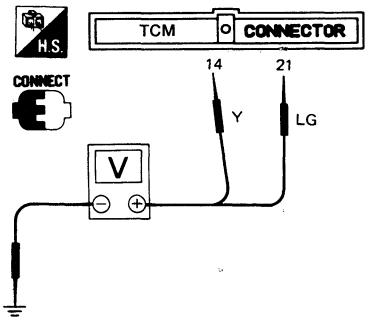
C D

☆MONITOR	☆NO FAIL
D POSITION SW	OFF
1 POSITION SW	OFF
2 POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD OUT	OFF
KICKDOWN SW	OFF
POWERSHIFT SW	OFF
CLOSED THL/SW	ON
W/O THRL/P-SW	OFF

RECORD

SAT955F

C D



AAT089

Ⓑ

C

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

1.

2.

- Select "ECU INPUT SIGNALS".
- Read out "WIDE OPEN THROTTLE POSITION SWITCH" depressing accelerator pedal fully.
- Check wide open throttle position switch position is indicated properly.

OR

- Check voltage between TCM (A/T control module) terminal (21) and ground while depressing accelerator pedal slowly. (after warming up engine)

Voltage:

When releasing accelerator pedal:

1V or less

When depressing accelerator pedal fully:

8 - 15V

O.K.

Ⓒ

N.G.

Check harness continuity between TCM (A/T control module) and wide open throttle position switch.

O.K.

N.G.

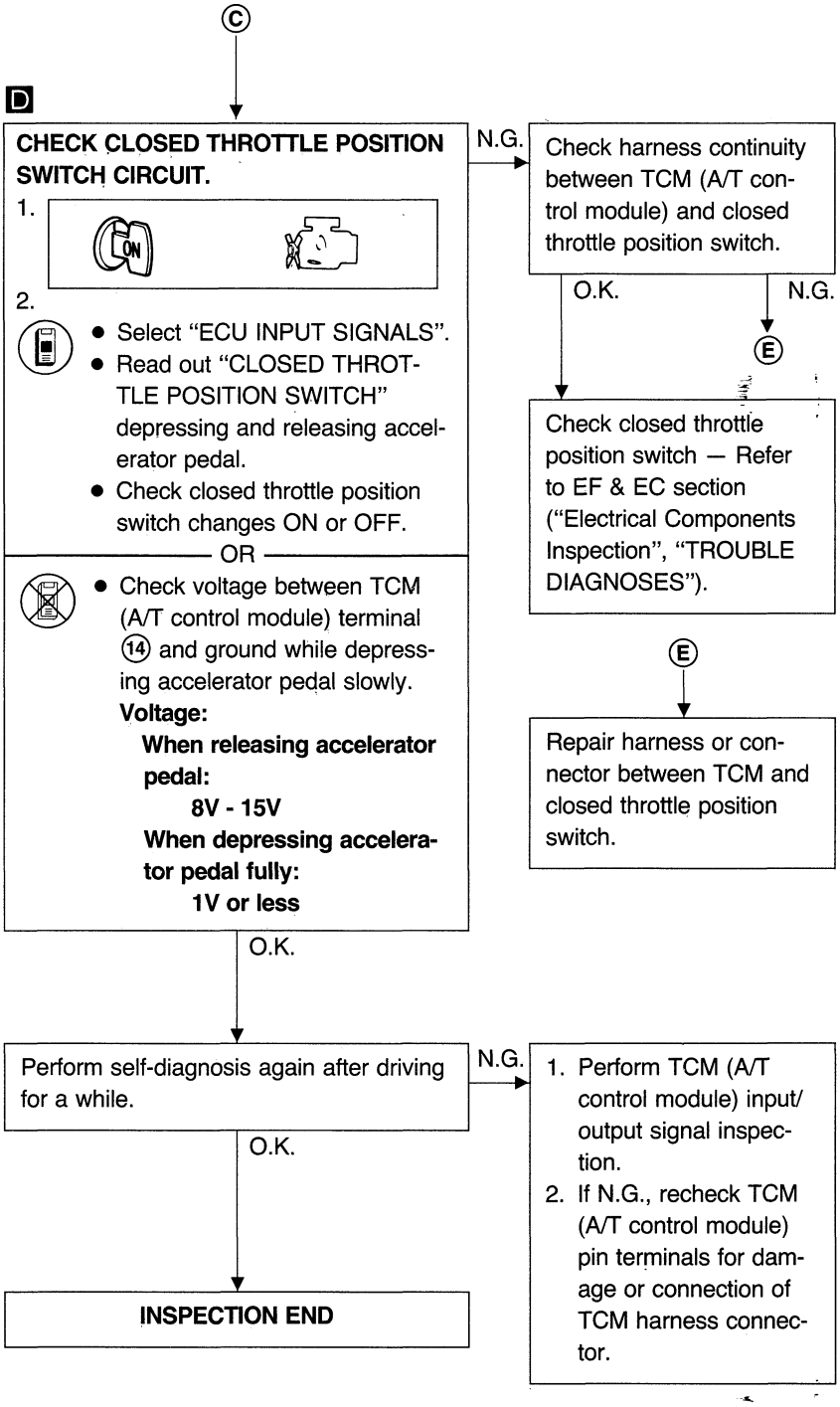
Ⓓ

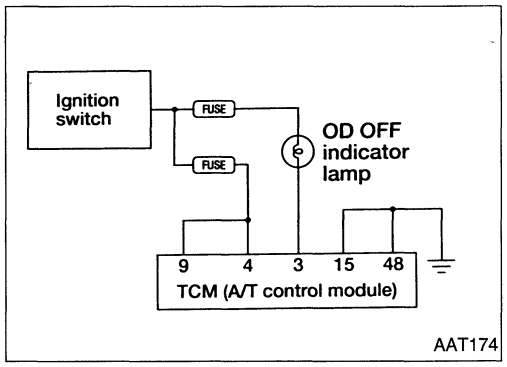
Check wide open throttle position switch — Refer to EF & EC section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

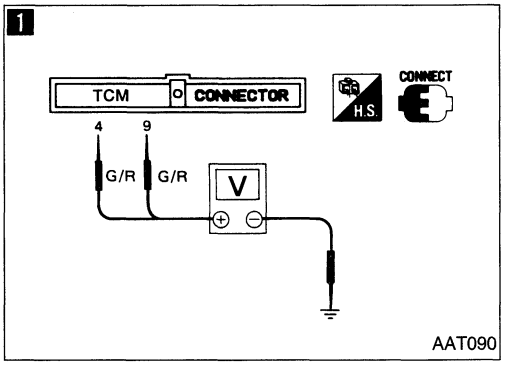
Ⓓ

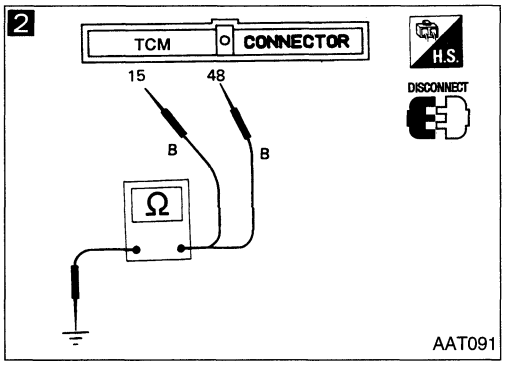
Repair harness or connector between TCM and wide open throttle position switch.

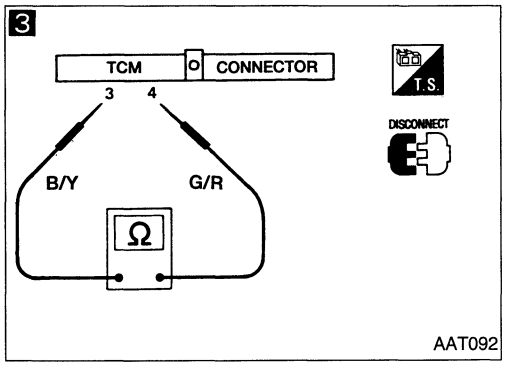
Self-diagnosis (Cont'd)









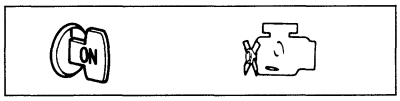


Diagnostic Procedure 1

SYMPTOM:
OD OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to "ON".

1

CHECK TCM (A/T CONTROL MODULE) POWER SOURCE.

1. 

2. Check voltage between TCM (A/T control module) terminals ④, ⑨ and ground.
   Battery positive voltage should exist.

N.G. → Check the following items.
- Harness continuity between ignition switch and TCM (A/T control module) (Main harness)
- Ignition switch and fuse — Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K. ↓

2

CHECK TCM (A/T CONTROL MODULE) GROUND CIRCUIT.

1. 

2. Disconnect TCM (A/T control module) harness connector.
3. Check resistance between TCM terminals ⑮, ㊽ and ground.
   Resistance:
   Approximately 0Ω

N.G. → Check harness continuity between TCM (A/T control module) and ground.

O.K. ↓

3

CHECK LAMP CIRCUIT.

1. 

2. Check resistance between TCM (A/T control module) terminals ③ and ④.
   Resistance: 50 - 100Ω
3. Reinstall any part removed.

N.G. → Check the following items.
- OD OFF indicator lamp — Refer to EL section ("Combination Meter", "METER AND GAUGES").
- Harness continuity between ignition switch and OD OFF indicator lamp (Main harness)
- Harness continuity between OD OFF indicator lamp and TCM (A/T control module).

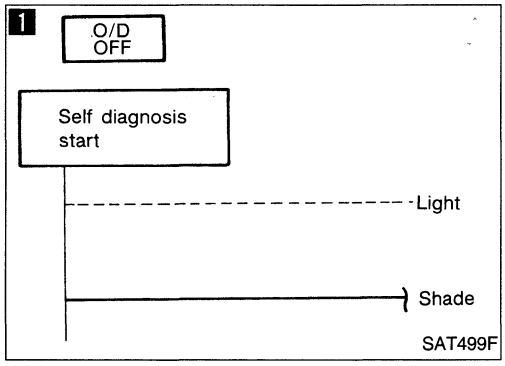
O.K. ↓

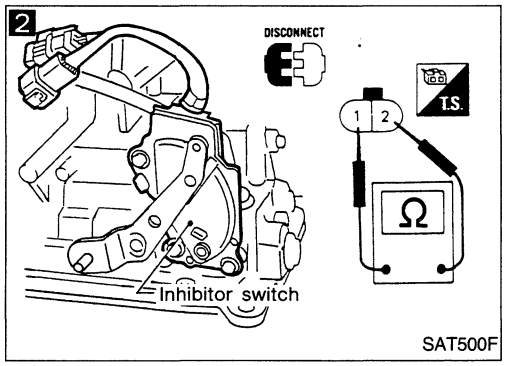
Check again.

N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END





Diagnostic Procedure 2

SYMPTOM:
Engine cannot be started with selector lever in "P" or "N" position or engine can be started with selector lever in "D", "2", "1" or "R" position.

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to AT-52.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No

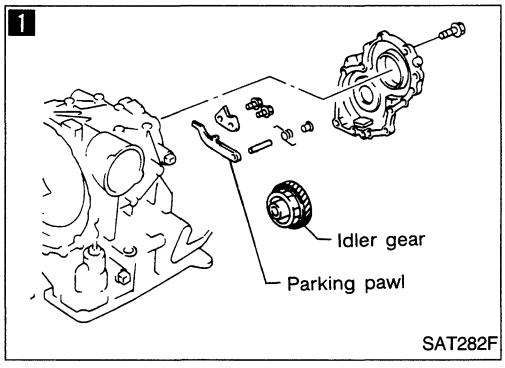
2 Check continuity of inhibitor switch 2-pin connector. — Refer to AT-78. — N.G. → Repair or replace inhibitor switch.

O.K.

Check starting system. — Refer to EL section ("STARTING SYSTEM"). — N.G. → Repair or replace damaged parts.

O.K.

INSPECTION END



Diagnostic Procedure 3

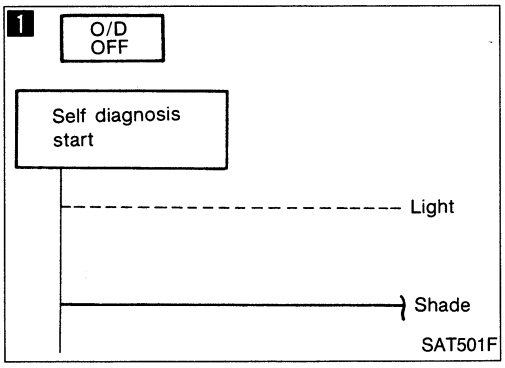
SYMPTOM:
Vehicle moves when it is pushed forward or backward with selector lever in "P" position.

1 Check parking components. — Refer to AT-107 and AT-188. — N.G. → Repair or replace damaged parts.

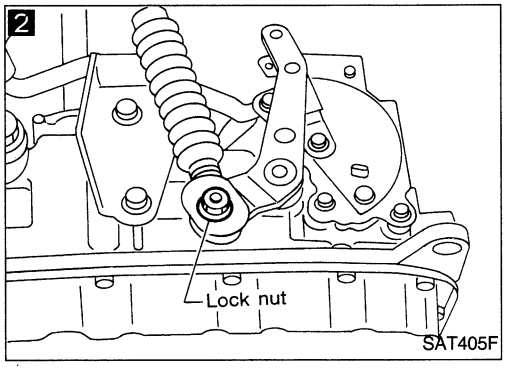
O.K.

INSPECTION END

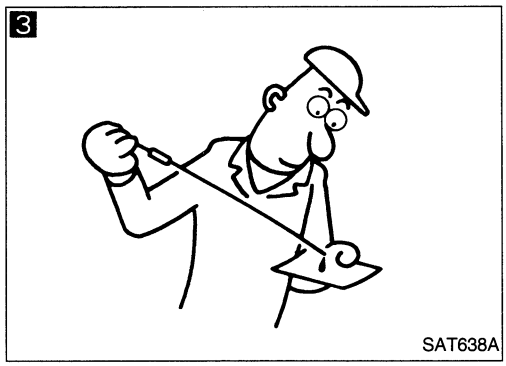
1



2



3



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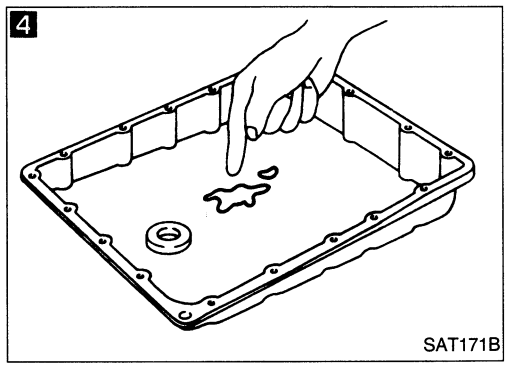


Diagnostic Procedure 4

SYMPTOM:
Vehicle moves forward or backward when selecting "N" position.

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to AT-52.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No

Check control cable. — Refer to AT-90. — N.G. → 2 Adjust control cable. — Refer to AT-90.

O.K.

3 Check A/T fluid level again. — N.G. → Refill ATF.

O.K.

4
1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Disassemble A/T.
2. Check the following items.
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly

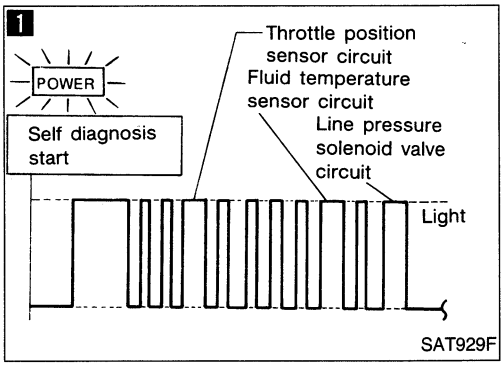
O.K.

Check again. — N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

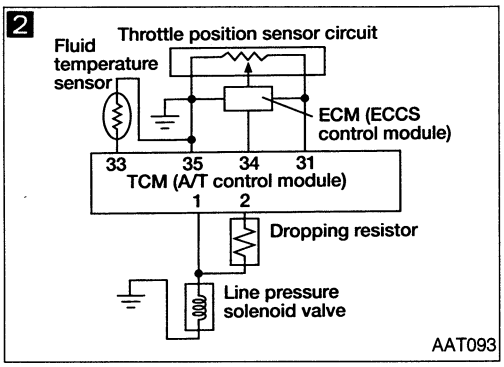
O.K.

INSPECTION END

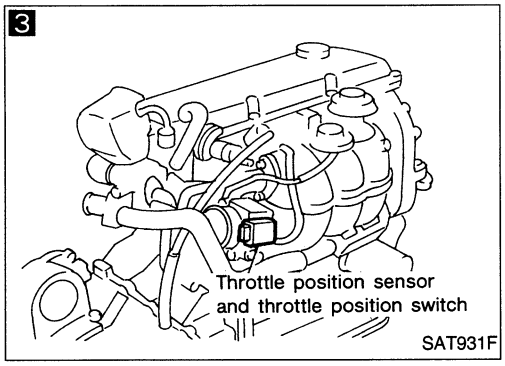
1



2



3



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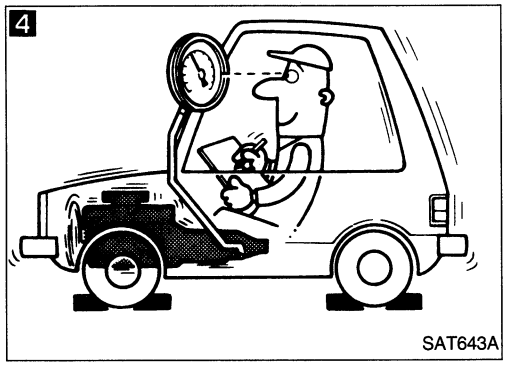


Diagnostic Procedure 5

SYMPTOM:
There is large shock when changing from "N" to "R" position.

1

Does self-diagnosis show damage to throttle position sensor, line pressure solenoid valve or fluid temperature sensor circuit?

Yes → **2** Check damaged circuit. — Refer to AT-43, AT-48, AT-51.

No ↓

3

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

N.G. → Repair or replace throttle position sensor.

O.K. ↓

4

Check line pressure at idle with selector lever in "D" position. — Refer to AT-83.

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

O.K. ↓

Check again.

N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

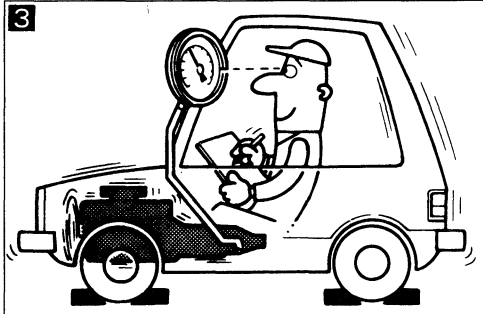
1

SAT638A

2

SAT642A

3



SAT643A

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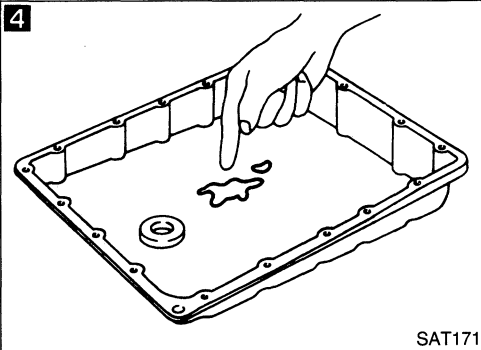


SAT171B

Diagnostic Procedure 6

SYMPTOM:

Vehicle does not creep backward when selecting "R" range.

1

Check A/T fluid level again.

N.G. → Refill ATF.

O.K.

2

Check stall revolution with selector lever in "1" and "R" position.

N.G. in both "1" and "R" position

O.K.

O.K. in "1" position
N.G. in "R" position

3

Check line pressure at idle with selector lever in "R" position. — Refer to AT-83.

N.G.

O.K.

4

1. Remove oil pan.
2. Check fluid condition.

N.G.

O.K.

Check again.

N.G.

O.K.

INSPECTION END

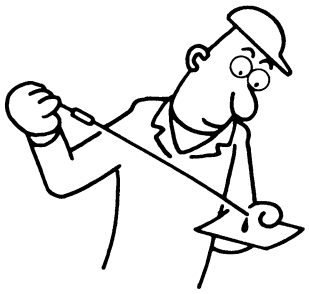
N.G. in both "1" and "R" position:

1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

N.G. at Check again.:

1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

1



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2

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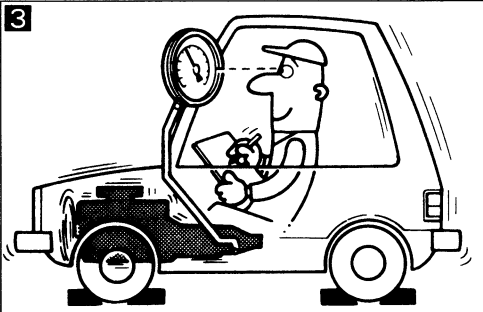
3



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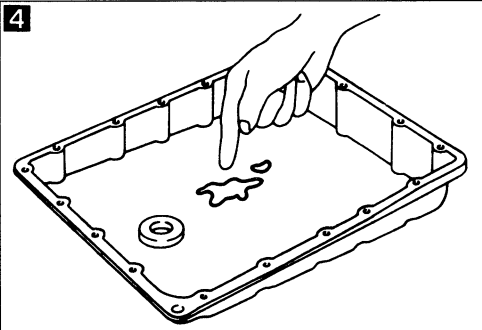


SAT171B

Diagnostic Procedure 7

SYMPTOM:
Vehicle does not creep forward when selecting "D", "2" or "1" position.

1

Check A/T fluid level again.

N.G. → Refill ATF.

O.K.

2

Check stall revolution with selector lever in "D" position. — Refer to AT-80.

N.G. →

1. Remve control valve assembly. — Refer to AT-88.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T
4. Check the following items.
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

O.K.

3

Check line pressure at idle with selector lever in "D" position. — Refer to AT-83.

O.K.

4

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →

O.K.

Check again.

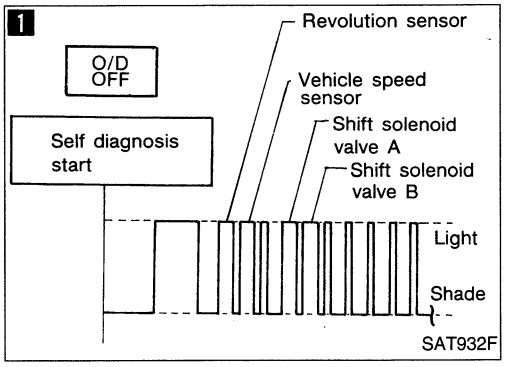
N.G. →

1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K.

INSPECTION END

1



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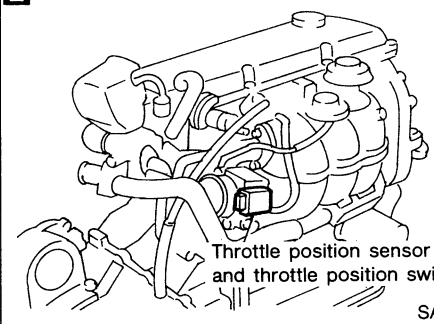

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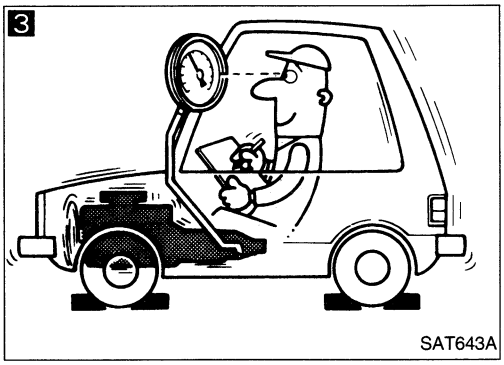

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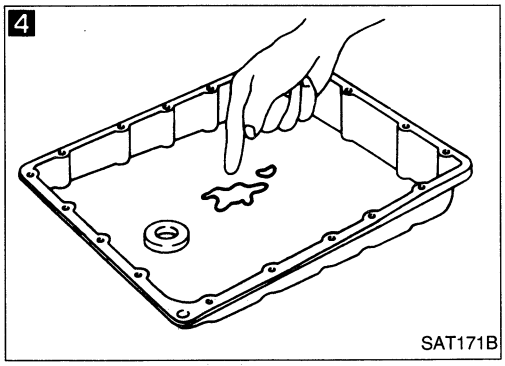


Diagnostic Procedure 8

SYMPTOM:

Vehicle cannot be started from D_1 on Cruise test — Part 1.

Is Diagnostic Procedure O.K.?

No → Go to Diagnostic Procedure 9.

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 AT-41, AT-42, AT-44, AT-45.

No ↓

2 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSIS").

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 AT-83.

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
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. ↓

4
1. Remove oil pan.
2. Check A/T fluid condition.

O.K. →
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

N.G. →

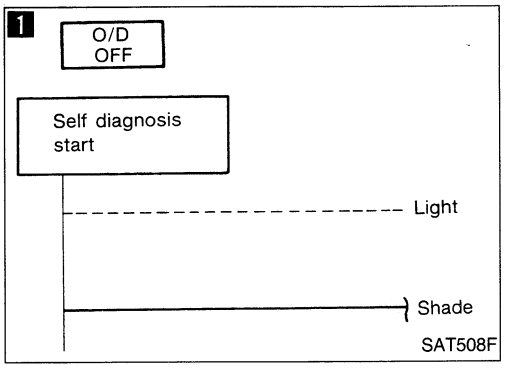
Check again.

N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

1



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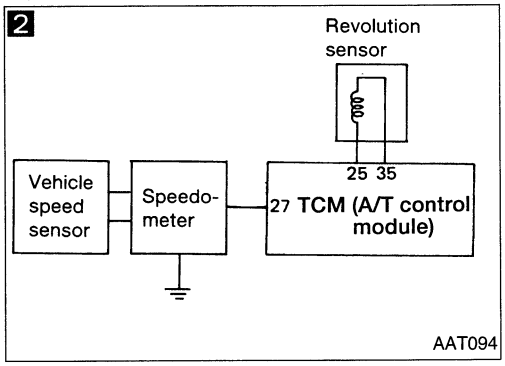

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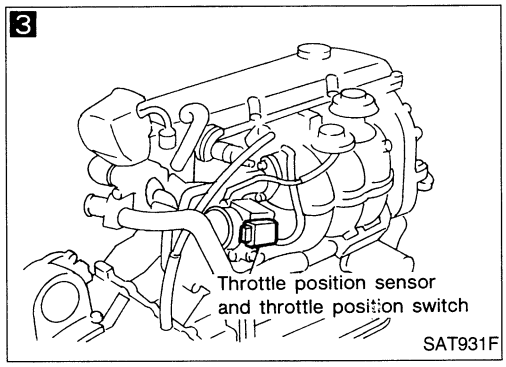

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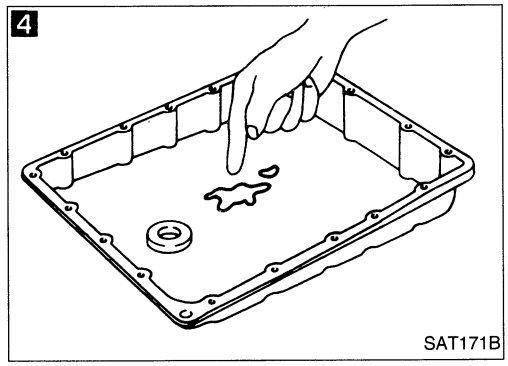


Diagnostic Procedure 9

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.

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 AT-52.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

2 Check revolution sensor and vehicle speed circuit. — Refer to AT-41 and AT-42. — N.G. → Repair or replace revolution sensor and vehicle speed sensor circuits.

O.K. ↓

3 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES"). — N.G. → Repair or replace throttle position sensor.

O.K. ↓

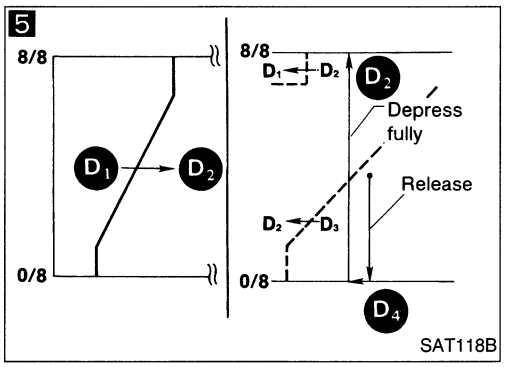
4 1. Remove oil pan.
2. Check A/T fluid condition. — N.G. →
   1. Remove control valve. — Refer to AT-88.
   2. Check the following items.
      - Shift valve A
      - Shift solenoid valve A
      - Pilot valve
      - Pilot filter

O.K. ↓

O.K. ↓
   3. Disassemble A/T.
   4. Check the following items.
      - Servo piston assembly
      - Brake band
      - Oil pump assembly

Ⓐ

Diagnostic Procedure 9 (Cont'd)



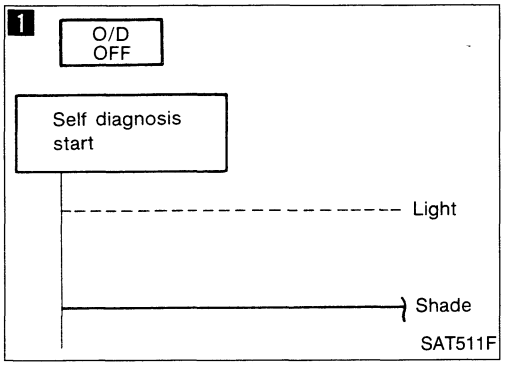
Ⓐ

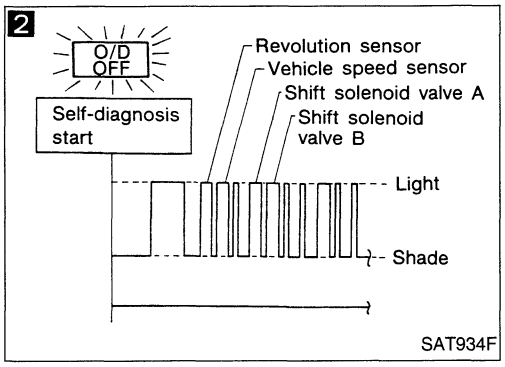
5

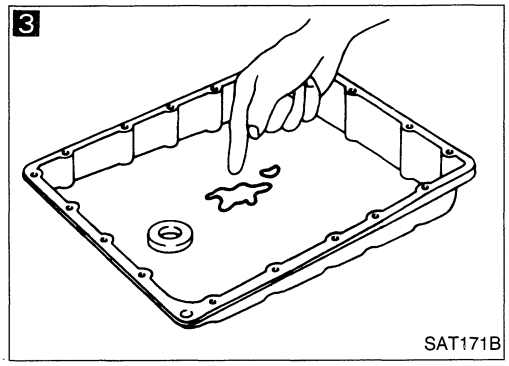
Check again. — N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

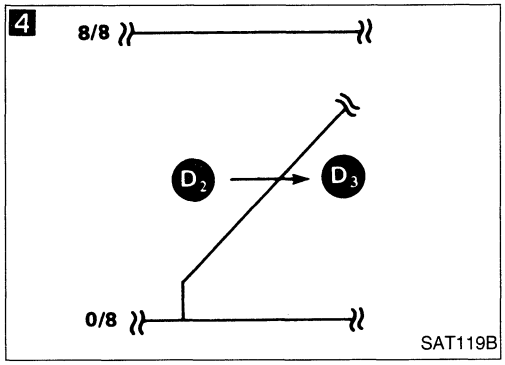
O.K.

INSPECTION END









Diagnostic Procedure 10

SYMPTOM:
A/T does not shift from D_2 to D_3 at the specified speed.

Are Diagnostic Procedures 7 and 8 O.K.?
- No → Perform Diagnostic Procedure 7 or 8. Refer to AT-61 or AT-62.
- Yes ↓

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?
- Yes → Check inhibitor switch circuit. — Refer to AT-52.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?
- No ↓

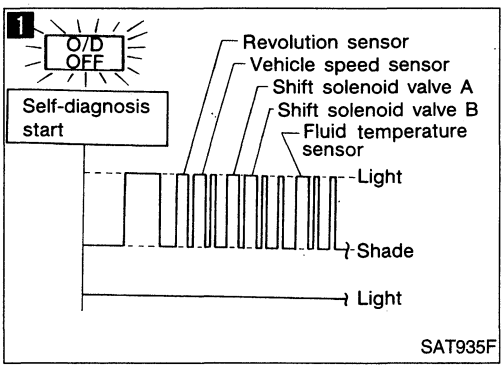
2 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").
- N.G. → Repair or replace throttle position sensor.
- O.K. ↓

3
1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. →
  1. Remove control valve assembly. — Refer to AT-88.
  2. Check the following items.
     - Shift valve B
     - Shift solenoid valve B
     - Pilot valve
     - Pilot filter
  - O.K. ↓
  3. Disassemble A/T.
  4. Check the following items.
     - Servo piston assembly
     - High clutch assembly
     - Oil pump assembly
  - O.K. ↓
- O.K. ↓

4 Check again.
- N.G. →
  1. Perform TCM (A/T control module) input/output signal inspection.
  2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.
- O.K. ↓

INSPECTION END

1



SAT935F

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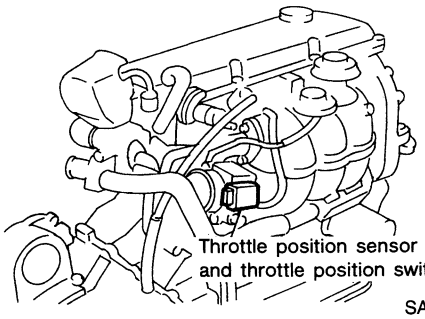

SAT931F

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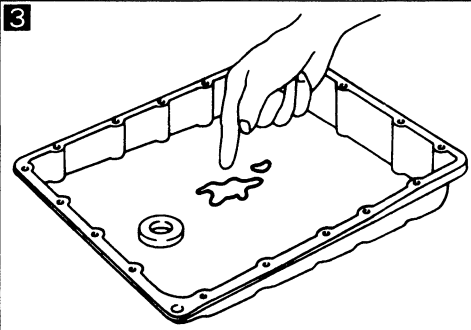
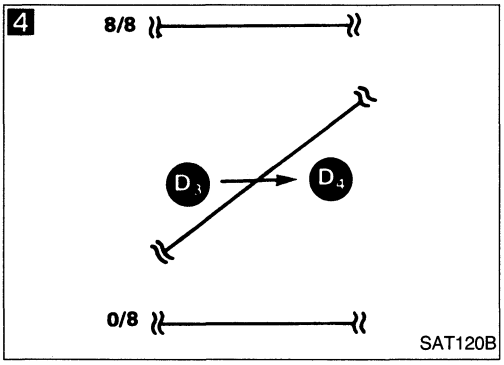


SAT171B

4



SAT120B

Diagnostic Procedure 11

SYMPTOM:

A/T does not shift from D_3 to D_4 at the specified speed.

- A/T must be warm before D_3 to D_4 shift will occur.

Are Diagnostic Procedures 7 and 8 O.K.? — No → Perform Diagnostic Procedure 7 or 8. Refer to AT-61 or AT-62.

Yes ↓

1 Does self-diagnosis show damage to inhibitor switch, overdrive switch, shift solenoid valve A, B, vehicle speed pulse generator, speed sensor or fluid temperature sensor circuit after cruise test? — Yes → Check damaged circuit. — Refer to AT-42, AT-44, AT-45, AT-48.

No ↓

2 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES"). — N.G. → Repair or replace throttle position sensor.

O.K. ↓

3
1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
2. Check the following items.
   - Shift valve B
   - Overrun clutch control valve
   - Shift solenoid valve B
   - Pilot valve
   - Pilot filter

O.K. ↓

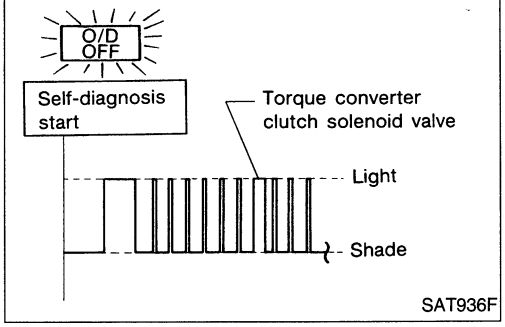
O.K. →
3. Disassemble A/T.
4. Check the following items.
   - Servo piston assembly
   - Brake band
   - Torque converter
   - Oil pump assembly

4 Check again. — N.G. → 1. Perform TCM (A/T control module) input/output signal inspection. 2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

1



SAT936F

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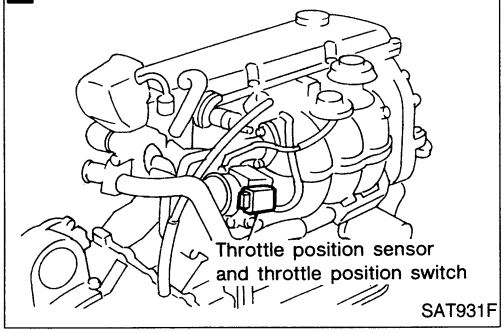

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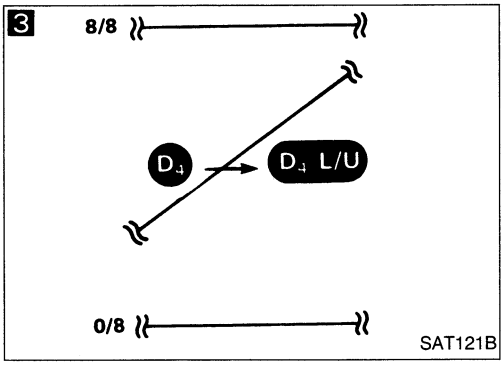


SAT121B

Diagnostic Procedure 12

SYMPTOM:
A/T does not perform lock-up at the specified speed.

1

Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?

Yes → Check torque converter clutch solenoid valve circuit. — Refer to AT-47.

No ↓

2

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

N.G. → Repair or replace throttle position sensor.

O.K. ↓

1. Remove control valve. — Refer to AT-88.
2. Check following items.
- Lock-up control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

N.G. → Repair or replace damaged parts.

O.K. ↓

3

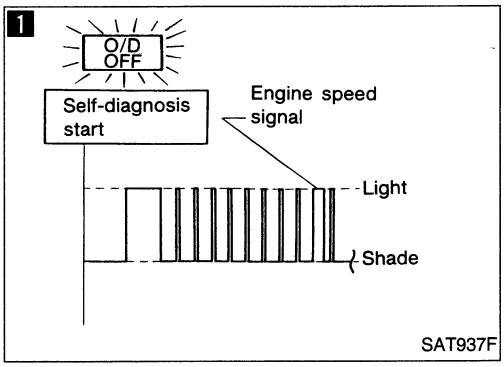
Check again.

N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END

1



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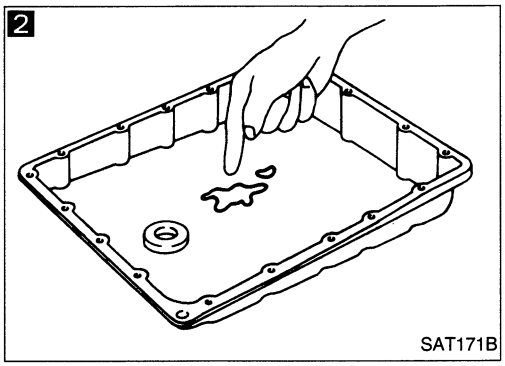


Diagnostic Procedure 13

SYMPTOM:

A/T does not hold lock-up condition for more than 30 seconds.

1

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes → Check engine speed signal circuit. — Refer to AT-50.

No

2

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
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.

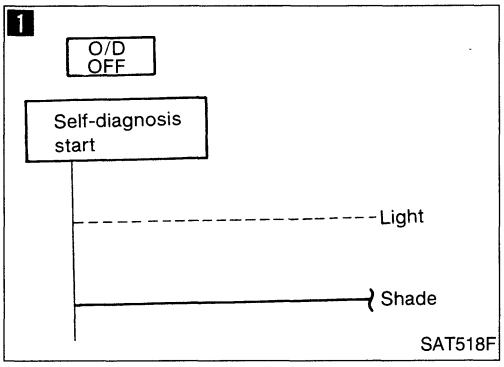
O.K. →

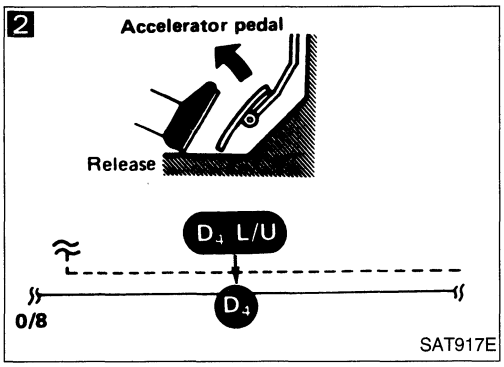
Check again.

N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. →

INSPECTION END





Diagnostic Procedure 14

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 AT-52.

OR

1

Does self-diagnosis show damage to closed throttle position switch circuit?

No

2

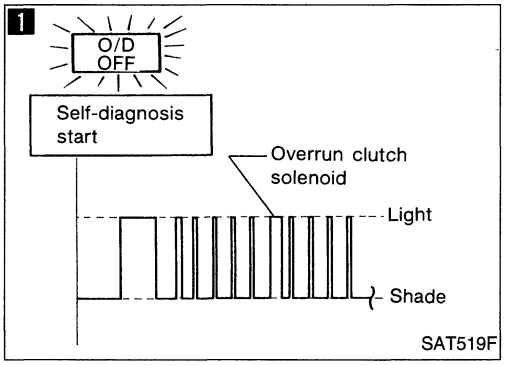
Check again.

N.G. →
1. Perform TCM (A/T control module) input/ output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K.

INSPECTION END

1



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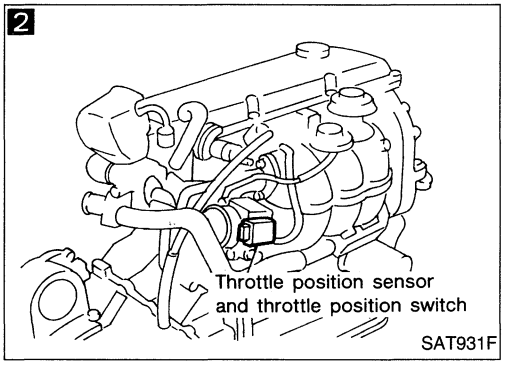

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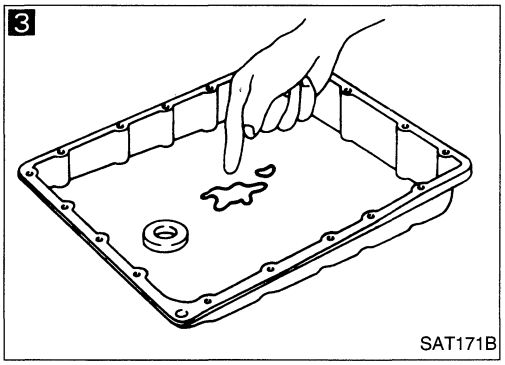

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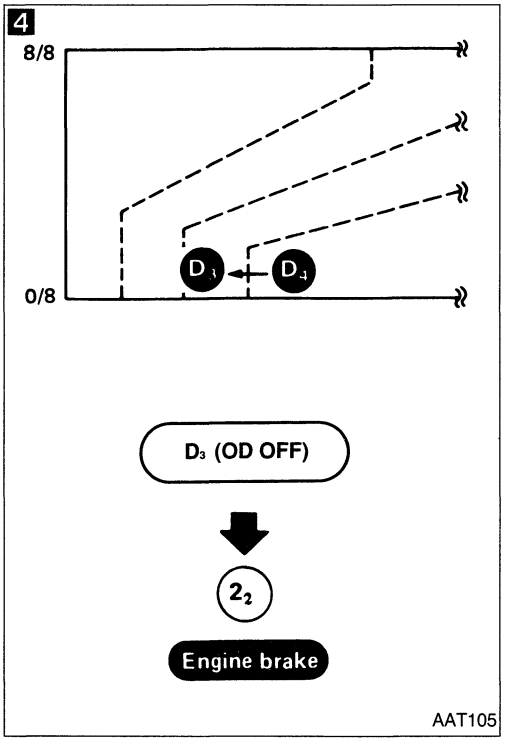


Diagnostic Procedure 15

SYMPTOM:

Engine speed does not return to idle smoothly when A/T is shifted from D_4 to D_3 with accelerator pedal released.

Vehicle does not decelerate by engine brake when changing overdrive switch to "OFF" position with accelerator pedal released.

Vehicle does not decelerate by engine brake when changing selector lever from "D" to "2" position with accelerator pedal released.

1

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?

Yes → Check overrun clutch solenoid valve circuit. — Refer to AT-46.

No ↓

2

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

N.G. → Repair or replace throttle position sensor.

O.K. ↓

3

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Remove control valve assembly. — Refer to AT-88.
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

O.K. ↓

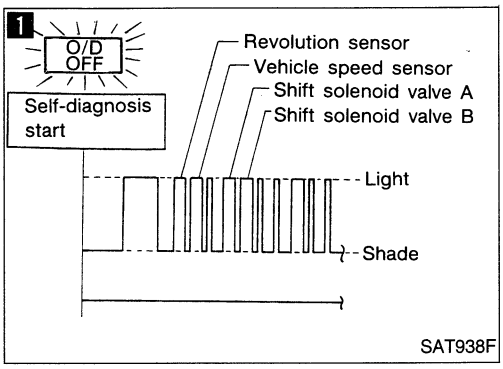
4

Check again.

N.G. →
1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

INSPECTION END



Diagnostic Procedure 16

SYMPTOM:

Vehicle does not start from D_1 on Cruise test — Part 2.

1

Does self-diagnosis show damage to revolution sensor, vehicle speed sensor, shift solenoid valve A or B after cruise test?

Yes → Check damaged circuit. — Refer to AT-41, AT-42, AT-44, AT-45.

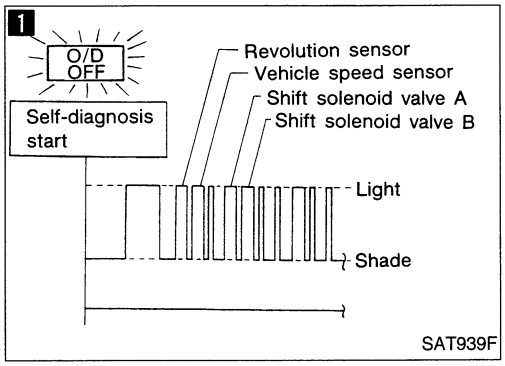
No ↓

Check again.

N.G. → 1. Perform TCM (A/T control module) input/output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

O.K. ↓

Perform Diagnostic Procedure 8. Refer to AT-62.



Diagnostic Procedure 17

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing overdrive switch to "OFF" position.

Does "ECU INPUT SIGNALS" show damage to overdrive switch circuit?

Yes → Check overdrive switch circuit. — Refer to AT-52.

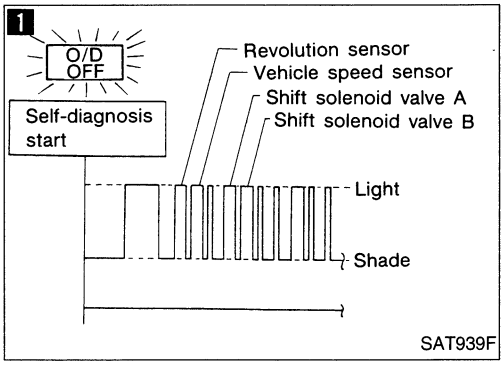
OR

1

Does self-diagnosis show damage to overdrive switch circuit?

No ↓

Perform Diagnostic Procedure 10. Refer to AT-65.



Diagnostic Procedure 18

SYMPTOM:

A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?

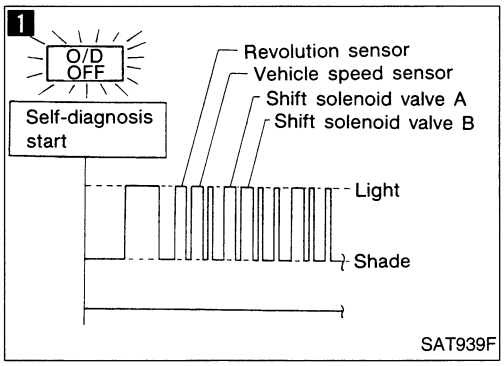
Yes → Check inhibitor switch circuit. — Refer to AT-52.

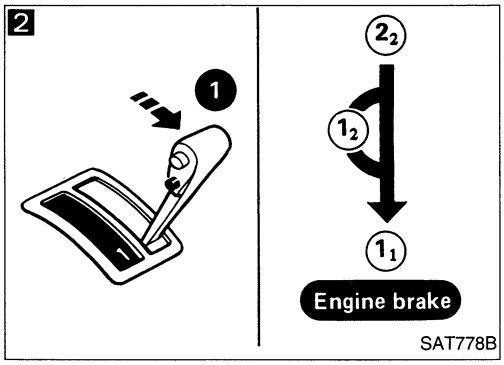
OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No → Perform Diagnostic Procedure 9. Refer to AT-63.





Diagnostic Procedure 19

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 circuit?

Yes → Check inhibitor switch circuit. — Refer to AT-52.

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No

2

Check again.

N.G. →
1. Perform TCM (A/T control module) input/ output signal inspection.
2. If N.G., recheck TCM (A/T control module) pin terminals for damage or connection of TCM harness connector.

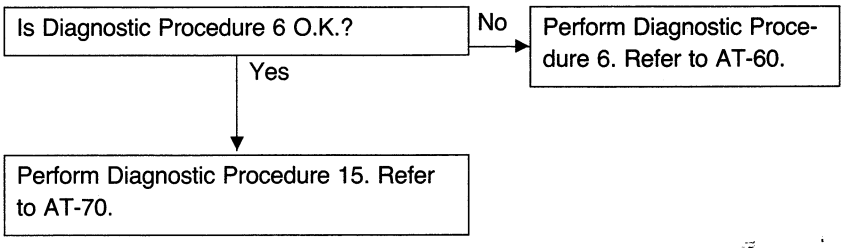
O.K.

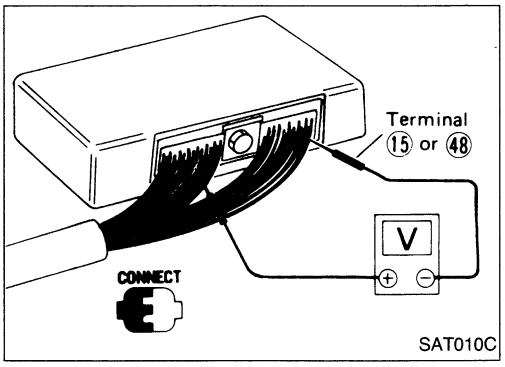
INSPECTION END

Diagnostic Procedure 20

SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.



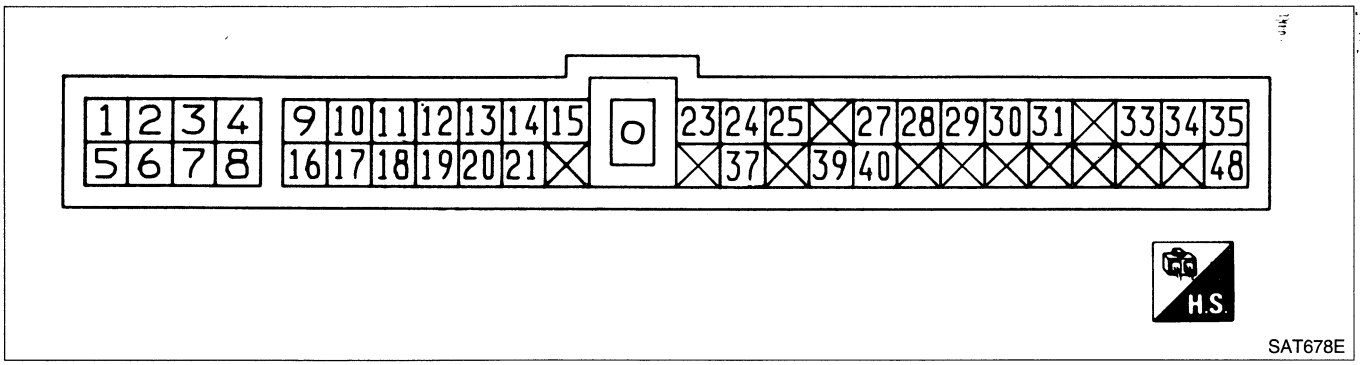


Electrical Components Inspection

INSPECTION OF TCM (A/T CONTROL MODULE)

- Measure voltage between each terminal and terminal ⑮ or ㊽ by following "TCM (A/T CONTROL MODULE) INSPECTION TABLE".

- Pin connector terminal layout.



TCM (A/T CONTROL MODULE) INSPECTION TABLE

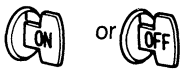
(Data are reference values.)

Terminal No.	Item	Condition		Judgement standard
1	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
3	OD OFF indicator lamp		When setting overdrive switch in "OFF" position.	1V or less
			When setting overdrive switch in "ON" position.	Battery positive voltage
4	Power source		When turning ignition switch to "ON".	Battery positive voltage
			When turning ignition switch to "OFF".	1V or less

Terminal No.	Item	Condition		Judgement standard
5	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
			When A/T does not perform lock-up.	1V or less
6	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery positive voltage
			When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	1V or less
7	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery positive voltage
			When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	1V or less
8	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery positive voltage
			When overrun clutch solenoid valve does not operate.	1V or less
9	Power source		Same as No. 4	
10*	—		—	—
11*	—		—	—
12*	—		—	—
13*	—		—	—
14	Closed throttle position switch		When releasing accelerator pedal after warming up engine.	8 - 15V
			When depressing accelerator pedal after warming up engine.	1V or less
15	Ground		—	—
16	"1" position switch		When setting selector lever to "1" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
17	"2" position switch		When setting selector lever to "2" position.	Battery positive voltage
			When setting selector lever to other position.	1V or less
18	"D" position switch		When setting selector lever to "D" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less

*: These terminals are connected to the ECM (ECCS control module).

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
19	Inhibitor switch (Park/Neutral position signal)		When setting selector lever to "N" and "P" position.	Battery positive voltage
			When setting selector lever to other position.	1V or less
20	"R" position switch		When setting selector lever to "R" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
21	Wide open throttle position switch		When depressing accelerator pedal more than half-way after warming up engine.	8 - 15V
			When releasing accelerator pedal after warming up engine.	1V or less
22	—		—	—
23	Power source (Back-up)		When turning ignition switch to "OFF".	Battery positive voltage
			When turning ignition switch to "ON".	Battery positive voltage
24	Engine speed signal		When engine runs at idle speed.	0.9V
			When engine runs at 3,000 rpm.	Approximately 3.7V
25	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle parks.	0V
26	—		—	—
27	Vehicle speed sensor		When moving vehicle 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	—		—	—

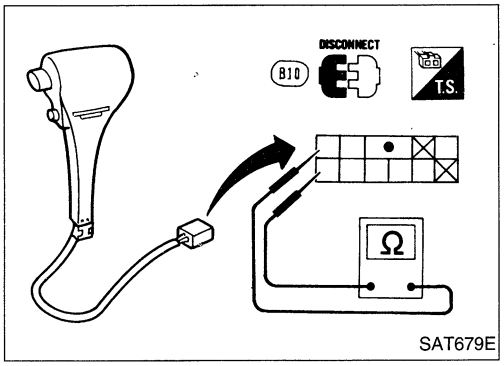
**: These terminals are connected to the data link connector for CONSULT.

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
33	Fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.56V
			When ATF temperature is 80°C (176°F).	0.45V
34	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.2 - 0.6V Fully-open throttle: 2.9 - 3.9V
35	Throttle position sensor (Ground)		—	—
36	—		—	—
37	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery positive voltage
			When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	1V or less
38	—		—	—
39	Overdrive switch		When setting overdrive switch in "ON" position.	Battery positive voltage
			When setting overdrive switch in "OFF" position.	1V or less
40	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 8V
			When "ACCEL" set switch on ASCD cruise is applied.	1V or less
41	—		—	—
42	—		—	—
43	—		—	—
44	—		—	—
45	—		—	—
46	—		—	—
47	—		—	—
48	Ground		—	—

Electrical Components Inspection (Cont'd)

OVERDRIVE SWITCH



SAT679E

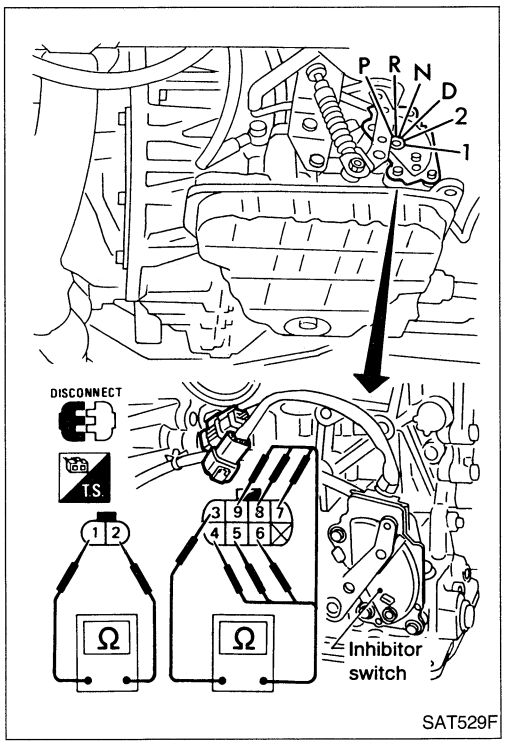
- Check continuity between two terminals.

Overdrive switch	Continuity
ON	No
OFF	Yes

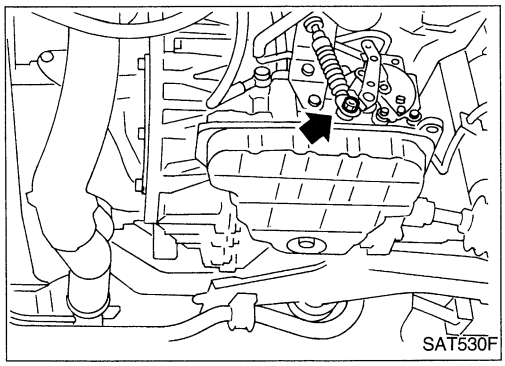
INHIBITOR SWITCH

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.

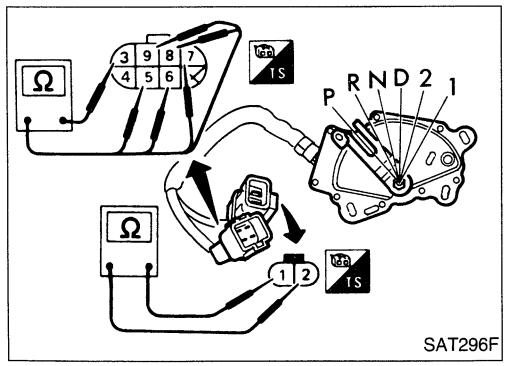
Lever position	Terminal No.								
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
P	○—○		○—○						
R			○—		—○				
N	○—○		○—			—○			
D			○—				—○		
2			○—					—○	
1			○—						—○



SAT529F


SAT530F

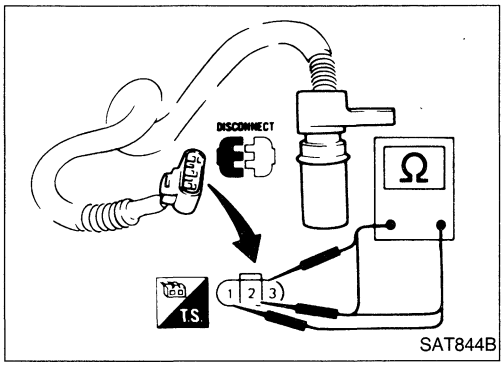
2. If N.G., check again with control cable disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If O.K. on step 2, adjust control cable. — Refer to AT-90.



SAT296F

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 AT-90.
6. If N.G. on step 4, replace inhibitor switch.

Electrical Components Inspection (Cont'd)



SAT844B

REVOLUTION SENSOR

- For removal and installation, refer to AT-90.
- Check resistance between terminals ①, ② and ③.

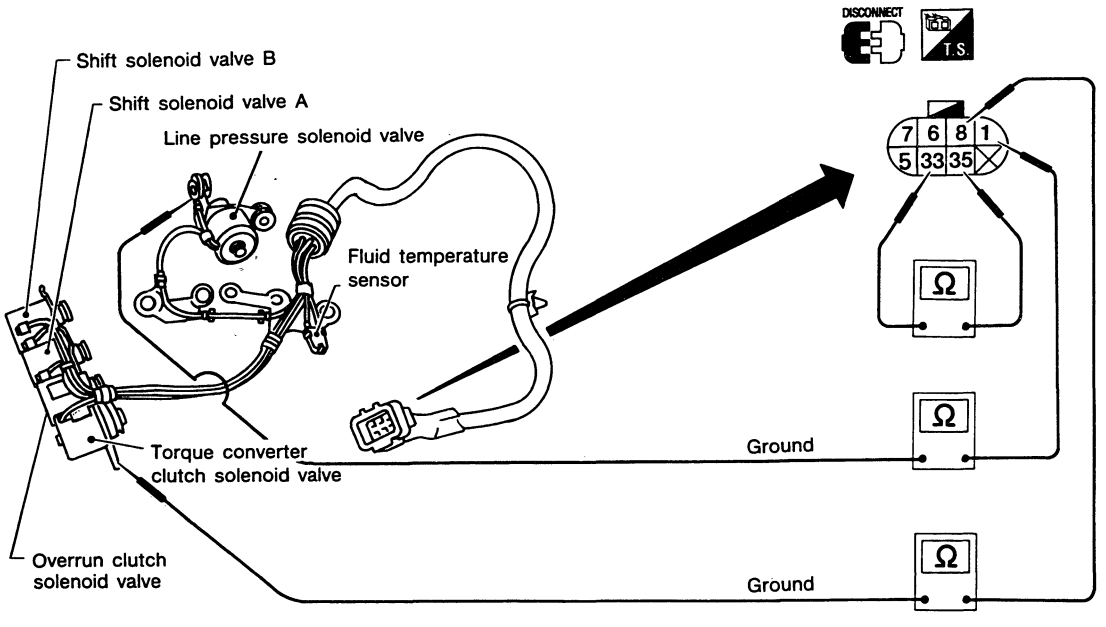
Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity

SOLENOID VALVES AND FLUID TEMPERATURE SENSOR

- For removal and installation, refer to AT-88.
- Check resistance between two terminals.

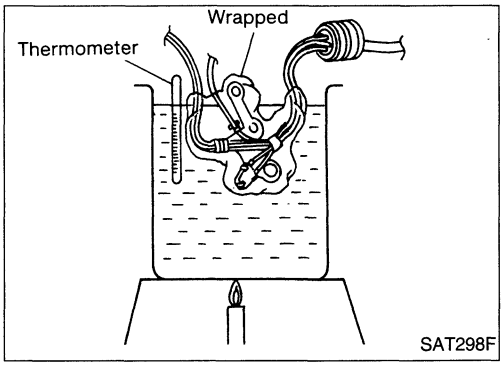
Solenoids

Solenoid	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	⑥	Ground (Bracket)	25Ω
Shift solenoid valve B	⑦		
Overrun clutch solenoid valve	⑧		
Line pressure solenoid valve	①		3.2Ω
Torque converter clutch solenoid valve	⑤		13.4Ω



AAT188

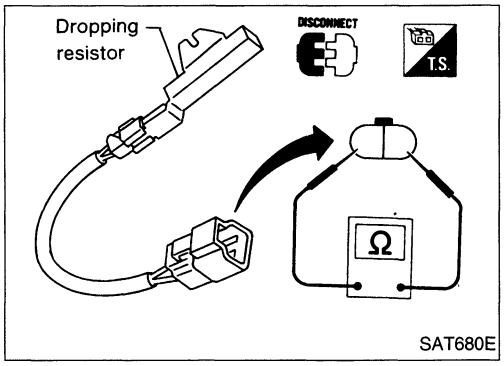
Electrical Components Inspection (Cont'd)



Fluid temperature sensor

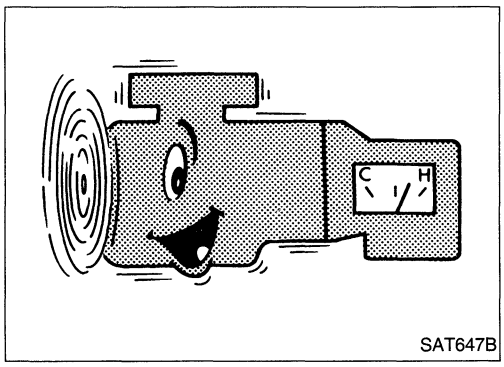
Check resistance between terminals ㉝ and ㉟ while changing temperature as shown at left.

Temperature °C (°F)	Resistance (Approx.)
20 (68)	2.5 kΩ
80 (176)	0.3 kΩ



DROPPING RESISTOR

- Check resistance between two terminals.
  Resistance: 11.2 - 12.8Ω

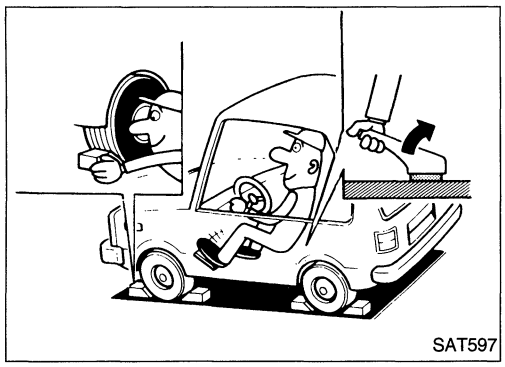


Final Check

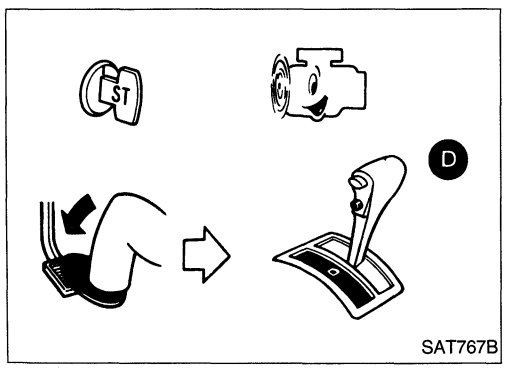
STALL TESTING

Stall test procedure

1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)

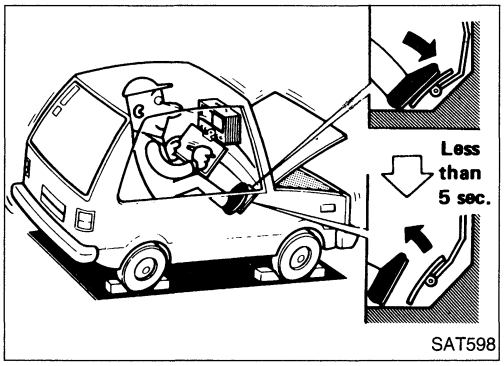


3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
- **It is good practice to put a mark on point of specified engine rpm on indicator.**



5. Start engine, apply foot brake, and place selector lever in "D" position.

Final Check (Cont'd)

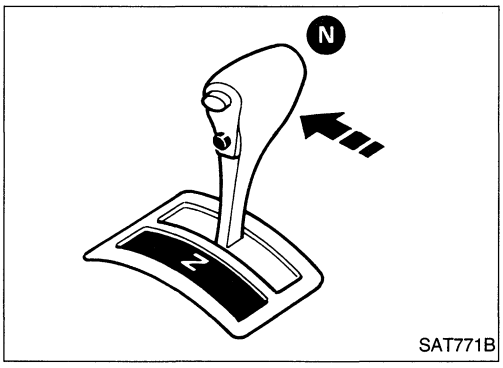


SAT598

6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall speed and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**

Stall speed:
2,100 - 2,400 rpm



SAT771B

8. Shift selector lever to "N" position.
9. Cool off ATF

- **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" positions, respectively.

Final Check (Cont'd)

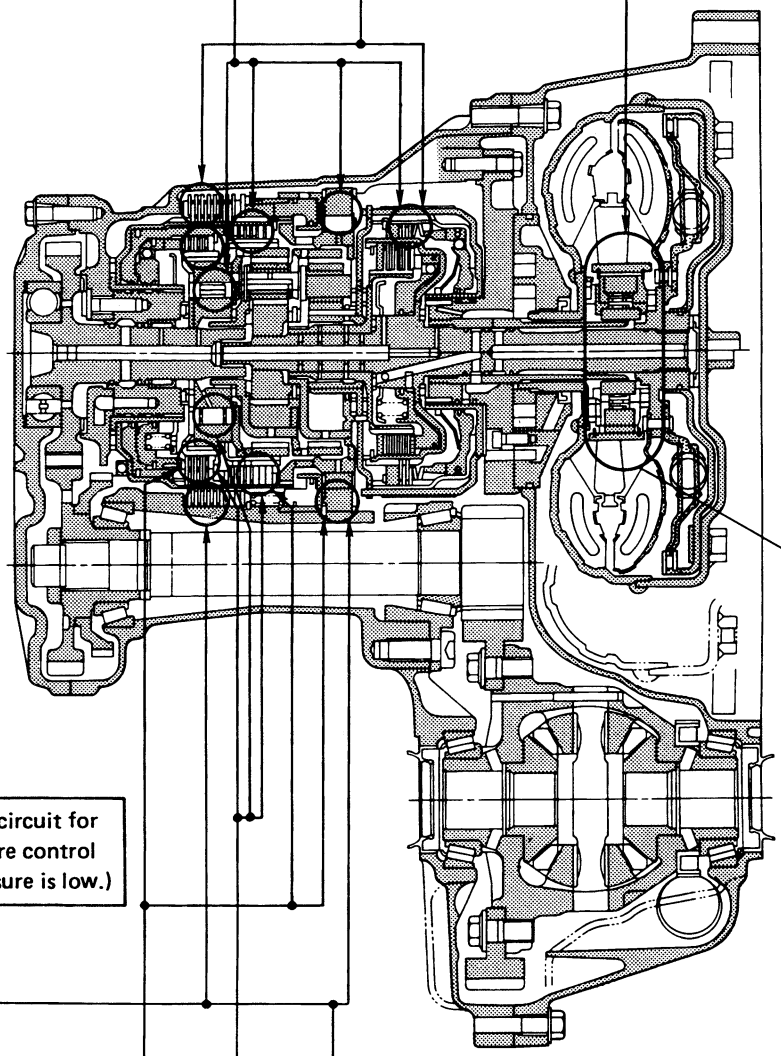
Judgement of stall test

Selector lever position	Judgement		
D	H	O	L
2	H	O	L
1	O	O	L
R	H	H	L

O : Stall speed is normal.
H : Stall speed is higher than specified.
L : Stall speed is lower than specified.

Damaged components

Engine



Torque converter one-way clutch

Hydraulic circuit for line pressure control (Line pressure is low.)

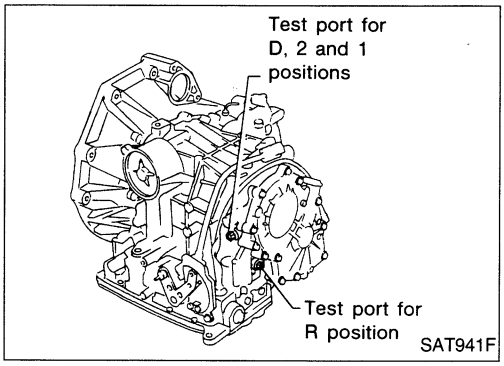
Clutch and brakes except high clutch and brake band are O.K. (Condition of high clutch and brake band cannot be confirmed by stall test.)

D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

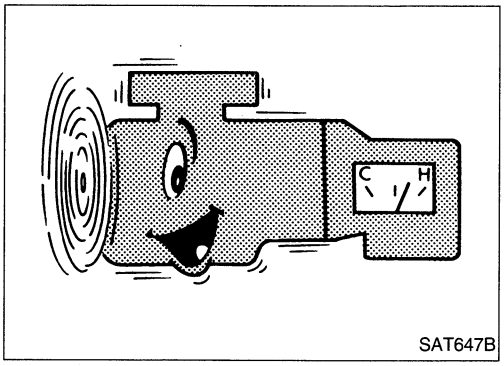
AAT175

Final Check (Cont'd)

PRESSURE TESTING



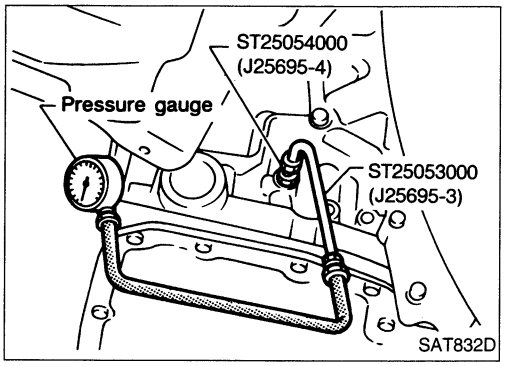
- Location of line pressure test port
- **Always replace pressure plugs as they are self-sealing bolts.**



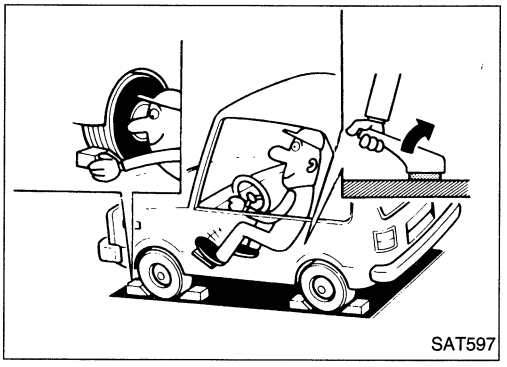
Line pressure test procedure

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.

   ATF operating temperature:
   50 - 80°C (122 - 176°F)

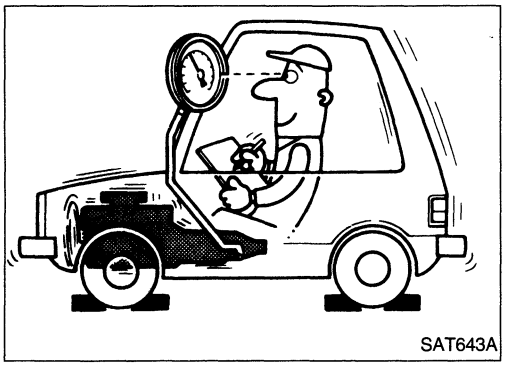


3. Install pressure gauge to corresponding line pressure port.



4. Set parking brake and block wheels.
- **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**

Final Check (Cont'd)


SAT643A

5. Start engine and measure line pressure at idle and stall speed.

- **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure:

Engine speed rpm	Line pressure (Approx.) kPa (kg/cm^2, psi)	
	"D", "2" and "1" positions	"R" position
Idle	755 (7.7, 109)	1,177 (12.0, 171)
Stall	1,226 (12.5, 178)	1,961 (20.0, 284)

Judgement of line pressure test

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve
	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" and "2" positions, 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 • 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

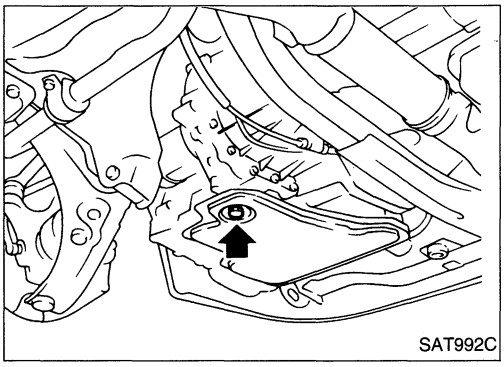
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.	ON vehicle: Fluid level / Control linkage	Inhibitor switch / Throttle position sensor (Adjustment)	Revolution sensor and vehicle 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 3-R / Ignition switch and starter	OFF vehicle: Torque converter / Oil pump	Reverse clutch / High clutch	Forward clutch / Forward one-way clutch	Overrun clutch / Low one-way clutch	Low & reverse brake / Brake band	Parking components
	Reference page (AT-)	13, 90	78	79	83	130, 79	79	79	79, 88	88	107, 126,	146, 150	155, 164	155, 107	161, 173	107
57	Engine does not start in "N", "P" positions.	. 2	3 .	. .	. .	. .	. .	. .	. .	. 1	. .	. .	. .	. .	. .	.
57	Engine starts in range other than "N" and "P".	. 1	2 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Transaxle noise in "P" and "N" positions.	1 .	. 3	4 5	. 2	. .	. .	. .	. .	. .	⑦ ⑥	. .	. .	. .	. .	.
57	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	②
58	Vehicle runs in "N" position.	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	③ .	② .	④ .	. .	.
60	Vehicle will not run in "R" position (but runs in "D", "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	. .	. .	. .	⑨ .	. .	. .	.
—	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions).	. 1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. ②	. .	.
61	Vehicle will not run in "D", "1", "2" 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	. .	⑫ ⑪	⑨ .	⑧ .	. .	⑩ .	.
—	Excessive creep.	. .	. .	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
60, 61	No creep at all.	1 .	. .	. .	. 2	3 .	. .	. .	. .	. .	⑥ ⑤	. .	④ .	. .	. .	.
—	Failure to change gear from "D_1" to "D_2".	. 2	1 .	5 .	. .	4 3	. .	. .	. .	. .	. .	. .	. .	. .	. ⑥	.
—	Failure to change gear from "D_2" to "D_3".	. 2	1 .	5 .	. .	4 .	3 .	. .	. .	. .	. .	. ⑥	. .	. .	. ⑦	.
—	Failure to change gear from "D_3" to "D_4".	. 2	1 .	4 .	. .	. 3	. .	. .	5 .	. .	. .	. .	. .	. .	. ⑥	.
63, 65, 66	Too high 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", "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	3 .	. .	. .	. .	. .	. .	. ④	. .	. .	. ⑤	.

Symptom Chart (Cont'd)

		ON vehicle										OFF vehicle					
Reference page (AT-)	Reference page (AT-)	13, 90	78	79	83	130, 79	79	79	79, 88	88	107, 126,	146, 150	155, 164	155, 107	161, 173	107
	Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level Control linkage	Inhibitor switch Throttle position sensor (Adjustment)	Revolution sensor and vehicle 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 3-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	Parking components
—	Too sharp a shock in change from "D_3" to "D_4".	. .	. 1	. .	. 2	3 .	. .	. .	. .	. .	. .	. .	. .	⑤ .	. ④	.
—	Almost no shock or clutches slipping in change from "D_1" to "D_3".	1 .	. 2	. .	. 3	5 .	. .	. .	. .	4 .	. .	. .	. .	. .	. ⑥	.
—	Almost no shock or slipping in change from "D_2" to "D_3".	1 .	. 2	. .	. 3	4 .	. .	. .	. .	. .	. .	. ⑤	. .	. .	. ⑥	.
—	Almost no shock or slipping in change from "D_3" to "D_4".	1 .	. 2	. .	. 3	4 .	. .	. .	. .	. .	. .	. ⑤	. .	. .	. ⑥	.
—	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_3".	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	. .	. .	. .	. .	. .	. .	. .	.
—	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 .	. .	. .	. 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
—	Transaxle noise in "D", "2", "1" and "R" positions.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② .	. .	. .	. .	. .	.

Symptom Chart (Cont'd)

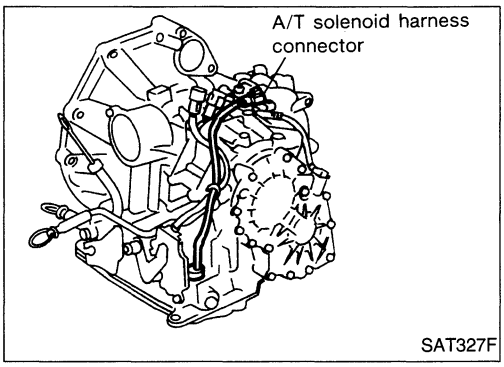
Reference page (AT-)		ON vehicle									OFF vehicle					
	Reference page (AT-)	13, 90	78	79	83	130, 79	79	79	79, 88	88	107, 126,	146, 150	155, 164	155, 107	161, 173	107
	Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level Control linkage	Inhibitor switch Throttle position sensor (Adjustment)	Revolution sensor and vehicle 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 3-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	Parking components
72	Failure to change from "D_3" to "2_2" when changing lever into "2" position.	. 7	1 2	. .	. .	6 5	4 .	. 3	. .	. .	. .	. .	. .	⑨ .	. ⑧	.
—	Gear change from "2_2" to "2_3" in "2" position.	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
73	Engine brake does not operate in "1" position.	. 2	1 3	4 .	. .	6 5	. .	. 7	. .	. .	. .	. .	. .	⑧ .	⑨ .	.
—	Gear change from "1_1" to "1_2" in "1" position.	. 2	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
—	Does not change from "1_2" to "1_1" in "1" position.	. .	1 .	2 .	. .	4 3	. .	. 5	. .	. .	. .	. .	. .	⑥ .	⑦ .	.
—	Large shock changing from "1_2" to "1_1" in "1" position.	. .	. .	. .	. .	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② .	.
—	Transaxle overheats.	1 .	. 3	. .	2 4	6 .	. 5	. .	. .	. .	⑭ ⑦	⑧ ⑨	⑪ .	⑫ .	⑬ ⑩	.
—	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	② ③	⑤ .	⑥ .	⑦ ④	.
—	Offensive smell at fluid charging pipe.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	② ③	④ ⑤	⑦ .	⑧ .	⑨ ⑥	.
—	Torque converter is not locked up.	. .	3 1	2 4	. 6	8 .	. .	7 .	5 .	. .	⑨ .	. .	. .	. .	. .	.
—	Lock-up piston slip	1 .	. 2	. .	. 3	6 .	. 5	4 .	. .	. .	⑦ .	. .	. .	. .	. .	.
67	Lock-up point is extremely high or low.	. .	. 1	2 .	. .	4 .	. .	3 .	. .	. .	. .	. .	. .	. .	. .	.
—	A/T does not shift to "D_4" when driving with overdrive switch "ON".	. .	2 1	3 .	. 8	6 4	. .	. 5	7 .	. .	. .	. .	. .	⑩ .	. ⑨	.
—	Engine is stopped at "R", "D", "2" and "1" positions.	1 .	. .	. .	. .	5 4	3 .	2 .	. .	. .	. .	. .	. .	. .	. .	.


SAT992C

Control Valve Assembly and Accumulator

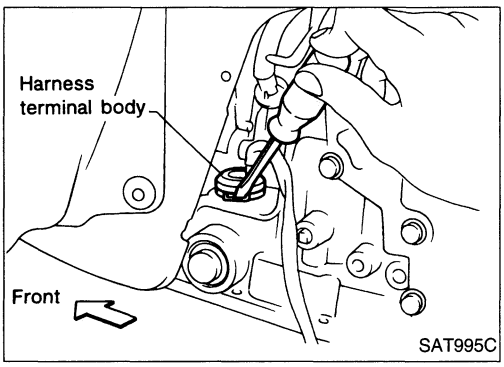
REMOVAL

1. Drain ATF from transaxle.
2. Remove oil pan and gasket.



SAT327F

3. Disconnect A/T solenoid harness connector.



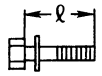
SAT995C

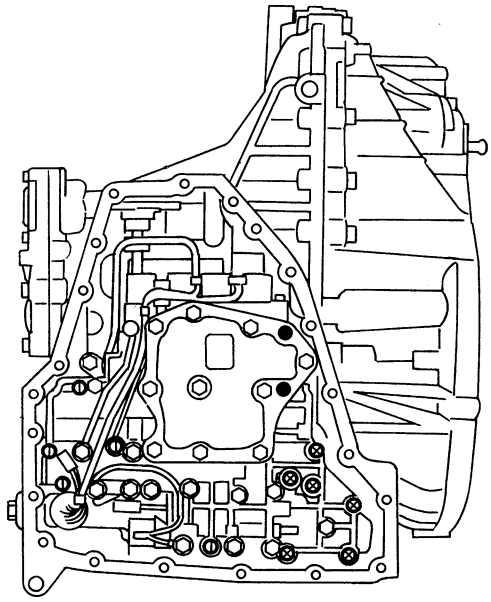
4. Remove stopper ring from A/T solenoid harness terminal body.
5. Remove A/T solenoid harness from transmission case by pushing on terminal body.

Control Valve Assembly and Accumulator (Cont'd)

Unit: mm (in)

- ⓘ 5 bolts ℓ = 40 (1.57)
- ⊗ 6 bolts ℓ = 33 (1.30)
- ● 2 bolts ℓ = 43.5 (1.713)





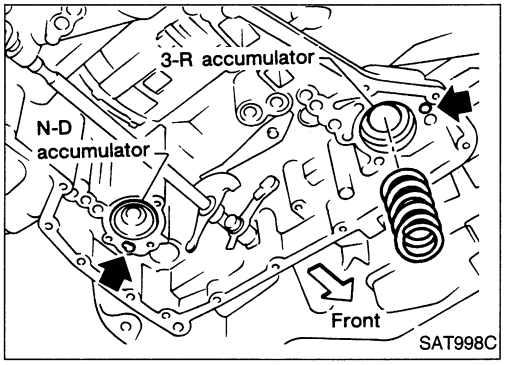
SAT647E

6. Remove control valve assembly by removing fixing bolts ⓘ, ⓧ and ●.

Bolt length, number and location are shown in the illustration.

- Be careful not to drop manual valve and 3-R accumulator return spring.

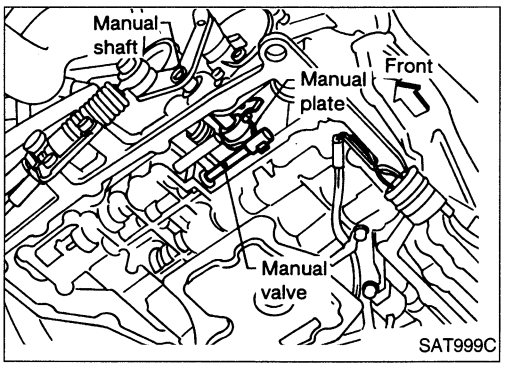
7. Disassemble and inspect control valve assembly if necessary — Refer to AT-130.



SAT998C

8. Remove 3-R and N-D accumulators by applying compressed air if necessary.

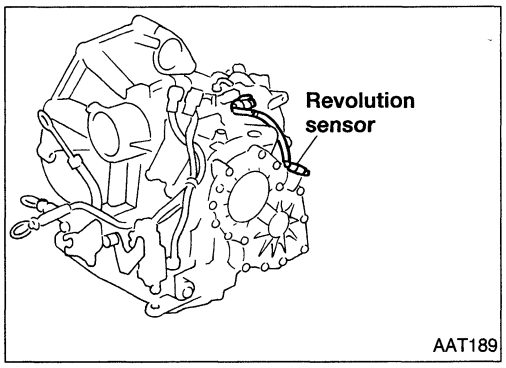
- **Hold each piston with a rag.**



SAT999C

INSTALLATION

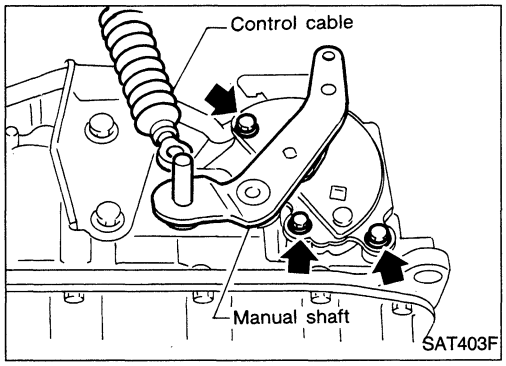
- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve on to transmission case, make sure that selector lever can be moved to all positions.**



Revolution Sensor Replacement

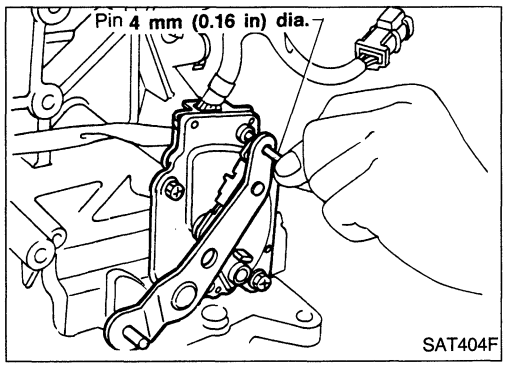
1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.

Always use new sealing parts.

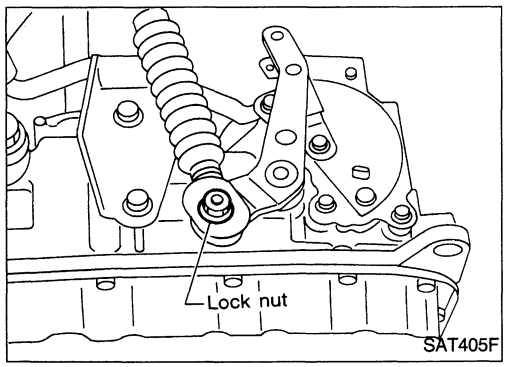


Inhibitor Switch Adjustment

1. Remove control cable from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen inhibitor switch fixing bolts.



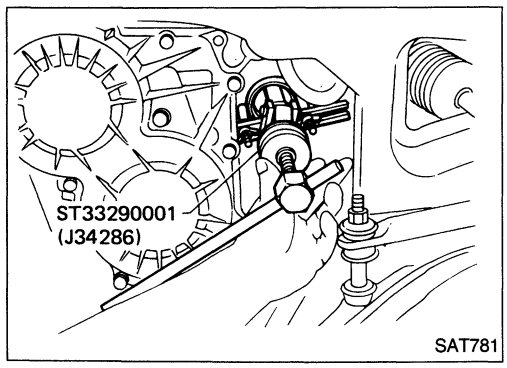
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to AT-78.



Control Cable Adjustment

Move selector lever from "P" to "1" position. You should be able to feel the detents in each position.
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

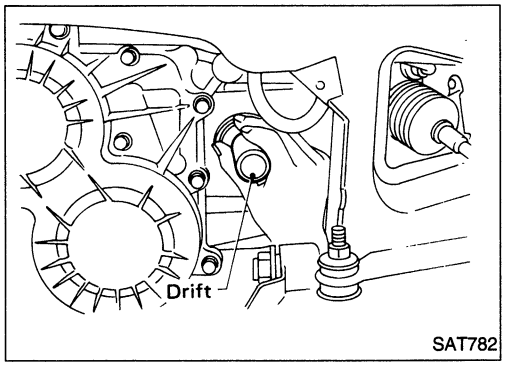
1. Place selector lever in "P" position.
2. Loosen lock nuts.
3. Tighten lock nut, pulling selector lever toward "R" position side.
4. Move selector lever from "P" to "1" position again. Make sure selector lever moves smoothly.



Differential Side Oil Seal Replacement

1. Remove drive shaft assembly. — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
2. Remove oil seal.

Differential Side Oil Seal Replacement (Cont'd)

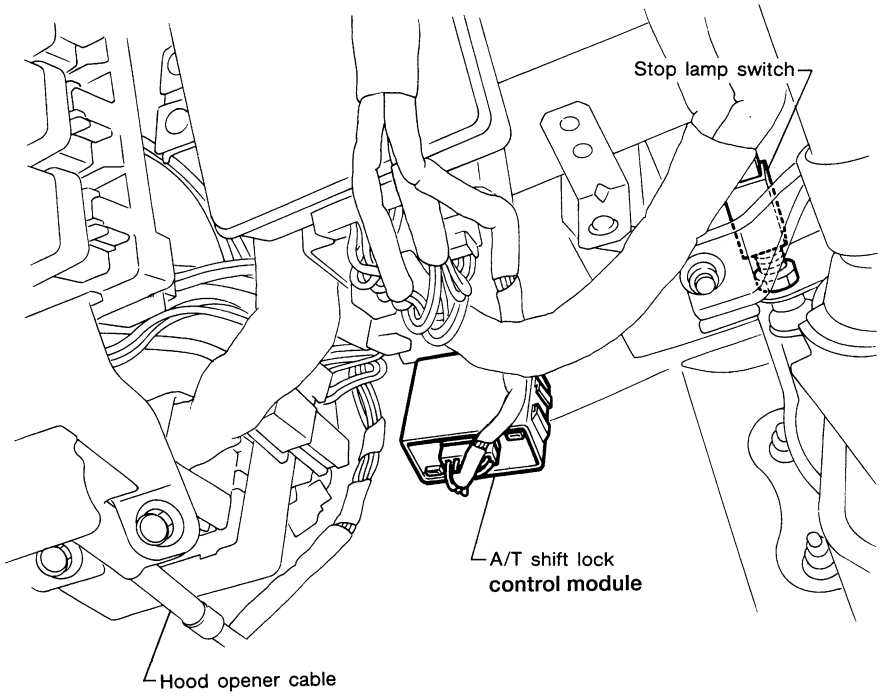


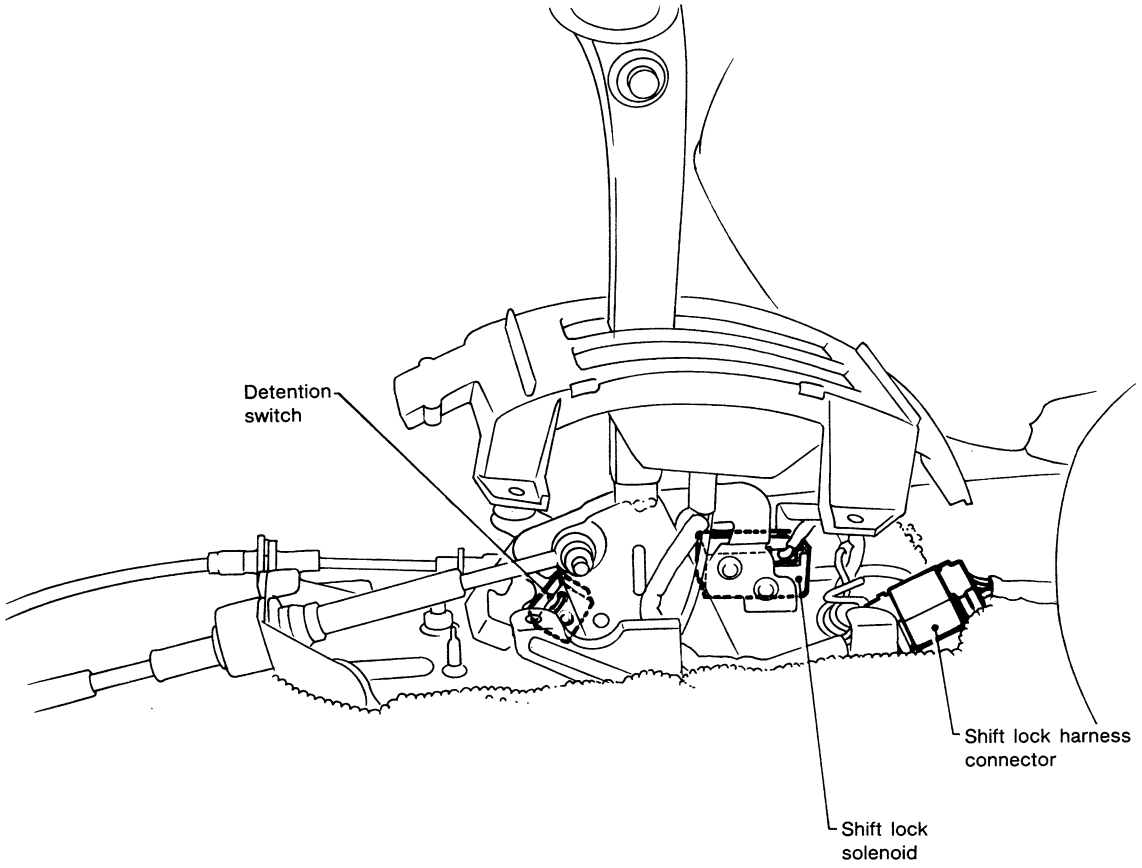
3. Install oil seal.

Apply ATF before installing.

4. Reinstall any part removed.

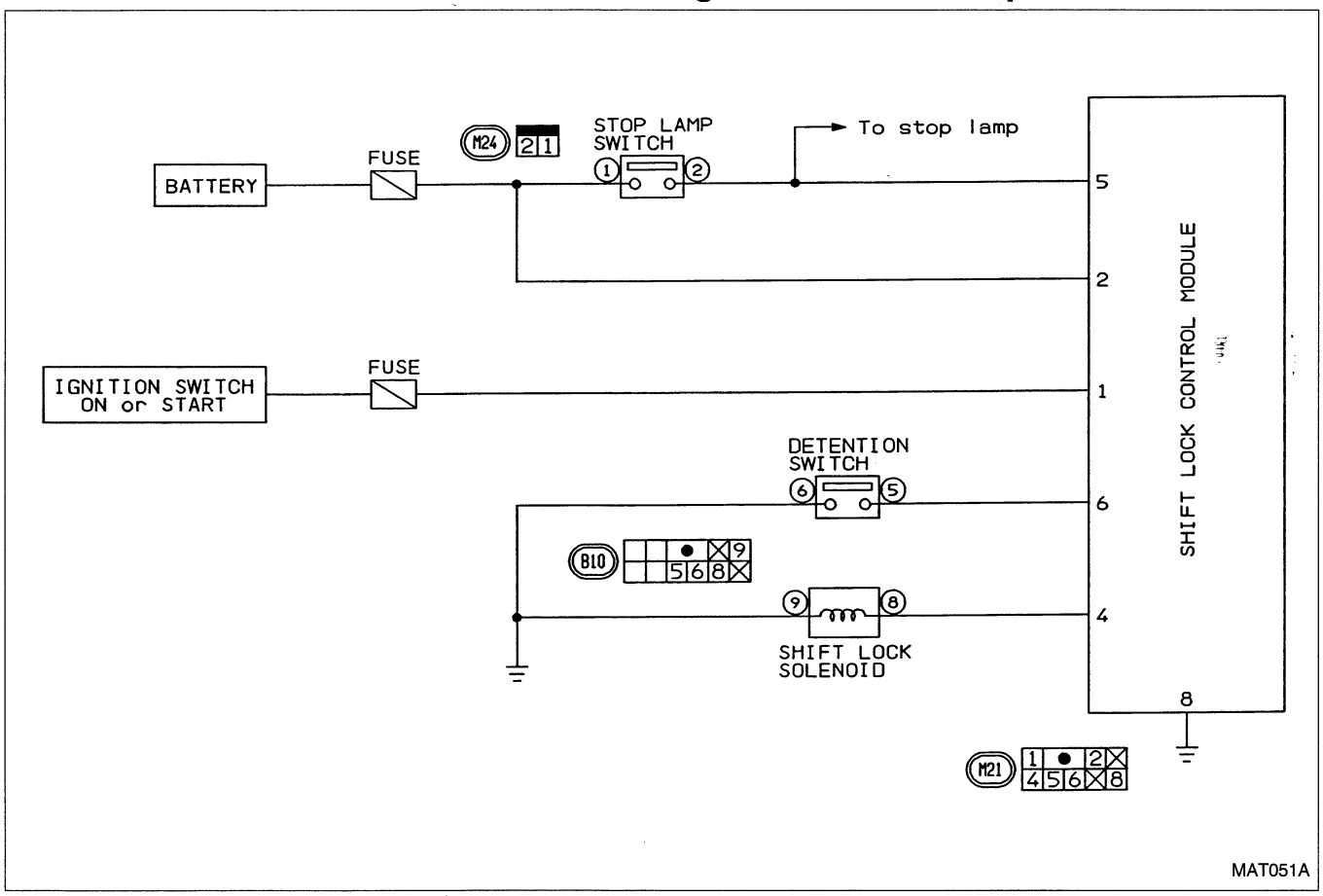
Shift Lock Electrical Parts Location



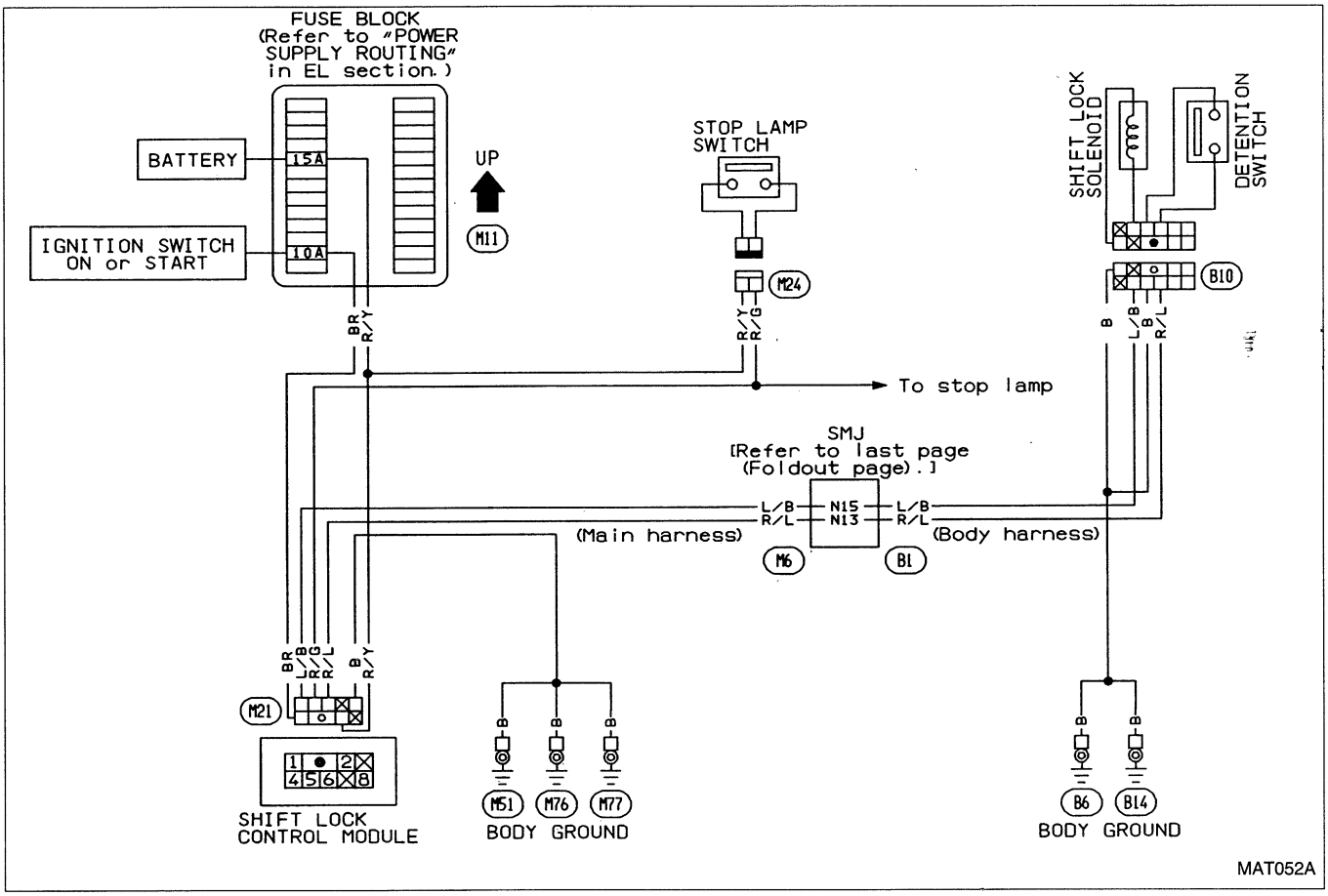


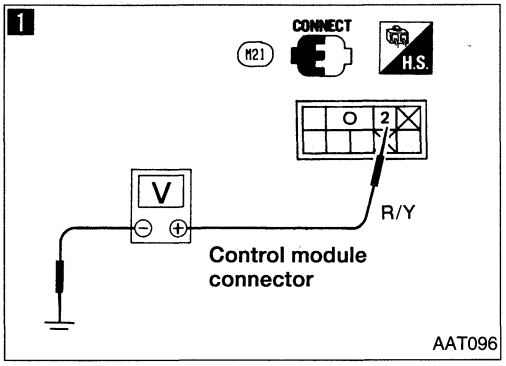
AAT095

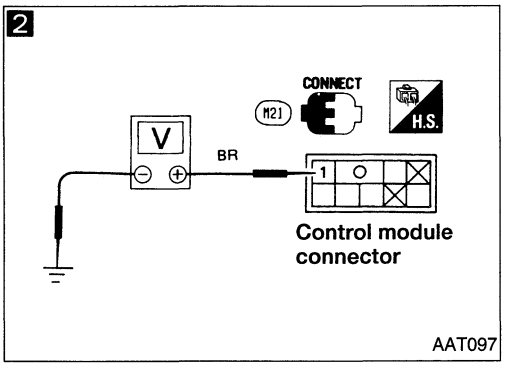
Circuit Diagram for Quick Pinpoint Check

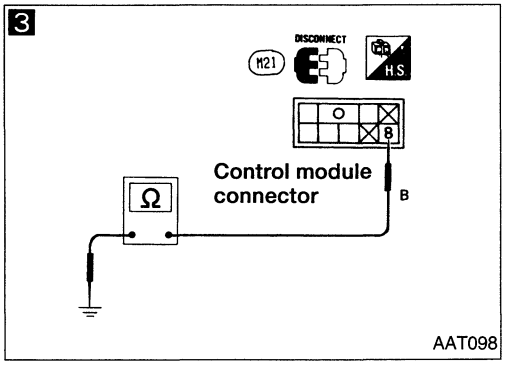


Wiring Diagram









Diagnostic Procedure

SYMPTOM 1:
With key in "ON" position, selector lever cannot be moved from "P" position when applying brake pedal or can be moved when releasing brake pedal.
Selector lever can be moved from "P" position when key is removed from key cylinder.
SYMPTOM 2:
Ignition key cannot be removed when selector lever is set to "P" position or can be removed when selector lever is set to any position except "P".

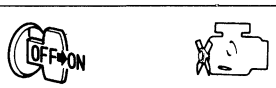
Check key interlock cable for damage.
- N.G. → Repair key interlock cable. Refer to AT-99.
- O.K. ↓

1 CHECK POWER SOURCE.
1. 

2. Check voltage between control module terminal ② and ground.
Battery positive voltage should exist.

- N.G. → Check the following items:
  1. Harness continuity between battery and control module terminal ②
  2. Fuse
- O.K. ↓

2 CHECK IGNITION SIGNAL.
1. 

2. Check voltage between control module terminal ① and ground.
0V
3. 

4. Check voltage between control module terminal ① and ground.
Battery positive voltage should exist.

- N.G. → Check the following items:
  1. Harness continuity between battery and control module terminal ①
  2. Fuse
  3. Ignition switch
- O.K. ↓

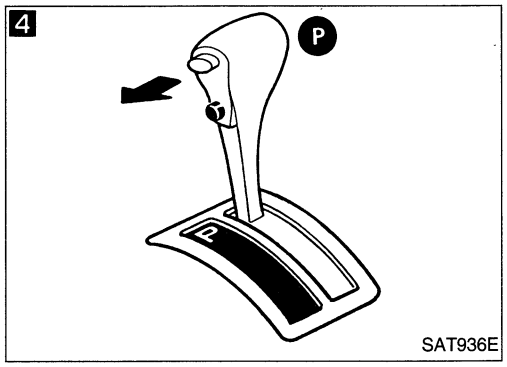
3 CHECK GROUND CIRCUIT FOR CONTROL MODULE.
1. 

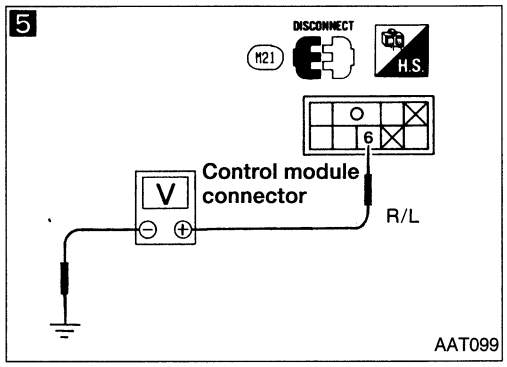
2. Disconnect control module harness connector.
3. Check continuity between control module terminal ⑧ and ground.
Continuity should exist.

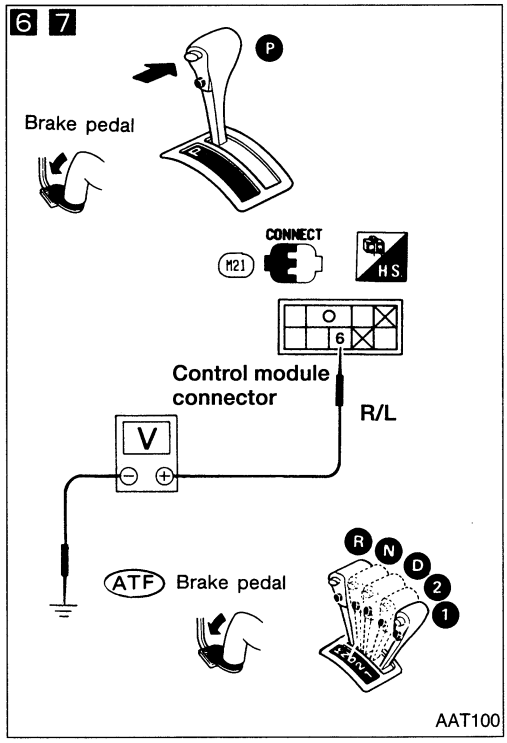
- N.G. → Repair harness or connector.
- O.K. ↓

Ⓐ

Diagnostic Procedure (Cont'd)

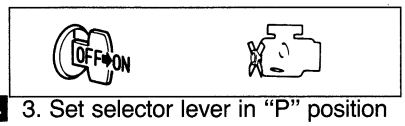






Ⓐ

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. Reconnect control module harness connector.
2. 

4 3. Set selector lever in "P" position and release selector lever button.
When selector lever cannot be moved from "P" position with brake pedal depressed, set ignition key to "ACC" position and move lever. Then set ignition key to "ON" position.

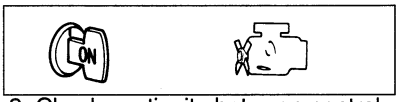
5 4. Disconnect control module harness connector.

5. Check continuity between control module terminal ⑥ and ground.
Continuity should not exist.

N.G. → Check detention switch—shift. (Refer to AT-101.)

O.K. ↓

CHECK INPUT SIGNAL (DETENTION SWITCH).

1. 

6 2. Check continuity between control module terminal ⑥ and ground with brake pedal depressed and selector lever button pushed.
Continuity should exist.

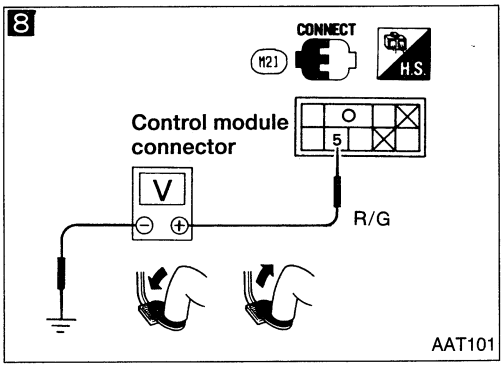
7 3. Check continuity between control module terminal ⑥ and ground with selector lever set in any position except "P".
Battery positive voltage should exist.

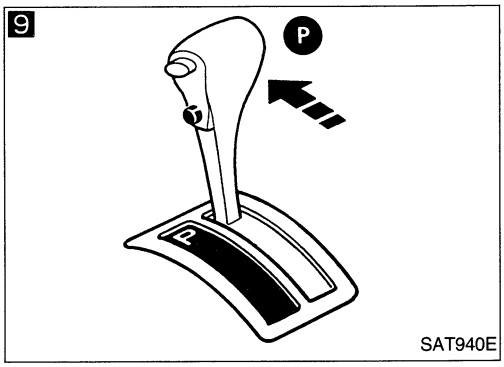
N.G. → Check the following items:
1. Harness continuity between control module terminal ⑥ and detention switch terminal ⑤
2. Harness continuity between detention switch terminal ⑥ and ground
3. Detention switch (Refer to AT-101.)

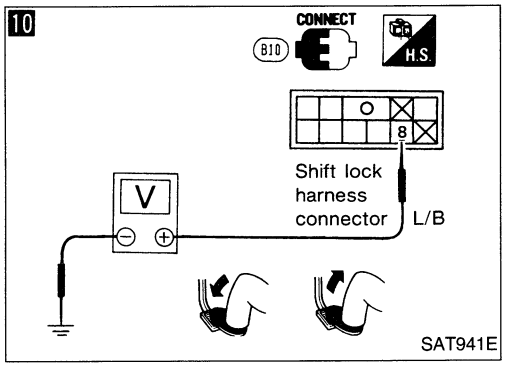
O.K. ↓

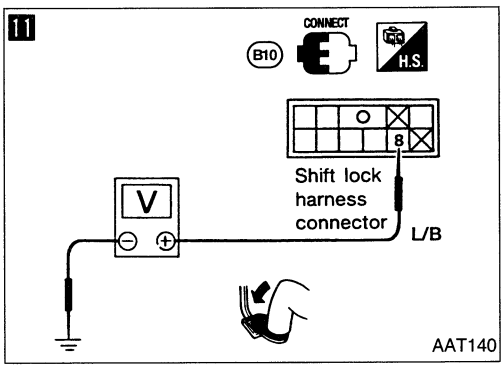
Ⓑ

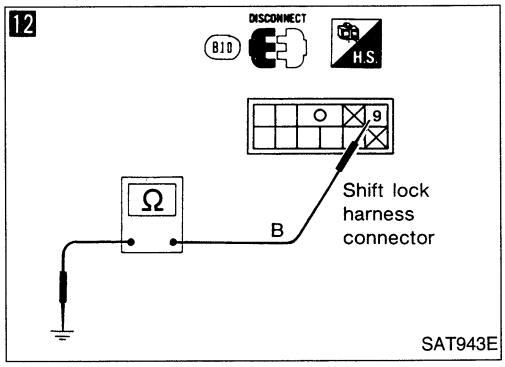
Diagnostic Procedure (Cont'd)





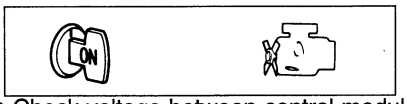






Ⓑ

8 **CHECK INPUT SIGNAL (STOP LAMP SWITCH).**



- Check voltage between control module terminal ⑤ and ground.

Brake pedal	Voltage
Depressed	Battery positive voltage
Released	0V

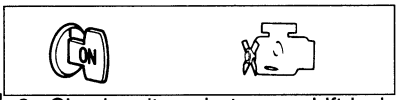
N.G. → Check the following items:
1. Harness continuity between control module terminal ⑤ and stop lamp switch terminal ②
2. Harness continuity between stop lamp switch terminal ① and fuse
3. Stop lamp switch (Refer to AT-101.)

O.K. ↓

9 Set selector lever in "P" position.

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

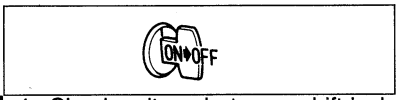
1.



10 2. Check voltage between shift lock harness connector terminal ⑧ and body ground.

Brake pedal	Voltage
Depressed	Battery positive voltage
Released	0V

3.



11 4. Check voltage between shift lock harness connector terminal ⑧ and ground with brake pedal depressed.
0V

N.G. → Check harness continuity between control module terminal ④ and shift lock harness connector terminal ⑧.

O.K. ↓

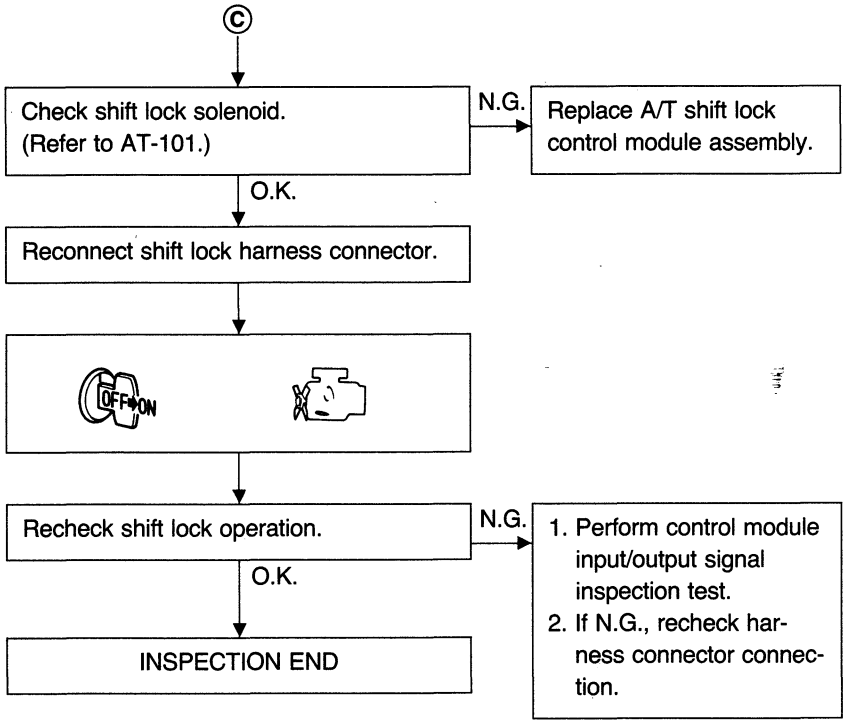
12 **CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.**
1. Disconnect shift lock harness connector.
2. Check continuity between shift lock harness connector terminal ⑨ and ground.
Continuity should exist.

N.G. → Repair harness or connector.

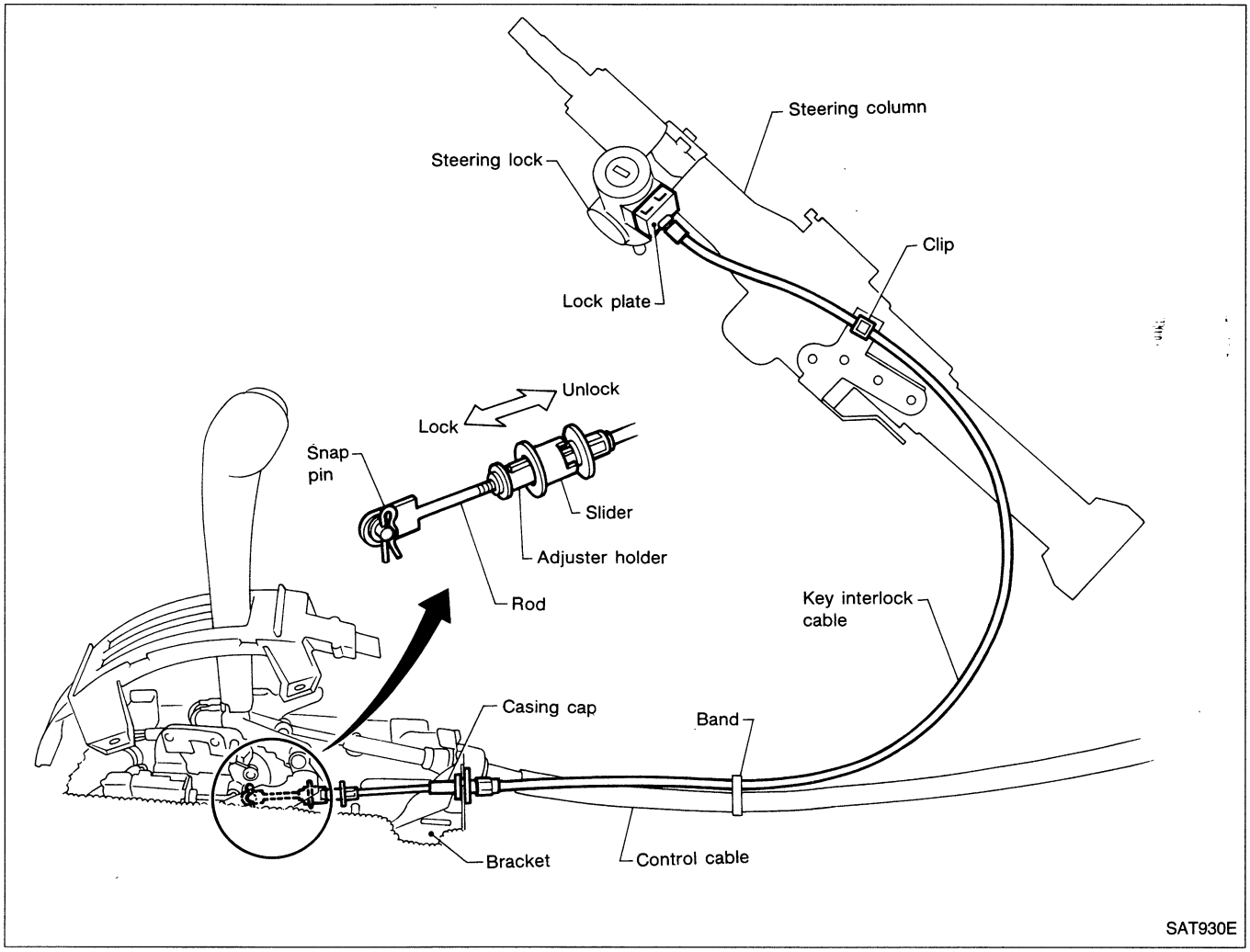
O.K. ↓

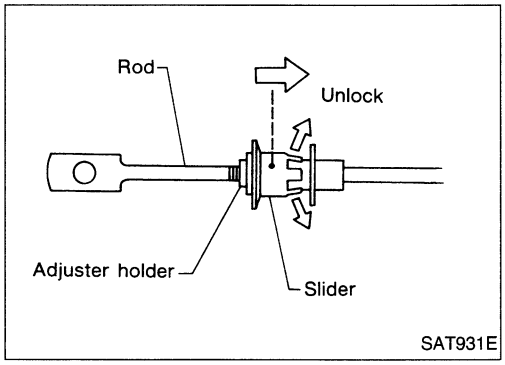
Ⓒ

Diagnostic Procedure (Cont'd)



Key Interlock Cable



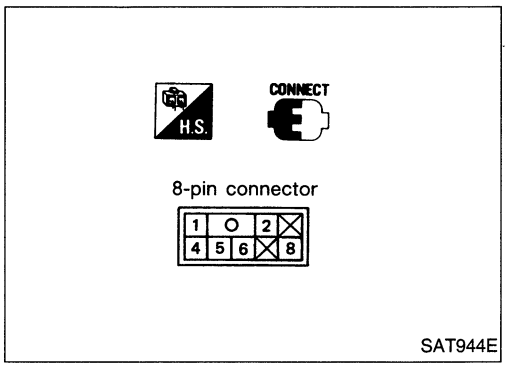


REMOVAL

1. Remove snap pin temporarily and remove key interlock cable from vehicle.
2. Unlock slider from adjuster holder and remove rod from cable.
3. Install rod to control device with snap pin.

INSTALLATION

1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to "P".
4. Insert rod into adjuster holder.
5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to rod.



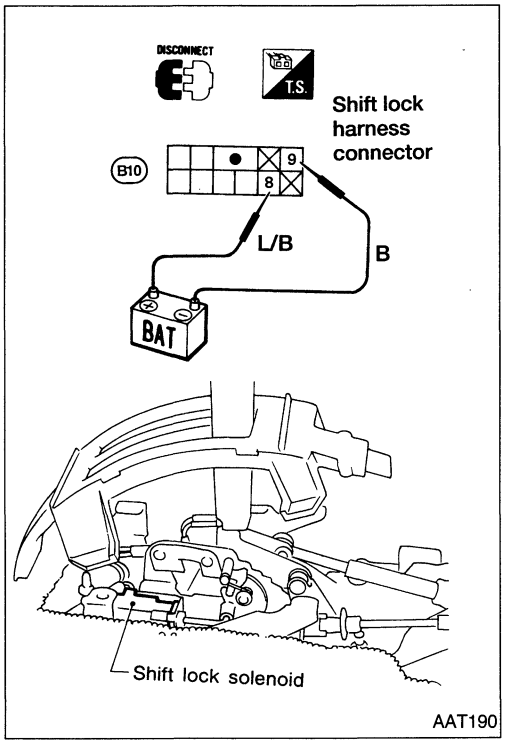
Shift Lock Control Module Inspection

- Measure voltage between each terminal and terminal ⑧ by following "Shift Lock Control Module Inspection Table".
- Pin connector terminal layout.

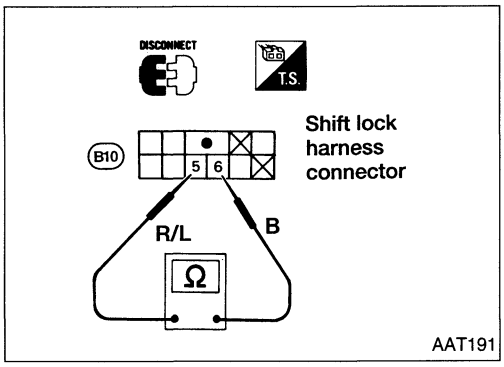
Shift Lock Control Module Inspection Table

(Data are reference values.)

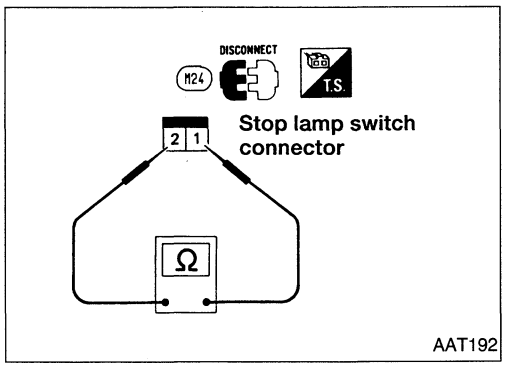
Terminal No. ⊕	Terminal No. ⊖	Item	Condition	Judgment standard
1	8	Ignition signal		Battery positive voltage
			Except above	0V
2		Power source	Any condition	Battery positive voltage
4		Shift lock signal	 When selector lever is set in "P" position and brake pedal is depressed.	Battery positive voltage
			Except above	0V
5		Stop lamp switch	When brake pedal is depressed.	Battery positive voltage
			When brake pedal is released.	0V
6		Detention switch	• When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed. • When selector lever is set in any position except "P".	Battery positive voltage
			Except above	0V



AAT190



AAT191



AAT192

Component Check

SHIFT LOCK SOLENOID

- Check operation by applying battery positive voltage to shift lock harness connector.

DETENTION SWITCH

- Check continuity between terminals ⑤ and ⑥ of shift lock harness connector.

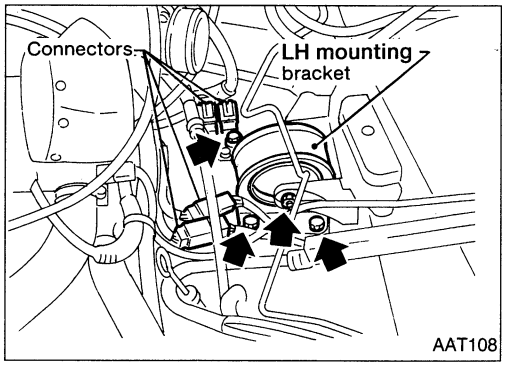
Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	No
Except above	Yes

STOP LAMP SWITCH

- Check continuity between terminals ① and ② of stop lamp switch harness connector.

Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No

Check stop lamp switch after adjusting brake pedal — refer to BR section ("Adjustment", "BRAKE PEDAL AND BRACKET").



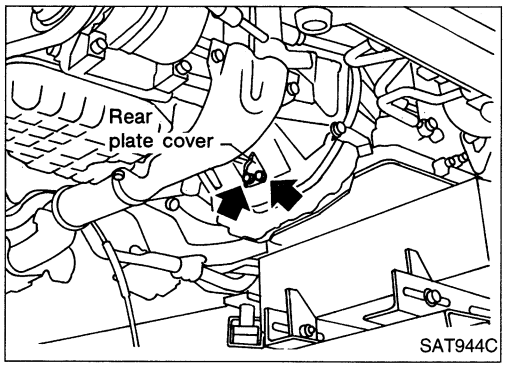
Removal

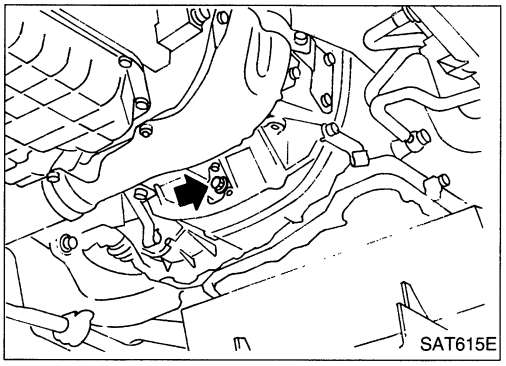
- Remove battery and bracket.
- Remove air cleaner and resonator.
- Disconnect A/T solenoid harness connector and inhibitor switch harness connectors.
- Disconnect harness connectors of revolution sensor and vehicle speed sensor.
- Remove LH mounting bracket from transaxle and body.
- Disconnect control cable at transaxle side.
- Drain ATF.
- Remove drive shafts — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
- Disconnect oil cooler piping.
- Remove starter motor from transaxle.
- Support engine by placing a jack under oil pan.

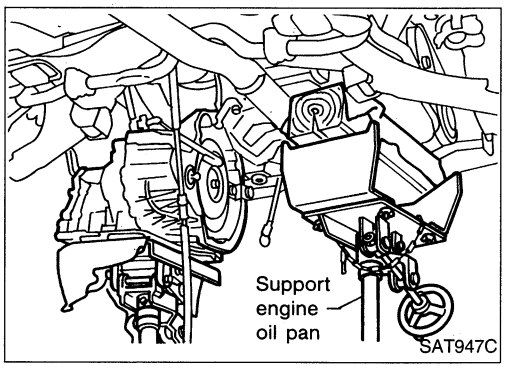
Do not place jack under oil pan drain plug.

- Remove center member.
- Remove rear plate cover and bolts securing torque converter to drive plate.

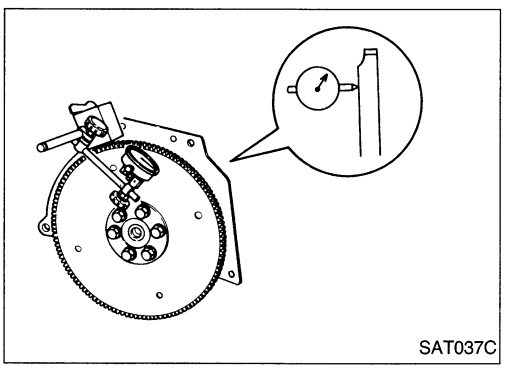
Rotate crankshaft for access to securing bolts.







- Support transaxle with a jack.
- Remove bolts fixing A/T to engine.
- Lower transaxle while supporting it with a jack.



Installation

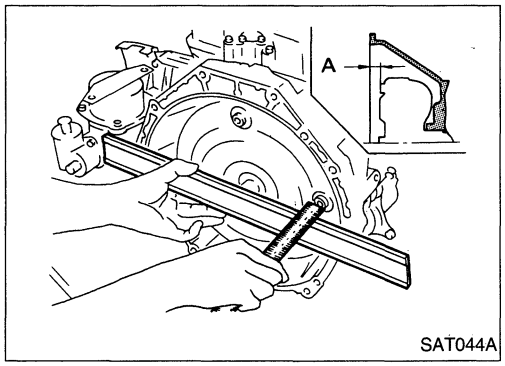
- Drive plate runout

  Maximum allowable runout:

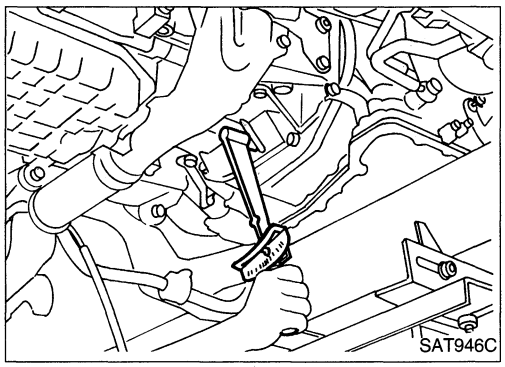
  Refer to EM section ("Inspection", "CYLINDER BLOCK").

  If this runout is out of allowance, replace drive plate and ring gear.

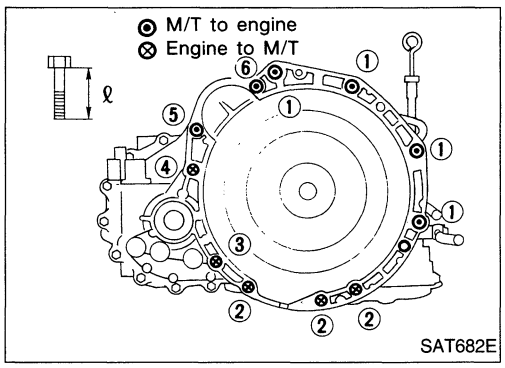
Installation (Cont'd)



- When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.
  Distance "A":
  19 mm (0.75 in) or more



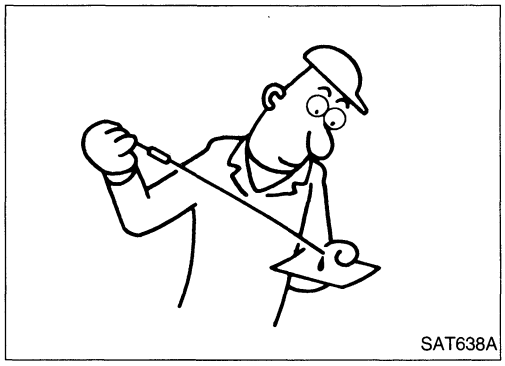
- Install bolts fixing converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transaxle rotates freely without binding.**



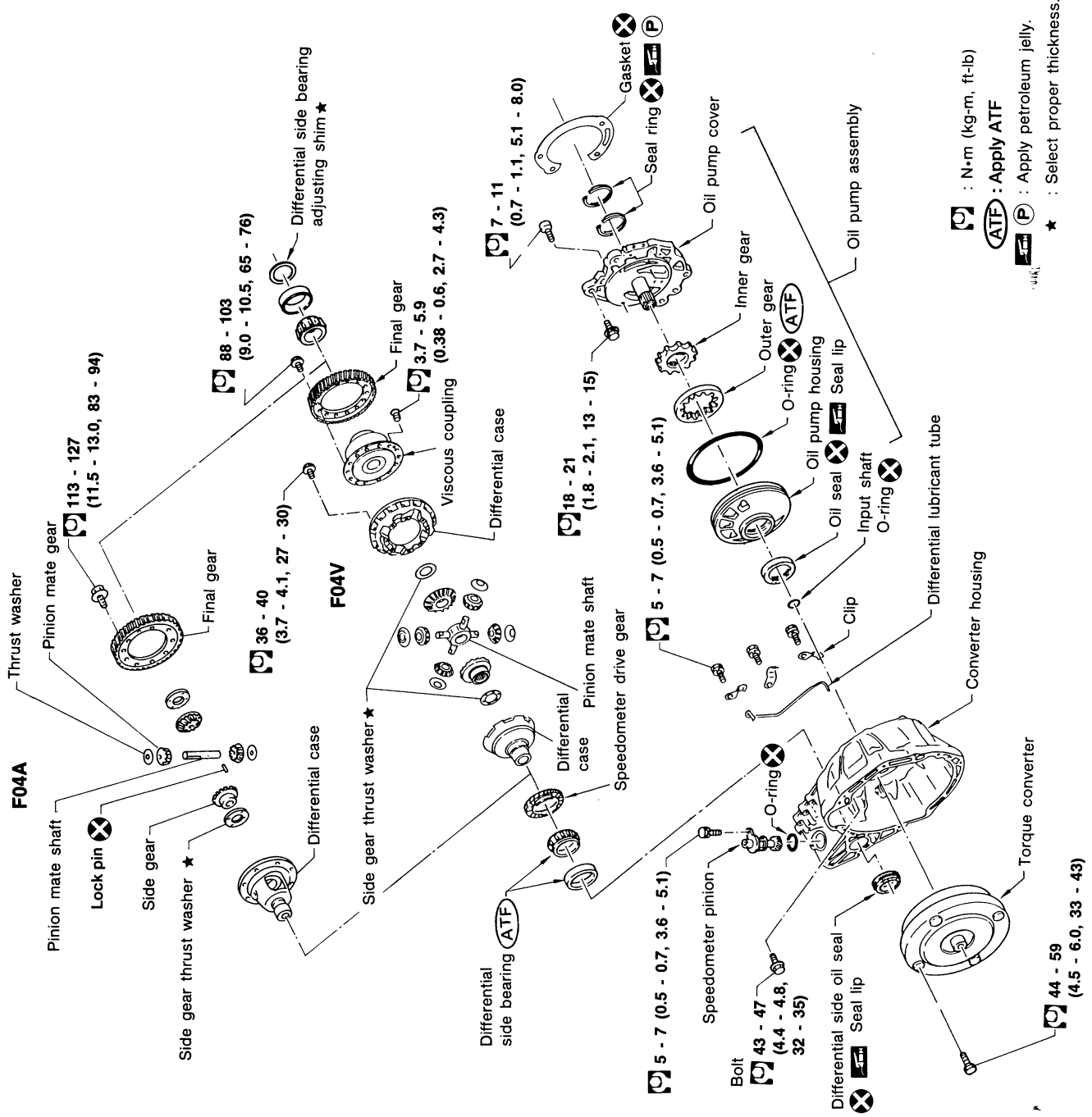
- Tighten bolt securing transaxle.

Bolt No.	Tightening torque N•m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
2	30 - 36 (3.1 - 3.7, 22 - 27)	30 (1.18)
3	30 - 36 (3.1 - 3.7, 22 - 27)	40 (1.57)
4	74 - 83 (7.5 - 8.5, 54 - 61)	45 (1.77)
5	30 - 36 (3.1 - 3.7, 22 - 27)	80 (3.15)
6	30 - 36 (3.1 - 3.7, 22 - 27)	65 (2.56)

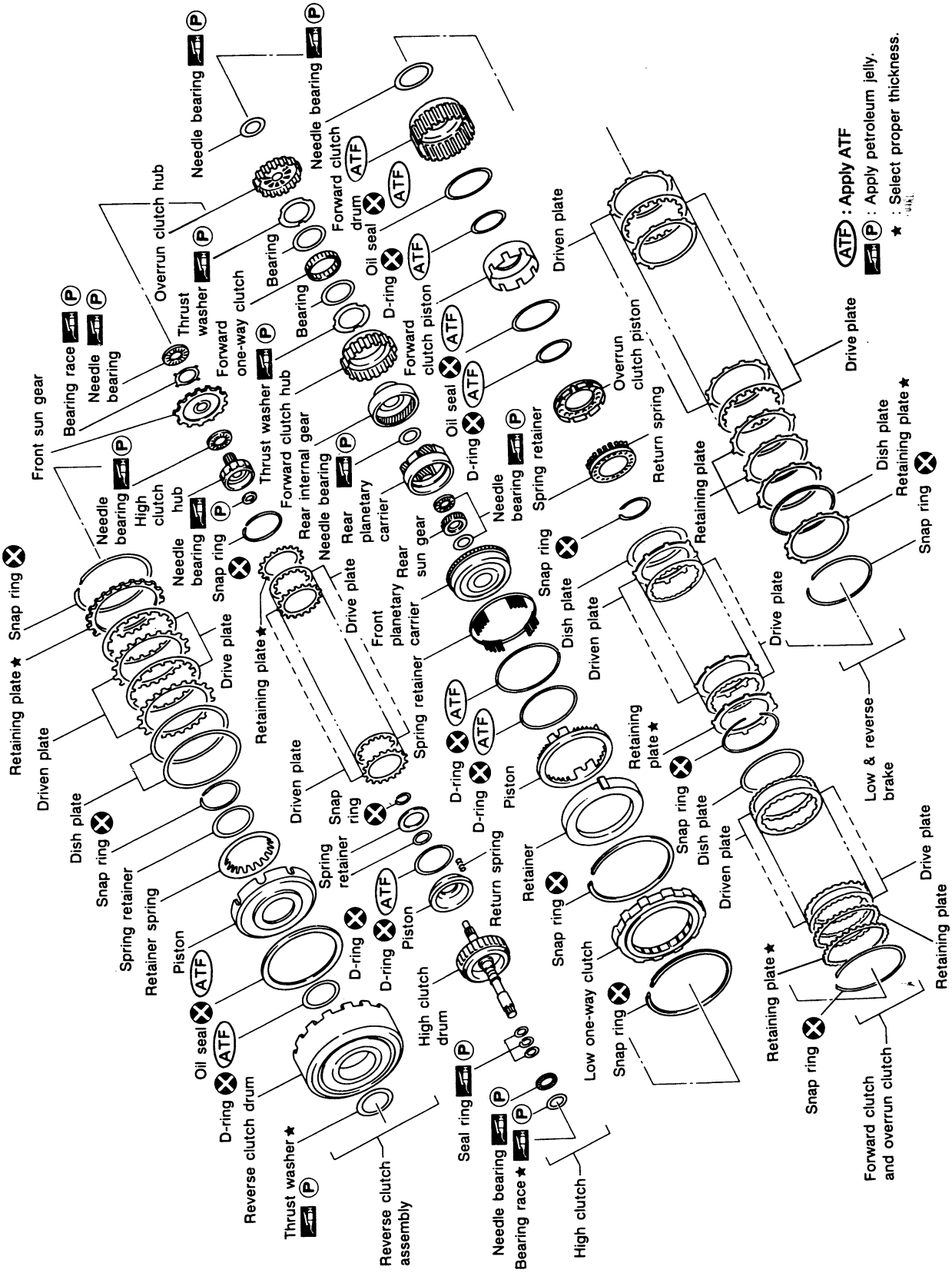
- Reinstall any part removed.



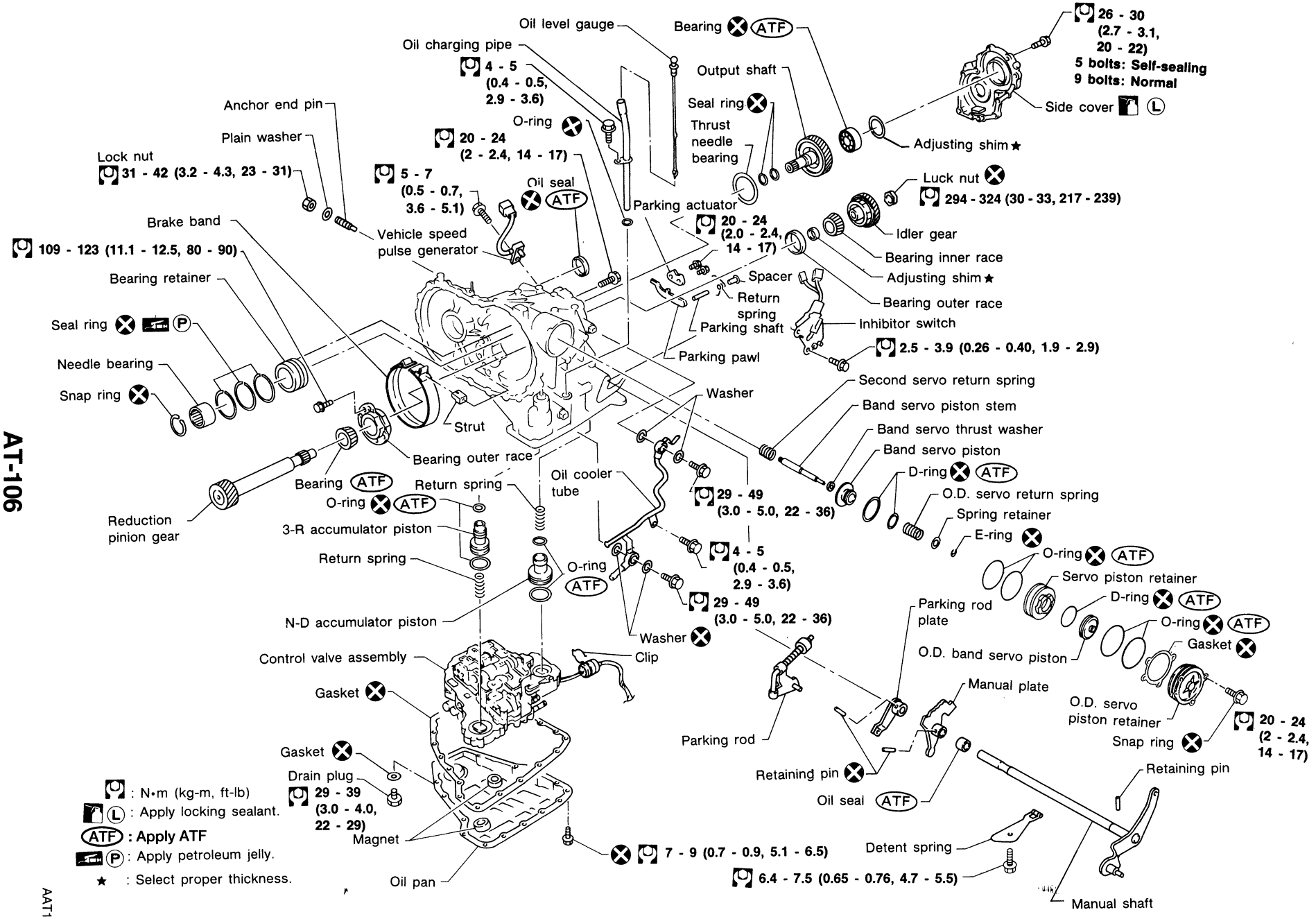
- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test — Refer to AT-13.


F04A
Thrust washer
Pinion mate gear
113 - 127 (11.5 - 13.0, 83 - 94)
Final gear
Pinion mate shaft
Lock pin
Side gear
Side gear thrust washer ★
Differential case
88 - 103 (9.0 - 10.5, 65 - 76)
Differential side bearing adjusting shim ★
Final gear
3.7 - 5.9 (0.38 - 0.6, 2.7 - 4.3)
Viscous coupling
Differential case
36 - 40 (3.7 - 4.1, 27 - 30)
F04V
Side gear thrust washer ★
Differential case
Pinion mate shaft
Speedometer drive gear
Differential side bearing
ATF
7 - 11 (0.7 - 1.1, 5.1 - 8.0)
18 - 21 (1.8 - 2.1, 13 - 15)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Speedometer pinion
Bolt
43 - 47 (4.4 - 4.8, 32 - 35)
Differential side oil seal
Seal lip
O-ring
Gasket
Seal ring
Oil pump cover
Inner gear
Outer gear
O-ring
ATF
Oil pump housing
Seal lip
Oil seal
Input shaft
O-ring
Clip
Oil pump assembly
Differential lubricant tube
Converter housing
Torque converter
44 - 59 (4.5 - 6.0, 33 - 43)
: N·m (kg-m, ft-lb)
ATF : Apply ATF
P : Apply petroleum jelly.
★ : Select proper thickness.

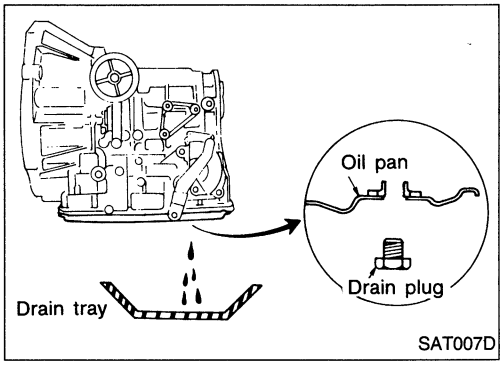
AAT109


ATF : Apply ATF
P : Apply petroleum jelly.
★ : Select proper thickness.
Front sun gear
Bearing race
Needle bearing
Thrust washer
Overrun clutch hub
Needle bearing
Bearing
Forward one-way clutch
Forward clutch drum
Oil seal
D-ring
Forward clutch piston
Thrust washer
Forward clutch hub
Forward internal gear
Needle bearing
Rear planetary carrier
Rear sun gear
Needle bearing
Spring retainer
Return spring
Overrun clutch piston
Driven plate
Drive plate
Dish plate
Retaining plate
Snap ring
Retaining plate
Needle bearing
High clutch hub
Snap ring
Retaining plate
Drive plate
Driven plate
Front planetary carrier
Snap ring
Dish plate
Driven plate
Drive plate
Retaining plate
Snap ring
Driven plate
Snap ring
Spring retainer
Piston
D-ring
D-ring
Piston
Retainer
Retaining plate
Snap ring
Dish plate
Driven plate
Low & reverse brake
Drive plate
Retaining plate
Snap ring
Dish plate
Spring retainer
Retainer spring
Piston
Oil seal
D-ring
Reverse clutch drum
Thrust washer
Reverse clutch assembly
D-ring
D-ring
Piston
Return spring
High clutch drum
Seal ring
Needle bearing
Bearing race
High clutch
Low one-way clutch
Snap ring
Retaining plate
Snap ring
Forward clutch and overrun clutch

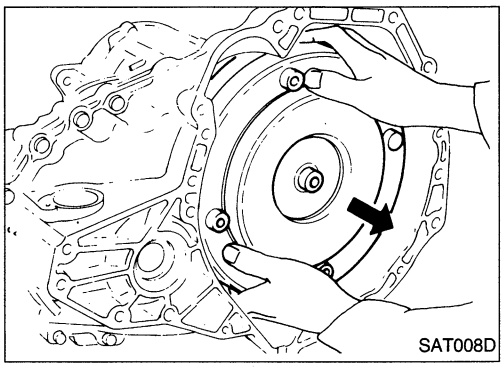
AAT110


Oil level gauge
Bearing ATF
Oil charging pipe
4 - 5 (0.4 - 0.5, 2.9 - 3.6)
Output shaft
26 - 30 (2.7 - 3.1, 20 - 22)
5 bolts: Self-sealing
9 bolts: Normal
Side cover L
Seal ring
Thrust needle bearing
Adjusting shim ★
Anchor end pin
Plain washer
O-ring
20 - 24 (2 - 2.4, 14 - 17)
Lock nut
31 - 42 (3.2 - 4.3, 23 - 31)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Oil seal ATF
Parking actuator
Luck nut
294 - 324 (30 - 33, 217 - 239)
Brake band
109 - 123 (11.1 - 12.5, 80 - 90)
Vehicle speed pulse generator
20 - 24 (2.0 - 2.4, 14 - 17)
Idler gear
Bearing inner race
Adjusting shim ★
Bearing retainer
Spacer
Return spring
Bearing outer race
Seal ring P
Parking shaft
Inhibitor switch
2.5 - 3.9 (0.26 - 0.40, 1.9 - 2.9)
Needle bearing
Parking pawl
Second servo return spring
Snap ring
Washer
Band servo piston stem
Strut
Band servo thrust washer
Band servo piston
Bearing outer race
Oil cooler tube
D-ring ATF
Bearing ATF
Return spring
29 - 49 (3.0 - 5.0, 22 - 36)
O.D. servo return spring
O-ring ATF
Spring retainer
Reduction pinion gear
3-R accumulator piston
E-ring
4 - 5 (0.4 - 0.5, 2.9 - 3.6)
O-ring ATF
Servo piston retainer
Return spring
O-ring ATF
29 - 49 (3.0 - 5.0, 22 - 36)
D-ring ATF
Parking rod plate
N-D accumulator piston
Washer
O-ring ATF
Gasket
Control valve assembly
Clip
O.D. band servo piston
Manual plate
Gasket
Parking rod
O.D. servo piston retainer
20 - 24 (2 - 2.4, 14 - 17)
Snap ring
Gasket
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
Retaining pin
Retaining pin
Oil seal ATF
Magnet
Detent spring
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Oil pan
6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
Manual shaft
: N•m (kg-m, ft-lb)
L : Apply locking sealant.
ATF : Apply ATF
P : Apply petroleum jelly.
★ : Select proper thickness.

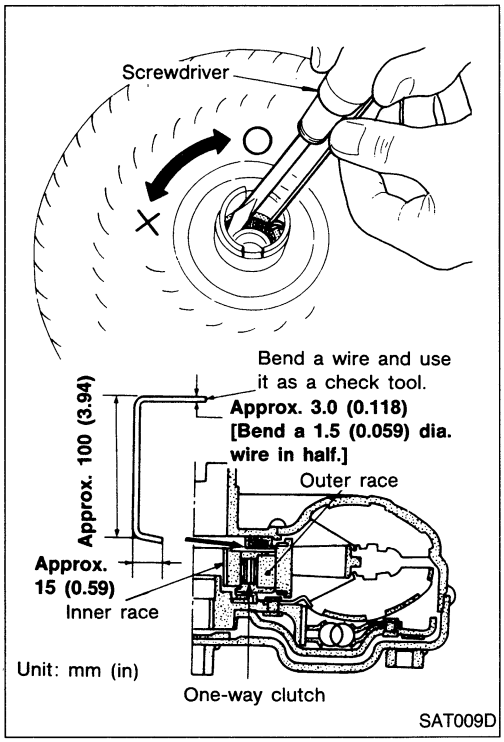
AAT111



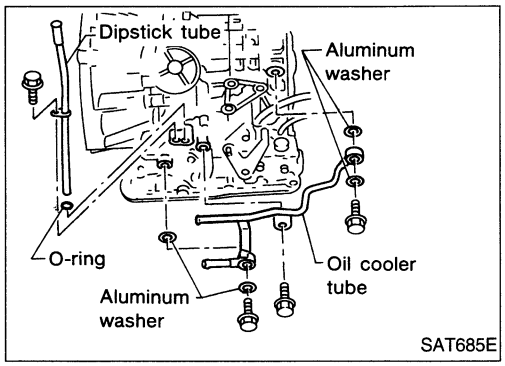
1. Drain ATF through drain plug.



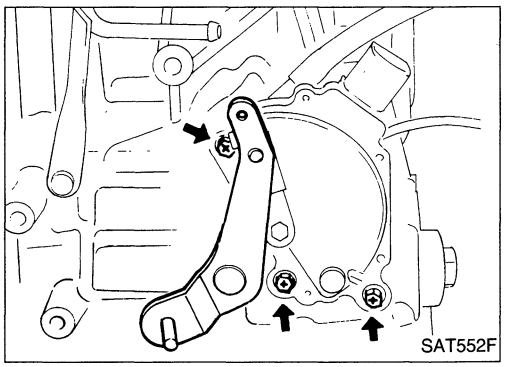
2. Remove torque converter.



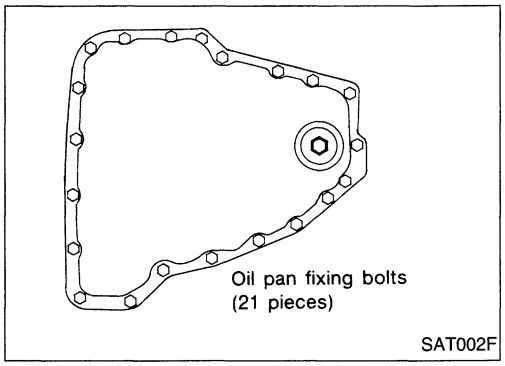
3. Check torque converter one-way clutch using check tool as shown at left.
   a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
   b. When fixing bearing support with check tool, rotate one- way clutch spline using screwdriver.
   c. Check that inner race rotates clockwise only. If not, replace torque converter assembly.



4. Remove oil charging pipe and oil cooler tube.

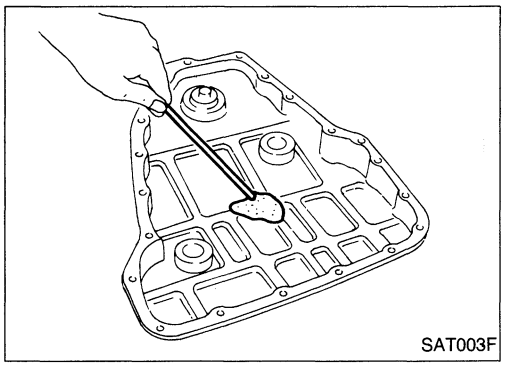

SAT552F

5. Set manual lever to park position.
6. Remove inhibitor switch.



SAT002F

7. Remove oil pan and oil pan gasket.
- **Do not reuse oil pan bolts.**


SAT003F

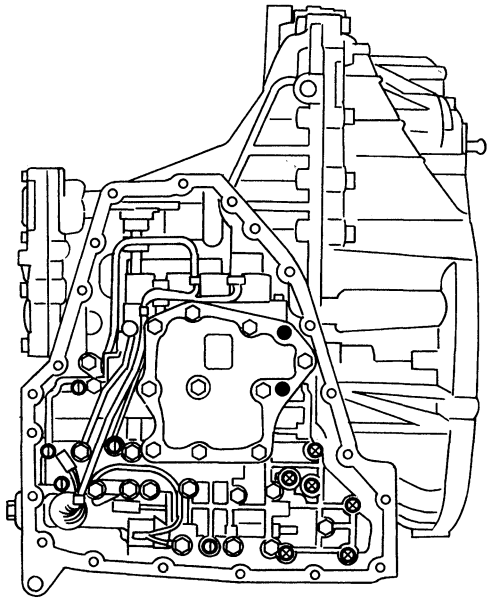
8. Analyze foreign materials in oil pan to trace possible causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up which can cause valves, servo, and clutches to stick and may inhibit pump pressure.

Unit: mm (in)

ⓘ 5 bolts ℓ = 40 (1.57)

ⓧ 6 bolts ℓ = 33 (1.30)

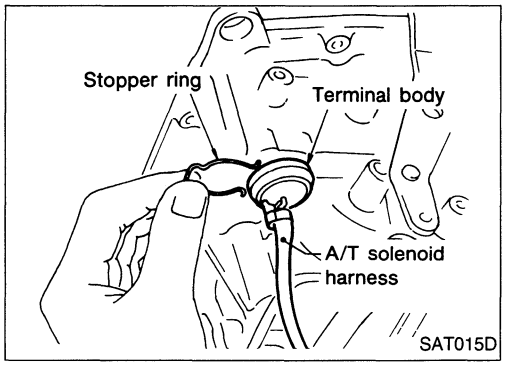
● 2 bolts ℓ = 43.5 (1.713)



SAT647E

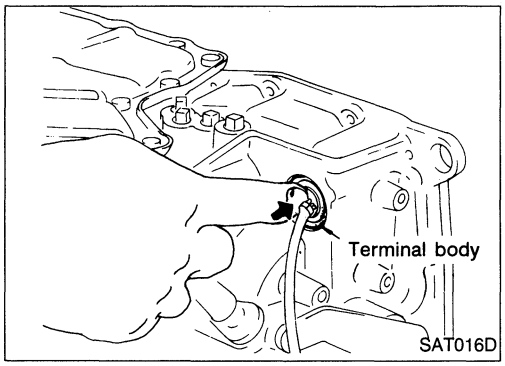
9. Remove control valve assembly according to the following procedures.

a. Remove control valve assembly mounting bolts ⓘ, ⓧ and ●.



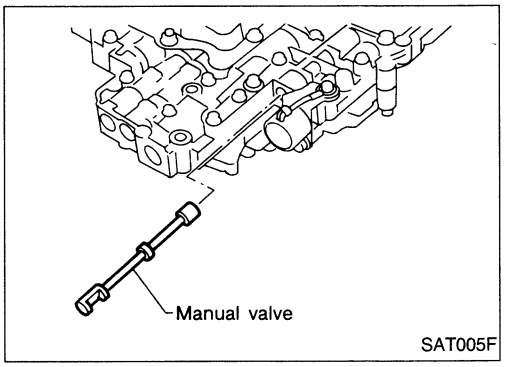
SAT015D

b. Remove stopper ring from terminal body.

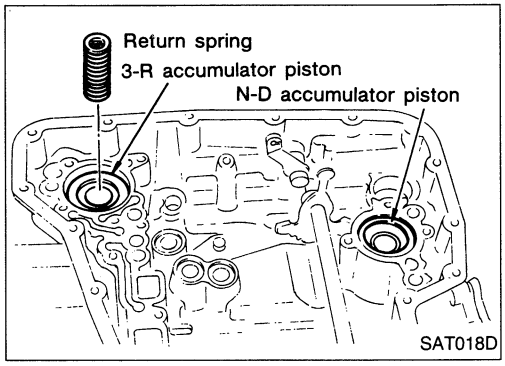


SAT016D

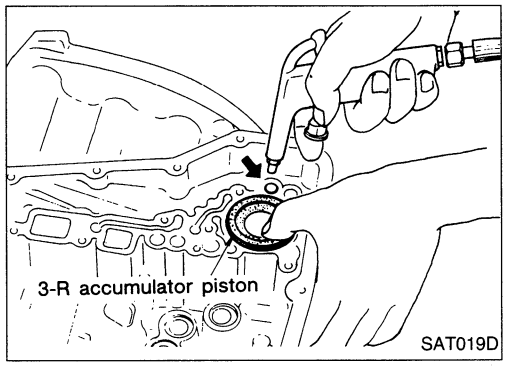
c. Push terminal body into transmission case and draw out solenoid harness.



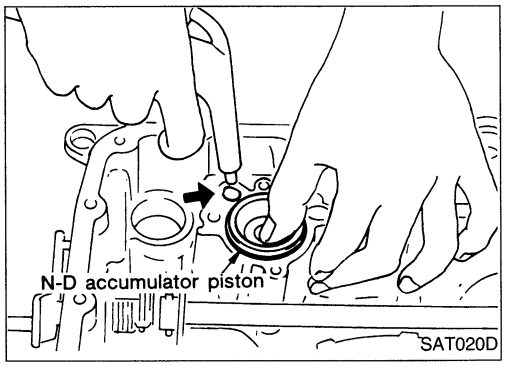
10. Remove manual valve from control valve assembly.



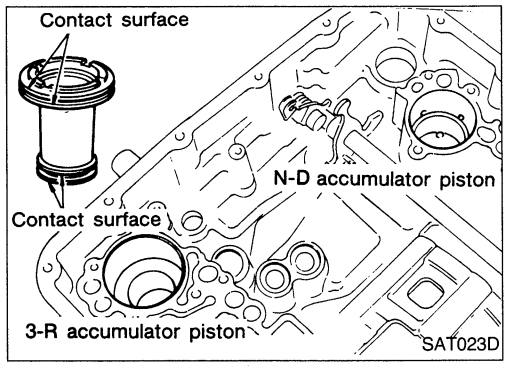
11. Remove return spring from 3-R accumulator piston.



12. Remove 3-R accumulator piston with compressed air.
13. Remove O-rings from 3-R accumulator piston.



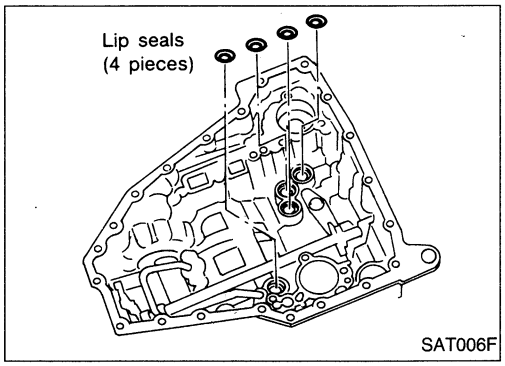
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



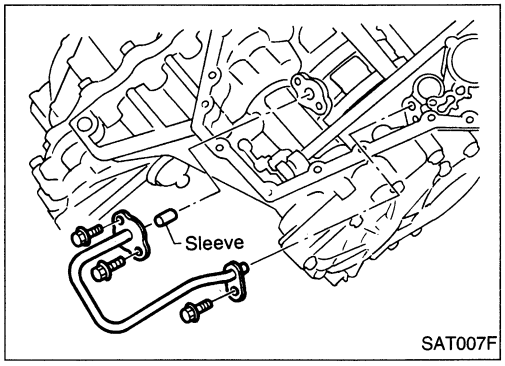
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Unit: mm (in)

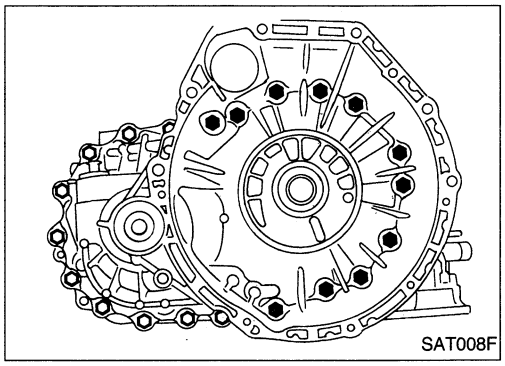
Spring	Free length	Outer diameter
3-R accumulator spring	52.5 (2.067)	20.4 (0.803)
N-D accumulator spring	43.5 (1.713)	27.0 (1.063)



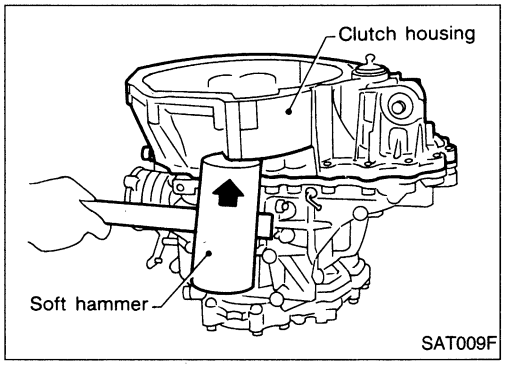
18. Remove lip seals.



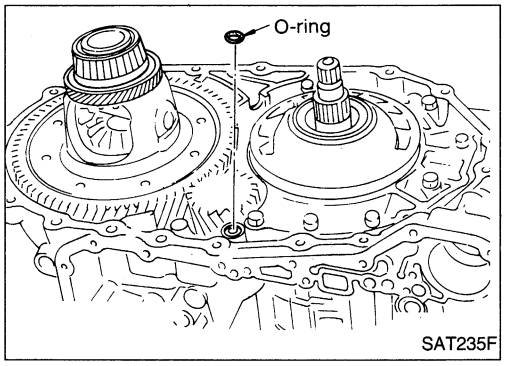
19. Remove tube and sleeve.



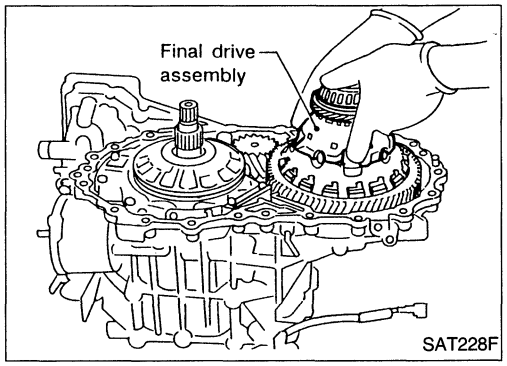
20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.



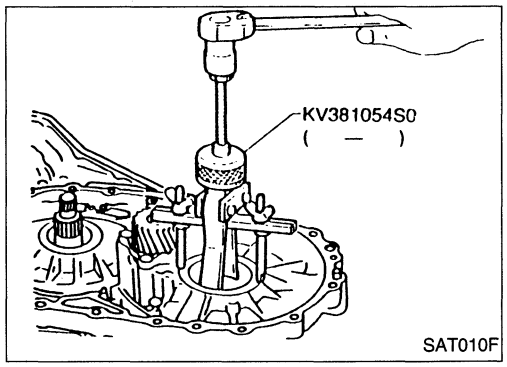
b. Remove converter housing by tapping it lightly.



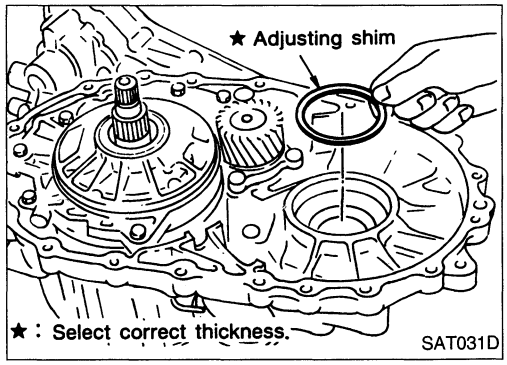
c. Remove O-ring from differential oil port.



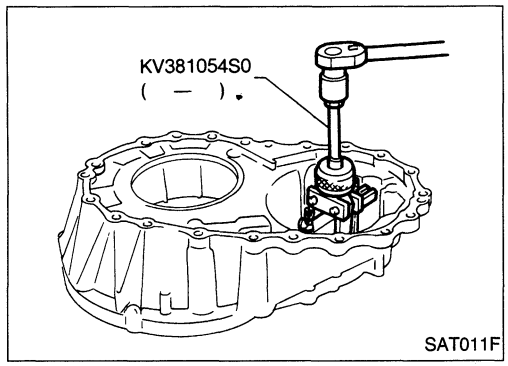
21. Remove final drive assembly from transmission case.



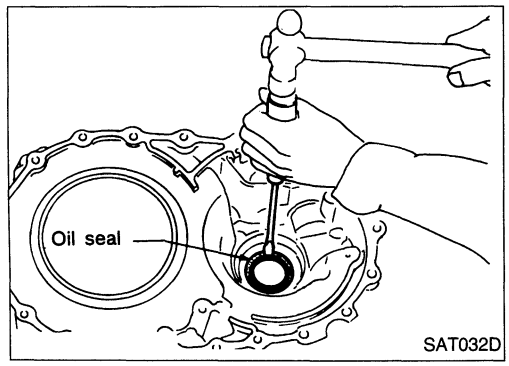
22. Remove differential side bearing outer race from transmission case.



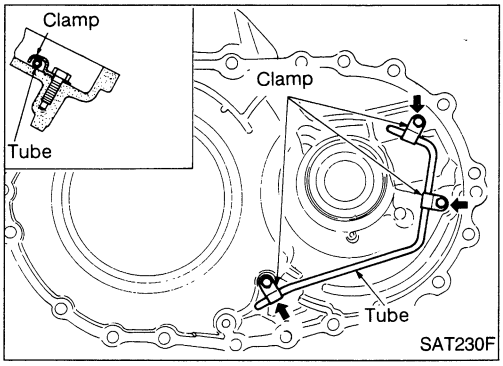
23. Remove differential side bearing adjusting shim from transmission case.



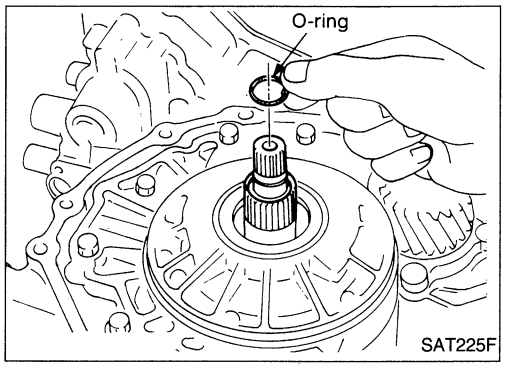
24. Remove differential side bearing outer race from converter housing.



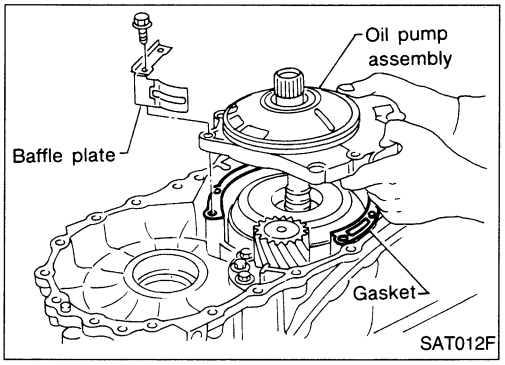
25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



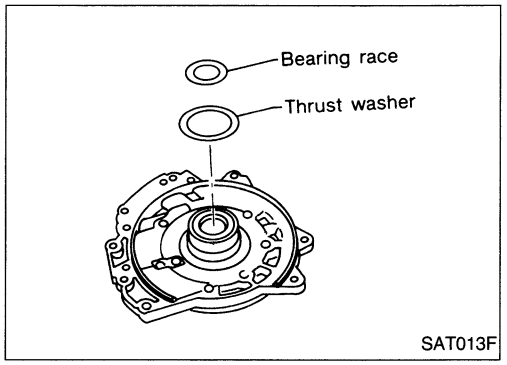
26. Remove oil tube from converter housing.



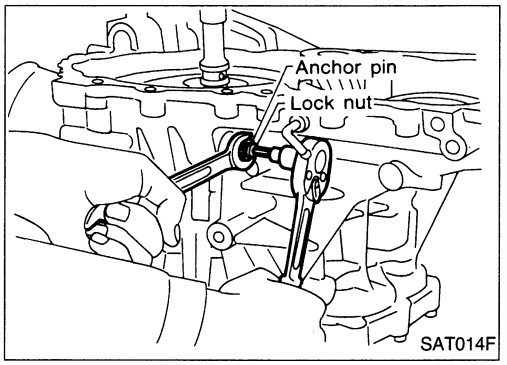
27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



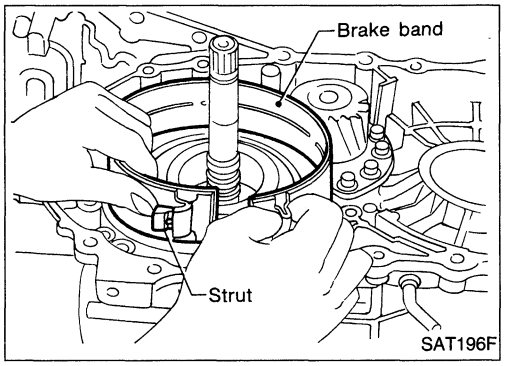
b. Remove oil pump assembly, baffle plate and gasket from transmission case.



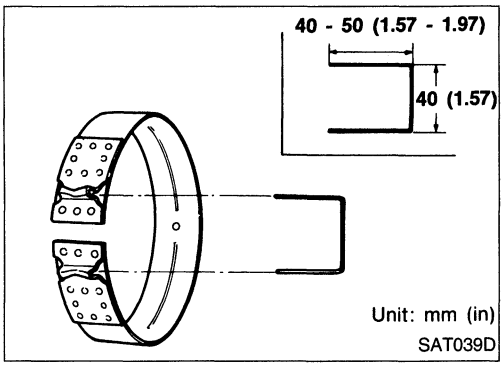
c. Remove thrust washer and bearing race from oil pump assembly.



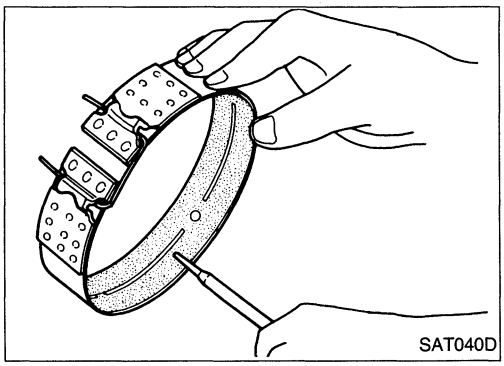
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off band servo anchor end pin.



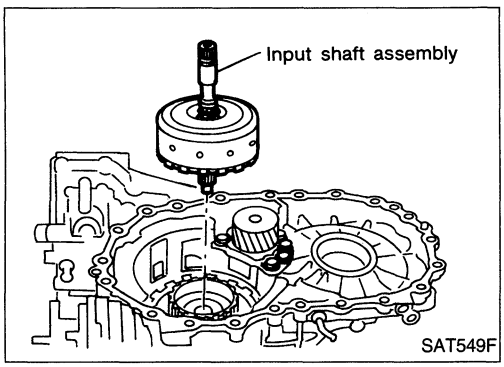
b. Remove brake band and strut from transmission case.



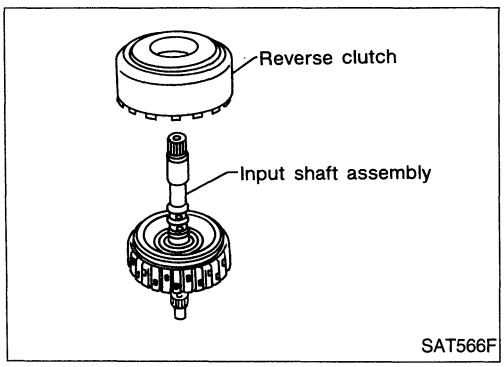
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  Leave the clip in position after removing the brake band.



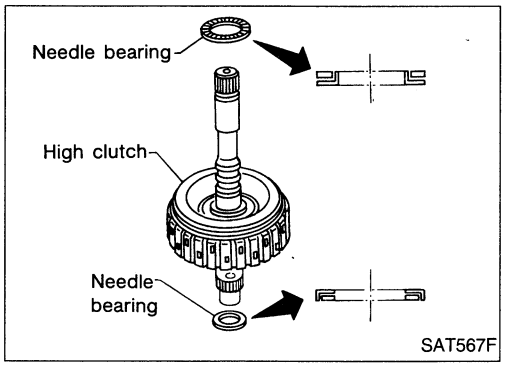
c. Check brake band facing for damage, cracks, wear or burns.



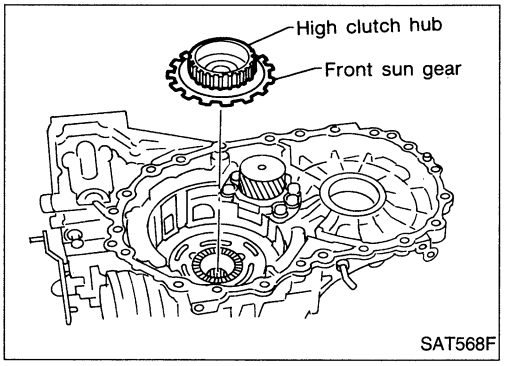
29. Remove input shaft assembly (high clutch), reverse clutch and front sun gear according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



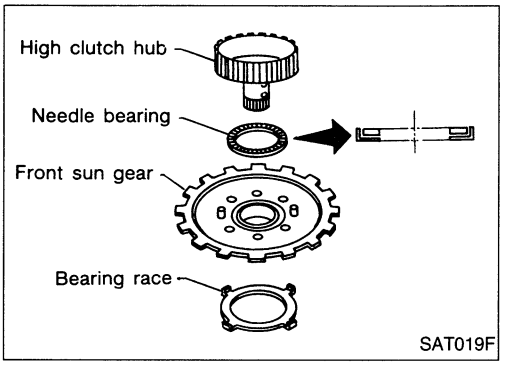
b. Remove input shaft assembly (high clutch) from reverse clutch.



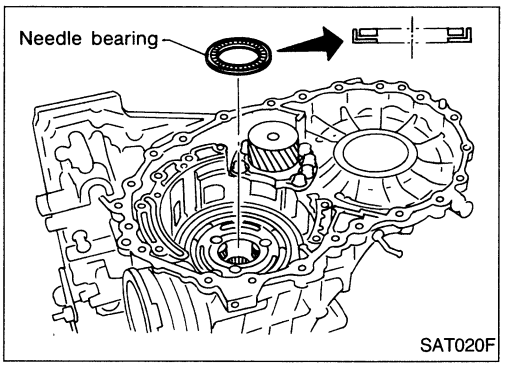
c. Remove needle bearings from high clutch drum and check for damage or wear.



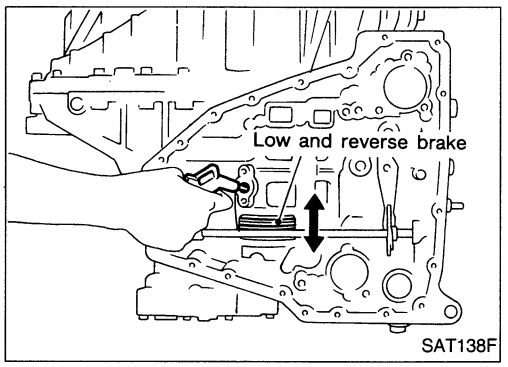
d. Remove high clutch hub and front sun gear from transmission case.



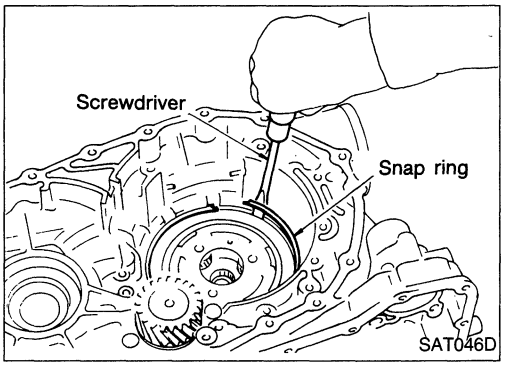
e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



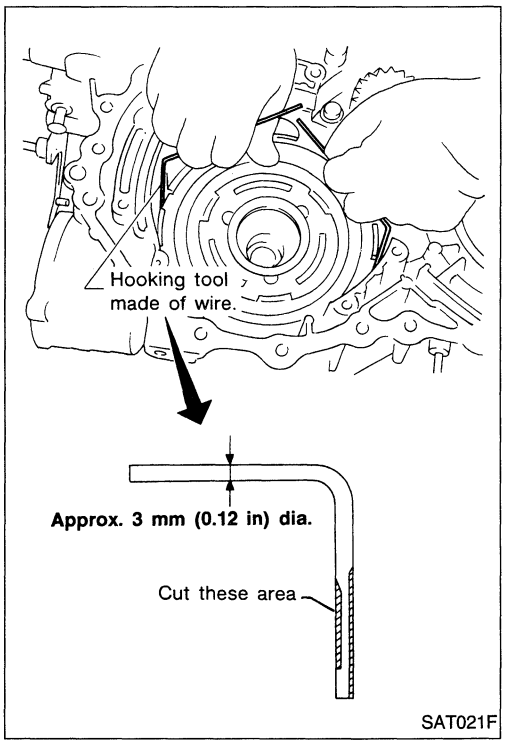
30. Remove needle bearing from transmission case and check for damage or wear.



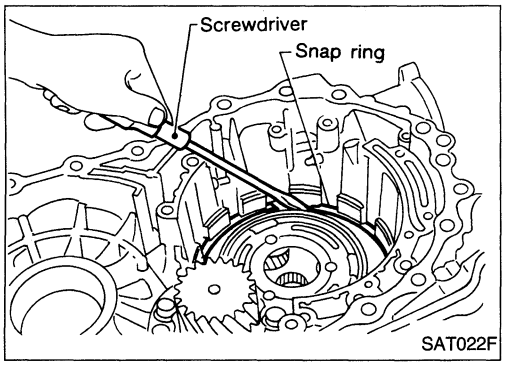
31. Apply compressed air and check to see that low and reverse brake operates.



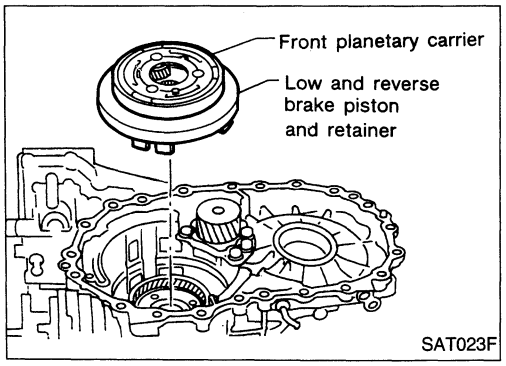
32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



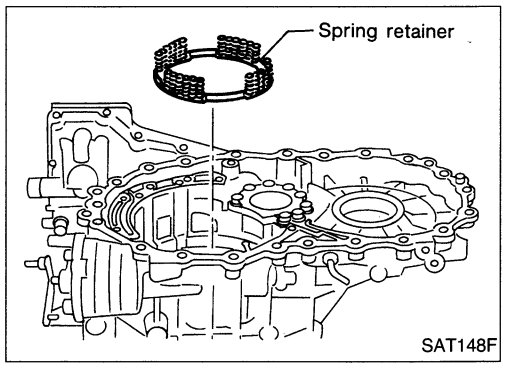
b. Remove low one way clutch with a hook made of wire.



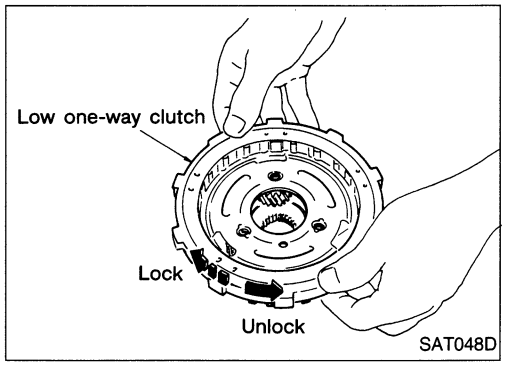
c. Remove snap ring with flat-bladed screwdriver.



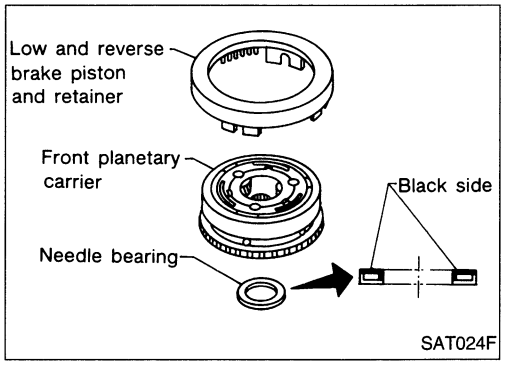
d. Remove front planetary carrier with low and reverse brake piston and retainer.



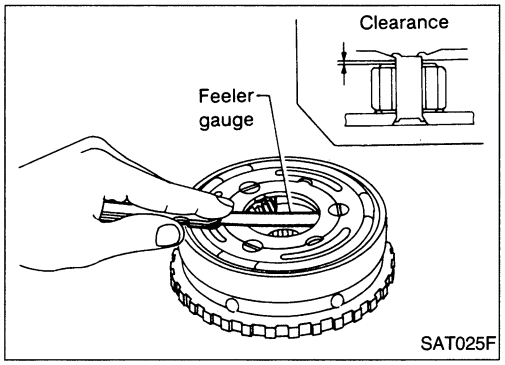
e. Remove low and reverse brake spring retainer.
- **Do not remove return springs from spring retainer.**



f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.

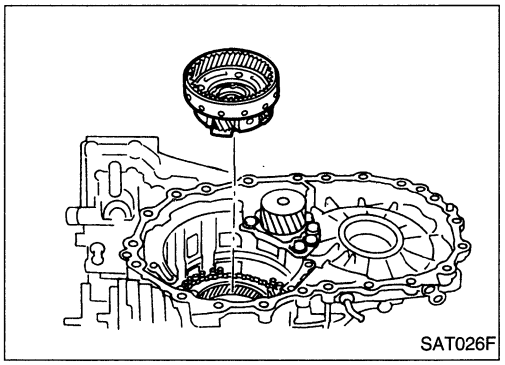


h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.

i. Check clearance between planetary gears and planetary carrier with feeler gauge.

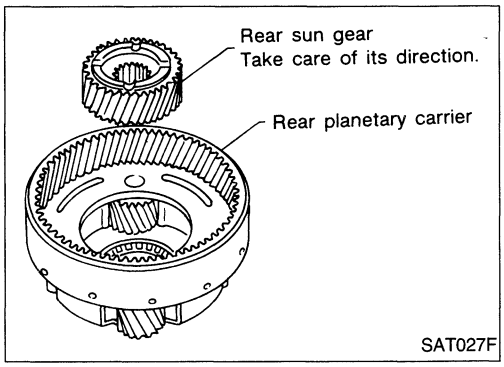
Standard clearance:
0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

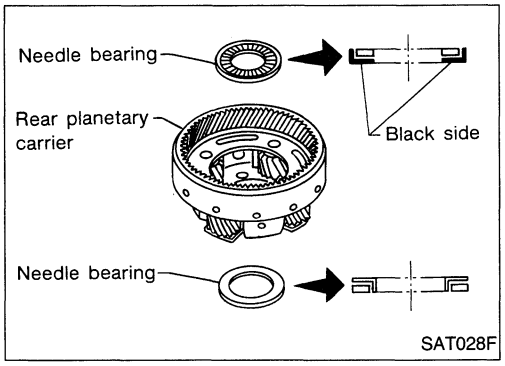


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

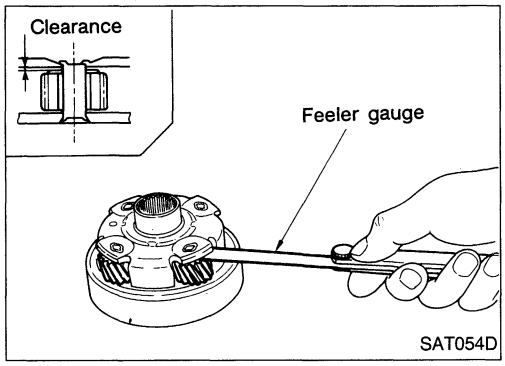
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



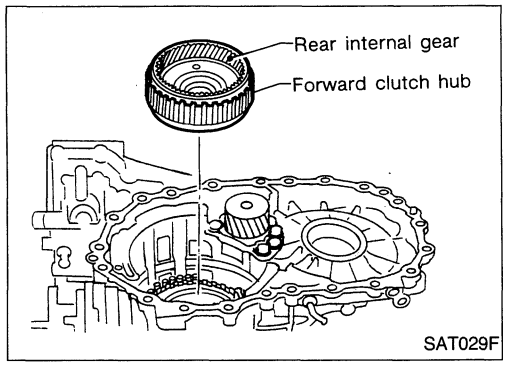
c. Remove needle bearings from rear planetary carrier assembly.



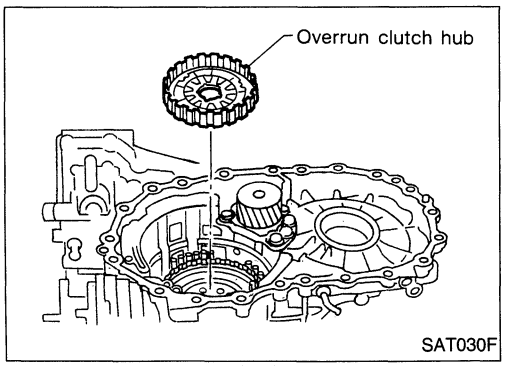
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

Standard clearance:
0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
0.80 mm (0.0315 in)

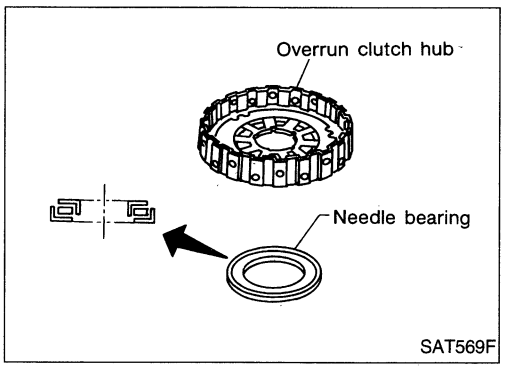
Replace rear planetary carrier if the clearance exceeds allowable limit.



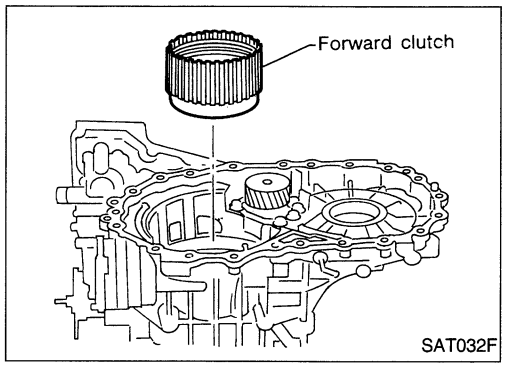
34. Remove rear internal gear and forward clutch hub from transmission case.



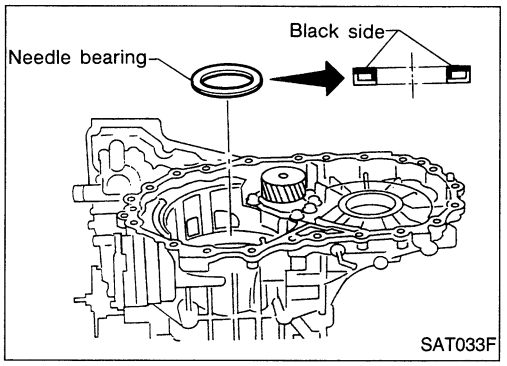
35. Remove overrun clutch hub from transmission case.



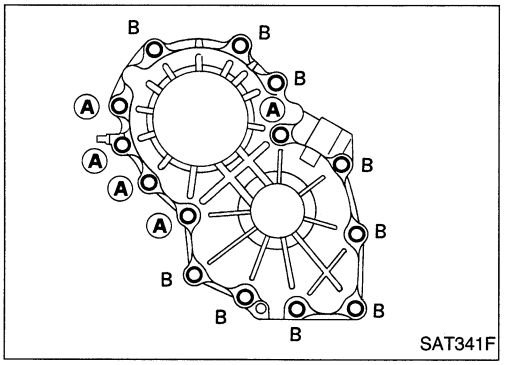
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



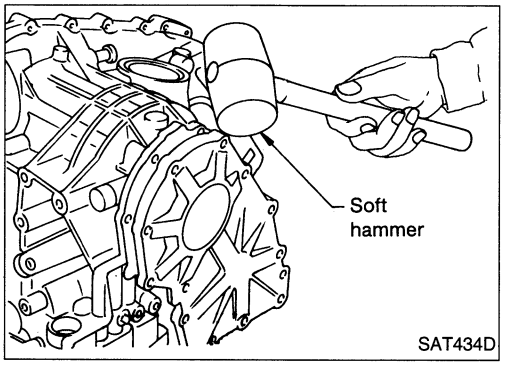
38. Remove needle bearing from transmission case.



39. Remove output shaft assembly according to the following procedures.

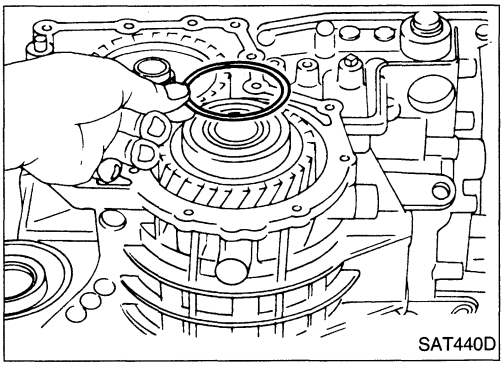
a. Remove side cover bolts.

- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**

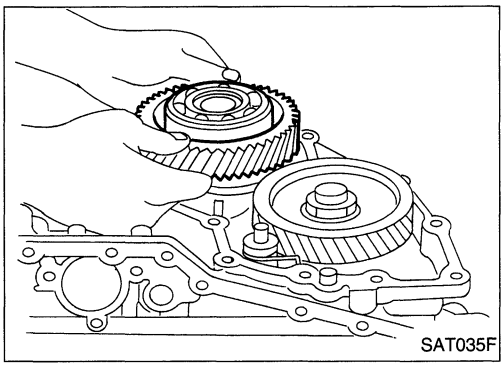


b. Remove side cover by lightly tapping it with a soft hammer.

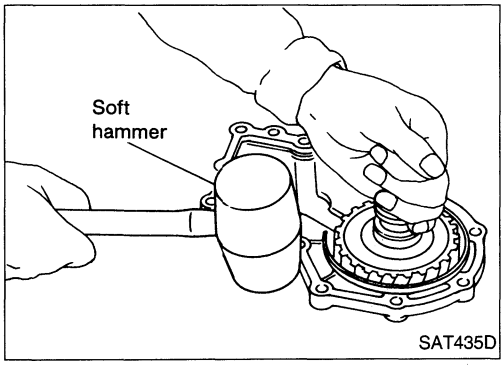
- **Be careful not to drop output shaft assembly as output shaft assembly may be removed together with side cover.**


SAT440D

c. Remove adjusting shim.

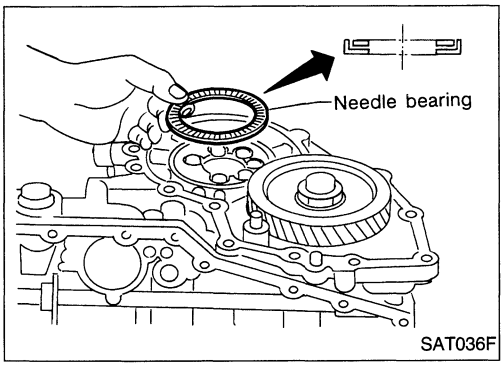

SAT035F

d. Remove output shaft assembly.



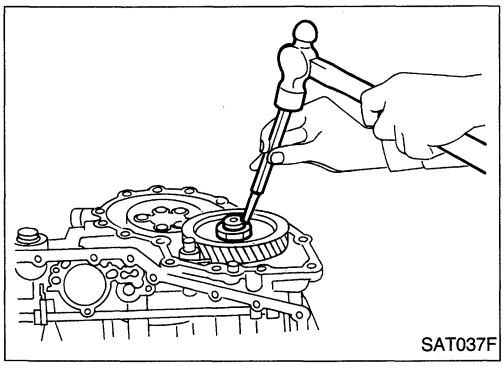
SAT435D

- If output shaft assembly was removed together with side cover, remove side cover by tapping it lightly with a soft hammer.

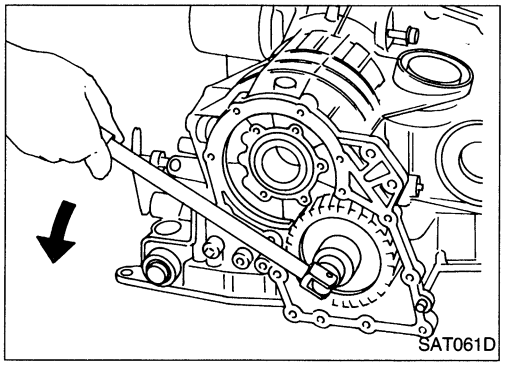


SAT036F

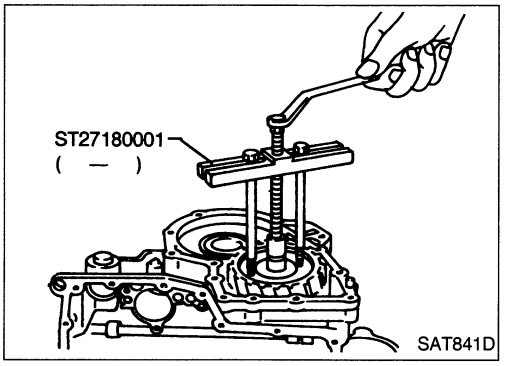
e. Remove needle bearing.


SAT037F

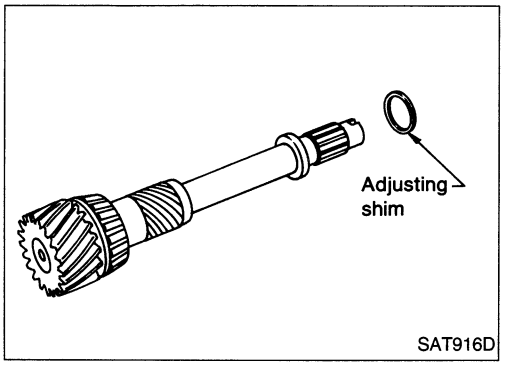
40. Disassemble reduction gear according to the following procedures.
a. Set manual lever to position "P" to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.



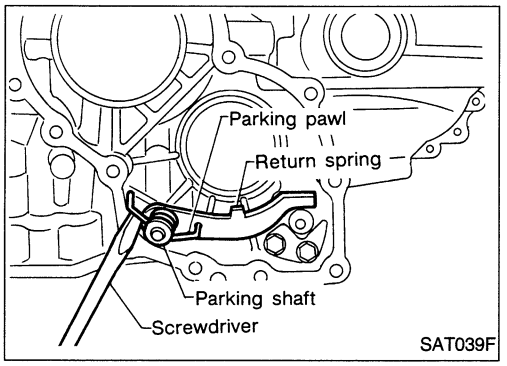
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



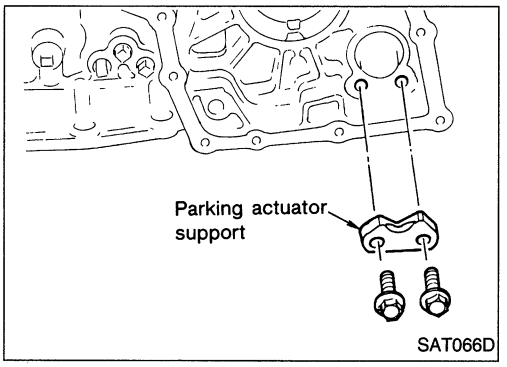
d. Remove idler gear with puller.



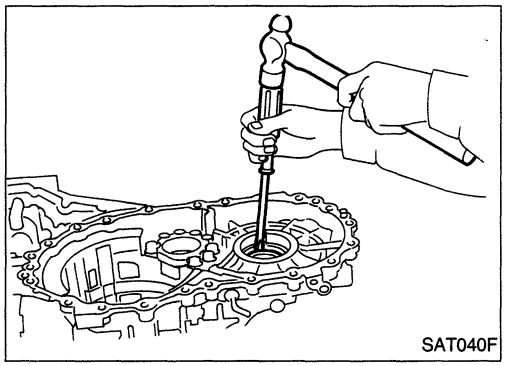
e. Remove reduction gear.
f. Remove adjusting shim from reduction gear.



41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.

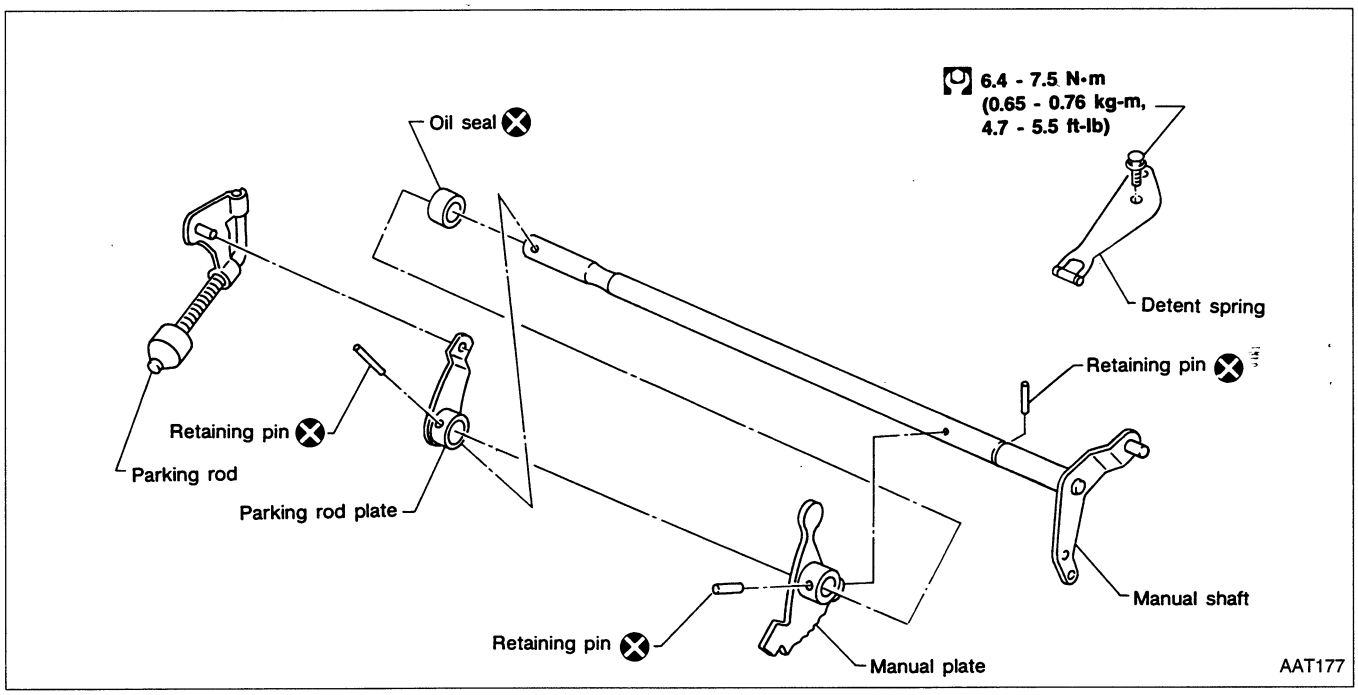


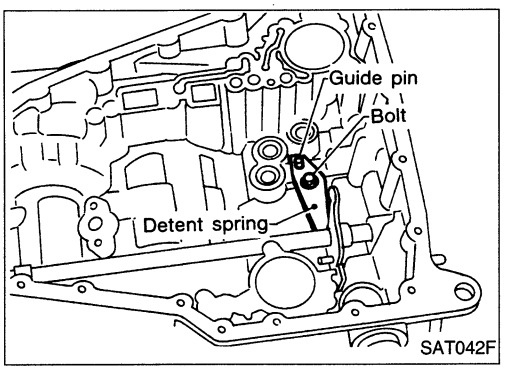
44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.


SAT040F

46. Remove side oil seal with screwdriver from transmission case.

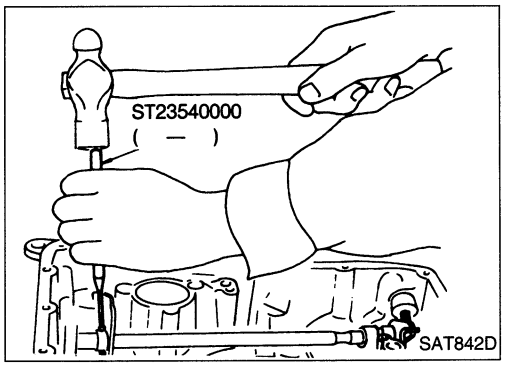
Manual Shaft



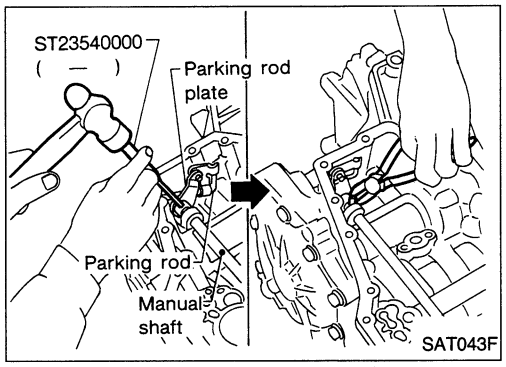


REMOVAL

1. Remove detent spring from transmission case.

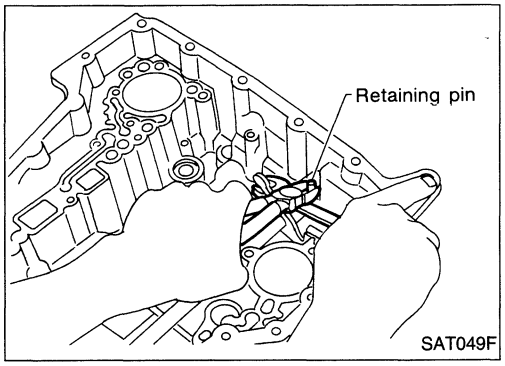


2. Drive out manual plate retaining pin.

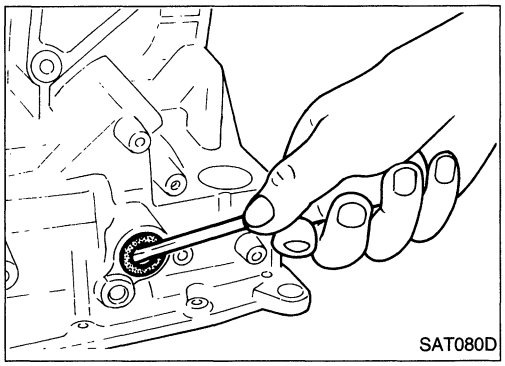


3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

Manual Shaft (Cont'd)



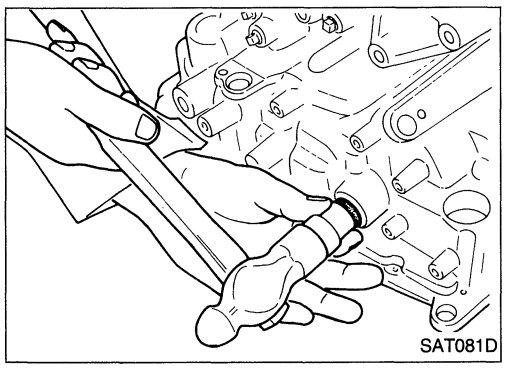
6. Pull out manual shaft retaining pin.
7. Remove manual shaft and manual plate from transmission case.



8. Remove manual shaft oil seal.

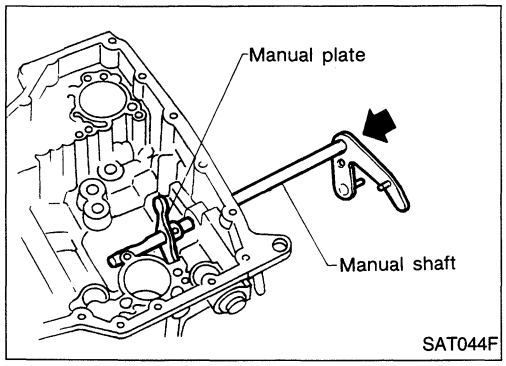
INSPECTION

- Check component parts for wear or damage. Replace if necessary.



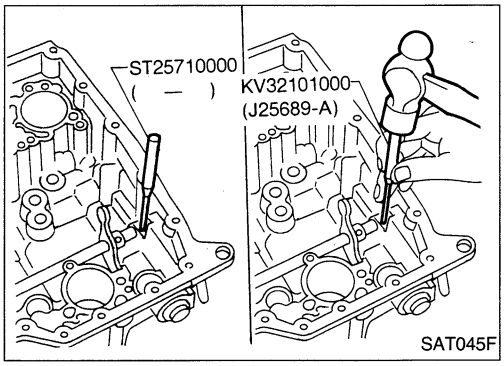
INSTALLATION

1. Install manual shaft oil seal.
- **Apply ATF to outer surface of oil seal.**

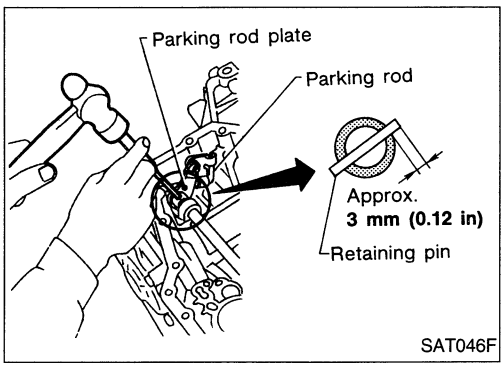


2. Install manual shaft and manual plate.

Manual Shaft (Cont'd)

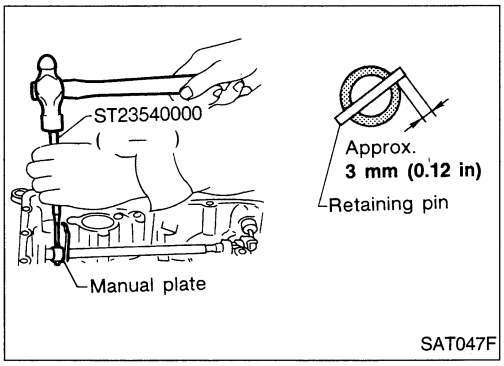


3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.



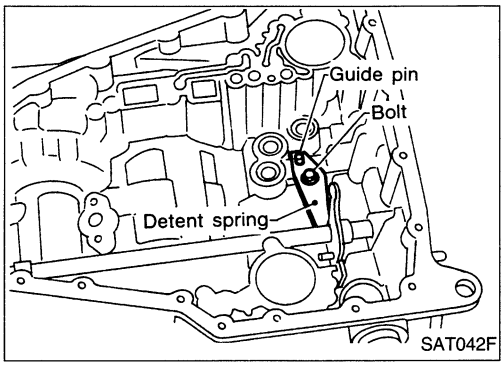
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

Both ends of pin should protrude.



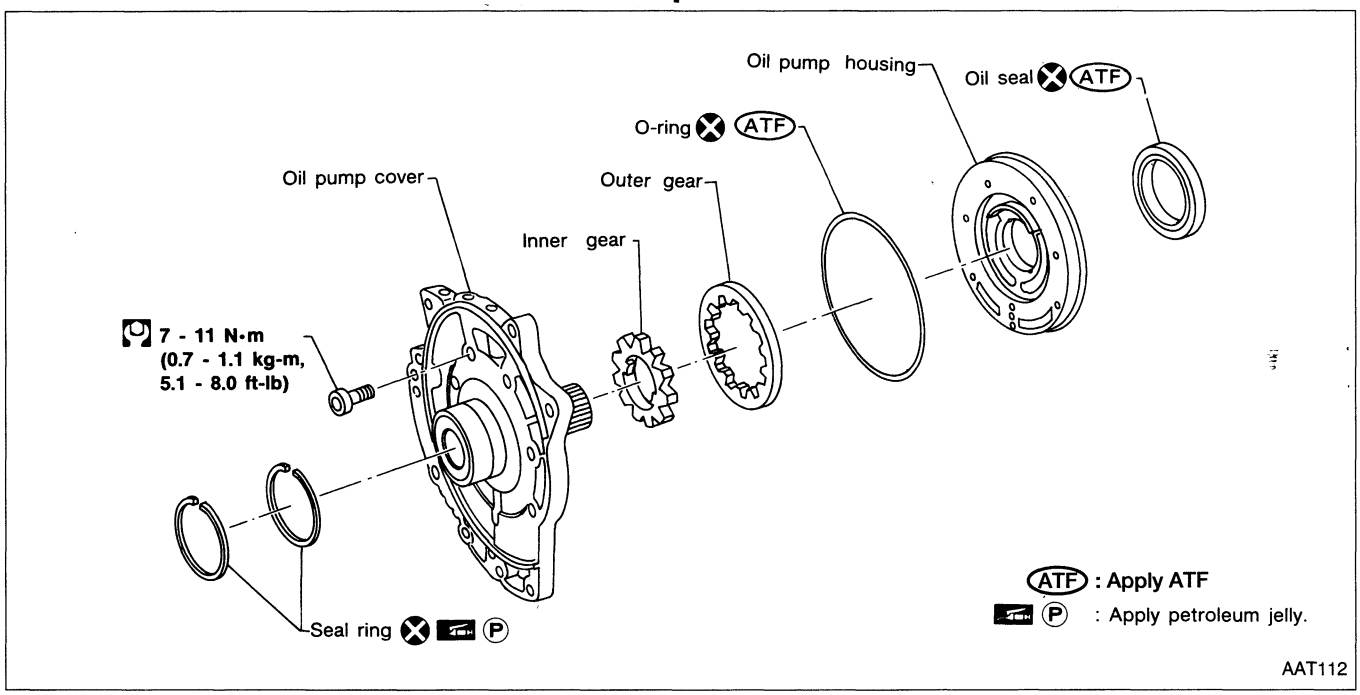
7. Drive manual plate retaining pin.

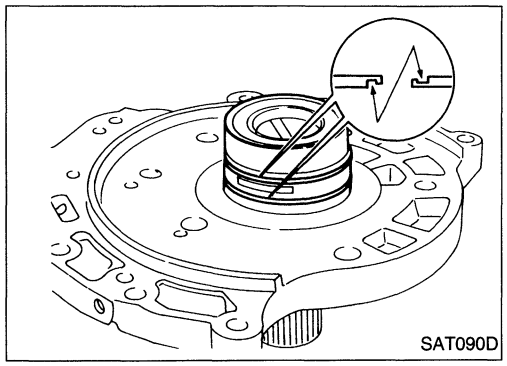
Both ends of pin should protrude.



8. Install detent spring.

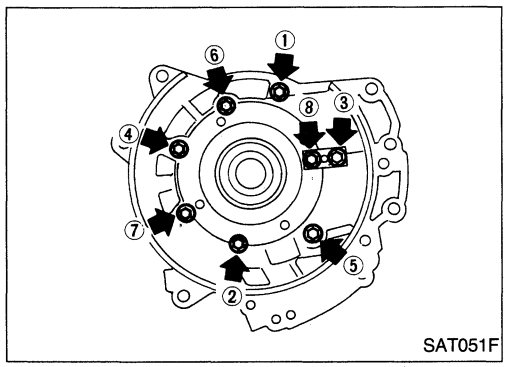
Oil Pump



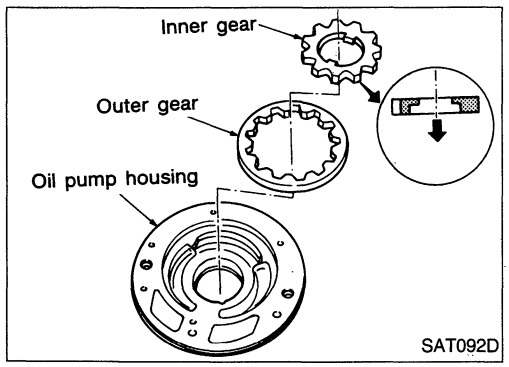


DISASSEMBLY

1. Remove seal rings by undoing hooks.

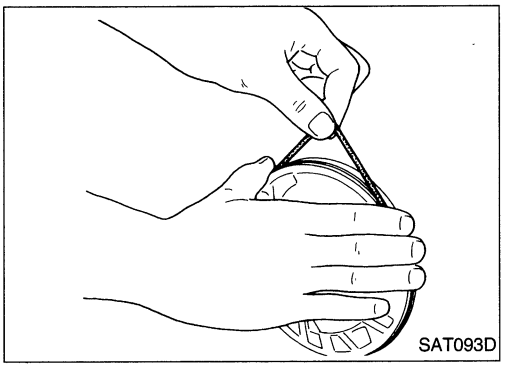


2. Loosen bolts in a crisscross pattern and remove oil pump cover.

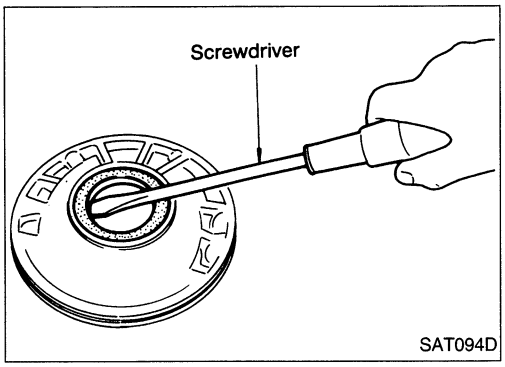


3. Remove inner and outer gear from oil pump housing.

Oil Pump (Cont'd)



4. Remove O-ring from oil pump housing.

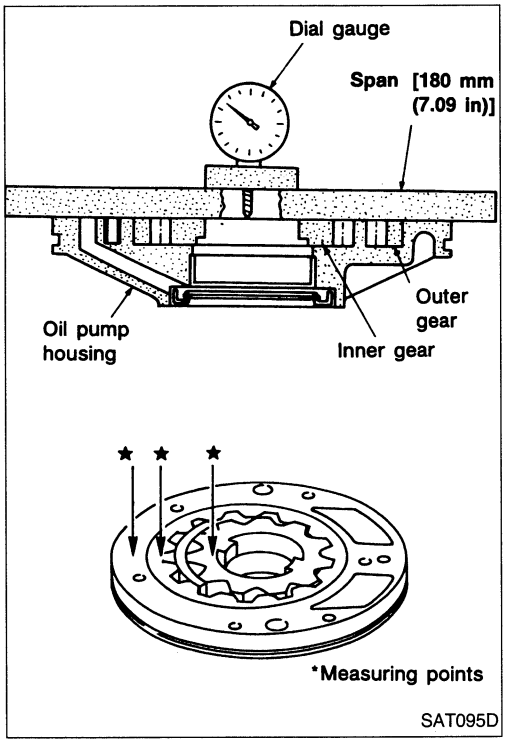


5. Remove oil pump housing oil seal.

INSPECTION

Oil pump housing, oil pump cover, inner gear and outer gear

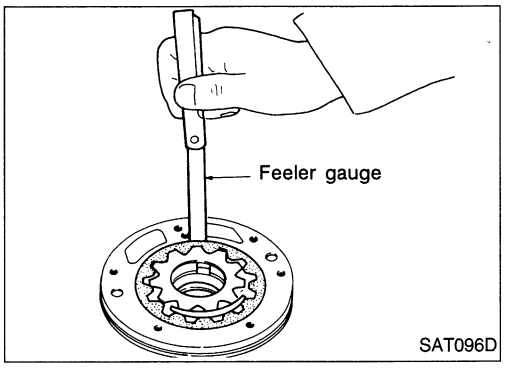
- Check for wear or damage.



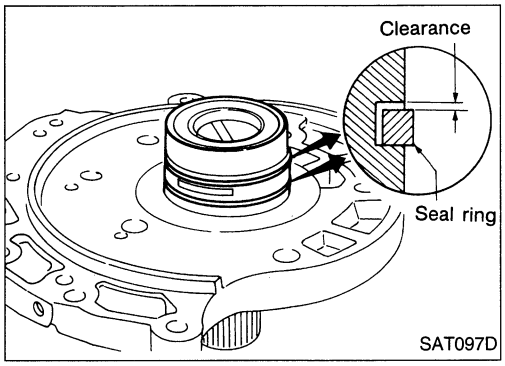
Side clearance

- Measure side clearance between end of oil pump housing and inner and outer gears in at least four places along their circumferences. Maximum measured values should be within specified ranges.
  Standard clearance:
  0.030 - 0.050 mm (0.0012 - 0.0020 in)
- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.
  Inner and outer gear:
  Refer to AT-213.
- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

Oil Pump (Cont'd)

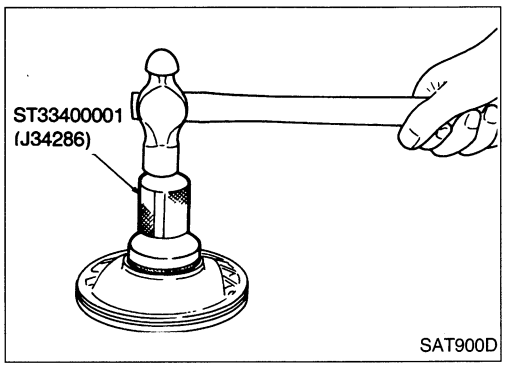


- Measure clearance between outer gear and oil pump housing.
  Standard clearance:
  0.111 - 0.181 mm (0.0044 - 0.0071 in)
  Allowable limit:
  0.181 mm (0.0071 in)
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



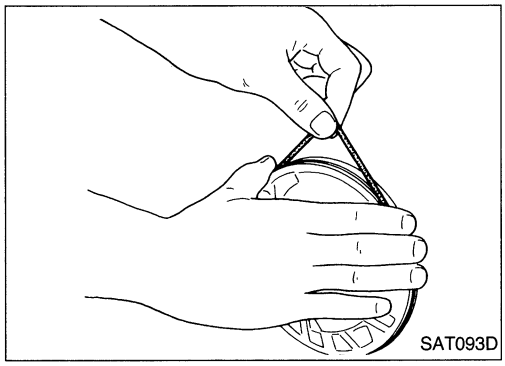
Seal ring clearance

- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.036 - 0.176 mm (0.0014 - 0.0069 in)
  Allowable limit:
  0.176 mm (0.0069 in)
- If not within allowable limit, replace oil pump cover assembly.

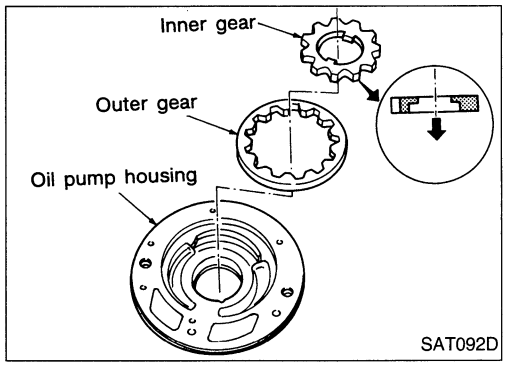


ASSEMBLY

1. Install oil seal on oil pump housing.

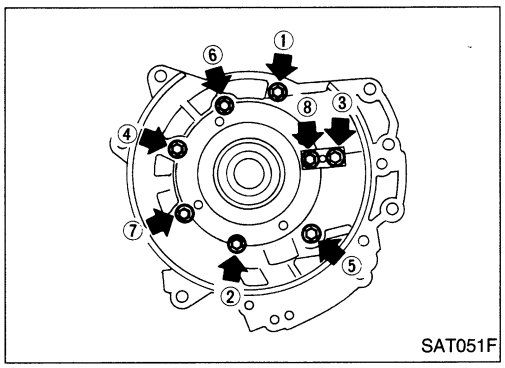


2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**



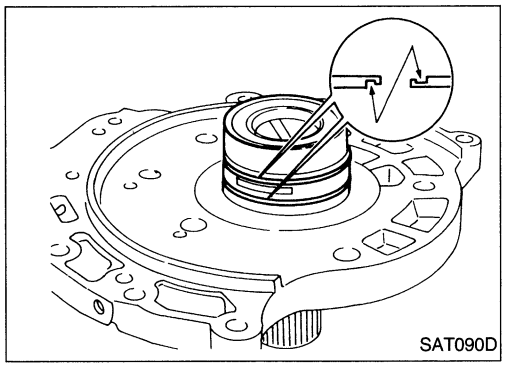
3. Install inner and outer gears on oil pump housing.
- **Be careful of direction of inner gear.**

Oil Pump (Cont'd)



SAT051F

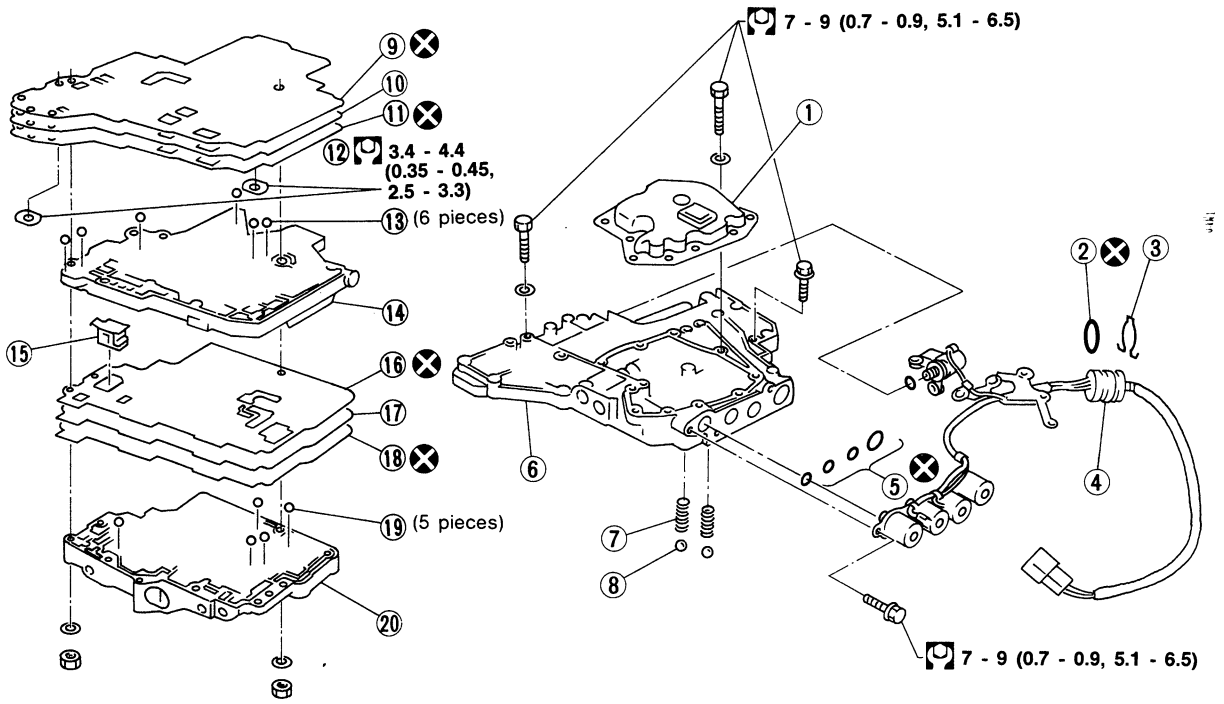
4. Install oil pump cover on oil pump housing.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a crisscross pattern.


SAT090D

5. Install new seal rings carefully after packing ring groove with petroleum jelly and attach hooks.

- **Do not spread gap of seal ring excessively while installing. The ring may be deformed.**

Control Valve Assembly



① Oil strainer
② O-ring
③ Clamp
④ Terminal body
⑤ O-rings
⑥ Control valve lower body
⑦ Oil cooler relief valve spring
⑧ Check ball
⑨ Lower separating gasket
⑩ Separating plate
⑪ Lower inter separating gasket
⑫ Support plate
⑬ Steel ball
⑭ Control valve inter body
⑮ Pilot filter
⑯ Upper inter separating gasket
⑰ Separating plate
⑱ Upper separating gasket
⑲ Steel ball
⑳ Control valve upper body

DISASSEMBLY

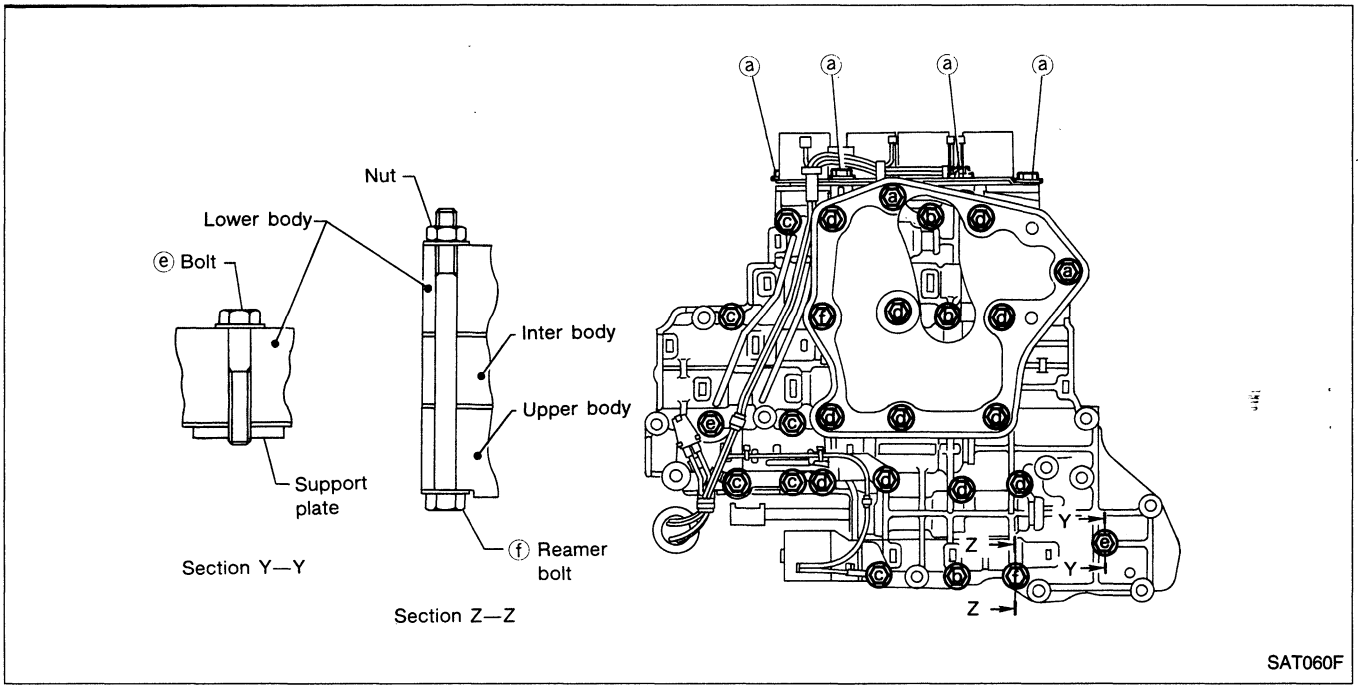
Disassemble upper, inter and lower bodies.

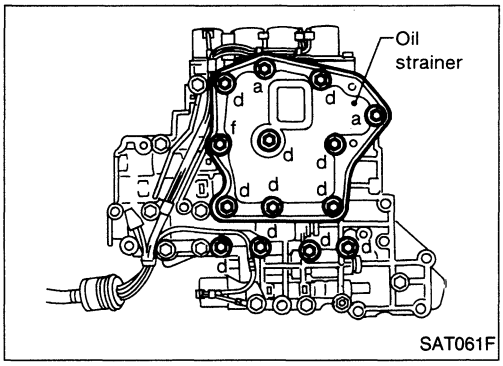
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

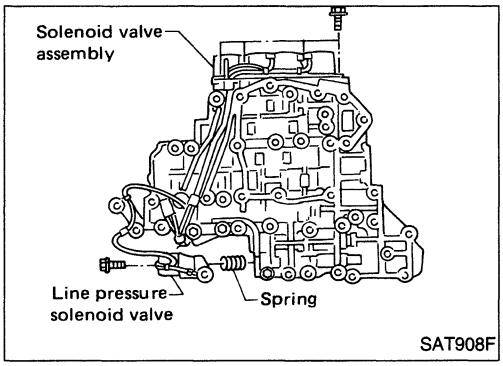
f: Reamer bolt and nut.

Control Valve Assembly (Cont'd)

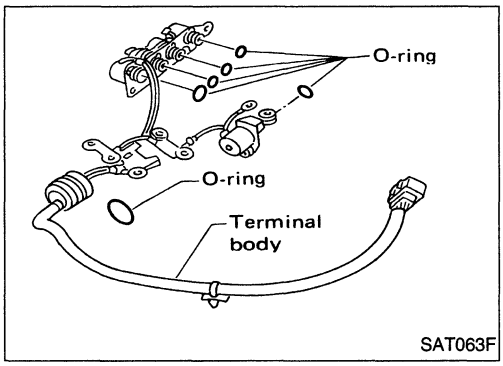




a. Remove bolts ⓐ, ⓓ and nut ⓕ and remove oil strainer from control valve assembly.

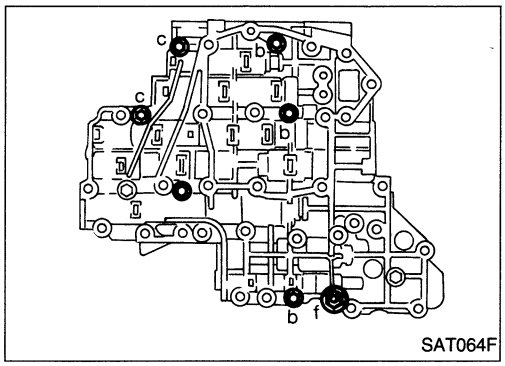


b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



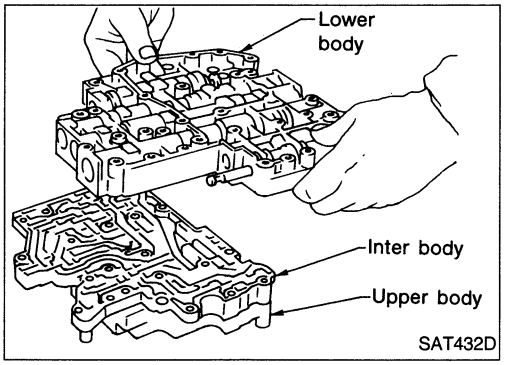
c. Remove O-rings from solenoid valves and terminal body.

Control Valve Assembly (Cont'd)



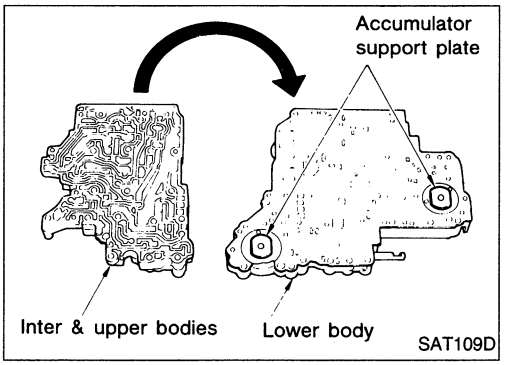
SAT064F

d. Place upper body facedown, and remove bolts ⓑ, ⓒ and nut ⓕ.



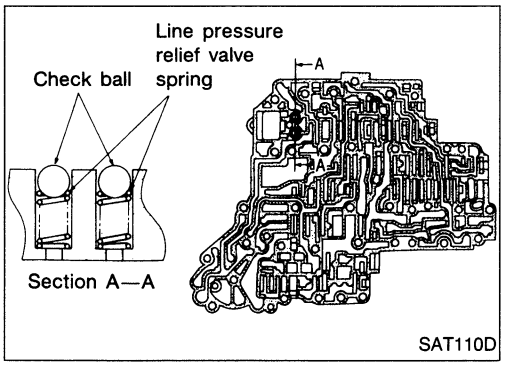
SAT432D

e. Remove inter body from lower body.



SAT109D

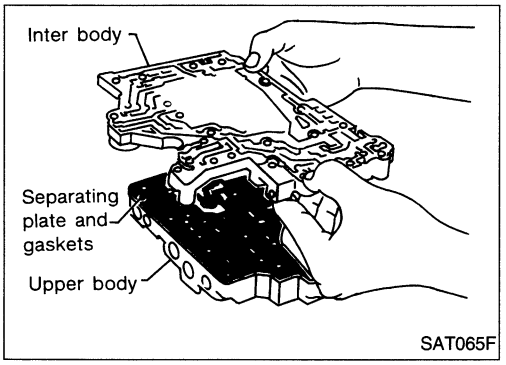
f. Turn over lower body, and remove accumulator support plate.



SAT110D

g. Remove bolts ⓔ, separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.

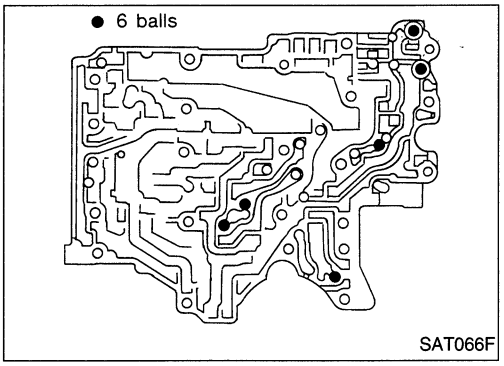
- **Be careful not to lose steel balls and relief valve springs.**



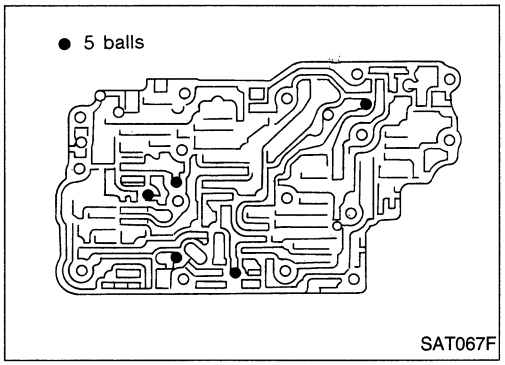
SAT065F

i. Remove inter body from upper body.

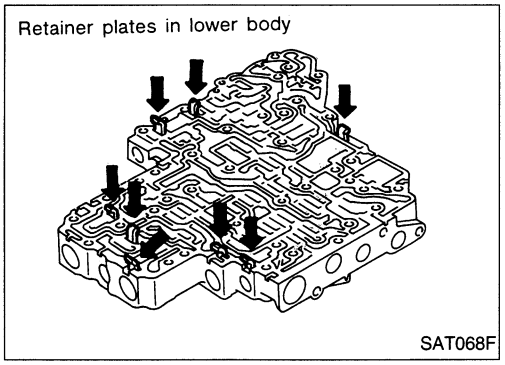
Control Valve Assembly (Cont'd)



j. Check to see that steel balls are properly positioned in inter body and then remove them from inter body.
- **Be careful not to lose steel balls.**



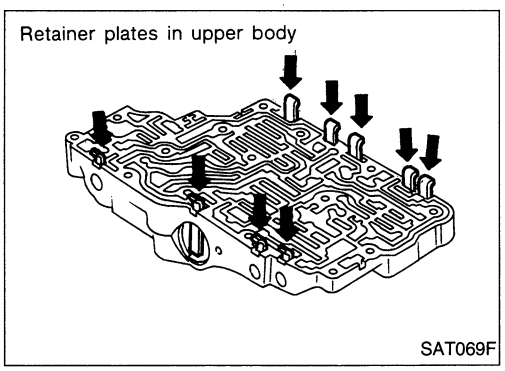
k. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.
- **Be careful not to lose steel balls.**



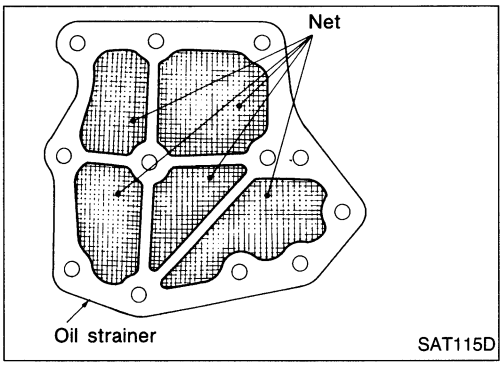
INSPECTION

Lower and upper bodies

- Check to see that retainer plates are properly positioned in lower body.



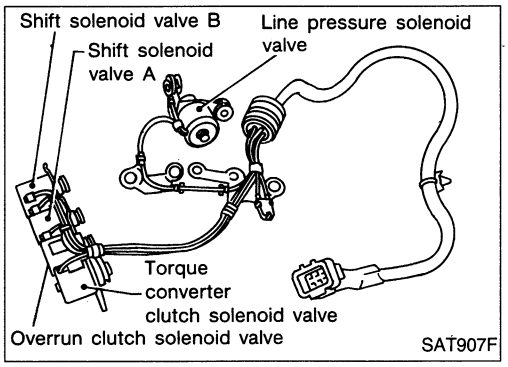
- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**



Oil strainer

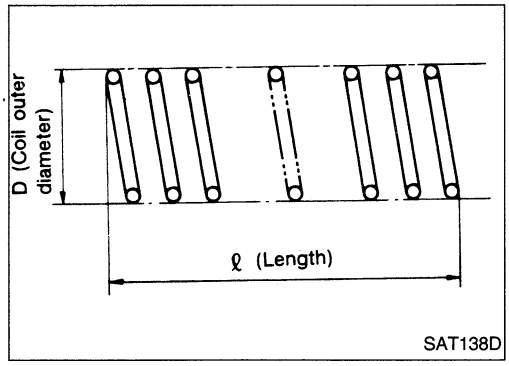
- Check wire netting of oil strainer for damage.

Control Valve Assembly (Cont'd)



Shift solenoid valve A and B, line pressure solenoid valve, torque converter clutch solenoid valve and overrun clutch solenoid valve.

- Measure resistance — Refer to AT-79.



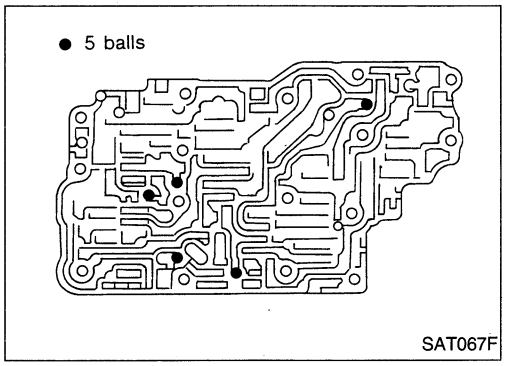
Oil cooler relief valve spring.

- Check springs for damage or deformation.
- Measure free length and outer diameter

Inspection standard:

Unit: mm (in)

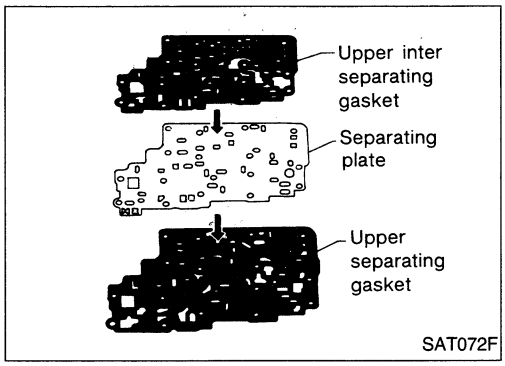
Part No.	ℓ	D
31872-31X00	17.02 (0.6701)	8.0 (0.315)



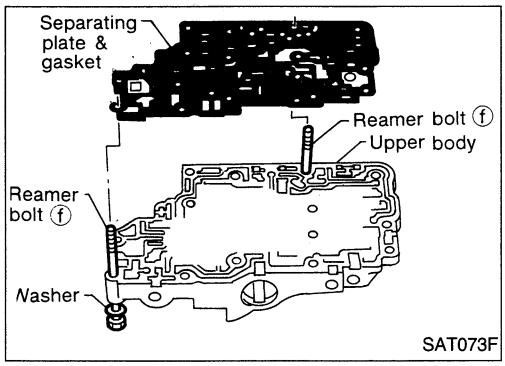
ASSEMBLY

1. Install upper, inter and lower body.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

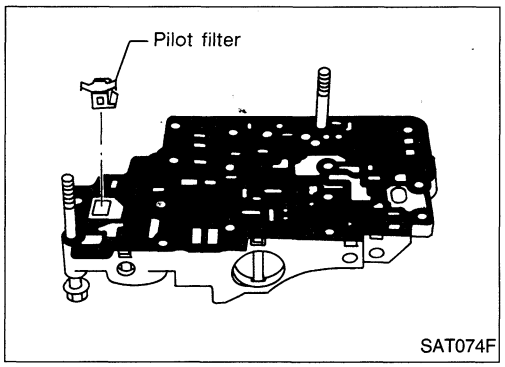


b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

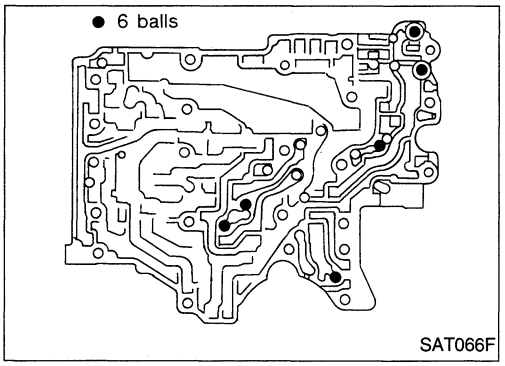


c. Install reamer bolts ⓕ from bottom of upper body and install separating gaskets and separating plate as a set on upper body using reamer bolts as guides.

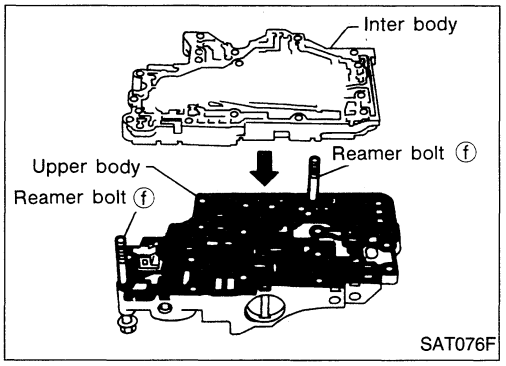
Control Valve Assembly (Cont'd)



d. Install pilot filter.

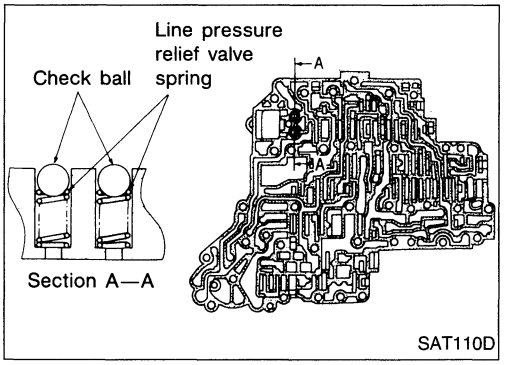


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

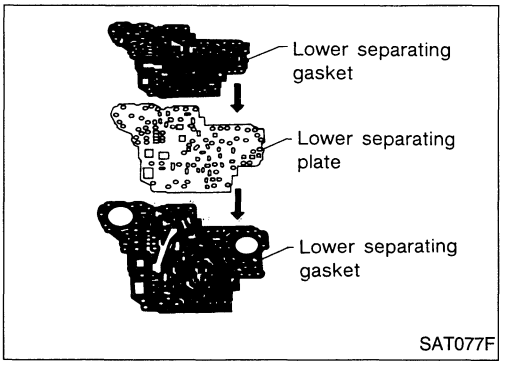


f. Install inter body on upper body using reamer bolts ⓕ as guides.

- **Be careful not to dislocate or drop steel balls.**

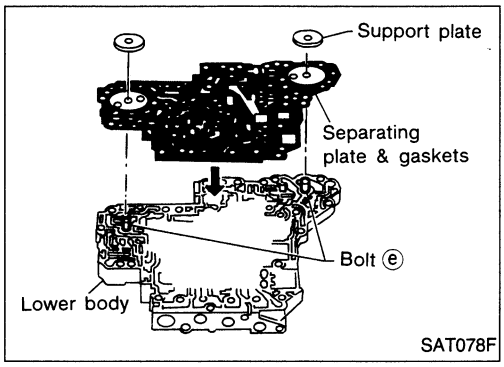


g. Install steel balls and relief valve springs in their proper positions in lower body.



