

QUICK REFERENCE CHART : M30 1991

ENGINE TUNE-UP DATA

Engine model			VG30E			
Firing order			1-2-3-4-5-6			
Idle speed		rpm	A/T (in "N" position)		800±50	
Ignition timing			(B.T.D.C. at idle speed)			
			15° ±2°			
CO% at idle			Idle mixture screw is preset and sealed at factory.			
Drive belt deflection (Cold)			mm (in)		Used belt deflection	Deflection of new belt
			Limit				Deflection after adjustment
Alternator			12 (0.47)		7.5 - 8.5 (0.295 - 0.335)	6.5 - 7.5 (0.256 - 0.295)
Air conditioner compressor			14 (0.55)		9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Power steering oil pump			20 (0.79)		14 - 16 (0.55 - 0.63)	12 - 14 (0.47 - 0.55)
Applied pressed force			N (kg, lb)		98 (10, 22)	
Radiator cap relief pressure			kPa (kg/cm ² , psi)		78 - 98 (0.8 - 1.0, 11 - 14)	
Cooling system leakage testing pressure			kPa (kg/cm ² , psi)		98 (1.0, 14)	
Compression pressure			Standard		1,196 (12.2, 173)/300	
kPa (kg/cm ² , psi)/rpm			Minimum		883 (9.0, 128)/300	
Spark plug			Type (Standard)		PFR6B-11	
			Gap mm (in)		1.0 - 1.1 (0.039 - 0.043)	

REAR WHEEL ALIGNMENT (Unladen)

Camber	degree	-1°5' to 20'
Total toe-out	mm (in)	0.2 - 4.2 (0.008 - 0.165)
	degree	1' - 22'

BRAKE

Unit: mm (in)

Front brake		
Pad wear limit		2.0 (0.079)
Rotor repair limit		20.0 (0.787)
Rear brake		
Pad wear limit		2.0 (0.079)
Rotor repair limit		9.0 (0.354)
Pedal free height		199 - 209 (7.83 - 8.23)
Pedal depressed height*1		110 (4.33) or more
Parking brake		
Number of notches*2		8 - 9

*1 Under force of 490 N (50 kg, 110 lb) with engine running

*2 At pulling force: 196 N (20 kg, 44 lb)

FRONT WHEEL ALIGNMENT (Unladen*)

Camber	degree	-35' to 55'
Caster	degree	3°55' - 5°25'
Kingpin inclination	degree	11°55' - 13°25'
Total toe-in	mm (in)	-1 to 1 (-0.04 to 0.04)
	degree	-5' to 5'
Wheel turning angle (Full turn)		
Inside	degree	40°30' - 44°30'
Outside		33°30'

* Fuel, radiator coolant and engine oil full.

Spare tire, jack, hand tools and mats in designated positions.

REFILL CAPACITIES

Unit		Liter	US measure
Fuel tank		65	17-1/8 gal
Coolant (With reservoir tank)		9.15	9-5/8 qt
Engine	With oil filter	4.4	4-5/8 qt
	Without oil filter	4.0	4-1/4 qt
Transmission	A/T	8.3	8-3/4 qt
Final drive		1.3	2-3/4 pt
Power steering system		0.9	1 qt
Air conditioning system	Compressor oil	0.20	6.8 fl oz
	Refrigerant	0.8 - 0.9 kg	1.8 - 2.0 lb



I N F I N I T I ®

M30

MODEL F31 SERIES

QUICK REFERENCE INDEX

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REAR AXLE & REAR SUSPENSION _____	RA
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STEERING SYSTEM _____	ST
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I N F I N I T I ®

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FOREWORD

This manual contains maintenance and repair procedures for the 1991 INFINITI M30.

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

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

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.

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



I N F I N I T I [®]



NISSAN MOTOR CO., LTD.

Overseas Service Department

Tokyo, Japan

GENERAL INFORMATION

GI

SECTION **GI**

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PRECAUTIONS

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

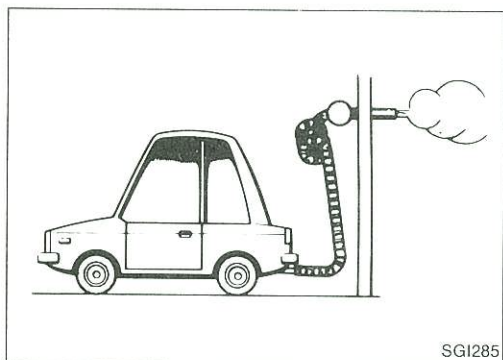


Precautions for Supplemental Restraint System "AIR BAG"

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF** section of this Service Manual.

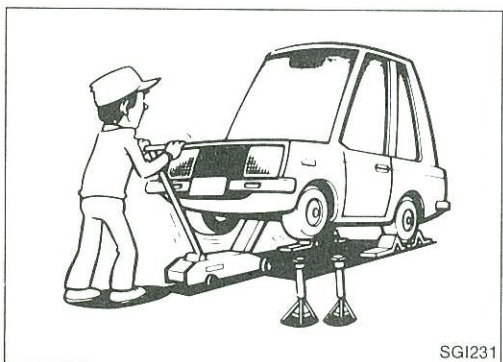
WARNING:

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



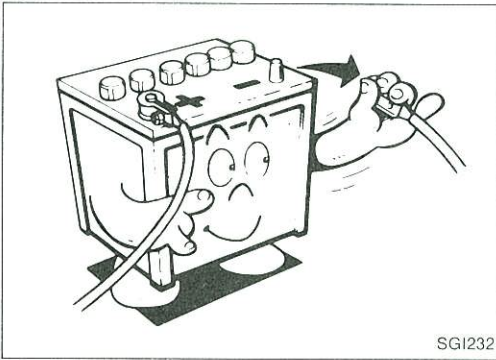
General Precautions

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.



PRECAUTIONS

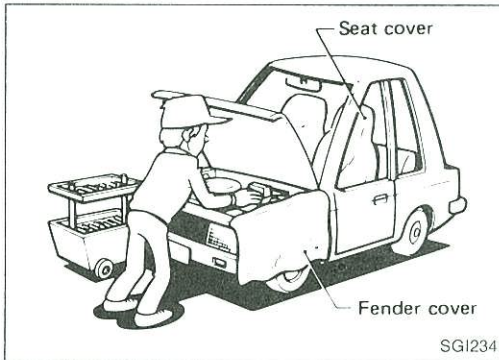
General Precautions (Cont'd)



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



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.



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 units). 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



Precautions for E.F.I. or E.C.C.S. Engine

1. Before connecting or disconnecting E.F.I. or E.C.C.S. harness connector to or from any E.F.I. or E.C.C.S. control unit, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal. Otherwise, there may be damage to control unit.
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 control unit and air flow meter.



Precautions for Catalyst

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

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

Precautions for Fuel

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

For improved vehicle performance, the use of unleaded gasoline with an octane rating of at least 91 AKI number (RON 96) is recommended.

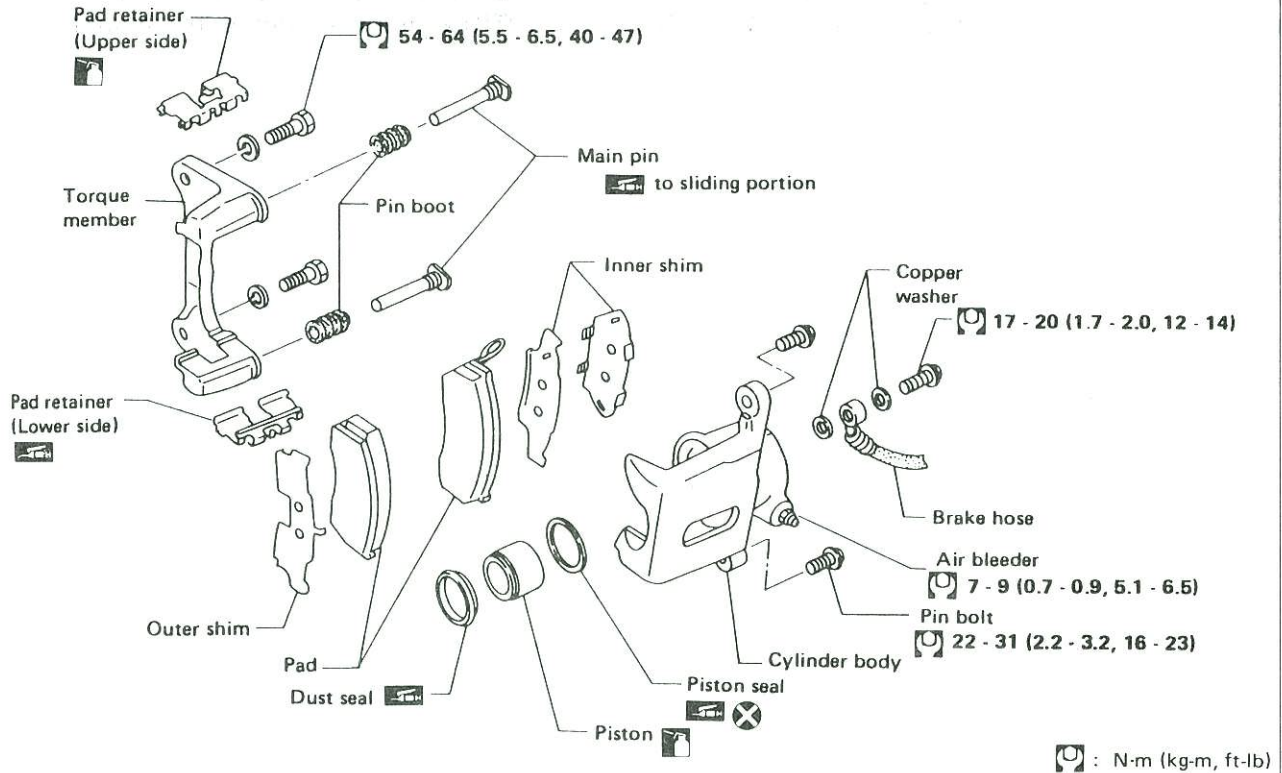
CAUTION:

Do not use leaded gasoline. Using leaded gasoline will damage the catalytic converter.

HOW TO USE THIS MANUAL

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

Example



SBR364A

6. **THE SMALL ILLUSTRATIONS** show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations. Assembly, inspection and adjustment procedures for complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.
7. The following **SYMBOLS AND ABBREVIATIONS** are used:

	: Tightening torque
	: Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.
	: Should be lubricated with oil.
	: Sealing point
	: Checking point
	: Always replace after every disassembly.
	: Apply petroleum jelly.
	: Apply A.T.F.
★	: Select with proper thickness.
☆	: Adjustment is required.

S.D.S.	: Service Data and Specifications
L.H.	: Left-Hand
A/T	: Automatic Transaxle/Transmission
Tool	: Special Service Tools
A.T.F.	: Automatic Transmission Fluid
D ₁	: Drive range 1st gear
D ₂	: Drive range 2nd gear
D ₃	: Drive range 3rd gear
D ₄	: Drive range 4th gear
O.D.	: Overdrive

HOW TO USE THIS MANUAL

8. The **UNITS** given in this manual are primarily expressed as SI UNITS (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.

“Example”

• Tightening torque:

59 - 78 N·m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)

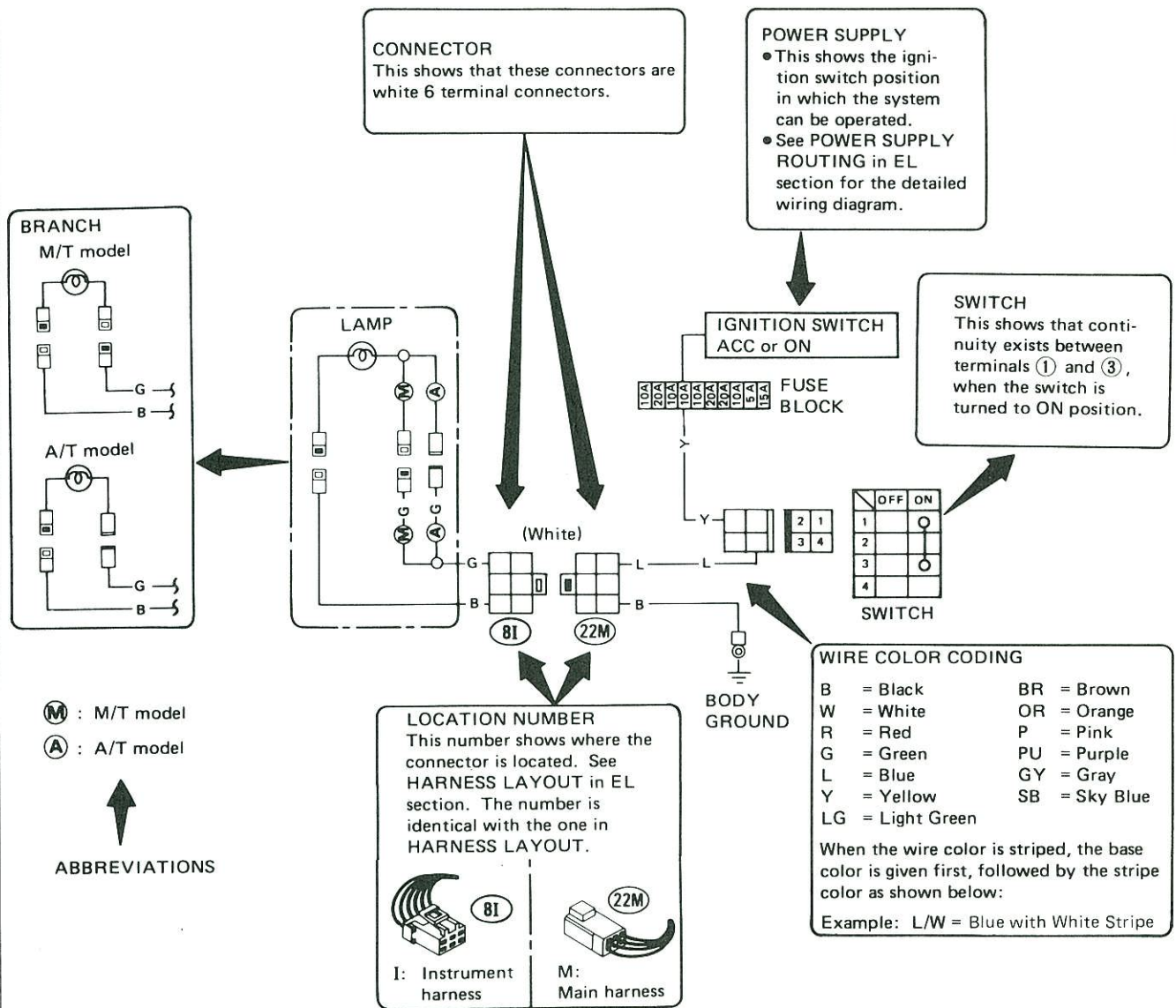
9. **TROUBLE DIAGNOSES** are included in sections dealing with complicated components.
10. **SERVICE DATA AND SPECIFICATIONS** are contained at the end of each section for quick reference of data.
11. The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.
- **WARNING** indicates the possibility of personal injury if instructions are not followed.
 - **CAUTION** indicates the possibility of component damage if instructions are not followed.
 - **BOLD TYPED STATEMENTS** except **WARNING** and **CAUTION** give you helpful information.

HOW TO READ WIRING DIAGRAMS

WIRING DIAGRAM

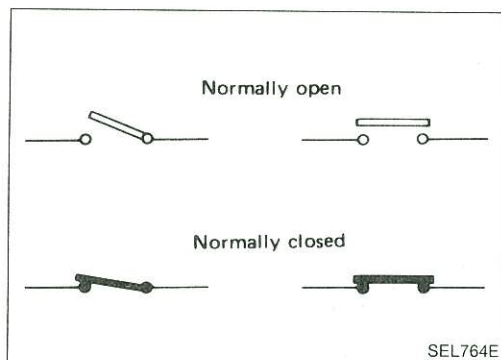
Symbols used in WIRING DIAGRAM are shown below:

Example



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HOW TO READ WIRING DIAGRAMS

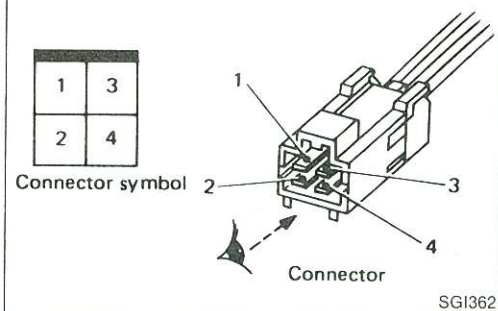


SWITCH POSITIONS

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

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

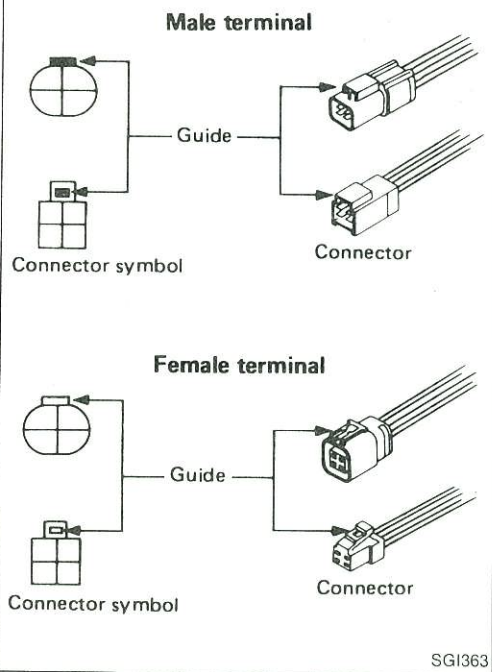
Example



CONNECTOR SYMBOLS

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

Example



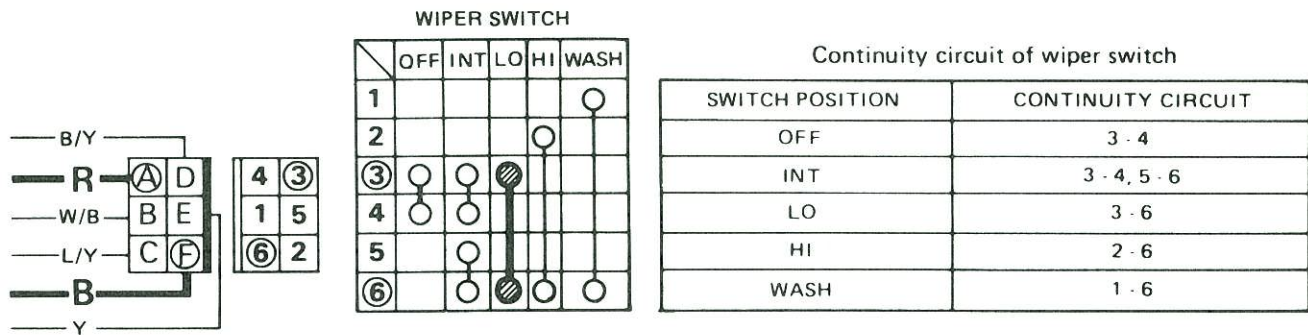
- Male and female terminals
Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

HOW TO READ WIRING DIAGRAMS

MULTIPLE SWITCH

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

Example



Example: Wiper switch in LO position

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

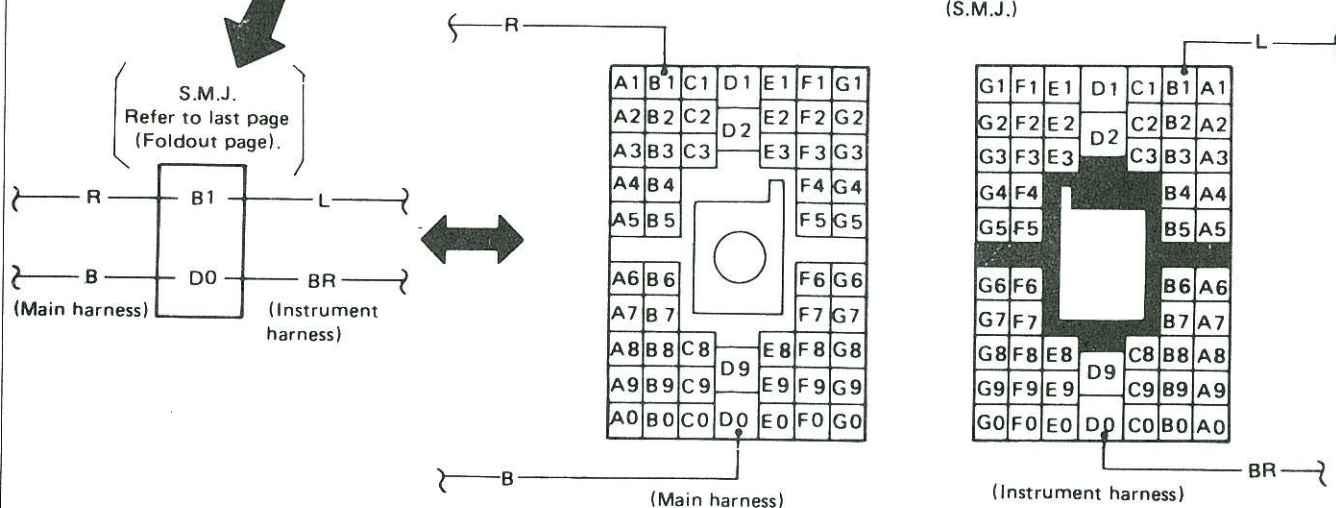
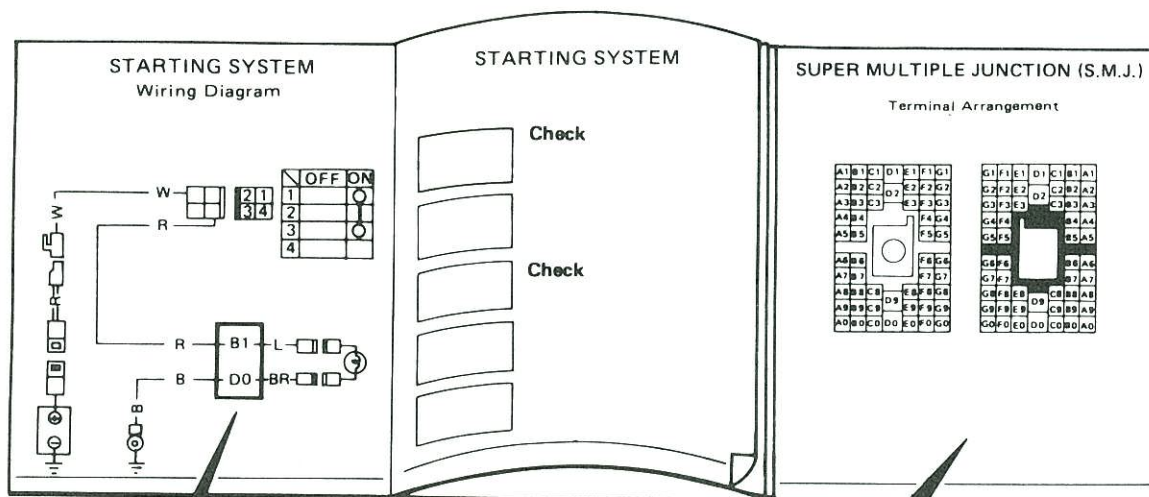
SGI365

HOW TO READ WIRING DIAGRAMS

SUPER MULTIPLE JUNCTION (S.M.J.)

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

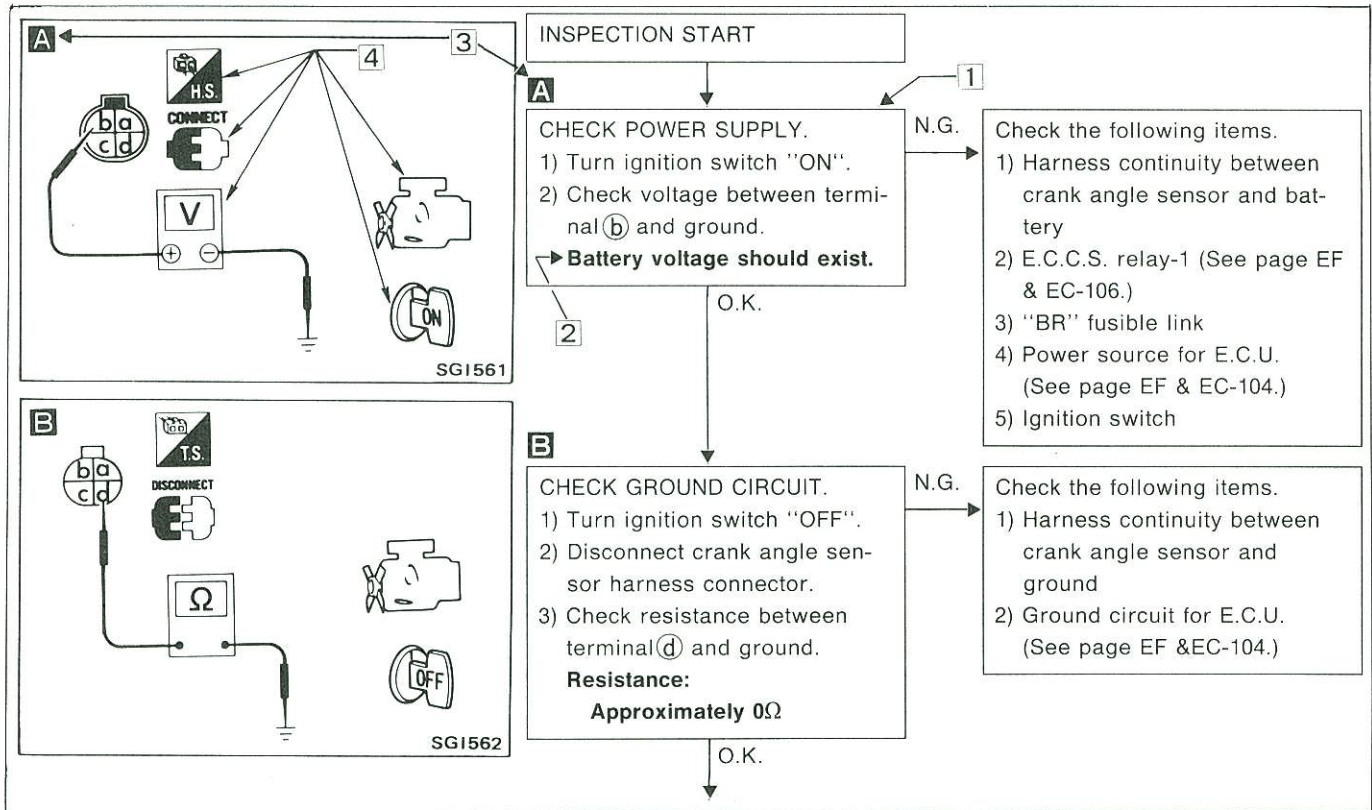
Example



SEL653F

HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES

Example



NOTICE

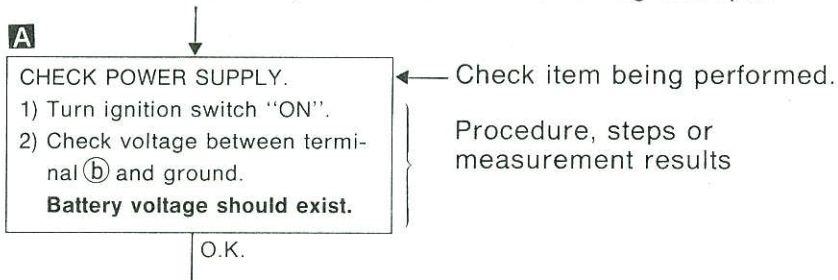
The flow chart indicates work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

- 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 perform circuit continuity between harness connectors more detail, such as in case of sub-harness is used, refer to Wiring Diagram and Harness Layout in EL section for identification of harness connectors.
- 5) When checking circuit continuity, ignition switch should be "OFF".
- 6) Before checking voltage at connectors, check battery voltage.
- 7) After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.

HOW TO FOLLOW THIS FLOW CHART

1 Work and diagnostic procedure

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



2 Measurement results

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

These have the following meanings:

Battery voltage → 11 - 14V or approximately 12V

Voltage: Approximately 0V → Less than 1V

3 Cross reference of work symbols in the text and illustrations

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

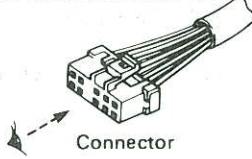
4 Symbols used in illustrations

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

HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES

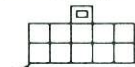
Example

View from terminal side



Connector

Connector symbol

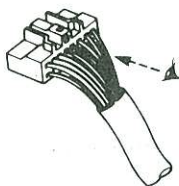


Single line

Direction mark

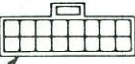


View from harness side



Connector

Connector symbol



Double lines

Direction mark



SGI364

Direction mark

A direction mark is shown to clarify the side of connector (terminal side or harness side).

Direction marks are mainly used in the illustrations indicating terminal inspection.



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

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



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

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

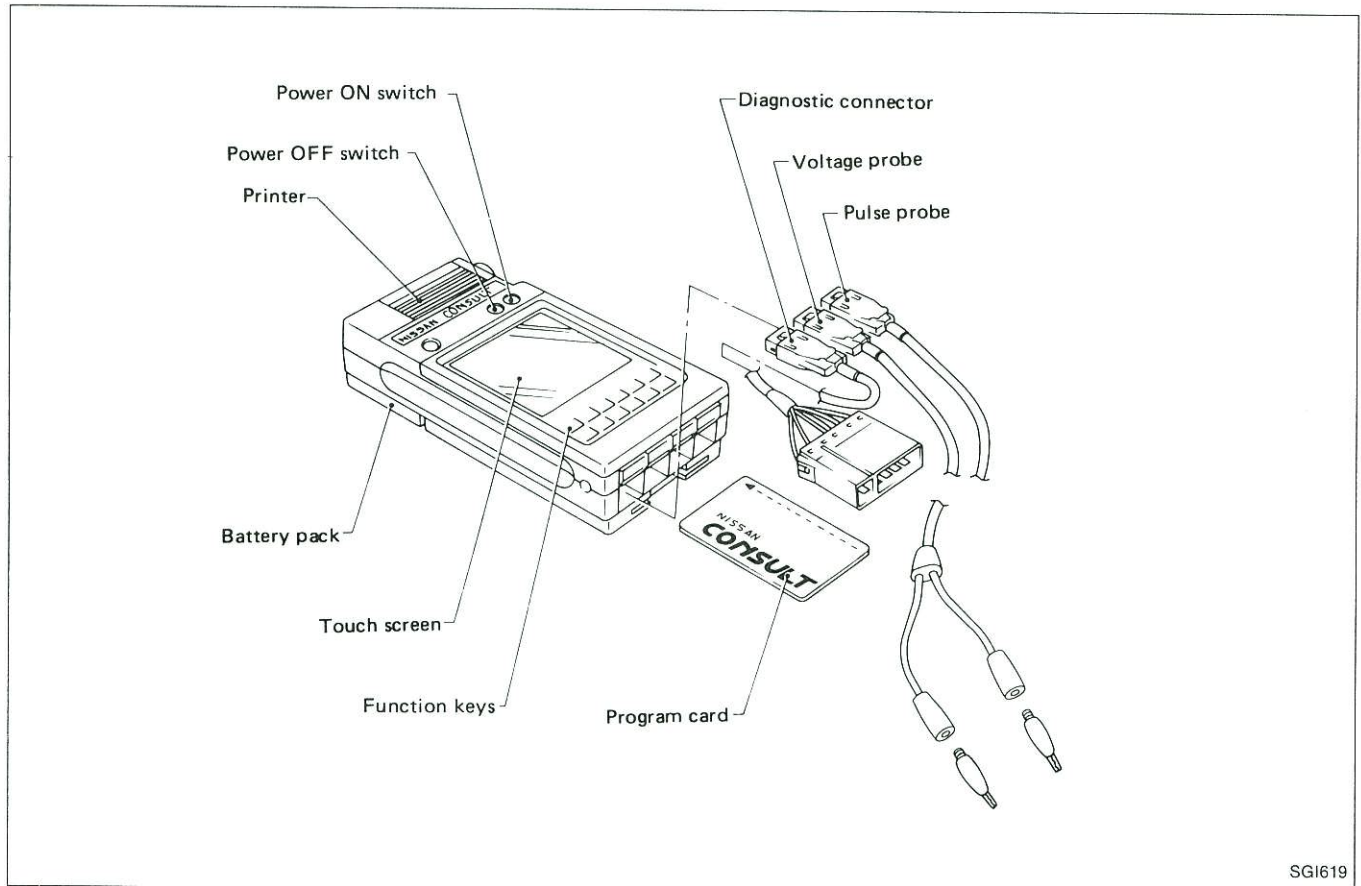
HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES

Key to symbols signifying measurements or procedures

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

CONSULT CHECKING SYSTEM

Outside View



SGI619

System Application

System	E.C.C.S.	A/T	Air bag
Diagnostic mode			
Work support	×	—	—
Self-diagnostic results	×	×	×
Data monitor	×	×	—
Active test	×	—	—
E.C.U. part number	×	×	—
Function test	×	—	—

× : Applicable

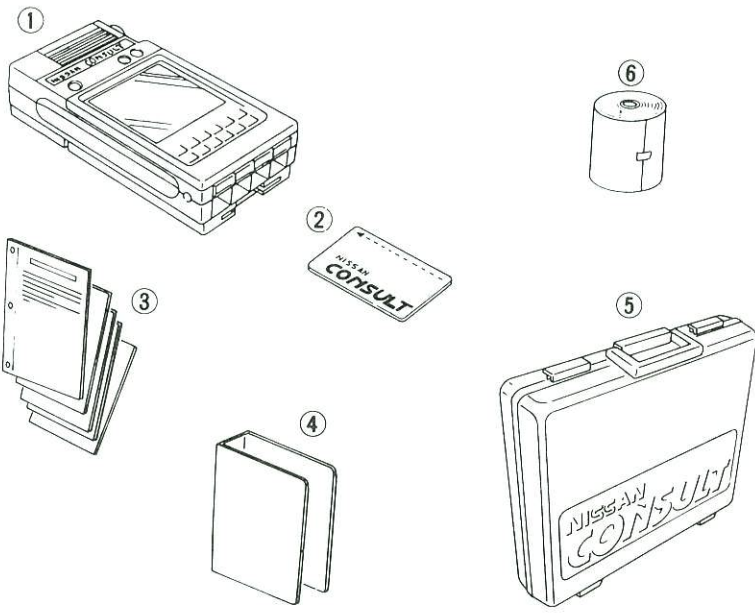
CONSULT CHECKING SYSTEM

Function

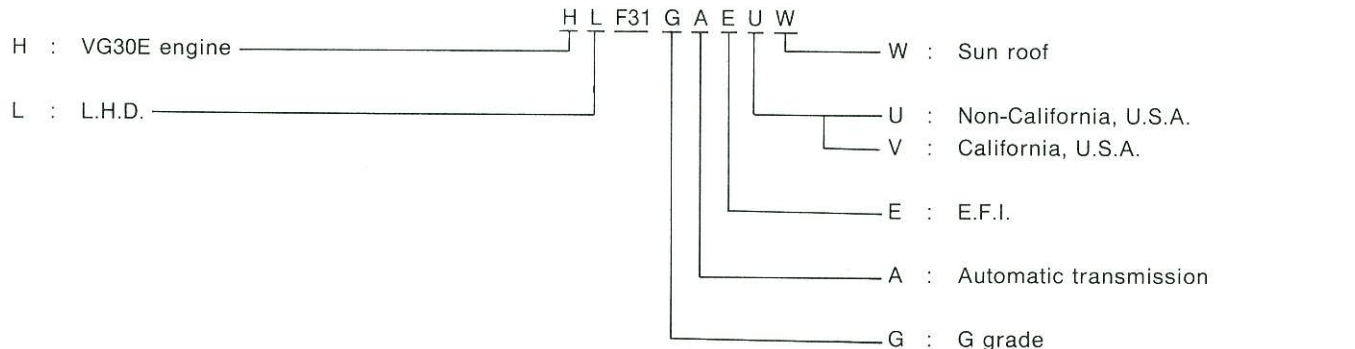
Diagnostic mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the control unit can be read.
Active test	Mode in which CONSULT drives some actuators apart from the control units and also shifts some parameters in a specified range.
E.C.U. part number	E.C.U. part number can be read.
Function test	E.C.C.S. faults can be isolated to a general area, semi-automatically and in a short time, by following the directions on the screen.

Checking Equipment

When ordering the below equipment, contact your INFINITI distributor.

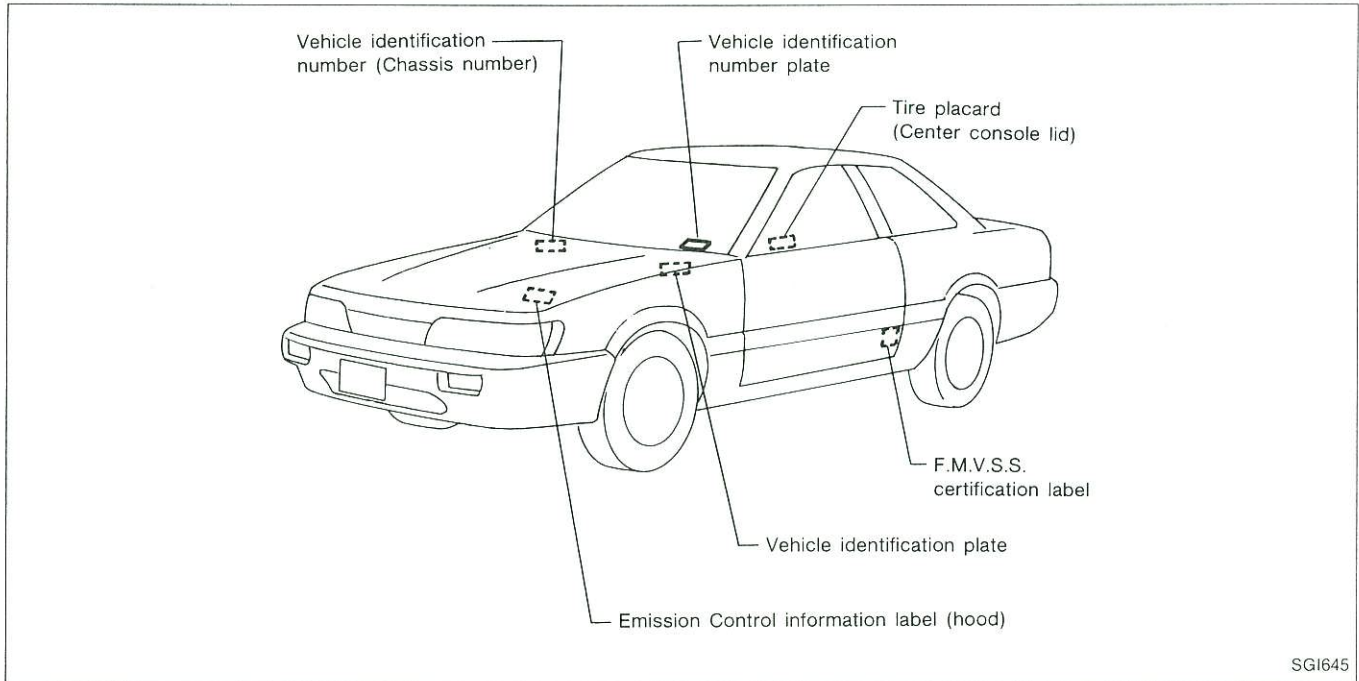
Tool name	Description
NISSAN CONSULT kit ① CONSULT unit and accessories ② Program card (UE 900) ③ Operation manuals ④ Binder ⑤ Carrying case ⑥ Thermal paper (Rolls)	

.....

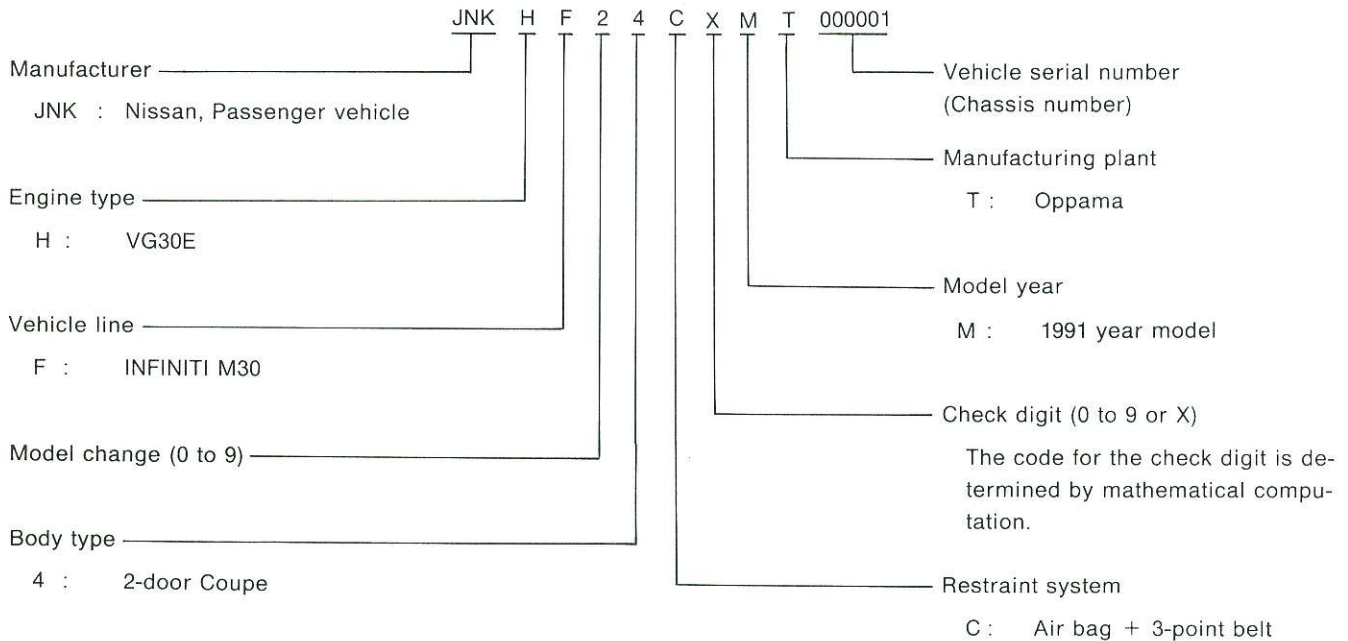


IDENTIFICATION INFORMATION

Identification Number



VEHICLE IDENTIFICATION NUMBER ARRANGEMENT



IDENTIFICATION INFORMATION

Identification Number (Cont'd)

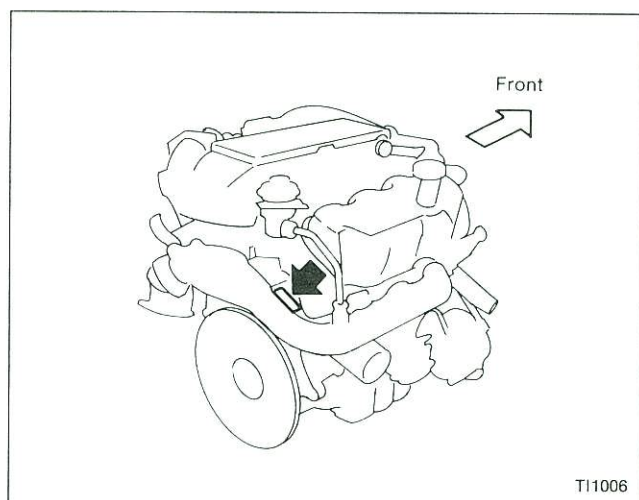
IDENTIFICATION PLATE

NISSAN MOTOR CO., LTD. JAPAN			
型式	TYPE	△1	
CHASSIS NO	NO. DE CHASIS	△2	
MODEL	MODELO	△3	
○ カラー COLOR TRIM	△4	△5	○
△6	△7	△8	△9
エンジン ENGINE	シリンダー MOTOR	ミッション TRANS. AXLE	アクスル TRANS. EJE
工場		PLANT	
日産自動車株式会社		MADE IN JAPAN	

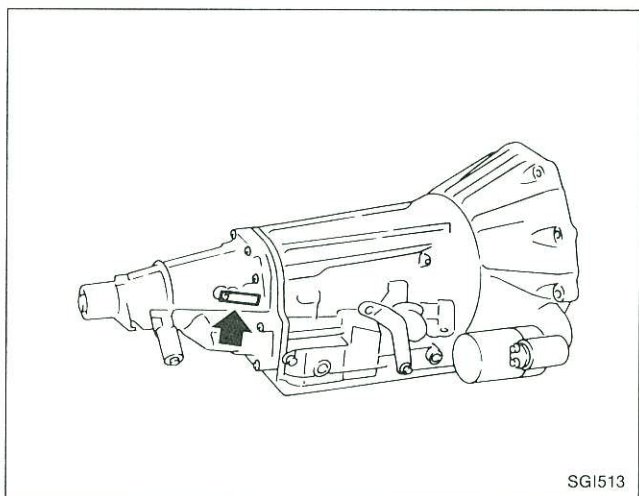
- 1 Type
- 2 Vehicle identification number (Chassis number)
- 3 Model
- 4 Body color code
- 5 Trim color code
- 6 Engine model
- 7 Engine displacement
- 8 Transmission model
- 9 Axle model

SGI315

ENGINE SERIAL NUMBER



AUTOMATIC TRANSMISSION NUMBER



IDENTIFICATION INFORMATION

Dimensions

Unit: mm (in)

Item		Model	Coupe
Overall length			4,796 (188.8)
Overall width			1,689 (66.5)
Overall height			1,379 (54.3)
Wheel base			2,616 (103.0)
Tread	Front		1,435 (56.5)
	Rear		1,435 (56.5)

Wheels and Tires

Road wheel	Aluminum	6-1/2 JJ x 15
	Offset mm (in)	25 (0.98)
Tire size	Conventional	P215/60R15
	Spare	T135/70D15

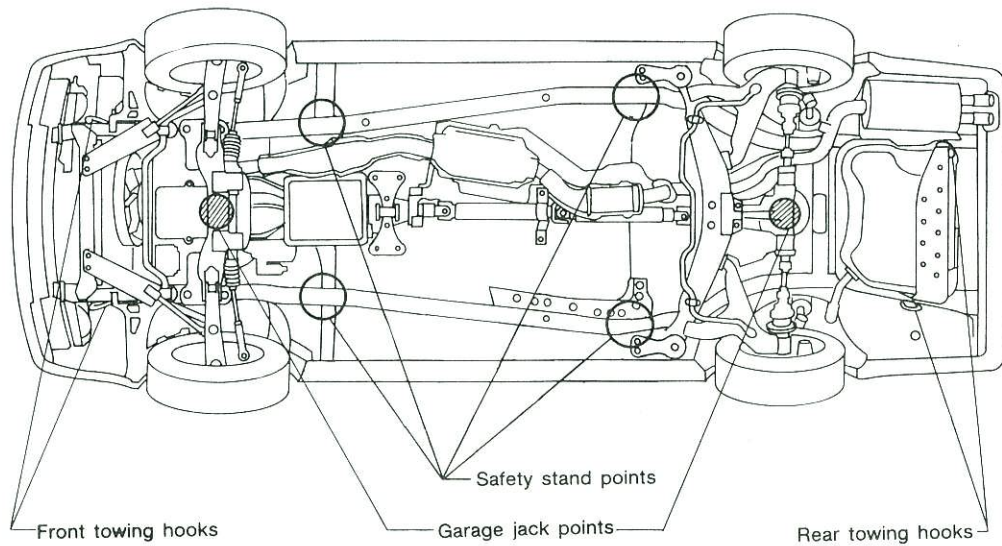
Garage Jack and Safety Stand

WARNING:

- Never get under the vehicle while it is supported only by the jack. Always use safety stands to support the frame when you have to get under the vehicle.
- Place wheel chocks at the front wheels when the rear wheels are raised and place wheel chocks at the rear wheels when the front wheels are raised.

CAUTION:

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



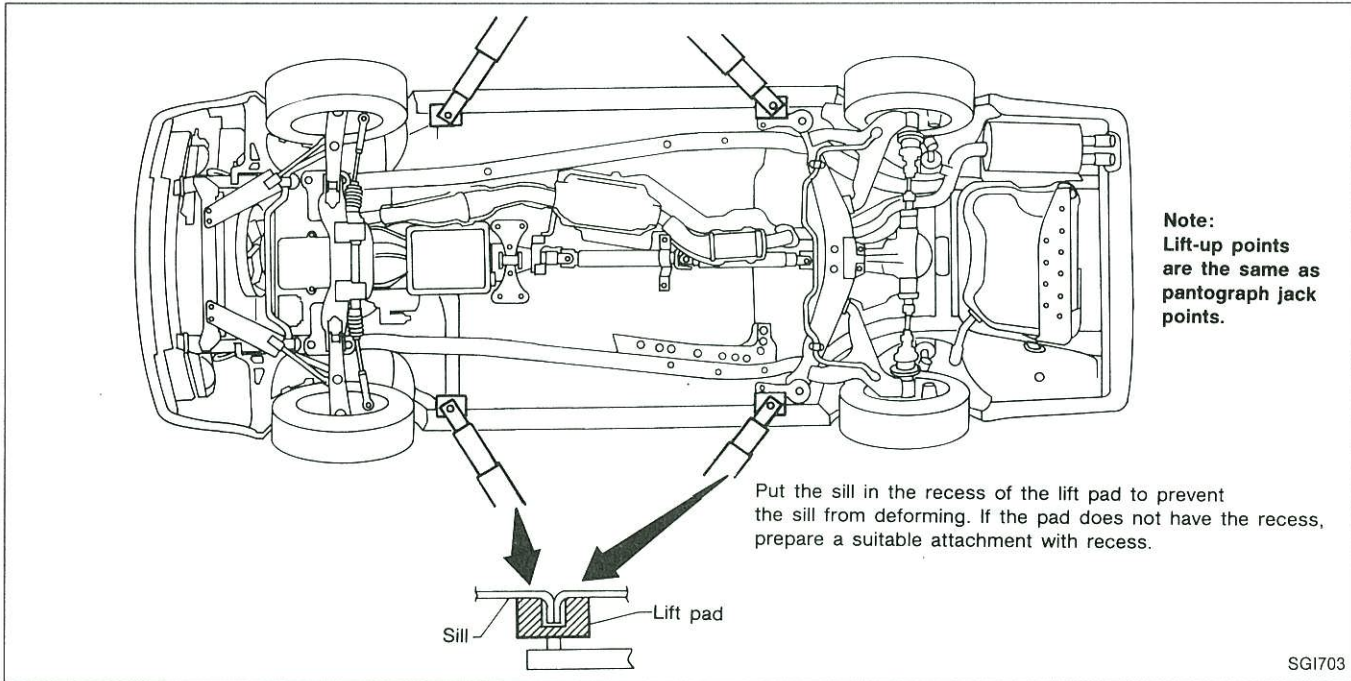
SGI702

2-pole Lift

WARNING:

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

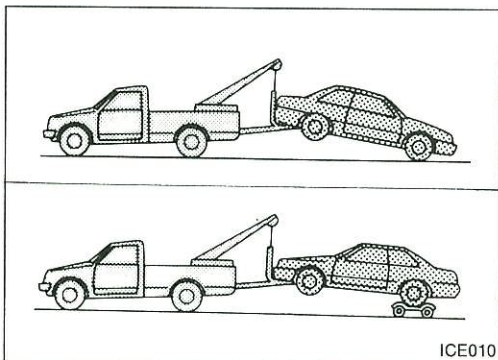
When setting the lift arm, do not allow the arm to contact the brake tubes and fuel lines.



Tow Truck Towing

CAUTION:

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



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

LIFTING POINTS AND TOW TRUCK TOWING

Tow Truck Towing (Cont'd)

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

Observe the following restricted towing speeds and distances.

Speed:

Below 50 km/h (30 MPH)

Distance:

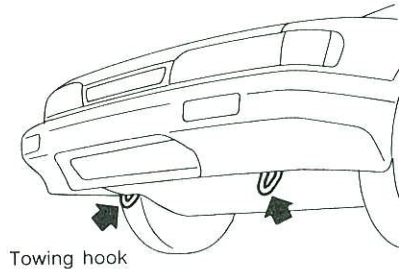
Less than 65 km (40 miles)

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

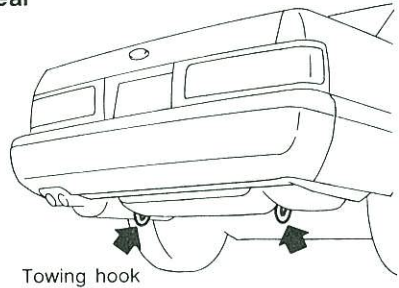
TOWING POINT

- **Never tow the vehicle using only the towing hooks. Use proper towing equipment when towing. Otherwise, the vehicle body will be damaged.**
- **Always pull the cable straight out from the vehicle. Never pull on the hook at a sideways angle.**

Front



Rear



SGI644

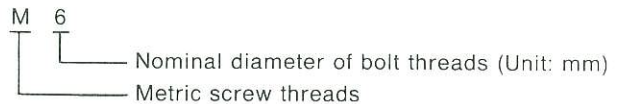
TIGHTENING TORQUE OF STANDARD BOLTS

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

1. Special parts are excluded.
2. This standard is applicable to bolts having the following marks embossed on the bolt head.

Grade	Mark
4T	4
7T	7
9T	9

* : Nominal diameter



MAINTENANCE

SECTION **MA**

MA

CONTENTS

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ENGINE MAINTENANCE.....	MA-10
CHASSIS AND BODY MAINTENANCE	MA-17
SERVICE DATA AND SPECIFICATIONS (S.D.S.).....	MA-22

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

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

GENERAL MAINTENANCE

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

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-20
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-19 FA-8
Windshield wiper blades Check for cracks or wear if they do not wipe properly.	—
Doors and engine hood Check that all doors and the engine hood operate smoothly as well as the trunk lid. Also ensure, that all latches lock securely. Lubricate hinges and latches if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check lubrication frequently.	MA-21
INSIDE THE VEHICLE	
The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle, etc.	
Lights Make sure that the headlights, stop lights, tail lights, turn signal lights, and other lights are all operating properly and installed securely. Also check headlight aim.	—
Warning lights and buzzers/chimes Make sure that all warning lights and buzzers/chimes are operating properly.	—
Windshield wiper and washer Check that the wipers and washer operate properly and that the wipers do not streak.	—
Windshield defroster Check that the air comes out of the defroster outlets properly and in sufficient quantity when operating the heater or air conditioner.	—
Steering wheel Check that it has the specified free play. Be sure to check for changes in the steering condition, such as excessive free play, hard steering or strange noises. Free play: Less than 35 mm (1.38 in)	—
Seats Check seat position controls such as seat adjuster, seatback recliner, etc. to ensure they operate smoothly and that all latches lock securely in every position. Check that the head restraints move up and down smoothly and that the locks (if so equipped) hold securely in all latched positions. Check that the latches lock securely for folding-down rear seatbacks.	—
Seat belts Check that all parts of the seat belt system (e.g. buckles, anchors, adjusters and retractors) operate properly and smoothly, and are installed securely. Check the belt webbing for cuts, fraying, wear or damage.	MA-21
Brakes Check that the brake does not pull the vehicle to one side when applied.	—
Brake pedal Check the pedal for smooth operation and make sure it has the proper distance under it when depressed fully. Check the brake booster function. Be certain to keep floor mats away from the pedal.	BR-9

GENERAL MAINTENANCE

Item	Reference page
Parking brake Check that the lever has the proper travel and confirm that your vehicle is held securely on a fairly steep hill with only the parking brake applied.	BR-29
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-12
Radiator and hoses Check the front of the radiator and clean off any dirt, insects, leaves, etc., that may have accumulated. Make sure the hoses have no cracks, deformation, rot or loose connections.	—
Brake fluid level Make sure that the brake fluid level is between the "MAX" and "MIN" lines on the reservoir.	MA-18
Battery Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines.	—
Engine drive belts Make sure that no belts is frayed, worn, cracked or oily.	MA-10
Engine oil level Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	MA-14
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-20
Automatic transmission fluid level Check the level on the dipstick after putting the selector lever in "P" with the engine idling.	MA-17
Exhaust system Make sure there are no loose supports, cracks or holes. If the sound of the exhaust seems unusual or there is a small of exhaust fumes, immediately locate the trouble and correct it.	MA-20
Underbody The underbody is frequently exposed to corrosive substances such as those used on icy roads or to control dust. It is very important to remove these substances, otherwise rust will form on the floor pan, frame, fuel lines and around the exhaust system. At the end of winter, the underbody should be thoroughly flushed with plain water, being careful to clean those areas where mud and dirt can easily accumulate.	—
Fluid leaks Check under the vehicle for fuel, oil water or other fluid leaks after the vehicle has been parked for a while. Water dripping from the air conditioner after use is normal. If you should notice any leaks or gasoline fumes are evident, check for the cause and correct it immediately.	—

PERIODIC MAINTENANCE

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

SCHEDULE 1

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

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

SCHEDULE 2

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

Schedule 1

[]: Perform service at the mileage intervals only

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

MAINTENANCE OPERATION																			MAINTENANCE INTERVAL										Reference page	
Perform at number of miles, kilo- meters or months, whichever comes first.		Miles x 1,000		3.75	7.5	11.25	15	18.75	22.5	26.25	30	33.75	37.5	41.25	45	48.75	52.5	56.25	60	Reference page										
		(km x 1,000)		(6)	(12)	(18)	(24)	(30)	(36)	(42)	(48)	(54)	(60)	(66)	(72)	(78)	(84)	(90)	(96)											
Months		3		6	9	12	15	18	21	24	27	30	33	36	39	42	45	48												
EMISSION CONTROL SYSTEM MAINTENANCE																														
Service "A"																														
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	MA-14										
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	R	R	MA-14										
Service "E"																														
Air cleaner filter		See NOTE (1)										[R]				[R]					MA-14									
Service "F"																														
Vapor lines												I*				I*					MA-16									
Fuel lines												I*				I*					MA-13									
Fuel filter		See NOTE (2)*																				MA-13								
Service "G"																														
Drive belts		See NOTE (3)																				I*	MA-10							
Service "J"																														
Engine coolant		See NOTE (4)																				R*	MA-11							
Service "H"																														
Spark plugs (PLATINUM-TIPPED type)																						[R]	MA-15							
Timing belt																						[R]	EM-13							
CHASSIS AND BODY MAINTENANCE																														
Service "B"																														
Brake pads & discs			I		I		I		I		I		I		I		I		I	MA-19										
Steering gear & linkage, axle & suspension parts			I		I		I		I		I		I		I		I		I	MA-20, FA-5, RA-5										
Steering linkage ball joints & front suspension ball joints			I		I		I		I		I		I		I		I		I	MA-20, FA-6										
Exhaust system			I		I		I		I		I		I		I		I		I	MA-20										
Service "D"																														
Brake lines & cables							I				I				I				I	MA-18										
Automatic transmission oil & differential gear oil							I				I				I				I	MA-17, 18										
Air bag system																				BF-53										

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

PERIODIC MAINTENANCE

Schedule 2

[]: Perform service at the mileage intervals only

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

MAINTENANCE OPERATION		MAINTENANCE INTERVAL												Reference page	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000)	7.5 (12)	15 (24)	22.5 (36)	30 (48)	37.5 (60)	45 (72)	52.5 (84)	60 (96)						
	Months	6	12	18	24	30	36	42	48						
EMISSION CONTROL SYSTEM MAINTENANCE															
Service "A"		R	R	R	R	R	R	R	R	R	R	R	R	MA-14	
Service "C"															
Engine oil filter (Use Nissan PREMIUM type or equivalent)		R		R		R		R						MA-14	
Service "E"															
Air cleaner filter					[R]								[R]	MA-14	
Service "F"															
Vapor lines					I*								I*	MA-16	
Fuel lines					I*								I*	MA-13	
Fuel filter	See NOTE (1)*													MA-13	
Service "G"															
Drive belts	See NOTE (2)												I*	MA-10	
Service "J"															
Engine coolant	See NOTE (3)												R*	MA-11	
Service "H"															
Spark plugs (PLATINUM-TIPPED Type)													[R]	MA-15	
Timing belt													[R]	EM-13	
CHASSIS AND BODY MAINTENANCE															
Service "D"															
Brake lines & cables			I		I								I	MA-18	
Brake pads & discs			I		I								I	MA-19	
Automatic transmission oil & differential gear oil			I		I								I	MA-17, 18	
Exhaust system			I		I								I	MA-20	
Service "F"															
Steering gear linkage axle & suspension parts					I								I	MA-20, FA-5, RA-5	
Air bag system	See NOTE (4)													BF-53	

NOTE: (1) If vehicle is operated under extremely adverse weather conditions or in areas where ambient temperatures are either extremely low or extremely high, the filters might become clogged. In such an event, replace them immediately.
 (2) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months.
 (3) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
 (4) Inspect the air bag system 10 years after the date of manufacture as noted on the F.M.V.S.S. certification label.
 (5) Maintenance items and intervals with "*" are recommended by INFINTI 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.

RECOMMENDED FLUIDS AND LUBRICANTS

Fluids and Lubricants

	Capacity (Approximate)			Recommended fluids and lubricants
	US measure	Imp measure	Liter	
Engine oil (Refill)				
With oil filter	4-5/8 qt	3-7/8 qt	4.4	Energy Conserving Oils of API SG*2, *3
Without oil filter	4-1/4 qt	3-1/2 qt	4.0	
Cooling system (With reservoir)	9-5/8 qt	8 qt	9.15	Anti-freeze coolant (Ethylene glycol base)
Differential gear oil	2-3/4 pt	2-1/4 pt	1.3	API GL-5*2
Automatic transmission fluid	8-3/4 qt	7-1/4 qt	8.3	Genuine ATF*1 or equivalent Type DEXRON™
Power steering fluid	—	—	—	Type DEXRON™
Brake fluid	—	—	—	Genuine Brake Fluid*1 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease	—	—	—	NLGI No. 2 (Lithium soap base)

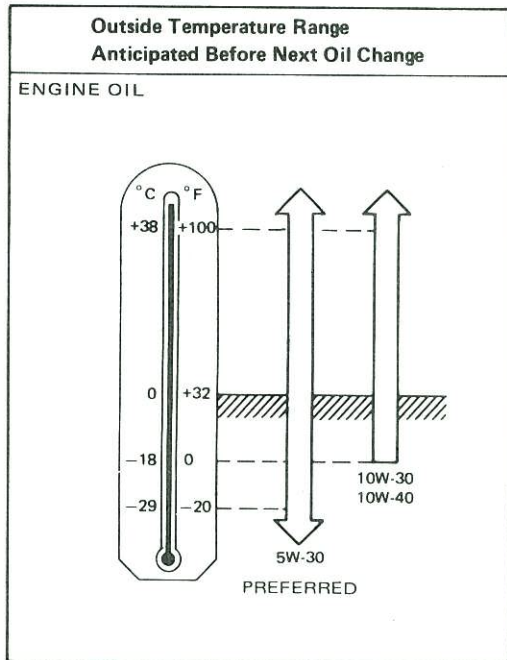
*1: Available in mainland U.S.A. through your INFINITI dealer.

*2: For further details, see "Recommended SAE viscosity number".

*3: Energy conserving oils

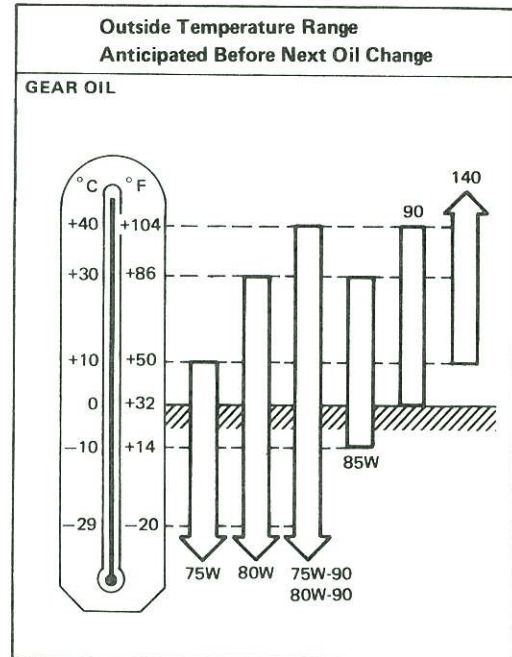
These oils can be identified by such labels as EC-I, EC-II, energy conserving, energy saving, improved fuel economy, etc.

SAE Viscosity Number



T10008

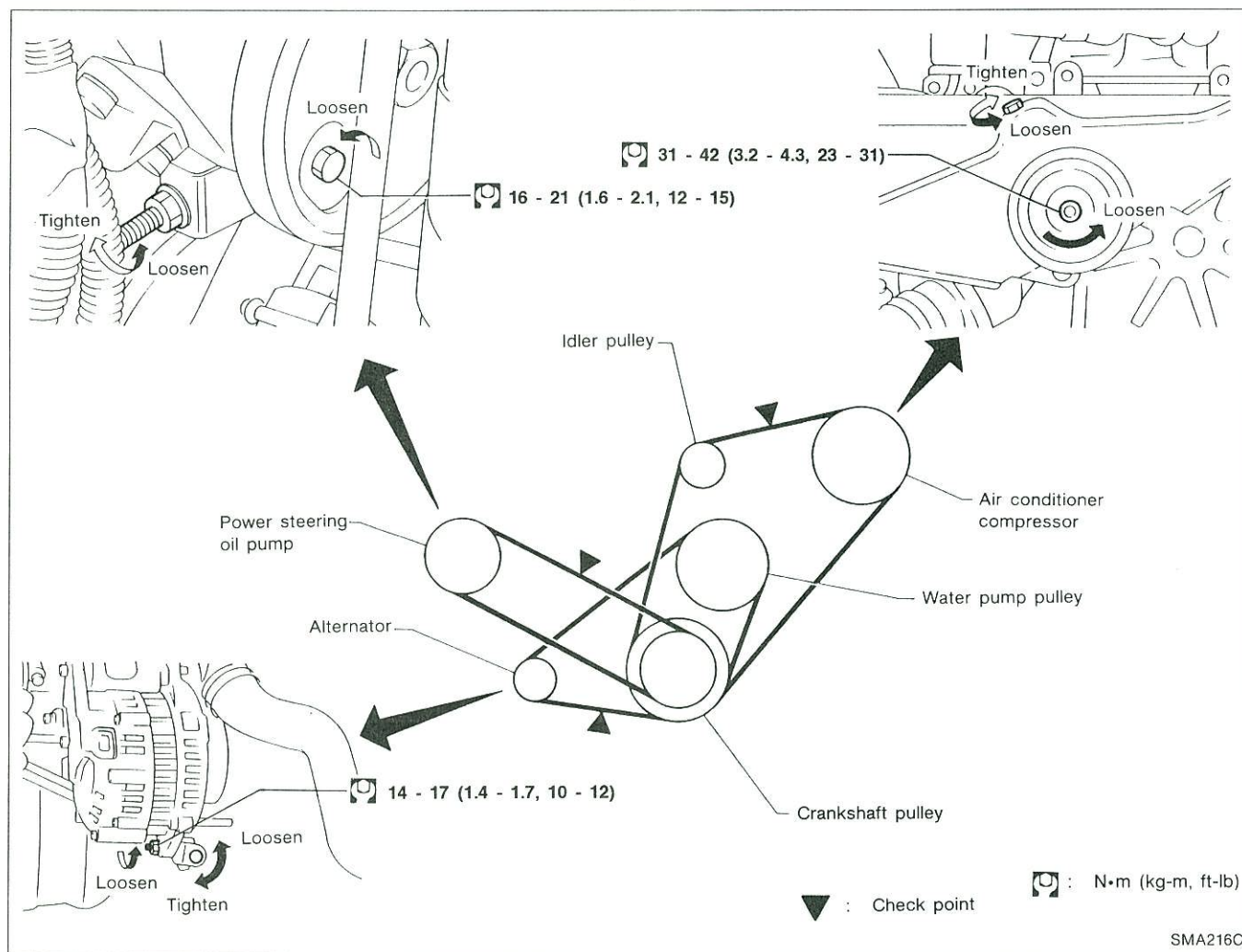
5W-30 is preferable for all ambient temperature. 20W-40 and 20W-50 are usable for ambient temperatures above 10°C (50°F) for all seasons.



T10003

75W-90 for transmission and 80W-90 for differential gear are preferable for ambient temperatures below 40°C (104°F).

Checking Drive Belts



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

Adjust if belt deflection exceed the limit.

Belt deflection:

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	12 (0.47)	7.5 - 8.5 (0.295 - 0.335)	6.5 - 7.5 (0.256 - 0.295)
Air conditioner compressor	14 (0.55)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Power steering oil pump	20 (0.79)	14 - 16 (0.55 - 0.63)	12 - 14 (0.47 - 0.55)
Applied pushing force	98 N (10 kg, 22 lb)		

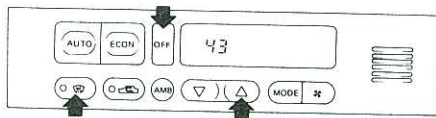
Inspect drive belt deflection when engine is cold.

Changing Engine Coolant

WARNING:

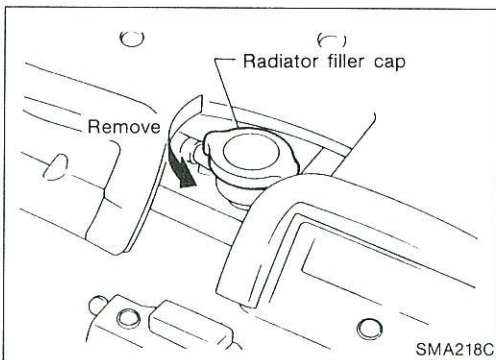
To avoid being scalded, never change the coolant when the engine is hot.

Auto air conditioner models:



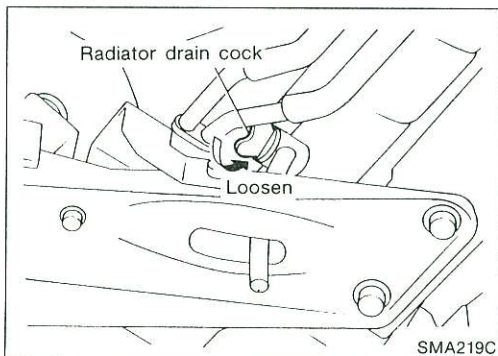
SMA217C

1. Manual air conditioner models:
Move heater "TEMP" control lever all the way to the "HOT" position.
1. Auto air conditioner models:
Perform self-diagnosis step 4 of Automatic Air Conditioner system, referring to the following notes. (Refer to HA section.)
 - 1) Turn ignition switch from "OFF" to "ON".
 - 2) In 10 seconds after starting engine (ignition switch is turned "ON"), press **OFF** switch for at least 5 seconds.
 - 3) Press **(HOT)** switch 3 times.
 - 4) Press **(DEF)** switch 2 times.
 - 5) Confirm indication of the A/C display shown at left.
 - 6) Wait 10 seconds before turning ignition switch off.



SMA218C

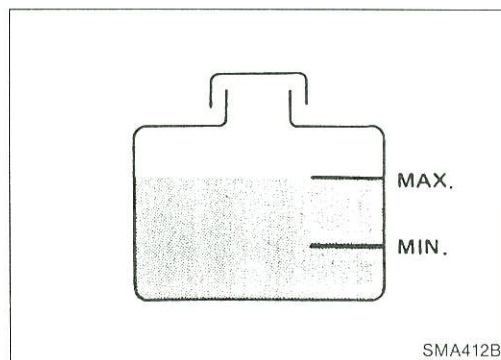
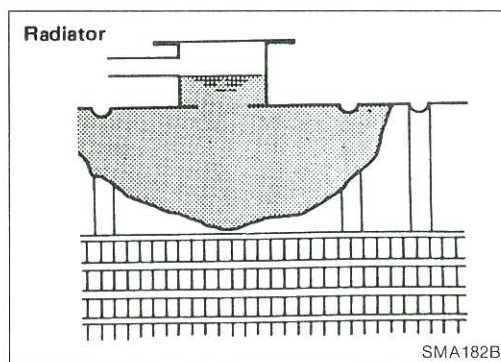
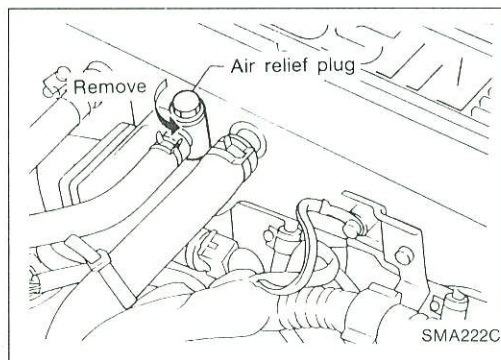
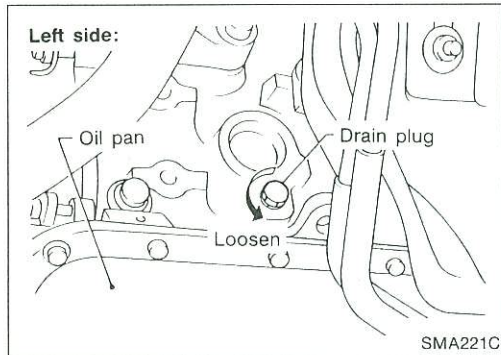
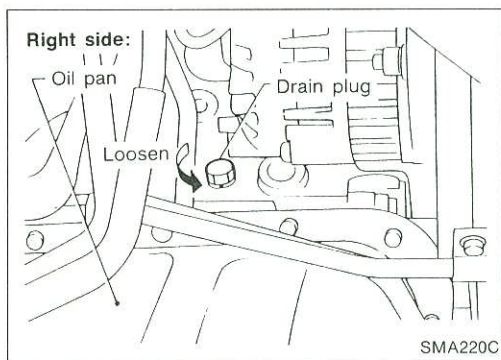
2. Open drain cock at the bottom of radiator, and remove radiator cap.



SMA219C

ENGINE MAINTENANCE

Changing Engine Coolant (Cont'd)



3. Remove drain plugs on both sides of cylinder block.
4. Close drain cock and tighten drain plugs securely.

- **Apply sealant to the drain plug thread.**

: 34 - 44 N·m
(3.5 - 4.5 kg-m, 25 - 33 ft-lb)

5. Open air relief plug.
6. Fill radiator with water and close air relief plug.
7. Start engine and warm it up sufficiently.
8. Stop engine and wait until it cools down.
9. Repeat step 3 through step 8 until clear water begins to drain from radiator.
10. Drain water.

11. Open air relief plug again.
12. Fill radiator with coolant up to specified level.
Follow instructions attached to anti-freeze container for mixing ratio of anti-freeze to water.

Coolant capacity (Without reservoir tank):

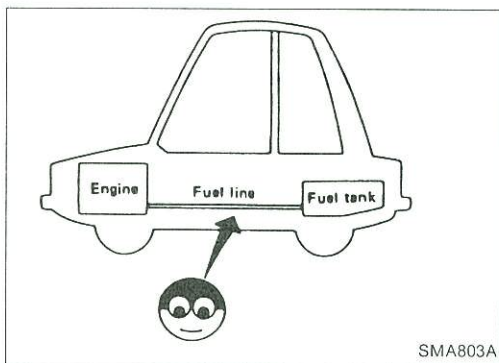
8.35 ℓ (8-7/8 US qt, 7-3/8 Imp qt)

Reservoir tank:

0.8 ℓ (7/8 US qt, 3/4 Imp qt)

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

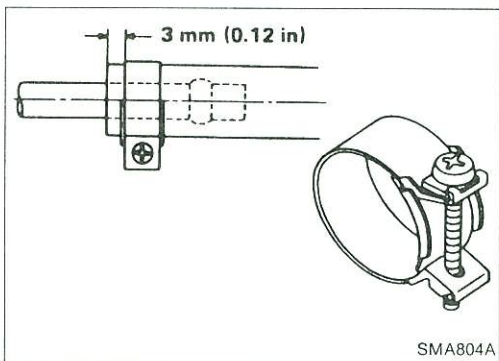
13. Remove reservoir tank, drain coolant, then clean reservoir tank.
14. Fill reservoir tank with coolant up to "MAX" level.
15. Close air relief plug again.
16. Run engine and warm it up.
17. Stop engine and cool it down, then add coolant as necessary.



Checking Fuel Lines

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

If necessary, repair or replace malfunctioning parts.



CAUTION:

Tighten high-pressure rubber hose clamp so that clamp end is 3 mm (0.12 in) from hose end.

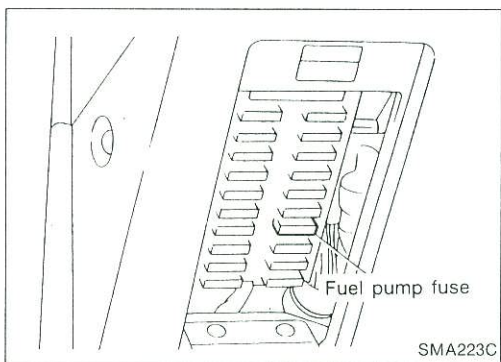
Tightening torque specifications are the same for all rubber hose clamps.

Ensure that screw does not contact adjacent parts.

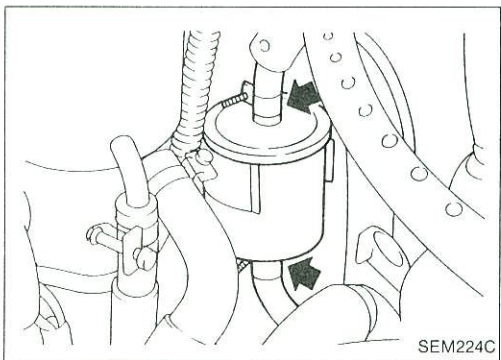
Changing Fuel Filter

WARNING:

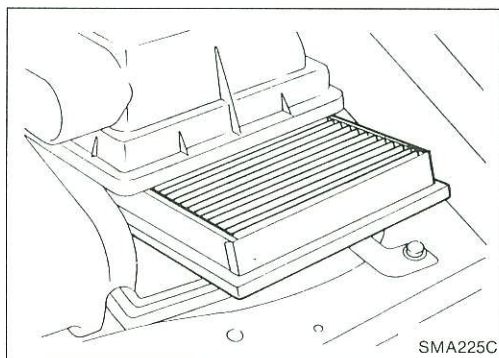
Before removing fuel filter, release fuel pressure from fuel line to eliminate danger.



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

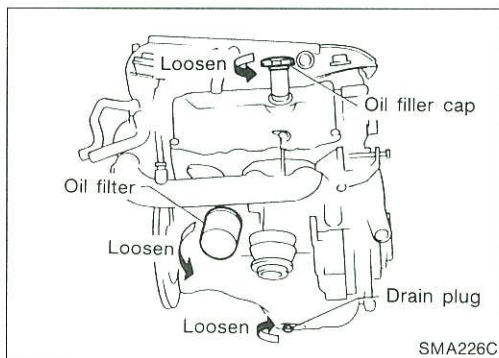


5. Loosen fuel hose clamps.
 6. Replace fuel filter.
- Be careful not to spill fuel over engine compartment. Place a shop towel to absorb fuel.
 - Use a high-pressure type fuel filter. Do not use a synthetic resinous fuel filter.
 - When tightening fuel hose clamps, refer to "Checking Fuel Lines".
 - Erase memory (Code No. 22) from control unit. (Refer to EF & EC section.)



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 capacity (Refill):

With oil filter

4.4 l (4-5/8 US qt, 3-7/8 Imp qt)

Without oil filter

4.0 l (4-1/4 US qt, 3-1/2 Imp qt)

CAUTION:

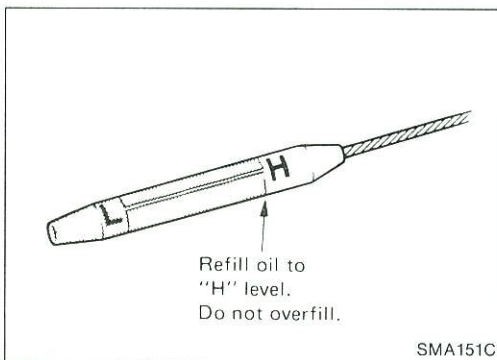
- Be sure to clean drain plug and install with new washer.

Oil pan drain plug:

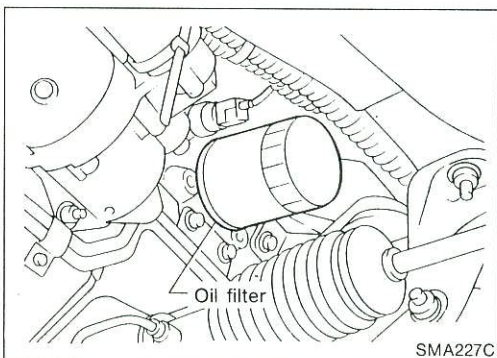
⚙: 29 - 39 N·m

(3.0 - 4.0 kg-m, 22 - 29 ft-lb)

- Use recommended engine oil.



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



Changing Oil Filter

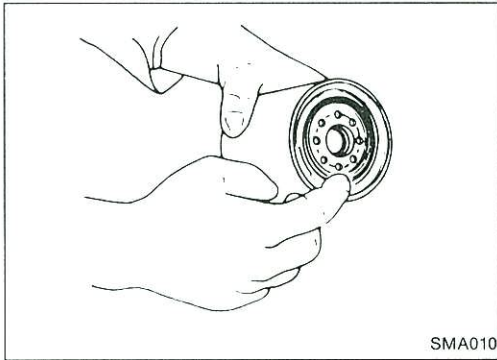
1. Remove oil filter with a suitable tool.

WARNING:

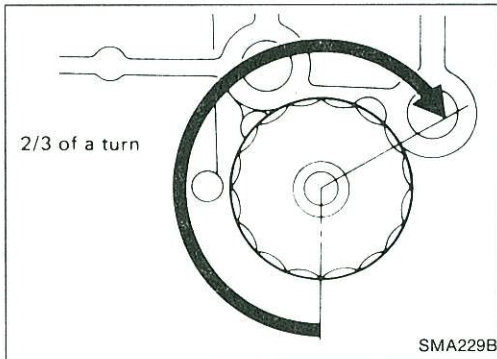
Be careful not to burn yourself, as the engine and engine oil are hot.

ENGINE MAINTENANCE

Changing Oil Filter (Cont'd)

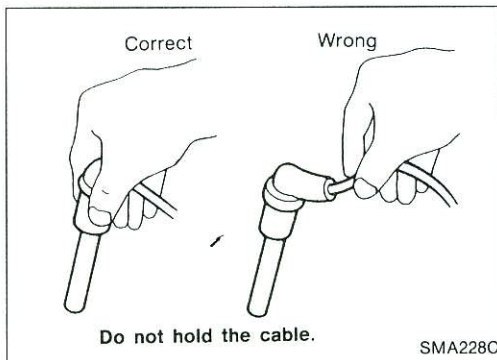


2. Before installing a new oil filter, clean the oil filter mounting surface on cylinder block, and coat the oil filter rubber seal with a little engine oil.



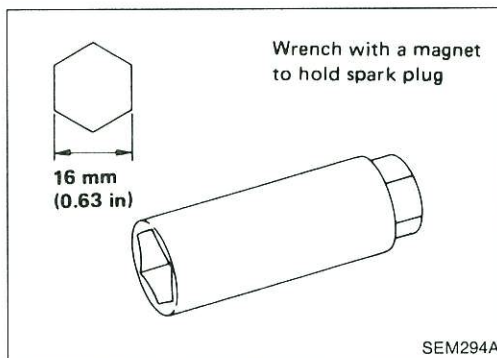
3. Screw in the oil filter until a slight resistance is felt, then tighten additionally more than 2/3 turn.
4. Add engine oil.

Refer to Changing Engine Oil.



Changing Spark Plugs

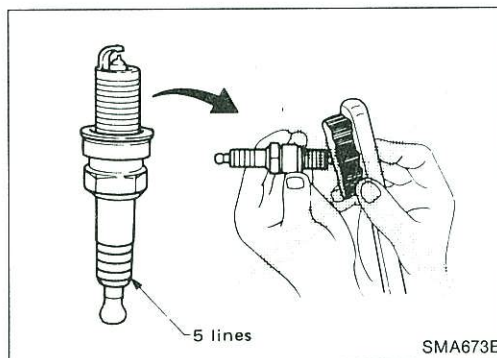
1. Disconnect ignition wires from spark plugs at boot. Do not pull on the wire.



2. Remove spark plugs with suitable spark plug wrench.

Spark plug (Platinum-tipped type):

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



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

Cleaner air pressure:

Less than 588 kPa (6 kg/cm², 85 psi)


Cleaning time:

Less than 20 seconds

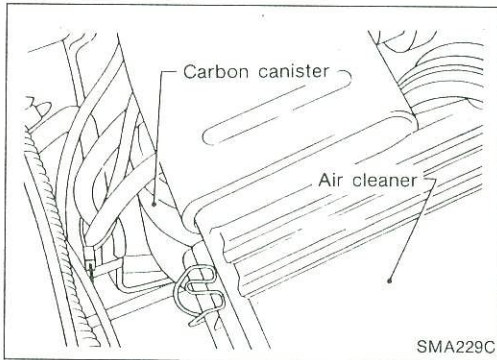
Changing Spark Plugs (Cont'd)

3. Install spark plugs. Reconnect ignition wires according to Nos. indicated on them.

Spark plug:

: 20 - 29 N·m

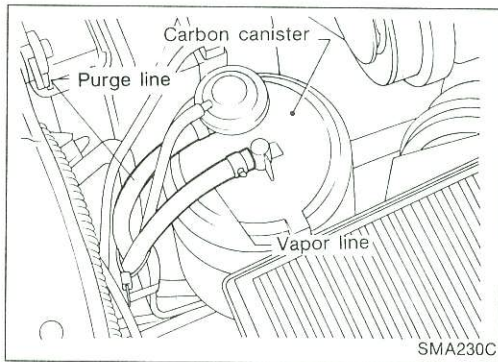
(2.0 - 3.0 kg-m, 14 - 22 ft-lb)

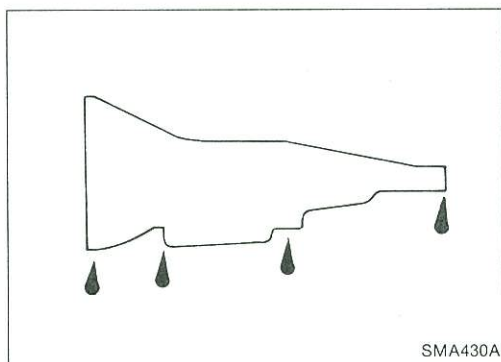


Checking Vapor Lines

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 “EVAPORATIVE EMISSION CONTROL SYSTEM” in EF & EC section.

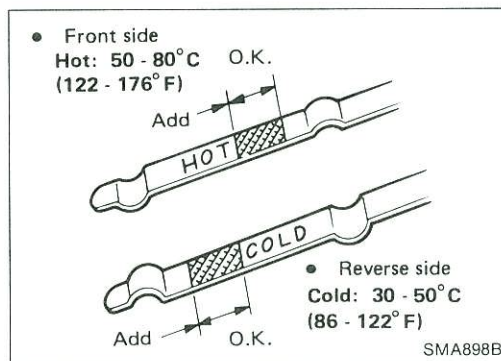




SMA430A

Checking A/T Fluid

1. Check for fluid leakage.



SMA898B

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

Do not overfill.



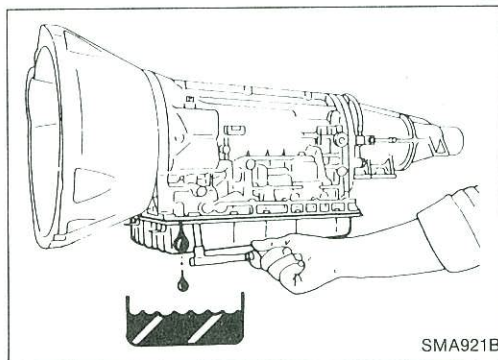
SMA853B

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

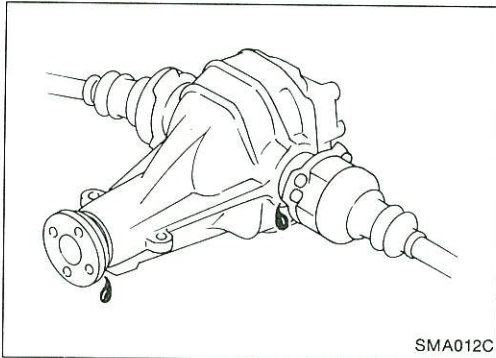
Changing A/T Fluid

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

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

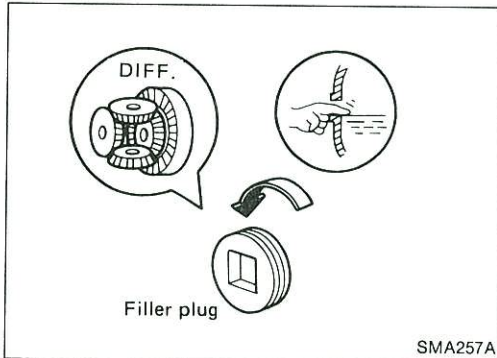


SMA921B



Checking Differential Gear Oil

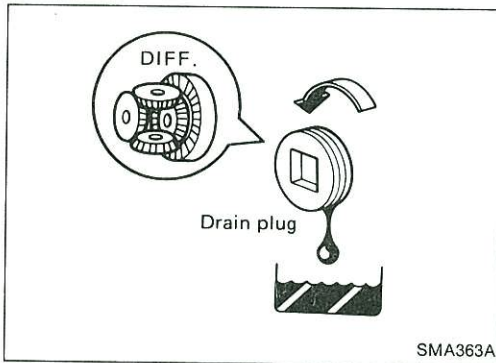
1. Check differential carrier for oil leakage.



2. If leakage is found, check oil level.

Filler plug:

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



Changing Differential Gear Oil

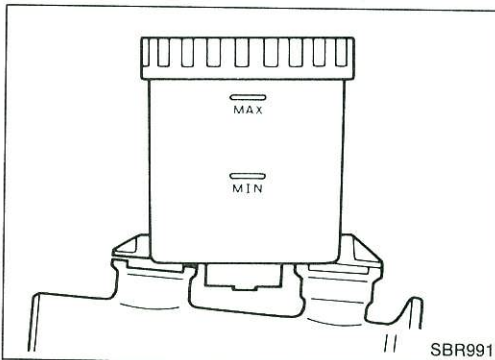
1. Drain oil and refill with new gear oil.
2. Check oil level.

Oil capacity:

1.3 ℓ (2-3/4 US pt, 2-1/4 Imp pt)

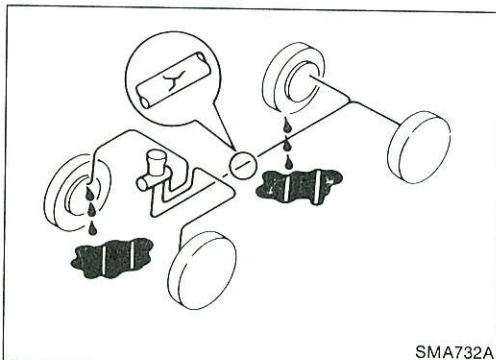
Drain plug:

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



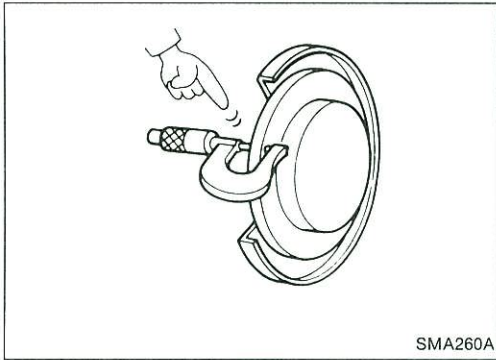
Checking Brake Fluid Level and Leaks

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



Checking Brake Lines and Cables

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



Checking Disc Brake

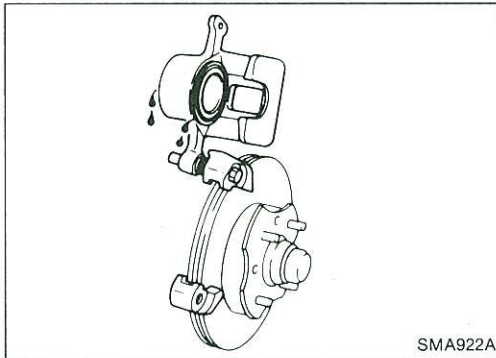
- Check condition of disc brake components.

ROTOR

- Check condition and thickness.

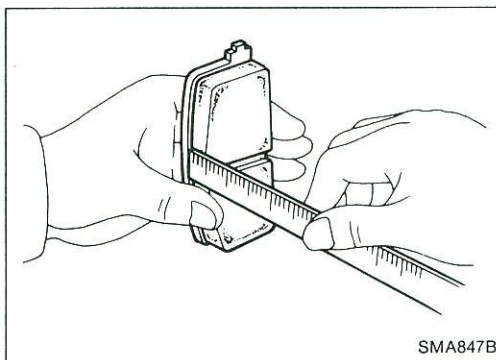
Unit: mm (in)

	Front	Rear
Standard thickness	22.0 (0.866)	10.0 (0.394)
Minimum thickness	20.0 (0.787)	9.0 (0.354)



CALIPER

- Check operation and for leakage.



PAD

- Check for wear or damage.

Unit: mm (in)

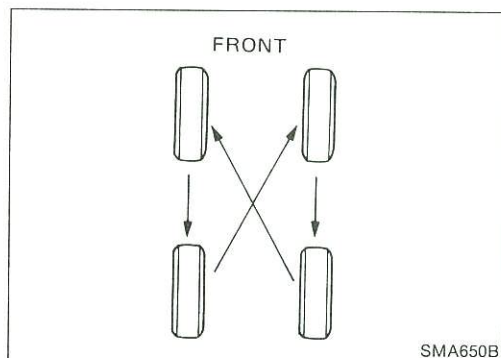
	Front	Rear
Standard thickness	11.0 (0.433)	10.0 (0.394)
Minimum thickness	2.0 (0.079)	

Balancing Wheels

- Adjust wheel balance using road wheel center.

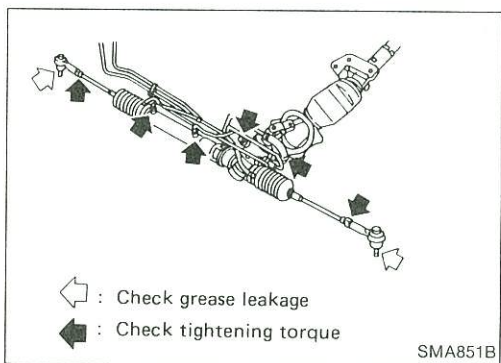
Wheel balance (Maximum allowable unbalance):

Refer to S.D.S.



Tire Rotation

- Do not include the T-type spare tire when rotating the tires.
- Wheel nuts:
- ⚙: 103 - 123 N·m (10.5 - 12.5 kg-m, 76 - 90 ft-lb)



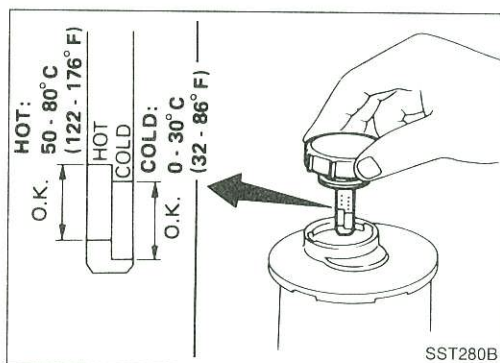
Checking Steering Gear and Linkage

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.

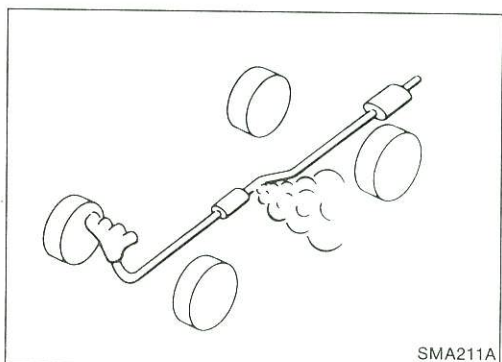
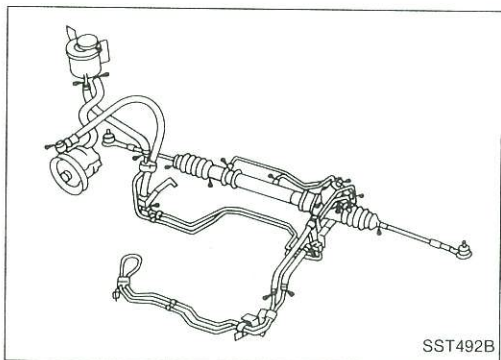


Checking Power Steering Fluid and Lines

- 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:

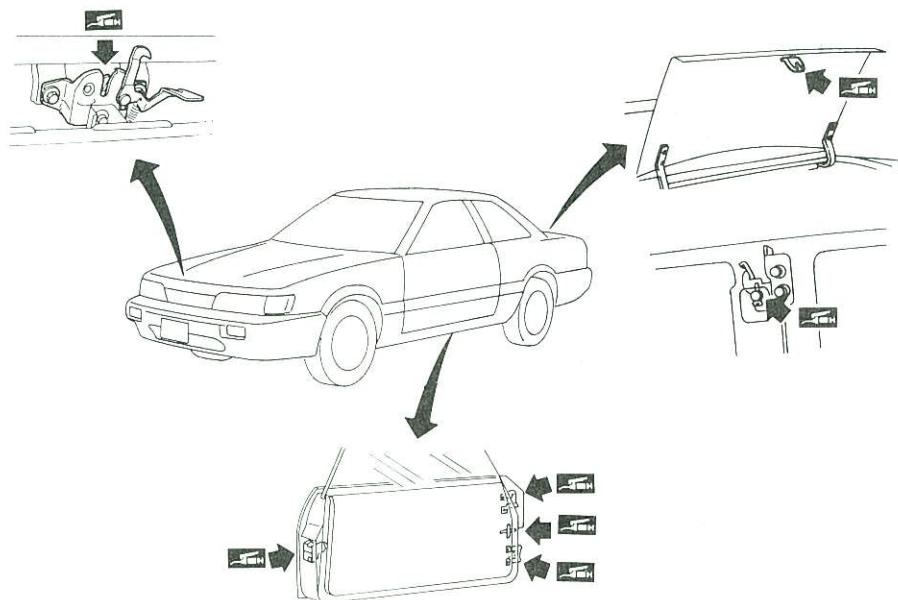
- Do not overfill.
 - Recommended fluid is Automatic Transmission Fluid "DEXRON™" type.
- Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



Checking Exhaust System

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

Lubricating Locks, Hinges and Hood Latches



SMA231C

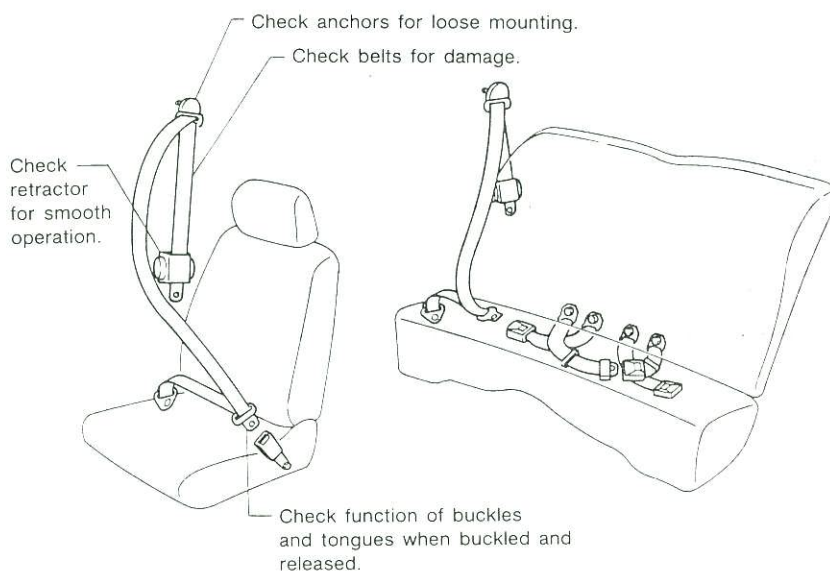
Checking Seat Belts, Buckles, Retractors, Anchors and Adjusters

CAUTION:

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



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



SMA232C

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

Engine Maintenance

INSPECTION AND ADJUSTMENT

Drive belt deflection

Unit: mm (in)

	Used belt deflection		Deflection of new belt
	Limit	Deflection after adjustment	
Alternator	12 (0.47)	7.5 - 8.5 (0.295 - 0.335)	6.5 - 7.5 (0.256 - 0.295)
Air conditioner compressor	14 (0.55)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Power steering oil pump	20 (0.79)	14 - 16 (0.55 - 0.63)	12 - 14 (0.47 - 0.55)
Applied pushing force	98 N (10 kg, 22 lb)		

Oil capacity (Refill)

Unit: ℓ (US qt, Imp qt)

With oil filter	4.4 (4-5/8, 3-7/8)
Without oil filter	4.0 (4-1/4, 3-1/2)

Coolant capacity

Unit: ℓ (US qt, Imp qt)

Without reservoir tank	8.35 (8-7/8, 7-3/8)
Reservoir tank	0.8 (7/8, 3/4)

Spark plug

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

Chassis and Body Maintenance

INSPECTION AND ADJUSTMENT

Front axle and front suspension (Unladen)*

Camber	degree	—35' to 55'
Caster	degree	3°55' - 5°25'
Kingpin inclination	degree	11°55' - 13°25'
Toe-in	mm (in)	—1 to 1 (—0.04 to 0.04)
(Total toe-in)	degree	—5' to 5'
Front wheel turning angle		
Full turn		
Inside/outside	degree	40°30' - 44°30'/33°30'

*: Fuel, radiator coolant and engine oil full.

Spare tire, jack, hand tools and mats in designated positions.

Rear axle and rear suspension (Unladen)*

Camber	degree	—1°5' to 0°25'
Toe-out	mm (in)	0.2 - 4.2 (0.008 - 0.165)
(Total toe-out)	degree	1' - 22'

*: Fuel, radiator coolant and engine oil full.

Spare tire, jack, hand tools and mats in designated positions.

Wheel bearing

	Front	Rear
Wheel bearing axle endplay limit	0 (0)	0.05 (0.0020)
mm (in)		
Wheel bearing lock nut		
Tightening torque	34 - 39	127 - 177
N·m (kg-m, ft-lb)	(3.5 - 4.0, 25 - 29)	(13 - 18, 94 - 130)
Return angle	90°	—
degree		

Brake

Unit: mm (in)

Disc brake	
Pad	
Standard thickness	
Front	11.0 (0.433)
Rear	10.0 (0.394)
Minimum thickness	
Front	2.0 (0.079)
Rear	2.0 (0.079)
Rotor	
Standard thickness	
Front	22.0 (0.866)
Rear	10.0 (0.394)
Minimum thickness	
Front	20.0 (0.787)
Rear	9.0 (0.354)
Pedal	
Free height	199 - 209 (7.83 - 8.23)
Free play	1 - 3 (0.04 - 0.12)
Depressed height [under force of 490 N (50 kg, 110 lb) with engine running]	110 (4.33) or more
Parking brake	
Number of notches [at pulling force 196 N (20 kg, 44 lb)]	8 - 9

Wheel balance

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

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

Chassis and Body Maintenance (Cont'd)

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Final drive			
Drain plug	39 - 59	4 - 6	29 - 43
Filler plug	39 - 59	4 - 6	29 - 43
Front axle and front suspension			
Tie-rod lock nut	78 - 98	8.0 - 10.0	58 - 72
Rear axle and rear suspension			
Toe adjusting pin	98 - 118	10 - 12	72 - 87
Brake system			
Air bleed valve	7 - 9	0.7 - 0.9	5.1 - 6.5
Brake lamp switch lock nut	12 - 15	1.2 - 1.5	9 - 11
Brake booster input rod lock nut	16 - 22	1.6 - 2.2	12 - 16
Wheel and tire			
Wheel nut	103 - 123	10.5 - 12.5	76 - 90

ENGINE MECHANICAL

SECTION **EM**

EM

CONTENTS

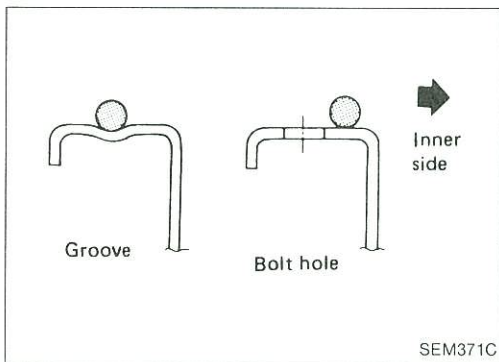
PRECAUTIONS.....	EM- 2
PREPARATION.....	EM- 3
OUTER COMPONENT PARTS	EM- 6
COMPRESSION PRESSURE.....	EM- 8
OIL PAN	EM- 9
TIMING BELT	EM-13
OIL SEAL REPLACEMENT	EM-20
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CYLINDER BLOCK.....	EM-42
SERVICE DATA AND SPECIFICATIONS (S.D.S.).....	EM-54

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF** section of this Service Manual.

WARNING:

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

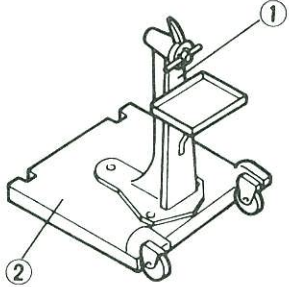
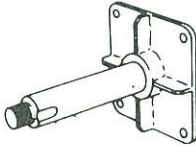
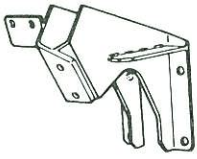
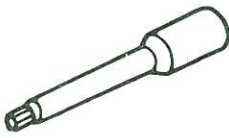

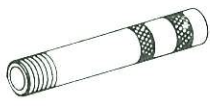


Liquid Gasket Application Procedure

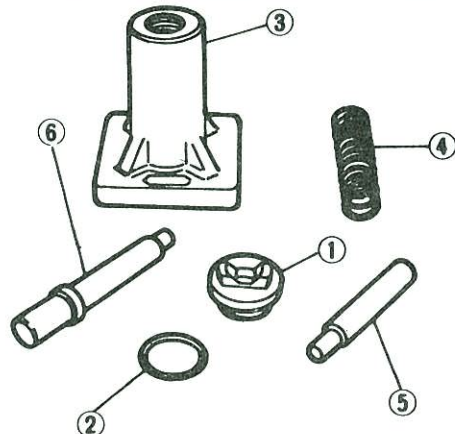


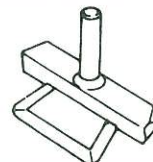
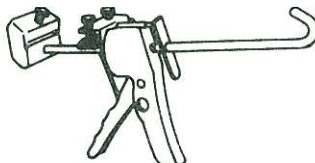
- Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surface.
- Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Liquid Gasket or equivalent.)
 - Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide (for oil pan).
 - Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) wide (in areas except oil pan).
- Apply liquid gasket to inner surface around hole perimeter area.
(Assembly should be done within 5 minutes after coating.)
- Wait at least 30 minutes before refilling engine oil and engine coolant.

PREPARATION

SPECIAL SERVICE TOOLS

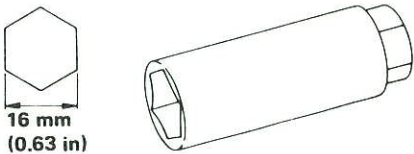


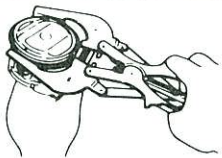
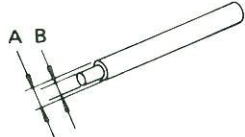
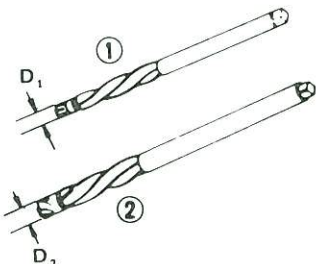
Tool number (Kent-Moore No.) Tool name	Description
ST0501S000 (—) Engine stand assembly ①ST05011000 (—) Engine stand ②ST05012000 (—) Base	Disassembling and assembling 
KV10106500 (—) Engine stand shaft	
KV10110001 (—) Engine sub-attachment	
ST10120000 (J24239-01) Cylinder head bolt wrench	Loosening and tightening cylinder head bolt 
KV10110600 (J33986) Valve spring compressor	Disassembling and assembling valve components 
KV10107501 (—) Valve oil seal drift	Installing valve oil seal 

PREPARATION

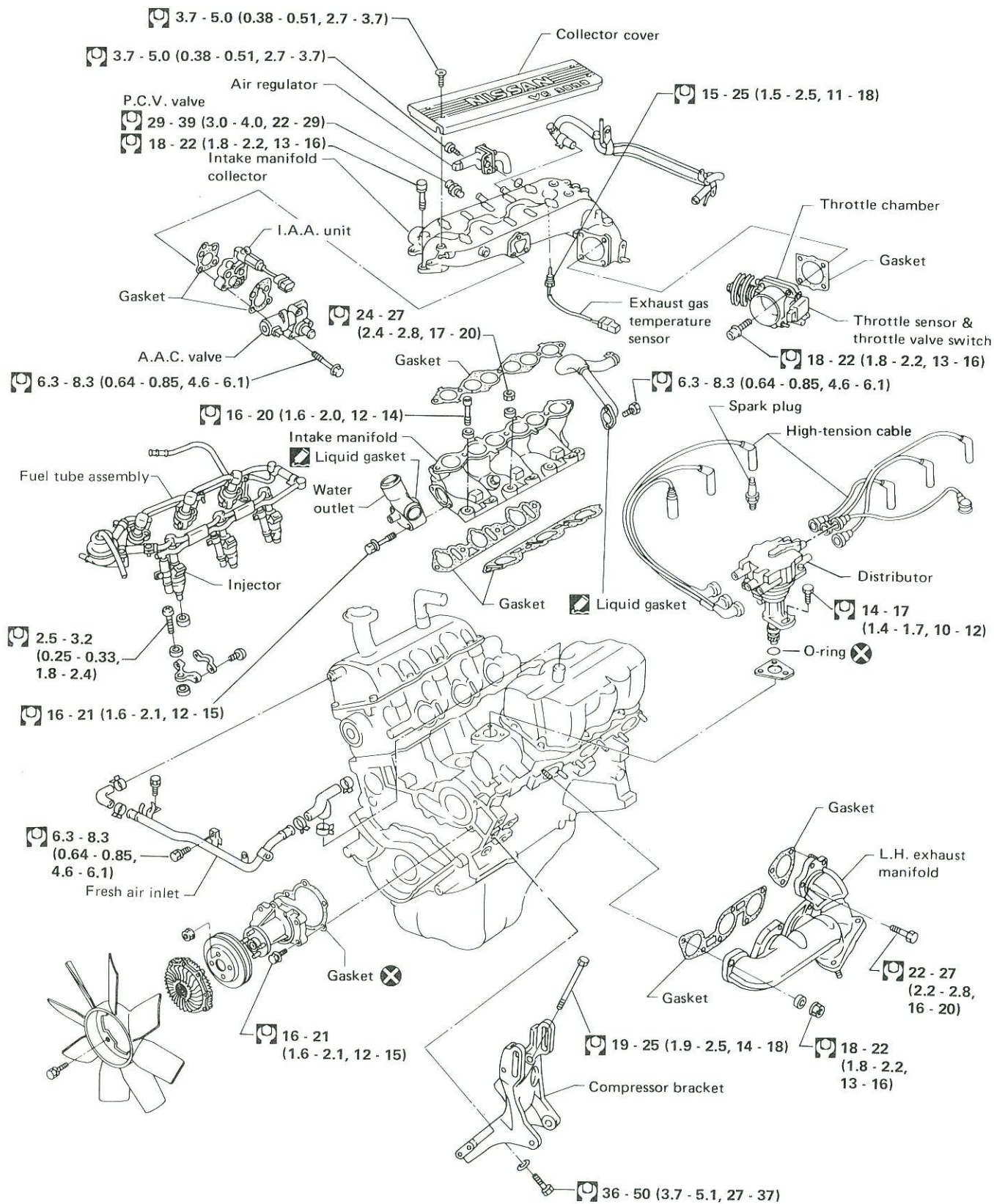
Tool number (Kent-Moore No.) Tool name	Description
KV10110300 (—) Piston pin press stand assembly ①KV10110310 (—) Cap ②KV10110330 (—) Spacer ③ST13030020 (—) Press stand ④ST13030030 (—) Spring ⑤KV10110340 (—) Drift ⑥KV10110320 (—) Center shaft	Disassembling and assembling piston with connecting rod 
EM03470000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

PREPARATION

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 <p> Intake & Exhaust: A = 10.5 mm (0.413 in) dia. B = 6.6 mm (0.260 in) dia. </p> 
Valve guide reamer	Reaming valve guide ① or hole for oversize valve guide ② <p> Intake: D₁ = 7.0 mm (0.276 in) dia. D₂ = 11.2 mm (0.441 in) dia. Exhaust: D₁ = 8.0 mm (0.315 in) dia. D₂ = 12.2 mm (0.480 in) dia. </p> 

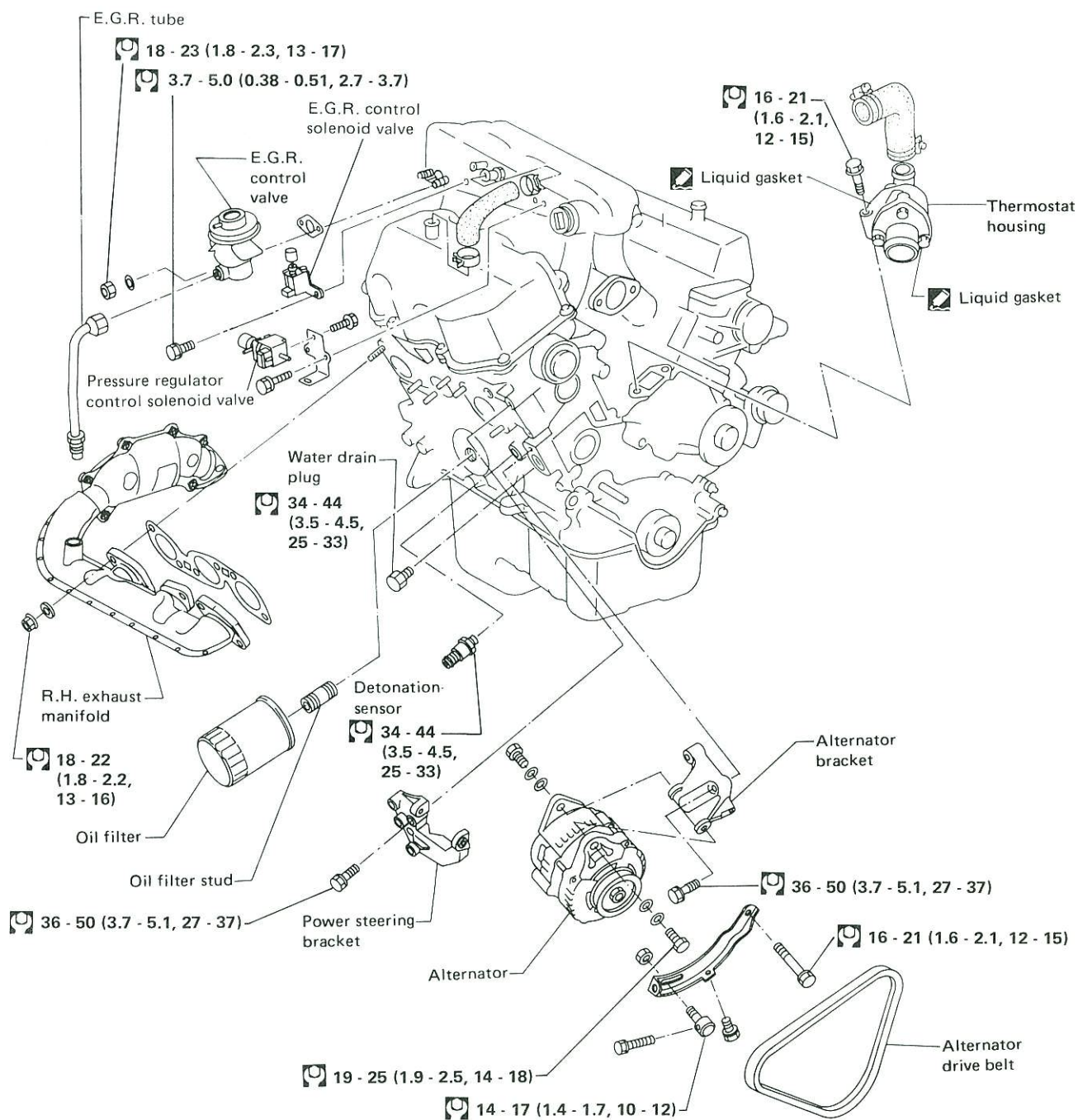
OUTER COMPONENT PARTS




□ : N·m (kg-m, ft-lb)

SEM853C

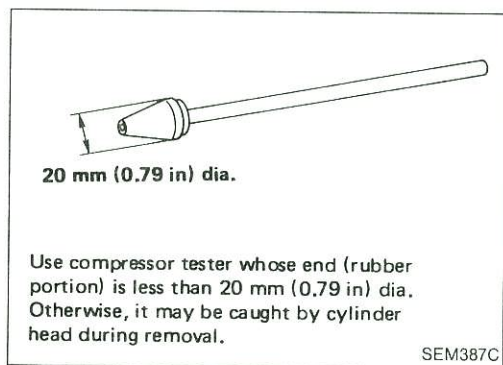
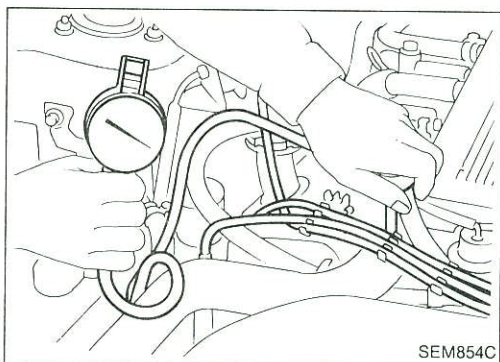
OUTER COMPONENT PARTS



 : N·m (kg-m, ft-lb)

Measurement of Compression Pressure

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



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

Compression pressure: kPa (kg/cm², psi)/300 rpm

Standard

1,196 (12.2, 173)

Minimum

883 (9.0, 128)

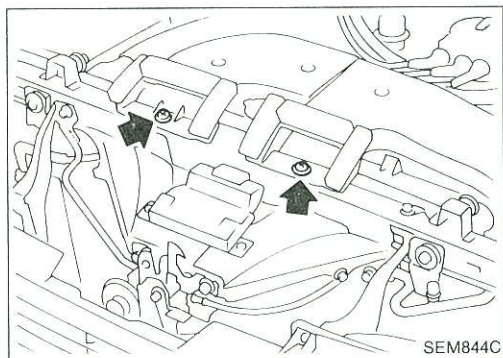
Difference limit between cylinders

98 (1.0, 14)

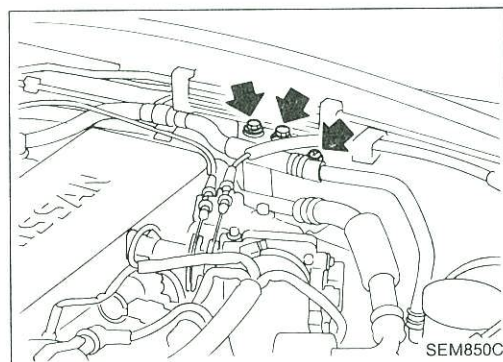
10. If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into cylinders through spark plug holes and retest compression.
- **If adding oil helps compression, piston rings may be worn or damaged. If so, replace piston rings after checking piston.**
 - **If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to S.D.S.) 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.**

Removal

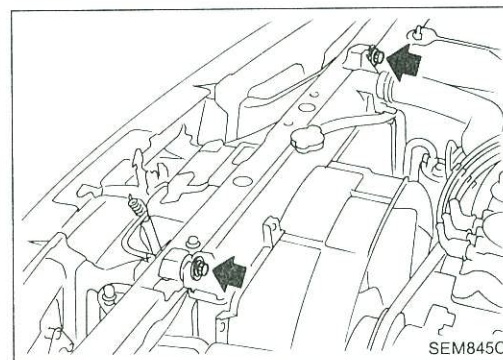
1. Remove engine lower cover.
2. Drain engine oil.
3. Remove engine oil level gauge.



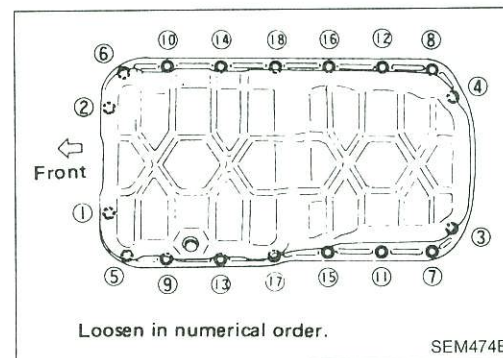
4. Remove air duct.



5. Remove air conditioner hose fixing bolt and brake booster vacuum hose fixing bolt.



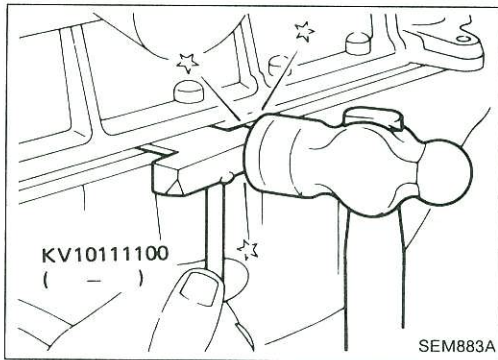
6. Remove radiator fitting bolts.
7. Remove A/T oil cooler tube fitting bolts.



8. Remove oil pan bolts.

OIL PAN

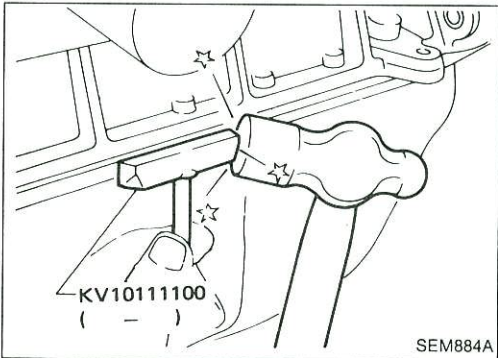
Removal (Cont'd)



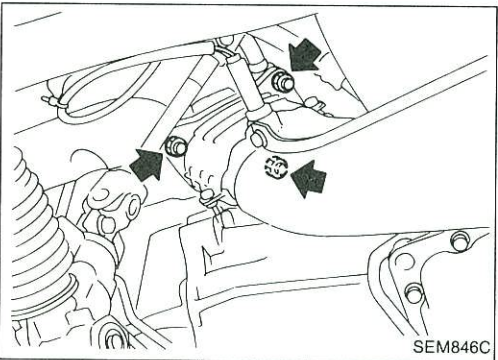
9. Remove oil pan.

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

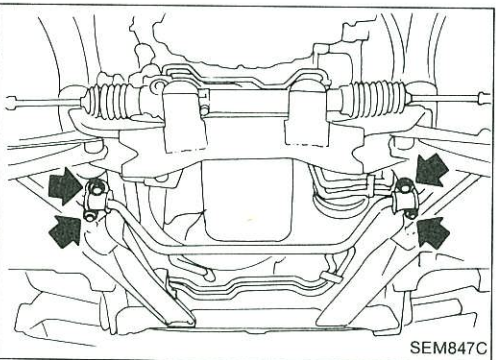
- Do not drive seal cutter into oil pump or rear oil seal retainer portion, or aluminum mating surfaces will be damaged.
- Do not insert screwdriver, or oil pan flange will be deformed.



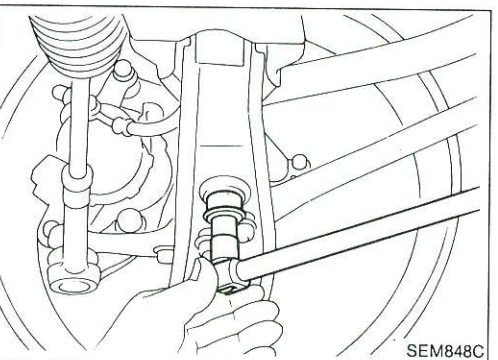
(2) Slide Tool by tapping its side with a hammer, and remove oil pan.



10. Loosen exhaust front tube fitting bolts.



11. Remove front stabilizer fixing brackets.

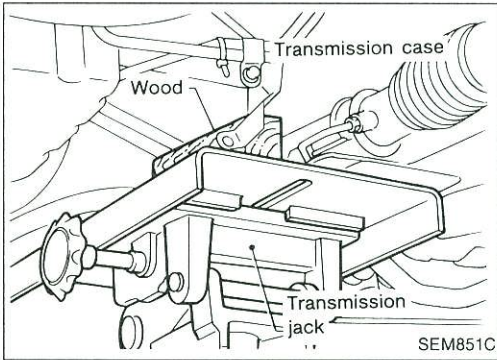


12. Remove right side front stabilizer fixing bolt.

13. Loosen left side front stabilizer fixing bolt.

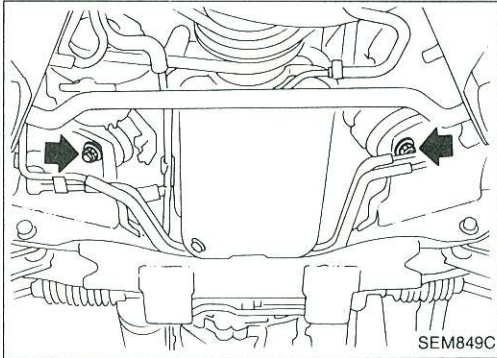
OIL PAN

Removal (Cont'd)



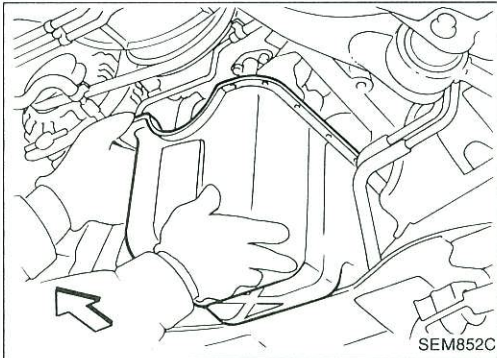
14. Set a suitable transmission jack under the transmission case.

- Place a suitable piece of wood between transmission jack and transmission case.

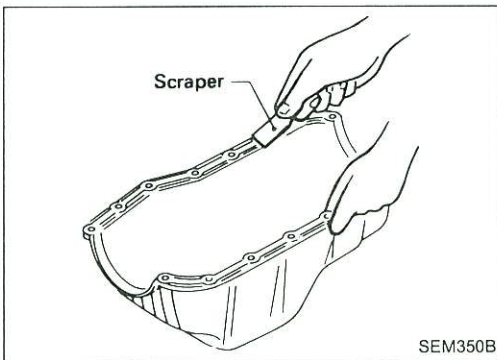


15. Remove engine mounting bolts.

16. Slowly raise transmission jack until oil pan can be removed.



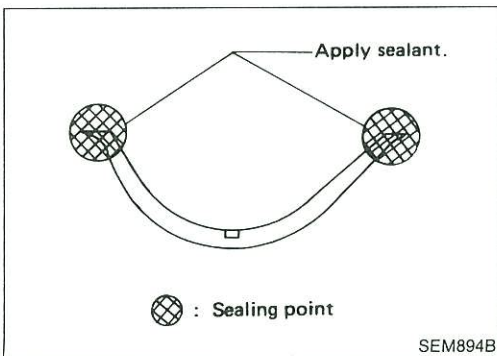
17. Remove oil pan from vehicle.



Installation

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

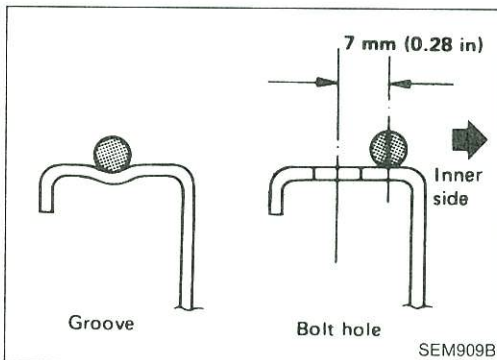
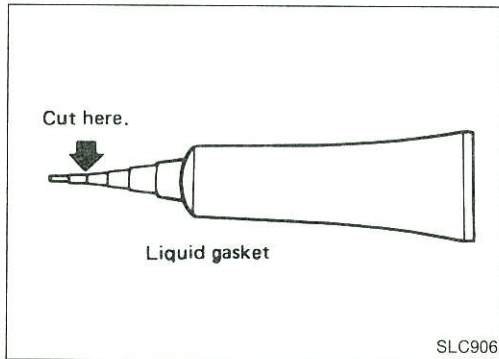
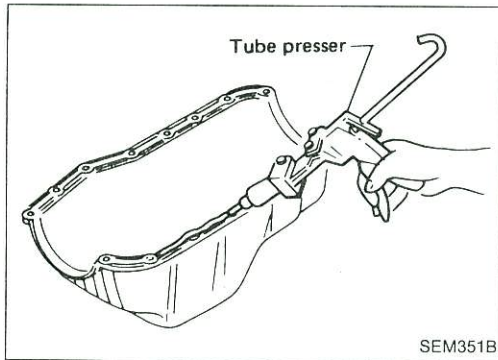
- Also remove traces of liquid gasket from mating surface of cylinder block.



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

OIL PAN

Installation (Cont'd)



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

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

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

4. Apply liquid gasket to inner sealing surface as shown in figure.

- Attaching should be done within 5 minutes after coating.

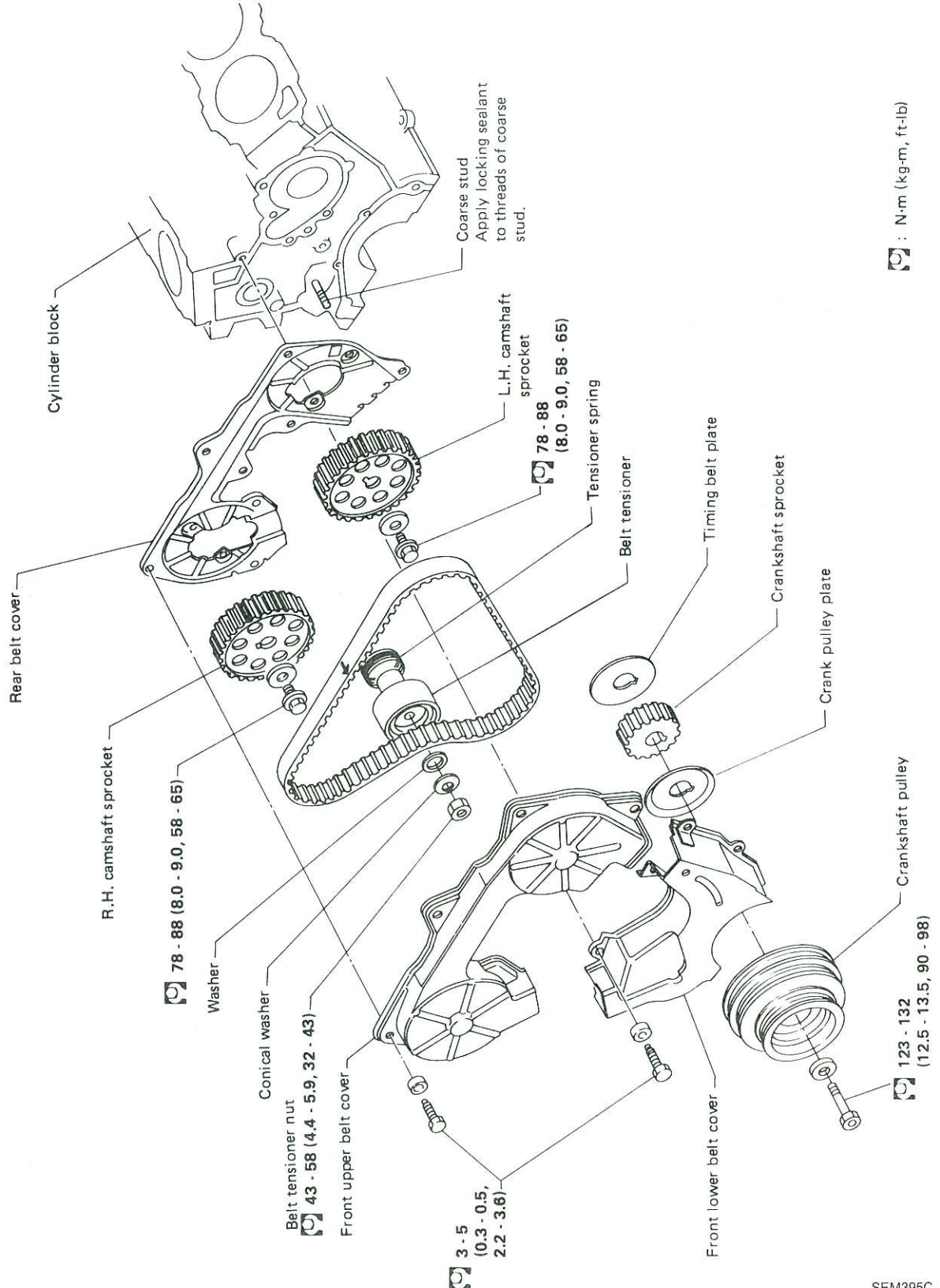
5. Install oil pan.

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

TIMING BELT

CAUTION:

- Do not bend or twist timing belt.
- After removing timing belt, do not turn crankshaft and camshaft separately because valves will strike piston heads.
- Make sure that timing belt, camshaft sprocket, crankshaft sprocket and belt tensioner are clean and free from oil and water.
- Installation should be carried out when engine is cold.



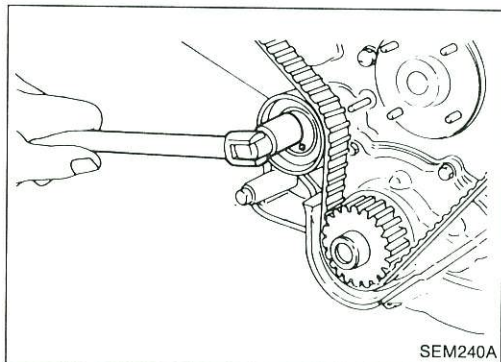
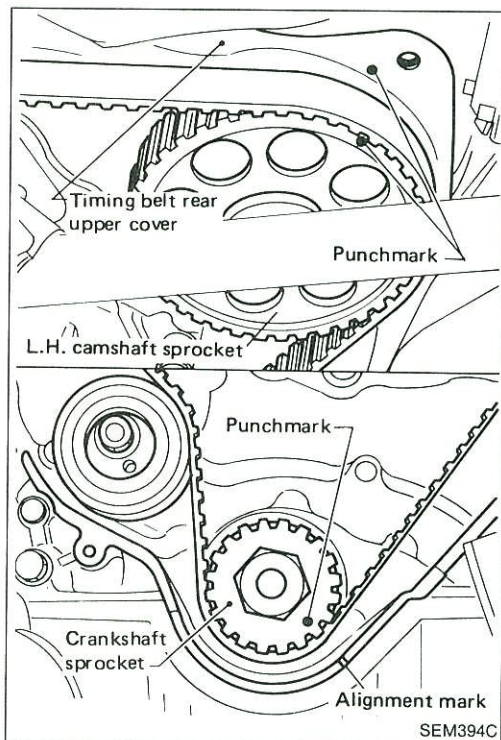
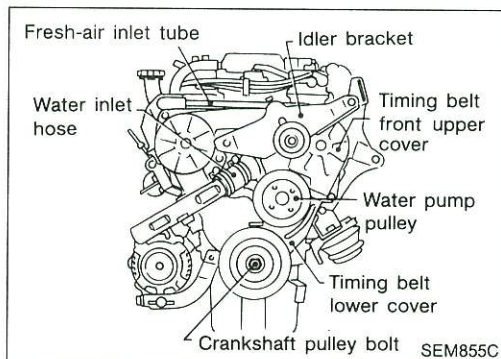
TIMING BELT

Removal

1. Remove engine undercover and air duct.
2. Drain engine coolant from radiator.

Be careful not to spill coolant on drive belts.

3. Remove radiator. (Refer to LC section.)
4. Remove engine cooling fan.
5. Remove the following belts.
 - Power steering pump drive belt
 - Compressor drive belt
 - Alternator drive belt
6. Remove water pump pulley.
7. Remove all spark plugs.
8. Remove distributor protector.
9. Remove compressor drive belt idler bracket.
10. Remove fresh-air inlet tube for rocker cover.
11. Remove water inlet hose for thermostat housing.
12. Remove crankshaft pulley bolt.
13. Remove crankshaft pulley with a suitable puller.
14. Remove front upper and lower belt covers.

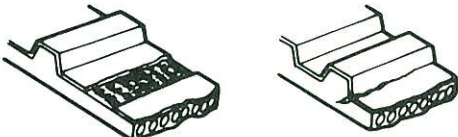

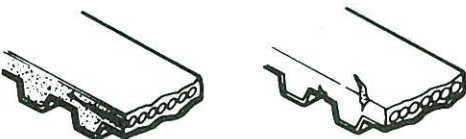



15. Set No. 1 piston at T.D.C. on its compression stroke by rotating crankshaft.
 - Align punchmark on L.H. camshaft sprocket with punchmark on timing belt upper rear cover.
 - Align punchmark on crankshaft sprocket with notch on oil pump housing.
 - Temporarily install crank pulley bolt on crankshaft so that crankshaft can be rotated.
16. Loosen timing belt tensioner nut, turn tensioner, then remove timing belt.

TIMING BELT

Inspection

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

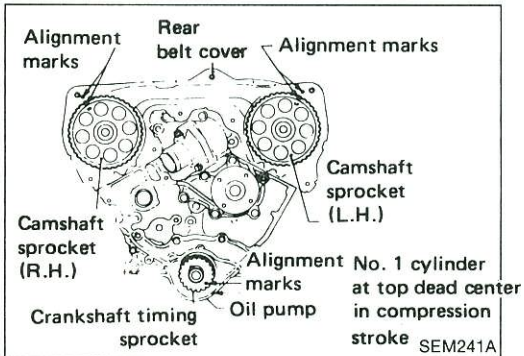
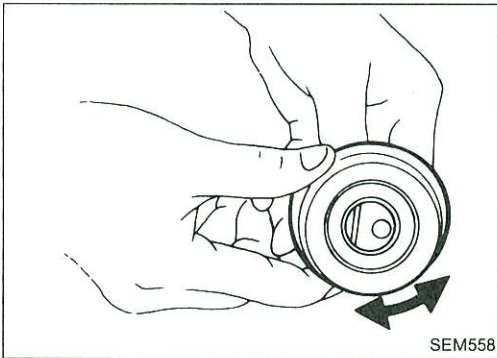
Item to check	Problem	Cause
Tooth is broken/tooth root is cracked.	 <p>SEM394A</p>	<ul style="list-style-type: none"> ● Camshaft jamming ● Distributor jamming ● Damaged camshaft/crankshaft oil seal
Back surface is cracked/worn.	 <p>SEM395A</p>	<ul style="list-style-type: none"> ● Tensioner jamming ● Overheated engine ● Interference with belt cover
Side surface is worn.	 <p>SEM396A</p> <ul style="list-style-type: none"> ● Belt corners are worn and round. ● Wicks are frayed and coming out. 	<ul style="list-style-type: none"> ● Improper installation of belt ● Malfunctioning crankshaft pulley plate/timing belt plate
Teeth are worn.	 <p>Rotating direction</p> <p>SEM397A</p> <ul style="list-style-type: none"> ● Canvas on tooth face is worn down. ● Canvas on tooth is fluffy, rubber layer is worn down and faded white, or weft is worn down and invisible. 	<ul style="list-style-type: none"> ● Poor belt cover sealing ● Coolant leakage at water pump ● Camshaft not functioning properly ● Distributor not functioning properly ● Excessive belt tension
Oil/Coolant or water is stuck to belt.		<ul style="list-style-type: none"> ● Poor oil sealing of each oil seal ● Coolant leakage at water pump ● Poor belt cover sealing

TIMING BELT

Inspection (Cont'd)

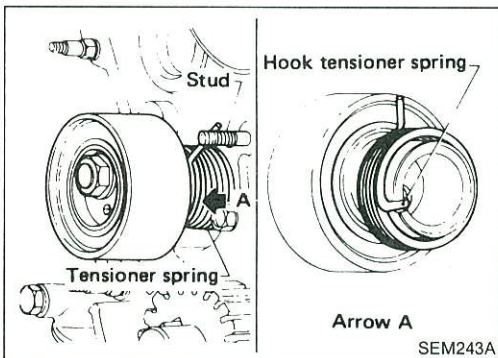
BELT TENSIONER AND TENSIONER SPRING

1. Check belt tensioner for smooth turning.
2. Check condition of tensioner spring.



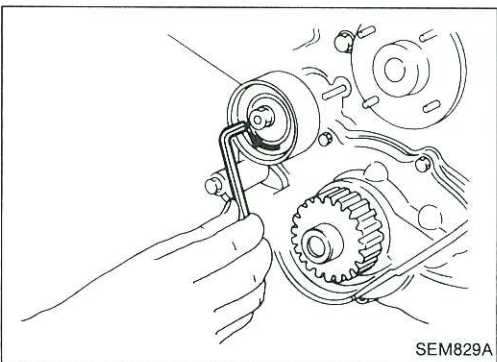
Installation

1. Confirm that No. 1 piston is set at T.D.C. on its compression stroke.



2. Install tensioner and tensioner spring.

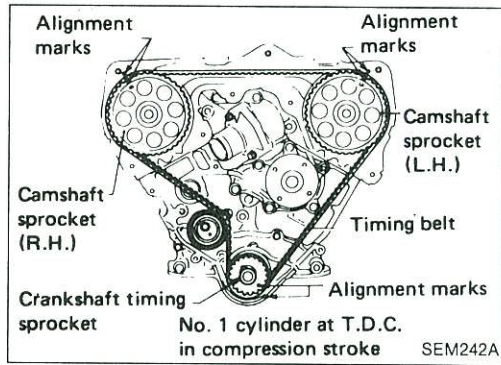
If stud is once removed, apply locking sealant to threads before installing.



3. Turn tensioner fully outward with hexagon wrench, and temporarily tighten lock nut.

TIMING BELT

Installation (Cont'd)



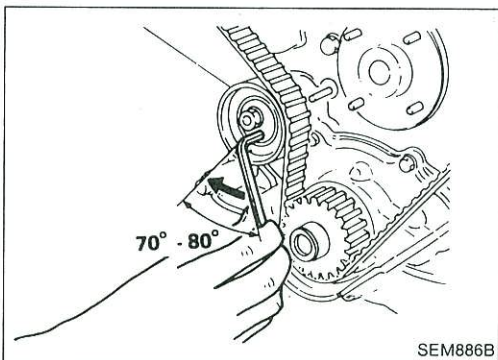
4. Set timing belt.

- (1) Align white lines on timing belt with punchmarks on camshaft sprockets and crankshaft sprocket.
- (2) Point arrow on timing belt toward front belt cover.

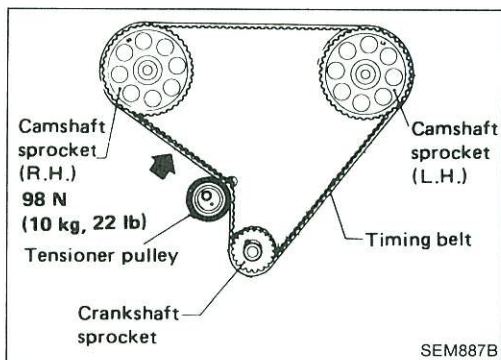
Number of teeth (reference):

Number of timing belt teeth		133
Number of teeth between timing marks	Between L.H. and R.H. camshaft sprockets	40
	Between L.H. camshaft sprocket and crankshaft timing sprocket	43

5. Loosen tensioner lock nut, keeping tensioner steady with hexagon wrench.



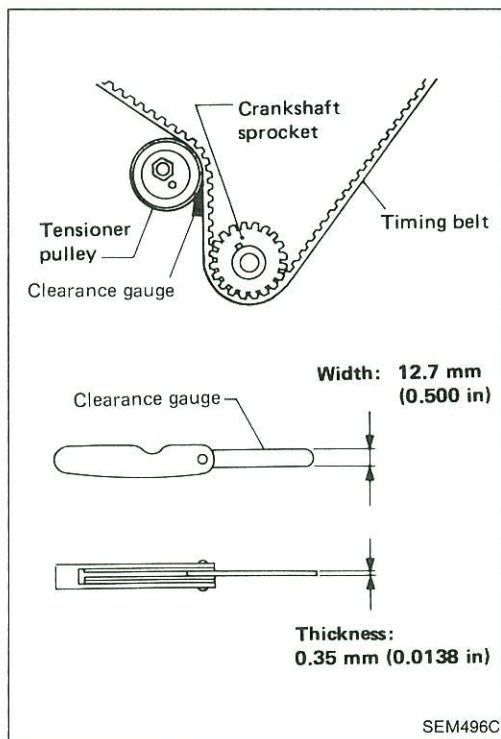
6. Turn tensioner 70 to 80 degrees clockwise with hexagon wrench, and temporarily tighten lock nut.
7. Turn crankshaft clockwise at least 2 times, then slowly set No. 1 piston at T.D.C. on its compression stroke.



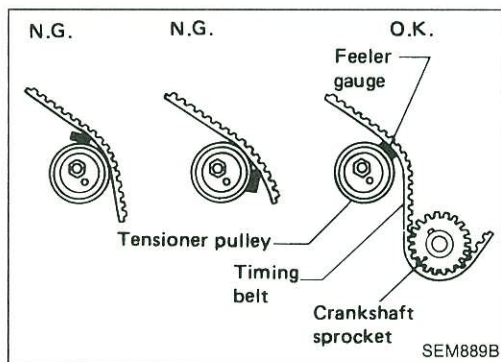
8. Push middle of timing belt between R.H. camshaft sprocket and tensioner pulley with force of 98 N (10 kg, 22 lb).
9. Loosen tensioner lock nut, keeping tensioner steady with hexagon wrench.

TIMING BELT

Installation (Cont'd)



10. Set clearance gauge as shown in figure which is 0.35 mm (0.0138 in) thick and 12.7 mm (0.500 in) wide.

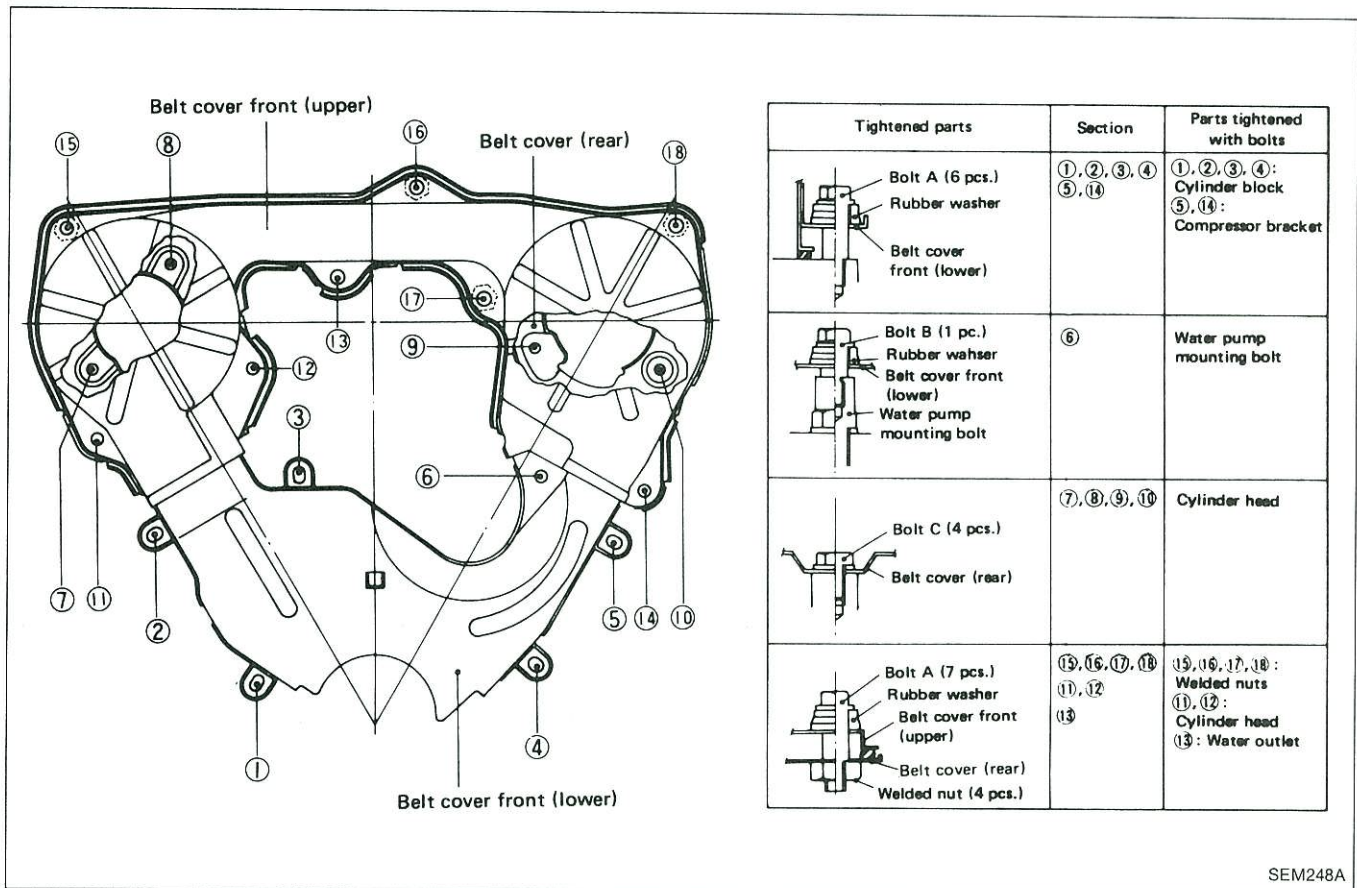


11. Turn crankshaft clockwise, and set clearance gauge as shown in figure.
 - Timing belt will move about 2.5 teeth.
12. Tighten tensioner lock nut, keeping tensioner steady with hexagon wrench.

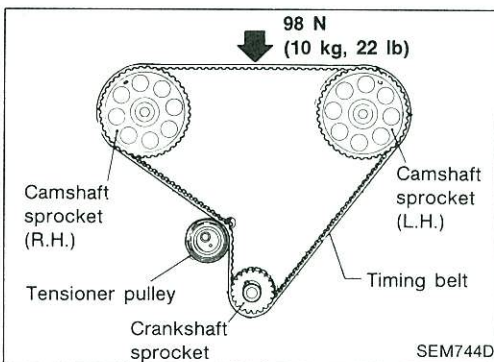
TIMING BELT

Installation (Cont'd)

13. Turn crankshaft clockwise or counterclockwise, and remove clearance gauge.
14. Turn crankshaft clockwise at least 2 times, then slowly set No. 1 piston at T.D.C. on its compression stroke.
15. Install lower and upper belt covers.



SEM248A



SEM744D

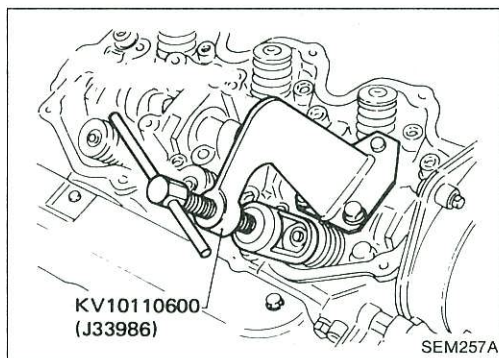
BELT TENSION CHECK

1. Set No. 1 piston at T.C.D. on its compression stroke.
2. Measure deflection of timing belt midway between camshaft pulleys when pushing with 10 kg force.

Belt deflection (Reference value):

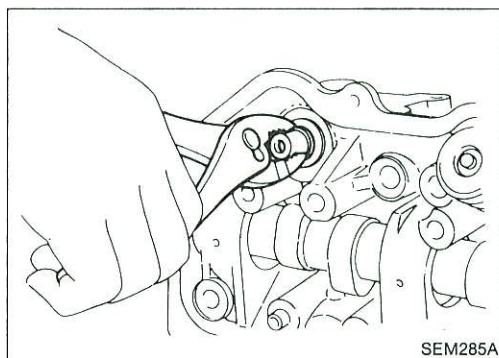
13 - 15 mm (0.51 - 0.59 in)/98 N (10 kg, 22 lb)

OIL SEAL REPLACEMENT

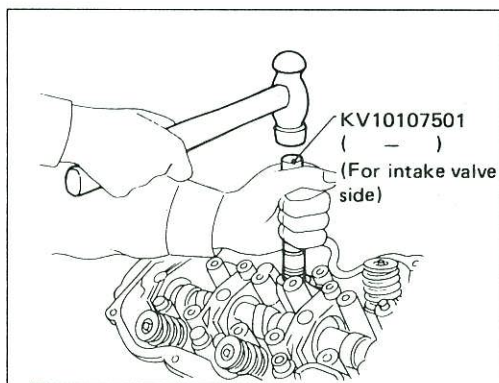


VALVE OIL SEAL

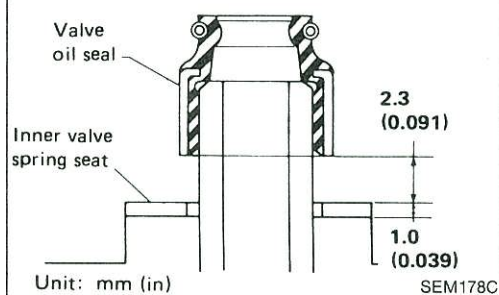
1. Remove rocker cover.
2. Remove rocker shaft assembly and valve lifters with valve lifter guide.
3. Remove valve springs and valve oil seal.
 - Piston concerned should be set at T.D.C. to prevent valve from falling.
 - When removing intake side valve oil seal, use Tool or suitable tool.



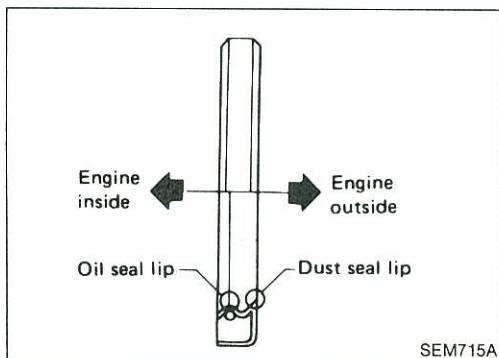
- When removing exhaust side valve oil seal, pull it out with suitable tool.



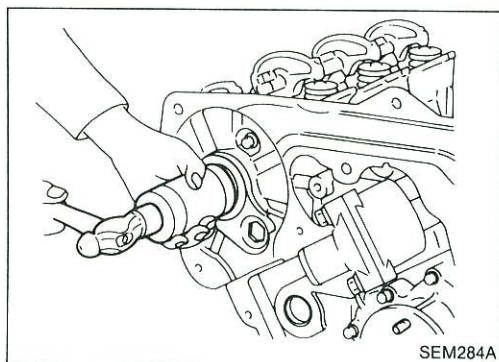
4. Apply engine oil to new valve oil seal and install it.
 - Before installing valve oil seal, install inner valve spring seat.
 - When installing intake side valve oil seal, use Tool.
 - When installing exhaust side valve oil seal, set it by hand.



OIL SEAL INSTALLING DIRECTION



OIL SEAL REPLACEMENT

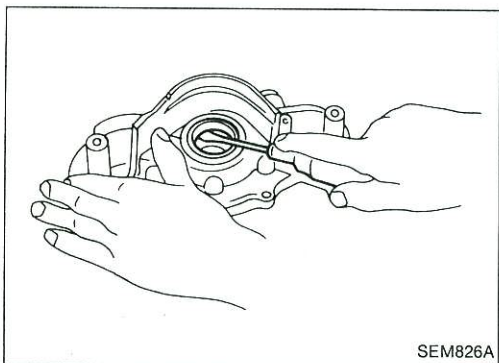


CAMSHAFT OIL SEAL

1. Remove timing belt.
2. Remove camshaft sprocket.
3. Remove camshaft.
4. Remove camshaft oil seal.

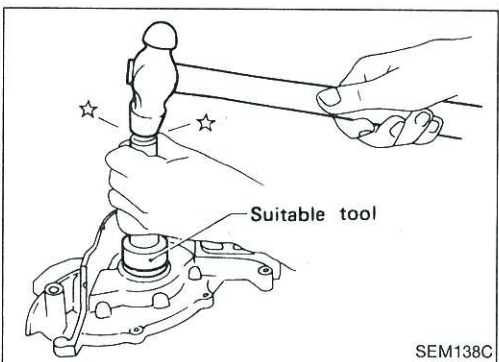
Be careful not to scratch camshaft.

5. Apply engine oil to new camshaft oil seal.

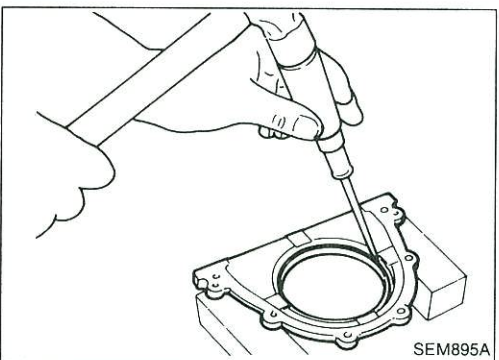


FRONT OIL SEAL

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

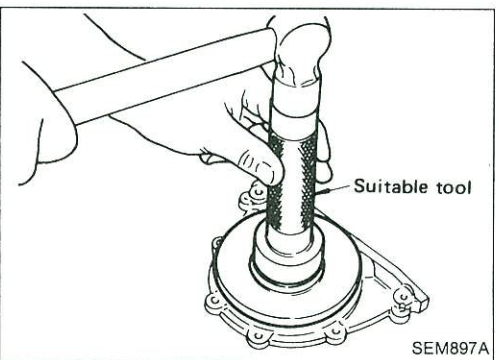


4. Apply engine oil to new oil seal and install it using suitable tool.



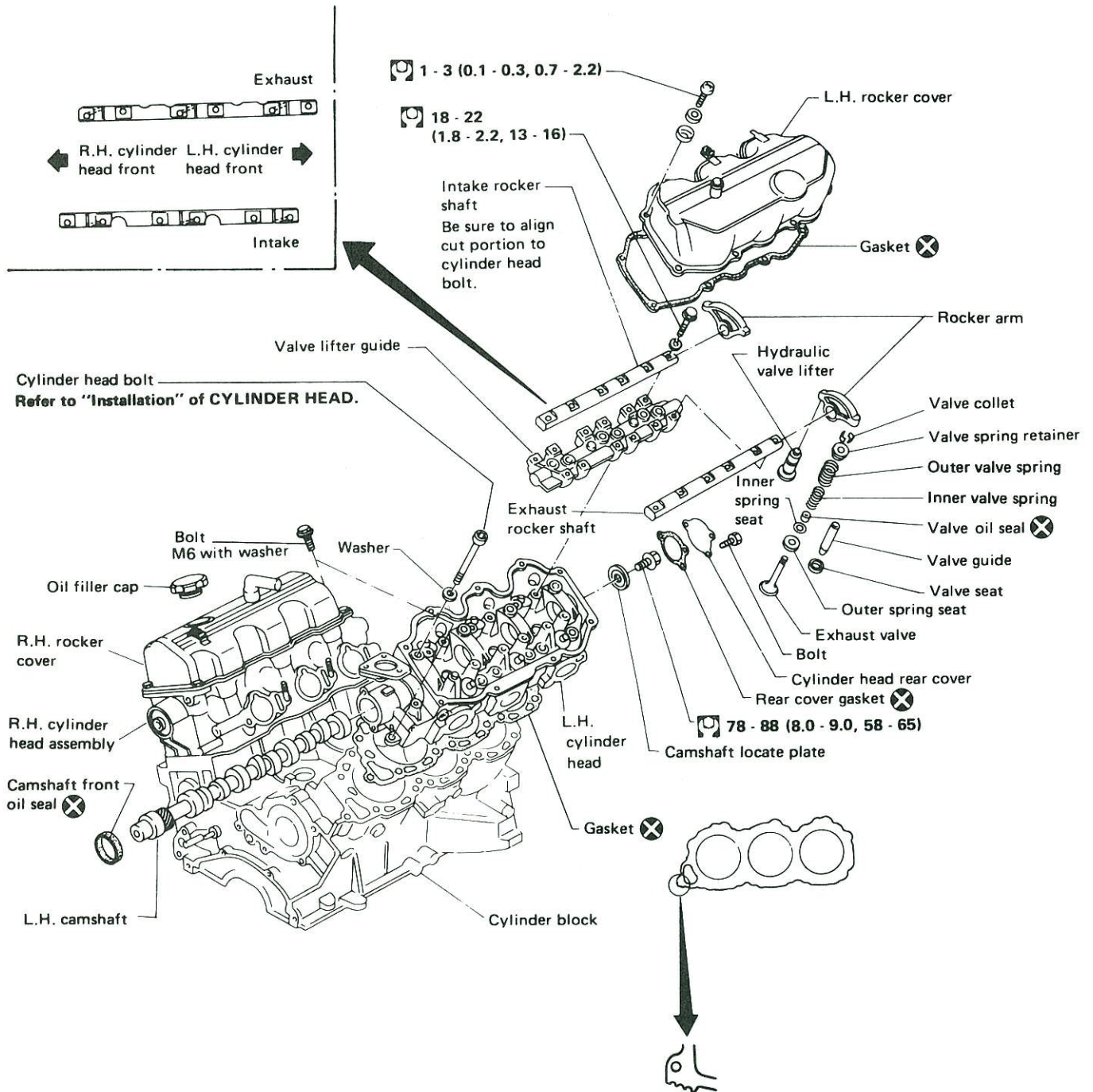
REAR OIL SEAL

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



4. Apply engine oil to new oil seal and install it using suitable tool.
5. Install rear oil seal retainer with a new gasket to cylinder block.

CYLINDER HEAD

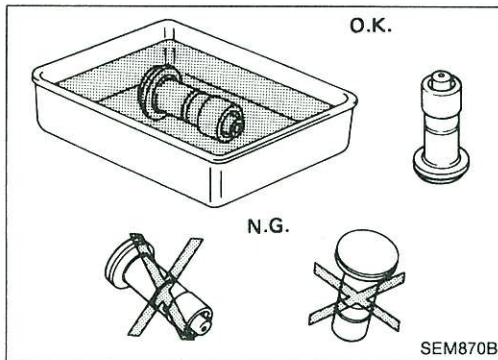


Ⓜ : N·m (kg·m, ft·lb)

CYLINDER HEAD

CAUTION:

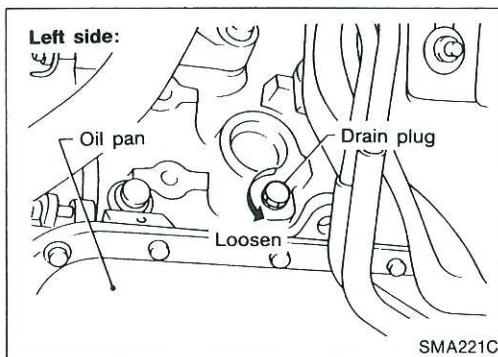
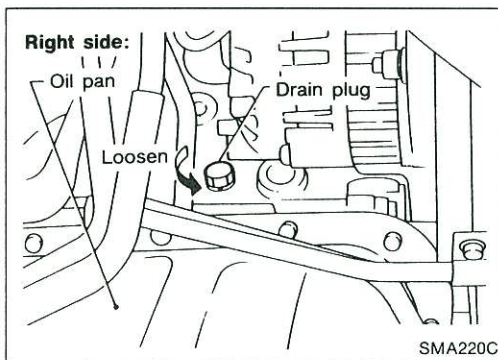
- When installing sliding parts such as rocker arms, camshaft and oil seal, be sure to apply new engine oil on their sliding surfaces.
- When tightening cylinder head bolts and rocker shaft bolts, apply new engine oil to thread portions and seat surfaces of bolts.



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

Removal

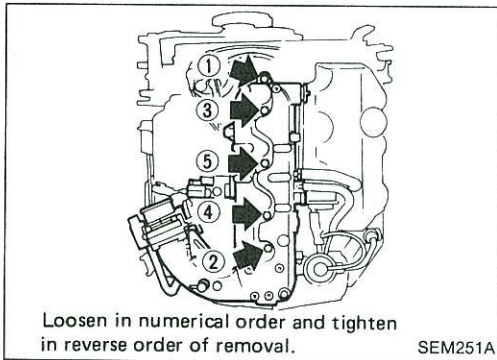
1. Release fuel pressure.
Refer to "Releasing Fuel Pressure" in section EF & EC.
2. Remove timing belt.
Refer to "TIMING BELT — Removal".
3. Drain coolant by removing drain plugs from both sides of cylinder block.



CYLINDER HEAD

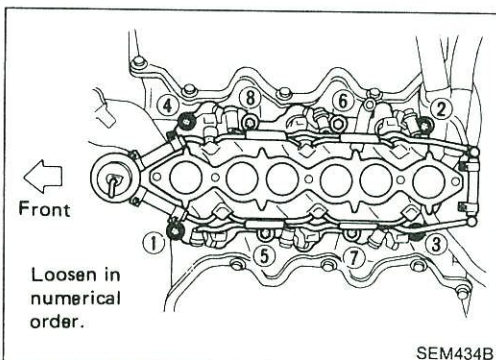
Removal (Cont'd)

4. Separate A.S.C.D. and accelerator control wire from intake manifold collector.



5. Remove intake manifold collector from engine. The following parts should be disconnected or removed.

- (1) Harness connectors for
 - A.A.C. valve
 - F.I.C.D. solenoid valve
 - Throttle valve switch
 - Throttle sensor
 - Pressure regulator control solenoid valve
 - Air regulator
 - E.G.R. control solenoid valve
 - Exhaust gas temperature sensor
 - Earth harness
- (2) P.C.V. hoses
- (3) Vacuum hoses for
 - Master brake cylinder
 - E.G.R. control solenoid valve
 - Fuel pressure regulator
 - Carbon canister
- (4) Air hoses from
 - Air duct
 - A.A.C. valve
 - Air regulator
- (5) Water hoses for
 - Throttle chamber
 - Air relief plug
- (6) Carbon canister purge hose
- (7) E.G.R. tube



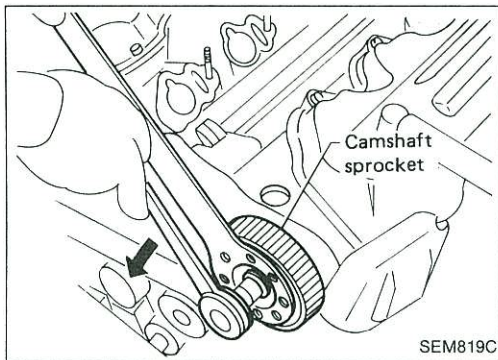
6. Remove intake manifold with fuel tube assembly. The following parts should be disconnected or removed.

- Vacuum hose for fuel pressure regulator
- Fuel feed and return hoses
- All injectors harness connectors
- Fuel temperature sensor harness connector

CYLINDER HEAD

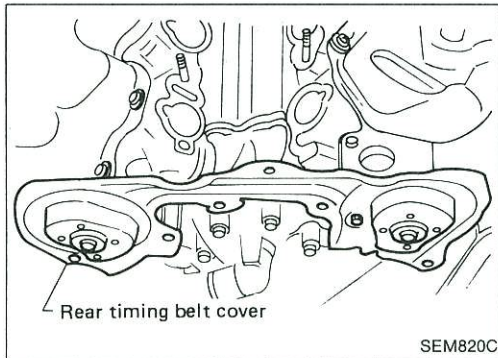
Removal (Cont'd)

7. Remove both camshaft sprockets.

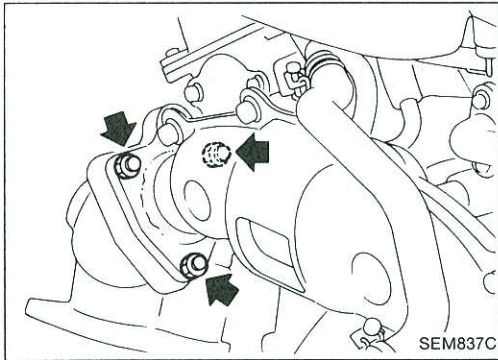


8. Remove rear timing belt cover.
9. Remove distributor and ignition wires.

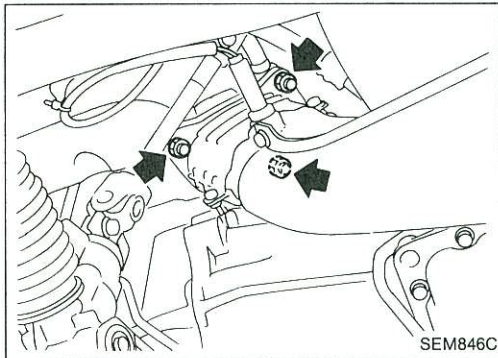
After pulling out distributor from cylinder head, do not rotate distributor rotor.



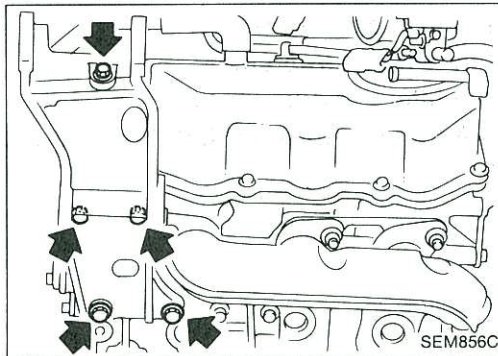
10. Remove R.H. exhaust manifold from L.H. exhaust manifold.



11. Remove front exhaust tube from exhaust manifold.



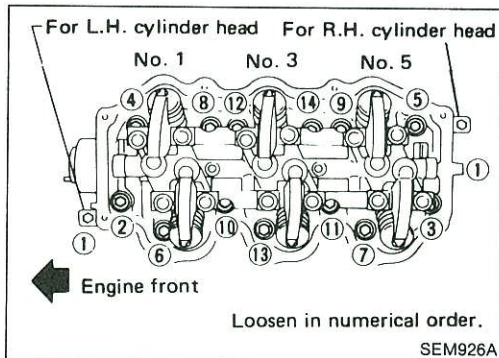
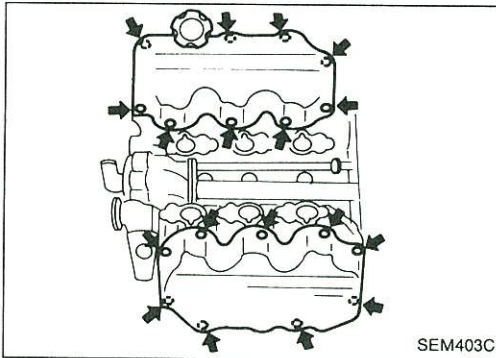
12. Remove compressor from bracket.
13. Remove compressor bracket.



CYLINDER HEAD

Removal (Cont'd)

14. Remove both rocker covers.

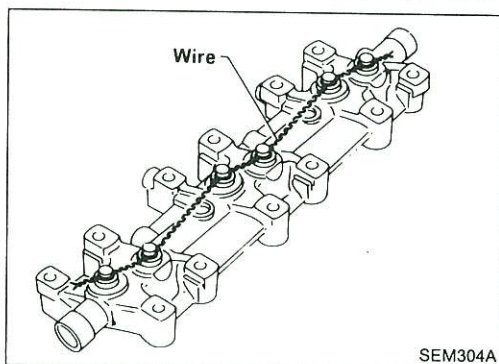
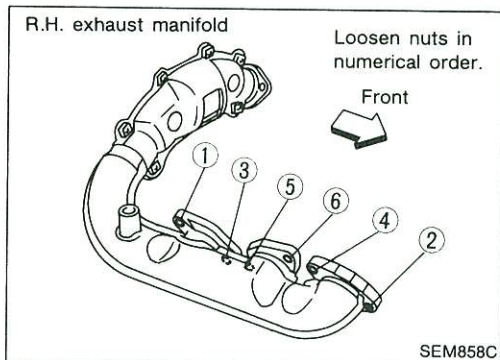
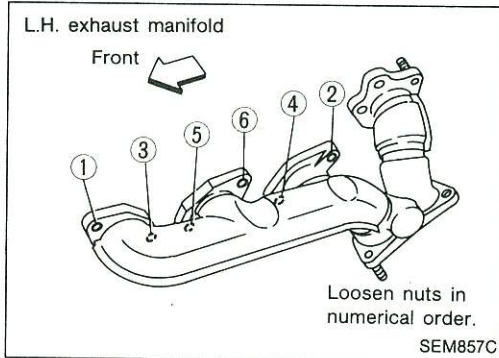


15. Remove cylinder head with exhaust manifold.

- **Head warpage or cracking could result from removing in incorrect order.**
- **Cylinder head bolts should be loosened in two or three steps.**

Disassembly

1. Remove exhaust manifolds from cylinder head.



2. Remove rocker shafts with rocker arms.

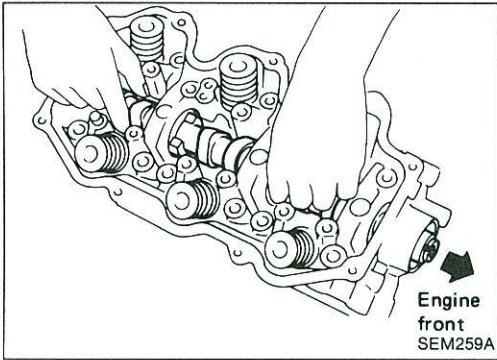
Bolts should be loosened in two or three steps.

3. Remove hydraulic valve lifters and lifter guide.

- **Hold hydraulic valve lifters with wire so that they will not drop from lifter guide.**

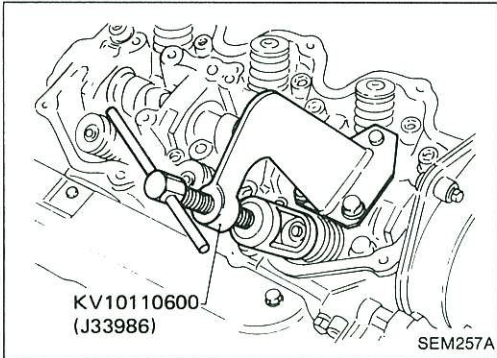
CYLINDER HEAD

Disassembly (Cont'd)



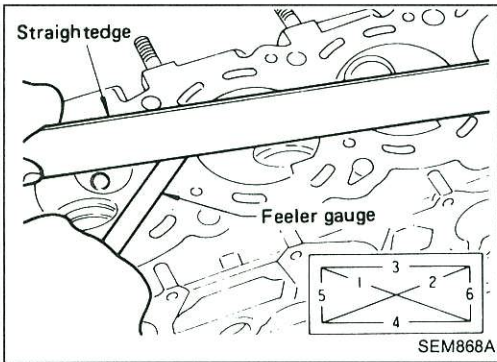
4. Remove oil seal and camshaft.

- Before removing camshaft, measure camshaft end play.



5. Remove valve components with Tool.

6. Remove valve oil seals with Tool or suitable tool.



Inspection

CYLINDER HEAD DISTORTION

Head surface flatness:

Less than 0.1 mm (0.004 in)

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

Resurfacing limit:

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

Amount of cylinder head resurfacing is "A".

Amount of cylinder block resurfacing is "B".

The maximum limit is as follows:

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

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

Nominal cylinder head height:

106.8 - 107.2 mm (4.205 - 4.220 in)

CAMSHAFT VISUAL CHECK

Check camshaft for scratches, seizure and wear.

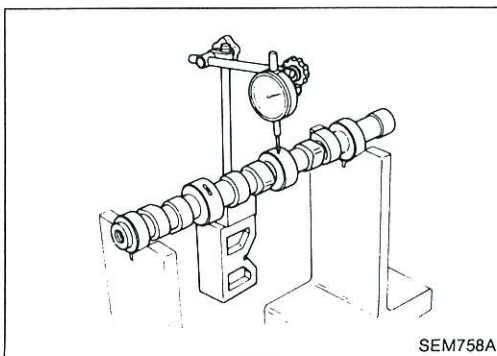
CAMSHAFT RUNOUT

1. Measure camshaft runout at the center journal.

Runout (Total indicator reading):

Limit 0.1 mm (0.004 in)

2. If it exceeds the limit, replace camshaft.

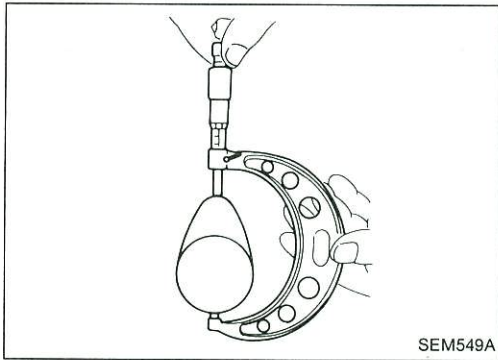


CYLINDER HEAD

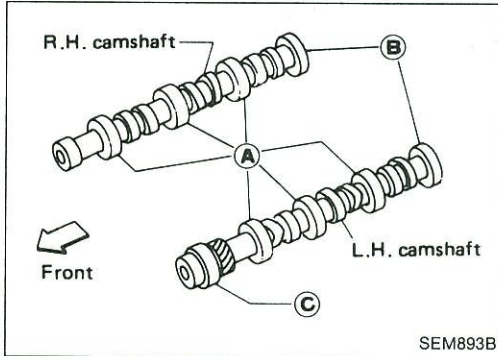
Inspection (Cont'd)

CAMSHAFT CAM HEIGHT

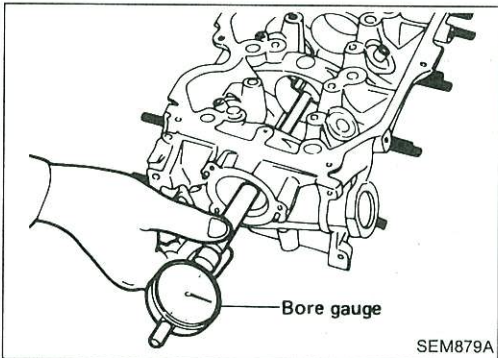
1. Measure camshaft cam height.
Standard cam height:
39.537 - 39.727 mm (1.5566 - 1.5641 in)
Cam wear limit:
0.15 mm (0.0059 in)
2. If wear is beyond the limit, replace camshaft.



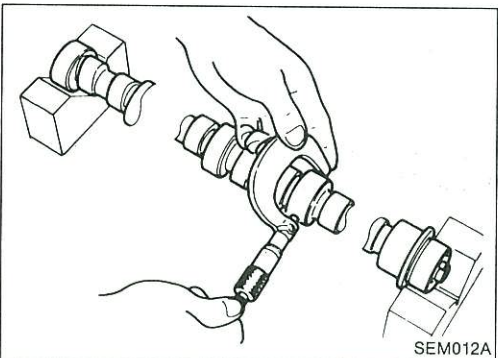
CAMSHAFT JOURNAL CLEARANCE



1. Measure inner diameter of camshaft bearing.
Standard inner diameter:
A 47.000 - 47.025 mm (1.8504 - 1.8514 in)
B 42.500 - 42.525 mm (1.6732 - 1.6742 in)
C 48.000 - 48.025 mm (1.8898 - 1.8907 in)

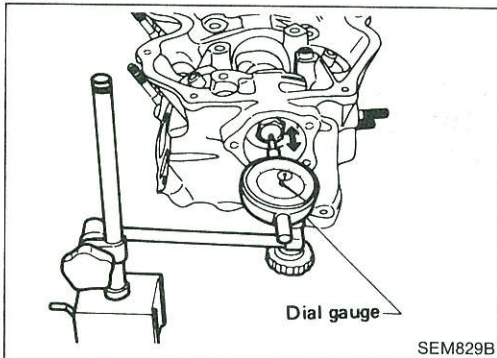


2. Measure outer diameter of camshaft journal.
Standard outer diameter:
A 46.920 - 46.940 mm (1.8472 - 1.8480 in)
B 42.420 - 42.440 mm (1.6701 - 1.6709 in)
C 47.920 - 47.940 mm (1.8866 - 1.8874 in)
3. If clearance exceeds the limit, replace camshaft and/or cylinder head.
Camshaft journal clearance limit:
0.15 mm (0.0059 in)



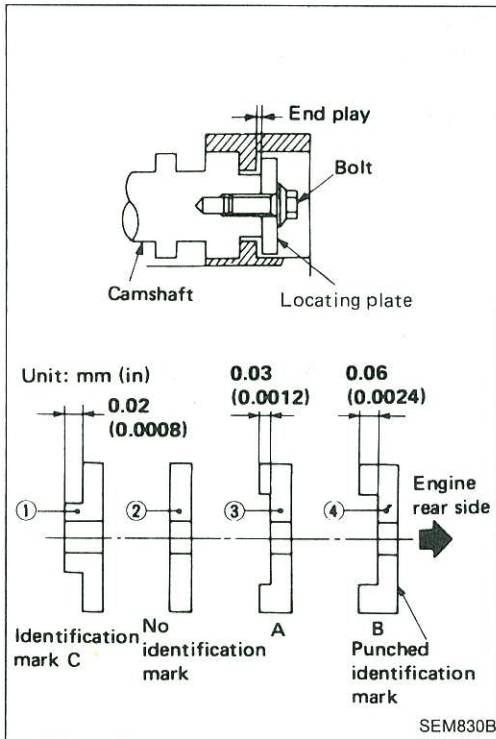
CAMSHAFT END PLAY

1. Install camshaft and locate plate in cylinder head.
2. Measure camshaft end play.
Camshaft end play:
Standard 0.03 - 0.06 mm (0.0012 - 0.0024 in)



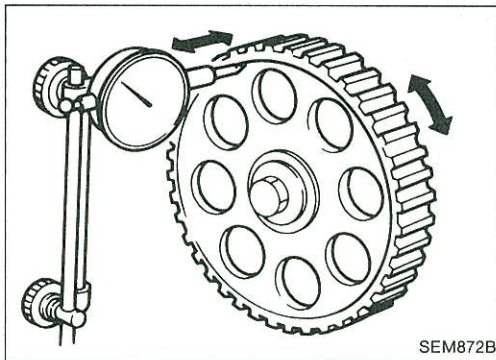
CYLINDER HEAD

Inspection (Cont'd)



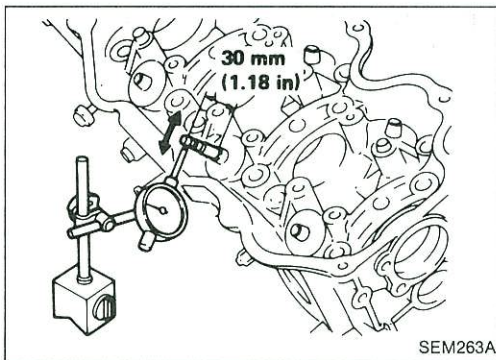
3. If it is out of the specified range, select thickness of camshaft locate plate to obtain standard specified end play.
Example:

When camshaft end play is 0.08 mm (0.0031 in) with camshaft locating plate ②, replace camshaft locating plate ② with camshaft locating plate ③ to set the end play at 0.05 mm (0.0020 in).



CAMSHAFT SPROCKET RUNOUT

1. Install sprocket on camshaft.
2. Measure camshaft sprocket runout.
Runout (Total indicator reading):
Limit 0.1 mm (0.004 in)
3. If it exceeds the limit, replace camshaft sprocket.



VALVE GUIDE CLEARANCE

1. Measure valve deflection in a right-angled direction with camshaft. (Valve and valve guide mostly wear in this direction.)
Valve deflection limit (Dial gauge reading):
0.20 mm (0.0079 in)

CYLINDER HEAD

Inspection (Cont'd)

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

Valve to valve guide clearance:

Intake

0.020 - 0.053 mm (0.0008 - 0.0021 in)

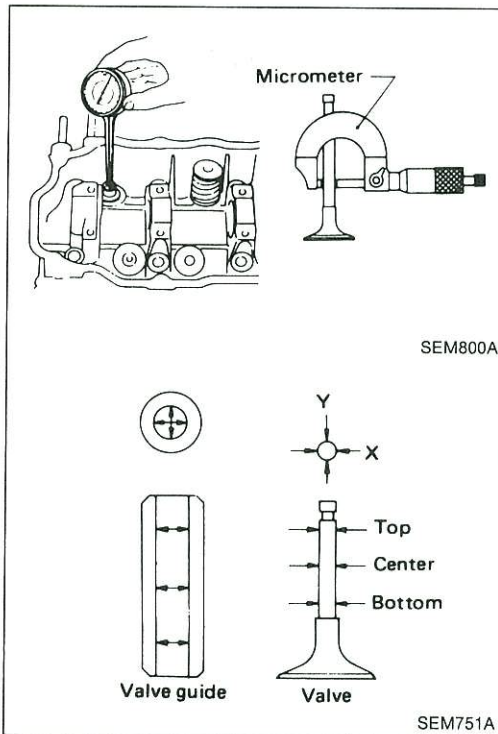
Exhaust

0.040 - 0.073 mm (0.0016 - 0.0029 in)

Limit

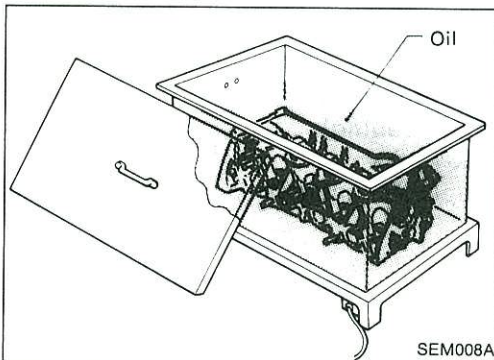
0.10 mm (0.0039 in)

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

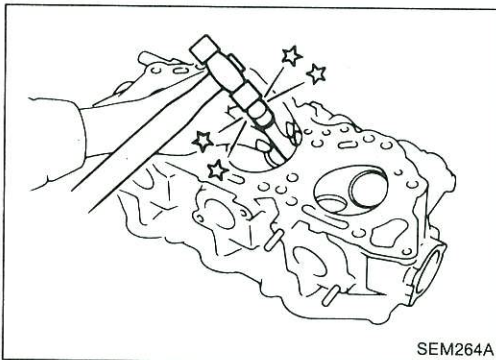


VALVE GUIDE REPLACEMENT

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



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



3. Ream cylinder head valve guide hole.

Valve guide hole diameter

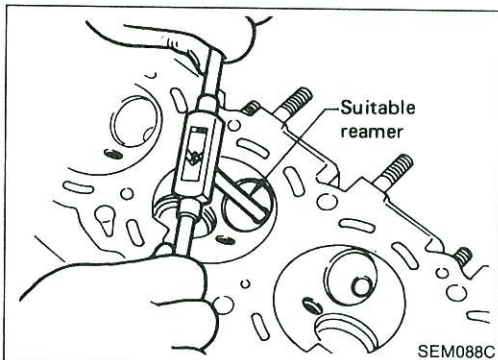
(for service parts):

Intake

11.175 - 11.196 mm (0.4400 - 0.4408 in)

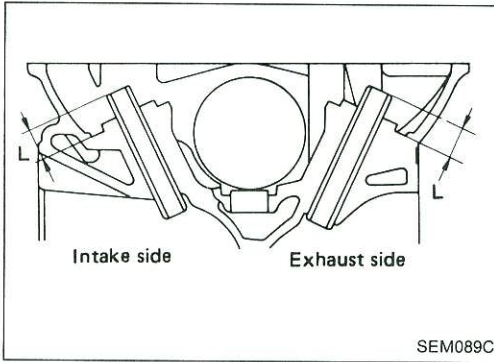
Exhaust

12.175 - 12.196 mm (0.4793 - 0.4802 in)



CYLINDER HEAD

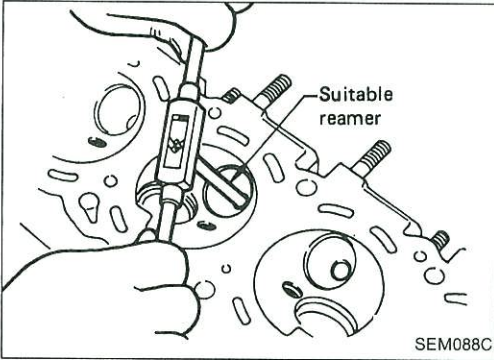
Inspection (Cont'd)



- Heat cylinder head to 150 to 160°C (302 to 320°F) and press service valve guide onto cylinder head.

Projection "L":

13.2 - 13.4 mm (0.520 - 0.528 in)



- Ream valve guide.

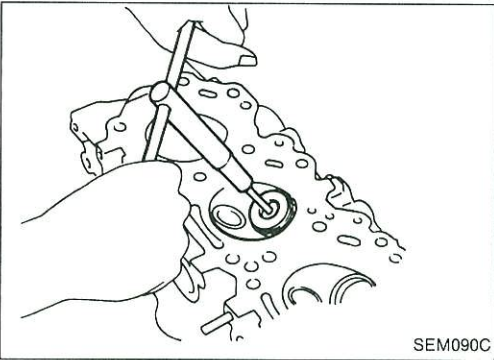
Finished size:

Intake

7.000 - 7.018 mm (0.2756 - 0.2763 in)

Exhaust

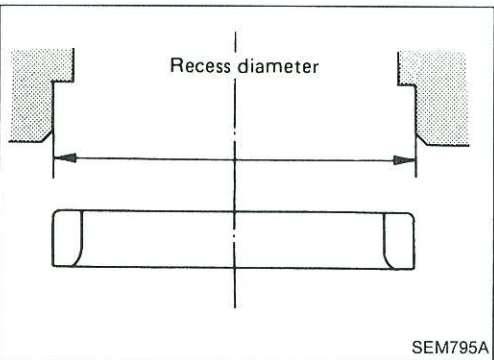
8.000 - 8.018 mm (0.3150 - 0.3157 in)



VALVE SEATS

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

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



REPLACING VALVE SEAT FOR SERVICE PARTS

- 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.
- Ream cylinder head recess.

Reaming bore for service valve seat

Oversize [0.5 mm (0.020 in)]:

Intake

44.500 - 44.516 mm (1.7520 - 1.7526 in)

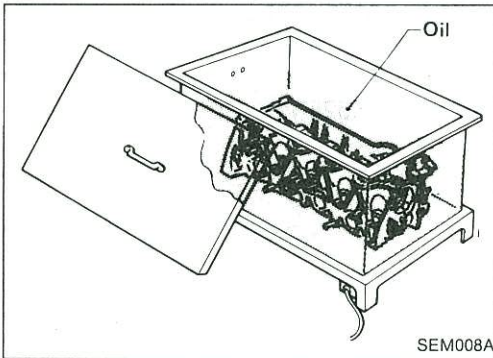
Exhaust

37.500 - 37.516 mm (1.4764 - 1.4770 in)

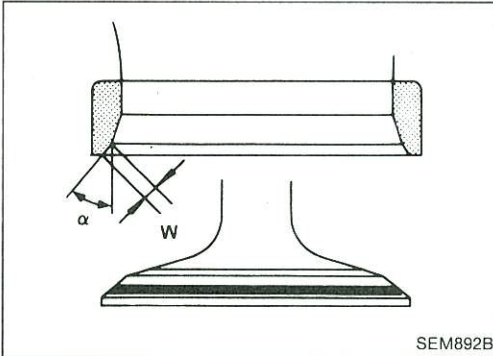
Reaming should be done in circles concentric to the valve guide center so that valve seat will have the correct fit.

CYLINDER HEAD

Inspection (Cont'd)

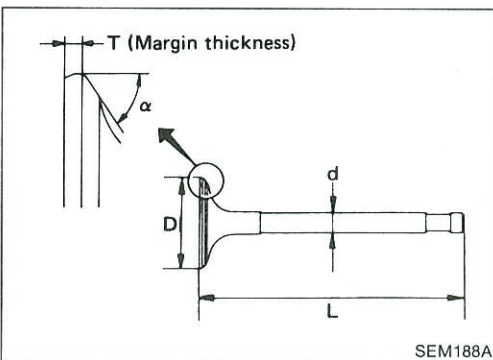


3. Heat cylinder head to 150 to 160°C (302 to 320°F).
4. Press fit valve seat until it seats on the bottom.



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

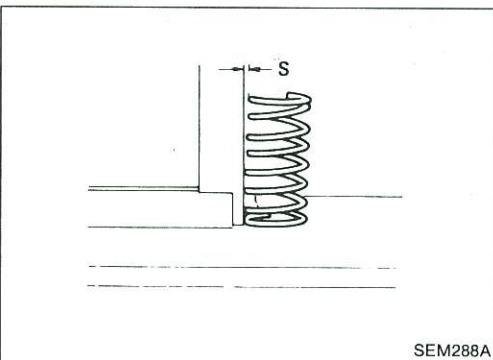
		Intake	Exhaust
Seat face angle "α"	degree	45	45
Contacting width "W"	mm (in)	1.75 (0.0689)	1.7 (0.067)



VALVE DIMENSIONS

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

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



VALVE SPRING

Squareness

1. Measure "S" dimension.

Out-of-square:

Outer

Less than 2.2 mm (0.087 in)

Inner

Less than 1.9 mm (0.075 in)

2. If it exceeds the limit, replace spring.

CYLINDER HEAD

Inspection (Cont'd)

Pressure

Check valve spring pressure.