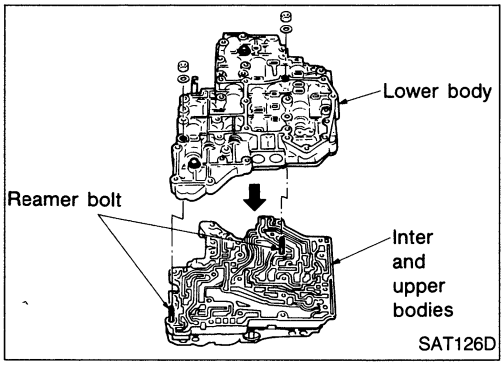
h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.

Control Valve Assembly (Cont'd)

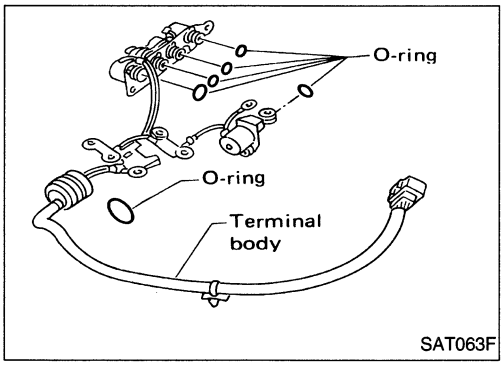


i. Install bolts ⓔ from bottom of lower body and install separating gaskets and separating plate as a set on lower body using bolts ⓔ as guides.

j. Temporarily install support plates on lower body.



k. Install lower body on inter body using reamer bolts ⓕ as guides and tighten reamer bolts ⓕ slightly.



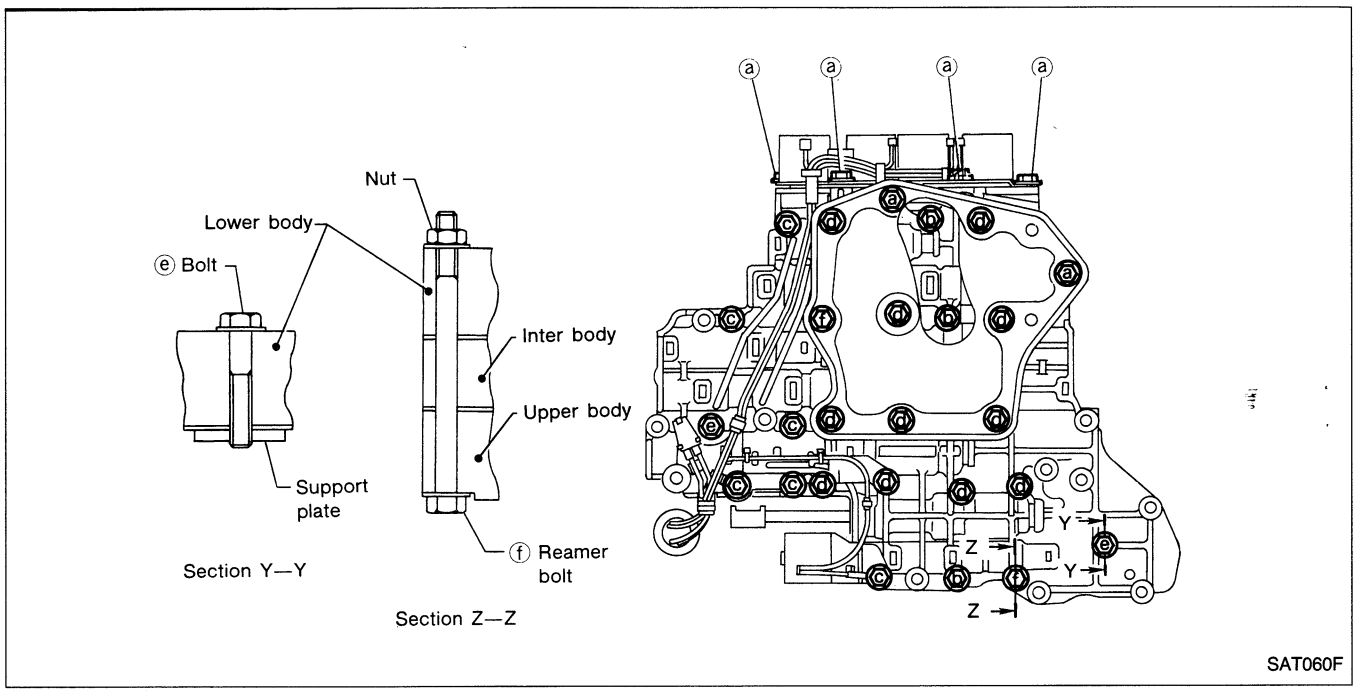
2. Install O-rings to solenoid valves and terminal body.

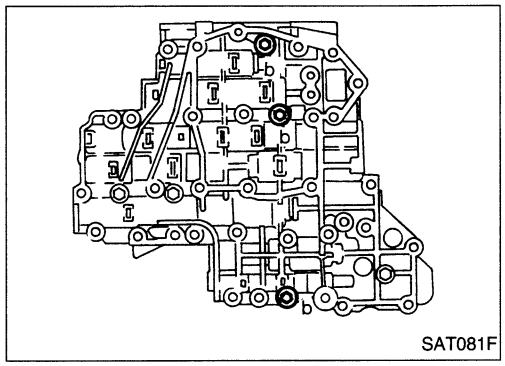
- **Apply ATF to O-rings.**

3. Install and tighten bolts.

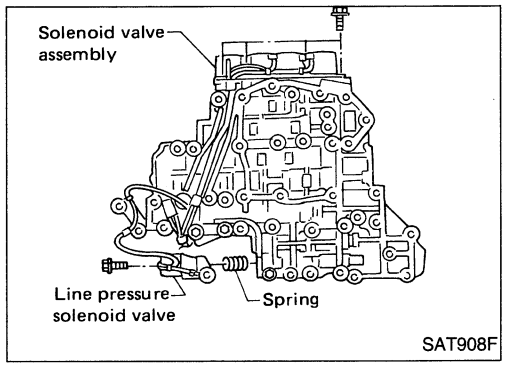
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

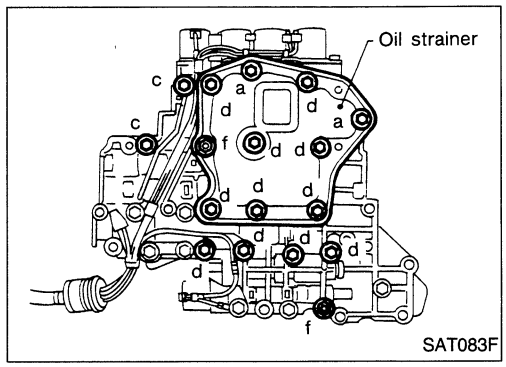




a. Install and tighten bolts ⓑ to specified torque.

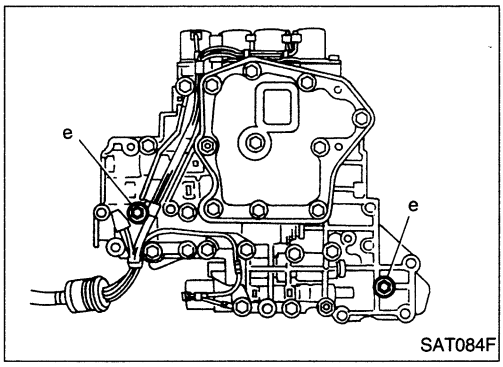


b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



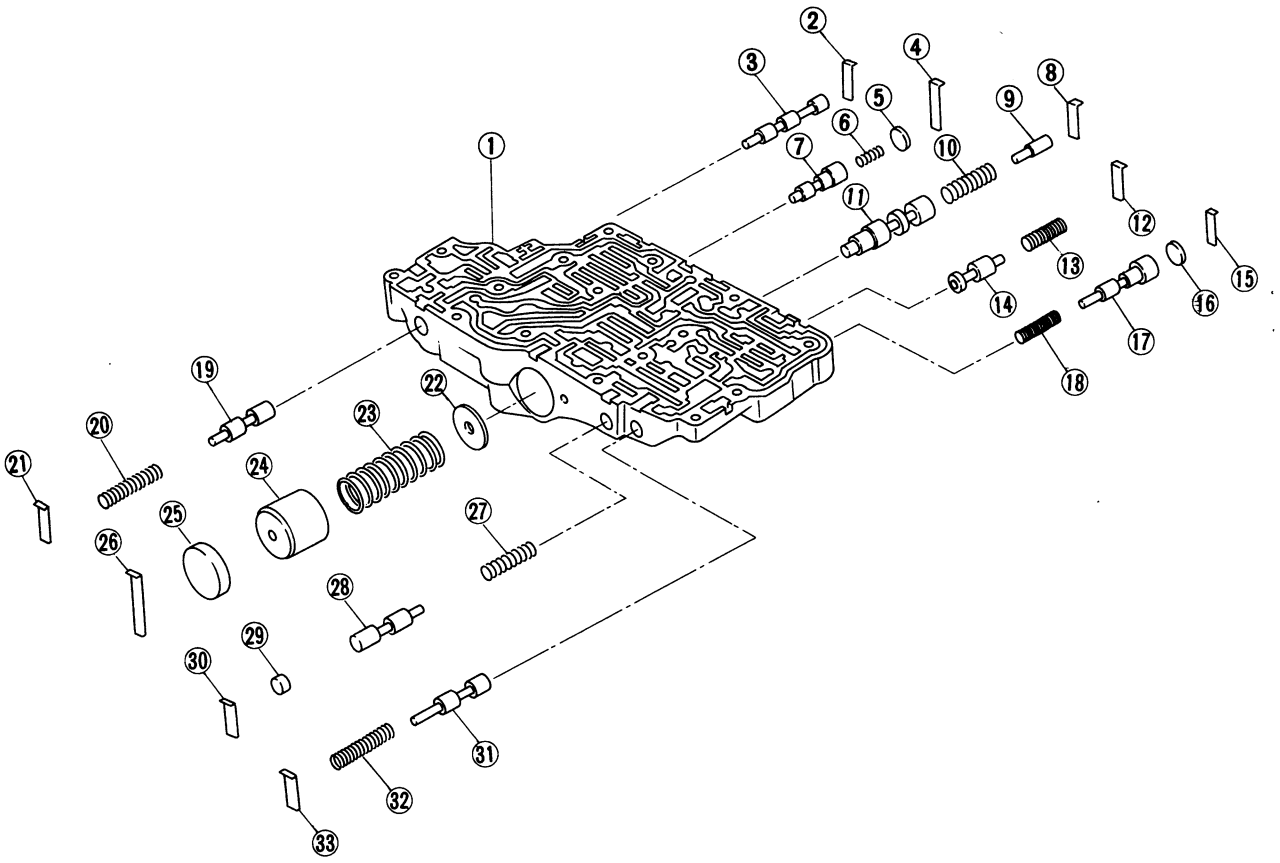
c. Set oil strainer, then tighten bolts ⓐ, ⓒ,ⓓ and nuts ⓕ to specified torque.

Control Valve Assembly (Cont'd)



d. Tighten bolts ⓔ (2 pieces) to specified torque.

Control Valve Upper Body

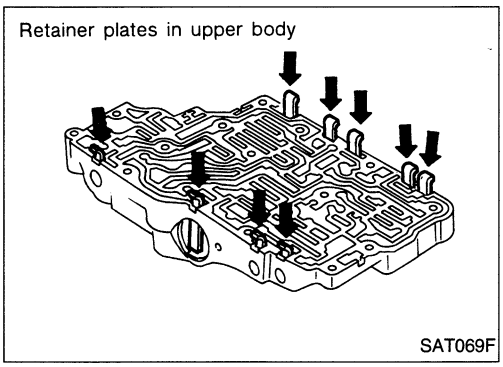


SAT538F

① Upper body
② Retainer plate
③ Sequence valve
④ Retainer plate
⑤ Plug
⑥ Return spring
⑦ 1-2 accumulator valve
⑧ Retainer plate
⑨ Plug
⑩ Return spring
⑪ Lock-up control valve
⑫ Retainer plate
⑬ Return spring
⑭ Torque converter relief valve
⑮ Retainer plate
⑯ Plug
⑰ Overrun clutch reducing valve
⑱ Return spring
⑲ Pilot valve
⑳ Return spring
㉑ Retainer plate
㉒ 1-2 accumulator retainer plate
㉓ Return spring
㉔ 1-2 accumulator piston
㉕ Plug
㉖ Retainer plate
㉗ Return spring
㉘ 1st reducing valve
㉙ Plug
㉚ Retainer plate
㉛ 2-3 timing valve
㉜ Return spring
㉝ Retainer plate

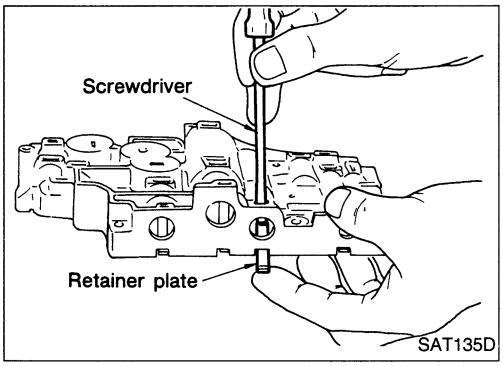
Control Valve Upper Body (Cont'd)

DISASSEMBLY

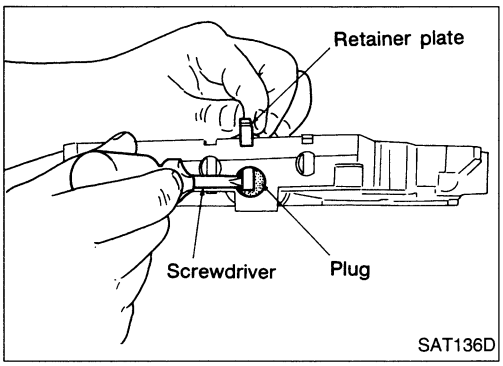


1. Remove valves at retainer plates.

- **Do not use a magnetic "hand".**

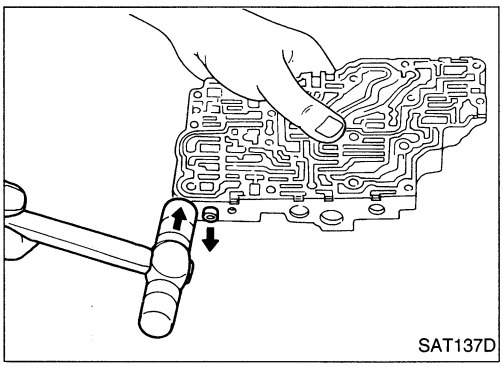


a. Use a screwdriver to pry out retainer plates.



b. Remove retainer plates while holding spring, plugs or sleeves.

- **Remove plugs slowly to prevent internal parts from jumping out.**

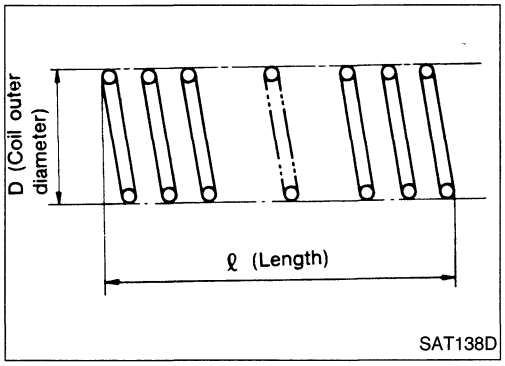


c. Place mating surface of valve body face down, and remove internal parts.

- **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**

Control Valve Upper Body (Cont'd)

INSPECTION



Valve spring

- 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 page AT-139.

Inspection standard

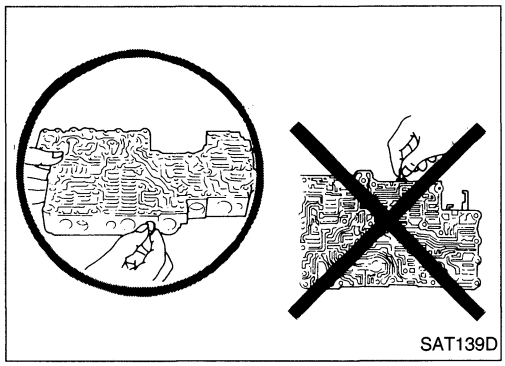
Unit: mm (in)

Parts		Item		
		Part No.	ℓ	D
⑳	Pilot valve spring	31742 80x14	36.0 (1.417)	8.1 (0.319)
⑥	1-2 accumulator valve spring	31742 80x10	20.5 (0.807)	7.0 (0.276)
㉓	1-2 accumulator piston spring	31742 80x12	52.0 (2.047)	19.6 (0.772)
㉗	1st reducing valve spring	31742 80x05	27.0 (1.063)	7.0 (0.276)
㉜	2-3 timing valve	31742 80x18	30.5 (1.201)	6.6 (0.260)
⑱	Overrun clutch reducing valve spring	31742 80x15	37.5 (1.476)	6.9 (0.272)
⑬	Torque converter relief valve spring	31742 80x07	31.0 (1.220)	9.0 (0.354)
⑩	Lock-up control valve	31742 80x17	39.5 (1.555)	11.0 (0.433)

- Replace valve springs if deformed or fatigued.

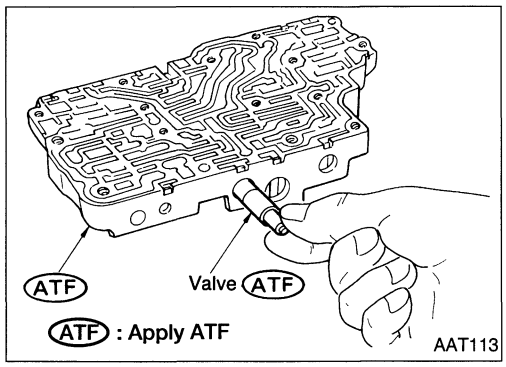
Control valves

- Check sliding surfaces of valves, sleeves and plugs.



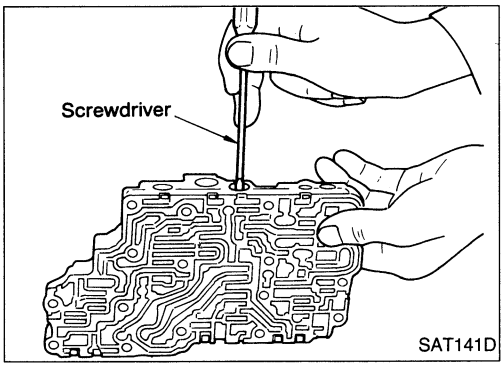
ASSEMBLY

- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**

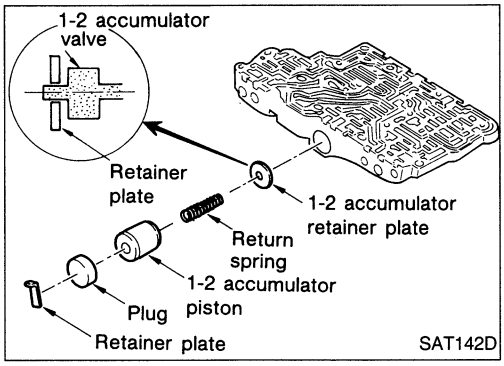


1. Lubricate the control valve body and all valves with ATF Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**

Control Valve Upper Body (Cont'd)

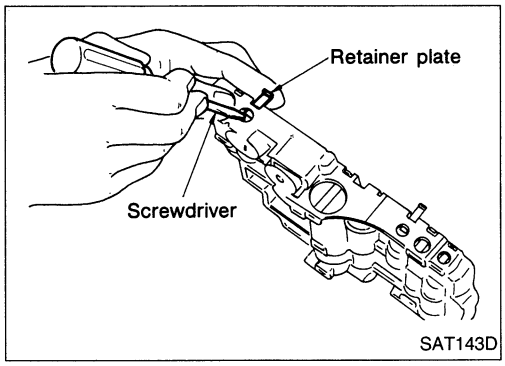


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

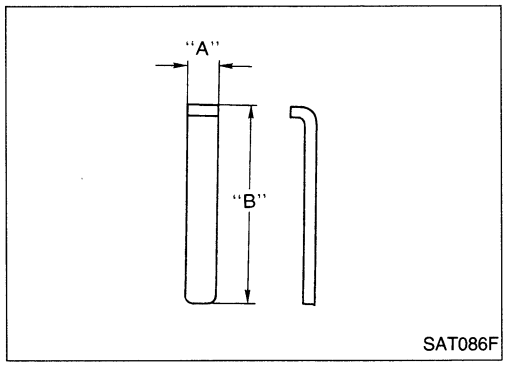


1-2 accumulator valve

- Install 1-2 accumulator valve and then align 1-2 accumulator retainer plate with 1-2 accumulator valve from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.



2. Install retainer plates
- Install retainer plate while pushing plug or return spring.



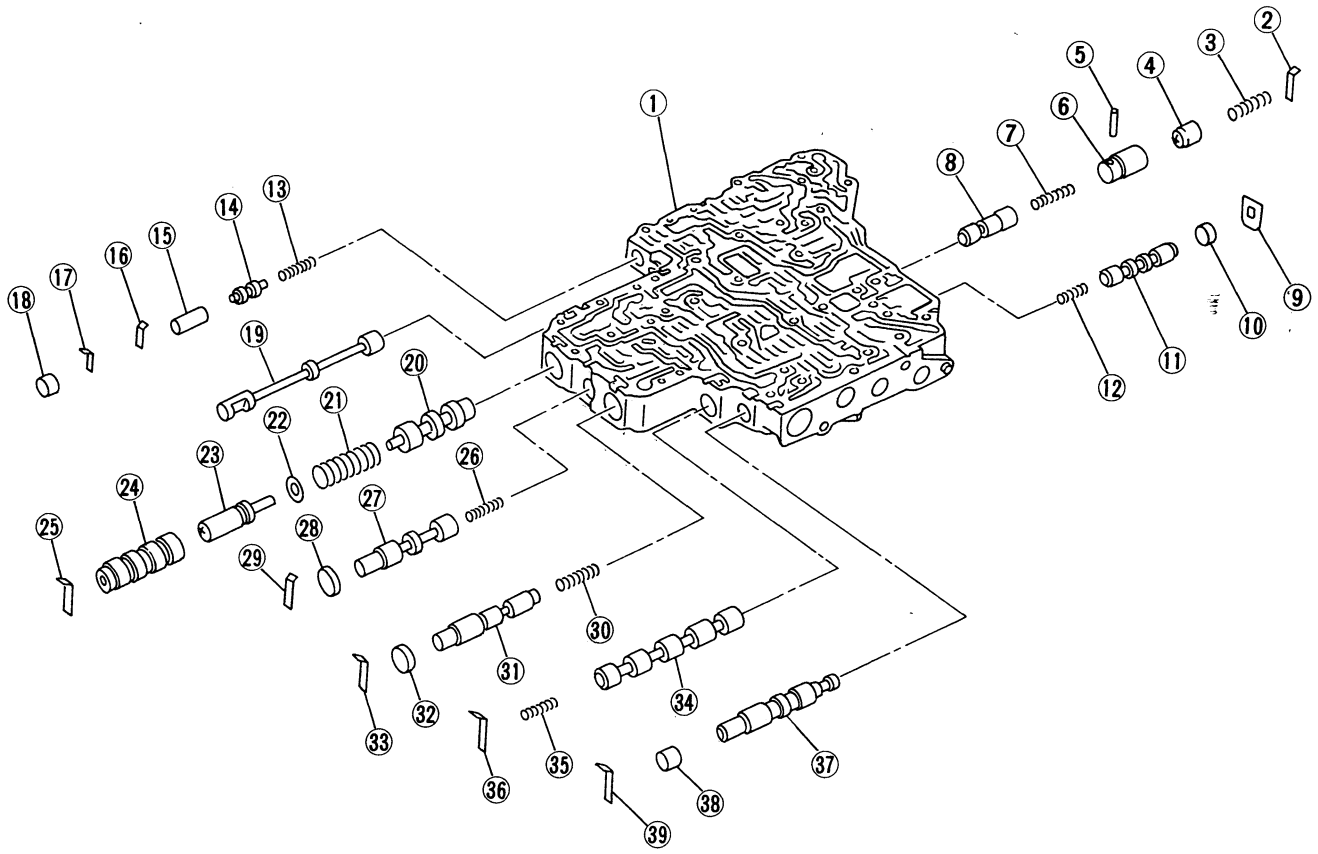
Retainer plate

Unit: mm (in)

Location of retainer plate	Length A	Length B
Pilot valve	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve		38.5 (1.516)
1-2 accumulator piston		
1st reducing valve		21.5 (0.846)
2-3 timing valve		
Overrun clutch reducing valve		24.0 (0.945)
Torque converter relief valve		21.5 (0.846)
Lock-up control valve		28.0 (1.102)
Sequence valve		

- Install proper retainer plates.

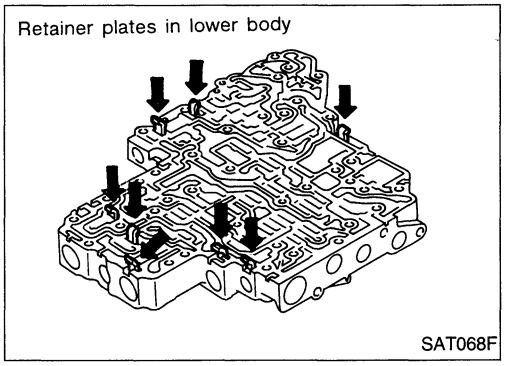
Control Valve Lower Body



SAT059F

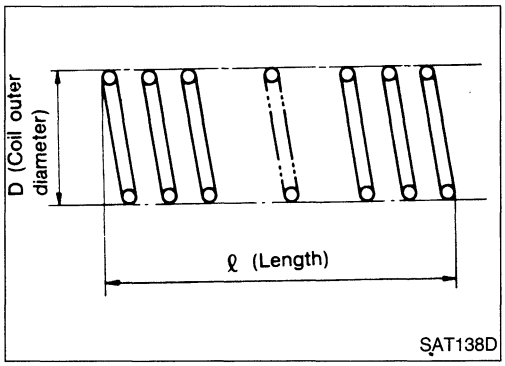
① Lower body
② Retainer plate
③ Return spring
④ Piston
⑤ Parallel pin
⑥ Sleeve
⑦ Return spring
⑧ Pressure modifier valve
⑨ Retainer plate
⑩ Plug
⑪ Shift valve B
⑫ Return spring
⑬ Return spring
⑭ Accumulator shift valve
⑮ Plug
⑯ Retainer plate
⑰ Retainer plate
⑱ Plug
⑲ Manual valve
⑳ Pressure regulator valve
㉑ Return spring
㉒ Spring seat
㉓ Plug
㉔ Sleeve
㉕ Retainer plate
㉖ Return spring
㉗ Overran clutch control valve
㉘ Plug
㉙ Retainer plate
㉚ Return spring
㉛ Accumulator control valve
㉜ Plug
㉝ Retainer plate
㉞ Shift valve A
㉟ Return spring
㊱ Retainer plate
㊲ Shuttle shift valve
㊳ Plug
㊴ Retainer plate

Control Valve Lower Body (Cont'd)



DISASSEMBLY

Remove valves at retainer plate.
For removal procedures, refer to AT-140.



INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers for each valve spring listed in the table below are the same as those in the figure on page AT-143.

Inspection standard

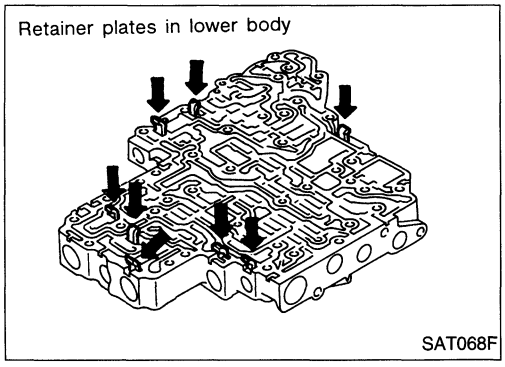
Unit: mm (in)

Parts		Item		
		Part No.	ℓ	D
⑬	Accumulator shift valve spring	31736 01X00	23.0 (0.906)	6.65 (0.2618)
㉑	Pressure regulator valve spring	31742 80X13	45.0 (1.772)	15.0 (0.591)
㉖	Overrun clutch control valve spring	31762 80X00	21.7 (0.854)	7.0 (0.276)
㉚	Accumulator control valve spring	31742 80X02	22.0 (0.866)	6.5 (0.256)
㉟	Shift valve A spring	31762 80X00	21.7 (0.854)	7.0 (0.276)
⑫	Shift valve B	31762 80X00	21.7 (0.854)	7.0 (0.276)
③	Pressure modifier valve spring	31742 41X15	30.5 (1.201)	9.8 (0.386)
⑦		31742 80X16	32.0 (1.260)	6.9 (0.272)

- Replace valve springs if deformed or fatigued.

Control valves

- Check sliding surfaces of control valves, sleeves and plugs for damage.

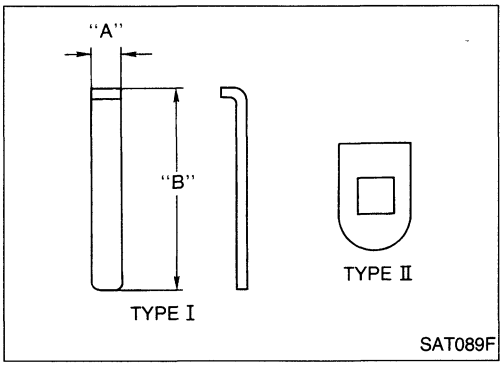


ASSEMBLY

- Install control valves.
For installation procedures, refer to AT-141.

Control Valve Lower Body (Cont'd)

Retainer plate

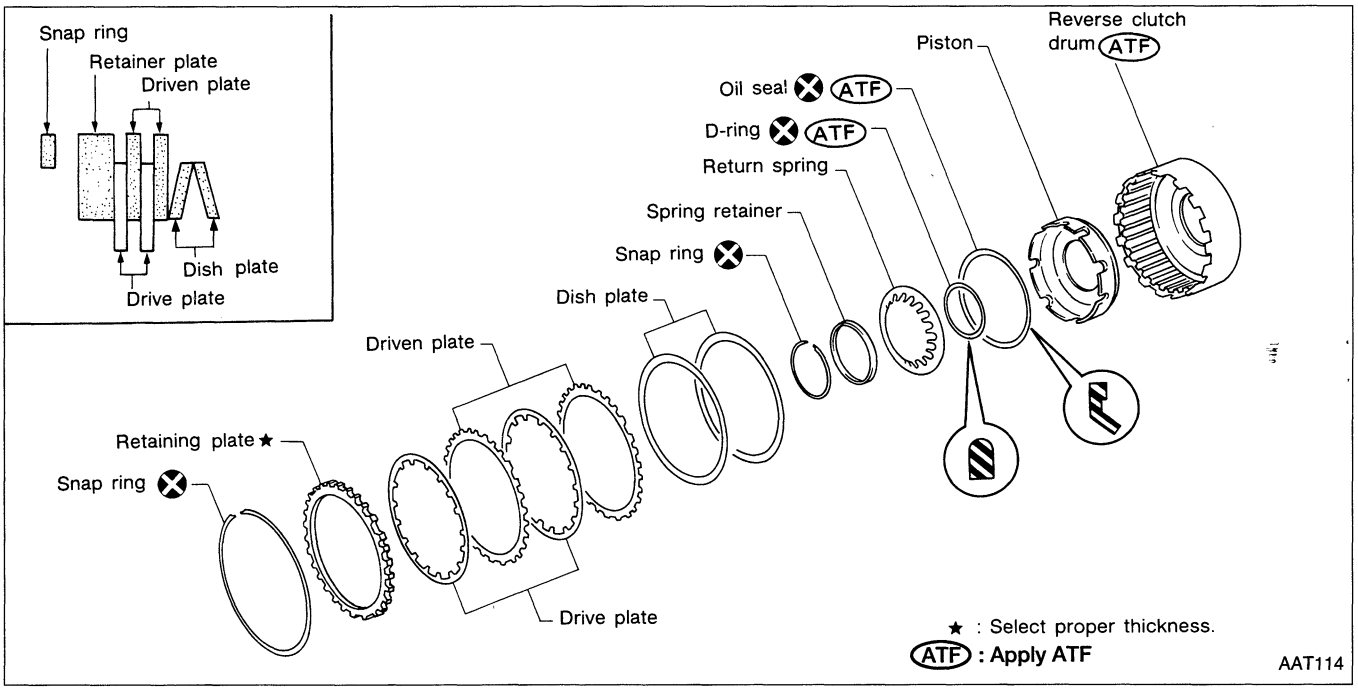


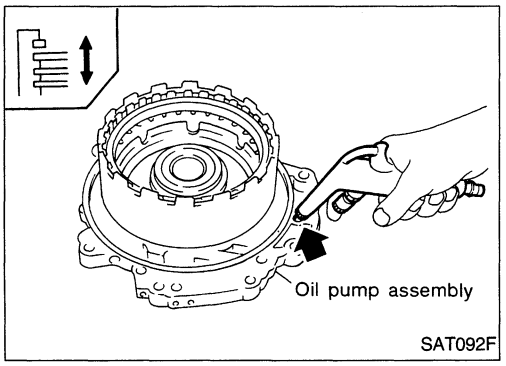
Unit: mm (in)

Location of retainer plate	Length A	Length B	Type
Accumulator shift valve	6.0 (0.236)	19.5 (0.768)	I
Pressure regulator valve		28.0 (1.102)	
Pressure clutch control			
Accumulator control valve			
Shift valve A			
Shuttle shift valve			
Overrun clutch control valve			
Pressure modifier valve			
Shift valve B	—	—	II

- Install proper retainer plates

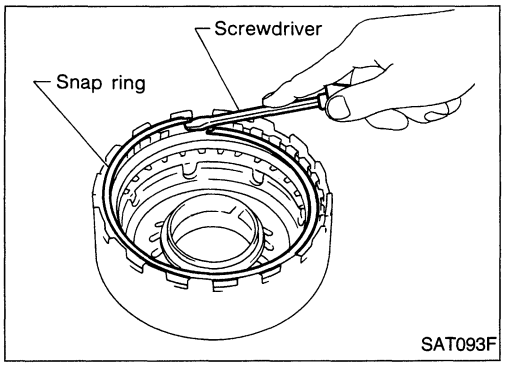
Reverse Clutch



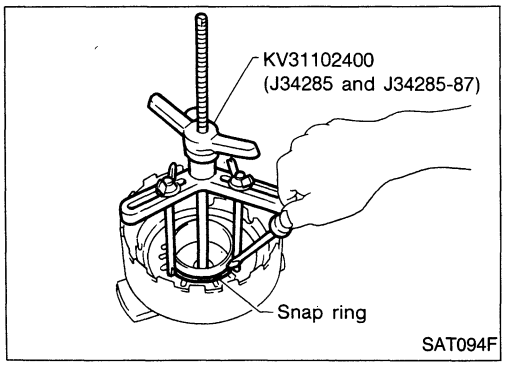


DISASSEMBLY

1. Check operation of reverse clutch
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. 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.

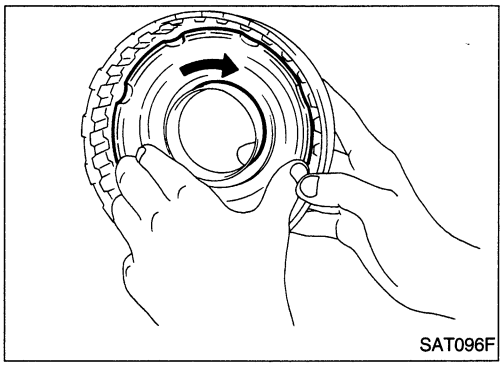


2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.

Reverse Clutch (Cont'd)

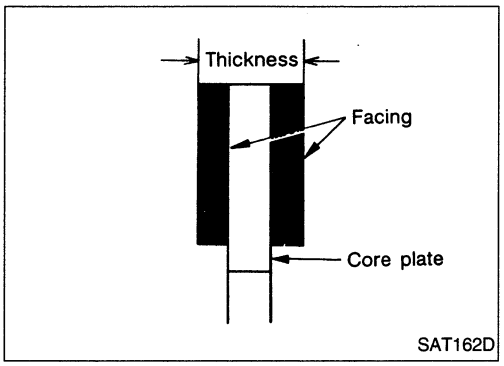

SAT096F

6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

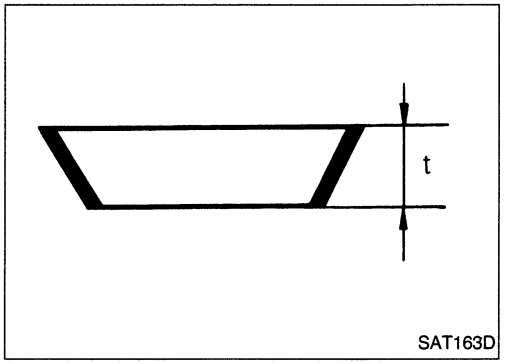
- Check for deformation, fatigue or damage.
  If necessary, replace.



SAT162D

Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 2.0 mm (0.079 in)
  Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.



SAT163D

Reverse clutch dish plates

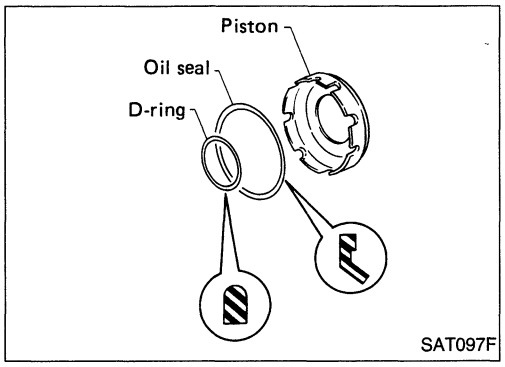
- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate: 3.08 mm (0.1213 in)
- If deformed or fatigued, replace.

Reverse clutch piston

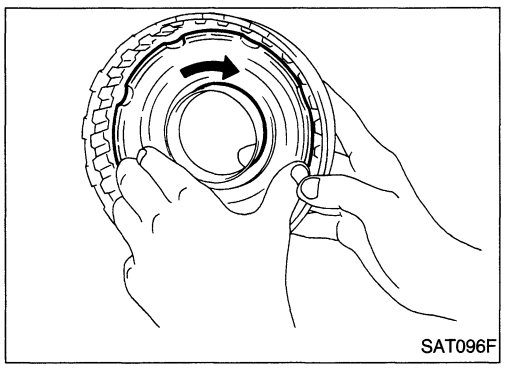
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

Reverse Clutch (Cont'd)

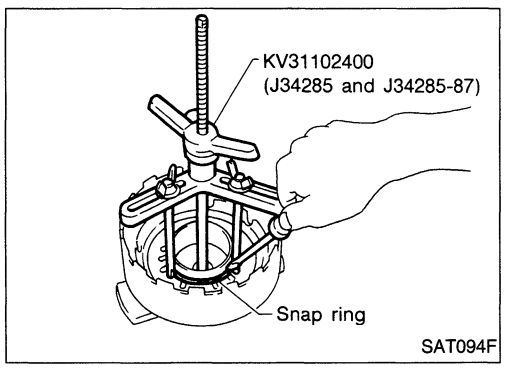
ASSEMBLY



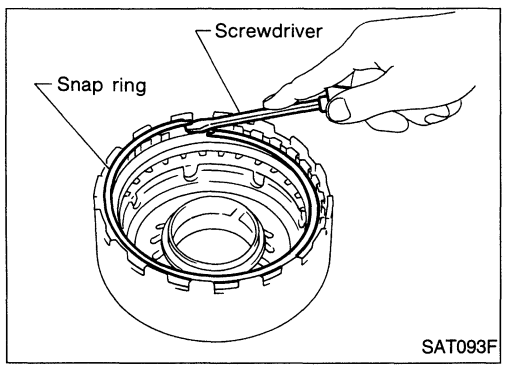
1. Install D-ring and oil seal on piston.
- **Take care with the direction of oil seal.**
- **Apply ATF to both parts.**



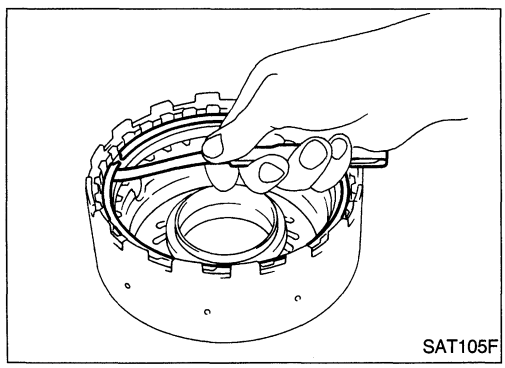
2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**



3. Install return springs and spring retainer on piston.
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**

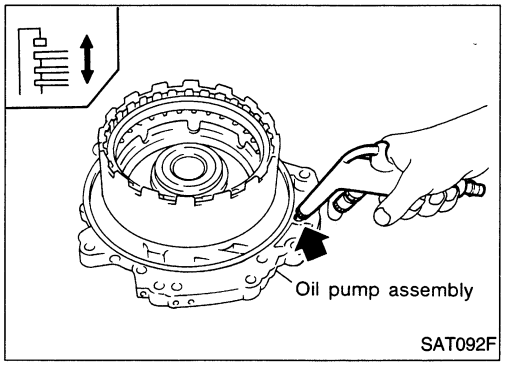


5. Install drive plates, driven plates, retaining plate and dish plates.
- **Take care with order of plates.**
6. Install snap ring.



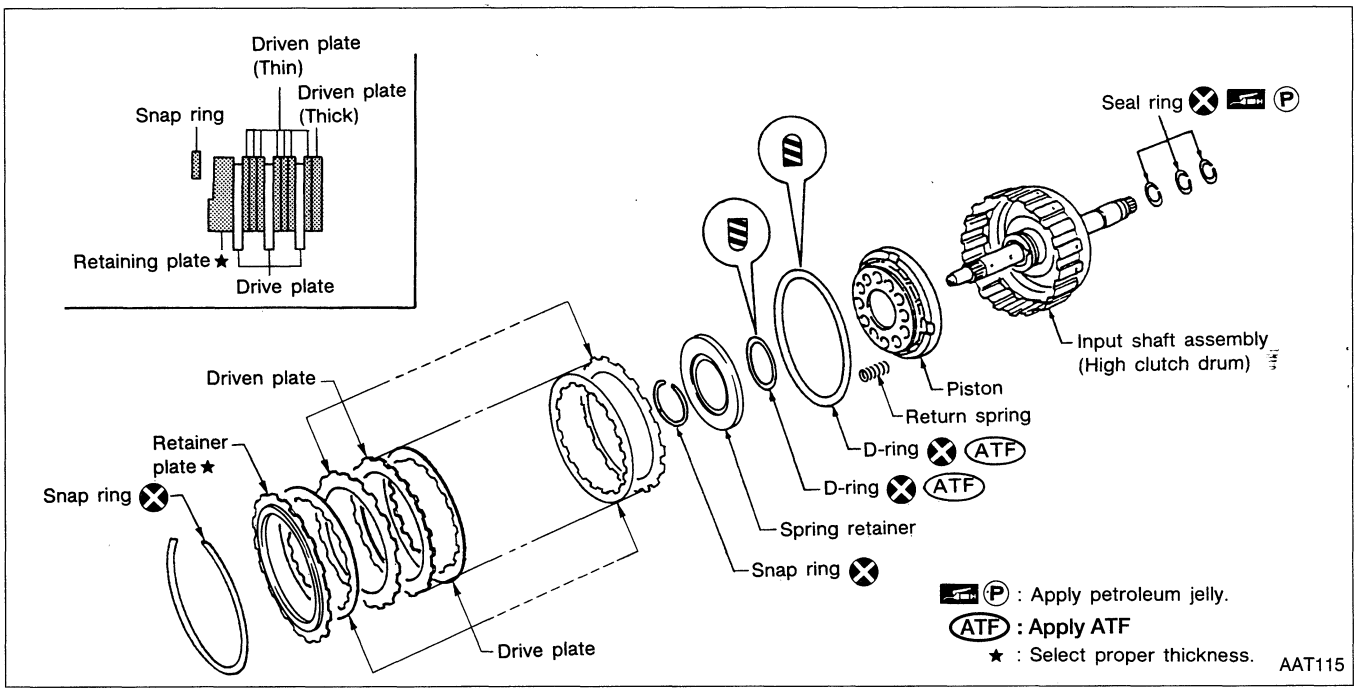
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit 1.2 mm (0.047 in)
   Retaining plate: Refer to AT-211.

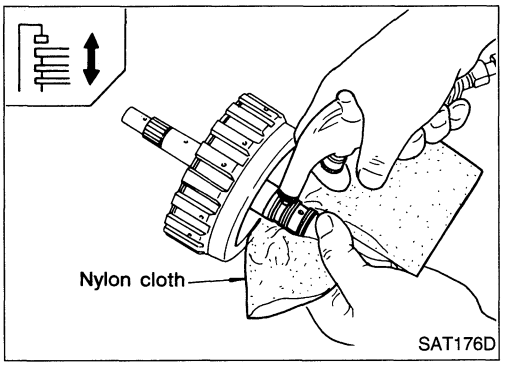
Reverse Clutch (Cont'd)



8. Check operation of reverse clutch.
   Refer to AT-146.

High Clutch





DISASSEMBLY

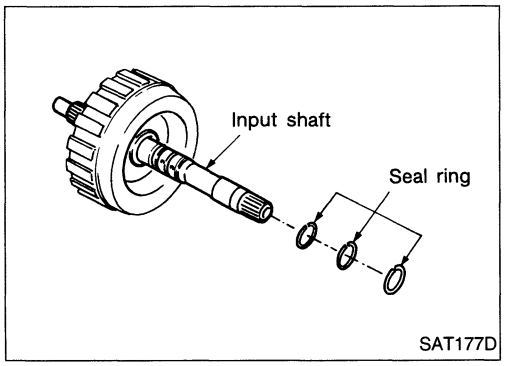
1. Check operation of high clutch.

a. Apply compressed air to oil hole of input shaft with nylon cloth.

- **Stop up hole on opposite side of input shaft with nylon cloth.**

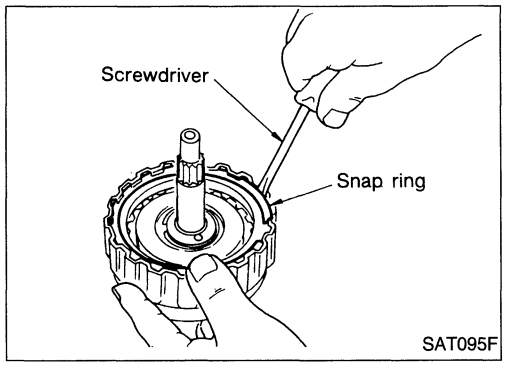
b. Check to see that retaining plate moves to snap ring.

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.



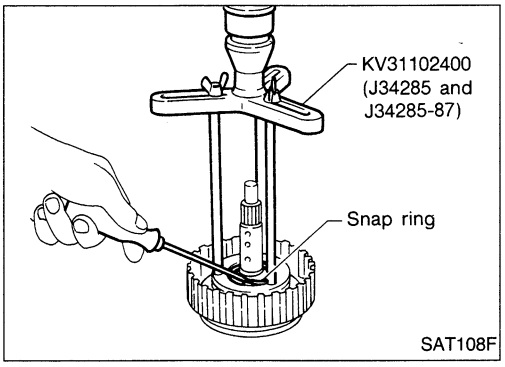
2. Remove seal rings from input shaft.

- **Always replace when removed.**



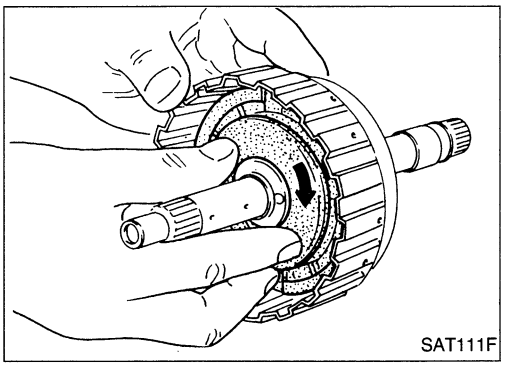
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

High Clutch (Cont'd)

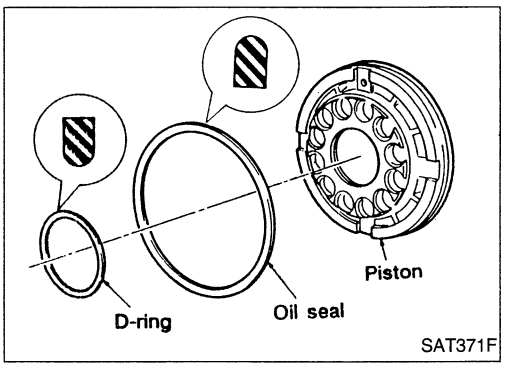


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.



7. Remove piston from high clutch drum by turning it.

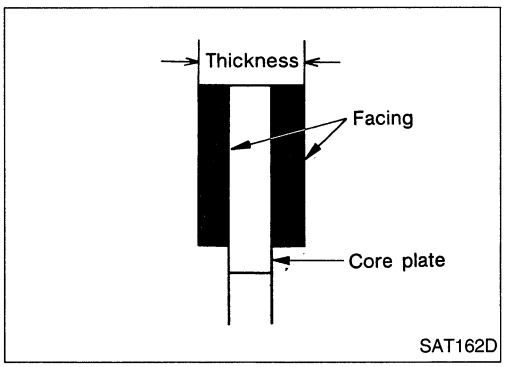


8. Remove D-rings from piston.

INSPECTION

High clutch snap ring, spring retainer and return springs.

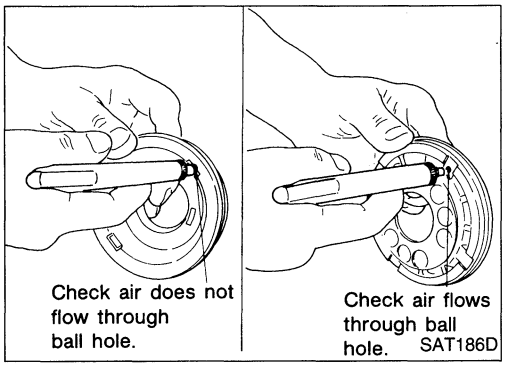
- Check for deformation, fatigue or damage. If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



High clutch drive plates

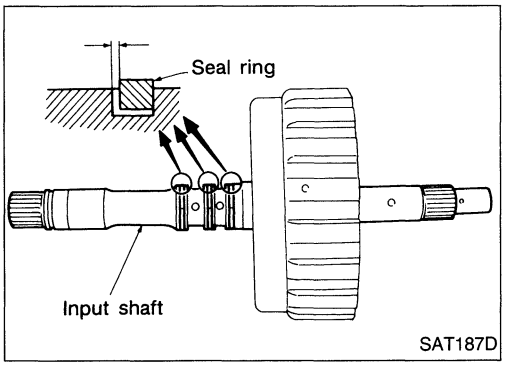
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.6 mm (0.063 in)
  Wear limit 1.4 mm (0.055 in)
- If not within wear limit, replace.

High Clutch (Cont'd)



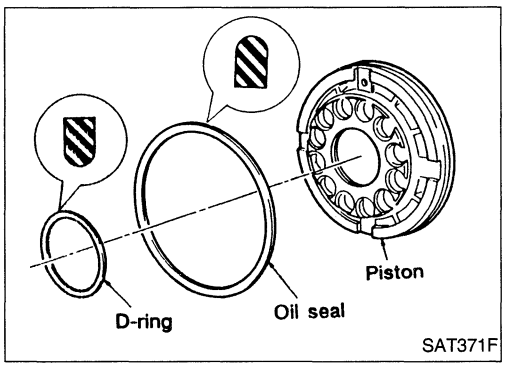
High clutch piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.



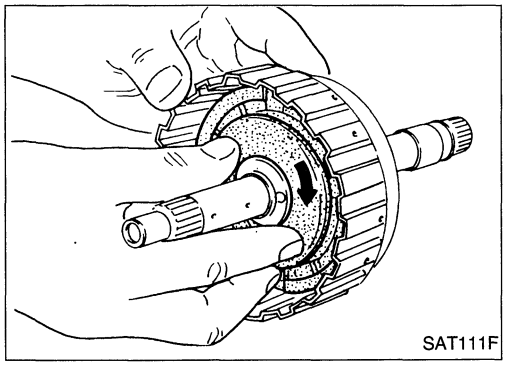
Seal ring clearance

- Measure clearance between seal ring and ring groove.
  Standard clearance: 0.08 - 0.23 mm (0.0031 - 0.0091 in)
  Allowable limit: 0.23 mm (0.0091 in)
- If not within allowable limit, replace input shaft assembly.

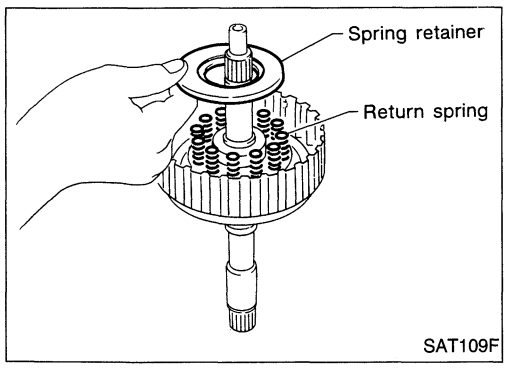


ASSEMBLY

1. Install D-rings on piston.
- **Take care with the direction of oil seal.**
- **Apply ATF to both parts.**

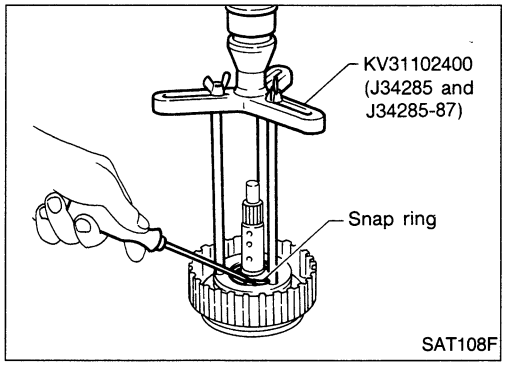


2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**

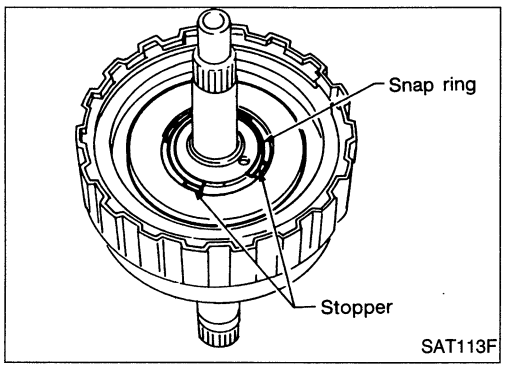


3. Install return springs and spring retainer on piston.

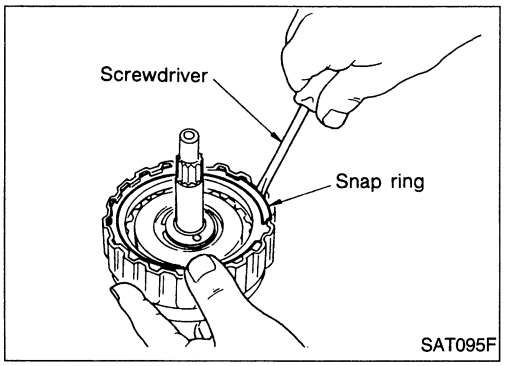
High Clutch (Cont'd)



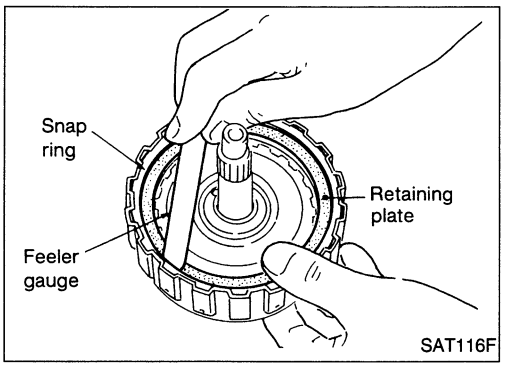
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



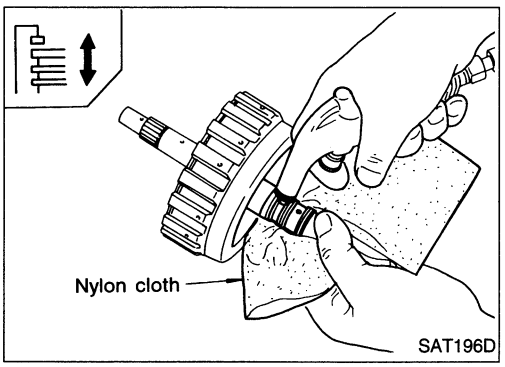
- **Do not align snap ring gap with spring retainer stopper.**



5. Install drive plates, driven plates and retaining plate.
- **Take care with direction of retaining plate and order of plates.**
6. Install snap ring.

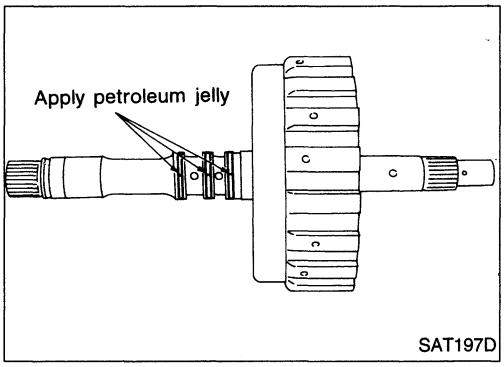


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 1.8 - 2.2 mm (0.071 - 0.087 in)
   Allowable limit 2.8 mm (0.110 in)
   Retaining plate: Refer to AT-211.

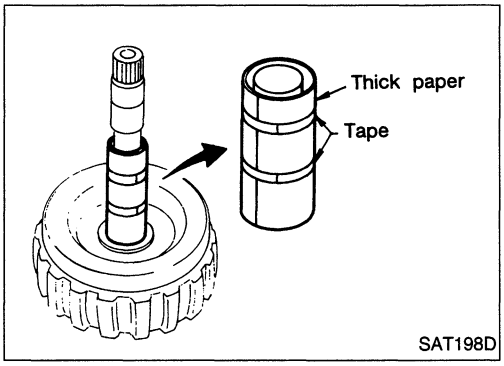


8. Check operation of high clutch.
   Refer to AT-150.

High Clutch (Cont'd)

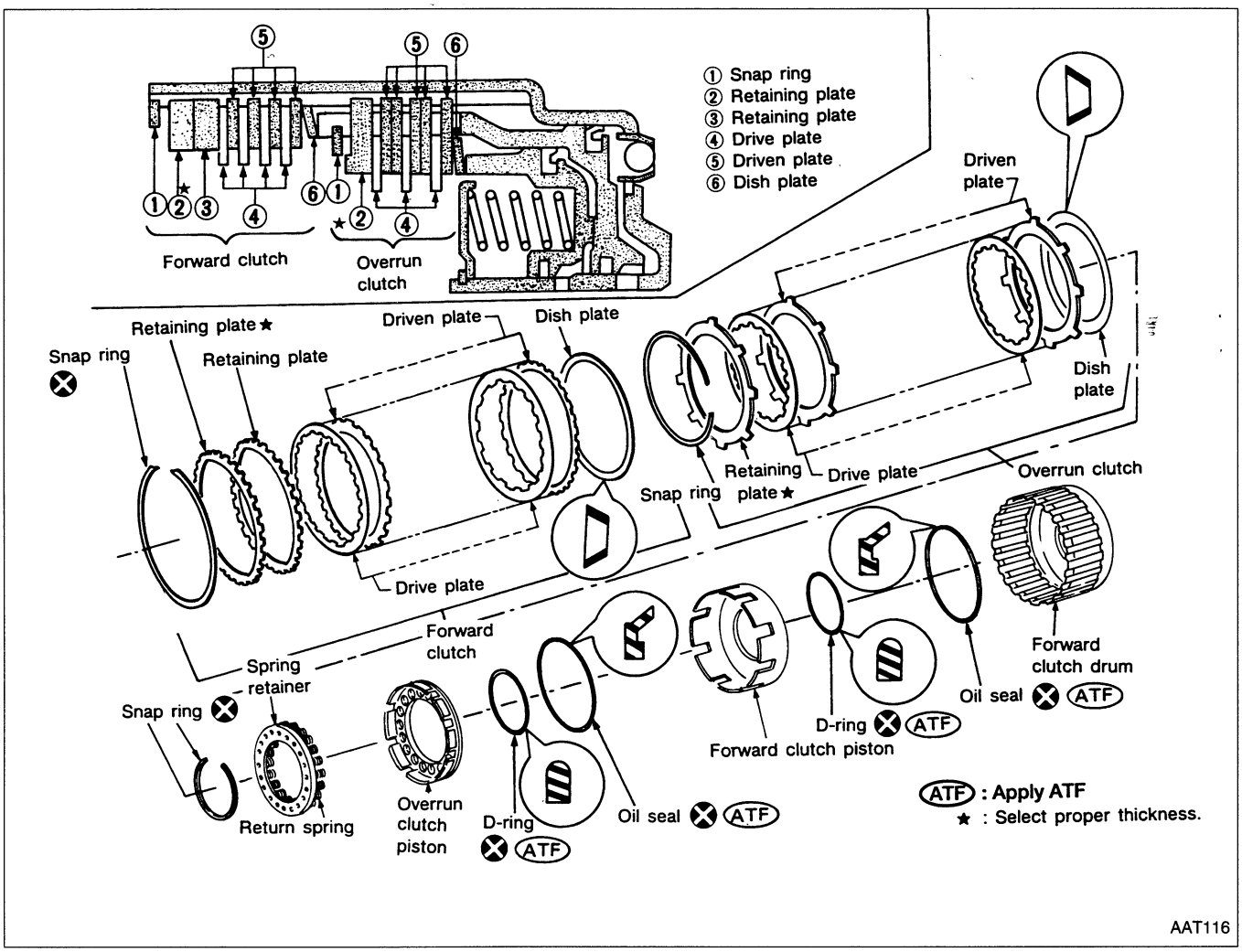


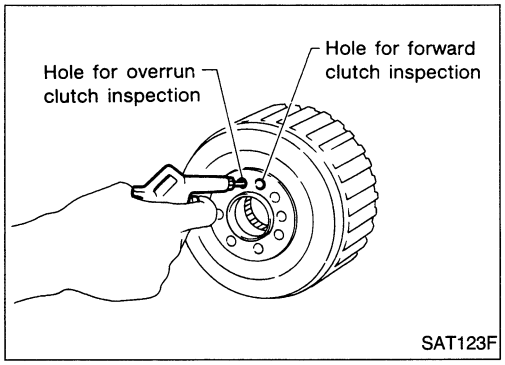
9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**

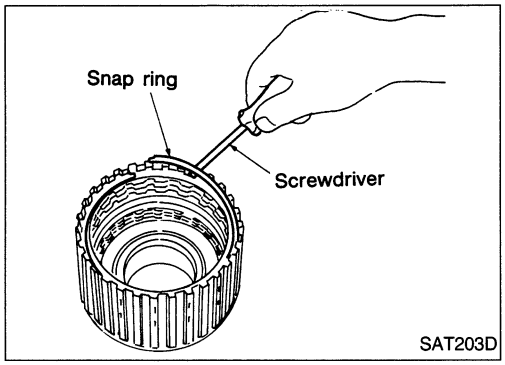


- **Roll paper around seal rings to prevent seal rings from spreading.**

Forward Clutch and Overrun Clutch





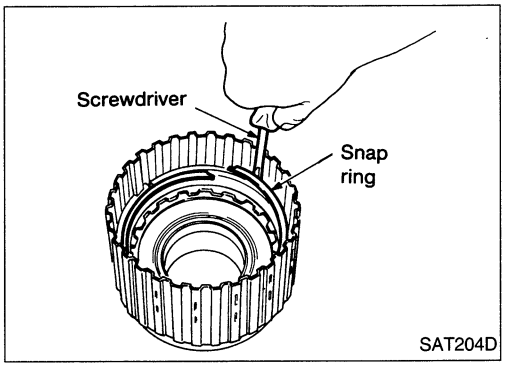


DISASSEMBLY

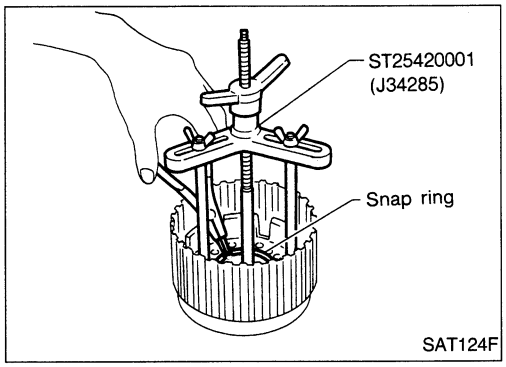
1. Check operation of forward clutch and overrun clutch.
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.

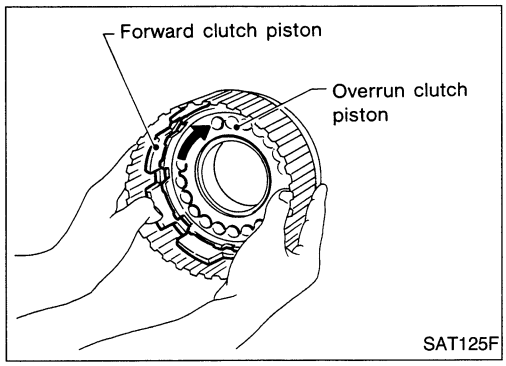
Forward Clutch and Overrun Clutch (Cont'd)



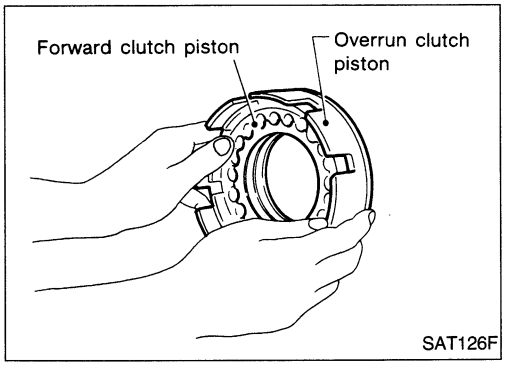
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



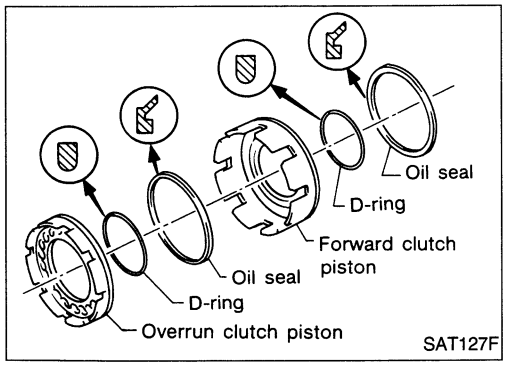
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
   - **Set Tool directly over return springs.**
   - **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.
   - **Do not remove return springs from spring retainer.**



8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



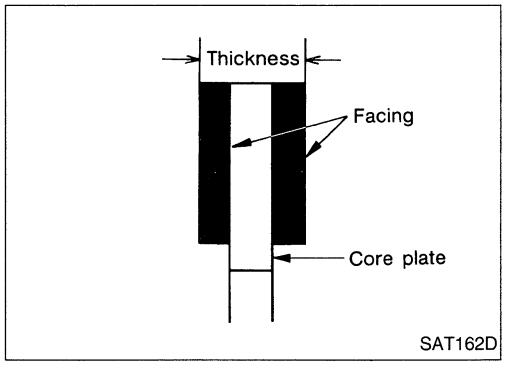
10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.

Forward Clutch and Overrun Clutch (Cont'd)

INSPECTION

Snap rings, spring retainer and return springs

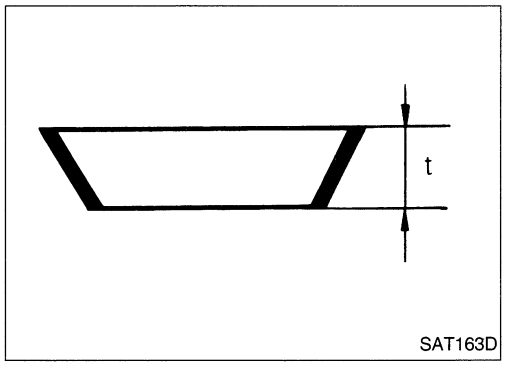
- Check for deformation, fatigue or damage.
- Replace if necessary.
- When replacing spring retainer and return springs, replace them as a set.



SAT162D

Forward clutch and overrun clutch drive plates

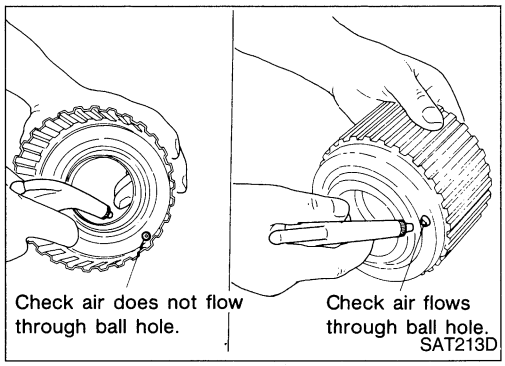
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Forward clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
  Overrun clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



SAT163D

Forward clutch and overrun clutch dish plates

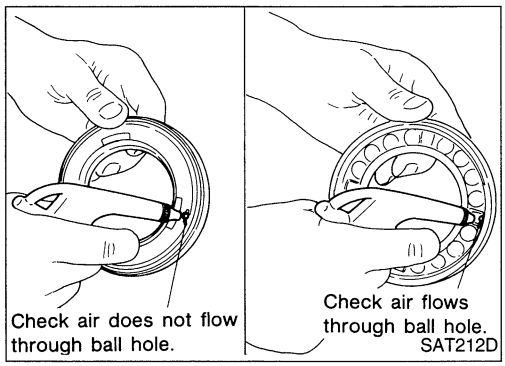
- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate:
  Forward clutch 2.7 mm (0.106 in)
  Overrun clutch 2.7 mm (0.106 in)
- If deformed or fatigued, replace.



SAT213D

Forward clutch drum

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum to make sure that air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum to make sure that there is no air leakage.



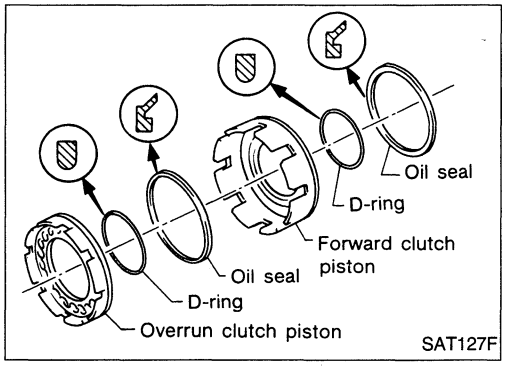
SAT212D

Overrun clutch piston

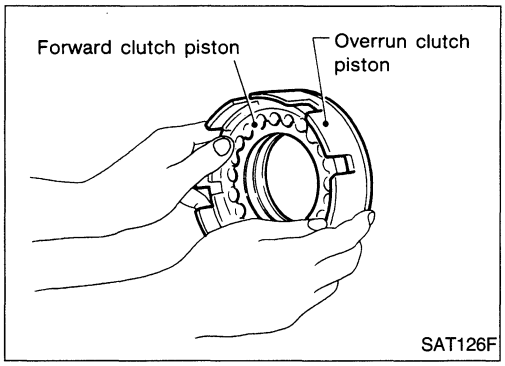
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

Forward Clutch and Overrun Clutch (Cont'd)

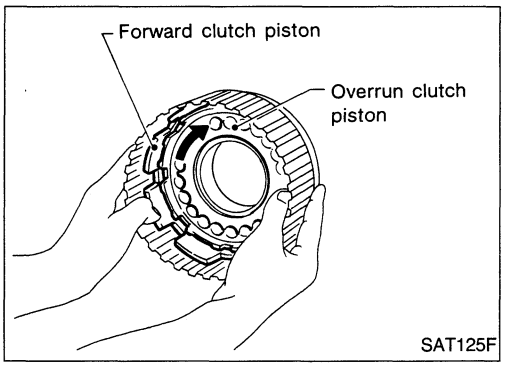
ASSEMBLY



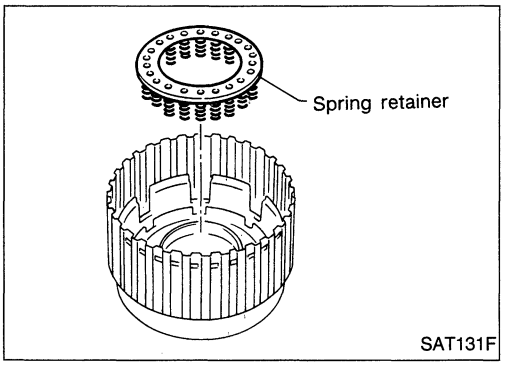
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
- **Take care with direction of oil seal.**
- **Apply ATF to both parts.**



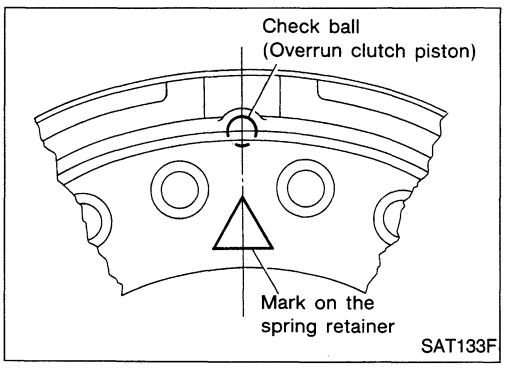
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
- **Apply ATF to inner surface of forward clutch piston.**



3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
- **Apply ATF to inner surface of drum.**

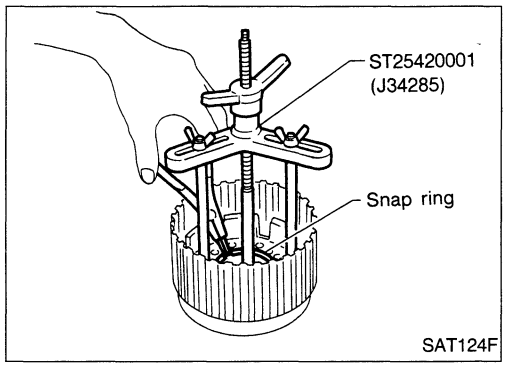


4. Install return spring on overrun clutch piston.



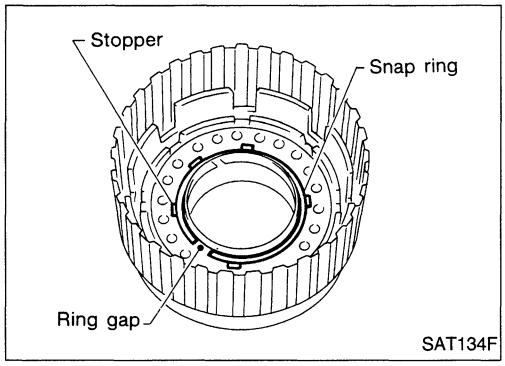
- Align the mark on spring retainer with check ball in overrun clutch piston.

Forward Clutch and Overrun Clutch (Cont'd)



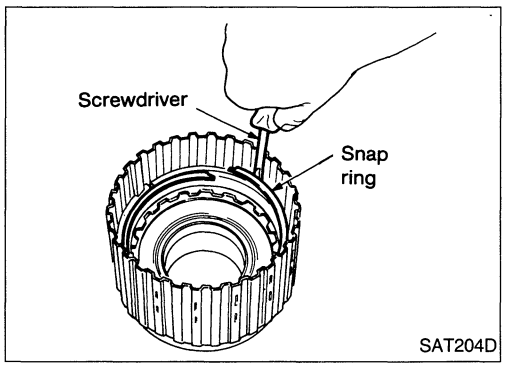
SAT124F

5. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



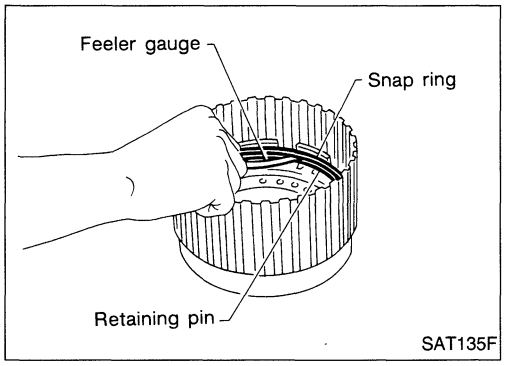
SAT134F

- **Do not align snap ring gap with spring retainer stopper.**



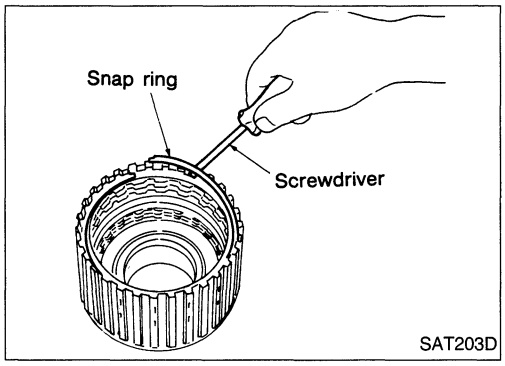
SAT204D

6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
7. Install snap ring for overrun clutch.



SAT135F

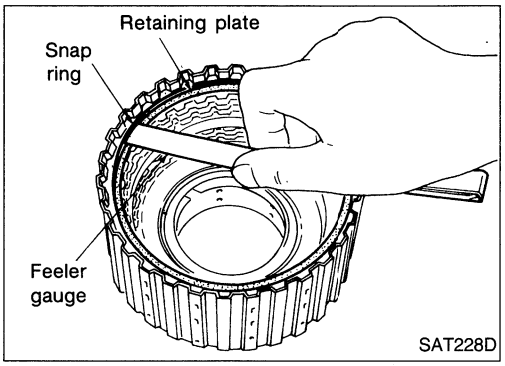
8. Measure clearance between overrun clutch retaining plate and snap ring.
   If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.7 - 1.1 mm (0.028 - 0.043 in)
   Allowable limit 1.7 mm (0.067 in)
   Overrun clutch retaining plate: Refer to AT-211.



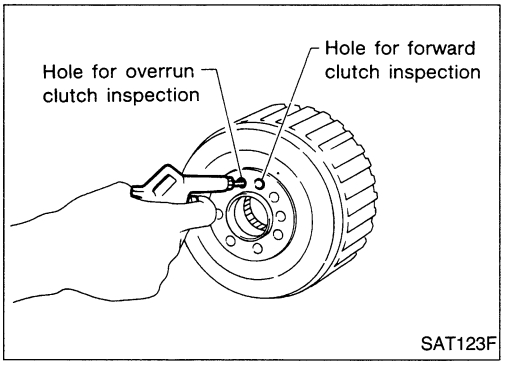
SAT203D

9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**
10. Install snap ring for forward clutch.

Forward Clutch and Overrun Clutch (Cont'd)

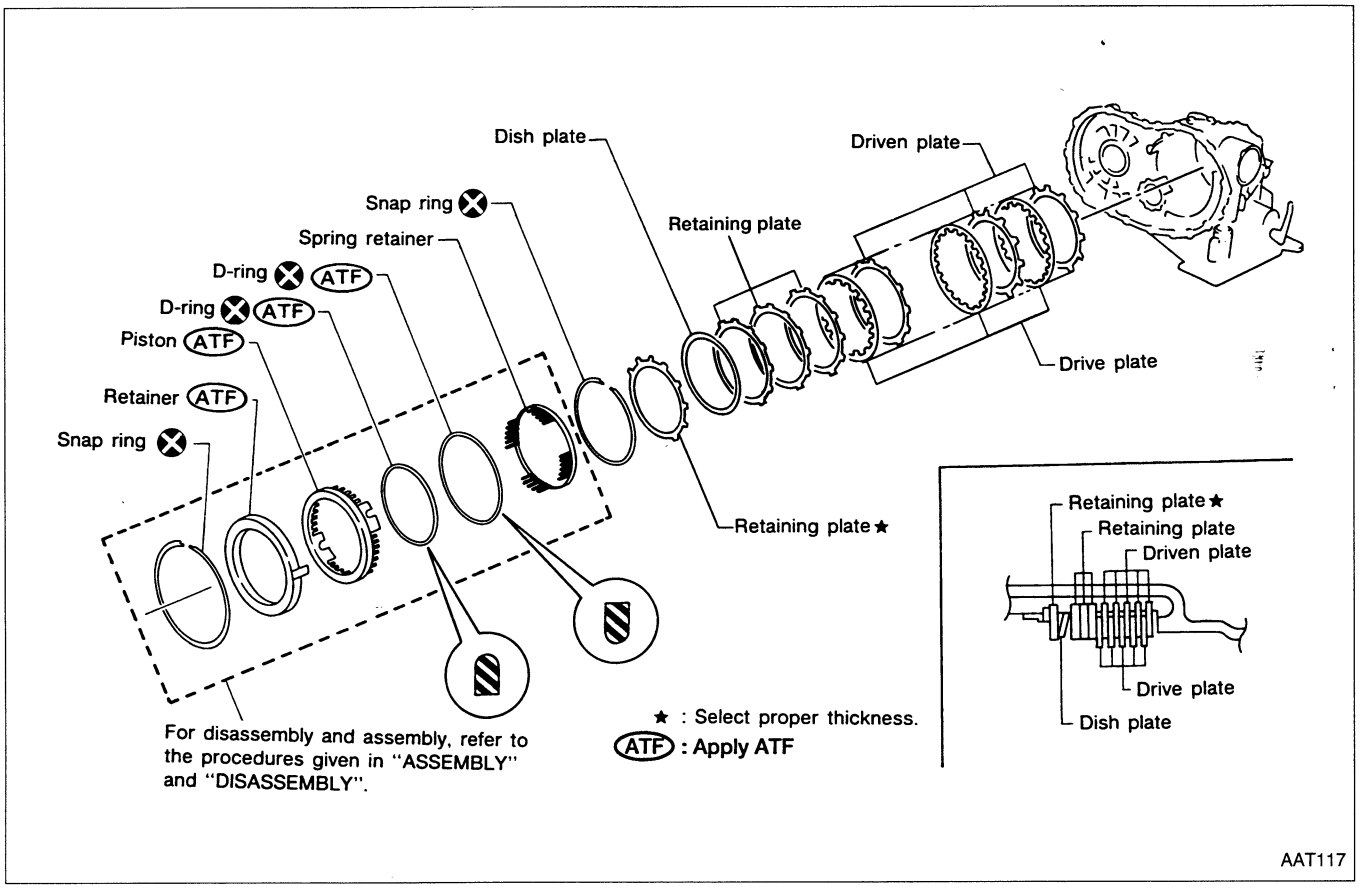


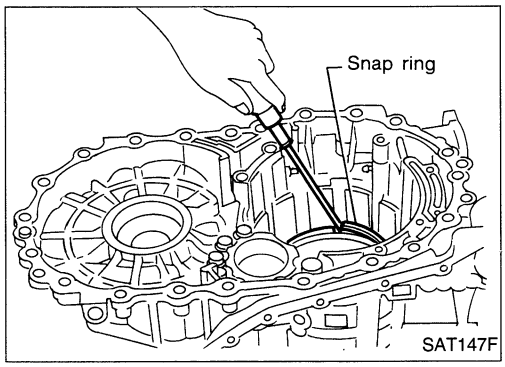
11. Measure clearance between forward clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    Specified clearance:
    Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)
    Allowable limit 1.65 mm (0.0650 in)
    Forward clutch retaining plate: Refer to AT-211.



12. Check operation of forward clutch.
    Refer to AT-155.
13. Check operation of overrun clutch.
    Refer to AT-155.

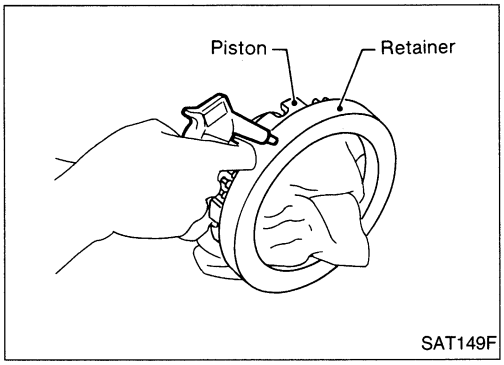
Low & Reverse Brake





DISASSEMBLY

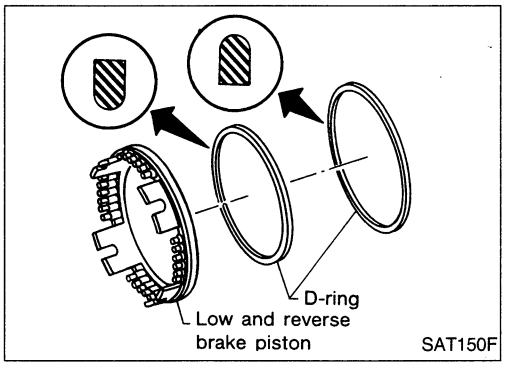
1. Stand transmission case.
2. Remove snap ring.
3. Remove dish plate, retaining plate, drive plates and driven plates from transmission case.



4. In order to remove piston, apply compressed air to oil hole of retainer while holding piston.

- **Apply air gradually and allow piston to come out evenly.**

Low & Reverse Brake (Cont'd)

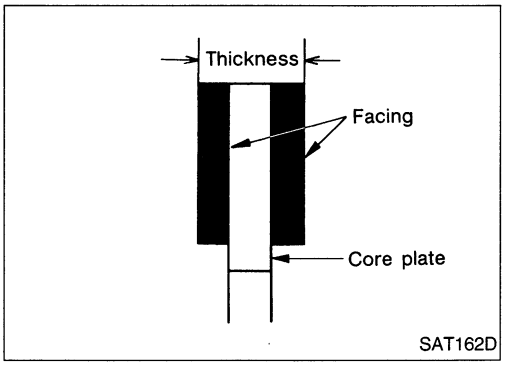


5. Remove D-rings from piston.

INSPECTION

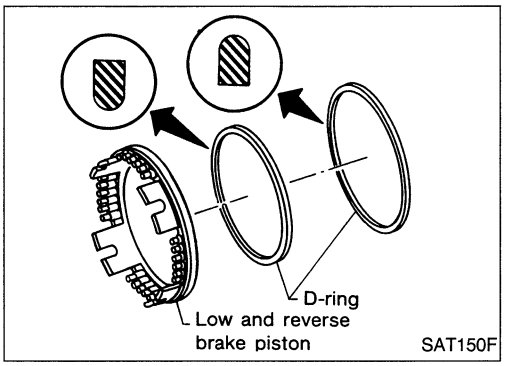
Low & reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage. If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



Low & reverse brake drive plate

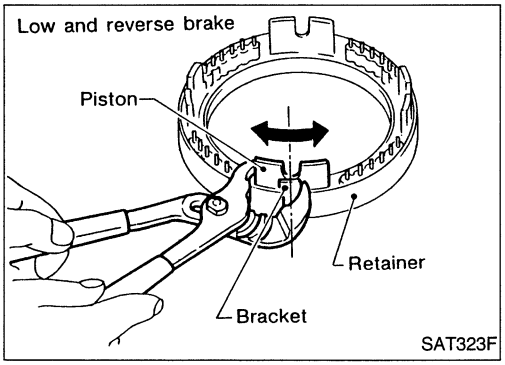
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.8 mm (0.071 in)
  Wear limit 1.6 mm (0.063 in)
- If not within wear limit, replace.



ASSEMBLY

1. Install D-rings on piston.

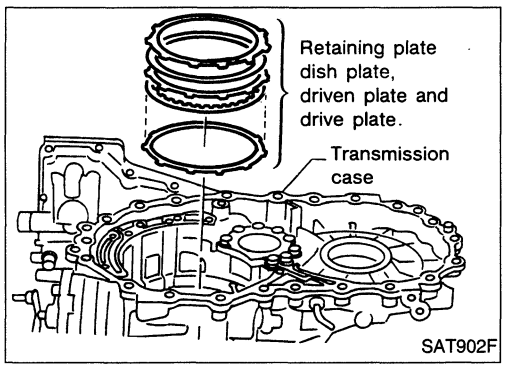
- **Take care with the direction of oil seal.**
- **Apply ATF to both parts.**



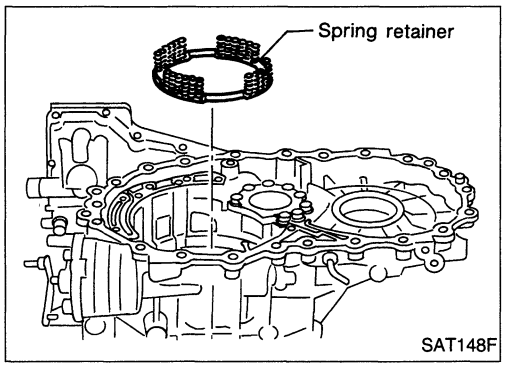
2. Set and align piston with retainer.

- **This operation is required in order to engage the protrusions of piston to return springs correctly.**
  Further procedures are given in "ASSEMBLY" (Refer to AT-188).

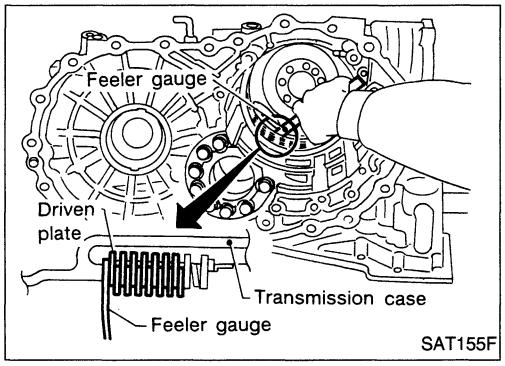
Low & Reverse Brake (Cont'd)



3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
   - **Refer to the illustration on the previous page for order of plates and direction of dish plate.**

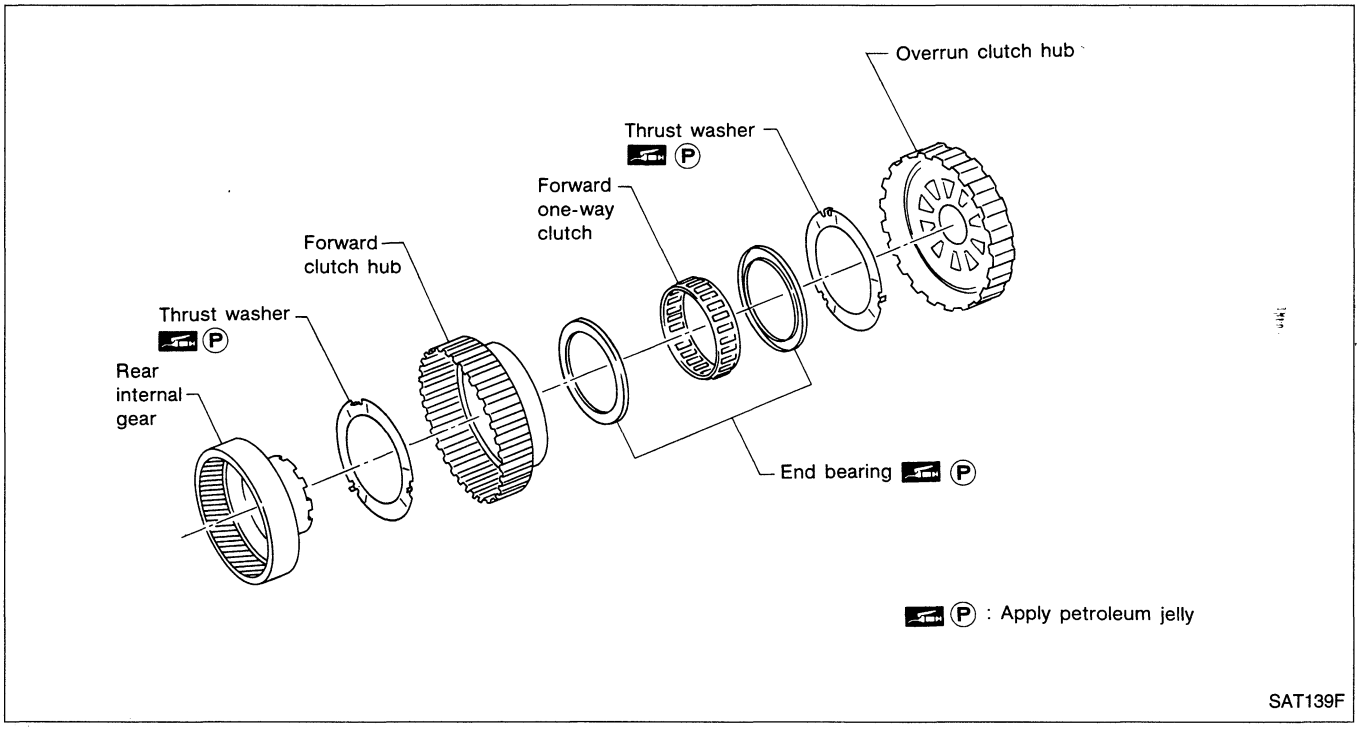


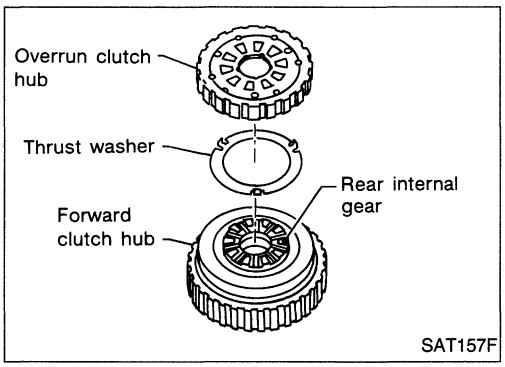
4. Install snap ring.



5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)
   Specified clearance:
   Standard 1.7 - 2.1 mm (0.067 - 0.083 in)
   Allowable limit 3.1 mm (0.122 in)
   Retaining plate: Refer to AT-211.

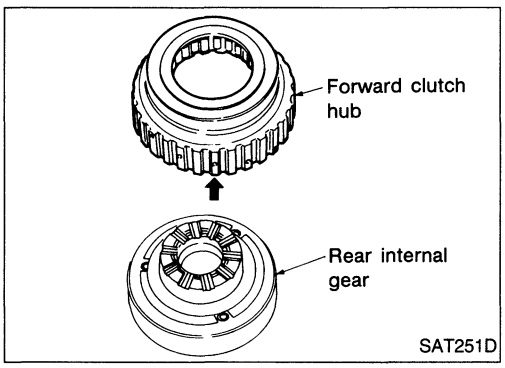
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub





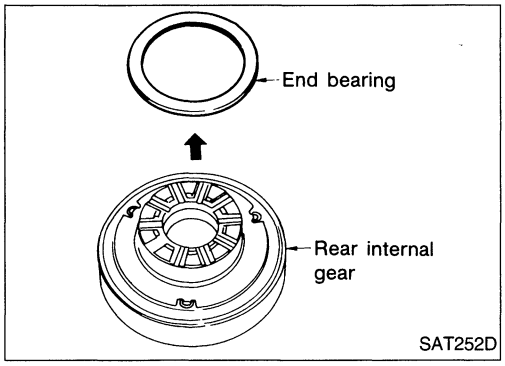
DISASSEMBLY

1. Remove overrun clutch hub and thrust washer from forward clutch hub.

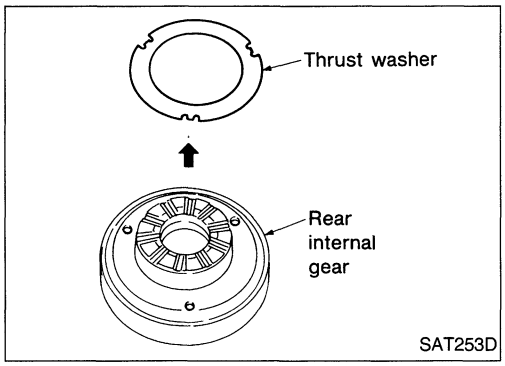


2. Remove forward clutch hub from rear internal gear.

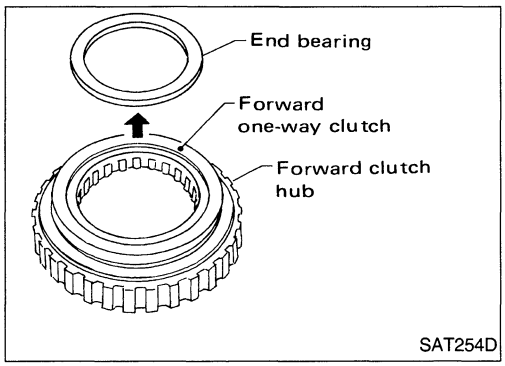
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



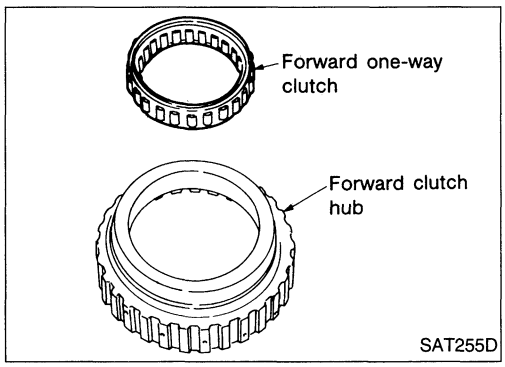
3. Remove end bearing from rear internal gear.



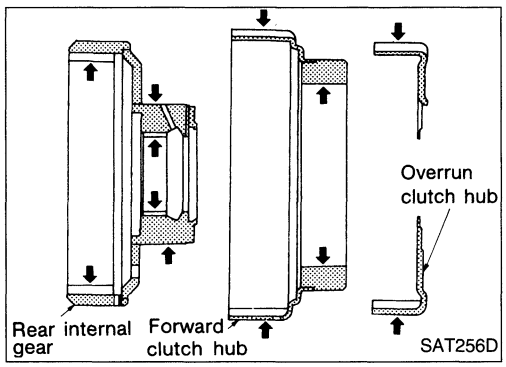
4. Remove thrust washer from rear internal gear.



5. Remove end bearing from forward one-way clutch.



6. Remove forward one-way clutch from forward clutch hub.

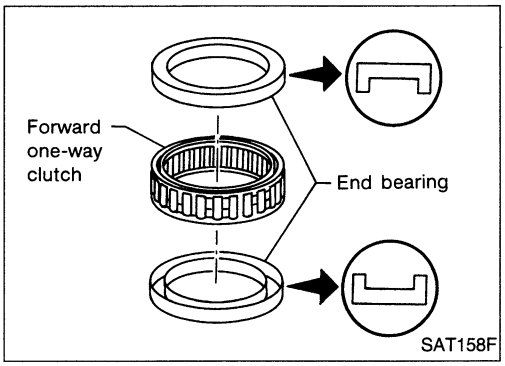


INSPECTION

Rear internal gear, forward clutch hub and overrun clutch hub

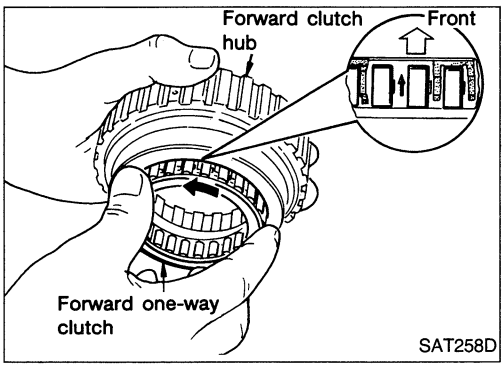
- Check rubbing surfaces for wear or damage.

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



End bearings and forward one-way clutch

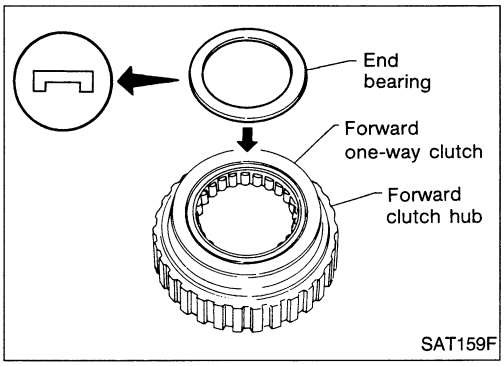
- Check end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



ASSEMBLY

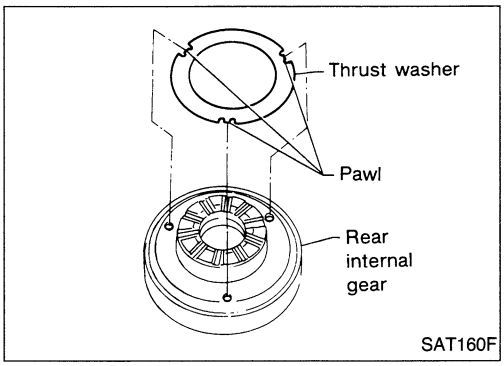
1. Install forward one-way clutch on forward clutch.

- **Take care with the direction of forward one-way clutch.**



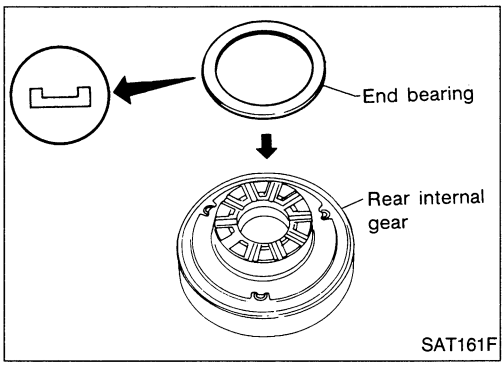
2. Install end bearing on forward one-way clutch.

- **Apply petroleum jelly to end bearing.**



3. Install thrust washer on rear internal gear.

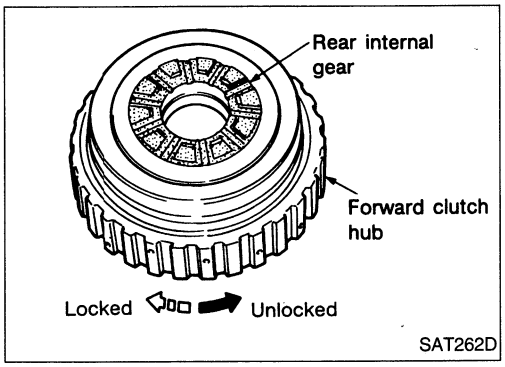
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**



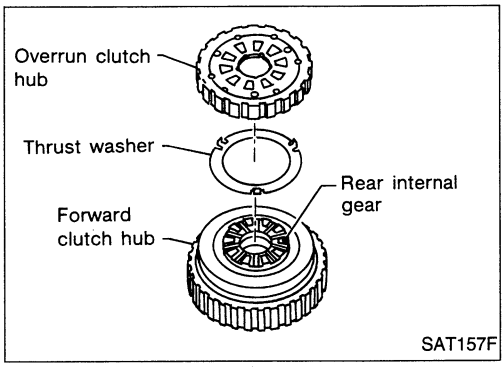
4. Install end bearing on rear internal gear.

- **Apply petroleum jelly to end bearing.**

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)

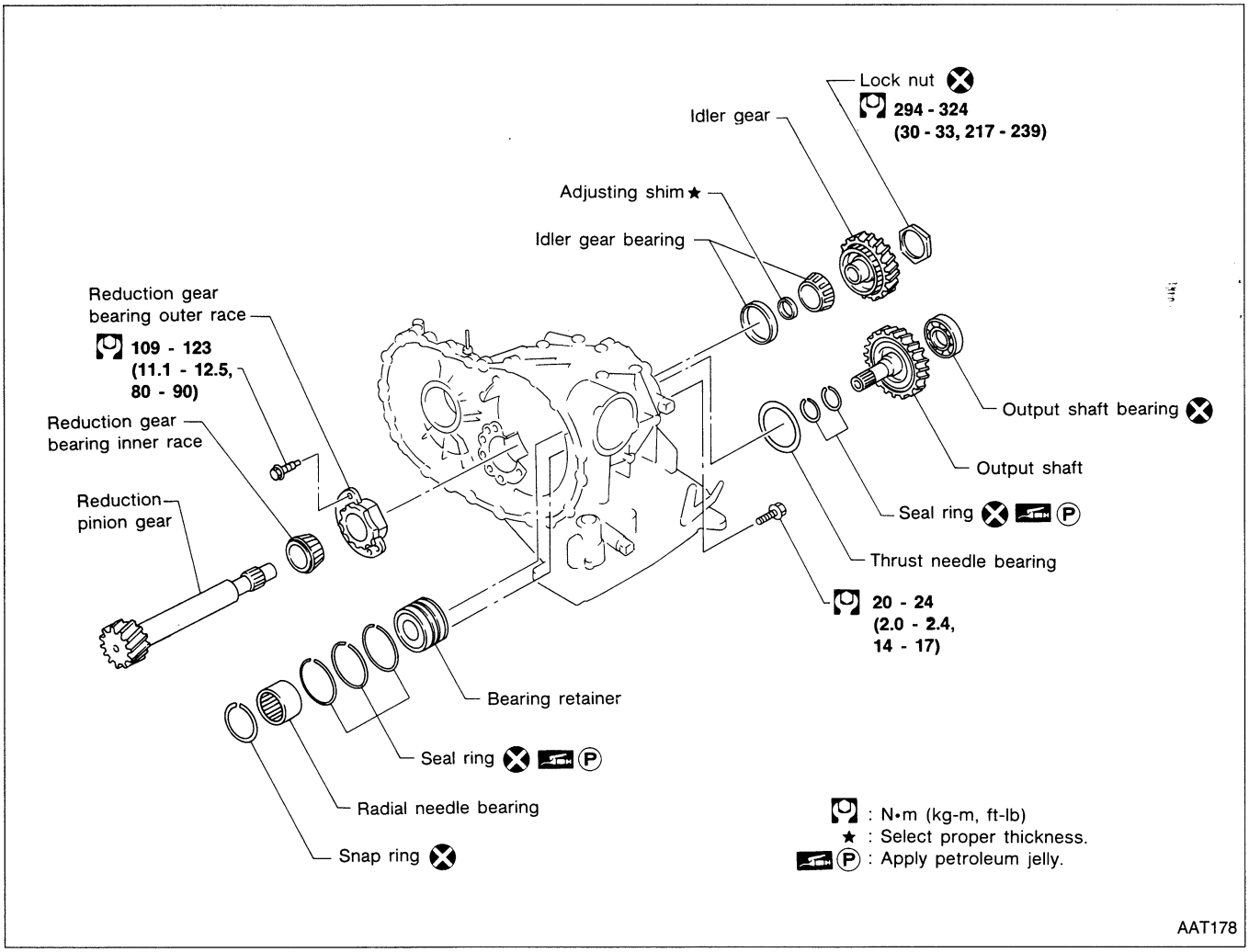


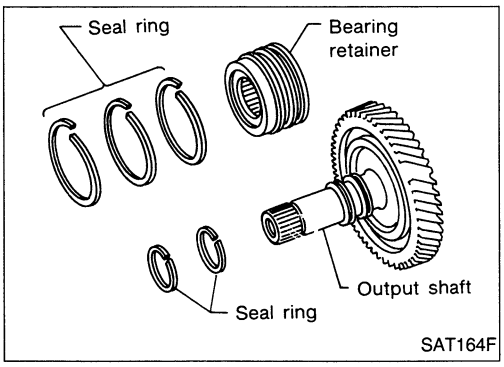
5. Install forward clutch hub on rear internal gear.
- **Check operation of forward one-way clutch.**



6. Install thrust washer and overrun clutch hub.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of overrun clutch hub.**
- **Align projections of rear internal gear with holes of overrun clutch hub.**

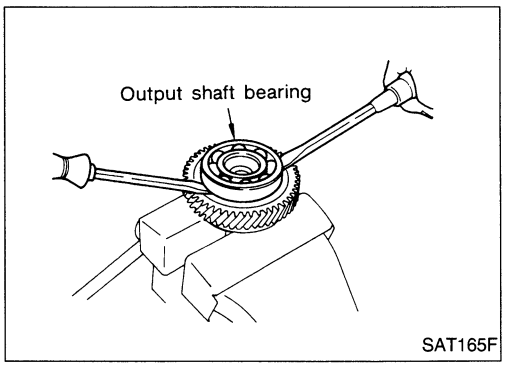
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer





DISASSEMBLY

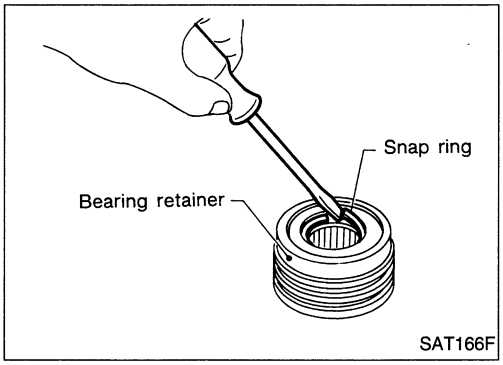
1. Remove seal rings from output shaft and bearing retainer.



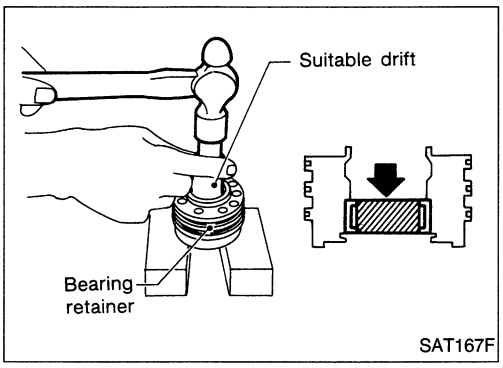
2. Remove output shaft bearing with screwdrivers.

- **Always replace bearing with a new one when removed.**
- **Do not damage output shaft.**

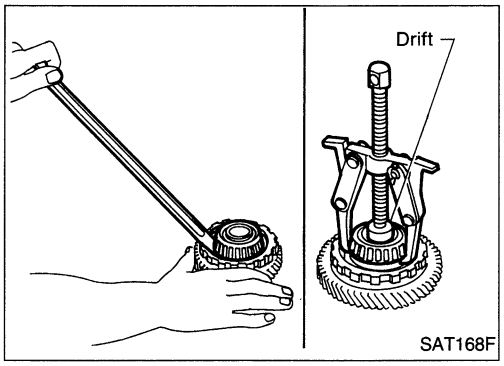
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



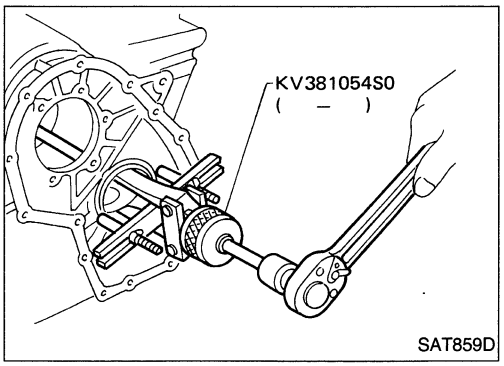
3. Remove snap ring from bearing retainer.



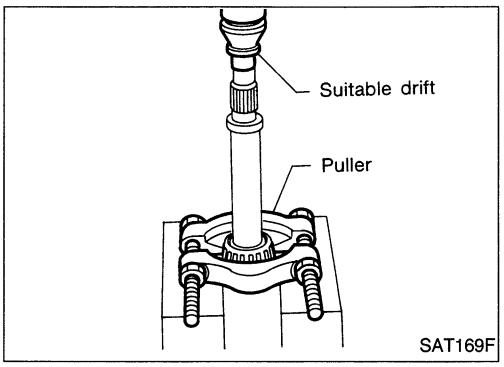
4. Remove needle bearing from bearing retainer.



5. Remove idler gear bearing inner race from idler gear.

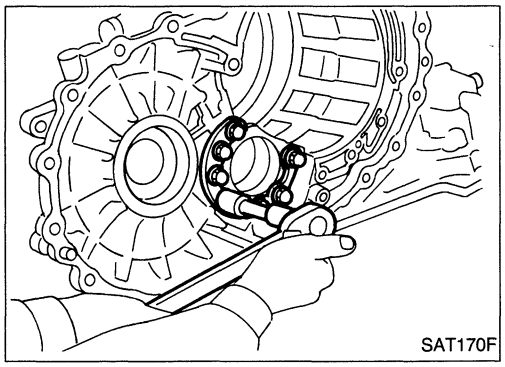


6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction gear bearing inner race from reduction gear.

Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

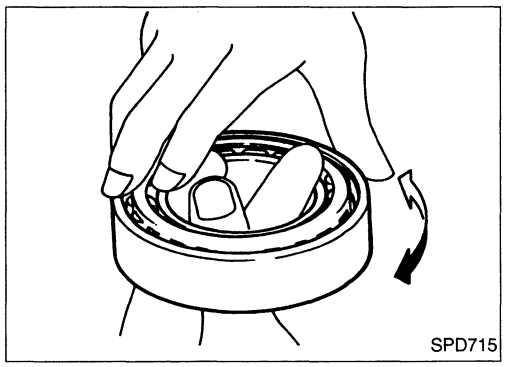

SAT170F

8. Remove reduction gear bearing outer race from transmission case.

INSPECTION

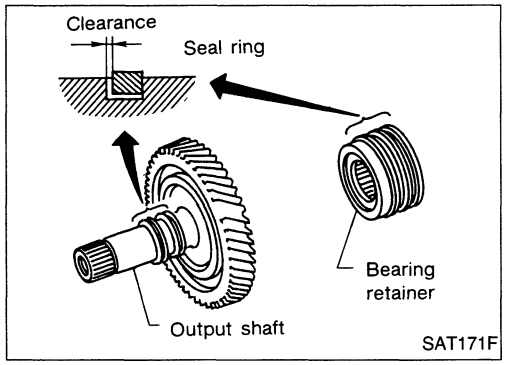
Output shaft, idler gear and reduction gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.


SPD715

Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



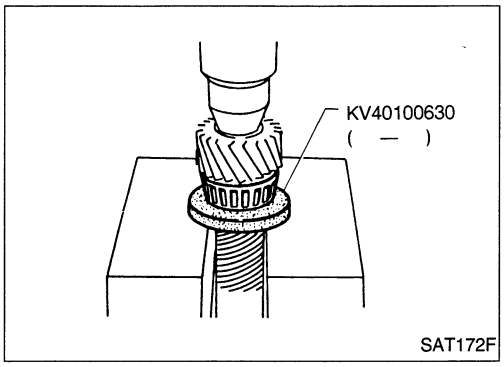
SAT171F

Seal ring clearance

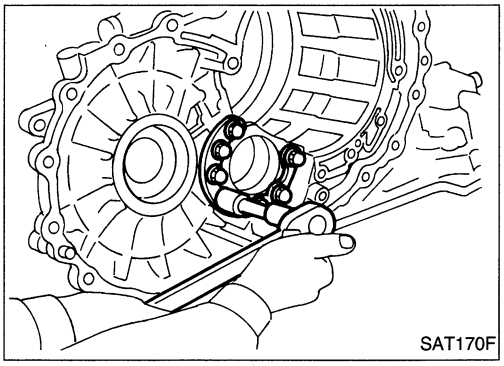
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Allowable limit:
  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.
  Standard clearance:
  0.10 - 0.30 mm (0.0039 - 0.0118 in)
  Allowable limit:
  0.30 mm (0.0118 in)
- If not within allowable limit, replace bearing retainer.

Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

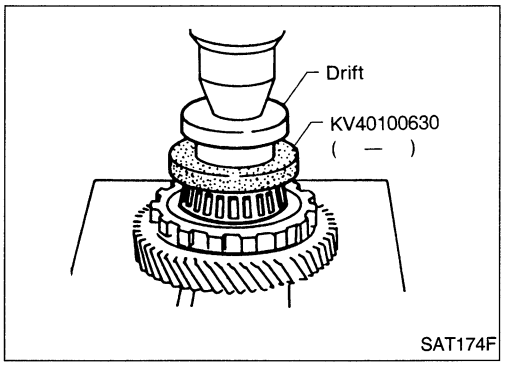
ASSEMBLY



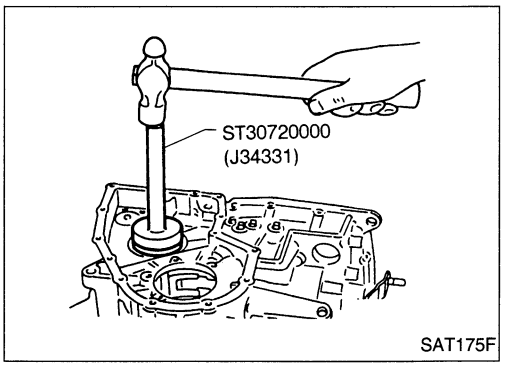
1. Press reduction gear bearing inner race on reduction gear.



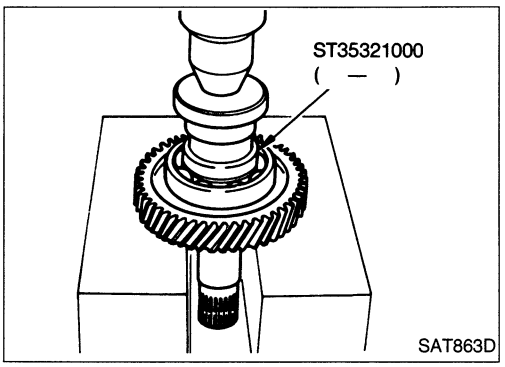
2. Install reduction gear bearing outer race on transmission case.



3. Press idler gear bearing inner race on idler gear.

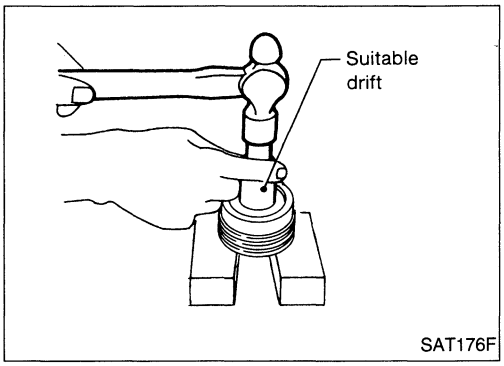


4. Install idler gear bearing outer race on transmission case.

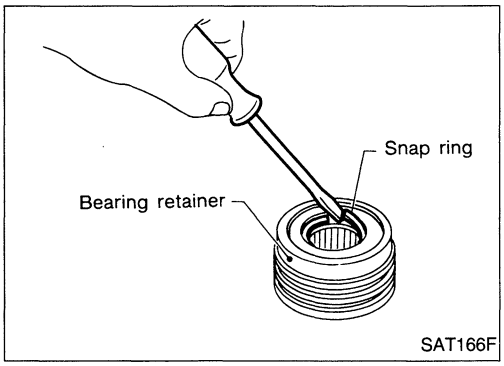


5. Press output shaft bearing on output shaft.

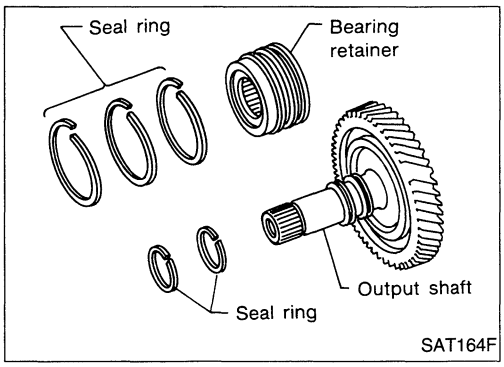
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



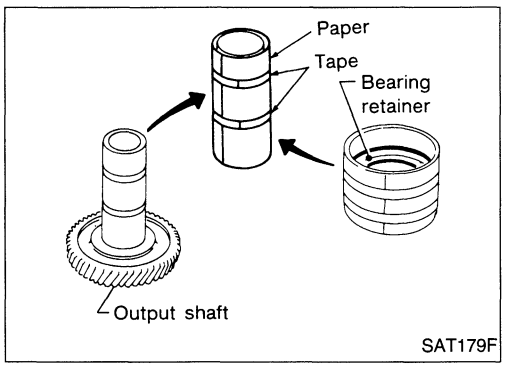
6. Press needle bearing on bearing retainer.



7. Install snap ring on to bearing retainer.

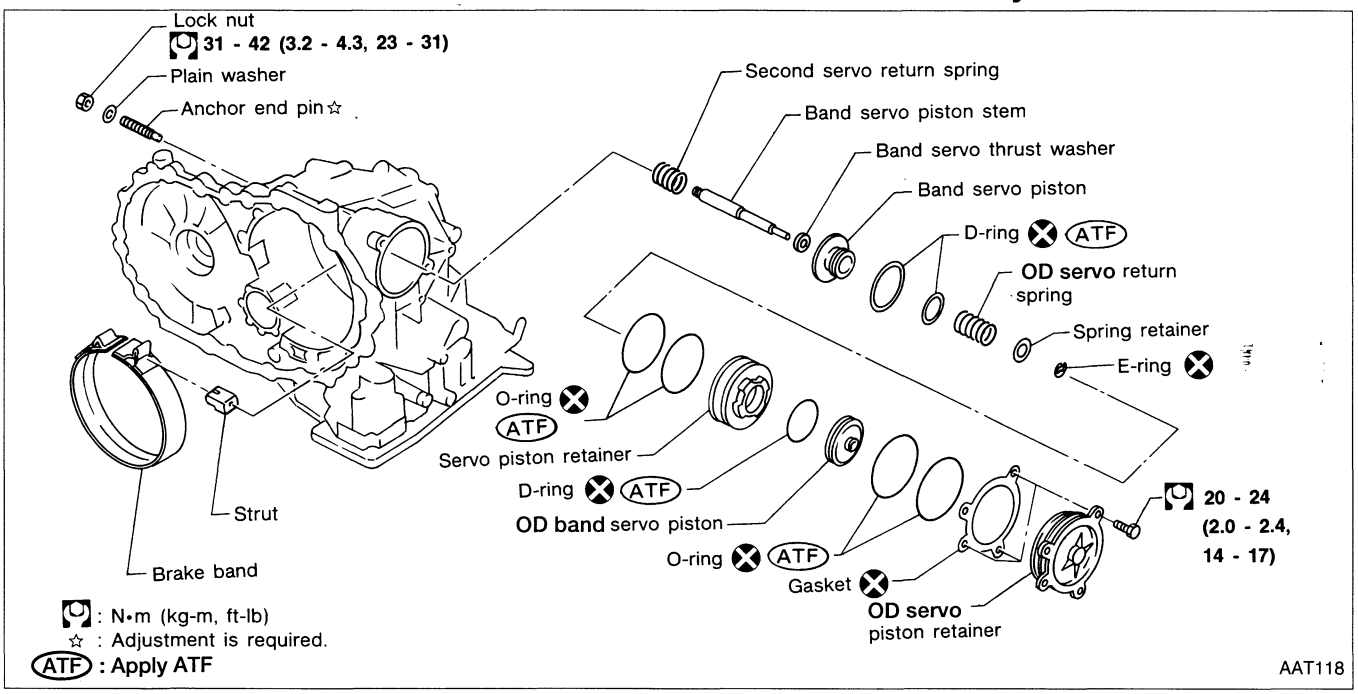


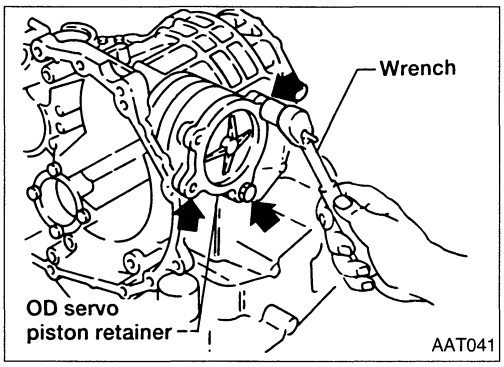
8. Install new seal rings to output shaft and bearing retainer carefully after packing ring grooves with petroleum jelly.



- **Roll paper around seal rings to prevent seal rings from spreading.**

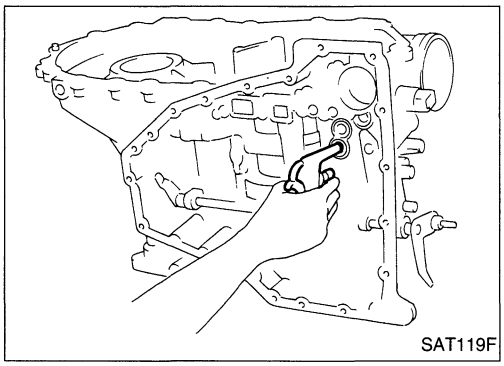
Band Servo Piston Assembly



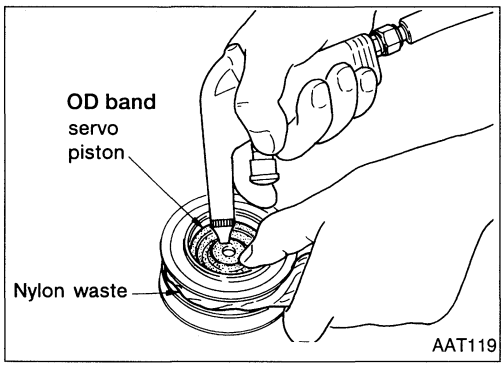


DISASSEMBLY

1. Remove OD servo piston retainer.

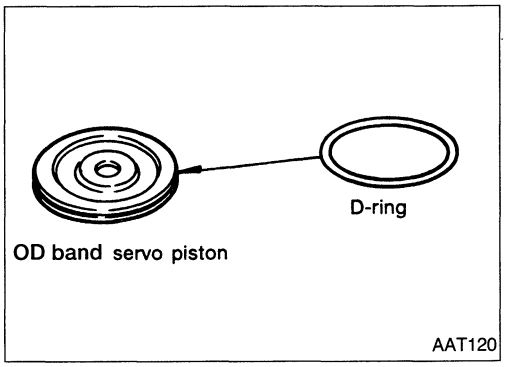


2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
- **Hold band servo piston assembly with a rag.**

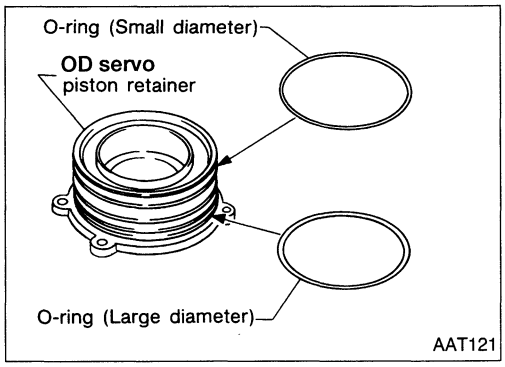


3. Apply compressed air to oil hole in OD servo piston retainer to remove OD band servo piston from retainer.
- **Hold OD band servo piston while applying compressed air.**

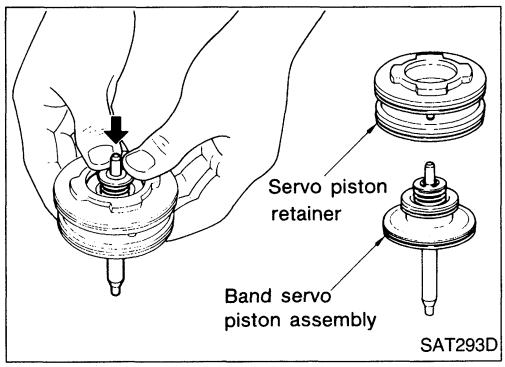
Band Servo Piston Assembly (Cont'd)



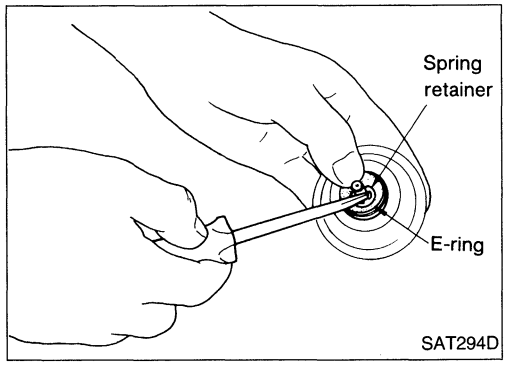
4. Remove D-ring from OD band servo piston.



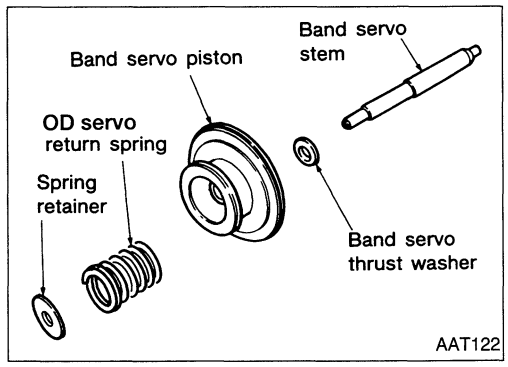
5. Remove O-rings from OD servo piston retainer.



6. Remove band servo piston assembly from servo piston retainer by pushing it forward.

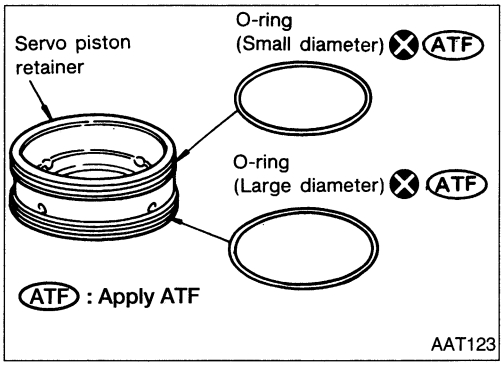


7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

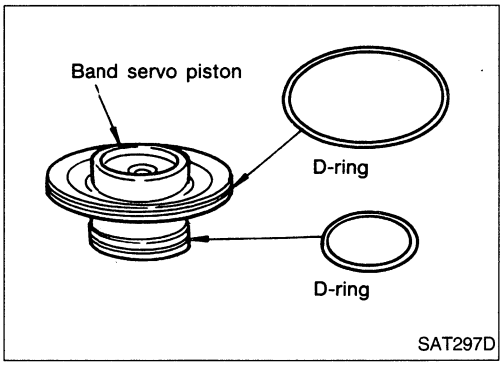


8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.

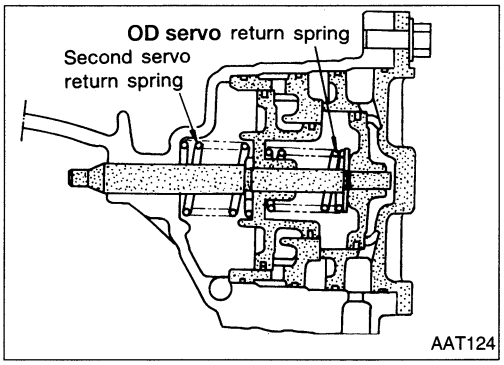


10. Remove D-rings from band servo piston.

INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



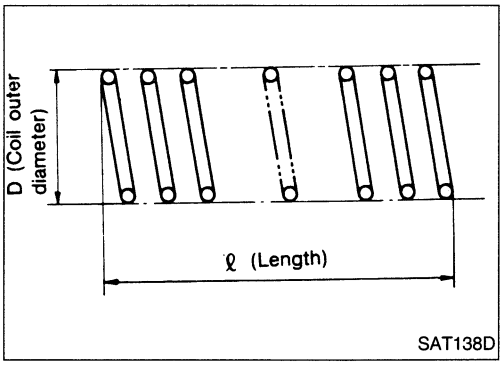
Return springs

- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard

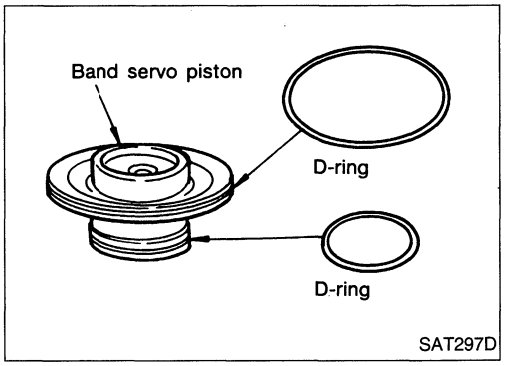
Unit: mm (in)

Parts	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31.0 (1.220)	21.7 (0.854)

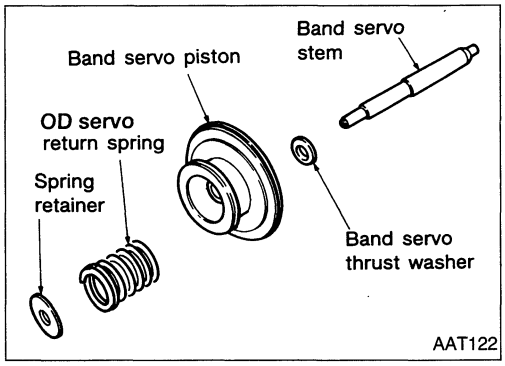


Band Servo Piston Assembly (Cont'd)

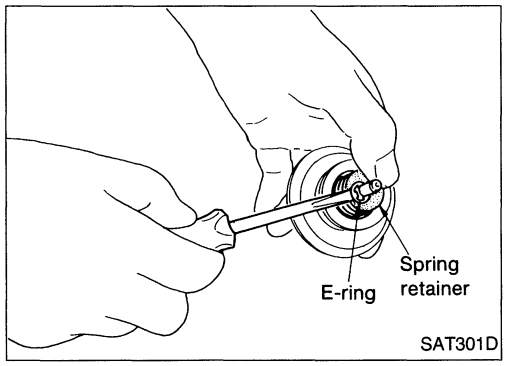
ASSEMBLY



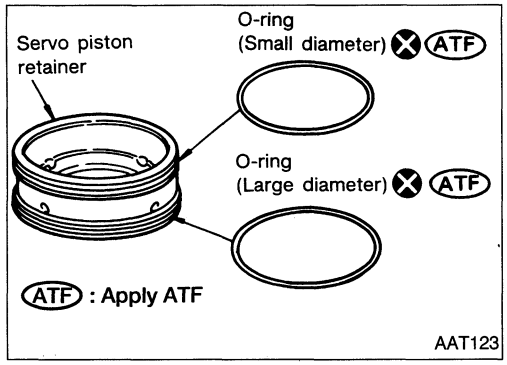
1. Install D-rings to servo piston retainer.
- **Apply ATF to D-rings.**
- **Pay attention to position of each O-ring.**



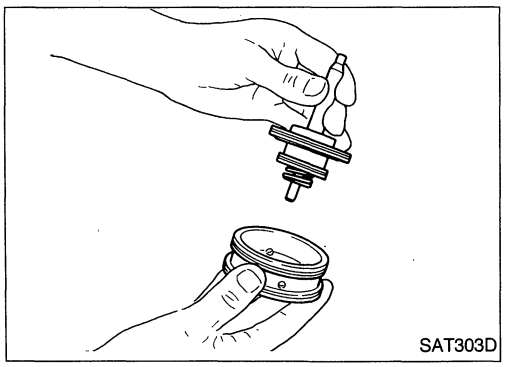
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

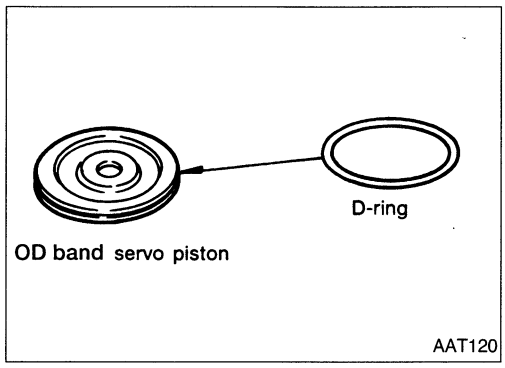


4. Install O-rings onto servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**

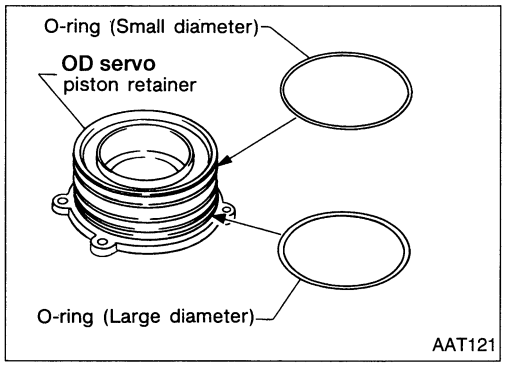


5. Install band servo piston assembly to servo piston retainer by pushing it inward.

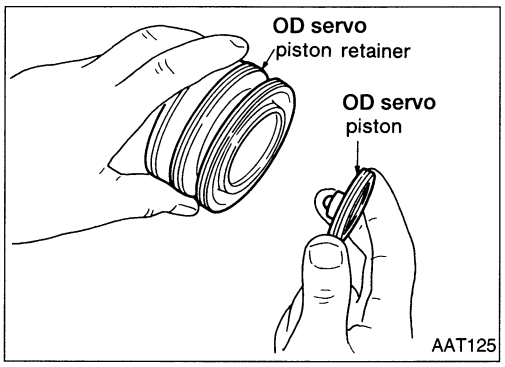
Band Servo Piston Assembly (Cont'd)



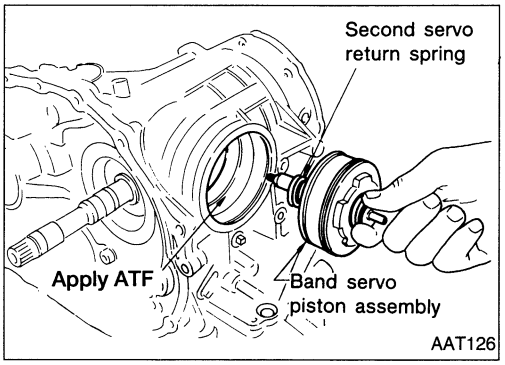
6. Install D-ring to OD band servo piston.
- **Apply ATF to D-ring.**



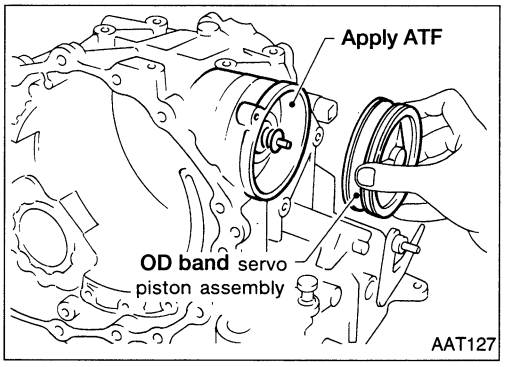
7. Install O-rings to OD servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



8. Install OD band servo piston to OD servo piston retainer.

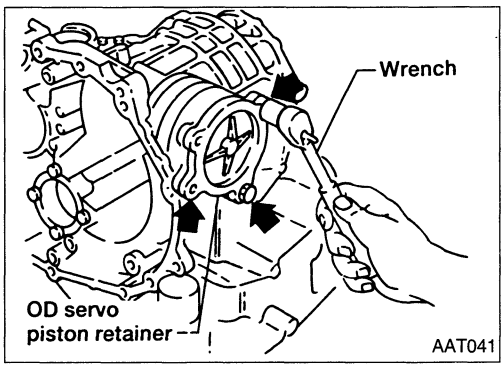


9. Install band servo piston assembly and 2nd servo return spring to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**



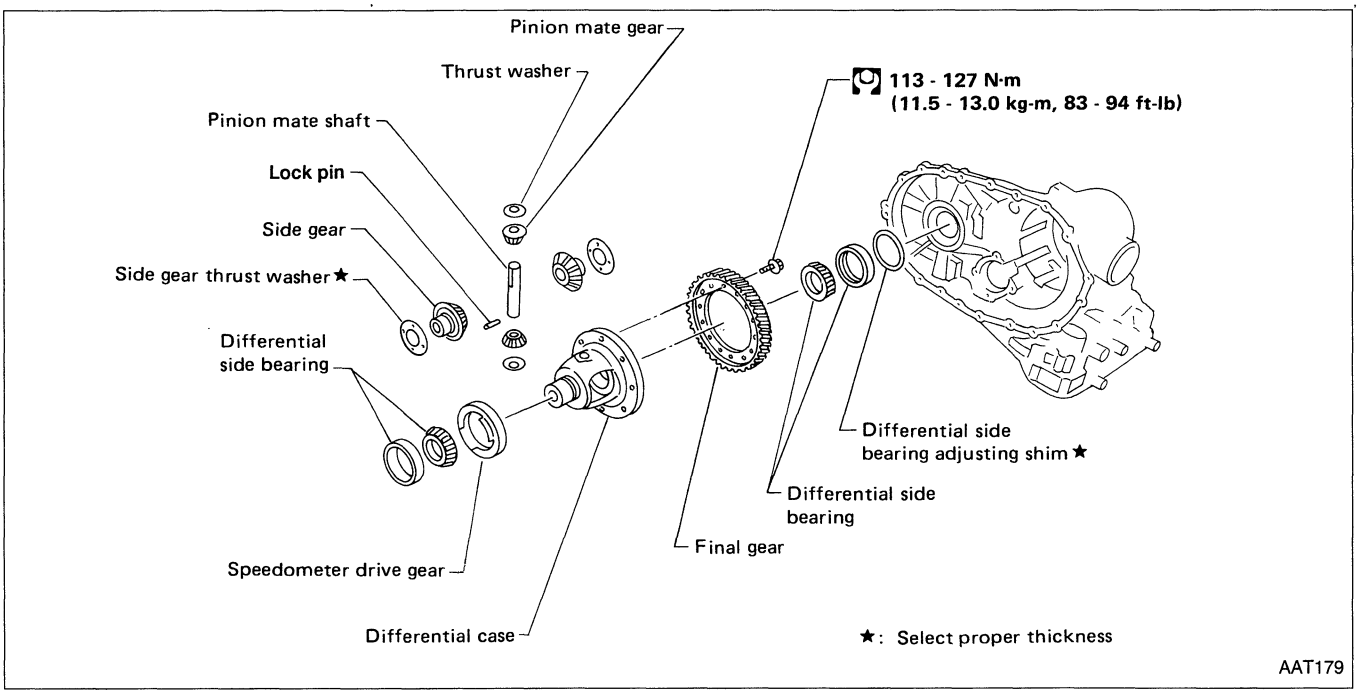
10. Install OD band servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

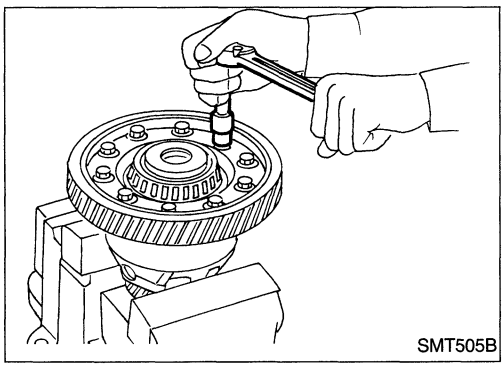
Band Servo Piston Assembly (Cont'd)



11. Install band servo piston snap ring to transmission case.

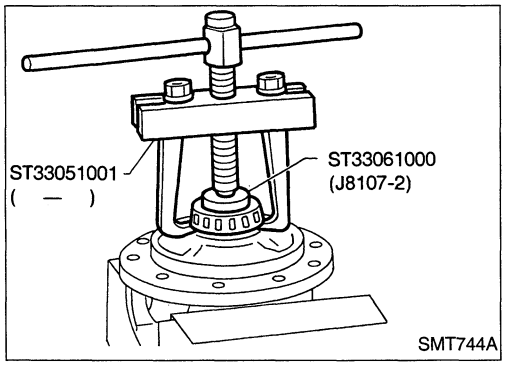
Final Drive — RE4F04A





DISASSEMBLY

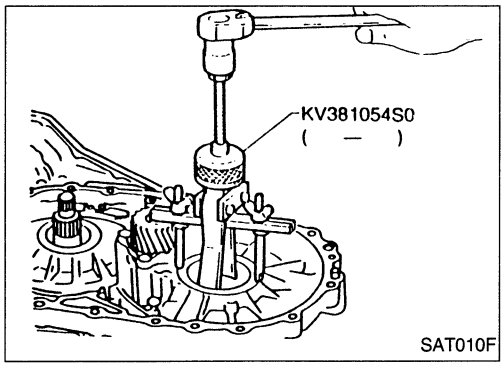
1. Remove final gear.



2. Press out differential side bearings.

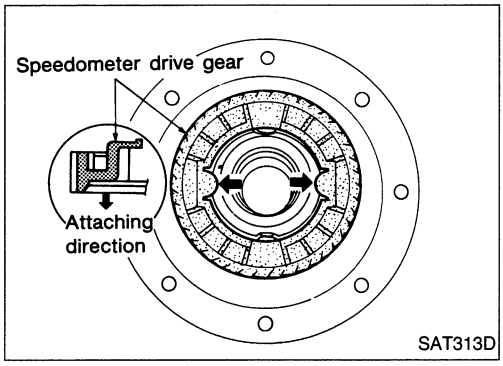
- **Be careful not to mix up the right and left bearings.**

Final Drive — RE4F04A (Cont'd)



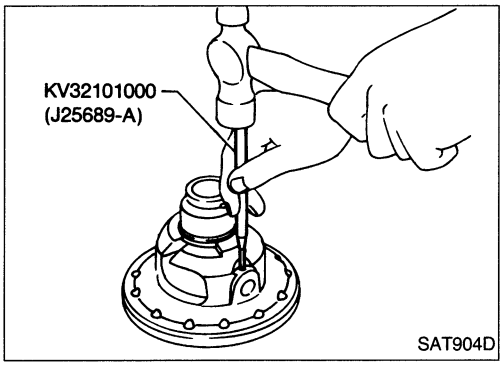
SAT010F

3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.



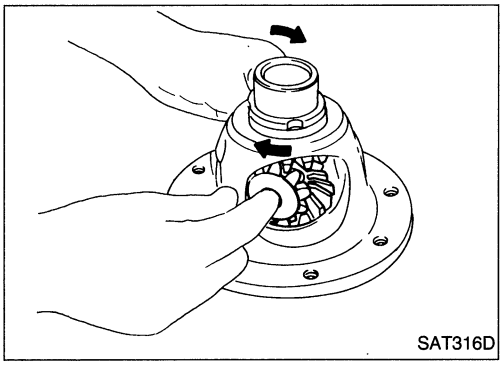
SAT313D

4. Remove speedometer drive gear.

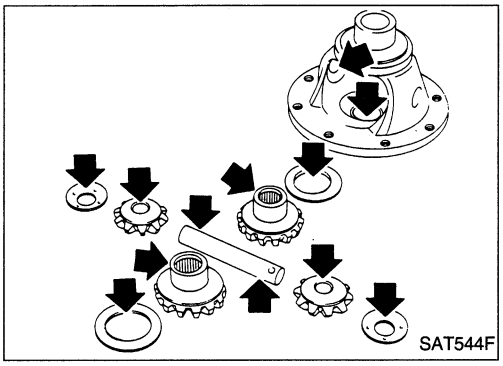


SAT904D

5. Drive out pinion mate shaft lock pin.


SAT316D

6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.

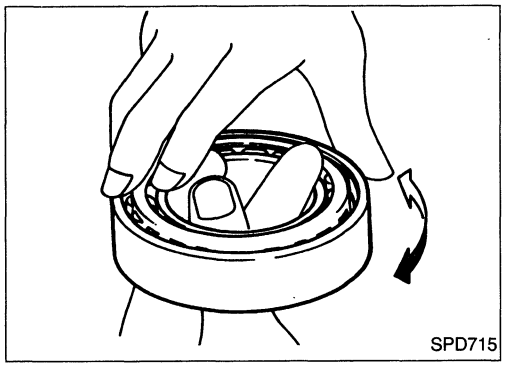

SAT544F

INSPECTION

Gear, washer, shaft and case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.

Final Drive — RE4F04A (Cont'd)

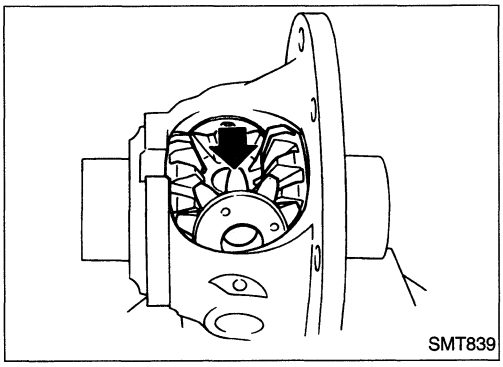

SPD715

Bearings

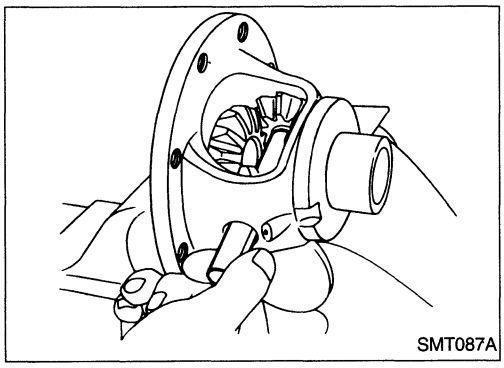
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

ASSEMBLY

1. Attach side gear thrust washers to side gears, then install pinion mate washers and pinion mate gears in place.

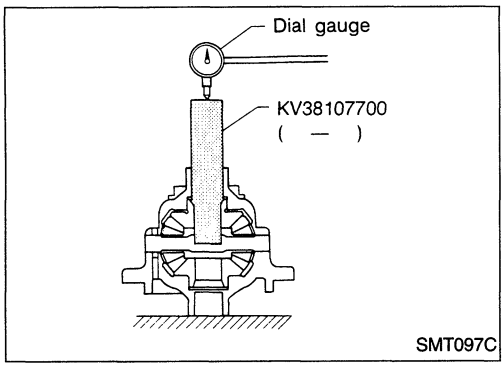

SMT839

2. Insert pinion mate shaft.
- **When inserting, be careful not to damage pinion mate thrust washers.**


SMT087A

3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.

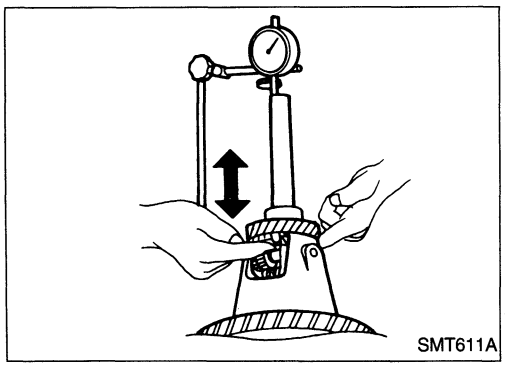


SMT097C

b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

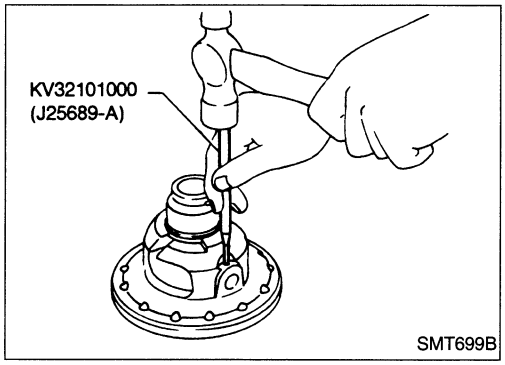
Clearance between side gear and differential case with washers:

0.1 - 0.2 mm (0.004 - 0.008 in)

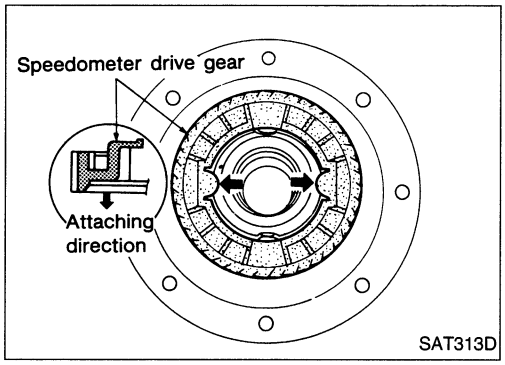

SMT611A

Final Drive — RE4F04A (Cont'd)

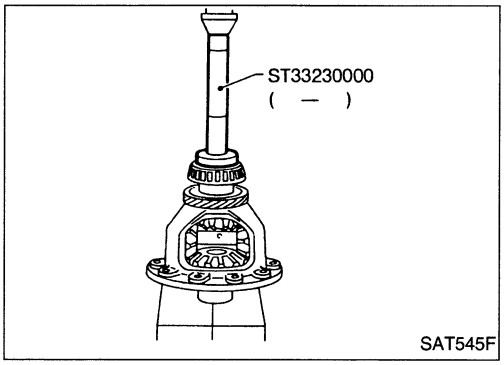
c. If not within specification, adjust clearance by changing thickness of side gear thrust washers.
Side gear thrust washer:
Refer to AT-212.



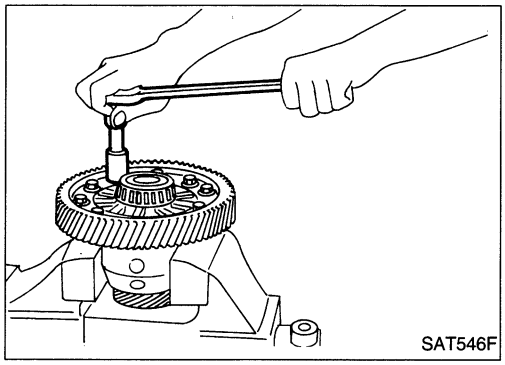
4. Install lock pin.
- **Make sure that lock pin is flush with case.**



5. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**

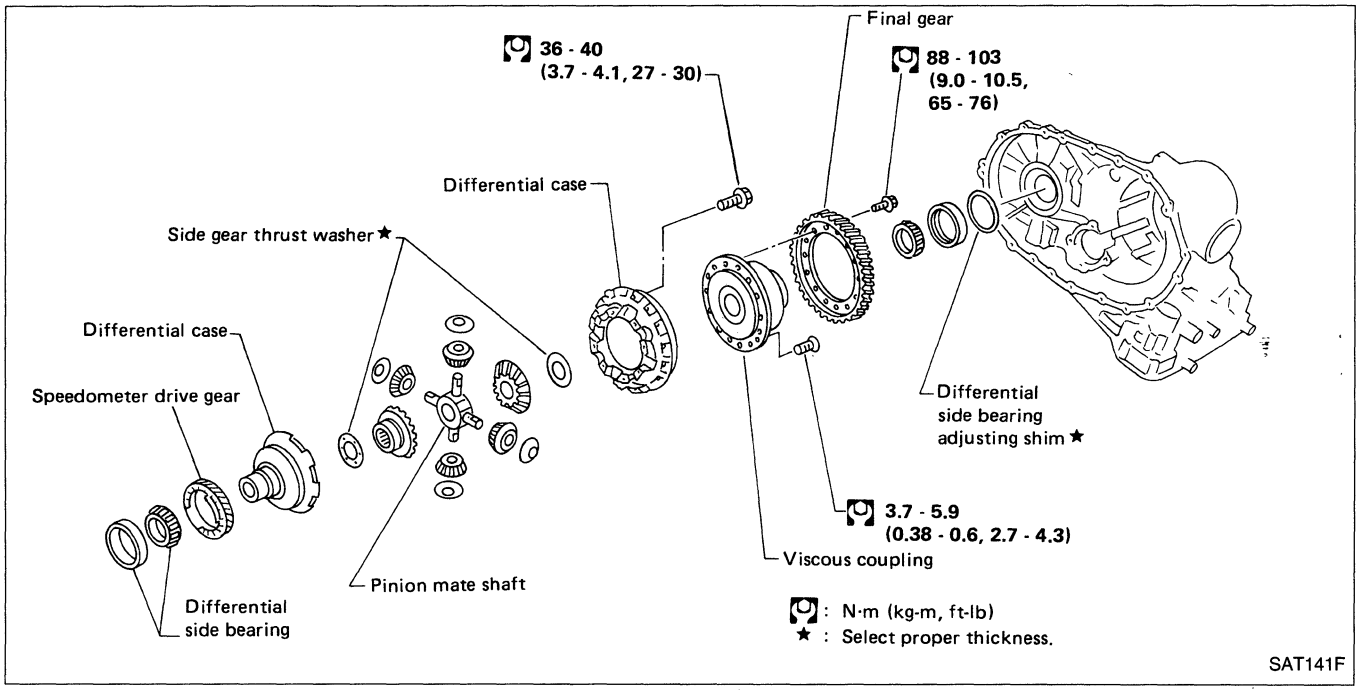


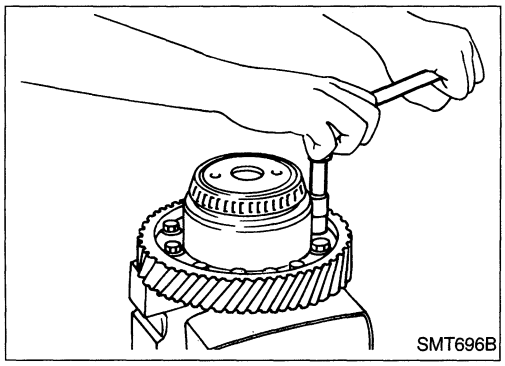
6. Press on differential side bearings.



7. Install final gear and tighten fixing bolts in a crisscross pattern.

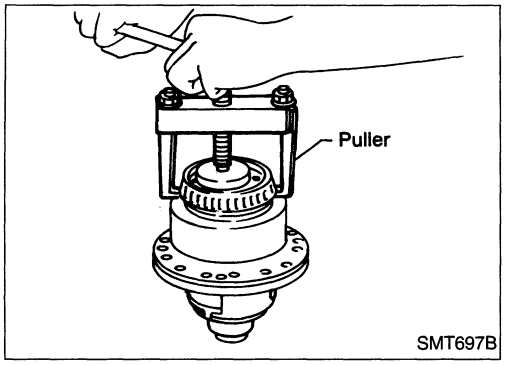
Final Drive — RE4F04V



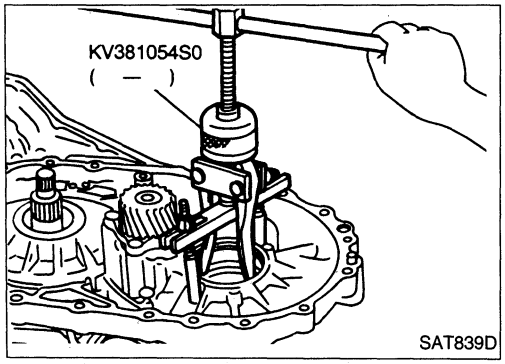


DISASSEMBLY

1. Remove final gear.

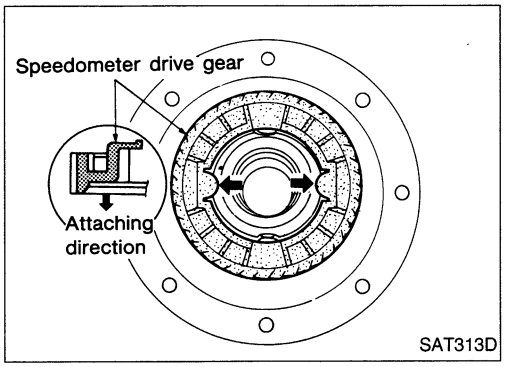


2. Press out differential side bearings.

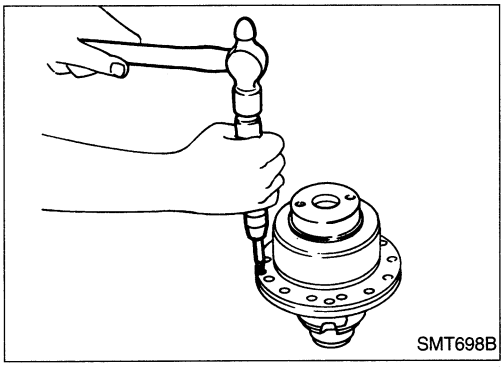


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

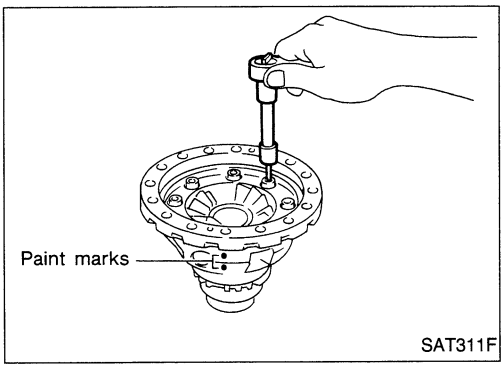
Final Drive — RE4F04V (Cont'd)



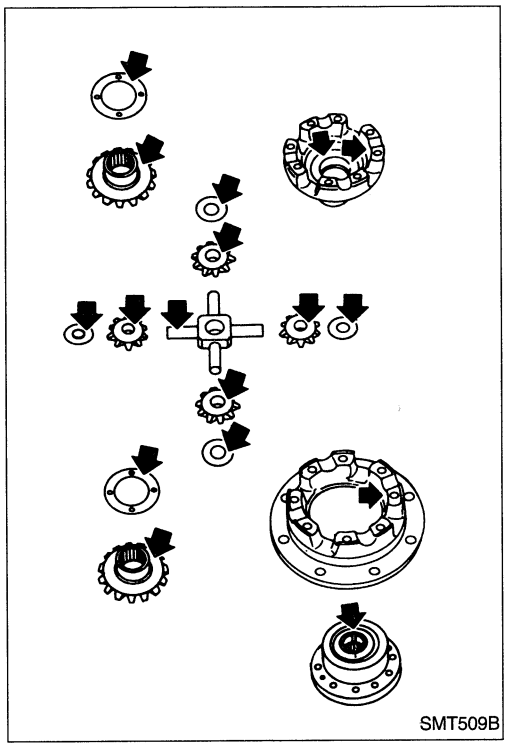
4. Remove speedometer drive gear.



5. Remove viscous coupling.



6. Separate differential cases. Make paint marks to identify their original position.
7. Remove pinion mate shaft with gears.

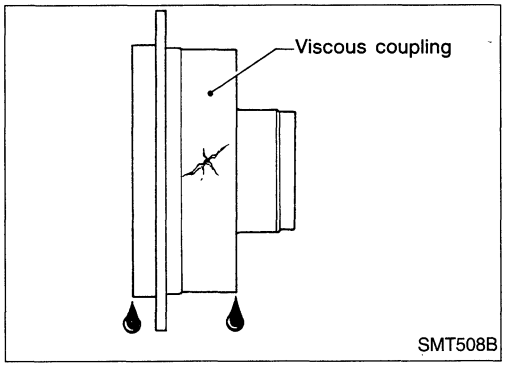


INSPECTION

Gear, washer, shaft and case

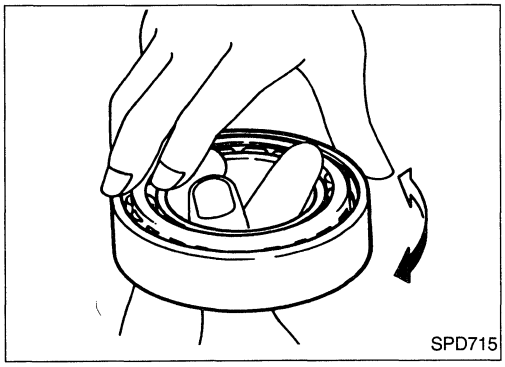
- Check mating surfaces of differential case, side gears, pinion mate gears and viscous coupling.
- Check washers for wear.

Final Drive — RE4F04V (Cont'd)



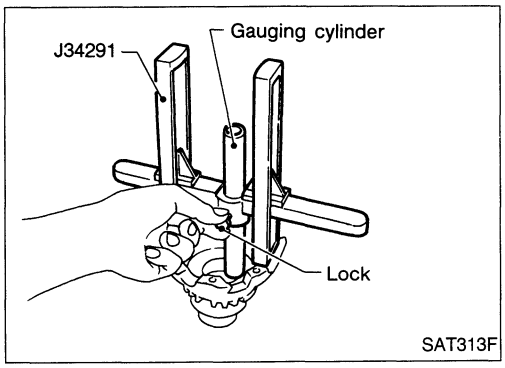
Viscous coupling

- Check case for cracks.
- Check silicone oil for leakage



Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

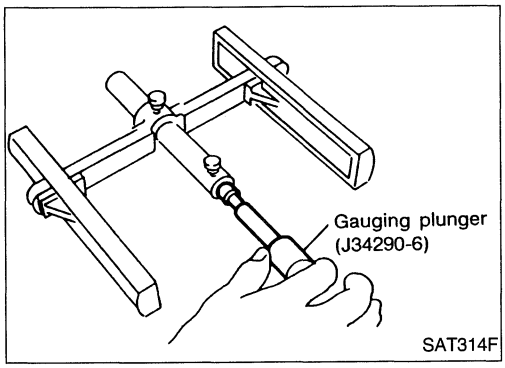


ASSEMBLY

1. Measure clearance between side gear and differential case & viscous coupling with washers using the following procedure:

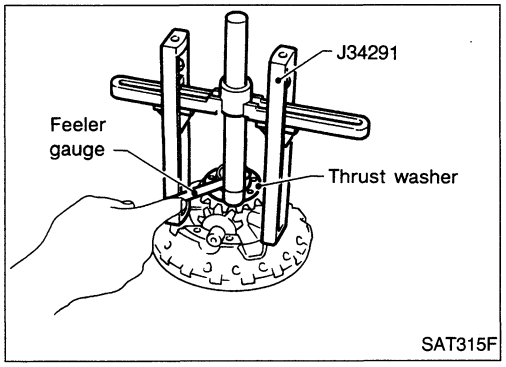
Differential case side

a. Set tool on the differential case and lock gauging cylinder in place with set screw.

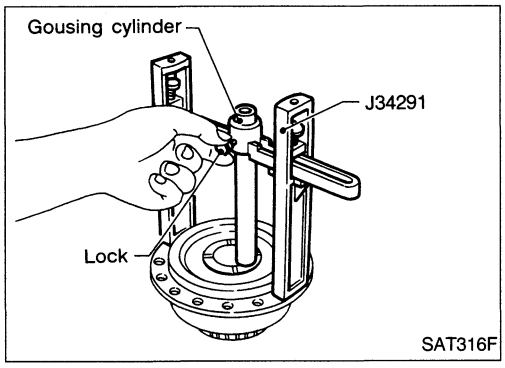


b. Install gauging plunger into cylinder.

Final Drive — RE4F04V (Cont'd)

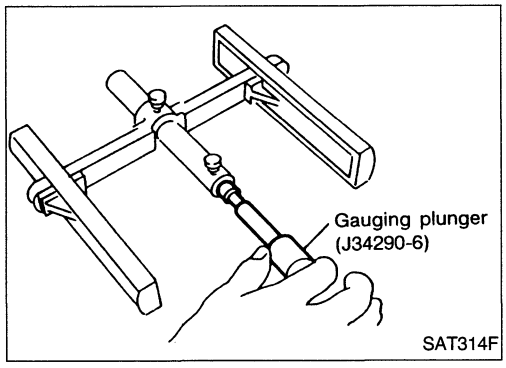


c. Install pinion mate gears and side gear with thrust washer on differential case.
d. Set tool and allow gauging plunger to rest on side gear thrust washer.
e. Measure gap between plunger and cylinder.
This measurement should give exact clearance between side gear and differential case with washers.
Standard clearance:
0.1 - 0.2 mm (0.004 - 0.008 in)
f. If not within specification adjust clearance by changing thickness of side gear thrust washer.
Side gear thrust washers for differential case side:
Refer to AT-212.



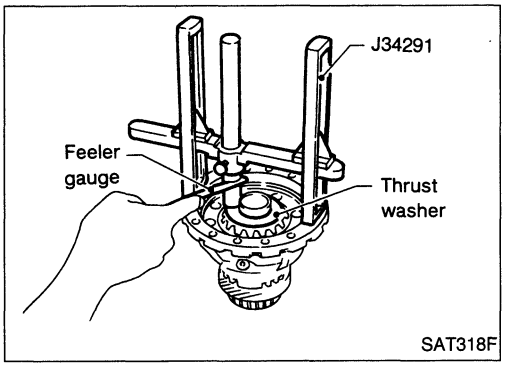
Viscous coupling side

a. Set tool on viscous coupling and lock gauging cylinder in place with set screw.

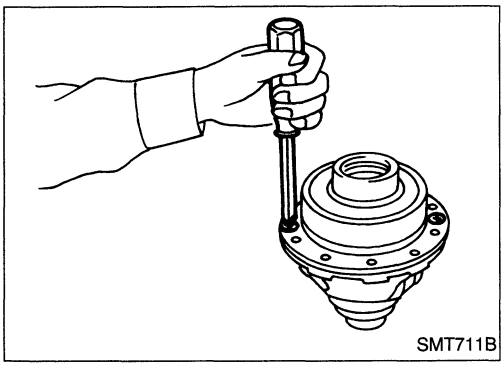


b. Install gauging plunger into cylinder.

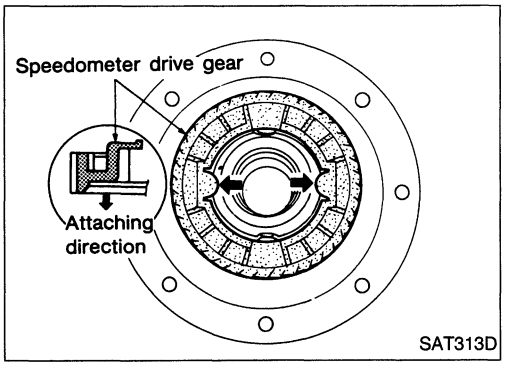
Final Drive — RE4F04V (Cont'd)



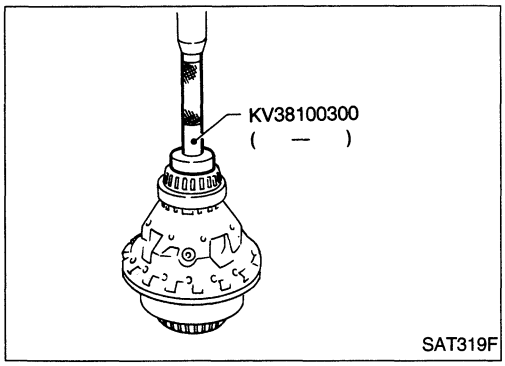
c. Install pinion mate gears and side gears with original washers on differential cases.
   Align paint marks.
d. Tighten differential case bolts.
e. Set tool and allow plunger to rest on side gear thrust washer.
f. Measure gap between plunger and cylinder.
   This measurement should give exact clearance between side gear and differential case with washers.
   Standard clearance:
   0.1 - 0.2 mm (0.004 - 0.008 in)
g. If not within specification, adjust clearance by changing thickness of side gear thrust washer.
   Side gear thrust washers for viscous coupling side:
   Refer to AT-212.



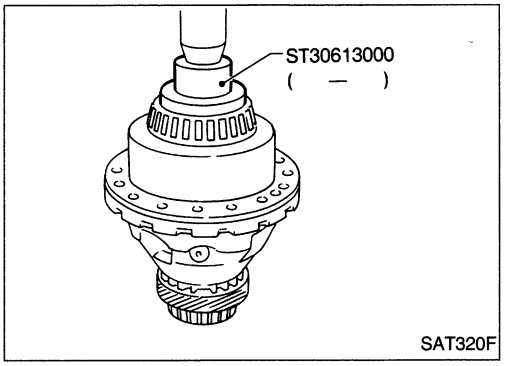
2. Install viscous coupling



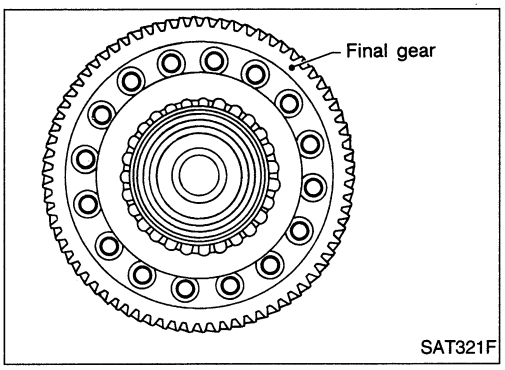
3. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**



4. Press differential side bearings on differential case.

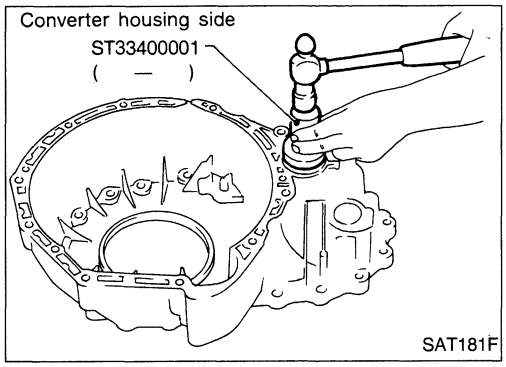


SAT320F



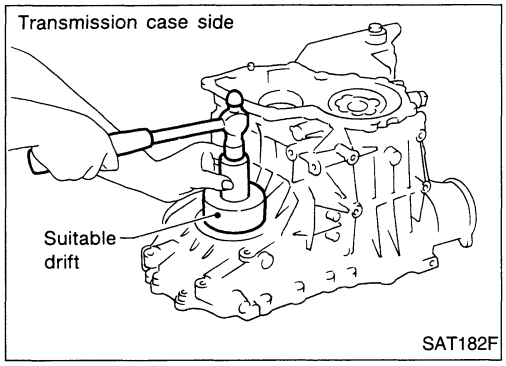
SAT321F

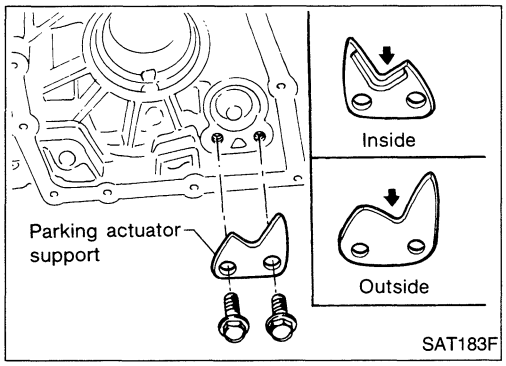
5. Install final gear and tighten fixing bolts in a crisscross pattern.



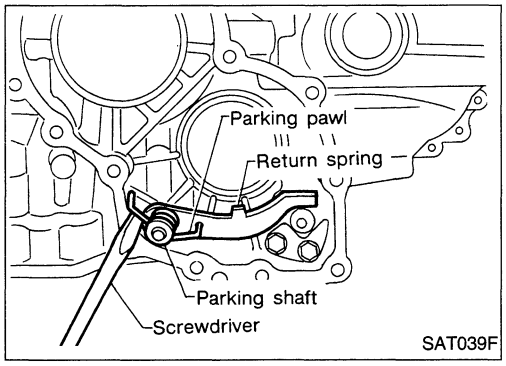
Assembly

1. Install differential side oil seals on transmission case and converter housing.

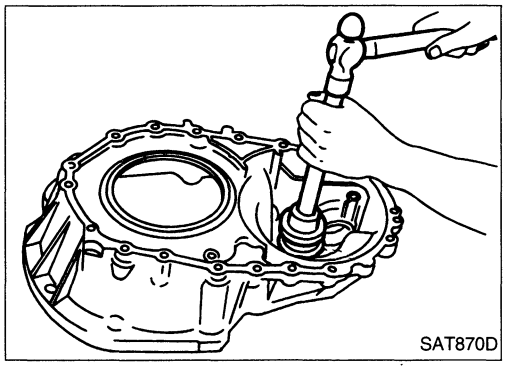




2. Install parking actuator support to transmission case.
- **Pay attention to direction of parking actuator support.**



3. Install parking pawl on transmission case and fix it with parking shaft.
4. Install return spring.

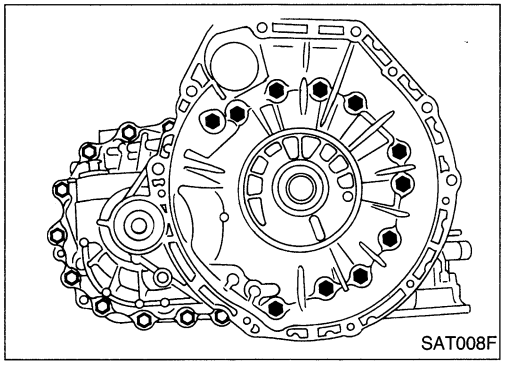


Adjustment

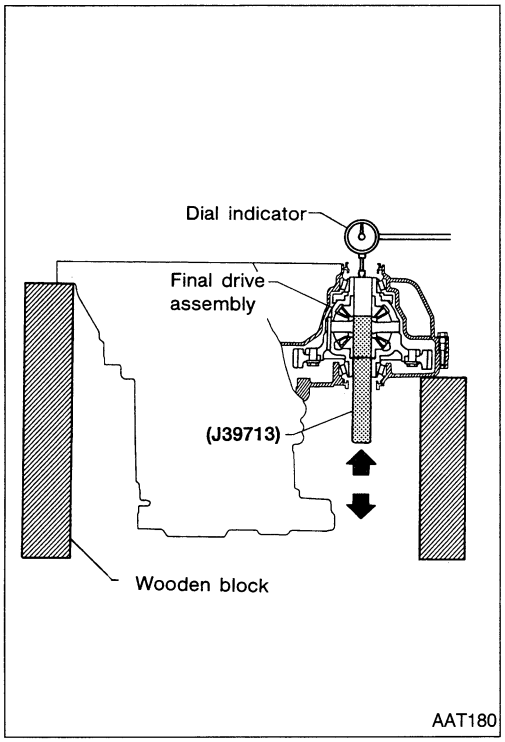
DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

Adjustment (Cont'd)


SAT008F

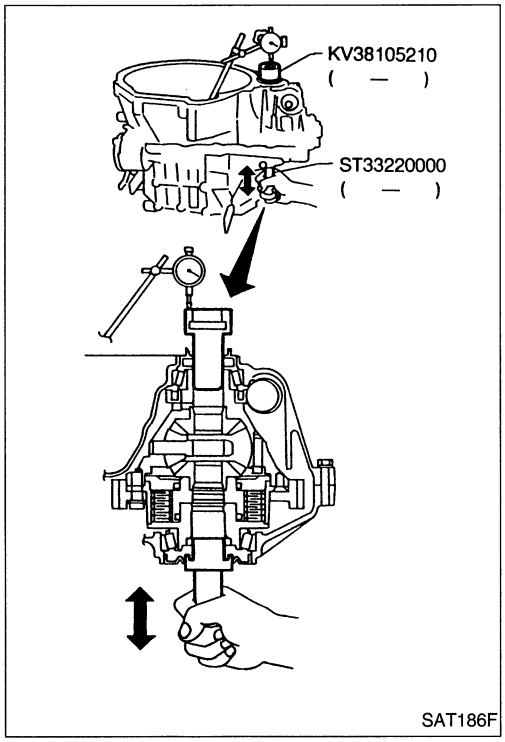
3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing and tighten transmission case fixing bolts to the specified torque.



AAT180

— RE4F04A —

5. Attach dial indicator on differential case at converter housing side.
6. Insert Tool into differential side gear from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.



SAT186F

— RE4F04V —

5. Set Tool on differential case at converter housing side and attach dial indicator on Tool.
6. Insert the other Tool viscous coupling from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.

— RE4F04A and RE4F04V —

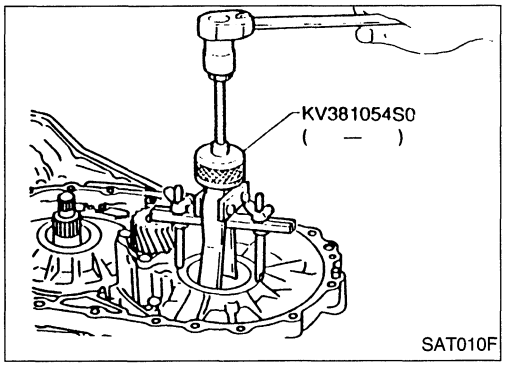
8. Select proper thickness of differential side bearing adjusting shim(s).

Suitable shim thickness = Dial indicator deflection + Specified bearing preload

Differential side bearing adjusting shim:
Refer to AT-212.

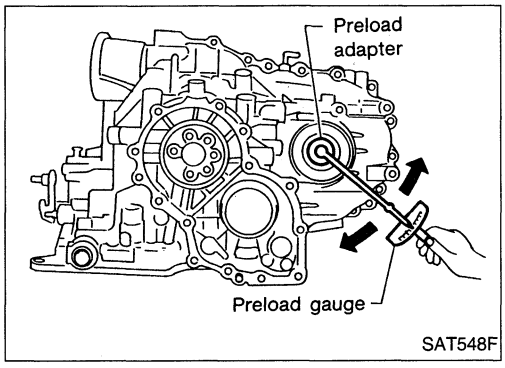
Bearing preload:
0.05 - 0.09 mm (0.0020 - 0.0035 in)

Adjustment (Cont'd)



SAT010F

9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.



SAT548F

14. Insert Tool into viscous coupling and measure turning torque of final drive assembly.

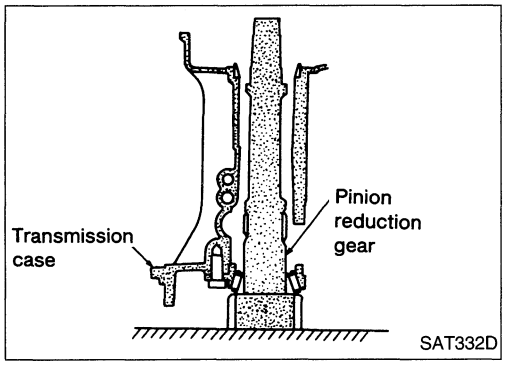
- **When measuring turning torque, turn final drive assembly in both directions several times to seat bearing rollers correctly.**

  Turning torque of final drive assembly (New bearing):
  0.78 - 1.37 N·m (8.0 - 14.0 kg-cm, 6.9 - 12.2 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

REDUCTION GEAR BEARING PRELOAD

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction gear bearing adjusting shim using the following procedures.

a. Place reduction gear on transmission case as shown.

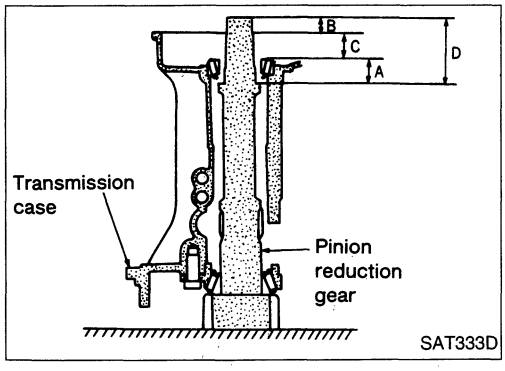


SAT332D

b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

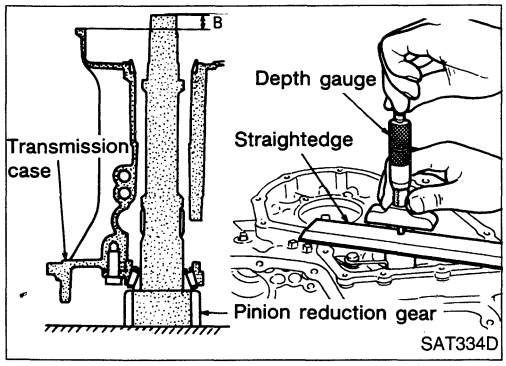
A = D − (B + C)

"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction gear.



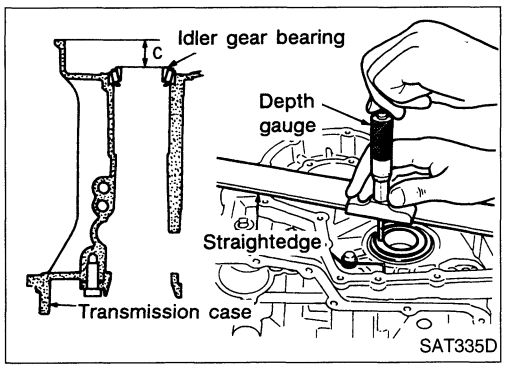
SAT333D

- Measure dimension "B" between the end of reduction gear and the surface of transmission case.
- **Measure dimension "B" in at least two places.**

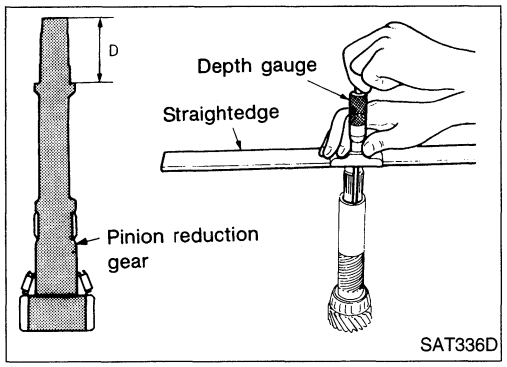


SAT334D

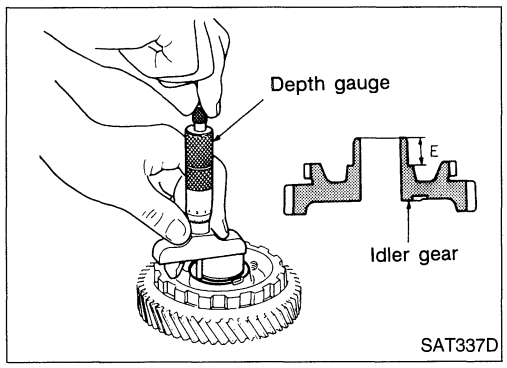
Adjustment (Cont'd)



- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- Measure dimension "D" between the end of reduction gear and the adjusting shim mating surface of reduction gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A"
  A = D − (B + C)



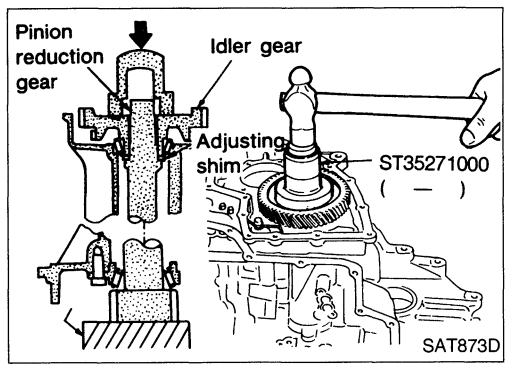
d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
- **Measure dimension "E" in at least two places.**

e. Select proper thickness of reduction gear bearing adjusting shim.

Proper shim thickness = A − E − 0.5 mm (0.0020 in)*

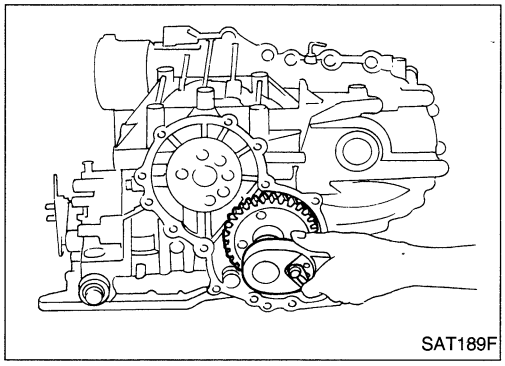
(* ... Bearing preload)

Reduction gear bearing adjusting shim: Refer to AT-213.



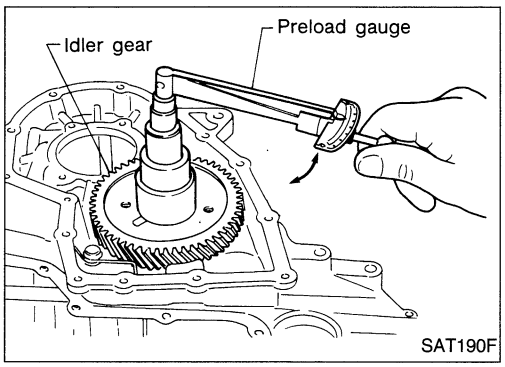
3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.
- **Press idler gear so that idler gear can be locked by parking pawl.**

Adjustment (Cont'd)


SAT189F

6. Tighten idler gear lock nut to the specified torque.

- **Lock idler gear with parking pawl when tightening lock nut.**



SAT190F

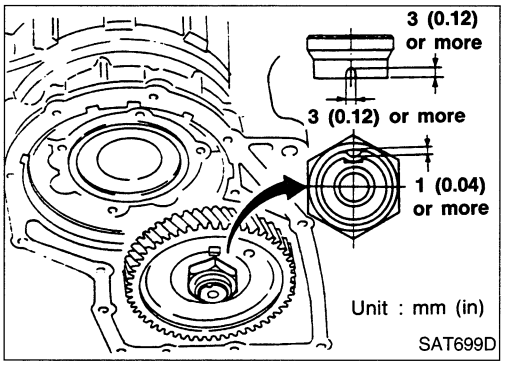
7. Measure turning torque of reduction gear.

- **When measuring turning torque, turn reduction gear in both directions several times to seat bearing rollers correctly.**

  Turning torque of reduction gear:

  0.05 - 0.39 N•m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)

- **If turning torque is out of specification, decrease or increase thickness of reduction gear bearing adjusting shim.**

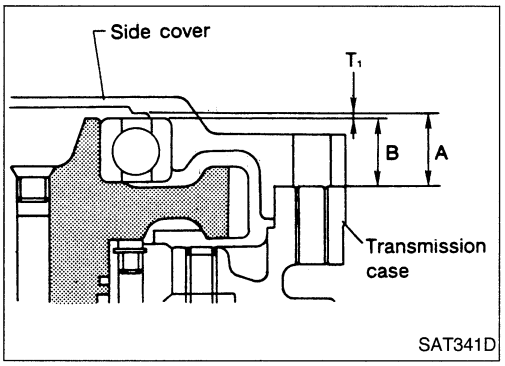


SAT699D

8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

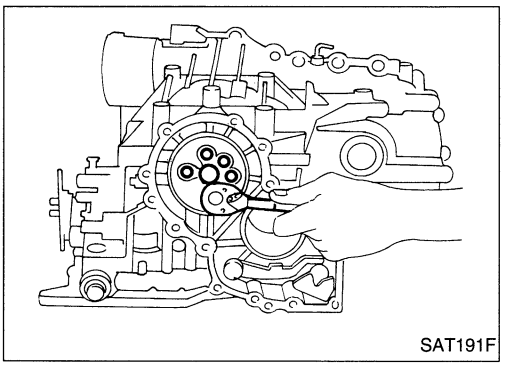
OUTPUT SHAFT END PLAY

- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.

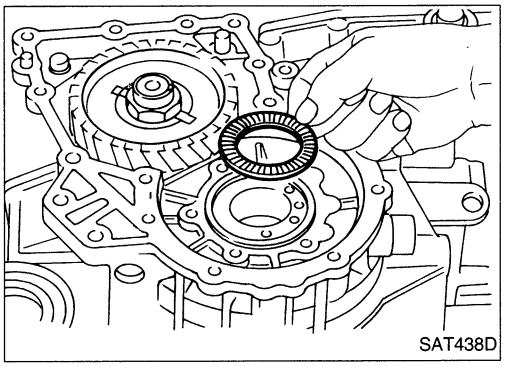


SAT341D

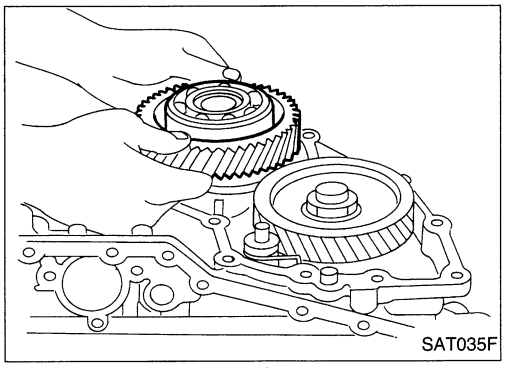
1. Install bearing retainer for output shaft.


SAT191F

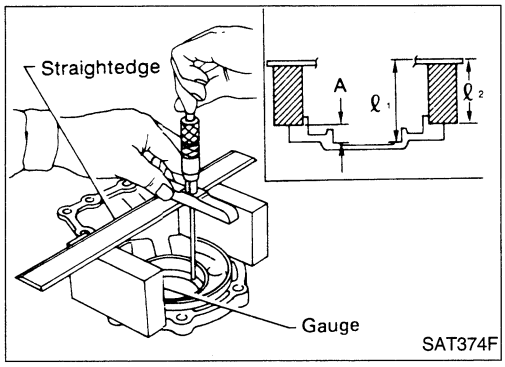
Adjustment (Cont'd)


SAT438D

2. Install output shaft thrust needle bearing on bearing retainer.


SAT035F

3. Install output shaft on transmission case.



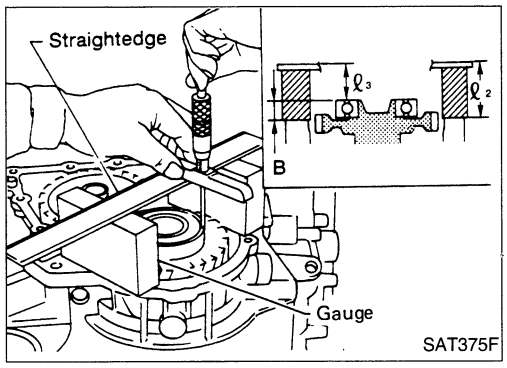
SAT374F

4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places.**

"A": Distance between transmission case fitting surface and adjusting shim mating surface.

$A = \ell_1 - \ell_2$ ℓ_2: Height of gauge



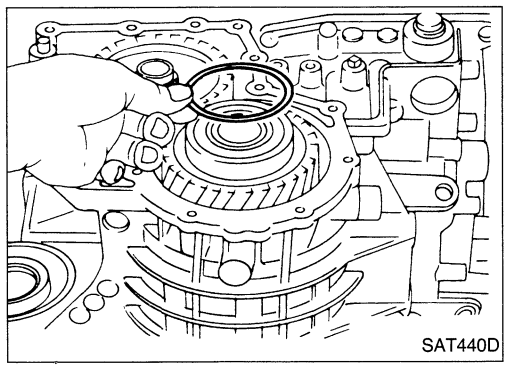
SAT375F

5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

Measure "ℓ_2" and "ℓ_3" in at least two places.

"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.

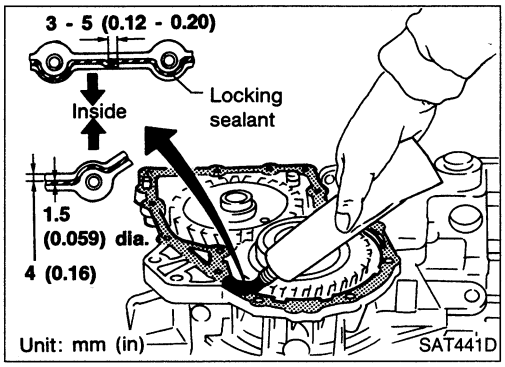
$B = \ell_2 - \ell_3$ ℓ_2: Height of gauge


SAT440D

6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

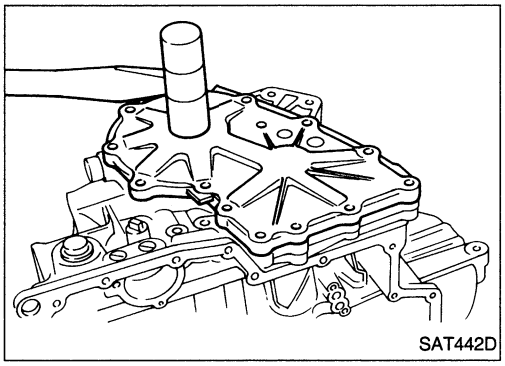
Output shaft end play (A − B):
0 - 0.15 mm (0 - 0.0059 in)
Output shaft end play adjusting shim:
Refer to AT-214.

7. Install adjusting shim on output shaft bearing.

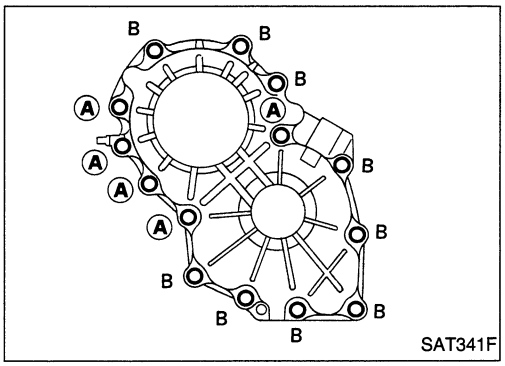


Assembly

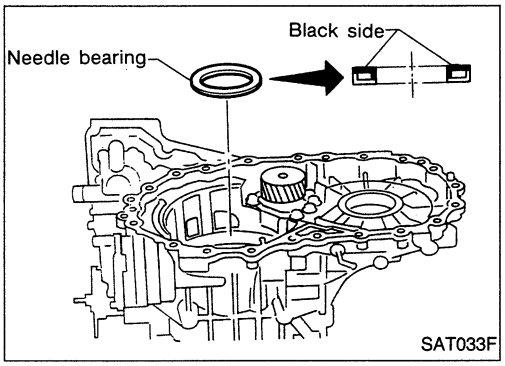
1. Apply locking sealant to transmission case as shown in illustration.
- Wash mating surfaces with a brake cleaner type solvent, allow to dry.
- The mating surfaces must be smooth and free of oil.
- Use an anaerobic liquid gasket Loctite P/N 51813 or equivalent to mating surface of side cover.



2. Set side cover on transmission case.

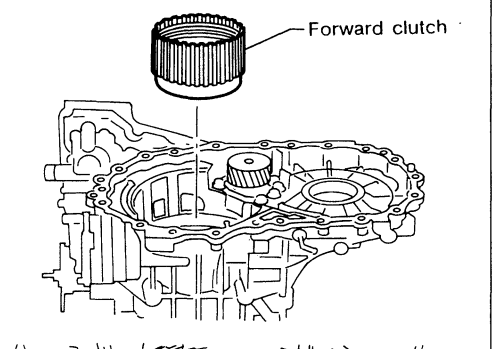


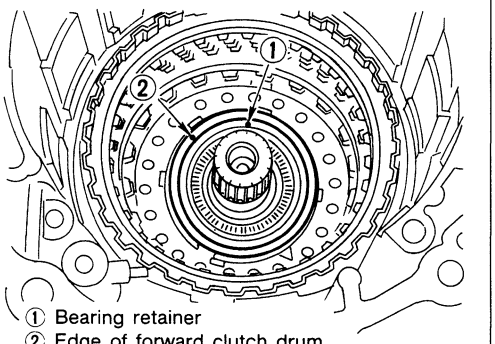
3. Tighten side cover fixing bolts to specified torque.
- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.
- **Apply petroleum jelly to thrust washer.**

Assembly (Cont'd)

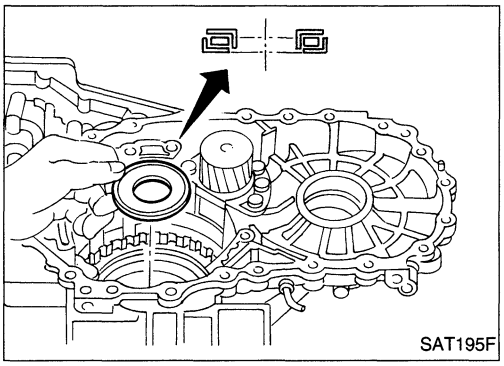




① Bearing retainer
② Edge of forward clutch drum

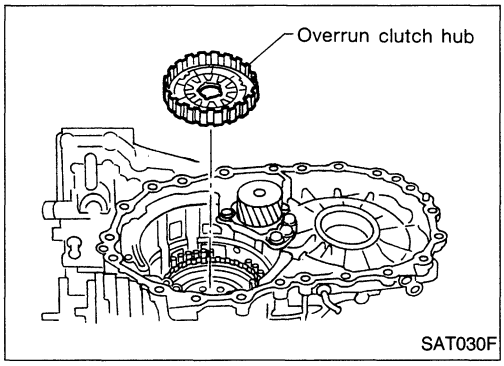
SAT194F

6. Install forward clutch assembly.
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points ① and ② are at almost same level.**



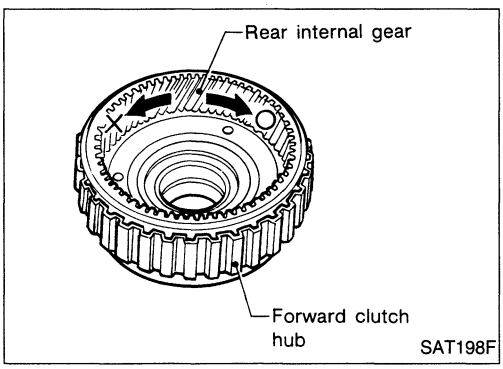
SAT195F

7. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



SAT030F

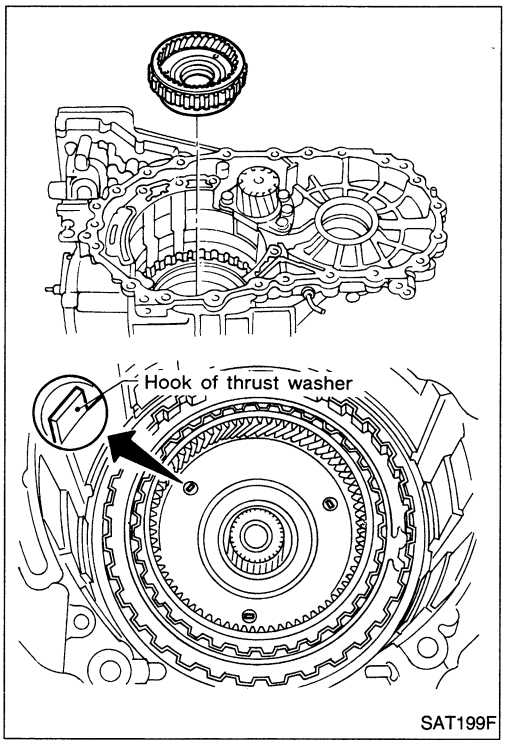
8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**



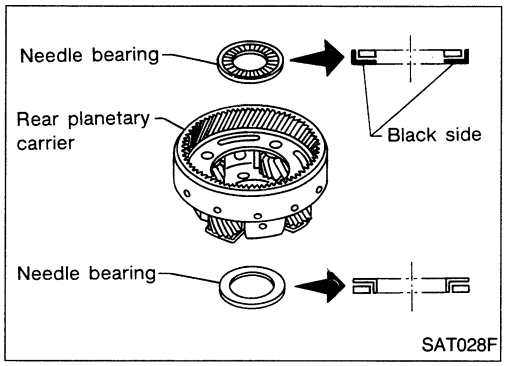
SAT198F

9. Hold forward clutch hub and turn rear internal gear. Check overrun clutch hub for correct directions of lock and unlock.
- **If not shown as illustration, check installed direction of forward one-way clutch.**

Assembly (Cont'd)

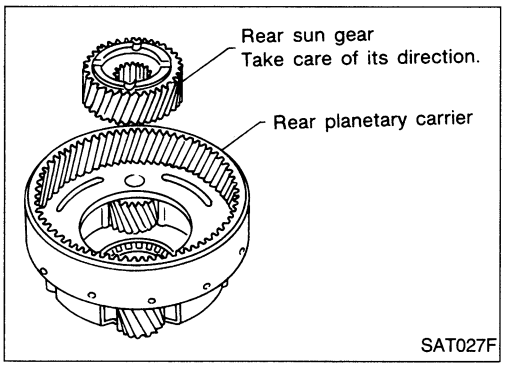


10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check three hooks of thrust washer are correctly aligned after installing.**

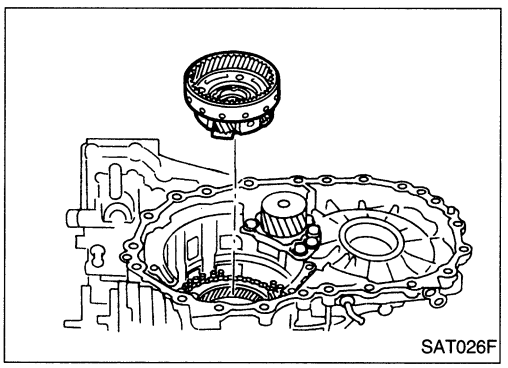


11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

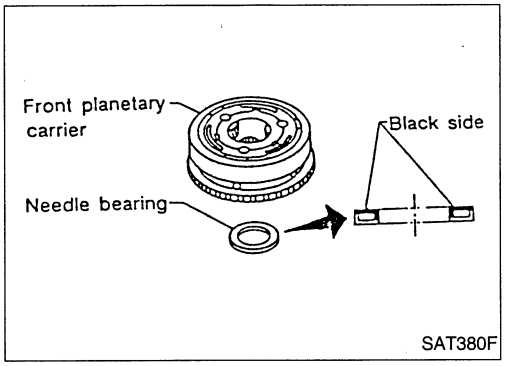


b. Install rear sun gear on rear planetary carrier.
- **Pay attention to direction of rear sun gear.**

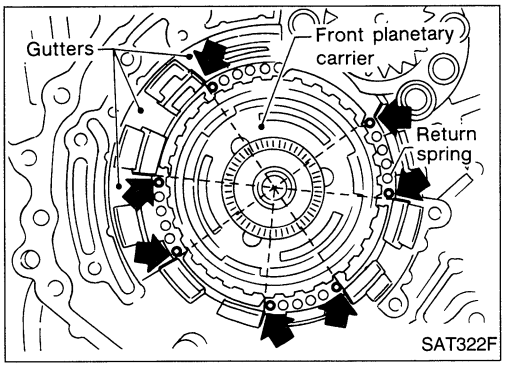


c. Install rear planetary carrier on transmission case.

Assembly (Cont'd)

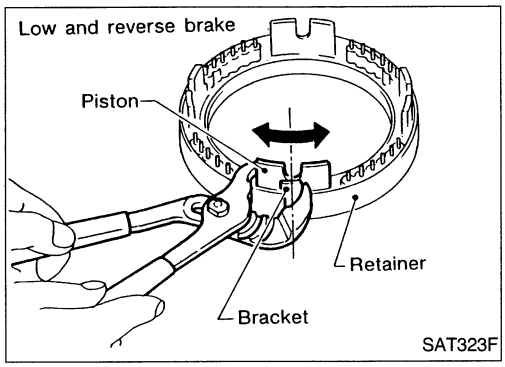


12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

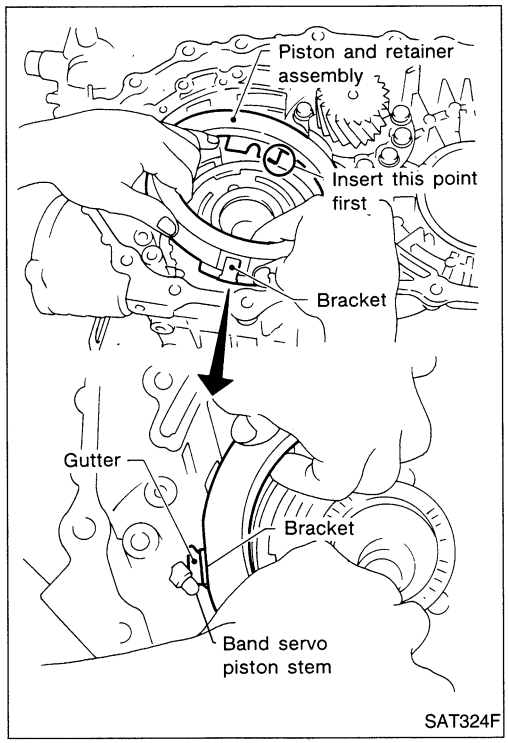


13. Install low and reverse brake piston according to the following procedures.

a. Set and align return springs to transmission case gutters as shown in illustration.

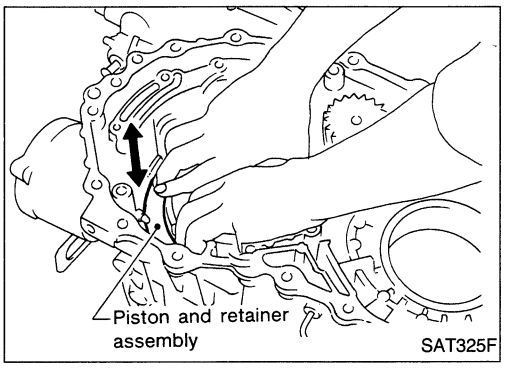


b. Set and align piston with retainer.



c. Install piston and retainer assembly on the transmission case.
- **Align bracket to specified gutter as indicated in illustration.**

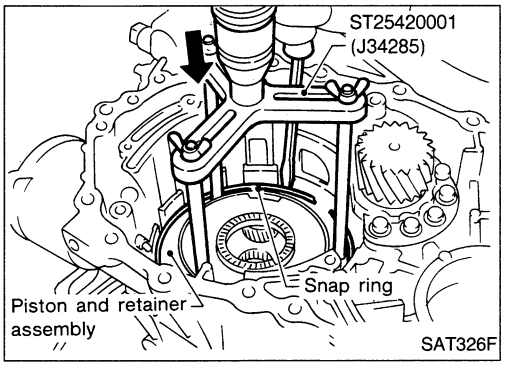
Assembly (Cont'd)



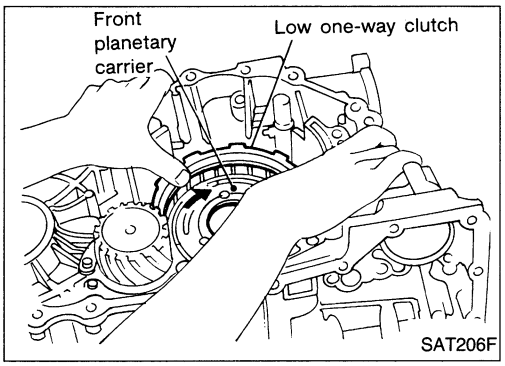
d. Check that each protrusions of piston is correctly set to corresponding return spring as follows.

Push piston and retainer assembly evenly and confirm they move smoothly.

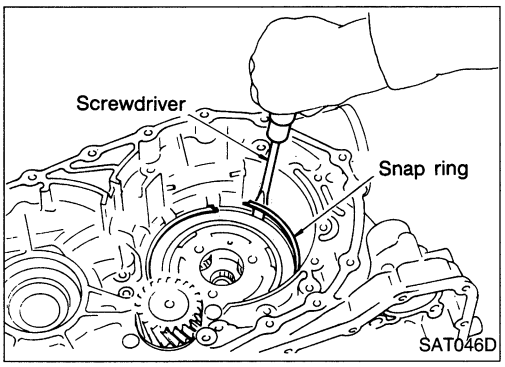
If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".



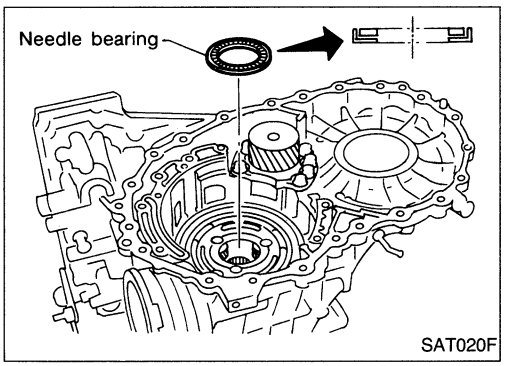
e. Push down piston and retainer assembly and install snap ring.



14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.

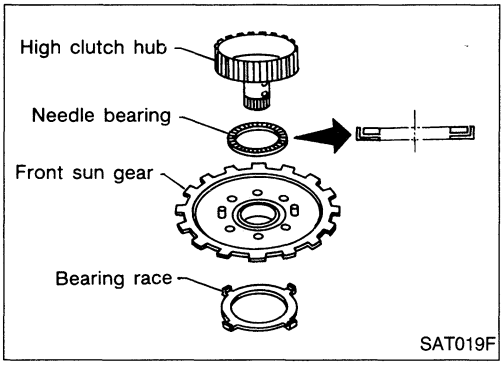


15. Install snap ring with screwdriver.

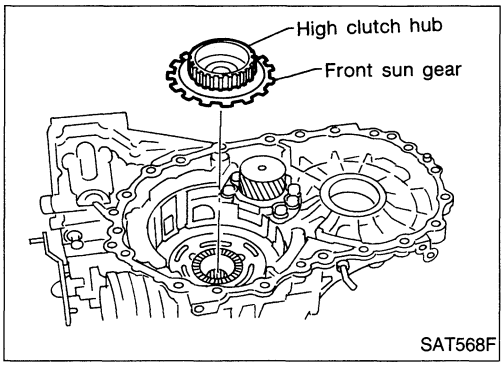


16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

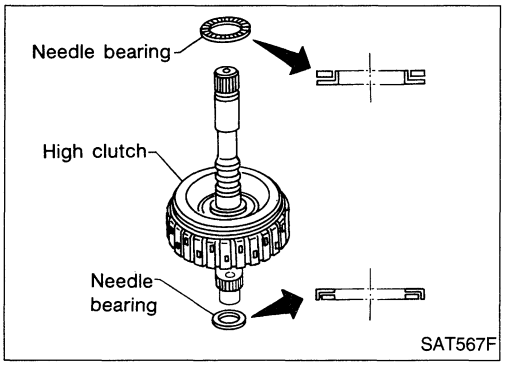
Assembly (Cont'd)



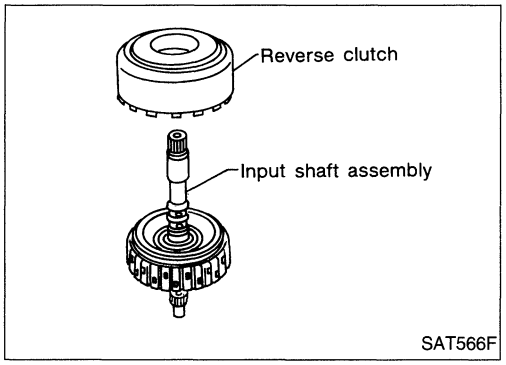
17. Install bearing race, needle bearing and high clutch hub on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



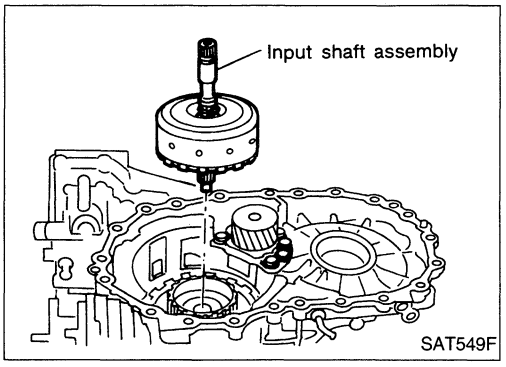
18. Install high clutch hub and front sun gear on transmission case.



19. Install needle bearings on high clutch drum.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
- **Align teeth of reverse clutch drive plates before installing.**

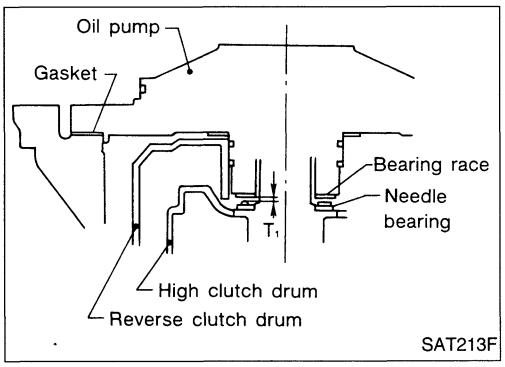


22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

Adjustment

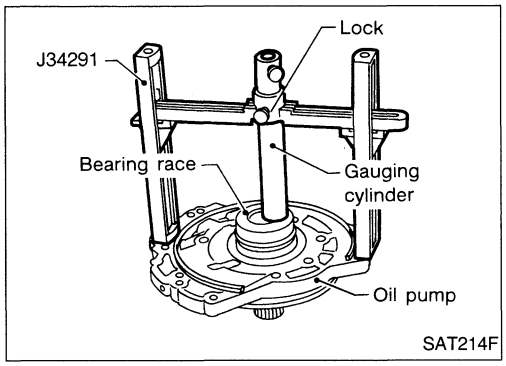
When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Part name	Item	
	Total end play	Reverse clutch end play
Transmission case	●	●
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	●	●

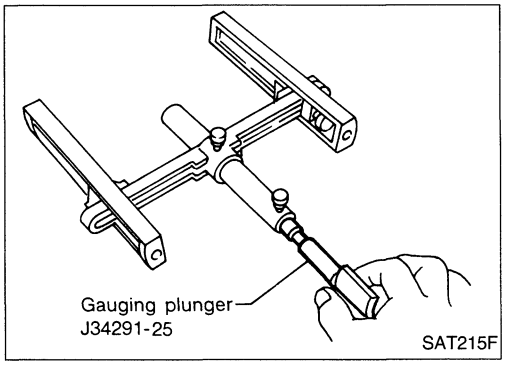


TOTAL END PLAY

1. Adjust total end play "T_1".

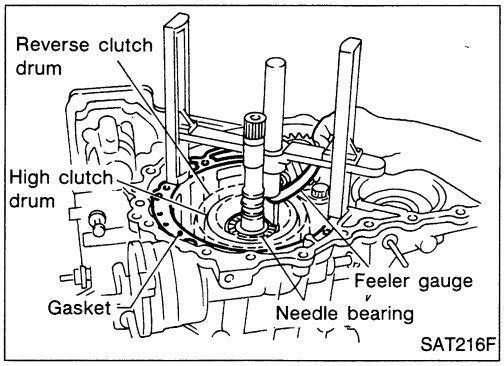


a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.

Adjustment (Cont'd)



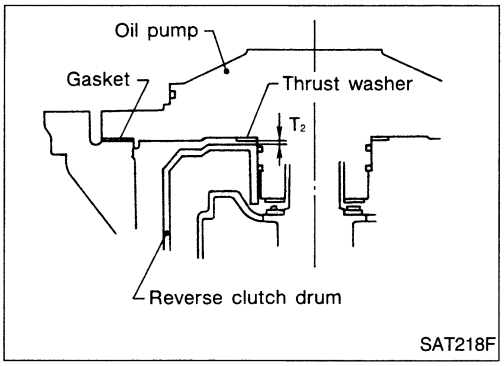
c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket) and allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

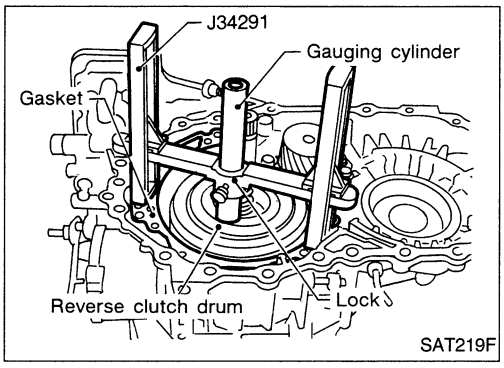
Total end play "T_1":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

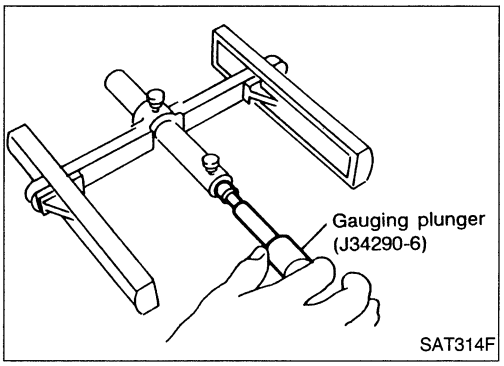
Available bearing race:
Refer to AT-215.



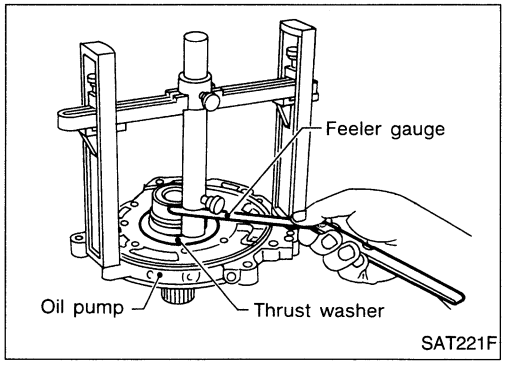
2. Adjust reverse clutch drum end play "T_2".



a. Place Tool on machined surface of transmission case (with gasket) and allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



b. Install gauging plunger into cylinder.



c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly and allow plunger to rest on thrust washer.

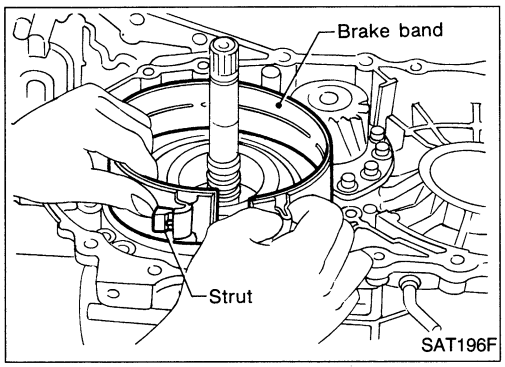
d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

Adjustment (Cont'd)

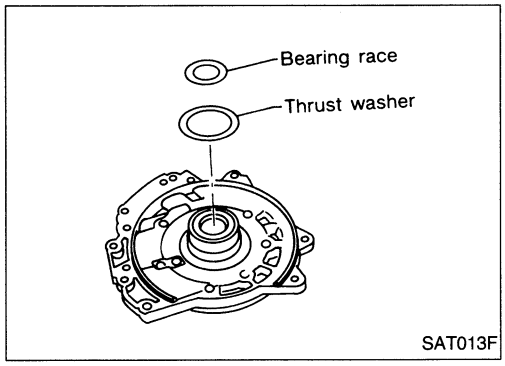
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

Available thrust washer:
Refer to AT-214.

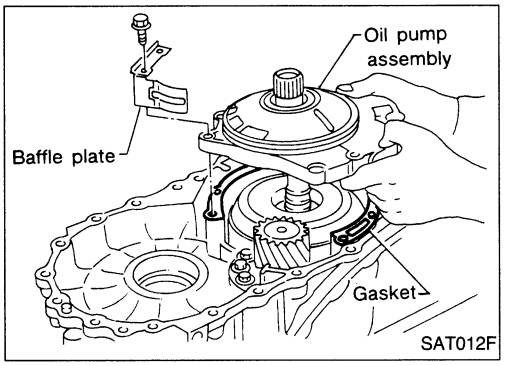


Assembly

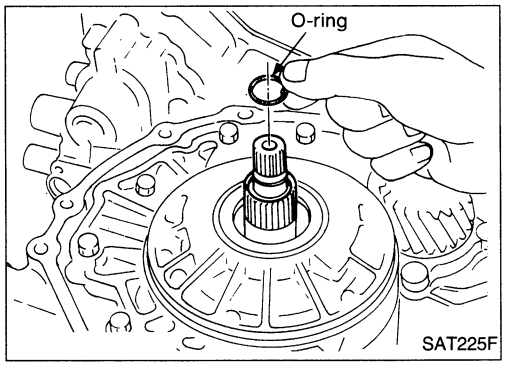
1. Install anchor end pin, washer and lock nut on transmission case.
2. Place brake band and strut on periphery of reverse clutch drum. Then, tighten anchor end pin just enough so that brake band is fitted on periphery of reverse clutch drum uniformly.



3. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

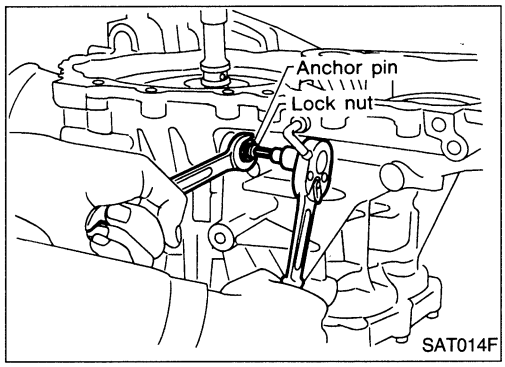


5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.

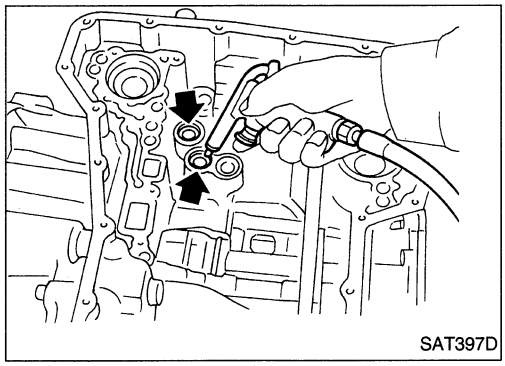


7. Install O-ring to input shaft.
- **Apply ATF to O-ring.**

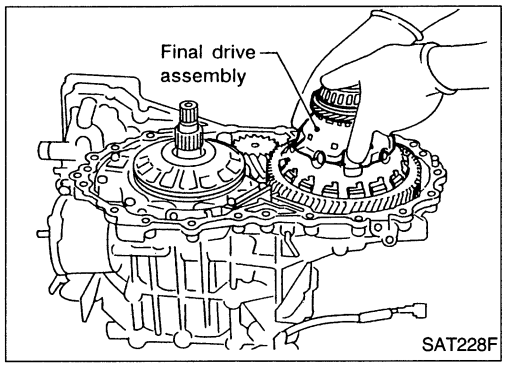
Assembly (Cont'd)



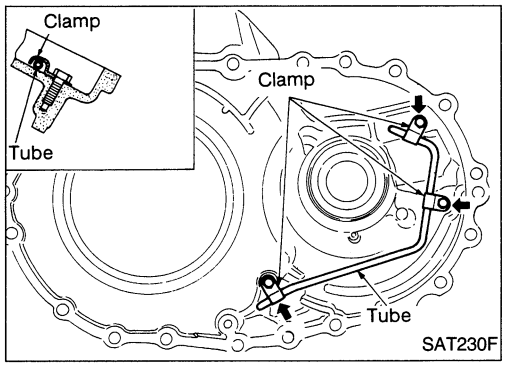
8. Adjust brake band.
a. Tighten anchor end pin to the specified torque.
Anchor end pin:
: 4 - 6 N•m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
b. Back off anchor end pin two and a half turns.
c. While holding anchor end pin, tighten lock nut.



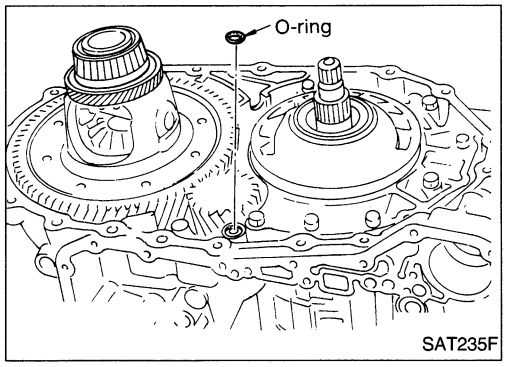
9. Apply compressed air to oil holes of transmission case and check operation of brake band.



10. Install final drive assembly on transmission case.

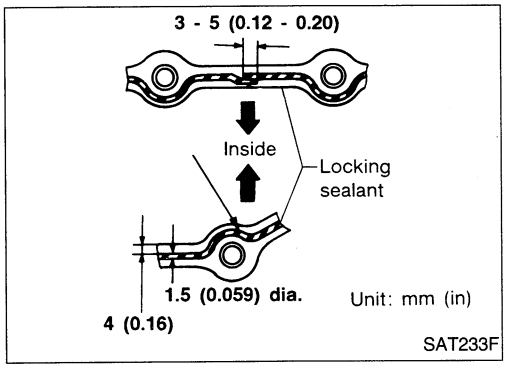


11. Install oil tube on converter housing.

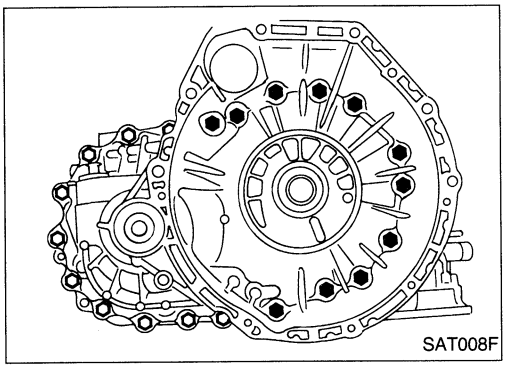


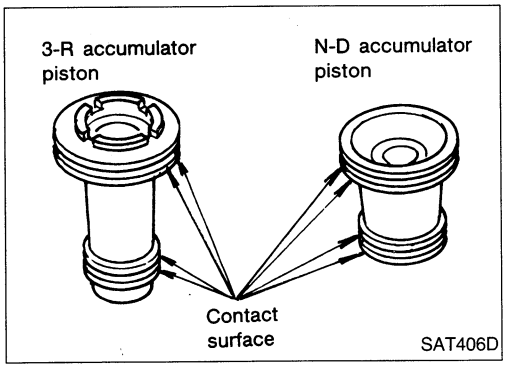
12. Install O-ring on differential oil port of transmission case.

Assembly (Cont'd)

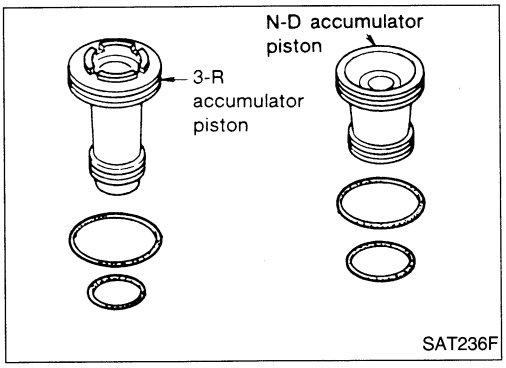


13. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**
- **Wash mating surfaces with a brake cleaner type solvent, allow to dry.**
- **The mating surfaces must be smooth and free of oil.**
- **Use an anaerobic liquid gasket Loctite P/N 51813 or equivalent to mating surface of converter housing.**





14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.

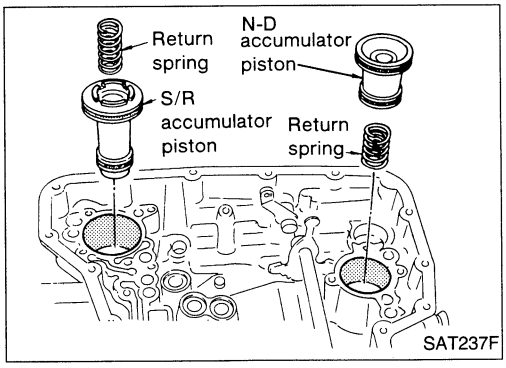


b. Install O-rings on accumulator piston.
- Apply ATF to O-rings.

Accumulator piston O-rings:

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
3-R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)



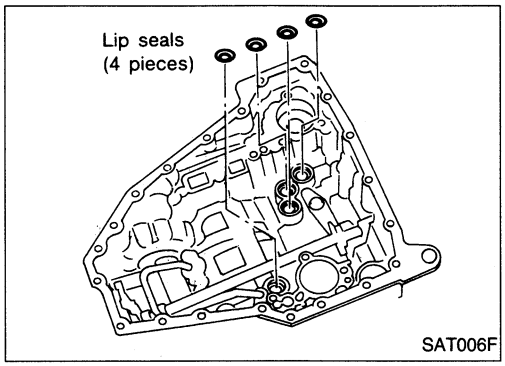
c. Install accumulator pistons and return springs on transmission case.
- **Apply ATF to inner surface of transmission case.**

Return springs:

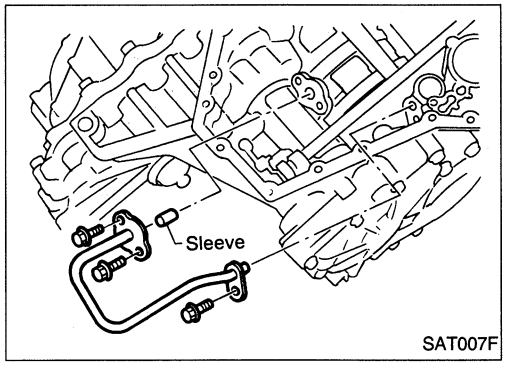
Unit: mm (in)

Spring	Free length	Outer diameter
3-R accumulator spring	52.5 (2.067)	20.4 (0.803)
N-D accumulator spring	43.5 (1.713)	27.0 (1.063)

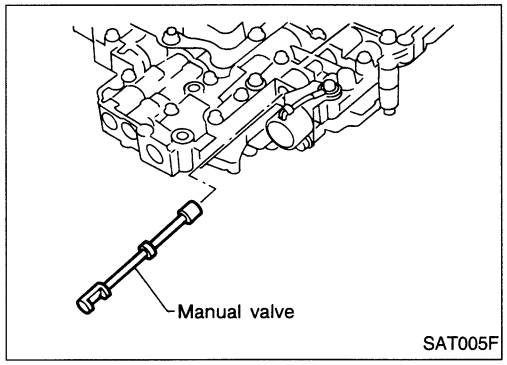
Assembly (Cont'd)



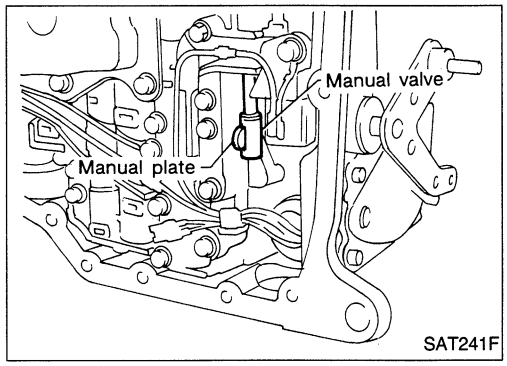
15. Install lip seals for band servo oil holes on transmission case.
- **Apply petroleum jelly to lip seals.**



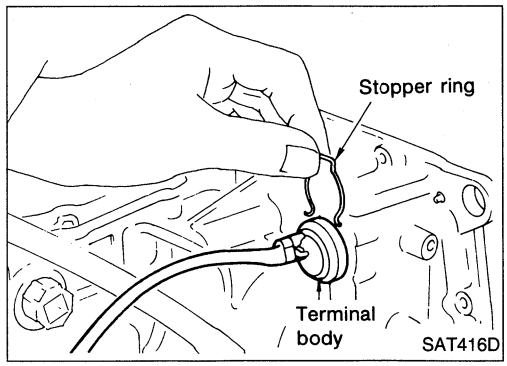
16. Install tube and sleeve.



17. Install control valve assembly.
a. Insert manual valve into control valve assembly.
- **Apply ATF to manual valve.**



b. Set manual shaft in Park/neutral position.
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

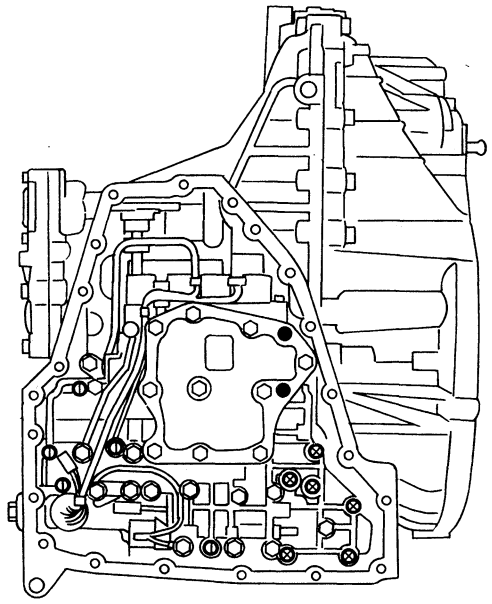


d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.

Assembly (Cont'd)

Unit: mm (in)

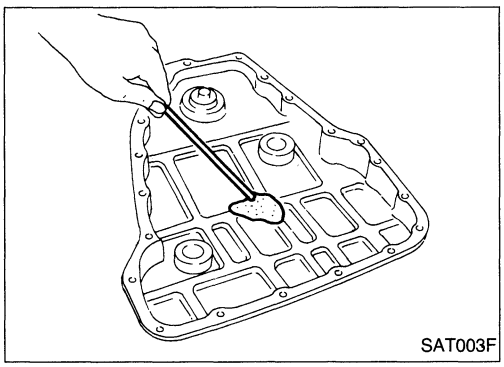
- ⓘ 5 bolts ℓ = 40 (1.57)
- ⓧ 6 bolts ℓ = 33 (1.30)
- ● 2 bolts ℓ = 43.5 (1.713)



SAT647E

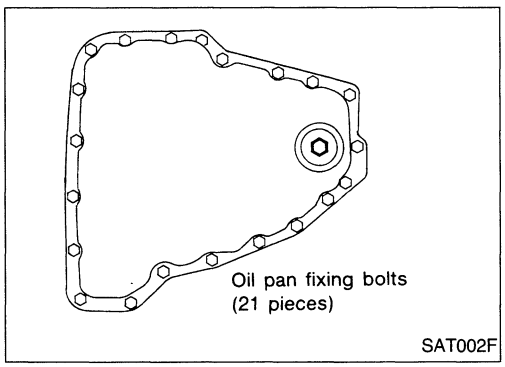
f. Tighten bolts ⓘ, ⓧ and ●.

Bolt length, number and location are shown in the illustration.



SAT003F

18. Install oil pan.
a. Attach a magnet to oil pan.



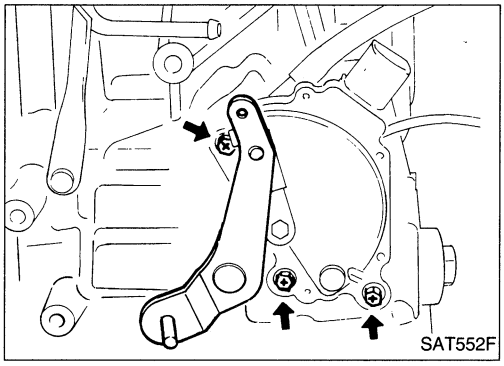
SAT002F

b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.

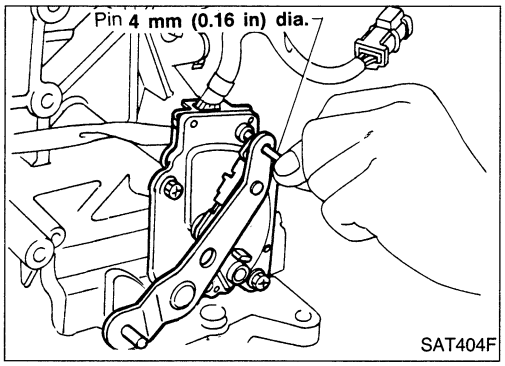
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to the specified torque.

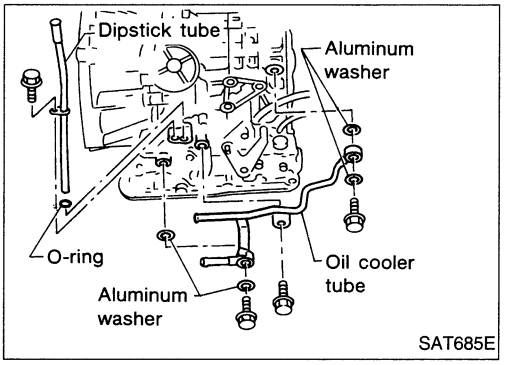
Assembly (Cont'd)



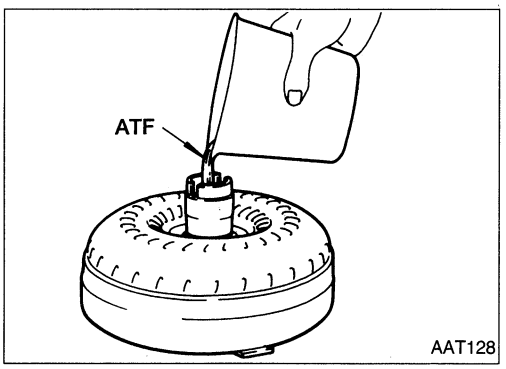
19. Install inhibitor switch.
a. Set manual lever in "P" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move selector lever to "N" position.



d. Insert 4.0 mm (0.157 in) dia. pin into adjustment hole in both inhibitor switch and manual shaft as near vertically as possible.
e. Tighten inhibitor switch fixing bolts.
f. Remove pin from adjustment hole after adjusting inhibitor switch.

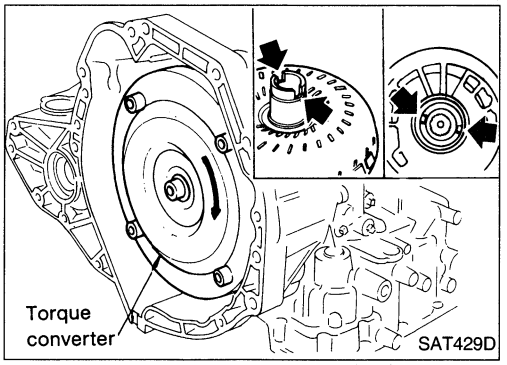


20. Install oil charging pipe and oil cooler tube to transmission case.



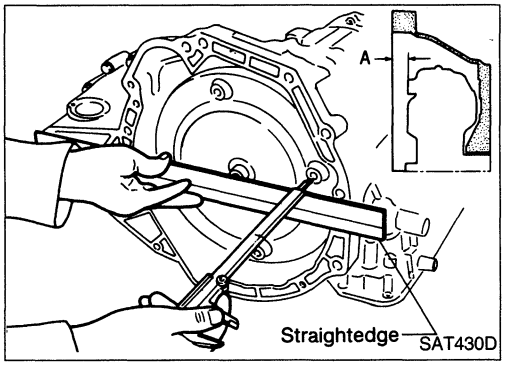
21. Install torque converter.
a. Pour ATF into torque converter.

- **Approximately 1 liters (1-1/8 US qt, 7/8 Imp qt) of fluid is 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 of torque converter with notches of oil pump.

Assembly (Cont'd)



c. Measure distance "A" to check that torque converter is in proper position.
   Distance "A": 19 mm (0.75 in) or more

General Specifications

Engine	KA24DE	
Automatic transaxle model	RE4F04A	RE4F04V
Automatic transaxle assembly Model code number	80X05	80X06
Transaxle gear ratio		
1st	2.785	
2nd	1.545	
3rd	1.000	
4th	0.694	
Reverse	2.272	
Final drive	3.619	
Recommended oil	Genuine Nissan Automatic Transmission Fluid (ATF) or equivalent DEXRON II E™ type fluid	
Oil capacity ℓ (US qt, Imp qt)	8.3 (8-3/4, 7-1/4)	8.5 (9, 7-1/2)

Specifications and Adjustments

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Shift pattern	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	Comfort	62 - 70 (39 - 43)	114 - 122 (71 - 76)	179 - 187 (111 - 116)	175 - 183 (109 - 114)	105 - 113 (65 - 70)	41 - 49 (25 - 30)	62 - 70 (39 - 43)
	Auto power	62 - 70 (39 - 43)	114 - 122 (71 - 76)	179 - 187 (111 - 116)	175 - 183 (109 - 114)	105 - 113 (65 - 70)	41 - 49 (25 - 30)	62 - 70 (39 - 43)
Half throttle	Comfort	42 - 50 (26 - 31)	78 - 86 (48 - 53)	124 - 132 (77 - 82)	74 - 82 (46 - 51)	40 - 48 (25 - 30)	5 - 13 (3 - 8)	62 - 70 (39 - 43)
	Auto power	45 - 53 (28 - 33)	84 - 92 (52 - 57)	132 - 140 (82 - 87)	86 - 94 (53 - 58)	52 - 60 (32 - 37)	5 - 13 (3 - 8)	62 - 70 (39 - 43)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Throttle position	Shift pattern	OD switch (shift range)	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	Comfort	ON [D_4]	105 - 113 (65 - 70)	53 - 61 (33 - 38)
		OFF [D_3]	86 - 94 (53 - 58)	83 - 91 (52 - 57)
	Auto power	ON [D_4]	108 - 116 (67 - 72)	53 - 61 (33 - 38)
		OFF [D_3]	88 - 94 (55 - 58)	83 - 91 (52 - 57)

STALL REVOLUTION

Stall revolution	rpm	2,100 - 2,400

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm^2, psi)	
	D, 2 and 1 ranges	R range
Idle	755 (7.7, 109)	1,177 (12.0, 171)
Stall	1,226 (12.5, 178)	1,961 (20.0, 284)

CONTROL VALVES

Control valve return springs

Unit: mm (in)

Parts		Item		
		Part No.	Free length	Outer diameter
Lower body	Accumulator shift valve spring	31736-01X00	23.0 (0.906)	6.65 (0.2618)
	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
		31742-80X16	32.0 (1.260)	6.9 (0.272)
Upper body	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	1-2 accumulator piston spring	31742-80X12	52.0 (2.047)	19.6 (0.772)
	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	2-3 timing valve	31742-80X18	30.5 (1.201)	6.6 (0.260)
	Overrun clutch reducing valve spring	31742-80X15	37.5 (1.476)	6.9 (0.272)
	Torque converter relief valve spring	31742-80X07	31.0 (1.220)	9.0 (0.354)
	Lock-up control valve spring	31742-80X17	39.5 (1.555)	11.0 (0.433)

CLUTCHES AND BRAKES

Reverse clutch	
Number of drive plates	2
Number of driven plates	2
Drive plate thickness mm (in)	
Standard	2.0 (0.079)
Allowable limit	1.8 (0.071)
Clearance mm (in)	
Standard	0.5 - 0.8 (0.020 - 0.031)
Allowable limit	1.2 (0.047)

Thickness of retaining plates	Thickness mm (in)	Part number
	6.6 (0.260)	31537-80X05
	6.8 (0.268)	31537-80X06
	7.0 (0.276)	31537-80X07
	7.2 (0.283)	31537-80X08
	7.4 (0.291)	31537-80X09
	7.6 (0.299)	31537-80X20
	7.8 (0.307)	31537-80X21

High clutch	
Number of drive plates	3
Number of driven plates	8
Drive plate thickness mm (in)	
Standard	1.6 (0.063)
Allowable limit	1.4 (0.055)
Clearance mm (in)	
Standard	1.8 - 2.2 (0.071 - 0.087)
Allowable limit	2.8 (0.110)

Thickness of retaining plates	Thickness mm (in)	Part number
	3.0 (0.118)	31537-80X15
	3.2 (0.126)	31537-80X16
	3.4 (0.134)	31537-80X17
	3.6 (0.142)	31537-80X18
	3.8 (0.150)	31537-80X19
	4.0 (0.157)	31537-80X22

Forward clutch	
Number of drive plates	4
Number of driven plates	4
Drive plate thickness mm (in)	
Standard	1.6 (0.063)
Allowable limit	1.4 (0.055)
Clearance mm (in)	
Standard	0.45 - 0.85 (0.0177 - 0.0335)
Allowable limit	1.65 (0.0650)

Thickness of retaining plates	Thickness mm (in)	Part number
	3.6 (0.142)	31537-80X70
	3.8 (0.150)	31537-80X71
	4.0 (0.157)	31537-80X72
	4.2 (0.165)	31537-80X73
	4.4 (0.173)	31537-80X74
	3.4 (0.134)	31537-80X75

Overrun clutch	
Number of drive plates	3
Number of driven plates	5
Drive plate thickness mm (in)	
Standard	1.6 (0.063)
Allowable limit	1.4 (0.055)
Clearance mm (in)	
Standard	0.7 - 1.1 (0.028 - 0.043)
Allowable limit	1.7 (0.067)

Thickness of retaining plates	Thickness mm (in)	Part number
	3.0 (0.118)	31537-80X60
	3.2 (0.126)	31537-80X61
	3.4 (0.134)	31537-80X62
	3.6 (0.142)	31537-80X63
	3.8 (0.150)	31537-80X64

Low & reverse brake	
Number of drive plates	5
Number of driven plates	5
Drive plate thickness mm (in)	
Standard	1.8 (0.071)
Allowable limit	1.6 (0.063)
Clearance mm (in)	
Standard	1.7 - 2.1 (0.067 - 0.083)
Allowable limit	3.1 (0.122)

Thickness of retaining plates	Thickness mm (in)	Part number
	2.0 (0.079)	31667-80X00
	2.2 (0.087)	31667-80X01
	2.4 (0.094)	31667-80X02
	2.6 (0.102)	31667-80X03
	2.8 (0.110)	31667-80X04
	3.0 (0.118)	31667-80X05
	3.2 (0.126)	31667-80X06
	3.4 (0.134)	31667-80X07

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
Lock nut tightening torque N•m (kg-m, ft-lb)	31 - 42 (3.2 - 4.3, 23 - 31)

Specifications and Adjustments (Cont'd)

FINAL DRIVE

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

Differential side gear thrust washers (RE4F04A)

Thickness mm (in)	Part number
0.75 (0.0295)	38424-81X00
0.80 (0.0315)	38424-81X01
0.85 (0.0335)	38424-81X02
0.90 (0.0354)	38424-81X03
0.95 (0.0374)	38424-81X04

(RE4F04V)

	Thickness mm (in)	Part number
Viscous coupling side	0.44 (0.0173)	38424-51E10
	0.53 (0.0209)	38424-51E11
	0.62 (0.0244)	38424-51E12
	0.71 (0.0280)	38424-51E13
	0.80 (0.0315)	38424-51E14
Differential case side	0.75 (0.0295)	38424-E3000
	0.80 (0.0315)	38424-E3001
	0.85 (0.0335)	38424-E3002
	0.90 (0.0354)	38424-E3003

Differential side bearing preload adjusting shims (RE4F04A)

Thickness mm (in)	Part number
0.48 (0.0189)	31438-80X00
0.52 (0.0205)	31438-80X01
0.56 (0.0220)	31438-80X02
0.60 (0.0236)	31438-80X03
0.64 (0.0252)	31438-80X04
0.68 (0.0268)	31438-80X05
0.72 (0.0283)	31438-80X06
0.76 (0.0299)	31438-80X07
0.80 (0.0315)	31438-80X08
0.84 (0.0331)	31438-80X09
0.88 (0.0346)	31438-80X10
0.92 (0.0362)	31438-80X11

(RE4F04V)

Thickness mm (in)	Part number
0.36 (0.0142)	38753-56E00
0.40 (0.0157)	38753-56E01
0.44 (0.0173)	38753-56E02
0.48 (0.0189)	38753-56E03
0.52 (0.0205)	38753-56E04
0.56 (0.0220)	38753-56E05
0.60 (0.0236)	38753-56E06
0.64 (0.0252)	38753-56E07
0.68 (0.0268)	38753-56E08
0.72 (0.0283)	38753-56E09
0.76 (0.0299)	38753-56E10
0.80 (0.0315)	38753-56E11
0.84 (0.0331)	38753-56E12
0.88 (0.0346)	38753-56E13
0.92 (0.0362)	38753-56E14
0.12 (0.0047)	38753-56E15
0.16 (0.0063)	38753-56E16
0.20 (0.0079)	38753-56E17
0.24 (0.0094)	38753-56E18
0.28 (0.0110)	38753-56E19
0.32 (0.0126)	38753-56E20

Bearing preload

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

Turning torque

Turning torque of final drive assembly N•m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

Clutch and brake return springs

Unit: mm (in)

Parts	Free length	Outer diameter
Forward clutch (Overrun clutch) (22 pcs)	21.4 (0.843)	10.3 (0.406)
High clutch (12 pcs)	22.5 (0.886)	10.8 (0.425)

Specifications and Adjustments (Cont'd)

PLANETARY CARRIER AND OIL PUMP

Planetary carrier		
Clearance between planetary carrier and pinion washer mm (in)		
Standard	0.20 - 0.70 (0.0079 - 0.0276)	
Allowable limit	0.80 (0.0315)	
Oil pump		
Oil pump side clearance mm (in)	0.030 - 0.050 (0.0012 - 0.0020)	
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number
	11.99 - 12.0 (0.4720 - 0.4724)	31346-80X00
	11.98 - 11.99 (0.4717 - 0.4720)	31346-80X01
	11.97 - 11.98 (0.4713 - 0.4717)	31346-80X02
	Outer gear	
	Thickness mm (in)	Part number
	11.99 - 12.0 (0.4720 - 0.4724)	31347-80X00
	11.98 - 11.99 (0.4717 - 0.4720)	31347-80X01
	11.97 - 11.98 (0.4713 - 0.4717)	31347-80X02
Clearance between oil pump housing and outer gear mm (in)		
Standard	0.111 - 0.181 (0.0044 - 0.0071)	
Allowable limit	0.181 (0.0071)	
Oil pump cover seal ring clearance mm (in)		
Standard	0.036 - 0.176 (0.0014 - 0.0069)	
Allowable limit	0.176 (0.0069)	

INPUT SHAFT

Input shaft seal ring clearance mm (in)	
Standard	0.08 - 0.23 (0.0031 - 0.0091)
Allowable limit	0.23 (0.0091)

REDUCTION GEAR

Turning torque

Turning torque of reduction gear N•m (kg-cm, in-lb)	0.05 - 0.39 (0.5 - 4.0, 0.43 - 3.47)

Reduction gear bearing adjusting shims

Thickness mm (in)	Part number
5.00 (0.1969)	31439-81X00
5.02 (0.1976)	31439-81X01
5.04 (0.1984)	31439-81X02
5.06 (0.1992)	31439-81X03
5.08 (0.2000)	31439-81X04
5.10 (0.2008)	31439-81X05
5.12 (0.2016)	31439-81X06
5.14 (0.2024)	31439-81X07
5.16 (0.2031)	31439-81X08
5.18 (0.2039)	31439-81X09
5.20 (0.2047)	31439-81X10
5.22 (0.2055)	31439-81X11
5.24 (0.2063)	31439-81X12
5.26 (0.2071)	31439-81X13
5.28 (0.2079)	31439-81X14
5.30 (0.2087)	31439-81X15
5.32 (0.2094)	31439-81X16
5.34 (0.2102)	31439-81X17
5.36 (0.2110)	31439-81X18
5.38 (0.2118)	31439-81X19
5.40 (0.2126)	31439-81X20
5.42 (0.2134)	31439-81X21
5.44 (0.2142)	31439-81X22
5.46 (0.2150)	31439-81X23
5.48 (0.2157)	31439-81X24
5.50 (0.2165)	31439-81X46
5.52 (0.2173)	31439-81X47
5.54 (0.2181)	31439-81X48
5.56 (0.2189)	31439-81X49
5.58 (0.2197)	31439-81X60
5.60 (0.2205)	31439-81X61
5.62 (0.2213)	31439-81X62
5.64 (0.2220)	31439-81X63
5.66 (0.2228)	31439-81X64
5.68 (0.2236)	31439-81X65
5.70 (0.2244)	31439-81X66
5.72 (0.2252)	31439-81X67
5.74 (0.2260)	31439-81X68
5.76 (0.2268)	31439-81X69
5.78 (0.2276)	31439-81X70
5.80 (0.2283)	31439-81X71
5.82 (0.2291)	31439-81X72
5.84 (0.2299)	31439-81X73
5.86 (0.2307)	31439-81X74
5.88 (0.2315)	31439-81X75
5.90 (0.2323)	31439-81X76
5.92 (0.2331)	31439-81X77
5.94 (0.2339)	31439-81X78
5.96 (0.2346)	31439-81X79
5.98 (0.2354)	31439-81X80
6.00 (0.2362)	31439-81X81
6.02 (0.2370)	31439-81X82
6.04 (0.2378)	31439-81X83
6.06 (0.2386)	31439-81X84
6.08 (0.2394)	31439-82X00
6.10 (0.2402)	31439-82X01
6.12 (0.2409)	31439-82X02
6.14 (0.2417)	31439-82X03
6.16 (0.2425)	31439-82X04
6.18 (0.2433)	31439-82X05

Specifications and Adjustments (Cont'd)

6.20 (0.2441)	31439-82X06
6.22 (0.2449)	31439-82X07
6.24 (0.2457)	31439-82X08
6.26 (0.2465)	31439-82X09
6.28 (0.2472)	31439-82X10
6.30 (0.2480)	31439-82X11
6.32 (0.2488)	31439-82X12
6.34 (0.2496)	31439-82X13
6.36 (0.2504)	31439-82X14
6.38 (0.2512)	31439-82X15
6.40 (0.2520)	31439-82X16
6.42 (0.2528)	31439-82X17
6.44 (0.2535)	31439-82X18
6.46 (0.2543)	31439-82X19
6.48 (0.2551)	31439-82X20
6.50 (0.2559)	31439-82X21
6.52 (0.2567)	31439-82X22
6.54 (0.2575)	31439-82X23
6.56 (0.2583)	31439-82X24
6.58 (0.2591)	31439-82X60
6.60 (0.2598)	31439-82X61
6.62 (0.2606)	31439-82X62
6.64 (0.2614)	31439-82X63
6.66 (0.2622)	31439-82X64
6.68 (0.2630)	31439-82X65
6.70 (0.2638)	31439-82X66
6.72 (0.2646)	31439-82X67

REVERSE CLUTCH END PLAY

Reverse clutch end play mm (in)	0.55 - 0.90 (0.0217 - 0.0354)

Thrust washers for adjusting reverse clutch drum end play

Thickness mm (in)	Part number
0.80 (0.0315)	31508-80X00
1.40 (0.0551)	31508-80X03
0.95 (0.0374)	31508-80X07
1.10 (0.0433)	31508-80X08
1.25 (0.0492)	31508-80X09
1.55 (0.0610)	31508-80X10
1.70 (0.0669)	31508-80X11
1.85 (0.0728)	31508-80X12

ACCUMULATOR

O-ring

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
3-R accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

Return spring

Unit: mm (in)

Accumulator	Free length	Outer diameter
3-R accumulator	52.5 (2.067)	20.4 (0.803)
N-D accumulator	43.5 (1.713)	27.0 (1.063)

BAND SERVO

Return spring

Unit: mm (in)

Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31.0 (1.220)	21.7 (0.854)

REMOVAL AND INSTALLATION

Unit: mm (in)

Distance between end of converter housing and torque converter	19 (0.75)

OUTPUT SHAFT

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

End play

Output shaft end play mm (in)	0 - 0.15 (0 - 0.0059)

Output shaft adjusting shims

Thickness mm (in)	Part number
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

Specifications and Adjustments (Cont'd)

BEARING RETAINER

Seal ring clearance

Bearing retainer seal ring clearance mm (in)	
Standard	0.10 - 0.30 (0.0039 - 0.0118)
Allowable limit	0.30 (0.0118)

TOTAL END PLAY

Total end play	mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

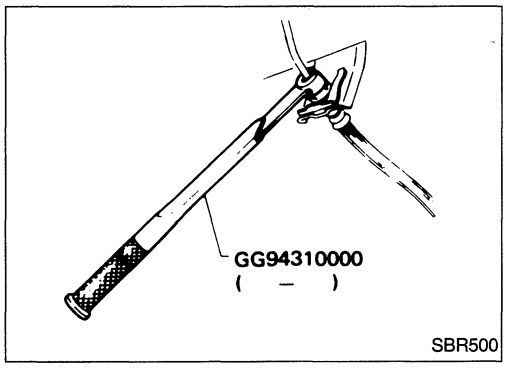
Bearing race for adjusting total end play

Thickness mm (in)	Part number
0.8 (0.031)	31435-80X00
1.0 (0.039)	31435-80X01
1.2 (0.047)	31435-80X02
1.4 (0.055)	31435-80X03
1.6 (0.063)	31435-80X04
1.8 (0.071)	31435-80X05
2.0 (0.079)	31435-80X06
0.9 (0.035)	31435-80X09
1.1 (0.043)	31435-80X10
1.3 (0.051)	31435-80X11
1.5 (0.059)	31435-80X12
1.7 (0.067)	31435-80X13
1.9 (0.075)	31435-80X14

FRONT AXLE AND FRONT SUSPENSION

SECTION FA

CONTENTS

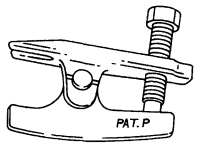
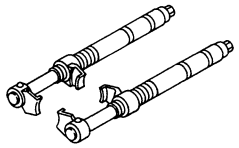
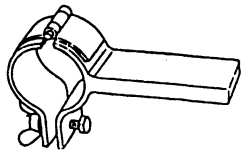
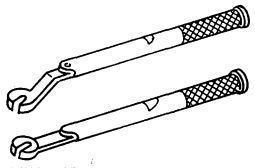
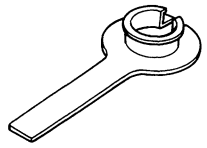


Precautions

- **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 flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**

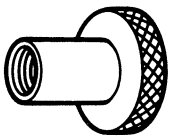
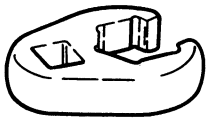
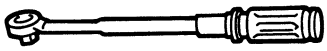
Preparation

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
HT72520000 (J25730-A) Ball joint remover		Removing tie-rod outer end and lower ball joint
HT71780000 (—) Spring compressor		Removing and installing coil spring
ST35652000 (—) Strut attachment		Fixing strut assembly
GG94310000 (—) Flare nut wrench		Removing and installing brake piping
KV38106700 (J34296) KV38106800 (J34297) Differential side oil seal protector	 LH: KV38106700 RH: KV38106800	Installing drive shaft

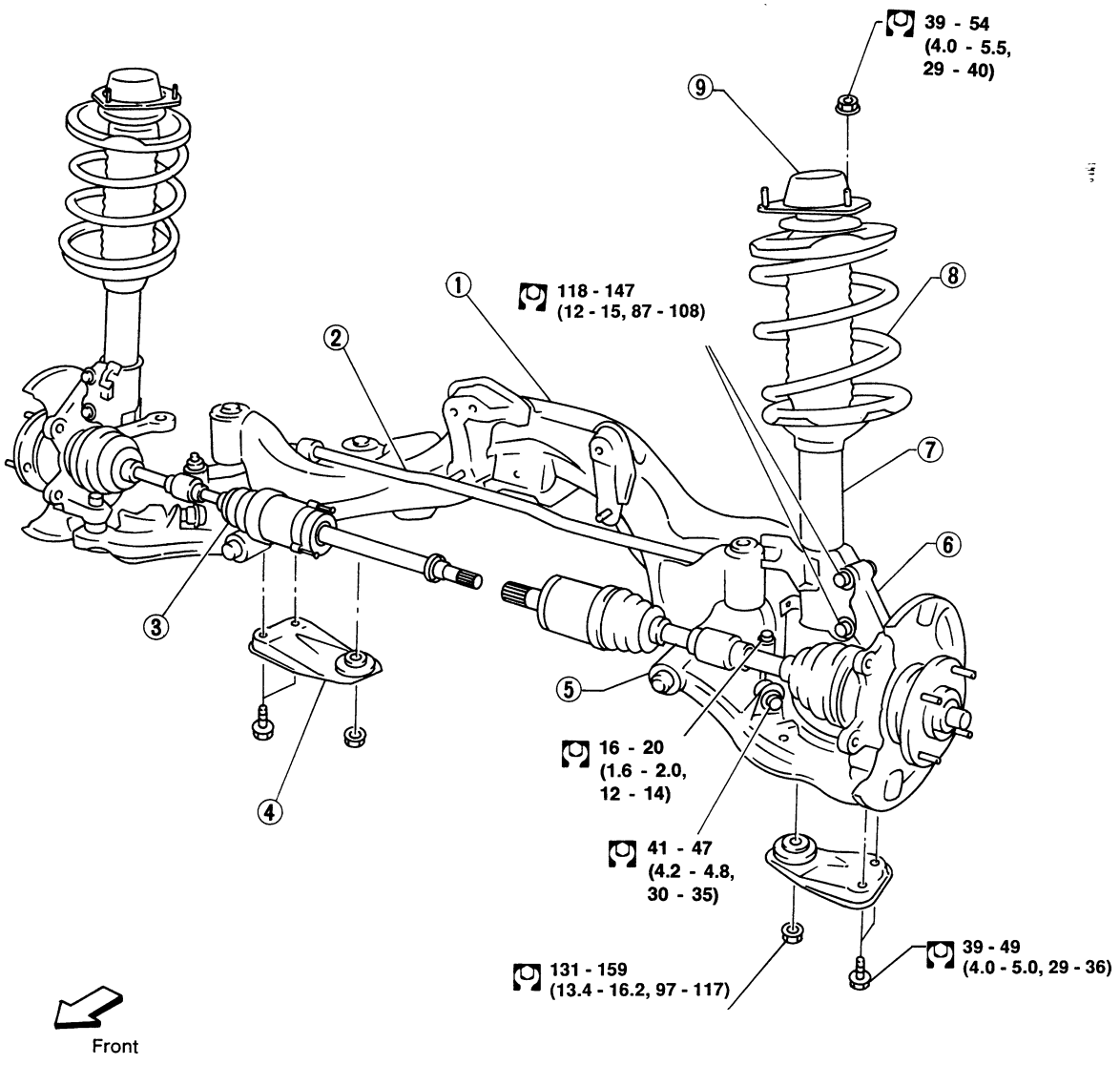
Preparation (Cont'd)

COMMERCIAL SERVICE TOOLS

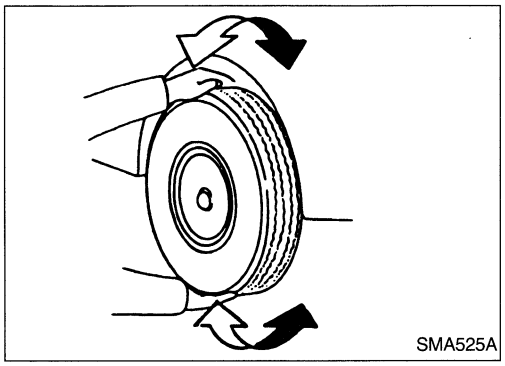
Tool name	Description
Attachment Wheel alignment	
Flare nut crows foot	
Torque wrench	

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

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



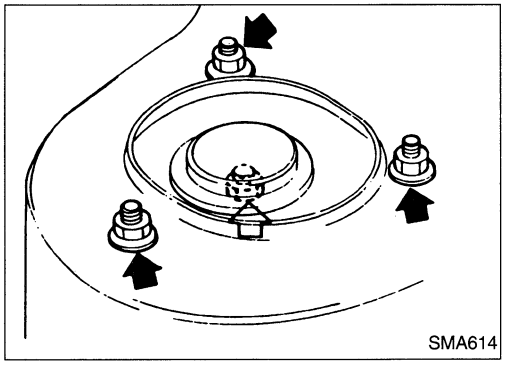
① Suspension member
② Stabilizer bar
③ Drive shaft
④ Rebound stopper
⑤ Transverse link
⑥ Knuckle
⑦ Strut assembly
⑧ Coil spring
⑨ Strut mounting insulator assembly


SMA525A

Front Axle and Front Suspension Parts

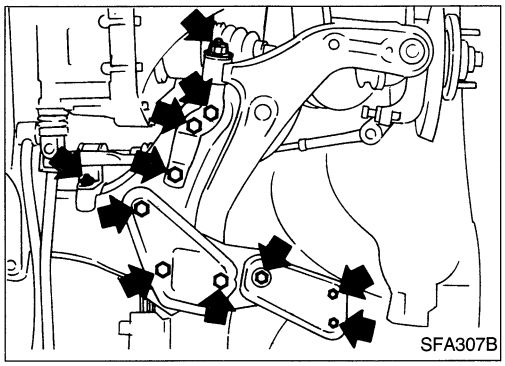
Check front axle and front suspension parts for looseness, cracks, wear or other damage.

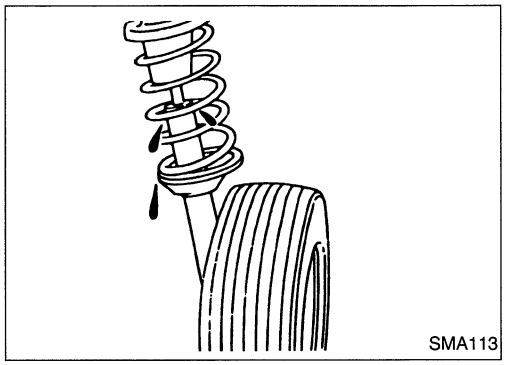
- Shake each front wheel to check for excessive play.


SMA614

- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.

Tightening torque:
Refer to FA-23.


SFA307B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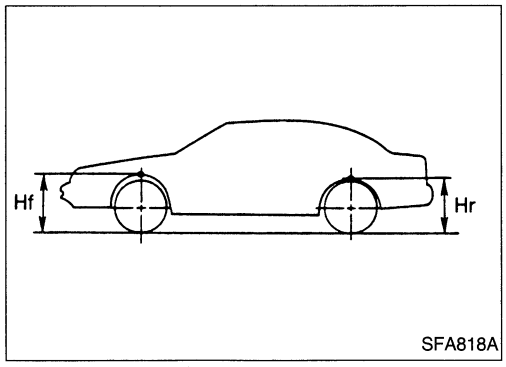
- Check strut (shock absorber) for oil leakage or other damage.

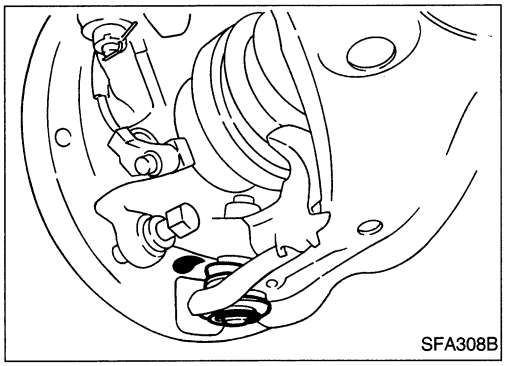


SFA818A

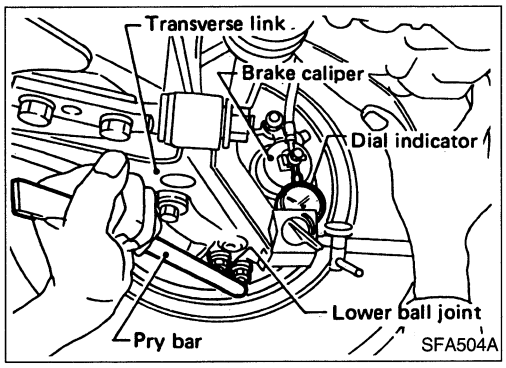
- Check spring height from top of wheelarch to ground.

(1) Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).
*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
(2) Bounce vehicle up and down several times before measuring.
Standard height: Refer to FA-28.
(3) Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.

Front Axle and Front Suspension Parts (Cont'd)

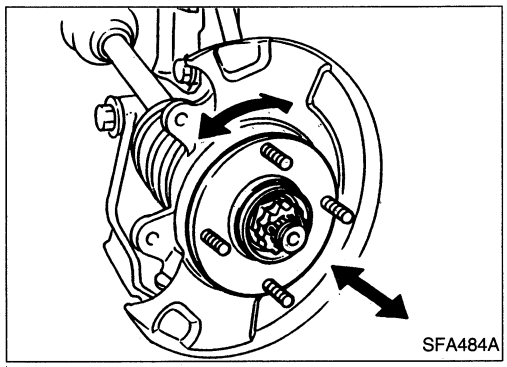

SFA308B

- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage. If ball joint dust cover is cracked or damaged, replace transverse link.



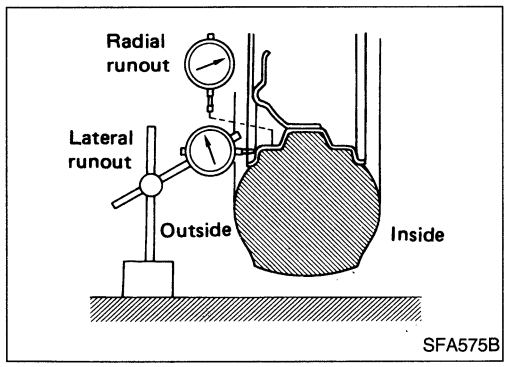
- Check suspension ball joint end play.

(1) Jack up front of vehicle and set the stands.
(2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
(3) Make sure front wheels are straight and brake pedal is depressed.
(4) Place a pry bar between transverse link and inner rim of road wheel.
(5) While raising and releasing pry bar, observe maximum dial indicator value.
Vertical end play:
0 mm (0 in)
(6) If ball joint movement is beyond specifications, remove and recheck it.


SFA484A

Front Wheel Bearing

- Check that wheel bearings operate smoothly.
- Check axial end play.
Axial end play:
0.05 mm (0.0020 in) or less
- If axial end play is not within specification or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to FA-10.



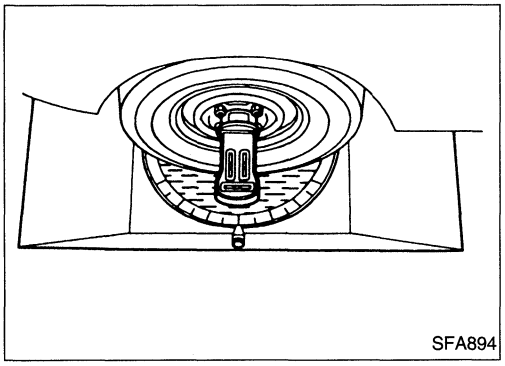
Front Wheel Alignment

Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*).
*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

Front Wheel Alignment (Cont'd)

PRELIMINARY INSPECTION

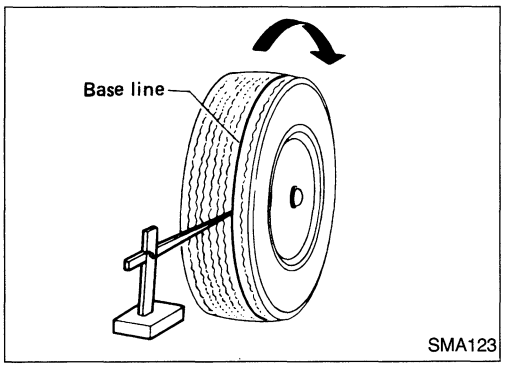
1. Check tires for wear and improper inflation.
2. Check wheel runout.
   Wheel runout:
   Refer to SDS, FA-29.
3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly by using the standard bounce test.
7. Check vehicle posture (Unladen).


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 SDS, FA-29.
2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.

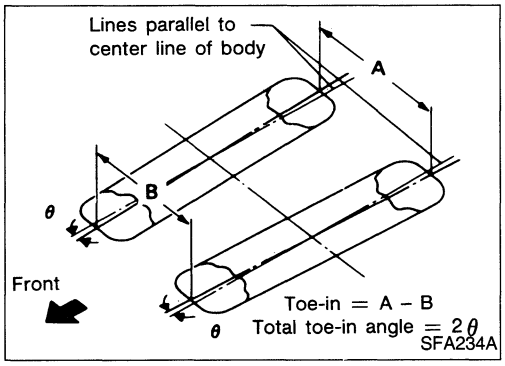


SMA123

TOE-IN

1. Draw a base line across the tread.

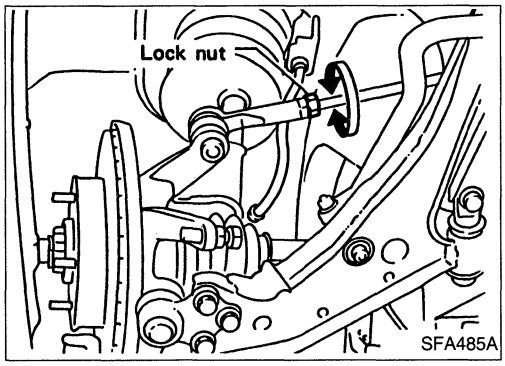
- After lowering front of vehicle, move it up and down to eliminate friction, and set steering wheel in straight-ahead position.



SFA234A

2. Measure toe-in.

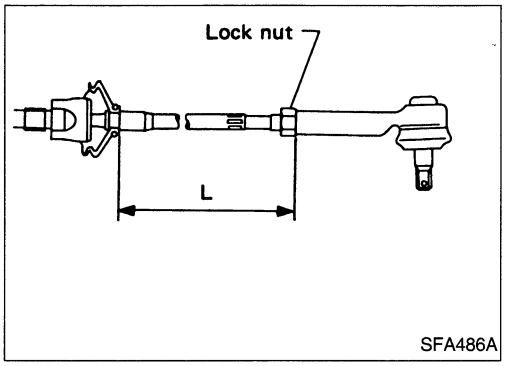
- Measure distance "A" and "B" at the same height as hub center.
  Toe-in:
  Refer to SDS, FA-29.



SFA485A

3. Adjust toe-in by varying the length of steering tie-rods.
(1) Loosen lock nuts.
(2) Adjust toe-in by screwing tie-rods in or out.

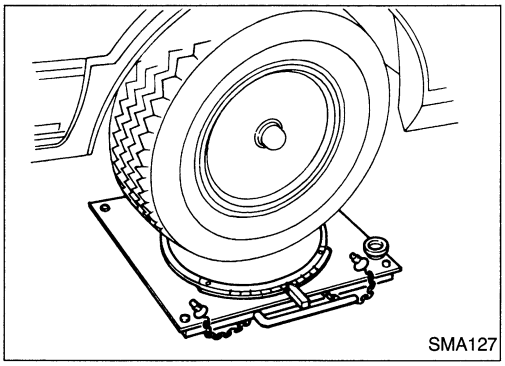
Front Wheel Alignment (Cont'd)



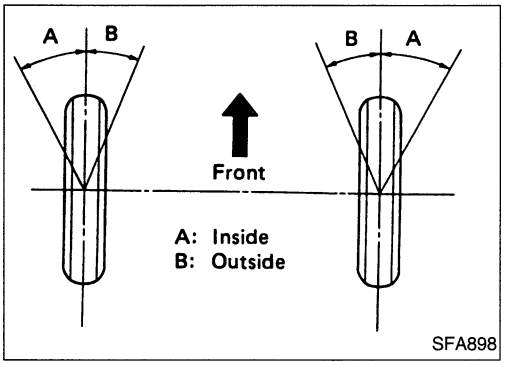
Standard length "L":
Refer to ST section ("General Specifications", "SERVICE DATA AND SPECIFICATIONS").

(3) Tighten lock nuts to specified torque.
Lock nut tightening torque:
Refer to ST section ("Description", "STEERING GEAR AND LINKAGE").

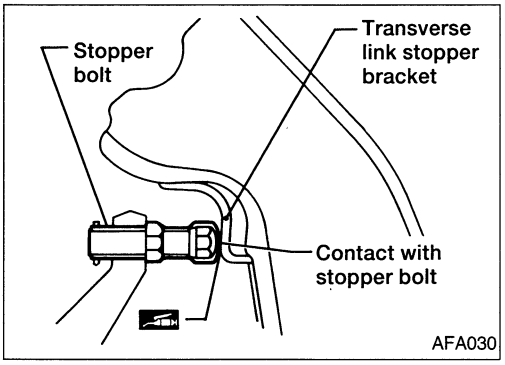
FRONT WHEEL TURNING ANGLE



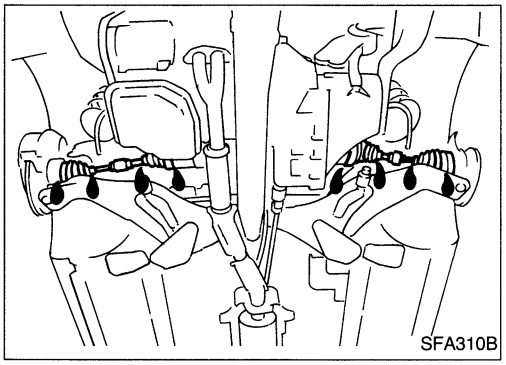
1. Set wheels in straight-ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.



2. Rotate steering wheel all the way right and left; measure turning angle.
Wheel turning angle (Full turn):
Inside wheel: 31°30′ - 35°30′
Outside wheel: 25°36′ - 29°36′

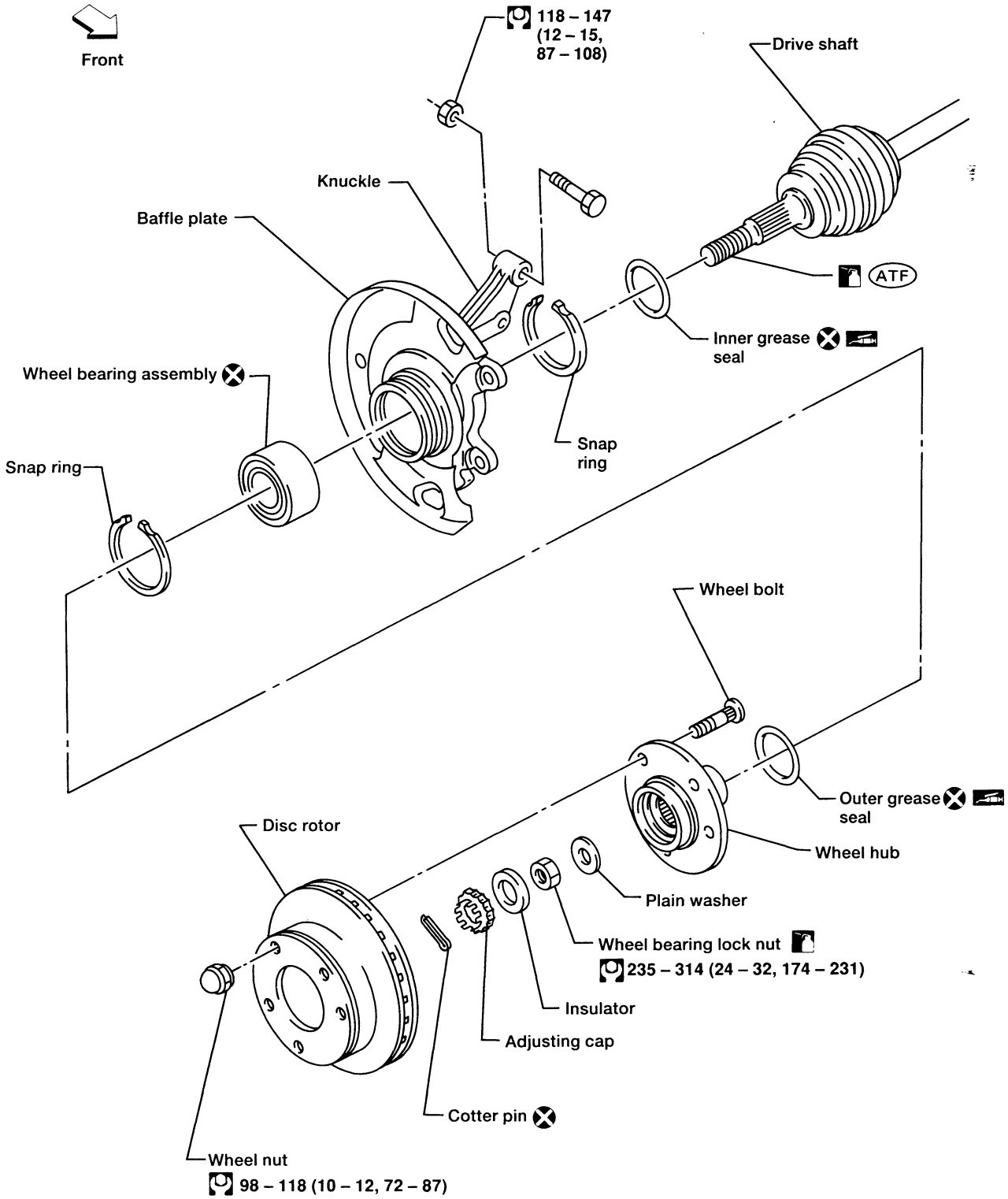


3. If stopper bolt head does not contact stopper bracket at specified outside wheel angle, adjust stopper bolt to contact stopper bracket at correct angle.
Adjust protrusion of stopper bolt before placing stopper bolt cap.
Apply grease to face of stopper bracket that bolt touches.
Stopper bolt lock nut tightening torque:
54 - 72 N•m (5.5 - 7.3 kg-m, 40 - 53 ft-lb)



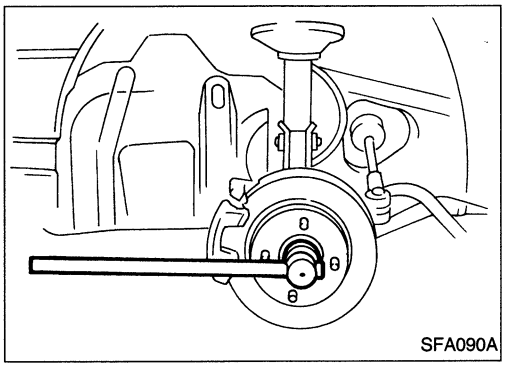
Drive Shaft

Check for grease leakage or other damage.



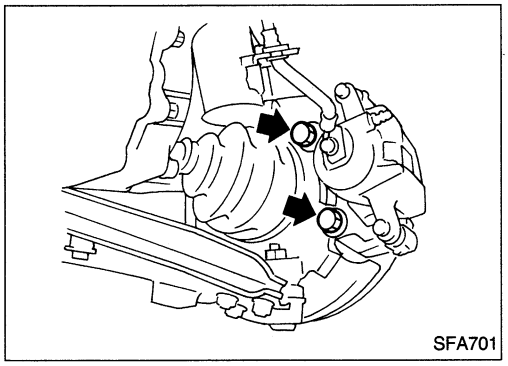
: N•m (kg-m, ft-lb)

AFA016


SFA090A

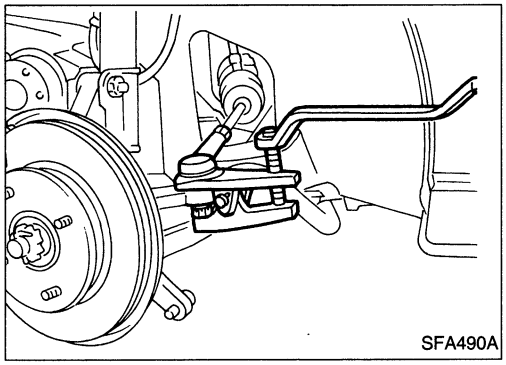
Removal

- Remove wheel bearing lock nut.


SFA701

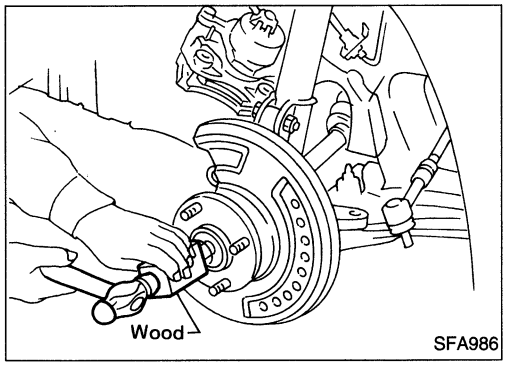
- Remove brake caliper assembly.

Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Make sure brake hose is not twisted.


SFA490A

- Separate tie-rod from knuckle with Tool.

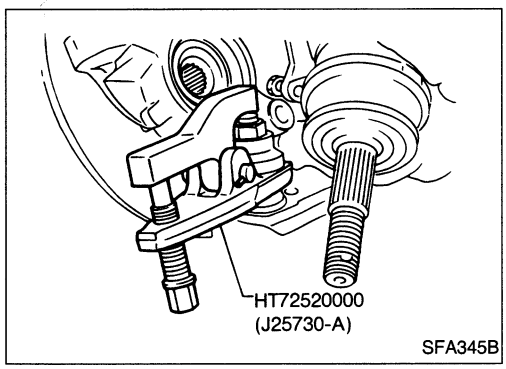
Install stud nut conversely on stud bolt to prevent damage to stud bolt.



SFA986

- Separate drive shaft from knuckle by lightly tapping it. If it is hard to remove, use a puller.

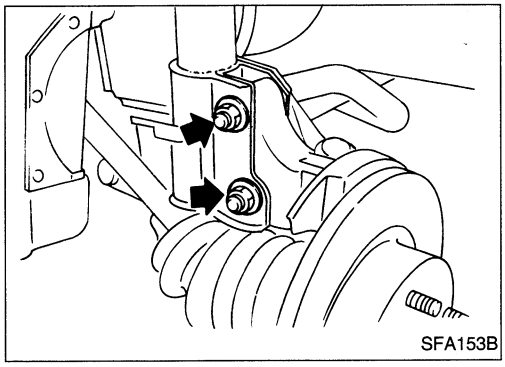
When removing drive shaft, cover boots with shop towel to prevent damage to them.



SFA345B

- Loosen lower ball joint tightening nut.
- Separate knuckle from lower ball joint stud with Tool.
- Remove knuckle from transverse link.

Removal (Cont'd)


SFA153B

- Remove strut lower mounting bolts.

Installation

- Install knuckle with wheel hub.

When installing knuckle to strut, be sure to hold bolts and tighten nuts.

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

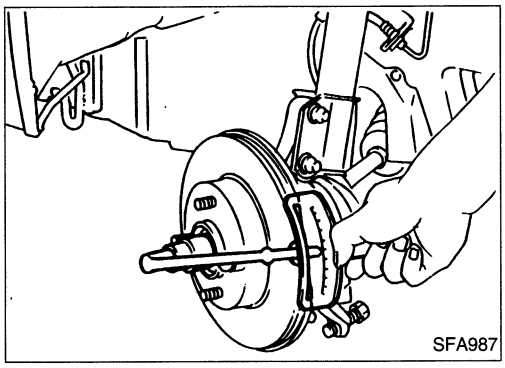
Before tightening wheel bearing lock nut, apply oil to threaded portion of drive shaft and to both sides of plain washer.

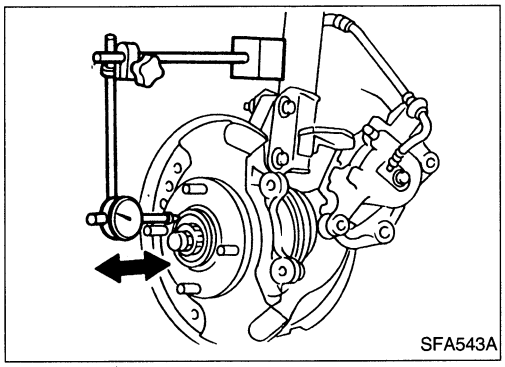
- Tighten wheel bearing lock nut.

: 235 - 314 N•m
(24 - 32 kg-m, 174 - 231 ft-lb)

- Check wheel bearing axial end play.

Axial end play:
0.05 mm (0.0020 in) or less.


SFA987

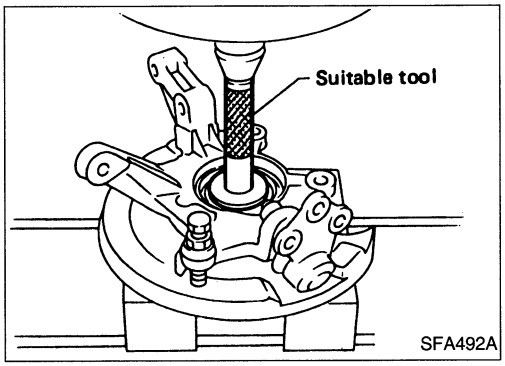

SFA543A

Disassembly

CAUTION:
When removing wheel hub or wheel bearing from knuckle, replace wheel bearing assembly (outer race, inner races and grease seals) with a new one.

WHEEL HUB

Drive out hub with inner race (outside) from knuckle with a suitable tool.

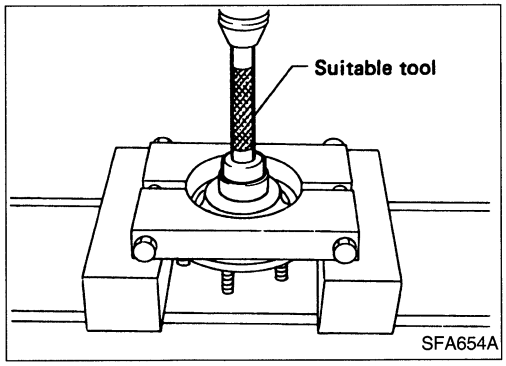


SFA492A

WHEEL BEARING

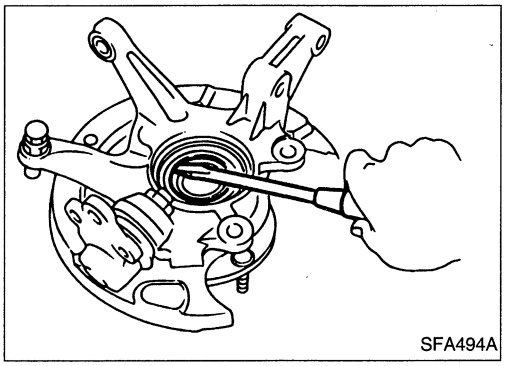
When replacing wheel bearing, replace wheel bearing assembly (inner races and outer race).

- Remove bearing inner race (outside), then remove outer grease seal.

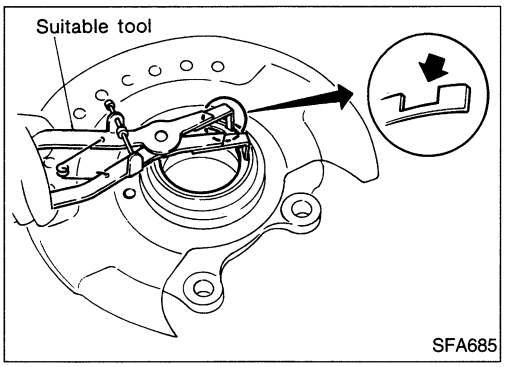


SFA654A

Disassembly (Cont'd)

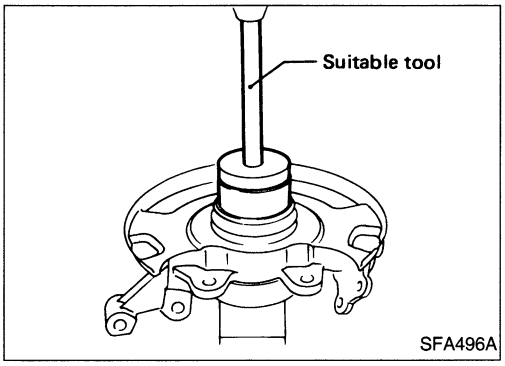

SFA494A

- Remove inner grease seal from knuckle.



SFA685

- Remove inner and outer snap rings.



SFA496A

- Press out bearing outer race.

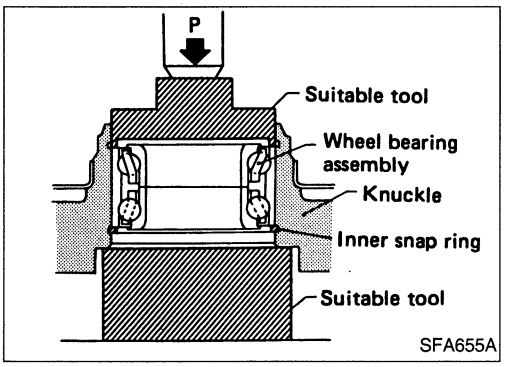
Inspection

WHEEL HUB AND KNUCKLE

Check wheel hub and knuckle for cracks by using a magnetic exploration or dyeing test.

SNAP RING

Check snap ring for wear or cracks. Replace if necessary.



SFA655A

Assembly

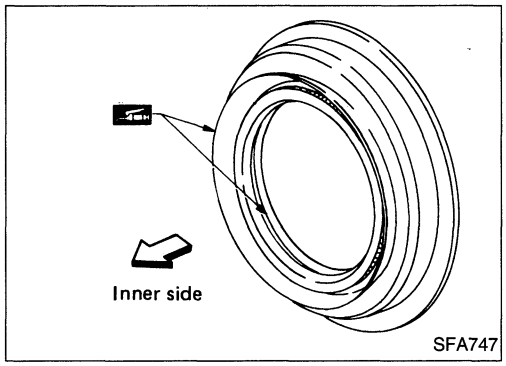
1. Install inner snap ring into groove of knuckle.
2. Press new wheel bearing assembly into knuckle.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

CAUTION:

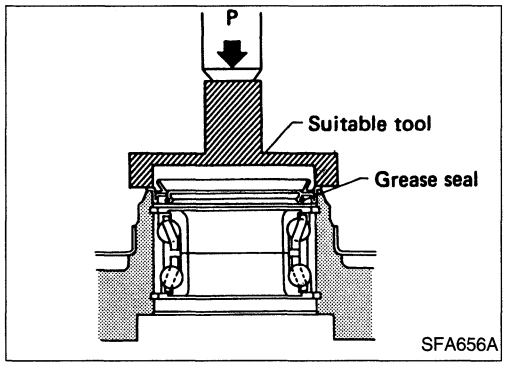
- **Do not press inner race of wheel bearing assembly.**
- **Do not apply oil or grease to mating surfaces of wheel bearing outer race and knuckle.**

3. Install outer snap ring into groove of knuckle.

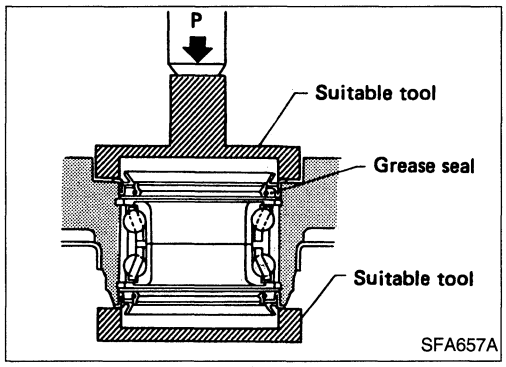
Assembly (Cont'd)



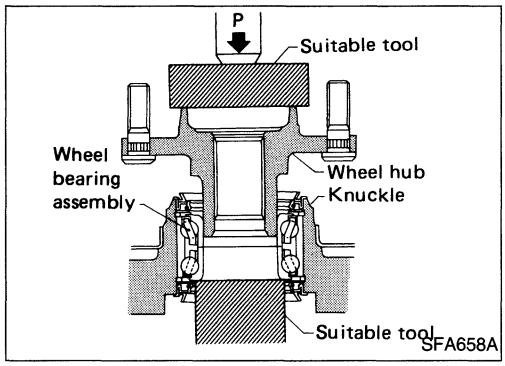
4. Pack grease seal lip with multi-purpose grease.



5. Install outer grease seal.

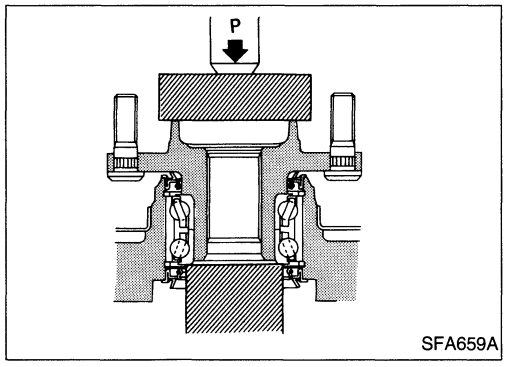


6. Install inner grease seal.



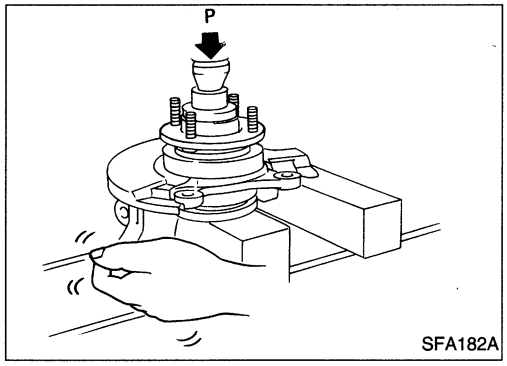
7. Press wheel hub into knuckle.
   Maximum load P:
   29 kN (3 ton, 3.3 US ton, 3.0 Imp ton)

Be careful not to damage grease seal.

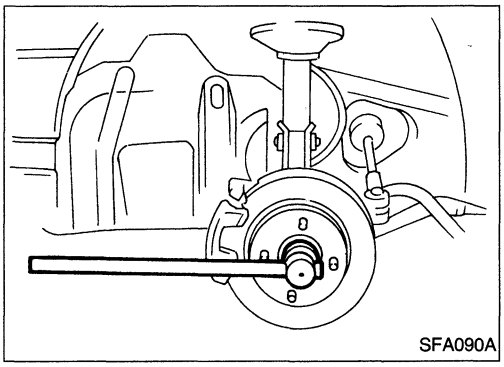


8. Check bearing operation.
(1) Add load P with press.
   Load P:
   34.3 - 49.0 kN
   (3.5 - 5.0 ton, 3.9 - 5.5 US ton, 3.44 - 4.92 Imp ton)

Assembly (Cont'd)



(2) Spin knuckle several turns in both directions.
(3) Make sure that wheel bearings operate smoothly.


SFA090A

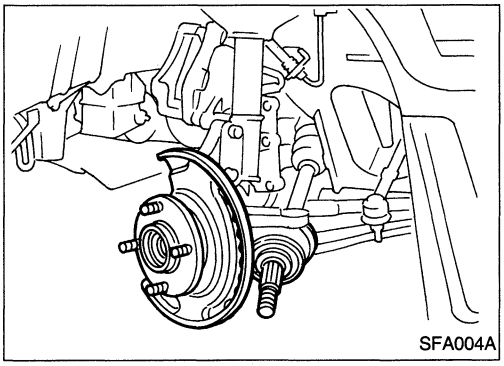
Removal

- Remove wheel bearing lock nut.

Brake caliper need not be disconnected.

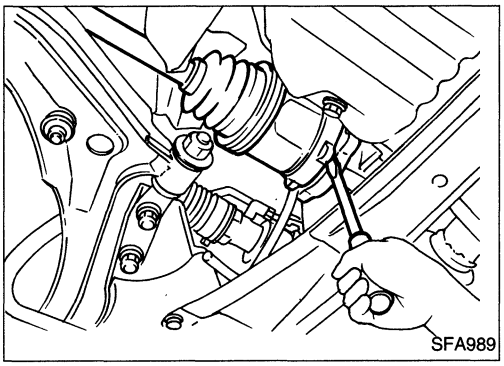
Do not twist or stretch brake hose when moving components.

- Remove cotter pin and nut securing lower ball joint to knuckle.
- Strike knuckle with a hammer and pull down transverse link to separate lower ball joint from knuckle.

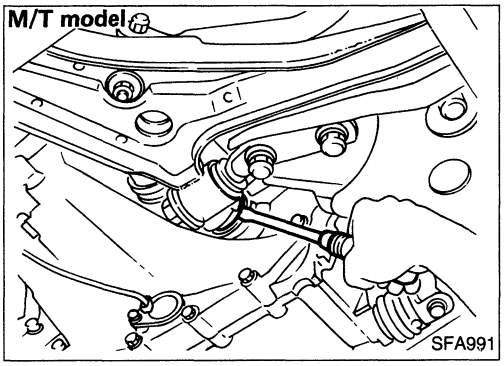

SFA004A

- Remove tie-rod ball joint.
- Separate drive shaft from knuckle by slightly tapping it. If it is hard to remove, use a puller.

When removing drive shaft, cover boots with shop towel to prevent damage to them.


SFA989

1. Remove right drive shaft from transaxle.



SFA991

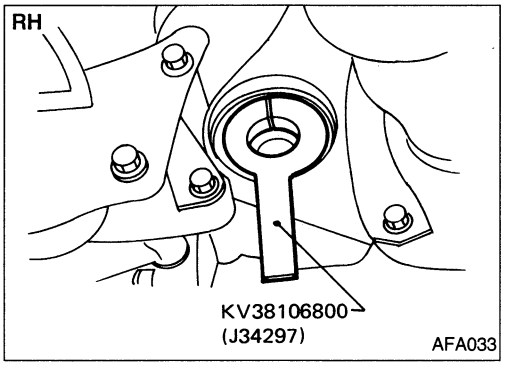
2. Remove left drive shaft with a suitable tool.

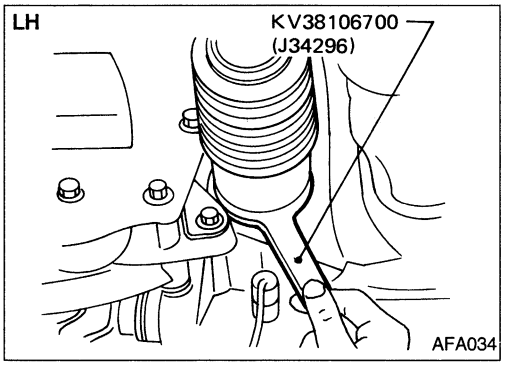
— FOR M/T MODELS —

- Pry drive shaft from transaxle as shown at left.

— FOR A/T MODELS —

Be careful not to damage pinion mate shaft and side gear.





Installation

TRANSAXLE SIDE

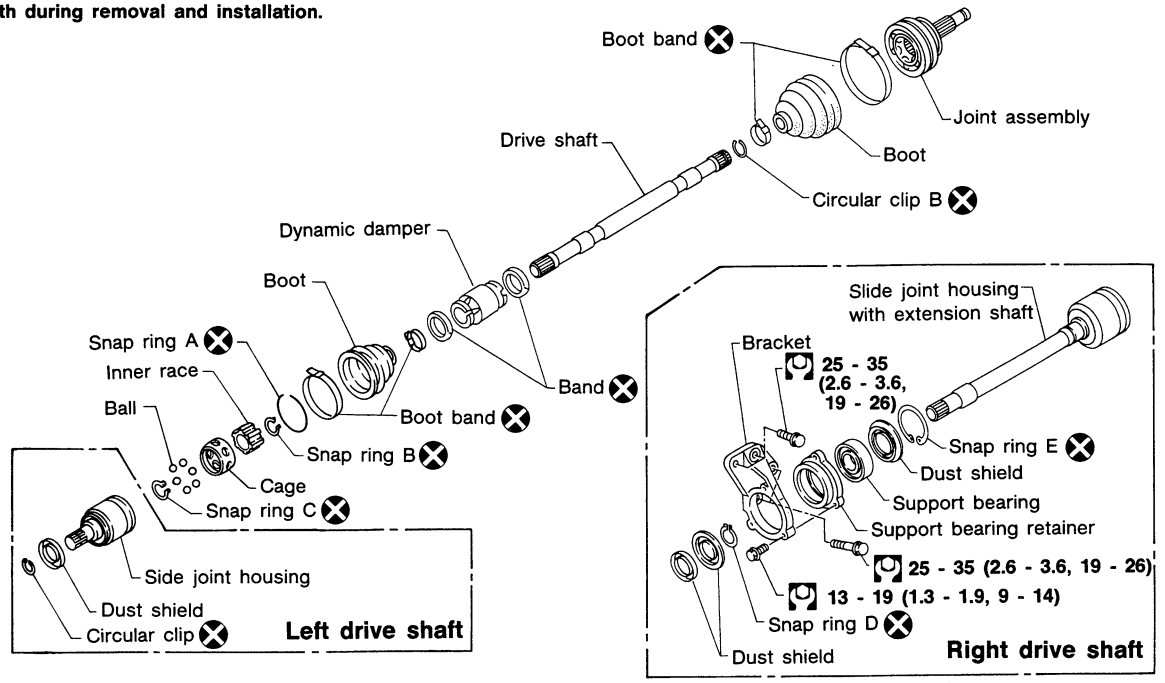
1. Drive a new oil seal to transaxle. Refer to MT or AT section ("Differential Side Oil Seal Replacement", "ON-VEHICLE SERVICE").
2. Set Tool along the inner circumference of oil seal (transaxle side).
3. Insert drive shaft into transaxle. Be sure to properly align the serrations and then withdraw Tool.
4. Push drive shaft, then press-fit circular clip on the drive shaft into circular clip groove of side gear.
5. After its insertion, try to pull the flange out of the slide joint by hand. If it pulls out, the circular clip is not properly meshed with the side gear.

WHEEL SIDE

- Install drive shaft into knuckle.
- Tighten wheel bearing lock nut. Refer to FA-11.

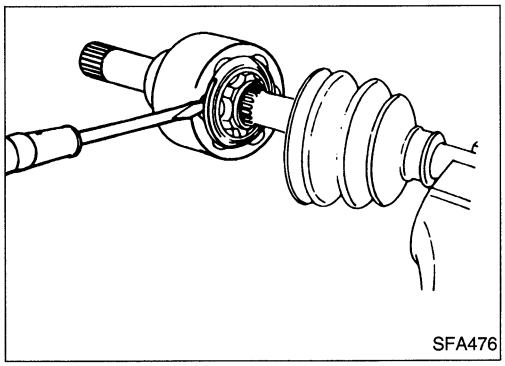
Components

Circular clip:
Make sure circular clip is properly meshed with side gear (transaxle side) and joint assembly (wheel side), and will not come out.
Be careful not to damage boots. Use suitable protector or cloth during removal and installation.

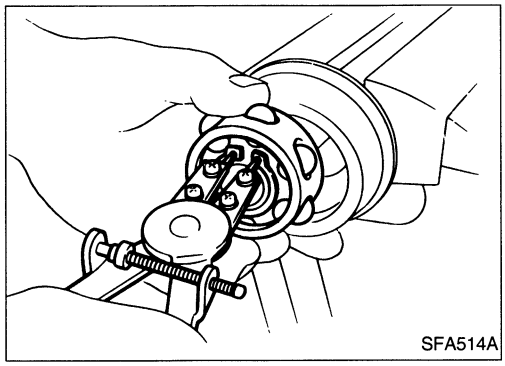


: N•m (kg-m, ft-lb)

SFA320B



SFA476



SFA514A

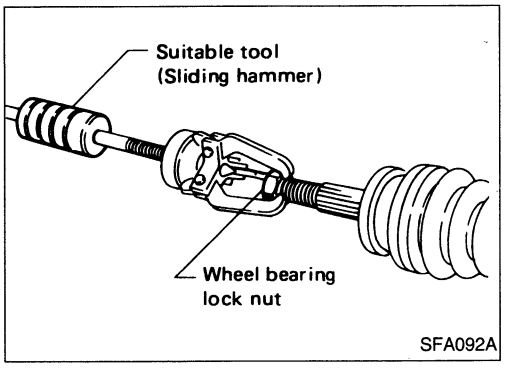
Disassembly

TRANSAXLE SIDE

1. Remove boot bands.
2. Put matching marks on slide joint housing and inner race, before separating joint assembly.
3. Pry off snap ring "A" with a screwdriver, and pull out slide joint housing.
4. Put matching marks on inner race and drive shaft.
5. Pry off snap ring "C", then remove ball cage, inner race and balls as a unit.
6. Pry off snap ring "B".
7. Draw out boot.

Cover drive shaft serrations with tape so as not to damage the boot.

Disassembly (Cont'd)



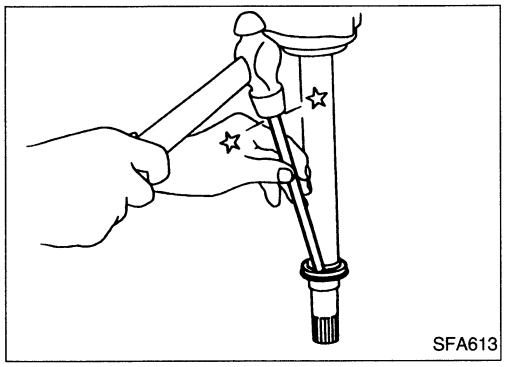
WHEEL SIDE

CAUTION:
The joint on the wheel side cannot be disassembled.

- Before separating joint assembly, put matching marks on drive shaft and joint assembly.
- Separate joint assembly with a suitable tool.

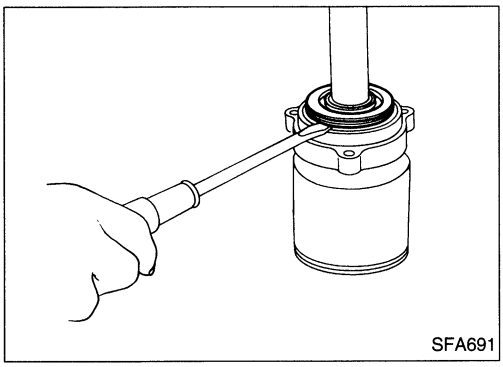
Be careful not to damage threads on drive shaft.

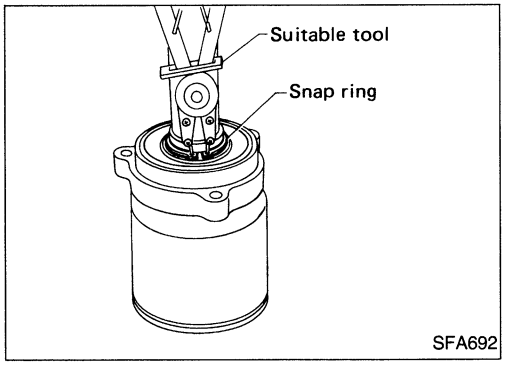
- Remove boot bands.



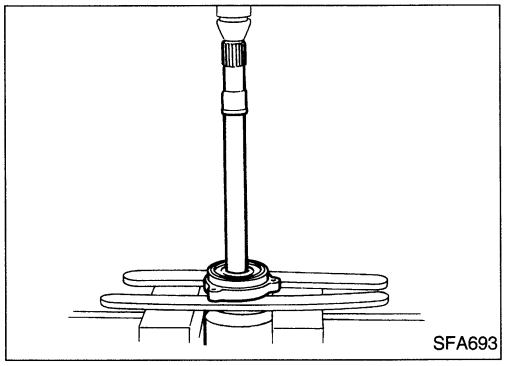
SUPPORT BEARING

- Remove dust shield.



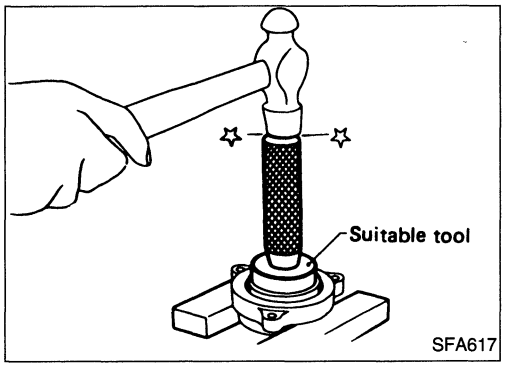


- Pry off snap ring.



- Press support bearing assembly out of drive shaft.

Disassembly (Cont'd)



- Press support bearing out of retainer.

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 (Transaxle side)

- Replace joint assembly if it is deformed or damaged.

JOINT ASSEMBLY (Wheel side)

Replace joint assembly if it is deformed or damaged.

SUPPORT BEARING

Make sure wheel bearing rolls freely and is free from noise, cracks, pitting or wear.

SUPPORT BEARING BRACKET

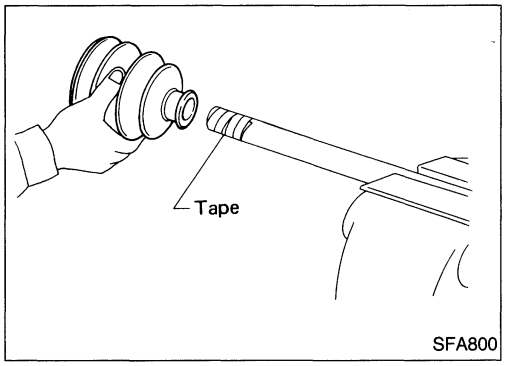
Check support bearing bracket for cracks with a magnetic exploration or dyeing test.

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.**

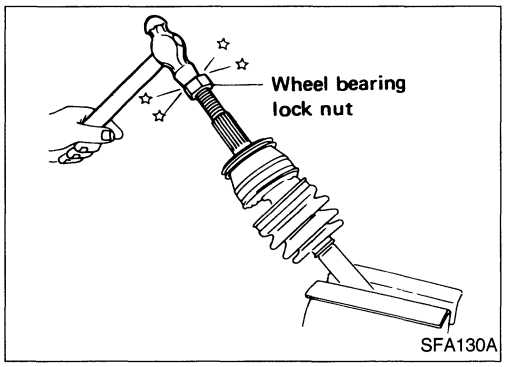
Assembly (Cont'd)

WHEEL SIDE

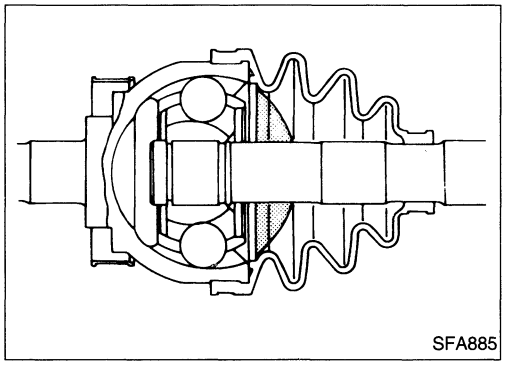


1. Install boot and new small boot band on drive shaft.

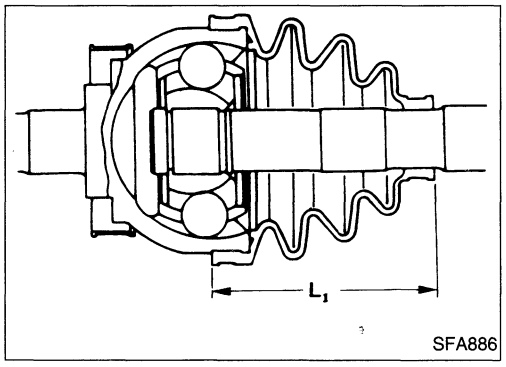
Cover drive shaft serration with tape so as not to damage boot during installation.



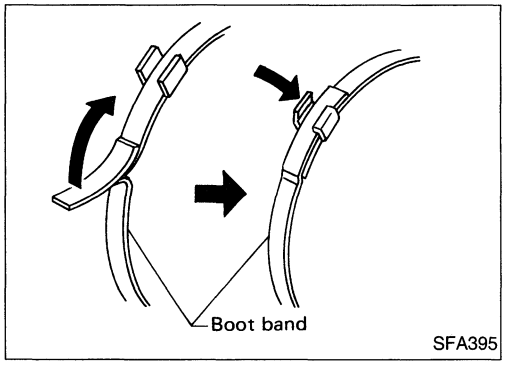
2. Set joint assembly onto drive shaft by lightly tapping it. Install joint assembly securely, ensuring marks which were made during disassembly are properly aligned.



3. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   100 - 120 g (3.53 - 4.23 oz)

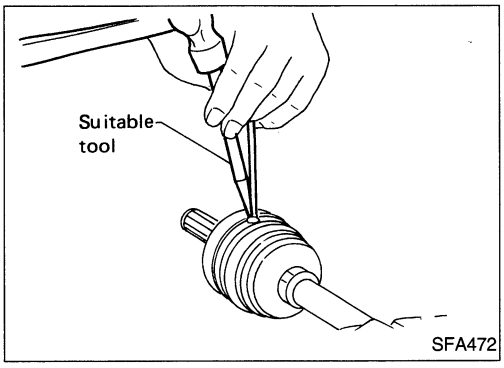


4. Make sure that boot is properly installed on the drive shaft groove.
   Set boot so that it does not swell and deform when its length is "L_1".
   Length "L_1":
   84.5 - 86.5 mm (3.327 - 3.406 in)



5. Lock new larger and smaller boot bands securely with a suitable tool.

Assembly (Cont'd)



SFA472

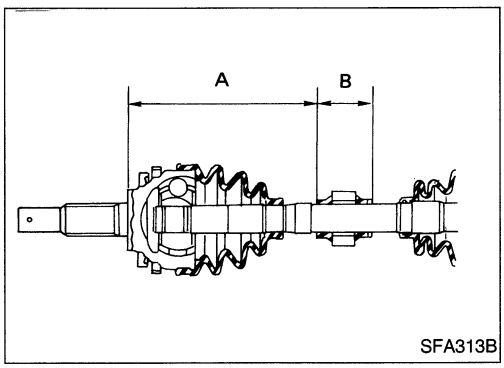
Dynamic damper

1. Use new damper band when reinstalling.
2. Install dynamic damper from stationary-joint side while holding it securely.

Length:

Unit: mm (in)

	LH	RH
"A"	203.1 (8.00)	185.6 (7.31)
"B"	70 (2.76)	50 (1.97)

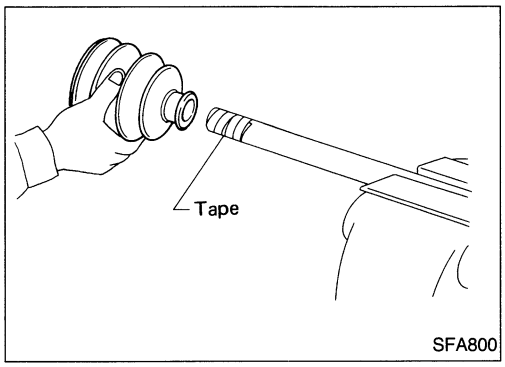


SFA313B

TRANSAXLE SIDE

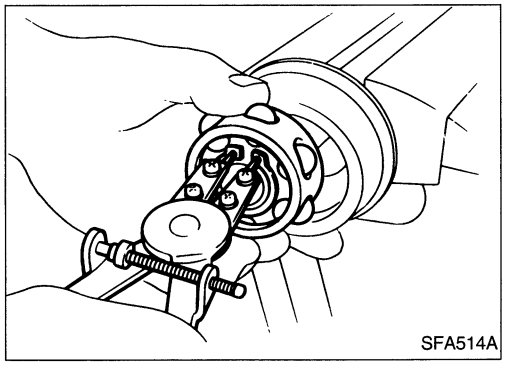
1. Install boot and new small boot band on drive shaft.

Cover drive shaft serration with tape so as not to damage boot during installation.

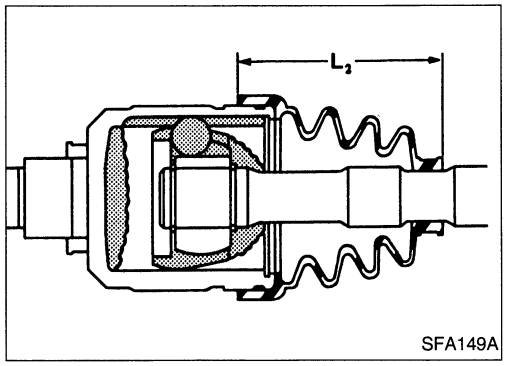


SFA800

2. Install new snap ring "B", then 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 "C".

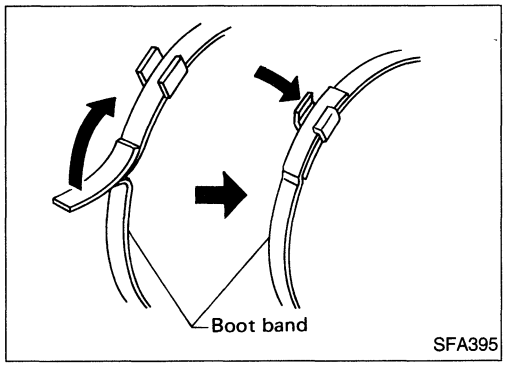

SFA514A

4. Pack drive shaft with specified amount of grease.
   Specified amount of grease:
   145 - 165 g (5.11 - 5.82 oz)
5. Install slide joint housing, then install new snap ring "A".
6. Make sure that boot is properly installed on the drive shaft groove.
   Set boot so that it does not swell and deform when its length is "L_2".
   Length "L_2":
   97 - 99 mm (3.82 - 3.90 in)

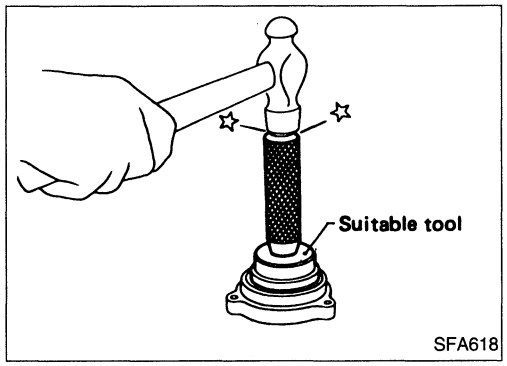


SFA149A

Assembly (Cont'd)

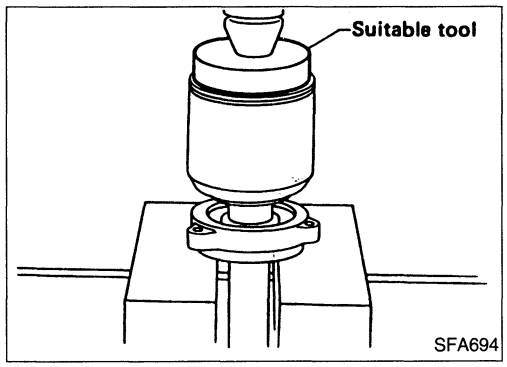


7. Lock new larger and smaller boot bands securely with a suitable tool.

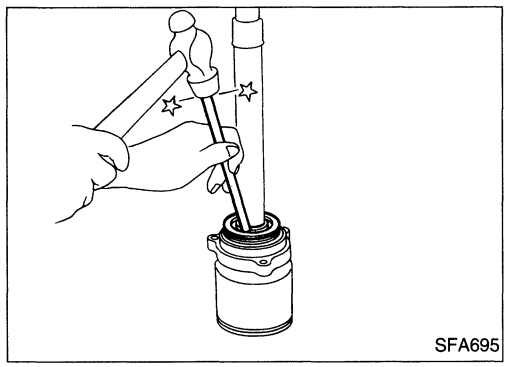


SUPPORT BEARING

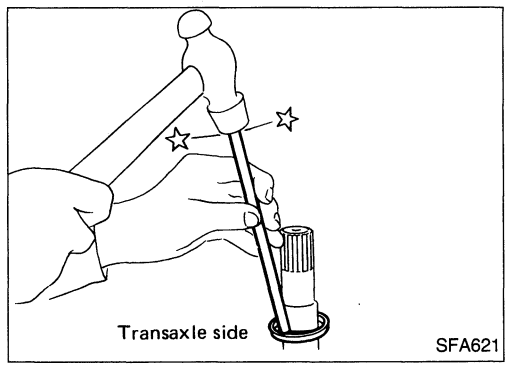
- Press bearing into retainer.



- Press drive shaft into bearing.

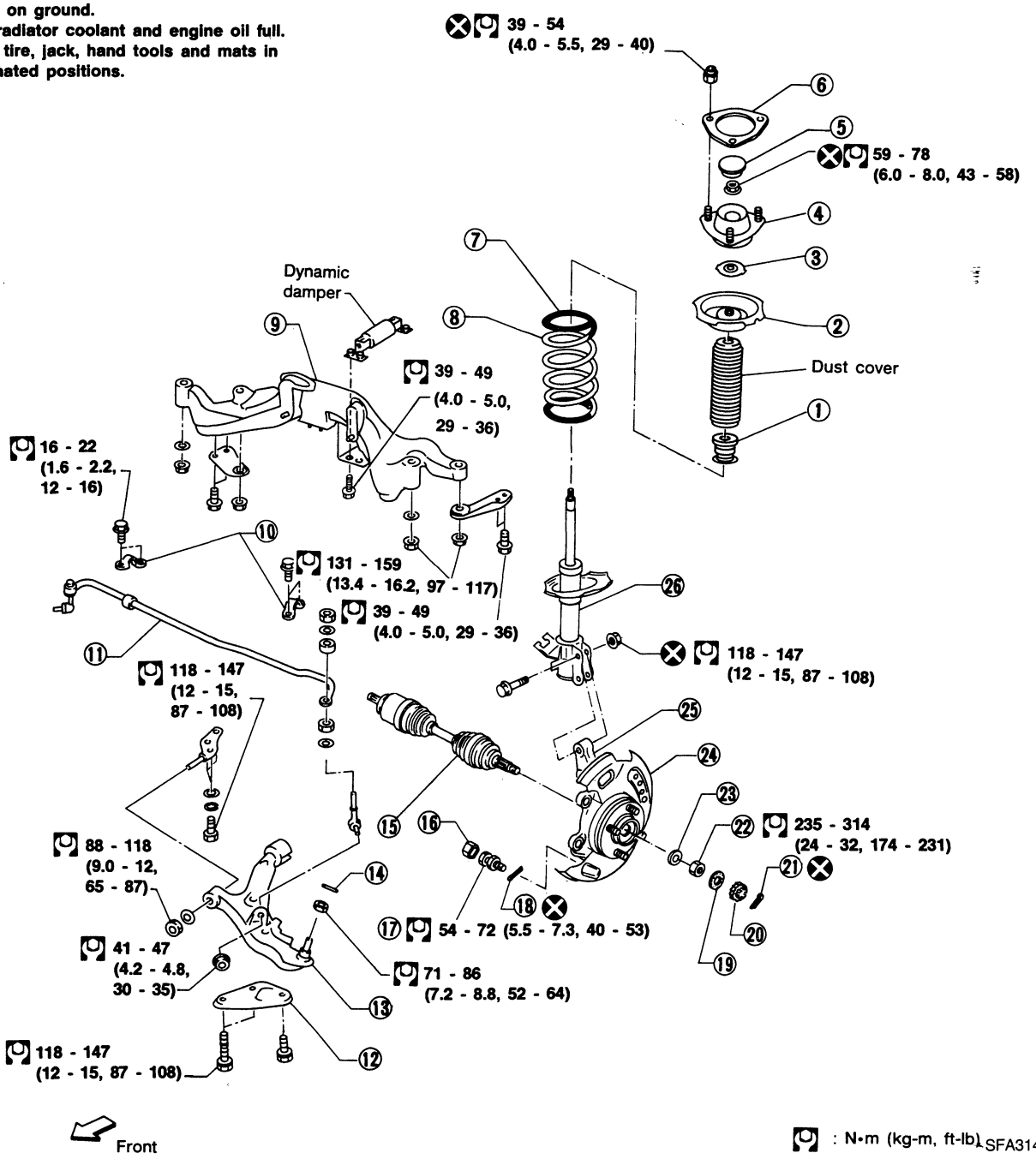


- Install snap ring.
- Install new dust shield.

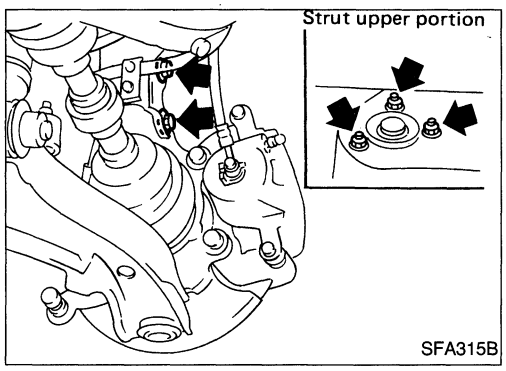


When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

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



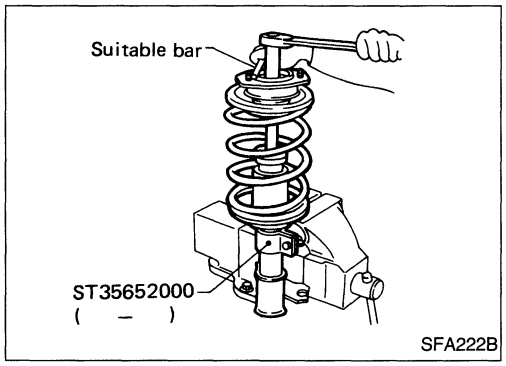
① Bound bumper assembly
② Upper spring seat
③ Strut mounting insulator
④ Plain washer
⑤ Cap
⑥ Spacer
⑦ (Polyuretane tube)
⑧ Coil spring
⑨ Front suspension member
⑩ Stabilizer clamp
⑪ Stabilizer
⑫ Compression rod bushing
⑬ Transverse link
⑭ Cotter pin
⑮ Drive shaft
⑯ Cap
⑰ Stopper bolt
⑱ Cotter pin
⑲ Insulator (Rubber)
⑳ Adjusting cap
㉑ Cotter pin
㉒ Wheel bearing cap
㉓ Washer
㉔ Baffle plate
㉕ Knuckle
㉖ Strut assembly
㉗ Dynamic damper assembly



Removal and Installation

- Remove strut assembly fixing bolts and nuts (to hoodledge).

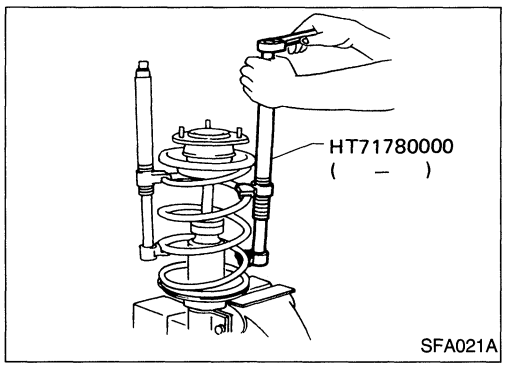
Do not remove piston rod lock nut on vehicle.



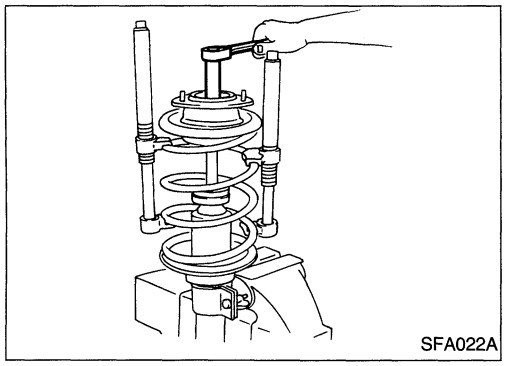
Disassembly

1. Set strut assembly on vise with Tool, then loosen piston rod lock nut.

Do not remove piston rod lock nut.



2. Compress spring with Tool so that the strut mounting insulator can be turned by hand.



3. Remove piston rod lock nut.

Inspection

STRUT ASSEMBLY

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage occurring on welded or gland packing portion.
- Check piston rod for cracks, deformation or other damage.
- Replace if necessary.

Inspection (Cont'd)

STRUT MOUNTING INSULATOR

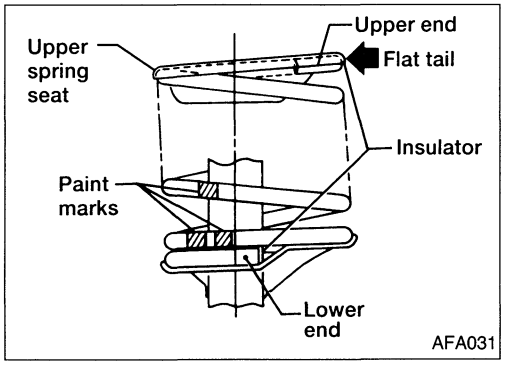
- Check cemented rubber-to-metal portion for separation or cracks.
- Check rubber parts for deterioration.

THRUST BEARING

- Check thrust bearing parts for abnormal noise or excessive rattle in axial direction.
- Replace if necessary.

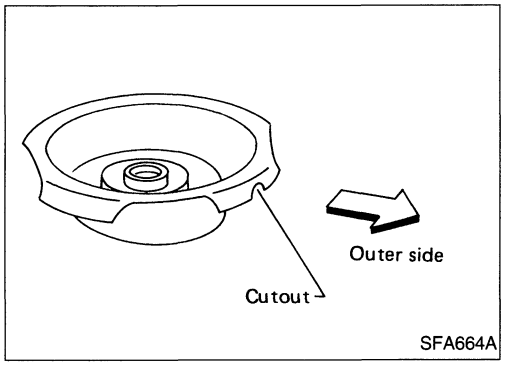
COIL SPRING AND INSULATOR

Check for cracks, deformation or other damage. Replace if necessary.



Assembly

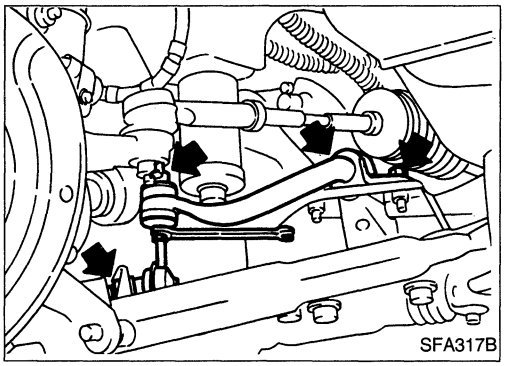
- When installing coil spring on strut, it must be positioned as shown in the figure at left.



- Install upper spring seat with its cutout facing the outer side of vehicle, in line with the strut-to-knuckle attachment points.

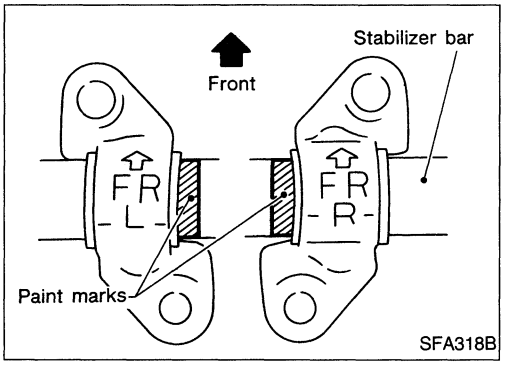
When installing strut to knuckle, be sure to hold bolts and tighten nuts.

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


SFA317B

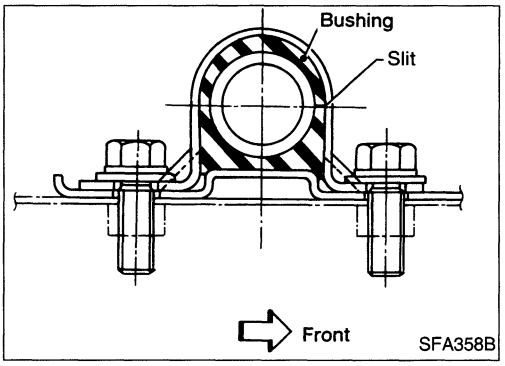
Removal and Installation

- Remove stabilizer bar.



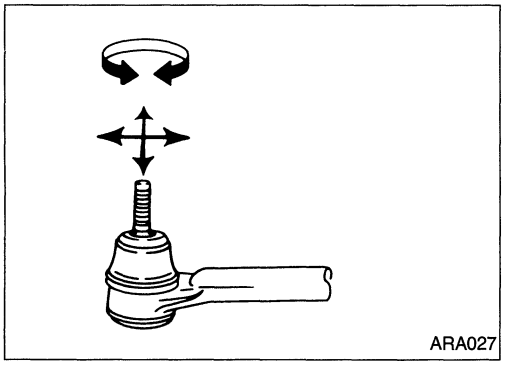
SFA318B

- When installing stabilizer, make sure that paint mark and clamp face in their correct directions.



SFA358B

- Make sure that slit in bushing is in the position shown in the figure.

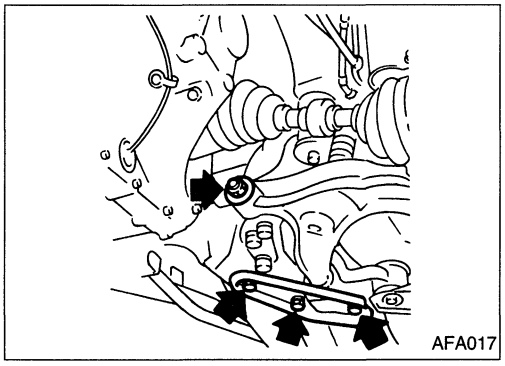

ARA027

Inspection

- Check stabilizer for deformation or cracks. Replace if necessary.
- Check rubber bushings for deterioration or cracks. Replace if necessary.
- Check ball joint can rotate in all directions. If movement is not smooth and free, replace stabilizer bar link.

Removal and Installation

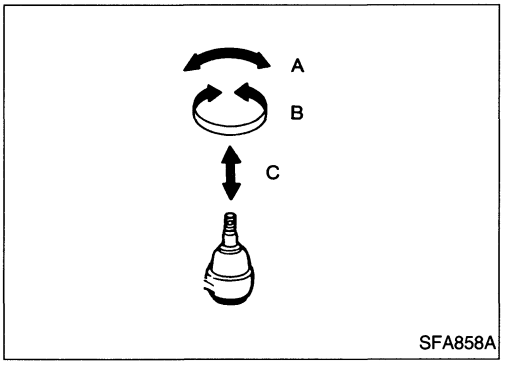
1. Remove stabilizer connecting rod from transverse link.
2. Remove cotter pin and lock nut securing lower ball joint to knuckle.
3. Strike knuckle with a hammer to separate lower ball joint from knuckle.



4. Remove bolts and nuts as shown at left.
5. Remove transverse link and lower ball joint.
6. Install fixing bolts and nuts.
   Tightening torque:
   Refer to FA-23.
7. During installation, final tightening must be carried out at curb weight with tires on the ground.
8. After installation, check wheel alignment. Refer to FA-6.

Inspection

- Check transverse link for damage, cracks or deformation. Replace if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



- Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace if necessary.
  Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.
  Swinging force "A":
  (measuring point: cotter pin hole of ball stud):
  7.8 - 54.9 N (0.8 - 5.6 kg, 1.8 - 12.3 lb)
  Turning torque "B":
  0.5 - 3.4 N·m (5 - 35 kg-cm, 4.3 - 30.4 in-lb)
  Vertical end play "C":
  0 mm (0 in)
- Check dust cover for damage. Replace it and cover clamp if necessary.

General Specifications

COIL SPRING

Applied model	XE		SE	
	M/T	A/T	M/T	A/T
Wire diameter mm (in)	13.4 (0.528)	13.6 (0.535)	13.6 (0.535)	13.8 (0.543)
Coil diameter mm (in)	173.8 (6.84)	174.2 (6.86)		174.6 (6.87)
Free length mm (in)	365 (14.37)	375 (14.76)	354 (13.94)	364 (14.33)
Spring constant N/mm (kg/mm, lb/in)	21.6 (2.2, 123)		23.5 (2.4, 134)	
Identification color	White x 2	White x 1, Pink x 1	White x 1, Pink x 1	White x 1, Light green x 1

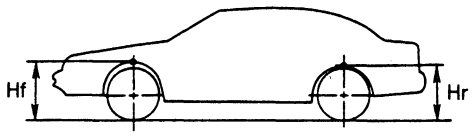
STRUT

Applied model	XE	SE
Piston rod diameter mm (in)	22 (0.87)	
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)		
Expansion	1,196 (122, 269)	1,314 (134, 295)
Compression	333 (34, 75)	471 (48, 106)

FRONT STABILIZER BAR

Applied model	M/T	A/T
Stabilizer diameter mm (in)	21.0 (0.827)	
Identification color	Green	Pink

WHEELARCH HEIGHT (Unladen*)



SFA818A

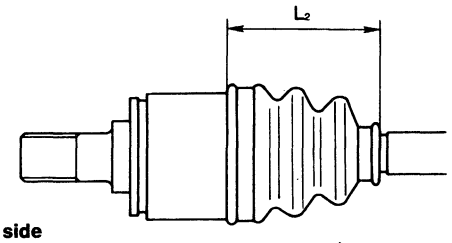
Applied model	XE	SE
Front (Hf) mm (in)	691 (27.20)	690 (27.17)
Rear (Hr) mm (in)	680 (26.77)	678 (26.69)

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

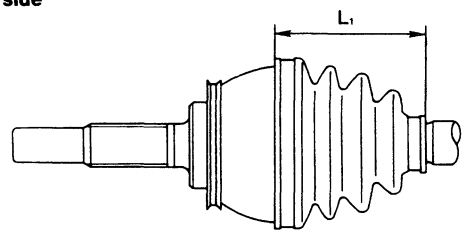
DRIVE SHAFT

Applied model	All
Joint type	
Transaxle side	DS90
Wheel side	BF90
Boot length mm (in)	
Transaxle side (L_2)	97 - 99 (3.82 - 3.90)
Wheel side (L_1)	84.5 - 86.5 (3.327 - 3.406)
Grease	Nissan genuine grease or equivalent
Capacity g (oz)	
Transaxle side	145 - 165 (5.11 - 5.82)
Wheel side	100 - 120 (3.53 - 4.23)

Transaxle side



Wheel side



Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Applied model		All
Camber	degree	−0°50′ to 0°40′
Caster	degree	1°55′ - 3°25′
Kingpin inclination	degree	13°20′ - 14°50′
Toe-in		
A − B	mm (in)	0 - 2 (0 - 0.08)
Total angle 2θ	degree	0′ - 12′
Front wheel turning angle		
Full turn*2	Inside	31°30′ - 35°30′
	Outside	25°36′ - 29°36′

*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.

WHEEL BEARING

Wheel bearing axial end play limit mm (in)	0.05 (0.0020) or less
Wheel bearing lock nut tightening torque N•m (kg-m, ft-lb)	235 - 314 (24 - 32, 174 - 231)

LOWER BALL JOINT

Swinging force (Measured at cotter pin hole) 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 limit mm (in)	0 (0)

WHEEL RUNOUT

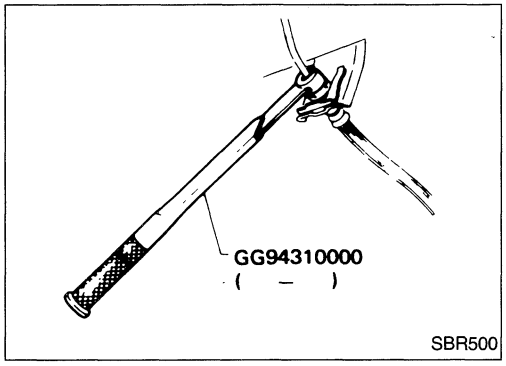
Unit: mm (in)

Wheel type	Aluminum wheel	Steel wheel
Maximum radial runout limit	0.3 (0.012) or less	0.5 (0.020) or less
Maximum lateral runout limit	0.3 (0.012) or less	0.8 (0.031) or less

REAR AXLE AND REAR SUSPENSION

SECTION RA

CONTENTS

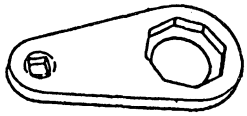
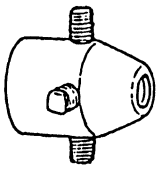
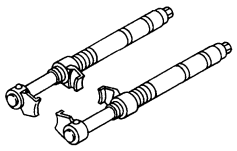
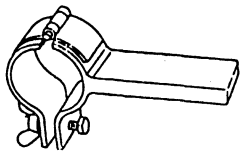
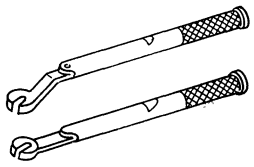


Precautions

- **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.**
- **Do not jack up at the parallel links.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**

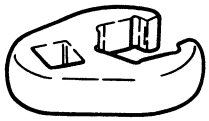
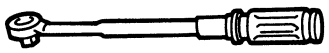
Preparation

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
ST35490000 (J26083) Gland packing wrench		Removing and installing gland packing
KV401021S0 (—) Bearing race drift		Installing wheel bearing outer race
HT71780000 (—) Spring compressor		Removing and installing coil spring
ST35652000 (—) Strut attachment		Fixing strut assembly
GG94310000 (—) Flare nut wrench		Removing and installing brake piping

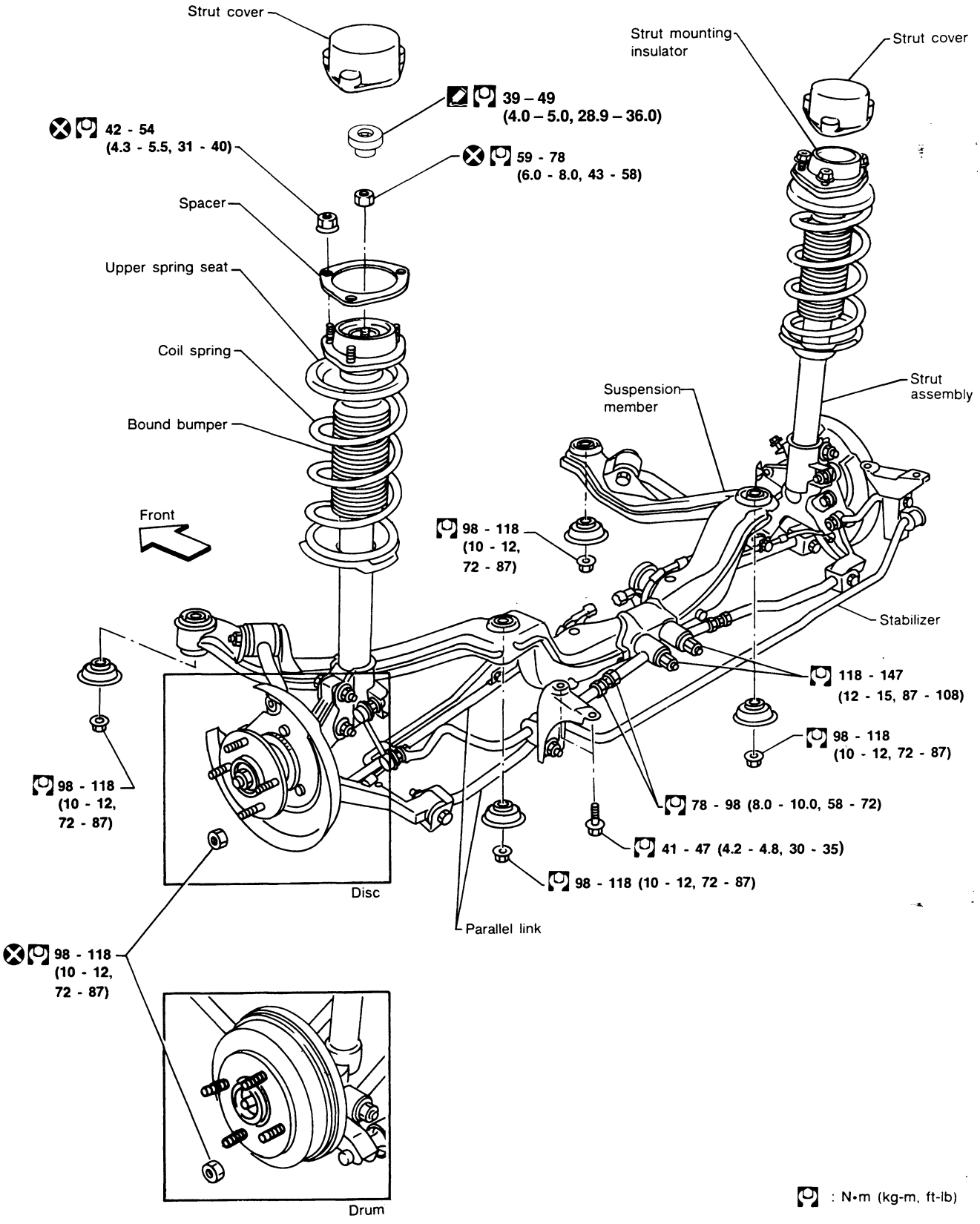
Preparation (Cont'd)

COMMERCIAL SERVICE TOOLS

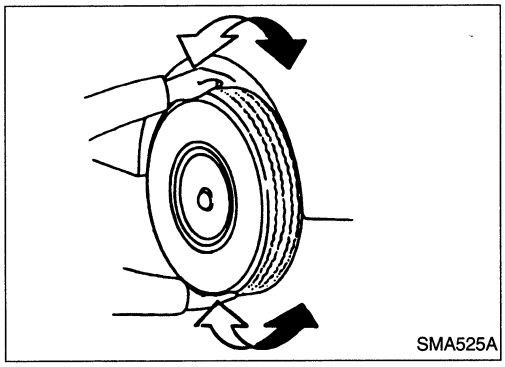
Tool name	Description
Flare nut crows foot	
Torque wrench	

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.**



ARA008

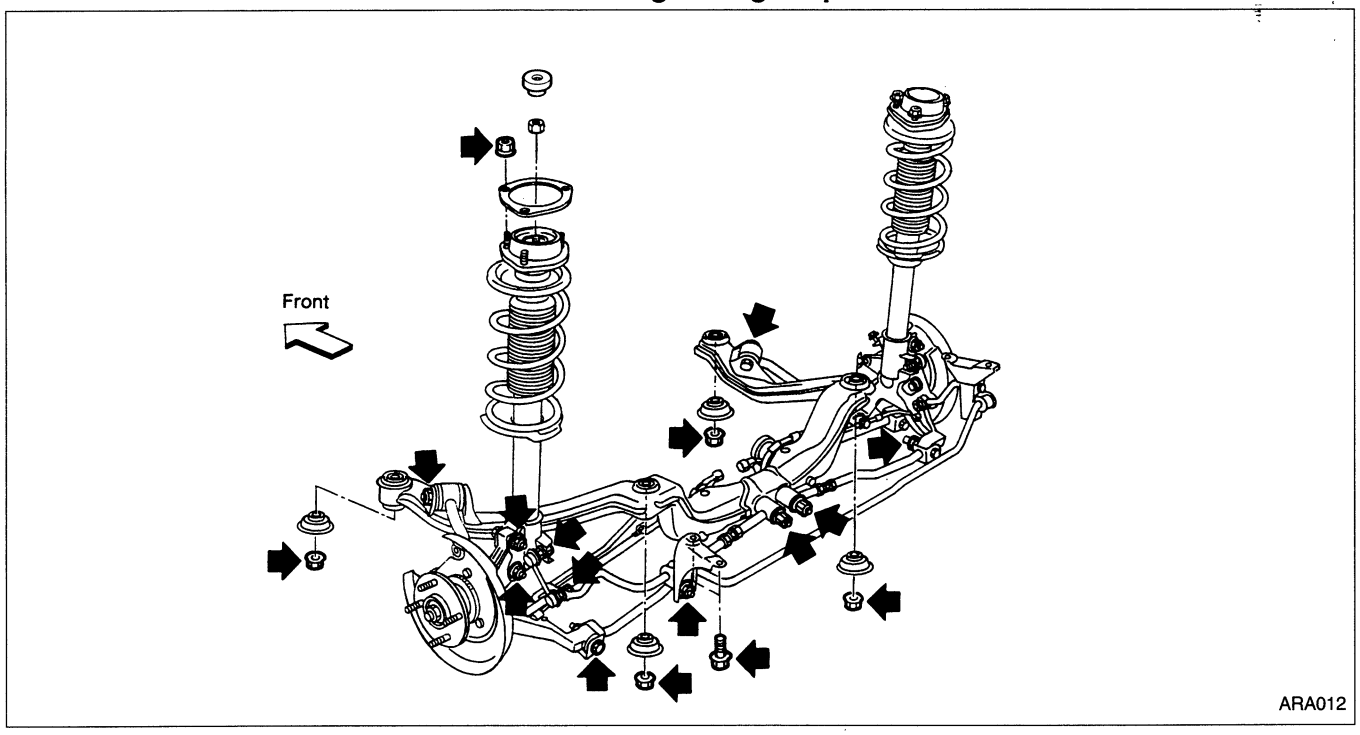

SMA525A

Rear Axle and Rear Suspension Parts

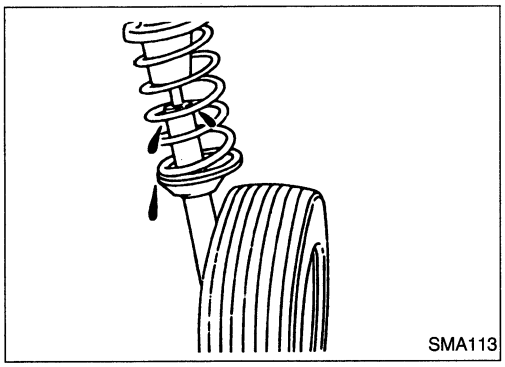
Check axle and suspension parts for looseness, wear or damage.

- Shake each rear wheel to see excessive play.

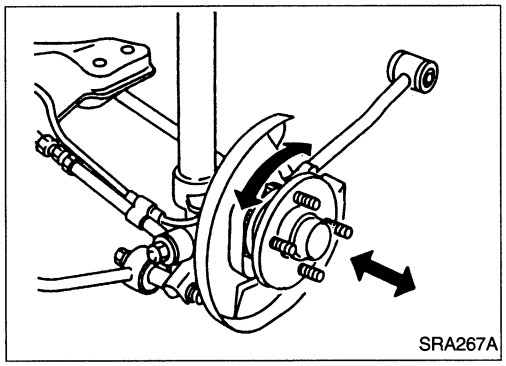
- Retighten all nuts and bolts to the specified torque.
  Tightening torque: Refer to RA-4.



ARA012

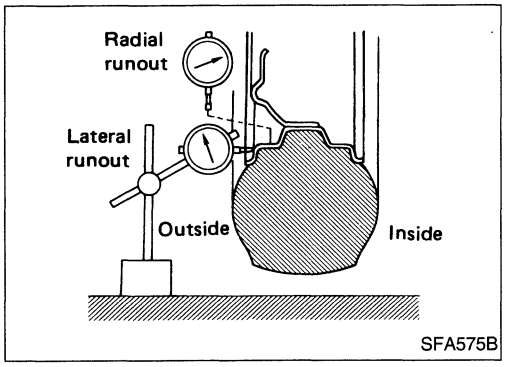

SMA113

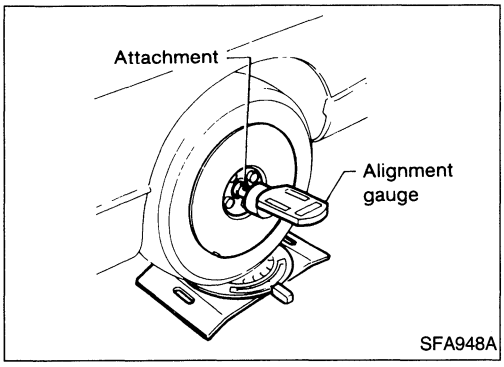
- Check strut (shock absorber) for oil leakage or other damage.
- Check wheelarch height. Refer to FA section ("Front Axle and Front Suspension Parts", "ON-VEHICLE SERVICE").

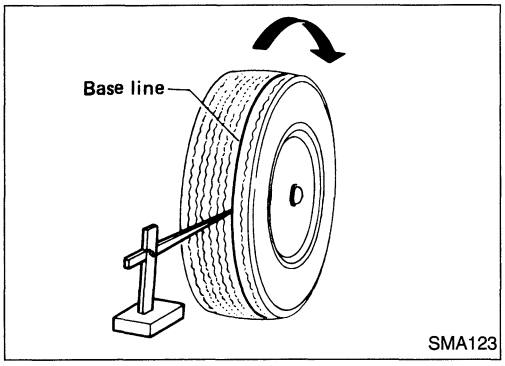

SRA267A

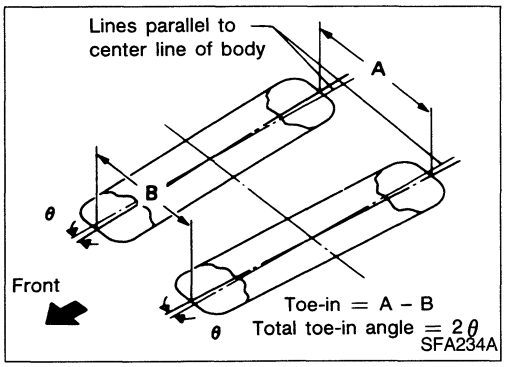
Rear Wheel Bearing

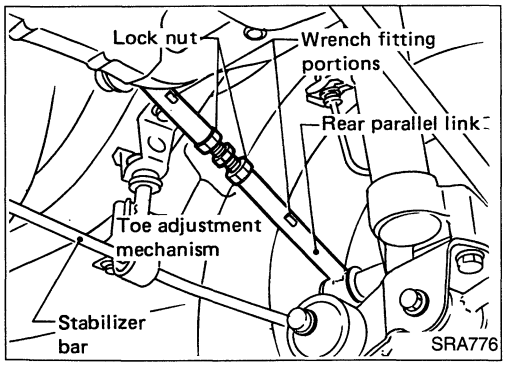
- Check axial end play.
  Axial end play:
  0.05 mm (0.0020 in) or less
- Check that wheel bearings operate smoothly.
- Check tightening torque of wheel bearing lock nut.
  : 186 - 255 N·m
  (19 - 26 kg-m, 137 - 188 ft-lb)
- If there is any axial end play or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to RA-8.











Rear Wheel Alignment

PRELIMINARY INSPECTION

Make following checks. Adjust, repair or replace if necessary.

- Check tires for wear and for improper inflation.
- Check rear wheel bearings for looseness.
- Check wheel runout.
  Wheel runout: Refer to FA section ("Inspection and Adjustment", "SDS").
- Check that rear strut (shock absorber) works properly.
- Check rear axle and rear suspension parts for looseness.
- Check vehicle posture (Unladen*).
  *: Fuel, radiator and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

CAMBER

Camber is preset at factory and cannot be adjusted.

Camber:
Refer to SDS, RA-15.

- If the camber is not within specification, inspect and replace any damaged or worn rear suspension parts.

TOE-IN

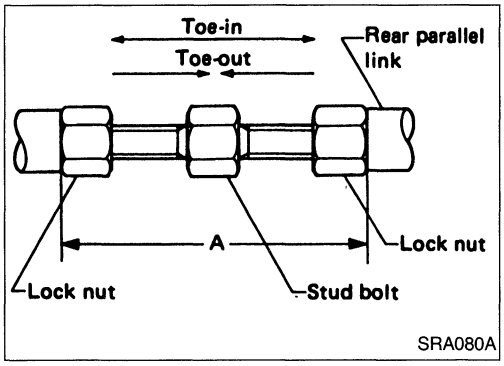
1. Draw a base line across the tread.
- After lowering rear of vehicle, move it up and down to eliminate friction.

2. Measure toe-in.
- Measure distance "A" and "B" at the same height as hub center.

Toe-in:
Refer to SDS, RA-15.

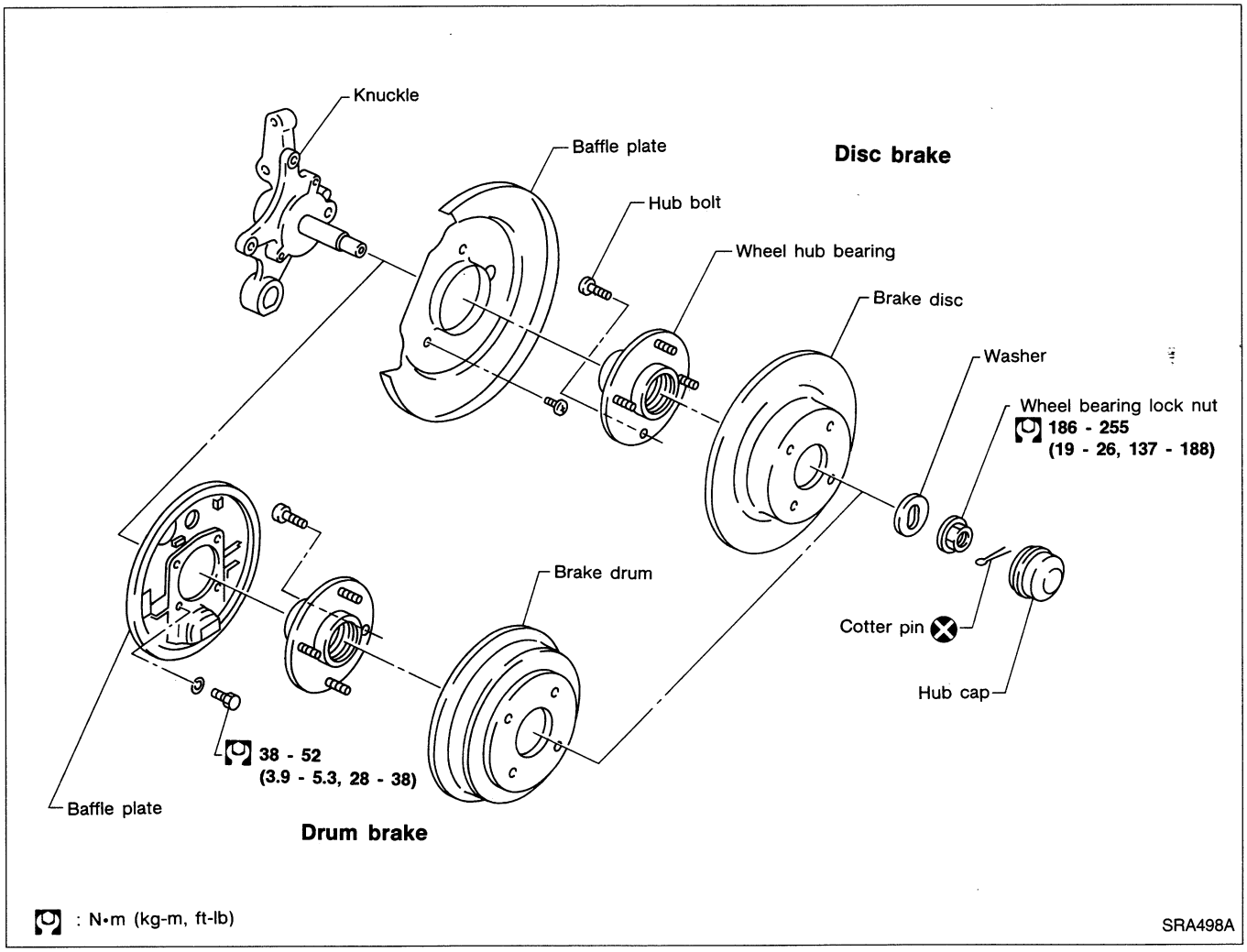
3. Adjust toe-in by varying the lengths of rear parallel links.

Rear Wheel Alignment (Cont'd)



- Adjust left and right rear parallel links to the same length "A".
- Tighten lock nut while holding rear parallel link with wrench to prevent bushing from twisting.

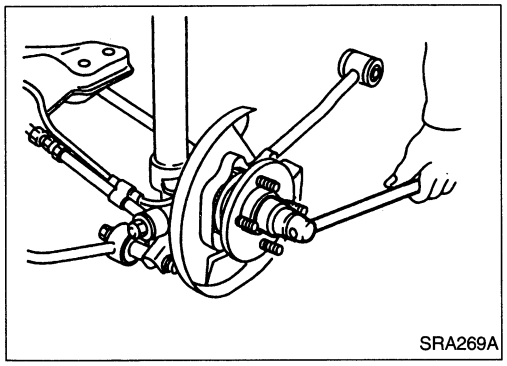
Standard length "A":
50 - 55 mm (1.97 - 2.17 in)



Removal

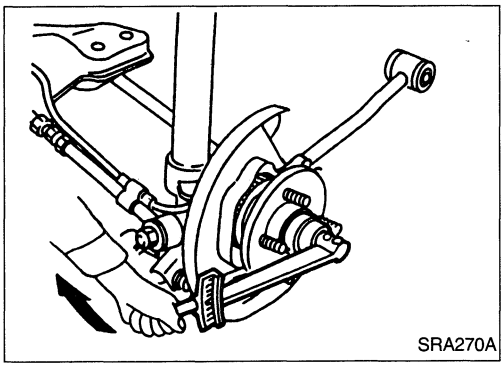
CAUTION:
Wheel hub bearing usually does not require maintenance. If any of the following symptoms are noted, replace wheel hub bearing assembly.

- Growling noise is emitted from wheel hub bearing during operation.
- Wheel hub bearing drags or turns roughly when hub is turned with your hand after bearing lock nut is tightened to specified torque.
- After wheel hub bearing is removed from knuckle spindle.



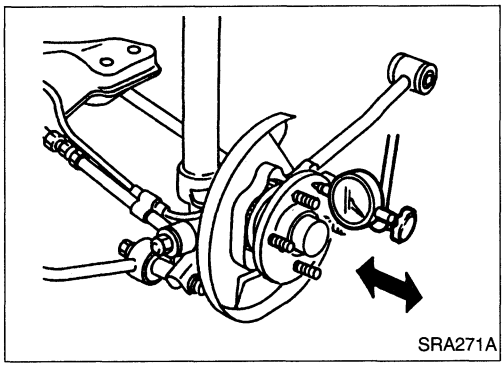
1) Remove brake caliper assembly.
2) Remove wheel bearing lock nut.

Brake hose does not need to be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Make sure brake hose is not twisted.

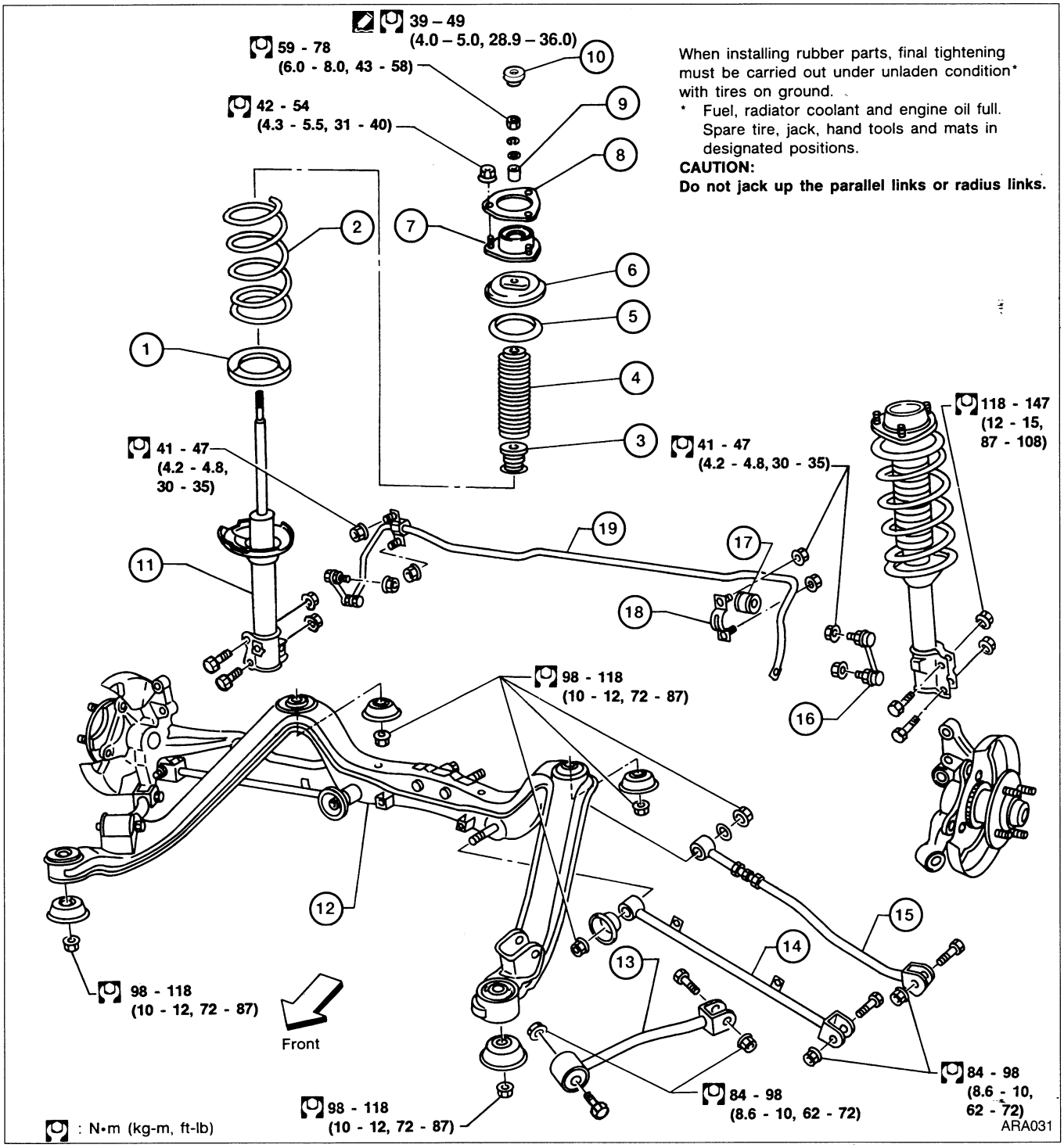

SRA270A

Installation

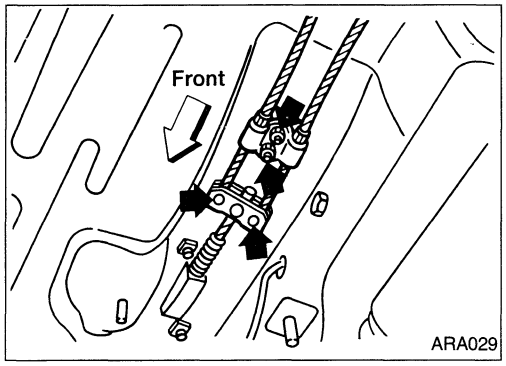
- Install wheel hub bearing.
- Tighten wheel bearing lock nut.
  : 186 - 255 N·m
  (19 - 26 kg-m, 137 - 188 ft-lb)
- Check that wheel bearings operate smoothly.


SRA271A

- Check wheel bearing axial end play.
  Axial end play:
  0.05 mm (0.0020 in) or less



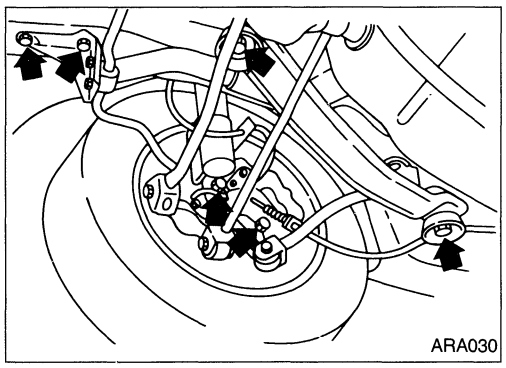
① Lower spring rubber seat
② Coil spring
③ Bound bumper
④ Dust cover
⑤ Upper spring rubber seat
⑥ Upper spring seat
⑦ Strut mounting insulator
⑧ Spacer
⑨ Strut mounting collor
⑩ Strut damper
⑪ Strut assembly
⑫ Suspension member
⑬ Radius link
⑭ Front parallel link
⑮ Rear parallel link
⑯ Connecting rod
⑰ Bushing
⑱ Clamp
⑲ Stabilizer bar



Removal and Installation

CAUTION:
Do not jack up at the parallel links or radius links.

- Disconnect brake hydraulic line and parking brake cable at equalizer. (Models with rear drum brake.)

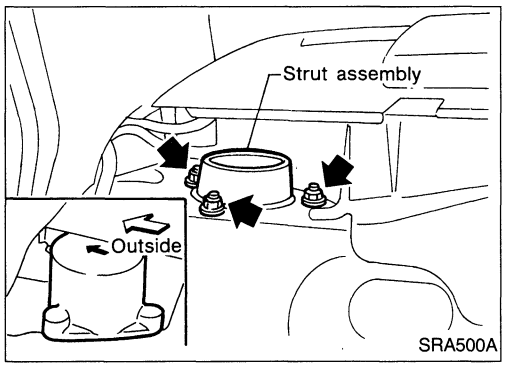


- Remove suspension assembly.

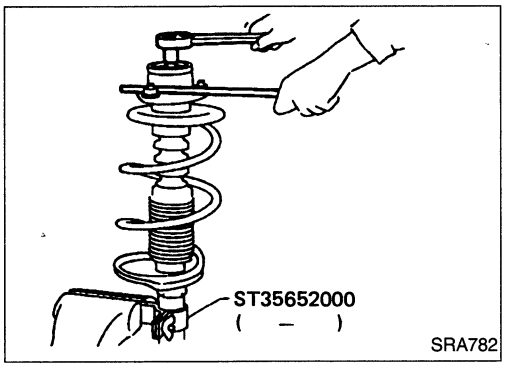
1) Disconnect parking brake cable from caliper. (Models with rear disc brake.)
2) Remove brake caliper assembly. (Models with rear disc brake.)

Brake hose need not be disconnected from brake caliper.
Be careful not to depress brake pedal, or piston will pop out.
Make sure brake hose is not twisted.

3) Remove parking brake cable fixing bolts. (Models with rear drum brake.)
4) Remove stabilizer fixing bolts and suspension member fixing bolts.
5) Remove rear seat. Refer to BF section ("Rear Seat", "SEAT").
6) Remove rear parcel shelf. Refer to BF section ("Interior", "INTERIOR AND EXTERIOR").



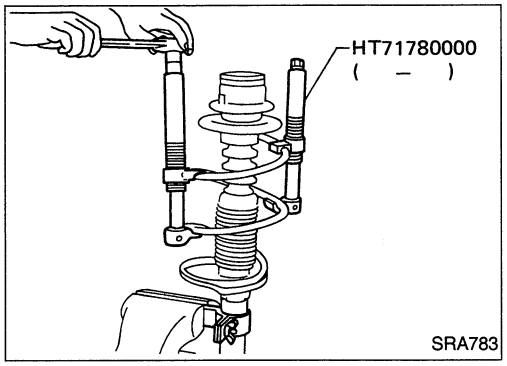
7) Remove strut securing nuts (Upper side). Then pull out strut assembly.



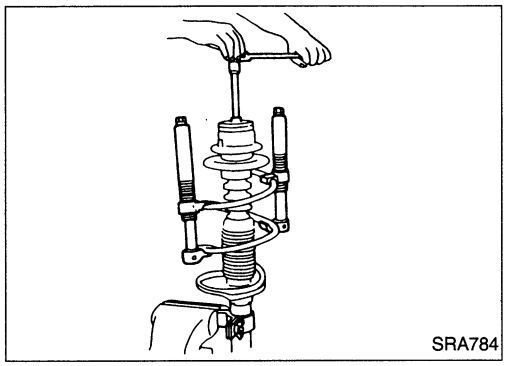
Disassembly

1. Set strut assembly on vise with attachment, then loosen piston rod lock nut.

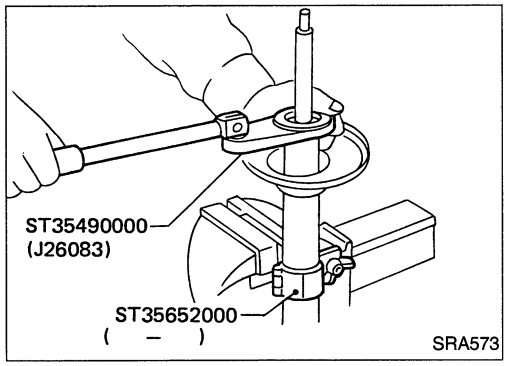
Do not remove piston rod lock nut.



2. Compress spring with Tool so that the strut mounting insulator can be turned by hand.



3. Remove piston rod lock nut.



4. Remove gland packing with Tool.

Avoid getting dirt and dust into gland packing portion.

5. Retract piston rod by pushing it down until it bottoms. Then, slowly withdraw piston rod from cylinder together with piston guide.

Inspection

STRUT 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.

Inspection (Cont'd)

UPPER RUBBER SEAT AND BUSHING

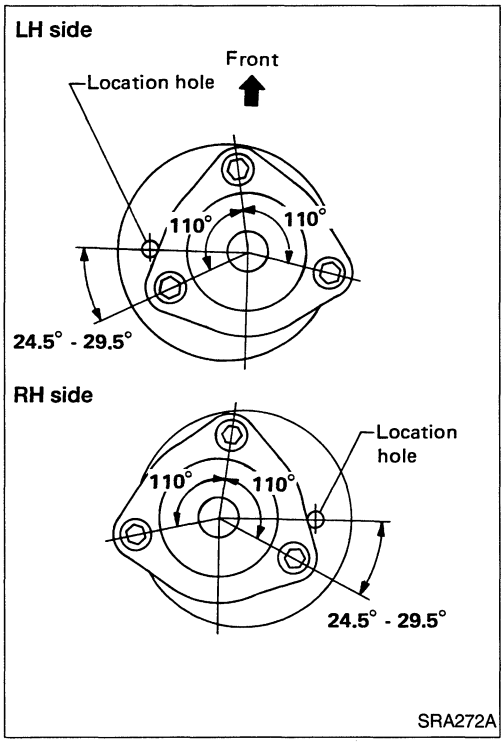
Check rubber parts for deterioration or cracks.
Replace if necessary.

STRUT MOUNTING INSULATOR

- Check cemented rubber-to-metal portion for melting or cracks.
- Check rubber parts for deterioration.

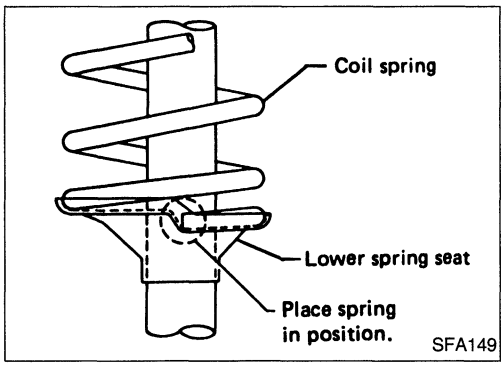
COIL SPRING

Check for cracks, deformation or other damage.
Replace if necessary.

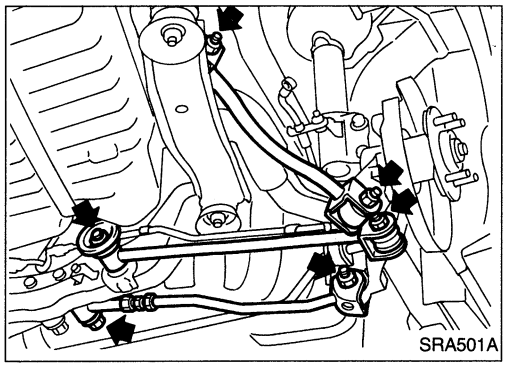


Assembly

1. Locate upper spring seat as shown.



2. After placing coil spring in position on lower spring seat, release spring compressor gradually.


SRA501A

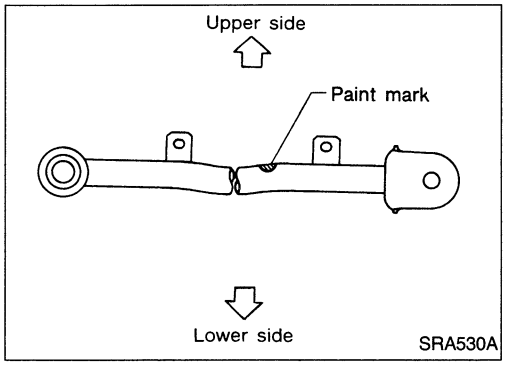
Removal and Installation

PARALLEL LINK AND RADIUS LINK

- Remove parallel link and radius link.

— Models without ABS —

- When installing front parallel link, make sure that paint mark faces in the correct direction.
- During installation, final tightening must be carried out at curb weight with tires on the ground.
- After installation, check wheel alignment. Refer to RA-6.

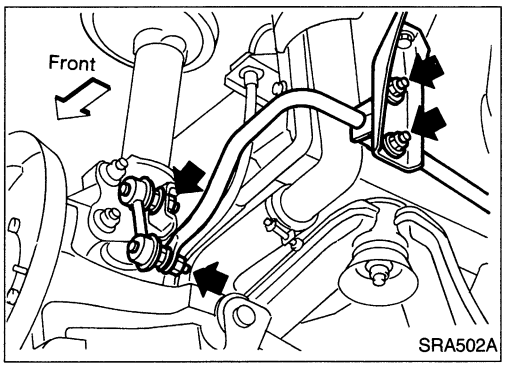


SRA530A

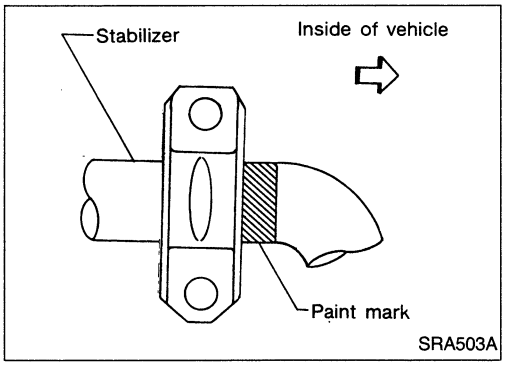
- **Check parallel link for cracks, deformation or other damage. Replace if necessary.**
- **Check radius link for cracks, deformation or other damage. Replace if necessary.**

STABILIZER BAR

- Remove stabilizer bar.

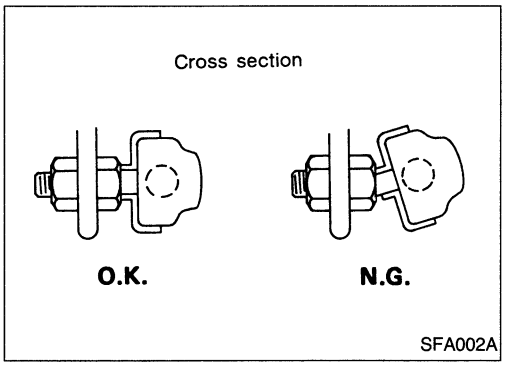


SRA502A



SRA503A

- When installing stabilizer, refer to paint marks to mount it even.



SFA002A

- Install stabilizer bar with ball joint socket properly placed.

General Specifications

COIL SPRING

Applied model		XE	SE
Wire diameter	mm (in)	11.9 (0.469)	12.2 (0.480)
Coil diameter	mm (in)	141.8 (5.58)	142.4 (5.61)
Free length	mm (in)	315 (12.40)	303.5 (11.95)
Spring constant	N/mm (kg/mm, lb/in)	19.6 (2.0, 112)	21.6 (2.2, 123)
Identification color		Yellow x 2	Yellow x 1, Pink x 1

STABILIZER BAR

Applied model		XE	SE
Diameter	mm (in)	15 (0.59)	16 (0.63)

STRUT

Applied model	SE	XE
Piston rod diameter mm (in)	22 (0.87)	
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)		
Expansion	765 - 1,040 (78 - 106, 172 - 234)	608 - 824 (62 - 84, 137 - 185)
Compression	363 - 539 (37 - 55, 82 - 121)	265 - 402 (27 - 41, 60 - 90)

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*)

Applied model		All
Camber	degree	− 2°00′ to − 0°30′
Toe-in		
A – B	mm (in)	1 - 3 (0.04 - 0.12)
Total angle 2θ	degree	6′ - 18′

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

WHEEL BEARING

Applied model	All
Wheel bearing axial end play mm (in)	0.05 (0.0020) or less
Wheel bearing lock nut tightening torque N•m (kg-m, ft-lb)	186 - 255 (19 - 26, 137 - 188)

SECTION BR

CONTENTS

CONTENTS (Cont'd.)

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 control module, 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 NISSAN 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".

BRAKE SYSTEM

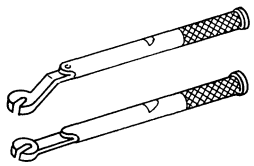
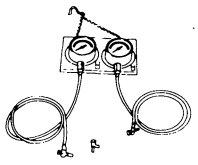
- **Use brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of hydraulic system.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**

WARNING:

Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder draffs caused by friction.

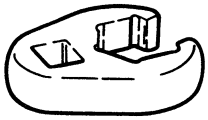
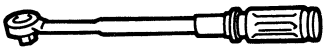
Preparation

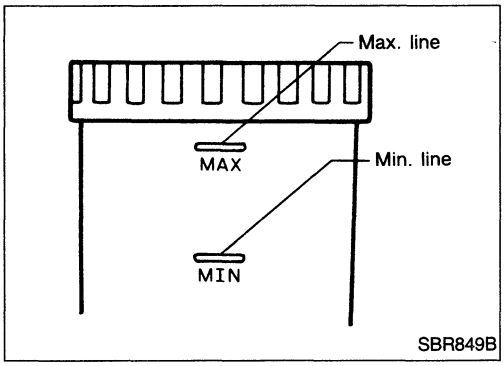
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
GG94310000 (—) Flare nut wrench		Removing and installing each brake piping
KV991V0010 (—) Brake fluid pressure gauge		Measuring brake fluid pressure

Preparation (Cont'd)

COMMERCIAL SERVICE TOOLS

Tool name	Description
Flare nut crows foot	
Torque wrench	



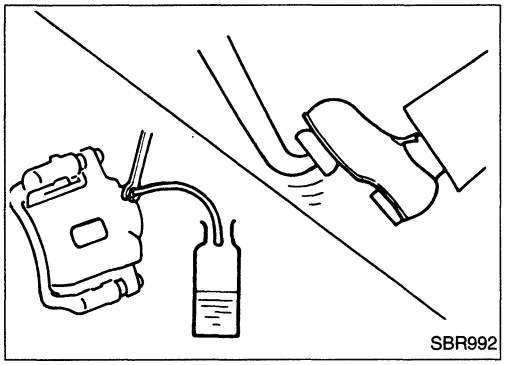
Checking Brake Fluid Level

- 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.

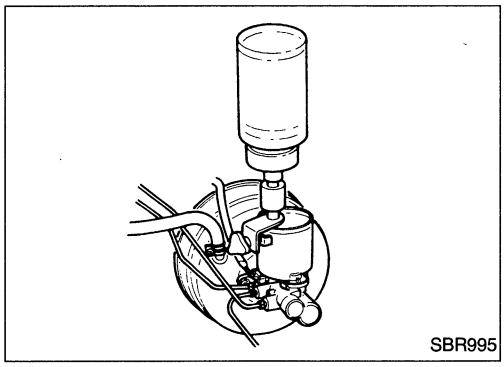


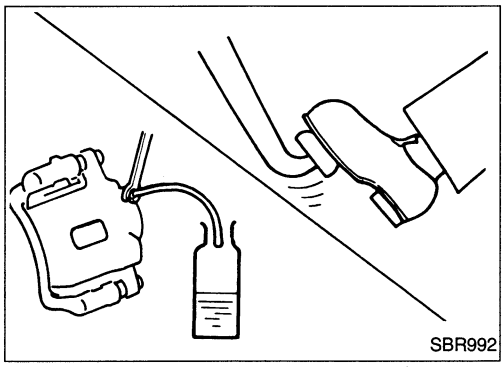
Changing Brake Fluid

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 BR-5.


SBR995


SBR992

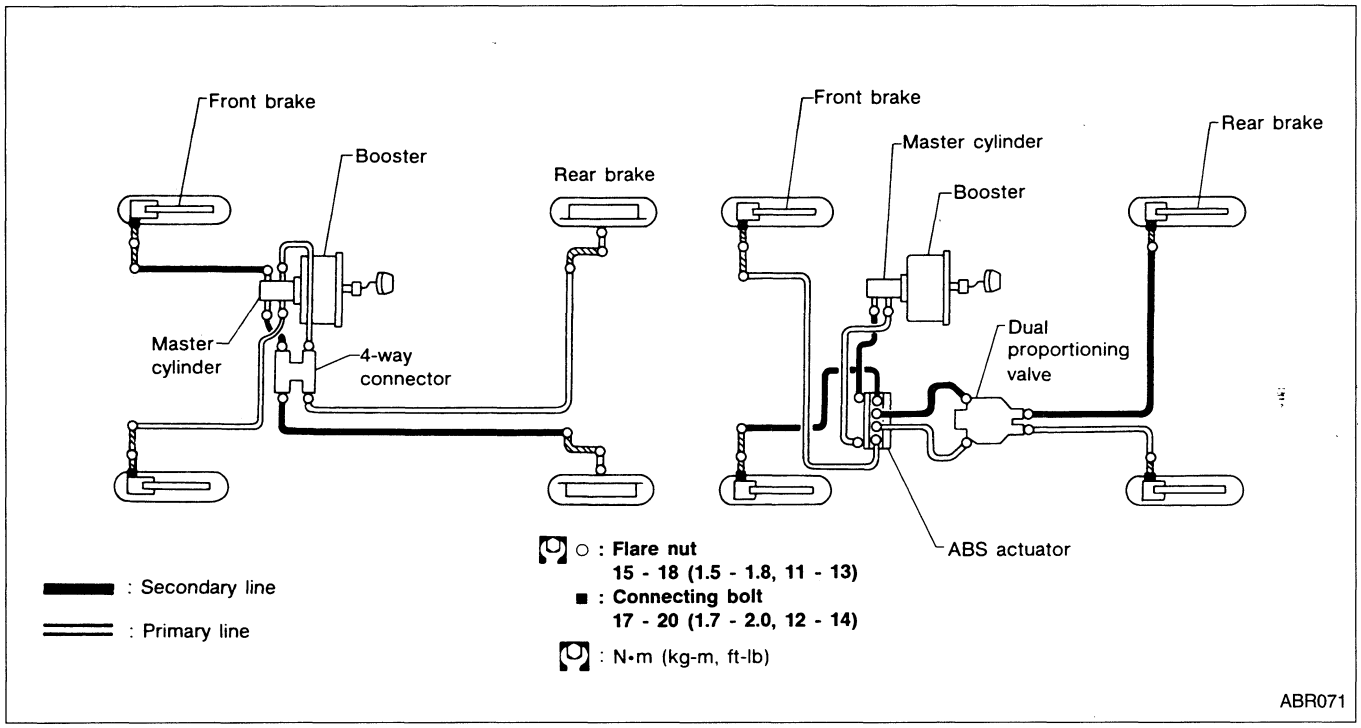
Bleeding Procedure

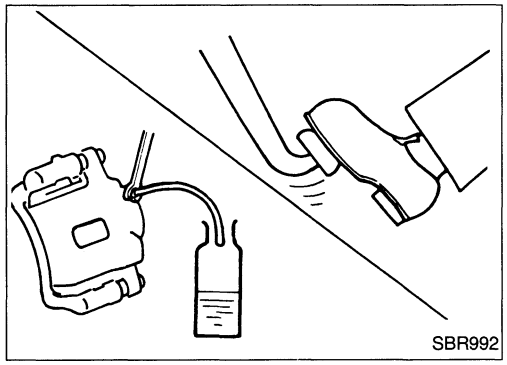
CAUTION:

- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**

1. Connect a transparent vinyl tube to air bleeder valve.
2. Fully depress brake pedal several times.
3. With brake pedal depressed, open air bleeder valve to release air.
4. Close air bleeder valve.
5. Release brake pedal slowly.
6. Repeat steps 2. through 5. until clear brake fluid comes out of air bleeder valve.

- Bleed air in the following order.
  Right rear brake
  ↓
  Left front brake
  ↓
  Left rear brake
  ↓
  Right front brake





Removal

CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **All hoses must be free from excessive bending, twisting and pulling.**

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut securing brake tube to hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.

Inspection

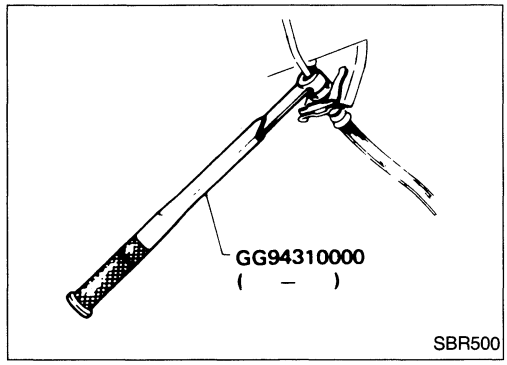
Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

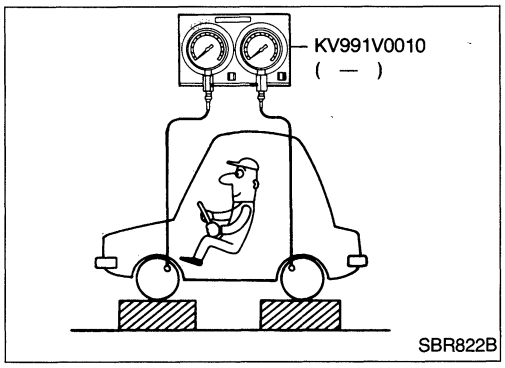
Installation

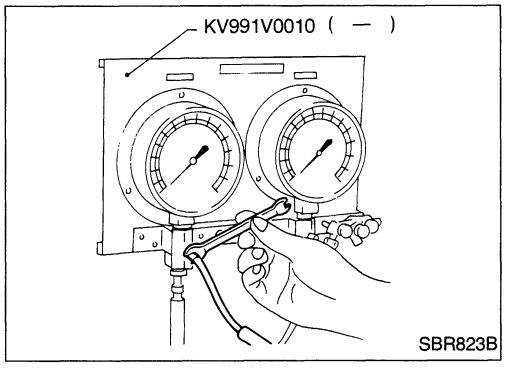
CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Tighten all flare nuts and connecting bolts.
   Flare nut:
   : 15 - 18 N•m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
   Connecting bolt:
   : 17 - 20 N•m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)
2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to BR-5.







Proportioning Valve

INSPECTION

CAUTION:

- **Carefully monitor brake fluid level at master cylinder.**
- **Use new brake fluid "DOT 3".**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.**
- **Depress pedal slowly when raising front brake pressure.**
- **Check rear brake pressure 2 seconds after front brake pressure reaches specified value.**
- **For models with ABS, disconnect harness connectors from ABS actuator relay before checking.**

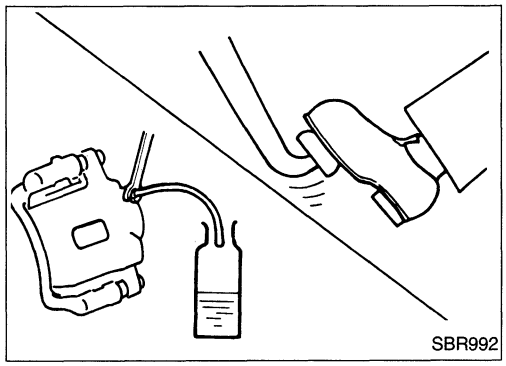
1. Connect Tool to air bleeders of front and rear brakes on either LH and RH side.
2. Bleed air from the Tool.
3. Check rear brake pressure by depressing brake pedal (increasing front brake pressure).

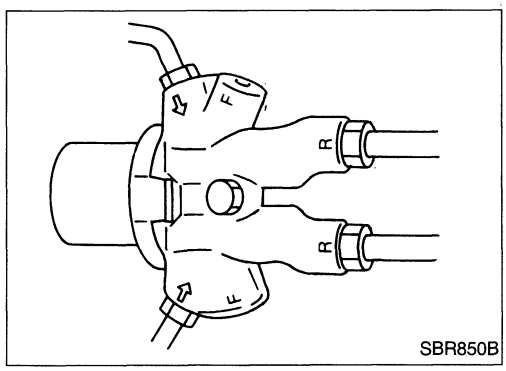
Unit: kPa (kg/cm^2, psi)

	Without ABS	With ABS
Applied pressure (Front brake) D_1	5,394 (55, 782)	5,884 (60, 853)
Output pressure (Rear brake) D_2	2,452 - 2,844 (25 - 29, 356 - 412)	3,334 - 3,727 (34 - 38, 483 - 540)

If output pressure is out of specifications, replace dual proportioning valve (separated type) or master cylinder assembly (built-in type).

4. Bleed air after disconnecting the Tool. Refer to BR-5.





REMOVAL (Separated type)

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. Loosen flare nut.
4. Remove proportioning valve mounting bolt, then remove flare nut.

Proportioning Valve (Cont'd)

INSTALLATION (Separated type)

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Temporarily fit flare nut to proportioning valve.
2. Tighten proportioning valve mounting bolt, then tighten flare nut.

   Flare nut:

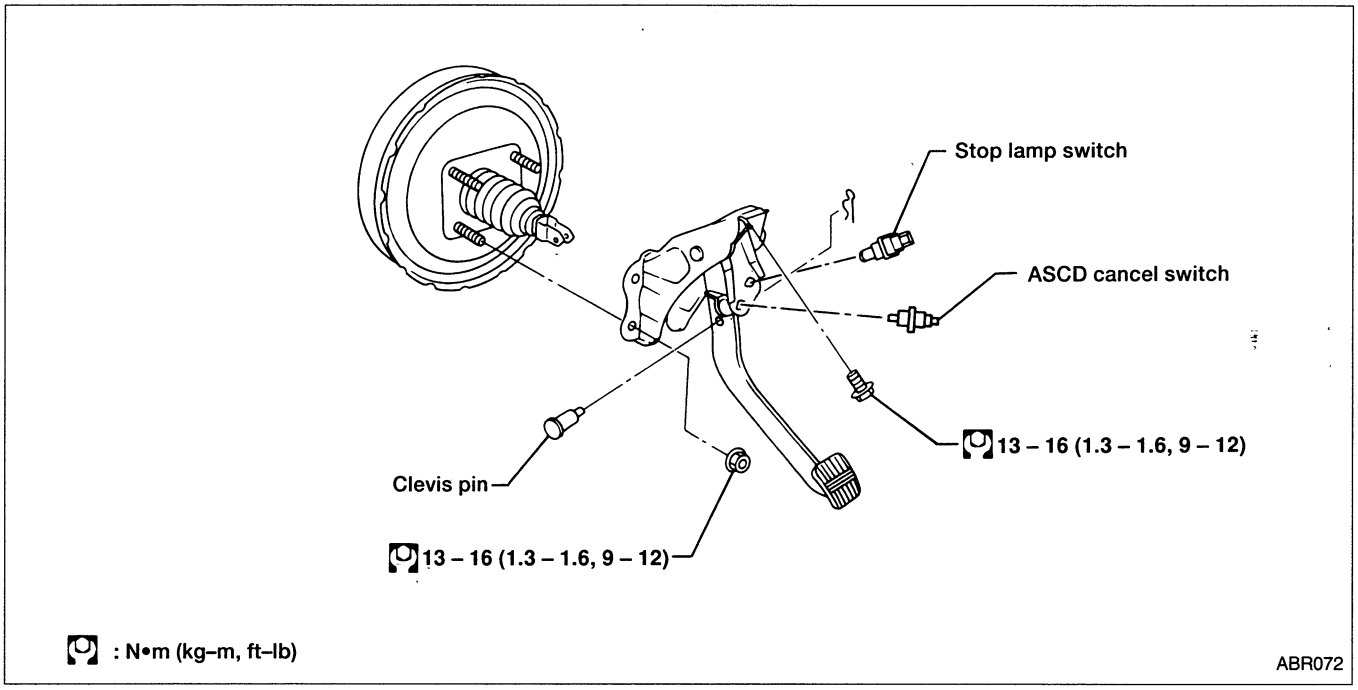
   : 15 - 18 N•m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
3. Refill until new brake fluid comes out of each air bleeder valve.
4. Bleed air. Refer to BR-5.

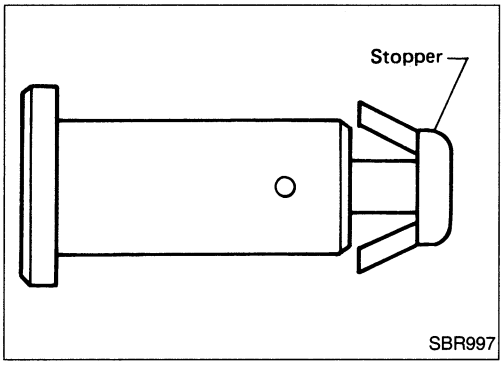
REMOVAL AND INSTALLATION (Built-in type)

Always replace together with master cylinder as an assembly.

- Refer to BR-11.

Removal and Installation

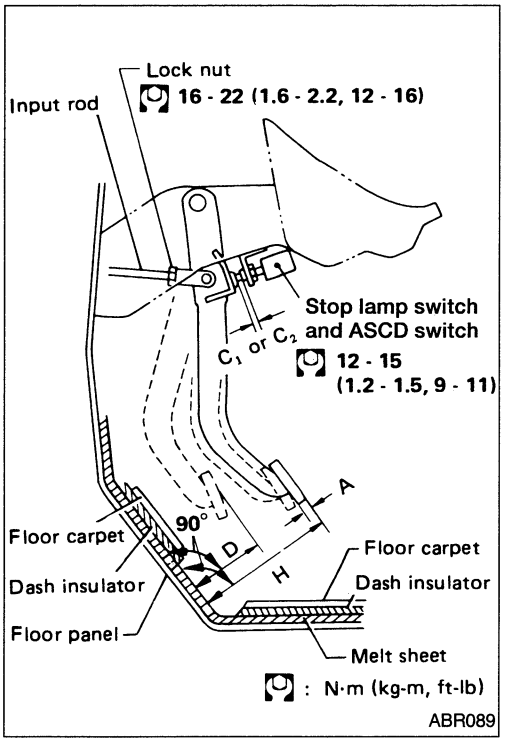




Inspection

Check brake pedal for following items:

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper



Adjustment

Check brake pedal free height from dash reinforcement panel.

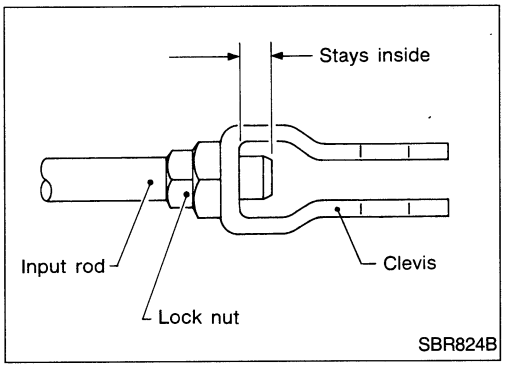
H: **Free height**
Refer to SDS, BR-58.

D: **Depressed height**
Refer to SDS, BR-58.
Under force of 490 N (50 kg, 110 lb) with engine running

C_1, C_2: **Clearance between pedal stopper and threaded end of stop lamp switch and ASCD switch**
0.3 - 1.0 mm (0.012 - 0.039 in)

A: **Pedal free play**
1.0 - 3.0 mm (0.039 - 0.118 in)

Adjustment (Cont'd)



If necessary, adjust brake pedal free height.

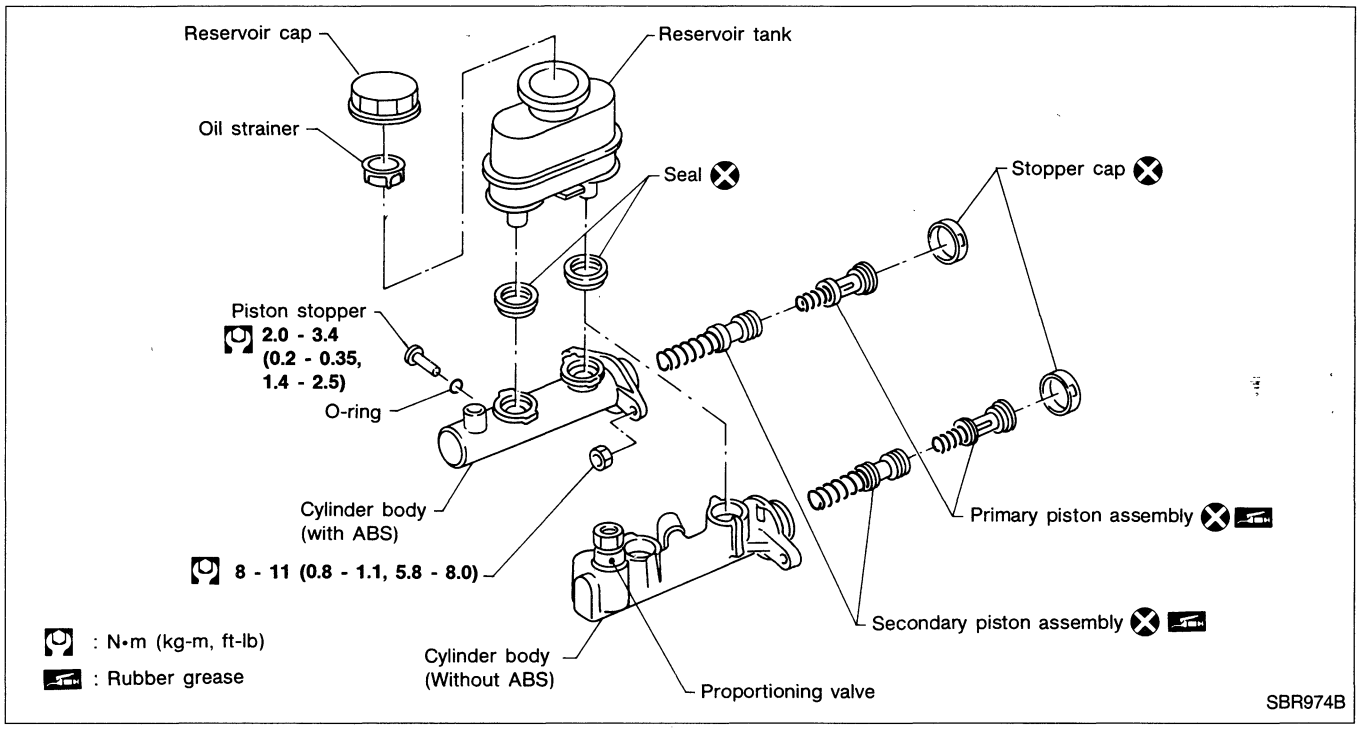
1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Tighten lock nut.

Make sure that tip of input rod stays inside of clevis.

2. Loosen lock nut and adjust clearance "C_1" and "C_2" with stop lamp switch and ASCD switch respectively. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamps go off when pedal is released.

4. Check brake pedal's depressed height while engine is running.
   If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, etc.); then make necessary repairs.



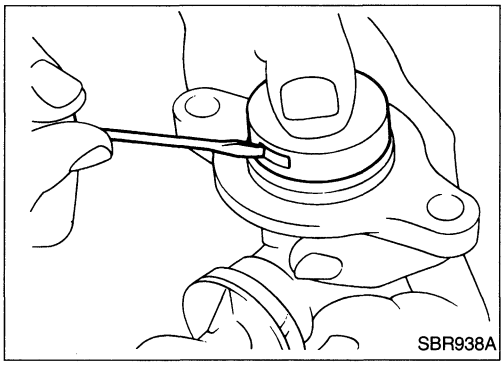
Removal

CAUTION:

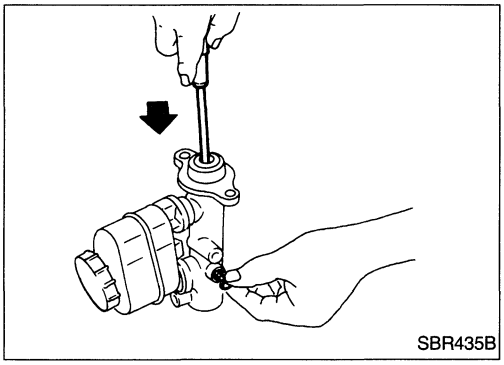
Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake pipe flare nuts.
4. Remove master cylinder mounting nuts.

Disassembly

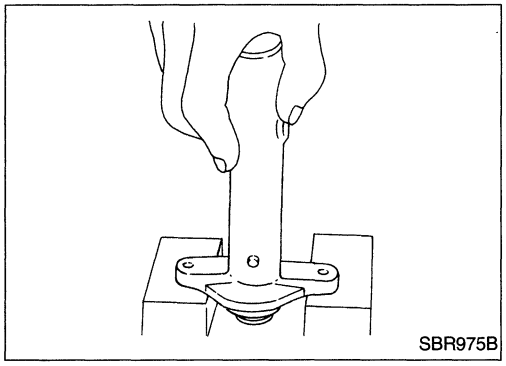


1. Bend claws of stopper cap outward.



2. Remove valve stopper while piston is pushed into cylinder. (Models with ABS only)

Disassembly (Cont'd)


SBR975B

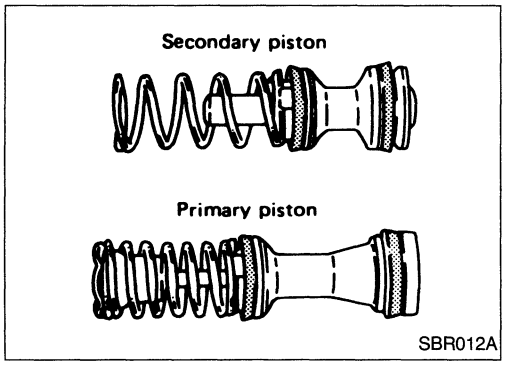
3. Remove piston assemblies.

If it is difficult to remove secondary piston assembly, tap flange with mallet or equivalent and pull out secondary piston.

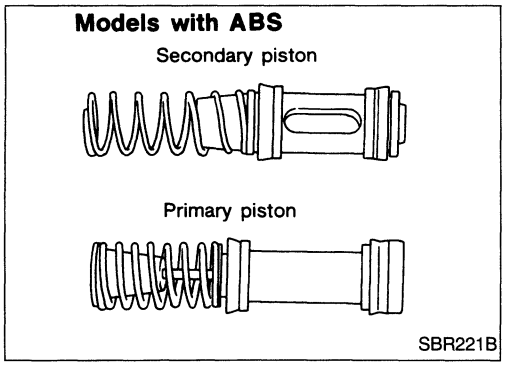
4. Draw out reservoir tank.

Inspection

Check master cylinder inner wall for pin holes or scratches. Replace if damaged.



SBR012A

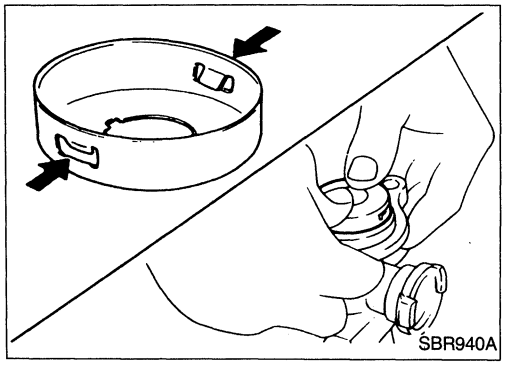


SBR221B

Assembly

1. Insert secondary piston assembly. Then insert primary piston assembly.

- **Pay attention to direction of piston cups in figure at left. Also, insert pistons squarely to avoid scratches on cylinder bore.**
- **Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body (For models with ABS only).**

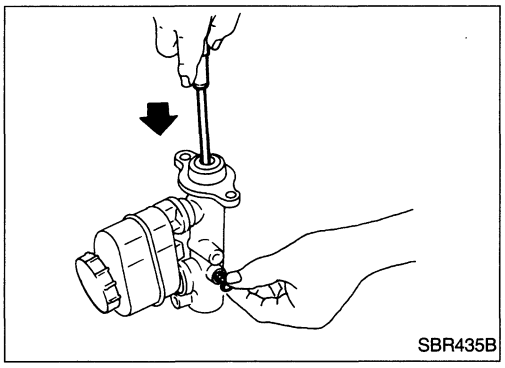

SBR940A

2. Install stopper cap.

Before installing stopper cap, ensure that claws are bent inward.

3. Push reservoir tank seals.
4. Push reservoir tank into master cylinder.

Assembly (Cont'd)


SBR435B

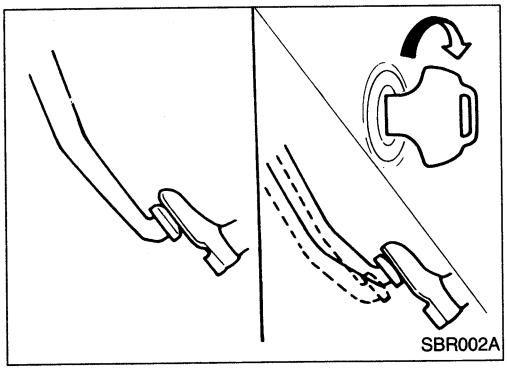
5. Install valve stopper while piston is pushed into cylinder. (Models with ABS only)

Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

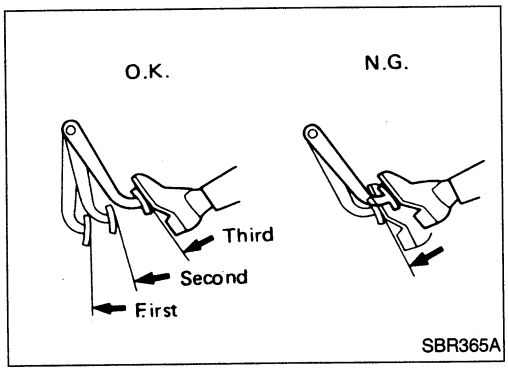
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Fit flare nuts to master cylinder.
3. Tighten mounting nuts.
   : 8 - 11 N·m (0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)
4. Tighten flare nuts.
   : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
5. Bleed air. Refer to BR-5.



On-vehicle Service

OPERATING CHECK

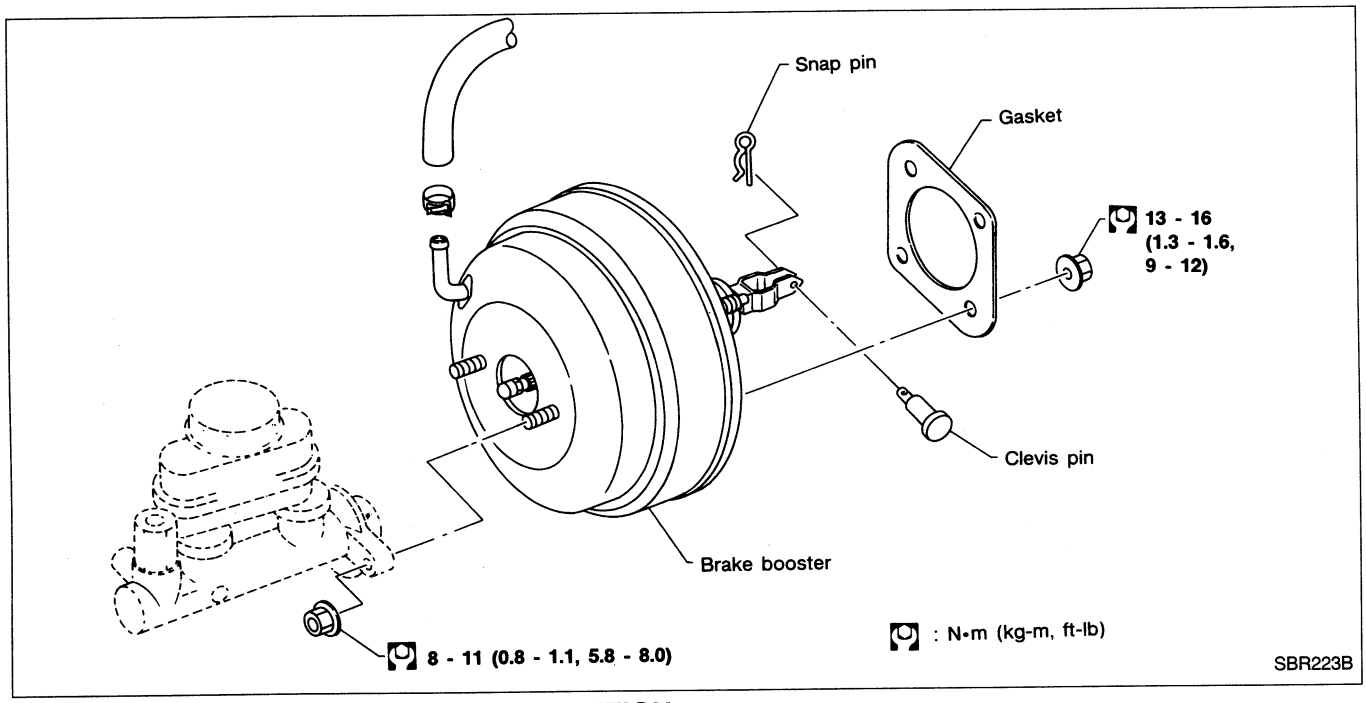
- Depress brake pedal several times with engine off, and check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.



AIRTIGHT CHECK

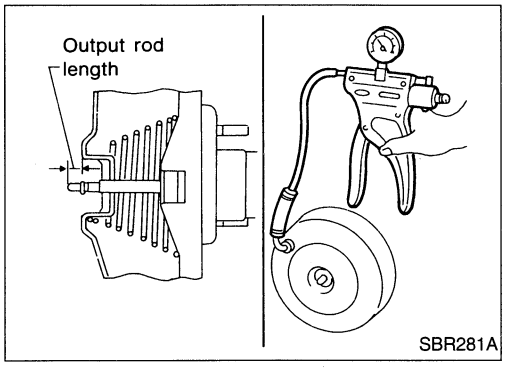
- Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. If pedal goes further down the first time and gradually rises after second or third time, booster is airtight.
- Depress brake pedal while engine is running, and stop engine with pedal depressed. If there is no change in pedal stroke after holding pedal down **30 seconds**, brake booster is airtight.

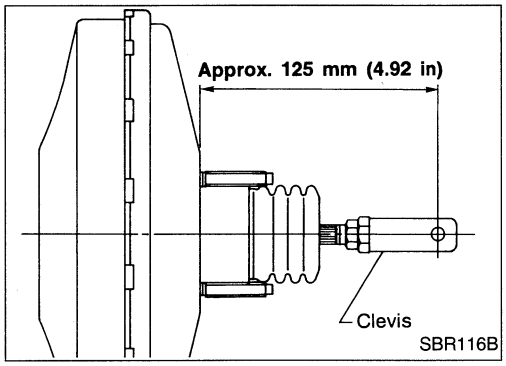
Removal



CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Be careful not to deform or bend brake pipes, during removal of booster.**
- **It is necessary to remove ABS actuator and actuator bracket first because space around booster is limited.**





Inspection

OUTPUT ROD LENGTH CHECK

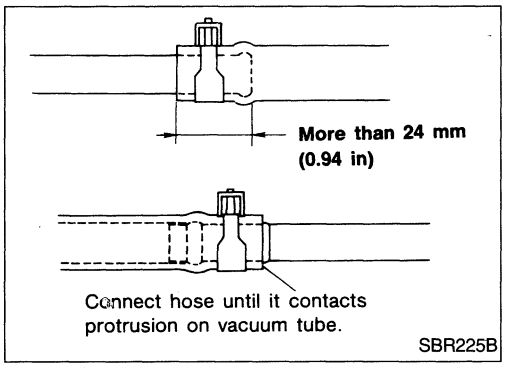
1. Apply vacuum of −66.7 kPa (−500 mmHg, −19.69 inHg) to brake booster with a handy vacuum pump.
2. Check output rod length.
   Specified length:
   10.275 - 10.525 mm (0.4045 - 0.4144 in)

Installation

CAUTION:

- **Be careful not to deform or bend brake pipes, during installation of booster.**
- **Replace clevis pin if damaged.**
- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**
- **Take care not to damage brake booster mounting bolt thread when installing. Due to the acute angle of installation, the threads can be damaged on the metal surrounding the dash panel holes.**

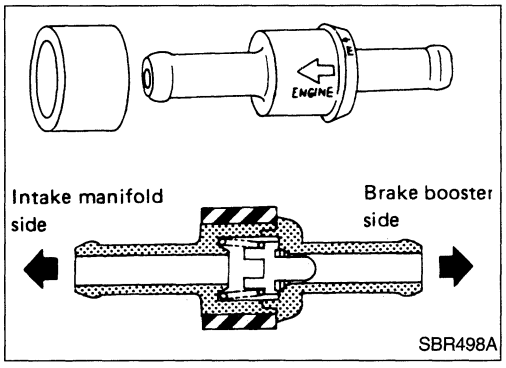
1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to brake booster) lightly.
3. Connect brake pedal and booster input rod with clevis pin.
4. Secure mounting nuts.
   : 13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)
5. Install master cylinder. Refer to BR-13.
6. Bleed air. Refer to BR-5.



Removal and Installation

CAUTION:
When installing vacuum hoses, pay attention to the following points.

- **Do not apply any oil or lubricants to vacuum hose and check valve.**
- **Insert vacuum tube into vacuum hose as shown.**

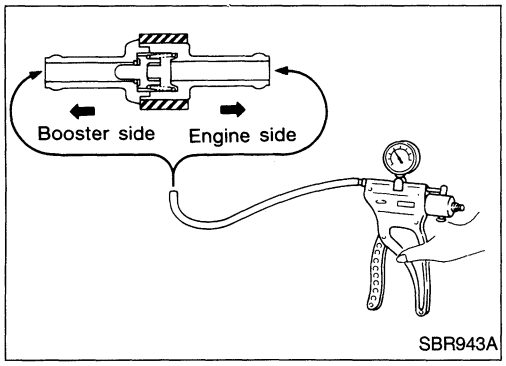


- **Install check valve, paying attention to its direction.**

Inspection

HOSES AND CONNECTORS

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



CHECK VALVE

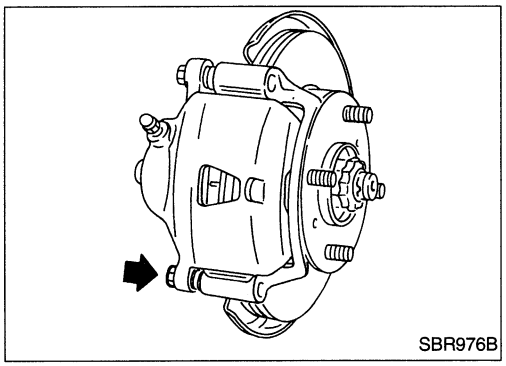
Check vacuum with a vacuum pump.

Connect to booster side	Vacuum should exist.
Connect to engine side	Vacuum should not exist.

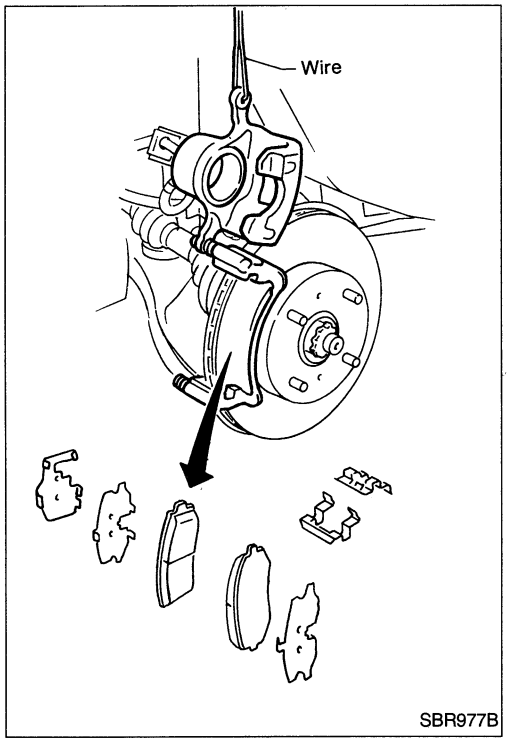
Pad Replacement

WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.

CAUTION:
- **When cylinder body is open, do not depress brake pedal or piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of 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.**


SBR976B

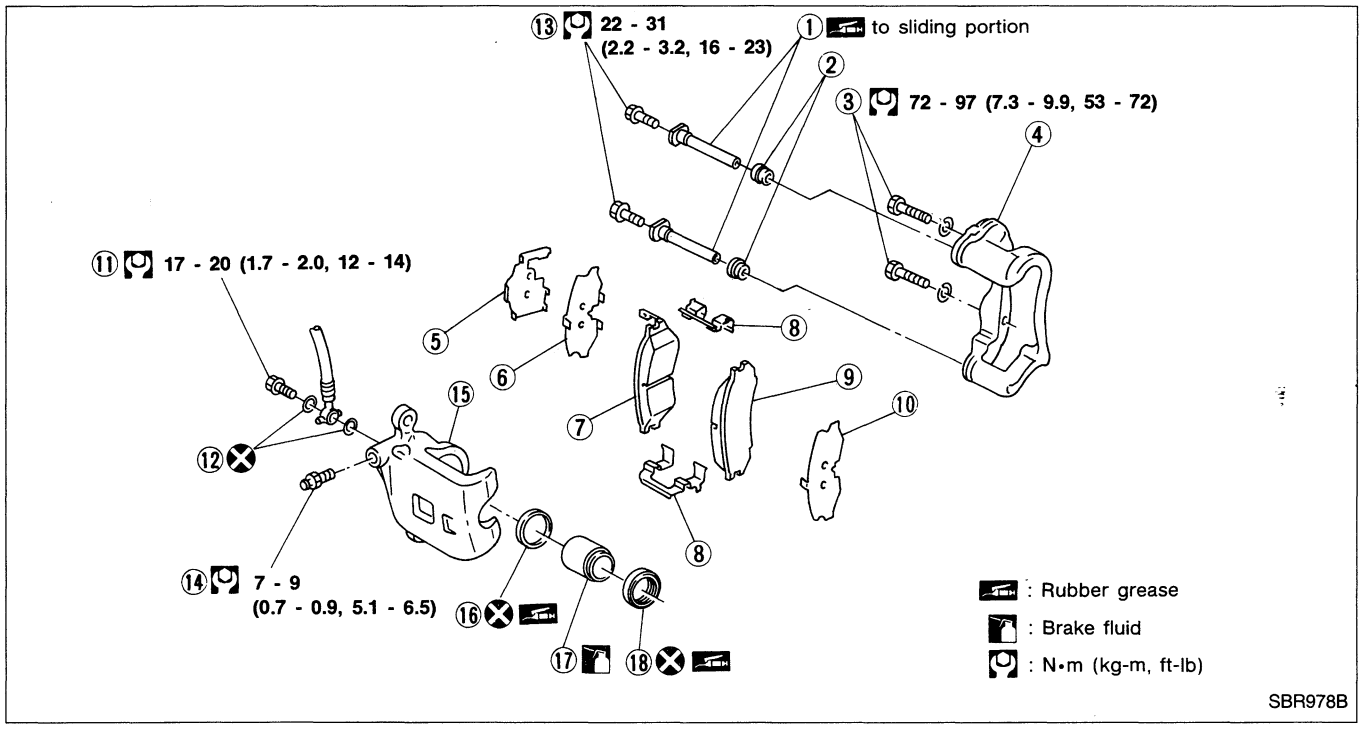
1. Remove master cylinder reservoir cap.
2. Remove lower pin bolt.



SBR977B

3. Open cylinder body upward. Then remove pad retainers and inner and outer shims.
   Standard pad thickness:
   11.0 mm (0.433 in)
   Pad wear limit:
   2.0 mm (0.079 in)

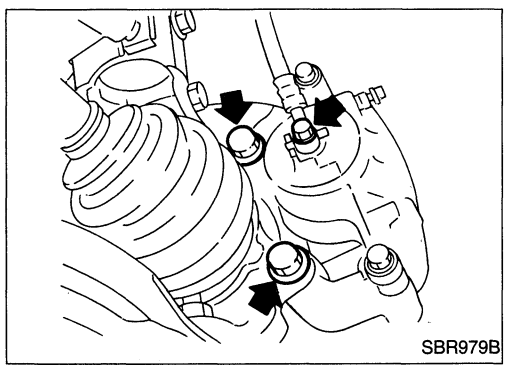
- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**



① Main pin
② Pin boot
③ Torque member fixing bolt
④ Torque member
⑤ Shim cover
⑥ Inner shim
⑦ Inner pad
⑧ Pad retainer
⑨ Outer pad
⑩ Outer shim
⑪ Connecting bolt
⑫ Copper washer
⑬ Main pin bolt
⑭ Bleed valve
⑮ Cylinder body
⑯ Piston seal
⑰ Piston
⑱ Piston boot

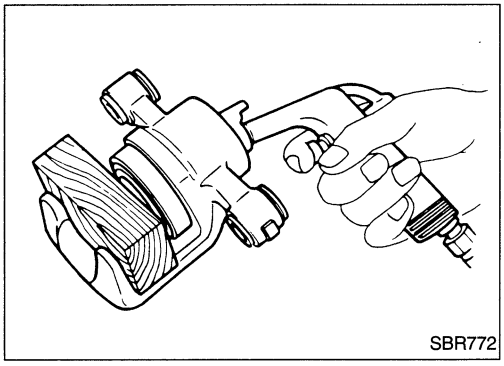
Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.



Remove torque member fixing bolts and connecting bolt.

It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.


SBR772

Disassembly

WARNING:
Do not place your fingers in front of piston.

CAUTION:
Do not scratch or score cylinder wall.

1. Push out piston with dust seal with compressed air.
2. Remove piston seal with a suitable tool.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

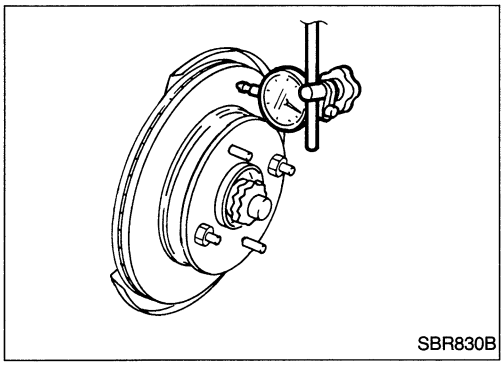
PISTON

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed.

SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed.


SBR830B

Inspection — Rotor

RUNOUT

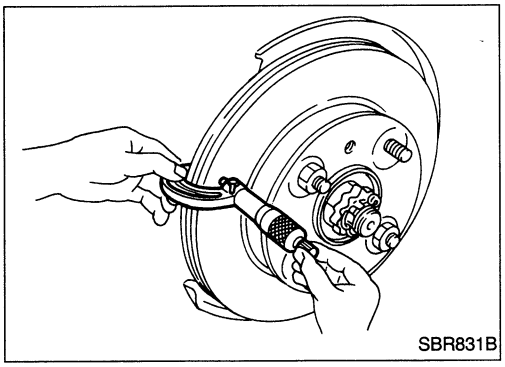
1. Secure rotor to wheel hub with at least two nuts (M12 × 1.25).
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to section FA ("Front Wheel Bearing", "ON-VEHICLE SERVICE").

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).

Inspection — Rotor (Cont'd)


SBR831B

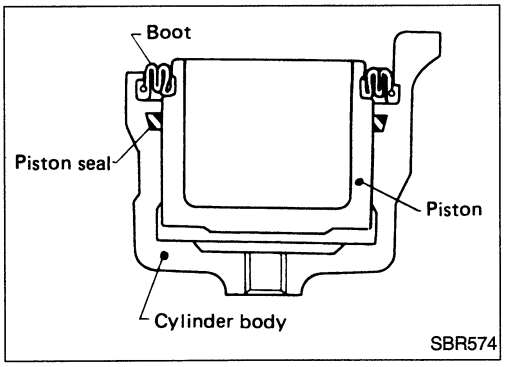
THICKNESS

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:
20.0 mm (0.787 in)

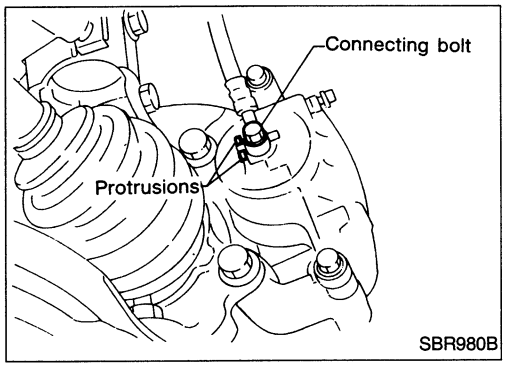
Assembly



SBR574

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.

Installation

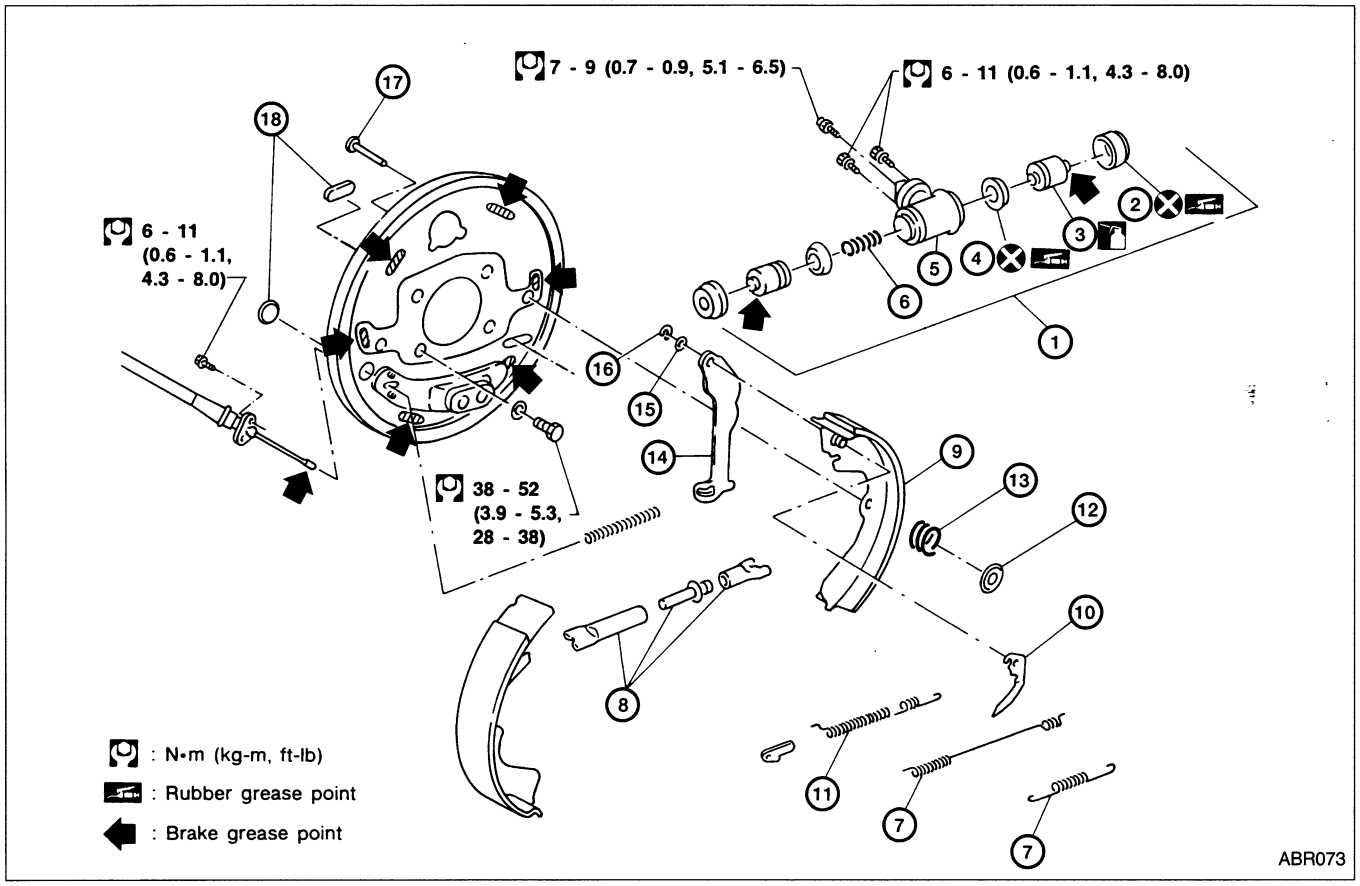


SBR980B

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.
2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to BR-5.

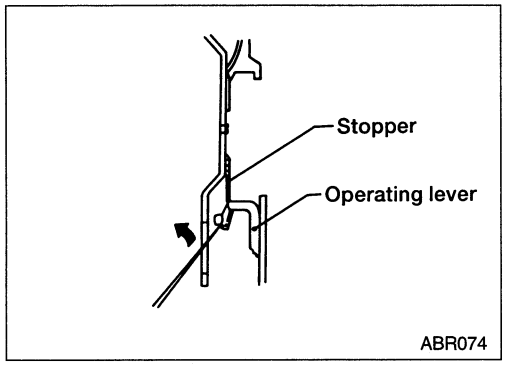


① Wheel cylinder assembly
② Boot
③ Piston
④ Piston cup
⑤ Cylinder body
⑥ Spring
⑦ Return spring
⑧ Adjuster
⑨ Shoe
⑩ Adjuster lever
⑪ Adjuster spring
⑫ Retainer
⑬ Shoe hold-down spring
⑭ Operating lever
⑮ Washer
⑯ Retainer ring
⑰ Shoe hold-down pin
⑱ Plug

Removal

WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.

CAUTION:
Make sure parking brake lever is released completely.

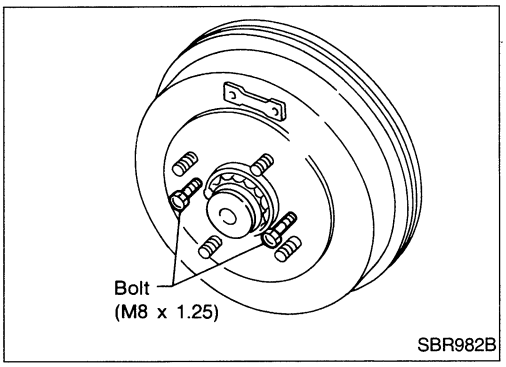


1. Release parking brake lever fully, then remove drum.

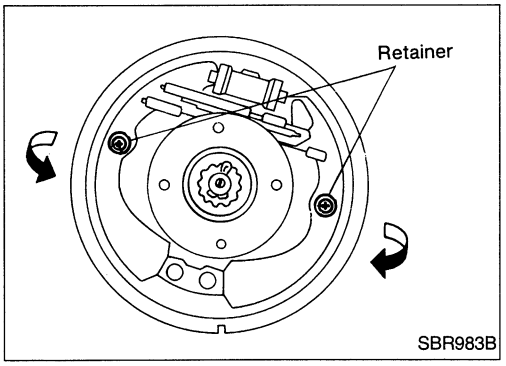
If drum is hard to remove, the following procedures should be carried out.

a. Remove plug. Then push down stopper to back plate to make clearance between brake shoe and drum as shown.

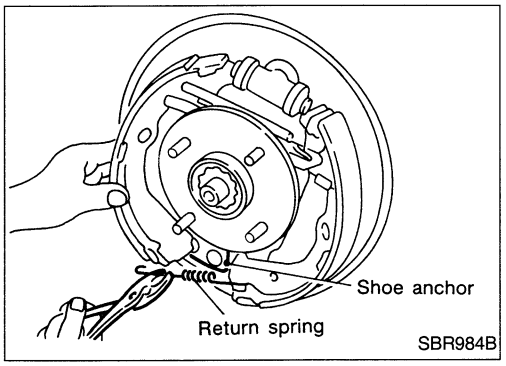
Removal (Cont'd)



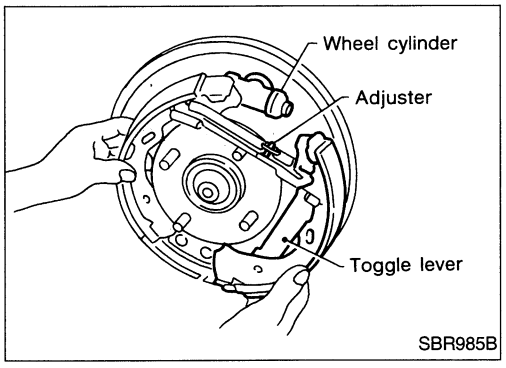
b. Tighten the two bolts gradually.



2. Push in shoe hold-down pins from behind the back plate. While pushing in the retainer, turn it and remove the shoe hold-down pins.
3. Pull out brake shoes in the direction of the arrows as illustrated.

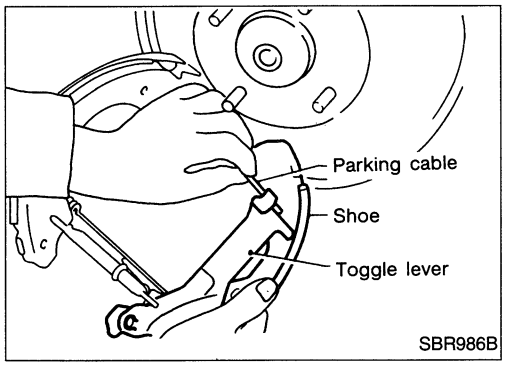


4. Using pliers, remove the lower return spring from shoe.



5. Separate shoes, one at a time, from wheel cylinder, and remove them from back plate with the adjuster assembly still on as shown.

Be careful not to scratch or damage wheel cylinder boot.

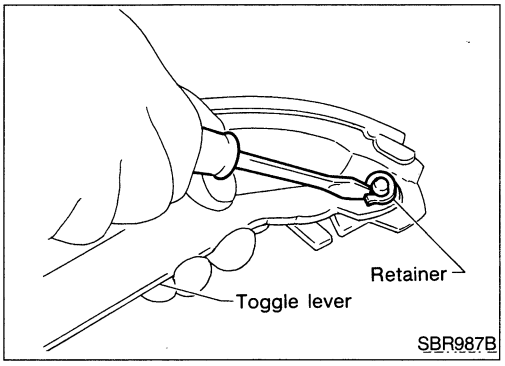


6. Disconnect parking brake cable from toggle lever.

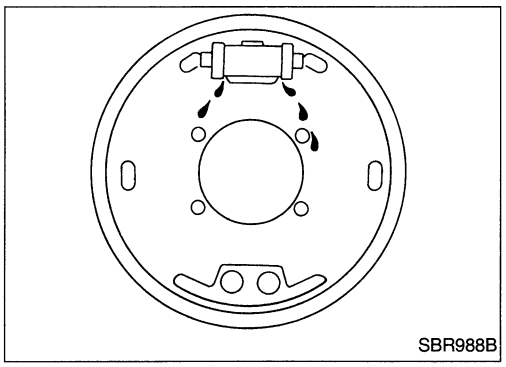
Be careful not to damage parking brake cable when separating it.

7. Remove adjuster return spring and shoe return spring.

Removal (Cont'd)

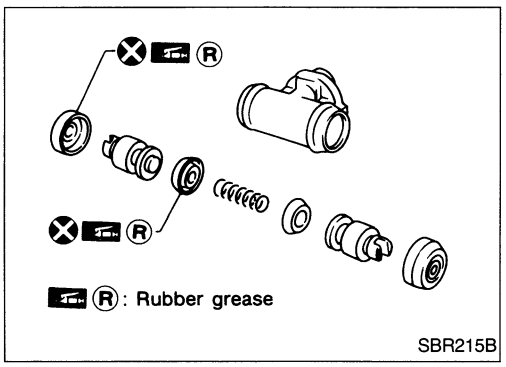


8. Remove retainer ring with a suitable tool. Then separate toggle lever and brake shoe.



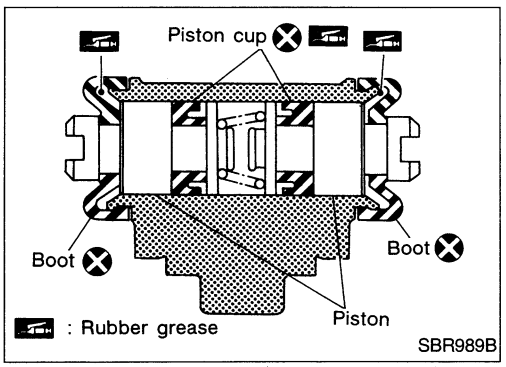
Inspection — Wheel Cylinder

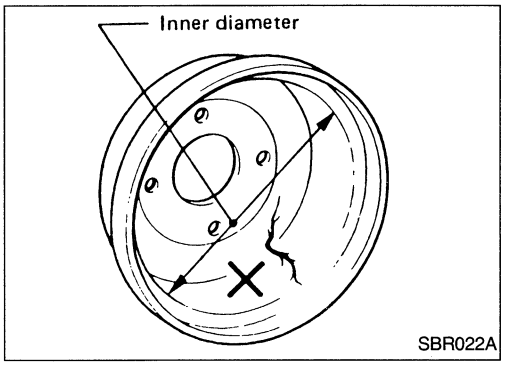
- Check wheel cylinder for leakage.
- Check for wear, damage and loose conditions. Replace if any such condition exists.



Wheel Cylinder Overhaul

Check all internal parts for wear, rust and damage. Replace if necessary.
Pay attention so as not to scratch cylinder when installing pistons.

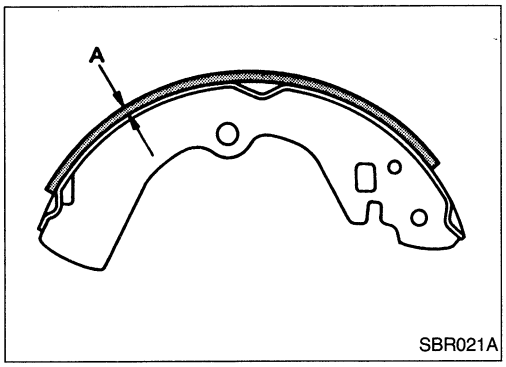




Inspection — Drum

Maximum inner diameter:
230 mm (9.06 in)
Out-of-roundness:
0.03 mm (0.0012 in) or less

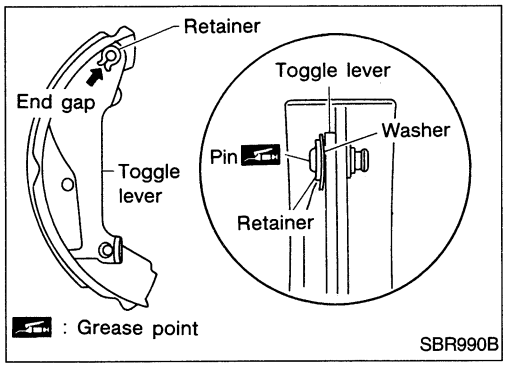
- Contact surface should be fine finished with No. 120 to 150 emery paper.
- Using a drum lathe, lathe brake drum if it shows scoring, partial wear or stepped wear.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.



Inspection — Lining

Check lining thickness.

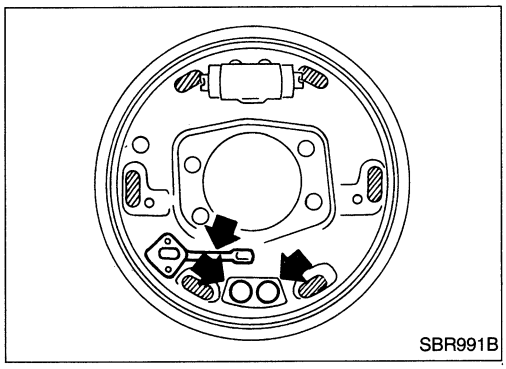
Standard lining thickness:
4.1 mm (0.161 in)
Lining wear limit (A):
1.5 mm (0.059 in)



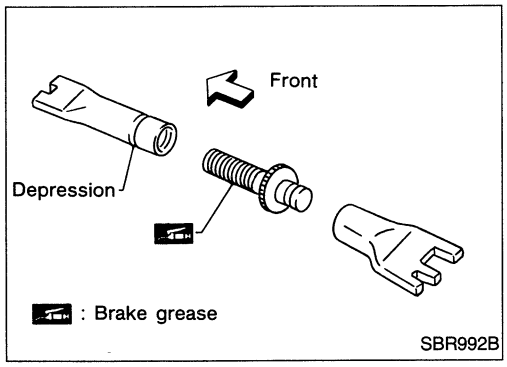
Installation

Always perform shoe clearance adjustment. Refer to BR-34.

1. Fit toggle lever to brake shoe with retainer ring.



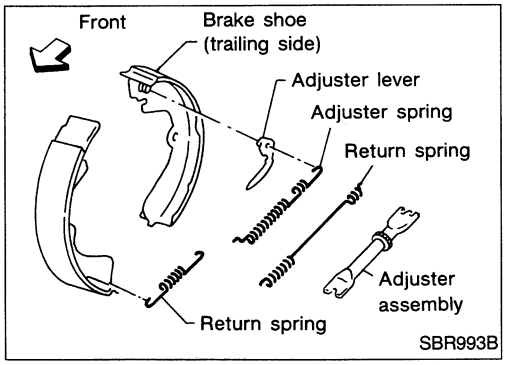
2. Apply brake grease to the contact areas shown at left.



3. Shorten adjuster by rotating it.
- **Pay attention to direction of adjuster.**

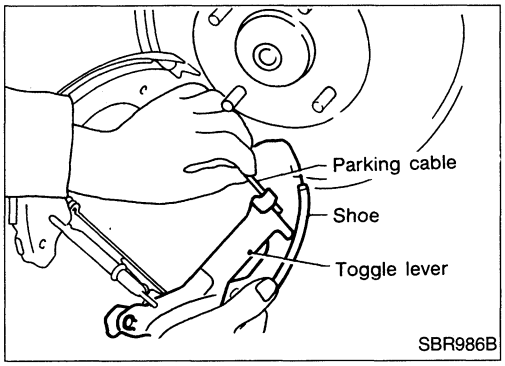
Wheel	Screw	Depression
Left	Left-hand thread	Yes
Right	Right-hand thread	No

4. Apply brake grease to adjuster as shown.



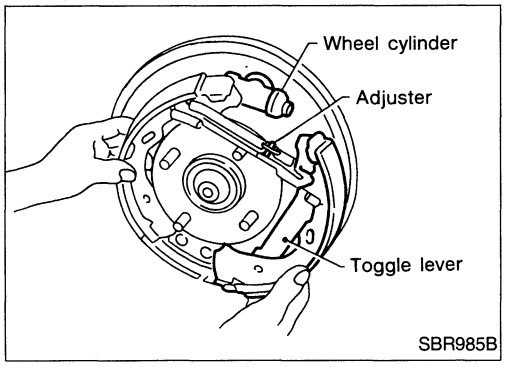
5. Install adjuster and adjuster lever; then install upper return spring and adjuster spring as shown.

Installation (Cont'd)



6. Connect parking brake cable to toggle lever.

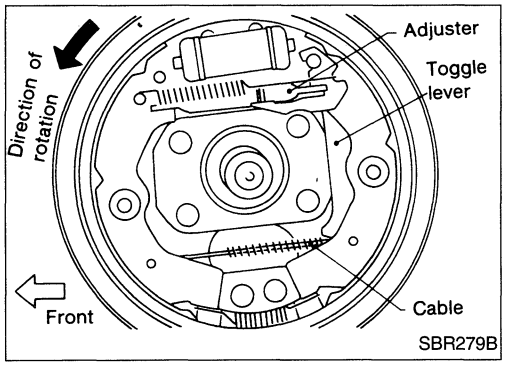
Be careful not to damage brake cable.



7. Install shoes on wheel cylinder one at a time.

Do not allow the piston to spring away when assembling.

8. Install lower return spring.



9. Secure shoe installation with shoe hold-down pins and retainer.
10. Check to make sure all parts are installed properly.

Pay attention to direction of adjuster assembly.

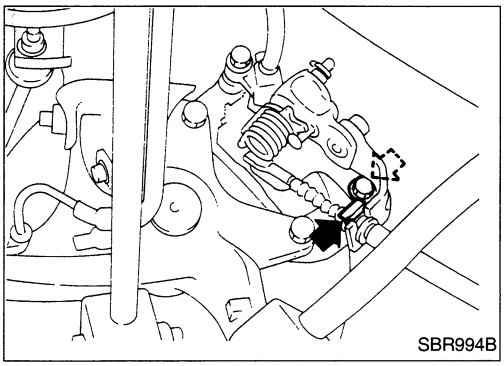
11. Install brake drum.
12. When installing new wheel cylinder, bleed air. Refer to BR-5.
13. Adjust parking brake. Refer to BR-34.

Pad Replacement

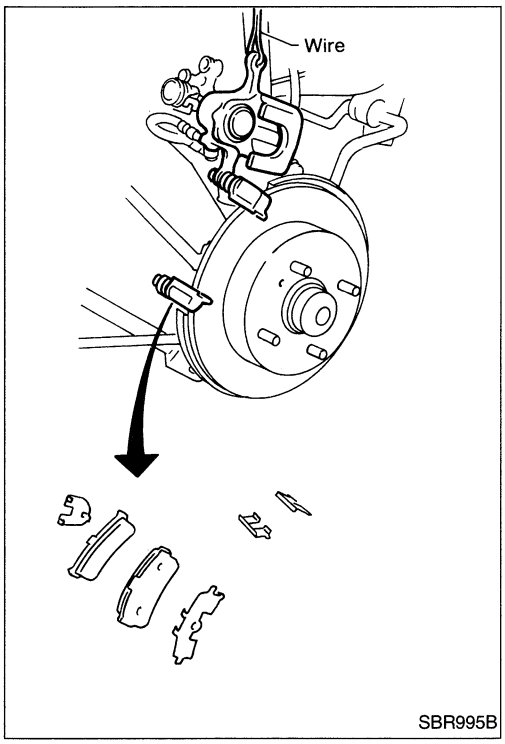
WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.

CAUTION:

- **When cylinder body is open, do not depress brake pedal, or piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**
- **Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.**


SBR994B

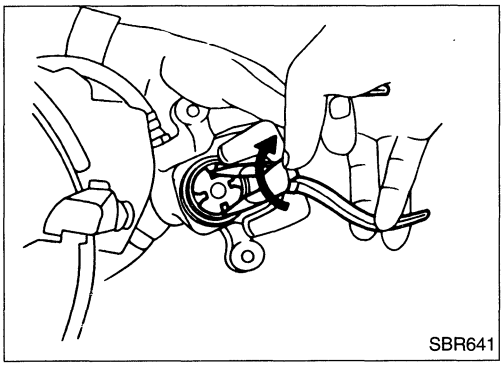
1. Remove master cylinder reservoir cap.
2. Remove brake cable lock spring.
3. Disconnect cable.
4. Remove lower pin bolt.



SBR995B

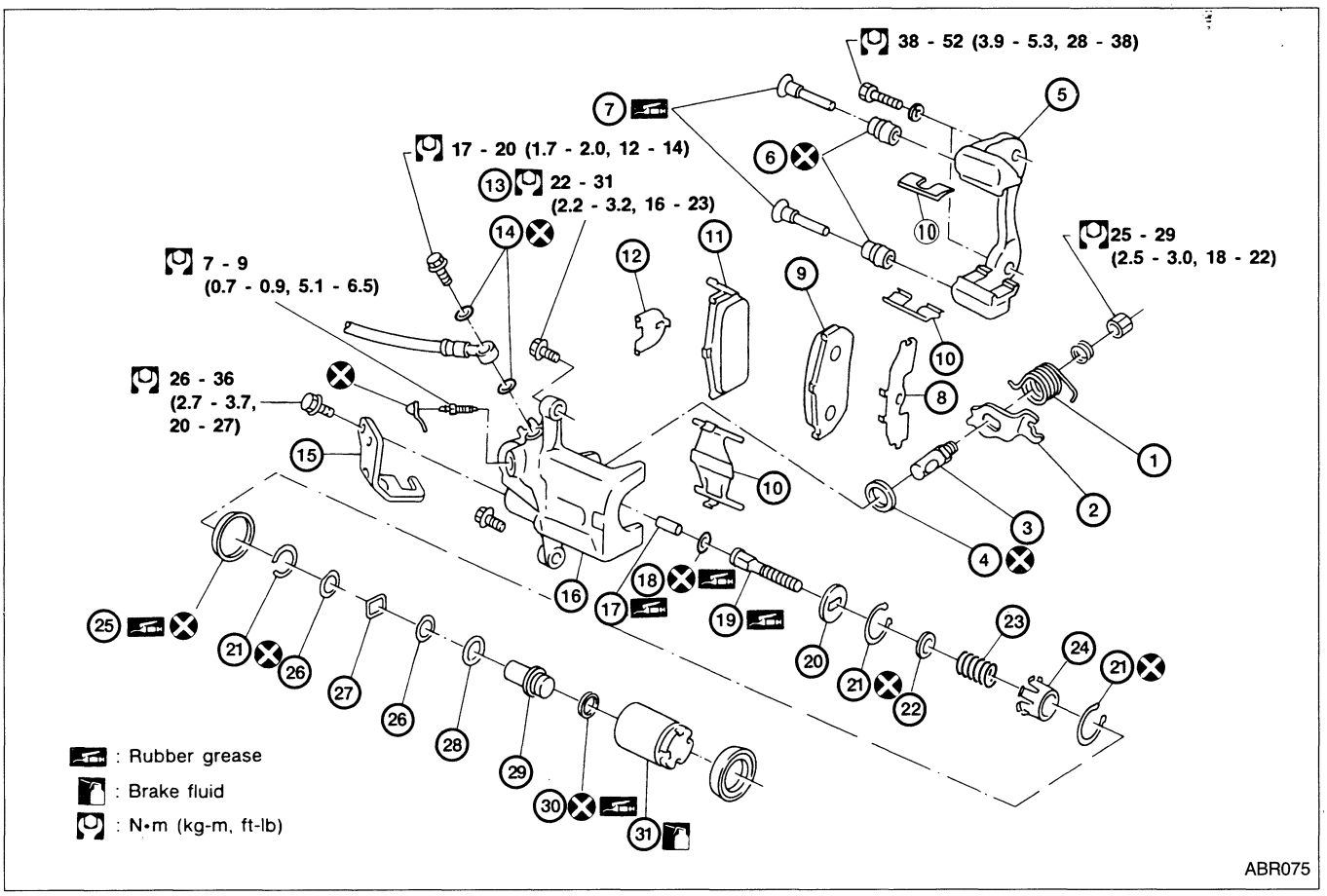
5. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.
   Standard pad thickness:
   10 mm (0.39 in)
   Pad wear limit:
   1.5 mm (0.059 in)

Pad Replacement (Cont'd)


SBR641

6. When installing new pads, push piston into cylinder body by turning piston clockwise.

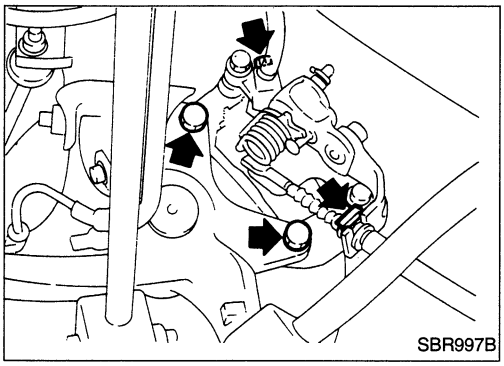
Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.



① Spring
② Toggle lever
③ Cam
④ Cam boot
⑤ Torque member
⑥ Pin boot
⑦ Side pin
⑧ Outer shim
⑨ Outer pad
⑩ Pad retainer
⑪ Inner pad
⑫ Inner shim
⑬ Pin bolt
⑭ Copper washer
⑮ Cable guide
⑯ Cylinder
⑰ Strut
⑱ O-ring
⑲ Push rod
⑳ Key plate
㉑ Snap ring
㉒ Spring seat
㉓ Spring
㉔ Spring cover
㉕ Piston seal
㉖ Spacer
㉗ Wave washer
㉘ Bearing
㉙ Adjuster nut
㉚ Piston cup
㉛ Piston
㉜ Piston boot

Removal

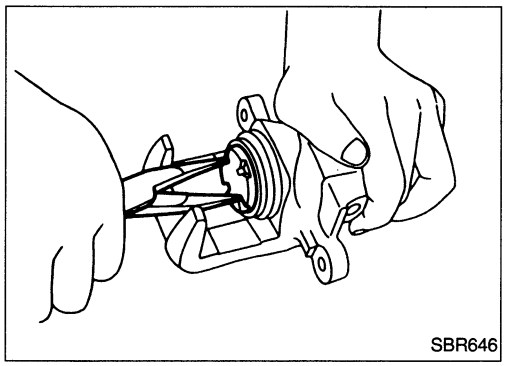
WARNING:
Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.


SBR997B

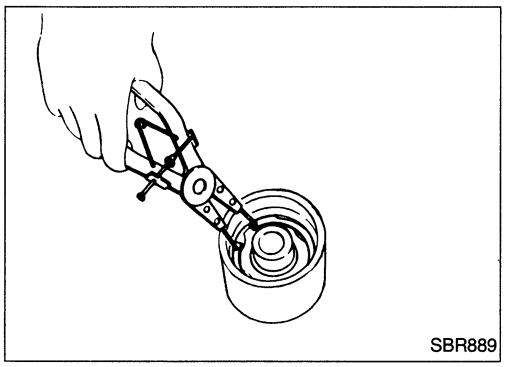
1. Remove brake cable mounting bracket bolt and lock spring.
2. Remove torque member fixing bolts and connecting bolt.

It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.

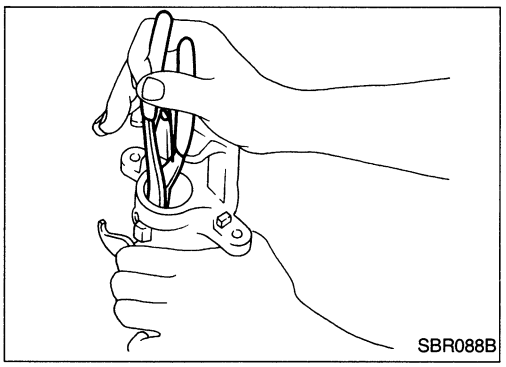
Disassembly


SBR646

1. Remove piston by turning it counterclockwise with suitable long nose pliers.

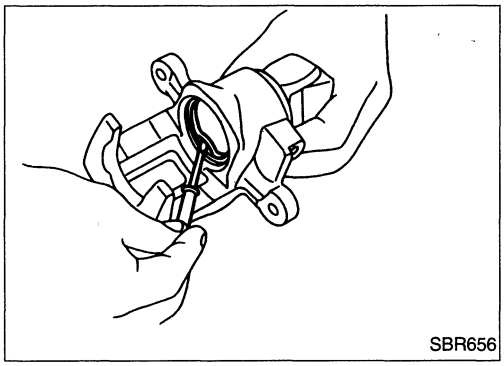

SBR889

2. Pry off snap ring from piston with suitable pliers and remove adjusting nut.


SBR088B

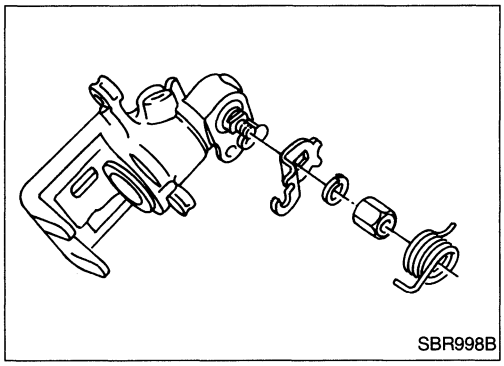
3. Disassemble cylinder body.
a. Pry off snap ring with suitable pliers, then remove spring cover, spring and seat.
b. Pry off snap ring, then remove key plate, push rod and strut.

Disassembly (Cont'd)


SBR656

c. Remove piston seal.

Be careful not to damage cylinder body.


SBR998B

4. Remove return spring and toggle lever.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign objects. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign objects may be eliminated by polishing surface with a fine emery paper.
  Replace cylinder body if necessary.

CAUTION:
Use brake fluid to clean cylinder. Never use mineral oil.

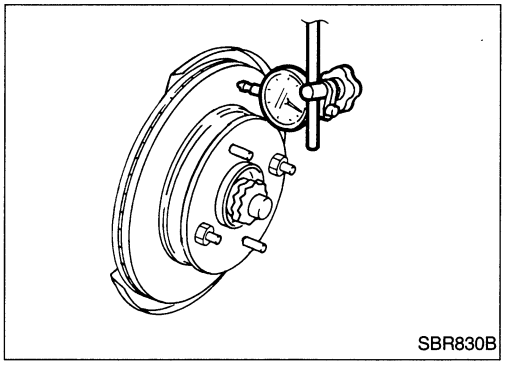
PISTON

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign objects are stuck to sliding surface.

Check piston for score, rust, wear, damage or presence of foreign objects. Replace if any of the above conditions are observed.

SLIDE PIN, PIN BOLT AND PIN BOOT

Check for wear, cracks, rust or other damage. Replace if any of the above conditions are observed.


SBR830B

Inspection — Rotor

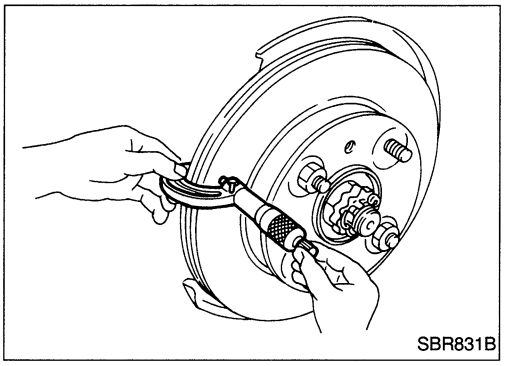
RUNOUT

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to section RA ("Rear Wheel Bearing", "ON-VEHICLE SERVICE").

3. Change relative positions of rotor and wheel hub so that runout is minimized.

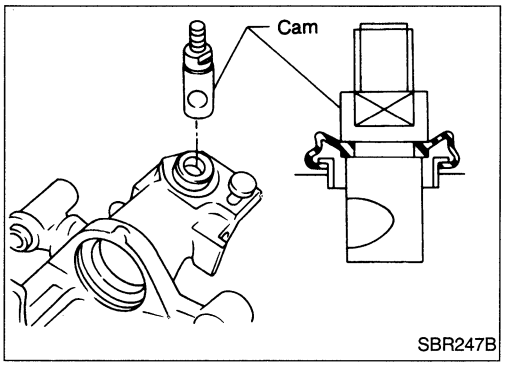
Maximum runout :
0.07 mm (0.0028 in)


SBR831B

THICKNESS

Rotor repair limit:
Minimum thickness
8.0 mm (0.315 in)
Thickness variation (At least 8 portions)
Maximum 0.02 mm (0.0008 in)

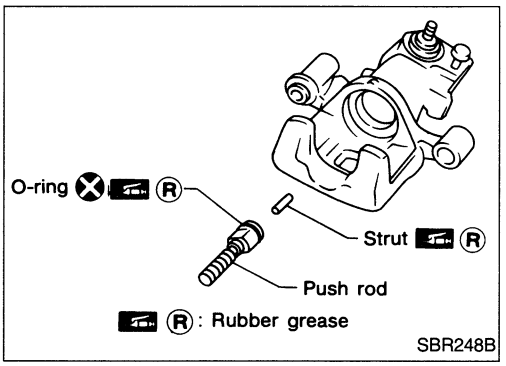
Replace rotor if any of the above do not meet the specifications.



SBR247B

Assembly

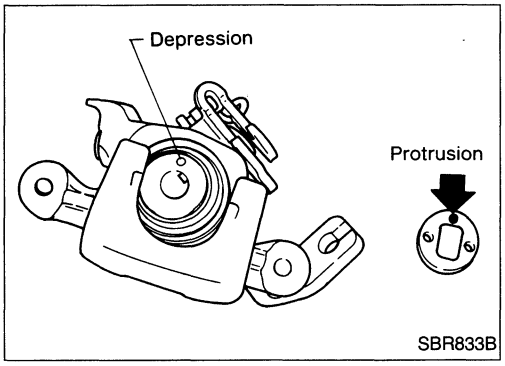
1. Insert cam with depression facing toward open end of cylinder.



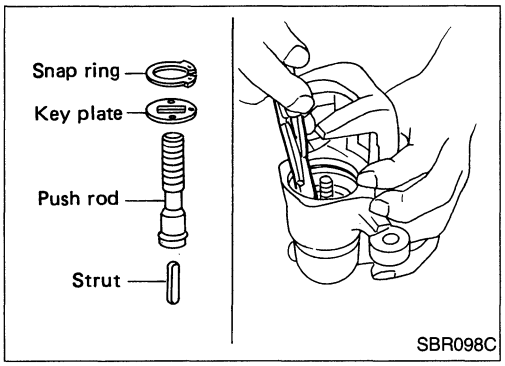
SBR248B

2. Generously apply rubber grease to strut and push rod to make insertion easy.

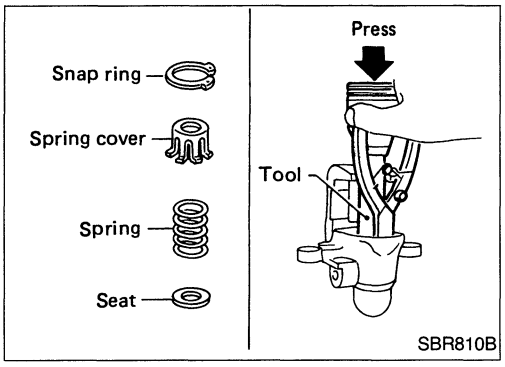
Assembly (Cont'd)



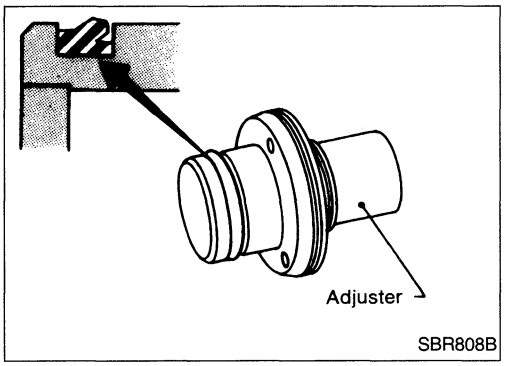
3. Mate protrusion on key plate with depression in cylinder bottom.



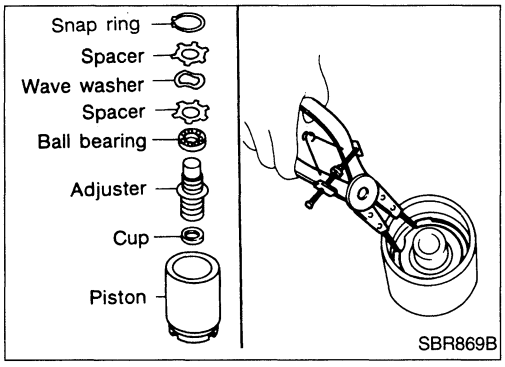
4. Install snap ring with a suitable tool.



5. Install seat, spring, spring cover and snap ring with a suitable tool.

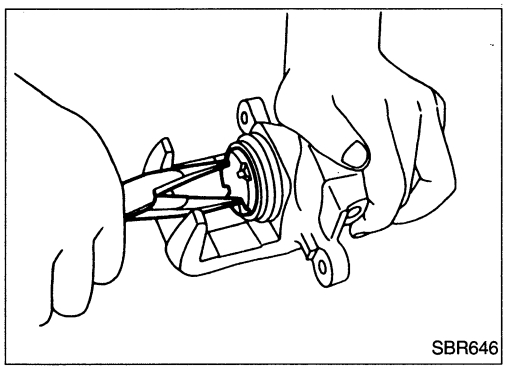


6. Install cup in the specified direction.

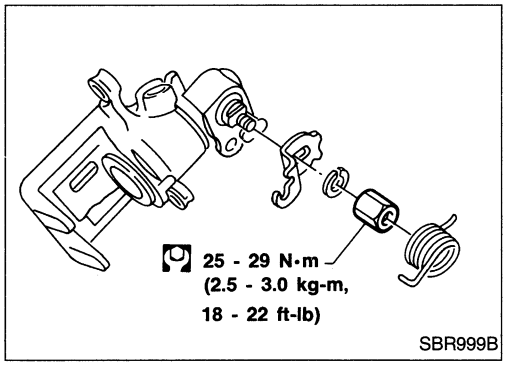


7. Install cup, adjuster, bearing, spacers, washers and snap ring with a suitable tool.

Assembly (Cont'd)

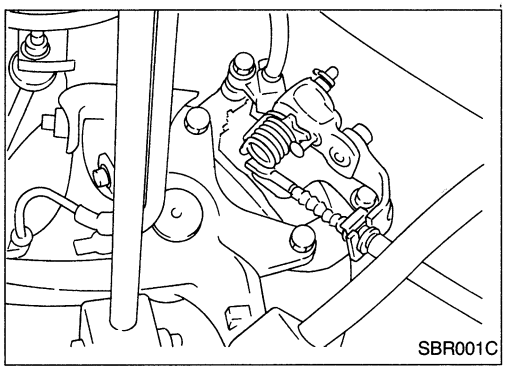

SBR646

8. Insert piston seal into groove on cylinder body.
9. With piston boot fitted to piston, insert piston boot into groove on cylinder body and fit piston by turning it clockwise with suitable long nose pliers.



SBR999B

10. Fit toggle lever and return spring.

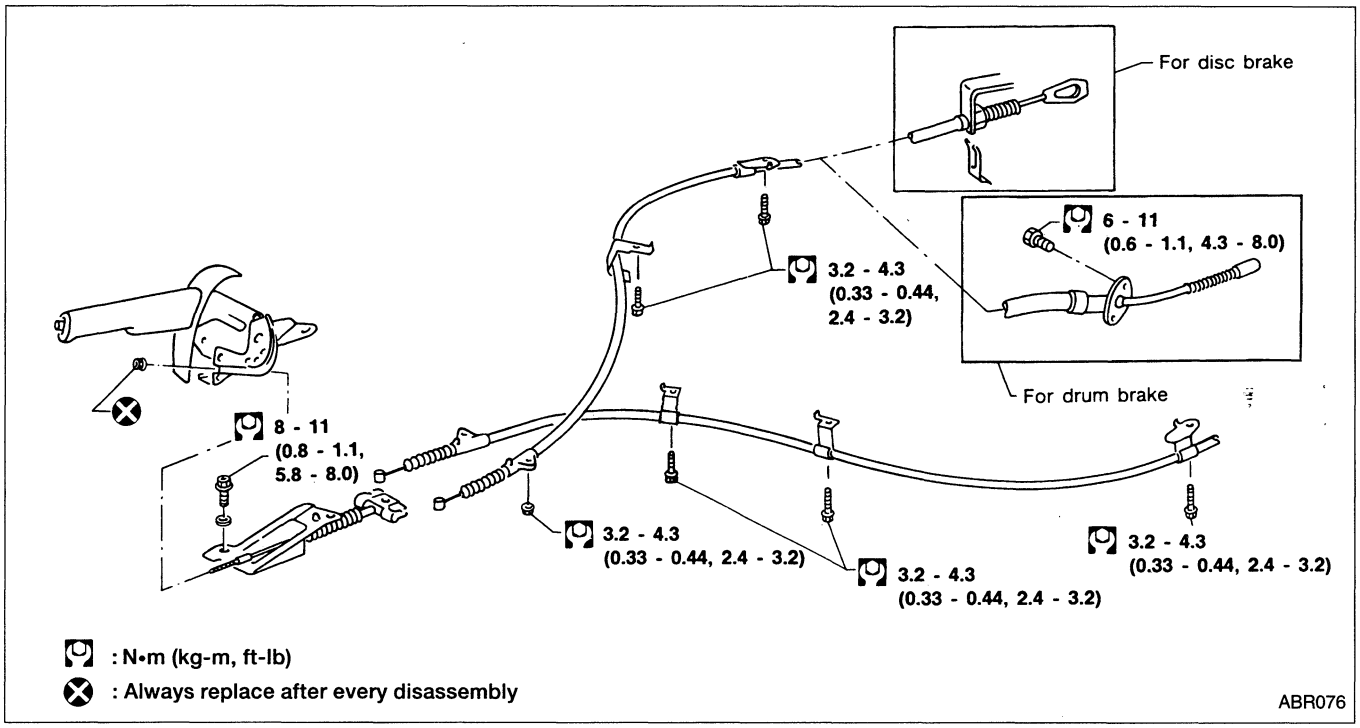

SBR001C

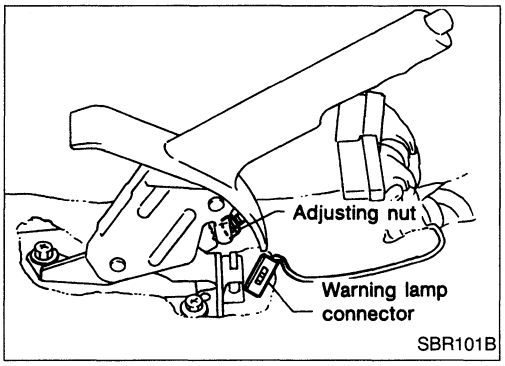
Installation

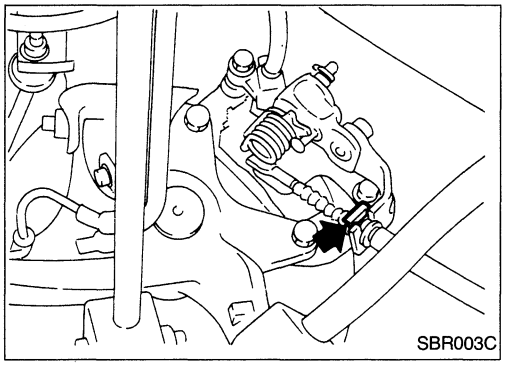
CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install caliper assembly.
2. Install brake hose to caliper securely.
3. Install all parts and secure all bolts.
4. Bleed air. Refer to BR-5.





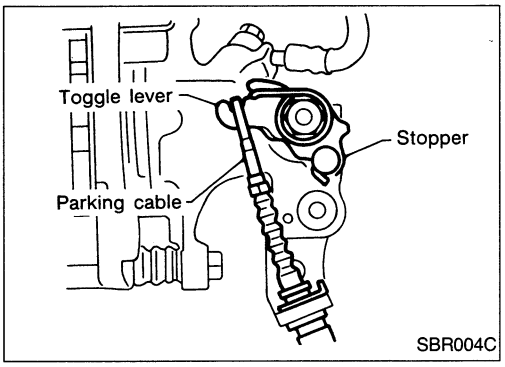


Removal and Installation

1. To remove parking brake cable, first remove center console.
2. Disconnect warning lamp connector.
3. Remove bolts, slacken off and remove adjusting nut.
4. Remove lock plate and disconnect cable (disc brake only). For drum brake models, refer to BR-21.

Inspection

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if deformed or damaged, replace.



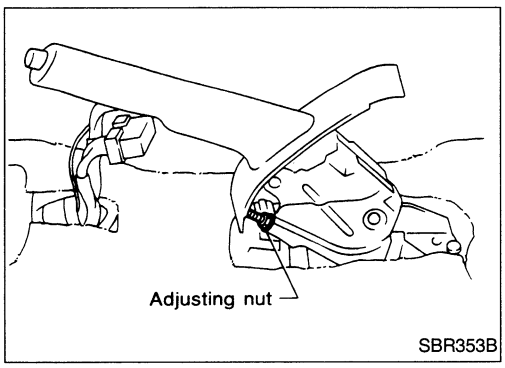
Adjustment

Before or after adjustment, pay attention to the following points.

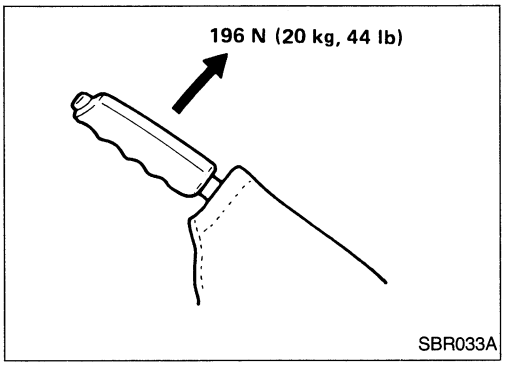
a. For rear disc brake be sure that toggle lever returns to stopper when parking brake lever is released.
b. There is no drag when parking brake lever is released.

1. Adjust clearance between shoe and drum/pad and rotor as follows:

a. Release parking brake lever and loosen adjusting nut.
b. Depress brake pedal fully at least 10 times with engine running.



2. Pull control lever 4 - 5 notches. Then adjust control lever by turning adjusting nut.



3. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.

Number of notches:

Drum brake	**7 - 8**
Disc brake	**7 - 8**

4. Bend parking brake warning lamp switchplate so that brake warning lamp comes on when parking brake lever is pulled "A" notches.

Number of "A" notches: 1 or less

Purpose

- Excessive braking in any condition (dry or wet) will adversely affect the normal turning of the vehicle's wheels and they may lock up.
- When the front wheels are locked, a vehicle cannot be controlled by the steering system.
- When the rear wheels are locked, the vehicle will enter a flat spin.

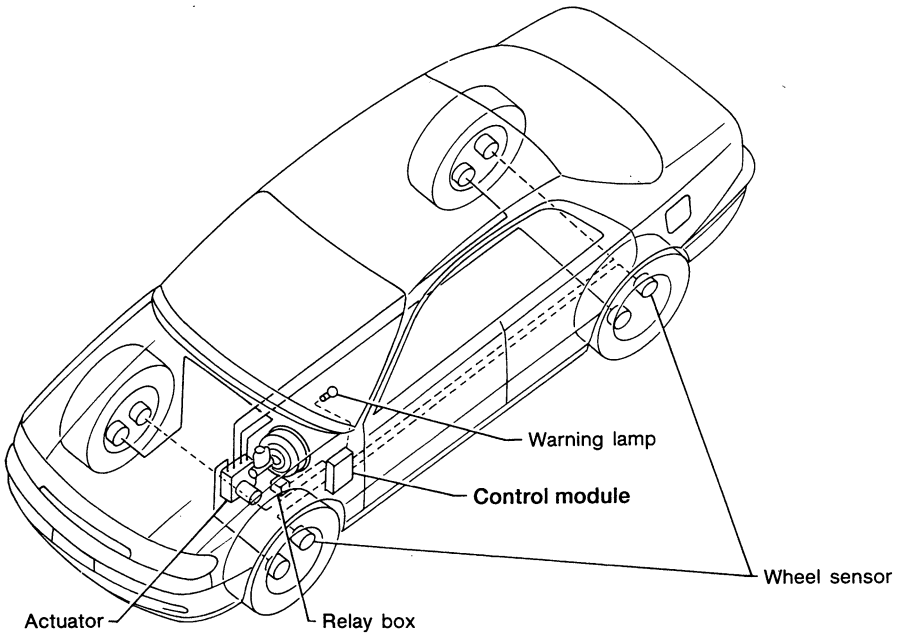
The ABS, by the use of electronic and hydraulic components, allows for control of braking force so that locking of the wheels can be avoided in the circumstances described above.
The ABS:

1) Ensures proper tracking performance through steering wheel operation.
2) Enables obstacles to be avoided through steering wheel operation.
3) Ensures vehicle stability by preventing flat spins.

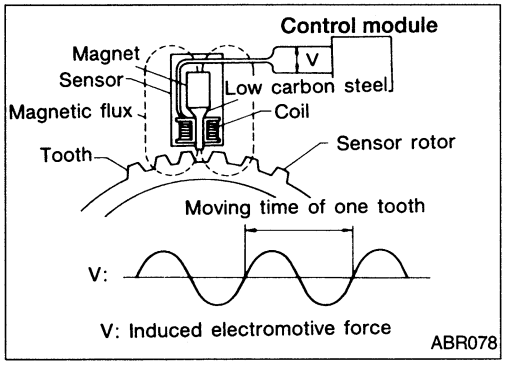
Operation

- When the vehicle speed is less than 10 km/h (6 MPH) this system does not work.
- The Anti-Lock Brake System (ABS) has self-test capabilities. The system turns on the anti-lock warning light each time the engine is started. After the engine is started and the anti-lock warning light turns off, the system performs another test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs a self-test. This is a normal part of the self-test feature. If a malfunction is found during this check, the anti-lock warning light will come on.
- During ABS operation, a mechanical noise may be heard. This is a normal condition.

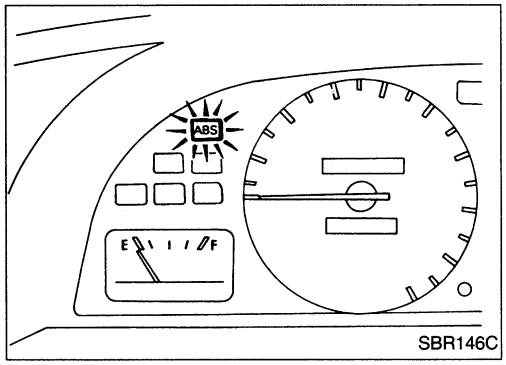
System Components



ABR077



ABR078



SBR146C

System Description

SENSOR

The sensor unit consists of a gear-shaped rotor and a sensor element which contains a bar magnet around which a coil is wound. The sensor is installed on the back side of the brake rotor. Sine-wave current is generated by the sensor as the wheel rotates. The frequency and voltage increase(s) as the rotating speed increases.

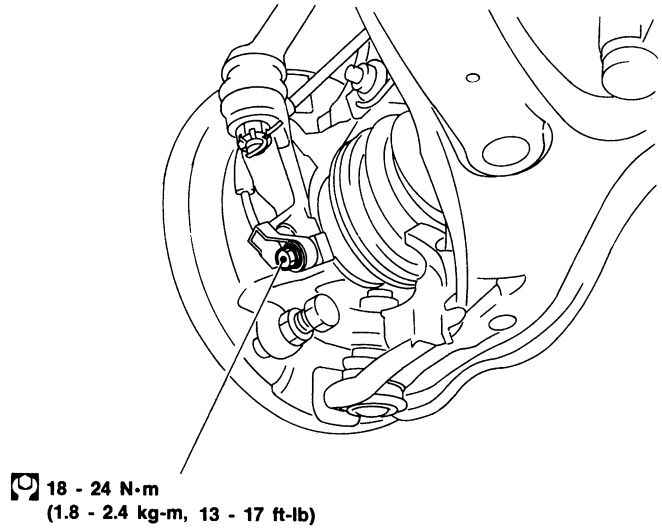
CONTROL MODULE

The control module computes the rotating speed of the wheel by the signal current sent from the sensor, and supplies a DC current of about 5 amperes, about 2 amperes, or 0 amperes to the actuator solenoid valve provided for each wheel by changing its internal resistance. It also controls ON-OFF operation of the valve relay and pump relay. If any electrically detectable malfunction should occur in the system, the control module causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control module, and the vehicle's braking system reverts to normal operation.

Removal and Installation

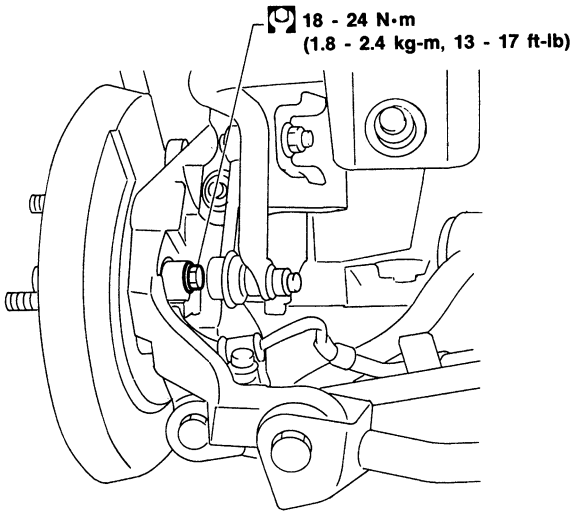
CAUTION:
Be careful not to damage sensor edge and sensor rotor teeth.

FRONT WHEEL SENSOR



SBR080C

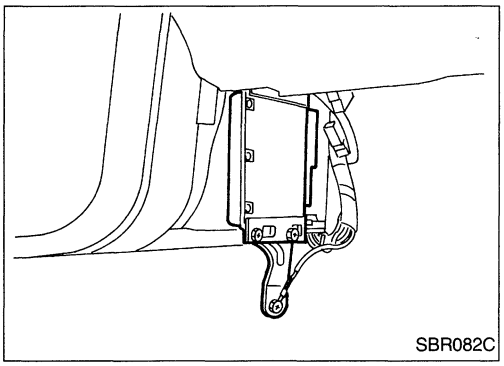
REAR WHEEL SENSOR



SBR081C

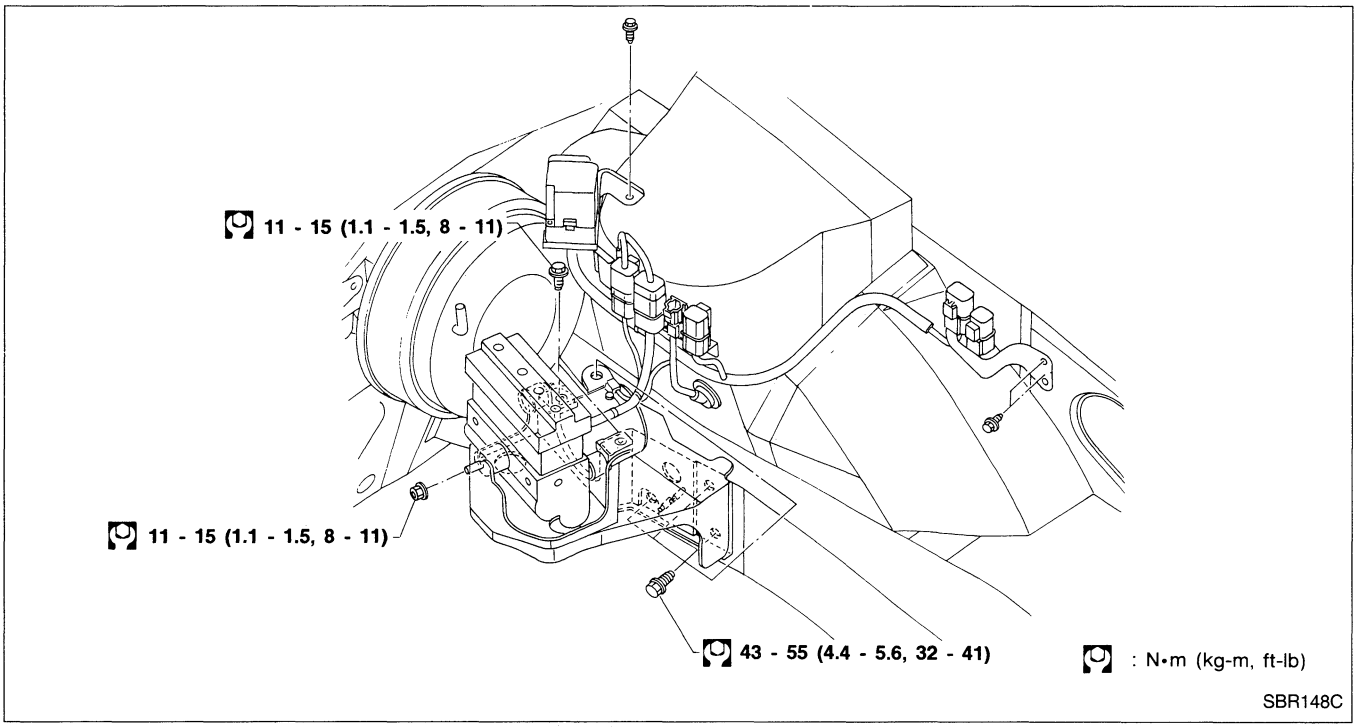
Removal and Installation (Cont'd)

CONTROL MODULE



Location: Driver side dash side lower.

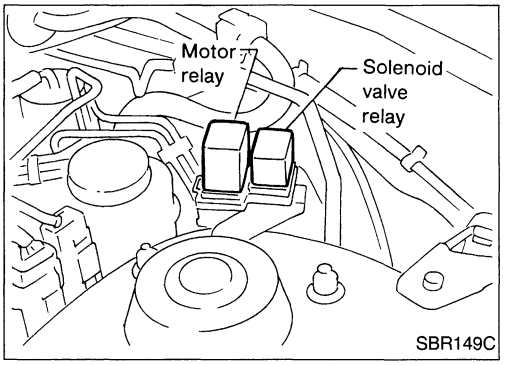
ACTUATOR



CAUTION:
After installation, pay attention to the following points.

- **Refill brake fluid and bleed air. Refer to BR-4 and BR-5, respectively.**

1. Remove actuator relay assembly.
2. Drain brake fluid. Remove master cylinder.
3. Remove actuator.



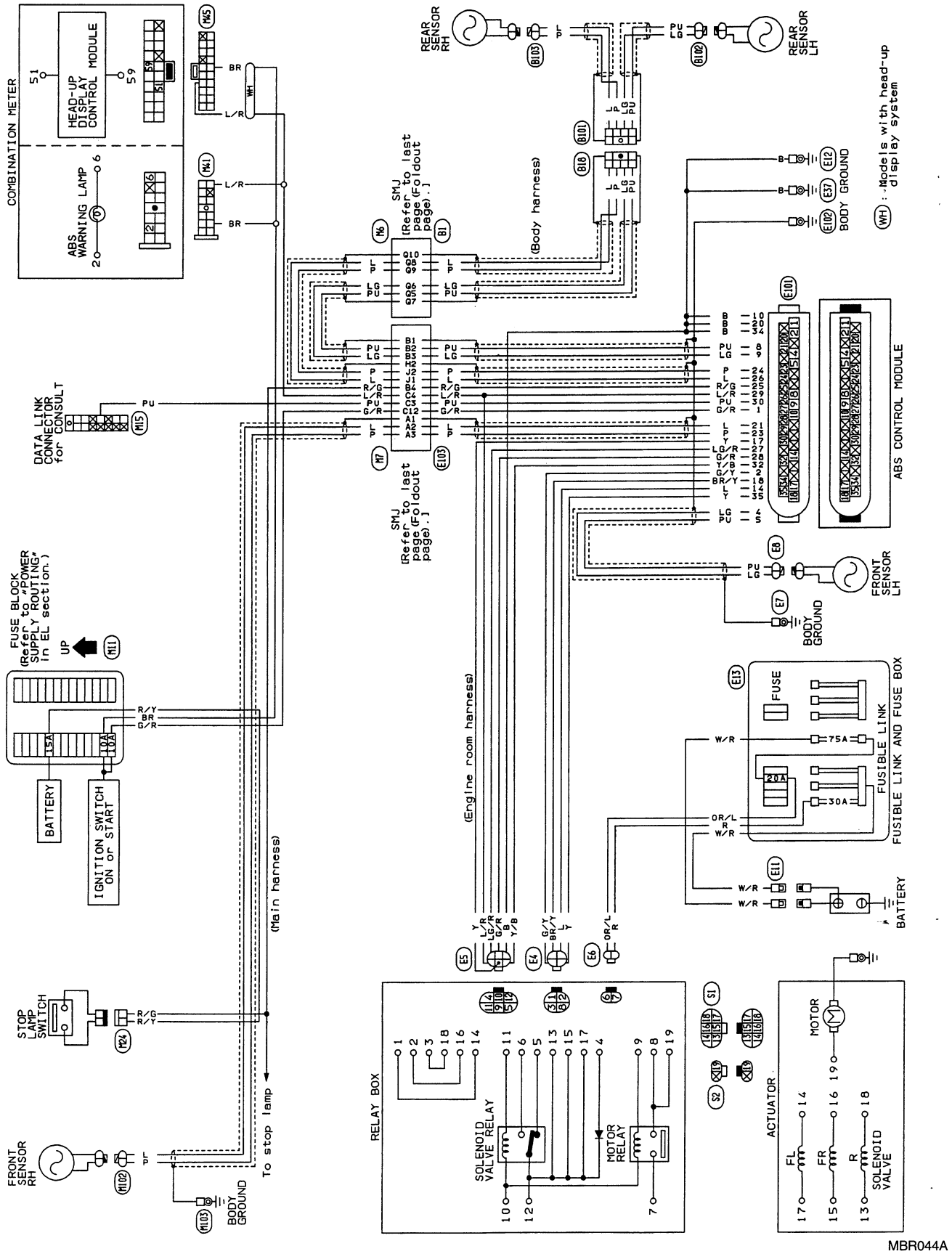
ACTUATOR RELAYS

Large: MOTOR RELAY
Small: SOLENOID VALVE RELAY

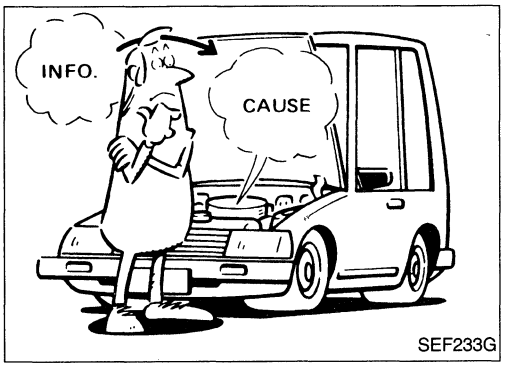
1. Disconnect battery cable.
2. Remove actuator relay cover.