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

Standard

Outer

250.1 (25.5, 56.2) at 40.0 (1.575)

Inner

255.0 (26.0, 57.3) at 25.0 (0.984)

Limit

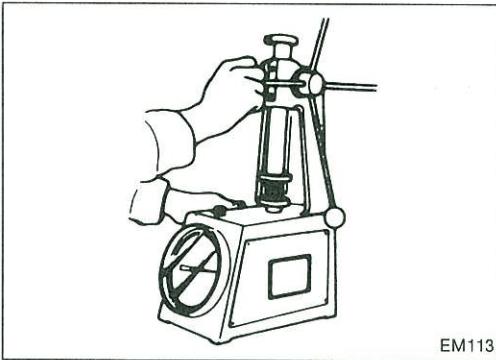
Outer

More than 228.5 (23.3, 51.4) at 25.0 (0.984)

Inner

More than 225.6 (23.0, 50.7) at 25.0 (0.984)

If it exceeds the limit, replace spring.



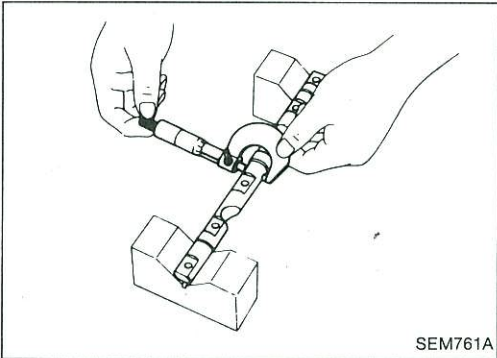
EM113

ROCKER SHAFT AND ROCKER ARM

1. Check rocker shafts for scratches, seizure and wear.
2. Check outer diameter of rocker shaft.

Diameter:

17.979 - 18.000 mm (0.7078 - 0.7087 in)



SEM761A

3. Check inner diameter of rocker arm.

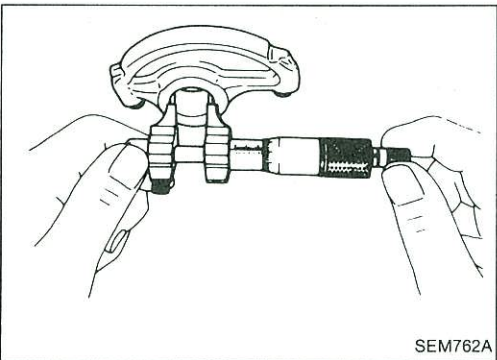
Diameter:

18.007 - 18.028 mm (0.7089 - 0.7098 in)

Rocker arm to shaft clearance:

0.007 - 0.049 mm (0.0003 - 0.0019 in)

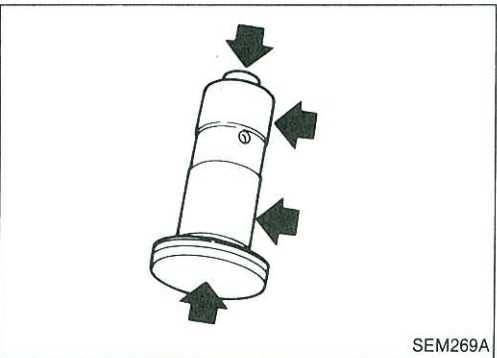
- Keep rocker arm with hydraulic valve lifter standing to prevent air from entering hydraulic valve lifter when checking.



SEM762A

HYDRAULIC VALVE LIFTER

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



SEM269A

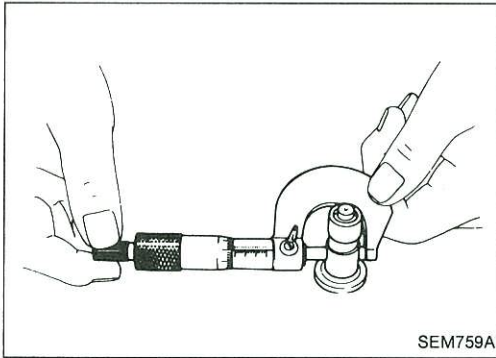
CYLINDER HEAD

Inspection (Cont'd)

2. Check diameter of valve lifter.

Outer diameter:

15.947 - 15.957 mm (0.6278 - 0.6282 in)



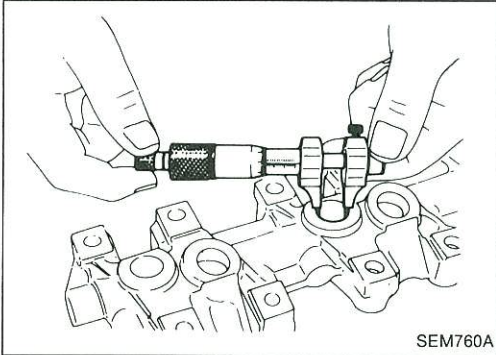
3. Check valve lifter guide inner diameter.

Inner diameter:

16.000 - 16.013 mm (0.6299 - 0.6304 in)

Standard clearance between valve lifter and lifter guide:

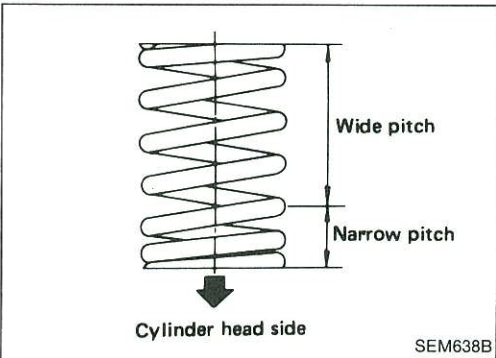
0.043 - 0.066 mm (0.0017 - 0.0026 in)



Assembly

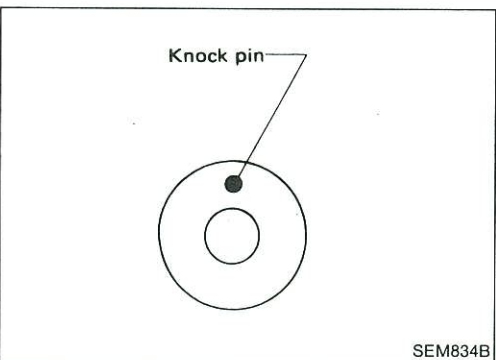
1. Install valve component parts.

- **Always use new valve oil seal. Refer to OIL SEAL REPLACEMENT.**
- **Before installing valve oil seal, install inner 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.**



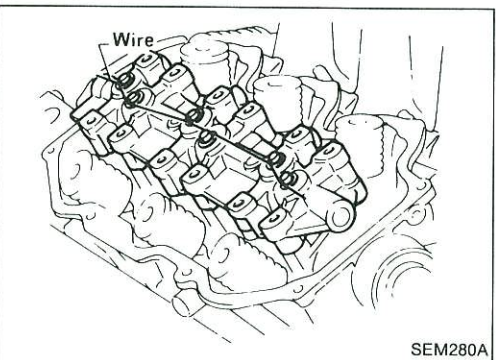
2. Install camshafts, locate plates and cylinder head rear covers.

- **Set knock pin of camshaft at the top.**



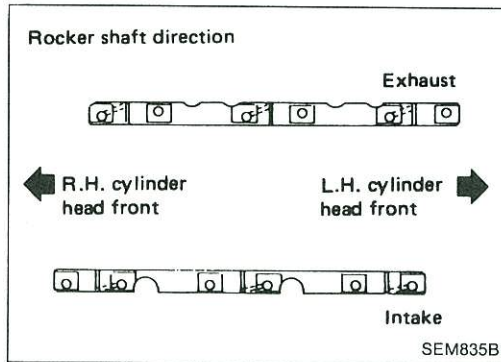
3. Install valve lifters into valve lifter guide.

- **Assemble valve lifters to their original position and hold all valve lifters with wire to prevent lifters from falling off.**
- **After installing them, remove the wire.**

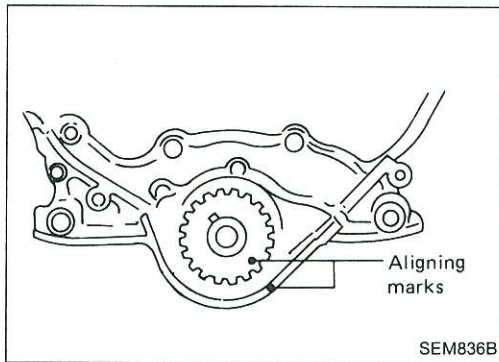


CYLINDER HEAD

Assembly (Cont'd)

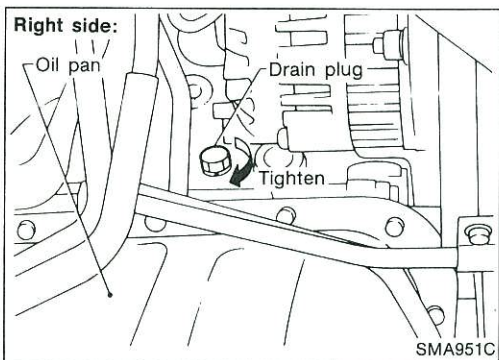


4. Install rocker shafts with rocker arms.
 - **Tighten bolts gradually in two or three stages.**
 - **Before tightening, be sure to set camshaft the lobe at the position where lobe is not lifted.**
- a. Set No. 1 piston at T.D.C. on its compression stroke and tighten rocker shaft bolts for No. 2, No. 4 and No. 6 cylinders.
- b. Set No. 4 piston at T.D.C. on its compression stroke and tighten rocker shaft bolts for No. 1, No. 3 and No. 5 cylinders.
5. Install exhaust manifold to cylinder head in reverse order of removal.

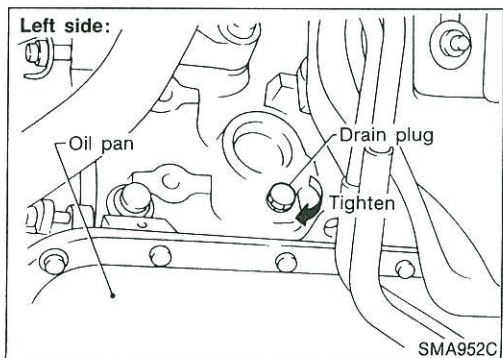


Installation

1. Set No. 1 piston at T.D.C. on its compression stroke as follows:
 - a. Align crankshaft sprocket aligning mark with mark on oil pump body.
 - b. Confirm that knock pin on camshaft is set at the top.

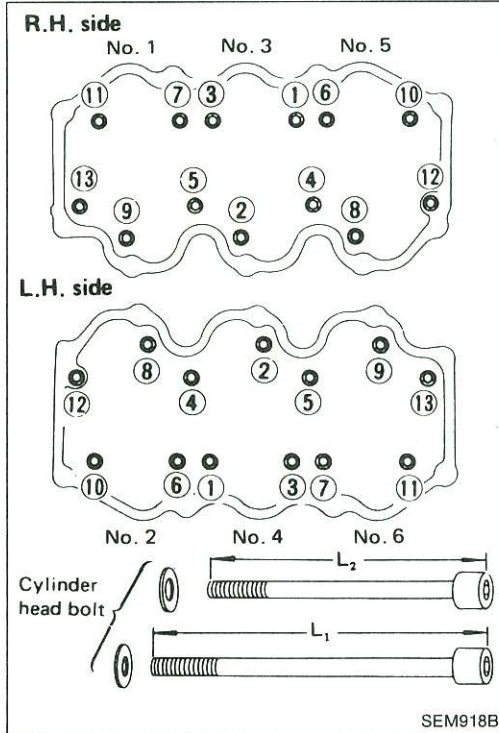
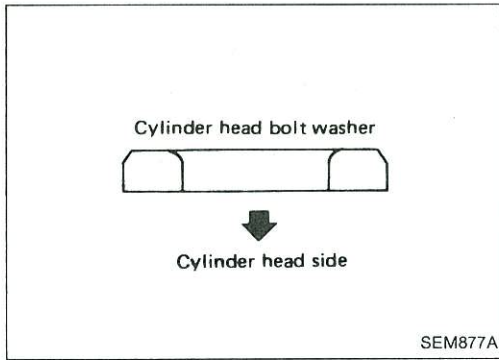


2. Install both drain plugs.
 - **Apply sealant to drain plug threads.**
3. Install exhaust manifolds to cylinder head in reverse order of removal.



CYLINDER HEAD

Installation (Cont'd)



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

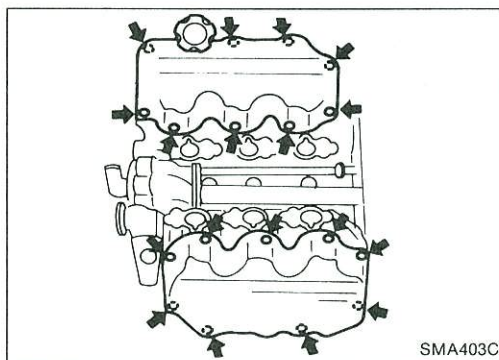
5. Tighten cylinder head bolts in numerical order using ST10120000 (J24239-01).

- **Tightening procedure:**

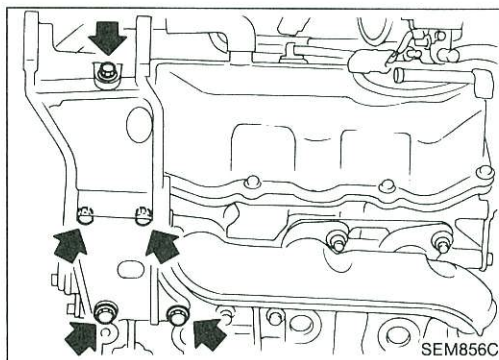
- (1) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
- (2) Tighten all bolts to 59 N·m (6.0 kg-m, 43 ft-lb).
- (3) Loosen all bolts completely.
- (4) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
- (5) Turn all bolts 60 to 65 degrees clockwise.

If an angle wrench is not available, tighten all bolts to 54 to 64 N·m (5.5 to 6.5 kg-m, 40 to 47 ft-lb).

- Bolts for ④, ⑤, ⑫ and ⑬ are longer than the others.
 L₁: 127 mm (5.00 in) for ④, ⑤, ⑫ and ⑬
 L₂: 106 mm (4.17 in) for others



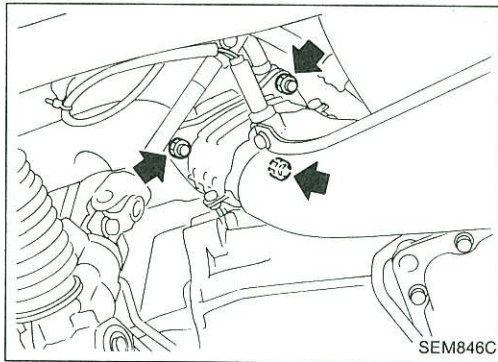
6. Install both rocker covers.



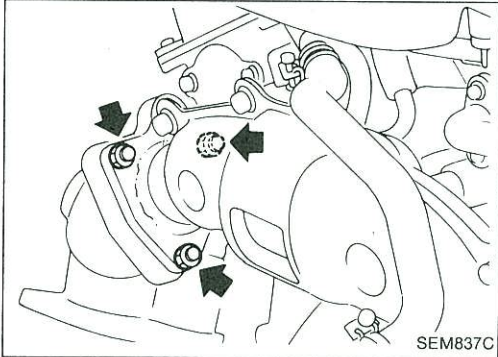
7. Install compressor bracket and compressor.

CYLINDER HEAD

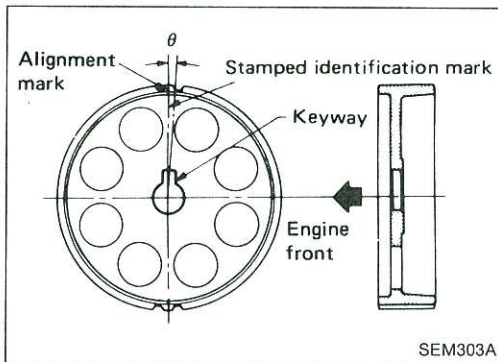
Installation (Cont'd)



8. Install front exhaust tube to exhaust manifold.



9. Install R.H. exhaust manifold to L.H. exhaust manifold.



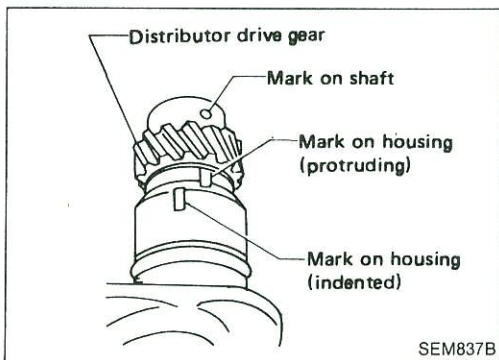
10. Install rear belt cover and camshaft sprocket.

- **R.H. camshaft sprocket and L.H. camshaft sprocket are different parts. Be sure to install them in the correct location.**

	Identification mark	θ
R.H. camshaft sprocket	R3	$0^{\circ}53'$
L.H. camshaft sprocket	L3	$-3^{\circ}27'$

11. Install timing belt and adjust belt tension.

Refer to "TIMING BELT — Installation".

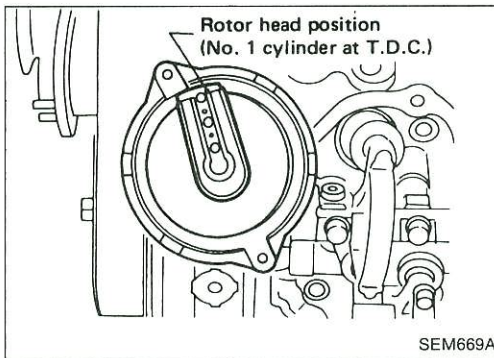


12. Install distributor.

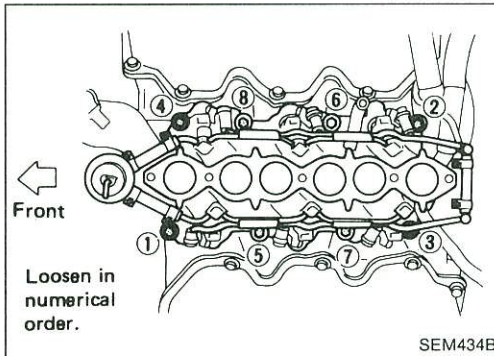
(1) Align mark on shaft with protruding mark on housing.

CYLINDER HEAD

Installation (Cont'd)

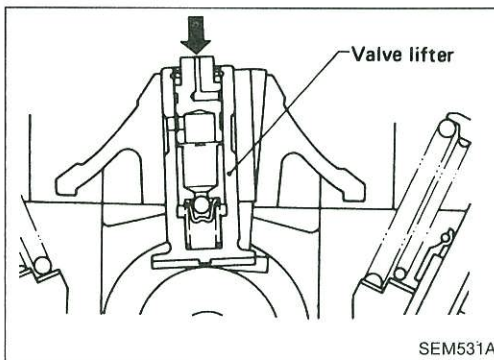


- (2) After installing, confirm that distributor rotor head is set as shown in figure.



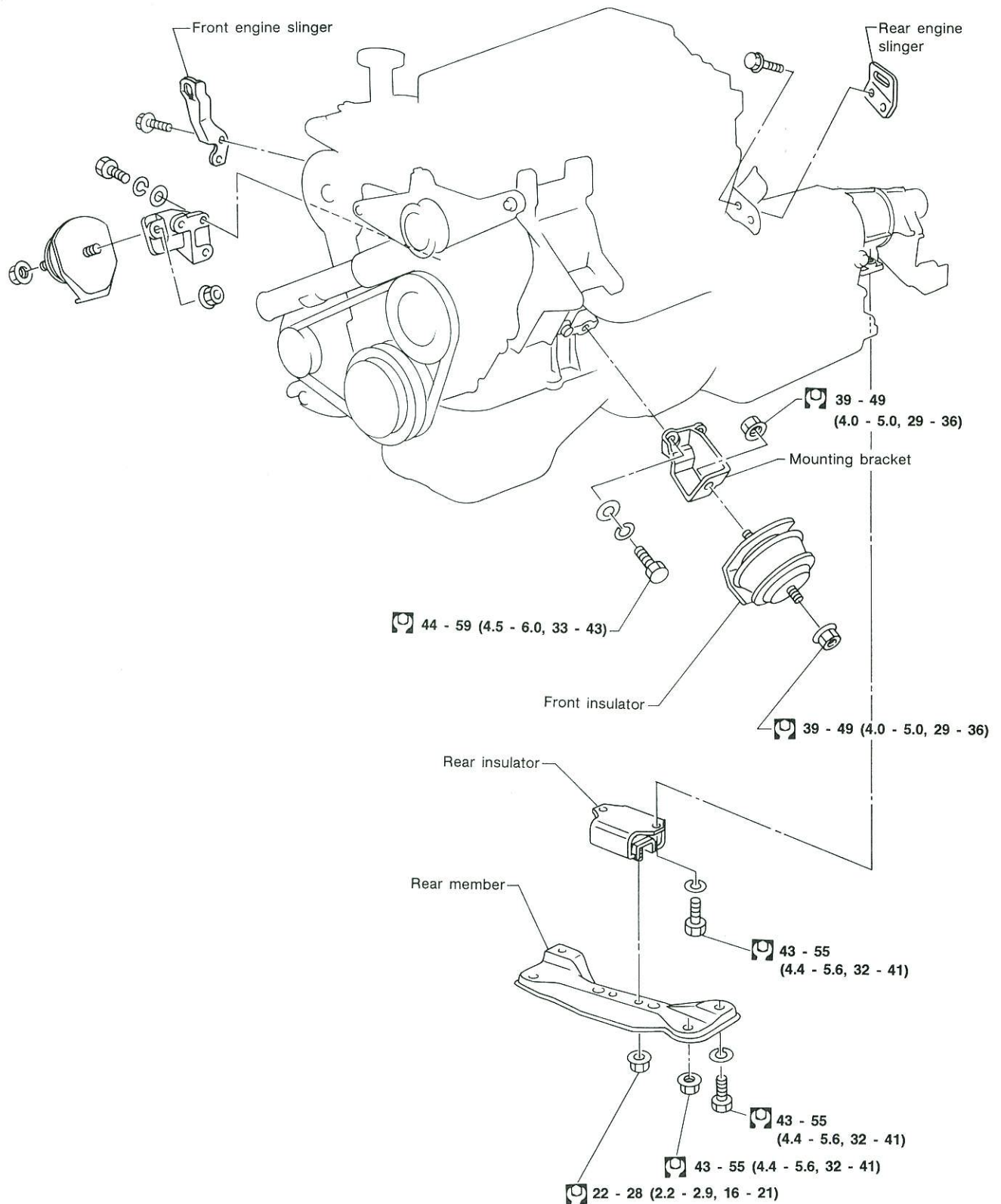
13. Install intake manifold with fuel tube assembly.
Install all parts which were removed in step 6 under "CYLINDER HEAD — Removal". (See page EM-24.)

14. Install intake manifold collector.
Install all parts which were removed in step 5 under "CYLINDER HEAD — Removal". (See page EM-24.)
15. Install A.S.C.D. and accelerator control wire.



16. Check hydraulic valve lifter.
- a. Push plunger forcefully with your finger.
 - **Be sure to check it with rocker arm in its free position (not on the lobe).**
 - b. If valve lifter moves more than 1 mm (0.04 in), air may be inside it.
 - c. Bleed air off by running engine at 1,000 rpm under no load for about 10 minutes.
 - d. If hydraulic valve lifters are still noisy, replace them and bleed air off again in the same manner as in step 16 (c).

ENGINE REMOVAL



: N·m (kg-m, ft-lb)

SEM859C

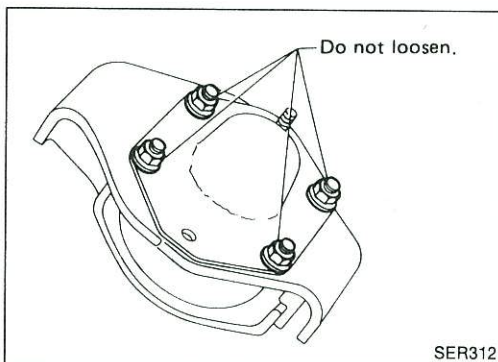
ENGINE REMOVAL

WARNING:

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

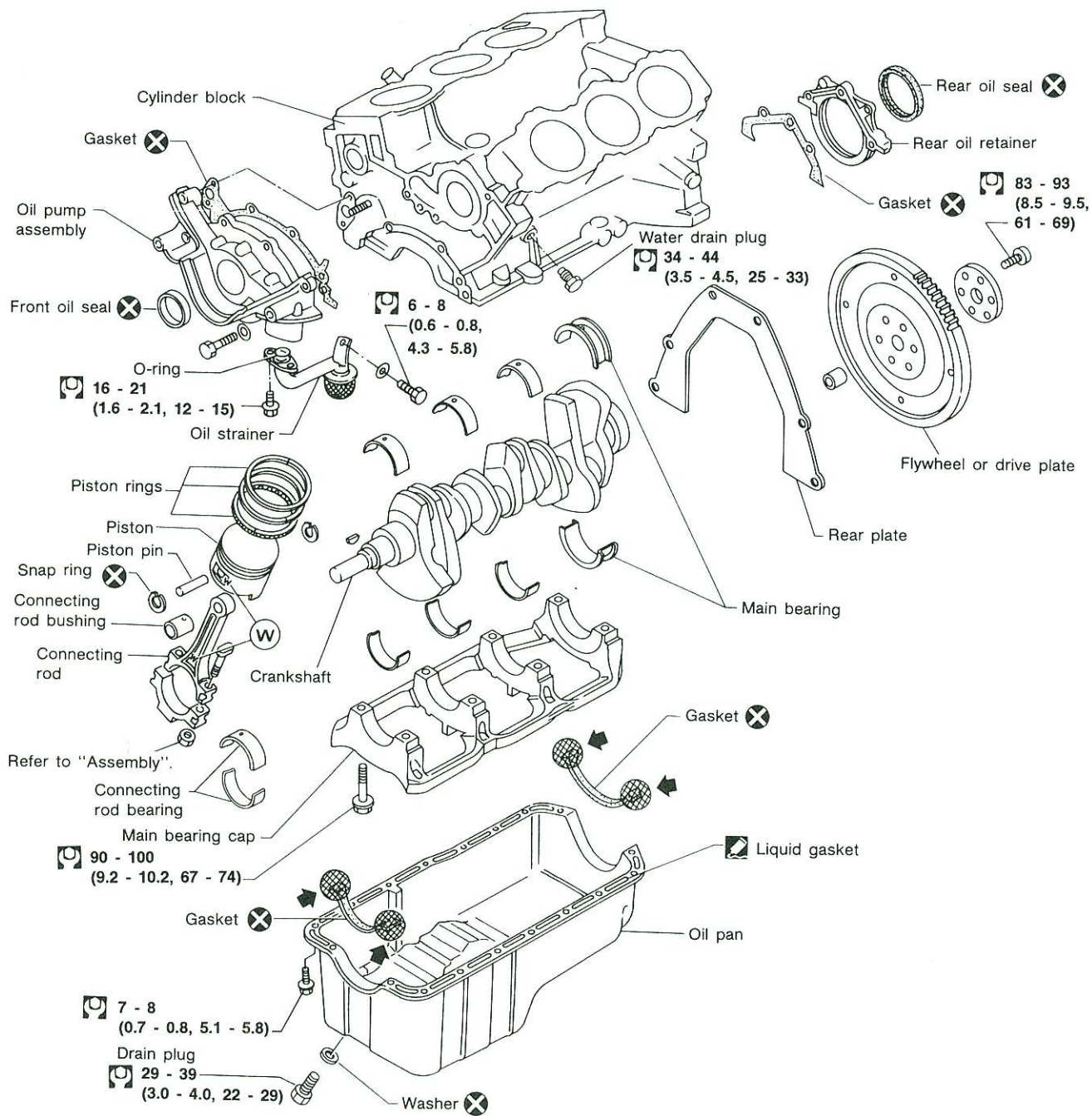


- Do not loosen front engine mounting insulator cover securing nuts.
When cover is removed, damper oil flows out and mounting insulator will not function.
For tightening torque, refer to sections AT.
Sealant should be applied between engine and transmission.

Removal

1. Remove engine undercover and hood.
2. Drain engine coolant.
3. Remove vacuum hoses, fuel tubes, wires, harnesses and connectors.
4. Remove radiator with shroud and cooling fan.
5. Remove drive belts.
6. Remove power steering oil pump and air conditioner compressor.
7. Remove front exhaust tube.
8. Install engine slingers.
9. Hoist engine with engine slingers and remove engine mounting bolts from both sides.
10. Remove engine from vehicle.

CYLINDER BLOCK



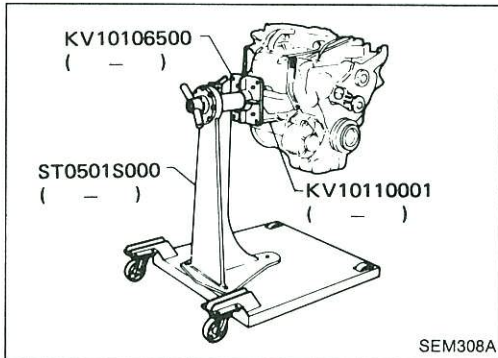
◀ : Apply sealant.

◻ : N·m (kg-m, ft-lb)

CYLINDER BLOCK

CAUTION:

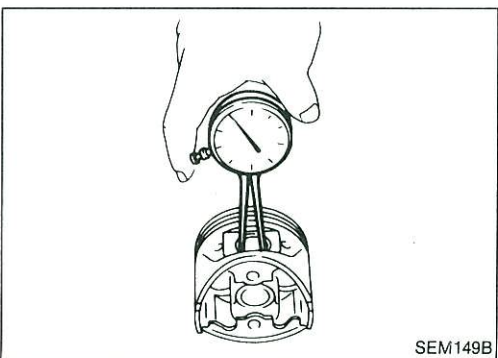
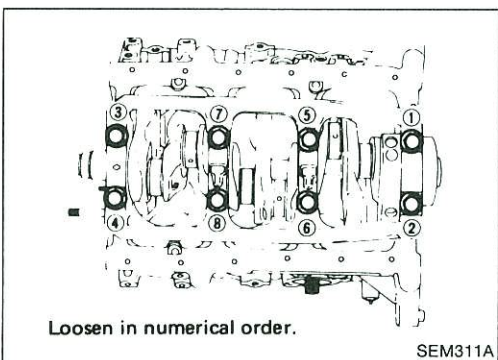
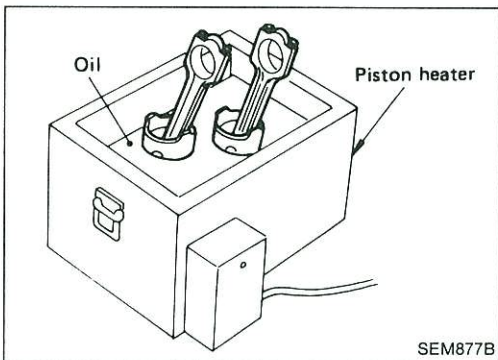
- When installing sliding parts such as bearings and pistons, be sure to apply engine oil on the sliding surfaces.
- Place removed parts such as bearings and bearing caps in their proper order and direction.
- When tightening connecting rod bolts and main bearing cap bolts, apply engine oil to thread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



Disassembly

PISTON AND CRANKSHAFT

1. Place engine on a work stand.
 2. Drain coolant and oil.
 3. Remove oil pan and oil pump.
 4. Remove timing belt.
 5. Remove water pump.
 6. Remove cylinder head.
7. Remove pistons with connecting rods.
 - When disassembling piston and connecting rod, remove snap ring first, then heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature.
 8. Remove bearing cap and crankshaft.
 - Before removing bearing cap, measure crankshaft end play.
 - Bolts should be loosened in two or three steps.



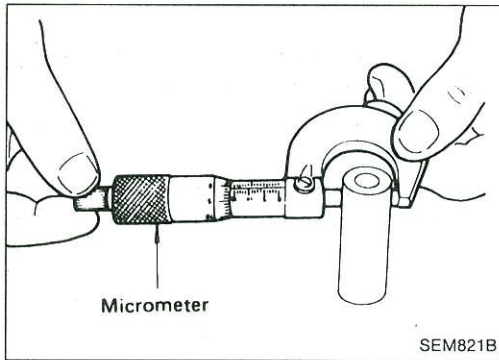
Inspection

PISTON AND PISTON PIN CLEARANCE

1. Measure inner diameter of piston pin hole "dp".
Standard diameter "dp":
20.969 - 20.981 mm (0.8255 - 0.8260 in)

CYLINDER BLOCK

Inspection (Cont'd)



2. Measure outer diameter of piston pin "Dp".

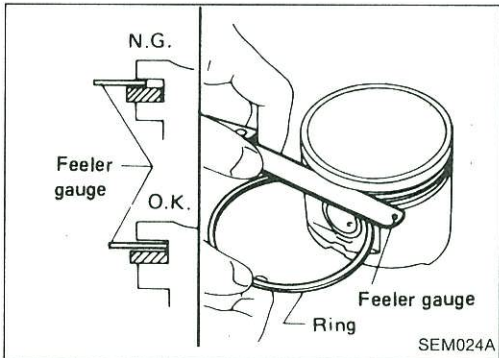
Standard diameter "Dp":

20.971 - 20.983 mm (0.8256 - 0.8261 in)

3. Calculate piston pin clearance.

dp - Dp = 0 to -0.004 mm (0 to -0.0002 in)

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



PISTON RING SIDE CLEARANCE

Side clearance:

Top ring

0.040 - 0.073 mm (0.0016 - 0.0029 in)

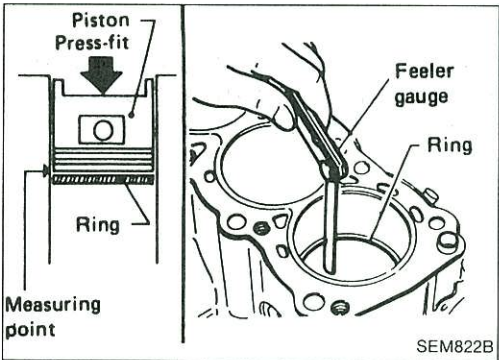
2nd ring

0.030 - 0.063 mm (0.0012 - 0.0025 in)

Max. limit of side clearance:

0.1 mm (0.004 in)

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



PISTON RING END GAP

End gap:

Top ring

0.21 - 0.44 mm (0.0083 - 0.0173 in)

2nd ring

0.18 - 0.44 mm (0.0071 - 0.0173 in)

Oil ring

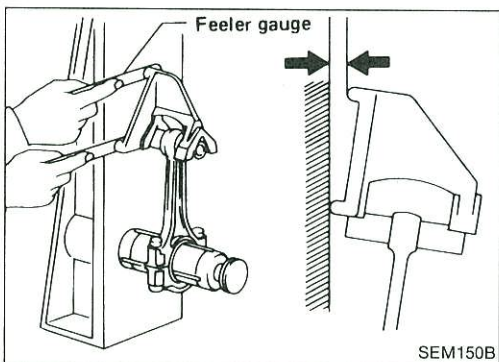
0.20 - 0.76 mm (0.0079 - 0.0299 in)

Max. limit of ring gap:

1.0 mm (0.039 in)

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

Refer to S.D.S.



CONNECTING ROD BEND AND TORSION

Bend:

Limit 0.15 mm (0.0059 in)

per 100 mm (3.94 in) length

Torsion:

Limit 0.30 mm (0.0118 in)

per 100 mm (3.94 in) length

If it exceeds the limit, replace connecting rod assembly.

CYLINDER BLOCK

Inspection (Cont'd)

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".

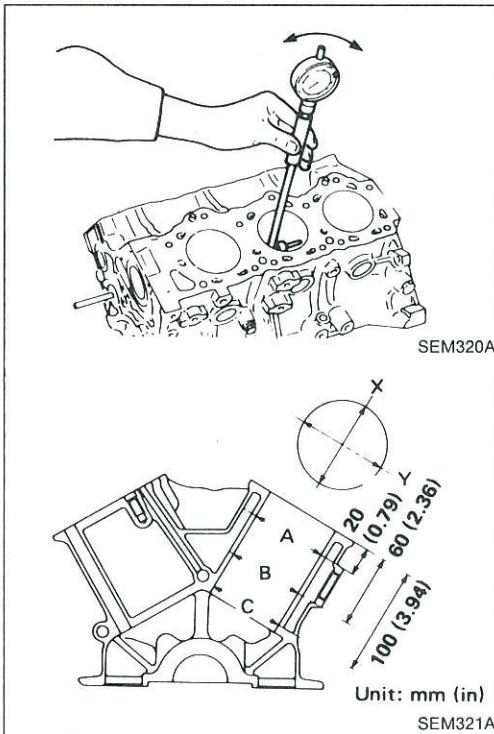
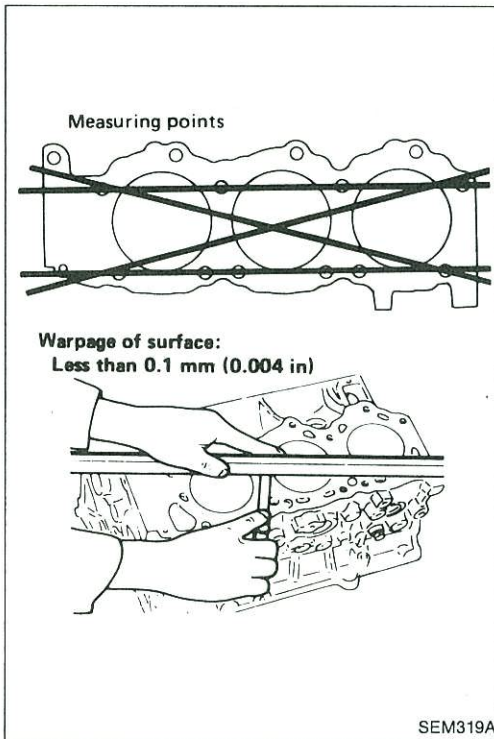
The maximum limit is as follows:

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

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

227.60 - 227.70 mm (8.9606 - 8.9645 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:

87.000 - 87.030 mm (3.4252 - 3.4264 in)

Wear limit:

0.20 mm (0.0079 in)

Out-of-round (X - Y) limit:

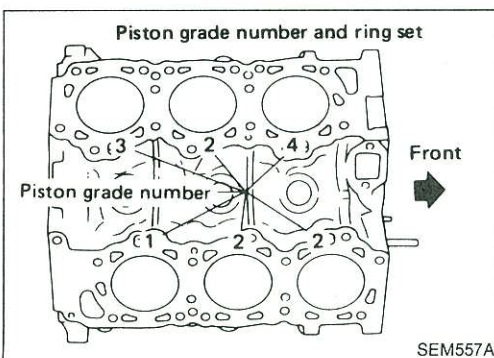
0.015 mm (0.0006 in)

Taper (A - B) limit:

0.015 mm (0.0006 in)

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

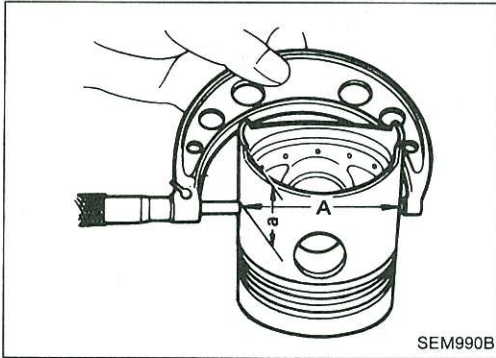
2. Check for scratches and seizure. If seizure is found, hone it.



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

CYLINDER BLOCK

Inspection (Cont'd)



3. Measure piston skirt diameter.

Piston diameter "A":

Refer to S.D.S.

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

18 mm (0.71 in)

4. Check that piston-to-bore clearance is within specification.

Piston-to-bore clearance "B":

0.015 - 0.035 mm (0.0006 - 0.0014 in)

5. Determine piston oversize according to amount of cylinder wear.

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

6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".

Rebored size calculation:

$$D = A + B - C$$

where,

D: Bored diameter

A: Piston diameter as measured

B: Piston-to-bore clearance

C: Honing allowance 0.02 mm (0.0008 in)

7. Install main bearing caps, and tighten to the specified torque to prevent distortion of cylinder bores in final assembly.

8. Cut cylinder bores.

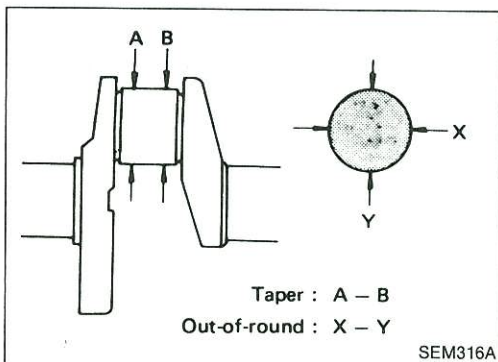
- **When any cylinder needs boring, all other cylinders must also be bored.**

- **Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.**

9. Hone cylinders to obtain specified piston-to-bore clearance.

10. Measure finished cylinder bore for out-of-round and taper.

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



CRANKSHAFT

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

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

Out-of-round (X - Y):

Less than 0.005 mm (0.0002 in)

Taper (A - B):

Less than 0.005 mm (0.0002 in)

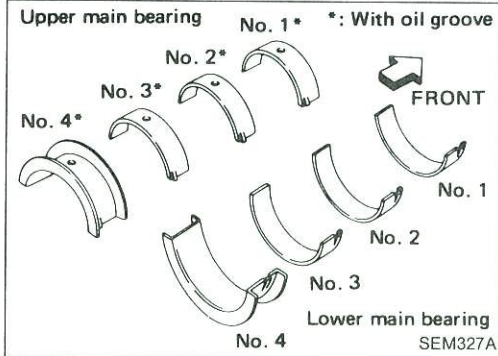
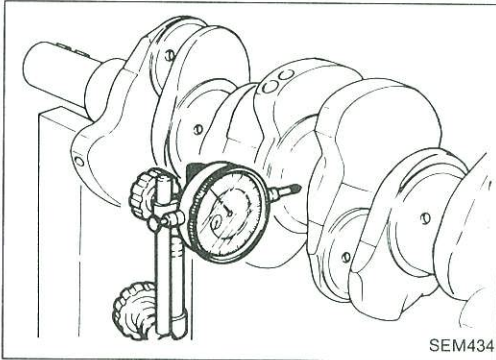
CYLINDER BLOCK

Inspection (Cont'd)

3. Measure crankshaft runout.

Runout (Total indicator reading):

Less than 0.10 mm (0.0039 in)



BEARING CLEARANCE

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

Method A (Using bore gauge & micrometer)

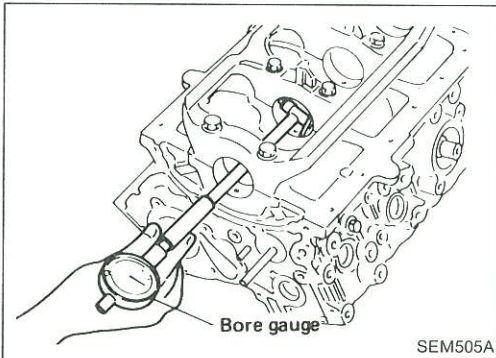
Main bearing

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

2. Install main bearing cap to cylinder block.

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

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



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

5. Calculate main bearing clearance.

Main bearing clearance (A - Dm):

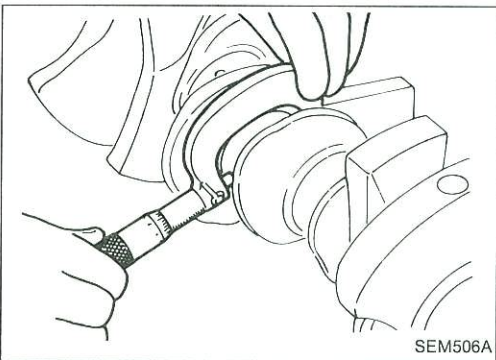
Standard

0.028 - 0.055 mm (0.0011 - 0.0022 in)

Limit

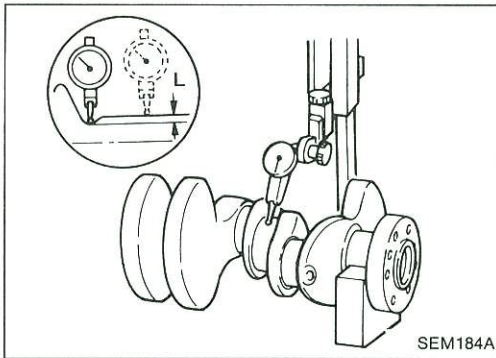
0.090 mm (0.0035 in)

6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing.



CYLINDER BLOCK

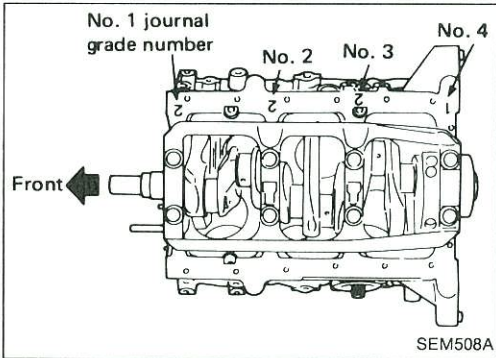
Inspection (Cont'd)



- a. When grinding crankshaft journal, confirm that "L" dimension in fillet roll is more than the specified limit.

"L": 0.1 mm (0.004 in)

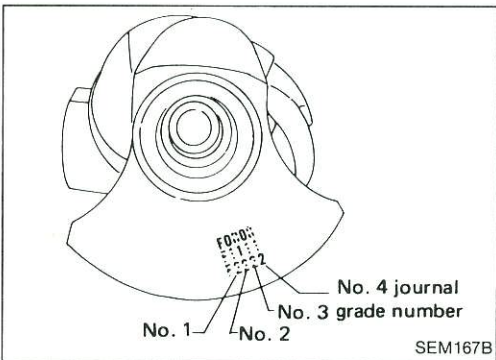
- b. Refer to S.D.S. for grinding crankshaft and available service parts.



8. If crankshaft is reused, measure main bearing clearances and select thickness of main bearings.

If crankshaft is replaced with a new one, it is necessary to select thickness of main bearings as follows:

- a. Grade number of each cylinder block main journal is punched on the respective cylinder block.



- b. Grade number of each crankshaft main journal is punched on the respective crankshaft.

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

Main bearing grade number:

Main journal 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

CYLINDER BLOCK

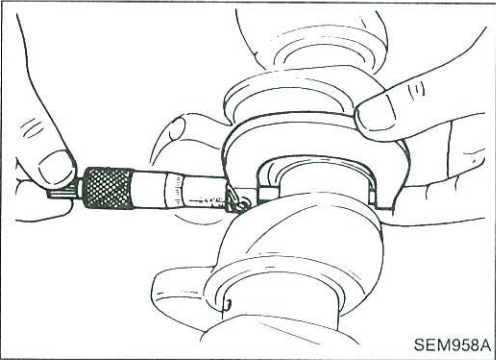
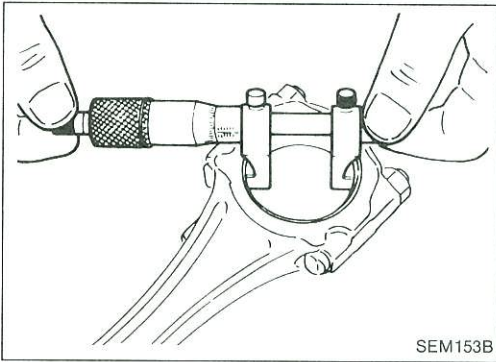
Inspection (Cont'd)

Connecting rod bearing (Big end)

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

Tighten bolts to the specified torque.

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



4. Measure outer diameter "Dp" of each crankshaft pin journal.

5. Calculate connecting rod bearing clearance.

Connecting rod bearing clearance (C - Dp):

Standard

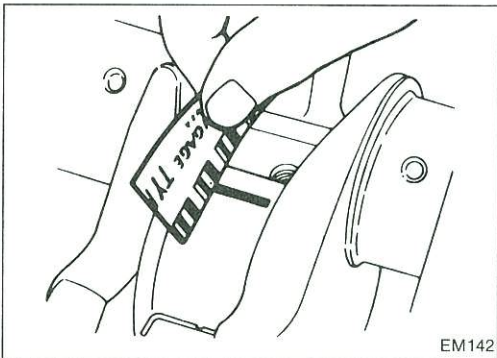
0.014 - 0.054 mm (0.0006 - 0.0021 in)

Limit

0.090 mm (0.0035 in)

6. If it exceeds the limit, replace bearing.
7. If clearance cannot be adjusted within the standard of any bearing, grind crankshaft journal and use undersized bearing.

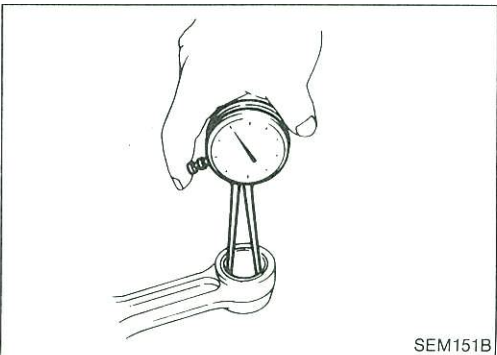
Refer to step 7 of "BEARING CLEARANCE — Main bearing".



Method B (Using plastigauge)

CAUTION:

- Do not turn crankshaft or connecting rod while plastigauge 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.

CYLINDER BLOCK

Inspection (Cont'd)

2. Measure outer diameter "Dp" of piston pin.
3. Calculate connecting rod bushing clearance.

$$\text{Connecting rod bushing clearance} = C - Dp$$

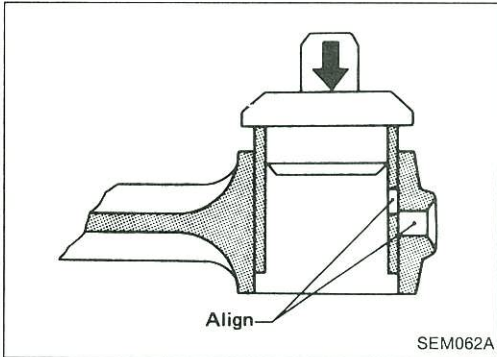
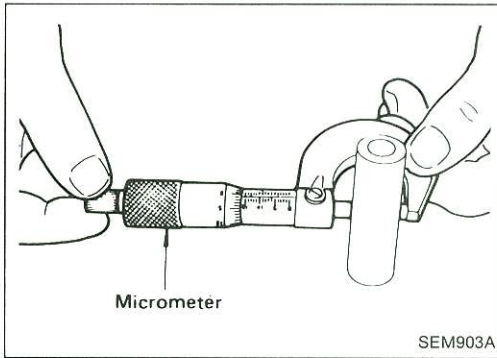
Standard:

0.005 - 0.017 mm (0.0002 - 0.0007 in)

Limit:

0.023 mm (0.0009 in)

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



REPLACEMENT OF CONNECTING ROD BUSHING (Small end)

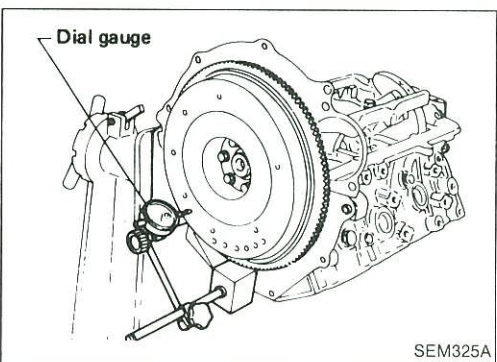
1. Drive in small end bushing until it is flush with end surface of rod.

Be sure to align the oil holes.

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

Clearance between connecting rod bushing and piston pin:

0.005 - 0.017 mm (0.0002 - 0.0007 in)



FLYWHEEL/DRIVE PLATE RUNOUT

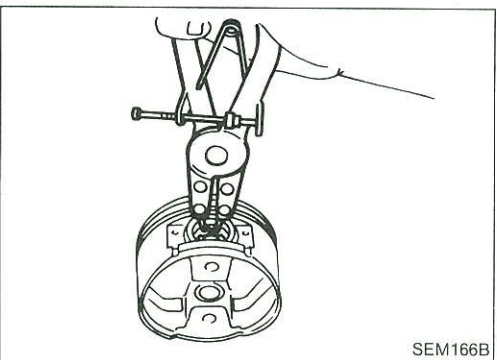
Runout (Total indicator reading):

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)



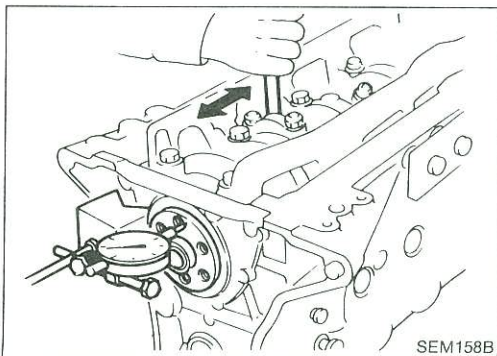
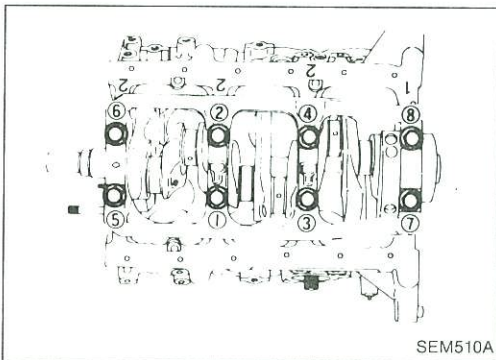
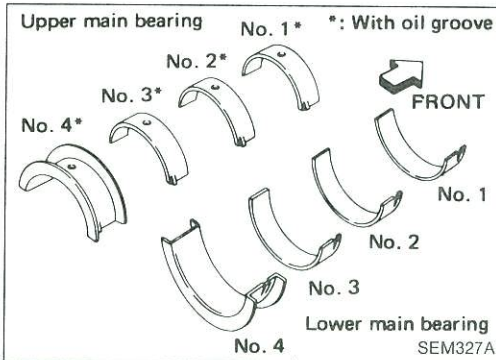
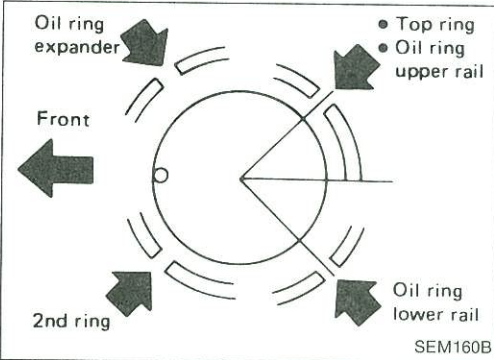
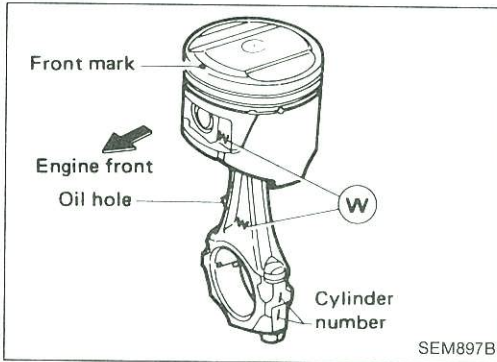
Assembly

PISTON

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

CYLINDER BLOCK

Assembly (Cont'd)



- Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.

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

- Set piston rings as shown.

CRANKSHAFT

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

- Confirm that correct main bearings are used. Refer to "Inspection" in this section.

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

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

- Measure crankshaft end play.

Crankshaft end play:

Standard

0.050 - 0.170 mm (0.0020 - 0.0067 in)

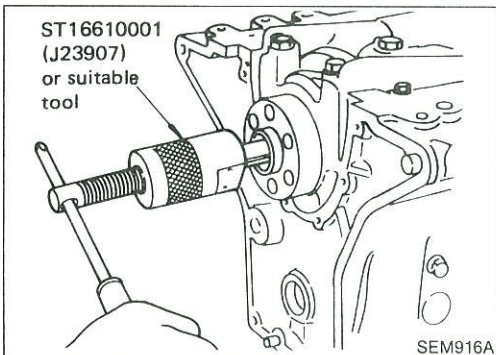
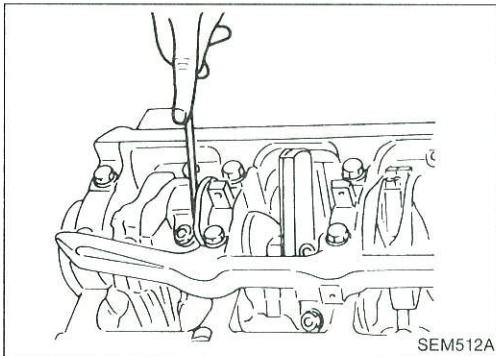
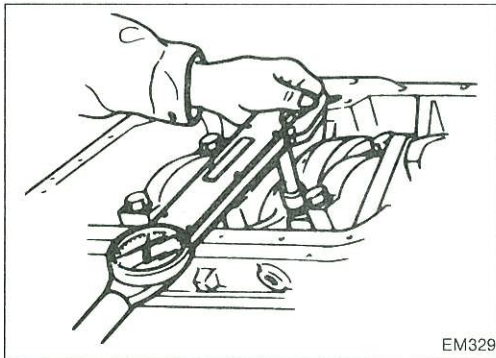
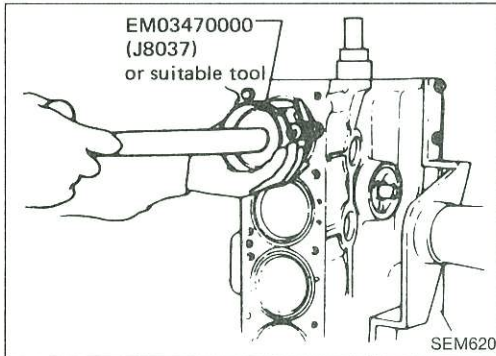
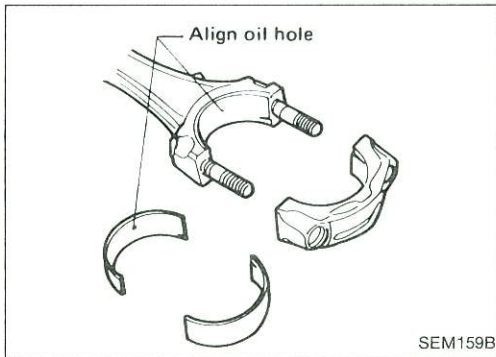
Limit

0.30 mm (0.0118 in)

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

CYLINDER BLOCK

Assembly (Cont'd)



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

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

Refer to "Inspection".

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

5. Install pistons with connecting rods.

- a. Install them into corresponding cylinders with Tool.

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

- b. Install connecting rod 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) Turn nuts 60 to 65 degrees clockwise.

If an angle wrench is not available, tighten nuts to 38 to 44 N·m (3.9 to 4.5 kg-m, 28 to 33 ft-lb).

6. Measure connecting rod side clearance.

Connecting rod side clearance:

Standard

0.20 - 0.35 mm (0.0079 - 0.0138 in)

Limit

0.40 mm (0.0157 in)

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

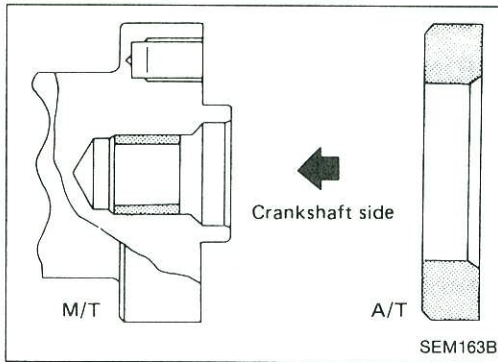
REPLACING PILOT CONVERTER

1. Remove pilot converter.

CYLINDER BLOCK

Assembly (Cont'd)

2. Install pilot converter.



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

General Specifications

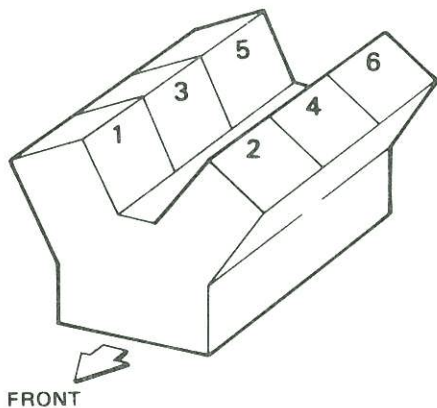
Cylinder arrangement	V-6	
Displacement	cm ³ (cu in)	2,960 (180.62)
Bore and stroke	mm (in)	87 × 83 (3.43 × 3.27)
Valve arrangement	O.H.C.	
Firing order	1-2-3-4-5-6	
Number of piston rings		
Compression	2	
Oil	1	
Number of main bearings	4	
Compression ratio	9.0	

COMPRESSION PRESSURE

Unit: kPa (kg/cm², psi)/300 rpm

Compression pressure	
Standard	1,196 (12.2, 173)
Minimum	883 (9.0, 128)
Differential limit between cylinders	98 (1.0, 14)

Cylinder number



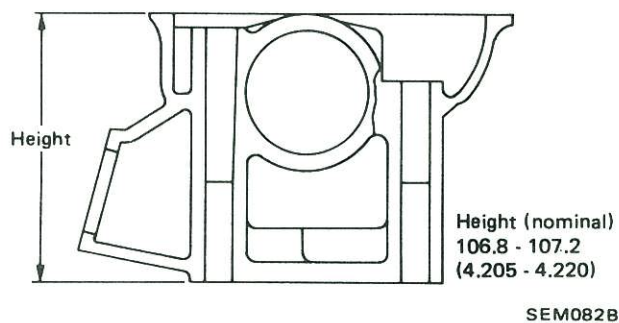
SEM713A

Inspection and Adjustment VALVE

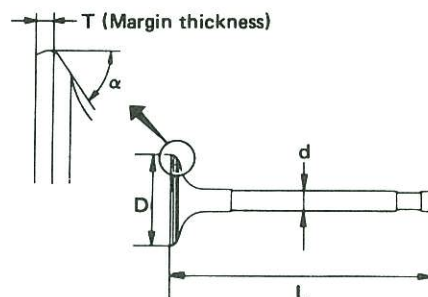
CYLINDER HEAD

Unit: mm (in)

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



Unit: mm (in)



SEM188

Valve head diameter "D"

Intake	42.0 - 42.2 (1.654 - 1.661)
Exhaust	35.0 - 35.2 (1.378 - 1.386)

Valve length "L"

Intake	125.3 - 125.9 (4.933 - 4.957)
Exhaust	124.2 - 124.8 (4.890 - 4.913)

Valve stem diameter "d"

Intake	6.965 - 6.980 (0.2742 - 0.2748)
Exhaust	7.965 - 7.970 (0.3136 - 0.3138)

Valve seat angle "α"

Intake	45°15' - 45°45'
Exhaust	

Valve margin "T"

Intake	1.15 - 1.45 (0.0453 - 0.0571)
Exhaust	1.35 - 1.65 (0.0531 - 0.0650)

Valve margin "T" limit

More than 0.5 (0.020)

Valve stem end surface grinding limit

Less than 0.2 (0.008)

Valve clearance

Intake	0 (0)
Exhaust	0 (0)

Valve spring

Free height	mm (in)	Outer	51.2 (2.016)
		Inner	44.1 (1.736)
Pressure N (kg, lb) at height mm (in)		Outer	523.7 (53.4, 117.7) at 30.0 (1.181)
		Inner	255.0 (26.0, 57.3) at 25.0 (0.984)
Out-of-square	mm (in)	Outer	2.2 (0.087)
		Inner	1.9 (0.075)

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

Inspection and Adjustment (Cont'd)

Hydraulic valve lifter

Unit: mm (in)

Lifter outside diameter	15.947 - 15.957 (0.6278 - 0.6282)
Lifter guide inside diameter	16.000 - 16.013 (0.6299 - 0.6304)
Clearance between lifter and lifter guide	0.043 - 0.066 (0.0017 - 0.0026)

Valve guide

Unit: mm (in)

		Standard	Service
Valve guide	Outer diameter	Intake 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)	12.223 - 12.234 (0.4812 - 0.4817)
Cylinder head valve guide hole diameter	Intake	10.975 - 10.996 (0.4321 - 0.4329)	11.175 - 11.196 (0.4400 - 0.4408)
Interference fit of valve guide	Exhaust	11.975 - 11.996 (0.4715 - 0.4723)	12.175 - 12.196 (0.4793 - 0.4802)
Stem to guide clearance	Intake	0.027 - 0.059 (0.0011 - 0.0023)	0.10 (0.0039)
Valve deflection limit	Exhaust	—	0.20 (0.0079)

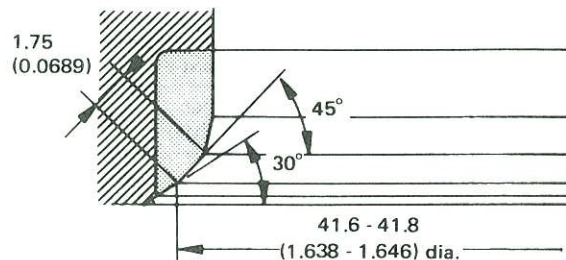
Rocker shaft and rocker arm

Unit: mm (in)

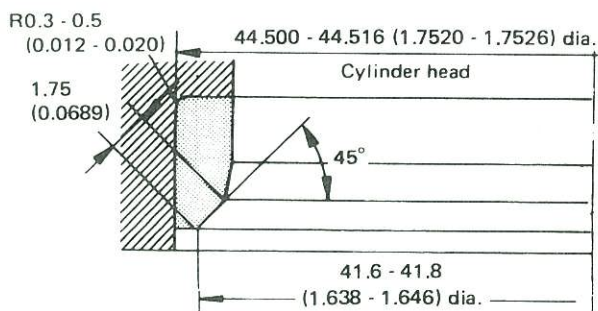
Rocker shaft	
Outer diameter	17.979 - 18.000 (0.7078 - 0.7087)
Rocker arm	
Inner diameter	18.007 - 18.028 (0.7089 - 0.7098)
Clearance between rocker arm and rocker shaft	0.007 - 0.049 (0.0003 - 0.0019)

Intake valve seat

Standard



Oversize [0.5 (0.020)]

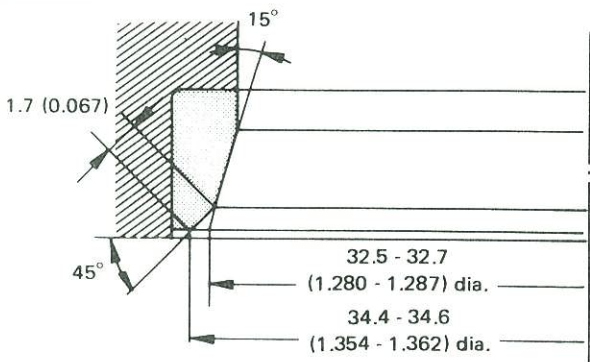


Unit: mm (in)

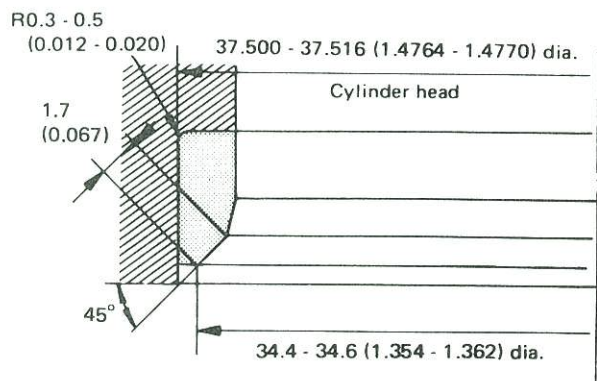
SEM755A

Exhaust valve seat

Standard



Oversize [0.5 (0.020)]



Unit: mm (in)

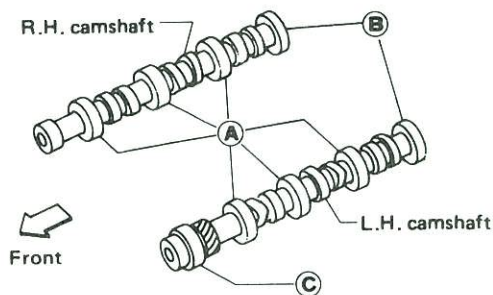
SEM756A

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

Inspection and Adjustment (Cont'd)

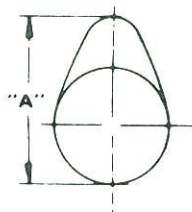
CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)



SEM893B

	Standard	Max. tolerance
Camshaft journal to bearing clearance	0.045 - 0.090 (0.0018 - 0.0035)	0.15 (0.0059)
Inner diameter of camshaft bearing		
(A) :	47.000 - 47.025 (1.8504 - 1.8514)	—
(B) :	42.500 - 42.525 (1.6732 - 1.6742)	—
(C) :	48.000 - 48.025 (1.8898 - 1.8907)	—
Outer diameter of camshaft journal		
(A) :	46.920 - 46.940 (1.8472 - 1.8480)	—
(B) :	42.420 - 42.440 (1.6701 - 1.6709)	—
(C) :	47.920 - 47.940 (1.8866 - 1.8874)	—
Camshaft runout [T.I.R.*]	Less than 0.04 (0.0016)	0.1 (0.004)
Camshaft end play	0.03 - 0.06 (0.0012 - 0.0024)	—



EM671

Cam height "A"

Intake

39.537 - 39.727 (1.5566 - 1.5641)

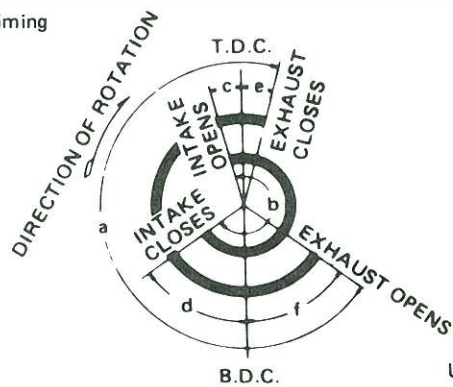
Exhaust

Wear limit of cam height

0.15 (0.0059)

*Total indicator reading

Valve timing



EM120

Unit: degree

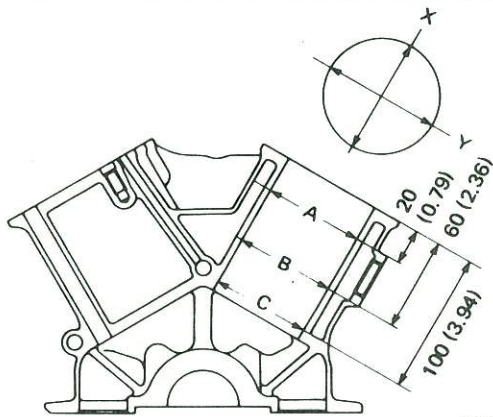
a	b	c	d	e	f
248	248	10	58	10	58

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

Inspection and Adjustment (Cont'd)

CYLINDER BLOCK

Unit: mm (in)



SEM321A

Surface flatness

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

Cylinder bore

Inner diameter

Standard

Grade No. 1	87.000 - 87.010 (3.4252 - 3.4256)
Grade No. 2	87.010 - 87.020 (3.4256 - 3.4260)
Grade No. 3	87.020 - 87.030 (3.4260 - 3.4264)

Wear limit	0.20 (0.0079)
------------	---------------

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

Taper (A - B - C)	Less than 0.015 (0.0006)
-------------------	--------------------------

Main journal inner diameter

Grade No. 0	66.645 - 66.654 (2.6238 - 2.6242)
Grade No. 1	66.654 - 66.663 (2.6242 - 2.6245)
Grade No. 2	66.663 - 66.672 (2.6245 - 2.6249)

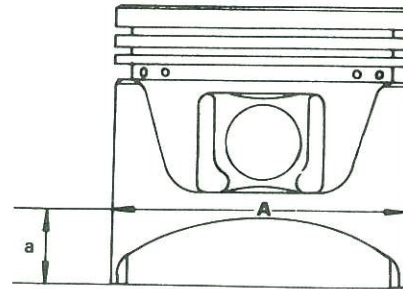
Difference in inner diameter between cylinders

Standard	Less than 0.05 (0.0020)
----------	-------------------------

PISTON, PISTON RING AND PISTON PIN

Available piston

Unit: mm (in)



SEM891B

Piston skirt diameter "A"

Standard

Grade No. 1	86.965 - 86.975 (3.4238 - 3.4242)
Grade No. 2	86.975 - 86.985 (3.4242 - 3.4246)
Grade No. 3	86.985 - 86.995 (3.4246 - 3.4250)
0.25 (0.0098) over-size (Service)	87.215 - 87.265 (3.4337 - 3.4356)
0.50 (0.0197) over-size (Service)	87.465 - 87.515 (3.4435 - 3.4455)

"a" dimension	18 (0.71)
---------------	-----------

Piston pin hole diameter	20.969 - 20.981 (0.8255 - 0.8260)
--------------------------	-----------------------------------

Piston clearance to cylinder block	0.015 - 0.035 (0.0006 - 0.0014)
------------------------------------	---------------------------------

Piston ring

Unit: mm (in)

	Standard	Limit
Side clearance		
Top	0.040 - 0.073 (0.0016 - 0.0029)	0.1 (0.004)
2nd	0.030 - 0.063 (0.0012 - 0.0025)	
Ring gap		
Top	0.21 - 0.44 (0.0083 - 0.0173)	1.0 (0.039)
2nd	0.18 - 0.44 (0.0071 - 0.0173)	
Oil (rail ring)	0.20 - 0.76 (0.0079 - 0.0299)	

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

Inspection and Adjustment (Cont'd)

Piston pin

Unit: mm (in)

Piston pin outer diameter	20.971 - 20.983 (0.8256 - 0.8261)
Interference fit of piston pin to piston	0 to 0.004 (0 to 0.0002)
Piston pin to connecting rod bushing clearance	0.005 - 0.017 (0.0002 - 0.0007)

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

CONNECTING ROD

Unit: mm (in)

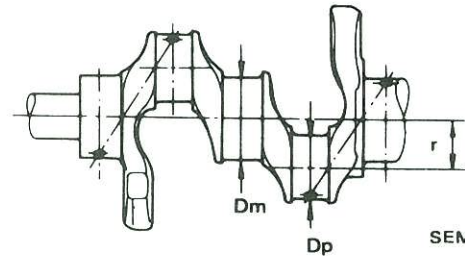
Center distance	154.1 - 154.2 (6.067 - 6.071)
Bend, torsion [per 100 (3.94)]	
Limit	Bend: 0.15 (0.0059) Torsion: 0.30 (0.0118)
Piston pin bushing inner diameter*	20.982 - 20.994 (0.8261 - 0.8265)
Connecting rod big end inner diameter	53.000 - 53.013 (2.0866 - 2.0871)
Side clearance	
Standard	0.20 - 0.35 (0.0079 - 0.0138)
Limit	0.40 (0.0157)

*After installing in connecting rod

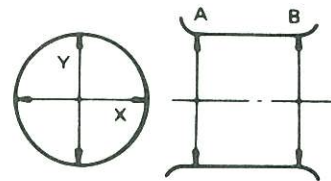
CRANKSHAFT

Unit: mm (in)

Main journal dia. "Dm"	
Grade No. 0	62.967 - 62.975 (2.4790 - 2.4793)
Grade No. 1	62.959 - 62.967 (2.4787 - 2.4790)
Grade No. 2	62.951 - 62.959 (2.4784 - 2.4787)
Pin journal dia. "Dp"	49.955 - 49.974 (1.9667 - 1.9675)
Center distance "r"	41.5 (1.634)
Out-of-round (X - Y)	
Standard	Less than 0.005 (0.0002)
Taper (A - B)	
Standard	Less than 0.005 (0.0002)
Runout [T.I.R.]	
Standard	Less than 0.10 (0.0039)
Free end play	
Standard	0.050 - 0.170 (0.0020 - 0.0067)
Limit	0.30 (0.0118)



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

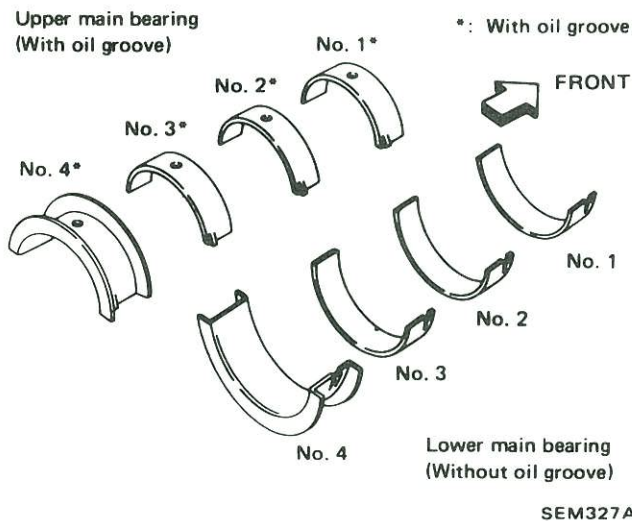


EM715

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

Inspection and Adjustment (Cont'd)

AVAILABLE MAIN BEARING



No. 4 main bearing

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

Main bearing 0.25 mm (0.0098 in) undersize

Unit: mm (in)

Thickness "T"	1.948 - 1.956 (0.0767 - 0.0770)
---------------	---------------------------------

No. 1 main bearing

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

No. 2 and 3 main bearing

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

AVAILABLE CONNECTING ROD BEARING

Connecting rod bearing undersize

Unit: mm (in)

	Thickness	Crank pin journal diameter "Dp"
Standard	1.502 - 1.506 (0.0591 - 0.0593)	49.955 - 49.974 (1.9667 - 1.9675)
Undersize		
0.08 (0.0031)	1.542 - 1.546 (0.0607 - 0.0609)	
0.12 (0.0047)	1.562 - 1.566 (0.0615 - 0.0617)	
0.25 (0.0098)	1.627 - 1.631 (0.0641 - 0.0642)	Grind so that bearing clearance is the specified value.

MISCELLANEOUS COMPONENTS

Unit: mm (in)

Flywheel

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

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

Inspection and Adjustment (Cont'd)

Bearing clearance

Unit: mm (in)

Main bearing clearance

Standard	0.028 - 0.055 (0.0011 - 0.0022)
----------	---------------------------------

Limit	0.090 (0.0035)
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Connecting rod bearing clearance

Standard	0.014 - 0.054 (0.0006 - 0.0021)
----------	---------------------------------

Limit	0.090 (0.0035)
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ENGINE LUBRICATION & COOLING SYSTEMS

SECTION **LC**

LC

CONTENTS

PRECAUTIONS	LC- 2
PREPARATION	LC- 3
ENGINE LUBRICATION SYSTEM	LC- 4
ENGINE COOLING SYSTEM	LC- 8
RADIATOR FAN MOTOR ELECTRICAL CIRCUIT	LC-14
SERVICE DATA AND SPECIFICATIONS (S.D.S.)	LC-18

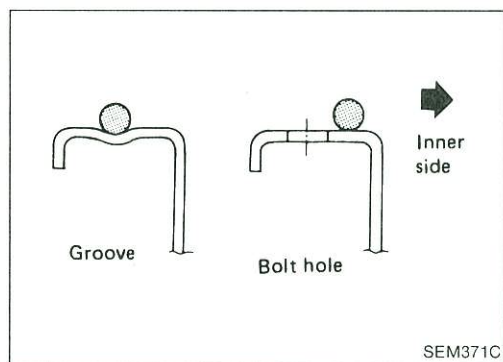
PRECAUTIONS

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF** section of this Service Manual.

WARNING:

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



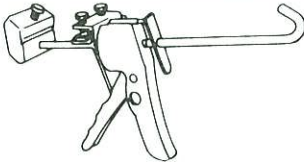



Liquid Gasket Application Procedure

- Before applying liquid gasket, use a scraper to remove all traces of old liquid gasket from mating surface.
- 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).
- Apply liquid gasket to inner sealing surface around hole perimeter area.
(Assembly should be done within 5 minutes after coating.)
- Wait at least 30 minutes before refilling engine oil and engine coolant.

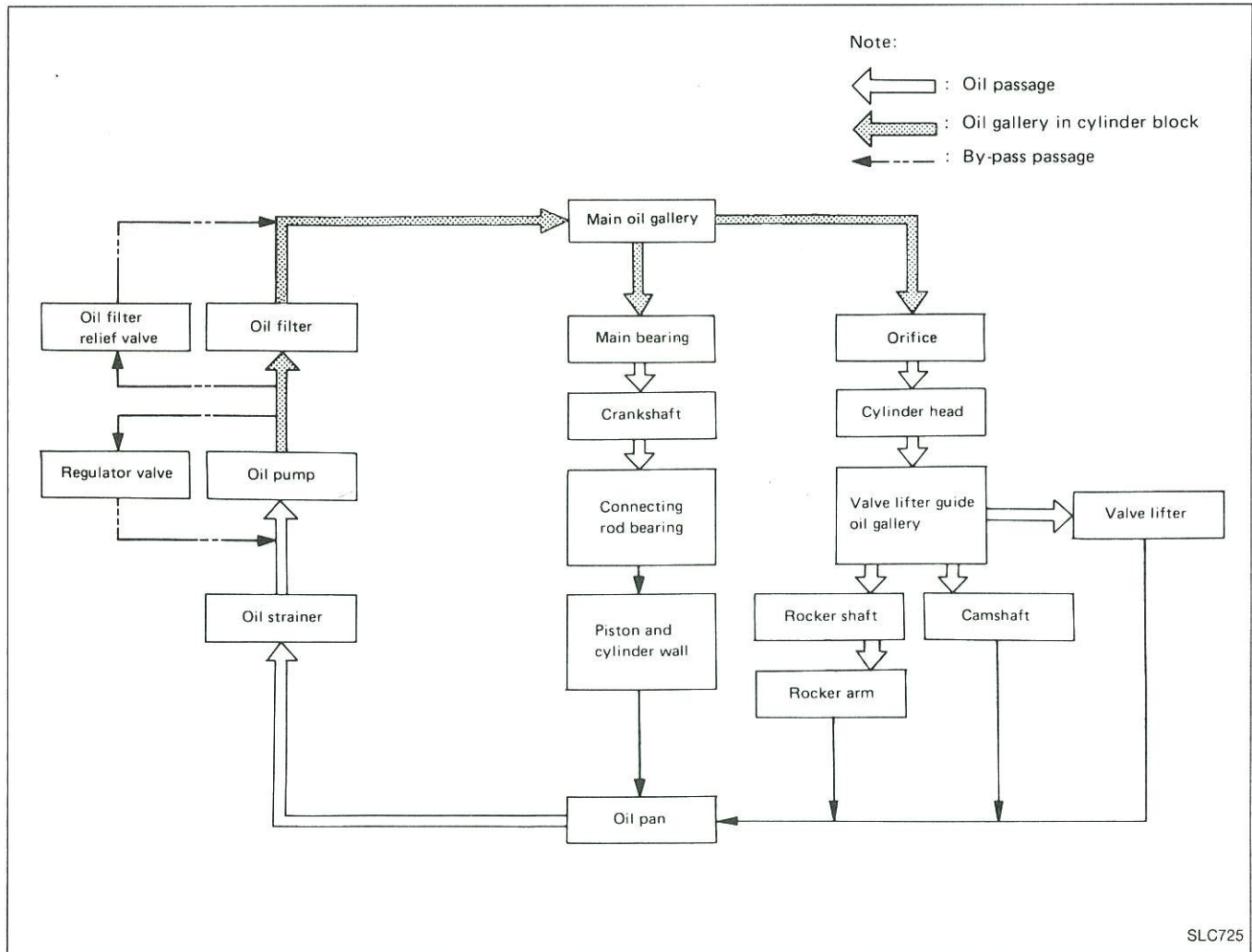
PREPARATION

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

ENGINE LUBRICATION SYSTEM

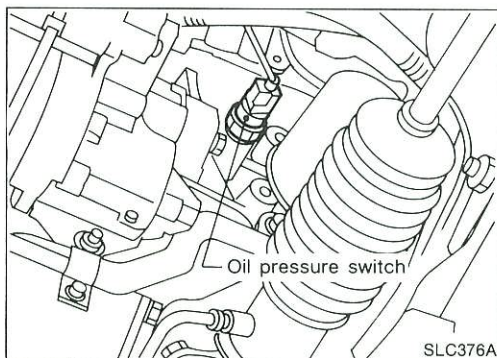
Lubrication Circuit



Oil Pressure Check

WARNING:

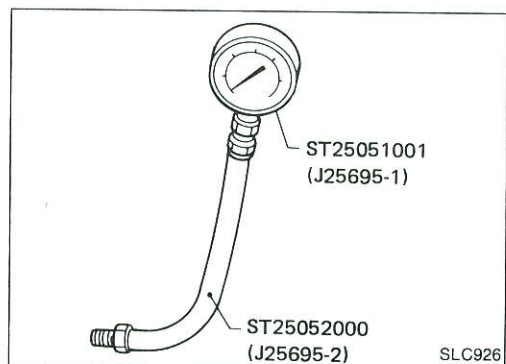
- Be careful not to burn yourself, as the engine and oil may be hot.
- Oil pressure check should be done in "Neutral" gear position.



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

ENGINE LUBRICATION SYSTEM

Oil Pressure Check (Cont'd)

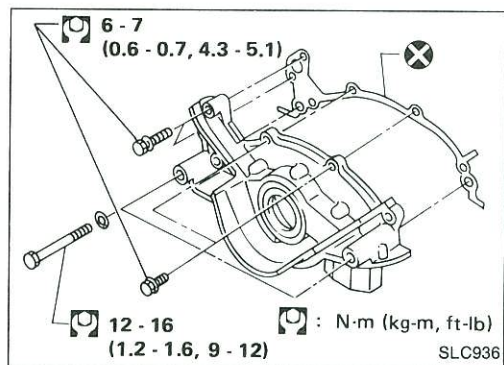


3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine rpm	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 59 (0.6, 9)
3,200	363 - 451 (3.7 - 4.6, 53 - 65)

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

6. Install oil pressure switch with sealant.



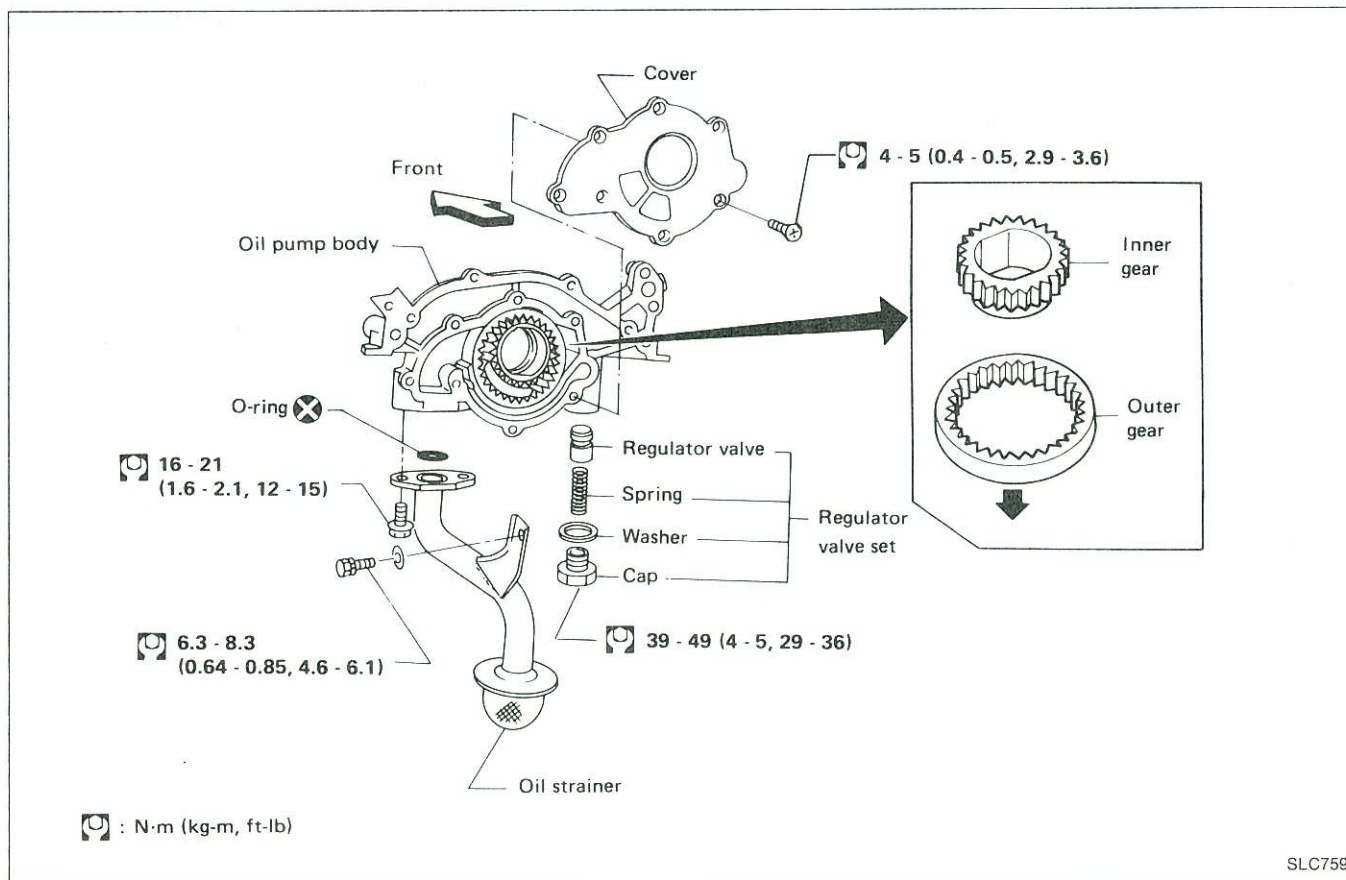
Oil Pump

REMOVAL

1. Drain oil.
2. Remove oil pan.
3. Remove oil pump assembly.

ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd) DISASSEMBLY AND ASSEMBLY



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

INSPECTION

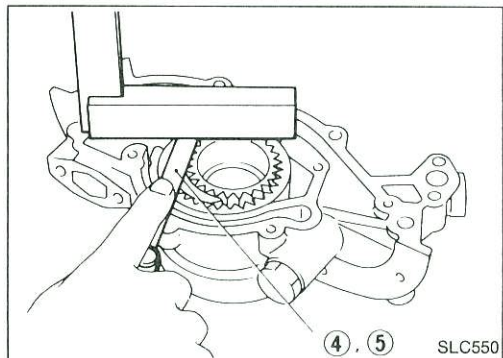
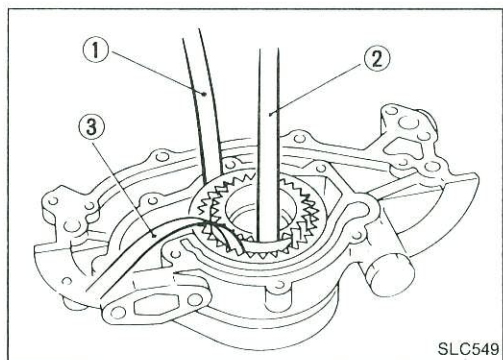
Using a feeler gauge, check the following clearances:

Standard clearance:

Unit: mm (in)

Body to outer gear clearance ①	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.12 - 0.23 (0.0047 - 0.0091)
Outer gear to crescent clearance ③	0.21 - 0.32 (0.0083 - 0.0126)
Housing to inner gear clearance ④	0.05 - 0.09 (0.0020 - 0.0035)
Housing to outer gear clearance ⑤	0.05 - 0.11 (0.0020 - 0.0043)

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



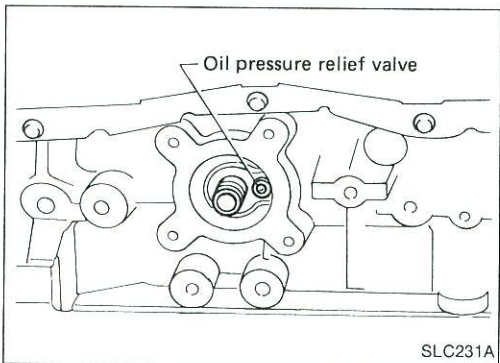
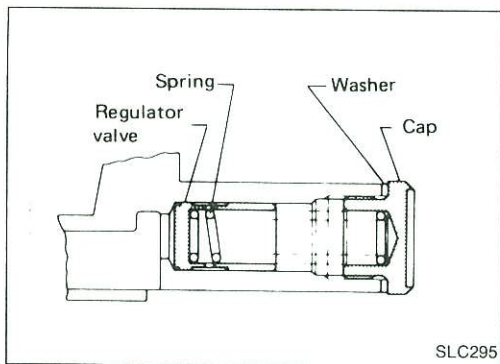
ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd)

REGULATOR VALVE INSPECTION

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

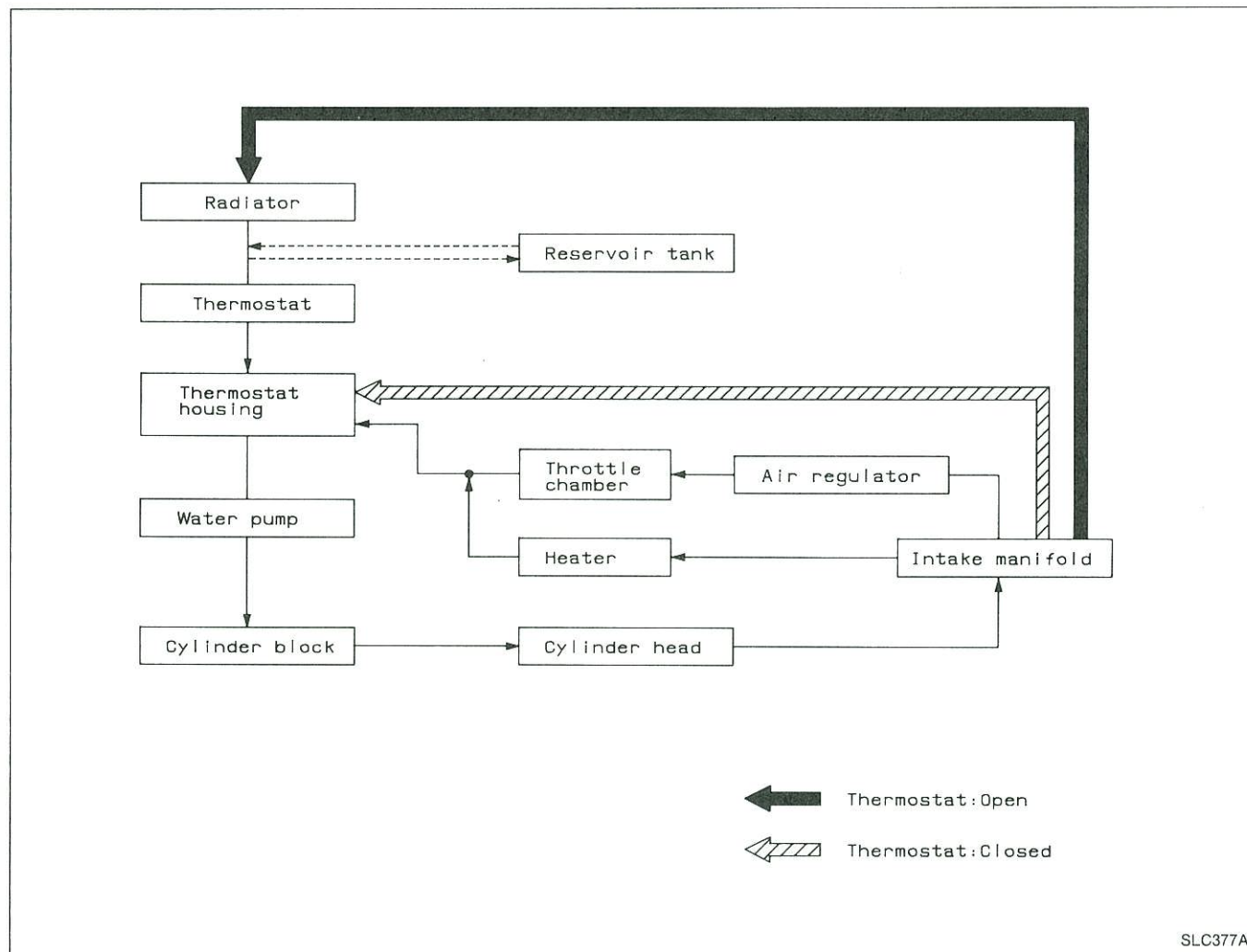
If damaged, replace regulator valve set or oil pump assembly.



OIL PRESSURE RELIEF VALVE INSPECTION

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

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

CHECKING COOLING SYSTEM HOSES

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

ENGINE COOLING SYSTEM

System Check (Cont'd)

CHECKING COOLING SYSTEM FOR LEAKS

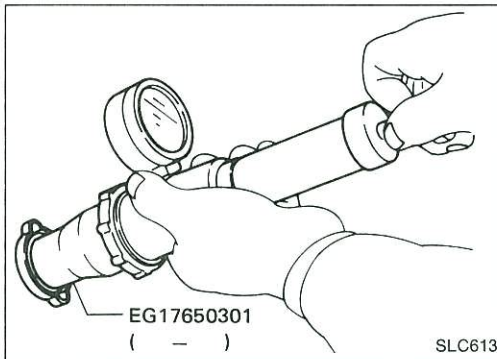
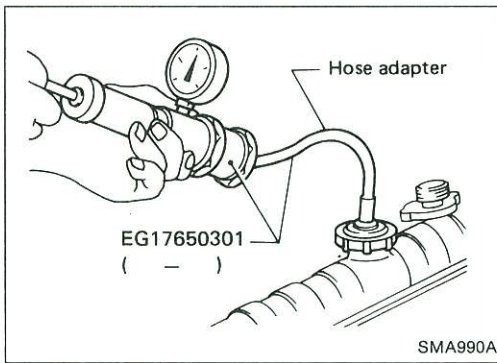
To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:

98 kPa (1.0 kg/cm², 14 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.

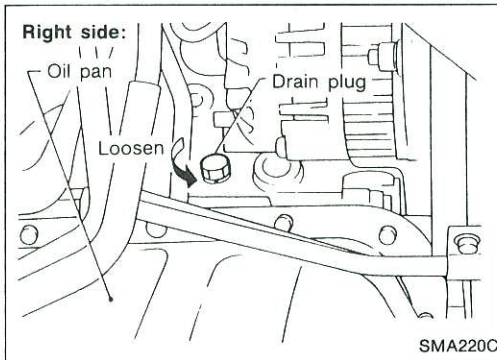


CHECKING RADIATOR CAP

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

Radiator cap relief pressure:

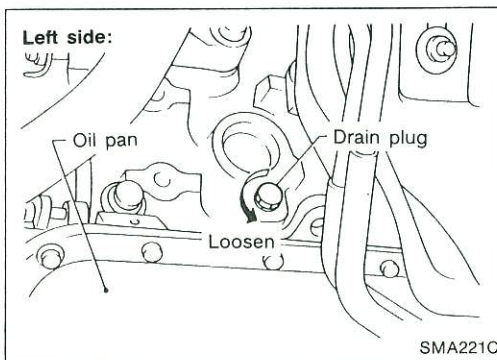
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)



Water Pump

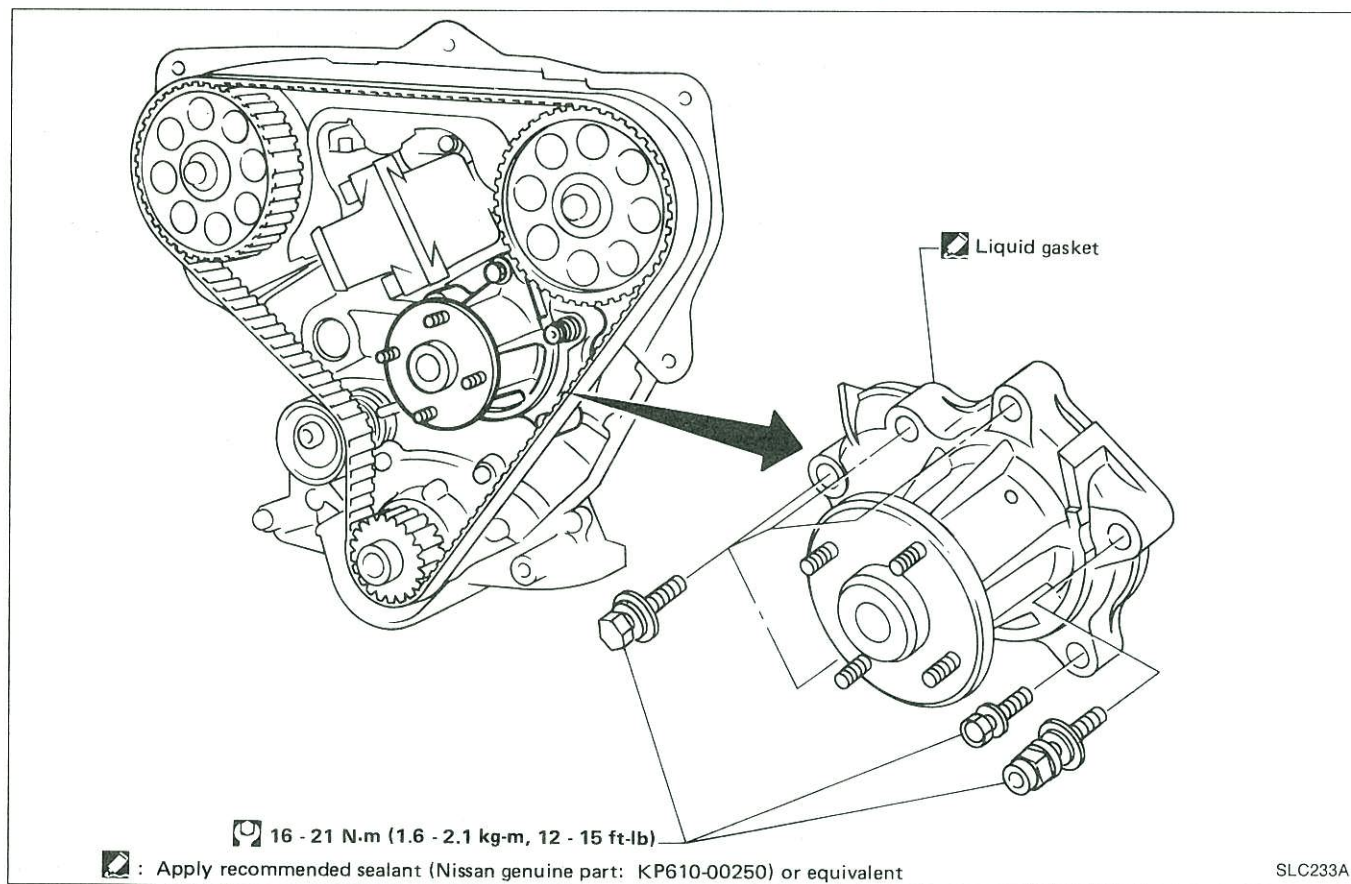
REMOVAL AND INSTALLATION

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



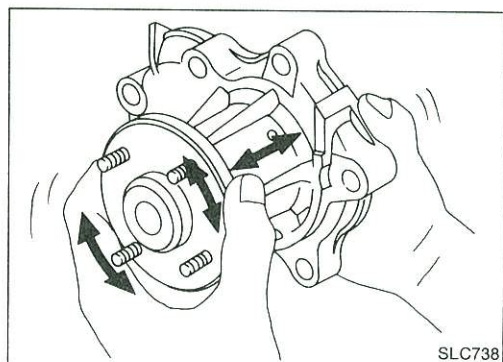
ENGINE COOLING SYSTEM

Water Pump (Cont'd)



CAUTION:

- When removing water pump assembly, be careful not to get coolant on timing belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- To avoid deforming timing cover, make sure there is adequate clearance between it and the hose clamp.
- After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.



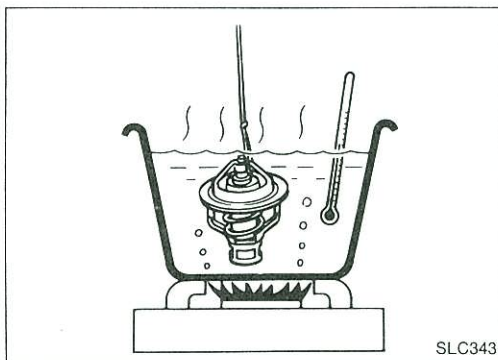
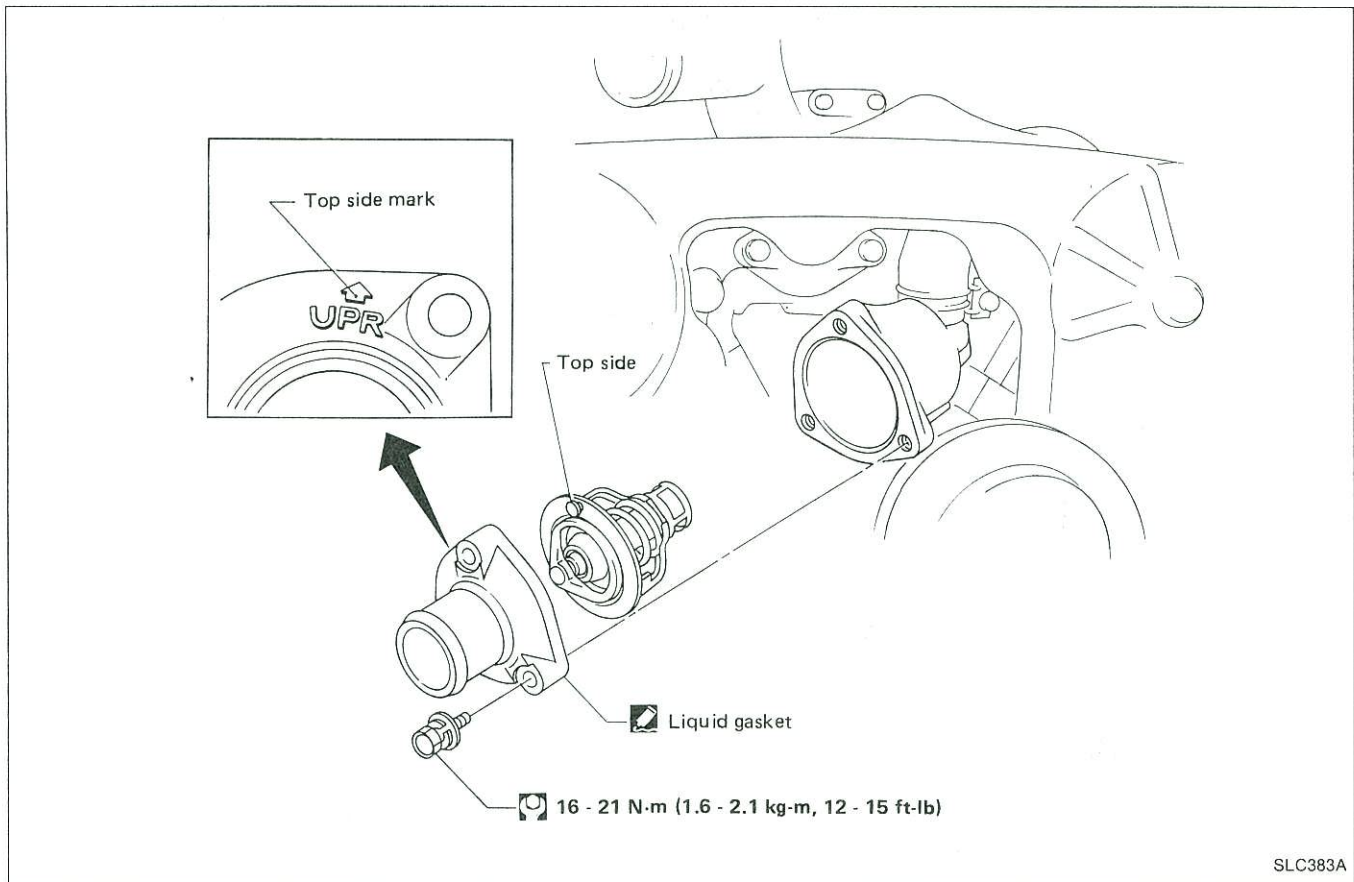
INSPECTION

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

Thermostat

INSPECTION

1. Check valve seating condition at ordinary 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)

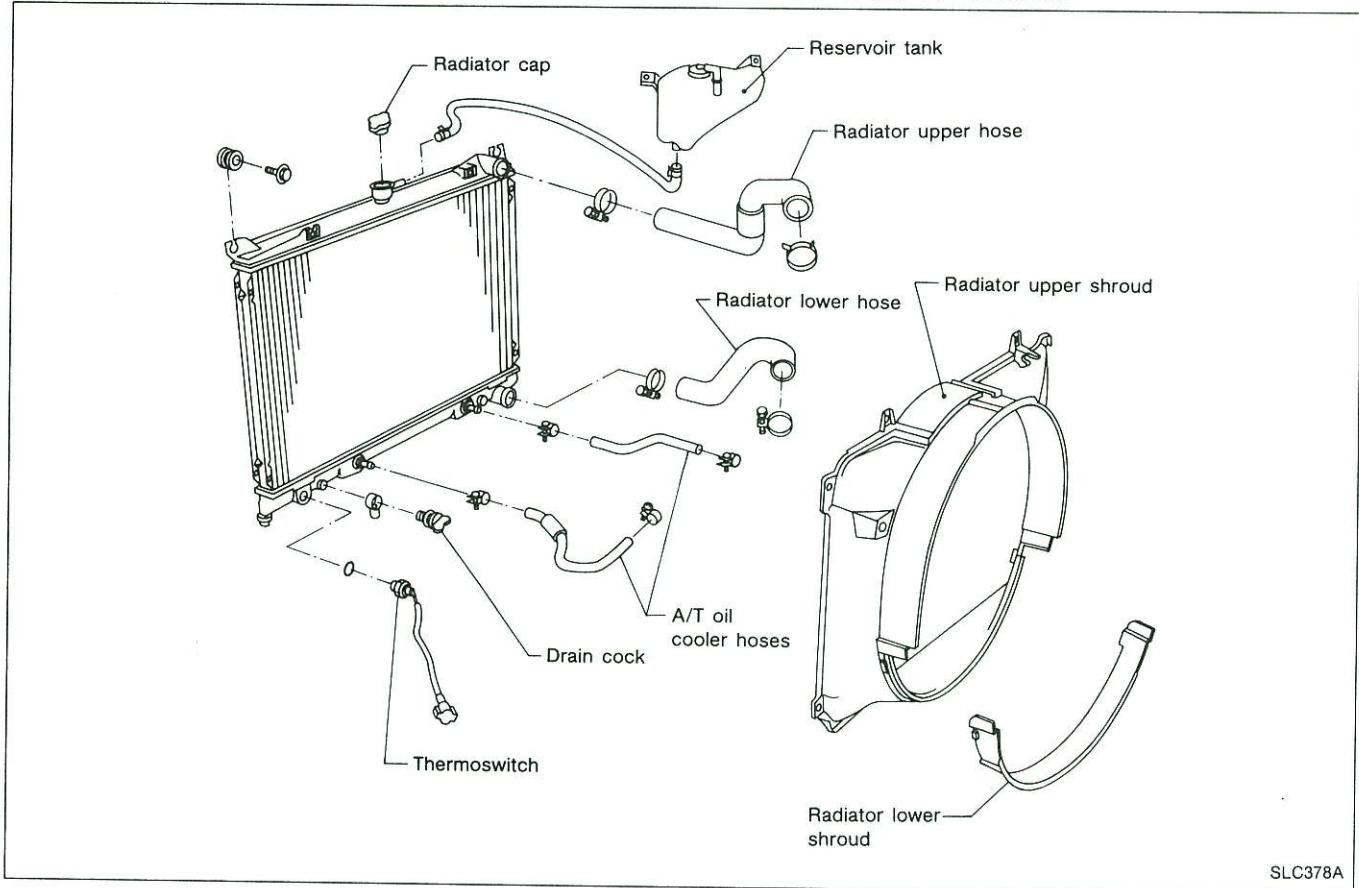
3. Then check if valve is closed at 5°C (9°F) below valve opening temperature.

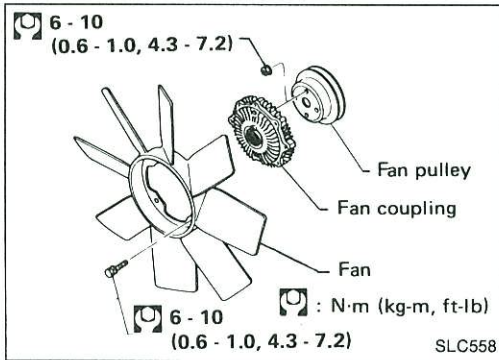
- After installation, run engine for a few minutes, and check for leaks.
- Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.

Radiator

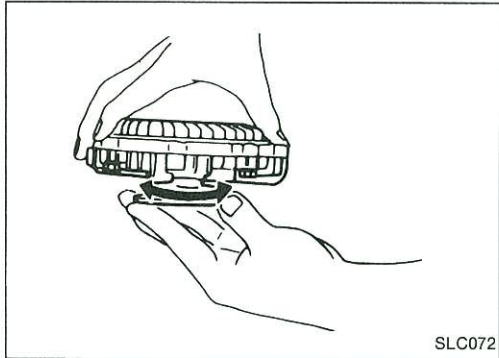
REMOVAL AND INSTALLATION

1. Remove under cover.
2. Drain coolant from radiator drain cock.
3. Disconnect radiator upper and lower hoses.
4. Remove A/T oil cooler hoses.
5. Remove radiator lower shroud.
6. Remove air duct.
7. Disconnect reservoir tank hose.
8. Remove radiator.
9. After repairing or replacing radiator, install any part removed in reverse order of removal.





Cooling Fan

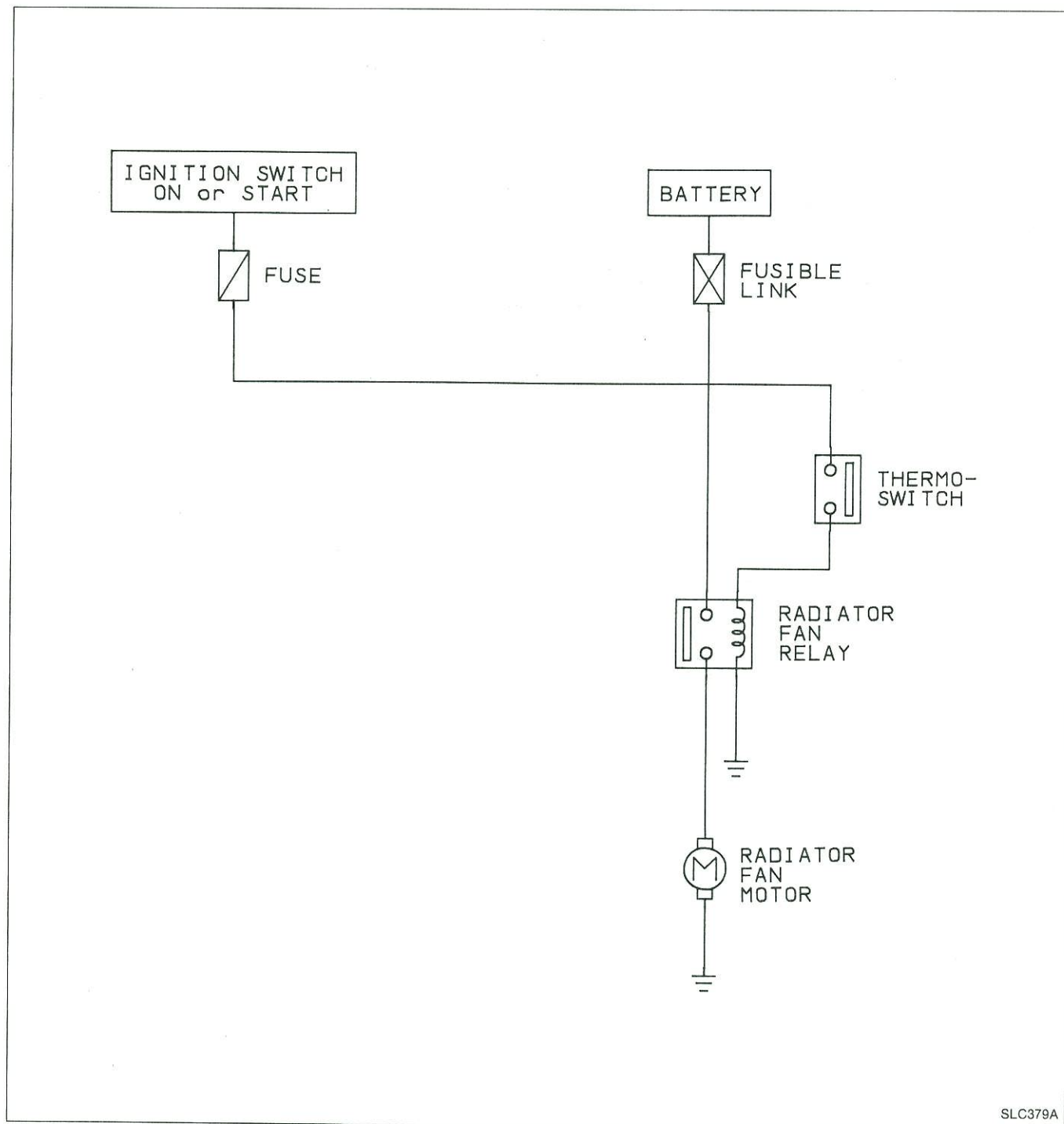


INSPECTION

Check fan coupling for oil leakage or bent bimetal.

RADIATOR FAN MOTOR ELECTRICAL CIRCUIT

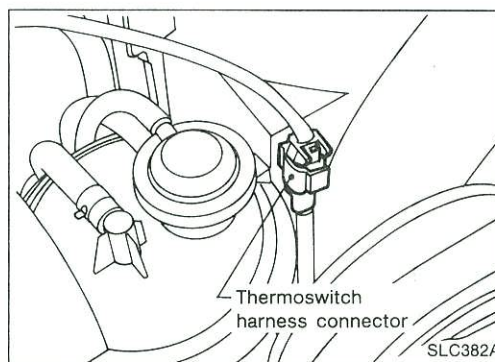
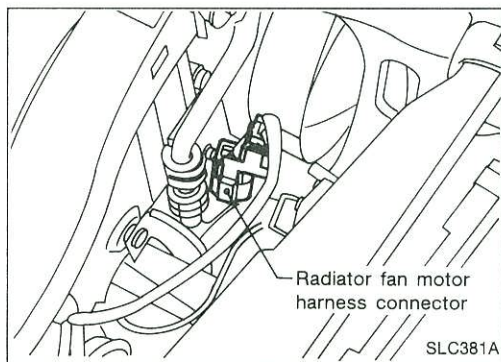
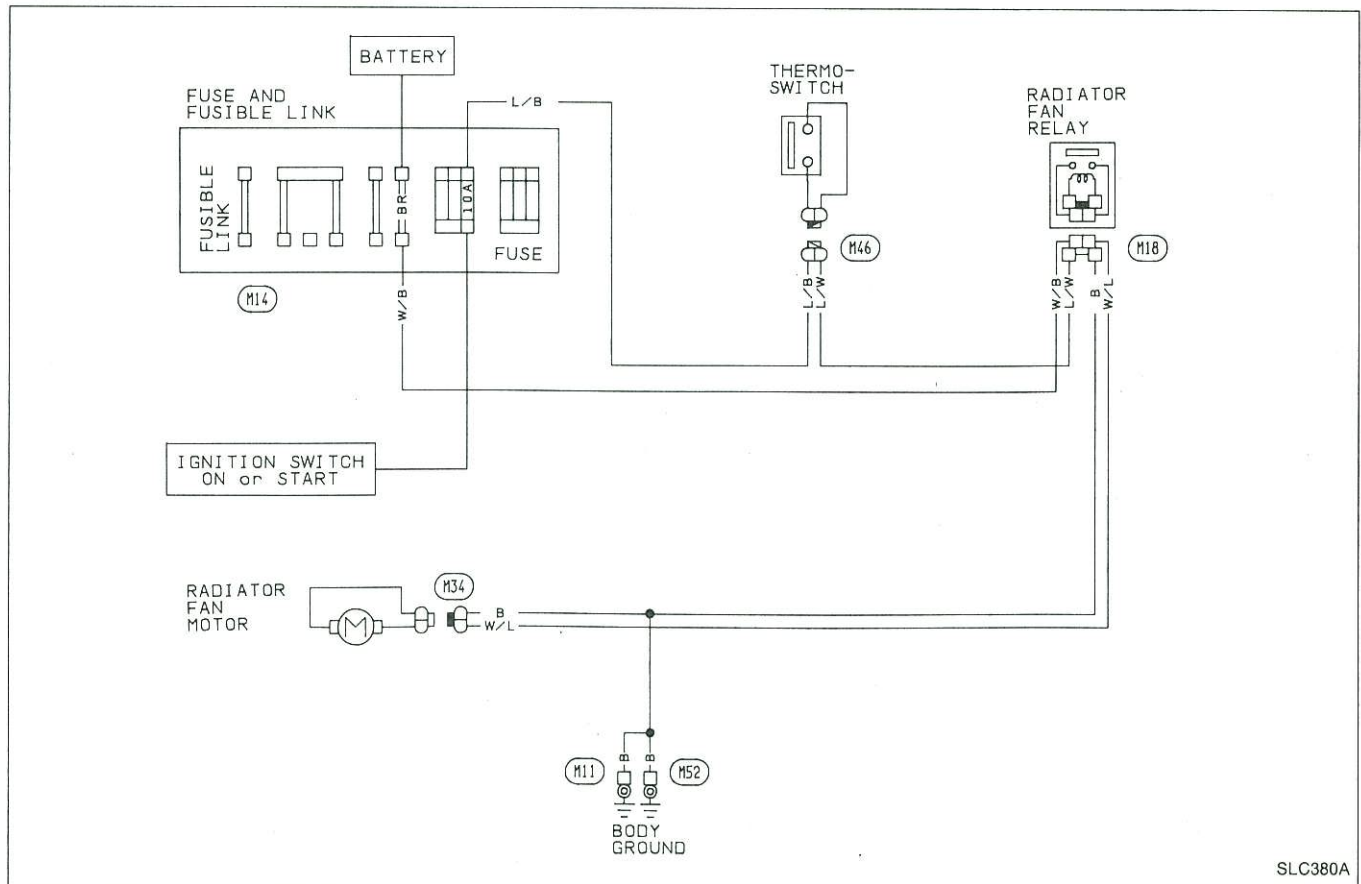
Circuit Diagram



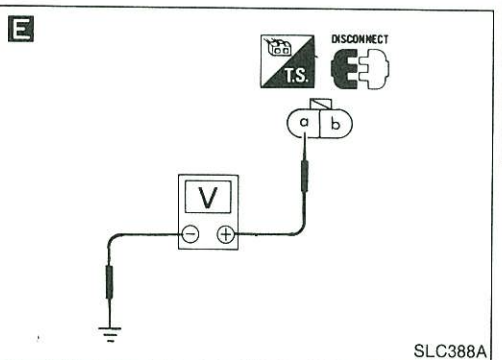
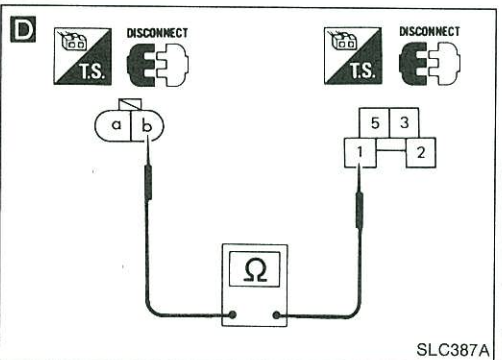
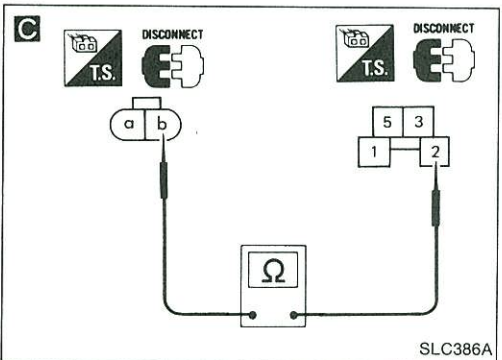
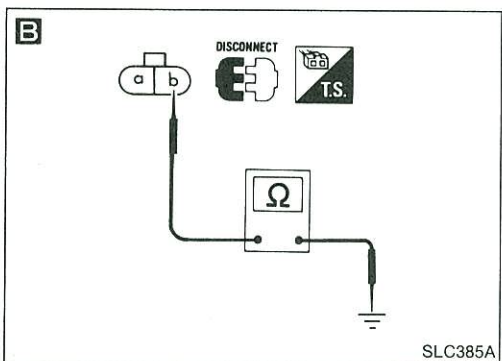
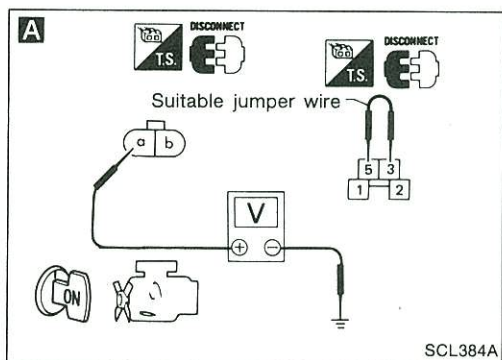
SLC379A

RADIATOR FAN MOTOR ELECTRICAL CIRCUIT

Wiring Diagram



RADIATOR FAN MOTOR ELECTRICAL CIRCUIT



Diagnostic Procedure

INSPECTION START

A

CHECK POWER SUPPLY.

- 1) Disconnect radiator fan relay.
- 2) Connect jumper wire between terminals ③ and ⑤.
- 3) Disconnect radiator fan motor harness connector.
- 4) Turn ignition switch "ON".
- 5) Check voltage between terminal ① and ground.

Voltage: Battery voltage

N.G.

Check the following.

- "BR" fusible link
 - Harness continuity between "BR" fusible link and radiator fan motor.
- If N.G., repair harness or connectors.

B

O.K.

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect jumper wire.
- 3) Check harness continuity between terminal ① and ground.

Continuity should exist .

N.G.

Repair harness or connectors.

O.K.

CHECK HARNESS CONTINUITY.

C

- 1) Check harness continuity between terminals ① and ②.

Continuity should exist .

- 2) Disconnect thermoswitch harness connector.

D

- 3) Check harness continuity between terminals ① and ①.

Continuity should exist .

- 4) Check "10A" fuse.
- 5) Turn ignition switch "ON".

E

- 6) Check voltage between terminal ① and ground.

Voltage: Battery voltage

N.G.

Repair harness or connectors.

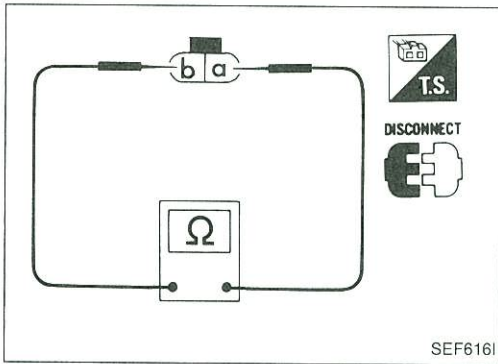
CHECK COMPONENTS

(Radiator fan motor, radiator fan relay and thermoswitch).

Refer to "Electrical Components Inspection".

(See page LC-18.)

RADIATOR FAN MOTOR ELECTRICAL CIRCUIT



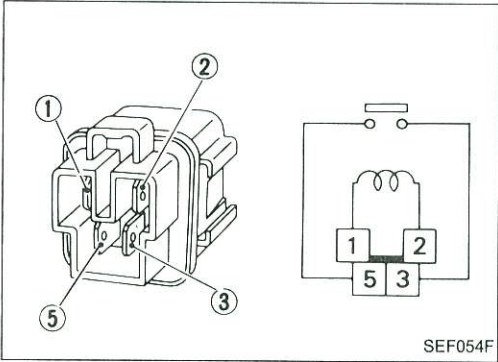
Electrical Components Inspection

RADIATOR FAN MOTOR

1. Disconnect radiator fan motor harness connector.
2. Check continuity between terminals Ⓐ and Ⓑ.

Continuity should exist.

If N.G., replace radiator fan motor.

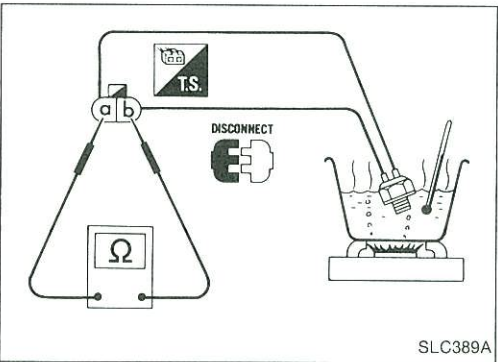


RADIATOR FAN RELAY

Check continuity between terminals ③ and ⑤.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If N.G., replace relay.



THERMOSWITCH

1. Remove thermoswitch.
2. Check thermoswitch for proper operation.

Operating temperature:

OFF → ON 90°C (194°F)

If N.G., replace thermoswitch.

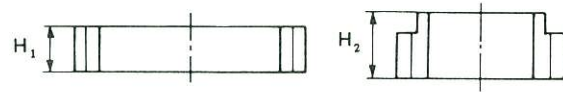
SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Engine Lubrication System

Oil pressure check

Engine rpm	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 59 (0.6, 9)
3,200	363 - 451 (3.7 - 4.6, 53 - 65)

Oil pump



OUTER GEAR

INNER GEAR

SLC573

Unit: mm (in)

Height	H ₁	H ₂
	12.5 (0.492)	18.5 (0.728)

Unit: mm (in)

Body to outer gear clearance ①	0.11 - 0.20 (0.0043 - 0.0079)
Inner gear to crescent clearance ②	0.12 - 0.23 (0.0047 - 0.0091)
Outer gear to crescent clearance ③	0.21 - 0.32 (0.0083 - 0.0126)
Housing to inner gear side clearance ④	0.05 - 0.09 (0.0020 - 0.0035)
Housing to outer gear side clearance ⑤	0.05 - 0.11 (0.0020 - 0.0043)

Engine Cooling System

Thermostat

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

Thermoswitch

Operating temperature (OFF → ON)	°C (°F)	90 (194)
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ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION **EF & EC**

EF & EC

CONTENTS

PRECAUTIONS	EF & EC- 2
PREPARATION.....	EF & EC- 4
ENGINE AND EMISSION CONTROL OVERALL SYSTEM	EF & EC- 5
ENGINE AND EMISSION CONTROL PARTS DESCRIPTION	EF & EC- 10
ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION	EF & EC- 16
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION	EF & EC- 27
TROUBLE DIAGNOSES	EF & EC- 33
FUEL INJECTION CONTROL SYSTEM INSPECTION	EF & EC-178
EVAPORATIVE EMISSION CONTROL SYSTEM	EF & EC-181
CRANKCASE EMISSION CONTROL SYSTEM	EF & EC-183
SERVICE DATA AND SPECIFICATIONS (S.D.S.)	EF & EC-184

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

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

PRECAUTIONS

Engine Fuel & Emission Control System

E.C.U.

- Do not disassemble E.C.C.S. control unit (E.C.U.).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ROM value. The E.C.C.S. 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.

INJECTOR

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

BATTERY

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

E.C.C.S. PARTS HANDLING

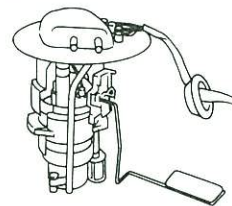
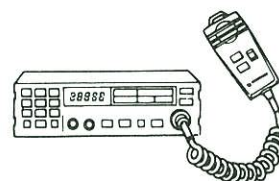
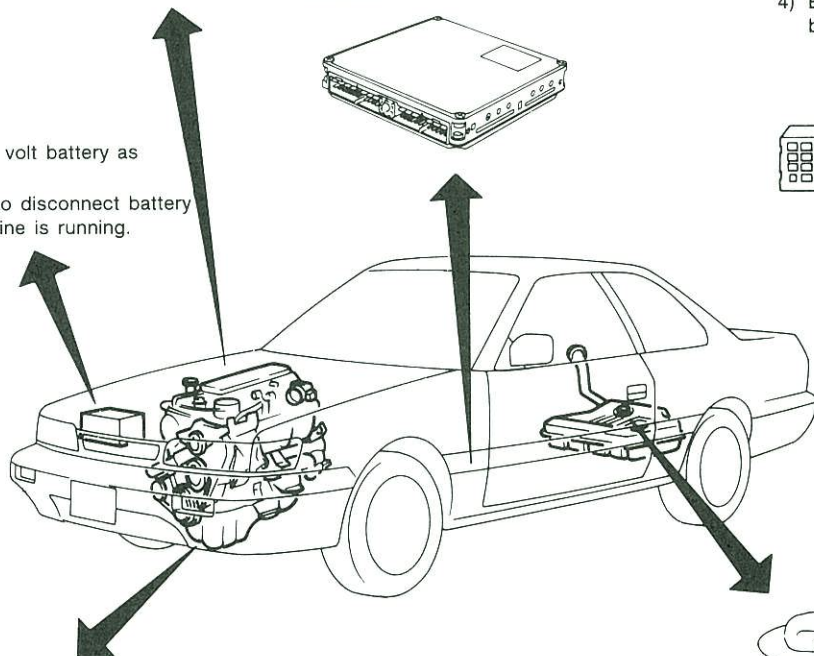
- Handle air flow meter carefully to avoid damage.
- Do not disassemble air flow meter.
- Do not clean air flow meter with any type of detergent.
- Do not disassemble auxiliary air control valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the crank angle sensor.

WHEN STARTING

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

WIRELESS EQUIPMENT

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far as possible away from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



FUEL PUMP

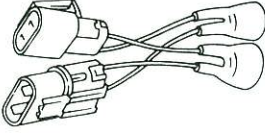
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

E.C.C.S. HARNESS HANDLING

- Securely connect E.C.C.S. 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 E.C.C.S. harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an E.C.C.S. system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep E.C.C.S. parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

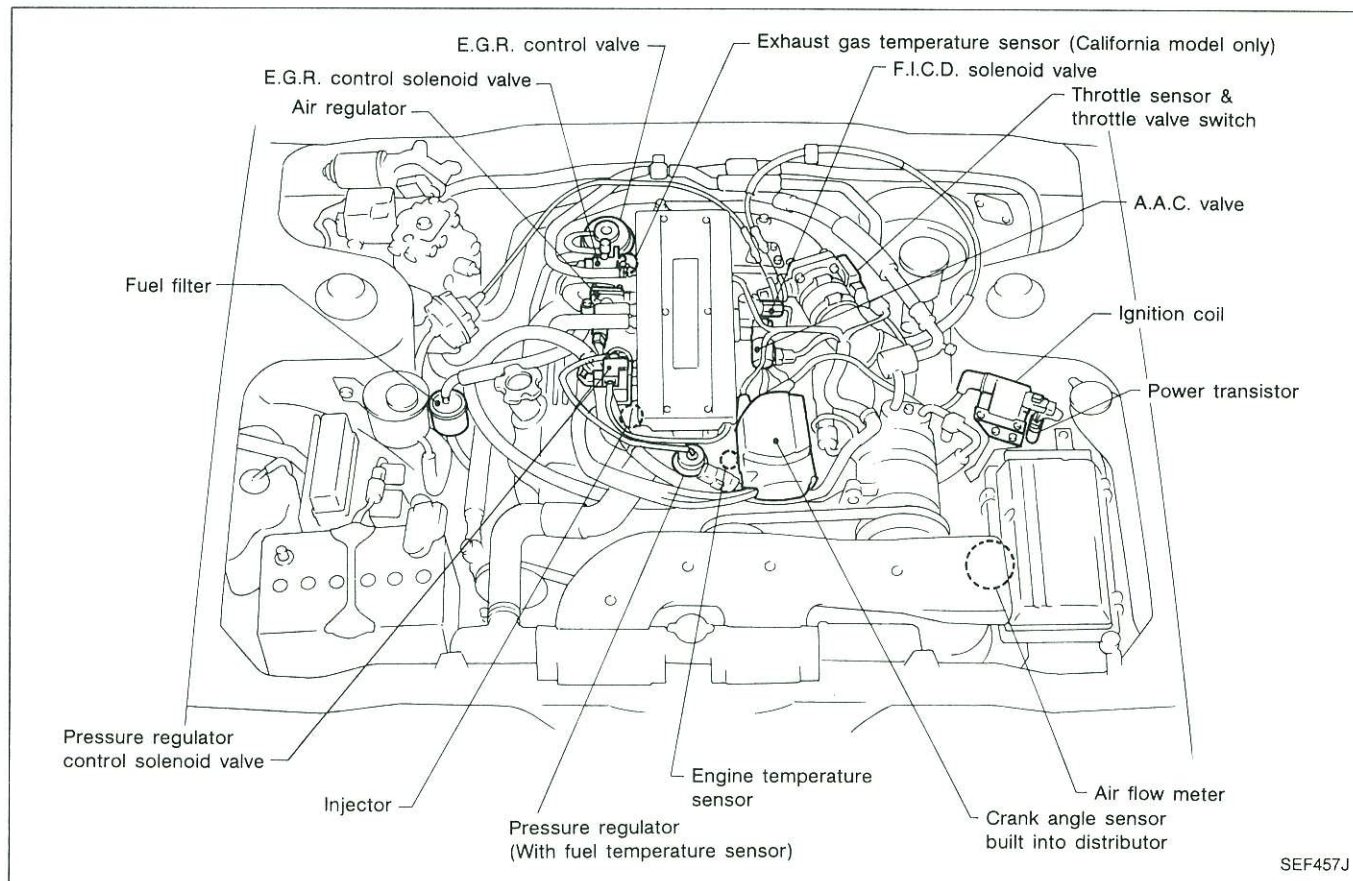
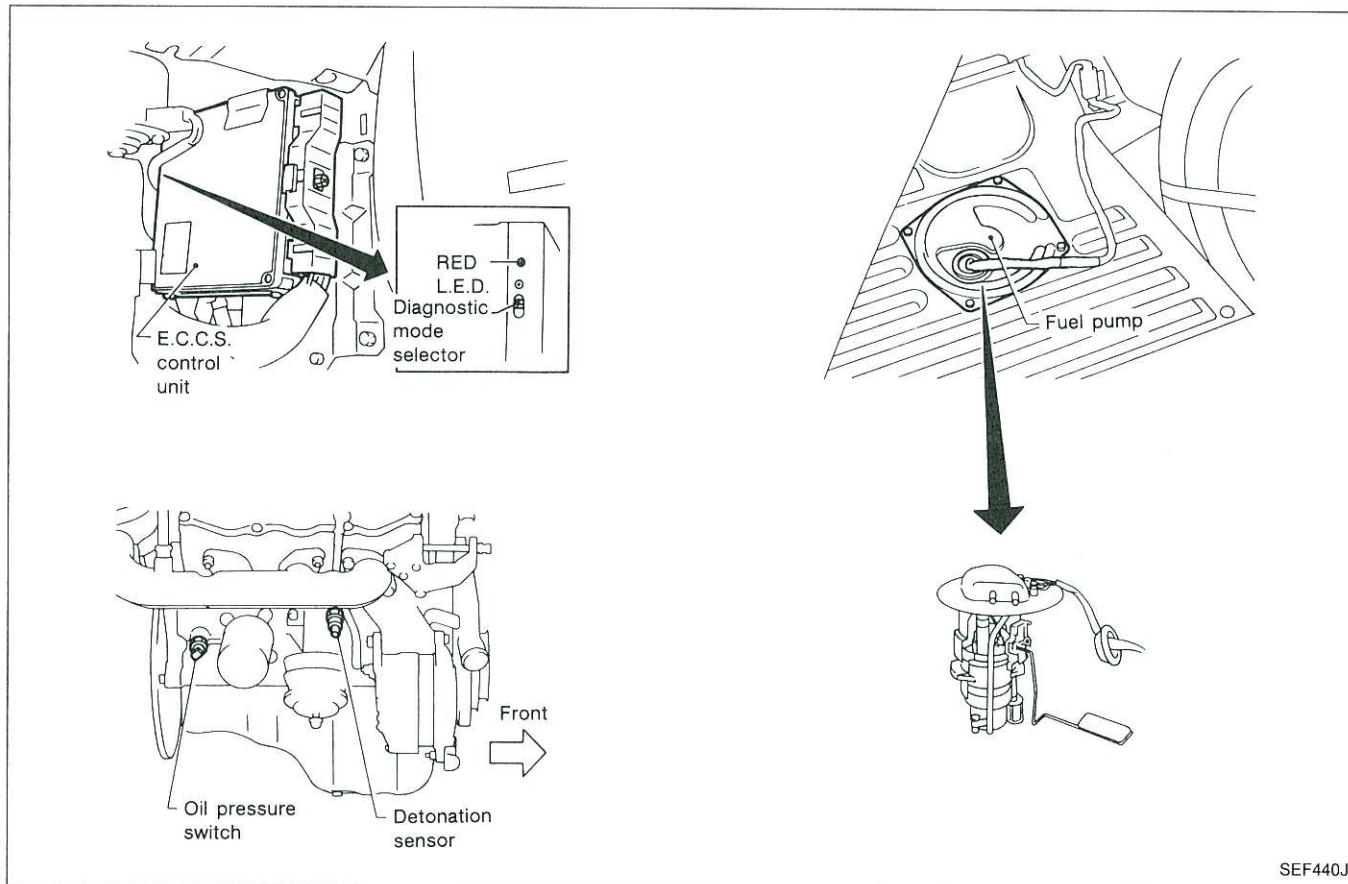
PREPARATION

SPECIAL SERVICE TOOL

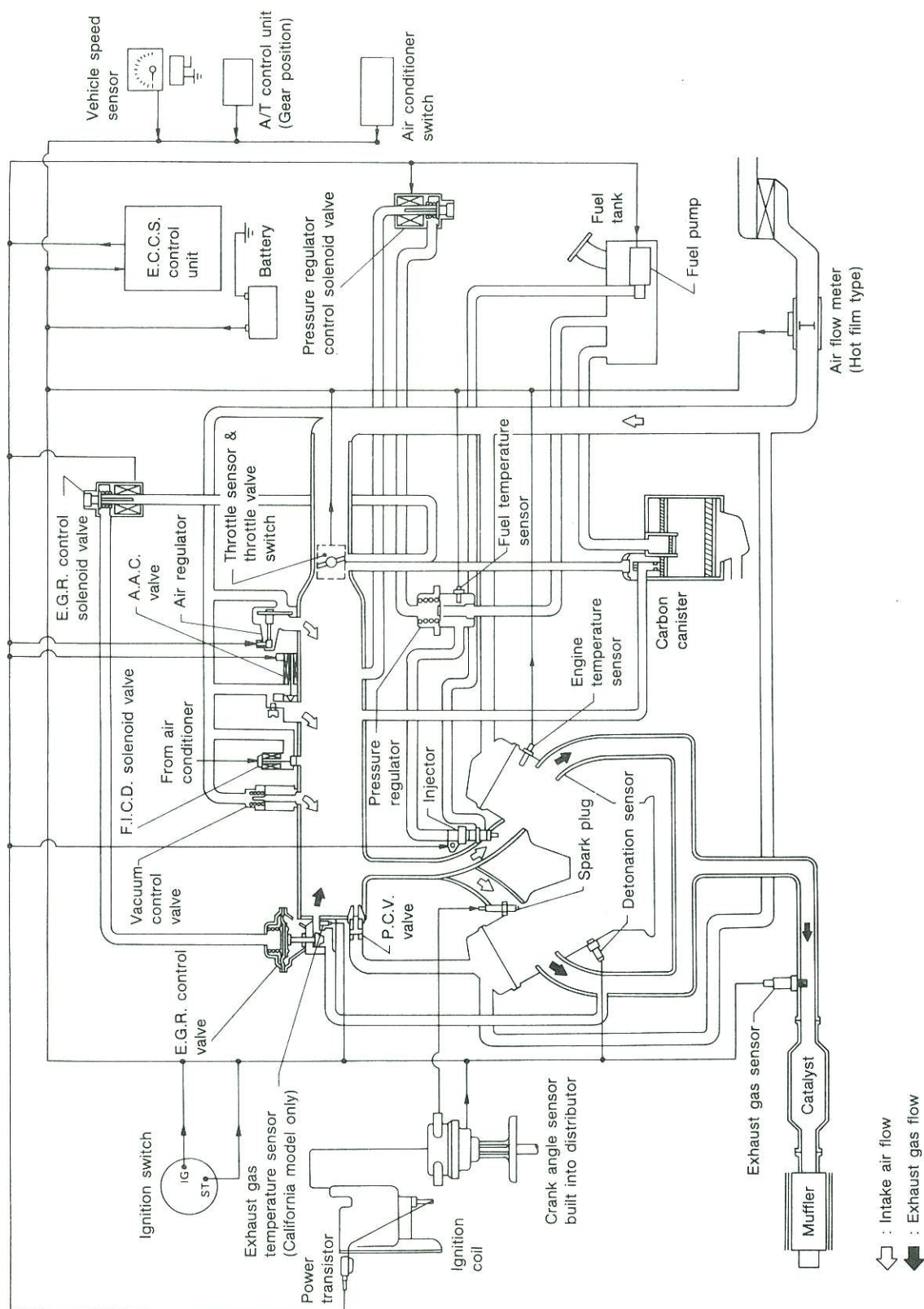
Tool number (Kent-Moore No.) Tool name	Description
EG11160000 (—) Adapter harness	 Measuring engine speed

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

E.C.C.S. Component Parts Location

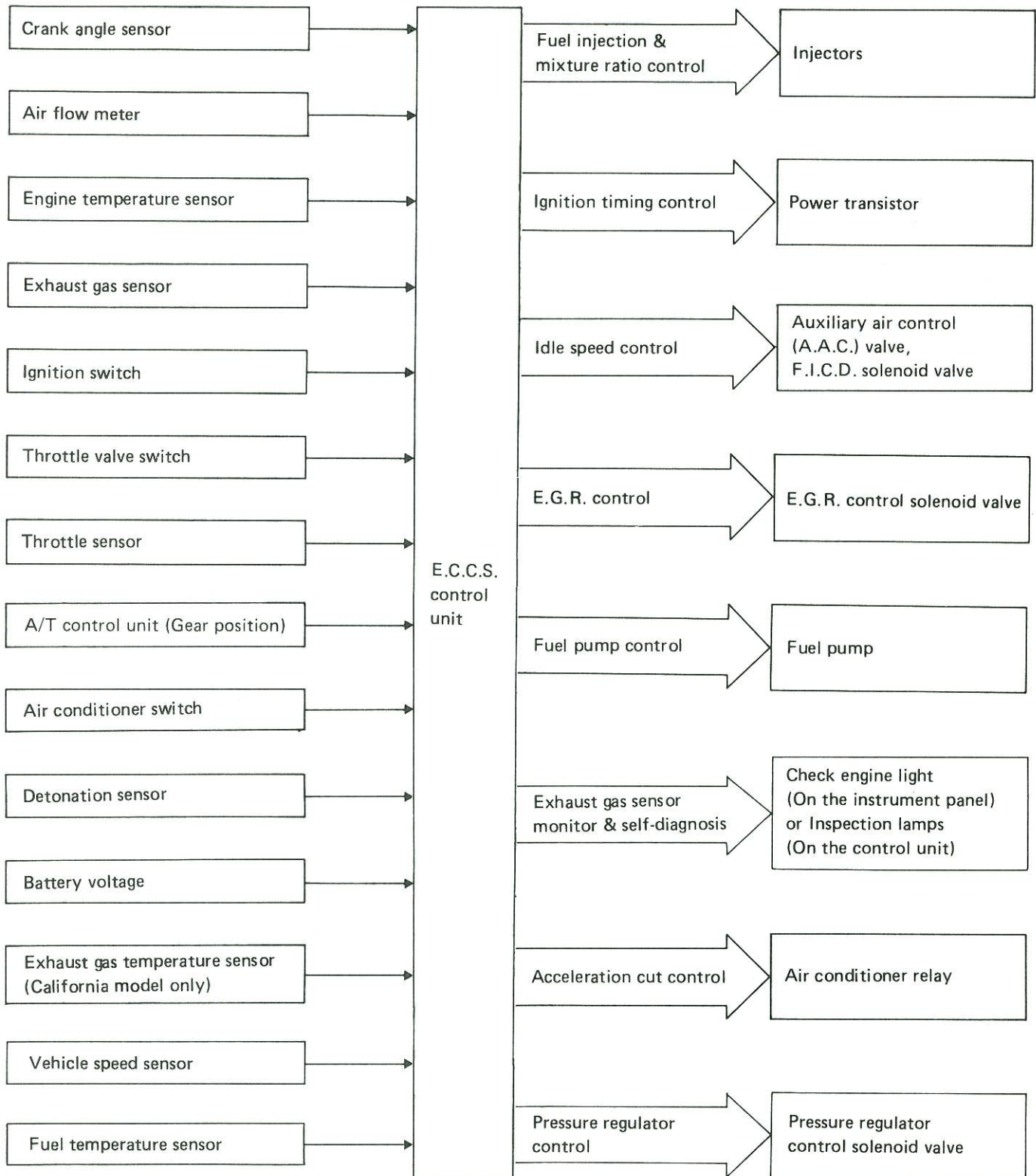


System Diagram



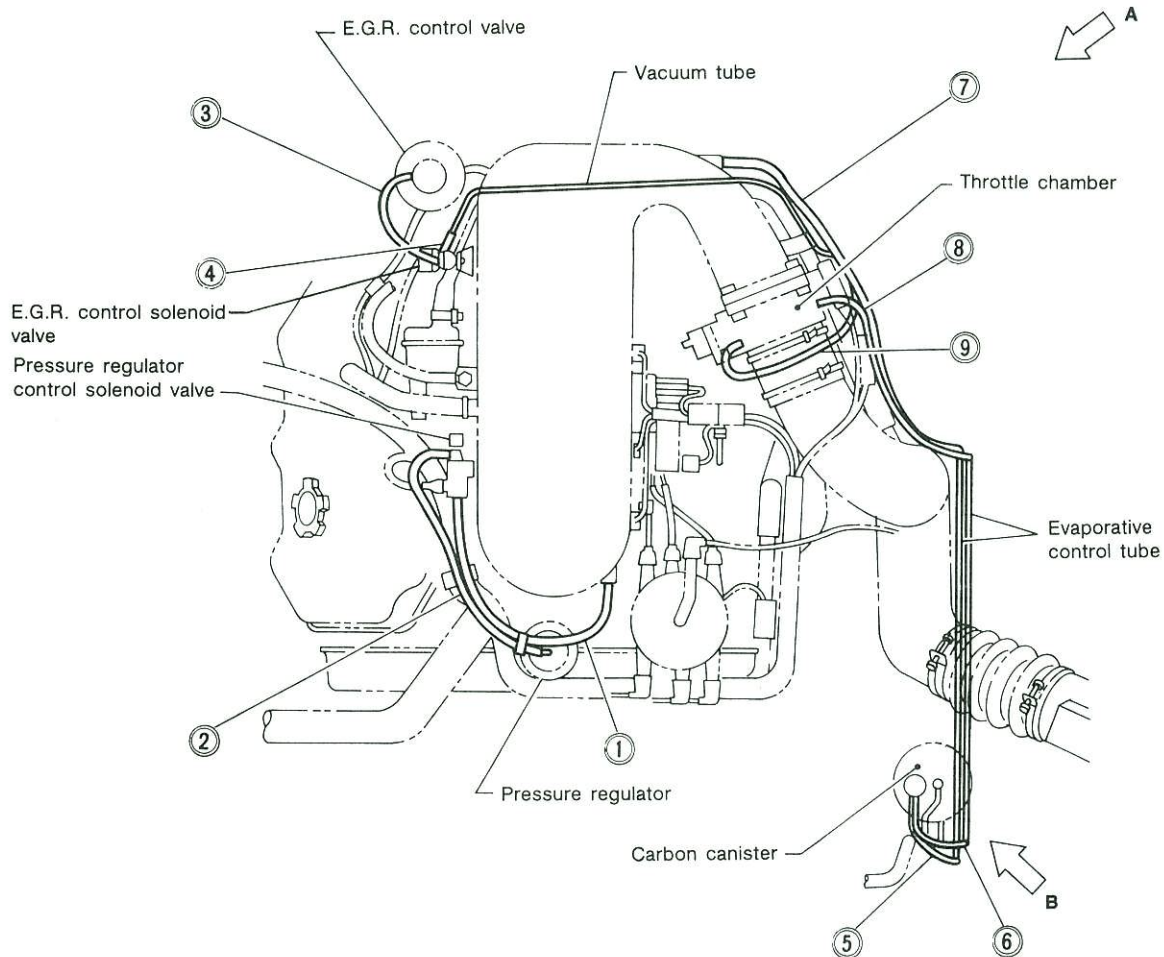
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Chart

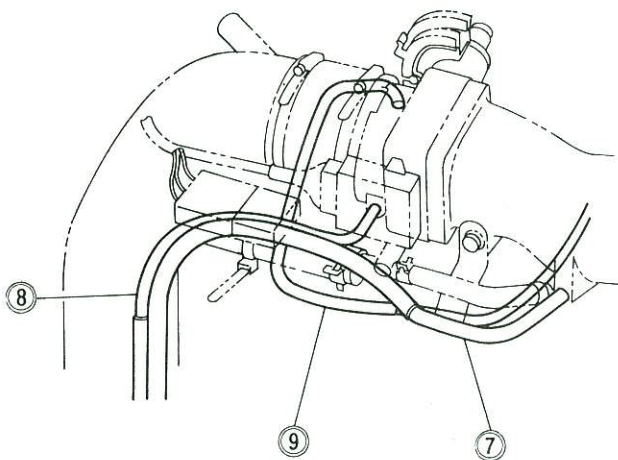


ENGINE AND EMISSION CONTROL OVERALL SYSTEM

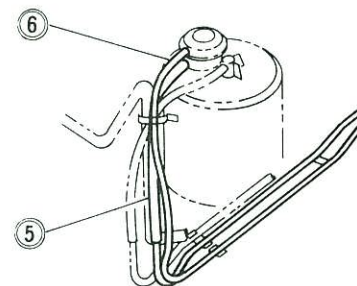
Vacuum Hose Drawing



View A



View B

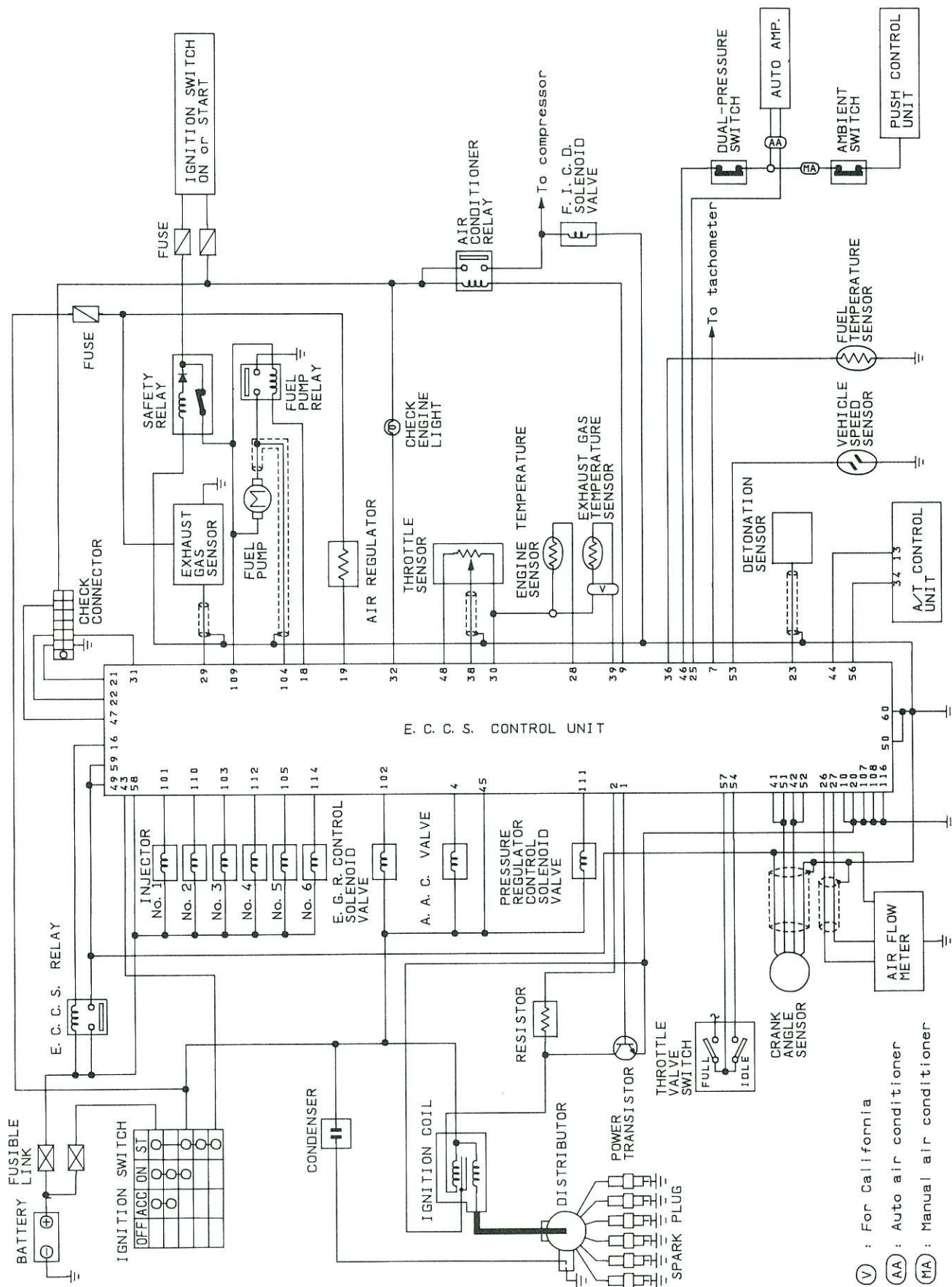


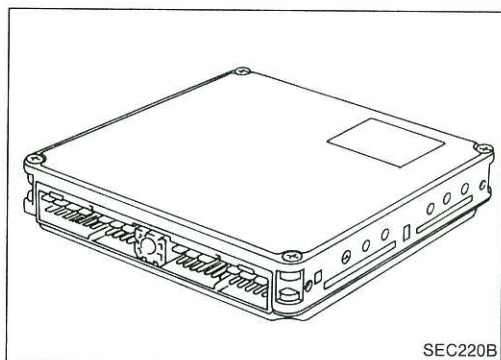
- ① Pressure regulator control solenoid valve to intake manifold collector
- ② Pressure regulator control solenoid valve to pressure regulator
- ③ E.G.R. control valve to E.G.R. control solenoid valve
- ④ E.G.R. control solenoid valve to vacuum tube
- ⑤ Canister (purge port) to evaporative control tube

- ⑥ Canister (vacuum port) to evaporative control tube
- ⑦ Intake manifold collector to evaporative control tube
- ⑧ Throttle chamber to evaporative control tube
- ⑨ Throttle chamber to vacuum tube

ENGINE AND EMISSION CONTROL OVERALL SYSTEM

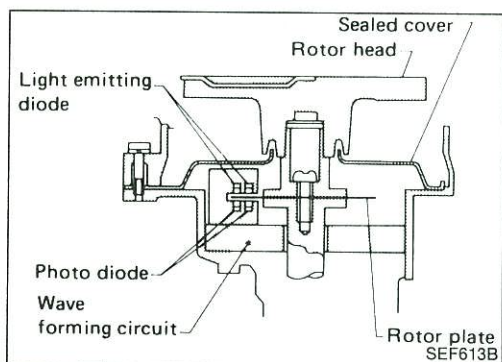
Circuit Diagram





E.C.C.S. Control Unit (E.C.U.)

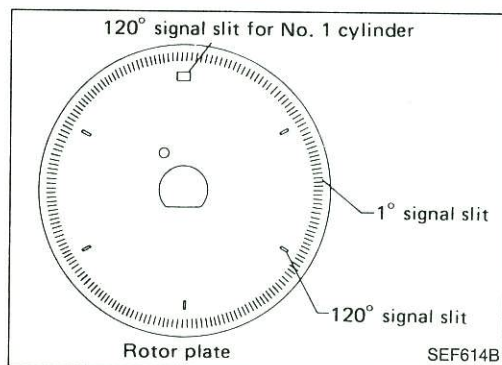
The E.C.U. consists of a microcomputer, inspection lamps, a diagnostic mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.



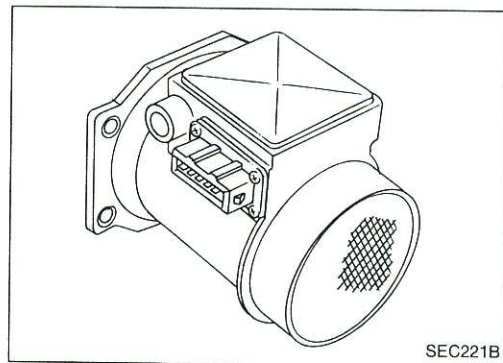
Crank Angle Sensor

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

The crank angle sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 6 slits for 120° signal. Light Emitting Diodes (L.E.D.) and photo diodes are built in the wave-forming circuit.



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

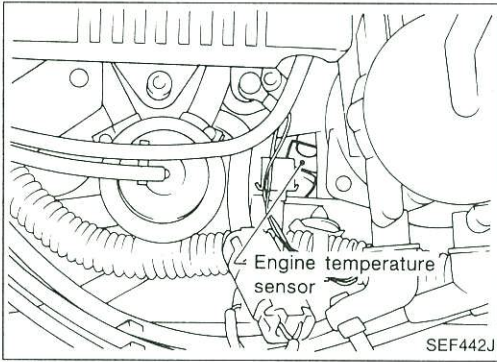


Air Flow Meter

The air flow meter measures the intake air flow rate by taking a part of the entire flow. Measurements are made in such a manner that the E.C.U. 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 depends on the air flow. On the other hand, the temperature of the hot film is automatically controlled to a certain number of degrees.

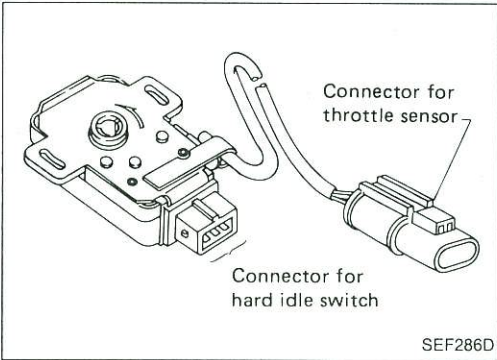
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The E.C.U. knows the air flow by means of the electric change.



Engine Temperature Sensor

The engine temperature sensor, located on the top of water inlet housing, detects engine coolant temperature and transmits a signal to the E.C.U.

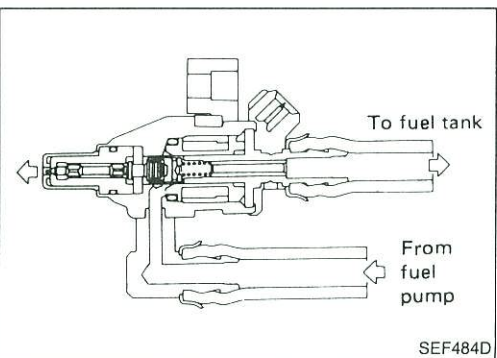
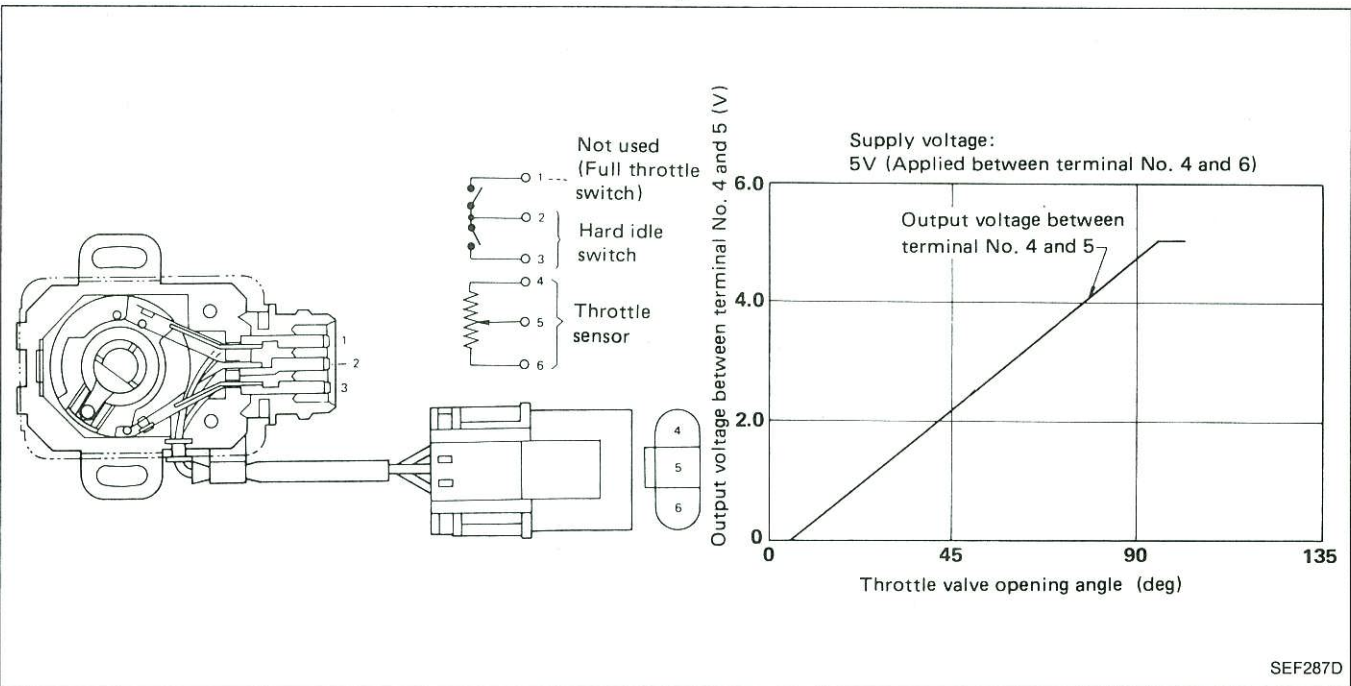
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



Throttle Sensor & Soft/Hard Idle Switch

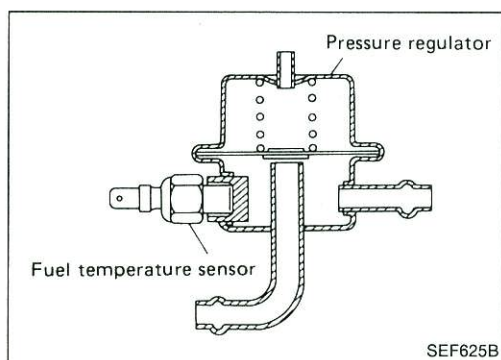
The throttle sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle valve position into output voltage, and emits the voltage signal to the E.C.U. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the E.C.U.

Idle position of the throttle valve is determined by the E.C.U. receiving the signal from the throttle sensor. This system is called "soft idle switch". This one controls engine operation such as fuel cut. On the other hand, "hard idle switch", which is built in the throttle sensor unit, is used not for engine control but for self-diagnosis.



Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the E.C.U. 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 E.C.U. in terms of injection pulse duration.



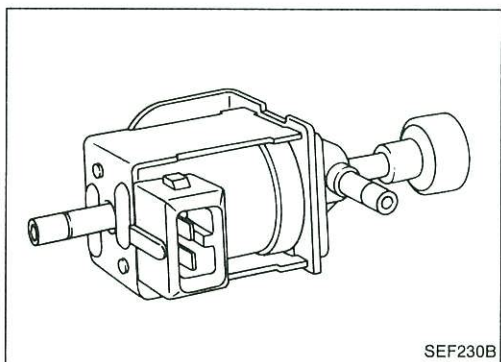
Pressure Regulator

The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm², 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.

Fuel Temperature Sensor

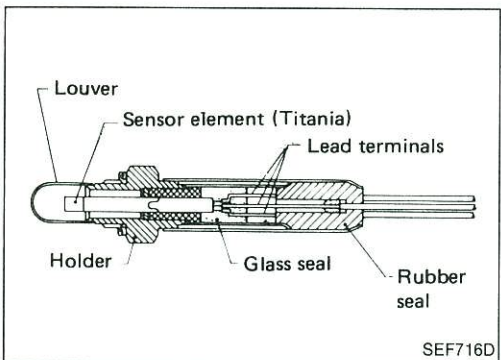
The fuel temperature sensor is built into the pressure regulator, and senses fuel temperature. When the fuel temperature is higher than the specified level, the E.C.U. enriches fuel injected.

Do not remove fuel temperature sensor from pressure regulator. Always replace as an assembly.



Pressure Regulator Control Solenoid Valve

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

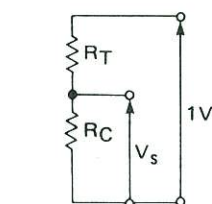
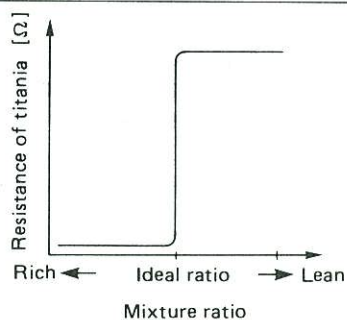


Exhaust Gas Sensor

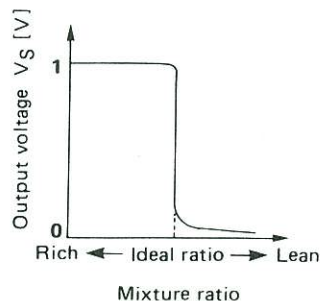
The exhaust gas sensor, located in the exhaust tube, monitors the oxygen level in the exhaust gas.

This sensor is made of ceramic titania, the electric resistance of which drastically changes at the ideal air-fuel ratio.

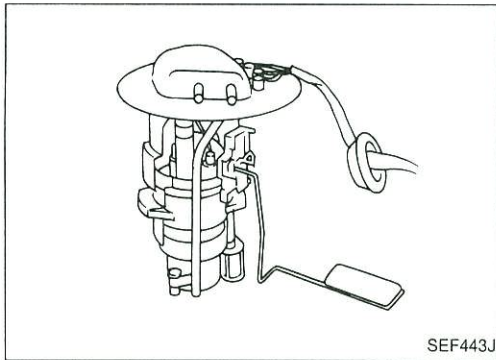
The E.C.U. supplies the sensor with approximately 1V and then measures the output voltage depending on its resistance. In order to activate the sensor element, it is equipped with a heater.



R_T : Resistance of titania
 R_C : Comparative resistance (equipped in the E.C.U.)

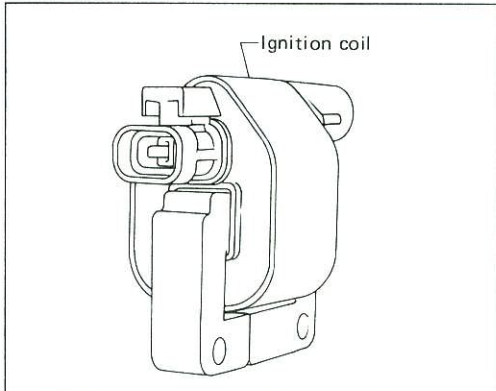


SEF285D



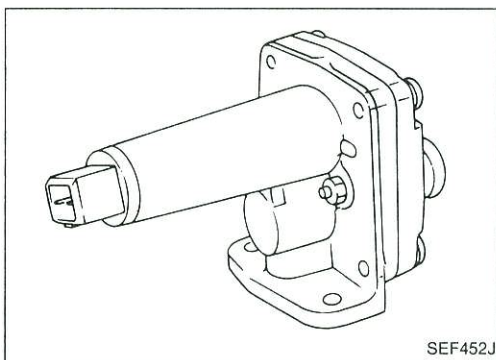
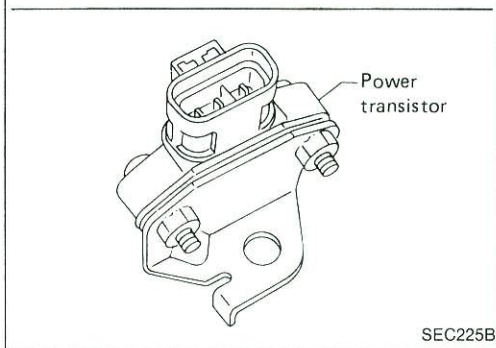
Fuel Pump

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



Power Transistor & Ignition Coil

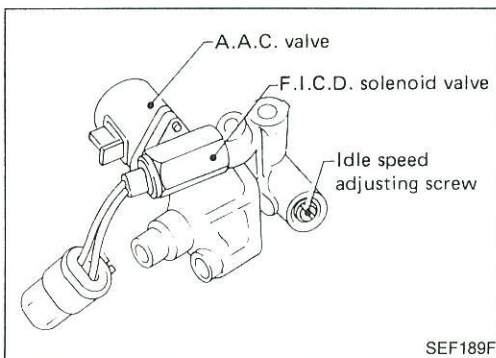
The ignition signal from the E.C.U. is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.



Air Regulator

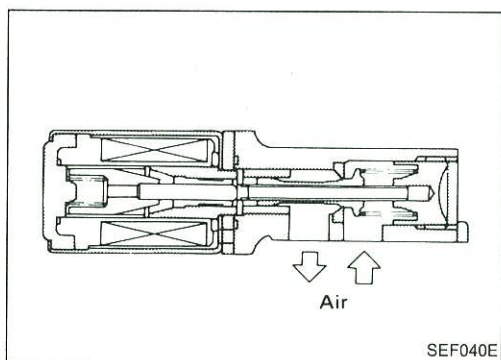
The air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.

A bimetal, heater and rotary shutter are built into the air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.



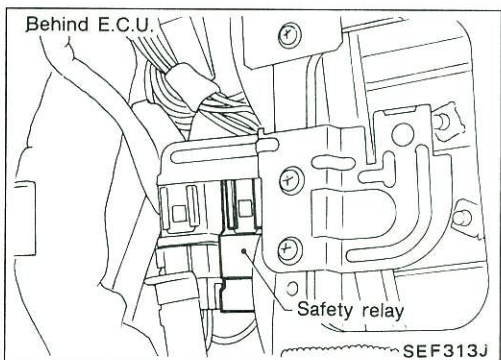
Idle Air Adjusting (I.A.A.) Unit

The I.A.A. unit is made up of the A.A.C. valve, F.I.C.D. solenoid valve and idle adjusting screw. It receives the signal from the E.C.U. and controls the idle speed at the preset value.



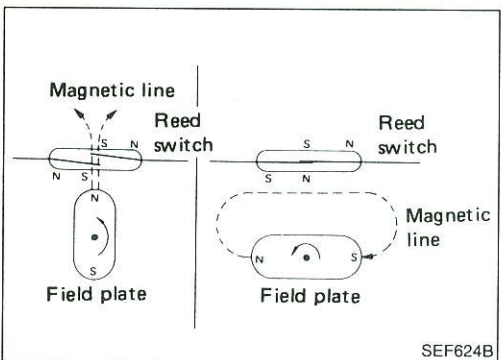
Auxiliary Air Control (A.A.C.) Valve

The E.C.U. actuates the A.A.C. valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the A.A.C. valve.



Safety Relay

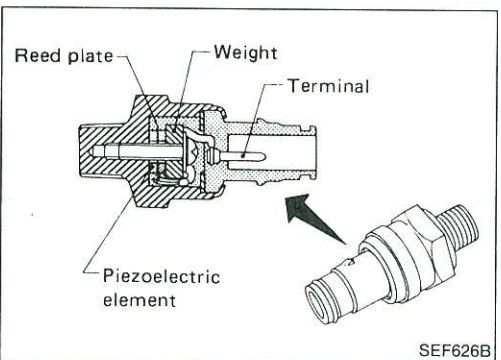
The safety relay prevents electrical damage to the E.C.U. and injectors when battery terminals are connected in reverse. The safety relay is built into the fuel pump control circuit.



Vehicle Speed Sensor

The vehicle speed sensor provides a vehicle speed signal to the E.C.U.

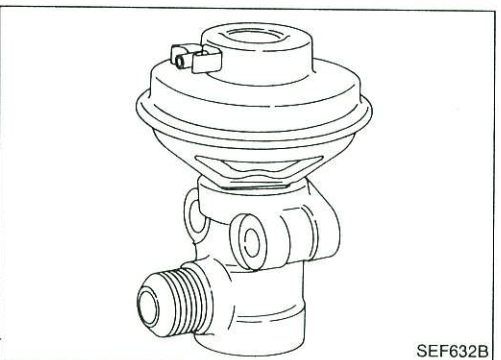
The speed sensor consists of a reed switch, which is installed in the speedometer unit and transforms vehicle speed into a pulse signal.



Detonation Sensor

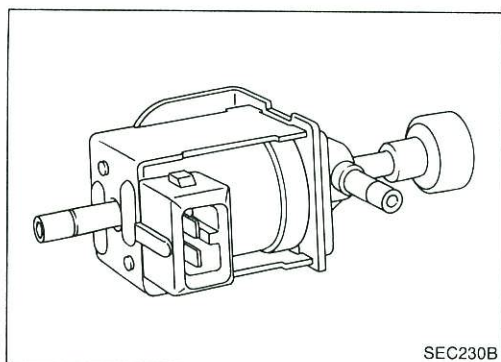
The detonation sensor is attached to the cylinder block and senses engine knocking conditions.

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 delivered as output.



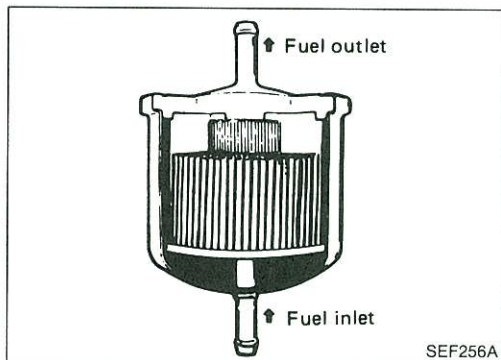
E.G.R. Control Valve

The E.G.R. control 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.



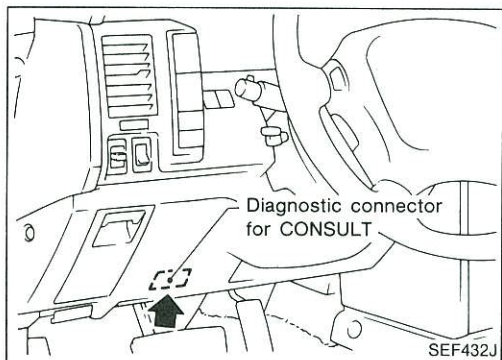
E.G.R. Control Solenoid Valve

The E.G.R. system is controlled only by the E.C.U. At both low- and high-speed revolutions of engine, the solenoid valve turns on and accordingly the E.G.R. valve cuts the exhaust gas leading to the intake manifold.



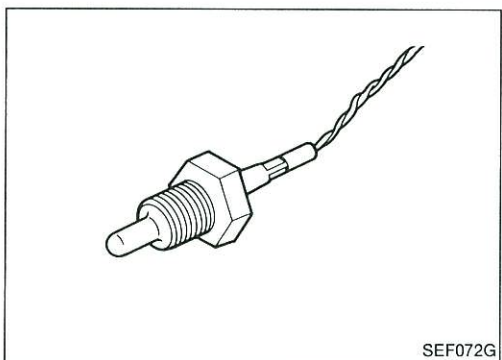
Fuel Filter

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



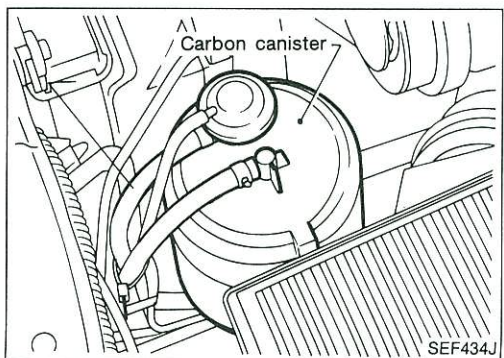
Diagnostic Connector for CONSULT

The diagnostic connector for CONSULT is located in the instrument lower panel, to the rear of the hood release handle.



Exhaust Gas Temperature Sensor

The exhaust gas temperature sensor monitors in exhaust gas temperature and transmits a signal to the E.C.U. 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.

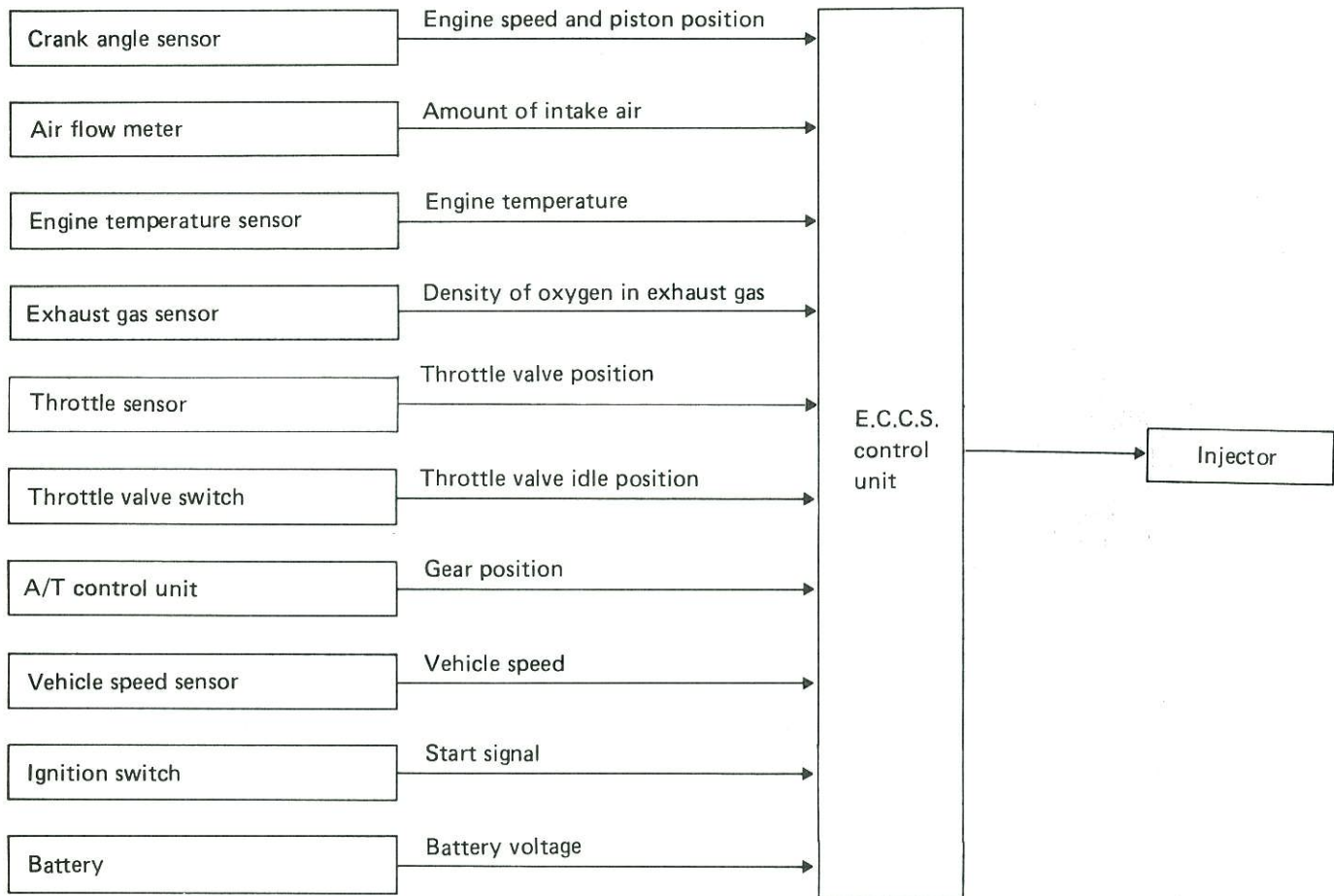


Carbon Canister

The carbon canister is filled with active charcoal to absorb evaporative gases produced in the fuel tank. These absorbed gases are then delivered to the intake manifold by manifold vacuum for combustion purposes.

Fuel Injection Control

INPUT/OUTPUT SIGNAL LINE



BASIC FUEL INJECTION CONTROL

The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the E.C.U. The basic amount of fuel injected is a program value mapped in the E.C.U. ROM memory. In other words, the program value is preset by engine operating conditions determined by input signals (for engine rpm and air intake) from both the crank angle sensor and the air flow meter.

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.

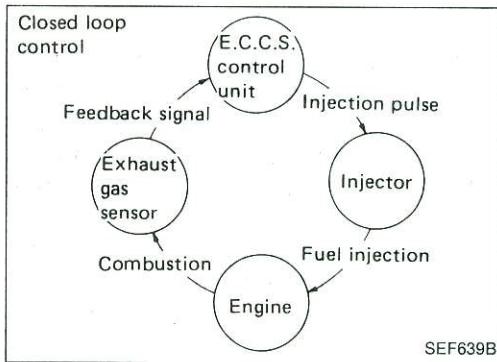
<Fuel increase>

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

<Fuel decrease>

- 1) During deceleration

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION



Fuel Injection Control (Cont'd)

MIXTURE RATIO FEEDBACK CONTROL

Mixture ratio feedback system is designed to precisely control the mixture ratio to the stoichiometric point so that the three-way catalyst can reduce CO, HC and NO_x emissions. This system uses an exhaust gas sensor in the exhaust manifold to check the air-fuel ratio. The control unit adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the exhaust gas sensor. This feedback signal is then sent to the E.C.U. to control the amount of fuel injection to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., air flow meter hot film) and changes during operation (injector clogging, etc.) of E.C.C.S. parts which directly affect the mixture ratio.

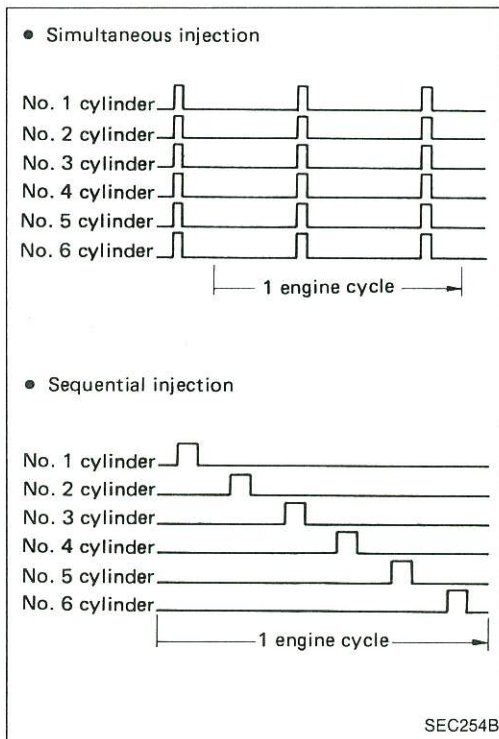
Accordingly, a difference between the basic and theoretical mixture ratios is quantitatively monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.

Fuel Injection Control (Cont'd)

FUEL INJECTION TIMING

Two types of fuel injection systems are used — simultaneous injection and sequential injection. In the former, fuel is injected into all six cylinders simultaneously twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the E.C.U. to the six injectors two times for each engine cycle.

In the sequential injection system, fuel is injected into each cylinder during each engine cycle according to the firing order. When engine is starting, fuel is injected into all six cylinders simultaneously twice a cycle.



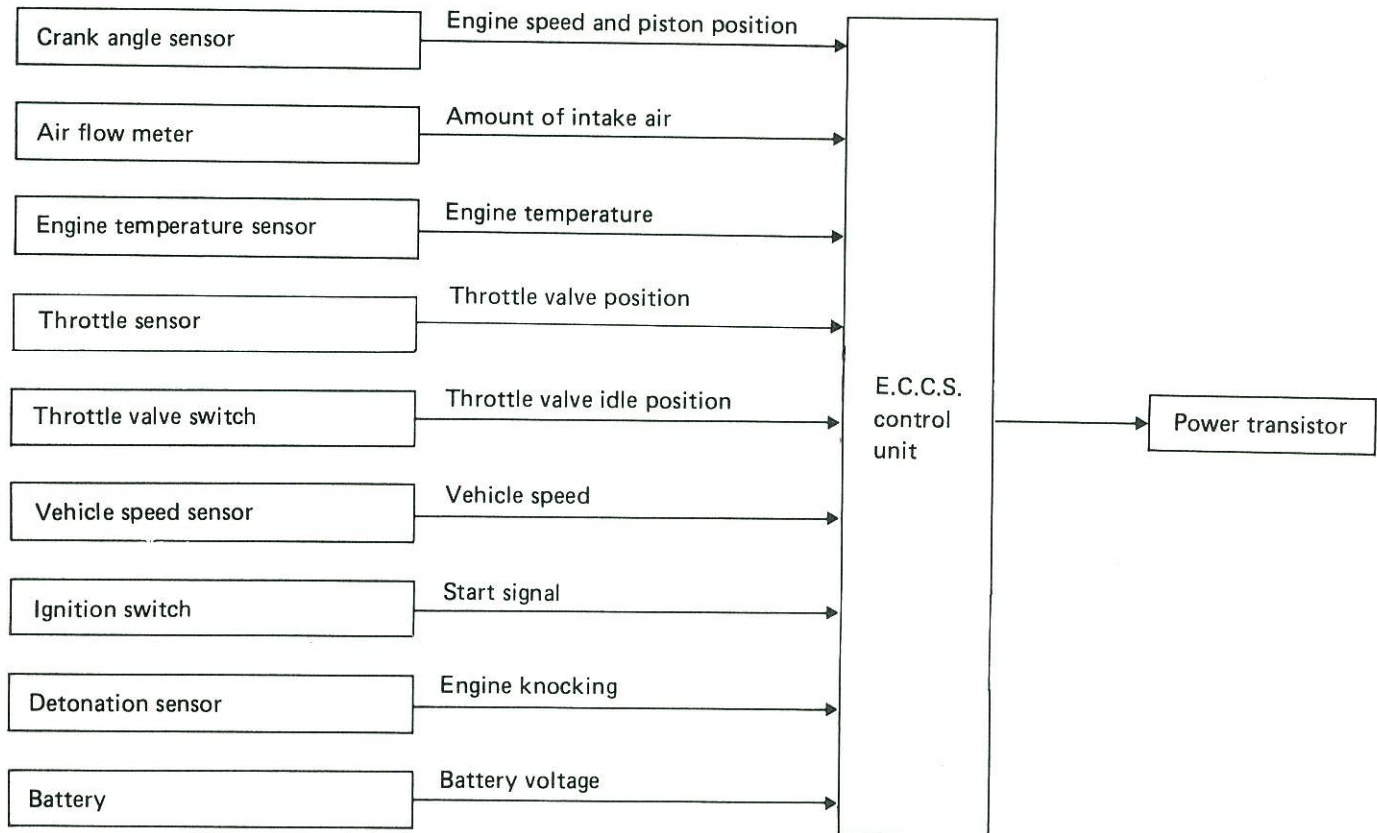
FUEL SHUT-OFF

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

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Ignition Timing Control

INPUT/OUTPUT SIGNAL LINE



Ignition Timing Control (Cont'd)

SYSTEM DESCRIPTION

The ignition timing is controlled by the E.C.U. in order to maintain the best air-fuel ratio in response to every running condition of the engine. The ignition timing data is stored in the ROM located in the E.C.U., in the form of the map shown below.

The E.C.U. detects information such as the injection pulse width and crank angle sensor signal which varies every moment. Then responding to

this information, ignition signals are transmitted to the power transistor.

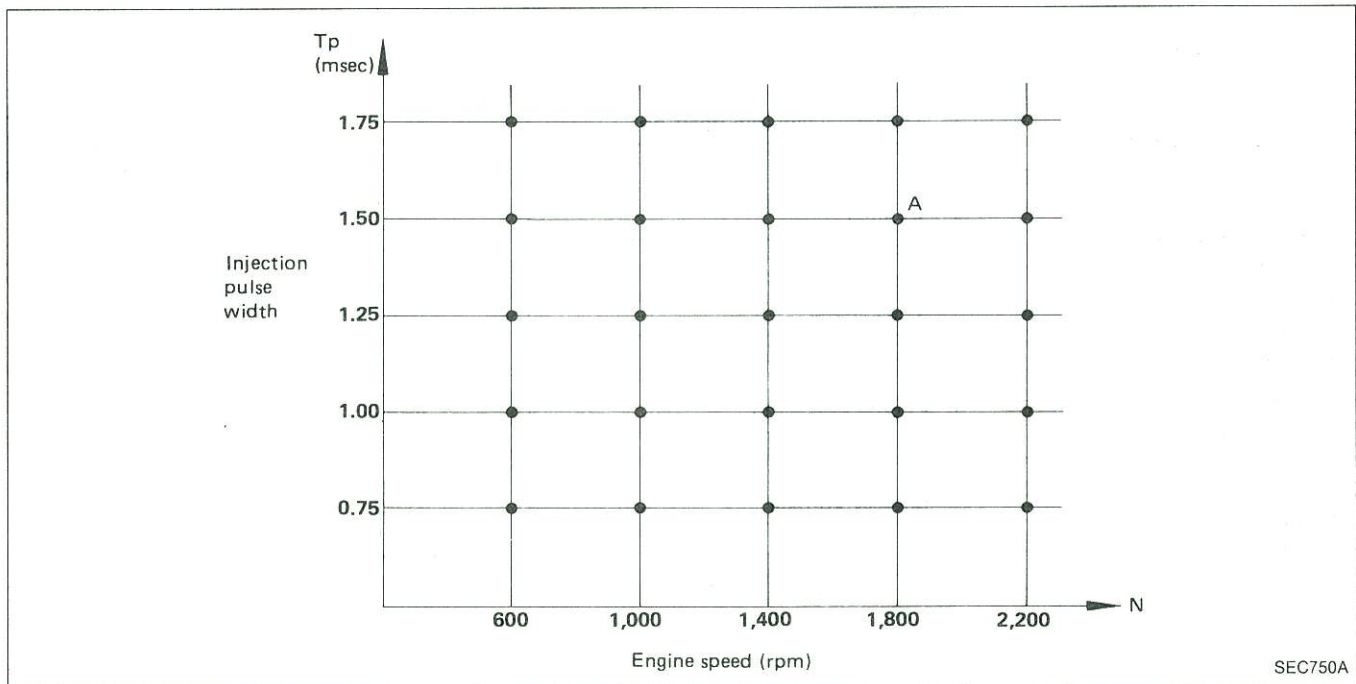
e.g. N: 1,800 rpm, Tp: 1.50 msec

A °B.T.D.C.