It is not necessary to remove the two screws for relay box.

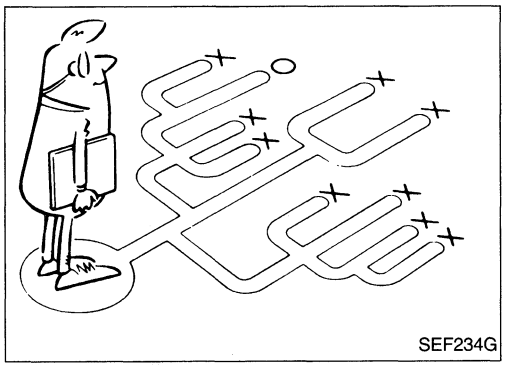
Wiring Diagram



MBR044A



SEF233G


SEF234G

How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

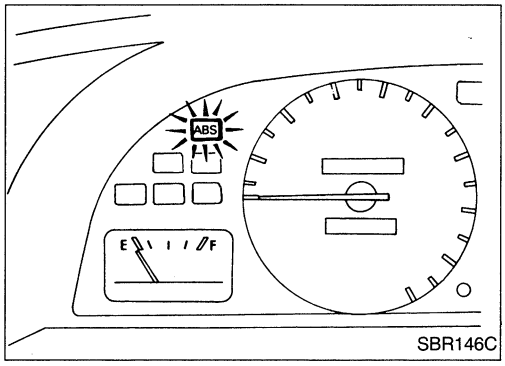
The ABS system has an electronic control module to control major functions. The control module accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional problems 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.

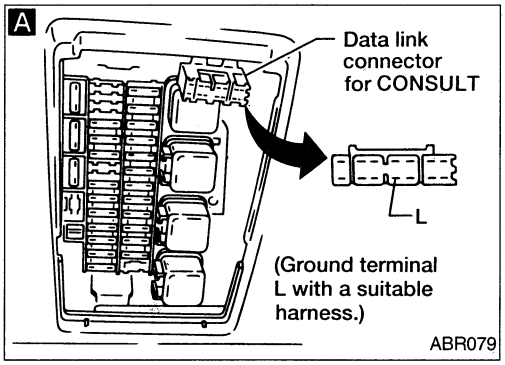


SBR146C

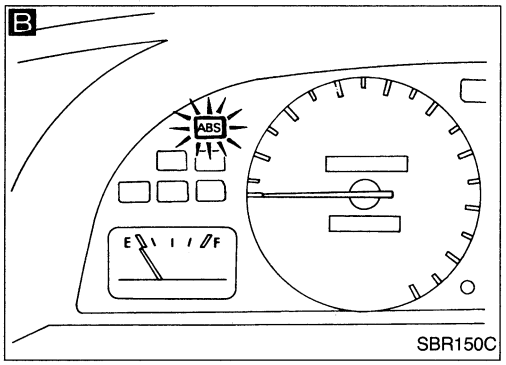
Self-diagnosis

FUNCTION

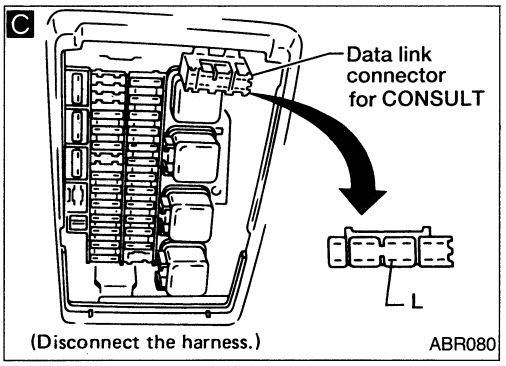
- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. The warning lamp is also lit by grounding the self-diagnostic (check) terminal located on the "Data Link Connector for Consult" to actuate the self-diagnostic results mode. The location of the malfunction is indicated by the warning lamp flashing on the instrument panel.



ABR079



SBR150C



ABR080

SELF-DIAGNOSIS PROCEDURE

Drive vehicle over 30 km/h (20 MPH) for at least one minute.

↓

Turn ignition switch "OFF".

↓

A

Ground terminal "L" of "DATA LINK CONNECTOR for CONSULT" with a suitable harness.

↓

Turn ignition switch "ON" while grounding terminal "L".
Do not depress brake pedal.

↓

B

After 3.6 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE 1.)

↓

After verifying the location of the malfunction with the malfunction code chart, make the necessary repairs following the instructions in the diagnostic procedures.

↓

After the malfunctions are repaired, erase the malfunction codes stored in the control module. (Refer to BR-43.)

↓

Rerun the self-diagnostic results mode to verify that the malfunction codes have been erased.

↓

C

Disconnect the check terminal from the ground. The self-diagnostic results mode is now complete.

↓

Ⓐ

NOTE 1: The indication terminates after five minutes. However, when the ignition switch is turned from "OFF" to "ON", the indication starts flashing again.

Self-diagnosis (Cont'd)

Ⓐ

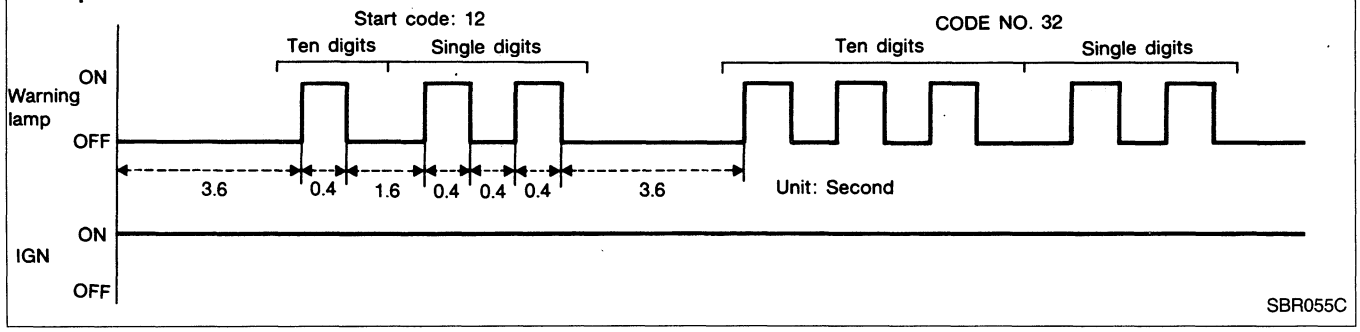
Check warning lamp for deactivation after driving vehicle over 30 km/h (20 MPH) for at least one minute.

After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly.

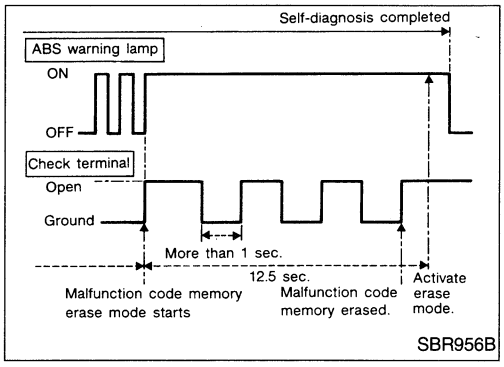
HOW TO READ SELF-DIAGNOSTIC RESULTS (Malfunction codes)

- Determine the code No. by counting the number of times the warning lamp flashes on and off.
- When several malfunctions occur at one time, up to three code Nos. can be stored; the latest malfunction will be indicated first.
- The indication begins with the start code 12, after which a maximum of three code Nos. appear in the order of the latest one first. The indication then returns to the start code to repeat (the indication will stay on for five minutes at the most).
- The malfunction code chart is given on the next page.

Example: Code No. 32 REAR RIGHT SENSOR SHORT-CIRCUIT



Self-diagnosis (Cont'd)



HOW TO ERASE SELF-DIAGNOSTIC RESULTS (Malfunction codes)

a. Under the self-diagnostic results mode, the malfunction memory erase mode starts when the check terminal is disconnected from the ground.

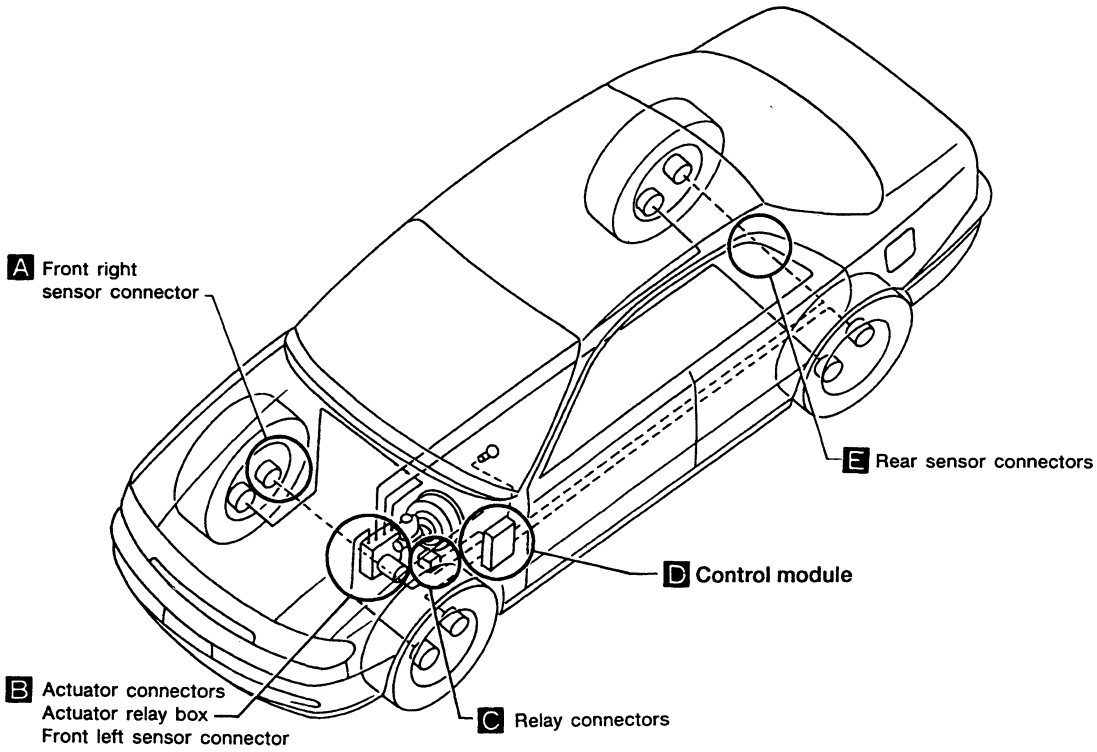
b. The self-diagnostic results (malfunction codes) can be erased by grounding the check terminal more than three times in succession within 12.5 seconds after the erase mode starts. (Each grounding must be longer than one second.)
The ABS warning lamp stays on while the self-diagnosis is in the erase mode, and goes out after the erase operation has been completed.
The self-diagnosis is also completed at the same time.

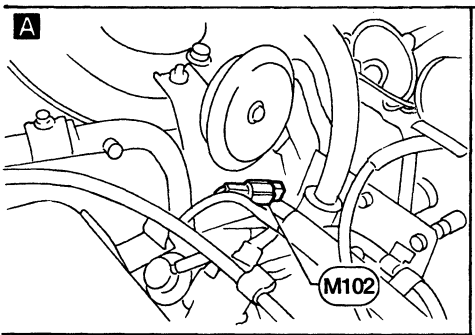
After the erase operation is completed, it is necessary to rerun the self-diagnostic mode to verify that malfunction codes no longer appear. Only the start code should be indicated when erase operation is completed and system is functioning normally.

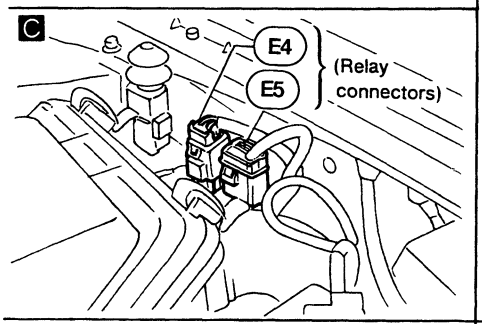
MALFUNCTION CODE CHART

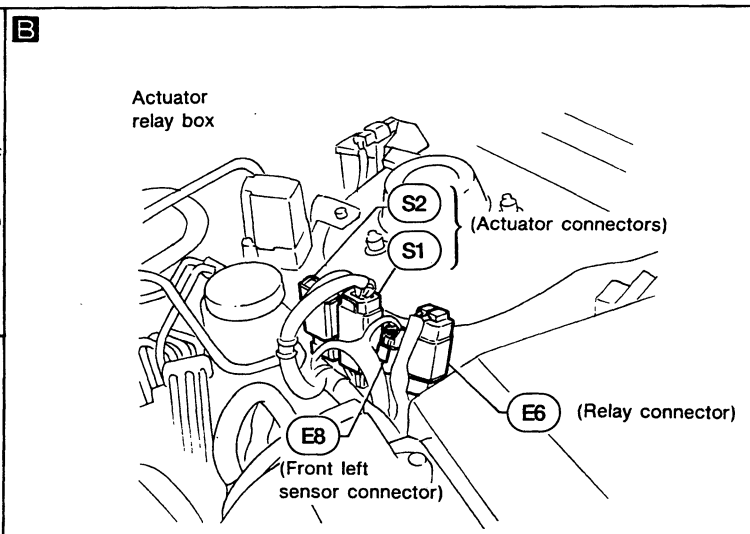
Code No.	Malfunctioning part	Diagnostic procedure
45	Front left actuator solenoid	3
41	Front right actuator solenoid	3
55	Rear actuator solenoid	3
25	Front left sensor (open-circuit)	4
26	Front left sensor (short-circuit)	4
21	Front right sensor (open-circuit)	4
22	Front right sensor (short-circuit)	4
35	Rear left sensor (open-circuit)	4
36	Rear left sensor (short-circuit)	4
31	Rear right sensor (open-circuit)	4
32	Rear right sensor (short-circuit)	4
18	Sensor rotor	4
61	Actuator motor or motor relay	5
63	Solenoid valve relay	6
57	Power supply (Low voltage)	7
16	Stop lamp switch circuit	8
71	Control module	9
Warning lamp stays on, does not blink.	Solenoid valve relay stuck or control module power supply circuit	2
Warning lamp does not come on.	Warning lamp bulb	1

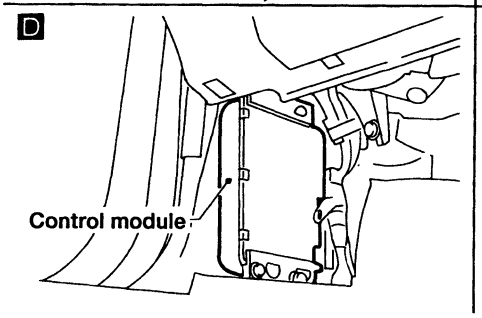
Component Parts and Harness Connector Location

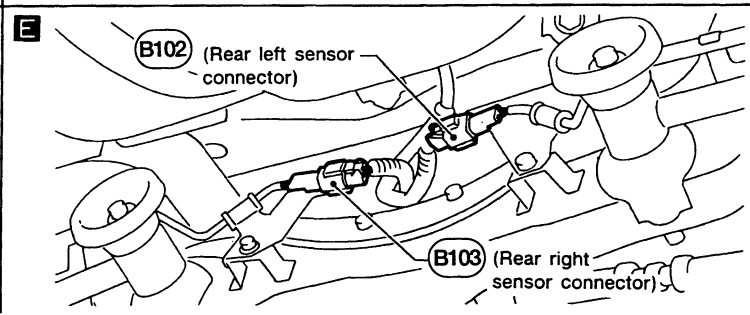






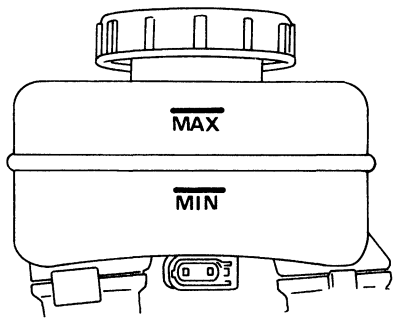






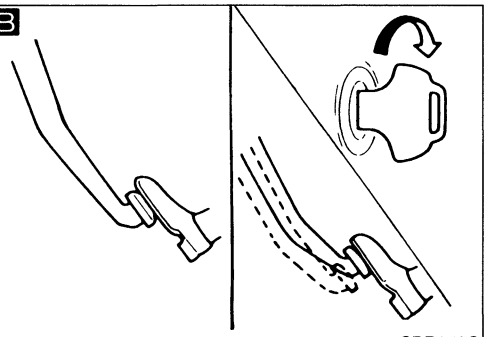
ABR081

A



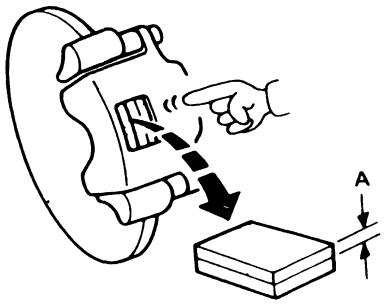
SBR057C

B



SBR058C

C



SBR059C

Preliminary Check

A

Check brake fluid level in reservoir tank. → N.G. → Fill up brake fluid.

O.K. ↓

Check brake line for leakage. → N.G. → Repair.

O.K. ↓

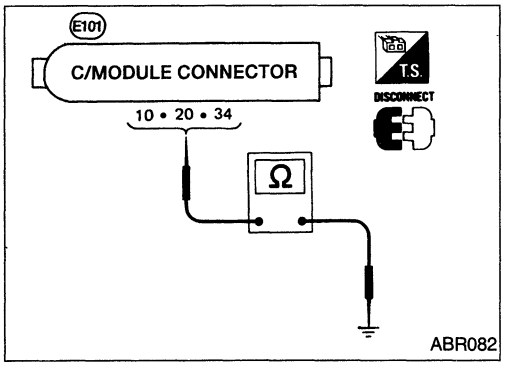
B

Check brake booster for operation and air tightness.
Refer to BR-14. → N.G. → Replace.

O.K. ↓

C

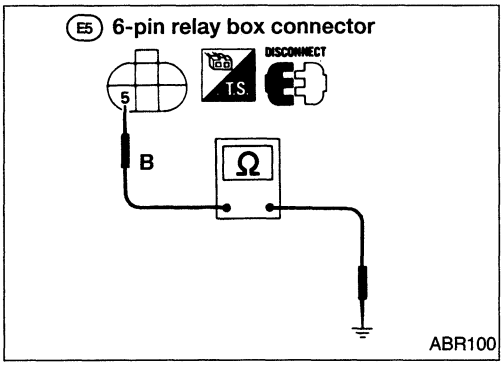
Check brake pads and rotor.
Refer to BR-17 and BR-19 for front disc brakes. Refer to BR-26 and BR-30 for rear disc brakes. → N.G. → Replace.



Ground Circuit Check

CONTROL MODULE GROUND

- Check resistance between the terminals and ground.
  Resistance: 0Ω

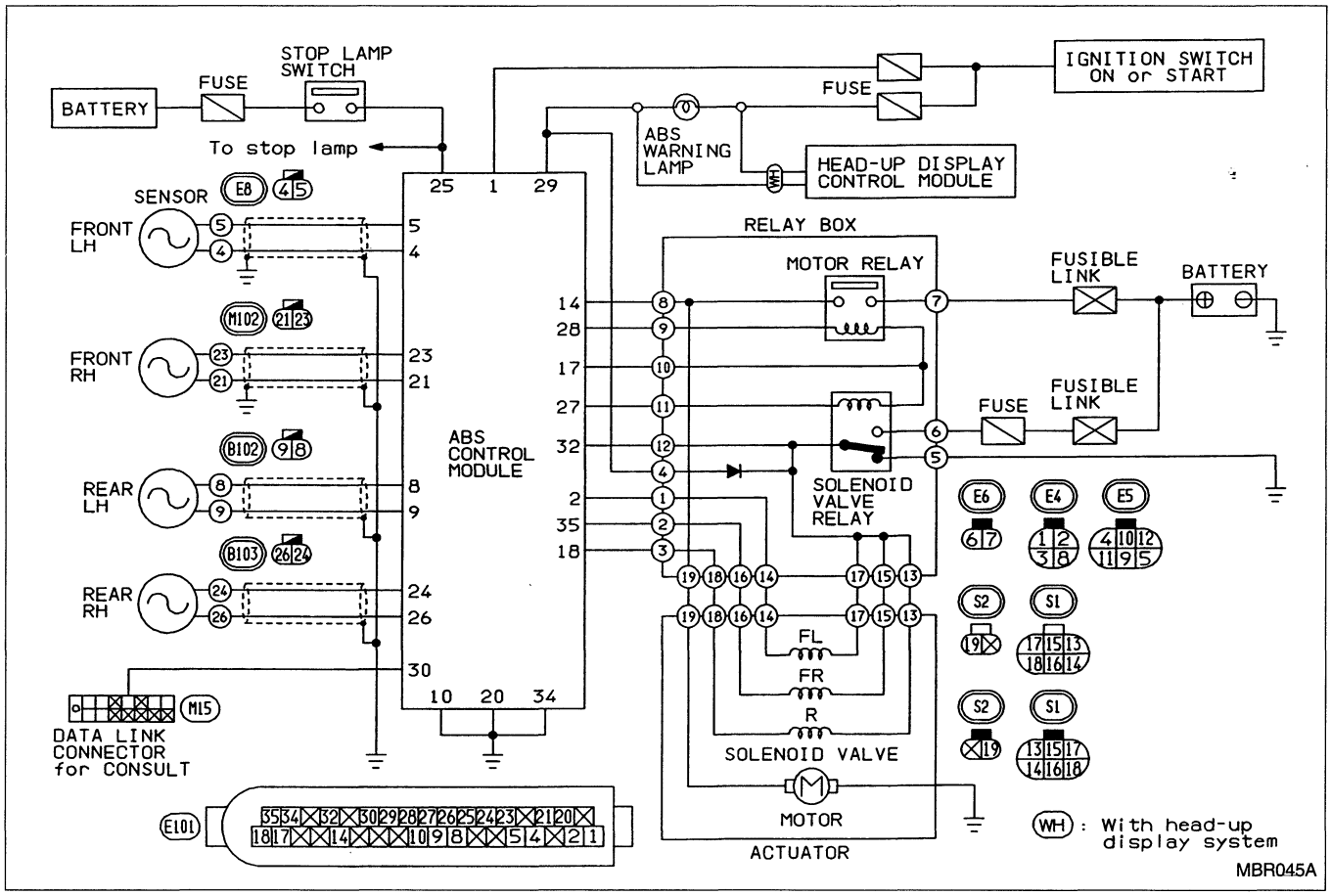


RELAY BOX GROUND

- Check resistance between relay box harness connector terminal ⑤ and ground.
  Resistance: 0Ω

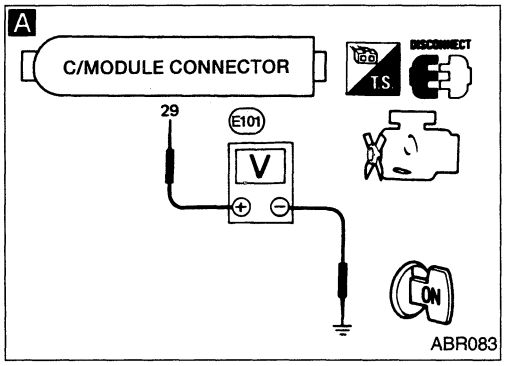
Circuit Diagram for Quick Pinpoint Check

- The unit side connectors with a double circle "⬭" are connected to the harness side connectors shown on BR-44.
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".



Diagnostic Procedure 1 (Not self-diagnostic item)

Warning lamp does not work before engine starts.



WARNING LAMP CIRCUIT CHECK

Check 10A fuse (METER). For fuse layout, refer to Circuit Diagram on foldout page.

N.G. → Replace fuse.

O.K. ↓

Check warning lamp bulb.

N.G. → Replace bulb.

O.K. ↓

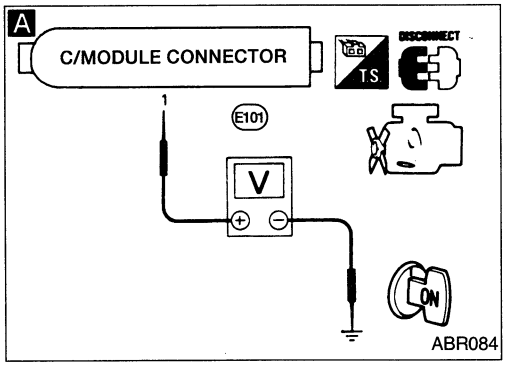
A

- Install 10A fuse and bulb.
- Disconnect connectors from control module and actuator.
- Check voltage between control module terminal (29) and ground after turning ignition switch "ON".
  Battery positive voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

Carry out self-diagnosis.



Diagnostic Procedure 2 (Not Self-diagnostic Item)

Warning lamp does not blink but stays on continuously.

A

CONTROL MODULE POWER SUPPLY CIRCUIT

- Disconnect connector from control module.
- Check voltage between control module connector terminal ① and ground after turning ignition switch "ON".
  Battery positive voltage should exist.

N.G. → Repair harness and connector.

O.K. ↓

GROUND-SHORT CHECK FOR WARNING LAMP CIRCUIT

- Turn ignition switch "OFF". Disconnect actuator connector.
- Check whether warning lamp goes on after turning ignition switch "ON".
  Warning lamp should not go on.
- Turn ignition switch "OFF".

N.G. → Repair harness and connector.

O.K. ↓

ACTUATOR SOLENOID VALVE RELAY CHECK

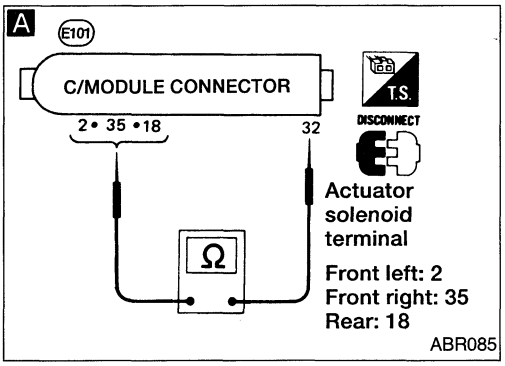
Refer to BR-57.

N.G. → Replace solenoid valve relay.

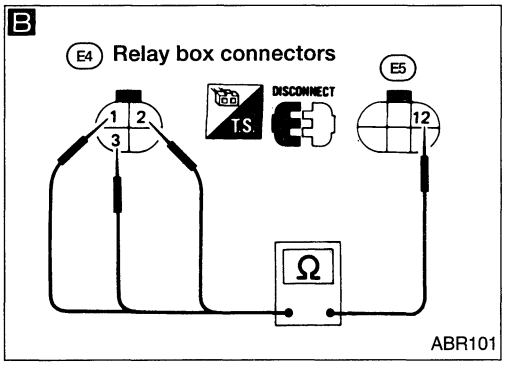
O.K. ↓

- Erase self-diagnostic results.
- Carry out self-diagnosis.
  Refer to BR-41.
- Inspect the system according to the code No.

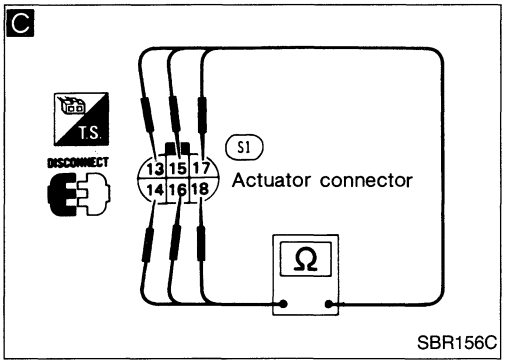
A



B



C



Diagnostic Procedure 3

ACTUATOR SOLENOID (Malfunction code No. 45, 41 or 55)

A

ACTUATOR SOLENOID VALVE CHECK.

- Disconnect control module connector.
- Check resistance between control module connector terminals.

Code No. 45
Terminals ㉜ and ②
Code No. 41
Terminals ㉜ and ㉟
Code No. 55
Terminals ㉜ and ⑱
Resistance: 1.07 - 1.17Ω

O.K. → Replace control module.

N.G. ↓

B

- Disconnect relay box connectors.
- Check resistance between relay box connector terminals.

Code No. 45
Terminals ⑫ and ①
Code No. 41
Terminals ⑫ and ②
Code No. 55
Terminals ⑫ and ③
Resistance: 1.07 - 1.17Ω

O.K. → Repair harness between relay box connector and control module connector.

N.G. ↓

C

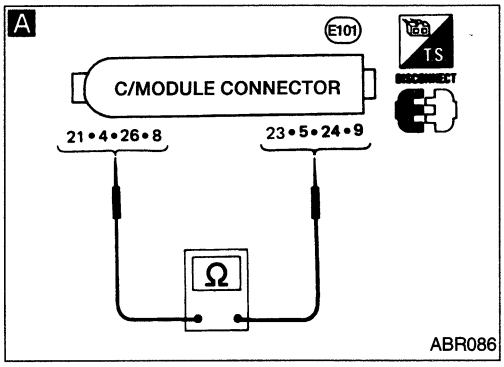
- Disconnect actuator connector.
- Check resistance between actuator connector terminals.

Code No. 45
Terminals ⑰ and ⑭
Code No. 41
Terminals ⑮ and ⑯
Code No. 55
Terminals ⑬ and ⑱
Resistance: 1.07 - 1.17Ω

O.K. → Replace relay box assembly.

N.G. ↓

Replace actuator.



Diagnostic Procedure 4

WHEEL SENSOR OR ROTOR

(Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18)

A

WHEEL SENSOR ELECTRICAL CHECK → O.K. → Ⓐ

- Disconnect control module connector.
- Check resistance between control module connector terminals.

Code No. 21 or 22 (Front RH wheel)
Terminals (21) and (23)
Code No. 25 or 26 (Front LH wheel)
Terminals (4) and (5)
Code No. 31 or 32 (Rear RH wheel)
Terminals (26) and (24)
Code No. 35 or 36 (Rear LH wheel)
Terminals (8) and (9)
Resistance: 1.0 - 1.25kΩ

N.G.

Note
CHECK WHEEL SENSOR
Refer to BR-57.

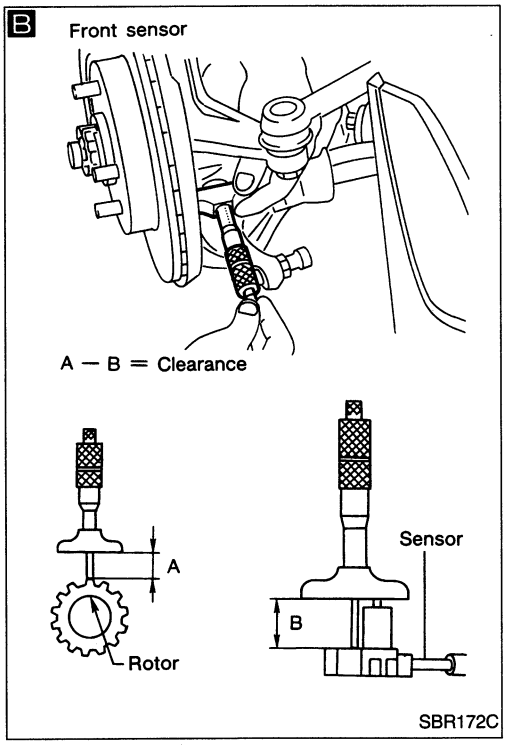
N.G. → Note: Replace wheel sensor.

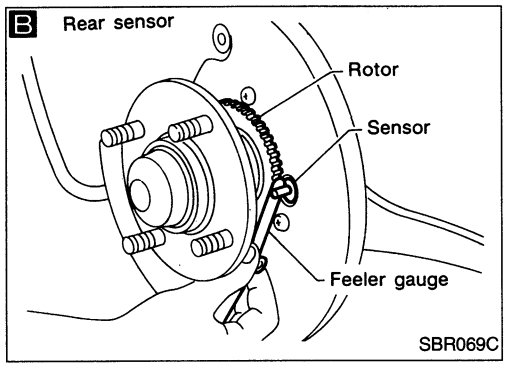
O.K.

Note
Repair harness and connectors between control module connector and wheel sensor connector.

Note: Wheel position should be distinguished by code No.

Diagnostic Procedure 4 (Cont'd)





Ⓐ

Note

WHEEL SENSOR MECHANICAL CHECK

Check for inflation pressure, wear and size of each tire.

N.G. → Note: Adjust tire pressure or replace tire(s).

O.K.

Note

Check wheel bearing axial end play. Refer to FA or RA section ("Front/Rear Wheel Bearing", "ON-VEHICLE SERVICE").

N.G. → Note: Follow the direction in FA or RA section ("Front/Rear Wheel Bearing", "ON-VEHICLE SERVICE").

O.K.

B Note

Check clearance between sensor and rotor.

Clearance: 0.175 - 0.875 mm (0.0069 - 0.0344 in) (Front)
0.075 - 0.825 mm (0.0030 - 0.0325 in) (Rear)

N.G. → Note: Clean sensor fixing portion, or replace sensor.

O.K.

Note

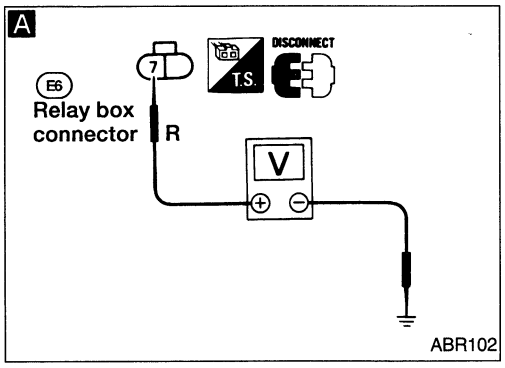
Check sensor rotor for teeth damage.

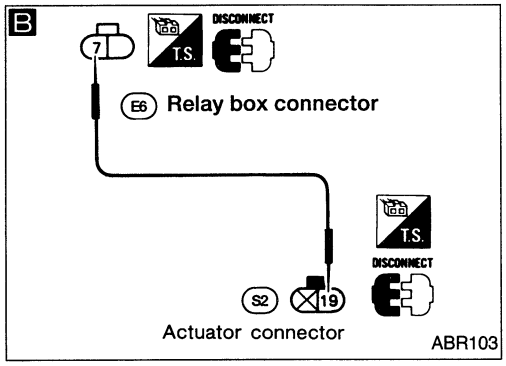
N.G. → Note: Replace sensor rotor (with drive shaft, wheel hub).

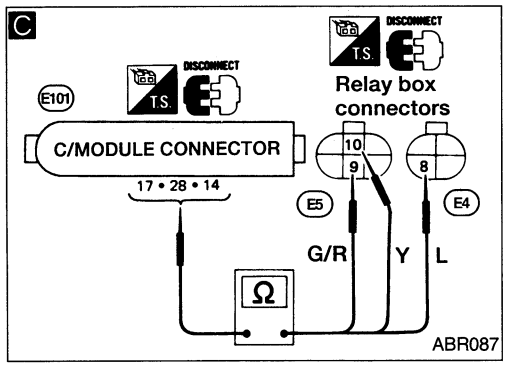
O.K.

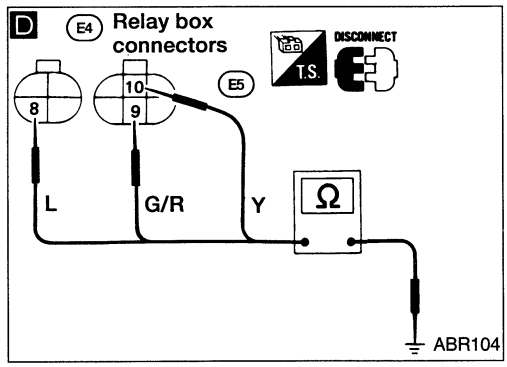
Replace control module.

Note: Wheel position should be distinguished by code No.









Diagnostic Procedure 5

MOTOR RELAY OR MOTOR

(Malfunction code No. 61)

A

MOTOR POWER SUPPLY CHECK

- Disconnect connectors from actuator and relay box.
- Check voltage between terminal ⑦ and ground.

Battery positive voltage should exist.

N.G. → Repair harness and connectors.

O.K. ↓

MOTOR RELAY CHECK

Refer to BR-57.

N.G. → Replace motor relay.

O.K. ↓

B

MOTOR CHECK

Check motor by connecting terminal ⑦ for relay box connector and terminal ⑲ for actuator connector with a suitable harness.

Motor should operate.

Do not connect harness for more than 5 seconds.

N.G. → Replace actuator.

O.K. ↓

C

CIRCUIT CHECK

- Disconnect control module connector.
- Check continuity between control module connector terminals and relay box connector terminals.

Control module	Relay box
⑰	⑩
㉘	⑨
⑭	⑧

Continuity should exist.

N.G. →

O.K. ↓

D

Check continuity between relay box connector terminals ⑧, ⑨, ⑩ and ground.

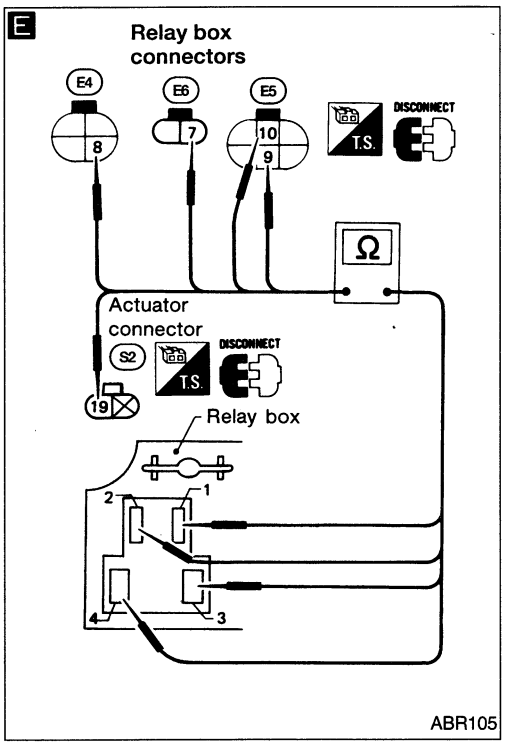
Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 5 (Cont'd)



Ⓐ

E

RELAY BOX CHECK

Check continuity between relay terminals and relay box connector terminals.

Relay terminals	Connector terminals
①	⑩
②	⑨
③	⑦
④	⑲
④	⑧

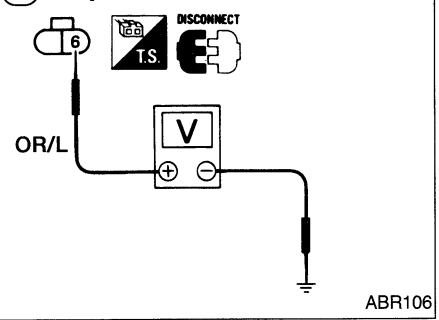
Continuity should exist.

N.G. → Replace relay box.

O.K. ↓

Replace control module.

A



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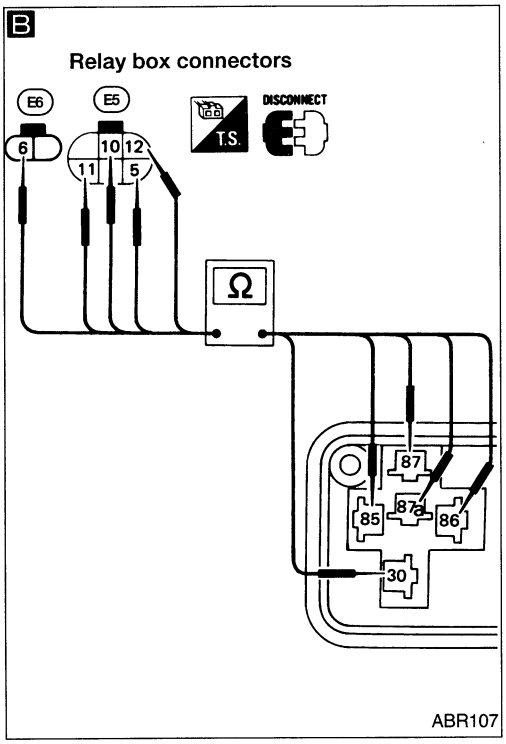
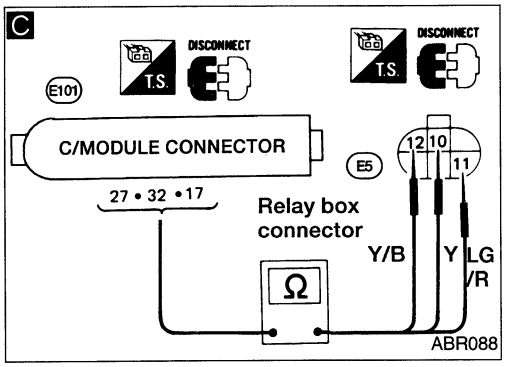
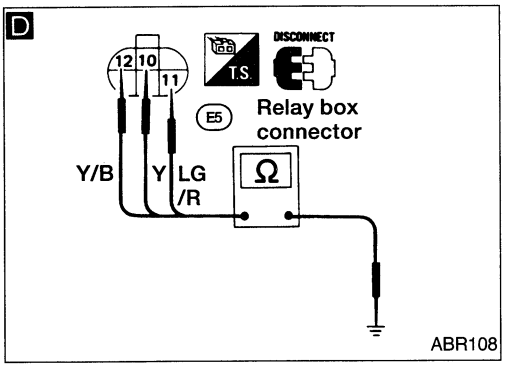


C



D



Diagnostic Procedure 6

SOLENOID VALVE RELAY

(Malfunction code No. 63)

A

SOLENOID VALVE POWER SUPPLY CHECK

- Disconnect connectors from actuator and relay box.
- Check voltage between terminal ⑥ and ground.

Battery positive voltage should exist.

N.G. → Repair harness and connector.

O.K. ↓

SOLENOID VALVE RELAY CHECK

Refer to BR-57.

N.G. → Replace solenoid valve relay.

O.K. ↓

B

RELAY BOX CHECK

Check continuity between relay terminals and relay box connector terminals.

Relay terminals	Connector terminals
㉚	⑫
㉟	⑪
㊱	⑩
㊲	⑥
㊲a	⑤

Continuity should exist.

N.G. → Replace relay box.

O.K. ↓

C

CIRCUIT CHECK

- Disconnect control module connector.
- Check continuity between control module connector terminals and relay box connector terminals.

Control module	Relay box
⑰	⑩
㉗	⑪
㉜	⑫

Continuity should exist.

N.G. ↓

O.K. ↓

D

Check continuity between relay box connector terminals ⑩, ⑪, ⑫ and ground.

Continuity should not exist.

N.G. → Repair harness and connectors.

O.K. ↓

Replace control module.

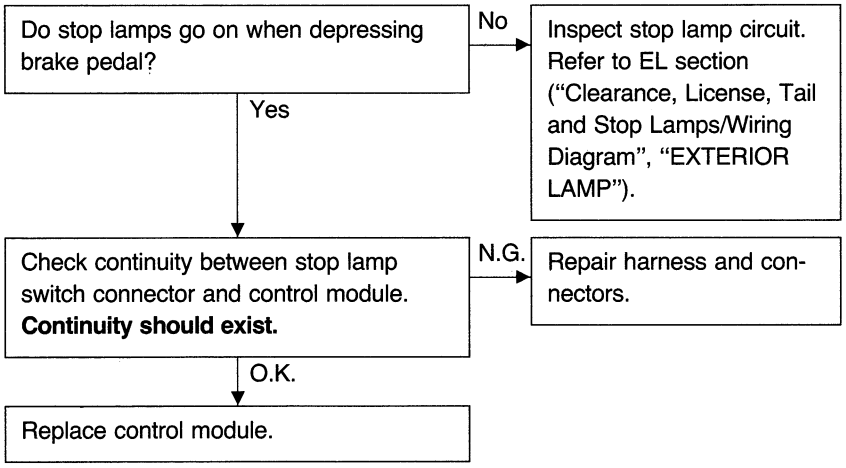
Diagnostic Procedure 7

POWER SUPPLY (Low voltage)
(Malfunction code No. 57)

BATTERY CHECK
Check battery.

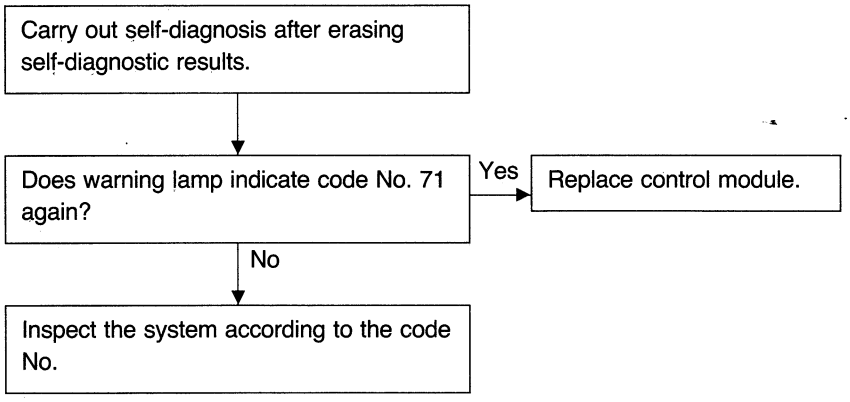
Diagnostic Procedure 8

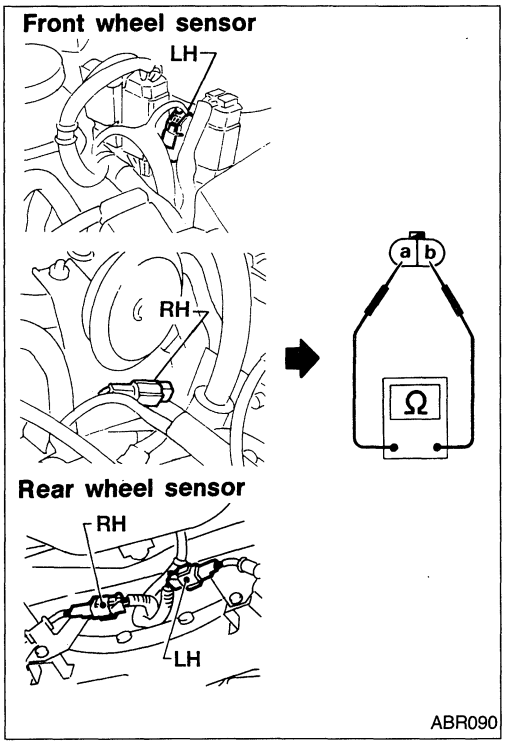
STOP LAMP SWITCH CIRCUIT
(Malfunction code No. 16)



Diagnostic Procedure 9

CONTROL MODULE
(Malfunction code No. 71)





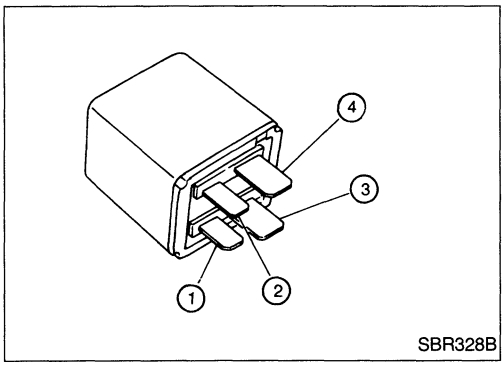
ABR090

Electrical Components Inspection

WHEEL SENSOR

Check resistance between terminals ⓐ and ⓑ.

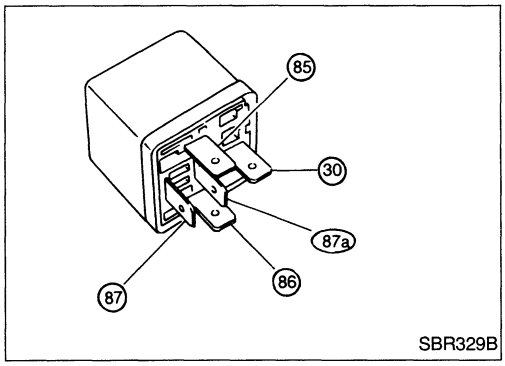
Resistance: 1.0 - 1.25kΩ



SBR328B

MOTOR RELAY

Condition	Continuity existence between terminals ③ and ④
Battery positive voltage not applied between terminals ① and ②.	No
Battery positive voltage applied between terminals ① and ②.	Yes



SBR329B

SOLENOID VALVE RELAY

Condition	Continuity existence between terminals 30 and 87a	Continuity existence between terminals 30 and 87
Battery positive voltage not applied between terminals 85 and 86.	Yes	No
Battery positive voltage applied between terminals 85 and 86.	No	Yes

General Specifications

Model	Without ABS	With ABS
Front brake		
Brake model	CL25VB	
Cylinder bore diameter mm (in)	57.2 (2.252)	
Pad mm (in)		
Length x width x thickness	125.6 x 45.3 x 11.0 (4.94 x 1.783 x 0.433)	
Rotor outer diameter x thickness mm (in)	280 x 22 (11.02 x 0.87)	
Rear brake		
Brake model	LT23E	CL9HA
Cylinder bore diameter mm (in)	19.05 (3/4)	33.96 (1.3370)
Lining or pad mm (in)		
Length x width x thickness	219.4 x 35 x 4.1 (8.64 x 1.38 x 0.161)	89.1 x 39.5 x 10 (3.508 x 1.555 x 0.39)
Drum inner diameter or rotor outer diameter x thickness mm (in)	228.6 (9)	258 x 9 (10.16 x 0.35)

Model	Without ABS	With ABS
Master cylinder		
Cylinder bore diameter mm (in)	23.81 (15/16)	25.40 (1)
Control valve		
Valve model	Dual proportioning valve (built-in type)	Dual proportioning valve (separated type)
Split point kPa (kg/cm^2, psi) x reducing ratio	1,961 (20, 284) x 0.2	2,942 (30, 427) x 0.2
Brake booster		
Booster model	M195T	M215T
Diaphragm diameter mm (in)	Primary: 205 (8.07) Secondary: 180 (7.09)	Primary: 230 (9.06) Secondary: 205 (8.07)
Recommended brake fluid	DOT 3	

Inspection and Adjustment

DISC BRAKE

Brake model	CL25VB	CL9HA
Pad wear limit mm (in)		
Minimum thickness	2.0 (0.079)	1.5 (0.059)
Rotor repair limit mm (in)		
Minimum thickness	20.0 (0.787)	8.0 (0.315)

DRUM BRAKE

Brake model	LT23E
Lining wear limit mm (in)	
Minimum thickness	1.5 (0.059)
Drum repair limit mm (in)	
Maximum inner diameter	230 (9.06)
Out-of-roundness	0.03 (0.0012)

BRAKE PEDAL

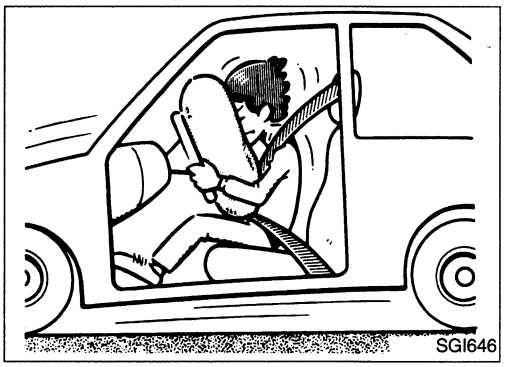
Free height "H" mm (in)	
M/T	169 - 179 (6.65 - 7.05)
A/T	177 - 187 (6.97 - 7.36)
Depressed height "D" mm (in) [under force of 490 N (50 kg, 110 lb) with engine running]	90 (3.54)
Clearance between switches and pedal stopper bracket "C" mm (in)	0.3 - 1.0 (0.012 - 0.039)
Pedal free play "A" mm (in)	1.0 - 3.0 (0.039 - 0.118)

PARKING BRAKE

Number of notches	Disc brake	Drum brake
[under force of 196 N (20 kg, 44 lb)]	7 - 8	7 - 8
Number of notches when warning lamp switch comes on	1	

SECTION ST

CONTENTS



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 control module, 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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

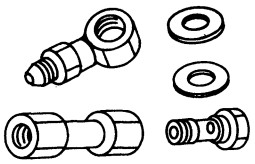
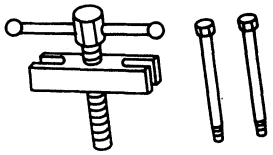
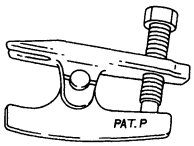
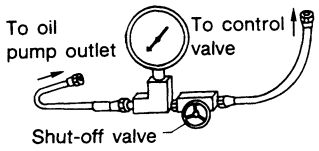
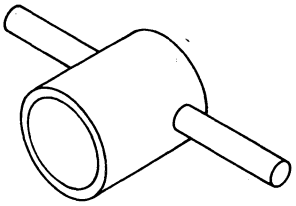
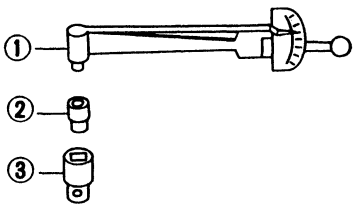
STEERING SYSTEM

- **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 on a part 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 ATF* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.**
- **Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.**

***: Automatic transmission fluid**

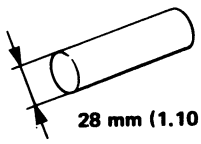
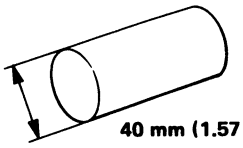
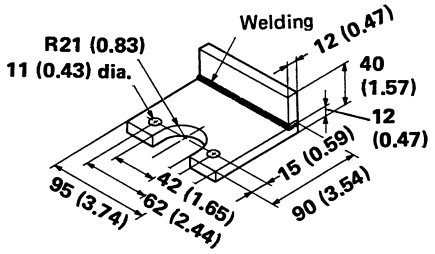
Preparation

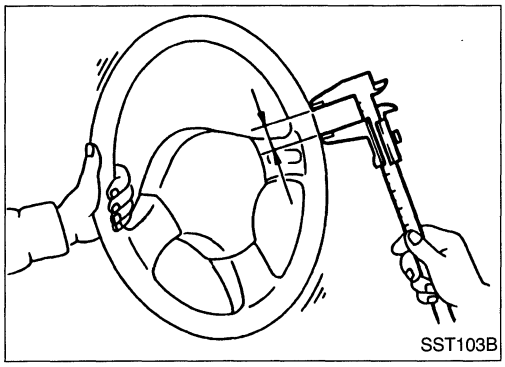
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
KV48100700 (J26364) Torque adapter		Measuring pinion rotating torque
KV48102500 (—) Pressure gauge adapter		Measuring oil pressure
ST27180001 (J25726-A) Steering wheel puller		Removing and installing steering wheel
HT72520000 (J25730-A) Ball joint remover		Removing ball joint
ST27091000 (J26357) Pressure gauge		Measuring oil pressure
KV48104400 (—) Rack seal ring reformer		Reforming teflon ring
ST3127S000 (See J25765-A) ①GG91030000 (J25765-A) Torque wrench ②HT62940000 (—) Socket adapter ③HT62900000 (—) Socket adapter		Measuring turning torque

Preparation (Cont'd)

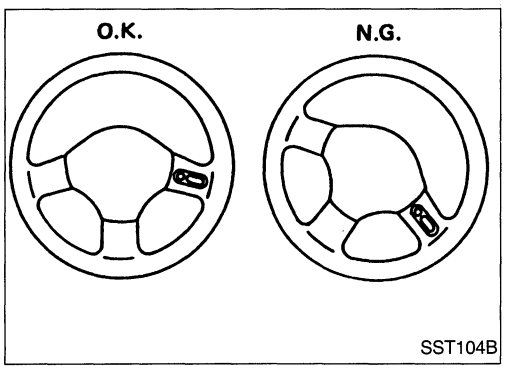
COMMERCIAL SERVICE TOOLS

Tool name	Description	
Rear oil seal drift		Installing rear oil seal
Pinion oil seal drift		Installing pinion oil seal
Oil pump attachment	 Unit: mm (in)	Disassembling and assembling oil pump


SST103B

Checking Steering Wheel Play

1. With wheels in a straight-ahead position, check steering wheel play.
   Steering wheel play:
   35 mm (1.38 in) or less
2. If it is not within specification, check steering gear assembly when front suspension and axle, steering gear assembly and steering column are mounted correctly.



SST104B

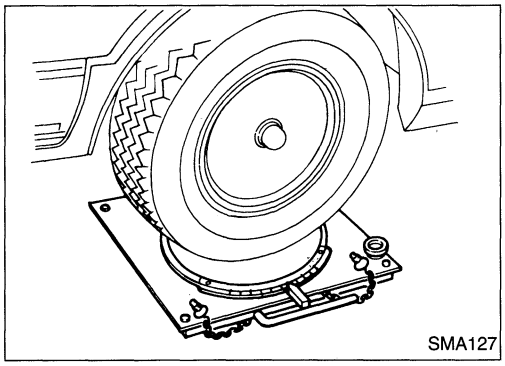
Checking Neutral Position on Steering Wheel

Pre-checking

- Make sure that wheel alignment is correct.
  Wheel alignment:
  Refer to FA section ("Inspection and Adjustment", "SERVICE DATA AND SPECIFICATIONS").
- Verify that the steering gear is centered before removing the steering wheel.

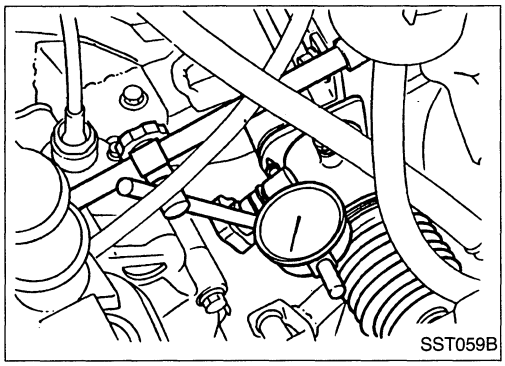
Checking

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two serrated teeth, loosen tie-rod lock nut and move tie-rod in the opposite direction by the same amount on both left and right sides to compensate for error in the neutral position.


SMA127

Front Wheel Turning Angle

1. Rotate steering wheel all the way right and left; measure turning angle.
   Turning angle of full turns:
   Refer to FA section ("Inspection and Adjustment", SERVICE DATA AND SPECIFICATIONS").
2. If it is not within specification, check rack stroke.
   Rack stroke "L":
   Refer to ST-28.

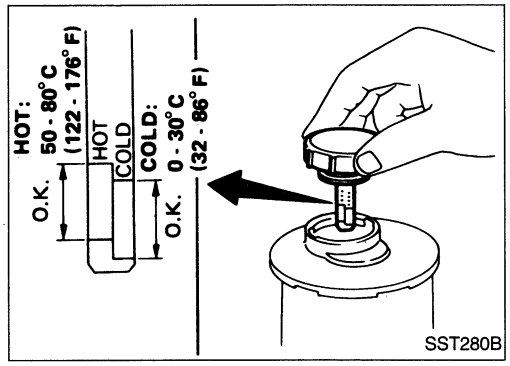

SST059B

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.

Checking and Adjusting Drive Belts

Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

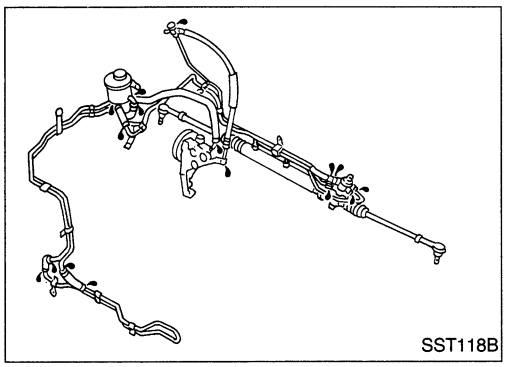


Checking Fluid Level

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.**



Checking Fluid Leakage

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

1. Run engine between idle speed and 1,000 rpm.

Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F).

2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

CAUTION:
Do not hold the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

Bleeding Hydraulic System

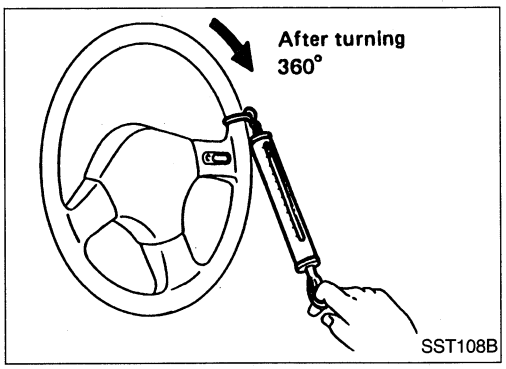
1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Meanwhile quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
   Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
   Repeat step 2 above.

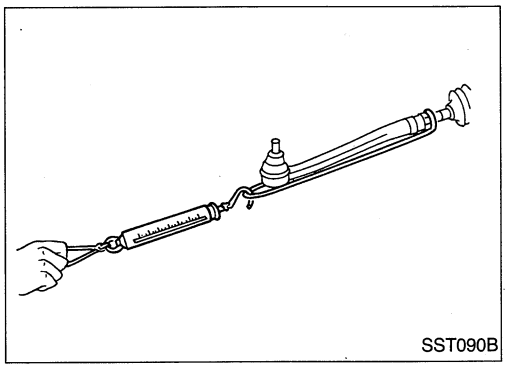
Bleeding Hydraulic System (Cont'd)

- 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 moving 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

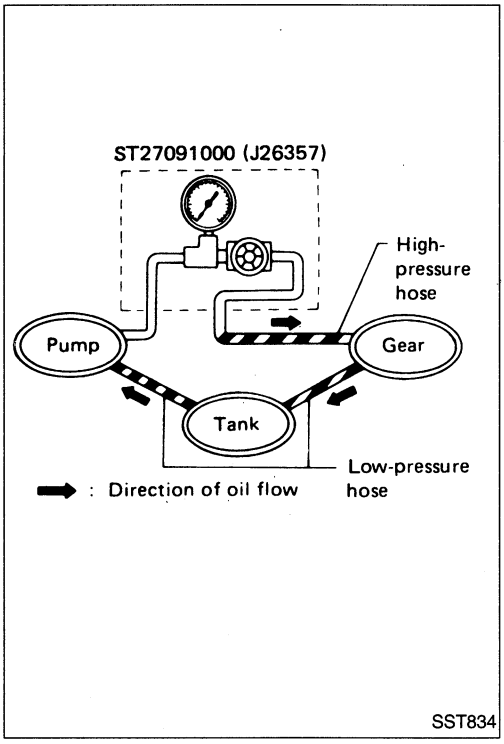
1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from 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 from the neutral position, make sure rack sliding force is within specification.
   Rack sliding force:
   118 - 235 N (12 - 24 kg, 26 - 53 lb)

6. If rack sliding force is not within specification, replace 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. Refer to ST-6.
2. Run engine.

Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, oil pressure in oil pump will increase to relief pressure, resulting in an abnormal rise in oil temperature.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Oil pump maximum standard pressure:
7,649 - 8,238 kPa (78 - 84 kg/cm^2, 1,109 - 1,194 psi)

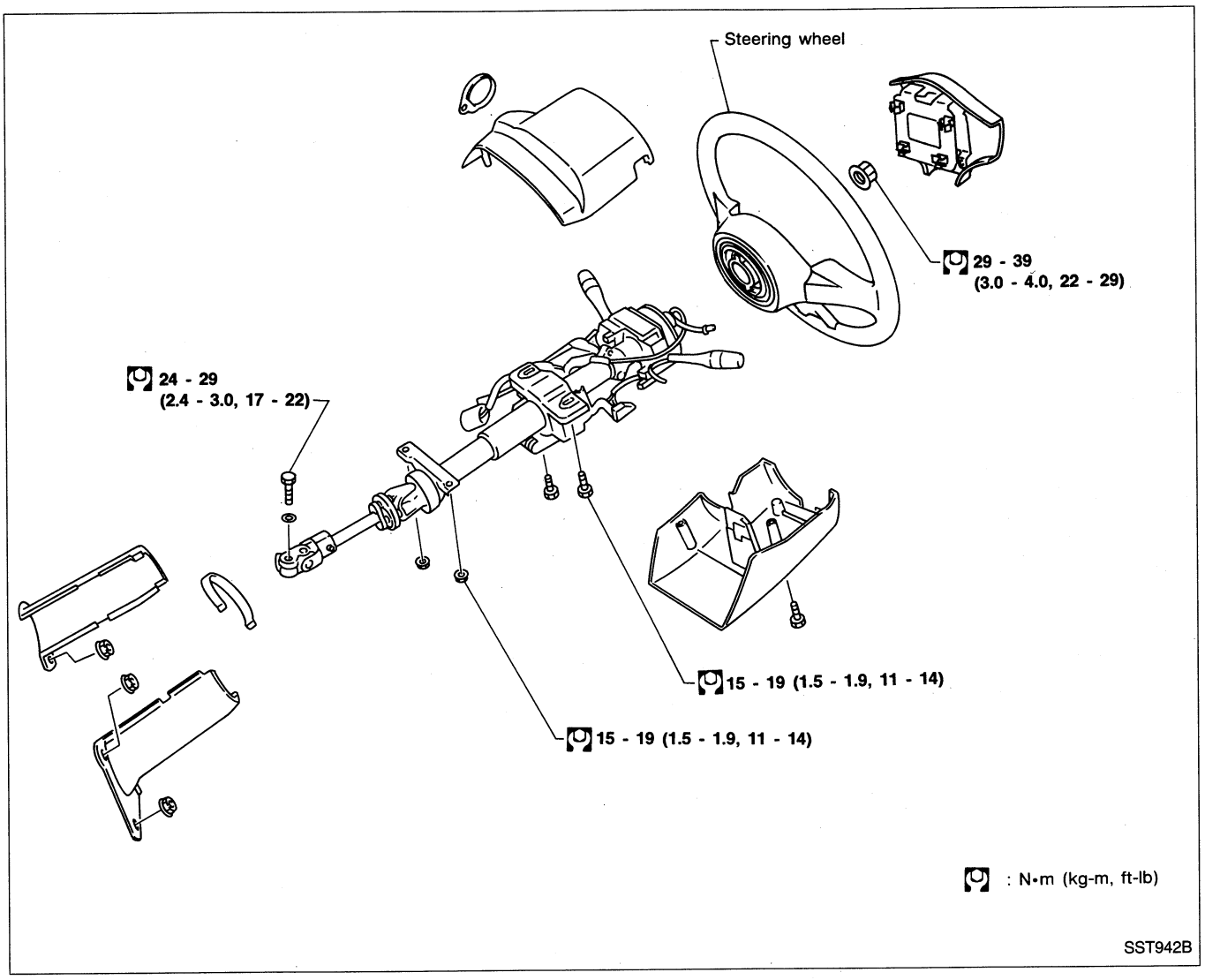
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.

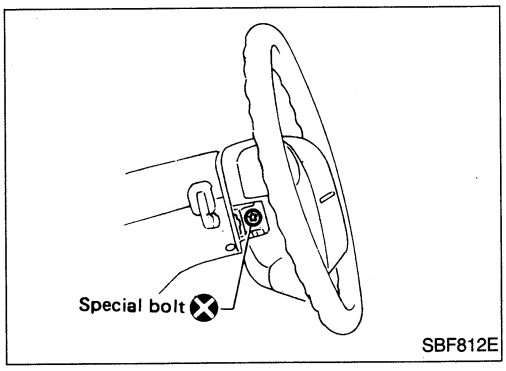
- When pressure reaches standard pressure, gear is damaged.
- When pressure remains below standard pressure, pump is damaged.

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. Refer to ST-6.

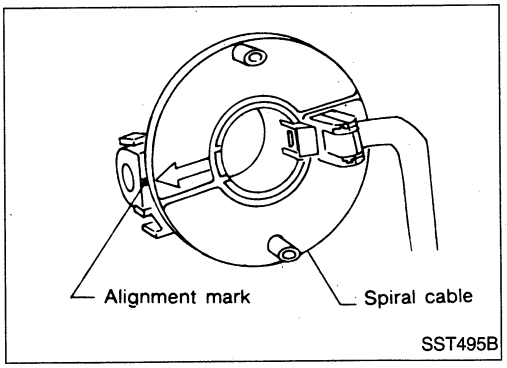




Removal (With air bag)

STEERING WHEEL

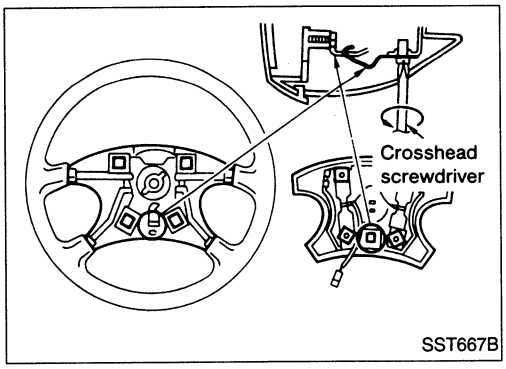
Remove air bag module and spiral cable. Refer to BF section ("Removal — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM").



STEERING COLUMN

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.



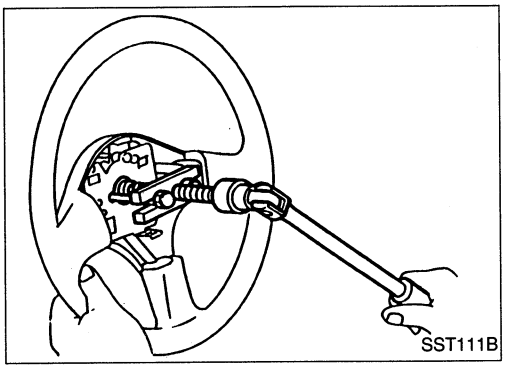
Removal (Without air bag)

STEERING WHEEL

— Three spoke type —

— Four spoke type —

1. Insert a crosshead screwdriver into hole on lower side of spoke and remove clamps. Lift horn pad off by hand.

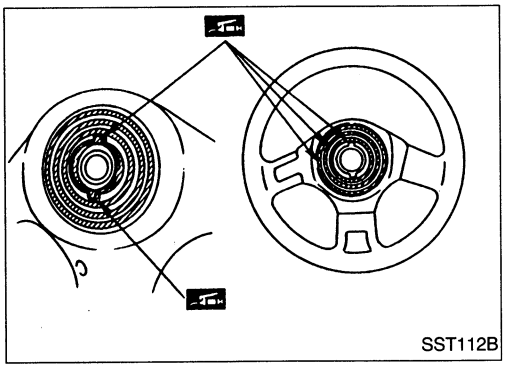


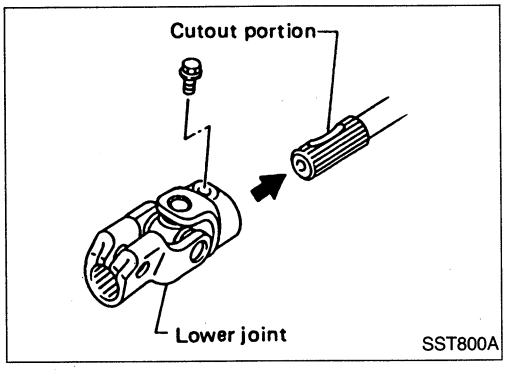
2. Remove steering wheel with Tool.

Installation

STEERING WHEEL

When installing steering wheel, apply multi-purpose grease to entire surface of turn signal cancel pin (both portions) and also to horn contact slip ring.





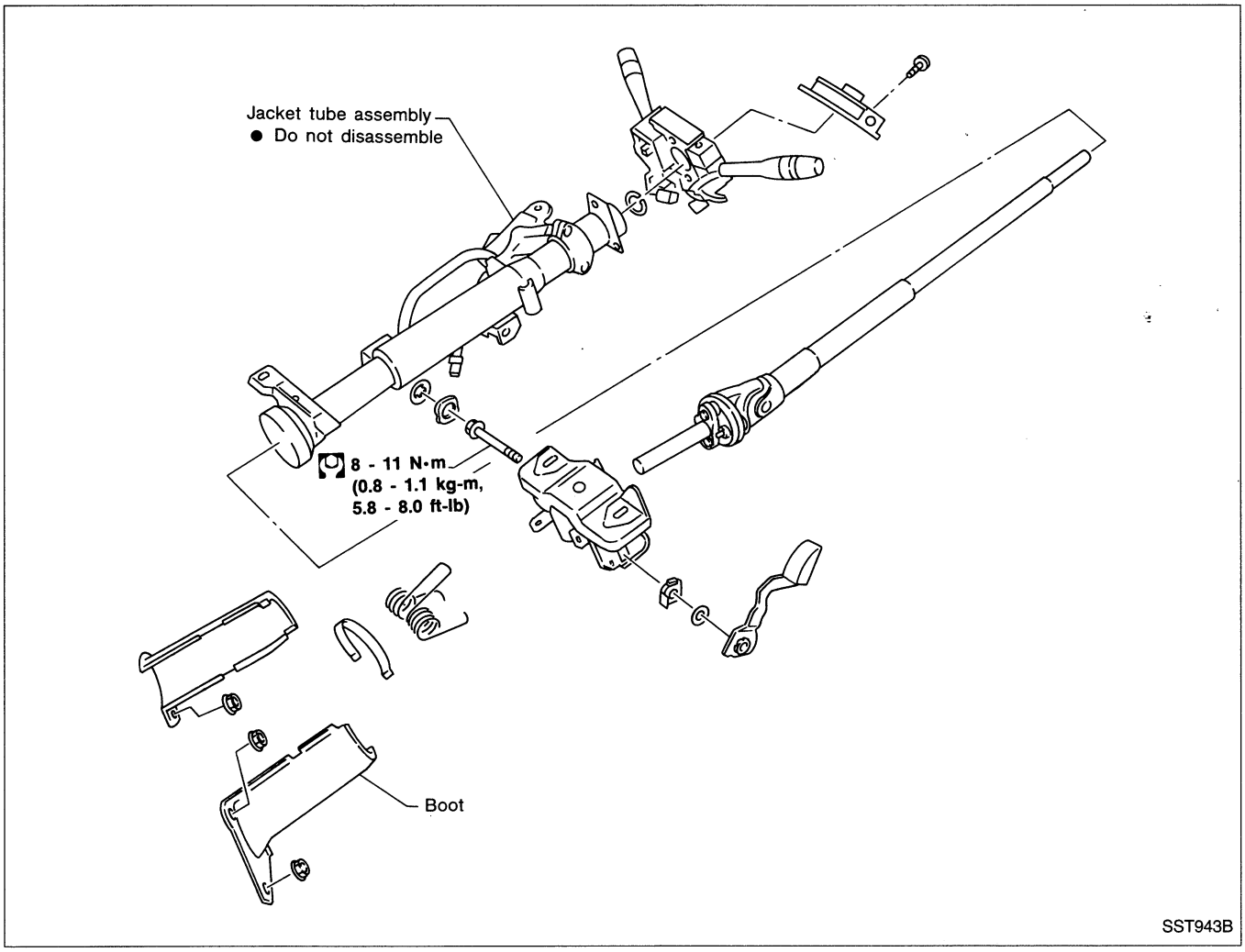
STEERING COLUMN

- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

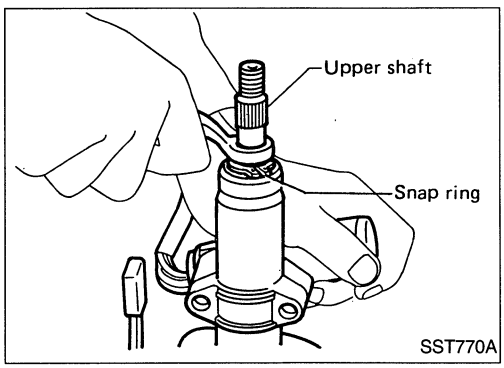
CAUTION:

After installing steering column, turn steering wheel to make sure it moves smoothly and that the number of turns from the straight forward position to left and right locks are equal. Be sure that the steering wheel is in a neutral position when driving straight ahead.

Disassembly and Assembly

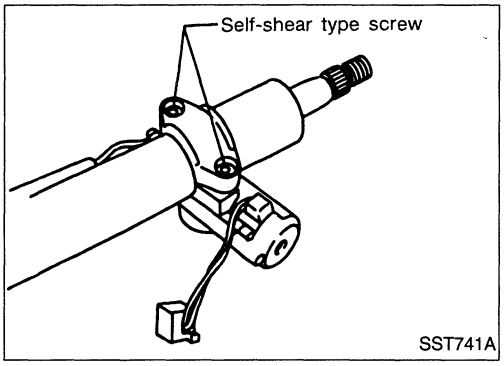


- When disassembling and assembling, unlock steering lock with key.
- Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.



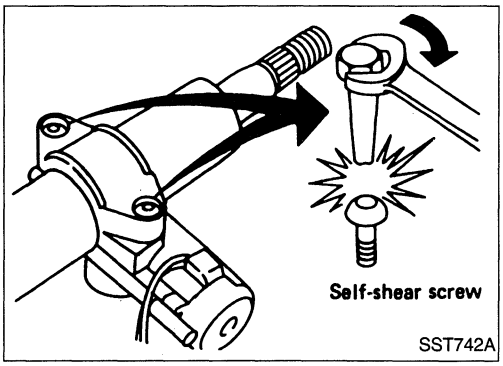
- Install snap ring on upper shaft with a suitable tool.

Disassembly and Assembly (Cont'd)



- Steering lock

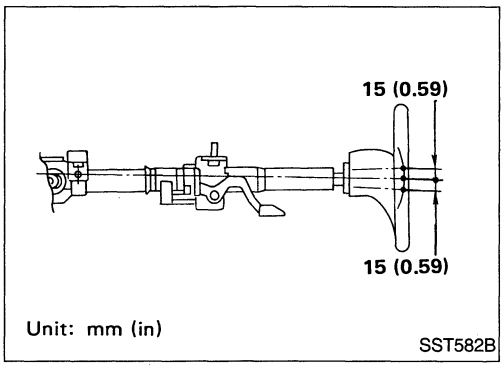
a. Break self-shear type screws with a drill or other appropriate tool.



b. Install self-shear type screws and then cut off self-shear type screw heads.

Tilt mechanism

- After installing steering column, check tilt mechanism operation.

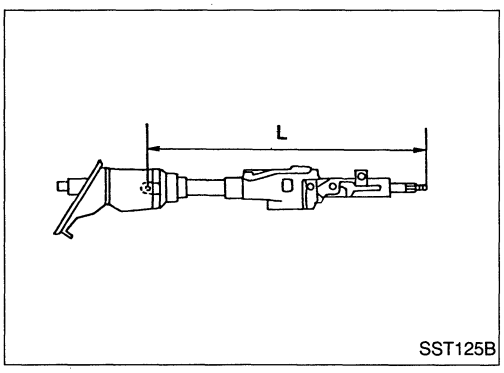


Inspection

- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.

a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

b. Check jacket tube for deformation or breakage. Replace if necessary.

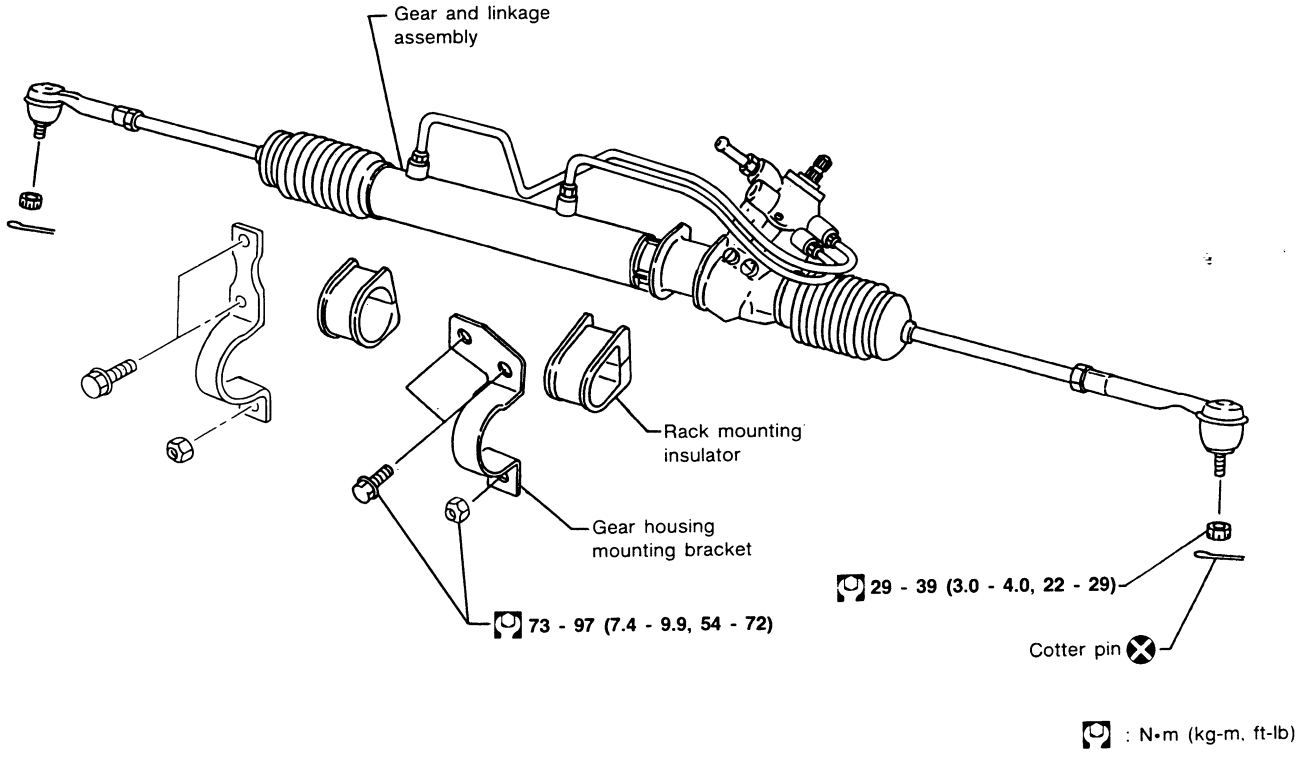


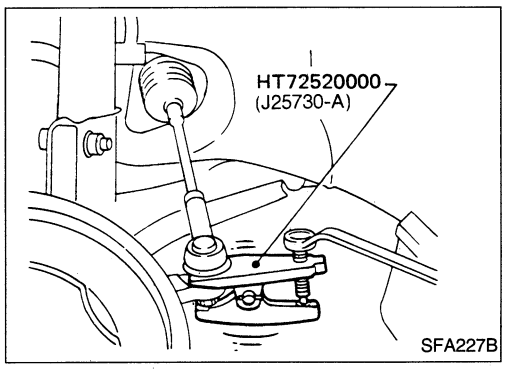
- When the vehicle is involved in a light collision, check column length "L". If it is not within specifications, replace steering column as an assembly.

Column length "L":

525.6 - 528.4 mm (20.69 - 20.80 in)

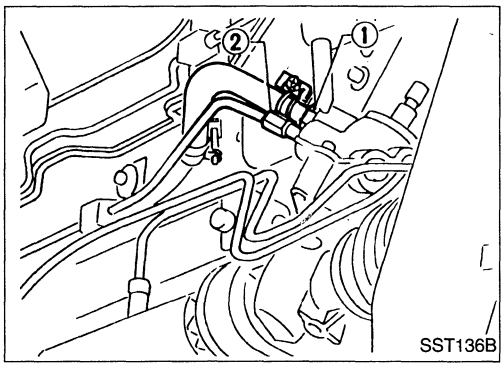
Removal and Installation





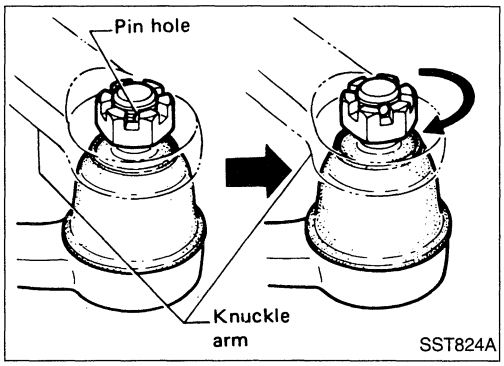
- Detach tie-rod outer sockets from knuckle arms with Tool.

Removal and Installation (Cont'd)



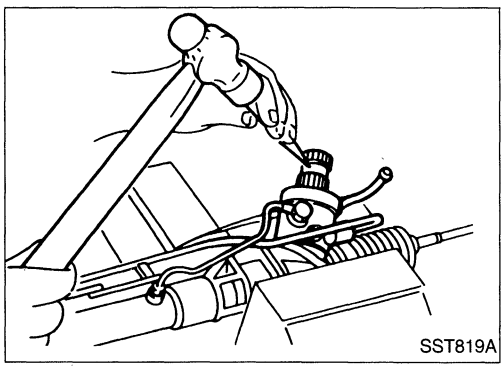
- Install pipe connector.
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or connector O-ring.
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.

Connector tightening torque:
Low-pressure side "1"
27 - 39 N•m (2.8 - 4.0 kg-m, 20 - 29 ft-lb)
High-pressure side "2"
15 - 25 N•m (1.5 - 2.5 kg-m, 11 - 18 ft-lb)

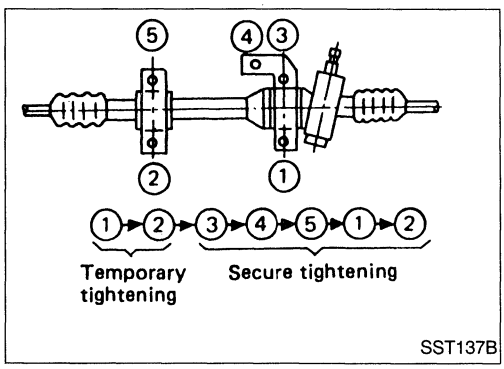


- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N•m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

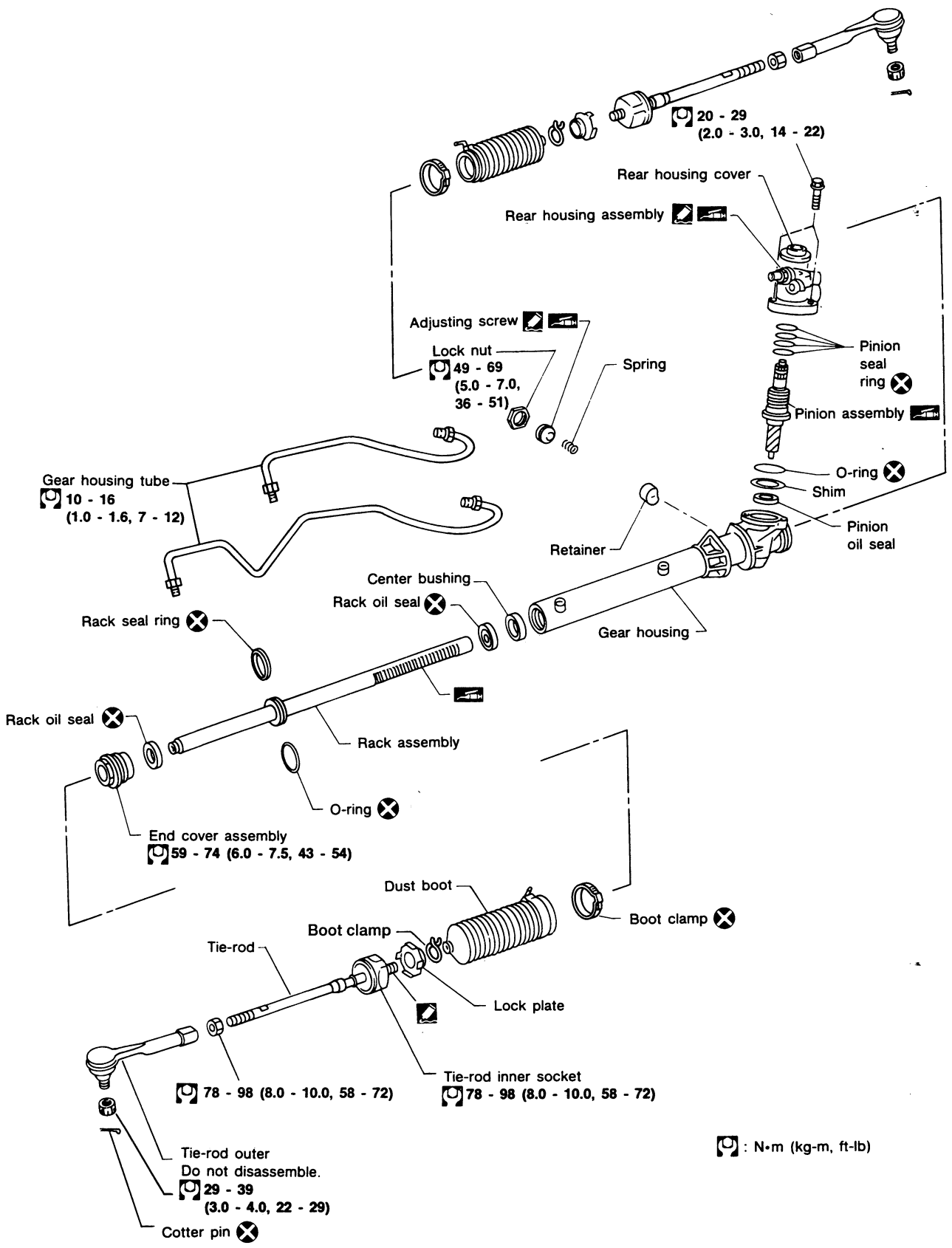
CAUTION:
Tightening torque must not exceed 49 N•m (5 kg-m, 36 ft-lb).



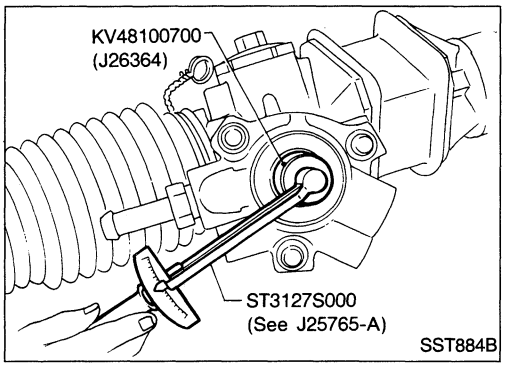
- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matching mark on pinion shaft and pinion housing to record neutral position of gear.
- To install, set left and right dust boots to equal deflection, and attach lower joint by aligning matching marks of pinion shaft and pinion housing.



- Tighten gear housing mounting bracket bolts in the order shown.


20 - 29
(2.0 - 3.0, 14 - 22)
Rear housing cover
Rear housing assembly
Adjusting screw
Lock nut
49 - 69
(5.0 - 7.0,
36 - 51)
Spring
Pinion
seal
ring
Pinion assembly
O-ring
Shim
Pinion
oil seal
Gear housing tube
10 - 16
(1.0 - 1.6, 7 - 12)
Retainer
Center bushing
Rack oil seal
Gear housing
Rack seal ring
Rack oil seal
Rack assembly
O-ring
End cover assembly
59 - 74 (6.0 - 7.5, 43 - 54)
Dust boot
Boot clamp
Boot clamp
Tie-rod
Lock plate
78 - 98 (8.0 - 10.0, 58 - 72)
Tie-rod inner socket
78 - 98 (8.0 - 10.0, 58 - 72)
Tie-rod outer
Do not disassemble.
29 - 39
(3.0 - 4.0, 22 - 29)
Cotter pin
: N•m (kg-m, ft-lb)

AST031



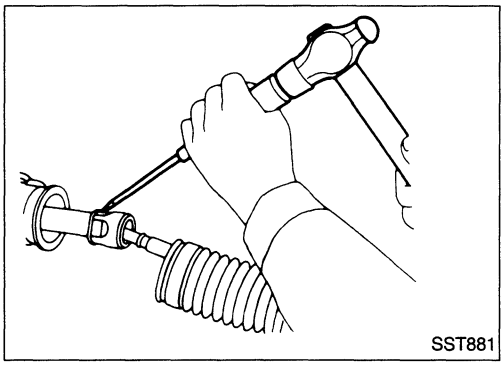
Disassembly

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.

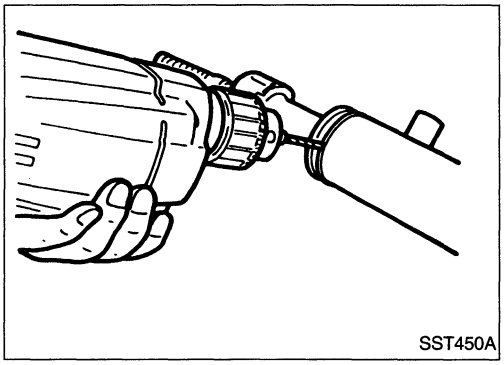
- **Before measuring, disconnect gear housing tube and drain fluid.**
- **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**

2. Remove pinion gear.

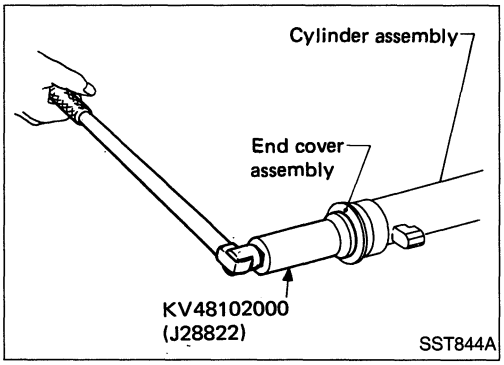
Be careful not to damage pinion gear when removing pinion seal ring.



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.

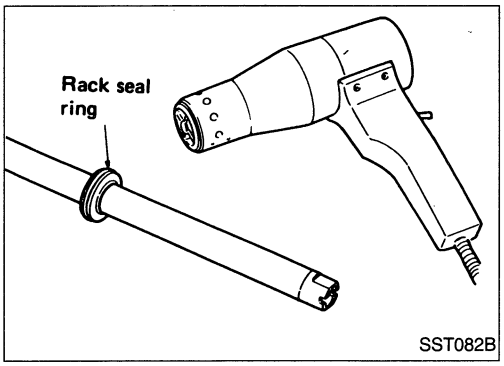


7. Drill staked portion of gear housing end with drill of 2 to 2.5 mm (0.079 to 0.098 in) diameter, until the staking is eliminated.



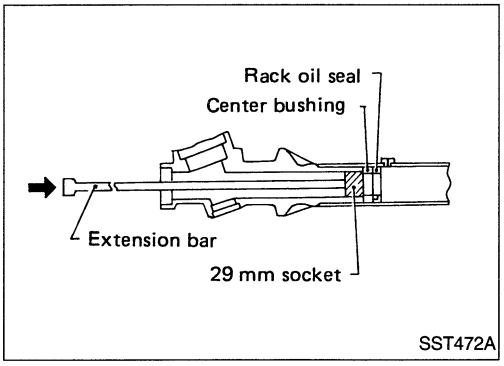
8. Remove end cover assembly with Tool.
9. Draw out rack assembly.

Disassembly (Cont'd)



10. Remove rack seal ring.
- Using a heat gun, heat rack seal to approximately 40°C (104°F).
- Remove rack seal ring.

Be careful not to damage rack.



11. Remove 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™", 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

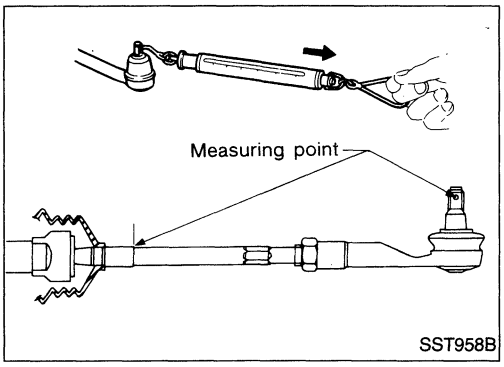
- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.

GEAR HOUSING CYLINDER

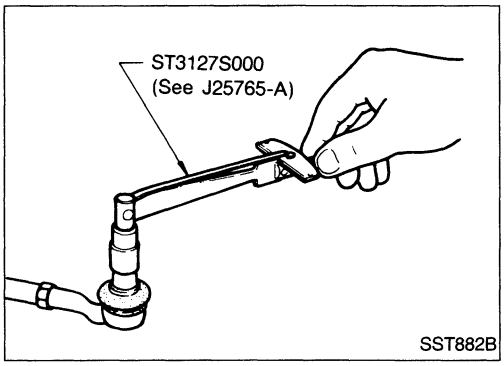
Check gear housing cylinder bore for scratches or other damage. Replace if necessary.

Inspection (Cont'd)

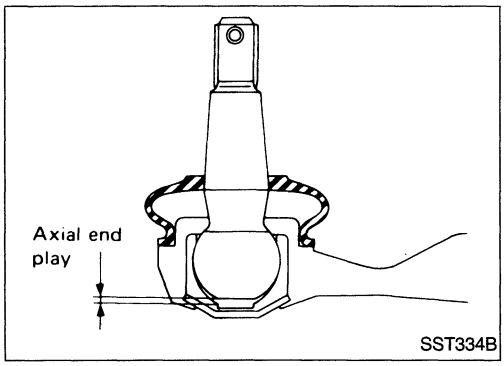
TIE-ROD OUTER AND INNER SOCKET



- Check ball joint for swinging force.
  Tie-rod outer ball joint:
  6.9 - 64.7 N
  (0.7 - 6.6 kg, 1.5 - 14.6 lb)
  Tie-rod inner ball joint:
  15.7 - 140.2 N
  (1.6 - 14.3 kg, 3.5 - 31.5 lb)

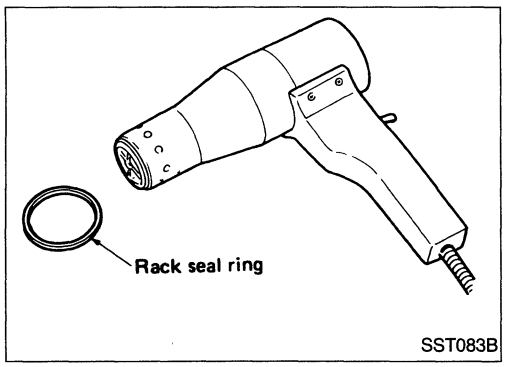


- Check ball joint for rotating torque.
  Tie-rod outer ball joint:
  0.3 - 2.9 N•m
  (3 - 30 kg-cm, 2.6 - 26.0 in-lb)

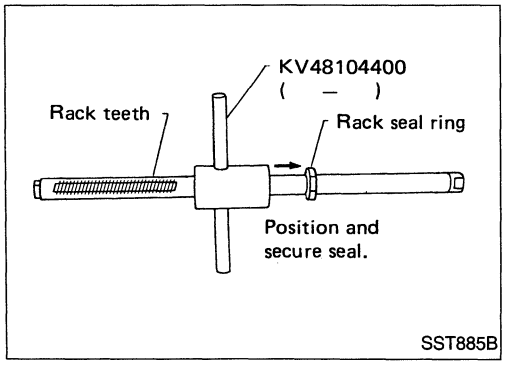


- Check ball joint for axial end play.
  Tie-rod outer ball joint:
  0.1 mm (0.004 in) or less
  Tie-rod inner ball joint:
  0.3 mm (0.012 in) or less
- Check condition of dust cover. If cracked excessively, replace it.

Assembly



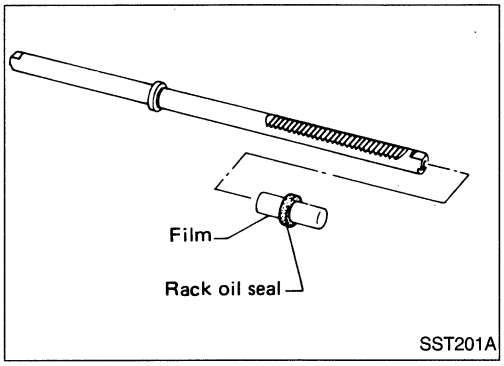
1. Using a heat gun, heat new rack seal ring (made of Teflon) to approximately 40°C (104°F) and install it onto rack with your hand.



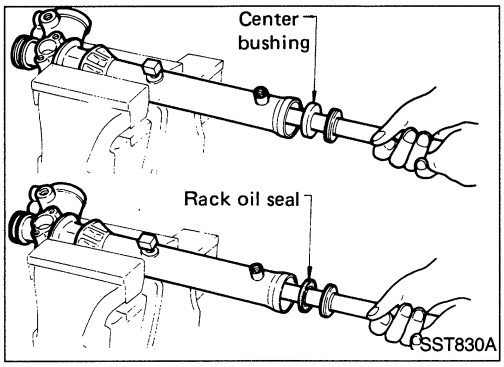
2. Using Tool, compress periphery of rack seal ring to position and secure it on rack.

Always insert Tool from the rack gear side.

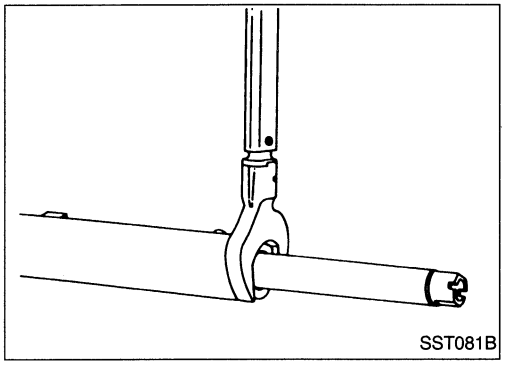
Assembly (Cont'd)



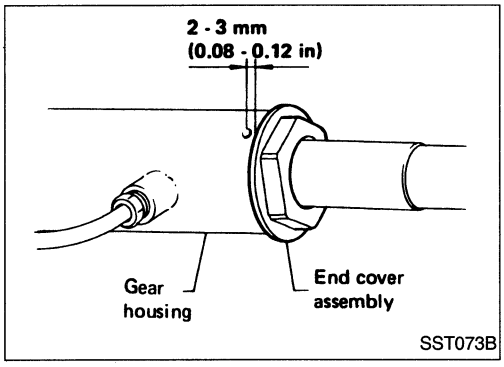
3. Insert new rack oil seal.
- **Place plastic film into rack oil seal to prevent damage by rack teeth.**
- **Do not forget to remove plastic film after rack oil seal is positioned properly.**
- **Make sure lips of rack oil seal face each other.**



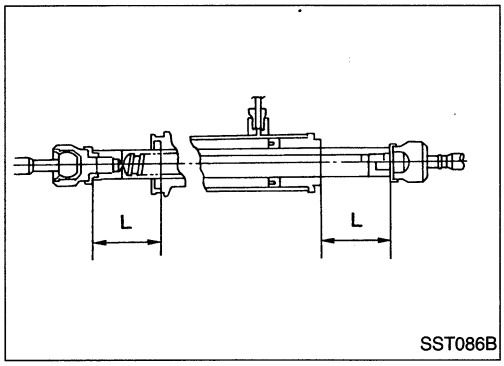
4. Install center bushing and rack oil seal with rack assembly.



5. Tighten end cover assembly with a suitable tool.

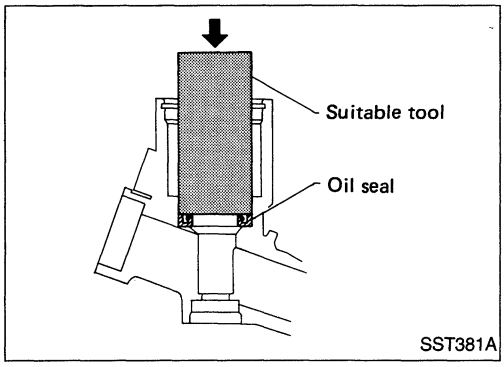


6. Fasten end cover assembly to gear housing by staking.



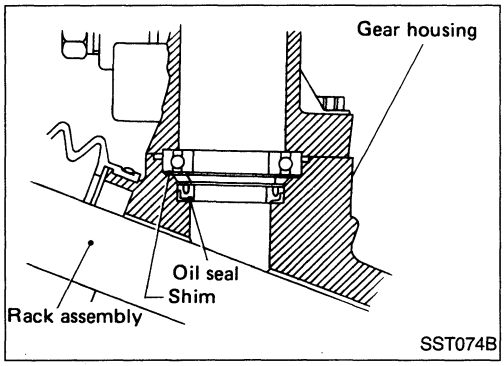
7. Set rack gear in neutral position.
   Rack stroke "L":
   Refer to SDS, ST-28.

Assembly (Cont'd)

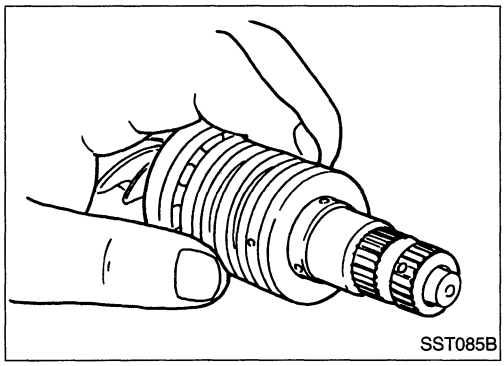


8. Coat seal lip of new pinion oil seal with multi-purpose grease and install it to pinion housing of gear housing with a suitable tool.

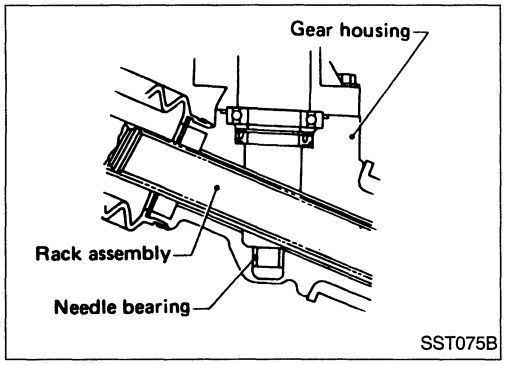
Make sure lip of oil seal faces up when installed.



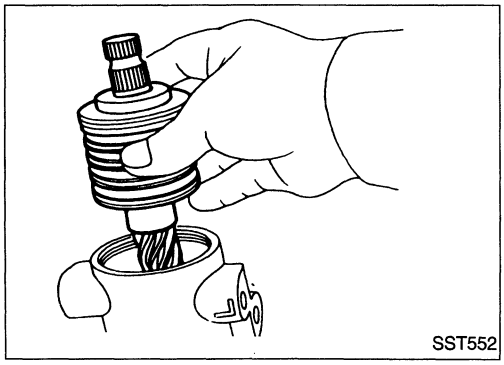
9. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



10. Install new pinion seal ring (made of Teflon) on pinion gear assembly.
- Using a heat gun, heat pinion seal ring to approximately 40°C (104°F) before installing it onto pinion gear assembly.
- Make sure pinion seal ring is properly settled in valve groove.



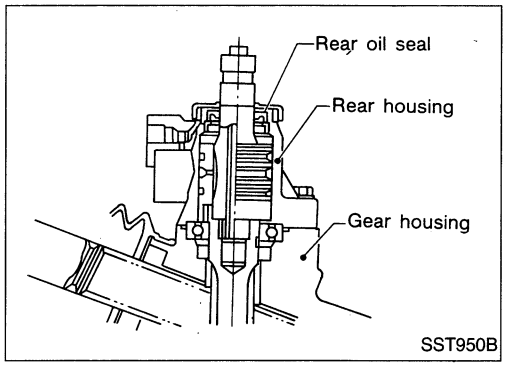
11. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip before installing pinion assembly in gear housing.



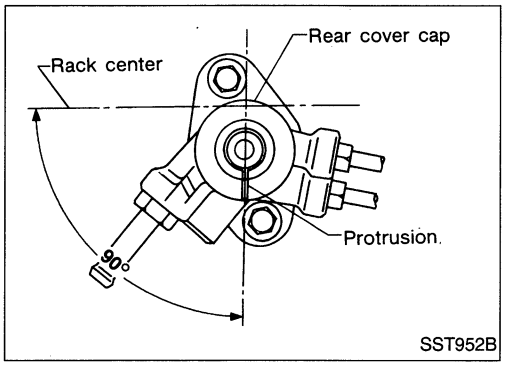
12. Install pinion assembly to pinion housing.

Be careful not to damage pinion oil seal.

Assembly (Cont'd)



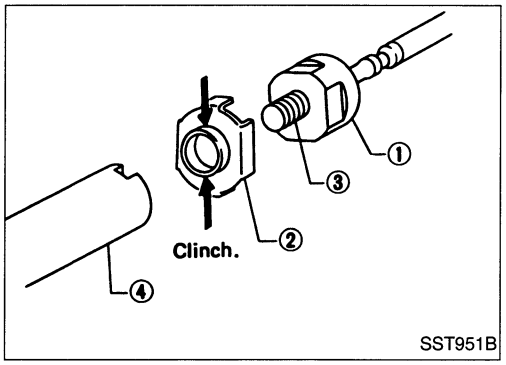
13. Apply a coat of multi-purpose grease to new rear oil seal lip before installing rear housing.



14. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure at left.

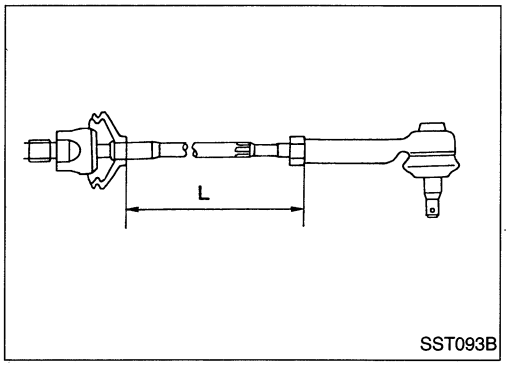
Be careful not to damage worm ring and oil seal.

15. Install retainer spring and adjusting screw temporarily.

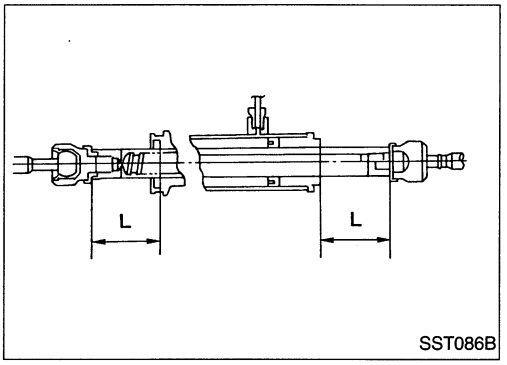


16. Install new lock plate.
- Attach lock plate ② to side rod inner socket ①.
- Apply locking sealant to inner socket threads ③. Screw inner socket into rack ④ and tighten to specified torque.
- Clinch two places of lock plate at rack's groove.

CAUTION:
To prevent scratching the boot, remove burrs from lock plate.

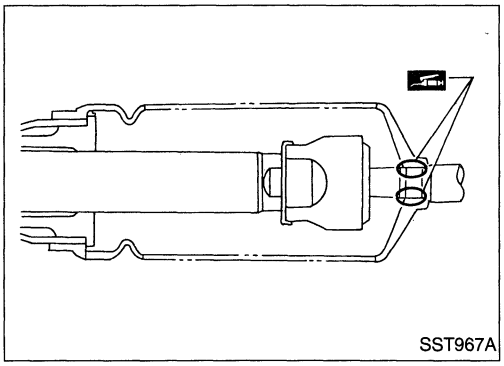


17. Tighten outer socket lock nut.
Tie-rod length "L":
Refer to SDS, ST-27.

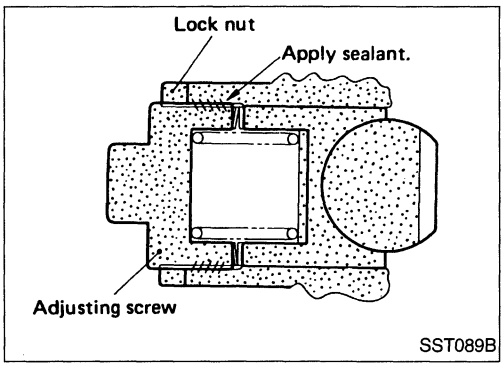


18. Measure rack stroke.
Rack stroke "L":
Refer to SDS, ST-28.

Assembly (Cont'd)


SST967A

19. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.

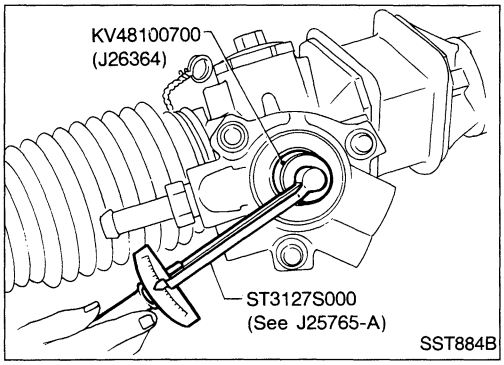


SST089B

Adjustment

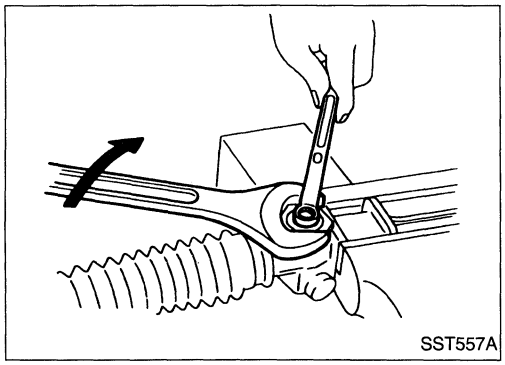
Adjust pinion rotating torque as follows:

1. Set rack to the neutral position without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 14.7 N•m (150 kg-cm, 130 in-lb).

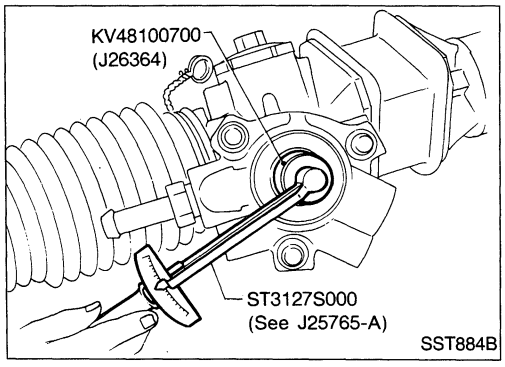


SST884B

5. Move rack over its entire stroke several times.
6. Loosen adjusting screw by 30°.


SST557A

7. Prevent adjusting screw from turning, and tighten lock nut to specified torque.

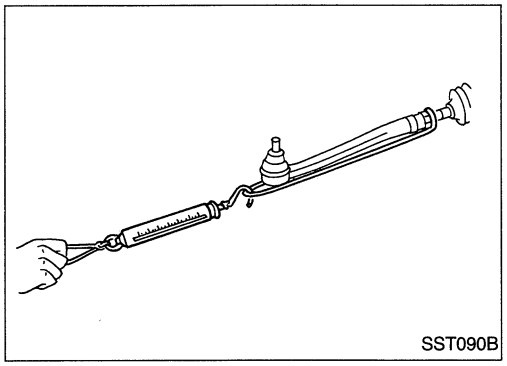


SST884B

8. Measure pinion rotating torque.
   Lock to lock:
   Average rotating torque
   0.8 - 1.3 N•m (8 - 13 kg-cm, 6.9 - 11.3 in-lb)
   Within ±100° from the neutral position:
   Maximum torque variation
   0.4 N•m (4 kg-cm, 3.5 in-lb)
   Outside the above range:
   Maximum force variation
   0.6 N•m (6 kg-cm, 5.2 in-lb)

Adjustment (Cont'd)

- If pinion rotating torque is not within specifications, readjust it starting from procedure 4. If pinion rotating torque is still out of specifications after readjustment, replace steering gear assembly.

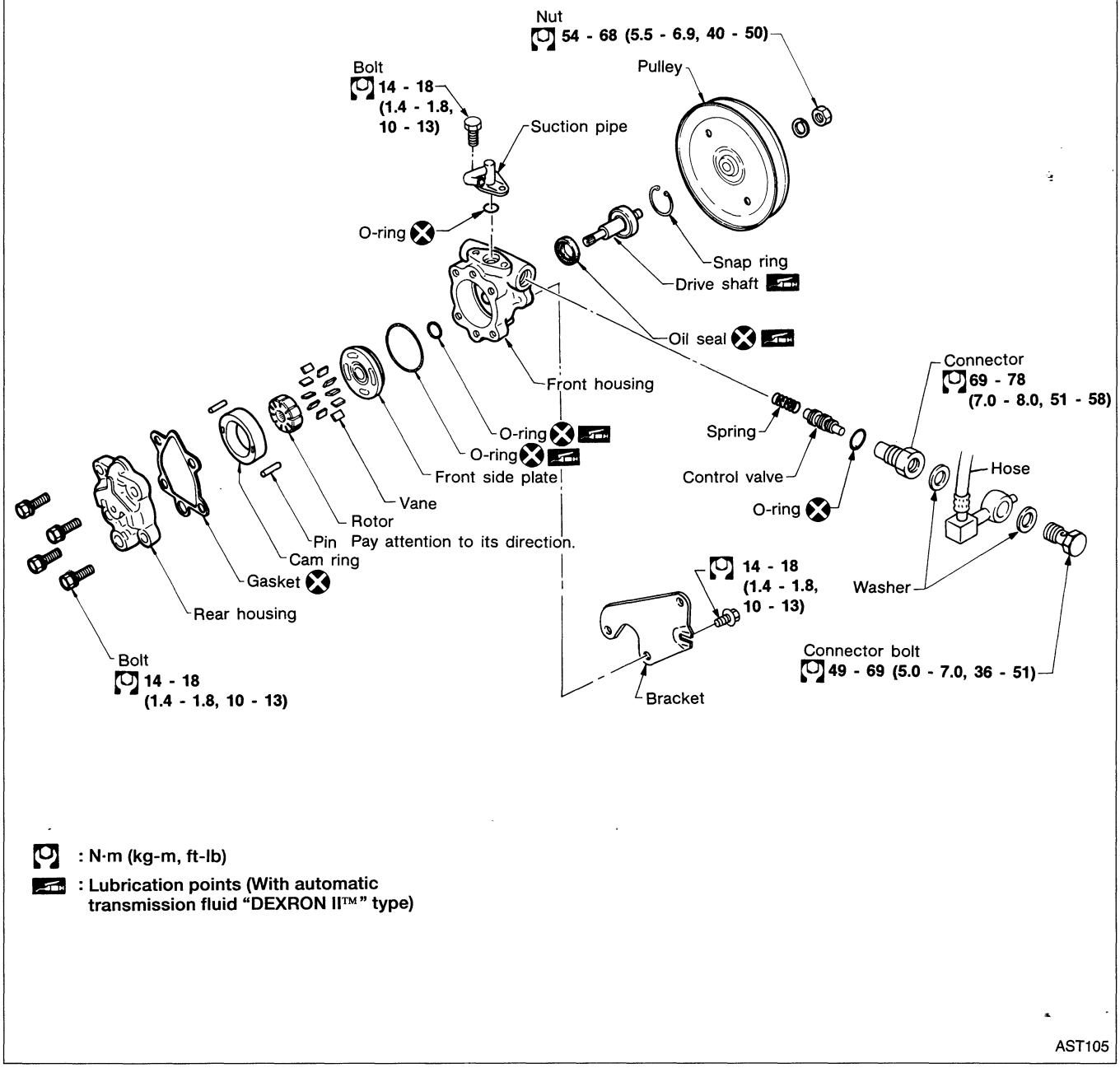

SST090B

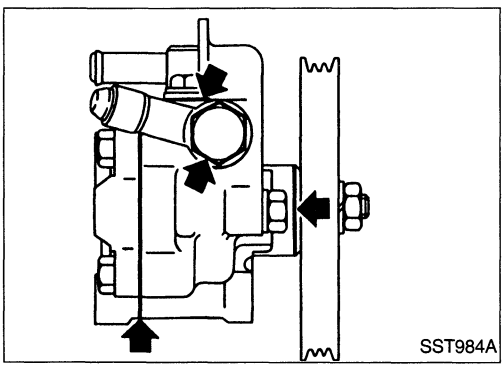
9. Check rack sliding force on vehicle as follows:
a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
b. Connect all piping and fill with steering fluid.
c. Start engine and bleed air completely.
d. Disconnect steering column lower joint from the gear.
e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
f. While pulling tie-rod slowly from the neutral position, make sure rack sliding force is within specification.

Rack sliding force:
118 - 235 N (12 - 24 kg, 26 - 53 lb)

- If rack sliding force is not within specification, readjust by repeating adjustment procedure from the beginning.
- If rack sliding force is still out of specification after readjustment, gear assembly needs to be replaced.

Disassembly and Assembly





Pre-disassembly Inspection

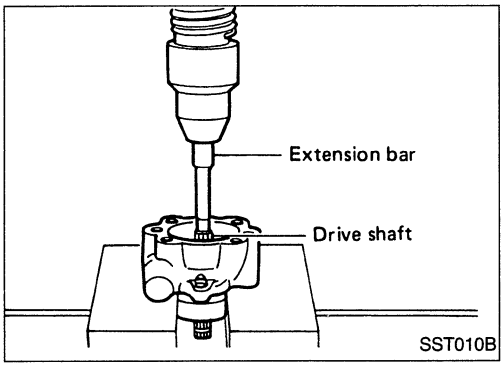
Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance.

Disassembly

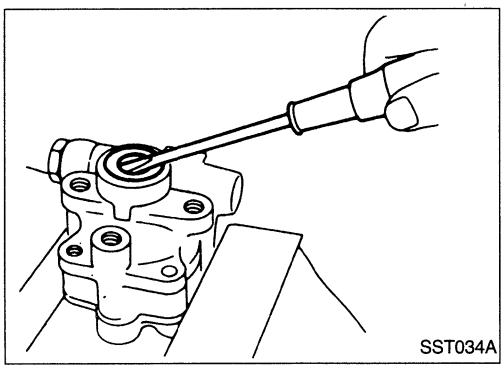
CAUTION:

- **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.**



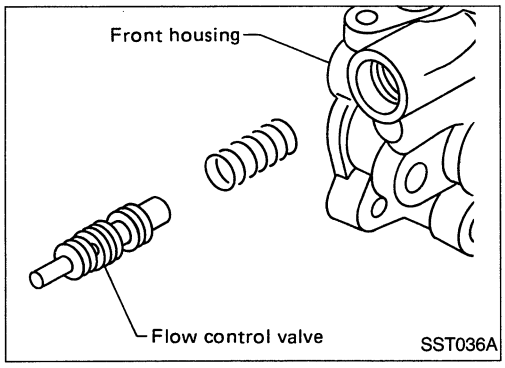
- Remove snap ring, then draw drive shaft out.

Be careful not to drop drive shaft.



- Remove oil seal.

Be careful not to damage front housing.



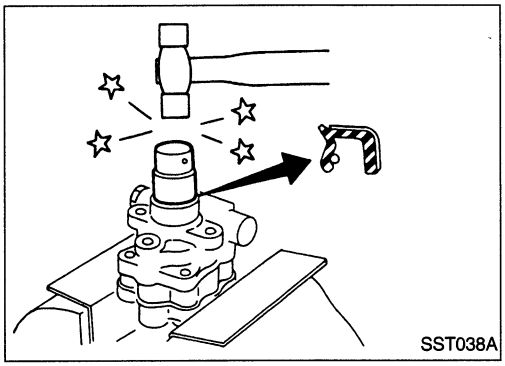
- Remove connector.

Be careful not to drop control valve.

Inspection

PULLEY AND PULLEY SHAFT

- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration of pulley or pulley shaft is deformed or worn, replace it.

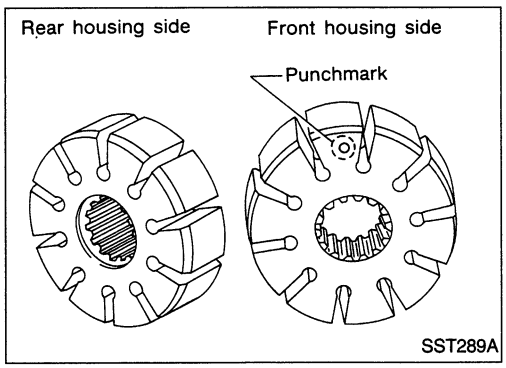

SST038A

Assembly

Assemble oil pump, noting the following instructions.

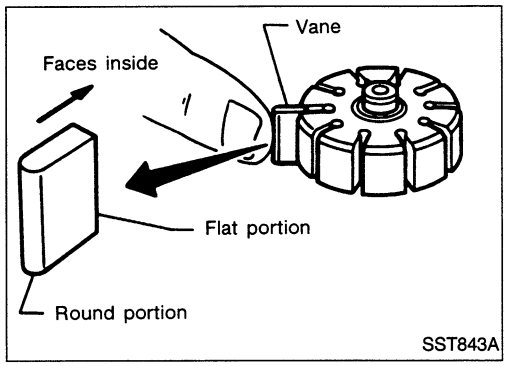
- Before installation, coat the O-rings and oil seal with ATF*
- Make sure O-rings and oil seal are properly installed. When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.

*: Automatic Transmission Fluid



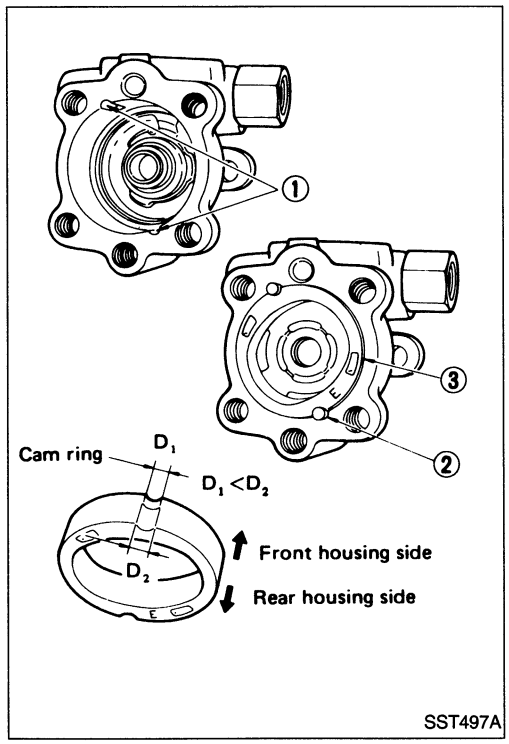
SST289A

- Pay attention to the direction of rotor.



SST843A

- Install vanes properly.



SST497A

- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

General Specifications

Applied model	All
Steering model	Power steering
Steering gear type	PR26K
Steering overall gear ratio	17.2
Turns of steering wheel (Lock to lock)	2.83
Steering column type	Collapsible, tilt

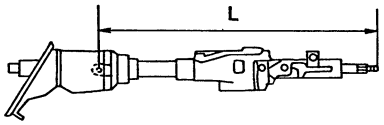
Inspection and Adjustment

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" mm (in)	525.6 - 528.4 (20.69 - 20.80)

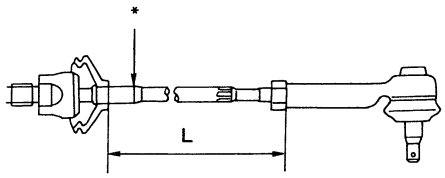


SST125B

STEERING GEAR AND LINKAGE

Steering gear type		PR26SC
Tie-rod outer ball joint		
Swinging force at cotter pin hole	N (kg, lb)	6.9 - 64.7 (0.7 - 6.6, 1.5 - 14.6)
Rotating torque	N•m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Axial end play	mm (in)	0.1 (0.004) or less
Tie-rod inner ball joint		
Swinging force*	N (kg, lb)	15.7 - 140.2 (1.6 - 14.3, 3.5 - 31.5)
Axial end play	mm (in)	0.3 (0.012) or less
Tie-rod standard length "L"	mm (in)	158.2 (6.23)

*: Measuring point

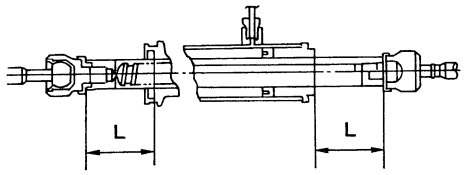


SST371B

Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE (Cont'd)

Steering gear type	PR26K
Rack stroke "L" mm (in)	66 (2.60)



SST086B

Pinion gear preload without gear fluid N•m (kg-cm, in-lb)	
Lock to lock	
Average rotating torque	0.78 - 1.27 (8.0 - 13.0, 6.9 - 11.3)
Within ±100° from the neutral position	
Maximum torque variation	0.4 (4, 3.5)
Outside the above range	
Maximum torque variation	0.6 (6, 5.2)

POWER STEERING

Rack sliding force N (kg, lb)	
Under normal operating oil pressure	118 - 235 (12 - 24, 26 - 53)
Retainer adjustment	
Adjusting screw	
Initial tightening torque N•m (kg-cm, in-lb)	14.7 (150, 130)
Returning angle degree	30°
Steering wheel turning force (Measured at one full turn from the neutral position) N (kg, lb)	39 (4, 9) or less
Fluid capacity (Approximate) ℓ (US qt, Imp qt)	0.9 (1, 3/4)
Oil pump maximum pressure kPa (kg/cm^2, psi)	7,649 - 8,238 (78 - 84, 1,109 - 1,194)

SECTION BF

CONTENTS

CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

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".

★ **For conventional seat belt, refer to MA section ("Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters", "CHASSIS AND BODY MAINTENANCE").**

Precautions

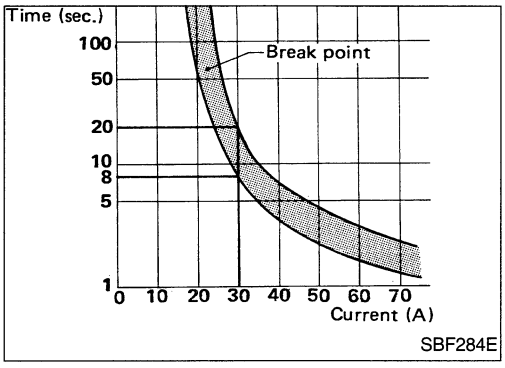
- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removing or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing 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 control module, 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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**



Circuit Breaker Inspection

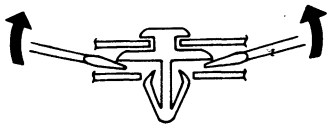
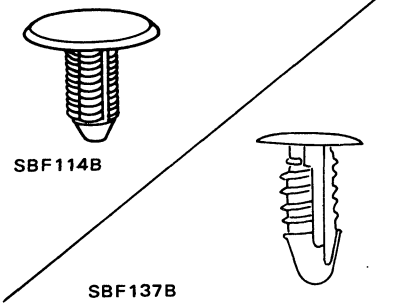
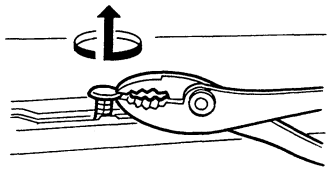
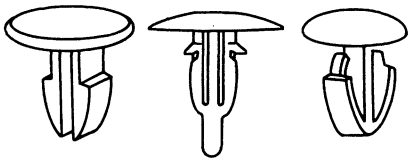
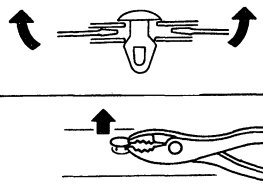
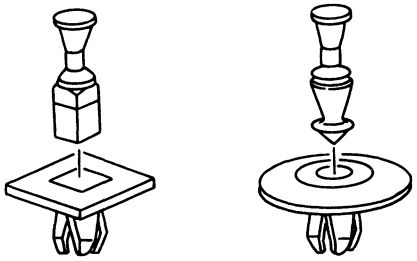
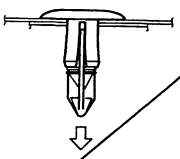
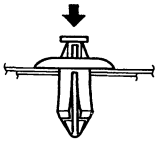
For example, when current is 30A, the circuit is broken within 8 to 20 seconds.

Circuit breakers are used in the following systems.

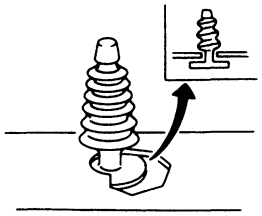
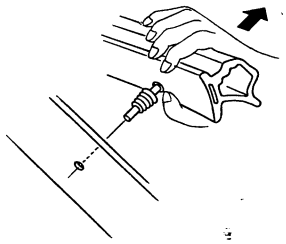
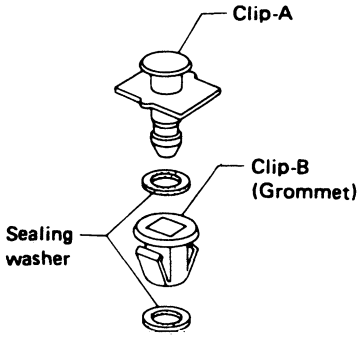
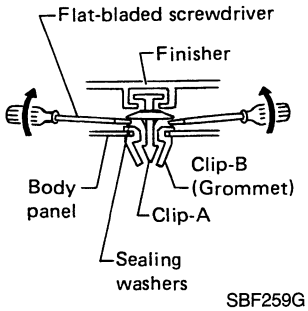
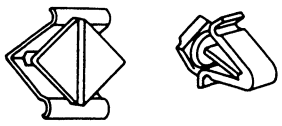
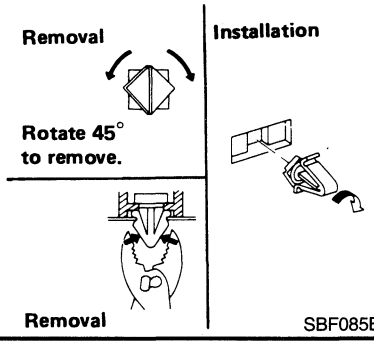
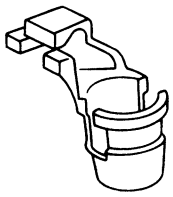
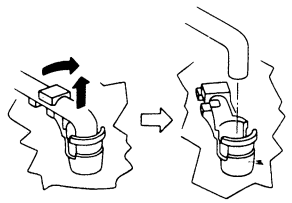
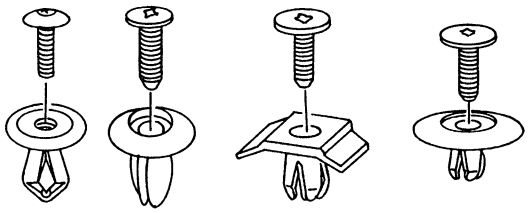
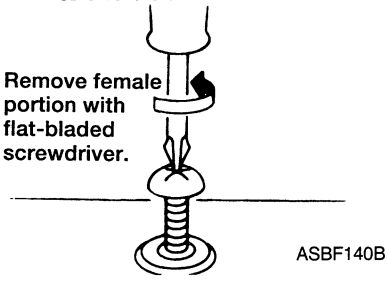
- Power window & power door lock
- Automatic seat belt
- Power sun roof

Clip and Fastener

- Clips and fasteners in BF section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

Symbol No.	Shapes	Removal & Installation
C101	 SBF256G	**Removal:** **Remove by bending up with flat-bladed screwdrivers.**  SBF367B
C102	 SBF114B SBF137B 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
CE103	 SBF104B	**Removal:**  SBF147B
CF118	 SBF151D	**Removal:**  SBF259G
CG101	 SBF145B	**Removal** **Installation**  SBF085B
CR103	 SBF768B	**Removal:** **Holder portion of clip must be spread out to remove rod.**  SBF770B
CS101	 SBF260G	**Removal:** **Screw out with a Phillips screwdriver.**  ASBF140B

Body Front End

- Bumper fascia: It is made of plastic, so do not use excessive force and take care to keep oil away from it.
- Hood adjustment: Adjust at hinge portion.
- Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism.
- Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.

REMOVAL — Front bumper assembly

① Remove screws and clips (C203) securing left and right fender protectors to bumper fascia.
② Remove screws securing left and right engine undercovers to bumper fascia.
③ Remove nuts securing left and right front fenders to bumper fascia.
④ Remove screws and clips (C203) securing bumper fascia to bumper reinforcement.
⑤ Extract bumper fascia.
⑥ Remove two bolts securing bumper reinforcement.

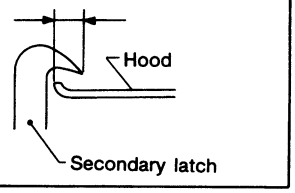
Body Front End (Cont'd)

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.

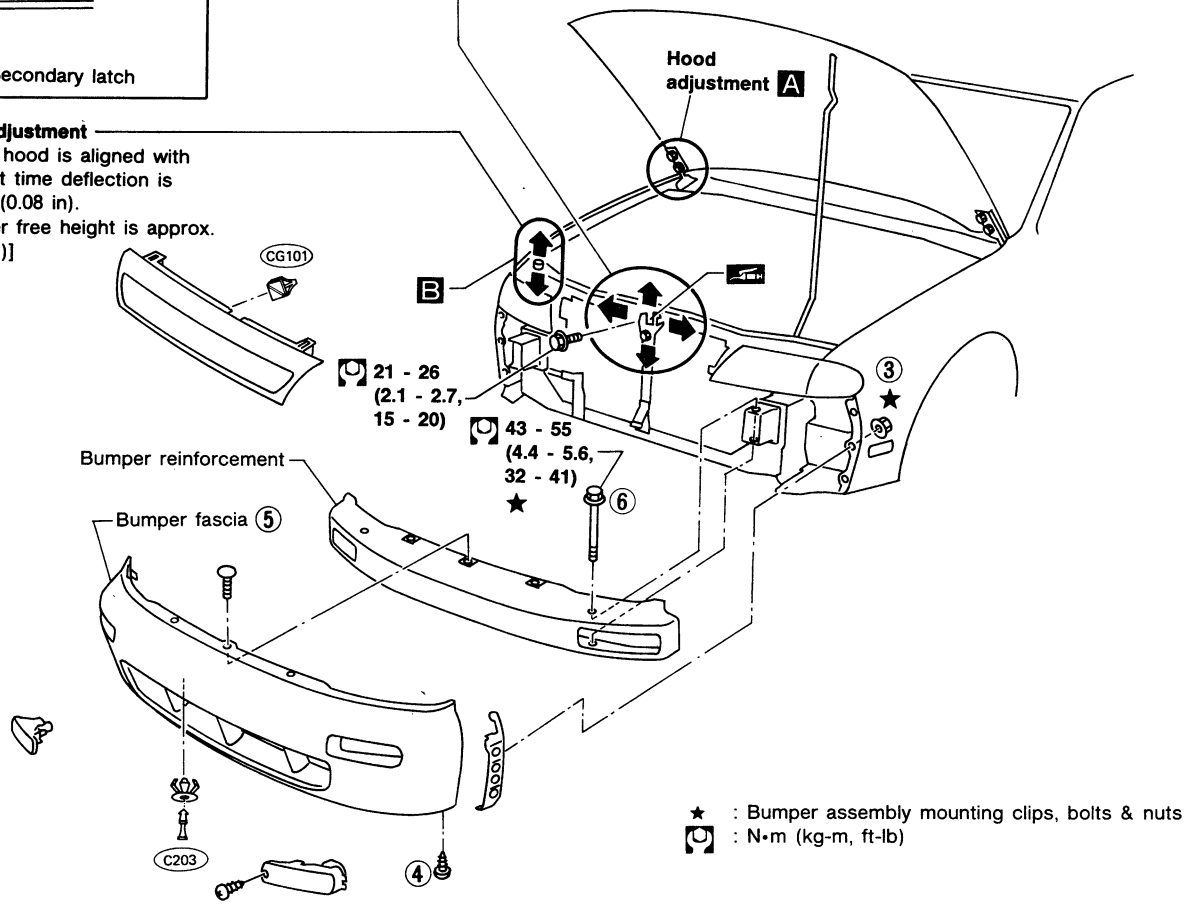
Hood lock secondary latch hooking length

More than 5.0 mm (0.197 in)

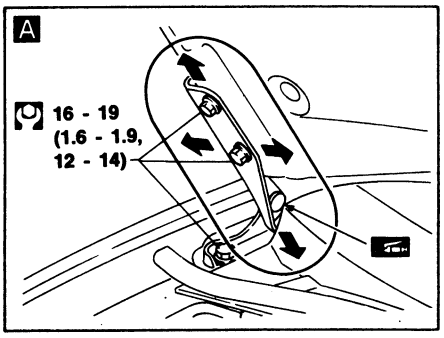


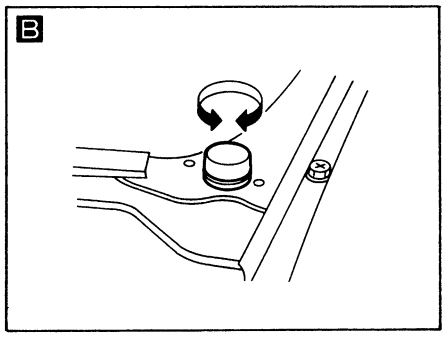
Bumper rubber adjustment

- Adjust so that hood is aligned with fender. At that time deflection is approx. 2 mm (0.08 in).
  [Bumper rubber free height is approx. 13 mm (0.51 in)]



★ : Bumper assembly mounting clips, bolts & nuts
: N•m (kg-m, ft-lb)





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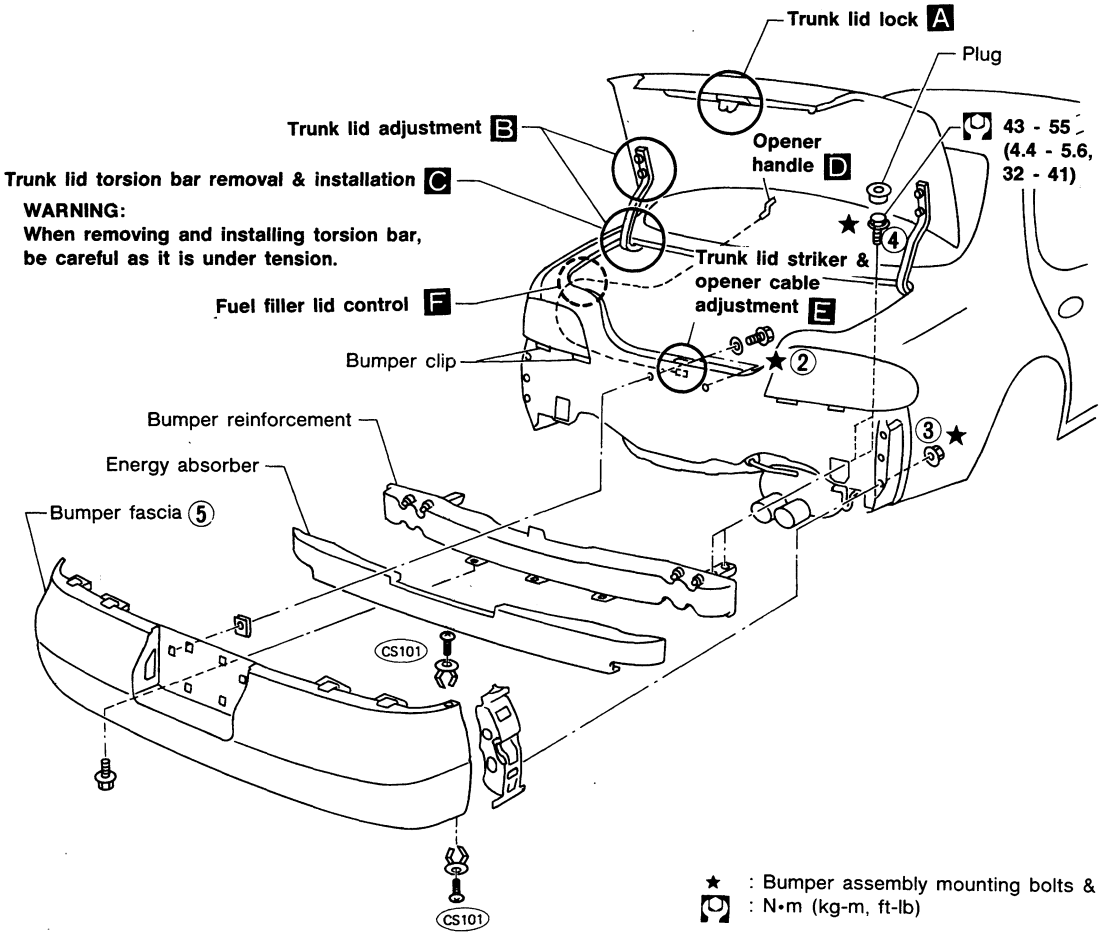
Body Rear End and Opener

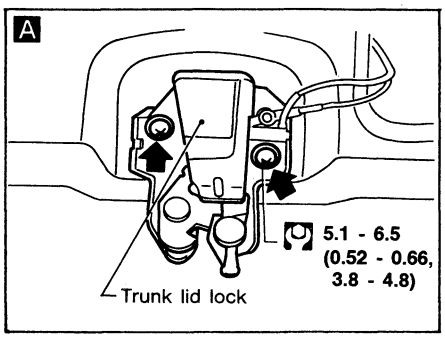
- Trunk lid adjustment: Adjust at hinge-trunk lid portion for proper trunk lid fit.
- Trunk lid lock system adjustment: Adjust striker so that it is in the center of the lock. After adjustment, check trunk lid lock operation.
- Opener cable: Do not attempt to bend cable using excessive force.
- After installing/adjusting opener, make sure that trunk lid and fuel filler lid open.

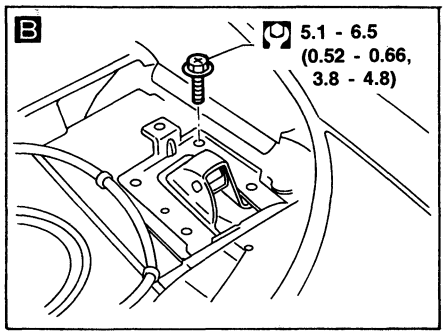
REMOVAL — Rear bumper assembly

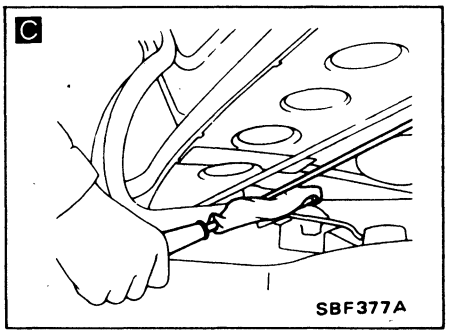
① Remove luggage room trim. Refer to BF-29.
② Remove the two bolts from inside of trunk room.
③ Working inside trunk, remove nuts securing left and right rear fenders to bumper fascia.
④ Working inside trunk, remove left and right plugs from floor, then remove the four bolts.
⑤ Extract bumper assembly.

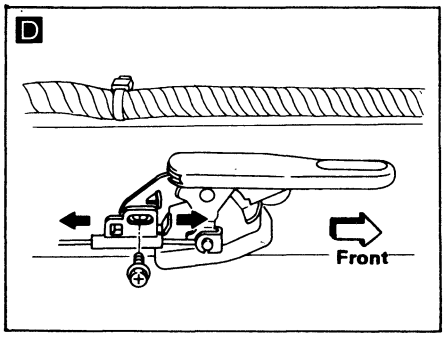


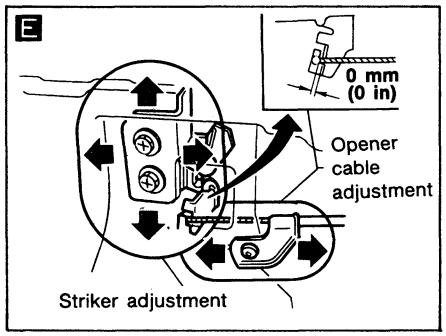
Body Rear End and Opener (Cont'd)

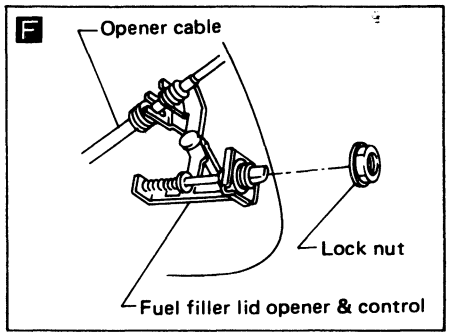










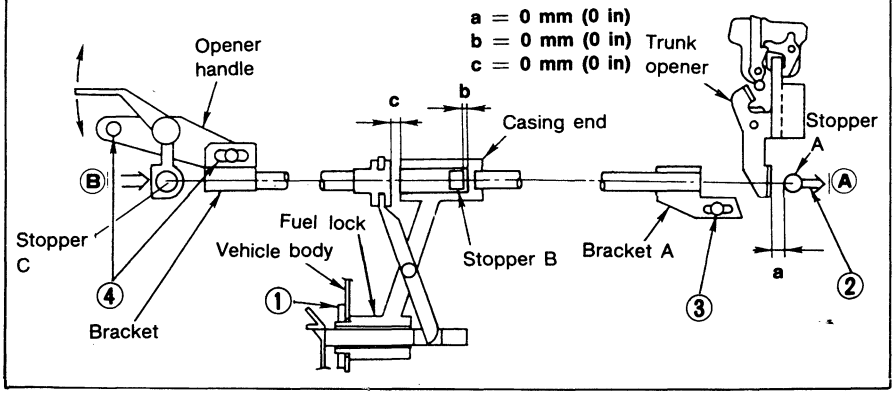


Trunk lid and fuel filler lid opener installation

Installation (Refer to figure below)

① Temporarily route cable and secure fuel lock to vehicle body.
② Lightly pull stopper A (at cable end) in direction Ⓐ to eliminate clearance **b** between stopper B and casing end.
③ Secure bracket A to vehicle body so that clearance **a** between stopper A and trunk striker is 0 mm (0 in). (At this point, do not pull striker lever.)
④ Attach stopper C to handle. While lightly pushing cable in direction Ⓑ shown by arrow (do not allow any clearance **c** at fuel lock casing end to occur), secure handle to vehicle body.

Ensure that clearances a and b are eliminated after installation.



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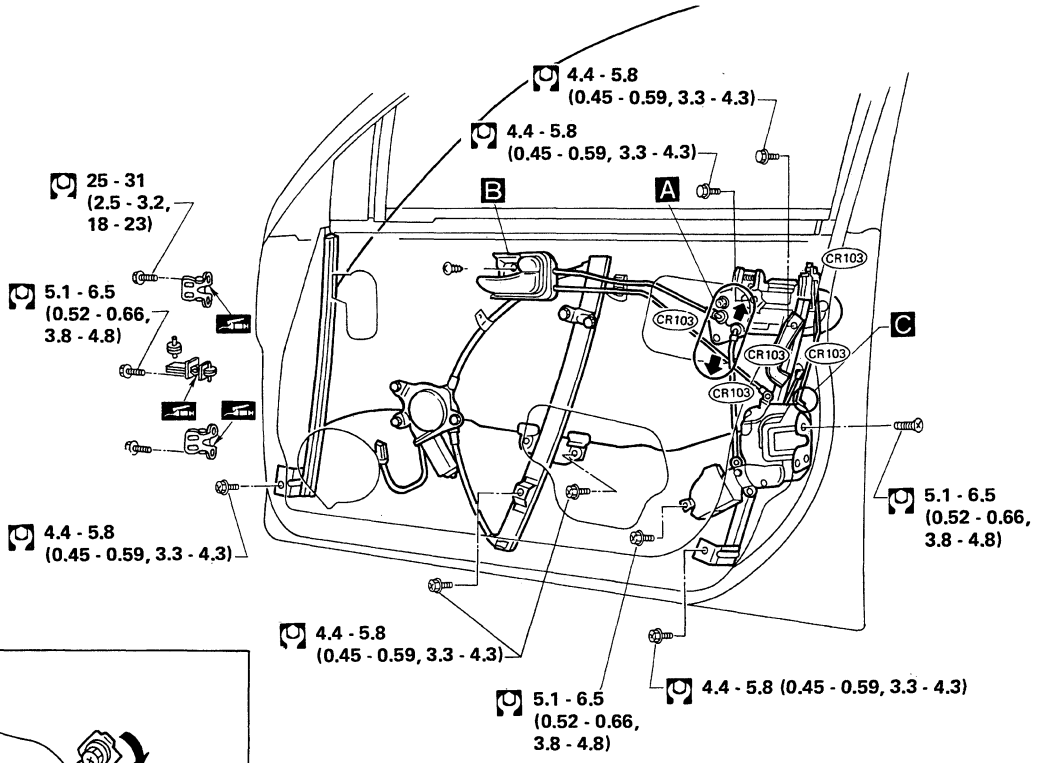
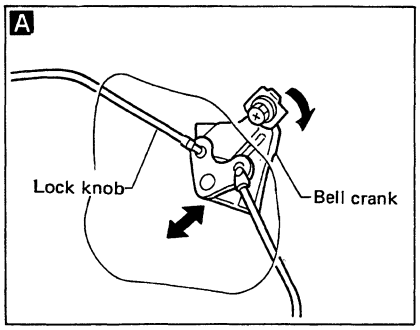
Front Door

- When removing door, be sure not to scratch vehicle body.
- After adjusting door or door lock, check door lock operation.

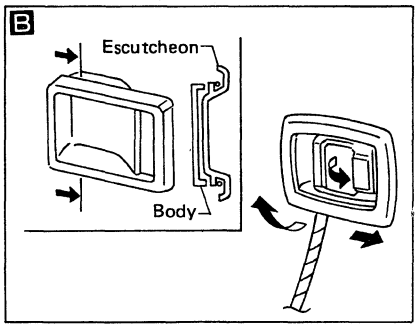




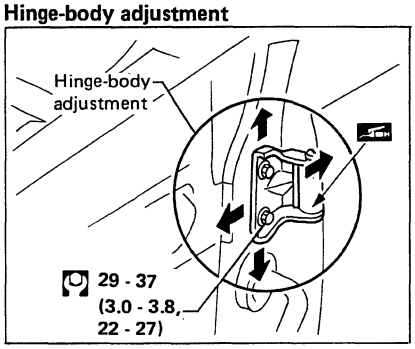
Bell crank adjustment

Lock door after setting door lock assembly and inside handle in position.

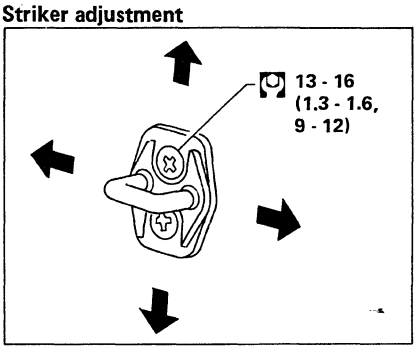
Move bell crank in direction of arrow (shown in figure at left) to take up knob free play, and secure with bolts.



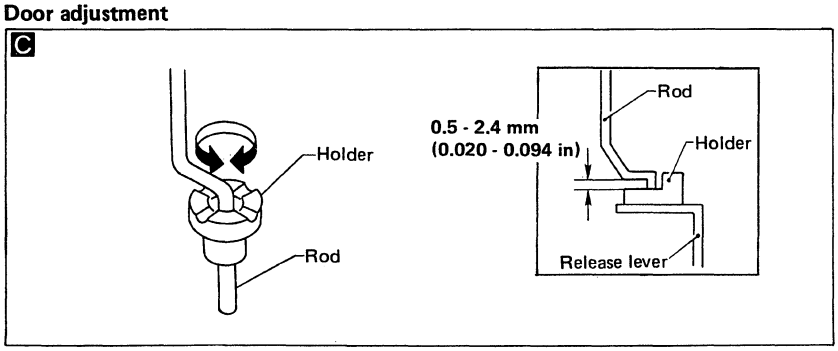
Hinge-body adjustment



Striker adjustment



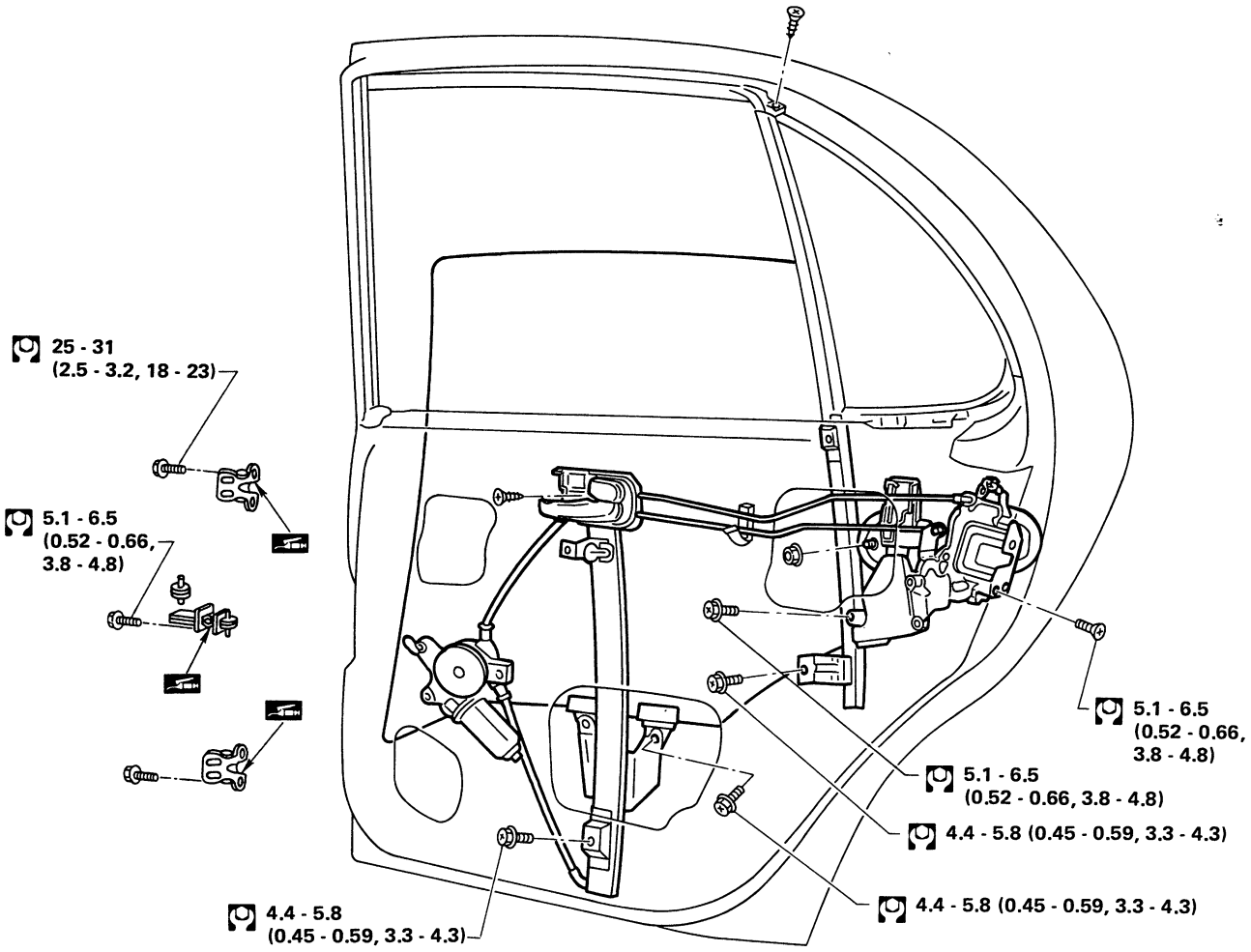
Door adjustment



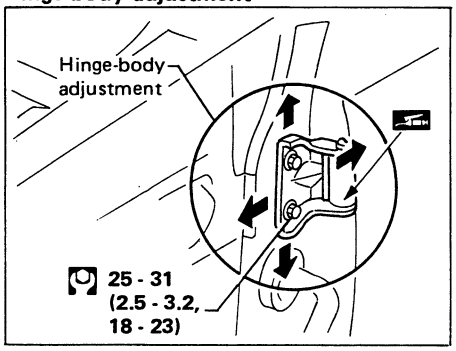
: N·m (kg-m, ft-lb)

MBF553A

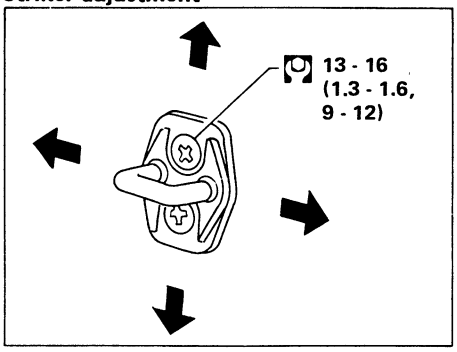
Rear Door



Hinge-body adjustment



Striker adjustment



: N·m (kg-m, ft-lb)

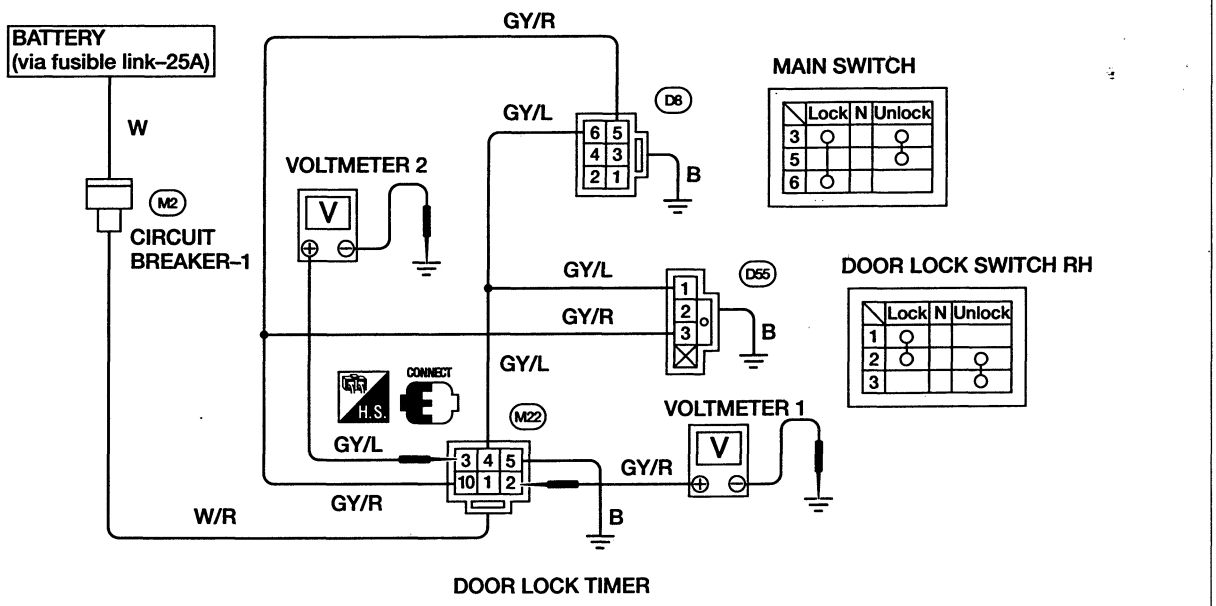
MBF555A

Power Window and Power Door Lock

DOOR LOCK TIMER

- Carry out the inspections below.

(1) Power source and ground: Battery voltage should exist between terminals ① and ⑤.
(2) Input signals: Continuity should exist between terminals ④, ⑩, and ground in "ON" condition, and should not exist in "OFF" condition.
(3) Output signals: Voltage shown in the chart should exist.



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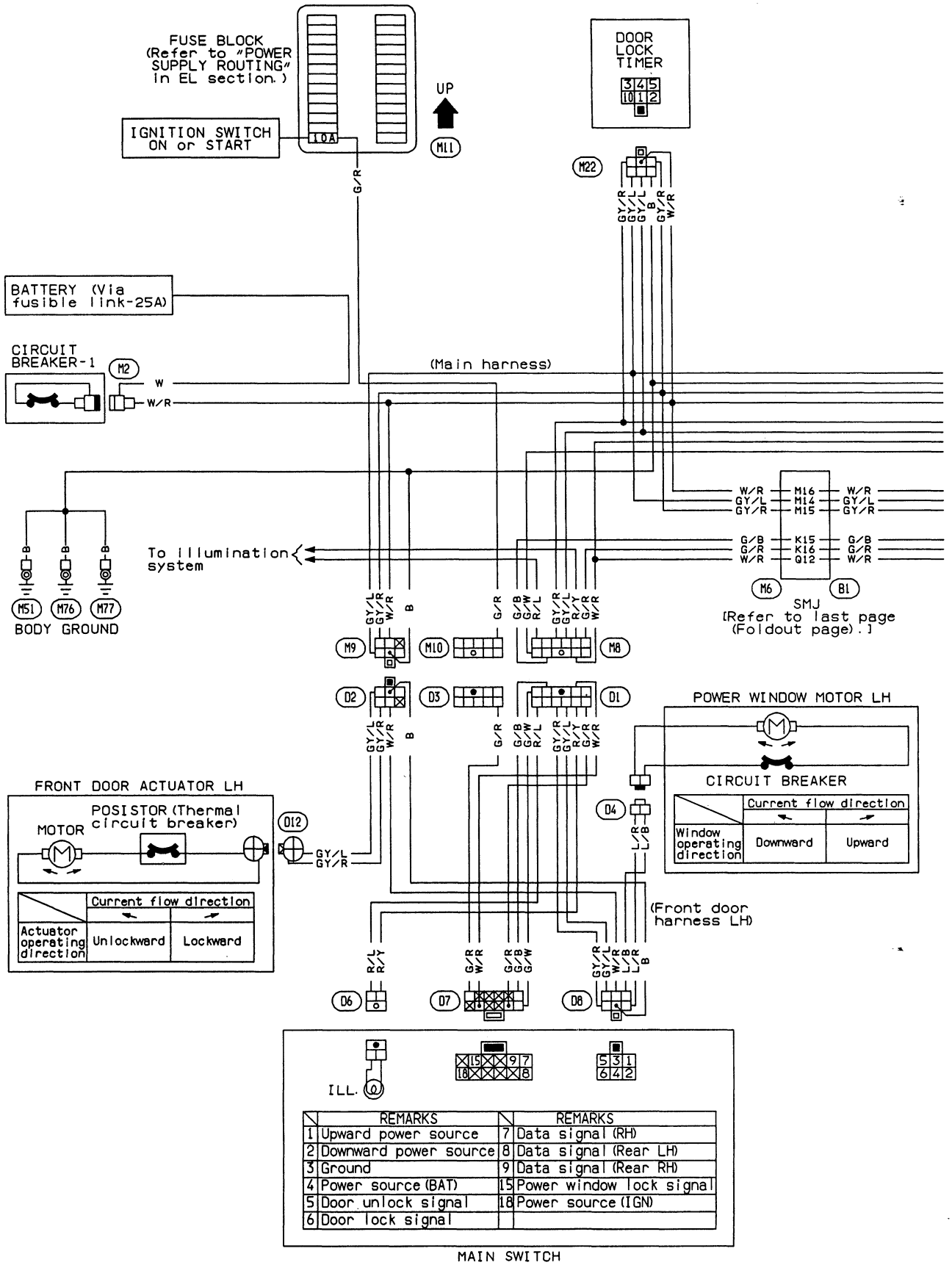
- Carry out the complete inspection in the chart from left to right.

	Connections		Operations		
			Main switch/door lock switch RH		
			N	Unlock	Lock
1	Power source		12V	12V	12V
5	Ground		Ground	Ground	Ground
4	Input signal	Main switch/door lock switch RH (Input signal for lock)	OFF	OFF	ON
10		Main switch/door lock switch RH (Input signal for unlock)	OFF	ON	OFF
2	Output signal	Door lock actuator (Lock power source) VOLTMETER 1	0V	0V	12V (Approx. 1.0 sec.) → 0V
3		Door lock actuator (Unlock power source) VOLTMETER 2	0V	12V (Approx. 1.0 sec.) → 0V	0V

Power Window and Power Door Lock (Cont'd)

WIRING DIAGRAM



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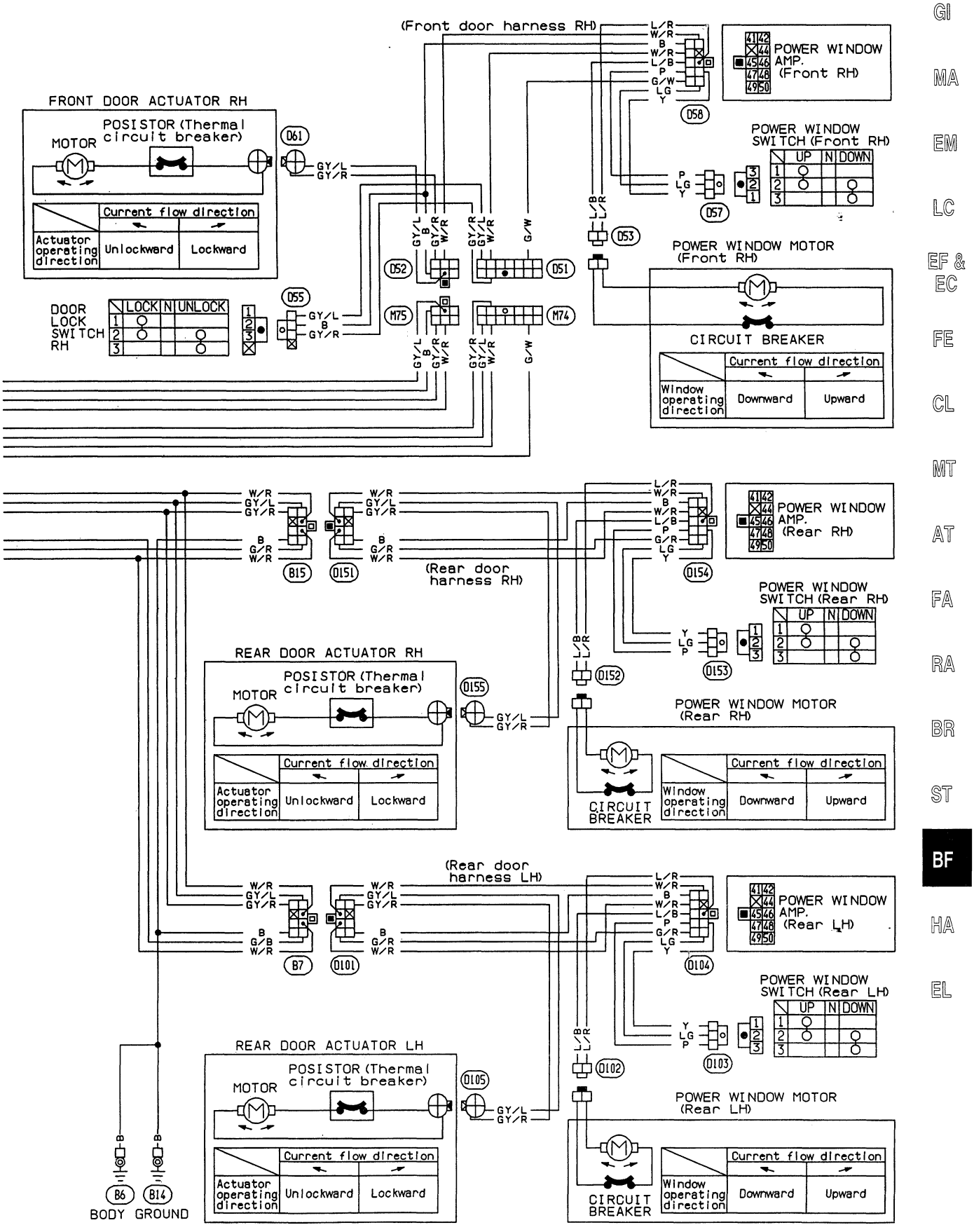
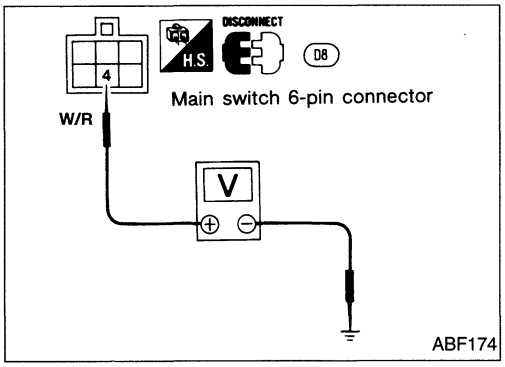

(Front door harness RH)
FRONT DOOR ACTUATOR RH
POSISTOR (Thermal circuit breaker)
MOTOR
Current flow direction
Actuator operating direction
Unlockward
Lockward
DOOR LOCK SWITCH RH
LOCK
UNLOCK
POWER WINDOW AMP. (Front RH)
POWER WINDOW SWITCH (Front RH)
UP
DOWN
POWER WINDOW MOTOR (Front RH)
CIRCUIT BREAKER
Window operating direction
Downward
Upward
(Rear door harness RH)
POWER WINDOW AMP. (Rear RH)
POWER WINDOW SWITCH (Rear RH)
REAR DOOR ACTUATOR RH
POWER WINDOW MOTOR (Rear RH)
(Rear door harness LH)
POWER WINDOW AMP. (Rear LH)
POWER WINDOW SWITCH (Rear LH)
REAR DOOR ACTUATOR LH
POWER WINDOW MOTOR (Rear LH)
BODY GROUND

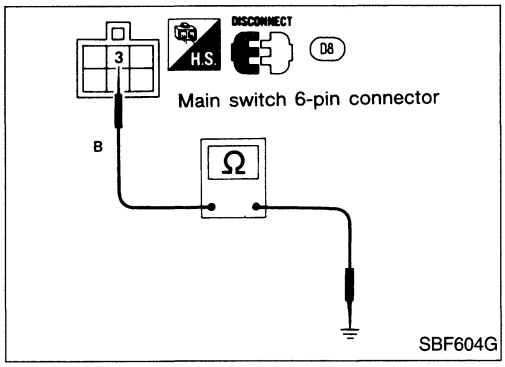
MBF627A

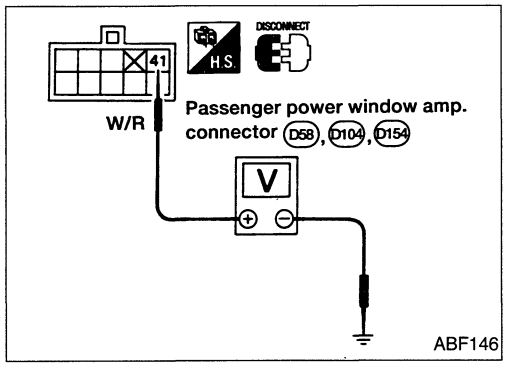
Since left and right component parts are basically the same, harness layout and methods for electrical components inspection are shown for one side only.
Although methods for checking component parts on both sides are described in the flow chart, making it easier to troubleshoot, apply checking procedures to either side that have malfunction during trouble diagnoses.

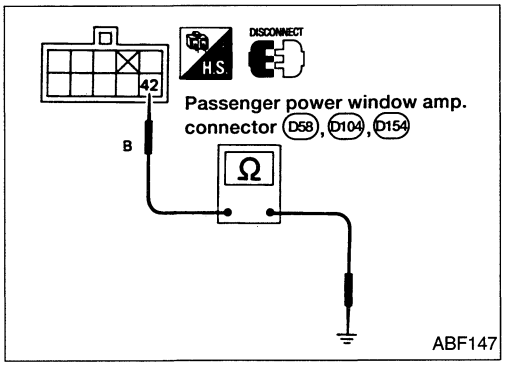
Symptom Chart

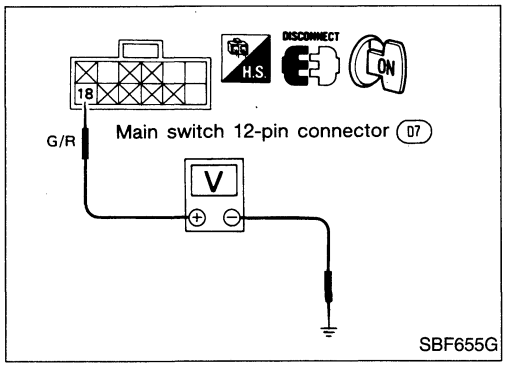
Procedure	Main Power Supply and Ground Circuit Check			Diagnostic Procedure				Electrical Components Inspection		Remarks
Reference Page	BF-15	BF-15	BF-15	BF-18	BF-19	BF-20	BF-21	BF-22	BF-22	—
SYMPTOM	Procedure 1	Procedure 2	Procedure 3	Procedure 1	Procedure 2	Procedure 3	Procedure 4	Power window motor(s)	Power window switch(es)	—
None of the power windows can be operated.	○		○	○	○	○	○	○	○	—
Driver side power window cannot be operated but other windows can be operated.				○				○		—
Passenger power windows cannot be operated.		○			○	○		○	○	—
Passenger power windows cannot be operated by main switch but can be operated by passenger's switches.	○						○			—











Main Power Supply and Ground Circuit Check

PROCEDURE 1

Main power supply

Terminals	Battery positive voltage existence
④ - Ground	Yes

Ground circuit

Terminals	Continuity
③ - Ground	Yes

PROCEDURE 2

Power supply for power window amp. (front and rear passengers)

Terminals	Battery positive voltage existence
㊶ - Ground	Yes

Ground circuit for power window amp. (front and rear passengers)

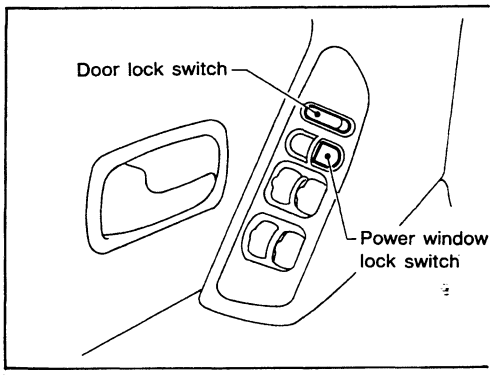
Terminals	Continuity
㊷ - Ground	Yes

PROCEDURE 3

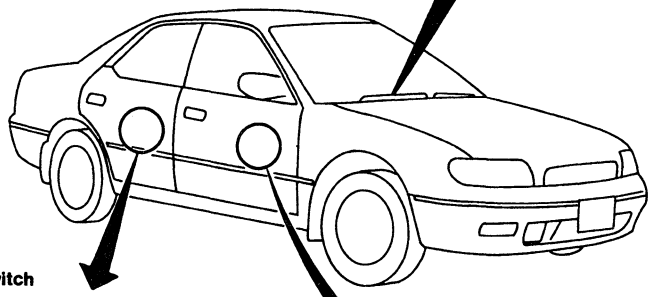
Power supply for ignition signal

Terminals	Ignition switch	Battery positive voltage existence
⑱ - Ground	ON	Yes

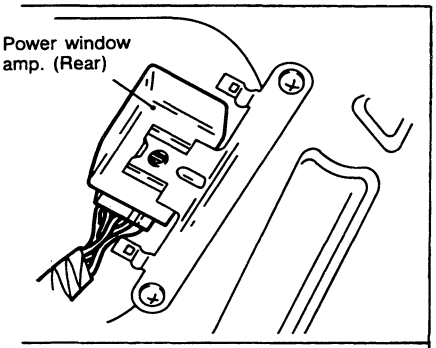
Component Layout

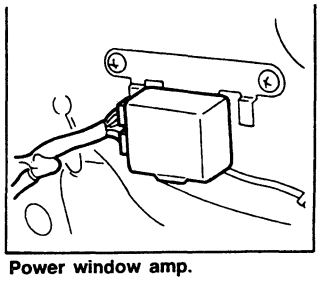


Power window main switch

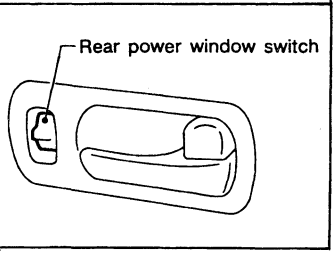


Rear power window amp. and switch

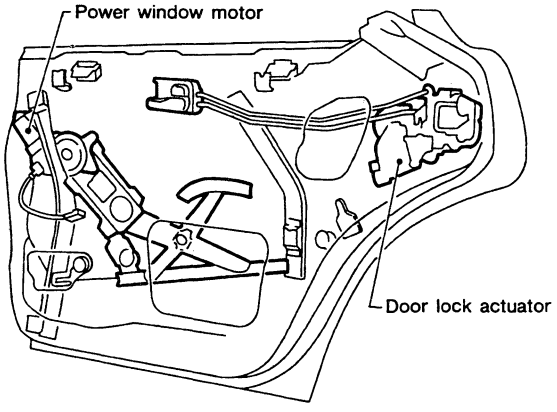




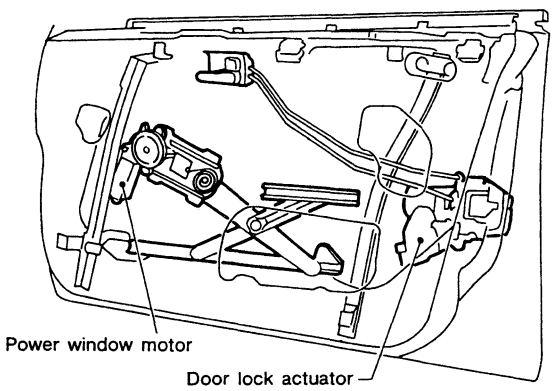
Power window amp. (Passenger side)



Rear door



Front door



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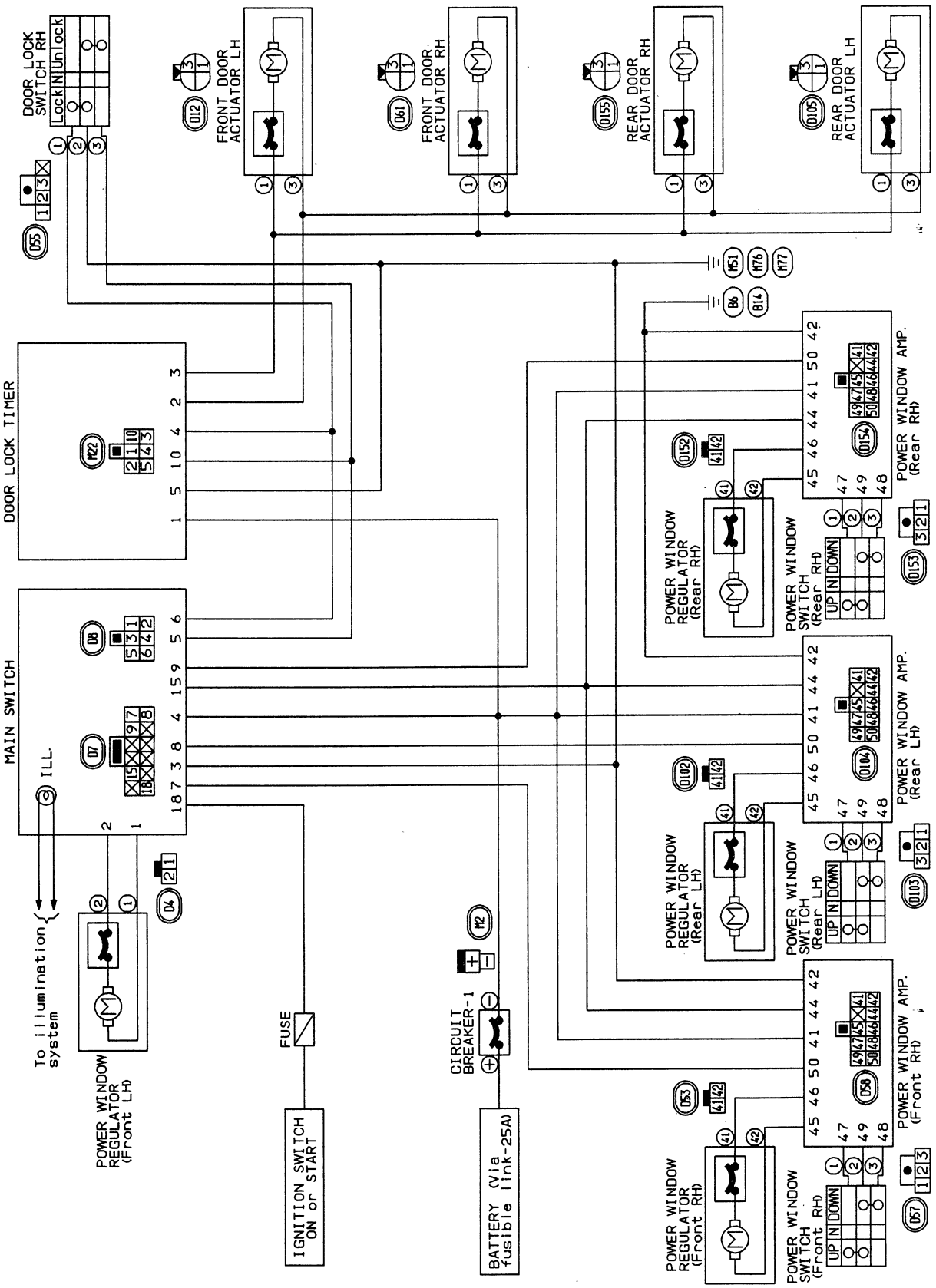
Circuit Diagram for Quick Pinpoint Check



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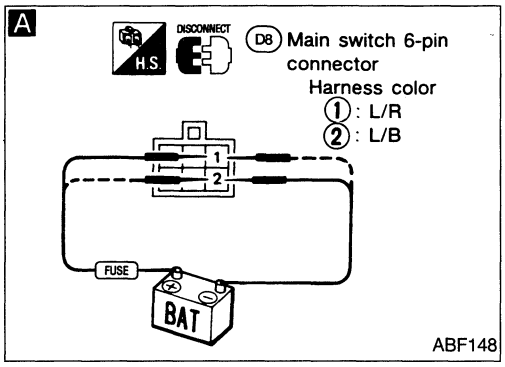
A



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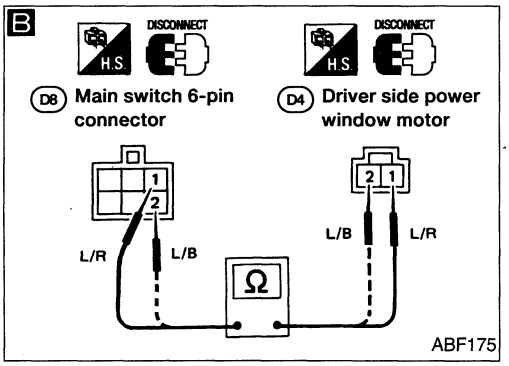

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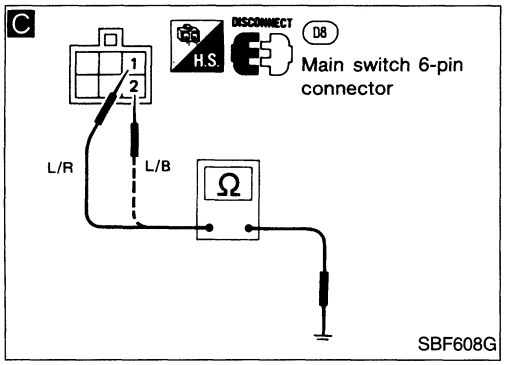


Diagnostic Procedure 1

SYMPTOM:

Driver side power window cannot be operated but other power windows can be operated.

START

A

CHECK DRIVER SIDE WINDOW MOTOR CIRCUIT.

1) Disconnect 6-pin connector from main switch.
2) Check power window operation.

Terminals		Window
⊕	⊖	
①	②	Up
②	①	Down

O.K. → Replace main switch.

N.G.

B

1) Disconnect connector from driver side power window motor.
2) Check continuity.

Terminals
① - ①
② - ②

Continuity should exist.

N.G. → Repair harness.

O.K.

C

Does continuity exist?

Terminals
① - Ground
② - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Go to POWER WINDOW MOTOR in Electrical Components Inspection. (Refer to BF-22.)

O.K. → Check system again.

N.G.

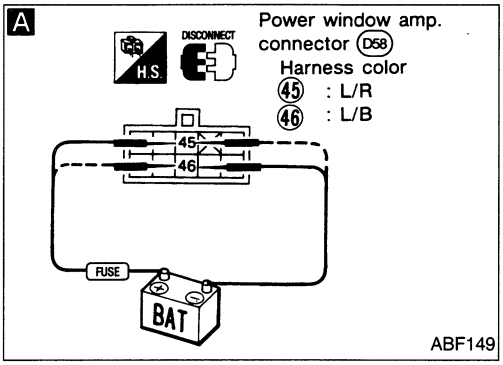
Check power window motor harness for open or short circuit.

N.G. → Repair harness.

O.K.

Replace power window motor.

A



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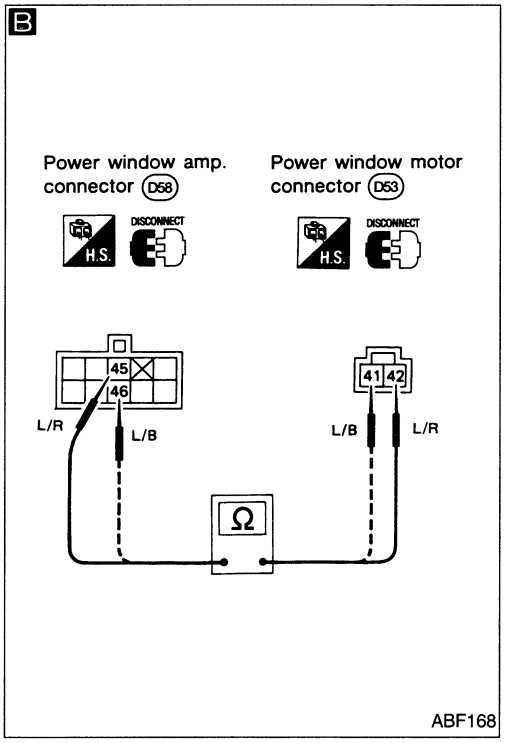

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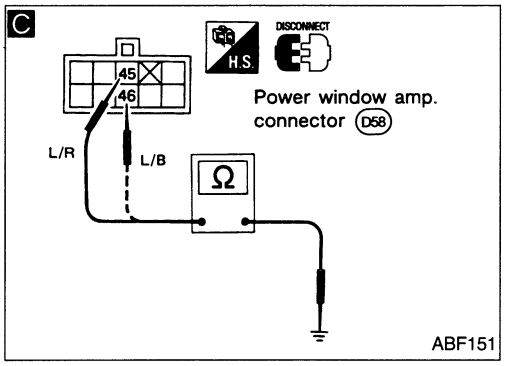


Diagnostic Procedure 2

SYMPTOM:
Passenger power windows cannot be operated by main switch and passenger switch.

START

A

CHECK PASSENGER POWER WINDOW CIRCUIT.
1) Disconnect connector from power window amp.
2) Check power window.

Terminals ⊕	Terminals ⊖	Window operation
45	46	Up
46	45	Down

O.K. → Perform Diagnostic Procedure 3. (Refer to BF-20.)

N.G.

B

1) Disconnect connector from power window motor.
2) Check continuity.

Terminals
45 - 42
46 - 41

Continuity should exist.

N.G. → Repair harness.

O.K.

C

Does continuity exist?

Terminals
45 - Ground
46 - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Go to POWER WINDOW MOTOR in Electrical Components Inspection. (Refer to BF-22.)

O.K. → Check system again.

N.G.

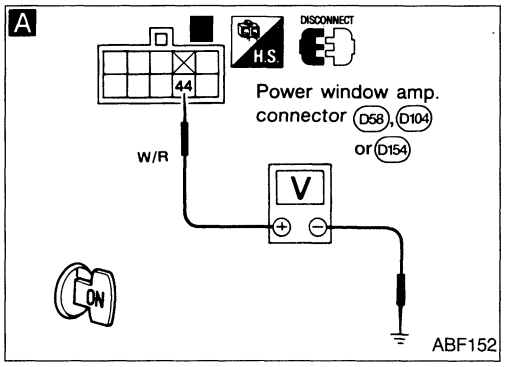
Check power window motor harness for open or short circuit.

N.G. → Repair harness.

O.K.

Replace power window motor.

A



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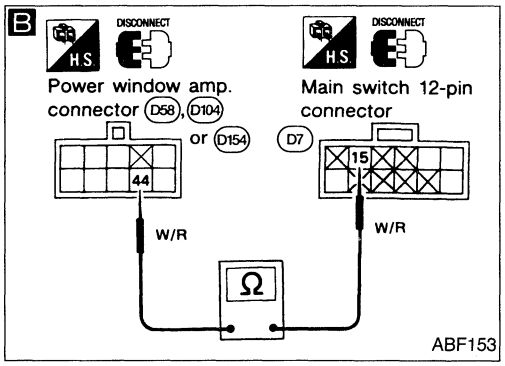

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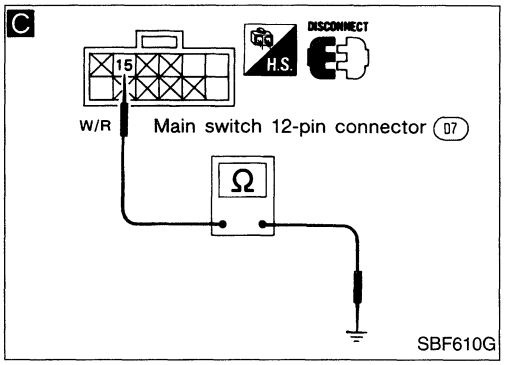
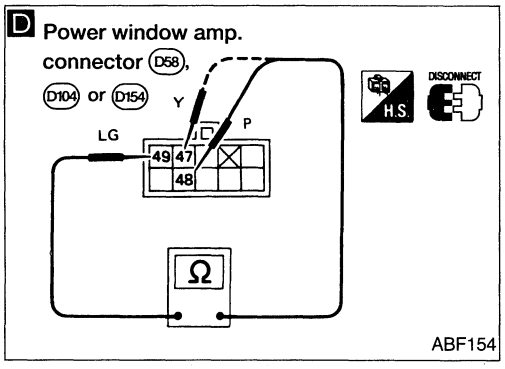


D



Diagnostic Procedure 3

SYMPTOM:

Passenger power windows cannot be operated but driver side power window can be operated.

START

A

CHECK POWER WINDOW LOCK SIGNAL CIRCUIT.
1) Disconnect connector from power window amp.
2) Check battery positive voltage between terminal (44) for each connector and ground while ignition switch is "ON".

Terminals	Power window lock switch	Battery positive voltage exists
(44) - Ground	ON	No
	OFF	Yes

O.K. → **D**

Check continuity.

Terminals	Passenger switches	Continuity
(47) - (49)	Up	Yes
	Down	No
(48) - (49)	Up	No
	Down	Yes

O.K. → Replace power window amp.

N.G. → Go to POWER WINDOW SWITCH in Electrical Components Inspection. (Refer to BF-22.)

O.K. → Repair harness between power window amp. and power window switch.

N.G. → Replace power window switch.

N.G. → Repair harness.

N.G.

B

1) Disconnect 12-pin connector from main switch.
2) Check continuity between terminal (44) for each connector and (15) for main switch connector.

Terminals
(44) - (15)
Continuity should exist.

O.K.

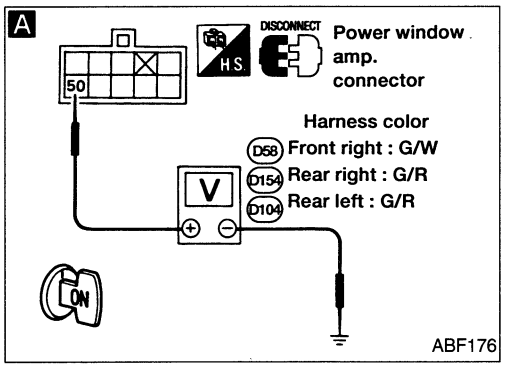
C

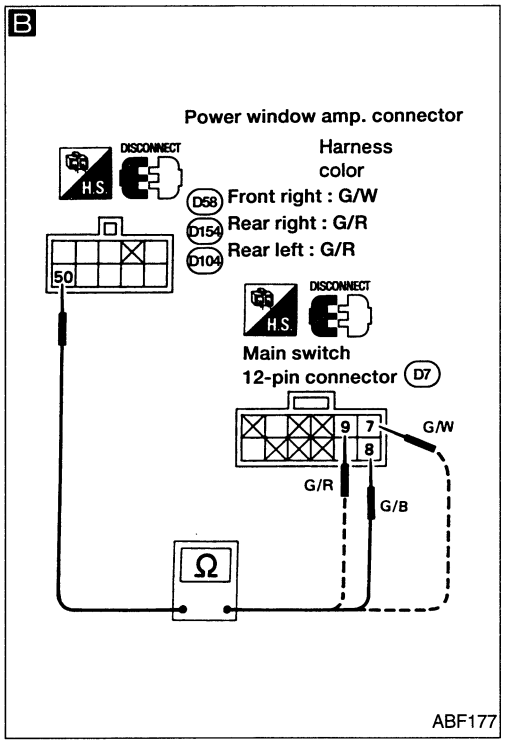
Does continuity exist?

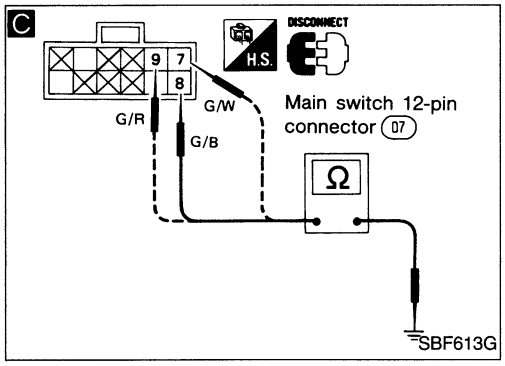
Terminals
(15) - Ground

Yes → Repair harness. There will be incorrect grounding.

No → Replace main switch.







Diagnostic Procedure 4

SYMPTOM:

Passenger power windows cannot be operated by main switch but can be operated by passenger's switches.

START

A

CHECK DATA LINE SIGNAL CIRCUIT.
1) Disconnect connectors from power window amp.
2) Check voltage while power window lock switch is "OFF".

Terminals	Main switch operation	Voltage
50 - Ground	Up	Above 12V
	Down	Approx. 4V
	No operation	Approx. 0V

O.K. → Replace switch.

N.G.

B

1) Disconnect 12-pin connector from main switch.
2) Check continuity.

	Terminals
Front right	7 - 50
Rear left	8 - 50
Rear right	9 - 50

Continuity should exist.

N.G. → Repair harness.

O.K.

C

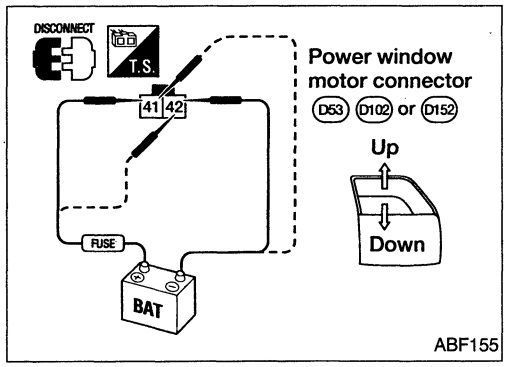
Does continuity exist?

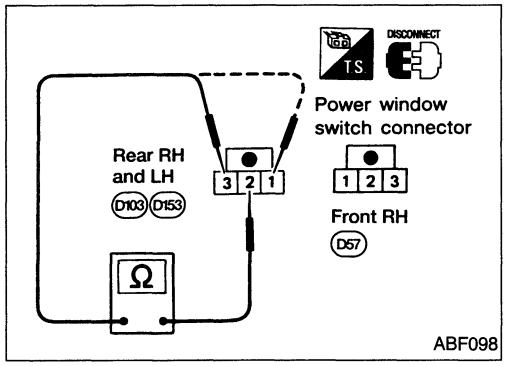
	Terminals
Front right	7 - Ground
Rear left	8 - Ground
Rear right	9 - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Replace main switch.





Electrical Components Inspection

POWER WINDOW MOTOR

Terminals		Operation
⊕	⊖	
㊶	㊷	Downward
㊷	㊶	Upward

POWER WINDOW SWITCH

Terminals	Condition	Continuity
① - ②	UP	Yes
	Down	No
② - ③	UP	No
	Down	Yes

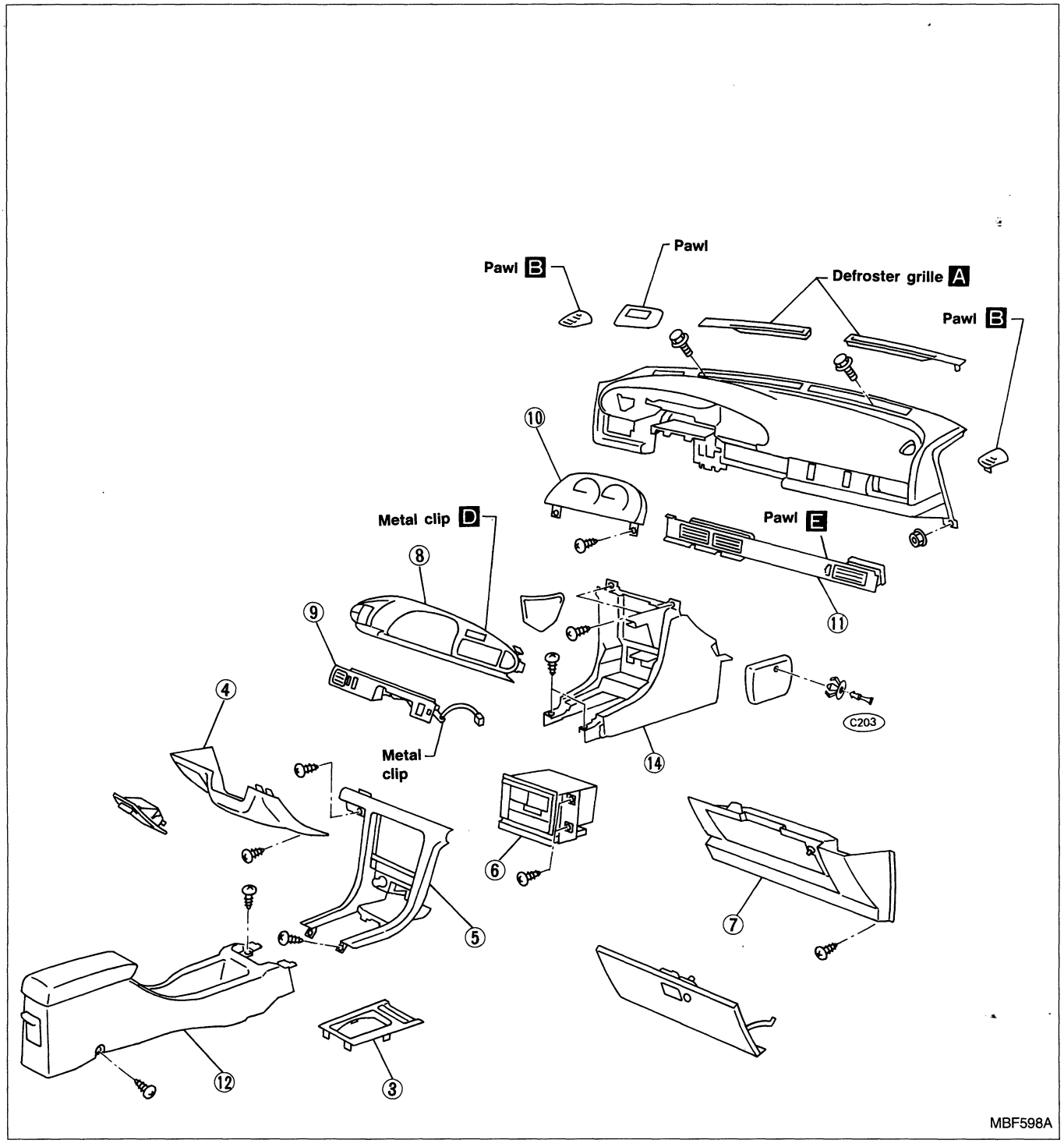
CAUTION:
a. Disconnect ground terminal from battery in advance.
b. Disconnect air bag system line in advance.
c Be careful not to scratch pad and other parts.

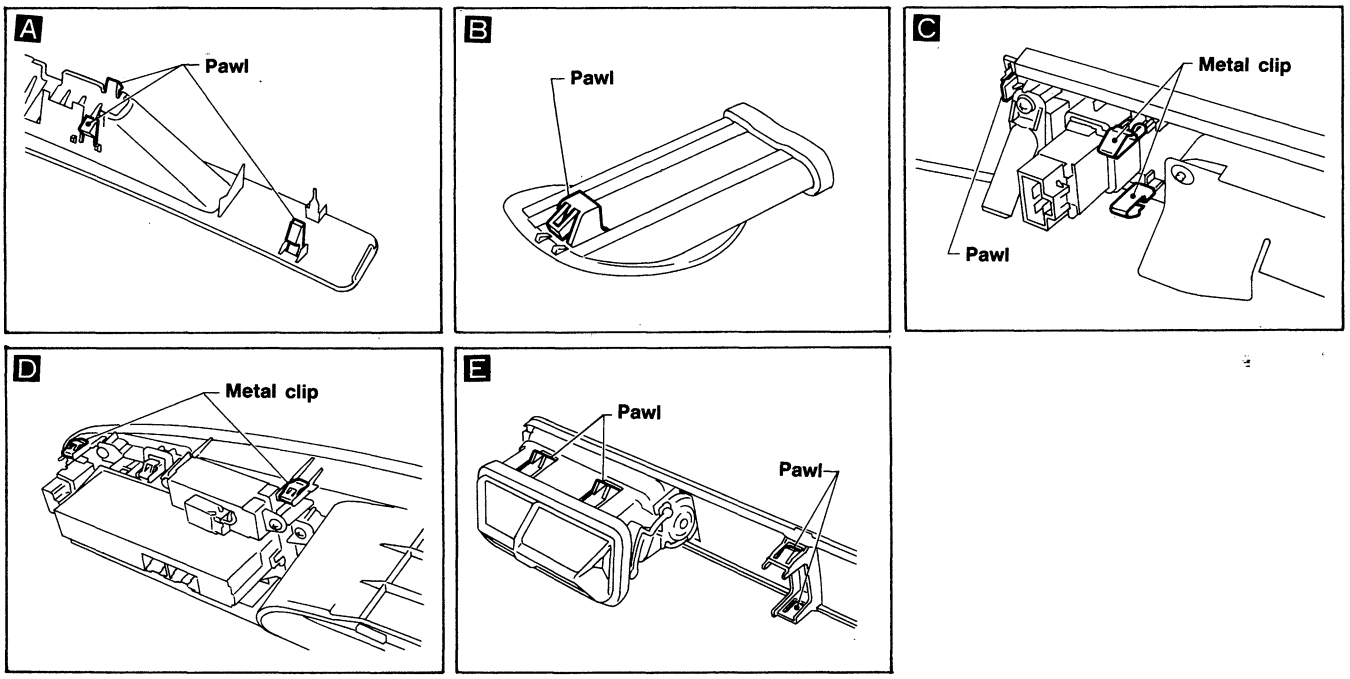
REMOVAL — Instrument panel assembly

① Remove steering wheel.
② Remove steering column cover.
③ Remove A/T finisher or shift lever boot.
④ Remove lower instrument cover on driver's side.
⑤ Remove cluster lid C.
⑥ Remove radio and deck pocket.
⑦ Remove glove box.
⑧ Remove cluster lid A.
⑨ Remove instrument finisher A.
⑩ Remove combination meter assembly.
⑪ Remove instrument finisher B.
⑫ Remove console box.
⑬ Remove instrument cover.
⑭ Remove instrument panel center.
⑮ Remove instrument panel assembly.

HEAD-UP DISPLAY (HUD)

- When removing HUD finisher, be extremely careful not to scratch HUD's reflective surface. To avoid scratching, cover HUD's reflective surface or finisher with a cloth or vinyl sheet.





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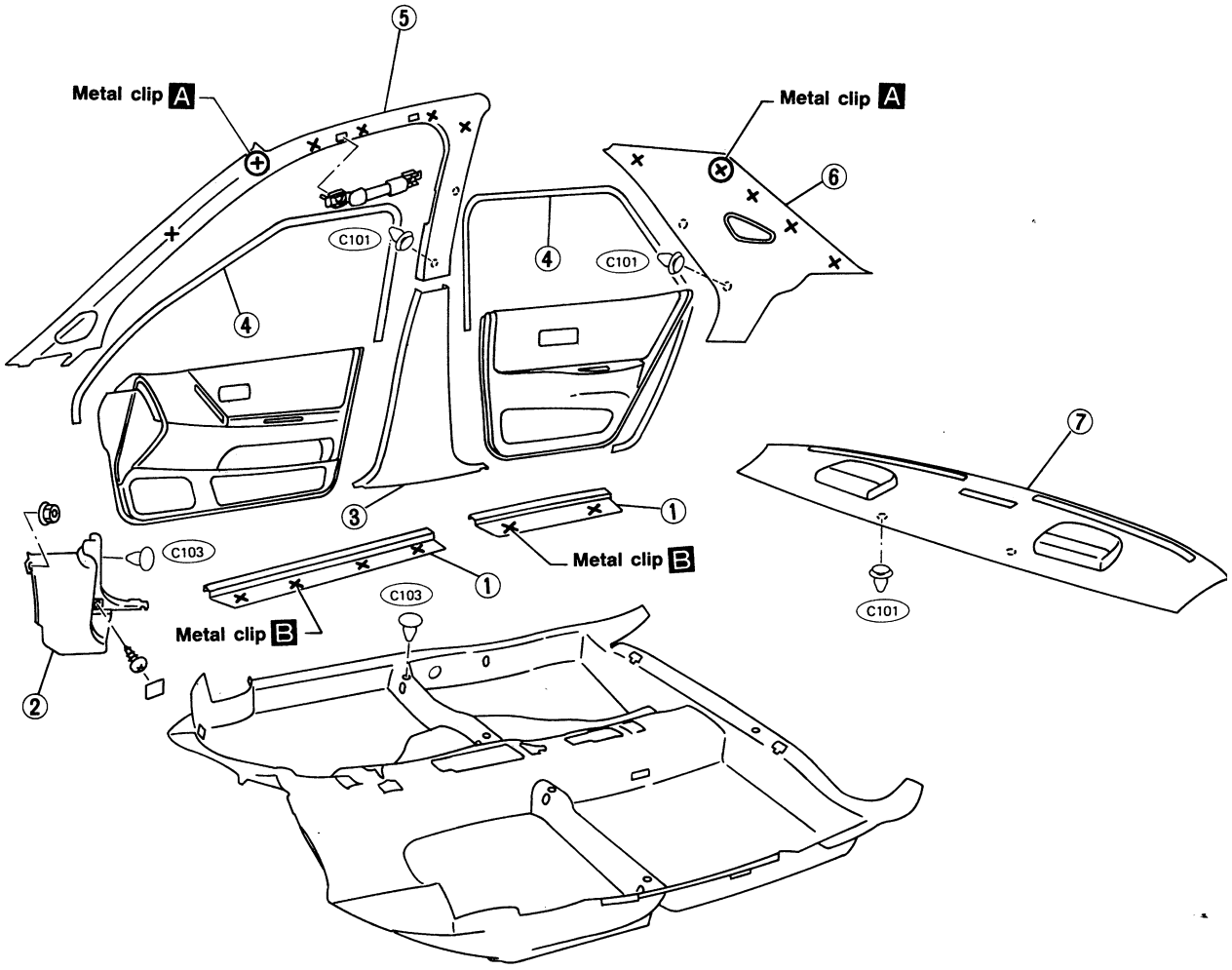
Interior

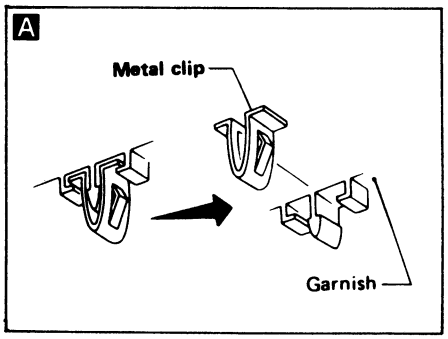
SIDE AND FLOOR TRIM

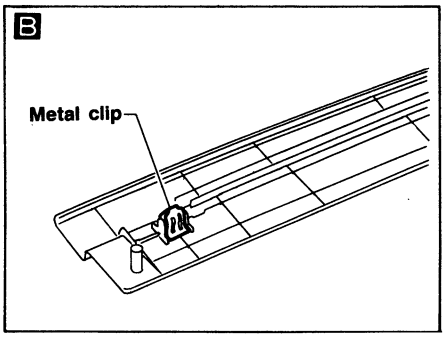
CAUTION:
Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.

REMOVAL — Body side trim

① Remove front and rear kick plates.
② Remove dash side finisher.
③ Remove center pillar lower garnish.
④ Remove front and rear body side welts.
⑤ Remove front pillar garnish.
⑥ Remove rear pillar garnish.
⑦ Remove rear parcel shelf.







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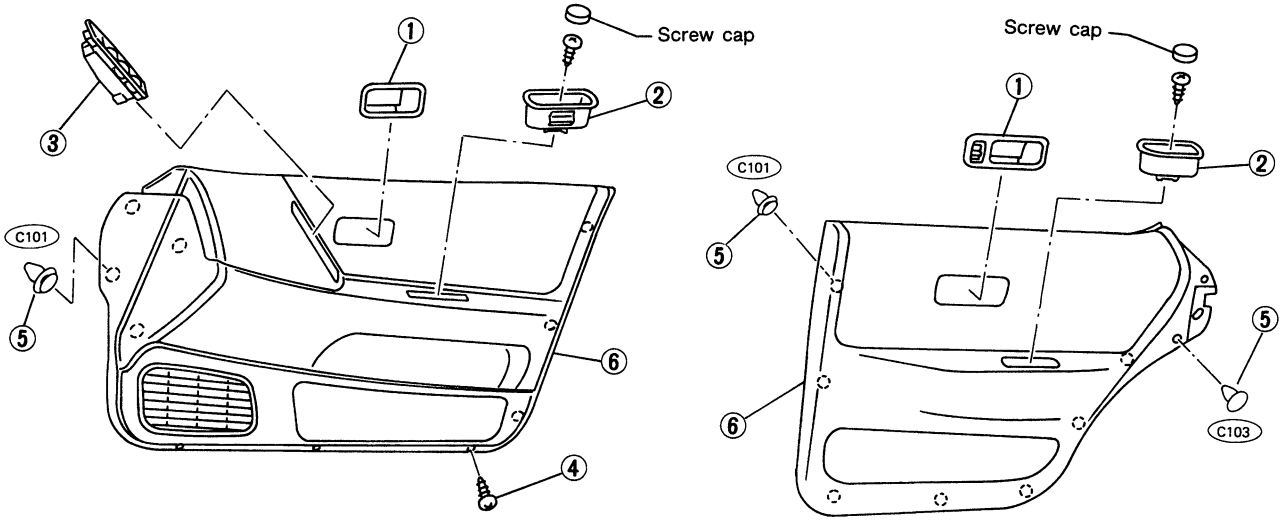
Interior (Cont'd)

DOOR TRIM REMOVAL — Door trim

① Remove inside handle escutcheon.
(Refer to BF-9.)
② Remove pull handle.
③ Remove power window switch finisher.
④ Remove screws.
⑤ Remove clips securing door finisher.
⑥ Lift out door finisher. Disconnect main and door harnesses.

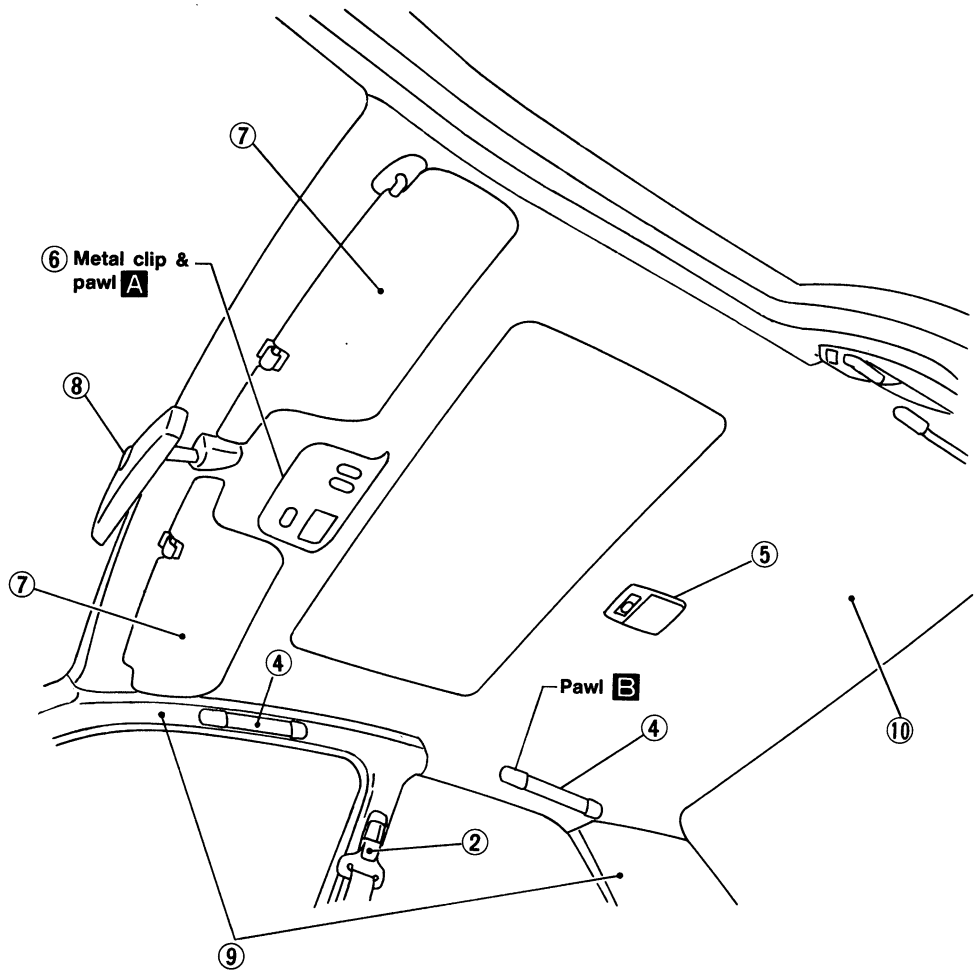


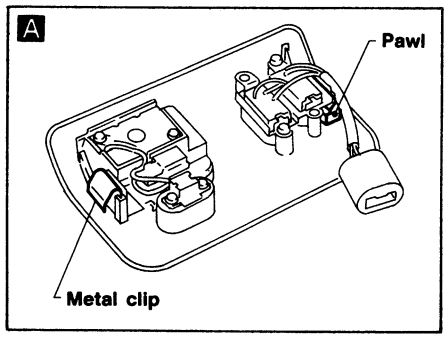
MBF600A

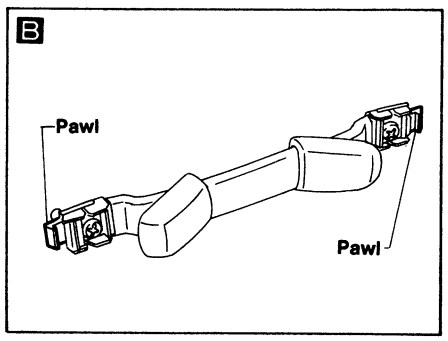
ROOM TRIM

REMOVAL — Headlining

① Remove rear seat.
② Remove front and rear seat belts.
③ Remove body side trim. Refer to BF-26.
④ Remove assist grips.
⑤ Remove interior lamp.
⑥ Remove sunroof switch. (Models equipped with sunroof)
⑦ Remove sunvisors.
⑧ Remove rearview mirror.
⑨ Remove front and rear pillar garnishes.
⑩ Remove headlining.



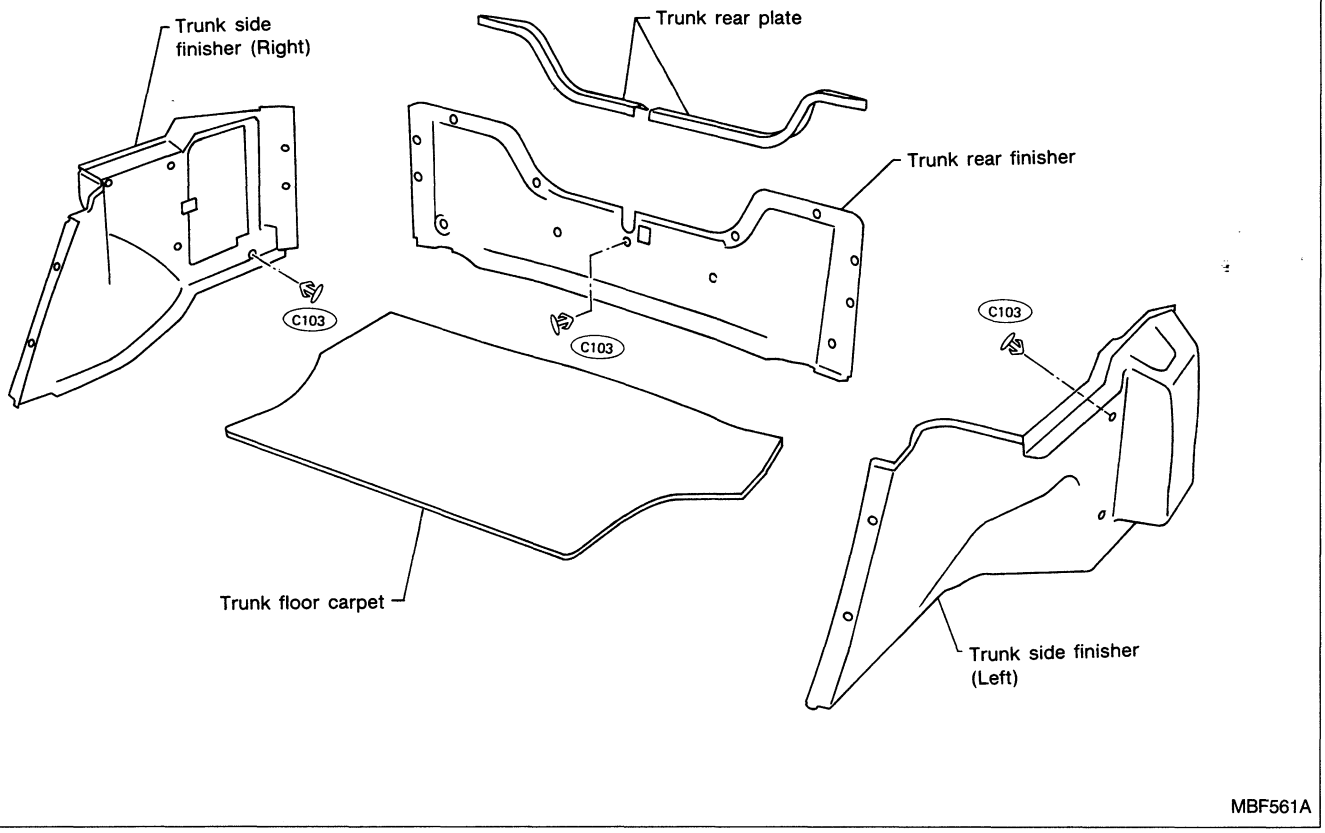




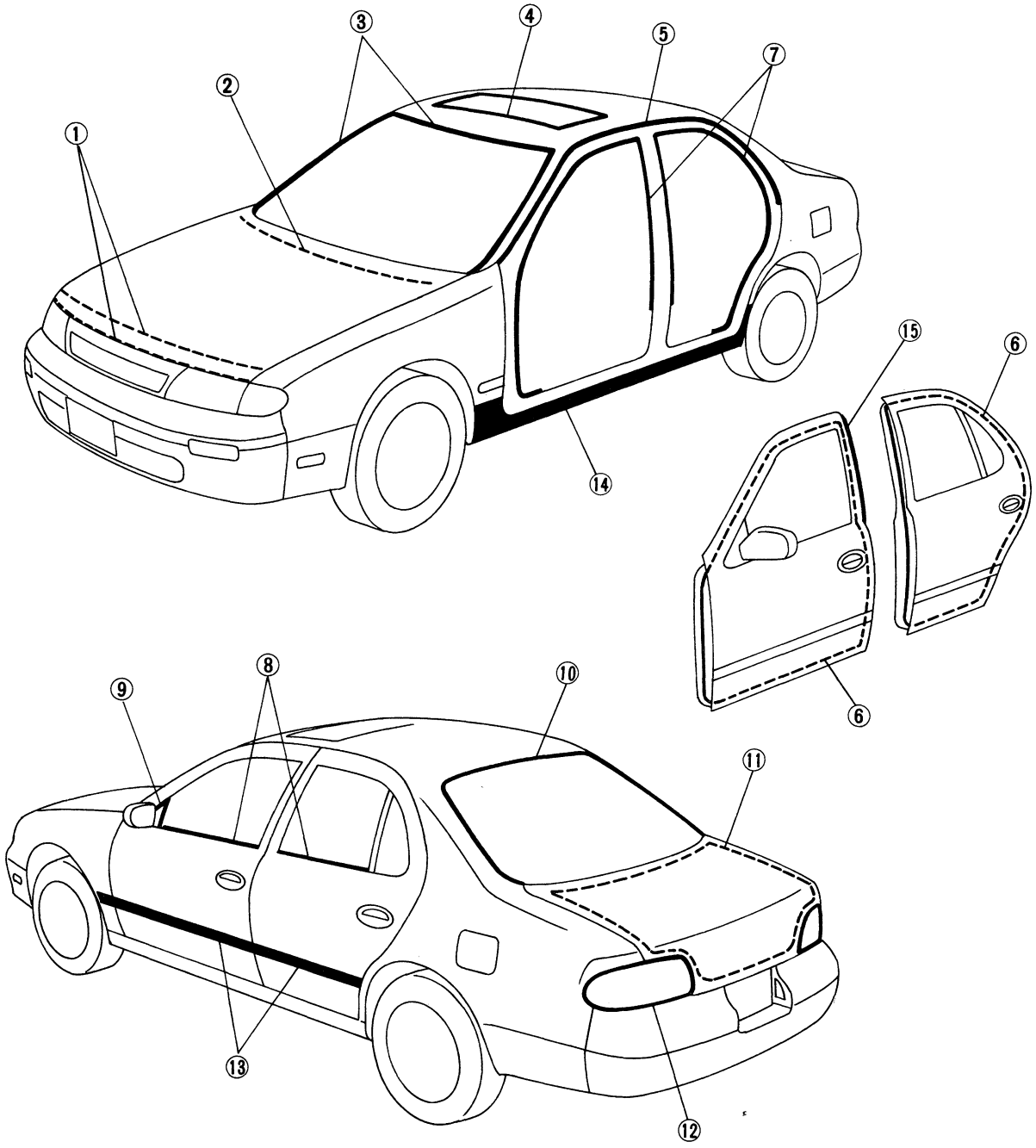
MBF601A

Interior (Cont'd)

LUGGAGE ROOM TRIM



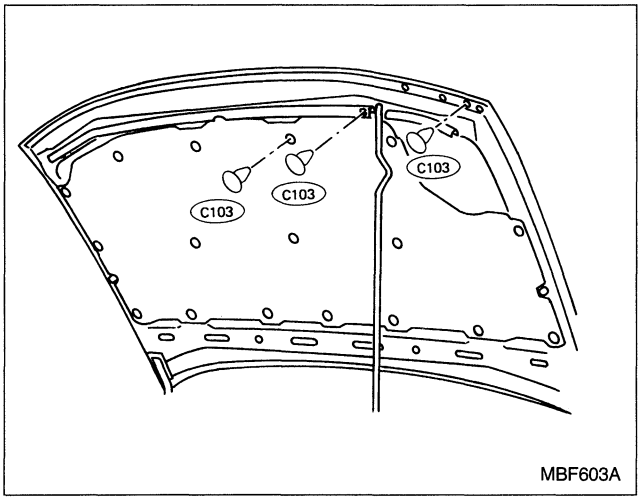
Exterior



MBF602A

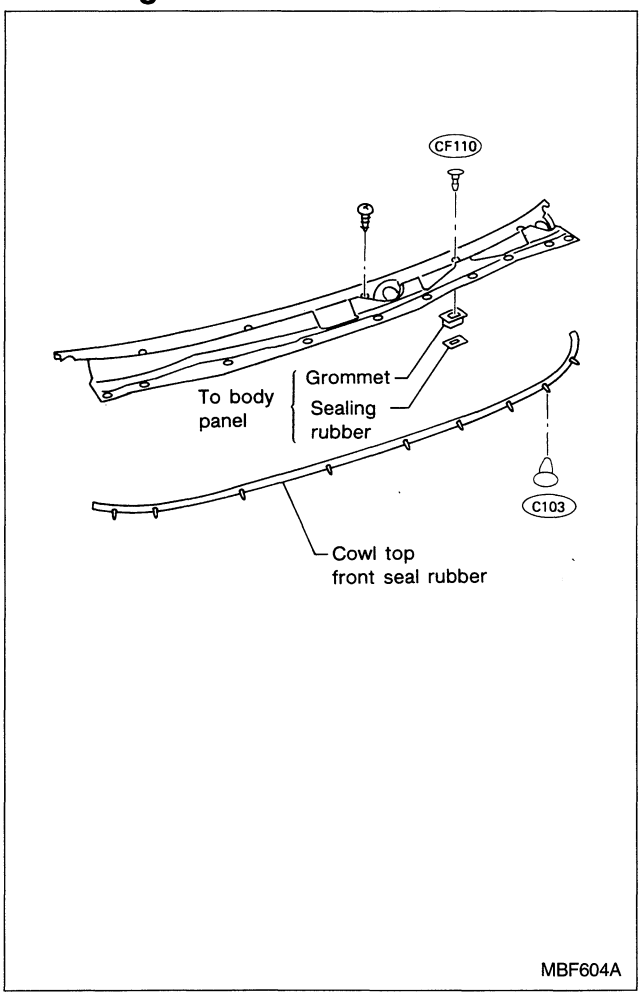
Exterior (Cont'd)

① Front hood insulator



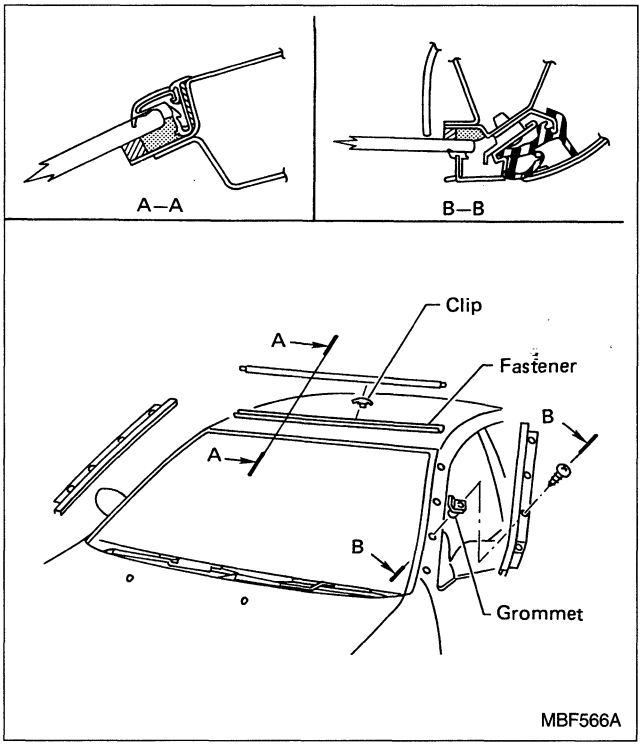
MBF603A

② Cowl top grille and cowl top front sealing rubber



MBF604A

③ Front windshield molding



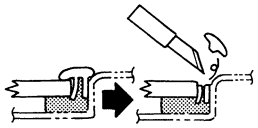
MBF566A

Exterior (Cont'd)

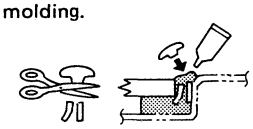
Windshield upper and side molding

Method 1

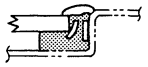
Cut off top portion of molding and clean glass and panel surfaces.



Apply sealant to top portion of molding.



Cut off lower portion of new molding.

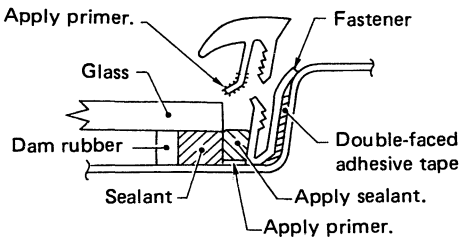


Finish well to give it a good appearance.

SBF266G

Method 2

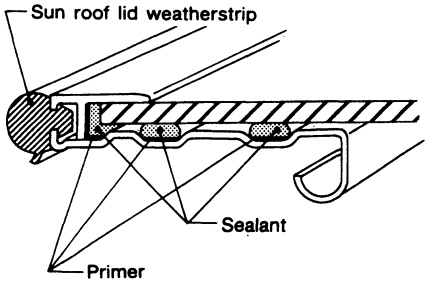
1. Cut off sealant at glass end.
2. Clean the side on which panel was mounted.
3. Set molding fastener and apply sealant to body panel, and apply primer to molding and body.



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.

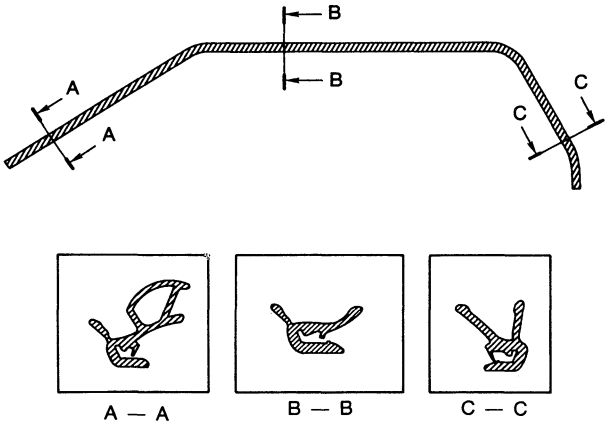
SBF267G

④ Sunroof lid weatherstrip



MBF109A

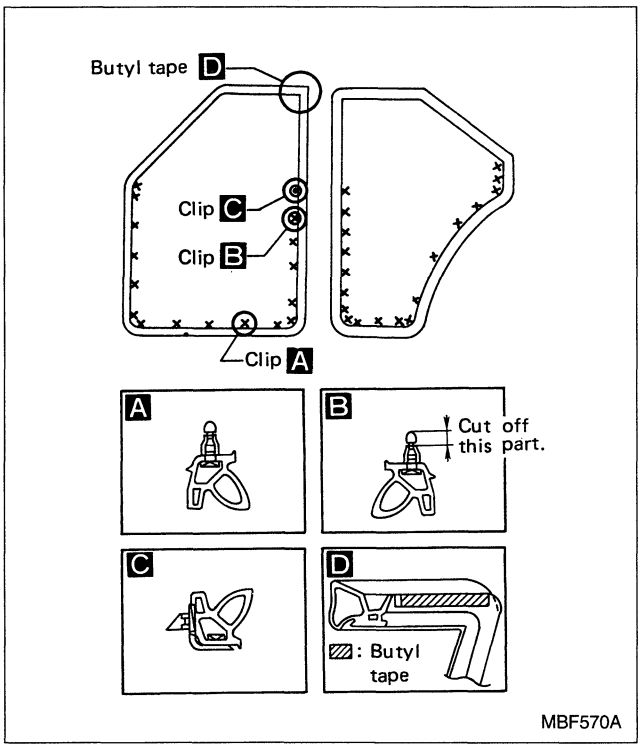
⑤ Body side drip weatherstrip



MBF568A

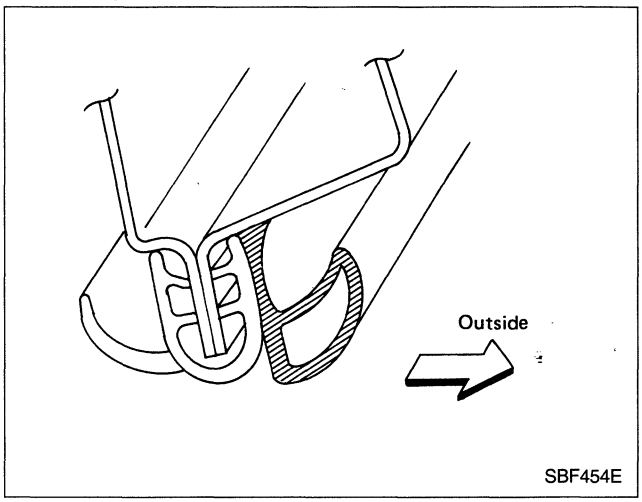
Exterior (Cont'd)

⑥ Door weatherstrip



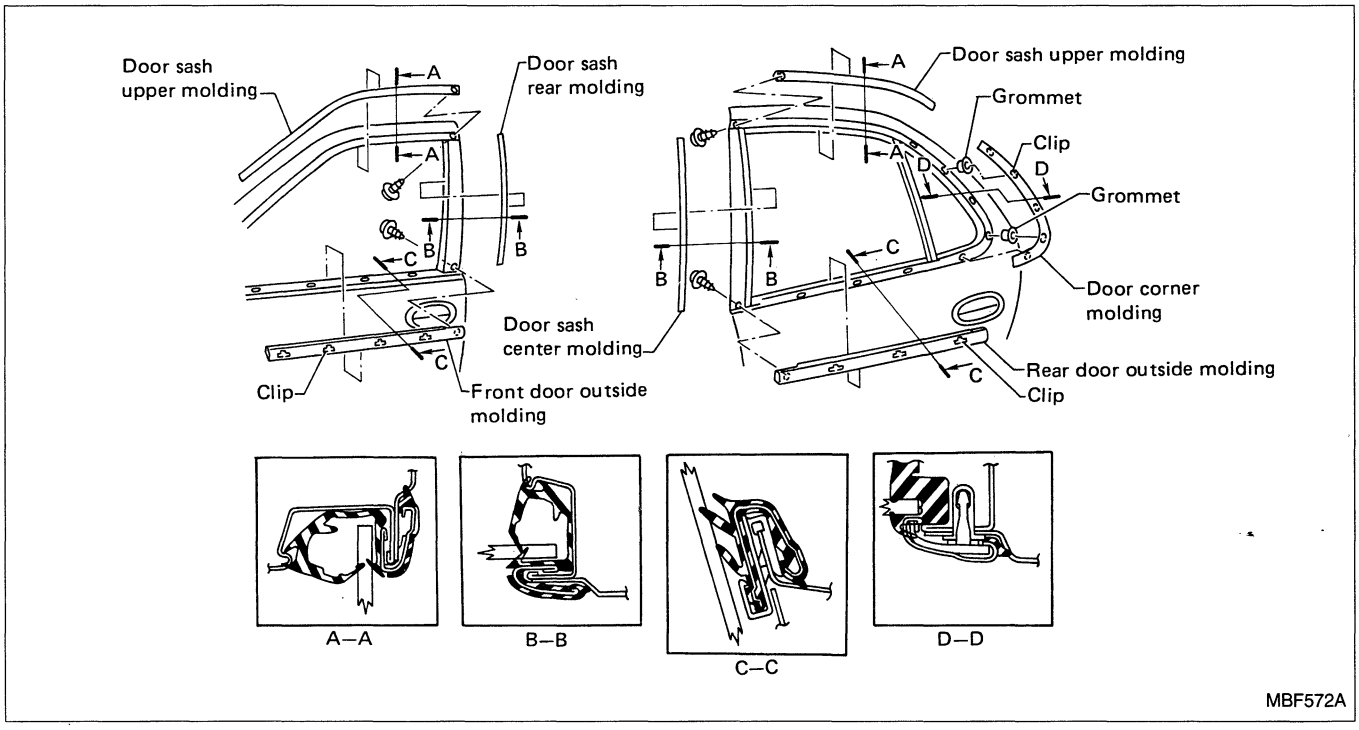
MBF570A

⑦ Body side welt



SBF454E

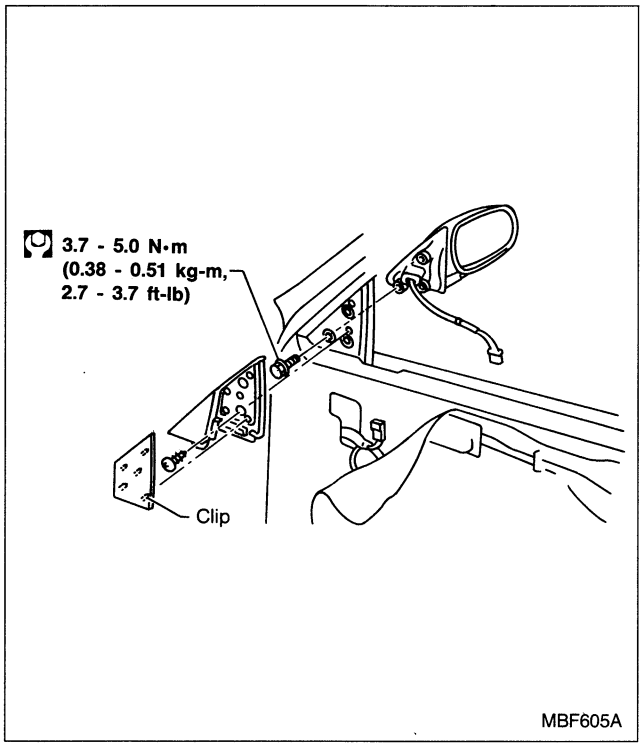
⑧ Door waist outside molding



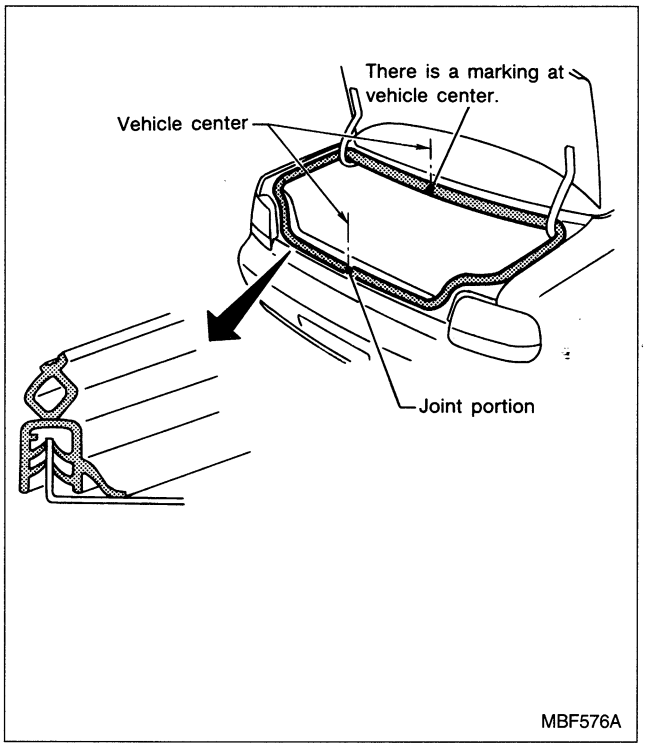
MBF572A

Exterior (Cont'd)

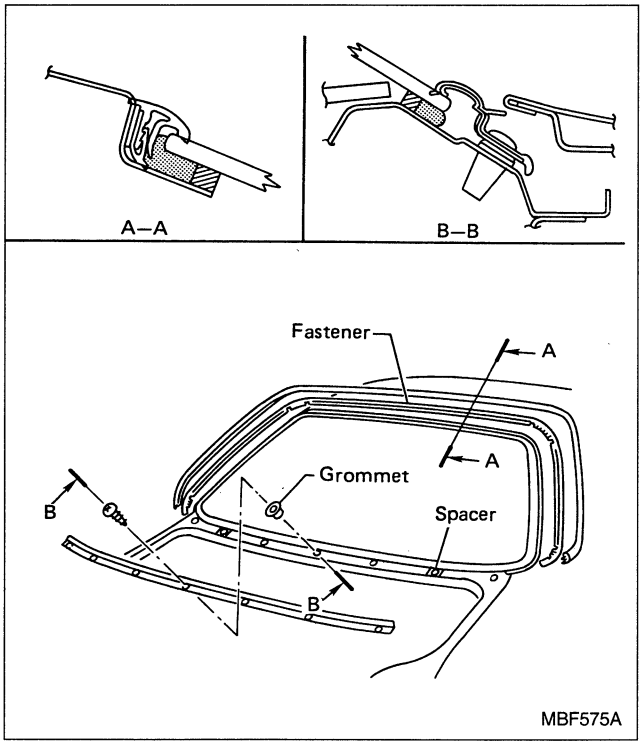
⑨ Front door corner cover



⑪ Trunk lid weatherstrip



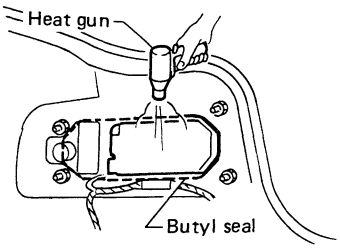
⑩ Rear windshield molding



⑫ Rear combination lamp

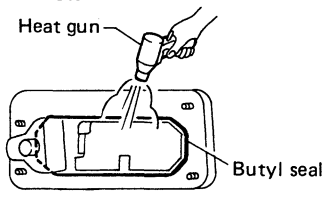
- Rear combination lamps are installed with nuts and butyl seal.

Removal



- Warm up lamp assembly area to a temperature slightly below 60°C (140°F)

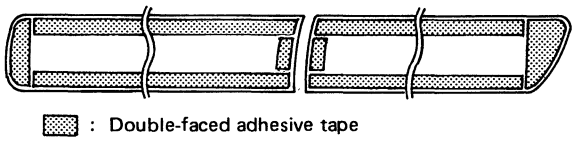
Installation



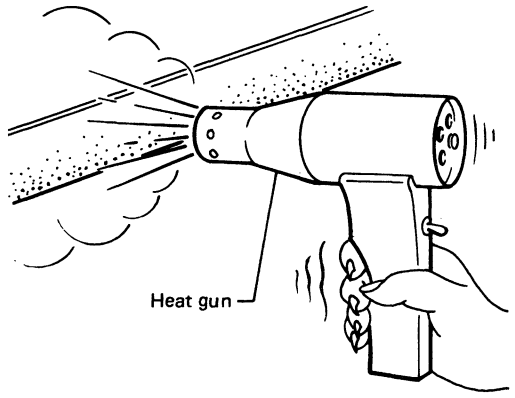
- Apply butyl seal evenly as it tends to become thin at the corners.
- Warm up lamp assembly area to a temperature slightly below 60°C (140°F).

MBF120A

⑬ Side guard molding



: Double-faced adhesive tape



SBF460E

- Original side guard molding is affixed to body panel with double-faced adhesive tape.
- The repair parts are also affixed with double-faced adhesive tape.
- **Removal:**

1. Heat molding portion to 30 to 40°C (86 to 104°F) with a heat gun.
2. Raise end of molding and, while cutting off bonding agent, detach molding.

- **Installation:**

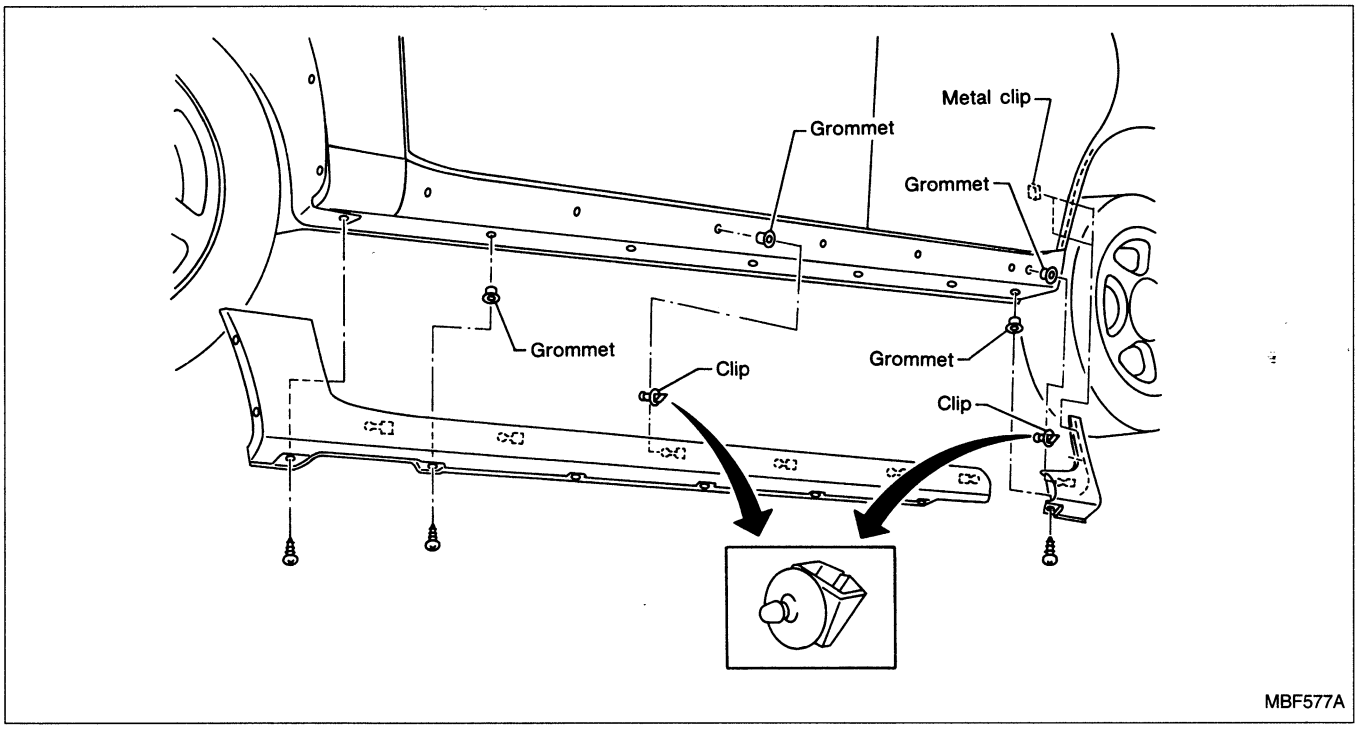
1. Remove all traces of bonding agent from body panel. Then clean contact face of body.

CAUTION:
Never apply tack-paper adhesive remover to body panel surface finished with lacquer-based paint.

2. Heat body panel and molding to 30 to 40°C (86 to 104°F) with a heat gun. Then install molding.

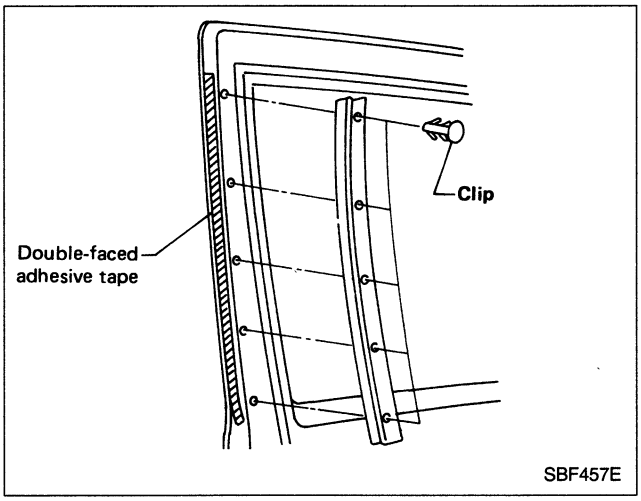
Exterior (Cont'd)

⑭ Center mudguard



MBF577A

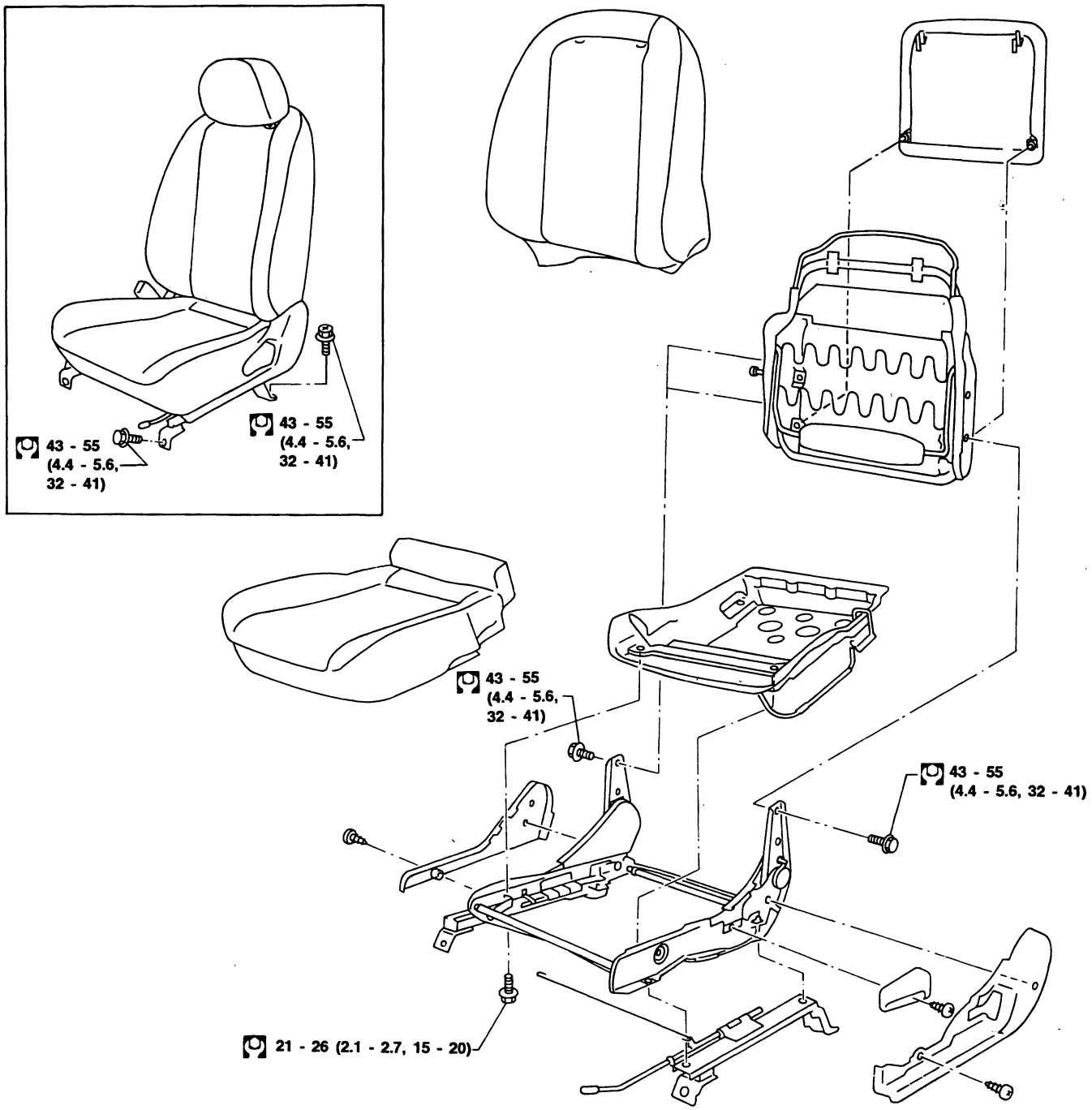
⑮ Front door parting seal



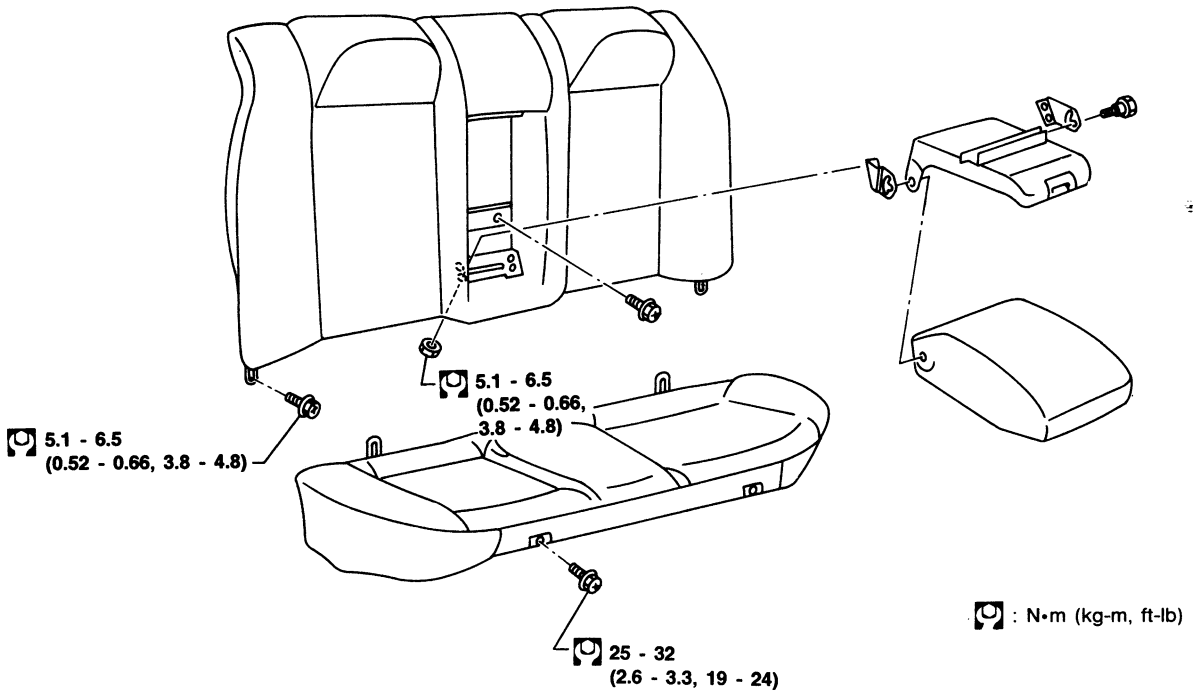
SBF457E

- When removing or installing the seat trim, handle carefully to keep dirt out and avoid damage.

Front Seat

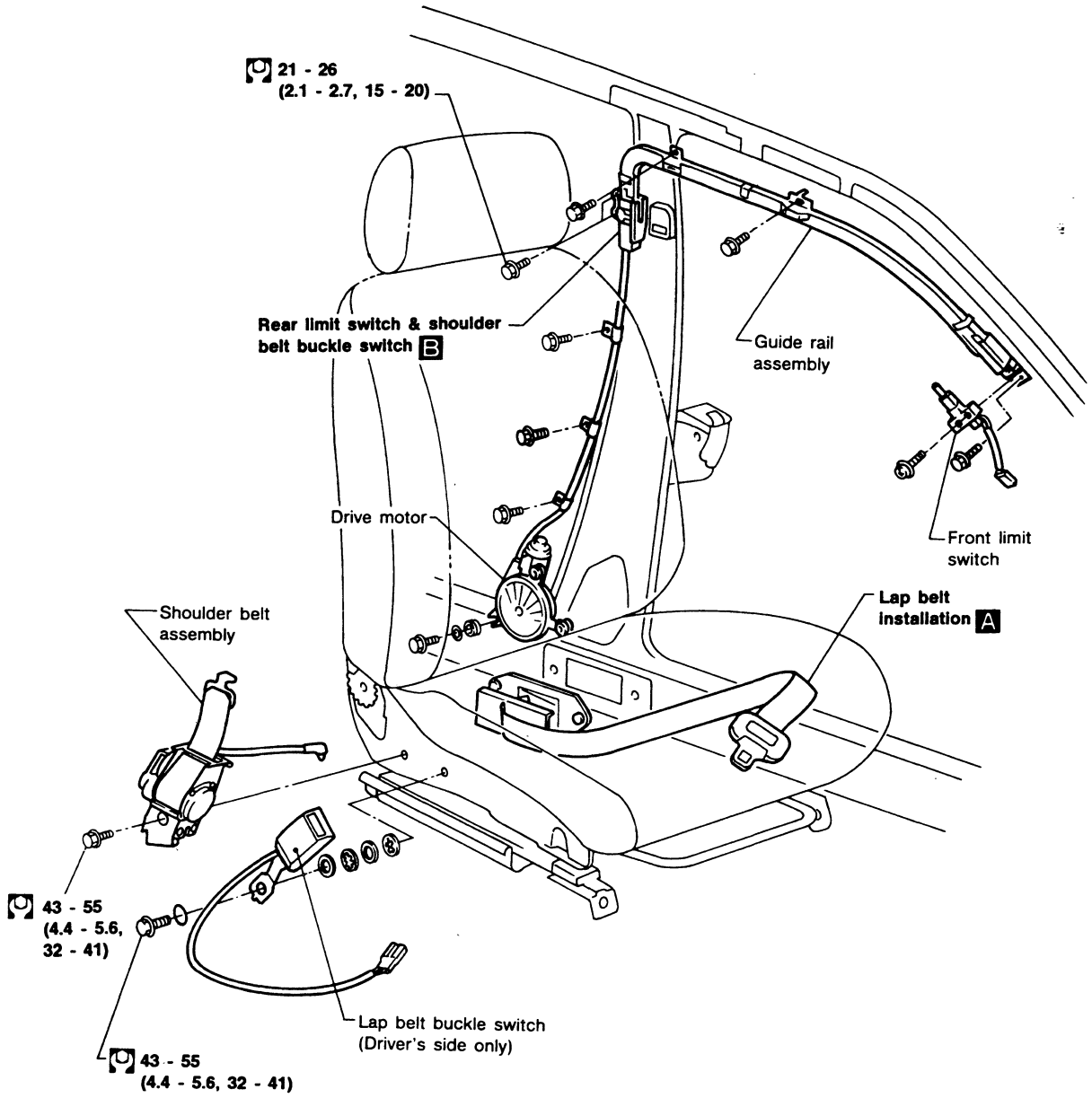


Rear Seat


5.1 - 6.5
(0.52 - 0.66, 3.8 - 4.8)
5.1 - 6.5
(0.52 - 0.66,
3.8 - 4.8)
25 - 32
(2.6 - 3.3, 19 - 24)
: N•m (kg-m, ft-lb)
MBF579A

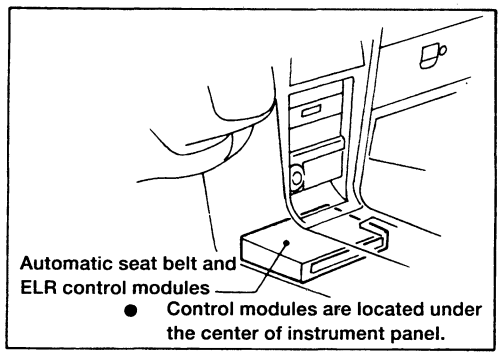
NOTE

Unit Location



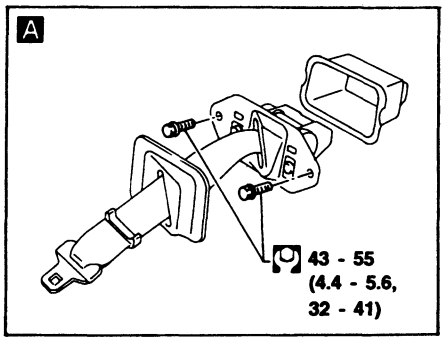
: N•m (kg-m, ft-lb)

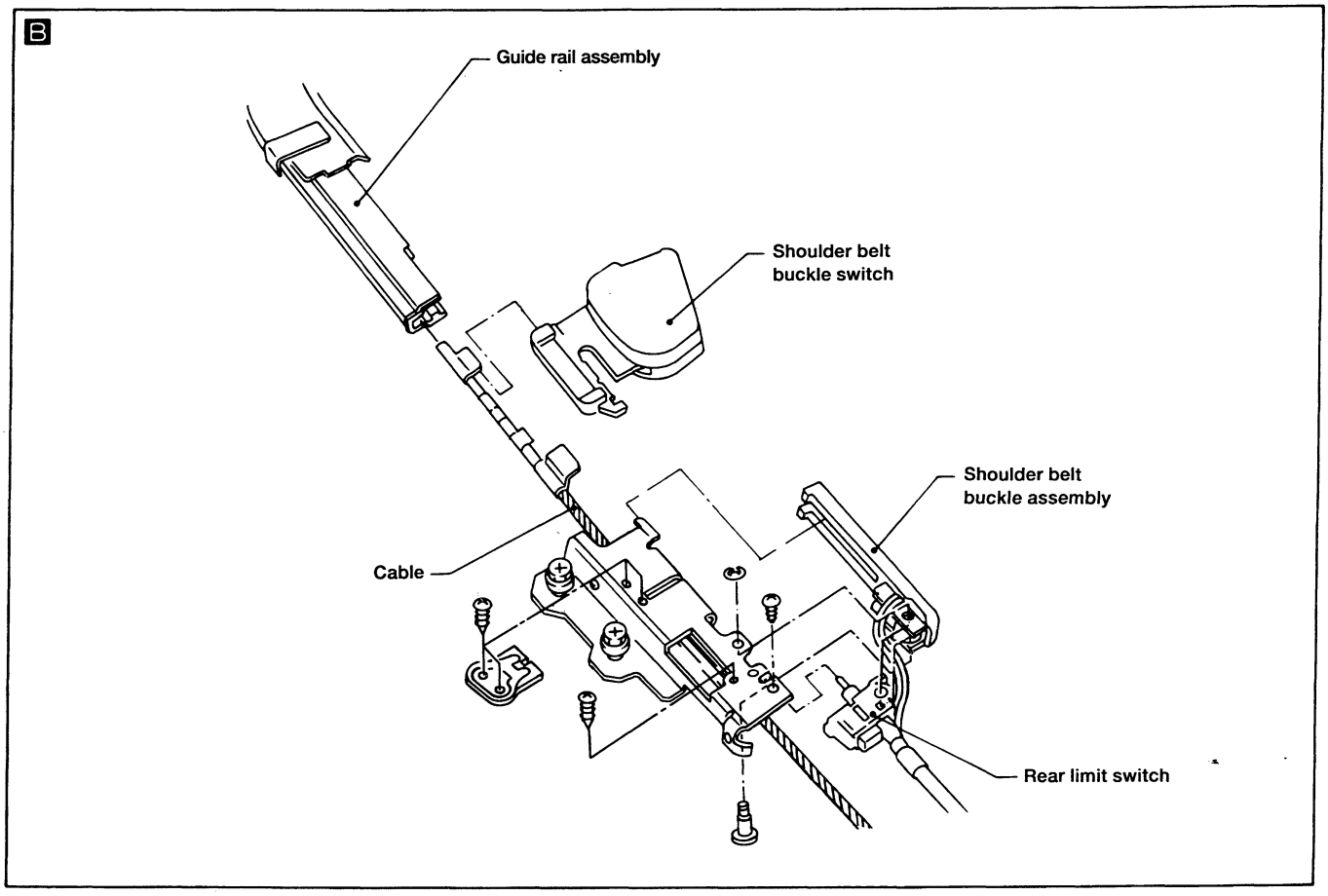
Control module



ABF099A

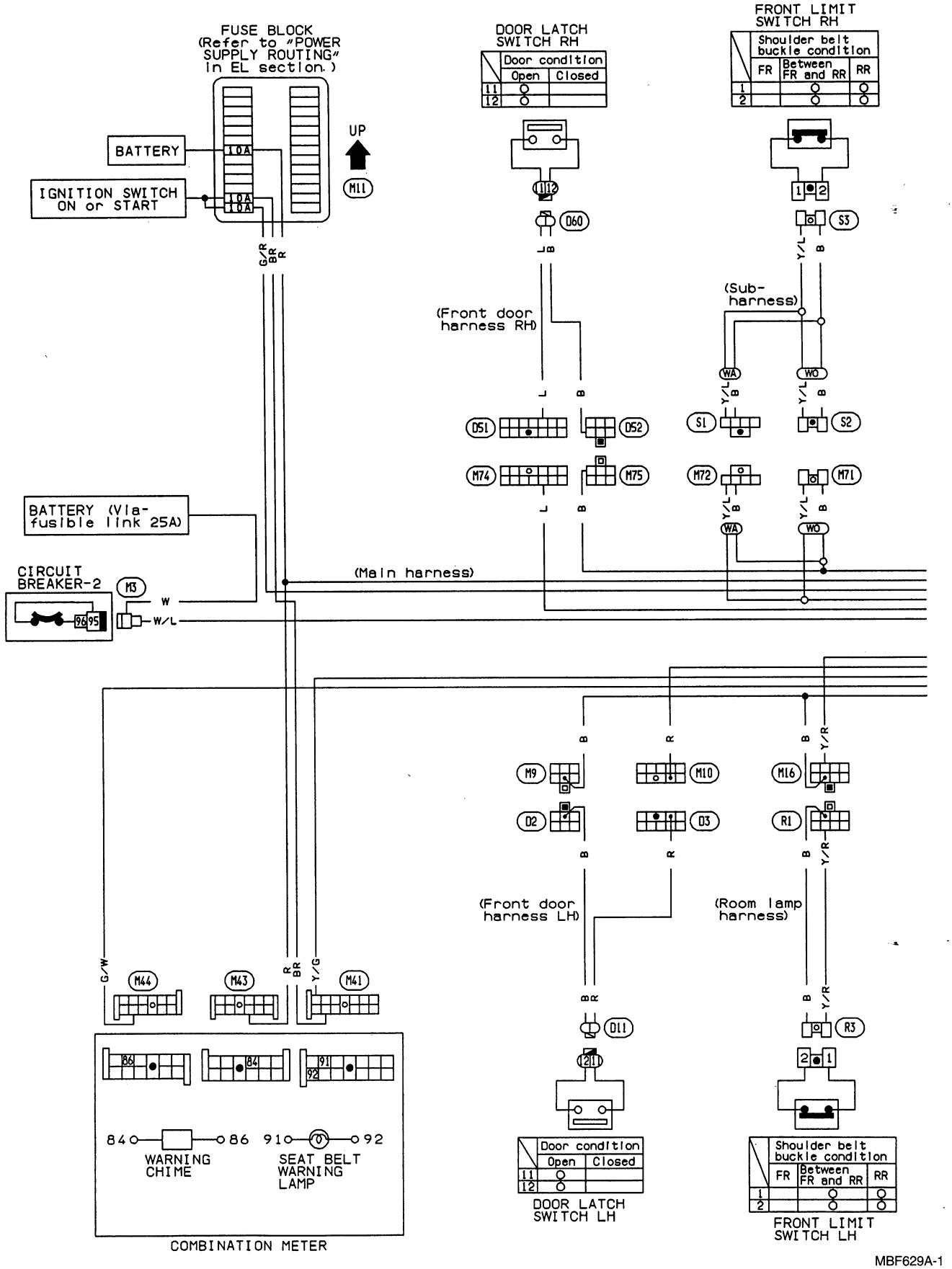
Unit Location (Cont'd)





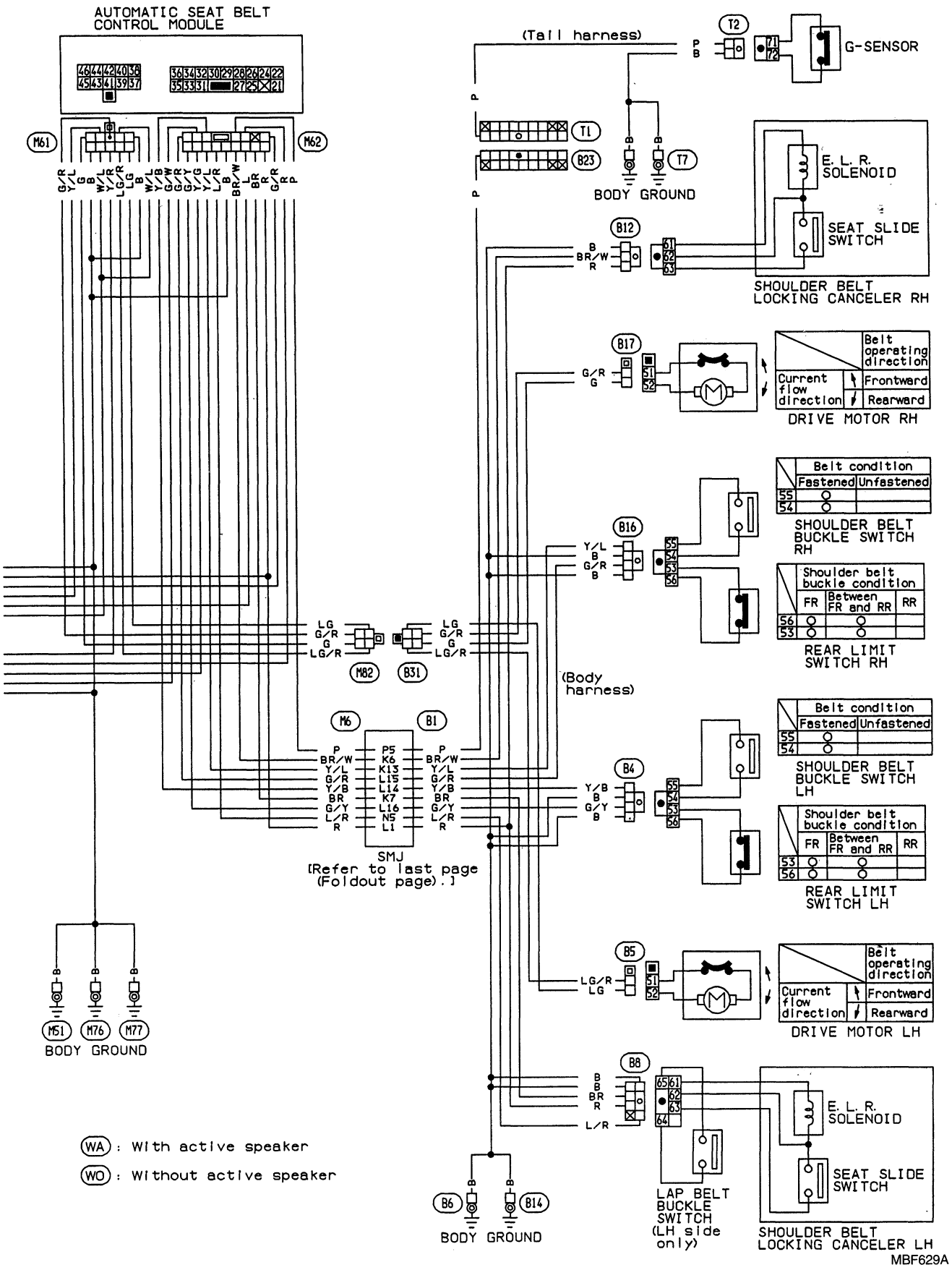
ABF099B

Wiring Diagram



MBF629A-1

Wiring Diagram (Cont'd)



Description

FUNCTION

Shoulder belt buckle is mainly operated while ignition switch is "ON".

Condition (A): Ignition switch is "ON".

When door is opened, shoulder belt buckle is moved frontward and when door is closed, buckle is moved rearward.

Condition (B): Ignition switch is "OFF".

When door is opened, shoulder belt buckle is moved frontward. When the door is closed, buckle will remain in this position.

(Voltage of output signal is approximate value.)

Input signal	Ignition switch	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	
	Door latch switch	OFF	ON	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	
	Front limit switch	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF	
	Rear limit switch	ON	ON	ON	ON	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	ON	ON	ON	
Output signal	Drive motor power source for frontward operation	0V	0V	0V	0V	0V	12V	12V	0V	0V	0V	0V	0V	12V	12V	0V	0V	
	Drive motor power source for rearward operation	0V	0V	12V	12V	0V	0V	0V	0V	12V	12V	0V	0V	0V	0V	0V	0V	
Shoulder belt buckle	Function	Stop	Stop	Start to move	Moving	Stop	Start to move	Moving	Stop	Start to move	Moving	Stop	Stop	Start to move	Moving	Stop	Stop	
	Position	Front	Front	Front	Between Front & Rear	Rear	Rear	Between Front & Rear	Front	Front	Between Front & Rear	Rear	Rear	Rear	Between Front & Rear	Front	Front	

TIMER (Ignition switch either "ON" or "OFF")

If limit switch does not operate (when accomplishing frontward operation, front limit switch can not be turned "OFF" or when accomplishing rearward operation, rear limit switch can not be turned "OFF"), control module will continue to supply power to drive motor for 15 seconds.

QUICK WARNING (Ignition switch "ON")

If front limit switch is not turned "OFF" after accomplishing frontward operation, control module will stop supplying power 15 seconds later and warning lamp will flash and chime will operate rapidly for approximately 6 seconds.

REAR LOCK (Fail safe operation)

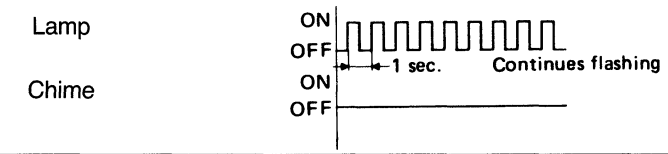
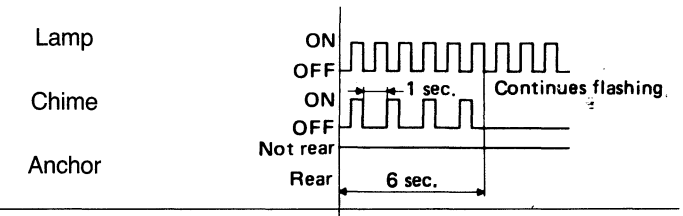
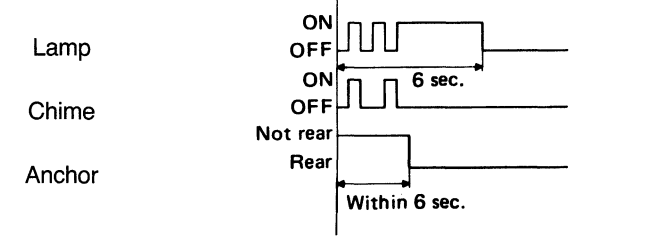
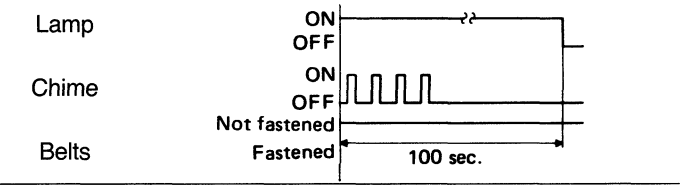
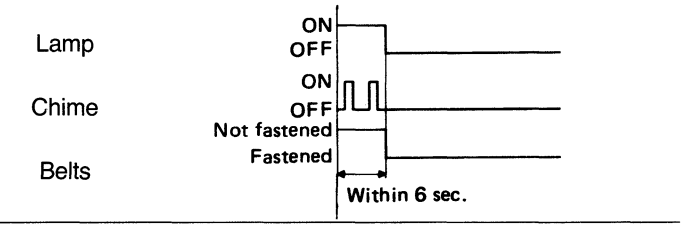
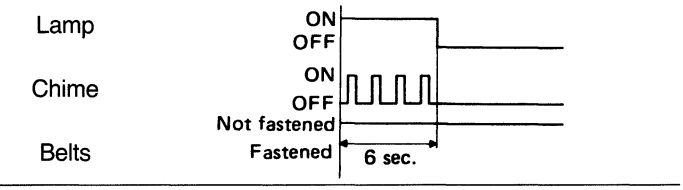
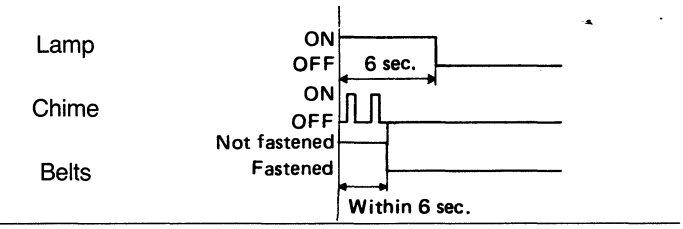
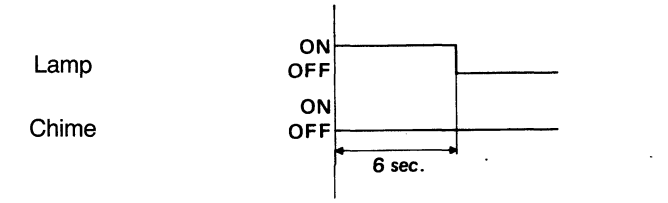
If quick warning functions twice successively while ignition switch is "ON", shoulder belt buckle will move to rear position and will remain in the rear position. This function is canceled when the ignition switch is "OFF".

SHOULDER BELT LOCKING CANCELLER—ELR SOLENOID (Ignition switch "ON" or "OFF")

The shoulder belt retractor does not lock belt length when moving the seat position front-rear adjusting lever (Seat slide switch is turned on). While ignition switch is "ON", the system warning lamp also glows. This system can be operated independently of "Automatic Seat Belt System".

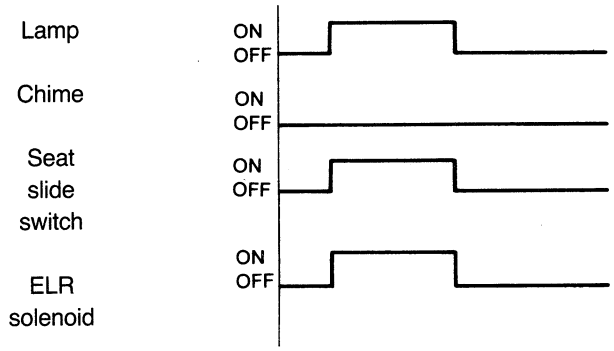
Description (Cont'd)

WARNING CODES (Shoulder belt system)

Priority	Warning item	Ignition switch	Indication of warning (Indicating time is approximately value.)
1	Shoulder anchors are not at rear lock position.	ON	
		OFF → ON	
			
2	Shoulder belts are not fastened.	ON	
			
3	Driver's side lap belt is not fastened.	OFF → ON	
			
4	Normal (All belts are fastened and shoulder anchors are in rear lock position.)	OFF → ON	

Description (Cont'd)

WARNING CODE (Seat adjustment)

Priority	Warning item	Ignition switch	Indication of warning (Indicating time is approximately value.)
1	Move seat front-rear adjusting lever. (Seat slide switch is turned on.)	ON	

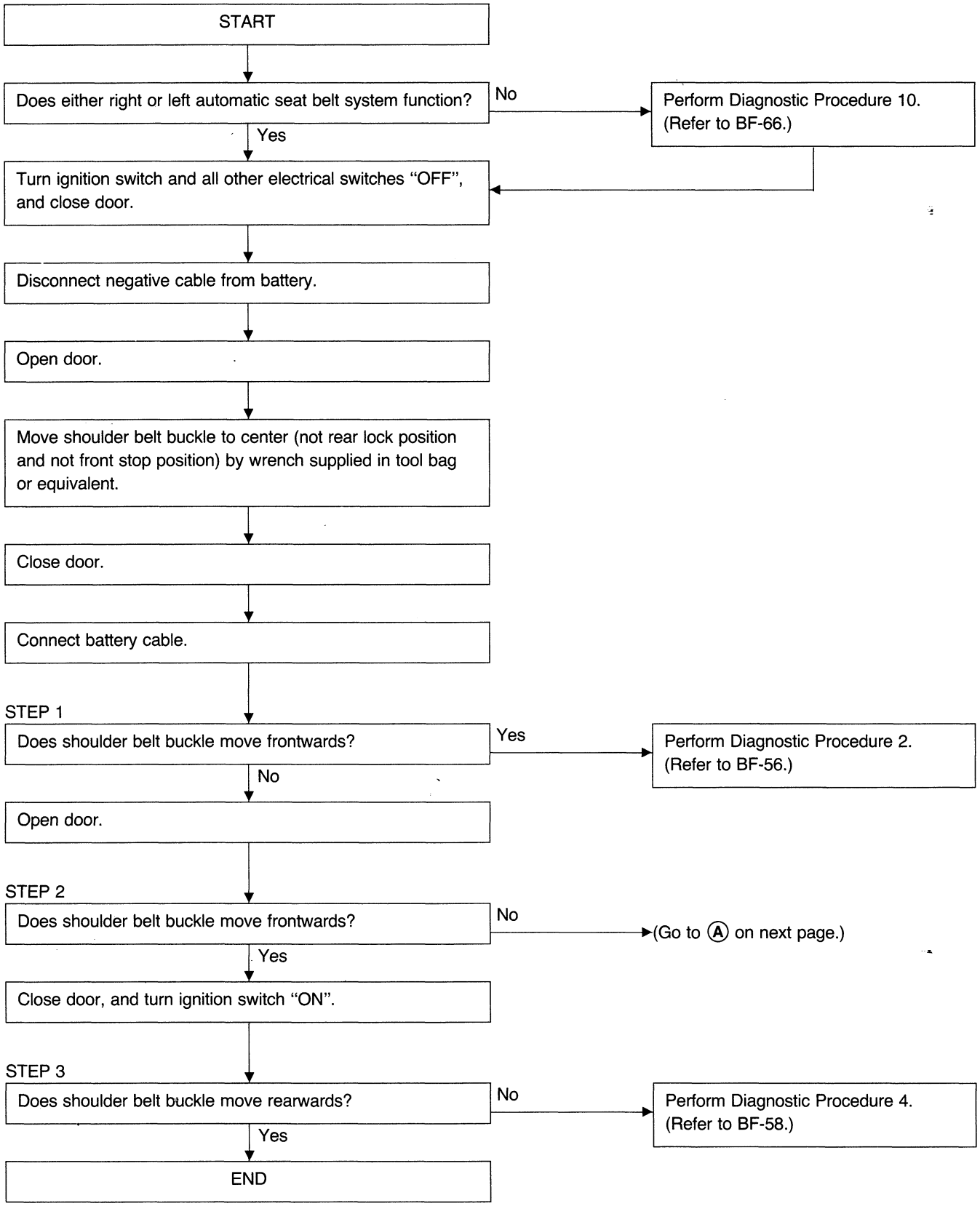
Since left and right component parts are basically the same, harness layout and methods for electrical components inspection are shown for one side only.
For those methods enclosed by double rectangles, component parts on both sides must be checked.

Symptom Chart

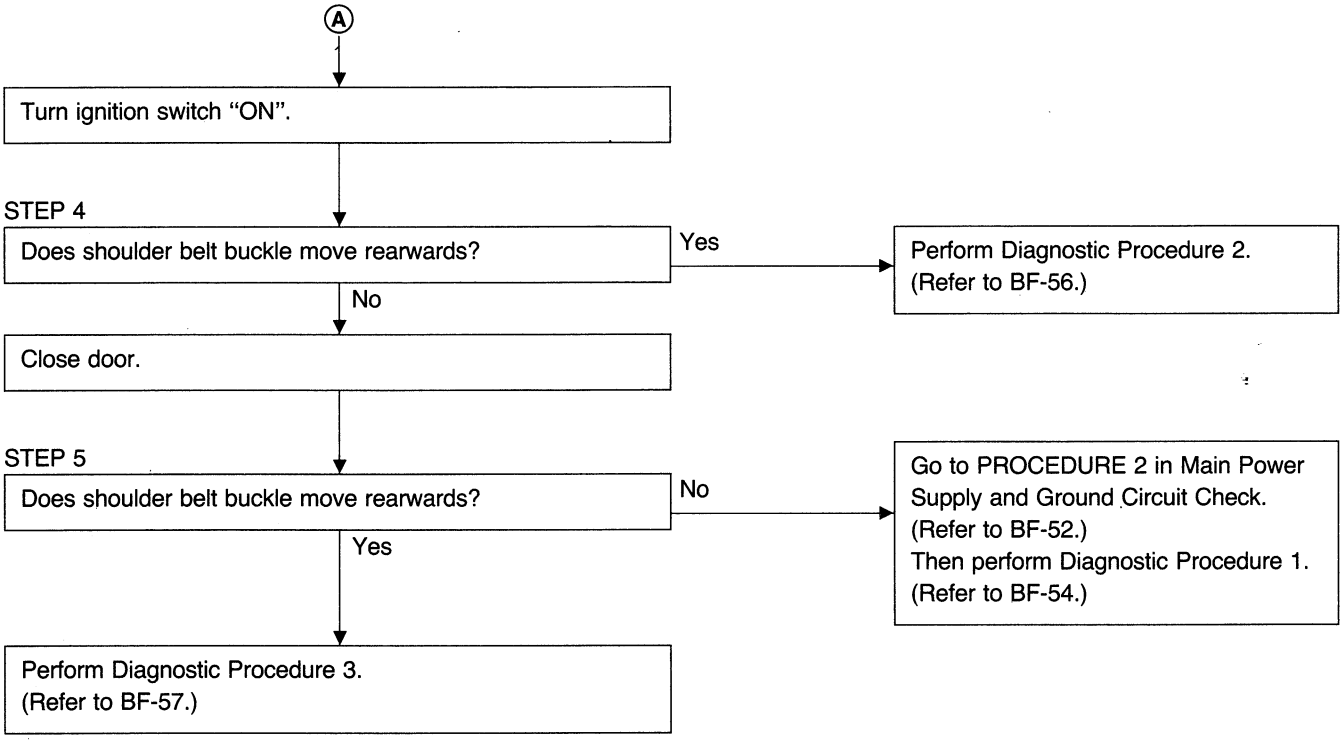
Procedure	Reference page		SYMPTOM	No operation has made. (No warning indicated and no buckles movement performed)	Shoulder belt buckle in LH or RH side does not move.	Shoulder belt buckle moves frontward only. (not rearward)	Shoulder belt buckle moves rearward only. (not frontward)	Warnings indicate incorrectly or do not function.	Quick warning operates.	Shoulder belt locks when adjusting front-rear seat position.
Electrical Components Inspection	BF-68	RH side	Seat slide switch					○		○
	BF-67		Drive motor assembly	○	○					
	BF-67		Shoulder belt buckle switch	○				○		
	BF-67		Door latch switch	○		○	○			
	BF-67		Rear limit switch	○	○	○		○		
	BF-67		Front limit switch	○	○		○		○	
	BF-68	LH side	Seat slide switch					○		○
	BF-68		Lap belt buckle switch	○				○		
	BF-67		Drive motor assembly	○	○					
	BF-67		Shoulder belt buckle switch	○				○		
	BF-67		Door latch switch	○		○	○			
	BF-67		Rear limit switch	○	○	○		○		
	BF-67		Front limit switch	○	○		○		○	
	—	Warning chime		○				○		
	—	Warning lamp		○				○		
Diagnostic Procedure	BF-66	Procedure 10		○						
	BF-65	Procedure 9						○		○
	BF-64	Procedure 8						○		
	BF-63	Procedure 7						○		
	BF-61	Procedure 6						○		
	BF-60	Procedure 5						○		
	BF-58	Procedure 4		○	○	○		○		
	BF-57	Procedure 3		○	○		○		○	
	BF-56	Procedure 2				○	○			
	BF-54	Procedure 1		○	○					
Main Power Supply and Ground Circuit Check	BF-52	Procedure 2			○					
	BF-52	Procedure 1		○						
Preliminary Check	BF-50	Procedure 2						○		
	BF-48	Procedure 1			○	○	○			

Preliminary Check

PROCEDURE 1

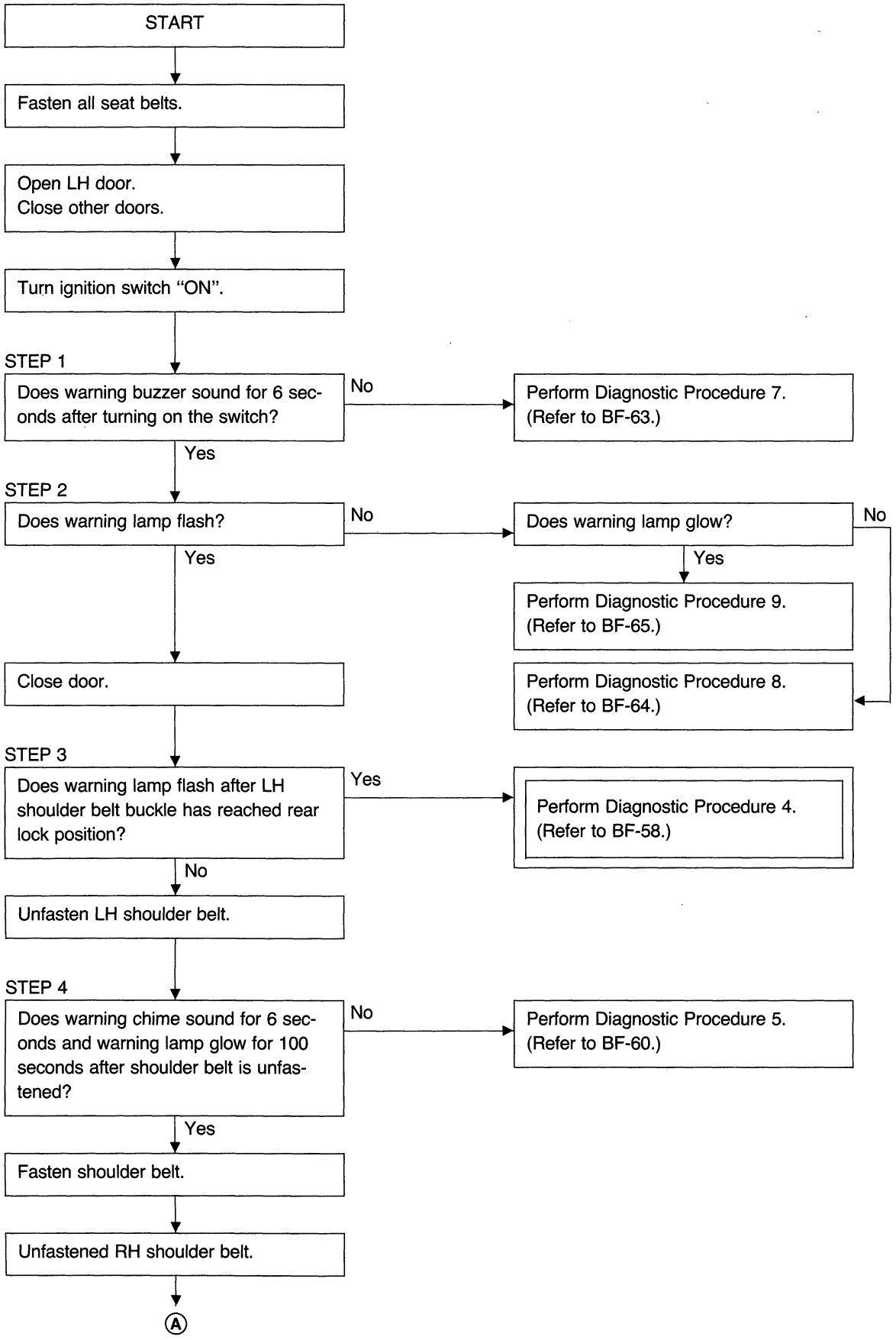


Preliminary Check (Cont'd)

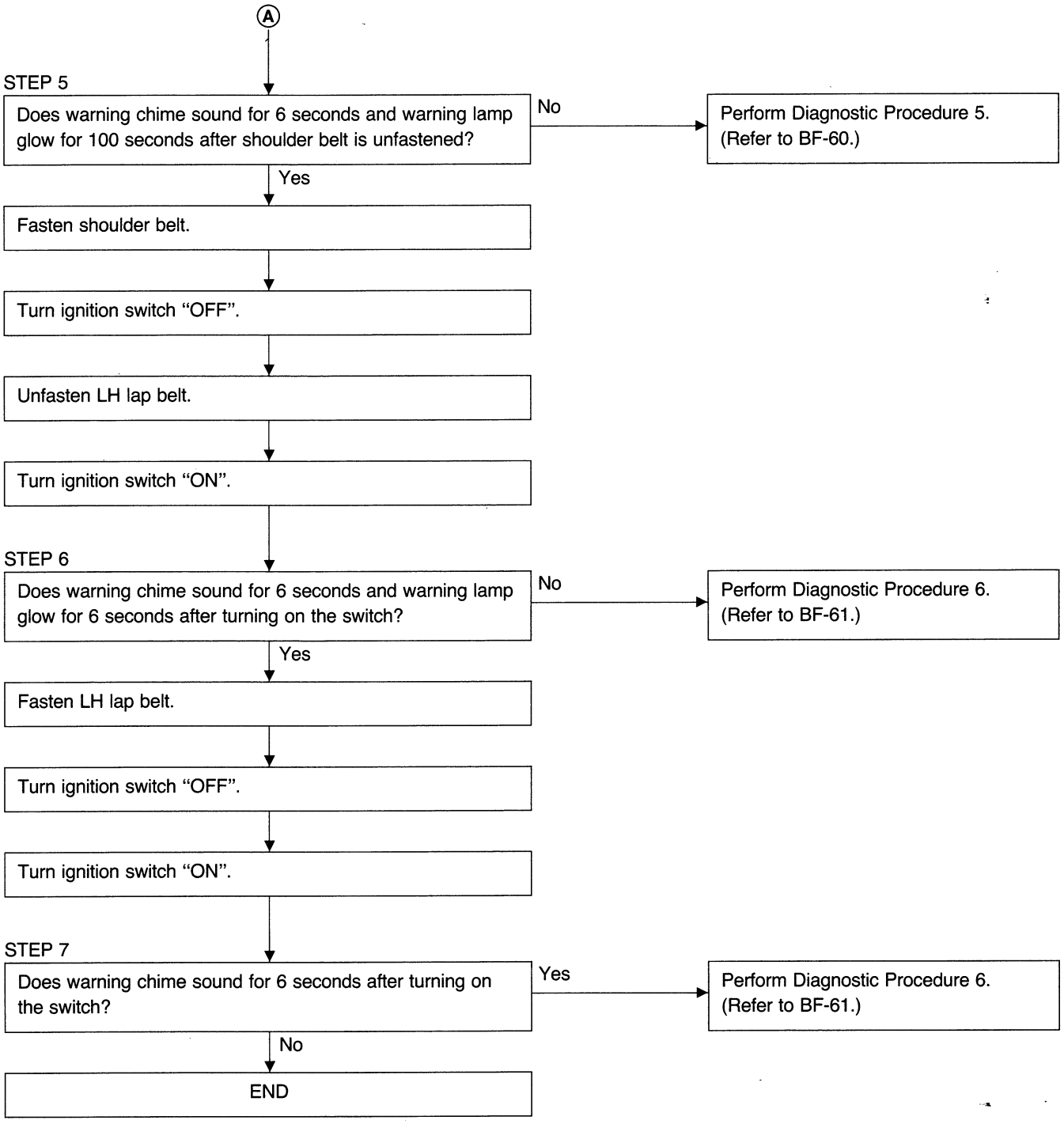


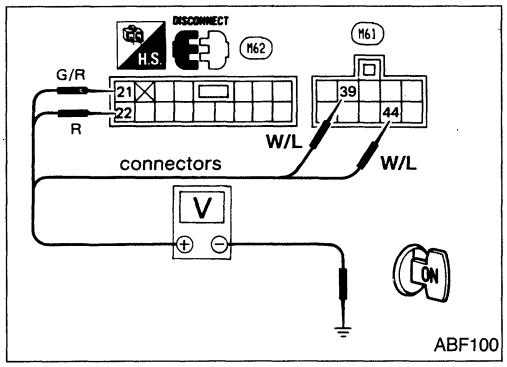
Preliminary Check (Cont'd)

PROCEDURE 2



Preliminary Check (Cont'd)



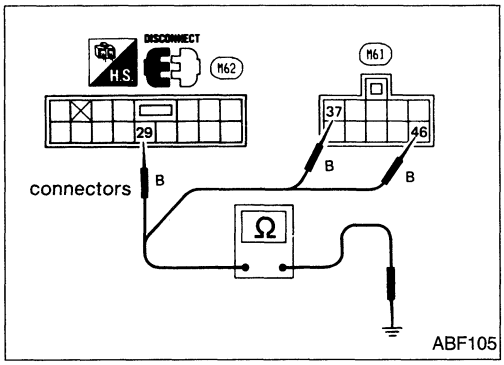


Main Power Supply and Ground Circuit Check

PROCEDURE 1

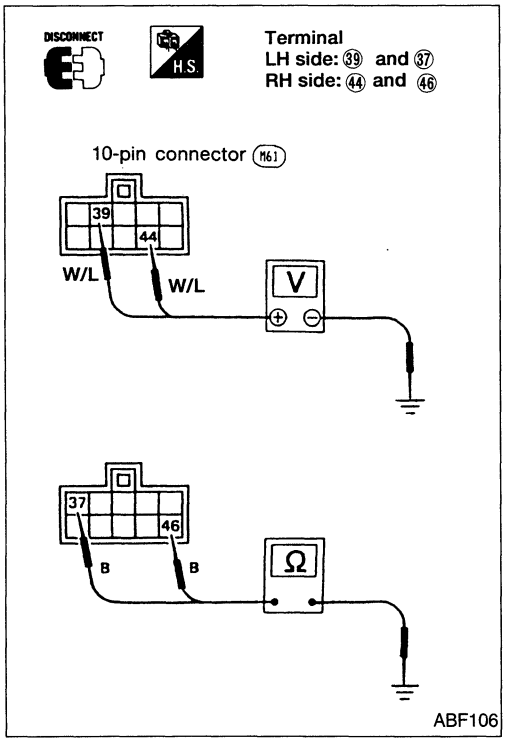
Main power supply

Terminals	Battery positive voltage existence condition	
	Ignition switch "ON"	Other than ignition switch "ON"
㉑ - Ground	Yes	No
㉒ - Ground	Yes	Yes
㊴ - Ground	Yes	Yes
㊹ - Ground	Yes	Yes



Ground circuit

Terminals	Continuity
㉙ - Ground	Yes
㊲ - Ground	Yes
㊻ - Ground	Yes



PROCEDURE 2

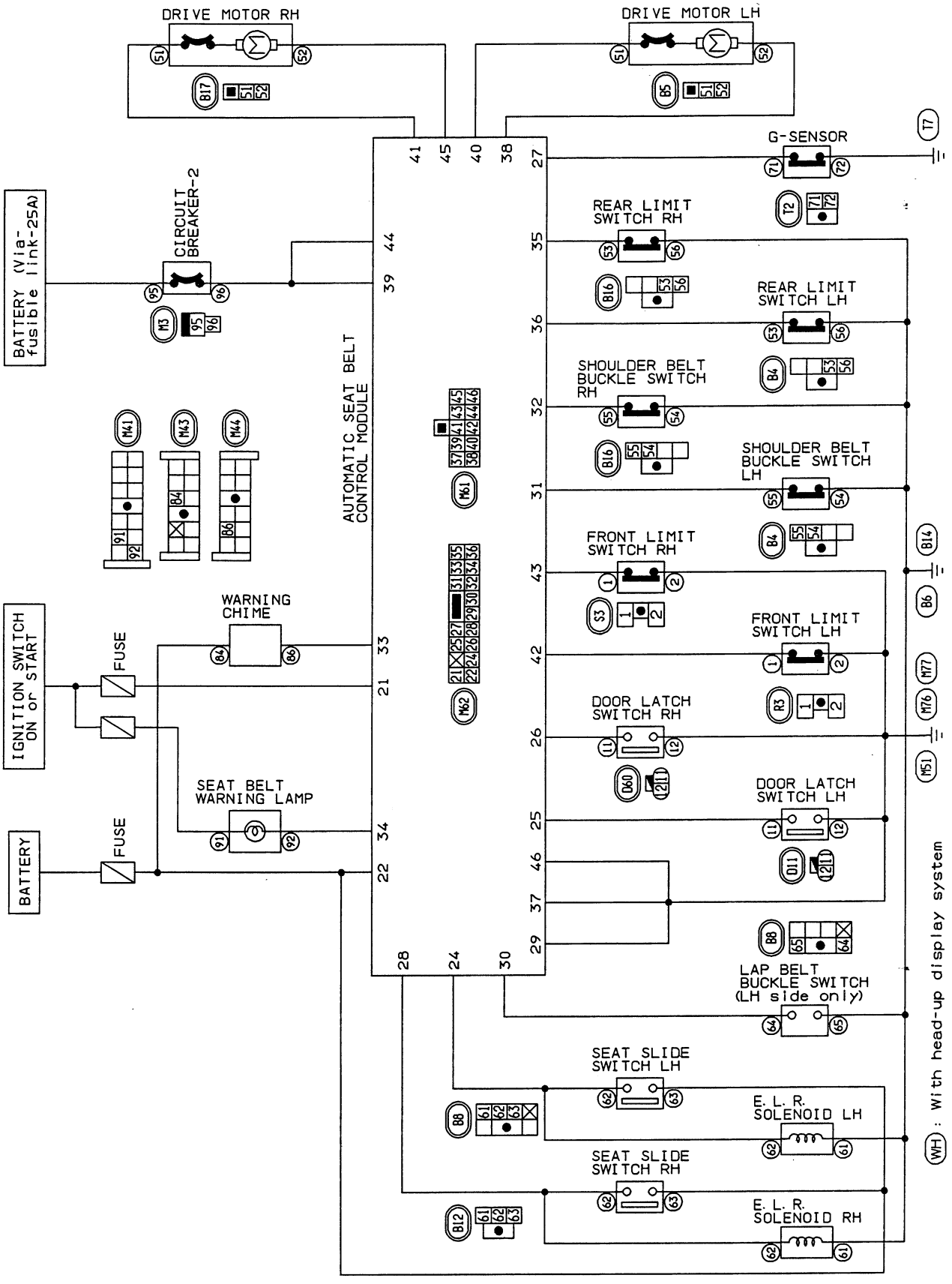
Power supply for motor drive

	Terminals	Battery positive voltage existence
LH side	㊴ - Ground	Yes
RH side	㊹ - Ground	Yes

Ground circuit for motor drive

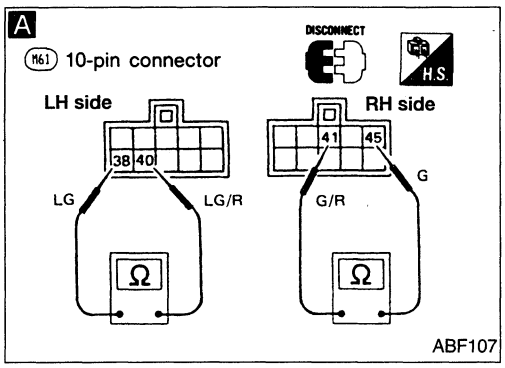
	Terminals	Continuity
LH side	㊲ - Ground	Yes
RH side	㊻ - Ground	Yes

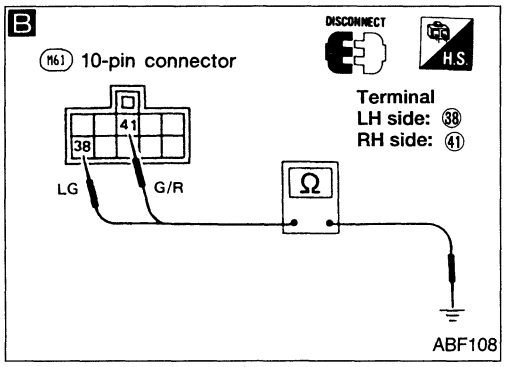
Circuit Diagram for Quick Pinpoint Check

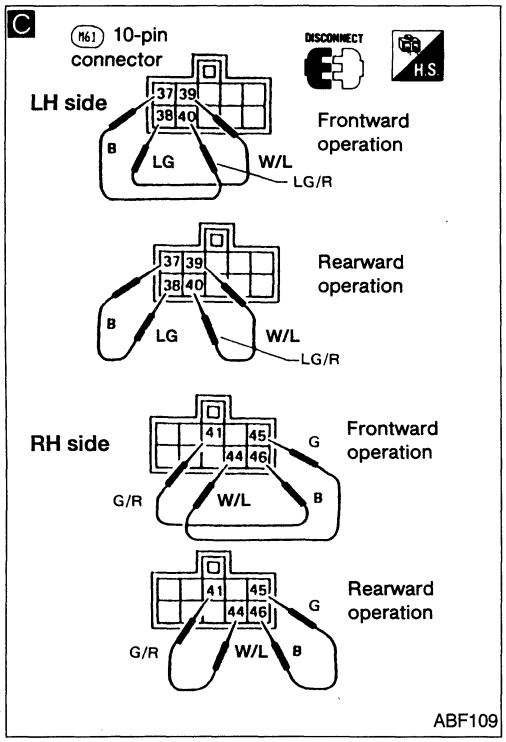


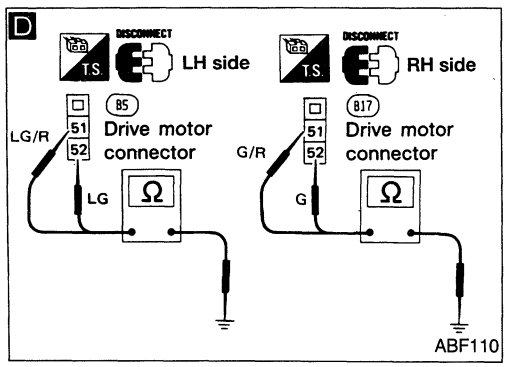
MBF630A

Diagnostic Procedure 1









START

A

CHECK MOTOR CIRCUIT.
1) Disconnect 10-pin connector from control module.
2) Check continuity.

	Terminals
LH side	(38) - (40)
RH side	(41) - (45)

Continuity should exist.

N.G. → (Go to Ⓐ on next page.)

O.K.

B

Does continuity exist?

	Terminals
LH side	(38) - Ground
RH side	(41) - Ground

Yes → (Go to Ⓑ below.)

No

C

CHECK MOTOR OPERATION.
Check shoulder belt buckle movement.

O.K. → (Go to Ⓒ on next page.)

N.G.

Go to DRIVE MOTOR ASSEMBLY in Electrical Components Inspection. (Refer to BF-67.)

N.G. → Replace drive motor assembly.

O.K.

Replace guide rail assembly.

Ⓑ

D

1) Disconnect connector from drive motor assembly.
2) Does continuity exist in at least one point?

	Terminals
LH side	(51) - Ground
	(52) - Ground
RH side	(51) - Ground
	(52) - Ground

Yes → Repair harness. There will be incorrect grounding.

No

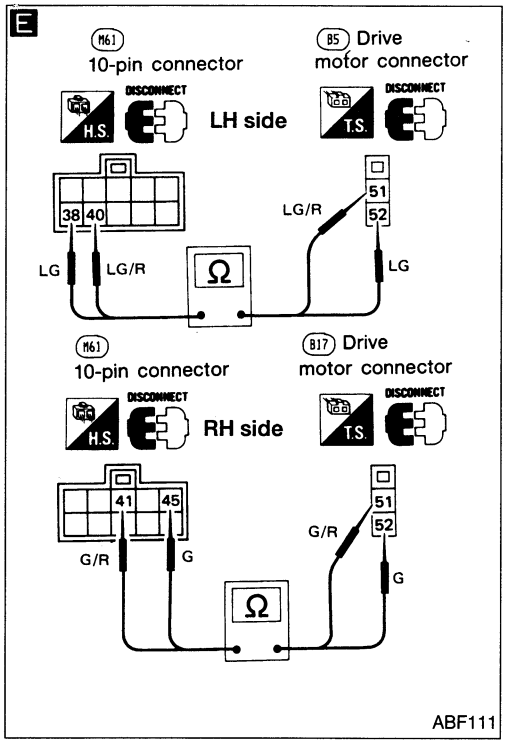
Check drive motor harness for incorrect grounding.

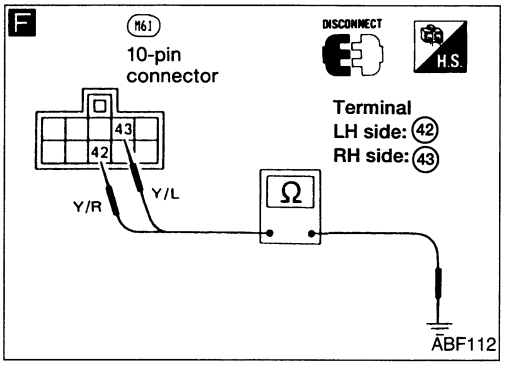
N.G. → Repair drive motor harness.

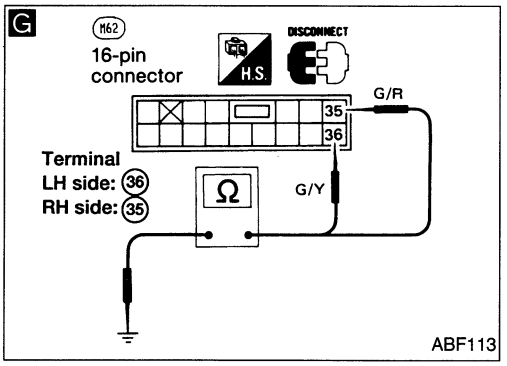
O.K.

Replace drive motor assembly.

Diagnostic Procedure 1 (Cont'd)







Ⓐ

E

1) Disconnect connector from drive motor assembly.
2) Check continuity.

N.G. → Repair harness.

	Terminals
LH side	38 - 52
	40 - 51
RH side	41 - 51
	45 - 52

Continuity should exist.

O.K.

Check drive motor harness for open circuit. N.G. → Repair drive motor harness.

O.K.

Replace drive motor.

Ⓒ

F

CHECK STOP SIGNAL.
1) Move shoulder belt buckle to center (not rear lock position and not front).
2) Check continuity.

N.G. → Perform Diagnostic Procedure 3 and return to next step. (Refer to BF-57.)

	Terminals
LH side	42 - Ground
RH side	43 - Ground

Continuity should exist.

O.K.

G

1) Disconnect 16-pin connector from control module.
2) Check continuity.

N.G. → Perform Diagnostic Procedure 4 and return to next step. (Refer to BF-58.)

	Terminals
LH side	36 - Ground
RH side	35 - Ground

Continuity should exist.

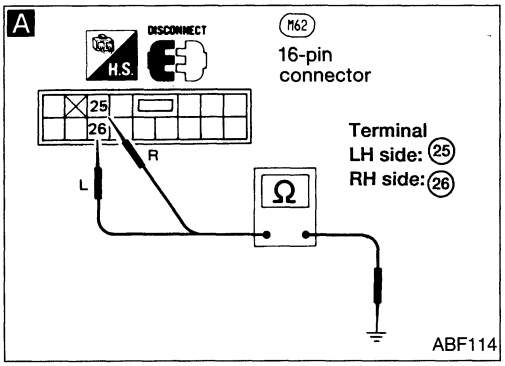
O.K.

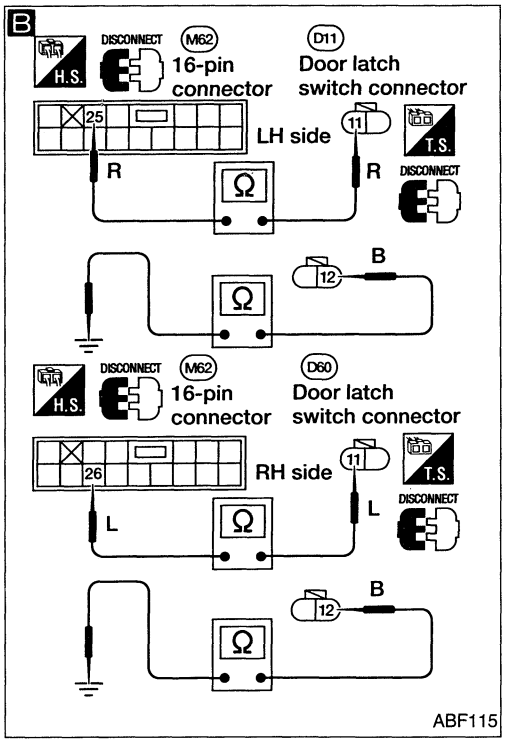
Is this the second time? Yes → Replace control module.

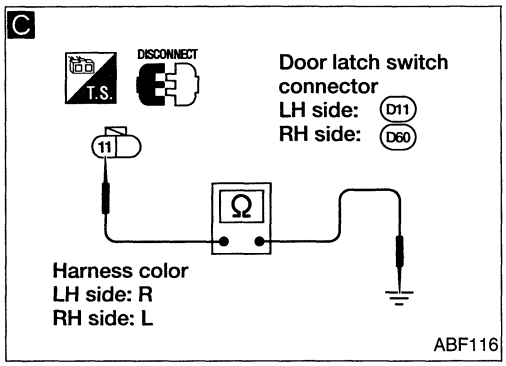
No

Reinstall any part removed.

Go to PROCEDURE 1 (START) in Preliminary Check. (Refer to BF-48.)







Diagnostic Procedure 2

START

A

CHECK DOOR LATCH SWITCH CIRCUIT.
1) Disconnect 16-pin connector from control module.
2) Check continuity.

	Terminals	Door condition	Continuity
LH side	25 - Ground	Open	Yes
		Closed	No
RH side	26 - Ground	Open	Yes
		Closed	No

O.K. → Is this the second time?
- Yes → Replace control module.
- No → Reinstall any part removed. → Go to PROCEDURE 1 (START) in Preliminary Check. (Refer to BF-48.)

N.G. →

B

1) Disconnect door latch switch connector.
2) Check continuity.

	Terminals
LH side	25 - 11 12 - Ground (M51, M76, M77)
RH side	26 - 11 12 - Ground (M51, M76, M77)

Continuity should exist.

N.G. → Repair harness.

O.K. →

C

Does continuity exist?

	Connector	Terminals
LH side	D11	11 - Ground
RH side	D60	11 - Ground

Yes → Repair harness. There will be incorrect grounding between terminals 25 and 11 or 26 and 11.

No →

Go to DOOR LATCH SWITCH in Electrical Components Inspection. (Refer to BF-67.)

O.K. → Reinstall any part removed. → Go to PROCEDURE 1 (START) in Preliminary Check. (Refer to BF-48.)

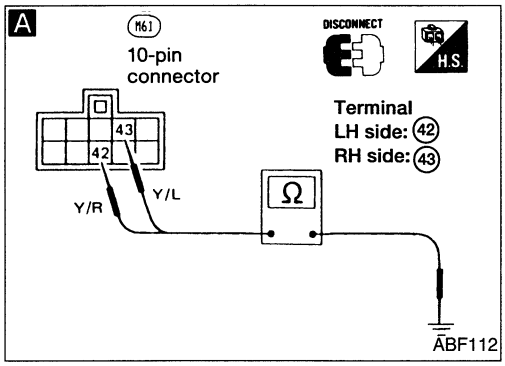
N.G. →

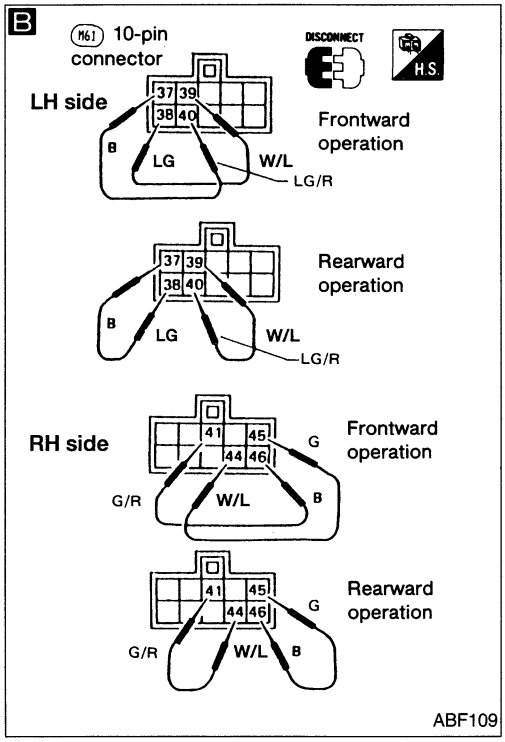
Check door latch switch harness for open and short circuit.

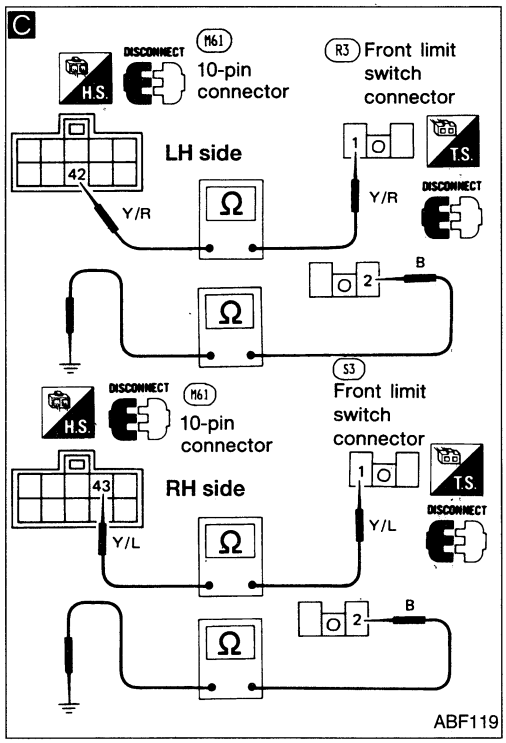
N.G. → Repair door latch switch harness.

O.K. →

Replace door lock assembly.







Diagnostic Procedure 3

START

A

CHECK FRONT LIMIT SWITCH CIRCUIT.
1) Disconnect 10-pin connector from control module.
2) Check continuity.

	Terminals	Shoulder belt buckle position	Continuity
LH side	42 - Ground	At front	No
		Not at front	Yes
RH side	43 - Ground	At front	No
		Not at front	Yes

O.K. → (Go to B below.)

B Check drive motor for operation.

N.G.

C

1) Disconnect connector from front limit switch.
2) Check continuity.

	Terminals
LH side	42 - 1 2 - Ground (M51, M76, M77)
RH side	43 - 1 2 - Ground (M51, M76, M77)

Continuity should exist.

N.G. → Repair harness.

O.K.

(Go to A on next page.)

B

Is this the second time?

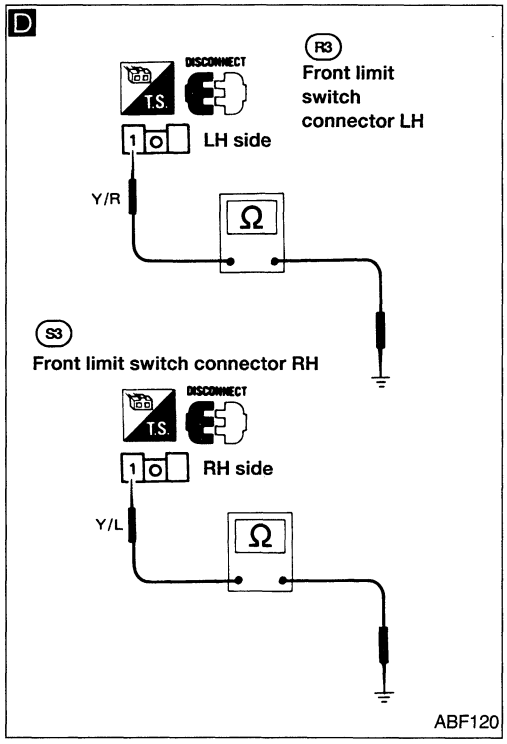
Yes → Replace control module.

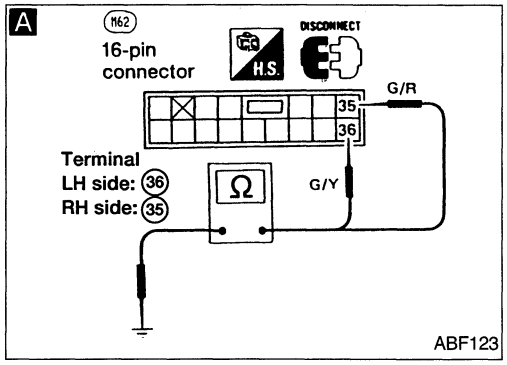
No

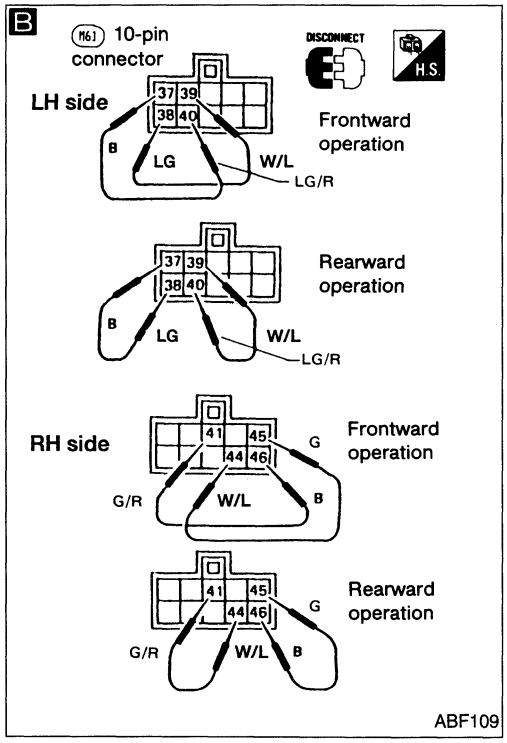
Reinstall any part removed.

Go to PROCEDURE 1 (START) in Preliminary Check. (Refer to BF-48.)

Diagnostic Procedure 3 (Cont'd)







Ⓐ

D

Does continuity exist?

	Connector	Terminals
LH side	R3	1 - Ground
RH side	S3	1 - Ground

Yes → Repair harness. There will be incorrect grounding between terminals 42 and 1 or 43 and 1.

No ↓

Go to FRONT LIMIT SWITCH in Electrical Components Inspection. (Refer to BF-67.)

O.K. → Replace guide rail assembly.

N.G. ↓

Check front limit switch harness for open and short circuit.

N.G. → Repair front limit switch harness.

O.K. ↓

Replace front limit switch.

Diagnostic Procedure 4

START

A

CHECK REAR LIMIT SWITCH CIRCUIT.
1) Disconnect 16-pin connector from control module.
2) Check continuity.

	Terminals	Shoulder belt buckle position	Continuity
LH side	36 - Ground	At rear	No
		Not at rear	Yes
RH side	35 - Ground	At rear	No
		Not at rear	Yes

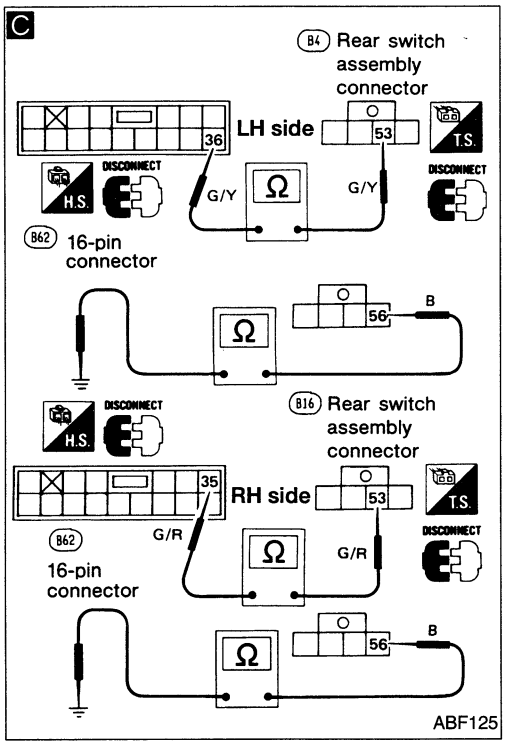
O.K. → (Go to Ⓑ on next page.)

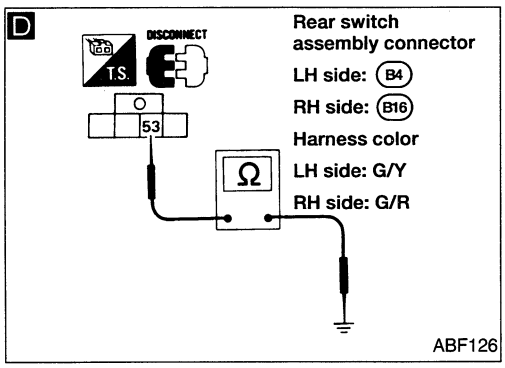
B **Check drive motor for operation.**

N.G. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 4 (Cont'd)





Ⓐ

C

1) Disconnect connector from rear switch assembly.
2) Check continuity.

	Terminals
LH side	36 - 53 56 - Ground (B6 , B14)
RH side	35 - 53 56 - Ground (B6 , B14)

Continuity should exist.

N.G. → Repair harness.

O.K. ↓

D

Does continuity exist?

	Connector	Terminals
LH side	B4	53 - Ground
RH side	B16	53 - Ground

Yes → Repair harness. There will be incorrect grounding between terminals 36 and 53 or 35 and 53.

No ↓

Go to REAR LIMIT SWITCH in Electrical Components Inspection. (Refer to BF-67.)

O.K. → (Go to Ⓑ below.)

N.G. ↓

Check rear limit switch harness for open or short circuit.

N.G. → Repair rear limit switch harness.

O.K. ↓

Replace rear switch assembly.

Ⓑ

Is this the second time?

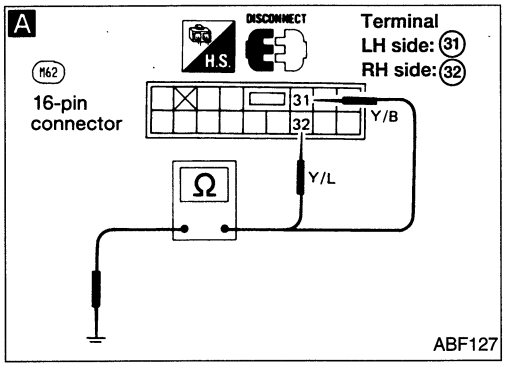
Yes → Replace control module.

No ↓

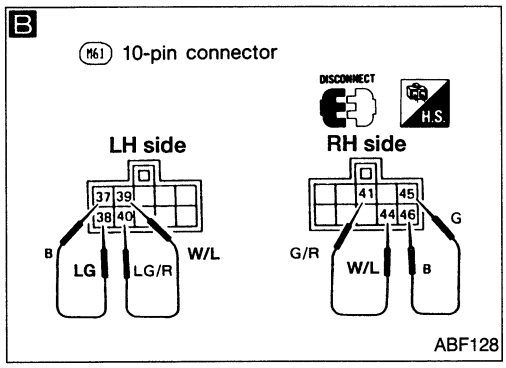
Reinstall any part removed.

Go to PROCEDURE 1 (STEP 3) or PROCEDURE 2 (STEP 3) in Preliminary Check. (Refer to BF-48 or BF-50.)

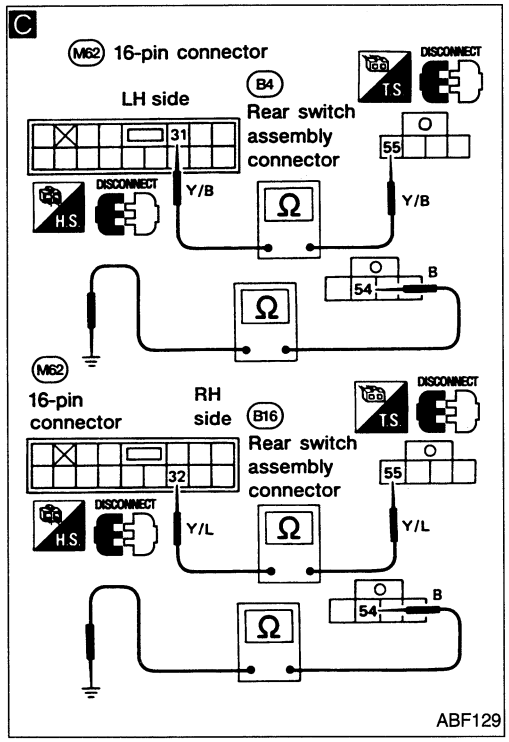
A



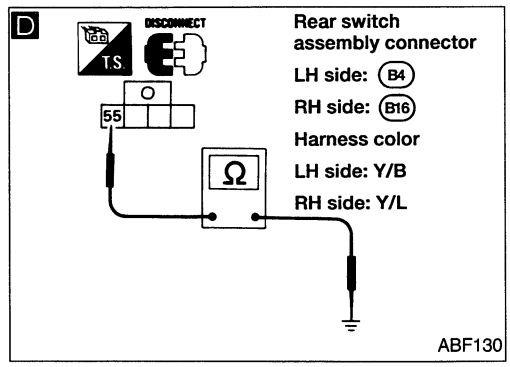
B



C



D



Diagnostic Procedure 5

START

A

CHECK SHOULDER BELT BUCKLE SWITCH CIRCUIT.
1) Disconnect 16-pin connector from control module.
2) Check continuity when shoulder belt buckle is at rear lock position.

	Terminals	Shoulder belt	Continuity
LH side	31 - Ground	Fastened	Yes
		Unfastened	No
RH side	32 - Ground	Fastened	Yes
		Unfastened	No

B **If shoulder belt buckle is not at rear lock position, set it to rear lock position.**

O.K. → (Go to Ⓑ on next page.)

N.G. ↓

C

1) Disconnect connector from rear switch assembly.
2) Check continuity.

	Terminals
LH side	31 - 55 54 - Ground (B6 , B14)
RH side	32 - 55 54 - Ground (B6 , B14)

Continuity should exist.

N.G. → Repair harness.

O.K. ↓

D

Does continuity exist?

	Connector	Terminals
LH side	B4	55 - Ground
RH side	B16	55 - Ground

Yes → Repair harness. There will be incorrect grounding between terminals 31 and 55 or 32 and 55.

No ↓

Go to SHOULDER BELT BUCKLE SWITCH in Electrical Components Inspection. (Refer to BF-67.)

O.K. → (Go to Ⓑ on next page.)

N.G. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 5 (Cont'd)

Ⓐ

Check shoulder belt buckle switch harness for open or short circuit. — N.G. → Repair shoulder belt buckle switch harness.

O.K.

Replace rear switch assembly.

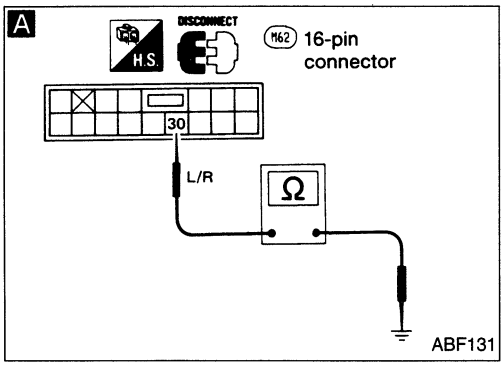
Ⓑ

Is this the second time? — Yes → Replace control module.

No

Reinstall any part removed.

Go to PROCEDURE 2 (STEP 4) in Preliminary Check. (Refer to BF-50.)



Diagnostic Procedure 6

START

A

CHECK LAP BELT BUCKLE SWITCH CIRCUIT (LH only).
1) Disconnect 16-pin connector from control module.
2) Check continuity.

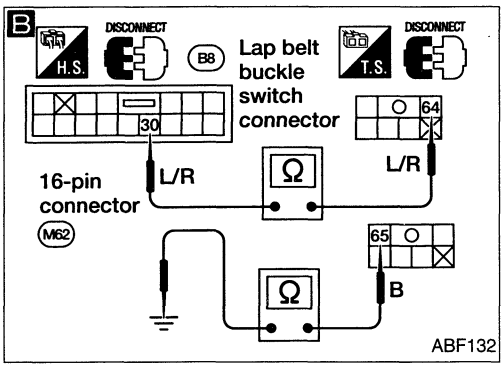
Terminals	Lap belt	Continuity
㉚ - Ground	Fastened	No
	Unfastened	Yes

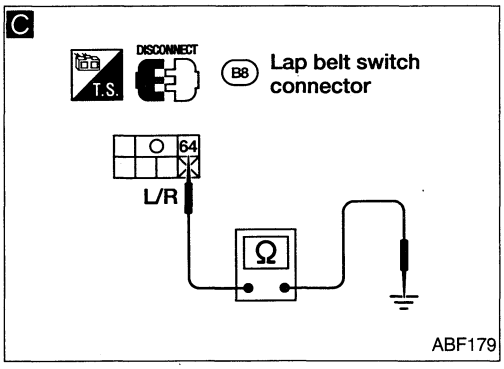
O.K. → (Go to Ⓐ on next page.)

N.G.

(Go to Ⓑ on next page.)

Diagnostic Procedure 6 (Cont'd)





Ⓑ

B

1) Disconnect lap belt switch connector.
2) Check continuity.

Terminals
㉚ - ㊹
㊺ - Ground (B6 , B14)

Continuity should exist.

N.G. → Repair harness.

O.K.

C

Does continuity exist?

Terminals
㊹ - Ground

Yes → Repair harness. There will be incorrect grounding.

No

Go to LAP BELT BUCKLE SWITCH in Electrical Components Inspection. (Refer to BF-68.)

O.K. → (Go to Ⓐ below.)

N.G.

Check lap belt buckle switch harness for open and short circuit.

N.G. → Repair lap belt buckle switch harness.

O.K.

Replace shoulder belt buckle assembly.

Ⓐ

Is this the second time?

Yes → Replace control module.

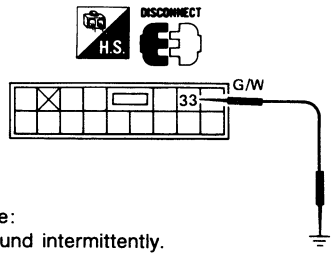
No

Reinstall any part removed.

Go to PROCEDURE 2 (STEP 6) in Preliminary Check. (Refer to BF-50.)

A

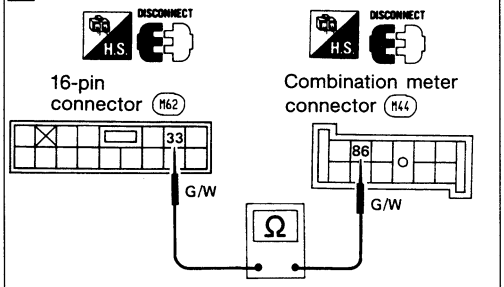
(M62) 16-pin connector



Note:
Ground intermittently.

ABF133

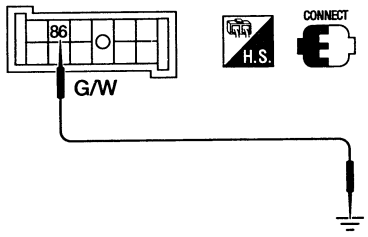
B



ABF134

C

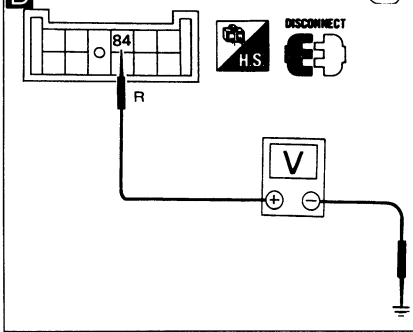
Combination meter connector (M44)



ABF184

D

Combination meter connector (M43)



SBF591G

Diagnostic Procedure 7

START

A

CHECK WARNING CHIME CIRCUIT.
1) Disconnect 16-pin connector from control module.
2) Check warning chime.

Terminals	Method	Result
(33) - Ground	Ground intermittently.	Sound

O.K. → (Go to Ⓐ below.)

N.G.

B

1) Disconnect connector(s) from combination meter.
2) Check continuity.

Terminals
(33) - (86)
Continuity should exist.

N.G. → Repair harness.

O.K.

C

1) Connect suitable wire between terminal (86) and ground.
2) Does chime sound?

Yes → Check automatic seat belt control module and its circuit.

No

D

Check battery positive voltage existence.

Terminals
(84) - Ground
Battery positive voltage should exist.

N.G. → Repair harness.
For details, refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K.

Ⓐ

Is this the first time?

Yes → Replace warning chime.

No

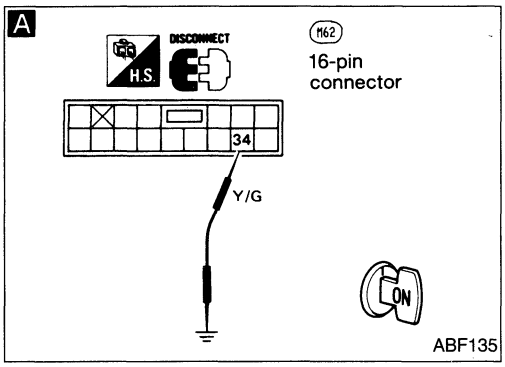
Is this the second time?

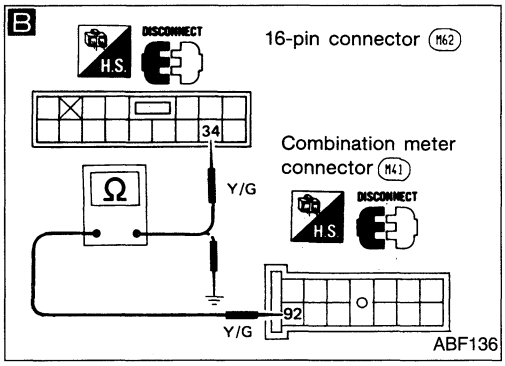
Yes → Replace control module.

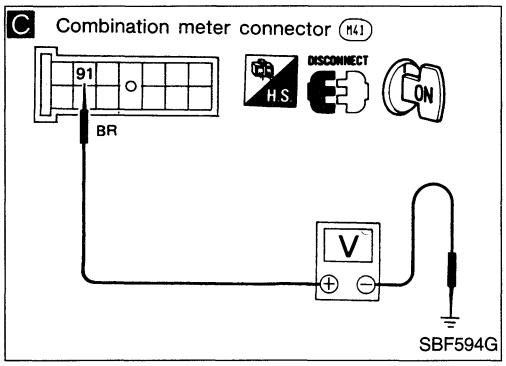
No

Reinstall any part removed.

Go to PROCEDURE 2 (START) in Preliminary Check.
(Refer to BF-50.)







Diagnostic Procedure 8

START

A

CHECK WARNING LAMP CIRCUIT.
1) Disconnect 16-pin connector from control module.
2) Check warning lamp.

Terminals	Result
34 - Ground	Glow

O.K. → (Go to Ⓐ below.)

N.G.

B

1) Disconnect connector from combination meter.
2) Check continuity.

Terminals
34 - 92

Continuity should exist.

N.G. → Repair harness.

O.K.

B

Does continuity exist?

Terminals
92 - Ground

Yes → Repair harness. There will be incorrect grounding.

No

C

Check battery positive voltage existence.

Terminals
91 - Ground

Battery positive voltage should exist.

N.G. → Repair harness. For details, refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K.

Is warning lamp bulb burn out?

Yes → Replace bulb.

No

Ⓐ

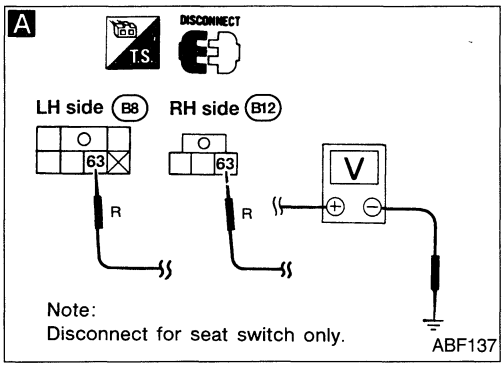
Is this the second time?

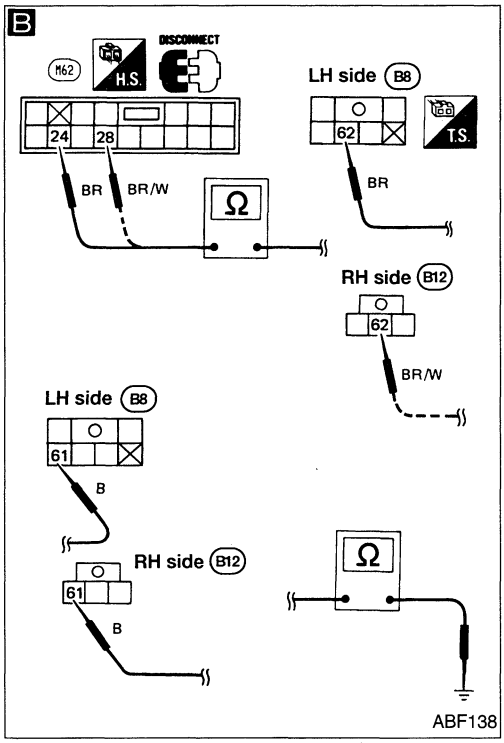
Yes → Replace control module.

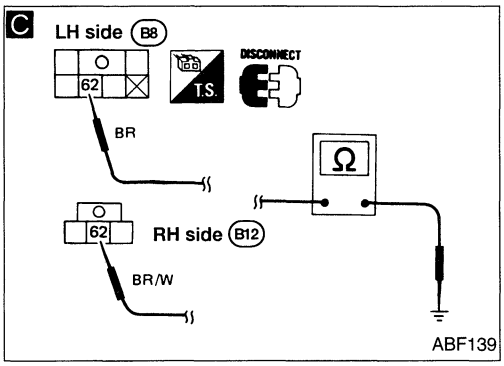
No

Reinstall any part removed.

Go to PROCEDURE 2 (START) in Preliminary Check. (Refer to BF-50.)







Diagnostic Procedure 9

START

A

Does battery positive voltage exist between terminal (63) and ground?

No → Repair harness, harness connector and fuse between battery and terminal (63).

Yes

Go to SEAT SLIDE SWITCH in Electrical Components Inspection. (Refer to BF-68.)

N.G. → Replace seat slide switch.

O.K.

B

Does continuity exist?

N.G. → Repair harness, harness connector.

	Connector	Terminals
LH side	(B8)	(62) - (24)
		(61) - Ground
RH side	(B12)	(62) - (28)
		(61) - Ground

O.K.

C

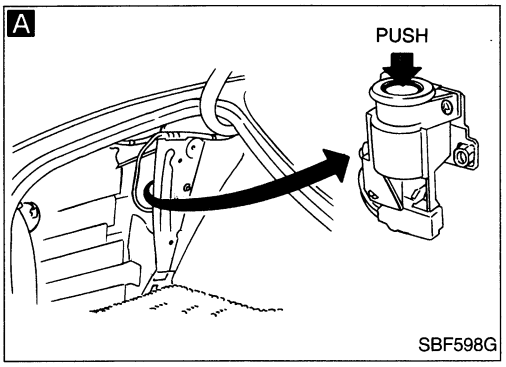
Does continuity exist between terminal (62) and ground?

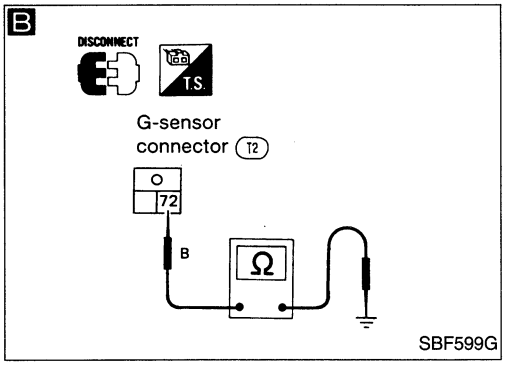
Yes → Repair harness. There will be incorrect grounding.

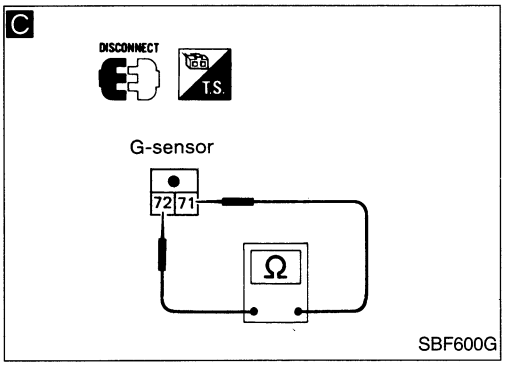
No

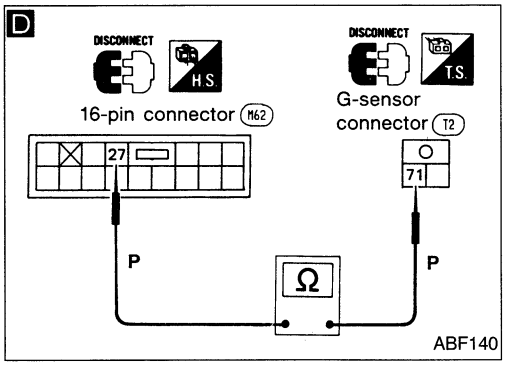
Replace shoulder belt locking canceller (shoulder belt retractor assembly).

Diagnostic Procedure 10









START

A

CHECK G-SENSOR CIRCUIT.
1) Remove luggage left trim.
2) Check G-sensor button. Can the button be pushed in?

Yes → Check system operation.

N.G. → Check system operation.

No

B

1) Disconnect connector from G-sensor.
2) Check continuity.

Terminals
(72) - Ground

Continuity should exist.

N.G. → Repair harness.

O.K.

C

1) Remove G-sensor.
2) Check G-sensor continuity.

Terminals
(71) - (72)

Continuity should exist.

N.G. → Replace G-sensor.

O.K.

D

1) Disconnect connector from front limit switch.
2) Check continuity.

Terminals
(27) - (71)

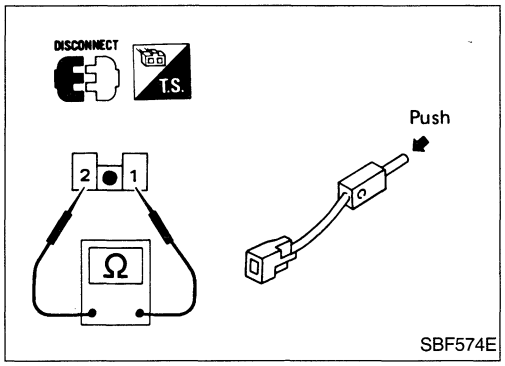
Continuity should exist.

N.G. → Repair harness.

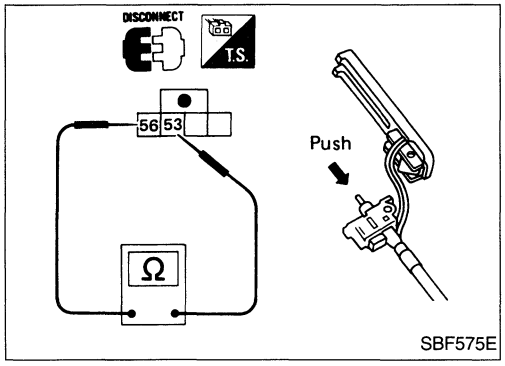
O.K.

Reinstall any part removed.

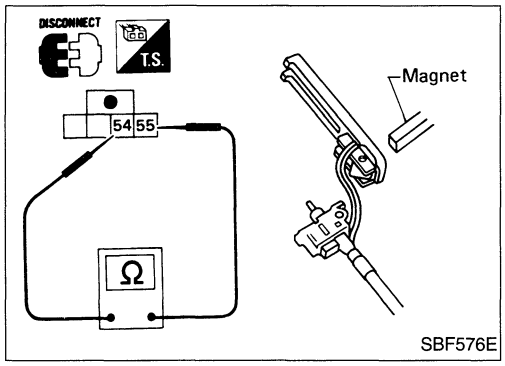
Go to PROCEDURE 1 (START) in Preliminary Check. (Refer to BF-48.)



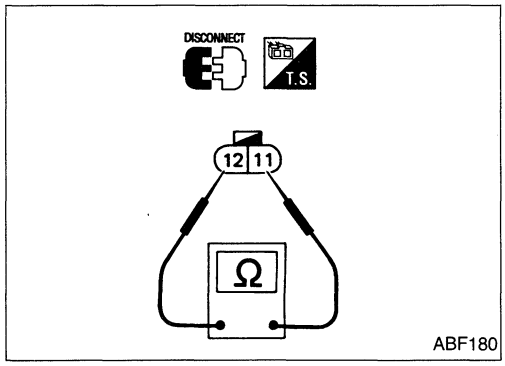
SBF574E



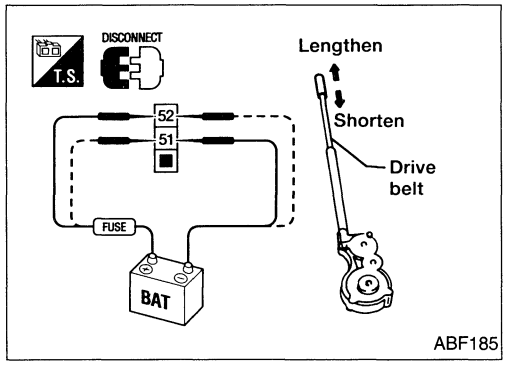
SBF575E



SBF576E



ABF180



ABF185

Electrical Components Inspection

FRONT LIMIT SWITCH

Condition	Continuity
Pushed	No
Released	Yes

REAR LIMIT SWITCH

Condition	Continuity
Pushed	No
Released	Yes

SHOULDER BELT BUCKLE SWITCH

Condition	Continuity
Move magnet toward buckle switch.	Yes
Move magnet away buckle switch.	No

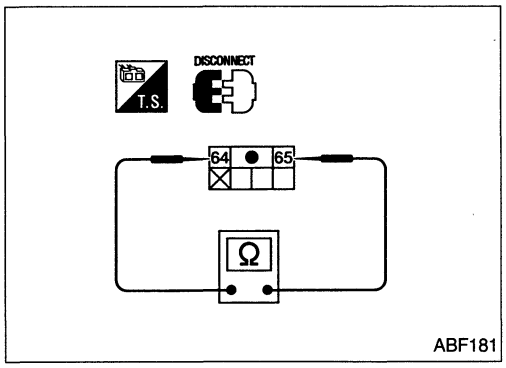
DOOR LATCH SWITCH (Built-into door lock assembly)

Door condition	Continuity
Open	Yes
Closed	No

DRIVE MOTOR ASSEMBLY

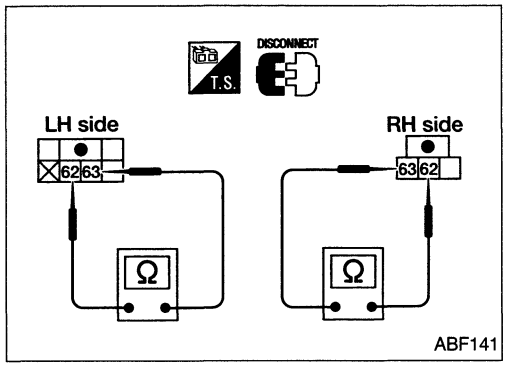
Terminals		Drive belt operation
⊕	⊖	
(52)	(51)	Lengthen
(51)	(52)	Shorten

Electrical Components Inspection (Cont'd)



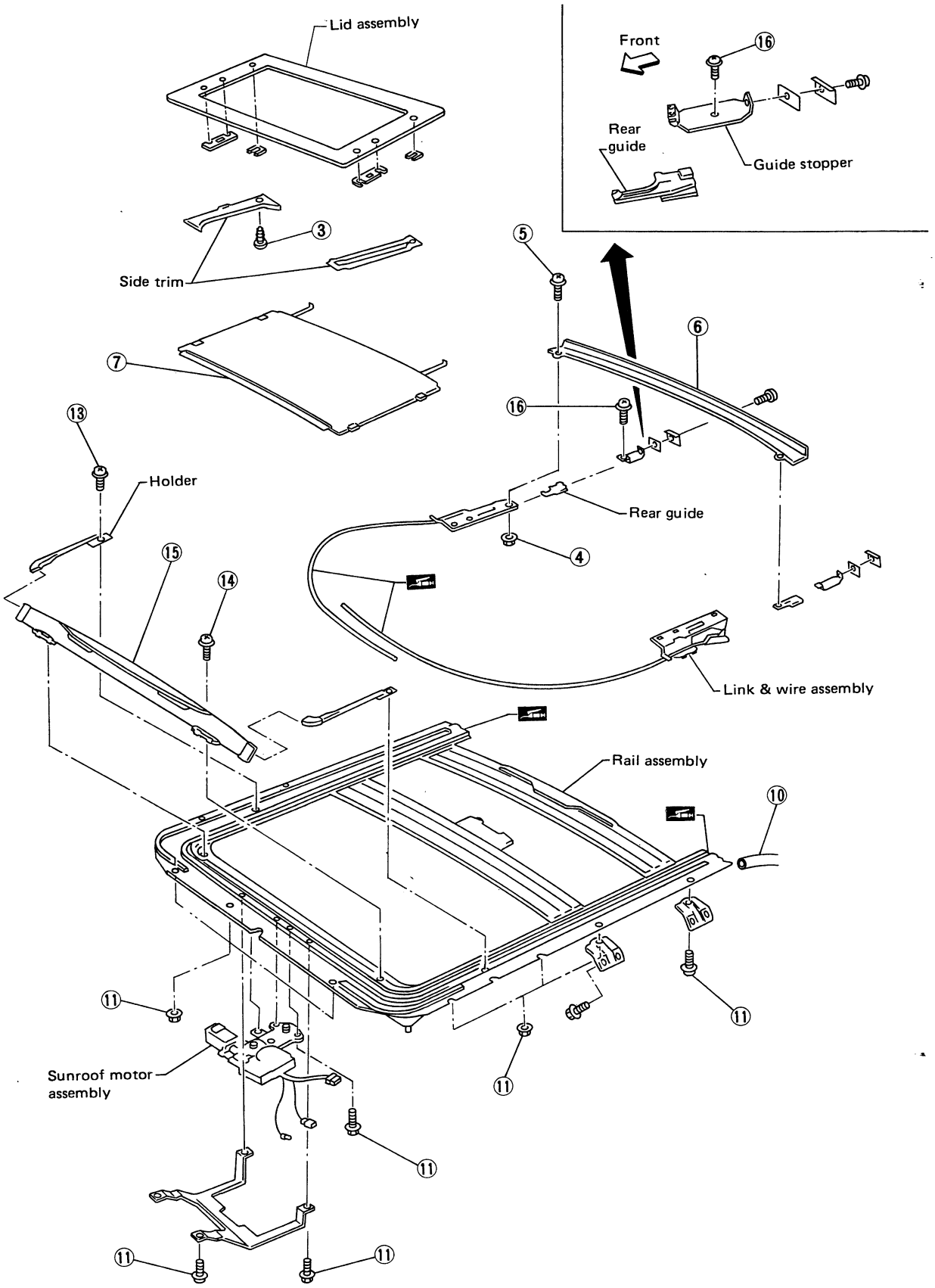
LAP BELT BUCKLE SWITCH
(Built-into lap belt buckle for LH side)

Condition	Continuity
Fastened	No
Unfastened	Yes



SEAT SLIDE SWITCH
(Seat slide inside rail)

Condition	Continuity
Move seat front-rear adjusting lever	Yes
Release seat front-rear adjusting lever	No


Lid assembly
Front
16
Rear guide
Guide stopper
3
Side trim
5
7
6
16
13
Holder
Rear guide
4
15
14
Link & wire assembly
Rail assembly
10
11
Sunroof motor assembly
11
11
11
11

MBF580A

- After any adjustment, check sunroof operation and lid alignment.
- Handle finisher plate and glass lid with care so not to cause damage.
- It is desirable for easy installation to mark each point before removal.

CAUTION:
a. Always work with a helper.
b. Remove sunroof frame from rear door opening.

REMOVAL — Sunroof lid assembly

① Open sunroof shade.
② Close sunroof lid.
③ Remove side trim clips.
④ Remove the six nuts securing sunroof lid assembly to link assembly.

REMOVAL — Shade assembly

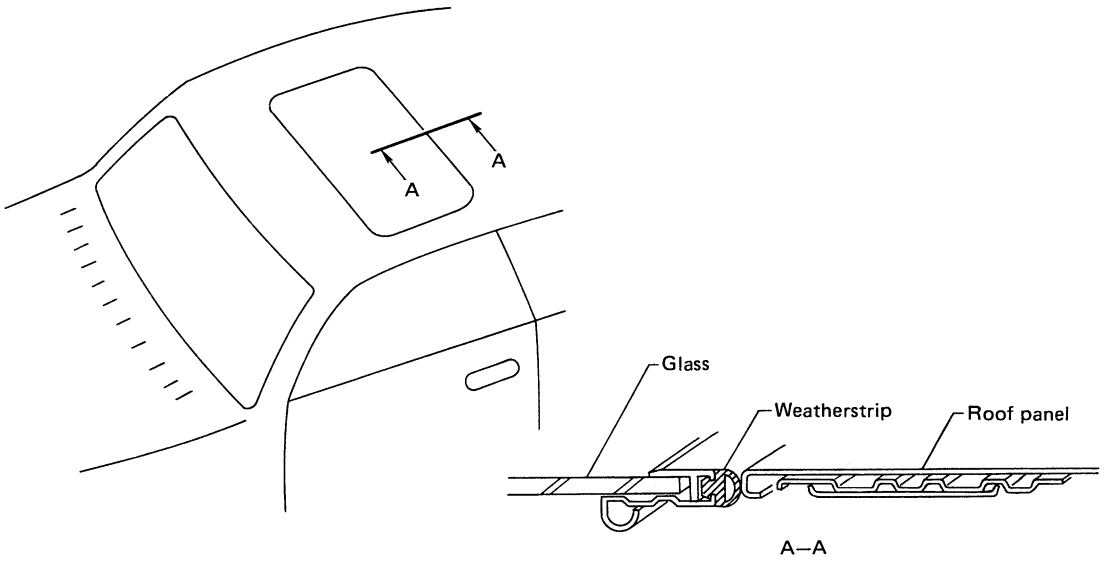
⑤ After removing sunroof lid assembly, remove screws securing rear drains to roof.
⑥ Remove rear drain.
⑦ Remove shade assembly.

REMOVAL — Sunroof assembly

⑧ Remove headlining. Refer to BF-28.
⑨ Disconnect interior lamp harness.
⑩ Disconnect front and rear drain hoses.
⑪ Remove nuts and bolts securing sunroof rail and motor to roof.
⑫ Remove sunroof assembly.

REMOVAL — Link & wire assembly

⑬ After removing shade assembly and sunroof assembly, remove the two screws securing holders to sunroof rail.
⑭ Remove the two screws securing window deflector to sunroof rail.
⑮ Remove window deflector.
⑯ Remove the two screws securing guide stoppers to sunroof rail.

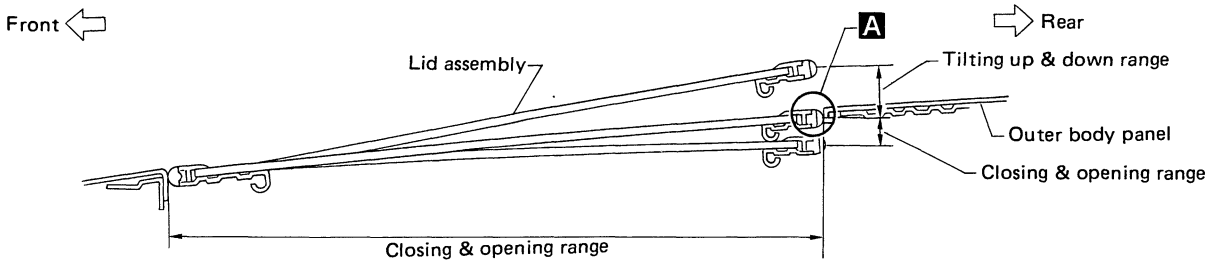


SBF918F

ADJUSTMENT

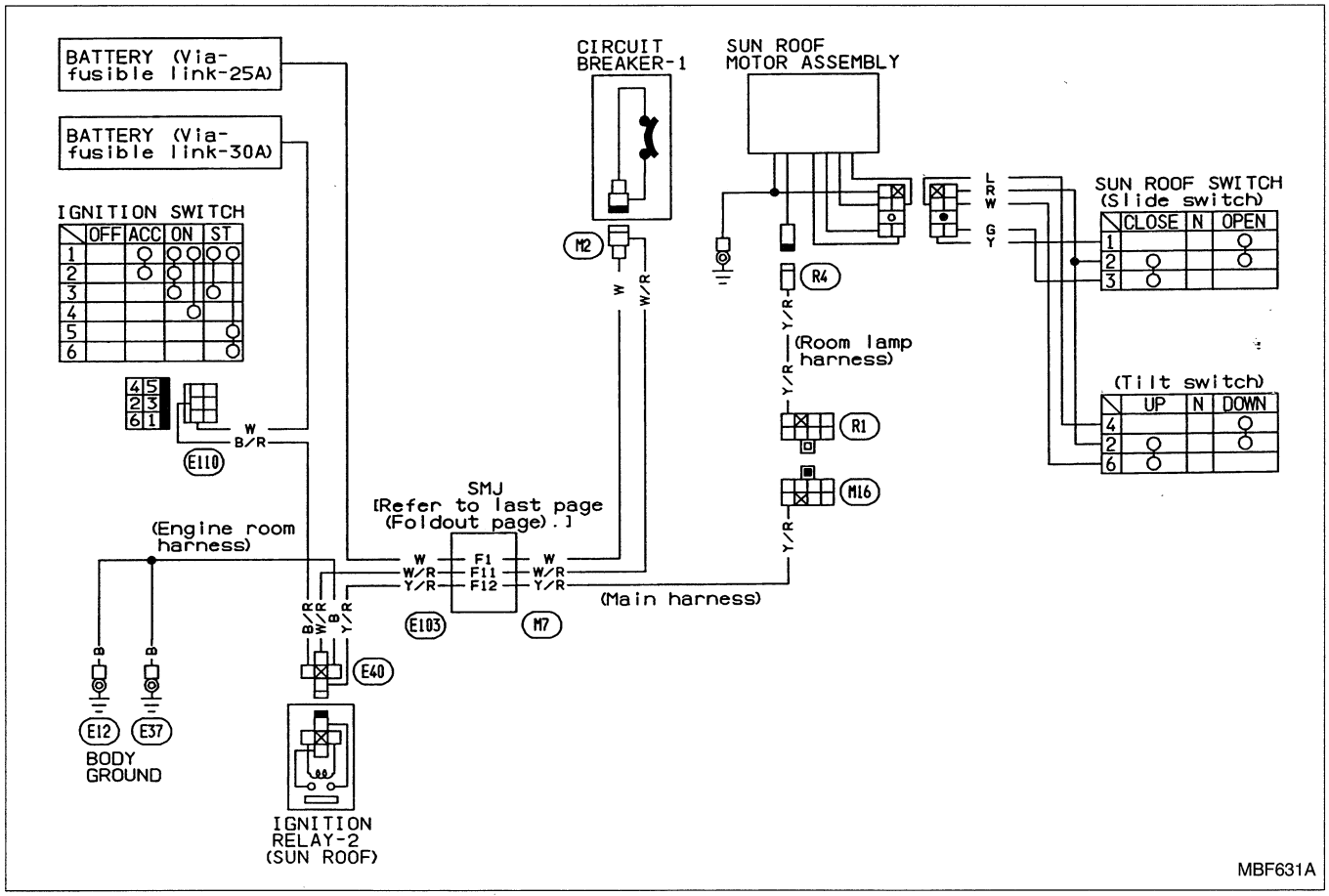
Install motor & limit SW assembly and sunroof rail assembly in the following sequence:

1. Arrange equal lengths of link and wire assemblies on both sides of sunroof opening.
2. Connect sunroof connector to sunroof switch and positive (+) power supply.
3. Set lid assembly to fully closed position **A** by operating CLOSE switch and TILT switch.
4. Fit outer side of lid assembly to the surface of roof on body outer panel.
5. Remove motor, and keep CLOSE switch pressed until motor pinion gear reaches the end of its rotating range.
6. Install motor.
7. Check that motor drive gear fits properly in wires.
8. Press TILT-UP switch to check lid assembly for normal tilting.
9. Check sunroof lid assembly for normal operations (tilt-up, tilt-down, open, and close).



SBF920F

Wiring Diagram

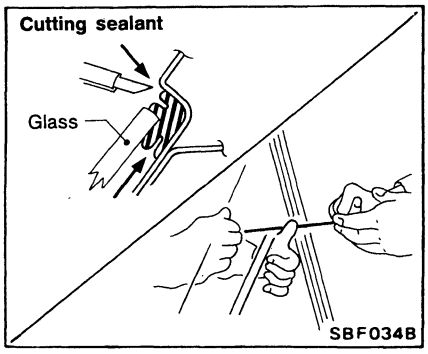


Windshield

REMOVAL

After removing moldings, remove glass.

CAUTION:
Be careful not to scratch glass when removing.



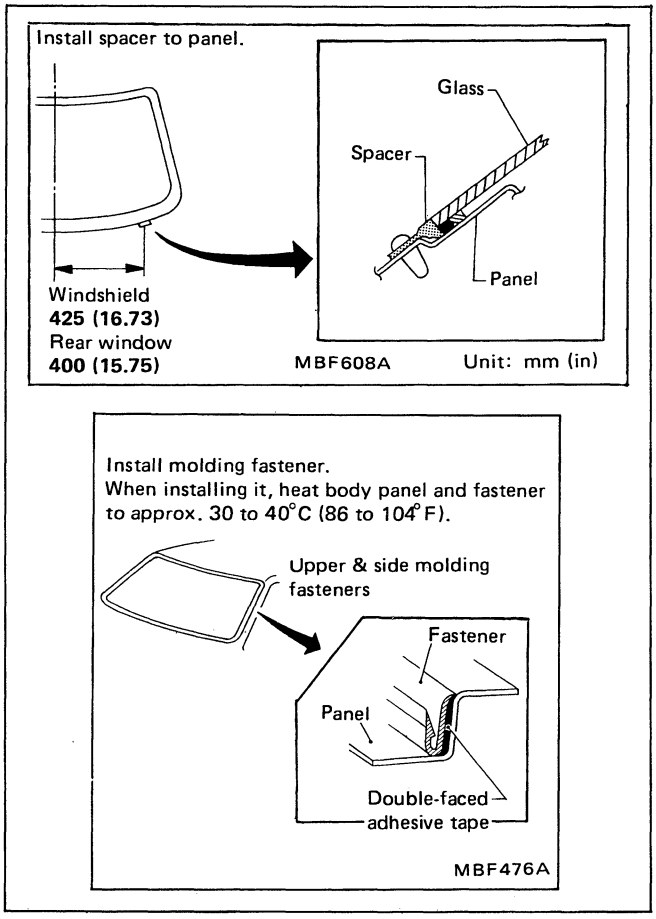
INSTALLATION

- **Use genuine Nissan Sealant kit or equivalent. Follow instructions furnished with it.**
- **After installation, the vehicle should remain stationary for about 24 hours.**

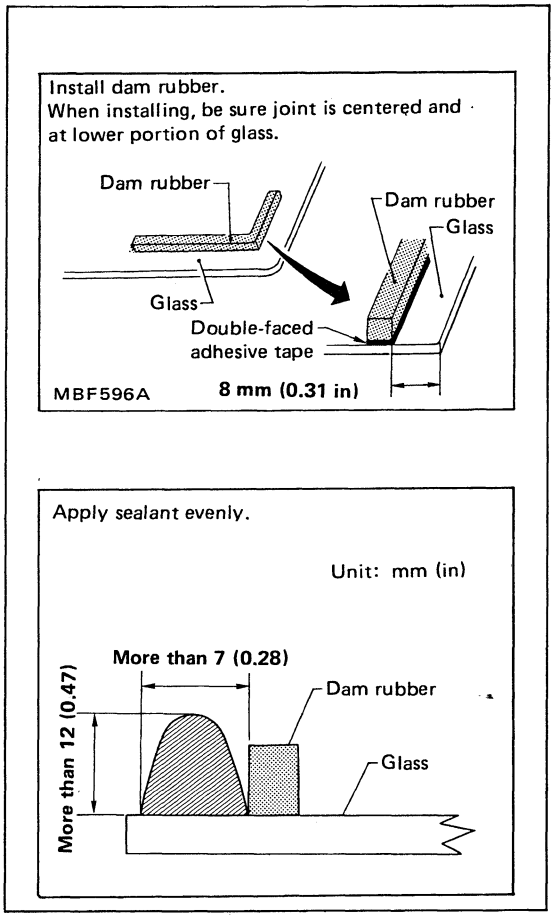
WARNING:
Keep heat and open flames away as primers are flammable.
CAUTION:
Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

- **Do not use sealant which is past its usable term.**
- **Do not leave cartridge unattended with its cap open.**
- **Keep primers and sealant in a cool, dry place. Ideally, they should be stored in a refrigerator.**
- **Windshield glass should be installed within 15 minutes of applying sealant:**
  sealant starts to harden 15 minutes after it is applied.
- **Molding must be installed securely so that it is in position and leaves no gap.**

Body side



Glass side



REPAIRING WATER LEAKS FOR WINDSHIELD

Leaks can be repaired without removing and reinstalling glass.

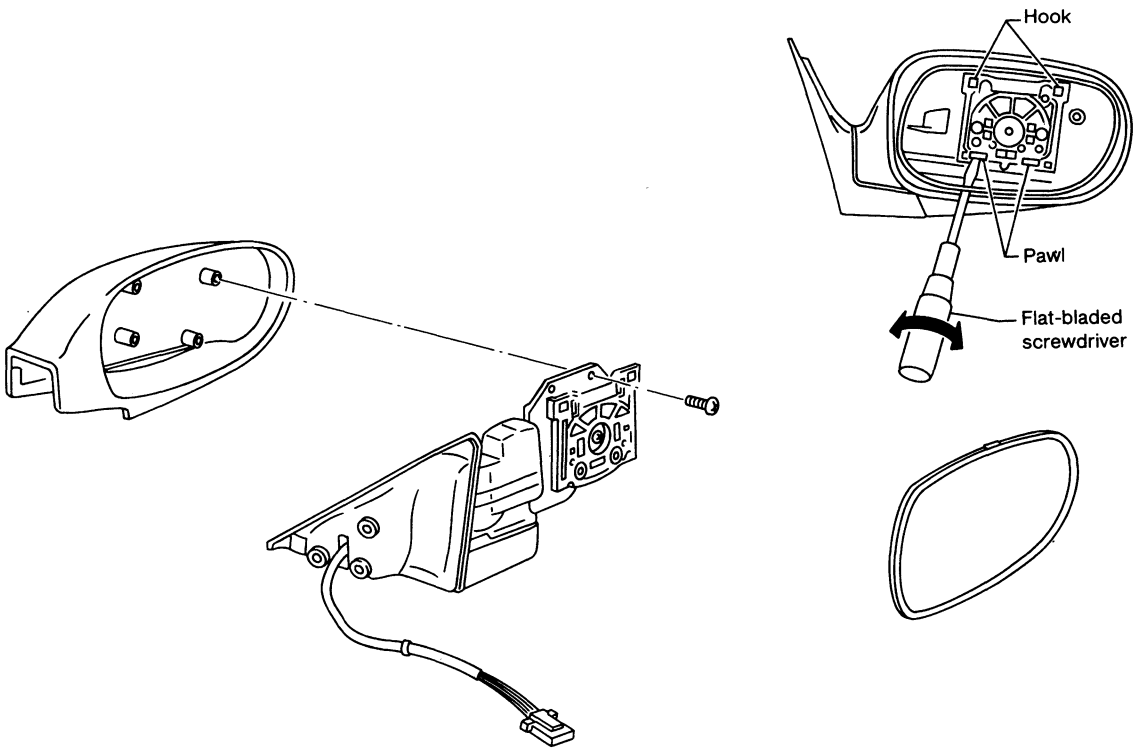
If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.

To stop the leak, apply primer (if necessary) and then sealant to the leak point.

Door Mirror

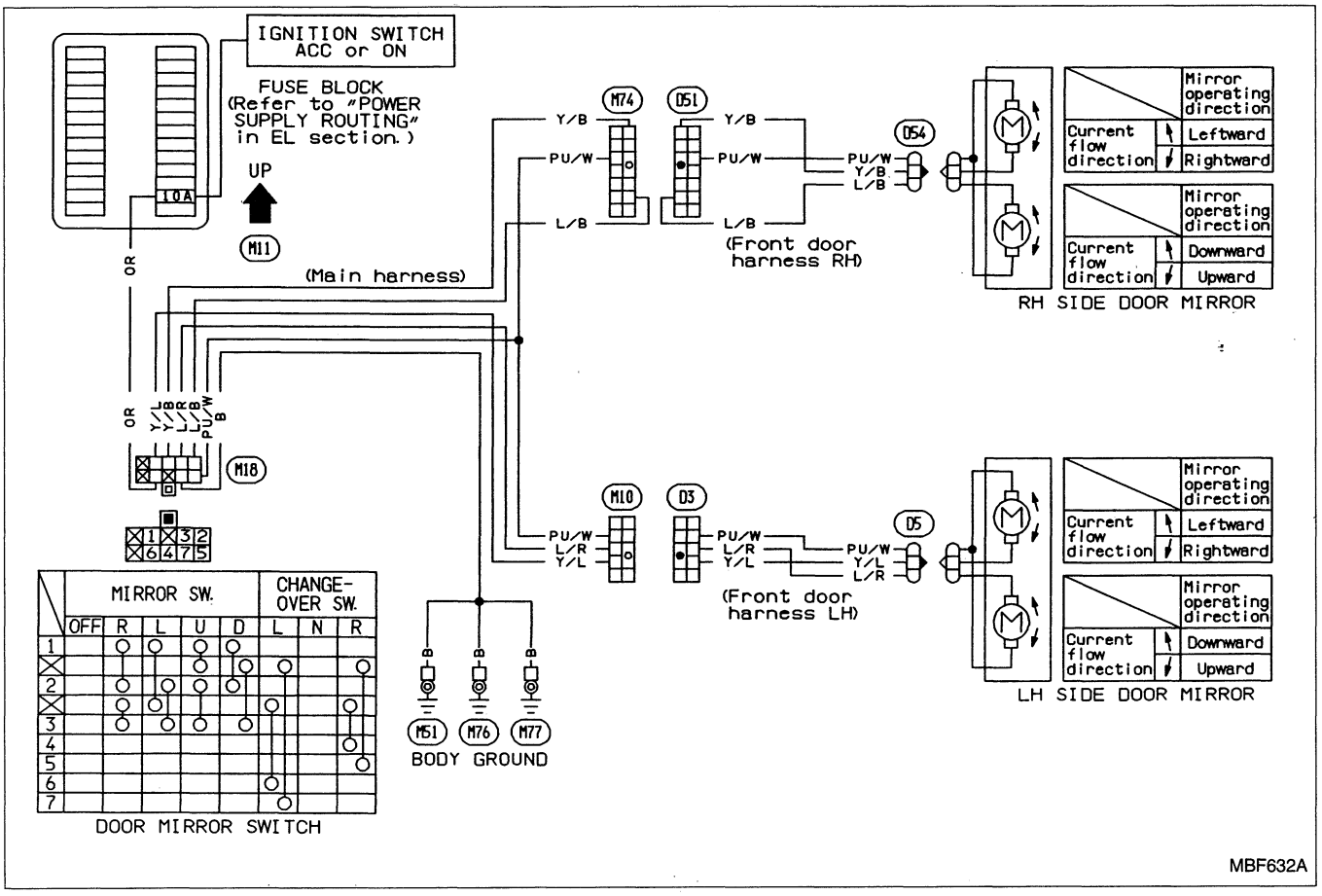
REMOVAL

- Wrap flat-bladed screwdriver with a cloth to prevent scratching rear of door mirror. Do not insert screwdriver too far.



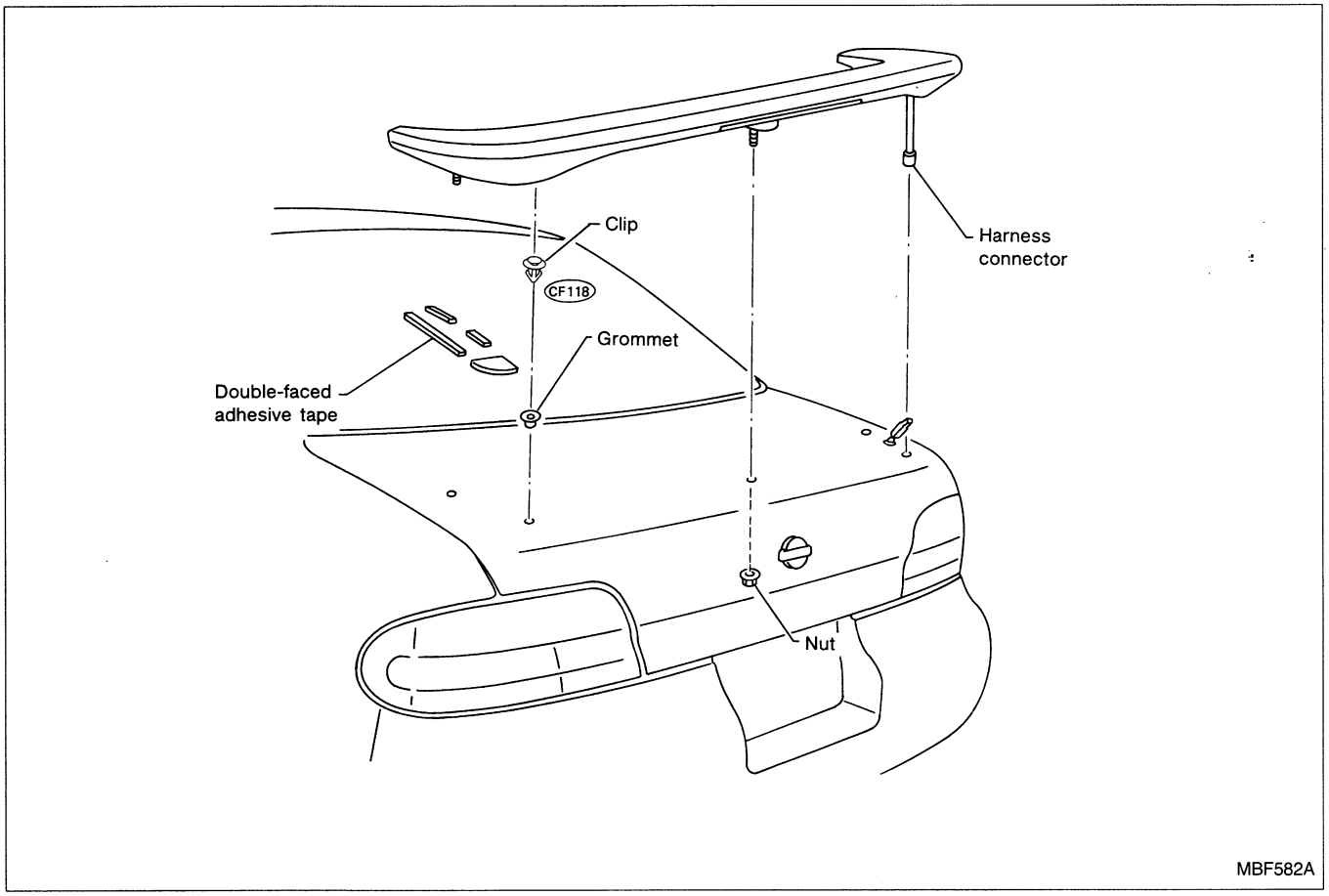
MBF581A

Door Mirror/Wiring Diagram

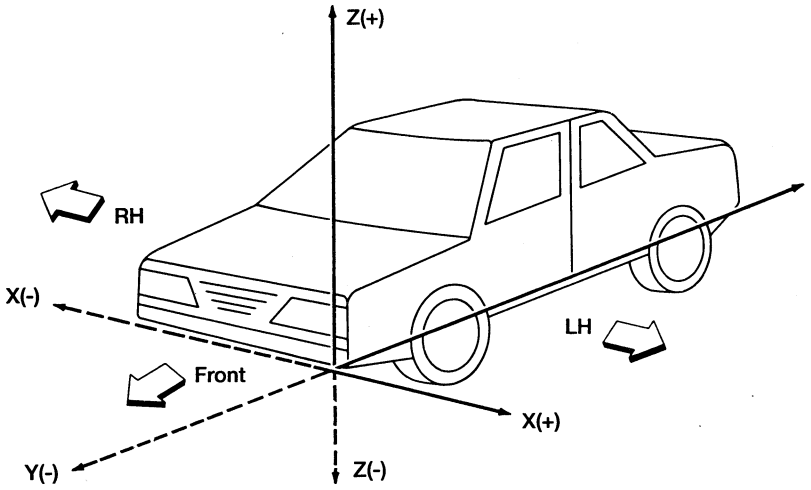


- When installing, make sure that there are no gaps or waves at ends of air spoiler.
- Before installing spoiler, clean and remove oil from surface where spoiler will be mounted.

REAR AIR SPOILER



- All dimensions indicated in figures are actual ones.
- When a tram tracking gauge is used, adjust both pointers to equal length and check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check for 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".

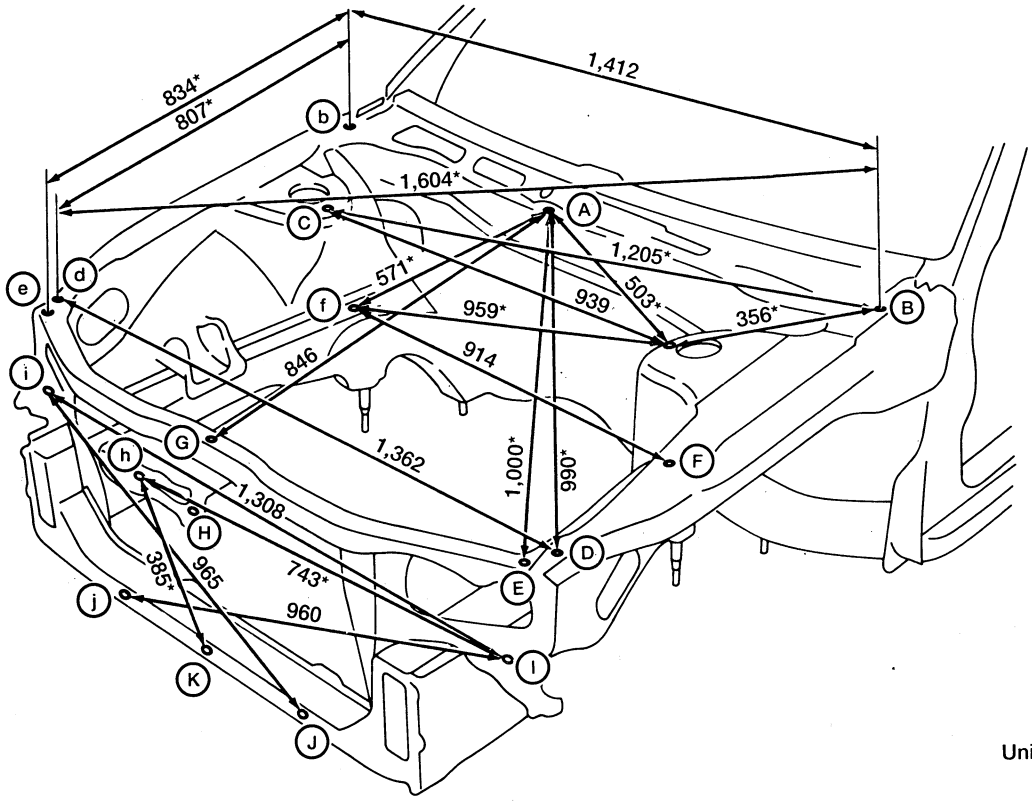


X=0: VEHICLE CENTER
Y=0: CENTER LINE OF FRONT AXLE
Z=0: IMAGINARY BASE LINE [200 MM BELOW DATUM LINE ("0Z" AT DESIGN PLAN)]

ABF159

Engine Compartment

MEASUREMENT



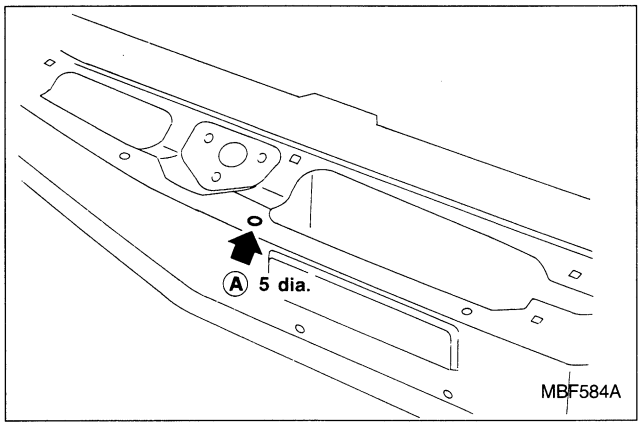
Unit: mm

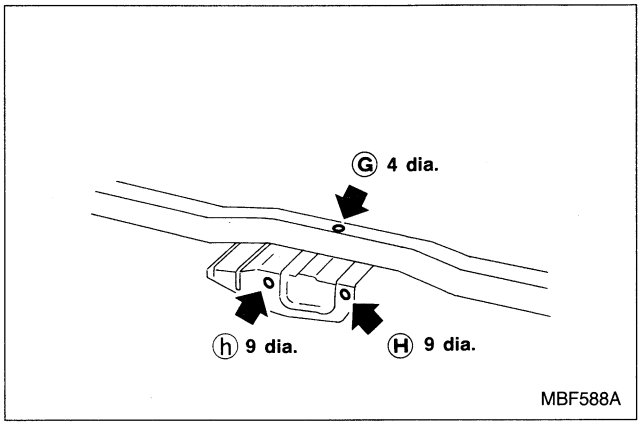
ABF156

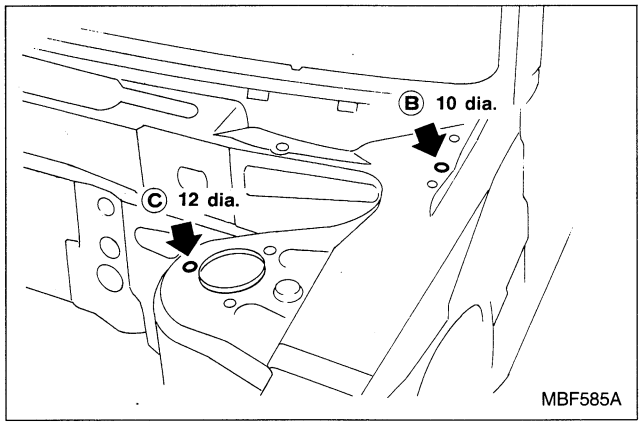
Engine Compartment (Cont'd)

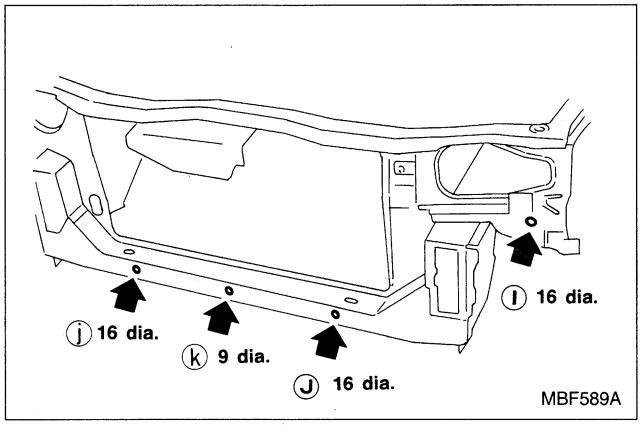
MEASUREMENT POINTS

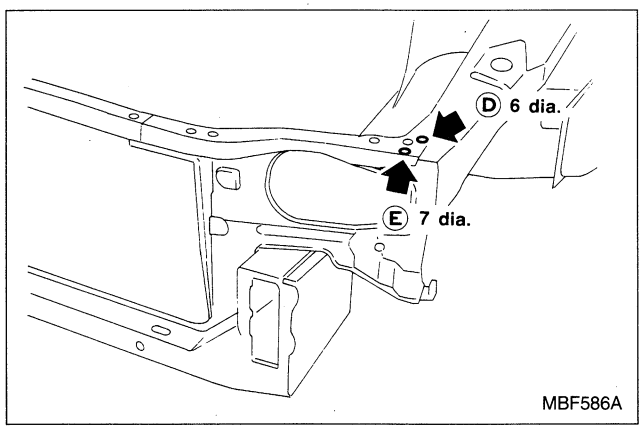
Unit: mm

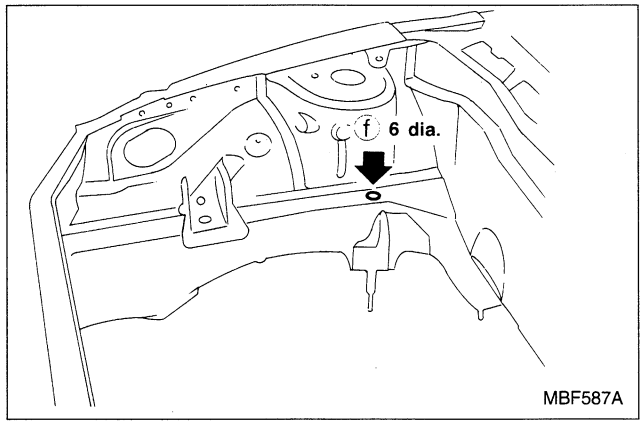






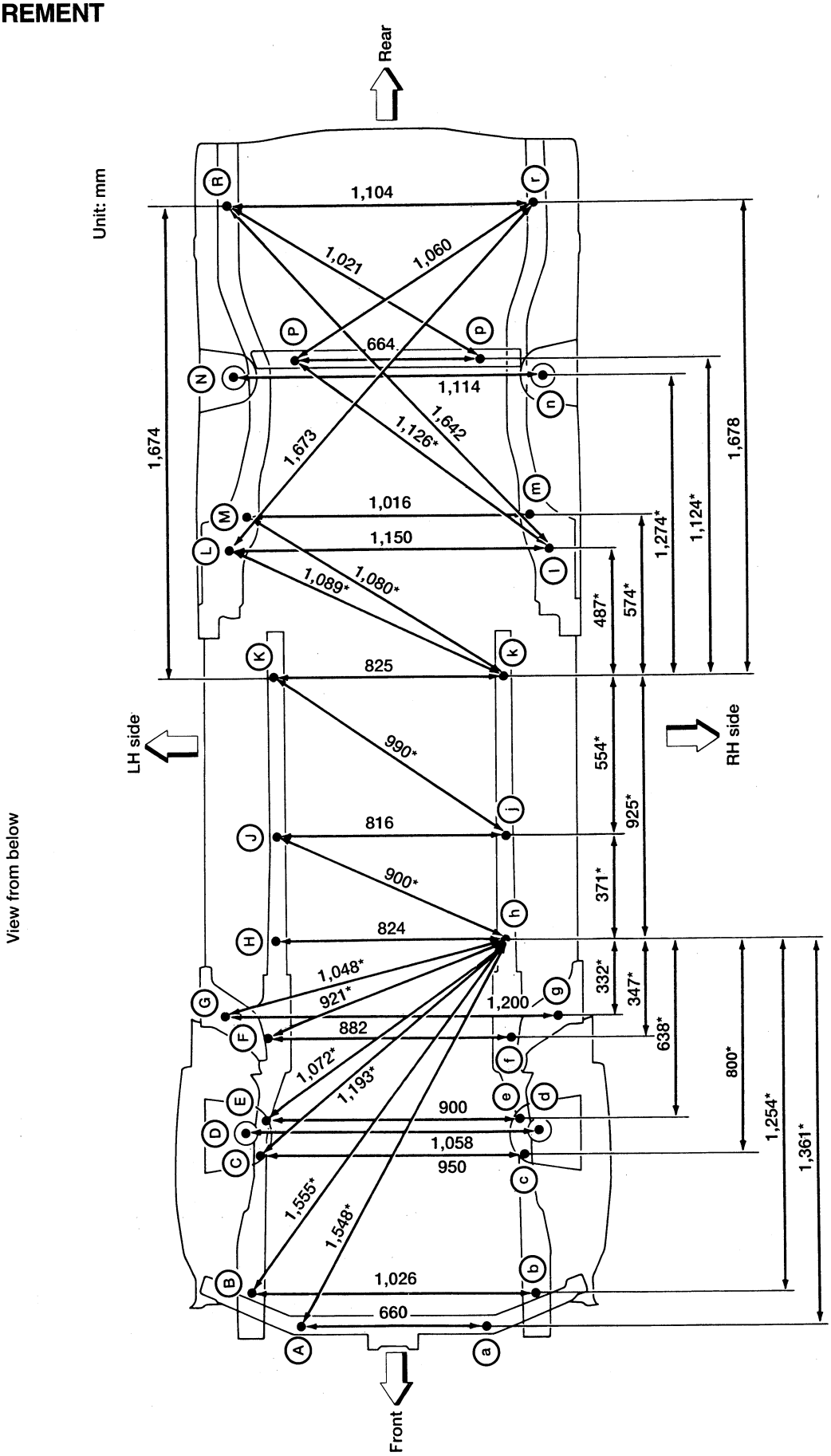






Underbody

MEASUREMENT



ABF157

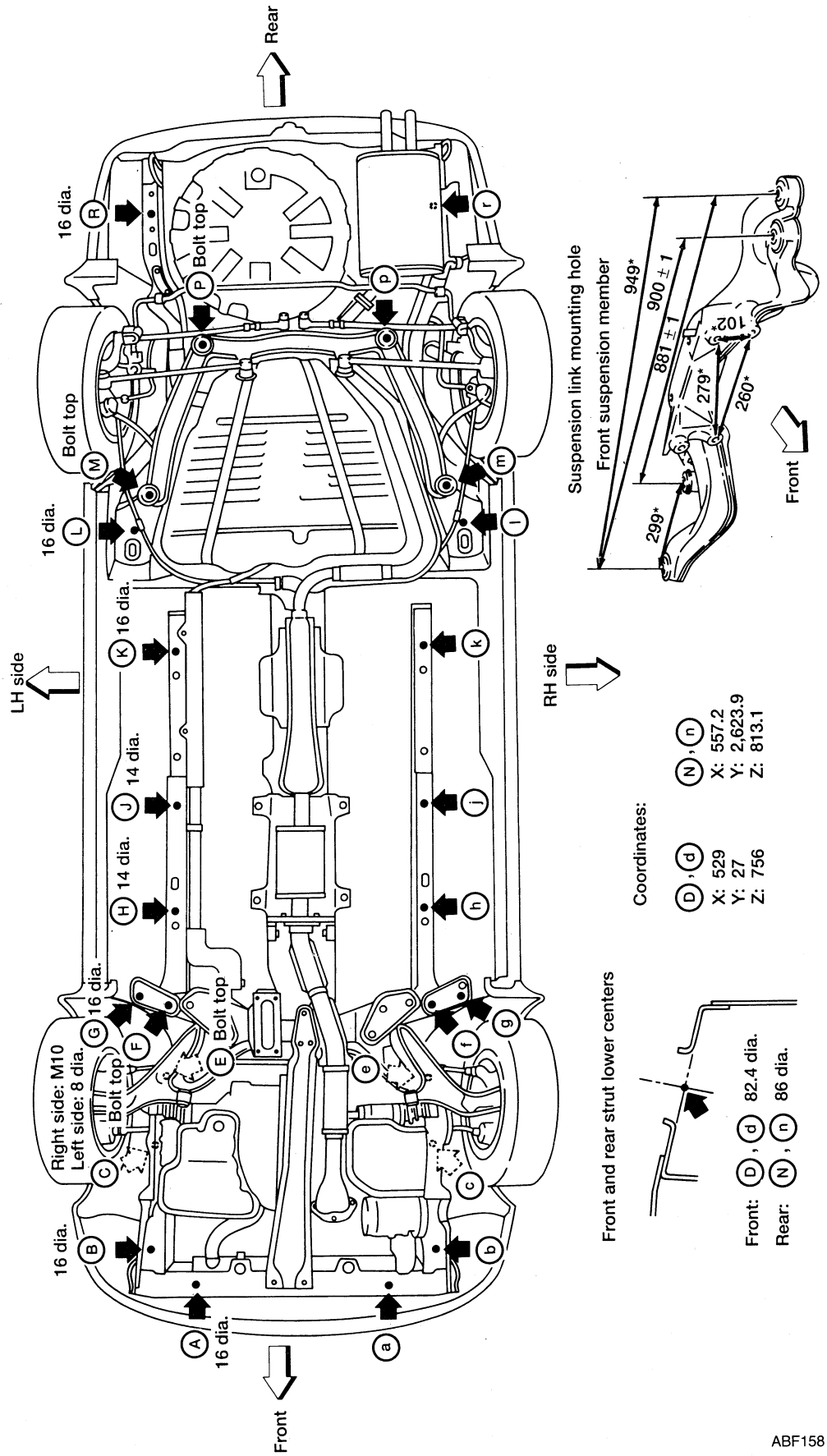
Underbody (Cont'd)

MEASUREMENT POINTS

Unit: mm

Coordinates:

Ⓐ,ⓐ	Ⓒ,ⓒ	Ⓕ,ⓕ	Ⓗ,ⓗ	Ⓚ,ⓚ	Ⓜ,ⓜ	Ⓡ			
X: 330	X: 475	X: 441	X: 412	X: 412.5	X: 508	X: 529			
Y: -655	Y: -52	Y: 354	Y: 700	Y: 1,625	Y: 2,190	Y: 3,280			
Z: 208	Z: 376	Z: 111.5	Z: 109	Z: 105.4	Z: 133	Z: 326.5			
Ⓑ,ⓑ	Ⓔ,ⓔ	Ⓖ,ⓖ	Ⓙ,ⓙ	Ⓛ,ⓛ	Ⓟ,ⓟ	ⓡ			
X: 513	X: 450	X: 600	X: 408	X: 575	X: 332	X: 575			
Y: -540	Y: 68	Y: 430	Y: 1,071	Y: 2,070	Y: 2,735	Y: 3,280			
Z: 265	Z: 188.5	Z: 154.9	Z: 109	Z: 216.1	Z: 266	Z: 326.5			



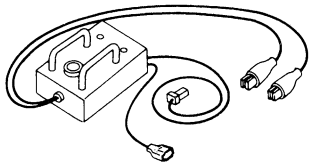
ABF158

Precautions for SRS "Air Bag" Service

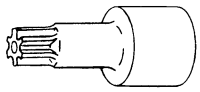
- Do not use a circuit tester to check SRS circuits.
- Before servicing the SRS, turn ignition switch "OFF", disconnect battery ground cable and wait for at least 10 minutes.
  For approximately ten minutes after the cables are removed, it is still possible for the air bag to inflate. Therefore, do not 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.

Preparation

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.) Tool name	Description	
(J38381) Deployment tool		Disposing of air bag module

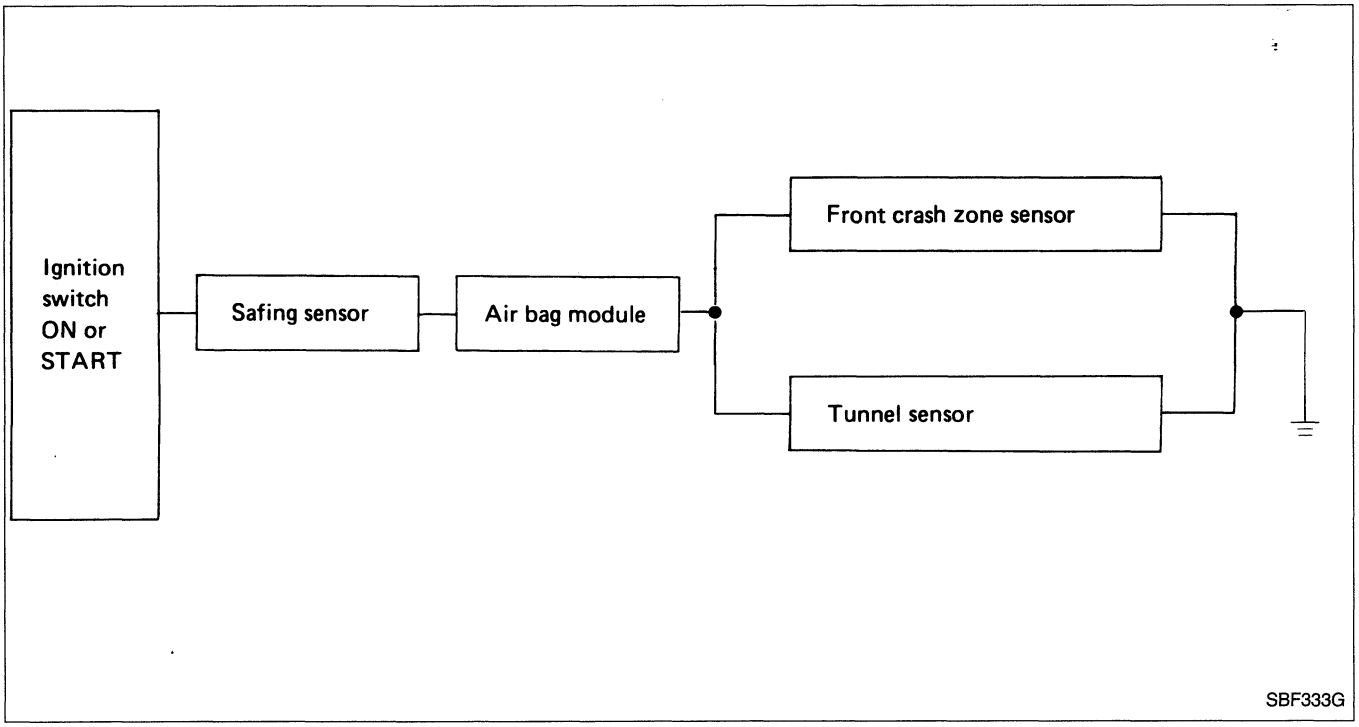
COMMERCIAL SERVICE TOOLS

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 (front crash zone sensor or tunnel sensor) and the safing sensor simultaneously activate while the ignition switch is "ON".

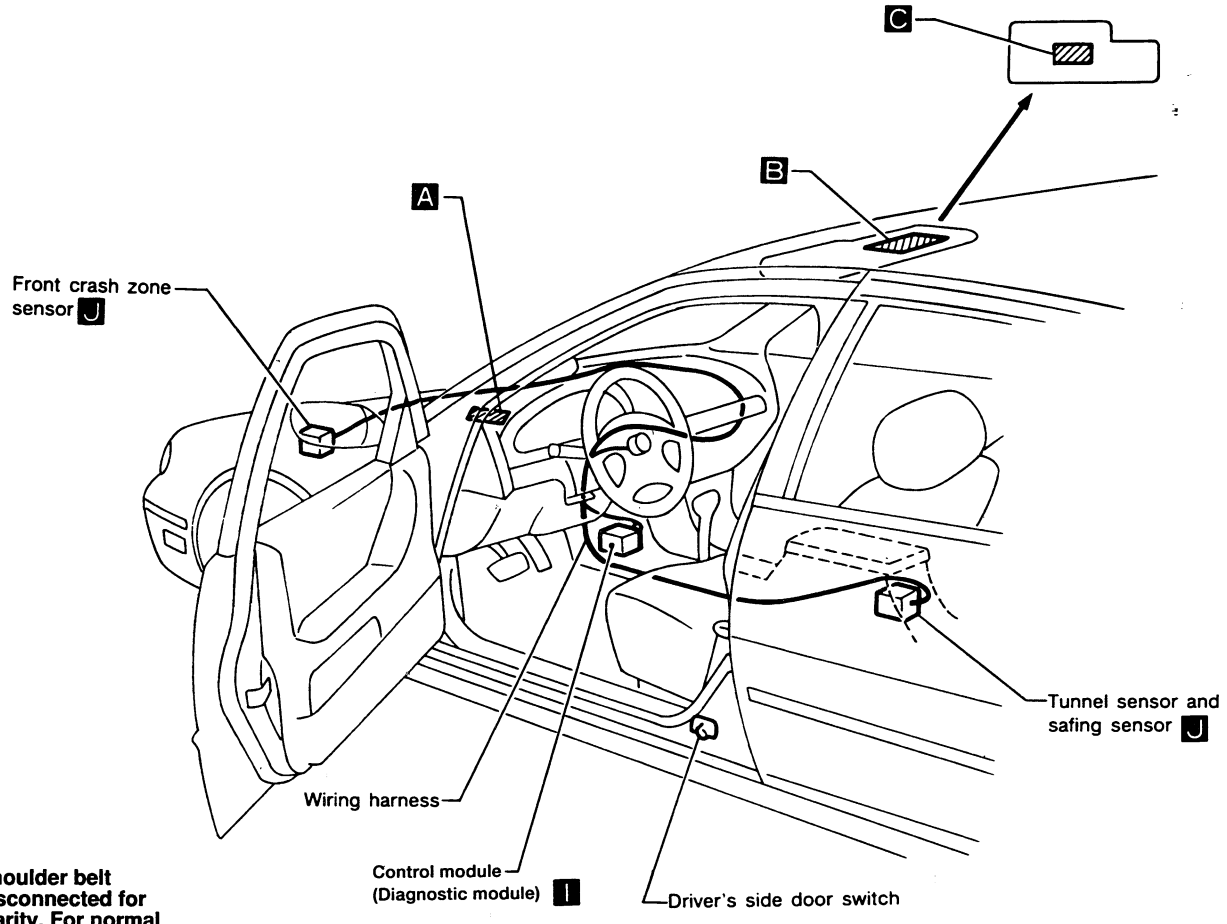
Ignition	Crash zone sensor	Tunnel sensor	Safing sensor	Air bag signal
	Front			
ON	ON		ON	ON
ON		ON	ON	ON



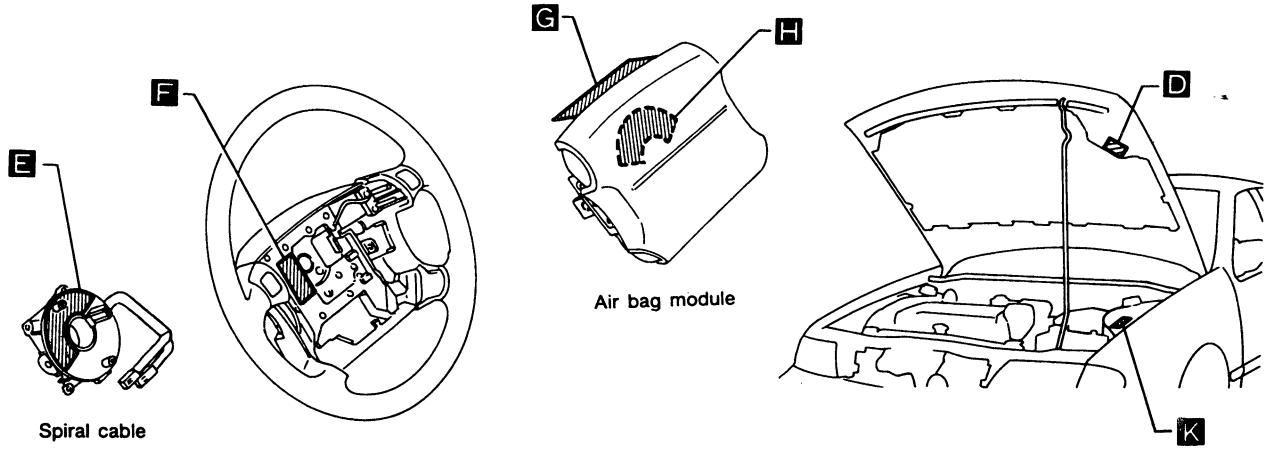
Self-diagnosis

The control module (diagnostic module) 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.

SRS Component Parts Location and Caution Labels



Shoulder belt disconnected for clarity. For normal use, the shoulder belt should always be connected to the buckle.



ABF142

Caution Labels

A

SRS-AIRBAG

B

INFORMATION SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS) 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.

IMPORTANT SAFETY INFORMATION
AUTOMATIC SHOULDER BELT AND MANUAL LAP BELT RESTRAINT SYSTEM

- ALWAYS USE MANUAL LAP BELT: Failure to do so may decrease the protection offered by the restraint system.
- DO NOT DISCONNECT THE EMERGENCY RELEASE FOR NORMAL DRIVING: This feature is for emergency use only.
- REFER TO OWNER'S MANUAL FOR OTHER IMPORTANT SAFETY INFORMATION ON:

1. Proper seating position and use of restraint system
2. Release of shoulder belt in an emergency
3. Use of hand crank for shoulder belt
4. Use by children

C

NOTICE SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.).
- IT IS DESIGNED TO SUPPLEMENT THE SEAT BELT.
- ALWAYS WEAR YOUR SEAT BELT.

D

WARNING SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.).
- ALL SRS 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.

Caution Labels (Cont'd)

G

WARNING SRS AIRBAG

- THIS AIR BAG MODULE CANNOT BE REPAIRED.
- USE DIAGNOSTIC INSTRUCTIONS TO DETERMINE IF THE UNIT IS OPERATIONAL.
- IF NOT OPERATIONAL, REPLACE AND DISPOSE OF THE ENTIRE UNIT AS DIRECTED IN THE INSTRUCTIONS.
- UNDER NO CIRCUMSTANCES SHOULD A DIAGNOSIS BE PERFORMED USING ELECTRICALLY POWERED TEST EQUIPMENT OR PROBING DEVICES.
- TAMPERING OR MISHANDLING CAN RESULT IN PERSONAL INJURY.
- STORE THE REMOVED AIR BAG MODULE WITH THE PAD SURFACE UP.
- FOR SPECIAL HANDLING OR STORAGE REFER TO SERVICE MANUAL.

H

DANGER POISON

- KEEP OUT OF THE REACH OF CHILDREN.
- CONTAINS SODIUM AZIDE AND POTASSIUM NITRATE.
- CONTENTS ARE POISONOUS AND EXTREMELY FLAMMABLE.
- CONTACT WITH ACID, WATER OR HEAVY METALS MAY PRODUCE HARMFUL AND IRRITATING GASES OR EXPLOSIVE COMPOUNDS.
- DO NOT DISMANTLE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY OR STORE AT TEMPERATURES EXCEEDING 200°F.
- FIRST AID: IF CONTENTS ARE SWALLOWED, INDUCE VOMITING;
  - FOR EYE CONTACT, FLUSH EYES WITH WATER FOR 15 MINUTES
  - IF GASES FROM ACID OR WATER CONTACT ARE INHALED, SEEK FRESH AIR
  - IN EVERY CASE, GET PROMPT MEDICAL ATTENTION
- FOR ADDITIONAL INFORMATION, SEE MATERIAL SAFETY DATA SHEET (MSDS) FOR THIS PRODUCT.

I

CAUTION SRS AIRBAG

- NO SERVICEABLE PARTS INSIDE.
- DO NOT DISASSEMBLE OR TAMPER.
- DO NOT DROP; KEEP DRY.
- WHILE REMOVED, STORE IN A CLEAN AND DRY AREA.
- IF WET CONDITION OCCURS, THIS UNIT MUST BE SERVICED.

J

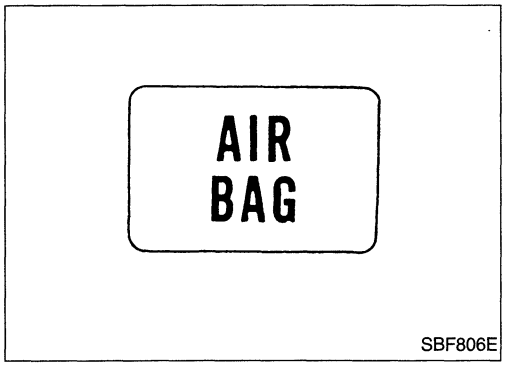
WARNING SRS AIRBAG

- DO NOT DISASSEMBLE OR TAMPER.
- DISMANTLING AND INSTALLATION SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL.

K

CAUTION SRS AIRBAG

TO AVOID DAMAGING THE SRS SPIRAL CABLE, REMOVE THE STEERING WHEEL BEFORE REMOVING THE STEERING JOINT.



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.

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 module — 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.

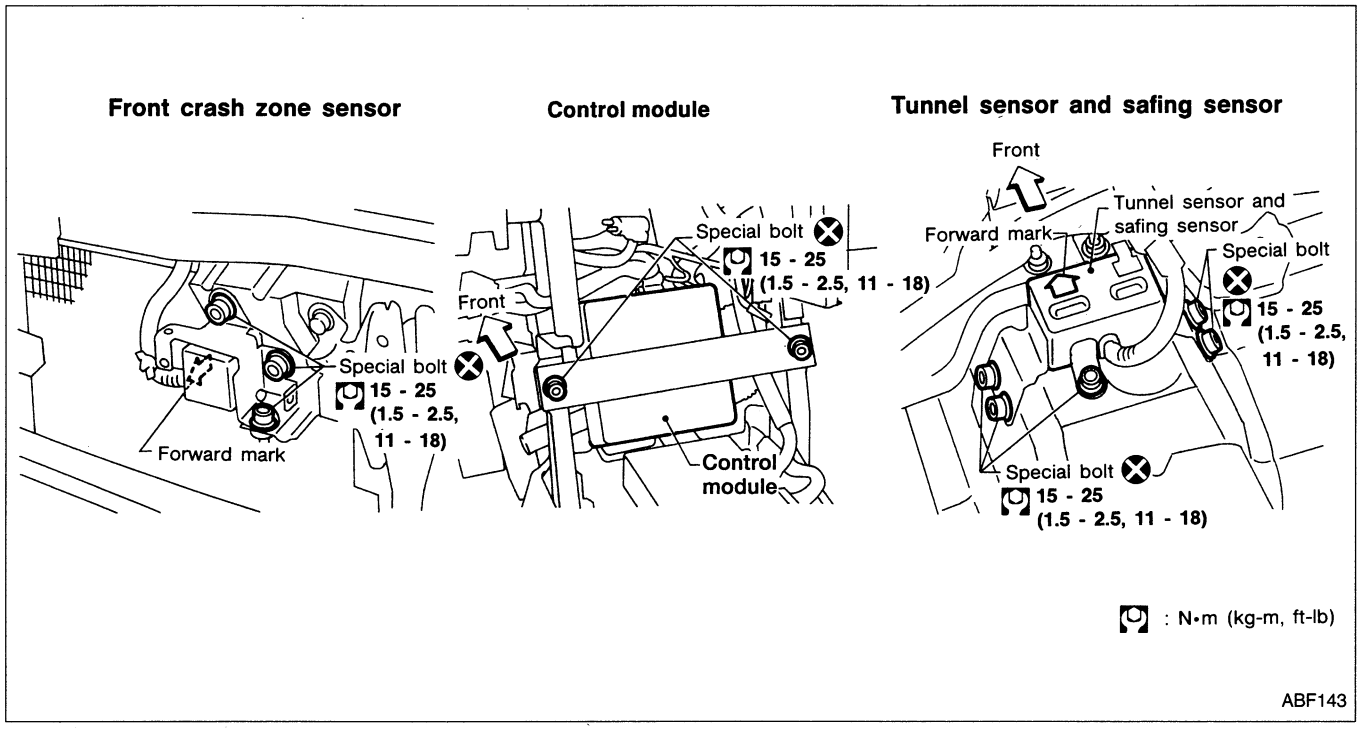
(6) Air bag module
- Remove air bag module from steering wheel.
  Check harness cover and connectors for damage, terminals for deformities, and harness for binds.
- Install air bag module to steering wheel to check fit or alignment with the wheel.

CAUTION:
Replace previously used screws with new ones.

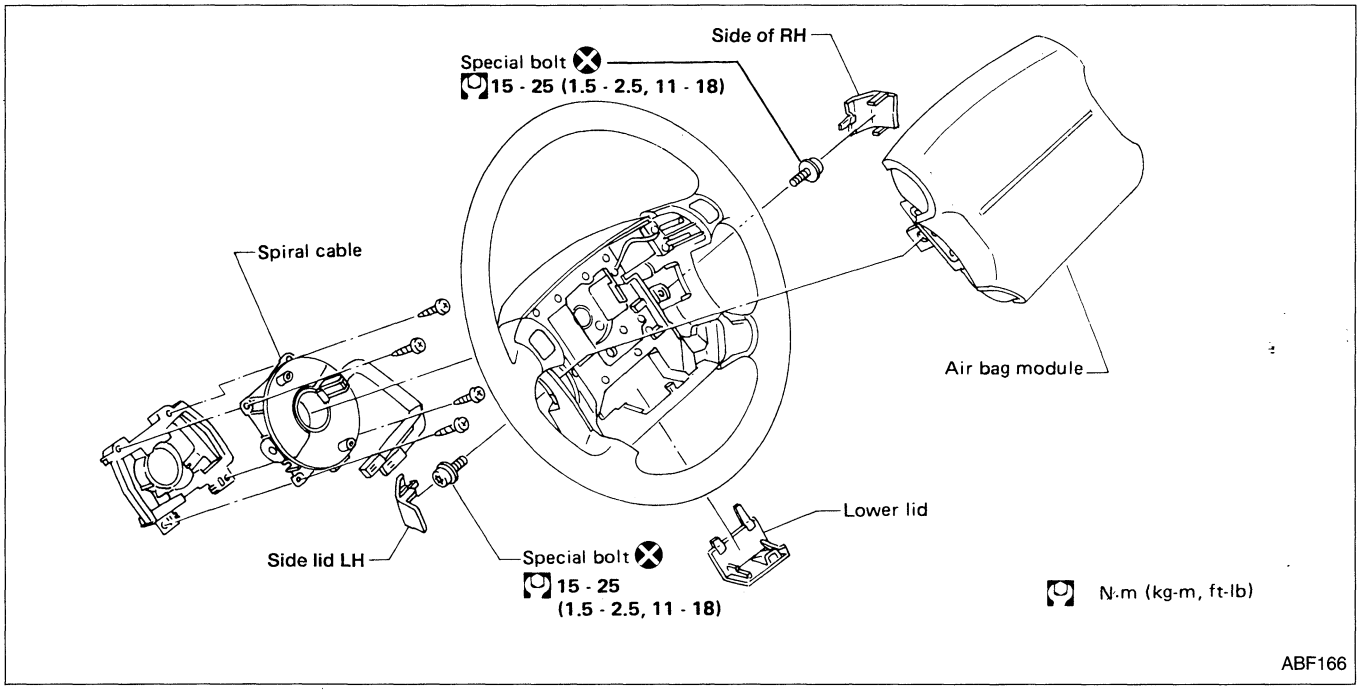
Removal and Installation — Control Module and Sensors

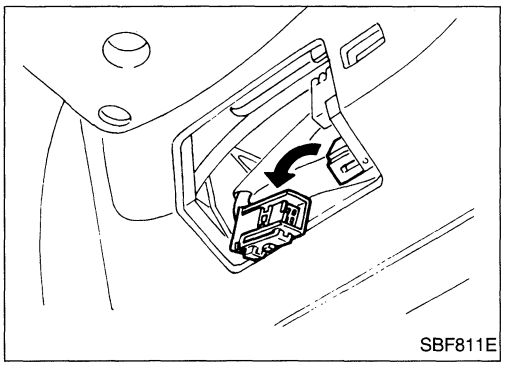
CAUTION:

- **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.



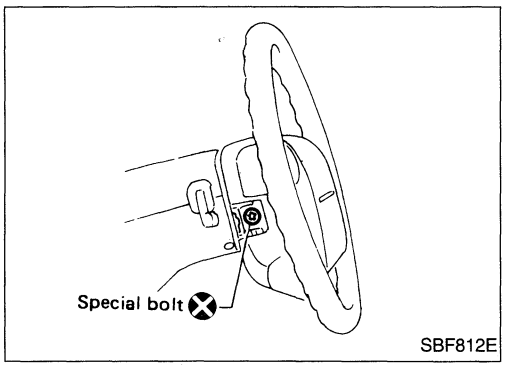
Removal — Air Bag Module and Spiral Cable



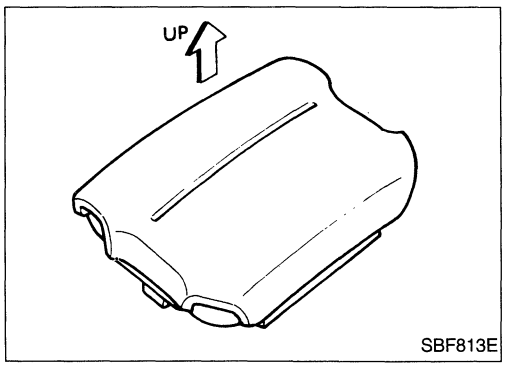


CAUTION:
Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.

1. Remove lower lid from steering wheel, and disconnect air bag module connector.

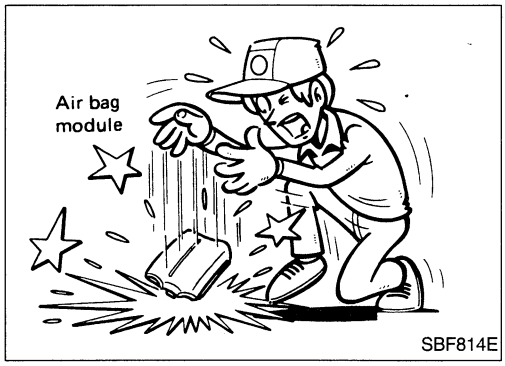


2. Remove side lid. Using the T50H torx bit, remove left and right special bolts. Air bag module can then be removed.



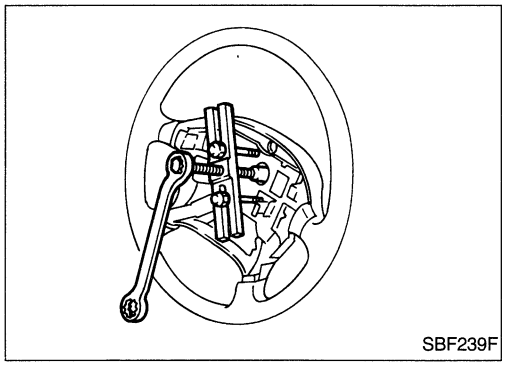
CAUTION:
- **Always place air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.**

Removal — Air Bag Module and Spiral Cable (Cont'd)

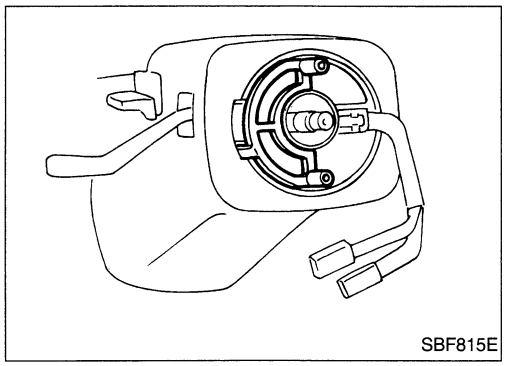


SBF814E

- **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

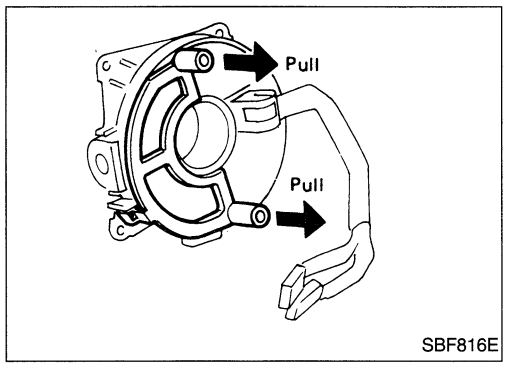
3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts.
5. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.


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

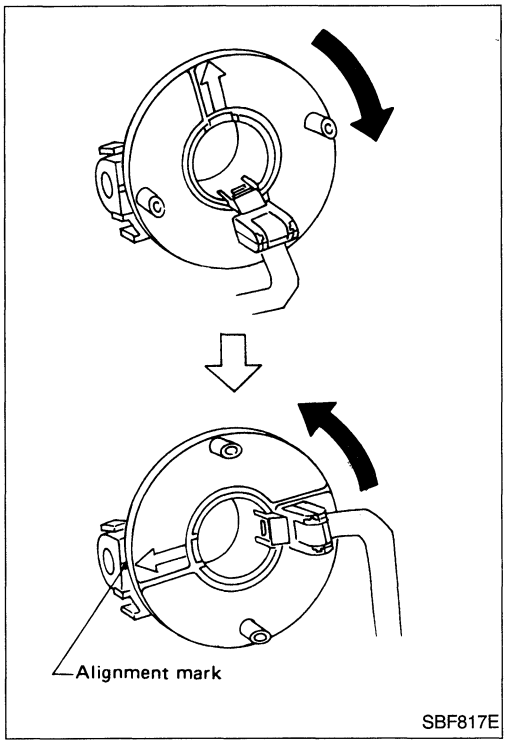
1. Connect spiral cable connector and tighten with screws. Install steering column cover.



SBF816E

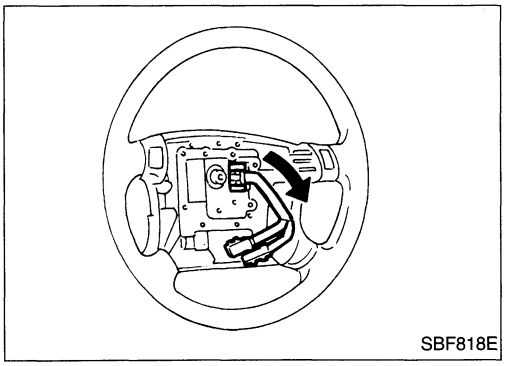
2. Remove stopper by pulling two pin guides.

Installation — Air Bag Module and Spiral Cable (Cont'd)

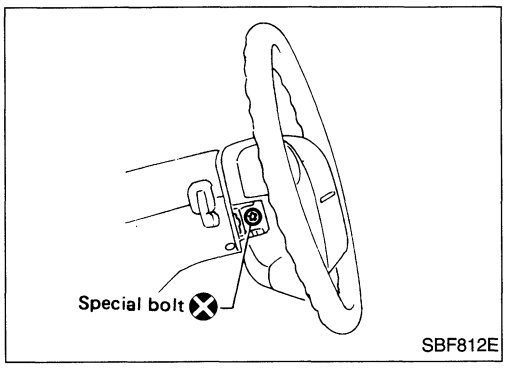


SBF817E

- 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.


SBF818E

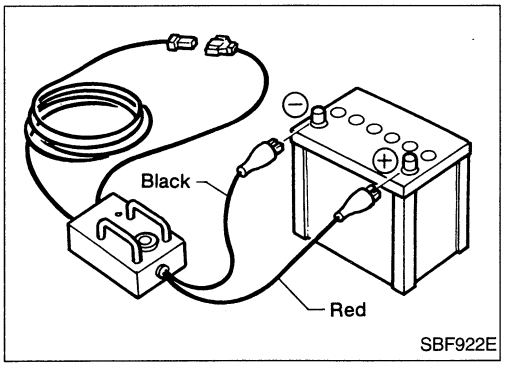
3. Install steering wheel setting spiral cable pin guides, and pull spiral cable through.
4. Connect horn connector and engage spiral cable with pawls in steering wheel.
5. Tighten nuts.



SBF812E

6. Position air bag module and tighten with new special bolts.
7. Connect air bag module connector.
8. Install all lids.

9. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT or warning lamp check.)



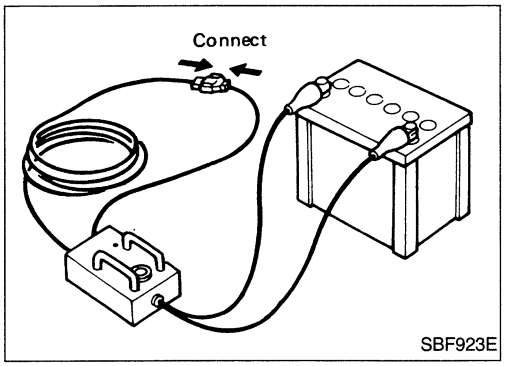
SBF922E

Scrapping 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

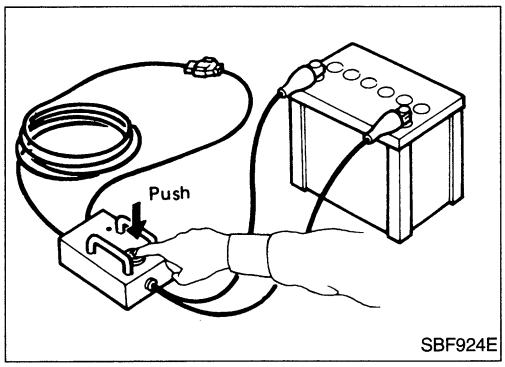
Prepare a 12-volt battery. Locate it approximately 5 m (16 ft) away from vehicle and connect deployment tool's battery cable. Ensure red light illuminates. If it does not, replace the battery with a new one.



SBF923E

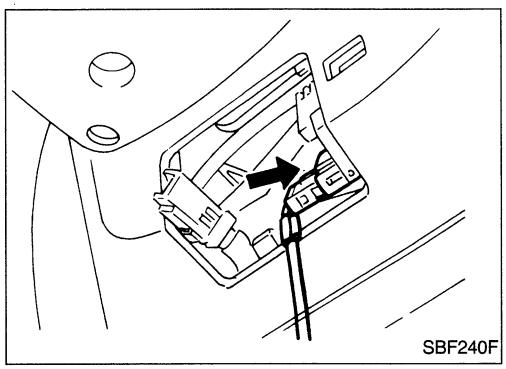
DEPLOYMENT TOOL CHECK

Connect check connector.



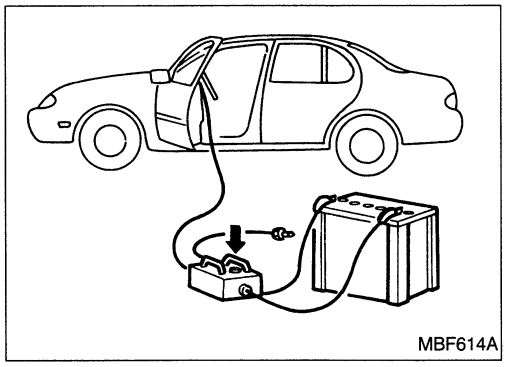
SBF924E

Push deployment tool switch to "ON" to ensure green light illuminates. If it does not, replace the deployment tool.


SBF240F

CONNECTING TO AIR BAG

1. Disconnect the prepared battery cable.
2. Also disconnect the vehicle battery ground cable and wait 10 minutes.
3. Remove lower lid from steering wheel and disconnect air bag module connector.
4. Connect deployment tool connector.
5. Reconnect the battery cable to the prepared battery. Ensure red light illuminates.


MBF614A

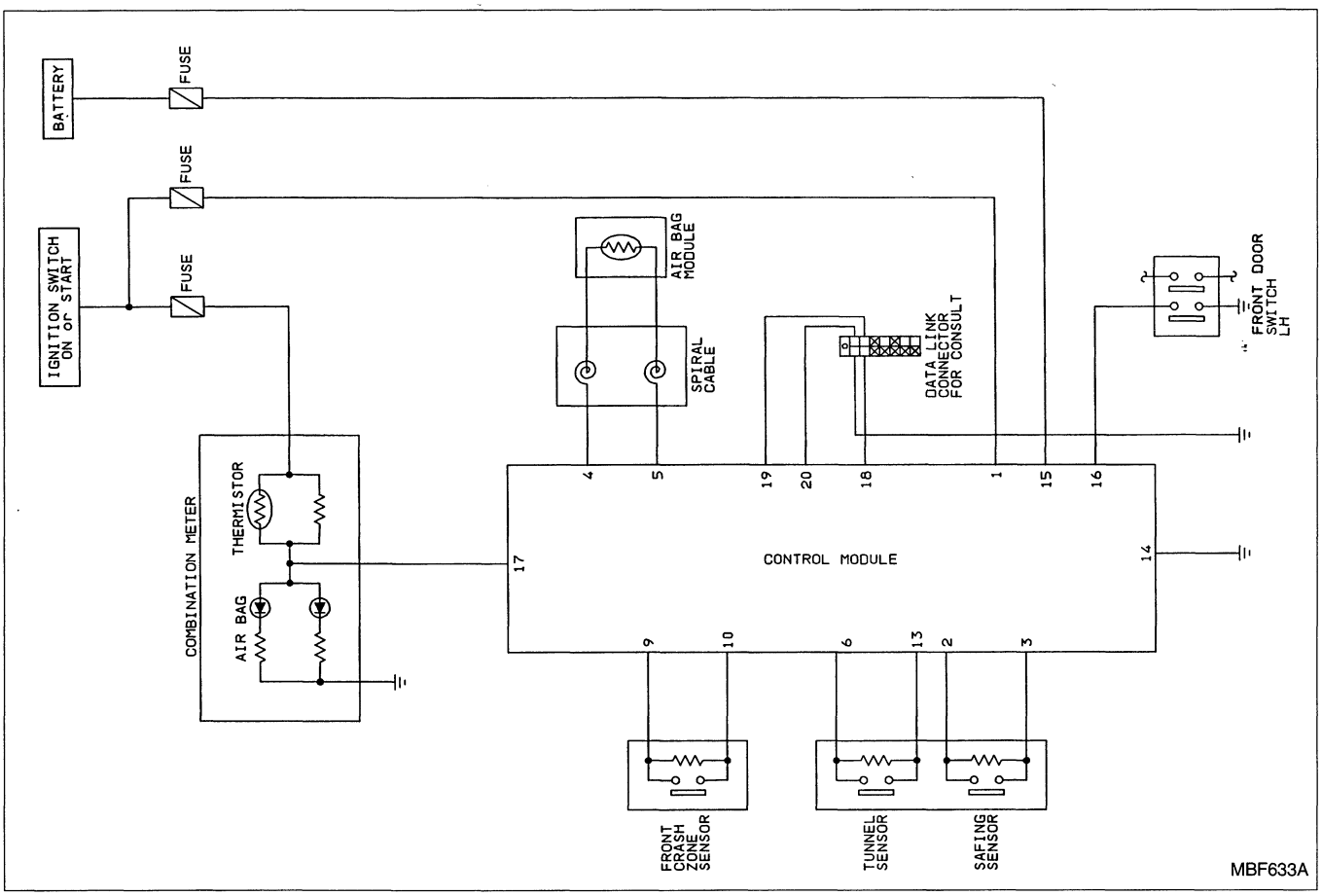
DEPLOYMENT

Press deployment tool switch. Green light will illuminate and air bag will deploy.

CAUTION:

- **When deploying air bag, ensure vehicle is empty.**
- **No poisonous gas is produced upon air bag deployment. However, be careful not to inhale gas since it irritates throat and can cause choking.**
- **Due to heat, leave air bag module unattended for more than 30 minutes after air bag deployment.**
- **Do not attempt to disassemble air bag module.**
- **Air bag module can not be re-used.**

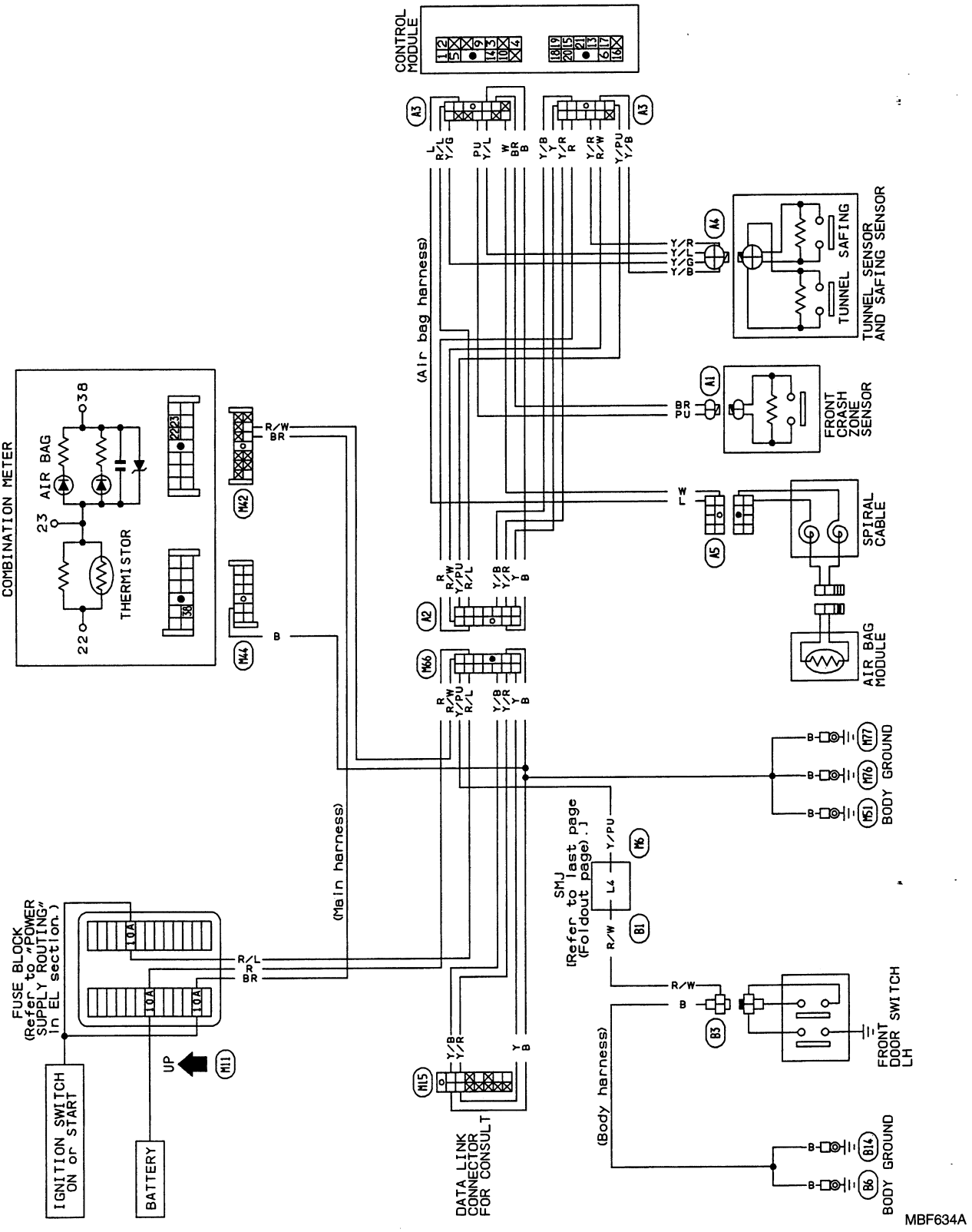
Schematic

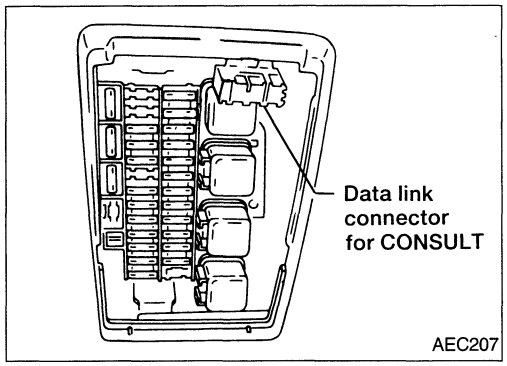

BATTERY
FUSE
FUSE
FUSE
IGNITION SWITCH ON or START
AIR BAG MODULE
SPIRAL CABLE
DATA LINK CONNECTOR FOR CONSULT
FRONT DOOR SWITCH LH
COMBINATION METER
THERMISTOR
AIR BAG
CONTROL MODULE
4
5
19
20
18
1
15
16
17
14
9
10
6
13
2
3
FRONT CRASH ZONE SENSOR
TUNNEL SENSOR
SAFING SENSOR
MBF633A

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.**





Self-diagnosis

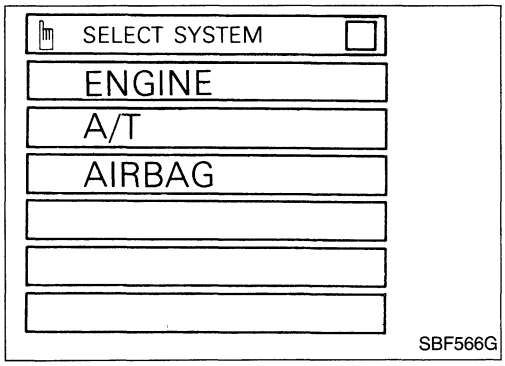
USING CONSULT

The self-diagnosis results can be read by CONSULT, as follows:

1. Connect "CONSULT" to vehicle harness connector.
↓
2. Turn ignition switch to "ON". (When CONSULT is connected, the "AIR BAG" warning lamp will be turned to present diagnosis mode.)
↓
3. Touch "START" to operate "CONSULT".
↓
4. Touch "AIR BAG" to choose air bag system.
↓
5. Touch "SELF DIAG RESULTS" to read self-diagnosis results.
↓
6. Problem codes are displayed on "SELF DIAG RESULT 1" (first page — present mode). The problem code last indicated is displayed on "SELF DIAG RESULT 2" (second page — initial mode).
↓
7. When "PRINT" is pressed, information displayed on "SELF DIAG RESULTS 1 and 2" is printed out.
↓
8. After repairing malfunctioning parts, press "ERASE" to clear self-diagnosis results.

- **After repairing malfunctioning parts, attempt to clear self-diagnosis results from memory.**
- **If malfunctioning parts are not completely repaired, self-diagnosis results remain stored in memory.**

↓
9. Push Back Key of CONSULT until SELECT SYSTEM mode appears to make "SELF-DIAGNOSIS" user mode.
↓
10. Push the power off switch.
↓
11. Turn off ignition switch.



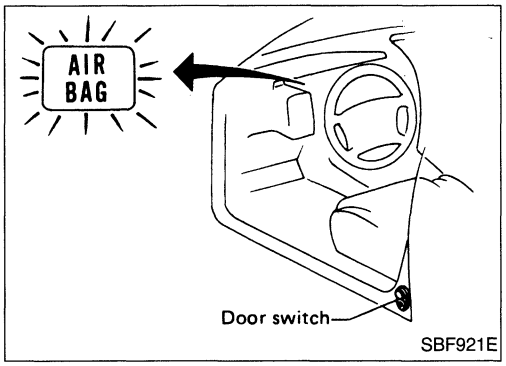
Self-diagnosis (Cont'd)

Self-diagnosis results

Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
NO SELF DIAGNOSTIC FAILURE INDICATED.	Normal. The SRS "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 module (terminal No. 3) is shorted.	1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor) 3. Replace the control module. 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 module (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 module. 5. Replace the main harness.
AIRBAG MODULE [VB-SHORT]	The circuit for driver's air bag module is shorted to some power supply circuit. (including the spiral cable)	
AIRBAG MODULE [GND-SHORT]	The circuit for the air bag module is shorted to ground. (including the spiral cable)	
AIRBAG MODULE [SHORT]	The circuit for driver's air bag module are shorted to each other.	
TUNNEL SENSOR [OPEN/UPR-VB-SHORT]	The circuit for the tunnel sensor is open or the wire from the control module (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) 3. Replace the control module. 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 center crash zone sensor is open or the wire from the control module (terminal No. 9) to the center crash zone sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the center crash zone sensor. 3. Replace the control module. 4. Replace the main harness.
CRASH ZONE SEN-CTR [SHORT]	The circuits for the center crash zone sensor are shorted to each other.	
CONTROL MODULE	The control module (diagnostic module) is out of order.	1. Visually check the wiring harness connections. 2. Replace the control module. 3. Replace the main harness.
INDEFINITE FAILURES	A problem which cannot be specified 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 module. 4. Replace all sensors, the spiral cable and air bag module. 5. Replace the main harness.

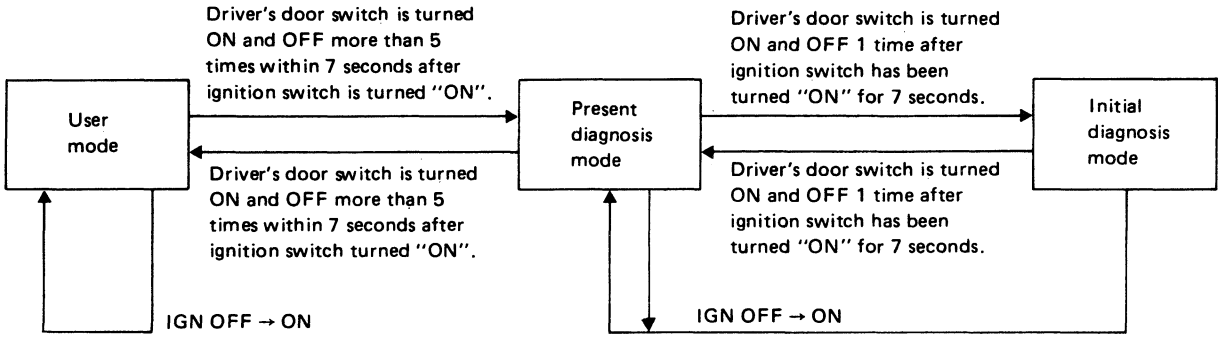
Self-diagnosis (Cont'd)

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



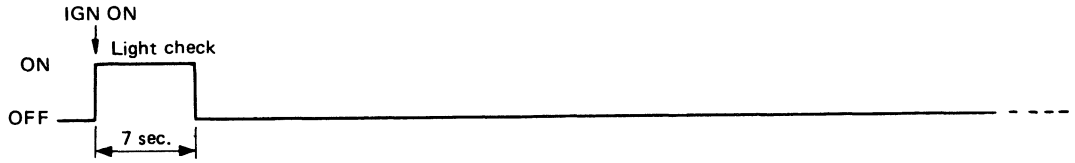
Problem codes are displayed in present diagnosis mode (self-diagnosis result 1). The problem code last indicated is displayed in initial diagnosis mode (self-diagnosis result 2).

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.

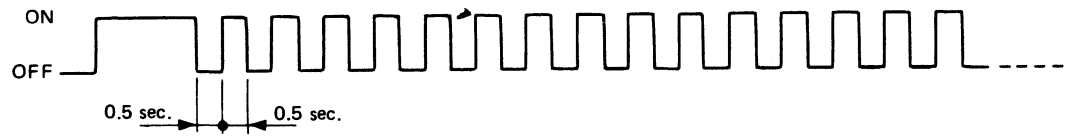
- **After repairing malfunctioning part, attempt to clear self-diagnosis results from memory.**
- **If a malfunctioning part is not completely repaired, information stored in memory will not be cleared.**

User mode

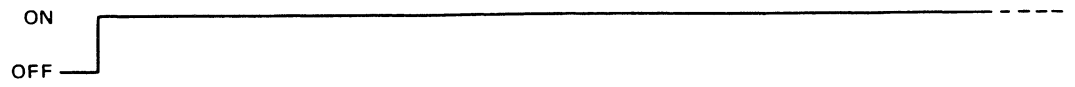
① Normal (OFF)



② Failure (flashing)



③ Air bag is deployed or part of control module is malfunctioning, (ON)

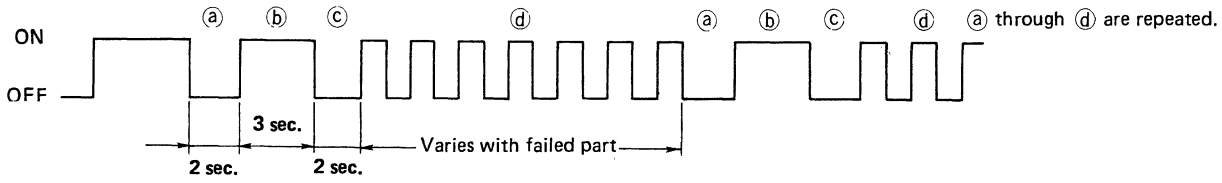


ABF145

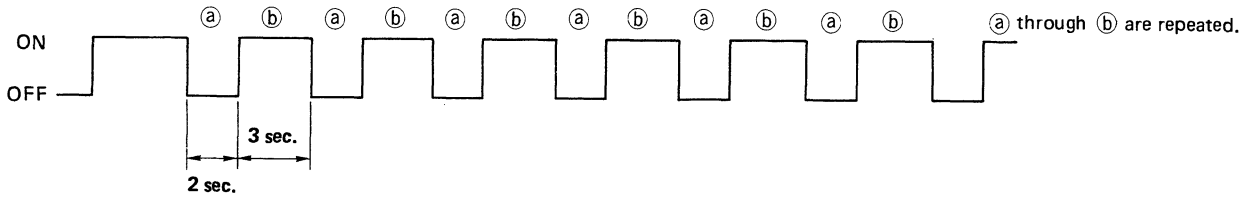
Self-diagnosis (Cont'd)

Present diagnosis mode (self-diagnosis result 1)

ⓑ Start signal; Start signal identifies display modes.



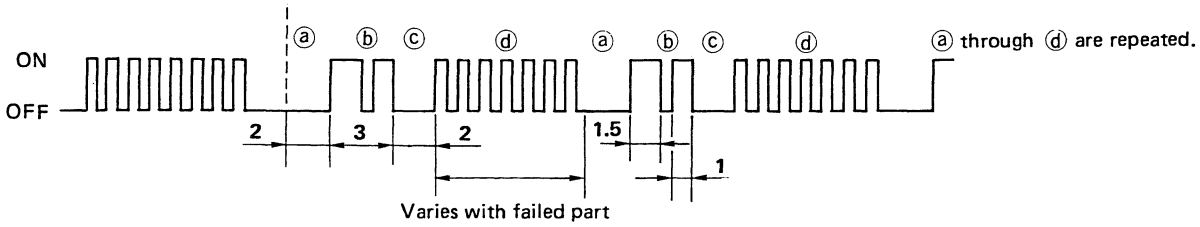
- No failure (or intermittent failure/repair completion)



ABF182

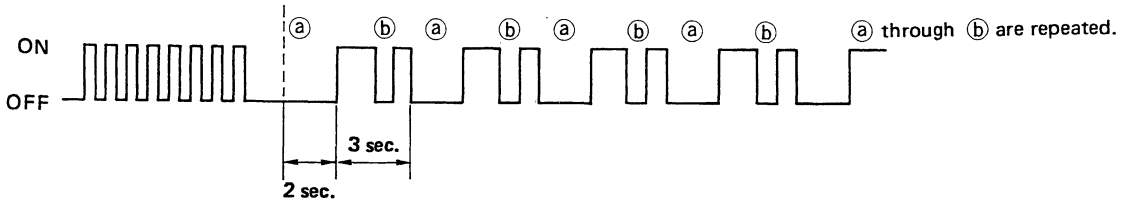
Initial diagnosis mode (self-diagnosis result 2)

ⓑ Start signal; Start signal identifies display modes.



- No failure

Unit: sec.



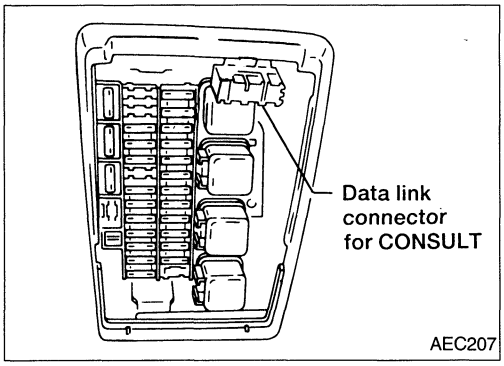
ABF183

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

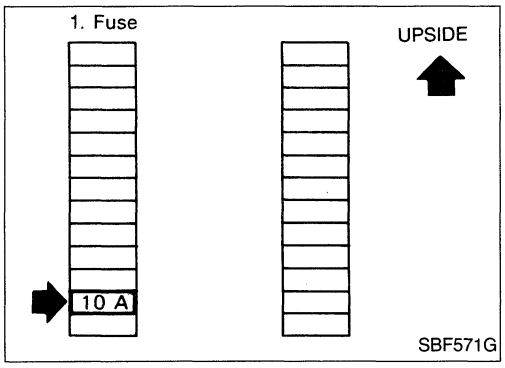
Flash code ⓓ (# of flashes)	Explanation	Repair order * Recheck SRS at each replacement.
0	Normal. The SRS "Air Bag" is in good order.	—
1	The circuit for the safing sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor) 3. Replace the control module. 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 module. 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) 3. Replace the control module. 4. Replace the main harness.
6	The circuit for the center crash zone sensor is out of order.	1. Visually check the wiring harness connections. 2. Replace the center crash zone sensor. 3. Replace the control module. 4. Replace the main harness.
7	The control module (diagnostic module) is out of order.	1. Visually check the wiring harness connections. 2. Replace the control module. 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 module. 4. Replace all sensors, spiral cable and air bag module. 5. Replace the main harness.



Diagnostic Procedure 1

SYMPTOM: Warning lamp flashes.

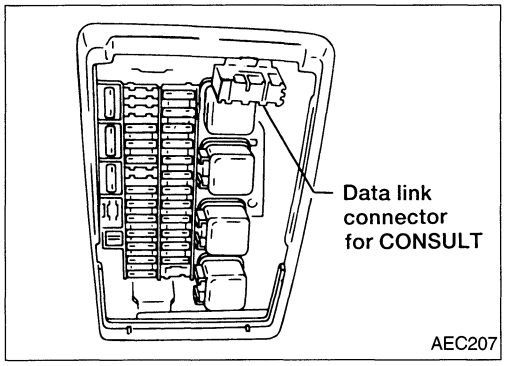
Connect CONSULT and operate it. Read the SELF-DIAGNOSIS RESULTS 1 and 2.	→ Refer to SELF-DIAGNOSIS RESULTS and repair.
OR	
Refer to warning lamp self-diagnosis.	→ Refer to the number of warning lamp flashes. Repair as necessary.

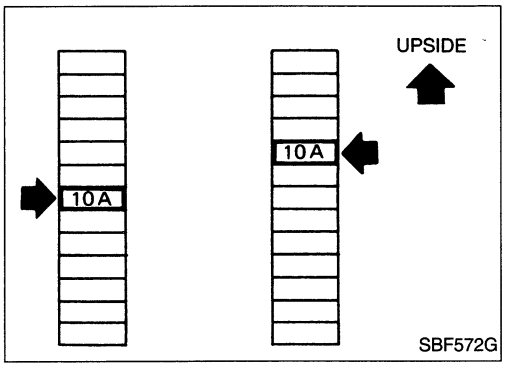


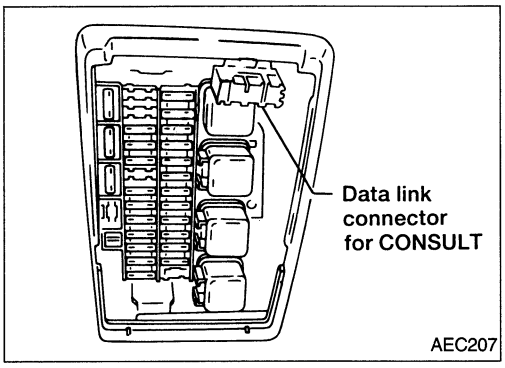
Diagnostic Procedure 2

SYMPTOM: Warning lamp does not come on.

1. Check the warning lamp fuse. — N.G. → Replace the fuse.
   ↓ O.K.
2. Connect CONSULT and begin diagnosis.
   • Is "AIR BAG" displayed on the CONSULT screen? — N.G. → Replace the control module.
   ↓ 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 module.







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 fuses used for the SRS "Air Bag" and "Elec Device".
   - N.G. → Replace the fuse.
   - O.K. ↓
3. Connect CONSULT and operate it.
   - Is "AIR BAG" displayed on the CONSULT?
   - N.G. → Replace the control module.
   - 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 module.
   - N.G. → Replace the harness.
   - O.K. ↓
6. Replace the control module.

* Recheck SRS after each replacement.

Collision Diagnosis

To repair the SRS "AIR BAG", perform the following steps.

① Check the control module (diagnostic module).
- 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 module.

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 module	Replace control module (diagnostic module).	(1) Check case and bracket for dents, cracks or deformities. (2) Check connectors for damage, and terminals for deformities.

HEATER AND AIR CONDITIONING

SECTION HA

CONTENTS

CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

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 for 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 control module, 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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

Precautions for Working with HFC-134a (R-134a)

WARNING:

- **CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant must never be mixed, even in the smallest amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur.**
- **Use only specified lubrication oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubrication oil other than that specified is used, compressor failure is likely to occur.**
- **The specified HFC-134a (R-134a) lubrication oil absorbs moisture from the atmosphere at a rapid rate, therefore the following handling precautions must be observed:**
  - **a: When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.**
  - **b: When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Also, complete the connection of all refrigerant loop components as quickly as possible to minimize the entry of moisture into the system.**
  - **c: Use the specified lubrication oil from a sealed container only. Containers must be re-sealed immediately after dispensing the lubrication oil. Lubrication oil in containers which are not properly sealed will become moisture saturated, and such lubrication oil is no longer suitable foruse and should be properly disposed of.**
  - **d: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. To remove HFC-134a (R-134a) from the A/C system, use service equipment certified to meet the requirements of SAE J2210 [HFC-134a (R-134a) recycling equipment] or J2209 [HFC-134a (R-134a) recovery equipment]. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.**
  - **e: Do not allow lubrication oil (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.**

General Refrigerant Precautions

WARNING:

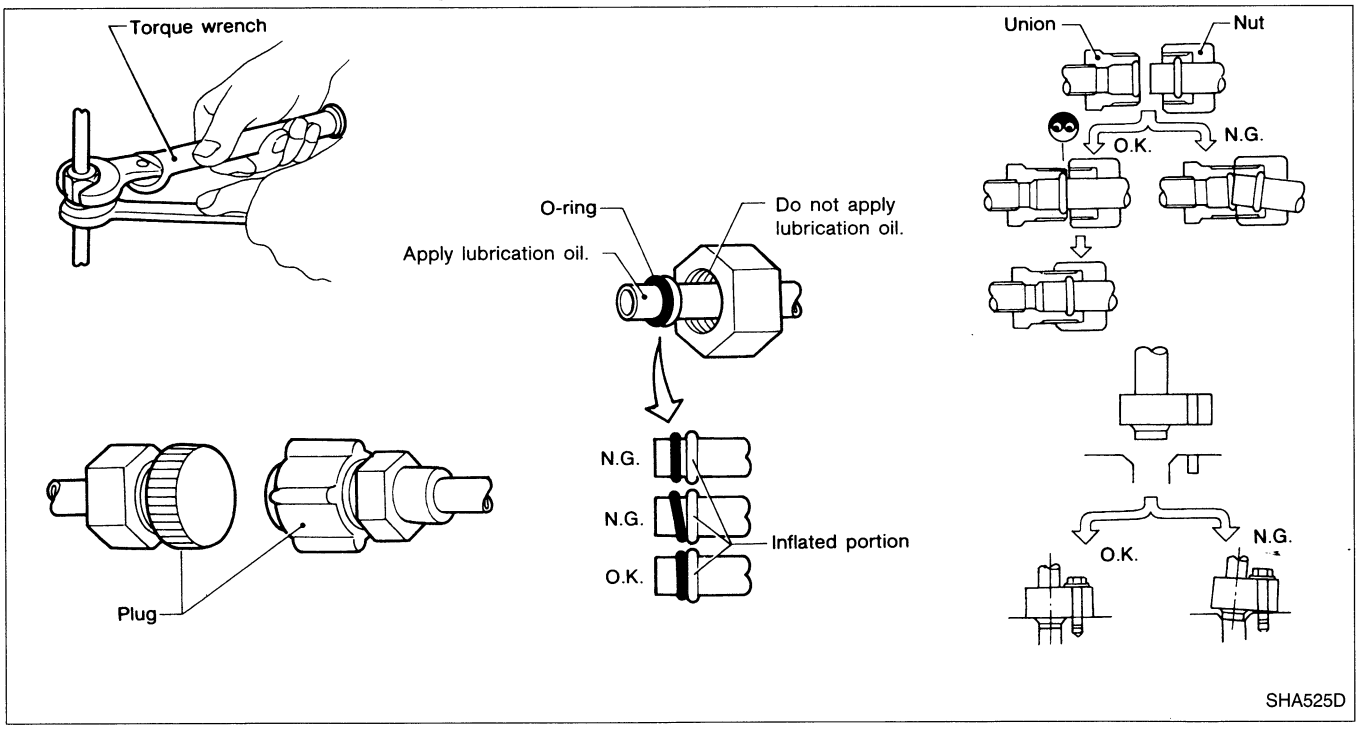
- **Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.**
- **Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.**
- **Do not store or heat refrigerant containers above 52°C (125°F).**
- **Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.**
- **Do not intentionally drop, puncture, or incinerate refrigerant containers.**
- **Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.**
- **Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.**
- **Do not introduce compressed air to any refrigerant container or refrigerant component.**

Precautions for Refrigerant Connection

WARNING:
Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:
When replacing or cleaning refrigerant cycle components, observe the following.

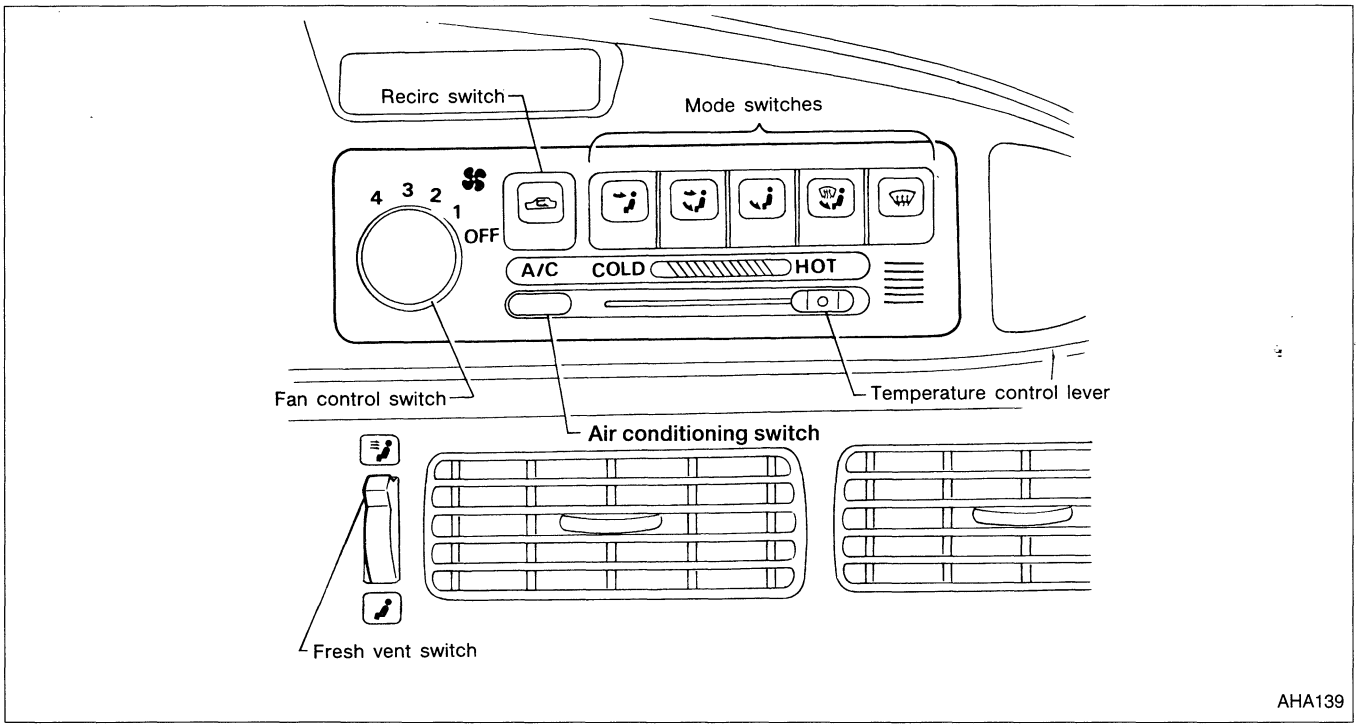
- **Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.**
- **When installing an air conditioning in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.**
- **To prevent the condensation of moisture inside A/C components, components stored in cool areas should be allowed to warm to the working area temperature before removing the seal caps.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubrication oil to portions shown in illustration. Be careful not to apply oil to threaded portion.**
  Name: Nissan A/C System Oil Type R
  Part No.: KLH00-PAGR0
- **O-ring must be closely attached to inflated portion of tube.**
- **After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.**
- **After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.**



Precautions for Servicing Compressor

- 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 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.

Control Operation — Manual Air Conditioning



FAN CONTROL SWITCH

This switch turns the fan ON and OFF, and controls fan speed.

MODE SWITCHES

These switches allow you to select the outlet air flow.
When the MODE switch is moved to "DEF" or "F/D", the push control amplifier sets the intake door to "FRE".
The compressor turns on when the MODE switch is moved to "DEF".

TEMPERATURE CONTROL LEVER

This lever allows you to adjust the temperature of the outlet air.

RECIRC SWITCH

OFF position:
Outside air is drawn into the passenger compartment when this switch is OFF.
ON position:
Interior air is recirculated inside the vehicle.
RECIRC is canceled when DEF or F/D are selected. RECIRC resumes when another mode is chosen.

AIR CONDITIONING SWITCH

Start the engine, set the fan control switch to the desired (1 to 4) position and push the air conditioning switch to turn ON the air conditioning. The indicator lamp will come on when the air conditioning is ON. To stop the air conditioning, push the switch again to return it to the original position.

The air conditioning cooling function operates only when the engine is running.

FRESH VENT SWITCH

When the fresh vent switch is in the "ON" position, a small amount of air flows directly from the evaporator outlet to the vent (face) duct, bypassing the heater unit. This provides a small amount of cool air in the occupant head/face area even though warm air may be discharging through the foot or defroster outlets.

Introduction — Auto Air Conditioning

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 (Automatic temperature control)

The air mix door is automatically controlled so that in-vehicle temperature is maintained at a predetermined value by: The temperature setting, ambient temperature, in-vehicle temperature, amount of sunload.

Fan speed control

Blower speed is automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, amount of sunload and air mix door position.
With FAN switch set to "AUTO", the blower motor starts to gradually increase air flow volume.
When engine coolant temperature is low, the blower fan stops to prevent cool air from flowing to the floor area.

Intake door control

The intake door is automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, amount of sunload and ON-OFF operation of the A/C switch.

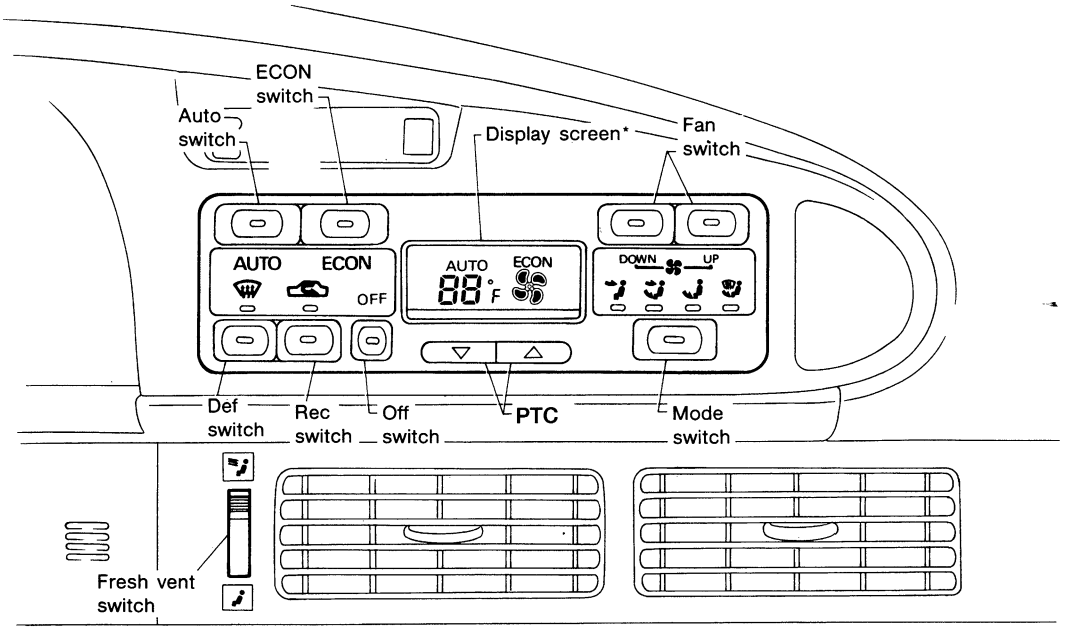
Outlet door control

The outlet door is automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, and amount of sunload.

Self-diagnostic system

The self-diagnostic system is built into the auto amplifier to quickly locate the cause of problems.

Control Operation — Auto Air Conditioning



*Displays the operational status of the system.

AHA140

Control Operation — Auto Air Conditioning (Cont'd)

AUTO SWITCH

The compressor, air inlet door, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.

ECON SWITCH

Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature.

PTC (Potentio Temperature Control)

Increases or decreases the set temperature.

OFF SWITCH

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 (78% foot and 28% 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.

FAN SWITCH

Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):
low , medium low , medium high , high

MODE SWITCH

Manual control of the air discharge outlets. Three selections are available (as shown on the display screen):
face , bi-level , foot

REC SWITCH

ON position: Interior air is recirculated inside the vehicle.

OFF position: Automatic control resumes.

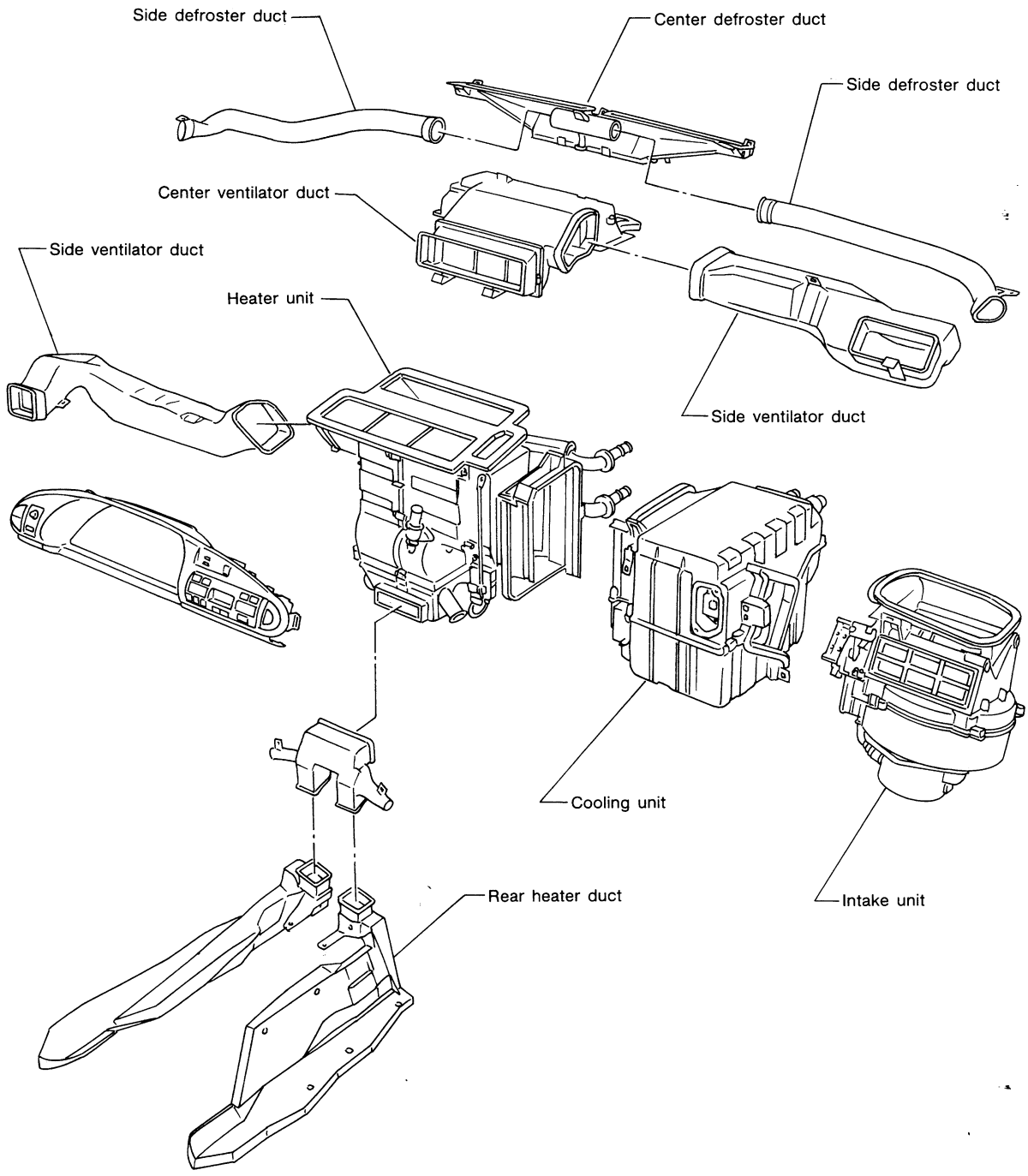
DEF SWITCH

Positions the air discharge doors to the defrost position. Also positions the air inlet door to the outside air position. The compressor operates at ambient temperature approx. 2°C (35°F) or above.

FRESH VENT SWITCH

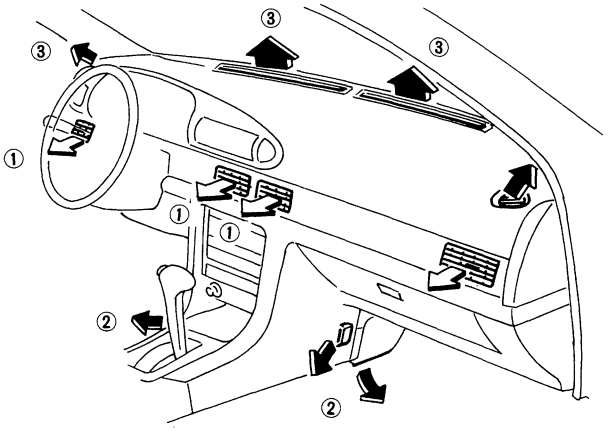
In order to prevent unpleasant hot air in the heater mode, or especially in the FOOT, FOOT/DEF or DEF modes, this system can provide cold air flow to the ventilator ducts directly (by- passing the heater core) by means of a fresh vent switch beside the center vent duct.

Component Layout

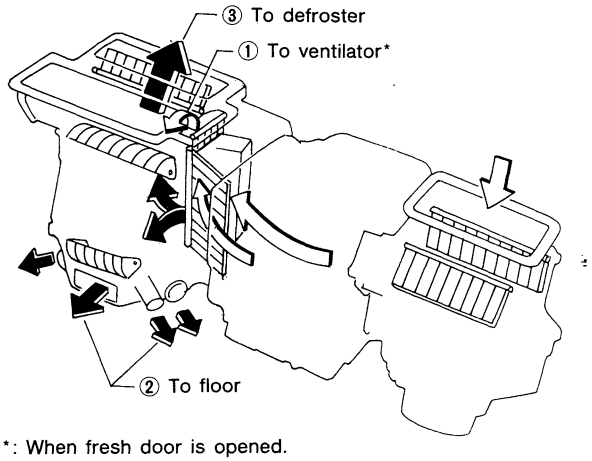


RHA096D

Air Flow — Auto Air Conditioning

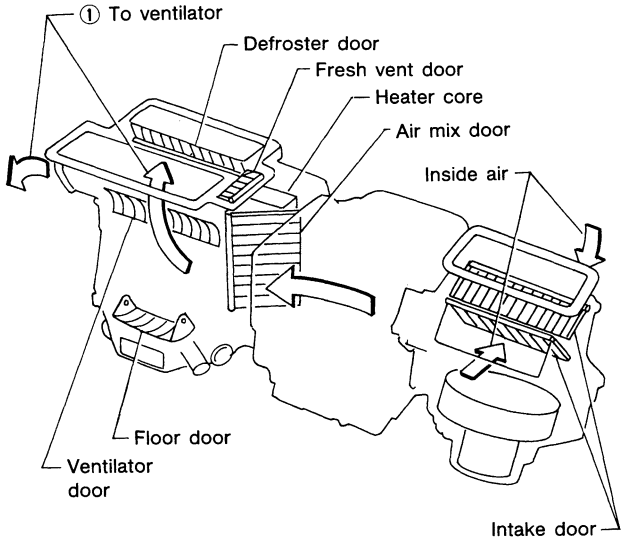


Floor

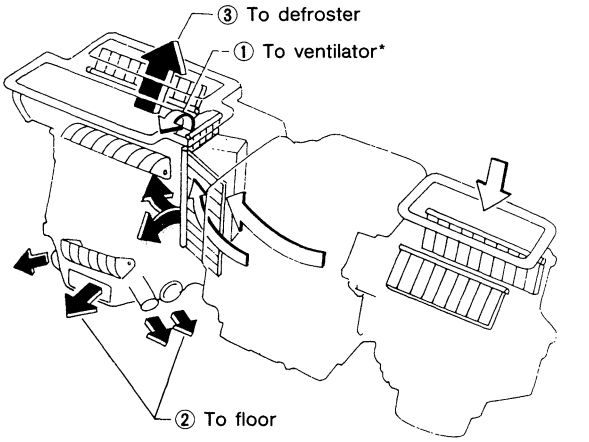


*: When fresh door is opened.

Ventilation

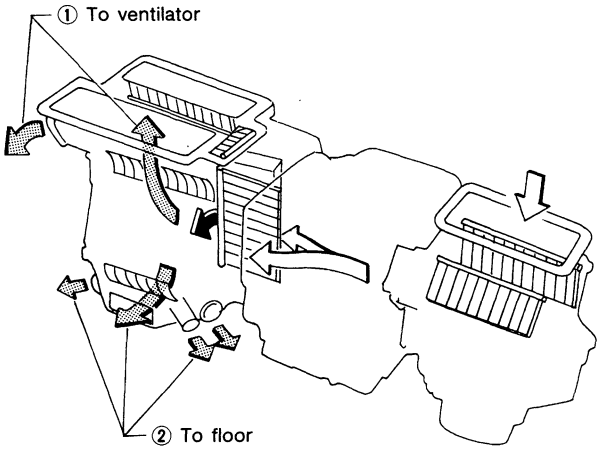


Floor and defroster

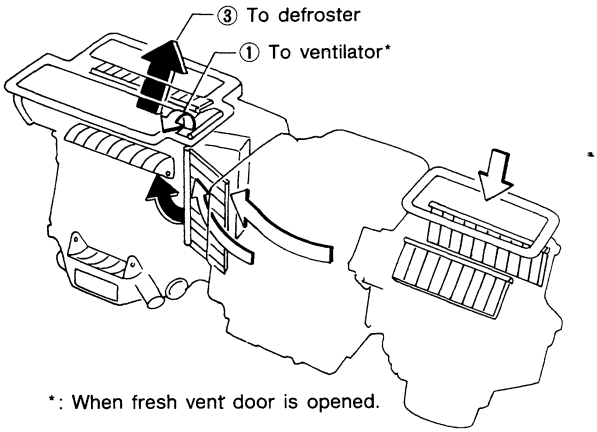


*: When fresh vent door is opened.

Bi-level



Defroster



*: When fresh vent door is opened.

: Air passed through heater core

: Mixed air (+)

: Air not passed through heater core

* : When fresh vent door is opened.

RHA097D

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.

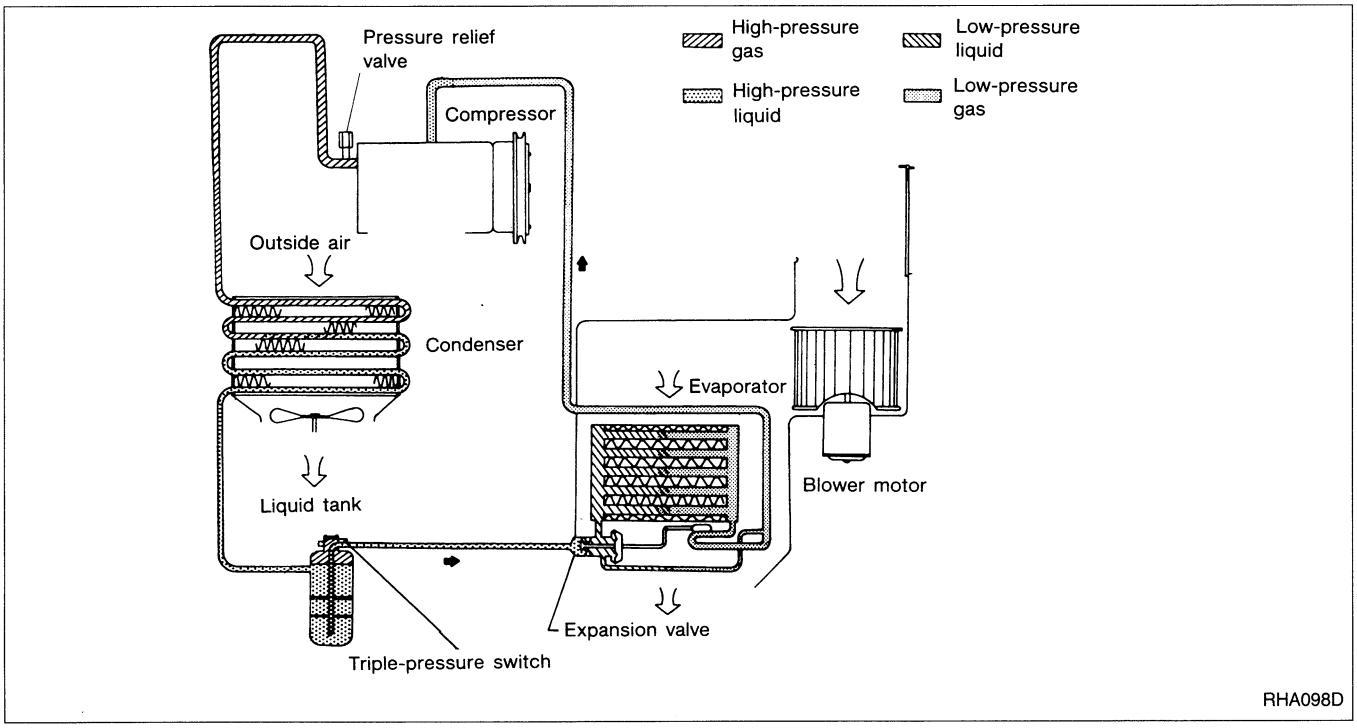
REFRIGERANT SYSTEM PROTECTION

Triple-pressure switch

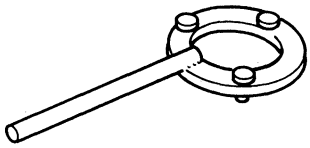
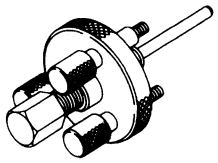
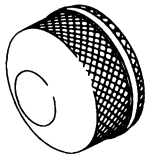
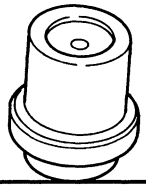
The refrigerant system is protected against excessively high or low pressures by the triple-pressure switch, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the triple-pressure switch opens to interrupt the compressor operation and to operate the radiator fan motor.

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.

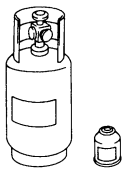
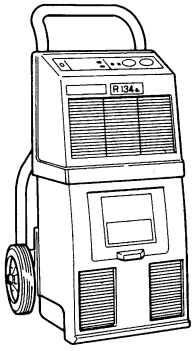
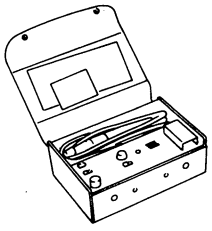


SPECIAL SERVICE TOOLS

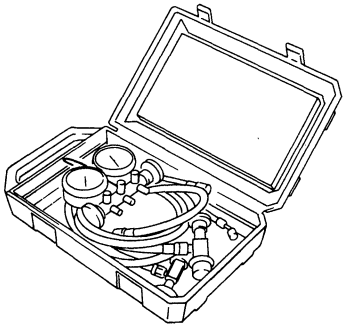
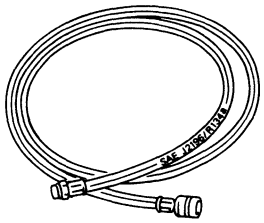
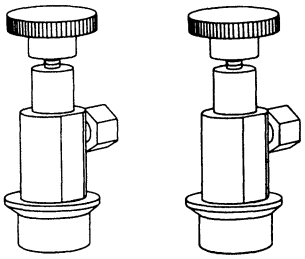
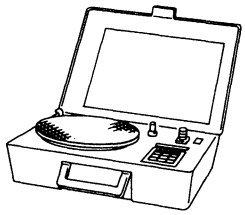
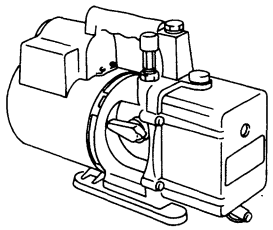
Tool number (Kent-Moore No.) Tool name	Description	Note
KV99231260 (J-38874) Clutch disc wrench		Removing shaft nut and clutch disc
KV99232340 (J-38874) Clutch disc puller		Removing clutch disc
KV99234330 (J-39024) Pulley installer		Installing pulley
KV99233130 (J-39023) Pulley puller		Removing pulley

HFC-134a (R-134a) Service Tools and Equipment

It is important to understand that HFC-134a (R-134a) refrigerant, and the specified lubrication oil which must be used with HFC-134a (R-134a), must never be mixed with CFC-12 (R-12) refrigerant and/or the CFC-12 (R-12) lubrication oil.
This means that separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubrication oil.
To prevent the mixing of refrigerants/lubrication oils, refrigerant container fittings, service hose fittings, and service equipment fittings (equipment which handles refrigerant and/or lubrication oil) are different between CFC-12 (R-12) and HFC-134a (R-134a).
Adapters to convert from one size fitting to the other must never be used: refrigerant/lubrication oil contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant	 RHA259D	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size ● large container 1/2″-16 ACME
KLH00-PAGR0 (—) Nissan A/C System Oil Type R	 RHA260D	Type: Poly alkyline glycol oil (PAG), type R Application: HFC-134a (R-134a) vane rotary compressors (Nissan only) Lubricity: 40 mℓ (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-NI) Recovery/Recycling equipment (ACR4)	 RHA261D	Function: Refrigerant Recovery and Recycling and Recharging
(J-39400) Electronic leak detector	 RHA267D	Power supply: ● DC 12 V (Cigarette lighter)

HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	Note
(J-39183) Manifold gauge set (with hoses and couplers)	 RHA262D	Identification: • The gauge face indicates R-134a. Fitting size: Thread size • 1/2″-16 ACME
Service hoses • High side hose (J-39501-72) • Low side hose (J-39502-72) • Utility hose (J-39476-72)	 RHA263D	Hose color: • Low hose: Blue with black stripe • High hose: Red with black stripe • Utility hose: Yellow with black stripe or green with black stripe Hose fitting to guage: • 1/2″-16 ACME
Service couplers • High side coupler (J-39500-20) • Low side coupler (J-39500-24)	 RHA264D	Hose fitting to service hose: • M14 x 1.5 fitting (optional) or permanently attached
(J-39650) Refrigerant weight scale	 RHA265D	For measuring of refrigerant Fitting size: Thread size • 1/2″-16 ACME
(J-39649) Vacuum pump (Including the isolator valve)	 RHA266D	Capacity: • Air displacement: 4 CFM • Micron rating: 20 microns • Oil capacity: 482 g (17 oz) Fitting size: Thread size • 1/2″-16 ACME

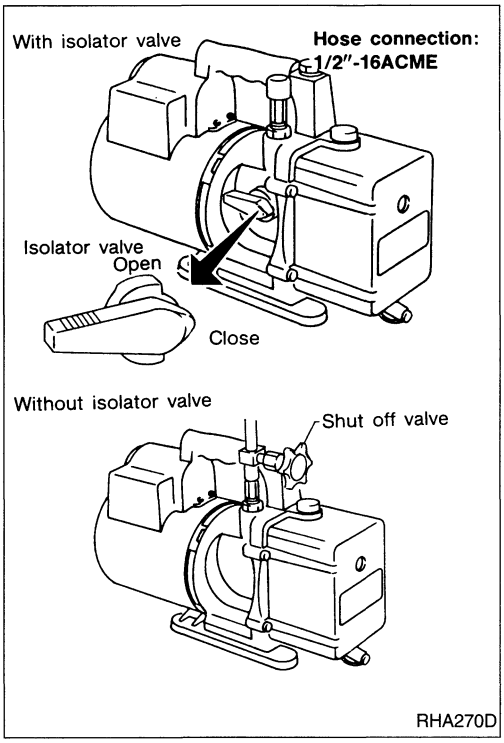
Precautions for Service Equipment

RECOVERY/RECYCLING EQUIPMENT

Be certain to follow the manufacturers instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

Be certain to follow the manufactures instructions for tester operation and tester maintenance.



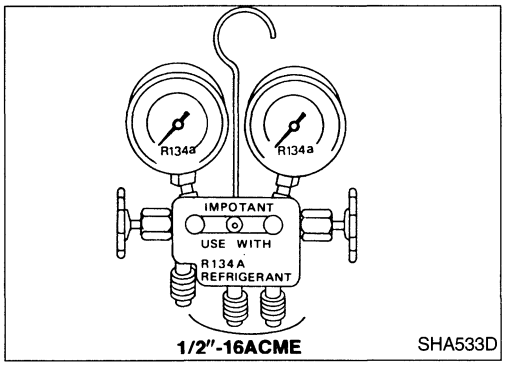
VACUUM PUMP

The lubrication oil contained inside the vacuum pump is not compatible with the specified lubrication oil for HFC-134a (R-134a) A/C systems. Since the vent side of the vacuum pump is exposed to atmospheric pressure, it is possible for the vacuum pump lubrication oil to migrate out of the pump into the service hose if the pump is switched off after evacuation (vacuuming) and the service hose is not isolated from the vacuum pump.

To prevent the migration of vacuum pump lubrication oil into service hoses, it is necessary to use a valve (which can be manually opened or closed) near the connection of the service hose to the pump.

- On a vacuum pump which is equipped with an isolator valve (usually part of the vacuum pump), closing this valve will isolate the service hose from the pump.
- For pumps without an isolator valve, be certain that the service hose is equipped with a manual shut off valve near the pump end of the hose.
- Hoses which contain an automatic shut off valve at the end of the service hose must be disconnected from the vacuum pump to prevent the migration of lubrication oil: as long as the hose is connected, the valve is open and lubrication oil may migrate.

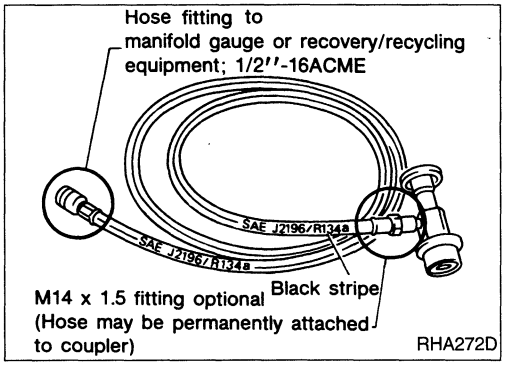
One-way valves which open when vacuum is applied and close under a no vacuum condition are not recommended, because this valve may restrict the pump's ability to pull a deep vacuum.



MANIFOLD GAUGE SET

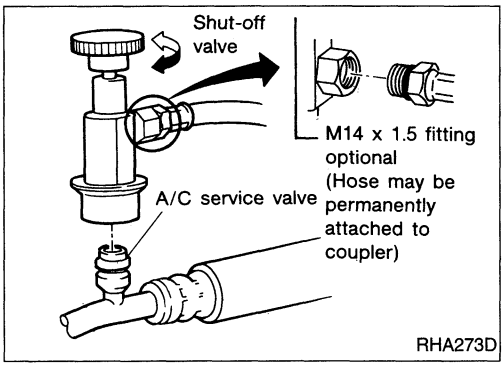
Be certain that the gauge face indicates R-134a or 134a. Be certain that the manifold gauge set has the 1/2"-16 ACME threaded connections for service hoses, and that no refrigerants other than HFC-134a (R-134a) (along with only specified lubrication oils) have been used with the manifold gauge set.

Precautions for Service Equipment (Cont'd)



SERVICE HOSES

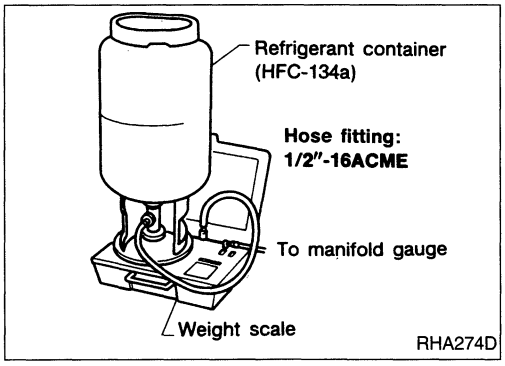
Be certain that the service hoses display the markings described (colored hose with black stripe). Be certain that all hoses include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



SERVICE COUPLERS

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. Although the HFC-134a (R-134a) couplers will not secure on to the CFC-12 (R-12) system, CFC-12 (R-12) refrigerant and lubrication oil will be discharged into the HFC-134a (R-134a) coupler, causing contamination.

Shut off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



REFRIGERANT WEIGHT SCALE

If the scale allows electronic control of the flow of refrigerant through the scale, be certain that the hose fitting size is 1/2″-16 ACME, and that no refrigerant other than HFC-134a (R-134a) (along with only specified lubrication oil) have been used with the scale.