In addition to this,

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

the ignition timing is revised by the E.C.U. according to the other data stored in the ROM.

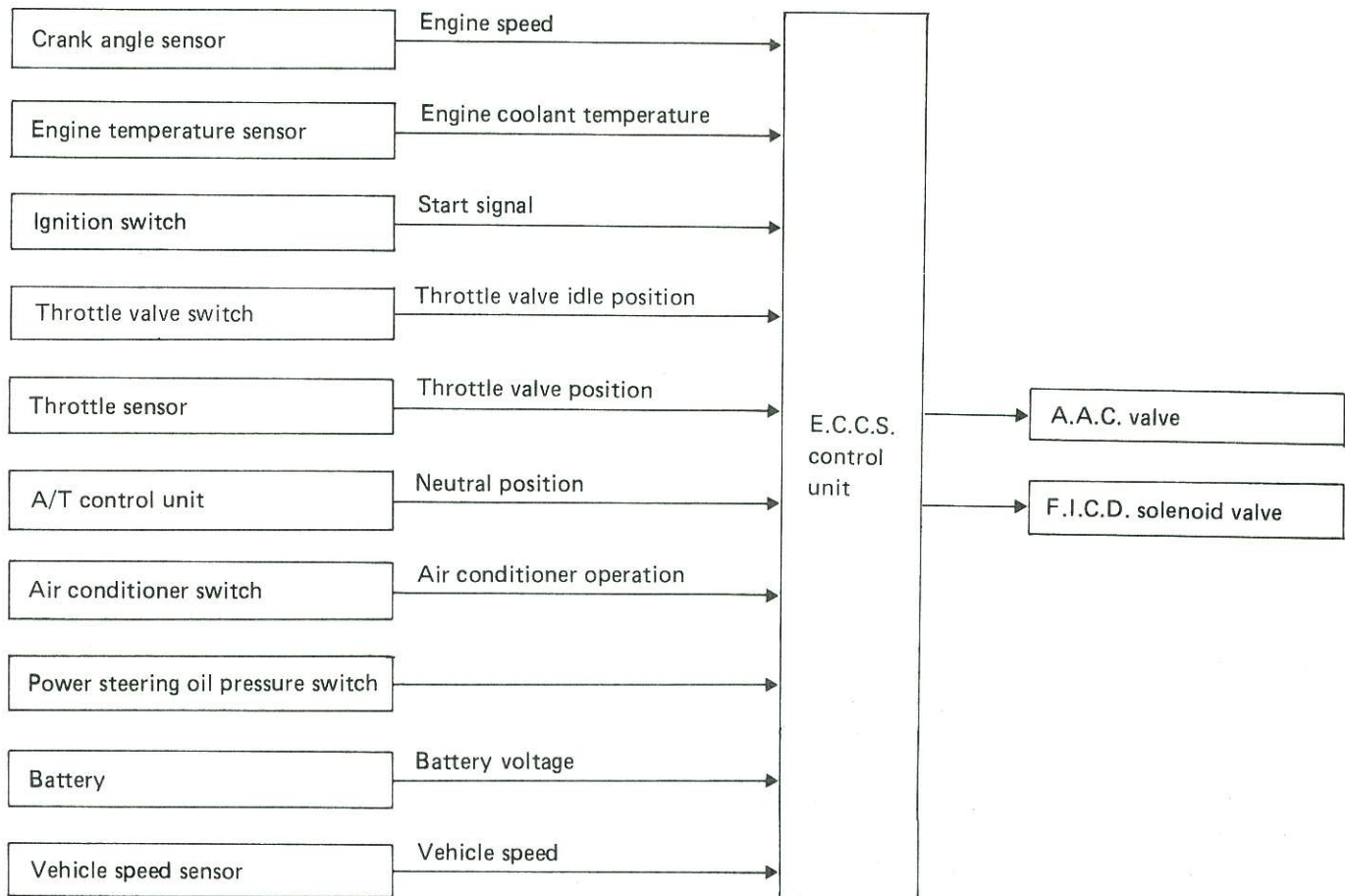


The retard system by detonation sensor is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, even if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

However, if engine knocking occurs, the detonation sensor monitors the condition and the signal is transmitted to the E.C.C.S. control unit. After receiving it, the control unit retards the ignition timing to avoid the knocking condition.

Idle Speed Control

INPUT/OUTPUT SIGNAL LINE

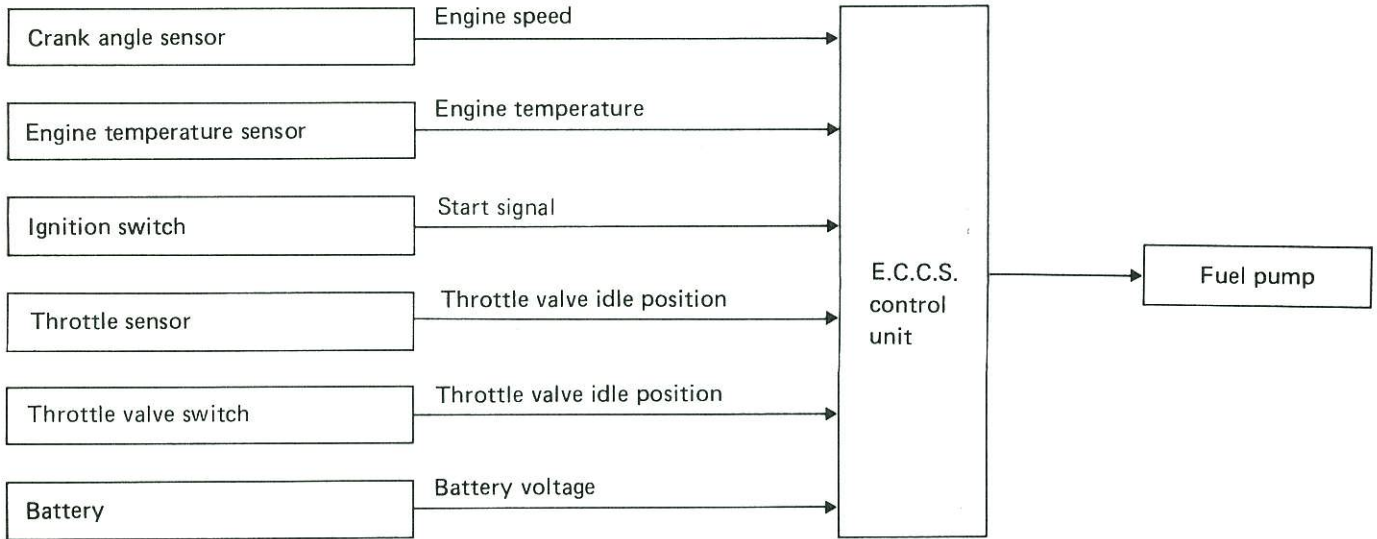


SYSTEM DESCRIPTION

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 A.A.C. valve. The A.A.C. valve changes the opening of the air by-pass passage to control the amount of auxiliary air. The opening of the valve is varied to allow for optimum control of the engine idling speed. The crank angle sensor detects the actual engine speed and sends a signal to the E.C.U. The E.C.U. then controls the ON/OFF time of the A.A.C. valve so that engine speed coincides with the target value memorized in ROM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ROM is determined by taking into consideration various engine conditions, such as warming up and during deceleration, fuel consumption, and engine load (air conditioner, electrical load).

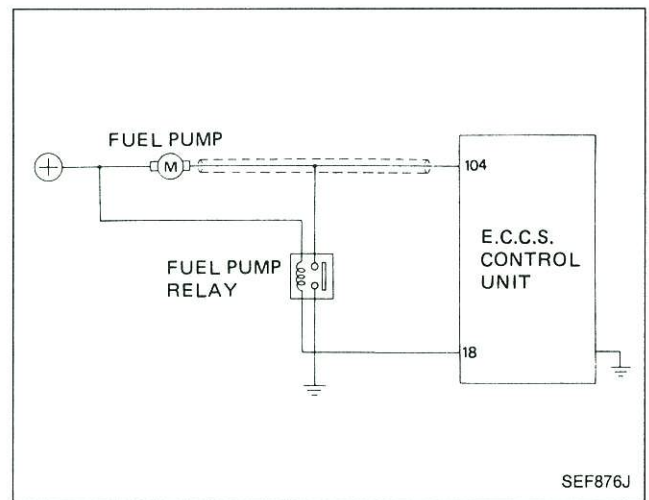
Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

When the fuel pump terminal voltage drops, pump speed, current consumption and fuel discharge decrease. This terminal voltage therefore is finely controlled corresponding to engine operating conditions in order to reduce power consumption and compartment noise level. The control unit receives various signals from sensors and switches and determines operating conditions of the engine. It then transmits a 20 Hz pulse signal to turn ON/OFF the grounding circuit of the fuel pump. The voltage is controlled by changing the mean voltage applied to the pump terminal by varying this on/off time ratio. That is, the longer the on-time in a cycle, the higher the mean voltage becomes, and vice versa. If the on-time reaches 100%, battery voltage is applied directly to the pump. The pump is driven directly by this battery voltage for several seconds after turning on the ignition switch when the engine is cold, when starting, and when the engine is hot.



Fuel pump ON-OFF control

1) Fuel pump ON-OFF control (terminal 104)

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

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Fuel Pump Control (Cont'd)

- 2) Fuel pump relay ON-OFF control (terminal ⑱)

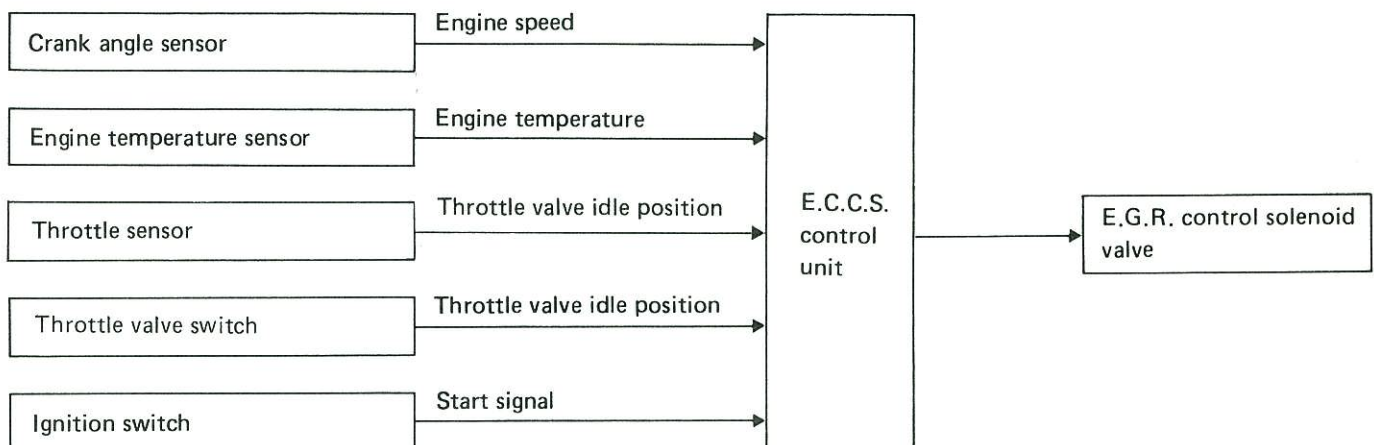
Condition	Fuel pump relay operation	Fuel pump operation
Ignition switch is turned to ON	ON for 5 seconds	Operates for 5 seconds
When engine is starting [Engine temp.: above 100°C (212°F)]	ON	Operates
After started [Engine temp.: above 100°C (212°F)]	ON for 30 seconds	Operates
When engine stalls and except as shown above	OFF	Stops

Fuel pump voltage control

Conditions	Voltage
5 seconds after ignition switch is turned to ON	0.1 - 0.5V
Engine cranking	
30 seconds after engine start [above 50°C (122°F)]	
Engine temp. above 100°C (212°F) [Except idle position]	
Engine temp. below 10°C (50°F)	9 - 14V
Except above	

E.G.R. (Exhaust Gas Recirculation) Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

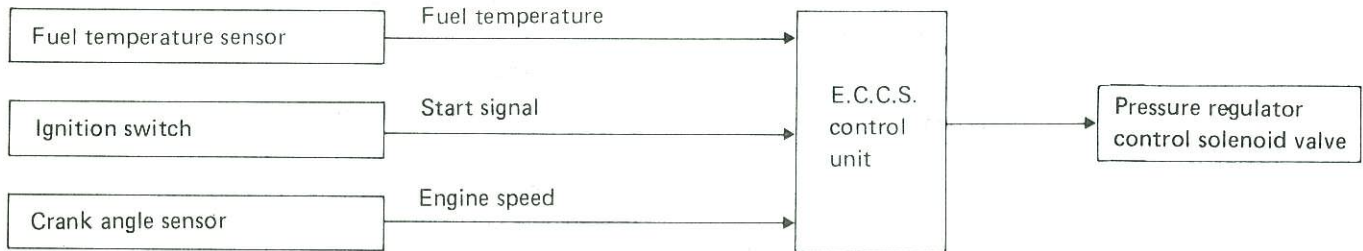
In addition, a system is provided which precisely cuts and controls port vacuum applied to the E.G.R. valve to suit engine operating conditions. This cut-and-control operation is accomplished through the E.C.U. When the E.C.U. detects any of the following conditions, current flows through the solenoid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

This causes the port vacuum to be discharged into the atmosphere so that the E.G.R. control valve remains closed.

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

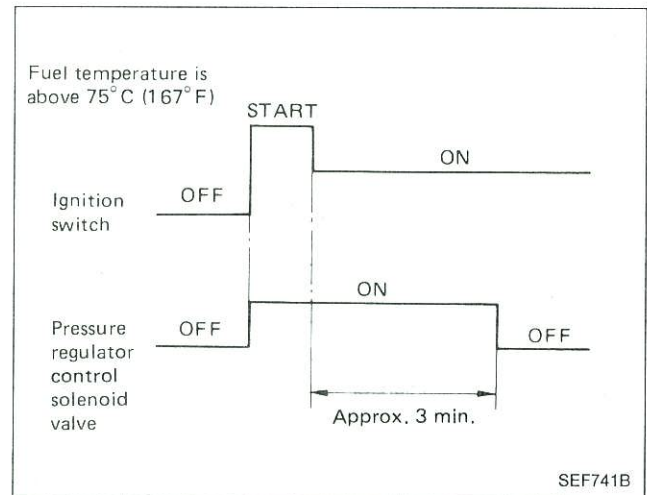
Fuel Pressure Regulator Control

INPUT/OUTPUT SIGNAL LINE



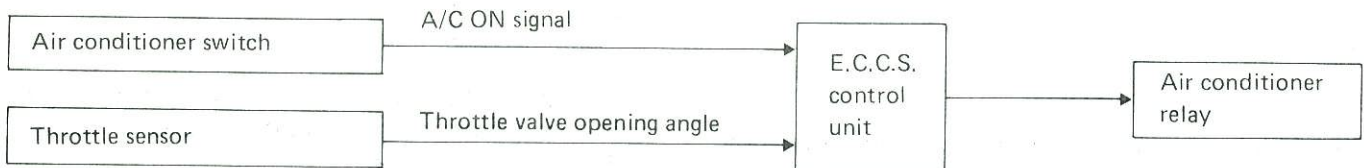
SYSTEM DESCRIPTION

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



Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



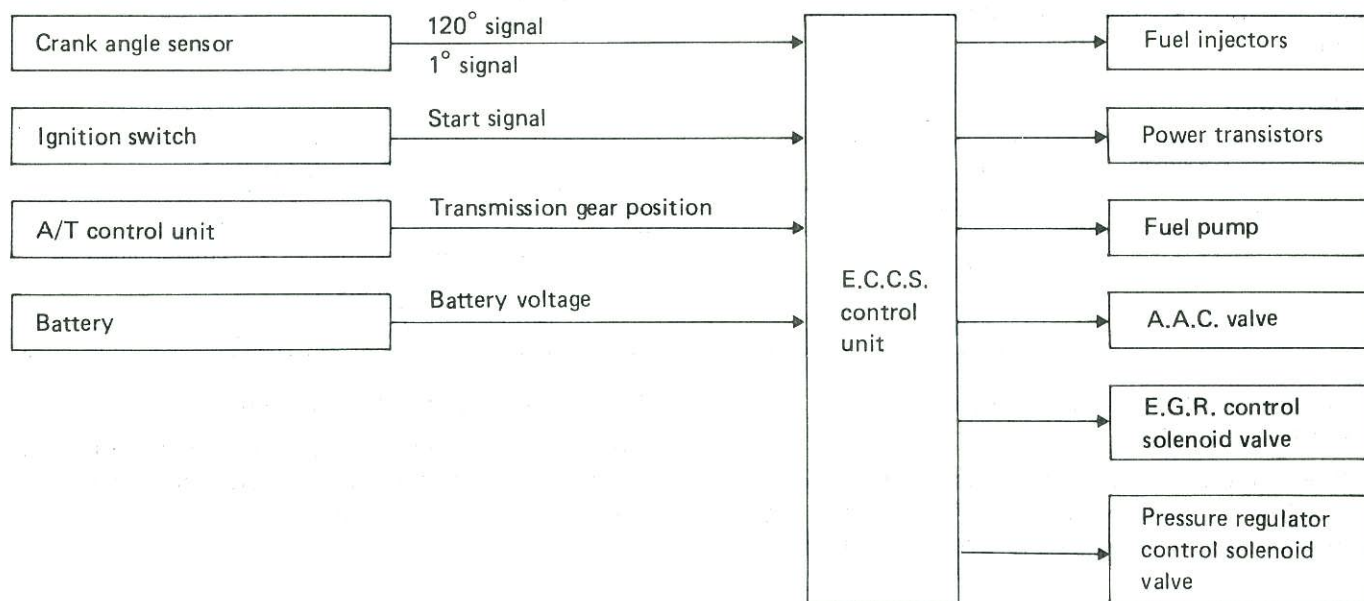
SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. This system improves acceleration when the air conditioner is used.

Fail-safe System

C.P.U. MALFUNCTION OF E.C.U. AND CRANK ANGLE SENSOR MALFUNCTION

Input/output signal line



OUTLINE

The fail-safe system makes engine starting possible if there is something malfunctioning in the E.C.U.'s C.P.U. circuit, or if there is a disconnection or short/open circuit in the crank angle sensor circuit. In former models, engine starting was difficult under the conditions mentioned above. But with the provisions provided in this back-up system, it is possible to start the engine.

Fail-safe system activating condition when crank angle sensor is malfunctioning

The fail-safe mode operation starts immediately after all of the following conditions have been satisfied for several seconds.

- (1) No pulse of 120° signal (reference signal) detected for several seconds, or 1° signal (position signal) is equivalent to 0 rpm.
- (2) Ignition switch in START
- (3) Battery voltage is greater than 10 volts with ignition switch ON.
- (4) The neutral switch is ON, or the inhibitor switch is in the "P" or "N" position.
- (5) When ignition switch is in START, battery voltage is at least 1 volt lower than when ignition switch is ON.

Fail-safe system activating condition when E.C.U. is malfunctioning

The computing function of the E.C.U. was judged to be malfunctioning.

When the fail-safe system activates, i.e. if the E.C.U. detects a malfunction condition in the C.P.U. of E.C.U. or crank angle sensor circuit, the CHECK ENGINE LIGHT on the instrument panel lights to warn the driver.

Engine control, with fail-safe system, operates when E.C.U. or crank angle sensor is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, engine idle speed, E.G.R. operation and pressure regulator operation are controlled under certain limitations.

Cancellation of fail-safe system when E.C.U. or crank angle sensor 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 above-mentioned activating conditions are satisfied after turning the ignition switch from OFF to ON.

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Fail-safe System (Cont'd)

AIR FLOW METER MALFUNCTION

If the air flow meter output voltage is above or below the specified value, the E.C.U. senses an air flow meter malfunction. In case of a malfunction, the throttle sensor substitutes for the air flow meter.

Though air flow meter is malfunctioning, it is possible to drive the vehicle and start the engine. But engine speed will not rise more than 2,000 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

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

ENGINE TEMPERATURE SENSOR MALFUNCTION

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

Operation

Condition	Engine temperature decided
Just as ignition switch is turned ON or Start	20°C (68°F)
More than 6 minutes after ignition ON or Start	80°C (176°F)
Except as shown above	20 - 80°C (68 - 176°F) (Depends on the time)

THROTTLE SENSOR MALFUNCTION

When throttle sensor output voltage is below or above the specified value, throttle sensor output is fixed at the preset value.

DETONATION SENSOR MALFUNCTION

When the output signal of the detonation sensor is abnormal, the E.C.U. judges it to be malfunctioning. When detonation sensor is malfunctioning, ignition timing will retard according to operating conditions.

IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

PREPARATION

1. Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - E.C.U. harness connector
 - Vacuum hoses
 - Air intake system (Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - E.G.R. control valve operation
 - Throttle valve
2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. When checking idle rpm, ignition timing and

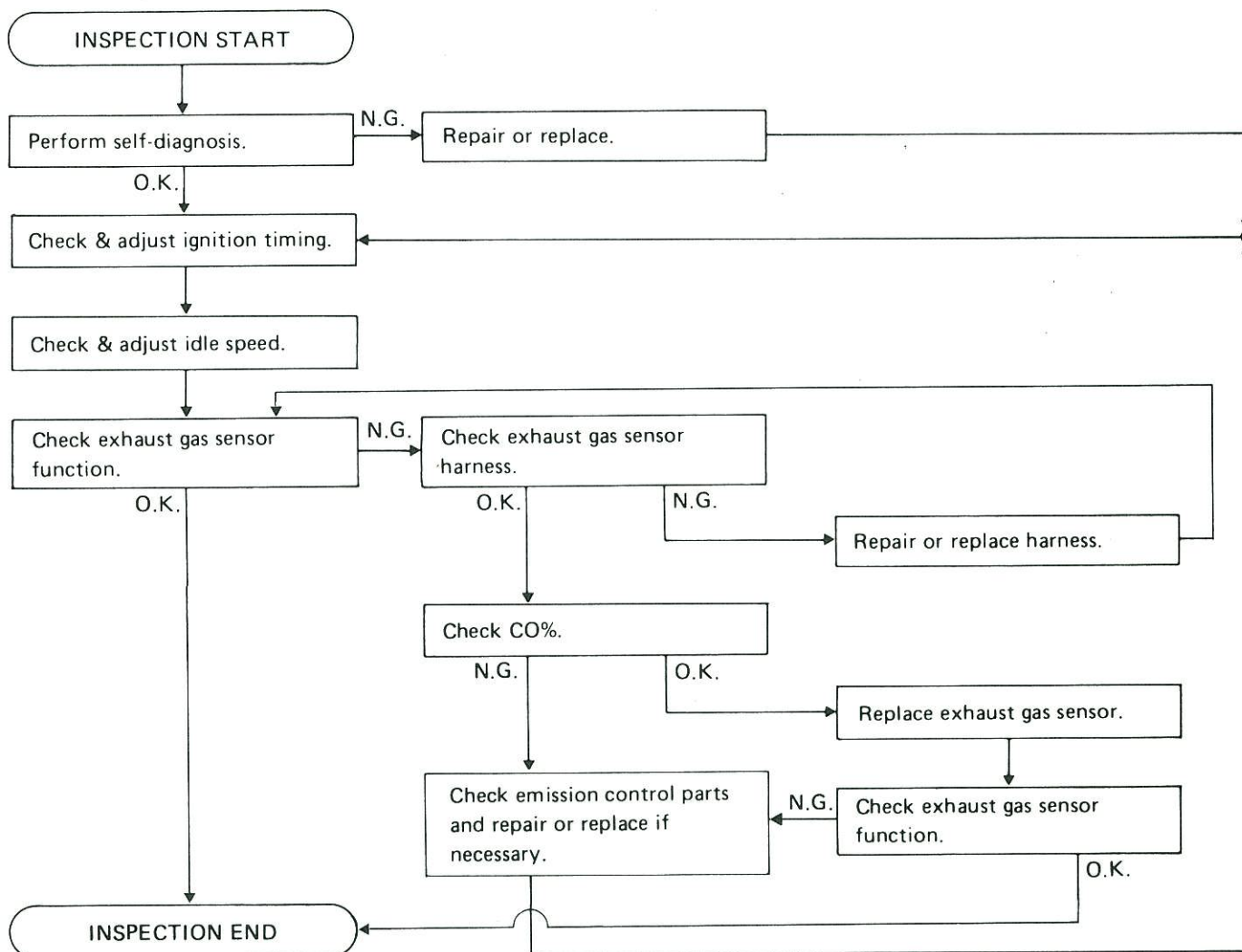
mixture ratio, checks should be carried out while shift lever is in "N" position.

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.

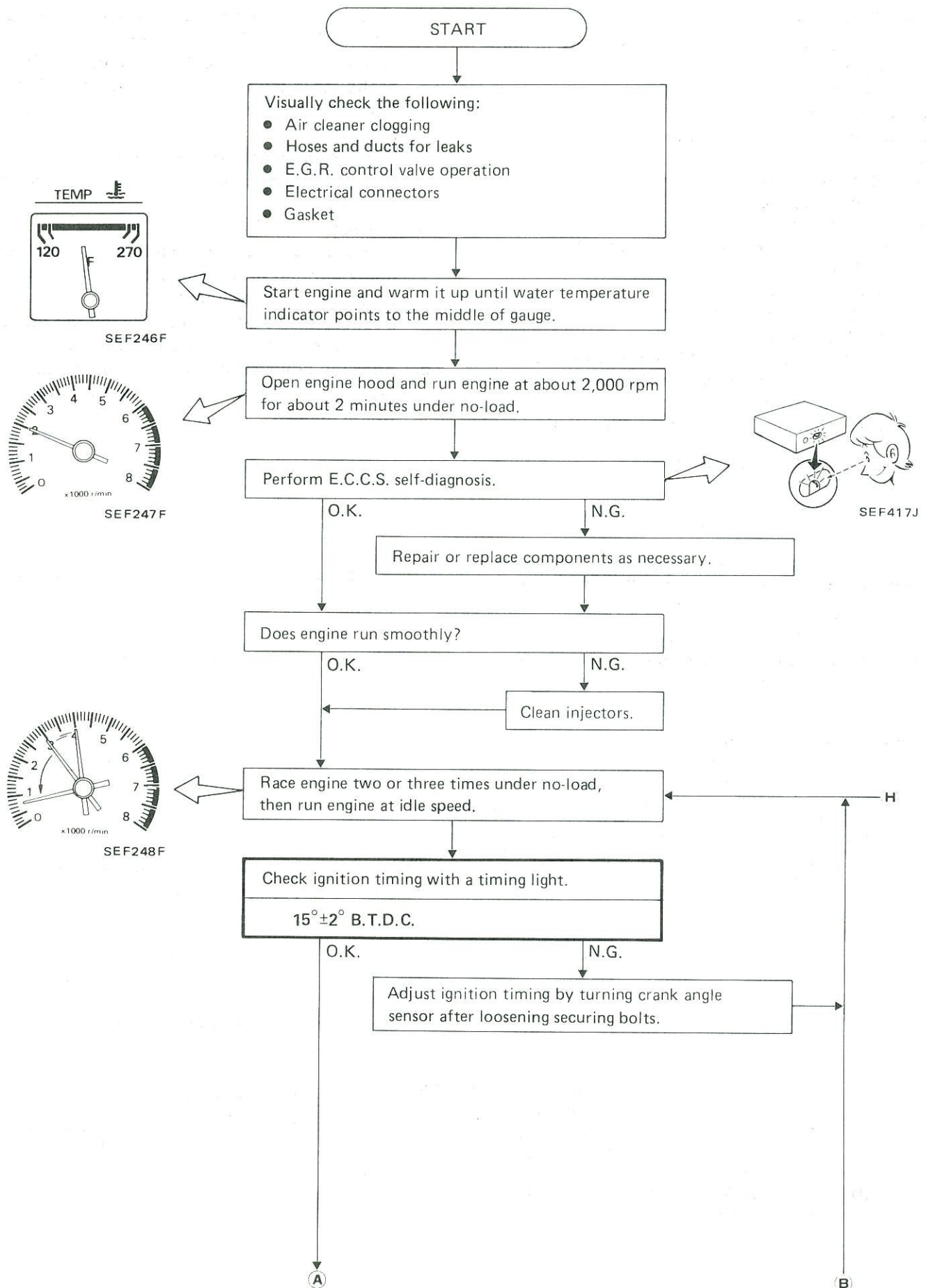
WARNING:

- a. When selector lever is shifted to "D" position, apply parking brake and block both front and rear wheels with chocks.
- b. Depress brake pedal while racing the engine to prevent forward surge of vehicle.
- c. After the adjustment has been made, shift the lever to the "N" or "P" position and remove wheel chocks.

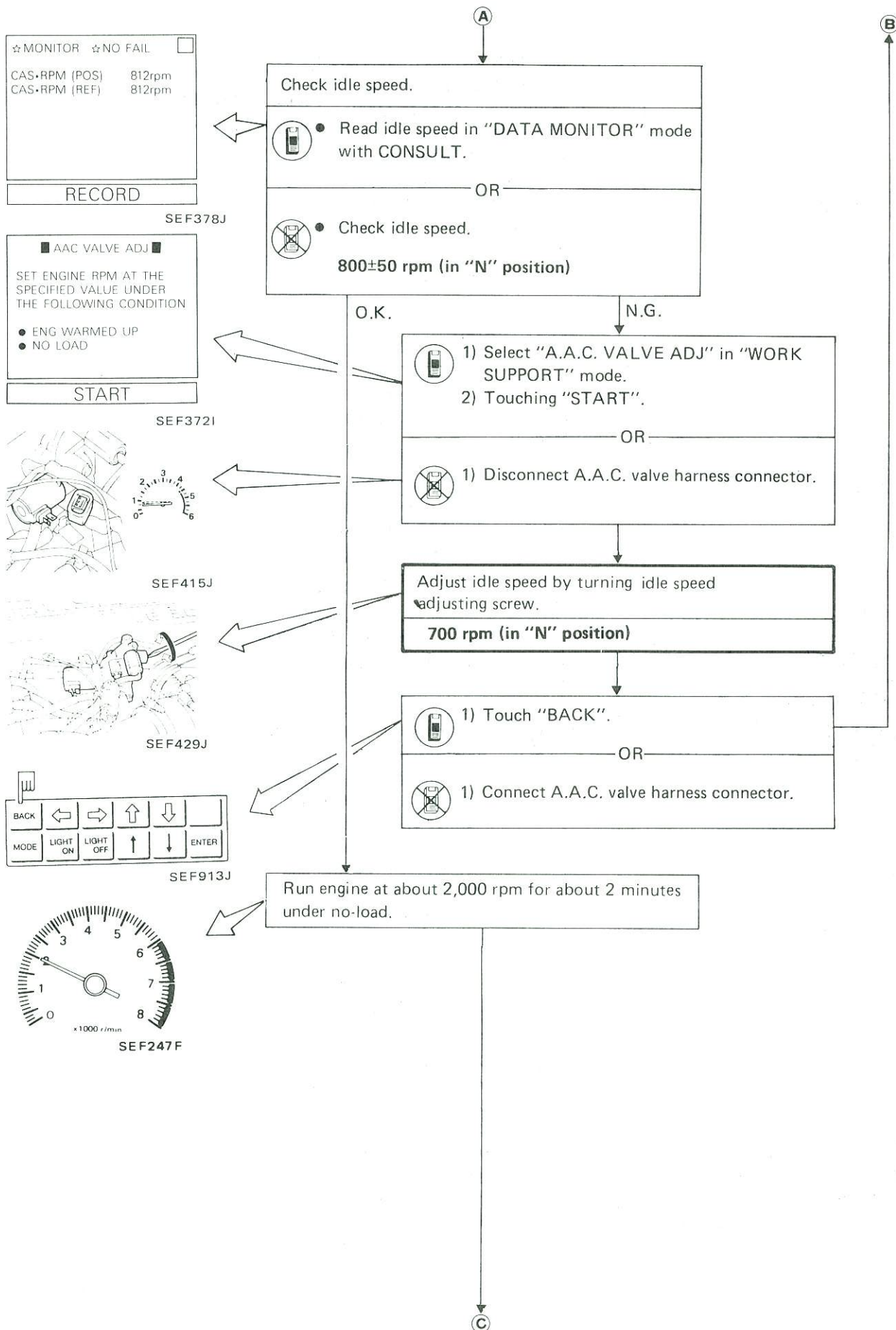
Overall inspection sequence



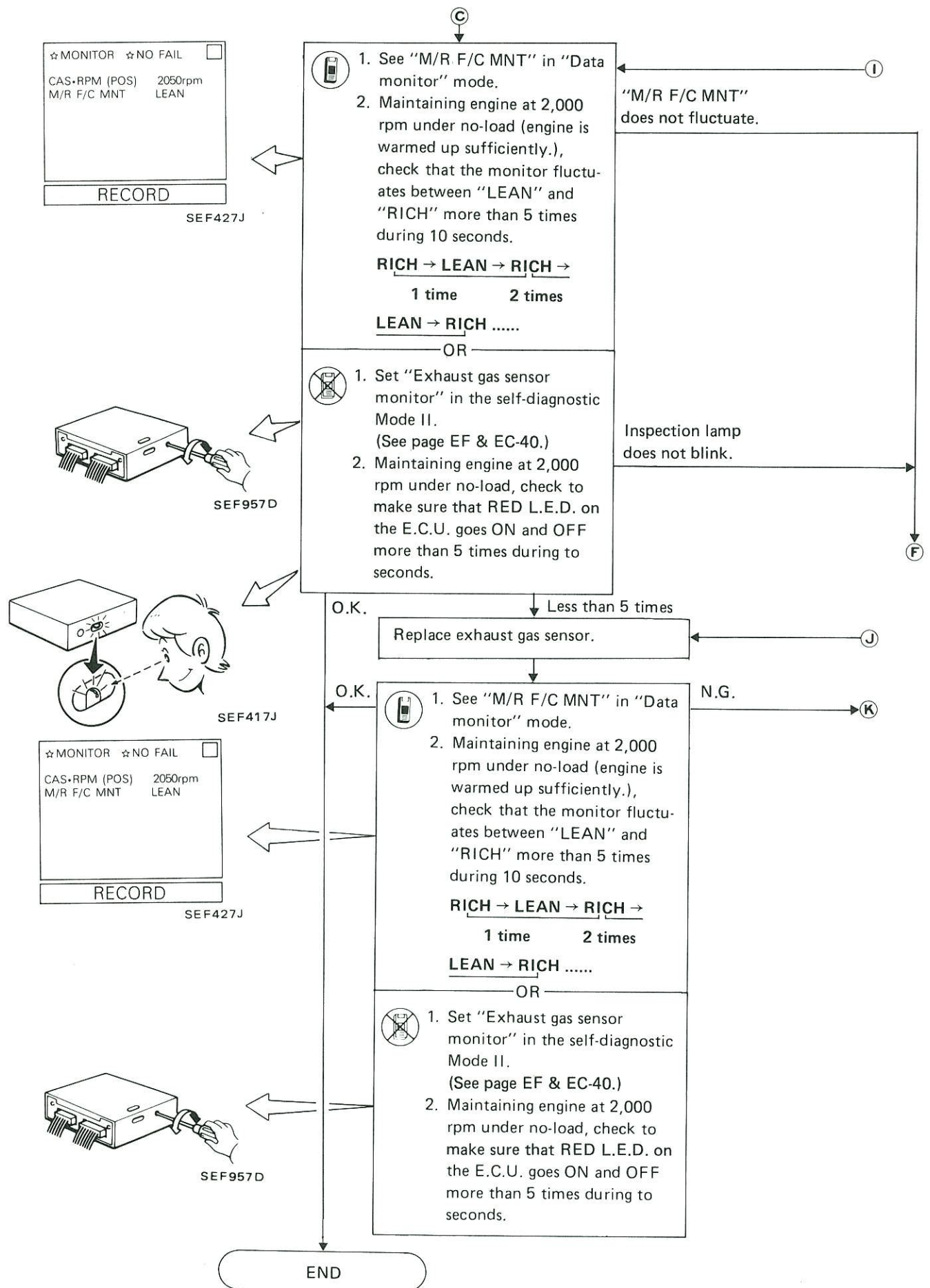
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



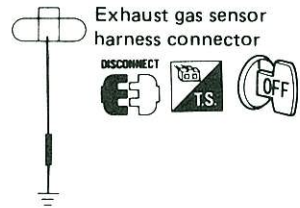
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

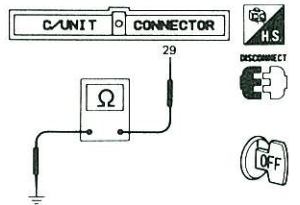


IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



As for the location of exhaust gas sensor harness connector, refer to page EF & EC-128.

SEC240B



SEC241B

Check exhaust gas sensor harness:

- 1) Turn off engine and disconnect battery ground cable.
- 2) Disconnect E.C.U. S.M.J. harness connector from E.C.U.
- 3) Disconnect exhaust gas sensor harness connector and connect main harness side terminal for exhaust gas sensor to ground with a jumper wire.
- 4) Check for continuity between terminal No. 29 of E.C.U. S.M.J. harness connector and body ground

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

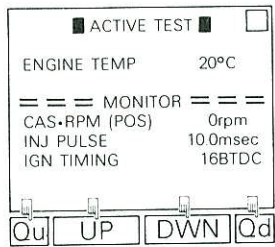
O.K.

N.G.

Repair or replace harness.

Connect 76-pin connector to control unit.

Connect battery ground cable.



SEF912J

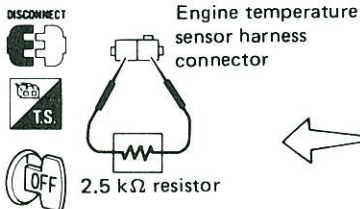


- 1) Select "ENG TEMPERATURE" in "ACTIVE TEST" mode.
- 2) Set "ENGINE TEMP" to 20°C (68°F) by touching "Qu" and "Qd" and "UP", "DOWN".

OR



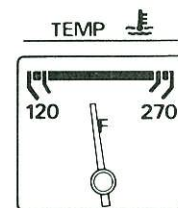
- 1) Disconnect engine temperature sensor harness connector.
- 2) Connect a resistor (2.5 kΩ) between terminals of engine temperature sensor harness connector.



SEC242B

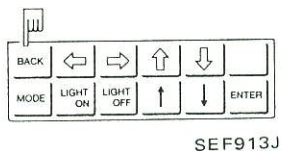
Disconnect jumper wire connected to exhaust gas sensor harness connector (main harness side).

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



SEF246F

IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



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

Check "CO" %.

Idle CO: 0.2 - 8.0%

After checking CO%,

1) Touch "BACK".

1) Disconnect the resistor from terminals of
engine temperature sensor harness connector.
2) Connect engine temperature sensor harness
connector to engine temperature sensor.

O.K.

N.G.

Connect exhaust gas sensor harness
connector to exhaust gas sensor.

Check fuel pressure regulator.
(See page EF & EC-178.)

Check air flow meter and its circuit.
(See page EF & EC-102.)

Check injector and its circuit.
(See page EF & EC-146.)
Clean or replace if necessary.

Check engine temperature sensor and its circuit.
(See page EF & EC-106.)

Check E.C.U. function* by substituting
another known good E.C.U.

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

Ⓕ

TROUBLE DIAGNOSES

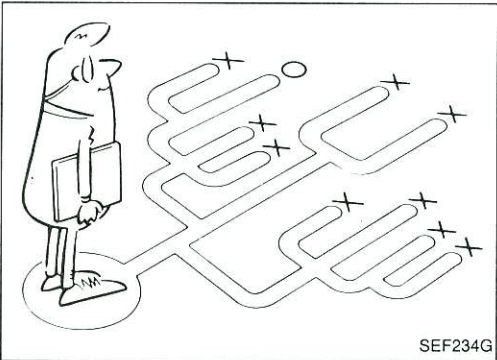
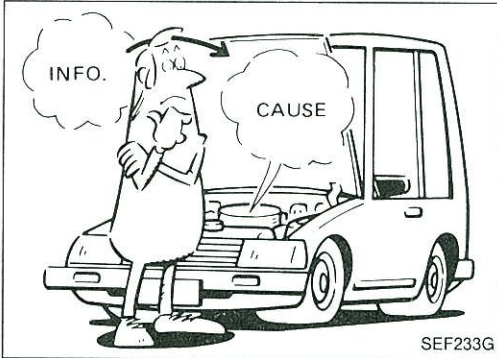
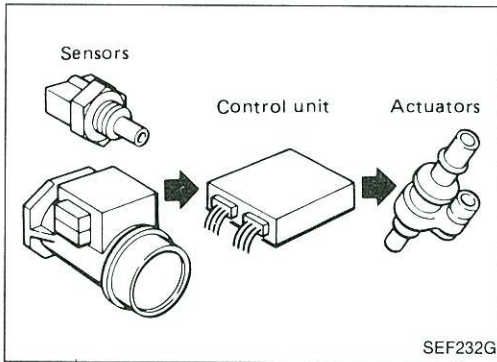
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TROUBLE DIAGNOSES

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How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The engine has an electronic control unit to control major systems such as fuel control, ignition control, idle speed control, etc. The control unit accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional problems such as 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.

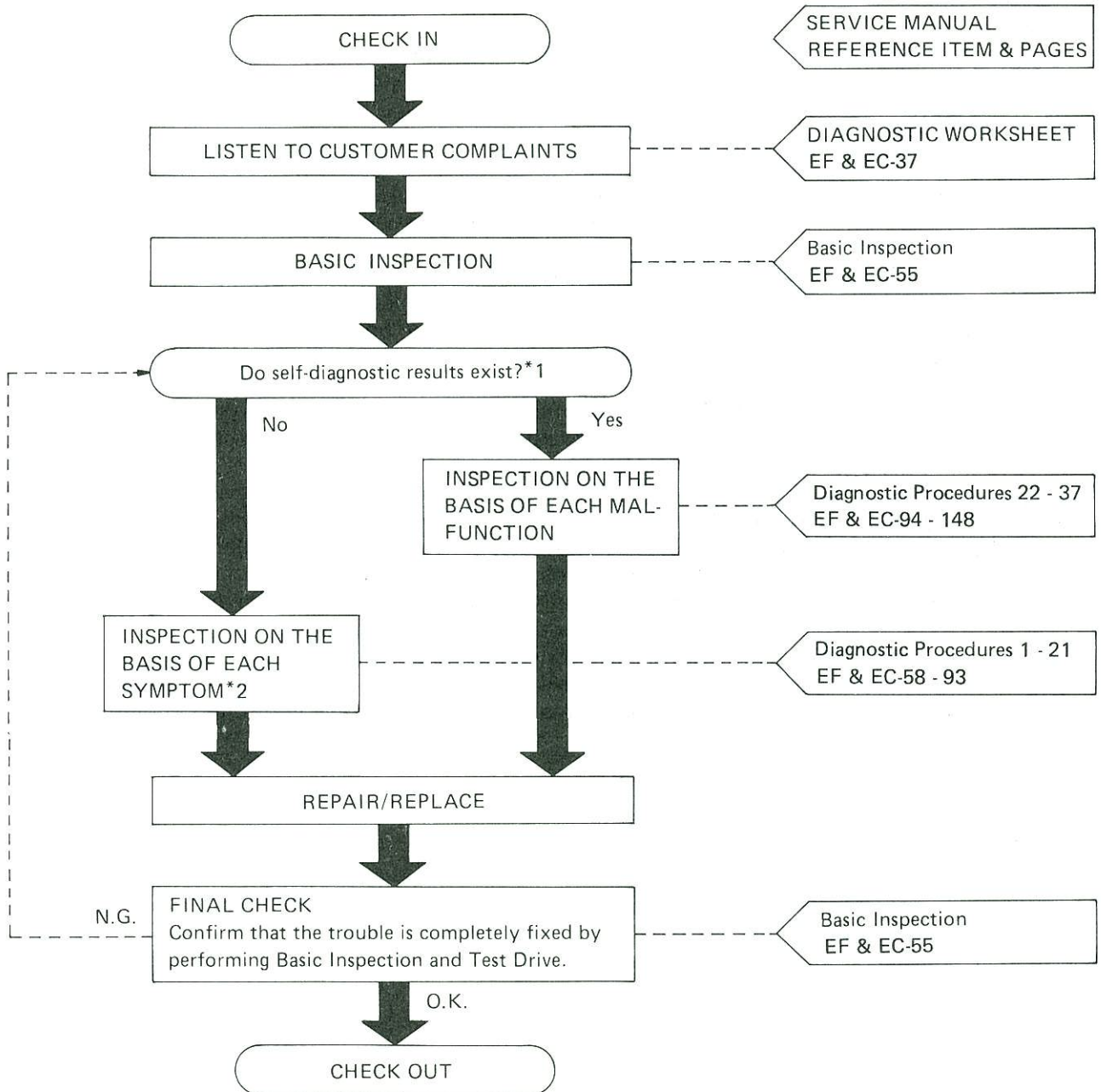
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present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

TROUBLE DIAGNOSES

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

WORK FLOW



*1: If the self-diagnosis cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 22.)

*2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EF & EC-38).

TROUBLE DIAGNOSES

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

DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to malfunctions on engine components.

A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, feelings for a problem depend on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.

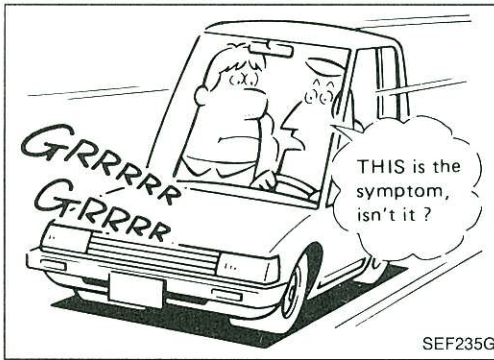
Make good use of a diagnostic worksheet such as the one shown below in order to utilize all the complaints for troubleshooting.

Worksheet sample

[illegible]

TROUBLE DIAGNOSES

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



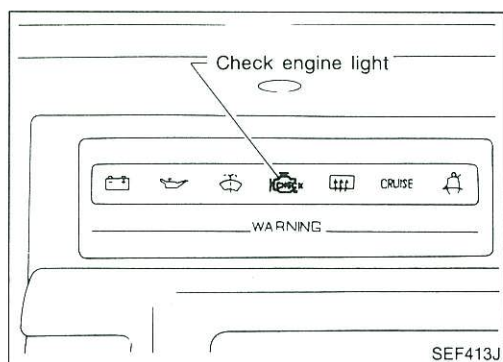
INTERMITTENT PROBLEM SIMULATION

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

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

	Variable factor	Influential part	Target condition	Service procedure
1	Mixture ratio	Pressure regulator	Made lean	Remove vacuum hose and apply vacuum.
			Made rich	Remove vacuum hose and apply pressure.
2	Ignition timing	Crank angle sensor	Advanced	Rotate distributor counterclockwise.
			Retarded	Rotate distributor clockwise.
3	Mixture ratio feedback control	Exhaust gas sensor	Suspended	Disconnect exhaust gas sensor harness connector.
		Control unit	Operation check	Perform self-diagnosis (Mode II) at 2,000 rpm.
4	Idle speed	A.A.C. 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	Control unit	Cooled	Cool with an icing spray or similar device.
			Warmed	Heat with a hair drier. [WARNING: Do not overheat the unit.]
7	Moisture	Electric parts	Damp	Wet. [WARNING: Do not directly pour water on components. Use a mist sprayer.]
8	Electric loads	Load switches	Loaded	Turn on headlamps, air conditioner, rear defogger, etc.
9	Idle switch condition	Control unit	ON-OFF switching	Rotate throttle sensor body.
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (S.S.T.).

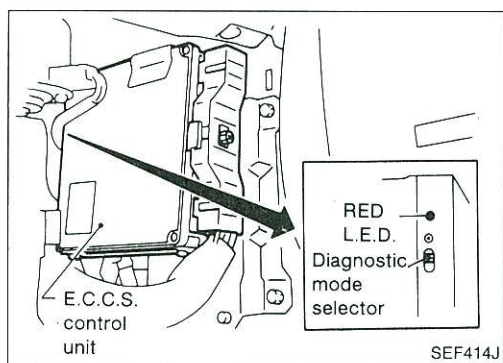
TROUBLE DIAGNOSES



Self-diagnosis

CHECK ENGINE LIGHT



A check engine light has been adopted on all models. This light blinks simultaneously with the RED L.E.D. on the E.C.U.



E.C.U. L.E.D.

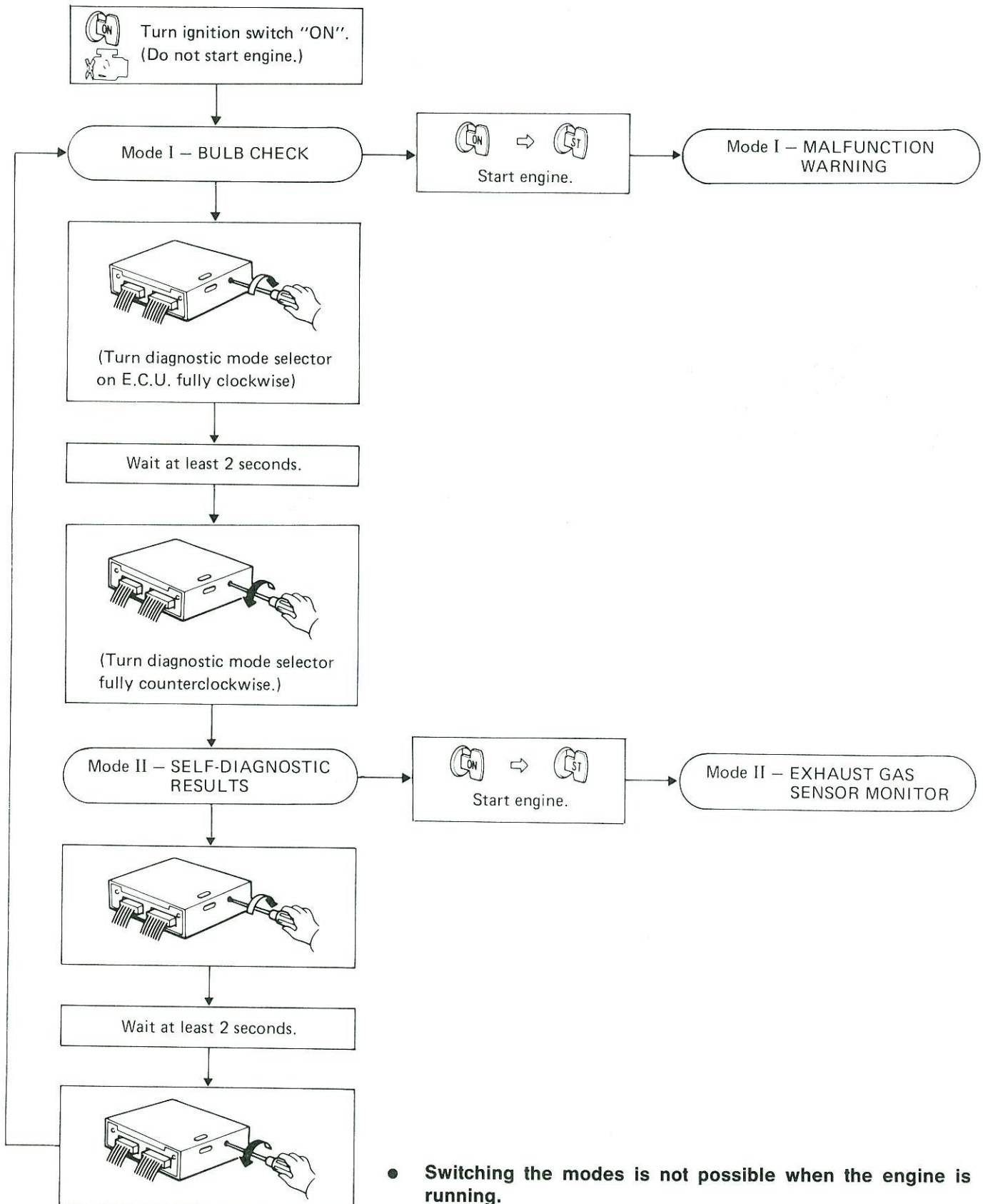
The E.C.U. has only one RED L.E.D.

SELF-DIAGNOSTIC FUNCTION

Mode		Mode I	Mode II
Condition			
Ignition switch in "ON" position	Engine stopped 	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	EXHAUST GAS SENSOR MONITOR

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd) HOW TO SWITCH MODES



- 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 E.C.U. has dropped off completely, the diagnosis will automatically return to Mode I.

TROUBLE DIAGNOSES

Self-diagnosis — Mode I

MODE I — BULB CHECK

In this mode, the RED L.E.D. in the E.C.U. and the CHECK ENGINE LIGHT in the instrument panel stay "ON".

If either remain "OFF", check the bulb in the CHECK ENGINE LIGHT or the RED L.E.D.

MODE I — MALFUNCTION WARNING

FOR CALIFORNIA MODEL

CHECK ENGINE LIGHT and RED L.E.D.	Condition
ON	When the following malfunctions (check engine light item) are detected or the E.C.U.'s C.P.U. or crank angle sensor is malfunctioning.
OFF	O.K.

Code No.	Malfunction
12	Air flow meter circuit
13	Engine temperature sensor circuit
14	Vehicle speed sensor circuit
31	E.C.U. (E.C.C.S. control unit)
32	E.G.R. function
33	Exhaust gas sensor circuit
35	Exhaust gas temperature sensor circuit
43	Throttle sensor circuit
45	Injector leak
51	Injector circuit

- These Code Numbers are clarified in Mode II — SELF-DIAGNOSTIC RESULTS.
- The RED L.E.D. and the CHECK ENGINE LIGHT will turn off when normal condition is detected. At this time, the Mode II — SELF-DIAGNOSTIC RESULTS memory must be cleared as the contents remain stored.

FOR NON-CALIFORNIA MODEL

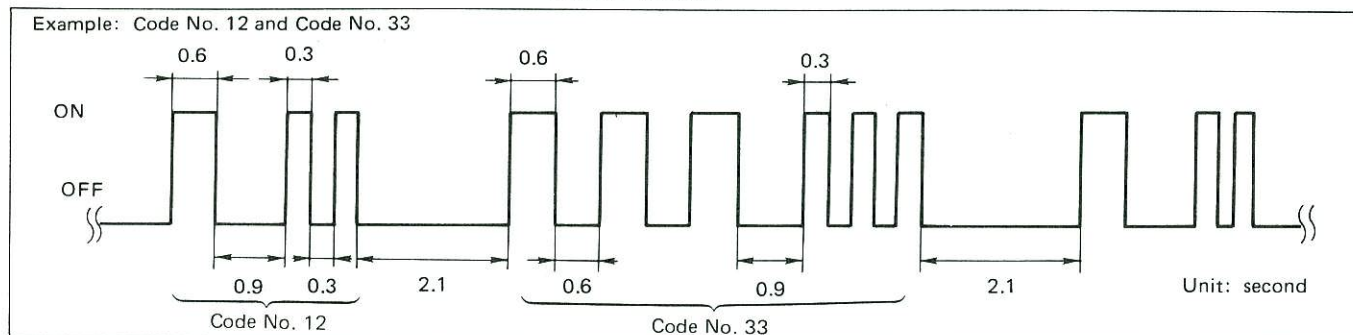
CHECK ENGINE LIGHT and RED L.E.D.	Condition
ON	When the E.C.U.'s C.P.U. or crank angle sensor is malfunctioning.
OFF	O.K.

TROUBLE DIAGNOSES

Self-diagnosis — Mode II (Self-diagnostic results)

DESCRIPTION

In this mode, a malfunction code is indicated by the number of flashes from the RED L.E.D. or the CHECK ENGINE LIGHT as shown below:



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

For example, the red L.E.D. flashes 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 air flow meter. In this way, all the problems are classified by their code numbers.

Display code table

Code No.	Detected items	California model	Non-California model
11*	Crank angle sensor circuit	X	X
12	Air flow meter circuit	X	X
13	Engine temperature sensor circuit	X	X
14	Vehicle speed sensor circuit	X	X
21*	Ignition signal circuit	X	X
22	Fuel pump circuit	X	X
31	E.C.U.	X	X
32	E.G.R. function	X	—
33	Exhaust gas sensor circuit	X	X
34	Detonation sensor circuit	X	X
35	Exhaust gas temperature sensor circuit	X	—
42	Fuel temperature sensor circuit	X	X
43	Throttle sensor circuit	X	X
45	Injector leak	X	—
51	Injector circuit	X	—
55	No malfunction in the above circuits	X	X

X: Available

—: Not available

: Check engine light item

*: Check items causing a malfunction of crank angle sensor circuit first, if both code No. 11 and 21 are displayed at the same time.

TROUBLE DIAGNOSES

Self-diagnosis — Mode II (Self-diagnostic results) (Cont'd)

Code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
*11	Crank angle sensor circuit	<ul style="list-style-type: none"> Either 1° or 120° signal is not entered for the first few seconds during engine cranking. Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm. 	<ul style="list-style-type: none"> Harness and connector (If harness and connector are normal, replace crank angle sensor.)
12	Air flow meter circuit	<ul style="list-style-type: none"> The air flow meter circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector (If harness and connector are normal, replace air flow meter.)
13	Engine temperature sensor circuit	<ul style="list-style-type: none"> The engine temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Engine temperature sensor
14	Vehicle speed sensor circuit	<ul style="list-style-type: none"> The vehicle speed sensor circuit is open or shorted. 	<ul style="list-style-type: none"> Harness and connector Vehicle speed sensor (reed switch)
*21	Ignition signal circuit	<ul style="list-style-type: none"> The ignition signal in the primary circuit is not entered during engine cranking or running. 	<ul style="list-style-type: none"> Harness and connector Power transistor unit
22	Fuel pump	<ul style="list-style-type: none"> Abnormally high or low current supply to the fuel pump persists. 	<ul style="list-style-type: none"> Harness and connector Fuel pump Fuel pump relay
31	E.C.U.	<ul style="list-style-type: none"> E.C.U. calculation function is malfunctioning. 	(Replace E.C.C.S. control unit.)
32	E.G.R. function	<ul style="list-style-type: none"> E.G.R. control valve does not operate. (E.G.R. control valve spring does not lift.) 	<ul style="list-style-type: none"> E.G.R. control valve E.G.R. control solenoid valve
33	Exhaust gas sensor circuit	<ul style="list-style-type: none"> The exhaust gas sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Exhaust gas sensor Fuel pressure Injectors Intake air leaks
53	Exhaust gas sensor circuit (Right side)		
34	Detonation sensor circuit	<ul style="list-style-type: none"> The detonation circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Detonation sensor
35	Exhaust gas temperature sensor circuit	<ul style="list-style-type: none"> The exhaust gas temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Exhaust gas temperature sensor
42	Fuel temperature sensor circuit	<ul style="list-style-type: none"> The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Fuel temperature sensor
43	Throttle sensor circuit	<ul style="list-style-type: none"> The throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Throttle sensor
45	Injector leak	<ul style="list-style-type: none"> Fuel leaks from injector. 	<ul style="list-style-type: none"> Injector
51	Injector circuit	<ul style="list-style-type: none"> The injector circuit is open. 	<ul style="list-style-type: none"> Injector

*: Check items causing a malfunction of crank angle sensor circuit first, if both code No. 11 and 21 come out at the same time.

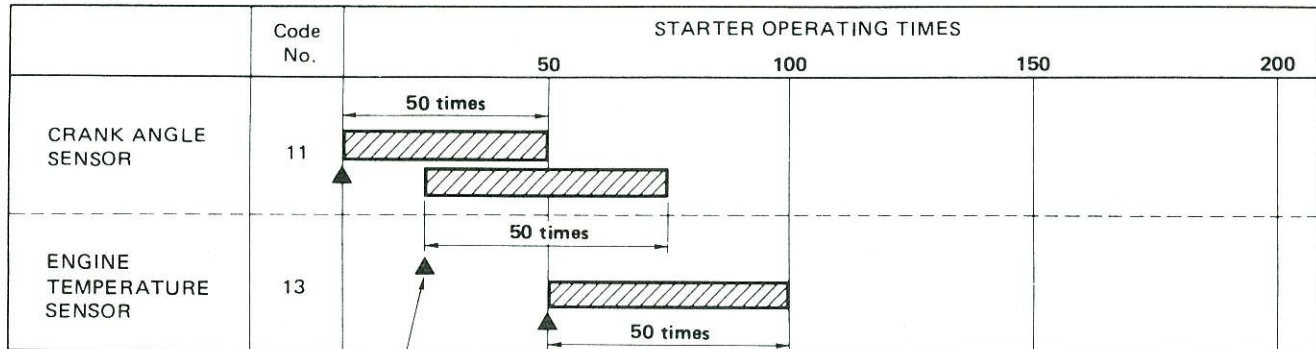
TROUBLE DIAGNOSES

Self-diagnosis — Mode II (Self-diagnostic results) (Cont'd)

RETENTION OF DIAGNOSTIC RESULTS

The diagnostic results will remain in E.C.U. memory until the starter is operated fifty times after a diagnostic item has been judged to be malfunctioning. The diagnostic result will then be canceled automatically. If a diagnostic item which has been judged to be malfunctioning and stored in memory is again judged to be malfunctioning before the starter is operated fifty times, the second result will replace the previous one. It will be stored in E.C.U. memory until the starter is operated fifty times more.

RETENTION TERM CHART (Example)



If the same diagnostic item is judged to be malfunctioning before the starter is operated fifty times, it will be stored in E.C.U. memory until the starter is operated fifty times from this point in time.



: Retention term



: Malfunction detecting point

SEF793D

HOW TO ERASE SELF-DIAGNOSTIC RESULTS

The malfunction code is erased from the backup memory on the E.C.U. when the diagnostic mode is changed from Mode II to Mode I. (Refer to "HOW TO SWITCH MODES".)

- When the battery terminal is disconnected, the malfunction code will be lost from the backup memory within 24 hours.
- Before starting self-diagnosis, do not erase the stored memory before beginning self-diagnosis.

TROUBLE DIAGNOSES

Self-diagnosis — Mode II (Exhaust gas sensor monitor)

DESCRIPTION

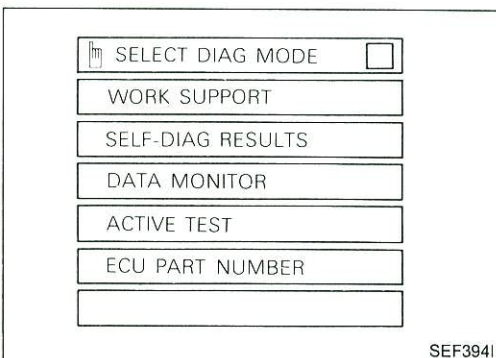
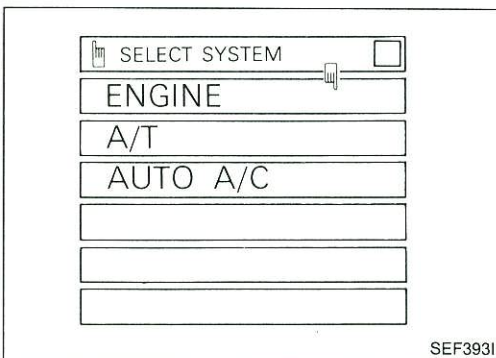
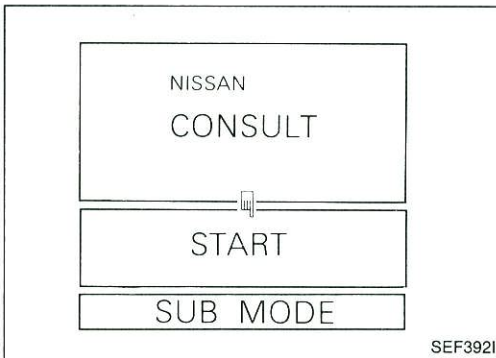
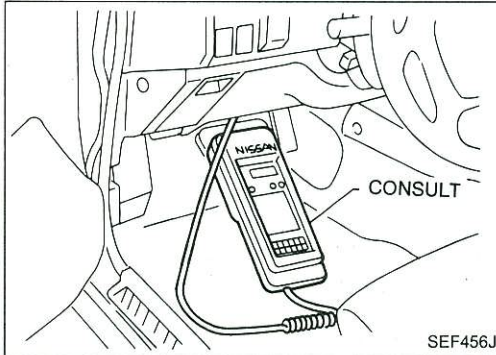
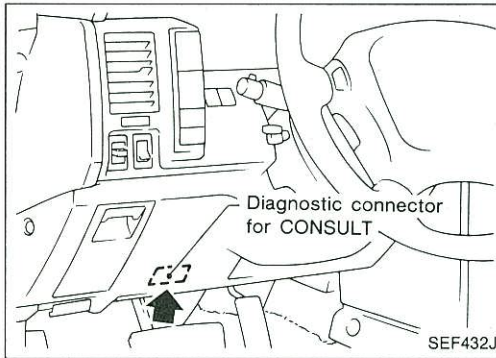
In this mode, the CHECK ENGINE LIGHT and RED L.E.D. display the condition of the fuel mixture (lean or rich) which is monitored by the exhaust gas sensor.

CHECK ENGINE LIGHT and RED L.E.D.	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop control
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop control

*: Maintains conditions just before switching to open loop.

HOW TO CHECK EXHAUST GAS SENSOR

1. Set Mode II. (Refer to "HOW TO SWITCH MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED L.E.D. or CHECK ENGINE LIGHT 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 diagnostic connector.
(Diagnostic connector is located in lower side instrument panel.)

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

5. Touch "ENGINE".

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

For further information, see the CONSULT Operation Manual.

TROUBLE DIAGNOSES

Consult (Cont'd)

E.C.C.S. COMPONENT PARTS APPLICATION

E.C.C.S. COMPONENT PARTS		MODE	WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST
INPUT	Crank angle sensor			X	X	
	Air flow meter			X	X	
	Engine temperature sensor			X	X	X
	Exhaust gas sensors			X	X	
	Vehicle speed sensors			X	X	
	Throttle sensor	X		X	X	
	Fuel temperature sensor			X	X	
	Exhaust gas temperature sensor*			X	X	
	Detonation sensor			X		
	Ignition switch (start signal)				X	
	Air conditioner switch				X	
	Neutral switch				X	
	Battery				X	
OUT-PUT	Injectors			X	X	X
	Power transistor (ignition signal)			X	X (Ignition timing)	X
	A.A.C. valve	X			X	X
	Pressure regulator control solenoid valve				X	X
	E.G.R. control solenoid valve				X	X
	Air conditioner relay				X	
	Fuel pump			X		

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

X: Applicable

FUNCTION

Diagnostic mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the control unit can be read.
Active test	Mode in which CONSULT drives some actuators apart from the control units and also shifts some parameters in a specified range.
E.C.U. part numbers	E.C.U. part numbers can be read.

TROUBLE DIAGNOSES

Consult (Cont'd)

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THROTTLE SENSOR ADJUSTMENT	CHECK THE THROTTLE SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none">● IGN SW "ON"● ENG NOT RUNNING● ACC PEDAL NOT PRESSED	When adjusting throttle sensor initial position.
IGNITION TIMING ADJUSTMENT*	<ul style="list-style-type: none">● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANK ANGLE SENSOR.	When adjusting initial ignition timing.
AAC VALVE ADJUSTMENT	SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none">● ENGINE WARMED UP● NO-LOAD	When adjusting idle speed.

*: The ignition timing feedback control is not adopted on model INFINITI M30, so it is not necessary to perform IGNITION TIMING ADJUSTMENT.

TROUBLE DIAGNOSES

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANK ANGLE SENSOR*	<ul style="list-style-type: none"> Either 1° or 120° signal is not entered for the first few seconds during engine cranking. Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm. 	<ul style="list-style-type: none"> Harness and connector (If harness and connector are normal, replace crank angle sensor.)
AIR FLOW METER	<ul style="list-style-type: none"> The air flow meter circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector (If harness and connector are normal, replace air flow meter.)
ENGINE TEMP SENSOR	<ul style="list-style-type: none"> The engine temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Engine temperature sensor
CAR SPEED SENSOR	<ul style="list-style-type: none"> The vehicle speed sensor circuit is open or shorted. 	<ul style="list-style-type: none"> Harness and connector Vehicle speed sensor (reed switch)
IGN SIGNAL-PRIMARY*	<ul style="list-style-type: none"> The ignition signal in primary circuit is not entered during engine cranking or running. 	<ul style="list-style-type: none"> Harness and connector Power transistor unit
FUEL PUMP	<ul style="list-style-type: none"> Abnormally high or low current supply to the fuel pump persists. 	<ul style="list-style-type: none"> Harness and connector Fuel pump Fuel pump relay
CONTROL UNIT	<ul style="list-style-type: none"> E.C.U. calculation function is malfunctioning. 	(Replace E.C.C.S. control unit.)
EGR SYSTEM**	<ul style="list-style-type: none"> E.G.R. control valve does not operate. (E.G.R. control valve spring does not lift.) 	<ul style="list-style-type: none"> E.G.R. control valve E.G.R. control solenoid valve
EXH GAS SENSOR	<ul style="list-style-type: none"> The exhaust gas sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Exhaust gas sensor Fuel pressure Injectors Intake air leaks
DETONATION SENSOR	<ul style="list-style-type: none"> The detonation circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Detonation sensor
EXH GAS TEMP SENSOR**	<ul style="list-style-type: none"> The exhaust gas temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Exhaust gas temperature sensor
FUEL TEMP SENSOR	<ul style="list-style-type: none"> The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Fuel temperature sensor
THROTTLE SENSOR	<ul style="list-style-type: none"> The throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> Harness and connector Throttle sensor
INJECTOR LEAK**	<ul style="list-style-type: none"> Fuel leaks from injector. 	<ul style="list-style-type: none"> Injector
INJECTOR OPEN**	<ul style="list-style-type: none"> The injector circuit is open. 	<ul style="list-style-type: none"> Injector

*: Check items causing a malfunction of crank angle sensor circuit first, if both "CRANK ANGLE SENSOR" and "IGN SIGNAL-PRIMARY" come out at the same time.

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

TROUBLE DIAGNOSES

Consult (Cont'd)

DATA MONITOR MODE

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CAS, RPM (POS)	<ul style="list-style-type: none">● Tachometer: Connect● Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.	<ul style="list-style-type: none">● Harness and connector● Crank angle sensor
CAS, RPM (REF)				
AIR FLOW MTR	<ul style="list-style-type: none">● Engine: After warming up, idle the engine● A/C switch "OFF"● Shift lever "N"	Idle	1.0 - 1.5V	<ul style="list-style-type: none">● Harness and connector● Air flow meter
		2,000 rpm	1.4 - 1.9V	
ENG TEMP SEN	<ul style="list-style-type: none">● Engine: After warming up		More than 70°C (158°F)	<ul style="list-style-type: none">● Harness and connector● Engine temperature sensor
EXH GAS SEN	<ul style="list-style-type: none">● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 ↔ Approx. 1.5V	<ul style="list-style-type: none">● Harness and connector● Exhaust gas sensor● Intake air leaks● Injectors
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.	
CAR SPEED SEN	<ul style="list-style-type: none">● Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	<ul style="list-style-type: none">● Harness and connector● Vehicle speed sensor
BATTERY VOLT	<ul style="list-style-type: none">● Ignition switch: ON (Engine stopped)		11 - 14V	<ul style="list-style-type: none">● Battery● E.C.U. power supply circuit
THROTTLE SEN	<ul style="list-style-type: none">● Ignition switch: ON (Engine stopped)	Throttle valve fully closed	0.4 - 0.5V	<ul style="list-style-type: none">● Harness and connector● Throttle sensor● Throttle sensor adjustment
		Throttle valve fully opened	Approx. 4.0V	
FUEL TEMP SEN	<ul style="list-style-type: none">● Engine: After warming up		20 - 60°C (68 - 140°F)	<ul style="list-style-type: none">● Harness and connector● Fuel temp. sensor
EGR TEMP SEN*	<ul style="list-style-type: none">● Engine: After warming up		Less than 4.5V	<ul style="list-style-type: none">● Harness and connector● Exhaust gas temperature sensor
START SIGNAL	<ul style="list-style-type: none">● Ignition switch: ON → START		OFF → ON	<ul style="list-style-type: none">● Harness and connector● Starter switch
IDLE POSITION	<ul style="list-style-type: none">● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON	<ul style="list-style-type: none">● Harness and connector● Throttle sensor● Throttle sensor adjustment
		Throttle valve: Slightly open	OFF	
AIR COND SIG	<ul style="list-style-type: none">● Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	<ul style="list-style-type: none">● Harness and connector● Air conditioner switch
		A/C switch "ON"	ON	
NEUTRAL SW	<ul style="list-style-type: none">● Ignition switch: ON	Shift lever "P" or "N"	ON	<ul style="list-style-type: none">● Harness and connector● Neutral switch
		Except above	OFF	

Remarks: The monitor item marked * is applicable to vehicles for California only.
Specifications are reference values.

TROUBLE DIAGNOSES

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
INJ PULSE	<ul style="list-style-type: none"> ● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load 	Idle	3.1 - 3.8 msec.	<ul style="list-style-type: none"> ● Harness and connector ● Injector ● Air flow meter ● Intake air system
		2,000 rpm	2.9 - 3.6 msec.	
IGN TIMING	ditto	Idle	15° B.T.D.C.	<ul style="list-style-type: none"> ● Harness and connector ● Crank angle sensor
		2,000 rpm	More than 25° B.T.D.C.	
AAC VALVE	ditto	Idle	15 - 40%	<ul style="list-style-type: none"> ● Harness and connector ● A.A.C. valve
		2,000 rpm	—	
AIR COND RLY	● Air conditioner switch OFF → ON		OFF → ON	<ul style="list-style-type: none"> ● Harness and connector ● Air conditioner switch ● Air conditioner relay
PRVR CONT SOL VALVE	<ul style="list-style-type: none"> ● Fuel temperature is above 75°C (167°F) 	For 3 minutes after starting engine	ON	<ul style="list-style-type: none"> ● Harness and connector ● Pressure regulator control solenoid valve ● Fuel temperature sensor
		3 minutes after starting engine	OFF	
EGR CONT S/V	<ul style="list-style-type: none"> ● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load 	Idle	ON	<ul style="list-style-type: none"> ● Harness and connector ● E.G.R. control solenoid valve
		2,000 rpm	OFF	

Remarks: Specifications are reference values.

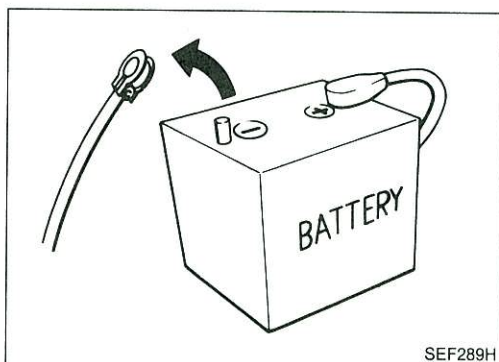
TROUBLE DIAGNOSES

Consult (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION TEST	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the amount of fuel injection with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel injectors ● Exhaust gas sensor
AAC/V OPENING TEST	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● Change the AAC valve opening percent with the CONSULT. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> ● Harness and connector ● AAC valve
ENGINE TEMP TEST	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the engine coolant temperature with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Engine temperature sensor ● Fuel injectors
IGN TIMING TEST	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Adjust initial ignition timing
POWER BALANCE TEST	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
EGR CONT SOL/V TEST	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound. 	Each solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
PRVR CONT SOL/V TEST			
SELF-LEARN CONT TEST	<ul style="list-style-type: none"> ● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen. 		

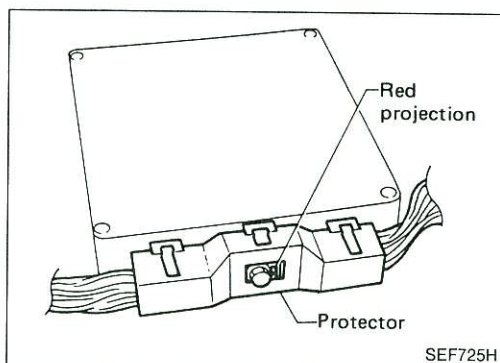
TROUBLE DIAGNOSES



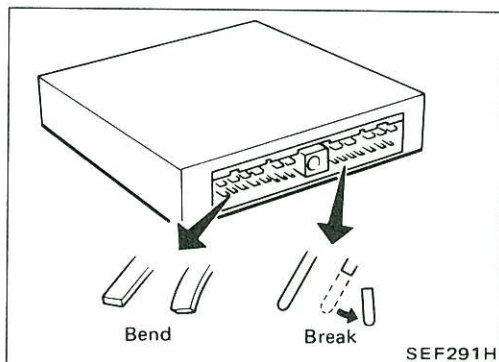
Diagnostic Procedure

CAUTION:

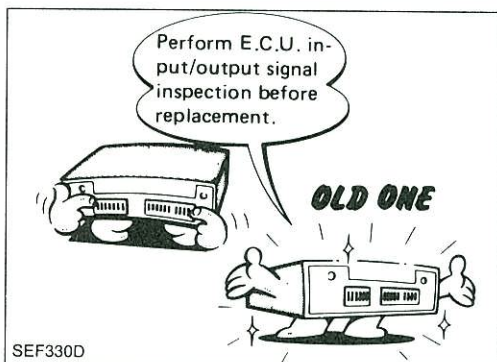
1. Before connecting or disconnecting the E.C.U. harness connector to or from any E.C.U., be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage E.C.U. as battery voltage is applied to E.C.U. even if ignition switch is turned off.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



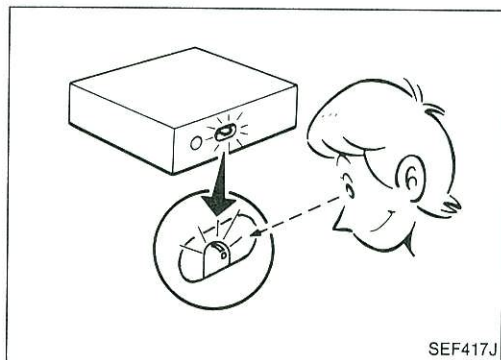
2. When connecting E.C.U. harness connector, tighten securing bolt until red projection is in line with connector face.



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



5. Before replacing E.C.U., perform E.C.U. input/output signal inspection and make sure whether E.C.U. functions properly or not. (See page EF & EC-166.)



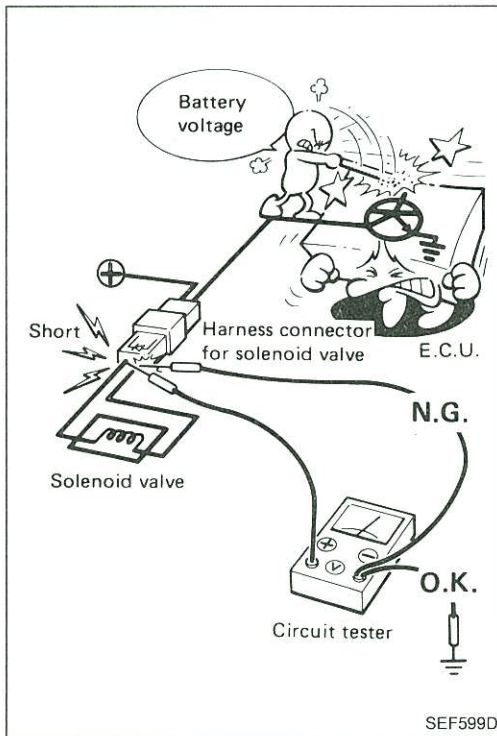
6. After performing this "Diagnostic Procedure", perform E.C.C.S. self-diagnosis and driving test.

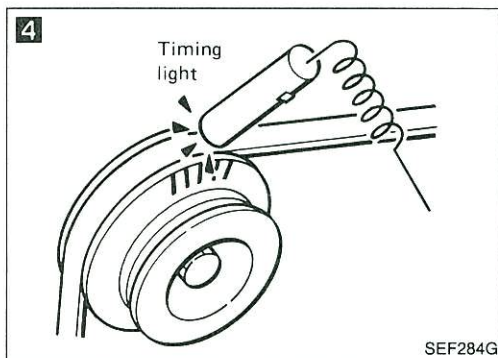
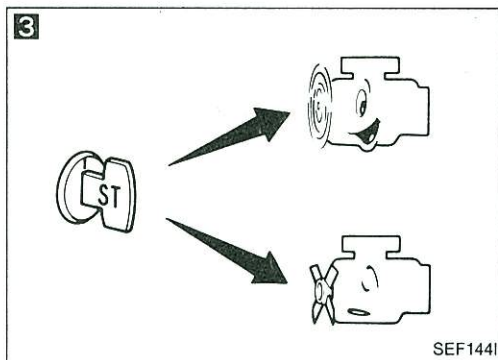
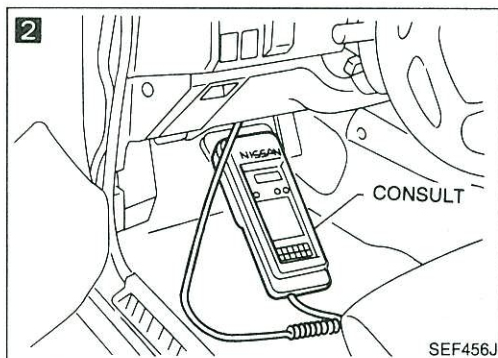
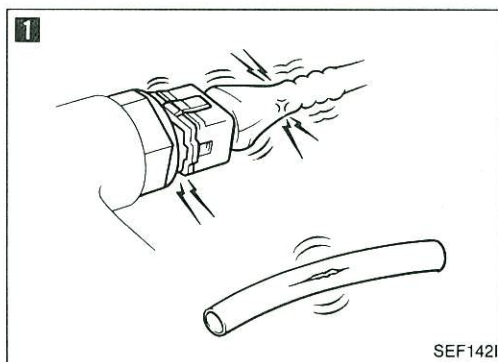
TROUBLE DIAGNOSES

Diagnostic Procedure (Cont'd)

7. When measuring E.C.U. 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 control unit power transistor.





Basic Inspection

1

BEFORE STARTING

1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.
2. Open engine hood and check the following:
 - Harness connectors for proper connections
 - Vacuum hoses for splits, kinks, and proper connections
 - Wiring for proper connections, pinches, and cuts

2

CONNECT CONSULT TO THE VEHICLE

Connect "CONSULT" to the diagnostic connector and select "ENGINE" from the menu. (Refer to page EF & EC-46.)

3

DOES ENGINE START?

No

Go to 6.

Yes

4

CHECK IGNITION TIMING.

Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EF & EC-27.)

Ignition timing:

$15^{\circ} \pm 2^{\circ}$ B.T.D.C.

N.G.

Adjust ignition timing by turning crank angle sensor.

O.K.

(Go to (A) on next page.)

TROUBLE DIAGNOSES

Basic Inspection (Cont'd)

5

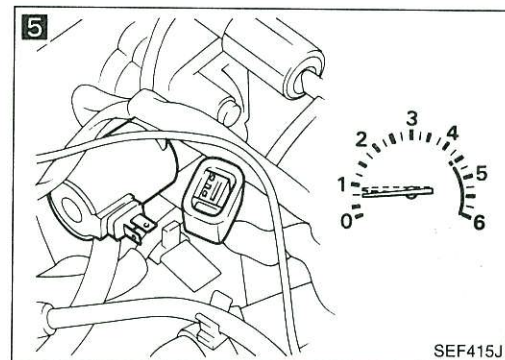
■ AAC VALVE ADJ ■

SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION

- ENG WARMED UP
- NO LOAD

START

SEF372I



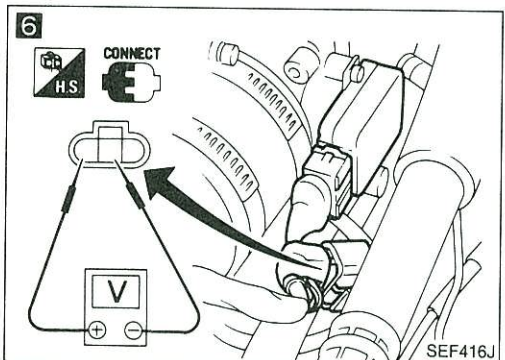
6

■ THROTTLE SEN ADJ ■

**** ADJ MONITOR ****

THROTTLE SEN	0.50V
===== MONITOR =====	
CAS-RPM (POS)	812rpm
IDLE POSITION	ON

SEF383J



5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "A.A.C. VALVE ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine rpm fall to 700 ± 50 rpm (in "N" position)?

OR

When disconnecting A.A.C. valve harness connector, does engine rpm fall to 700 ± 50 rpm (in "N" position)?

No → Adjust engine rpm by turning idle adjusting screw.

Yes

6

CHECK THROTTLE SENSOR IDLE POSITION.

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

OR

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

N.G. →

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

O.K.

(Go to **B** on next page)

TROUBLE DIAGNOSES

Basic Inspection (Cont'd)

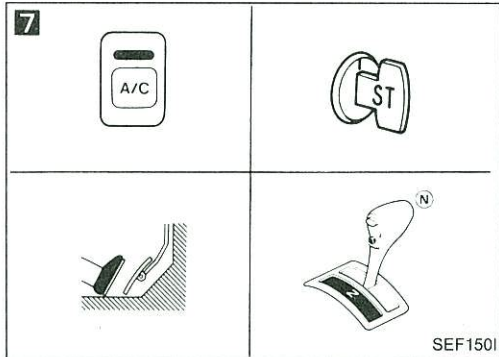
7

☆ MONITOR ☆ NO FAIL ☐

START SIGNAL	OFF
IDLE POSITION	ON
AIR COND SIG	OFF
NEUTRAL SW	ON

RECORD

SEF384J



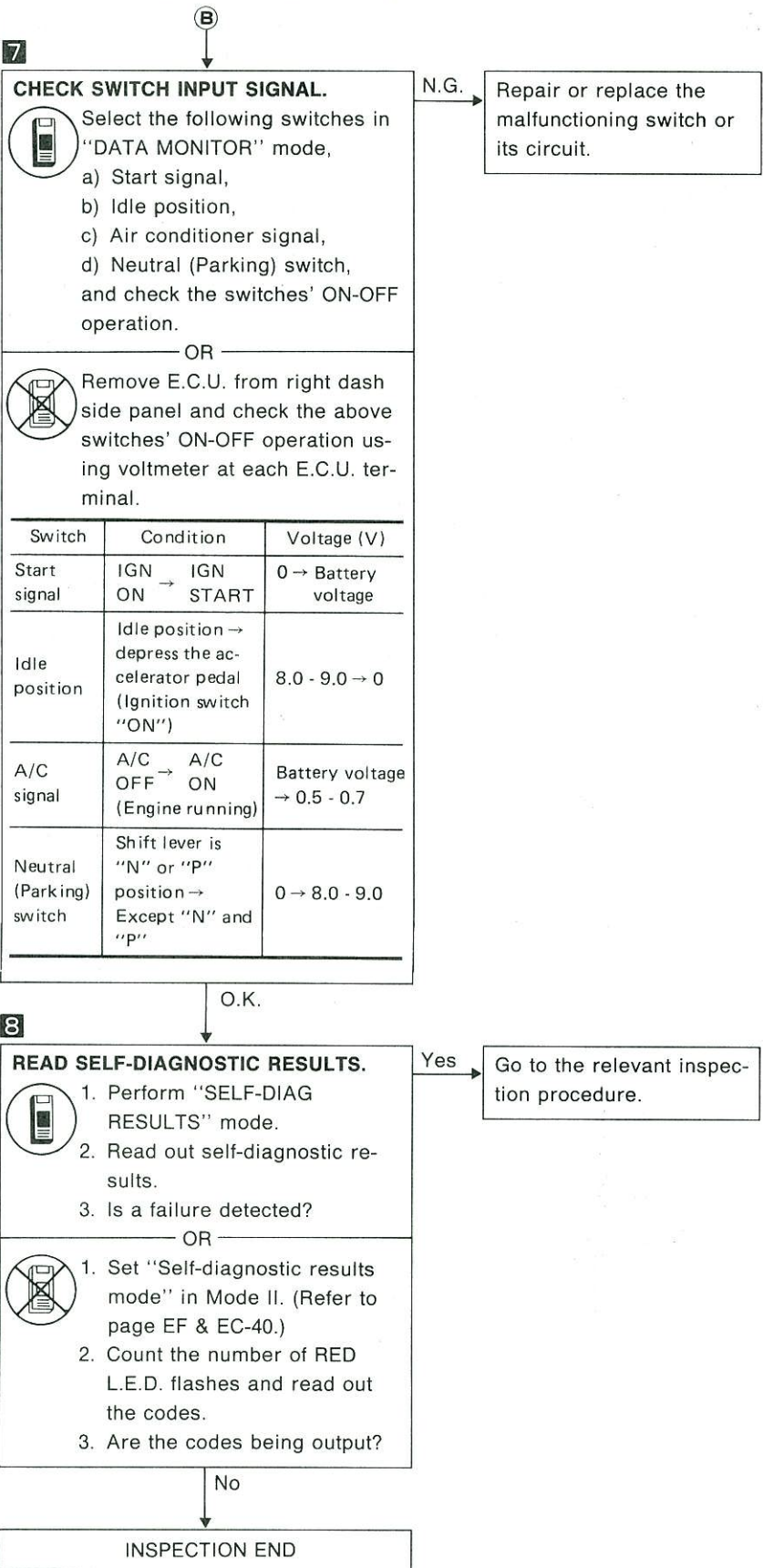
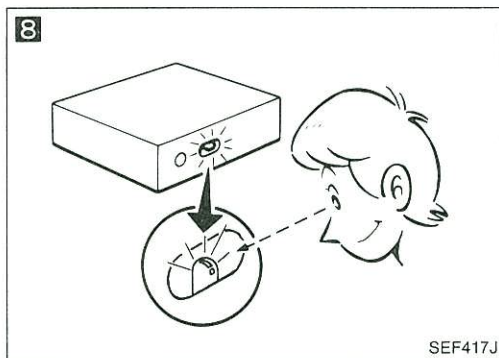
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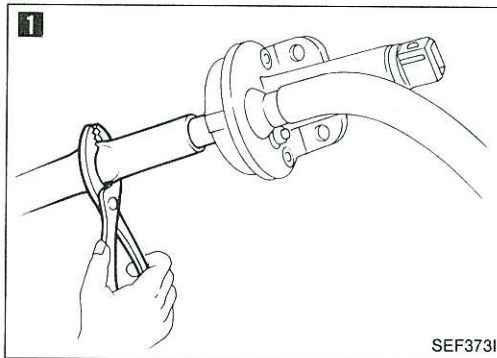
■ SELF-DIAG RESULTS ■ ☐

FAILURE DETECTED TIME
ENGINE TEMP SENSOR 0

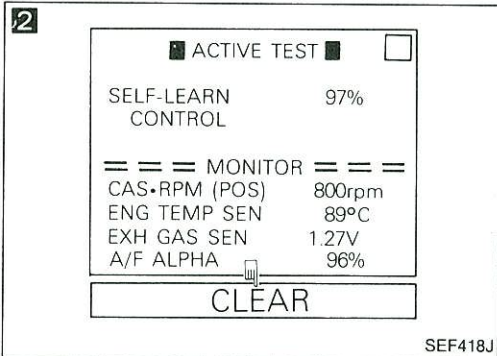
ERASE PRINT

SEF151I

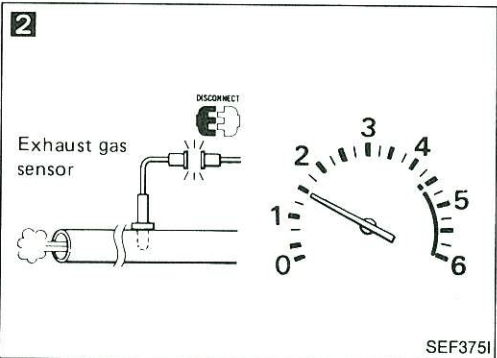




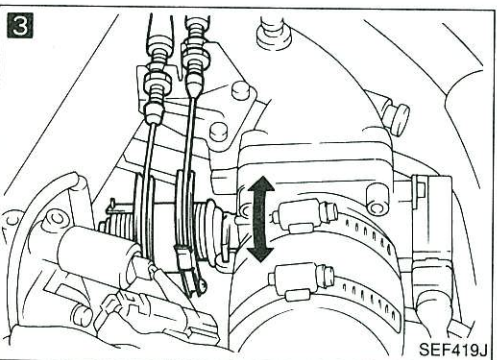
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SEF418J

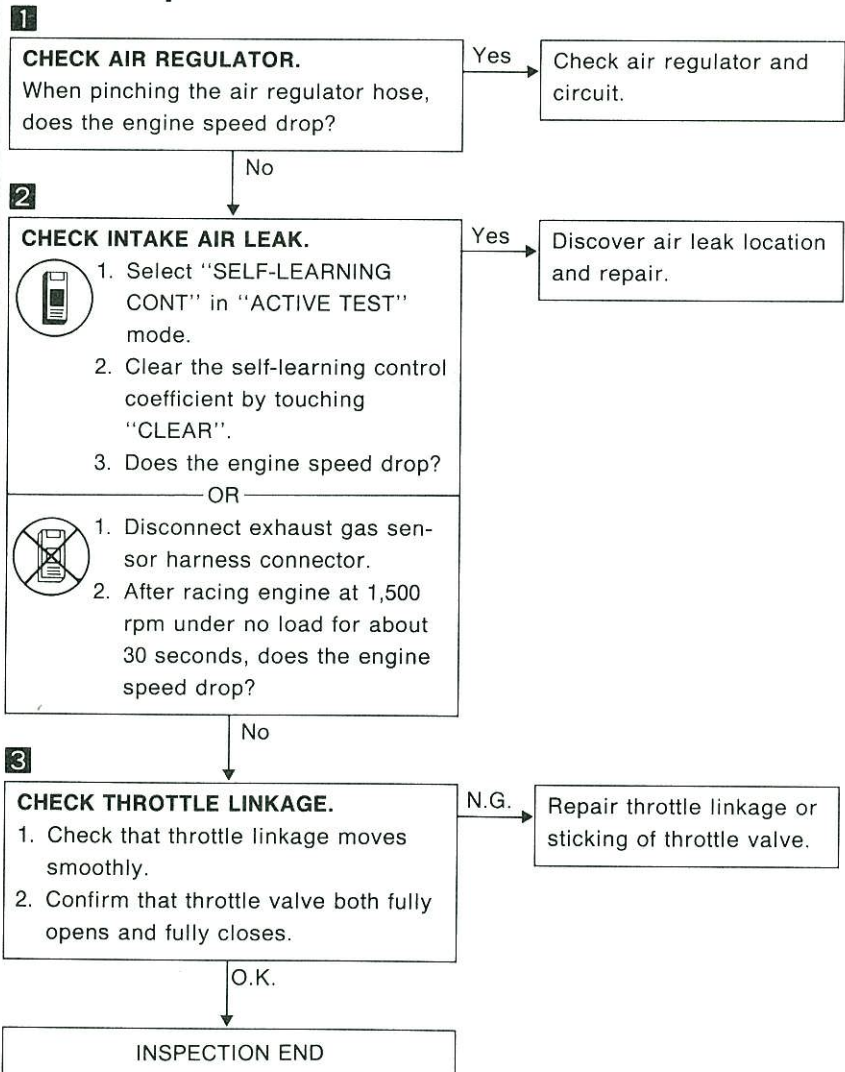


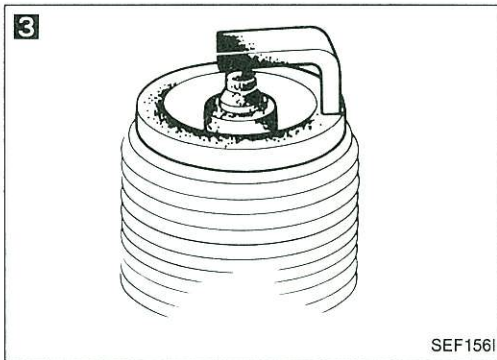
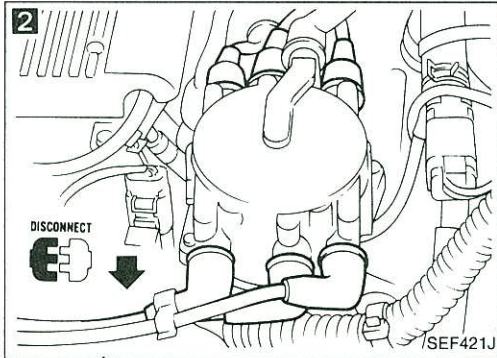
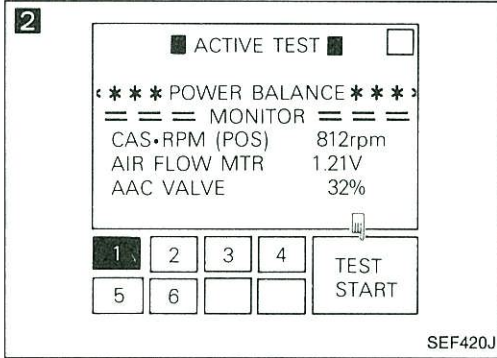
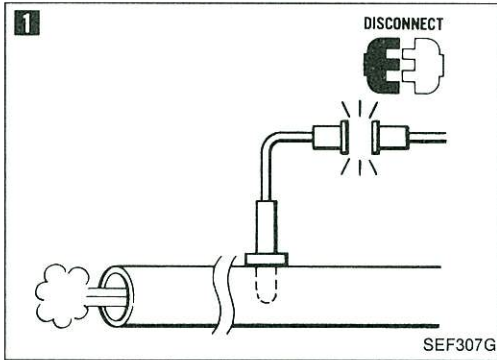
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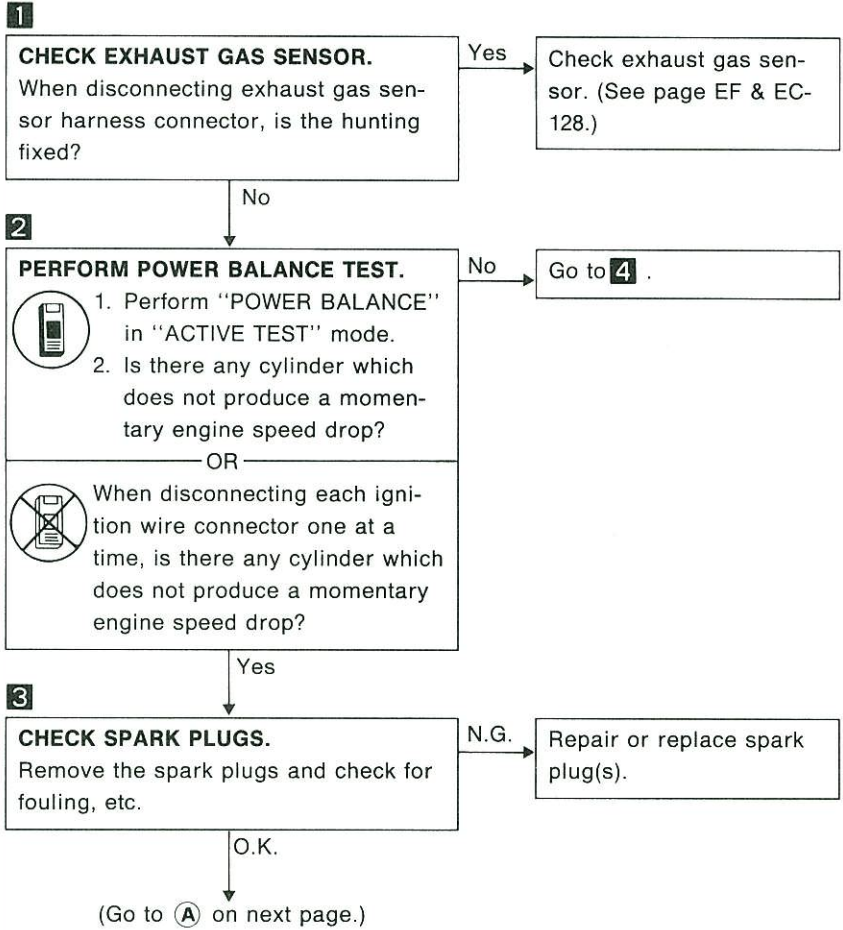
SEF419J

Diagnostic Procedure 1 — High Idling after Warm-up



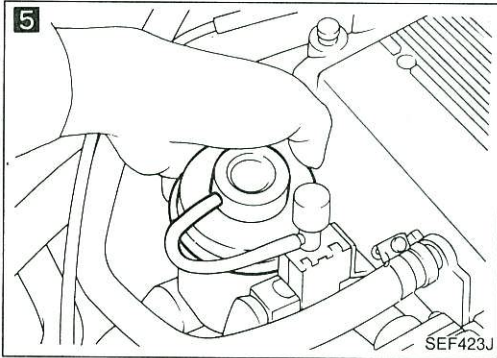
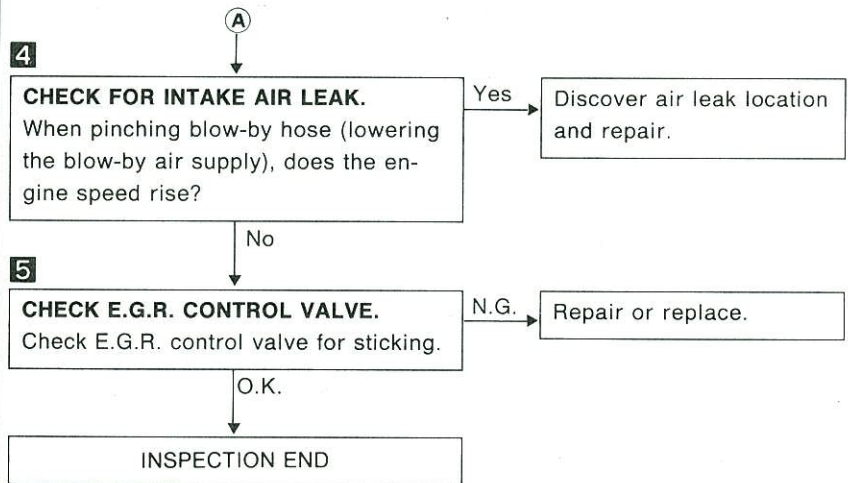
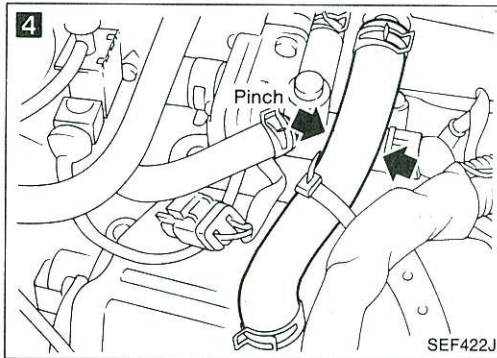


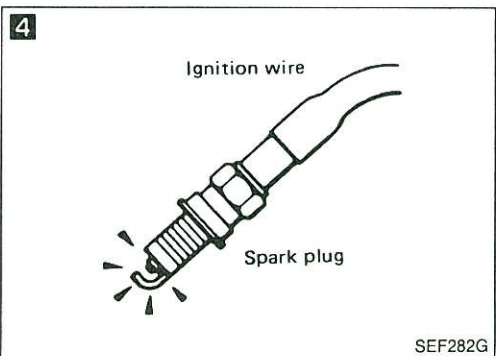
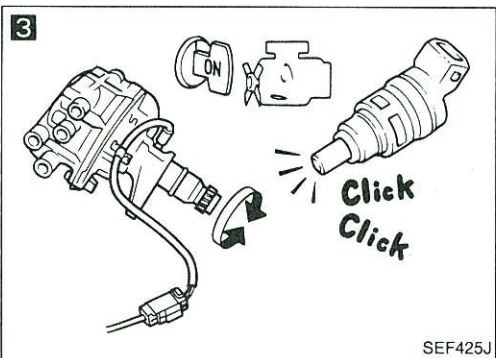
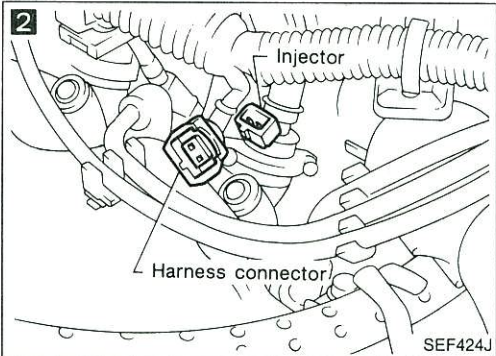
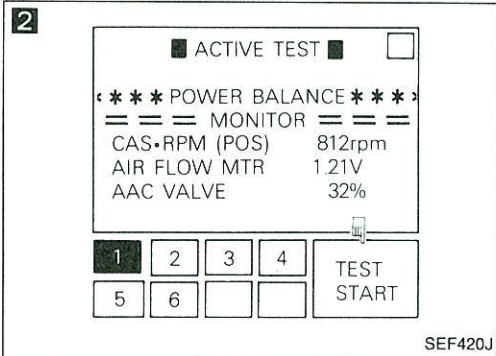
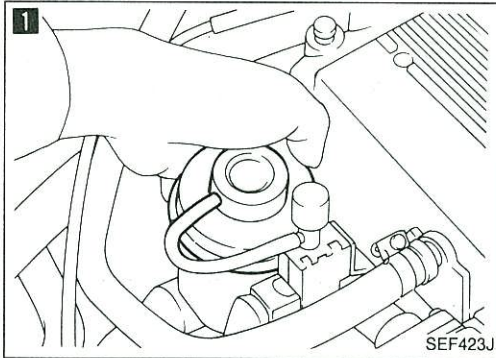
Diagnostic Procedure 2 — Hunting



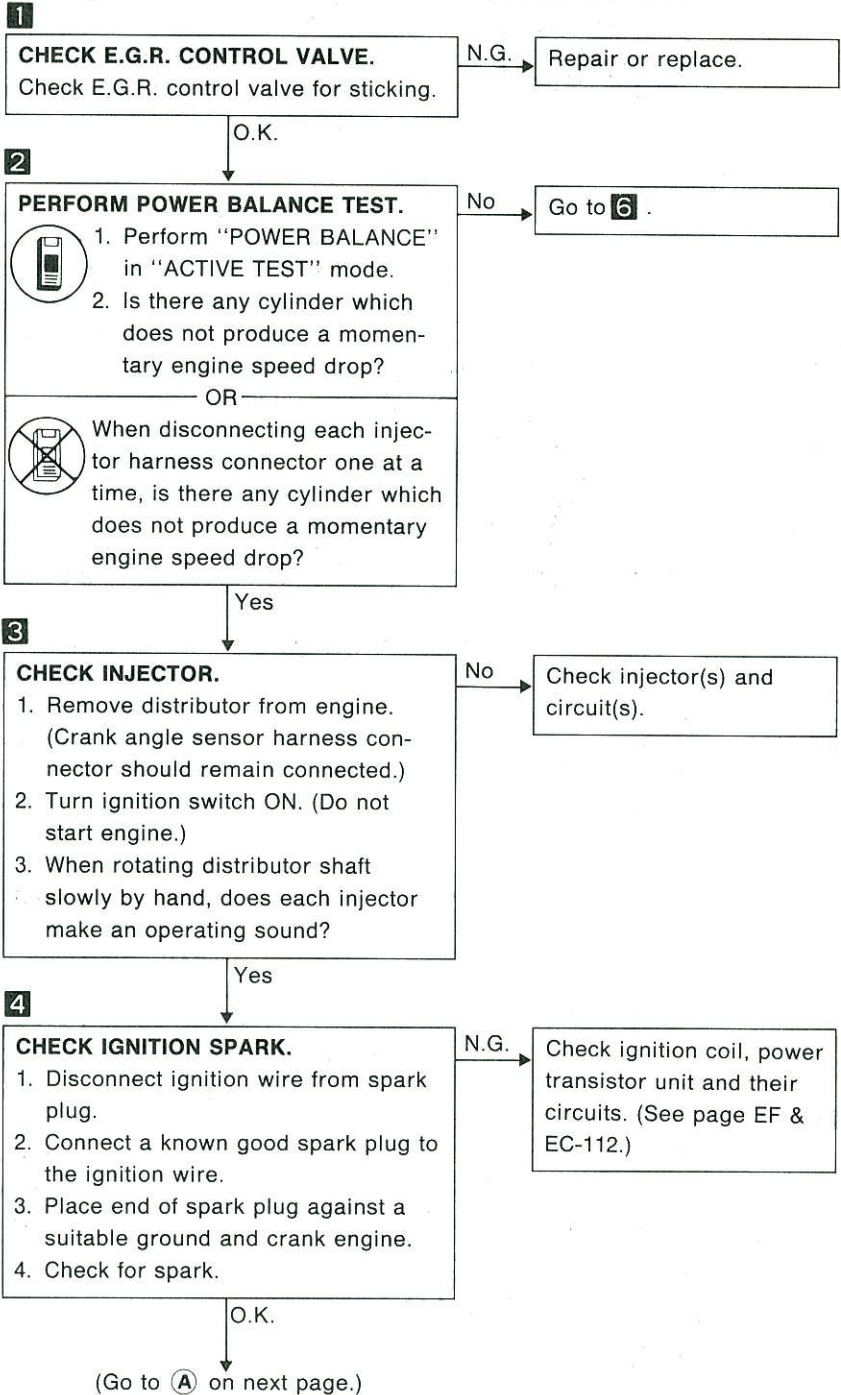
TROUBLE DIAGNOSES

Diagnostic Procedure 2 — Hunting (Cont'd)



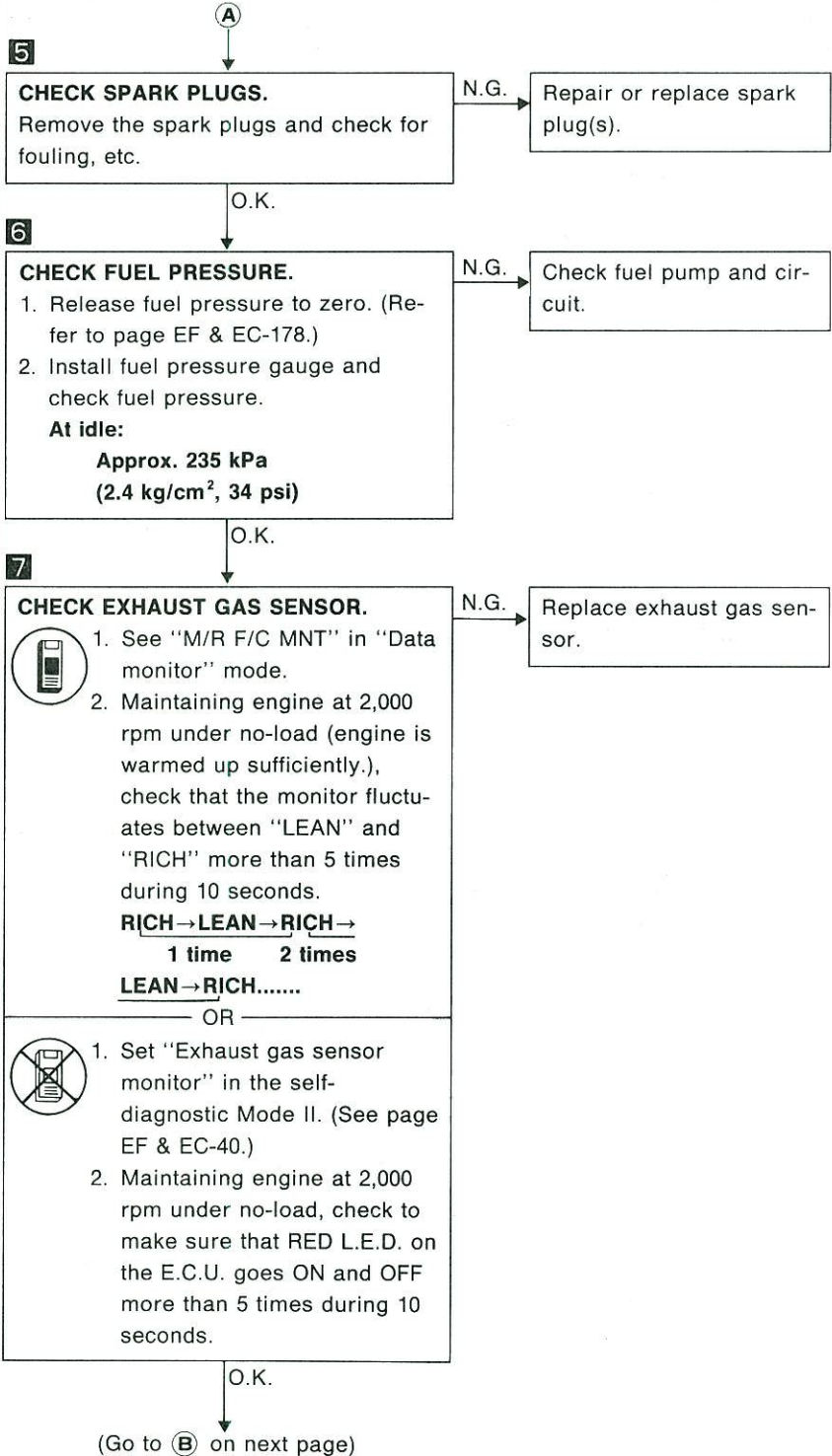
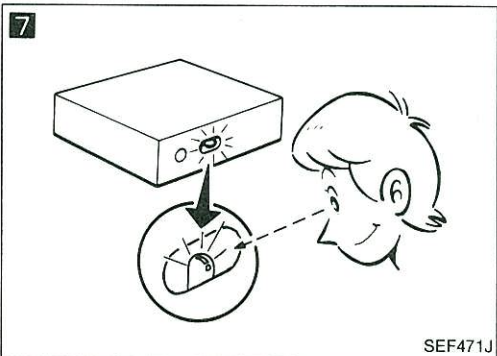
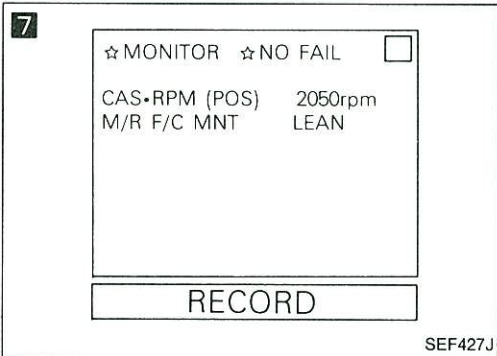
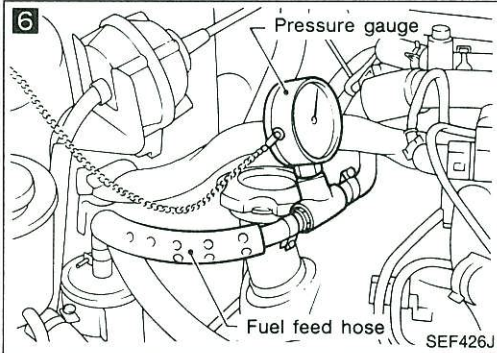
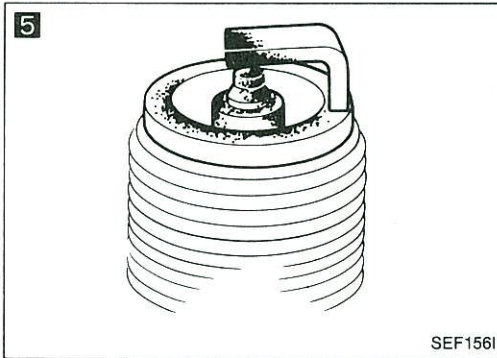


Diagnostic Procedure 3 — Unstable Idle



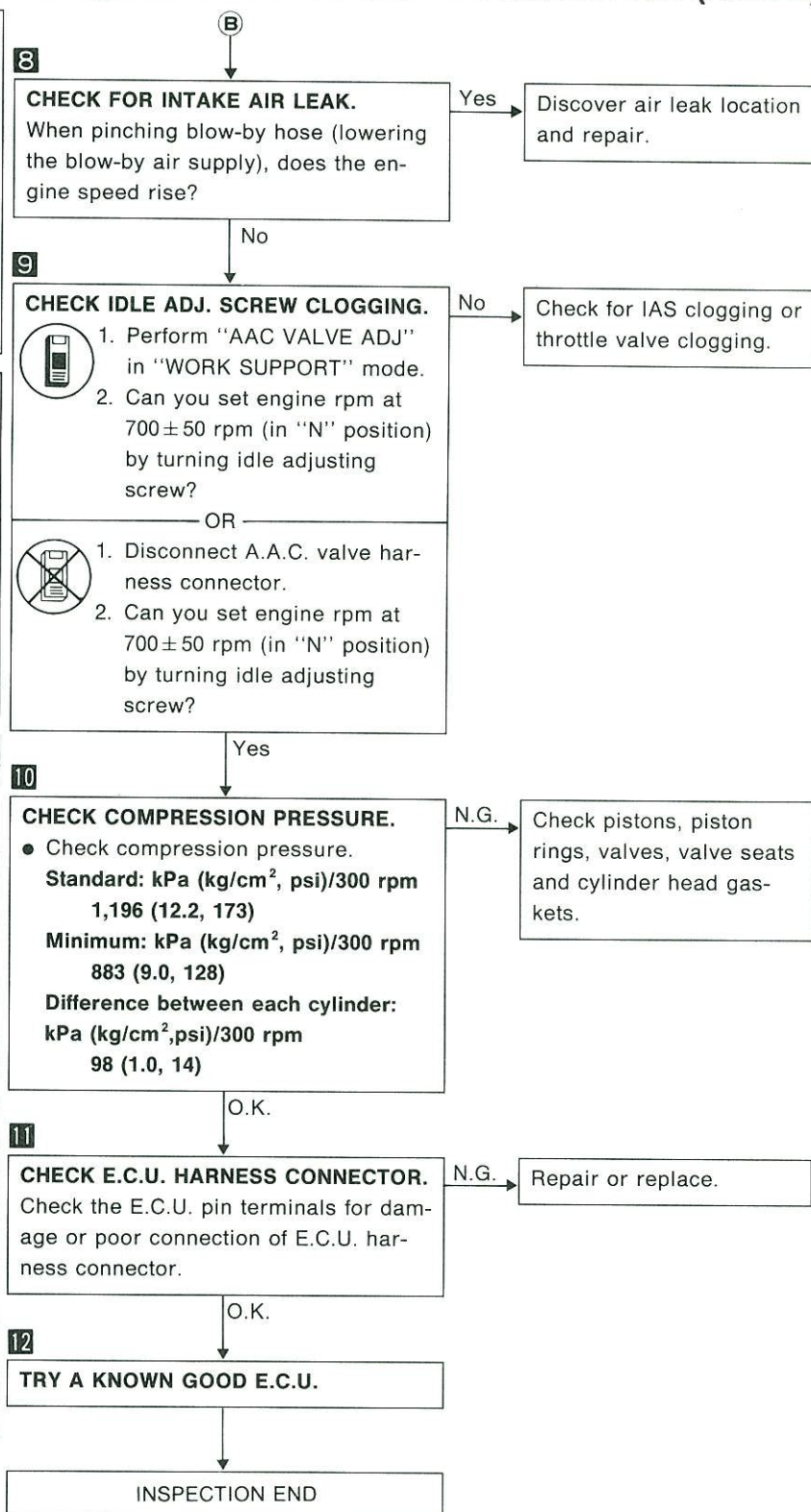
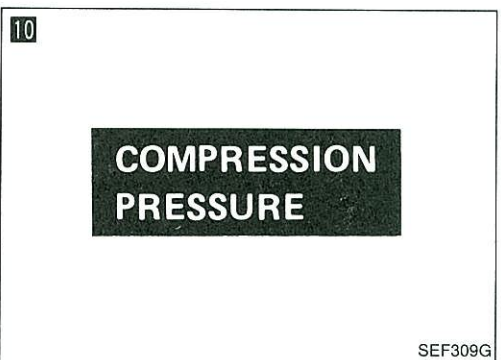
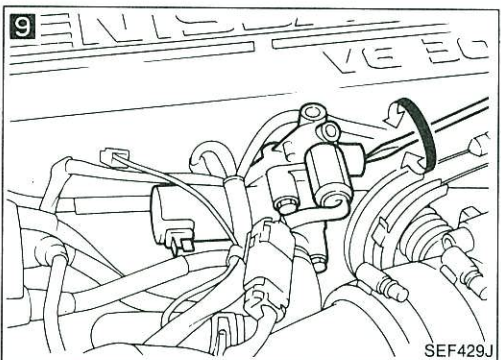
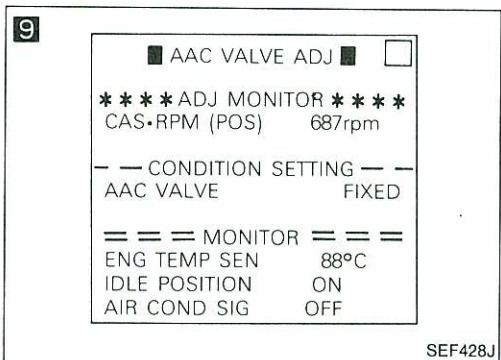
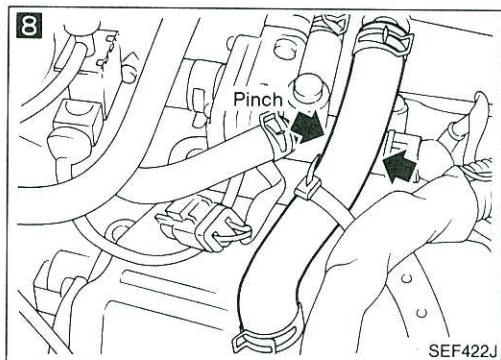
TROUBLE DIAGNOSES

Diagnostic Procedure 3 — Unstable Idle (Cont'd)

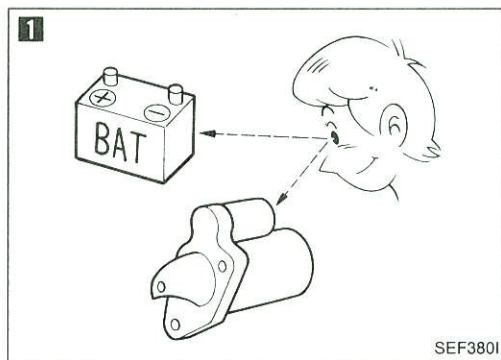


TROUBLE DIAGNOSES

Diagnostic Procedure 3 — Unstable Idle (Cont'd)



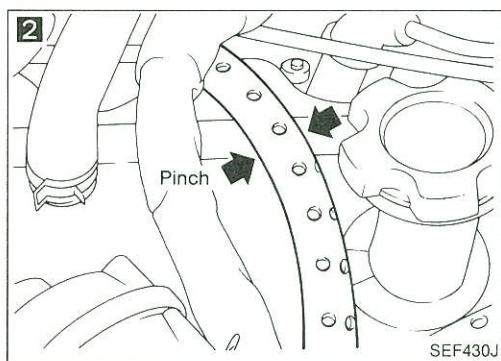
Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold



1
CHECK BATTERY AND STARTER.
Check battery and starter condition.
(Refer to EL section.)

N.G. → Repair or replace.

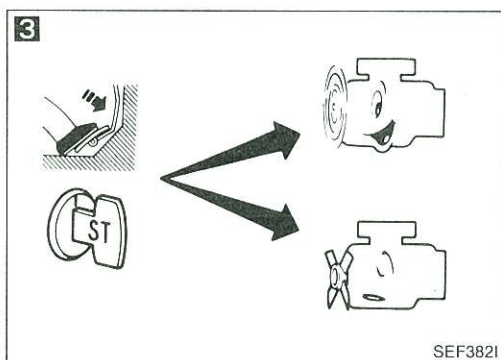
O.K. ↓



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

No → Check fuel pump and circuit. (See page EF & EC-116.)

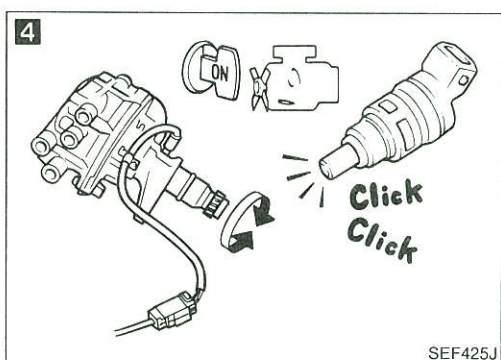
Yes ↓



3
CHECK AIR REGULATOR AND A.A.C. VALVE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check A.A.C. valve, air regulator and circuits. (See pages EF & EC-158, 160.)

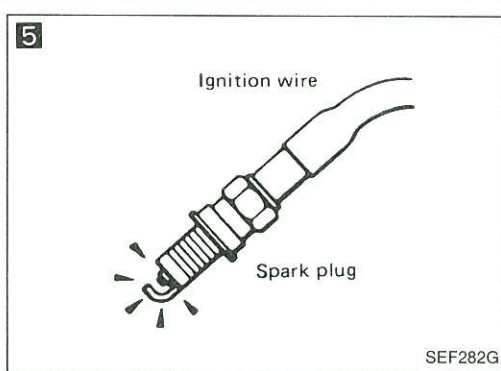
No ↓



4
CHECK INJECTOR.
1. Remove distributor from engine. (Crank angle sensor harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

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

Yes ↓



5
CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

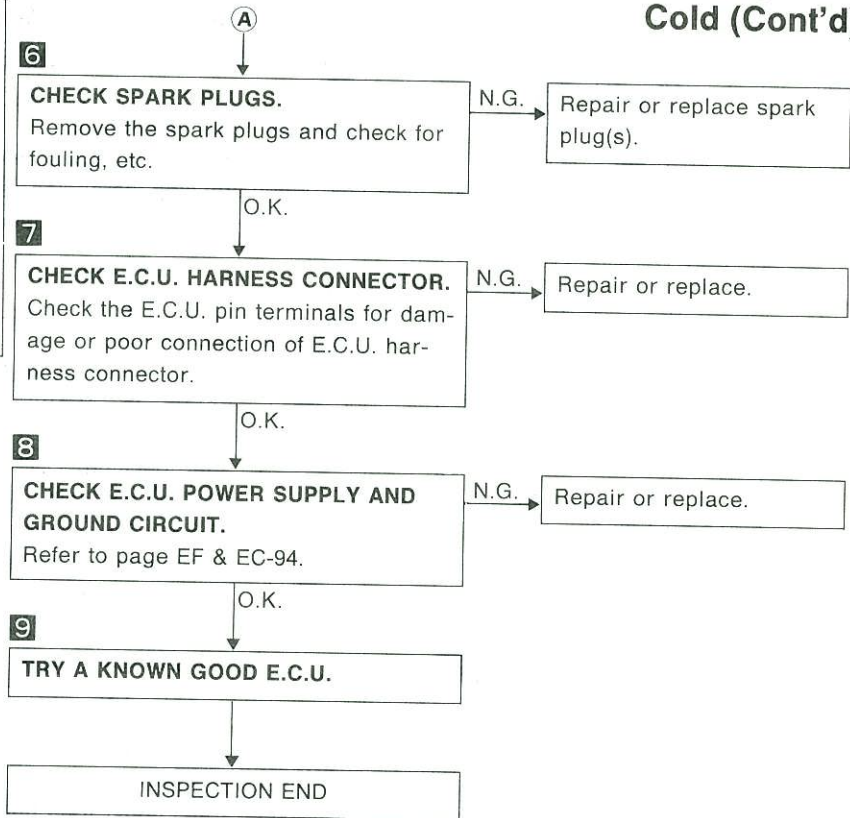
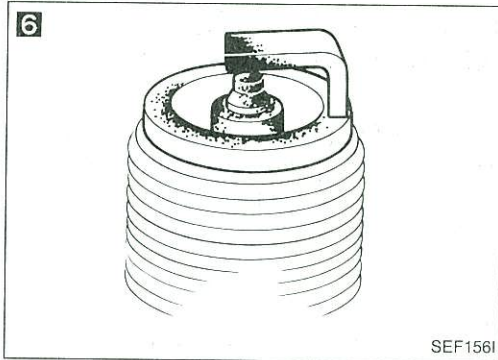
N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-112.)

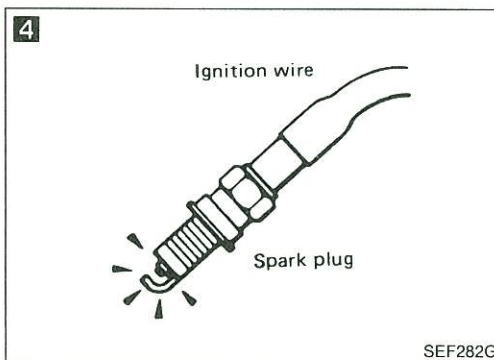
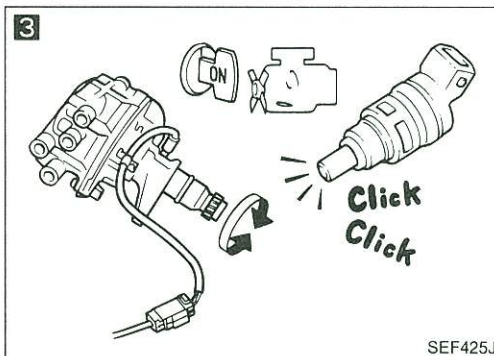
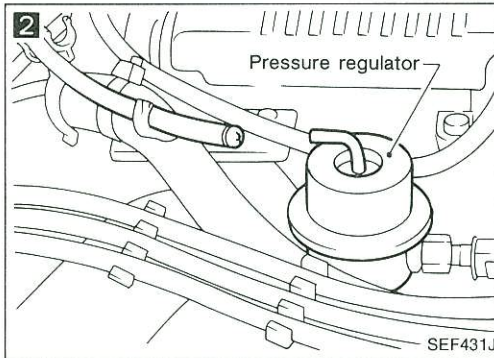
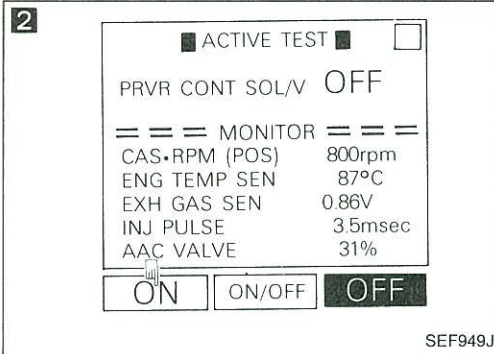
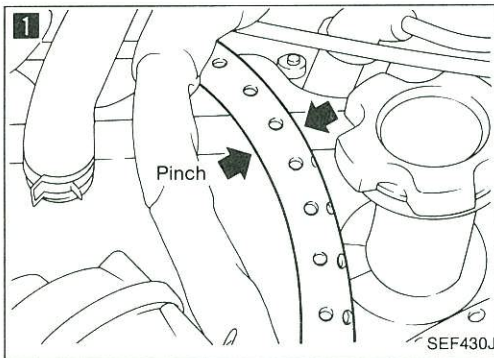
O.K. ↓

(Go to (A) on next page.)

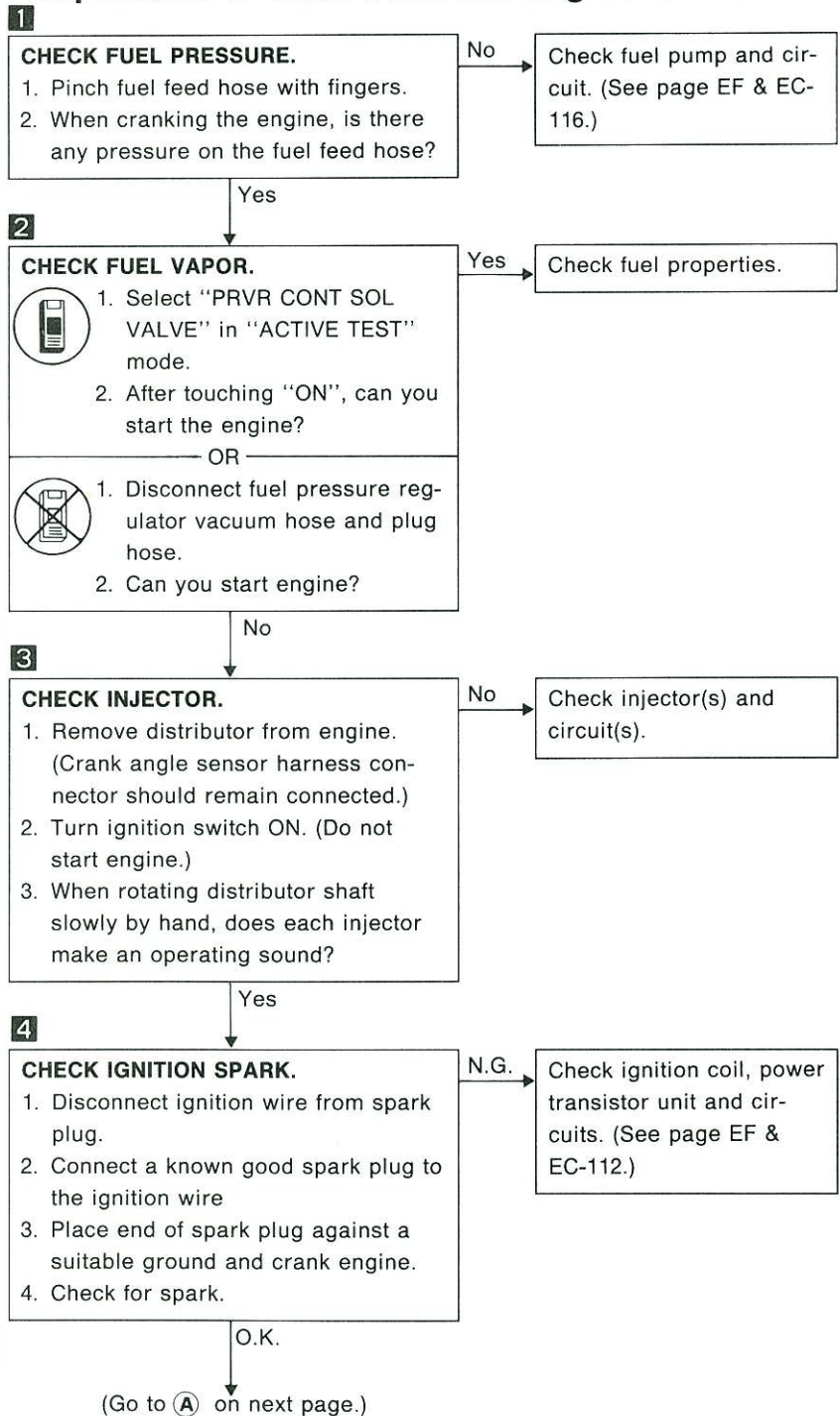
TROUBLE DIAGNOSES

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



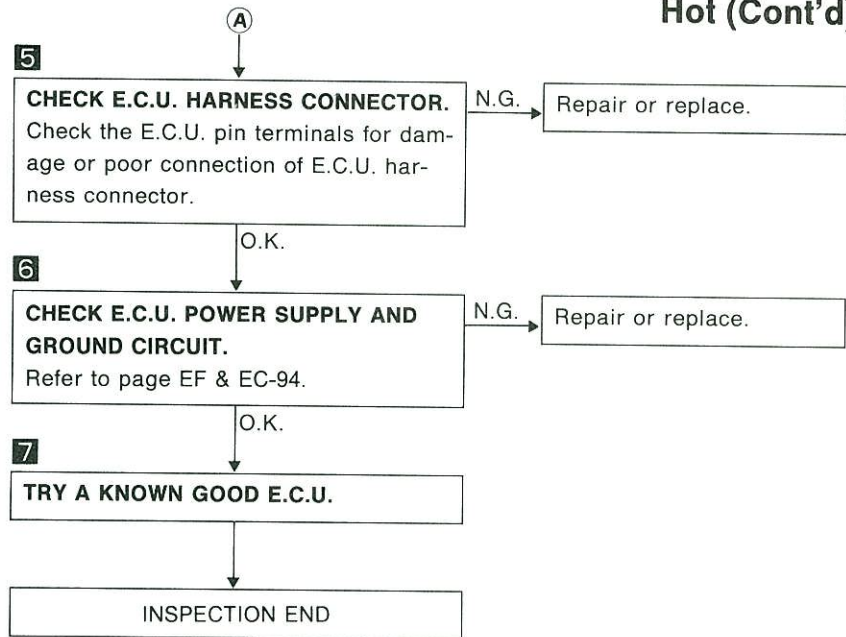


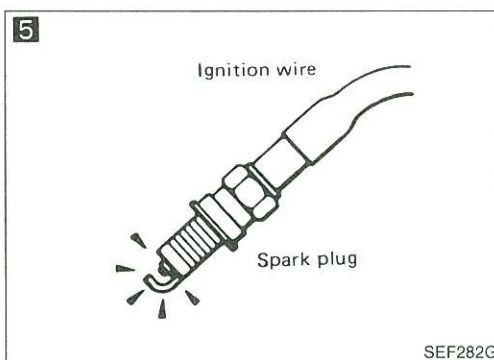
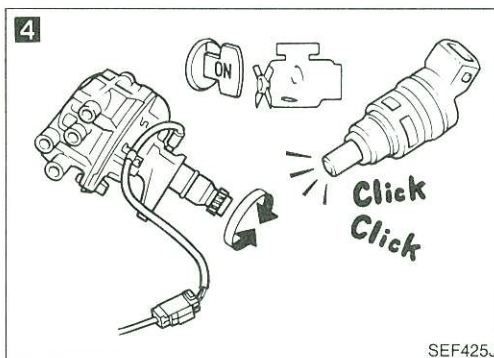
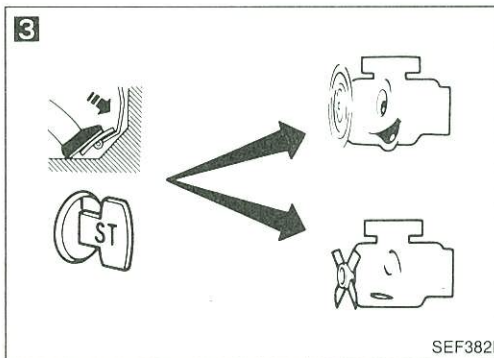
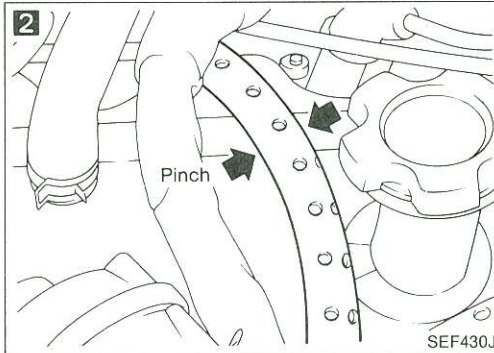
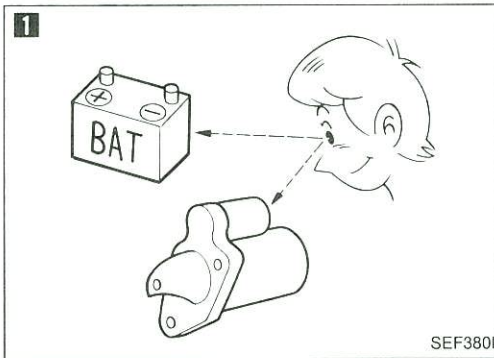
Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot



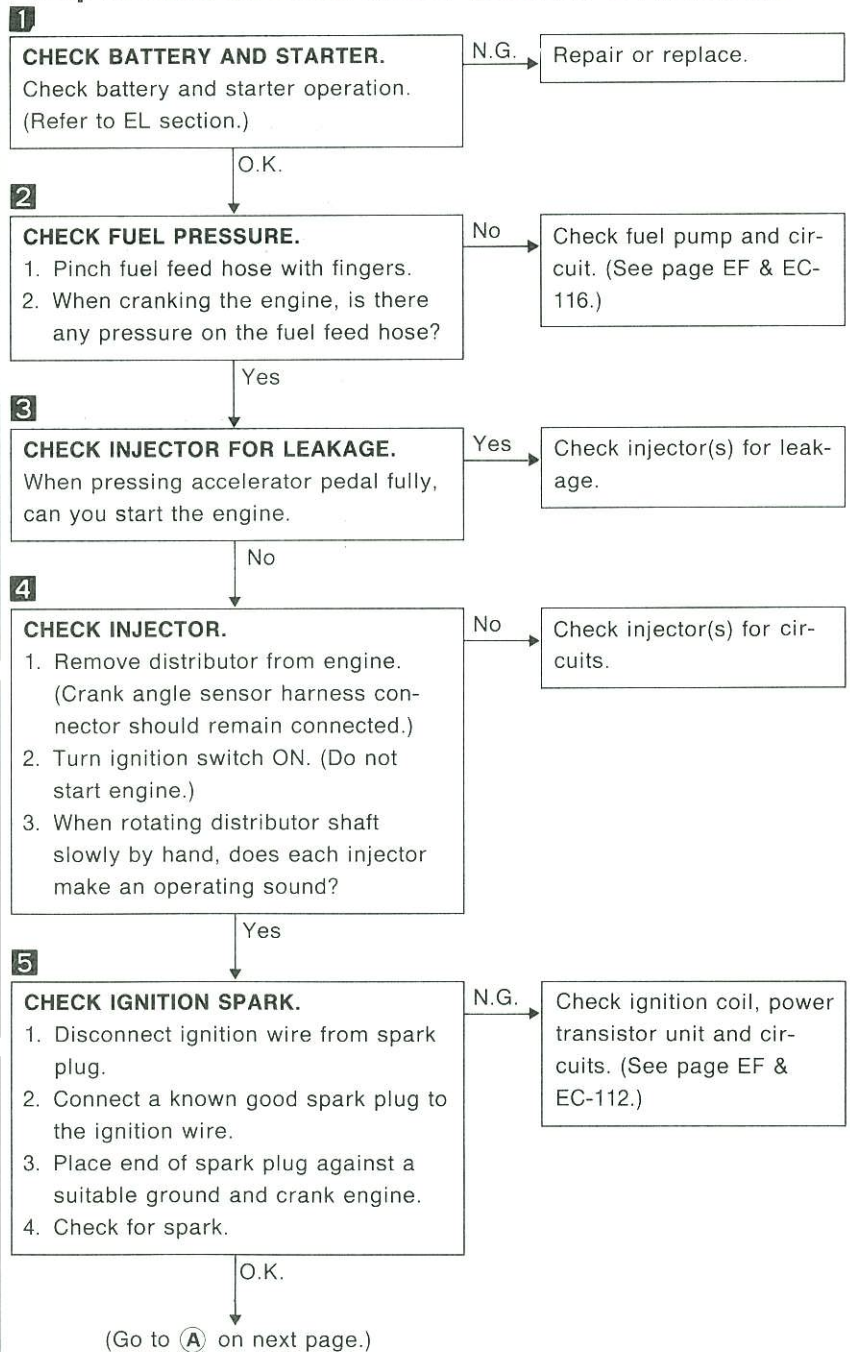
TROUBLE DIAGNOSES

Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



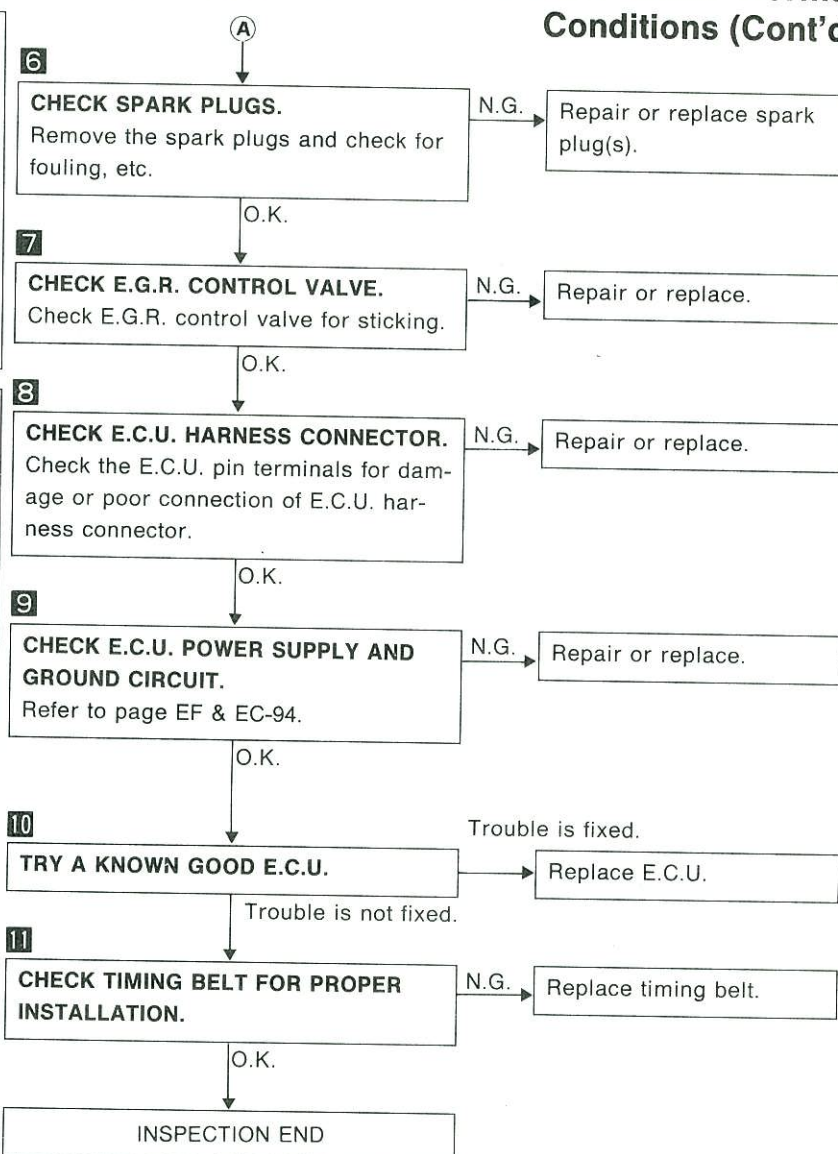
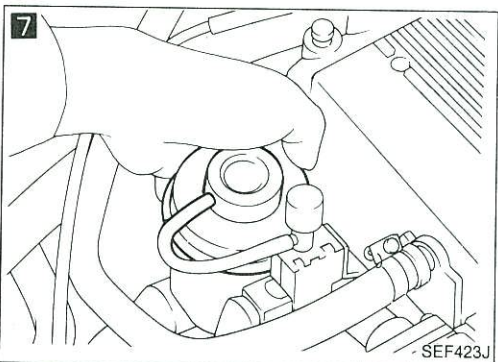
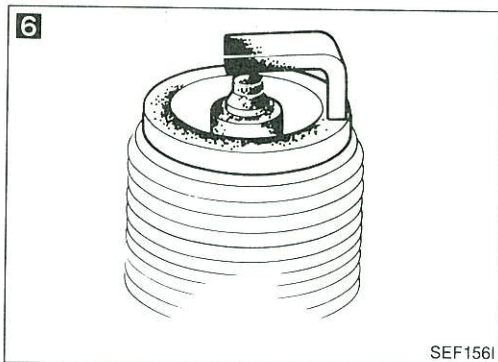


Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions

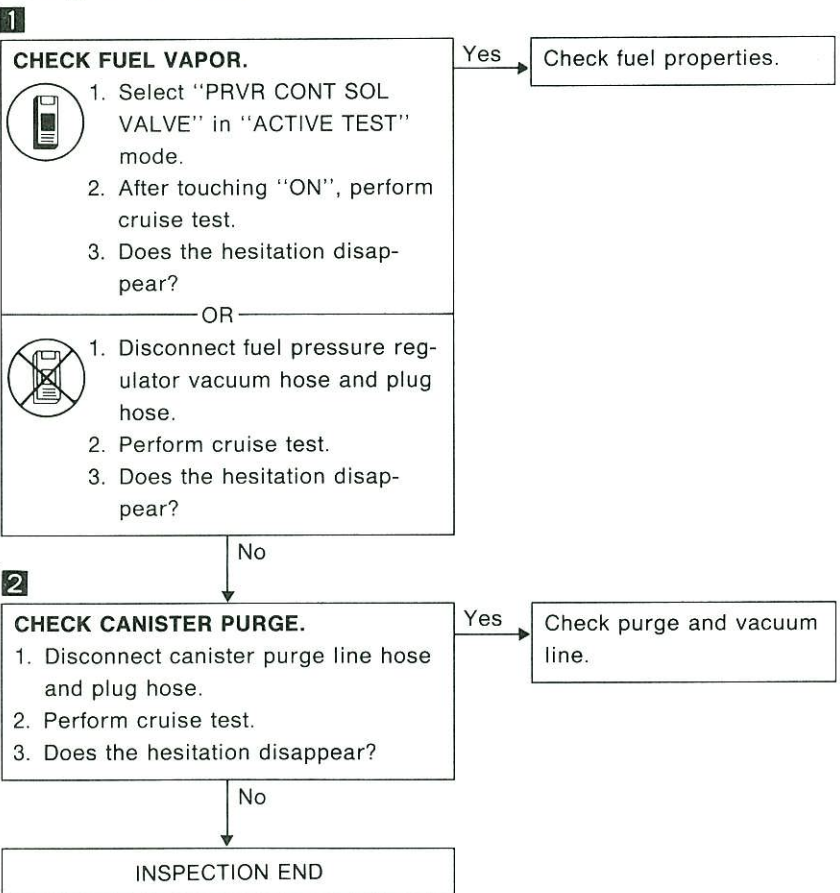
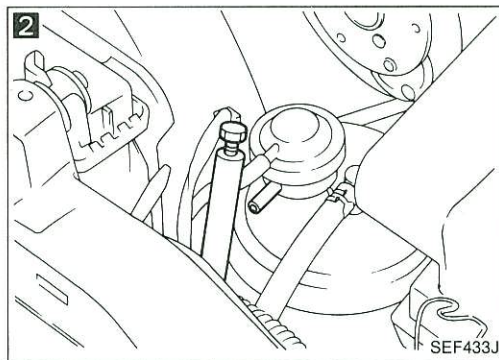
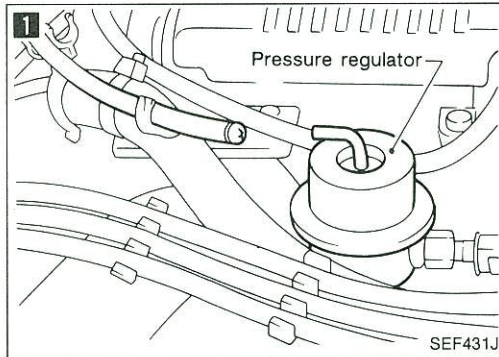
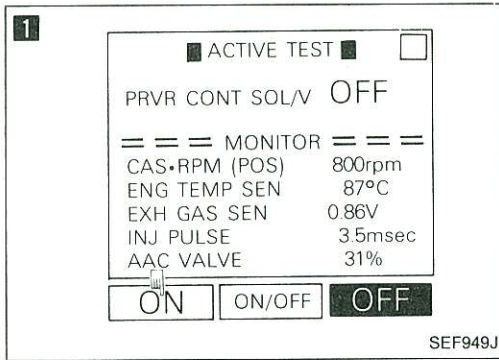


TROUBLE DIAGNOSES

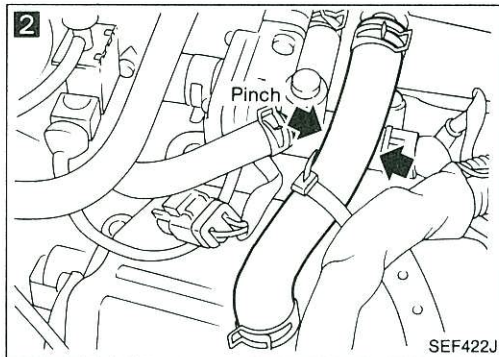
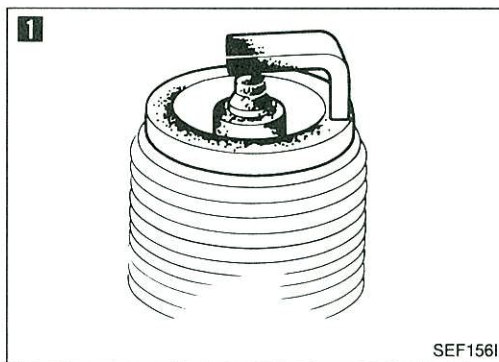
Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)



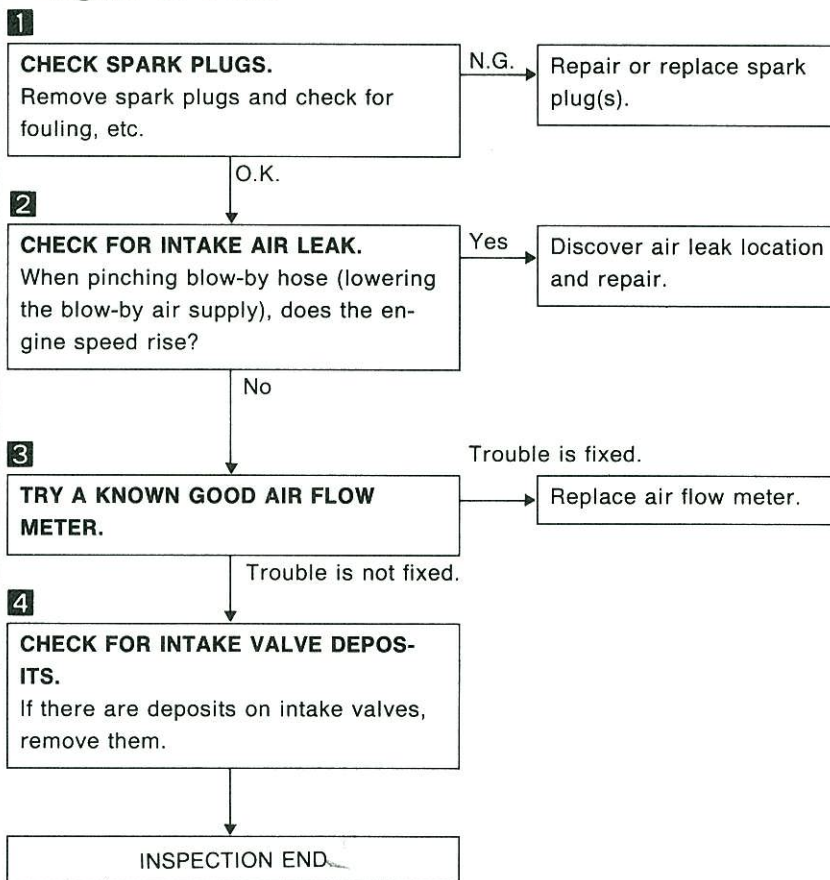
Diagnostic Procedure 7 — Hesitation when the Engine is Hot

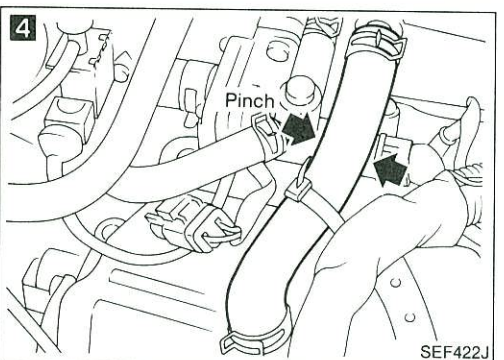
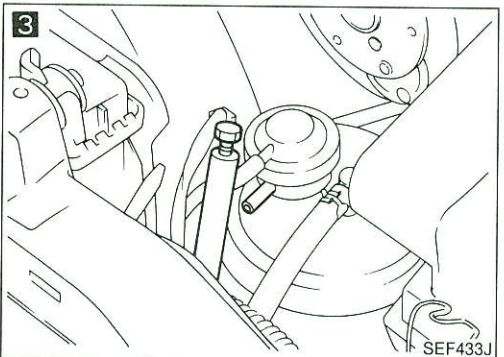
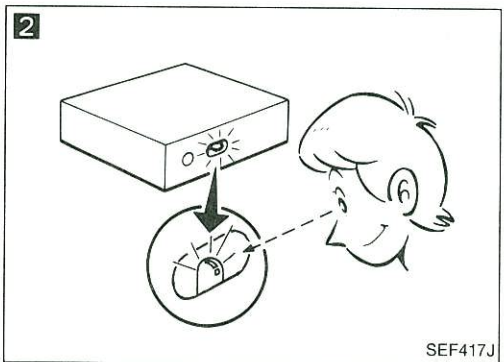
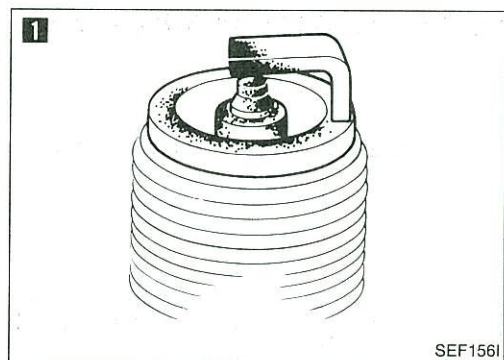


TROUBLE DIAGNOSES

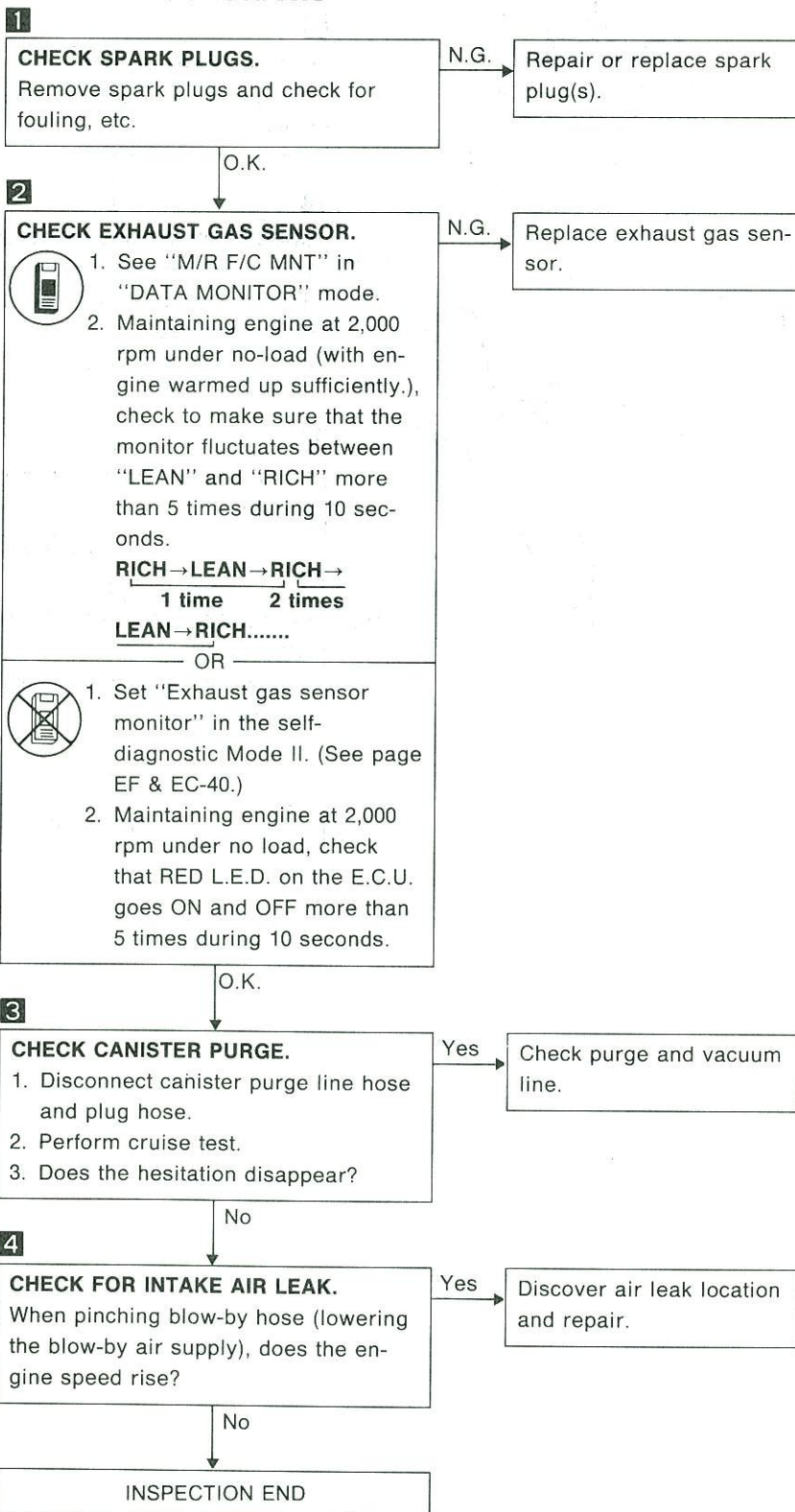


Diagnostic Procedure 8 — Hesitation when the Engine is Cold

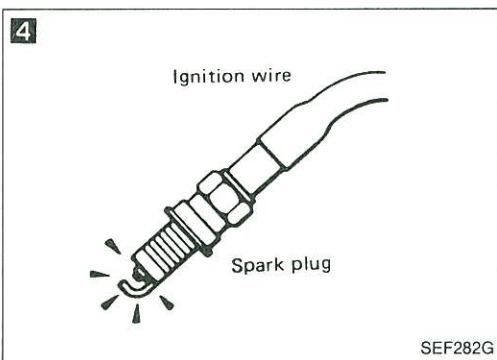
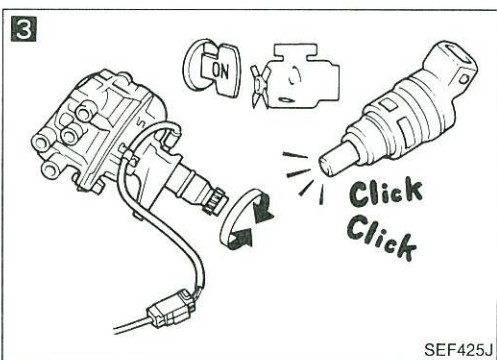
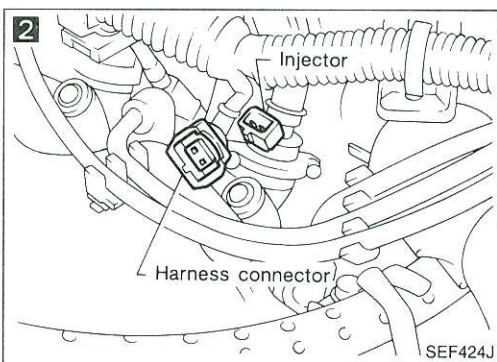
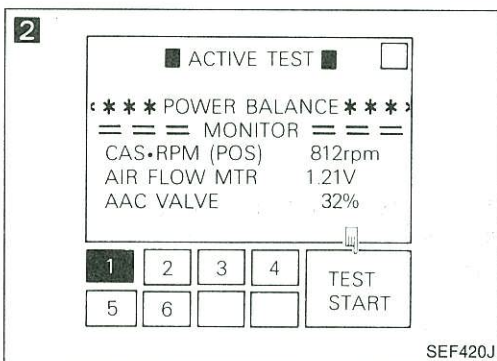
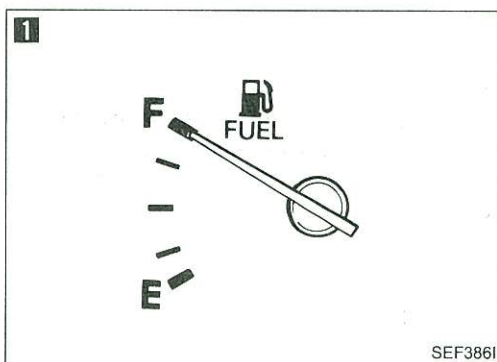




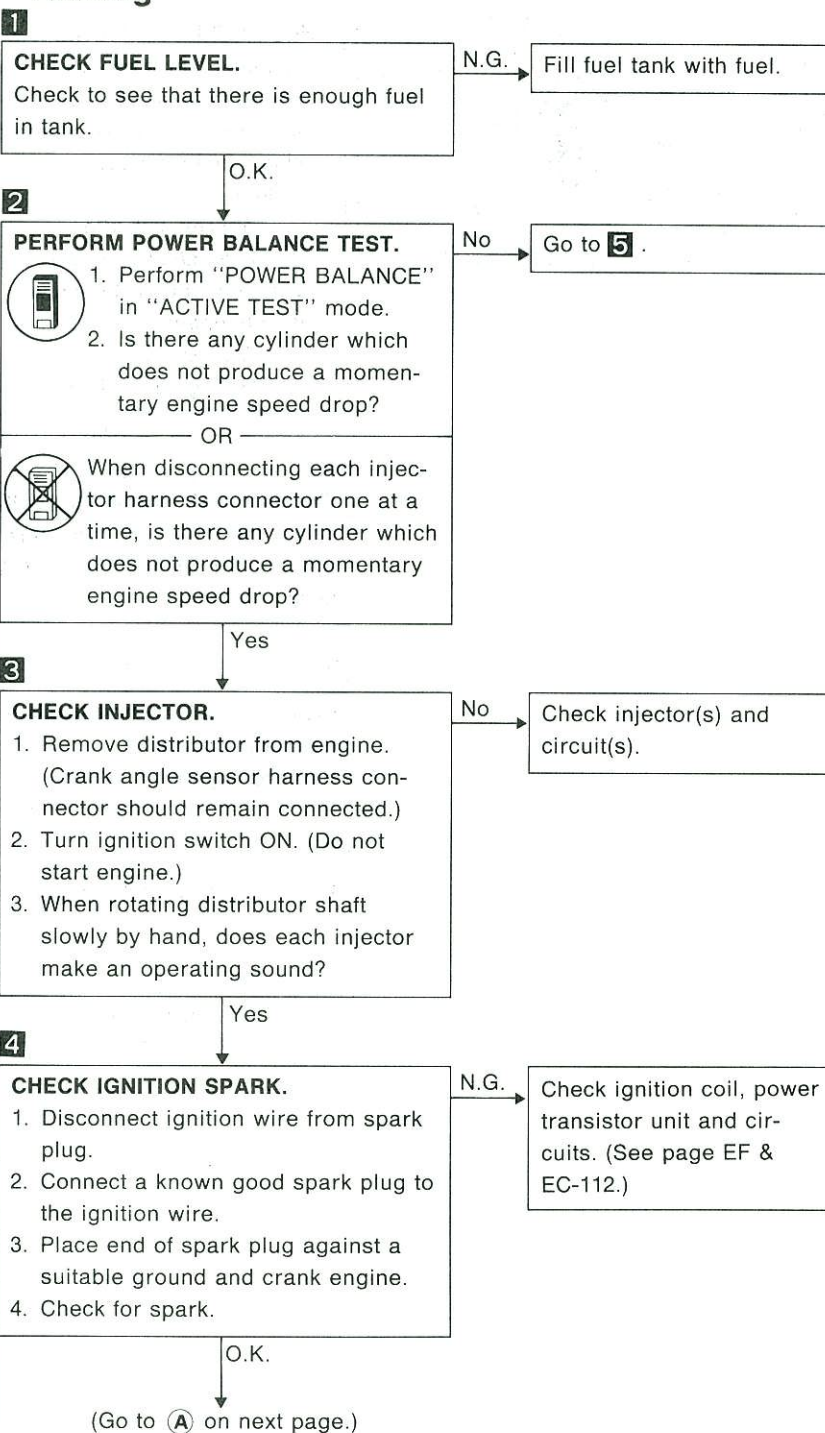
Diagnostic Procedure 9 — Hesitation under Normal Conditions



TROUBLE DIAGNOSES

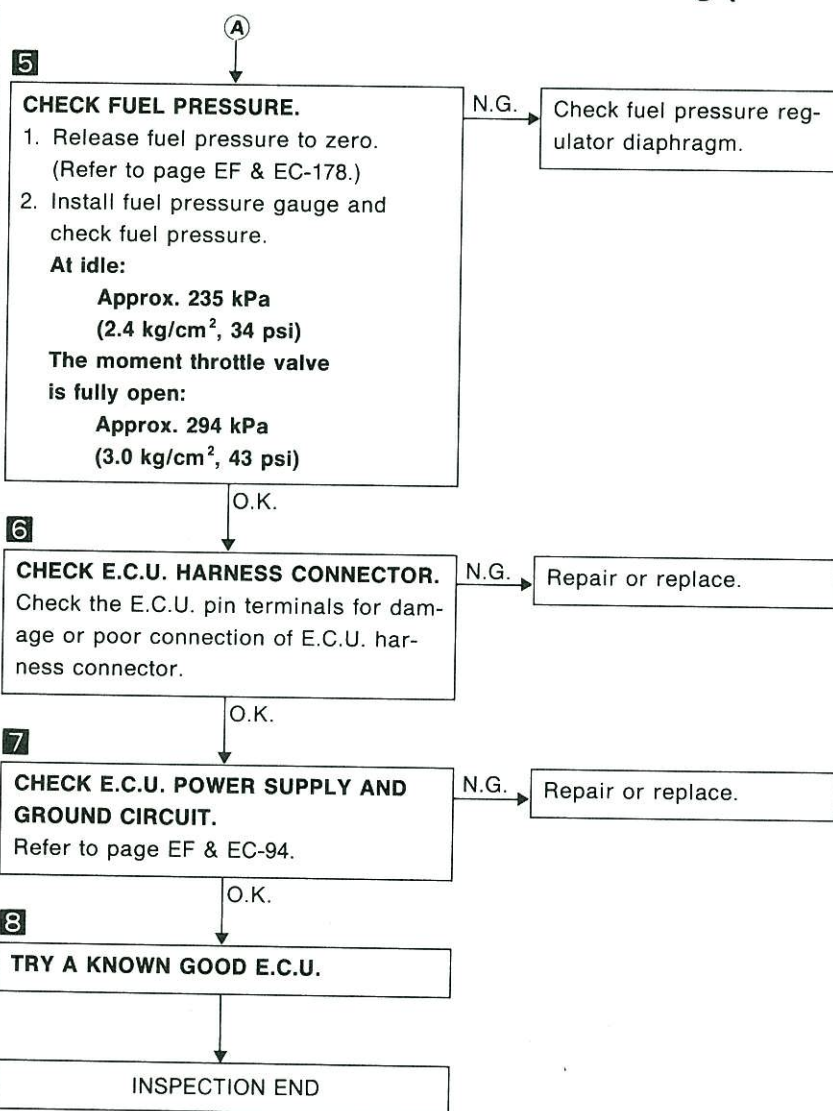
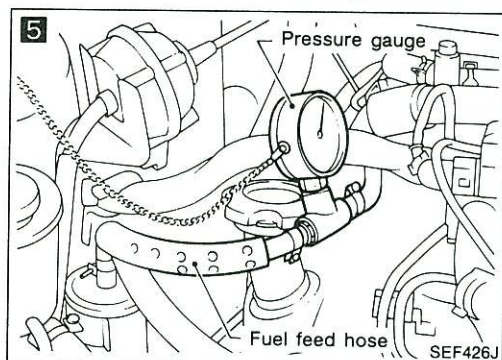


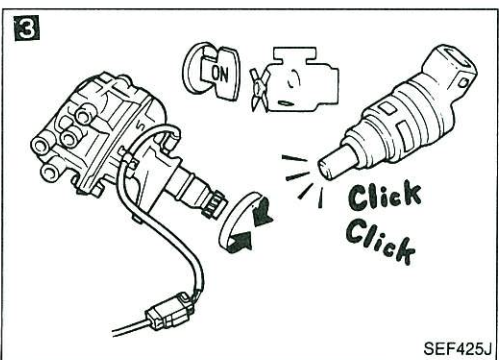
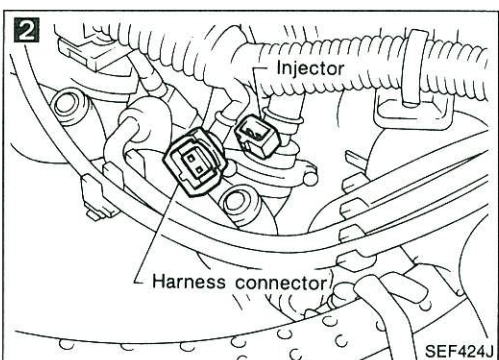
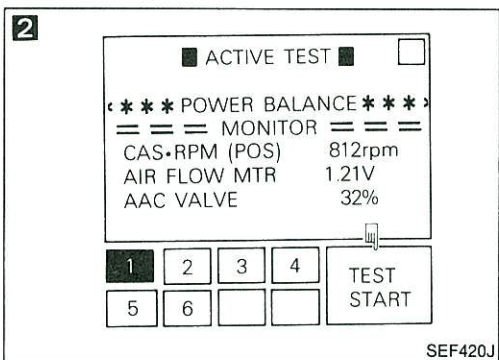
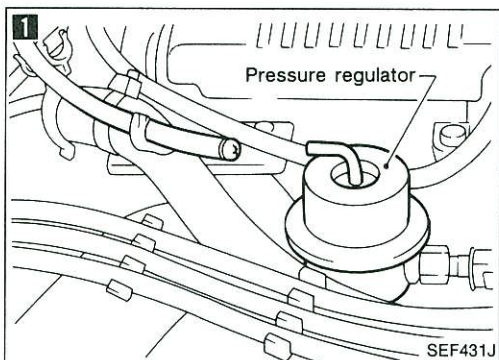
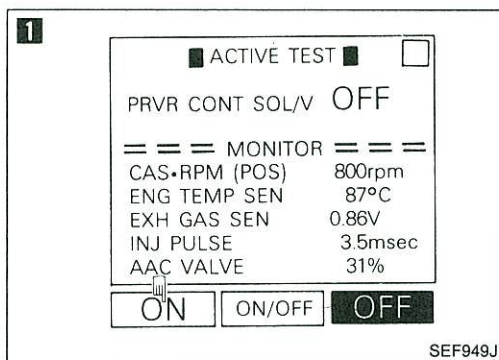
Diagnostic Procedure 10 — Engine Stalls when Turning



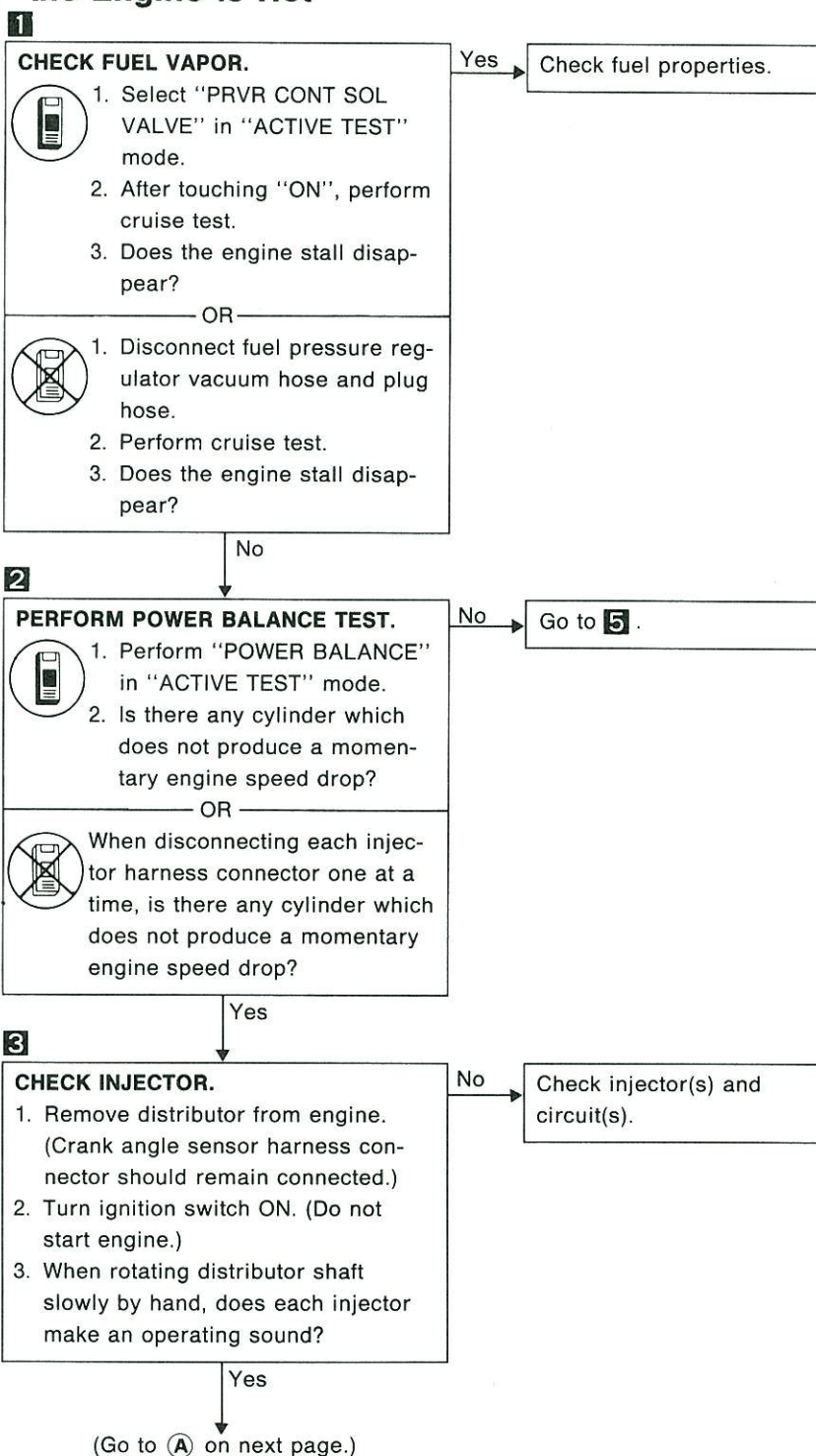
TROUBLE DIAGNOSES

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



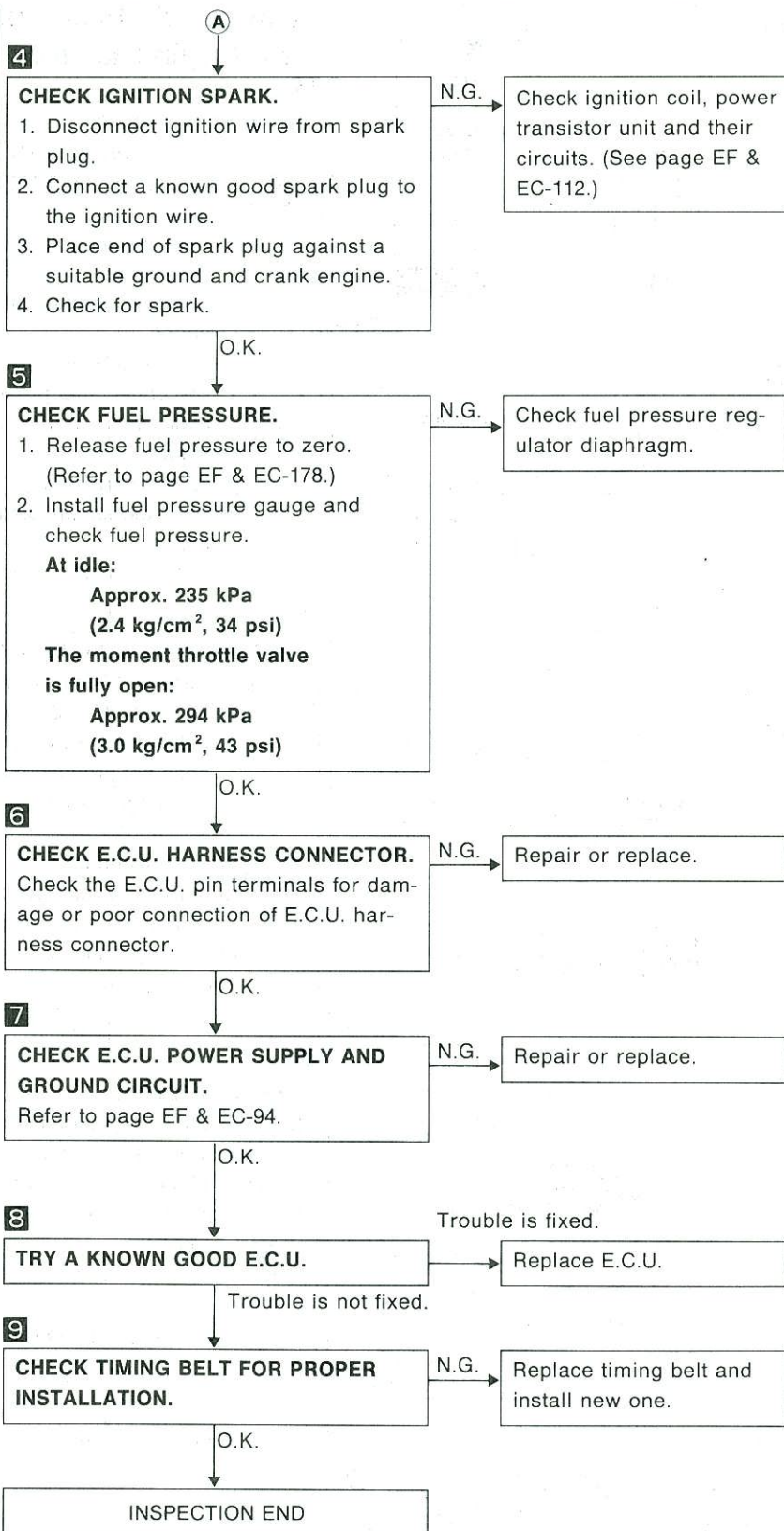
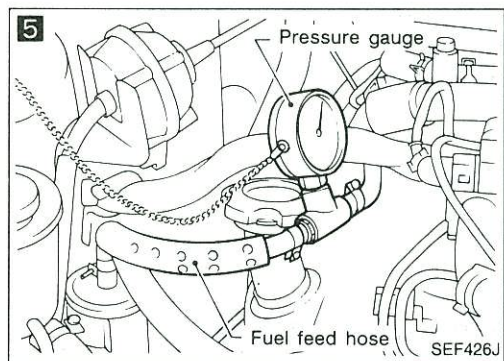
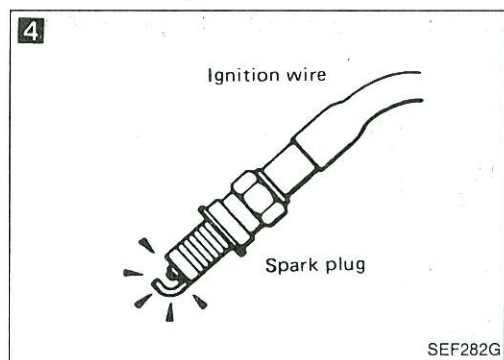


Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot

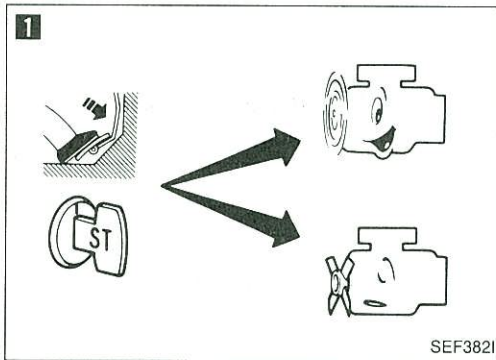


TROUBLE DIAGNOSES

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



TROUBLE DIAGNOSES



Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

1

CHECK AIR REGULATOR AND A.A.C. VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal fully?

N.G. → Check A.A.C. valve, air regulator and circuits.
(See pages EF & EC-158, 160.)

O.K.

2

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

N.G. → Go to **6**.

OR

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

O.K.

3

CHECK INJECTOR.
1. Remove distributor from engine. (Crank angle sensor harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

N.G. → Check injector(s) and circuit(s).

O.K.

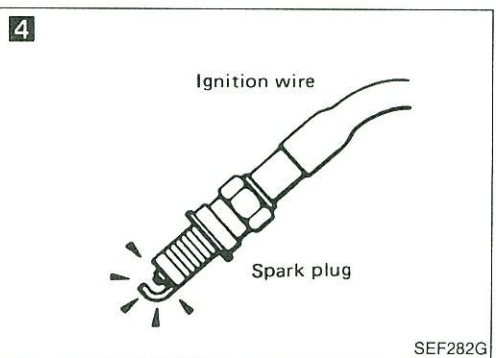
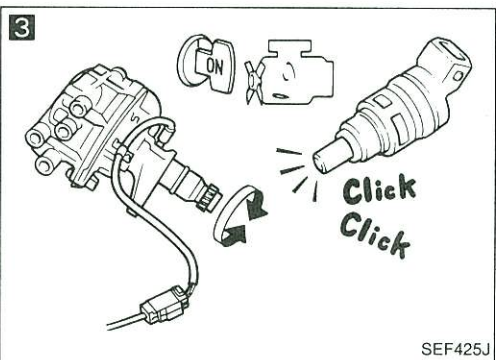
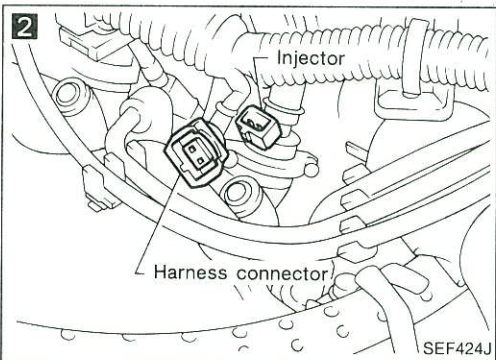
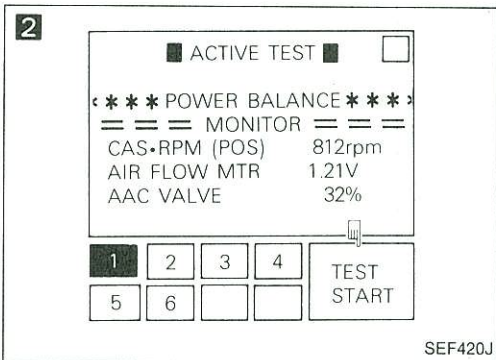
4

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

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-112.)

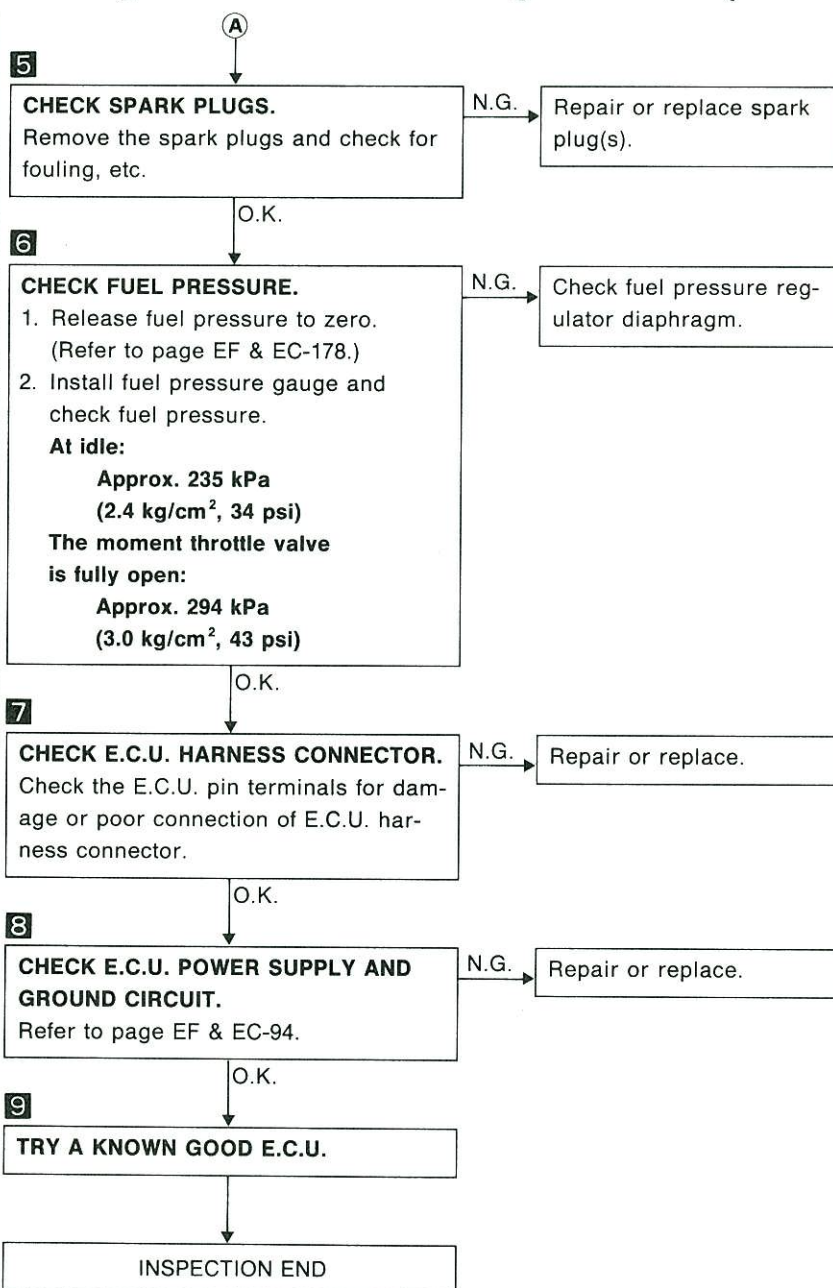
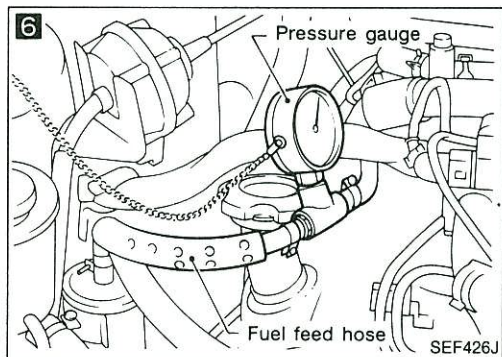
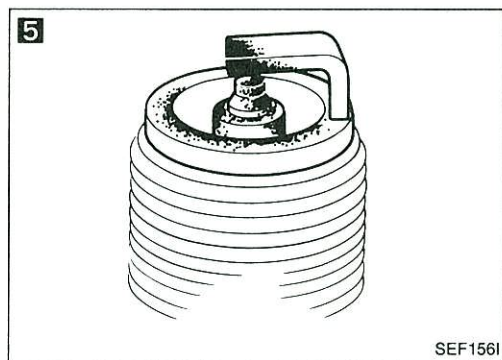
O.K.

(Go to **A** on next page.)

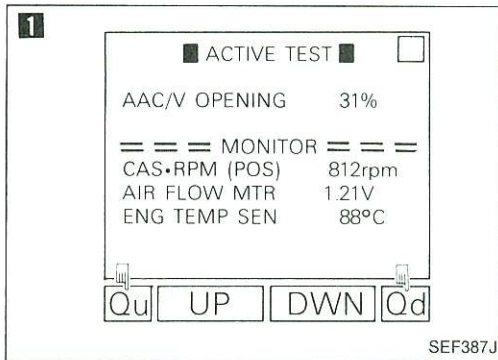


TROUBLE DIAGNOSES

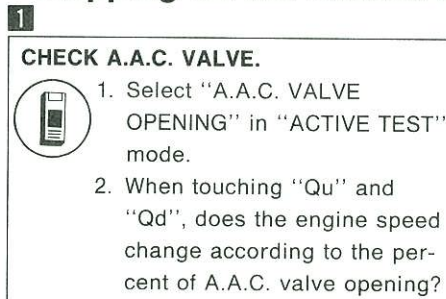
Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold (Cont'd)



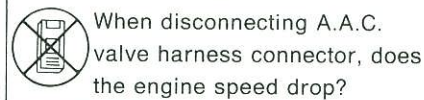
TROUBLE DIAGNOSES



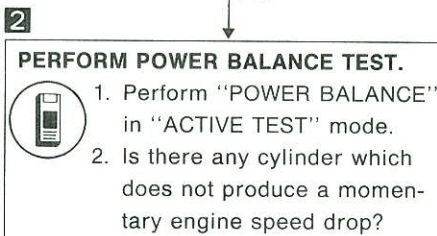
Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily



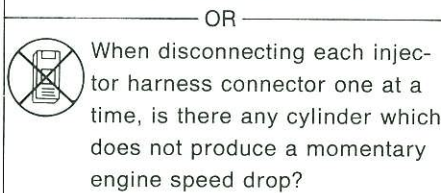
No → Check A.A.C. valve and circuit. (See page EF & EC-160.)



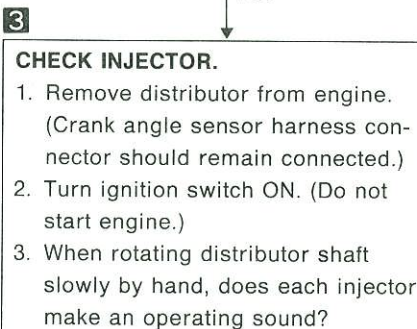
Yes



No → Go to 5.



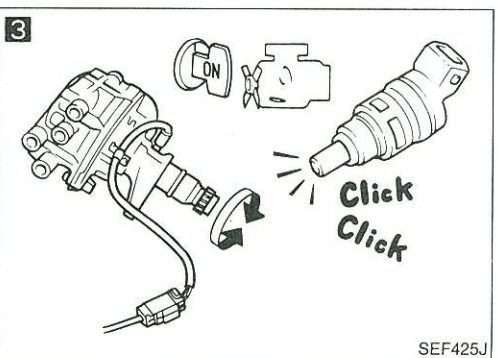
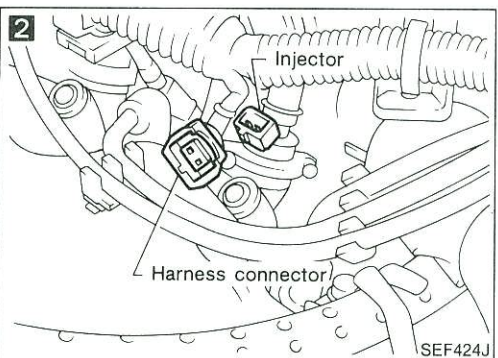
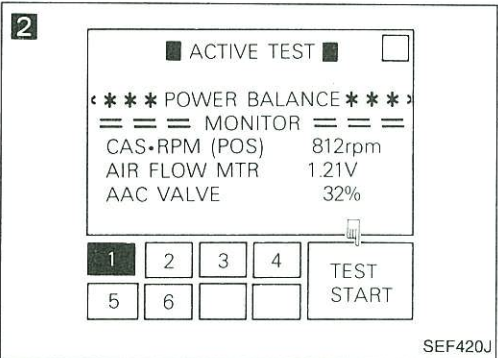
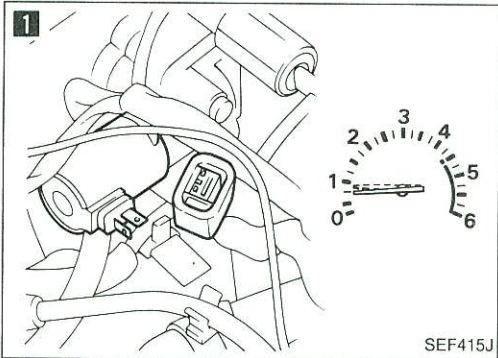
Yes



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

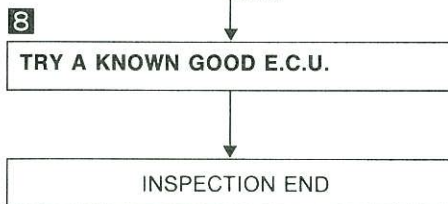
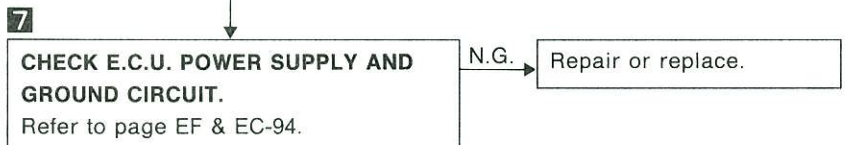
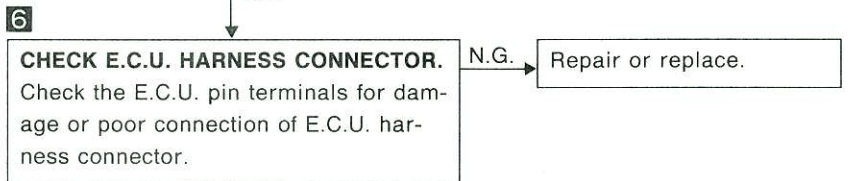
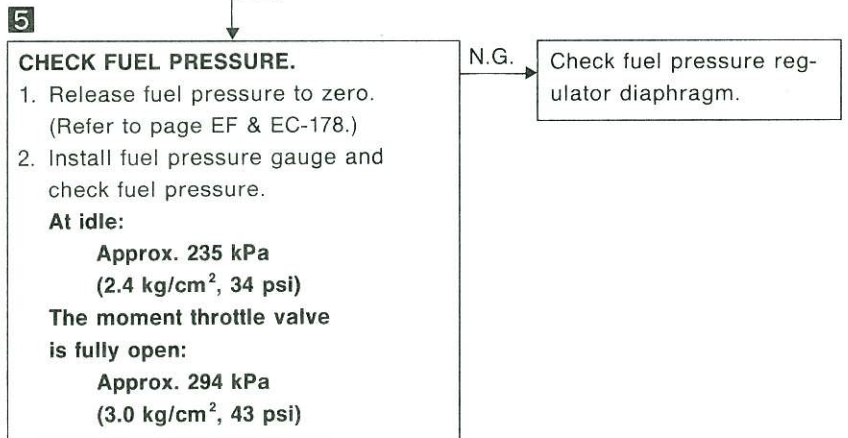
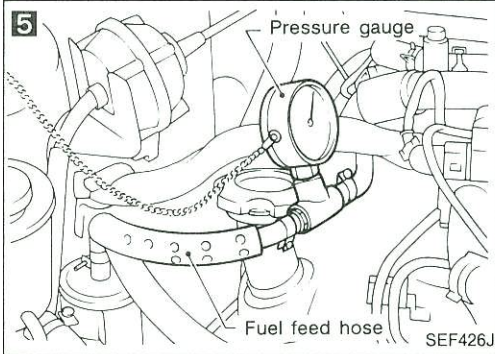
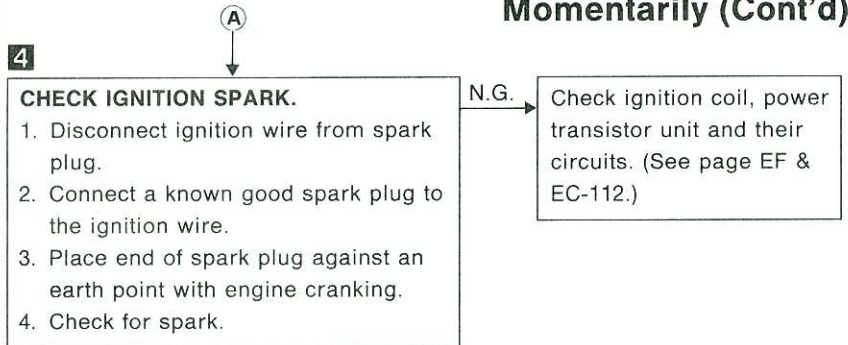
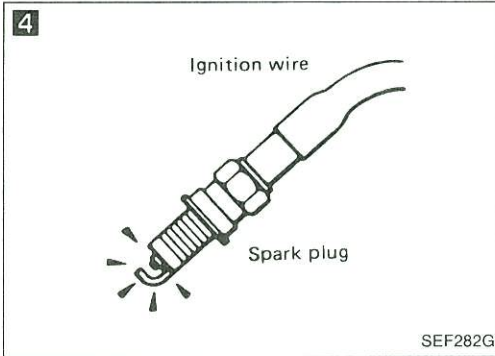
Yes

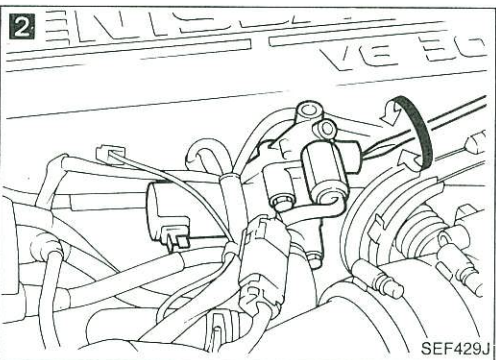
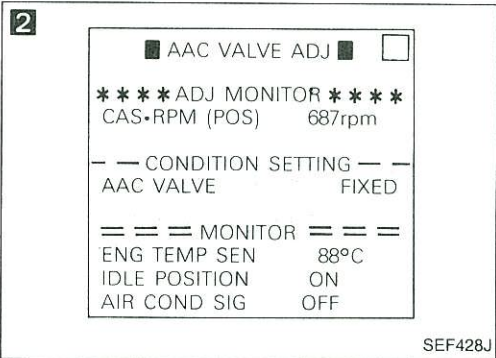
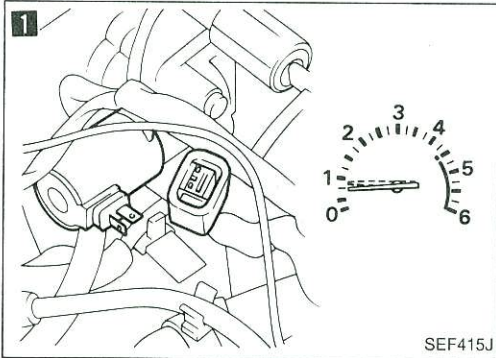
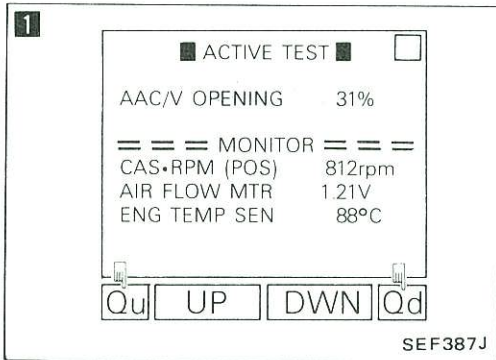
(Go to A on next page.)



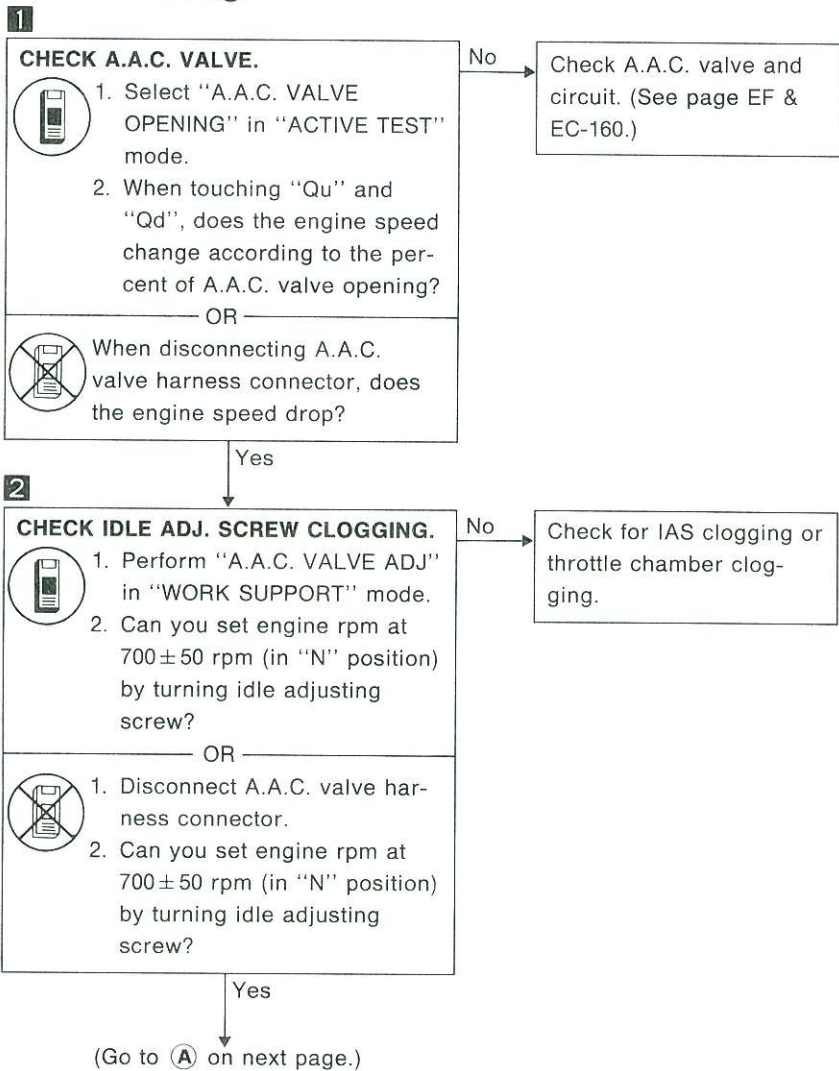
TROUBLE DIAGNOSES

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



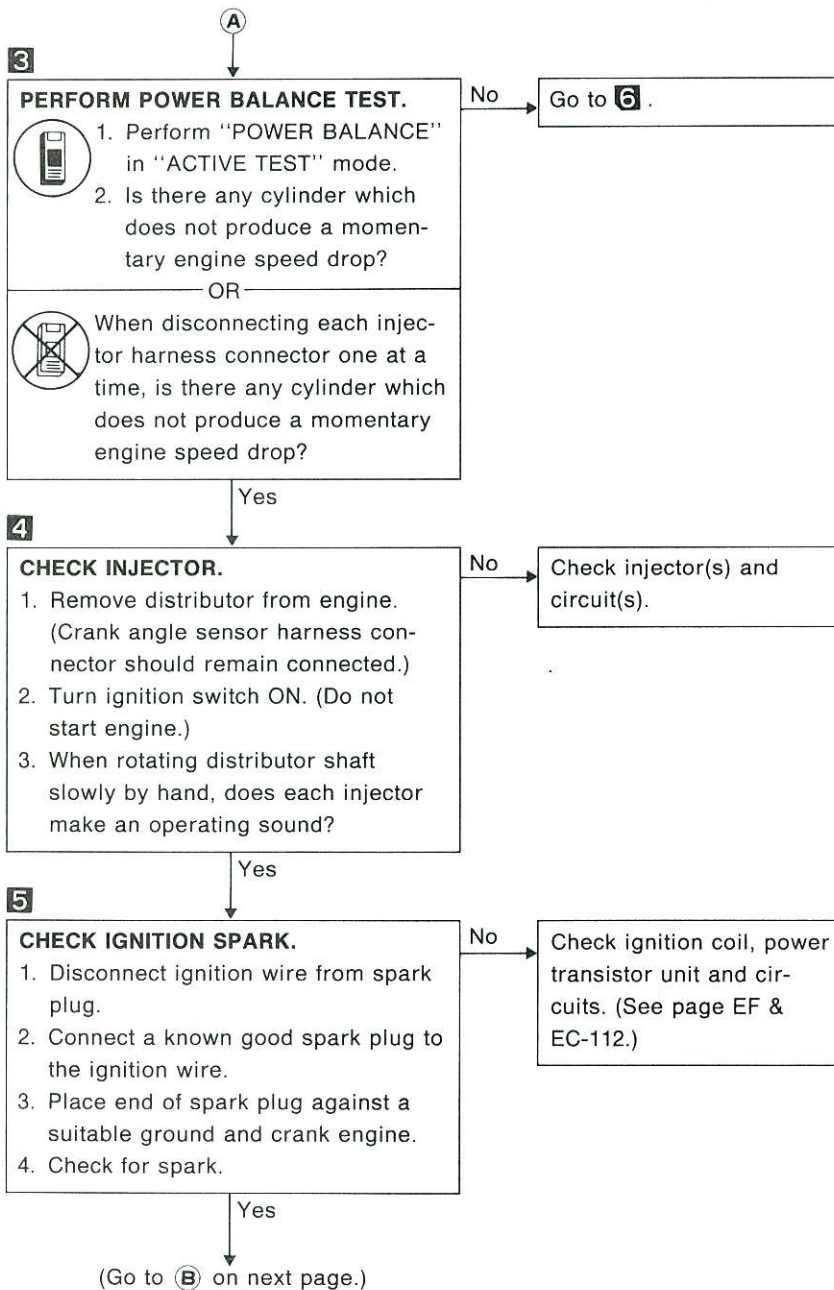
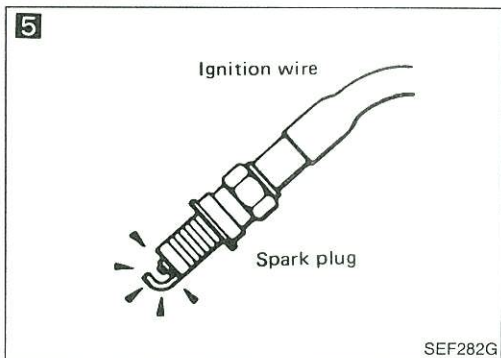
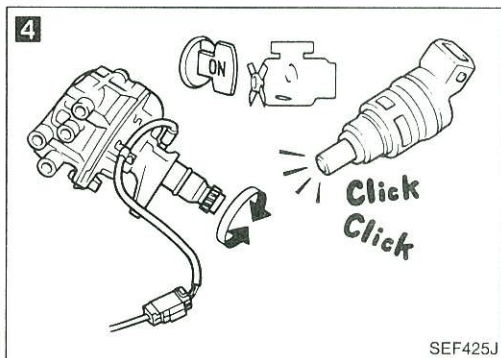
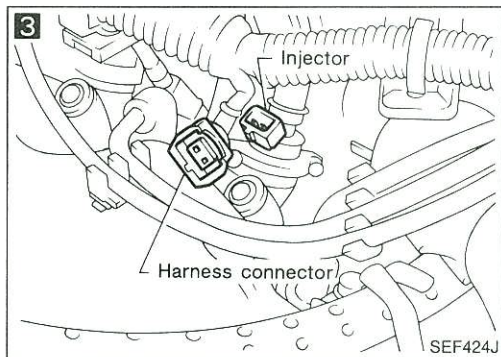
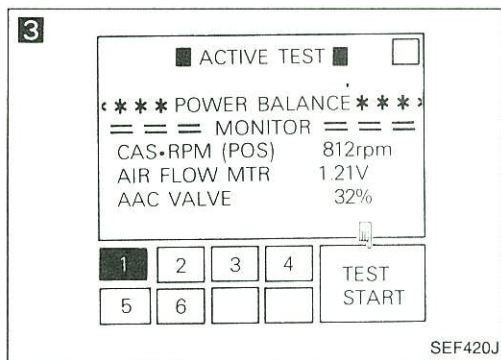


Diagnostic Procedure 14 — Engine Stalls after Decelerating



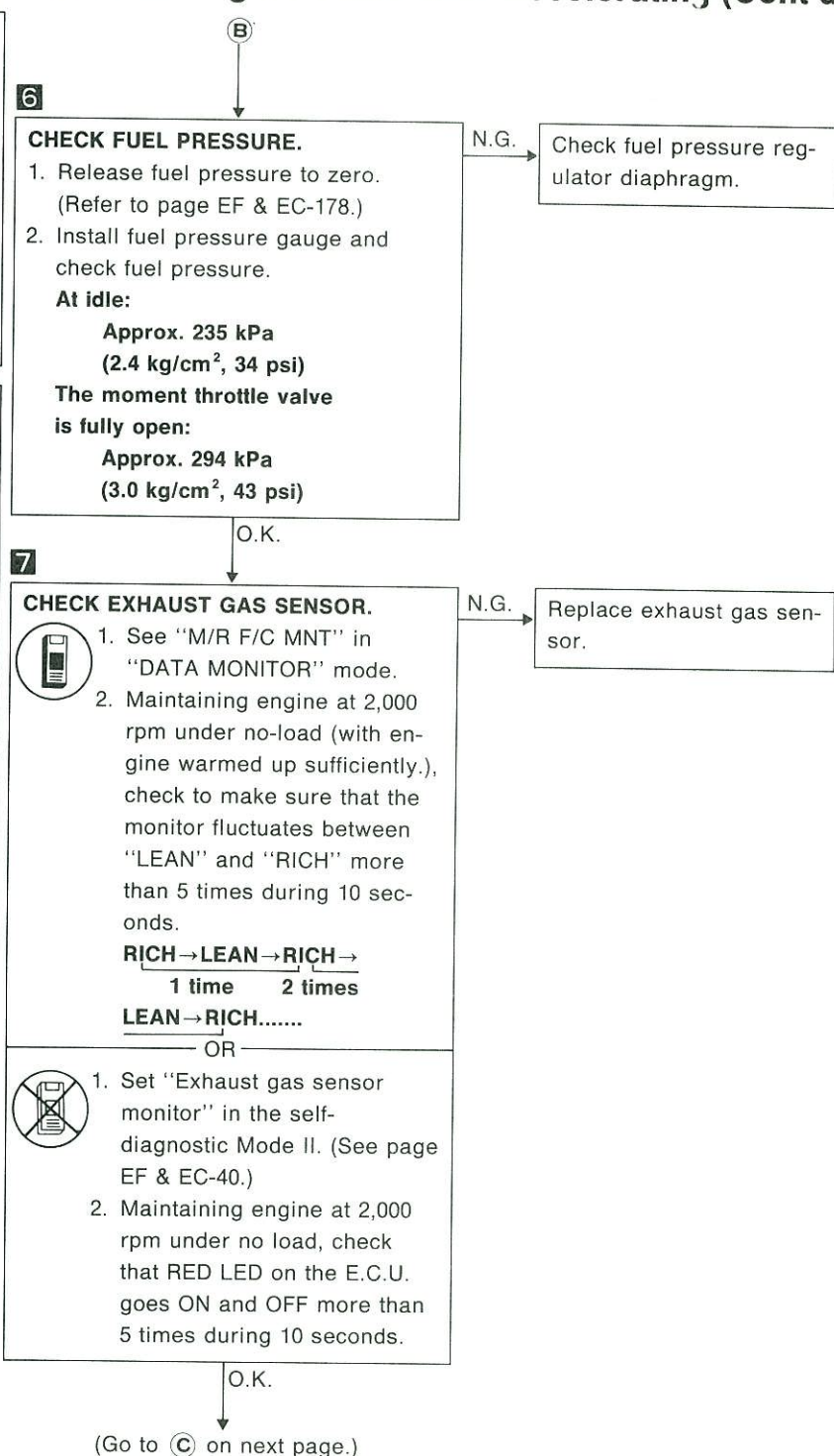
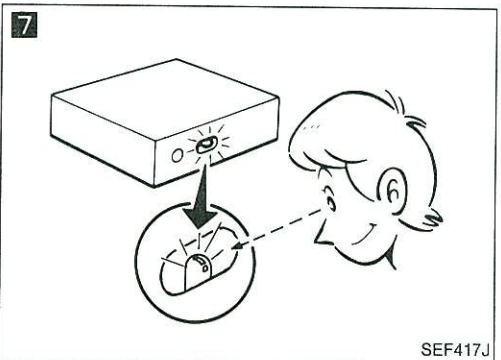
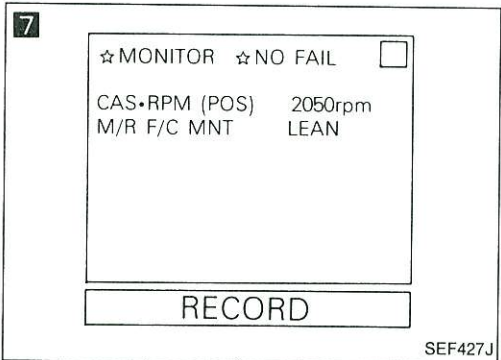
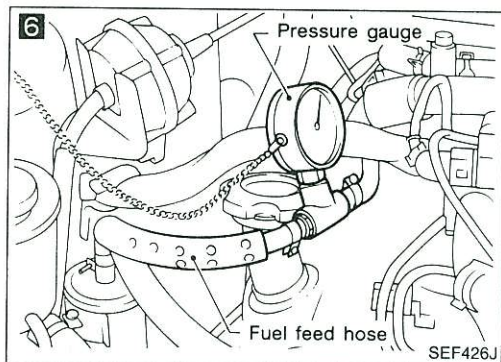
TROUBLE DIAGNOSES

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



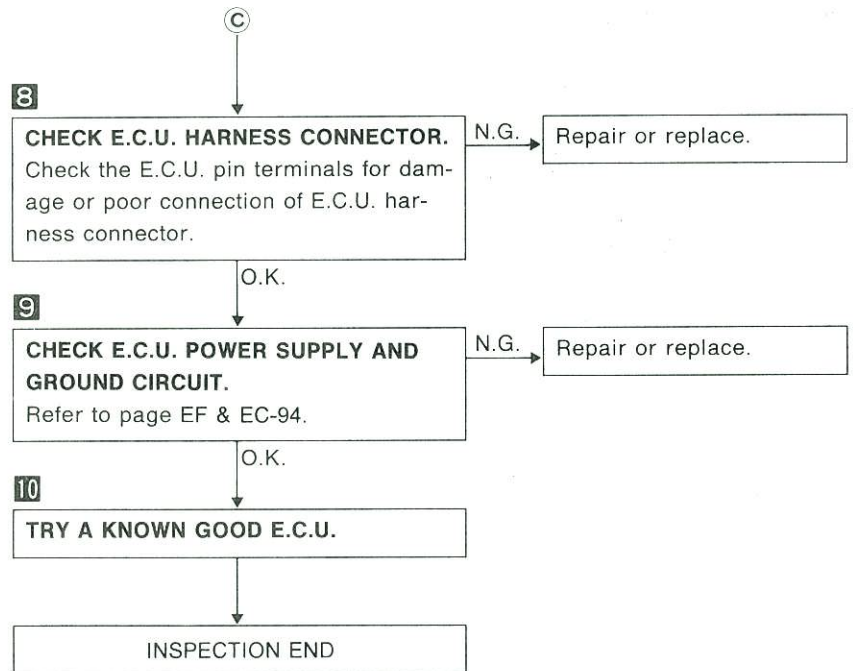
TROUBLE DIAGNOSES

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

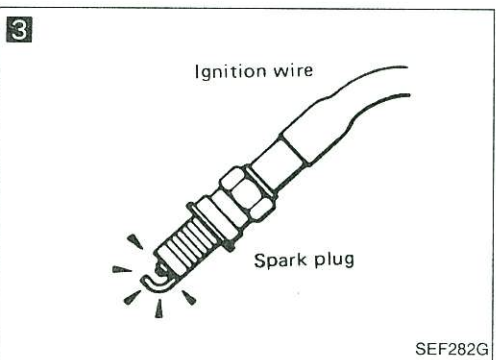
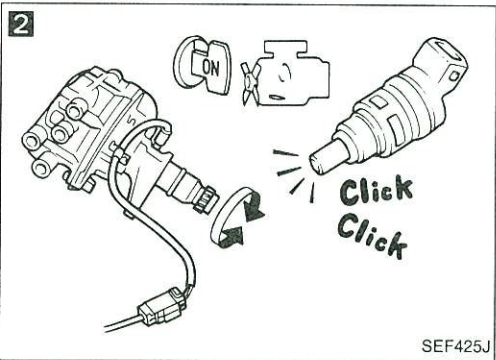
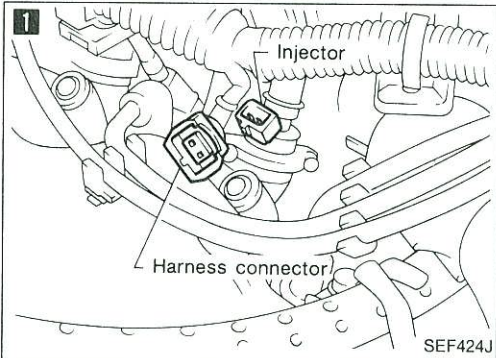
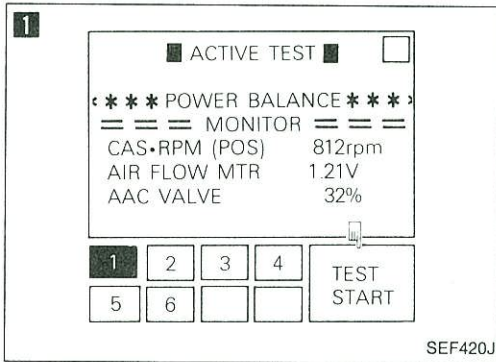


TROUBLE DIAGNOSES

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



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.

1. Remove distributor from engine. (Crank angle sensor harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

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

Yes

3 CHECK IGNITION SPARK.

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

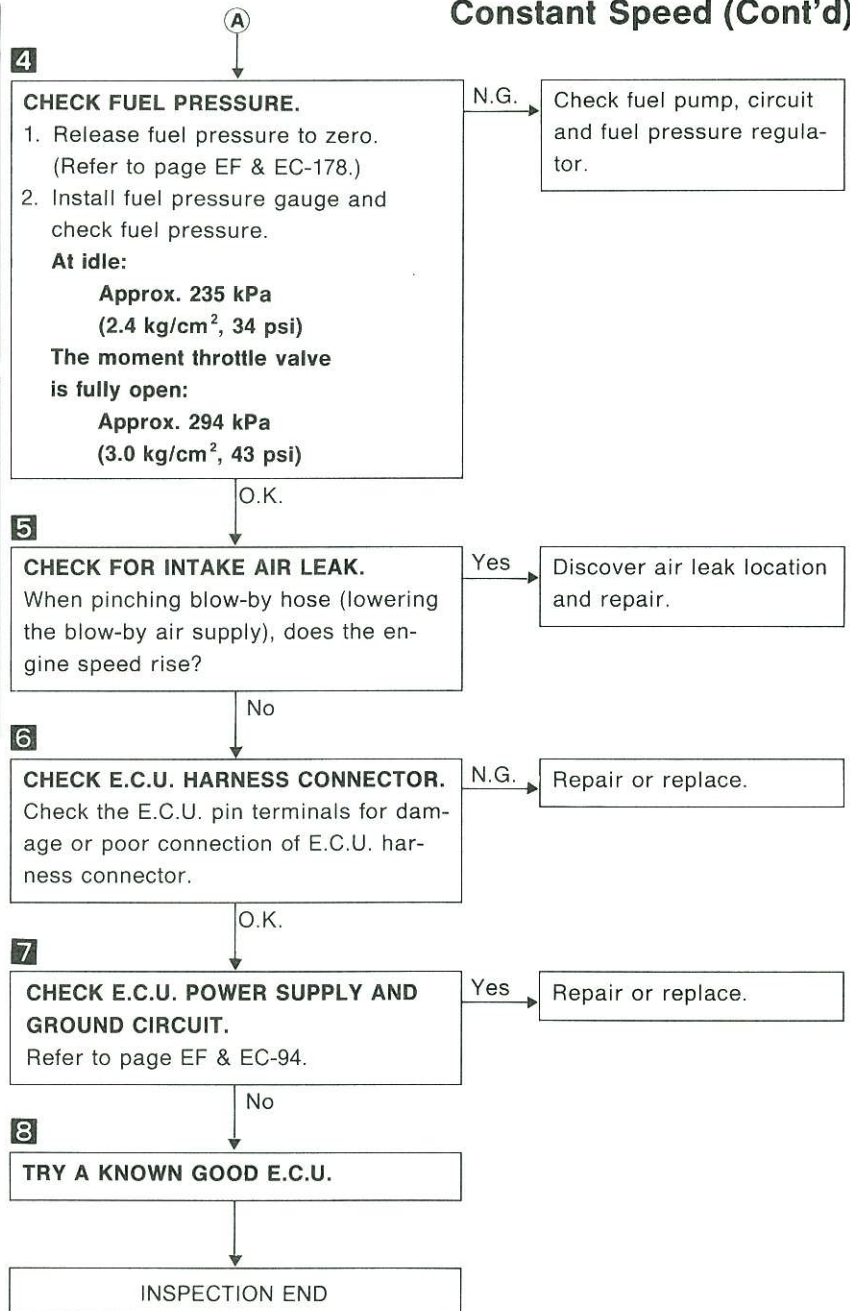
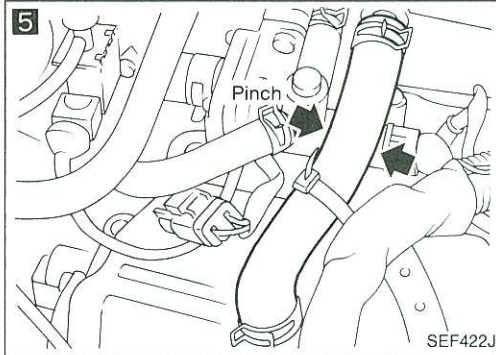
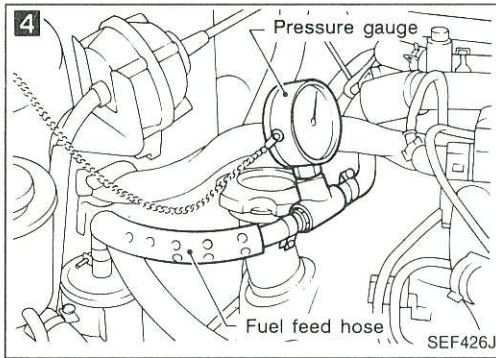
No → Check ignition coil, power transistor unit and circuits. (See page EF & EC-112.)

Yes

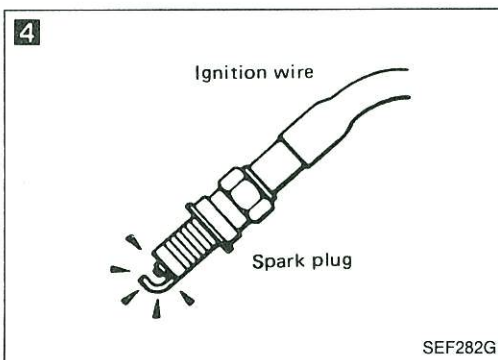
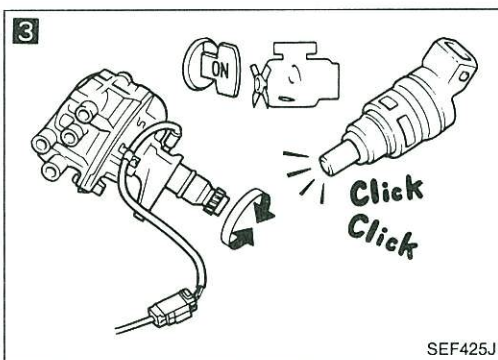
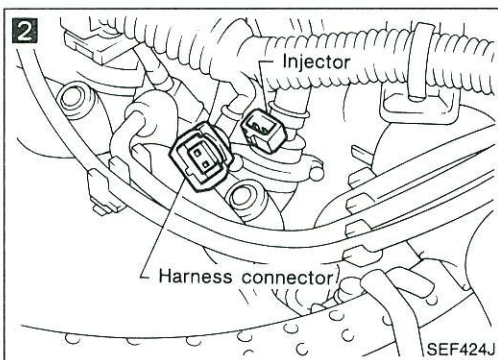
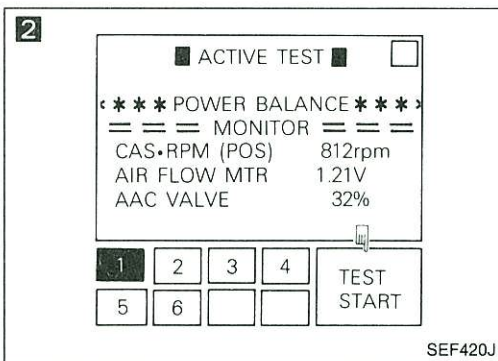
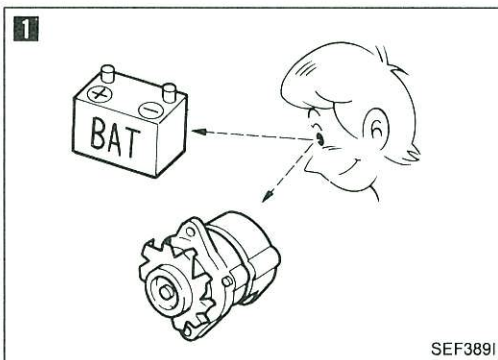
(Go to **A** on next page.)

TROUBLE DIAGNOSES

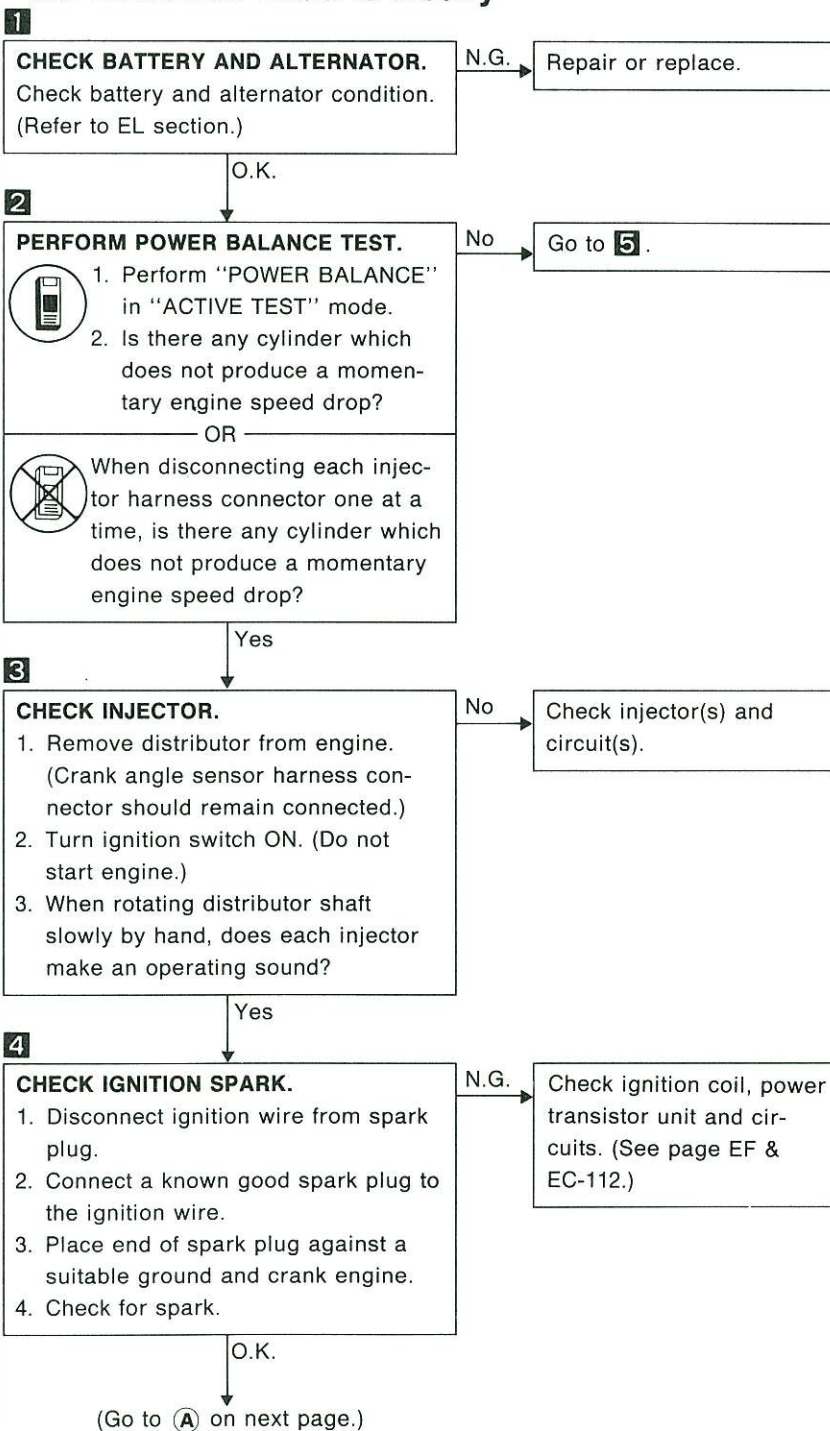
Diagnostic Procedure 15 — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)



TROUBLE DIAGNOSES

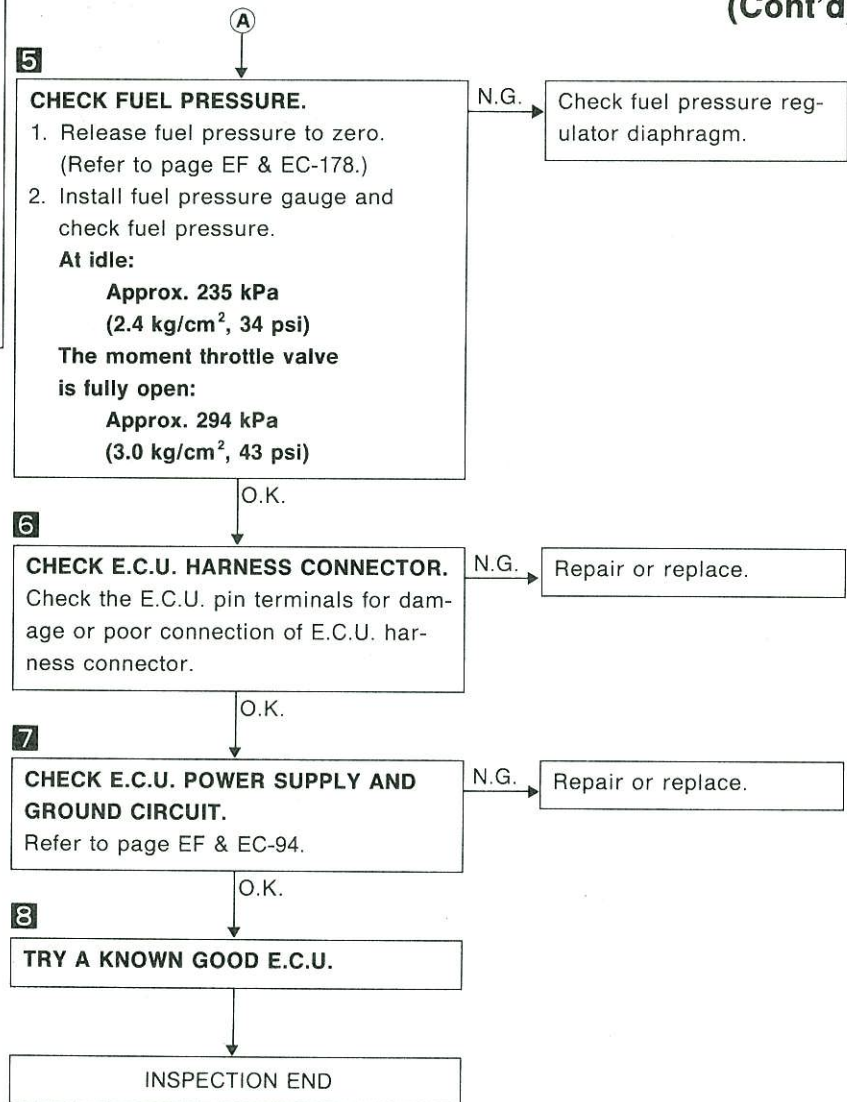
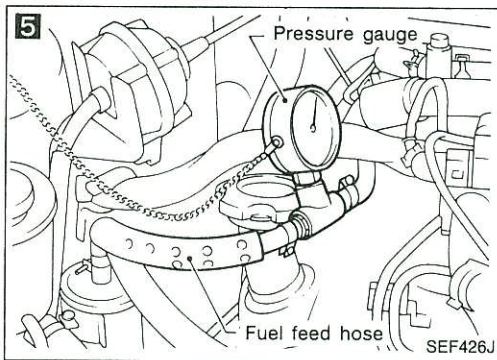


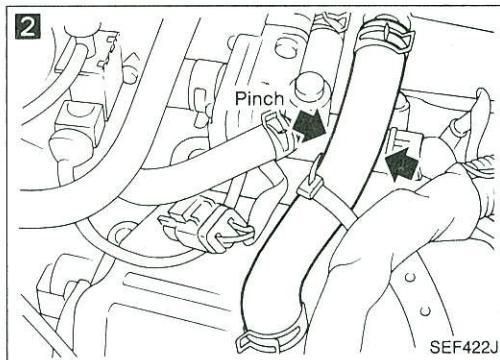
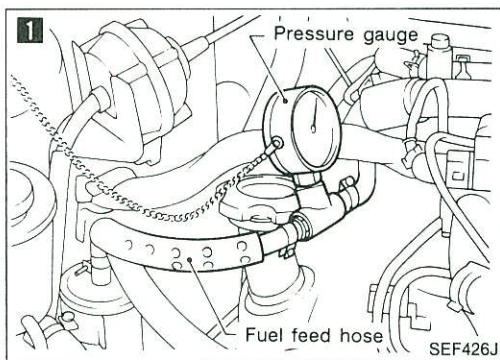
Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy



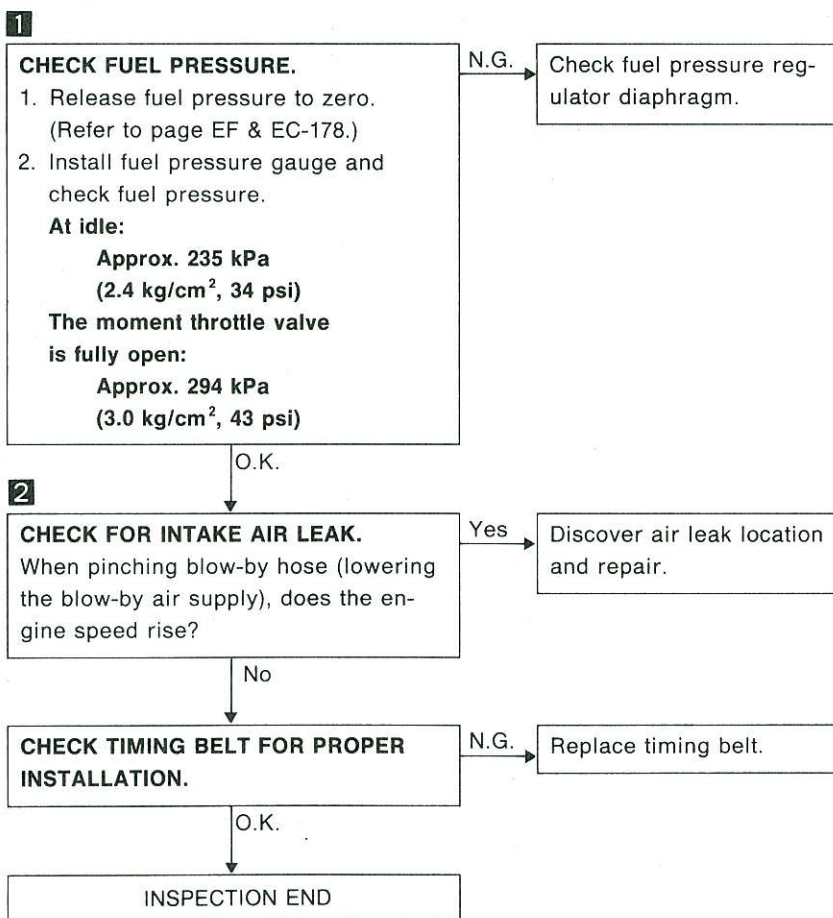
TROUBLE DIAGNOSES

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

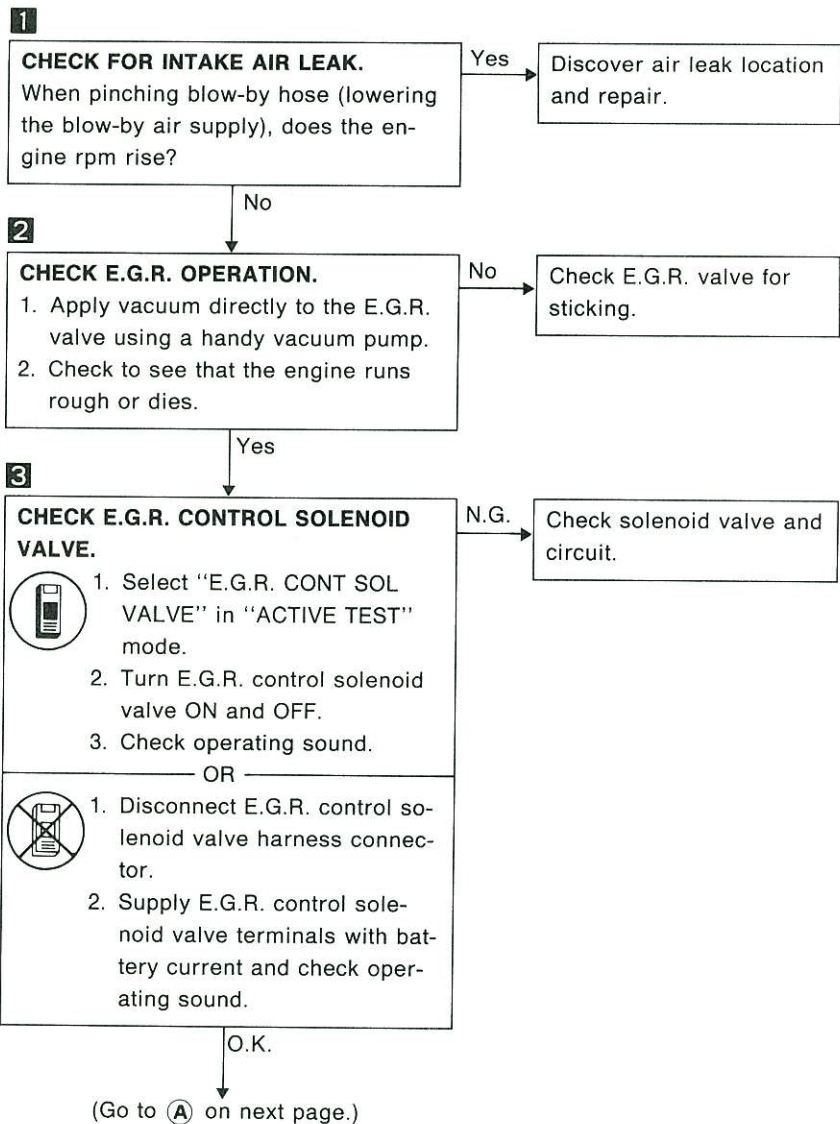
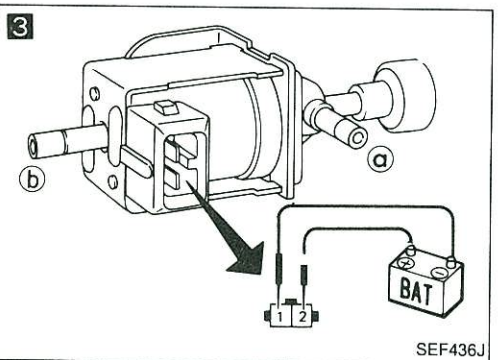
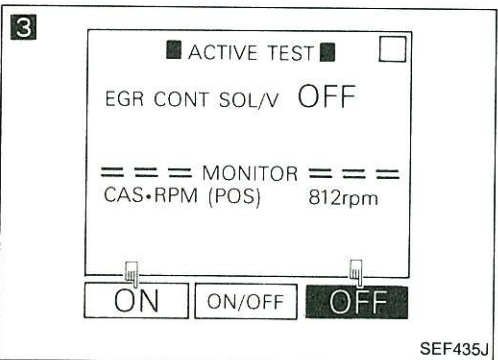
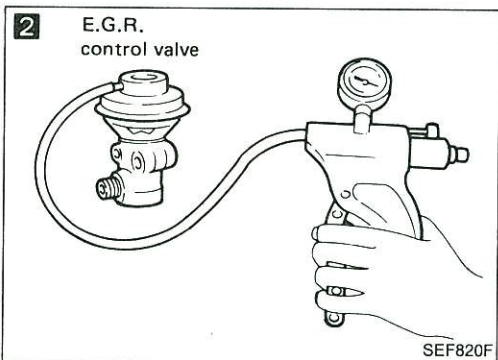
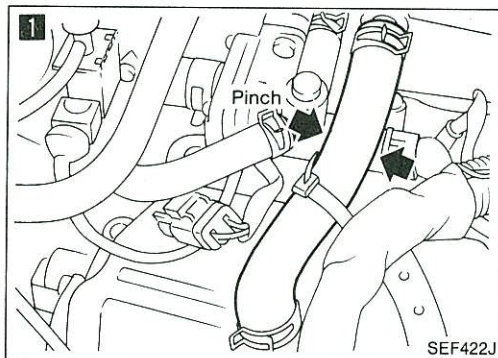




Diagnostic Procedure 17 — Lack of Power and Stumble

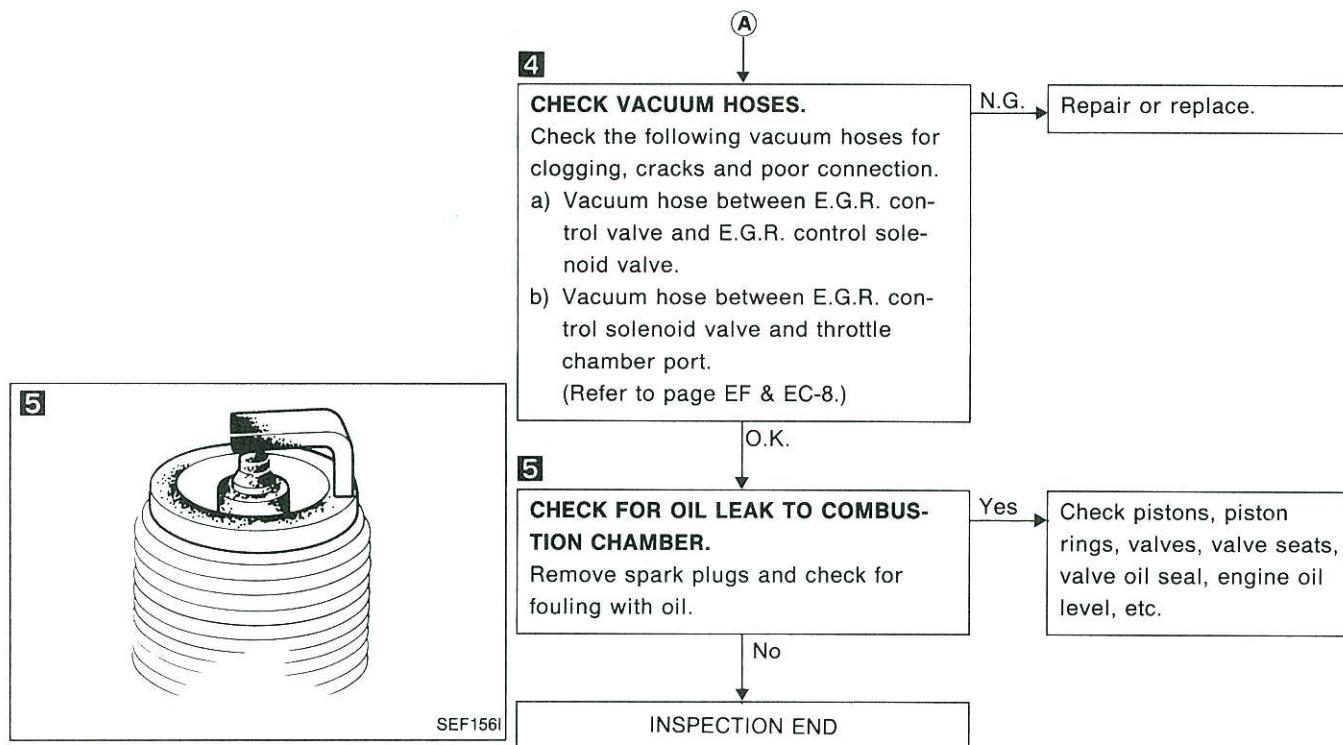


Diagnostic Procedure 18 — Detonation

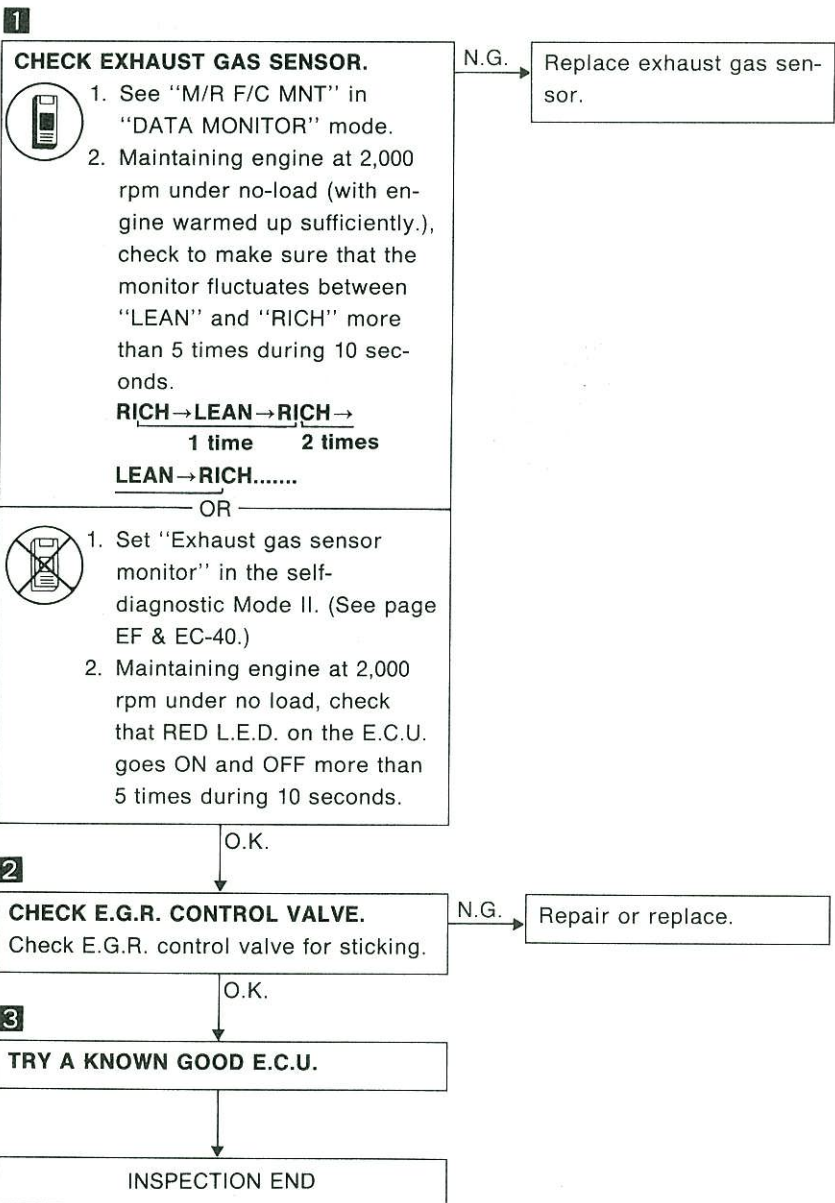
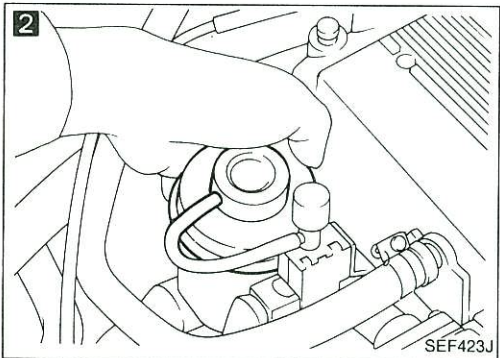
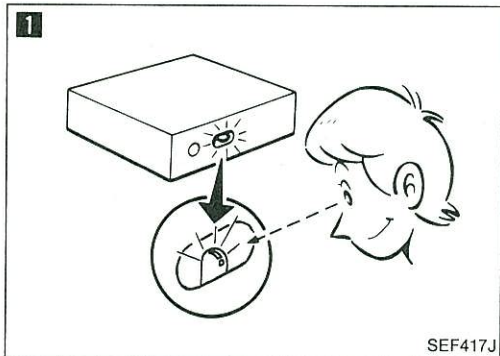
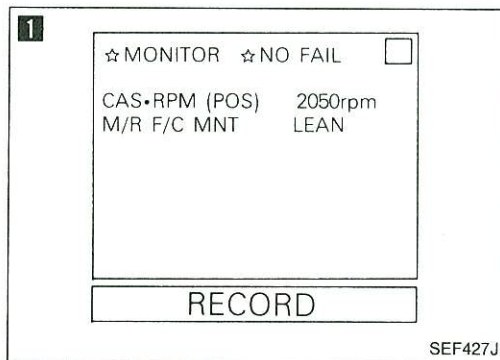


TROUBLE DIAGNOSES

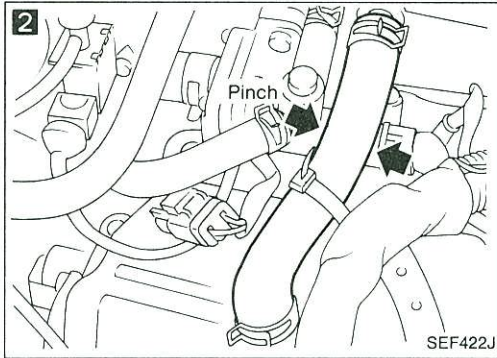
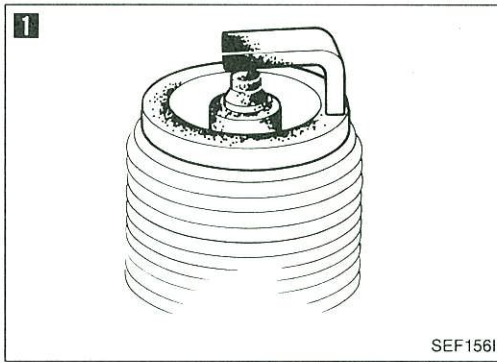
Diagnostic Procedure 18 — Detonation (Cont'd)



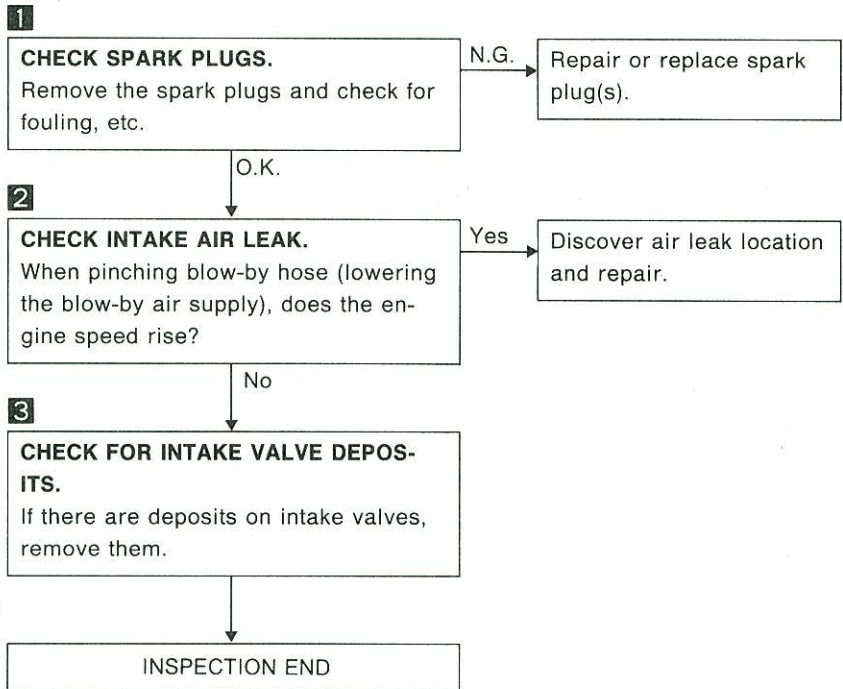
Diagnostic Procedure 19 — Surge



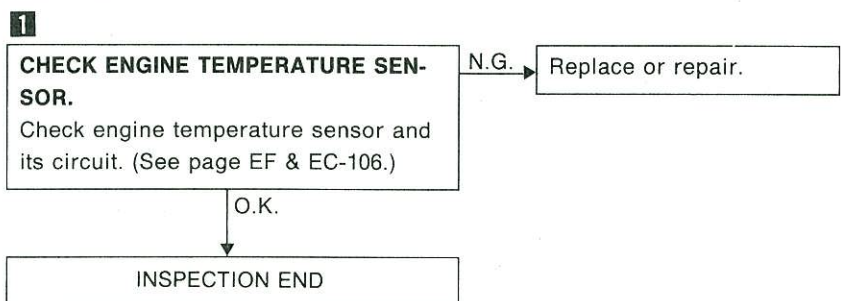
TROUBLE DIAGNOSES



Diagnostic Procedure 20 — Backfire through the Intake



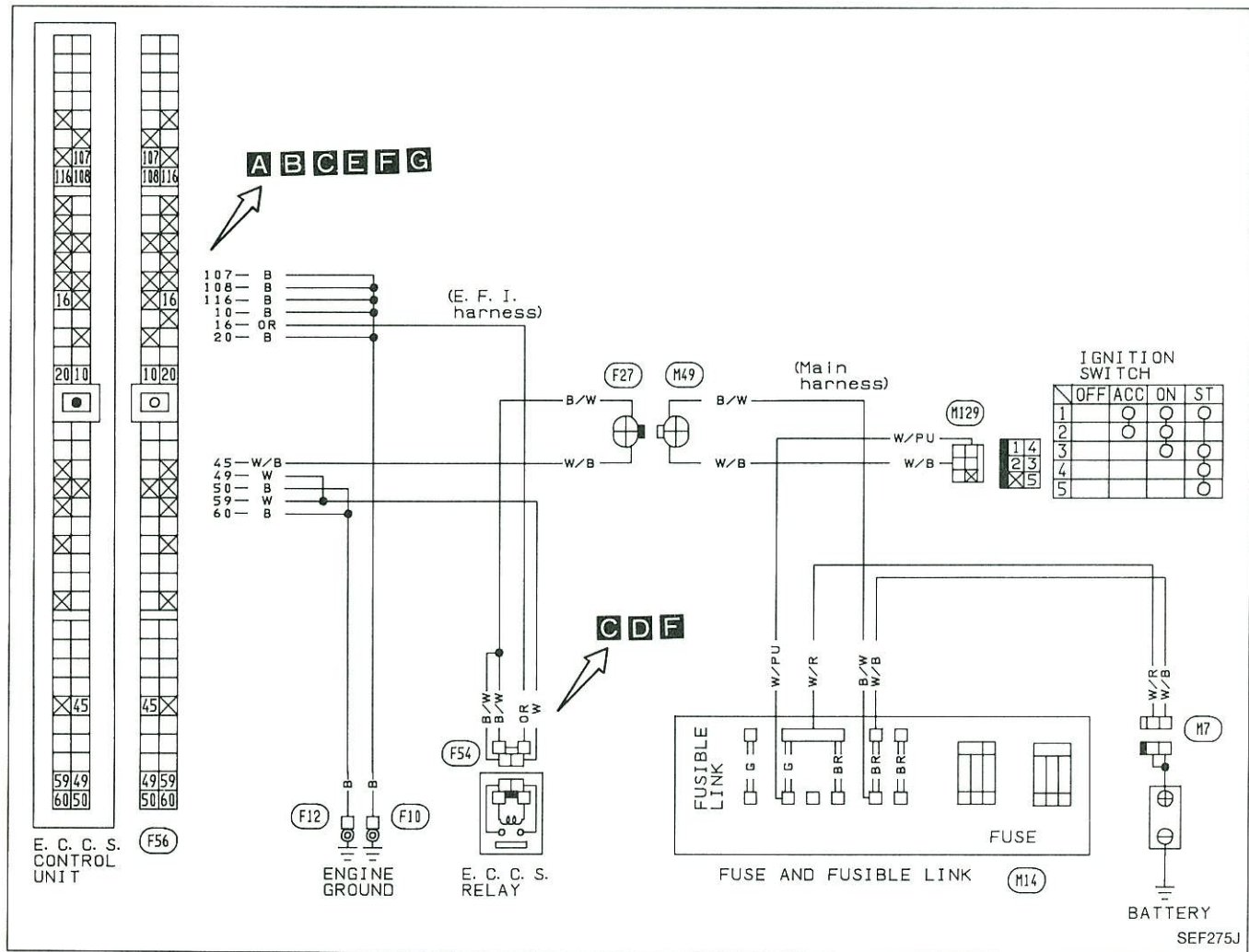
Diagnostic Procedure 21 — Backfire through the Exhaust



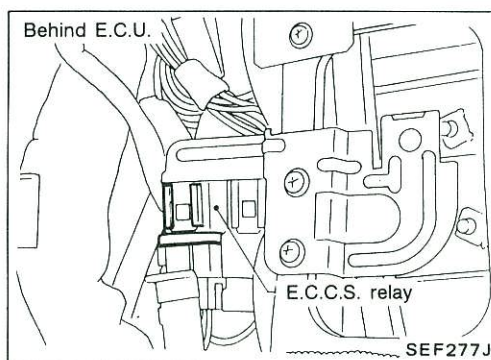
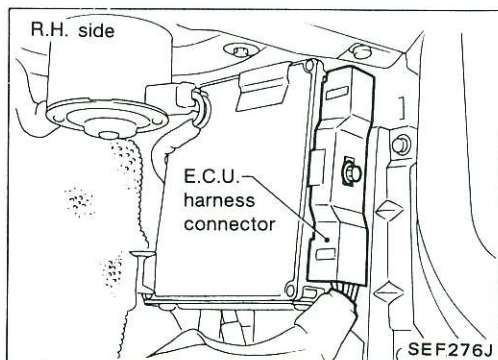
TROUBLE DIAGNOSES

Diagnostic Procedure 22

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

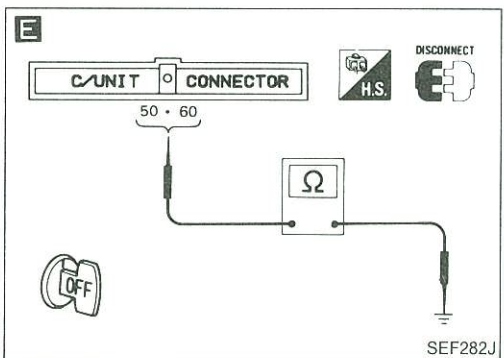
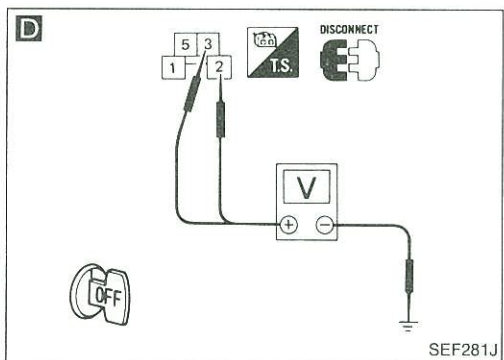
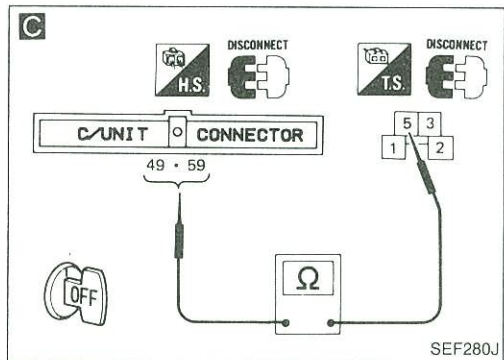
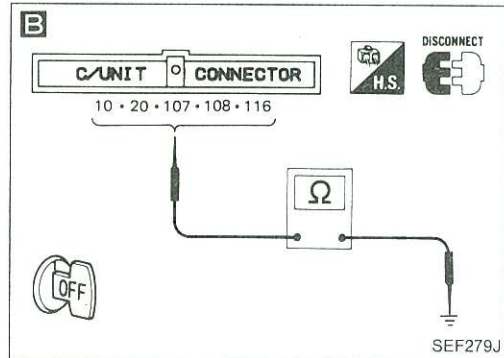
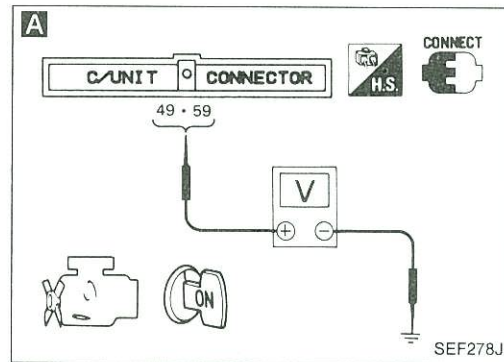


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 22 (Cont'd)



INSPECTION START

A

CHECK POWER SUPPLY.

- 1) Turn ignition switch "ON".
- 2) Check voltage between E.C.U. terminals (49, 59) and ground.

Voltage: Battery voltage

B

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect E.C.U. harness connector.
- 3) Check harness continuity between E.C.U. terminals (10, 20, 107, 108, 116) and engine ground.

Continuity should exist.

If N.G., repair harness or connectors.

N.G.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

C

CHECK HARNESS CONTINUITY BETWEEN E.C.C.S. RELAY AND E.C.U.

- 1) Turn ignition switch "OFF".
- 2) Disconnect E.C.U. harness connector.
- 3) Disconnect E.C.C.S. relay.
- 4) Check harness continuity between E.C.U. terminals (49, 59) and terminal (5).

Continuity should exist.

N.G.

Repair harness or connectors.

O.K.

D

CHECK VOLTAGE BETWEEN E.C.C.S. RELAY AND GROUND.

- 1) Check voltage between terminals (2, 3) and ground.

Voltage: Battery voltage

N.G.

Check the following.

- Harness connectors (F27, H49)
- "BR" fusible link
- Harness continuity between E.C.C.S. relay and battery

If N.G., repair harness or connectors.

O.K.

E

CHECK GROUND CIRCUIT.

- 1) Check harness continuity between E.C.U. terminals (50, 60) and engine ground.

Continuity should exist.

N.G.

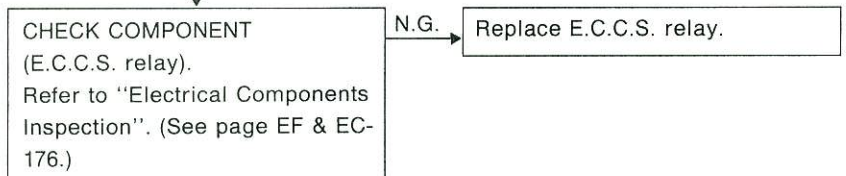
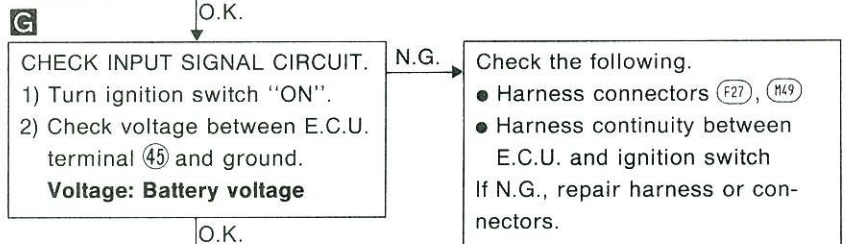
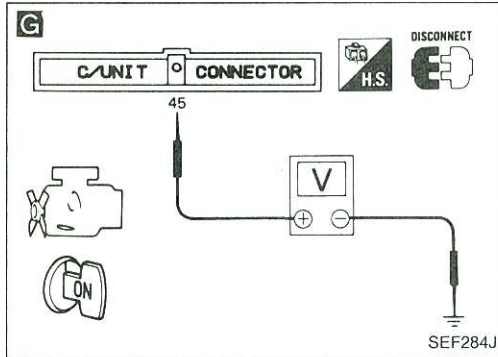
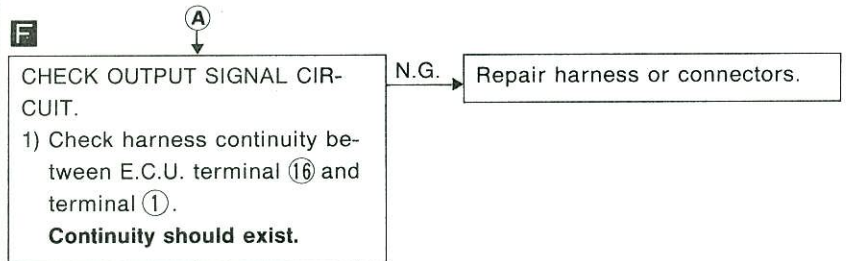
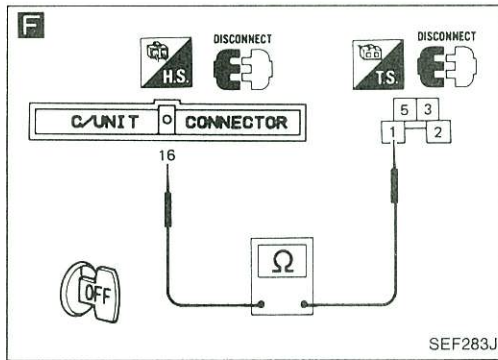
Repair harness or connectors.

O.K.

A

TROUBLE DIAGNOSES

Diagnostic Procedure 22 (Cont'd)



Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

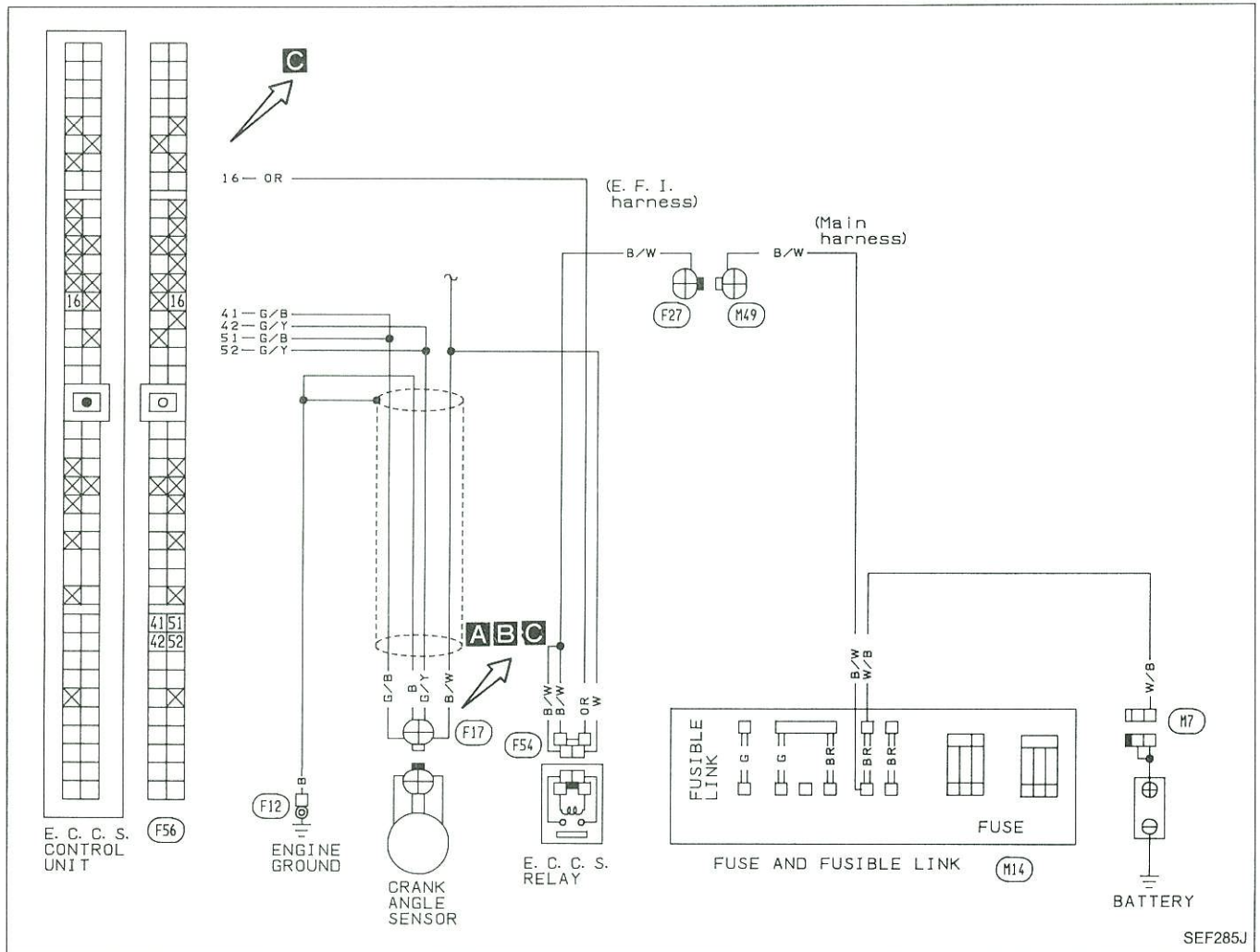
TROUBLE DIAGNOSES

NOTE

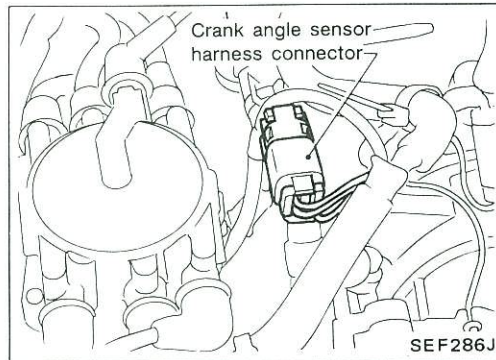
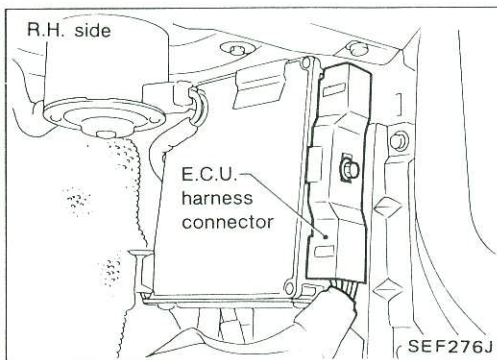
TROUBLE DIAGNOSES

Diagnostic Procedure 23

CRANK ANGLE SENSOR (Code No. 11)

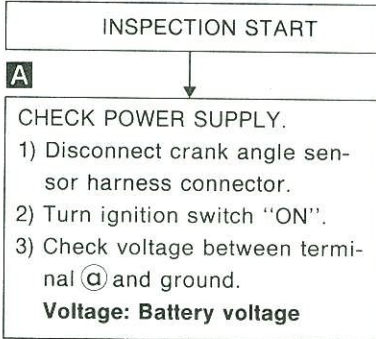
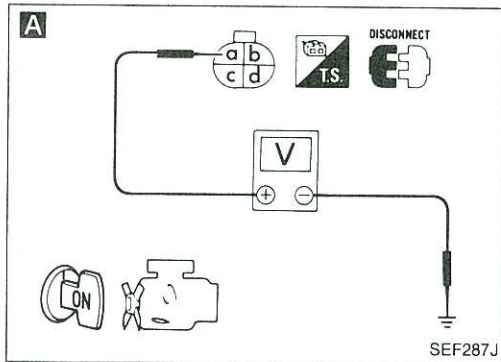


Harness layout



TROUBLE DIAGNOSES

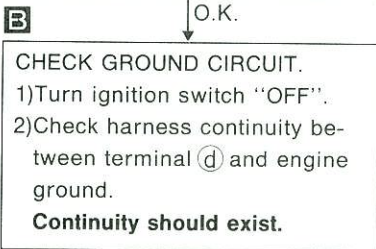
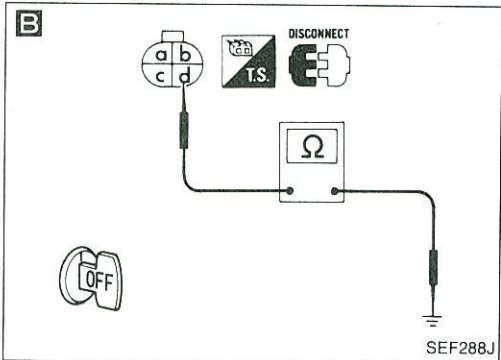
Diagnostic Procedure 23 (Cont'd)



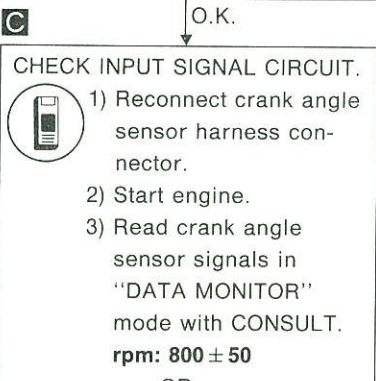
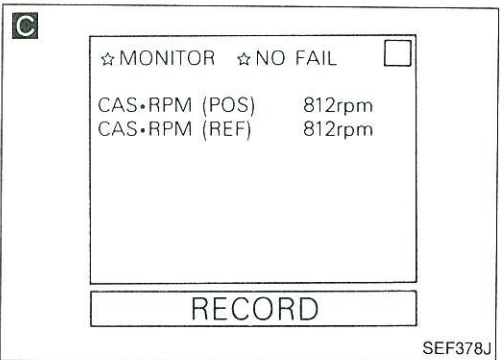
N.G. → Check the following.

- Harness continuity between crank angle sensor and E.C.C.S. relay

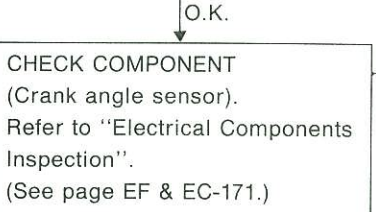
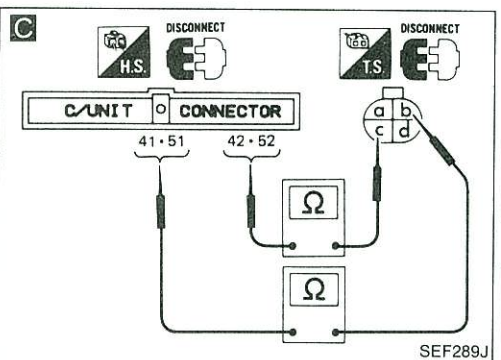
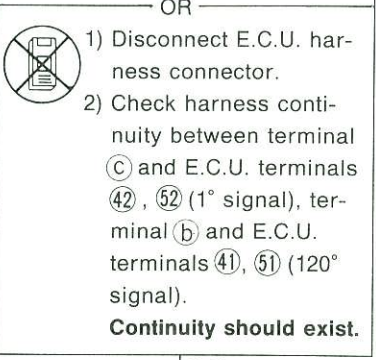
If N.G., repair harness or connectors.



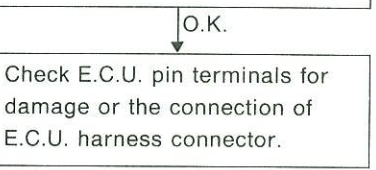
N.G. → Repair harness or connectors.



N.G. → Repair harness or connectors.



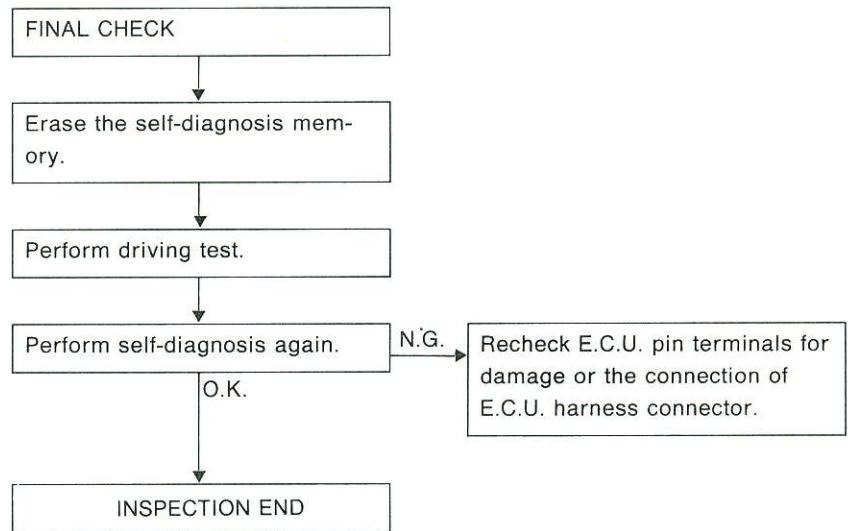
N.G. → Replace crank angle sensor.



TROUBLE DIAGNOSES

Diagnostic Procedure 23 (Cont'd)

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



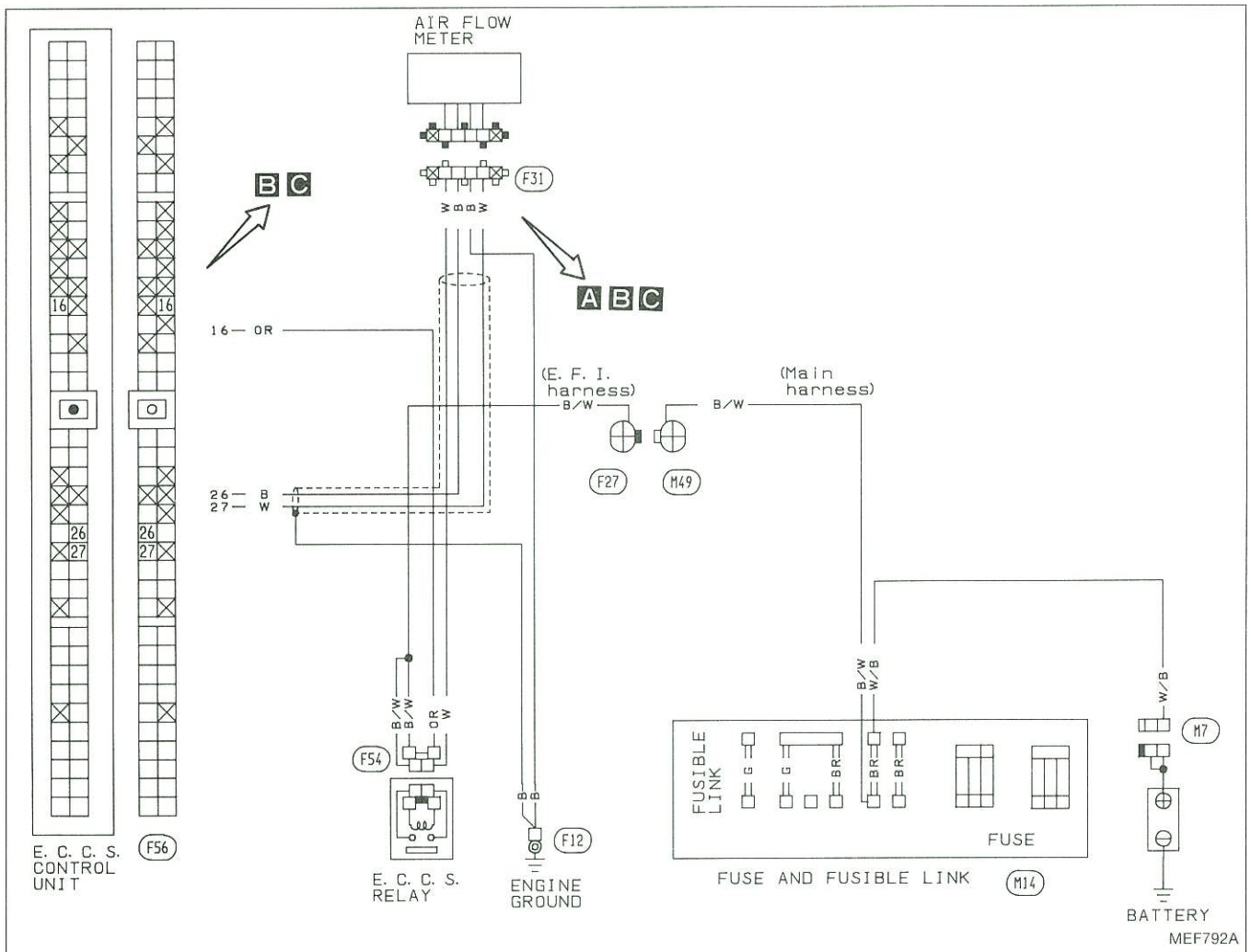
TROUBLE DIAGNOSES

NOTE

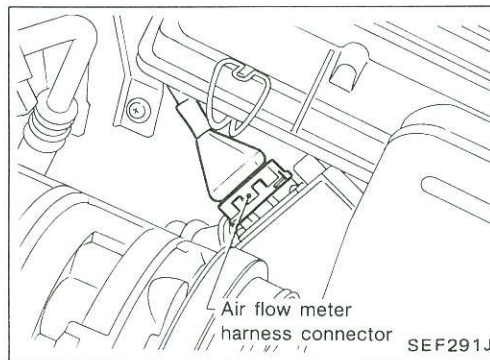
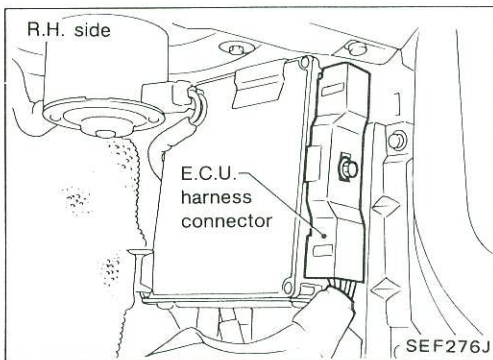
TROUBLE DIAGNOSES

Diagnostic Procedure 24

AIR FLOW METER (Code No. 12) (CHECK ENGINE LIGHT ITEM)

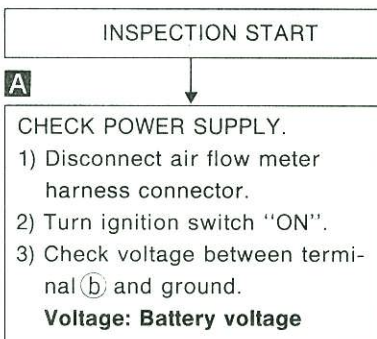
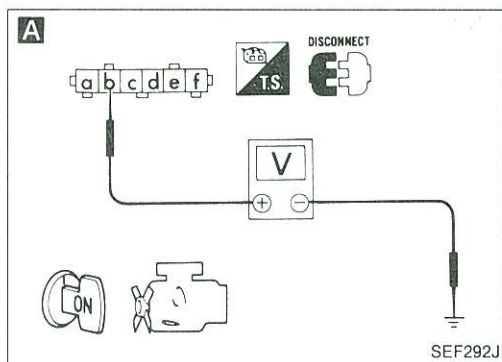


Harness layout



TROUBLE DIAGNOSES

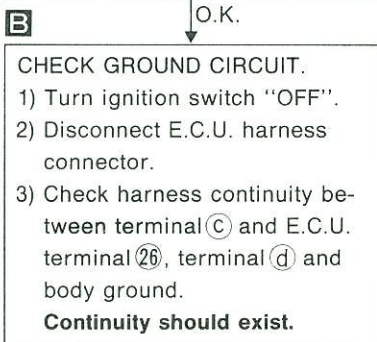
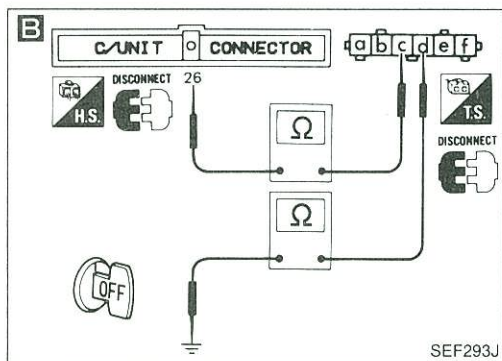
Diagnostic Procedure 24 (Cont'd)



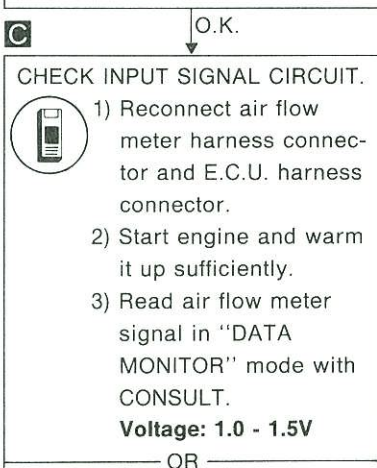
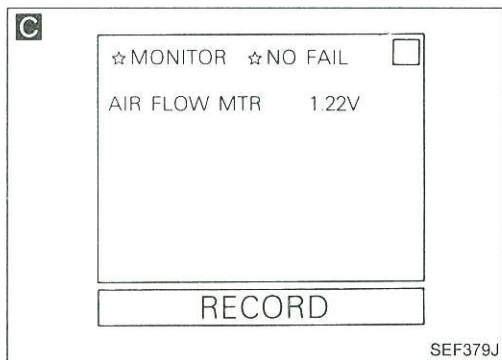
N.G. → Check the following.

- Harness continuity between air flow meter and E.C.C.S. relay

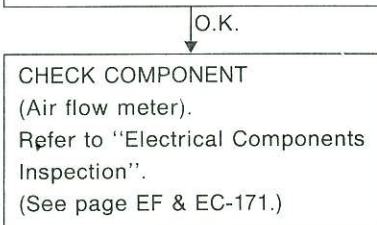
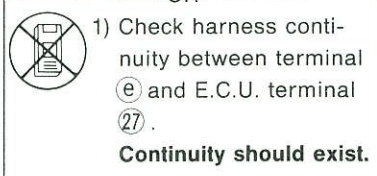
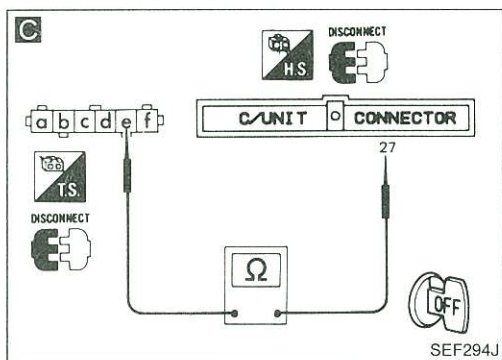
If N.G., repair harness or connectors.



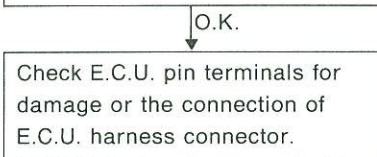
N.G. → Repair harness or connectors.



N.G. → Repair harness or connectors.



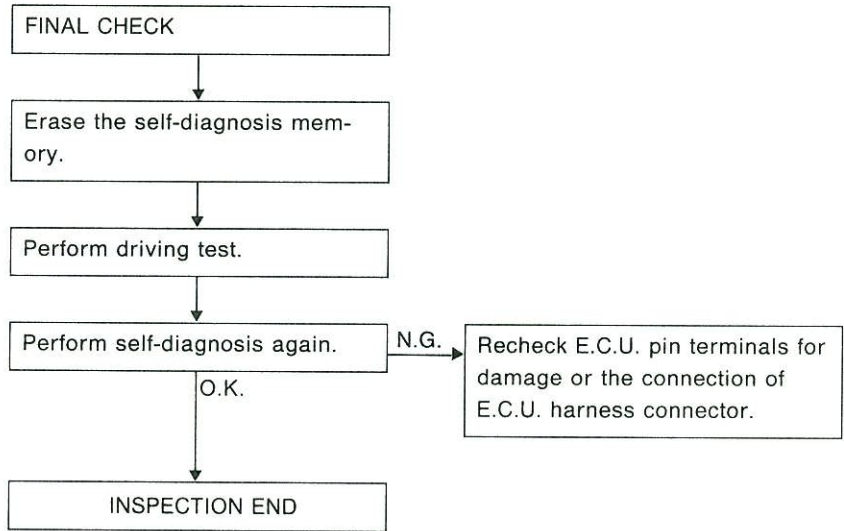
N.G. → Replace air flow meter.



TROUBLE DIAGNOSES

Diagnostic Procedure 24 (Cont'd)

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

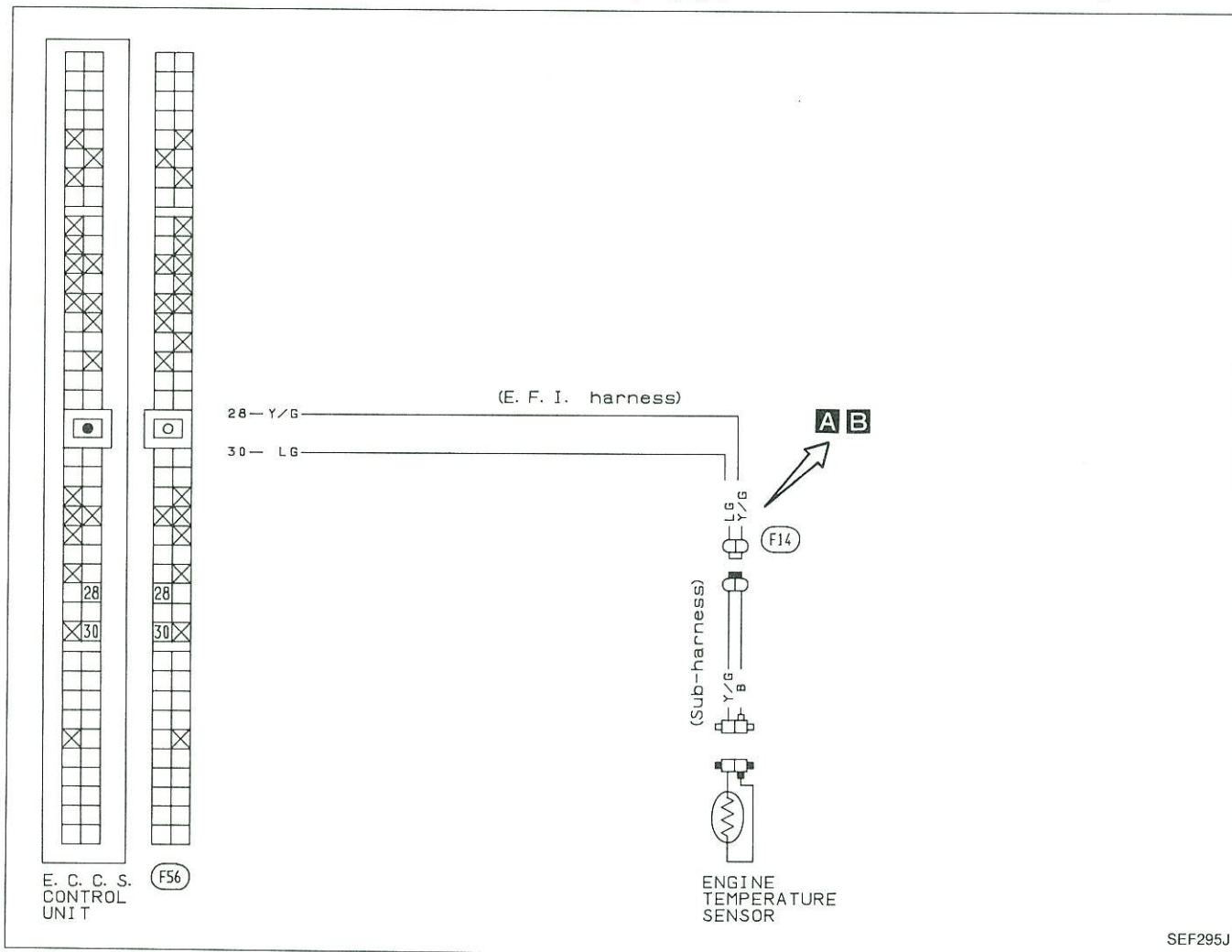


TROUBLE DIAGNOSES

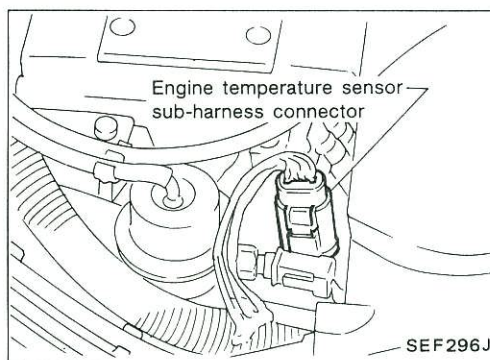
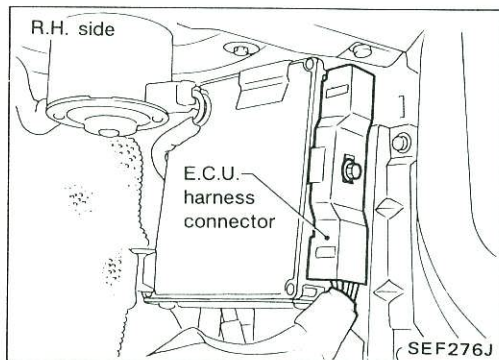
NOTE

Diagnostic Procedure 25

ENGINE TEMPERATURE SENSOR (Code No. 13)  (CHECK ENGINE LIGHT ITEM)

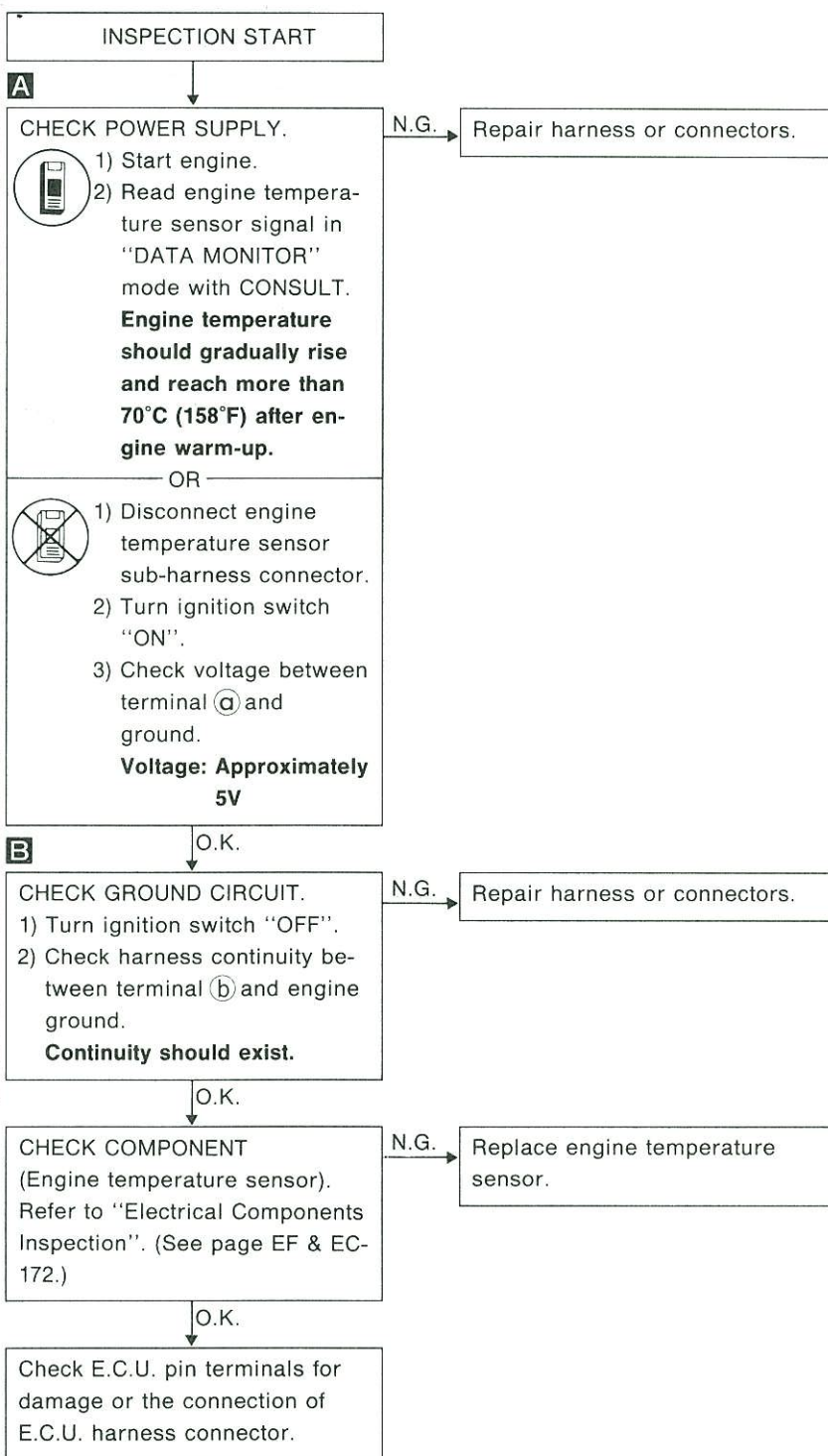
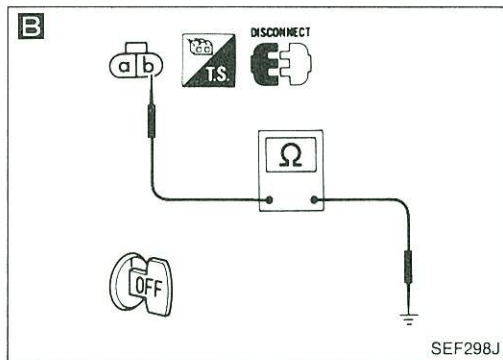
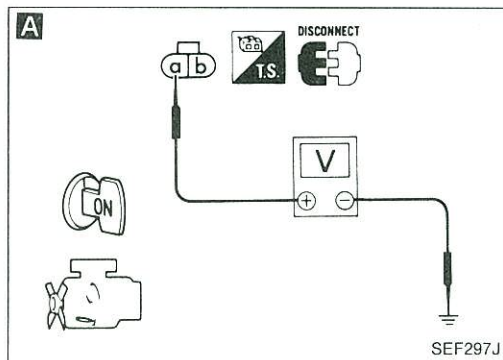
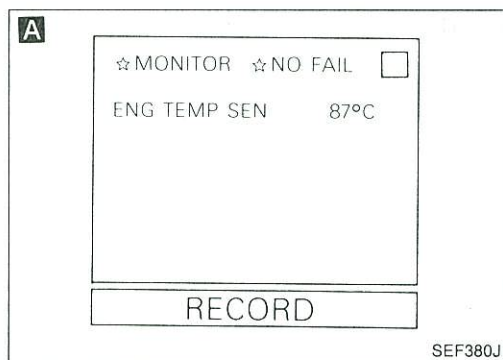


Harness layout



TROUBLE DIAGNOSES

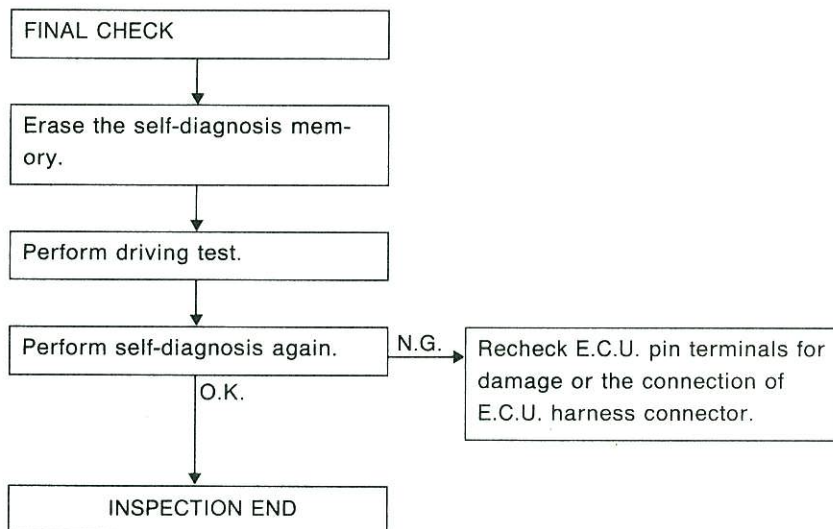
Diagnostic Procedure 25 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 25 (Cont'd)

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



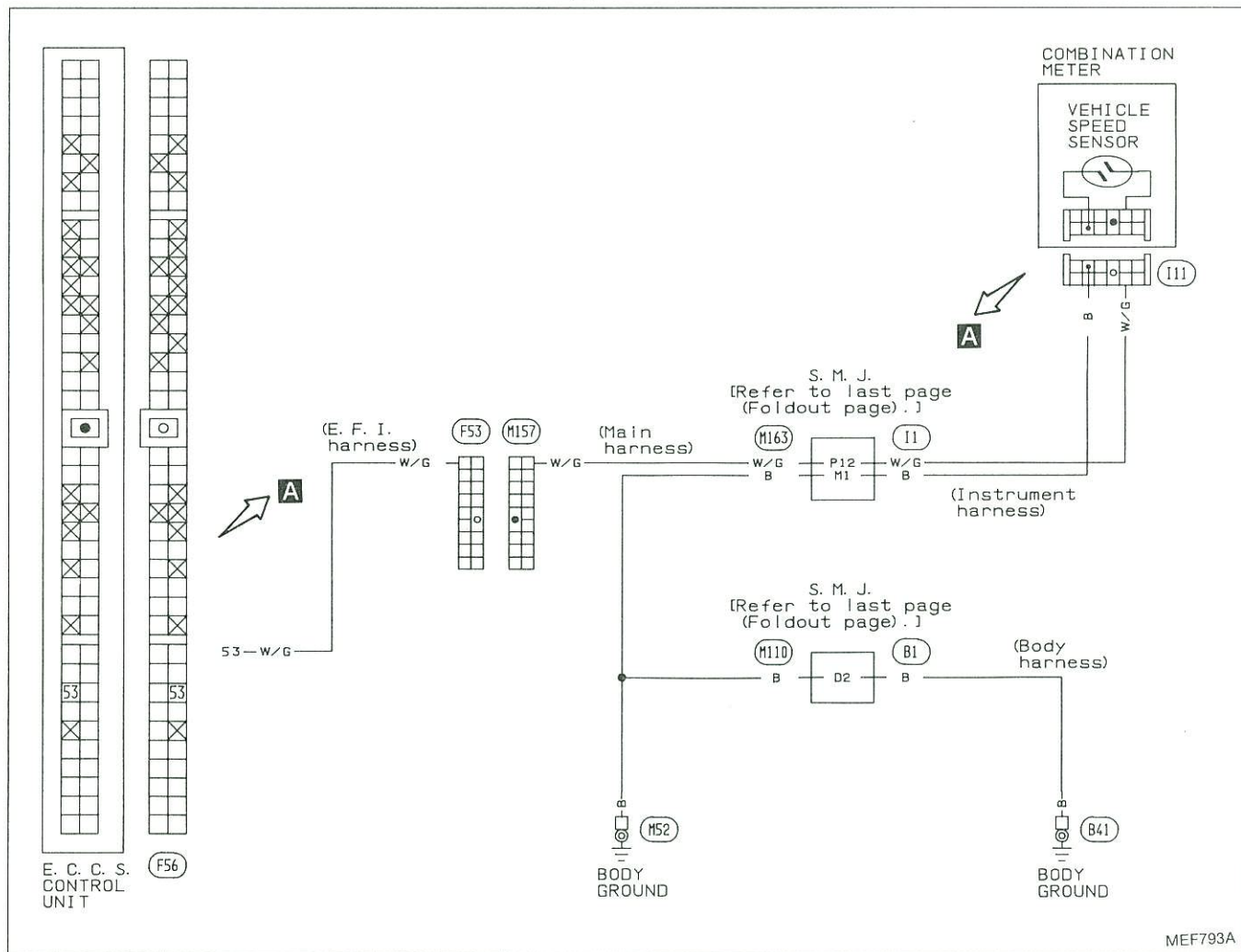
TROUBLE DIAGNOSES

NOTE

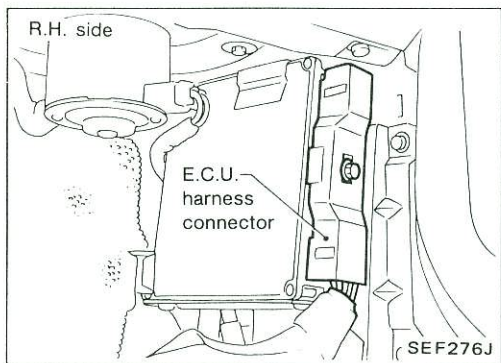
TROUBLE DIAGNOSES

Diagnostic Procedure 26

VEHICLE SPEED SENSOR (Code No. 14) (CHECK ENGINE LIGHT ITEM)

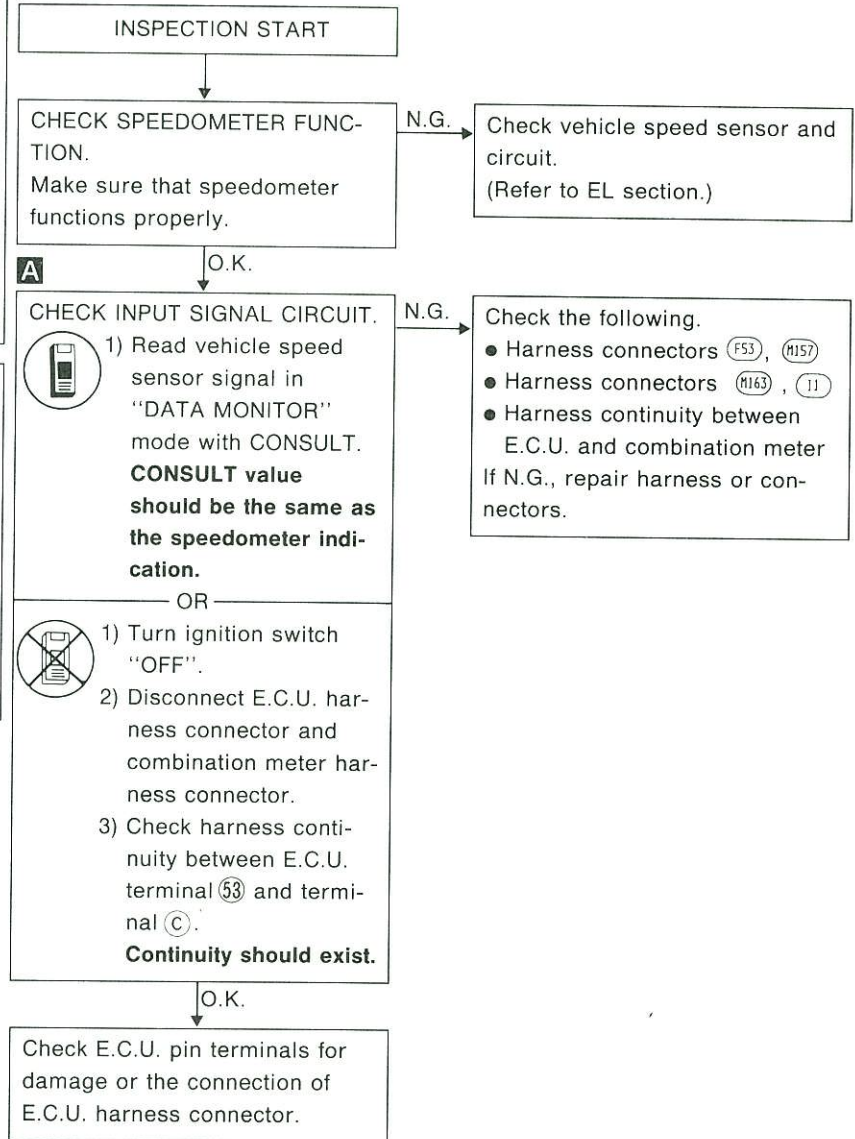
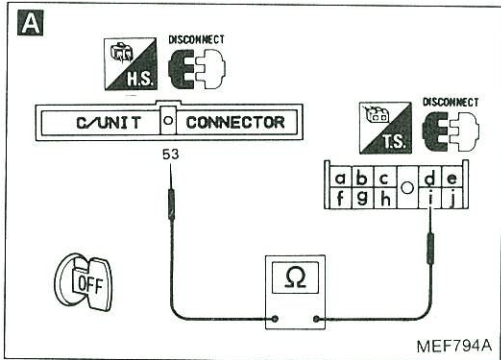
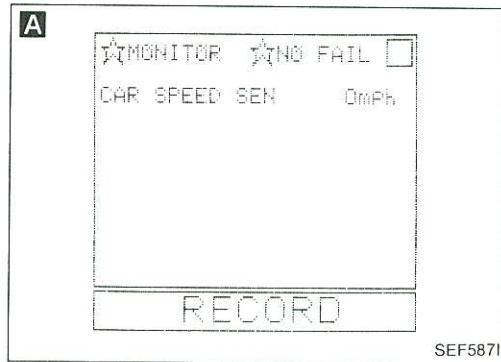


Harness layout

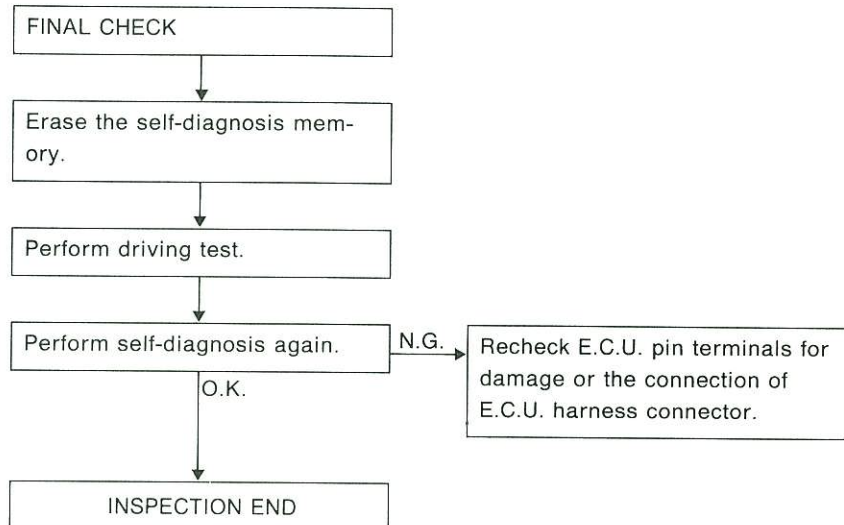


TROUBLE DIAGNOSES

Diagnostic Procedure 26 (Cont'd)



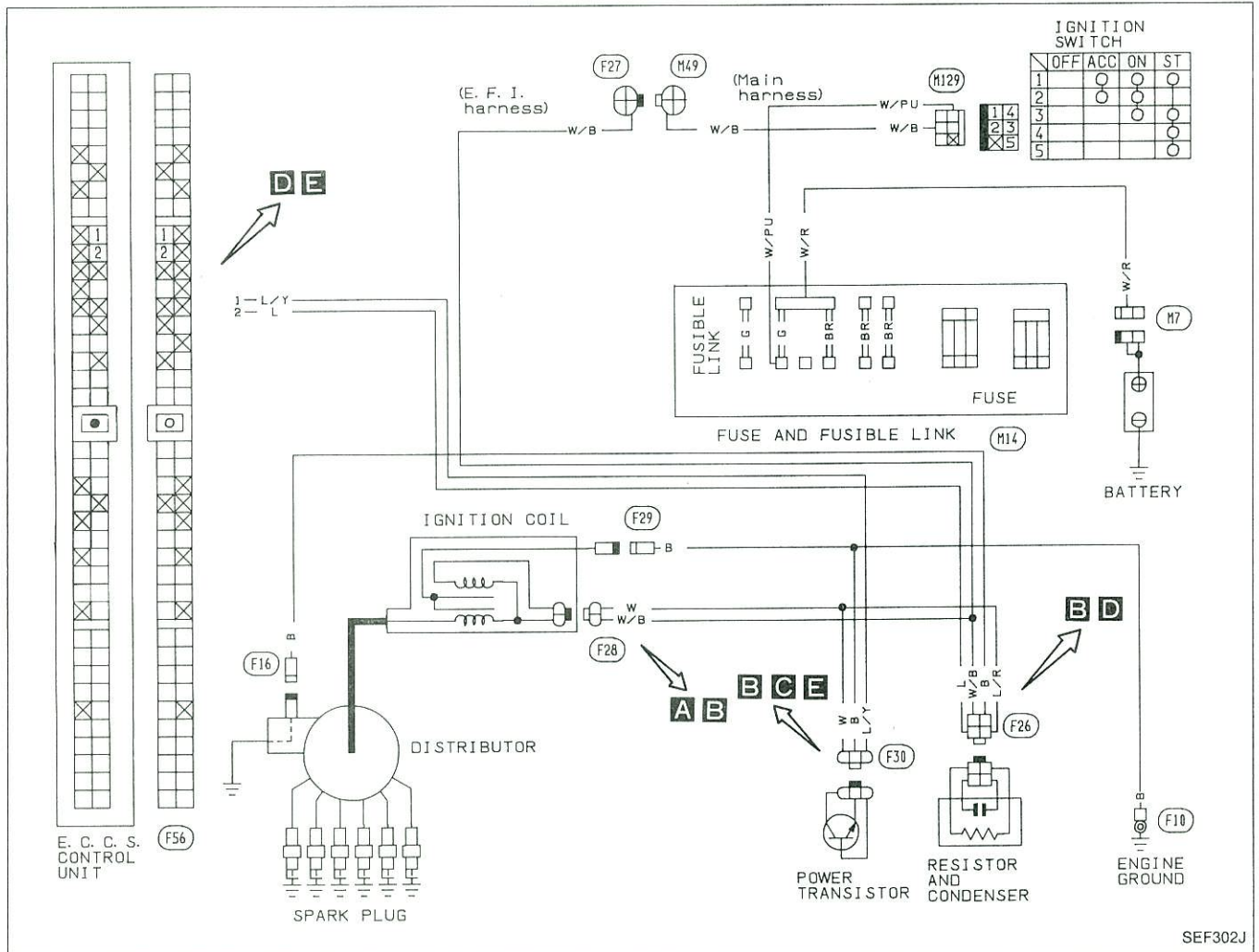
Perform FINAL CHECK by the following procedure after repair is completed.



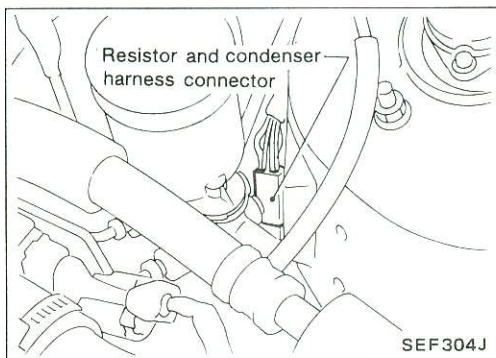
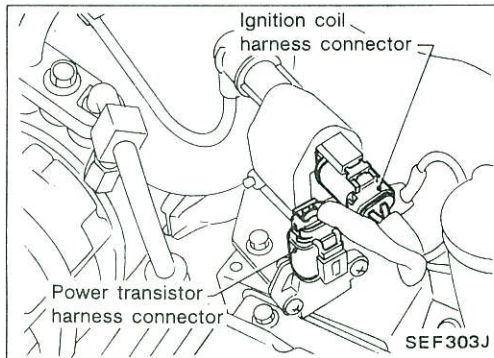
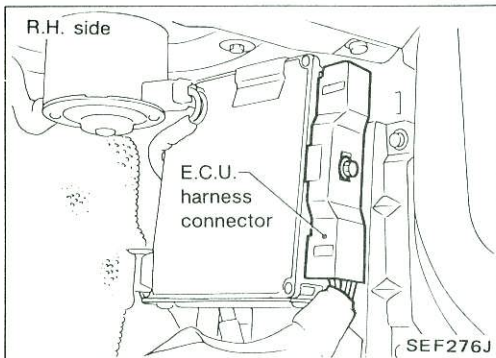
TROUBLE DIAGNOSES

Diagnostic Procedure 27

IGNITION SIGNAL (Code No. 21)

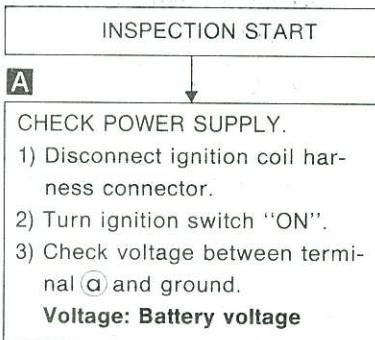
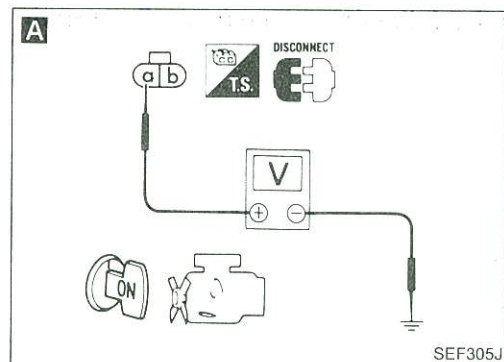


Harness layout



TROUBLE DIAGNOSES

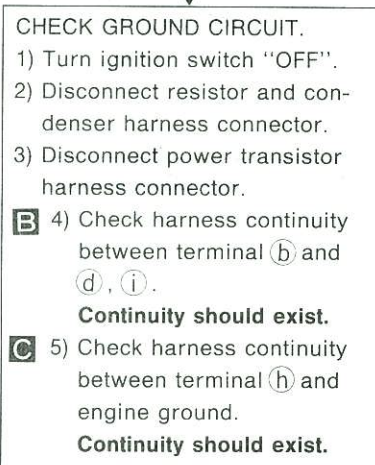
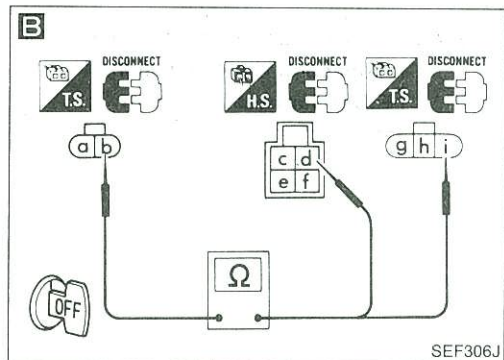
Diagnostic Procedure 27 (Cont'd)



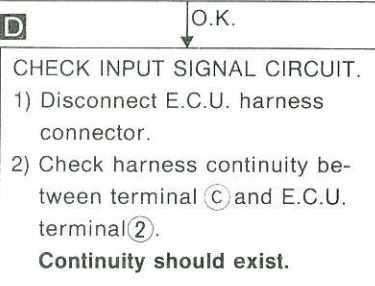
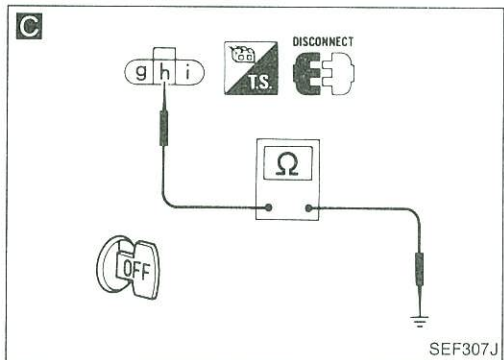
N.G. → Check the following.

- Harness connectors (F27, H49)
- Harness continuity between ignition coil and ignition switch

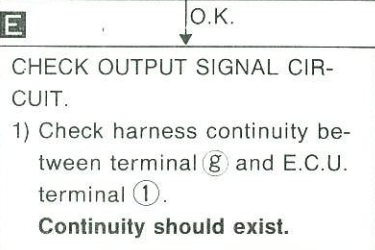
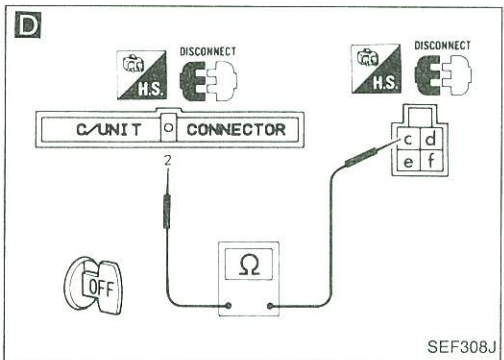
If N.G., repair harness or connectors.



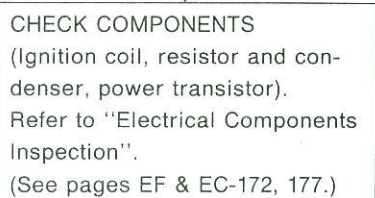
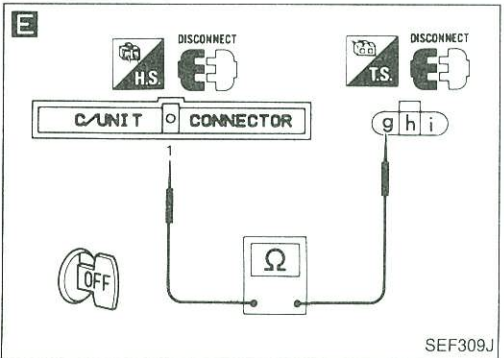
N.G. → Repair harness or connectors.



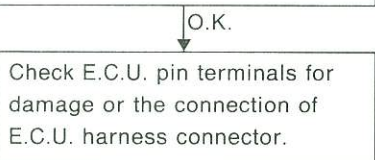
N.G. → Repair harness or connectors.



N.G. → Repair harness or connectors.



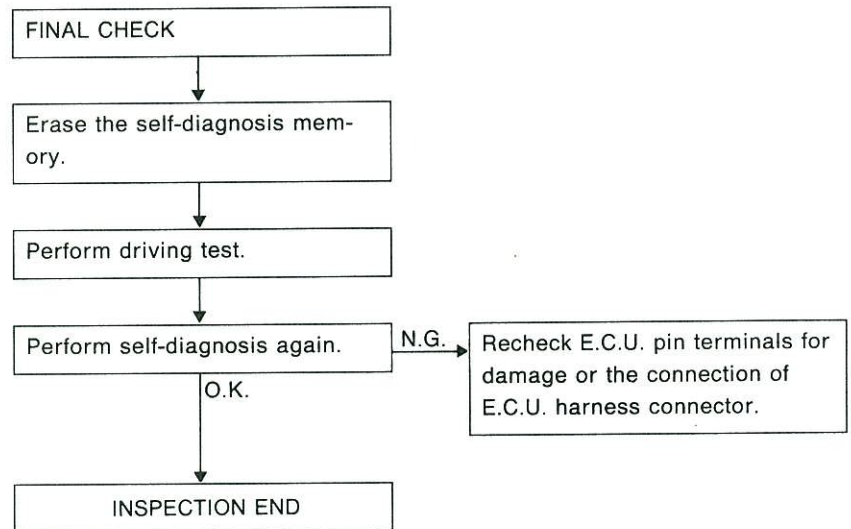
N.G. → Replace malfunctioning component(s).



TROUBLE DIAGNOSES

Diagnostic Procedure 27 (Cont'd)

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

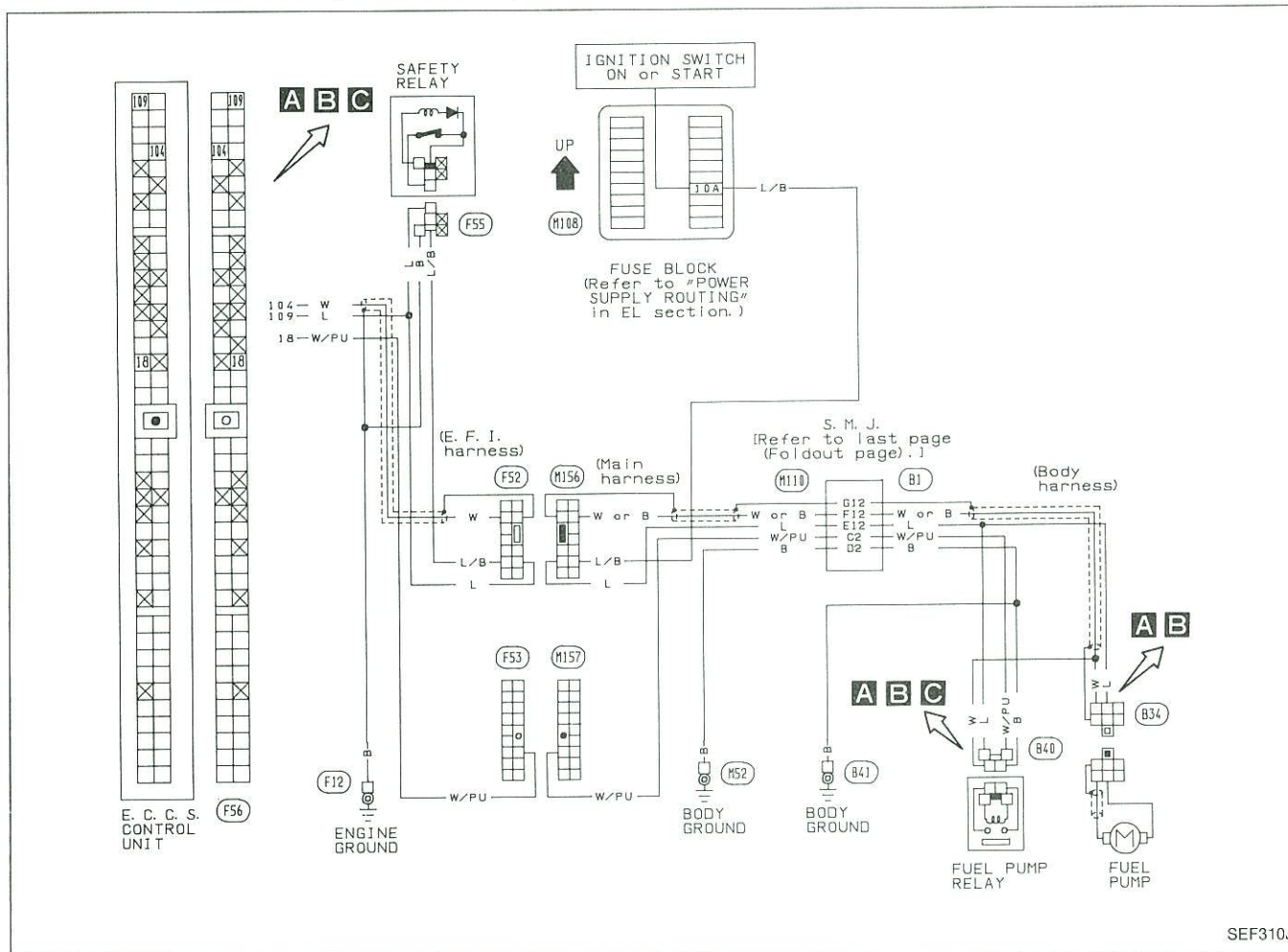


TROUBLE DIAGNOSES

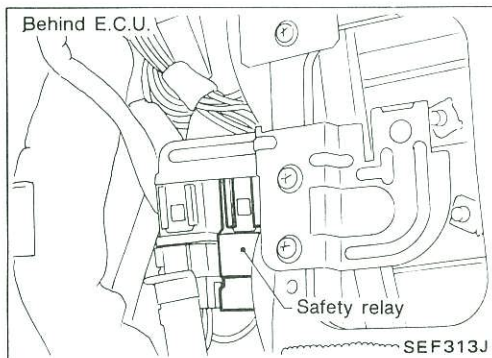
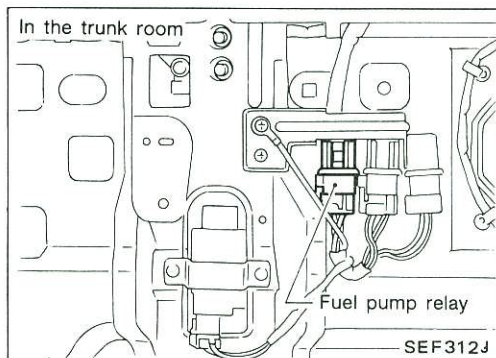
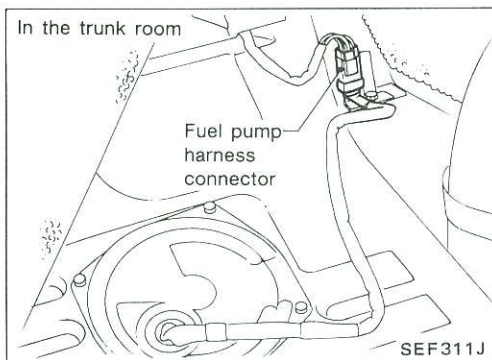
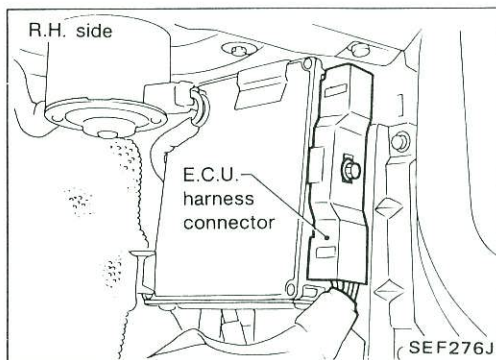
NOTE

Diagnostic Procedure 28

FUEL PUMP CONTROL (Code No. 22)

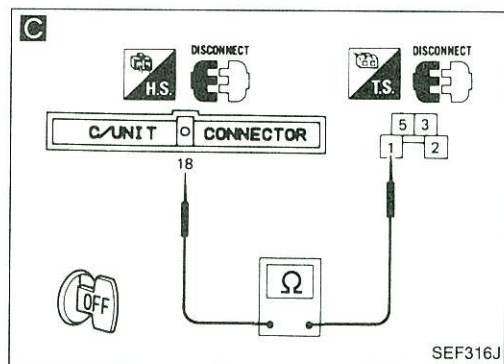
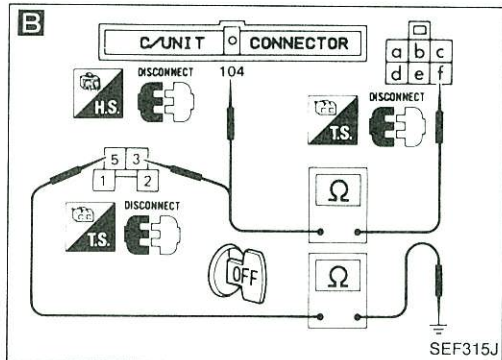
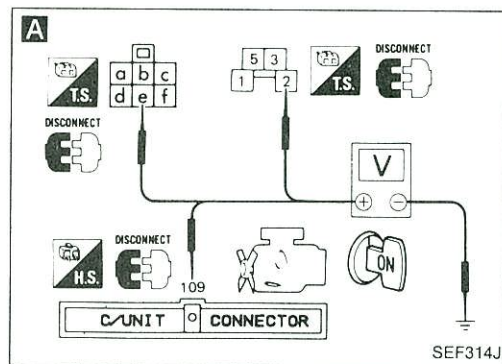


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 28 (Cont'd)



INSPECTION START

A

CHECK POWER SUPPLY.

- 1) Disconnect E.C.U. harness connector, fuel pump harness connector and fuel pump relay.
- 2) Turn ignition switch "ON".
- 3) Check voltage between terminals ①, ②, E.C.U. terminal ⑩ and ground.

Voltage: Battery voltage

N.G. → Check the following.

- Harness connectors (M156, F52)
- Harness connectors (M110, B1)
- Harness continuity between safety relay and fuse
- Harness continuity between safety relay and E.C.U., fuel pump, fuel pump relay
- 10A fuse

If N.G., repair harness or connectors.

O.K. →

CHECK COMPONENT
(Safety relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-177.)
If N.G., replace safety relay.

B

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal ① and E.C.U. terminal ⑩, terminal ① and ③, terminal ⑤ and body ground.

Continuity should exist.

N.G. → Check the following.

- Harness connectors (B1, M110)
- Harness connectors (M156, F52)
- Harness continuity between fuel pump and E.C.U., fuel pump and fuel pump relay, fuel pump relay and body ground

If N.G., repair harness or connectors.

C

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Check harness continuity between E.C.U. terminal ⑩ and terminal ①.

Continuity should exist.

N.G. → Check the following.

- Harness connectors (B1, M110)
- Harness connectors (M157, F53)
- Harness continuity between E.C.U. and fuel pump relay

If N.G., repair harness or connectors.

O.K. →

CHECK COMPONENT
(Fuel pump relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-176.)

N.G. → Replace fuel pump relay.

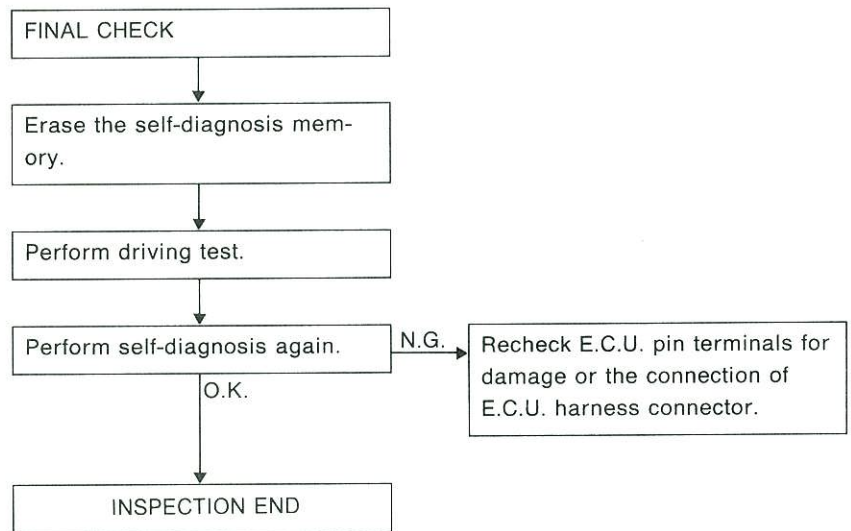
O.K. →

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

TROUBLE DIAGNOSES

Diagnostic Procedure 28 (Cont'd)


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

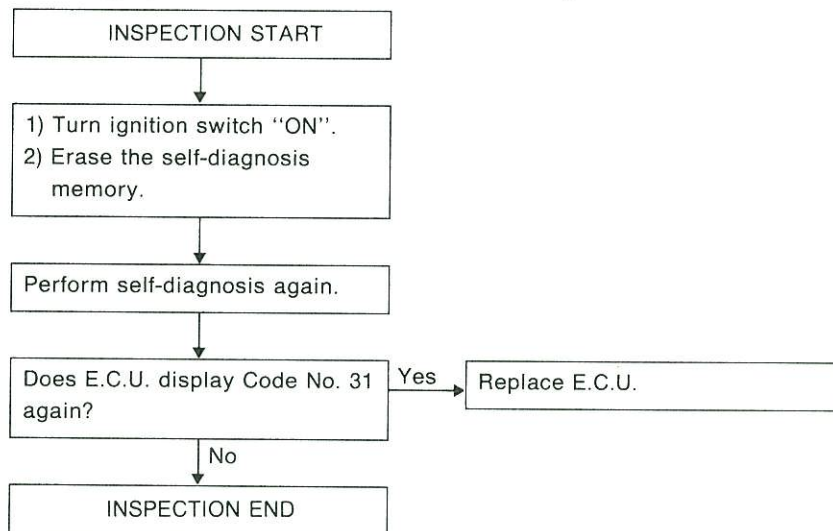


TROUBLE DIAGNOSES

NOTE

Diagnostic Procedure 29

E.C.C.S. CONTROL UNIT (Code No. 31)  (CHECK ENGINE LIGHT ITEM)




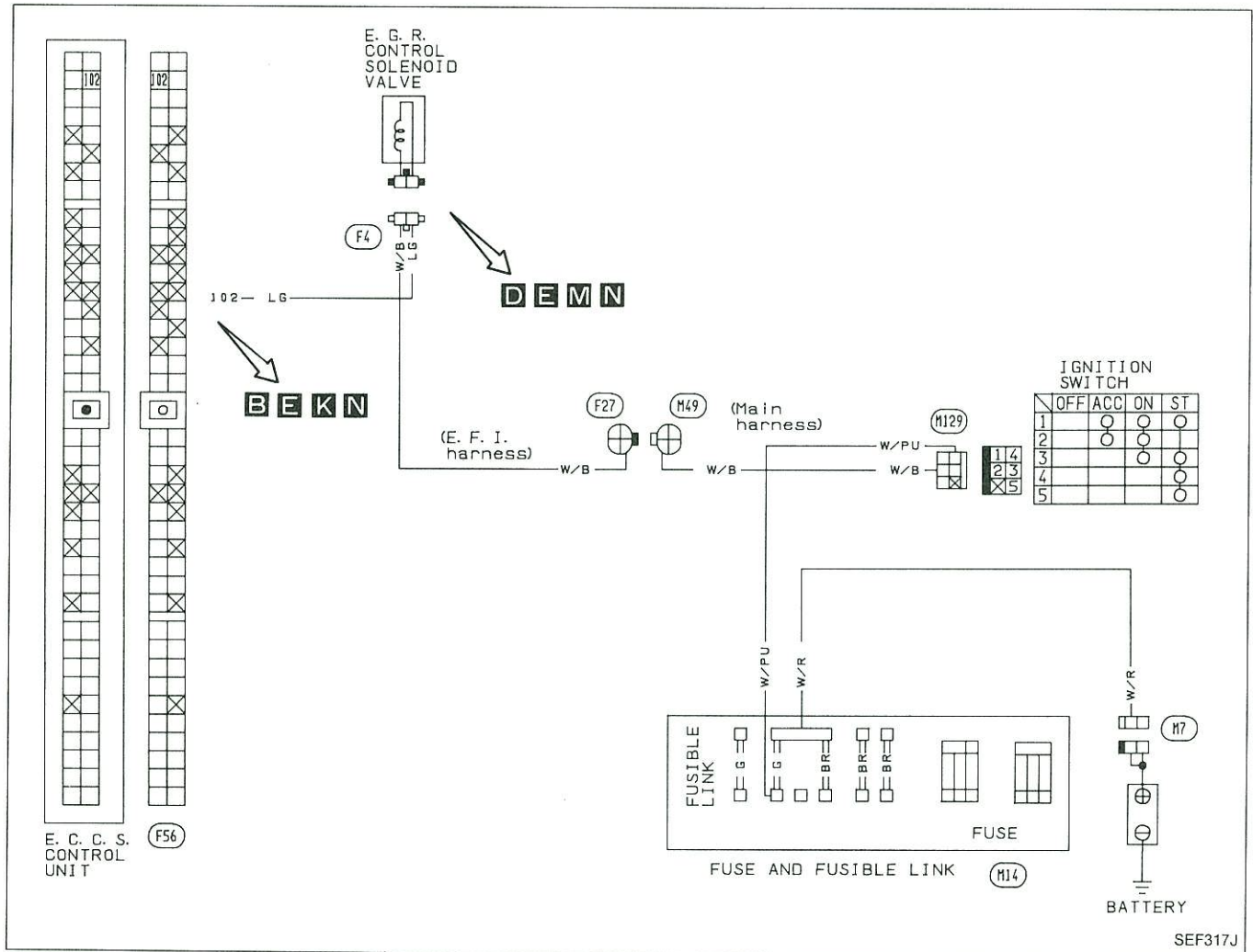
TROUBLE DIAGNOSES

NOTE

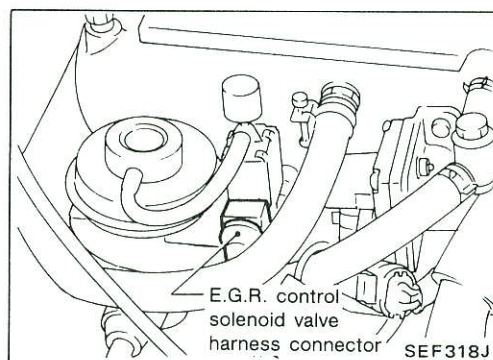
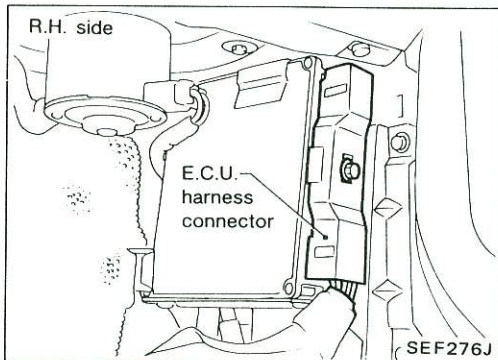
TROUBLE DIAGNOSES

Diagnostic Procedure 30

E.G.R. FUNCTION (Code No. 32)  (CHECK ENGINE LIGHT ITEM): CALIFORNIA MODEL
E.G.R. CONTROL (Not self-diagnostic item): NON-CALIFORNIA MODEL

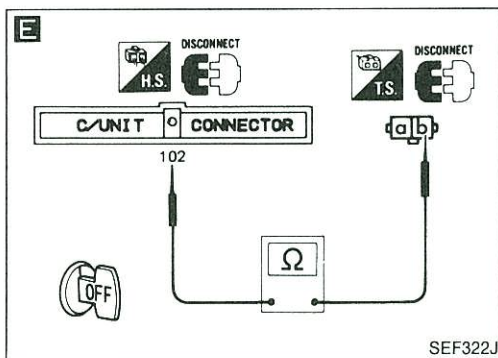
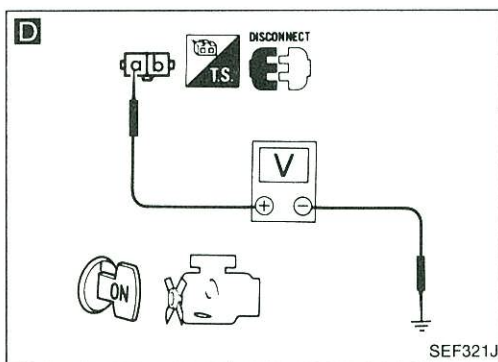
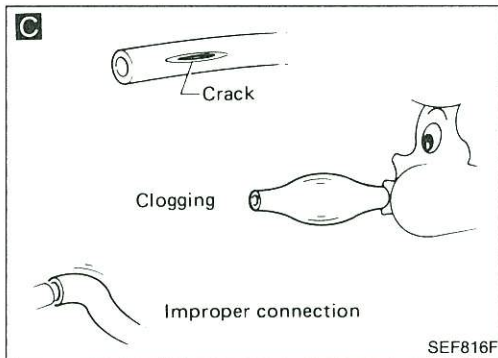
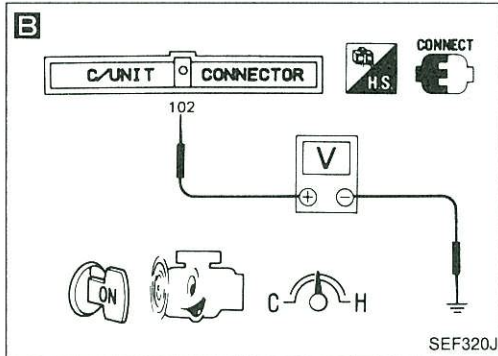
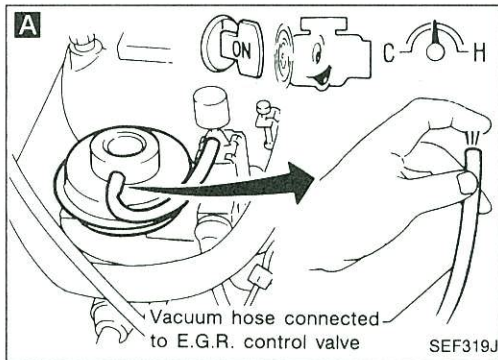


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 30 (Cont'd)



California model

INSPECTION START

A

CHECK VACUUM SOURCE TO E.G.R. CONTROL VALVE.

- 1) Start engine and warm it up sufficiently.
- 2) Perform self-diagnosis.
Make sure that code No. 12 is not displayed.
Make sure that both crank angle sensor and E.C.U.'s C.P.U. are not in "fail-safe" state.
- 3) Keep engine speed at 2,000 rpm.
- 4) Disconnect vacuum hose to E.G.R. control valve.
- 5) Make sure that vacuum exists.

Vacuum should exist.

O.K.

CHECK COMPONENTS
(E.G.R. control valve and exhaust gas temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-173.)

N.G.

Replace malfunctioning component(s).

B

CHECK CONTROL FUNCTION.

- 1) Check voltage between E.C.U. terminal 102 and ground under the following conditions.

Voltage:

- At idle
0.7 - 0.8 V
- Engine speed is about 2,000 rpm
Battery voltage

O.K.

CHECK VACUUM HOSE.

- 1) Check vacuum hose for clogging, cracks and proper connection.

D

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect E.G.R. control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal @ and ground.

Voltage: Battery voltage

N.G.

Check the following.

- Harness connectors (F27, H49)
- Harness continuity between E.G.R. control solenoid valve and ignition switch

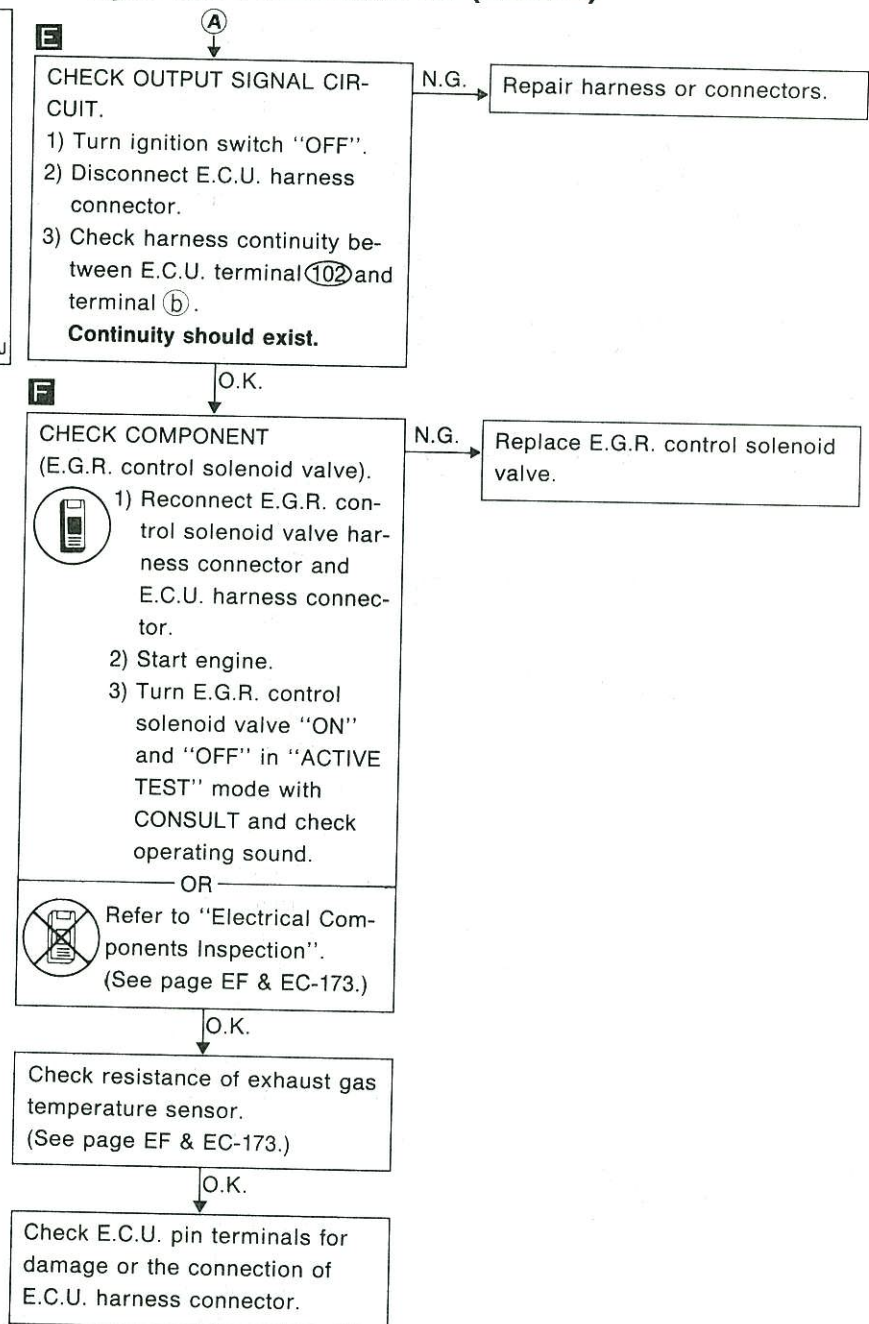
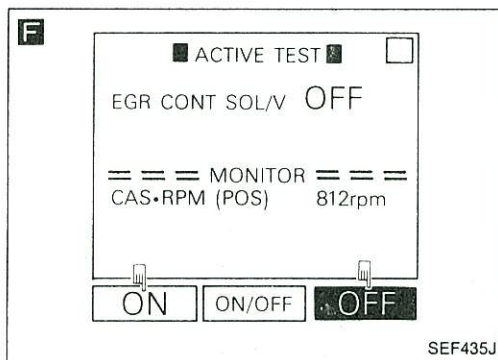
If N.G., repair harness or connectors.

O.K.

A

TROUBLE DIAGNOSES

Diagnostic Procedure 30 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 30 (Cont'd)

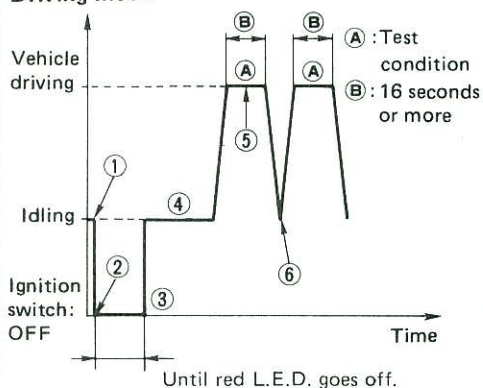
G ROAD TEST

Test condition

Drive vehicle under the following conditions with a suitable shift position.

- (1) Engine speed:
2,150±450 rpm
- (2) Intake manifold vacuum:
-32.0±6.7 kPa
(-240±50 mmHg, -9.45±1.97 inHg)

Driving mode



- ① Start engine and warm it up sufficiently.
- ② Turn off ignition switch and keep it off until red L.E.D. goes off.
- ③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during driving test.
- ④ Keep engine running for at least 4 minutes.
- ⑤ Shift to suitable gear position and drive in "Test condition" for at least 16 seconds.
- ⑥ Decrease engine revolution to less than 2,000 rpm.
- ⑦ Repeat steps ⑤ through ⑥ at least 1 time.

SEF302H

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

FINAL CHECK

Erase the self-diagnosis memory.

G

Perform driving test under the following conditions.

- 1) Warm up engine sufficiently.
- 2) Use test driving modes indicated in figure G.

H

Make sure that check engine light does not come on during driving test.

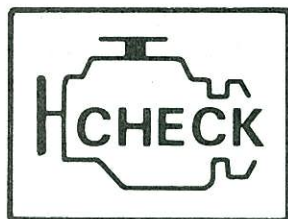
Comes on

Recheck E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

Does not come on

INSPECTION END

H

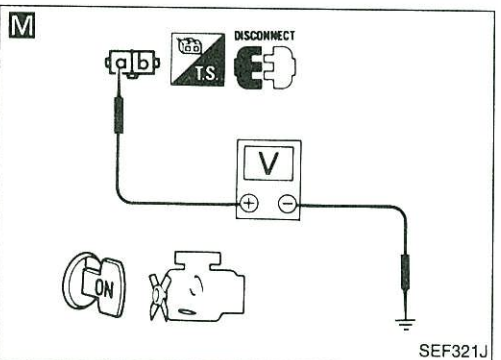
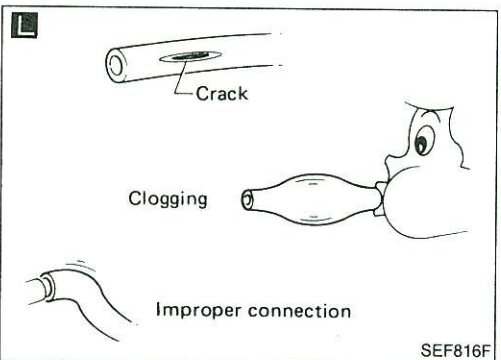
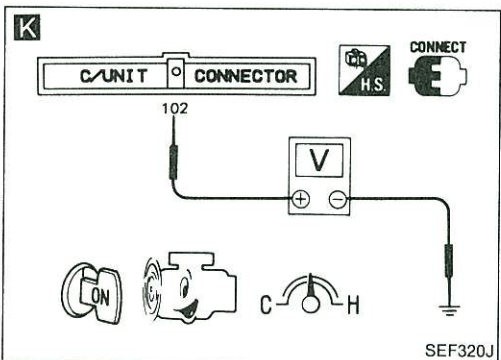
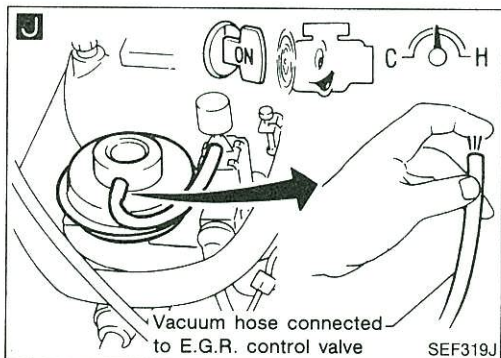
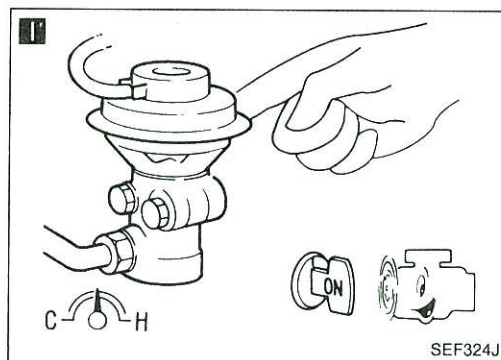


CHECK ENGINE LIGHT

SEF924F

TROUBLE DIAGNOSES

Diagnostic Procedure 30 (Cont'd)



Non-California model

INSPECTION START

- I**
- CHECK OVERALL FUNCTION.**
- 1) Start engine and warm it up sufficiently.
 - 2) Perform self-diagnosis.
Make sure that code No. 12 is not displayed.
Make sure that both crank angle sensor and E.C.U.'s C.P.U. are not in "fail-safe" state.
 - 3) Make sure that E.G.R. control valve spring is lifted up and down when racing engine.
(Use your finger.)

Is lifted up and down

INSPECTION END

Is not lifted up and down

- J**
- CHECK VACUUM SOURCE TO E.G.R. CONTROL VALVE.**
- 1) Disconnect vacuum hose to E.G.R. control valve.
 - 2) Make sure that vacuum exists under the following conditions.
- At idle:**
Vacuum should exist.
- Engine speed is about 2,000 rpm:**
Vacuum should not exist.

O.K.

CHECK COMPONENT
(E.G.R. control valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-173.)

N.G.

Replace malfunctioning component(s).

N.G.

- K**
- CHECK CONTROL FUNCTION.**
- 1) Check voltage between E.C.U. terminal 102 and ground under the following conditions.
- Voltage:**
- At idle**
0.7 - 0.8V
- Engine speed is about 2,000 rpm**
Battery voltage

O.K.

L

CHECK VACUUM HOSE.

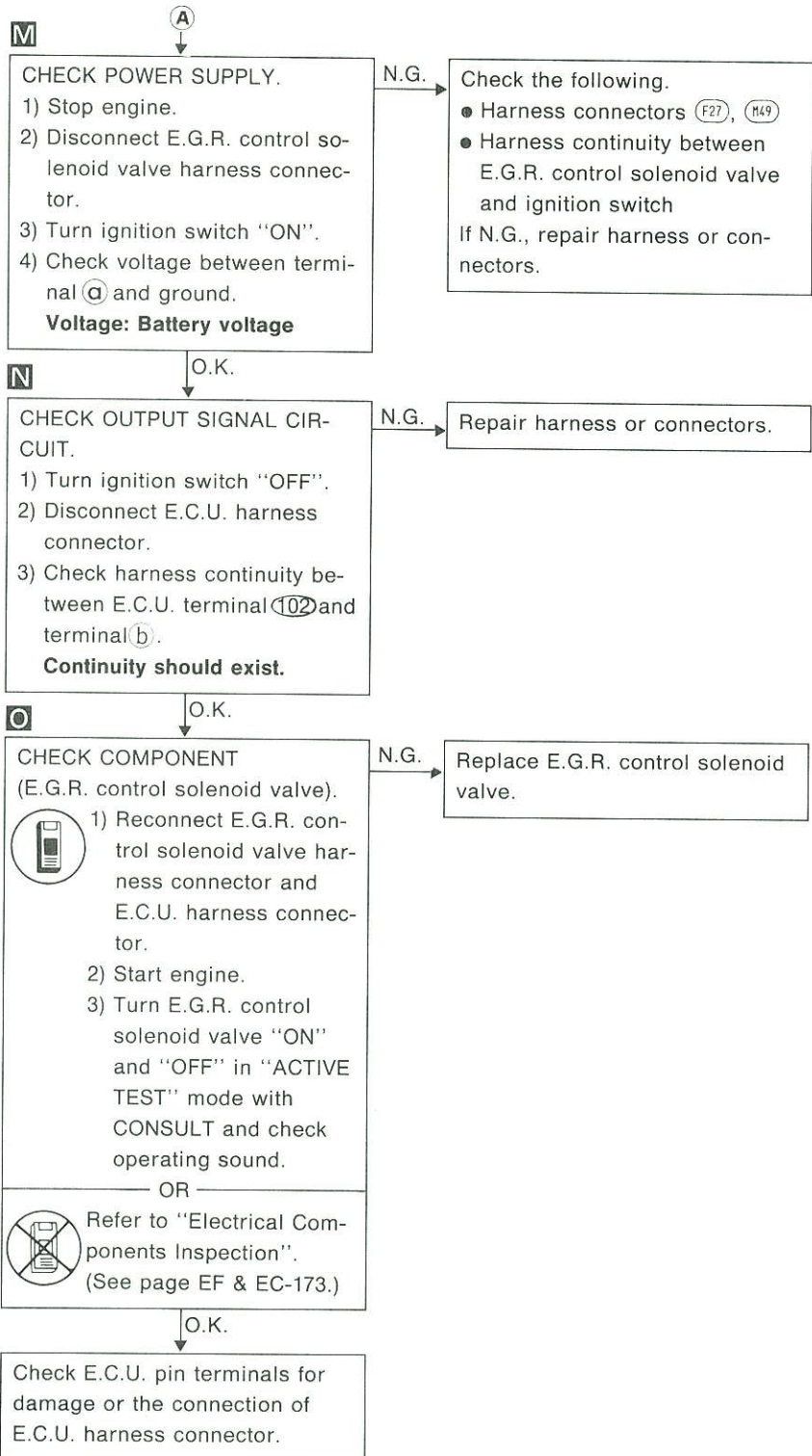
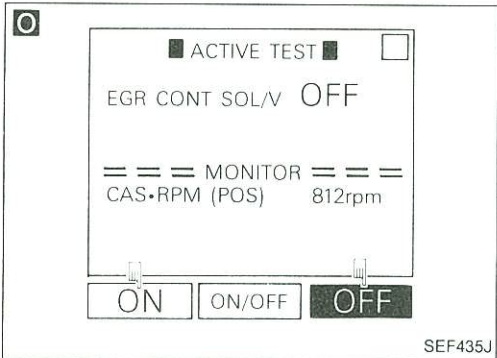
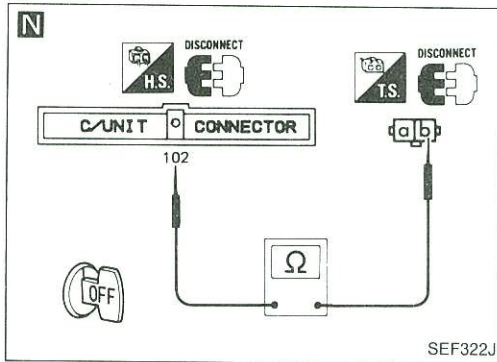
- 1) Check vacuum hose for clogging, cracks and proper connection.

N.G.

A

TROUBLE DIAGNOSES

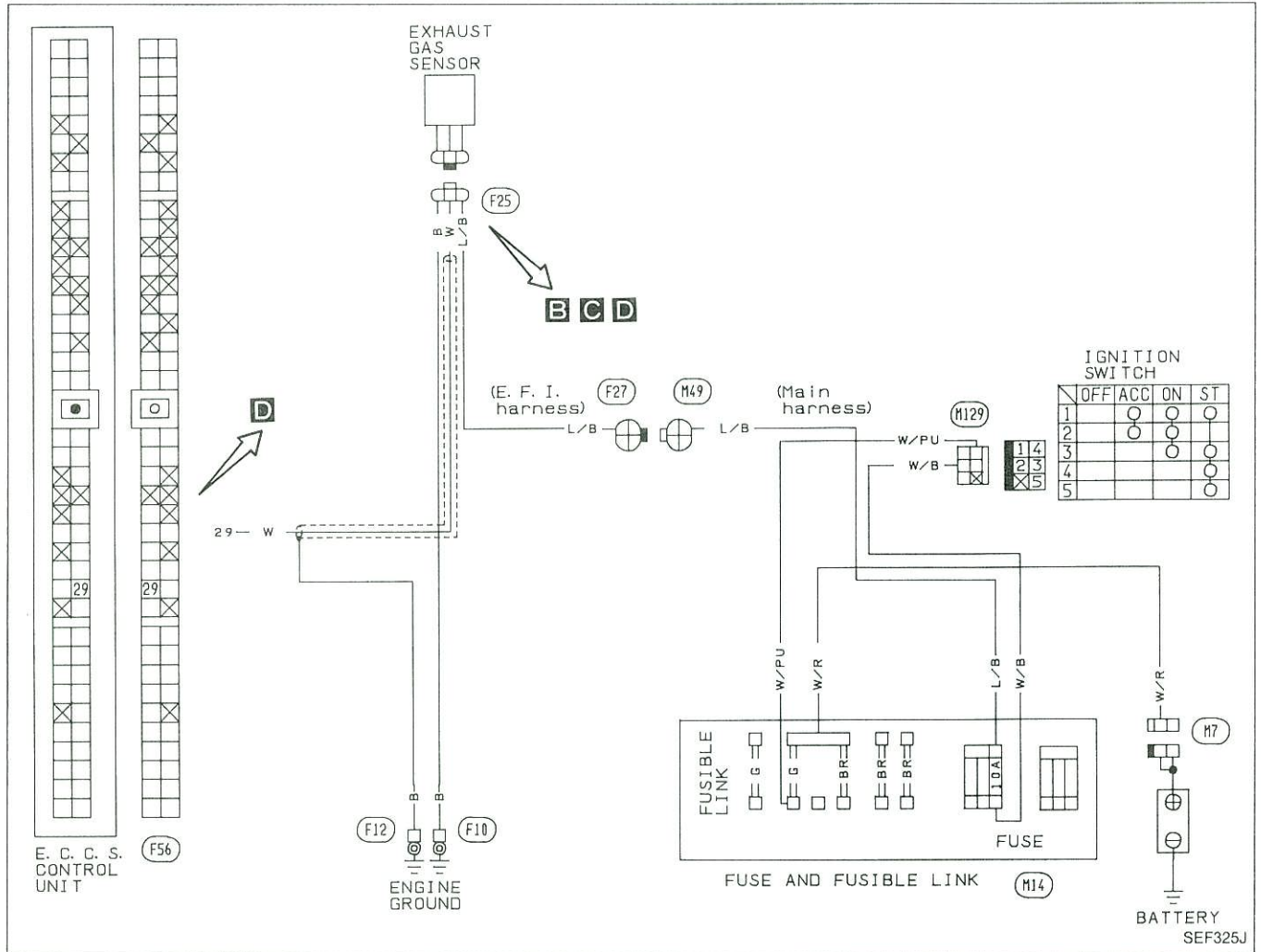
Diagnostic Procedure 30 (Cont'd)



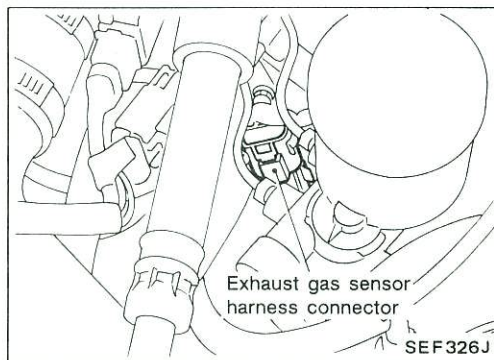
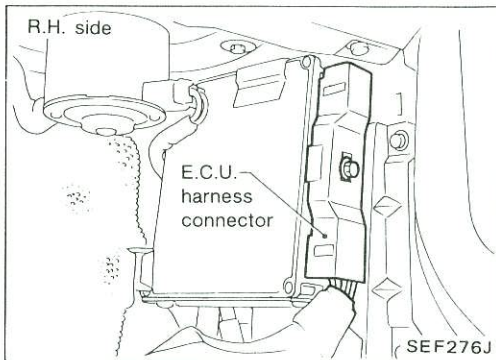
TROUBLE DIAGNOSES

Diagnostic Procedure 31

EXHAUST GAS SENSOR (Code No. 33)

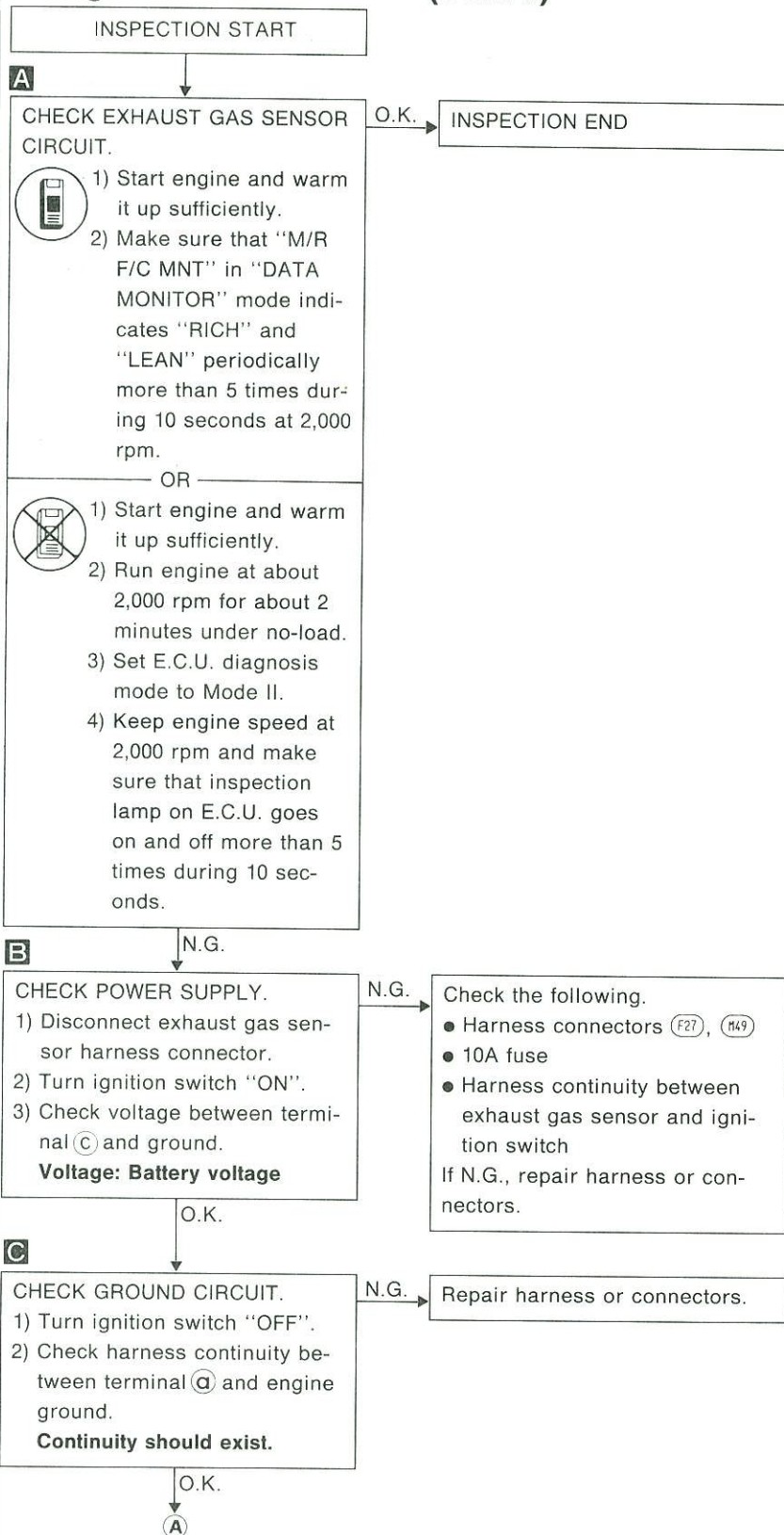
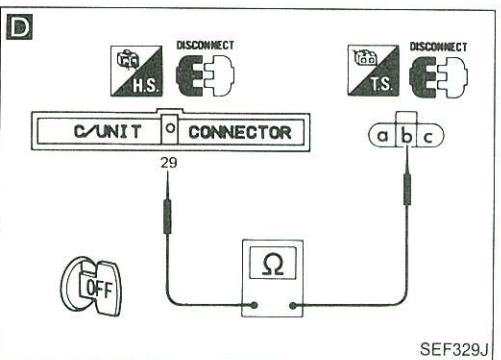
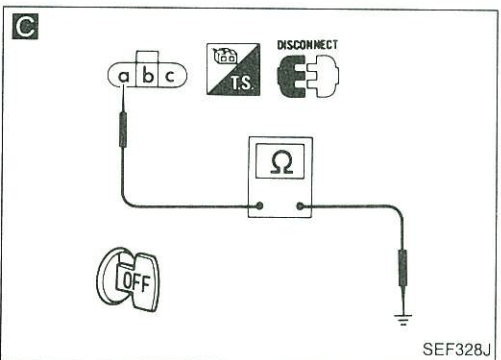
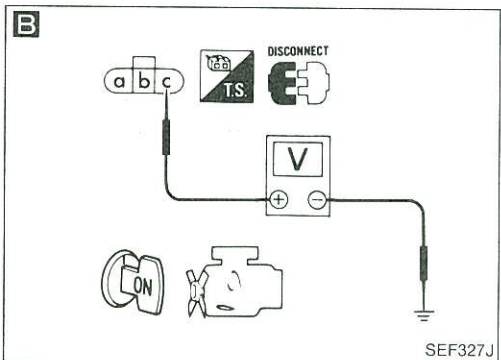
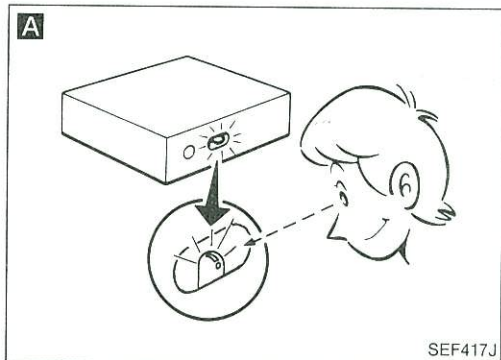


Harness layout



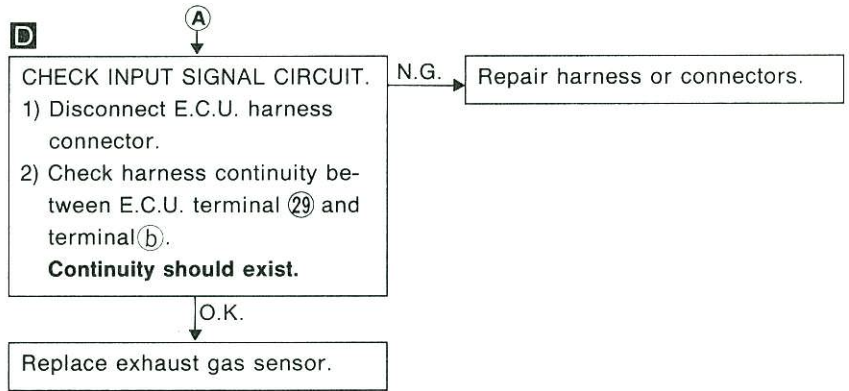
TROUBLE DIAGNOSES

Diagnostic Procedure 31 (Cont'd)

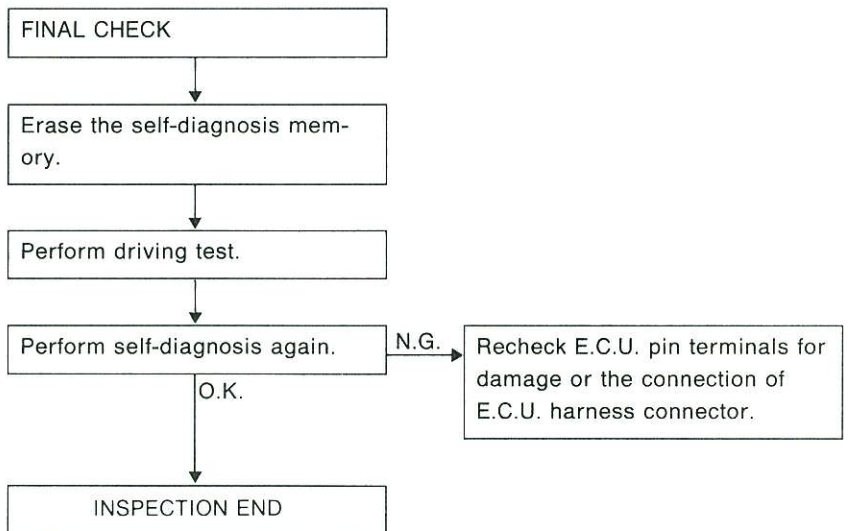


TROUBLE DIAGNOSES

Diagnostic Procedure 31 (Cont'd)



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

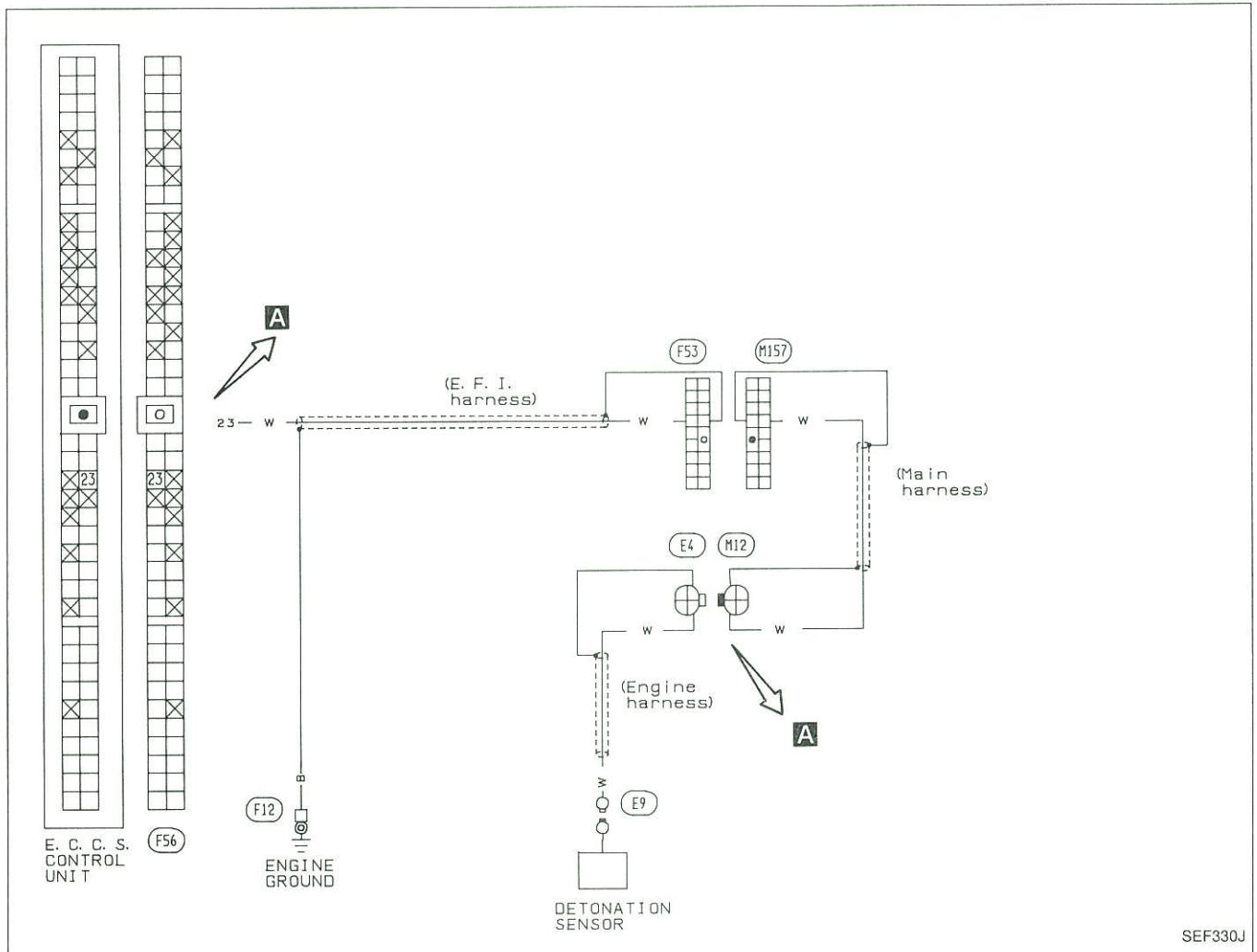


TROUBLE DIAGNOSES

NOTE

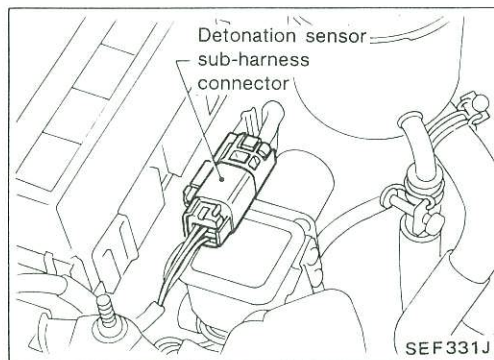
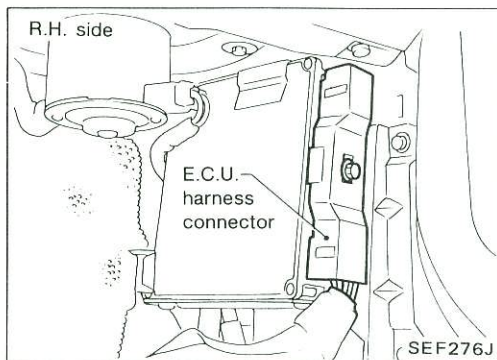
Diagnostic Procedure 32

DETONATION SENSOR (Code No. 34)



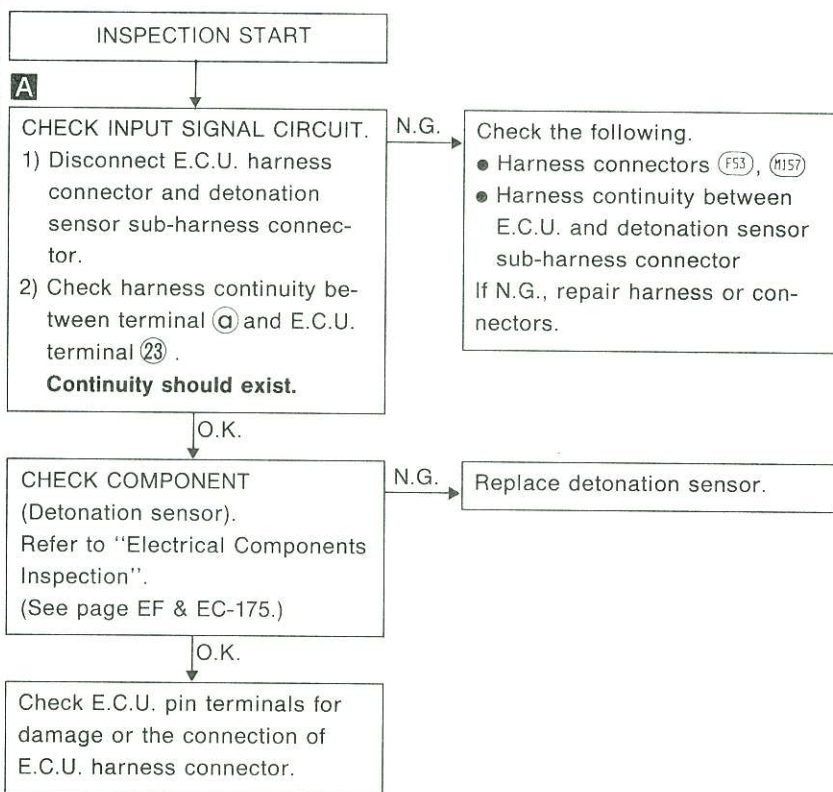
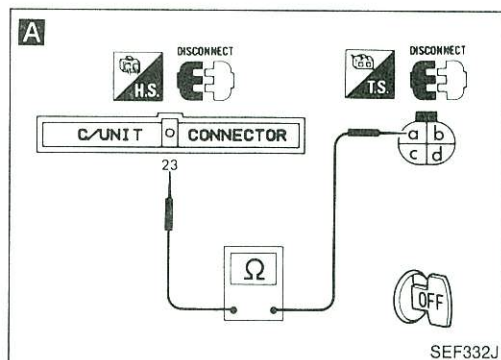
SEF330J

Harness layout

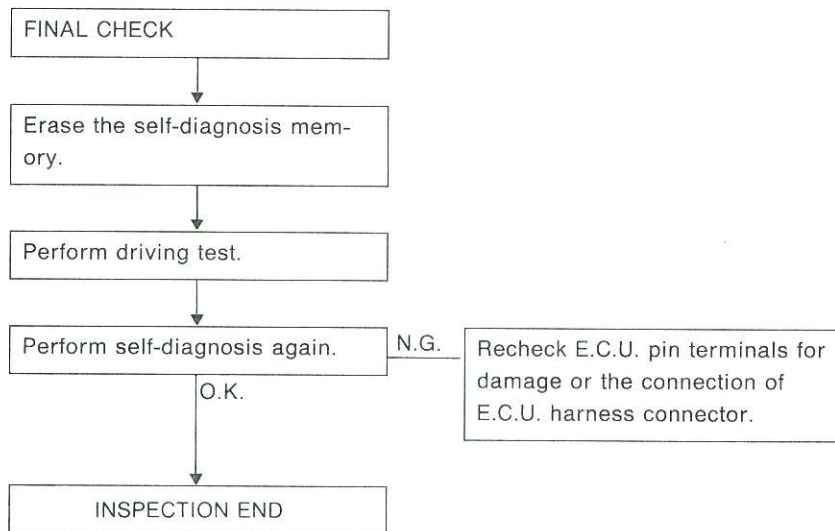


TROUBLE DIAGNOSES

Diagnostic Procedure 32 (Cont'd)

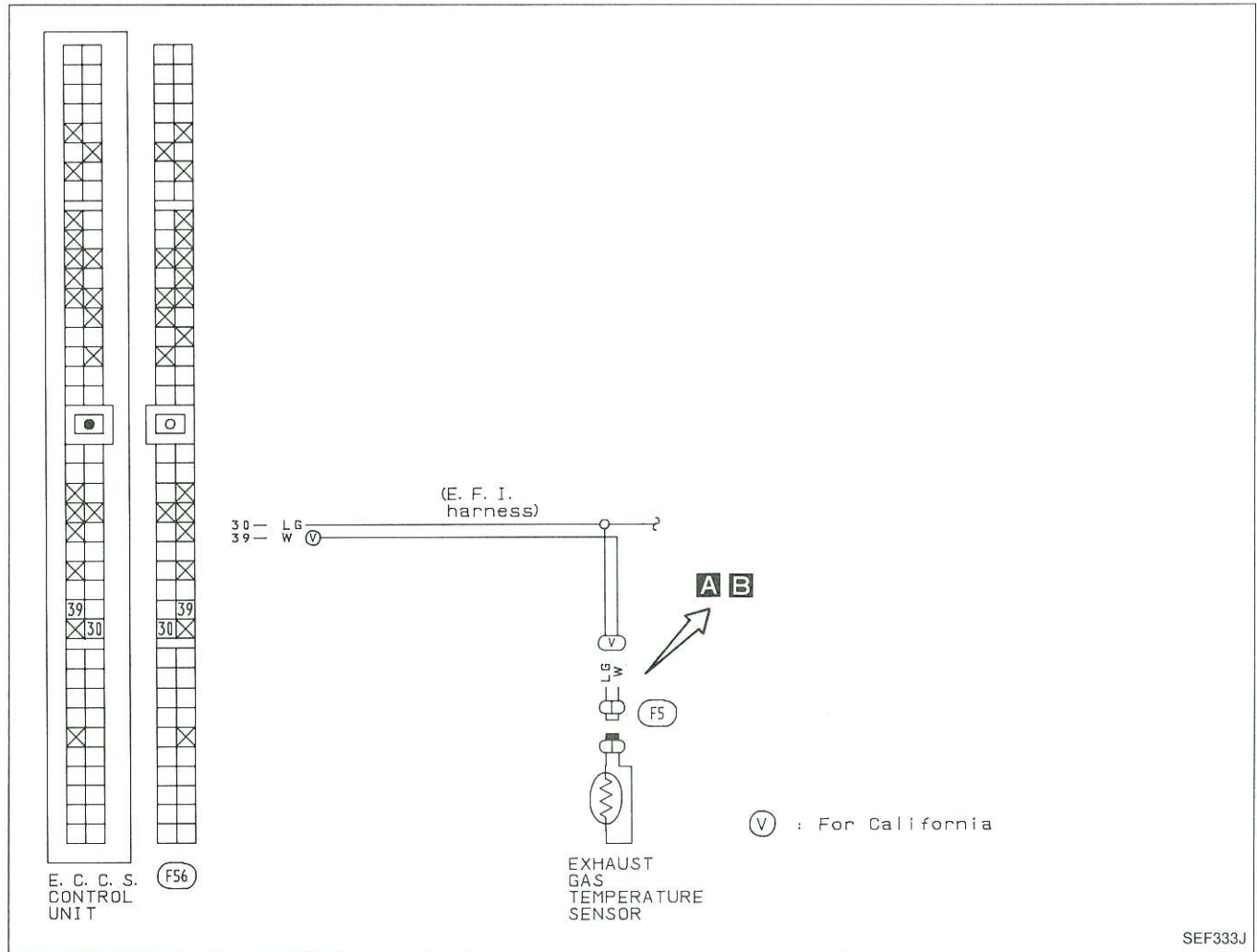


Perform FINAL CHECK by the following procedure after repair is completed.