CHARGING CYLINDER

The charging cylinder is not recommended because refrigerant may be vented into the air from the top valve of the cylinder when filling the cylinder with refrigerant. Additionally, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

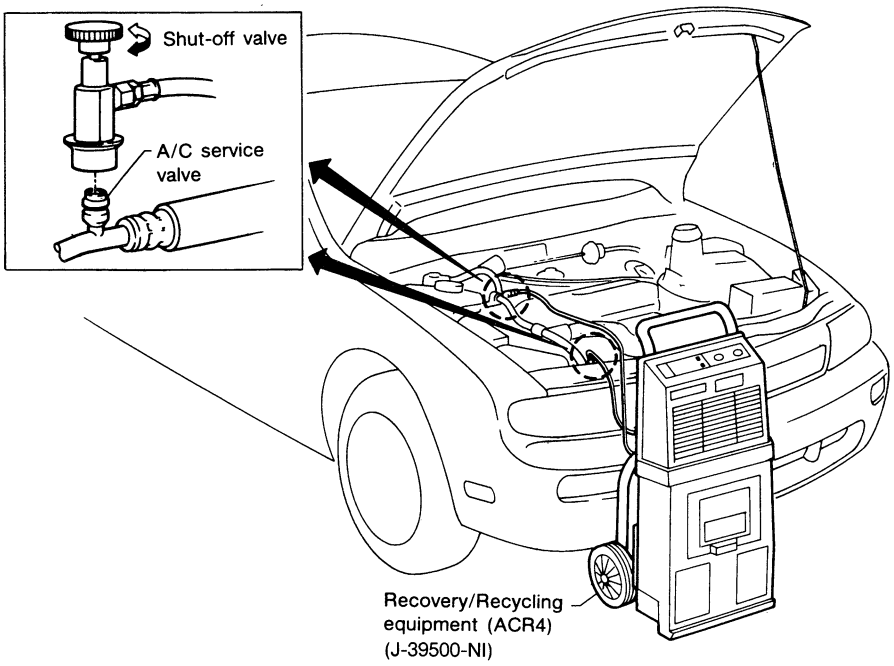
HFC-134a (R-134a) Service Procedure

SETTING OF SERVICE TOOLS AND EQUIPMENT

DISCHARGING REFRIGERANT

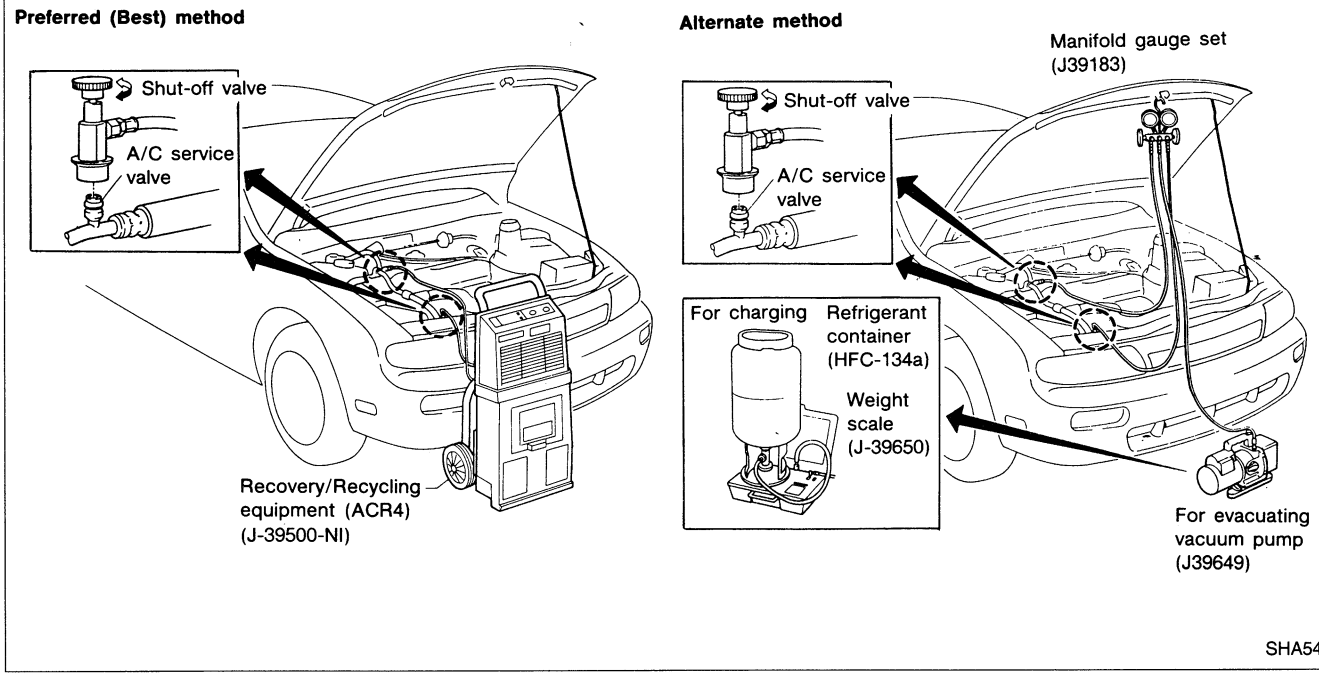
WARNING:

Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. To remove HFC-134a (R-134a) from the A/C system, use service equipment certified to meet the requirements of SAE J2210 [HFC-134a (R-134a) recycling equipment] or J2209 [HFC-134a (R-134a) recovery equipment]. If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



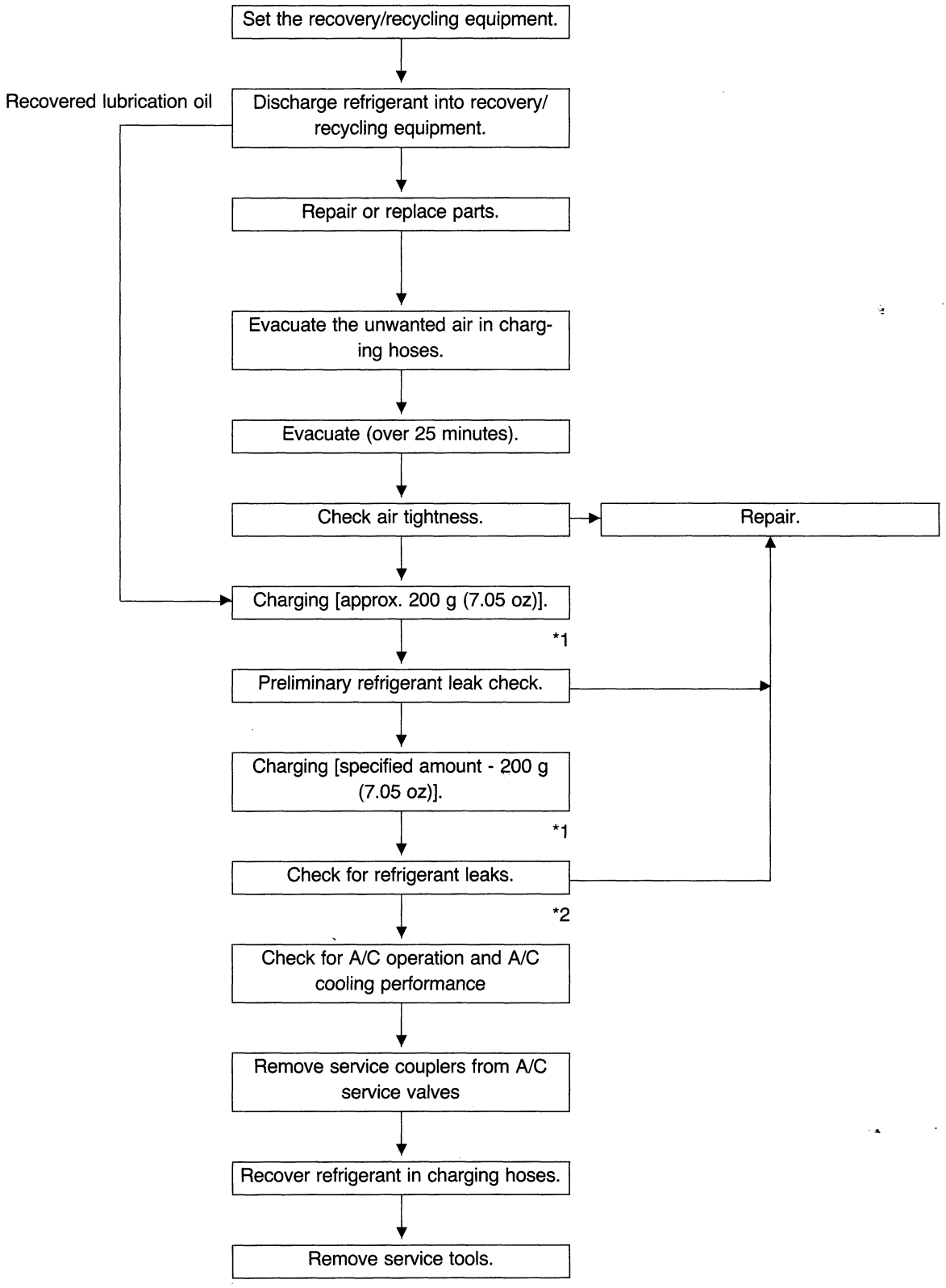
SHA539D

EVACUATING SYSTEM AND CHARGING REFRIGERANT



SHA540D

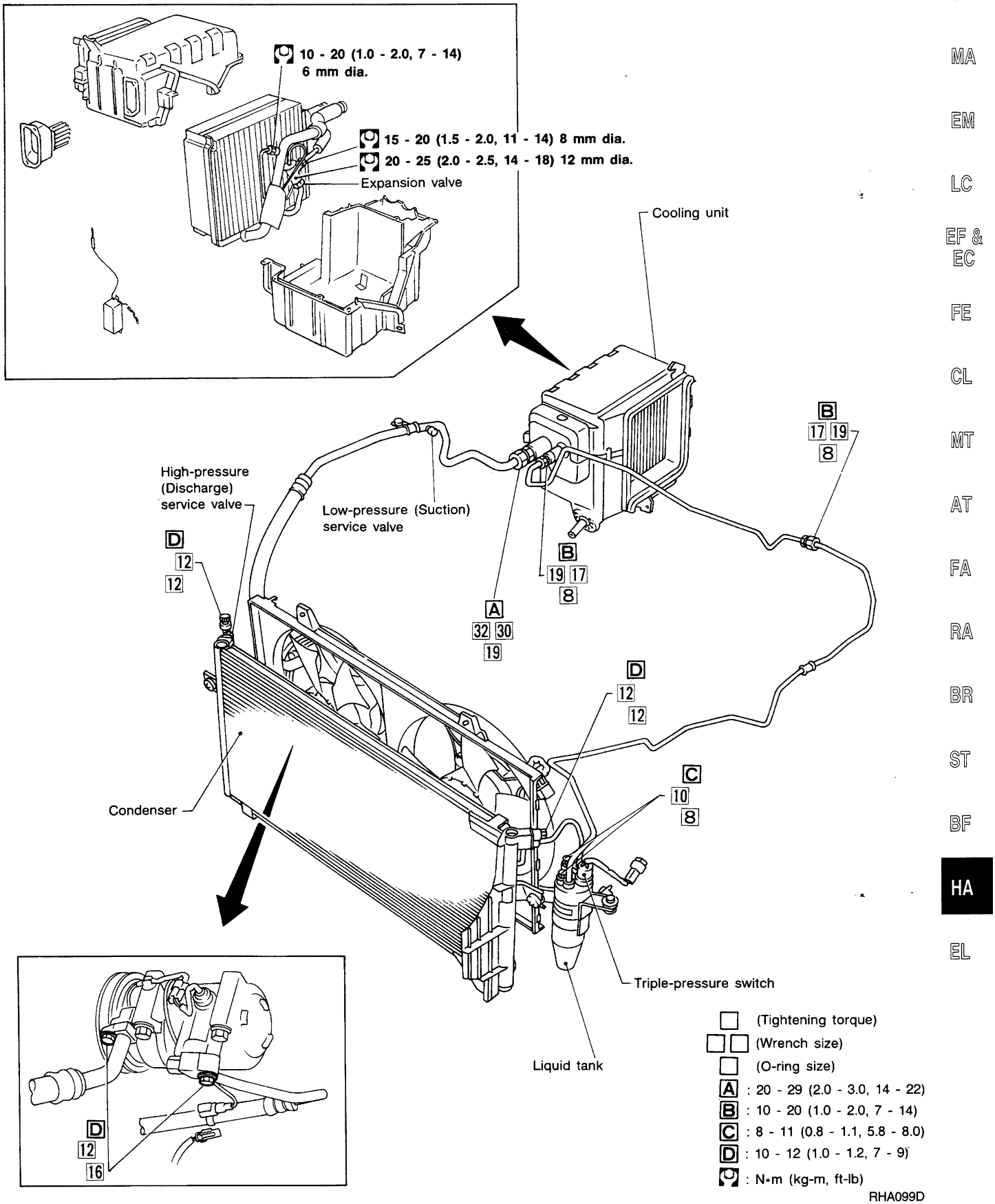
HFC-134a (R-134a) Service Procedure (Cont'd)



Note: *1 Before charging refrigerant, ensure engine is off.
*2 Before checking for leaks, start engine to activate air conditioning system then turn it off.

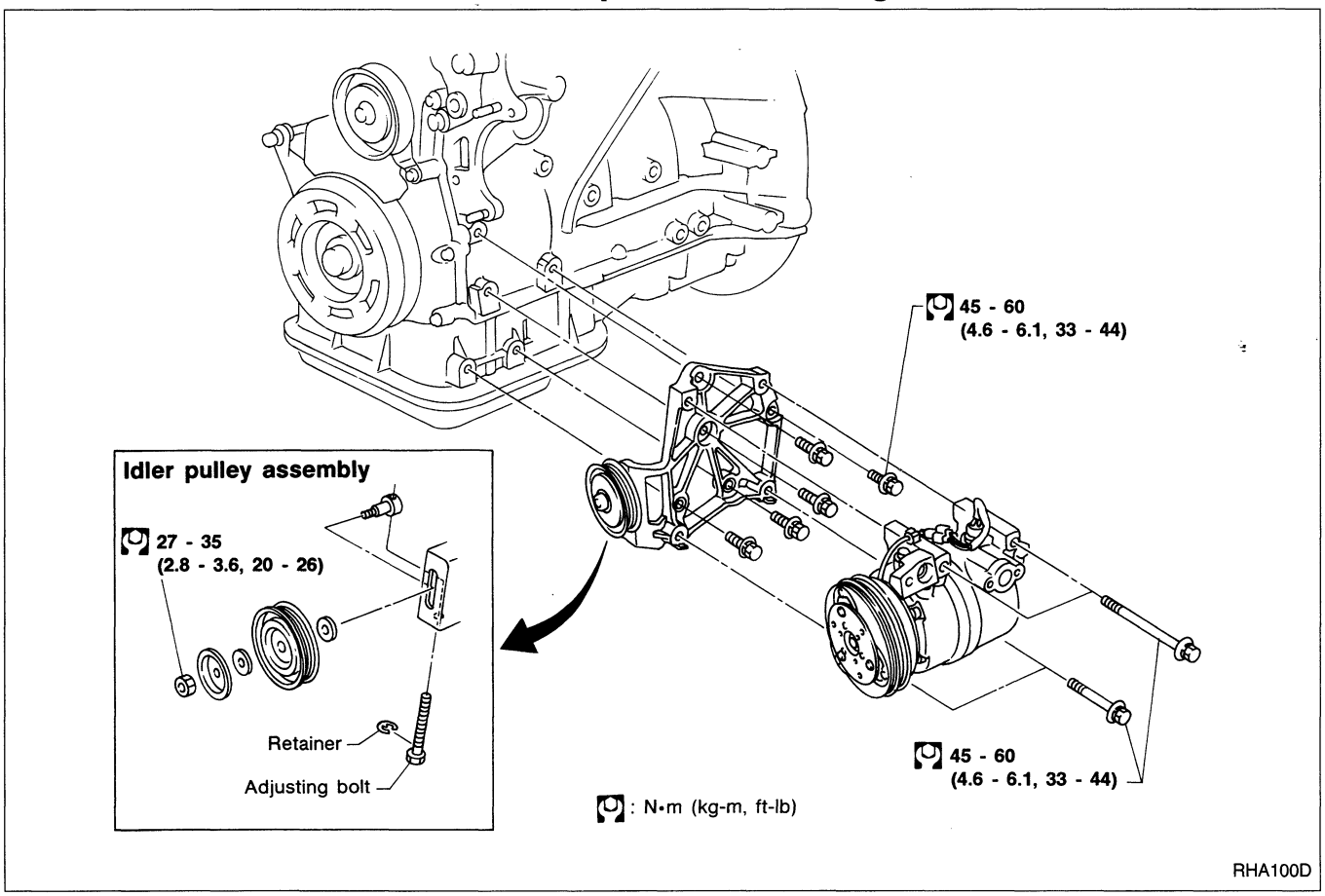
Refrigerant Lines

- Refer to HA-4.



RHA099D

Compressor Mounting



Belt Tension

- **Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").**

Fast Idle Control Device (FICD)

- **Refer to EF & EC section ("IAC VALVE-FICD SOLENOID VALVE", "Electrical Components Inspection", "TROUBLE DIAGNOSES").**

Lubrication Oil

Name: Nissan A/C System Oil Type R
Part No.: KLH00-PAGR0

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/cm^2, 85 psi) or higher.
   If less than the reference level, attach a cover to the front face of the condenser to lower the pressure.
3. Perform oil return operating for about 10 minutes.
4. Stop engine

CAUTION:
If excessive oil leakage is noted, do not perform the oil return operation.

No

Should the compressor be replaced?

No / Yes

Ⓐ (Go to next page.)

Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of oil leakage.)

Yes → After replacing any of the following major components of the system, be sure to add the correct amount of oil to the system.

Amount of oil to be added

Part replaced	Oil to be added to system		Remarks
	Amount of oil mℓ (US fl oz, Imp fl oz)	Ratio (%)	
Evaporator	75 (2.5, 2.6)	30	—
Condenser	75 (2.5, 2.6)	20	—
Liquid tank	5 (0.2, 0.2)	10	Add if compressor is not replaced.*1
In case of refrigerant leak	30 (1.0, 1.1)	—	Large leak
	—	—	Small leak*2

*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

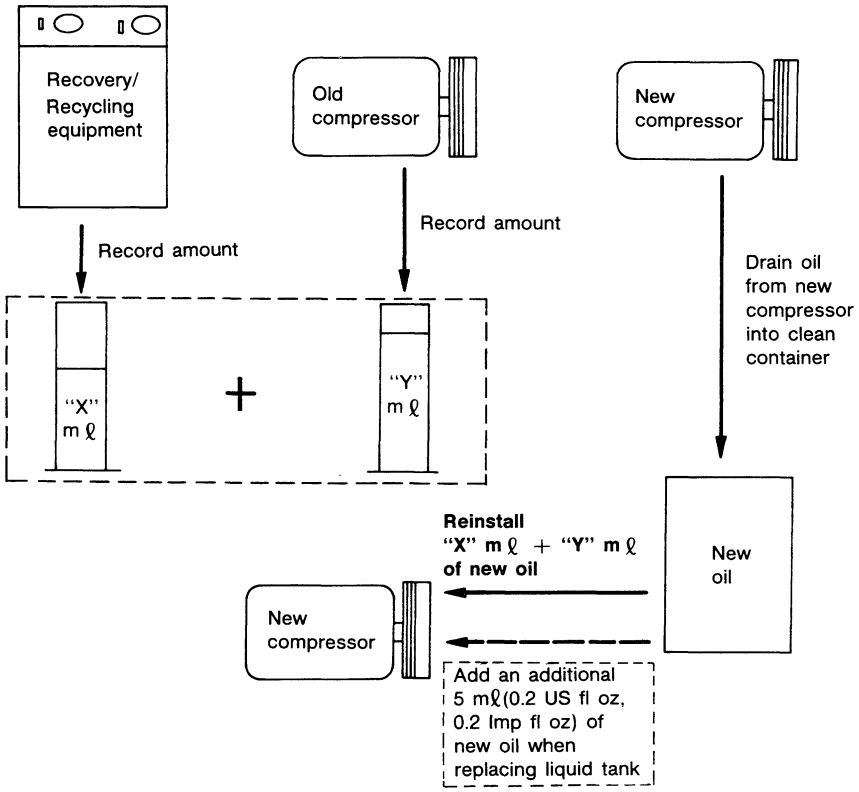
Carry out the A/C performance test.

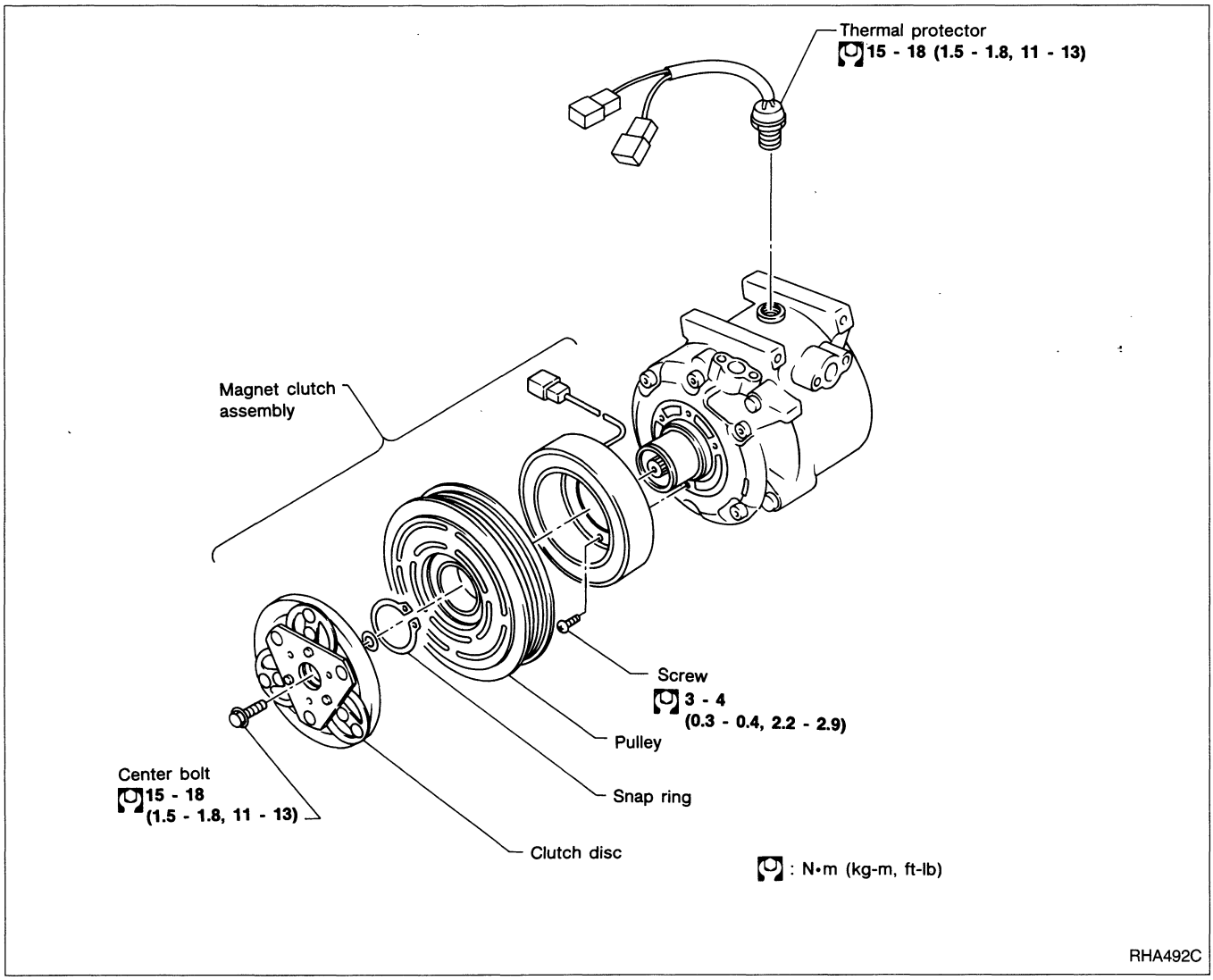
Checking and Adjusting (Cont'd)

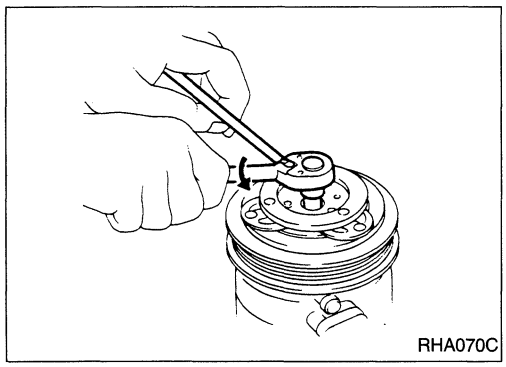
Ⓐ

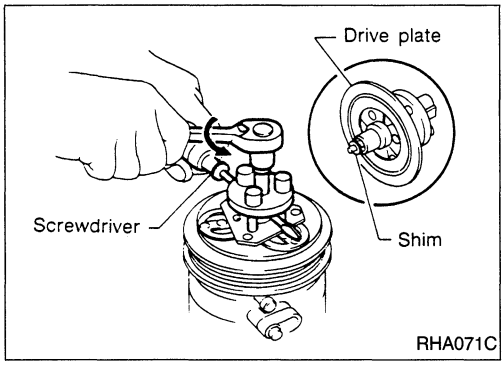
1. Discharge refrigerant into refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug (for V-5 or V-6, and DKS-16H compressor) and drain the oil from the "old" (removed) compressor into a graduated container, and record the amount of oil drained.
3. Remove the drain plug and drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of the new oil equivalent to that drained from the "old" compressor, and add this oil to the "new" compressor through the drain plug or suction port opening.
5. Measure an amount of the "new" oil equivalent to that recovered during discharging, and add this oil to the "new" compressor through the drain plug or suction port opening.
6. Torque the drain plug.
   V-5 or V-6 compressor: 18 - 19 N•m (1.8 - 1.9 kg-m, 13 - 14 ft-lb)
   DKS-16H compressor: 14 - 16 N•m (1.4 - 1.6 kg-m, 10 - 12 ft-lb)
7. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil at this time.
   Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement









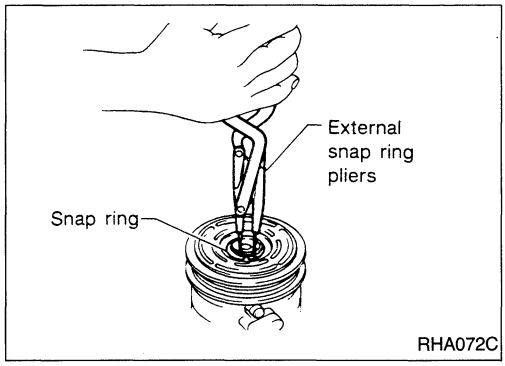
Compressor Clutch

REMOVAL

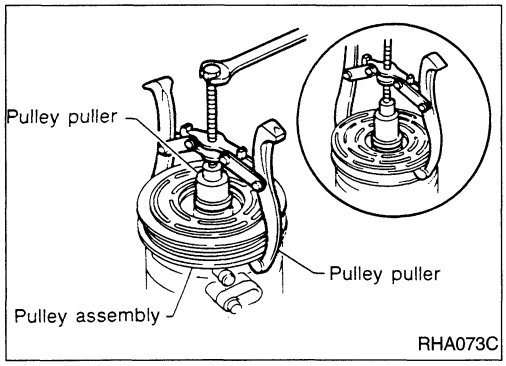
- When removing center bolt, hold clutch disc with clutch disc wrench.

- Remove the drive plate using the clutch disc puller.
  Insert the holder's three pins into the holes in the drive plate, and rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the drive plate.
  When tightening the center bolt, insert a round bar (screwdriver, etc.) between two of the pins (as shown in the left-hand figure) to prevent drive plate rotation. After removing the drive plate, remove the shims from either the drive shaft or the drive plate.

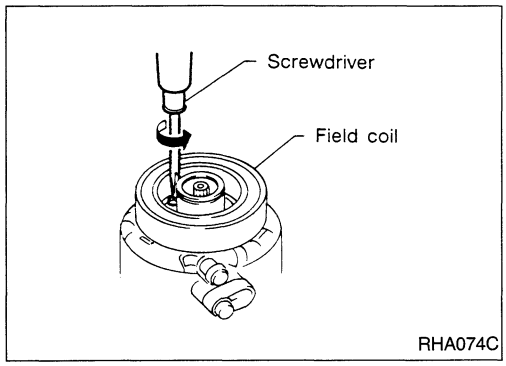
Compressor Clutch (Cont'd)

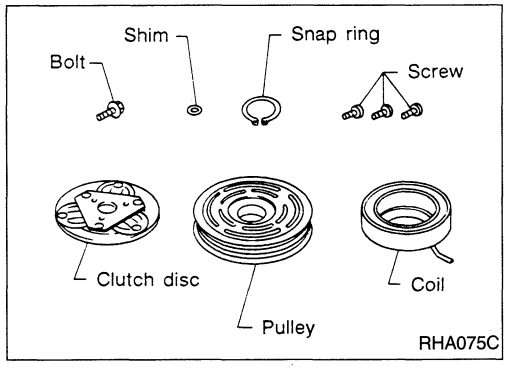


- Remove the snap ring using external snap ring pliers.



- Pulley removal
  Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
  For pressed pulleys
  To prevent deformation of the pulley groove, the puller claws should be hooked into (not under) the pulley groove.
  For machine latched pulleys
  Align the pulley puller groove with the pulley groove, and then remove the pulley assembly.
- Remove the field coil harness clip using a screwdriver.
- Remove the three field coil fixing screws and remove the field coil.





INSPECTION

Clutch disc

If the contact surface shows signs of damage due to excessive heat, the clutch disc and pulley should be replaced.

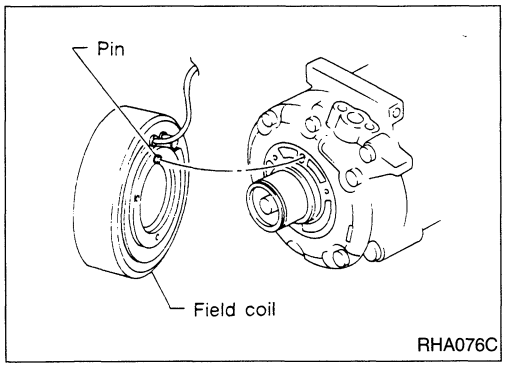
Pulley

Check the appearance of the pulley assembly. If the contact surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and clutch disc should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil

Check coil for loose connection or cracked insulation.

Compressor Clutch (Cont'd)

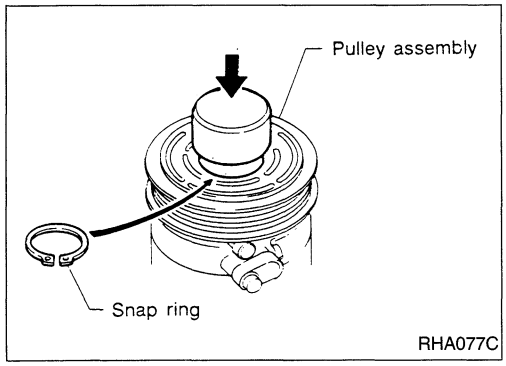


INSTALLATION

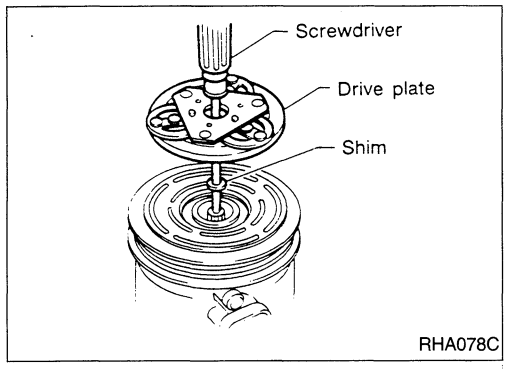
- Install the field coil.

Be sure to align the coil's pin with the hole in the compressor's front head.

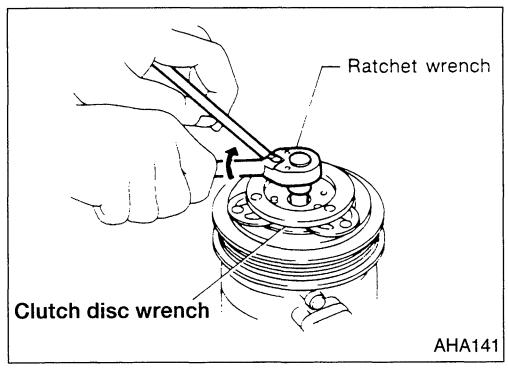
- Install the field coil harness clip using a screwdriver.



- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.



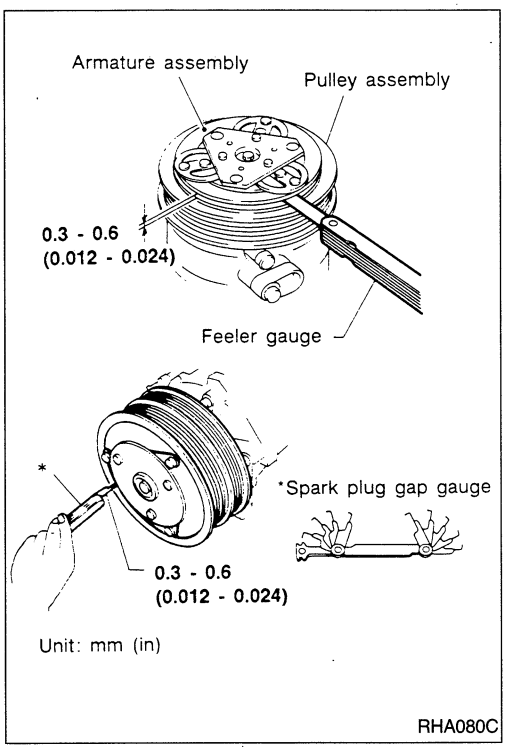
- Install the drive plate on the drive shaft, together with the original shim(s). Press the drive plate down by hand.



- Using the clutch disc wrench to prevent drive plate rotation, tighten the bolt to 12 to 15 N•m (1.2 to 1.5 kg-m, 9 to 11 ft-lb) torque.

After tightening the bolt, check that the pulley rotates smoothly.

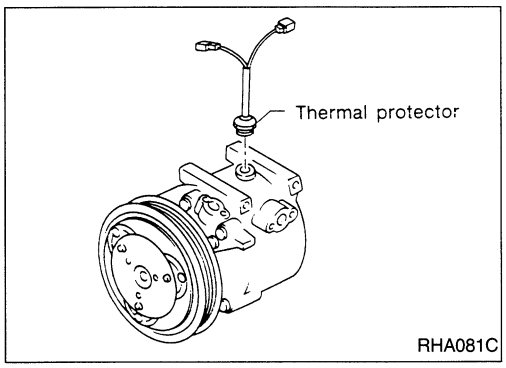
Compressor Clutch (Cont'd)



- Check clearance around the entire periphery of clutch disc.
  Disc-to-pulley clearance:
  0.3 - 0.6 mm (0.012 - 0.024 in)
  If the specified clearance is not obtained, replace adjusting spacer and readjust.

BREAK-IN OPERATION

When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.



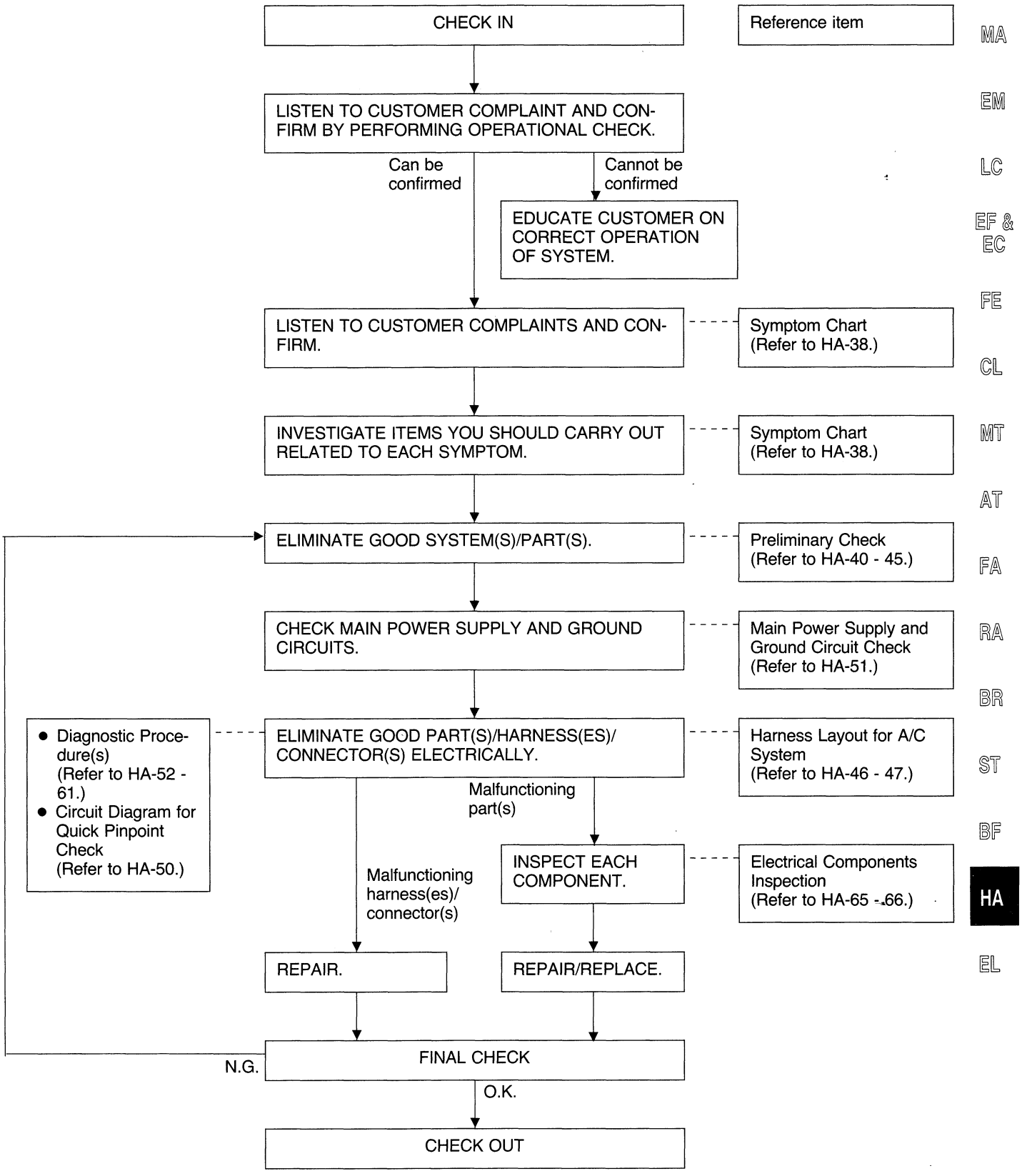
Thermal Protector

INSPECTION

- When servicing, do not allow foreign matter to get into compressor.
- Check continuity between two terminals.

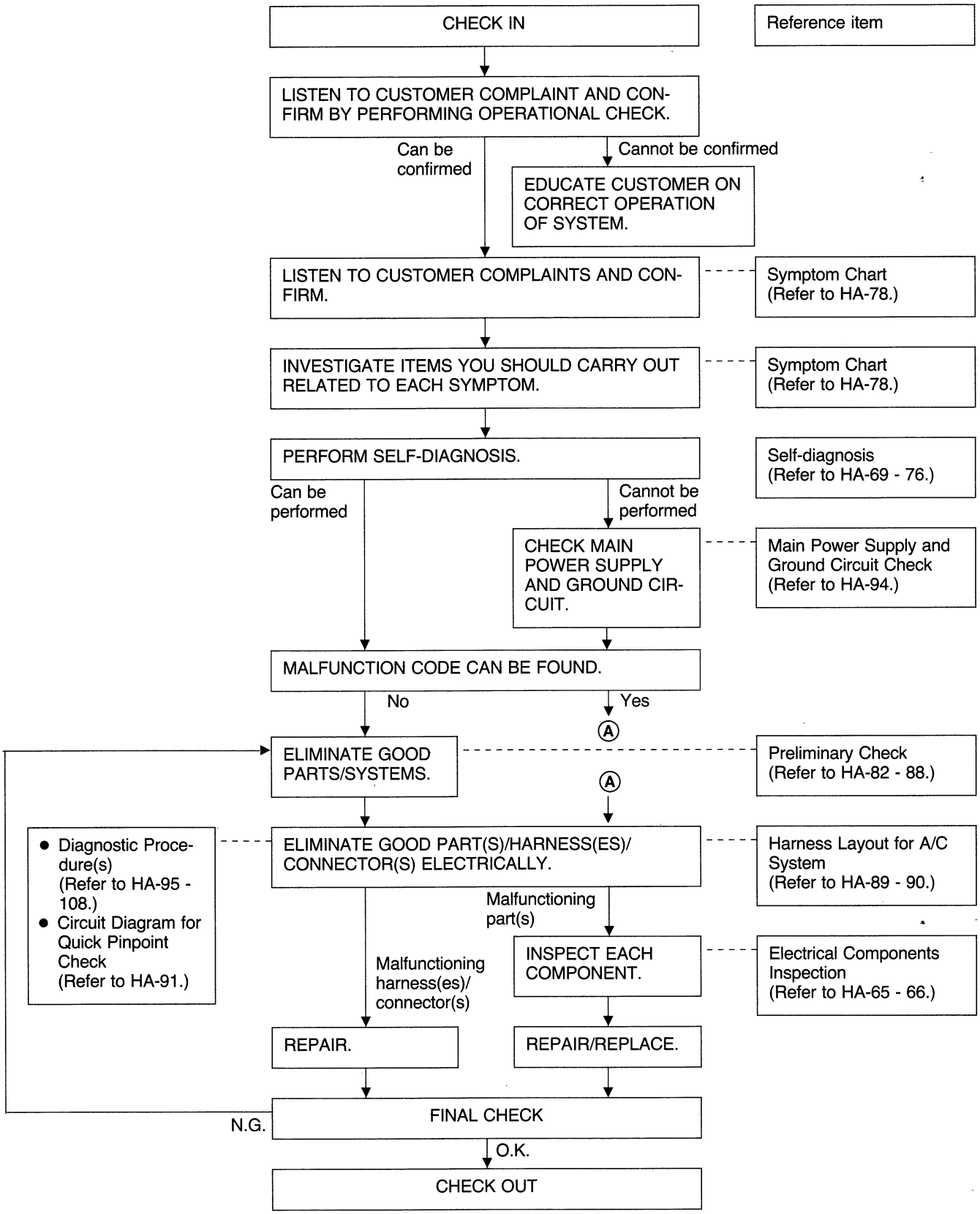
How to Perform Trouble Diagnoses for Quick and Accurate Repair — Manual Air Conditioning

WORK FLOW



How to Perform Trouble Diagnoses for Quick and Accurate Repair — Auto Air Conditioning

WORK FLOW

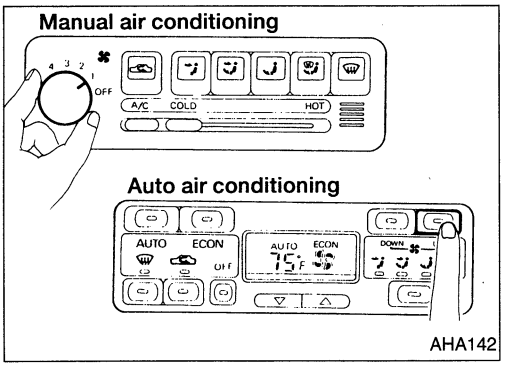


Operational Check

The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase, A/C switch and the memory function (Auto air conditioning type only).

CONDITIONS:

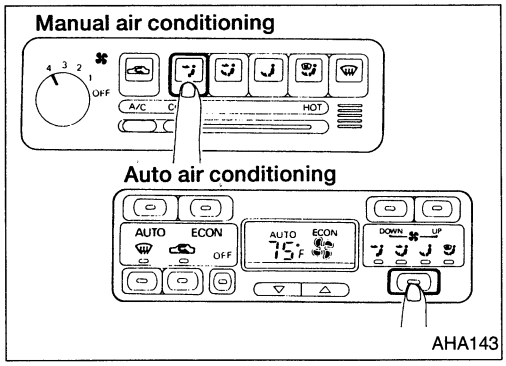
- **Engine running and at normal operating temperature.**
- **Fresh VENT "OFF"**



PROCEDURE:

1. Check blower

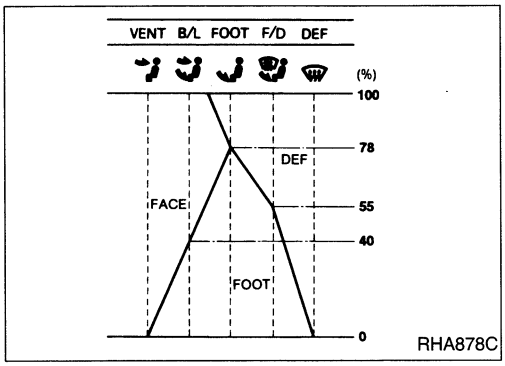
1) Turn fan switch to 1-speed or Press fan switch (up side) at one time.
   Blower should operate on low speed.
   The fan symbol should have one blade lit . (Auto Air Conditioning type only)
2) Then turn fan switch to 2-speed or Press fan switch (up side) one more time.
3) Continue checking blower speed until all speeds are checked.
   Continue checking fan symbol until all speeds are checked (Auto Air Conditioning type only)
4) Leave blower on speed 4.



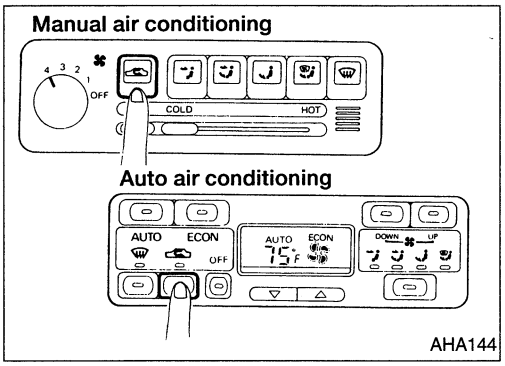
2. Check discharge air.

1) Press each mode switch (Manual Air Conditioning type).
   Press mode switch four times and DEF button (Auto Air Conditioning type).
2) Confirm that discharge air comes out according to the air distribution ratios table at left.

NOTE:
Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF button is pressed.
Confirm that the intake door position is at FRESH when the F/D button is pressed (Manual Air Conditioning type only).

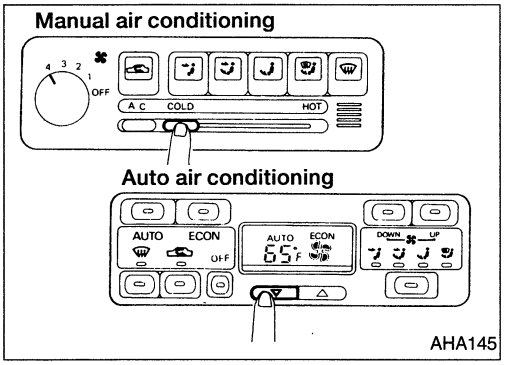


Operational Check (Cont'd)



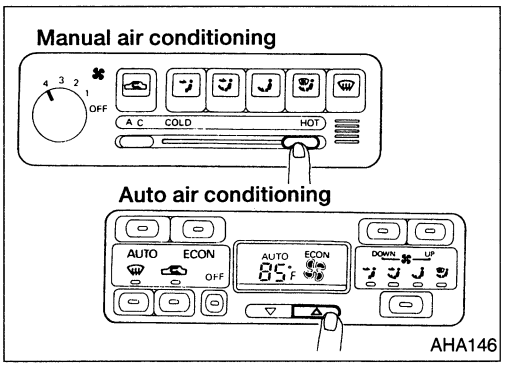
3. Check recirc

1) Press REC switch
   Recirc indicator should illuminate.
2) Listen for intake door position change (you should hear blower sound change slightly).



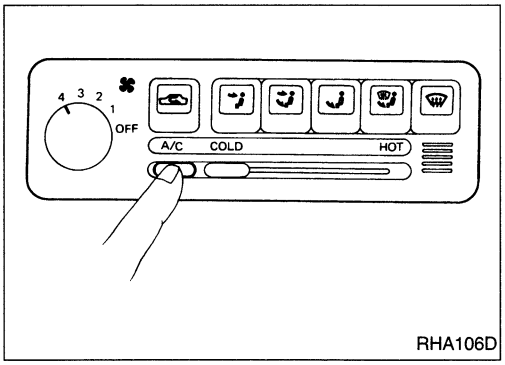
4. Check temperature decrease

1) Slide temperature control lever to full cold. (Manual Air Conditioning type)
   Press the temperature decrease button until 18°C (65°F) is displayed (Auto Air Conditioning type).
2) Check for cold air at discharge air outlets.



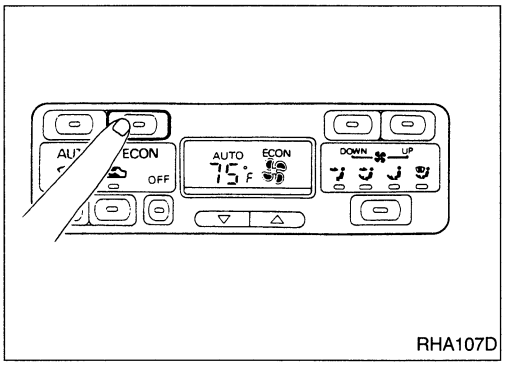
5. Check temperature increase

1) Slide temperature control lever to full hot. (Manual Air Conditioning type)
   Press the temperature increase button until 32°C (85°F) is displayed (Auto Air Conditioning type).
2) Check for hot air at discharge air outlets.



6. Check air conditioning switch (Manual Air Conditioning type only)

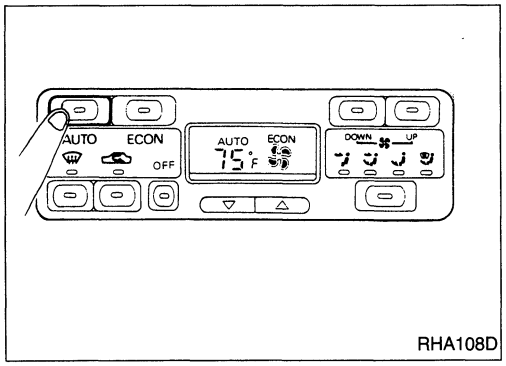
Move the fan control switch to the desired (1 to 4 speed) position and push the A/C switch to turn ON the air conditioning.
The indicator lamp should come on when air conditioning is ON.



7. Check ECON mode (Auto Air Conditioning type only)

1) Press ECON switch.
2) Display should indicate ECON (no AUTO, no MANUAL).
   Confirm that the compressor clutch is not engaged (visual inspection).
   (Discharge air will depend on ambient, in-vehicle, and set temperatures).

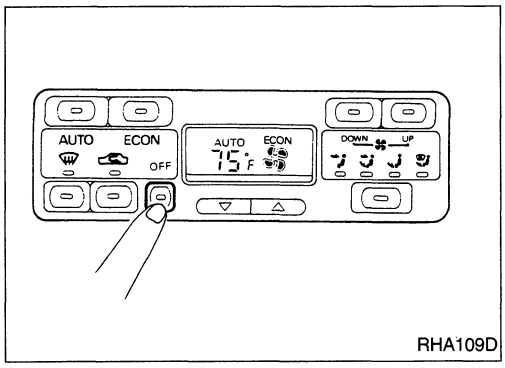
Operational Check (Cont'd)



RHA108D

8. Check AUTO mode (Auto Air Conditioning type only)

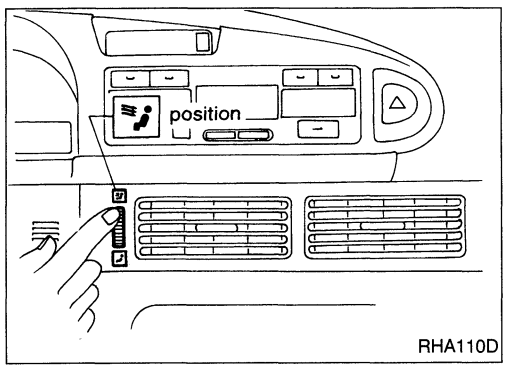
1) Press AUTO switch.
2) Display should indicate AUTO (no ECON, no MANUAL).
   Confirm that the compressor clutch engages (audio or visual inspection).
   (Discharge air will depend on ambient, in-vehicle, and set temperatures).



RHA109D

9. Check memory function (Auto Air Conditioning type only)

1) Press OFF switch.
2) Turn the ignition off.
3) Turn the ignition on.
4) Press the AUTO switch.
5) Confirm that the set temperature remains at previous temperature.



RHA110D

10. Check fresh vent switch

1) Set temperature control to full hot.
2) Set mode position at DEF.
3) Turn the fresh vent switch on (position)
4) Confirm that discharge air comes out of defroster vents, and that cool air comes from face vents.

Performance Chart

TEST CONDITION

For Auto Air Conditioning, before conducting performance test, disconnect ambient sensor harness connector and make short circuit using jumper cable.

Testing must be performed as follows:

Vehicle location: Indoors or in the shade (in a well ventilated place)
Doors: Closed
Door window: Open
Hood: Open
TEMP.: Max. COLD
Discharge Air: Face Vent
REC switch: (Recirculation) set
FAN speed: 4-speed
Engine speed: 1,500 rpm
Time required before starting testing after air conditioning starts operating: More than 10 minutes

TEST READING

Recirculating-to-discharge air temperature table

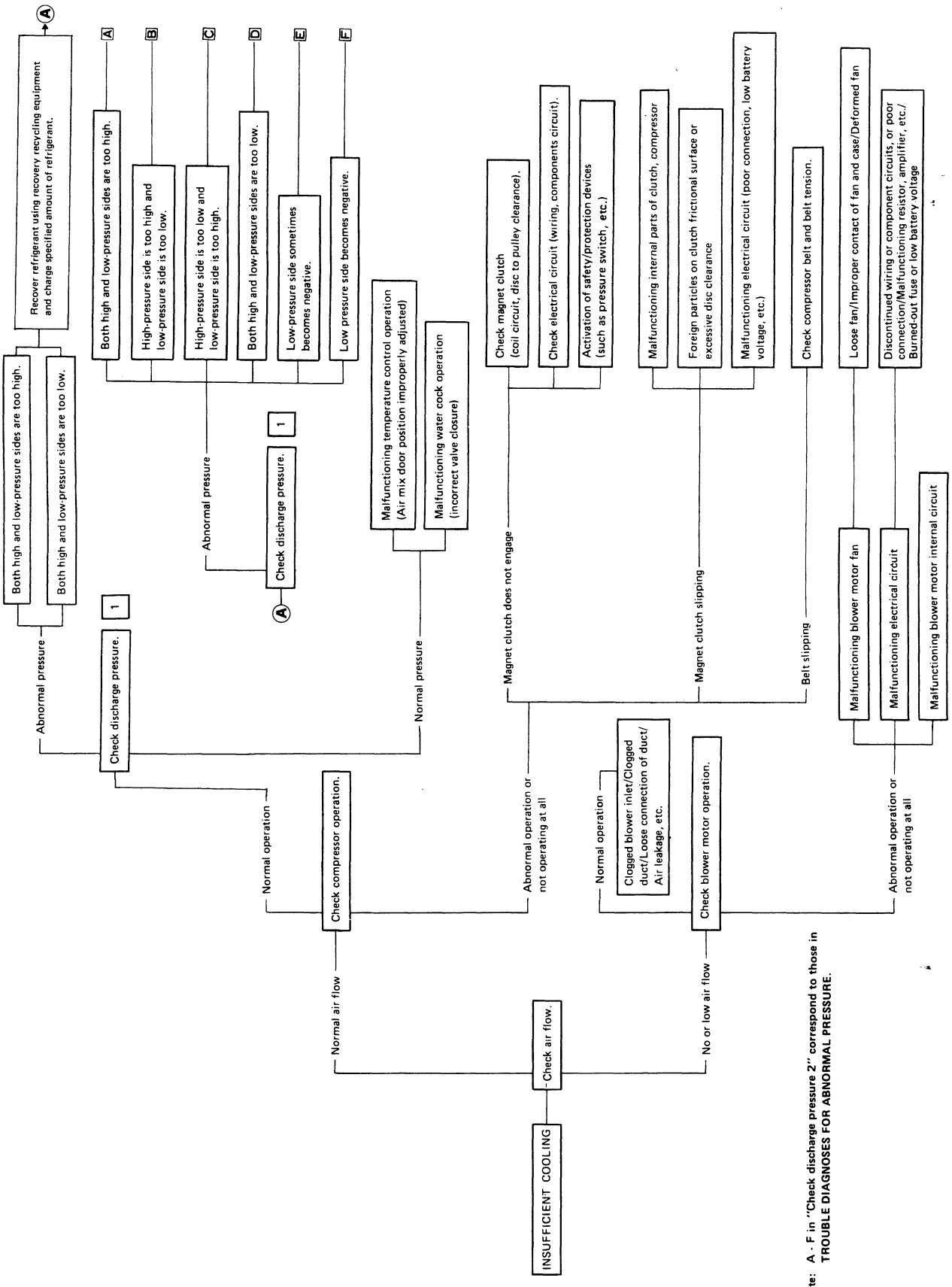
Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	4.0 - 5.4 (39 - 42)
	25 (77)	4.2 - 5.6 (40 - 42)
	30 (86)	8.5 - 11.1 (47 - 52)
	35 (95)	13.5 - 16.7 (56 - 62)
	40 (104)	18.5 - 22.3 (65 - 72)
60 - 70	20 (68)	5.4 - 6.8 (42 - 44)
	25 (77)	5.6 - 8.0 (42 - 46)
	30 (86)	11.1 - 14.1 (52 - 57)
	35 (95)	16.7 - 20.3 (62 - 69)
	40 (104)	22.3 - 26.5 (72 - 80)

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)	834 - 1,098 (8.5 - 11.2, 121 - 159)	122.6 - 161.8 (1.25 - 1.65, 17.8 - 23.5)
	25 (77)	1,049 - 1,363 (10.7 - 13.9, 152 - 198)	137.3 - 181.4 (1.4 - 1.85, 19.9 - 26.3)
	30 (86)	1,226 - 1,618 (12.5 - 16.5, 178 - 235)	152.0 - 201.0 (1.55 - 2.05, 22.0 - 29.2)
	35 (95)	1,255 - 1,716 (12.8 - 17.5, 182 - 249)	166.7 - 230.5 (1.7 - 2.35, 24.2 - 33.4)
	40 (104)	1,540 - 2,030 (15.7 - 20.7, 223 - 294)	201.0 - 289.3 (2.05 - 2.95, 29.2 - 41.9)

Performance Test Diagnoses

INSUFFICIENT COOLING



Note: A - F in "Check discharge pressure 2" correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.

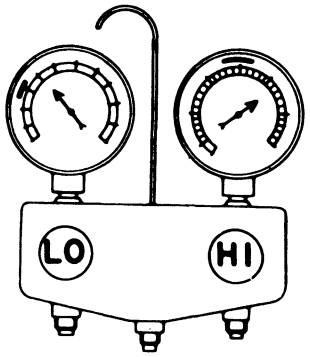
U13DHA8

Performance Test Diagnoses (Cont'd)

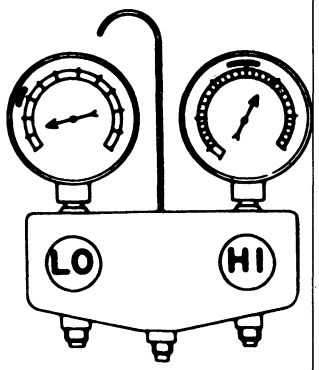
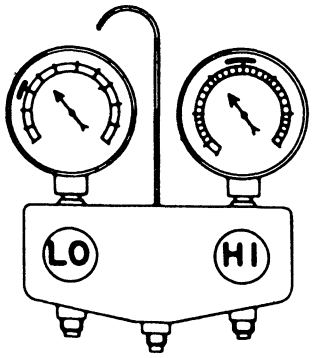
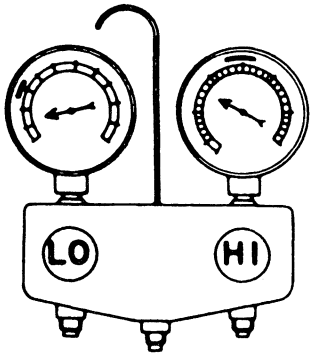
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

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 HA-32 ("Ambient air temperature-to-compressor pressure table").

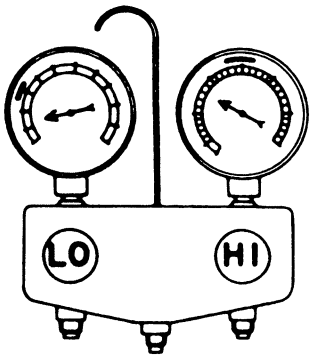
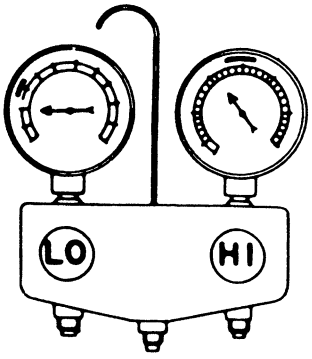
Pressure measurements are effective only when ambient temperature is in the range indicated under the heading "INSPECTION DATA (1) Measurement of system pressure".

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by radiator or radiator fan is insufficient.	Insufficient condenser cooling performance ↓ ① Condenser fins are clogged. ② Improper rotation of radiator fan or radiator fan	• Clean condenser. • Check and repair radiator or radiator 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.

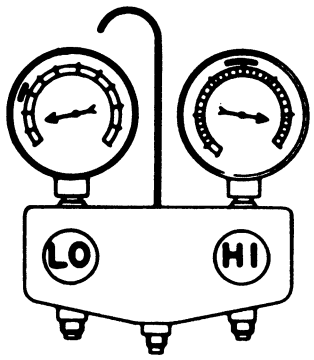
Performance Test Diagnoses (Cont'd)

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 receiver drier 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 receiver drier 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.

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE	Preliminary Check						Diagnostic Procedure						Main Power Supply and Ground Circuit Check			
REFERENCE PAGE	HA-40	HA-41	HA-42	HA-43	HA-44	HA-45	HA-52	HA-54	HA-56	HA-57	HA-59	HA-61	HA-51	HA-51	HA-51	HA-51
SYMPTOM	Preliminary check 1	Preliminary check 2	Preliminary check 3	Preliminary check 4	Preliminary check 5	Preliminary check 6	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	Diagnostic procedure 6	20A Fuses (#4, #5)	10A Fuse (#10)	10A Fuse (#20)	Push control module
A/C does not blow cold air.		❶					○			○			○	○		
Insufficient heating.						❶	○					○				
Blower motor does not rotate.		❶					❷						○			
Air outlet does not change.				❶				❷						○		○
Intake door does not change in VENT, B/L or FOOT mode.									❶					○		○
Intake door is not set at "FRESH" in DEF or F/D mode.	❶								○					○		○
Air mix door does not change.		❶								❷						
Fresh vent door does not change.											❶					
Magnet clutch does not engage when A/C switch and fan switch are ON.		❶										❷		○	○	
Magnet clutch does not engage in DEF mode.		❶	❷									○		○	○	
Noise					❶											

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)

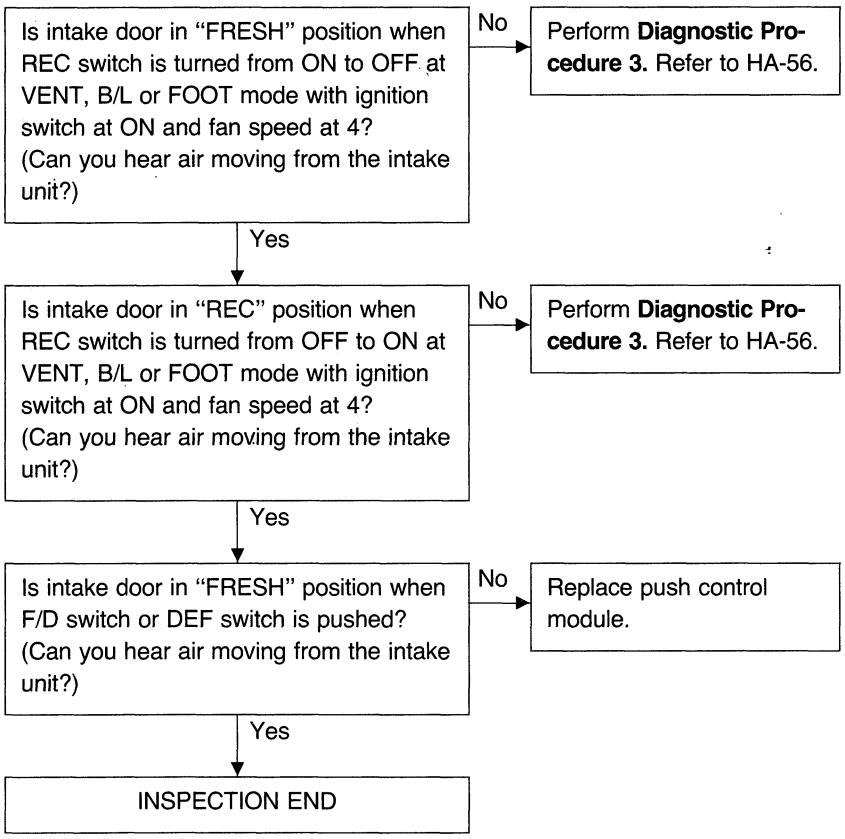
Electrical Components Inspection

HA-65	HA-65	HA-65	—	—	—	—	—	—	HA-65	—	—	—	—	—	HA-66	HA-66	—	—	Refer to EF & EC section.	—	
Blower motor	Resistor	A/C switch	REC switch	VENT switch	B/L switch	FOOT switch	F/D switch	DEF switch	Fan switch	Fresh vent switch	Mode door motor	Intake door motor	Air mix door motor	Fresh vent door motor	A/C relay	Triple pressure switch	Compressor (Magnet clutch)	Ambient switch	ECM (ECCS control module)	Harness	
																	Compressor				
							Push control module														
○	○	○							○				○		○	○	○	○	○	○	
													○							○	
○	○								○											○	
				○	○	○	○	○		○	○			○						○	
			○									○								○	
			○									○								○	
													○							○	
										○				○						○	
		○							○						○	○	○	○	○	○	
								○	○						○	○	○	○	○	○	

Preliminary Check

PRELIMINARY CHECK 1

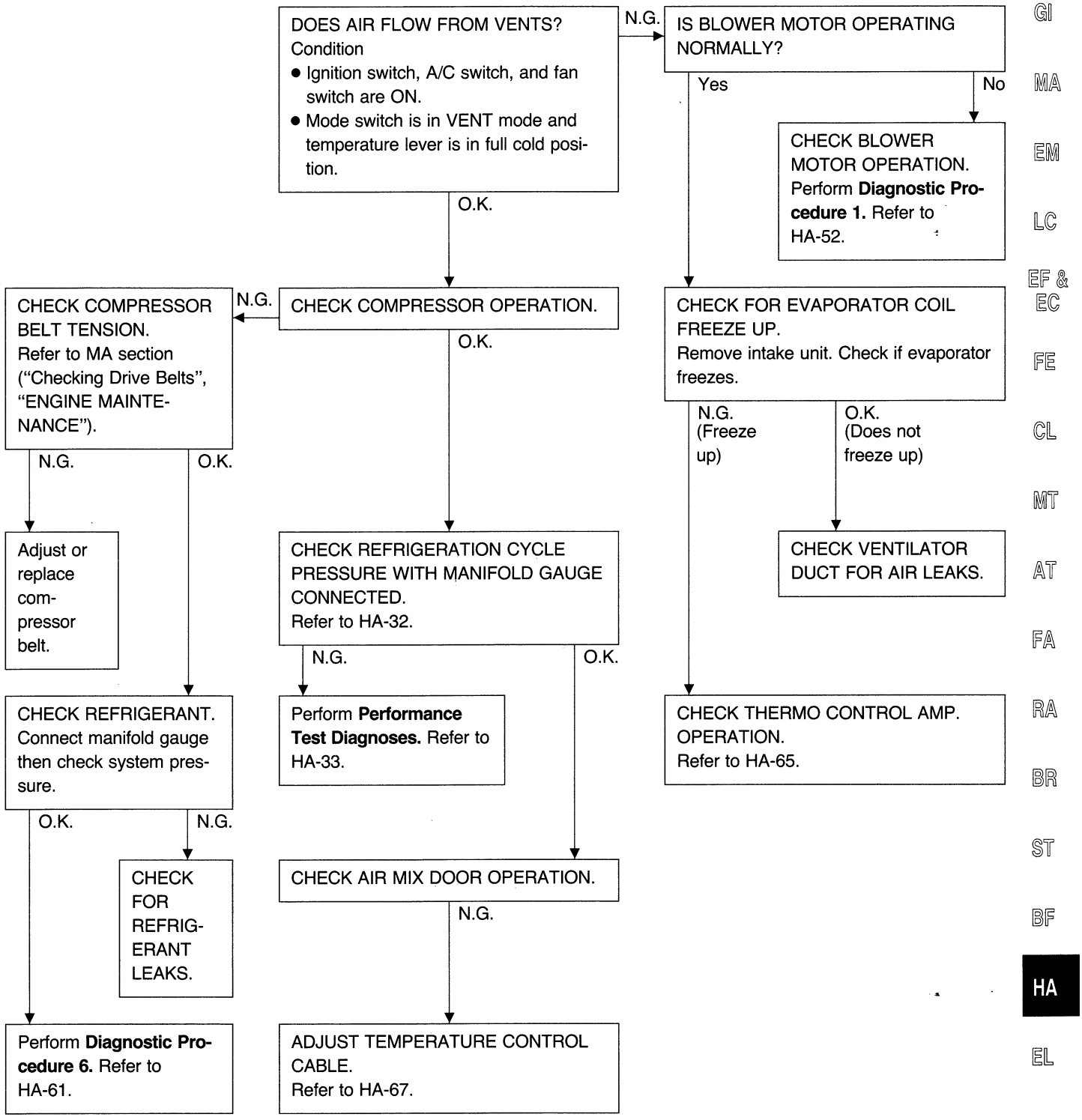
Intake door is not set at "FRESH" in DEF or F/D mode.



Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.

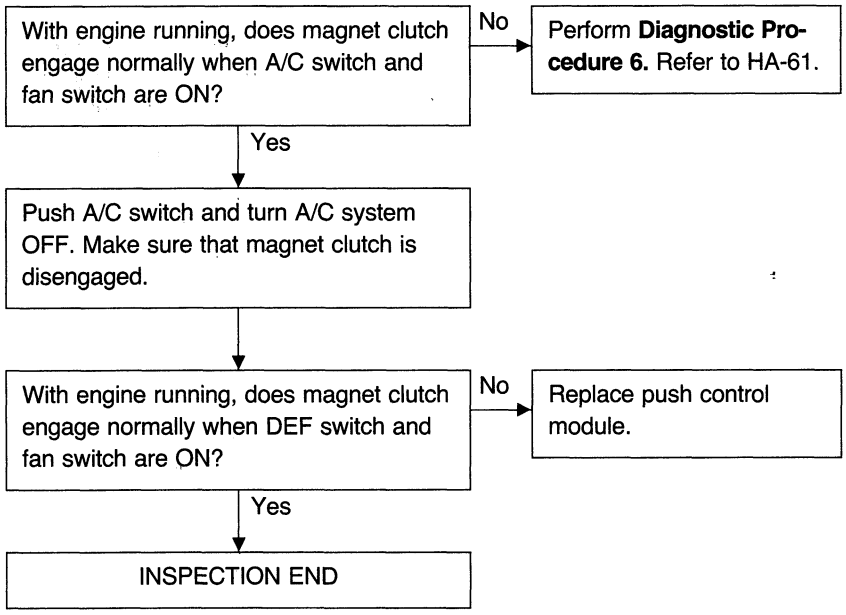


Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Magnet clutch does not engage in DEF mode.

- **Perform PRELIMINARY CHECK 2 before referring to the following flow chart.**



PRELIMINARY CHECK 4

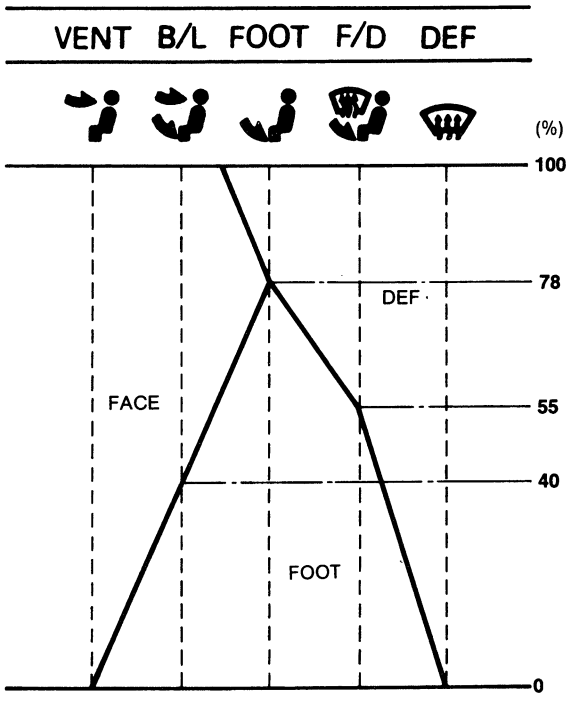
Air outlet does not change.

DOES AIR COME OUT FROM EACH DUCT NORMALLY WHEN EACH MODE SWITCH IS PUSHED WITH IGNITION SWITCH AT ON?

No → Perform **Diagnostic Procedure 2.** Refer to HA-54.

Mode switch	Indicator illuminates	Air outlet
	○	VENT
	○	FOOT & VENT
	○	FOOT & DEF
	○	FOOT & DEF
	○	DEF

Air distribution ratios



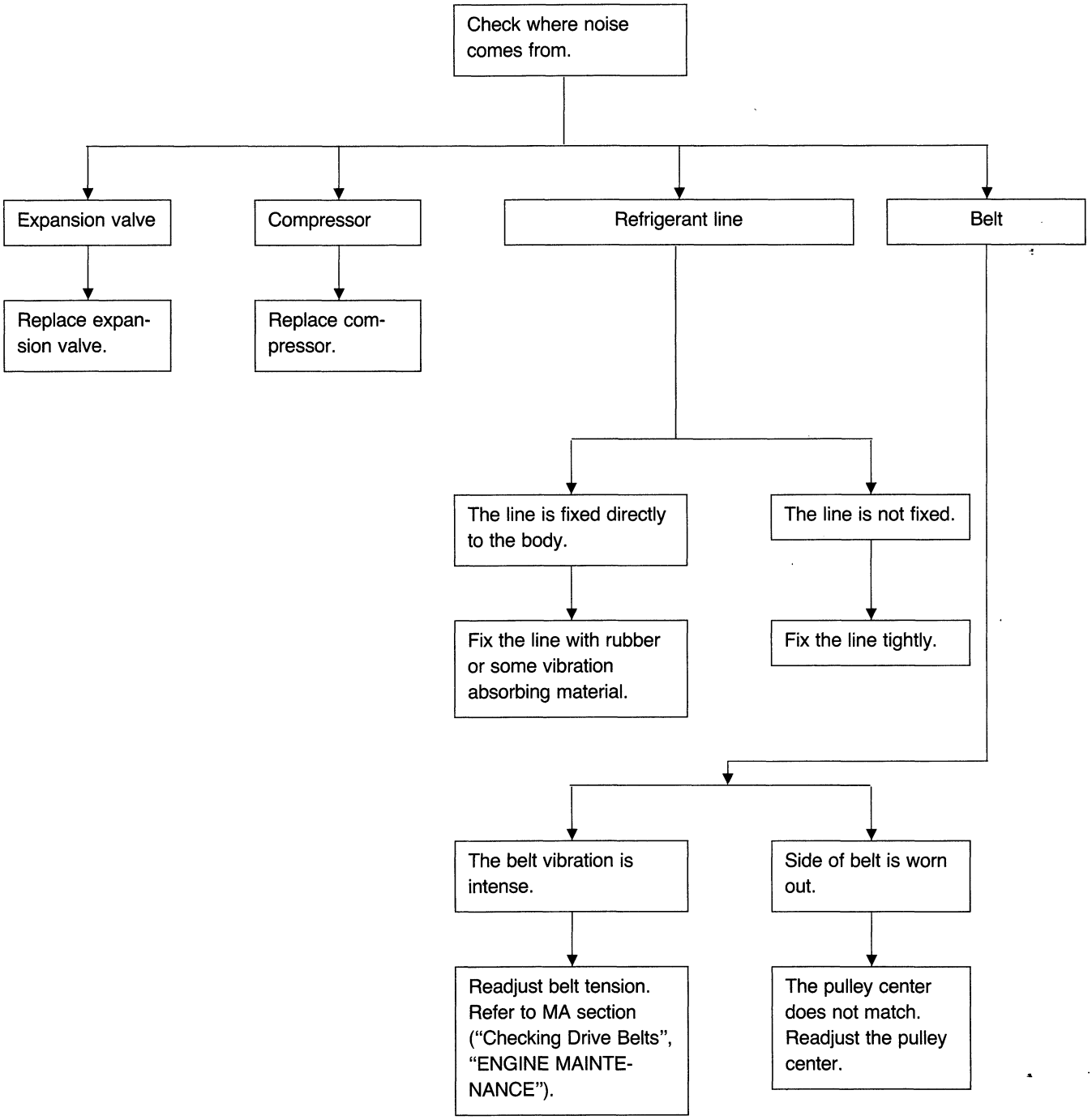
SHA527D

Yes

INSPECTION END

PRELIMINARY CHECK 5

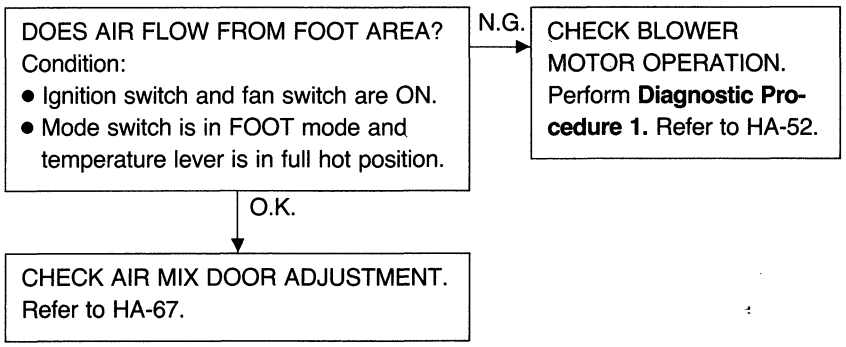
Noise



Preliminary Check (Cont'd)

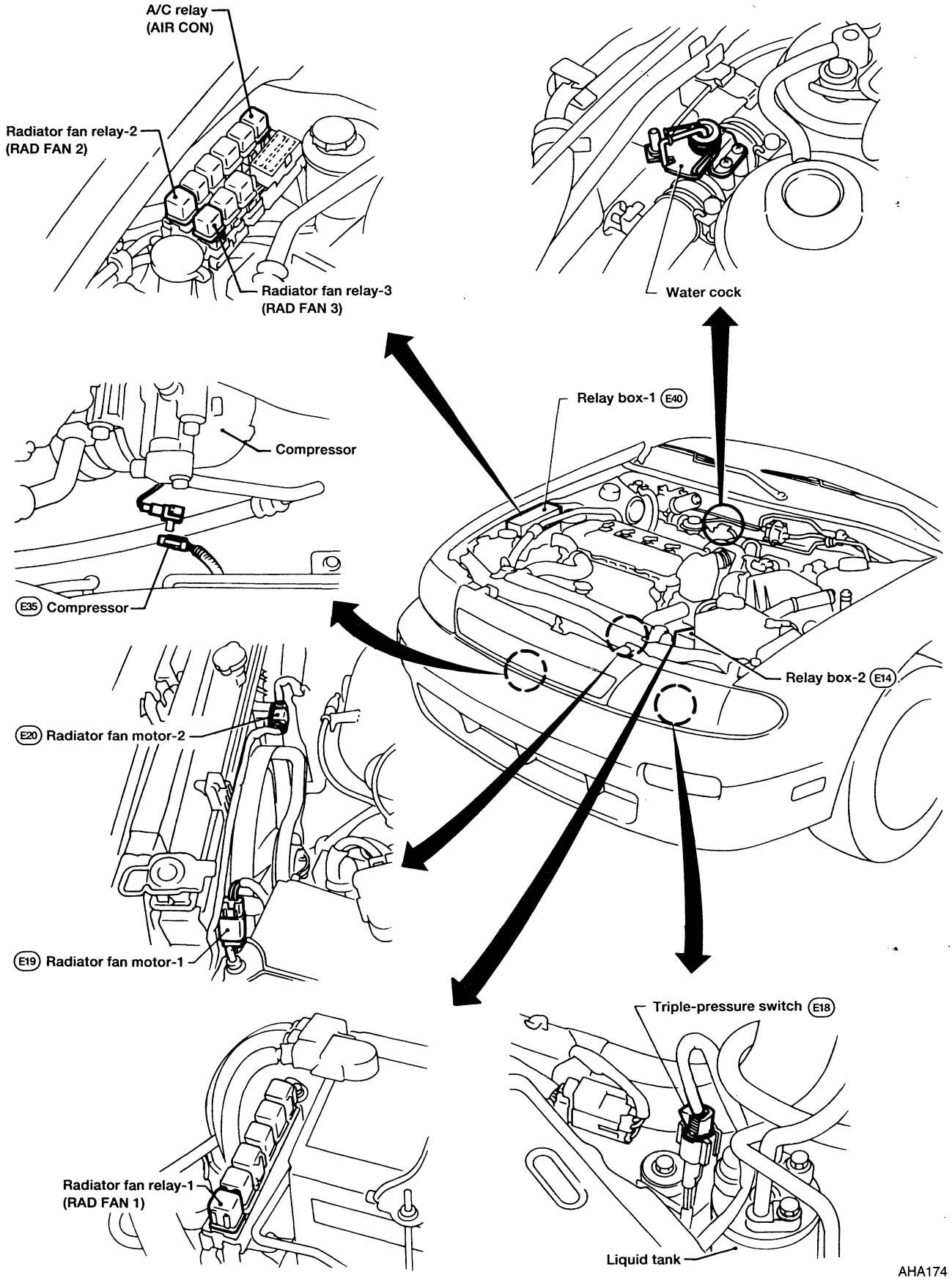
PRELIMINARY CHECK 6

Insufficient heating



Harness Layout for A/C System

Engine compartment

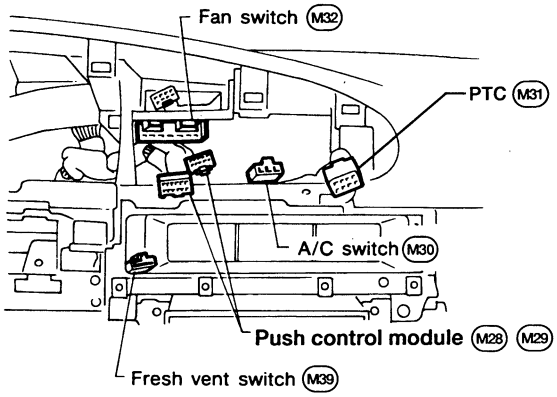


AHA174

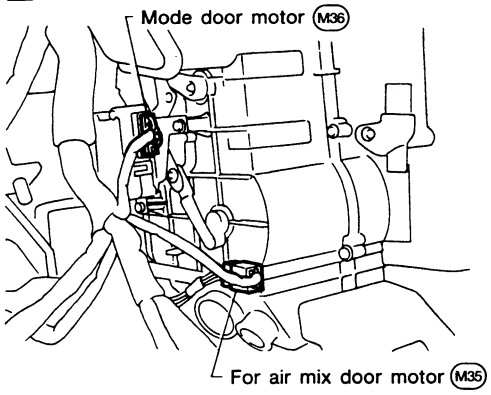
Harness Layout for A/C System (Cont'd)

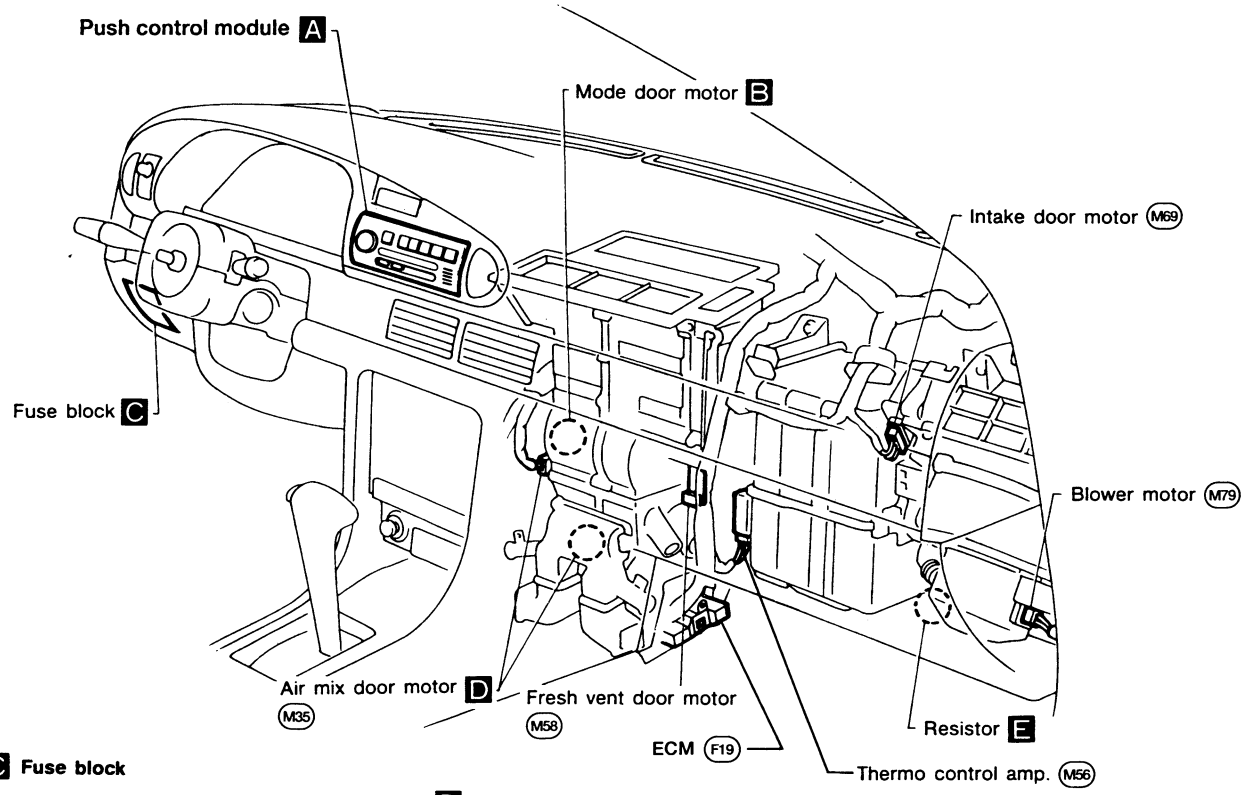
Passenger compartment

A Push control module

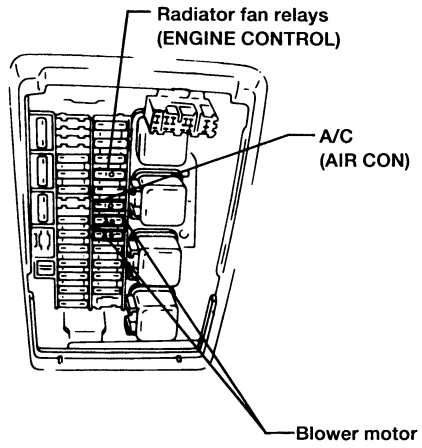


B Mode door motor

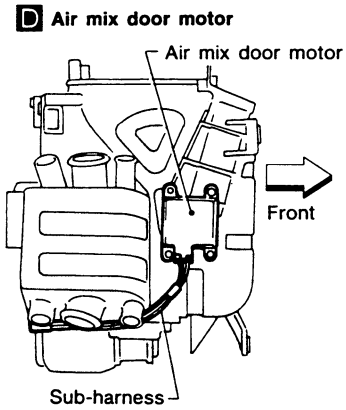




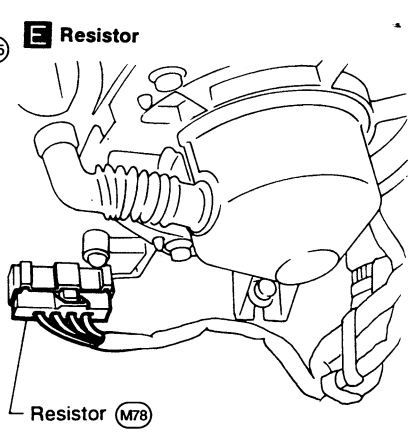
C Fuse block



D Air mix door motor

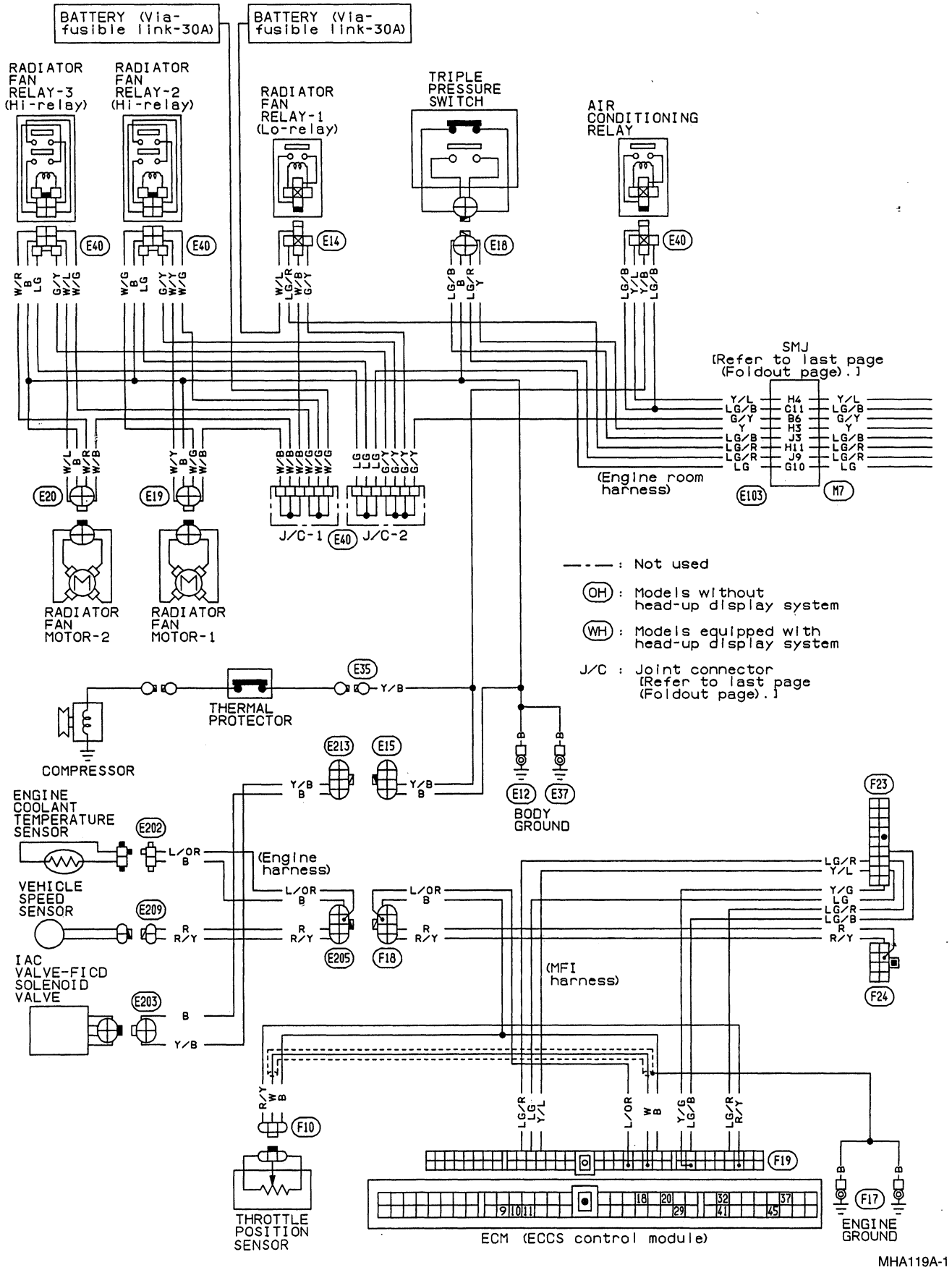


E Resistor



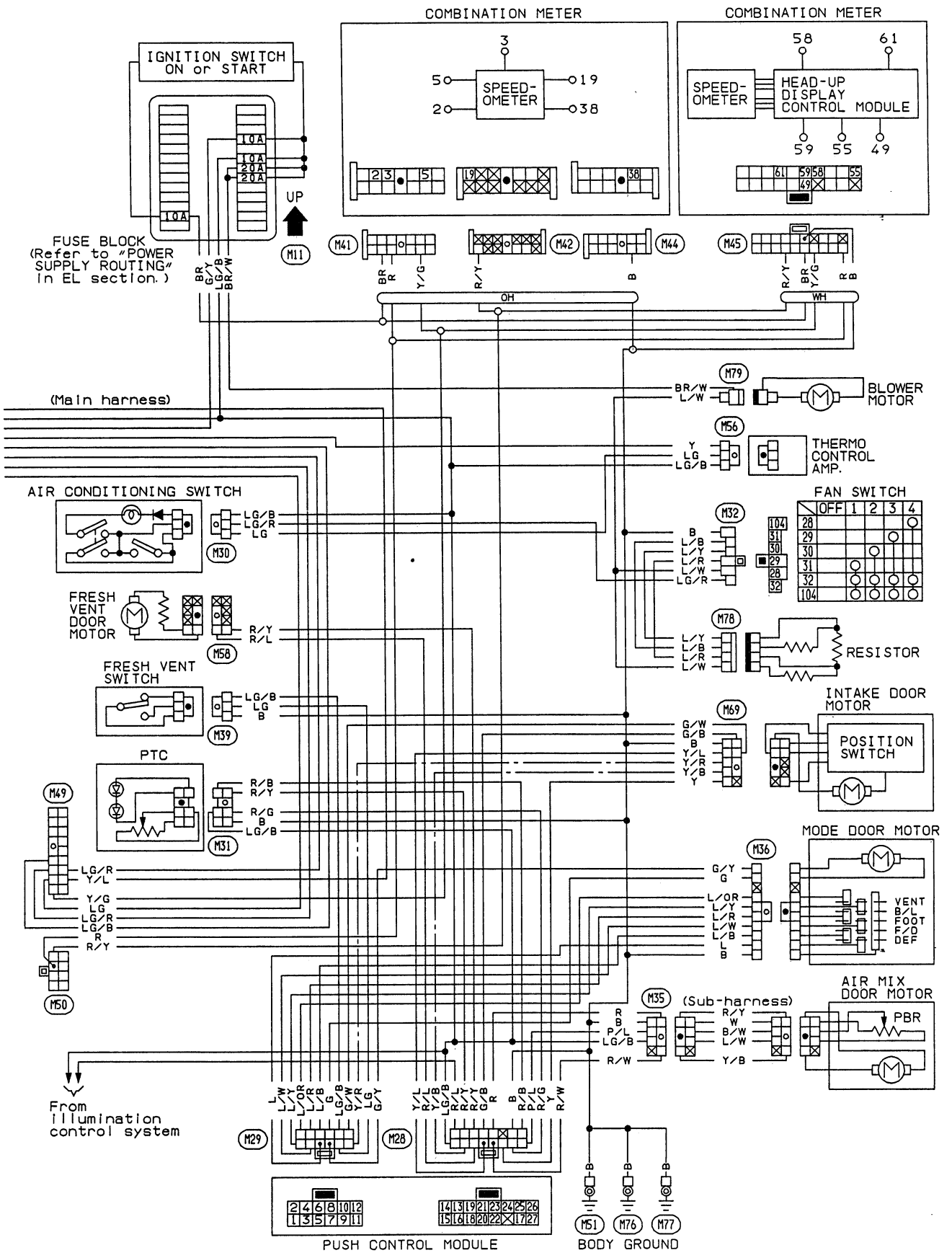
AHA105

Wiring Diagram — Manual Air Conditioning



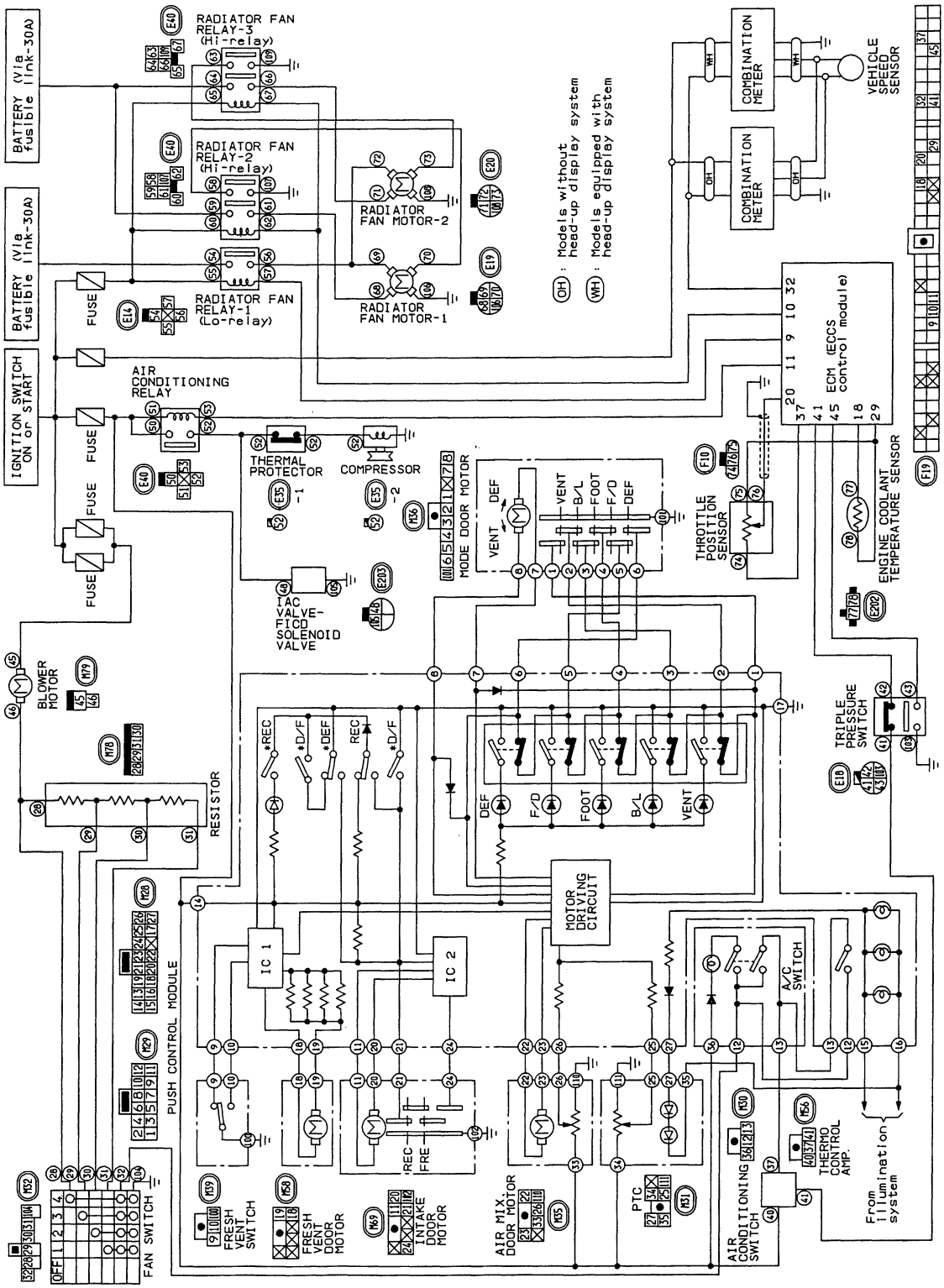
MHA119A-1

Wiring Diagram — Manual Air Conditioning (Cont'd)



MHA119A

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 "Harness Layout for A/C System". (Refer to HA-46, HA-47.).
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".

*: These switches are built into push control module and mechanically linked to corresponding switches.

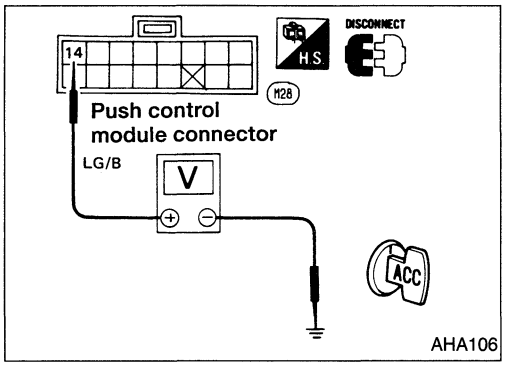
MHA118A

Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

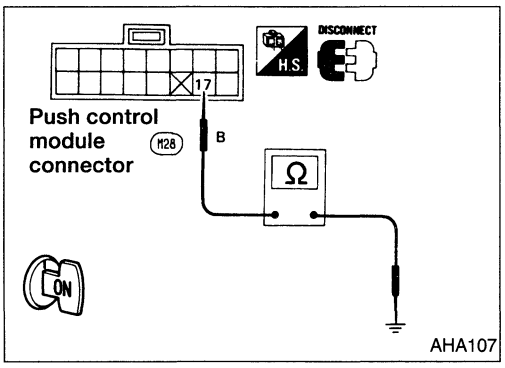


PUSH CONTROL MODULE CHECK

Check power supply circuit for push control module with ignition switch at ACC.

1. Disconnect push control module harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ⑭ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
⑭	Body ground	Approx. 12V



Check body ground circuit for push control module with ignition switch ON.

1. Disconnect push control module harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑰ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑰	Body ground	Yes

	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

- **Perform PRELIMINARY CHECK 2 before referring to the following flow chart.**

Check if blower motor rotates properly at each fan speed.
Conduct check as per flow chart at left.

2 3 4 5 (Go to next page.) → (B)

1

A

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. (45) and body ground?

N.G. → Check 20A fuses at fuse block.
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K.

B

Check circuit continuity between blower motor harness terminal No. (46) and body ground.

N.G. → Reconnect blower motor harness connector.

O.K.

CHECK BLOWER MOTOR.
(Refer to HA-65.)

N.G.

Replace blower motor.

C

CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. (28) and body ground?

N.G. → Disconnect blower motor and resistor harness connectors.

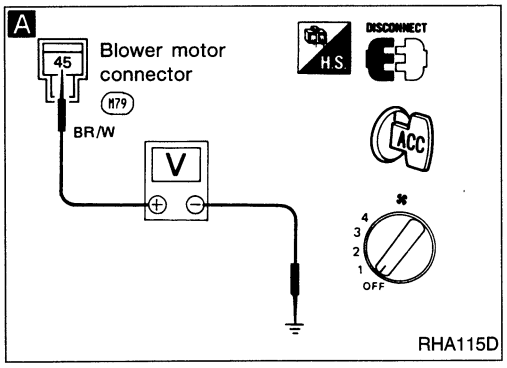
D Note

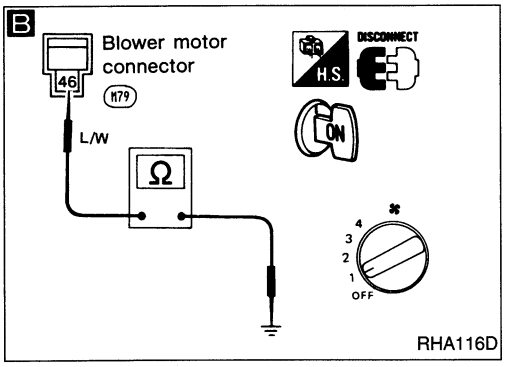
Check circuit continuity between blower motor harness terminal No. (46) and resistor harness terminal No. (28).

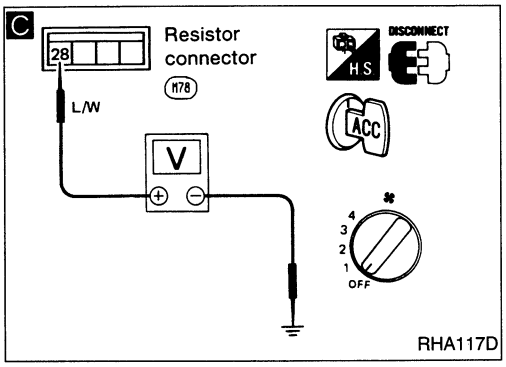
O.K.

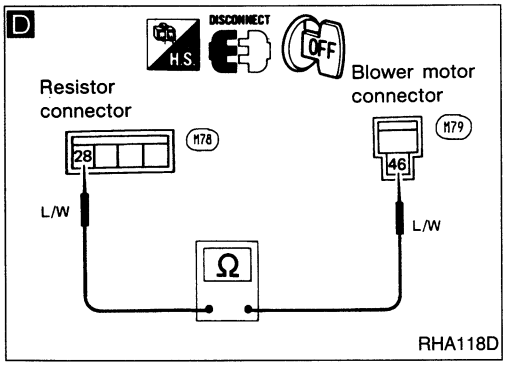
(A) (Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.



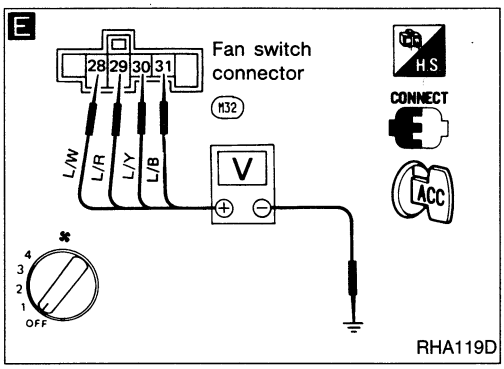




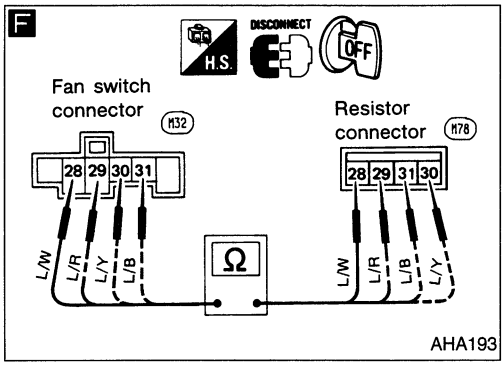


Diagnostic Procedure 1 (Cont'd)

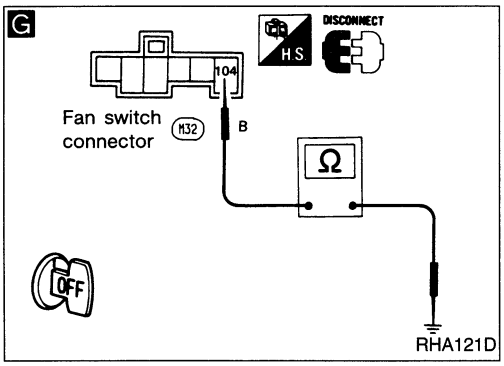
E



F



G



Ⓐ

1

CHECK RESISTOR AFTER DISCONNECTING IT.
(Refer to HA-65.)

O.K. / N.G.

Replace resistor.

Ⓑ

2 3 4

Reconnect resistor harness connector.

1 2 3 4 5

E

CHECK FAN SWITCH CIRCUIT.
Do approx. 12 volts exist between each fan switch harness terminal and body ground?

Flow chart No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
2	31	Body ground	Approx. 12V
3	30		
4	29		
5	28		

O.K. 2 3 4 5

N.G.

F Note

Check circuit continuity between fan switch and resistor.

CHECK FAN SWITCH AFTER DISCONNECTING IT.
(Refer to HA-65.)

N.G. → Replace fan switch.

O.K.

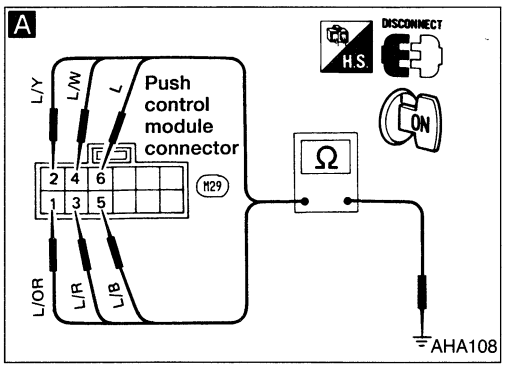
G Note

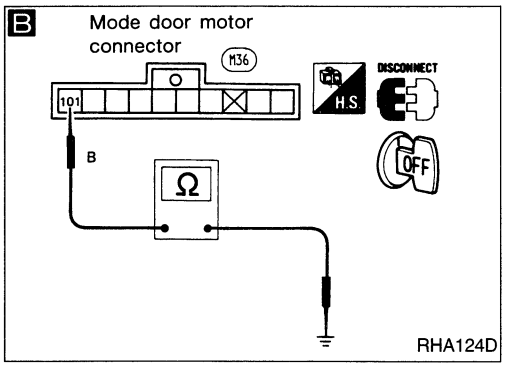
Check circuit continuity between fan switch harness terminal No. (104) and body ground.

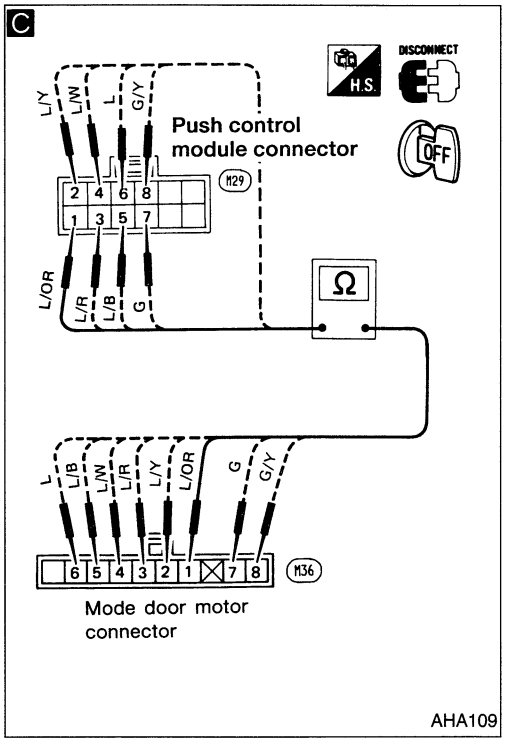
O.K.

Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

- **Perform PRELIMINARY CHECK 4 and Main Power Supply and Ground Circuit Check before referring to the following flow chart.**

A

CHECK MODE DOOR MOTOR POSITION SWITCH.

1. Turn VENT switch ON with ignition switch at ON position.
2. Turn ignition switch OFF. Disconnect push control module connector.
3. Turn ignition switch ON. Check if continuity exists between terminal No. ① or ② of push control module harness connector and body ground.
4. Using above procedures, check for continuity in any other mode, as indicated in chart.

Mode switch	Terminal No. ⊕	Terminal No. ⊖	Continuity
VENT	① or ②	Body ground	Yes
B/L	② or ③		
FOOT	③ or ④		
F/D	④ or ⑤		
DEF	⑤ or ⑥		

N.G. → Disconnect mode door motor harness connector.

O.K. ↓

CHECK SIDE LINK.
Refer to HA-67.

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. ↓

C

Note

Check circuit continuity between each terminal on push control module and on mode door motor.

Terminal No. ⊕ Push control module	Terminal No. ⊖ Mode door motor	Continuity
①	①	Yes
②	②	
③	③	
④	④	
⑤	⑤	
⑥	⑥	
⑦	⑦	
⑧	⑧	

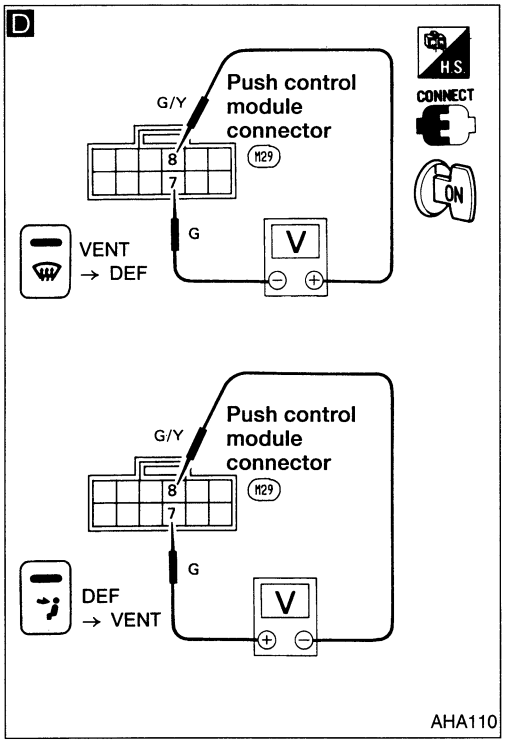
O.K. ↓

Ⓐ

(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 2 (Cont'd)



Ⓐ

Reconnect push control module and mode door motor harness connectors.

D

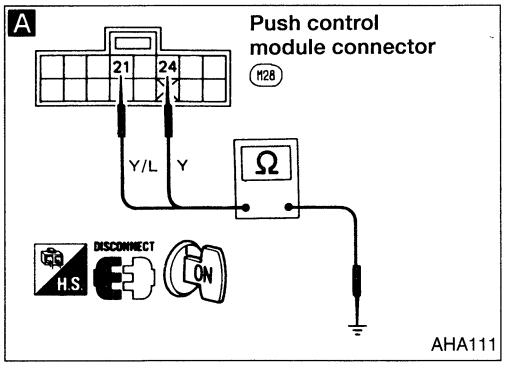
CHECK FOR OUTPUT OF PUSH CONTROL MODULE.
Do approx. 12 volts exist between push control module harness terminal No. ⑦ and ⑧ when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"?

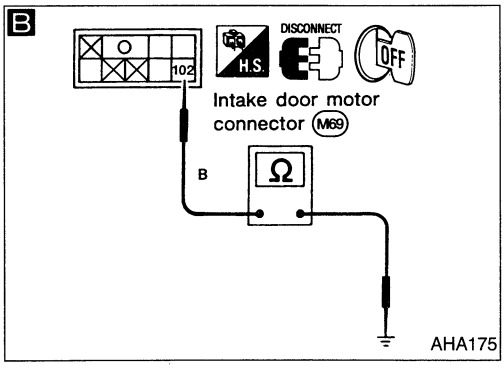
N.G. → Replace push control module.

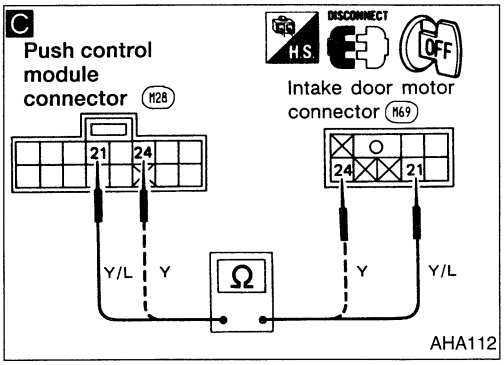
Terminal No.		Mode door motor	
⑦	⑧	Mode door operation	Direction of linkage rotation
⊖	⊖	Stop	Stop
⊖	⊕	VENT → DEF	Clockwise
⊕	⊖	DEF → VENT	Counterclockwise

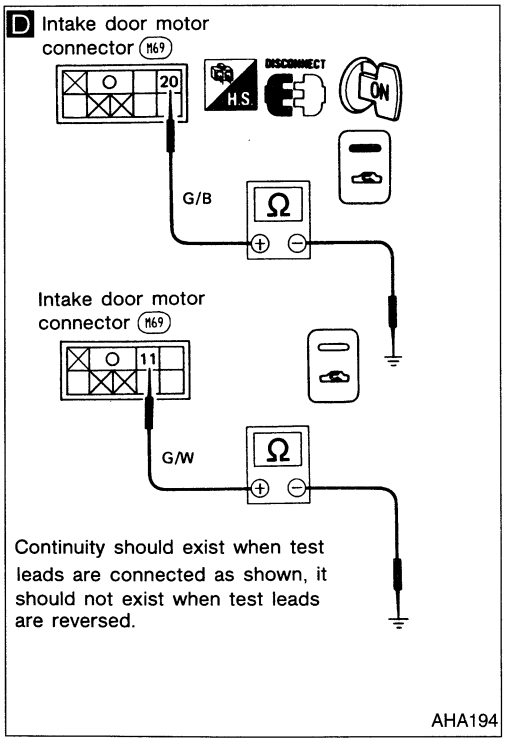
O.K.

Replace mode door motor.









Diagnostic Procedure 3

SYMPTOM: Intake door does not change in VENT, B/L or FOOT mode.

- **Perform PRELIMINARY CHECK 1 and Main Power Supply and Ground Circuit Check before referring to the following flow chart.**

A

CHECK INTAKE DOOR MOTOR POSITION SWITCH.
1. Turn REC switch ON with ignition switch at ON position.
2. Turn ignition switch OFF. Disconnect push control module connector.
3. Turn ignition switch ON. Check if continuity exists between terminal No. (21) of push control module harness connector and body ground.
4. Using above procedures, check for REC switch OFF position as indicated in chart.

REC switch	Terminal No. ⊕	Terminal No. ⊖	Continuity
ON	(21)	Body ground	Yes
OFF	(24)		

N.G. → Disconnect intake door motor harness connector.

B Note

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Does continuity exist between intake door motor harness terminal No. (32) and body ground?

O.K. →

C Note

Check circuit continuity between push control module harness terminal No. (21) ((24)) and intake door motor harness terminal No. (21) ((24)).

O.K. →

Reconnect push control module and intake door motor harness connector.

D

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Does continuity exist between intake door motor harness terminal No. (20) and body ground when REC switch is ON?
Does continuity exist between intake door motor harness terminal No. (11) and body ground when REC switch is OFF?

N.G. → Replace push control module.

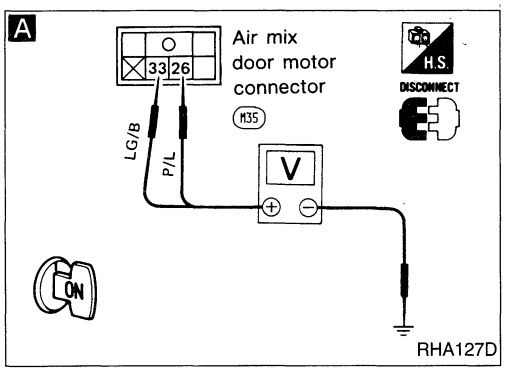
O.K. →

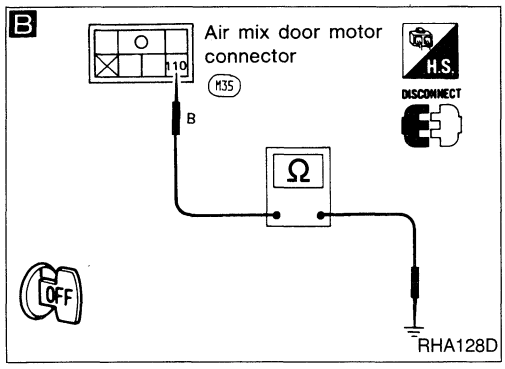
Replace intake door motor.

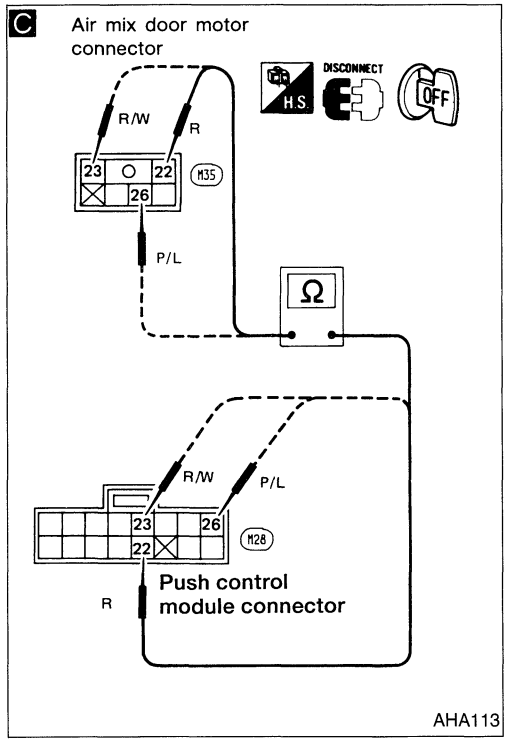
O.K. →

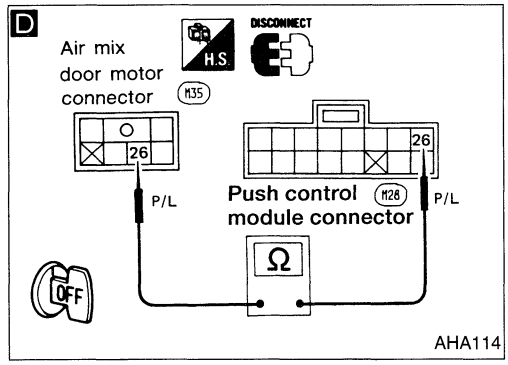
CHECK INTAKE DOOR LINK.
Refer to HA-67.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.









Diagnostic Procedure 4

SYMPTOM: Air mix door does not change.

Perform Main Power Supply and Ground Circuit Check before referring to the following chart.

A

CHECK POWER SUPPLY FOR AIR MIX DOOR MOTOR.
Disconnect air mix door motor harness connector.
Do approx. 12V exist between air mix door motor harness terminal No. (26) ((33)) and body ground?

N.G. → Disconnect push control module harness connector.

D Note

Check circuit continuity between push control module harness terminal No. (26) and air mix door motor harness terminal No. (26).

O.K. → Replace push control module.

O.K.

B Note

Check circuit continuity between air mix door motor harness terminal No. (110) and body ground.

O.K.

Disconnect push control module harness connector.

C Note

Check circuit continuity between each terminal on push control module and air mix door motor.

O.K.

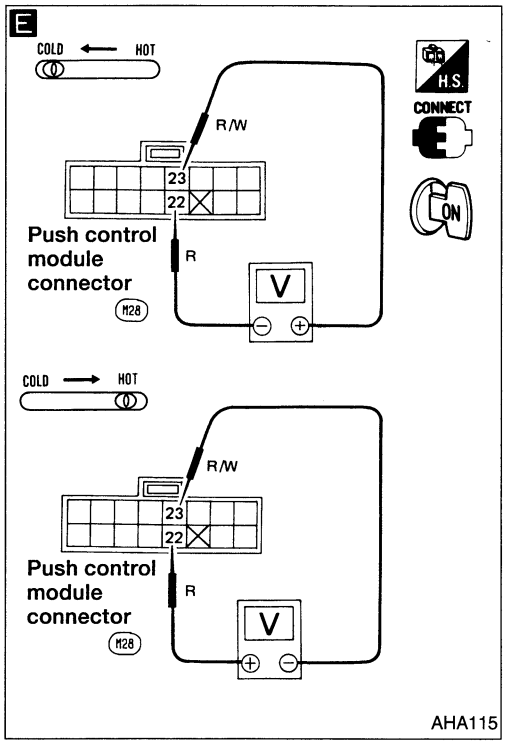
Reconnect push control module and air mix door motor harness connector.

(A)

(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 4 (Cont'd)



Ⓐ

E

CHECK FOR PUSH CONTROL MODULE OUTPUT.
Do approx. 12 volts exist between push control module harness terminal No. ㉒ and ㉓ when temperature lever is slid from "HOT" to "COLD" or when temperature lever is slid from "COLD" to "HOT"?

N.G. → Replace push control module.

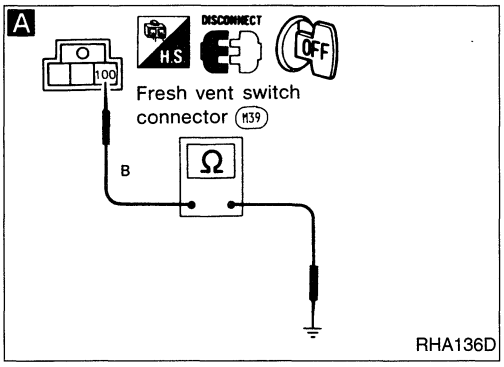
Terminal No.		Air mix door motor	
㉒	㉓	Air mix door operation	Direction of linkage rotation
⊖	⊕	HOT → COLD	Clockwise
⊕	⊖	COLD → HOT	Counterclockwise
⊖	⊖	STOP	STOP

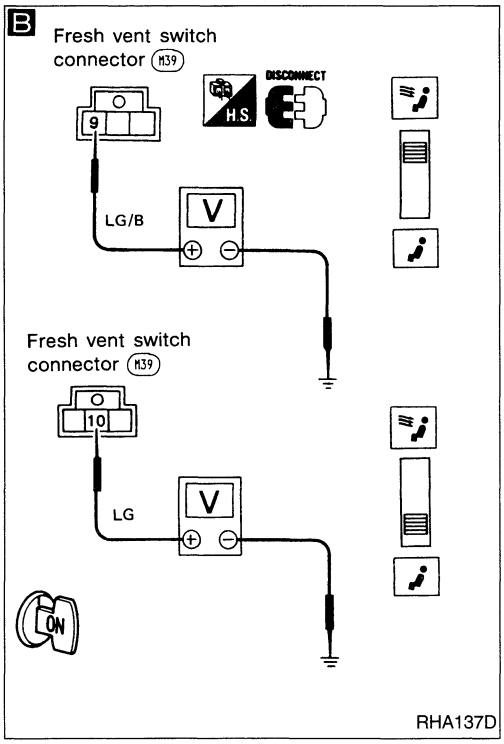
O.K.

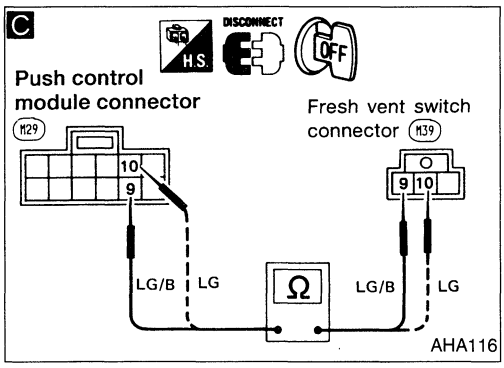
CHECK AIR MIX DOOR.
(Refer to HA-67.)

O.K.

Replace air mix door motor.







Diagnostic Procedure 5

SYMPTOM: Fresh vent door does not operate.

- **Perform Main Power Supply and Ground Circuit Check before referring to the following chart.**

DIAGNOSTIC PROCEDURE 5-1

A Note

CHECK BODY GROUND CIRCUIT FOR FRESH VENT SWITCH.
Disconnect fresh vent switch connector.
Does continuity exist between fresh vent switch connector harness terminal No. (100) and body ground?

O.K.

B

CHECK POWER SUPPLY FOR FRESH VENT SWITCH.
Do approx. 12 volts exist between fresh vent switch harness terminal No. (9) and body ground when FRESH VENT SWITCH is ON?
Do approx. 12 volts exist between fresh vent switch connector harness terminal No. (10) and body ground when FRESH VENT SWITCH is OFF?

N.G. → Disconnect push control module connector.

C Note

Check circuit continuity between fresh vent switch harness terminal No. (9) ((10)) and push control module harness terminal No. (9) ((10)).

O.K.

Perform DIAGNOSTIC PROCEDURE 5-2. Refer to HA-60.

O.K.

CHECK FRESH VENT SWITCH. (Refer to HA-67.)

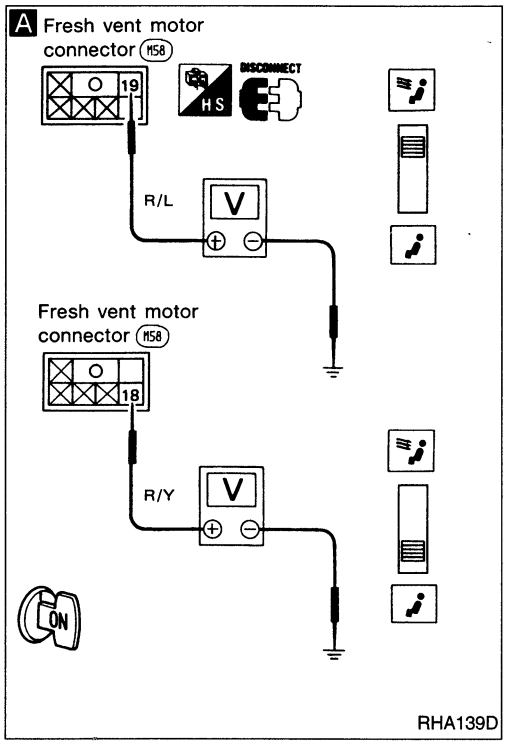
N.G.

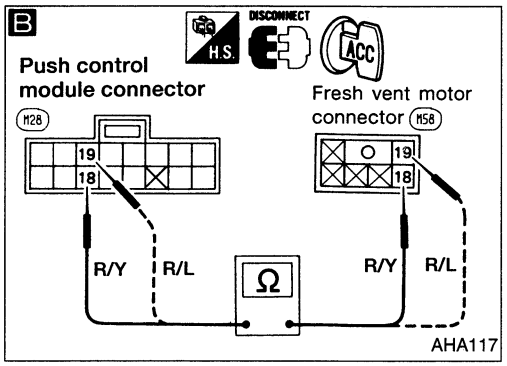
Replace fresh vent switch.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-2





A

CHECK POWER SUPPLY FOR FRESH VENT DOOR MOTOR.
Disconnect fresh vent door motor harness connector.
Do approx. 12 volts exist between fresh vent switch harness terminal No. ⑲ and body ground when FRESH VENT SWITCH is ON?
Do approx. 12 volts exist between fresh vent door motor harness terminal No. ⑱ and body ground when FRESH VENT SWITCH is OFF?

N.G. → Disconnect push control module connector.

B

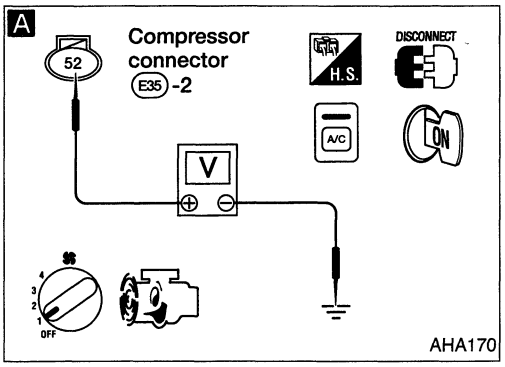
Check circuit continuity between fresh vent door motor harness terminal No. ⑱ (⑲) and push control module harness terminal No. ⑱ (⑲).

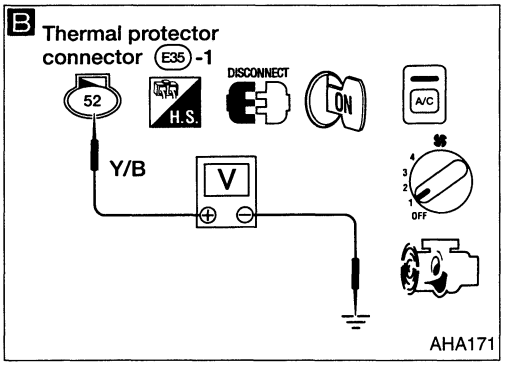
Note

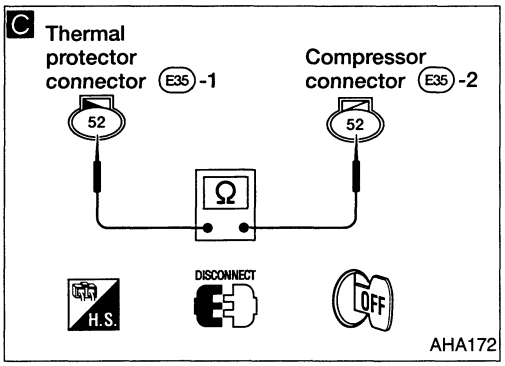
O.K. → Replace push control module.

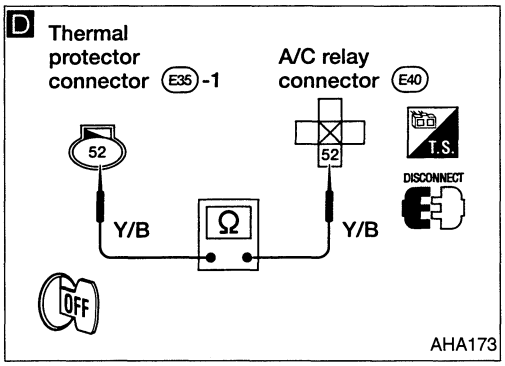
O.K. → Replace fresh vent door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.









Diagnostic Procedure 6

SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON.

- **Perform PRELIMINARY CHECK 2 before referring to the following chart.**

A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. (52) and body ground?

N.G. → **B**

CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. (52) and body ground?

O.K. → **C**

N.G. → (A)

O.K.

Check magnet clutch coil.

O.K.

Replace magnet clutch.
Refer to HA-23.

C

CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. (52) and compressor harness terminal No. (52).

N.G.

Replace thermal protector.

(A)

Disconnect A/C relay harness connector.

D Note

Check circuit continuity between A/C relay harness terminal No. (52) and thermal protector harness terminal No. (52).

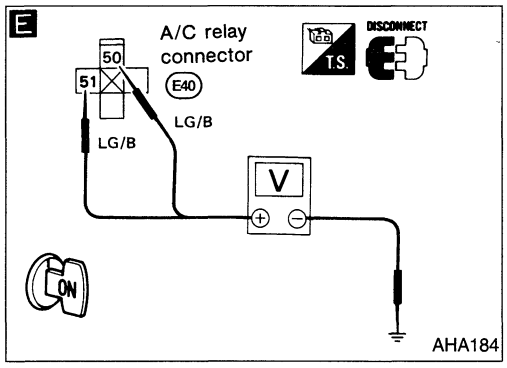
O.K.

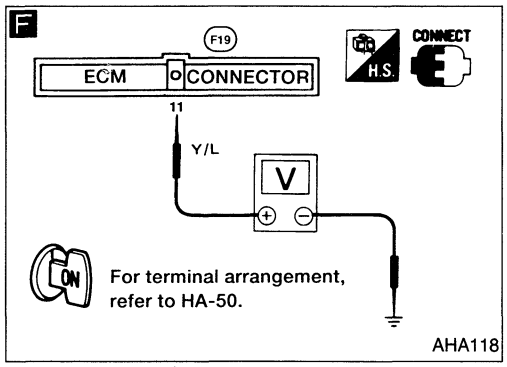
(B)

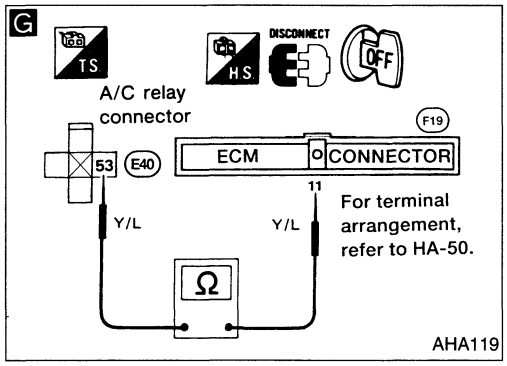
(Go to next page.)

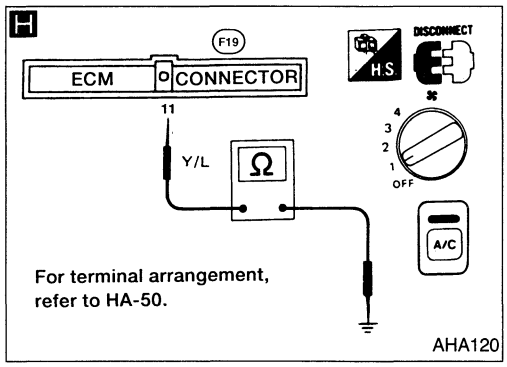
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

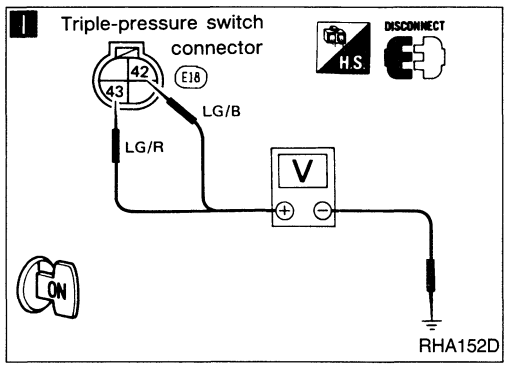
Diagnostic Procedure 6 (Cont'd)











Ⓑ

E

CHECK POWER SUPPLY FOR A/C RELAY.
Do approx. 12 volts exist between A/C relay harness terminals (50), (51) and body ground?

O.K. → CHECK A/C RELAY. (Refer to HA-66.)

O.K. → Reconnect A/C relay.

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

N.G. → Replace A/C relay.

F

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. (11) and body ground?
(For terminal arrangement, refer to HA-50.)

N.G. → **G**

Check circuit continuity between A/C relay harness terminal No. (53) and ECM (ECCS control module) harness terminal No. (11).
(For terminal arrangements, refer to HA-50.)

O.K. → **H**

Disconnect ECM (ECCS control module) harness connector.
Does continuity exist between ECM (ECCS control module) harness terminal No. (11) and body ground?
(For terminal arrangement, refer to HA-50.)

N.G. → Reconnect ECM (ECCS control module) harness connector.

O.K. → CHECK ECM (ECCS control module). Refer to EF & EC section ("Diagnostic Procedure 28", "TROUBLE DIAGNOSES").

I

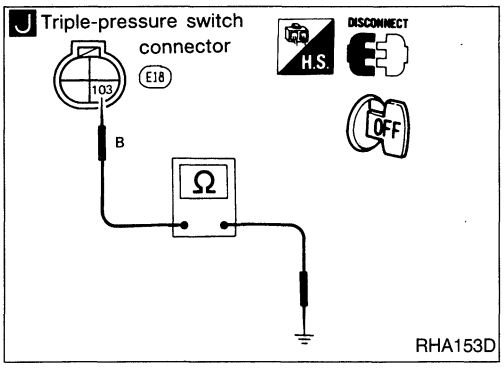
CHECK TRIPLE-PRESSURE SWITCH CIRCUIT BETWEEN TRIPLE-PRESSURE SWITCH AND ECM (ECCS control module.)
Disconnect triple-pressure switch harness connector.
Do approx. 8 to 9 volts exist between triple-pressure switch harness terminals No. (42), (43) and body ground?

O.K. → Ⓒ (Go to next page.)

N.G. → Ⓓ (Go to next page.)

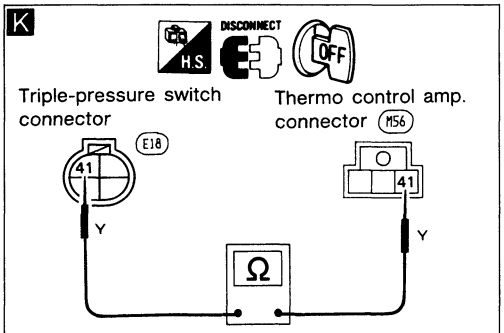
Diagnostic Procedure 6 (Cont'd)

J Triple-pressure switch connector



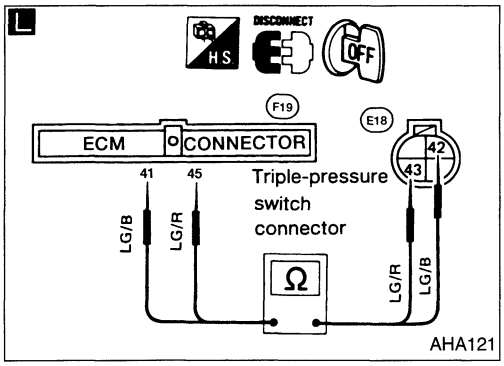
RHA153D

K



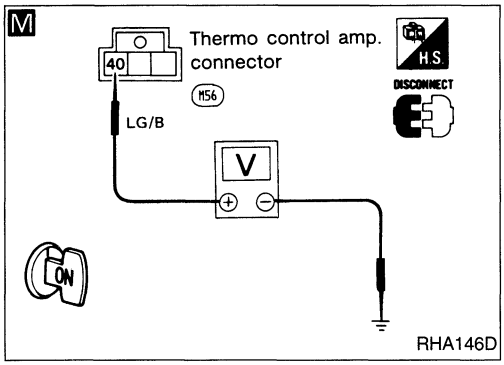
RHA154D

L



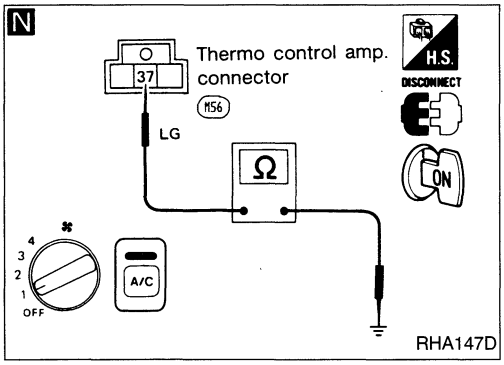
AHA121

M



RHA146D

N



RHA147D

Ⓒ

J Note

Check circuit continuity between triple-pressure switch harness terminal No. (103) and body ground?

O.K.

CHECK TRIPLE-PRESSURE SWITCH. (Refer to HA-66.)

N.G. → L

O.K.

Disconnect thermo control amp. harness connector.

K Note

Check circuit continuity between triple-pressure switch harness terminal No. (41) and thermo control amp. harness terminal No. (41).

O.K.

M

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Do approx. 12 volts exist between thermo control amp. harness terminal No. (40) and body ground?

N.G. → Check 10A fuses at fuse block
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K.

N

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Does continuity exist between thermo control amp. harness terminal No. (37) and body ground?

N.G. → Disconnect A/C switch harness connector.

O.K.

Replace thermo control amp.

Ⓓ

Disconnect ECM (ECCS control module) harness connector.

L Note

Check circuit continuity between ECM (ECCS control module) harness terminal No. (41) ((45)) and triple-pressure switch harness terminal No. (42) ((43)).

O.K.

Check ECM (ECCS control module). Refer to EF & EC section "ECM (ECCS Control Module) (Diagnostic trouble code No. 31)", "TROUBLE DIAGNOSES").

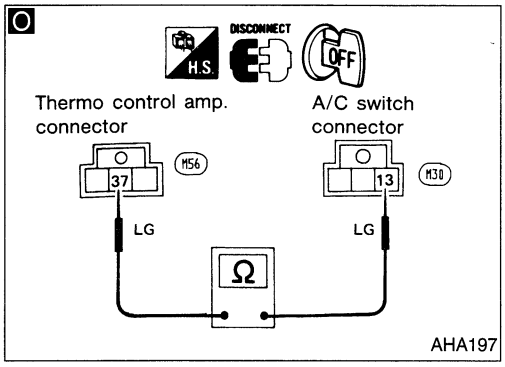
Replace triple-pressure switch.

Ⓔ
(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 6 (Cont'd)

O



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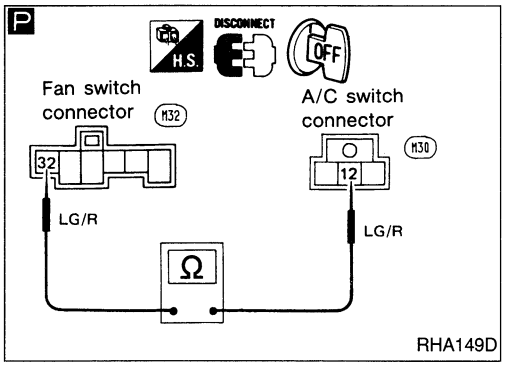

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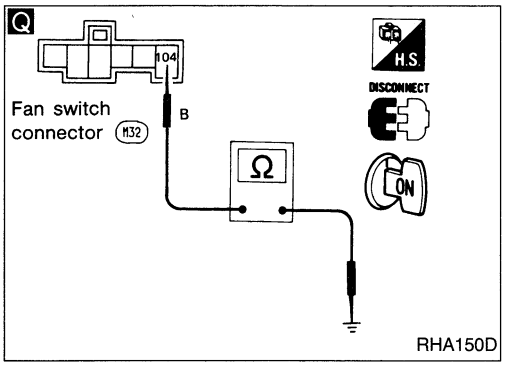


(E)

O Note

Check circuit continuity between thermo control amp. harness terminal No. (37) and A/C switch harness terminal No. (13).

O.K.

CHECK A/C SWITCH. (Refer to HA-65.)

N.G. → Replace A/C switch.

O.K.

Disconnect fan switch harness connector.

O.K.

P Note

Check circuit continuity between A/C switch harness terminal No. (12) and fan switch harness terminal No. (32).

O.K.

Q Note

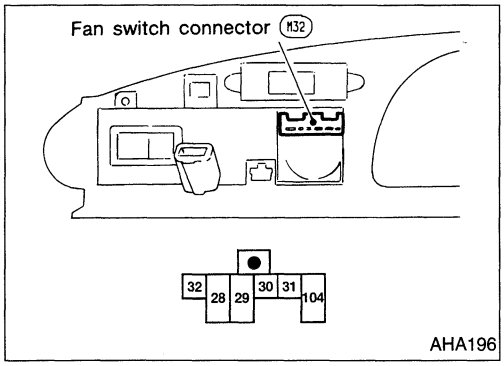
CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. (104) and body ground?

O.K.

CHECK FAN SWITCH. (Refer to HA-65.)

N.G. → Replace fan switch.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

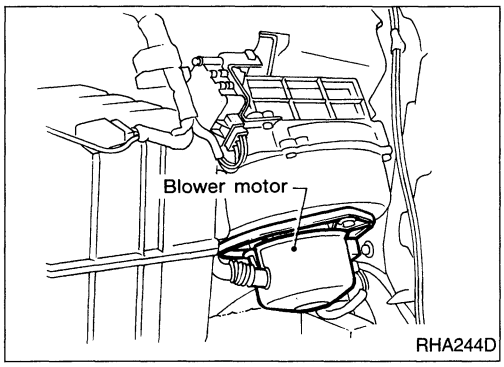


Electrical Components Inspection

FAN SWITCH

Check continuity between terminals at each position.

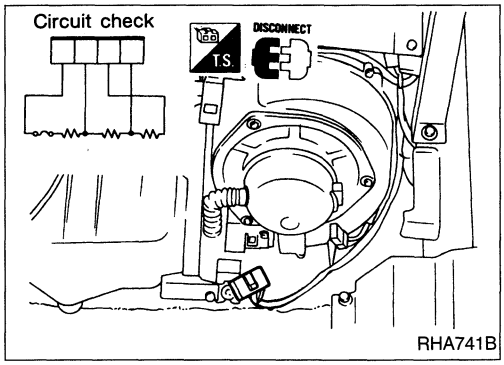
TERMINAL	POSITION				
	OFF	1	2	3	4
28					○
29				○	
30			○		
31		○			
32		○	○	○	○
104		○	○	○	○



BLOWER MOTOR

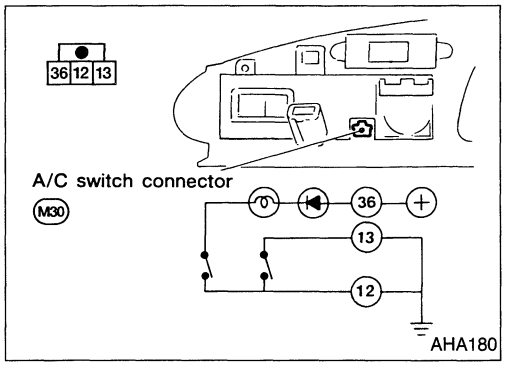
Check blower motor for smooth rotation.

- Ensure that there are no foreign particles inside the intake unit.



BLOWER RESISTOR

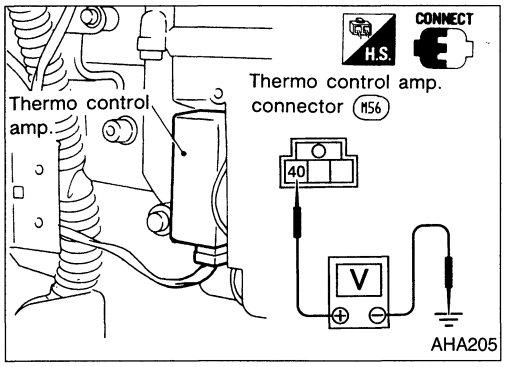
Check continuity between terminals.



A/C SWITCH

Check continuity between terminals.

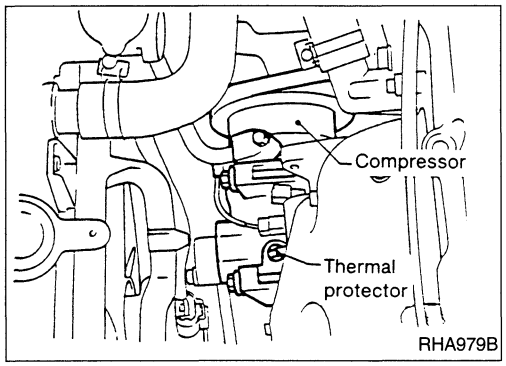
Electrical Components Inspection (Cont'd)



THERMO CONTROL AMP.

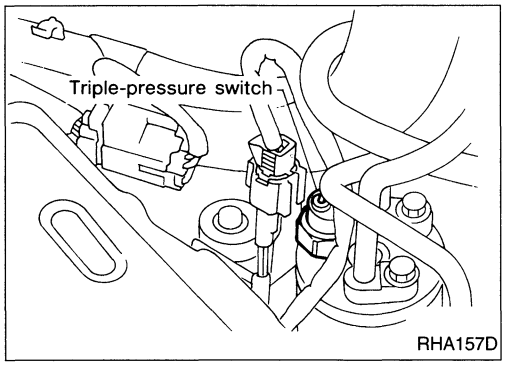
1. Run engine, and operate A/C system.
2. Connect the voltmeter from harness side.
3. Check thermo control amp. operation shown in the table.

Evaporator outlet air temperature °C (°F)	Thermo amp. operation	Tester
Decreasing to 2.5 - 3.5 (37 - 38)	Turn OFF	Approx. 12V
Increasing to 4.0 - 5.0 (39 - 41)	Turn ON	Approx. 0V



THERMAL PROTECTOR

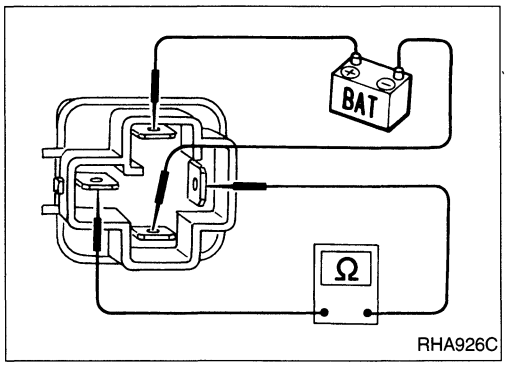
Temperature of compressor °C (°F)	Operation
Increasing to approx. 145 - 155 (293 - 311)	Turn OFF
Decreasing to approx. 130 - 140 (266 - 284)	Turn ON



TRIPLE-PRESSURE SWITCH

	ON kPa (kg/cm^2, psi)	OFF kPa (kg/cm^2, psi)
Low-pressure side	157 - 226 (1.6 - 2.3, 23 - 33)	152.0 - 201.0 (1.55 - 2.05, 22.0 - 29.2)
Medium-pressure side*	1,422 - 1,618 (14.5 - 16.5, 206 - 235)	1,128 - 1,422 (11.5 - 14.5, 164 - 206)
High-pressure side	1,667 - 2,059 (17 - 21, 242 - 299)	2,452 - 2,844 (25 - 29, 356 - 412)

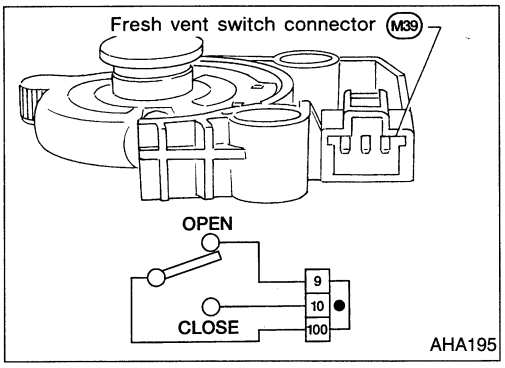
* For radiator fan motor operation.



A/C RELAY AND BLOWER HI RELAY

Check circuit continuity between terminals by supplying 12 volts to coil side terminals of the relay.

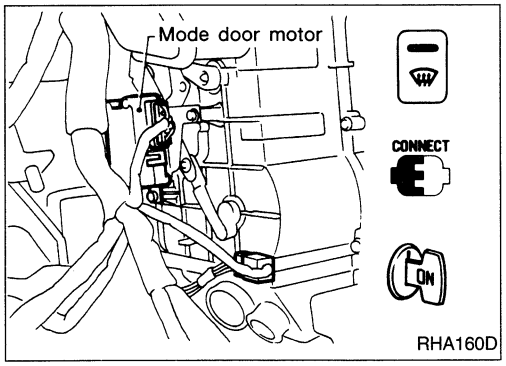
Electrical Components Inspection (Cont'd)



FRESH VENT SWITCH

Check continuity between terminals.

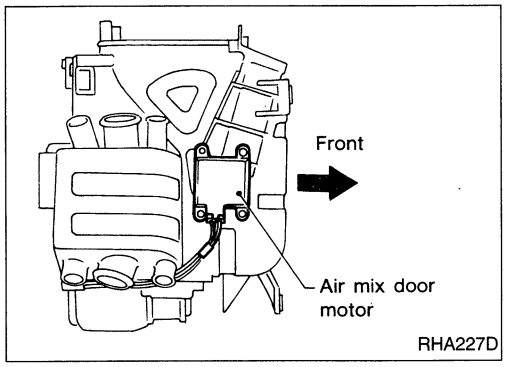
Switch position	Terminal		
	9	10	100
Open	○		○
Closed		○	○



Control Linkage Adjustment

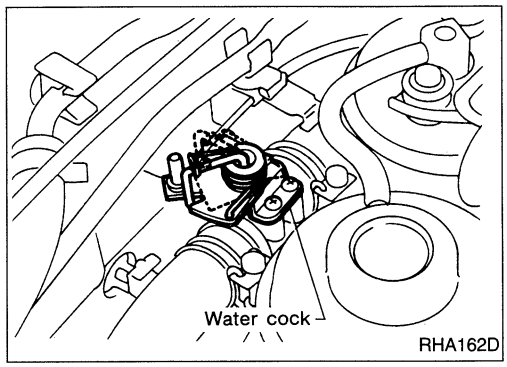
MODE DOOR

1. Move side link by hand and hold mode door in DEF mode.
2. Install mode door motor on heater unit and connect it to main harness.
3. Turn ignition switch to ON.
4. Turn VENT switch ON.
5. Attach mode door motor rod to side link rod holder.
6. Turn DEF switch ON. Check that side link operates at the fully-open position. Also turn DEF switch ON to check that side link operates at the fully-open position.

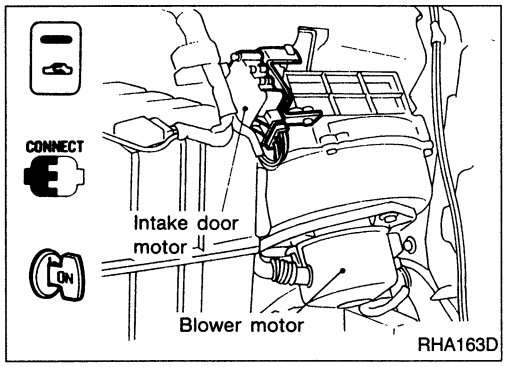


AIR MIX DOOR (Water cock)

1. Move air mix link by hand and hold air mix door in full cold position.
2. Install air mix door motor on heater unit and connect sub-harness.
3. Turn ignition switch to ON.
4. Slide temperature control lever to full cold.
5. Attach air mix door motor rod to air mix door link rod holder.
6. Check that air mix door and water cock operate properly when temperature control lever is slid to full hot and full cold.

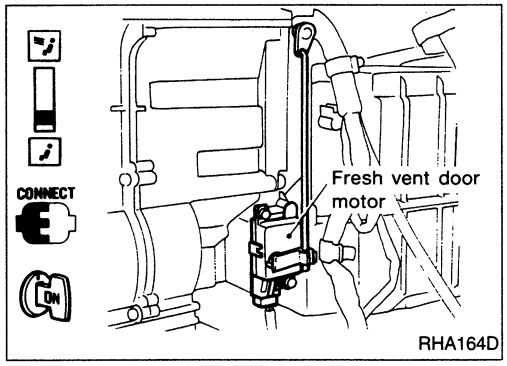


Control Linkage Adjustment (Cont'd)



INTAKE DOOR

1. Connect intake door motor harness connector before installing intake door motor.
2. Turn ignition switch to ON.
3. Turn REC switch ON.
4. Install intake door motor on intake unit.
5. Install intake door lever.
6. Set intake door rod in REC position and fasten door rod to holder on intake door lever.
7. Check that intake door operates properly when REC switch is turned ON and OFF.



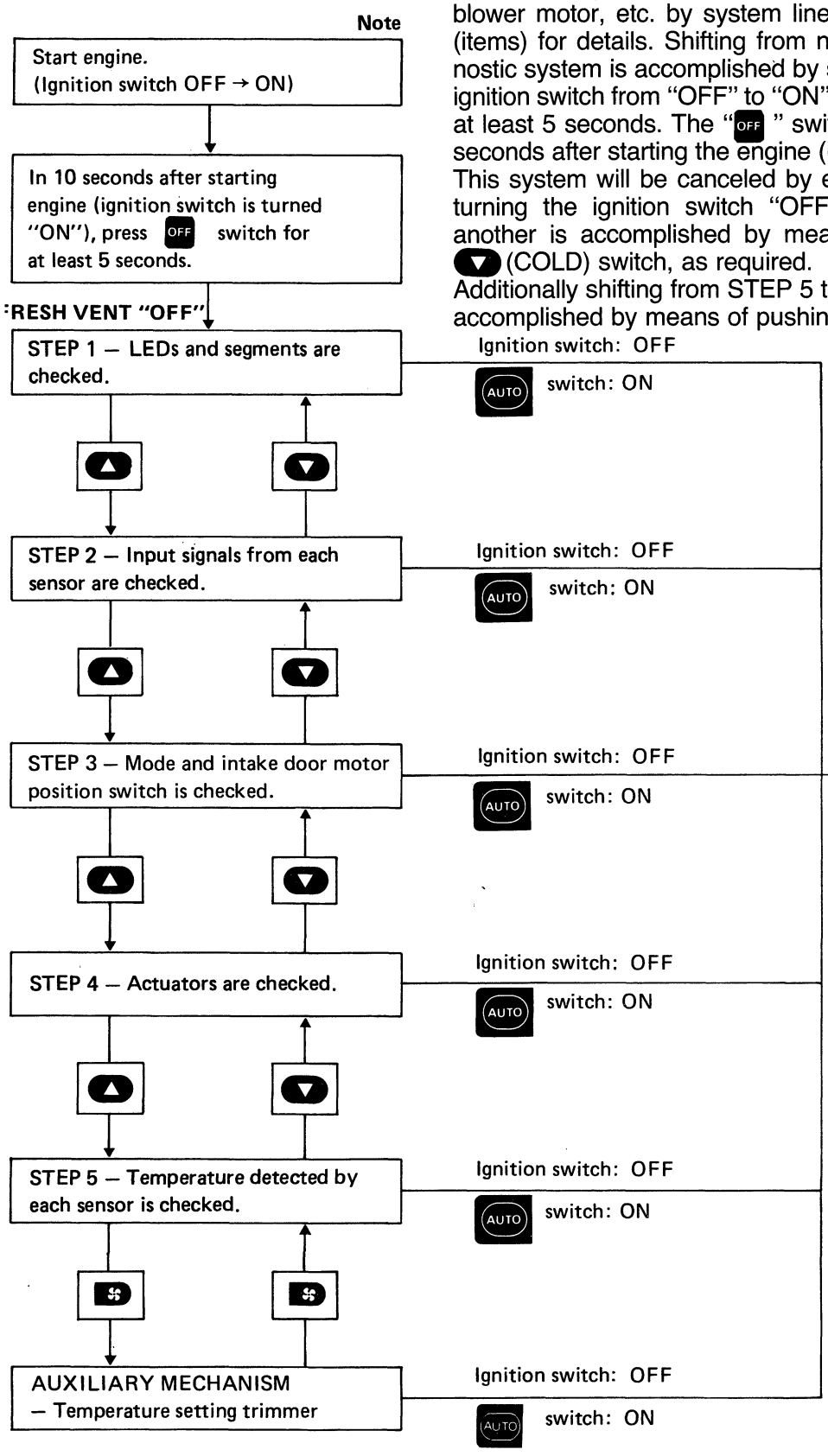
FRESH VENT DOOR

1. Connect fresh vent door motor harness connector before installing fresh vent door motor.
2. Turn ignition switch to ON.
3. Turn fresh vent switch OFF.
4. Install fresh vent door motor on heater unit.
5. Attach fresh vent door rod to fresh vent door link rod holder.
6. Check that fresh vent door operates properly when fresh vent switch is turned ON and OFF.

Self-diagnosis

During self-diagnosis, be certain that the fresh vent lever is in the "OFF" position.

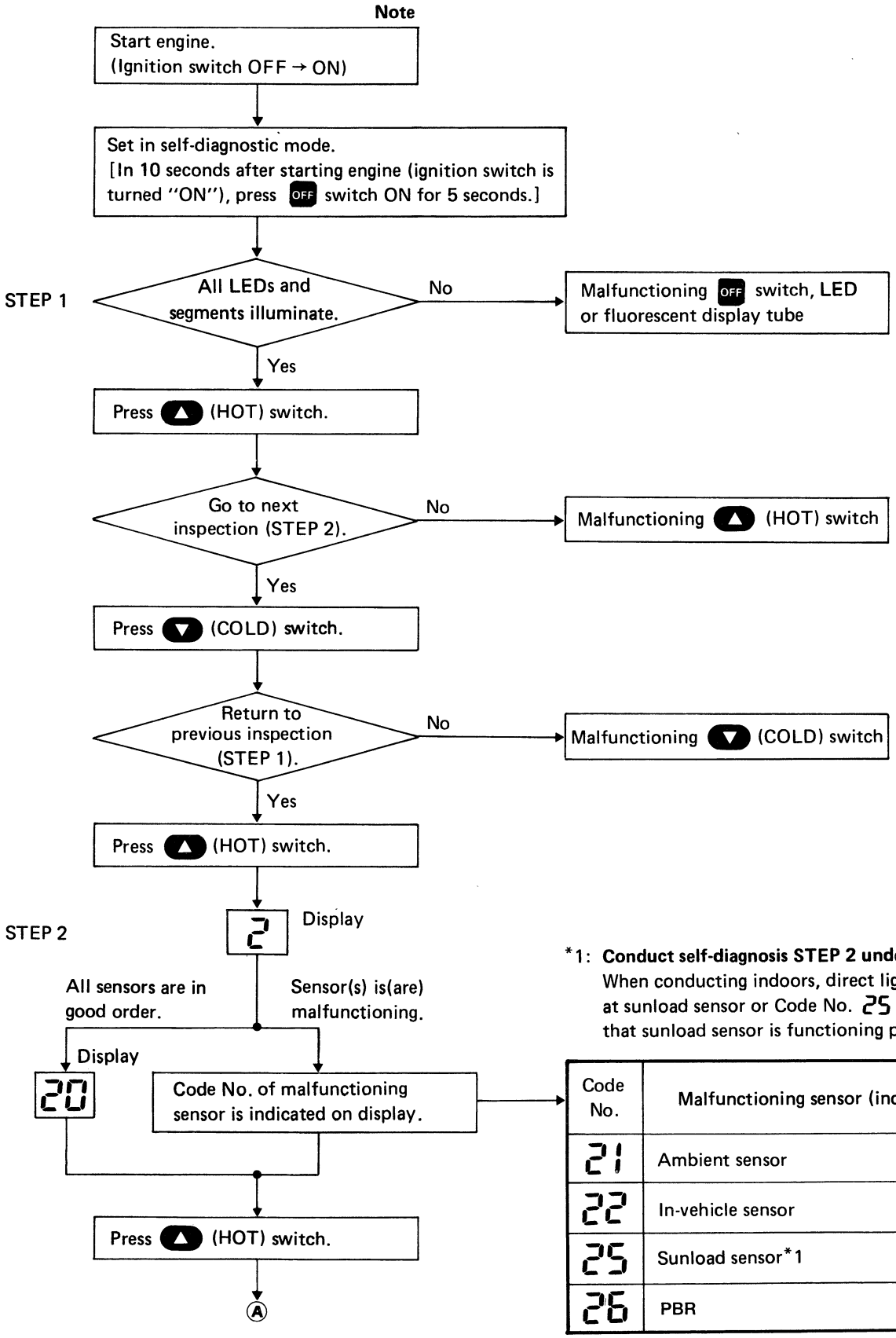
The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from "OFF" to "ON") and pressing "OFF" switch for at least 5 seconds. The "OFF" switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing AUTO switch or turning the ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing ▲ (HOT) or ▼ (COLD) switch, as required.
Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing (fan) switch.



Note:
Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

Self-diagnosis (Cont'd)

CHECKING PROCEDURE

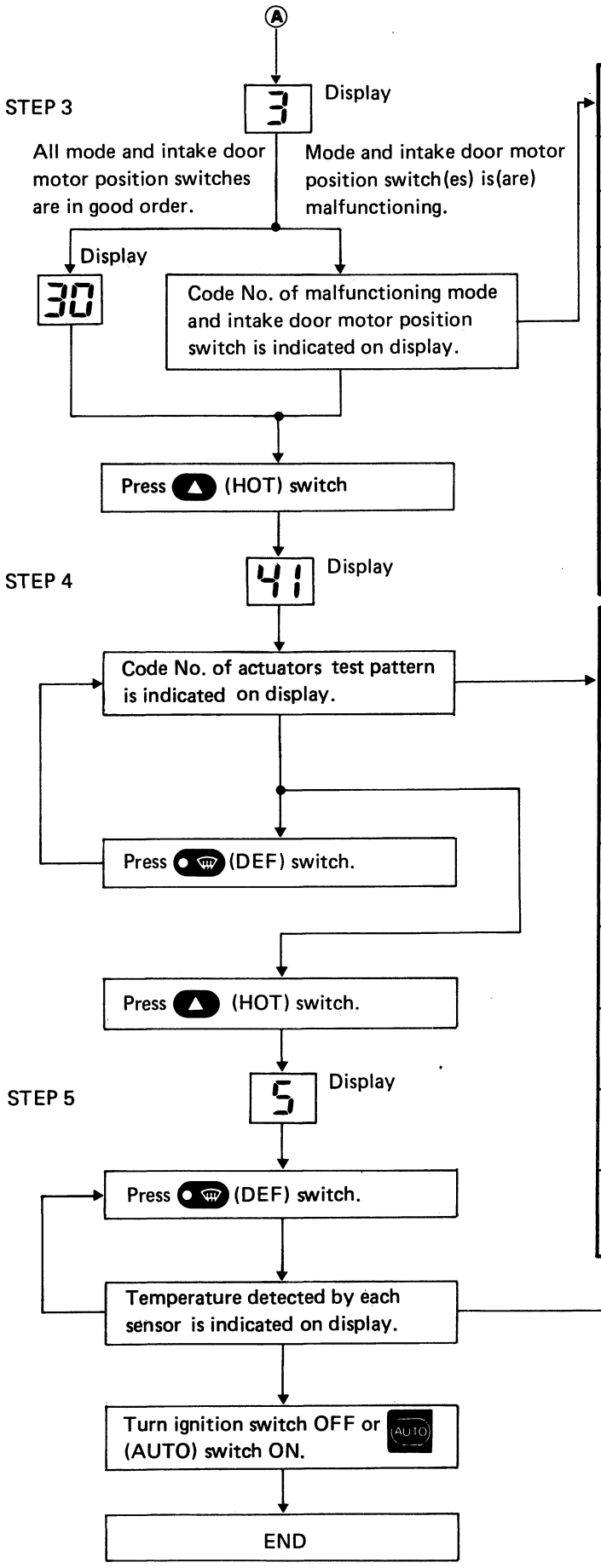


*1: **Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, direct light (more than 60W) at sunload sensor or Code No. 25 will indicate despite that sunload sensor is functioning properly.

Code No.	Malfunctioning sensor (including circuits)
21	Ambient sensor
22	In-vehicle sensor
25	Sunload sensor*1
26	PBR

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 and intake door motor position switch (including circuits)
31	VENT
32	B/L
34	FOOT
35	FOOT/DEF
36	DEF
37	REC
38	20% FRE
39	FRE

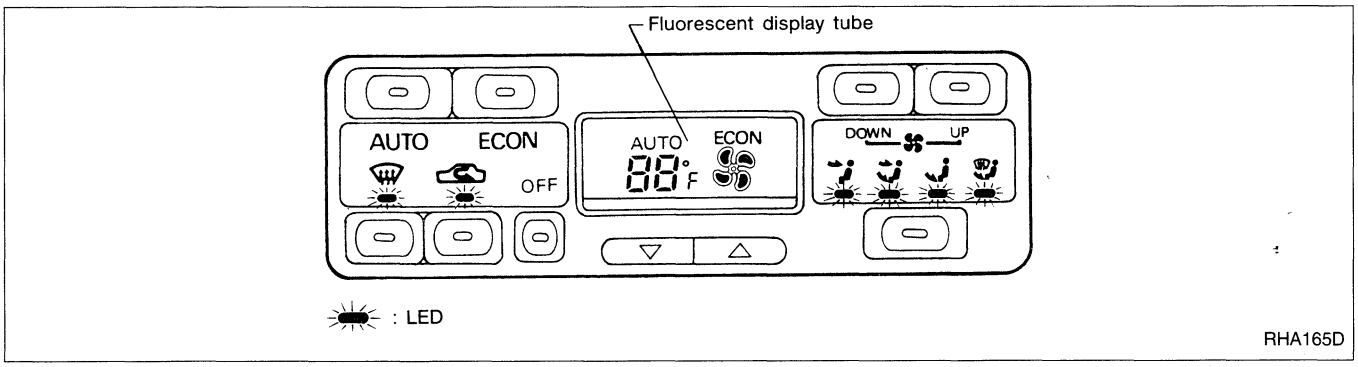
Code No.	Actuators test pattern					
	Mode door	Intake door	Air mix door	Fresh vent door	Blower motor	Compressor
41	VENT	REC	Full Cold	Open	4 - 5V	ON
42	B/L	REC	Full Cold	Open	9 - 11V	ON
43	B/L	20% FRE	Full Hot	Close	7 - 9V	ON
44	FOOT	FRE	Full Hot	Close	7 - 9V	OFF
45	F/D	FRE	Full Hot	Close	7 - 9V	OFF
46	DEF	FRE	Full Hot	Close	10 - 12V	ON

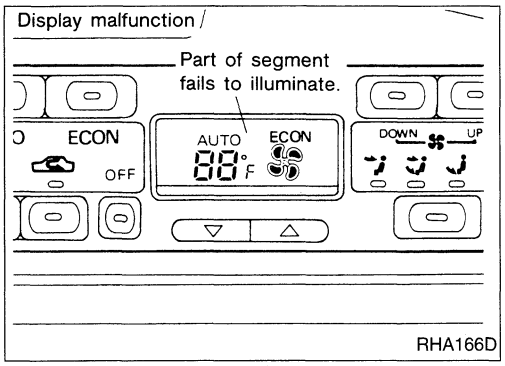
Ambient sensor
In-vehicle sensor

Self-diagnosis (Cont'd)

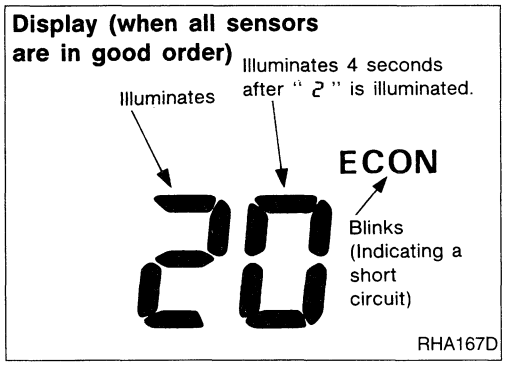
STEP 1: Checks LEDs and segments

When switch's LED and segments are in good order in STEP 1 mode, the corresponding LED and fluorescent display tube will illuminate.



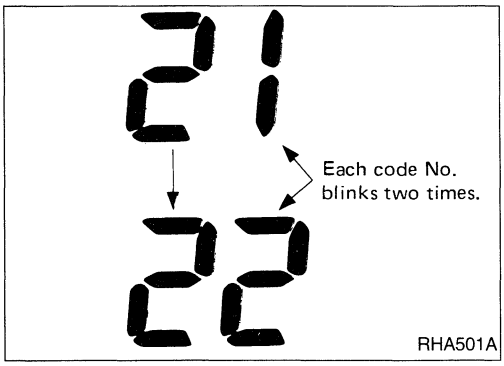


If LEDs or segments malfunction, LED does not come on or display shows incomplete segment.



STEP 2: Checks each sensor circuit for open or short circuit

Display shows " 2 " in STEP 2 mode.
When all sensors are in good order, display shows "20".
It takes approximately 4 seconds to check all sensors.
If a circuit is shorted, display shows ECON mark blinks on display.



If two or more sensors malfunction, corresponding code Nos. respectively blink two times.

Self-diagnosis (Cont'd)

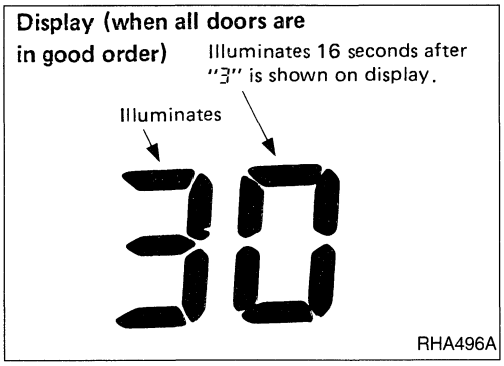
Sensors and abnormalities

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 −50°C (−58°F)	Greater than 75°C (167°F)
22	In-vehicle sensor	Less than −50°C (−58°F)	Greater than 75°C (167°F)
25	Sunload sensor*2	Less than 48.84 W/m^2 (42 kcal)	Greater than 1,640 W/m^2 (1,410 kcal)
26	PBR*1	Greater than 50%	Less than 30%

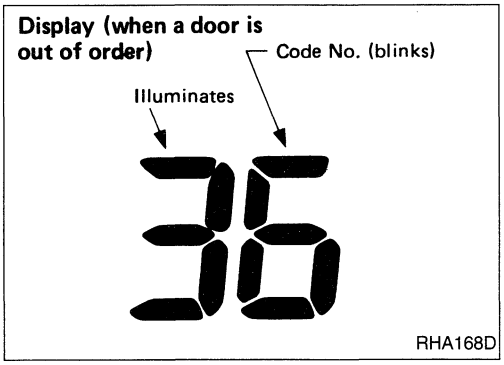
*1: "50%" and "30%" refer to percentage with respect to full stroke of air mix door. (Full cold: 0%, Full hot: 100%)

*2: **Conduct self-diagnosis STEP 2 under sunshine.**
When conducting indoors, direct light (more than 60W) at sunload sensor.



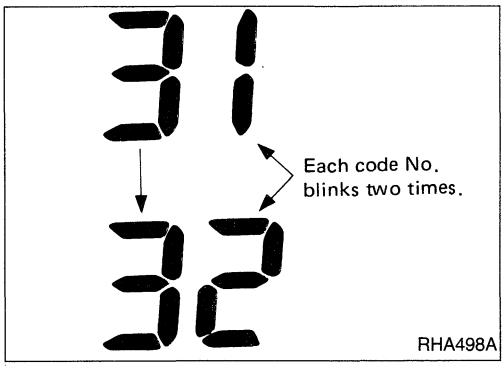
STEP 3: Checks mode door position

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 and intake doors.



When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

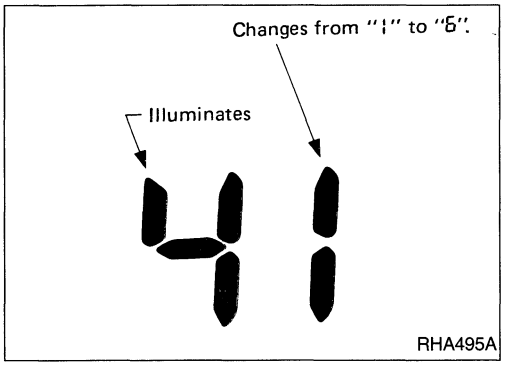
Code No.	31	32	34	35	36
Malfunctioning part	VENT	B/L	FOOT	F/D	DEF



If two or more mode and intake doors are out of order, corresponding code numbers respectively blink two times.

If any mode and intake door motor position switch is malfunctioning, mode and intake door motor will also malfunction.

Self-diagnosis (Cont'd)



STEP 4: Checks operation of each actuator

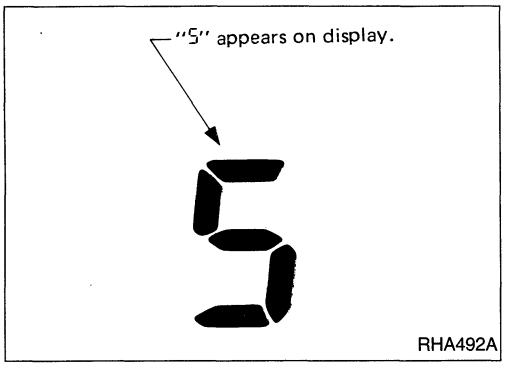
Display shows "41 " in STEP 4 mode.
When (DEF) switch is pressed one time, display shows "42 ". Thereafter, each time the switch is pressed, display advances one number at a time, up to "46 ", then returns to "41 ".

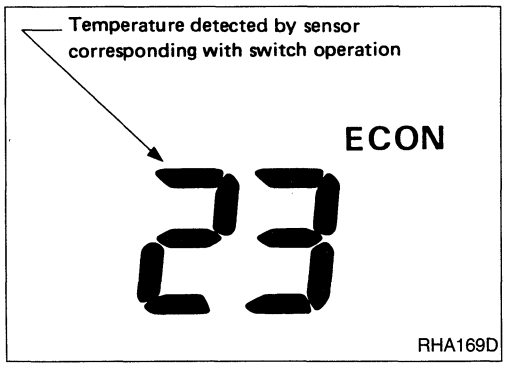
During inspection in STEP 4 mode, be certain that the fresh vent lever is in the "OFF" position. The auto amplifier will forcefully transmit an output to the affected actuators in response to code No. shown on display, as indicated in table below.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.

Actuator	Code No.					
	41	42	43	44	45	46
Mode door	VENT	B/L	B/L	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
Fresh vent door	OPEN	OPEN	CLOSE	CLOSE	CLOSE	CLOSE
Blower motor V	4 - 5	9 - 11	7 - 9	7 - 9	7 - 9	10 - 12
Compressor	ON	ON	ON	OFF	OFF	ON

Operating condition of each actuator cannot be checked by indicators.



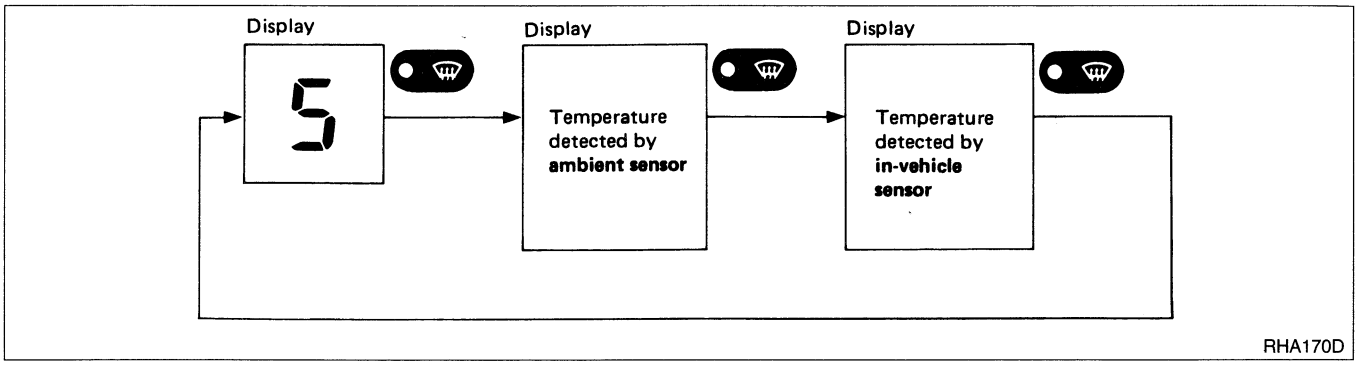


STEP 5: Checks temperature detected by sensors

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 returns to original presentation " 5 ".

Self-diagnosis (Cont'd)



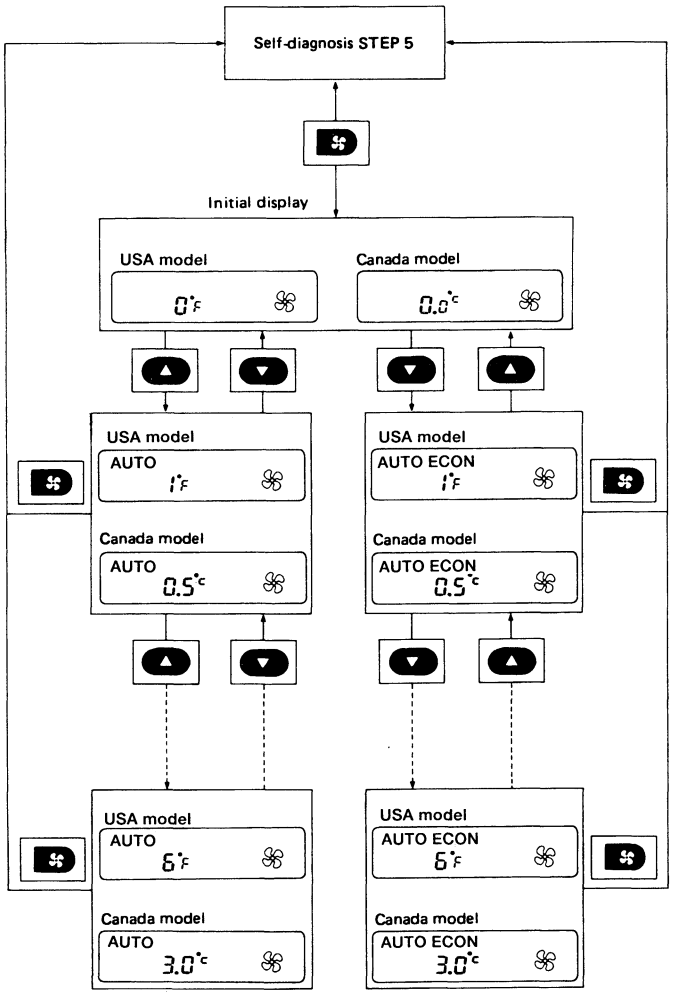
If temperature shown on display greatly differs from actual temperature, check sensor circuit at first then inspect sensor itself according to the procedures described in **Control System Input Components**. Refer to HA-114.

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.



(COLD)

: If driver felt warmer than the set temperature, push this COLD switch and A/C system will supply colder air without change in the temperature setting (displayed digitally).

(HOT)

: If driver felt cooler than the set temperature, push this HOT switch and A/C system will supply warmer air without change in the temperature setting (displayed digitally).

AHA122

When battery cable is disconnected, trimmer operation is canceled and temperature set becomes that of initial condition, i.e. 0°C (0°F).

NOTE

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE			Self-diagnosis						Preliminary Check								Diagnostic Procedure			
REFERENCE PAGE			HA-70, 72	HA-70, 72	HA-70, 73	HA-70, 74	HA-70, 74	HA-70, 76	HA-82	HA-83	HA-84	HA-85	HA-86	HA-87	HA-88	HA-88	HA-95	HA-96	HA-97	HA-98
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
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 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		
	25	Sunload sensor circuit is open.	❶	❷															❸	
	26	PBR circuit is open.	❶	❷																❸

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																								
HA-99	HA-101	HA-102.	HA-103	HA-105	HA-108	HA-94	HA-94	HA-94	HA-94	HA-94	—	—	—	—	—	—	—	—	HA-65	HA-66	HA-66	HA-66	HA-66	HA-66	—	Refer to EF & EC section.								—
Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Auto amp.	10A Fuse #23	20A Fuses #4 and #5	10A Fuse #10	10A Fuse #20	Ambient sensor	In-vehicle sensor	Sunload sensor	PBR	Air mix door motor	Mode door motor	Intake door motor	Fresh vent door motor	Blower motor	Thermo control amp.	Blower high relay	A/C relay	Triple-pressure switch	Magnet clutch (Compressor)	ECM (ECCS control module)	Radiator fan motor-1	Radiator fan motor-2	Radiator fan relay-1	Radiator fan relay-2	Radiator fan relay-3	Speed sensor	Harness
○						○	○	○		○	○	○	○	○		○																	○
	○					○	○	○		○	○	○	○	○			○																○
○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			○			○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○													○
				○		○	○	○		○	○	○	○	○						○	○	○			○									○
					○	○	○	○	○	○	○												○	○	○									○
		○	○			○	○	○	○	○	○	○	○	○	○				○															○
											○																							○
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														○																				○

Symptom Chart (Cont'd)

PROCEDURE			Self-diagnosis						Preliminary Check								Diagnostic Procedure			
REFERENCE PAGE			HA-70, 72	HA-70, 72	HA-70, 73	HA-70, 74	HA-70, 74	HA-70, 76	HA-82	HA-83	HA-84	HA-85	HA-86	HA-87	HA-88	HA-88	HA-95	HA-96	HA-97	HA-98
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
Result of Self-diagnosis STEP 2	ECON 21	Ambient sensor circuit is shorted.	❶	❷			❸										❹			
	ECON 22	In-vehicle sensor circuit is shorted.	❶	❷			❸											❹		
	ECON 25	Sunload sensor circuit is shorted.	❶	❷															❸	
	ECON 26	PBR circuit is shorted.	❶	❷																❸
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	○										○	○	○	○
Fresh vent door 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																					
HA-99	HA-101	HA-102.	HA-103	HA-105	HA-108	HA-94	HA-94	HA-94	HA-94	HA-94	—	—	—	—	—	—	—	—	HA-65	HA-66	HA-66	HA-66	HA-66	HA-66	—	Refer to EF & EC section.					
Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Auto amp.	10A Fuse #23	20A Fuses #4 and #5	10A Fuse #10	10A Fuse #20	Ambient sensor	In-vehicle sensor	Sunload sensor	PBR	Air mix door motor	Mode door motor	Intake door motor	Fresh vent door motor	Blower motor	Thermo control amp.	Blower high relay	A/C relay	Triple-pressure switch	Magnet clutch (Compressor)	ECM (ECCS control module)	Radiator fan motor-1	Radiator fan motor-2	Radiator fan relay-1	Radiator fan relay-2	Radiator fan relay-3	Speed sensor	Harness
											○																					○
												○																				○
													○																			○
														○																		○
❺						○	○	○		○	○	○	○	○		○																○
	❹					○	○	○		○	○	○	○	○			○															○
		❹				○	○	○		○	○	○	○	○	○																	○
				❹		○	○	○		○	○	○	○	○						○	○	○			○							○
					❹	○	○	○	○	○	○												○	○	○	○							○
						❷																										○
			❹			○	○	○		○								○														○

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
21	Perform Diagnostic Procedure 1. Refer to HA-95.
22	Perform Diagnostic Procedure 2. Refer to HA-96.
25	Perform Diagnostic Procedure 3. Refer to HA-97.
26	Perform Diagnostic Procedure 4. Refer to HA-98.
ECON 21	Perform Diagnostic Procedure 1. Refer to HA-95.
ECON 22	Perform Diagnostic Procedure 2. Refer to HA-96.
ECON 25	Perform Diagnostic Procedure 3. Refer to HA-97.
ECON 26	Perform Diagnostic Procedure 4. Refer to HA-98.

When malfunctioning sensor circuits for ambient sensor and in-vehicle sensor are suspected, it is useful 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. → Perform **Diagnostic Procedure 5.** Refer to HA-99.

O.K. ↓

CHECK MODE DOOR OPERATION.
Set up Self-diagnosis STEP 4.
Does air outlet change according to each code No.? **(Fresh vent lever "OFF")**

41	42	43	44	45	46
VENT	B/L	B/L	FOOT	F/D	DEF

Refer to HA-10.

N.G. → CHECK SIDE LINK MECHANISM. Refer to HA-111.

N.G. → Repair or adjust.

O.K. ↓

Perform **Diagnostic Procedure 5.** Refer to HA-99.

O.K. ↓

Air outlet control system is normal. Refer to HA-119.

Preliminary Check (Cont'd)

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
21	Perform Diagnostic Procedure 1. Refer to HA-95.
22	Perform Diagnostic Procedure 2. Refer to HA-96.
25	Perform Diagnostic Procedure 3. Refer to HA-97.
26	Perform Diagnostic Procedure 4. Refer to HA-98.
ECON 21	Perform Diagnostic Procedure 1. Refer to HA-95.
ECON 22	Perform Diagnostic Procedure 2. Refer to HA-96.
ECON 25	Perform Diagnostic Procedure 3. Refer to HA-97.
ECON 26	Perform Diagnostic Procedure 4. Refer to HA-98.

When malfunctioning sensor circuits for ambient sensor and in-vehicle sensor are suspected, it is useful 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% FRESH	FRESH	FRESH	FRESH

N.G. → CHECK INTAKE DOOR ROD or LEVER MECHANISM. Refer to HA-112.

N.G. → Repair or adjust.

O.K. ↓

Perform **Diagnostic Procedure 6.** Refer to HA-101.

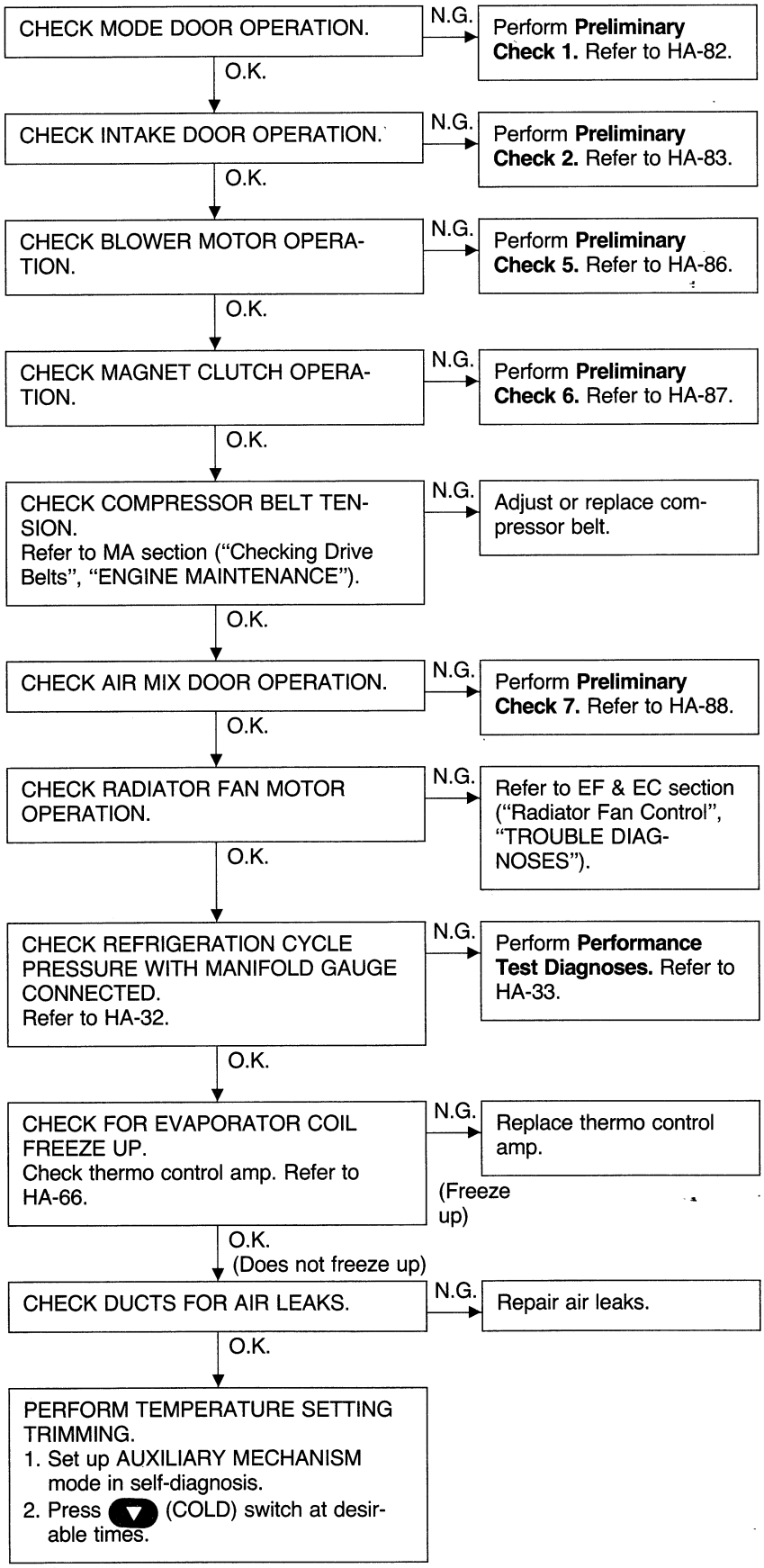
O.K. ↓

Intake door control system is normal. Refer to HA-120.

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

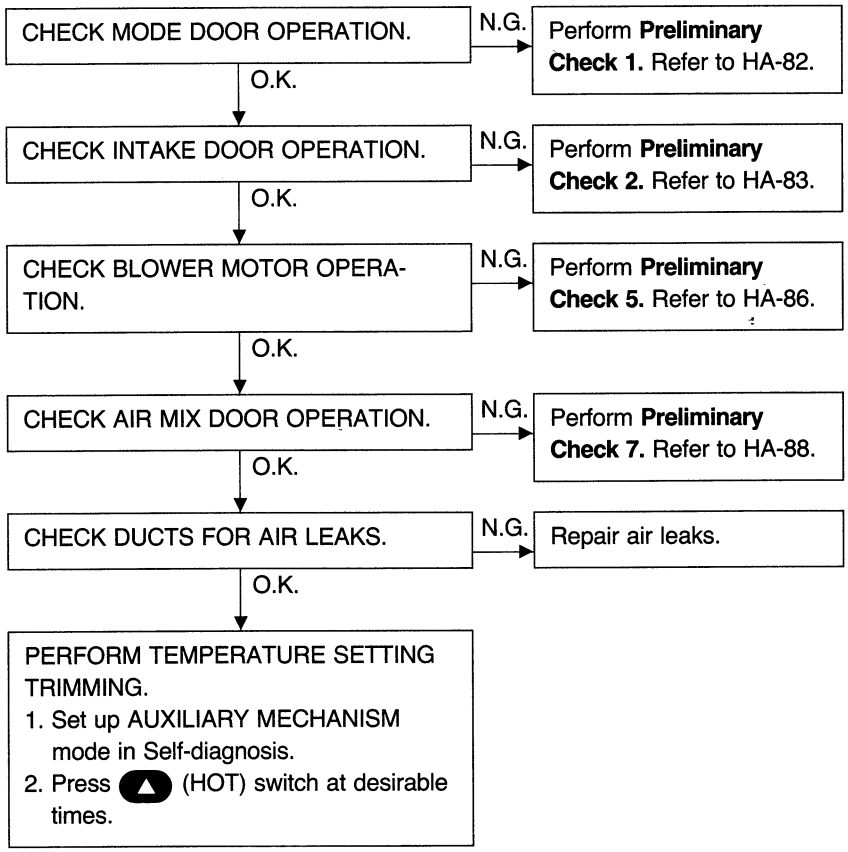
Insufficient cooling



Preliminary Check (Cont'd)

PRELIMINARY CHECK 4

Insufficient heating



Preliminary Check (Cont'd)

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
21	Perform Diagnostic Procedure 1. Refer to HA-95.
22	Perform Diagnostic Procedure 2. Refer to HA-96.
25	Perform Diagnostic Procedure 3. Refer to HA-97.
26	Perform Diagnostic Procedure 4. Refer to HA-98.
ECON 21	Perform Diagnostic Procedure 1. Refer to HA-95.
ECON 22	Perform Diagnostic Procedure 2. Refer to HA-96.
ECON 25	Perform Diagnostic Procedure 3. Refer to HA-97.
ECON 26	Perform Diagnostic Procedure 4. Refer to HA-98.

When malfunctioning sensor circuits for ambient sensor and in-vehicle sensor are suspected, it is useful 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 motor speed change according to each code No.?

Code No.	41	42	43	44	45	46
Blower motor speed	Low	Middle high	Middle low			High

N.G. → Perform **Diagnostic Procedure 9.** Refer to HA-105.

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 HA-123.

Yes ↓

IS BLOWER MOTOR CONTROLLED UNDER FAN STARTING SPEED CONTROL?
Refer to HA-122.

No → Check engine coolant temperature sensor control circuit. Refer to EF & EC section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

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 CORRESPONDING TO EACH CODE NO.

Code No.	How to repair
21	Perform Diagnostic Procedure 1. Refer to HA-95.
22	Perform Diagnostic Procedure 2. Refer to HA-96.
25	Perform Diagnostic Procedure 3. Refer to HA-97.
26	Perform Diagnostic Procedure 4. Refer to HA-98.
ECON 21	Perform Diagnostic Procedure 1. Refer to HA-95.
ECON 22	Perform Diagnostic Procedure 2. Refer to HA-96.
ECON 25	Perform Diagnostic Procedure 3. Refer to HA-97.
ECON 26	Perform Diagnostic Procedure 4. Refer to HA-98.

When malfunctioning sensor circuits for ambient sensor and in-vehicle sensor are suspected, it is useful 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.?

Actuator	Code No.					
	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. ↓

Perform **Diagnostic Procedure 10.**
Refer to HA-108.

O.K. ↓

Magnet clutch control system is normal.
Refer to HA-124.

Preliminary Check (Cont'd)

PRELIMINARY CHECK 7

Discharged air temperature does not change.

- **Perform Self-diagnosis STEP 1 before referring to the following flow chart.**

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 CORRESPONDING TO EACH CODE NO.

Code No.	How to repair
21	Perform Diagnostic Procedure 1. Refer to HA-95.
22	Perform Diagnostic Procedure 2. Refer to HA-96.
25	Perform Diagnostic Procedure 3. Refer to HA-97.
26	Perform Diagnostic Procedure 4. Refer to HA-98.
ECON 21	Perform Diagnostic Procedure 1. Refer to HA-95.
ECON 22	Perform Diagnostic Procedure 2. Refer to HA-96.
ECON 25	Perform Diagnostic Procedure 3. Refer to HA-97.
ECON 26	Perform Diagnostic Procedure 4. Refer to HA-98.

When malfunctioning sensor circuits for ambient sensor and in-vehicle sensor are suspected, it is useful 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 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 HA-116.

N.G. ↓

CHECK AIR MIX DOOR MECHANISM.
Refer to HA-111.

N.G. → Repair or adjust.

O.K. ↓

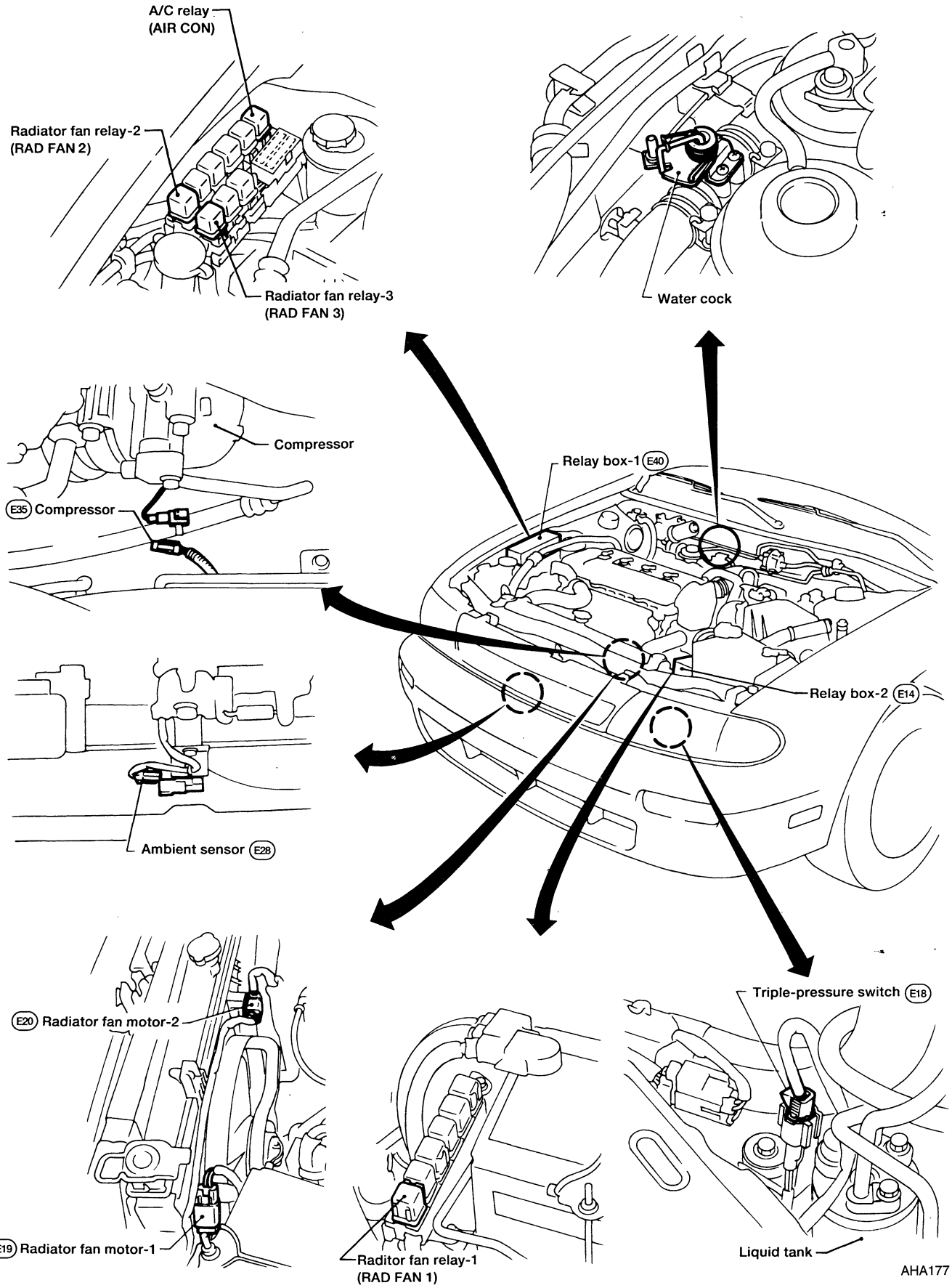
Perform **Diagnostic Procedure 7.** Refer to HA-102.

PRELIMINARY CHECK 8

Noise
Refer to HA-44.

Harness Layout for A/C System

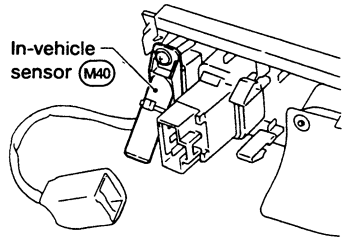
Engine compartment



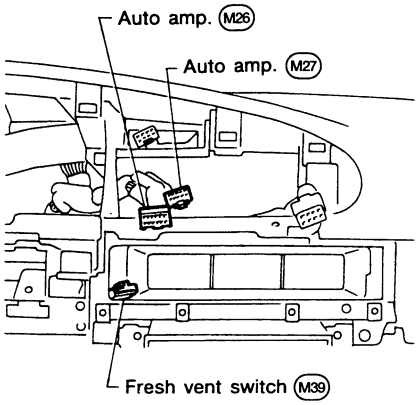
Harness Layout for A/C System (Cont'd)

Passenger compartment

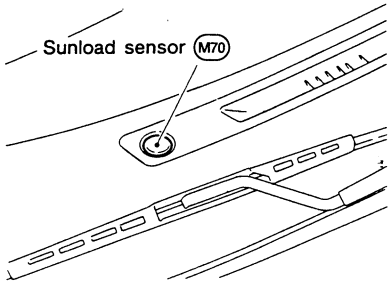
A In-vehicle sensor

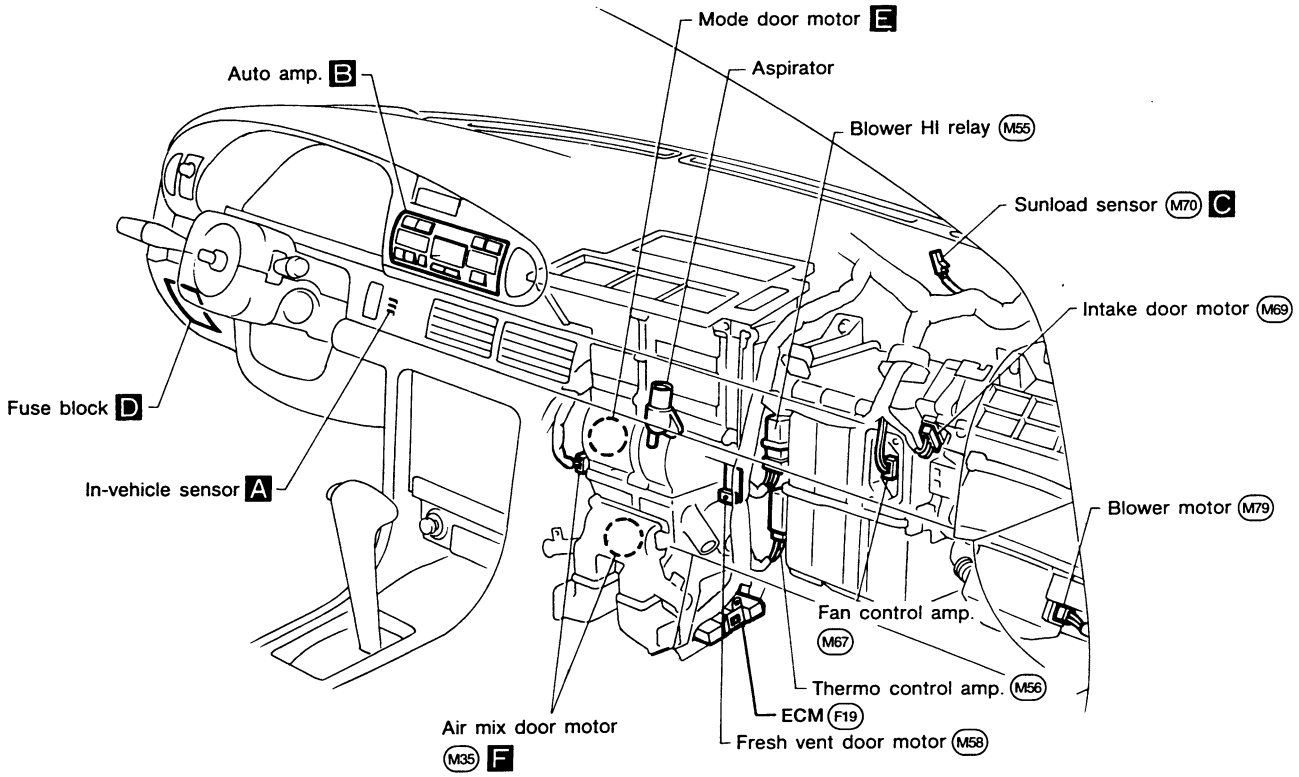


B Auto amp.

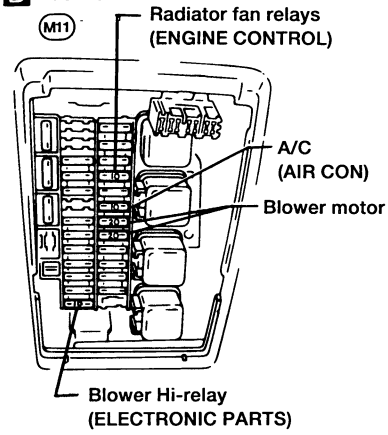


C Sunload sensor

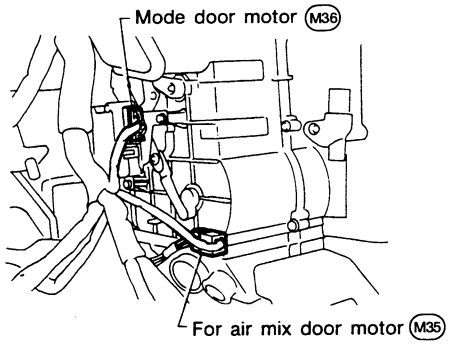




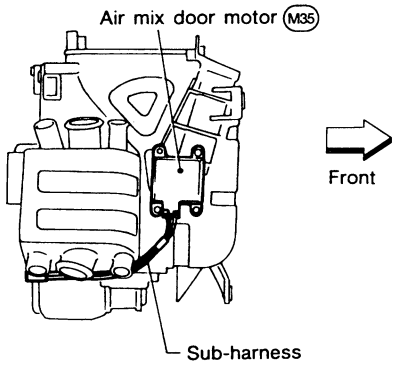
D Fuse block



E Mode door motor

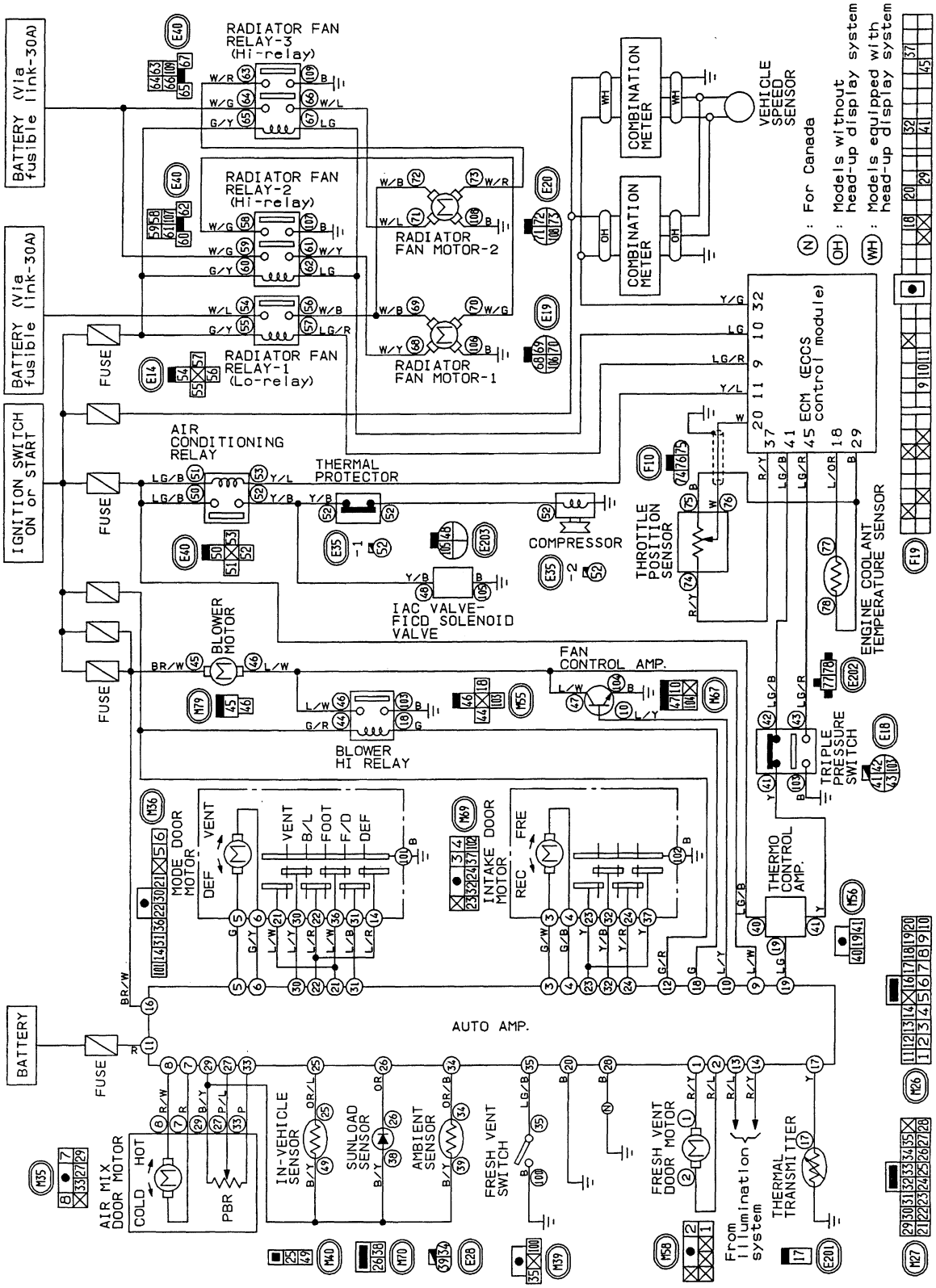


F Air mix door motor



AHA178

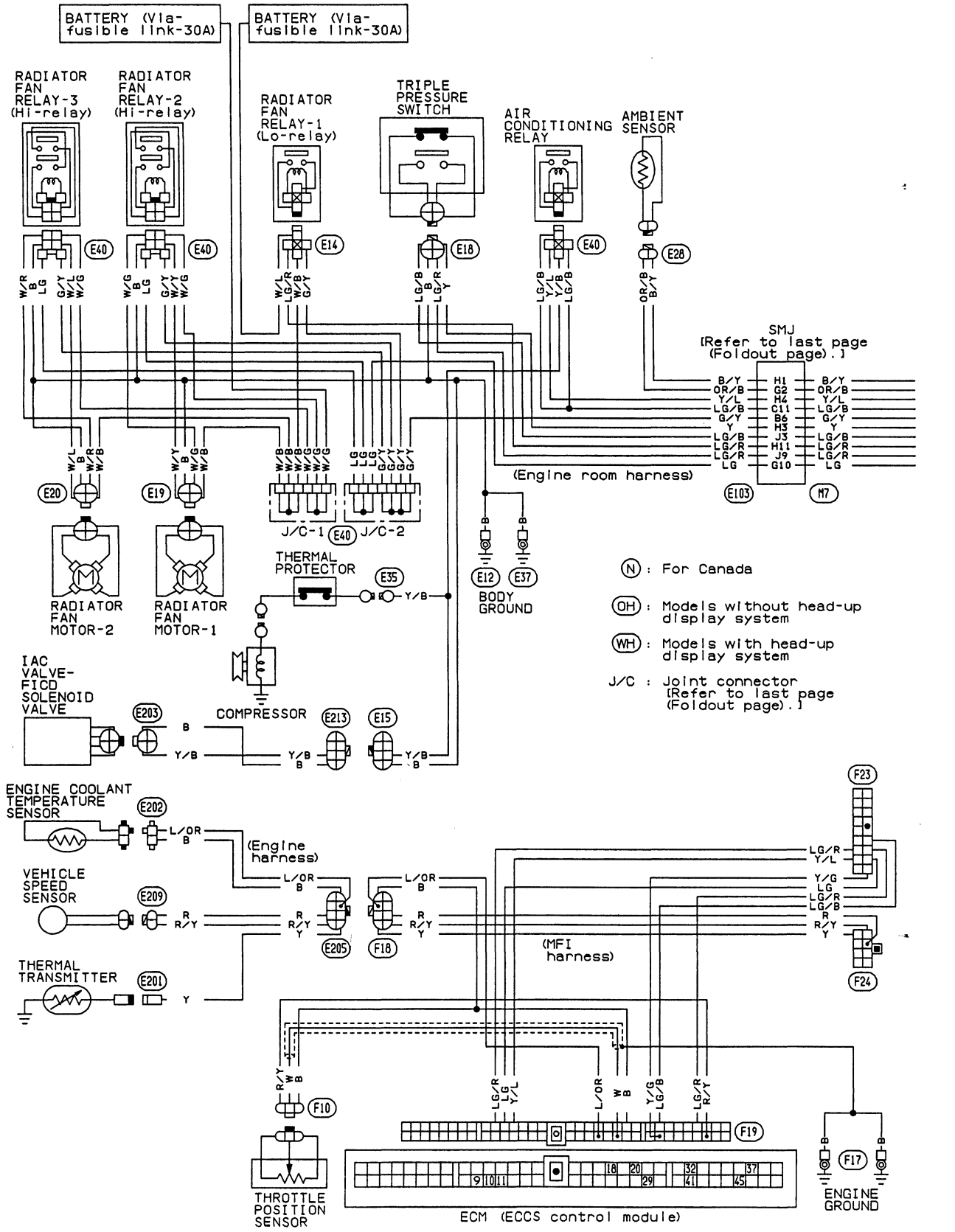
Circuit Diagram for Quick Pinpoint Check



- 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 "Harness Layout for A/C System". (Refer to HA-89, HA-90.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".

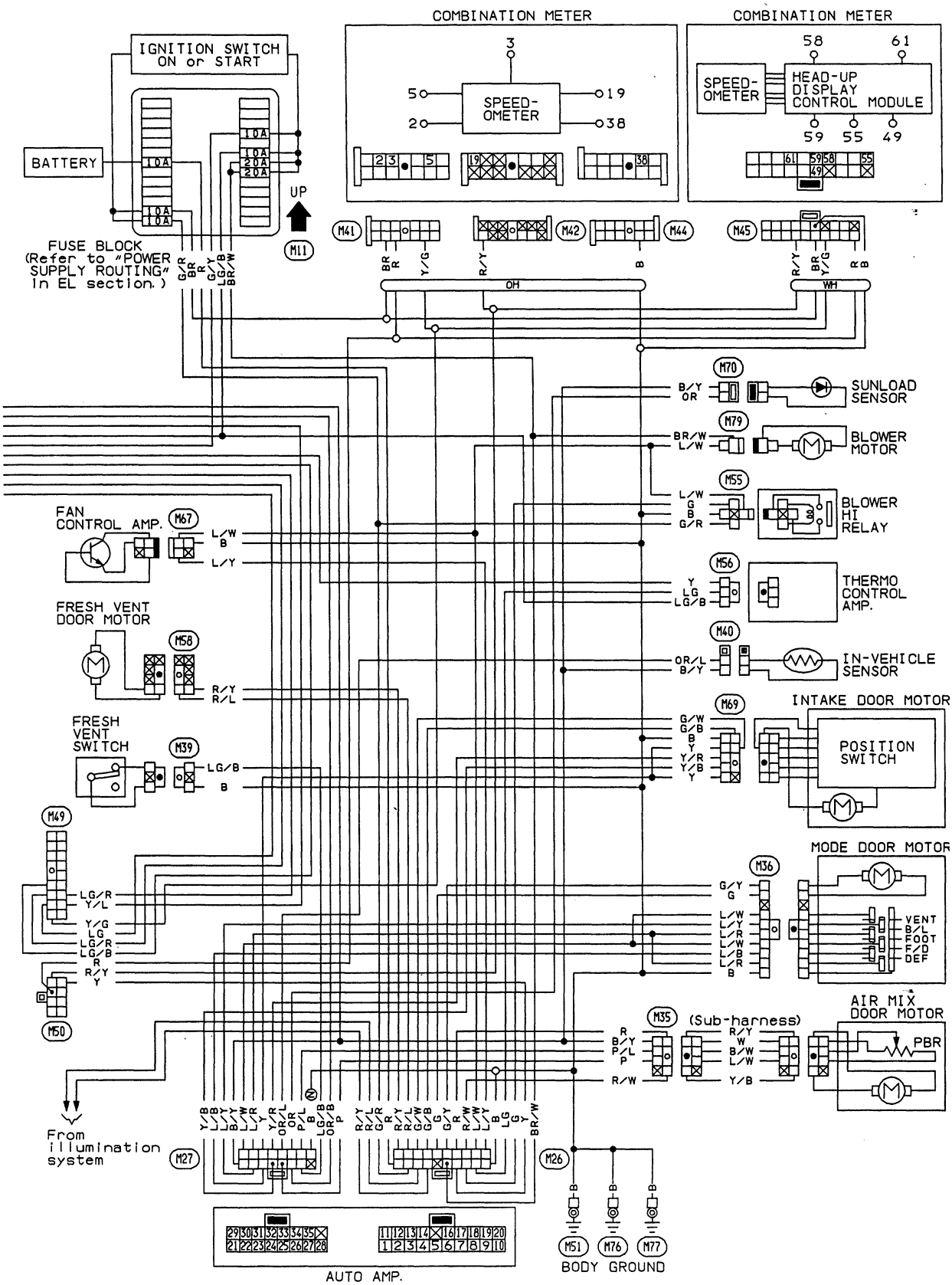
MHA120A

Wiring Diagram



MHA121A-1

Wiring Diagram (Cont'd)



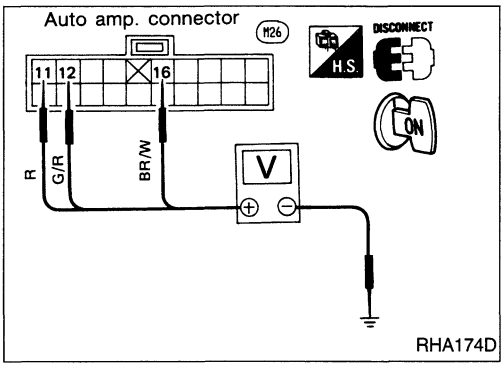
MHA121A

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 EL section ("Wiring Diagram", "POWER SUPPLY ROUTING") and HA-92.

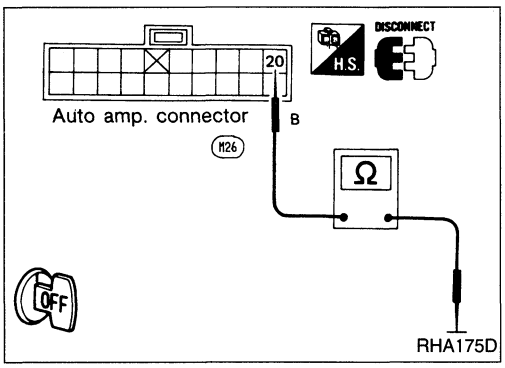


AUTO AMP. CHECK

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. ⑪, ⑫, ⑯ and body ground.

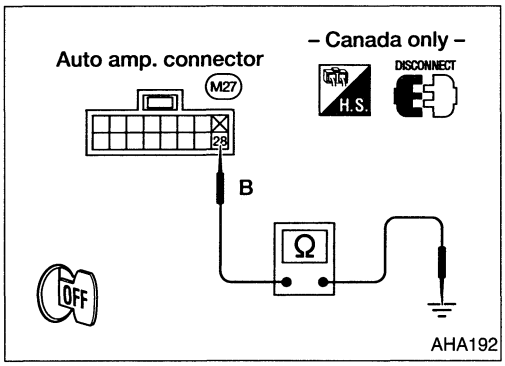
Voltmeter terminal		Voltage
⊕	⊖	
⑪	Body ground	Approx. 12V
⑫		
⑯		

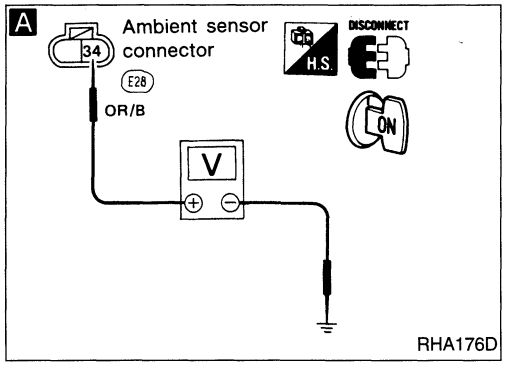


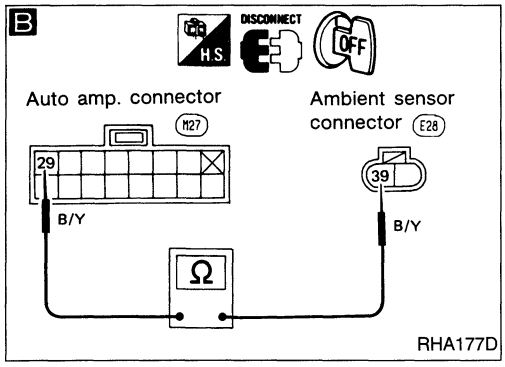
Check body ground circuit for auto amp. with ignition switch OFF.

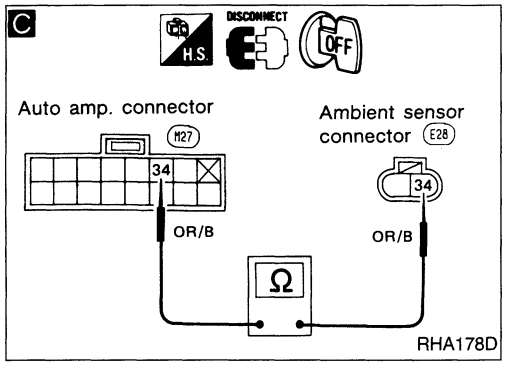
1. Disconnect auto amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑳ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑳	Body ground	Yes
㉘(Canada only)	Body ground	Yes









Diagnostic Procedure 1

SYMPTOM: Ambient sensor circuit is open or shorted. (21 or ECON 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. (34) and body ground?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between ambient sensor harness terminal No. (34) and auto amp. harness terminal No. (34).

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between ambient sensor harness terminal No. (39) and auto amp. harness terminal No. (29).

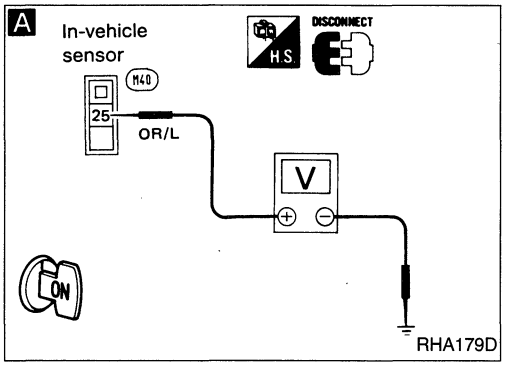
O.K. →

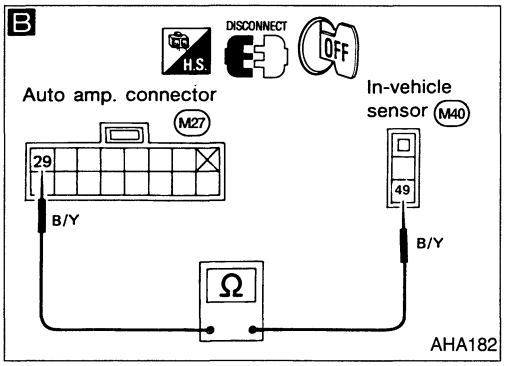
CHECK AMBIENT SENSOR. (Refer to HA-115.)

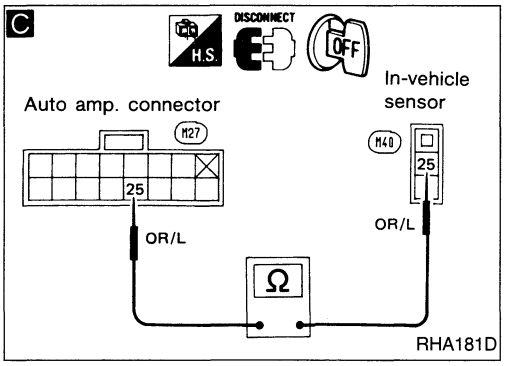
N.G. → Replace ambient sensor.

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 or shorted. (22 or ECON 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. (25) and body ground?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between in-vehicle sensor harness terminal No. (25) and auto amp. harness terminal No. (25).

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

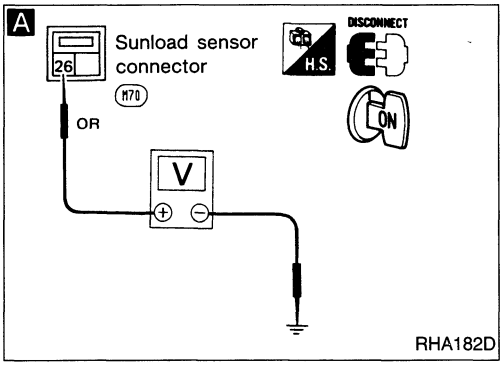
Check circuit continuity between in-vehicle sensor harness terminal No. (49) and auto amp. harness terminal No. (29).

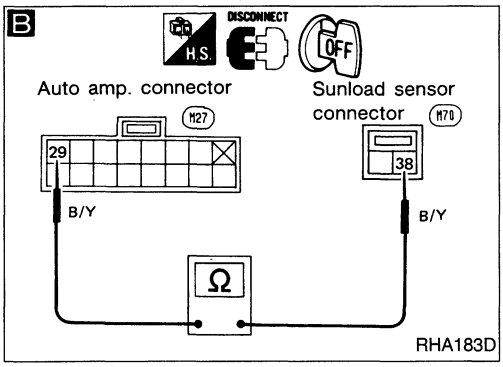
O.K. → CHECK IN-VEHICLE SENSOR. (Refer to HA-114.)

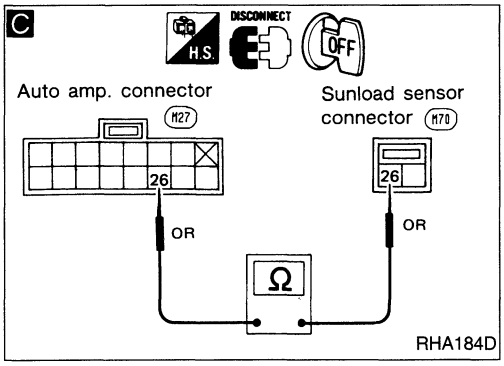
N.G. → Replace in-vehicle sensor.

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 3

SYMPTOM: Sunload sensor circuit is open or shorted. (25 or ECON 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. (26) and body ground?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between sunload sensor harness terminal No. (26) and auto amp. harness terminal No. (26).

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. (29).

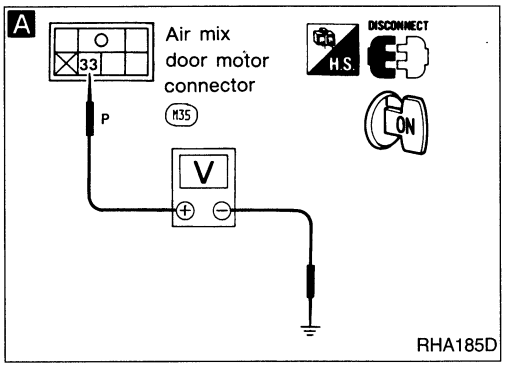
O.K. →

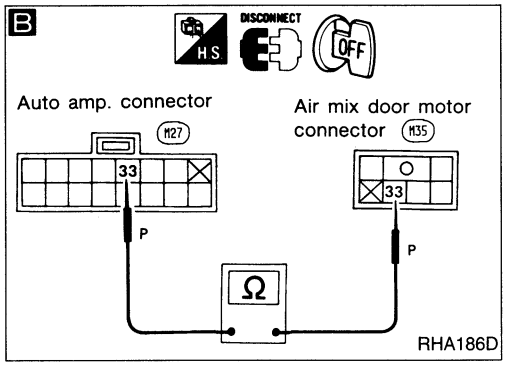
CHECK SUNLOAD SENSOR. (Refer to HA-115.)

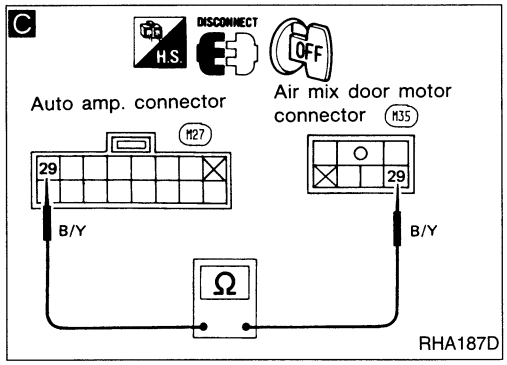
N.G. → Replace sunload sensor.

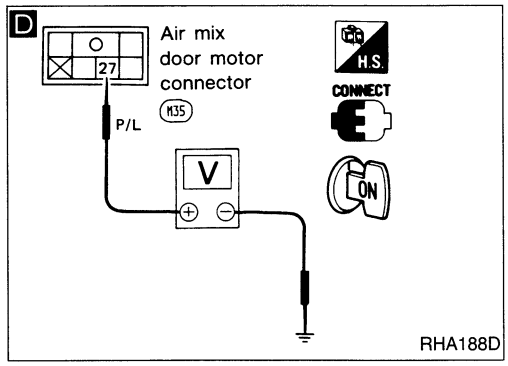
O.K. → Replace auto amp.

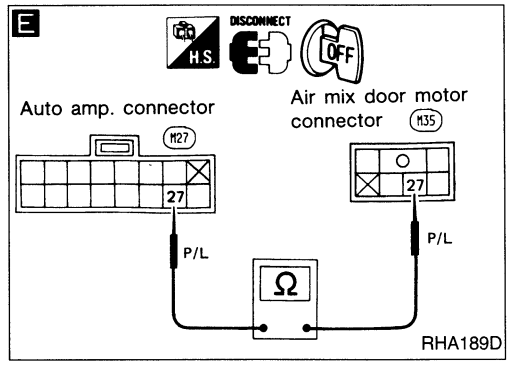
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.











Diagnostic Procedure 4

SYMPTOM: PBR circuit is open or shorted. (26 or ECON 26 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

A

CHECK PBR CIRCUIT BETWEEN PBR AND AUTO AMP.
Disconnect air mix door motor harness connector.
Do approx. 5 volts exist between air mix door motor harness terminal No. (33) and body ground?

N.G. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between air mix door motor harness terminal No. (33) and auto amp. harness terminal No. (33).

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. (29) and auto amp. harness terminal No. (29).

O.K.

D

CHECK PBR CIRCUIT BETWEEN PBR 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.

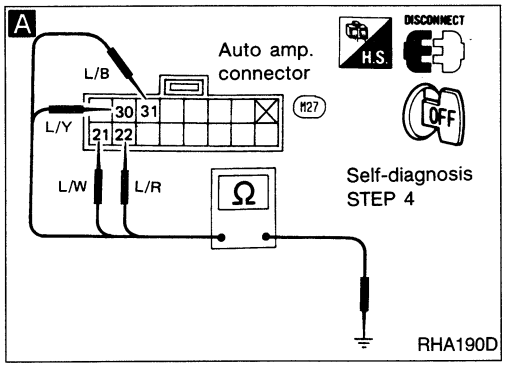
O.K.

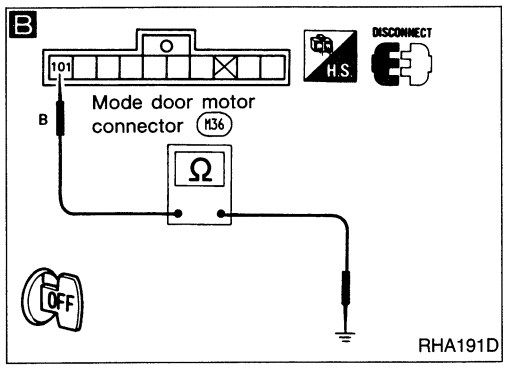
CHECK PBR SENSOR.
(Refer to HA-118.)

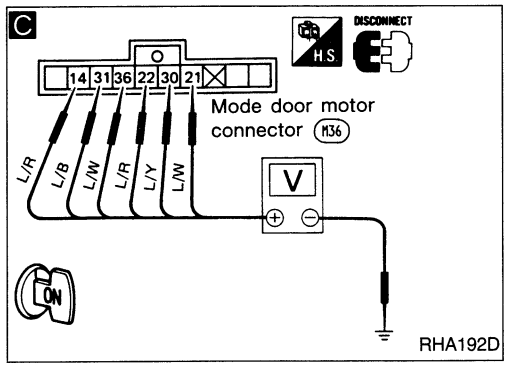
N.G. → Replace air mix door motor (PBR).

O.K. → Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 5

SYMPTOM: Mode door motor does not operate normally.

- **Perform Self-diagnosis STEPS 1 to 4 before referring to the following flow chart.**

A

CHECK MODE DOOR MOTOR POSITION SWITCH.
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. (22) or (31) 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	(22) or (31)	Body ground	Yes
42 or 43	B/L	(21) or (31)		
44	FOOT	(21) or (22)		
45	F/D	(30) or (22)		
46	DEF	(21) or (30)		

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?

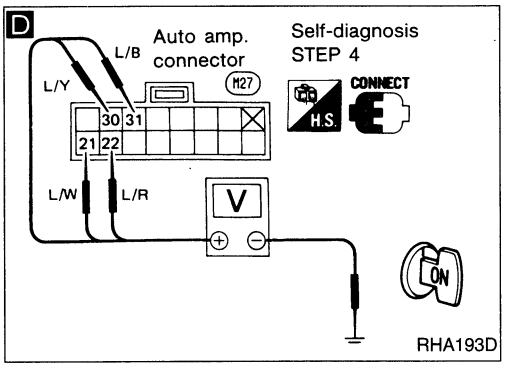
Terminal No. ⊕	Terminal No. ⊖	Voltage
(21)	Body ground	Approx. 5V
(30)		
(22)		
(36)		
(31)		
(14)		

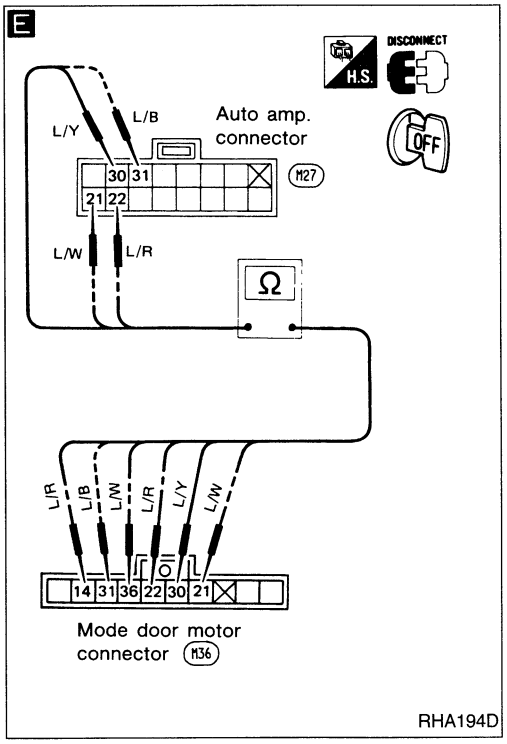
O.K. ↓ Reconnect mode door motor harness connector. → Ⓐ (Go to next page.)

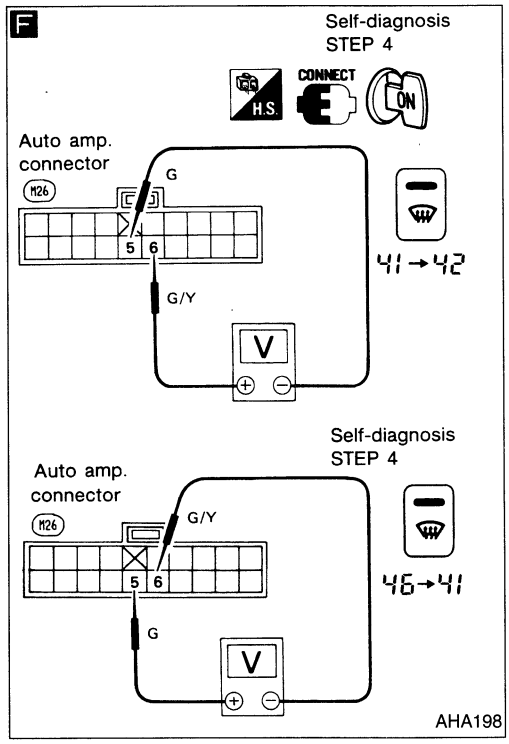
N.G. → Ⓑ (Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 5 (Cont'd)







Ⓐ

D

CHECK MODE DOOR MOTOR POSITION SWITCH.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.

Code No.	Condition	Terminal No. ⊕ 22	31	21	30	Terminal No. ⊖
41	VENT	0V	0V	5V	5V	Body ground
42 or 43	B/L	5V	0V	0V	5V	
44	FOOT	0V	5V	0V	5V	
45	D/F	0V	5V	5V	0V	
46	DEF	5V	5V	0V	0V	

0V: Approx. 0V
5V: Approx. 5V

O.K. → **F**

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
30	30	Yes
22	14 or 22	
21	21 or 36	
31	31	

O.K. → Replace auto amp.

F

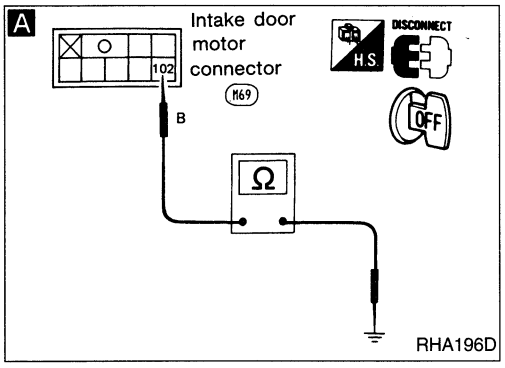
CHECK FOR AUTO AMP. OUTPUT.
Do approx. 10.5 volts exist between auto amp. harness terminals No. ⑤ and ⑥ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

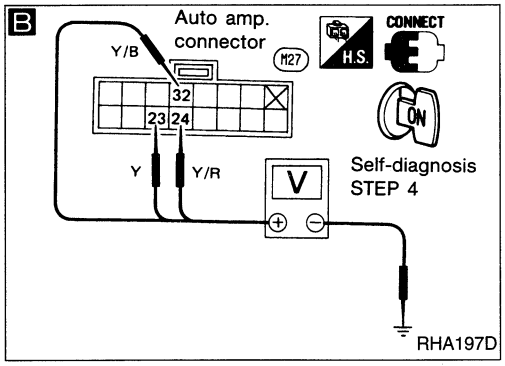
Code No.	Mode door motor operation	Terminal No. ⑥	Terminal No. ⑤	Voltage V
41 →42	VENT → B/L	⊕	⊖	Approx. 10.5
46 →41	DEF → VENT	⊖	⊕	
—	Stop	⊖	⊖	0

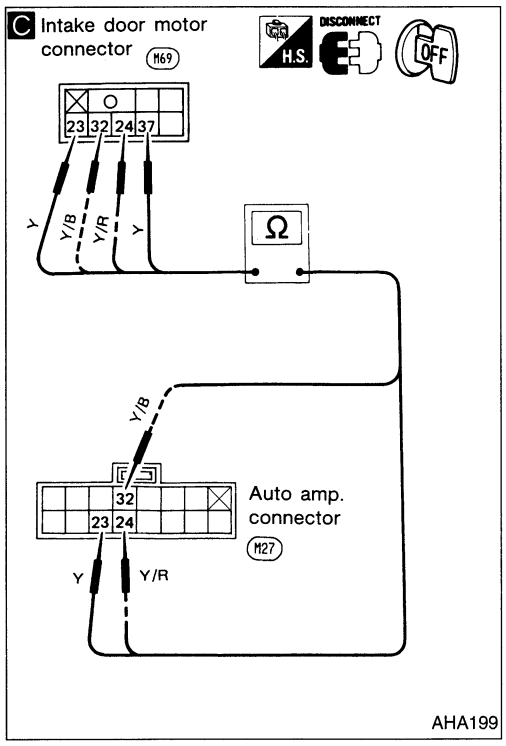
N.G. → Replace auto amp.

O.K. → Replace mode door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.







Diagnostic Procedure 6

SYMPTOM: Intake door motor does not operate normally.

- **Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the flow chart.**

A

Note

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Does continuity exist between intake door motor harness terminal No. (102) and body ground?

O.K.

B

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Condition	Voltage V
41 42	23	Body ground	REC	0
	24			12
	32			12
43	23		20% REC	12
	24			0
	32			0
44 45 46	23		FRE	0
	24			12
	32			12

0V: Approx. 0V
12V: Approx. 12V

N.G.

C

Note

Check circuit continuity between each terminal on auto amp. and on intake door motor.

Terminal No. ⊕	Terminal No. ⊖	
Auto amp.	Intake door motor	Continuity
23	23 or 37	Yes
24	24	
32	32	

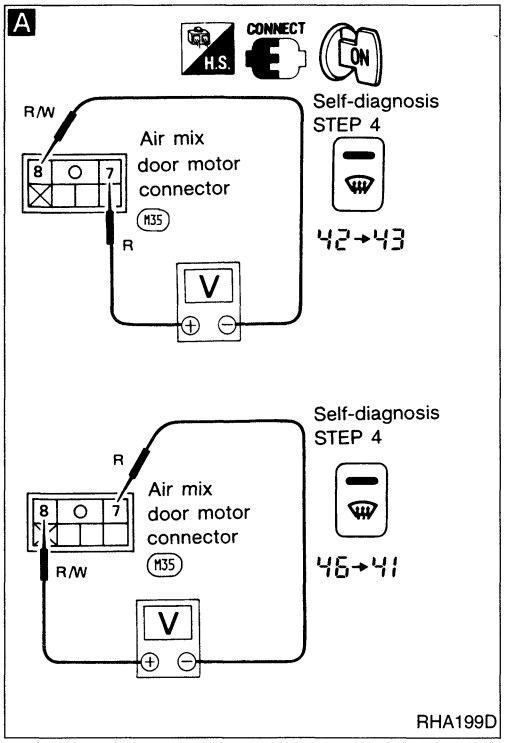
O.K.

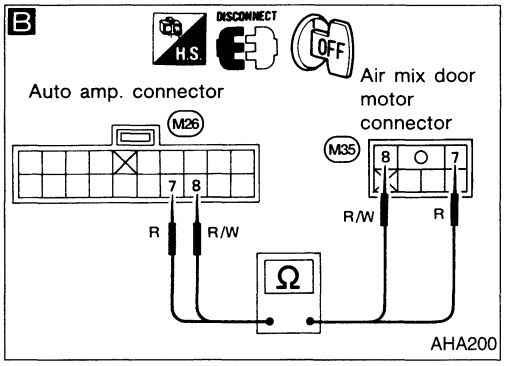
Replace auto amp.

O.K.

Replace intake door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.





Diagnostic Procedure 7

SYMPTOM: Air mix door motor does not operate normally.

- **Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.**

IS PBR OPERATING NORMALLY?
Refer to Self-diagnoses STEP 2.

N.G. → CHECK PBR CIRCUIT. Perform Diagnostic Procedure 4. Refer to HA-98.

O.K. ↓

A

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Do approx. 10.5 volt exist between air mix door motor harness terminals No. ⑦ and ⑧ when code No. is switched from "42" to "43" or when code No. is switched from "46" to "41"?

Code No.	Air mix door operation	Terminal No. ⑦	Terminal No. ⑧	Voltage V
42 →43	Cold → Hot	⊕	⊖	Approx. 10.5
46 →41	Hot → Cold	⊖	⊕	
—	Stop	⊖	⊖	0

N.G. → Disconnect auto amp. and air mix door motor harness connectors.

B

Note: Check circuit continuity between auto amp. harness terminal No. ⑦ (⑧) and air mix door harness terminal No. ⑦ (⑧).

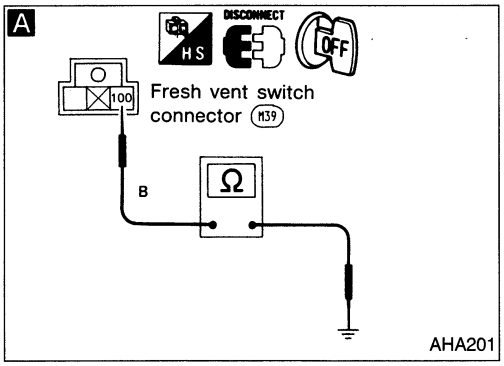
O.K. ↓

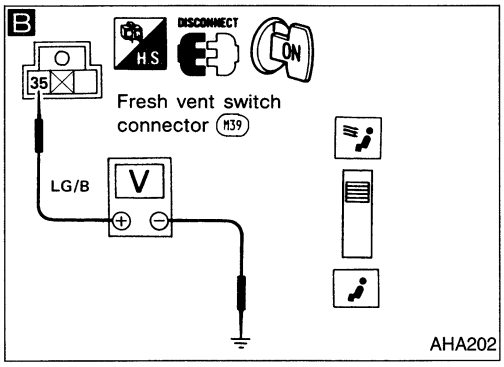
Replace auto amp.