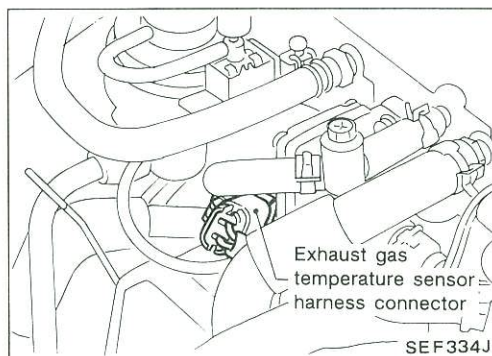
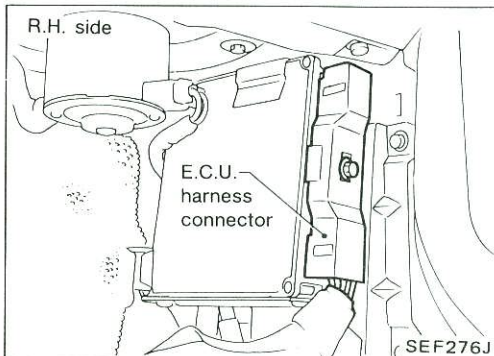


Diagnostic Procedure 33

EXHAUST GAS TEMPERATURE SENSOR (Code No. 35)  (CHECK ENGINE LIGHT ITEM): CALIFORNIA MODEL ONLY

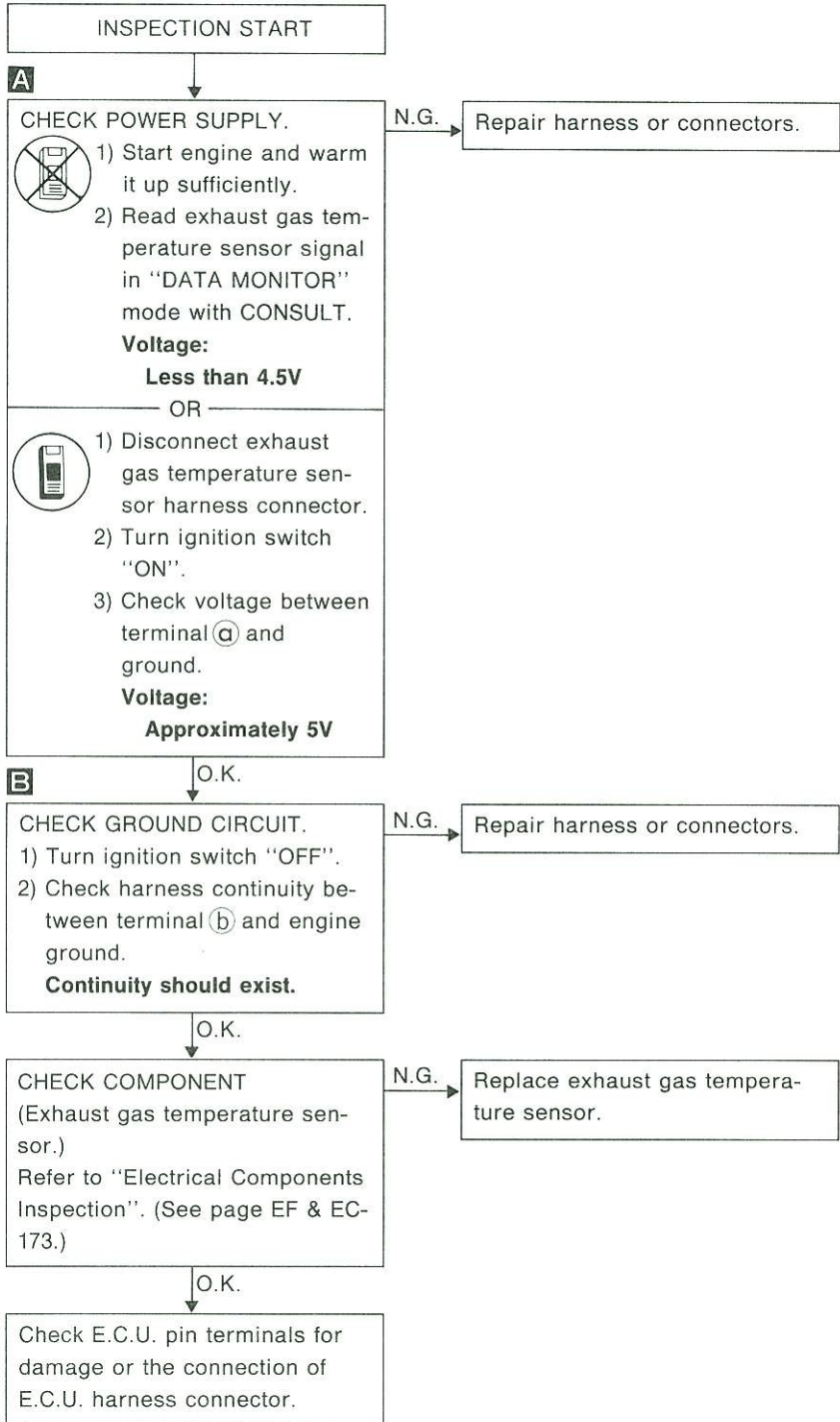
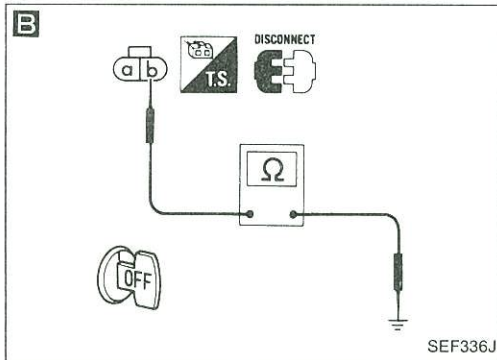
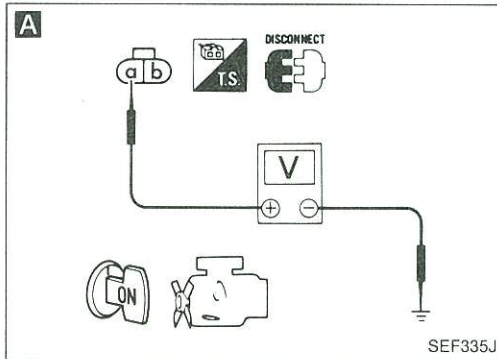
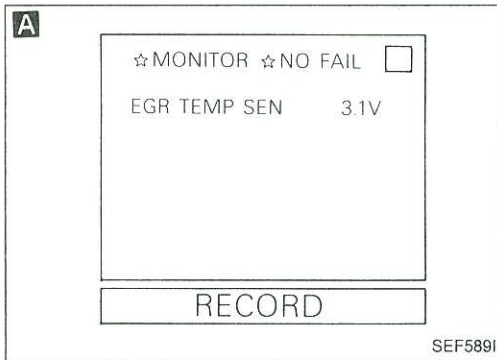


Harness layout



TROUBLE DIAGNOSES

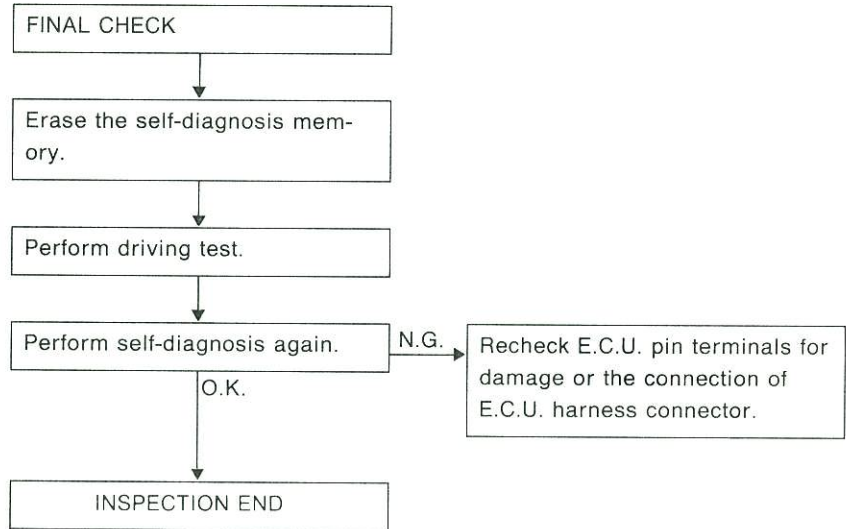
Diagnostic Procedure 33 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 33 (Cont'd)


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

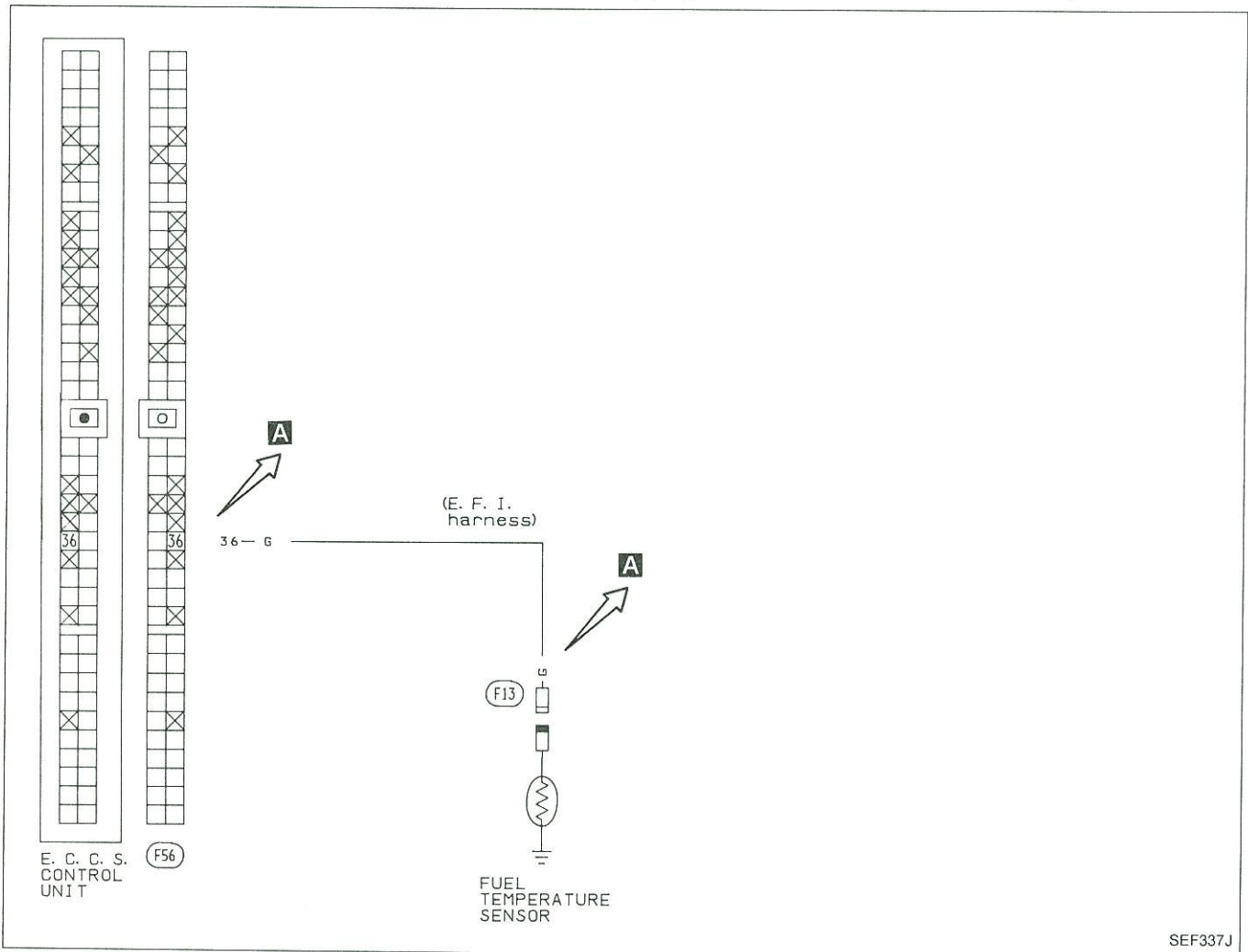


TROUBLE DIAGNOSES

NOTE

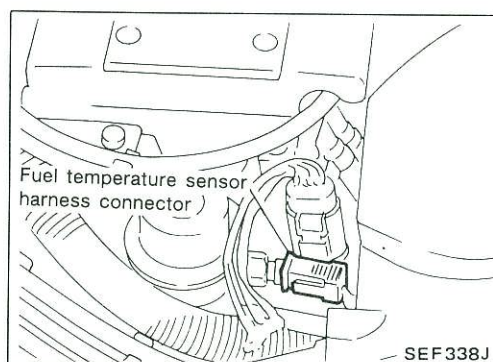
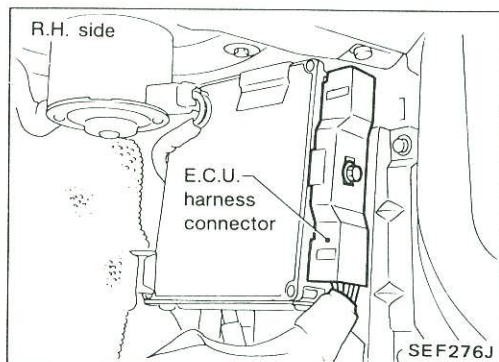
Diagnostic Procedure 34

FUEL TEMPERATURE SENSOR (Code No. 42)  (CHECK ENGINE LIGHT ITEM)



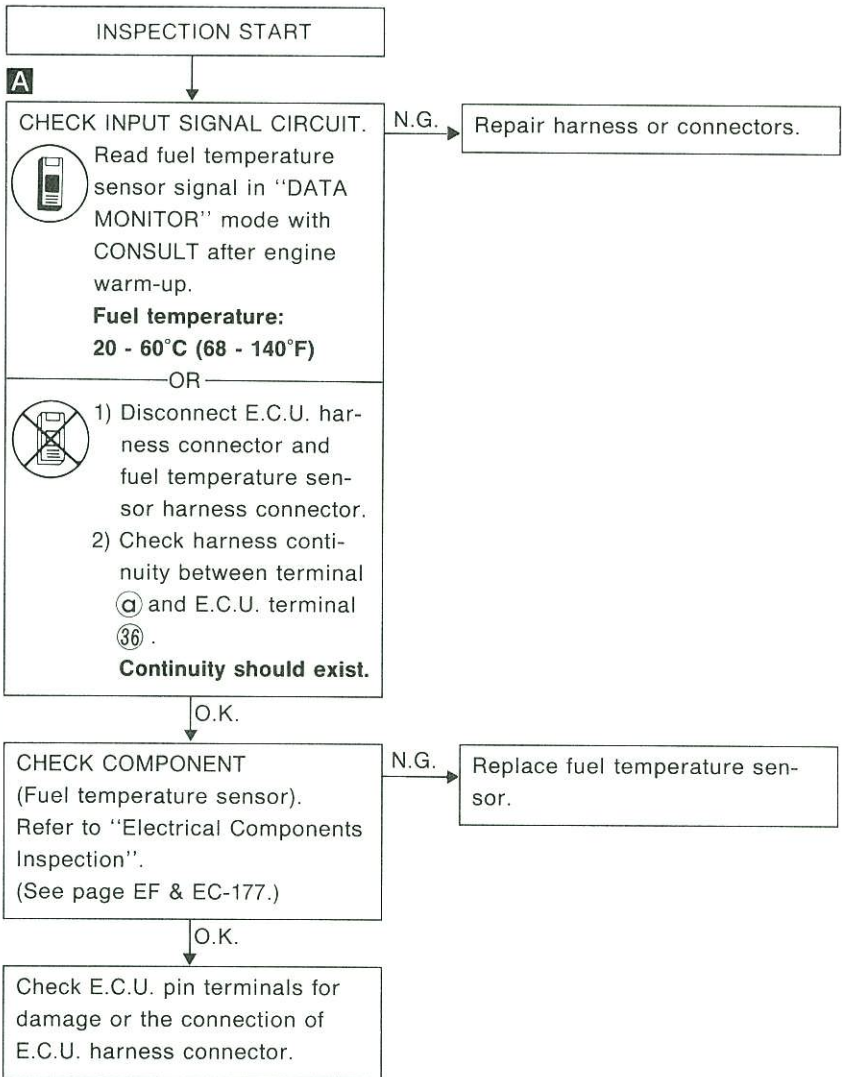
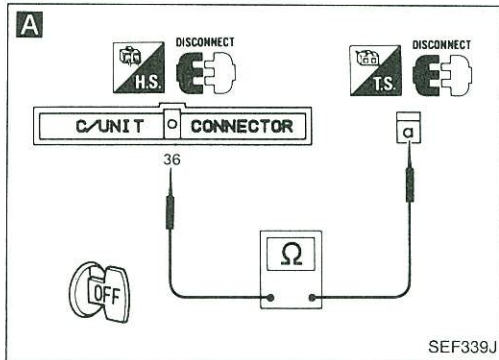
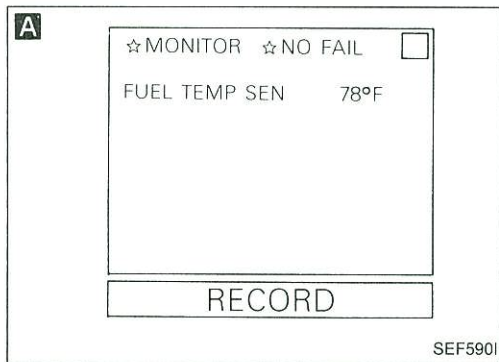
SEF337J

Harness layout

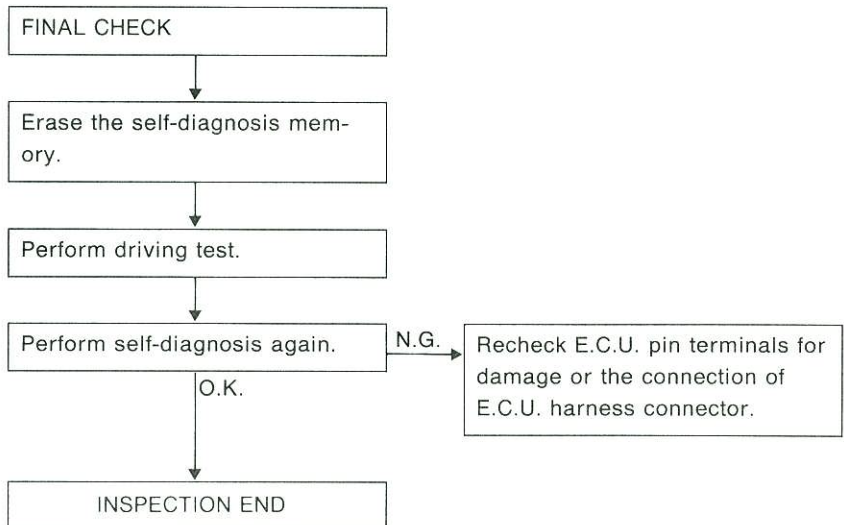


TROUBLE DIAGNOSES

Diagnostic Procedure 34 (Cont'd)



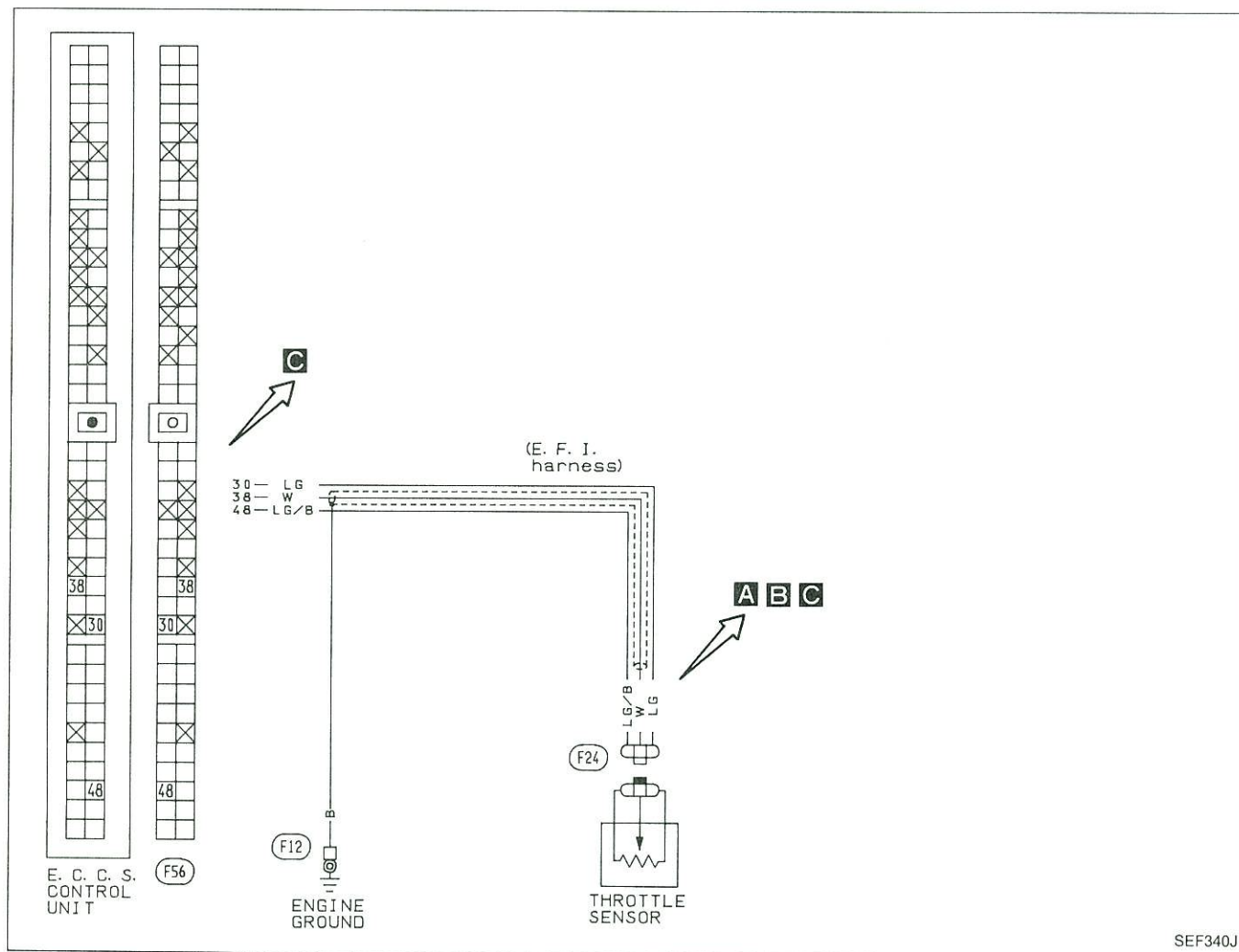
Perform FINAL CHECK by the following procedure after repair is completed.



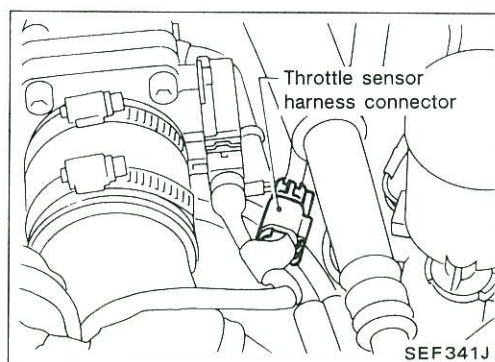
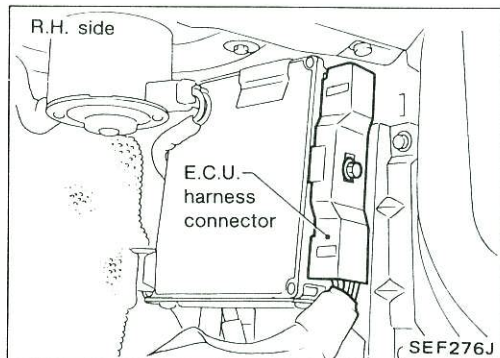
TROUBLE DIAGNOSES

Diagnostic Procedure 35

THROTTLE SENSOR (Code No. 43) (CHECK ENGINE LIGHT ITEM)

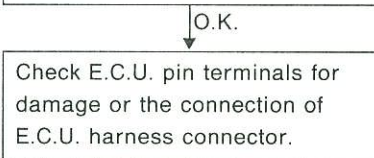
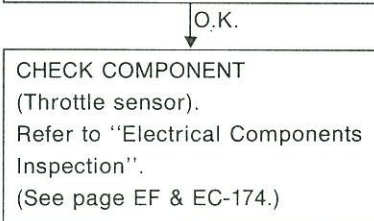
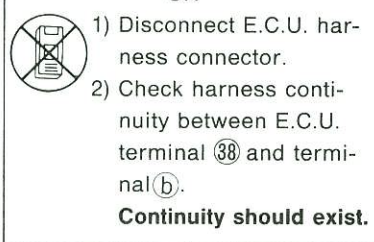
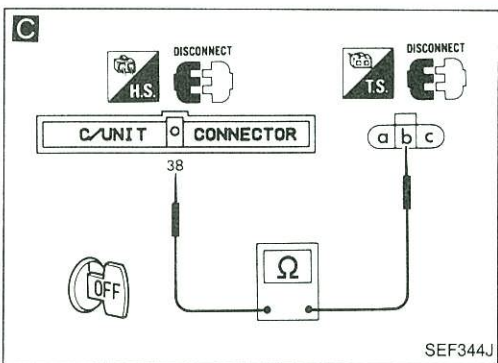
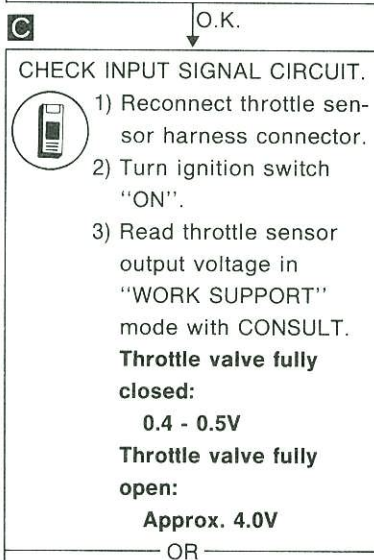
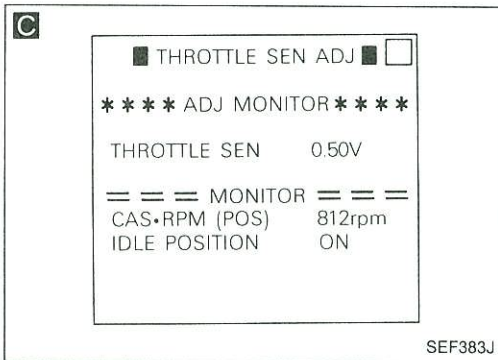
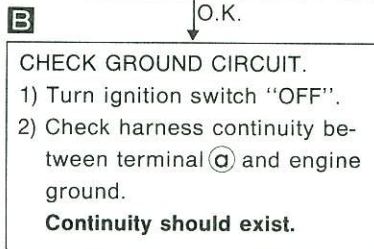
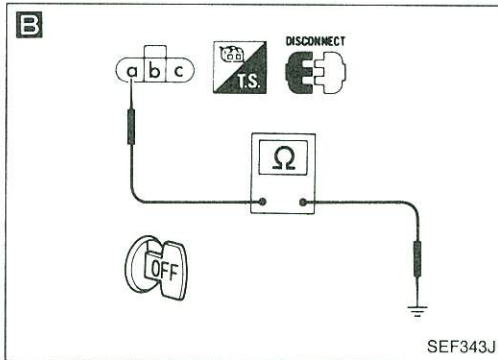
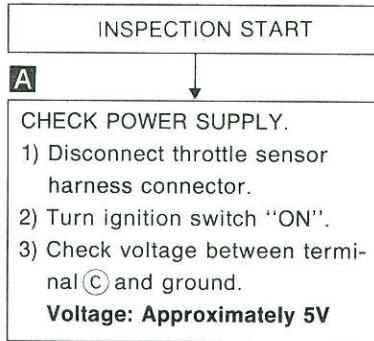
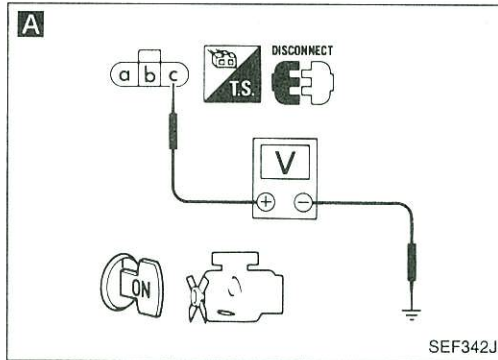


Harness layout



TROUBLE DIAGNOSES

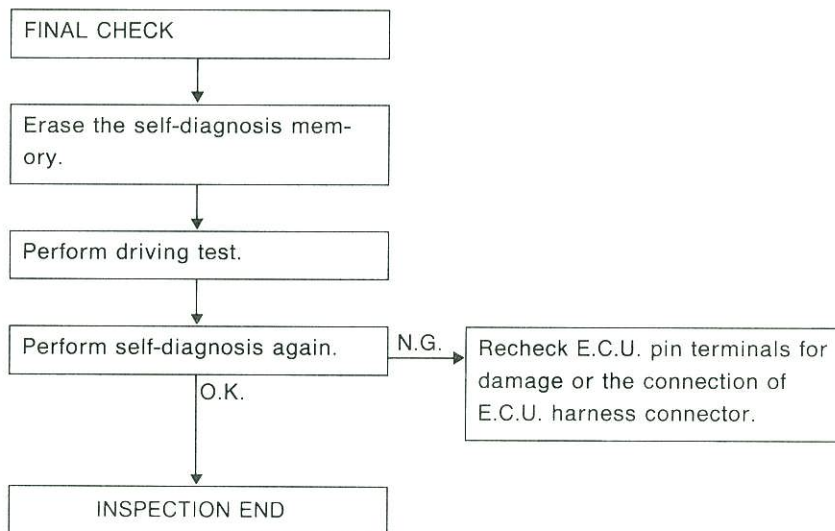
Diagnostic Procedure 35 (Cont'd)



TROUBLE DIAGNOSES

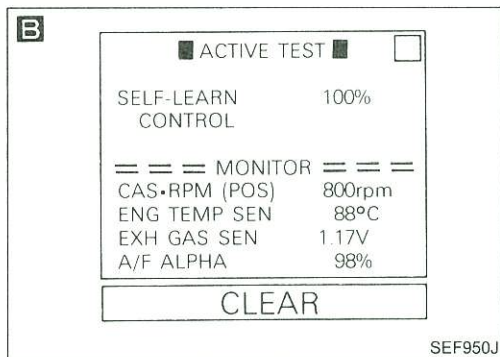
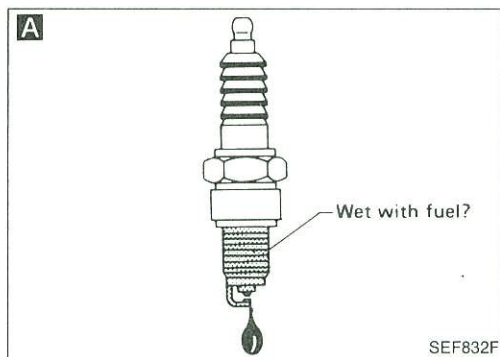
Diagnostic Procedure 35 (Cont'd)

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



TROUBLE DIAGNOSES

NOTE



C ROAD TEST

Test condition
Drive vehicle under the following conditions with a suitable shift position.

- (1) Engine speed:
2,500±700 rpm
- (2) Intake manifold vacuum:
-46.7±6.7 kPa
(-350±50 mmHg, -13.78±1.97 inHg)

Driving mode

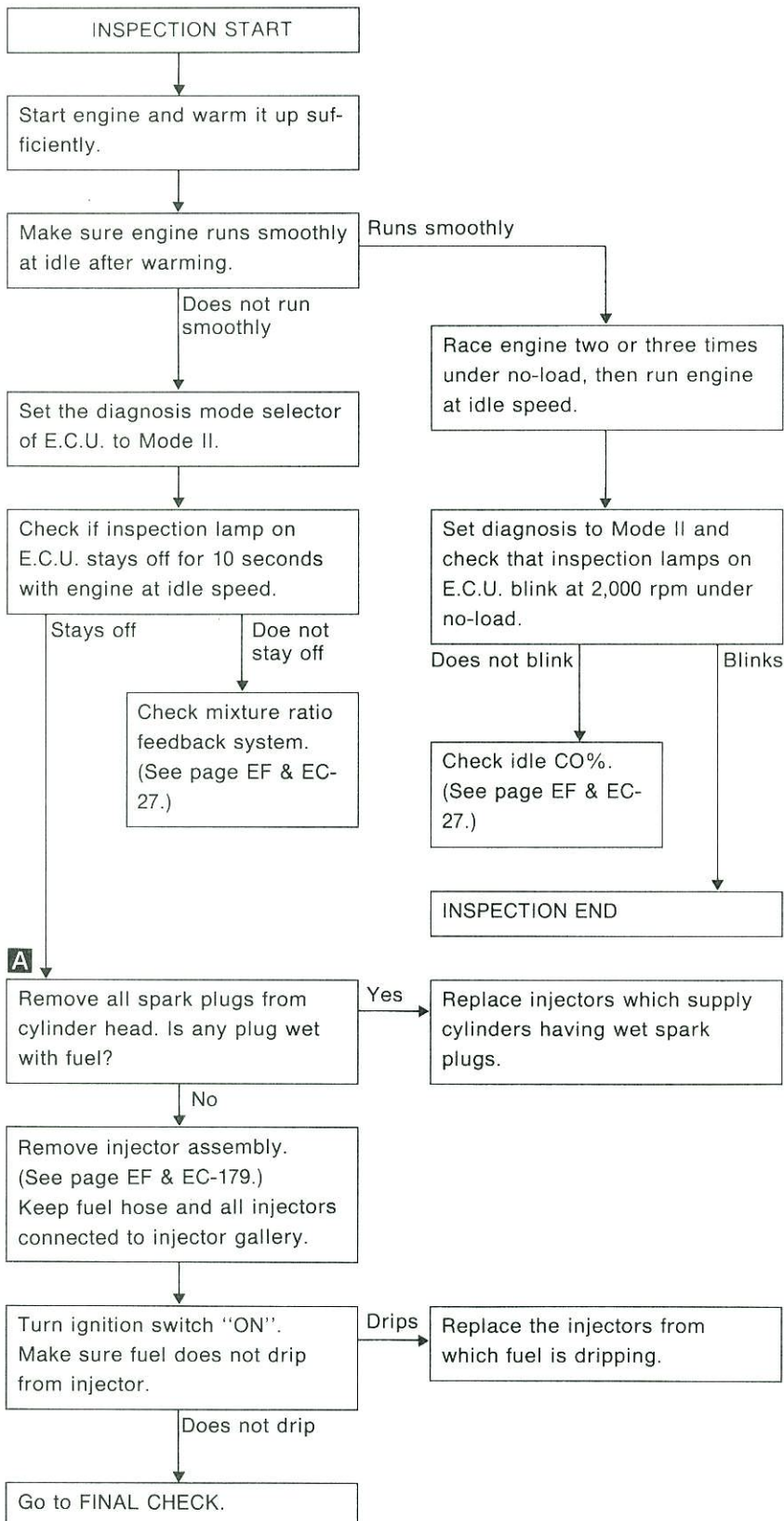
- (A) : 60 seconds or more
- (B) : 5 seconds or more
- (C) : 10 seconds or more

- ① Start engine and warm it up sufficiently.
- ② Keep engine at idle speed for at least 60 seconds.
- ③ Shift to a suitable gear position and drive in "Test condition" for at least 5 seconds.
- ④ Keep engine at idle speed for at least 10 seconds.
- ⑤ Repeat steps ② through ④ at least 10 times.

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Diagnostic Procedure 36

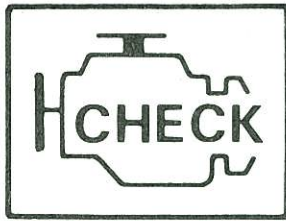
INJECTOR LEAK (Code No. 45) (CHECK ENGINE LIGHT ITEM); CALIFORNIA MODEL ONLY



TROUBLE DIAGNOSES

Diagnostic Procedure 36 (Cont'd)

D



CHECK ENGINE LIGHT

SEF924F

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

FINAL CHECK

Erase the self-diagnosis memory. Make sure code No. 55 is displayed in Mode II.

B

Clear the self-learning data using the following procedure:

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

OR



- 2) Disconnect air flow meter connector, and restart and run engine for at least 30 seconds at 2,000 rpm.
- 3) Stop engine and reconnect air flow meter connector.
- 4) Make sure Code No. 12 is displayed in Mode II.
- 5) Erase the self-diagnosis memory. Make sure Code No. 55 is displayed in Mode II.

C

Perform engine racing test as indicated in figure **C**.

D

Make sure that check engine light does not come on during engine test.

Comes on


Recheck E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

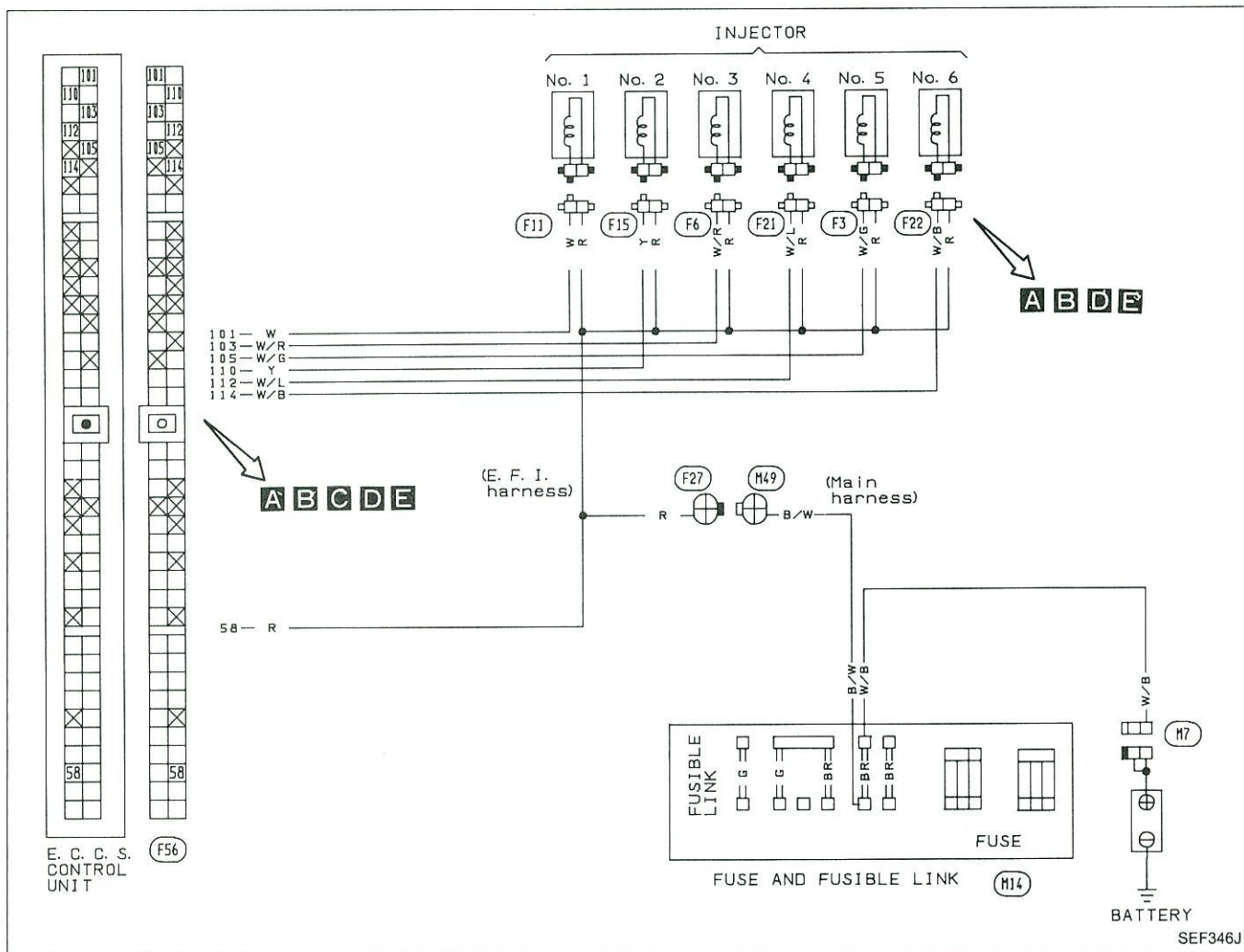
Does not come on

INSPECTION END

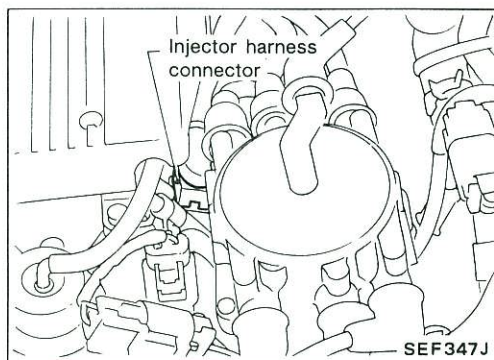
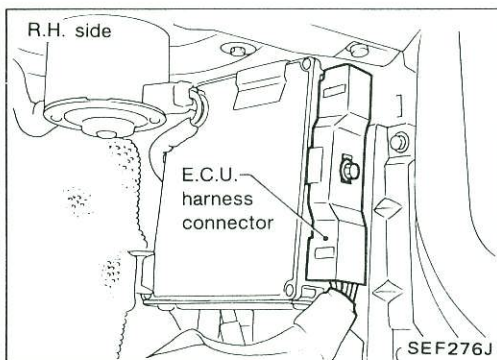
TROUBLE DIAGNOSES

Diagnostic Procedure 37

INJECTOR CIRCUIT (Code No. 51)  (CHECK ENGINE LIGHT ITEM): CALIFORNIA MODEL
INJECTOR CIRCUIT (Not self-diagnostic item): NON-CALIFORNIA MODEL

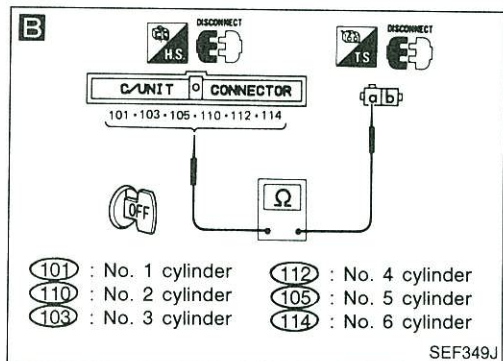
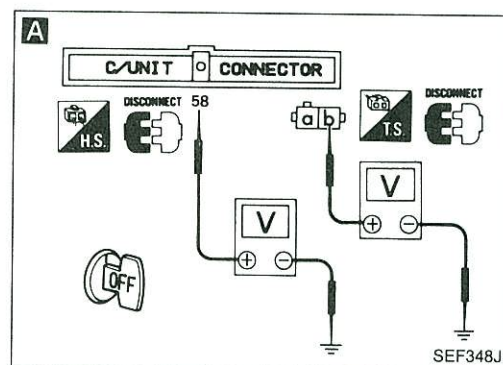


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 37 (Cont'd)



California model

INSPECTION START

A

CHECK POWER SUPPLY.

- 1) Disconnect injector harness connector and E.C.U. harness connector.
- 2) Check voltage between terminal (b) and ground, E.C.U. terminal (58) and ground.

Voltage: Battery voltage

N.G.

Check the following.

- Harness connectors (F27), (H49)
- "BR" fusible link
- Harness continuity between battery and injector
- Harness continuity between battery and E.C.U.

If N.G., repair harness or connectors.

O.K.

B

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Check harness continuity between terminal (a) and E.C.U. terminals (101), (103), (105), (110), (112), (114).

Continuity should exist.

N.G.

Repair harness or connectors.

O.K.

CHECK COMPONENT

(Injector).

Refer to "Electrical Components Inspection".
(See page EF & EC-176.)

N.G.

Replace injector.

O.K.

Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

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

FINAL CHECK

Erase the self-diagnosis memory.

Perform driving test.

Perform self-diagnosis again.

N.G.

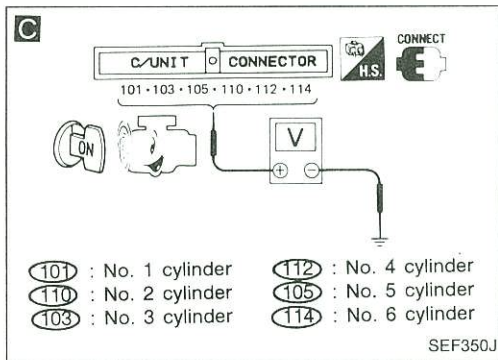
Recheck E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

O.K.

INSPECTION END

TROUBLE DIAGNOSES

Diagnostic Procedure 37 (Cont'd)



Non-California model

INSPECTION START

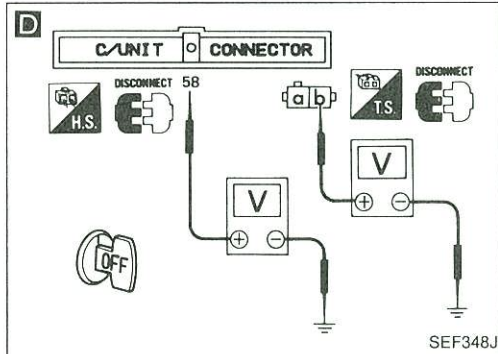
C

CHECK CONTROL FUNCTION.

- 1) Start engine.
- 2) Check voltage between E.C.U. terminals (101), (103), (105), (110), (112), (114) and ground.

Voltage: Battery voltage

O.K. → INSPECTION END



D

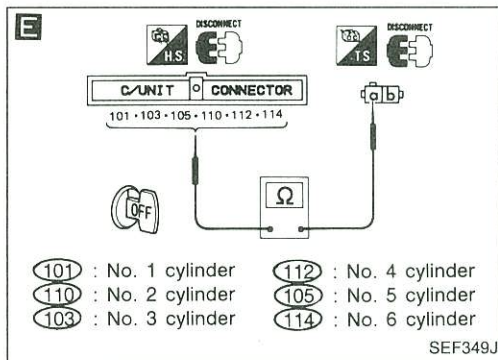
CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect injector harness connector and E.C.U. harness connector.
- 3) Check voltage between terminal (b) and ground, E.C.U. terminal (58) and ground.

Voltage: Battery voltage

N.G. → Check the following.

- Harness connectors (F27), (H49)
 - "BR" fusible link
 - Harness continuity between battery and injector
 - Harness continuity between battery and E.C.U.
- If N.G., repair harness or connectors.



E

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Check harness continuity between terminal (a) and E.C.U. terminals (101), (103), (105), (110), (112), (114).

Continuity should exist.

N.G. → Repair harness or connectors.

CHECK COMPONENT

(Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-176.)

N.G. → Replace injector.

O.K. →

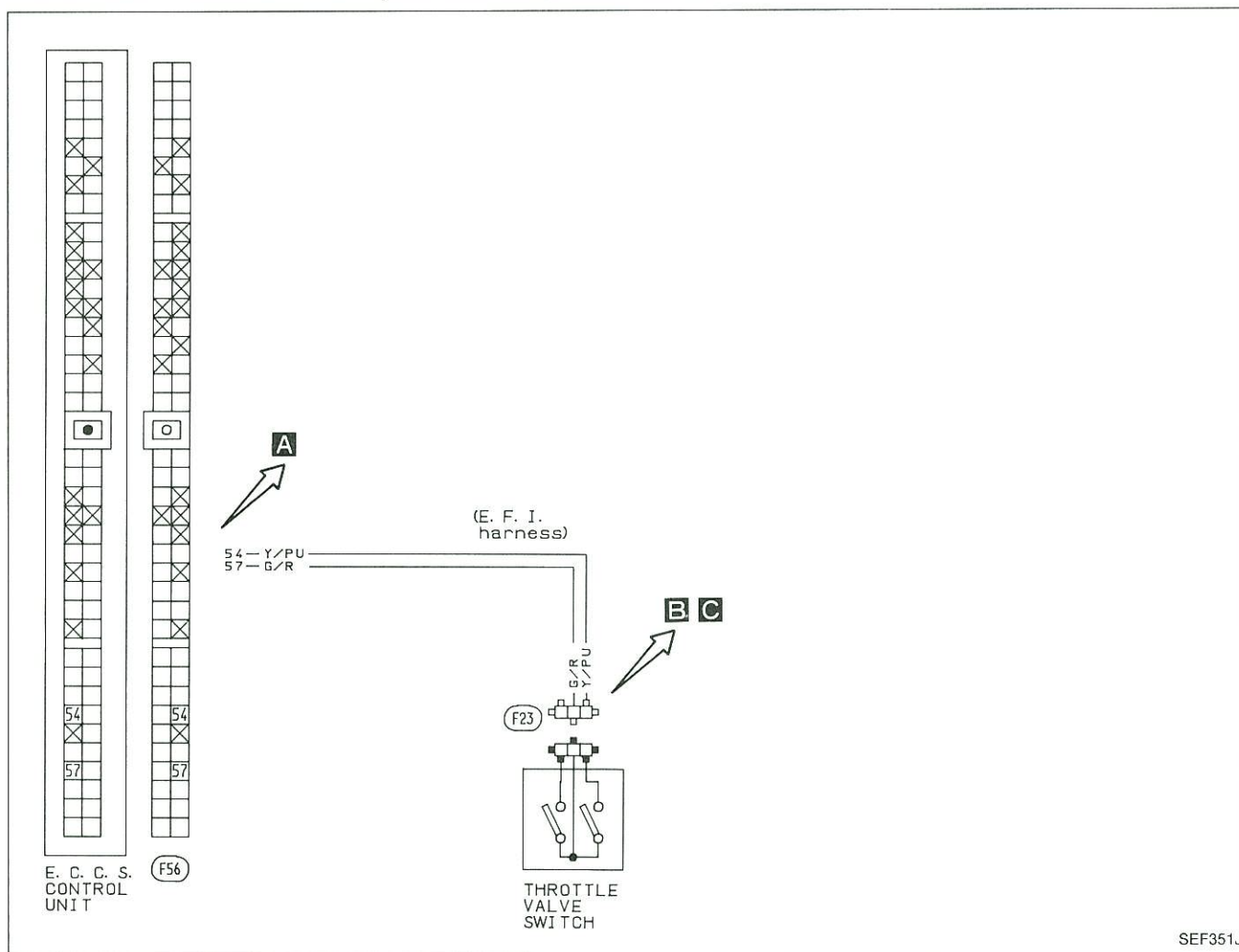
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

TROUBLE DIAGNOSES

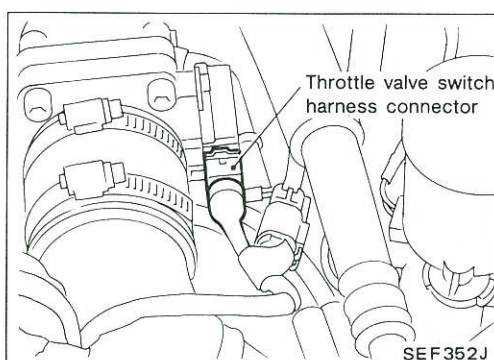
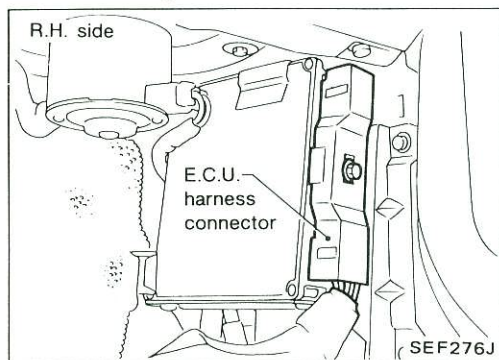
NOTE

Diagnostic Procedure 38

THROTTLE VALVE SWITCH (Not self-diagnostic item)

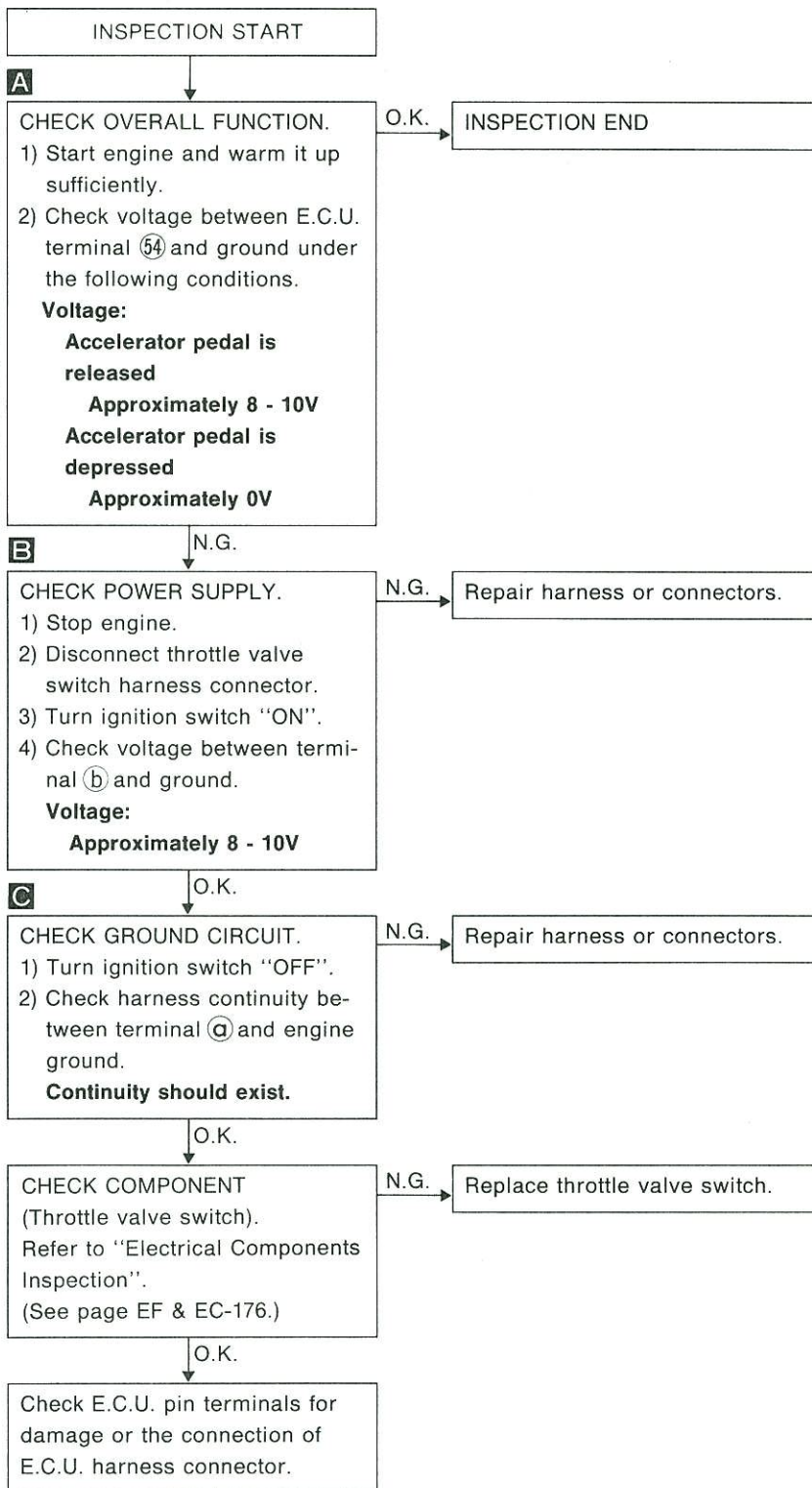
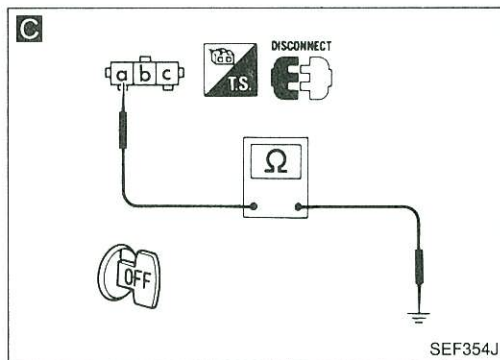
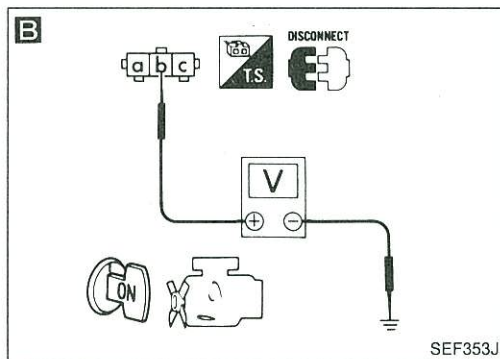
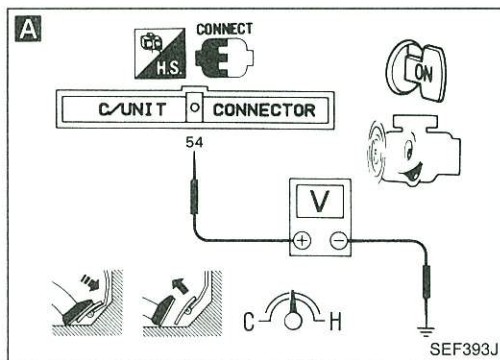


Harness layout



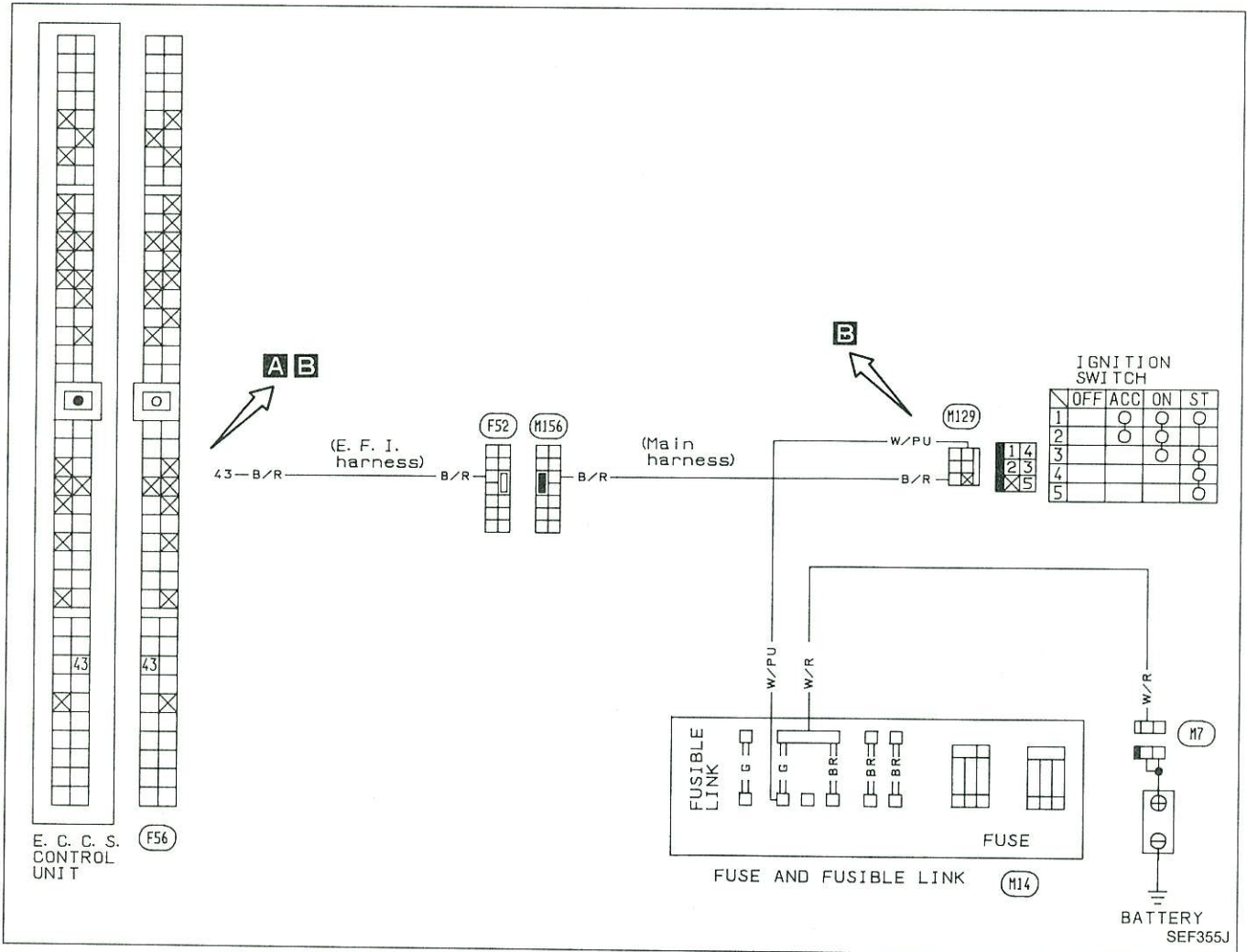
TROUBLE DIAGNOSES

Diagnostic Procedure 38 (Cont'd)

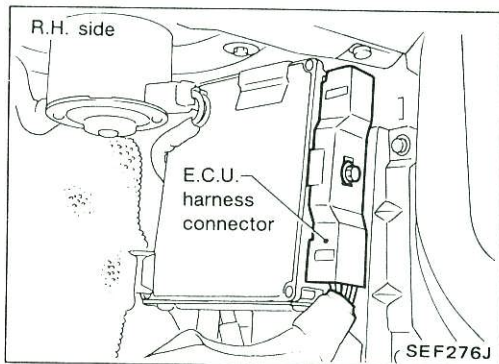


Diagnostic Procedure 39

START SIGNAL (Not self-diagnostic item)



Harness layout



TROUBLE DIAGNOSES

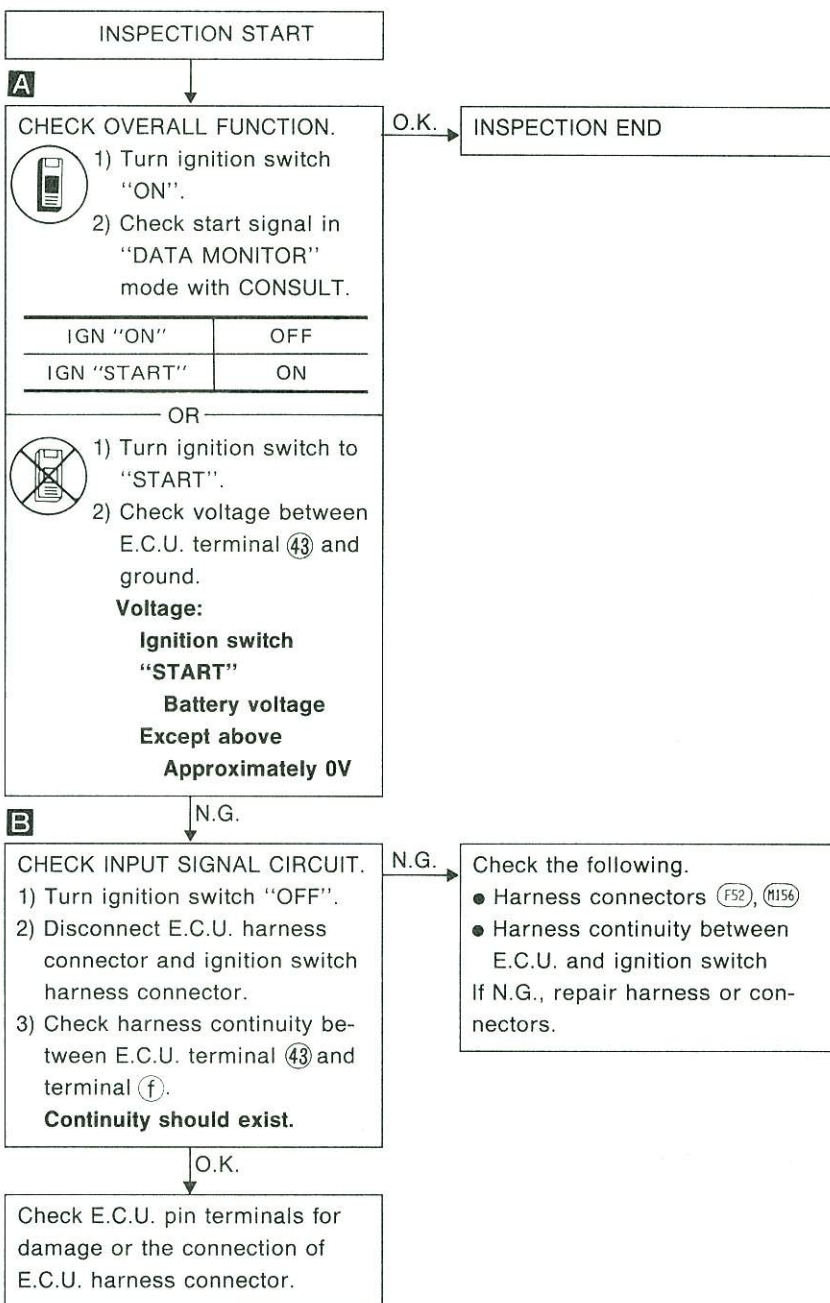
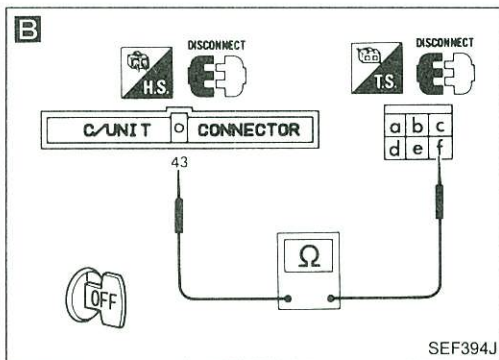
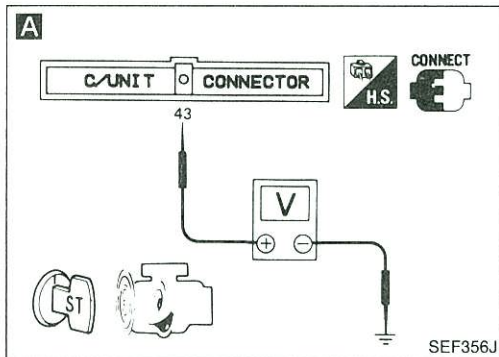
Diagnostic Procedure 39 (Cont'd)

A

☆ MONITOR	☆ NO FAIL	<input type="checkbox"/>
START SIGNAL	OFF	
IDLE POSITION	ON	
AIR COND SIG	OFF	
NEUTRAL SW	ON	

RECORD

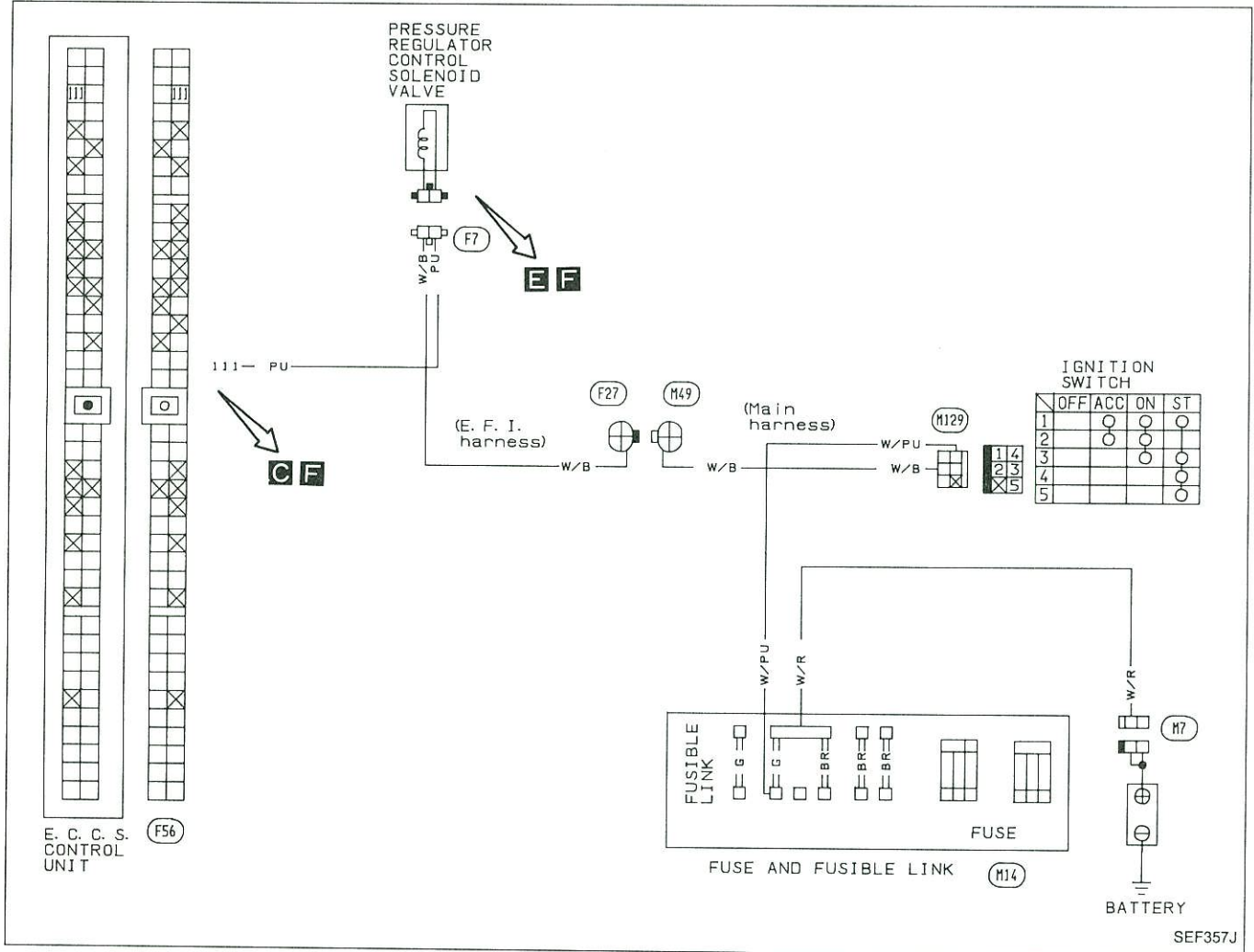
SEF384J



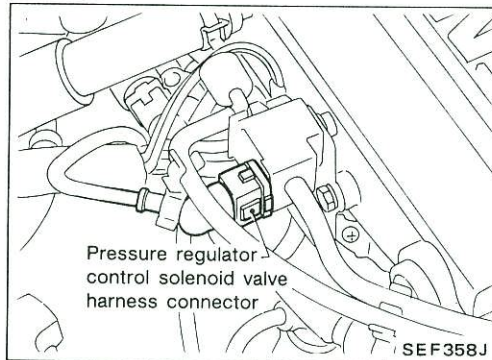
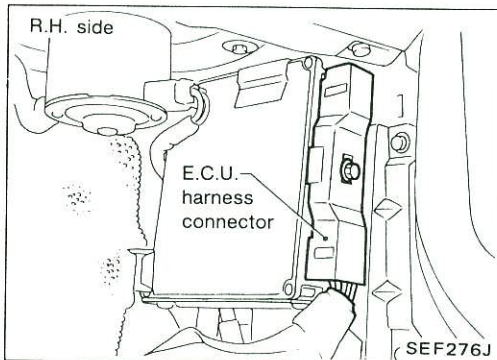
TROUBLE DIAGNOSES

Diagnostic Procedure 40

P.R.V.R. CONTROL (Not self-diagnostic item)

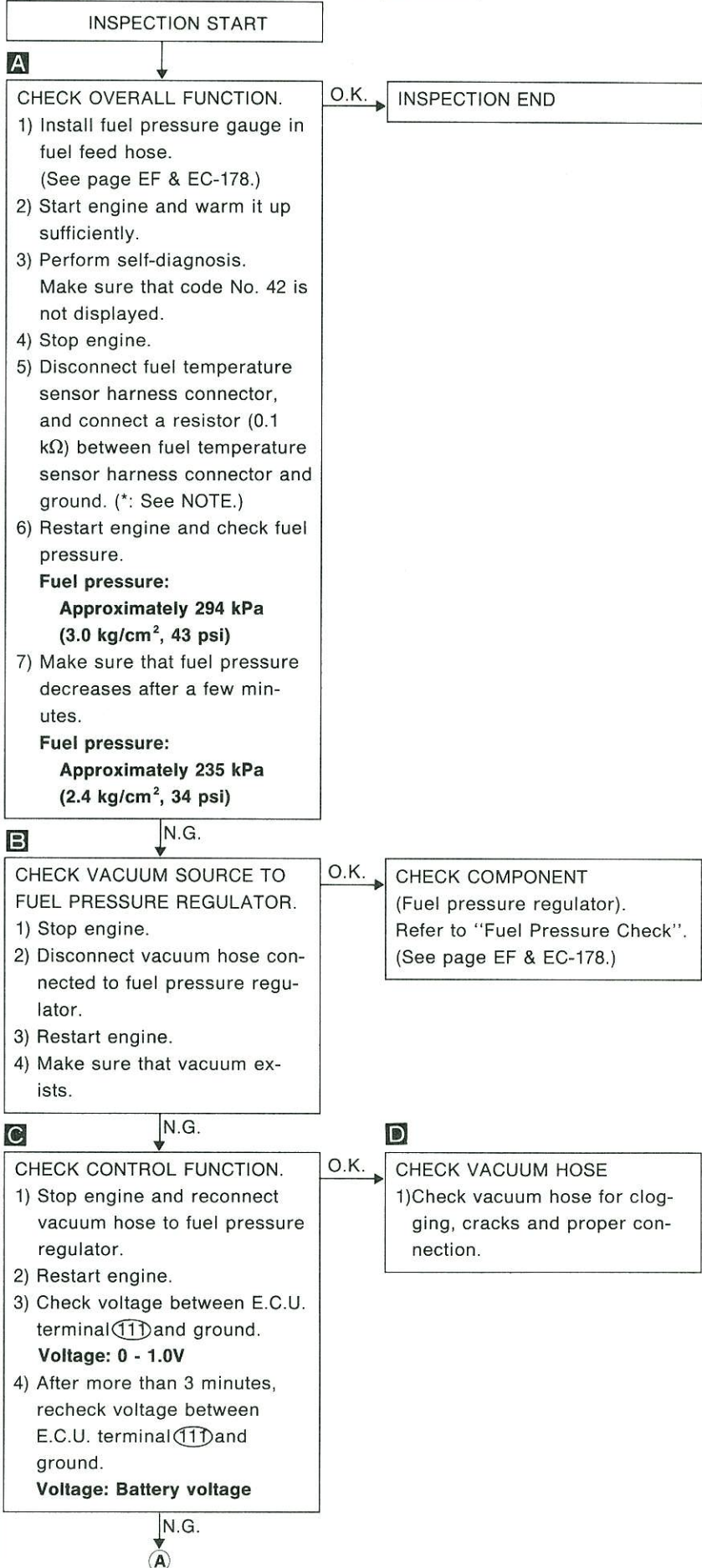
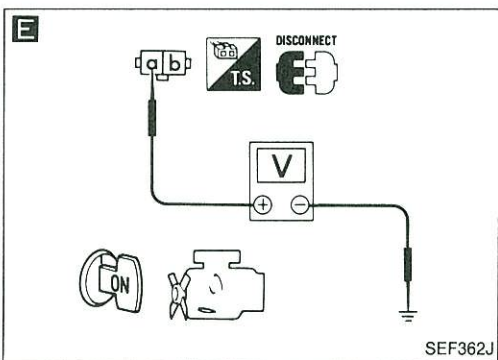
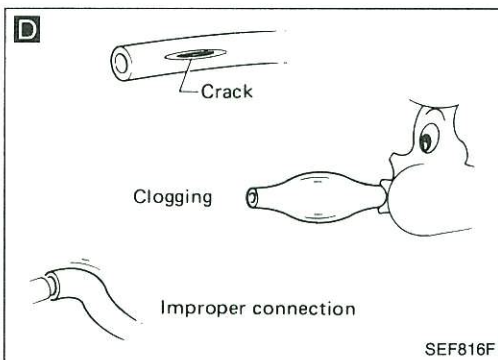
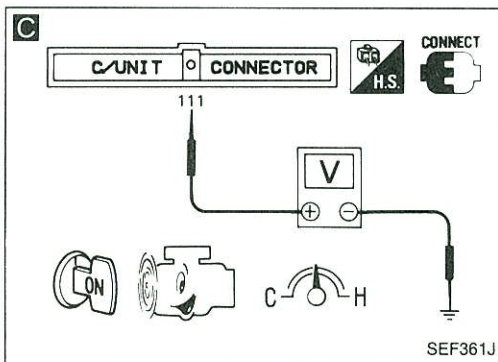
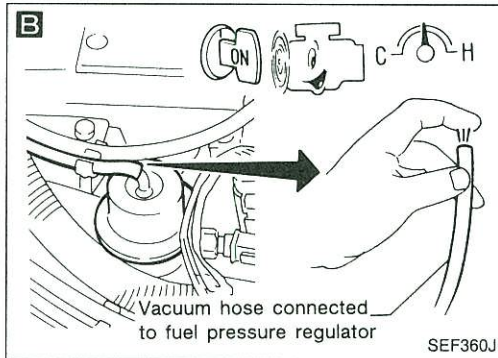
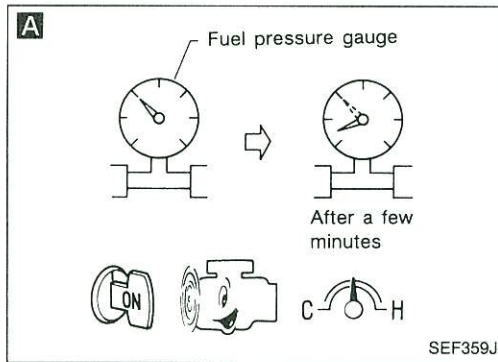


Harness layout



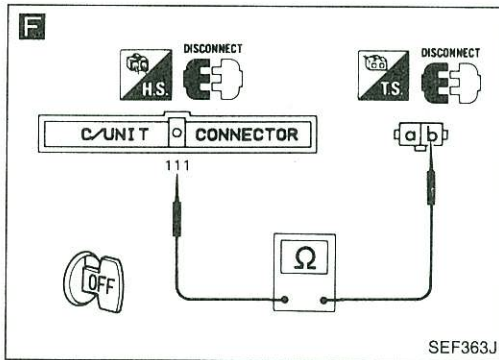
TROUBLE DIAGNOSES

Diagnostic Procedure 40 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 40 (Cont'd)



E

CHECK POWER SUPPLY.

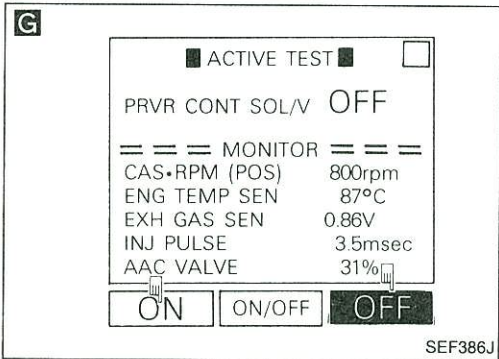
- 1) Stop engine.
- 2) Disconnect pressure regulator control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal ① and ground.

Voltage: Battery voltage

N.G. → Check the following.

- Harness connectors (F27, H49)
- Harness continuity between pressure regulator control solenoid valve and ignition switch

If N.G., repair harness or connectors.



O.K. →

F

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect E.C.U. harness connector.
- 3) Check harness continuity between E.C.U. terminal ① and terminal ②.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

G

CHECK COMPONENT
(Pressure regulator control solenoid valve).

- 1) Reconnect pressure regulator control solenoid valve harness connector and E.C.U. harness connector.
- 2) Start engine.
- 3) Turn P.R.V.R. control solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-173.)

N.G. → Replace pressure regulator control solenoid valve.

O.K. →

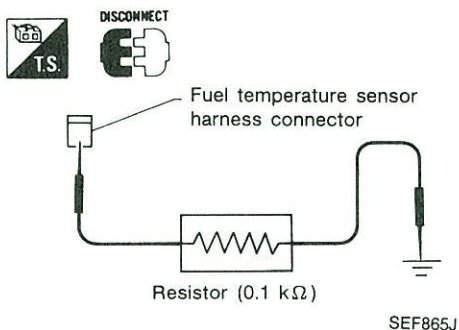
Check E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

TROUBLE DIAGNOSES

Diagnostic Procedure 40 (Cont'd)

***NOTE**

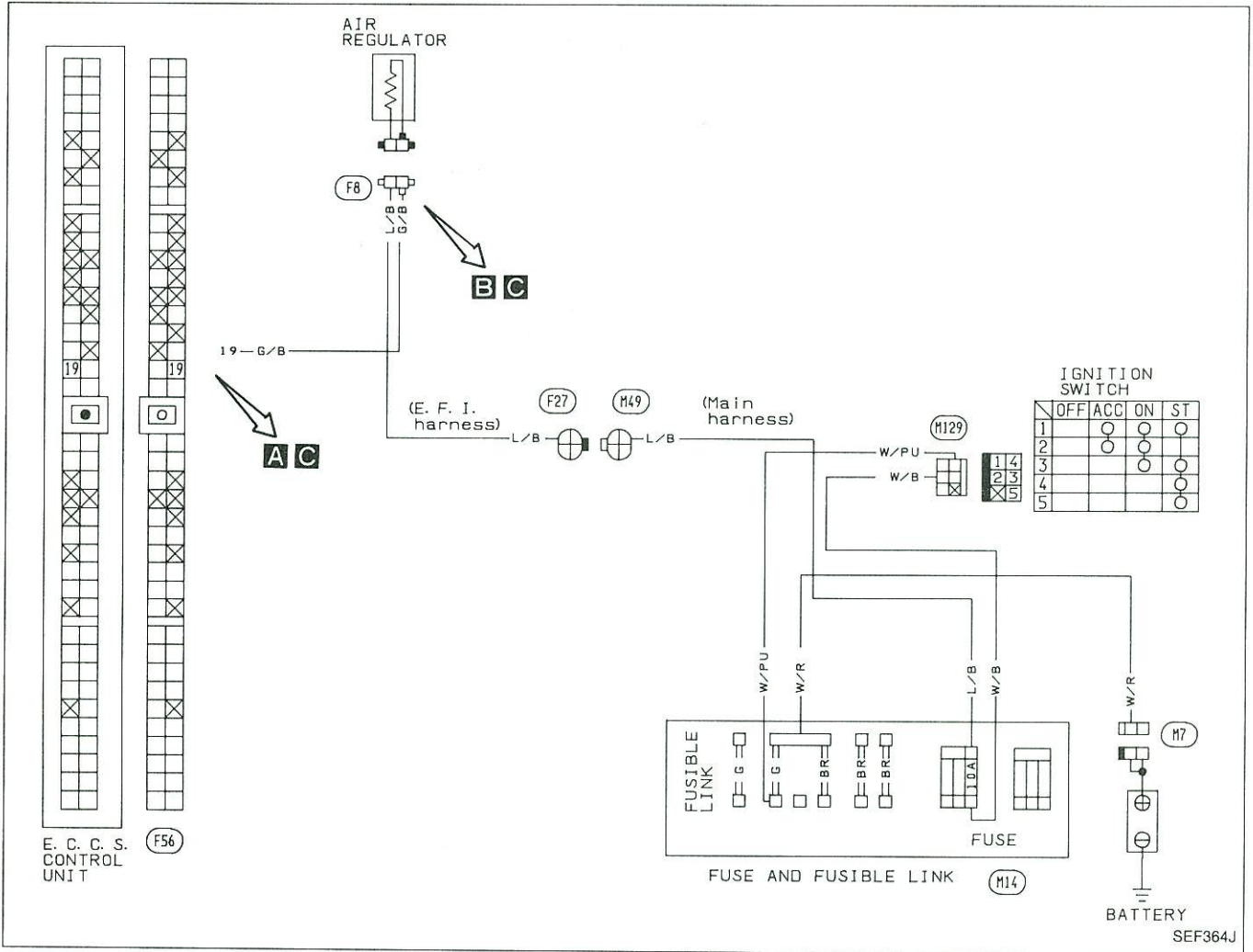
- 1) Do not perform this test for a long time.
 - 2) Perform self-diagnosis after this test.
- If code No. 42 is displayed, erase it.



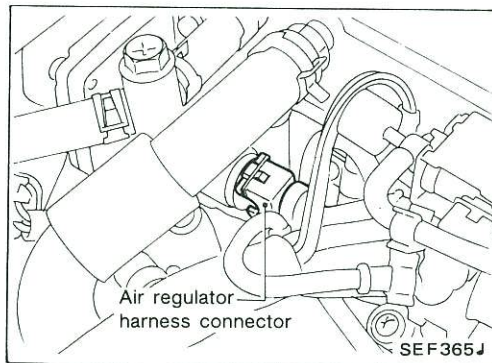
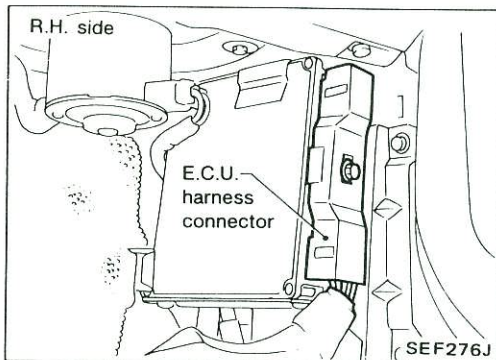
TROUBLE DIAGNOSES

Diagnostic Procedure 41

AIR REGULATOR (Not self-diagnostic item)

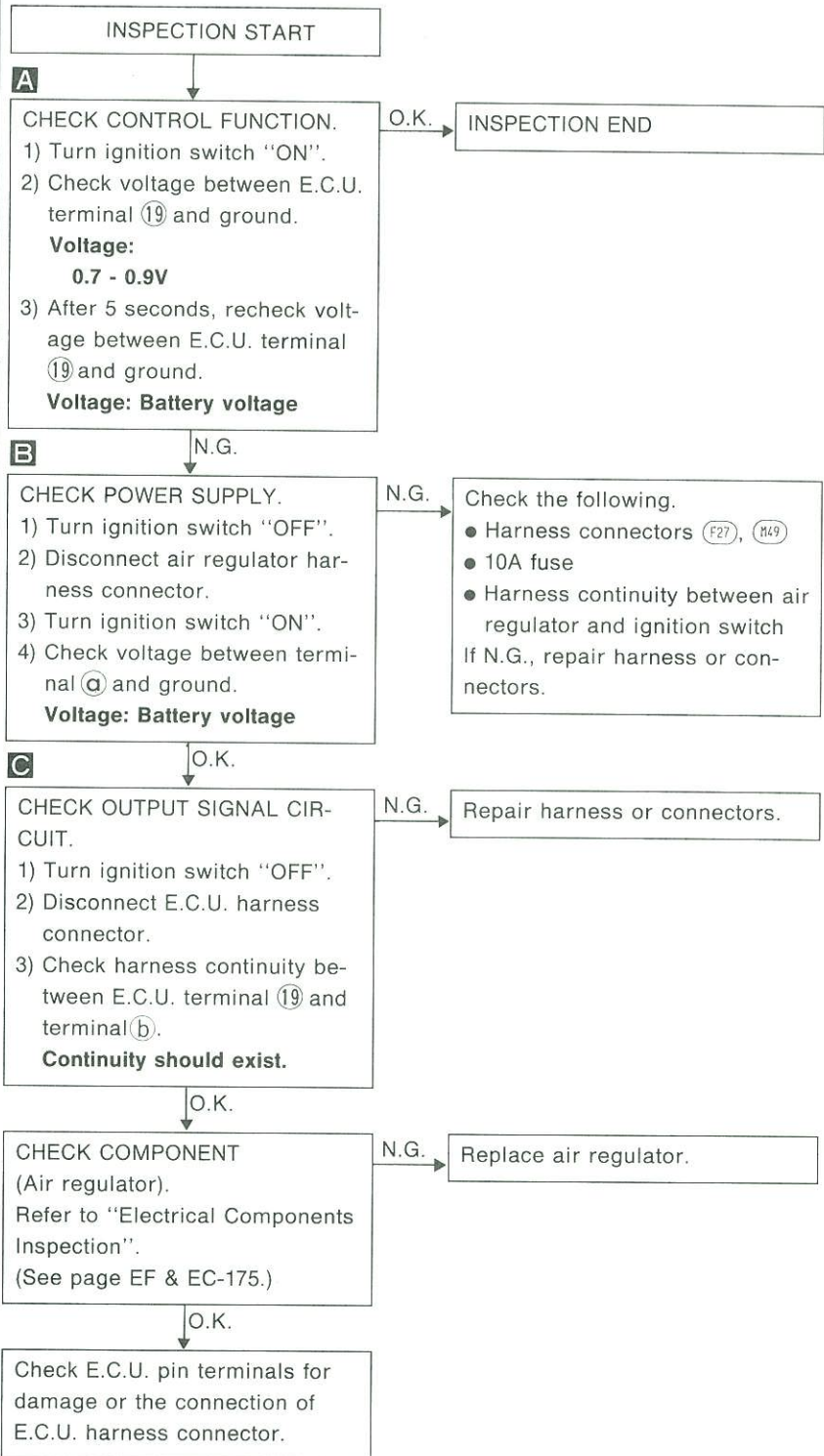
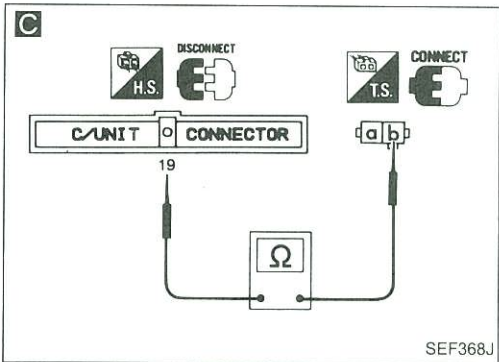
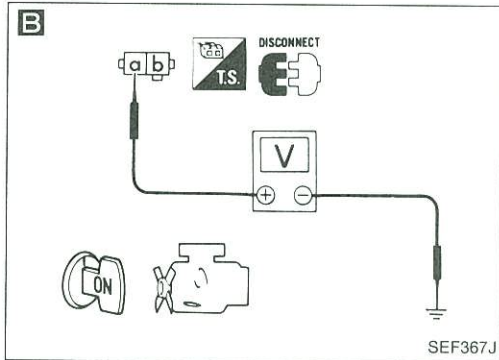
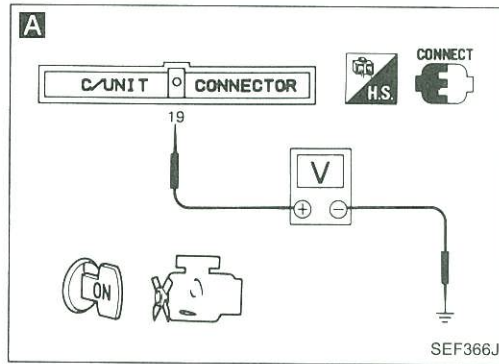


Harness layout



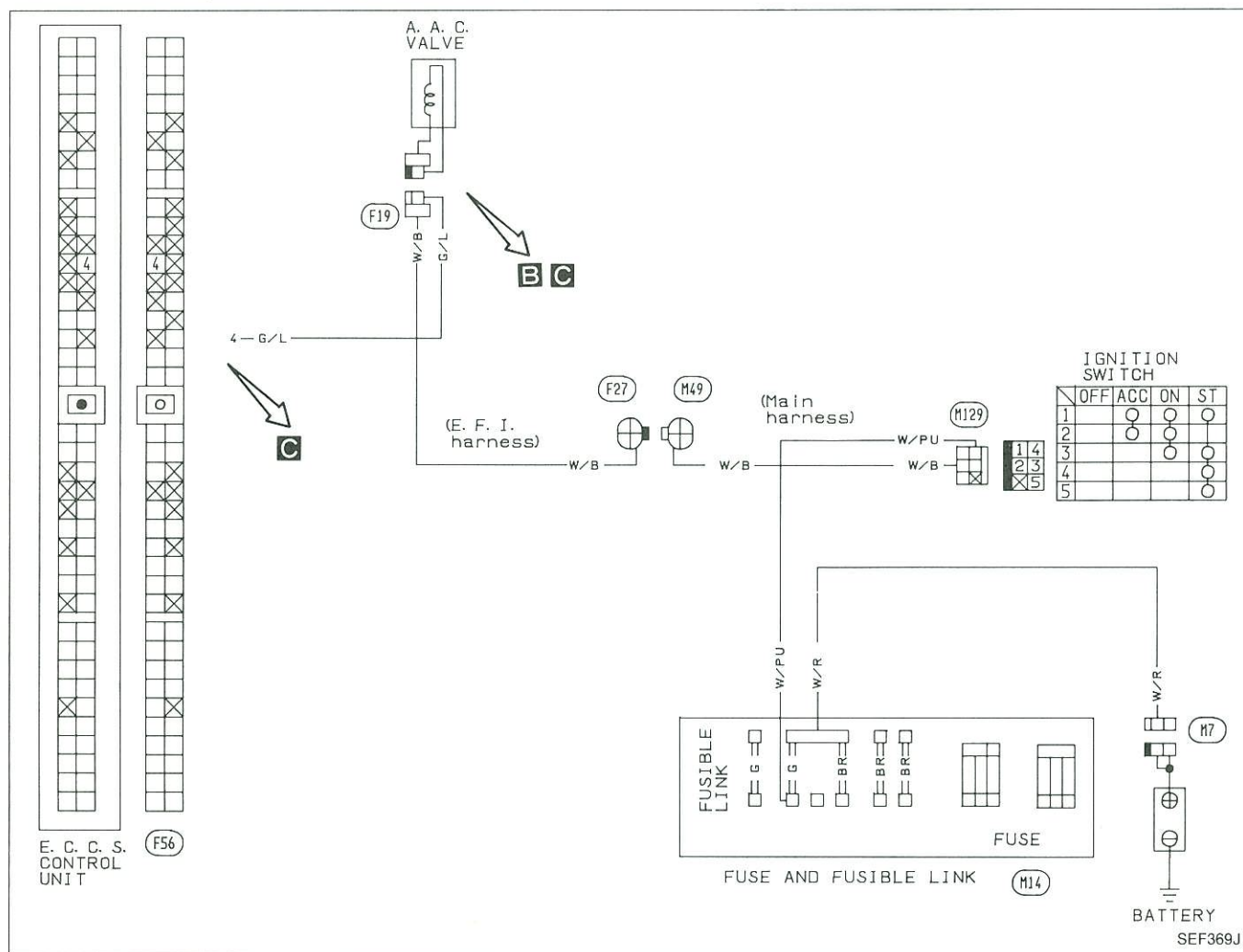
TROUBLE DIAGNOSES

Diagnostic Procedure 41 (Cont'd)

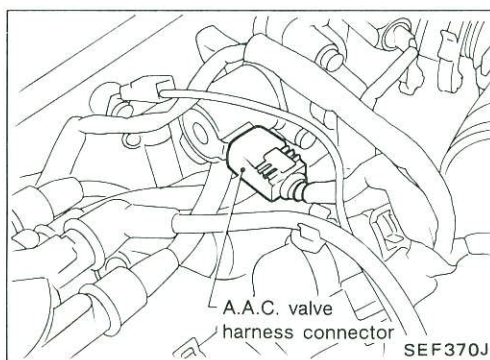
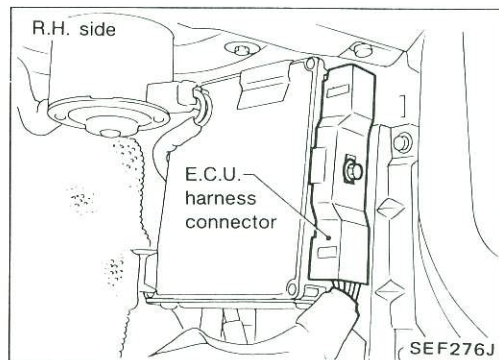


Diagnostic Procedure 42

A.A.C. VALVE (Not self-diagnostic item)

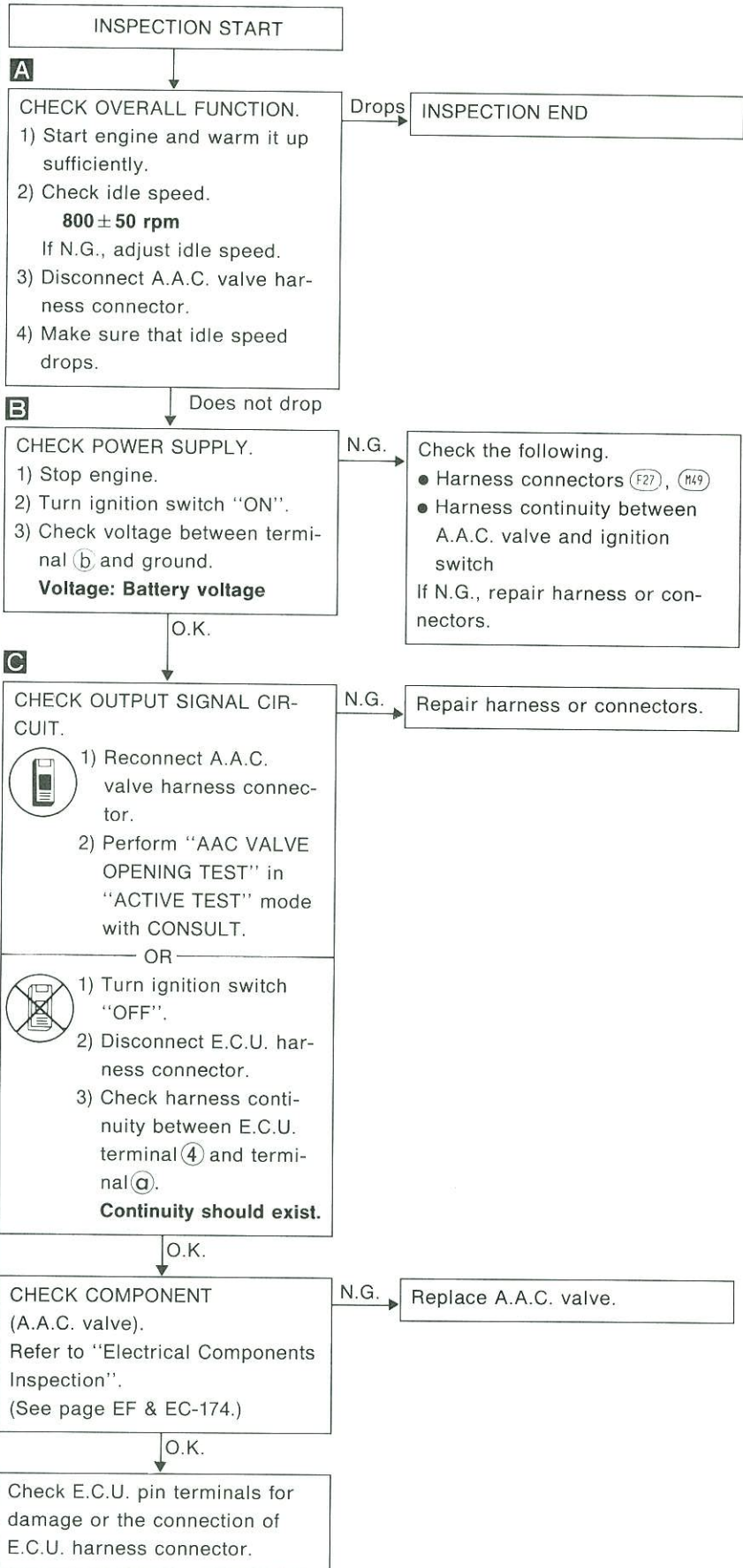
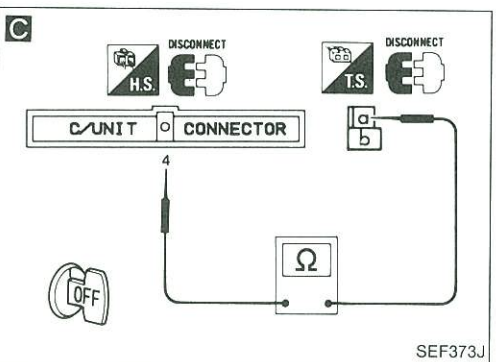
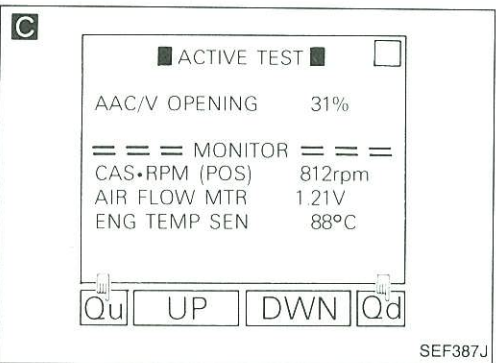
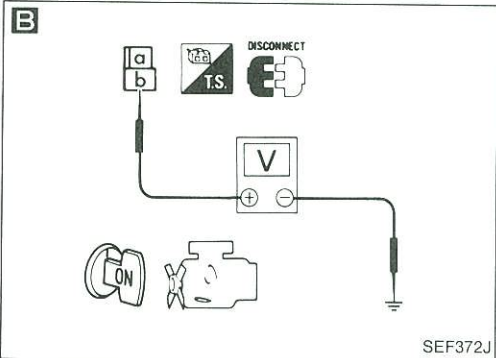
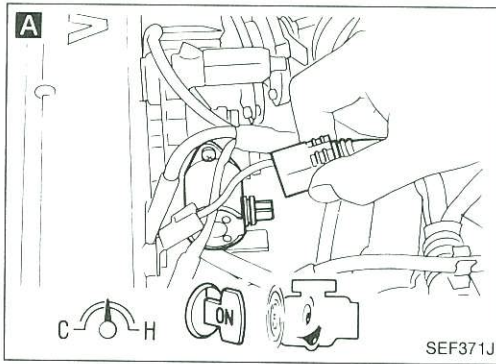


Harness layout



TROUBLE DIAGNOSES

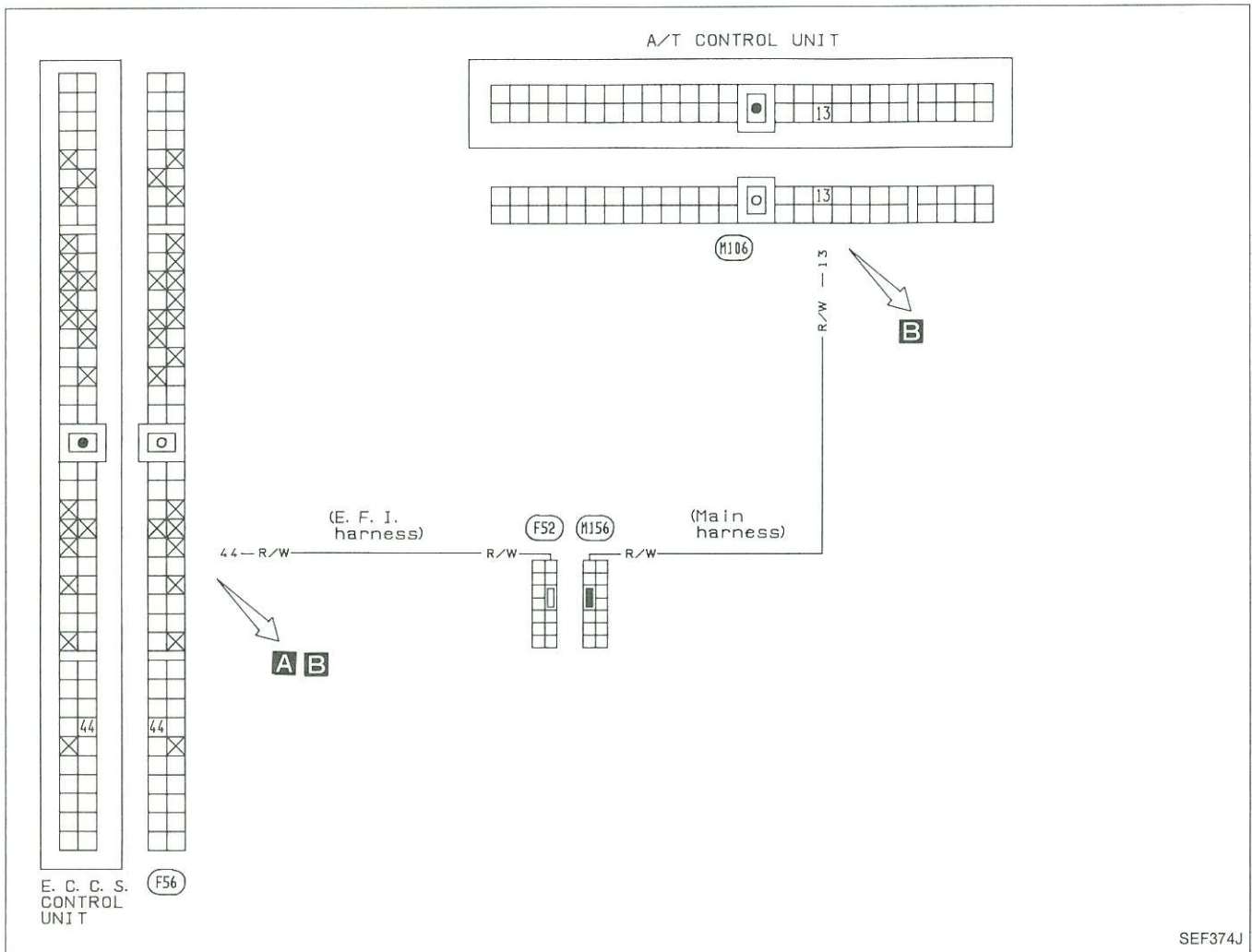
Diagnostic Procedure 42 (Cont'd)



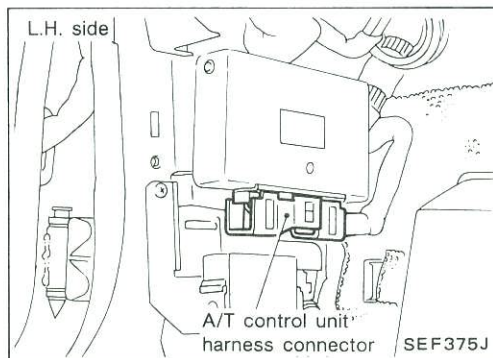
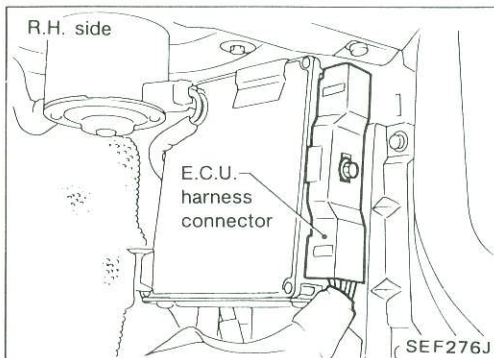
TROUBLE DIAGNOSES

Diagnostic Procedure 43

A/T CONTROL UNIT (NEUTRAL SIGNAL) CIRCUIT (Not self-diagnostic item)



Harness layout



TROUBLE DIAGNOSES

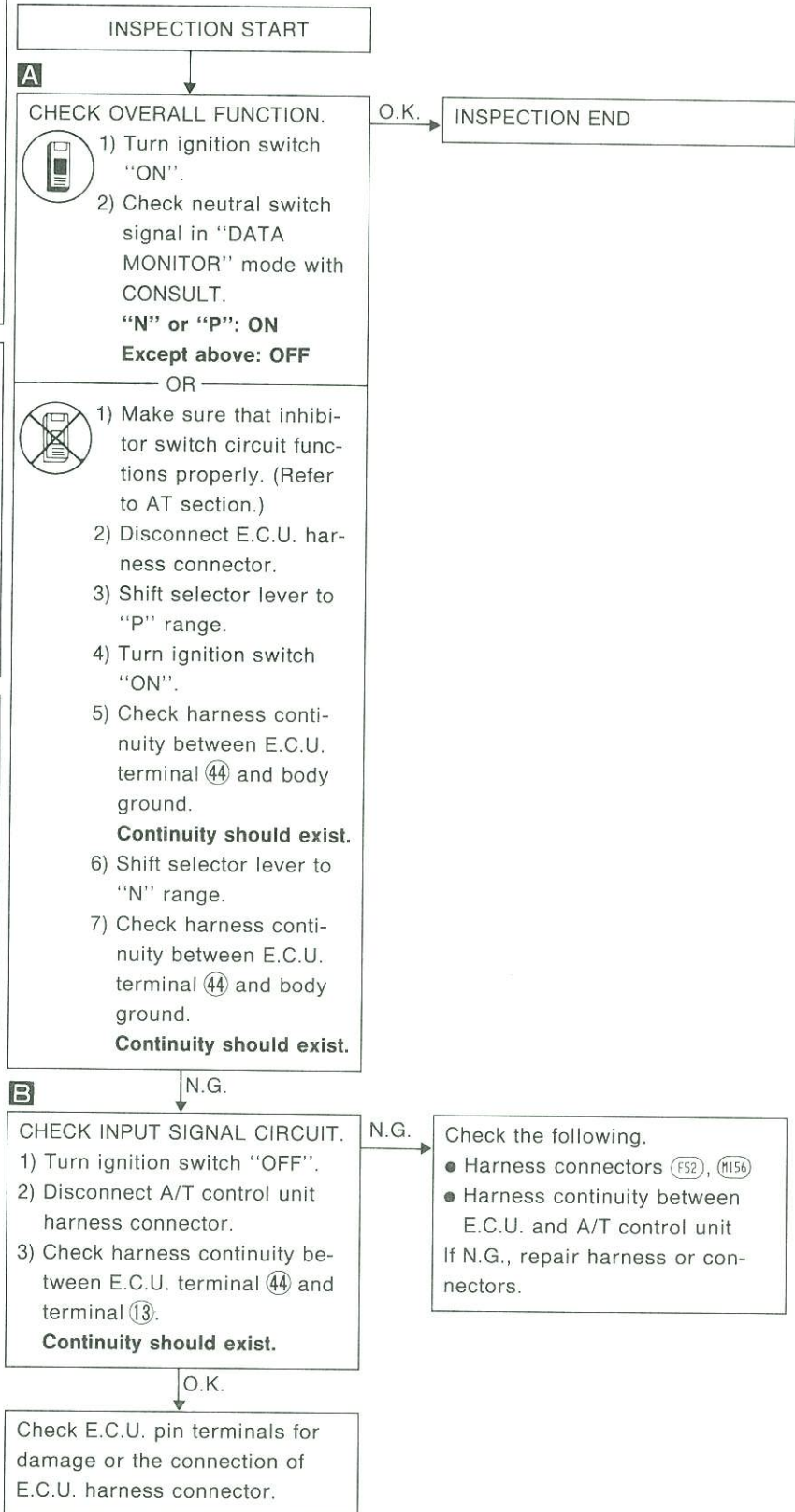
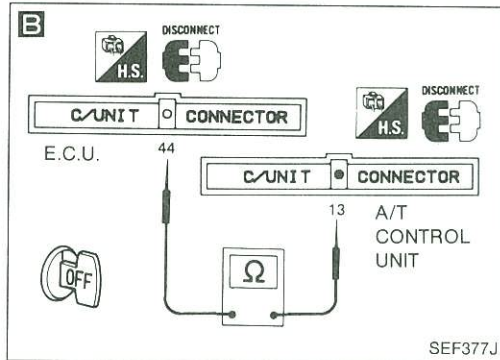
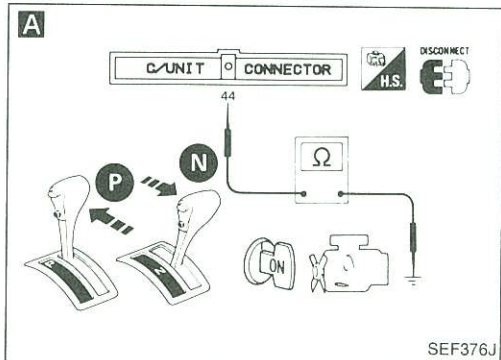
Diagnostic Procedure 43 (Cont'd)

A

☆ MONITOR	☆ NO FAIL	<input type="checkbox"/>
START SIGNAL	OFF	
IDLE POSITION	ON	
AIR COND SIG	OFF	
NEUTRAL SW	ON	

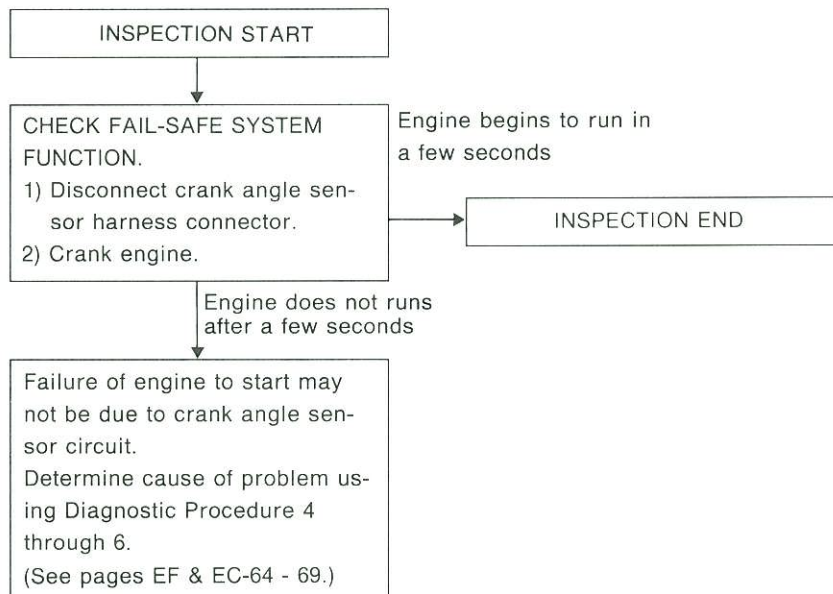
RECORD

SEF385J



Diagnostic Procedure 44

FAIL-SAFE SYSTEM FOR CRANK ANGLE SENSOR AND C.P.U. OF E.C.U.

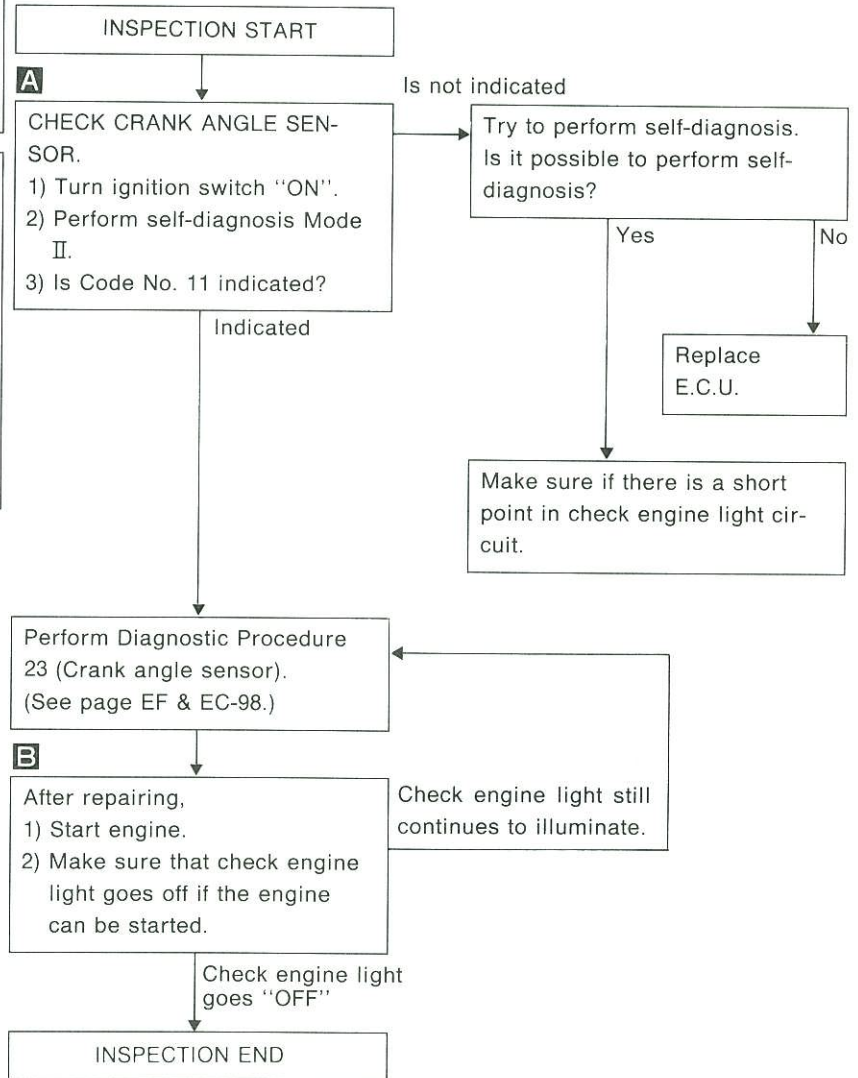
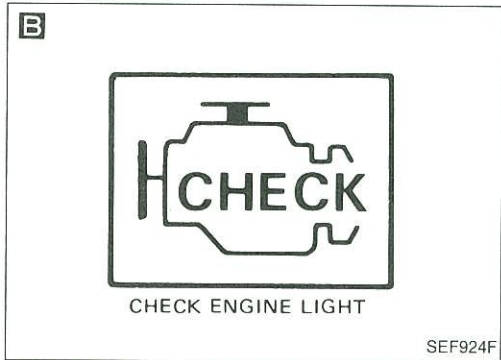
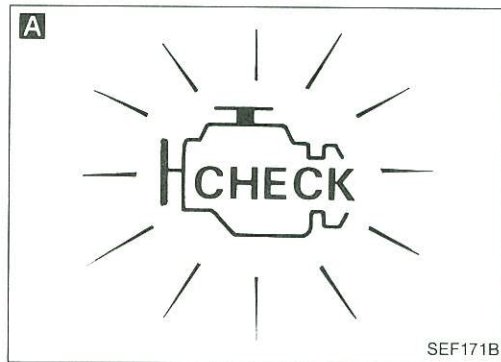


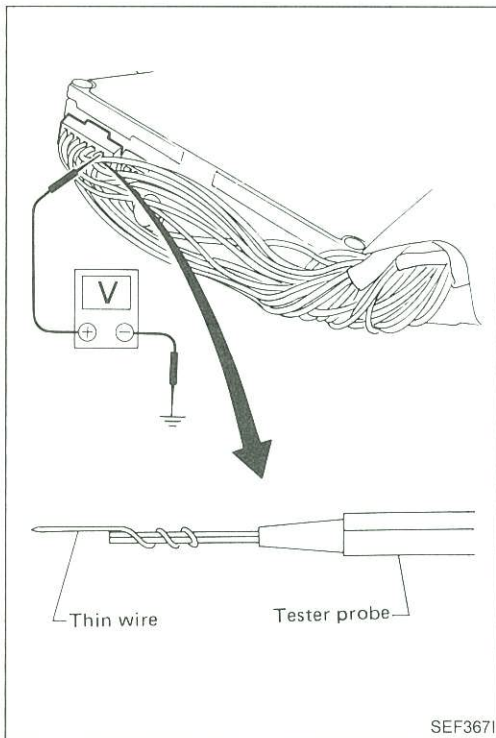
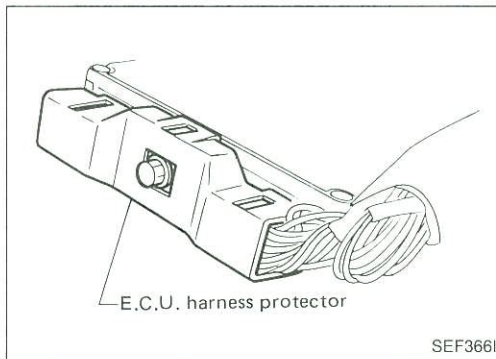
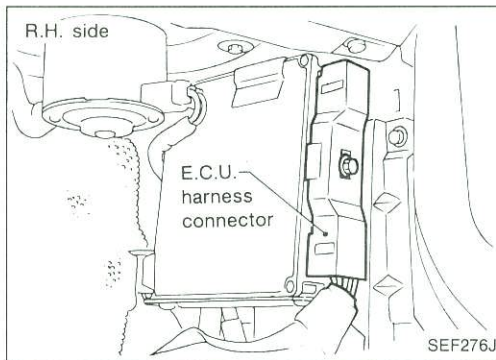
TROUBLE DIAGNOSES

Diagnostic Procedure 44 (Cont'd)

TRouble DIAGNOSES FOR FAIL-SAFE SYSTEM

When fail-safe system activates, warning lamp (CHECK ENGINE LIGHT) in instrument panel blinks. When vehicle with such a problem is brought to dealer for checkup, conduct diagnostic procedures using the following chart as a guide.





Electrical Components Inspection

E.C.U. INPUT/OUTPUT SIGNAL INSPECTION

1. E.C.U. is located behind the right side dash panel. For this inspection, remove the right side dash panel.
2. Remove E.C.U. harness protector.
3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

E.C.U. Inspection table

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.4 - 0.6V
		Engine is running. └ Engine speed is 2,000 rpm	1.3 - 1.4V
2	Ignition check	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
4	A.A.C. valve	Engine is running. └ Idle speed	9 - 12V
		Engine is running. └ Air conditioner is operating. └ Rear defogger is "ON". └ Head lamps are in high position.	5 - 9V
9	Air conditioner relay	Engine is running. └ Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Air conditioner switch "ON"	0.7 - 0.9V
16	E.C.U. power source (Self-shutoff)	Engine is running. └ Idle speed	0.8 - 1.0V
		Engine is not running. └ For a few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
18	Fuel pump relay	Engine is running. └ Normal condition	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Abnormal condition [Fuel pump voltage control circuit (E.C.U. terminal No. ⑩④) is inoperative.]	0.7 - 0.8V

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
19	Air regulator	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
23	Detonation sensor	Engine is running. └ Idle speed	3.5 - 4.0V
27	Air flow meter	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.5V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.4 - 1.9V
28	Engine temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine temperature.
29	Exhaust gas sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 ↔ approximately 1.5V
36	Fuel temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with fuel temperature.
38	Throttle sensor	Ignition switch "ON"	0.4 - 4.0V Output voltage varies with throttle valve opening angle.
39	Exhaust gas temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
		Engine is running. (Warm-up condition) └ E.G.R. system is operating.	0 - 1.0V
41 51	Crank angle sensor (Reference signal)	Engine is running. └ Do not run engine at high speed under no-load.	0.3 - 0.5V Output voltage varies slightly with engine speed.
42 52	Crank angle sensor (Position signal)	Engine is running. └ Do not run engine at high speed under no-load.	2.5 - 2.7V Output voltage varies slightly with engine speed.
43	Start signal	Ignition switch "ON"	Approx. 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
44	A/T control unit (Neutral position)	Ignition switch "ON" └ Gear position is "N" or "P"	Approx. 0V
		Ignition switch "ON" └ Except the above conditions	7.0 - 9.0V
45	Ignition switch	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └ Air conditioner switch "OFF"	7.0 - 9.0V
		Engine is running. └ Air conditioner switch "ON"	0.5 - 0.7V
48	Power source for sensors	Ignition switch "ON" └ Engine stopped	Approximately 5.0V
49 59	Power supply	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
54	Throttle valve switch (Idle position)	Ignition switch "ON" └ Accelerator pedal is fully released (Engine running).	8.0 - 10.0V
		Ignition switch "ON" └ Accelerator pedal is depressed (Engine running).	0V
57	Power source for idle switch	Ignition switch "ON" └ Engine stopped	8.0 - 10.0V
101 103 105 110 112 114	Injectors	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
102	E.G.R. control solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	0.7 - 0.8V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Engine speed is above 3,100 rpm.	0.8 - 0.9V

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
104	Fuel pump voltage control	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approx. 0.1V
		Engine is running. (Warm-up condition) └ For 30 seconds after engine begins to run.	Approx. 0.5V
		Engine is running. └ Racing (up to 4,000 rpm)	2.0 - 4.5V
111	P.R.V.R. control solenoid valve	Stop and restart engine after warming it up. └ Fuel temperature is above 75°C (167°F)	0 - 1.0V (For 3 minutes after restarting engine) BATTERY VOLTAGE (11 - 14V) (3 minutes after restarting engine)
		Stop and restart engine after warming it up. └ Fuel temperature is below 75°C (167°F)	BATTERY VOLTAGE(11 - 14V)

E.C.U. HARNESS CONNECTOR TERMINAL LAYOUT

101	102	103	104	105	106	107	108	1	2	3	4	5	6	7	8	9	10		21	22	23	24	25	26	27	28	29	30	41	42	43	44	45	46	47	48	49	50
109	110	111	112	113	114	115	116	11	12	13	14	15	16	17	18	19	20		31	32	33	34	35	36	37	38	39	40	51	52	53	54	55	56	57	58	59	60



SEC250B

TROUBLE DIAGNOSES

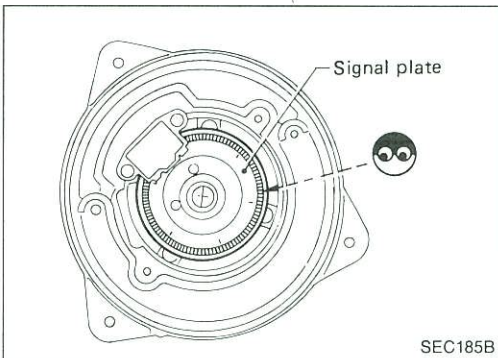
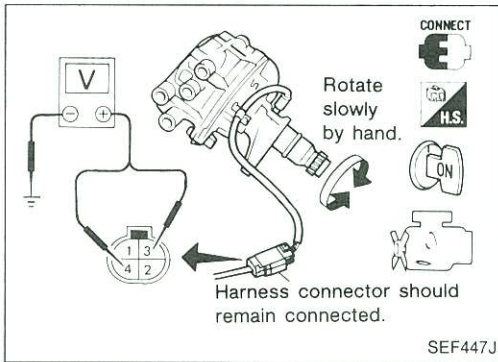
Electrical Components Inspection (Cont'd)

CRANK ANGLE SENSOR

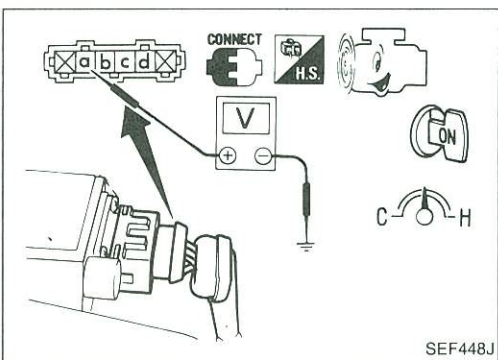
1. Remove distributor from engine. (Crank angle sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate distributor shaft slowly by hand and check voltage between terminals ③, ④ and ground.

Terminal	Voltage
③ (120° signal)	Tester's pointer fluctuates between 5V and 0V.
④ (1° signal)	

If N.G., replace distributor assembly with crank angle sensor.



4. Visually check signal plate for damage or dust.

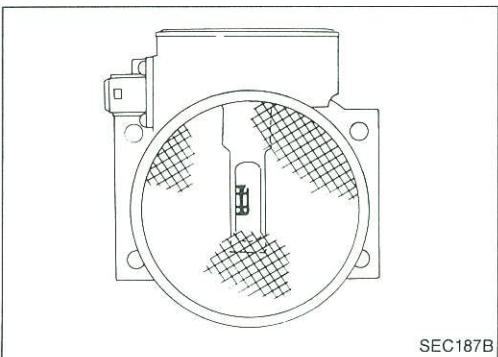


AIR FLOW METER

1. Peel air flow meter 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 ⑥ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 0.5
Idle (Engine is warm-up sufficiently.)	Approximately 1.0 - 1.3

5. If N.G., remove air flow meter from air duct. Check hot wire for damage or dust.



TROUBLE DIAGNOSES

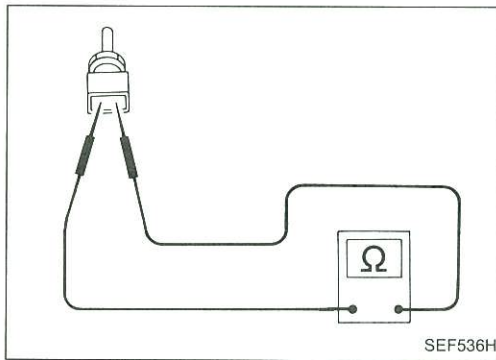
Electrical Components Inspection (Cont'd)

ENGINE TEMPERATURE SENSOR

1. Disconnect engine temperature sensor harness connector.
2. Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
80 (176)	0.30 - 0.33

If N.G., replace engine temperature sensor.

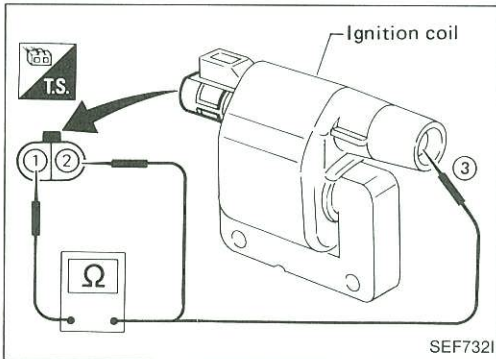


IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
① - ②	Approximately 1.0Ω
① - ③	Approximately 10 kΩ

If N.G., replace ignition coil.

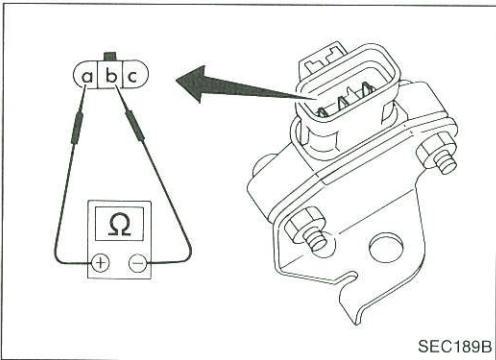


POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals as shown in the figure.

Terminal No.	Tester polarity	Continuity
Ⓐ	⊕	Yes
Ⓑ	⊖	
Ⓐ	⊖	No
Ⓑ	⊕	
Ⓐ	⊕	Yes
Ⓒ	⊖	
Ⓐ	⊖	No
Ⓒ	⊕	

If N.G., replace power transistor.

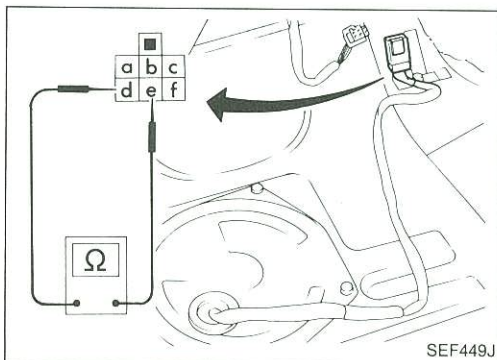


FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals Ⓓ and Ⓔ.

Resistance: Approximately 0.5Ω

If N.G., replace fuel pump.



TROUBLE DIAGNOSES

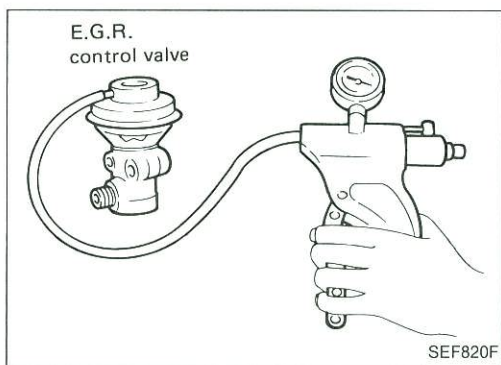
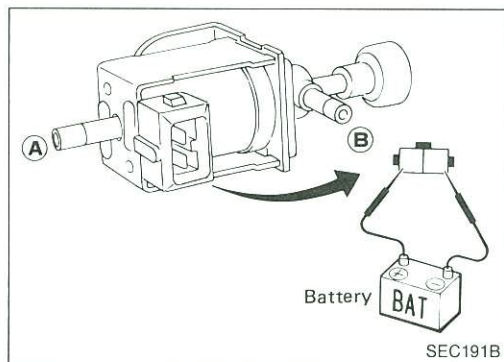
Electrical Components Inspection (Cont'd)

E.G.R. CONTROL SOLENOID VALVE AND PRESSURE REGULATOR CONTROL SOLENOID VALVE

1. Disconnect E.G.R. control solenoid valve harness connector.
2. Check solenoid valve, following the table as shown below:

Conditions	Continuity between port (A) and (B)
Supply 12V direct current between terminals ① and ②	Yes
No current supply	No

If N.G., replace E.G.R. control solenoid valve.



E.G.R. CONTROL VALVE

Apply vacuum to E.G.R. vacuum port with a hand vacuum pump.

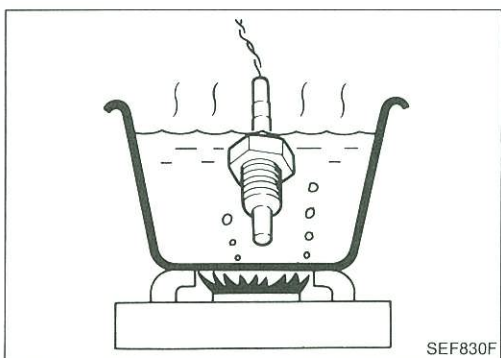
E.G.R. control valve spring should lift.

If N.G., replace E.G.R. control valve.

EXHAUST GAS SENSOR

Refer to "Diagnostic Procedure 31".

(See page EF & EC-128.)



EXHAUST GAS 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 exhaust gas temperature sensor.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

THROTTLE SENSOR

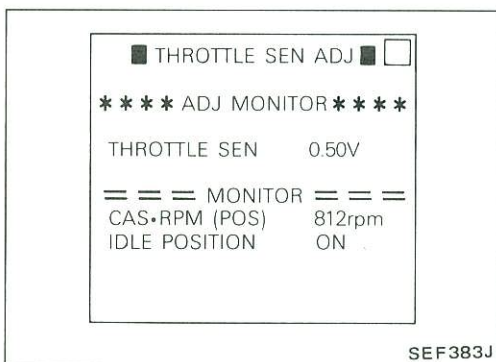
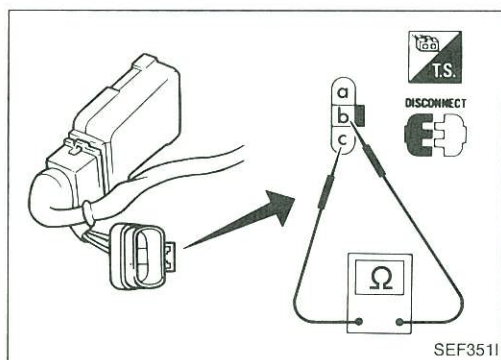
1. Disconnect throttle sensor harness connector.
2. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9

If N.G., replace throttle sensor.

Adjustment

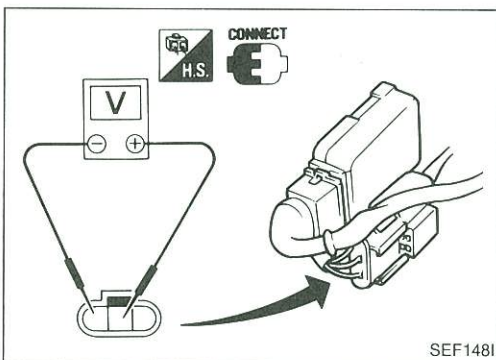
If throttle sensor is replaced or removed, it is necessary to install in proper position, by following the procedure as shown below:



1. Install throttle sensor body in throttle chamber. Do not tighten bolts. Leave bolts loose.
2. Connect throttle sensor and idle switch harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THROTTLE SEN. ADJ." in "WORK SUPPORT" mode.



Measure output voltage of throttle sensor using voltmeter.



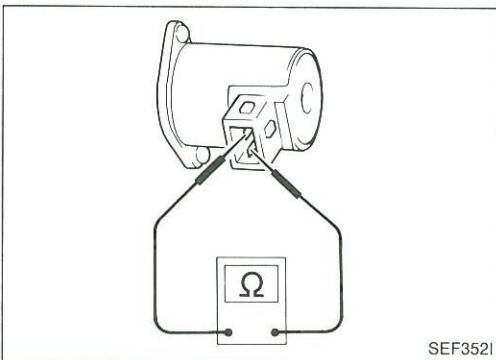
5. Adjust by rotating throttle sensor body so that output voltage is 0.4 to 0.5V.
6. Tighten mounting bolts.
7. Disconnect throttle sensor harness connector for a few seconds and then reconnect it.

A.A.C. VALVE

- Check A.A.C. valve resistance.

Resistance:

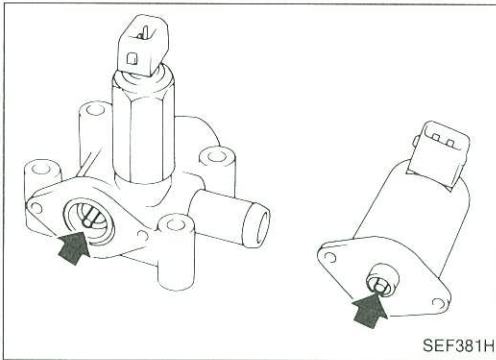
Approximately 10Ω



TROUBLE DIAGNOSES

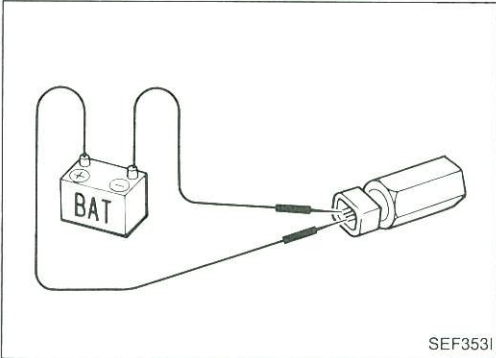
Electrical Components Inspection (Cont'd)

- Check plunger for seizing or sticking.
- Check for broken spring.

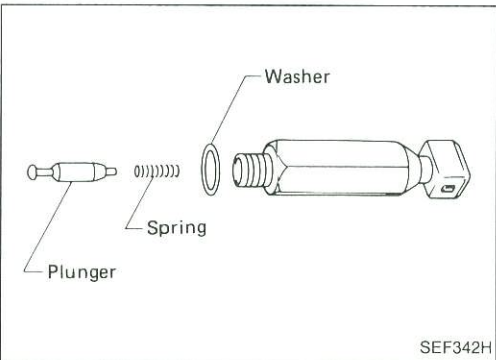


F.I.C.D. SOLENOID VALVE

- Check for clicking sound when applying 12V direct current to terminals.

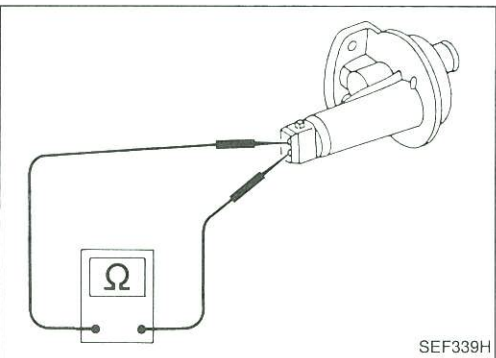


- Check plunger for seizing or sticking.
- Check for broken spring.



AIR REGULATOR

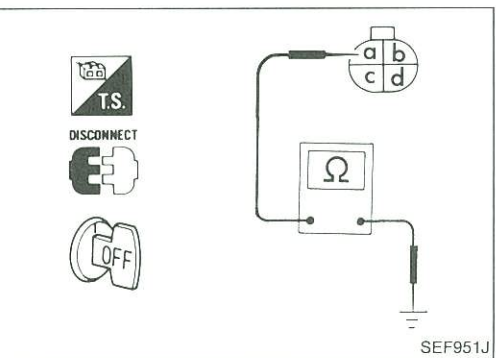
- Check air regulator resistance.
Resistance:
Approximately 70 - 80Ω
- Check air regulator for clogging.



DETONATION SENSOR

1. Disconnect detonation sensor sub-harness connector.
2. Check continuity between terminal Ⓐ and ground.

Continuity should exist.

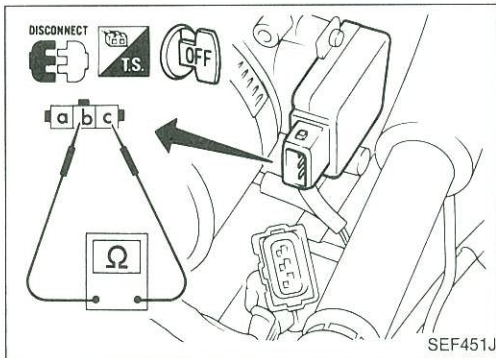
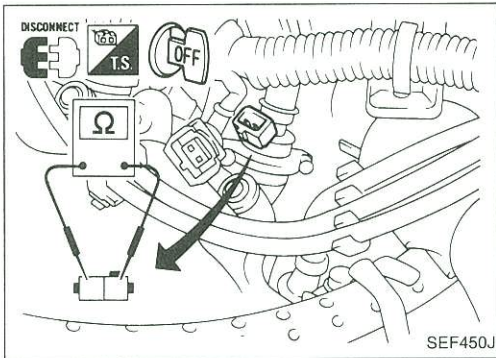


TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
Resistance: 10 - 14Ω
If N.G., replace injector.



THROTTLE VALVE SWITCH

1. Disconnect idle switch harness connector.
2. Check continuity between terminals ② and ③.

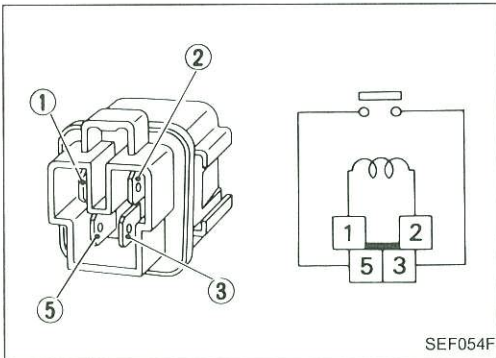
Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace idle switch.

- Adjust idle switch touch speed with A.A.C. valve off.

Touch speed:

Idle speed (800 rpm) ± 400 rpm in "N" position



E.C.C.S. 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

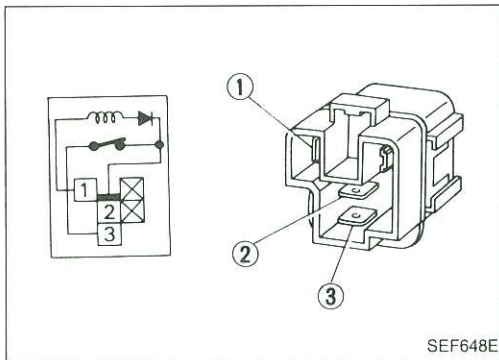
If N.G., replace relay.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

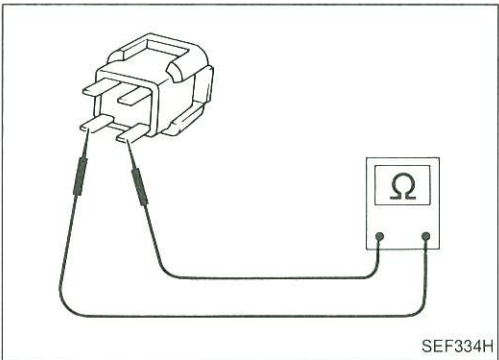
SAFETY RELAY

Check continuity between terminals ② and ③.



Conditions		Continuity between terminals ② and ③
12V direct current supply between terminals ① and ②		
①	②	
—	+	
+	—	Yes
		No

If N.G., replace relay.

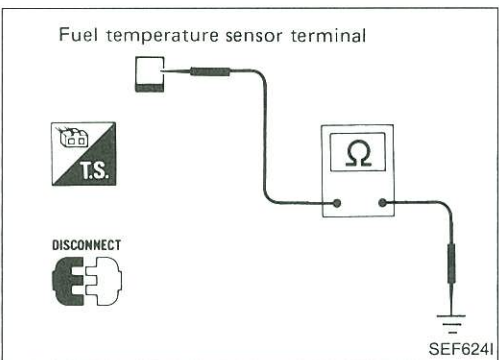


RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminal ① and ②.

Resistance: Approximately 2.2Ω

If N.G., replace resistor.



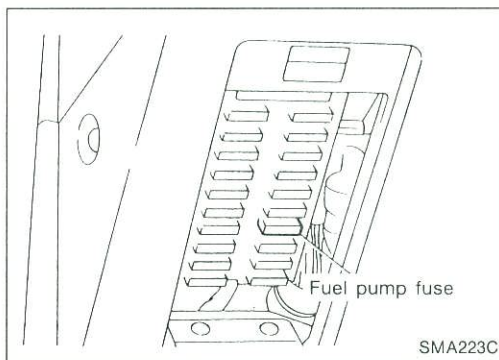
FUEL TEMPERATURE SENSOR

1. Disconnect fuel temperature sensor harness connector.
2. Check resistance between terminal and ground as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

If N.G., replace fuel inhibitor switch.

FUEL INJECTION CONTROL SYSTEM INSPECTION



Releasing Fuel Pressure

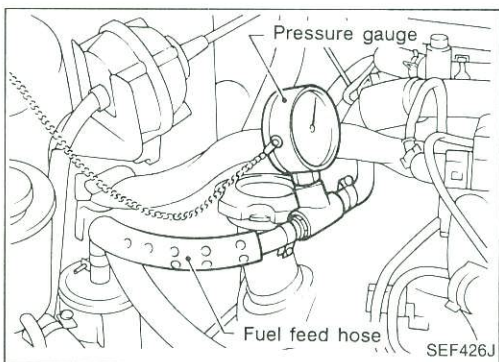
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuel pump relay.

Erase the memory (Code No. 22) of the self-diagnosis in the control unit.

Fuel Pressure Check

- a. When reconnecting fuel line, always use new clamps.
 - b. Make sure that clamp screw does not contact adjacent parts.
 - c. Use a torque driver to tighten clamps.
 - d. Use Pressure Gauge to check fuel pressure.
 - e. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.
1. Release fuel pressure to zero.
 2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
 3. Install pressure gauge between fuel filter and fuel tube.
 4. Start engine and check for fuel leakage.



5. Read the indication of fuel pressure gauge.

At idling:

When fuel pressure regulator valve vacuum hose is connected.

**Approximately 235 kPa
(2.4 kg/cm², 34 psi)**

When fuel pressure regulator valve vacuum hose is disconnected.

**Approximately 294 kPa
(3.0 kg/cm², 43 psi)**

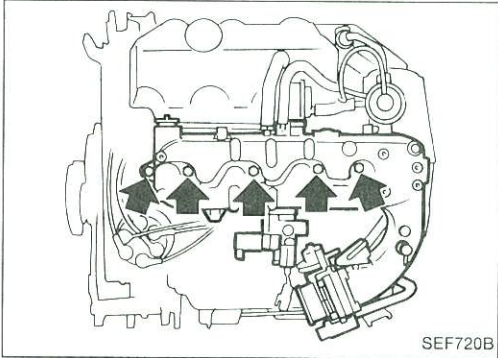
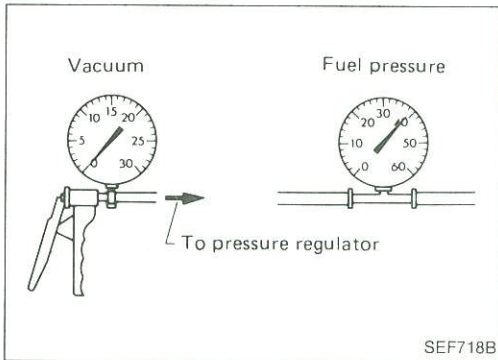
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

FUEL INJECTION CONTROL SYSTEM INSPECTION

Fuel Pressure Check (Cont'd)

9. Start engine and read indication of fuel pressure gauge as vacuum is changed.

Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.



Injector Removal

1. Release fuel pressure to zero.
 2. Separate A.S.C.D. and accelerator control wire from intake manifold collector.
 3. Remove intake manifold collector from engine.
- The following parts should be disconnected or removed.

(1) Harness connectors for

- A.A.C. valve
- F.I.C.D. solenoid valve
- Throttle valve switch
- Throttle sensor
- Pressure regulator control solenoid valve
- Air regulator
- E.G.R. control solenoid valve
- Exhaust gas temperature sensor
- Earth harness

(2) P.C.V. hoses

(3) Vacuum hoses for

- Master brake cylinder
- E.G.R. control solenoid valve
- Fuel pressure regulator
- Carbon canister

(4) Air hoses from

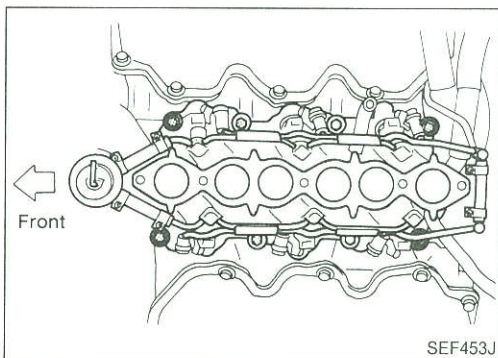
- Air duct
- A.A.C. valve
- Air regulator

(5) Water hoses for

- Throttle chamber
- Air relief plug

(6) Carbon canister purge hose

(7) E.G.R. flare tube



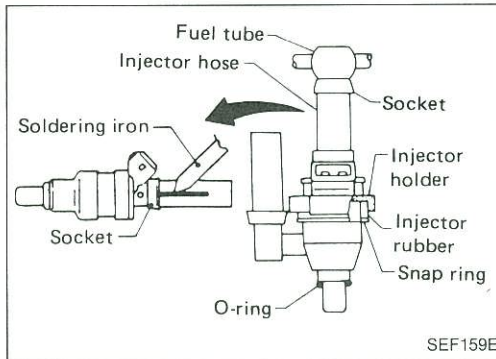
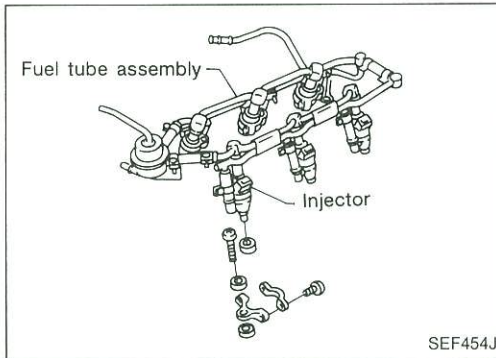
4. Remove injector fuel tube assembly.

The following parts should be disconnected or removed.

- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- Fuel temperature sensor harness connector

FUEL INJECTION CONTROL SYSTEM INSPECTION

Injector Removal (Cont'd)



5. Remove any malfunctioning injector from injector fuel tube.

6. Remove fuel hose.

- 1) Heat sharp knife for 15 minutes. Cut into hose braided reinforcement from mark to socket end and fuel tube end.

Do not allow sharp knife to cut all the way through the hose and touch injector tail piece.

- 2) Then pull rubber hose out with hand.

Never place injector in a vise when disconnecting rubber hose.

7. Install fuel hose as follows:

- 1) Clean exterior of injector tail piece and fuel tube end.
 - 2) Wet inside of new rubber hose with fuel.
 - 3) Push end of rubber hose with hose sockets onto injector tail piece and fuel tube end by hand as far as they will go.

Clamp is not necessary at the connections.

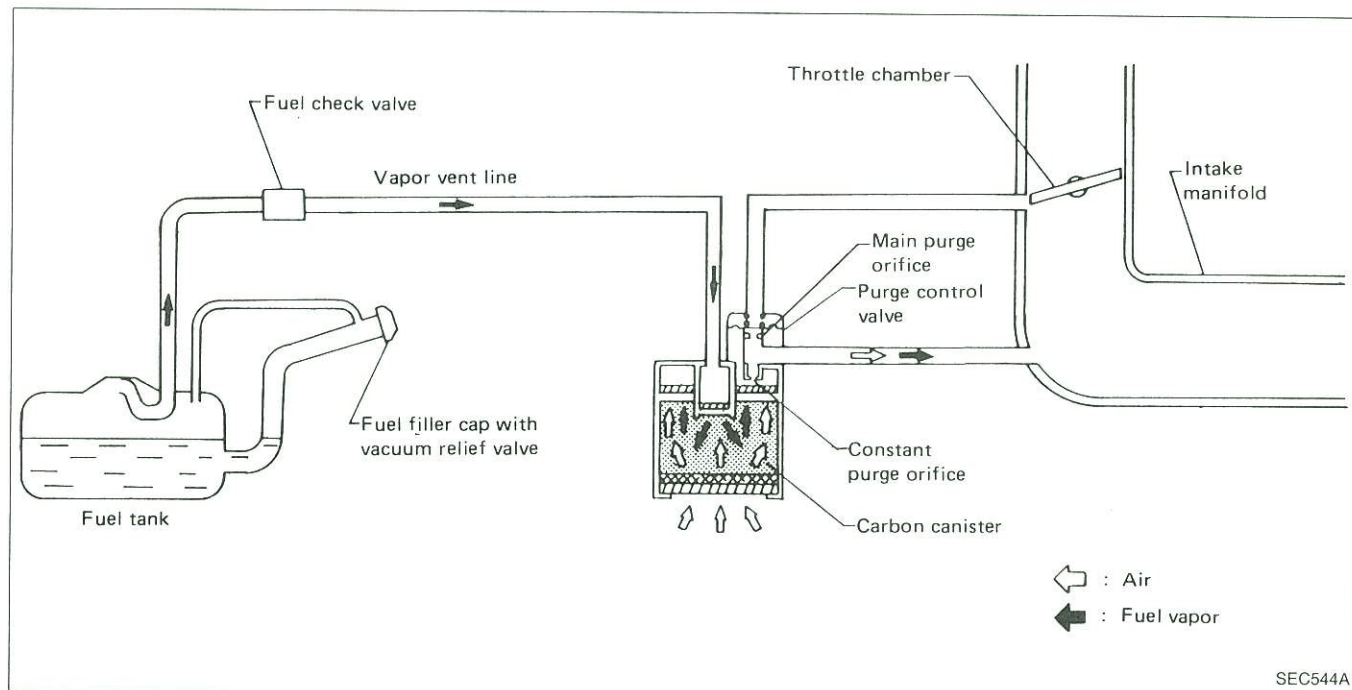
8. Reinstall any part removed in reverse order of removal.

CAUTION:

After properly connecting fuel hose to injector and fuel tube, check connection for fuel leakage.

EVAPORATIVE EMISSION CONTROL SYSTEM

Description

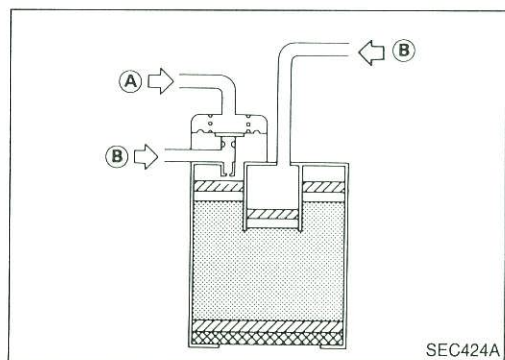


The evaporative emission control system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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:

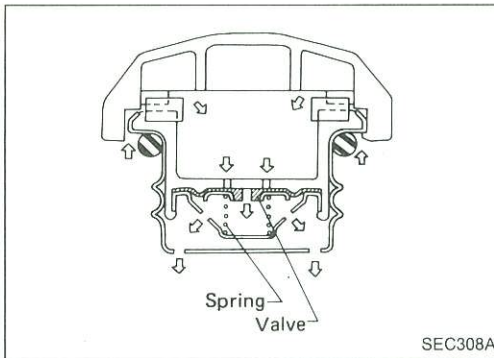
- (A) : Blow air and ensure that there is no leakage.
- (B) : Blow air and ensure that there is leakage.

EVAPORATIVE EMISSION CONTROL SYSTEM

Inspection (Cont'd)

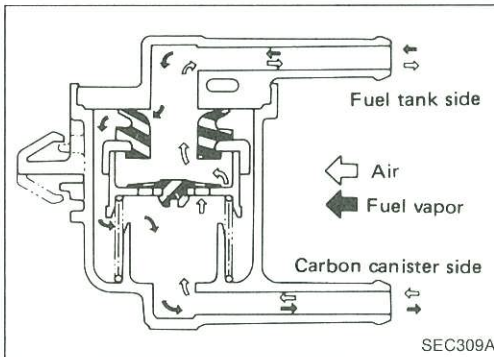
FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Inhale air through the cap. A slight resistance accompanied by valve clicks indicates that valve is in good mechanical condition. Note also that, by further inhaling air, the resistance should disappear with valve clicks.
3. If valve is clogged or if no resistance is felt, replace cap as an assembly.

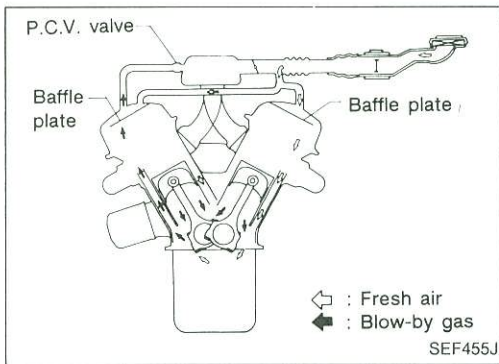


FUEL CHECK VALVE

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.



CRANKCASE EMISSION CONTROL SYSTEM



Description

This system returns blow-by gas to both the intake manifold and air inlet tubes.

The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.

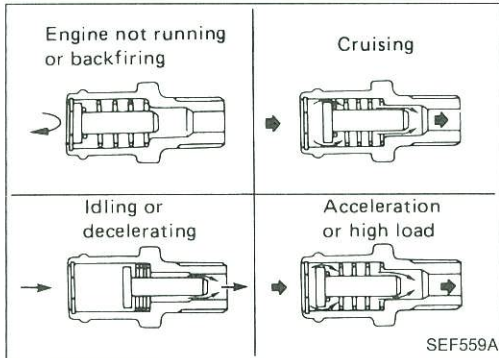
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air inlet tubes, through the hose connecting air inlet tubes to rocker cover, into the crankcase.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.

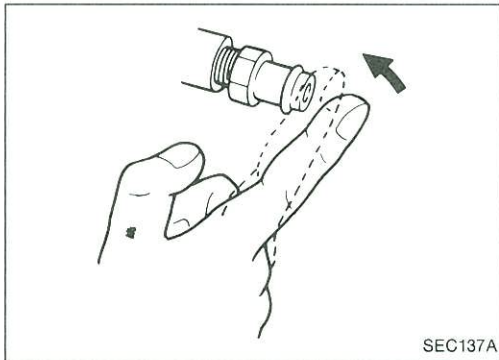
On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Inspection

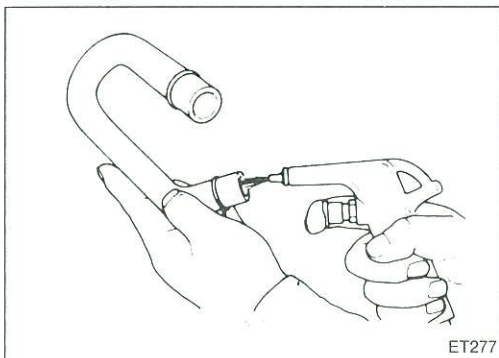
P.C.V. (Positive Crankcase Ventilation)

With engine running at idle, remove ventilation hose from P.C.V. valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



General Specifications

PRESSURE REGULATOR

Regulated pressure kPa (kg/cm ² , psi)	299.1 (3.05, 43.4)
--	--------------------

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2 (in "N" position)		800 ± 50
Air conditioner: ON (in "N" position)		800 ± 50
Ignition timing		15° ± 2° B.T.D.C.
Throttle sensor idle position	V	0.4 - 0.5

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10.0

AIR FLOW METER

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	Approximately 1.0 - 1.3*

*: Engine is warmed up sufficiently and idling under no-load.

ENGINE TEMPERATURE SENSOR AND FUEL TEMPERATURE SENSOR

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

FUEL PUMP

Resistance	Ω	Approximately 0.5
------------	---	-------------------

EXHAUST GAS TEMPERATURE SENSOR

Resistance [at 100°C (212°F)]	kΩ	85.3 ± 8.53
----------------------------------	----	-------------

A.A.C. VALVE

Resistance	Ω	Approximately 10.0
------------	---	--------------------

INJECTOR

Resistance	Ω	10 - 14
------------	---	---------

RESISTOR

Resistance	kΩ	Approximately 2.2
------------	----	-------------------

THROTTLE SENSOR

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9

ACCELERATOR CONTROL, FUEL & EXHAUST SYSTEMS

SECTION **FE**

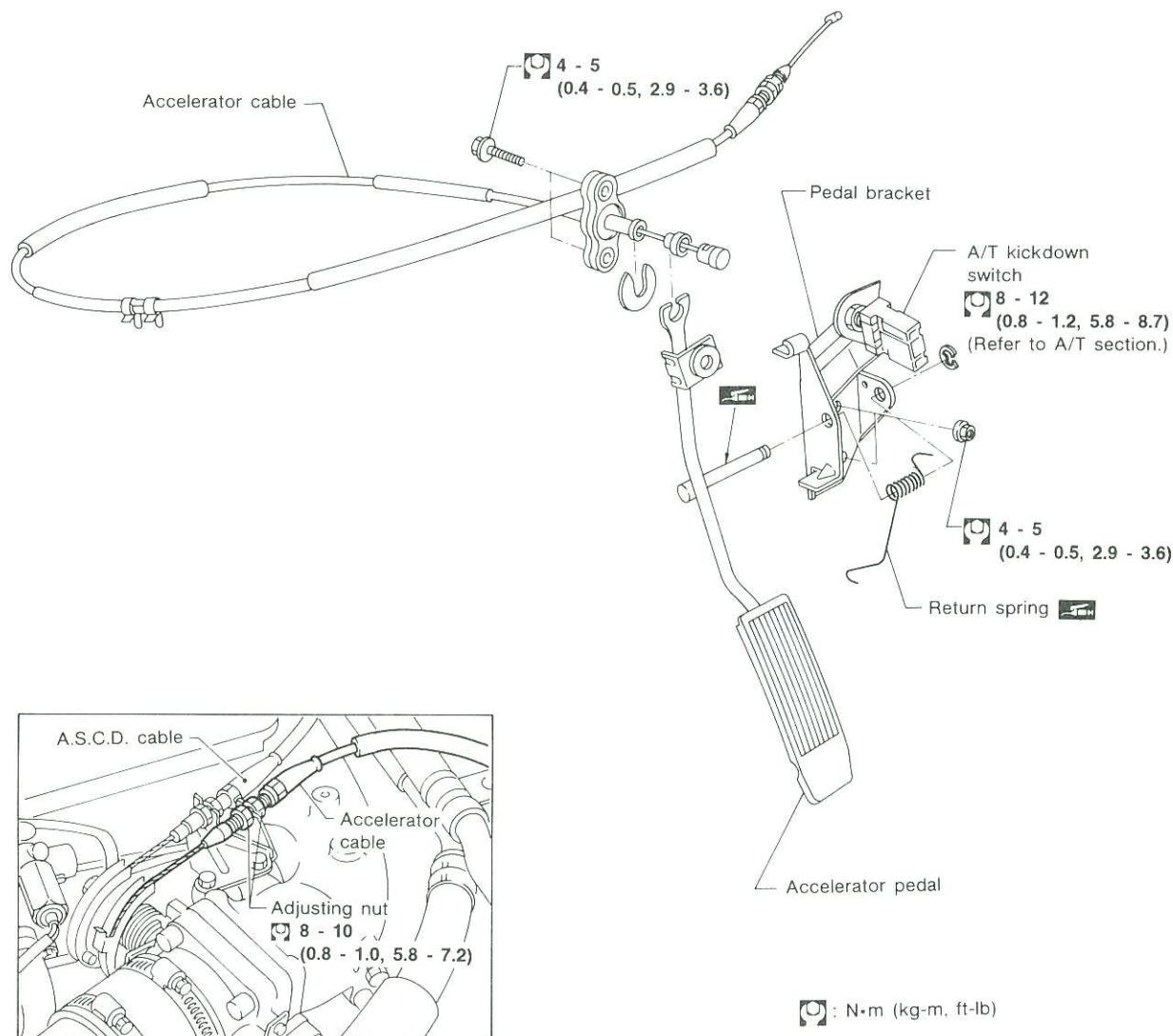
CONTENTS

ACCELERATOR CONTROL SYSTEM	FE-2
FUEL SYSTEM	FE-3
EXHAUST SYSTEM	FE-4

FE

ACCELERATOR CONTROL SYSTEM

- 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.
- Adjust accelerator cable according to the following procedure.
Tighten "adjusting nut" until "throttle drum" starts to move.
From that position turn back "adjusting nut" 1.5 to 2 turns, and fasten it with a lock nut.
- 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.



SFE071A

FUEL SYSTEM

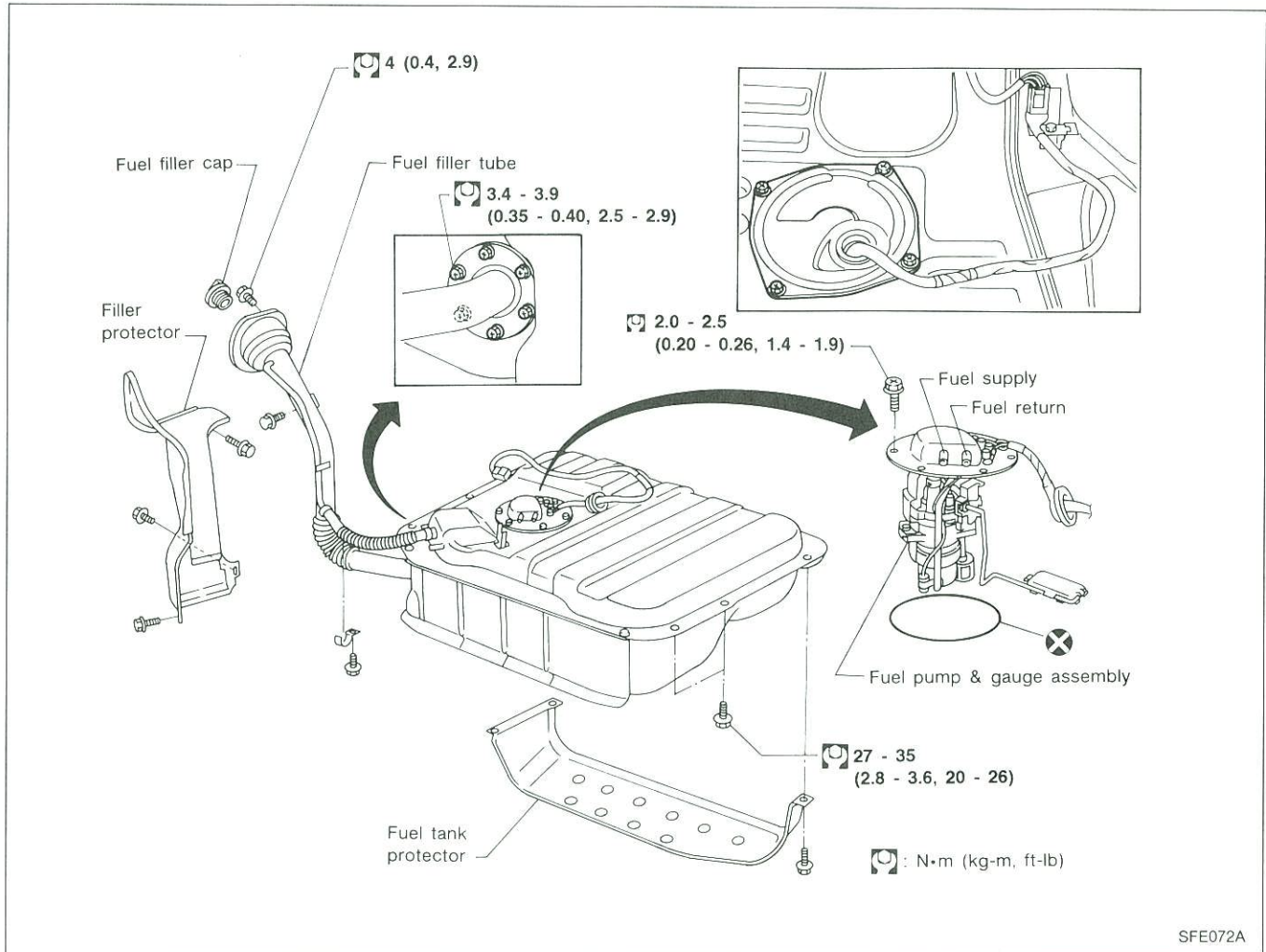
WARNING:

When replacing fuel line parts, be sure to observe the following:

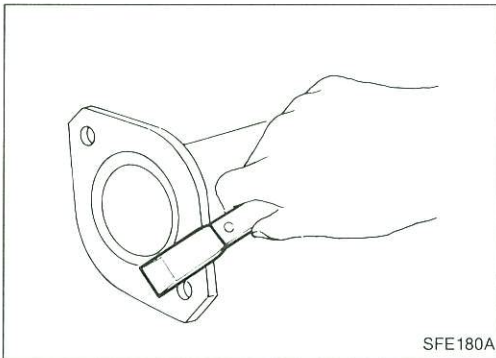
- Put a "CAUTION: INFLAMMABLE" sign in workshop.
- Be sure to furnish workshop with a CO₂ fire extinguisher.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to disconnect battery ground cable before conducting operations.
- Put drained fuel in an explosion-proof container and put lid on securely.

CAUTION:

- Before disconnecting fuel hose, release fuel pressure from fuel line. Refer to "Changing Fuel Filter" in MA section.
- Do not disconnect any fuel line unless absolutely necessary.
- Plug hose and pipe openings to prevent entry of dust or dirt.
- Always replace O-ring and clamps with new ones.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose clamps excessively.
- When installing fuel check valve, be careful of its designated direction. (Refer to section EF & EC.)
- After assembly, run engine and check for fuel leaks at connections.

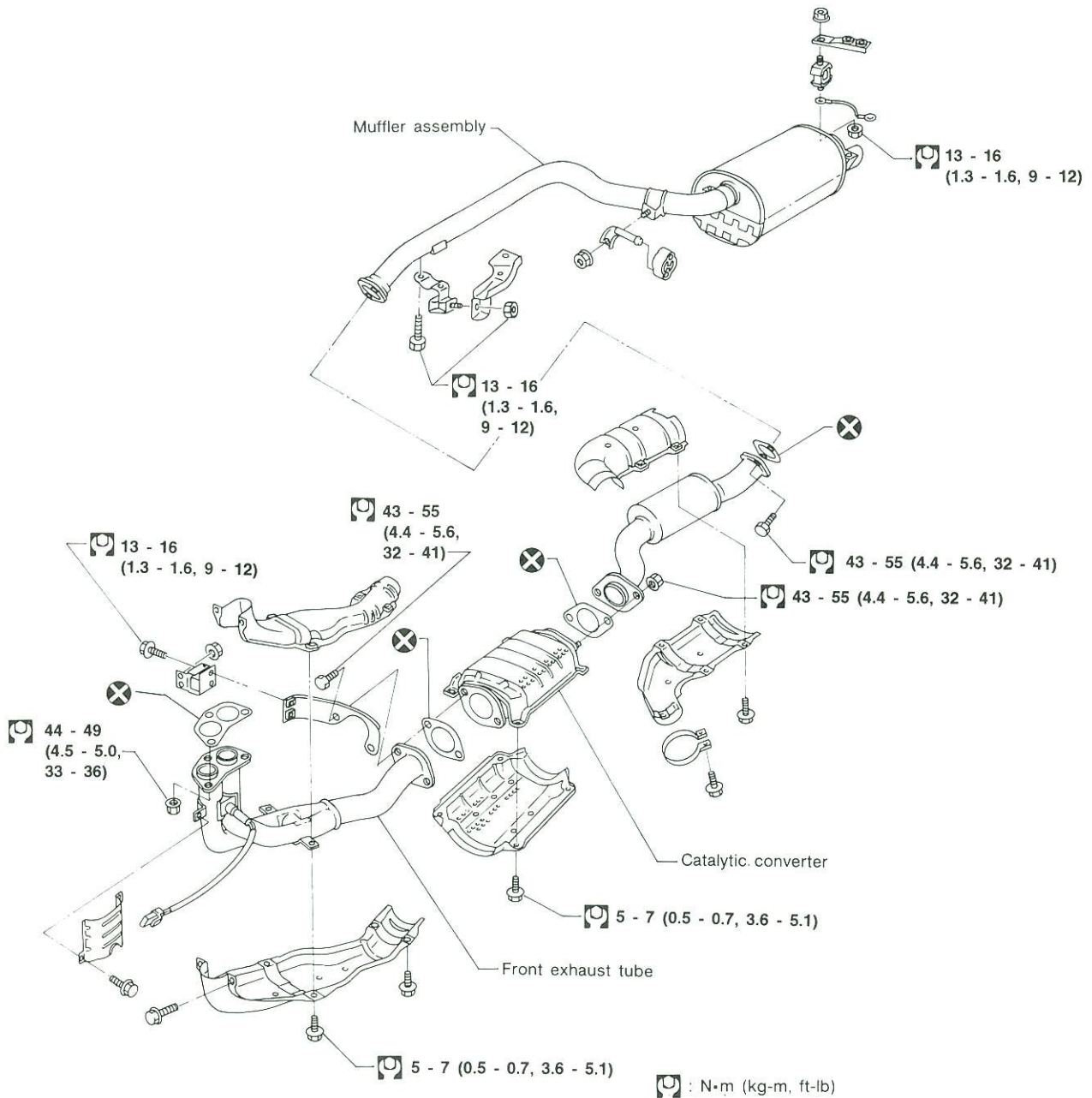


EXHAUST SYSTEM



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.



SFE073A

AUTOMATIC TRANSMISSION

SECTION **AT**

CONTENTS

PREPARATION	AT- 2
PRECAUTIONS	AT- 4
A/T CONTROL DIAGRAM	AT- 5
ON-VEHICLE SERVICE	AT- 8
TROUBLE DIAGNOSES	AT- 12
REMOVAL AND INSTALLATION	AT-110
MAJOR OVERHAUL	AT-112
DISASSEMBLY	AT-116
REPAIR FOR COMPONENT PARTS	AT-127
ASSEMBLY	AT-172
SERVICE DATA AND SPECIFICATIONS (S.D.S.)	AT-191

AT

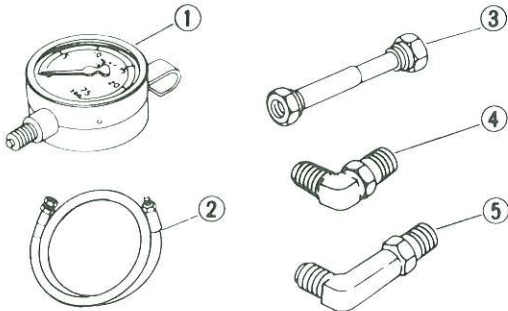
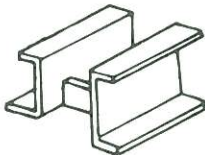
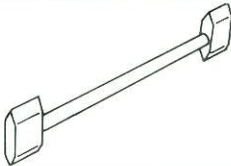
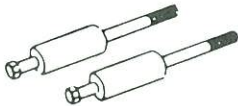
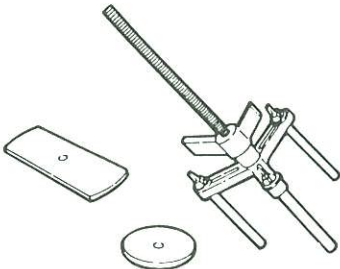
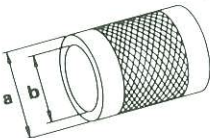
When you read wiring diagrams:

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


When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

PREPARATION

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
ST2505S001 (J25695-A) Oil pressure gauge set ① ST25051001 (—) Oil pressure gauge ② ST25052000 (—) Hose ③ ST25053000 (—) Joint pipe ④ ST25054000 (—) Adapter ⑤ ST25055000 (—) Adapter	Measuring line pressure 
ST07870000 (J37068) Transmission case stand	Disassembling and assembling A/T 
KV31102100 (J37065) Torque converter one-way clutch tool	Checking one-way clutch in torque converter 
ST25850000 (J25721-A) Sliding hammer	Removing oil pump assembly 
KV31102400 (J34285 and J34285-87) Clutch spring compressor	Removing and installing clutch return springs 
ST33200000 (J26082) Drift	Installing oil pump housing oil seal Installing rear oil seal  <p> a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia. </p>

PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
(J34291) Shim setting gauge set	 <p>Selecting oil pump cover bearing race and oil pump thrust washer</p>

Service Notice

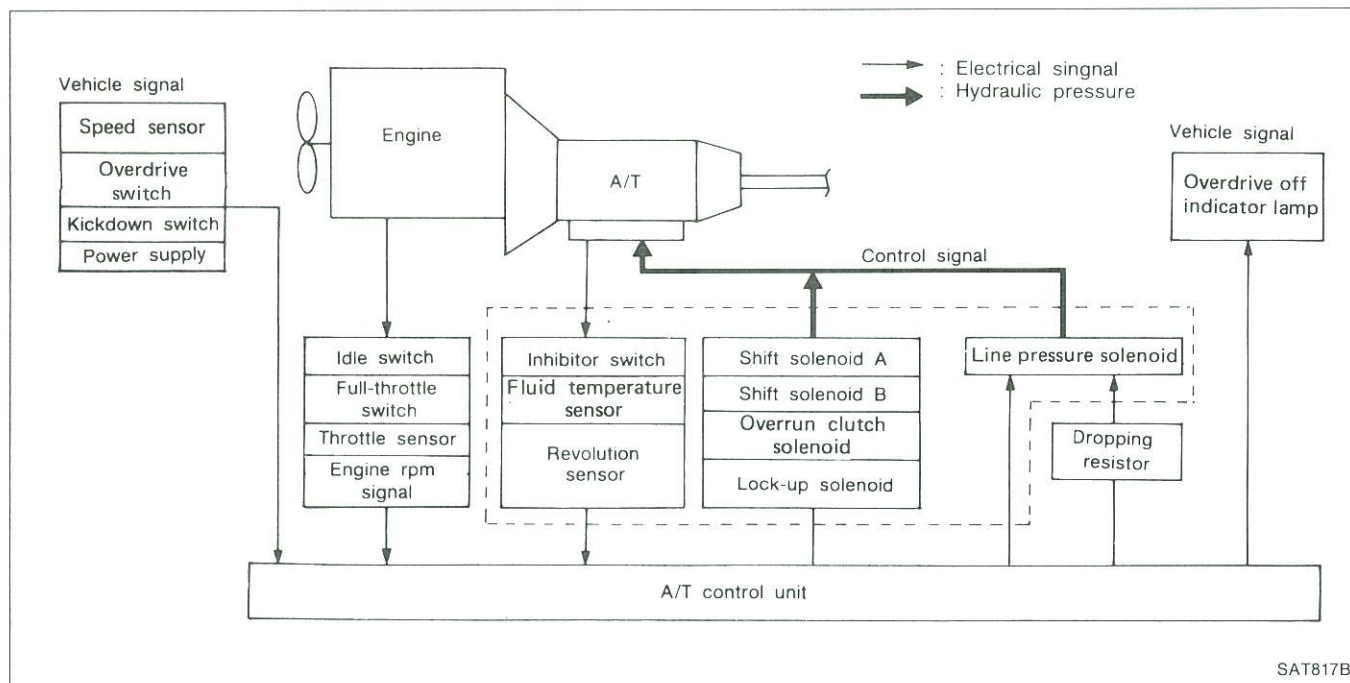
- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- When disassembling parts, place them in order in a parts rack so that they can be put back into the unit in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order on a parts rack so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended A.T.F. to all parts. Petroleum jelly may be applied to O-rings and seals and used to hold small bearings and washers in place during reassembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- After overhaul, refill the transmission with new A.T.F.

Hydraulic Control Circuits



A/T CONTROL DIAGRAM

Electrical Control Chart



Mechanical Operation

Shift position	Re-verse clutch	High clutch	For-ward clutch	Over-run clutch	Band servo			For-ward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
					2nd apply	3rd release	4th apply					
P												PARK
R	○									○		REVERSE
N												NEUTRAL
D *4	1st		○	⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd		○	*1 ⊗	○			●				
	3rd	○	○	⊗	*2 ⊗	⊗		●				
	4th	○	⊗		*3 ⊗	⊗	○				○	
2	1st		○	⊗				●	●			Automatic shift 1 ↔ 2
	2nd		○	⊗	○			●				
1	1st		○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2
	2nd		○	○	○			●				

*1. Operates when overdrive switch is set in "OFF" position.

*2. Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, because oil pressure area on the "release" side is greater than that on the "apply" side, brake band does not contract.

*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 set in "OFF" position.

○ : Operates.

⊗ : Operates when throttle opening is less than 1/16. Engine brake activates.

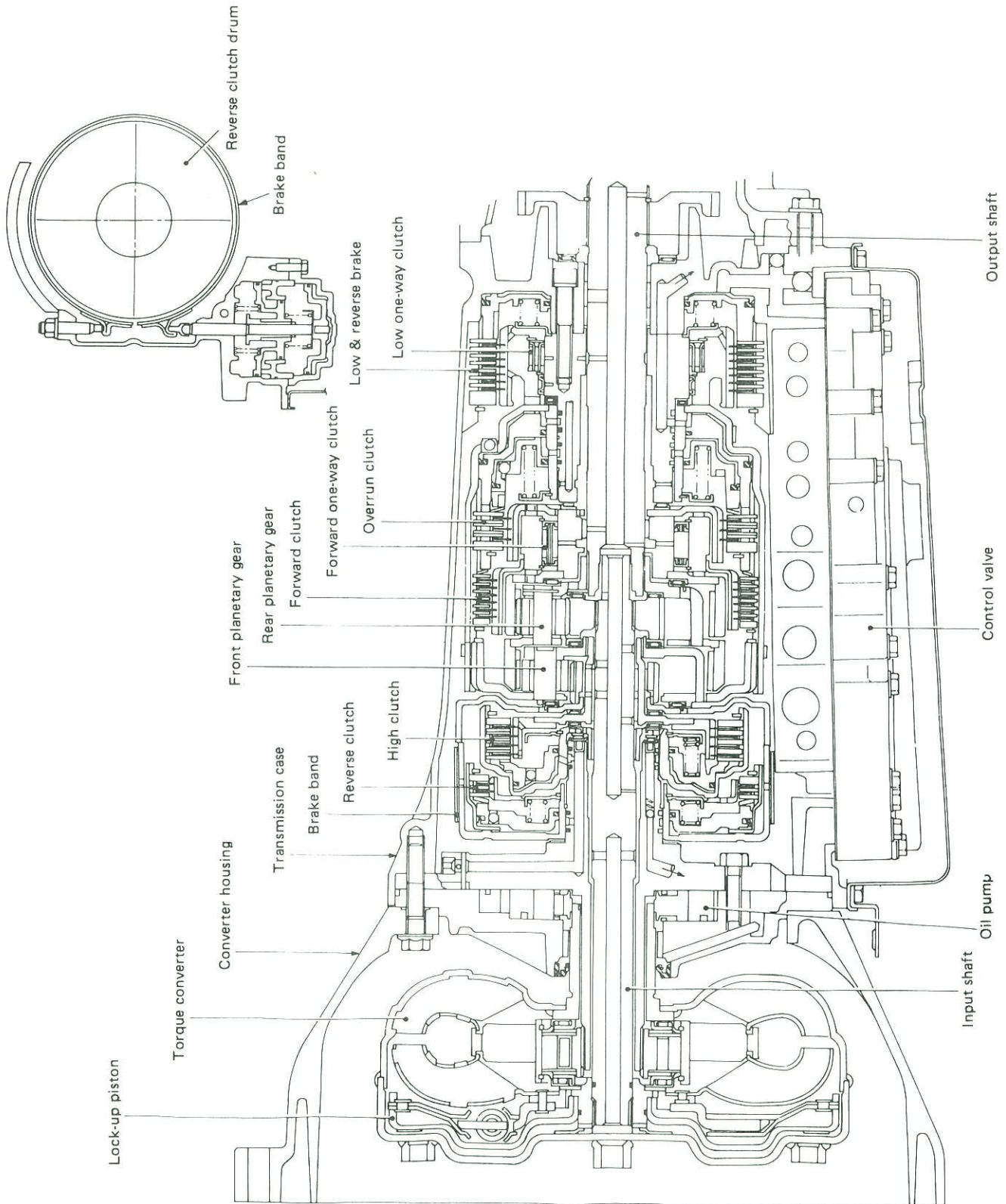
● : Operates during "progressive" acceleration.

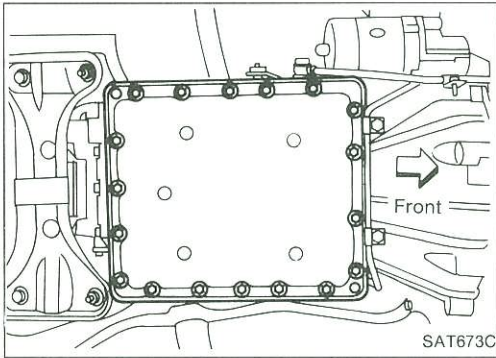
⊗ : Operates but does not affect power transmission.

⊗ : Operates when throttle opening is less than 1/16 but does not affect engine brake.

A/T CONTROL DIAGRAM

Cross-Sectional View

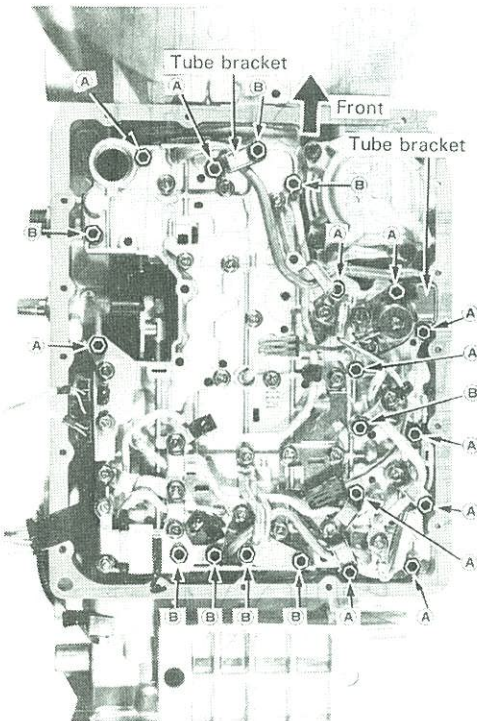




Control Valve Assembly and Accumulators Inspection

1. Remove oil pan and gasket and drain A.T.F.

2. Remove oil strainer.

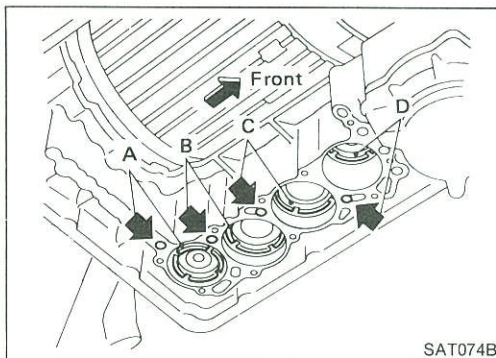


3. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

Bolt length and location

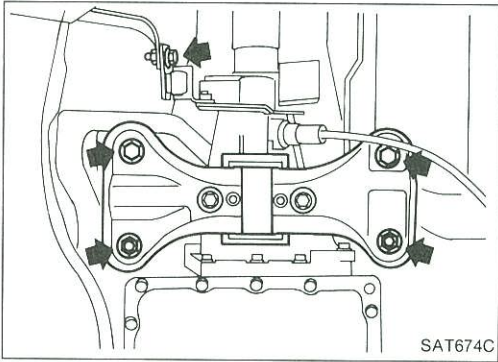
Bolt symbol	ℓ mm (in)	ℓ
(A)	33 (1.30)	
(B)	45 (1.77)	

4. Remove solenoids and valves from valve body if necessary.
5. Remove terminal cord assembly if necessary.



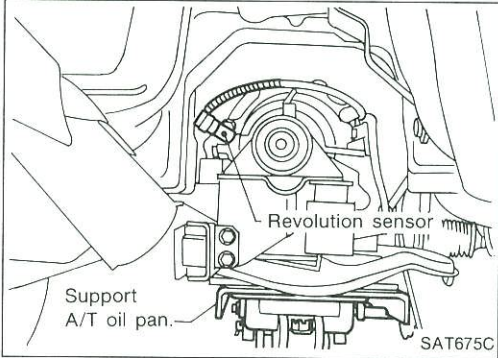
6. Remove accumulators A, B, C and D by applying compressed air if necessary.

- **Hold each piston with rag.**
- 7. Reinstall any part removed.
- **Always use new sealing parts.**

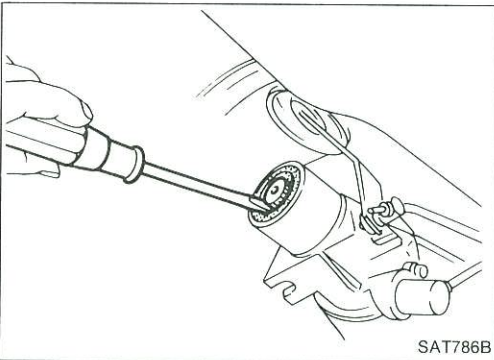


Revolution Sensor Replacement

1. Remove propeller shaft from vehicle. — Refer to section PD.
2. Remove rear engine mounting member from body panel while supporting A/T with jack.
3. Lower A/T assembly as much as possible.

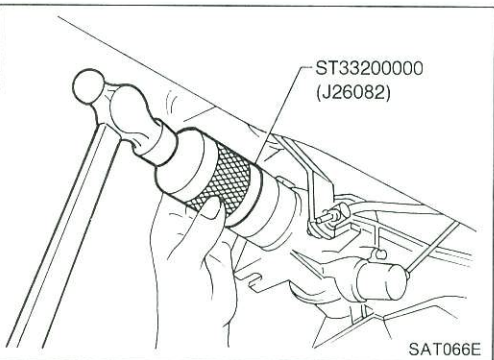


4. Remove revolution sensor from A/T assembly.
 5. Reinstall any part removed.
- **Always use new sealing parts.**

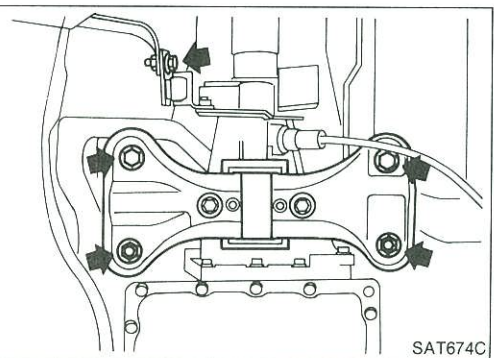


Rear Oil Seal Replacement

1. Remove propeller shaft from vehicle. — Refer to section PD.
2. Remove rear oil seal.



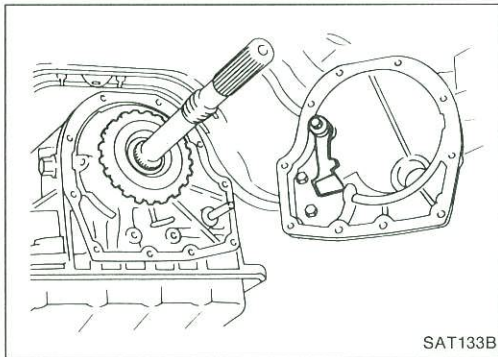
3. Install rear oil seal.
- **Apply A.T.F. before installing.**
4. Reinstall any part removed.