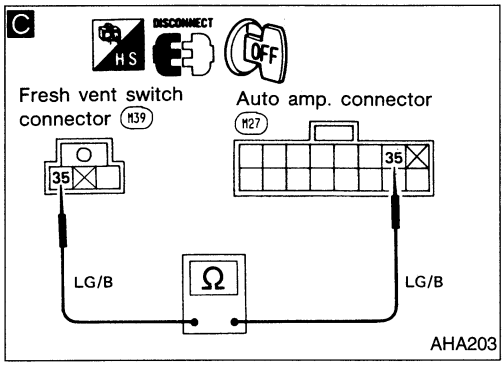
O.K. ↓

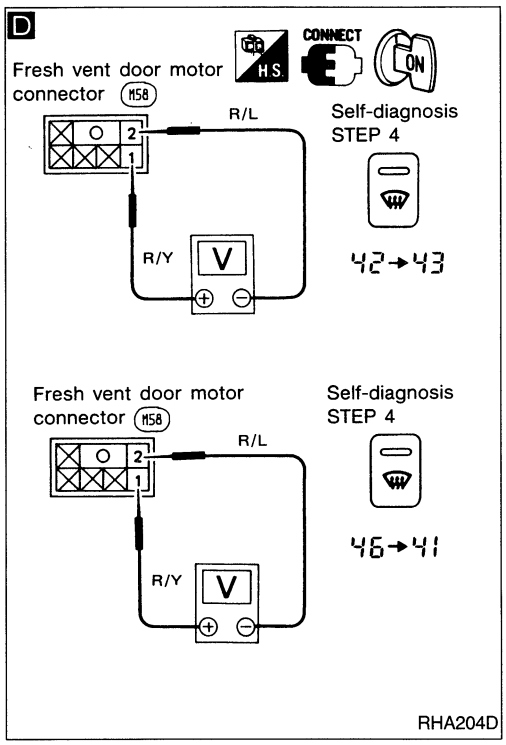
Replace air mix door motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.









Diagnostic Procedure 8

SYMPTOM: Fresh vent door motor does not operate normally.

- **Perform Self-diagnosis STEP 4 before referring to the following flow chart.**

A — Note

CHECK BODY GROUND CIRCUIT FOR FRESH VENT SWITCH.
Disconnect fresh vent switch harness connector.
Does continuity exist between fresh vent switch harness terminal No. (100) and body ground?

O.K.

B

CHECK POWER SUPPLY FOR FRESH VENT SWITCH.
Do approx. 12 volts exist between fresh vent door switch harness terminal No. (35) and body ground?

N.G. → D

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Do approx. 12 volts exist between fresh vent door motor harness terminals (1) and (2) when code No. is switched from "42" to "43" or when code No. is switched from "46" to "41"?

Code No.	Fresh vent door condition	Terminal No. ①	Terminal No. ②	Voltage V
42 →43	OPEN → CLOSE	⊕	⊖	Approx. 12V
46 →41	CLOSE → OPEN	⊖	⊕	

O.K.

Disconnect auto amp. harness connector.

C — Note

Check circuit continuity between fresh vent switch harness terminal No. (35) and auto amp. harness terminal No. (35).

O.K.

CHECK FRESH VENT SWITCH.
(Refer to HA-67.)

N.G.

Replace fresh vent switch.

N.G.

Replace fresh vent door motor.

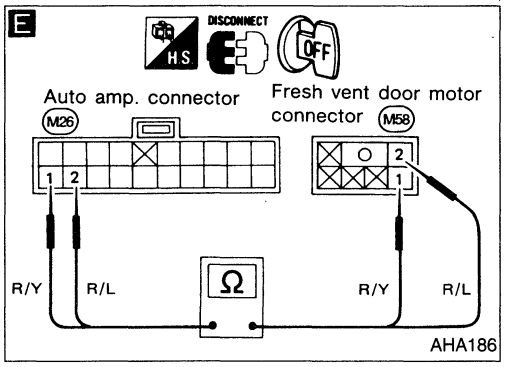
O.K. / N.G.

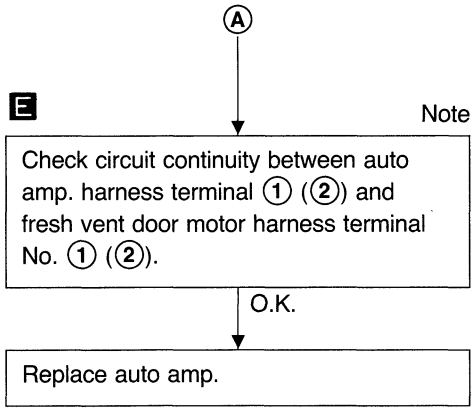
Disconnect auto amp. harness connector.

Ⓐ
(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

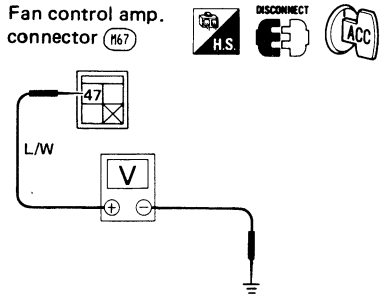
Diagnostic Procedure 8 (Cont'd)





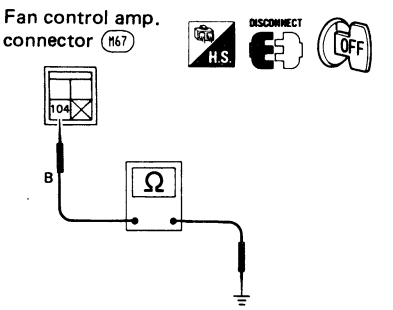
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

A



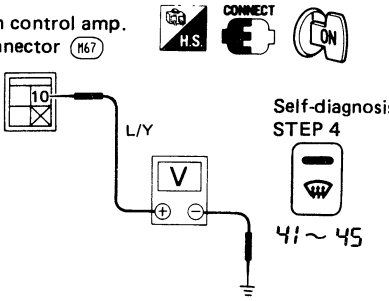
RHA206D

B



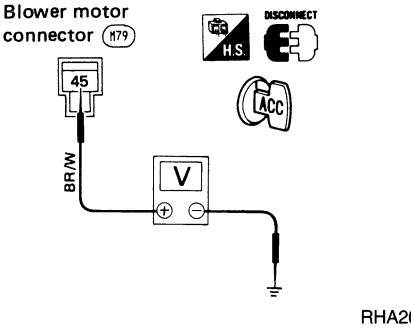
RHA207D

C



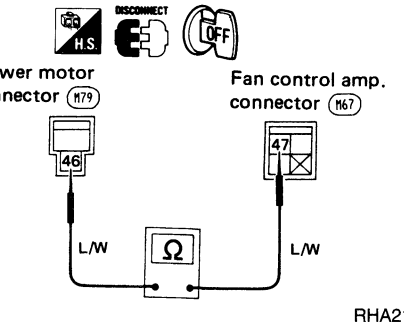
RHA208D

D



RHA209D

E



RHA210D

Diagnostic Procedure 9

SYMPTOM: Blower motor operation is malfunctioning under out of Starting Fan Speed Control.

- **Perform Preliminary Check 5 before referring to the following flow chart.**

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. (47) and body ground?

N.G. → **D**

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. (45) and body ground?

O.K. → **B**

N.G. → Check 20A fuses at fuse block. Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING") and HA-92.

B Note

CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.
Does continuity exist between fan control amp. harness terminal No. (104) and body ground?

O.K.

Reconnect fan control amp. harness connector.

C

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across fan control amp. harness terminal No. (10) and body ground.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
41 -45	(10)	Body ground	Approx. 1 - 3V

O.K.

Replace fan control amp.

N.G.

E Note

Check circuit continuity between blower motor harness terminal No. (46) and fan control amp. harness terminal No. (47).

O.K.

CHECK BLOWER MOTOR.
(Refer to HA-65.)

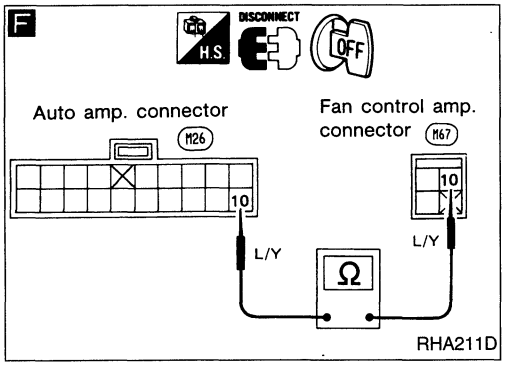
N.G.

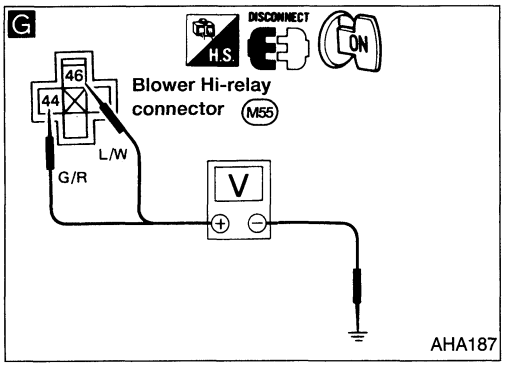
Replace blower motor.

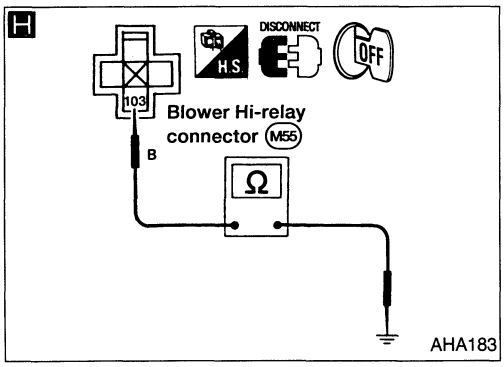
Ⓐ (Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 9 (Cont'd)







Ⓐ

Disconnect auto amp. and fan control amp. harness connector.

F — Note

Does continuity exist between auto amp. harness terminal No. ⑩ and fan control amp. harness terminal No. ⑩?

O.K.

G

CHECK POWER SUPPLY FOR BLOWER HI-RELAY.
Do approx. 12 volts exist between blower Hi-relay harness terminals No. ㊹, ㊻ and body ground?

N.G. → Check 10A or 20A fuses at fuse block.
Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING") and HA-92.

O.K.

H — Note

CHECK BODY GROUND CIRCUIT FOR BLOWER HI-RELAY.
Does continuity exist between blower Hi-relay harness terminal No. ⑩③ and body ground?

O.K.

CHECK BLOWER HI-RELAY AFTER DISCONNECTING IT.
(Refer to HA-66.)

N.G. → Replace blower Hi-relay.

O.K.

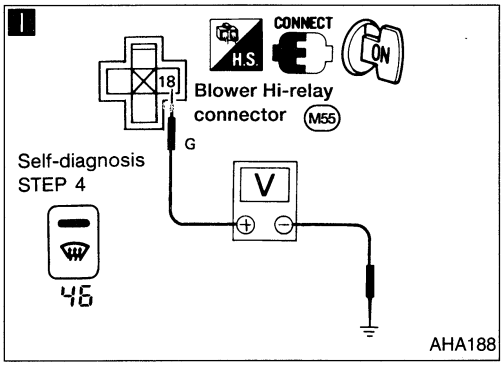
Reconnect blower Hi-relay.

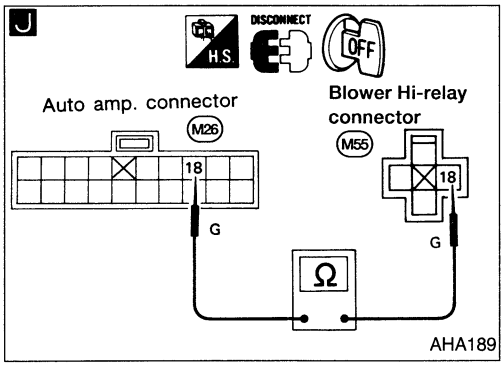
Ⓑ

(Go to next page.)

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 9 (Cont'd)





Ⓑ

I

CHECK FOR AUTO AMP. OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across blower Hi-relay harness terminal No. ⑱ and body ground.

Code No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
46	⑱	Body ground	Less than approx. 1.5V

N.G. → Disconnect blower Hi-relay and auto amp. harness connectors.

J

Note

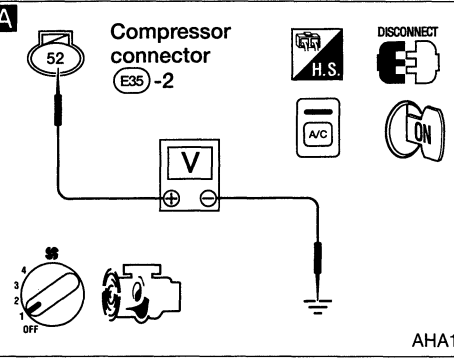
Does continuity exist between blower Hi-relay harness terminal No. ⑱ and auto amp. harness terminal No. ⑱?

O.K. → Replace auto amp.

O.K. → Replace blower motor.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

A



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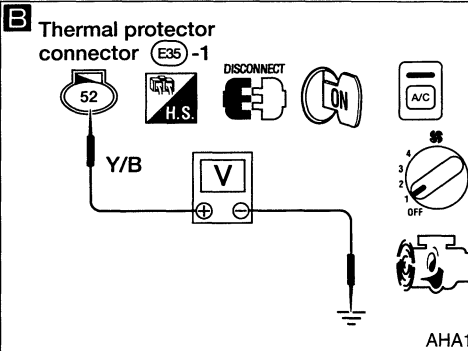

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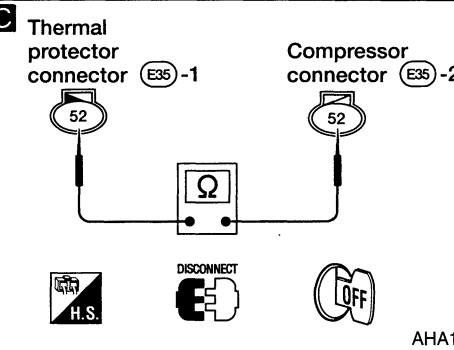

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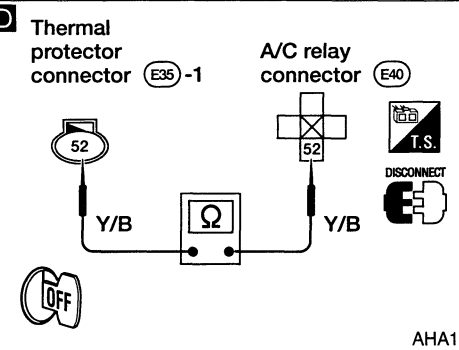


Diagnostic Procedure 10

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. (52) and body ground?

N.G. → B

O.K. ↓

Check magnet clutch.

N.G. ↓

Replace magnet clutch.
Refer to HA-21.

B

CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. (52) and body ground?

O.K. ↓ C

N.G. → (A)

C

CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. (52) and compressor harness terminal No. (52).

N.G. ↓

Replace thermal protector.

(A) ↓

Disconnect A/C relay harness connector.

D

Note

Check circuit continuity between A/C relay harness terminal No. (52) and thermal protector harness terminal No. (52).

O.K. ↓

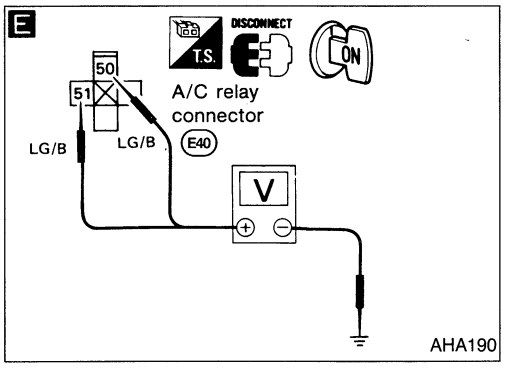
Turn ignition switch OFF to cancel Self-diagnosis STEP 4.

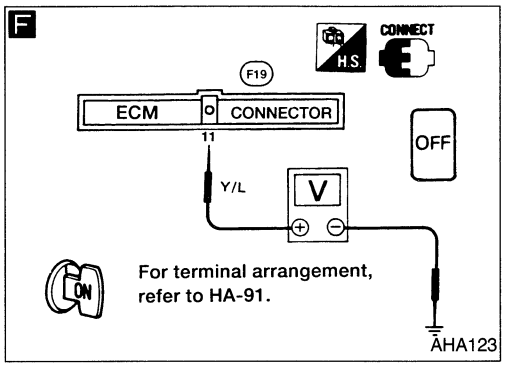
(B)

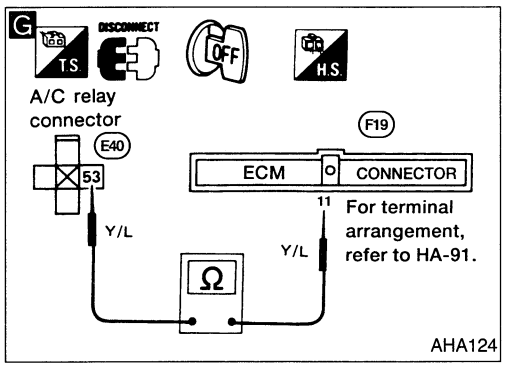
(Go to next page.)

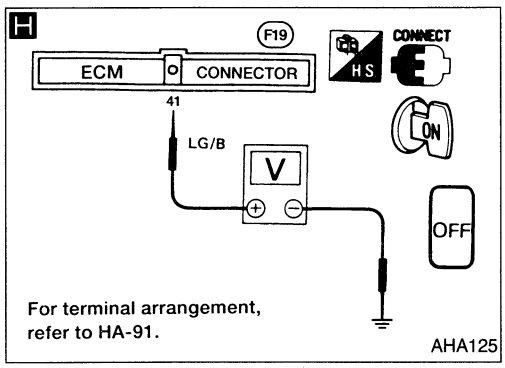
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 10 (Cont'd)









Ⓑ

E

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminals No. (50), (51) and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

O.K. ↓

CHECK A/C RELAY AFTER DISCONNECTING IT.
(Refer to HA-66.)

N.G. → Replace A/C relay.

O.K. ↓

Reconnect A/C relay.

Turn ignition switch ON and press OFF switch.

F

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. (11) and body ground?
(For terminal arrangement, refer to HA-91.)

O.K. ↓

N.G. → **G**

Note

Check circuit continuity between A/C relay harness terminal No. (53) and ECM (ECCS control module) harness terminal No. (11).
(For terminal arrangement, refer to HA-91.)

H

CHECK COIL SIDE CIRCUIT OF A/C RELAY CONTROLLED BY ECM (ECCS control module).
Do more than 8 volts exist between ECM (ECCS control module) harness terminal No. (41) and body ground?
(For terminal arrangement, refer to HA-91.)

N.G. → CHECK ECM (ECCS control module). (Refer to EF & EC section.)

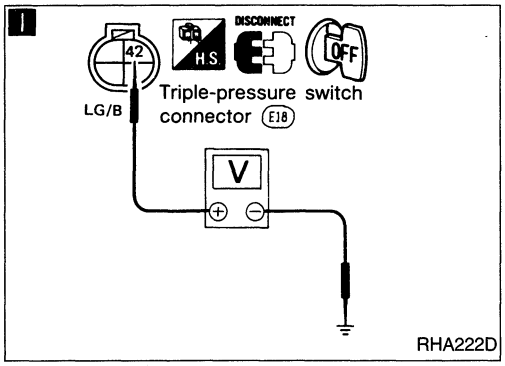
O.K. ↓

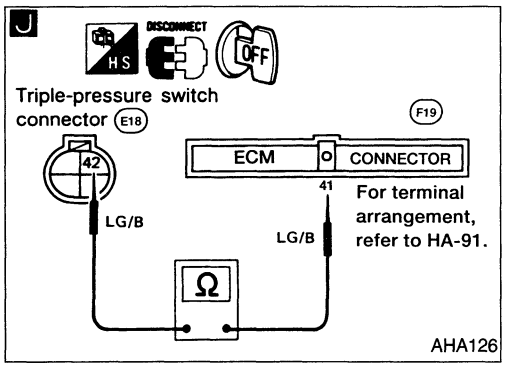
Ⓒ

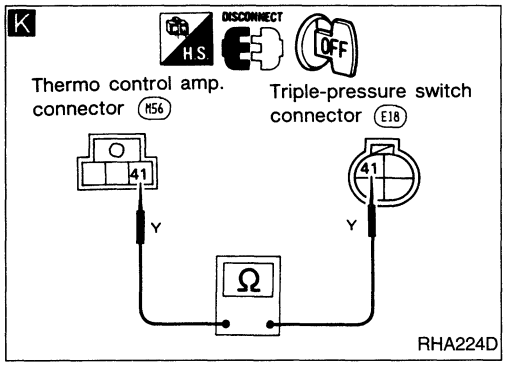
(Go to next page.)

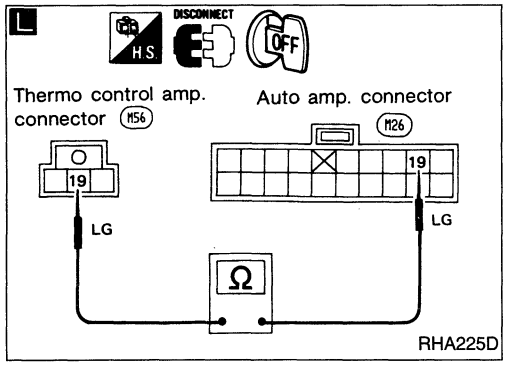
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 10 (Cont'd)









Ⓒ

I

CHECK TRIPLE-PRESSURE SWITCH CIRCUIT BETWEEN TRIPLE-PRESSURE SWITCH AND ECM (ECCS control module).
Disconnect triple-pressure switch harness connector.
Do more than 8 volts exist between triple-pressure switch harness terminal No. ㊷ and body ground?

N.G. → Disconnect ECM (ECCS control module) harness connector.

J Note

Check circuit continuity between ECM (ECCS control module) harness terminal No. ㊶ and triple-pressure switch harness terminal No. ㊷. (For terminal arrangement, refer to HA-91.)

O.K.

CHECK TRIPLE-PRESSURE SWITCH. (Refer to HA-66.)

N.G. → Replace triple-pressure switch.

O.K.

Disconnect thermo control amp. harness connector.

K Note

Check circuit continuity between thermo control amp. harness terminal No. ㊶ and triple-pressure switch harness terminal No. ㊶.

N.G. → CHECK THERMO CONTROL AMP. (Refer to HA-66.)

N.G. → Replace thermo control amp.

O.K.

Disconnect auto amp. harness connector.

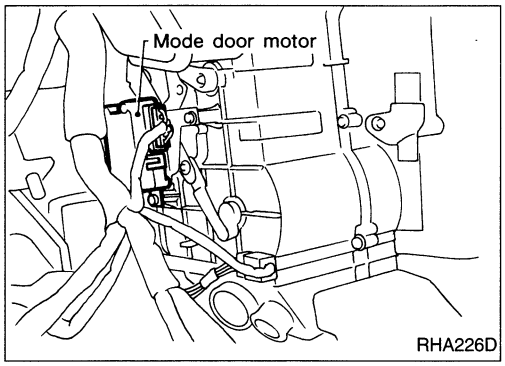
L Note

Check circuit continuity between auto amp. harness terminal No. ⑲ and thermo control amp. harness terminal No. ⑲.

O.K.

Replace auto amp.

Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

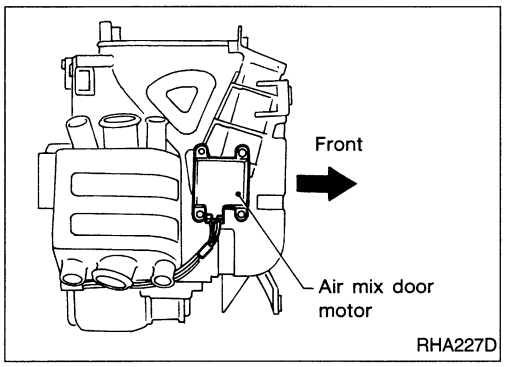


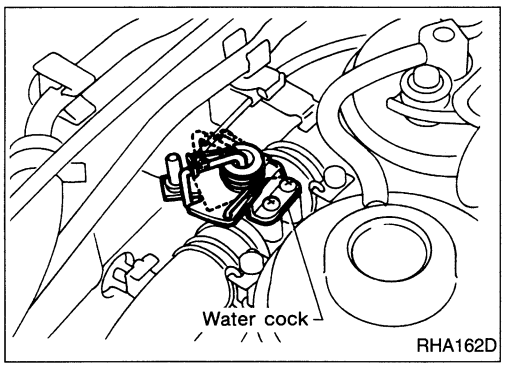
Control Linkage Adjustment

MODE DOOR

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. 46 in Self-diagnosis STEP 4.
3. Move side link by hand and hold mode door in DEF mode.
4. Attach mode door motor rod to side link rod holder.
5. Make sure mode door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
VENT	B/L	B/L	FOOT	F/D	DEF



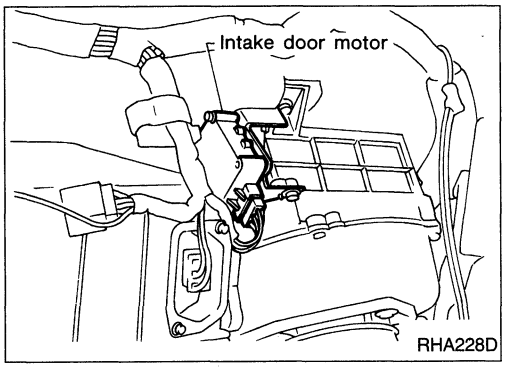


AIR MIX DOOR (Water cock)

1. Install air mix door motor on heater unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move air mix door lever by hand and hold it in full cold position.
4. Attach air mix door lever to rod holder.
5. Make sure air mix door and water cock operate properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
Full cold		Full hot			

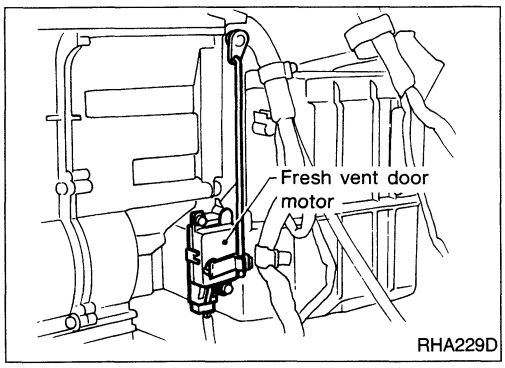
Control Linkage Adjustment (Cont'd)



INTAKE DOOR

1. Install intake door motor on intake unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move intake door link by hand and hold it in REC position.
4. Attach intake door lever to rod holder.
5. Make sure intake door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
REC		20% FRE	FRE		



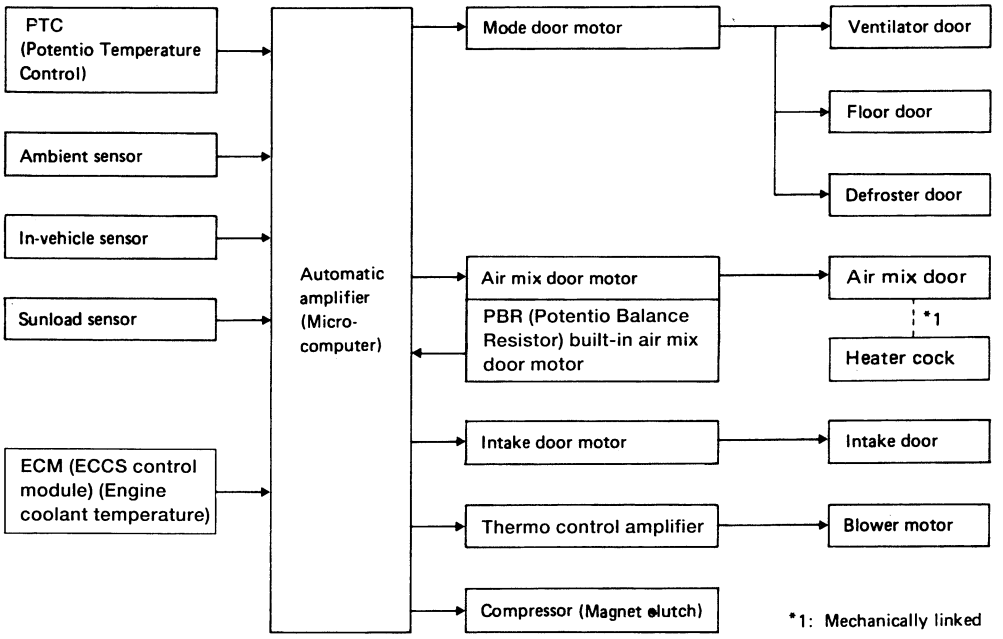
FRESH VENT DOOR

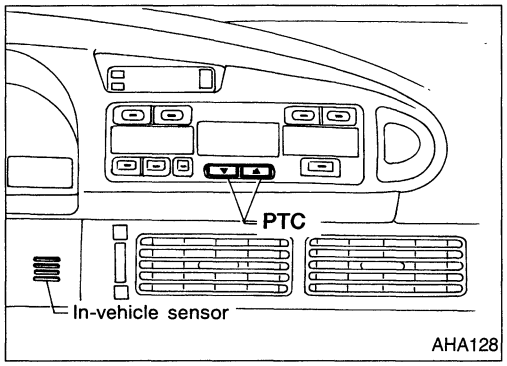
1. Install fresh vent door motor on heater unit and connect it to main harness.
2. Set up code No. 46 in self-diagnosis STEP 4.
3. Move fresh vent door link by hand and hold it in CLOSE position.
4. Attach fresh vent door lever to rod holder.
5. Make sure fresh vent door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
OPEN		CLOSE			

Overview of Control System

The control system consists of a) input sensors and switches, b) the automatic amplifier (microcomputer), and c) outputs. The relationship of these components is shown in the diagram below:





Control System Input Components

POTENTIO TEMPERATURE CONTROL (PTC)

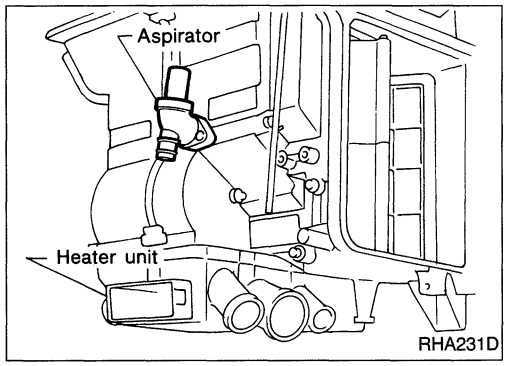
The PTC is built into the auto amplifier. It can be set at an interval of 1°C (2°F) through both ▲ (HOT) and ▼ (COLD) control switches. Setting temperature is digitally displayed.

IN-VEHICLE SENSOR

The in-vehicle sensor is attached to cluster lid-C. It converts variations in temperature of compartment air drawn from an aspirator into a resistance value which is then input into the auto amplifier.

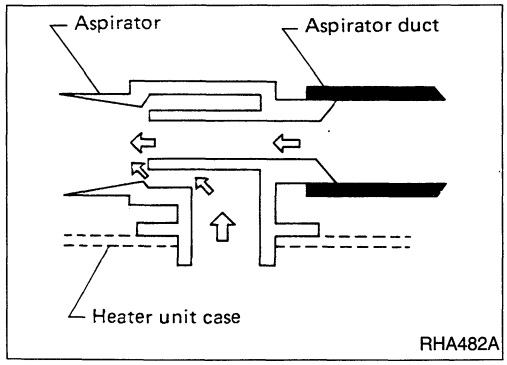
After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ㉕ and ㊾ at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

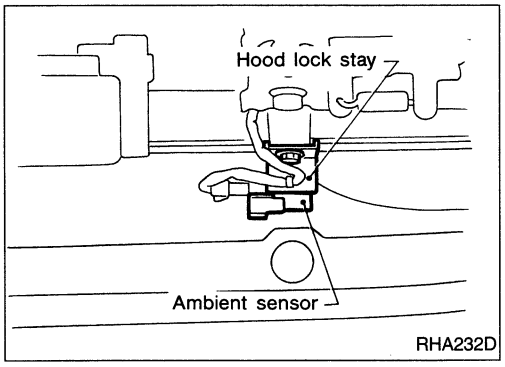


ASPIRATOR

The aspirator is located on heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.



Control System Input Components (Cont'd)

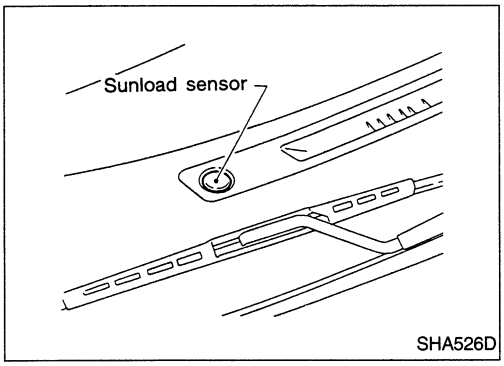


AMBIENT SENSOR

The ambient sensor is attached to hood lock stay. 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 ㉞ and ㊴ at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
−15 (5)	12.73
−10 (14)	9.92
−5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07



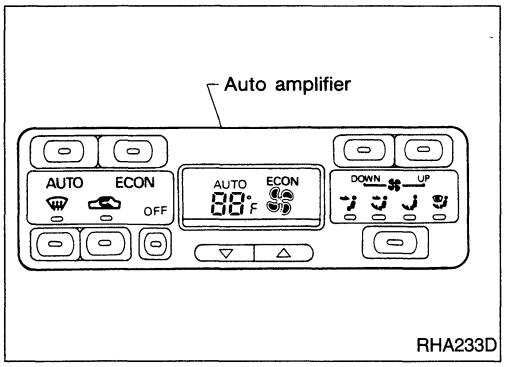
SUNLOAD SENSOR

The sunload sensor is located on the right defroster grille. It detects sunload entering through windshield by means of a photo diode and converts it into a current value which is then input to the auto amplifier.

Measure voltage between terminals ㉖ and ㊳ 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.**



Control System Automatic Amplifier (Auto amp.)

The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioning operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.
The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (PTC) are directly entered into auto amplifier.
Self-diagnostic functions are also built into auto amplifier to provide quick check of malfunctions in the auto air conditioning 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 0.2°C (0.4°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).

SUNLOAD INPUT PROCESS

The auto amp. also includes a processing circuit which "average" the variations in detected sunload over a period of time. This prevents drastic swings in the ATC system operation due to small or quick variations in detected sunload.
For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.

Control System Output Components

AIR MIX DOOR CONTROL (Automatic temperature control)

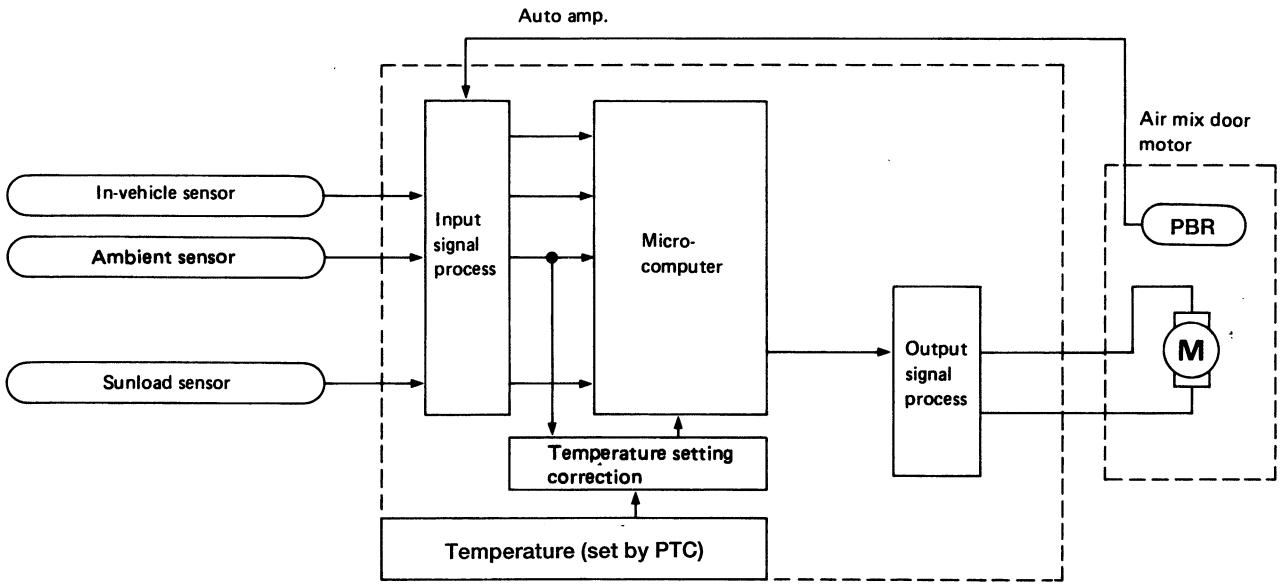
Component parts

Air mix door control system components are:
1) Auto amplifier
2) Air mix door motor (PBR)
3) In-vehicle sensor
4) Ambient sensor
5) Sunload sensor

System operation

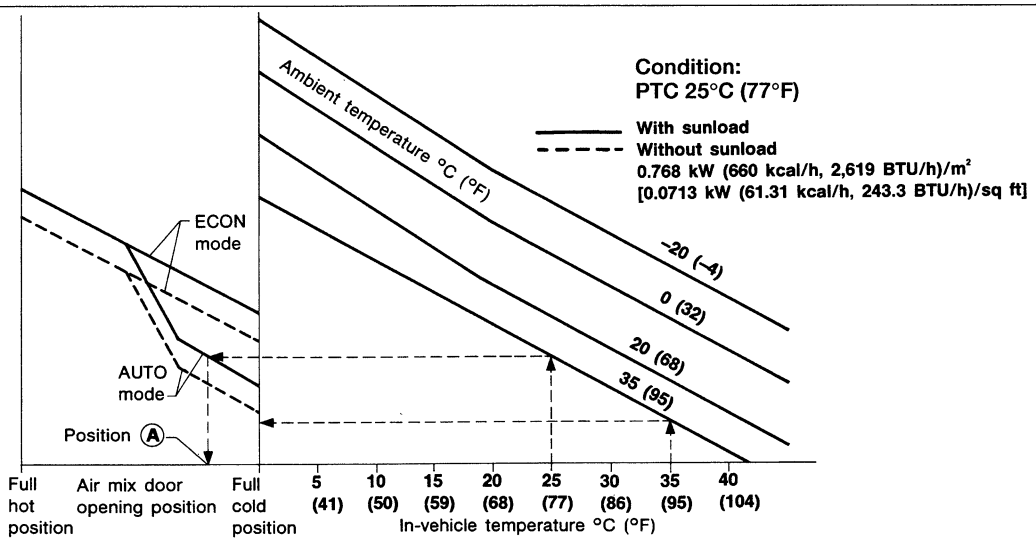
Temperature set by Potentio Temperature Control (PTC) is compensated through setting temperature correction circuit to determine target temperature.
Auto amplifier will operate air mix door motor to set air conditioning system in HOT or COLD position, depending upon relationship between conditions (target temperature, sunload, in-vehicle temperature and ambient temperature) and conditions (air mix door position and compressor operation).

Control System Output Components (Cont'd)



AHA129

Air mix door control specification



Example:

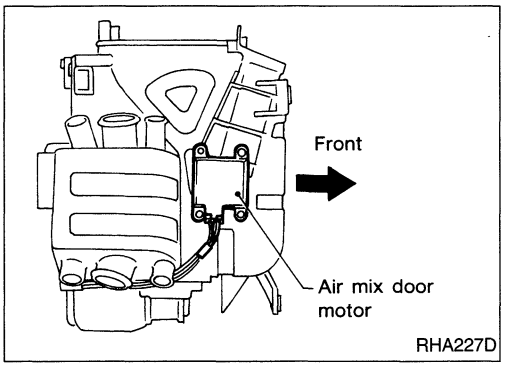
- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature is 35°C (95°F), air mix door is initially automatically set in full cold position.
- Within some period, in-vehicle temperature will lower towards the objective temperature, and the air mix door position will shift incrementally towards the hot side and finally stay in this position (A) if mode is at AUTO position (No. ECON mode).
  Air mix door opening position is always fed back to auto amplifier by PBR built-in air mix door motor.

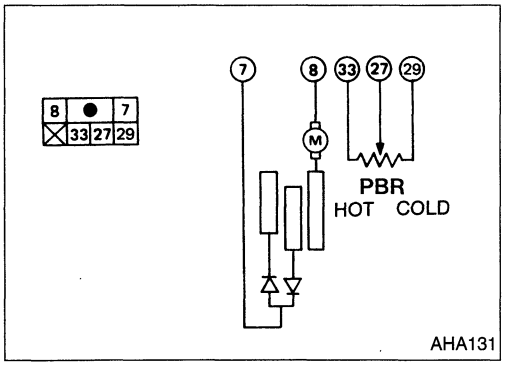
AHA130

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 PBR built-in air mix door motor.



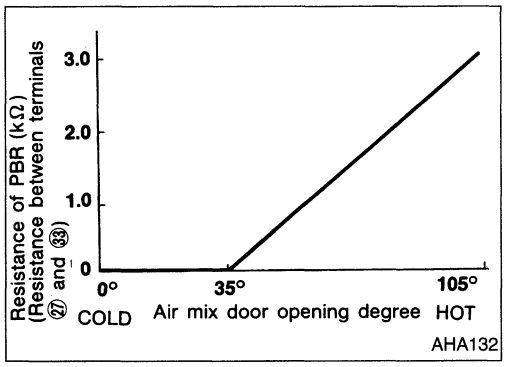


Air mix door operation

7	8	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Toward passenger compartment)
⊖	⊖	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Toward engine compartment)

PBR

Measure voltage between terminals ㉗ and ㉝ at vehicle harness side.



PBR characteristics

Control System Output Components (Cont'd)

OUTLET DOOR CONTROL

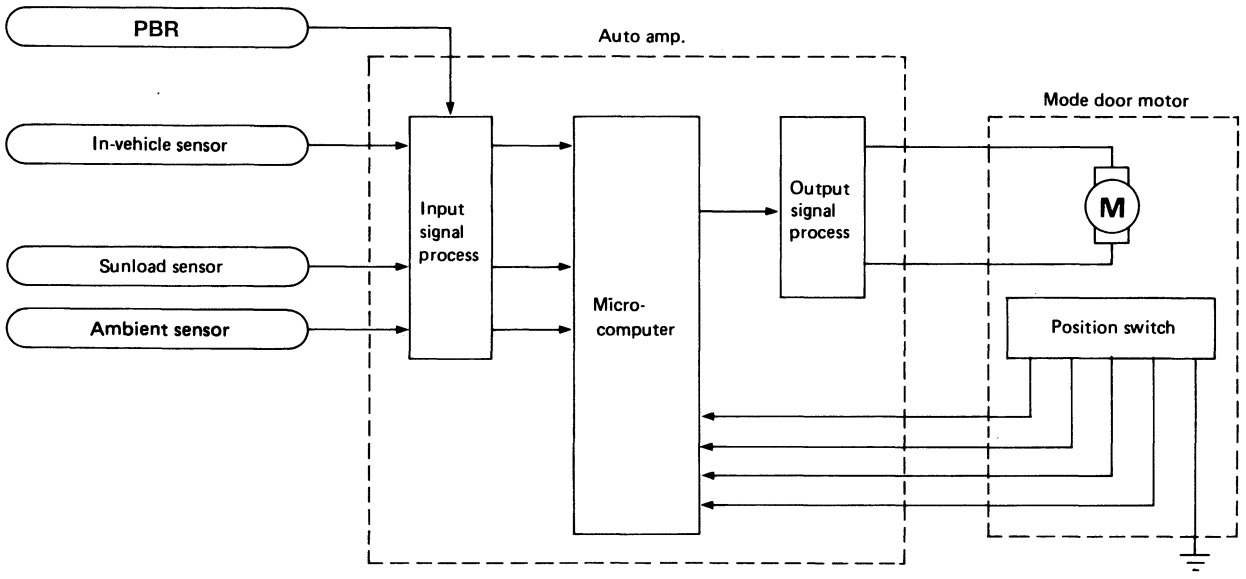
Component parts

Outlet door control system components are:

1) Auto amplifier
2) Mode door motor
3) PBR
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor

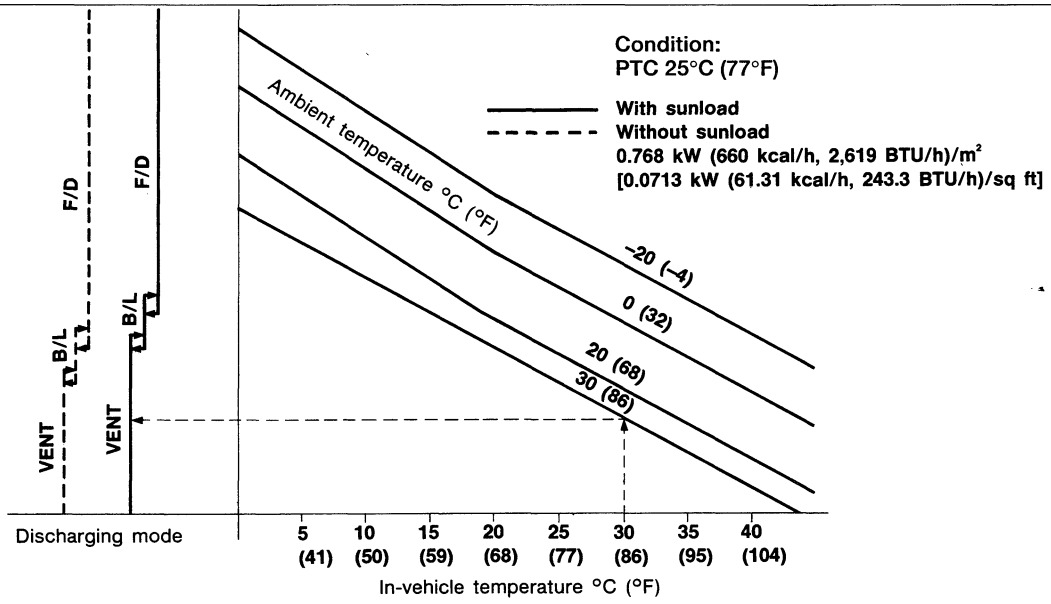
System operation

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 the air outlets through which air is discharged into the passenger compartment.



AHA133

Outlet door control specification

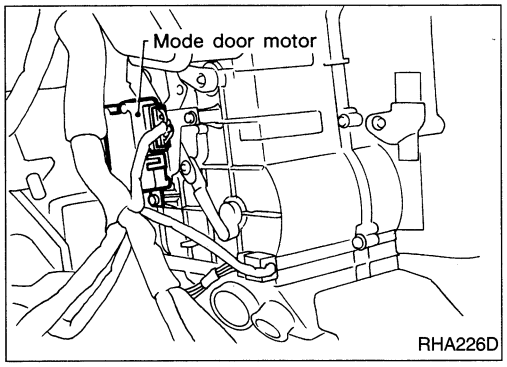


Example:

- **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.**

AHA134

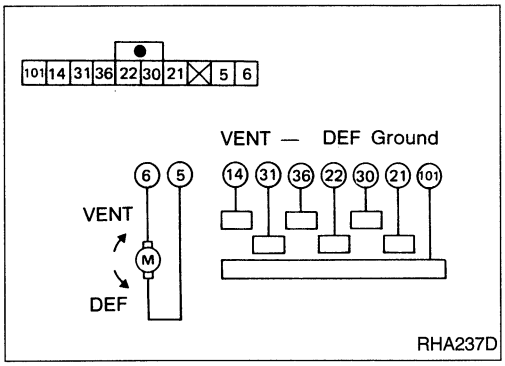
Control System Output Components (Cont'd)



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.

6	5	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Clockwise
⊖	⊖	STOP	STOP
⊖	⊕	DEF → VENT	Counterclockwise



INTAKE DOOR CONTROL

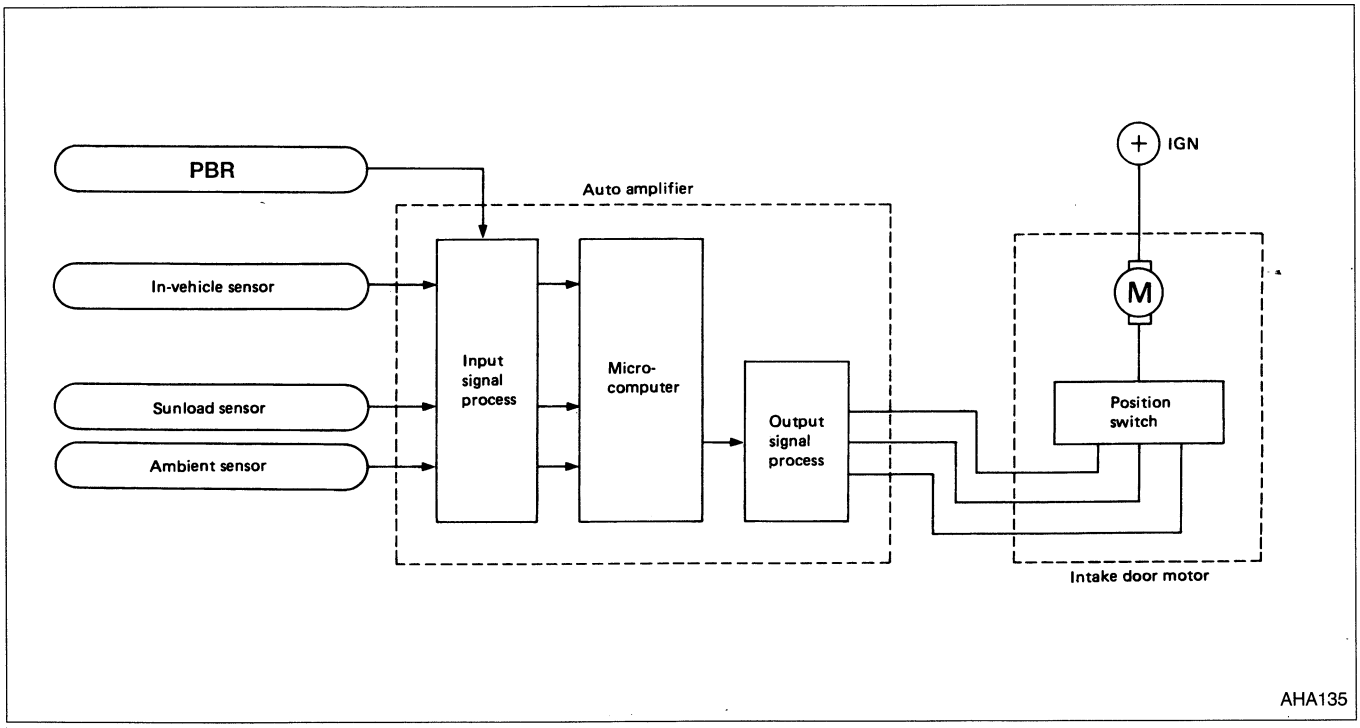
Components parts

Intake door control system components are:

1) Auto amplifier
2) Intake door motor
3) PBR
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor

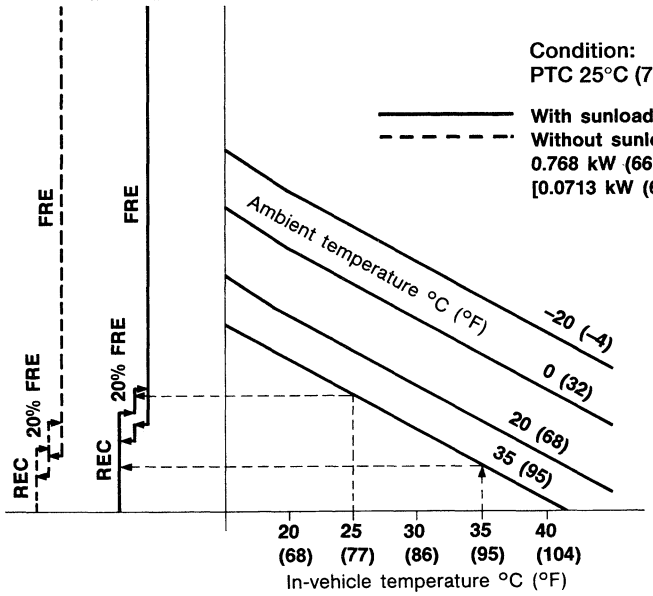
System operation

The intake door control determines intake door position based on the ambient temperature and the in-vehicle temperature. When the ECON, DEF, or OFF buttons are pushed, the auto amplifier sets the intake door at the "Fresh" position.



Control System Output Components (Cont'd)

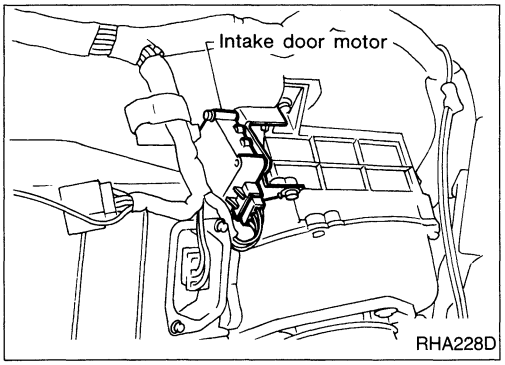
Intake door control specification

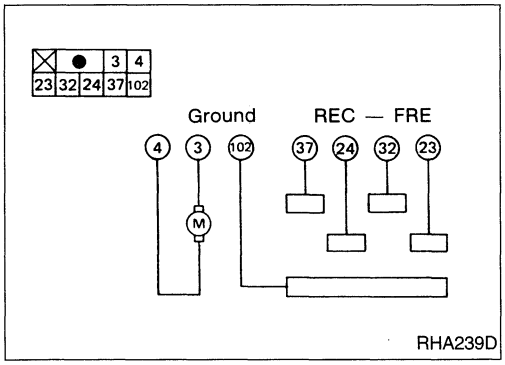


Example:

- **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 25°C (77°F) is reached, intake door will shift to 20% FRE position.**

AHA136





INTAKE DOOR MOTOR

The intake door motor is attached to the heater 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

3	4	Intake door operation	Movement of link rotation
⊕	⊖	REC → FRE	Clockwise
⊖	⊖	STOP	STOP
⊖	⊕	FRE → REC	Counterclockwise

Control System Output Components (Cont'd)

FAN SPEED CONTROL

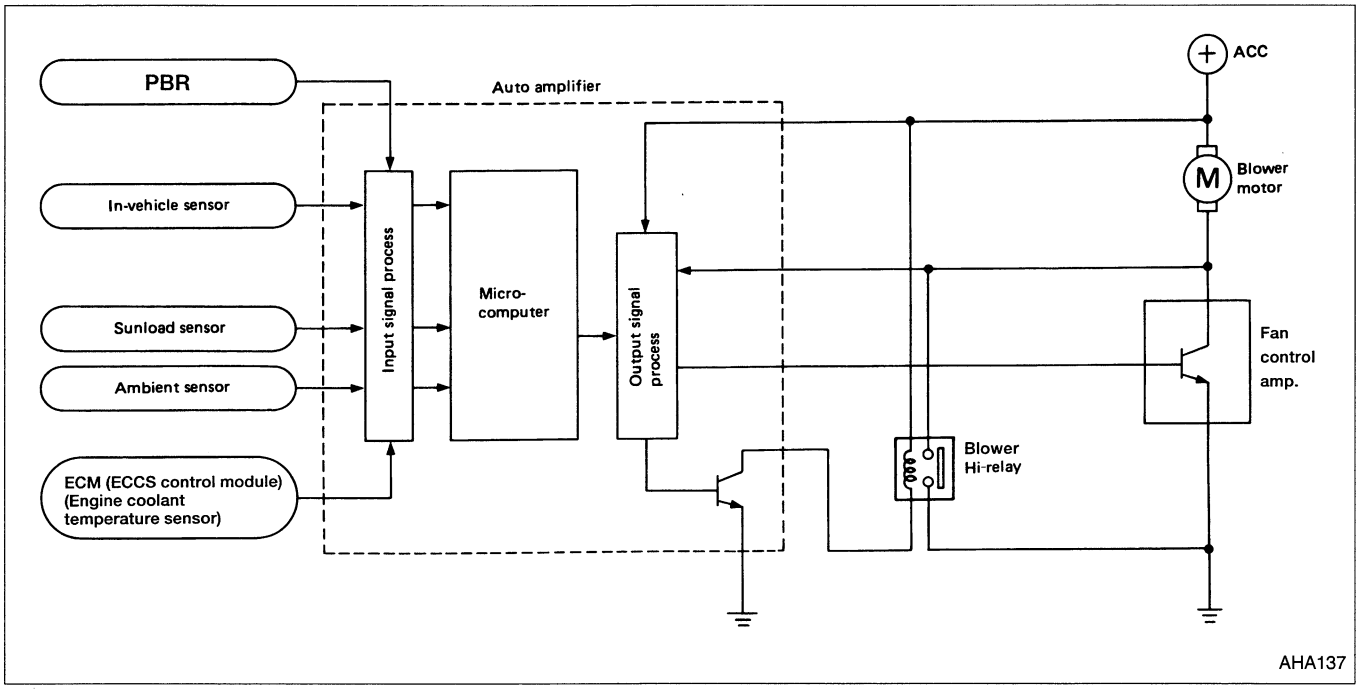
Component parts

Fan speed control system components are:
1) Auto amplifier
2) Fan control amplifier
3) PBR
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Blower Hi-relay
8) ECM (ECCS control module) (Engine coolant temperature sensor)

System operation

AUTOMATIC MODE

In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the PBR, in-vehicle sensor, sunload sensor, and ambient sensor. The blower motor applied voltage ranges from approximately 4.5 volts (lowest speed) to 12 volts (highest speed).
To control blower speed (in the range of 4.5V to 10.5V), the automatic amplifier supplies a signal to the thermo control amplifier. Based on this signal, the thermo control amplifier controls the current flow from the blower motor to ground. If the computed blower voltage (from the 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 blower amplifier), and the blower motor operates at high speed.



STARTING FAN SPEED CONTROL

Start up from "COLD SOAK" condition (Automatic mode)

In a cold start up condition where the engine coolant temperature is below 50°C (122°F), the blower will not operate for a short period of time (up to 180 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.
In the most extreme case (very low ambient) the blower starting delay will be 180 seconds. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 50°C (122°F), at which time the blower speed will increase to the objective speed.

Start up from normal or "HOT SOAK" condition (Automatic mode)

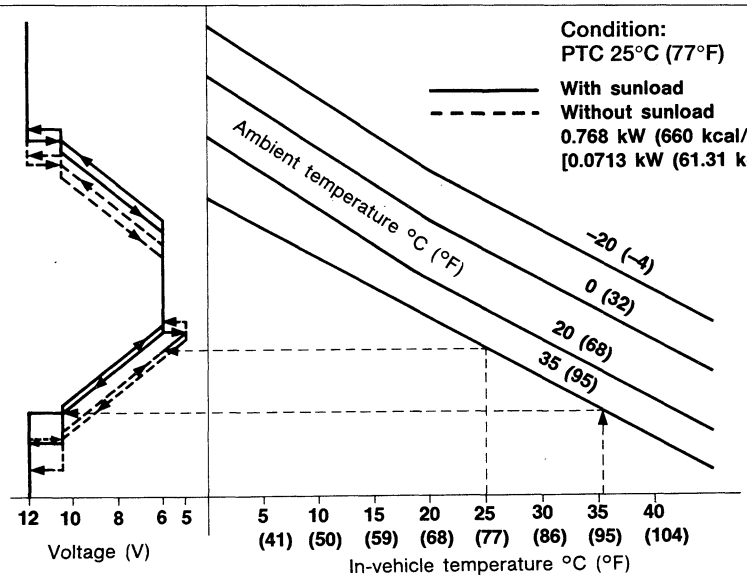
The blower will begin operation momentarily after the AUTO button is pushed. The blower speed will gradually rise to the objective speed over a time period of 5 seconds or less (actual time depends on the objective blower speed).

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. 5.5V). During low or no sunload conditions, the low speed will drop to "low" low speed (approx. 4.5V).

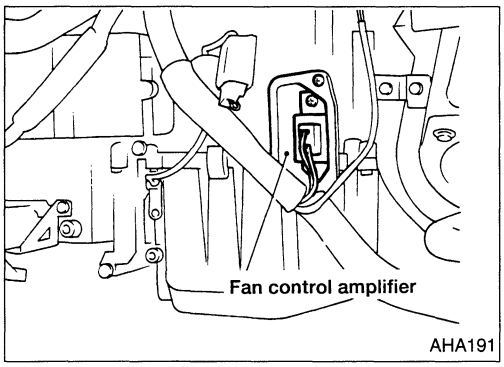
Fan speed control specification



Example:

- **If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature is 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.**

AHA138

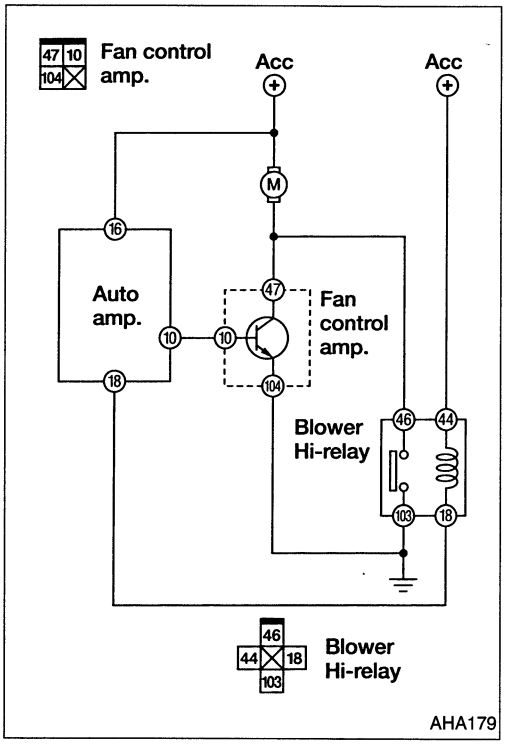


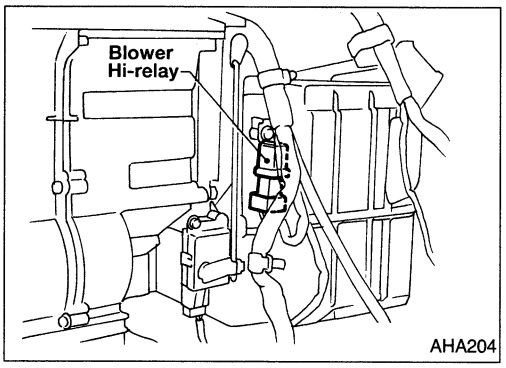
AHA191

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 the blower speed within the range of 5V to 10.5V. Above 10.5 volts, the high relay applies a direct ground to the blower motor.

Control System Output Components (Cont'd)



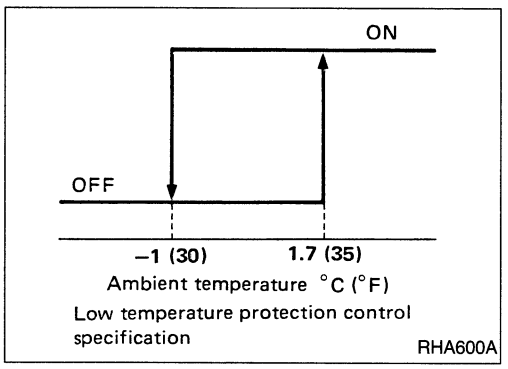


BLOWER HI-RELAY

The blower Hi-relay is located on the intake unit. It receives a signal from the auto amplifier to operate the blower motor at high speed.

MAGNET CLUTCH CONTROL

The ECM (ECCS control module) controls compressor operation using inputs from the throttle position sensor and auto amplifier.



Low temperature protection control

The auto amplifier will signal the ECM (ECCS control module) to turn the compressor "ON" or "OFF" based on the signal supplied to the auto amplifier by the ambient temperature sensor.

Acceleration cut control

The ECM (ECCS control module) will turn the compressor "ON" or "OFF" based on the signal from the throttle position sensor.

General Specifications

COMPRESSOR

Model	DKV-14C
Type	Vane rotary
Displacement cm^3 (cu in)/Rev	140 (8.54)
Direction of rotation	Clockwise (Viewed from drive end)
Drive belt	Poly V type

LUBRICATION OIL

Model	ZEXEL make DKV-14C
Name	Nissan A/C System Oil Type R
Part No.	KLH00-RAGR0
Capacity mℓ (US fl oz, Imp fl oz)	
Total in system	200 (6.8, 7.0)
Compressor (Service part) charging amount	200 (6.8, 7.0)

REFRIGERANT

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.70 - 0.80 (1.54 - 1.76)

Inspection and Adjustment

ENGINE IDLING SPEED

When A/C is ON

- **Refer to EF & EC section ("Inspection and Adjustments", "SERVICE DATA AND SPECIFICATIONS").**

BELT TENSION

- **Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").**

COMPRESSOR

Model	DKV-14C
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)

SECTION EL

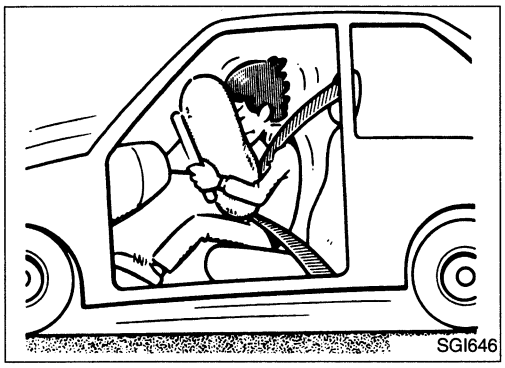
CONTENTS

CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**

WIRING DIAGRAM REFERENCE CHART


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 control module, 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 NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

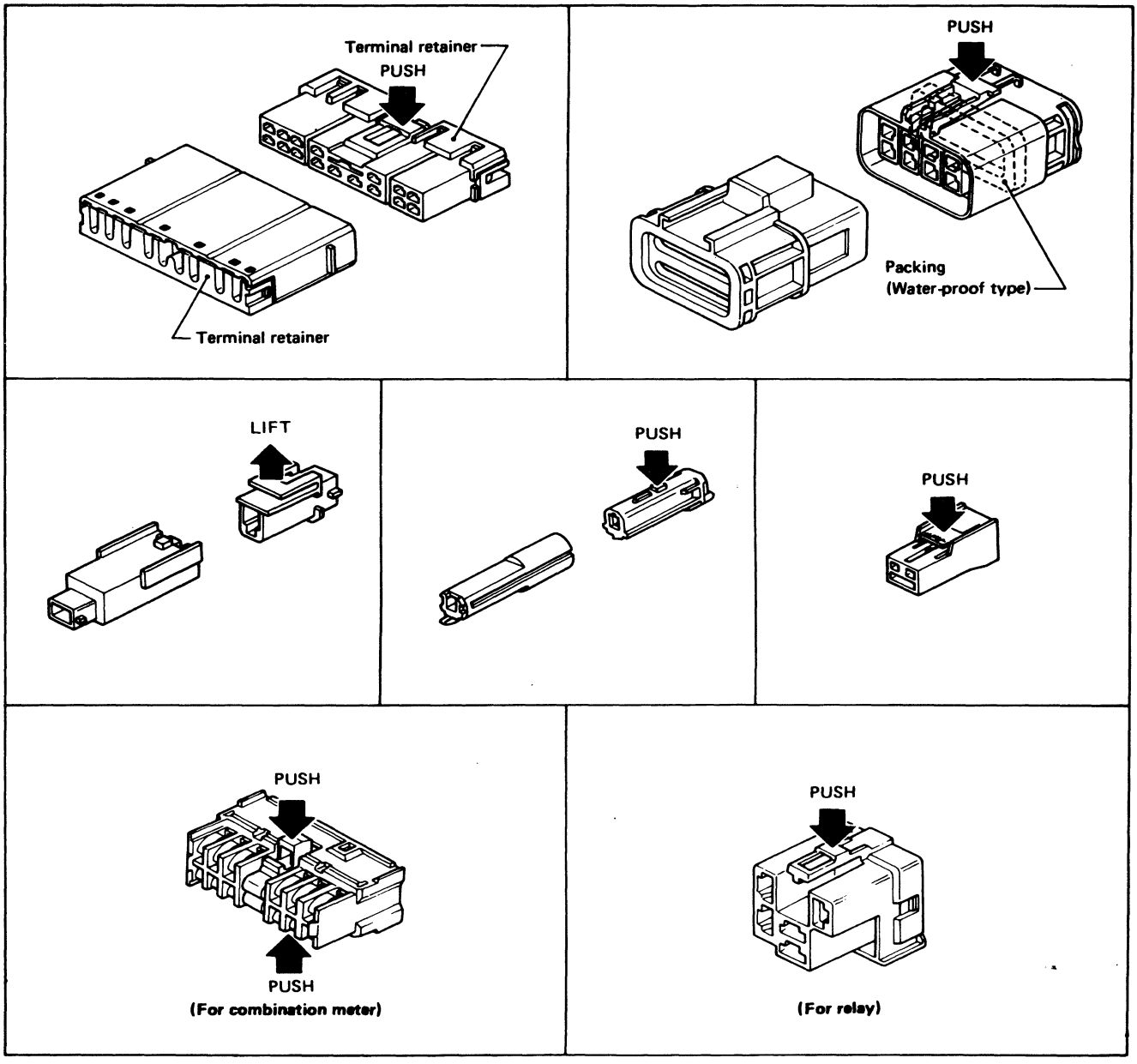
Description

HARNESS CONNECTOR

- The connector can be disconnected by pushing or lifting the locking section.

CAUTION:
Do not pull the harness when disconnecting the connector.

[Example]

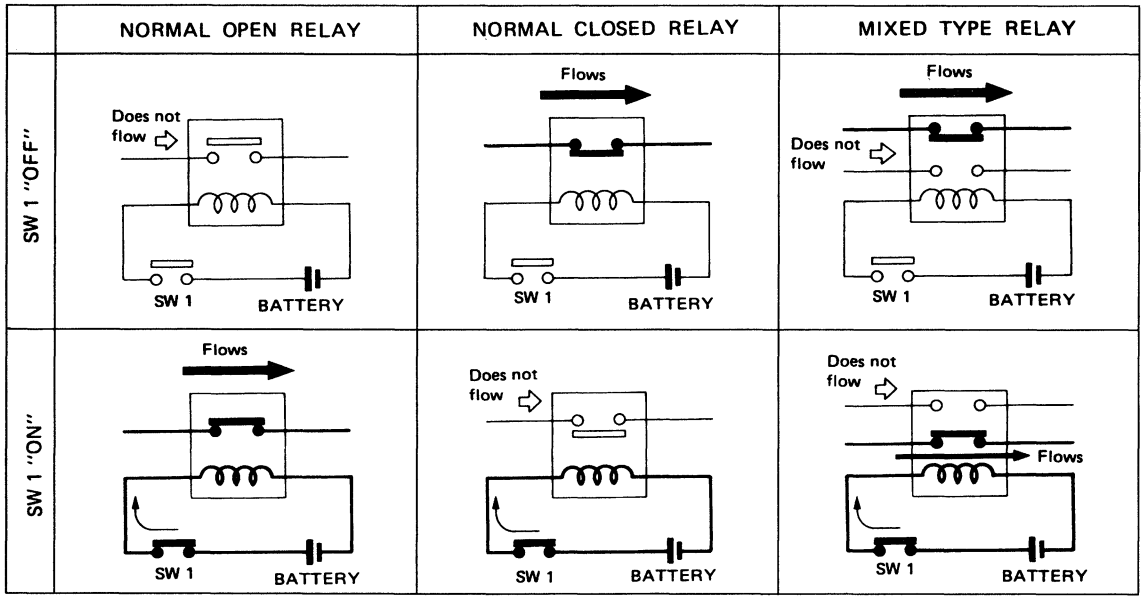


SEL769D

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

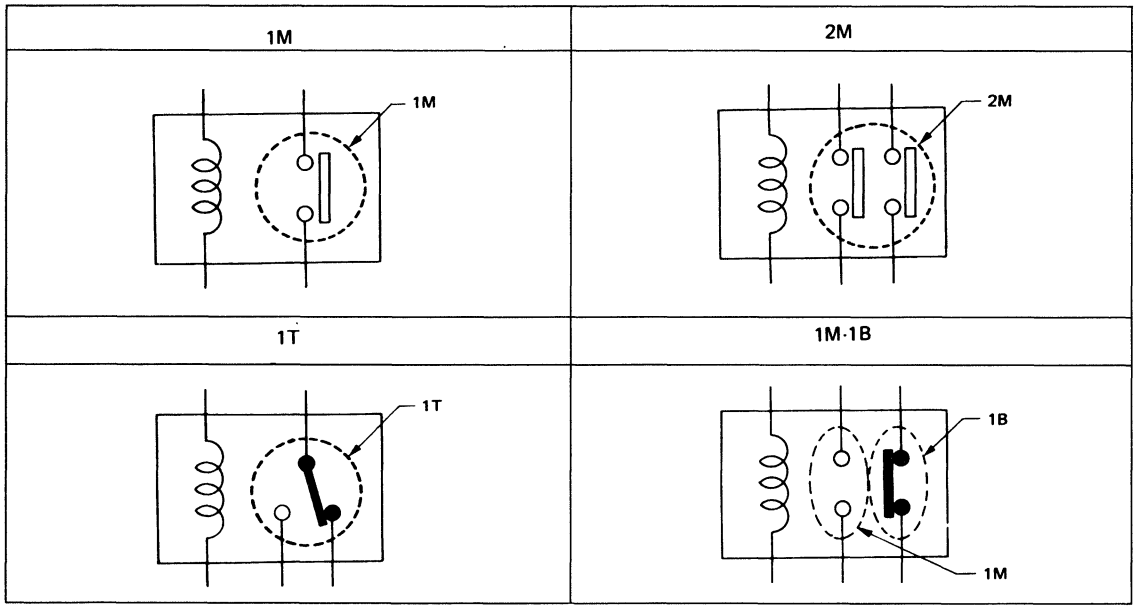
Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



SEL881H

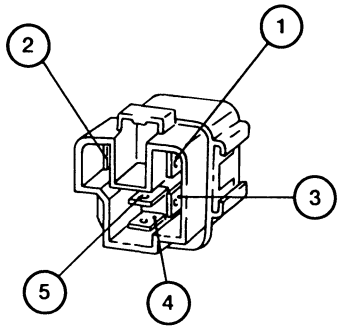
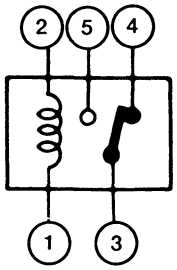
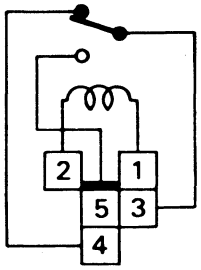
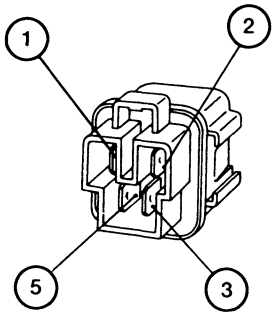
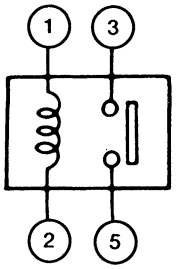
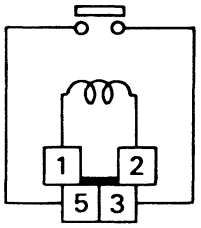
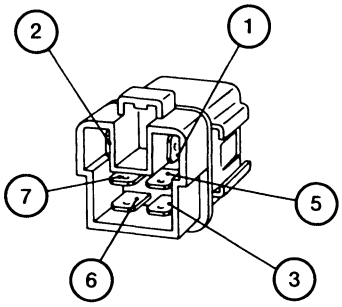
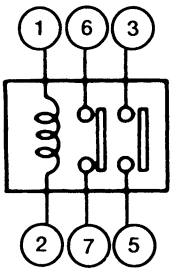
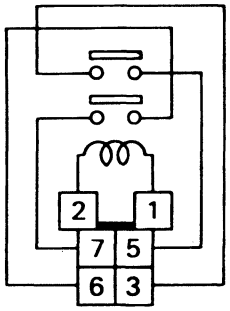
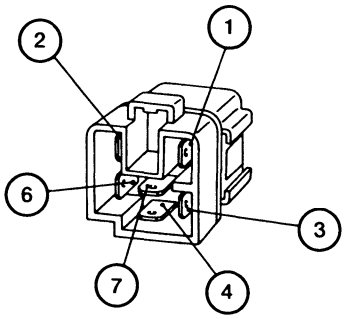
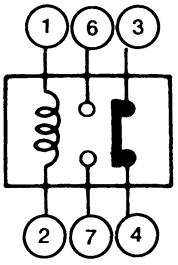
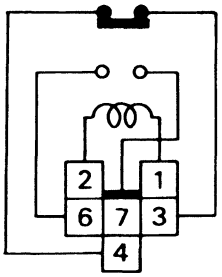
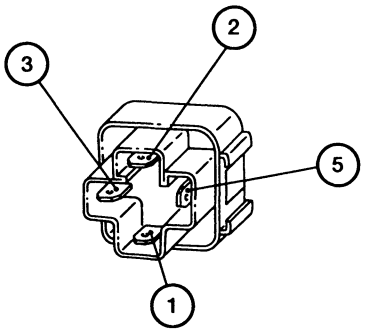
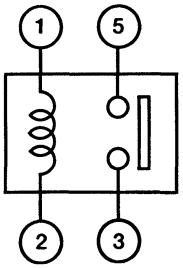
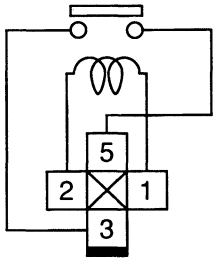
TYPE OF STANDARDIZED RELAYS

1M	1 Make	2M	2 Make
1T	1 Transfer	1M•1B	1Make 1 Break



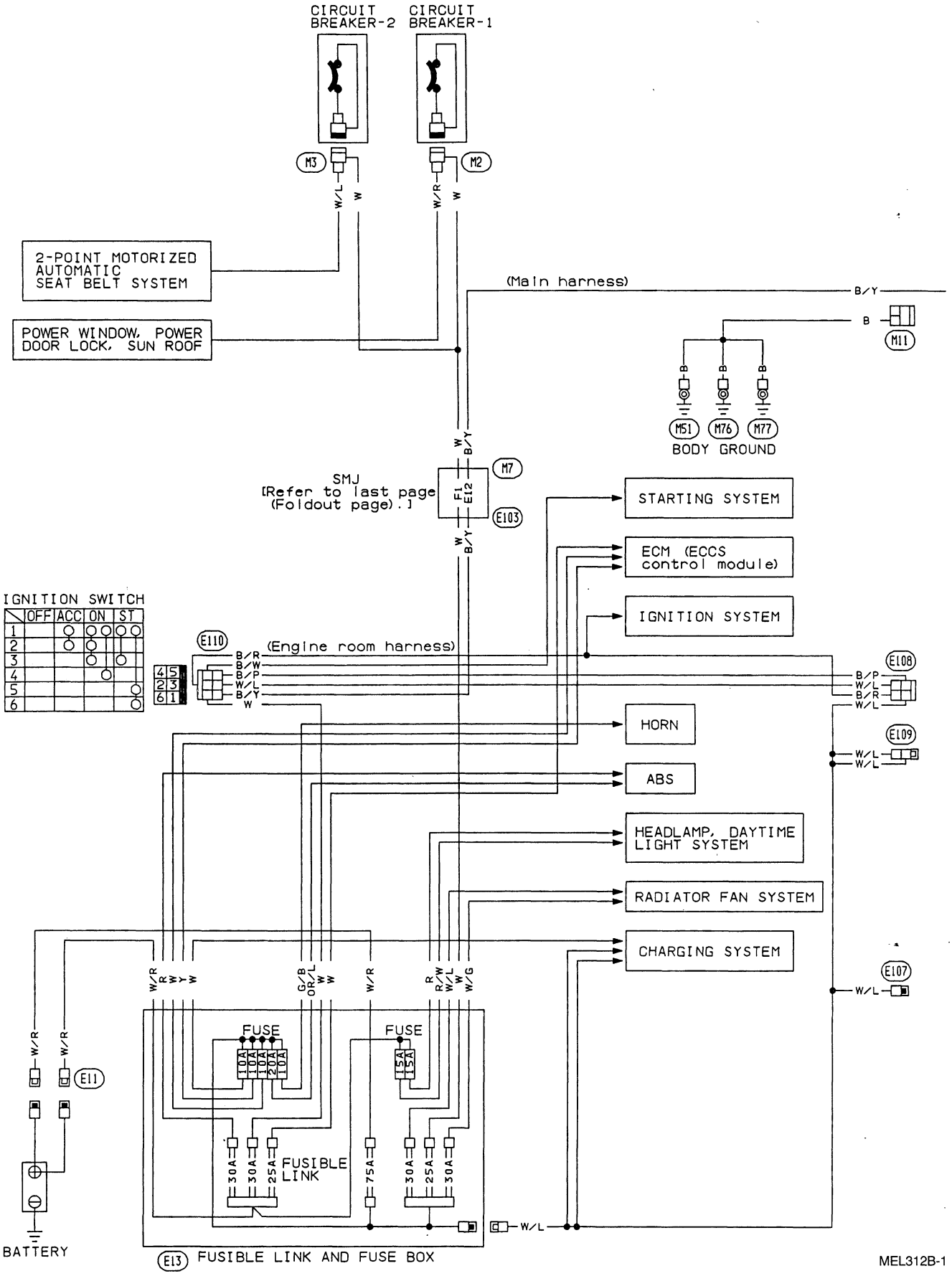
SEL882H

Description (Cont'd)

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE, GREEN or YELLOW
2M				BROWN
1M·1B				GRAY
1M				BLUE

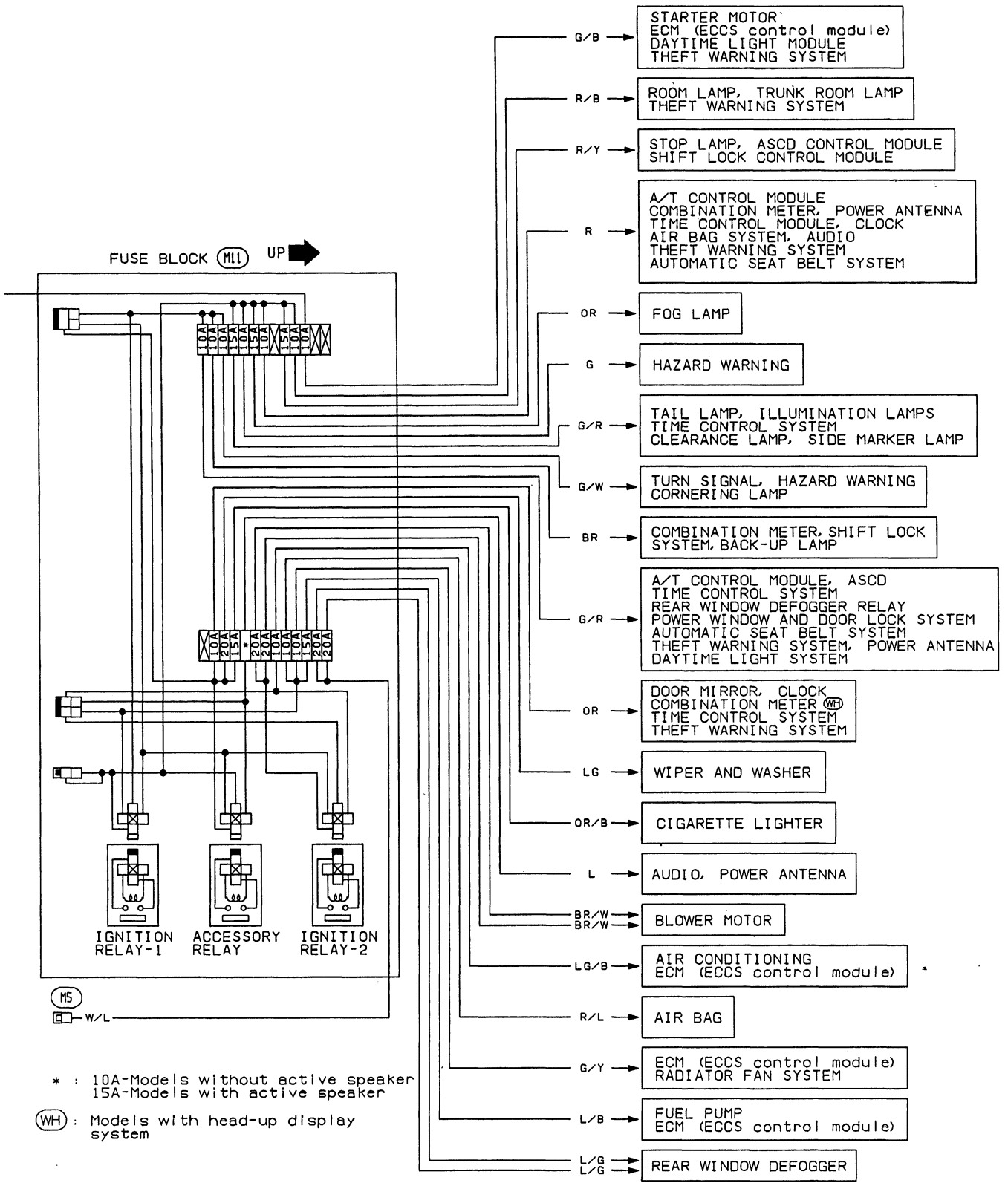
AEL227

Wiring Diagram

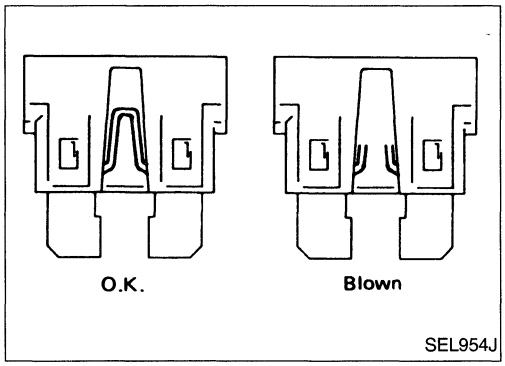


MEL312B-1

Wiring Diagram (Cont'd)

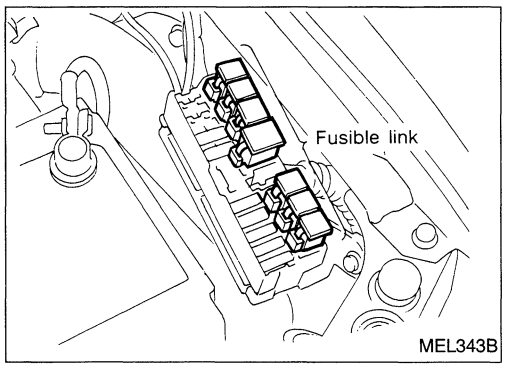


MEL312B



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 partially install fuse; 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

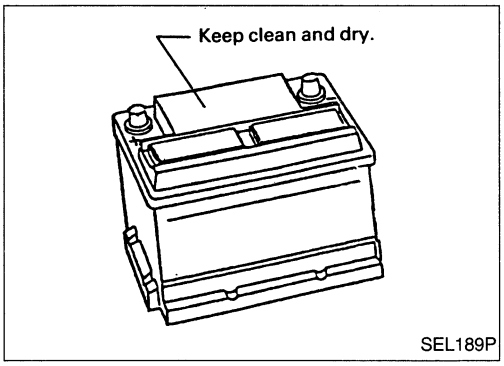
A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

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 outside 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.**

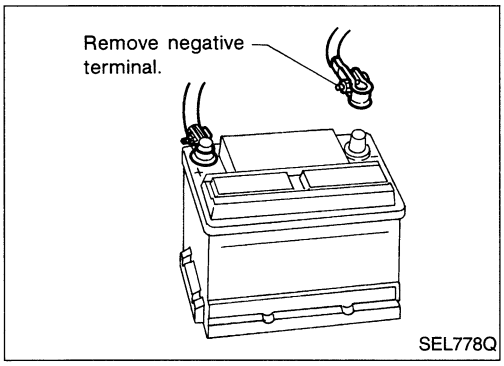


How to Handle Battery

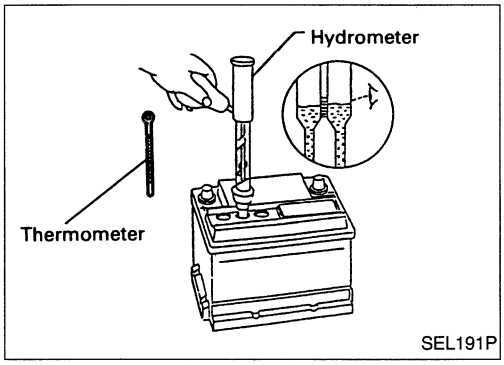
METHODS OF PREVENTING DISCHARGE

The following precautions must be taken to prevent battery discharge.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- **During every routine maintenance, check the electrolyte level.**
  This also applies to batteries designated as "low maintenance" and "maintenance-free".



- 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 condition of the battery by checking the specific gravity of the electrolyte.

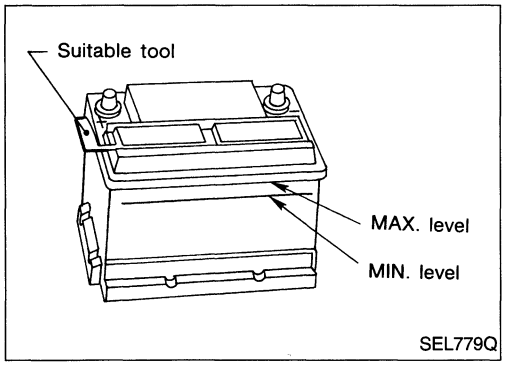
How to Handle Battery (Cont'd)

CHECKING ELECTROLYTE LEVEL

WARNING:

Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If the acid contacts the eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

Normally the battery does not require additional water. However, when the battery is used under severe conditions, adding distilled water may be necessary during the battery life.

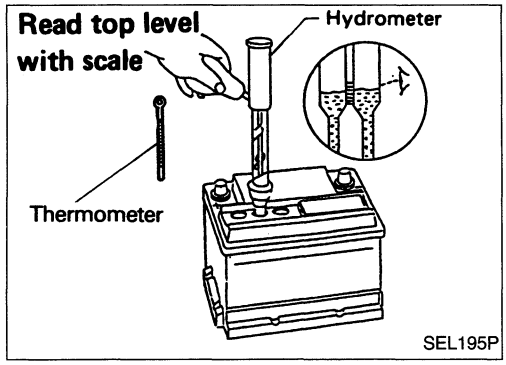


- Remove the vent cap using a suitable tool.
- Add distilled water up to the MAX level.

SULPHATION

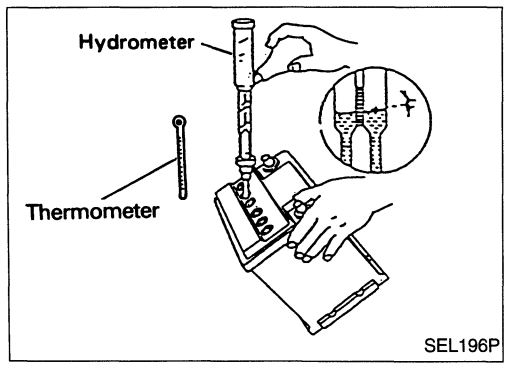
When a battery has been left unattended for a long period of time and has a specific gravity of less than 1.100, it will be completely discharged, resulting in sulphation on the cell plates.

A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.



SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.



- When electrolyte level is too low, tilt battery case to raise it for easy measurement.

How to Handle Battery (Cont'd)

- 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

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

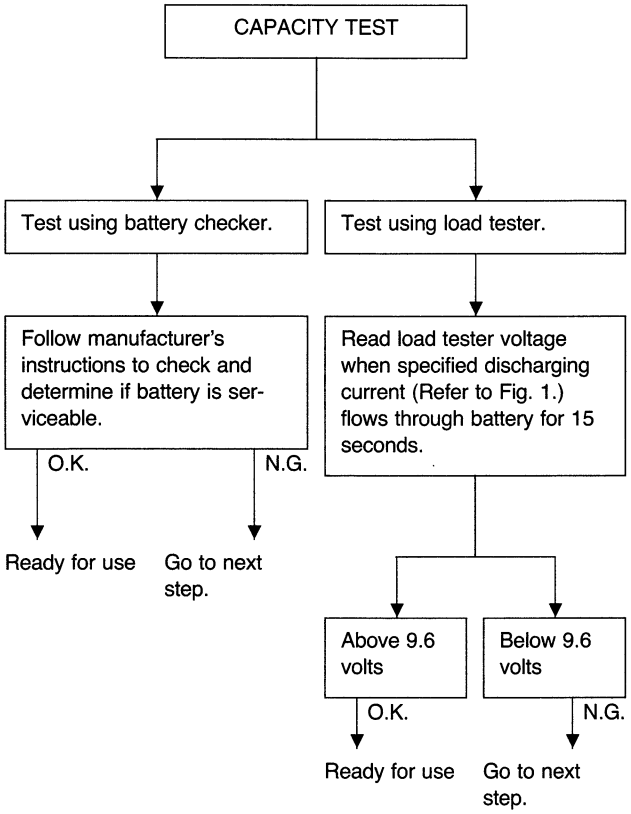
How to Handle Battery (Cont'd)

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.
- After the battery is charged, always perform a "capacity test" as follows, to assure that the battery is serviceable.

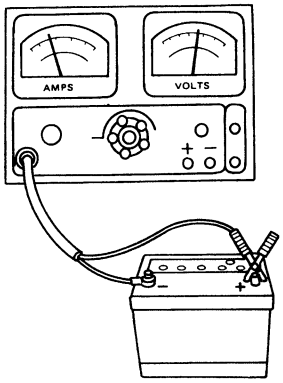
How to Handle Battery (Cont'd)



- Check battery type and determine the specified current using the following table.

Fig. 1 DISCHARGING CURRENT (Load tester)

Type	Current (A)
35	225
24R	260



SEL008Z

Voltage chart

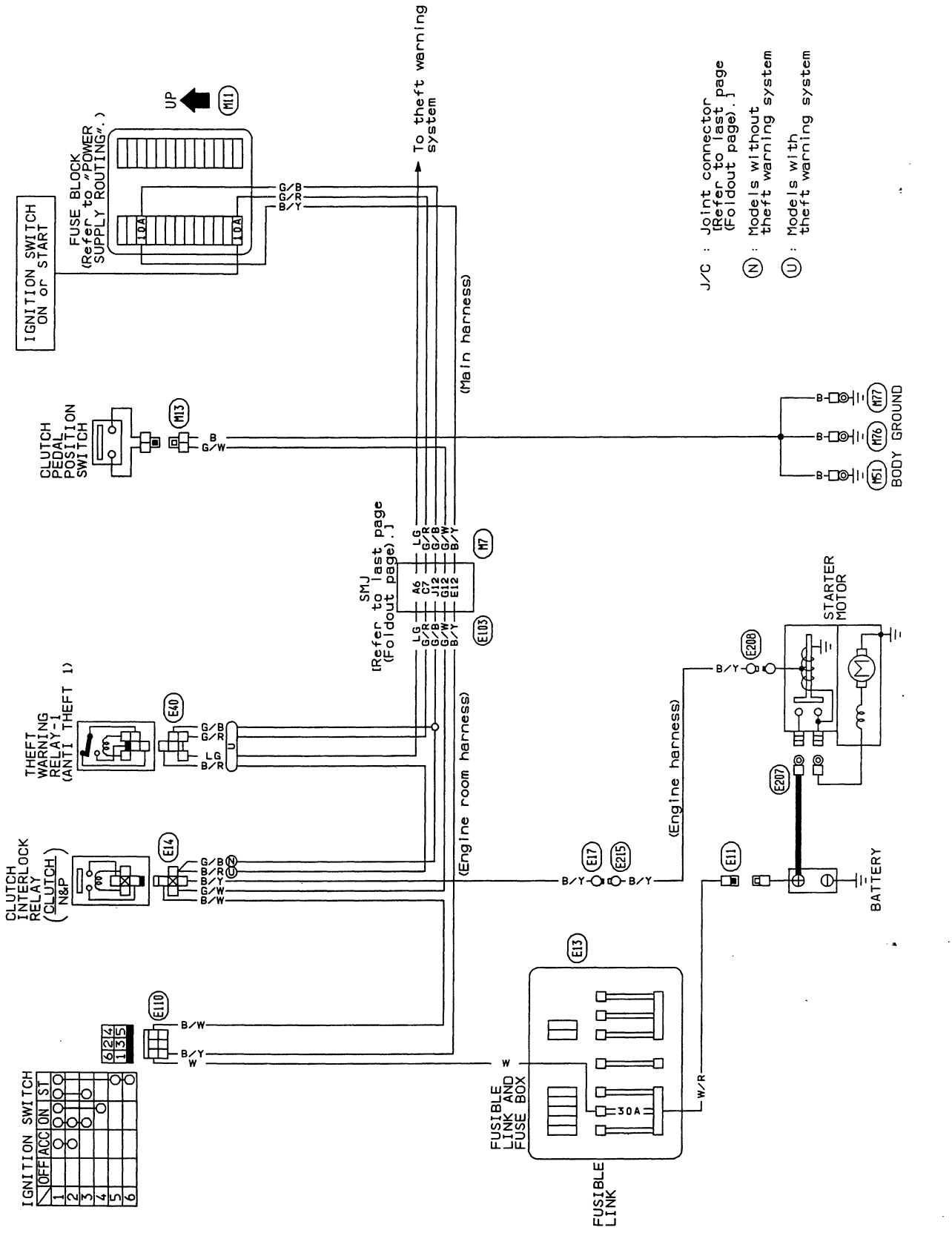
Estimated electrolyte temperature °C (°F)	Minimum voltage under 15 second load
21 (70)	9.6
16 (60)	9.5
10 (50)	9.4
4 (40)	9.3
−1 (30)	9.1
−7 (20)	8.9
−12 (10)	8.7
−18 (0)	8.5

Service Data and Specifications (SDS)

Applied model	USA	USA option and Canada
Type	35	24R
Capacity V-AH	12-48	12-55

Wiring Diagram

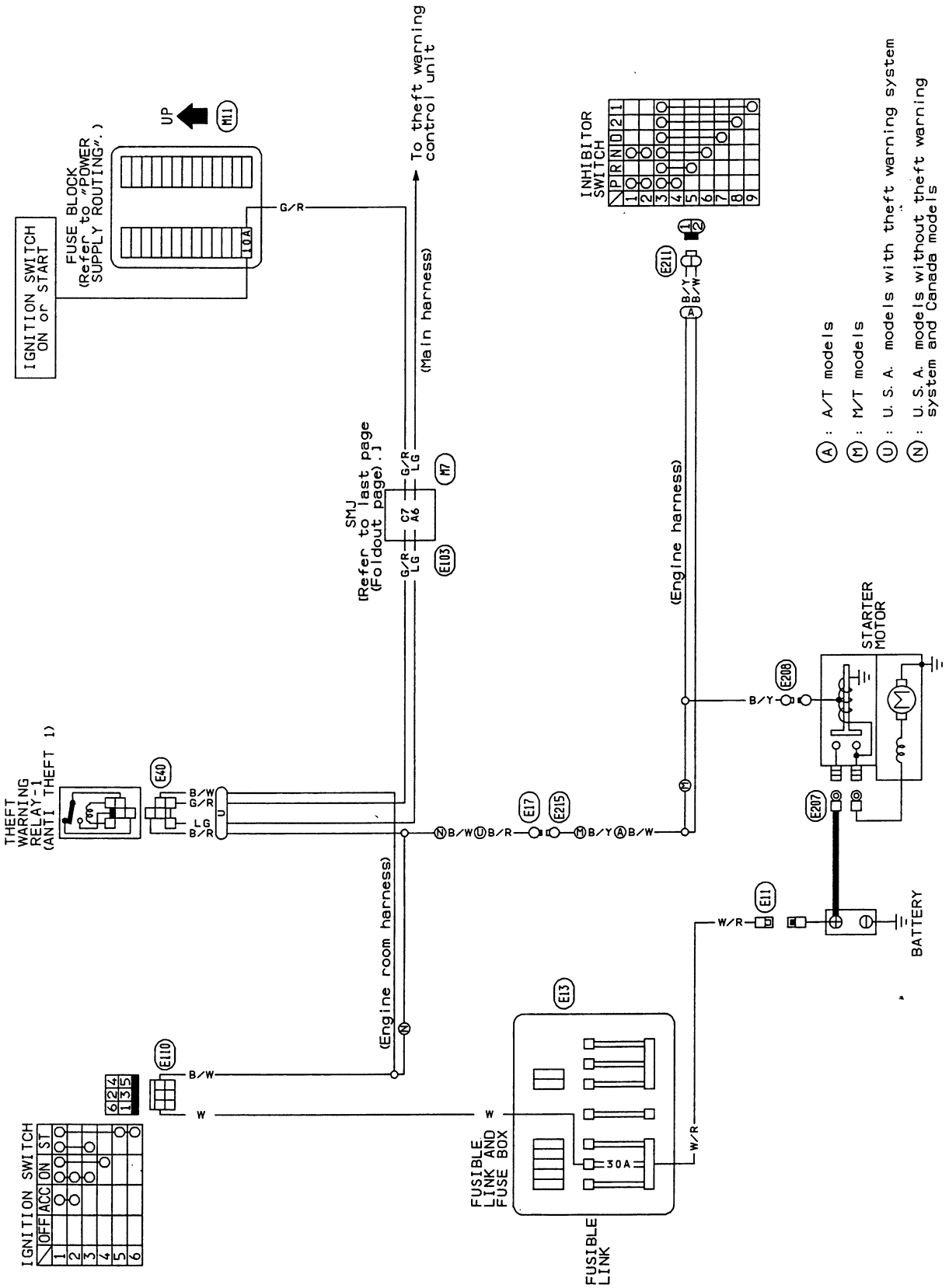
M/T models for USA



MEL313B

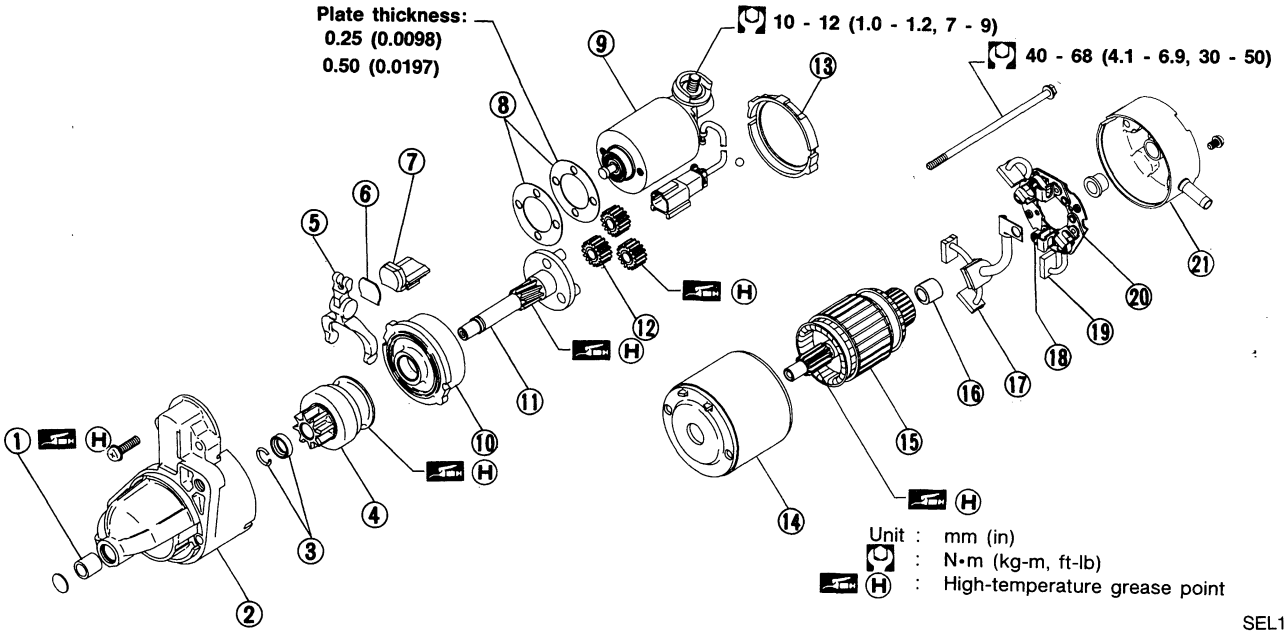
Wiring Diagram (Cont'd)

A/T models and CANADA M/T models



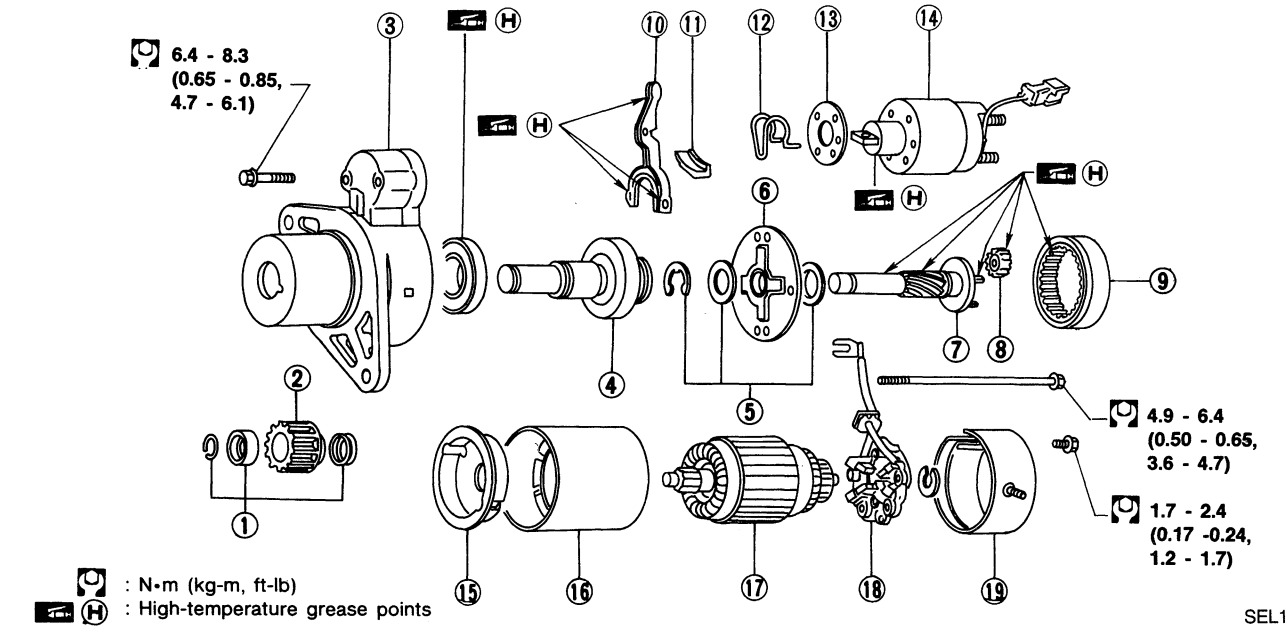
MEL314B

M1T73881ZC



① Sleeve bearing
② Gear case
③ Pinion stopper
④ Pinion assembly
⑤ Shift lever
⑥ Plate
⑦ Packing
⑧ Adjusting plate
⑨ Magnetic switch assembly
⑩ Internal gear
⑪ Shaft
⑫ Planetary gear
⑬ Packing
⑭ Yoke
⑮ Armature
⑯ Sleeve bearing
⑰ Brush (+)
⑱ Brush spring
⑲ Brush (−)
⑳ Brush holder
㉑ Rear cover

S114-754



① Pinion stopper
② Pinion gear
③ Gear case
④ Clutch assembly
⑤ Thrust washer
⑥ Center bracket (P)
⑦ Pinion shaft
⑧ Planetary gear
⑨ Internal gear
⑩ Shift lever
⑪ Dust cover
⑫ Return spring
⑬ Adjusting plate
⑭ Magnetic switch assembly
⑮ Center bracket (A)
⑯ Yoke assembly
⑰ Armature assembly
⑱ Brush holder
⑲ Rear cover

Pinion/Clutch Check

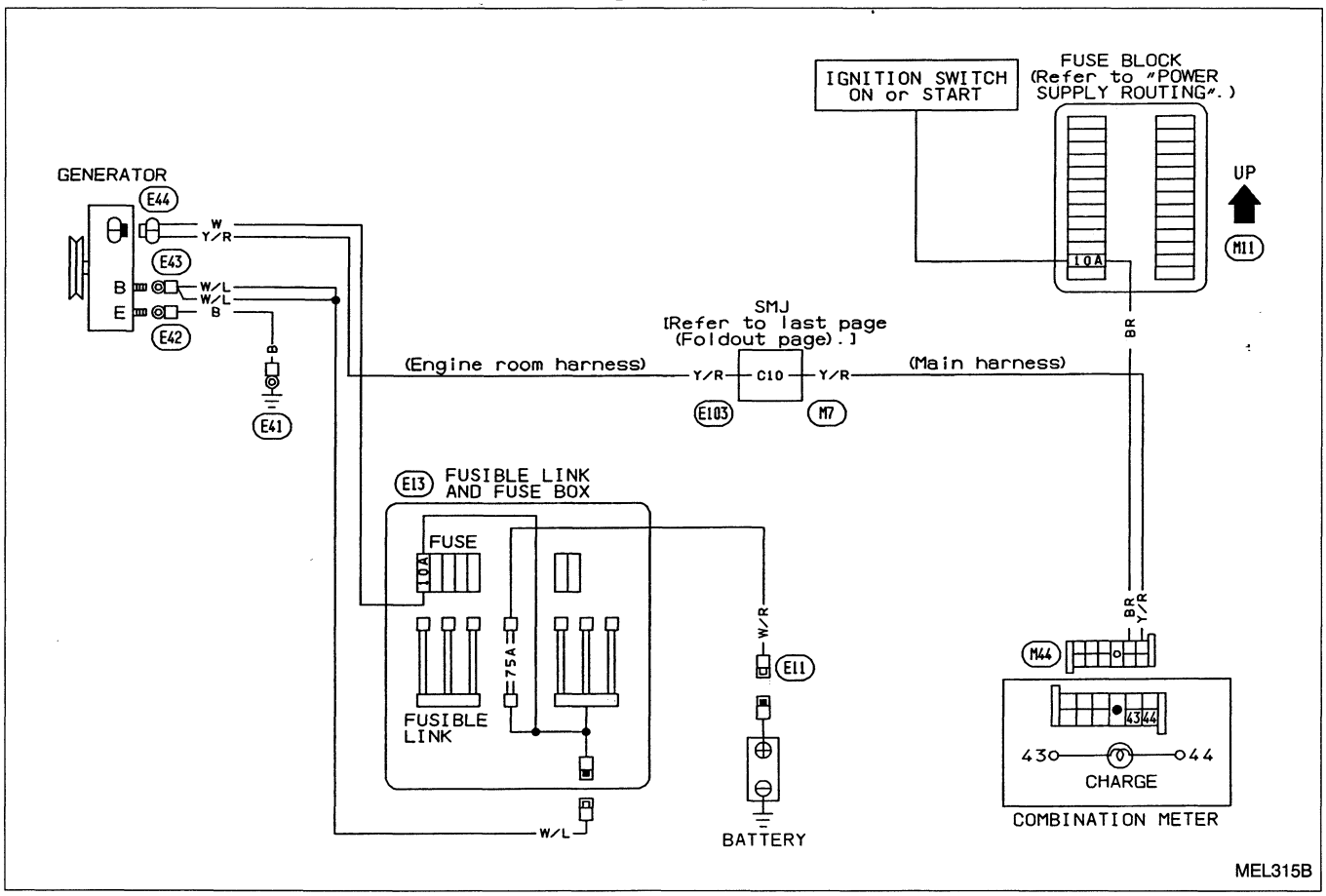
1. Inspect pinion teeth.
- Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Inspect reduction gear teeth.
- Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
3. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
- If it locks or rotates in both directions, or unusual resistance is evident. ... Replace.

Service Data and Specifications (SDS)

STARTER

Type		M1T73881ZC	S114-754
		MELMAC	HAP
		Reduction gear type	
Applied model		A/T	M/T
System voltage	V	12	
No-load			
Terminal voltage	V	11.0	
Current	A	Less than 88	Less than 85
Revolution	rpm	More than 3,000	More than 2,950
Minimum diameter of commutator	mm (in)	28.8 (1.134)	28.0 (1.102)
Minimum length of brush	mm (in)	12.0 (0.472)	10.5 (0.413)
Brush spring tension	N (kg, lb)	13.7 - 25.5 (1.4 - 2.6, 3.1 - 5.7)	14.7 - 17.7 (1.5 - 1.8, 3.3 - 4.0)
Clearance of bearing metal and armature shaft	mm (in)	—	0.03 - 0.3 (0.0012 - 0.0118)
Clearance "ℓ" between pinion front edge and pinion stopper	mm (in)	0.5 - 2.0 (0.020 - 0.079)	0.05 - 1.5 (0.0020 - 0.0591)
Installed current	A	140	120

Wiring Diagram

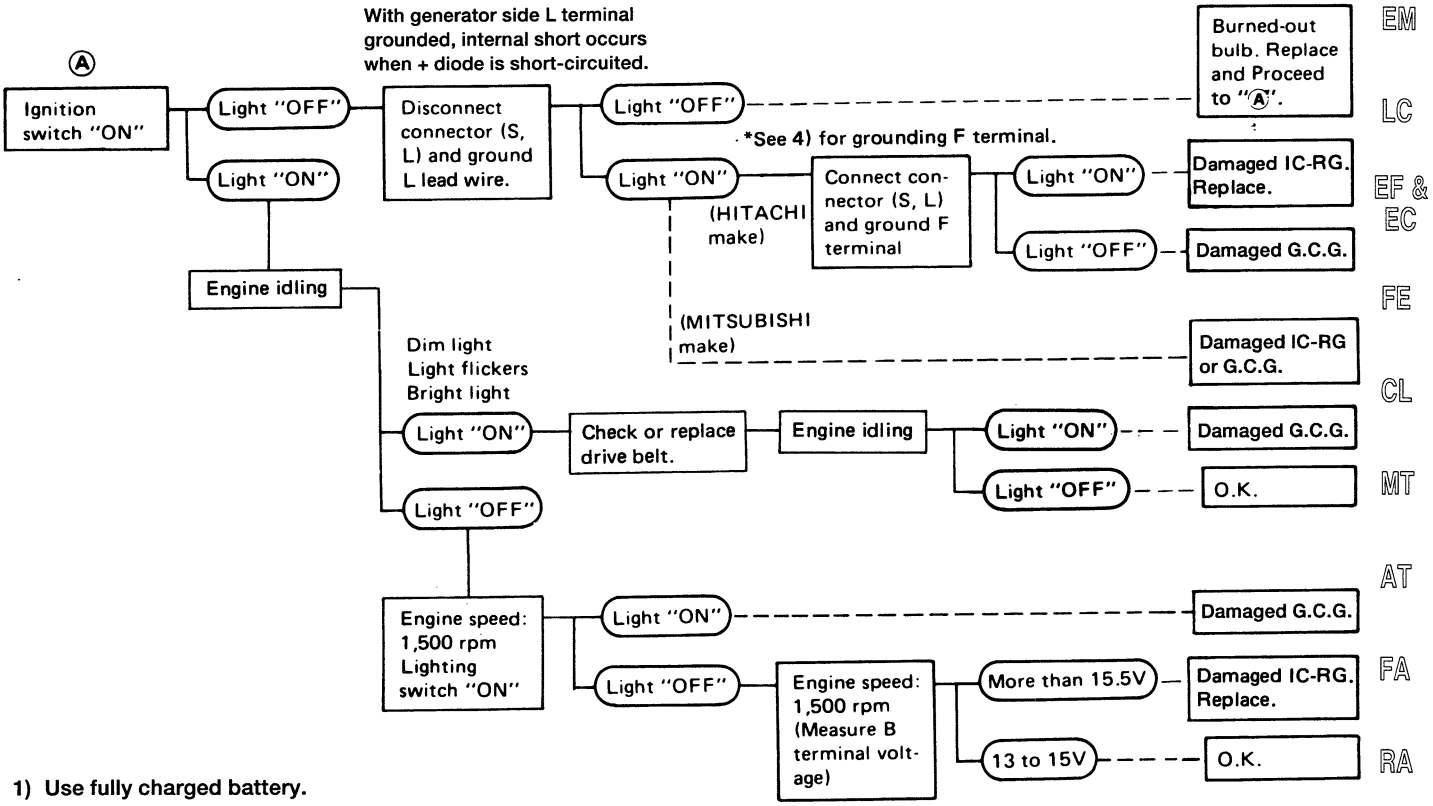


Trouble-shooting

Before conducting an generator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test. The generator can be checked easily by referring to the Inspection Table.

Before starting trouble-shooting, inspect the fusible link.

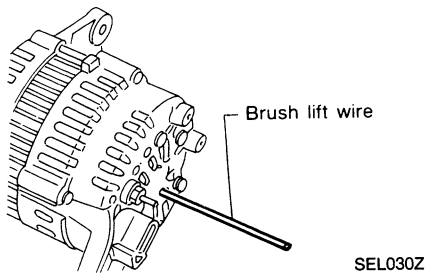
WITH IC REGULATOR



1) Use fully charged battery.
2) Light : Charge warning light
   G.C.G. : Generator parts except IC regulator
   IC-RG : IC regulator
   O.K. : IC-generator is in good condition.
3) When reaching "Damaged G.C.G.", remove generator from vehicle and disassemble, inspect and correct or replace faulty parts.
4) *Method of grounding F terminal (HITACHI make only)

Gasoline engine model

Contact tip of wire with brush and attach wire to generator body.



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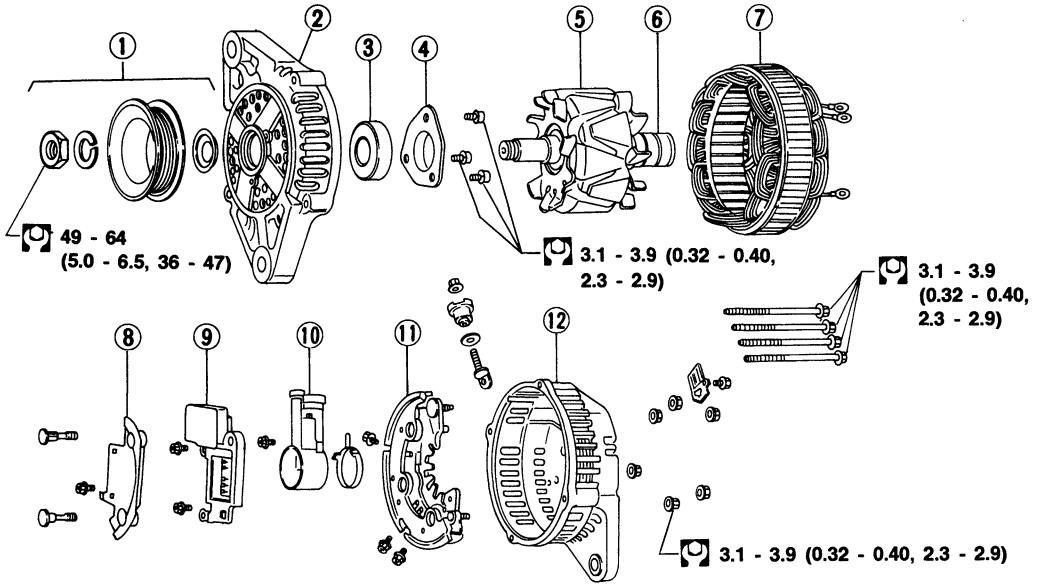
5) Terminals "S", "L", "B" and "E" are marked on rear cover of generator.

AEL215

Construction

LR180-736B



① Pulley assembly
② Front cover
③ Front bearing
④ Retainer
⑤ Rotor
⑥ Slip ring
⑦ Stator
⑧ Condenser
⑨ IC regulator assembly
⑩ Brush holder
⑪ Diode assembly
⑫ Rear cover

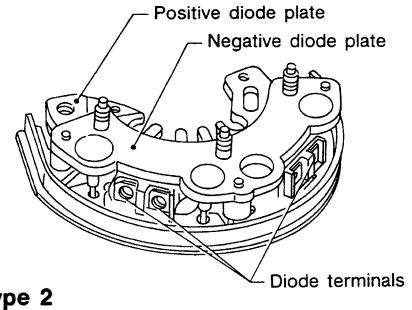
Diode Check

MAIN DIODES

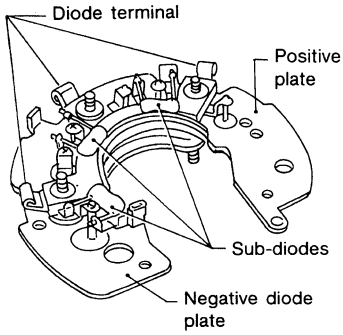
- In order to check diodes, they must be unsoldered from the stator.
- Use an ohmmeter to check condition of diodes as indicated in chart below.
- If any of the test results is not satisfactory, replace diode assembly.

	Ohmmeter probes		Judgement
	Positive ⊕	Negative ⊖	
Diodes check (Positive side)	Positive diode plate	Diode terminals	Diode conducts in only one direction.
	Diode terminals	Positive diode plate	
Diodes check (Negative side)	Negative diode plate	Diode terminals	Diode conducts in only one direction.
	Diode terminals	Negative diode plate	

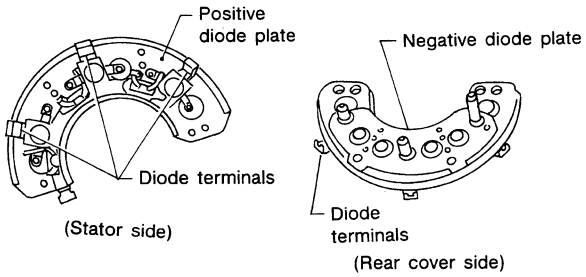
Type 1



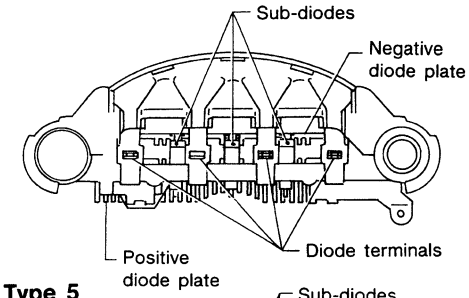
Type 2



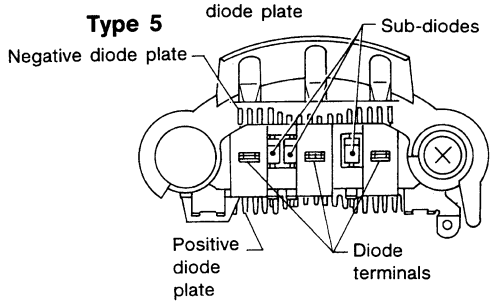
Type 3



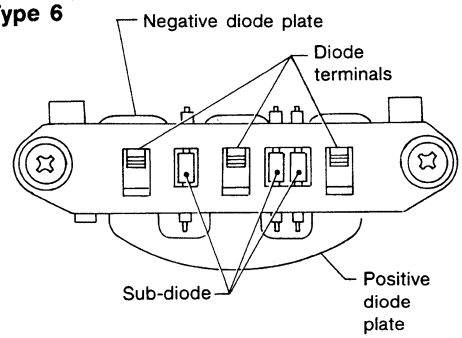
Type 4



Type 5



Type 6



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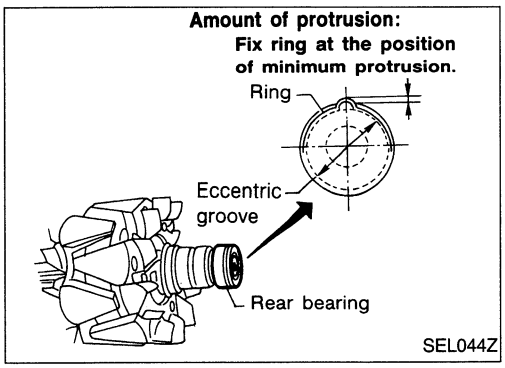
Assembly

Carefully observe the following instructions.

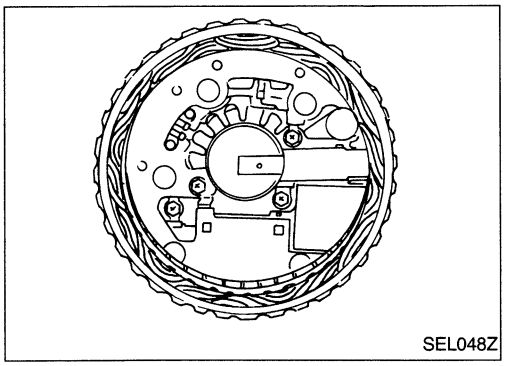
- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.



RING FITTING IN REAR BEARING

- Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible.

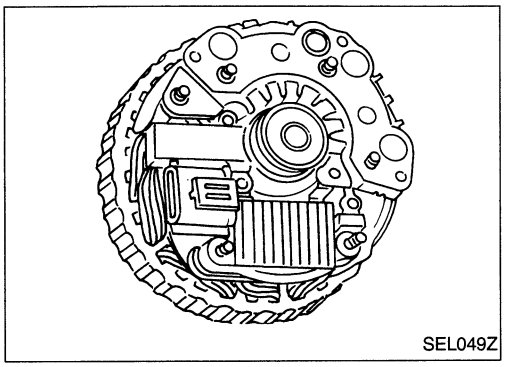
CAUTION:
Do not reuse rear bearing after removal.



REAR COVER INSTALLATION

(1) Fit brush assembly, diode assembly, regulator assembly and stator.
(2) Push brushes up with fingers and install them to rotor.

Take care not to damage slip ring sliding surface.

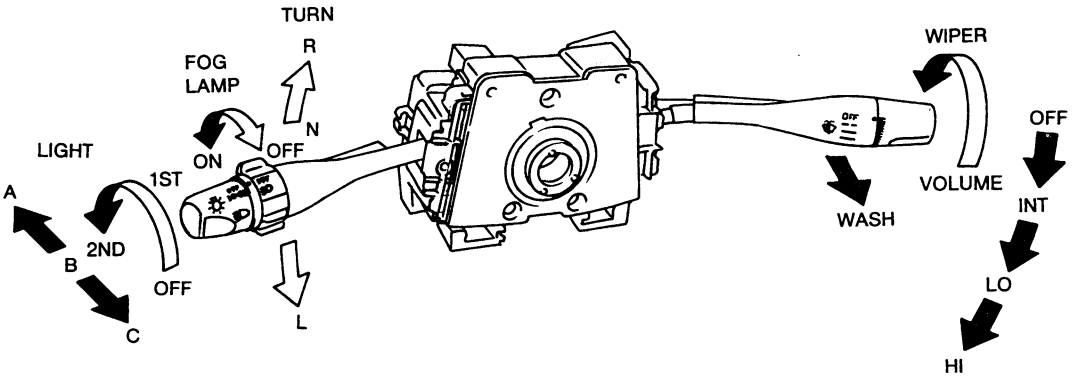


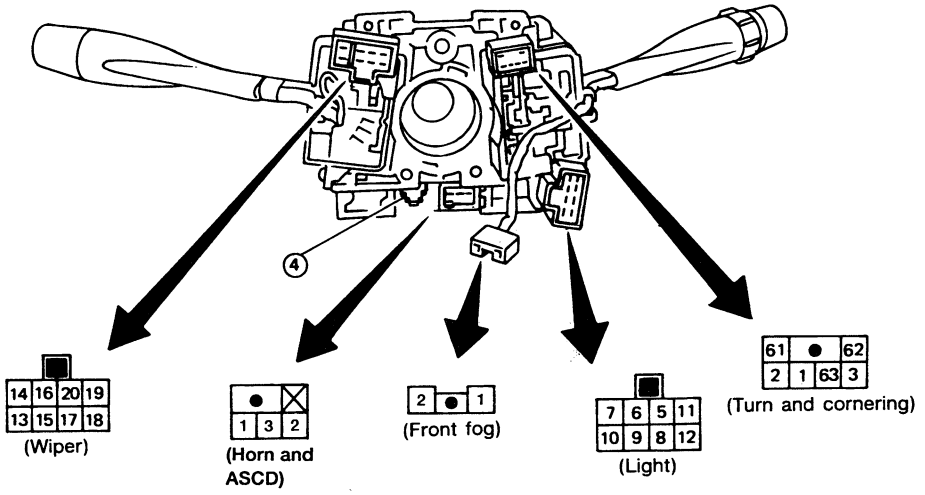
Service Data and Specifications (SDS)

GENERATOR

Type		LR180-736B
		HAP
Nominal rating	V-A	12-80
Ground polarity		Negative
Minimum revolution under no-load (When 13.5 volts is applied)	rpm	Less than 1,000
Hot output current (When 13.5 volts is applied)	A/rpm	More than 23/1,300 More than 63/2,500 More than 77/5,000
Regulated output voltage	V	14.1 - 14.7
Minimum length of brush	mm (in)	6.0 (0.236)
Brush spring pressure	N (g, oz)	1.000 - 2.452 (102 - 250, 3.60 - 8.82)
Slip ring minimum diameter	mm (in)	26.0 (1.024)
Rotor (Field coil) resistance	Ω	2.67

Combination Switch/Check





LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5			○			○	○	○	○
6			○			○	○		○
7								○	
8			○			○	○	○	○
9			○			○	○		○
10								○	
11				○	○	○	○	○	○
12				○	○	○	○	○	○

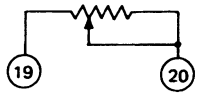
WIPER SWITCH

	OFF	INT	LO	HI	WASH
13	○	○			
14	○	○	○		
15		○			
16				○	
17		○	○	○	○
18					○

ASCD SWITCH

	RESUME ACCEL	SET COAST	CANCEL
1	○	○	○
2		○	○
3	○		○

INTERMITTENT WIPER VOLUME



TURN SIGNAL SWITCH

	R	N	L
1	○		○
2	○		
3			○

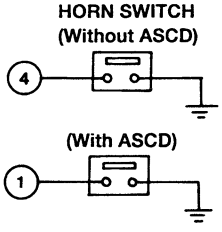
CORNERING LAMP SWITCH

	R	N	L
61	○		○
62	○		
63			○

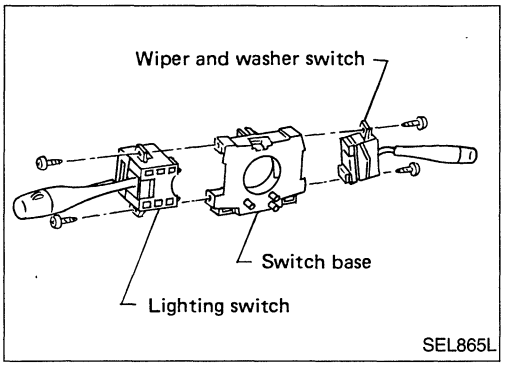
FRONT FOG LAMP SWITCH

	OFF	ON
2		○
1	○	○

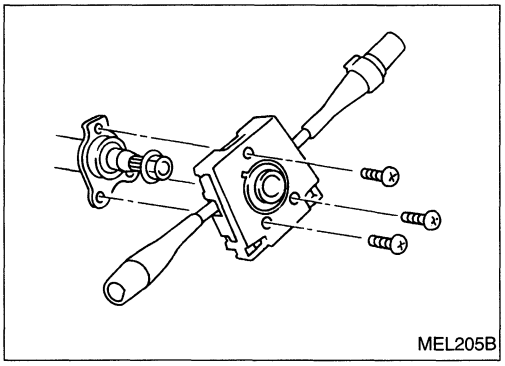
HORN SWITCH



AEL216



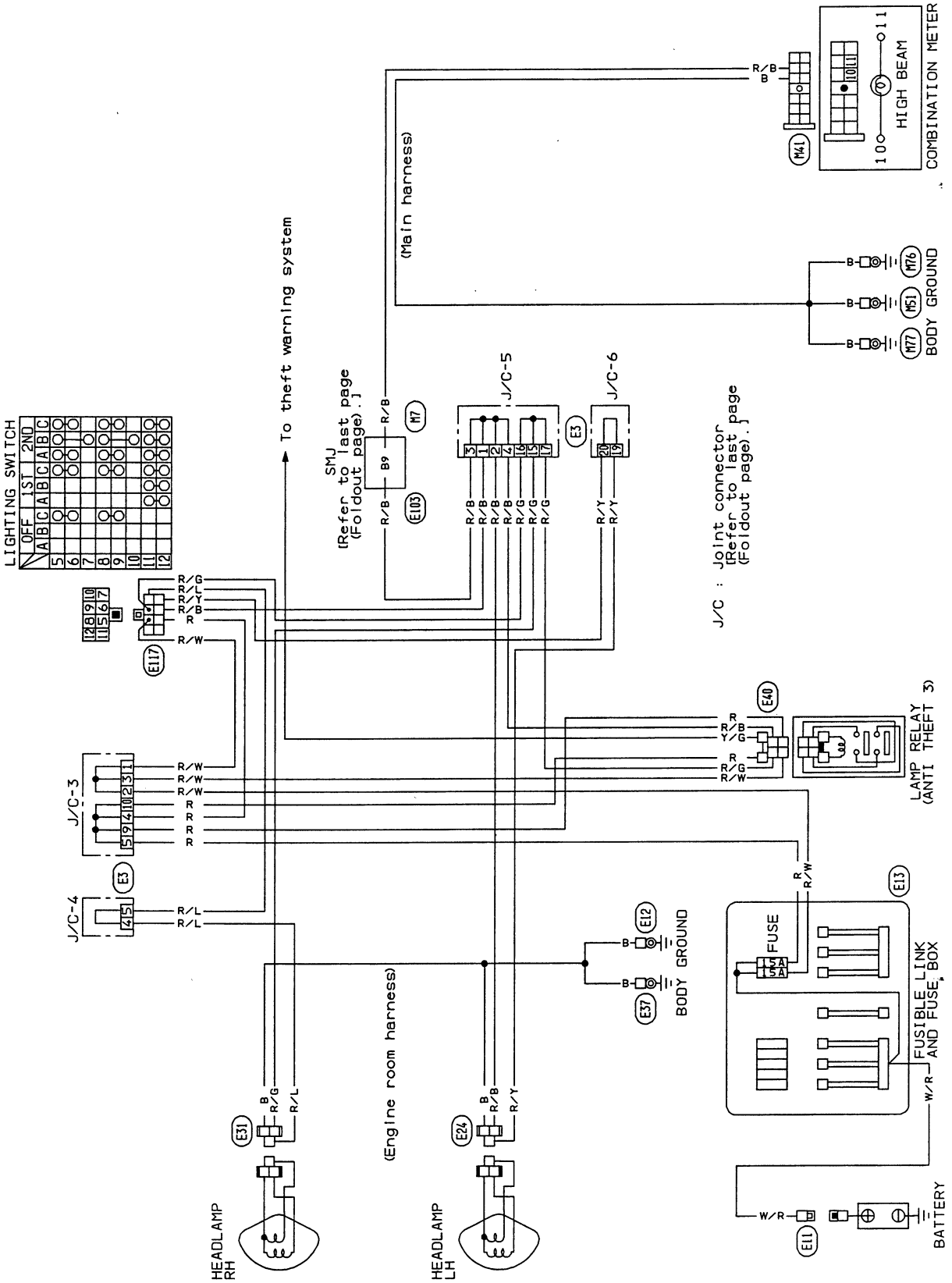
SEL865L


MEL205B

Combination Switch/Replacement

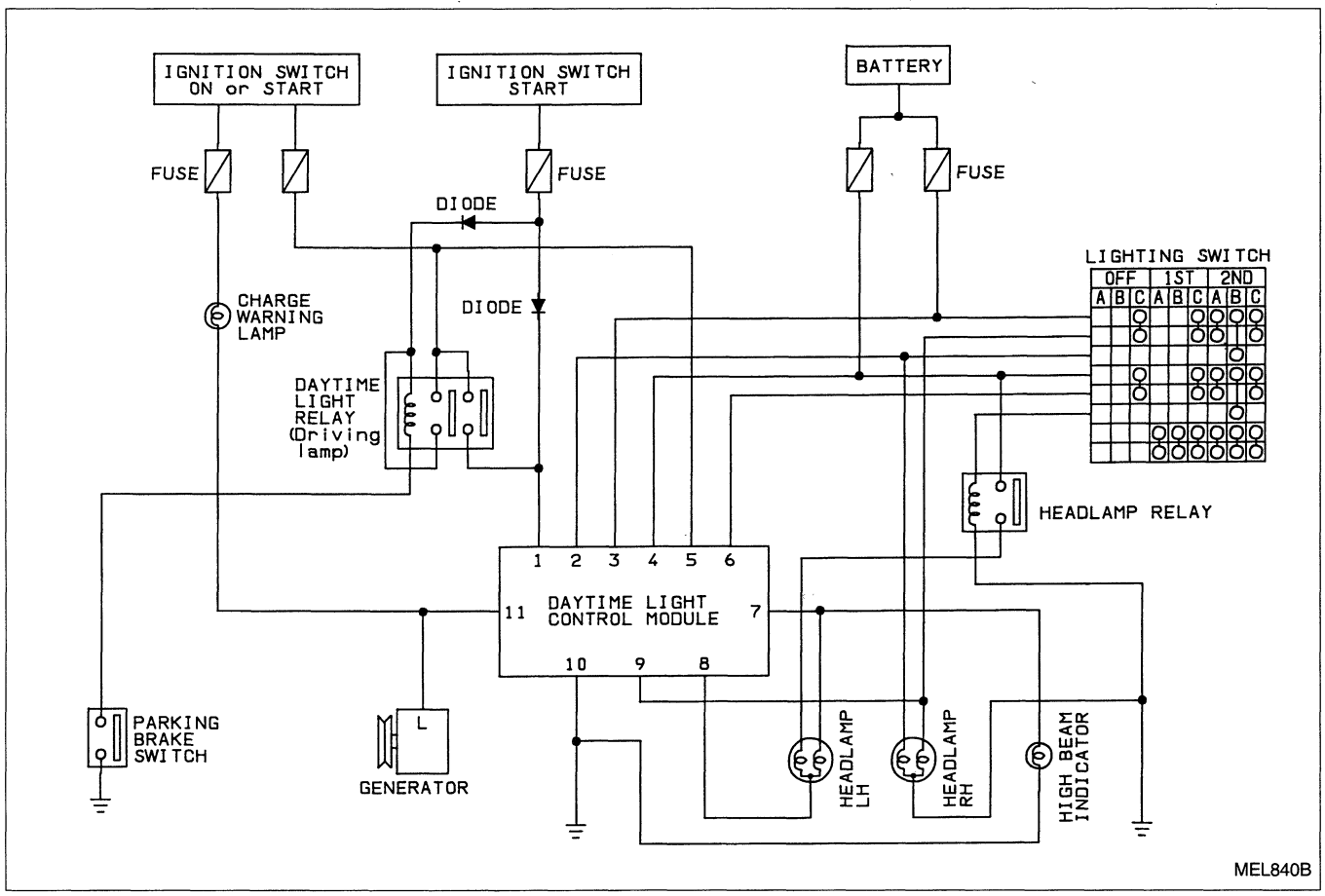
- Each switch can be replaced without removing combination switch base.
- To remove combination switch base, remove base attaching screws.

Wiring Diagram (For USA)

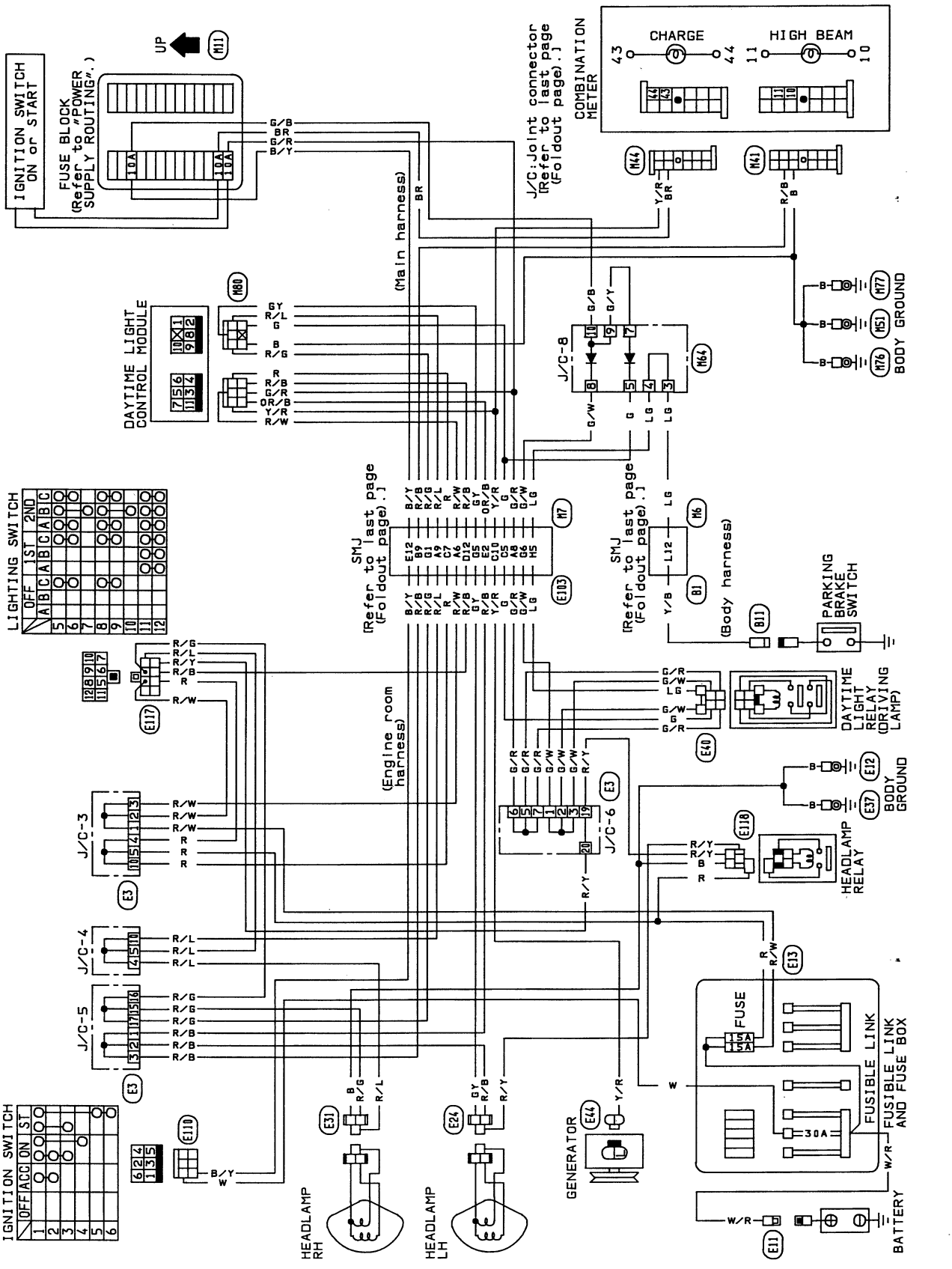


MEL316B

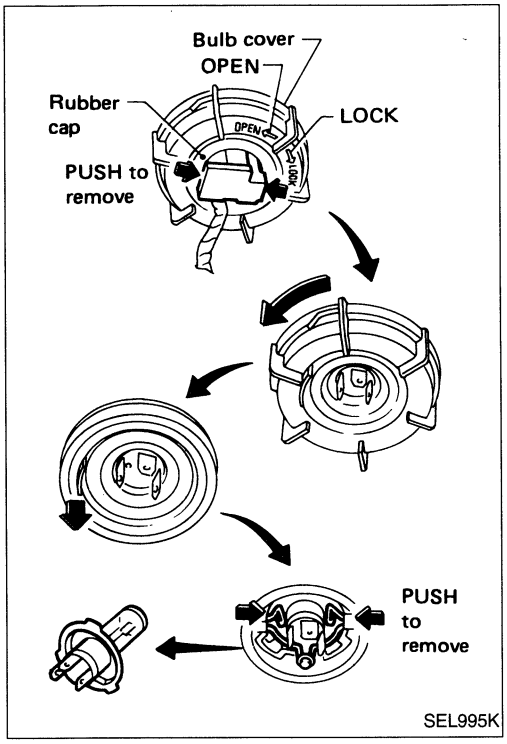
Schematic (For Canada)



Wiring Diagram (For Canada)



MEL841B



Bulb Replacement

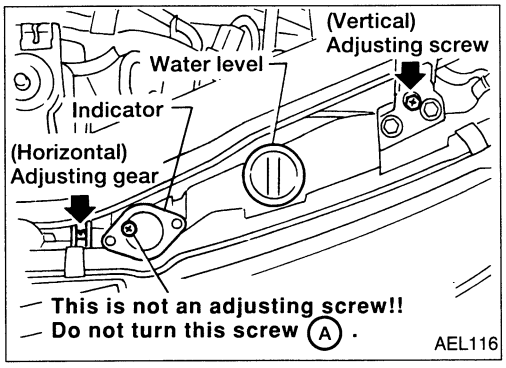
The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the battery cable.
2. Disconnect the harness connector from the back side of the bulb.
3. Turn the bulb retaining ring counterclockwise until it is free from the headlamp reflector, and then remove it.
4. Pull off the rubber cap.
5. Remove the headlamp bulb carefully. Do not shake or rotate the 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.



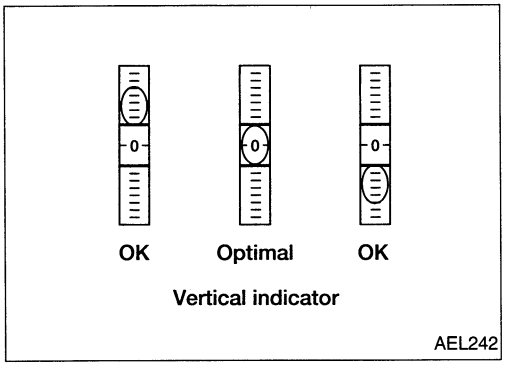
Aiming Adjustment

Before performing aiming adjustment, make sure of the following.

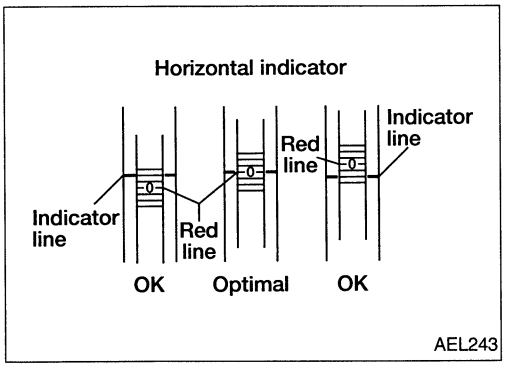
a. Keep all tires inflated to correct pressure.
b. Place vehicle on level ground.
c. See that vehicle is unloaded (except for full levels of coolant, engine oil and fuel, and spare tire, jack, and tools). Have the driver or equivalent weight placed in driver's seat.

LOW BEAM

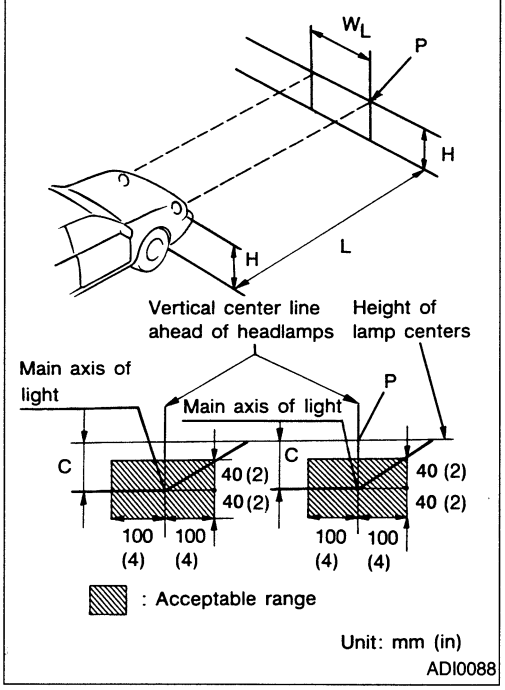
1. Open the hood.
2. Adjust the vertical indicator by turning the adjusting screw. The bubble in the gauge should be centered on the "o" mark as shown in the illustration.



3. Adjust the horizontal indicator by turning the adjusting screw with a Philips screwdriver.
   The inner red line with the "o" mark should align with the indicator line.
   Never turn screw (A).



Aiming Adjustment (Cont'd)



ADJUSTMENT AFTER HEADLAMP ASSEMBLY REPLACEMENT

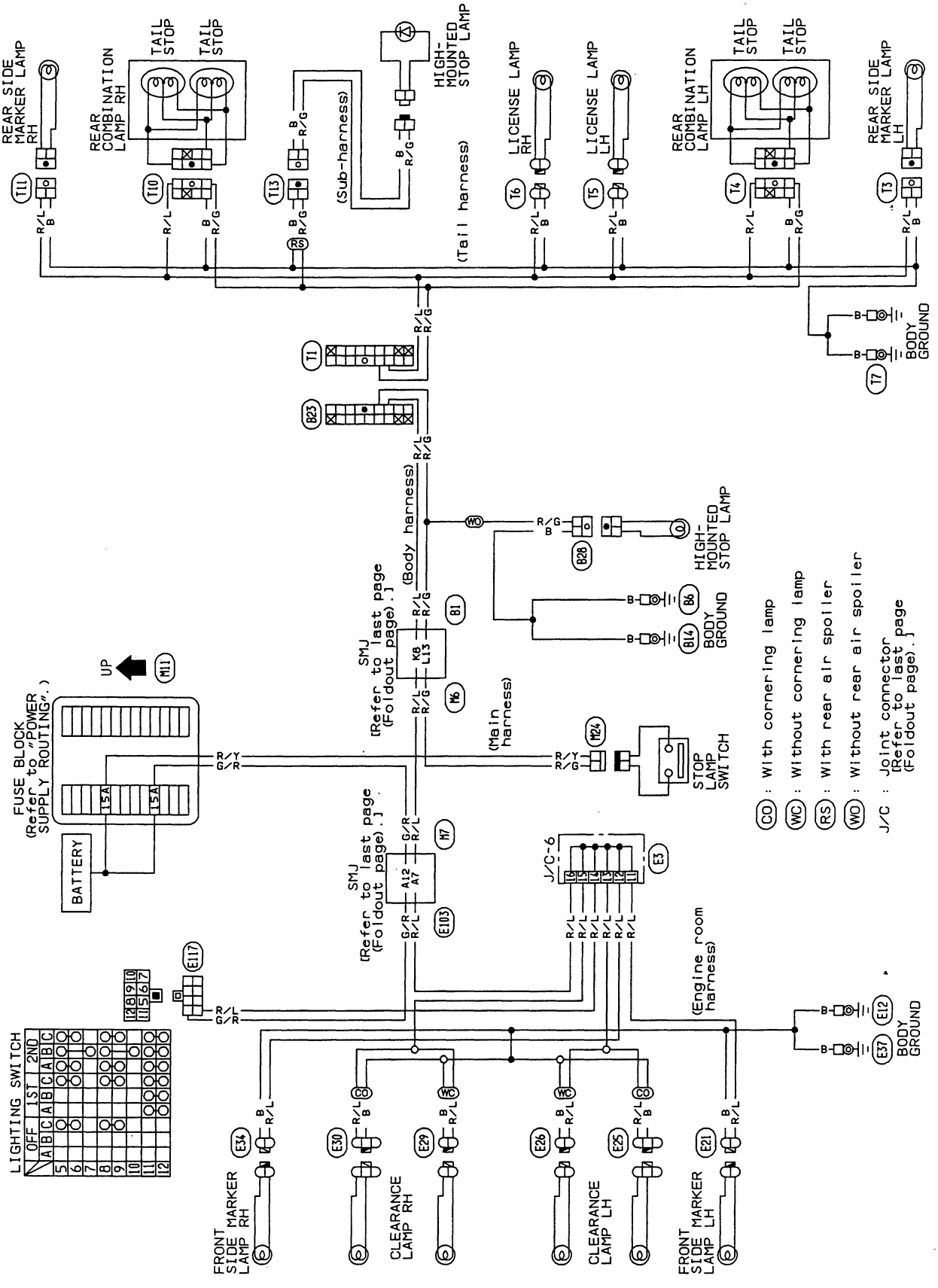
If the vehicle has had front body repair and the headlamp assembly has been replaced, the aiming should be checked using the aiming chart as shown in the illustration.

a. Adjust headlamps so that main axis of light is parallel to center line of body and is aligned with point P shown in the illustration.

b. Dotted lines in illustration show center of headlamp.
"H": Horizontal center line of headlamps
"W_L": Distance between each headlamp center
"L": 7,620 mm (300.00 in)
"C": 106 mm (4.17 in)

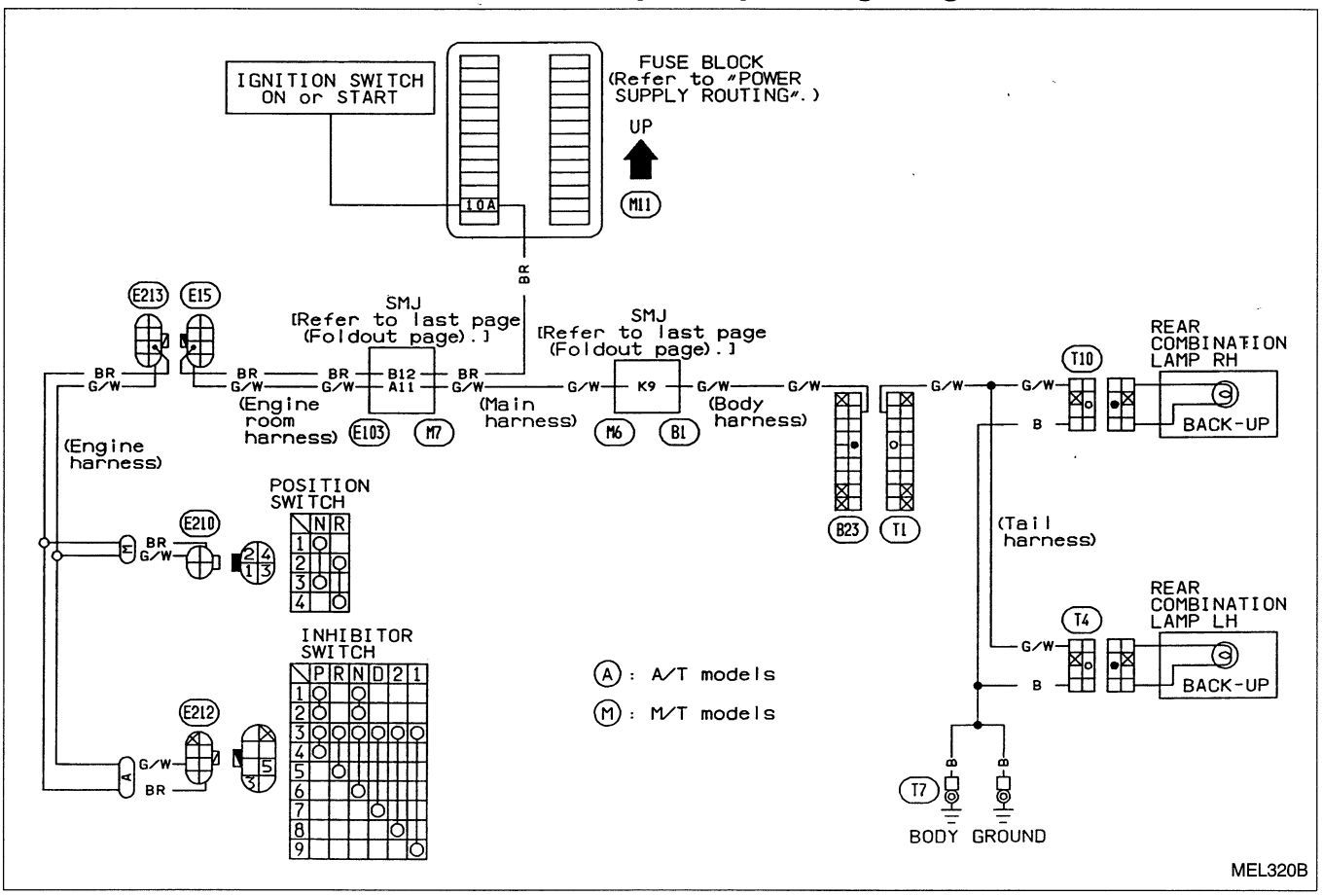
Even if the horizontal indicator does not align with the indicator line or the water level bubble is not centered in the gauge after aiming by the chart, it is acceptable if they are within the O.K. ranges.

Clearance, License, Tail and Stop Lamps/Wiring Diagram

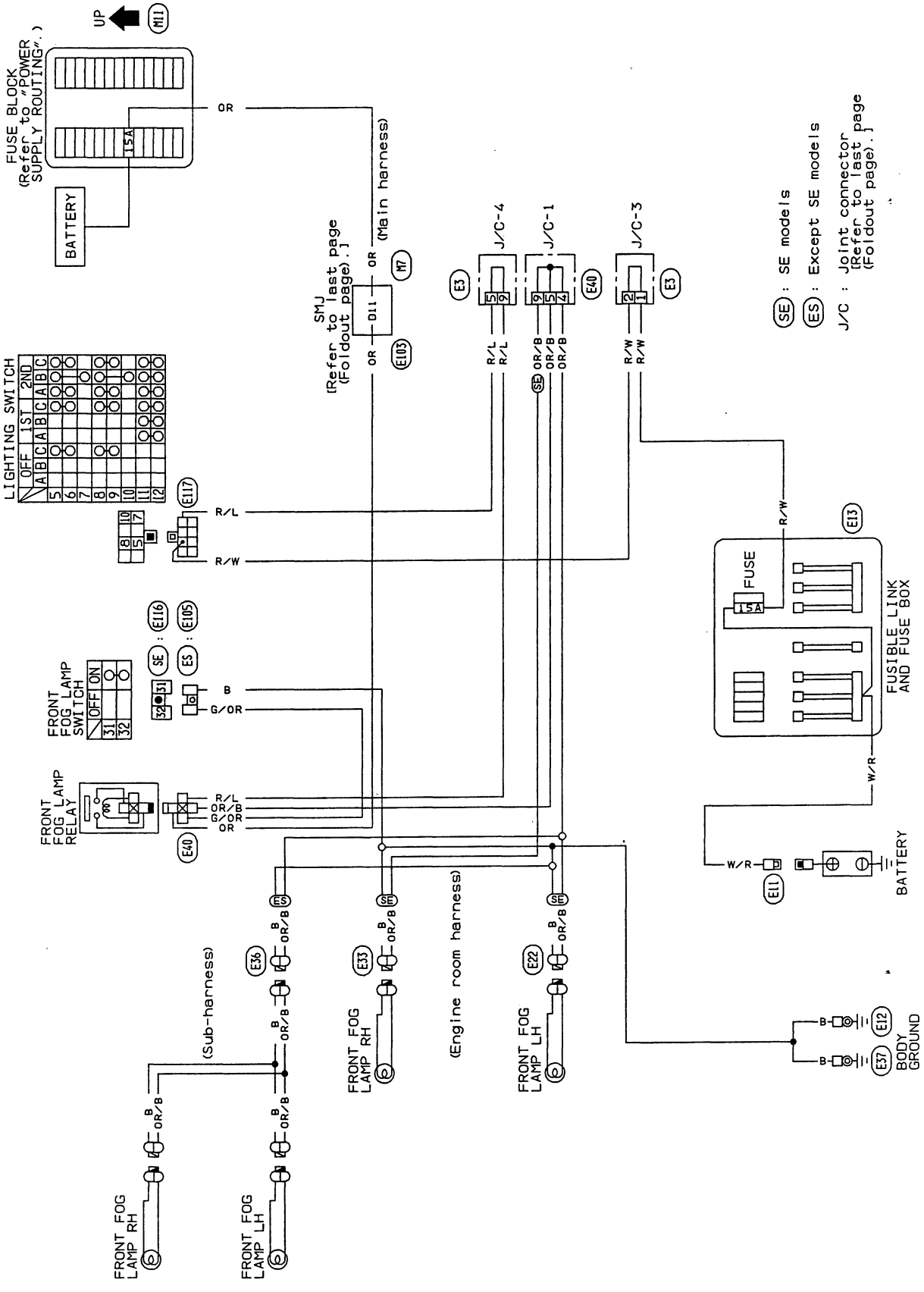


MEL319B

Back-up Lamp/Wiring Diagram

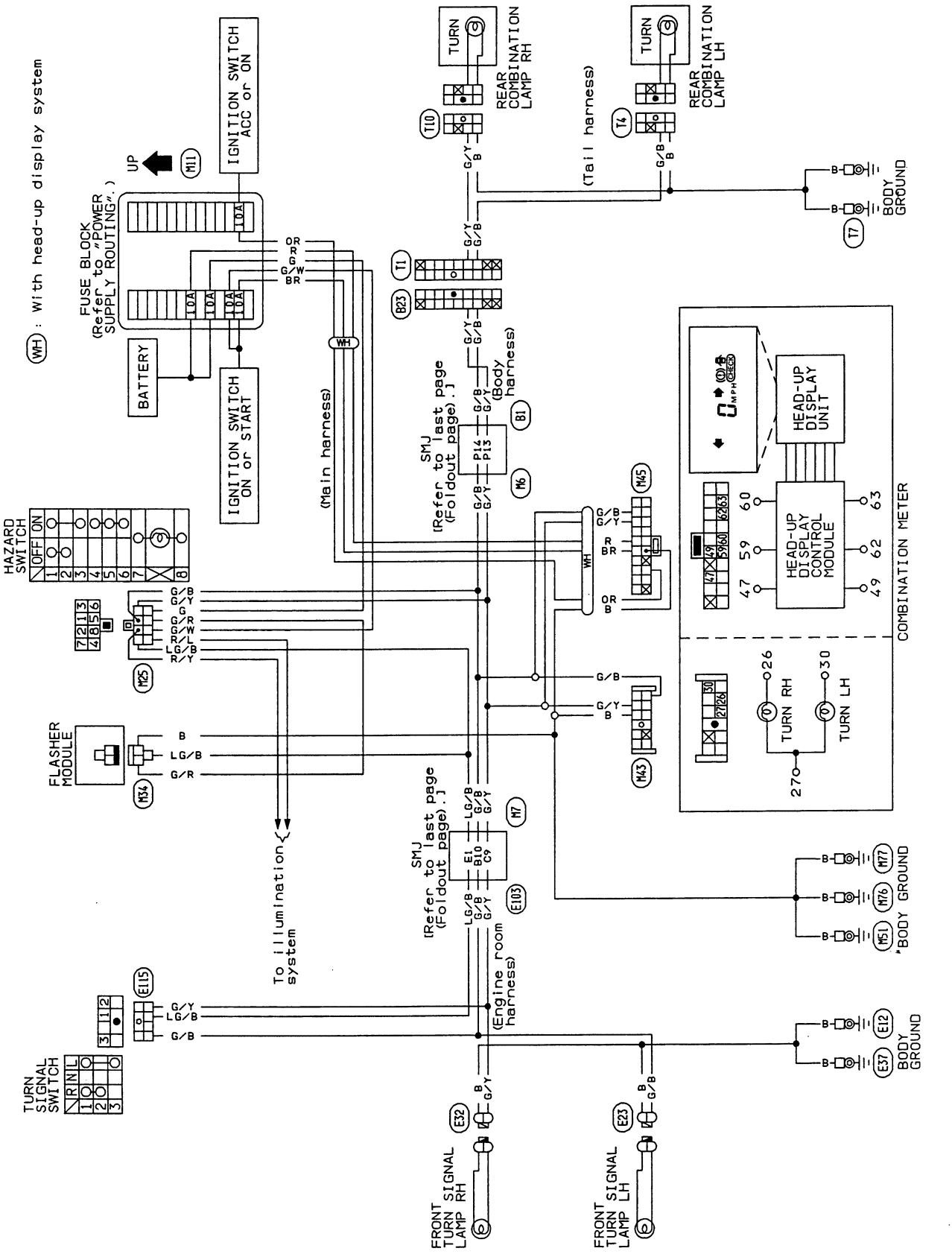


Front Fog Lamp/Wiring Diagram



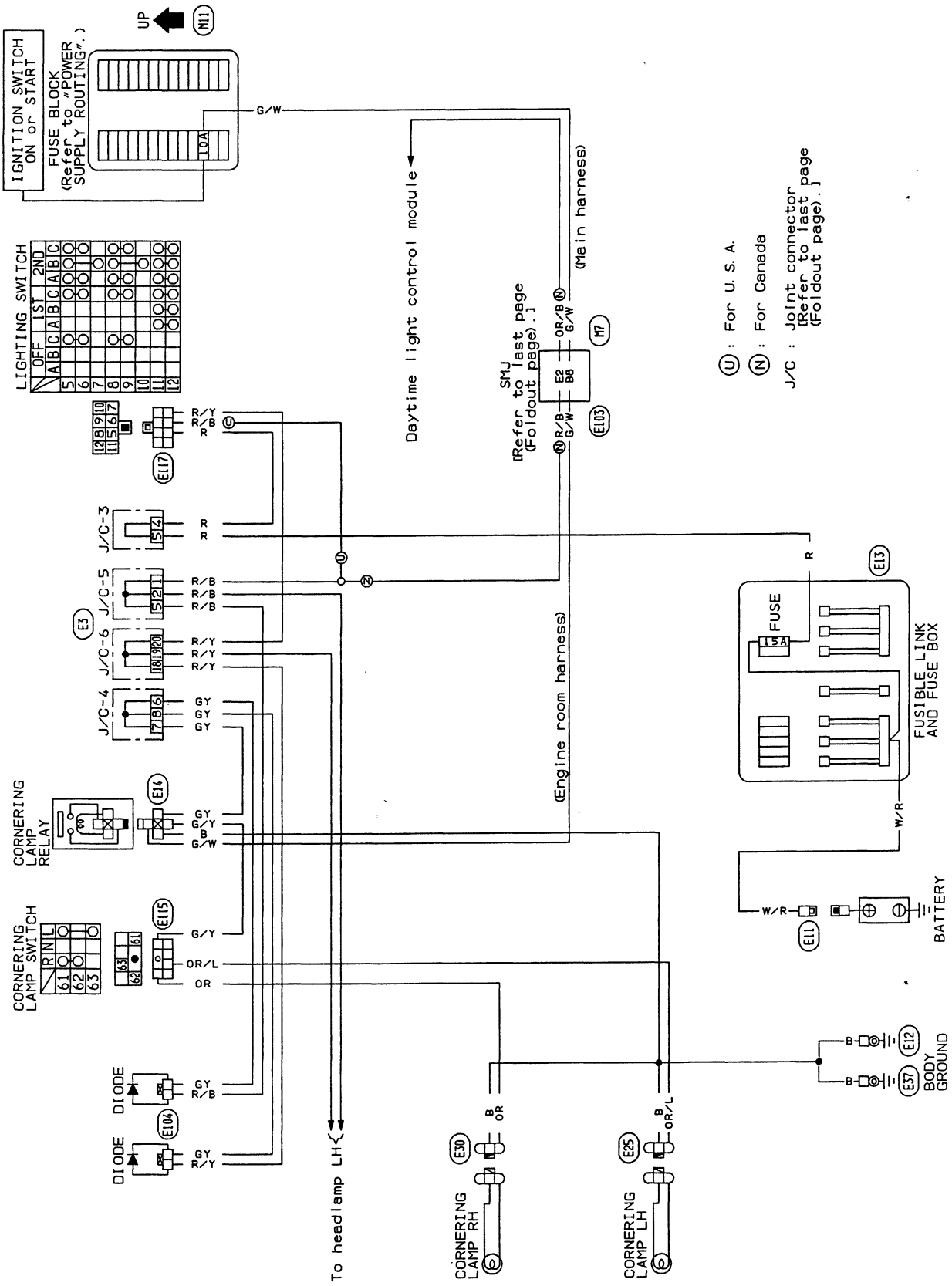
MEL321B

Turn Signal and Hazard Warning Lamps/Wiring Diagram

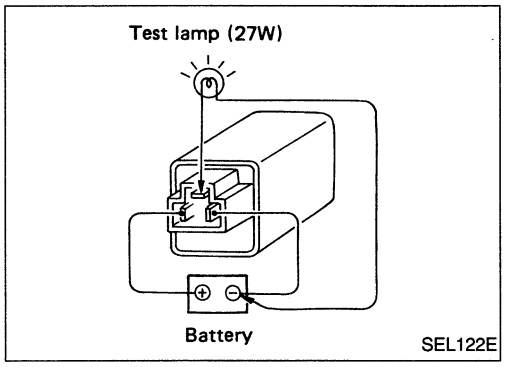


MEL322B

Cornering Lamp/Wiring Diagram



MEL323B



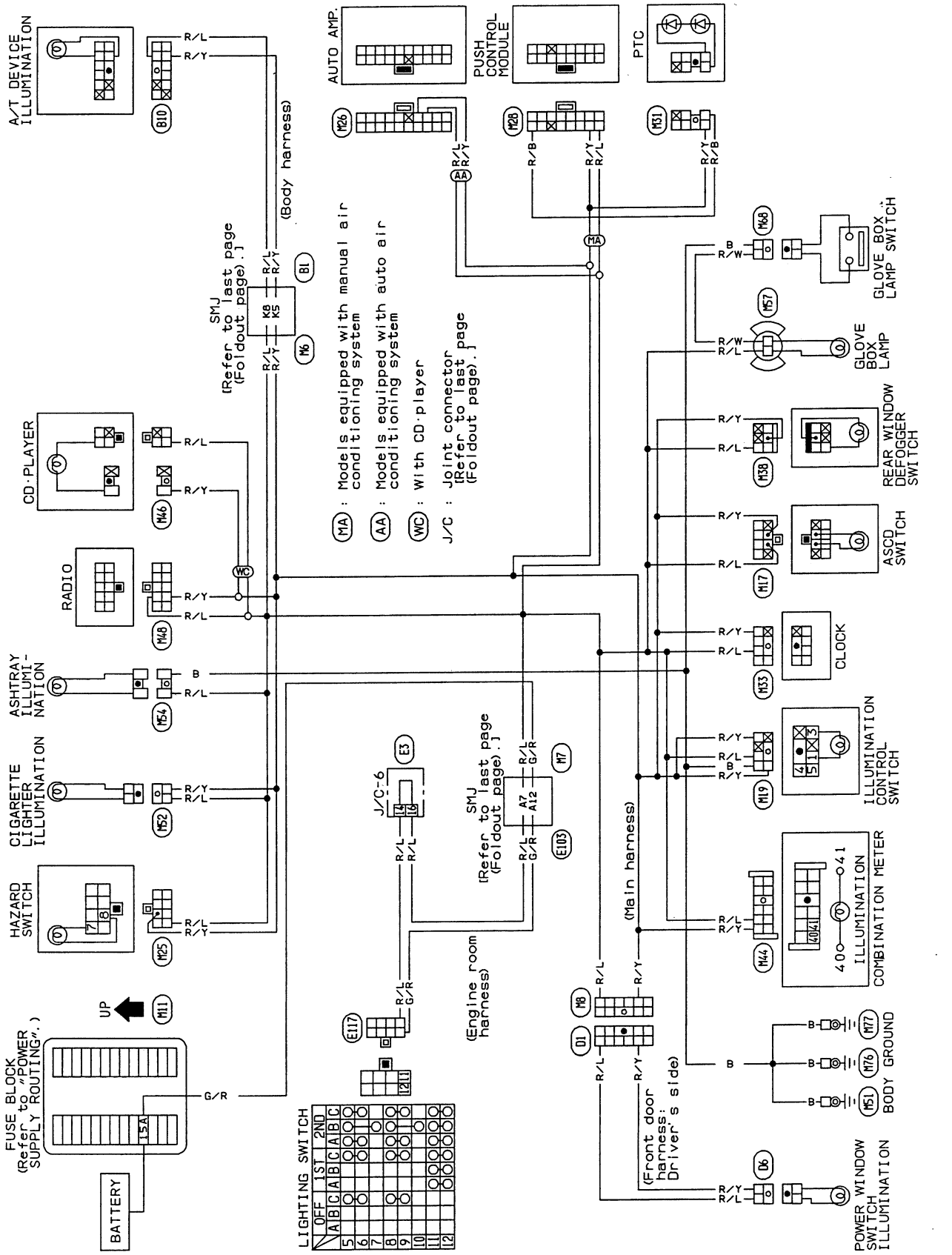
Flasher Module Check

- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the flasher module, as shown. Flasher module is properly functioning if it blinks when power is supplied to the circuit.

Bulb Specifications

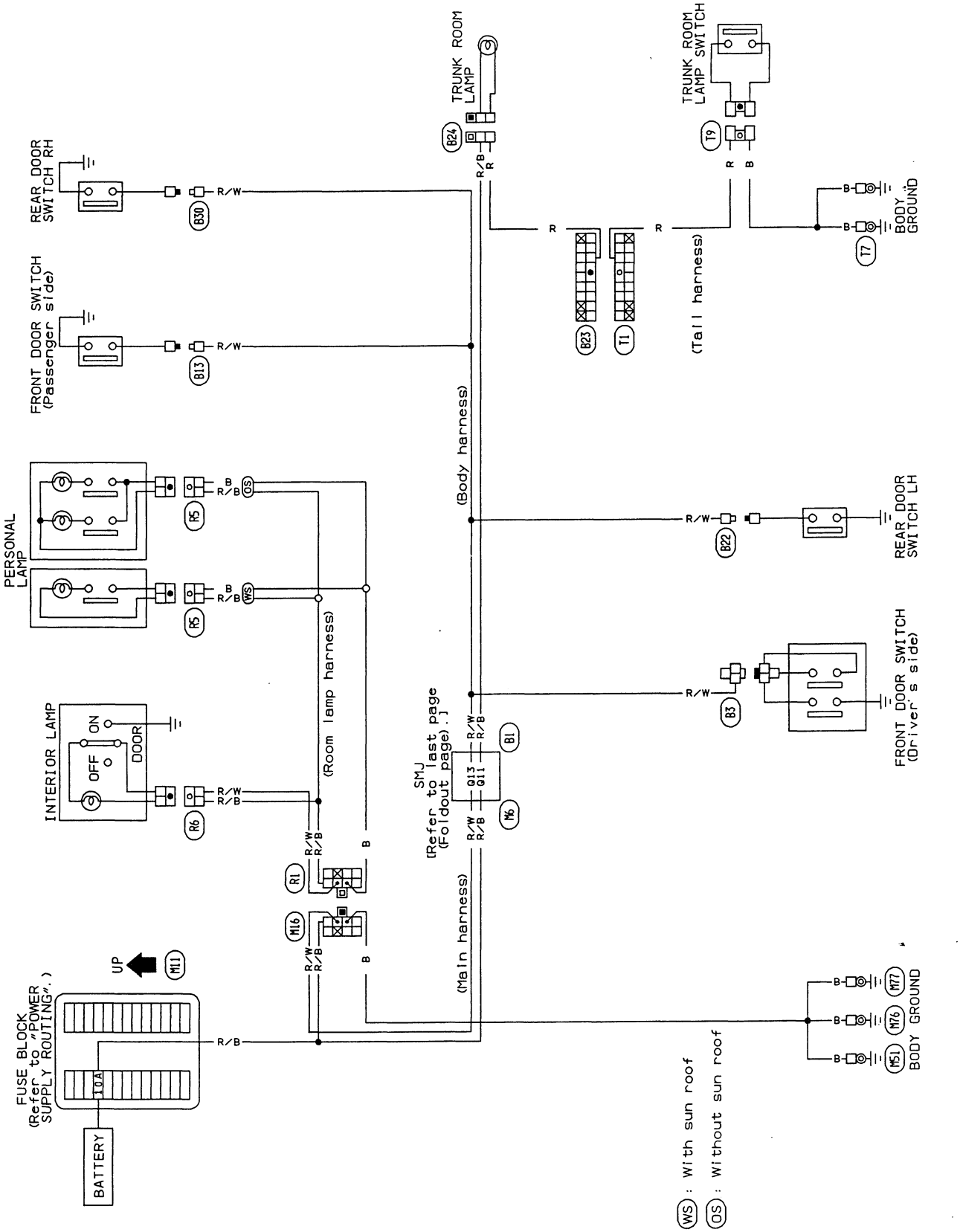
	Wattage (12 volt)	Bulb No.
Headlamp (Semi-sealed beam)		
High/Low	60/55	HB2
Front turn signal lamp	27	1156NA
Cornering lamp/Front clearance lamp	27/5	1157
Front side marker lamp	3.8	194
Front fog lamp	55	
Rear combination lamp		
Turn signal	27	1156
Stop/Tail	27/8	1157
Back-up	27	1156
Rear side marker lamp	3.8	194
License plate lamp	5	168
High-mounted stop lamp	13	912
Interior lamp	10	
Front personal lamp	10	
Trunk room lamp	3.4	158

Illumination/Wiring Diagram



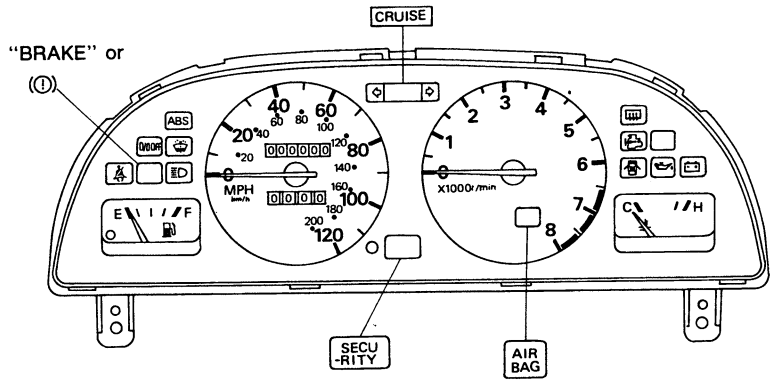
MEL324B

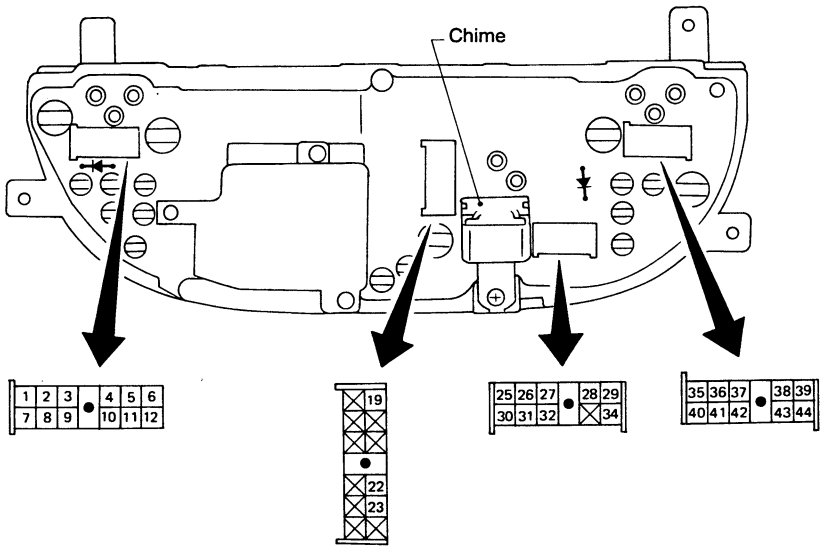
Interior, Personal and Trunk Room Lamps/Wiring Diagram

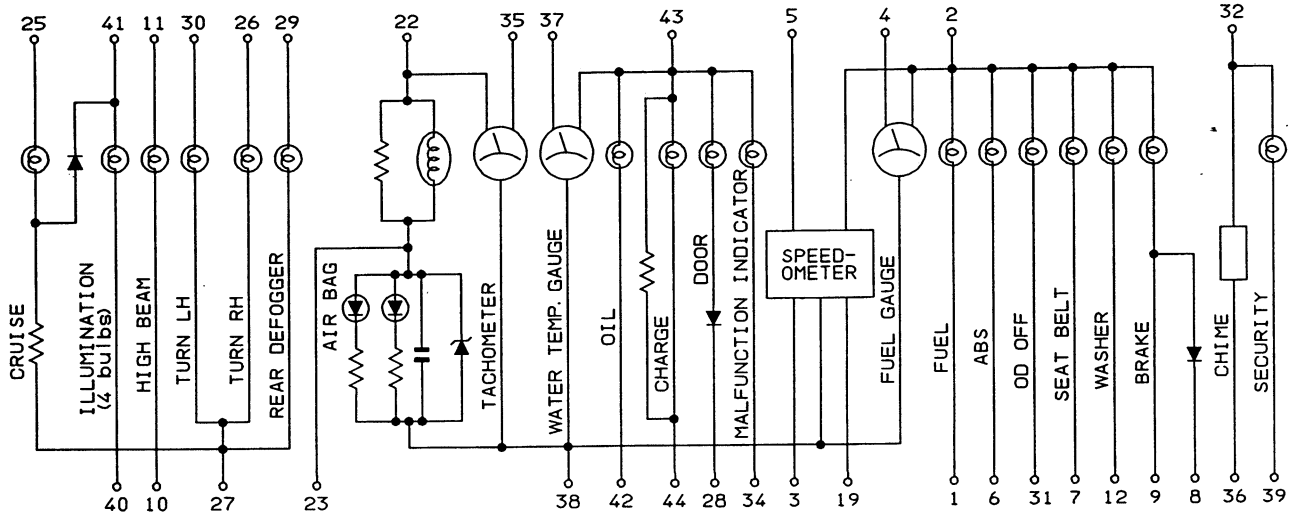


MEL325B

Combination Meter

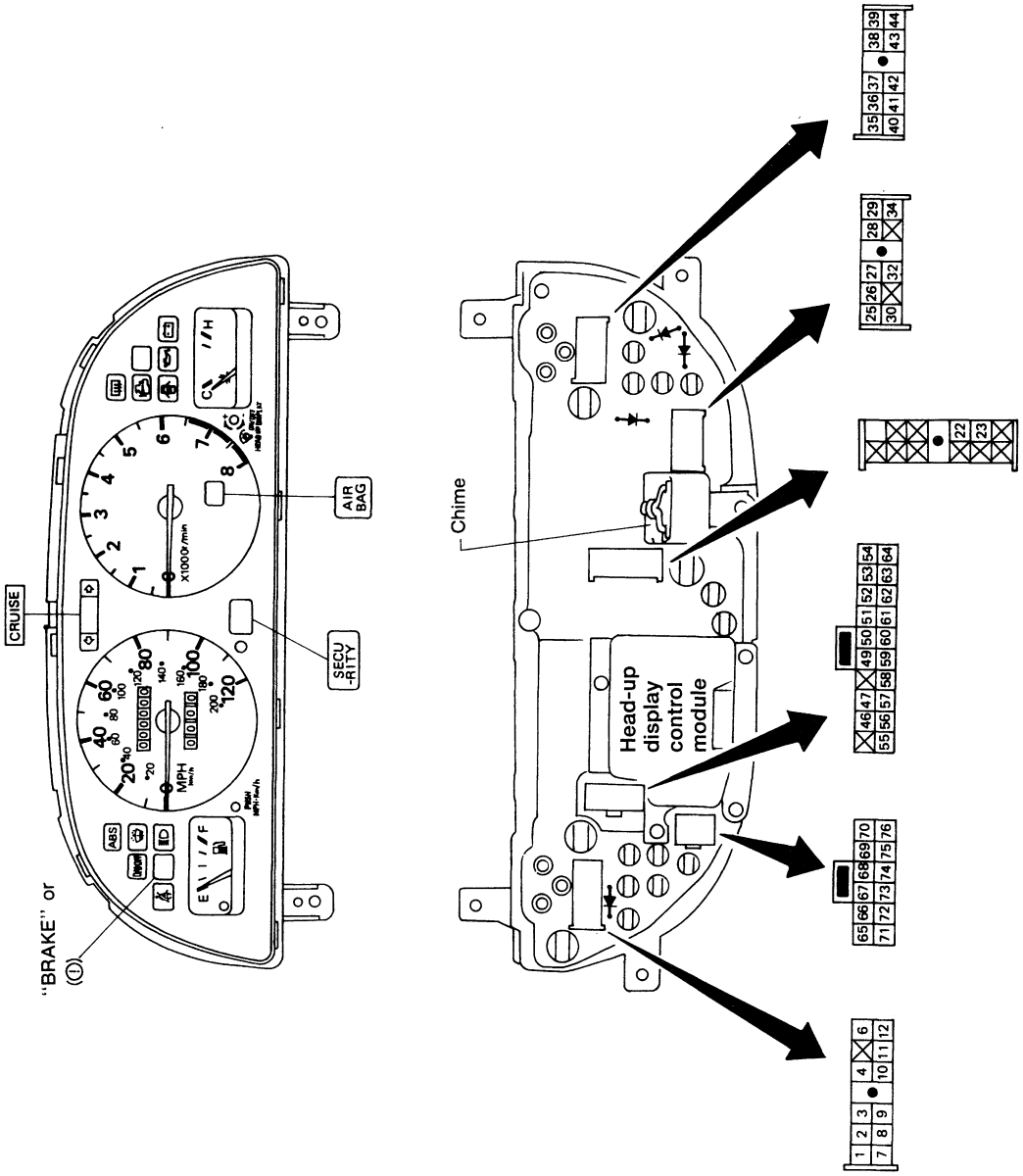






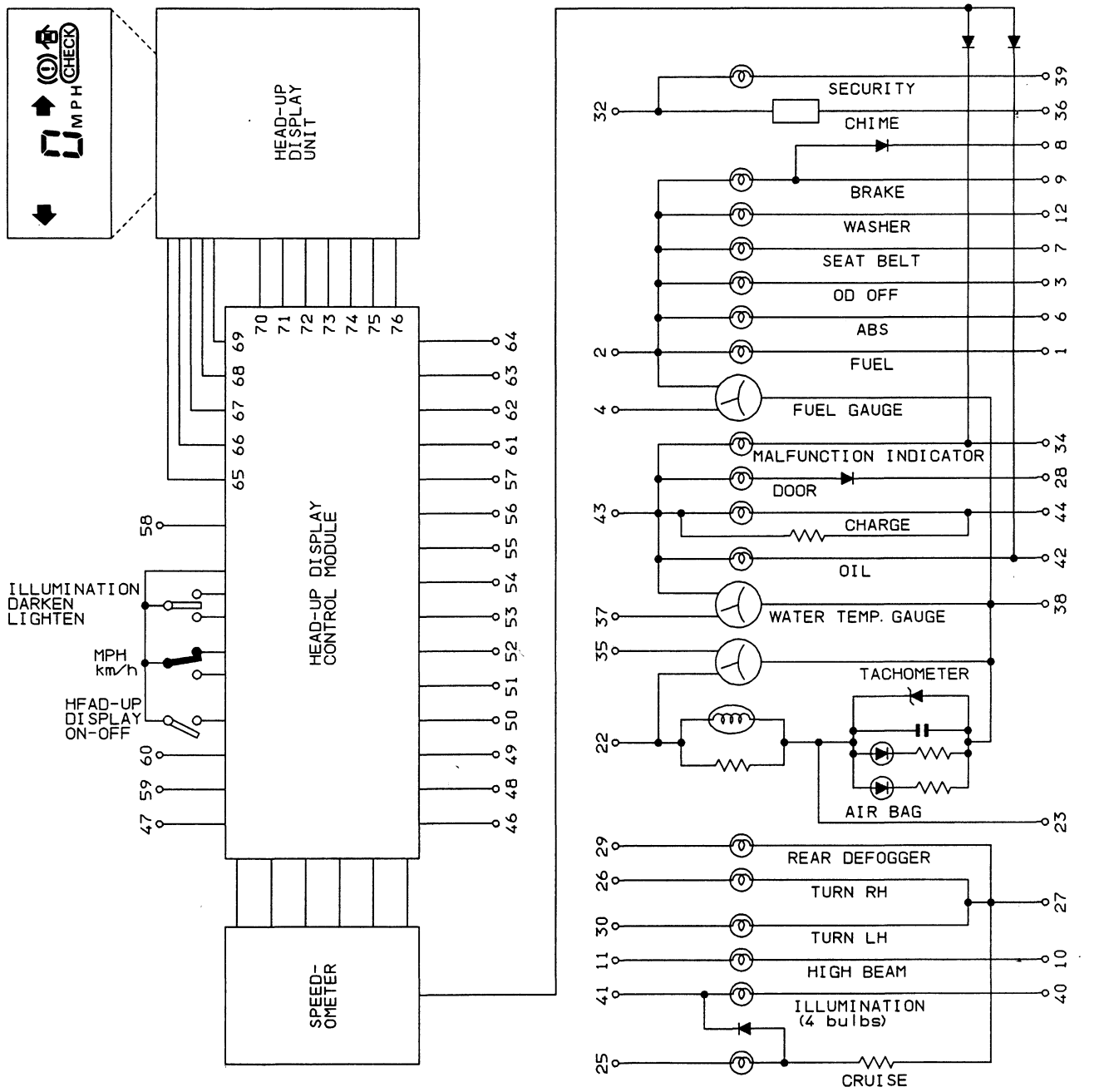
MEL349B

Combination Meter



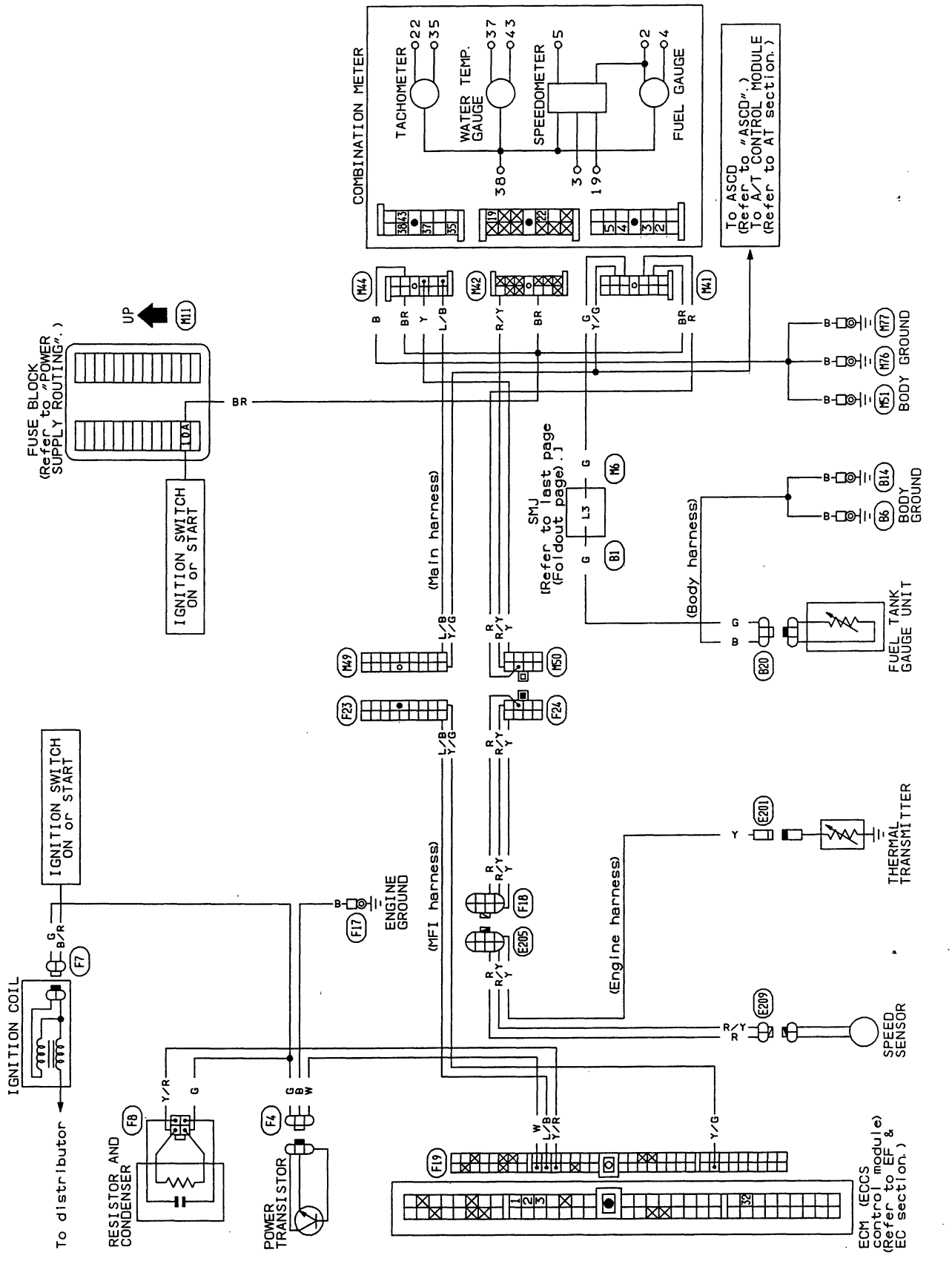
AEL120A

Combination Meter (Cont'd)



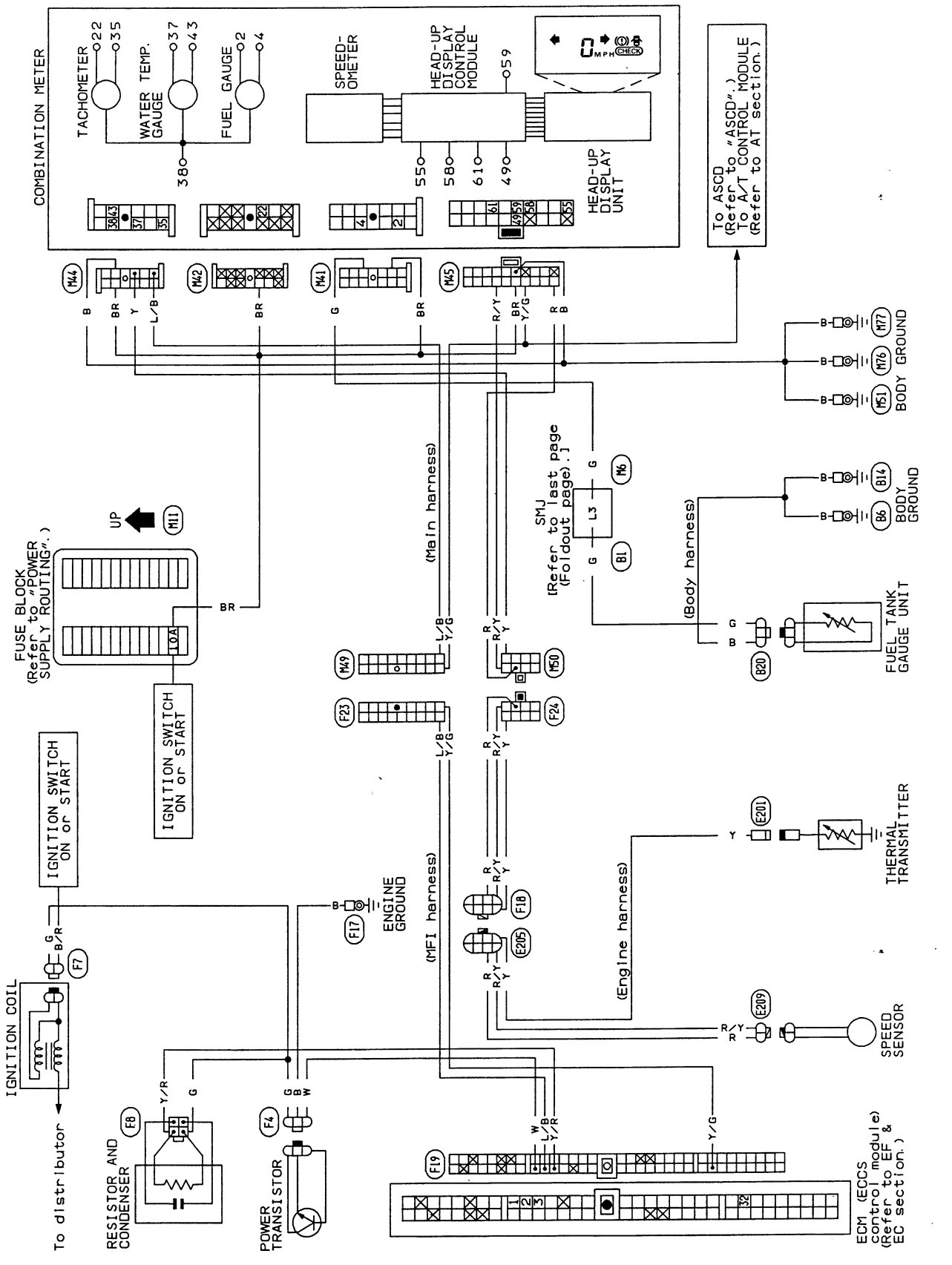
AEL120B

Speedometer, Tachometer, Temp. and Fuel Gauges/Wiring Diagram



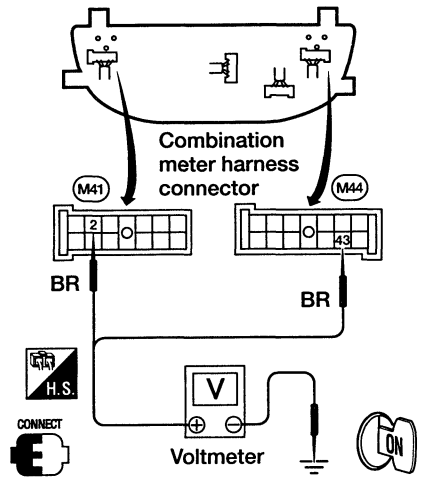
MEL326B

Speedometer, Tachometer, Temp. and Fuel Gauges/Wiring Diagram



MEL327B

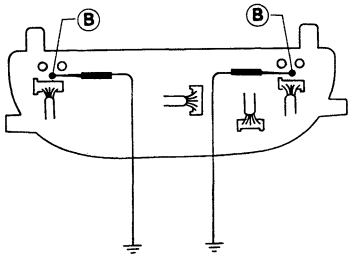
A



② : Fuel gauge
㊸ : Water temperature gauge

AEL228

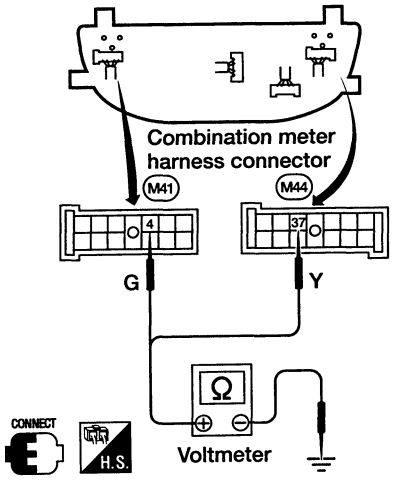
B



Ⓑ : Fuel gauge
Ⓑ' : Water temperature gauge

MEL352B

C



④ : Fuel gauge
㊲ : Water temperature gauge

AEL229

Inspection/Fuel Gauge and Water Temperature Gauge

INSPECTION START

A

CHECK POWER SOURCE.
1) Turn ignition switch "ON".
2) Check voltage between terminal ②, ㊸ and ground.
Battery positive 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. ↓

B

CHECK GAUGE OPERATION.
1) Turn ignition switch "ON".
2) Connect terminal Ⓑ, Ⓑ' 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. ↓

C

Check harness continuity between component and combination meter ④, ㊲.

N.G. → Repair or replace.

O.K. ↓

CHECK COMPONENT.
Check gauge units and harness.
Perform "Fuel Tank Gauge Unit Check" and "Thermal Transmitter Check".
Refer to EL-48.

N.G. → Repair or replace.
Refer to FE section ("Fuel Pump and Gauge", "FUEL SYSTEM").

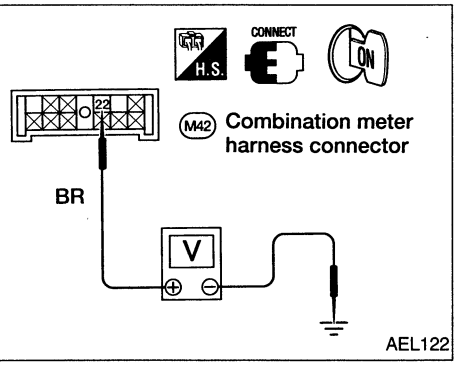
O.K. ↓

Reinstall any part removed.

↓

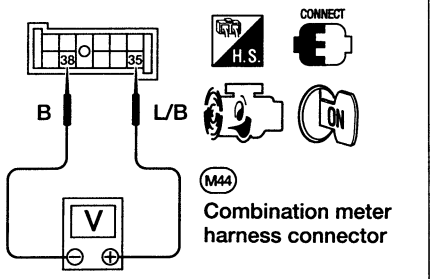
INSPECTION END

A



AEL122

B



AEL123

Inspection/Tachometer

INSPECTION START

A

CHECK POWER SOURCE.
1) Turn ignition switch "ON".
2) Check voltage between terminal (22) 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.

B

CHECK ECM OUTPUT.
1) Start engine.
2) Check voltage between terminals (35) and (38) at idle and 2,000 rpm.
Higher rpm = Higher voltage
Lower rpm = Lower voltage
Voltage should change with rpm.

N.G. → Check harness and connector between ECM and combination meter, or check ground.

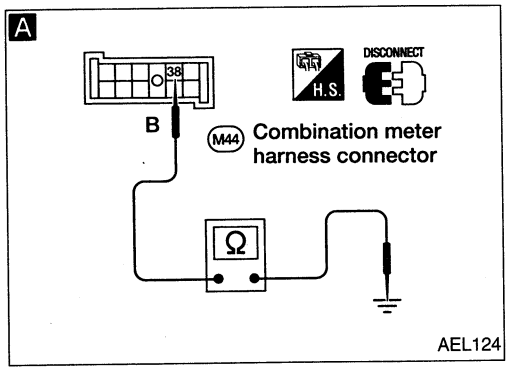
O.K.

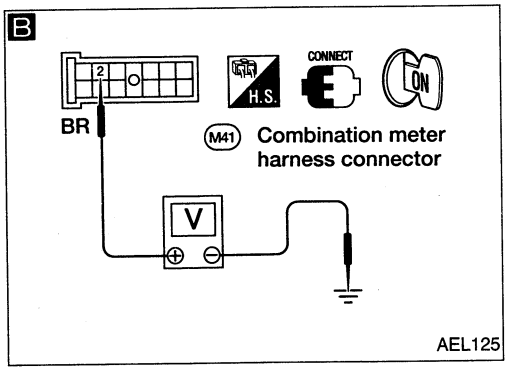
Replace tachometer.

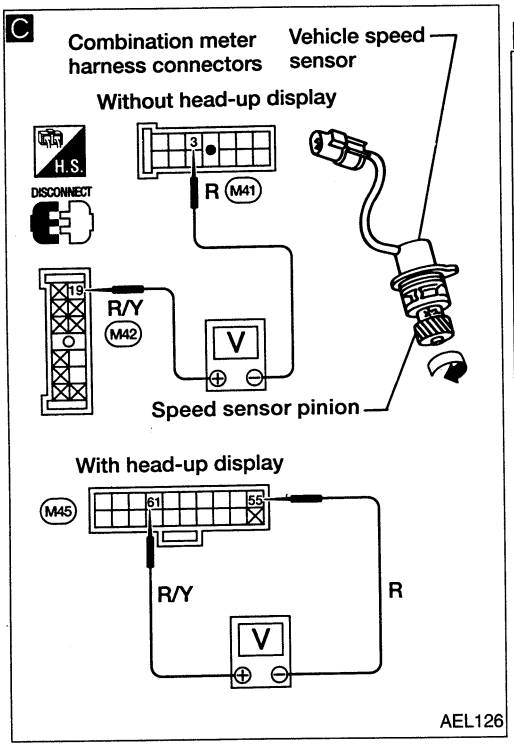
INSPECTION END

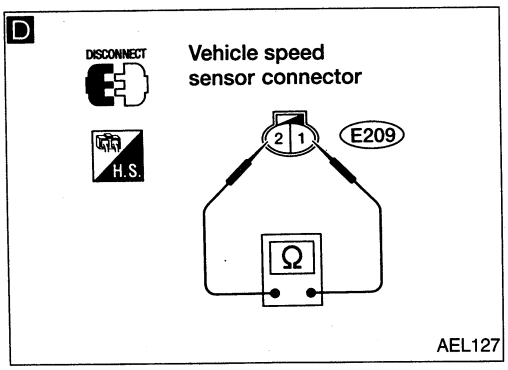
Inspection/Speedometer and Vehicle Speed Sensor

SYMPTOM: Speedometer stays at 0 km/h (0 MPH).









INSPECTION START

A

CHECK GROUND CIRCUIT OF SPEEDOMETER.
Check continuity between terminal (38) and body ground.
Continuity should exist.

N.G. → Repair harness or connector.

O.K.

B

CHECK SPEEDOMETER CIRCUIT.
1) Turn ignition switch "ON".
2) Check voltage between terminal (2) and body ground.
Battery voltage should exist.

N.G. → Repair harness or connector.

O.K.

C

CHECK VEHICLE SPEED SENSOR OUTPUT.
1) Remove vehicle speed sensor from transaxle.
2) (Without head-up display)
Check voltage between terminal (3) and (19) while quickly turning speed sensor pinion.
(With head-up display)
Check voltage between terminal (55) and (61) while quickly turning speed sensor pinion.
Voltage: Approx. 0.5V

O.K. → Replace speedometer.

N.G.

D

CHECK VEHICLE SPEED SENSOR.
Check resistance between terminals (1) and (2).
Resistance: Approx. 250Ω.

N.G. → Replace vehicle speed sensor.

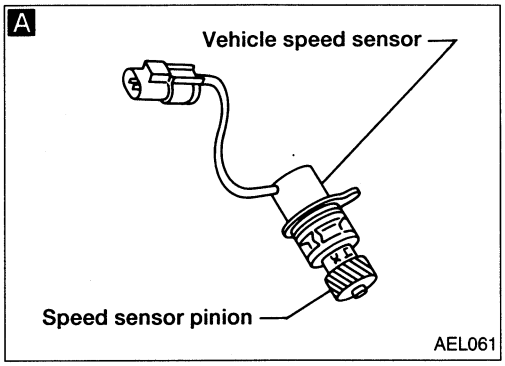
O.K.

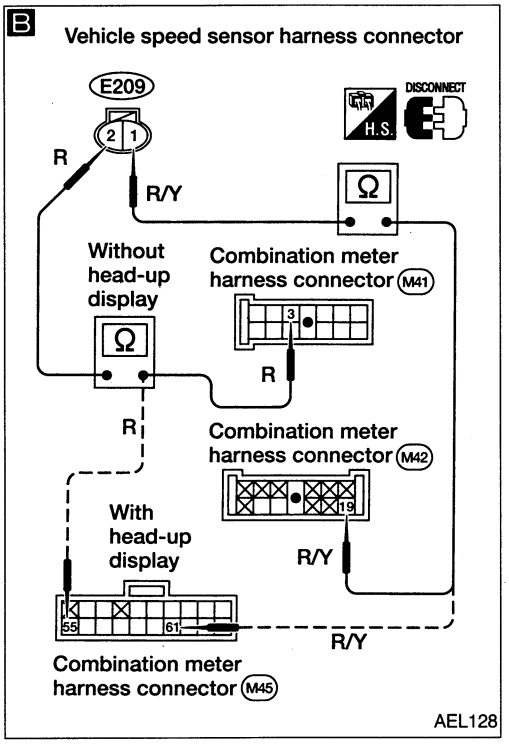
Repair harness or connector between speedometer and vehicle speed sensor.

INSPECTION END

Inspection/Speedometer and Vehicle Speed Sensor (Cont'd)

SYMPTOM: Speedometer indication flutters.





INSPECTION START

↓

Is vehicle speed sensor installed properly? Check looseness and so on. — N.G. → Install vehicle speed sensor properly.

↓ O.K.

A

Do you feel resistance when turning vehicle speed sensor pinion? — No → Replace vehicle speed sensor.

↓ Yes

B

(Without head-up display)
Check continuity between speedometer terminal ⑲ and vehicle speed sensor terminal ①, and between ③ and ②.
(With head-up display)
Check continuity between speedometer terminal ⑥① and vehicle speed sensor terminal ①, and between ⑤⑤ and ②.
Continuity should exist. — N.G. → Repair harness and connector.

↓ O.K.

Replace speedometer.

Inspection/Speedometer and Fuse

SYMPTOM: Speedometer does not go back to 0 km/h (0 MPH).

INSPECTION START

↓

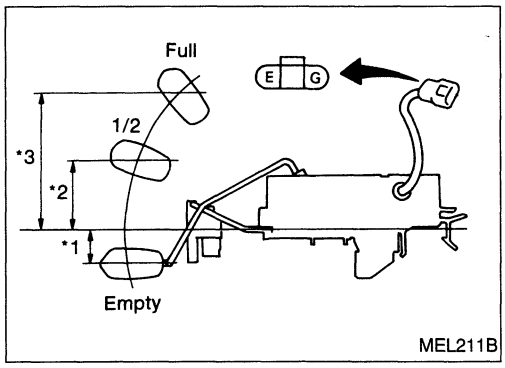
Check fuse related to speedometer. — N.G. → Replace fuse.

↓ O.K.

Drive at over 80 km/h (50 MPH).

↓ N.G.

Replace speedometer.

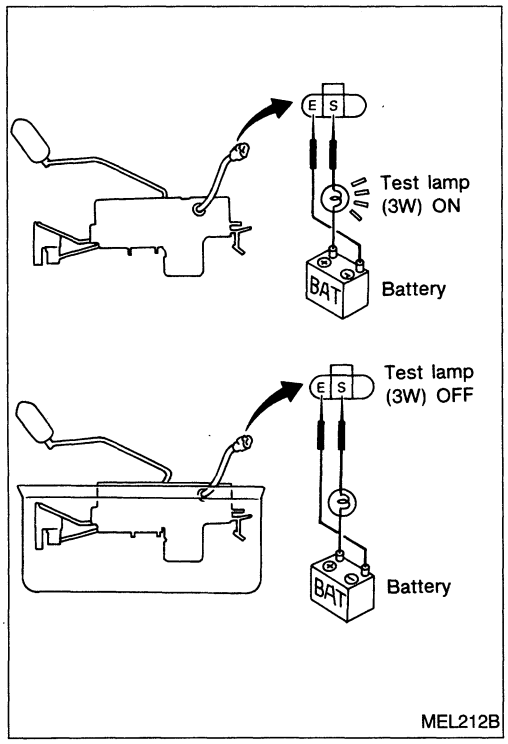


Fuel Tank Gauge Unit Check

- For removal, refer to FE section ("Fuel Pump and Gauge", "FUEL SYSTEM").

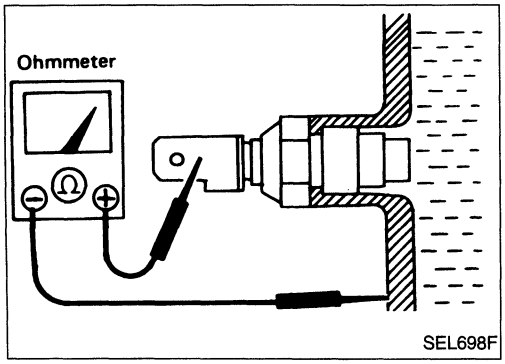
Check the resistance between terminals (G) and (E).

Ohmmeter (+)	Ohmmeter (−)	Float position	mm (in)		Resistance value (Ω)
G	E	*3	Full	80.5 (3.169)	Approx. 4.5 - 6
		*2	1/2	29.4 (1.157)	Approx. 31.5 - 33.5
		*1	Empty	19.0 (0.748)	Approx. 80 - 83



Fuel Warning Lamp Sensor Check

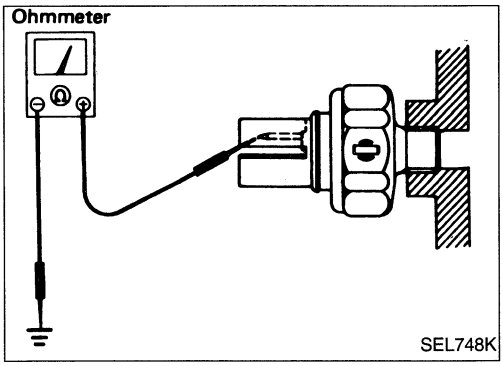
- It will take a short time for the bulb to light.

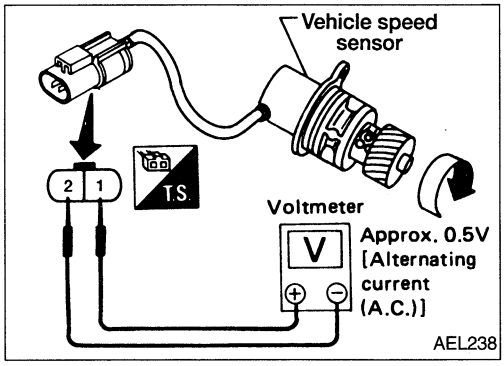


Thermal Transmitter Check

Check the resistance between the terminals of thermal transmitter and body ground.

Water temperature	Resistance
60°C (140°F)	Approx. 70 - 90Ω
100°C (212°F)	Approx. 21 - 24Ω





Oil Pressure Switch Check

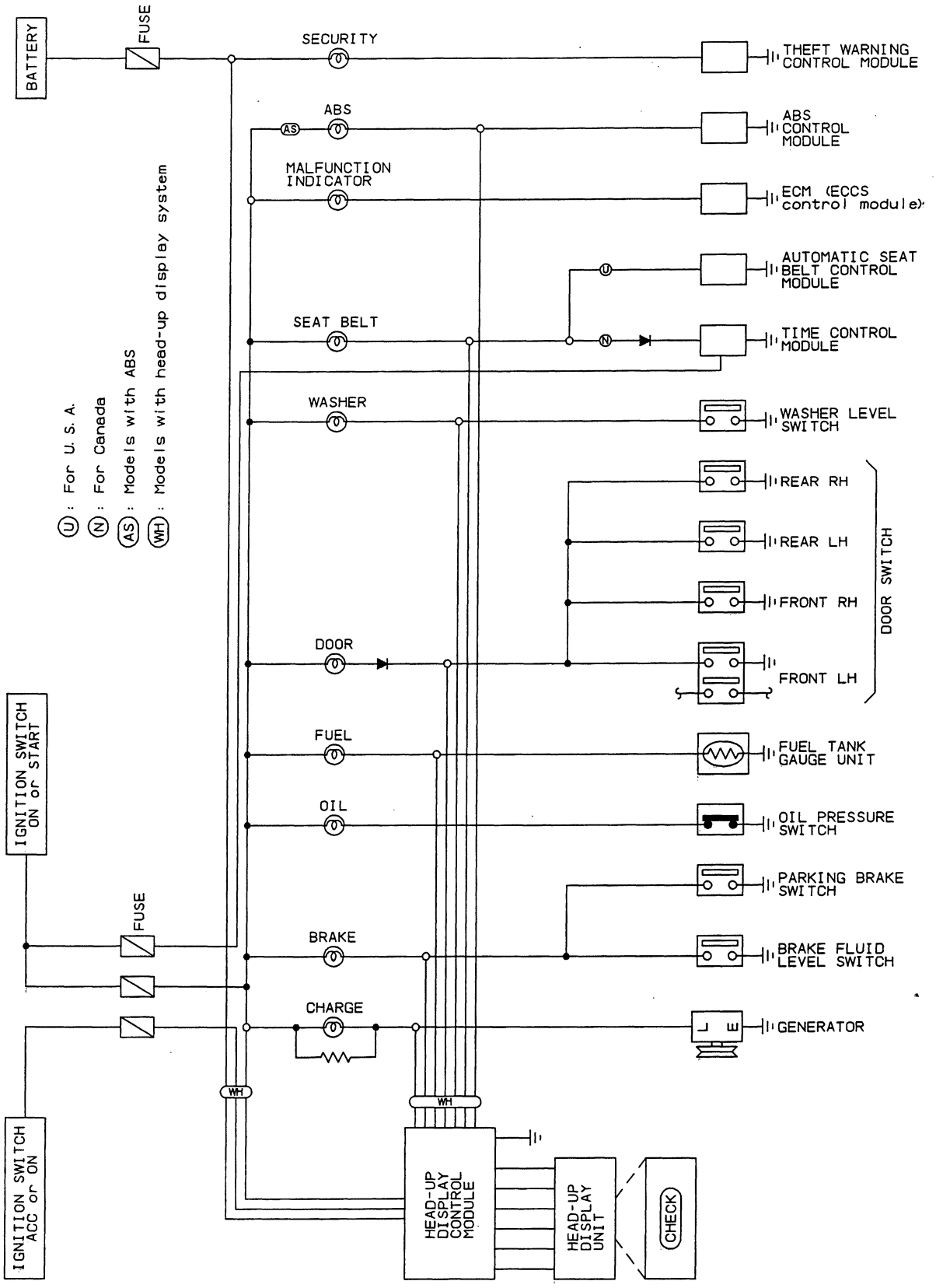
	Oil pressure kPa (kg/cm^2, psi)	Continuity
Engine start	More than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	NO
Engine stop	Less than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	YES

Check the continuity between the terminals of oil pressure switch and body ground.

Vehicle Speed Sensor Signal Check

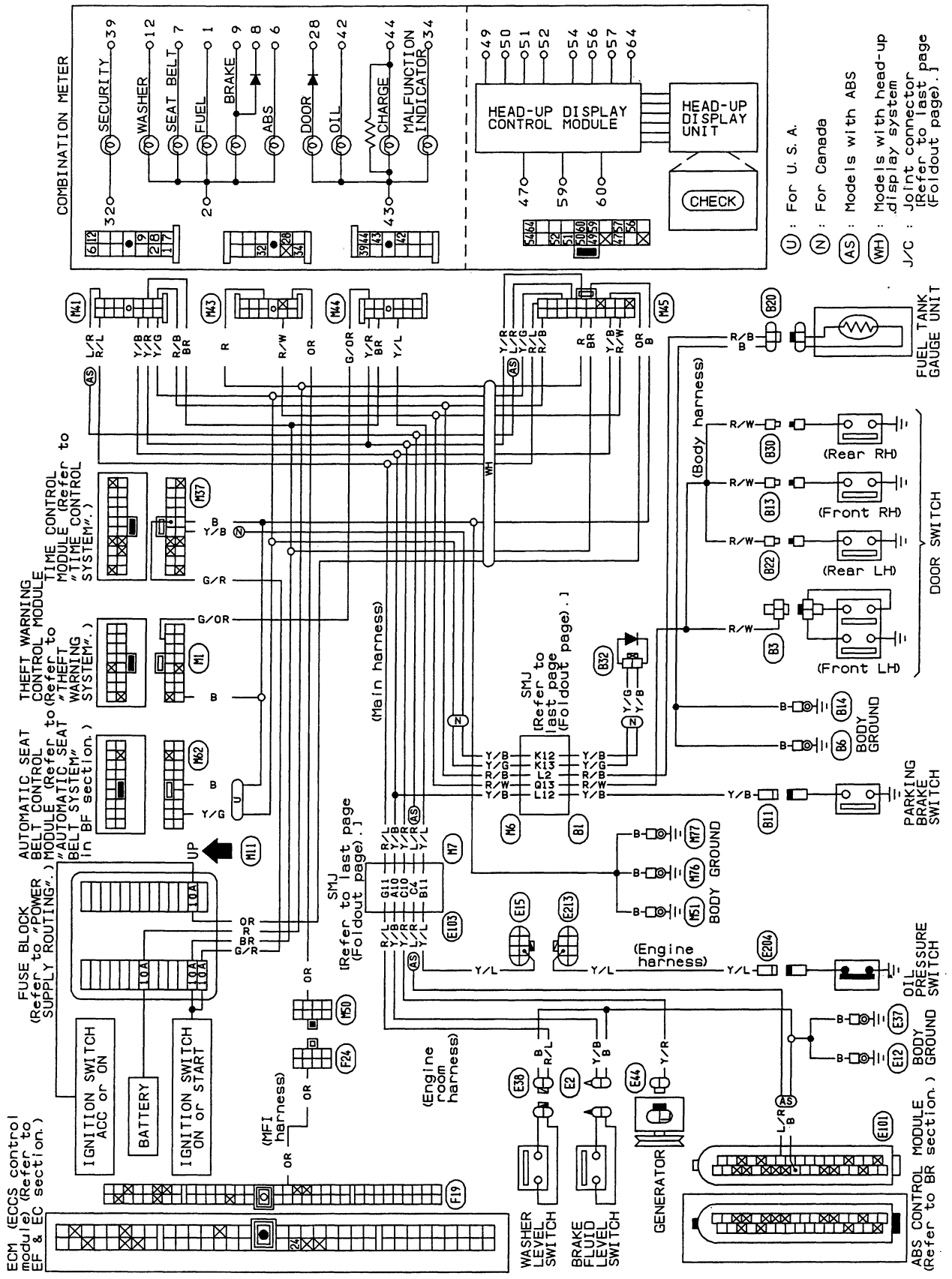
1. Remove vehicle speed sensor from transaxle.
2. Turn speedometer pinion quickly and measure voltage across ① and ②.

Warning Lamps/Schematic



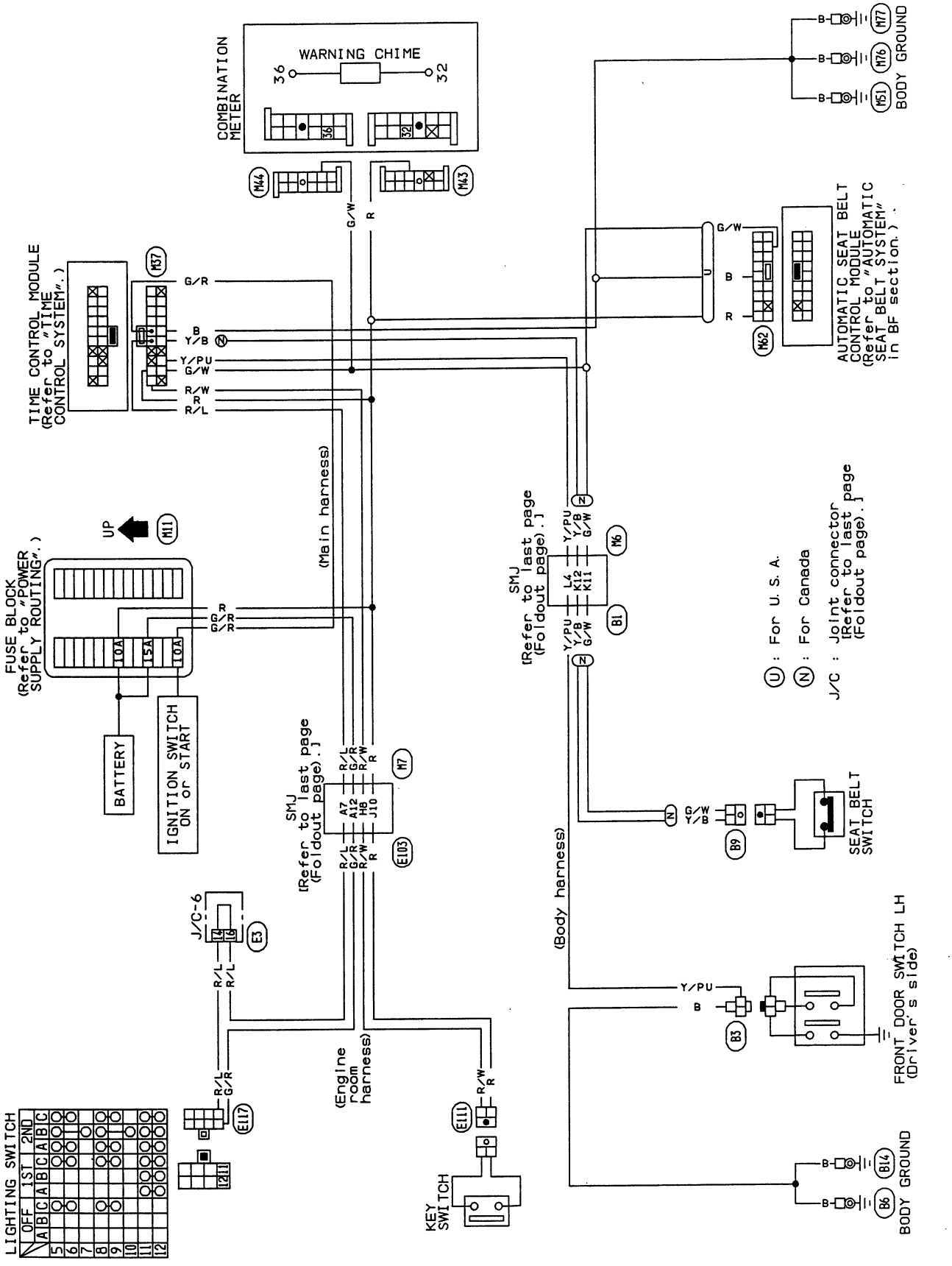
MEL328B

Warning Lamps/Wiring Diagram

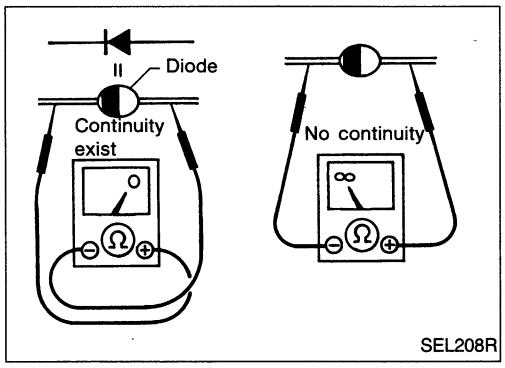


MEL329B

Warning Chime/Wiring Diagram

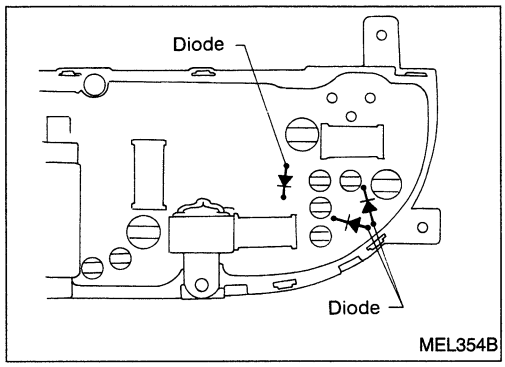


MEL330B



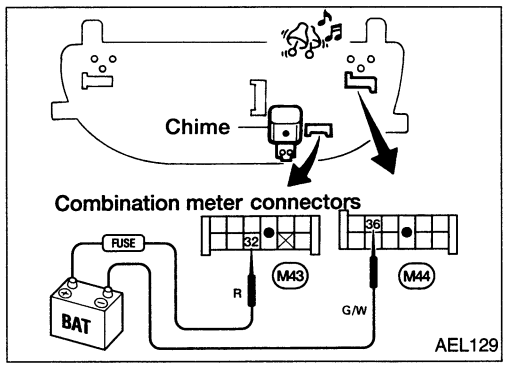
Diode Check

- 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 EL-39 and EL-40.



Warning Chime Check

Description

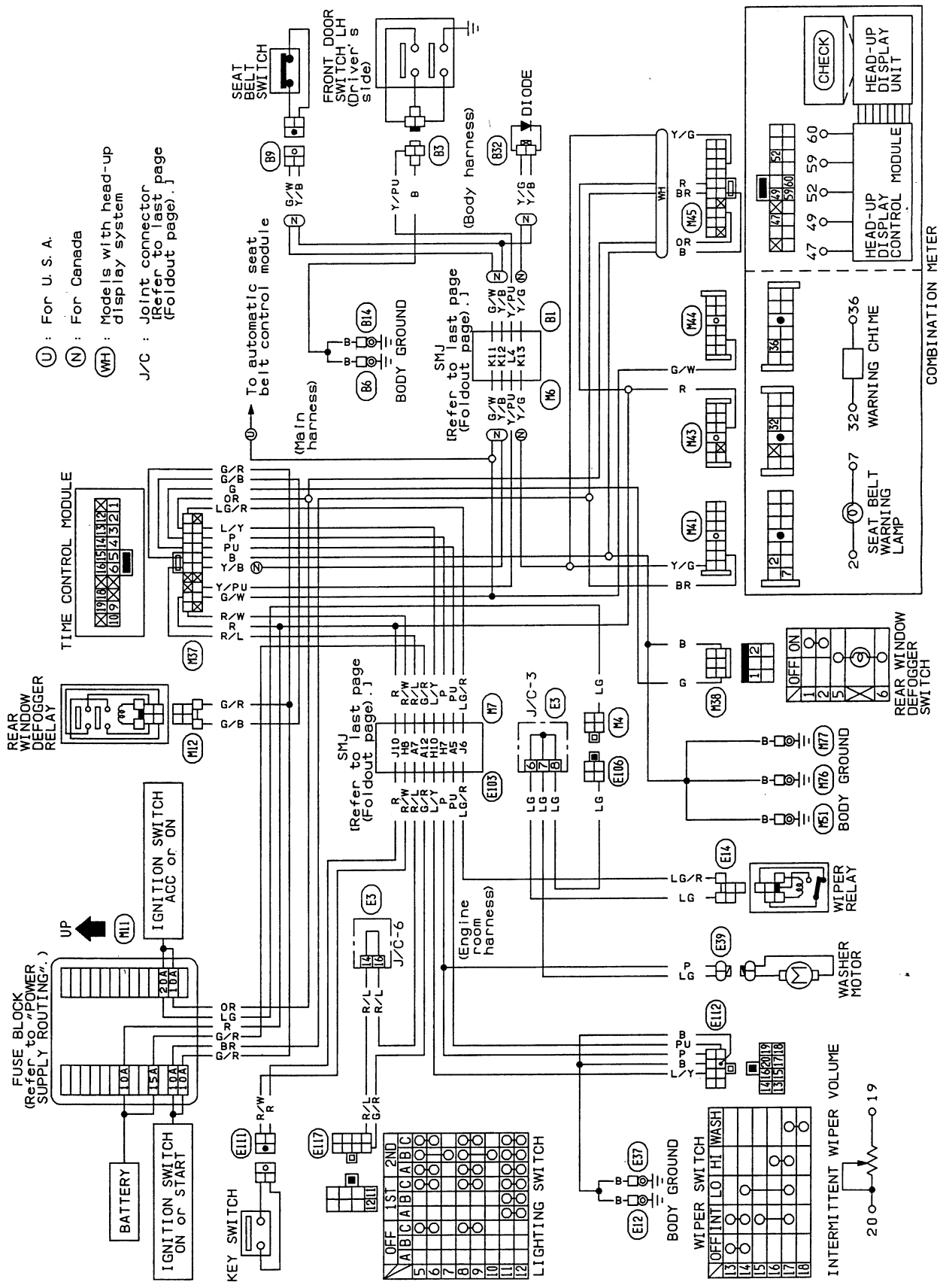
FUNCTION

- Time control module has the following functions.

Item		Details of control
1, 2	Intermittent wiper control	Regulates intermittent time from approximately 1 to 20 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 lighting 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.

*: Vehicles without automatic seat belt system.

Wiring Diagram



MEL331B

Trouble Diagnoses

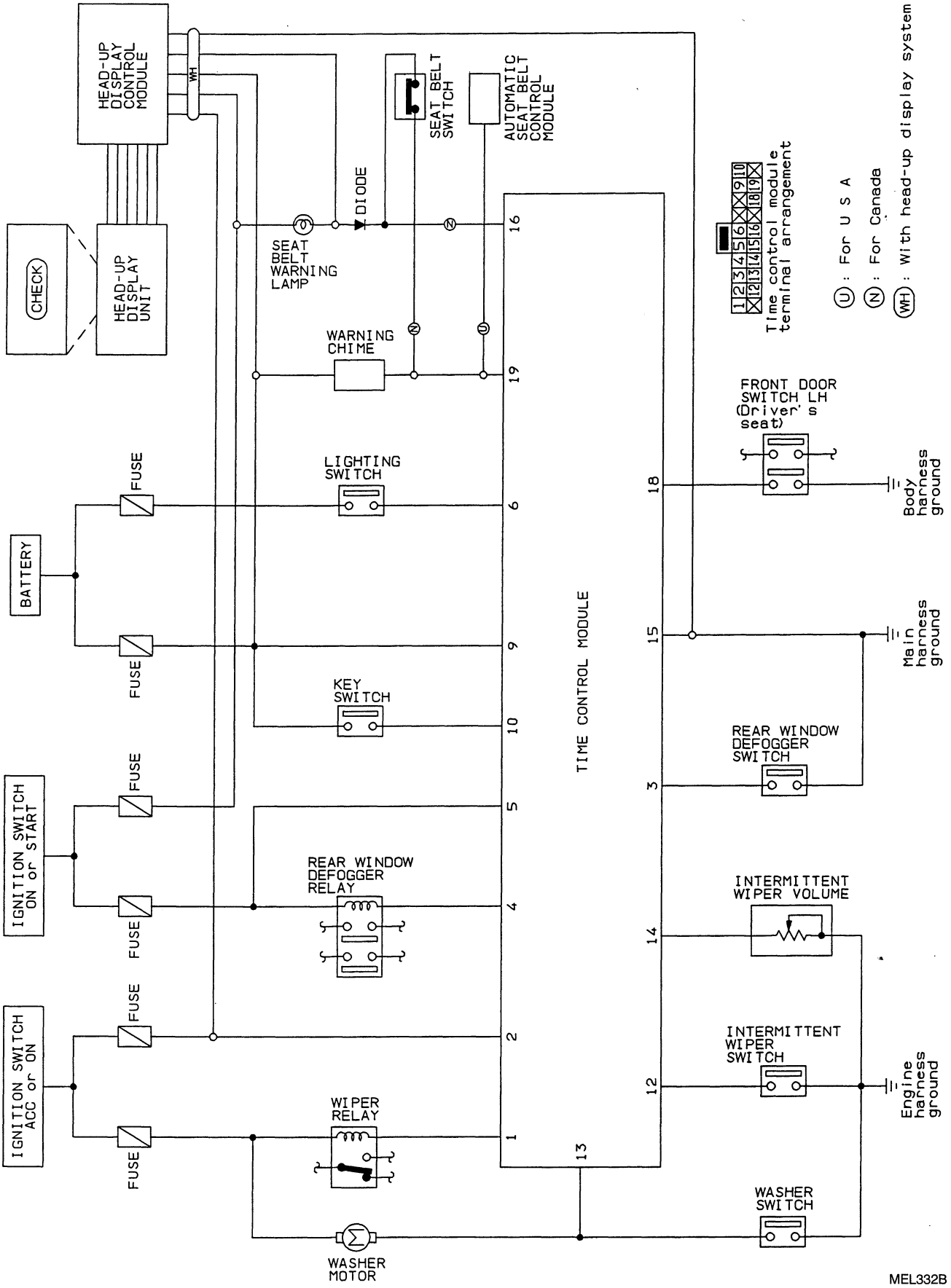
SYMPTOM CHART

PROCEDURE		Preliminary Check			Main Power Supply and Ground Circuit Check	Diagnostic Procedure							
REFERENCE PAGE		EL-58	EL-58	EL-58	EL-59	EL-60	EL-61	EL-61	EL-62	EL-63	EL-64	EL-65	EL-65
SYMPTOM		Preliminary check 1	Preliminary check 2	Preliminary check 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
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.				○								○

*: Vehicles without automatic seat belt system.

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



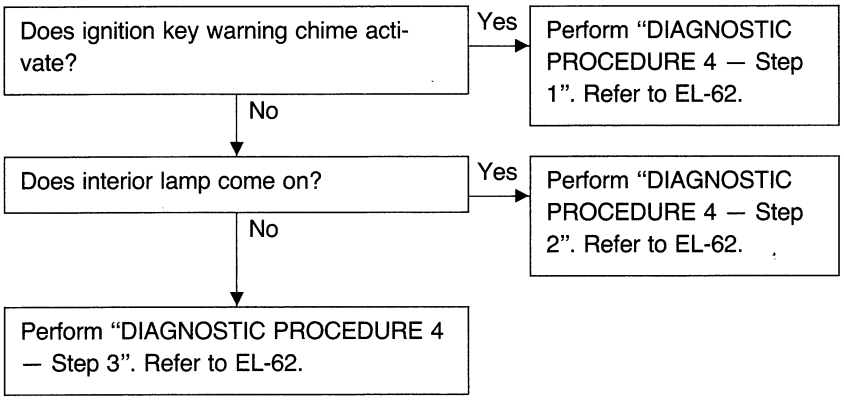
MEL332B

Trouble Diagnoses (Cont'd)

PRELIMINARY CHECK

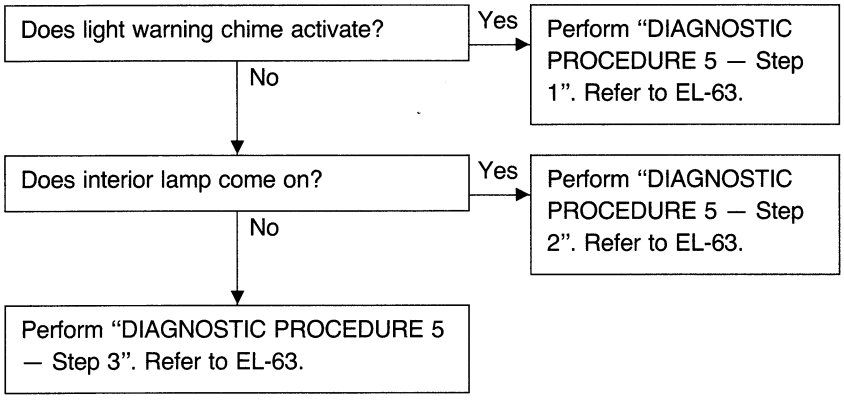
Preliminary check 1

- **Light warning chime does not activate.**



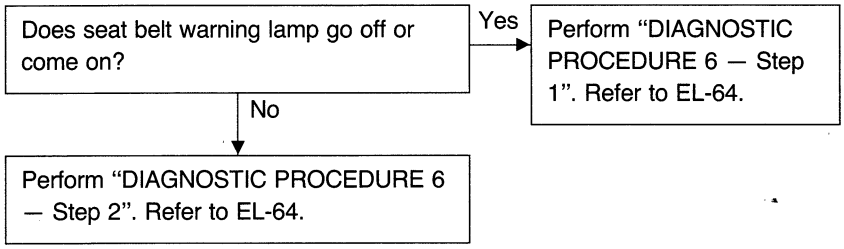
Preliminary check 2

- **Ignition key warning chime does not activate.**



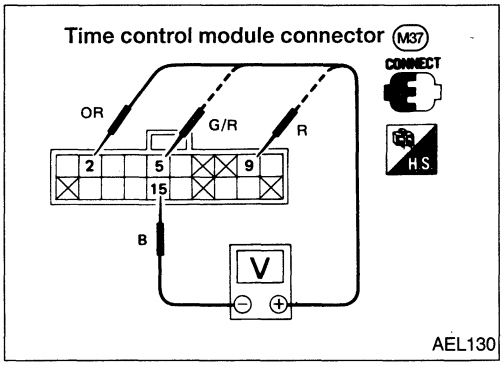
Preliminary check 3

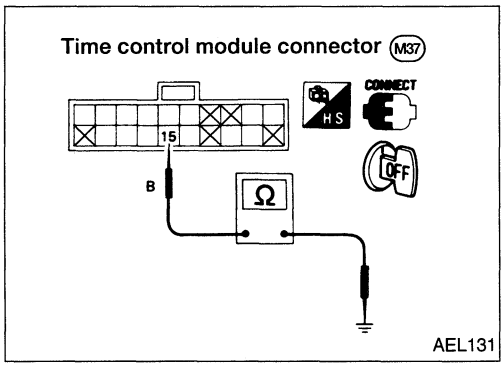
- **Seat belt warning chime does not activate.**



Trouble Diagnoses (Cont'd)

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK





Main power supply

Terminals	Battery positive 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

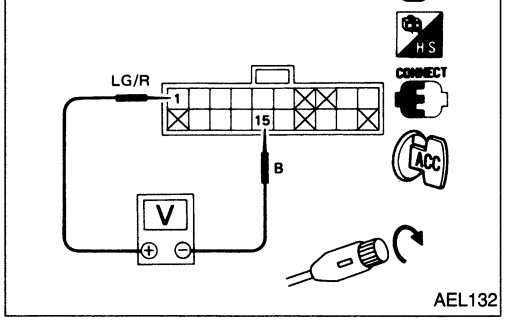
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: Intermittent wiper does not operate.

A

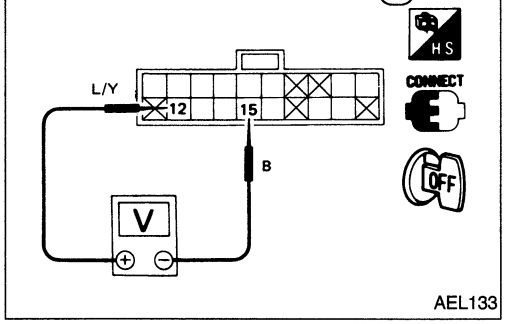
Time control module connector (M37)



AEL132

B

Time control module connector (M37)



AEL133

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 module 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 EL-66.

O.K. → Check wiper relay circuit.

N.G. → Replace wiper relay.

N.G.

B

INTERMITTENT SWITCH INPUT SIGNAL CHECK

Measure voltage between control module 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 control module and wiper switch.

O.K.

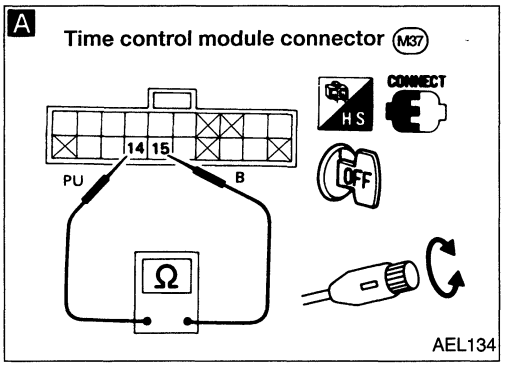
Replace control module.

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 module harness terminals ⑭ and ⑮ while turning intermittent wiper volume.

Position of wiper knob	Resistance [Ω]
S	0
L	Approx. 1 k

O.K. → **TRY A KNOWN GOOD CONTROL MODULE.***

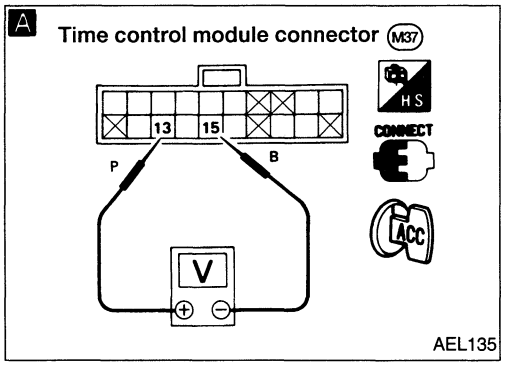
N.G. →

Check intermittent wiper volume.
Check harness continuity between control module and wiper switch.

DIAGNOSTIC PROCEDURE 3

SYMPTOM: Wiper and washer activate individually but not in combination.

A



WASHER SWITCH INPUT SIGNAL CHECK

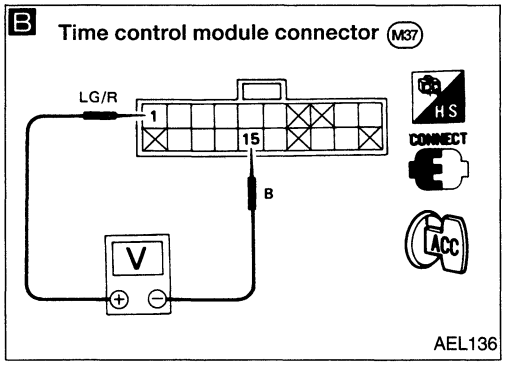
1) Turn ignition switch to "ACC".
2) Measure voltage between control module harness terminals ⑬ and ⑮.

Condition of washer switch	Voltage [V]
OFF	Approx. 12
ON	0

N.G. → Check harness continuity between control module and washer switch.

O.K. ↓

B



TIME CONTROL MODULE SIGNAL CHECK

Measure voltage between control module harness terminals ① and ⑮ after operating washer switch.

0V for approx. 3 seconds after washer has operated.

N.G. → **TRY A KNOWN GOOD CONTROL MODULE.***

O.K. ↓

Check wiper relay and circuit.

N.G. → Repair wiper circuit or replace wiper relay.

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

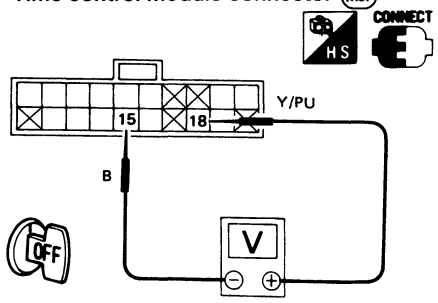
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Light warning chime does not activate.

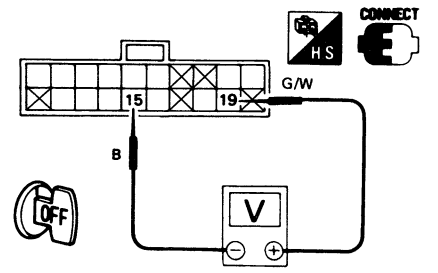
- Perform "PRELIMINARY CHECK — Procedure 1" before referring to the following flow chart.

A Time control module connector (M37)



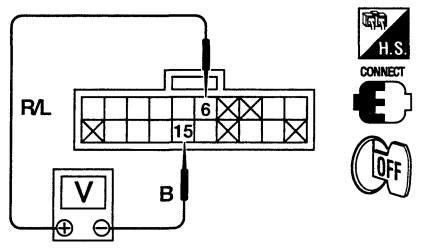
AEL137

B Time control module connector (M37)



AEL138

C Time control module connector (M37)



AEL139

A

Step 3

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control module 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 control module and door switch.

O.K. ↓

B

Step 2

CHIME OUTPUT SIGNAL CHECK
Measure voltage between control module 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 control module and chime.

N.G. ↓

C

Step 1

LIGHTING SWITCH INPUT SIGNAL CHECK
Measure voltage between control module harness terminals (6) and (15).

Condition	Voltage [V]
Lighting switch is ON	Approx. 12
Lighting switch is OFF	0

N.G. → Check lighting switch. Check harness continuity between control module and lighting switch.

O.K. ↓

TRY A KNOWN GOOD CONTROL MODULE.*

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

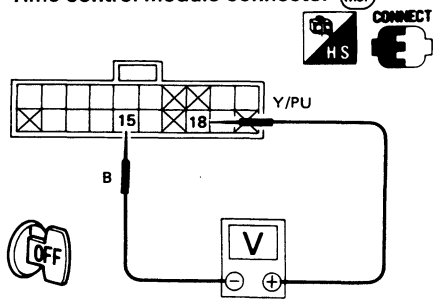
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: Ignition key warning chime does not activate.

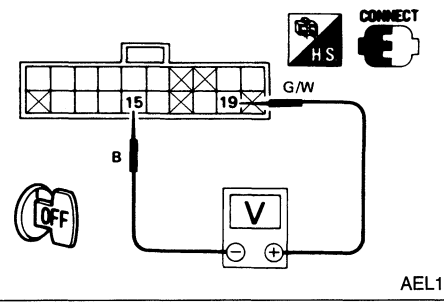
- Perform "PRELIMINARY CHECK — Procedure 2" before referring to the following flow chart.

A Time control module connector (M37)



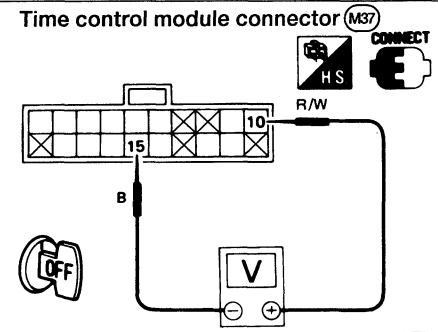
AEL140

B Time control module connector (M37)



AEL141

C Time control module connector (M37)



AEL142

A

Step 3

DOOR SWITCH INPUT SIGNAL CHECK
Measure voltage between control module 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 control module and door switch.

O.K. ↓

B

Step 2

CHIME OUTPUT SIGNAL CHECK
Measure voltage between control module 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 control module and chime.