Parking Components Inspection

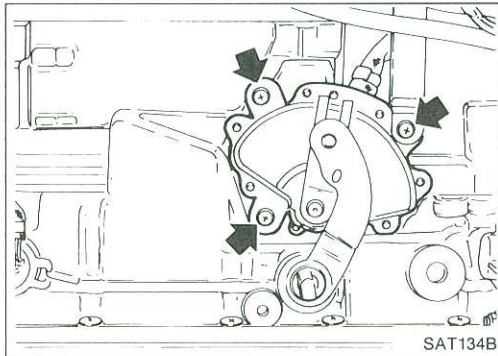
1. Remove propeller shaft from vehicle. — Refer to section PD.
2. Remove rear engine mounting member from A/T assembly while supporting A/T with jack.

Parking Components Inspection (Cont'd)

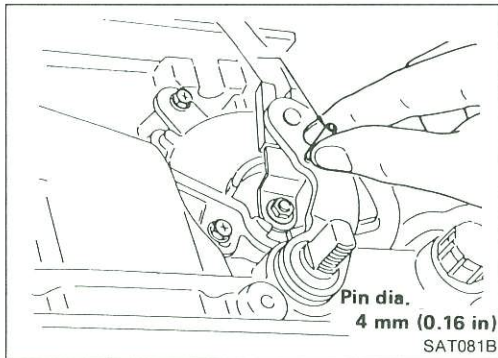


3. Remove rear extension from transmission case.
 4. Replace parking components if necessary.
 5. Reinstall any part removed.
- **Always use new sealing parts.**

Inhibitor Switch Adjustment



1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen inhibitor switch fixing bolts.



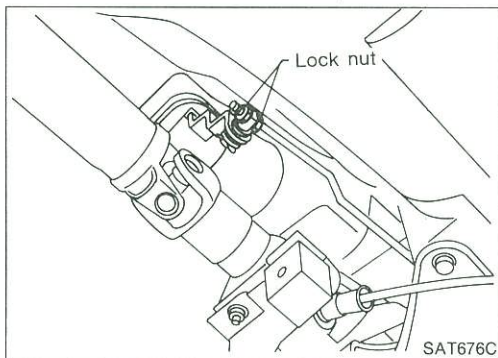
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to "Electrical Components Inspection".

Manual Control Linkage Adjustment

Move selector lever from "P" range to "1" range. You should be able to feel the detents in each range.

If the detents cannot be felt or the pointer indicating the range is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" range.
2. Loosen lock nuts.

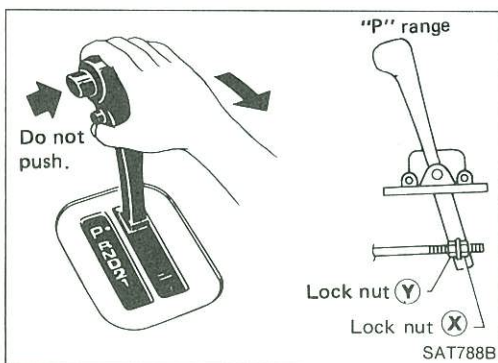


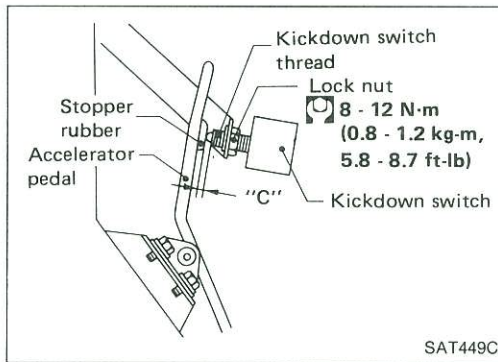
3. Tighten lock nut (X) until it touches trunnion pulling selector lever toward "R" range side without pushing button.
4. Back off lock nut (X) 1 turn and tighten lock nut (Y) to the specified torque.

Lock nut:

: 11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)

5. Move selector lever from "P" range to "1" range. Make sure that selector lever can move smoothly.





Adjusting Kickdown Switch

1. Adjust accelerator cable — Refer to section FE.
2. Adjust clearance "C" between stopper rubber and end of kickdown switch thread while depressing accelerator pedal fully.

Clearance "C": 0.3 - 1.0 mm (0.012 - 0.039 in)

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TROUBLE DIAGNOSES

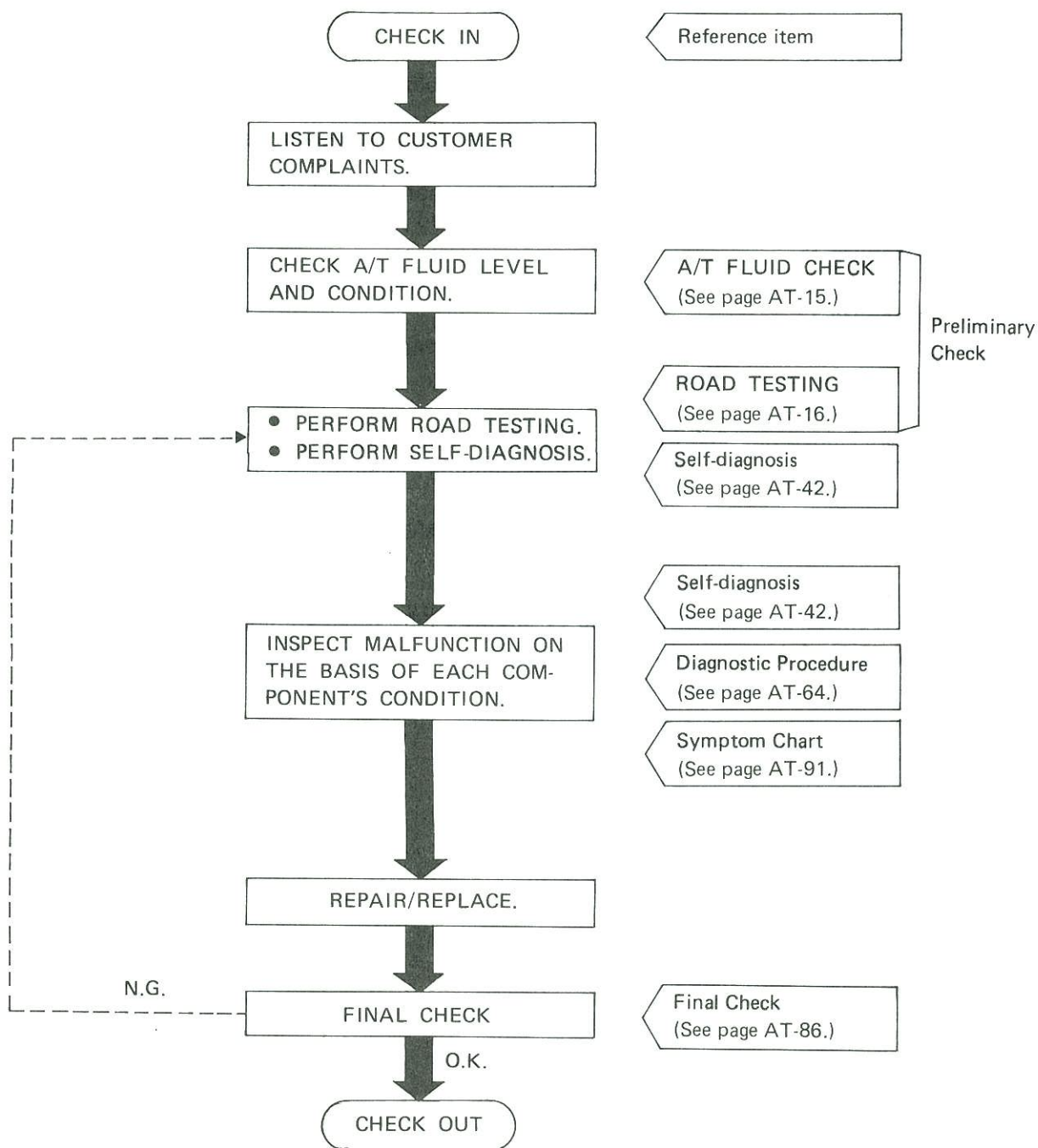
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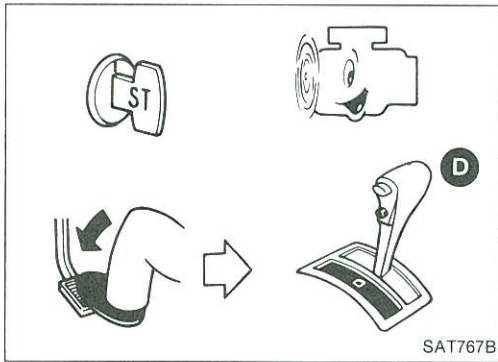
TROUBLE DIAGNOSES

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



TROUBLE DIAGNOSES

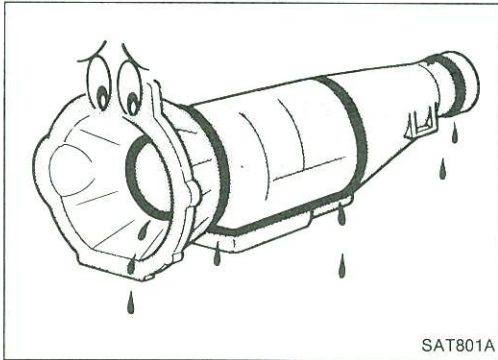


Preliminary Check

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" range and wait a few minutes.
3. Stop engine.
4. Check for fresh leakage.



Fluid condition check

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling — Overheating

Fluid level check

Refer to section MA.

TROUBLE DIAGNOSES

ROAD TEST PROCEDURE

1. Check before engine is started.

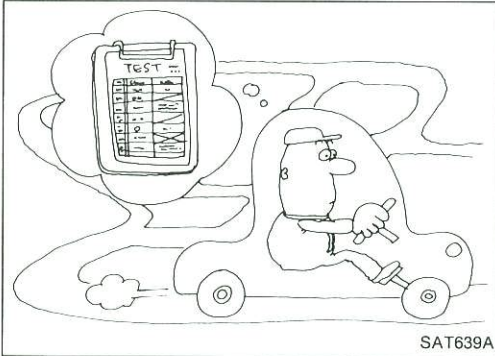


2. Check at idle.



3. Cruise test.

SAT786A



SAT639A

Preliminary Check (Cont'd)

ROAD TESTING

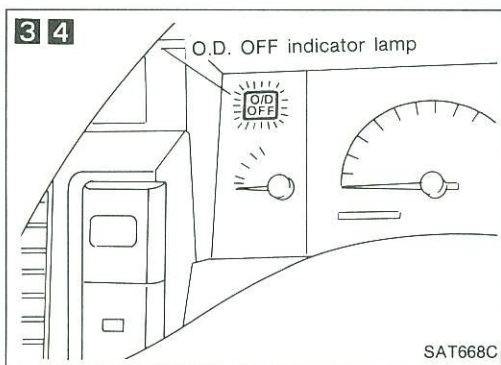
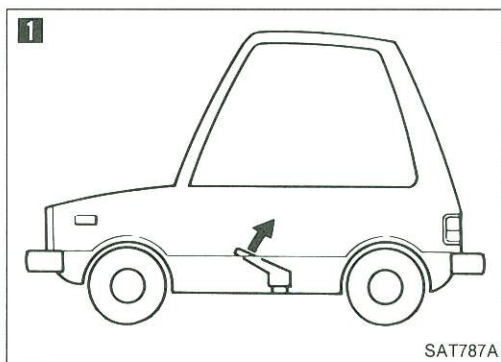
Description

- The purpose of this road test is to determine overall performance of automatic transmission and analyze causes of problems.
- The road test consists of the following three parts:
 1. Check before engine is started
 2. Check at idle
 3. Cruise test
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to "Self-diagnosis" and "Diagnostic Procedure".

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

1. Check before engine is started



1

Park vehicle on flat surface.



2

Move selector lever to "P" range.



3

Does O.D. OFF indicator lamp come on for about 2 seconds?

No

Go to Diagnostic Procedure 1.

Yes

4

Does O.D. OFF indicator lamp flicker for about 8 seconds?

Yes

Perform self-diagnosis.
— Refer to SELF-DIAGNOSIS
PROCEDURE.

No



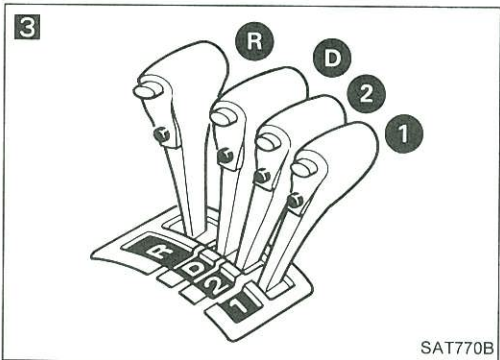
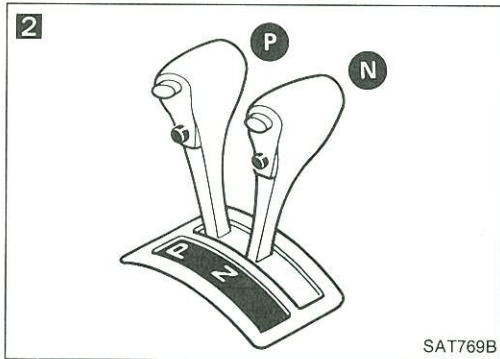
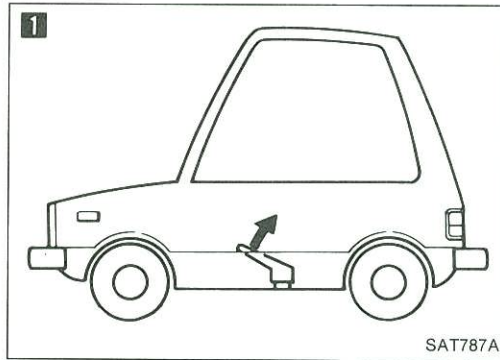
Perform self-diagnosis.
— Refer to SELF-DIAGNOSIS
PROCEDURE and note N.G.
items.

Go to "ROAD TESTING — 2.
Check at idle".

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

2. Check at idle



1
Park vehicle on flat surface.



2
Move selector lever to "P" or "N" range.



Is engine started?

No

Go to Diagnostic Procedure 2.

Yes



3
Move selector lever to "D", "1", "2" or "R" range.



Is engine started?

Yes

Go to Diagnostic Procedure 2.

No



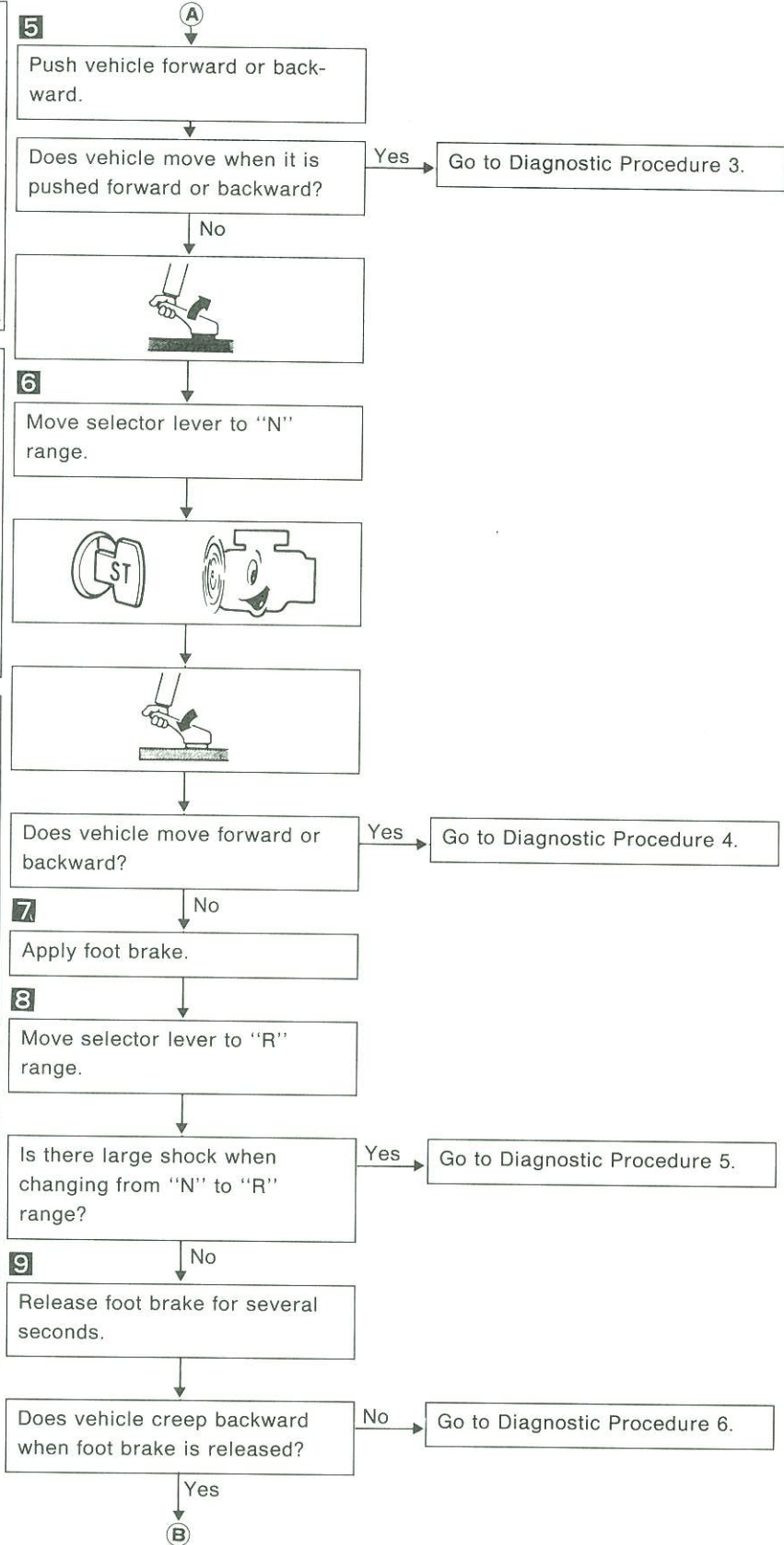
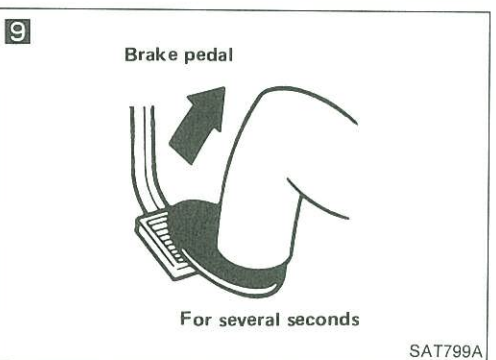
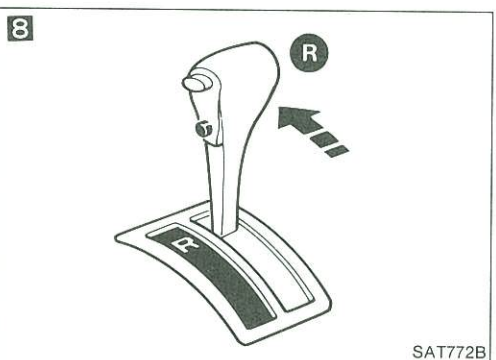
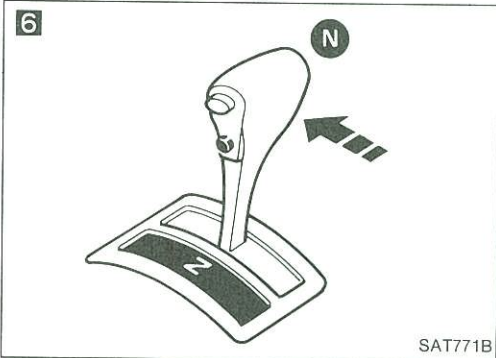
4
Move selector lever to "P" range.



A

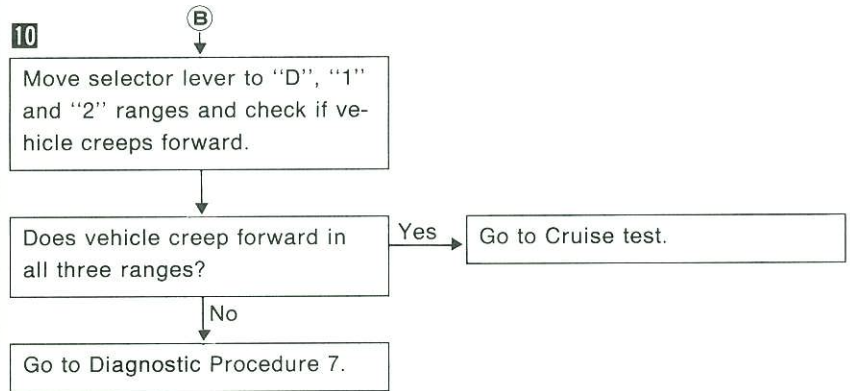
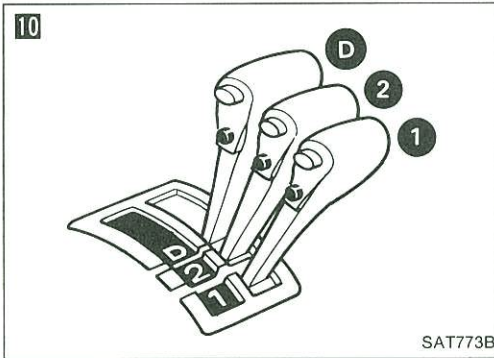
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)



TROUBLE DIAGNOSES

Preliminary Check (Cont'd)



TROUBLE DIAGNOSES

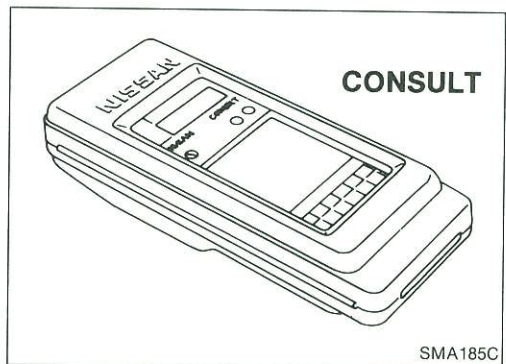
Preliminary Check (Cont'd)

3. Cruise test



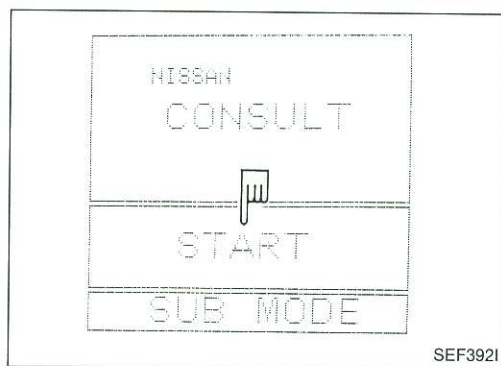
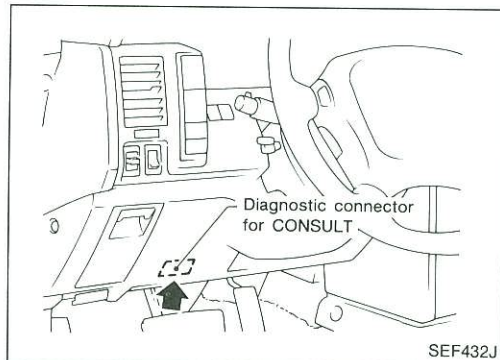
With CONSULT

- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule."
- Check all items listed in Parts 1 through 3.

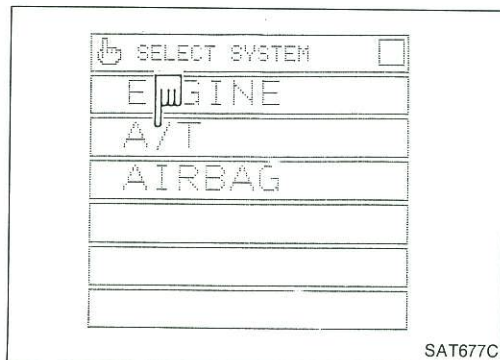


CONSULT setting procedure

1. Turn off ignition switch.
2. Connect "CONSULT" to diagnostic connector. (Diagnostic connector is located in left dash side panel.)



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

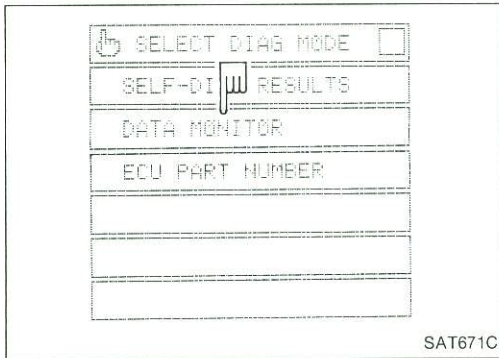


5. Touch "A/T".

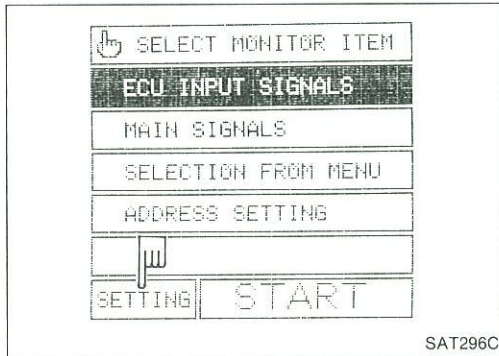
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

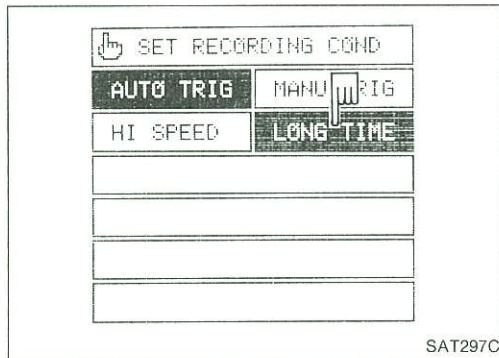
6. Touch "DATA MONITOR".



7. Touch "SETTING" to set recording condition.

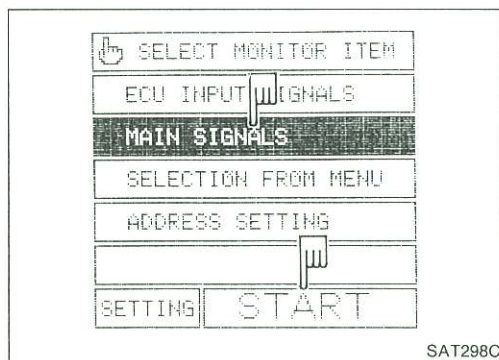


8. Touch "LONG TIME" and "ENTER" key.

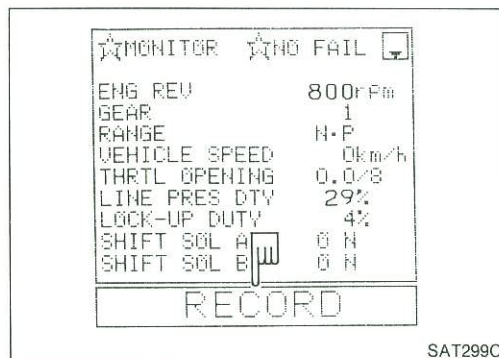


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".

10. Touch "START".



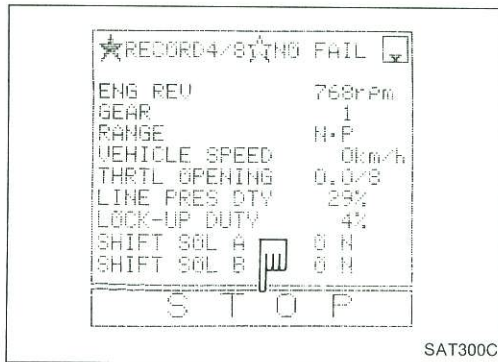
11. When performing cruise test, touch "RECORD".



TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

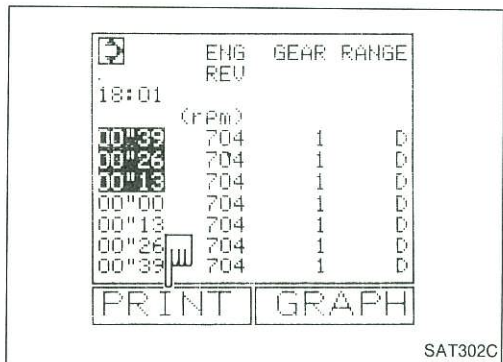
12. After finishing cruise test part 1, touch "STOP".



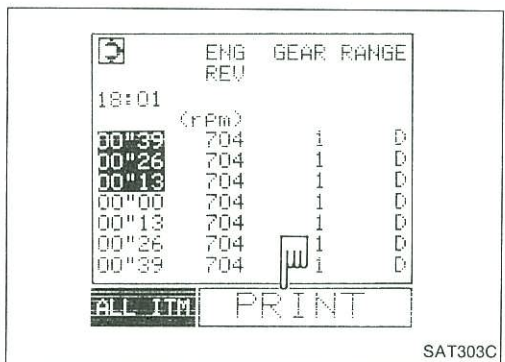
13. Touch "DISPLAY".



14. Touch "PRINT".

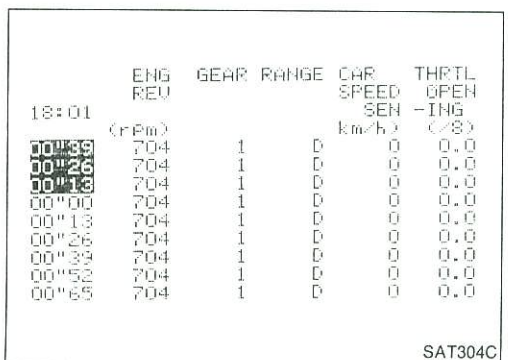


15. Touch "PRINT" again.



16. Check the monitor data printed out.

17. Continue cruise test part 2 and 3.



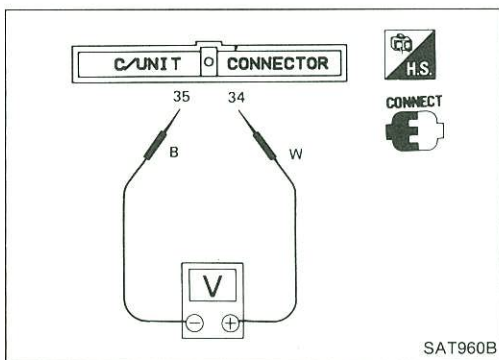
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)



Without CONSULT

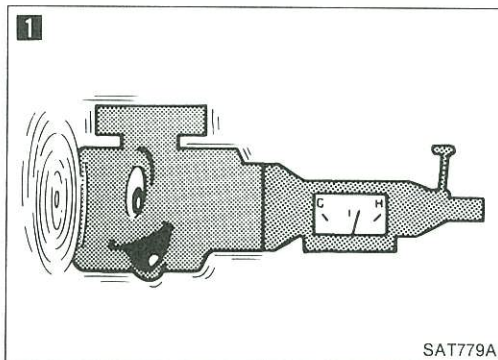
- Throttle position can be controlled by voltage across terminals ③④ and ③⑤ of A/T control unit.



TROUBLE DIAGNOSES

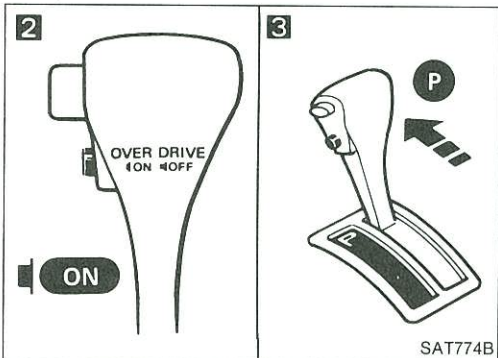
Preliminary Check (Cont'd)

Cruise test — Part 1



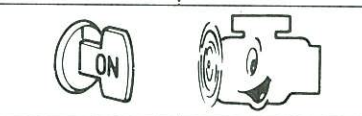
- 1
- Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.
- A.T.F. operating temperature:**
50 - 80°C (122 - 176°F)

Park vehicle on flat surface.



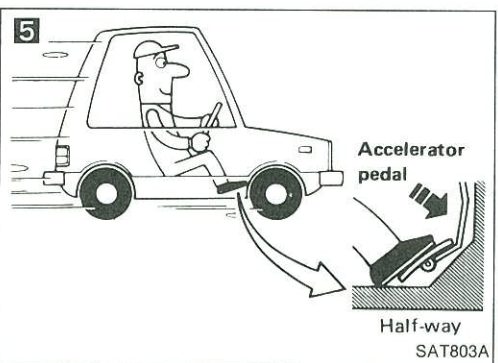
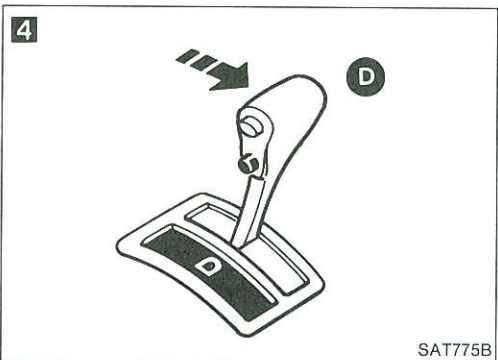
- 2
- Set overdrive switch in "ON" position.

- 3
- Move selector lever to "P" range.



- 4
- Move selector lever to "D" range.

- 5
- Accelerate vehicle to half throttle.



Does vehicle start from D₁?



Read gear position.

No

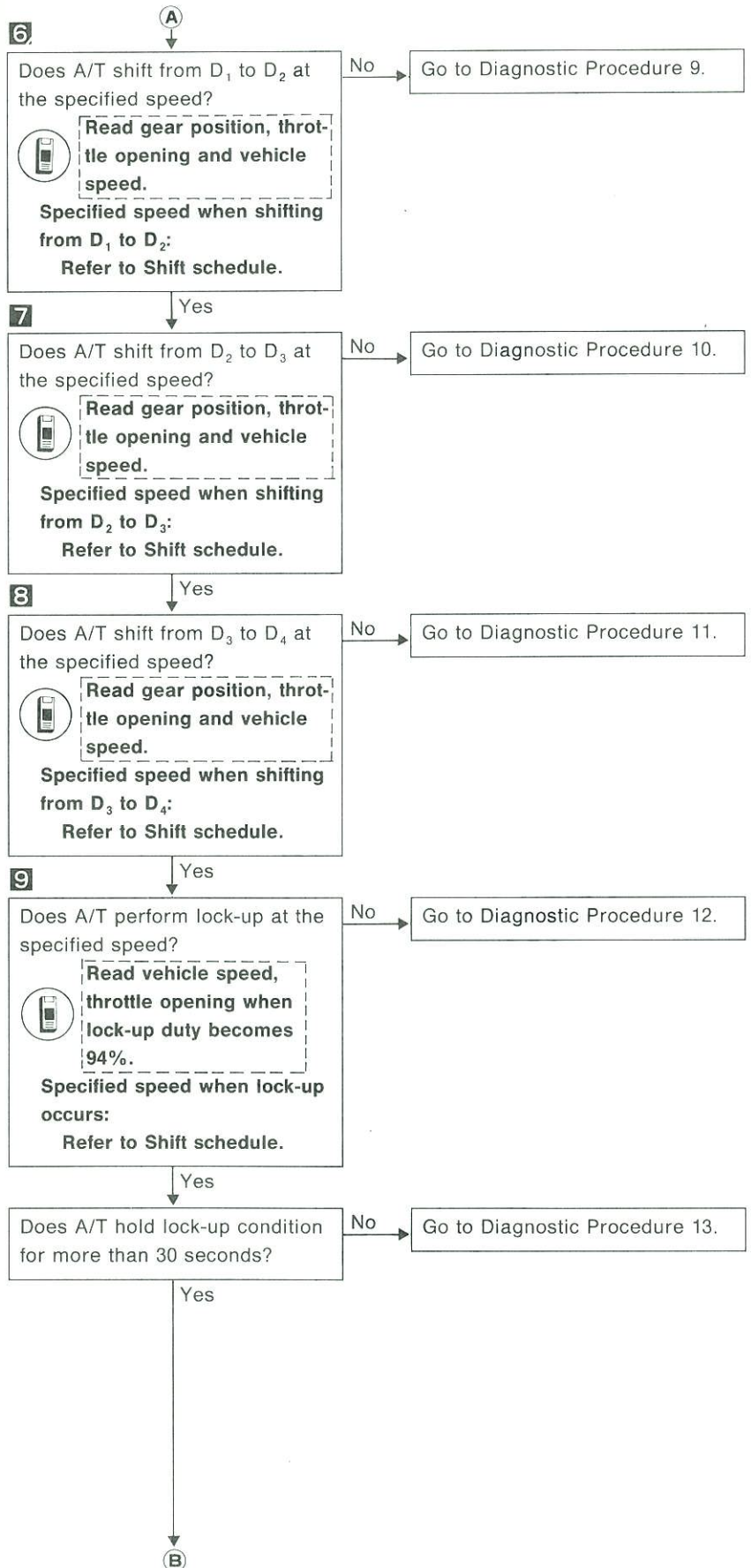
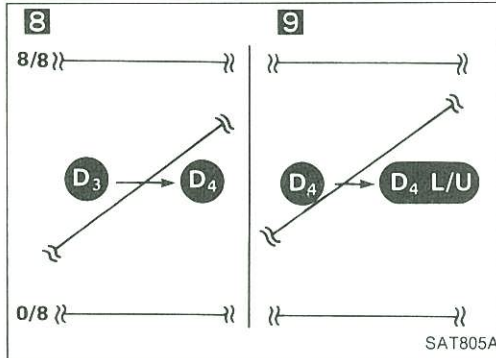
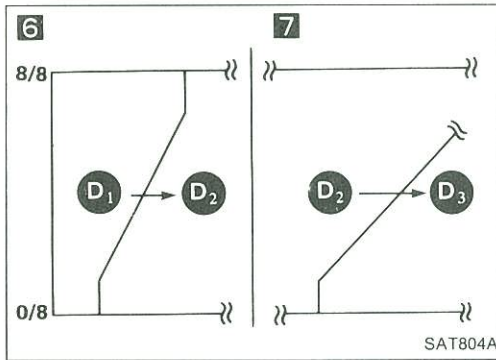
Go to Diagnostic Procedure 8.

Yes

A

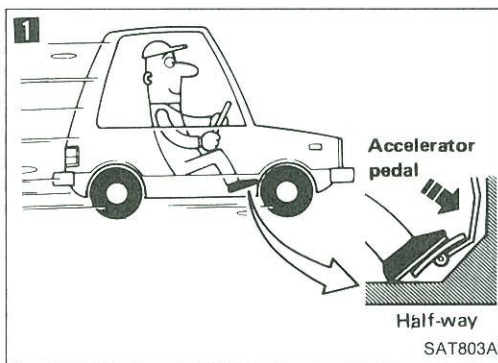
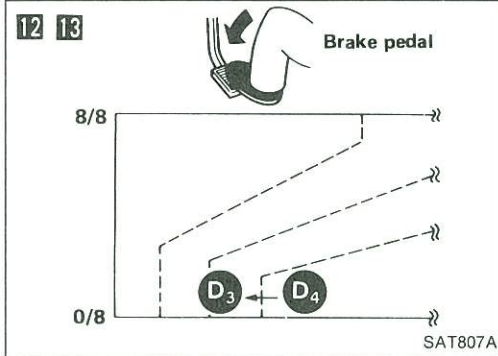
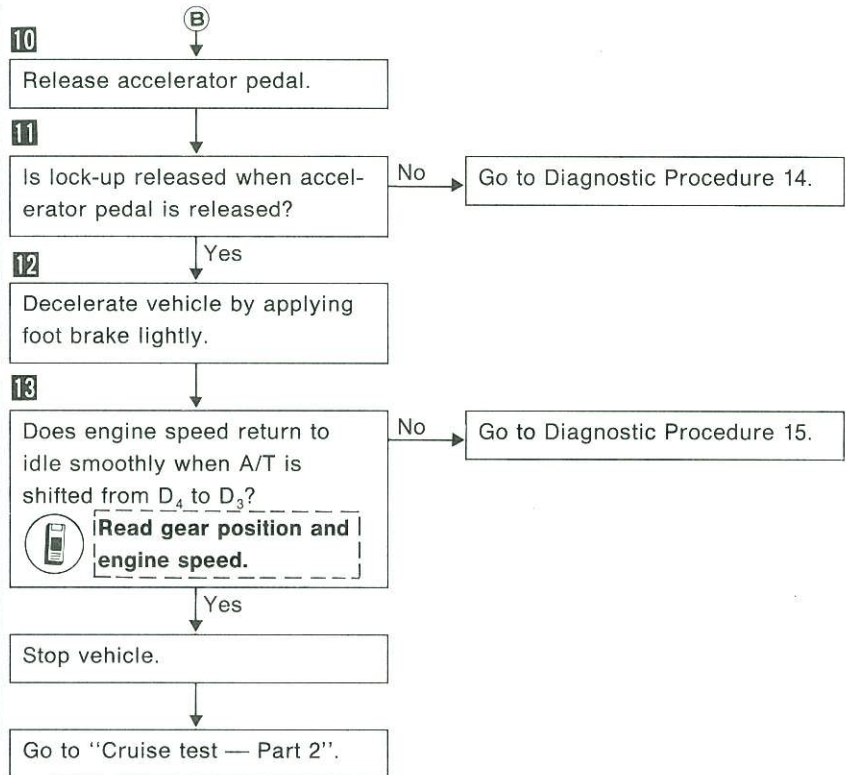
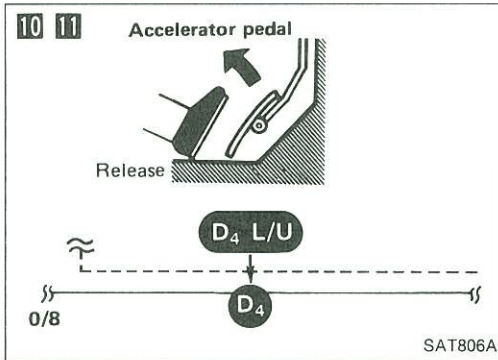
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

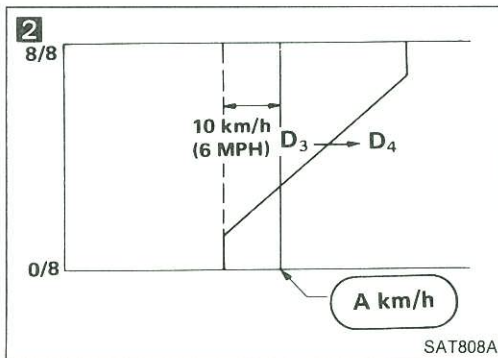
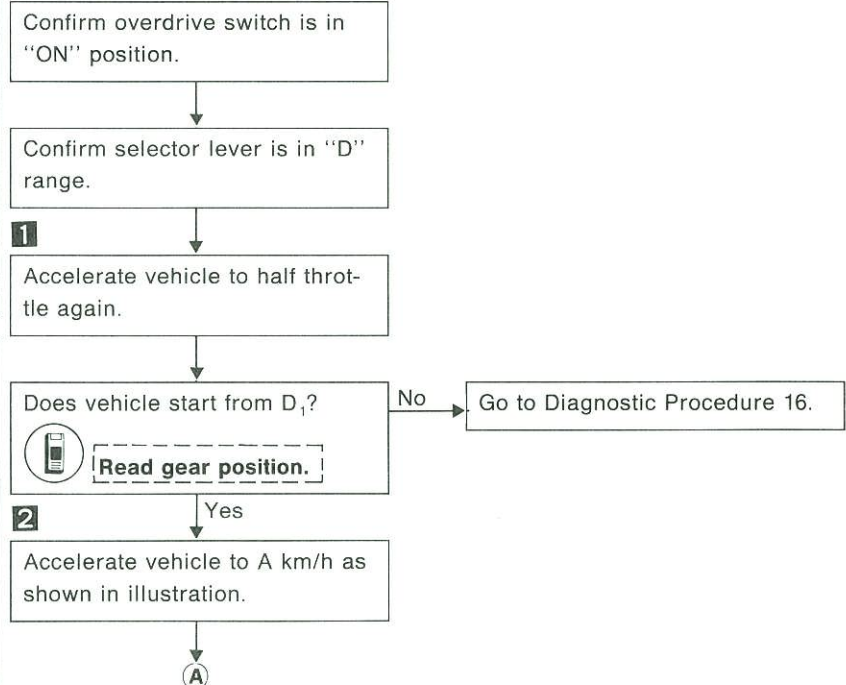


TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

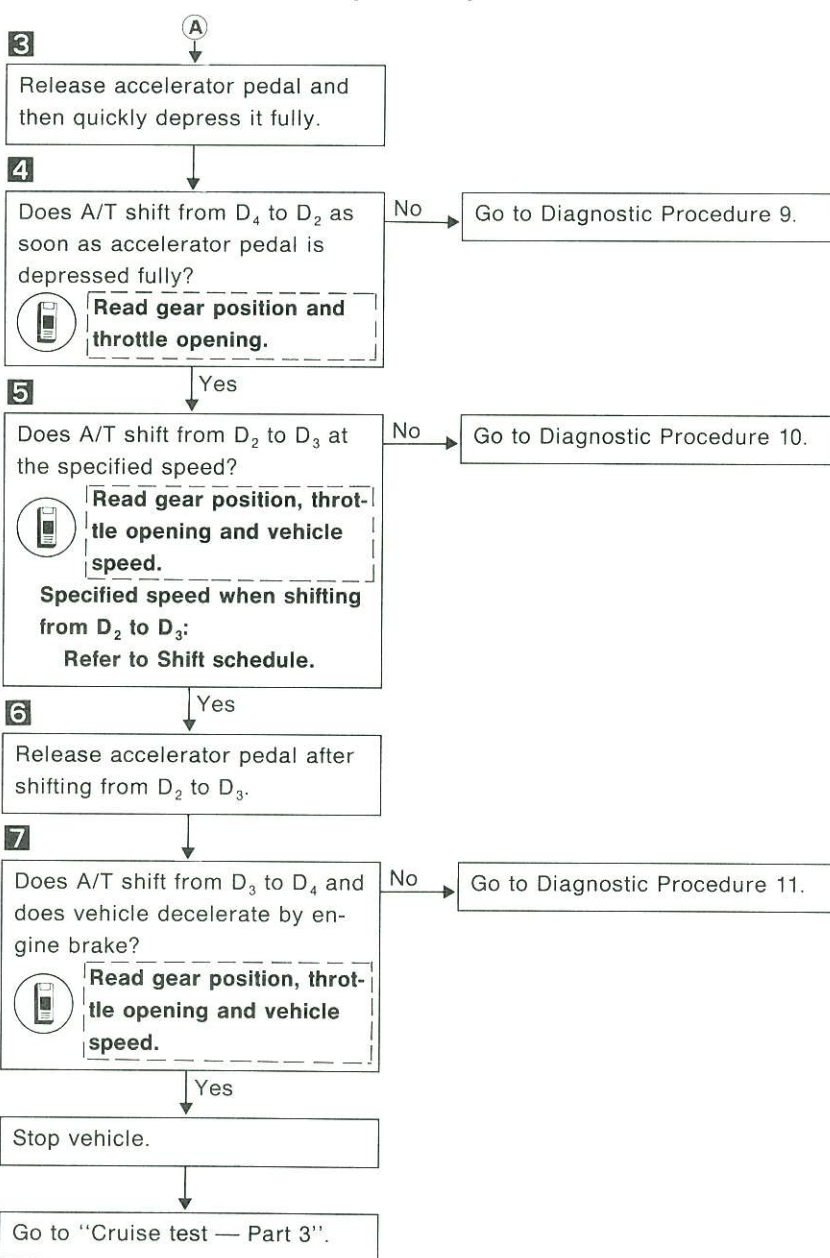
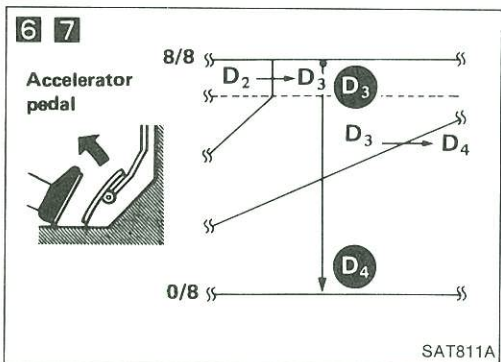
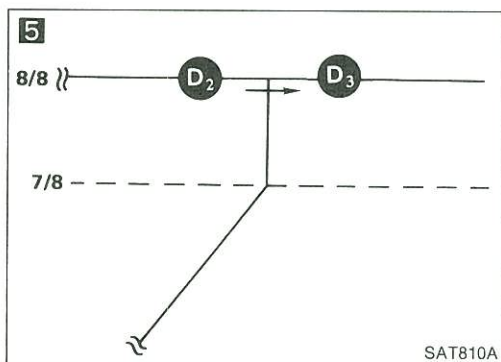
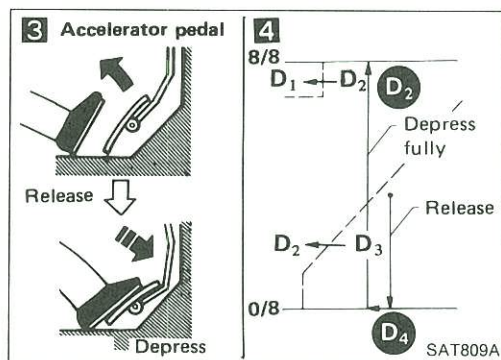


Cruise test — Part 2



TROUBLE DIAGNOSES

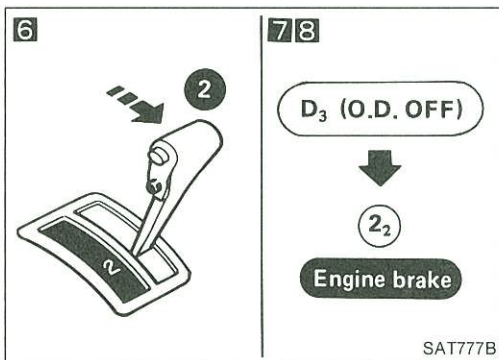
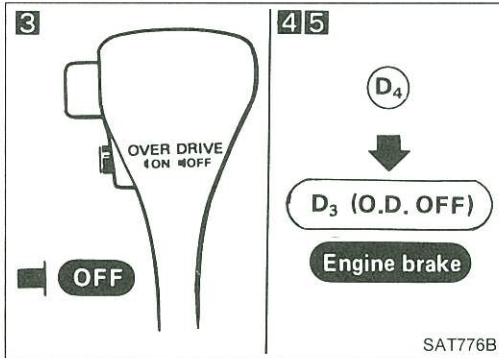
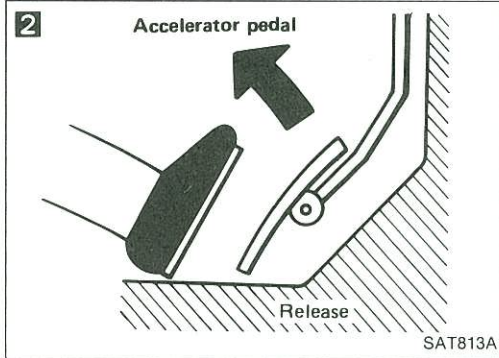
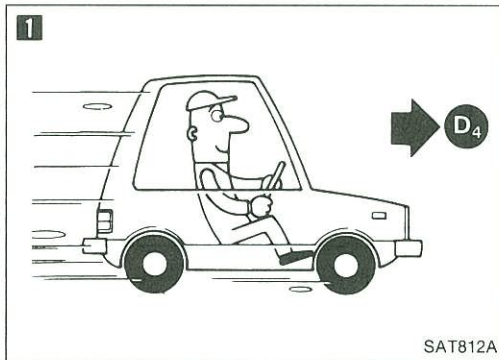
Preliminary Check (Cont'd)



TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Cruise test — Part 3



Confirm overdrive switch is in "ON" position.

Confirm selector lever is in "D" range.

1 Accelerate vehicle, using half-throttle, to D₄.

2 Release accelerator pedal.

3 Set overdrive switch in "OFF" position while driving in D₄ range.

4 Does A/T shift from D₄ to D₃?
Read gear position and vehicle speed.

No Go to Diagnostic Procedure 17.

5 Does vehicle decelerate by engine brake?

No Go to Diagnostic Procedure 15.

6 Move selector lever from "D" to "2" range while driving in D₃.

7 Does A/T shift from D₃ to 2₂?
Read gear position.

No Go to Diagnostic Procedure 18.

8 Does vehicle decelerate by engine brake?

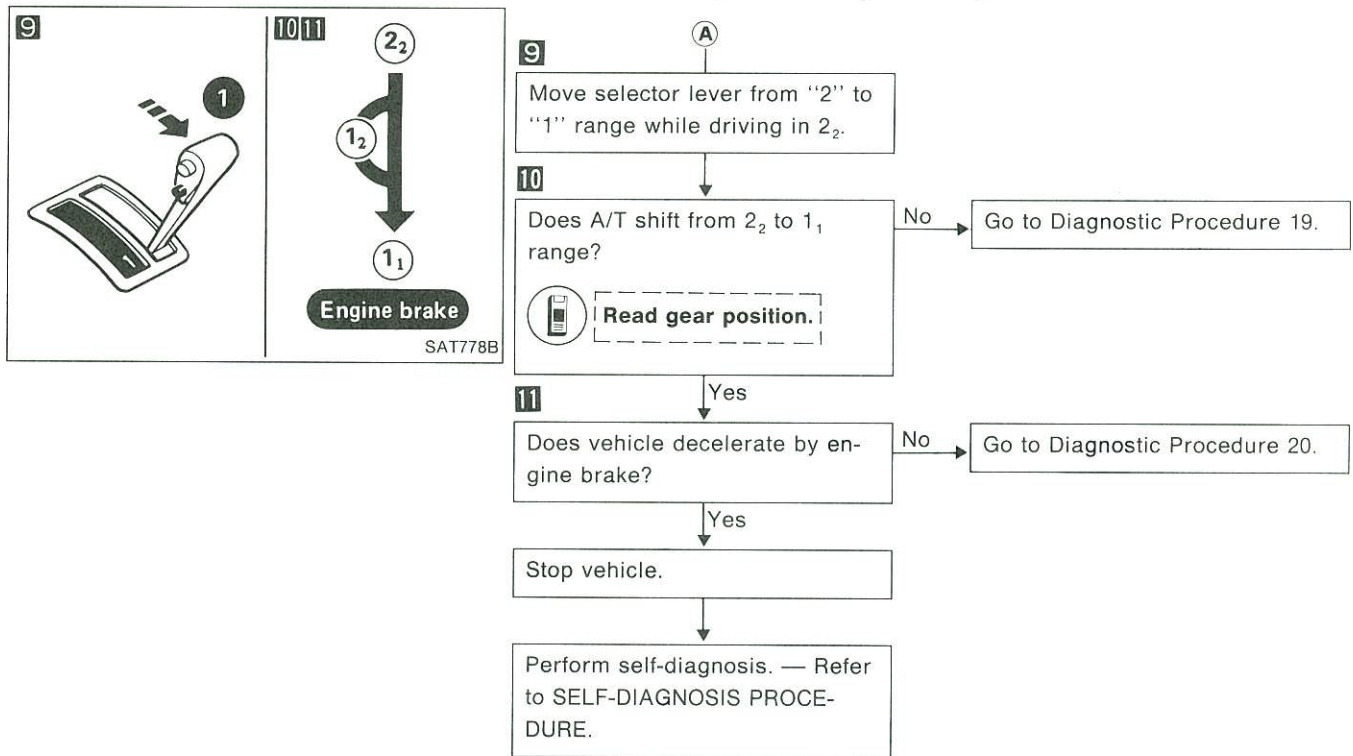
No Go to Diagnostic Procedure 15.

Yes

A

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)



TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Vehicle speed when shifting gears

Throttle position	Vehicle speed km/h (MPH)					
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁
Full throttle	58 - 61 (36 - 38)	103 - 111 (64 - 69)	160 - 170 (99 - 106)	154 - 164 (96 - 102)	98 - 106 (61 - 66)	48 - 52 (30 - 32)
Half throttle	42 - 46 (26 - 29)	81 - 87 (50 - 54)	112 - 122 (70 - 76)	73 - 81 (45 - 50)	45 - 51 (28 - 32)	10 - 14 (6 - 9)

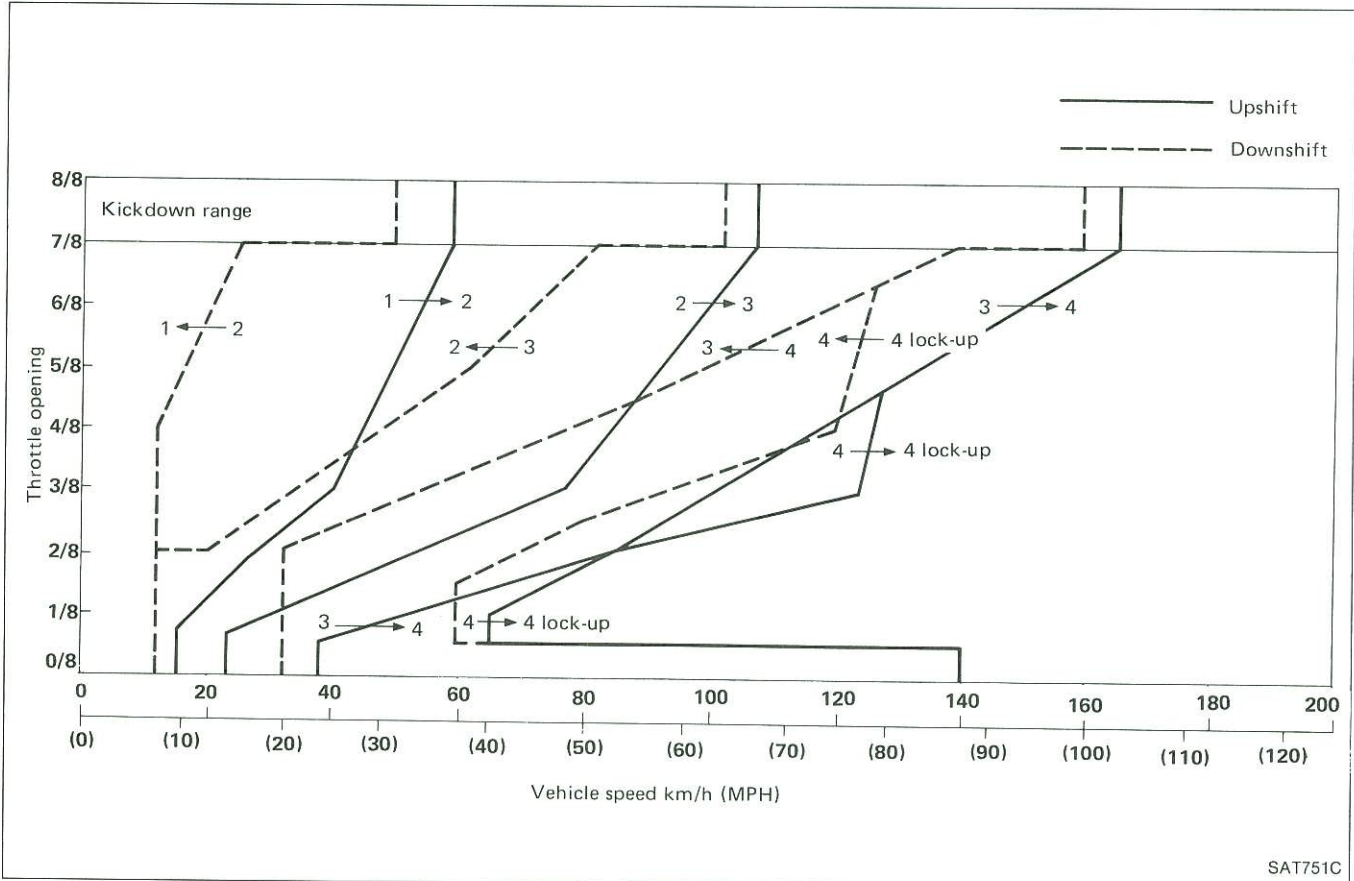
Vehicle speed when performing

Throttle position	O.D. switch [Shift range]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D ₄]	161 - 169 (100 - 105)	155 - 163 (96 - 101)
Half throttle	ON [D ₄]	121 - 129 (75 - 80)	116 - 124 (72 - 77)

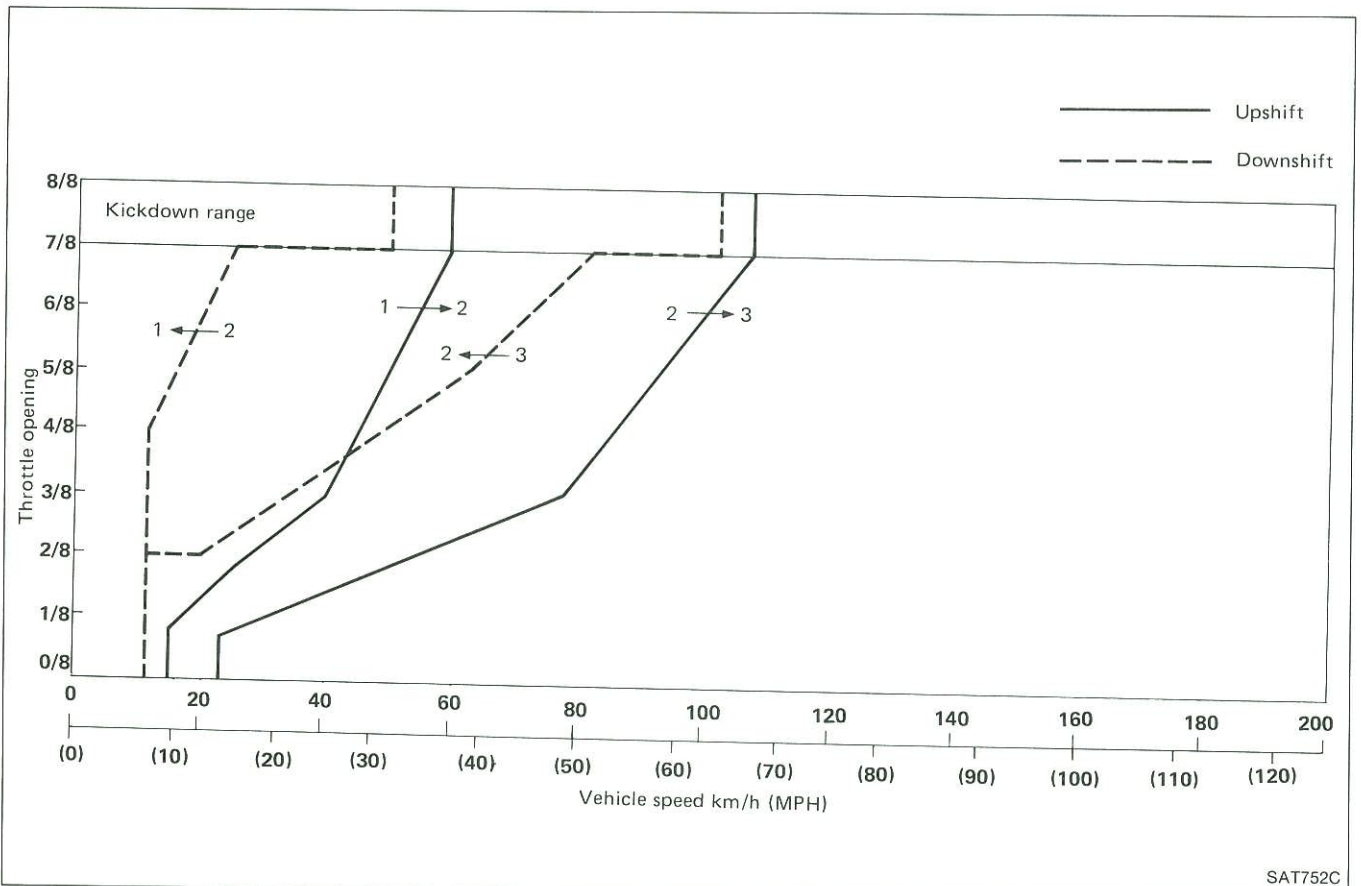
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Shift schedule (Overdrive ON)



Shift schedule (Overdrive OFF)



Diagnosis by CONSULT

NOTICE

1. The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
When a noticeable time difference occurs between shift timing which is manifested by shift shock and the CONSULT display, mechanical parts (except solenoids, sensors, etc.) are considered to be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
 - Actual shift schedule has more or less tolerance or allowance,
 - Shift schedule indicated in Service Manual refers to the point where shifts starts, and
 - Gear position displayed on CONSULT indicates the point where shifts are completed.
3. Shift solenoid “A” or “B” is displayed on CONSULT at the start of shifting while gear position is displayed upon completion of shifting (which is computed by A/T control unit).

TROUBLE DIAGNOSES

Diagnosis by CONSULT (Cont'd)

DATA MONITOR APPLICATION

Item	Application
Vehicle speed sensor 1 (A/T)	X
Vehicle speed sensor 2 (meter)	X
Throttle sensor	X
Fluid temperature sensor	X
Battery voltage	X
Engine rpm	X
Selector lever switch (O.D. switch)	X
A.S.C.D. — cruise signal	X
A.S.C.D. — O.D. cut signal	X
Kickdown switch	X
Power shift switch	—
Idle switch	X
Full throttle switch	X
Shift solenoid A	X
Shift solenoid B	X
Overrun clutch solenoid	X
*Shift solenoid A (feedback)	X
*Shift solenoid B (feedback)	X
*Overrun clutch solenoid (feedback)	X
Hold mode switch	—
1 range switch	X
2 range switch	X
D range switch	X
N range switch	X
R range switch	X
Gear position	X
Range position	X
Vehicle speed	X
Throttle opening	X
Line-pressure solenoid	X
Lock-up solenoid	X

X: Applicable —: Not applicable

TROUBLE DIAGNOSES

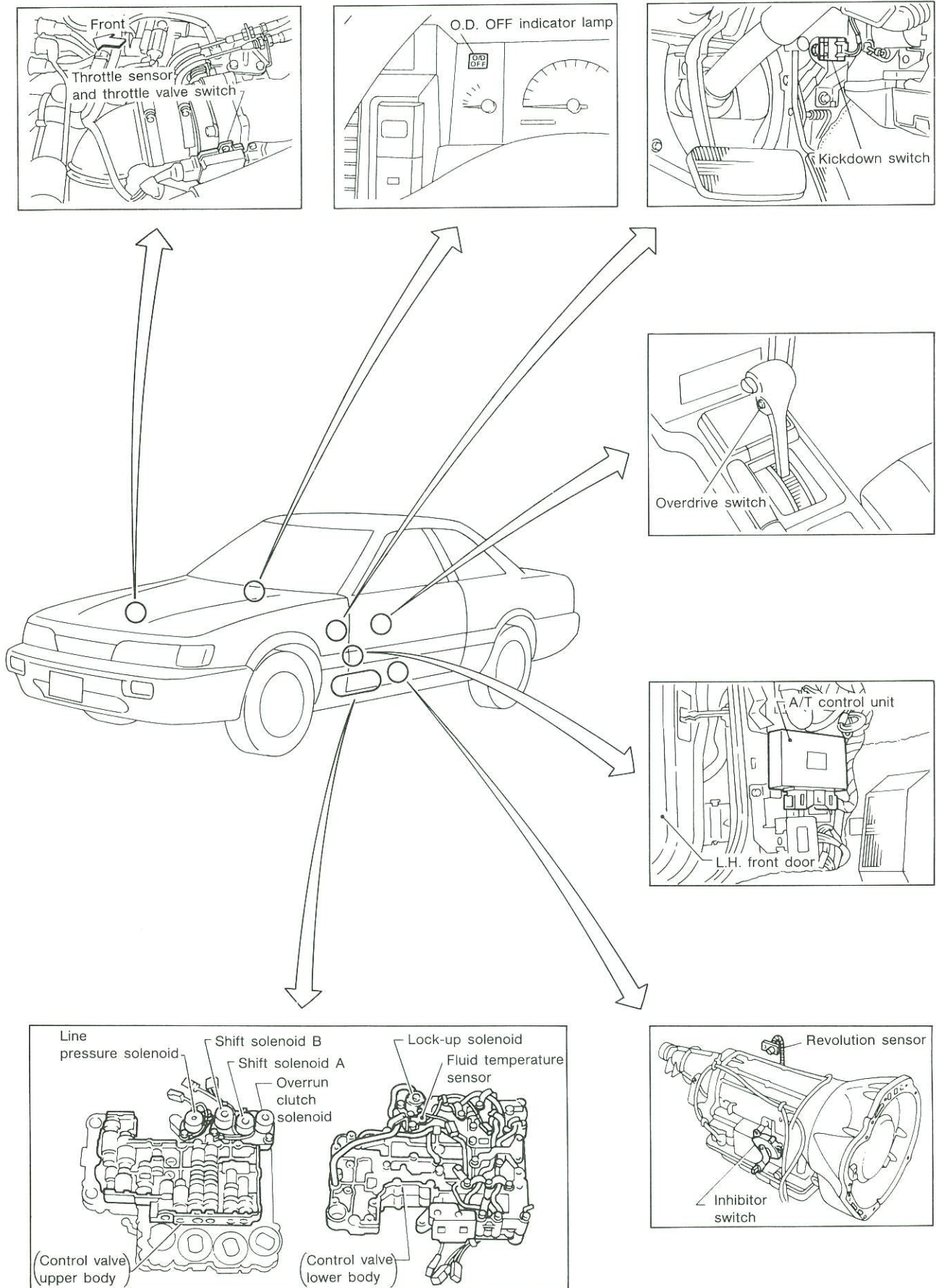
Diagnosis by CONSULT (Cont'd)

DATA ANALYSIS

Item	Display	Condition
Lock-up duty	Approximately 4%	Lock-up "OFF"
	↓	↓
	Approximately 94%	Lock-up "ON"
Line pressure duty	Approximately 29%	Low line-pressure (Small throttle opening)
	↓	↓
	Approximately 94%	High line-pressure (Large throttle opening)
Throttle sensor	Approximately 0.5V	Fully-closed throttle
	↓	↓
	Approximately 4V	Fully-open throttle
Fluid temperature sensor	Approximately 1.5V	Cold [20°C (68°F)]
	↓	↓
	Approximately 0.5V	Hot [80°C (176°F)]

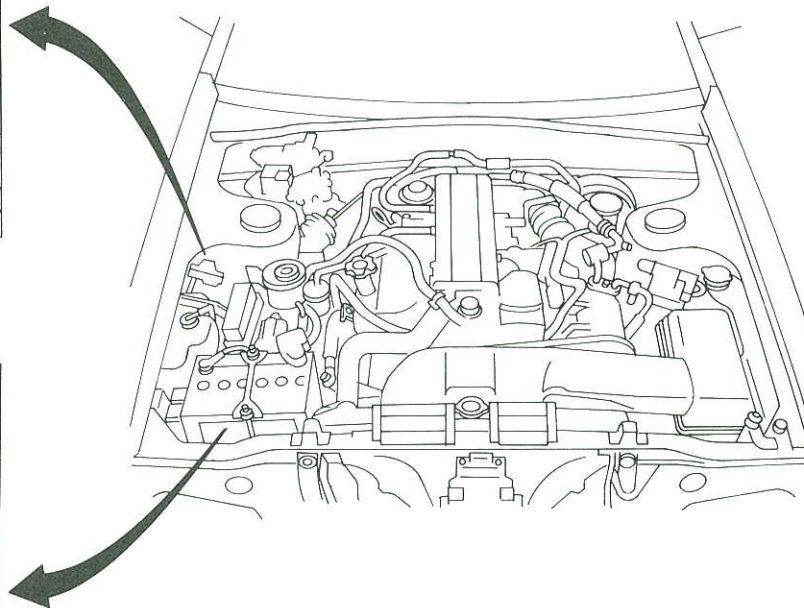
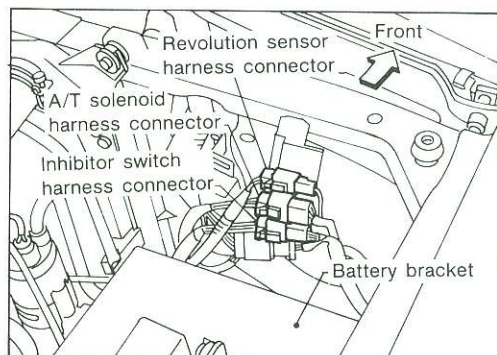
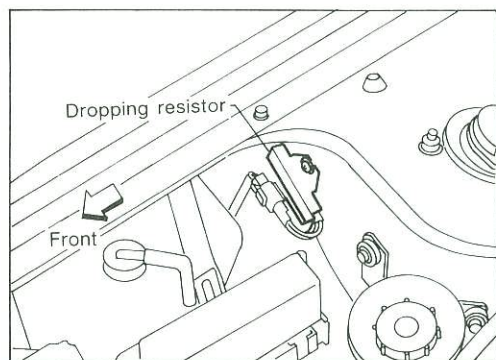
Gear position	1	2	3	4
Shift solenoid A	ON	OFF	OFF	ON
Shift solenoid B	ON	ON	OFF	OFF

A/T Electrical Parts Location



TROUBLE DIAGNOSES

A/T Electrical Parts Location (Cont'd)

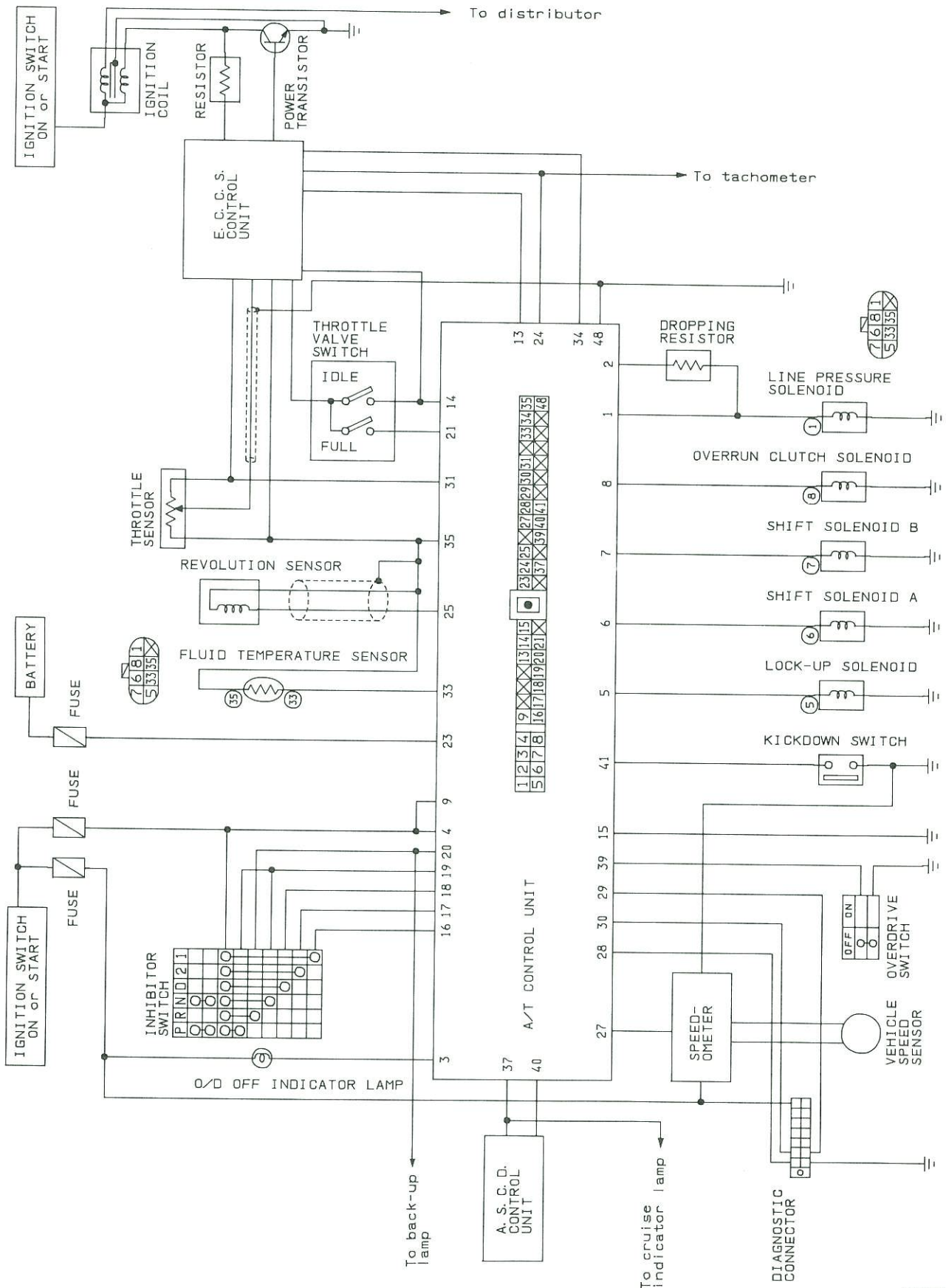


SAT667C

NOTE

TROUBLE DIAGNOSES

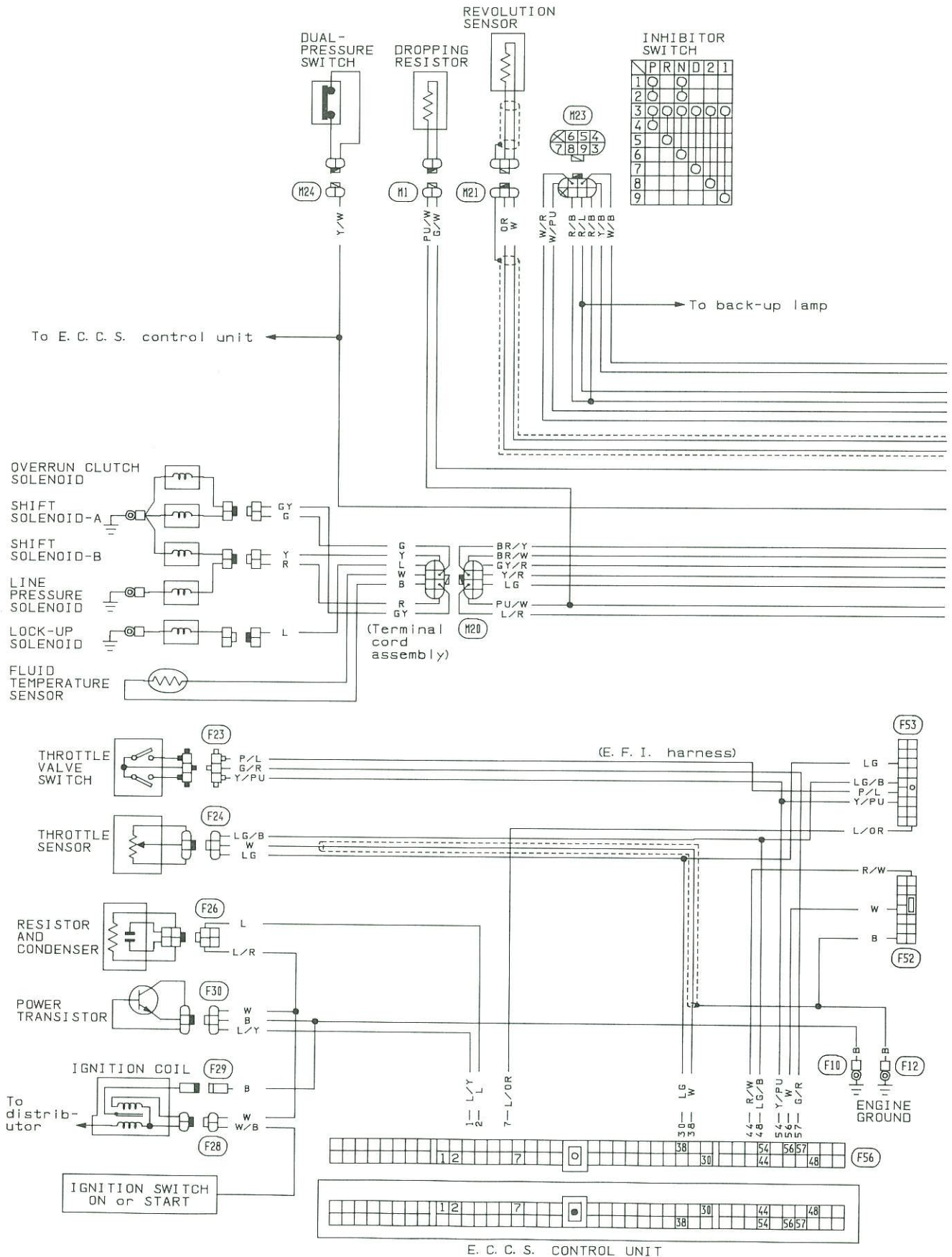
Circuit Diagram for Quick Pinpoint Check



MAT022A

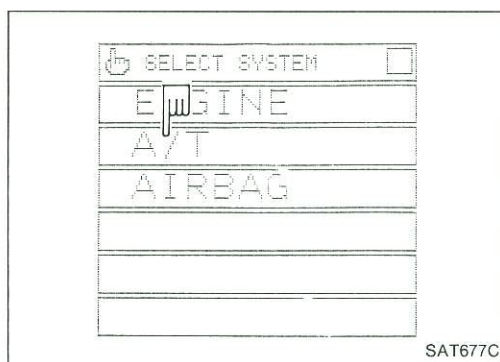
TROUBLE DIAGNOSES

Wiring Diagram



Wiring Diagram (Cont'd)

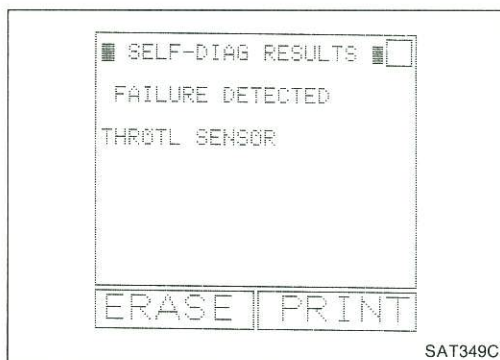




Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

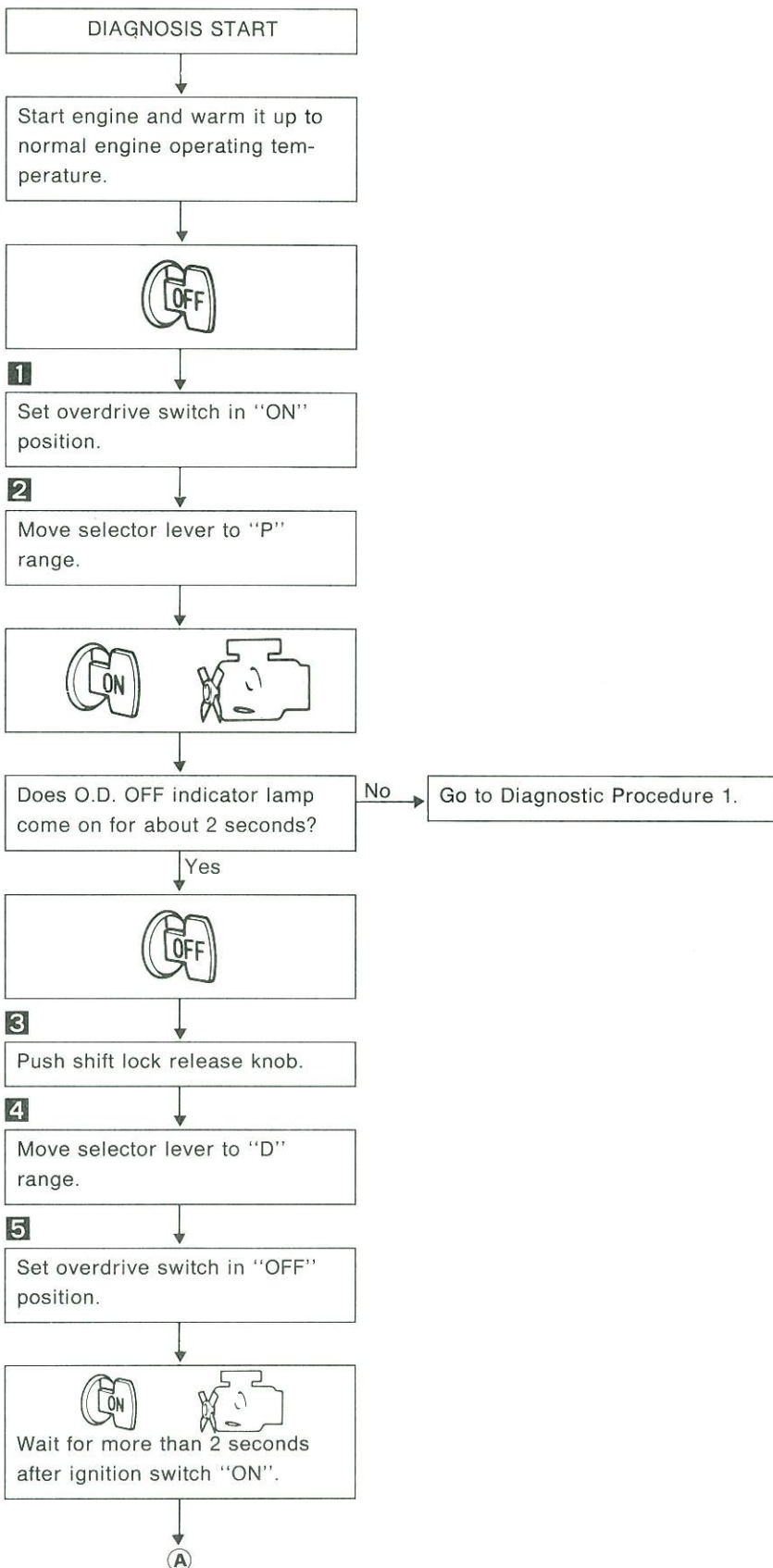
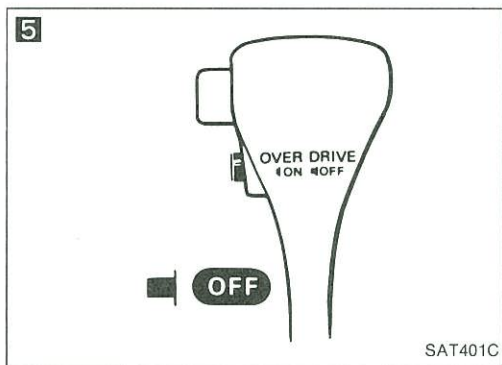
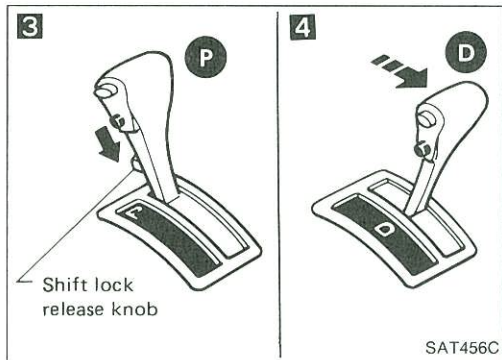
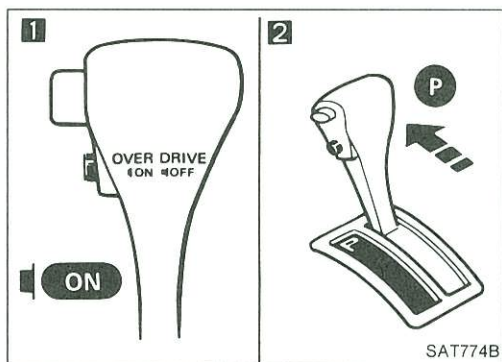
1. Turn on CONSULT.
2. Touch "A/T".
3. Touch "SELF-DIAGNOSIS".
CONSULT performs REAL-TIME SELF-DIAGNOSIS.



TROUBLE DIAGNOSES

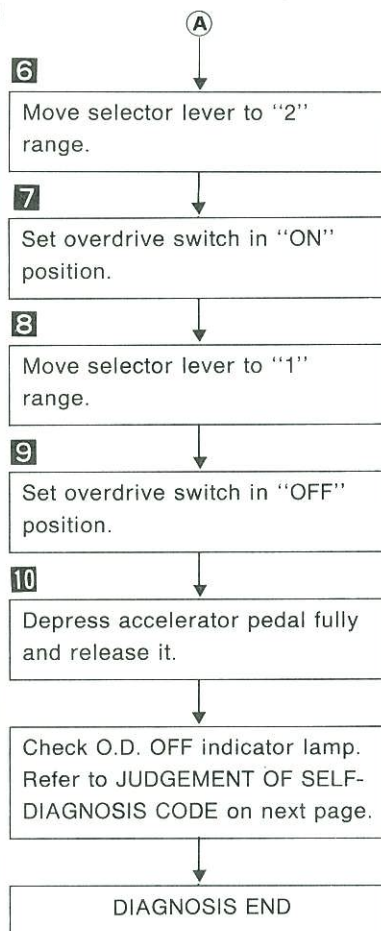
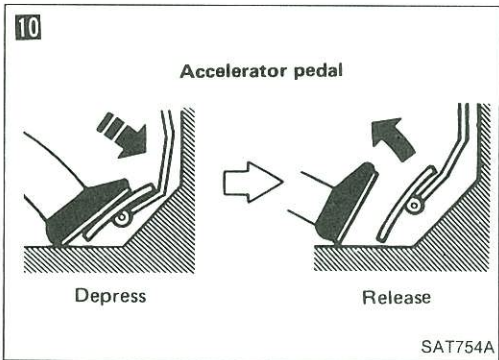
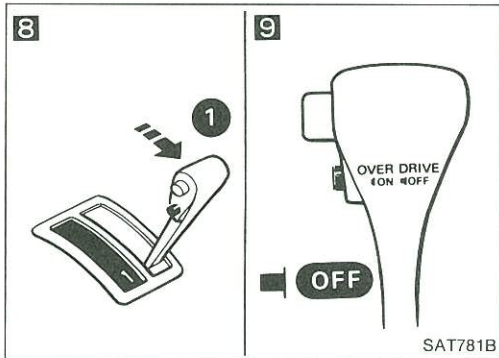
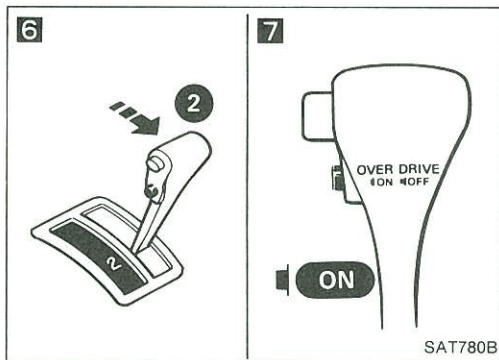
Self-diagnosis (Cont'd)

SELF-DIAGNOSTIC PROCEDURE (⌚ Without CONSULT)



TROUBLE DIAGNOSES

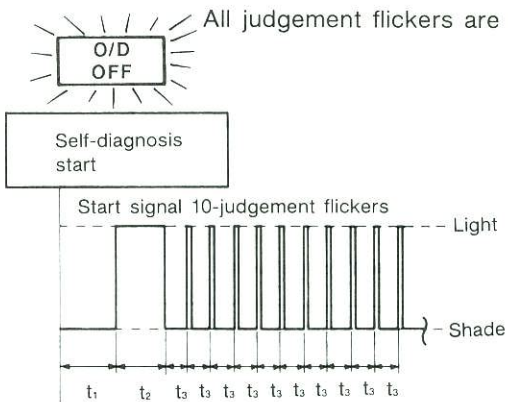
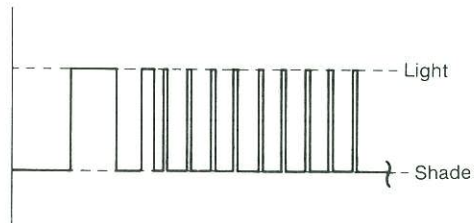
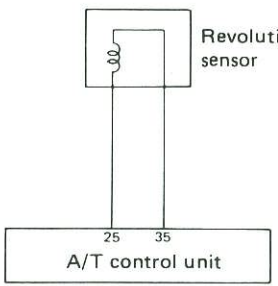
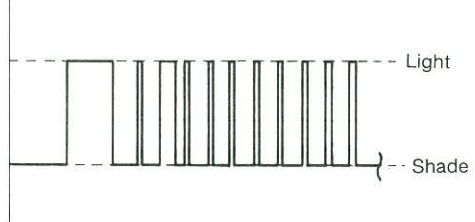
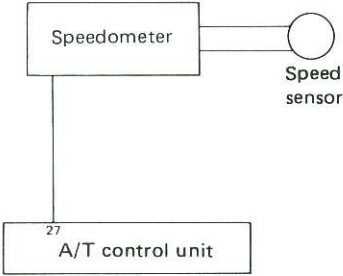
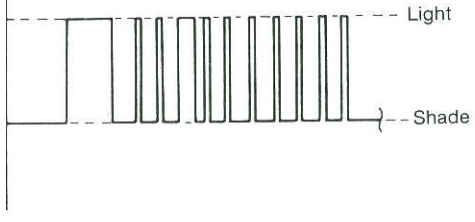
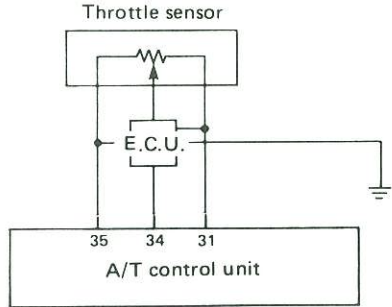
Self-diagnosis (Cont'd)



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

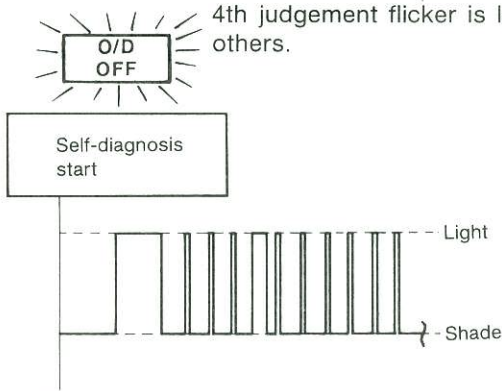
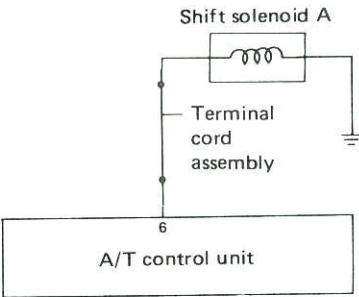
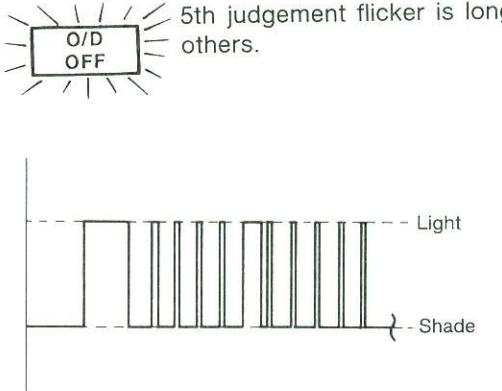
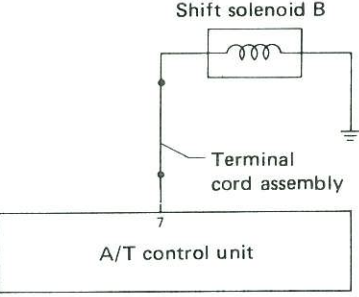
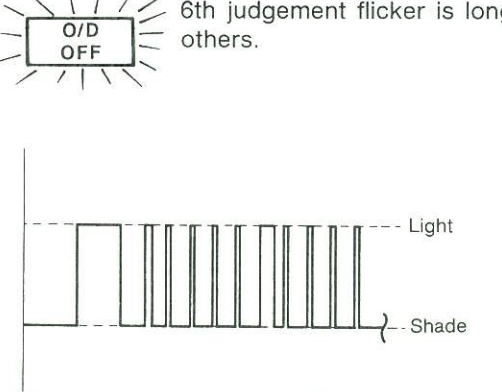
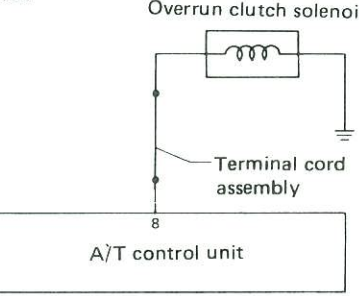
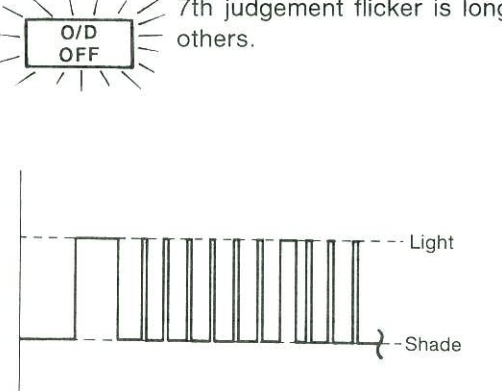
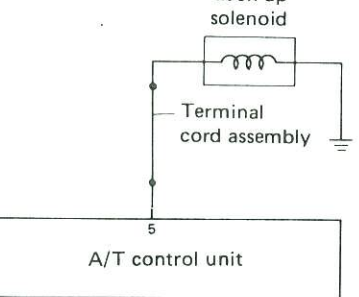
JUDGEMENT OF SELF-DIAGNOSIS CODE

<p>O.D. OFF indicator lamp</p> <p>All judgement flickers are same.</p>  <p>SAT678C</p>	<p>Damaged circuit</p> <p>All circuits that can be confirmed by self-diagnosis are O.K.</p>
<p>1st judgement flicker is longer than others.</p>  <p>SAT679C</p>	<p>Revolution sensor circuit is short-circuited or disconnected.</p>  <p>➡ Go to revolution sensor circuit check. SAT965B</p>
<p>2nd judgement flicker is longer than others.</p>  <p>SAT680C</p>	<p>Speed sensor circuit is short-circuited or disconnected.</p>  <p>➡ Go to speed sensor circuit check. SAT067E</p>
<p>3rd judgement flicker is longer than others.</p>  <p>SAT681C</p>	<p>Throttle sensor circuit is short-circuited or disconnected.</p>  <p>➡ Go to throttle sensor circuit check. SAT967B</p>

$t_1 = 2.5$ seconds $t_2 = 2.0$ seconds $t_3 = 1.0$ second

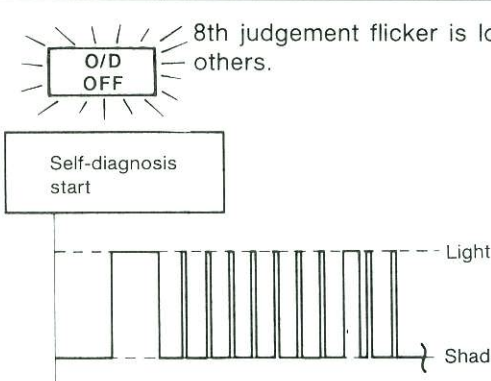
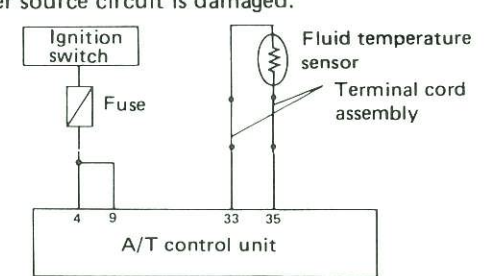
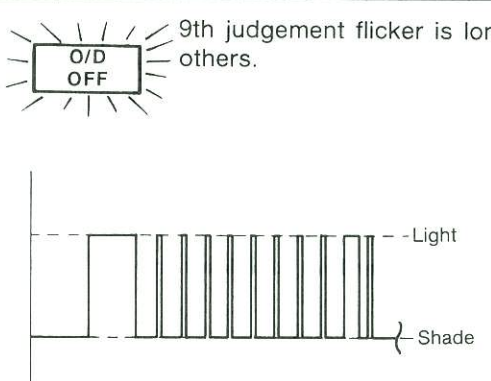
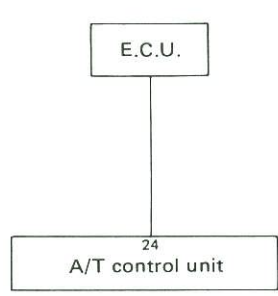
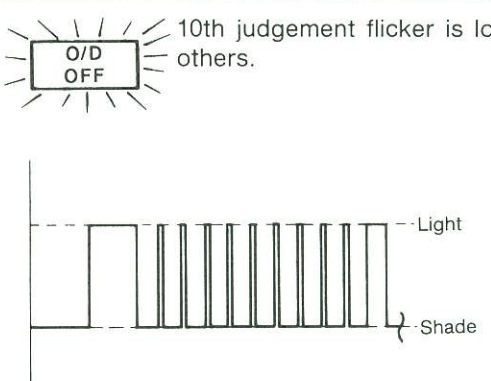
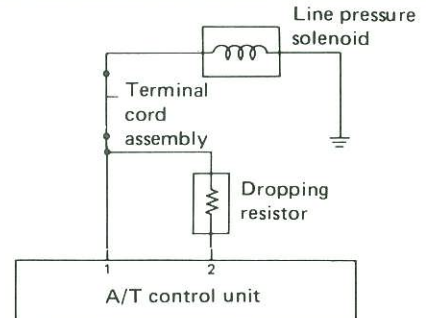
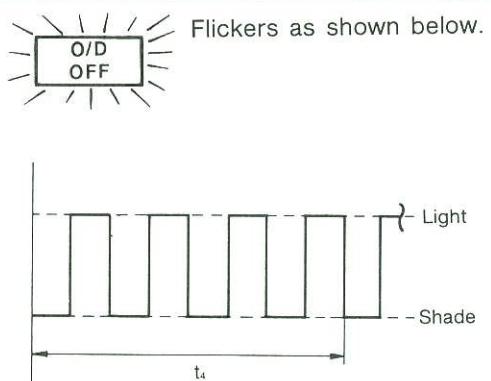
TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

O.D. OFF indicator lamp	Damaged circuit
<p>4th judgement flicker is longer than others.</p>  <p>Self-diagnosis start</p> <p>Light</p> <p>Shade</p> <p>SAT682C</p>	<p>Shift solenoid A circuit is short-circuited or disconnected.</p>  <p>Shift solenoid A</p> <p>Terminal cord assembly</p> <p>6</p> <p>A/T control unit</p> <p>➡ Go to shift solenoid A circuit check. SAT968B</p>
<p>5th judgement flicker is longer than others.</p>  <p>Light</p> <p>Shade</p> <p>SAT683C</p>	<p>Shift solenoid B circuit is short-circuited or disconnected.</p>  <p>Shift solenoid B</p> <p>Terminal cord assembly</p> <p>7</p> <p>A/T control unit</p> <p>➡ Go to shift solenoid B circuit check. SAT969B</p>
<p>6th judgement flicker is longer than others.</p>  <p>Light</p> <p>Shade</p> <p>SAT684C</p>	<p>Overrun clutch solenoid circuit is short-circuited or disconnected.</p>  <p>Overrun clutch solenoid</p> <p>Terminal cord assembly</p> <p>8</p> <p>A/T control unit</p> <p>➡ Go to overrun clutch solenoid circuit check. SAT970B</p>
<p>7th judgement flicker is longer than others.</p>  <p>Light</p> <p>Shade</p> <p>SAT685C</p>	<p>Lock-up solenoid circuit is short-circuited or disconnected.</p>  <p>Lock-up solenoid</p> <p>Terminal cord assembly</p> <p>5</p> <p>A/T control unit</p> <p>➡ Go to lock-up solenoid circuit check. SAT971B</p>

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

<p>O.D. OFF indicator lamp</p> <p>8th judgement flicker is longer than others.</p>  <p>SAT686C</p>	<p>Damaged circuit</p> <p>Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.</p>  <p>➡ Go to fluid temperature sensor and A/T control unit power source circuit check. SAT972B</p>
<p>9th judgement flicker is longer than others.</p>  <p>SAT687C</p>	<p>Engine revolution signal circuit is short-circuited or disconnected.</p>  <p>➡ Go to engine revolution signal circuit check. SAT973B</p>
<p>10th judgement flicker is longer than others.</p>  <p>SAT688C</p>	<p>Line pressure solenoid circuit is short-circuited or disconnected.</p>  <p>➡ Go to line pressure solenoid circuit check. SAT974B</p>
<p>Flickers as shown below.</p>  <p>SAT689C</p>	<p>Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting A/T control unit connectors. — This is not a problem.)</p>

$t_4 = 1.0 \text{ second}$

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

O.D. OFF indicator lamp	Damaged circuit
<p>Does not come on.</p> <div> </div>	<p>Inhibitor switch, overdrive switch, kickdown switch or idle switch circuit is disconnected or A/T control unit is damaged.</p> <div> </div> <p>➡ Go to inhibitor, overdrive, kickdown and idle switch circuit checks.</p>

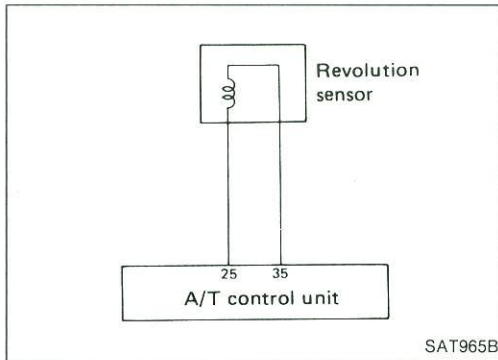
SAT690C

SAT319C

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK



CHECK REVOLUTION SENSOR.
— Refer to "Electrical Components Inspection".

N.G.

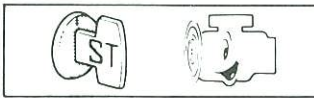
Repair or replace revolution sensor.

A

O.K.

CHECK INPUT SIGNAL.

1.



2.



- Select "E.C.U. INPUT SIGNALS".
- Read out the value of "CAR SPEED SENSOR 1" while driving.
- Check the value changes according to driving speed.

N.G.

Check harness continuity between A/T control unit and revolution sensor.

A



★MONITOR	★NO FAIL	
CAR/S SE1-A/T	0km/h	
CAR/S SE2-MTR	5km/h	
THROTTLE SEN	0.4V	
FLUID TEMP SE	1.2V	
BATTERY VOLT	13.4V	
ENG REV	1024rpm	
SLCT LEVER SW	0 N	
R-RANGE SW	OFF	
N-RANGE SW	0 N	
RECORD		

SAT320C



Check voltage between A/T control unit 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.)

O.K.

Perform self-diagnosis again after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

INSPECTION END

A



25

W




SAT976B

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

SPEED SENSOR CIRCUIT CHECK

A

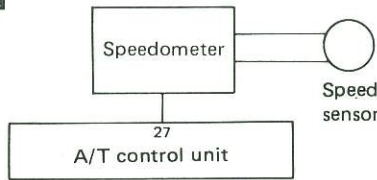


☆MONITOR ☆NG FAIL	
CAR/S SE1-A/T	0km/h
CAR/S SE2-MTR	5km/h
THROTTLE SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENG REV	1024rpm
SLOT LEVER SW	0 N
R-RANGE SW	OFF
N-RANGE SW	0 N

RECORD

SAT320C

A




Speedometer

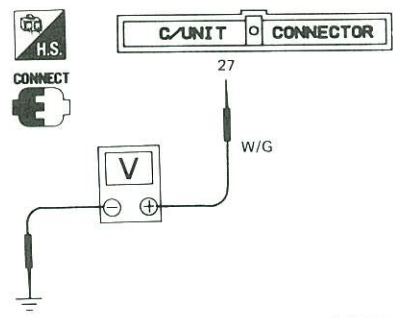
Speed sensor

27

A/T control unit



At 2 - 3 km/h
(1 - 2 MPH)



H.S. CONNECT

C/UNIT CONNECTOR

27

V

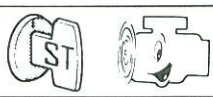
W/G


GND

SAT068E

A


CHECK INPUT SIGNAL.

1. 

2. 

- Select "E.C.U. INPUT SIGNALS".
- Read out the value of "CAR SPEED SENSOR 2" while driving.
- Check the value changes according to driving speed.

—OR—



- Check voltage between A/T control unit terminal 27 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.

Voltage: Varies from 0V to 5V

N.G. → Check the following items.

- Speed sensor and ground circuit for speed sensor — Refer to section EL.
- Harness continuity between A/T control unit and speed sensor

O.K. → Perform self-diagnosis again after driving for a while.

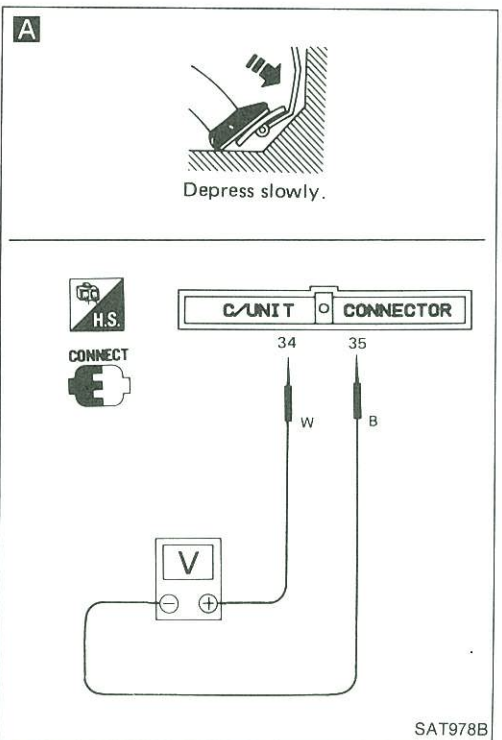
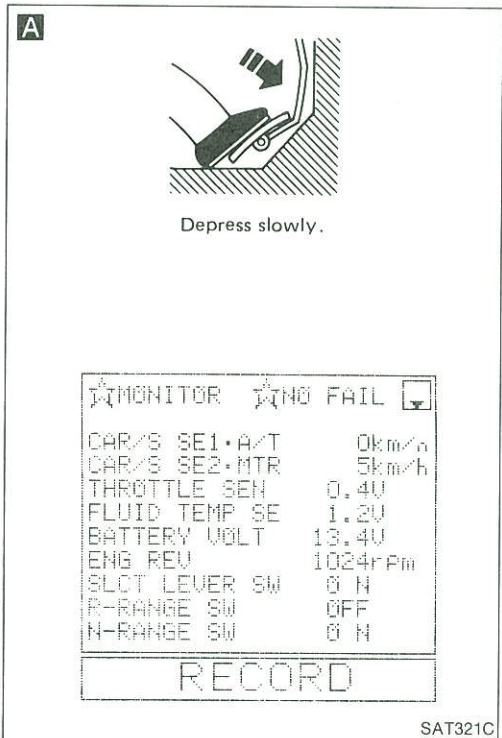
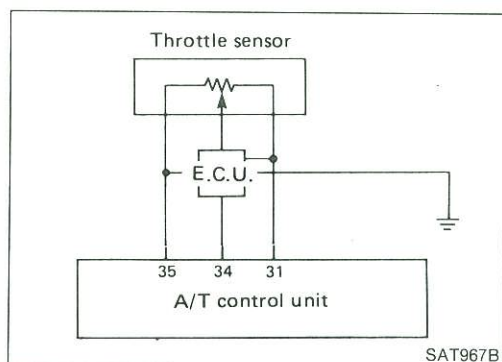
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. → **INSPECTION END**

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

THROTTLE SENSOR CIRCUIT CHECK



Perform self-diagnosis (Mode III) for engine control.

N.G.

Check throttle sensor circuit for engine control. — Refer to section EF & EC.

O.K.

A

CHECK INPUT SIGNAL.

1.



2.



- Select "E.C.U. INPUT SIGNALS".
- Read out the value of "THROTTLE SENSOR".

Voltage:

Fully-closed throttle:

Approximately
0.5V

Fully-open throttle:

Approximately
4V

OR



- Check voltage between A/T control unit terminals ③④ and ③⑤ while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle:

Approximately
0.5V

Fully-open throttle:

Approximately
4V

(Voltage rises gradually in response to throttle valve opening.)

O.K.

Perform self-diagnosis again after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

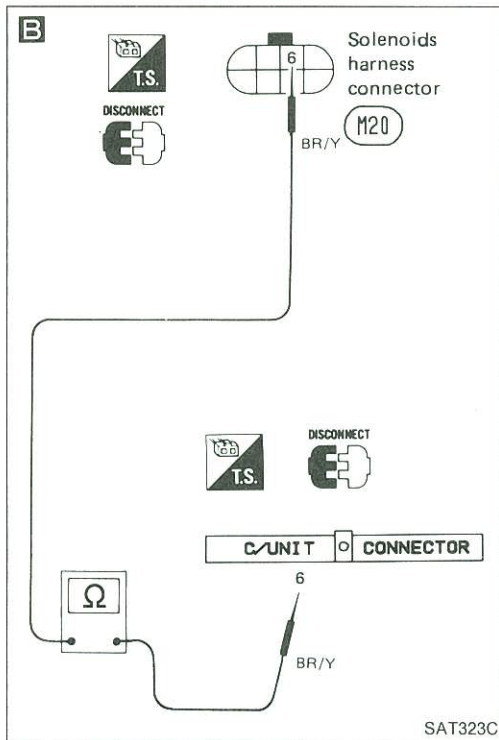
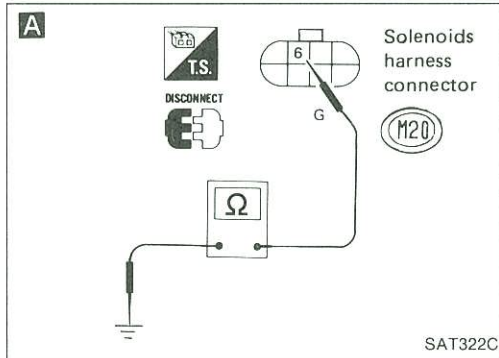
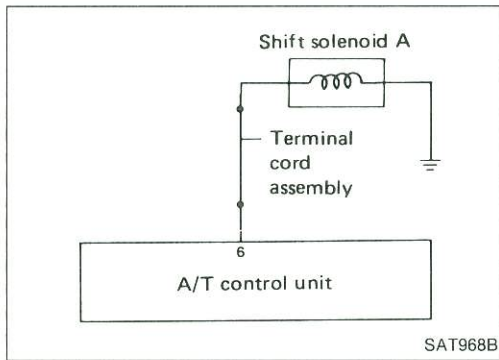
O.K.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

SHIFT SOLENOID A CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

- 1.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.
Resistance: 20 - 40Ω

N.G.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
 - Shift solenoid A — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly

B

CHECK POWER SOURCE CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑥ and A/T control unit terminal ⑥.
Resistance: Approximately 0Ω
4. Reinstall any part removed.

N.G.

- Repair or replace harness between A/T control unit and terminal cord assembly.

O.K.

Perform self-diagnosis after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

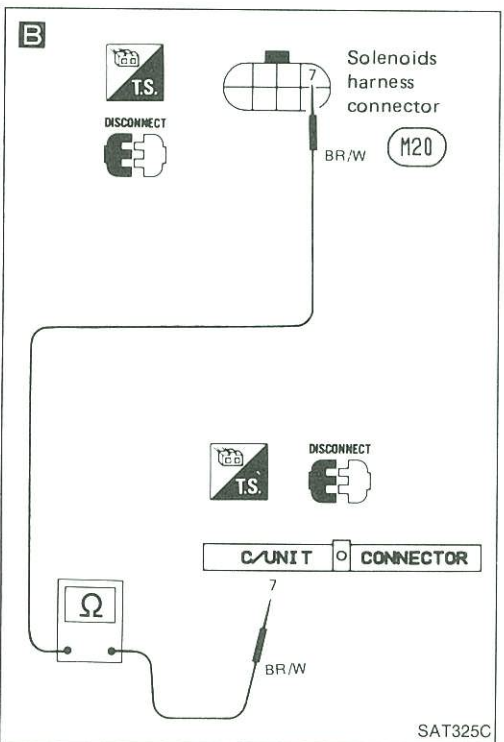
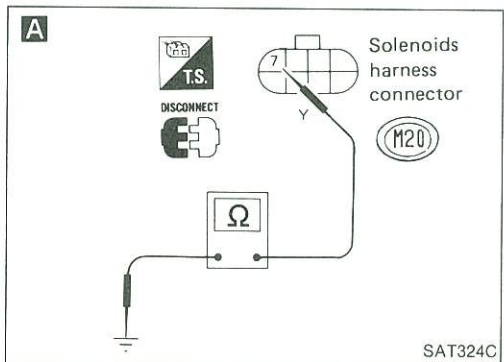
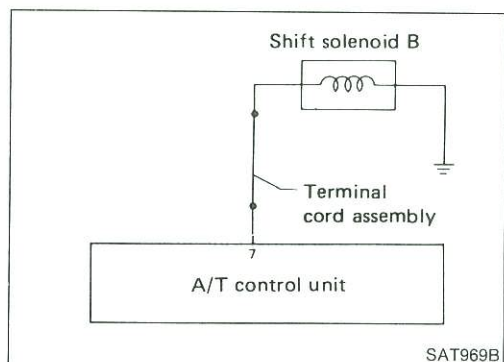
O.K.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

SHIFT SOLENOID B CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

- 1.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.
Resistance: 20 - 40Ω

N.G.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
 - Shift solenoid B — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly

B

CHECK POWER SOURCE CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑦ and A/T control unit terminal ⑦.
Resistance: Approximately 0Ω
4. Reinstall any part removed.

N.G.

- Repair or replace harness between A/T control unit and terminal cord assembly.

O.K.

Perform self-diagnosis after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

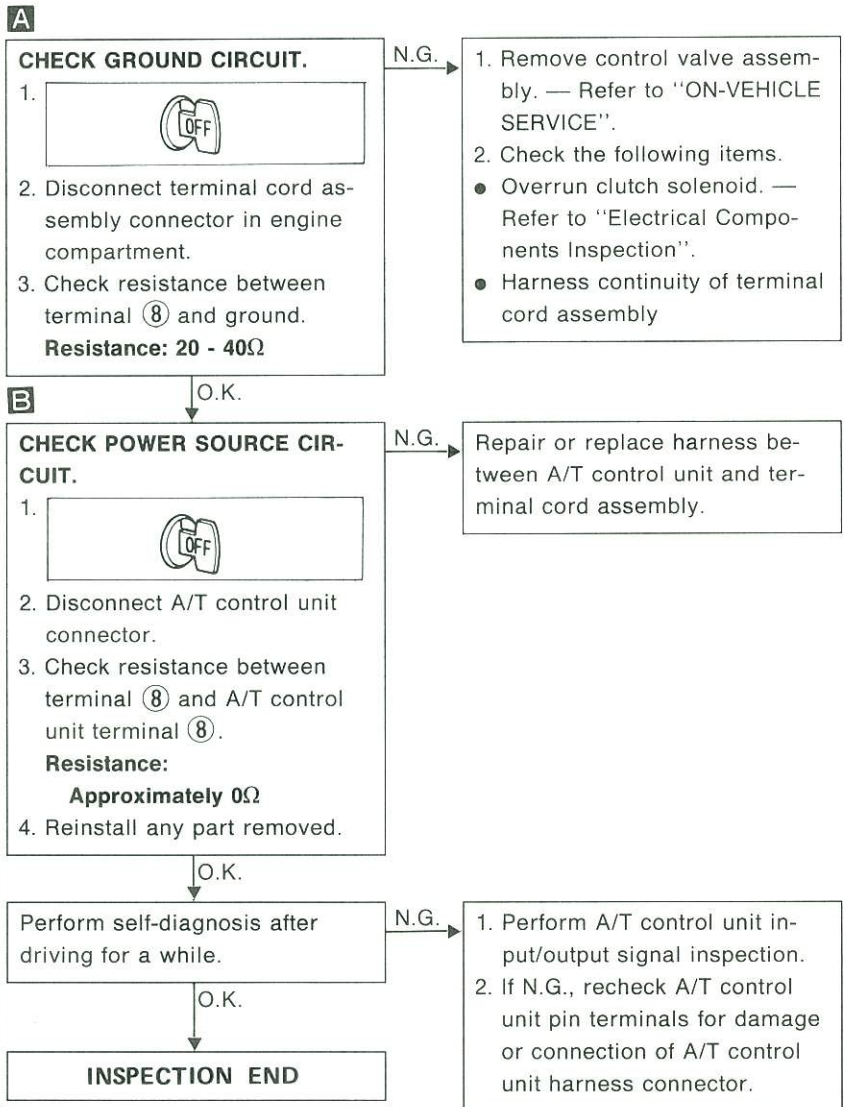
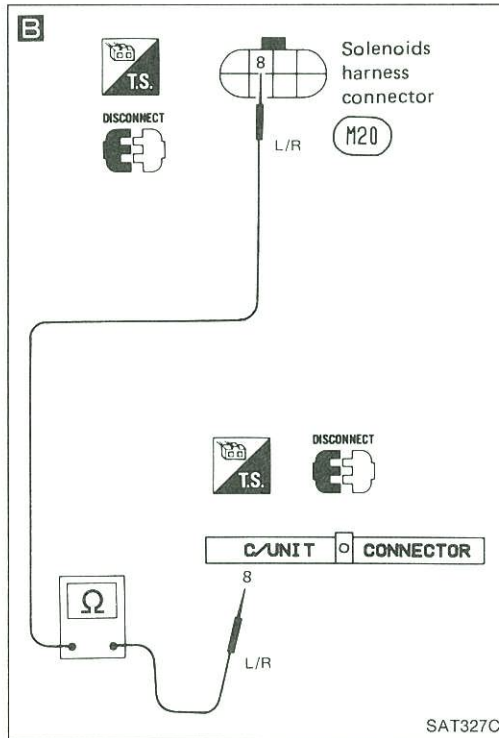
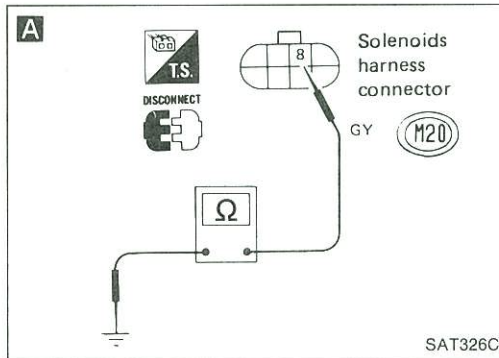
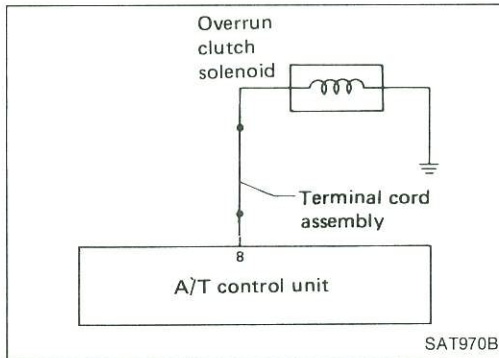
O.K.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

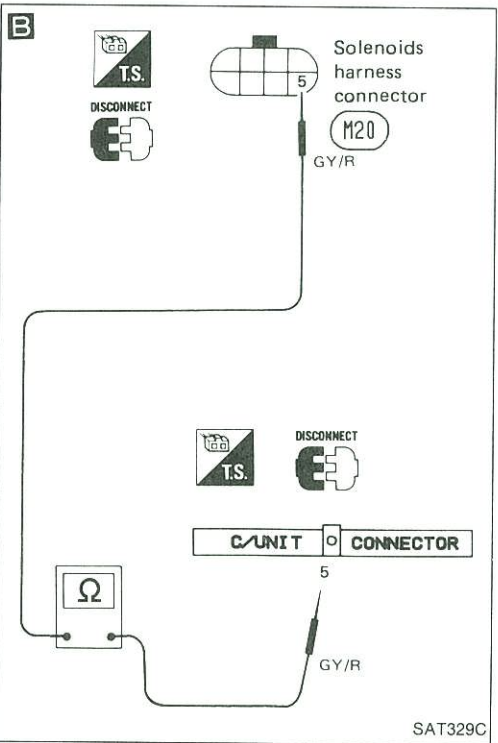
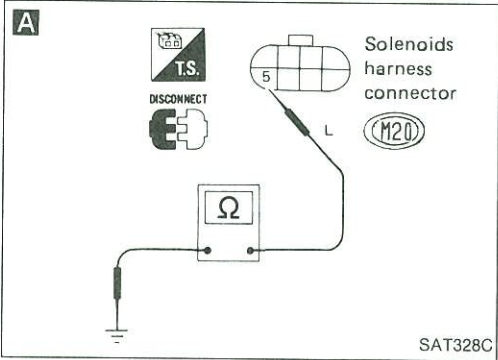
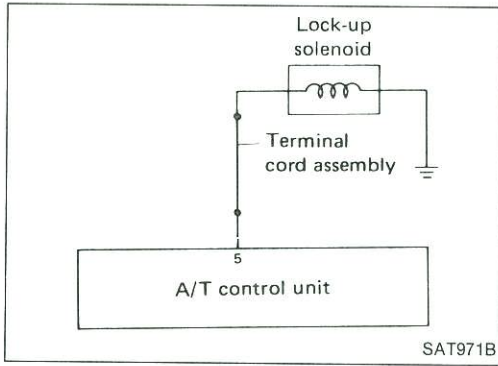
OVERRUN CLUTCH SOLENOID CIRCUIT CHECK



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

LOCK-UP SOLENOID CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

- 1.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
Resistance: 10 - 20 Ω

N.G.

1. Remove oil pan. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
 - Lock-up solenoid — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly

B

CHECK POWER SOURCE CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑤ and A/T control unit terminal ⑤
Resistance: Approximately 0 Ω
4. Reinstall any part removed.

N.G.

- Repair or replace harness between A/T control unit and terminal cord assembly.

O.K.

O.K.

Perform self-diagnosis after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

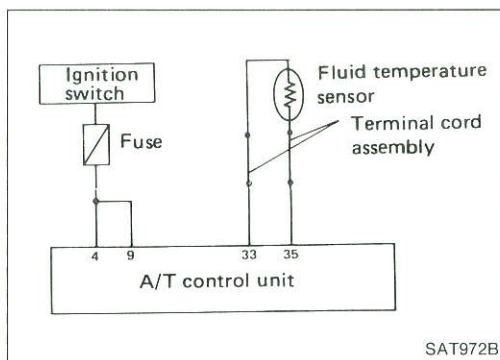
O.K.

INSPECTION END

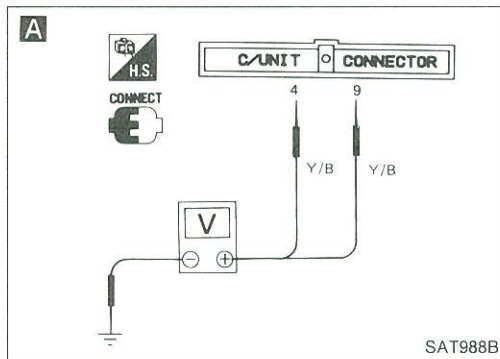
TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

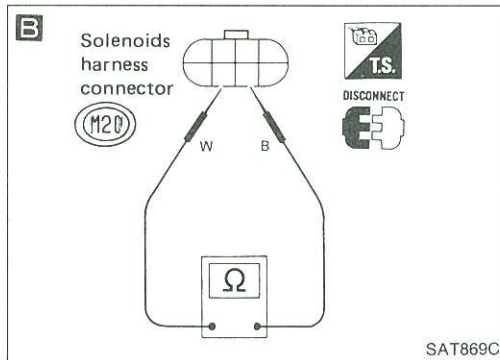
FLUID TEMPERATURE SENSOR CIRCUIT AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS



SAT972B



SAT988B



SAT869C

A

CHECK A/T CONTROL UNIT POWER SOURCE.

1. Check voltage between A/T control unit terminals ④ and ⑨ and ground. Battery voltage should exist.
2. Check voltage between A/T control unit terminals ④ and ⑨ and ground.

N.G.

Check the following items.

- Harness continuity between ignition switch and A/T control unit.
- Ignition switch and fuse — Refer to section EL.

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. Disconnect terminal cord assembly connector in engine compartment.
2. Check resistance between terminals ③③ and ③⑤ when A/T is cold.
3. Check resistance between terminals ③③ and ③⑤ when A/T is cold.
4. Reinstall any part removed.

N.G.

1. Remove control valve cover.
 2. Check the following items.
- Fluid temperature sensor — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly

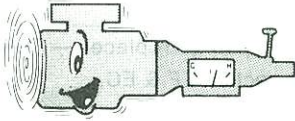
O.K.

A

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

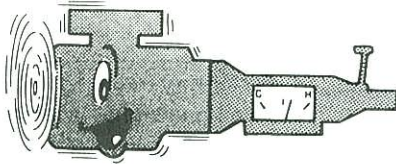
C



☆MONITOR	☆NO FAIL
CAR/S SE1·A/T	0km/h
CAR/S SE2·MTR	5km/h
THROTTLE SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENG REV	1024rPm
SLCT LEVER SW	0 N
R-RANGE SW	OFF
N-RANGE SW	0 N
RECORD	

SAT330C

C



C/UNIT CONNECTOR

33

Y/R



SAT990B

A

C

CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.

1.



2.



- Select "E.C.U. INPUT SIGNALS".
- Read out the value of "FLUID TEMPERATURE SENSOR".

Voltage:

Cold [20°C (68°F)] →

Hot [80°C (176°F)]:

Approximately

1.5V → 0.5V

OR



- Check voltage between A/T control unit terminal (33) and ground while warming up A/T.

Voltage:

Cold [20°C (68°F)] →

Hot [80°C (176°F)]:

Approximately

1.5V → 0.5V

N.G.

Check harness continuity between A/T control unit and terminal cord assembly.

O.K.

Perform self-diagnosis after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

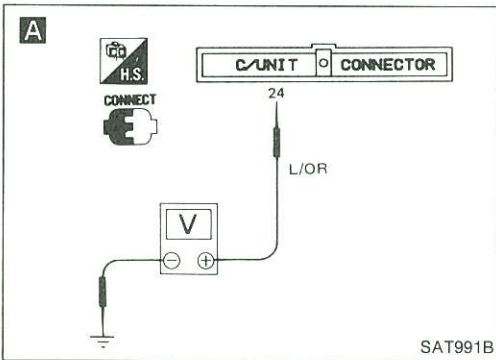
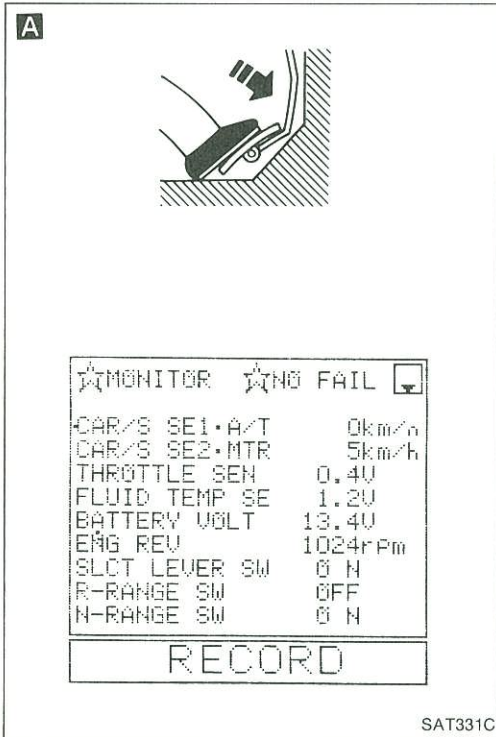
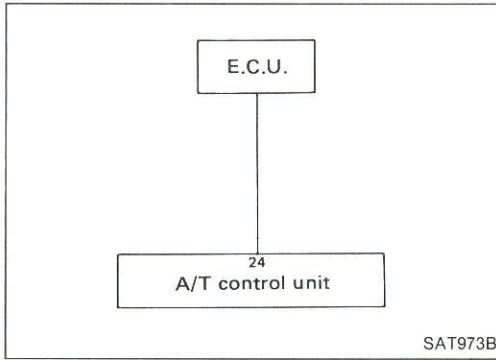
O.K.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

ENGINE REVOLUTION SIGNAL CIRCUIT CHECK



Check ignition circuit condition for engine.

N.G.

Repair or replace. — Refer to section EF & EC.

O.K.

A

CHECK INPUT SIGNAL.

1.



2.



- Select "E.C.U. INPUT SIGNALS".
- Read out the value of "ENGINE REVOLUTION".
- Check engine revolution changes according to throttle opening.

OR



- Check voltage between A/T control unit terminal 24 and ground.

Voltage: 0.9 - 4.5V

N.G.

Check harness continuity between A/T control unit and E.C.C.S. control unit.

O.K.

Perform self-diagnosis again after driving for a while.

N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

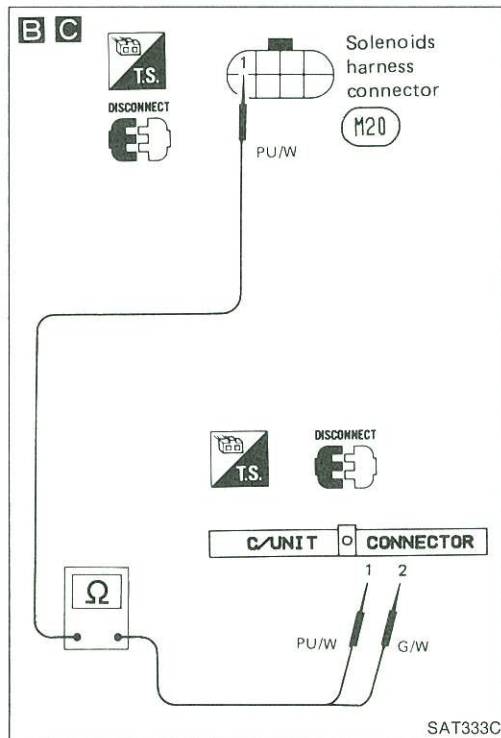
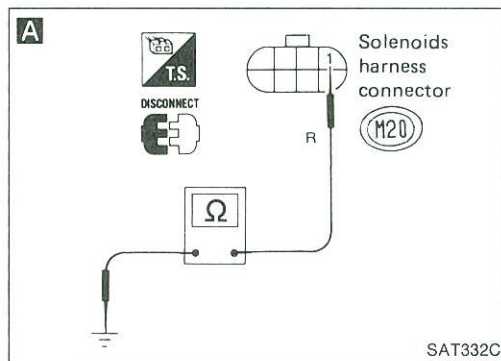
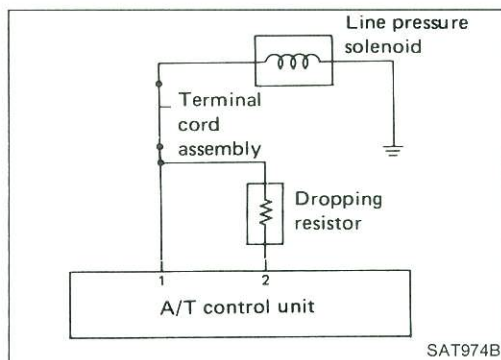
O.K.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

- 1.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.
Resistance: 2.5 - 5Ω

N.G.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
 - Line pressure solenoid — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly

B

CHECK POWER SOURCE CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ① and A/T control unit terminal ②.
Resistance: 11.2 - 12.8Ω

N.G.

- Check the following items.
- Dropping resistor — Refer to "Electrical Components Inspection".
 - Harness continuity between A/T control unit ② and terminal cord assembly

C

CHECK POWER SOURCE CIRCUIT.

- 1.
2. Check resistance between terminal ① and A/T control unit terminal ①.
Resistance: Approximately 0Ω
4. Reinstall any part removed.

N.G.

- Repair or replace harness between A/T control unit ① and terminal cord assembly.

O.K.

Perform self-diagnosis after driving for a while.

N.G.

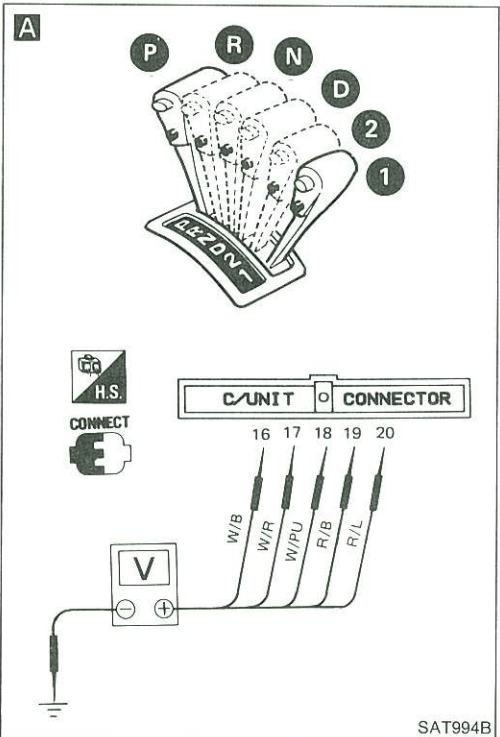
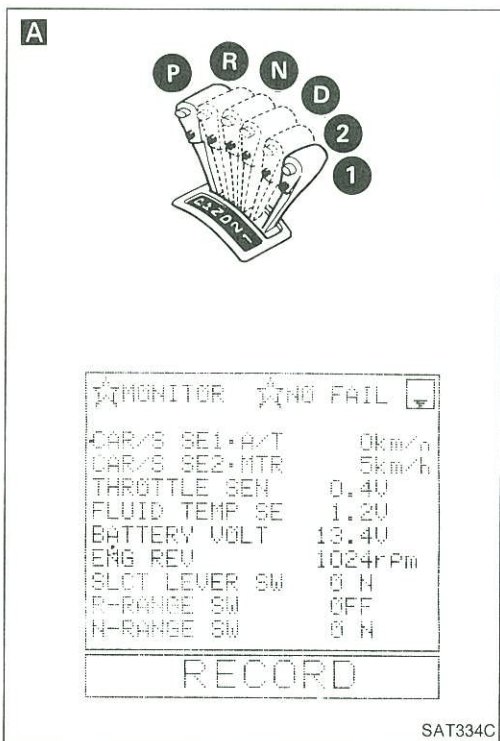
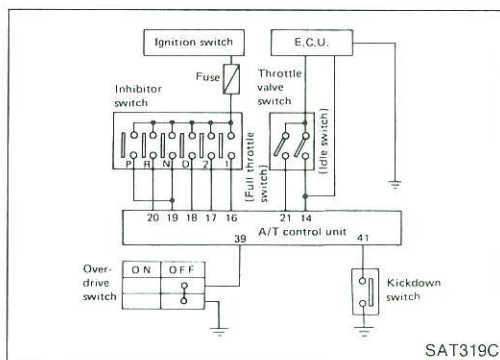
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

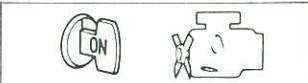
INHIBITOR, OVERDRIVE, KICKDOWN AND IDLE SWITCH CIRCUIT CHECKS



A

CHECK INHIBITOR SWITCH CIRCUIT.

1.



2.



- Select "E.C.U. INPUT signals".
- Read out "R, N, D, 1 and 2 range switches" moving selector lever to each range.
- Check the selector lever position is indicated properly.

OR



- Check voltage between A/T control unit terminals ①⑥, ①⑦, ①⑧, ①⑨, ②① and ground while moving selector lever through each range.

Voltage:

B: Battery voltage

0: 0V

Lever position	Terminal No.				
	①⑨	②①	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.

A

N.G.

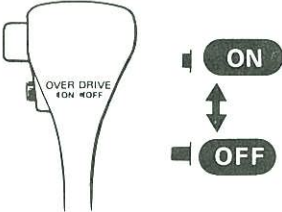
Check the following items.

- Inhibitor switch — Refer to "Electrical Components Inspection".
- Harness continuity between ignition switch and inhibitor switch
- Harness continuity between inhibitor switch and A/T control unit

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

B



OVER DRIVE
ON OFF

ON
OFF

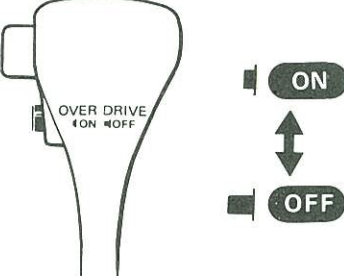
```

☆MONITOR ☆NO FAIL
CAR/S SE1-A/T      0km/h
CAR/S SE2-MTR      5km/h
THROTTLE SEN       0.4V
FLUID TEMP SE      1.2V
BATTERY VOLT       13.4V
ENG REV            1024rpm
SLCT LEVER SW      0 N
R-RANGE SW         OFF
N-RANGE SW         0 N
    
```

RECORD

SAT335C

B



OVER DRIVE
ON OFF

ON
OFF

H.S.
CONNECT

C/UNIT CONNECTOR

39


R/Y


V

SAT995B

B


CHECK OVERDRIVE SWITCH CIRCUIT.

1. 

2. 

- Select "E.C.U. INPUT SIGNALS".
- Read out "SELECTOR LEVER SWITCH (Overdrive switch)".
- Check the selector lever switch position is indicated properly. (Selector lever switch "ON" displayed on CONSULT means overdrive "OFF".)

— OR —



- Check voltage between A/T control unit terminal ③⑨ and ground when overdrive switch is in "ON" position and in "OFF" position.

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

N.G. → Check the following items.


- Overdrive switch — Refer to "Electrical Components Inspection".
- Harness continuity between A/T control unit and overdrive switch
- Harness continuity of ground circuit for overdrive switch

O.K. → **B**

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

C




☆MONITOR ☆NO FAIL	
D-RANGE SW	OFF
1-RANGE SW	OFF
2-RANGE SW	OFF
ASCD·CRUISE	OFF
ASCD·OD CUT	OFF
KICKDOWN SW	OFF
POWERSHIFT SW	OFF
IDLE SW	ON
FULL THRTL SW	OFF

RECORD

SAT336C

C



H.S.
CONNECT

C/UNIT CONNECTOR

41

OR

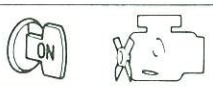
V


SAT337C

C

↓


CHECK KICKDOWN SWITCH CIRCUIT.

1. 

2. 

- Select "E.C.U. INPUT SIGNALS".
- Read out "KICKDOWN SWITCH" depressing accelerator pedal fully.
- Check kickdown switch position is indicated properly.

—OR—



- Check voltage between A/T control unit terminal (41) and ground while depressing accelerator pedal slowly. (after warming up engine)

Voltage:

When releasing accelerator pedal:

3 - 8V

When depressing accelerator pedal fully:

1V or less

N.G. → Check the following items.


- Kickdown switch
- Harness continuity between A/T control unit and kickdown switch
- Harness continuity of ground circuit for kickdown switch

O.K. → **C**

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

D




☆MONITOR ☆NO FAIL	
D-RANGE SW	OFF
1-RANGE SW	OFF
2-RANGE SW	OFF
ASCD+CRUISE	OFF
ASCD+OD CUT	OFF
KICKDOWN SW	OFF
POWERSHIFT SW	OFF
IDLE SW	ON
FULL THRTL SW	OFF

RECORD

SAT338C

D



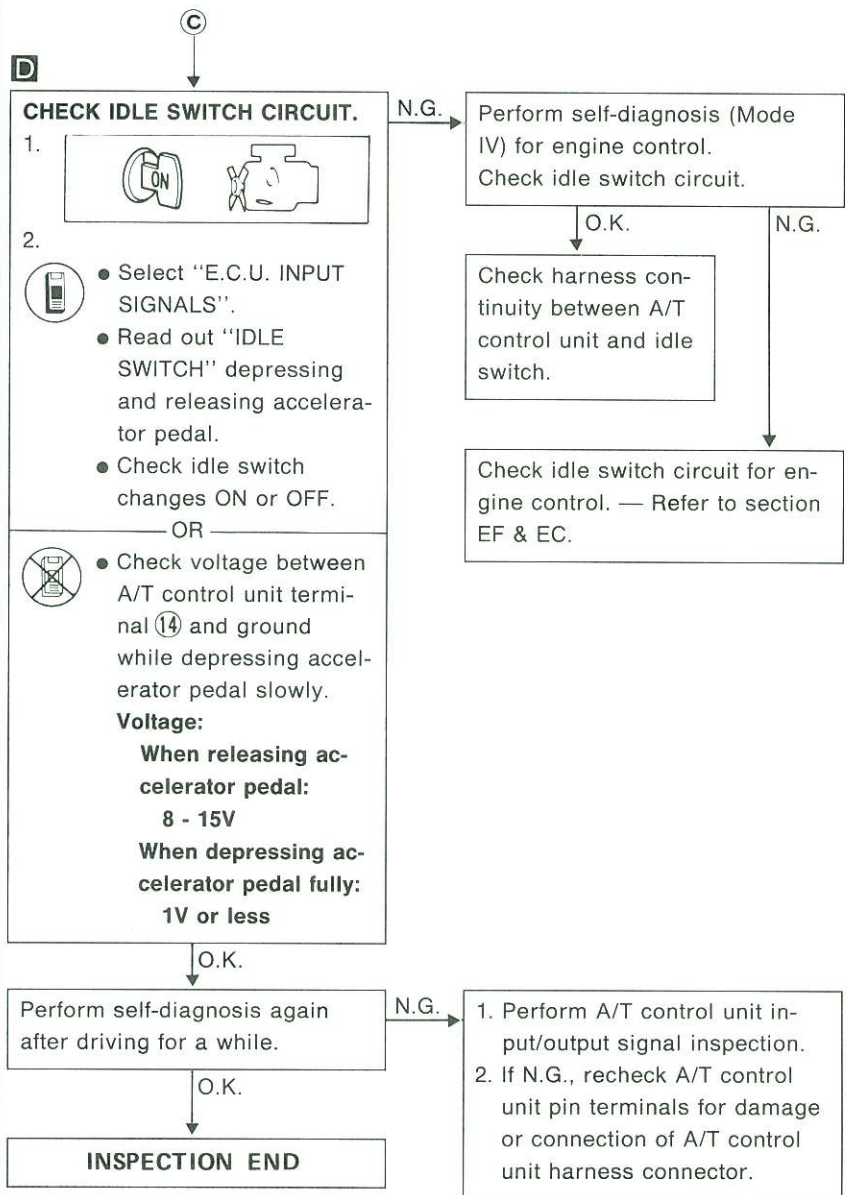
H.S.
CONNECT

C/UNIT CONNECTOR

14 Y/PU

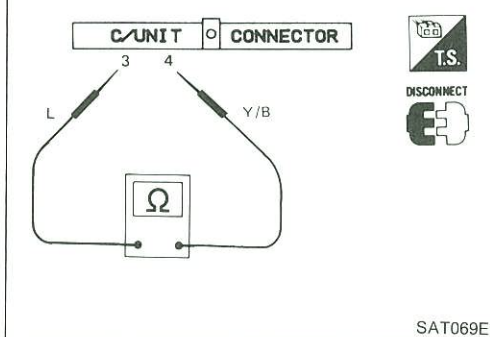
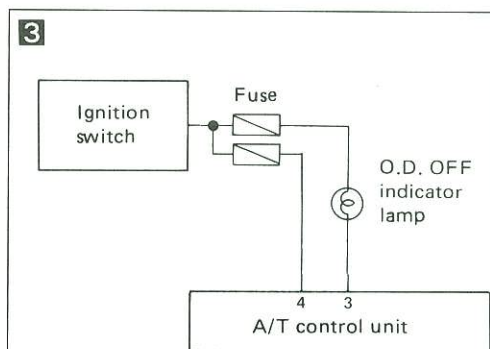
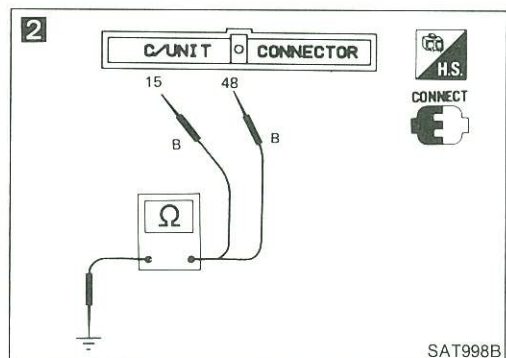
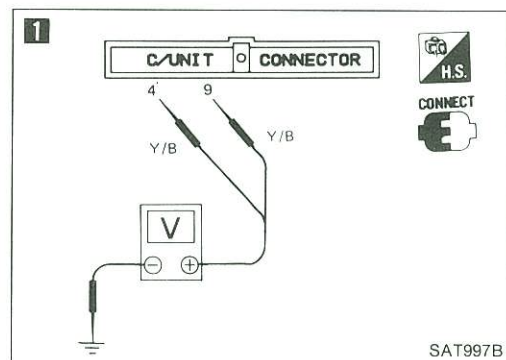
V

SAT339C



Diagnostic Procedure 1

SYMPTOM: O.D. OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to "ON".



1

CHECK A/T CONTROL UNIT POWER SOURCE.

- 1.
2. Check voltage between A/T control unit terminals (4), (9) and ground.
Battery voltage should exist.

N.G.

Check the following items.

- Harness continuity between ignition switch and A/T control unit.
- Ignition switch and fuse — Refer to section EL.

O.K.

2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals (15), (48) and ground.

Resistance:
Approximately 0Ω

N.G.

Check harness continuity between A/T control unit and ground.

O.K.

3

CHECK LAMP CIRCUIT.

- 1.
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals (3) and (4).
- Resistance: 50 - 100Ω**
4. Reinstall any part removed.

N.G.

Check the following items.

- O.D. OFF indicator lamp
- Harness continuity between ignition switch and O.D. OFF indicator lamp
- Harness continuity between O.D. OFF indicator lamp and A/T control unit

O.K.

Check again.

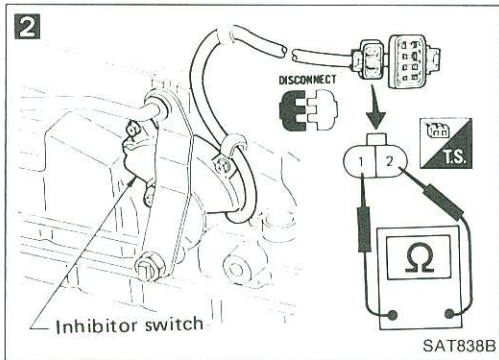
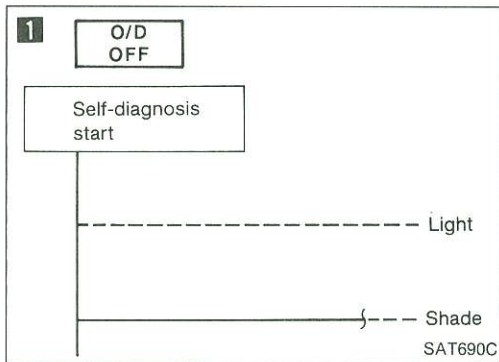
N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

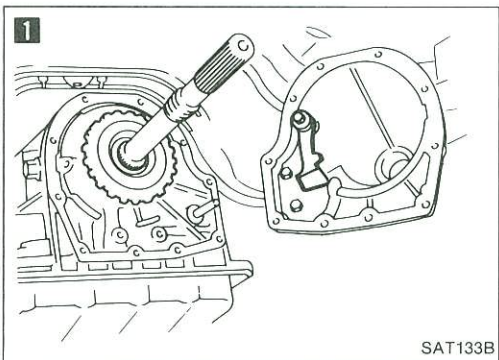
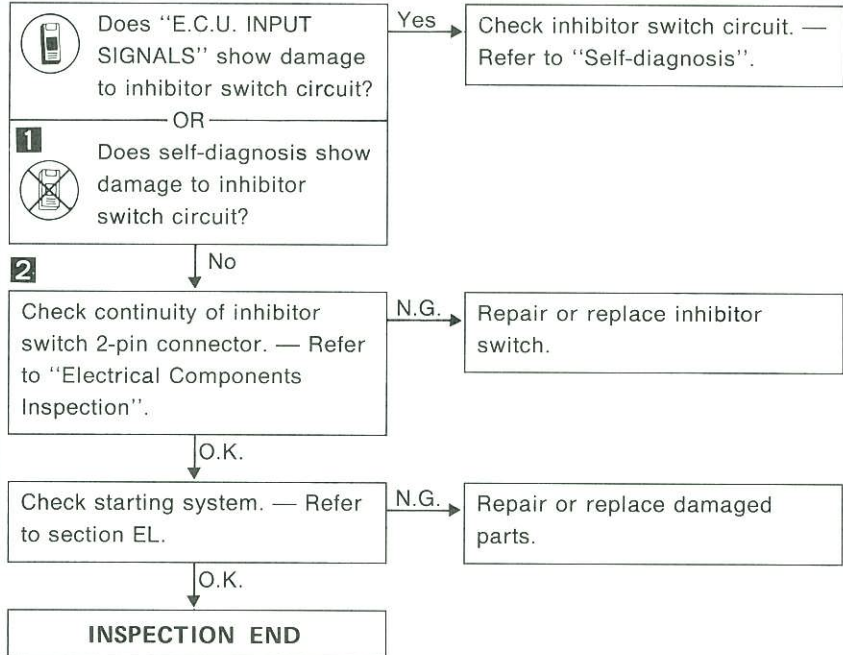
INSPECTION END

TROUBLE DIAGNOSES



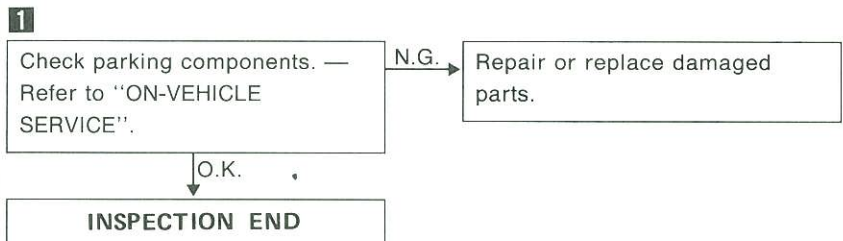
Diagnostic Procedure 2

SYMPTOM: Engine cannot be started with selector lever in "P" or "N" range or engine can be started with selector lever in "D", "2", "1" or "R" range.

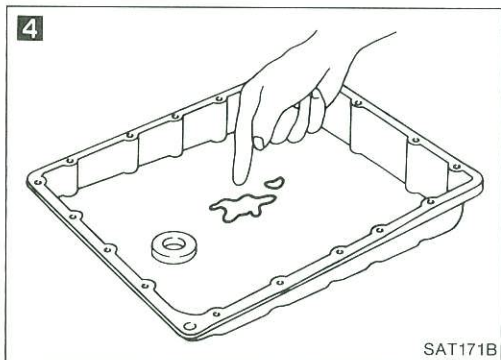
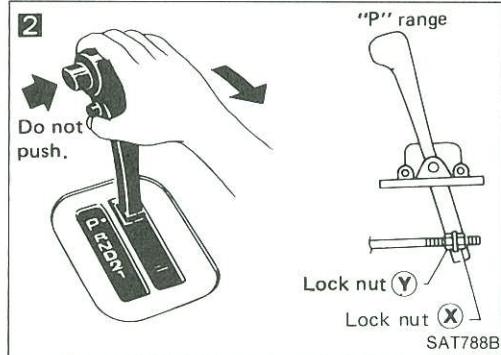
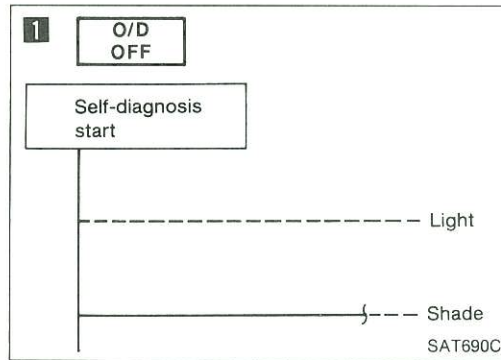


Diagnostic Procedure 3

SYMPTOM: Vehicle moves when it is pushed forward or backward with selector lever in "P" range.

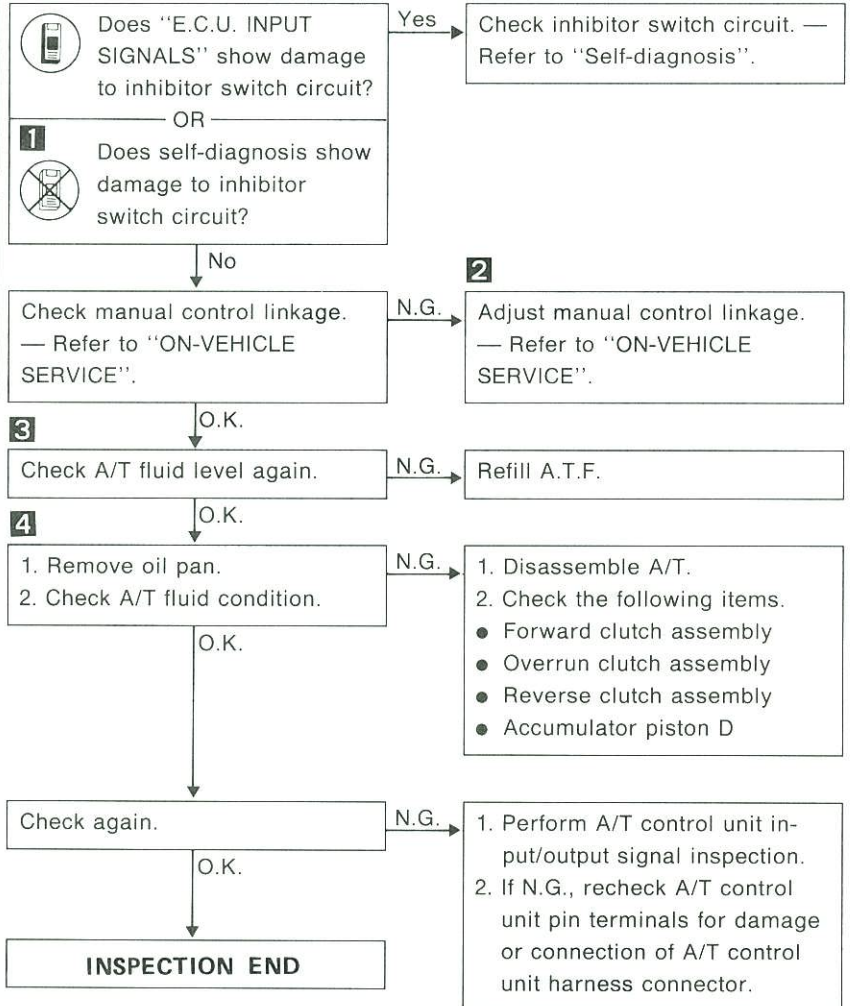


TROUBLE DIAGNOSES

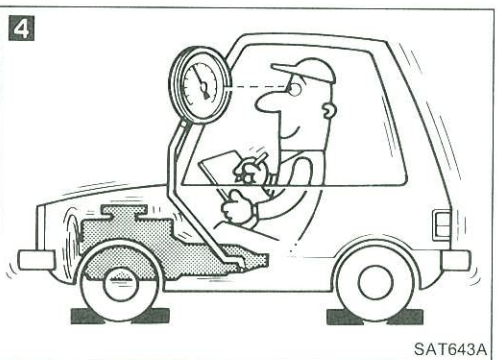
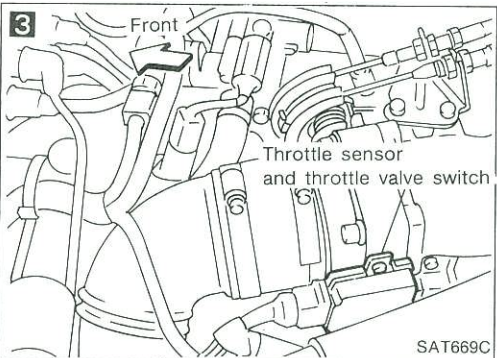
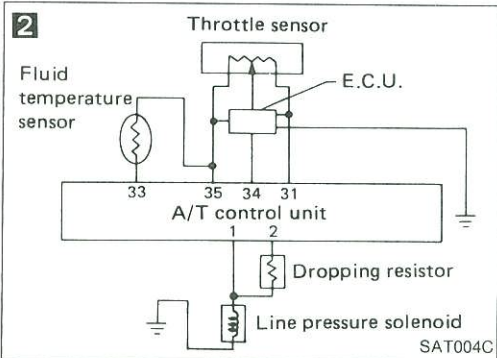
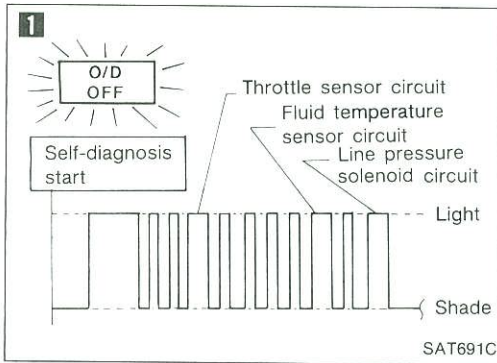


Diagnostic Procedure 4

SYMPTOM: Vehicle moves forward or backward when selecting "N" range.

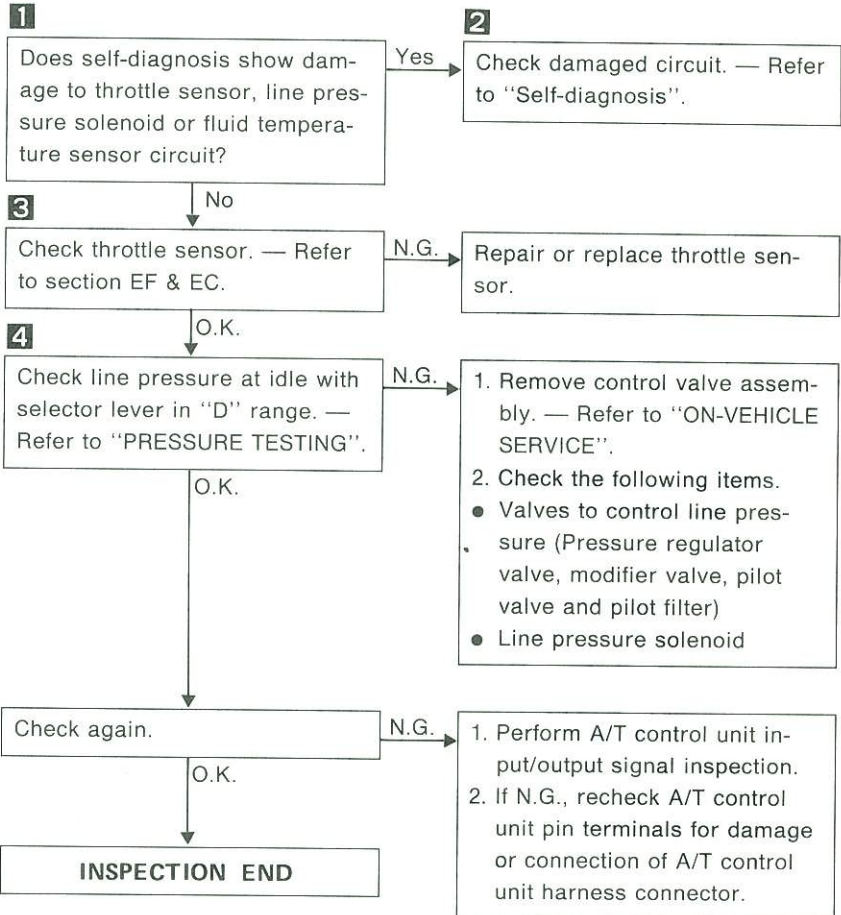


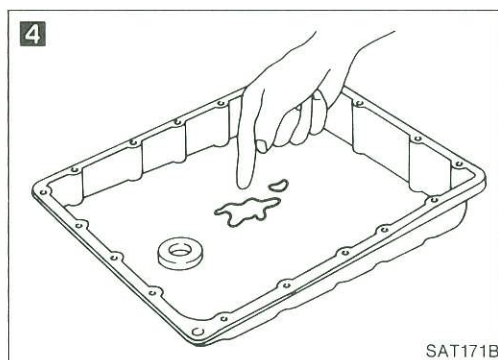
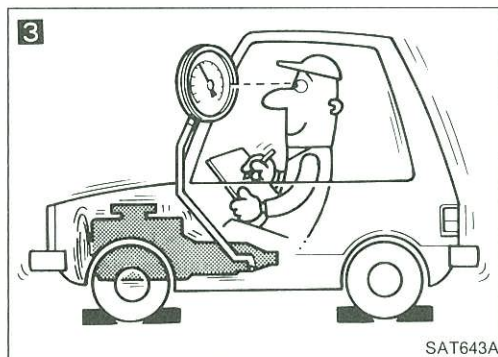
TROUBLE DIAGNOSES



Diagnostic Procedure 5

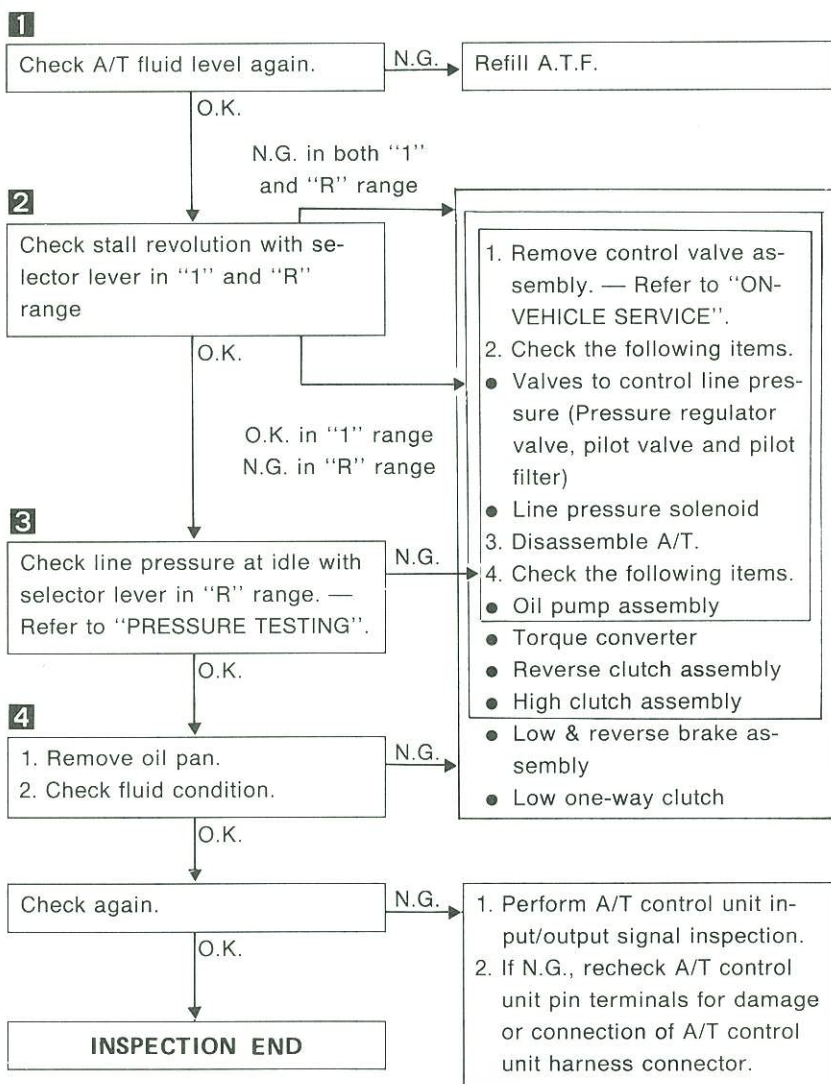
SYMPTOM: There is large shock when changing from "N" to "R" range.





Diagnostic Procedure 6

SYMPTOM: Vehicle does not creep backward when selecting "R" range.



TROUBLE DIAGNOSES

1



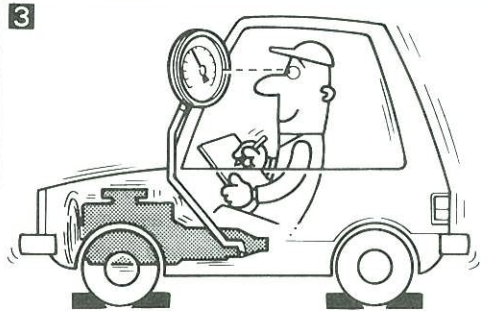
SAT638A

2



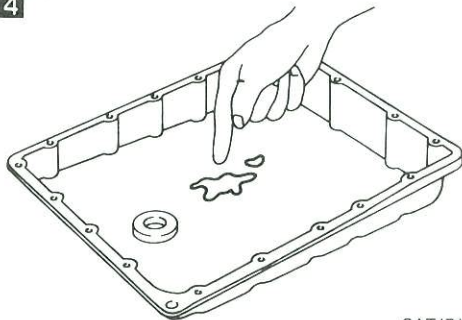
SAT642A

3



SAT643A

4



SAT171B

Diagnostic Procedure 7

SYMPTOM: Vehicle does not creep forward when selecting "D", "2" or "1" range.

1

Check A/T fluid level again.

N.G.

Refill A.T.F.

2

Check stall revolution with selector lever in "D" range. — Refer to "STALL TESTING".

N.G.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
 - Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
 - Line pressure solenoid
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

3

Check line pressure at idle with selector lever in "D" range. — Refer to "PRESSURE TESTING".

N.G.

4

1. Remove oil pan.
2. Check A/T fluid condition.

N.G.

O.K.

Check again.

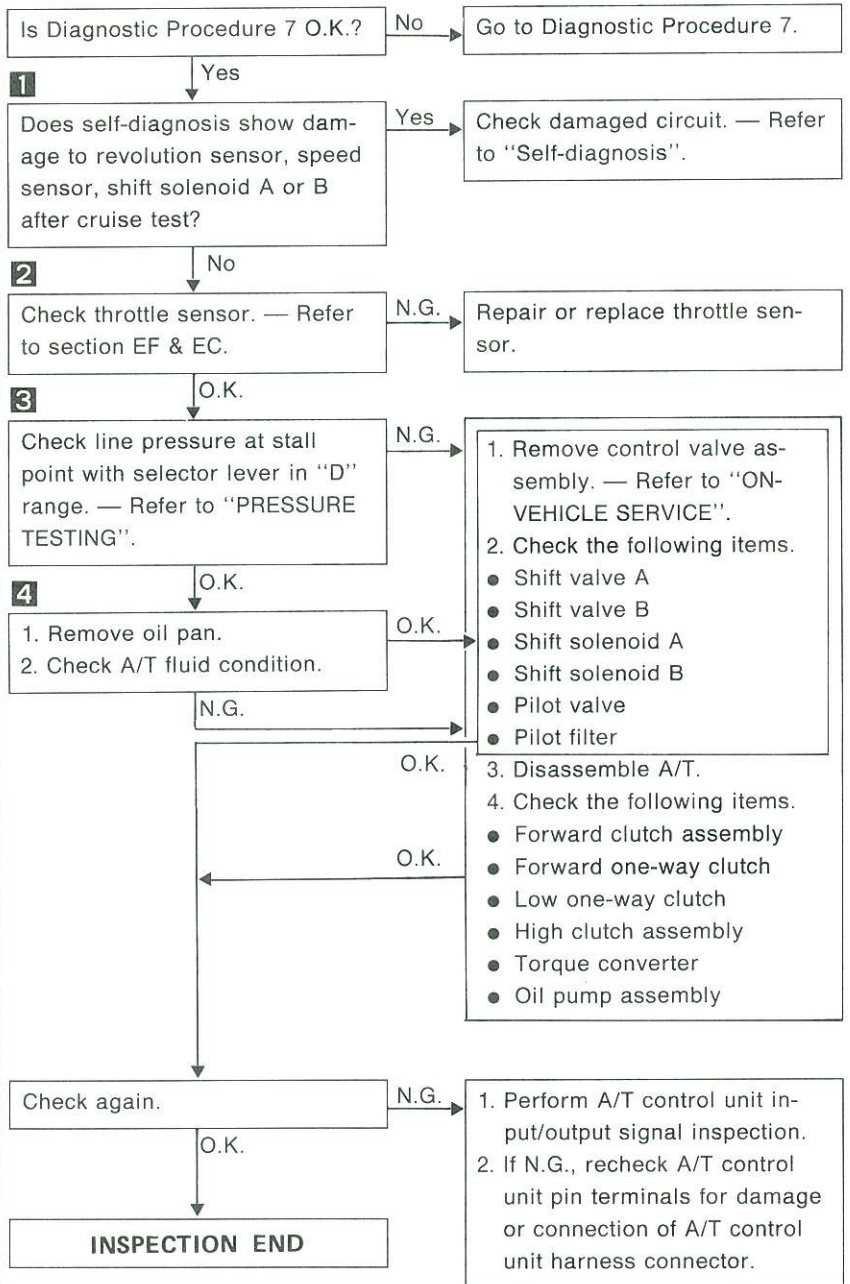
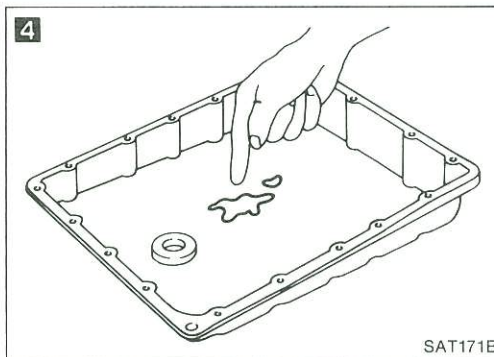
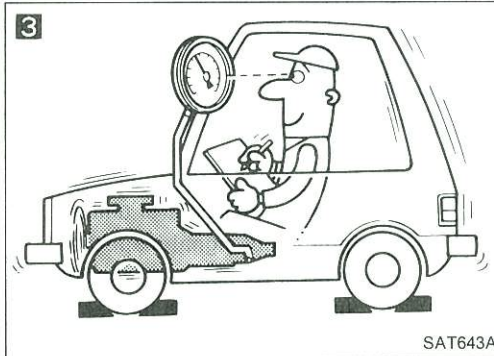
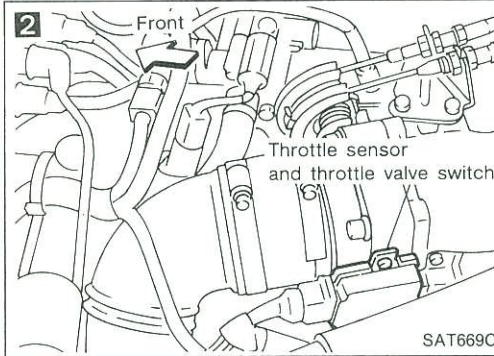
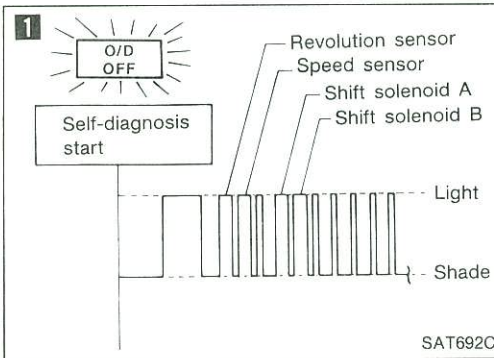
N.G.

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

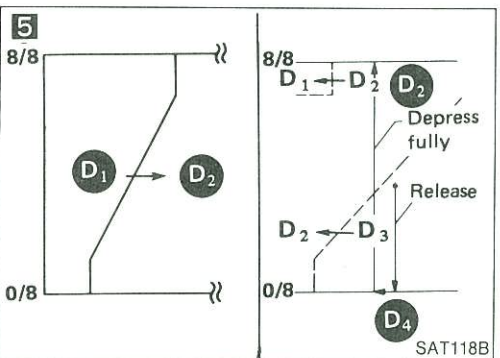
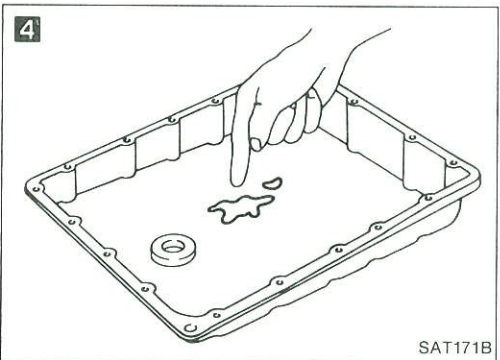
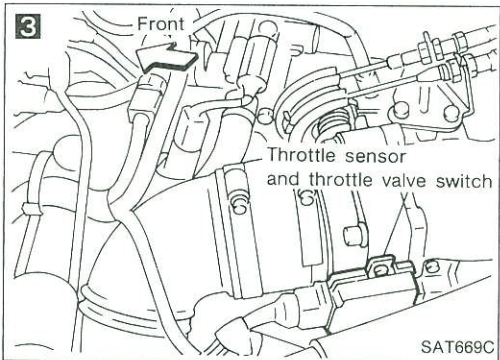
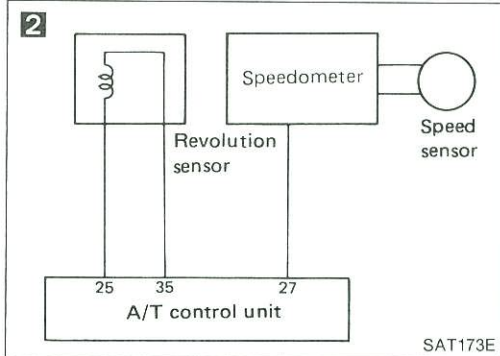
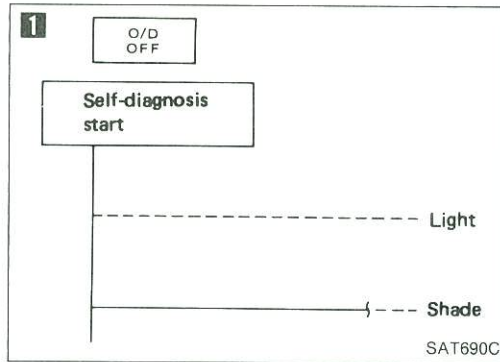
INSPECTION END

Diagnostic Procedure 8

SYMPTOM: Vehicle cannot be started from D₁ on Cruise test — Part 1.

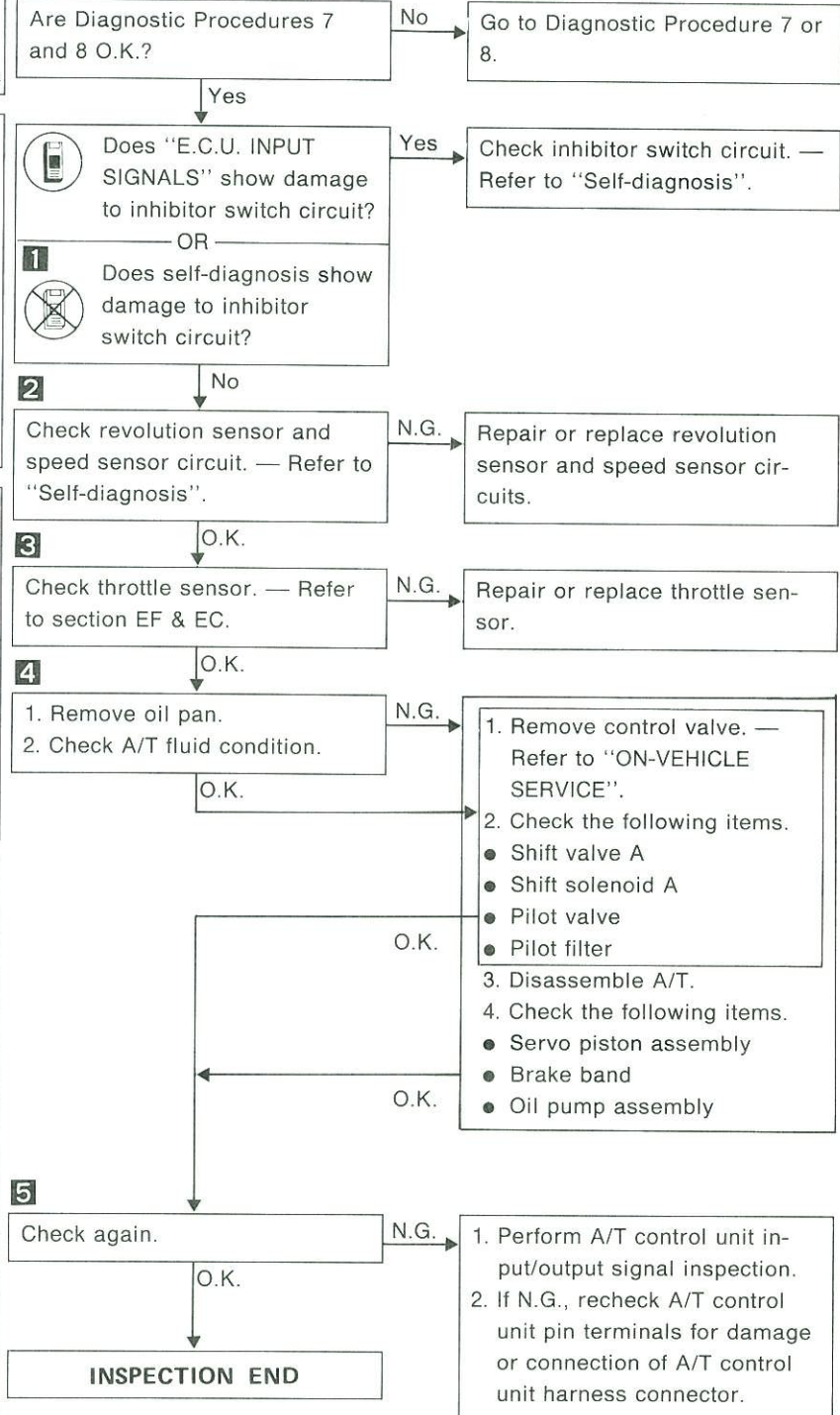


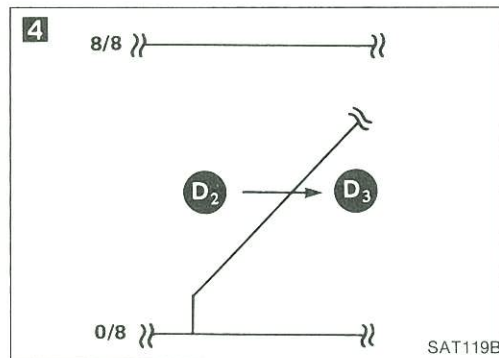
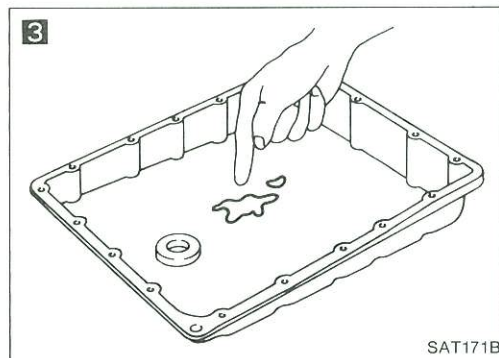
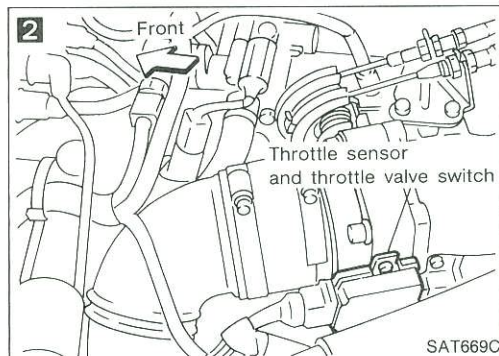
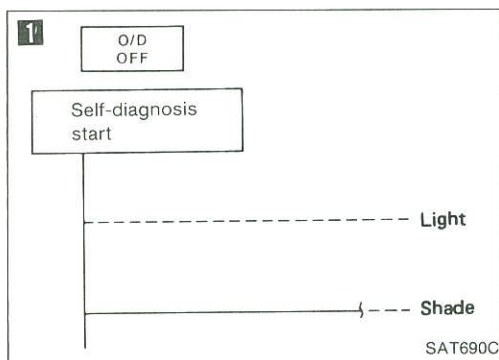
TROUBLE DIAGNOSES



Diagnostic Procedure 9

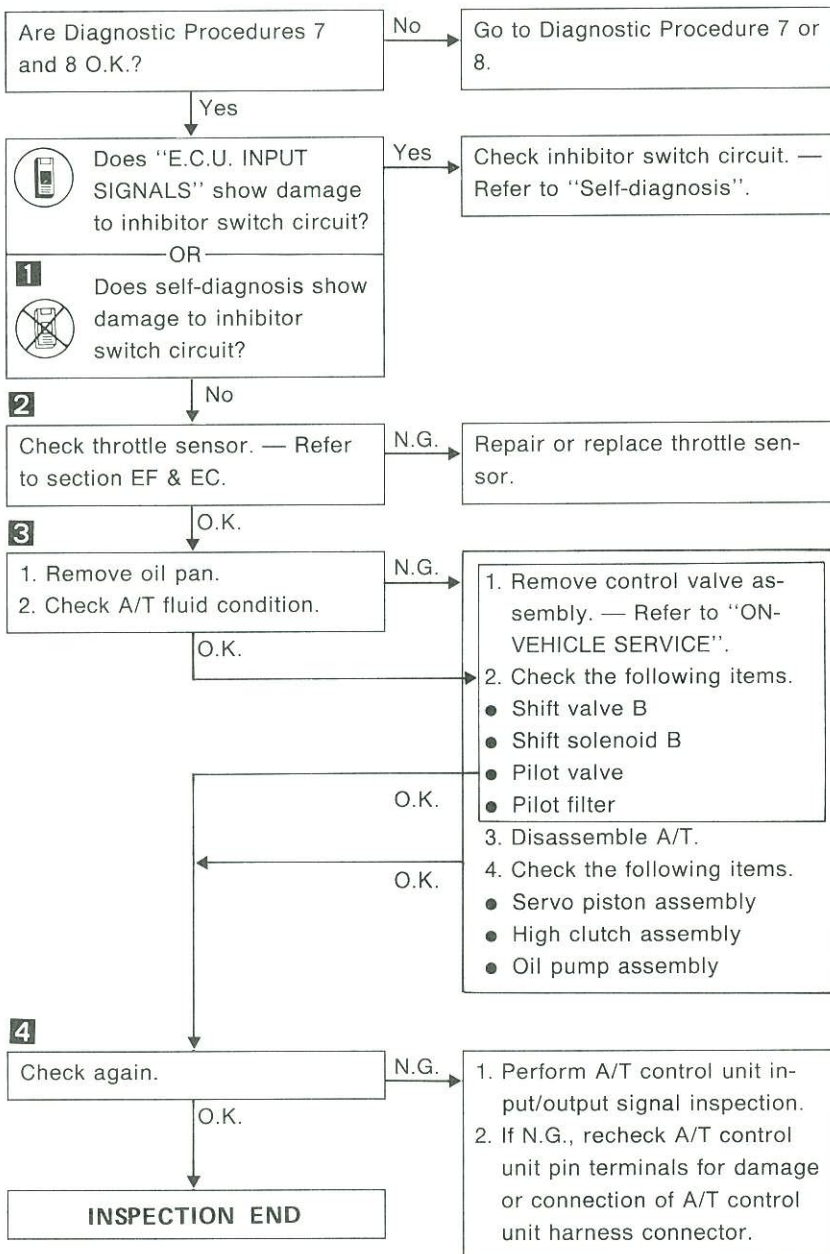
SYMPTOM: A/T does not shift from D₁ to D₂ at the specified speed.
A/T does not shift from D₄ to D₂ when depressing accelerator pedal fully at the specified speed.

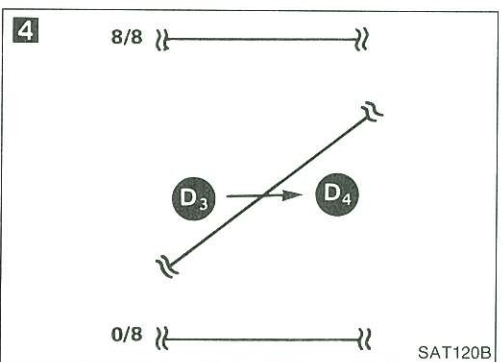
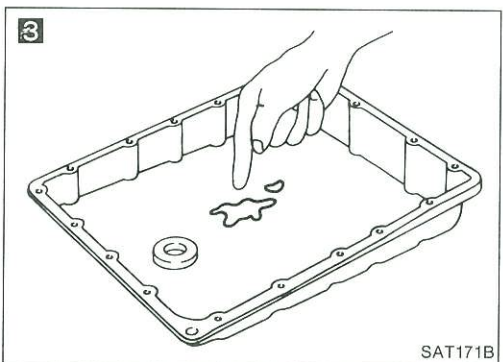
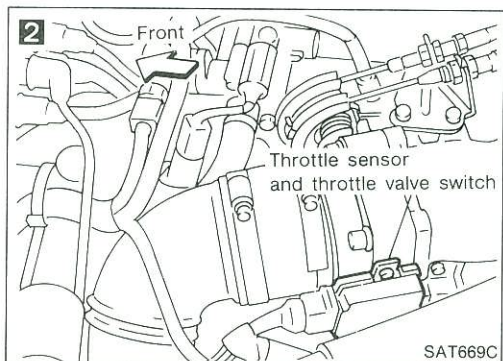
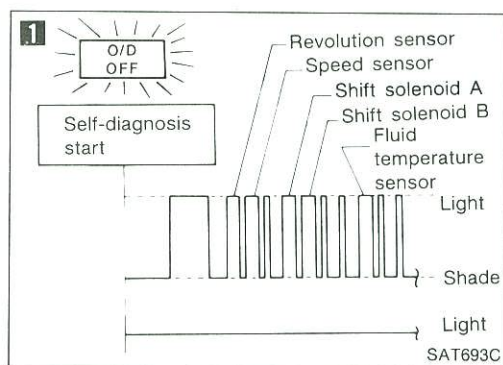




Diagnostic Procedure 10

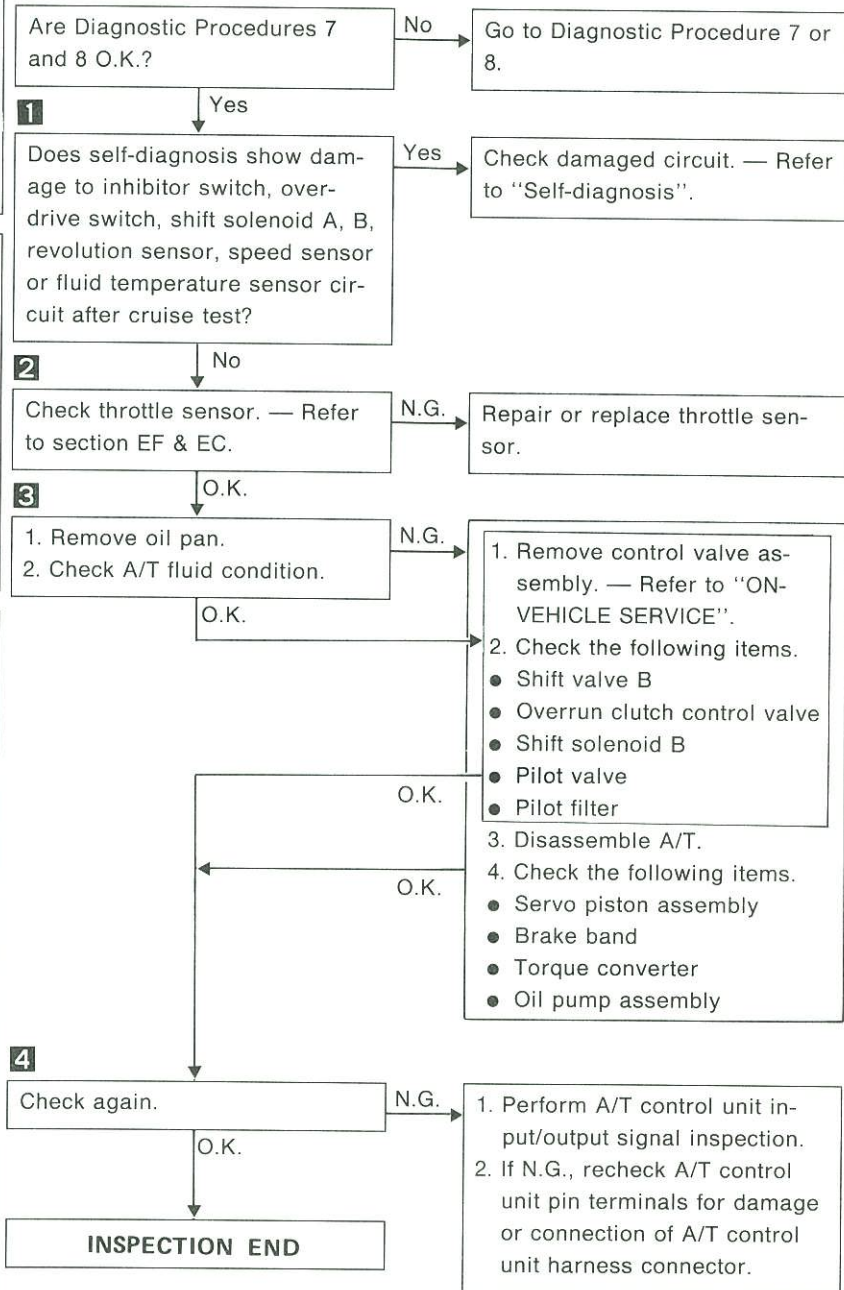
SYMPTOM: A/T does not shift from D₂ to D₃ at the specified speed.

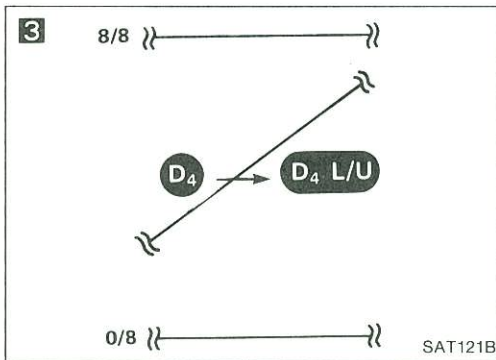
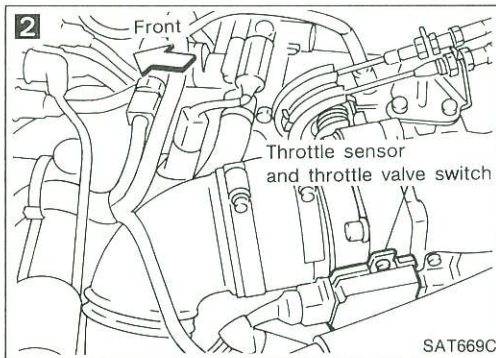
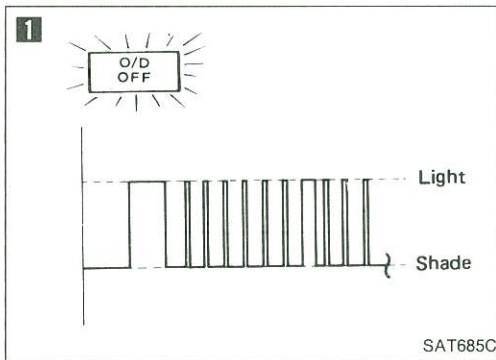




Diagnostic Procedure 11

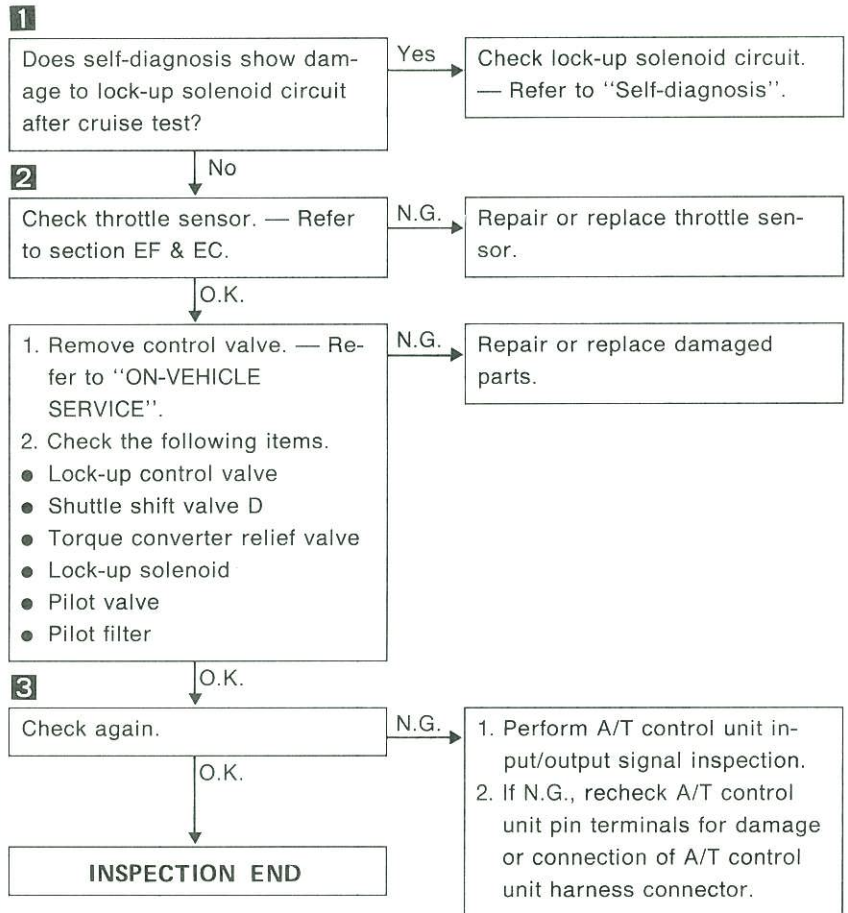
SYMPTOM: A/T does not shift from D₃ to D₄ at the specified speed.



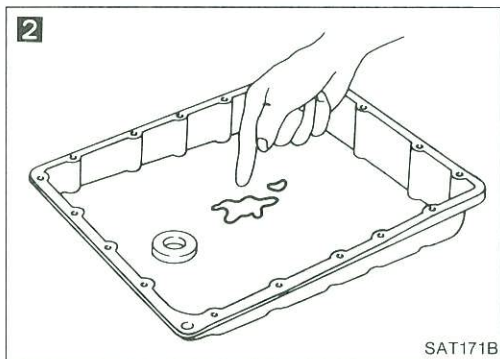
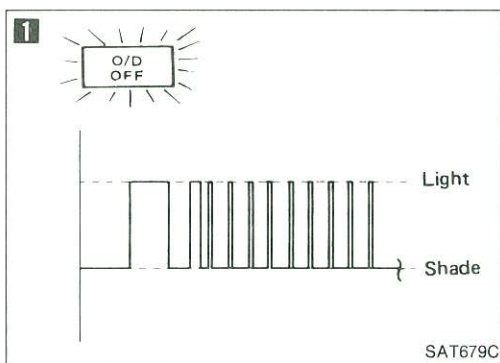


Diagnostic Procedure 12

SYMPTOM: A/T does not perform lock-up at the specified speed.

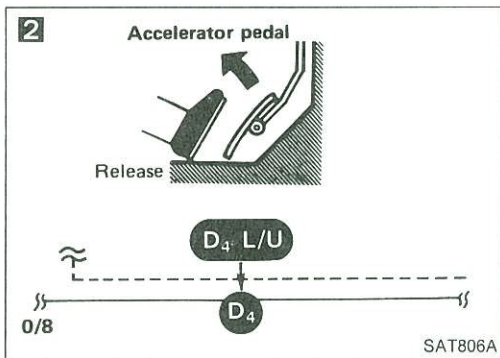
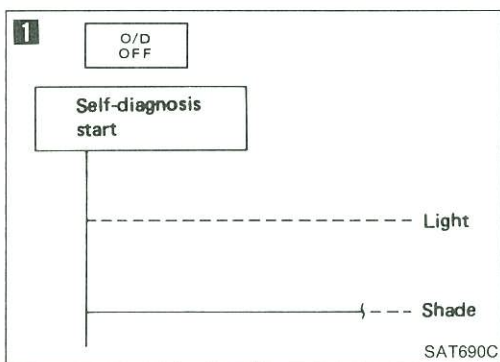
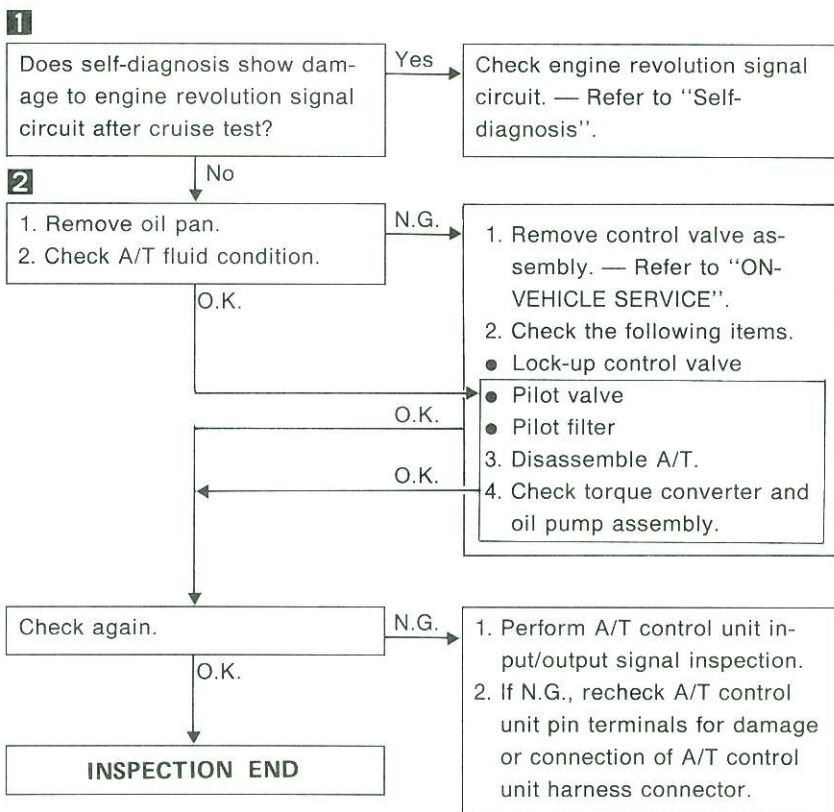


TROUBLE DIAGNOSES



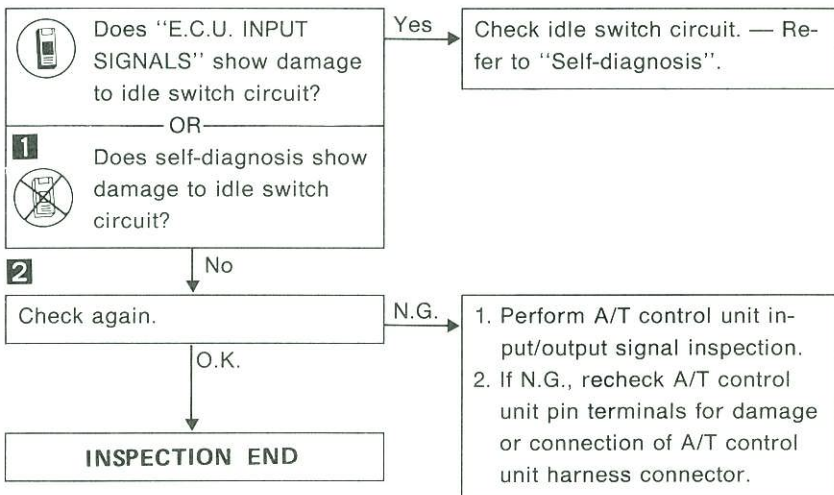
Diagnostic Procedure 13

SYMPTOM: A/T does not hold lock-up condition for more than 30 seconds.



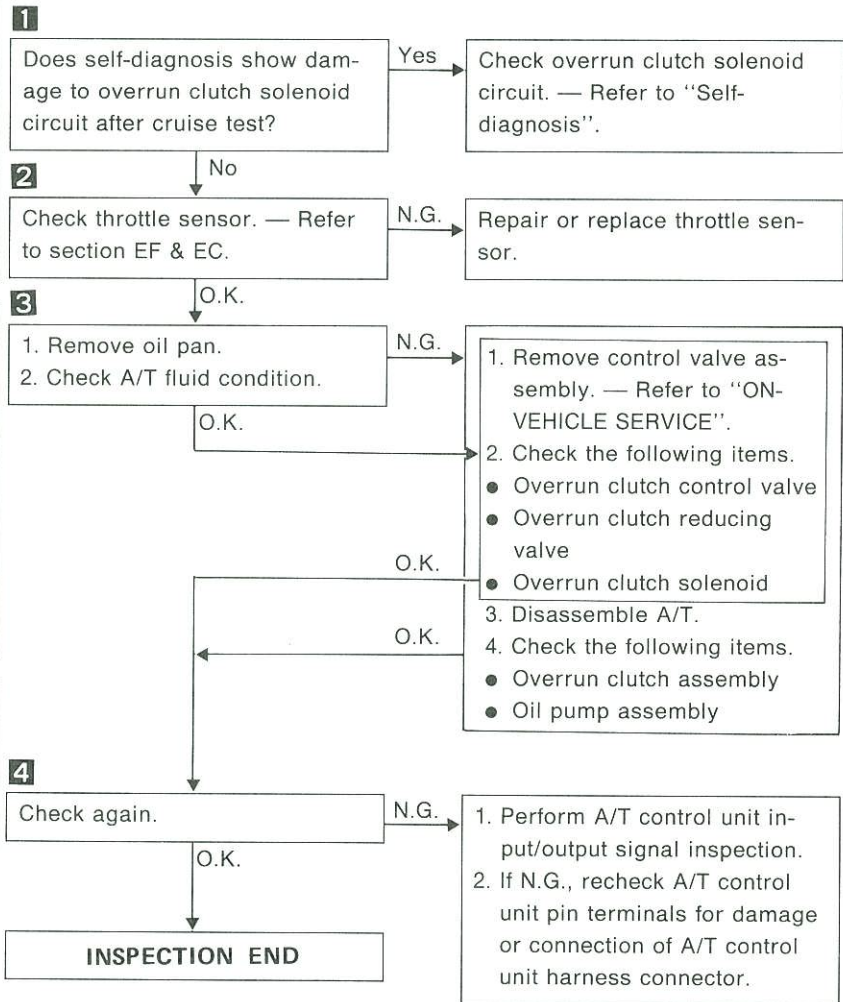
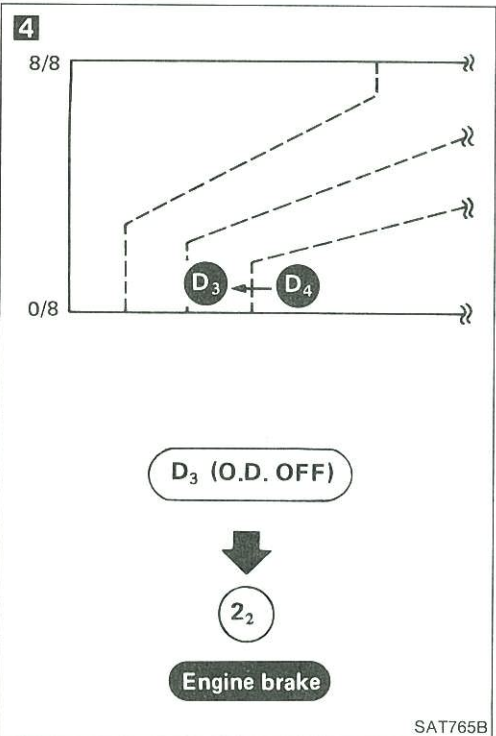
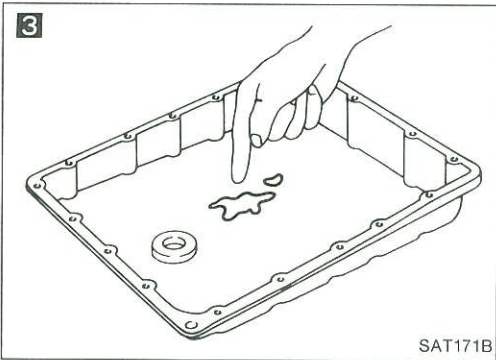
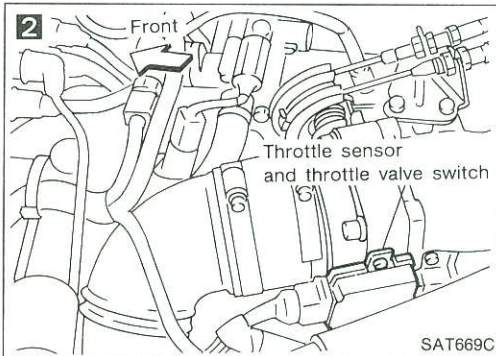
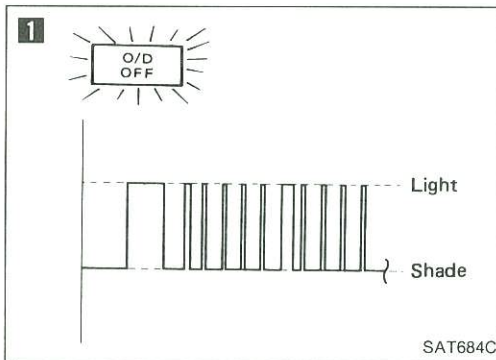
Diagnostic Procedure 14

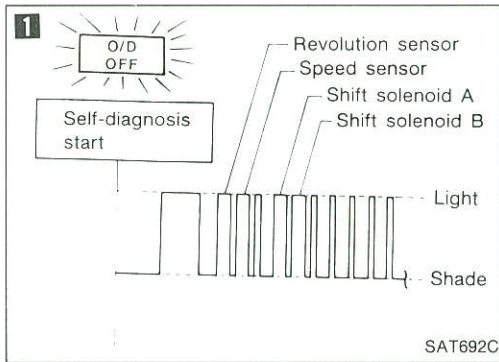
SYMPTOM: Lock-up is not released when accelerator pedal is released.



Diagnostic Procedure 15

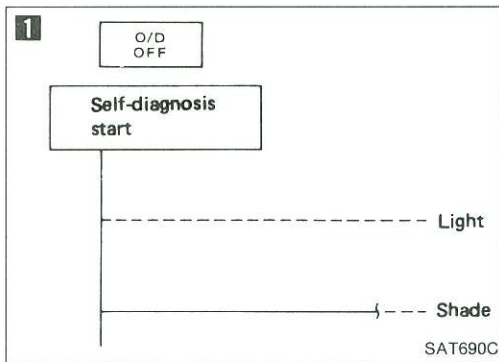
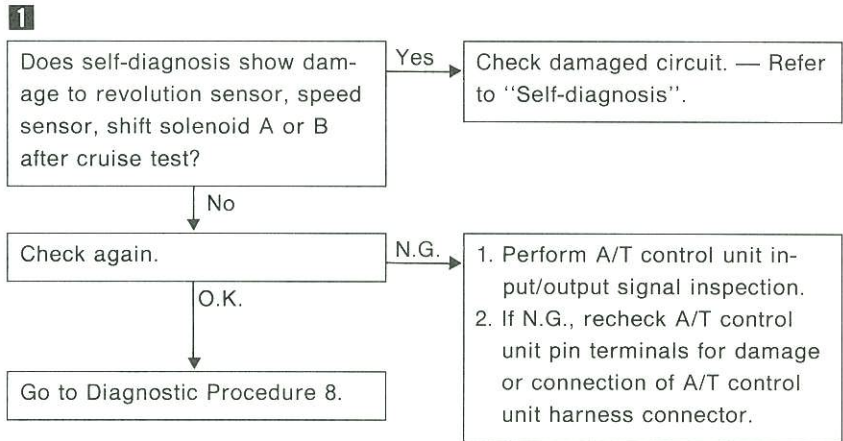
SYMPTOM: Engine speed does not return to idle smoothly when A/T is shifted from D₄ to D₃ with accelerator pedal released.
 Vehicle does not decelerate by engine brake when changing overdrive switch to "OFF" position with accelerator pedal released.
 Vehicle does not decelerate by engine brake when changing selector lever from "D" to "2" range with accelerator pedal released.





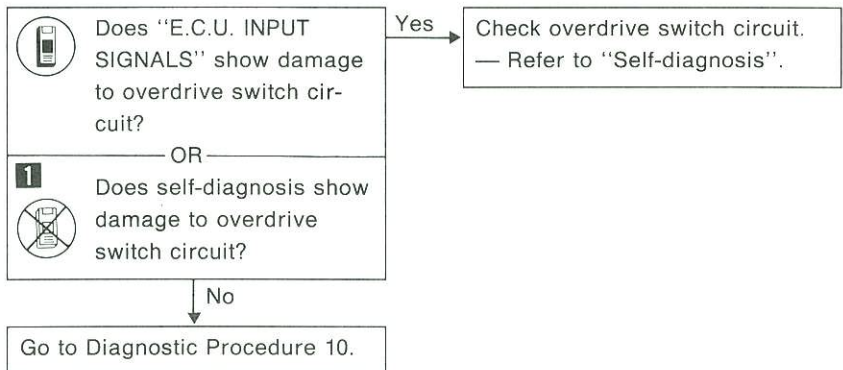
Diagnostic Procedure 16

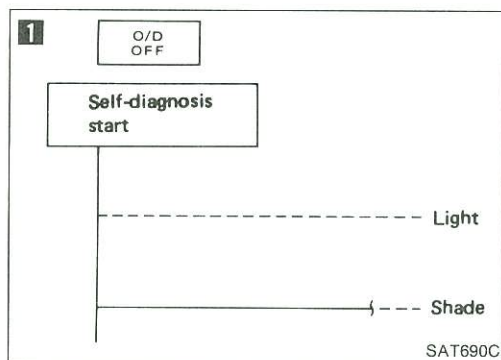
SYMPTOM: Vehicle does not start from D₁ on Cruise test — Part 2.



Diagnostic Procedure 17

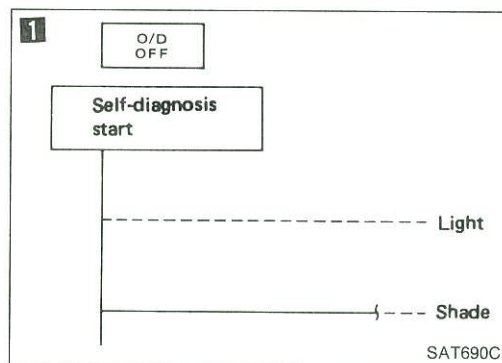
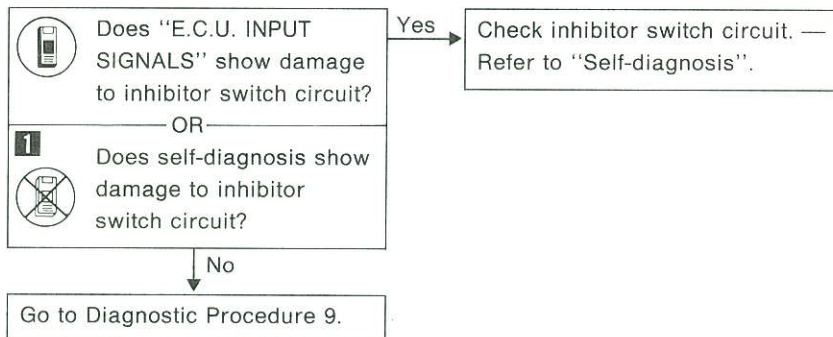
SYMPTOM: A/T does not shift from D₄ to D₃ when changing overdrive switch to "OFF" position.





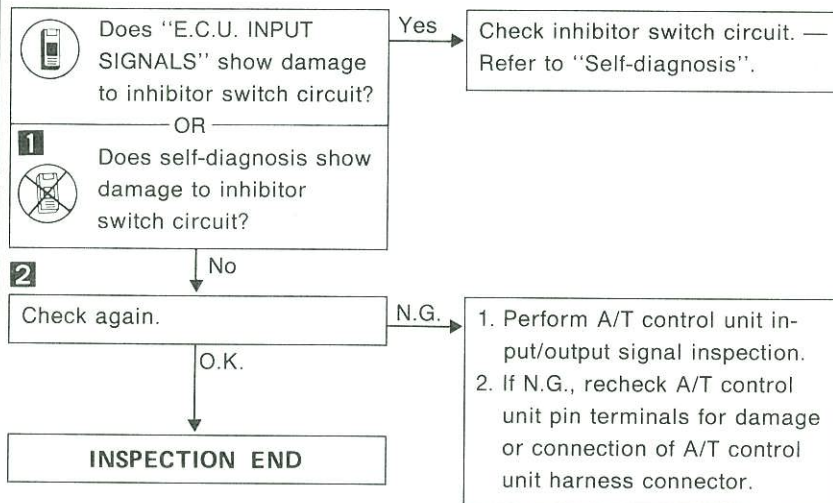
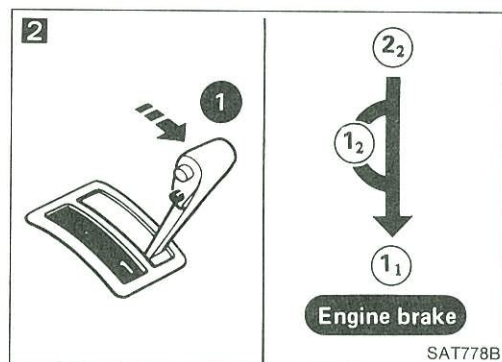
Diagnostic Procedure 18

SYMPTOM: A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" range.



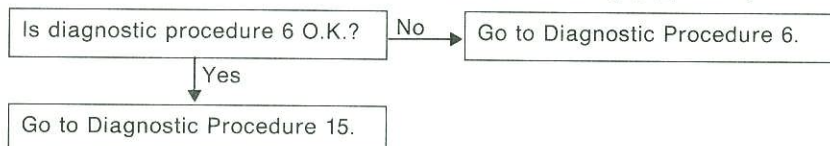
Diagnostic Procedure 19

SYMPTOM: A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" range.

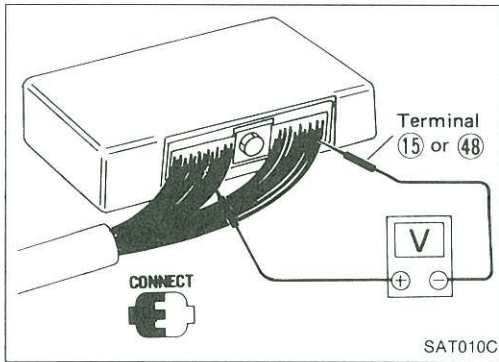


Diagnostic Procedure 20

SYMPTOM: Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1 .



TROUBLE DIAGNOSES



Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal ⑮ or ④⑧ by following "A/T CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.

1	2	3	4	9	×	×	×	13	14	15		23	24	25	×	27	28	29	30	31	×	33	34	35
5	6	7	8	16	17	18	19	20	21	×		×	37	38	39	40	41	×	43	×	×	×	×	48






SAT070E

TROUBLE DIAGNOSES

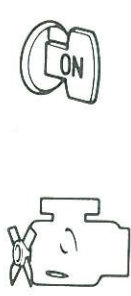
Electrical Components Inspection (Cont'd)

A/T CONTROL UNIT INSPECTION TABLE
(Data are reference values.)

Terminal No.	Item	Condition		Judgement standard
1	Line pressure sole-noid	 	When accelerator pedal is released after warming up engine.	1.5 - 2.5V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
2	Line pressure sole-noid (with dropping resistor)		When accelerator pedal is released after warming up engine.	5 - 14V
			When accelerator pedal is depressed fully after warming up engine.	0.5V or less
3	A/T check lamp		When A/T check lamp is on.	1V or less
			When A/T check lamp is not on.	Battery voltage
4	Power source		When ignition switch is turned to "ON".	Battery voltage
			When ignition switch is turned to "OFF".	1V or less
5	Lock-up solenoid		When A/T is performing lock-up.	8 - 15V
			When A/T is not performing lock-up.	1V or less
6	Shift solenoid A		When shift solenoid A is operating. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When shift solenoid A is not operating. (When driving in "D ₂ " or "D ₃ ".)	1V or less
7	Shift solenoid B		When shift solenoid B is operating. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
			When shift solenoid B is not operating. (When driving in "D ₃ " or "D ₄ ".)	1V or less
8	Overrun clutch sole-noid		When timing solenoid is operating. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
			When timing solenoid is not operating. (When driving in "D ₂ " or "D ₃ ".)	1V or less

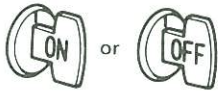






TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
9	Power source		Same as No. 4	
10	—		—	
11	—		—	
12	—		—	
13	—		—	
14	Idle switch (in throttle valve switch)		When accelerator pedal is released after warming up engine.	8 - 15V
			When accelerator pedal is depressed after warming up engine.	1V or less
15	Ground		—	
16	Inhibitor "1" range switch		When selector lever is set to "1" range.	Battery voltage
			When selector lever is set to other ranges.	1V or less
17	Inhibitor "2" range switch		When selector lever is set to "2" range.	Battery voltage
			When selector lever is set to other ranges.	1V or less
18	Inhibitor "D" range switch		When selector lever is set to "D" range.	Battery voltage
			When selector lever is set to other ranges.	1V or less
19	Inhibitor "N" or "P" range switch		When selector lever is set to "N" range.	Battery voltage
			When selector lever is set to other ranges.	1V or less
20	Inhibitor "R" range switch		When selector lever is set to "R" range.	Battery voltage
			When selector lever is set to other ranges.	1V or less
21	Full throttle switch		When accelerator pedal is depressed more than half-way after warming up engine.	8 - 15V
			When accelerator pedal is released after warming up engine.	1V or less
22	—		—	





TROUBLE DIAGNOSES

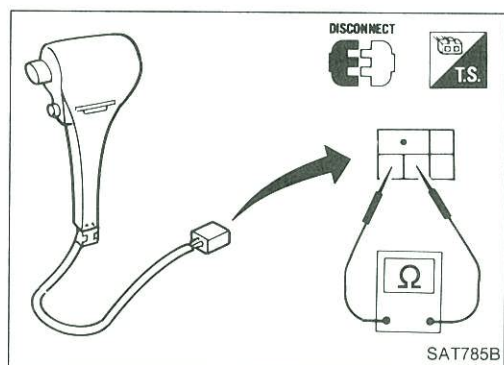
Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
23	Power source (Back-up)		When ignition switch is turned to "OFF".	Battery voltage
			When ignition switch is turned to "ON".	Battery voltage
24	Engine revolution signal		When engine is running at idle speed.	0.9V
			When engine is running at 3,000 rpm.	Approximately 3.7V
25	Revolution sensor (Measure in AC range)		When vehicle is cruising at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
26	—		When vehicle is parked.	0V
27	Speed sensor		When vehicle is moving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V
28	—		—	—
29	—		—	—
30	—		—	—
31	Throttle sensor (Power source)		—	4.5 - 5.5V
32	—		—	—
33	Fluid temperature sensor		When A.T.F. temperature is 20°C (68°F).	Approximately 1.5V
			When A.T.F. temperature is 80°C (176°F).	Approximately 0.5V
34	Throttle sensor		When accelerator pedal is depressed slowly after warming up engine.	Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V
35	Throttle sensor (Ground)		—	—
36	—		—	—
37	A.S.C.D. cruise signal		When A.S.C.D. cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
			When A.S.C.D. cruise is not being performed. ("CRUISE" light does not come on.)	1V or less

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
38	—		—	—
39	Overdrive switch		When overdrive switch is set in "ON" position.	Battery voltage
		When overdrive switch is set in "OFF" position.	1V or less	
40	A.S.C.D. O.D. cut signal		When "ACCEL" set switch on A.S.C.D. cruise is released.	5 - 8V
			When "ACCEL" set switch on A.S.C.D. cruise is applied.	1V or less
41	Kickdown switch	 	When accelerator pedal is released after warming up engine.	3 - 8V
			When accelerator pedal is depressed fully after warming up engine.	1V or less
42	—		—	
43	—		—	
44	—		—	
45	—		—	
46	—		—	
47	—	—		
48	Ground	—	—	



OVERDRIVE SWITCH

- Check continuity between two terminals.

O.D. switch position	Continuity
ON	No
OFF	Yes

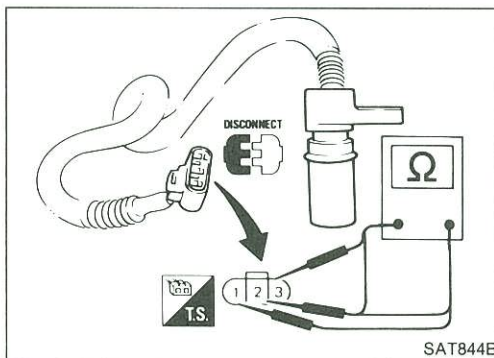
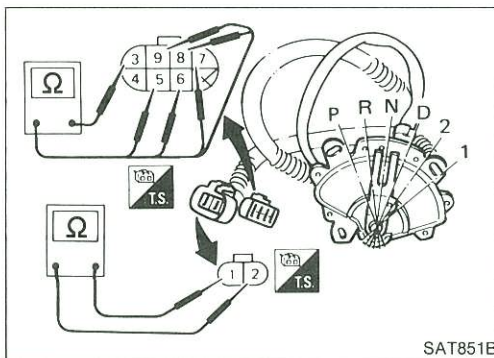
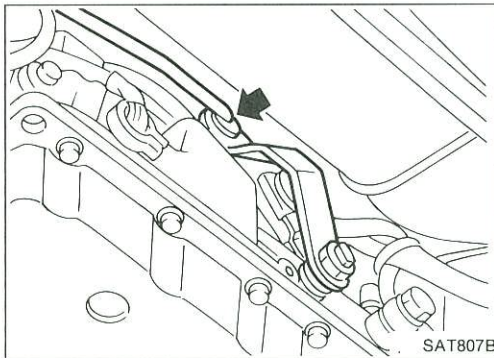
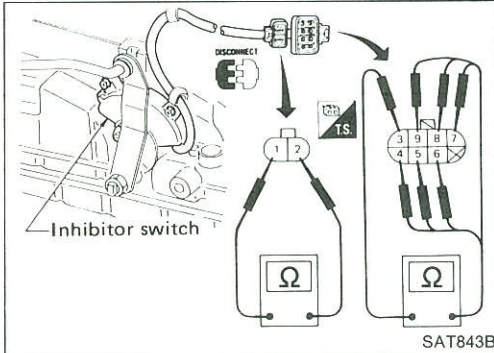
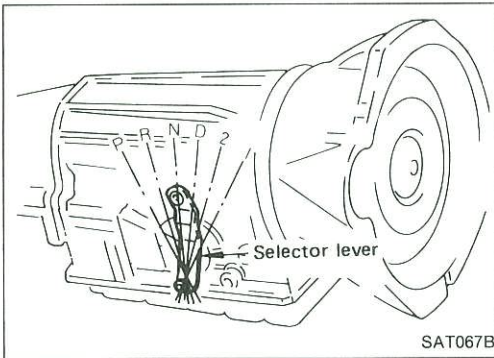
TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

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 range.

Terminal No.	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Lever position									
P	○	○	○	○					
R			○	○	○				
N	○	○	○			○			
D			○				○		
2			○					○	
1			○						○



2. If N.G., check again with manual control linkage disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If O.K. on step 2, adjust manual control linkage. — Refer to "ON-VEHICLE SERVICE".
4. If N.G. on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminal. — Refer to step 1.
5. If O.K. on step 4, adjust inhibitor switch. — Refer to "ON-VEHICLE SERVICE".
6. If N.G. on step 4, replace inhibitor switch.

REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals ①, ② and ③.

Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity

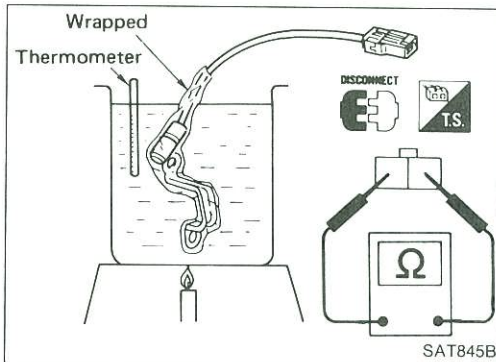
TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals while changing temperature as shown at left.

Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ

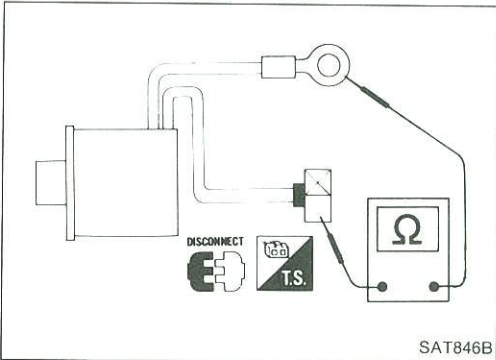


LOCK-UP SOLENOID

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals.

Resistance:

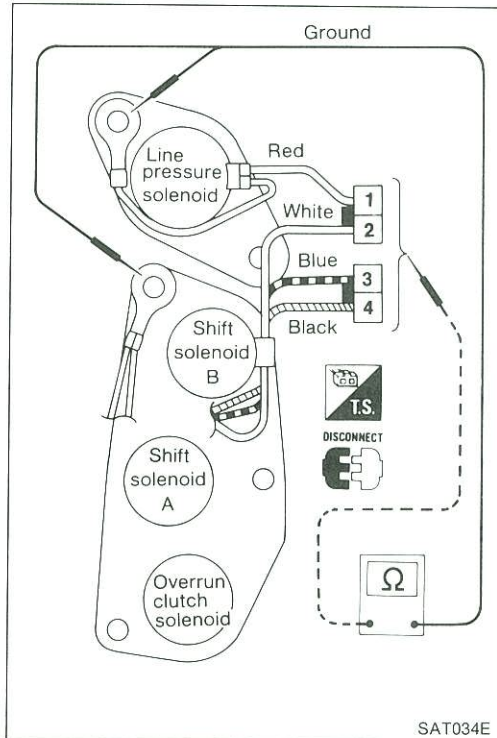
Lock-up solenoid 10 - 20Ω



3-UNIT SOLENOID ASSEMBLY (Shift solenoids A, B and overrun clutch solenoid) AND LINE PRESSURE SOLENOID

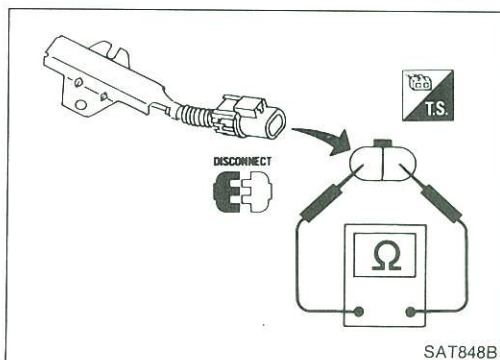
- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals of each solenoid.

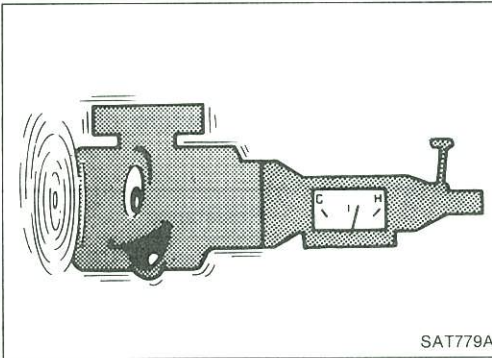
Solenoid	Terminal No.	Resistance
Shift solenoid A	③	20 - 40Ω
Shift solenoid B	②	
Overrun clutch solenoid	④	
Line pressure solenoid	①	2.5 - 5Ω



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 A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

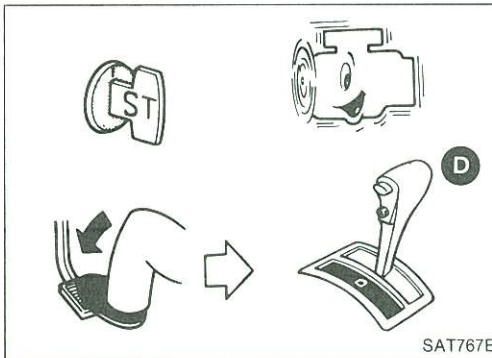
A.T.F. operating temperature:

50 - 80°C (122 - 176°F)

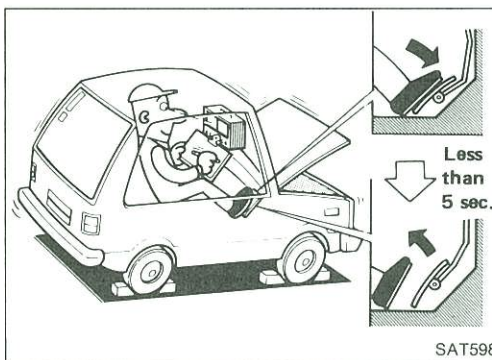


3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

- It is good practice to put a mark on point of specified engine rpm on indicator.



5. Start engine, apply foot brake, and place selector lever in "D" range.

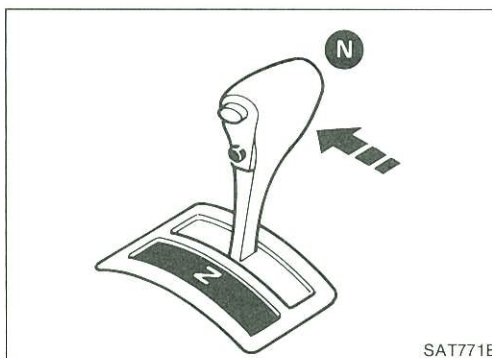


6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- During test, never hold throttle wide-open for more than 5 seconds.

Stall revolution:

2,200 - 2,400 rpm



8. Shift selector lever to "N".

9. Cool off A.T.F.

- Run engine at idle for at least one minute.

10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.

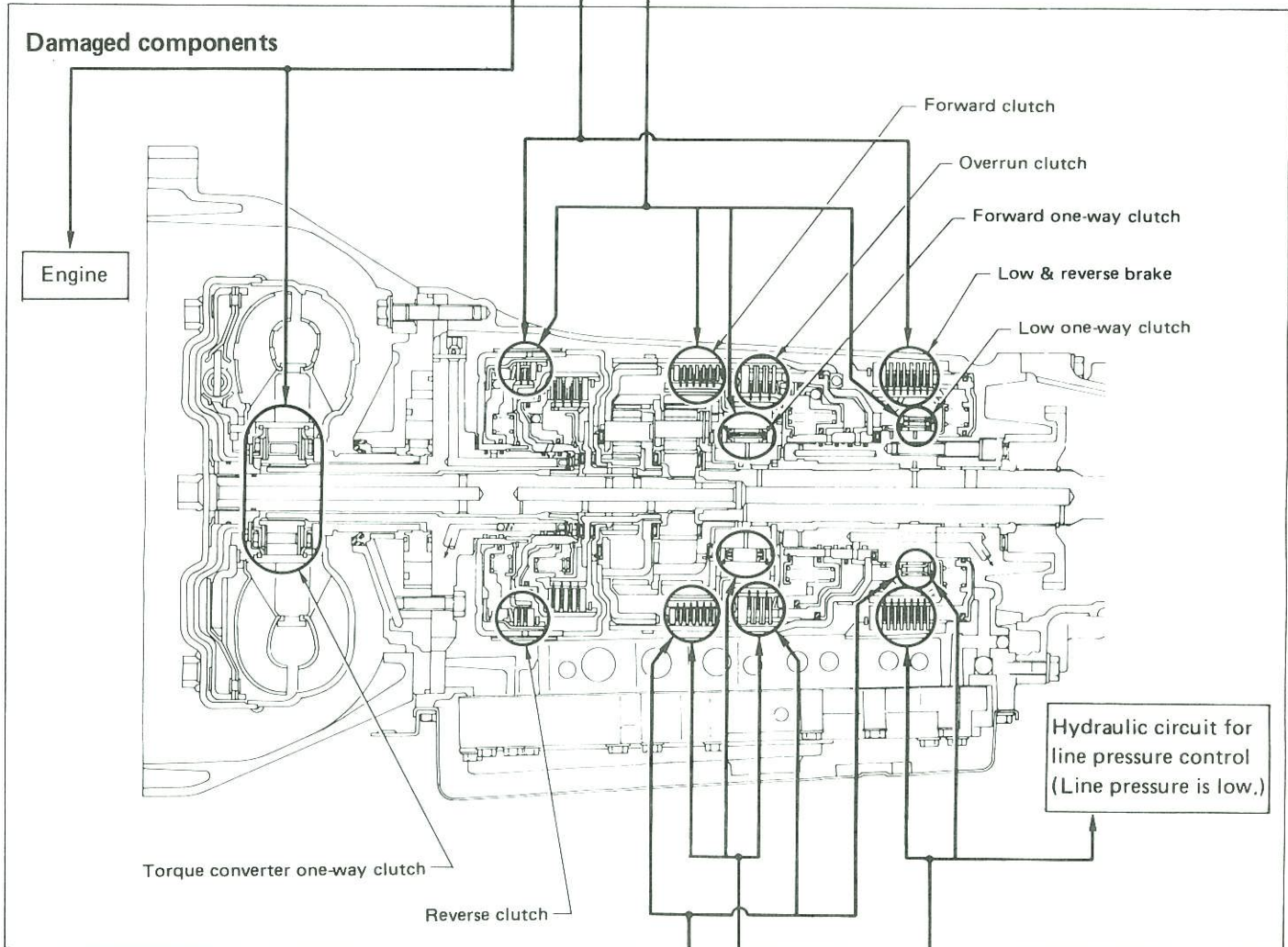
TROUBLE DIAGNOSES

Final Check (Cont'd)

Judgement of stall test

Selector lever position	Judgement		
D	L	O	H
2	L	O	H
1	L	O	O
R	L	H	H

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.



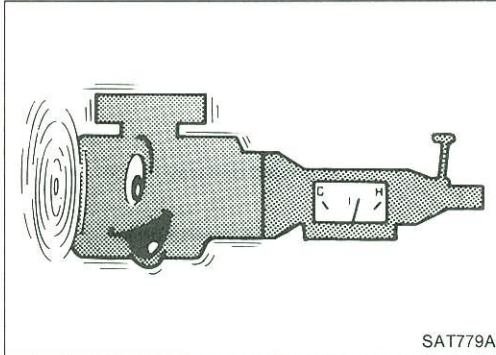
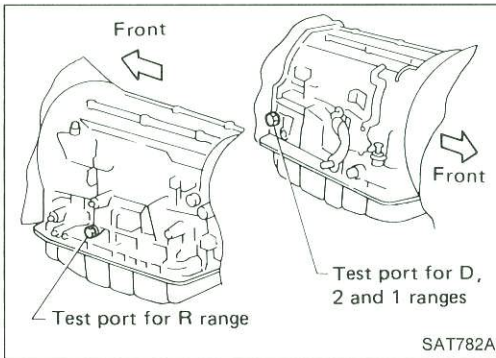
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

TROUBLE DIAGNOSES

Final Check (Cont'd)

PRESSURE TESTING

- Location of line pressure test port
- Line pressure plugs are hexagon headed bolts.
- Always replace line pressure plugs as they are self-sealing bolts.



Line pressure test procedure

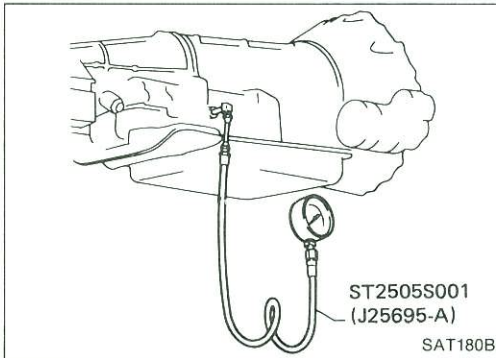
1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

A.T.F. operating temperature:

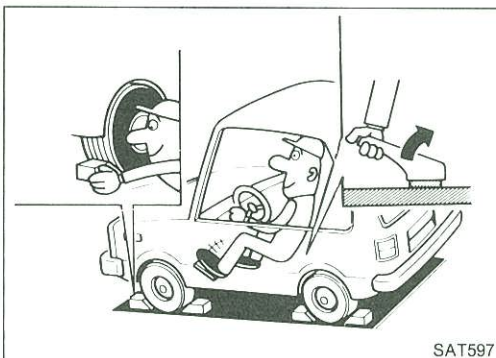
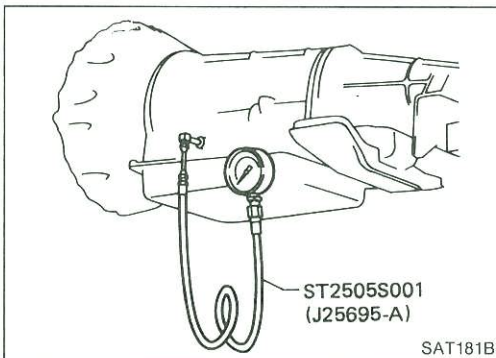
50 - 80°C (122 - 176°F)

3. Install pressure gauge to line pressure port.

— D, 2 and 1 ranges —

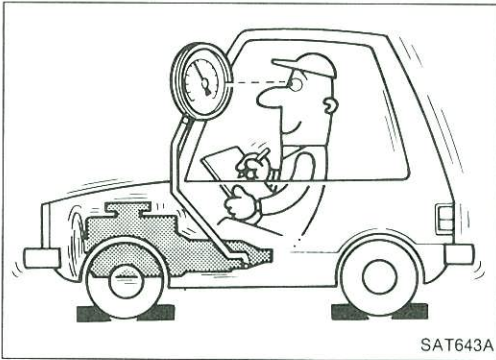


— R range —



4. Set parking brake and block wheels.
- Continue to depress brake pedal fully while line pressure test at stall speed is performed.

TROUBLE DIAGNOSES



Final Check (Cont'd)

5. Start engine and measure line pressure at idle and stall speed.
 - **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure:

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)	
	D, 2 and 1 ranges	R range
Idle	432 - 471 (4.4 - 4.8, 63 - 68)	667 - 706 (6.8 - 7.2, 97 - 102)
Stall	883 - 961 (9.0 - 9.8, 128 - 139)	1,393 - 1,471 (14.2 - 15.0, 202 - 213)

TROUBLE DIAGNOSES

Final Check (Cont'd)

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all ranges.	<ul style="list-style-type: none"> ● 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 range.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch. ● For example; If line pressure is low in "R" and "1" ranges but is normal in "D" and "2" range, fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle sensor ● Fluid temperature sensor damaged ● Line pressure solenoid sticking ● Short circuit of line pressure solenoid circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle sensor ● Control piston damaged ● Line pressure solenoid sticking ● Short circuit of line pressure solenoid circuit ● Pressure regulator valve or plug sticking ● Pressure modifier valve sticking ● Pilot valve sticking

TROUBLE DIAGNOSES

Symptom Chart

		ON vehicle										OFF vehicle																		
Reference page (AT-)	Reference page (AT-)	10, 15	84	84	88	85, 132	85	85	8, 85	8	8	116, 127	146, 150	152, 163	152, 160	156	170													
	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.	Fluid level Control linkage	Inhibitor switch	Throttle sensor (Adjustment)	Revolution sensor and speed sensor	Engine revolution signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Lock-up solenoid	Overrun clutch solenoid	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components
65	Engine does not start in "N", "P" ranges.	2	3									1																		
65	Engine starts in range other than "N" and "P".	1	2																											
—	Transmission noise in "P" and "N" ranges.	1		3	4	5	2														7	6								
65	Vehicle moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range.	1																												2
66	Vehicle runs in "N" range.	1											4										3		2		5			
68	Vehicle will not run in "R" range (but runs in "D", "2" and "1" ranges). Clutch slips. Very poor acceleration.	1				2	4		3														5	6	7		8		9	
—	Vehicle braked when shifting into "R" range.	1	2			3	5		4														6	8		9			7	
—	Sharp shock in shifting from "N" to "D" range.			2	5	1	3	7		6		4	8												9					
—	Vehicle will not run in "D" and "2" ranges (but runs in "1" and "R" range).	1																										2		
69	Vehicle will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch slips. Very poor acceleration.	1				2	4		3			5											6	7	8	9		10		
—	Clutches or brakes slip somewhat in starting.	1	2	3		4	6		5			7		8								13	12	10		9			11	
—	Excessive creep.					1																								
68, 69	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	
71, 72, 73	Too high a gear change point from "D ₁ " to "D ₂ ", from "D ₂ " to "D ₃ ", from "D ₃ " to "D ₄ ".			1	2			3	4																					
—	Gear change directly from "D ₁ " to "D ₃ " occurs.	1										2																	3	
—	Engine stops when shifting lever into "R", "D", "2" and "1".					1	3			2												4								
—	Too sharp a shock in change from "D ₁ " to "D ₂ ".			1		2	4					5	3																6	
—	Too sharp a shock in change from "D ₂ " to "D ₃ ".			1		2	4									3							5						6	

TROUBLE DIAGNOSES

Symptom Chart (Cont'd)

		ON vehicle										OFF vehicle					
Reference page (AT-)		10, 15	84	84	88	85, 132	85	85	8, 85	8	8	116, 127	146, 150	152, 163	152, 160	156	170
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.																
		Fluid level	Control linkage	Inhibitor switch	Throttle sensor (Adjustment)	Revolution sensor and speed sensor	Engine revolution signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Lock-up solenoid	Overrun clutch solenoid	Fluid temperature sensor	Accumulator N-D
—	Too sharp a shock in change from "D ₃ " to "D ₄ ".	.	.	1	.	.	2	4	.	.	.	.	.	.	3	.	.
—	Almost no shock or clutches slipping in change from "D ₁ " to "D ₂ ".	1	.	2	.	.	3	5	.	.	.	.	.	.	.	4	.
—	Almost no shock or slipping in change from "D ₂ " to "D ₃ ".	1	.	2	.	.	3	5	.	.	.	.	.	.	.	4	.
—	Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	1	.	2	.	.	3	5	.	.	.	.	.	.	.	4	.
—	Vehicle braked by gear change from "D ₁ " to "D ₂ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Vehicle braked by gear change from "D ₂ " to "D ₃ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Vehicle braked by gear change from "D ₃ " to "D ₄ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Maximum speed not attained. Acceleration poor.	1	2	.	.	.	.	5	3	4	.	.	.	.	.	.	.
—	Failure to change gear from "D ₄ " to "D ₃ ".	1	.	2	.	.	.	6	4	5	3	.	.	.	.	.	.
—	Failure to change gear from "D ₃ " to "D ₂ " or from "D ₄ " to "D ₂ ".	1	.	2	.	.	.	5	3	4	.	.	.	.	.	.	.
—	Failure to change gear from "D ₂ " to "D ₁ " or from "D ₃ " to "D ₁ ".	1	.	2	.	.	.	5	3	4	.	.	.	.	.	.	.
—	Gear change shock felt during deceleration by releasing accelerator pedal.	.	.	1	.	.	2	4	.	.	.	.	.	.	.	.	.
—	Too high a change point from "D ₄ " to "D ₃ ", from "D ₃ " to "D ₂ ", from "D ₂ " to "D ₁ ".	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.
—	Kickdown does not operate when depressing pedal in "D ₄ " within kickdown vehicle speed.	.	.	1	2	.	.	3	4	.	.	.	.	.	.	.	.
—	Kickdown operates or engine overruns when depressing pedal in "D ₄ " beyond kickdown vehicle speed limit.	.	.	2	1	.	.	3	4	.	.	.	.	.	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " to "D ₃ " when depressing pedal.	1	.	2	.	.	3	5	.	4	.	.	.	.	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	1	.	2	.	.	3	6	5	4	.	.	.	.	.	.	.
—	Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	1	.	2	.	.	3	5	.	4	.	.	8	10	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " or "D ₃ " to "D ₁ " when depressing pedal.	1	.	2	.	.	3	5	.	4	.	.	.	.	.	.	.
—	Vehicle will not run in any range.	1	2	.	.	.	3	.	.	4	.	.	.	.	.	.	.
—	Transmission noise in "D", "2", "1" and "R" ranges.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

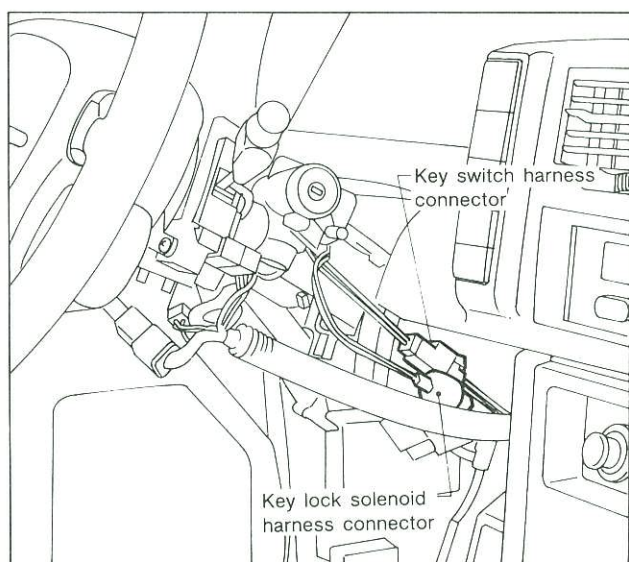
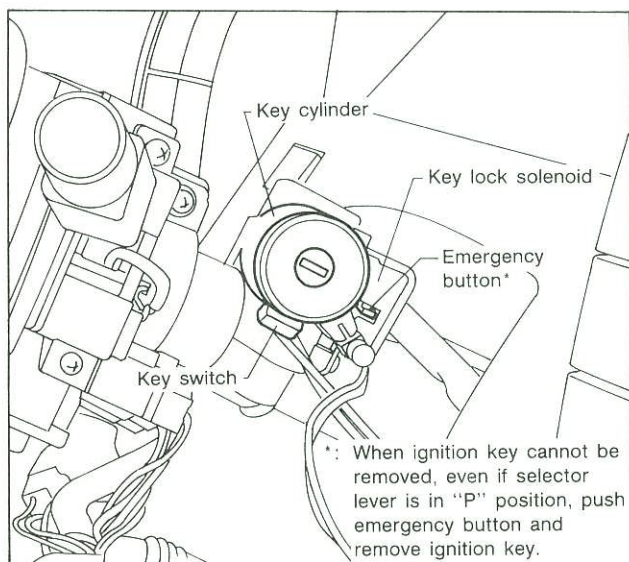
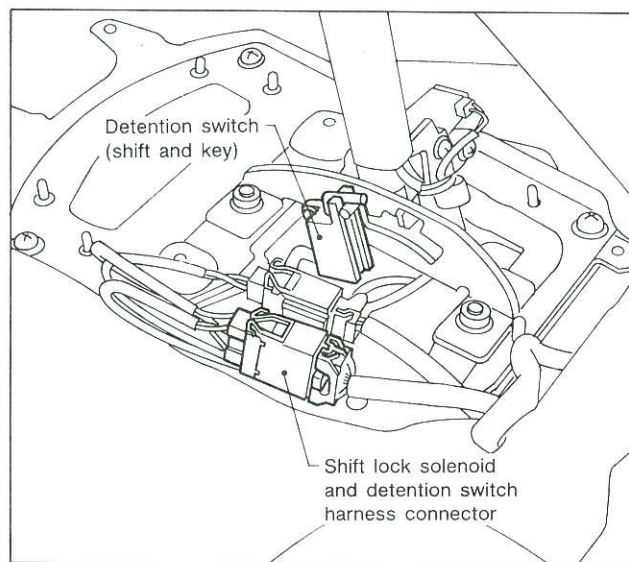
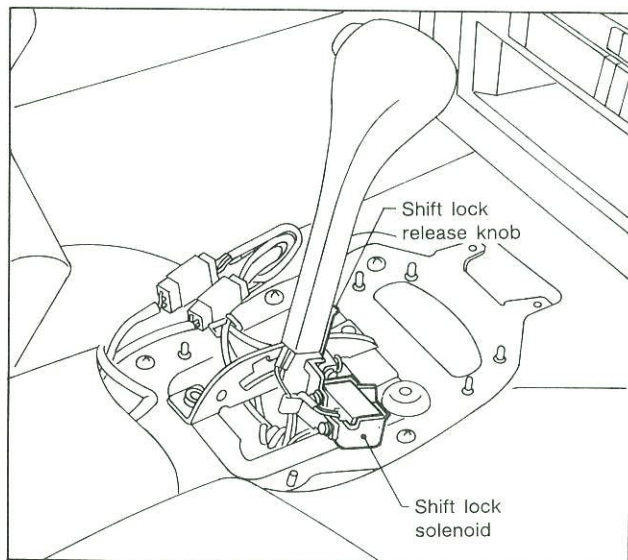
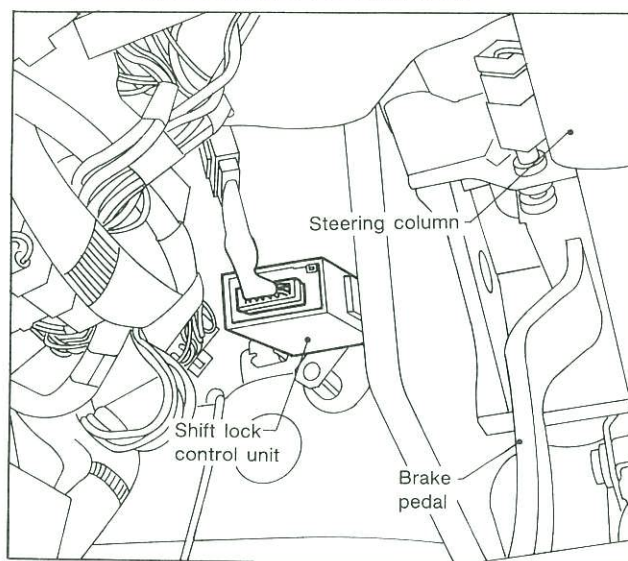
TROUBLE DIAGNOSES

Symptom Chart (Cont'd)

		ON vehicle										OFF vehicle																			
Reference page (AT-)	Reference page (AT-)	10, 15	84	84	88	85, 132	85	85	8, 85	8	8	116, 127	146, 150	152, 163	152, 160	156	170														
	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.	Fluid level Control linkage	Inhibitor switch	Throttle sensor (Adjustment)	Revolution sensor and speed sensor	Engine revolution signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Lock-up solenoid	Overrun clutch solenoid	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components
78	Failure to change from "D ₃ " to "D ₂ " when changing lever into "2" range.	7	1	2	.	.	.	.	6	5	4	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	9	.	8	.	.
—	Gear change from "2 ₂ " to "2 ₃ " in "2" range.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
78	Engine brake does not operate in "1" range.	2	1	3	4	.	.	.	6	5	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.	8	9	.	.	.
—	Gear change from "1 ₁ " to "1 ₂ " in "1" range.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Does not change from "1 ₂ " to "1 ₁ " in "1" range.	.	1	2	.	.	.	.	4	3	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	6	7	.	.	.
—	Large shock changing from "1 ₂ " to "1 ₁ " in "1" range.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
—	Transmission overheats.	1	.	3	.	2	4	6	.	5	.	.	.	.	.	.	.	.	.	.	14	7	8	9	11	12	13	10	.	.	.
—	A.T.F. shoots out during operation. White smoke emitted from exhaust pipe during operation.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	5	6	7	4	.	.	.
—	Offensive smell at fluid charging pipe.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	3	4	5	7	8	9	6	.	.	.
—	Torque converter is not locked up.	.	3	1	2	4	6	8	.	.	.	7	5	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.	.	.
—	Lock-up piston slip	1	.	2	.	.	3	6	.	5	4	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.
74	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" ranges.	1	.	.	.	.	.	5	4	3	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

A/T Shift Lock System

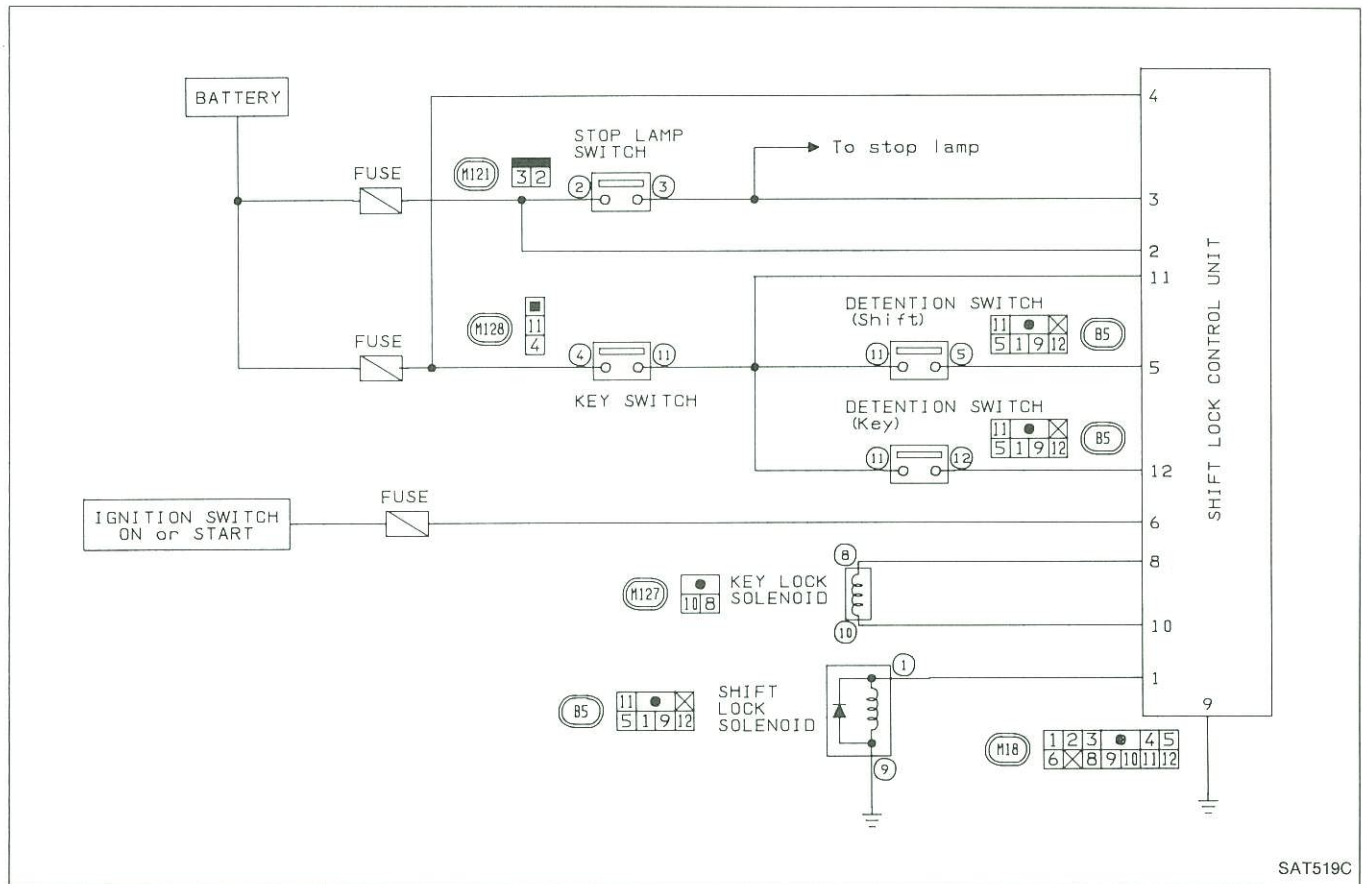
SHIFT LOCK SYSTEM ELECTRICAL PARTS LOCATION



TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

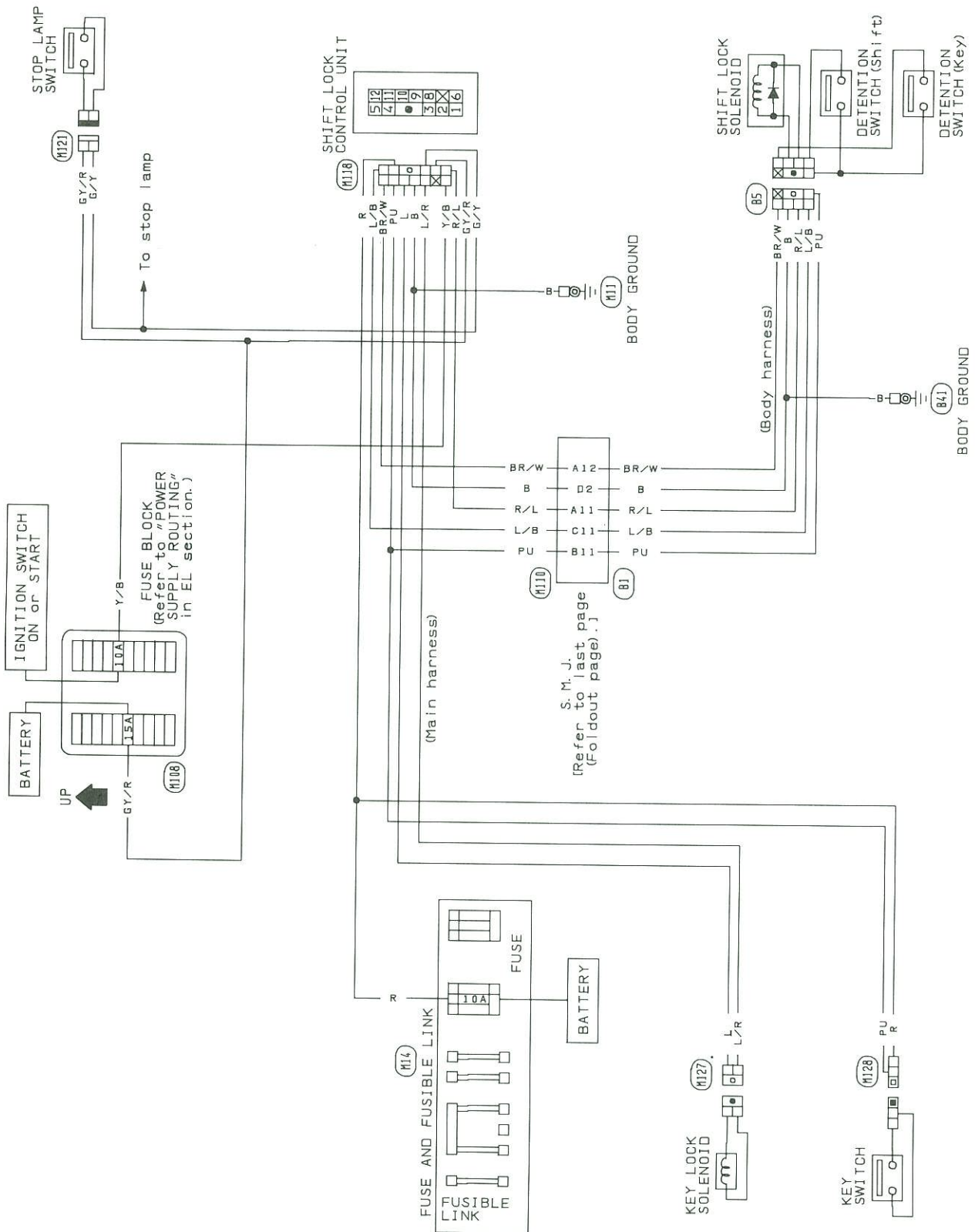
CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

WIRING DIAGRAM



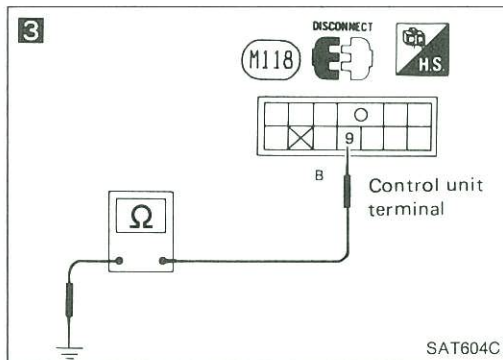
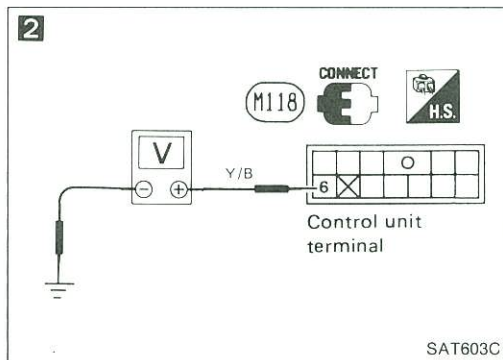
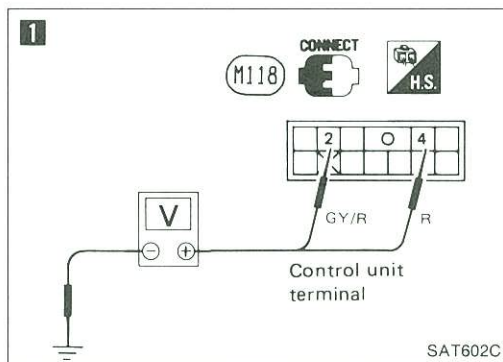
TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM:

Selector lever cannot be moved from "P" range when applying brake pedal or can be moved when releasing brake pedal.
Selector lever can be moved from "P" range when key is removed from key cylinder.



1

CHECK POWER SOURCE.

- 1.
2. Check voltage between control unit harness terminals ②, ④ and ground.
Battery voltage should exist.

N.G.

Check the following items:

1. Harness continuity between battery and control unit harness terminals ②, ④
2. Fuse

O.K.

2

CHECK IGNITION SIGNAL.

- 1.
2. Check voltage between control unit harness terminal ⑥ and ground.
0V
- 3.
4. Check voltage between control unit harness terminal ⑥ and ground.
Battery voltage should exist.

N.G.

Check the following items:

1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch

O.K.

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

- 1.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑨ and ground.
Continuity should exist.

N.G.

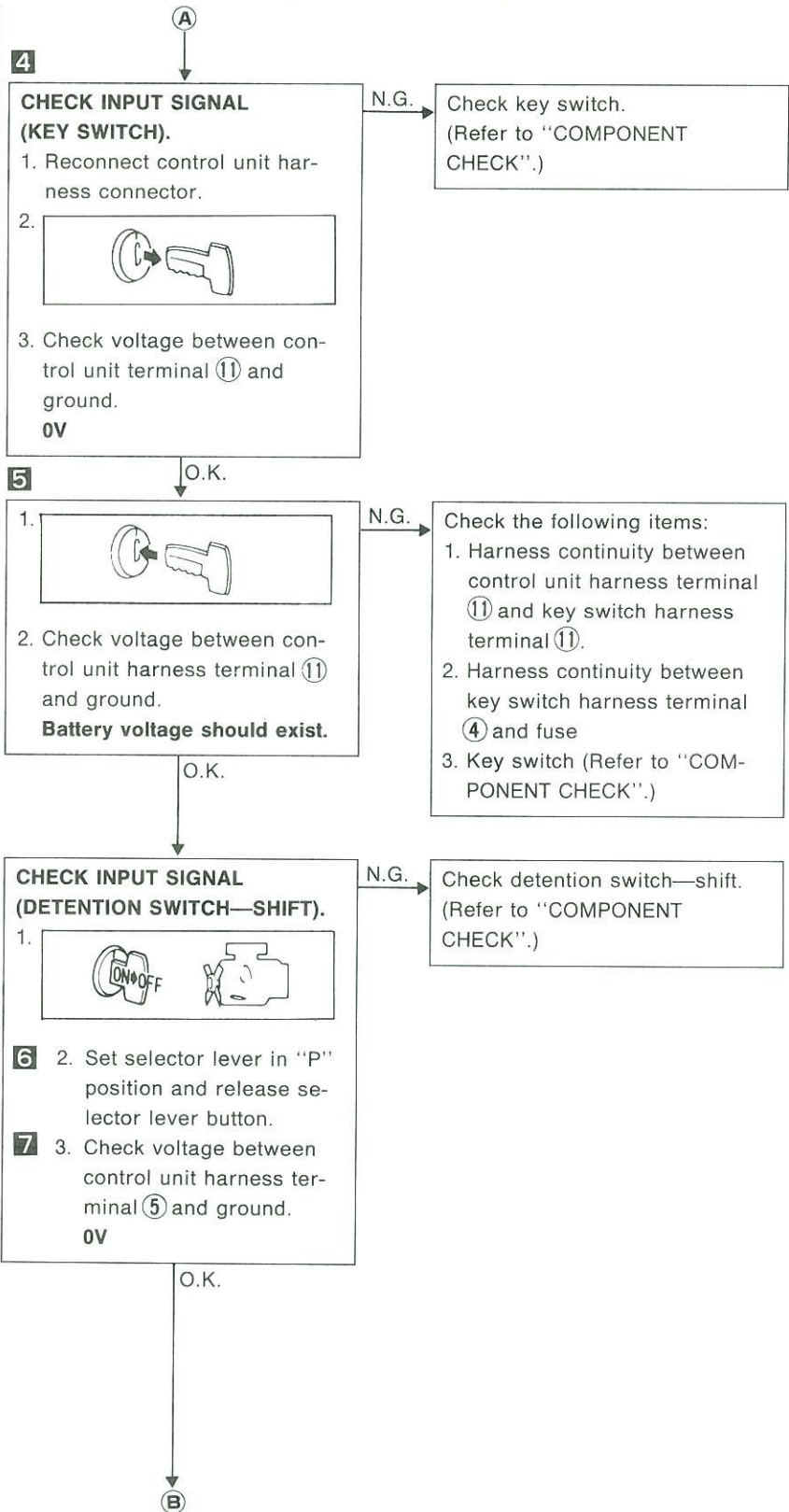
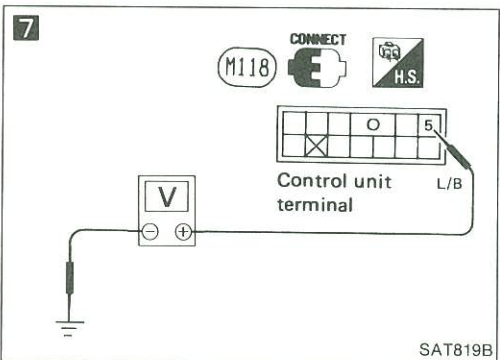
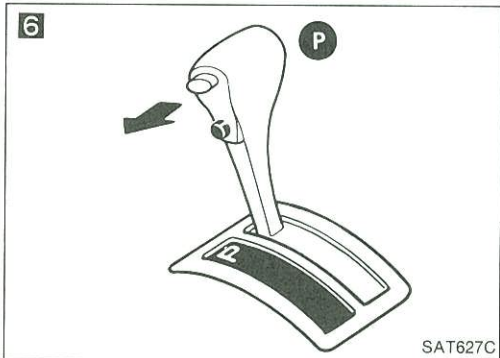
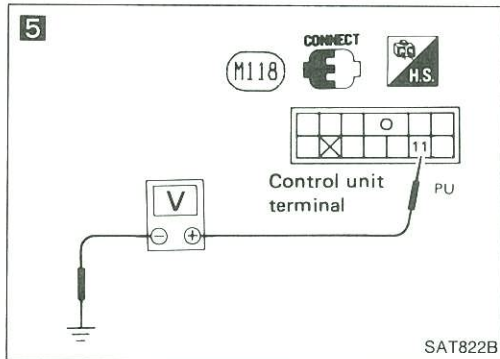
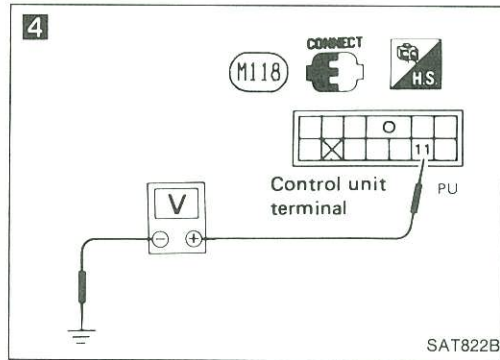
Repair harness or connector.

O.K.

A

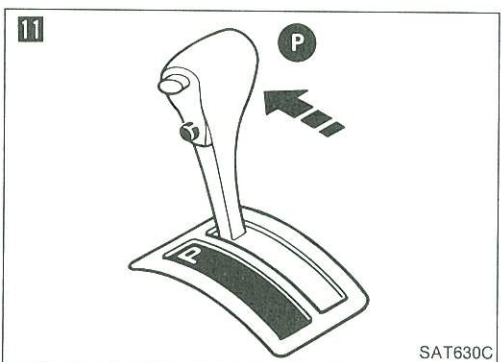
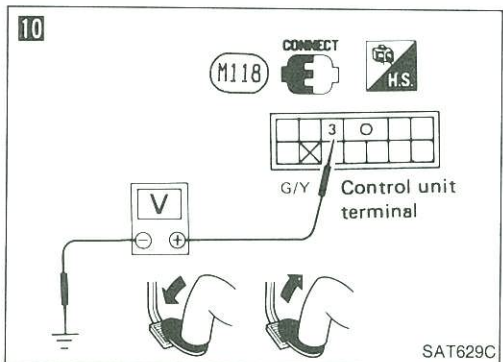
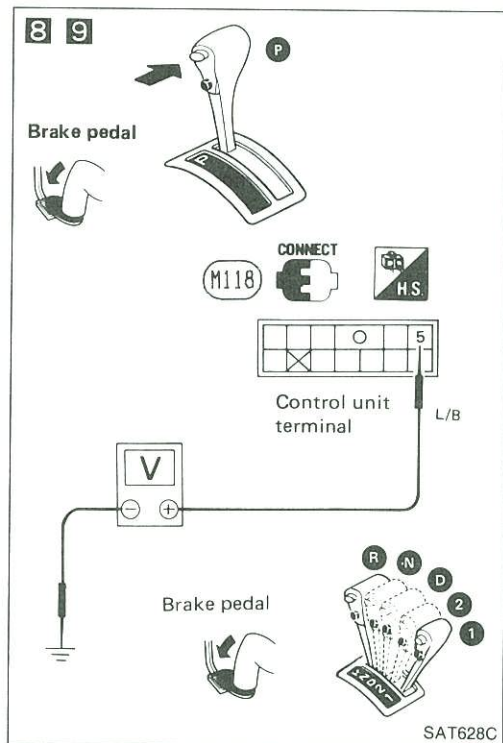
TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)



TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)



CHECK INPUT SIGNAL (DETENTION SWITCH—SHIFT).



- 8** 2. Check voltage between control unit harness terminal ⑤ and ground with brake pedal depressed and selector lever button pushed.

Battery voltage should exist.

- 9** 3. Check voltage between control unit harness terminal ⑤ and ground with selector lever set in any position except "P".

When selector lever cannot be moved from "P" position with brake pedal depressed, push shift lock release knob.

Battery voltage should exist.

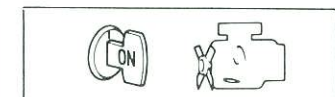
N.G.

Check the following items:

1. Harness continuity between control unit harness terminal ⑤ and detention switch harness terminal ⑤
2. Harness continuity between detention switch harness terminal ⑪ and key switch harness terminal ⑪
3. Detention switch—shift (Refer to "COMPONENT CHECK".)

O.K.

CHECK INPUT SIGNAL (STOP LAMP SWITCH).



- Check voltage between control unit harness terminal ③ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

N.G.

Check the following items:

1. Harness continuity between control unit harness terminal ③ and stop lamp switch harness terminal ③
2. Harness continuity between stop lamp switch harness terminal ② and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK".)

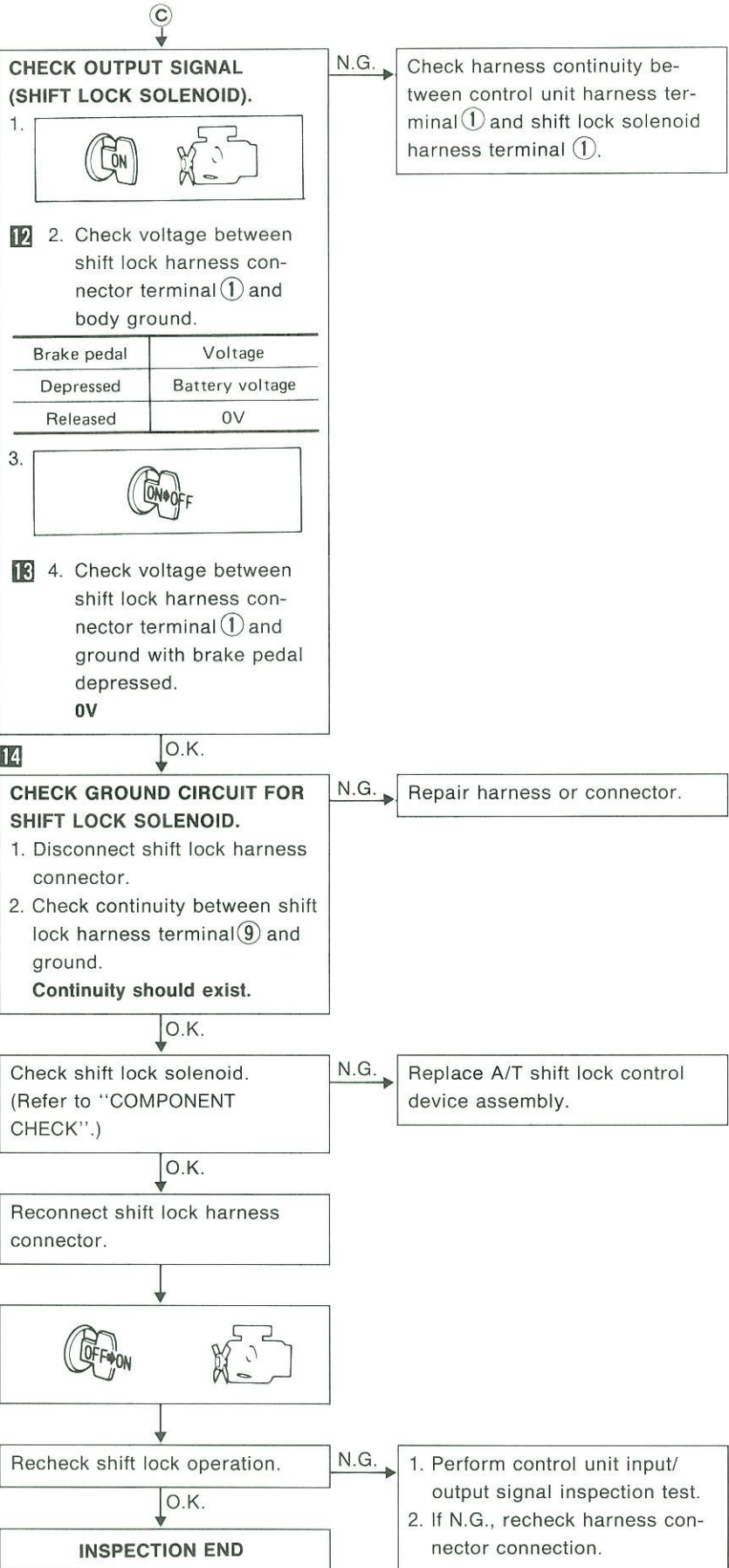
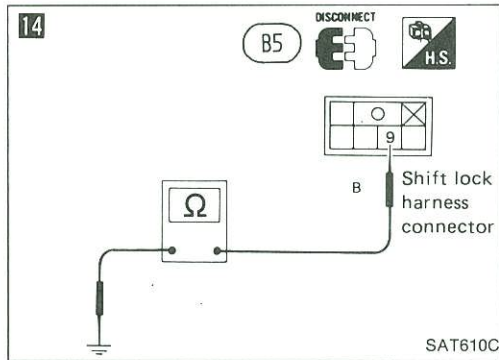
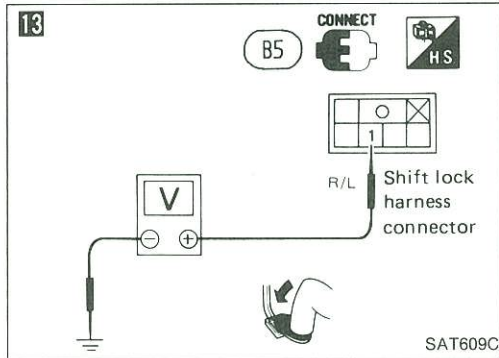
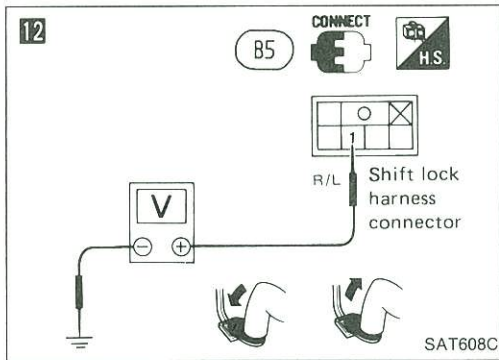
O.K.

Set selector lever in "P" position.

Ⓒ

TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)



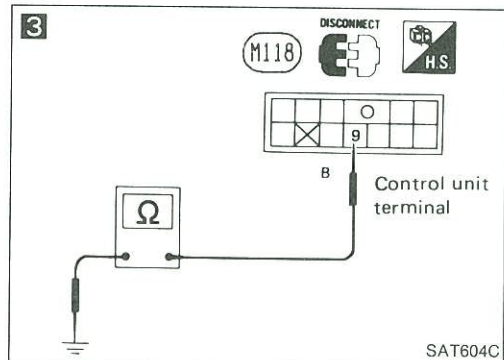
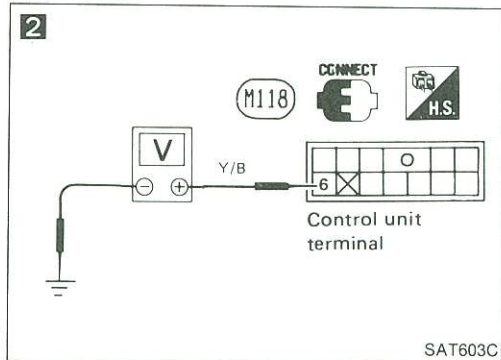
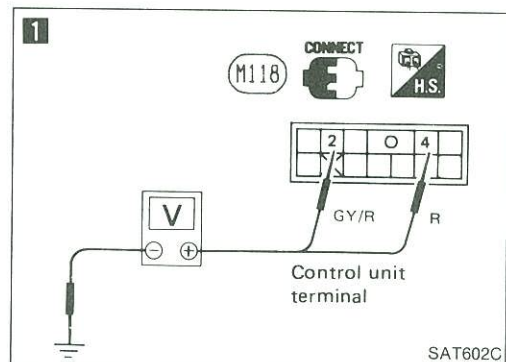
TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

DIAGNOSTIC PROCEDURE 2


SYMPTOM:

Ignition key cannot be removed when selector lever is set to "P" position or can be removed when selector lever is set to any position except "P".



1

CHECK POWER SOURCE.

1. 
2. Check voltage between control unit harness terminals ②, ④ and ground.
Battery voltage should exist.



N.G.

Check the following items:

1. Harness continuity between battery and control unit harness terminals ②, ④
2. Fuse

2

CHECK IGNITION SIGNAL.

1. 
2. Check voltage between control unit harness terminal ⑥ and ground.
0V
3. 
4. Check voltage between control unit harness terminal ⑥ and ground.
Battery voltage should exist.


N.G.

Check the following items:

1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

1. 
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑨ and ground.
Continuity should exist.

N.G.

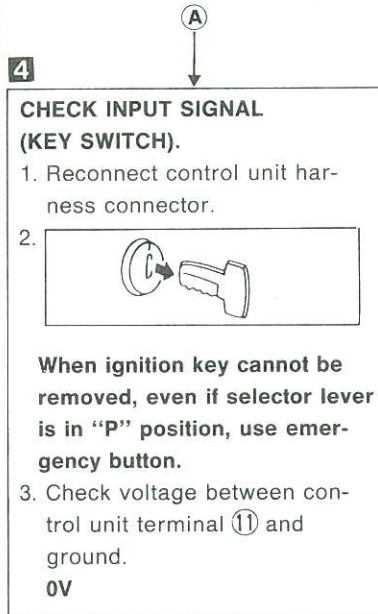
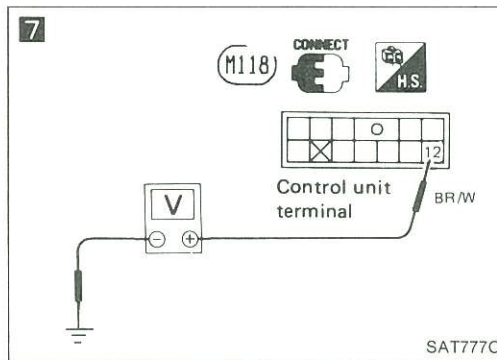
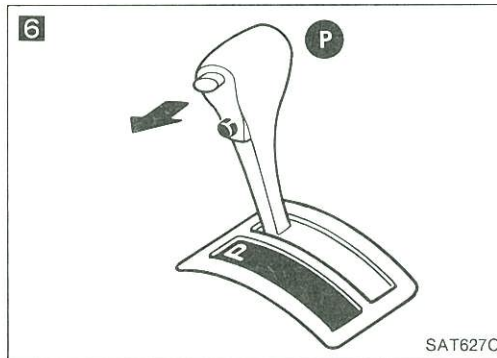
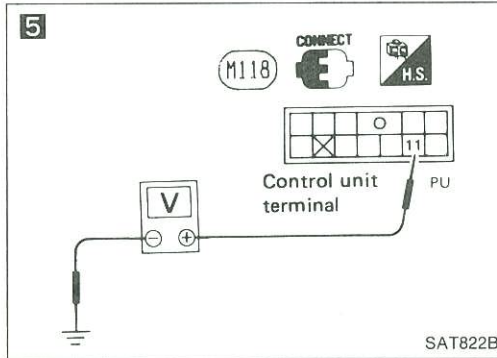
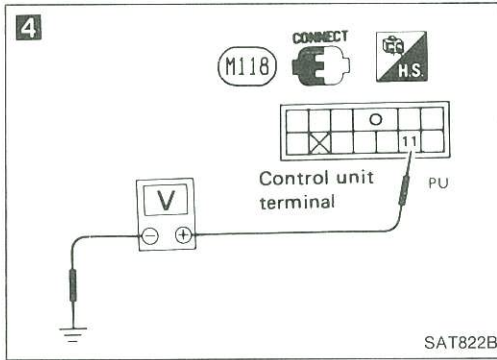
Repair harness or connector.

O.K.

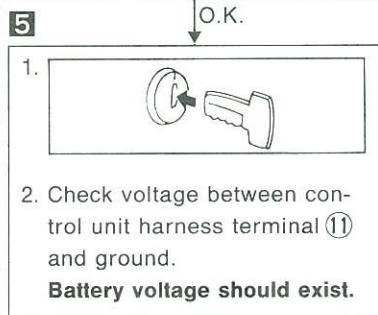
A

TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

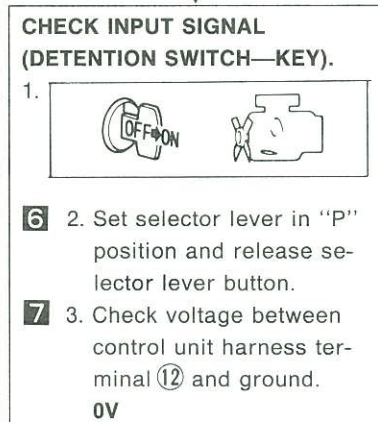


N.G. → Check key switch.
(Refer to "COMPONENT CHECK".)



N.G. → Check the following items:

1. Harness continuity between control unit harness terminal ⑪ and key switch harness terminal ⑪.
2. Harness continuity between key switch harness terminal ④ and fuse
3. Key switch (Refer to "COMPONENT CHECK".)



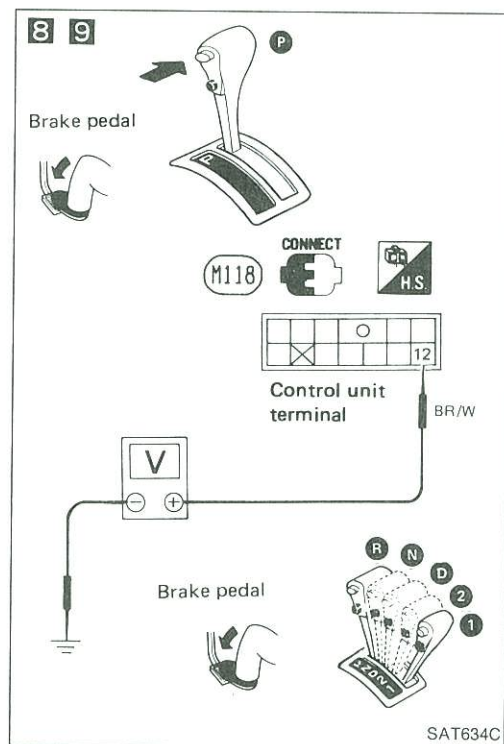
N.G. → Check detention switch—key.
(Refer to "COMPONENT CHECK".)

O.K. →

B

TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)



CHECK INPUT SIGNAL (DETENTION SWITCH—KEY).



- 8** 1. Check voltage between control unit harness terminal ⑫ and ground with brake pedal depressed and selector lever button pushed.

Battery voltage should exist.

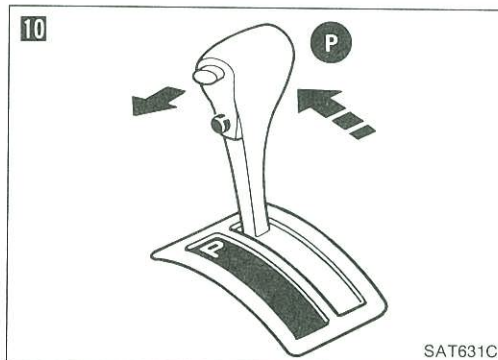
- 9** 2. Check voltage between control unit harness terminal ⑫ and ground with selector lever set in any position except "P".

Battery voltage should exist.

N.G.

Check the following items:

1. Harness continuity between control unit harness terminal ⑫ and detention switch harness terminal ⑫
2. Harness continuity between detention switch harness terminal ⑪ and key switch harness terminal ⑪
3. Detention switch—key (Refer to "COMPONENT CHECK".)



O.K.

10 Set selector lever in "P" position and release selector lever button.



CHECK OUTPUT SIGNAL (KEY LOCK SIGNAL).



Check voltage between key lock solenoid harness terminal ⑧ and ground at the moment ignition key is turned from OFF to ON.

Battery voltage should exist for approximately 0.1 seconds.

N.G.

Check harness continuity between shift lock solenoid harness terminal ⑧ and control unit harness terminal ⑧.

O.K.

N.G.

Repair harness or connector.

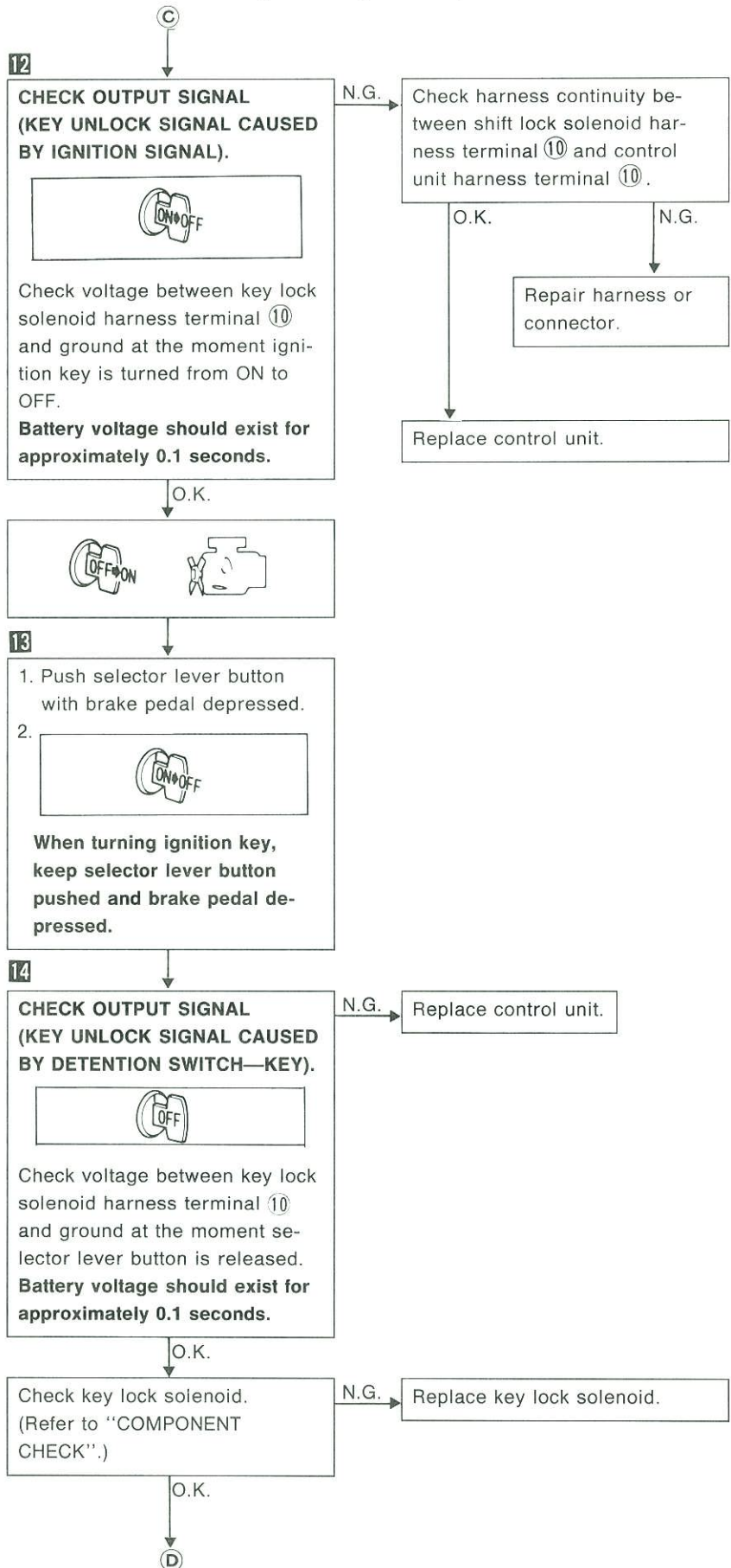
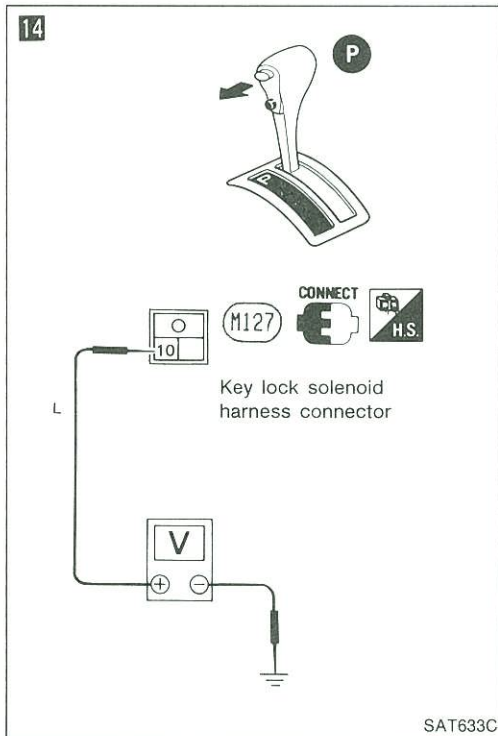
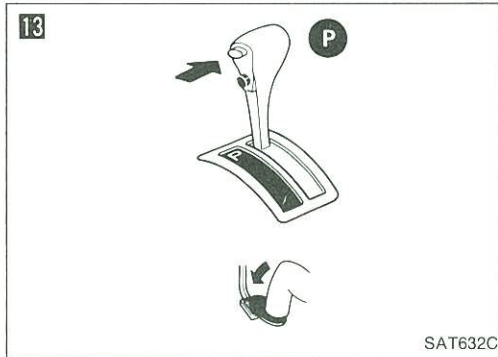
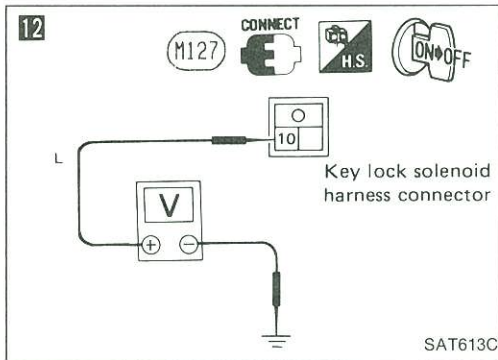
Replace control unit.

O.K.

C

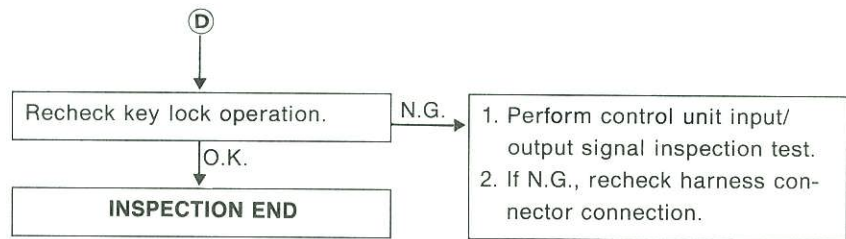
TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)



TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

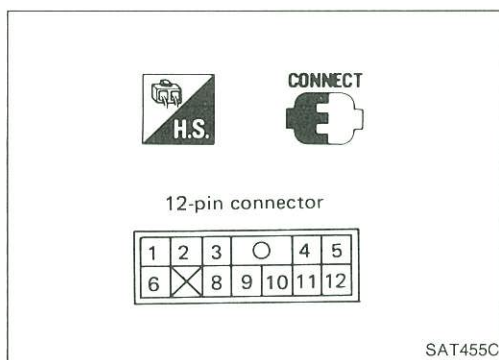


TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

SHIFT LOCK CONTROL UNIT INSPECTION





- Measure voltage between each terminal and terminal ⑨ by following "SHIFT LOCK CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.



TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

SHIFT LOCK CONTROL UNIT INSPECTION TABLE (Data are reference values.)

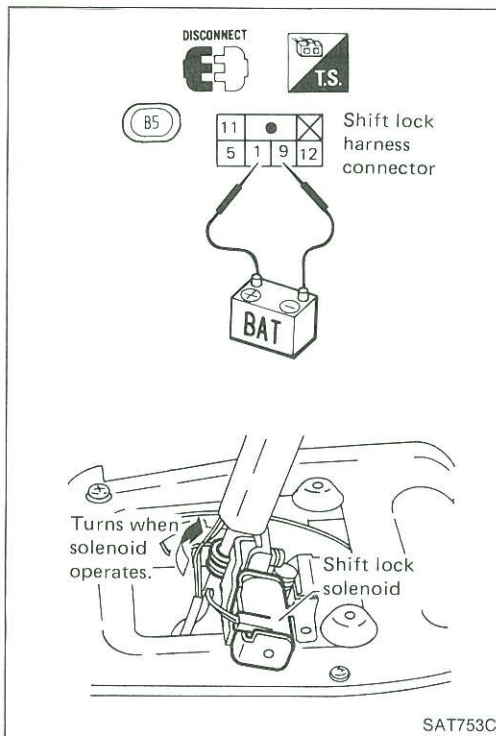
Terminal No.		Item	Condition	Judgement standard
⊕	⊖			
1	9	Shift lock signal	 When selector lever is set in “P” position and brake pedal is depressed	Battery voltage
			Except above	0V
2		Power source		Battery voltage
3		Stop lamp switch	When brake pedal is depressed	Battery voltage
			When brake pedal is released	0V
4		Power source		Battery voltage
5		Detention switch (Shift)	When key is inserted into key cylinder, selector lever is set in “P” position and selector lever button is released	0V
			Except above	Battery voltage
6		Ignition signal		Battery voltage
8	10	Key lock signal	When ignition switch is turned from LOCK, OFF or ACC to ON.	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
9	—	Ground	—	—
10	8	Key unlock signal	When ignition switch is turned from ON to LOCK, OFF or ACC, selector lever is set in “P” position and selector lever button is released	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
11	9	Key switch	When key is inserted into key cylinder	Battery voltage
			When key is removed from key cylinder	0V
12		Detention switch (Key)	When key is inserted into key cylinder, selector lever is set in “P” position and selector lever button is released	0V
			Except above	Battery voltage

A/T Shift Lock System (Cont'd)

COMPONENT CHECK

Shift lock solenoid

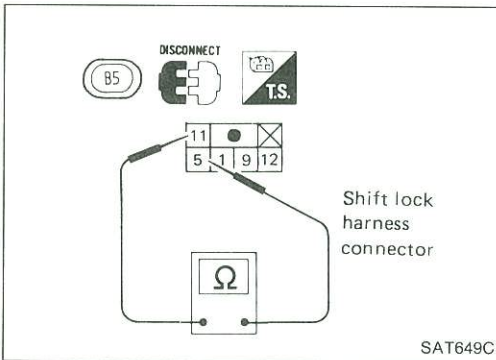
- Check operation by applying battery voltage to shift lock harness connector.



Detention switch—shift

- Check continuity between terminals ⑤ and ⑪ of shift lock harness connector.

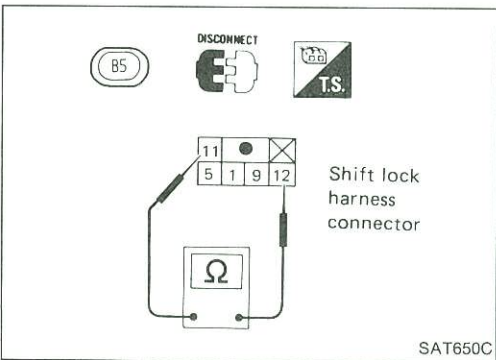
Condition	Continuity
When selector lever is set to "P" position and selector lever button is released	Yes
Except above	No



Detention switch—key

- Check continuity between terminals ⑪ and ⑫ of shift lock harness connector.

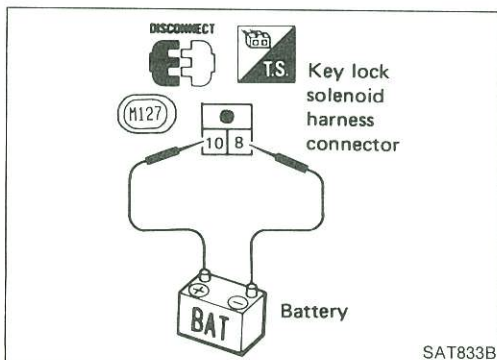
Condition	Continuity
When selector lever is set to "P" position and selector lever button is released	Yes
Except above	No



Key lock solenoid

- Check operation by applying battery voltage to key lock solenoid harness connector.

Operating sound must be emitted.



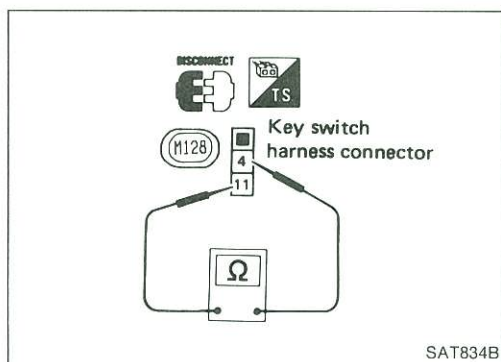
TROUBLE DIAGNOSES

A/T Shift Lock System (Cont'd)

Key switch

- Check continuity between terminals ④ and ⑪ of key switch harness connector.

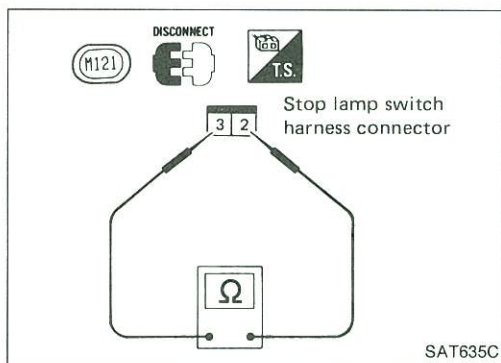
Condition	Continuity
When key is inserted into key cylinder	Yes
When key is removed from key cylinder	No

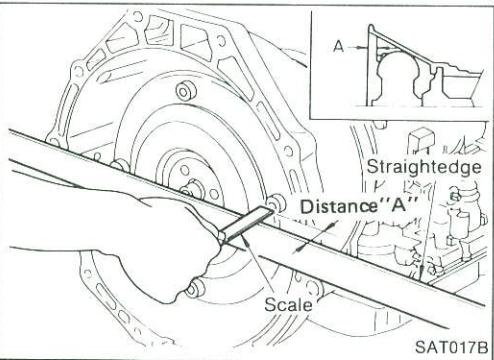
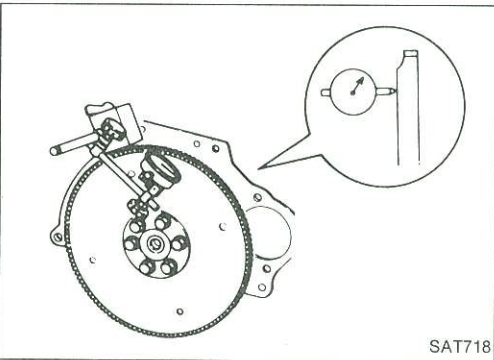
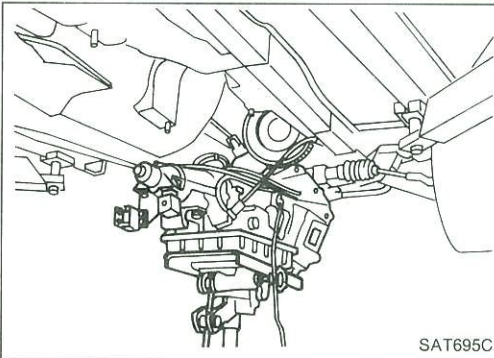
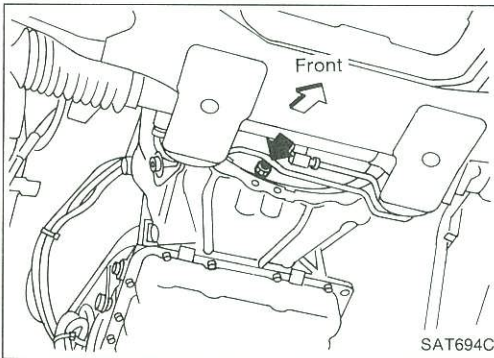


Stop lamp switch

- Check stop lamp switch after adjusting brake pedal — refer to section BR.
- Check continuity between terminals ③ and ② of stop lamp switch harness connector.

Condition	Continuity
When depressing brake pedal	Yes
When releasing brake pedal is released	No





Removal

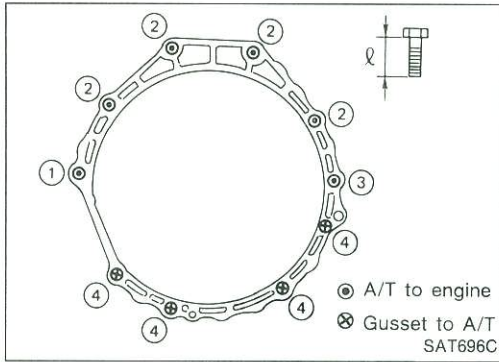
- Remove exhaust tube.
- Remove fluid charging pipe from A/T assembly.
- Remove oil cooler pipe from A/T assembly.
- Remove control linkage from selector lever.
- Disconnect inhibitor switch and solenoid harness connectors.
- Remove speedometer cable from A/T assembly.
- Plug up openings such as the oil charging pipe hole, etc.
- Remove propeller shaft. — Refer to section PD.
- **Insert plug into rear oil seal after removing propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**
- Remove starter motor.
- Remove gusset securing engine to A/T assembly.
- Remove bolts securing torque converter to drive plate.
- **Remove the bolts by turning crankshaft.**
- Support engine by placing a jack under oil pan.
- **Do not place jack under oil pan drain plug.**
- Remove transmission from engine.
- **Support automatic transmission, while removing it.**

Installation

- Drive plate runout
Maximum allowable runout:
0.5 mm (0.020 in)
 If this runout is out of allowance, replace drive plate with ring gear.
- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.
Distance "A":
26 mm (1.02 in) or more
- Install converter to drive plate.
- Reinstall any part removed.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**

REMOVAL AND INSTALLATION

Installation (Cont'd)



- Tighten bolts securing transmission.





Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "ℓ" mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	39 - 49 (4.0 - 5.0, 29 - 36)	50 (1.97)
3	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
4	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.98)

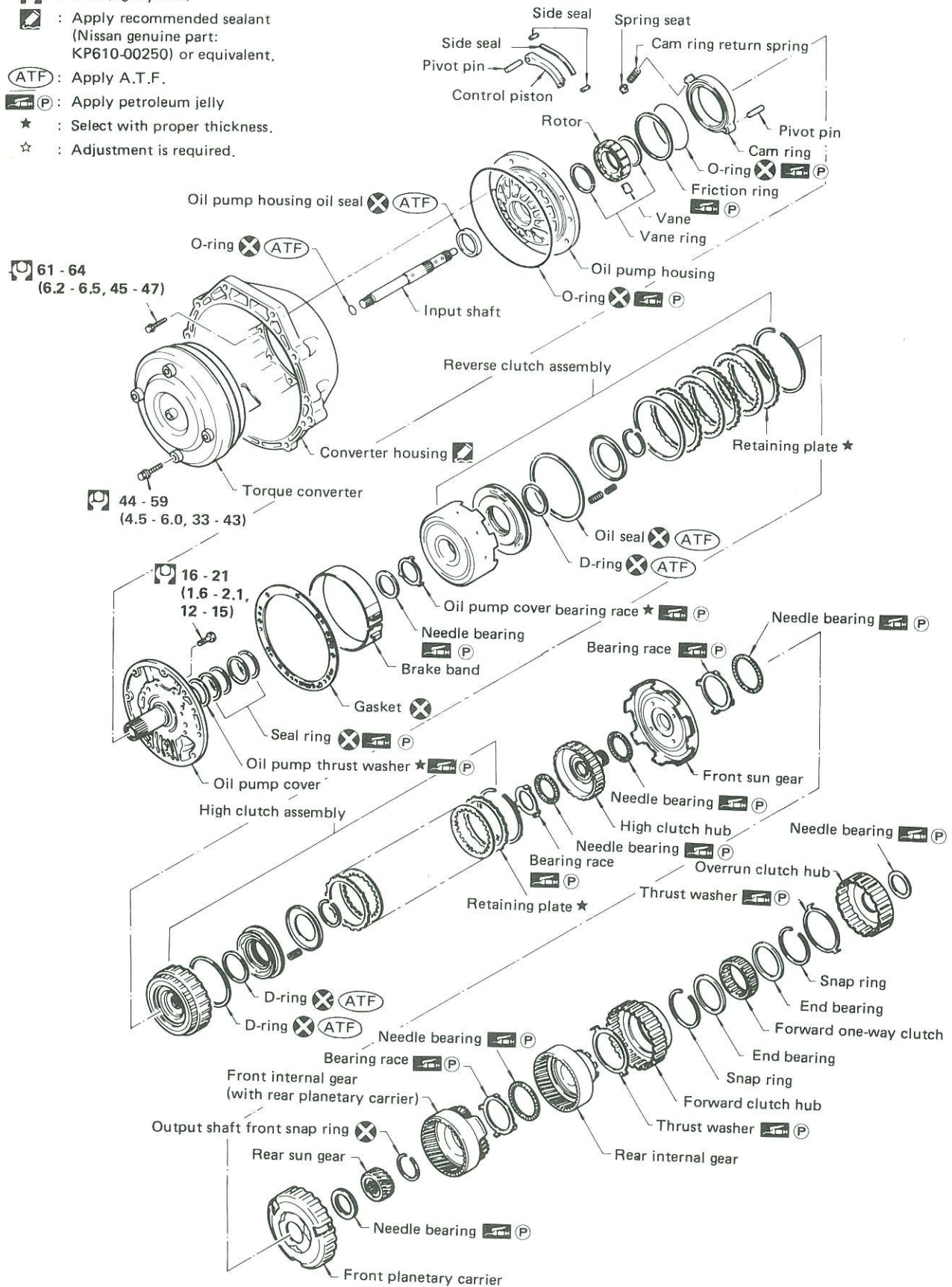
- Reinstall any part removed.



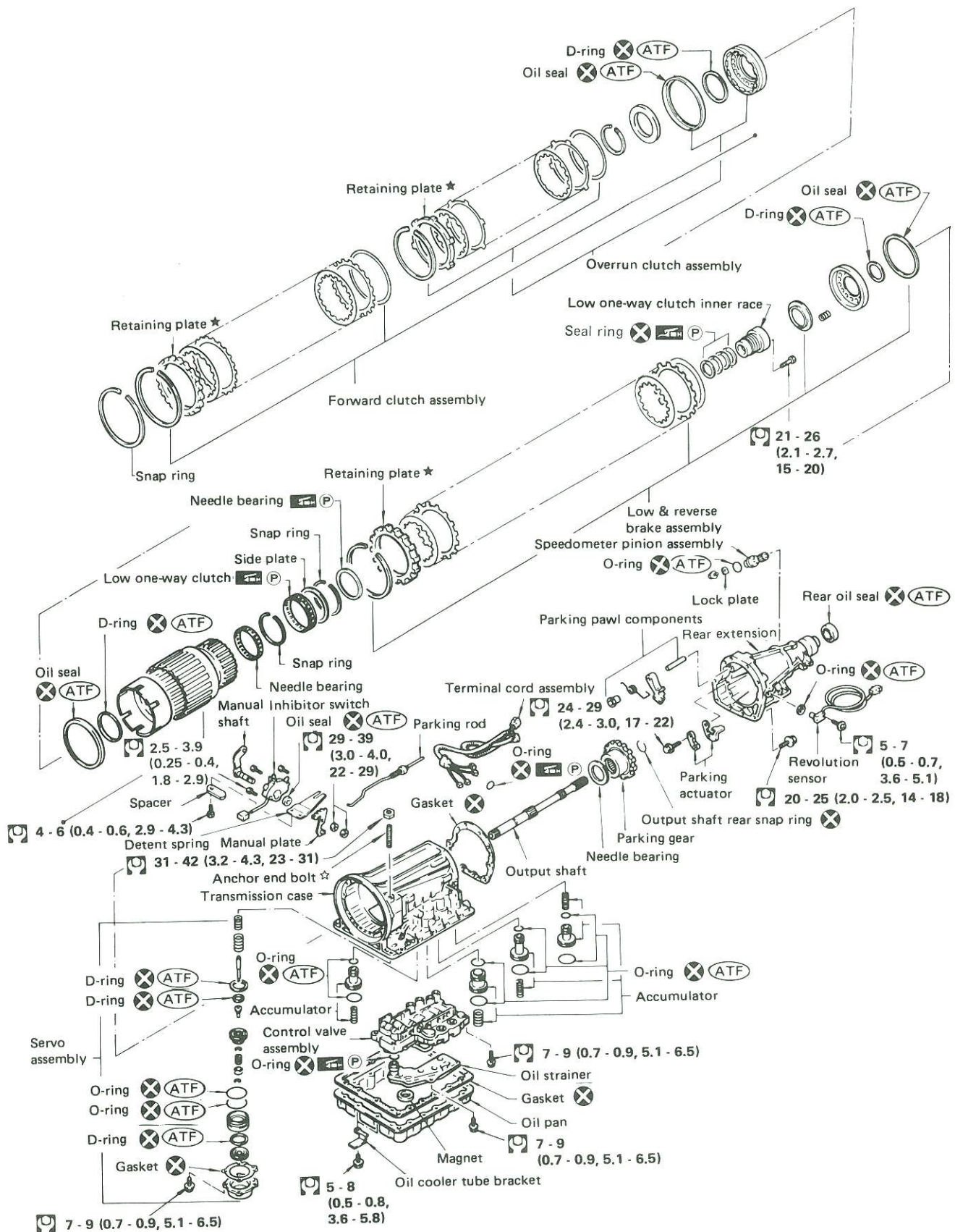
- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. — Refer to "ROAD TESTING".

MAJOR OVERHAUL

-  : N·m (kg-m, ft-lb)
-  : Apply recommended sealant
(Nissan genuine part:
KP610-00250) or equivalent.
-  : Apply A.T.F.
-  : Apply petroleum jelly
- ★ : Select with proper thickness.
- ☆ : Adjustment is required.

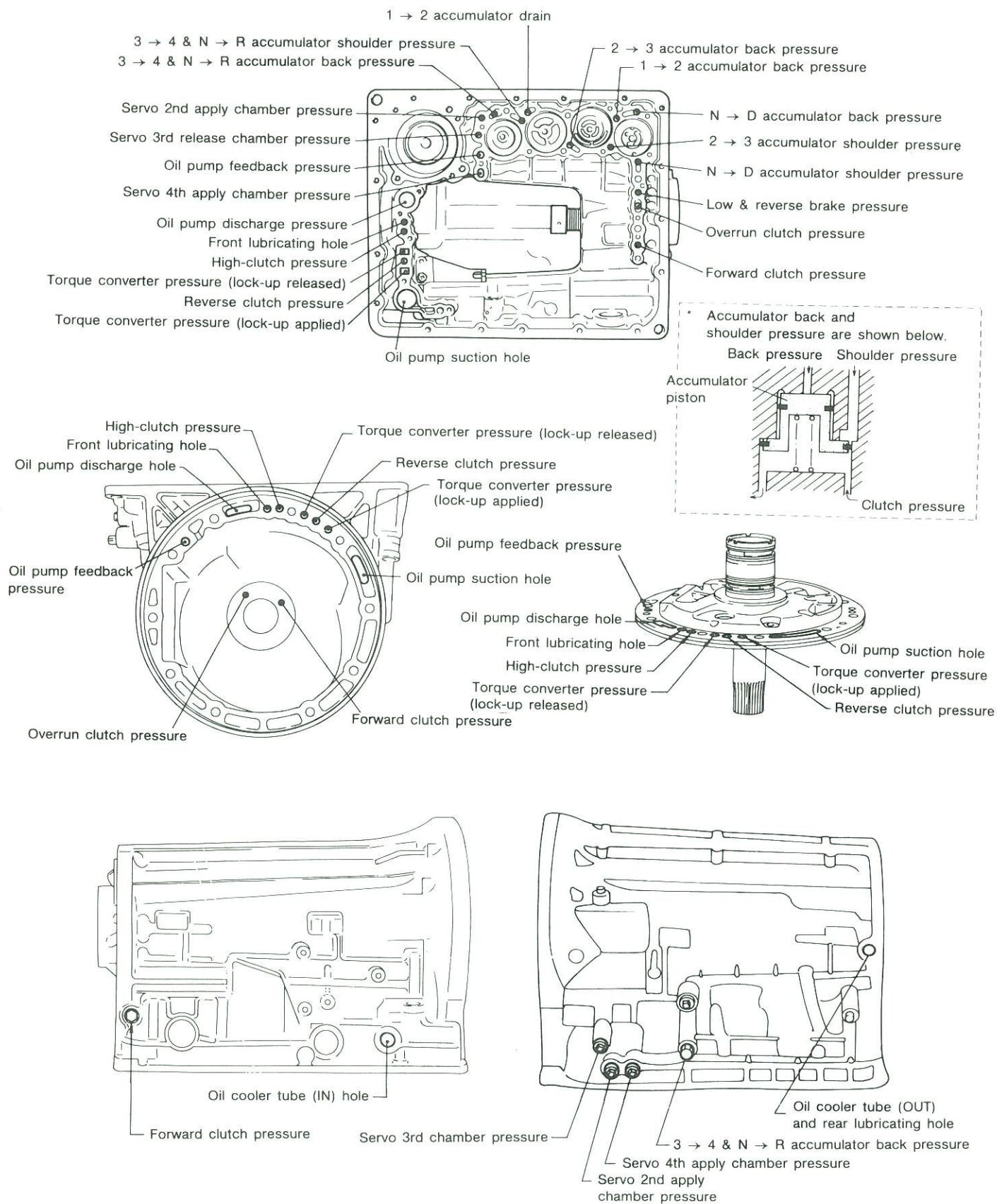


MAJOR OVERHAUL



MAJOR OVERHAUL

Oil Channel



Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②	161.0 (6.34)
③	140.1 (5.52)
④	156.4 (6.16)
⑥	142.0 (5.59)
⑦	159.2 (6.27)

Thrust washers

Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings

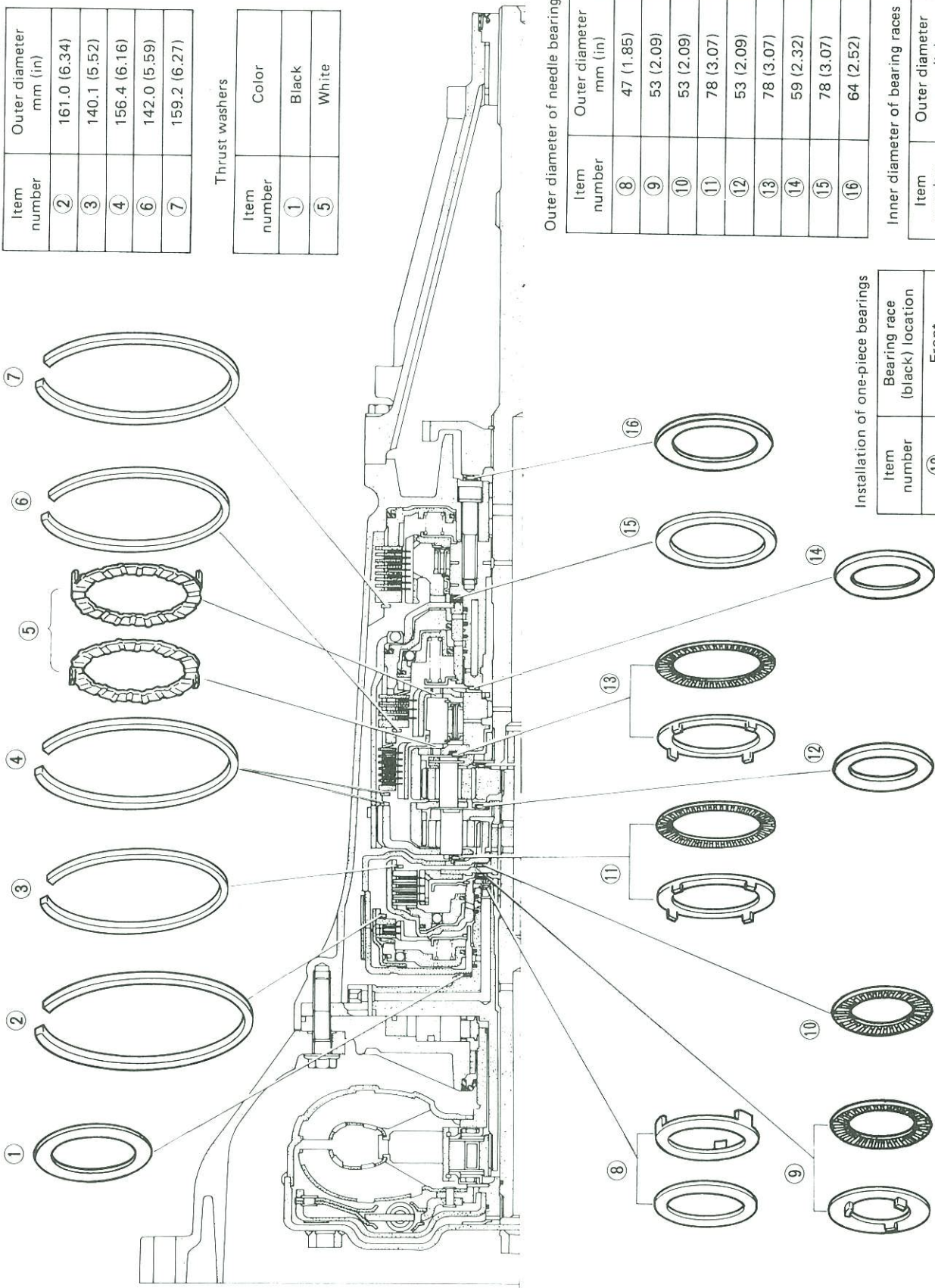
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑩	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	59 (2.32)
⑮	78 (3.07)
⑯	64 (2.52)

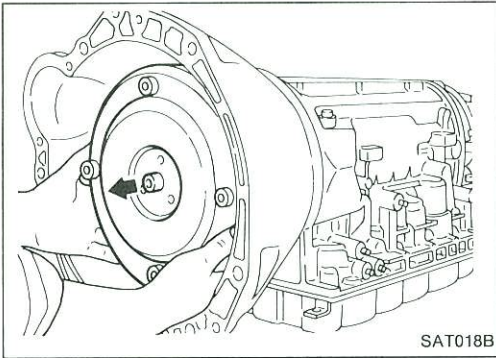
Inner diameter of bearing races

Item number	Outer diameter mm (in)
⑪	58 (2.28)
⑬	58.8 (2.315)

Installation of one-piece bearings

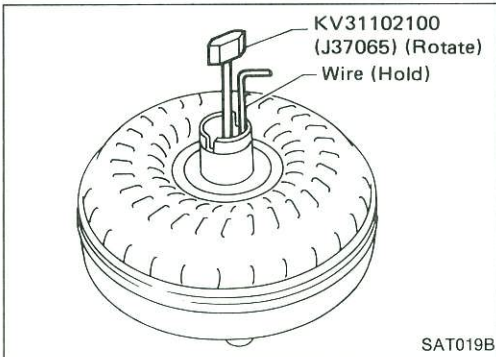
Item number	Bearing race (black) location
⑫	Front
⑮	Rear side
⑯	Rear side



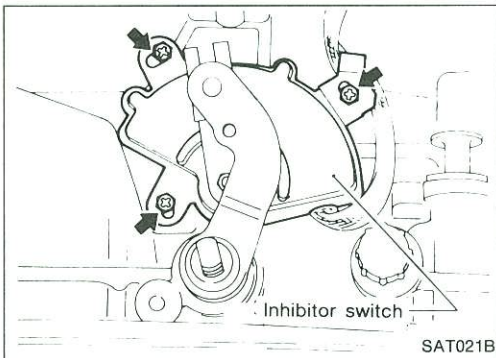


Disassembly

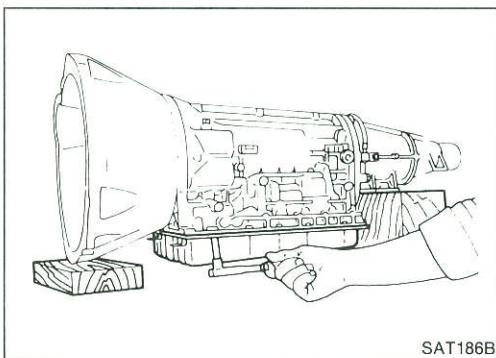
1. Remove torque converter by holding it firmly and turning while pulling straight out.



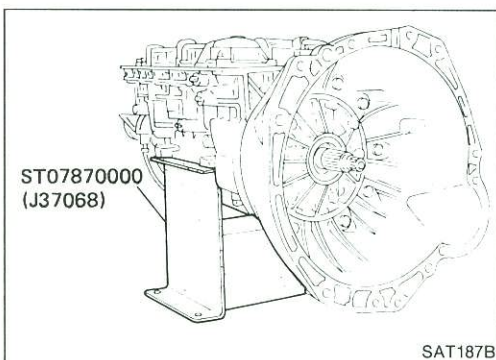
2. Check torque converter one-way clutch.
 - a. Insert Tool into spline of one-way clutch inner race.
 - b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
 - c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



3. Remove inhibitor switch from transmission case.



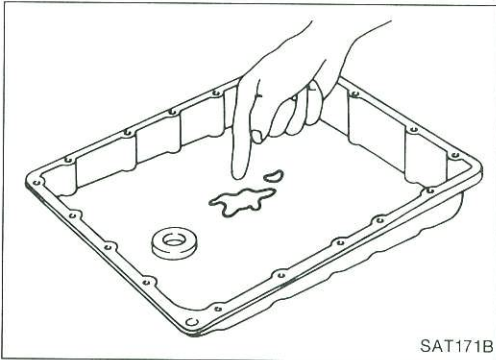
4. Remove oil pan.
 - a. Drain A.T.F. from rear extension.
 - b. Raise oil pan by placing wooden blocks under converter housing and rear extension.
 - c. Separate the oil pan and transmission case.
 - **Always place oil pan straight down so that foreign particles inside will not move.**



5. Place transmission into Tool with the control valve facing up.

DISASSEMBLY

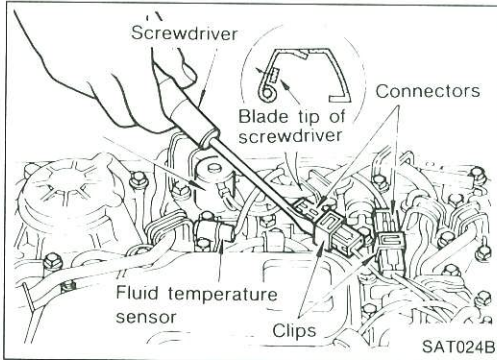
Disassembly (Cont'd)



6. Check oil pan and oil strainer for accumulation of foreign particles.

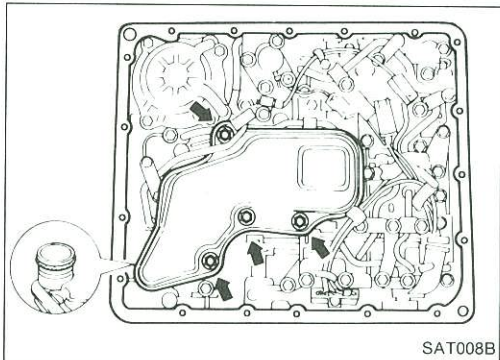
- If materials of clutch facing are found, clutch plates may be worn.
- If metal filings are found, clutch plates, brake bands, etc. may be worn.
- If aluminum filings are found, bushings or aluminum cast parts may be worn.

In above cases, replace torque converter and check unit for cause of particle accumulation.



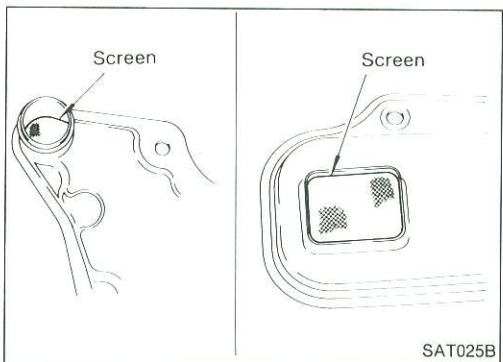
7. Remove lock-up solenoid and fluid temperature sensor connectors.

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

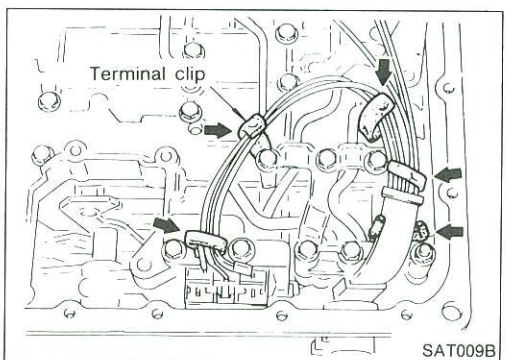


8. Remove oil strainer.

- Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



- Check oil strainer screen for damage.



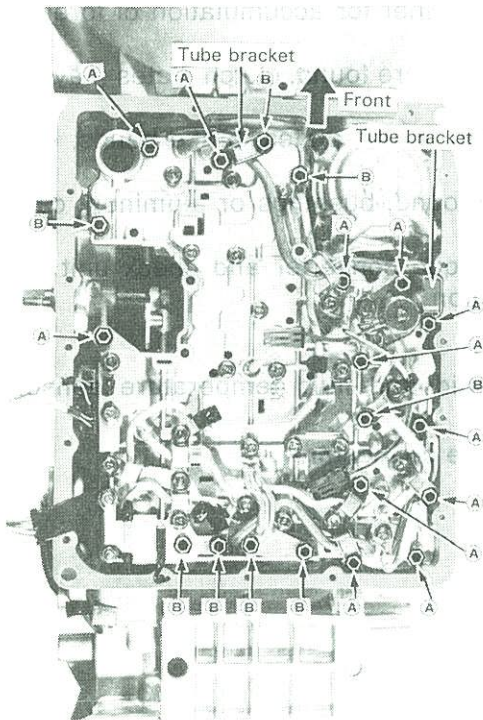
9. Remove control valve assembly.


- Straighten terminal clips to free terminal cords then remove terminal clips.

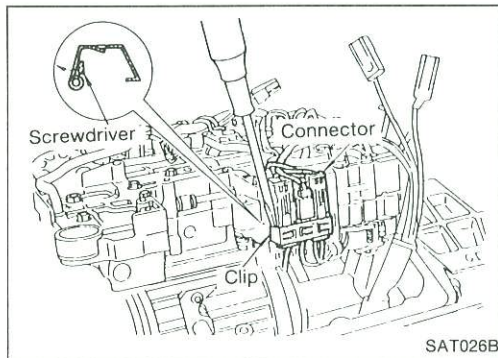
DISASSEMBLY

Disassembly (Cont'd)

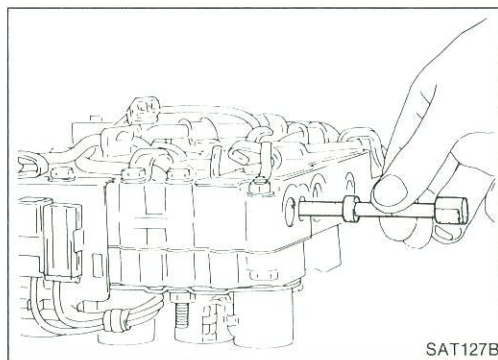
- b. Remove bolts **(A)** and **(B)**, and remove control valve assembly from transmission.



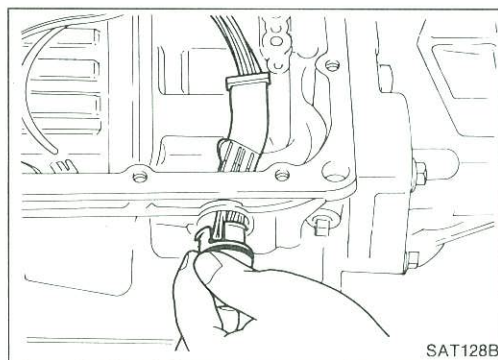
Bolt	ℓ mm (in)	 ℓ
(A)	33 mm (1.30 in)	
(B)	45 mm (1.77 in)	



- c. Remove solenoid connector.
- **Be careful not to damage connector.**



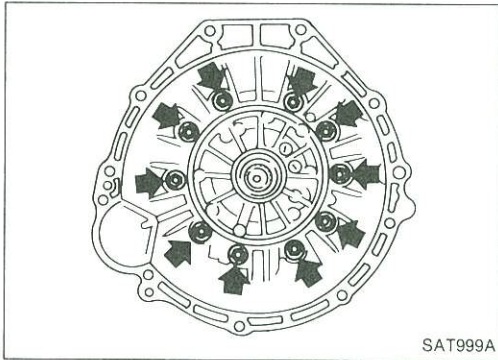
- d. Remove manual valve from control valve assembly.



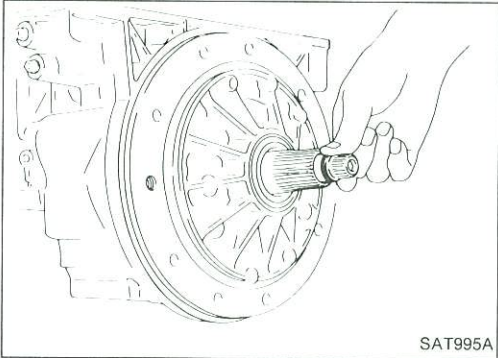
10. Remove terminal cord assembly from transmission case while pushing on stopper.
- **Be careful not to damage cord.**
 - **Do not remove terminal cord assembly unless it is damaged.**

DISASSEMBLY

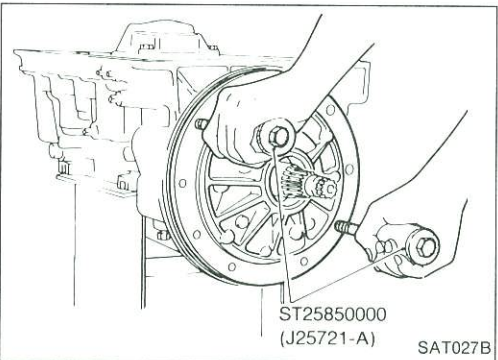
Disassembly (Cont'd)



11. Remove converter housing from transmission case.

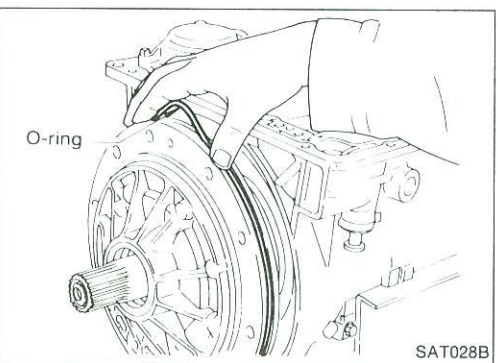


12. Remove O-ring from input shaft.



13. Remove oil pump assembly.

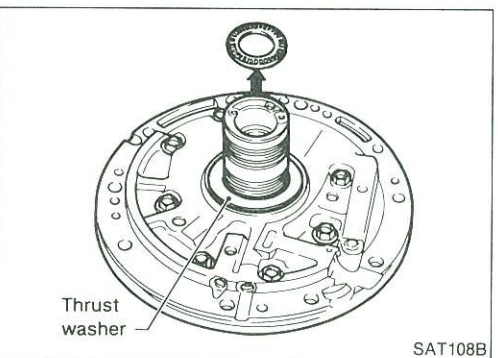
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing.

● **Be careful not to scratch pump housing.**

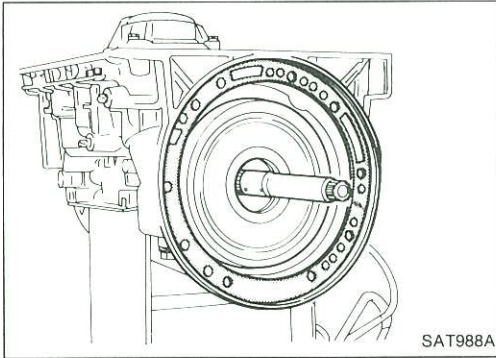


d. Remove needle bearing and thrust washer from oil pump assembly.

DISASSEMBLY

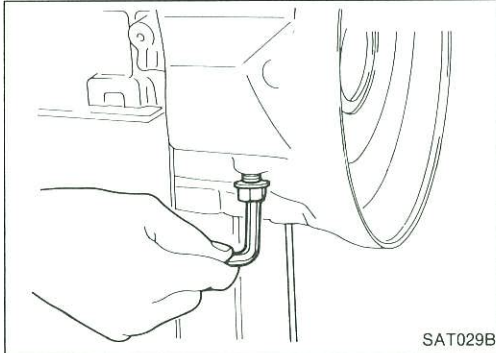
Disassembly (Cont'd)

14. Remove input shaft and oil pump gasket.

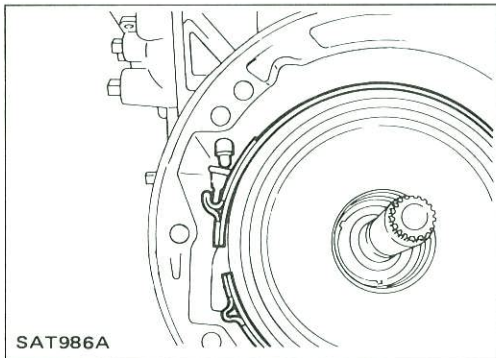


15. Remove brake band and band strut.

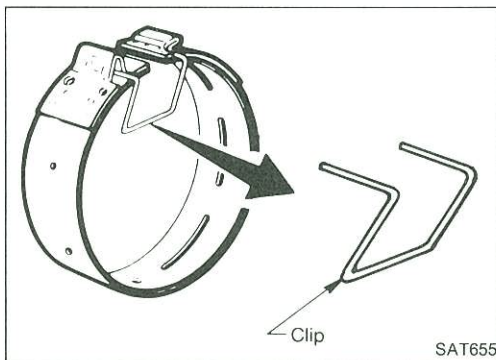
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



b. Remove brake band and band strut from transmission case.

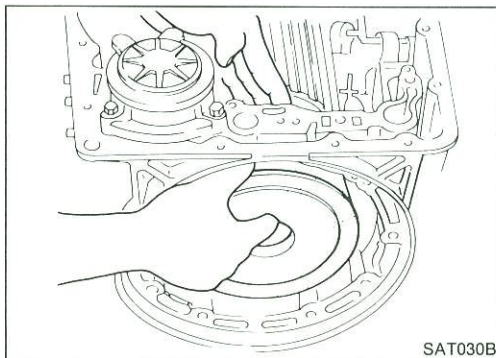


c. Hold brake band in a circular shape with clip.



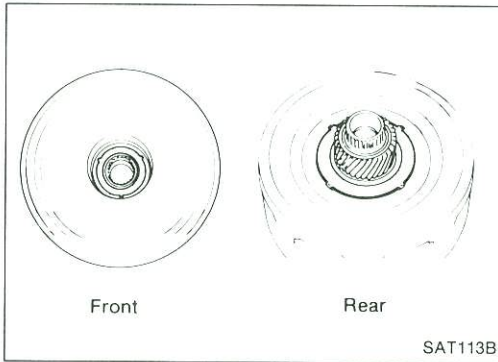
16. Remove front side clutch and gear components.

a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.

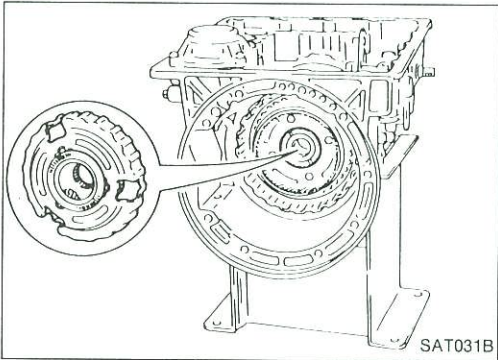


DISASSEMBLY

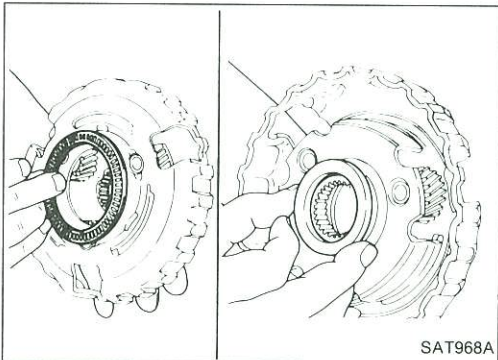
Disassembly (Cont'd)



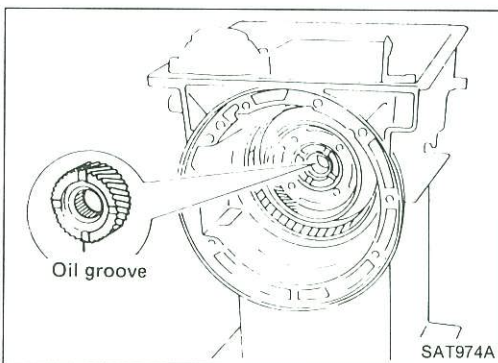
- b. Remove front bearing race from clutch pack.
- c. Remove rear bearing race from clutch pack.



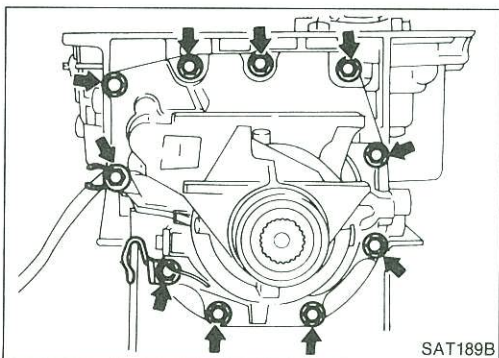
- d. Remove front planetary carrier from transmission case.



- e. Remove front needle bearing from front planetary carrier.
- f. Remove rear needle bearing from front planetary carrier.



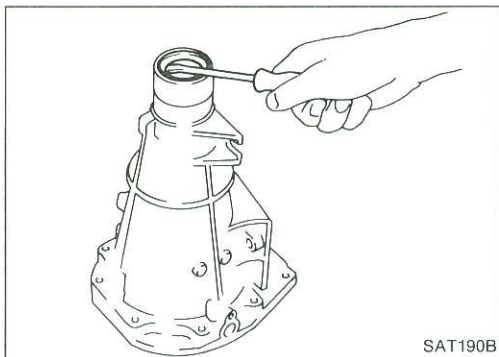
- g. Remove rear sun gear from transmission case.



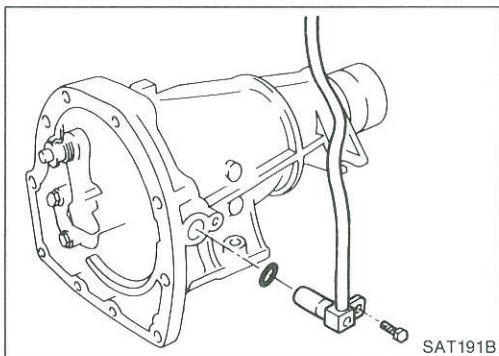
- 17. Remove rear extension.
 - a. Remove rear extension from transmission case.
 - b. Remove rear extension gasket from transmission case.

DISASSEMBLY

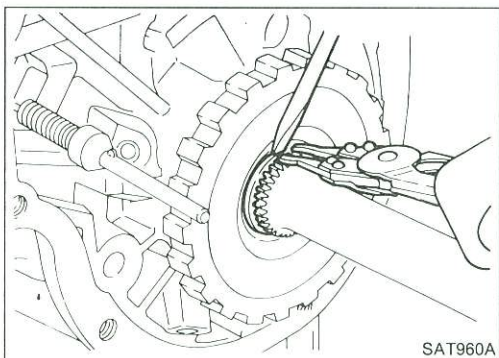
Disassembly (Cont'd)



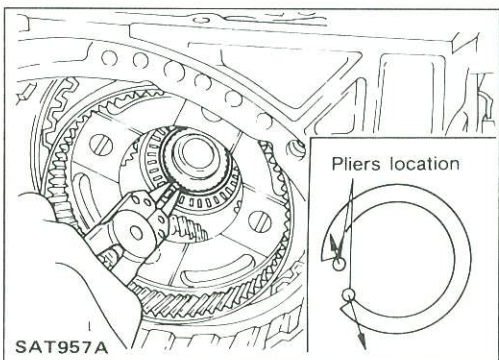
- c. Remove oil seal from rear extension.
- **Do not remove oil seal unless it is to be replaced.**



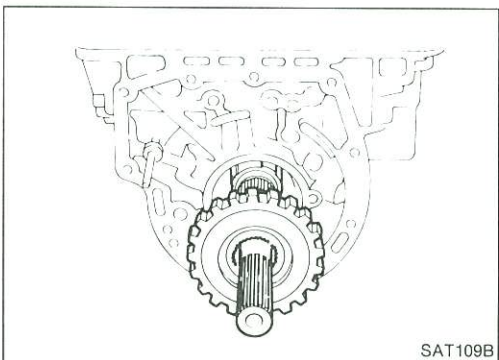
- d. Remove revolution sensor from rear extension.
- e. Remove O-ring from revolution sensor.



- 18. Remove output shaft and parking gear.
- a. Remove rear snap ring from output shaft.



- b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**
- c. Remove snap ring from output shaft.

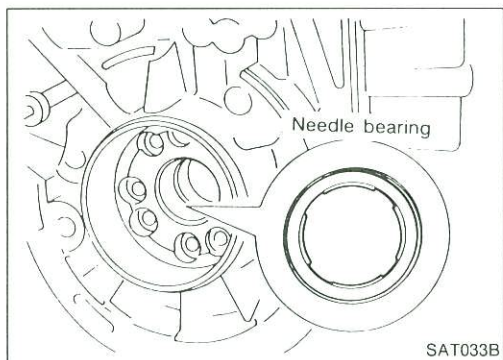


- d. Remove output shaft and parking gear as a unit from transmission case.
- e. Remove parking gear from output shaft.

DISASSEMBLY

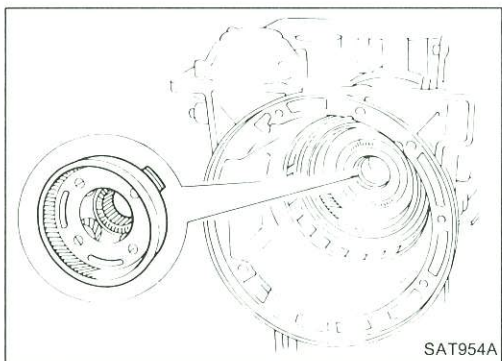
Disassembly (Cont'd)

- f. Remove needle bearing from transmission case.

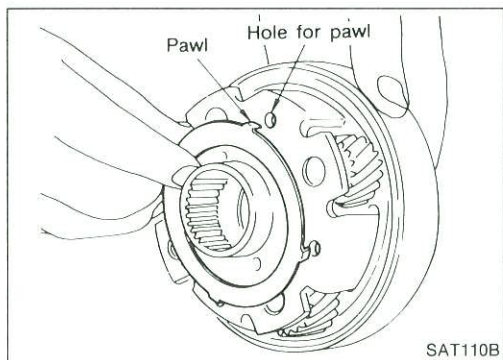


19. Remove rear side clutch and gear components.

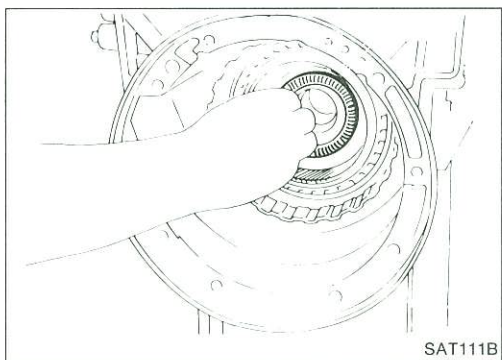
- a. Remove front internal gear.



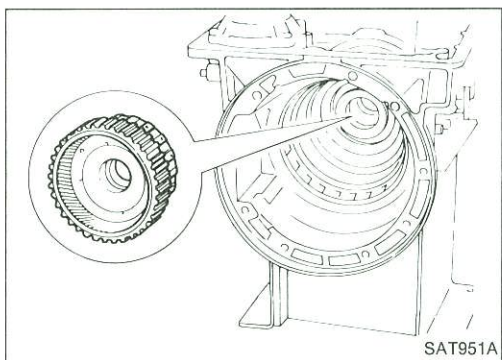
- b. Remove bearing race from front internal gear.



- c. Remove needle bearing from rear internal gear.



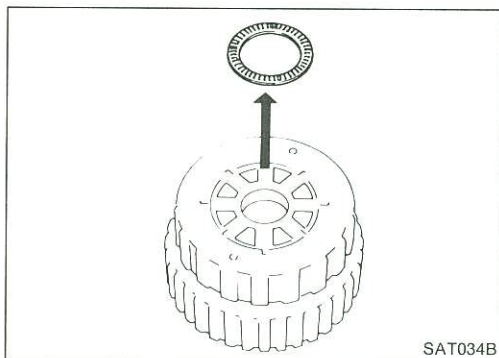
- d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.



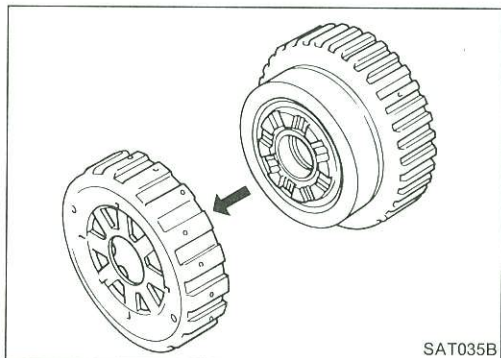
DISASSEMBLY

Disassembly (Cont'd)

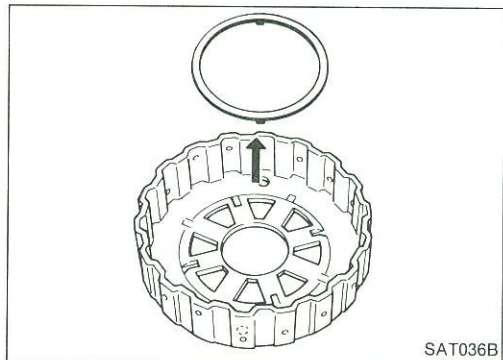
- e. Remove needle bearing from overrun clutch hub.



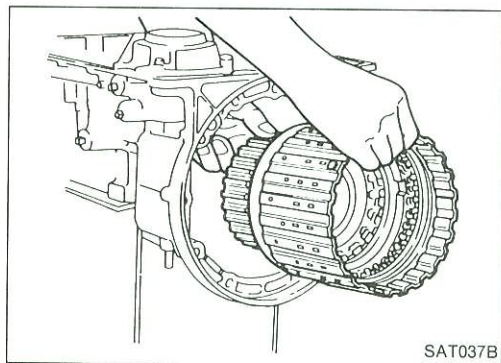
- f. Remove overrun clutch hub from rear internal gear and forward clutch hub.



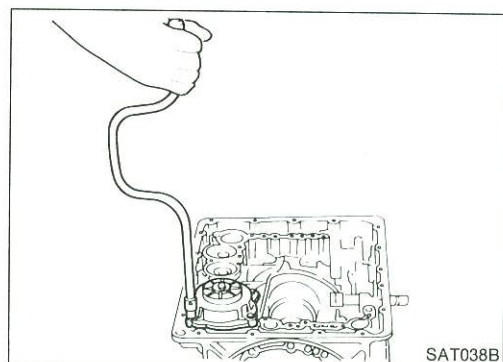
- g. Remove thrust washer from overrun clutch hub.



- h. Remove forward clutch assembly from transmission case.

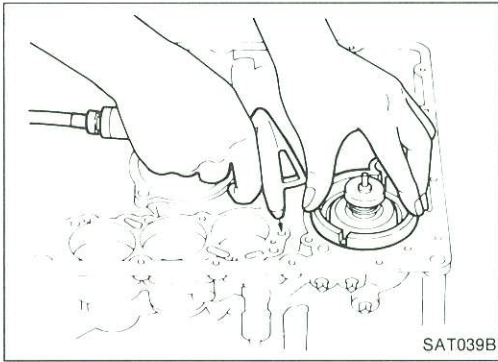


20. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.

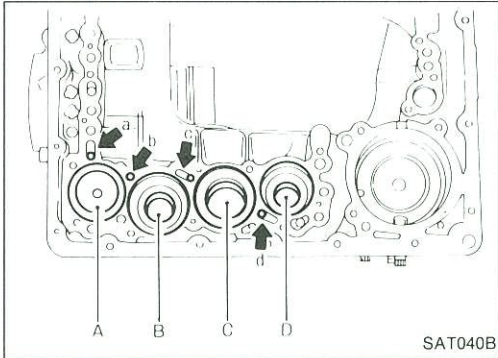


DISASSEMBLY

Disassembly (Cont'd)

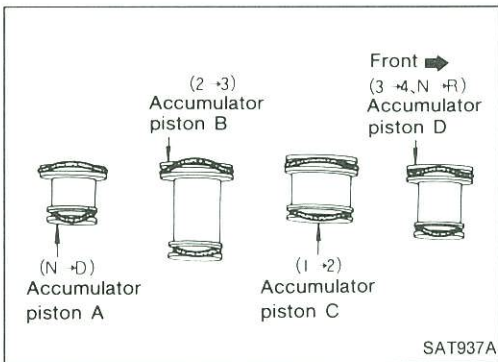


- b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**
- c. Remove return springs.

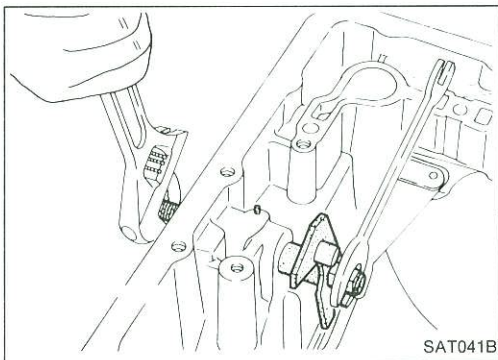


- d. Remove springs from accumulator pistons B, C and D.
- e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

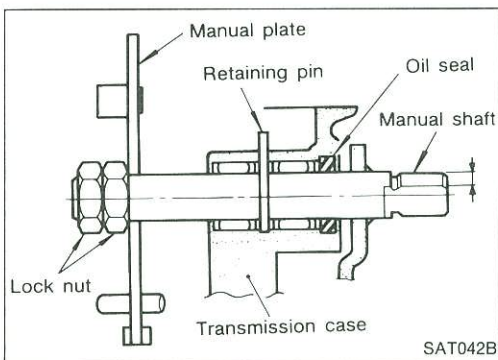
Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d



- f. Remove O-ring from each piston.



21. Remove manual shaft components, if necessary.
- a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

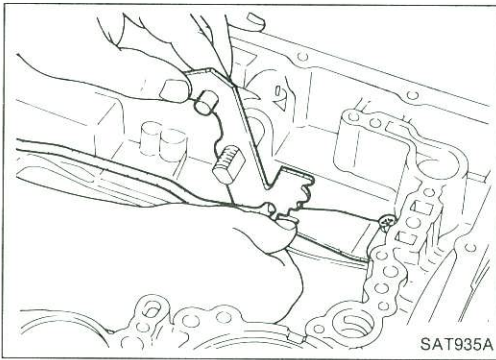


- b. Remove retaining pin from transmission case.

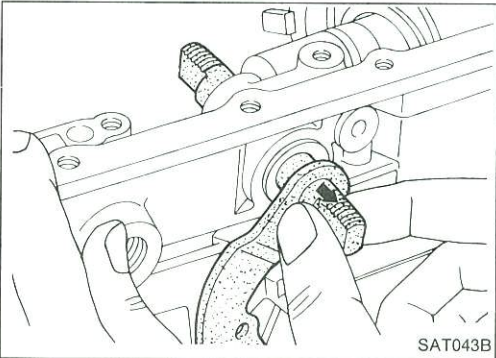
DISASSEMBLY

Disassembly (Cont'd)

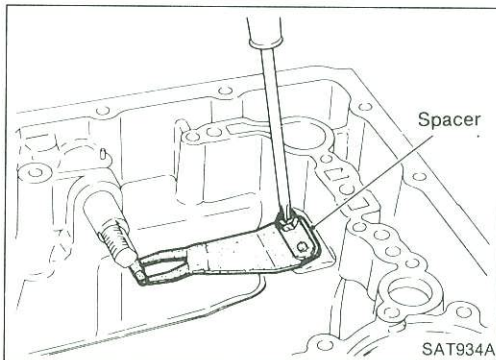
- c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



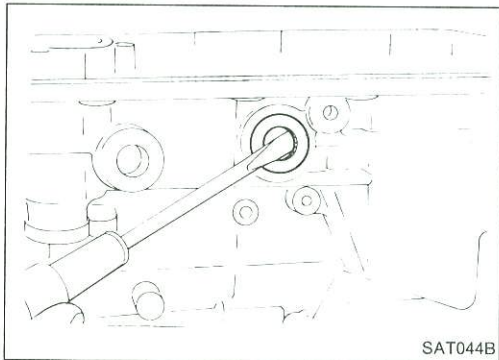
- d. Remove manual shaft from transmission case.



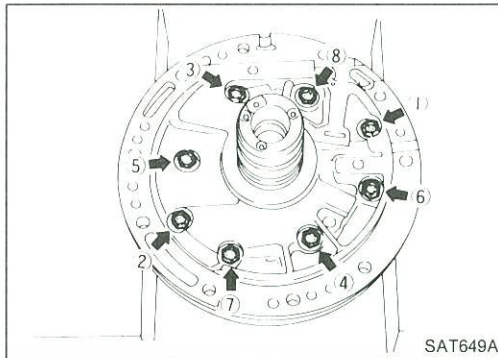
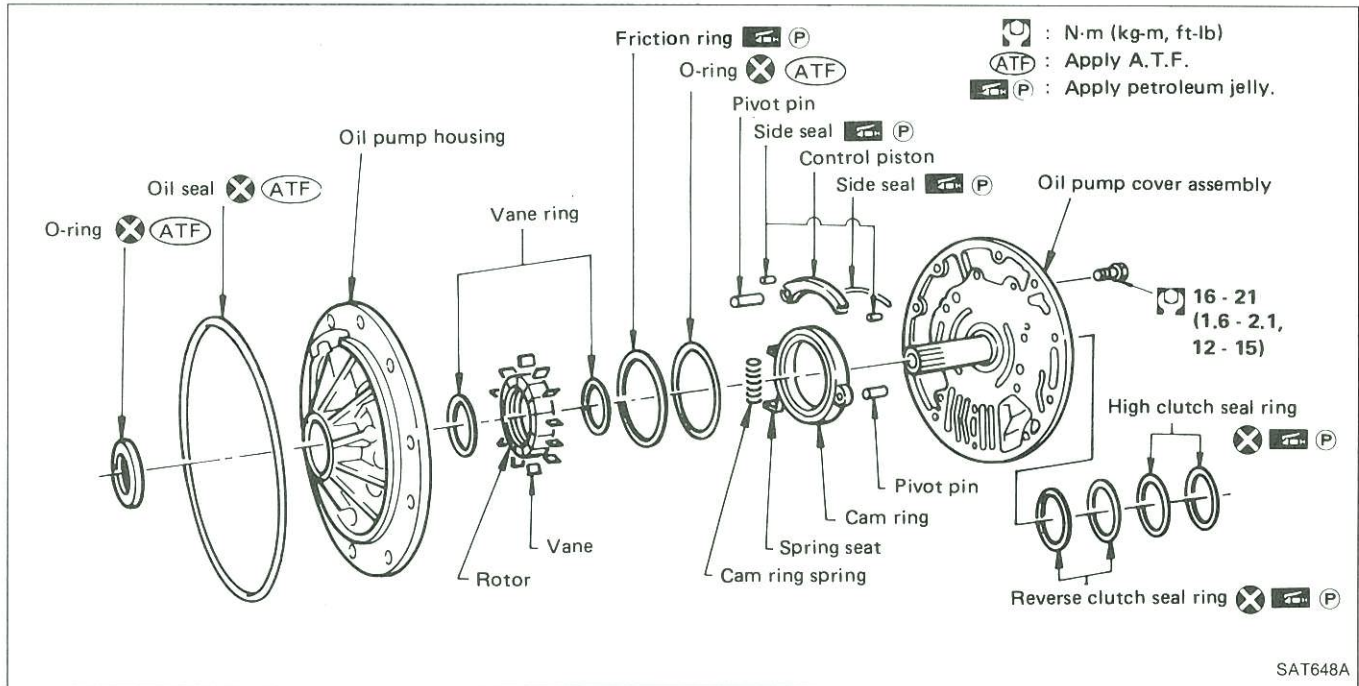
- e. Remove spacer and detent spring from transmission case.



- f. Remove oil seal from transmission case.

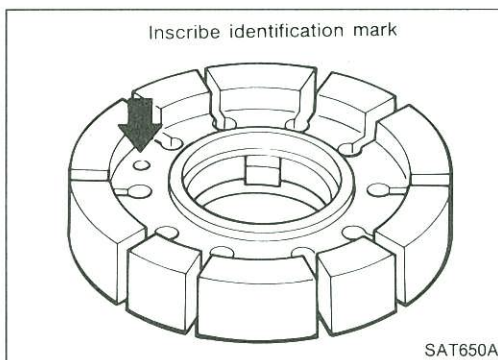


Oil Pump



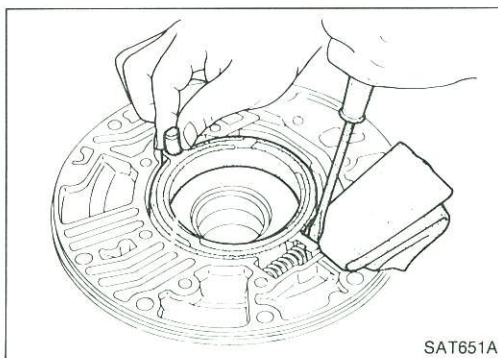
DISASSEMBLY

1. Loosen bolts in numerical order and remove oil pump cover.



2. Remove rotor, vane rings and vanes.

- Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.

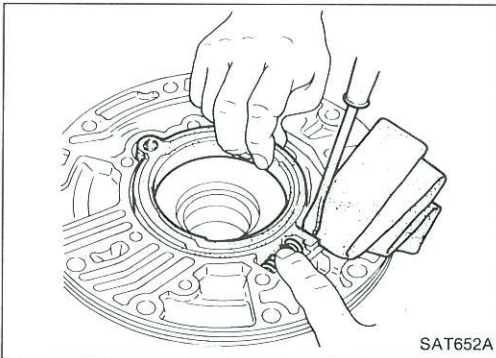


3. While pushing on cam ring remove pivot pin.

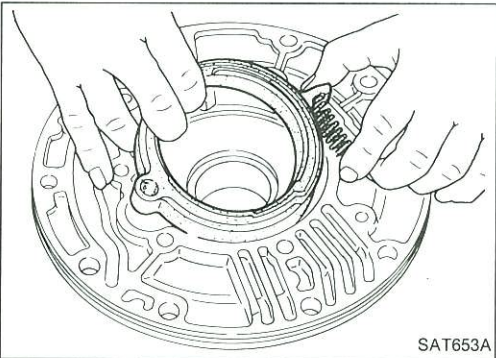
- Be careful not to scratch oil pump housing.

REPAIR FOR COMPONENT PARTS

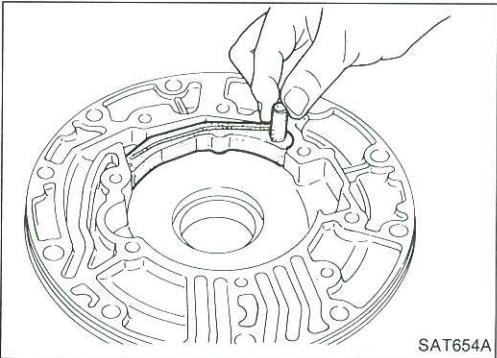
Oil Pump (Cont'd)



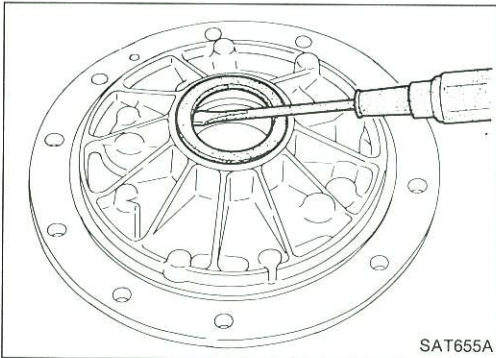
4. While holding cam ring and spring lift out cam ring spring.
 - **Be careful not to damage oil pump housing.**
 - **Hold cam ring spring to prevent it from jumping.**



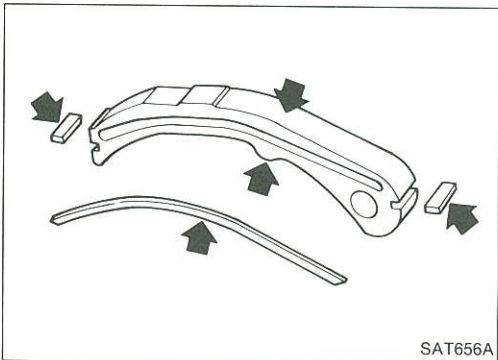
5. Remove cam ring and cam ring spring from oil pump housing.



6. Remove pivot pin from control piston and remove control piston assembly.



7. Remove oil seal from oil pump housing.
 - **Be careful not to scratch oil pump housing.**



INSPECTION

Oil pump cover, rotor, vanes, control piston, side seals, cam ring and friction ring

- Check for wear or damage.

REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

Side clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences. Maximum measured values should be within specified ranges.

- **Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

Standard clearance:

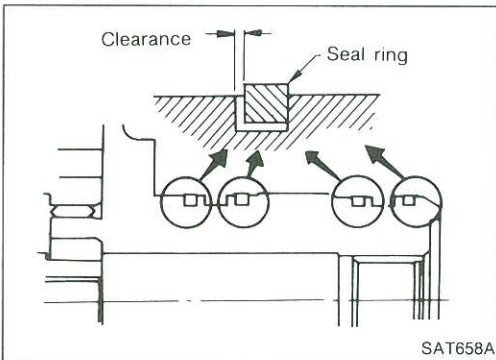
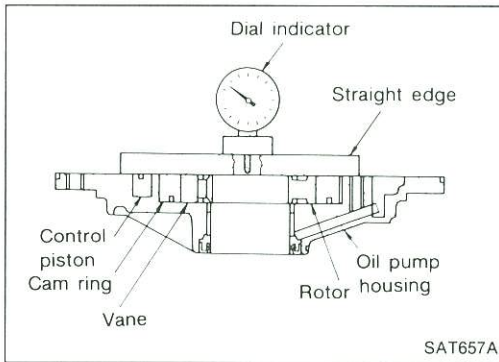
Cam ring

0.01 - 0.024 mm (0.0004 - 0.0009 in)

Rotor, vanes, control piston

0.03 - 0.044 mm (0.0012 - 0.0017 in)

- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



Seal ring clearance

- Measure clearance between seal ring and ring groove.

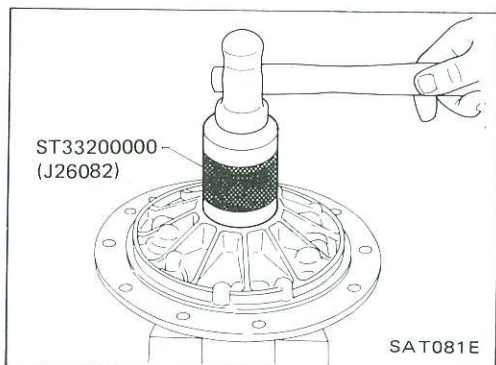
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

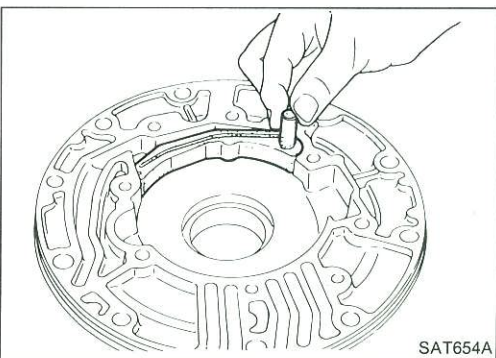
- If not within wear limit, replace oil pump cover assembly.



ASSEMBLY

1. Drive oil seal into oil pump housing.

- **Apply A.T.F. to outer periphery and lip surface.**



2. Install cam ring in oil pump housing by the following steps.

- a. Install side seal on control piston.

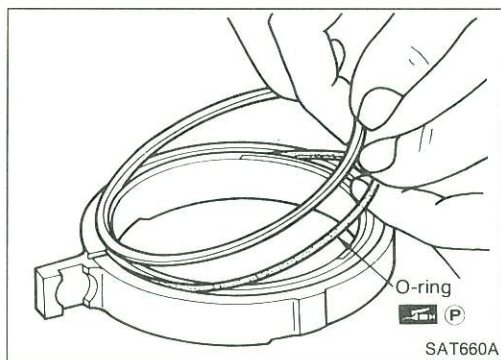
- **Pay attention to its direction — Black surface goes toward control piston.**

- **Apply petroleum jelly to side seal.**

- b. Install control piston on oil pump.

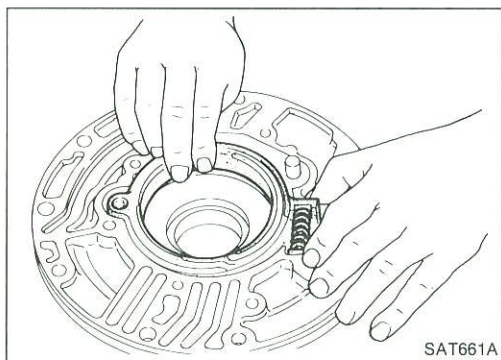
REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

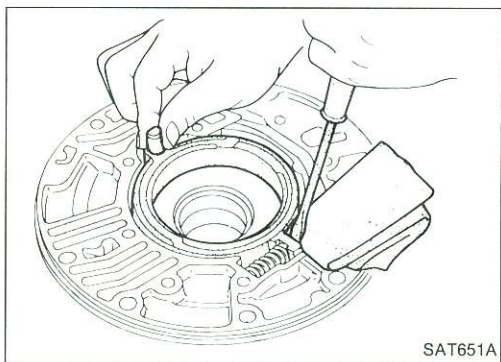


c. Install O-ring and friction ring on cam ring.

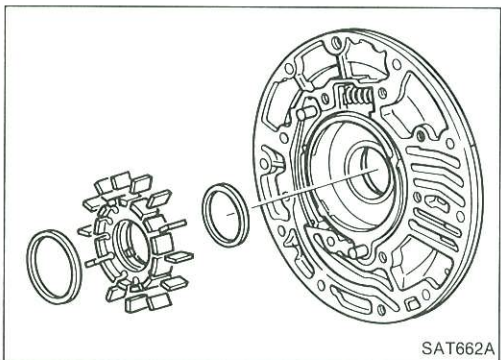
- **Apply petroleum jelly to O-ring.**



d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

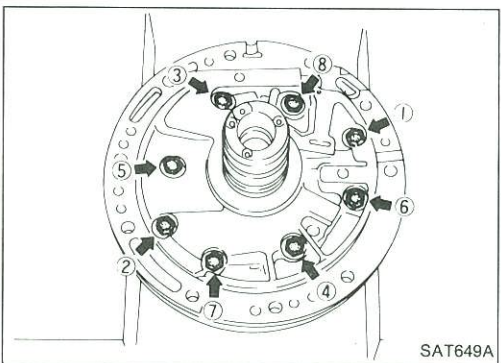


e. While pushing on cam ring install pivot pin.



3. Install rotor, vanes and vane rings.

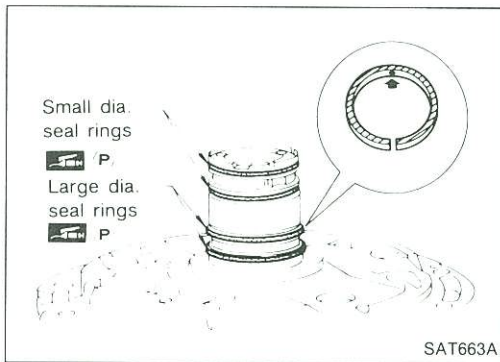
- **Pay attention to direction of rotor.**



4. Install oil pump housing and oil pump cover.

- Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
- Tighten bolts in a criss-cross pattern.

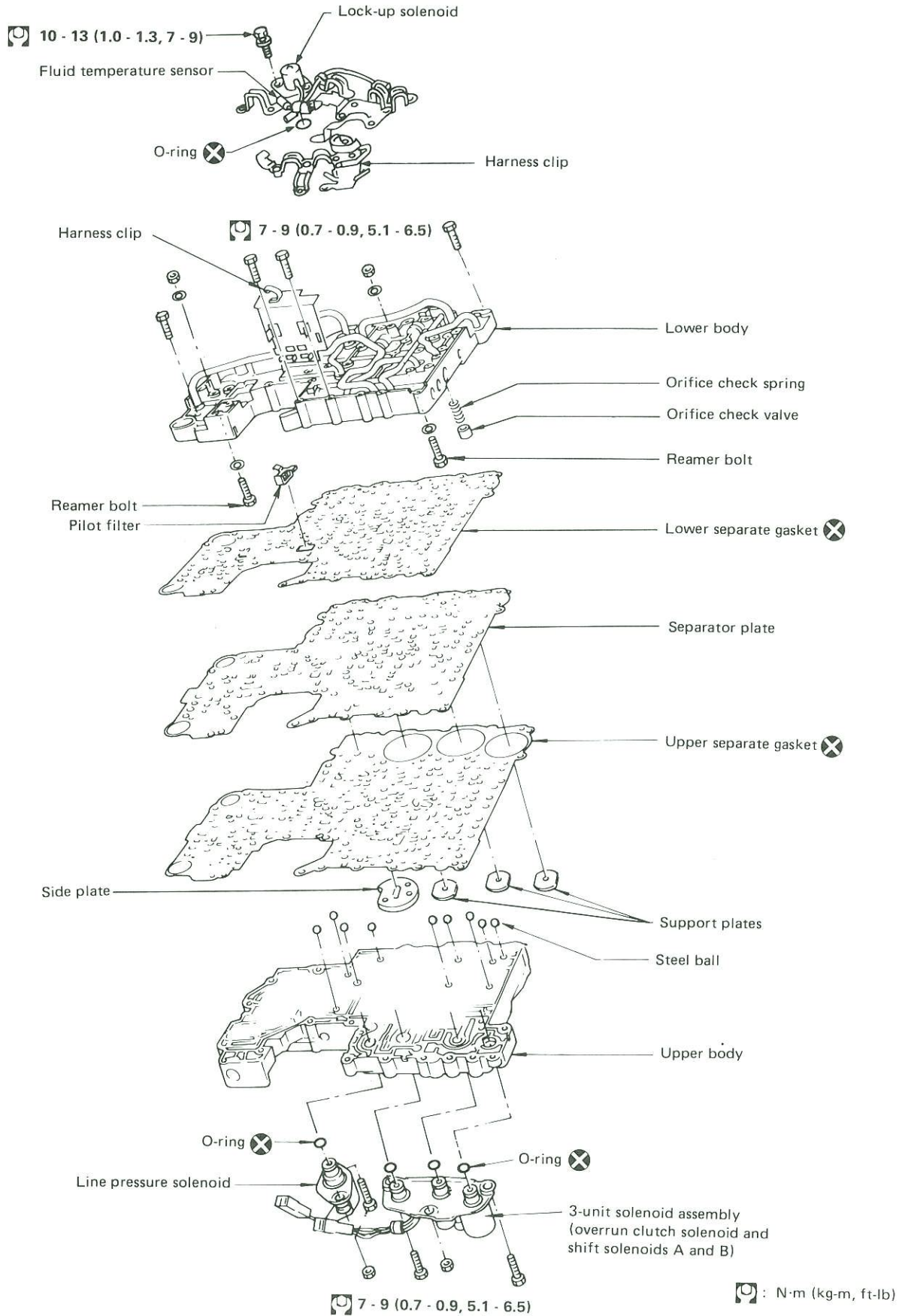
REPAIR FOR COMPONENT PARTS



Oil Pump (Cont'd)

5. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
- **Seal rings come in two different diameters. Check fit carefully in each groove.**
 - Small dia. seal ring:**
 - No mark
 - Large dia. seal ring:**
 - Yellow mark in area shown by arrow
- **Do not spread gap of seal ring excessively while installing. It may deform ring.**

Control Valve Assembly

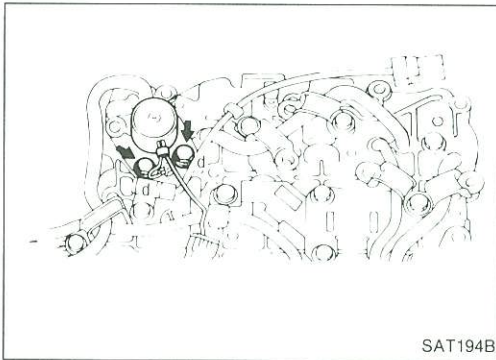


REPAIR FOR COMPONENT PARTS

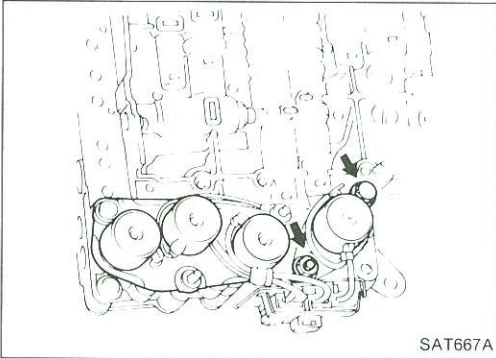
Control Valve Assembly (Cont'd)

DISASSEMBLY

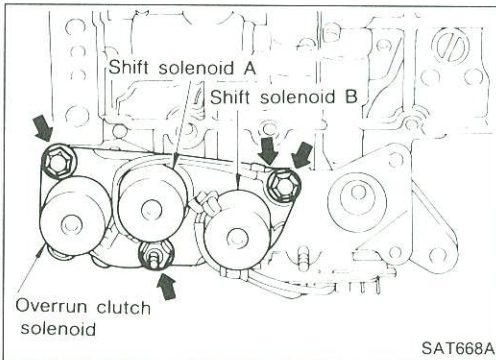
1. Remove solenoids.
 - a. Remove lock-up solenoid and side plate from lower body.
 - b. Remove O-ring from solenoid.



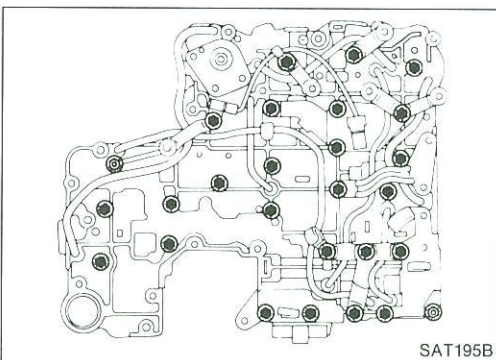
- c. Remove line pressure solenoid from upper body.
 - d. Remove O-ring from solenoid.



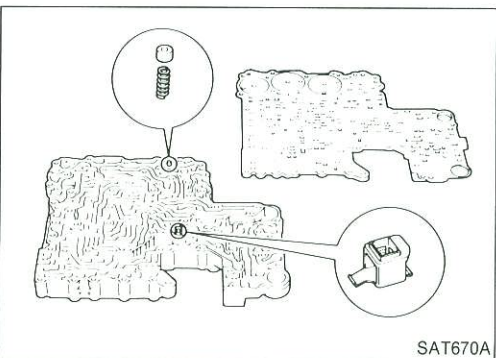
- e. Remove 3-unit solenoid assembly from upper body.
 - f. Remove O-rings from solenoids.



2. Disassemble upper and lower bodies.
 - a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
 - b. Remove lower body, separator plate and separate gasket as a unit from upper body.
- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**



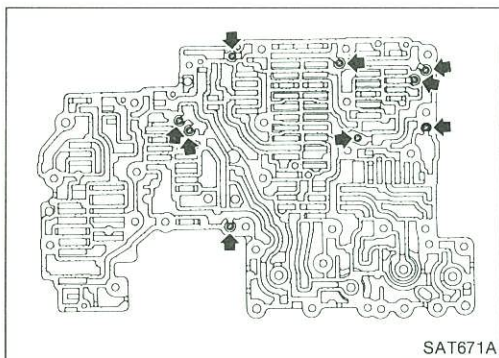
- c. Place lower body facedown, and remove separate gasket and separator plate.
 - d. Remove pilot filter, orifice check valve and orifice check spring.



REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

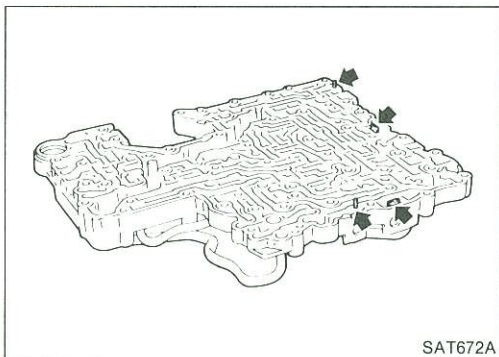
- e. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.



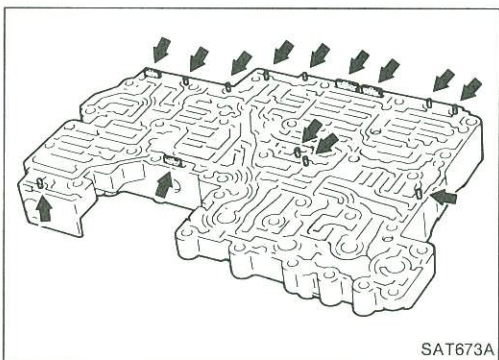
INSPECTION

Lower and upper bodies

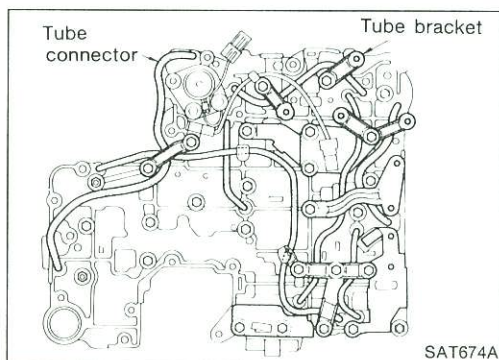
- Check to see that there are pins and retainer plates in lower body.



- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**

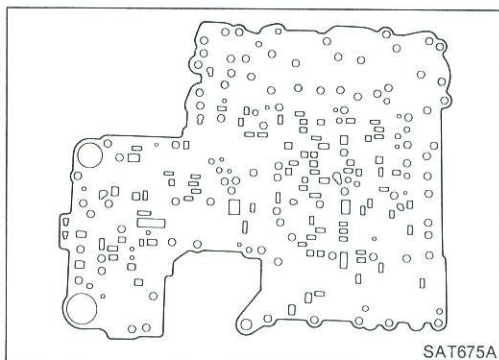


- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.



Separator plates

- Check to make sure that separator plate is free of damage and not deformed and oil holes are clean.

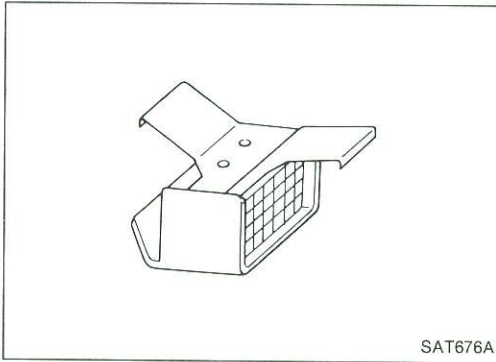


REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

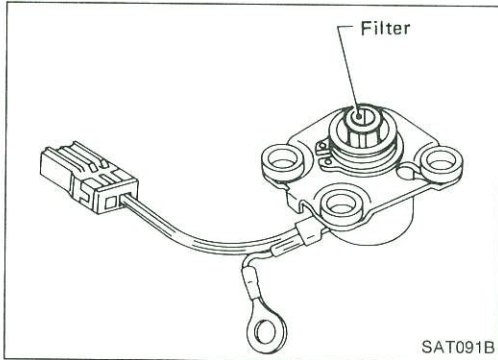
Pilot filter

- Check to make sure that filter is not clogged or damaged.



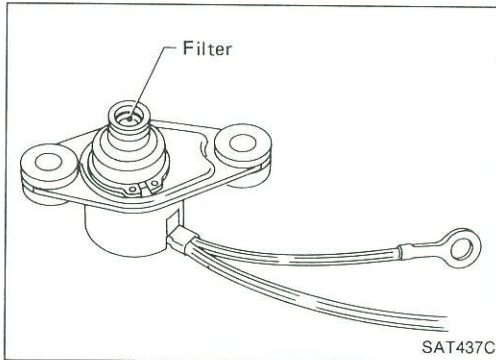
Lock-up solenoid

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".