N.G. ↓

C

Step 1

IGNITION KEY SWITCH INPUT SIGNAL CHECK
Measure voltage between control module harness terminals ⑩ and ⑮.

Condition	Voltage [V]
Key is inserted	Approx. 12
Key is pulled	0

N.G. → Check ignition key switch. Check harness continuity between control module and ignition key switch.

O.K. ↓

TRY A KNOWN GOOD CONTROL MODULE.*

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

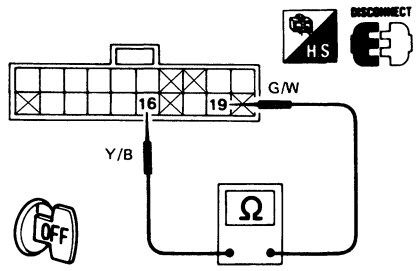
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 6

SYMPTOM: Seat belt warning chime does not activate.

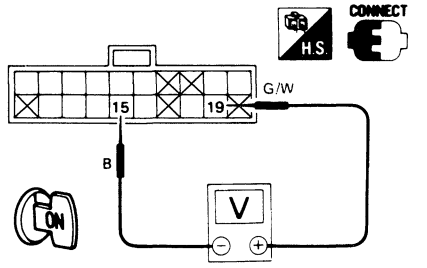
- Perform "PRELIMINARY CHECK — Procedure 3" before referring to the following flow chart.

A Time control module connector (M37)



AEL143

B Time control module connector (M37)



AEL144

A

Step 2

SEAT BELT SWITCH INPUT SIGNAL CHECK

Check continuity between control module harness terminals (16) and (19).

Condition	Continuity
Unfastened	Yes
Fastened	No

N.G. → Check seat belt switch. Check harness continuity between control module and seat belt switch.

O.K. ↓

B

Step 1

CHIME OUTPUT SIGNAL CHECK

1) Connect control module harness connector.
2) Turn ignition switch "ON".
3) Measure voltage between control module 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 control module and chime.

N.G. ↓

TRY A KNOWN GOOD CONTROL MODULE.*

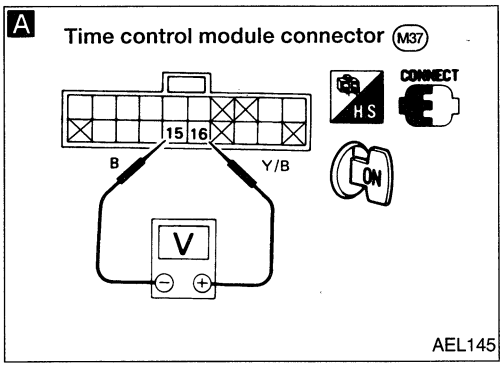
*: Time control module may be the cause of a problem, but this is rarely the case.

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 control module harness connector.
2) Turn ignition switch "ON", after connecting control module 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 control module and warning lamp.

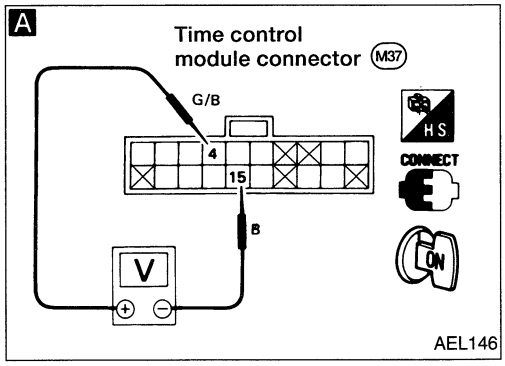
No ↓

TRY A KNOWN GOOD CONTROL MODULE.*

DIAGNOSTIC PROCEDURE 8

SYMPTOM: Rear defogger does not activate, or does not go off after activating.

A



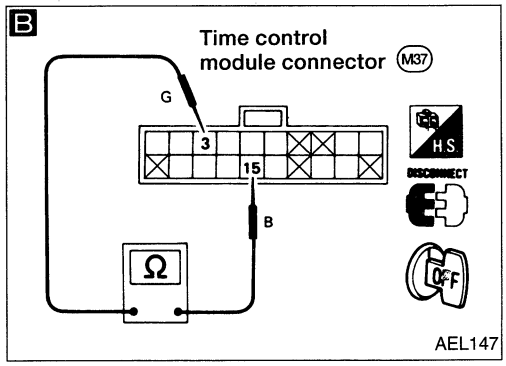
REAR WINDOW DEFOGGER OUTPUT SIGNAL CHECK
Measure voltage between control module harness terminals (4) and (15).

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 control module harness connector.
2) Check continuity between control module harness terminals (3) and (15).

Condition of defogger switch	Continuity
Defogger switch is "OFF"	No
Defogger switch is "ON"	Yes

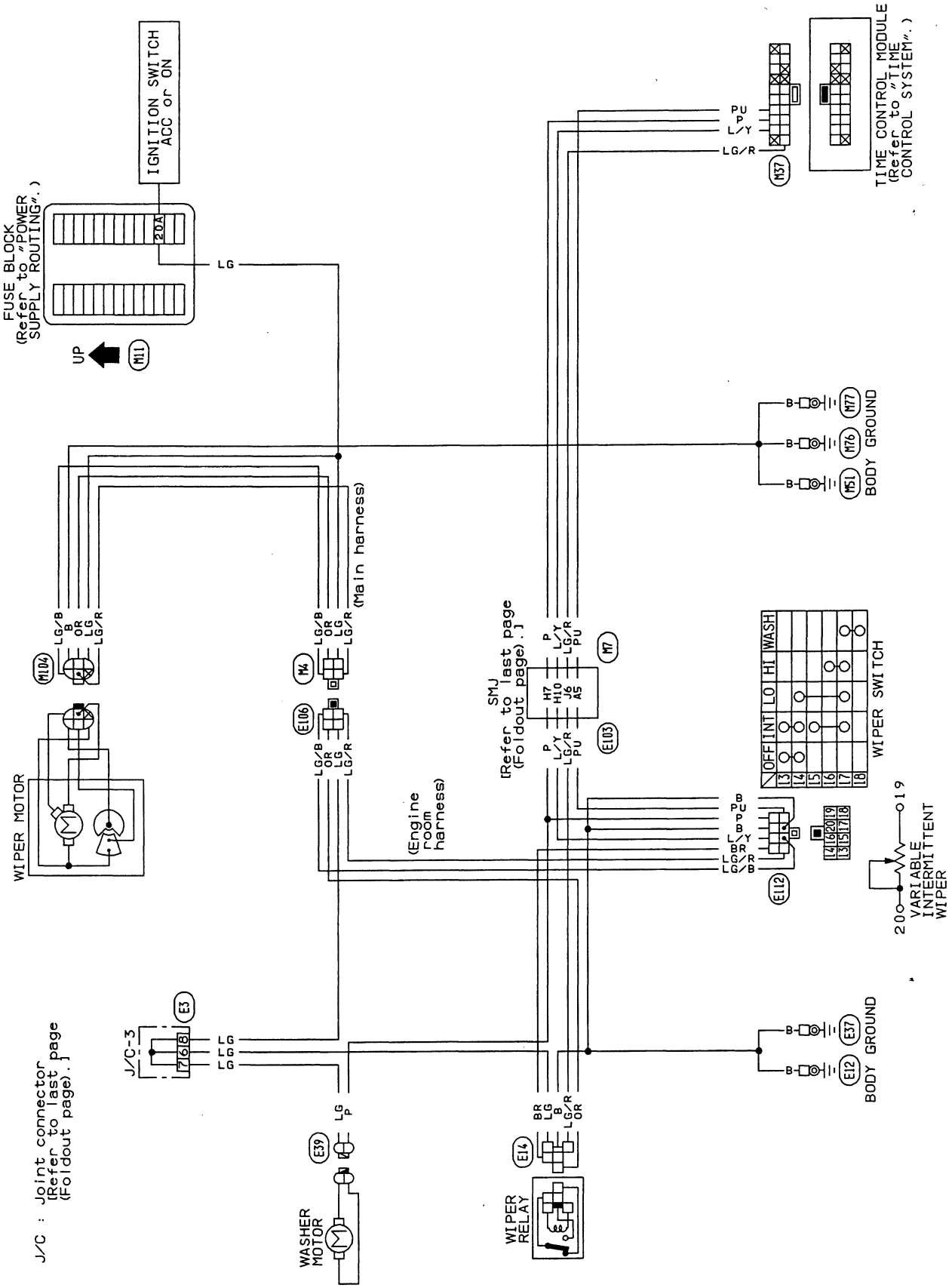
N.G. → Check rear window defogger switch.
Check harness continuity between control module and rear window defogger switch.

O.K. ↓

TRY A KNOWN GOOD CONTROL MODULE.*

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

Front Wiper and Washer/Wiring Diagram



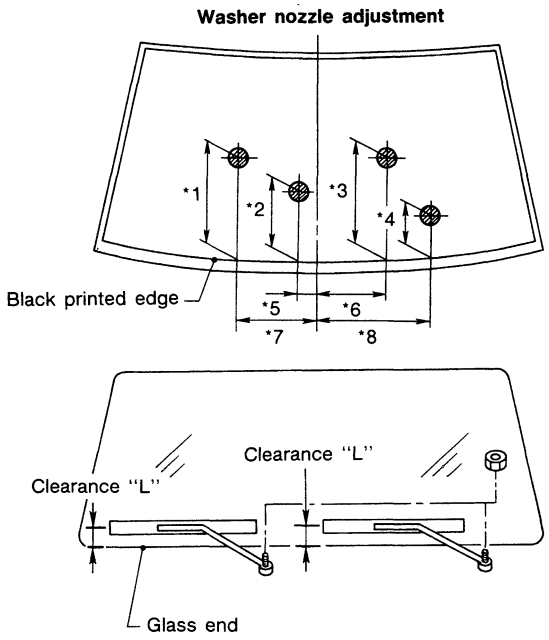
MEL333B

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" 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".
   Clearance "L": 27 - 41 mm (1.06 - 1.61 in)

- Tighten windshield wiper arm nuts to specified torque.
  Windshield wiper:
  21 - 26 N·m (2.1 - 2.7 kg-m, 15 - 20 ft-lb)

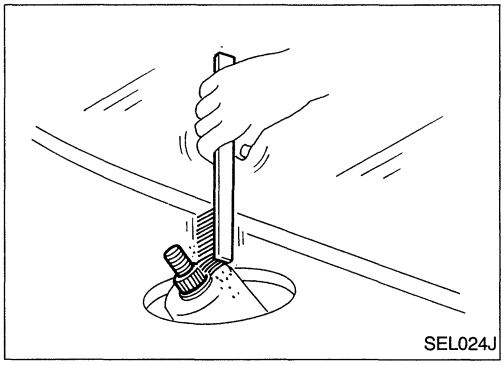
Windshield wiper and washer



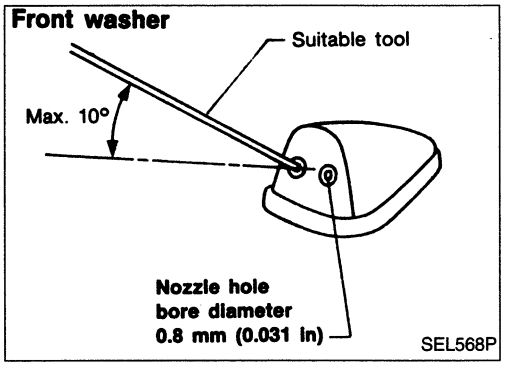
*1	350 (13.78)
*2	190 (7.48)
*3	320 (12.60)
*4	135 (5.31)
*5	135 (5.31)
*6	230 (9.06)
*7	275 (10.83)
*8	440 (17.32)

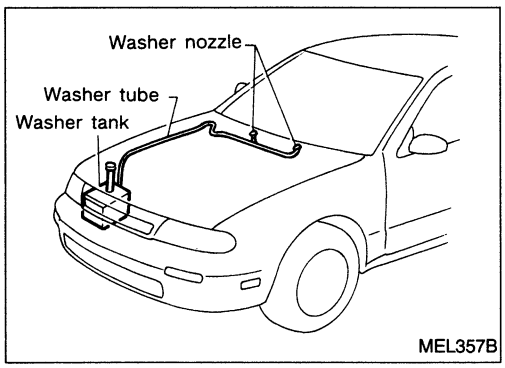
Unit: mm (in)

MEL356B



- **Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**

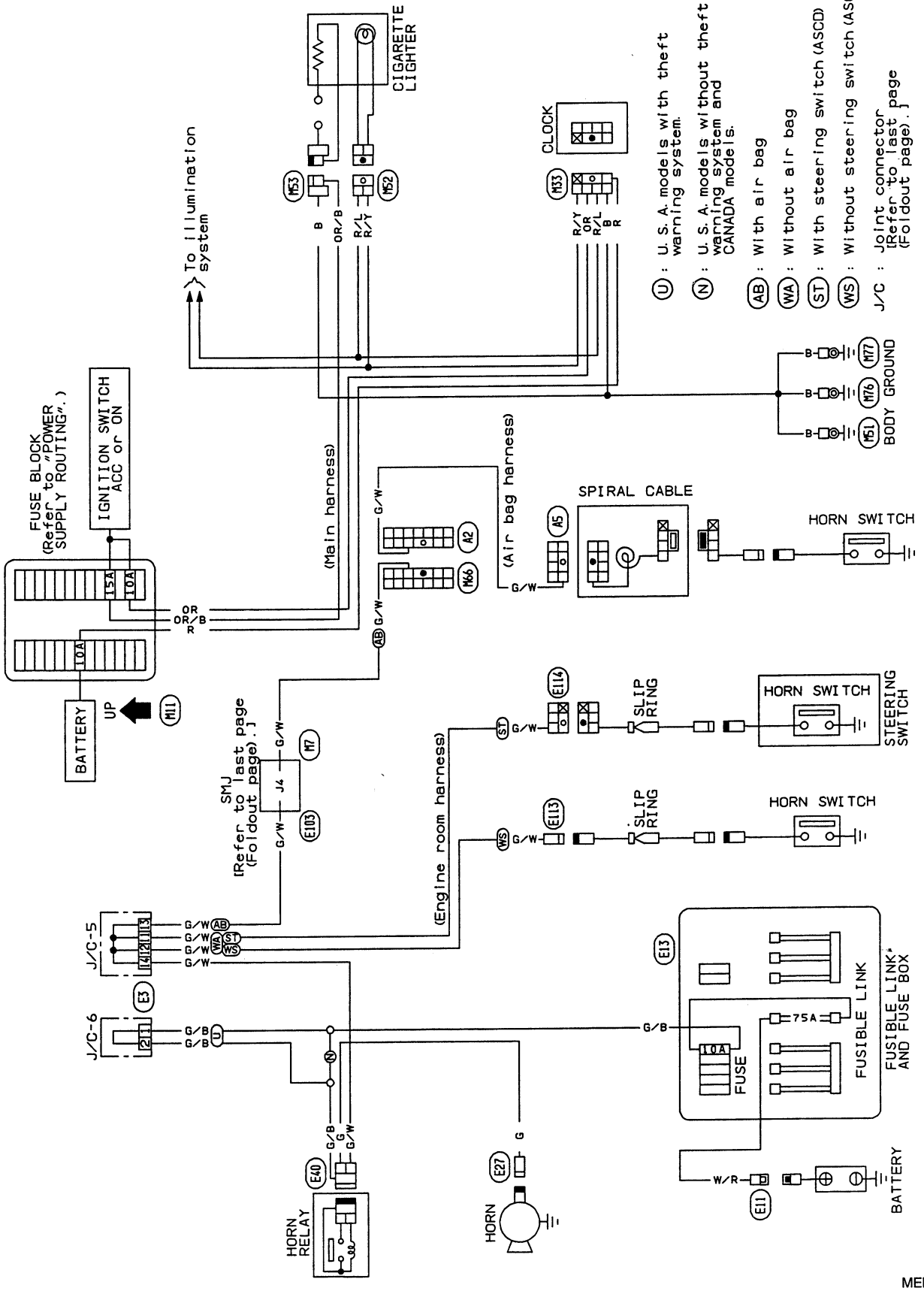




Washer Nozzle Adjustment

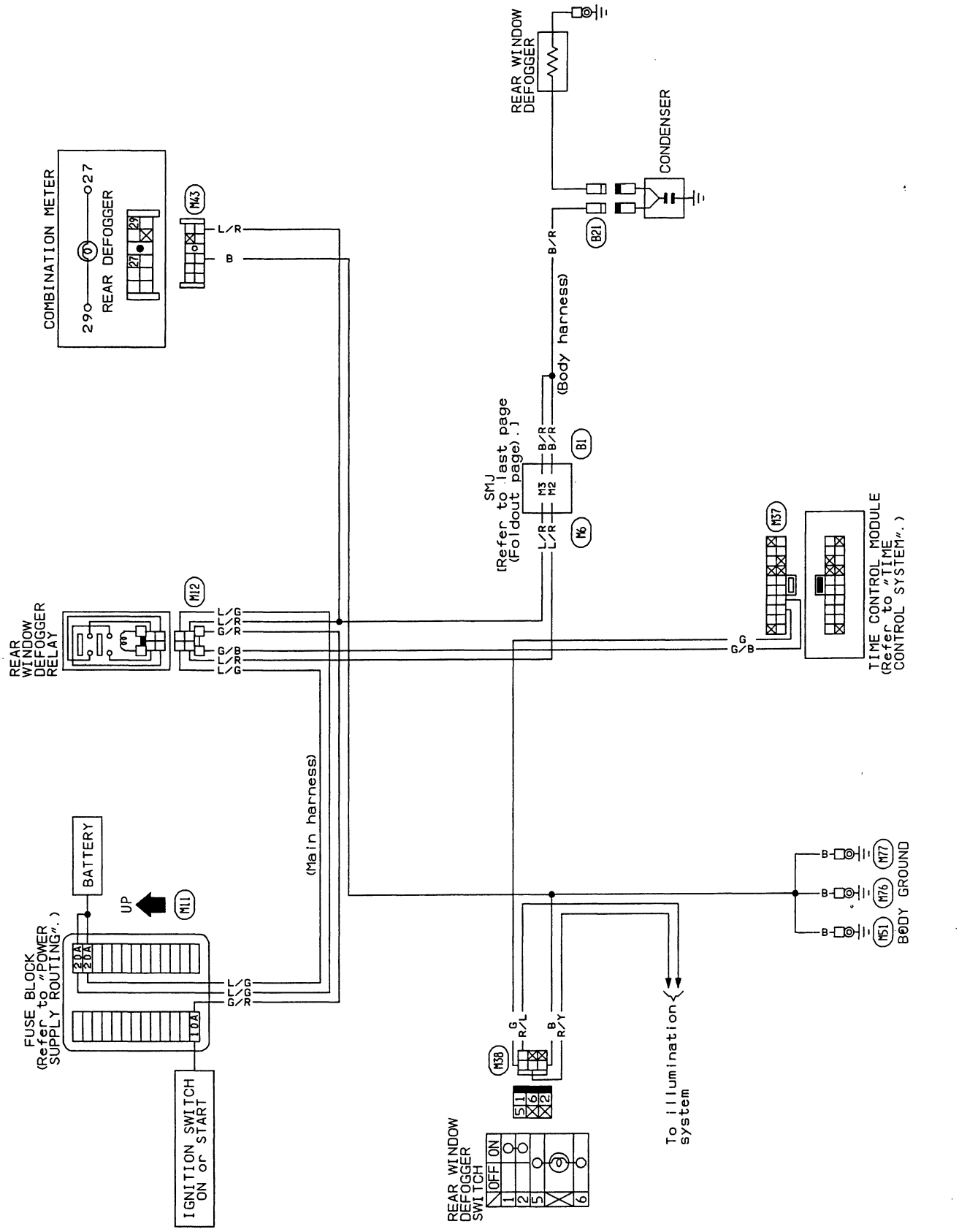
- Adjust washer nozzle with suitable tool as shown in the figure at left.
  Adjustable range: ±10°

Wiring Diagram

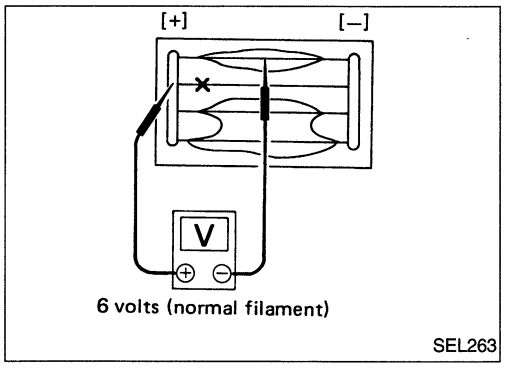


MEL334B

Wiring Diagram

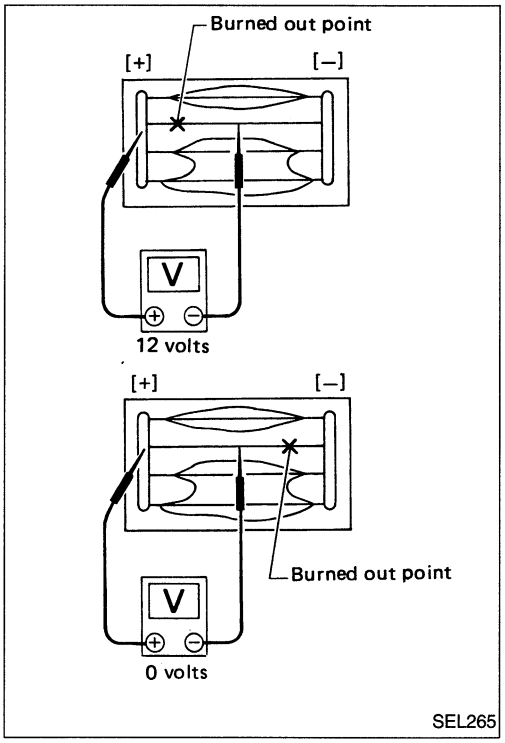


MEL335B

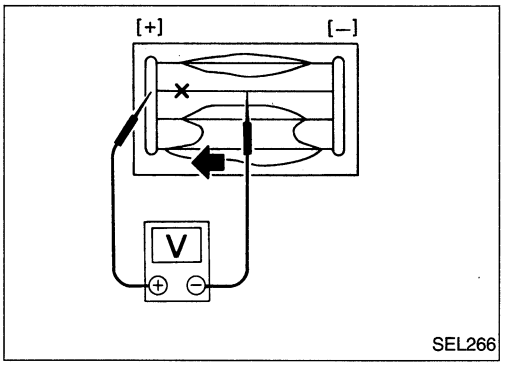


Filament Check

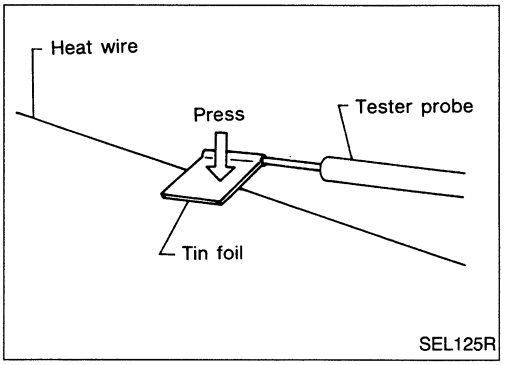
1. Attach probe circuit tester (in volt range) to middle portion of each filament.



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.

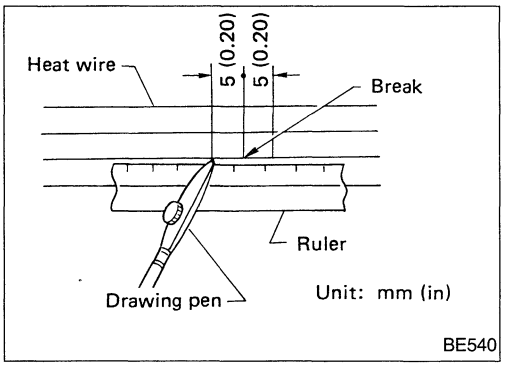


- **When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger.**

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



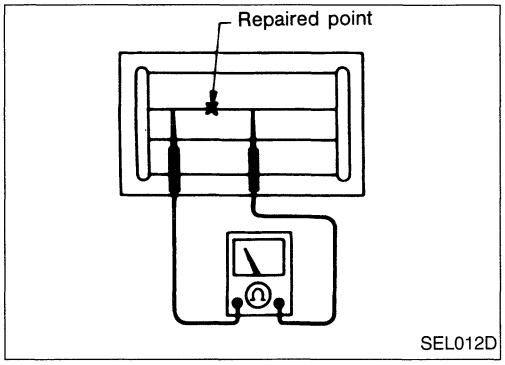
REPAIRING PROCEDURE

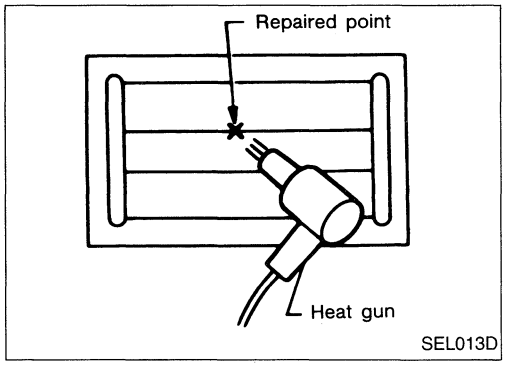
1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

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.

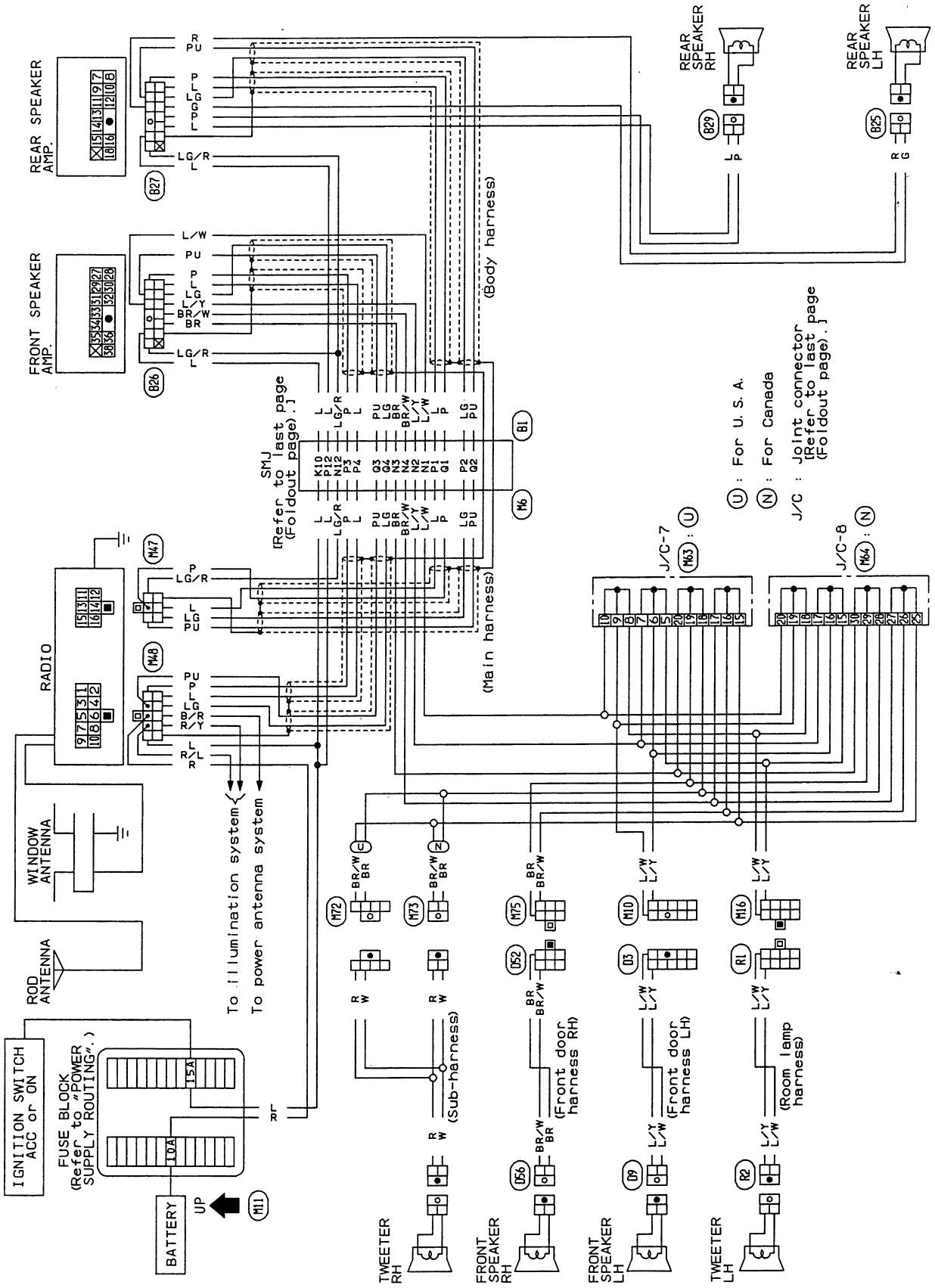




5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

Audio/Wiring Diagram

ACTIVE SPEAKER SYSTEM



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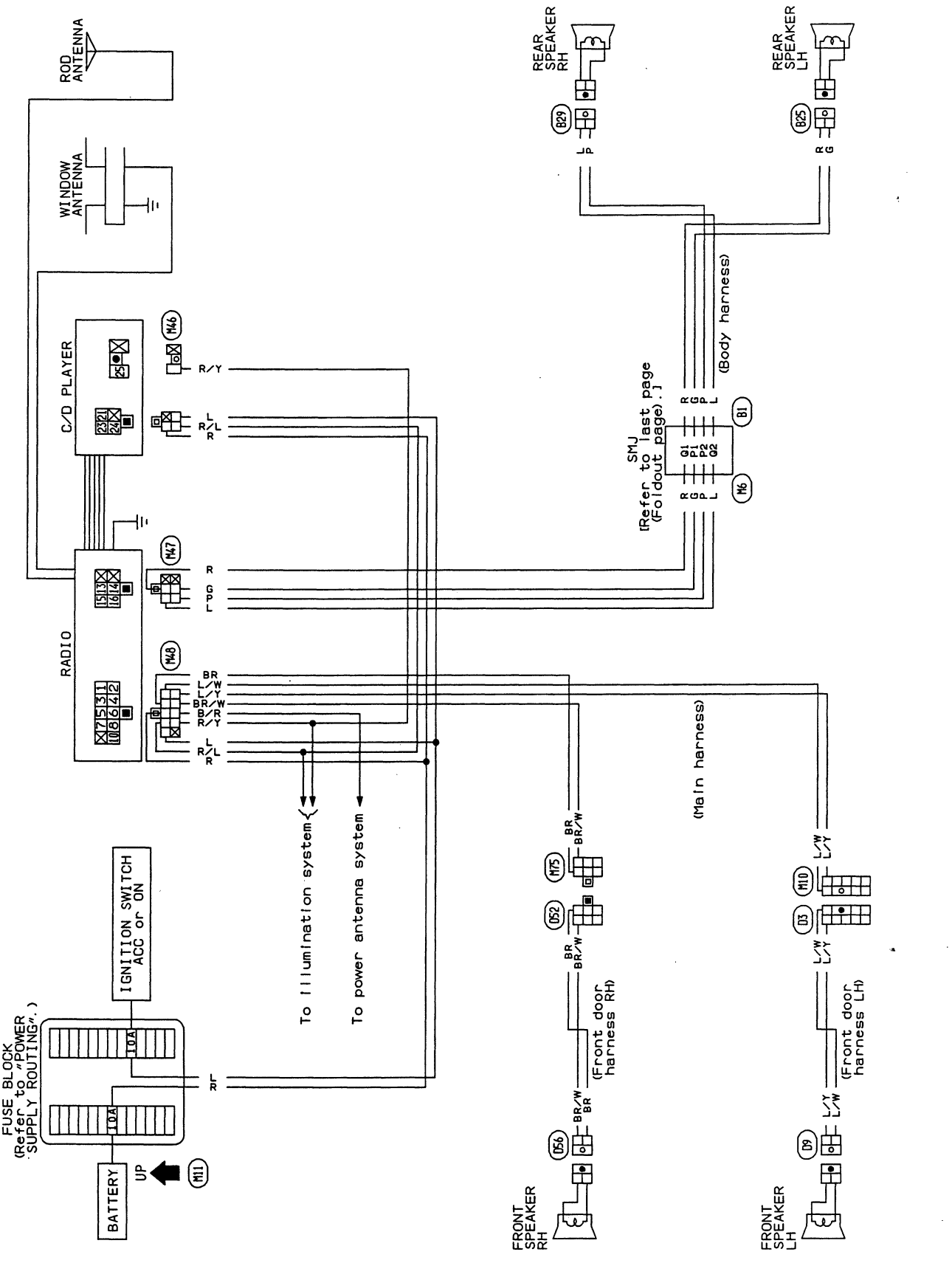
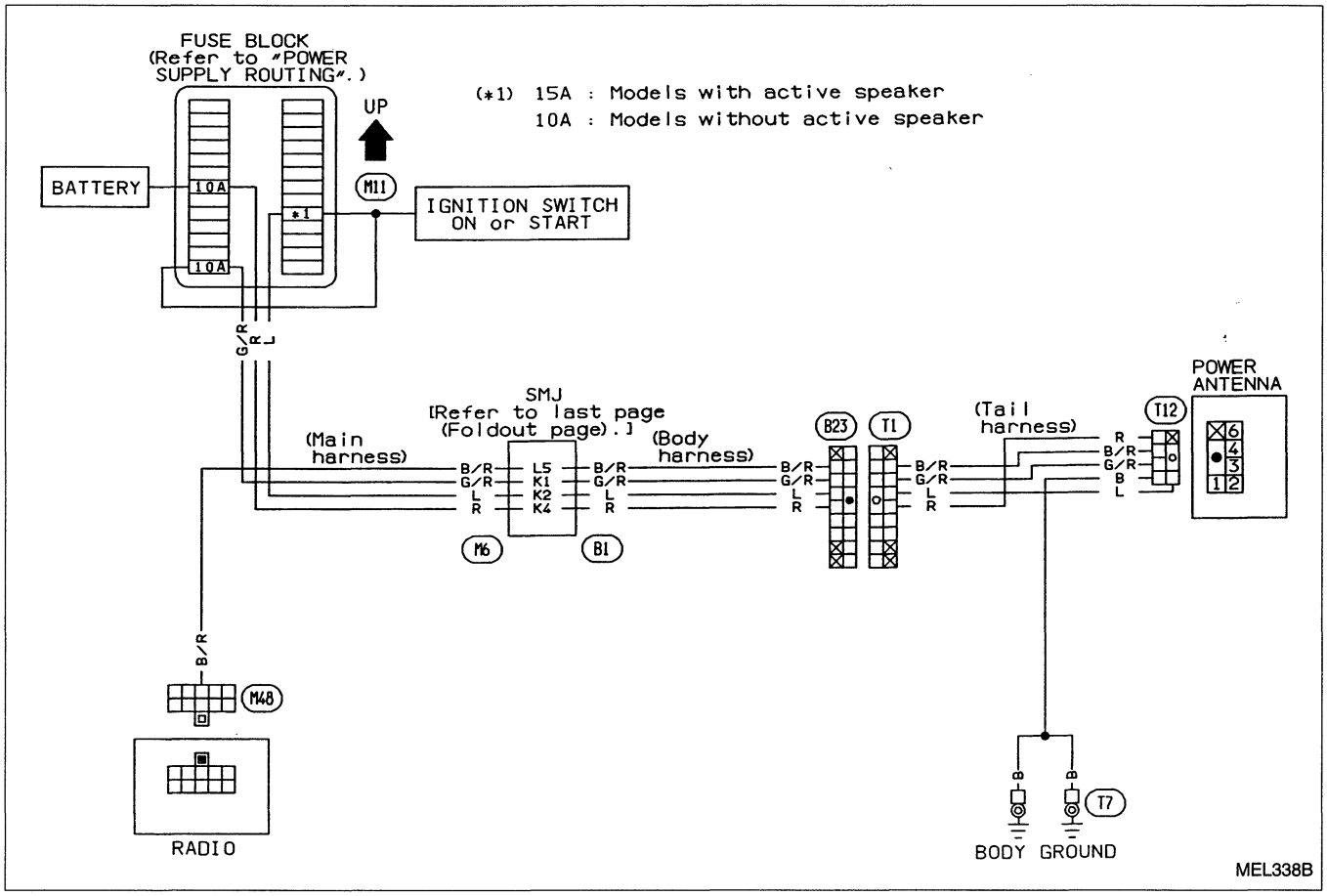
Audio/Wiring Diagram (Cont'd)

EXCEPT ACTIVE SPEAKER SYSTEM

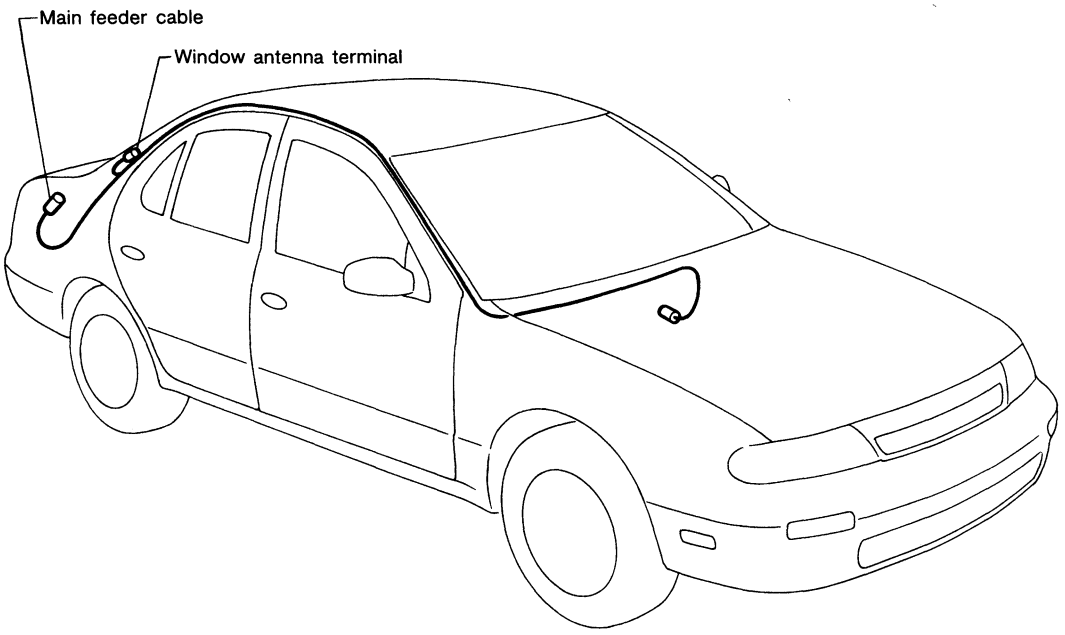


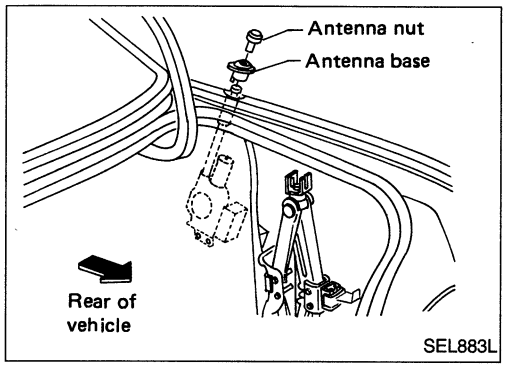
MEL337B

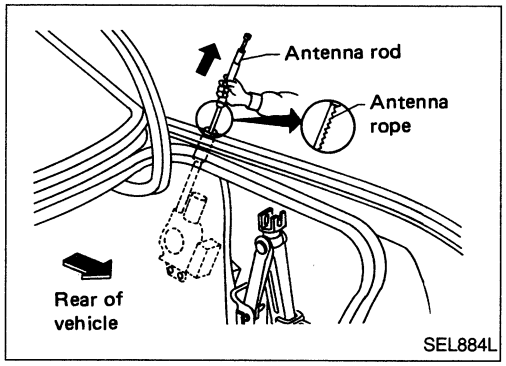
Power Antenna/Wiring Diagram

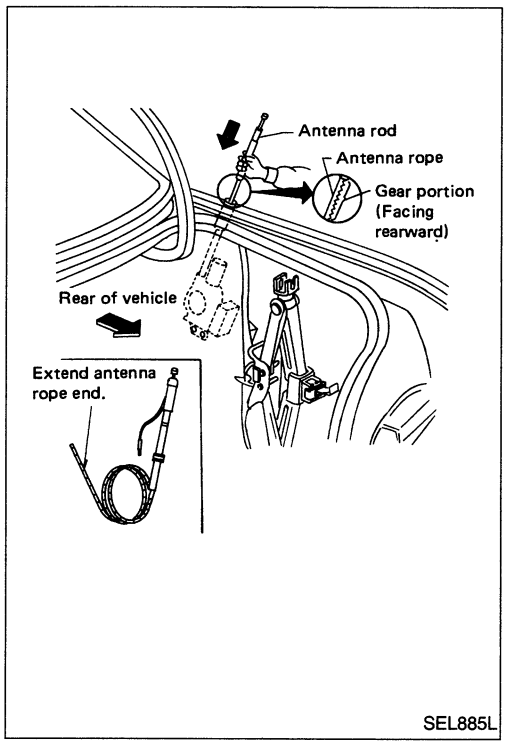


Location of Antenna









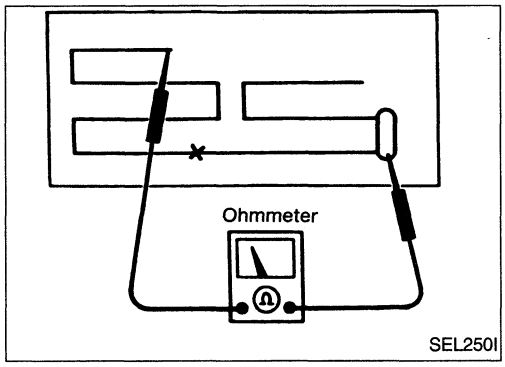
Antenna Rod Replacement

REMOVAL

1. Remove antenna nut and antenna base.
2. Withdraw antenna rod while raising it by operating antenna motor.

INSTALLATION

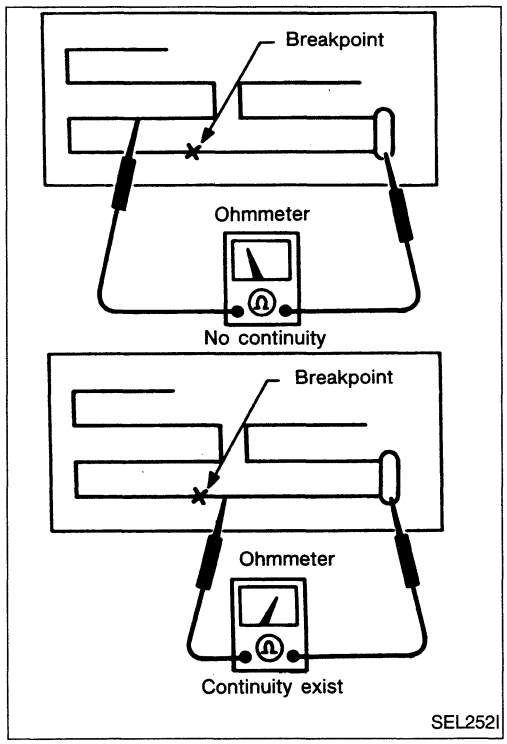
1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor.
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe.
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base.



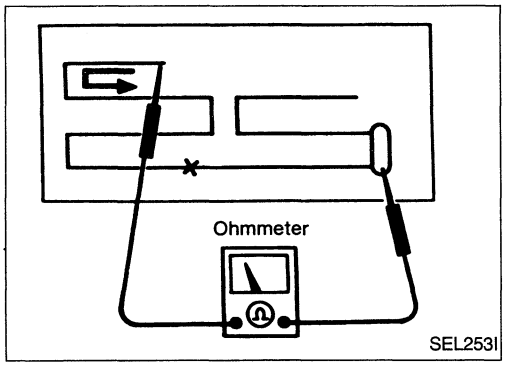
Window Antenna Repair

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.

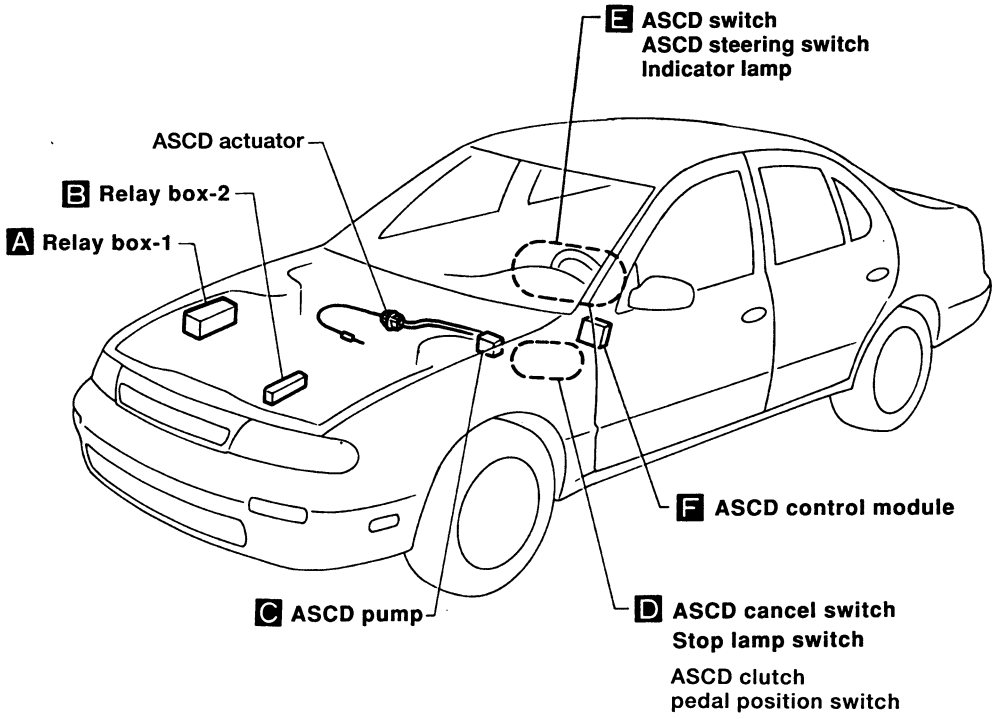


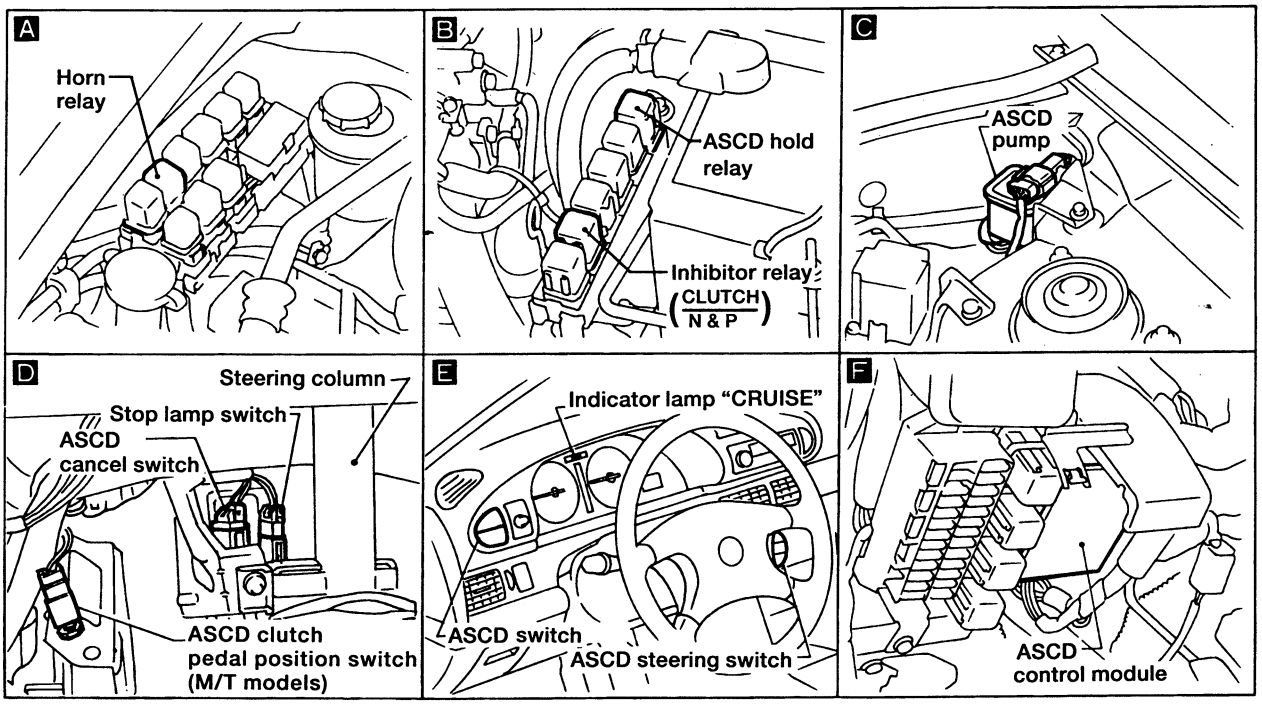
3. To locate broken point, move probe to left and right along element to determine point where tester needle swings abruptly.

ELEMENT REPAIR

Refer to EL-72.

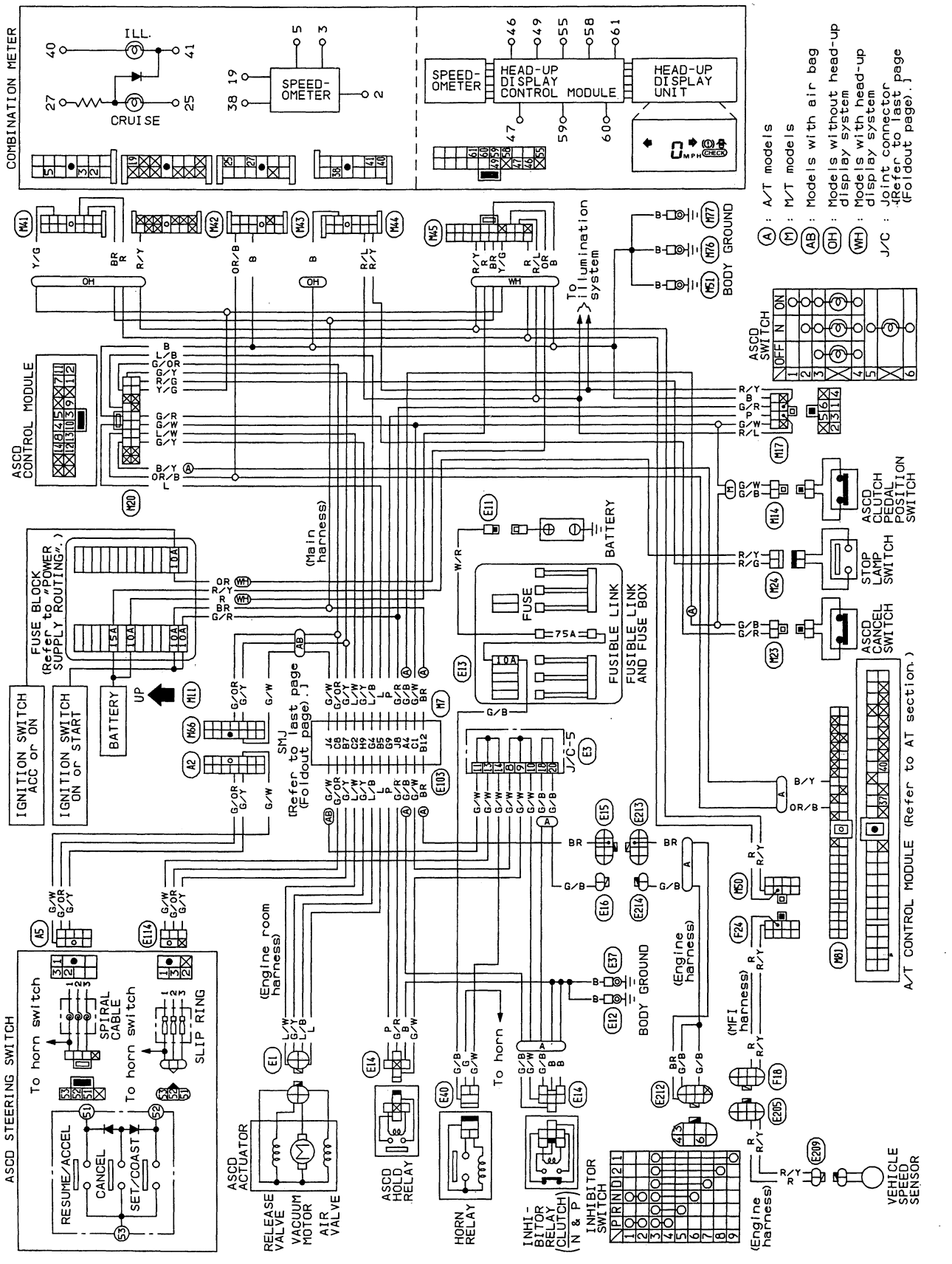
Component Parts and Harness Connector Location





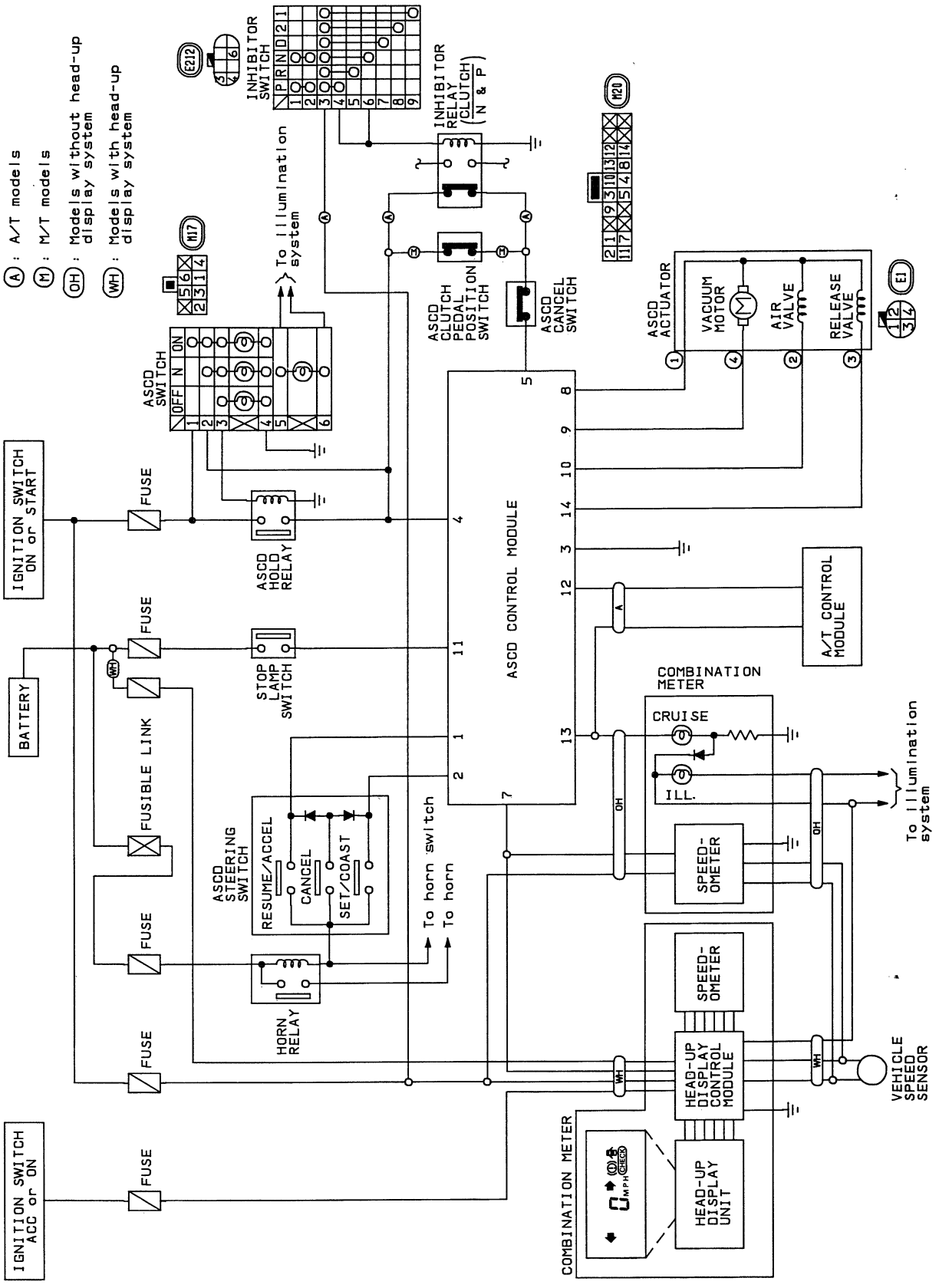
AEL148

Wiring Diagram



MEL340B

Schematic



MEL339B

Trouble Diagnoses

SYMPTOM CHART

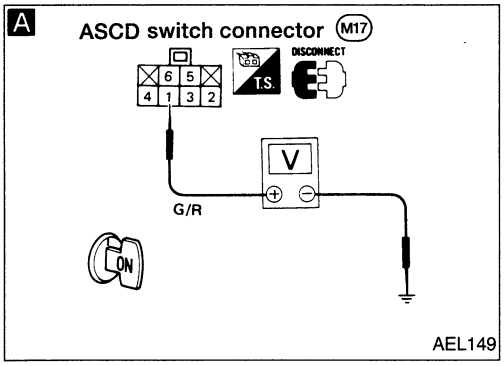
PROCEDURE	Diagnostic Procedure								—	Electrical Components Inspection							
REFERENCE PAGE	EL-83	EL-85	EL-85	EL-85	EL-86	EL-87	EL-88	EL-89	EL-90	EL-91	EL-92	EL-92	EL-92	EL-92	EL-92	EL-92	EL-93
SYMPTOM	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	ASCD Wire Adjustment	ASCD actuator/ASCD pump	ASCD switch	ASCD steering switch	ASCD cancel switch and stop lamp switch	Clutch pedal position switch (M/T models)	Inhibitor switch (A/T models)	Vehicle speed sensor	
ASCD control module cannot be set properly.	○									○	○	○	○	○	○	○	
Engine hunts.		○							○	○							
Large difference between set speed and actual vehicle speed.			○						○	○							
Deceleration is greatest immediately after ASCD has been set.				○					○	○							
ACCEL switch will not operate.	○				○							○					
RESUME switch will not operate.	○					○						○	○	○			
Set speed cannot be cancelled.							○		○	○			○	○			
"CRUISE" indicator lamp blinks.								○		○		○	○				

Trouble Diagnoses (Cont'd)

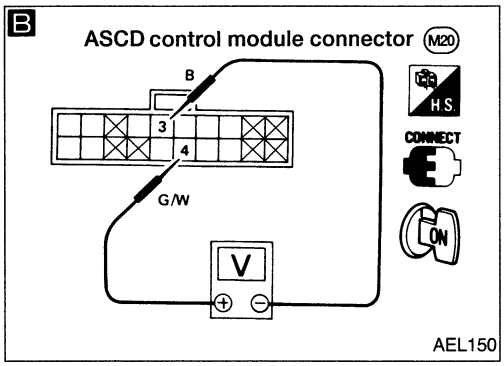
DIAGNOSTIC PROCEDURE 1

SYMPTOM: ASCD control cannot be set.

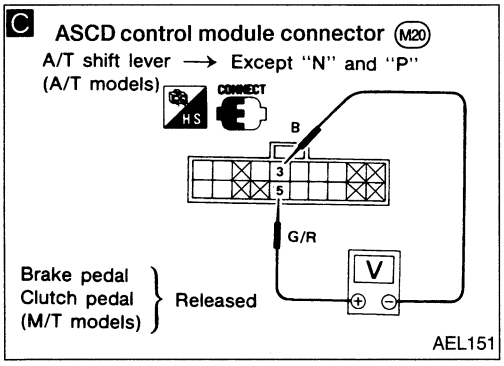
A



B



C



Turn ASCD switch "OFF" and "ON" to make sure indicator illuminates.

N.G. → A

O.K. ↓

A

CHECK POWER SUPPLY FOR ASCD SWITCH.
1. Disconnect switch harness connector.
2. Do approx. 12 volts exist between switch harness terminal ① and body ground?

No → Check fuse and harness.

Yes → CHECK ASCD SWITCH. Refer to EL-92. CHECK ASCD HOLD RELAY.

B

CHECK POWER SUPPLY CIRCUIT FOR ASCD CONTROL MODULE.
1. Turn ASCD switch "ON".
2. Check voltage between control module harness terminals ④ and ③.
Battery positive voltage should exist.

N.G. → Check continuity between control module harness terminal ④ and ASCD hold relay.

O.K. ↓

C

CHECK CUT-OFF CIRCUIT FOR ASCD CONTROL MODULE.
Check voltage between control module harness terminals ⑤ and ③.
Battery positive voltage should exist.

N.G. → CHECK ASCD CANCEL SWITCH, ASCD CLUTCH PEDAL POSITION SWITCH (M/T models) AND INHIBITOR SWITCH (A/T models). Refer to EL-92. CHECK INHIBITOR RELAY (A/T models).

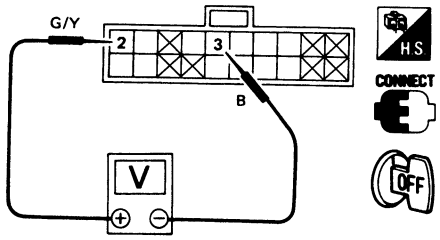
O.K. ↓

Ⓐ (Next page)

Trouble Diagnoses (Cont'd)

D

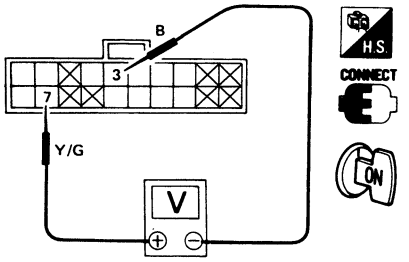
ASCD control module connector (M20)



AEL152

E

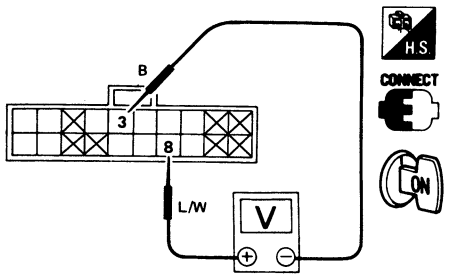
ASCD control module connector (M20)



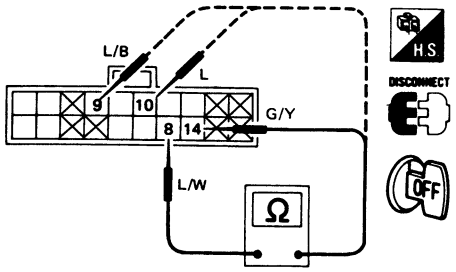
AEL153

F

ASCD control module connector (M20)



ASCD control module connector (M20)



AEL154

Ⓐ

D

CHECK SET/COAST SWITCH CIRCUIT FOR ASCD CONTROL MODULE.

1. Turn and keep on SET/COAST switch of ASCD steering switch.
2. Check voltage between control module harness terminals ② and ③.

Battery positive voltage should exist.

N.G. → Does horn work?

- No → Check fuse and horn relay.
- Yes → CHECK ASCD STEERING SWITCH. Refer to EL-92.

O.K. ↓

E

CHECK VEHICLE SPEED SENSOR CIRCUIT.

1. Apply wheel chocks and jack up rear of vehicle.
2. Connect voltmeter between control module harness terminals ⑦ and ③.
3. Slowly turn rear wheel.
4. Check deflection of voltmeter pointer.

N.G. → CHECK VEHICLE SPEED SENSOR. Refer to EL-93.

O.K. ↓

CHECK ASCD ACTUATOR/ASCD PUMP. Refer to EL-91.

N.G. → Replace ASCD actuator assembly.

O.K. ↓

F

CHECK ASCD ACTUATOR/ASCD PUMP CIRCUIT.

1. Check voltage between control module harness terminals ⑧ and ③.
   Voltage is 0V.
2. Disconnect ASCD control module connector.
3. Measure resistance between control module harness terminals ⑧ and ⑨, ⑩, ⑭.

N.G. → Repair short or open circuit in ASCD actuator/ASCD pump harness.

Terminals		Resistance [Ω]
⑧	⑨	Approx. 8 - 45
	⑩	Approx. 65
	⑭	Approx. 65

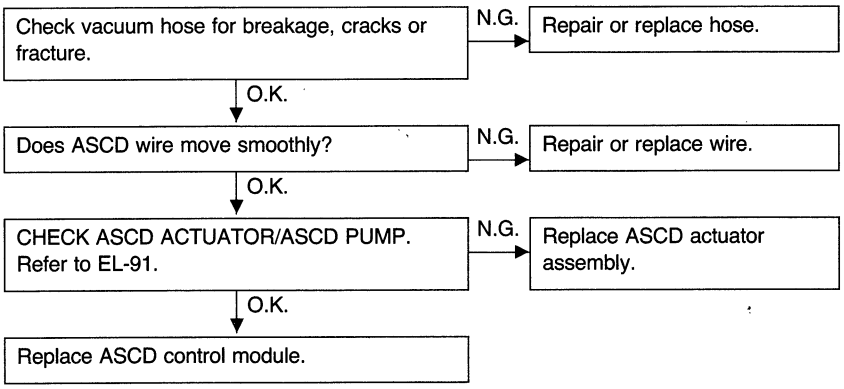
O.K. ↓

Replace ASCD control module.

Trouble Diagnoses (Cont'd)

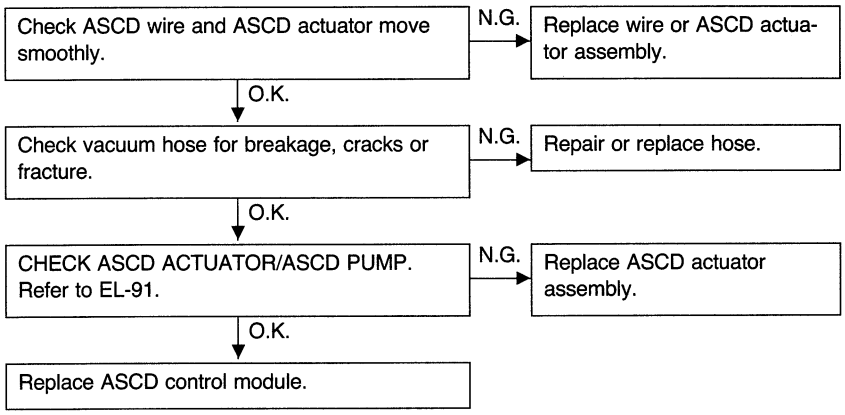
DIAGNOSTIC PROCEDURE 2

SYMPTOM: Engine hunts.



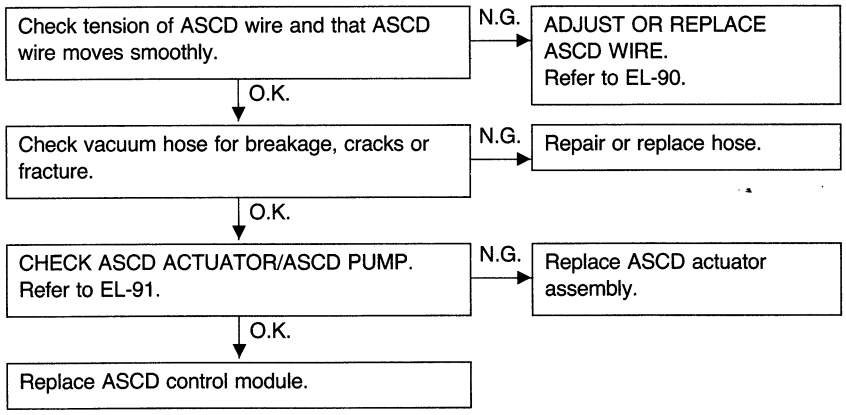
DIAGNOSTIC PROCEDURE 3

SYMPTOM: Large difference between set vehicle speed and actual speed.



DIAGNOSTIC PROCEDURE 4

SYMPTOM: Deceleration is greatest immediately after ASCD has been set.

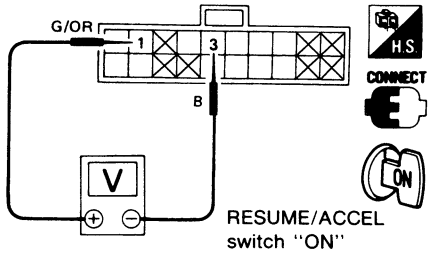


Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

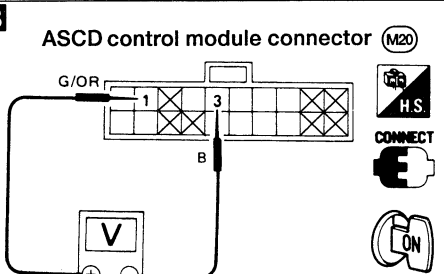
SYMPTOM: ACCEL switch will not operate.

A



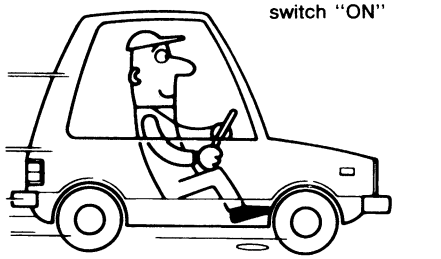
AEL155

B



AEL156

C



SEL766P

Check constant-speed function for operating using SET/COAST switch.

N.G. → Peform "DIAGNOSTIC PROCEDURE 1". Refer to EL-83.

O.K. ↓

A

Check voltage between control module harness terminals ① and ③ after turning on and holding RESUME/ACCEL switch.
Battery positive voltage should exist.

O.K. → CHECK ASCD STEERING SWITCH. Refer to EL-92.

O.K. ↓

B

Check voltage between control module harness terminals ① and ③ after releasing RESUME/ACCEL switch.
Voltage is 0V.

N.G. → CHECK ASCD STEERING SWITCH. Refer to EL-92.

O.K. ↓

C

Does vehicle accelerate when RESUME/ACCEL switch is turned on?

No → Replace control module.

Yes ↓

Does vehicle maintain the new (faster) speed when RESUME/ACCEL switch is released?

No → Replace control module.

Yes ↓

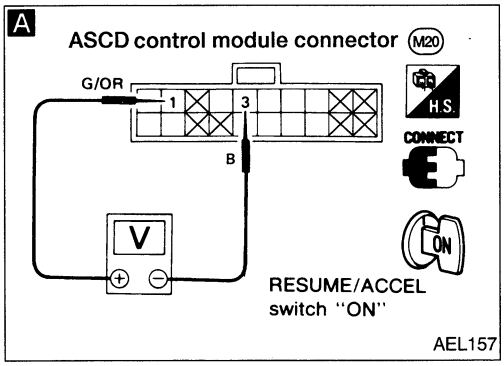
System is O.K.

Trouble Diagnoses (Cont'd)

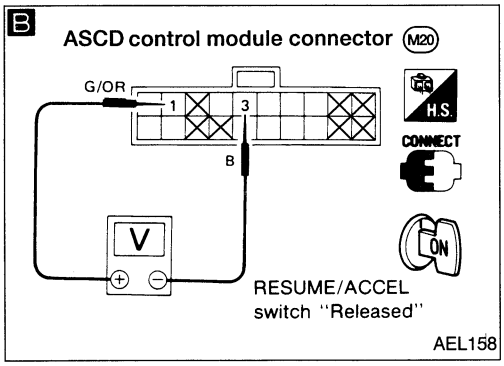
DIAGNOSTIC PROCEDURE 6

SYMPTOM: RESUME switch will not operate.

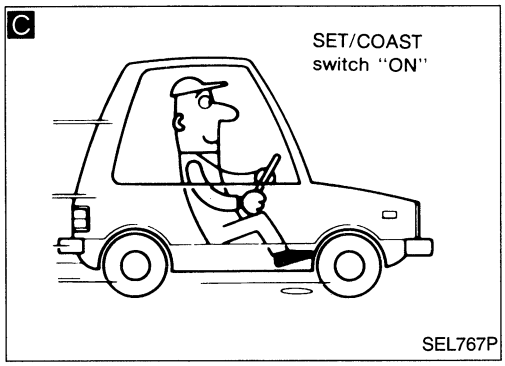
A



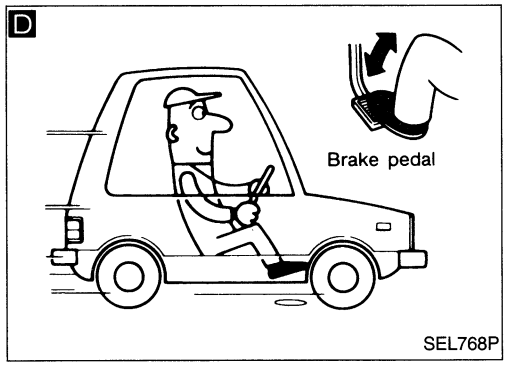
B



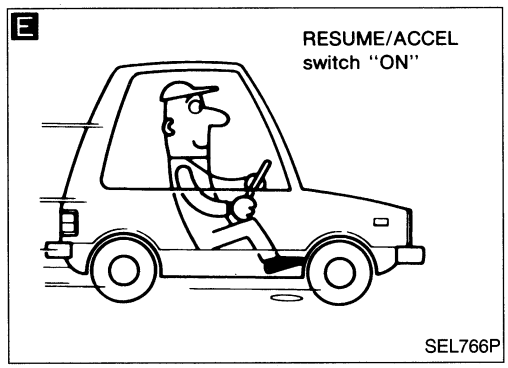
C



D



E



Check constant-speed function for operation using SET/COAST switch.
- N.G. → Perform "DIAGNOSTIC PROCEDURE 1". Refer to EL-83.
- O.K. ↓

A

Check voltage between control module harness terminals ① and ③ after turning on and holding RESUME/ACCEL switch.
Battery positive voltage should exist.
- N.G. →
- O.K. ↓

B

Check voltage between control module harness terminals ① and ③ after releasing RESUME/ACCEL switch.
Voltage is 0V.
- N.G. → CHECK ASCD STEERING SWITCH. Refer to EL-92.
- O.K. ↓

C

Set vehicle speed at 80 km/h (50 MPH) by turning on SET/COAST switch.
- O.K. ↓

D

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, ASCD CANCEL SWITCH AND ASCD CLUTCH PEDAL POSITION SWITCH (M/T models). Refer to EL-92.
- Yes ↓

E

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 module.
- Yes ↓

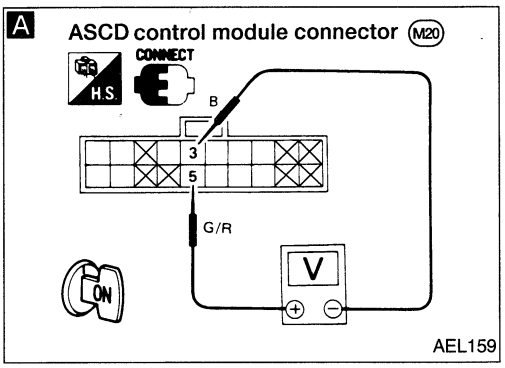
System is O.K.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

SYMPTOM: Set speed cannot be cancelled.

A



CHECK ASCD CANCEL, CLUTCH PEDAL POSITION, INHIBITOR SWITCH CIRCUIT.

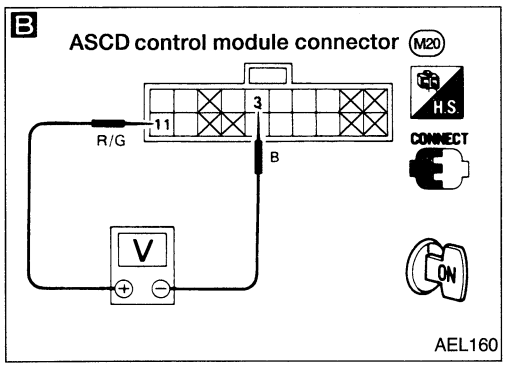
1. Turn ASCD switch on.
2. Check voltage between control module harness terminals ⑤ and ③.

Conditions			Voltage [V]
M/T	ASCD cancel switch	Depressed	0
		Released	Approx. 12
	ASCD clutch pedal position switch	Depressed	0
		Released	Approx. 12
A/T	A/T shift lever position is at any position except N or P.		Approx. 12
	A/T shift lever position is at N or P.		0

N.G. → CHECK ASCD CANCEL, CLUTCH PEDAL POSITION, and INHIBITOR SWITCH. Refer to EL-92.

O.K. ↓

B



CHECK STOP LAMP SWITCH CIRCUIT.
Check voltage between control module harness terminals ⑪ and ③.

Condition		Voltage [V]
Stop lamp switch	Depressed	Approx. 12
	Released	0

N.G. → CHECK STOP LAMP SWITCH. Refer to EL-92.

O.K. ↓

Check ASCD wire moves smoothly.

N.G. → Replace ASCD wire.

O.K. ↓

CHECK ASCD ACTUATOR/ASCD PUMP.
Refer to EL-91.

N.G. → Replace ASCD actuator assembly.

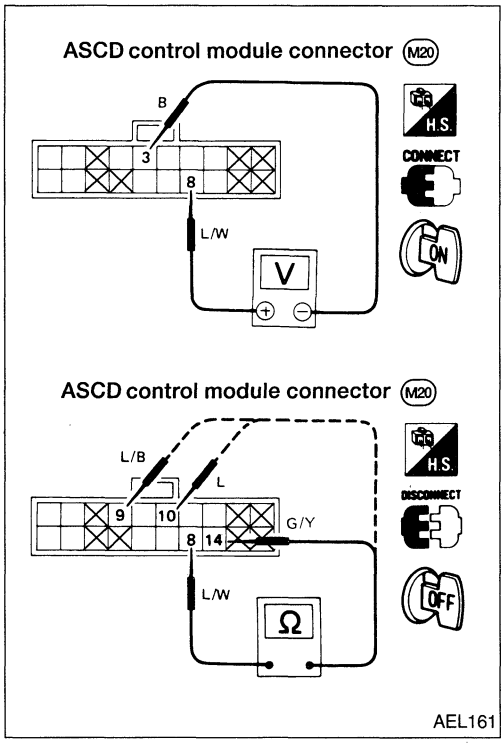
O.K. ↓

Replace ASCD control module.

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

SYMPTOM: "CRUISE" indicator lamp blinks.



Does indicator lamp blink when ASCD main switch is turned to "ON" again?

Yes → Does indicator lamp blink when brake pedal is depressed slowly?

No → Does indicator lamp blink when brake pedal is depressed slowly?

No → CHECK ASCD STEERING SWITCH. Refer to EL-92.

Yes → Adjust installation of stop lamp switch and ASCD cancel switch. Refer to BR section ("Adjustment", "BRAKE PEDAL AND BRACKET").

CHECK ASCD STEERING SWITCH. Refer to EL-92.

- N.G. → Replace ASCD steering switch.
- O.K. → Replace control module.

No → CHECK ASCD ACTUATOR/ASCD PUMP. Refer to EL-91.

- N.G. → Replace ASCD actuator assembly.
- O.K. → CHECK ASCD ACTUATOR/ASCD PUMP CIRCUIT.

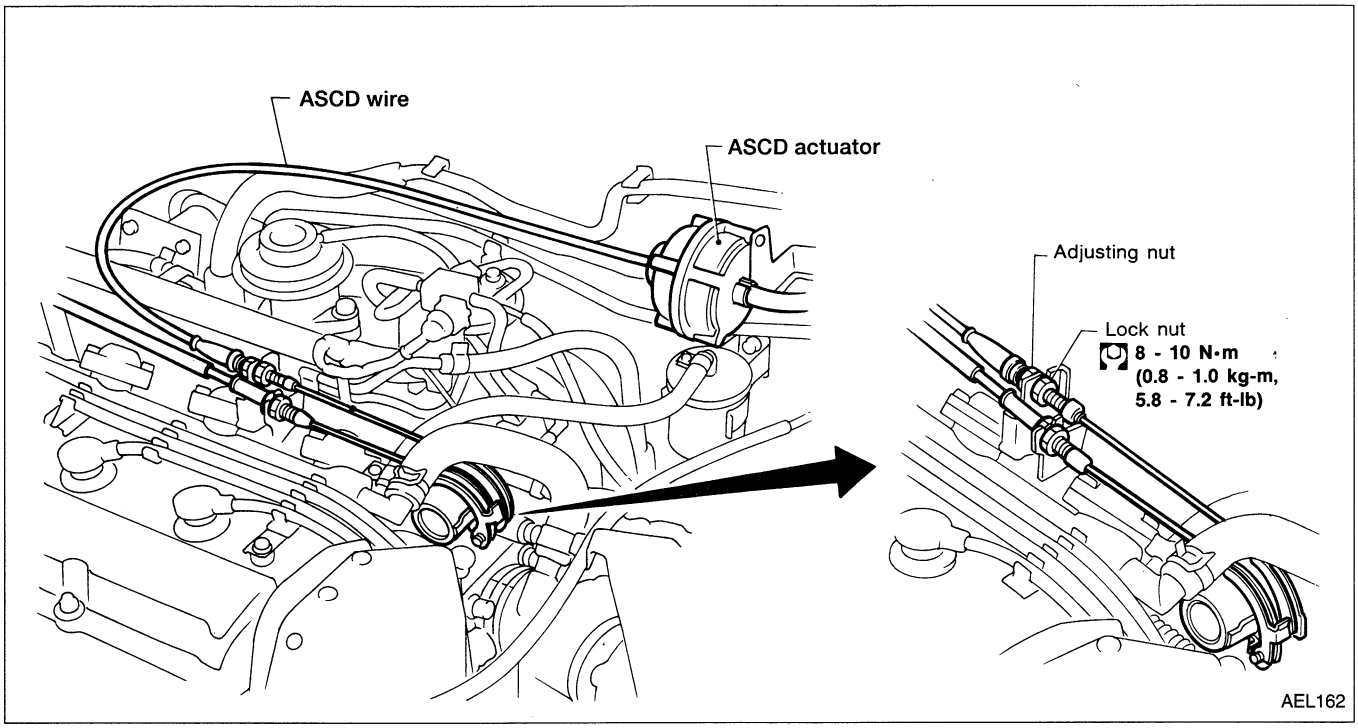
1. Check voltage between control module harness terminals ⑧ and ③. **Voltage is 0V.**
2. Disconnect ASCD control module connector.
3. Measure resistance between control module harness terminals ⑧ and ⑨, ⑩, ⑭.

Terminals		Resistance [Ω]
⑧	⑨	Approx. 8 - 45
	⑩	Approx. 65
	⑭	Approx. 65

- N.G. → Repair short or open circuit in ASCD actuator/ ASCD pump harness.
- O.K. → Replace ASCD control module.

Trouble Diagnoses (Cont'd)

ASCD WIRE ADJUSTMENT



CAUTION:

- **Be careful not to twist ASCD wire when removing it.**
- **Do not tense ASCD wire excessively during adjustment.**

Confirm that accelerator wire is properly adjusted and adjust tension of ASCD wire in the following manner.

(1) After adjusting the length of ASCD wire, turn adjusting nut counterclockwise 1/2 to 1 turn from closed throttle position. (Must be carried out to prevent response delay of operation of the ASCD.)

(2) Securely tighten lock nut to hold adjusting nut in place.

- For ASCD cancel switch and clutch pedal position switch adjustment, refer to BR and CL sections ("Adjustment", "BRAKE PEDAL AND BRACKET" and "Adjusting Clutch Pedal", "INSPECTION AND ADJUSTMENT", respectively).

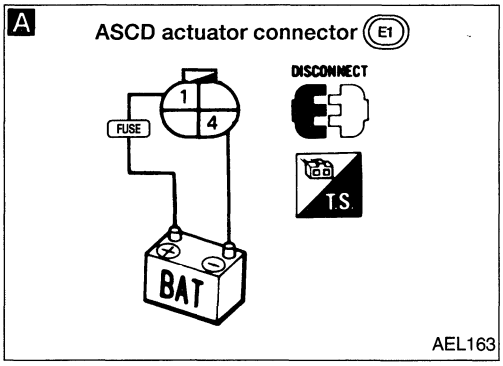
Trouble Diagnoses (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

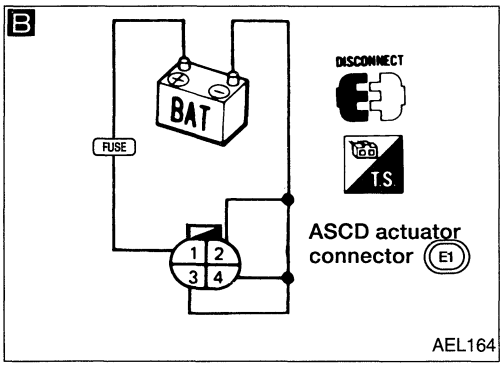
ASCD actuator/ASCD pump

1. Disconnect ASCD actuator/ASCD pump connector.
2. Check ASCD actuator/ASCD pump operations as shown.

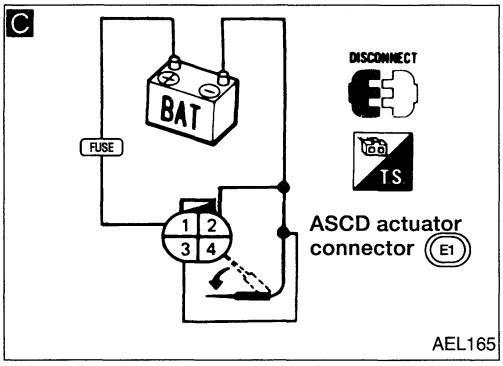
A



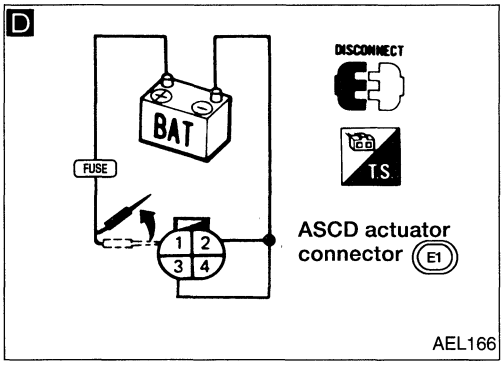
B



C



D



A

Check to see if motor starts when 12V D.C. is applied across ① and ④.

N.G. → Replace ASCD actuator assembly.

O.K.

B

Check to see if ASCD wire is pulled when 12V D.C. is applied across ①, ②, ③ and ④.

N.G.

O.K. (Wire is pulled.)

C

Check to see if ASCD wire returns to original position 50 to 60 seconds after disconnecting lead from ④.

N.G. → Replace ASCD actuator assembly.

O.K. (Wire does not return.)

D

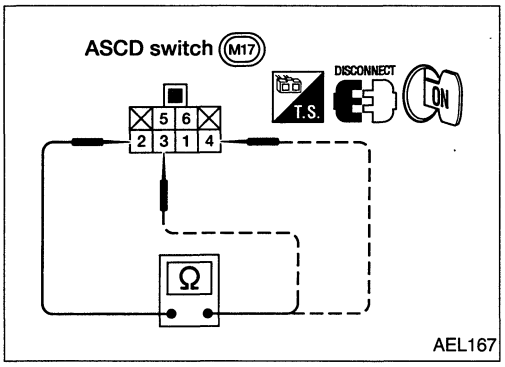
Disconnect lead from ① to see if ASCD wire returns immediately.

N.G. → Replace ASCD actuator assembly.

O.K. (Wire returns.)

ASCD actuator/ASCD pump are O.K.

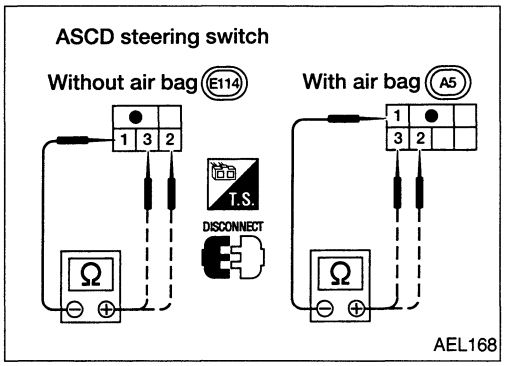
Trouble Diagnoses (Cont'd)



ASCD main switch

Check continuity between terminals by pushing switch to each position.

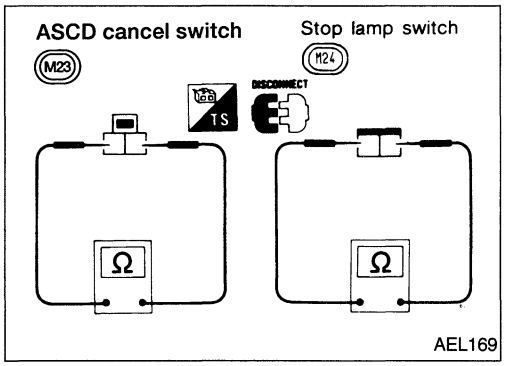
Switch position	Terminal					
	1	2	3	4	5	6
ON	○	○	○	○		
N		○	○	○	ILL. ○	○
OFF						



ASCD steering switch

Check continuity between terminals by pushing each button.

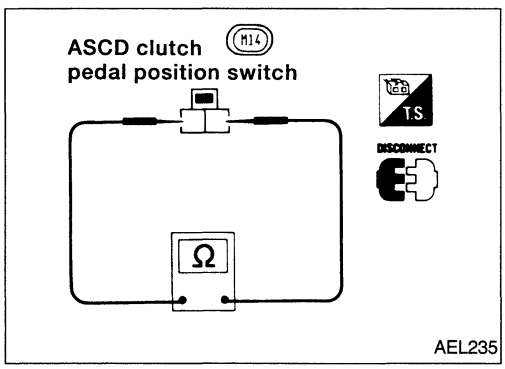
Button	Terminal		
	1	2	3
SET/COAST	○	○	
RESUME/ACCEL	○		○
CANCEL	○	▶ ○	
	○	▶	○



ASCD cancel switch and stop lamp switch

Condition	Continuity	
	ASCD cancel switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

Check each switch after adjusting brake pedal — refer to BR section ("Adjustment", "BRAKE PEDAL AND BRACKET").

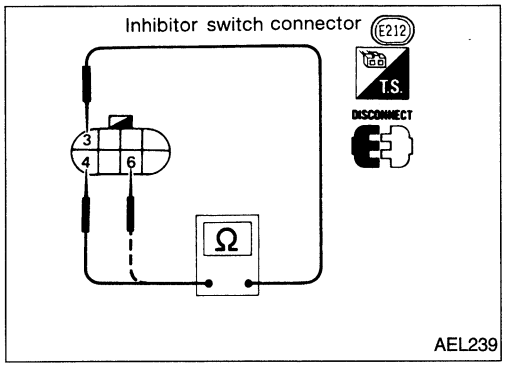


ASCD clutch pedal position switch (For M/T models)

Condition	Continuity
When clutch pedal is depressed	No
When clutch pedal is released	Yes

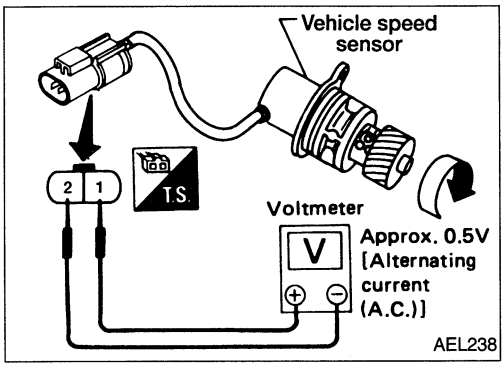
Check switch after adjusting clutch pedal — refer to CL section ("Adjusting Clutch Pedal", "INSPECTION AND ADJUSTMENT").

Trouble Diagnoses (Cont'd)



Inhibitor switch (For A/T models)

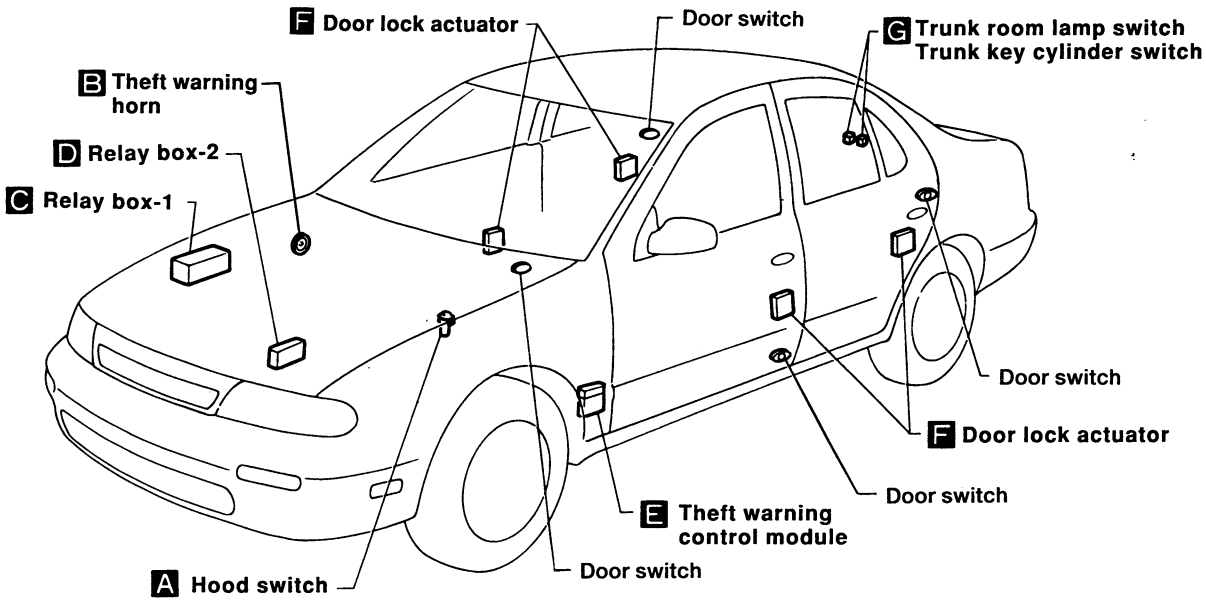
Shift lever position	Terminal		
	3	4	6
"P"	○	○	
"N"	○		○
Except "N" or "P"			

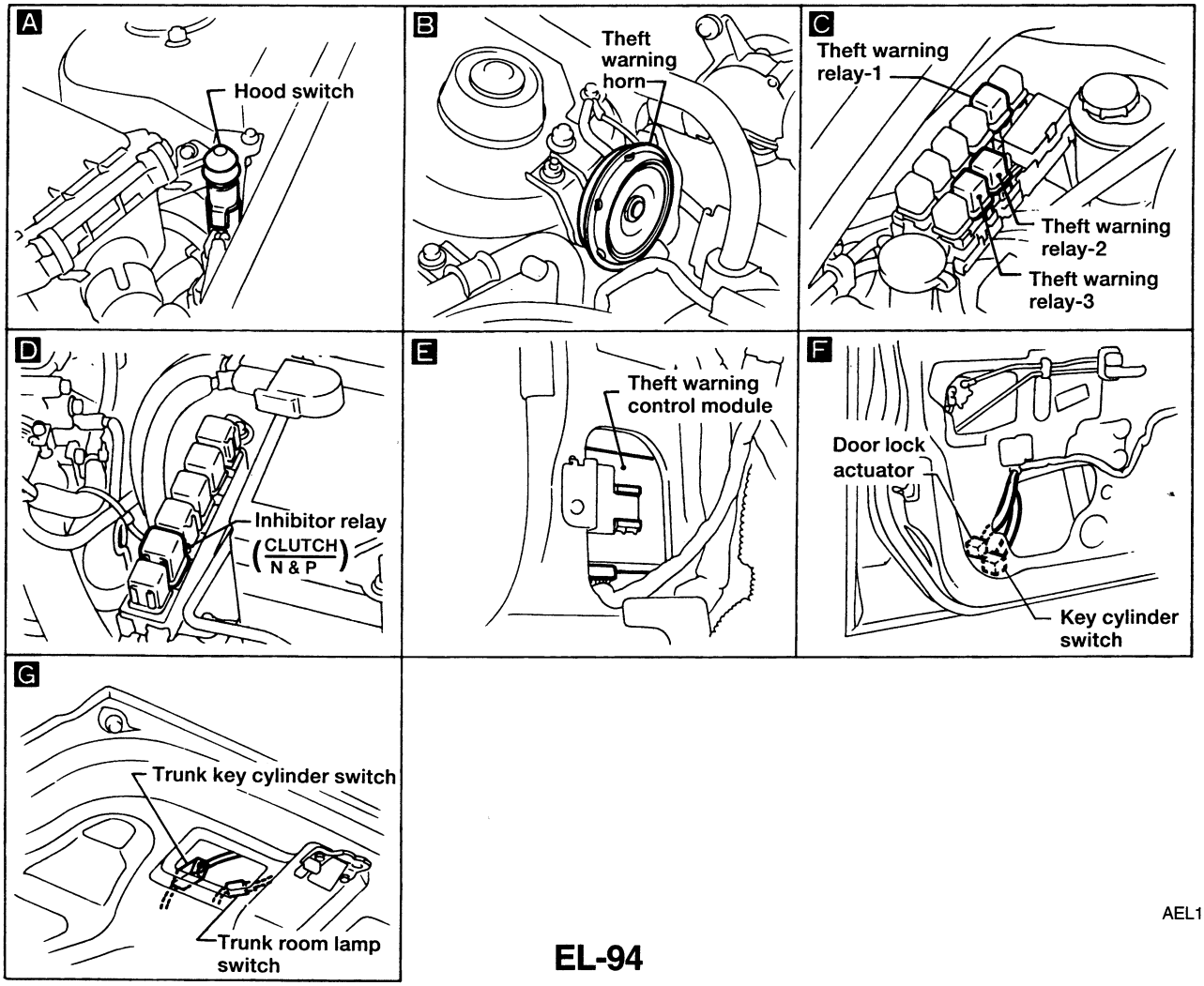


Vehicle speed sensor

1 Remove vehicle speed sensor from transaxle.
2. Turn speedometer pinion quickly and measure voltage across ② and ①.

Component Parts and Harness Connector Location

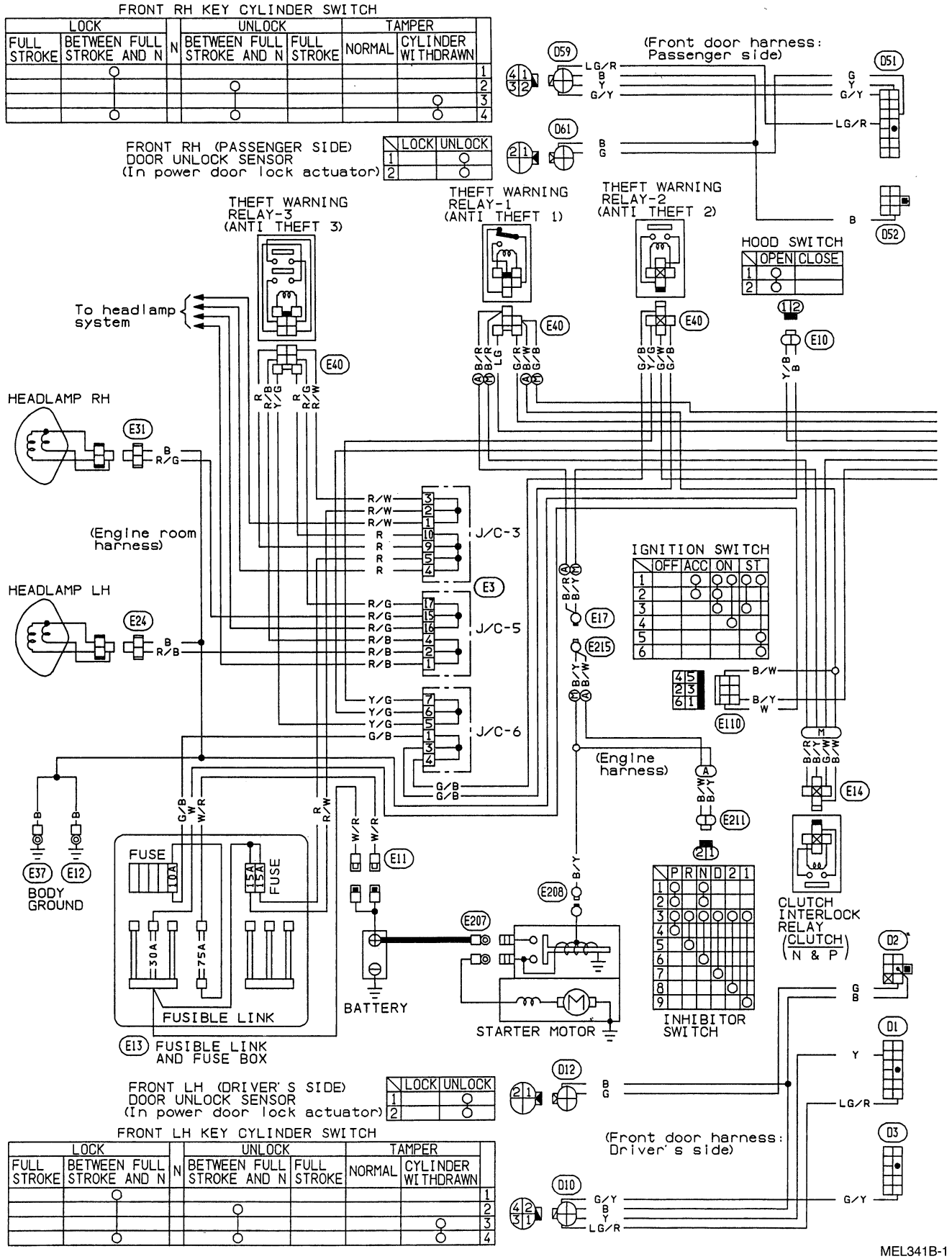




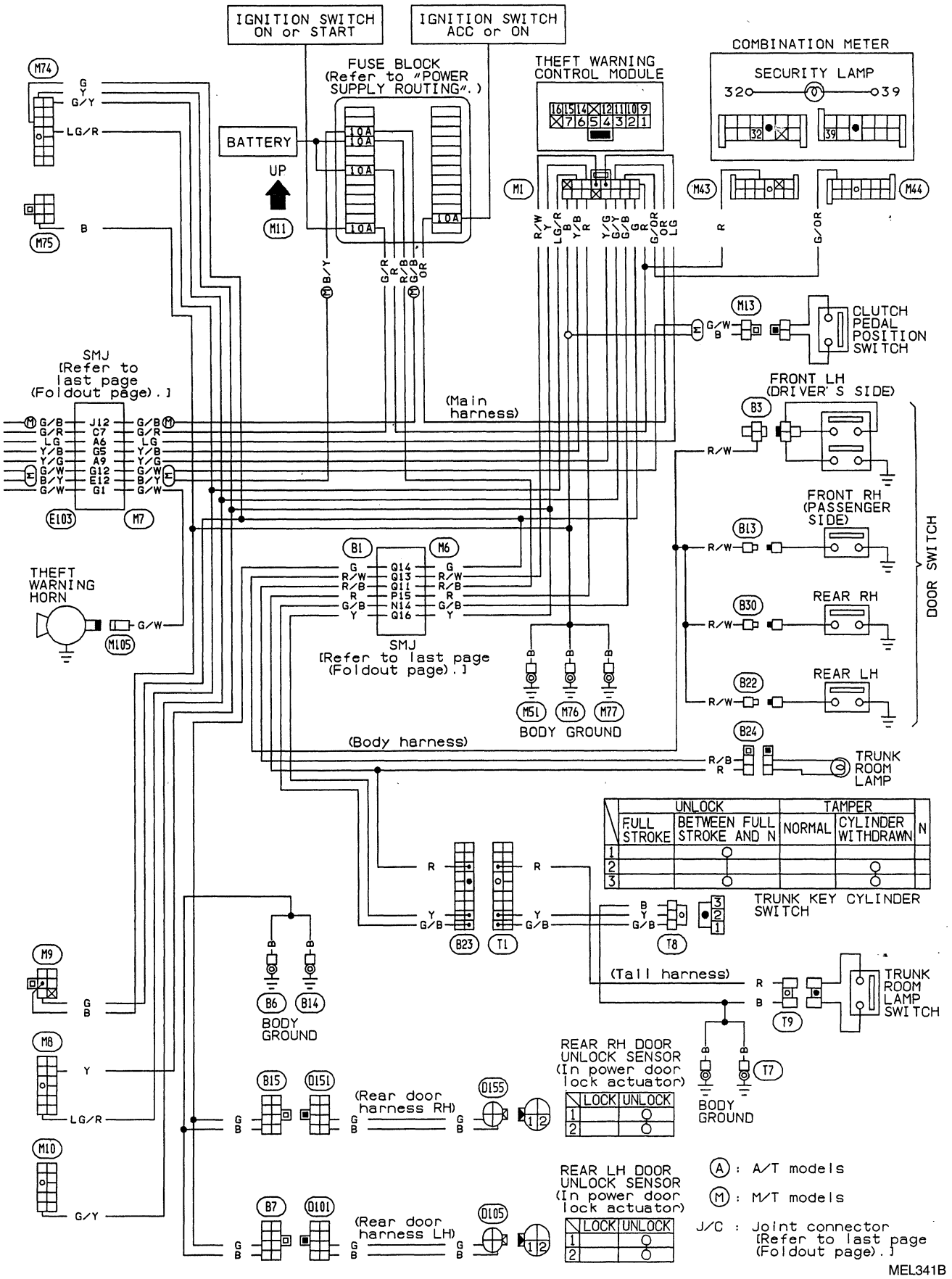
AEL170

NOTE

Wiring Diagram



Wiring Diagram (Cont'd)

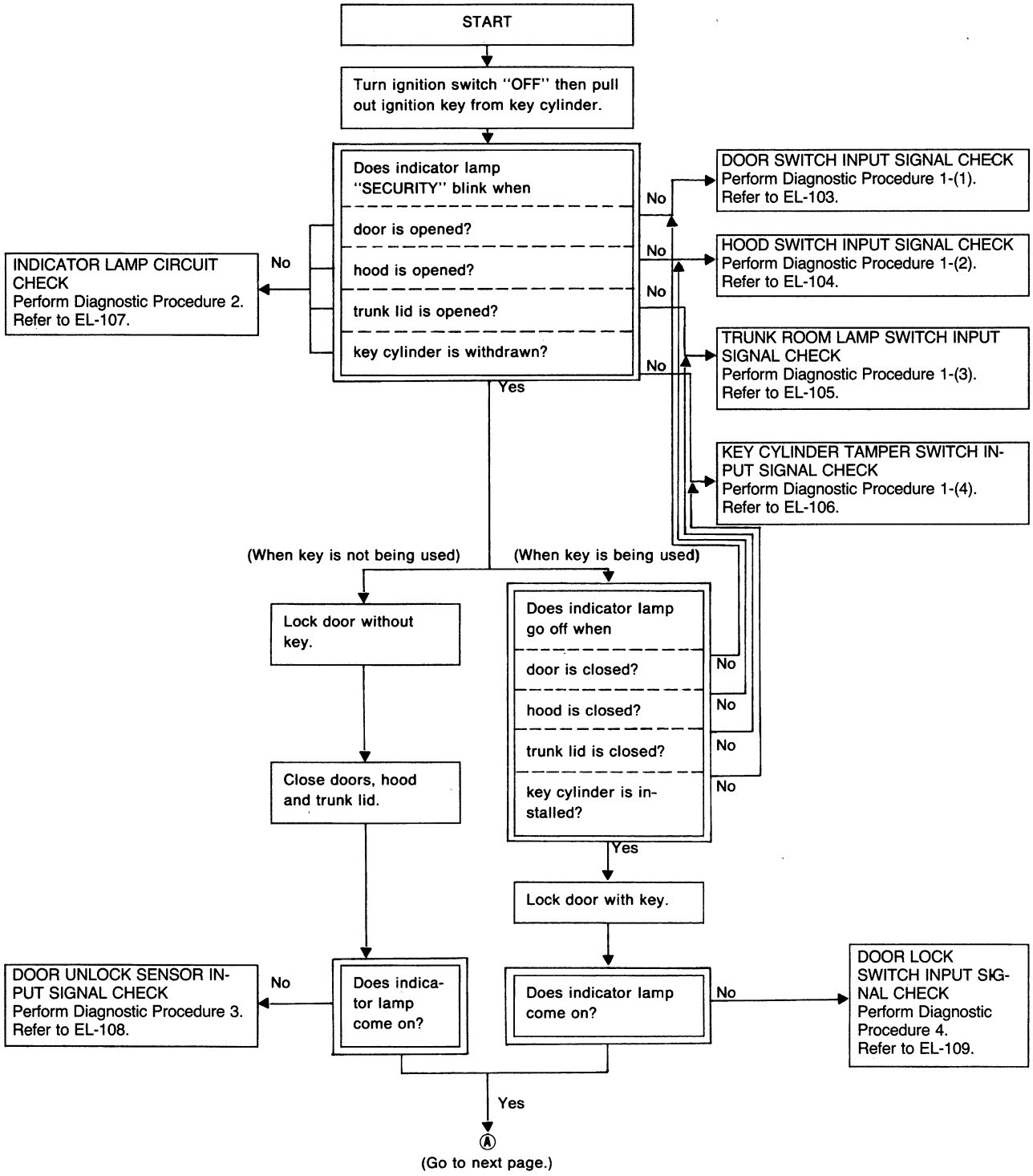


MEL341B

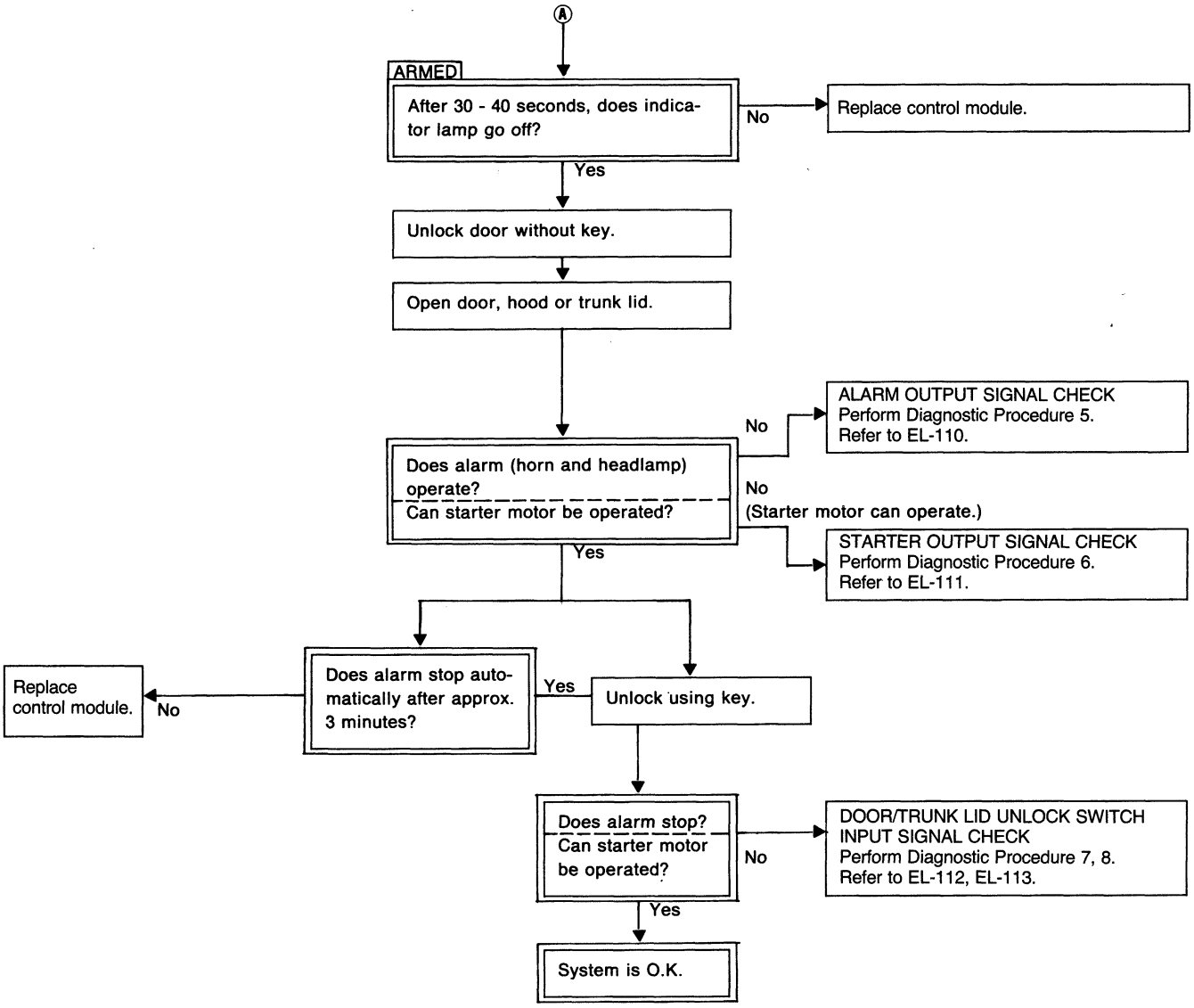
Trouble Diagnoses

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.

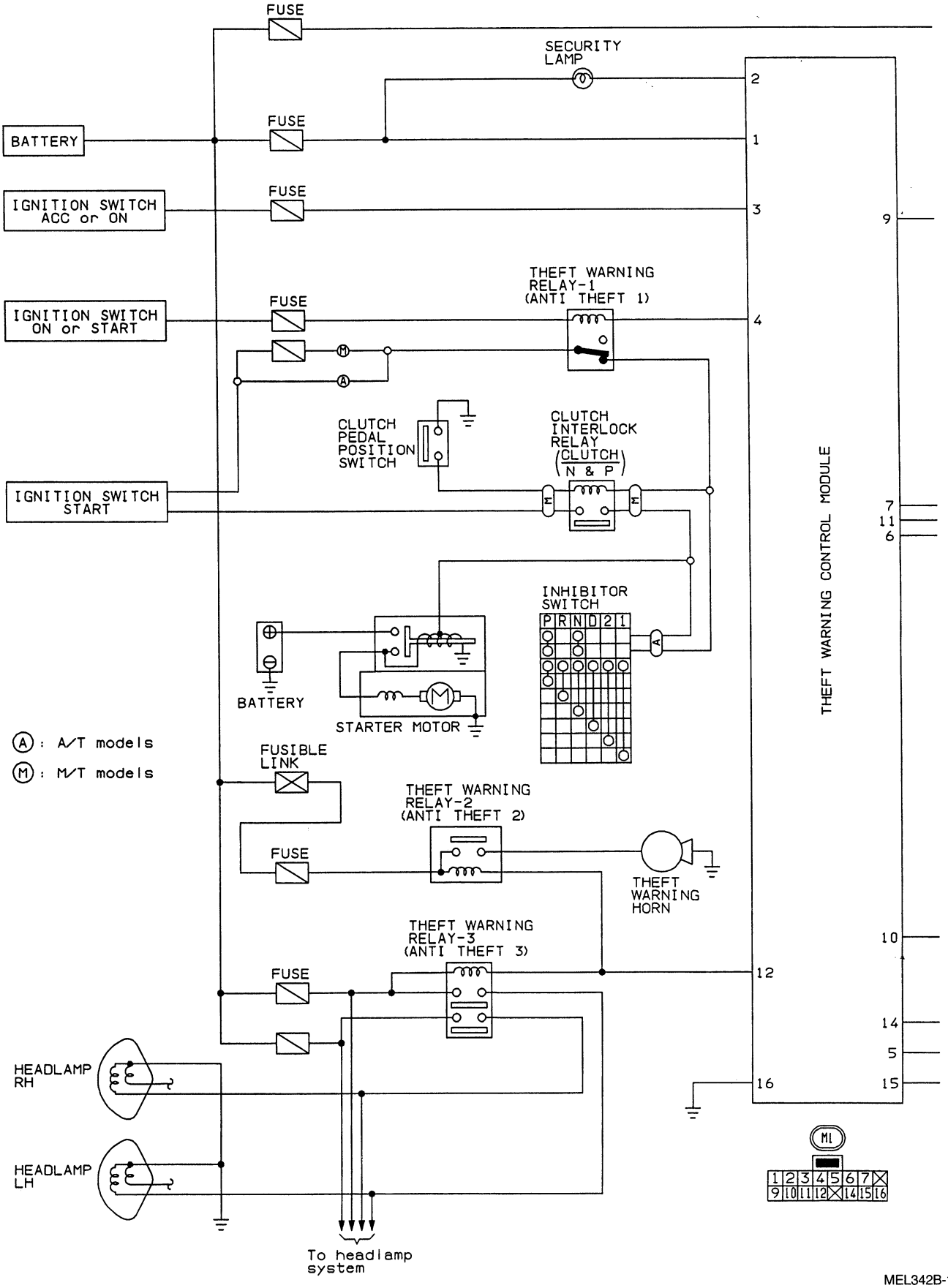


Trouble Diagnoses (Cont'd)

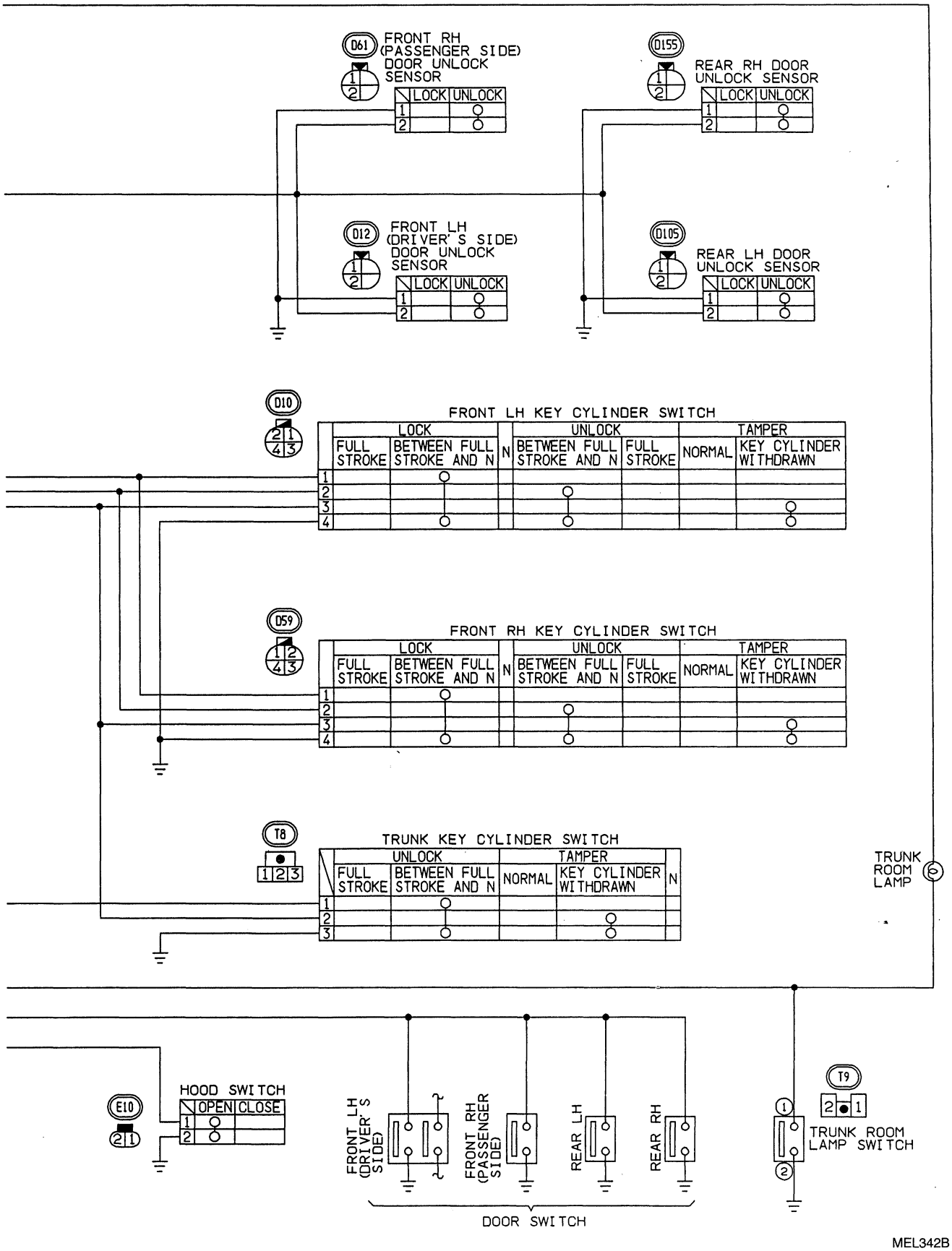


Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



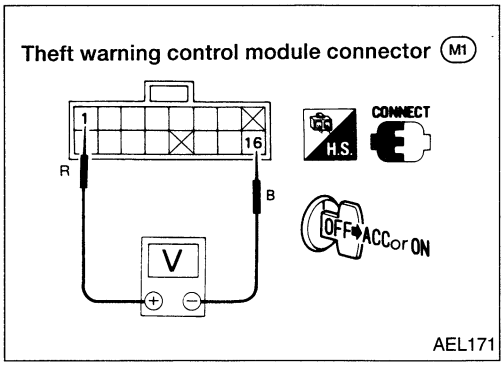
MEL342B-1


D61
FRONT RH (PASSENGER SIDE) DOOR UNLOCK SENSOR
LOCK UNLOCK
1
2
D155
REAR RH DOOR UNLOCK SENSOR
LOCK UNLOCK
1
2
D12
FRONT LH (DRIVER'S SIDE) DOOR UNLOCK SENSOR
LOCK UNLOCK
1
2
D105
REAR LH DOOR UNLOCK SENSOR
LOCK UNLOCK
1
2
D10
FRONT LH KEY CYLINDER SWITCH
LOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
UNLOCK
BETWEEN FULL STROKE AND N
FULL STROKE
TAMPER
NORMAL
KEY CYLINDER WITHDRAWN
1
2
3
4
D59
FRONT RH KEY CYLINDER SWITCH
LOCK
FULL STROKE
BETWEEN FULL STROKE AND N
N
UNLOCK
BETWEEN FULL STROKE AND N
FULL STROKE
TAMPER
NORMAL
KEY CYLINDER WITHDRAWN
1
2
3
4
T8
TRUNK KEY CYLINDER SWITCH
UNLOCK
FULL STROKE
BETWEEN FULL STROKE AND N
TAMPER
NORMAL
KEY CYLINDER WITHDRAWN
N
1
2
3
TRUNK ROOM LAMP
E10
HOOD SWITCH
OPEN CLOSE
1
2
FRONT LH (DRIVER'S SIDE)
FRONT RH (PASSENGER SIDE)
REAR LH
REAR RH
DOOR SWITCH
T9
TRUNK ROOM LAMP SWITCH

MEL342B

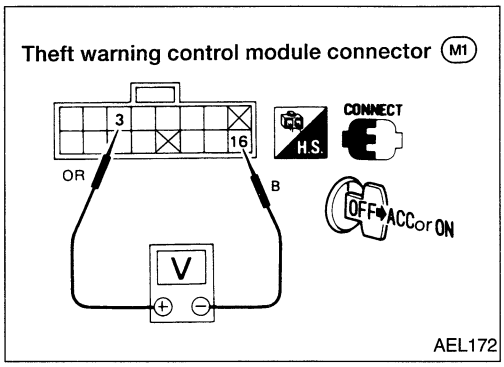
Trouble Diagnoses (Cont'd)

POWER SUPPLY AND GROUND CIRCUIT CHECK



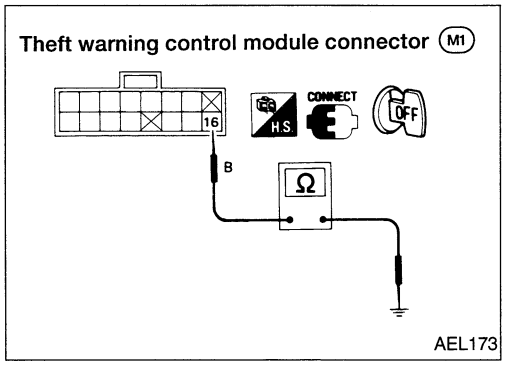
Main power supply circuit check

Terminals	Ignition switch position		
	OFF	ACC	ON
① - ⑯	Battery positive voltage	Battery positive voltage	Battery positive voltage



Power supply circuit check for system cancel

Terminals	Ignition switch position		
	OFF	ACC	ON
③ - ⑯	0V	Battery positive voltage	Battery positive voltage



Ground circuit check

Terminals	Continuity
⑯ - Ground	Yes

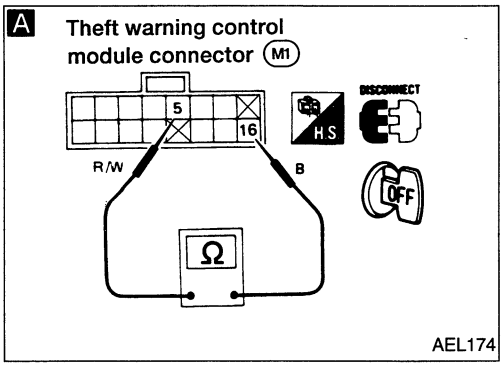
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

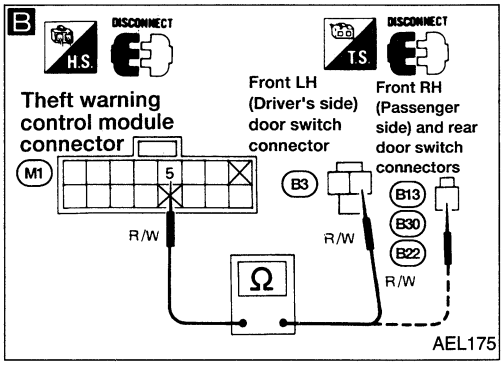
SYMPTOM: ● **Indicator lamp does not blink.**
● **Indicator lamp remains blinking.**

Diagnostic procedure 1-(1)

A



B



A

DOOR SWITCH INPUT SIGNAL CHECK
Check continuity between control module harness terminals ⑤ and ⑯.

Condition	Continuity
All doors are closed	No
At least one door is open	Yes

O.K. → Peform Diagnostic Procedure 2. Refer to EL-107.

N.G.

DOOR SWITCH CHECK
Refer to EL-114.

N.G. → Replace door switch.

O.K.

B

DOOR SWITCH CIRCUIT CHECK
Check harness continuity between control module harness terminal ⑤ and door switch harness terminal.
Continuity should exist.

N.G. → Repair harness or connectors.

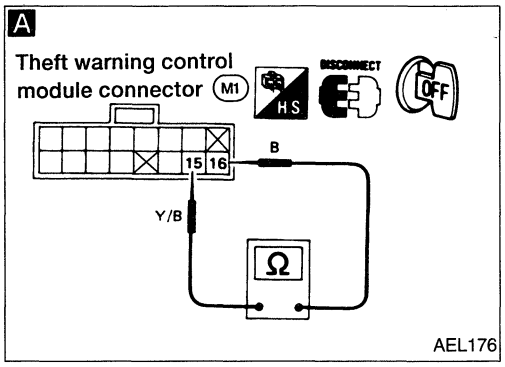
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

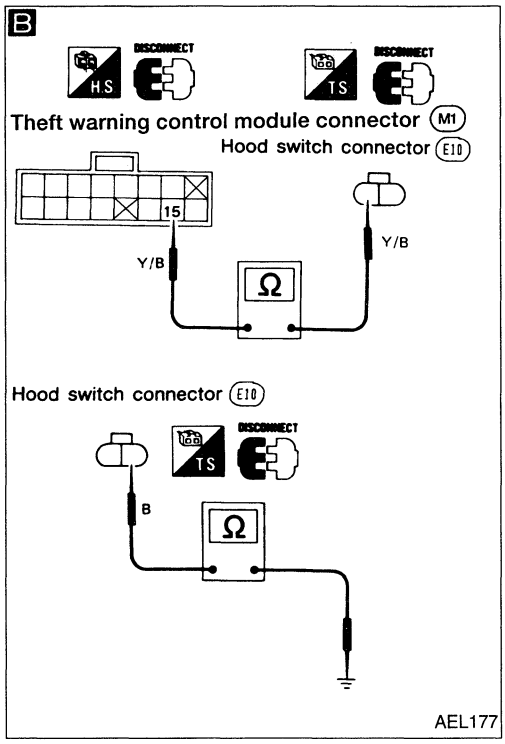
Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(2)

A



B



A

HOOD SWITCH INPUT SIGNAL CHECK
Check continuity between control module harness terminals (15) and (16).

Condition	Continuity
Hood is open	Yes
Hood is closed	No

O.K. → Perform Diagnostic Procedure 2. Refer to EL-107.

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 EL-114.

N.G. → Replace hood switch.

O.K.

B

HOOD SWITCH CIRCUIT CHECK
- Check harness continuity between control module 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.

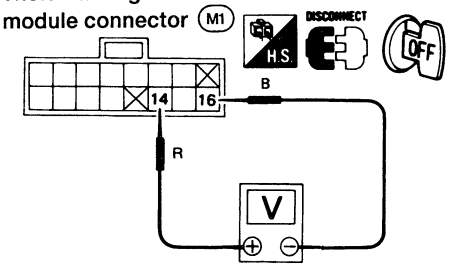
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(3)

A

Theft warning control module connector (M1)

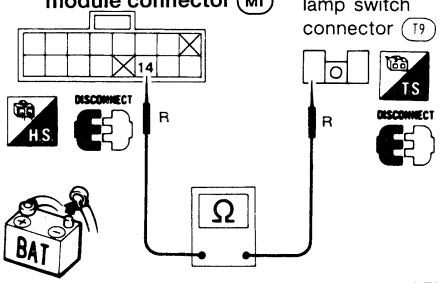


AEL178

B

Theft warning control module connector (M1)

Trunk room lamp switch connector (T9)



AEL179

A

TRUNK ROOM LAMP SWITCH INPUT SIGNAL CHECK
Check voltage between control module harness terminals (14) and (16).

Condition	Voltage
Trunk lid is open	Approx. 0V
Trunk lid is closed	Approx. 12V

O.K. → Perform Diagnostic Procedure 2. Refer to EL-107.

N.G.

Does trunk room lamp come on?

Yes → B

No

TRUNK ROOM LAMP SWITCH CHECK
Refer to EL-114.

O.K. → B

N.G.

Replace trunk room lamp switch.

B

TRUNK ROOM LAMP SWITCH CIRCUIT CHECK
Check harness continuity between control module harness terminals (14) and trunk room lamp harness terminal.

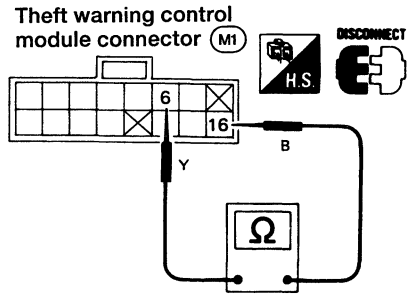
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTORS.

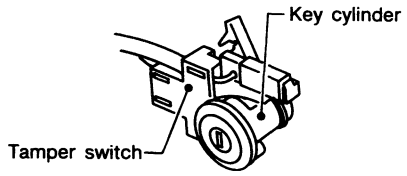
Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(4)

A

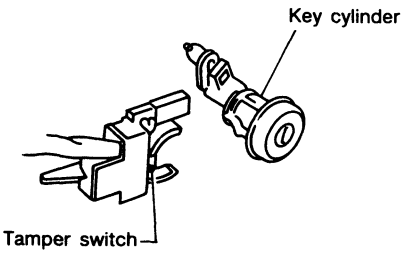


[Example]



No continuity ... O.K.

[Example]

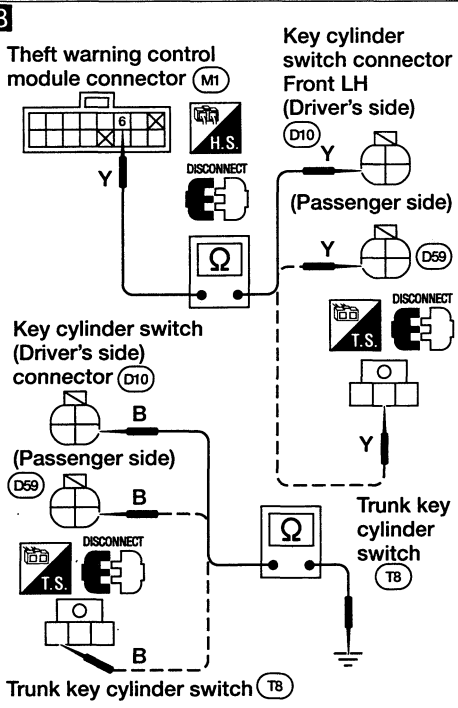


Read switch turns on when key cylinder is removed.

Continuity exists ... O.K.

AEL180

B



AEL181

A

KEY CYLINDER TAMPER SWITCH INPUT SIGNAL CHECK

Check continuity between control module harness terminals (6) and (16).

Condition	Continuity
Tamper switch is	
Normal	No
Removed	Yes

O.K. → Perform Diagnostic Procedure 2. Refer to EL-107.

N.G.

KEY CYLINDER SWITCH CHECK

Refer to EL-115.

N.G. → Replace key cylinder switch.

O.K.

B

KEY CYLINDER SWITCH CIRCUIT CHECK

- Check harness continuity between control module harness terminal (6) and key cylinder switch harness terminal.
- Check harness continuity between key cylinder switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness and connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

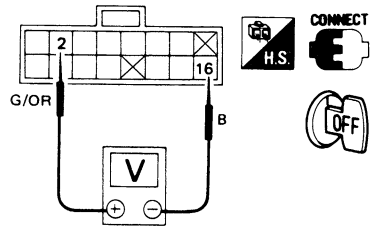
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

SYMPTOM: Indicator lamp does not blink.

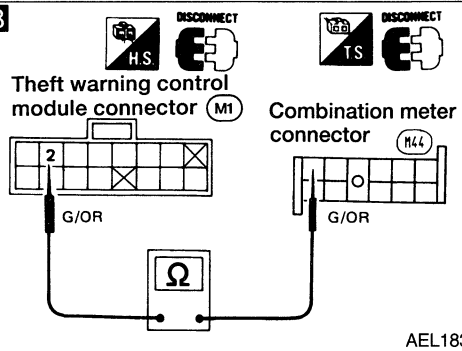
A

Theft warning control module connector (M1)



AEL182

B



AEL183

A

INDICATOR LAMP OUTPUT SIGNAL CHECK
Check voltage between control module harness terminals (2) and (16).
Pointer of voltmeter should deflect intermittently.

N.G. → Replace control module.

O.K. ↓

INDICATOR LAMP CHECK
Refer to EL-115.

N.G. → Replace indicator lamp.

O.K. ↓

B

INDICATOR LAMP CIRCUIT CHECK
Check harness continuity between control module harness terminal (2) and indicator lamp harness terminal.
Continuity should exist.

N.G. → Repair harness or connectors.

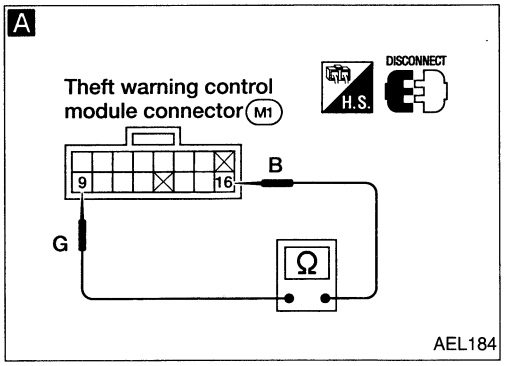
O.K. ↓

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 module harness terminals (9) and (16).

Condition	Continuity
Driver's door	
Locked	No
Unlocked	Yes
Except driver's door	
All locked	No
At least one is unlocked	Yes

O.K. → Perform Diagnostic Procedure 4. Refer to EL-109.

O.K. → Replace control module.

N.G. → DOOR UNLOCK SENSOR CHECK
Refer to EL-115.

N.G. → Replace door lock actuator.

O.K. →

B

DOOR UNLOCK SENSOR CIRCUIT CHECK

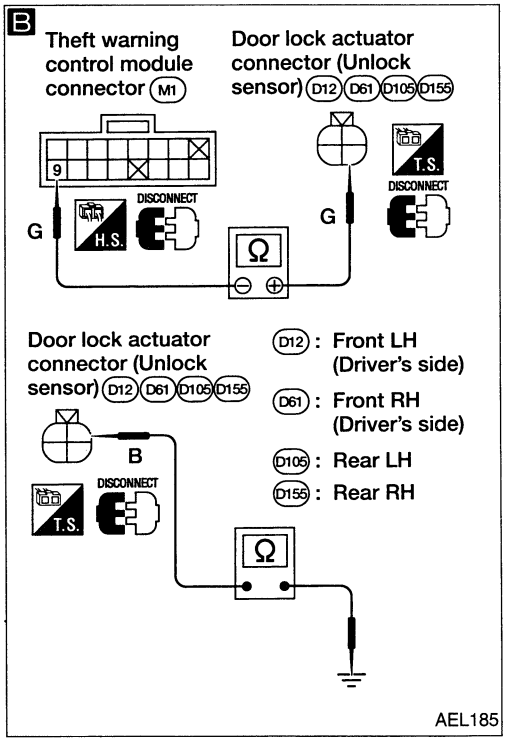
- Check harness continuity between control module harness terminal (9) and door lock actuator terminal.
- Check harness continuity between door lock actuator terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

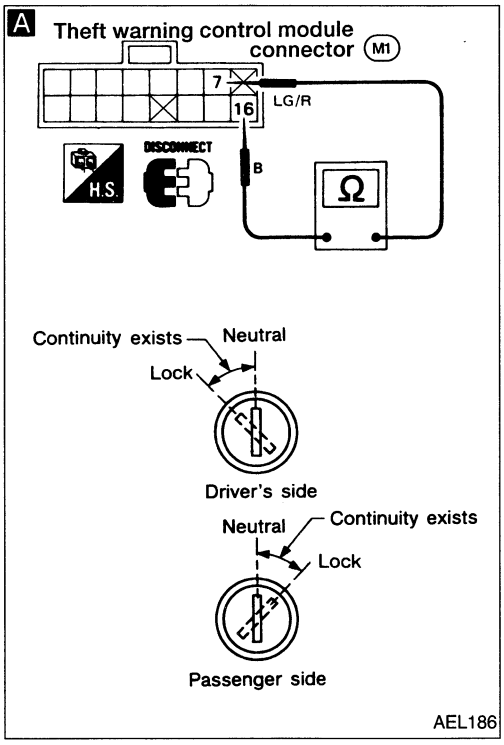
CHECK THE CONNECTIONS AT EACH CONNECTOR.

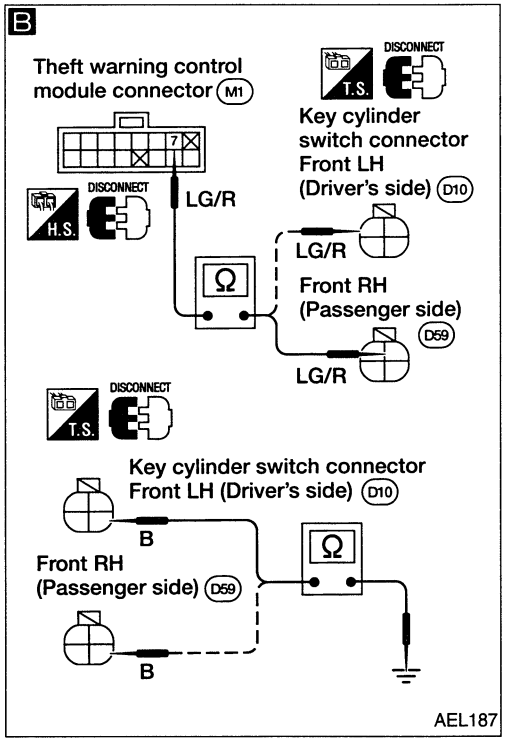


Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Indicator lamp does not come on.





A

KEY CYLINDER SWITCH INPUT SIGNAL CHECK (LOCK SIGNAL)
Check continuity between control module harness terminals ⑦ and ⑯.

Key position	Continuity
Neutral/Lock	No
Between neutral and lock	Yes

O.K. → Perform Diagnostic Procedure 3. Refer to EL-108.

O.K. → Replace control module.

N.G.

KEY CYLINDER SWITCH CHECK
Refer to EL-115.

N.G. → Replace key cylinder switch.

O.K.

B

KEY CYLINDER SWITCH CIRCUIT CHECK

- Check harness continuity between control module harness terminal ⑦ and key cylinder switch terminal.
- Check harness continuity between key cylinder switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

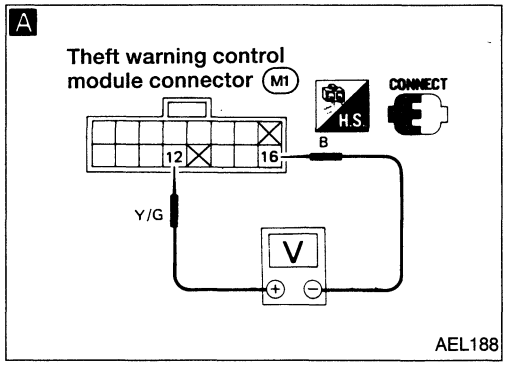
CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

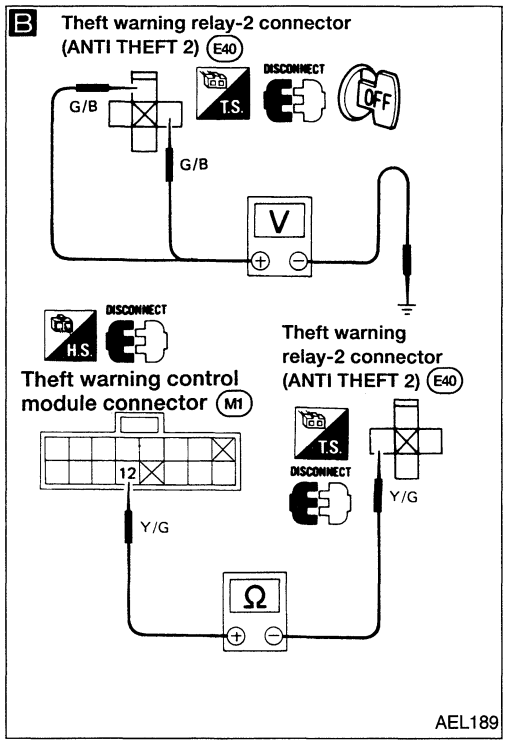
DIAGNOSTIC PROCEDURE 5

SYMPTOM: Alarm does not operate.

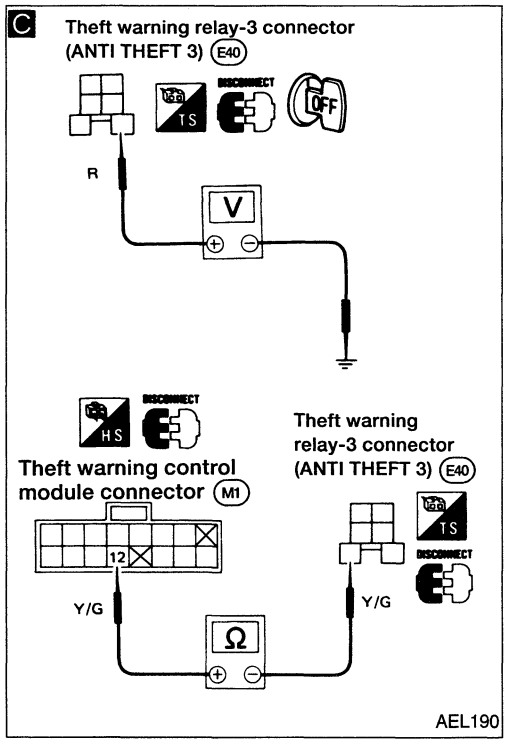
A



B



C



A

ALARM SIGNAL OUTPUT CHECK
Check voltage between control module harness terminals ⑫ and ⑯.

Condition	Voltmeter
Except alarm phase	12V
Alarm phase	Pointer deflects intermittently

N.G. → Replace control module.

O.K. ↓

Check theft warning relay-2. N.G. → Replace theft warning relay-2.

O.K. ↓

B

THEFT WARNING HORN CIRCUIT CHECK
Check if voltage across theft warning relay-2 harness terminal and body is 12V.
Check continuity between theft warning relay-2 terminal and control module harness terminal ⑫.
Continuity should exist.

N.G. → Repair harness, fuse and connectors.

O.K. ↓

Check theft warning relay-3. N.G. → Replace theft warning relay-3.

O.K. ↓

C

THEFT WARNING HEADLAMP CIRCUIT CHECK
Check if voltage across theft warning relay-3 harness terminal and body is 12V.
Check continuity between theft warning relay-3 terminal and control module harness terminal ⑫.

N.G. → Repair harness, fuse and connectors.

O.K. ↓

Does headlamp come on when turning ignition switch "ON"? No → Check headlamp system. Refer to EL-26.

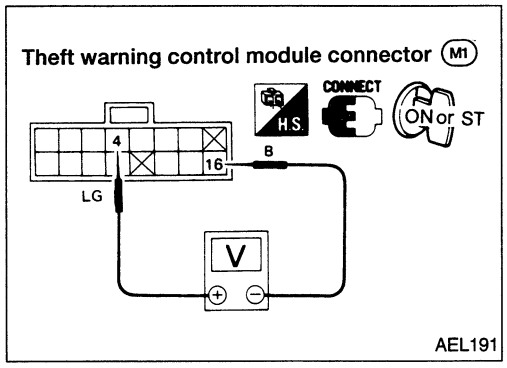
Yes ↓

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 module harness terminals ④ and ⑯ when ignition switch is turned to ON or "START".

→ Replace control module.

Approx. 0 volt

↓

Check theft warning relay-1 and circuit.

N.G. → Replace theft warning relay-1.

O.K.

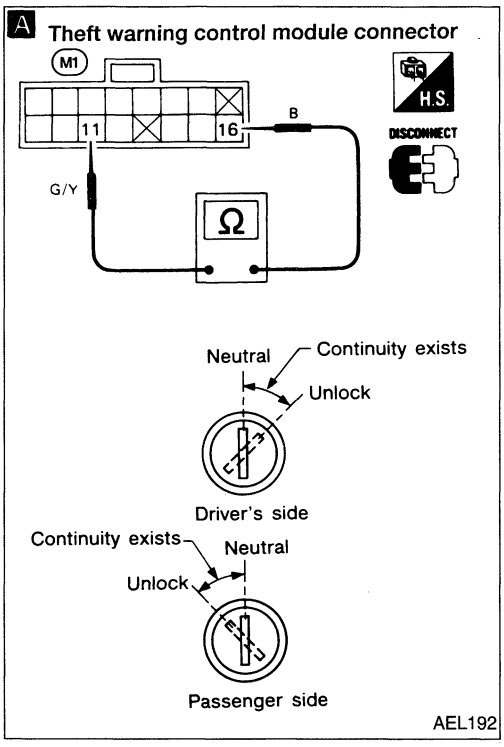
↓

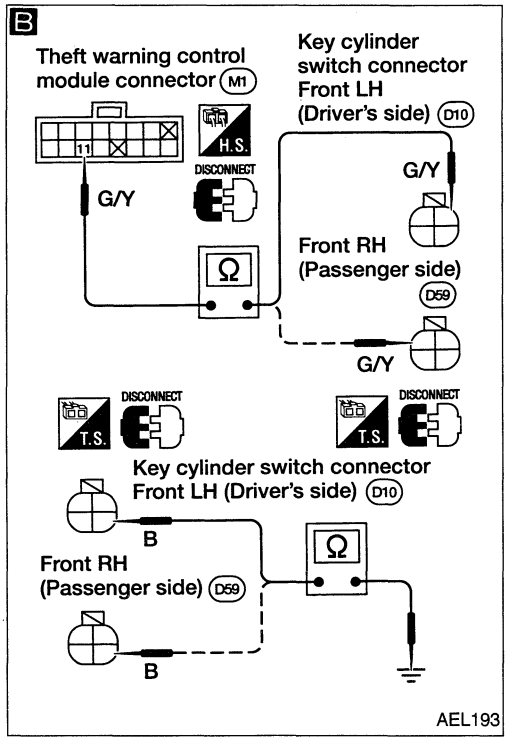
Repair harness between control module and clutch interlock relay (M/T models) or inhibitor switch (A/T models).

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

SYMPTOM: Alarm does not stop even if stop signal is given.





A

KEY CYLINDER SWITCH INPUT SIGNAL CHECK (UNLOCK SIGNAL)
Check continuity between control module harness terminals (11) and (16).

Key position	Continuity
Neutral/Unlock	No
Between neutral and unlock	Yes

O.K. → Replace control module.

N.G.

KEY CYLINDER SWITCH CHECK
Refer to EL-115.

N.G. → Replace key cylinder switch.

O.K.

B

KEY CYLINDER SWITCH CIRCUIT CHECK
- Check harness continuity between control module harness terminal (11) and key cylinder switch terminal.
- Check harness continuity between key cylinder switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

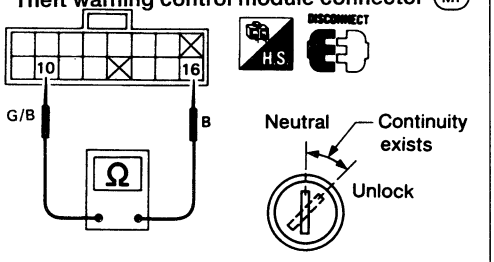
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

SYMPTOM: Alarm does not stop even if stop signal is given.

A

Theft warning control module connector (M1)

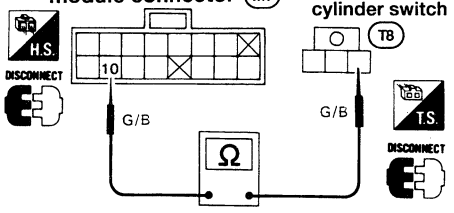


AEL194

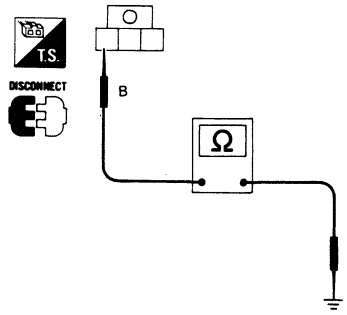
B

Theft warning control module connector (M1)

Trunk key cylinder switch (T8)



Trunk key cylinder switch connector (T8)



AEL195

A

TRUNK KEY CYLINDER SWITCH INPUT SIGNAL CHECK (UNLOCK SIGNAL)
Check continuity between control module harness terminals (10) and (16).

Key position	Continuity
Neutral/Unlock	No
Between neutral and unlock	Yes

O.K. → Replace control module.

N.G.

TRUNK KEY CYLINDER SWITCH CHECK
Refer to EL-115.

N.G. → Replace trunk key cylinder switch.

O.K.

B

TRUNK KEY CYLINDER SWITCH CIRCUIT CHECK
- Check harness continuity between control module harness terminal (10) and trunk key cylinder switch terminal.
- Check harness continuity between trunk key cylinder switch terminal and body ground.

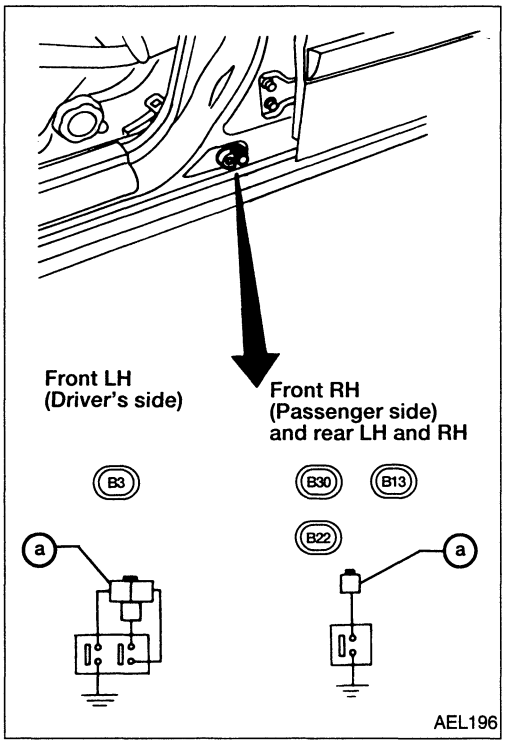
N.G. → Repair harness or connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

Trouble Diagnoses (Cont'd)

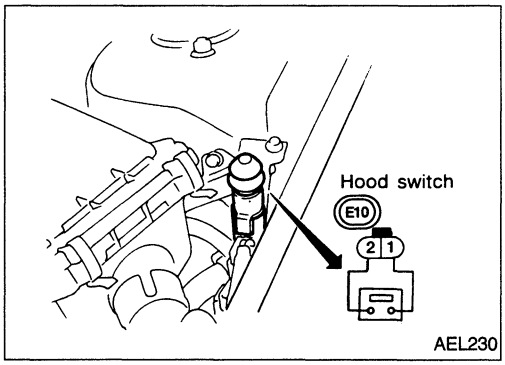
ELECTRICAL COMPONENTS INSPECTION



Door switches

Check continuity between terminal ⓐ and switch body.

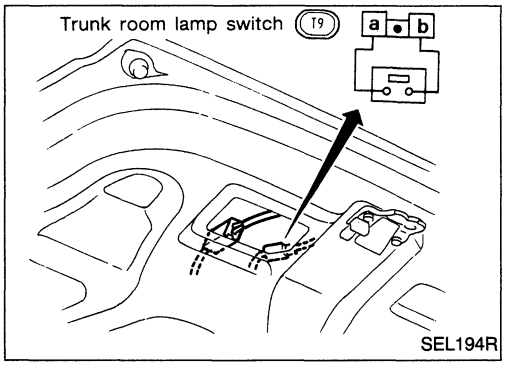
Terminal	Pushed	Released
a		○
switch body		○



Hood switch

Check continuity between terminals when hood switch is pushed and released.

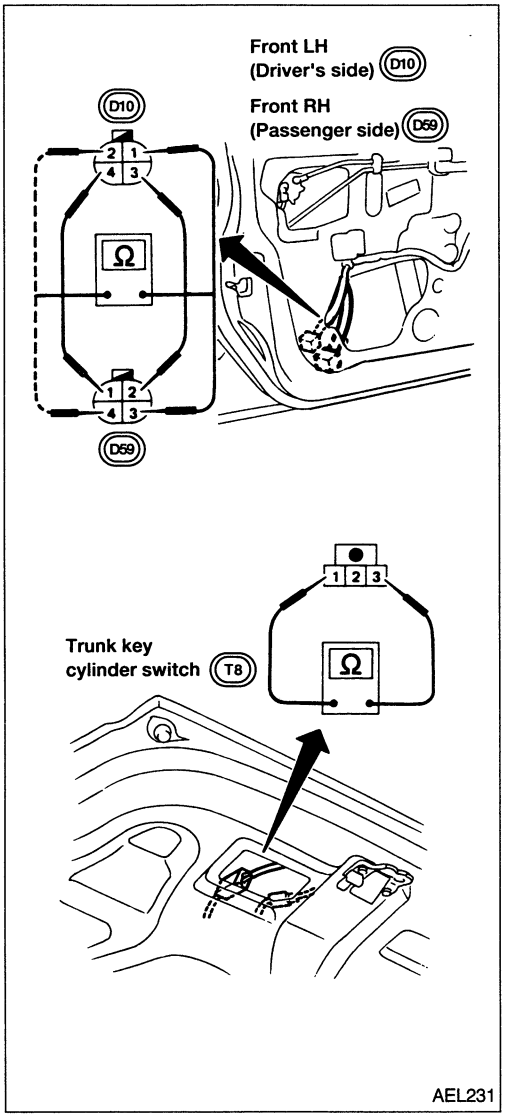
Terminal	Pushed	Released
a		○
b		○



Trunk room lamp switch

Terminal	Trunk lid	
	Closed	Open
a		○
b		○

Trouble Diagnoses (Cont'd)



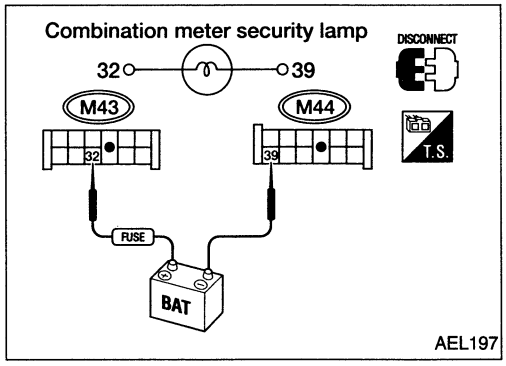
Key cylinder switch

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		○		○		○	

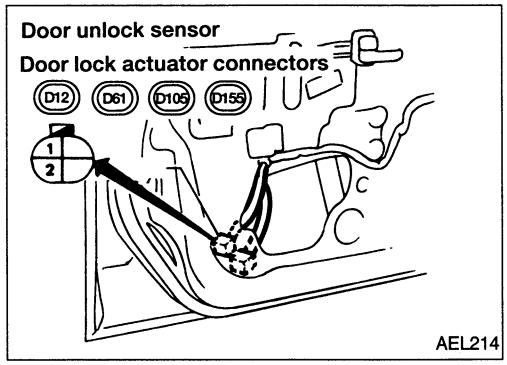
Trunk

	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		○		○	



Indicator lamp (security lamp)

Check if it lights when 12V is supplied.

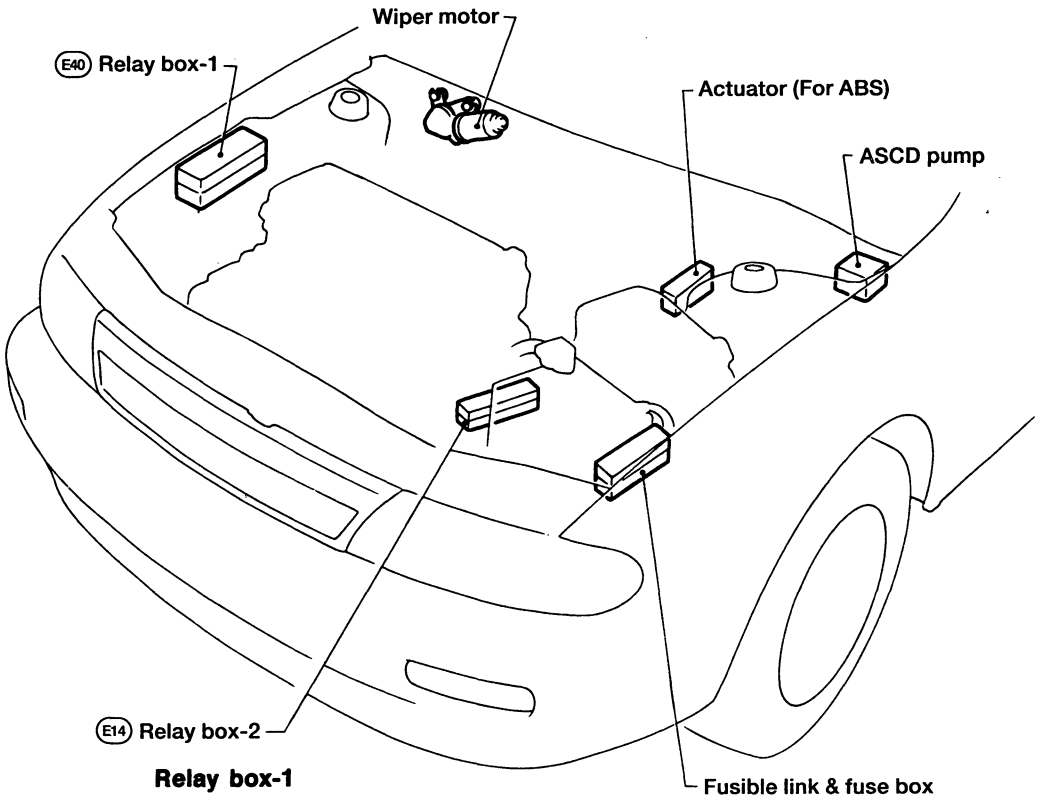


Door unlock sensor

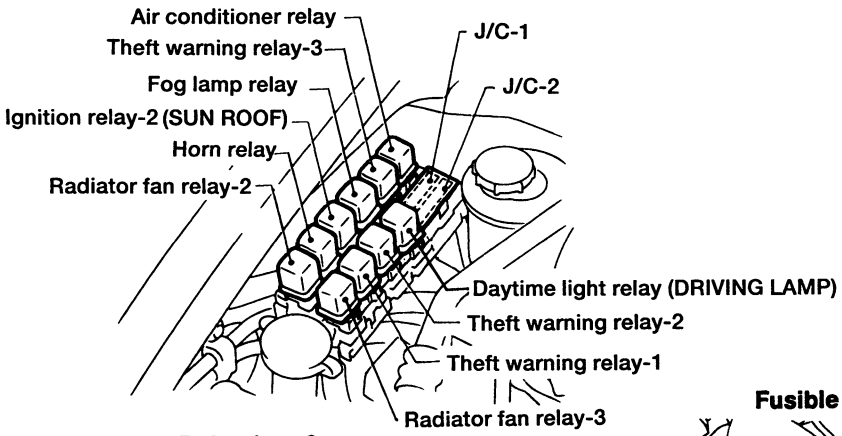
	LOCK	UNLOCK
1		○
2		○

NOTE

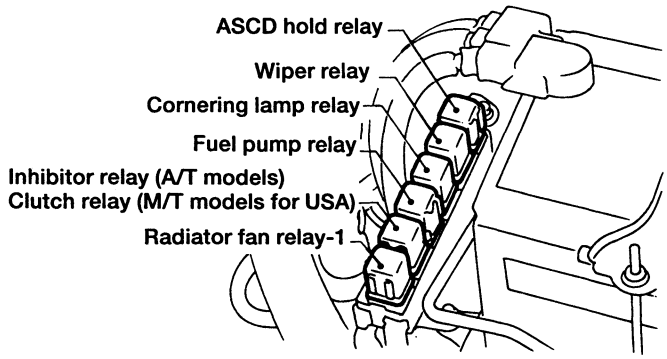
Engine Compartment



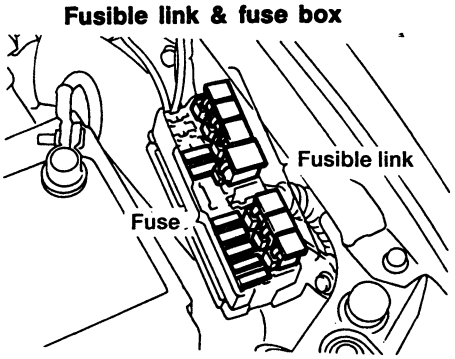
Relay box-1



Relay box-2

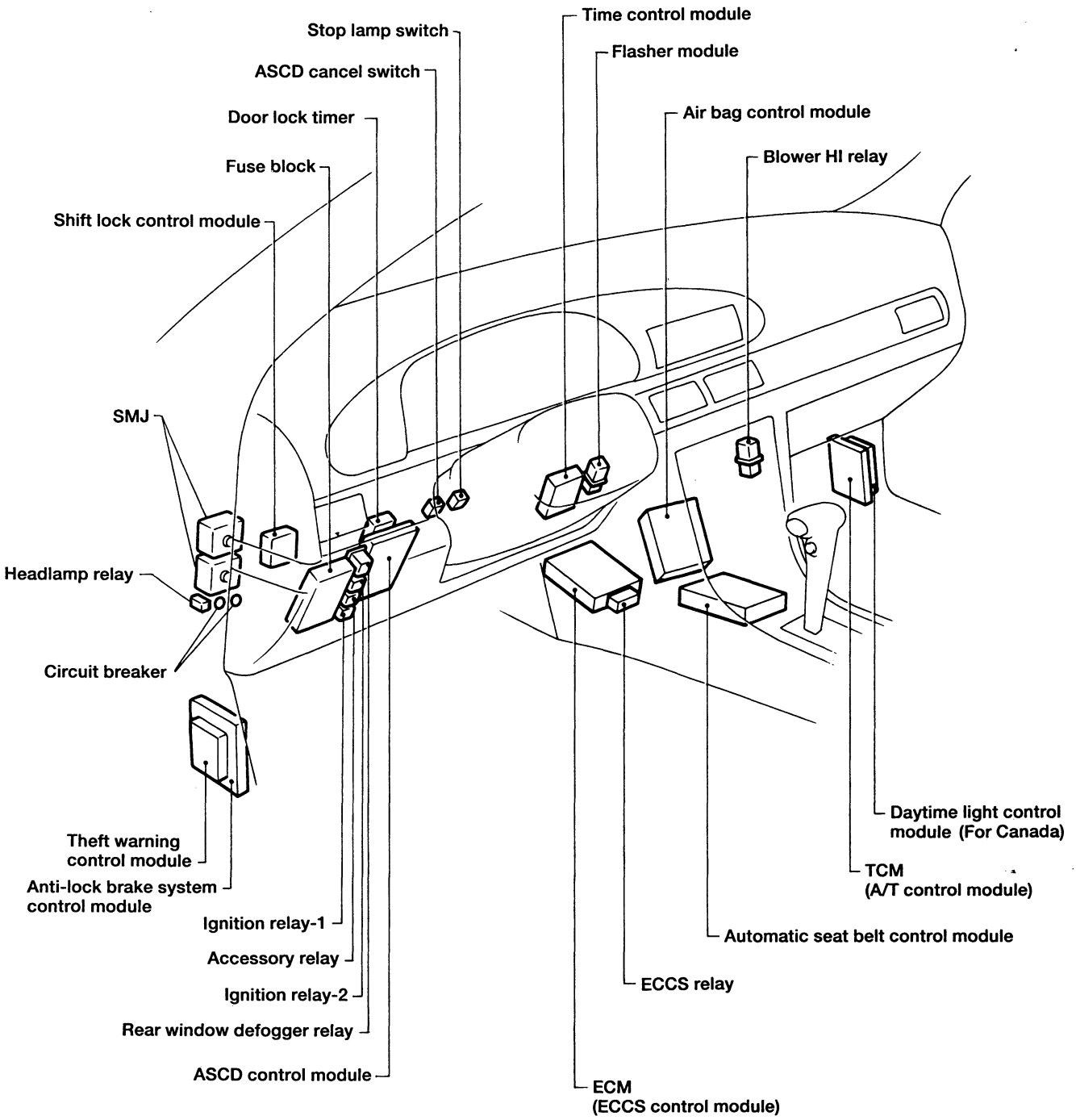


Fusible link & fuse box



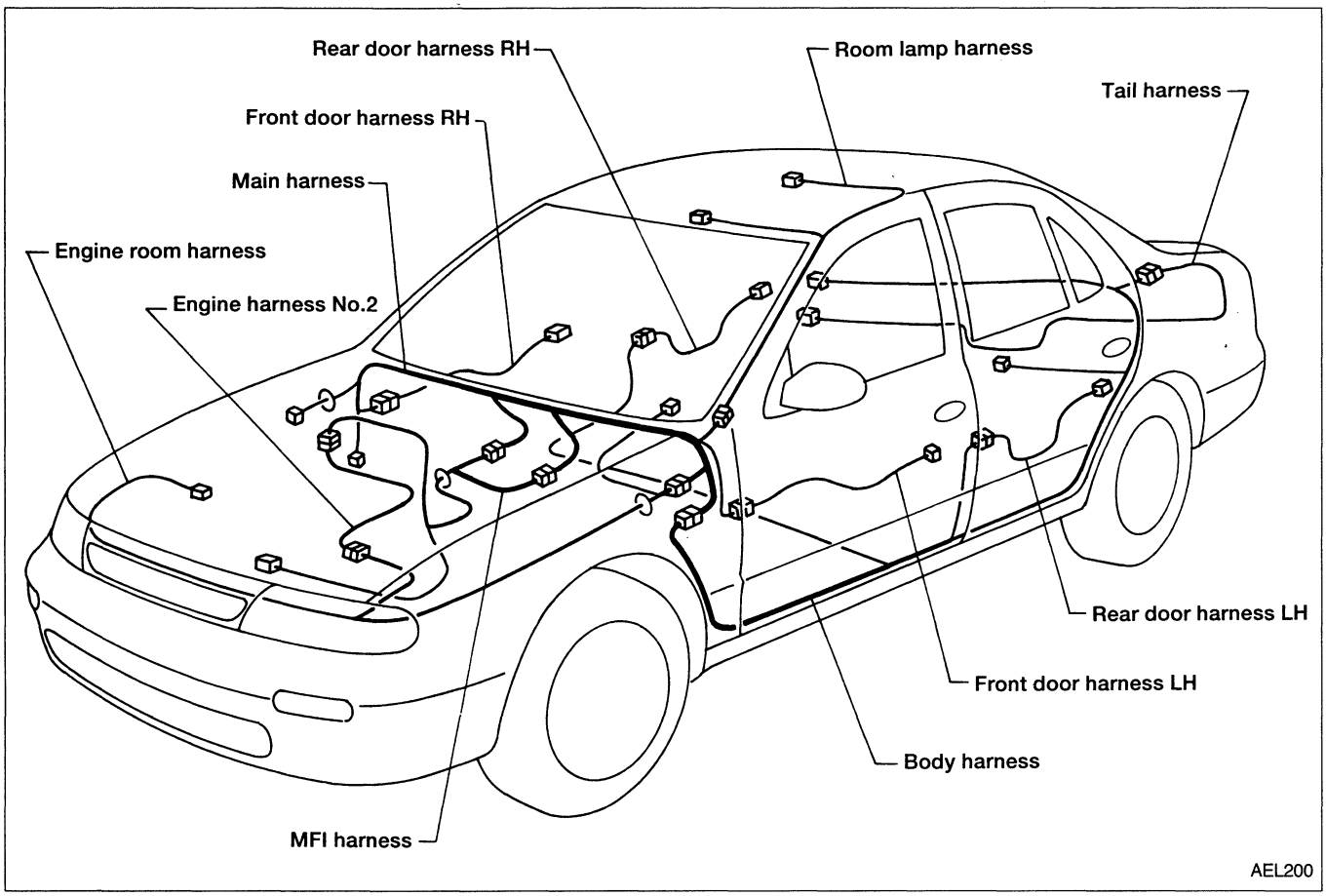
AEL198

Passenger Compartment



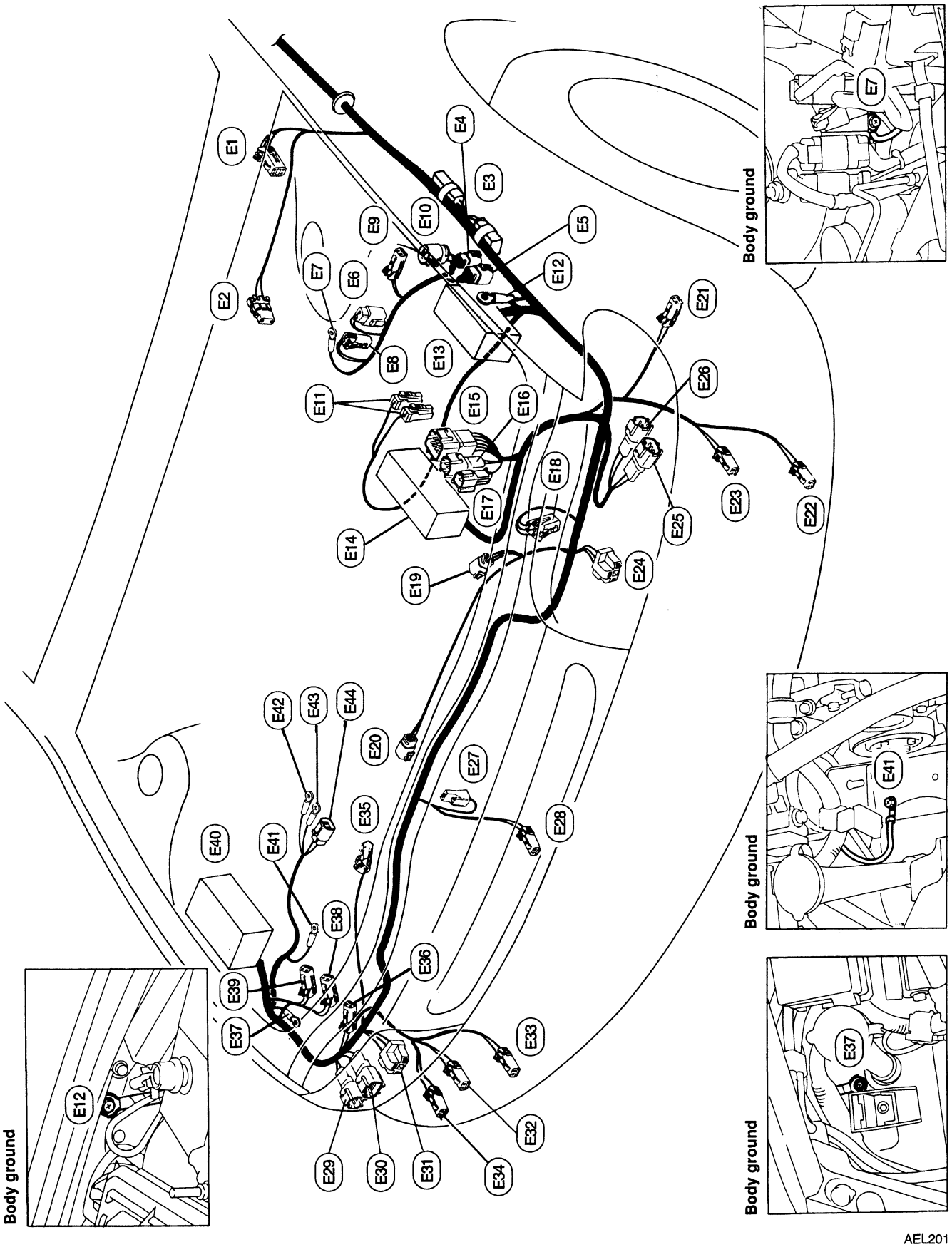
AEL199

Outline


Rear door harness RH
Room lamp harness
Tail harness
Front door harness RH
Main harness
Engine room harness
Engine harness No.2
Rear door harness LH
Front door harness LH
Body harness
MFI harness
AEL200

Engine Room Harness

ENGINE COMPARTMENT



AEL201

Engine Room Harness (Cont'd)

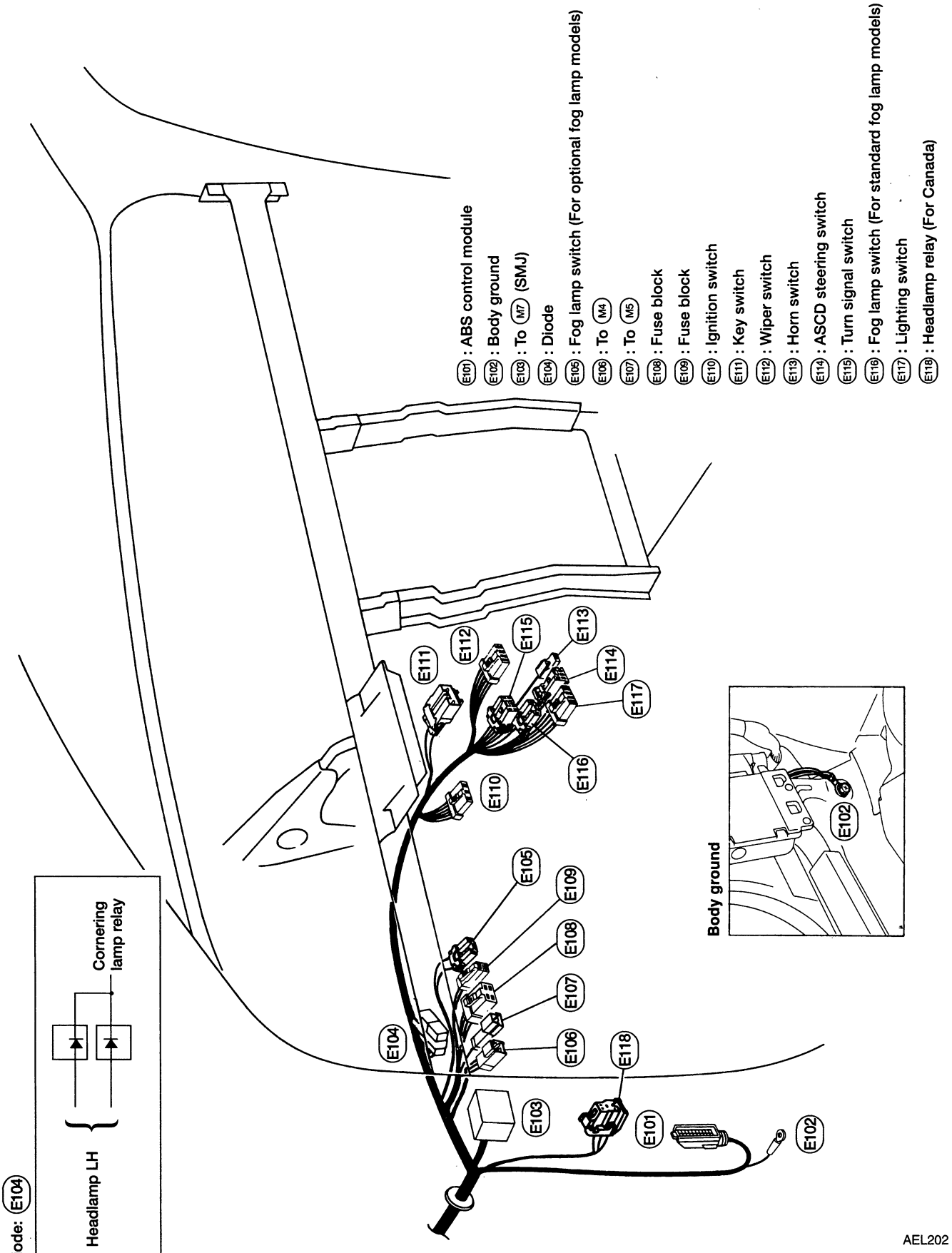
Engine room harness

(E1) : ASCD actuator
(E2) : Brake fluid level switch
(E3) : Joint connectors 3-6
(E4) : Actuator (For ABS)
(E5) : Actuator (For ABS)
(E6) : Actuator (For ABS)
(E7) : Body ground (For ABS)
(E8) : Front sensor LH (For ABS)
(E9) : Dropping resistor (A/T models)
(E10) : Hood switch (For theft warning system)
(E11) : Battery
(E12) : Body ground
(E13) : Fusible link and fuse box
(E14) : Relay box-2
(E15) : To (E213)
(E16) : To (E214)
(E17) : To (E215)
(E18) : Air conditioning triple-pressure switch
(E19) : Radiator fan motor-1
(E20) : Radiator fan motor-2
(E21) : Front side marker lamp LH
(E22) : Front fog lamp LH (For standard fog lamp models)
(E23) : Front turn signal lamp LH
(E24) : Headlamp LH
(E25) : Clearance and cornering lamp LH (XE-L models)
(E26) : Clearance lamp LH
(E27) : Horn
(E28) : Ambient sensor
(E29) : Clearance lamp RH
(E30) : Clearance and cornering lamp RH (XE-L models)
(E31) : Headlamp RH
(E32) : Front turn signal lamp RH
(E33) : Front fog lamp RH (For standard fog lamp models)
(E34) : Front side marker RH
(E35) : Compressor
(E36) : Front fog lamp sub-harness (For optional fog lamp models)
(E37) : Body ground
(E38) : Washer level switch
(E39) : Washer motor
(E40) : Relay box-1
(E41) : Body ground
(E42) : Generator
(E43) : Generator
(E44) : Generator

AEL201A

Engine Room Harness (Cont'd)

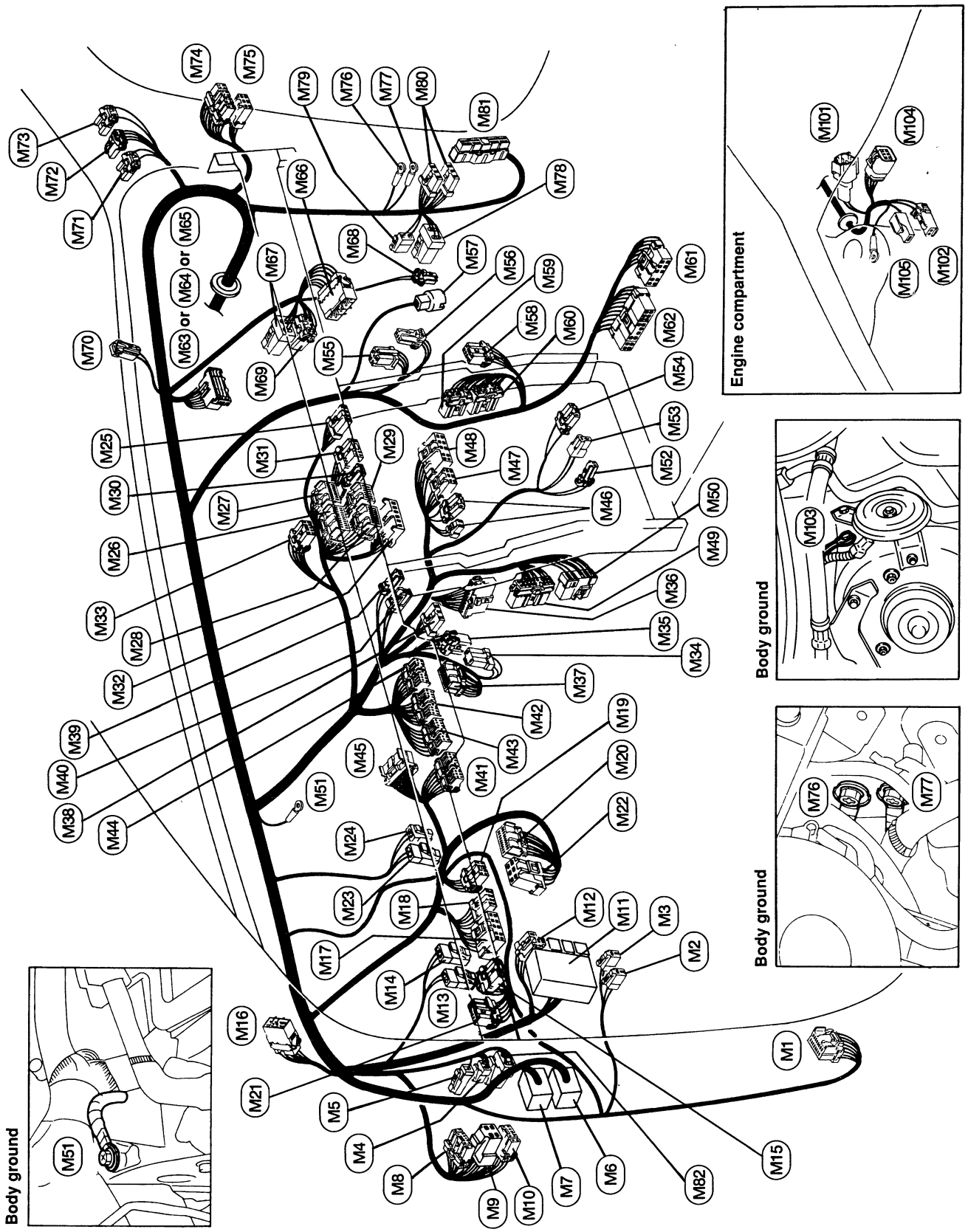
PASSENGER COMPARTMENT



AEL202

NOTE

Main Harness

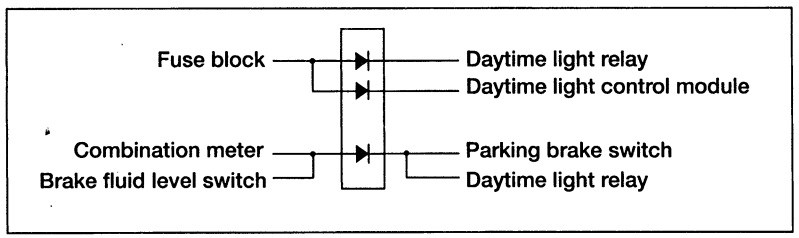


AEL203A

Main harness

(M1) : Theft warning control module (For theft warning system)
(M2) : Circuit breaker-1
(M3) : Circuit breaker-2
(M4) : To (E106)
(M5) : To (E107)
(M6) : To (B1) (SMJ)
(M7) : To (E103) (SMJ)
(M8) : To (D1)
(M9) : To (D2)
(M10) : To (D3)
(M11) : Fuse block
(M12) : Rear window defogger relay
(M13) : Clutch pedal position switch (M/T models for USA)
(M14) : ASCD clutch pedal position switch (M/T models)
(M15) : Data link connector for CONSULT
(M16) : To (R1)
(M17) : ASCD switch
(M18) : Mirror switch
(M19) : Illumination control switch
(M20) : ASCD control module
(M21) : Shift lock control module (A/T models)
(M22) : Door lock timer
(M23) : ASCD cancel switch
(M24) : Stop lamp switch
(M25) : Hazard switch
(M26) : Auto air conditioning unit
(M27) : Auto air conditioning unit
(M28) : Push control module
(M29) : Push control module
(M30) : Air conditioner switch
(M31) : Potentio temperature control
(M32) : Fan switch
(M33) : Clock
(M34) : Flasher module
(M35) : Air mix door motor
(M36) : Mode door motor
(M37) : Time control module
(M38) : Rear window defogger switch
(M39) : Fresh vent switch
(M40) : In-vehicle sensor
(M41) : Combination meter
(M42) : Combination meter
(M43) : Combination meter
(M44) : Combination meter
(M45) : Head-up display control module
(M46) : CD player
(M47) : Radio
(M48) : Radio
(M49) : To (F23)
(M50) : To (F24)
(M51) : Body Ground
(M52) : Cigarette lighter illumination
(M53) : Cigarette lighter
(M54) : Ashtray illumination
(M55) : Blower HI-relay
(M56) : Thermo control amp.
(M57) : Glove box lamp
(M58) : Fresh vent door motor
(M59) : To (F21)
(M60) : To (F22)
(M61) : Automatic seat belt control module (For USA)
(M62) : Automatic seat belt control module (For USA)
(M63) : Joint connector-7 (With audio amp. for USA)
(M64) : Joint connector-8 (With audio amp. for Canada)
(M65) : Joint connector-9 (With audio amp. for Canada)
(M66) : To (A2)
(M67) : Fan control amp.
(M68) : Glove box lamp switch
(M69) : Intake door motor
(M70) : Sunload sensor
(M71) : To pillar sub-harness (Without audio amp. for USA)
(M72) : To pillar sub-harness (With audio amp. for USA)
(M73) : To pillar sub-harness (With audio amp. for Canada)
(M74) : To (D51)
(M75) : To (D52)
(M76) : Body ground
(M77) : Body ground
(M78) : Fan resistor
(M79) : Blower motor
(M80) : Daytime light control module (For Canada)
(M81) : TCM (A/T control module)
(M82) : To (B31)

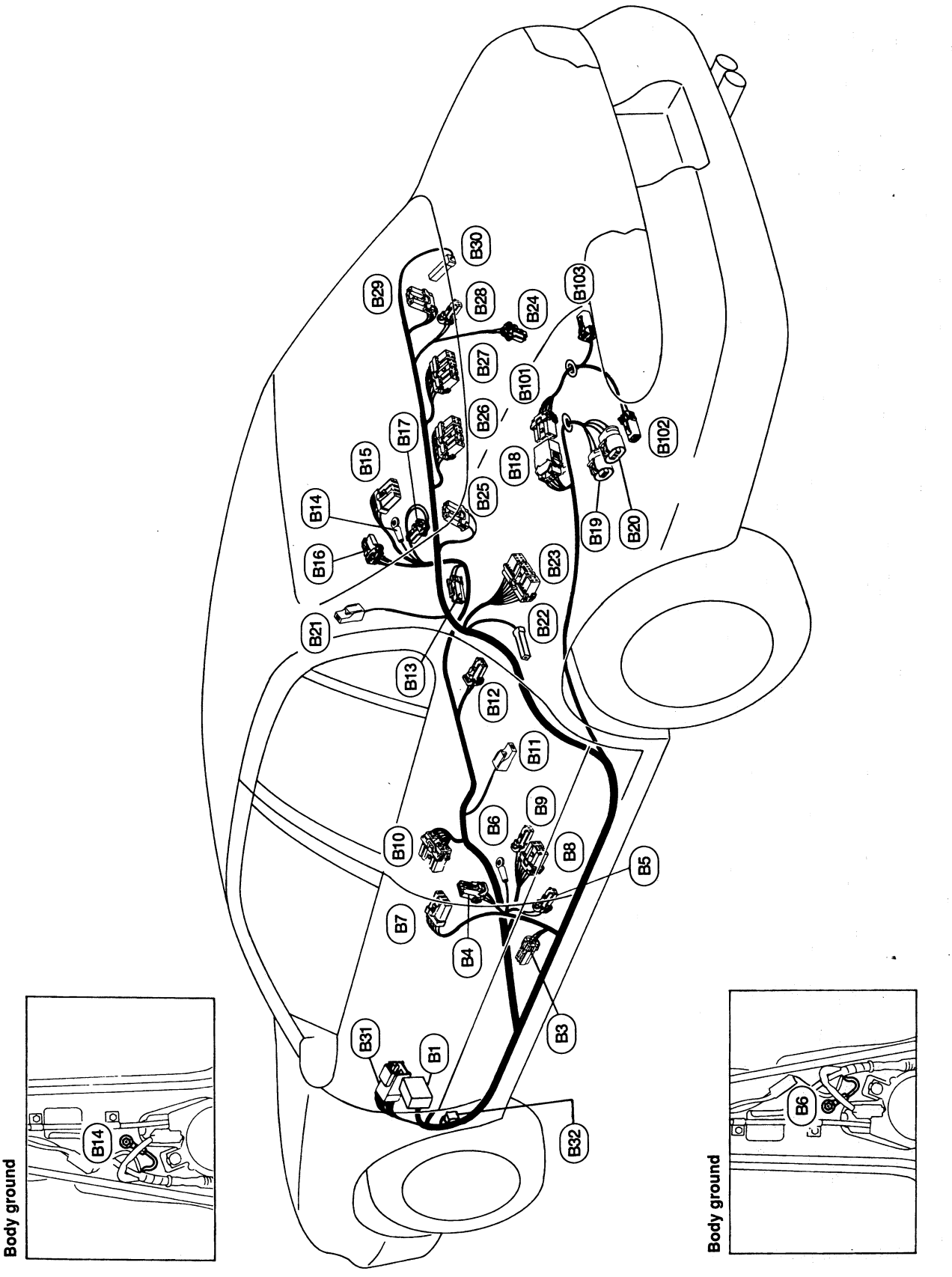
Diode (In joint connector-8 (M64) / In joint connector-9 (M65))



Engine Compartment

(M101) : Power steering pressure switch
(M102) : Front sensor RH (For ABS)
(M103) : Body ground (For ABS)
(M104) : Wiper motor
(M105) : Horn (For theft warning system)

Body Harness

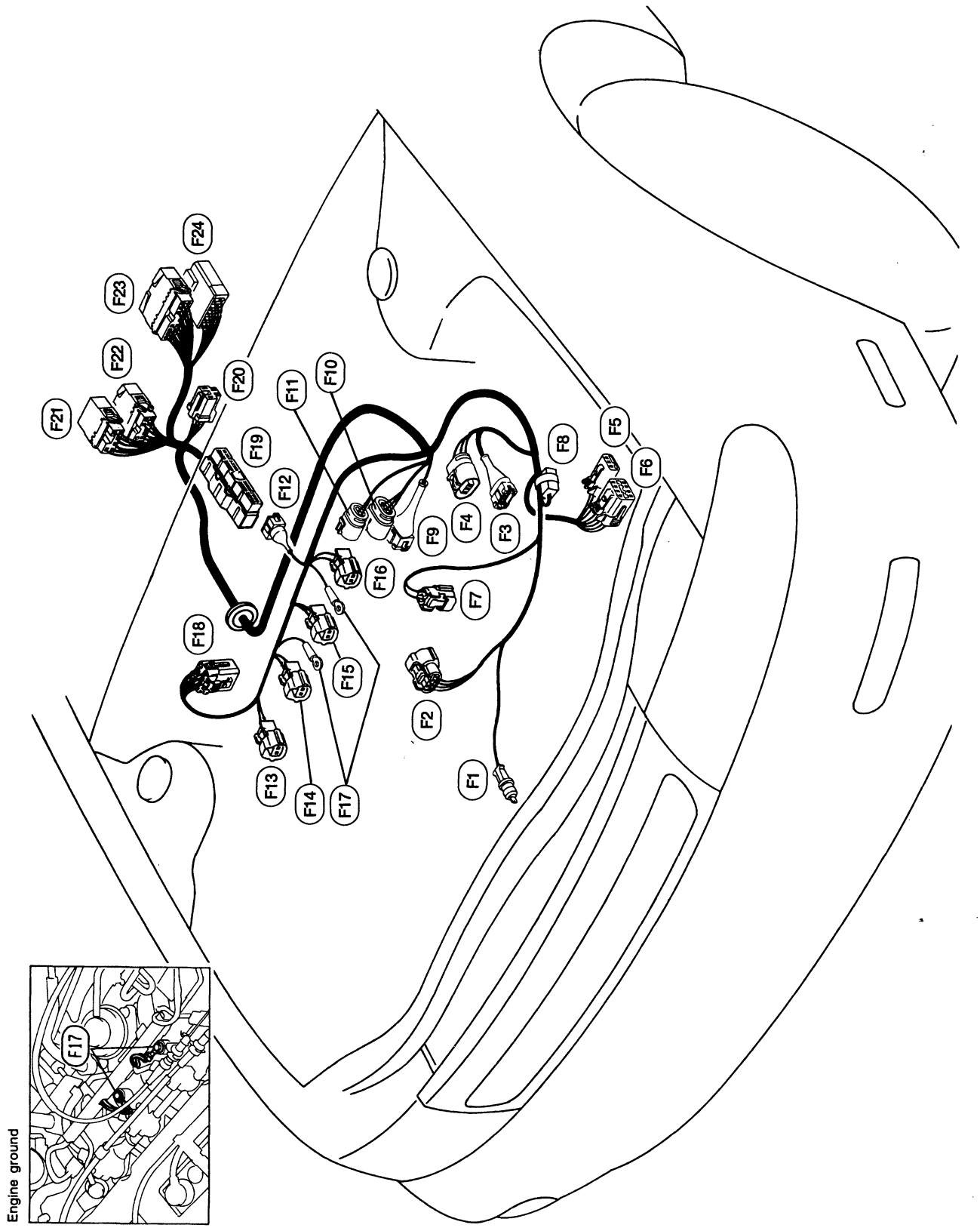


AEL204A

(B1) : To (M6) (SMJ)
(B3) : Front door switch LH (Driver's side)
(B4) : Rear limit switch and shoulder belt buckle switch LH (For USA)
(B5) : Drive motor LH (For USA)
(B6) : Body ground
(B7) : To (D101)
(B8) : Lap belt buckle switch and shoulder belt locking canceler LH (For USA)
(B9) : Seat belt switch (For Canada)
(B10) : Shift lock solenoid, detention switch and A/T illumination (A/T models)
(B11) : Parking brake switch
(B12) : Shoulder belt locking canceler RH (For USA)
(B13) : Front door switch RH (Passenger side)
(B14) : Body ground
(B15) : To (D151)
(B16) : Rear limit switch and shoulder belt buckle switch RH (For USA)
(B17) : Drive motor RH (For USA)
(B18) : To (B101)
(B19) : Fuel pump
(B20) : Fuel tank gauge unit
(B21) : Rear window defogger condenser
(B22) : Rear door switch LH
(B23) : To (T1)
(B24) : Trunk room lamp
(B25) : Rear speaker LH
(B26) : Front speaker amp.
(B27) : Rear speaker amp.
(B28) : High-mounted stop lamp (Without rear air spoiler)
(B29) : Rear speaker RH
(B30) : Rear door switch RH
(B31) : To (M82)
(B32) : Diode (For Canada)
(B101) : To (B18)
(B102) : Rear sensor LH (For ABS)
(B103) : Rear sensor RH (For ABS)

AEL204B

MFI Harness



AEL205A

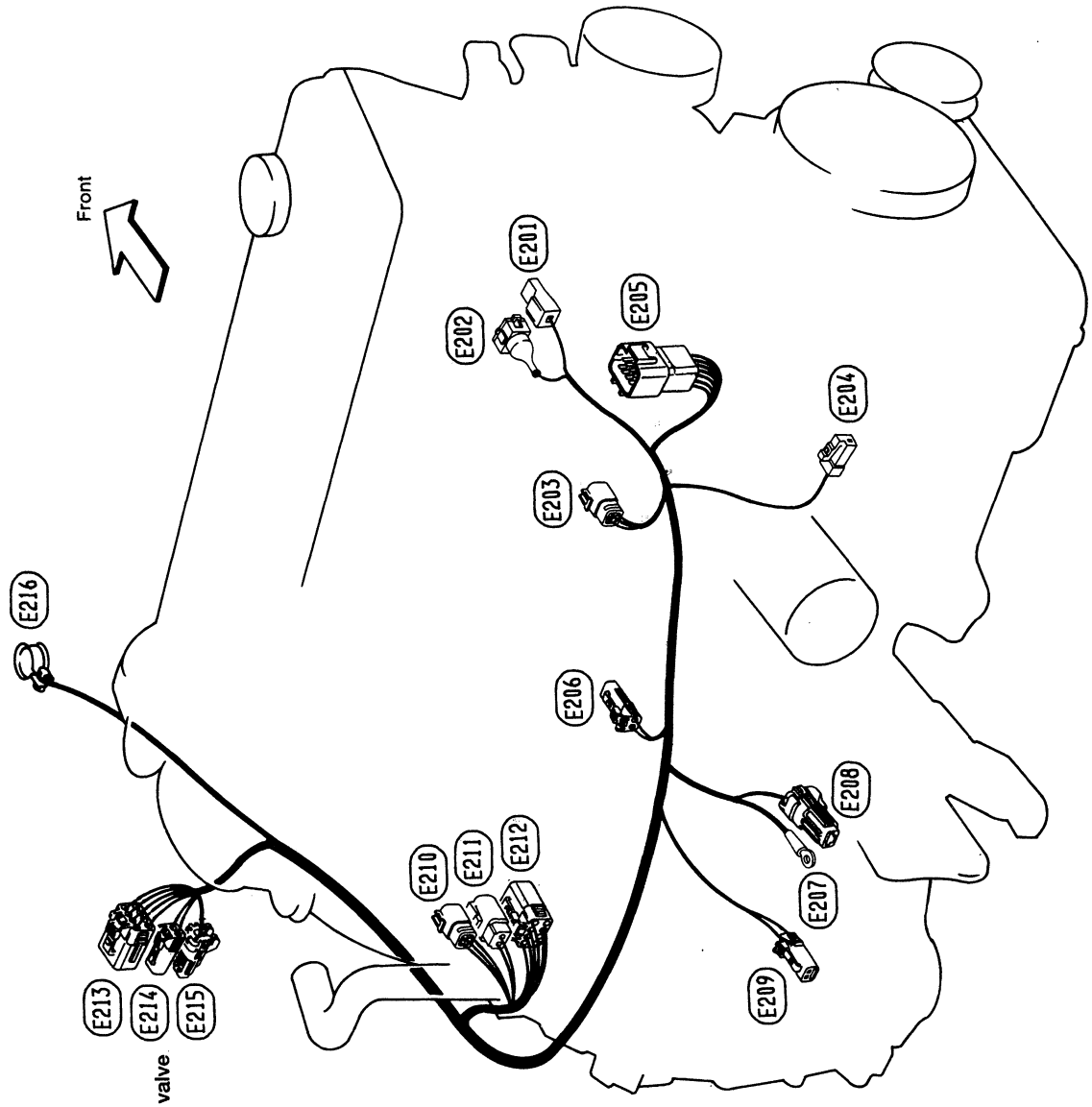
MFI Harness (Cont'd)

MFI harness

- (F1) : Oxgen sensor
- (F2) : Crankshaft position sensor
- (F3) : Mass air flow sensor
- (F4) : Power transistor
- (F5) : Revolution sensor (A/T models)
- (F6) : To terminal cord assembly (A/T models)
- (F7) : Ignition coil
- (F8) : Resistor & condenser
- (F9) : Throttle position switch
- (F10) : Throttle position sensor
- (F11) : EGR temperature sensor
- (F12) : EGR control-solenoid valve
- (F13) : Injector No. 1
- (F14) : Injector No. 2
- (F15) : Injector No. 3
- (F16) : Injector No. 4
- (F17) : Engine ground
- (F18) : To (E206)
- (F19) : ECM (ECCS control module)
- (F20) : ECM relay
- (F21) : To (M59)
- (F22) : To (M60)
- (F23) : To (M49)
- (F24) : To (M50)

AEL205

Engine Harness No. 2

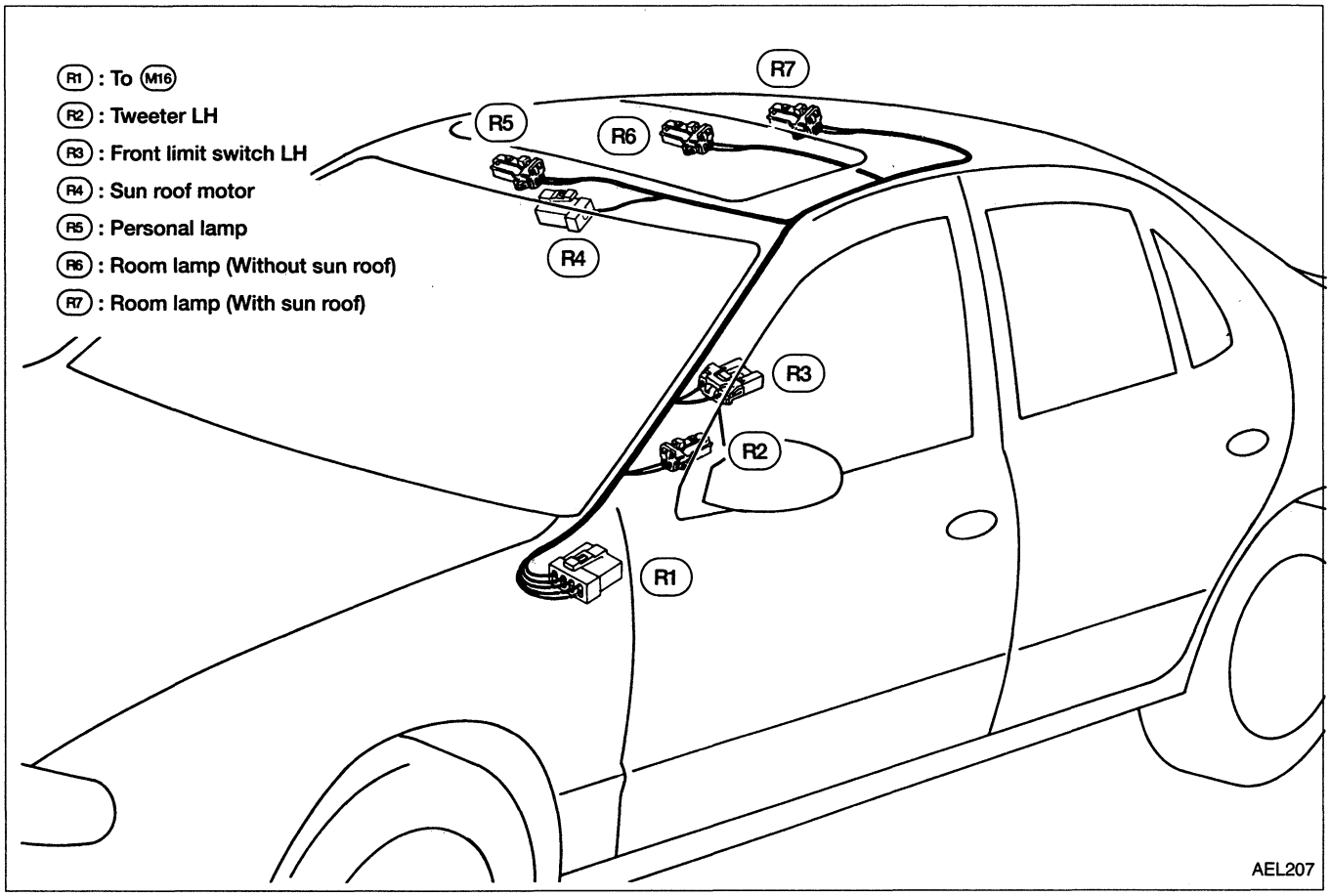


Engine harness No. 2

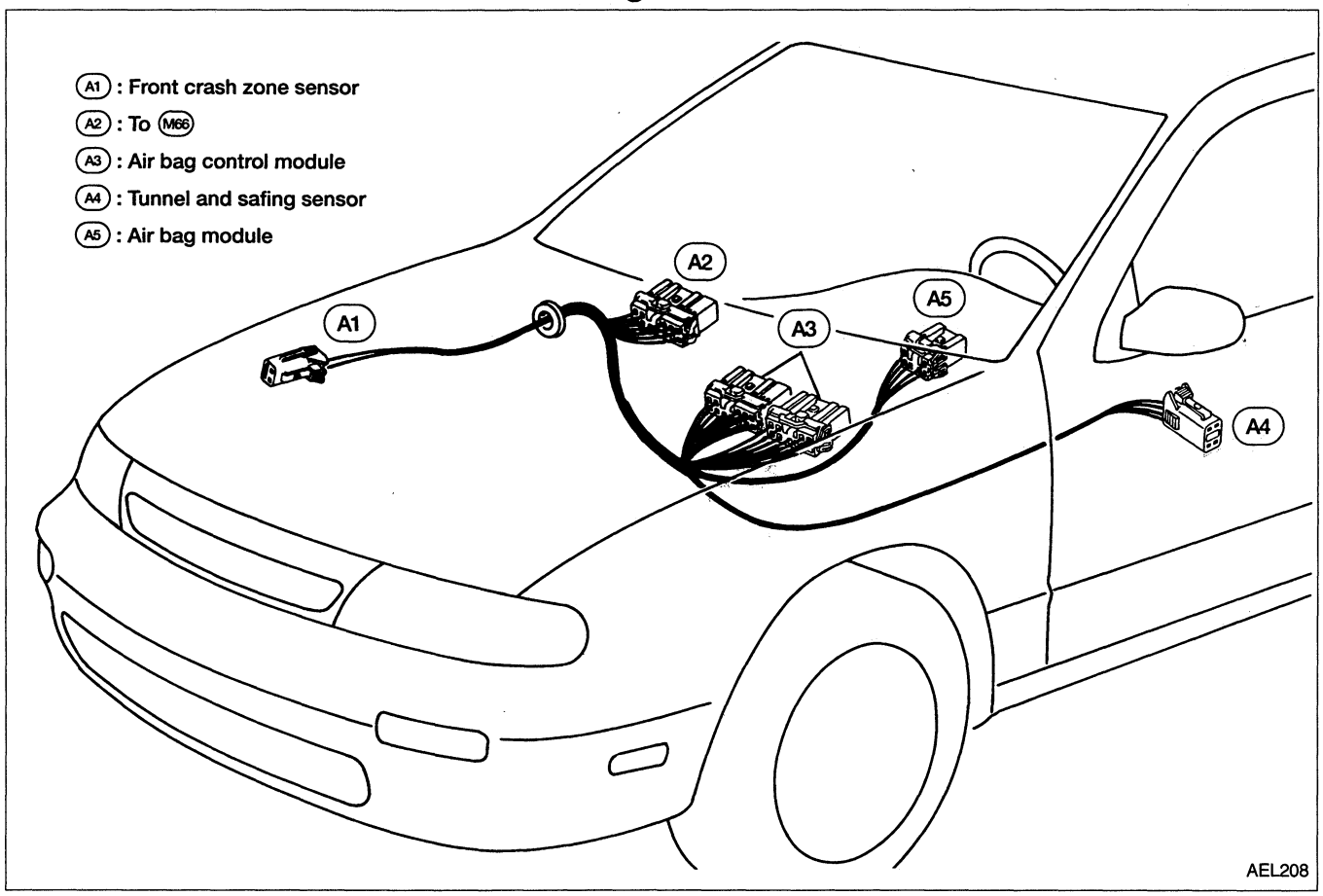
- E201 : Thermal transmitter
- E202 : Engine coolant temperature sensor
- E203 : IAC valve-FICD solenoid valve & IAC valve-AAC valve
- E204 : Oil pressure switch
- E205 : To F18
- E206 : Knock sensor
- E207 : Starter motor
- E208 : Starter motor
- E209 : Vehicle speed sensor
- E210 : Position switch (M/T models)
- E211 : Inhibitor switch (A/T models)
- E212 : Inhibitor switch (A/T models)
- E213 : To E15
- E214 : To E16
- E215 : To E17
- E216 : Battery

AEL206

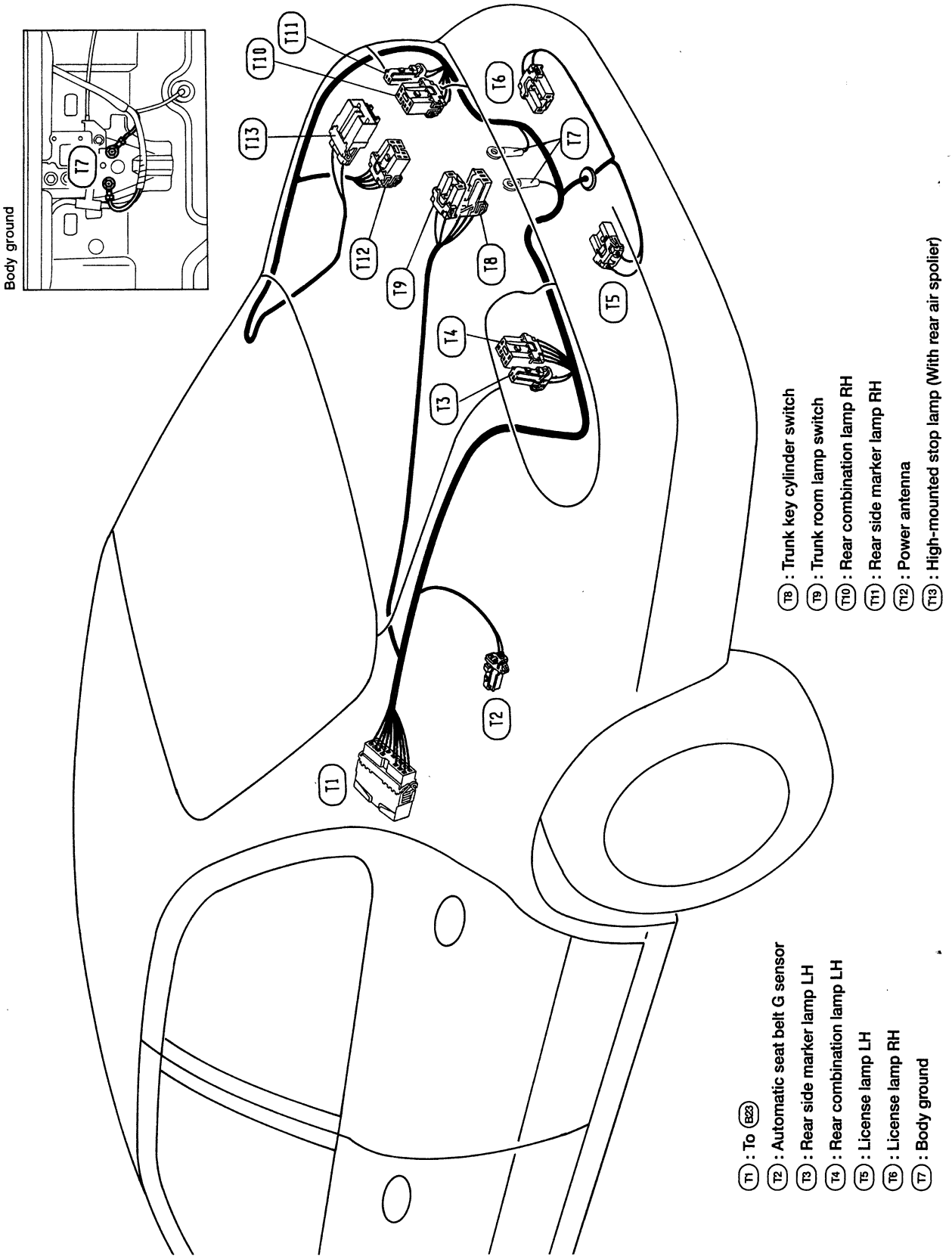
Room Lamp Harness



Air Bag Harness



Tail Harness



(T1) : To (B23)
(T2) : Automatic seat belt G sensor
(T3) : Rear side marker lamp LH
(T4) : Rear combination lamp LH
(T5) : License lamp LH
(T6) : License lamp RH
(T7) : Body ground

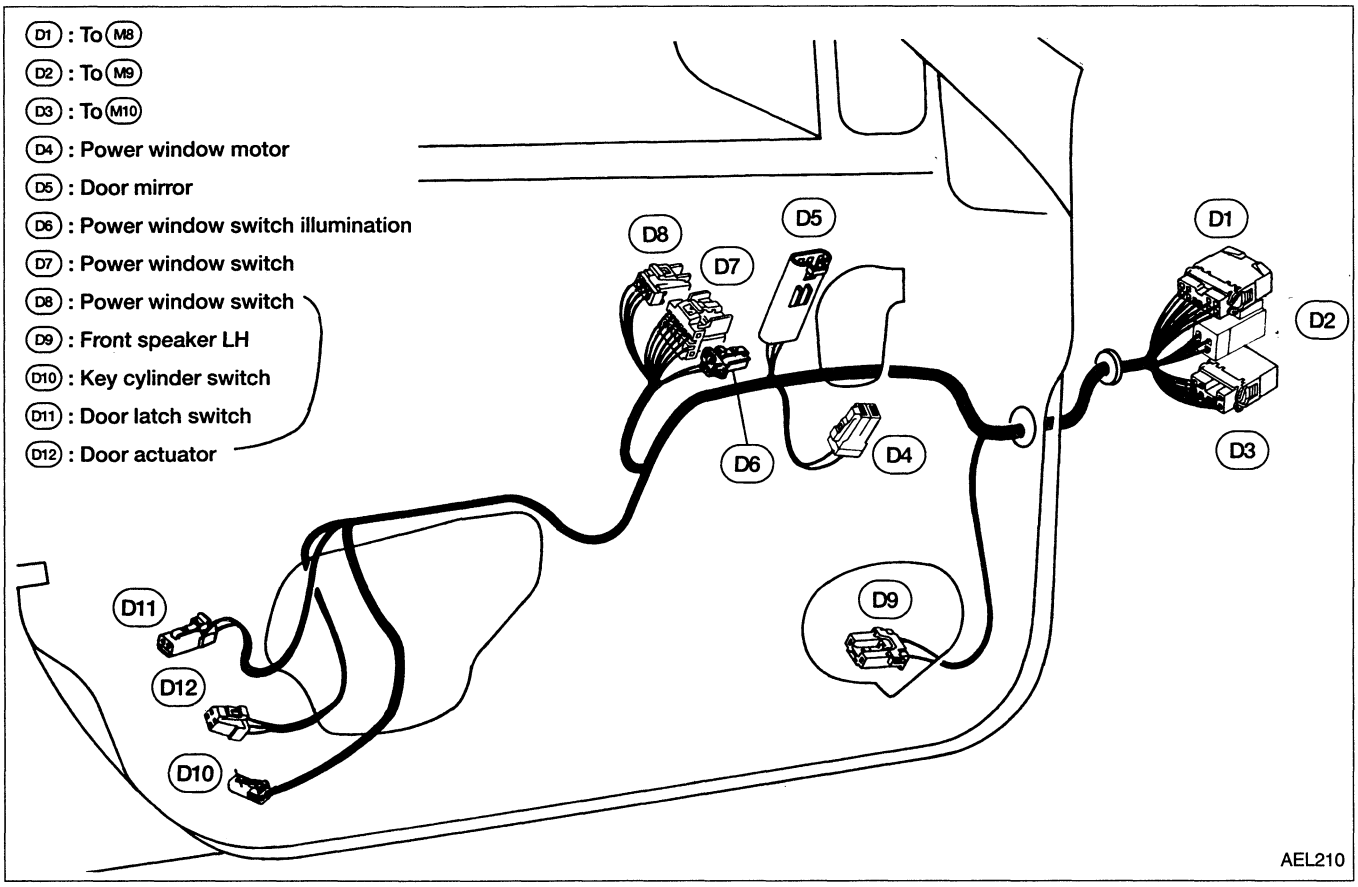
(T8) : Trunk key cylinder switch
(T9) : Trunk room lamp switch
(T10) : Rear combination lamp RH
(T11) : Rear side marker lamp RH
(T12) : Power antenna
(T13) : High-mounted stop lamp (With rear air spolier)

AEL209

Door Harness (LH side)

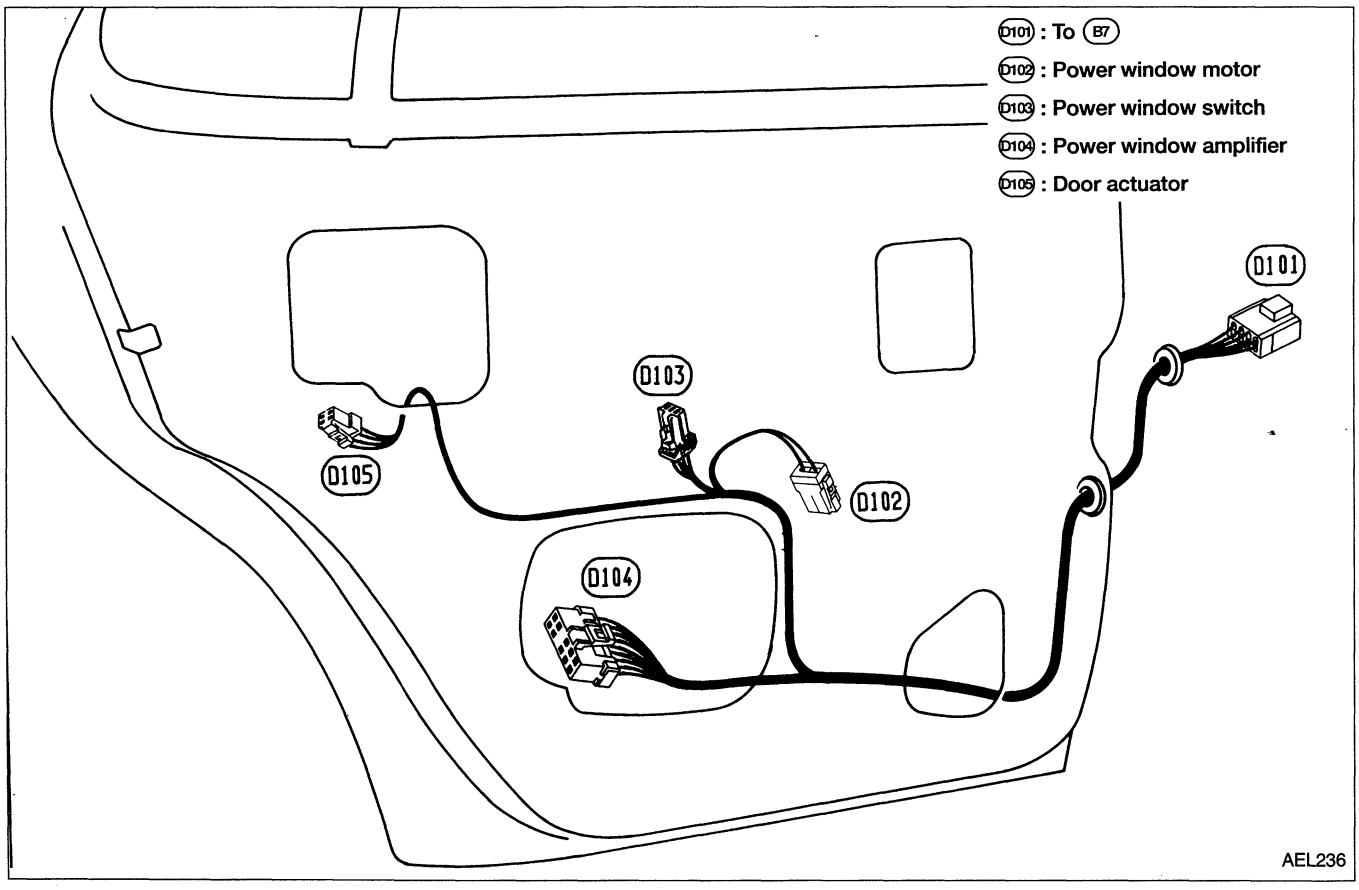
FRONT

(D1) : To (M8)
(D2) : To (M9)
(D3) : To (M10)
(D4) : Power window motor
(D5) : Door mirror
(D6) : Power window switch illumination
(D7) : Power window switch
(D8) : Power window switch
(D9) : Front speaker LH
(D10) : Key cylinder switch
(D11) : Door latch switch
(D12) : Door actuator



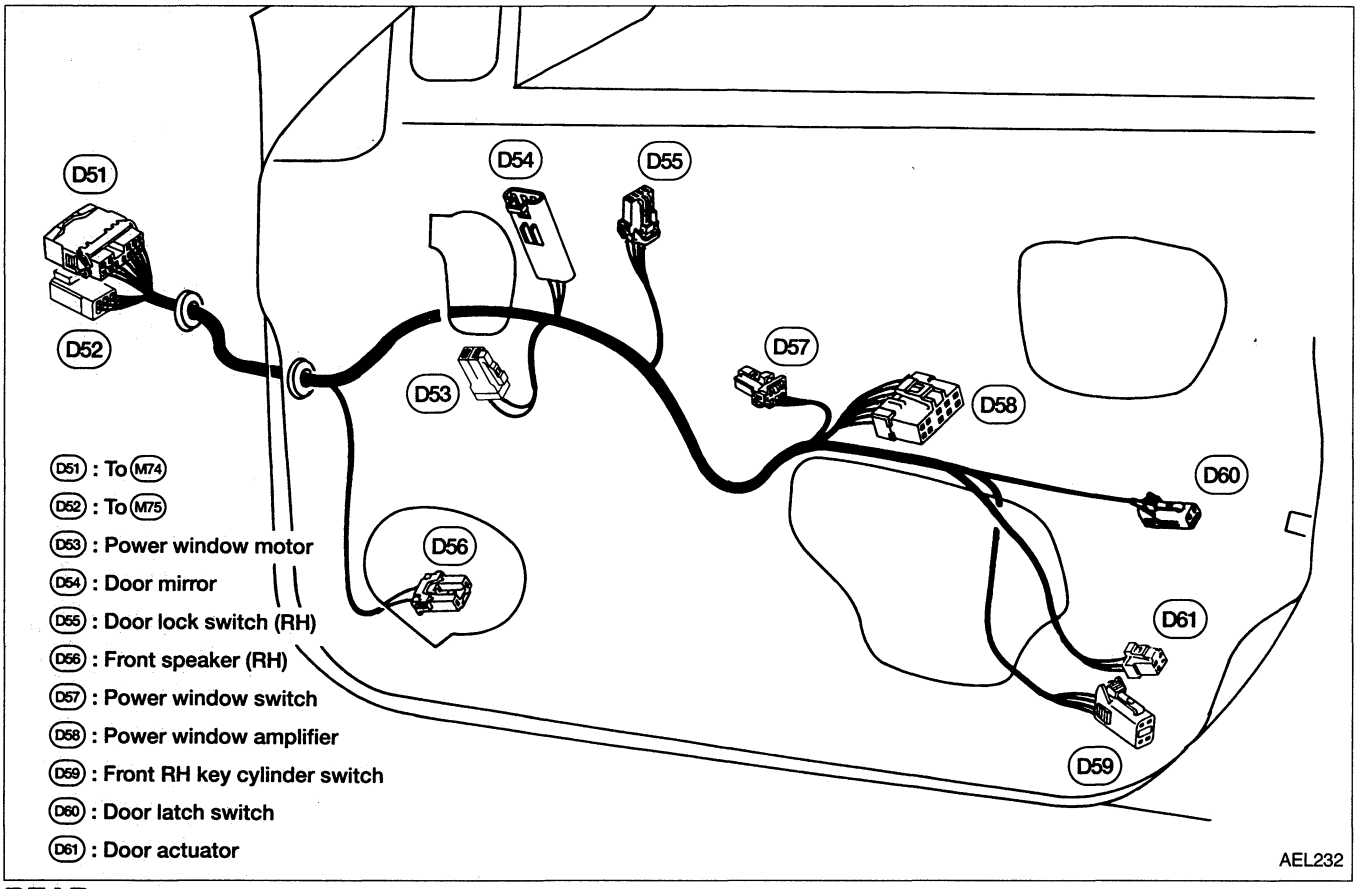
REAR

(D101) : To (B7)
(D102) : Power window motor
(D103) : Power window switch
(D104) : Power window amplifier
(D105) : Door actuator

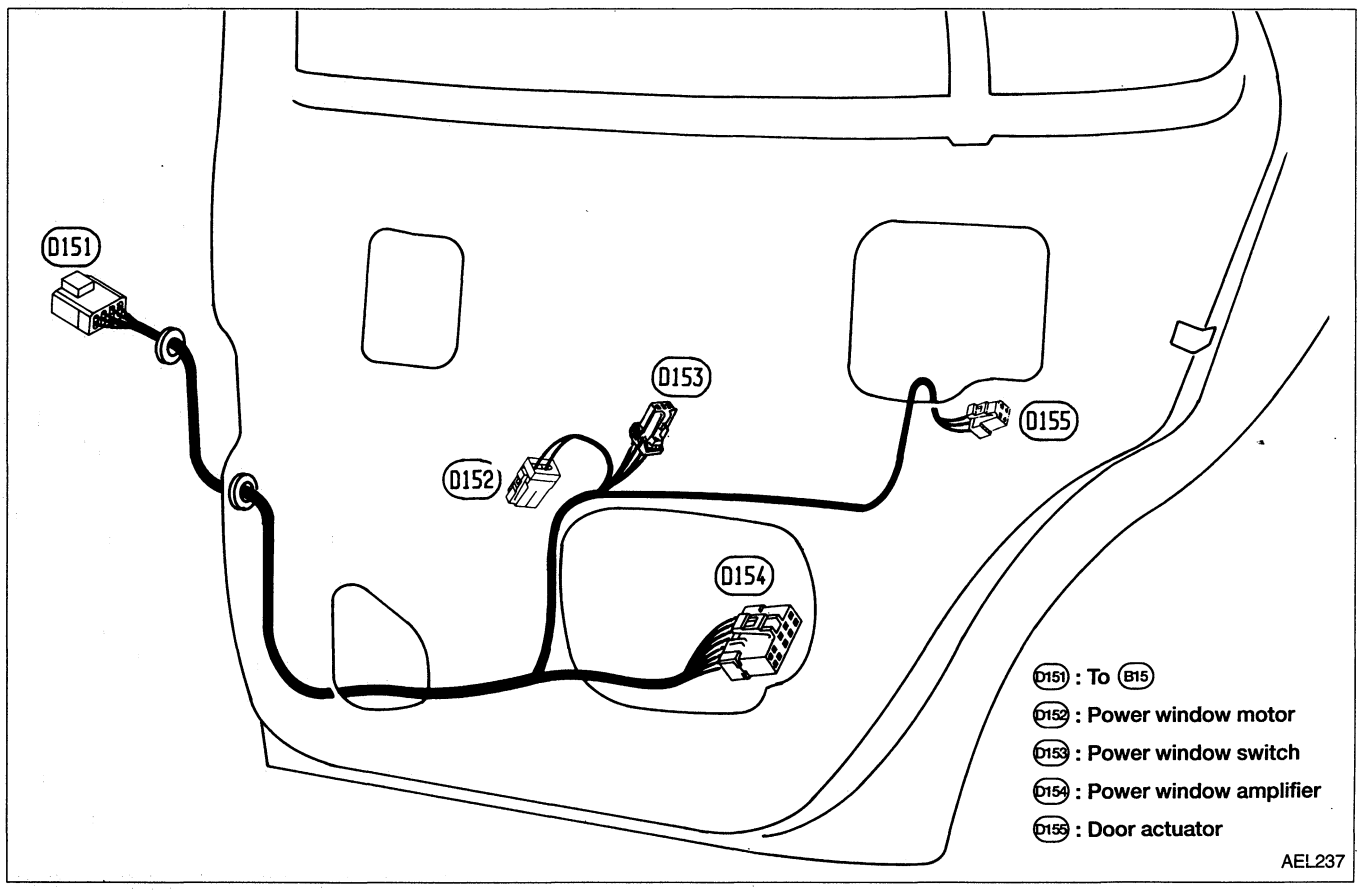


FRONT

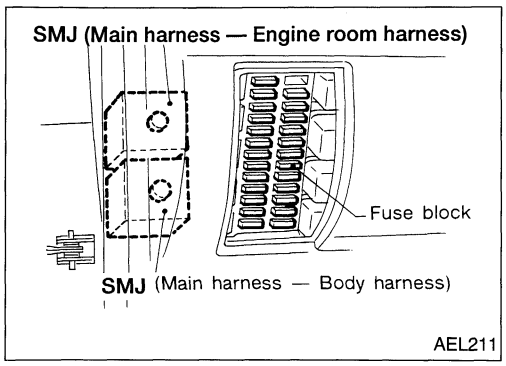
Door Harness (RH side)

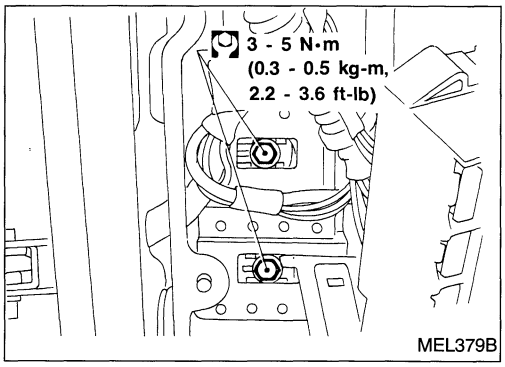


REAR



NOTE





INSTALLATION

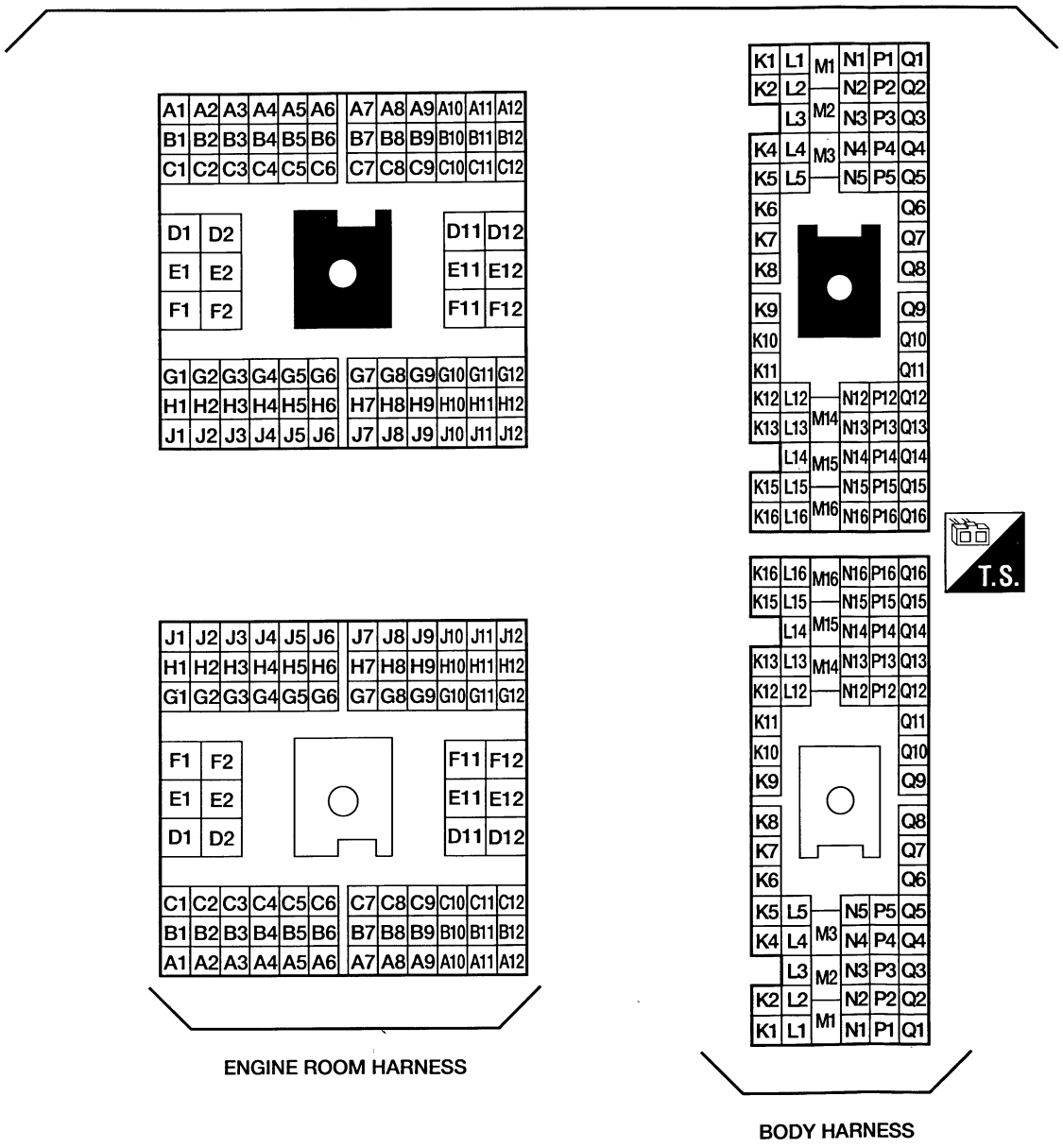
To install SMJ, tighten bolts until orange "fulltight" mark appears and then retighten to specified torque as required.

: 3 - 5 N·m
(0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

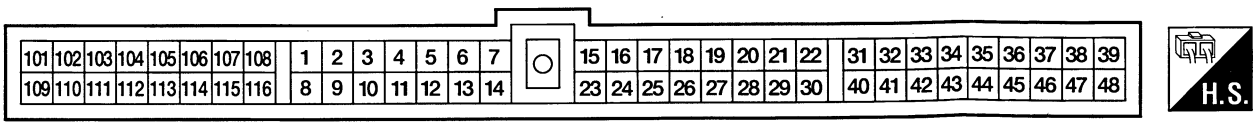
CAUTION:
Do not overtighten bolts, otherwise, they may be damaged.

Terminal Arrangement

MAIN HARNESS

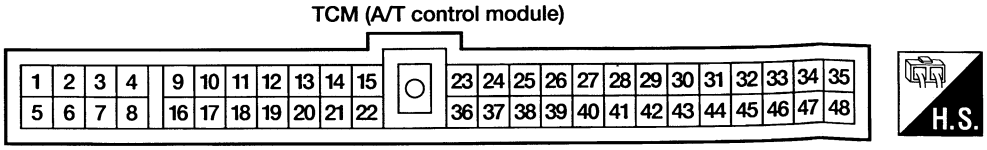


ECM (ECCS control module)



View from harness side

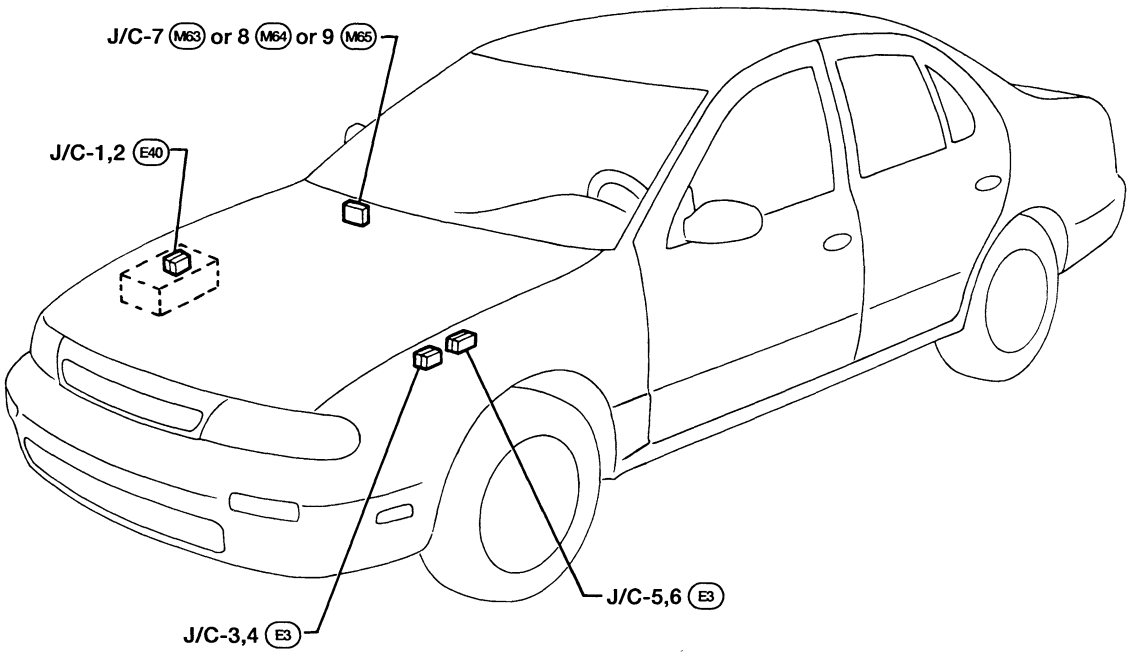
TCM (A/T control module)



View from harness side

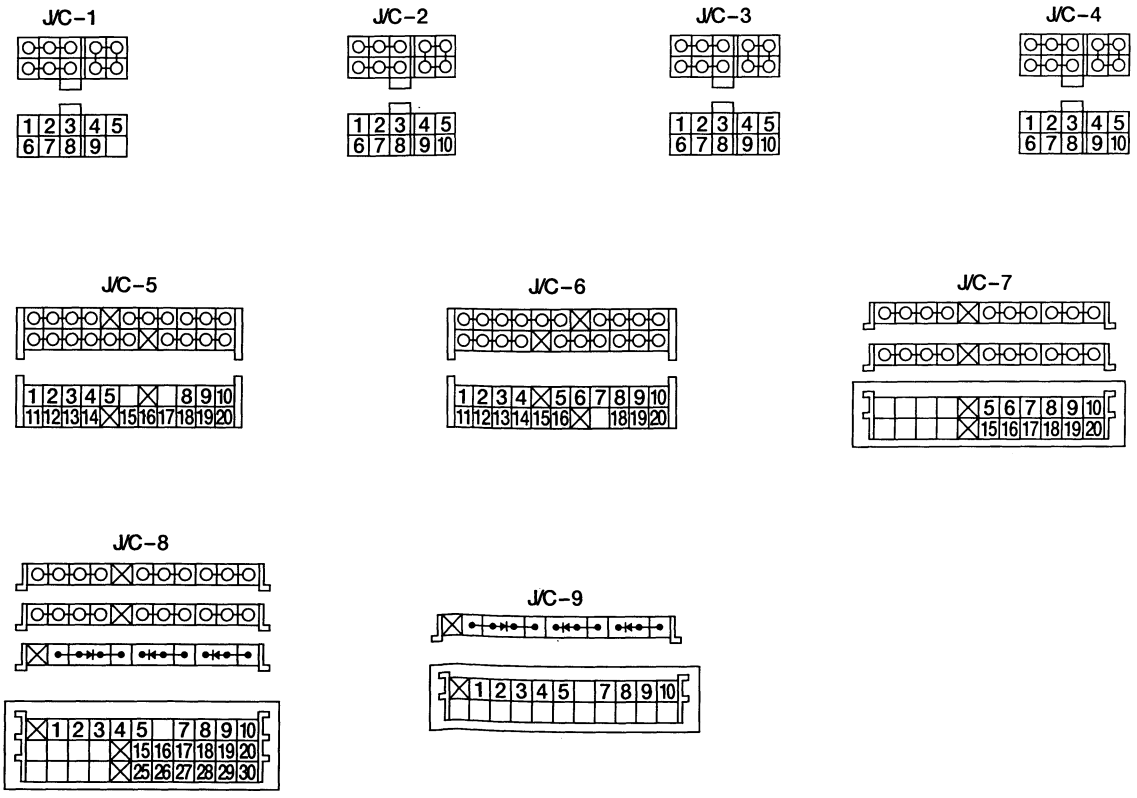
AEL212

Location



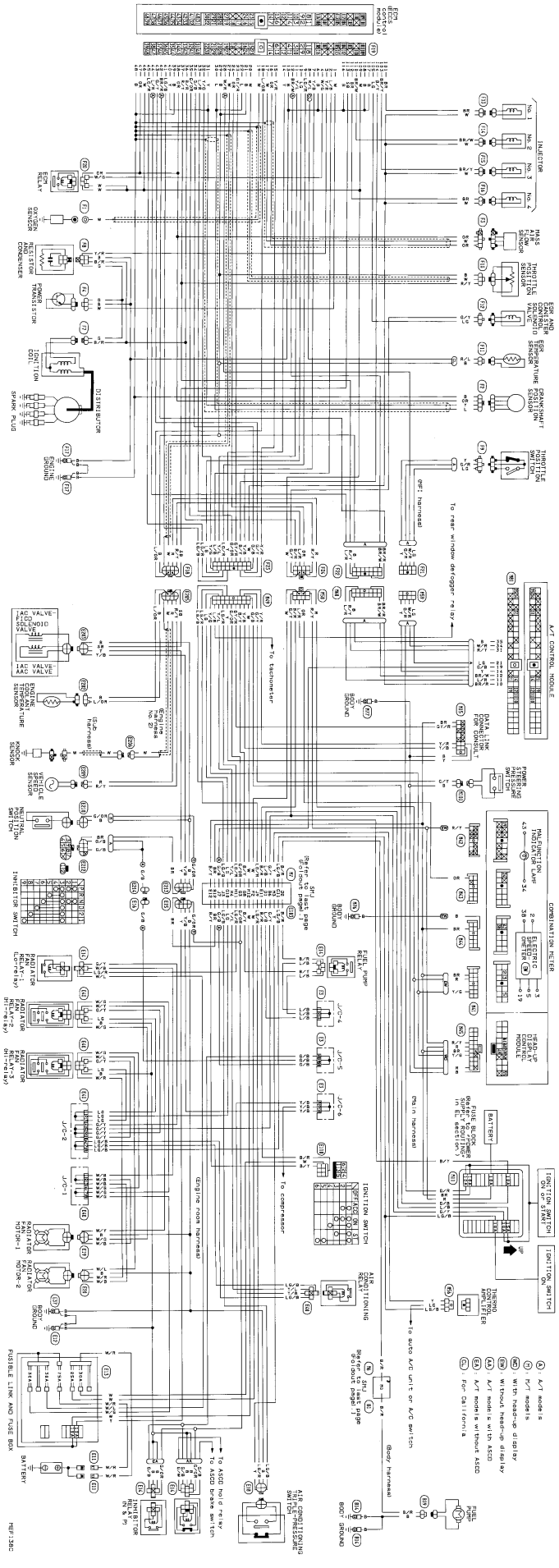
AEL233

Terminal Arrangement

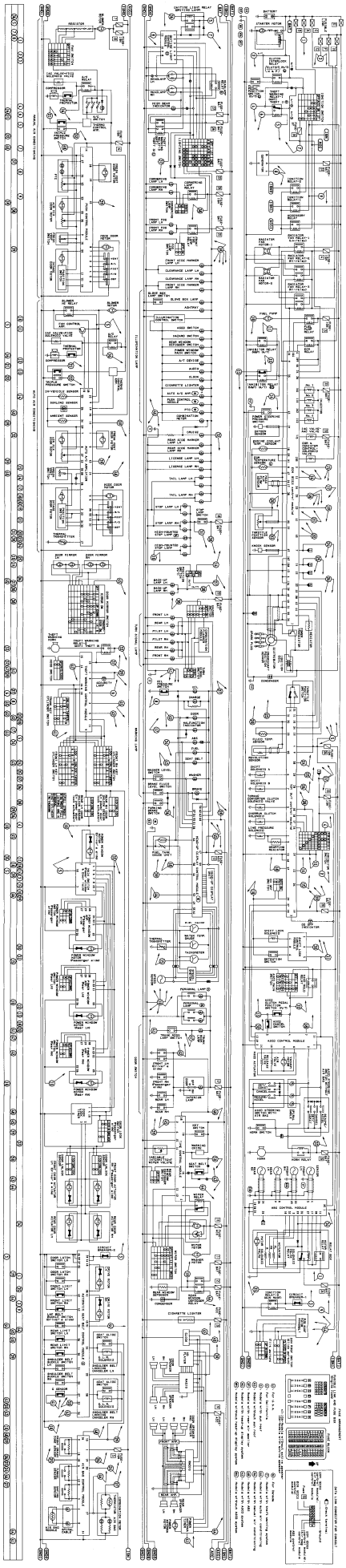


AEL213

1993 NISSAN STANZA ALTIMA
ECCS WIRING DIAGRAM



1993 NISSAN STANZA ALTIMA
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

QUICK REFERENCE CHART: STANZA ALTIMA 1993

ENGINE TUNE-UP DATA

Engine model		KA24DE		
Firing order		1-3-4-2		
Idle speed	rpm			
M/T		700 ± 50		
A/T (in "N" position)		700 ± 50		
Ignition timing (degree B.T.D.C. at idle speed)		20° ± 2°		
Idle "CO" (% at idle speed)		idle mixture screw is preset and sealed at factory.		
Valve clearance (Hot)	mm (in)			
Intake		0.31 - 0.39 (0.012 - 0.015)		
Exhaust		0.33 - 0.41 (0.013 - 0.016)		
Spark plug				
Type	Standard	BKR5E-11		
	Cold	BKR6E-11		
		BKR7E-11		
Gap	mm (in)	1.0 - 1.1 (0.039 - 0.043)		
Drive belt deflection (Cold)	mm (in)	Used belt deflection		Deflection of new belt
		Limit	Deflection after adjustment	
Generator & Power steering oil pump		8 (0.31)	6 - 7 (0.24 - 0.28)	5 - 6 (0.20 - 0.24)
Air conditioner compressor		10 (0.39)	7 - 8 (0.28 - 0.31)	6 - 7 (0.24 - 0.28)
Applied pressed force	N (kg, lb)	98 (10, 22)		
Tightening torque		N•m	kg-m	ft-lb
Spark plug		20 - 29	2.0 - 3.0	14 - 22
Oil pan drain plug		29 - 39	3.0 - 4.0	22 - 29

CLUTCH PEDAL

Unit: mm (in)

Pedal height	165 - 175 (6.50 - 6.89)
Pedal free play	1 - 3 (0.04 - 0.12)

FRONT WHEEL ALIGNMENT (Unladen*)

Camber	degree	−0°50′ to 0°40′
Caster	degree	1°55′ - 3°25′
Kingpin inclination	degree	13°20′ - 14°50′
Toe-in		
A − B	mm (in)	0 - 2 (0 - 0.08)
Total angle 2θ	degree	0′ - 12′
Turning angle		
Inside		31°30′ - 35°30′
Outside		25°36′ - 29°36′

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

REAR WHEEL ALIGNMENT (Unladen*)

Camber	degree	−2°00′ to −0°30′
Toe-in		
A − B	mm (in)	1 - 3 (0.04 - 0.12)
Total angle 2θ	degree	6′ - 18′

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

BRAKE

Unit: mm (in)

Disc brake	
Pad minimum thickness	2.0 (0.079)
Rotor repair limit Minimum thickness	20.0 (0.787)*1, 8.0 (0.315)*2
Drum brake	
Lining minimum thickness	1.5 (0.059)
Drum repair limit Maximum inner diameter	230.0 (9.06)

*1 Front disc brake
*2 Rear disc brake

REFILL CAPACITIES

Unit		Liter	US measure
Fuel tank		60	15-7/8 gal
Coolant	With reservoir tank	7.8	8-1/4 qt
Engine	With oil filter	3.9	4-1/8 qt
	Without oil filter	3.5	3-3/4 qt
Transaxle	M/T	4.7	10 pt
	A/T	9.4	10 qt
Power steering system (approximate)		0.9	1 qt
Air conditioning system	Compressor oil	0.2	6.8 fl oz
	Refrigerant*	0.7 - 0.8 kg	1.5 - 1.8 lb

* R-134a

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