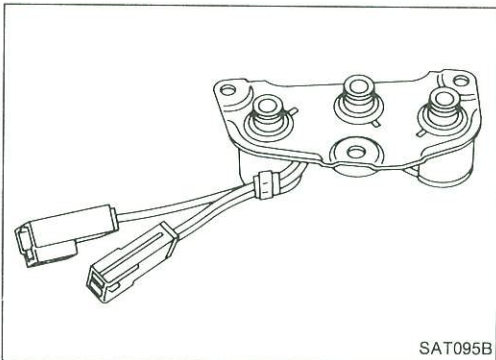
Line pressure solenoid

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection".



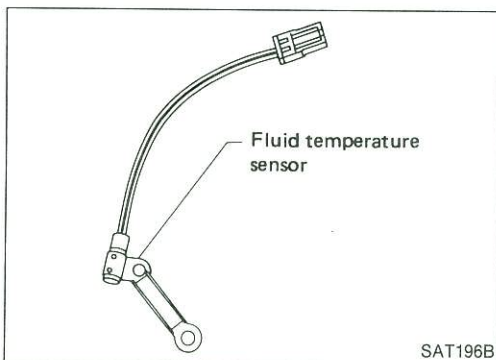
3-unit solenoid assembly (Overrun clutch solenoid and shift solenoids A and B)

- Measure resistance of each solenoid. — Refer to "Electrical Components Inspection".



Fluid temperature sensor

- Measure resistance. — Refer to "Electrical Components Inspection".

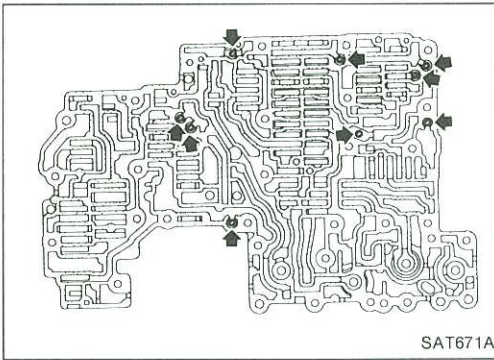


REPAIR FOR COMPONENT PARTS

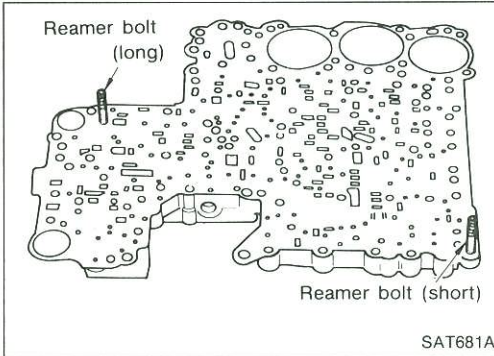
Control Valve Assembly (Cont'd)

ASSEMBLY

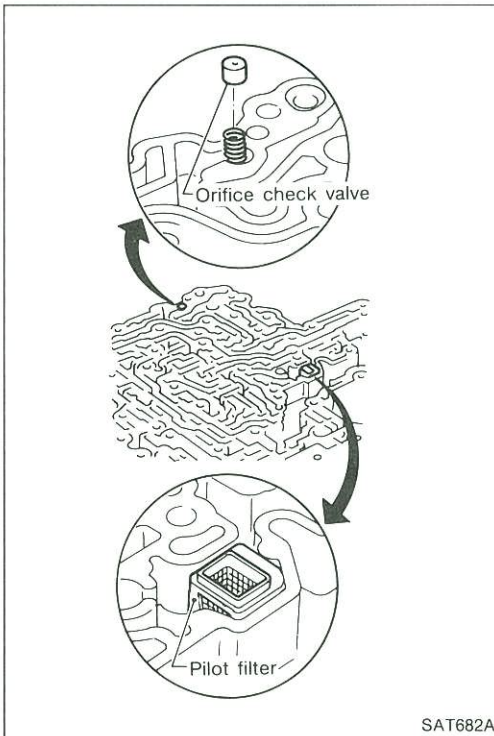
1. Install upper and lower bodies.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.
 - b. Install reamer bolts from bottom of upper body and install separate gaskets.
 - c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.
 - d. Install lower separate gaskets and separator plates on lower body.
 - e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.



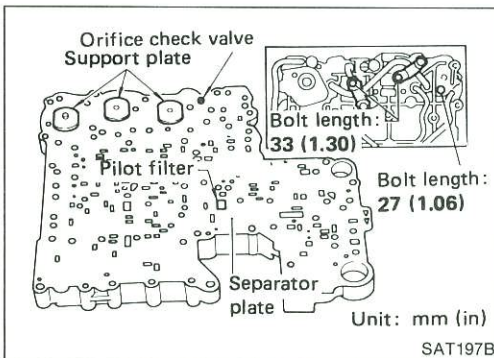
SAT671A



SAT681A



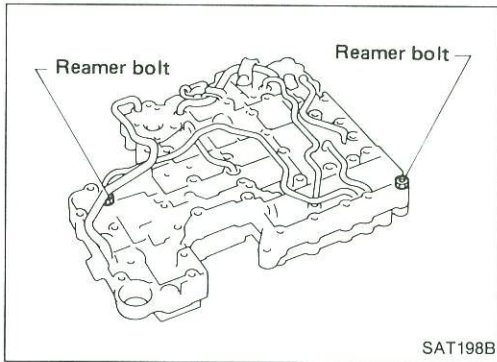
SAT682A



SAT197B

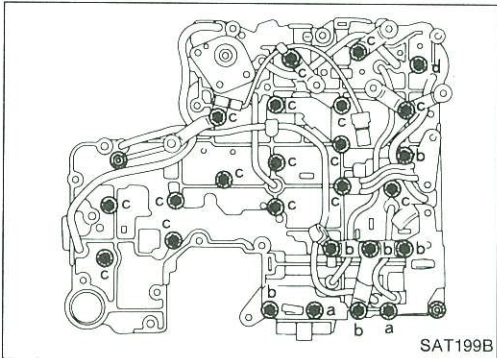
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

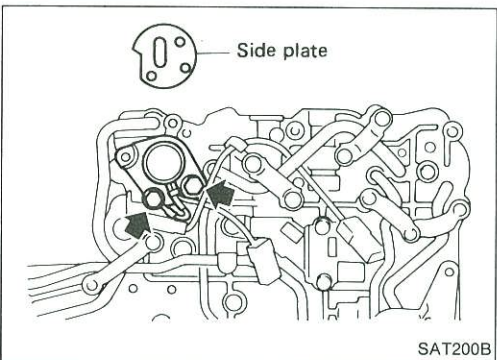
- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**



g. Install and temporarily tighten bolts and tube brackets in their proper locations.

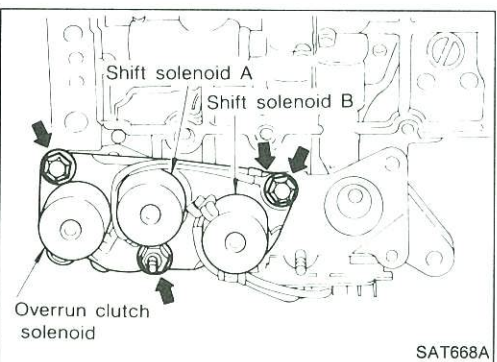
Bolt length and location:

Item	Bolt symbol	a	b	c	d
		70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)

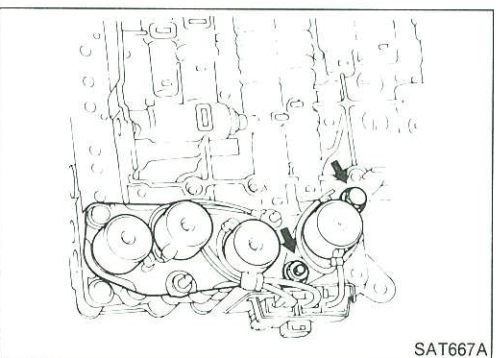


2. Install solenoids.

- Attach O-ring and install lock-up solenoid and side plates onto lower body.

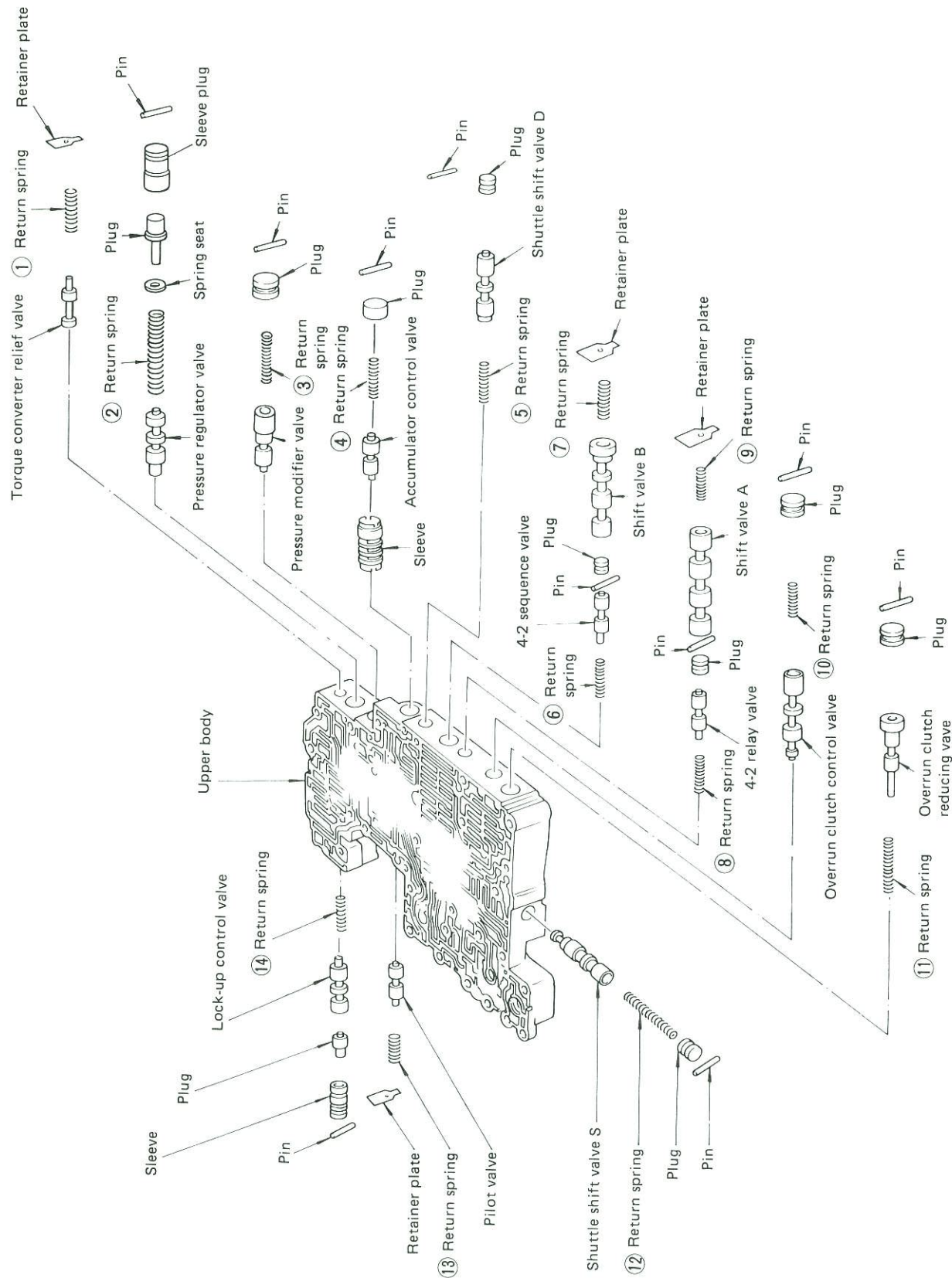


- Attach O-rings and install 3-unit solenoids assembly onto upper body.



- Attach O-ring and install line pressure solenoid onto upper body.
3. Tighten all bolts.

Control Valve Upper Body



Numbers preceding valve springs correspond with those shown in Spring Chart on page A.T-141.

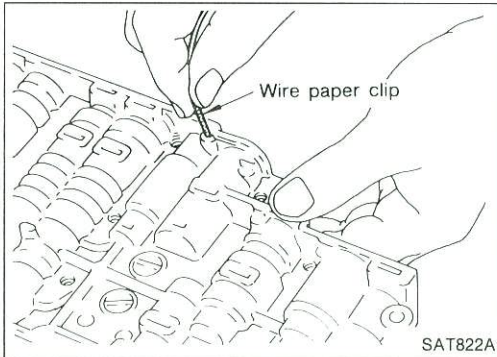
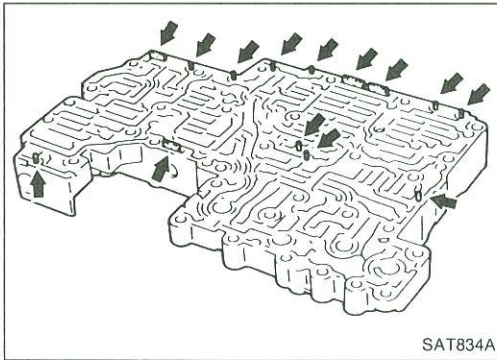
Apply A.T.F. to all components before their installation.

Control Valve Upper Body (Cont'd)

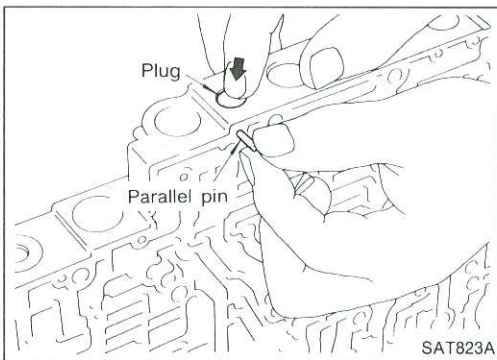
DISASSEMBLY

1. Remove valves at parallel pins.

- Do not use a magnetic hand.

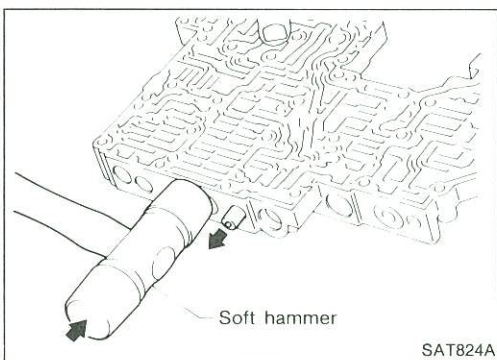


a. Use a wire paper clip to push out parallel pins.



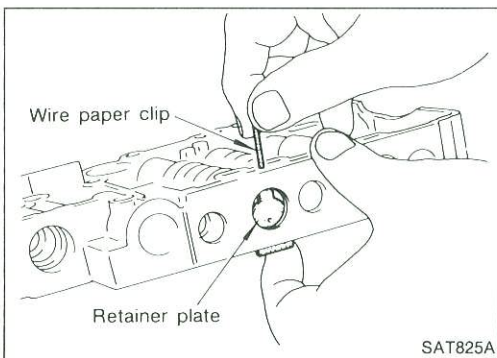
b. Remove parallel pins while pressing their corresponding plugs and sleeves.

- Remove plug slowly to prevent internal parts from jumping out.



c. Place mating surface of valve facedown, and remove internal parts.

- If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.
- Be careful not to drop or damage valves and sleeves.



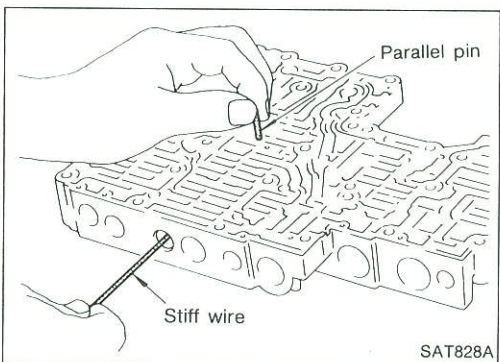
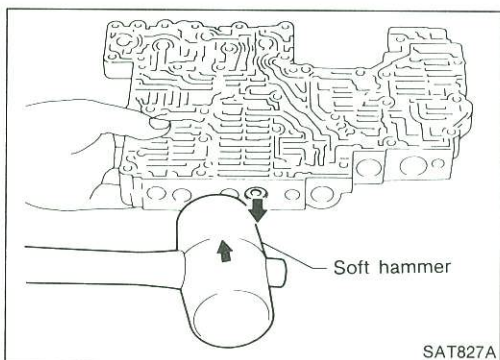
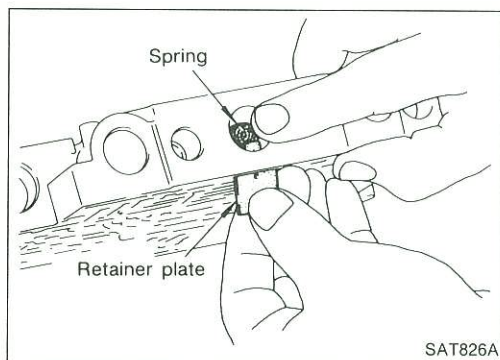
2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

b. Remove retainer plates while holding spring.



c. Place mating surface of valve facedown, and remove internal parts.

- If a valve is hard to remove, lightly tap valve body with a soft hammer.
- Be careful not to drop or damage valves, sleeves, etc.

● 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.

- Be careful not to scratch sliding surface of valve with wire.

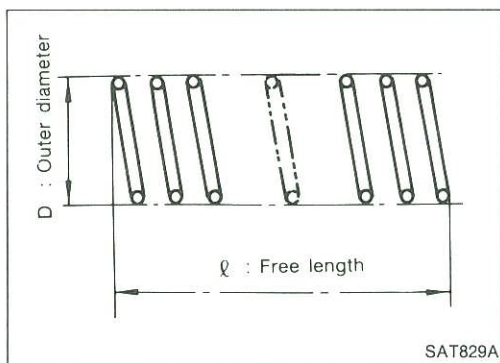
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

INSPECTION

Valve springs

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
- Numbers of each valve spring listed in table below are the same as those in the figure on page AT-138.



Inspection standard

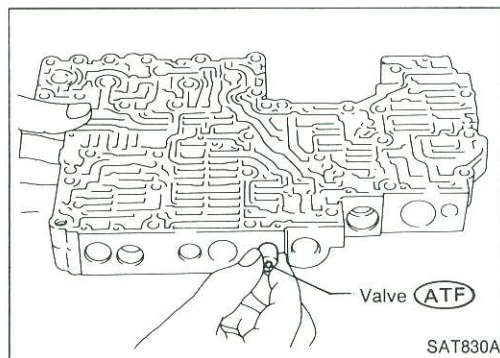
Unit: mm (in)

Parts	Item	Part No.	ℓ	D
①	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
②	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
③	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
④	Accumulator control valve spring	31742-41X60	17.0 (0.669)	10.5 (0.413)
⑤	Shuttle shift valve D spring	31762-41X00	26.5 (1.043)	6.0 (0.236)
⑥	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
⑦	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
⑧	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
⑨	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
⑩	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
⑪	Overrun clutch reducing valve spring	31742-41x20	32.5 (1.280)	7.0 (0.276)
⑫	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
⑬	Pilot valve spring	31742-41X13	25.7 (1.012)	9.1 (0.358)
⑭	Lock-up control valve spring	31742-41X22	18.5 (0.728)	13.0 (0.512)

- Replace valve springs if deformed or fatigued.

Control valves

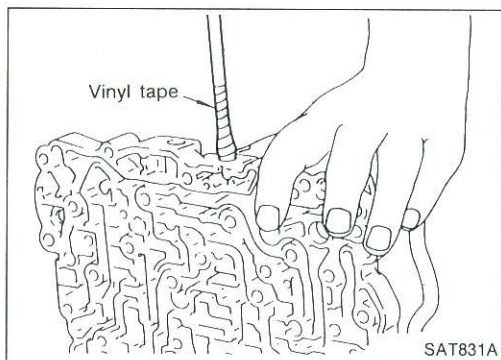
- Check sliding surfaces of valves, sleeves and plugs.



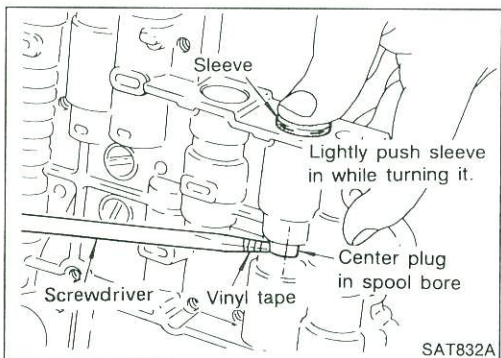
ASSEMBLY

1. Lubricate the control valve body and all valves with A.T.F. Install control valves by sliding them carefully into their bores.
- Be careful not to scratch or damage valve body.

Control Valve Upper Body (Cont'd)

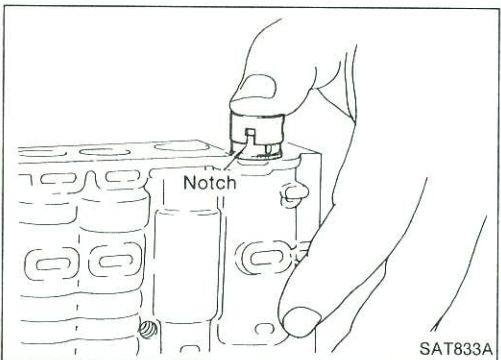


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



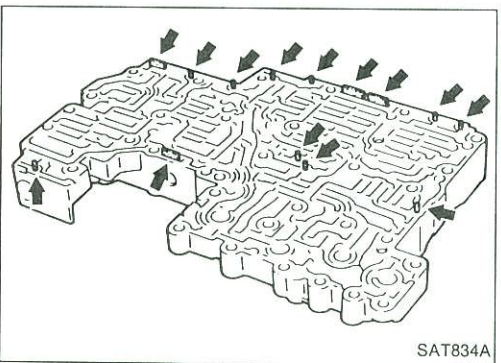
Pressure regulator valve

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body. If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

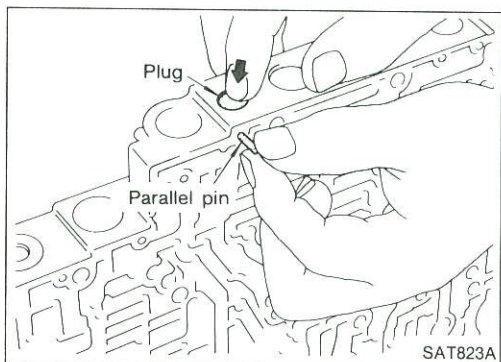


Accumulator control plug

- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.



2. Install parallel pins and retainer plates.



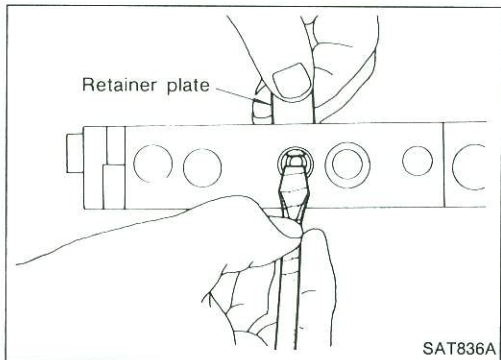
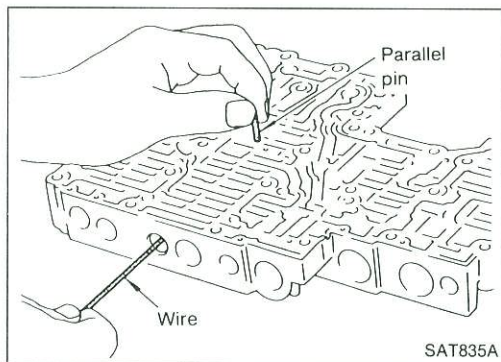
- While pushing plug, install parallel pin.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

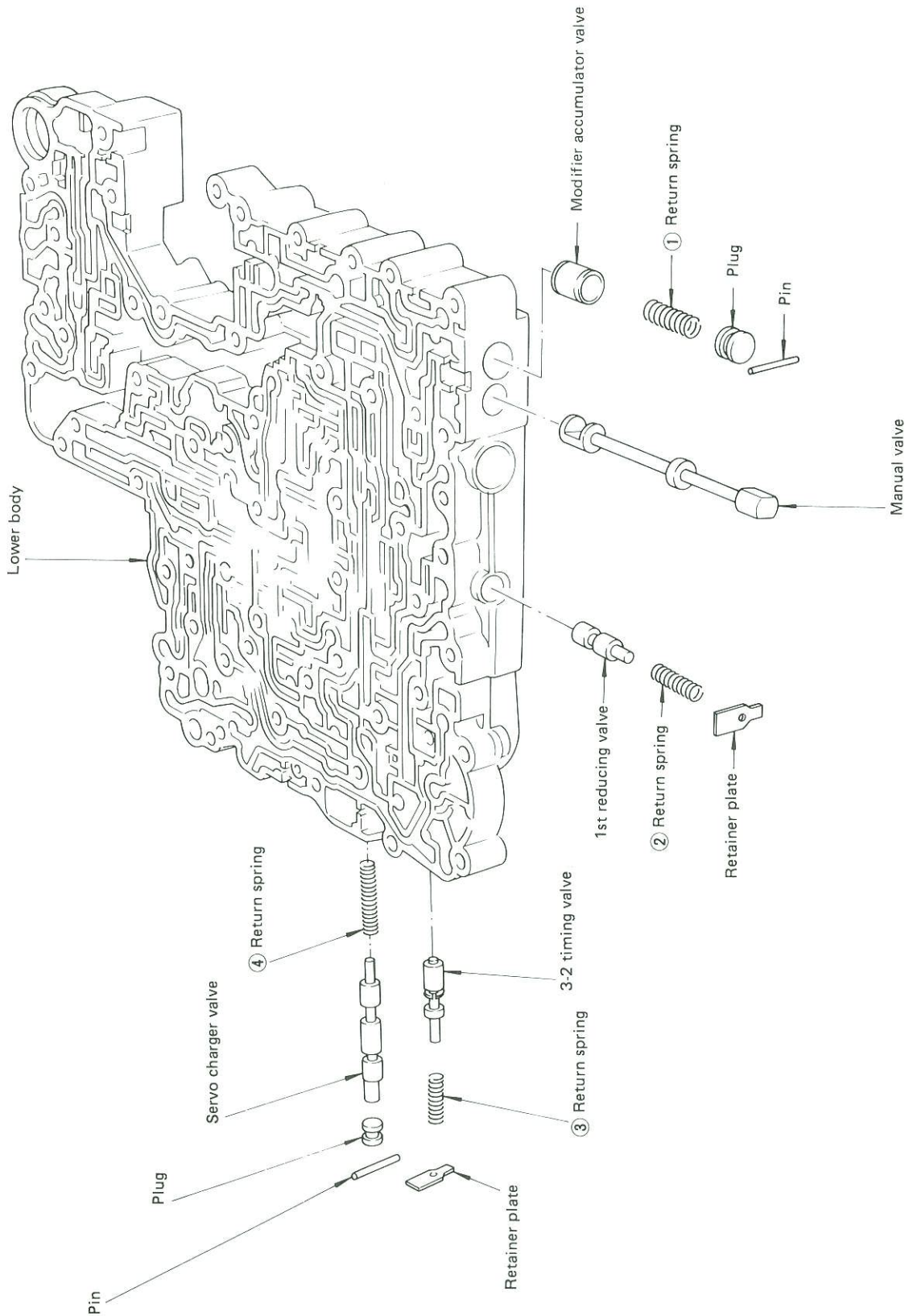
4-2 sequence valve and relay valve

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.



- Insert retainer plate while pushing spring.

Control Valve Lower Body



Numbers preceding valve springs correspond with those shown in Spring Chart on page A.T-145.

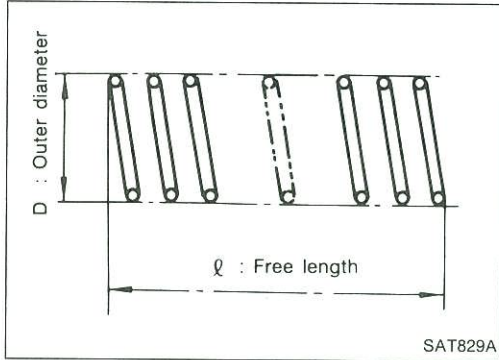
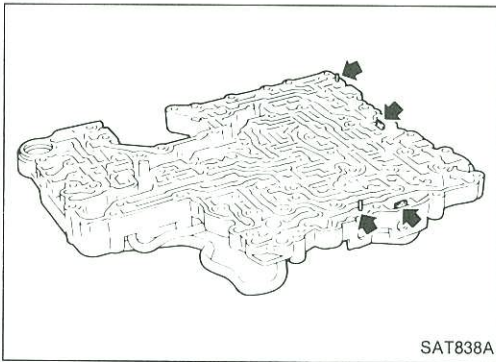
Apply A.T.F. to all components before their installation.

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)

DISASSEMBLY

1. Remove valves at parallel pins.
 2. Remove valves at retainer plates.
- For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers of each valve spring listed in table below are the same as those in the figure on page AT-144.

Inspection standard:

Unit: mm (in)

Parts	Item	Part No.	l	D
①	Modifier accumulator valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
②	1st reducing valve spring	31756-41X05	25.4 (1.000)	6.75 (0.2657)
③	3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
④	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)

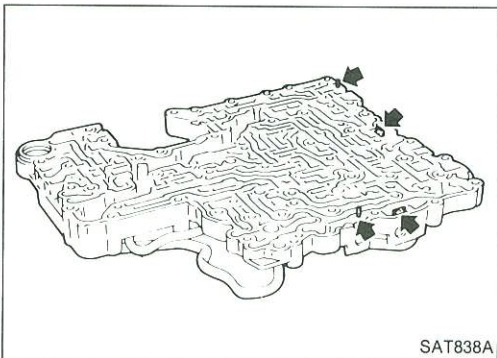
- Replace valve springs if deformed or fatigued.

Control valves

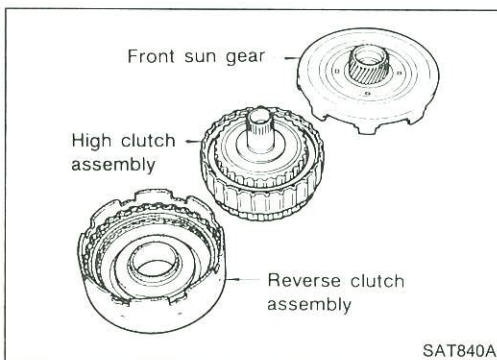
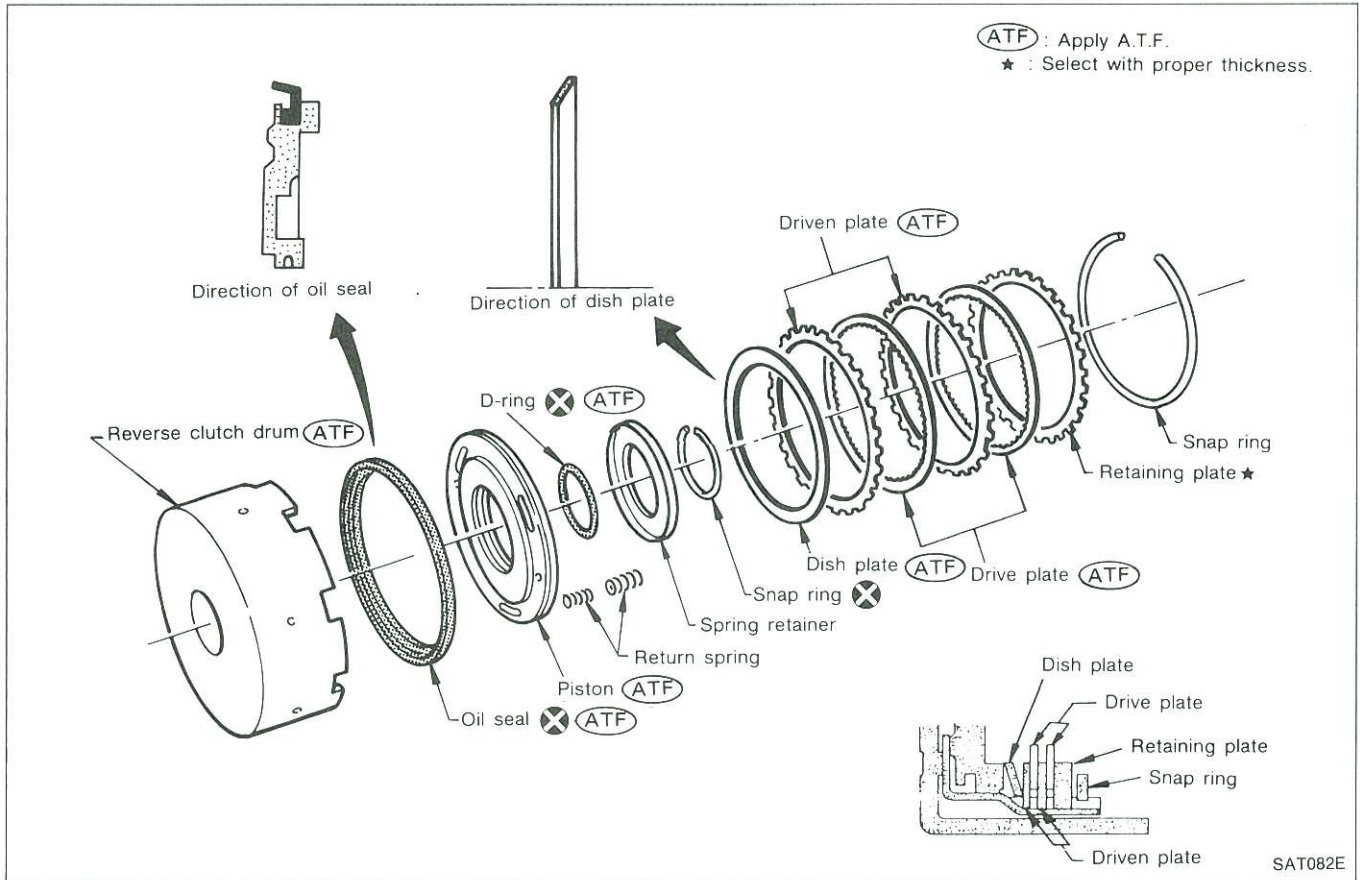
- Check sliding surfaces of control valves, sleeves and plugs for damage.

ASSEMBLY

- Install control valves.
For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body.

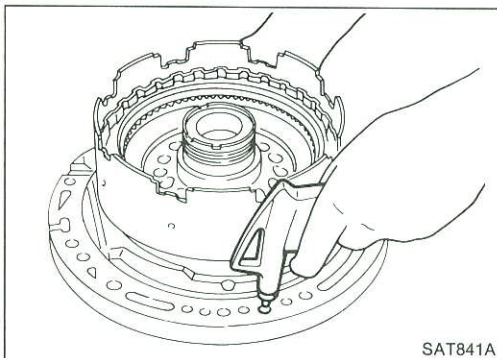


Reverse Clutch



DISASSEMBLY

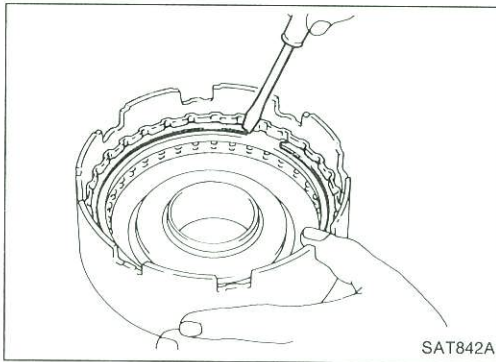
1. Remove reverse clutch assembly from clutch pack.



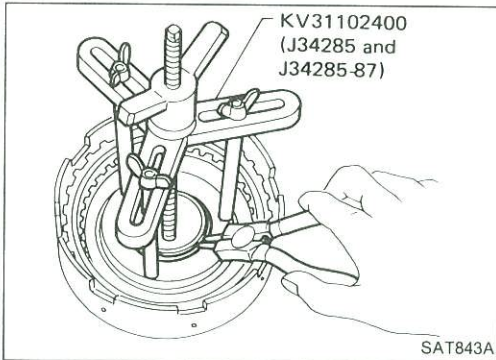
2. Check operation of reverse clutch.
 - a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



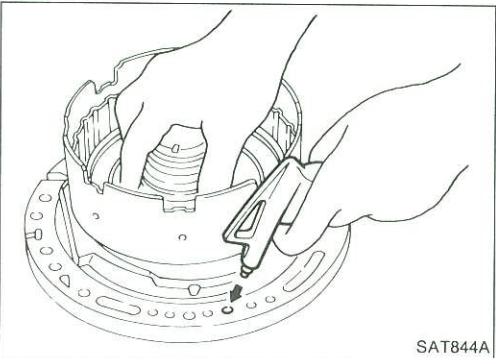
3. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.



4. Remove snap ring from clutch drum while compressing clutch springs.

- **Do not expand snap ring excessively.**

5. Remove spring retainer and return spring.



6. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.

- **Do not apply compressed air abruptly.**

7. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.

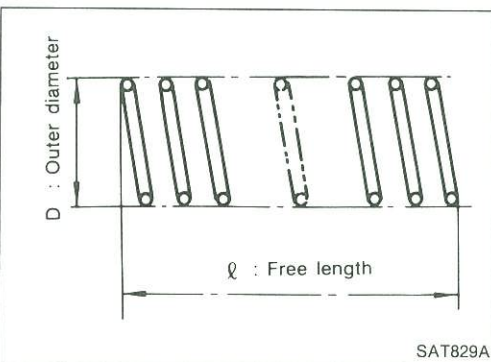
Reverse clutch return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-41X02	19.69 (0.7752)	11.6 (0.457)



Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

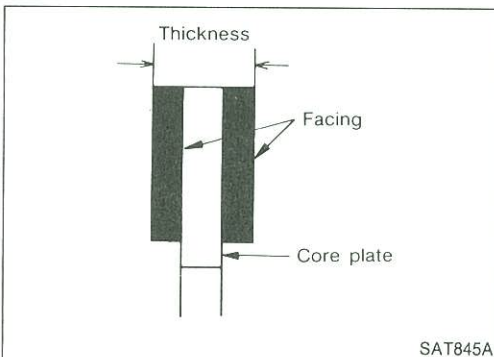
Standard value: 2.0 mm (0.079 in)

Wear limit: 1.8 mm (0.071 in)

- If not within wear limit, replace.

Reverse clutch dish plate

- Check for deformation or damage.

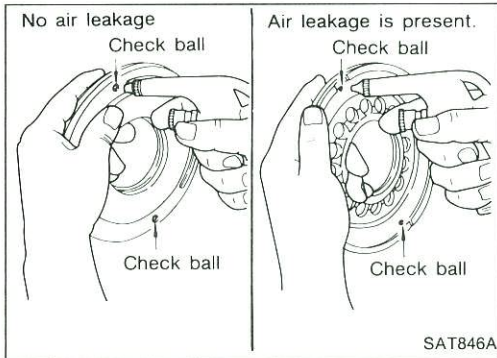


REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

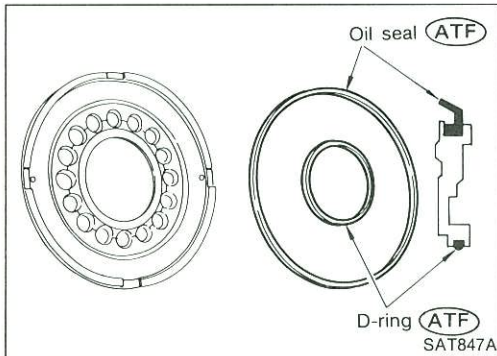
Reverse clutch piston

- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring to assure that there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

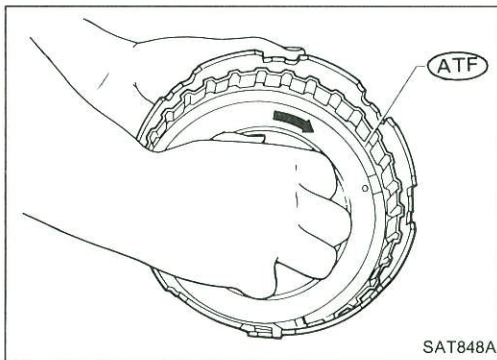


ASSEMBLY

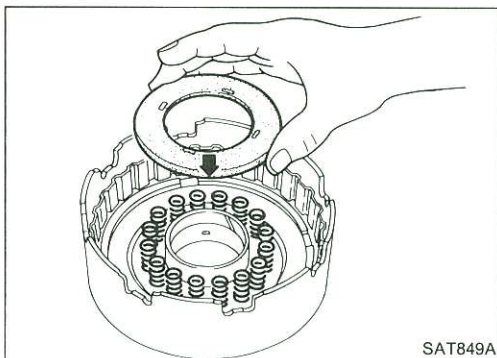
1. Install D-ring and oil seal on piston.
- **Apply A.T.F. to both parts.**



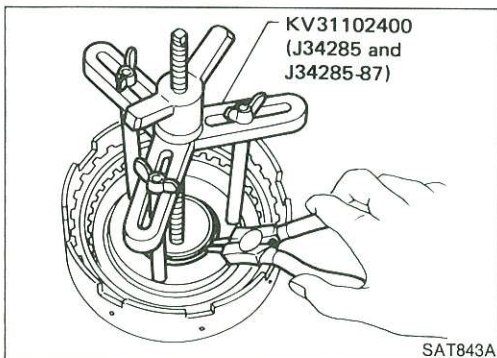
2. Install piston assembly by turning it slowly and evenly.
- **Apply A.T.F. to inner surface of drum.**



3. Install return springs and spring retainer.



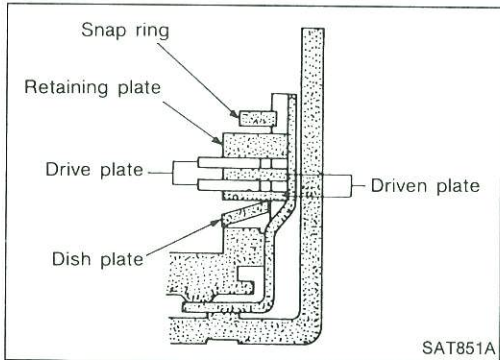
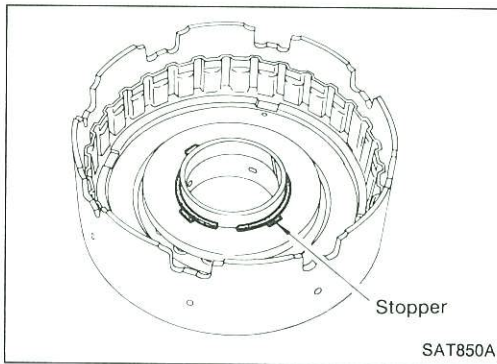
4. Install snap ring while compressing clutch springs.



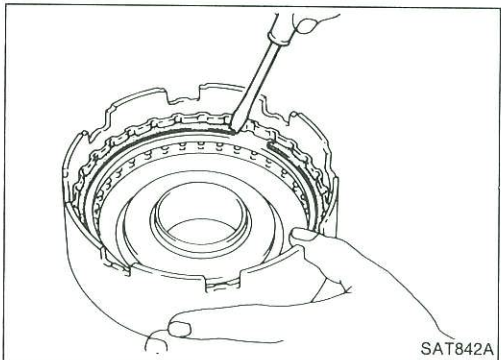
REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

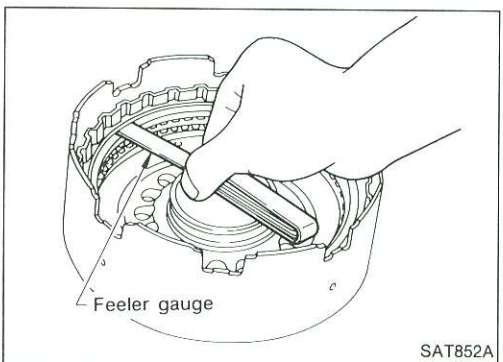
- Do not align snap ring gap with spring retainer stopper.



5. Install drive plates, driven plates, retaining plate and dish plate.



6. Install snap ring.



7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

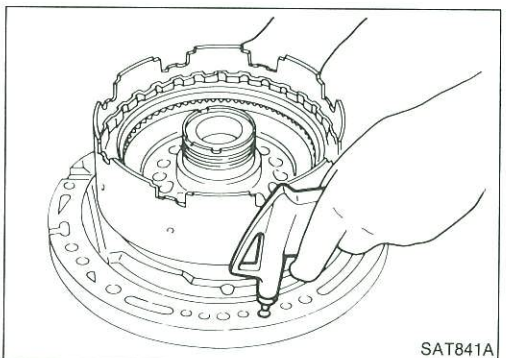
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

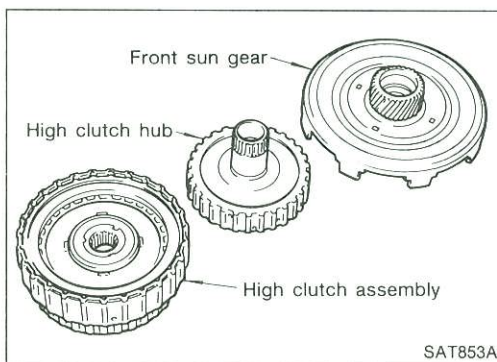
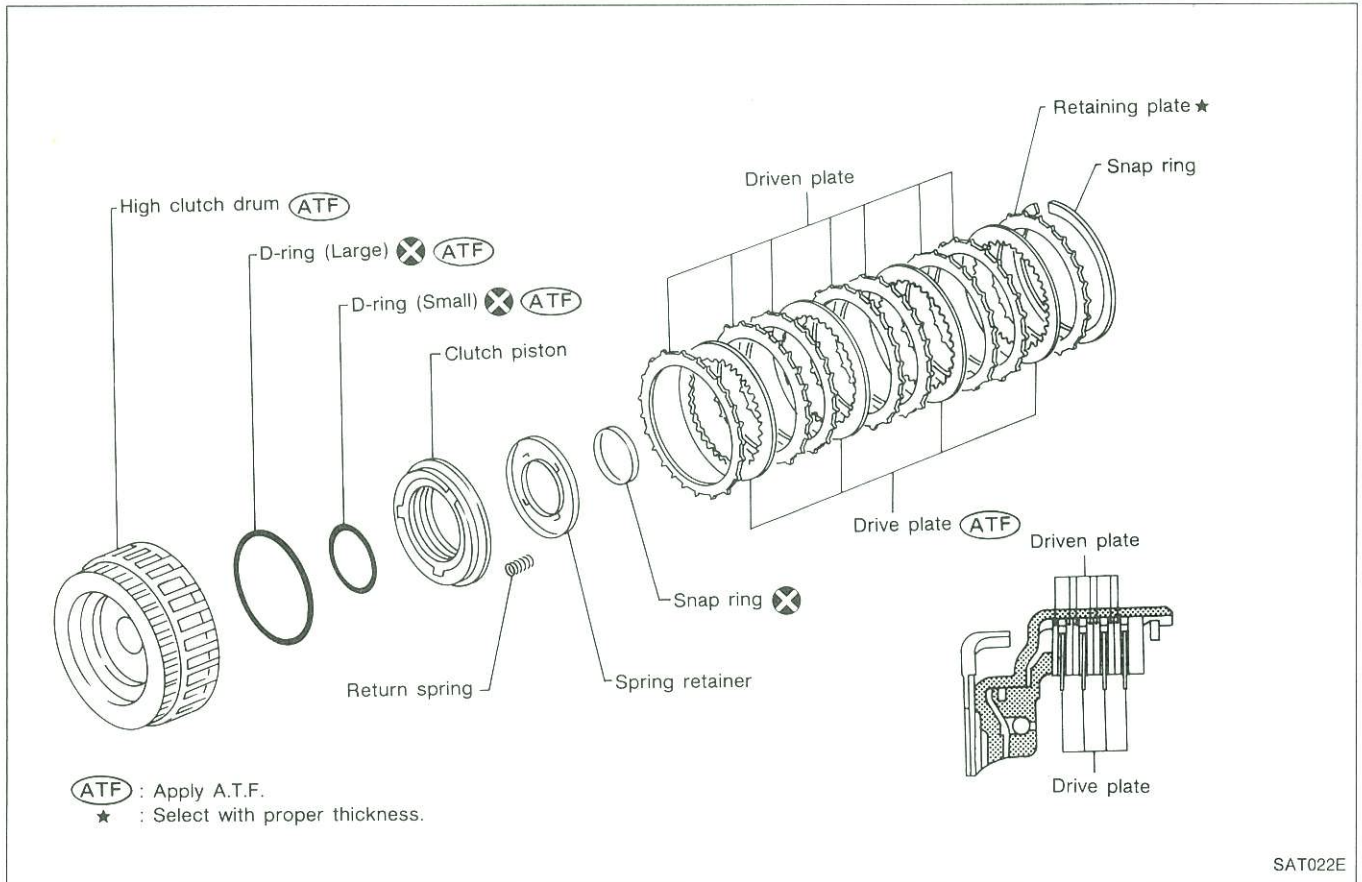
Retaining plate:

Refer to S.D.S.



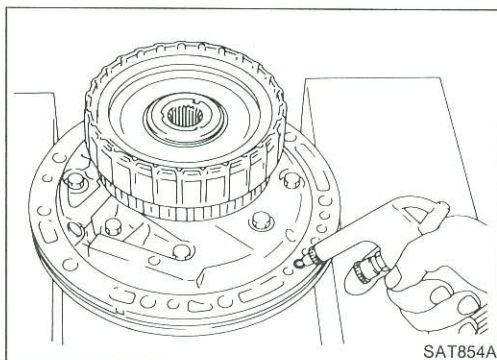
8. Check operation of reverse clutch. Refer to "DISASSEMBLY" of Reverse Clutch.

High Clutch



Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

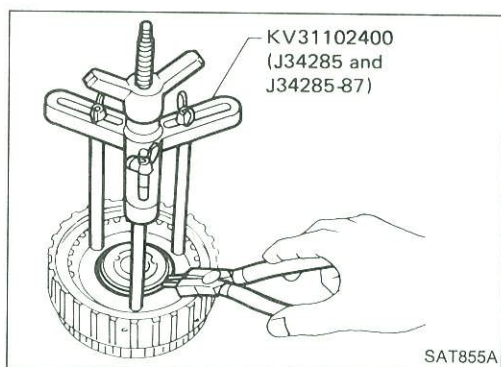
- Check of high clutch operation



REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)

- Removal and installation of return spring

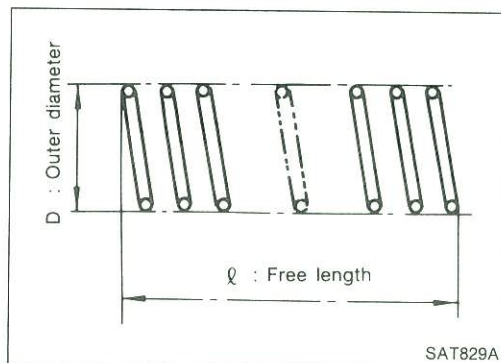


- Inspection of high clutch return springs

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)



- Inspection of high clutch drive plate

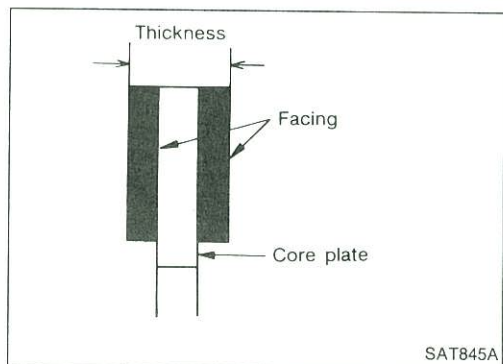
Thickness of drive plate:

Standard

1.6 mm (0.063 in)

Wear limit

1.4 mm (0.055 in)



- Measurement of clearance between retaining plate and snap ring

Specified clearance:

Standard

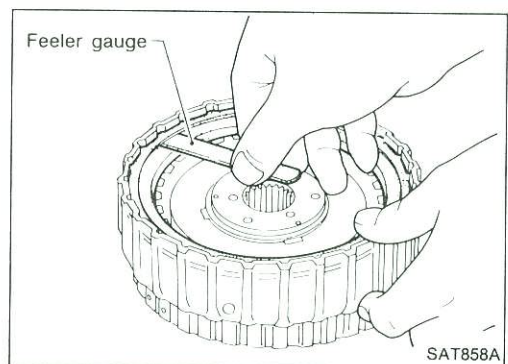
1.8 - 2.2 mm (0.071 - 0.087 in)

Allowable limit

3.0 mm (0.118 in)

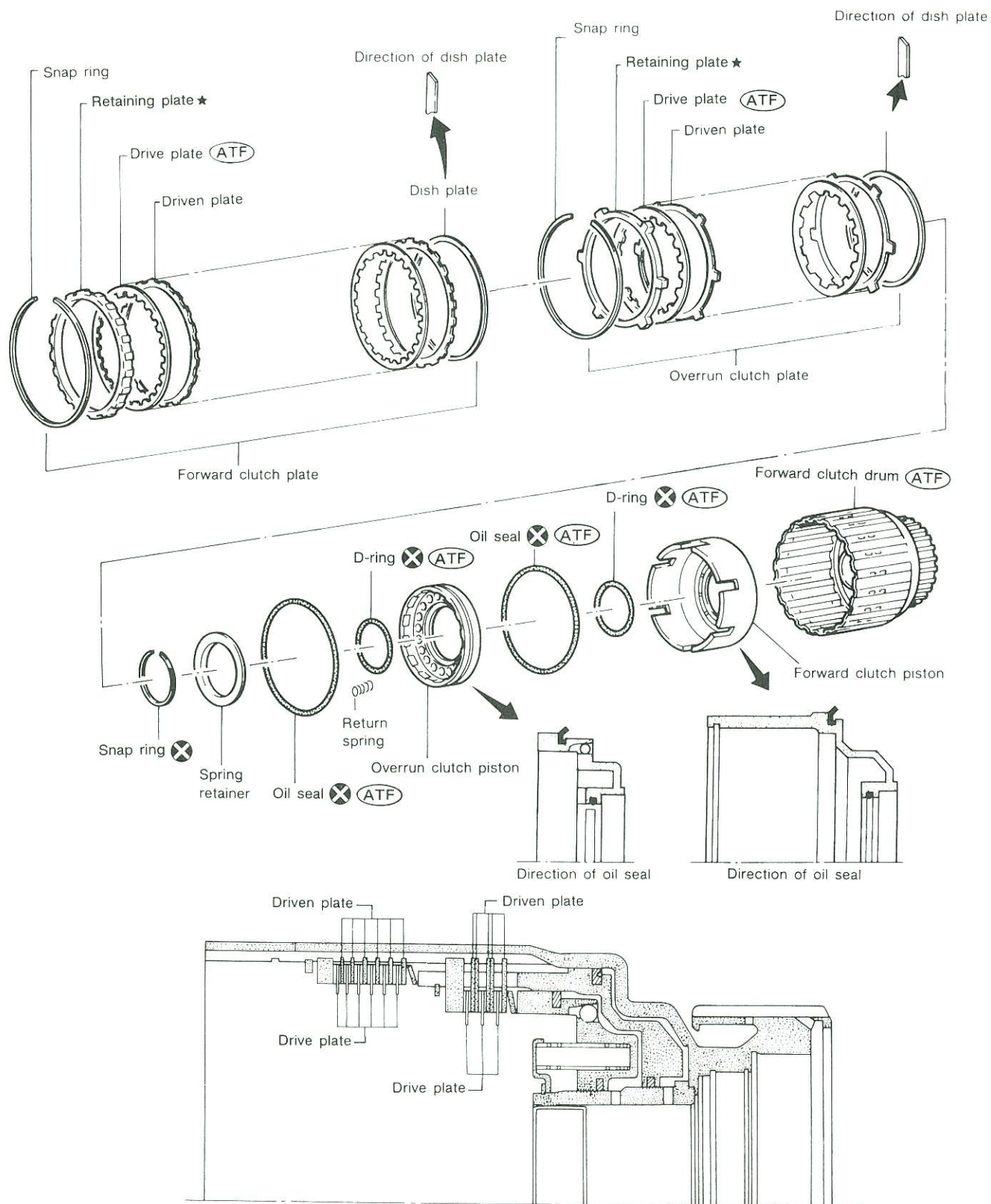
Retaining plate:

Refer to S.D.S.



Forward and Overrun Clutches

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.



(ATF) : Apply A.T.F.

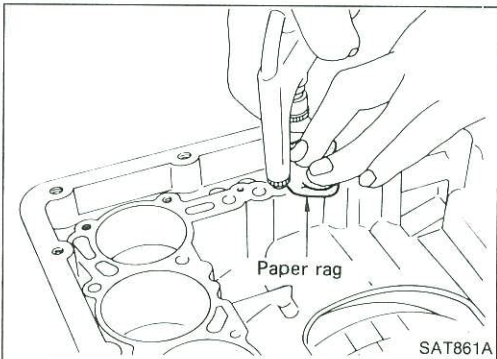
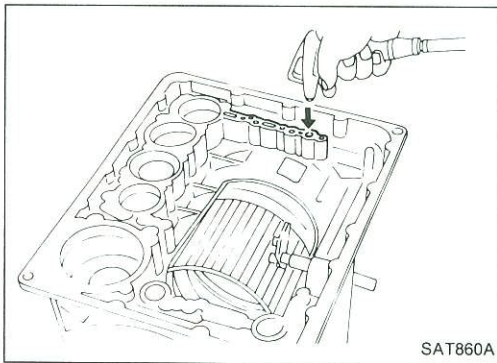
★ : Select with proper thickness.

REPAIR FOR COMPONENT PARTS

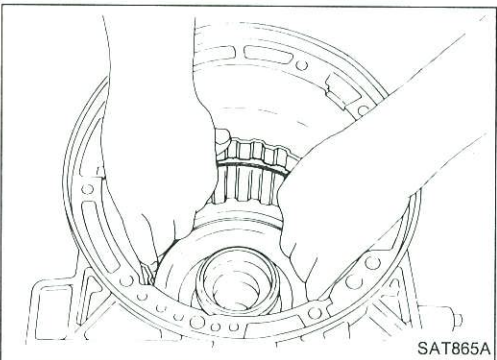
Forward and Overrun Clutches (Cont'd)

Service procedures for forward and overrun clutches are essentially the same as those for reverse clutch, with the following exception:

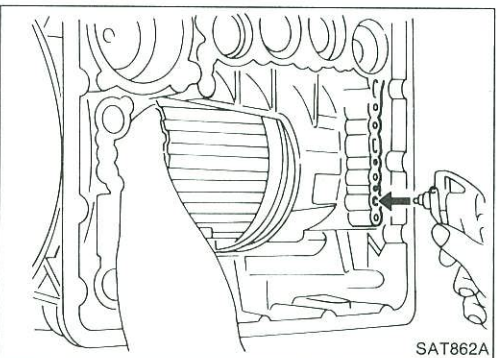
- Check of forward clutch operation.



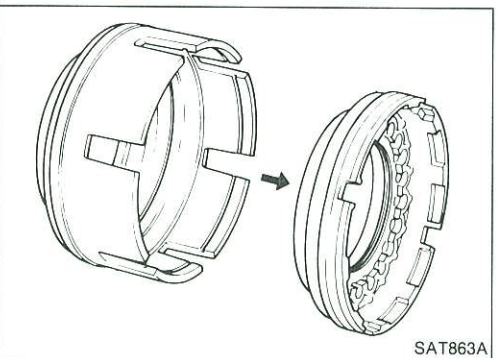
- Check of overrun clutch operation.



- Removal of forward clutch drum
Remove forward clutch drum from transmission case by holding snap ring.



- Removal of forward clutch and overrun clutch pistons
1. While holding overrun clutch piston, gradually apply compressed air to oil hole.

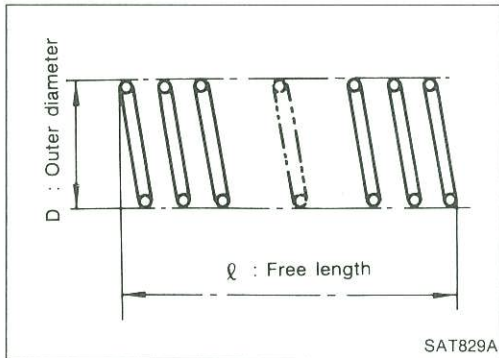
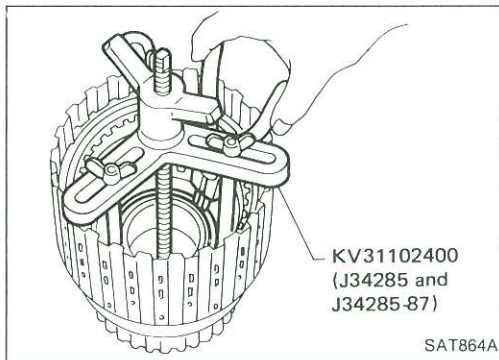


2. Remove overrun clutch from forward clutch.

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

- Removal and installation of return springs

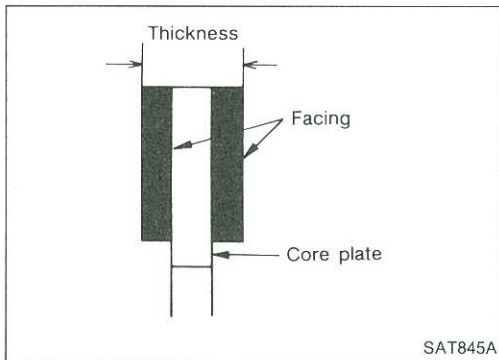


- Inspection of forward clutch and overrun clutch return springs

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31505-41X01	35.77 (1.4083)	9.7 (0.382)



- Inspection of forward clutch drive plates

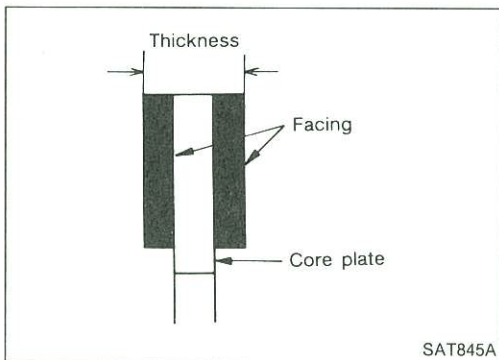
Thickness of drive plate:

Standard

1.6 mm (0.063 in)

Wear limit

1.4 mm (0.055 in)



- Inspection of overrun clutch drive plates

Thickness of drive plate:

Standard

2.0 mm (0.079 in)

Wear limit

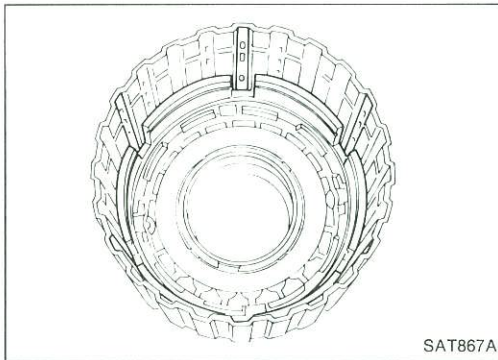
1.8 mm (0.071 in)



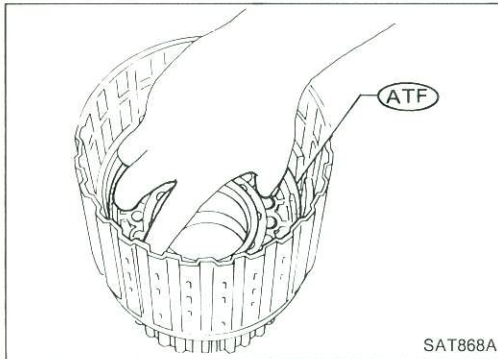
- Installation of forward clutch piston and overrun clutch piston
1. Install forward clutch piston by turning it slowly and evenly.
- Apply A.T.F. to inner surface of clutch drum.

REPAIR FOR COMPONENT PARTS

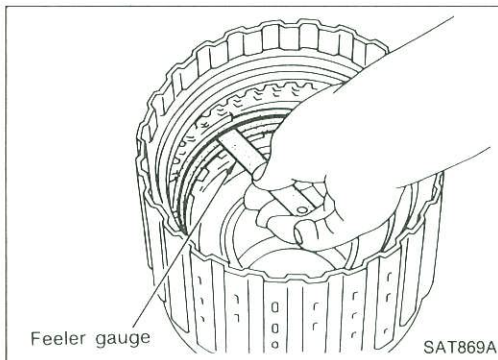
Forward and Overrun Clutches (Cont'd)



- Align notch in forward clutch piston with groove in forward clutch drum.



2. Install overrun clutch by turning it slowly and evenly.
- Apply A.T.F. to inner surface of forward clutch piston.



- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:

Standard

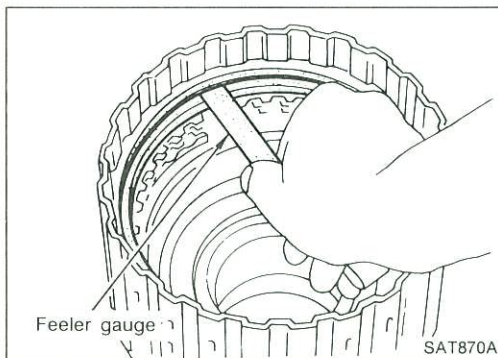
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.0 mm (0.079 in)

Retaining plate:

Refer to S.D.S.



- Measurement of clearance between retaining plate and snap ring of forward clutch

Specified clearance:

Standard

0.45 - 0.85 mm (0.0177 - 0.0335 in)

Allowable limit

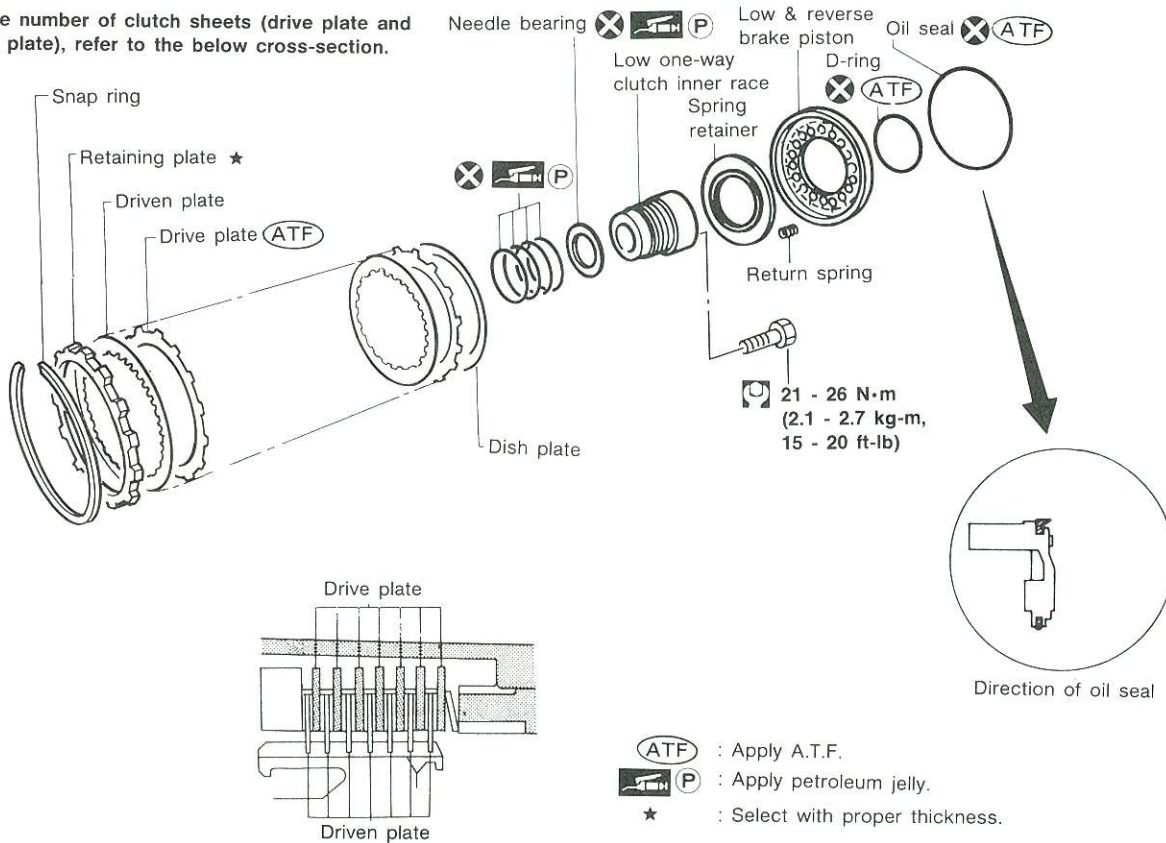
2.05 mm (0.0807 in)

Retaining plate:

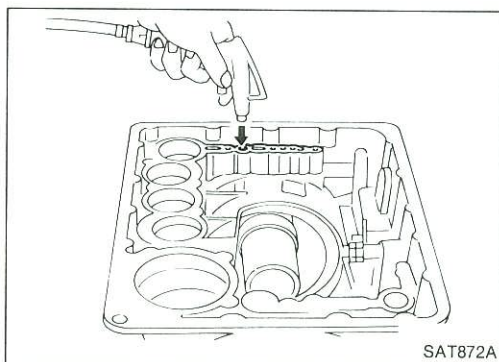
Refer to S.D.S.

Low & Reverse Brake

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.

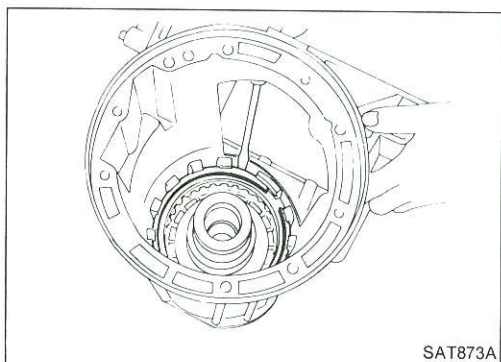


SAT085E



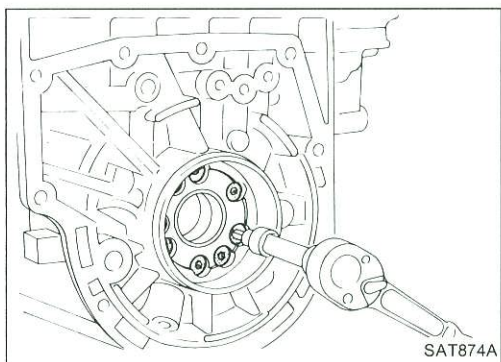
DISASSEMBLY

- Check operation of low and reverse brake.
 - Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
 - Check to see that retaining plate moves to snap ring.
 - 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.
- Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.

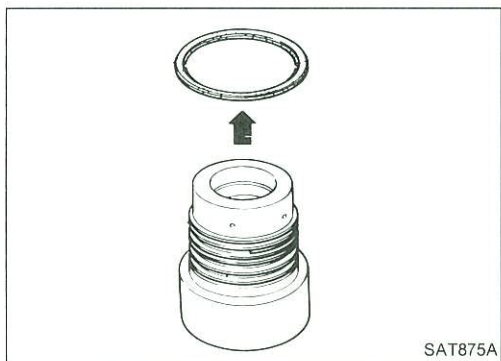


REPAIR FOR COMPONENT PARTS

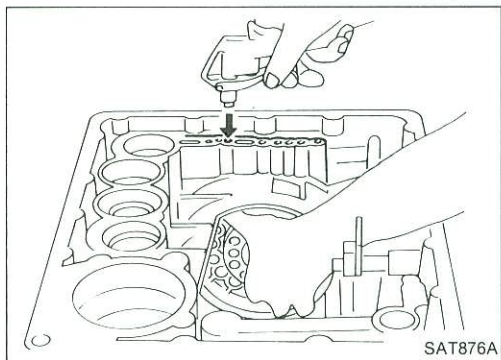
Low & Reverse Brake (Cont'd)



3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.



4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.



6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION

Low and reverse brake snap ring and spring retainer

- Check for deformation or damage.

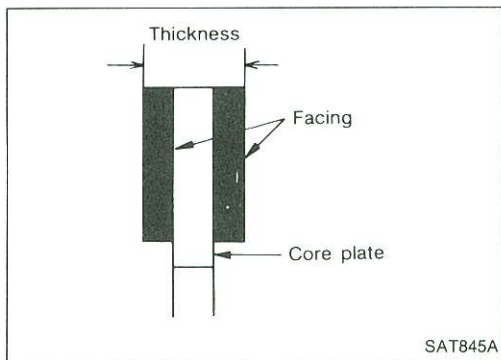
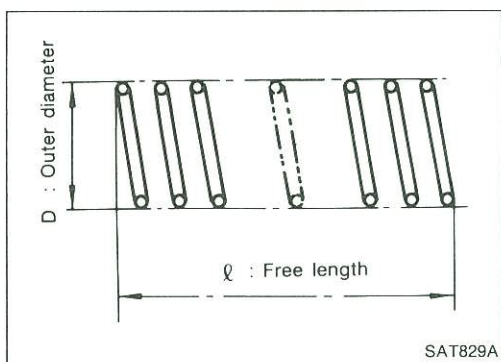
Low and reverse brake return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard:

Unit: mm (in)

Part No.	ℓ	D
31521-21X00	23.7 (0.933)	11.6 (0.457)



Low and reverse brake drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value

2.0 mm (0.079 in)

Wear limit

1.8 mm (0.071 in)

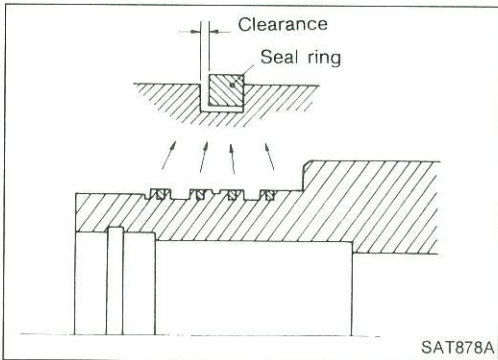
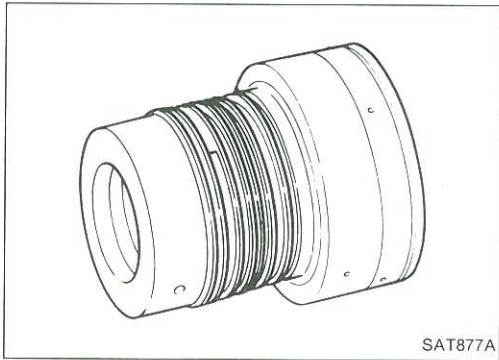
- If not within wear limit, replace.

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low one-way clutch inner race

- Check frictional surface of inner race for wear or damage.



- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

Inspection standard:

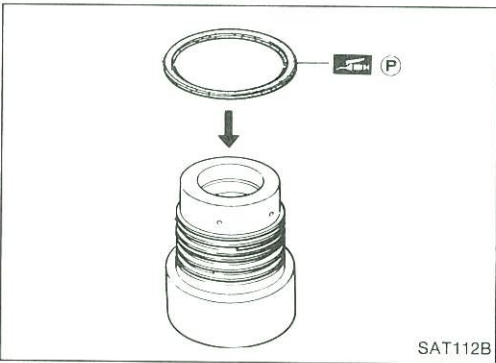
Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit: 0.25 mm (0.0098 in)

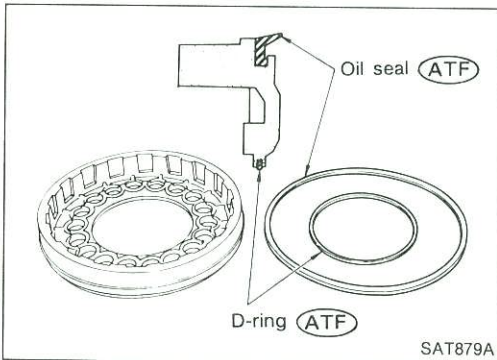
- If not within allowable limit, replace low one-way clutch inner race.

ASSEMBLY

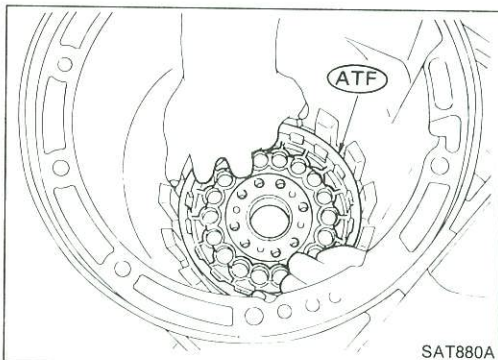
1. Install bearing onto one-way clutch inner race.
 - **Pay attention to its direction — Black surface goes to rear side.**
 - **Apply petroleum jelly to needle bearing.**



2. Install oil seal and D-ring onto piston.
 - **Apply A.T.F. to oil seal and D-ring.**

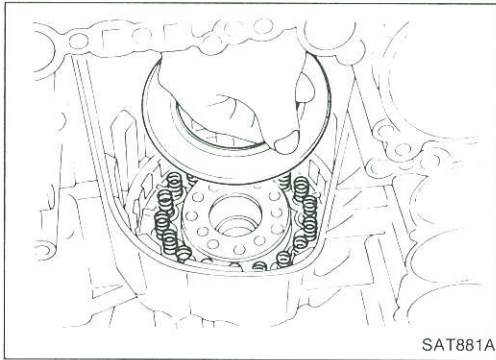


3. Install piston by rotating it slowly and evenly.
 - **Apply A.T.F. to inner surface of transmission case.**

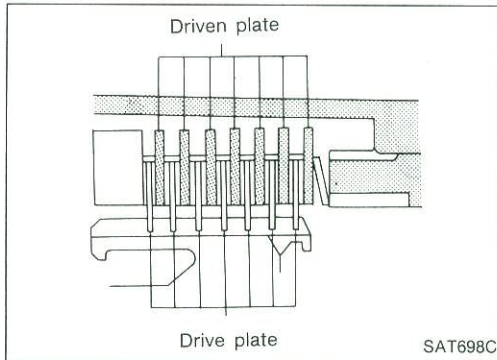


REPAIR FOR COMPONENT PARTS

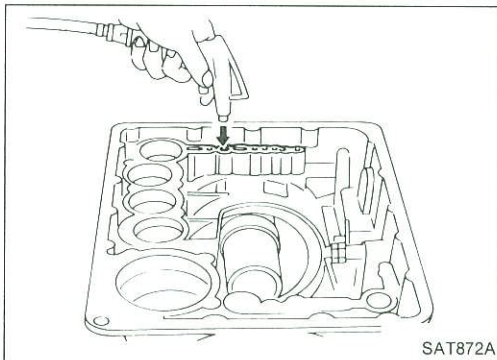
Low & Reverse Brake (Cont'd)



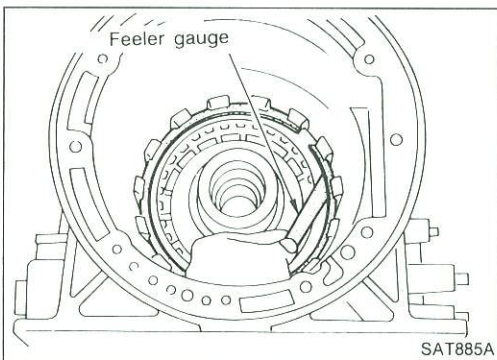
4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.



5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.



7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY".



8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

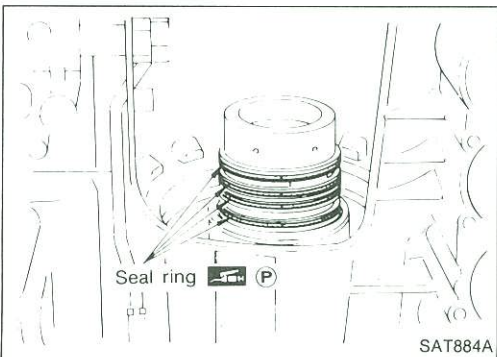
0.7 - 1.1 mm (0.028 - 0.043 in)

Allowable limit

2.5 mm (0.098 in)

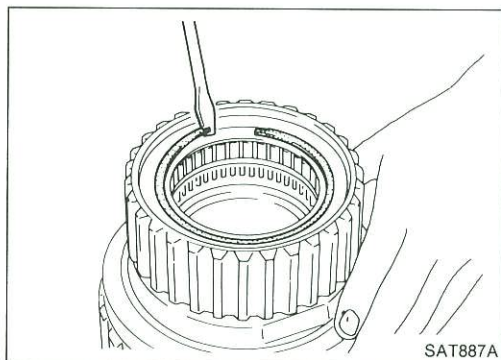
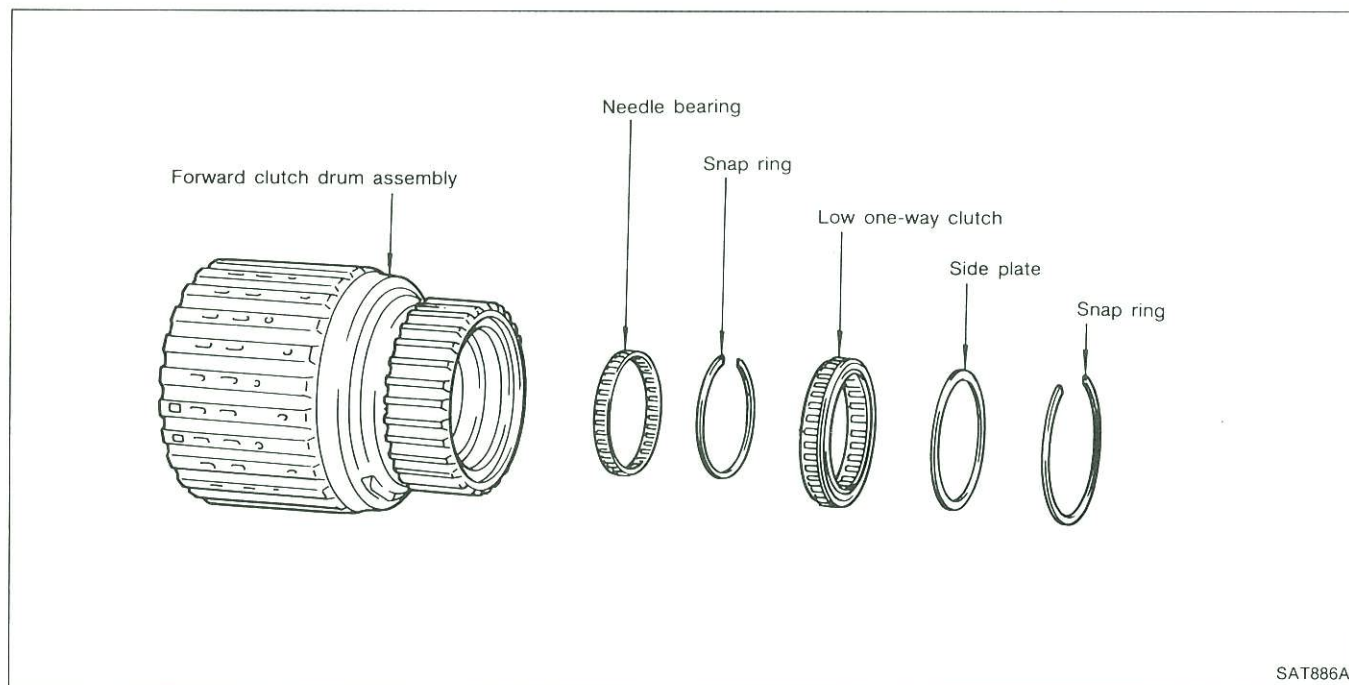
Retaining plate:

Refer to S.D.S.



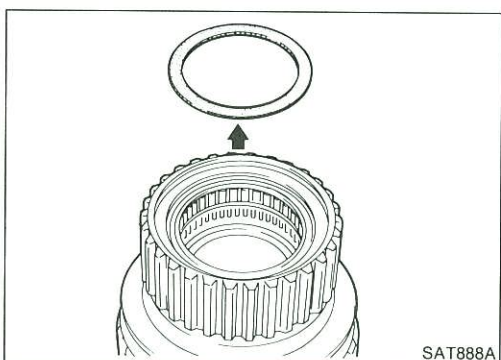
9. Install low one-way clutch inner race seal ring.
 - Apply petroleum jelly to seal ring.
 - Make sure seal rings are pressed firmly into place and held by petroleum jelly.

Forward Clutch Drum Assembly

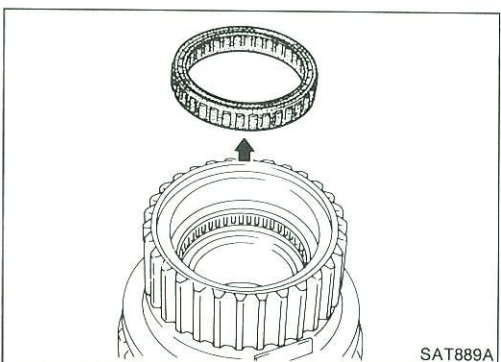


DISASSEMBLY

1. Remove snap ring from forward clutch drum.



2. Remove side plate from forward clutch drum.

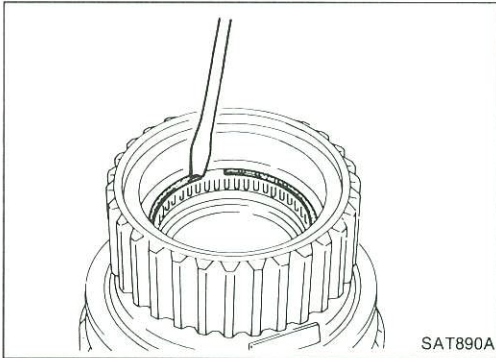


3. Remove low one-way clutch from forward clutch drum.

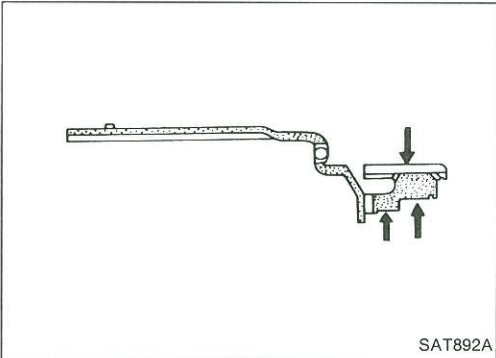
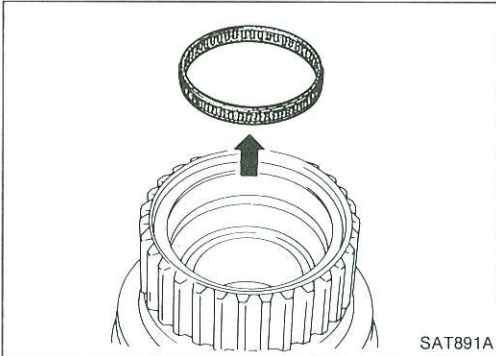
REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

4. Remove snap ring from forward clutch drum.



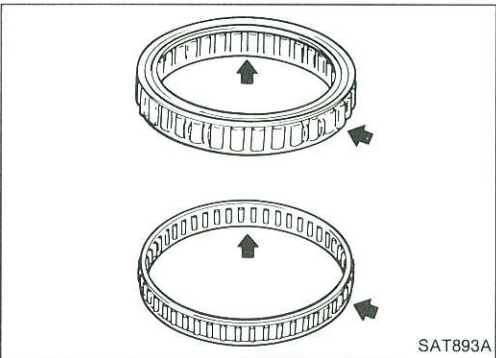
5. Remove needle bearing from forward clutch drum.



INSPECTION

Forward clutch drum

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.

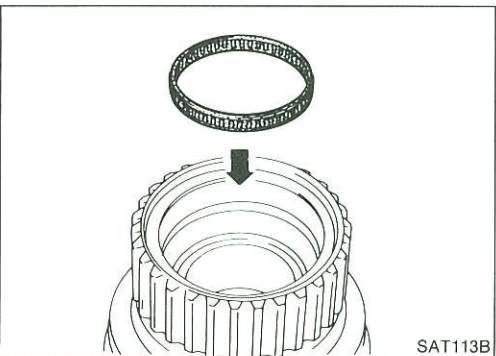


Needle bearing and low one-way clutch

- Check frictional surface for wear or damage.

ASSEMBLY

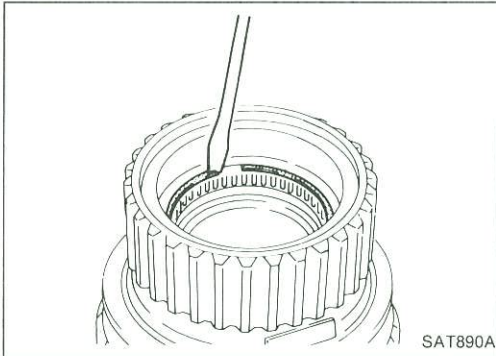
1. Install needle bearing in forward clutch drum.



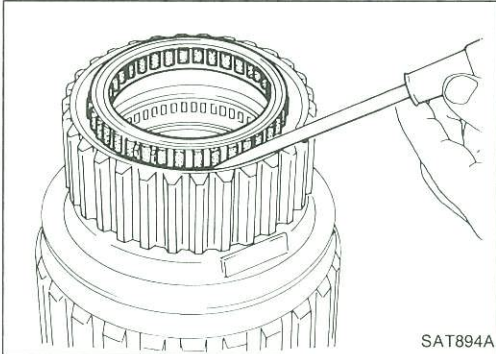
REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

2. Install snap ring onto forward clutch drum.



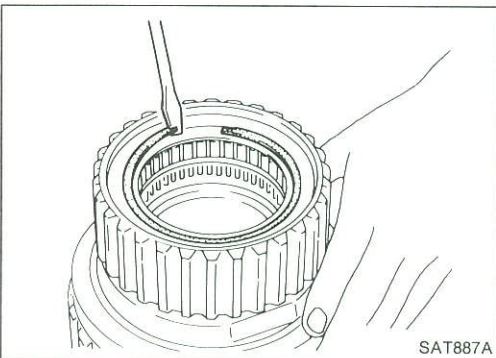
3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.



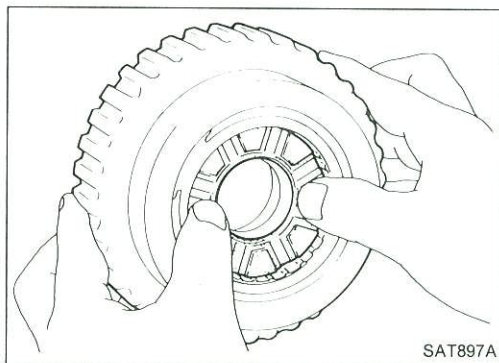
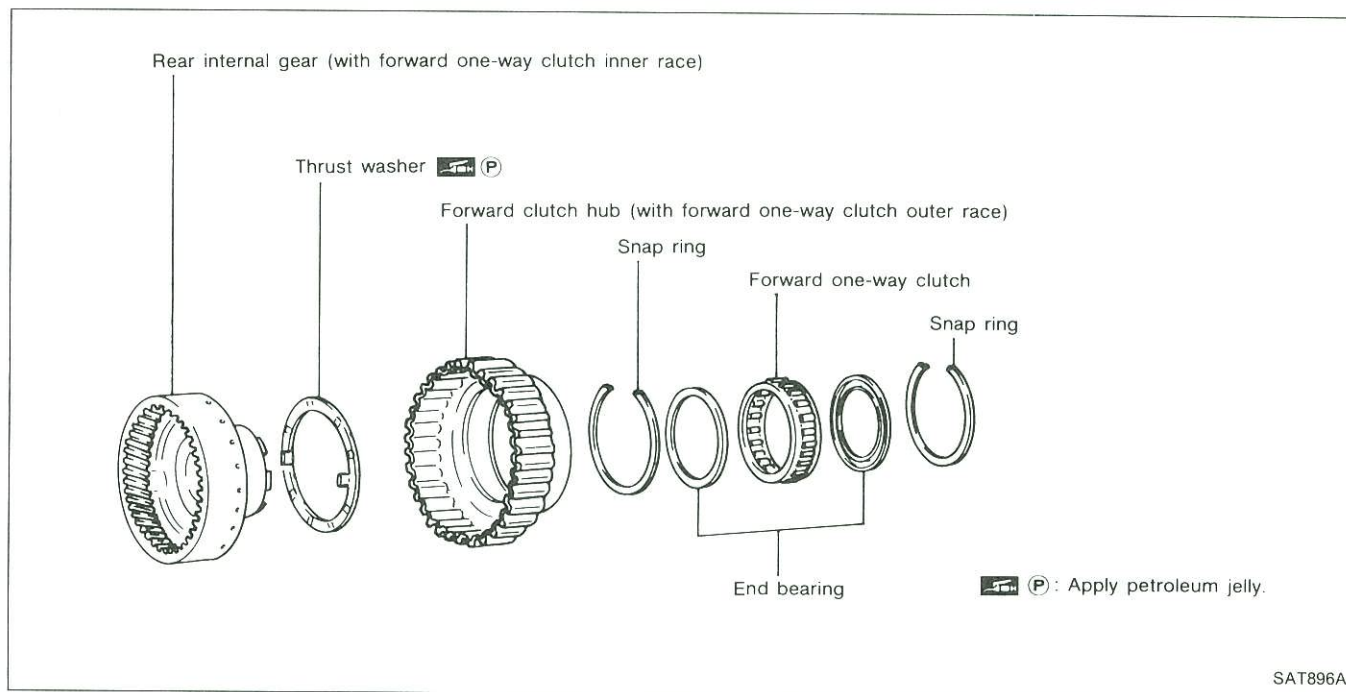
- Install low one-way clutch with flange facing rearward.



4. Install side plate onto forward clutch drum.
5. Install snap ring onto forward clutch drum.

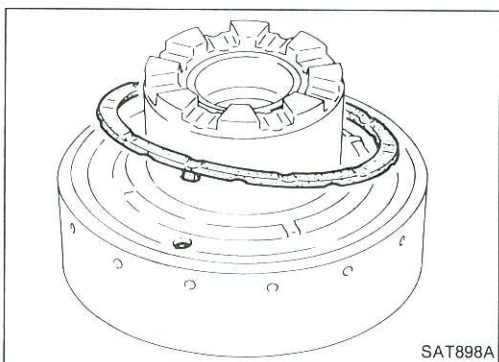


Rear Internal Gear and Forward Clutch Hub

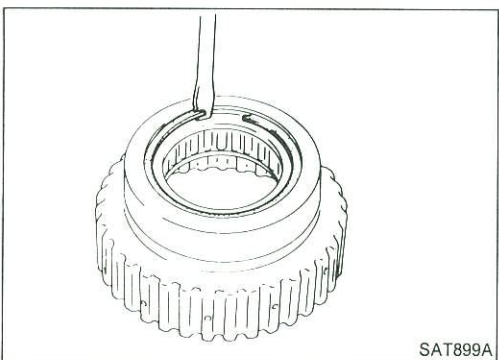


DISASSEMBLY

1. Remove rear internal gear by pushing forward clutch hub forward.



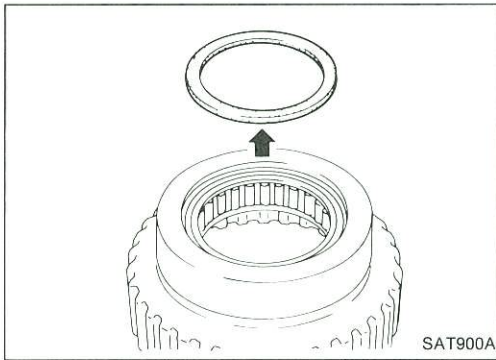
2. Remove thrust washer from rear internal gear.



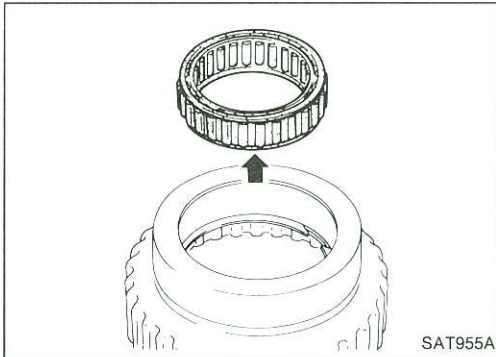
3. Remove snap ring from forward clutch hub.

REPAIR FOR COMPONENT PARTS

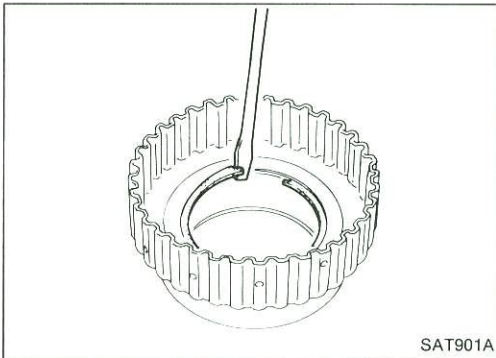
Rear Internal Gear and Forward Clutch Hub (Cont'd)



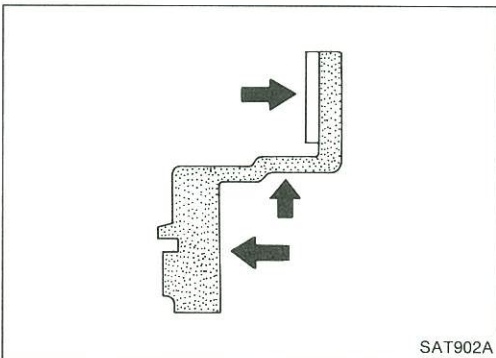
4. Remove end bearing.



5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.



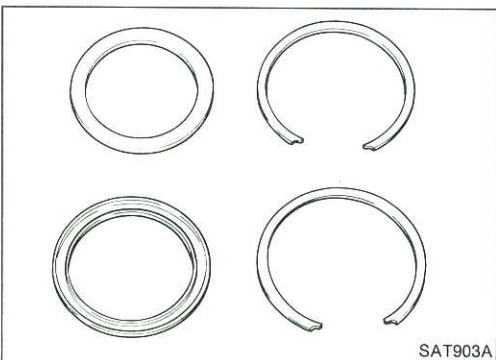
6. Remove snap ring from forward clutch hub.



INSPECTION

Rear internal gear and forward clutch hub

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.



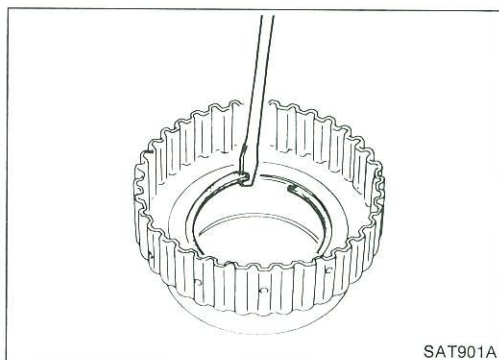
Snap ring and end bearing

- Check for deformation or damage.

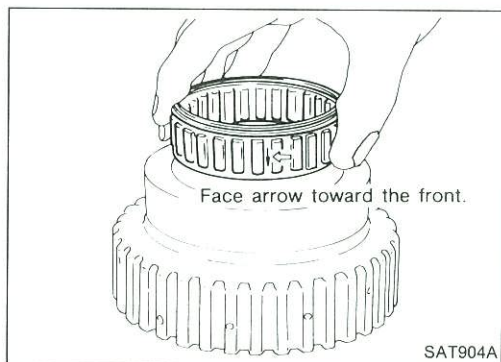
REPAIR FOR COMPONENT PARTS

Rear Internal Gear and Forward Clutch Hub (Cont'd)

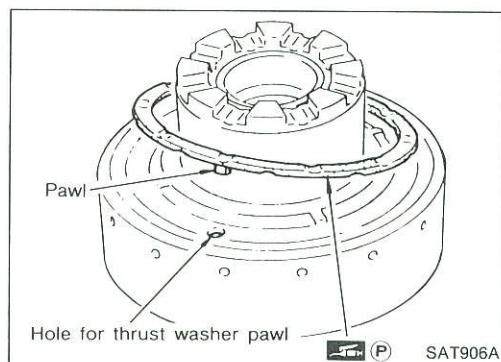
ASSEMBLY



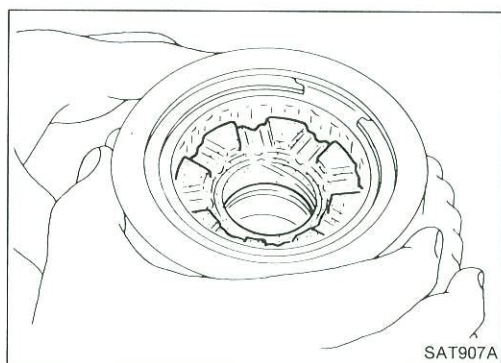
1. Install snap ring onto forward clutch hub.
2. Install end bearing.



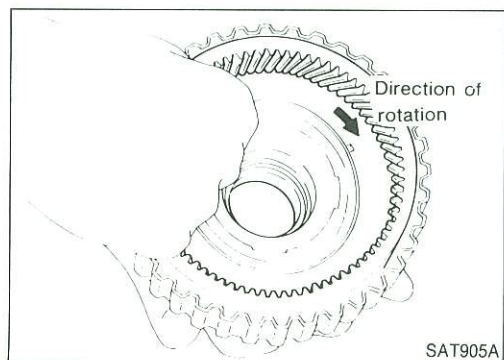
3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**

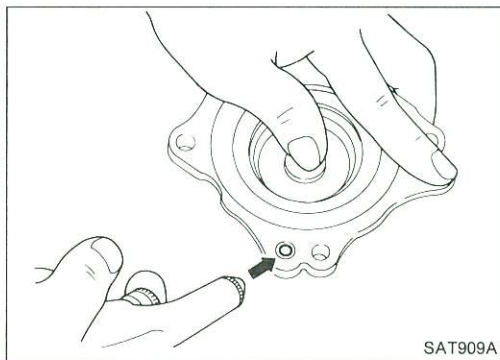
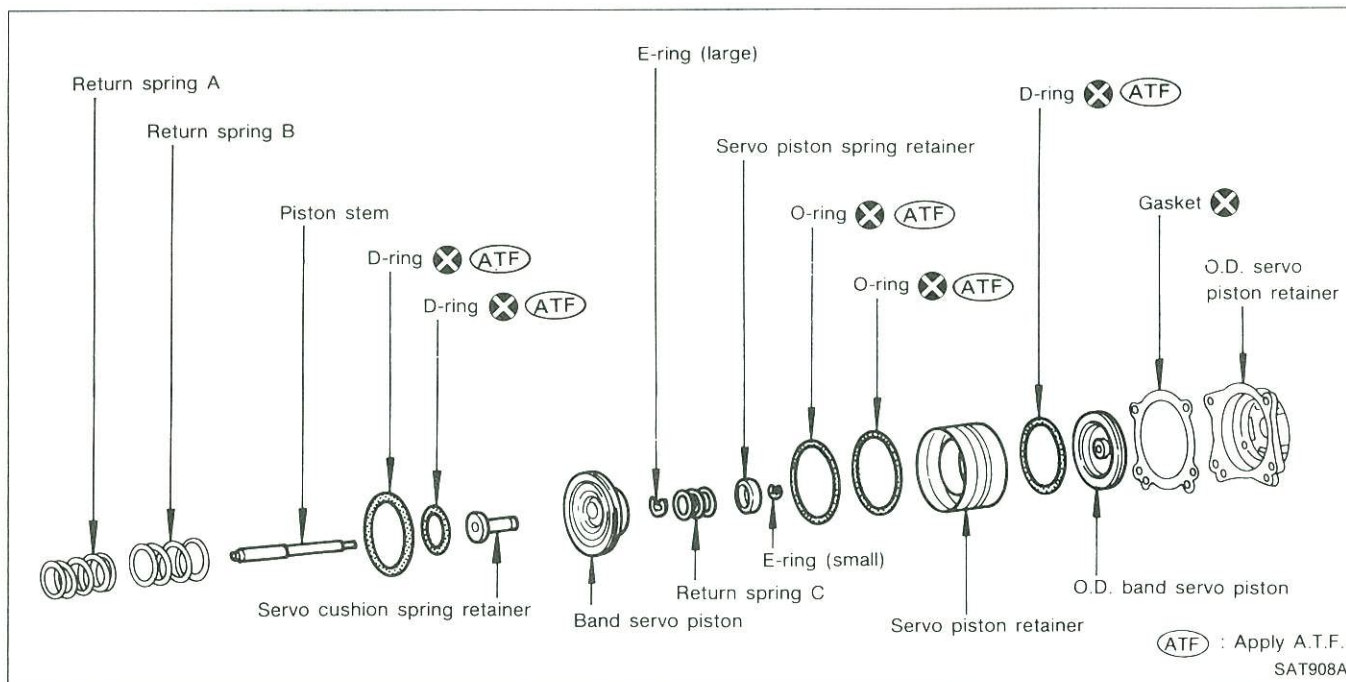


7. Position forward clutch hub in rear internal gear.



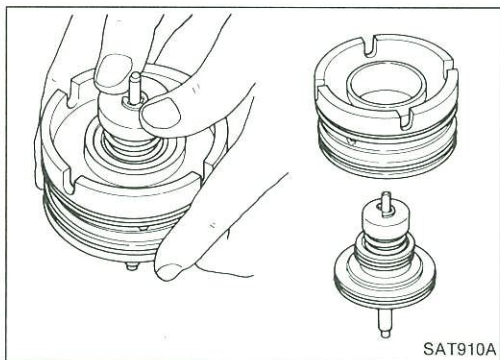
8. After installing, check to assure that forward clutch hub rotates clockwise.

Band Servo Piston Assembly

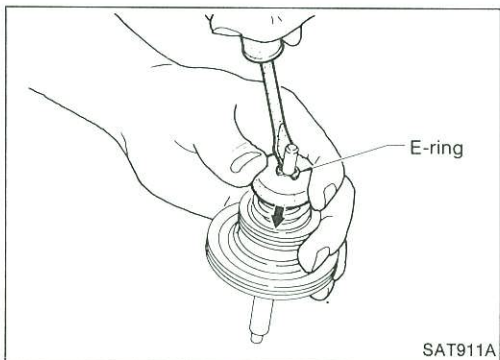


DISASSEMBLY

1. Block one oil hole in O.D. servo piston retainer and the center hole in O.D. band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove O.D. band servo piston from retainer.
3. Remove D-ring from O.D. band servo piston.



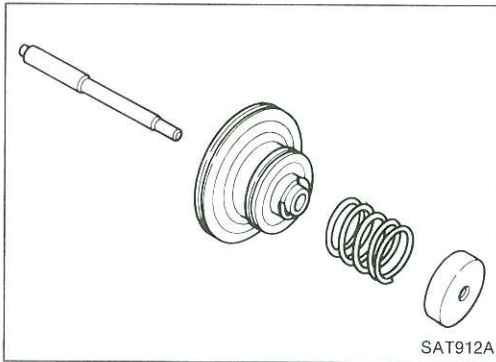
4. Remove band servo piston assembly from servo piston retainer by pushing it forward.



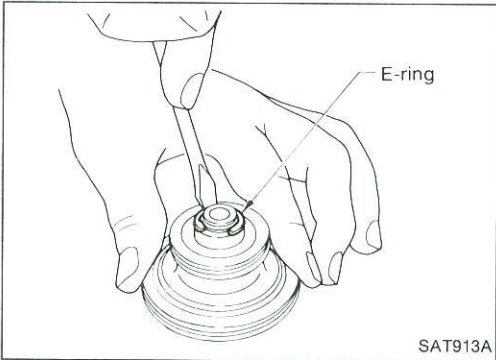
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

REPAIR FOR COMPONENT PARTS

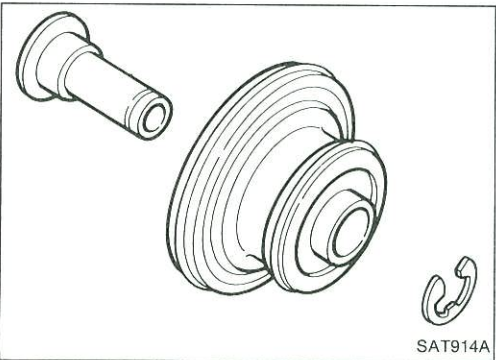
Band Servo Piston Assembly (Cont'd)



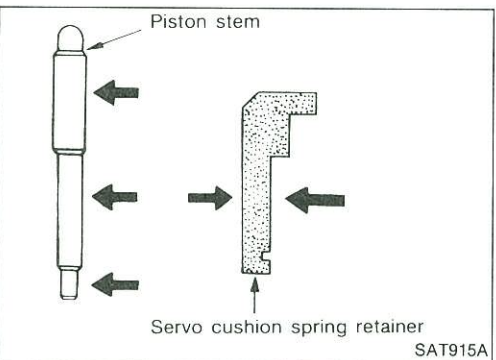
6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.



7. Remove E-ring from band servo piston.



8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.



INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

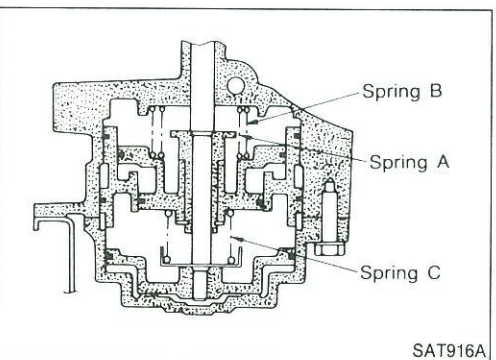
Return springs

- Check for deformation or damage. Measure free length and outer diameter.

Inspection standard:

Unit: mm (in)

Parts	Free length	Outer diameter
Spring A	45.6 (1.795)	34.3 (1.350)
Spring B	53.8 (2.118)	40.3 (1.587)
Spring C	29.0 (1.142)	27.6 (1.087)

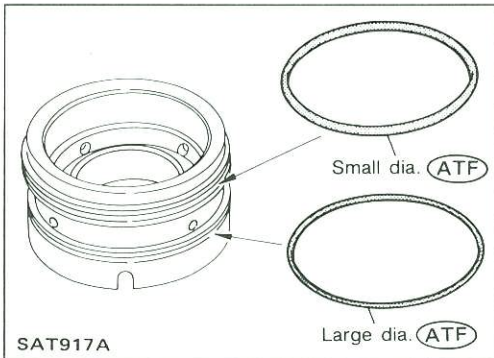


Band Servo Piston Assembly (Cont'd)

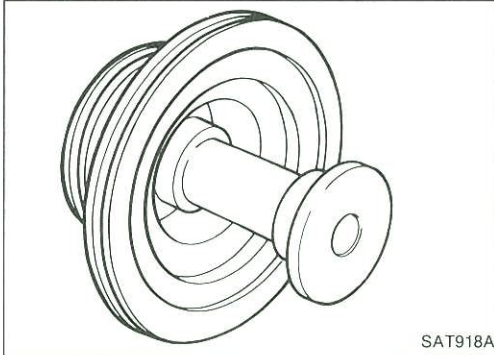
ASSEMBLY

1. Install O-rings onto servo piston retainer.

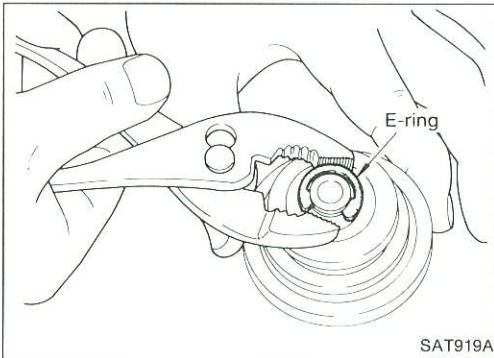
- Apply A.T.F. to O-rings.
- Pay attention to position of each O-ring.



2. Install servo cushion spring retainer onto band servo piston.

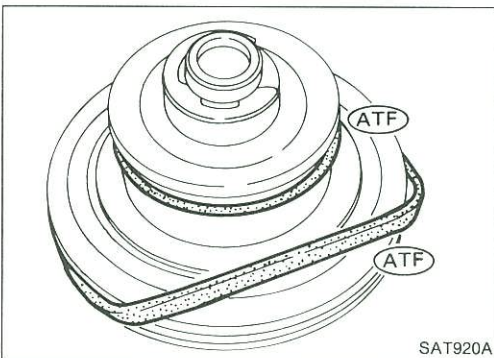


3. Install E-ring onto servo cushion spring retainer.

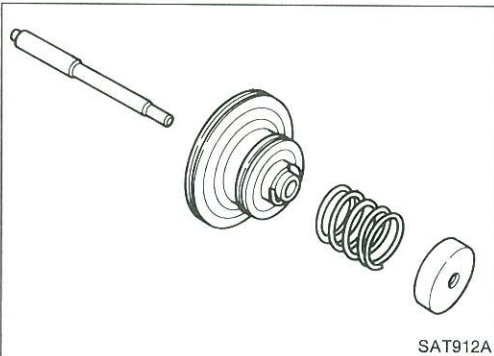


4. Install D-rings onto band servo piston.

- Apply A.T.F. to D-rings.

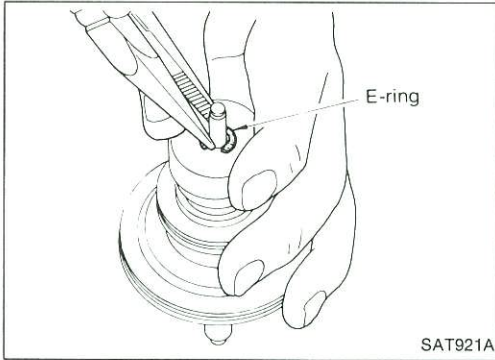


5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

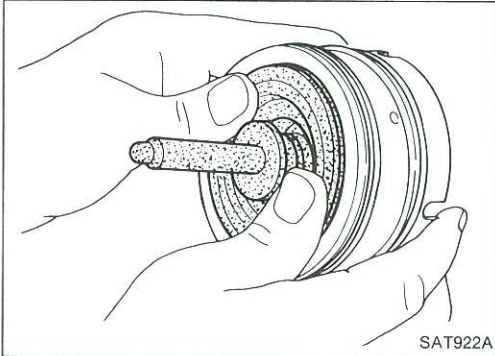


REPAIR FOR COMPONENT PARTS

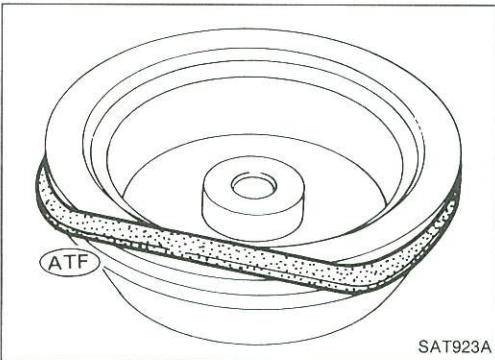
Band Servo Piston Assembly (Cont'd)



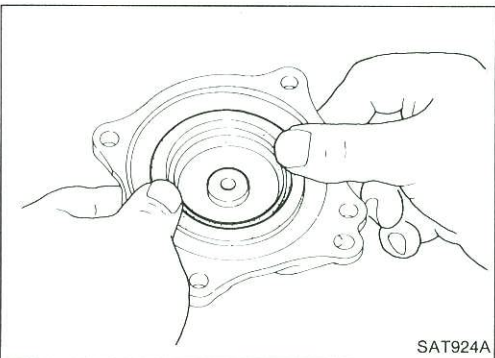
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

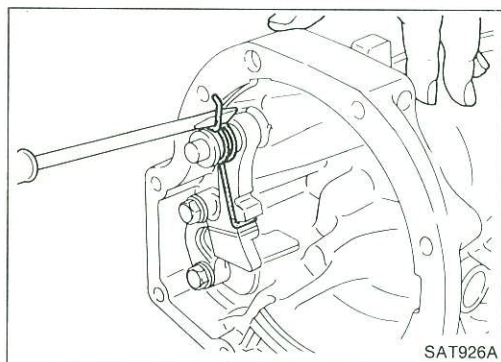
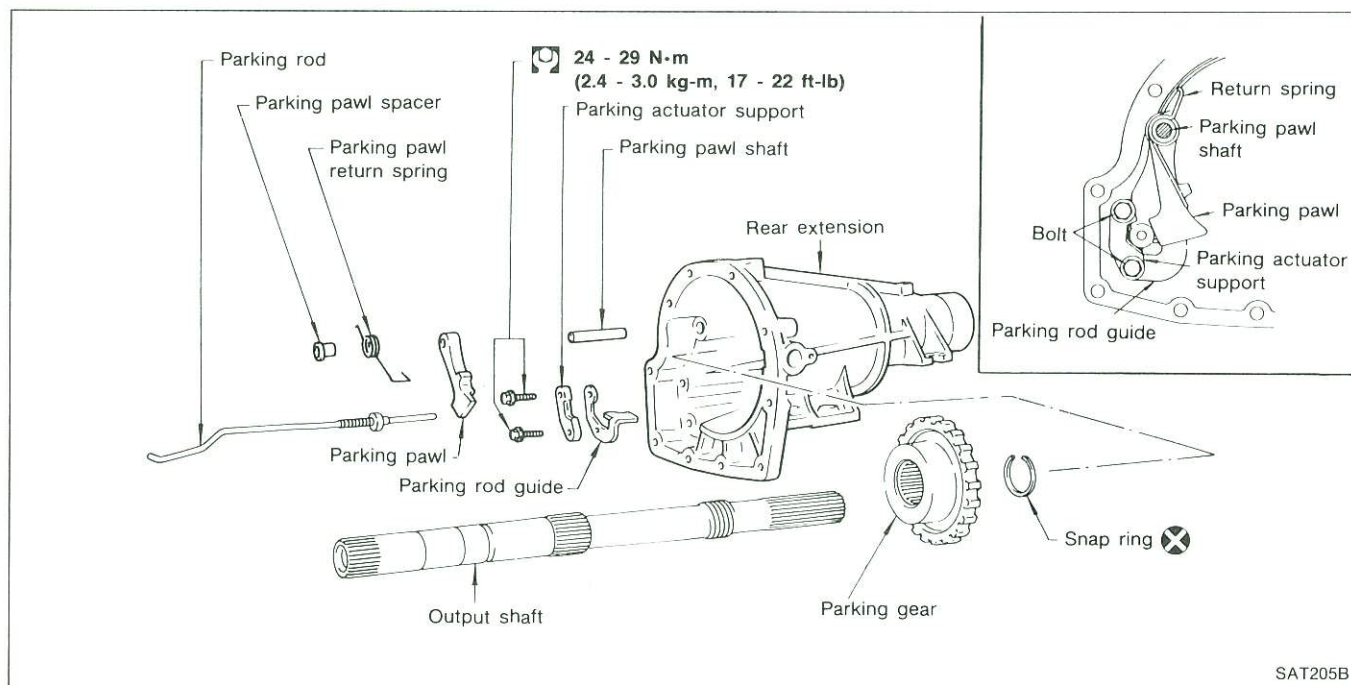


8. Install D-ring on O.D. band servo piston.
● **Apply A.T.F. to D-ring.**



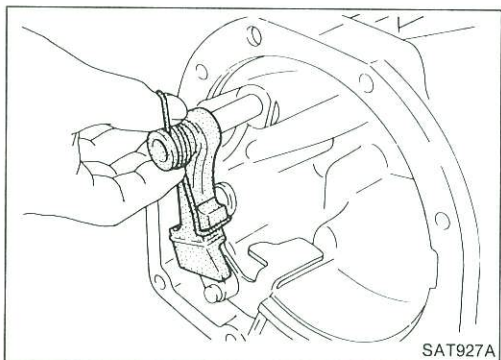
9. Install O.D. band servo piston onto servo piston retainer by pushing it inward.

Parking Pawl Components

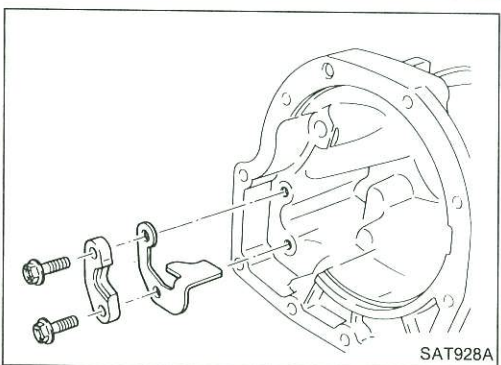


DISASSEMBLY

1. Slide return spring to the front of rear extension flange.



2. Remove return spring, pawl spacer and parking pawl from rear extension.
3. Remove parking pawl shaft from rear extension.



4. Remove parking actuator support and rod guide from rear extension.

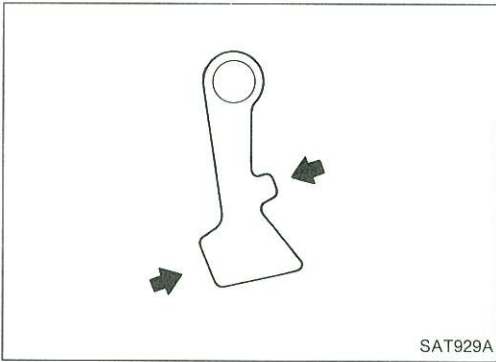
REPAIR FOR COMPONENT PARTS

Parking Pawl Components (Cont'd)

INSPECTION

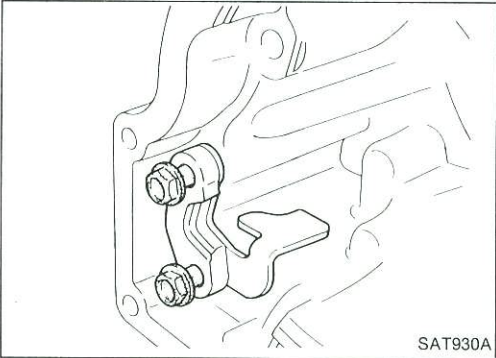
Parking pawl and parking actuator support

- Check contact surface of parking rod for wear.

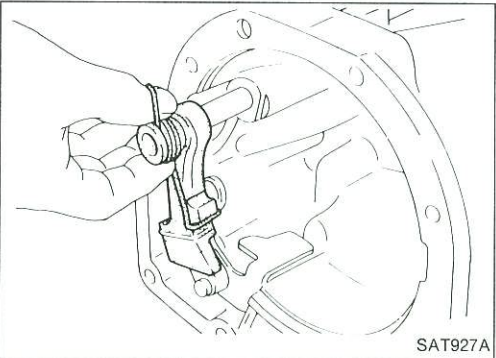


ASSEMBLY

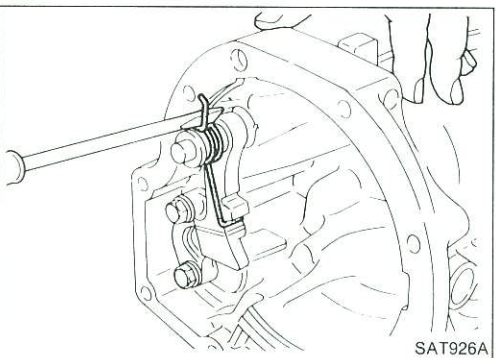
1. Install rod guide and parking actuator support onto rear extension.
2. Insert parking pawl shaft into rear extension.

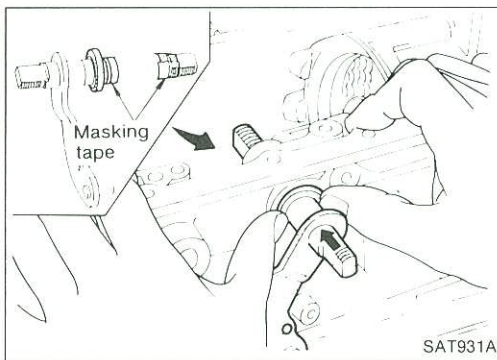


3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



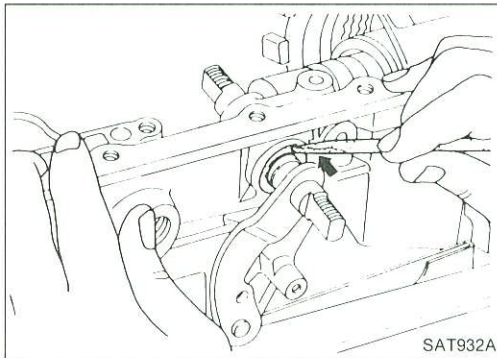
4. Bend return spring upward and install it onto rear extension.



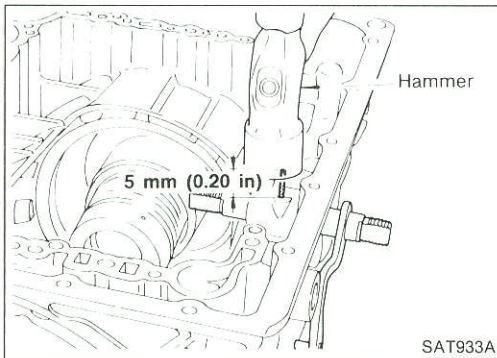


Assembly

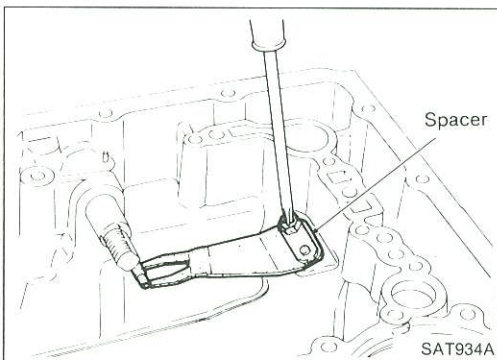
1. Install manual shaft components.
 - a. Install oil seal onto manual shaft.
 - **Apply A.T.F. to oil seal.**
 - **Wrap threads of manual shaft with masking tape.**
 - b. Insert manual shaft and oil seal as a unit into transmission case.
 - c. Remove masking tape.



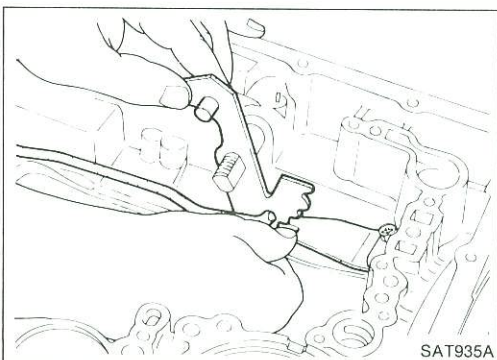
- d. Push oil seal evenly and install it onto transmission case.



- e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.



- f. Install detent spring and spacer.

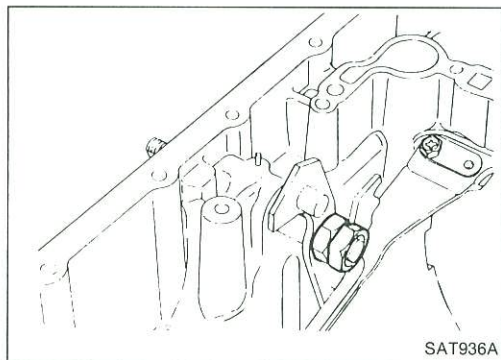


- g. While pushing detent spring down, install manual plate onto manual shaft.

ASSEMBLY

Assembly (Cont'd)

- h. Install lock nuts onto manual shaft.



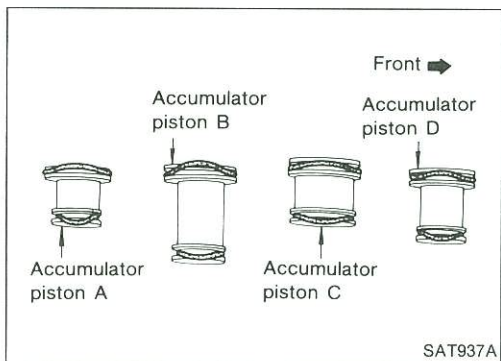
2. Install accumulator piston.
a. Install O-rings onto accumulator piston.

● **Apply A.T.F. to O-rings.**

Accumulator piston O-rings:

Unit: mm (in)

Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

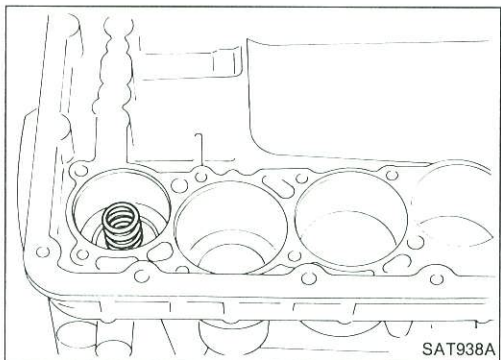


- b. Install return spring for accumulator A onto transmission case.

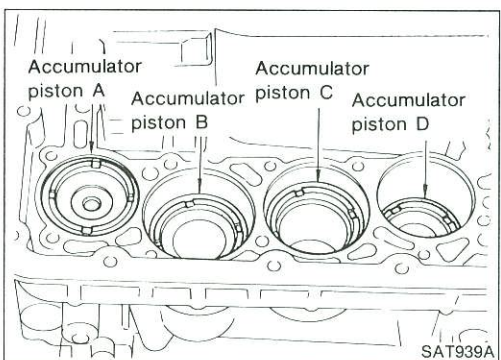
Free length of return spring:

Unit: mm (in)

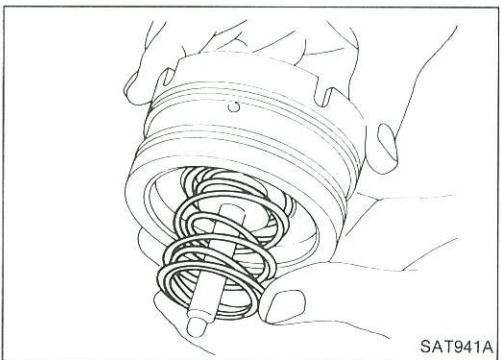
Accumulator	A
Free length	43 (1.69)



- c. Install accumulator pistons A, B, C and D.
● **Apply A.T.F. to transmission case.**

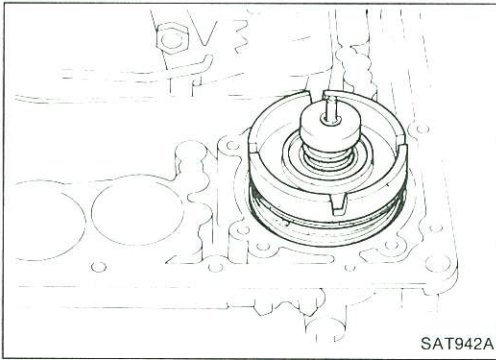


3. Install band servo piston.
a. Install return springs onto servo piston.

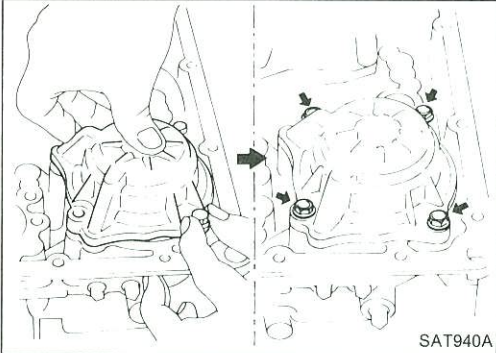


ASSEMBLY

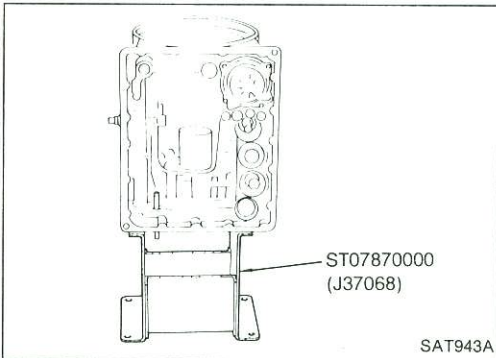
Assembly (Cont'd)



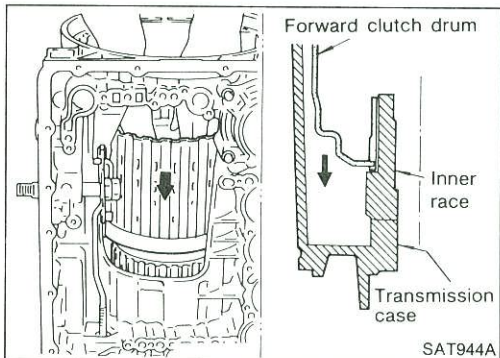
- b. Install band servo piston onto transmission case.
- **Apply A.T.F. to O-ring of band servo piston and transmission case.**
- c. Install gasket for band servo onto transmission case.



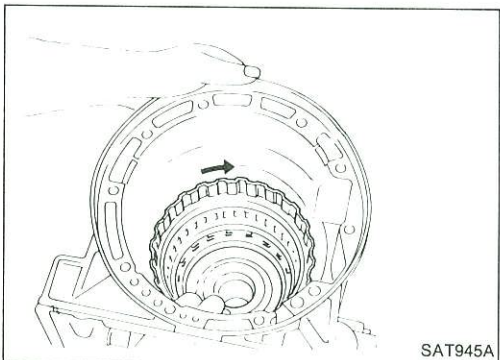
- d. Install band servo retainer onto transmission case.



- 4. Install rear side clutch and gear components.
- a. Place transmission case in vertical position.



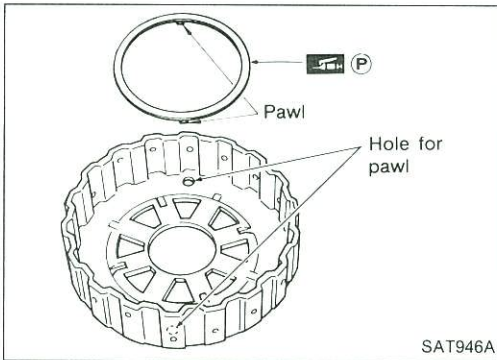
- b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.



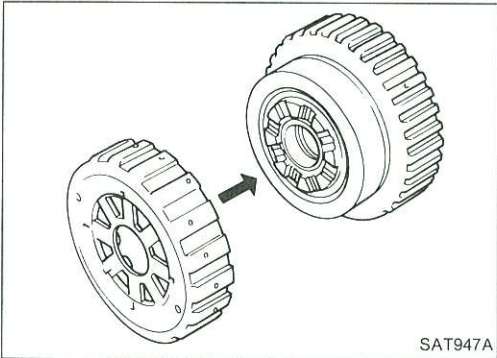
- c. Check to be sure that rotation direction of forward clutch assembly is correct.

ASSEMBLY

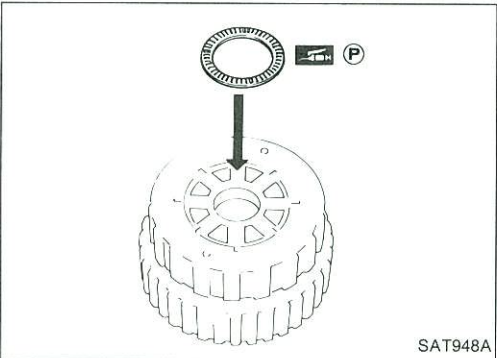
Assembly (Cont'd)



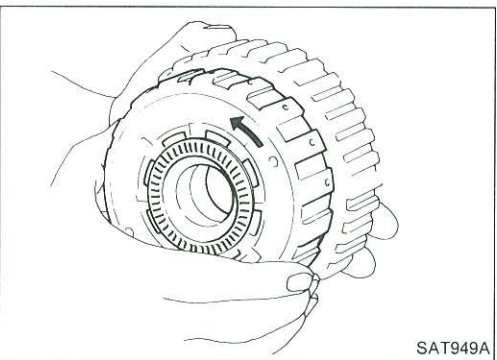
- d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
 - **Insert pawls of thrust washer securely into holes in overrun clutch hub.**



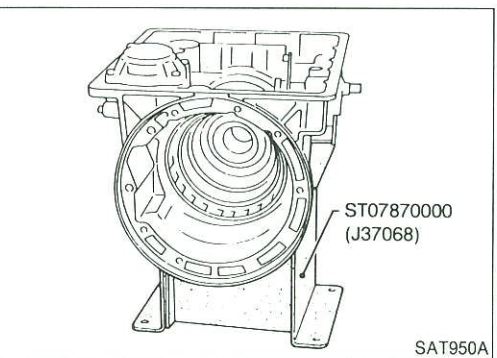
- e. Install overrun clutch hub onto rear internal gear assembly.



- f. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**



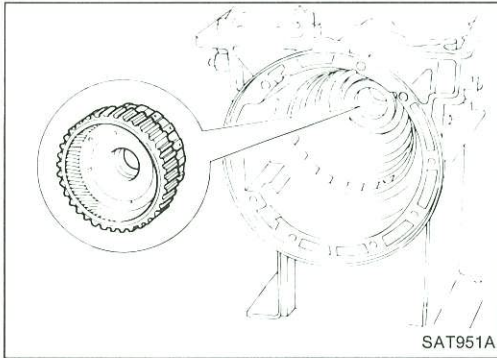
- g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.



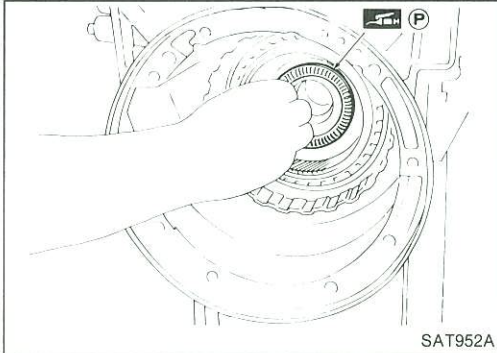
- h. Place transmission case into horizontal position.

ASSEMBLY

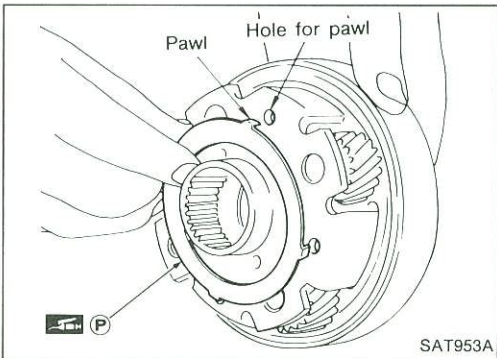
Assembly (Cont'd)



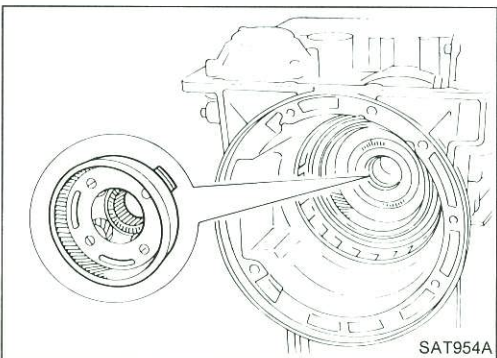
- i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.



- j. Install needle bearing onto rear internal gear.
● **Apply petroleum jelly to needle bearing.**



- k. Install bearing race onto rear of front internal gear.
● **Apply petroleum jelly to bearing race.**
● **Securely engage pawls of bearing race with holes in front internal gear.**

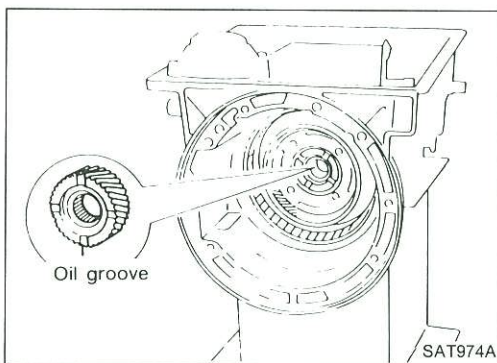


- l. Install front internal gear on transmission case.

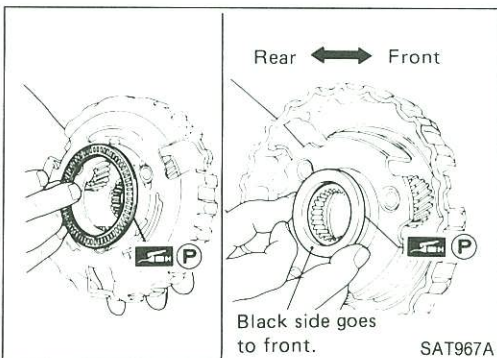
Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

Part name \ Item	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●



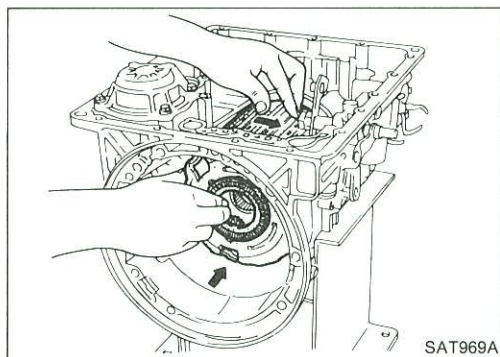
1. Install front side clutch and gear components.
 - a. Install rear sun gear on transmission case.
 - **Pay attention to its direction.**



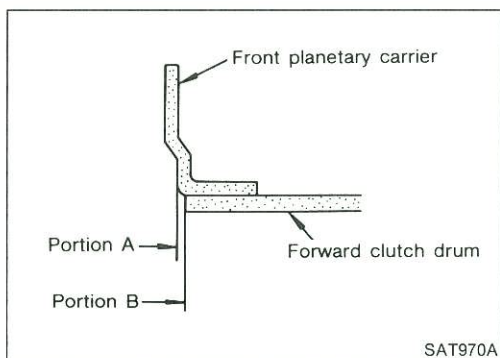
- b. Install needle bearing on front of front planetary carrier.
 - **Apply petroleum jelly to needle bearing.**
 - c. Install needle bearing on rear of front planetary carrier.
 - **Apply petroleum jelly to bearing.**
 - **Pay attention to its direction — Black side goes to front.**

ASSEMBLY

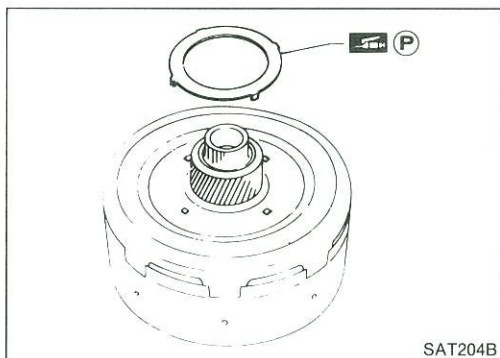
Adjustment (Cont'd)



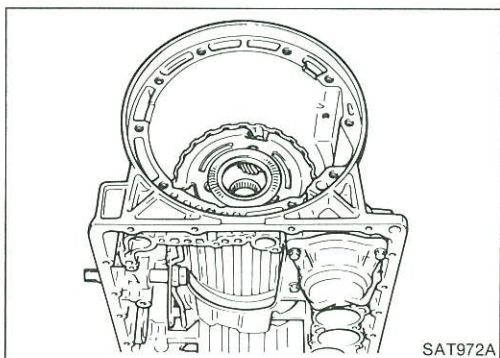
- d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



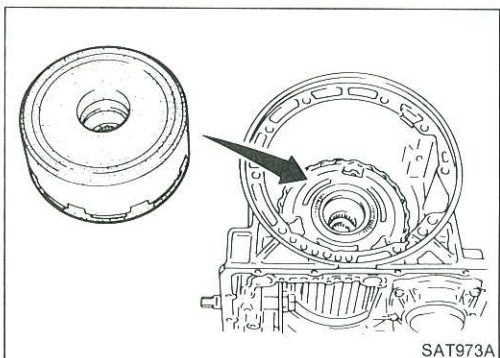
- Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.



- e. Install bearing race on rear of clutch pack.
- Apply petroleum jelly to bearing races.
 - Securely engage pawls of bearing race with hole in clutch pack.



- f. Place transmission case in vertical position.



- g. Install clutch pack into transmission case.

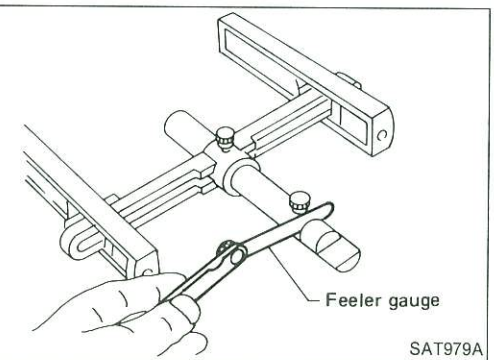
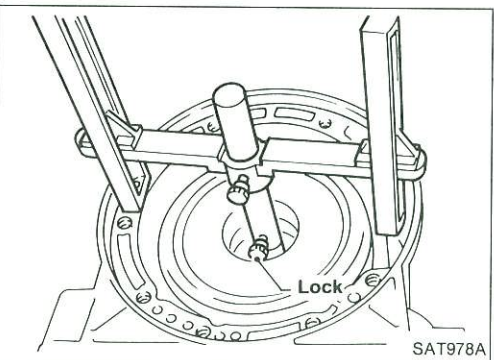
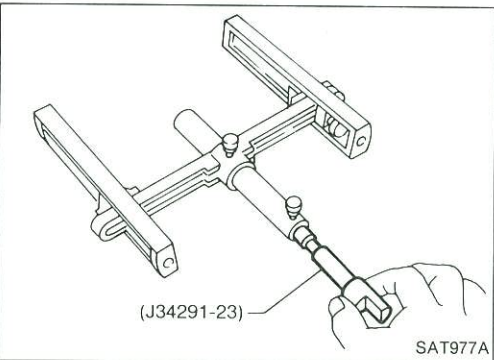
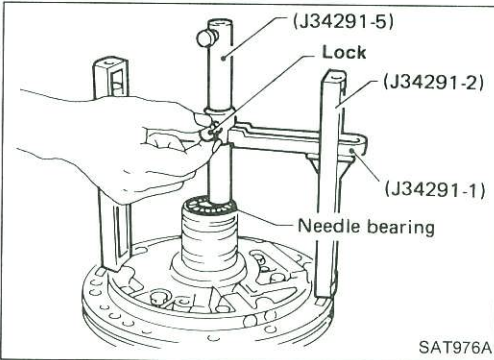
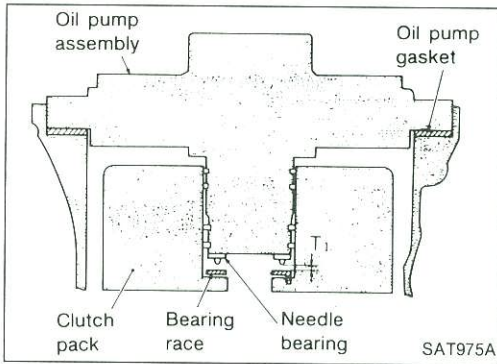
ASSEMBLY

Adjustment (Cont'd)

2. Adjust total end play.

Total end play "T₁":

0.25 - 0.55 mm (0.0098 - 0.0217 in)



- a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.

- b. Install J34291-23 (gauging plunger) into gauging cylinder.

- c. With original bearing race installed inside reverse clutch drum, place shim selecting gauge with its legs on machined surface of transmission case (no gasket) and allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.

- d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.

Total end play "T₁":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

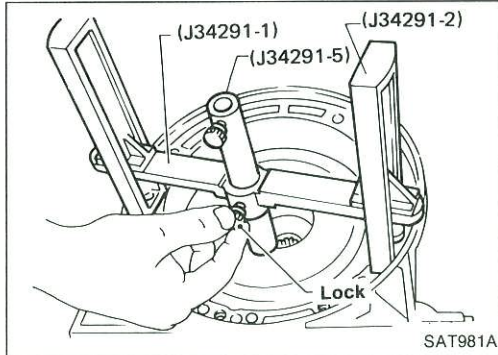
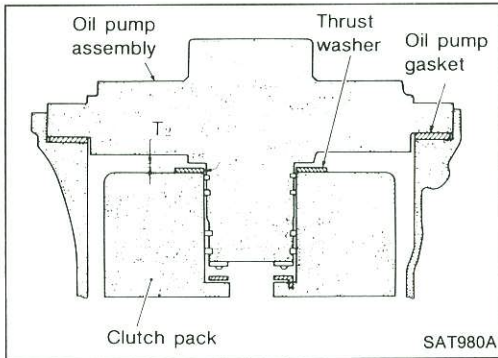
Available oil pump cover bearing race:

Refer to S.D.S.

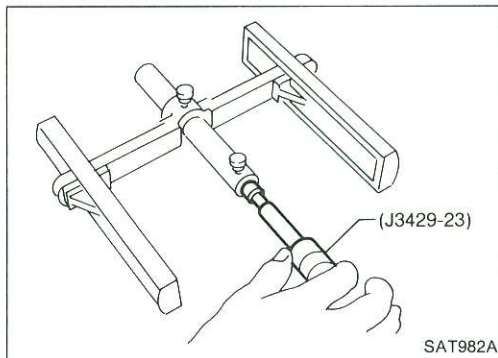
ASSEMBLY

Adjustment (Cont'd)

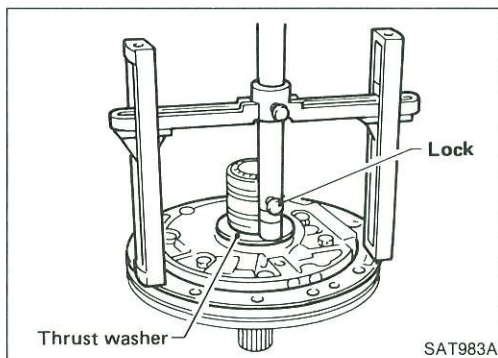
3. Adjust reverse clutch drum end play.
Reverse clutch drum end play " T_2 ":
0.55 - 0.90 mm (0.0217 - 0.0354 in)



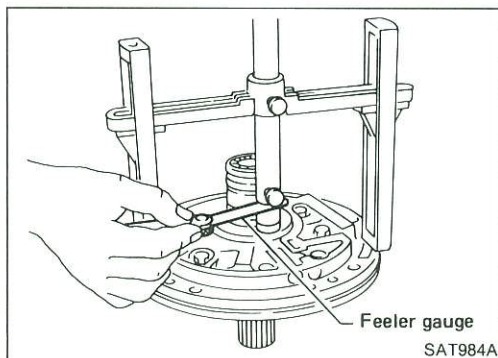
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket) and allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



- b. Install J34291-23 (gauging plunger) into gauging cylinder.



- c. With original thrust washer installed on oil pump, place shim setting gauge legs onto machined surface of oil pump assembly and allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.



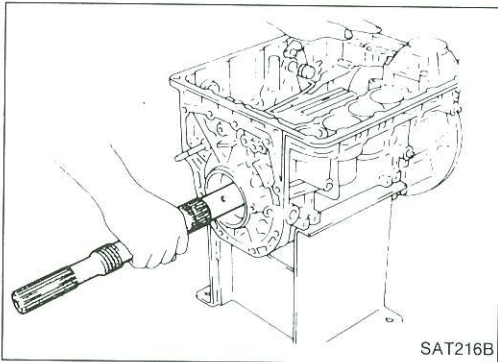
- d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

Reverse clutch drum end play " T_2 ":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

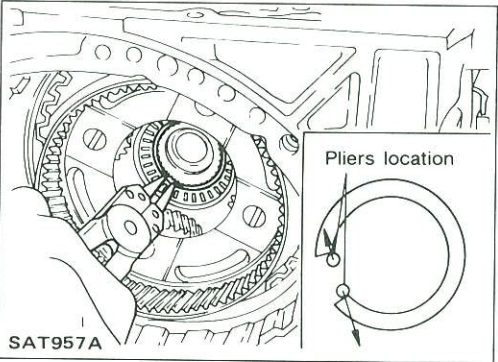
Available oil pump thrust washer:
Refer to S.D.S.

ASSEMBLY

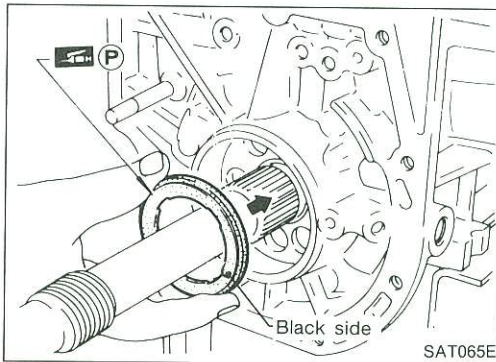


Assembly

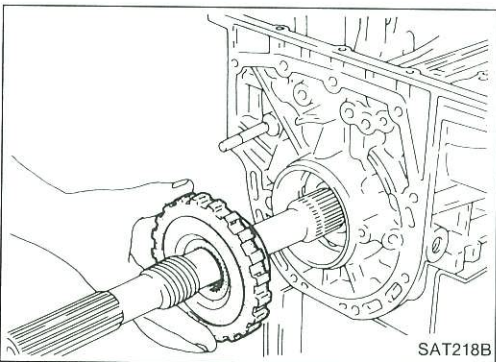
1. Install output shaft and parking gear.
 - a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
 - **Do not force output shaft against front of transmission case.**



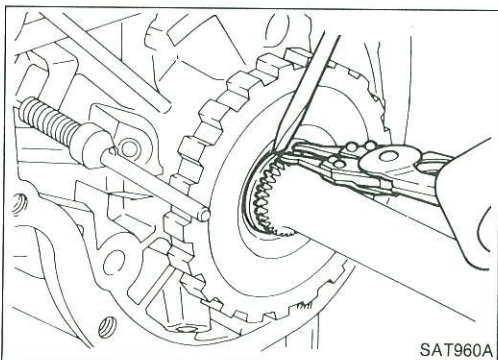
- b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
 - **Check to be sure output shaft cannot be removed in rear direction.**



- c. Install needle bearing on transmission case.
 - **Pay attention to its direction — Black side goes to rear.**
 - **Apply petroleum jelly to needle bearing.**



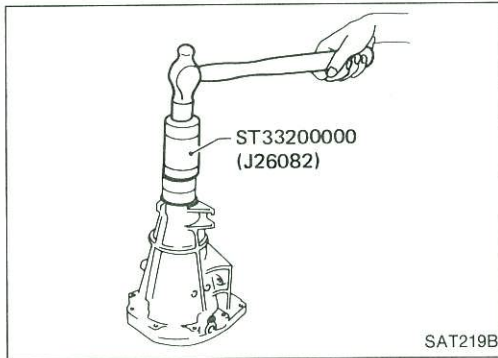
- d. Install parking gear on transmission case.



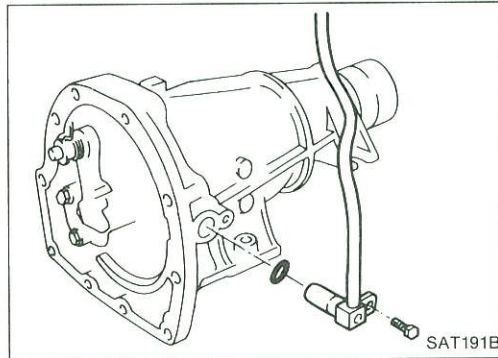
- e. Install snap ring on rear of output shaft.
 - **Check to be sure output shaft cannot be removed in forward direction.**

ASSEMBLY

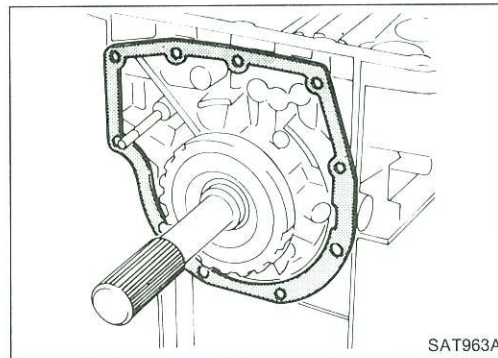
Assembly (Cont'd)



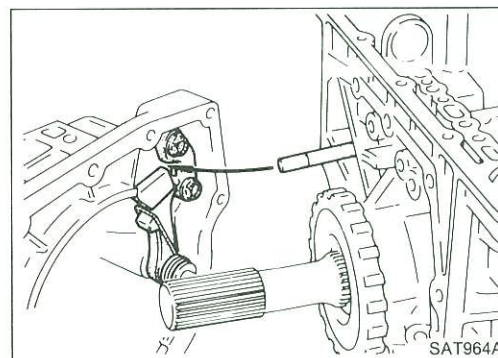
2. Install rear extension.
 - a. Install oil seal on rear extension.
 - **Apply A.T.F. to oil seal.**



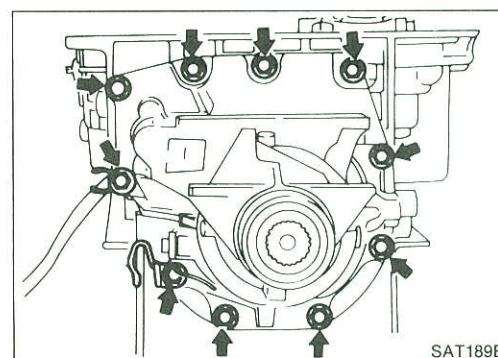
- b. Install O-ring on revolution sensor.
 - **Apply A.T.F. to O-ring.**
 - c. Install revolution sensor on rear extension.



- d. Install rear extension gasket on transmission case.



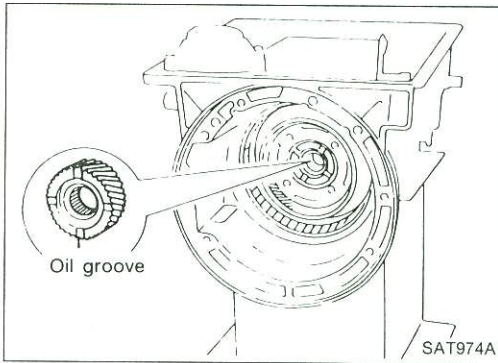
- e. Install parking rod on transmission case.



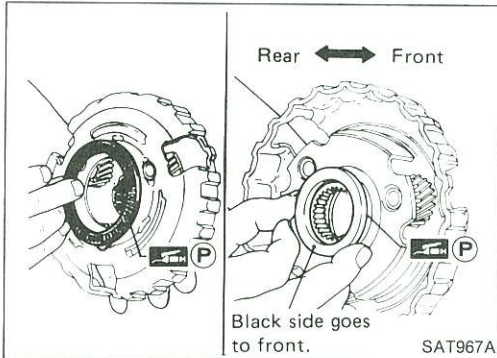
- f. Install rear extension on transmission case.

ASSEMBLY

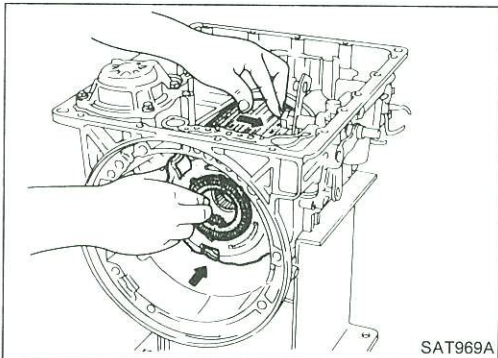
Assembly (Cont'd)



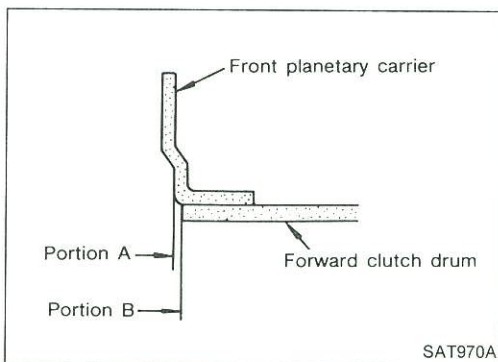
3. Install front side clutch and gear components.
 - a. Install rear sun gear on transmission case.
 - **Pay attention to its direction.**



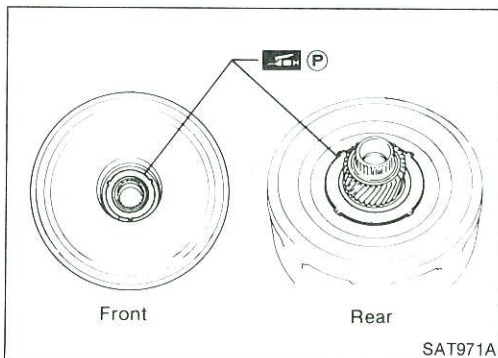
- b. Make sure needle bearing is on front of front planetary carrier.
 - **Apply petroleum jelly to needle bearing.**
 - c. Make sure needle bearing is on rear of front planetary carrier.
 - **Apply petroleum jelly to bearing.**
 - **Pay attention to its direction — Black side goes to front.**



- d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



- **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**

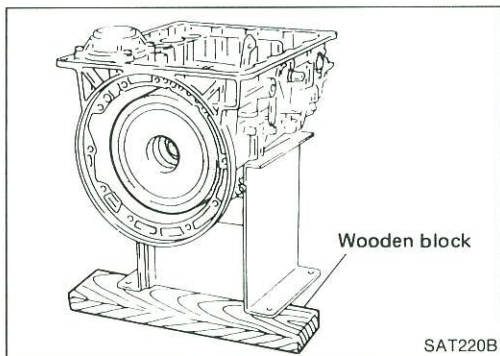


- e. Make sure bearing races are on front and rear of clutch pack.
 - **Apply petroleum jelly to bearing races.**
 - **Securely engage pawls of bearing races with holes in clutch pack.**

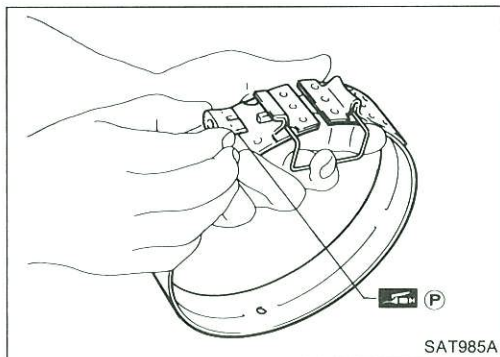
ASSEMBLY

Assembly (Cont'd)

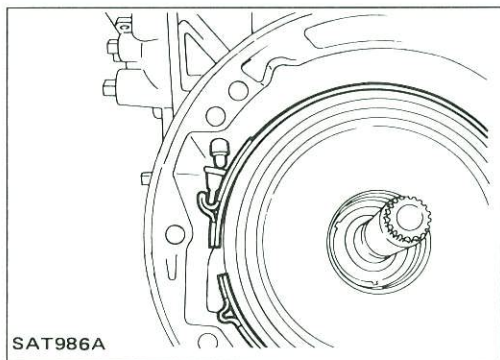
- f. Install clutch pack into transmission case.



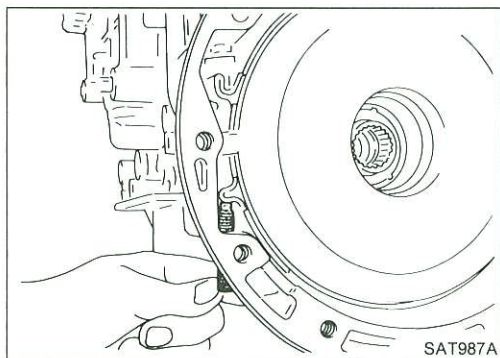
4. Install brake band and band strut.
a. Install band strut on brake band.
● **Apply petroleum jelly to band strut.**



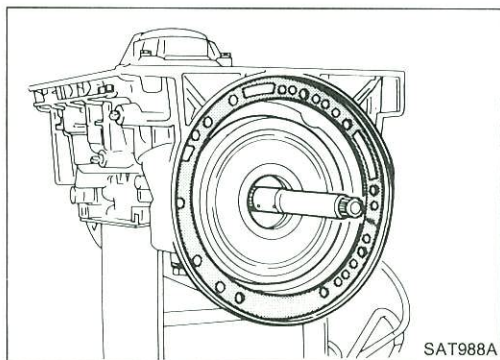
- b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.



- c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.

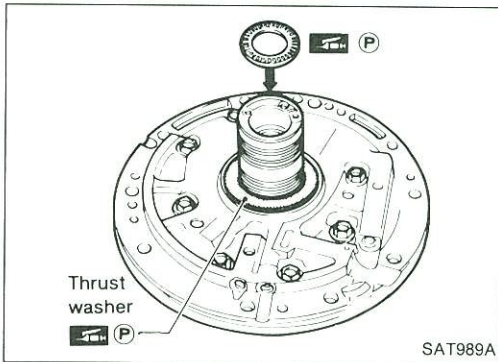


5. Install input shaft on transmission case.
● **Pay attention to its direction — O-ring groove side is front.**
6. Install gasket on transmission case.

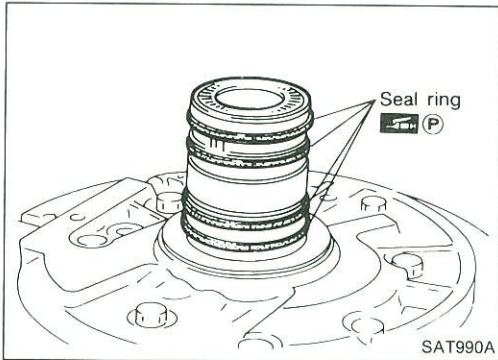


ASSEMBLY

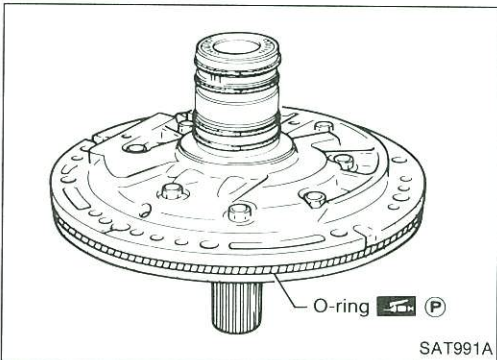
Assembly (Cont'd)



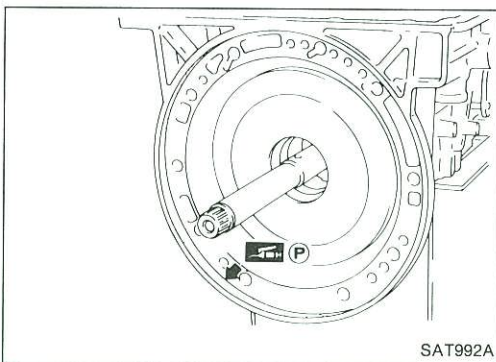
7. Install oil pump assembly.
 - a. Install needle bearing on oil pump assembly.
 - **Apply petroleum jelly to the needle bearing.**
 - b. Install selected thrust washer on oil pump assembly.
 - **Apply petroleum jelly to thrust washer.**



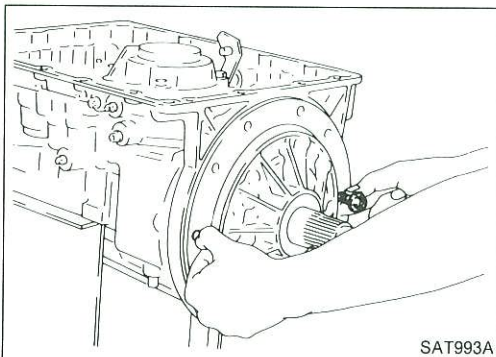
- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



- d. Install O-ring on oil pump assembly.
 - **Apply petroleum jelly to O-ring.**



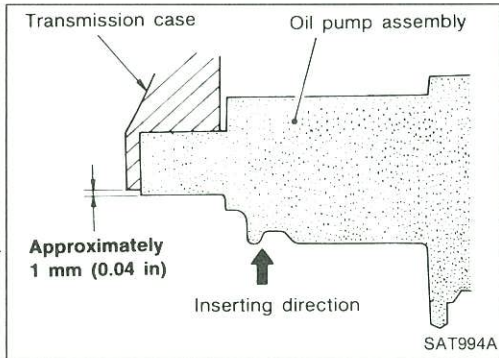
- e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.



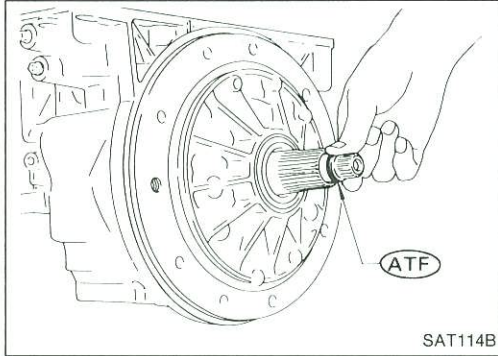
- f. Install oil pump assembly.
 - **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**

ASSEMBLY

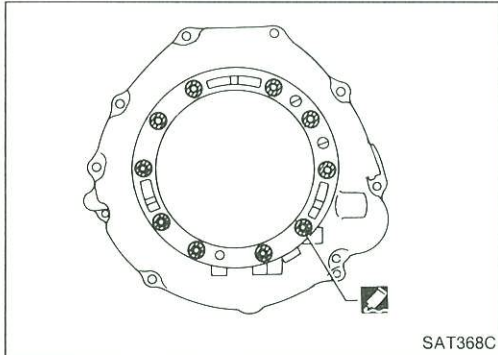
Assembly (Cont'd)



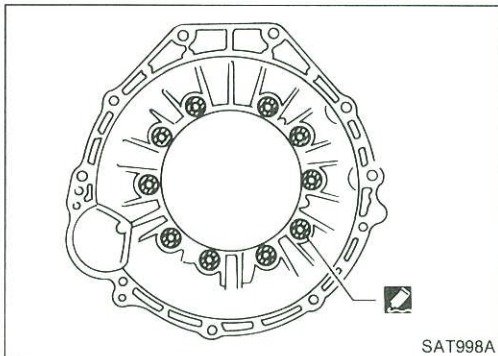
- Insert oil pump assembly to the specified position in transmission, as shown at left.



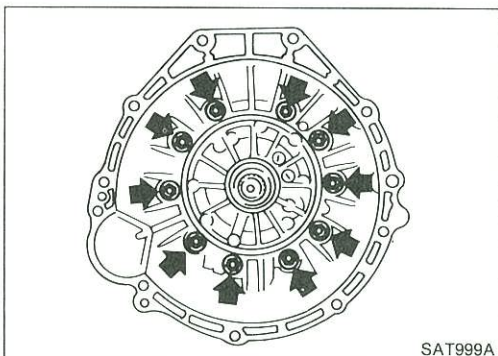
8. Install O-ring on input shaft.
- Apply A.T.F. to O-rings.



9. Install converter housing.
 - a. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.
- Do not apply too much sealant.



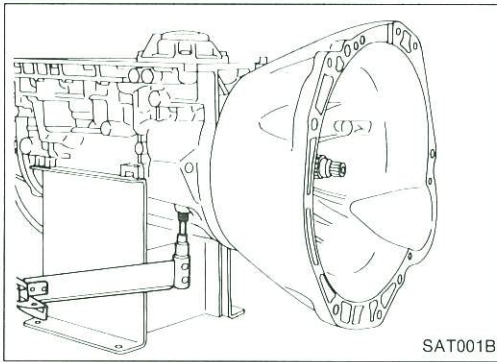
- b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.



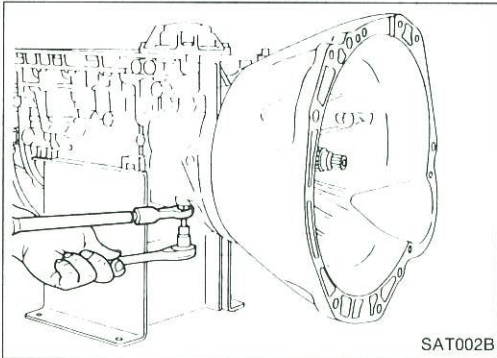
- c. Install converter housing on transmission case.

ASSEMBLY

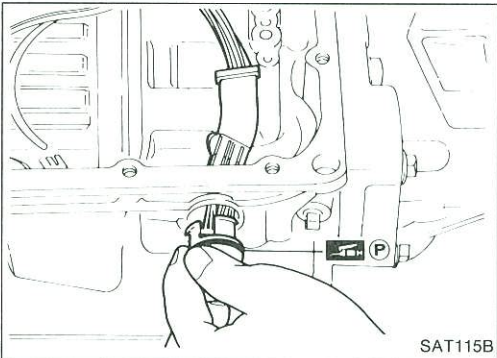
Assembly (Cont'd)



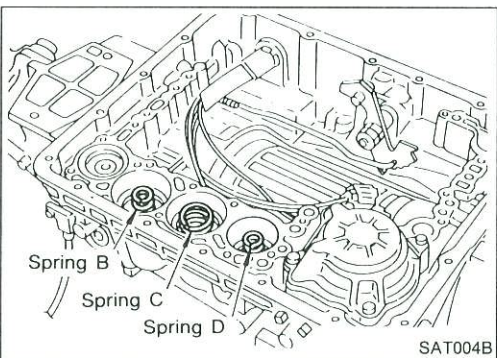
10. Adjust brake band.
 - a. Tighten anchor end bolt to specified torque.
Anchor end bolt:
 \Rightarrow 4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
 - b. Back off anchor end bolt two and a half turns.



- c. While holding anchor end pin, tighten lock nut.



11. Install terminal cord assembly.
 - a. Install O-ring on terminal cord assembly.
 - **Apply petroleum jelly to O-ring.**
 - b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

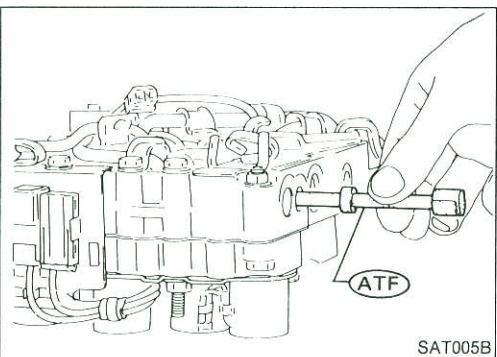


12. Install control valve assembly.
 - a. Install accumulator piston return springs B, C and D.

Free length of return springs:

Unit: mm (in)

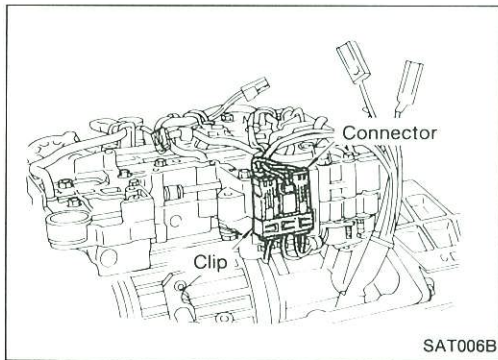
Item	Accumulator	B	C	D
Free length		66 (2.60)	45 (1.77)	58.4 (2.299)



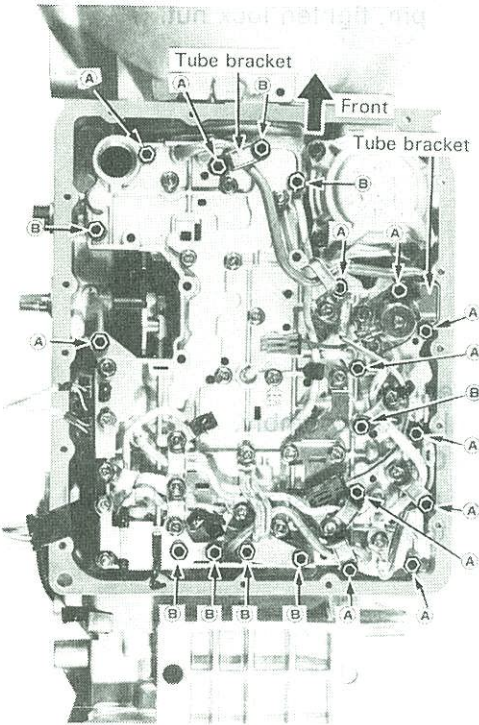
- b. Install manual valve on control valve.
 - **Apply A.T.F. to manual valve.**

ASSEMBLY


Assembly (Cont'd)

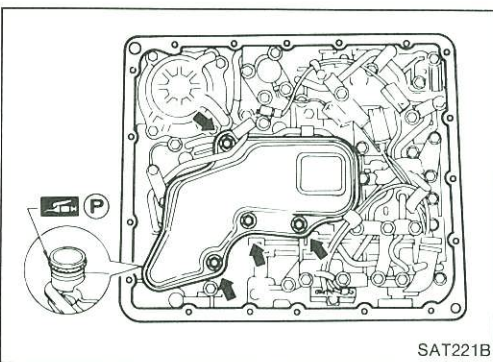


- c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
- d. Install connector clip.

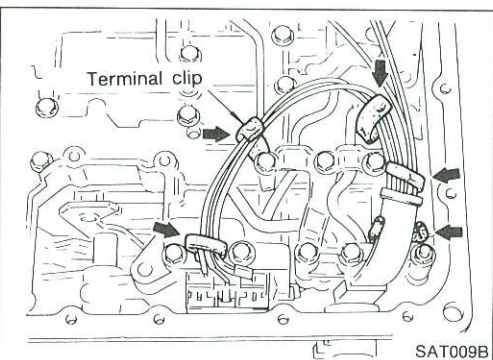


- e. Install control valve assembly on transmission case.
- f. Install connector tube brackets and tighten bolts (A) and (B).
- Check that terminal assembly harness does not catch.

Bolt	ℓ mm (in)	 ℓ
(A)	33 mm (1.30 in)	
(B)	45 mm (1.77 in)	



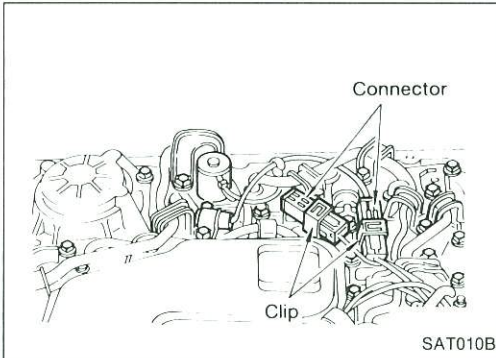
- g. Install O-ring on oil strainer.
- Apply petroleum jelly to O-ring.
- h. Install oil strainer on control valve.



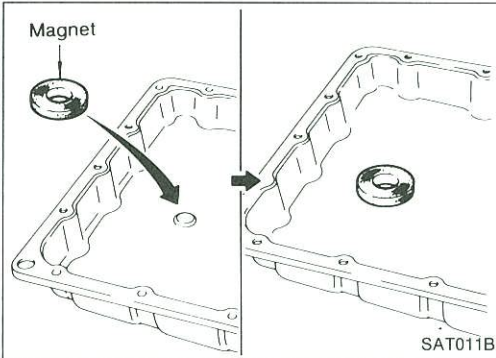
- i. Securely fasten terminal harness with clips.

ASSEMBLY

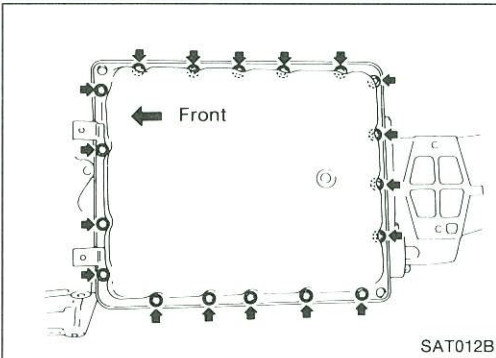
Assembly (Cont'd)



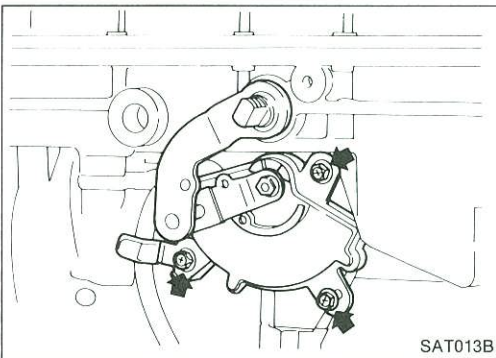
- j. Install lock-up solenoid and fluid temperature sensor connectors.



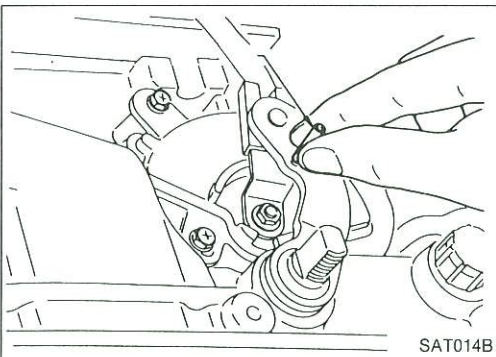
13. Install oil pan.
- a. Attach a magnet to oil pan.



- b. Install oil pan gasket on transmission case.
- c. Install oil pan and bracket on transmission case.
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**



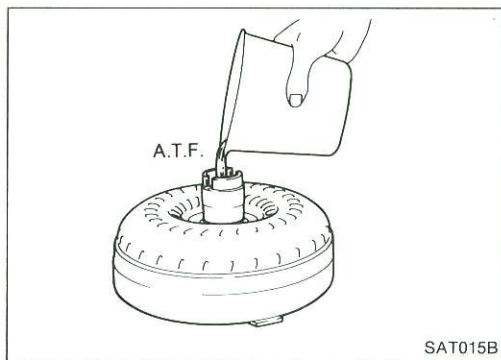
14. Install inhibitor switch.
- a. Check that manual shaft is in "1" range.
- b. Temporarily install inhibitor switch on manual shaft.
- c. Move manual shaft to "N".



- d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.

ASSEMBLY

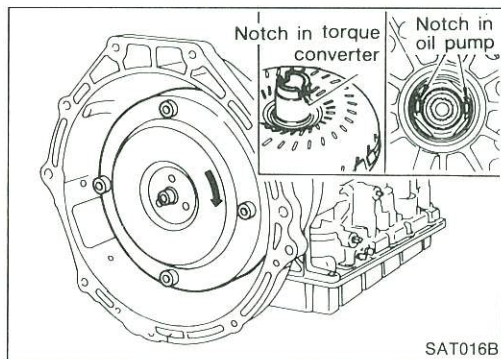
Assembly (Cont'd)



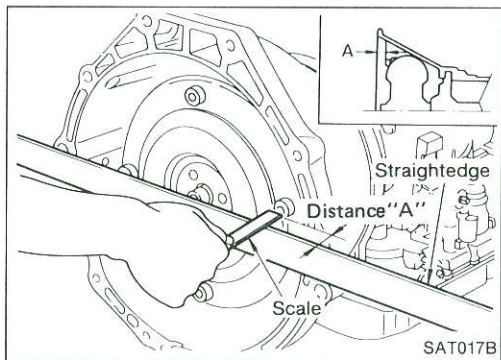
15. Install torque converter.

a. Pour A.T.F. into torque converter.

- Approximately 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of fluid are required for a new torque converter.
- When reusing old torque converter, add the same amount of fluid as was drained.



b. Install torque converter while aligning notches and oil pump.



c. Measure distance A to check that torque converter is in proper position.

Distance "A":

26 mm (1.02 in) or more

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

General Specifications

Engine	VG30E
Automatic transmission model	RE4R01A
Transmission model code number	45 x 05
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.785
2nd	1.545
Top	1.000
O.D.	0.694
Reverse	2.272
Recommended oil	Automatic transmission fluid Type DEXRON™
Oil capacity ℓ (US qt, Imp qt)	8.3 (8-3/4, 7-1/4)

Specifications and Adjustment

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Vehicle speed km/h (MPH)					
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁
Full throttle	58 - 61 (36 - 38)	103 - 111 (64 - 69)	160 - 170 (99 - 106)	154 - 164 (96 - 102)	98 - 106 (61 - 66)	48 - 52 (30 - 32)
Half throttle	42 - 46 (26 - 29)	81 - 87 (50 - 54)	112 - 122 (70 - 76)	73 - 81 (45 - 50)	45 - 51 (28 - 32)	10 - 14 (6 - 9)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	O.D. switch [Shift range]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D ₄]	161 - 169 (100 - 105)	155 - 163 (96 - 101)
Half throttle	ON [D ₄]	121 - 129 (75 - 80)	116 - 124 (72 - 77)

STALL REVOLUTION

Stall revolution rpm
2,200 - 2,400

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)	
	D, 2 and 1 ranges	R range
Idle	432 - 471 (4.4 - 4.8, 63 - 68)	667 - 706 (6.8 - 7.2, 97 - 102)
Stall	883 - 961 (9.0 - 9.8, 128 - 139)	1,393 - 1,471 (14.2 - 15.0, 202 - 213)

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

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts			Item	Part No.	Free length	Outer diameter
Control valve	Upper body	Torque converter relief valve spring		31742-41X23	38.0 (1.496)	9.0 (0.354)
		Pressure regulator valve spring		31742-41X24	44.02 (1.7331)	14.0 (0.551)
		Pressure modifier valve spring		31742-41X19	31.95 (1.2579)	6.8 (0.268)
		Shuttle shift valve D spring		31762-41X00	26.5 (1.043)	6.0 (0.236)
		Accumulator control valve spring		31742-41X60	17.0 (0.669)	10.5 (0.413)
		4-2 sequence valve spring		31756-41X00	29.1 (1.146)	6.95 (0.2736)
		Shift valve B spring		31762-41X01	25.0 (0.984)	7.0 (0.276)
		4-2 relay valve spring		31756-41X00	29.1 (1.146)	6.95 (0.2736)
		Shift valve A spring		31762-41X01	25.0 (0.984)	7.0 (0.276)
		Overrun clutch control valve spring		31762-41X03	23.6 (0.929)	7.0 (0.276)
		Overrun clutch reducing valve spring		31742-41x20	32.5 (1.280)	7.0 (0.276)
		Shuttle shift valve S spring		31762-41X04	51.0 (2.008)	5.65 (0.2224)
		Pilot valve spring		31742-41X13	25.7 (1.012)	9.1 (0.358)
		Lock-up control valve spring		31742-41X22	18.5 (0.728)	13.0 (0.512)
	Lower body	Modifier accumulator valve spring		31742-41X15	30.5 (1.201)	9.8 (0.386)
		1st reducing valve spring		31756-41X05	25.4 (1.000)	6.75 (0.2657)
		3-2 timing valve spring		31742-41X08	20.55 (0.8091)	6.75 (0.2657)
		Servo charger valve spring		31742-41X06	23.0 (0.906)	6.7 (0.264)
Reverse clutch		16 pcs	31505-41X02	19.69 (0.7752)	11.6 (0.457)	
High clutch		16 pcs	31505-21X03	22.06 (0.8685)	11.6 (0.457)	
Forward clutch (Overrun clutch)		20 pcs	31505-41X01	35.77 (1.4083)	9.7 (0.315)	
Low & reverse brake		18 pcs	31521-21X00	23.7 (0.933)	11.6 (0.457)	
Band servo	Spring A			31605-41X05	45.6 (1.795)	34.3 (1.350)
	Spring B			31605-41X00	53.8 (2.118)	40.3 (1.587)
	Spring C			31605-41X01	29.0 (1.142)	27.6 (1.087)
Accumulator	Accumulator A			31605-41X02	43.0 (1.693)	
	Accumulator B			31605-41X10	66.0 (2.598)	
	Accumulator C			31605-41X09	45.0 (1.772)	
	Accumulator D			31605-41X06	58.4(2.299)	

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

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

CLUTCHES AND BRAKES

Reverse clutch		
Number of drive plates	2	
Number of driven plates	2	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	1.2 (0.047)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.6 (0.181)	31537-21X00
	4.8 (0.189)	31537-21X01
	5.0 (0.197)	31537-21X02
	5.2 (0.205)	31537-21X03
	5.4 (0.213)	31537-21X04
	5.6 (0.220)	31567-41X13
	5.8 (0.228)	31567-41X14
High clutch		
Number of drive plates	4	
Number of driven plates	7	
Thickness of drive plate mm (in)		
Standard	1.6 (0.063)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	1.8 - 2.2 (0.071 - 0.087)	
Allowable limit	3.0 (0.118)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.0 (0.118)	31537-41X69
	3.2 (0.126)	31537-41X70
	3.4 (0.134)	31537-41X71
	3.6 (0.142)	31537-41X61
	3.8 (0.150)	31537-41X62
	4.0 (0.157)	31537-41X63
	4.2 (0.165)	31537-41X64
	4.4 (0.173)	31537-41X65

Forward clutch		
Number of drive plates	6	
Number of driven plates	6	
Thickness of drive plate mm (in)		
Standard	1.6 (0.063)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit	2.05 (0.0807)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X07
	4.2 (0.165)	31537-41X08
	4.4 (0.173)	31537-41X09
	4.6 (0.181)	31537-41X10
	4.8 (0.189)	31537-41X11
	5.0 (0.197)	31537-41X12
	5.2 (0.205)	31537-41X13
Overrun clutch		
Number of drive plates	3	
Number of driven plates	5	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	2.0 (0.079)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X79
	4.2 (0.165)	31537-41X80
	4.4 (0.173)	31537-41X81
	4.6 (0.181)	31537-41X82
	4.8 (0.189)	31537-41X83
	5.0 (0.197)	31537-41X84
	5.2 (0.205)	31537-41X20

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

Specifications and Adjustment (Cont'd)

Low & reverse brake		
Number of drive plates		7
Number of driven plates		7
Thickness of drive plate mm (in)		
Standard		2.0 (0.079)
Wear limit		1.8 (0.071)
Clearance mm (in)		
Standard		0.7 - 1.1 (0.028 - 0.043)
Allowable limit		2.5 (0.098)
Thickness of retaining plate	Thickness mm (in)	Part number
	7.2 (0.283)	31667-41X13
	7.4 (0.291)	31667-41X14
	7.6 (0.299)	31667-41X07
	7.8 (0.307)	31667-41X08
	8.0 (0.315)	31667-41X00
	8.2 (0.323)	31667-41X01
Brake band		
Anchor end bolt tightening torque N·m (kg-m, ft-lb)		4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Number of returning revolu- tions for anchor end bolt		2.5

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play "T ₂ "	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number
	0.7 (0.028)	31528-21X00
	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
	1.9 (0.075)	31528-21X06

REMOVAL AND INSTALLATION

Manual control linkage	
Number of returning revolutions for lock nut	1
Lock nut tightening torque	11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)
Distance between end of converter housing and torque converter	26.0 mm (1.024 in) or more
Drive plate runout limit	0.5 mm (0.020 in)

OIL PUMP AND LOW ONE-WAY CLUTCH

Oil pump clearance mm (in)	
Cam ring — oil pump housing	
Standard	0.01 - 0.024 (0.0004 - 0.0009)
Rotor, vanes and control piston — oil pump housing	
Standard	0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

TOTAL END PLAY

Total end play "T ₁ "	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	0.8 (0.031)	31429-21X00
	1.0 (0.039)	31429-21X01
	1.2 (0.047)	31429-21X02
	1.4 (0.055)	31429-21X03
	1.6 (0.063)	31429-21X04
	1.8 (0.071)	31429-21X05
	2.0 (0.079)	31429-21X06

PROPELLER SHAFT & DIFFERENTIAL CARRIER

SECTION **PD**

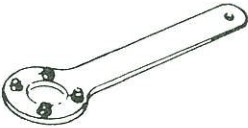
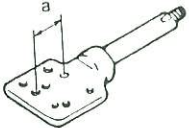
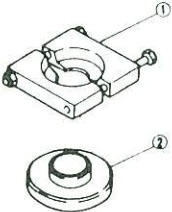
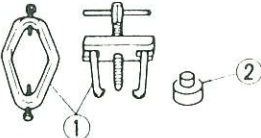
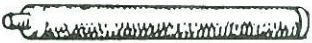

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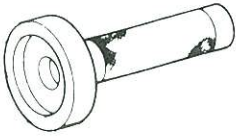
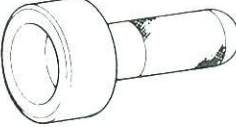
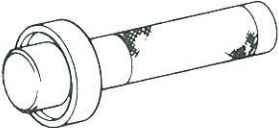

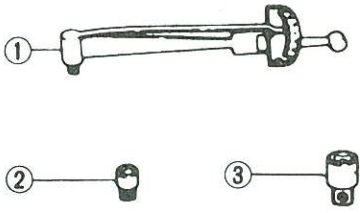

PD

PREPARATION


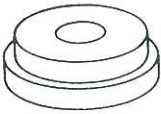
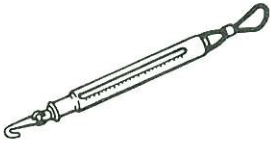


SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
ST31520000 (—) Drive pinion flange wrench	 <p>Removing and installing propeller shaft lock nut, and drive pinion lock nut</p>
KV38100800 (—) Equivalent tool (J25604-01) Differential attachment	 <p>Mounting final drive (To use, make a new hole.)</p> <p>a: 152 mm (5.98 in)</p>
ST3090S000 (—) Drive pinion rear inner race puller set ① ST30031000 (J22912-01) Puller ② ST30901000 (—) Equivalent tool (J26010-01) Base	 <p>Removing and installing drive pinion rear cone</p>
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Equivalent tool (J22888) Body ② ST33061000 (J8107-2) Equivalent tool (J26010-01) Adapter	 <p>Removing and installing differential side bearing inner cone</p>
ST30611000 (J25742-1) Drift	 <p>Installing pinion rear bearing outer race</p>
ST30613000 (J25742-3) Drift	 <p>Installing pinion front bearing outer race</p>

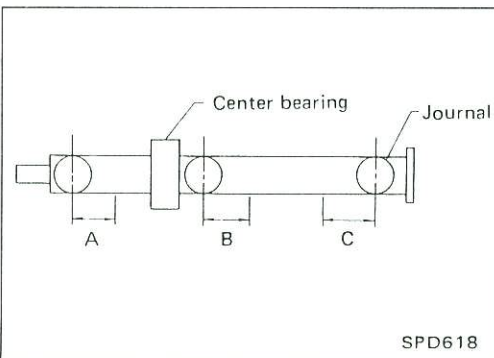
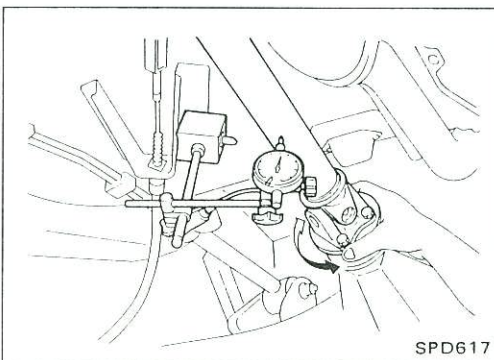
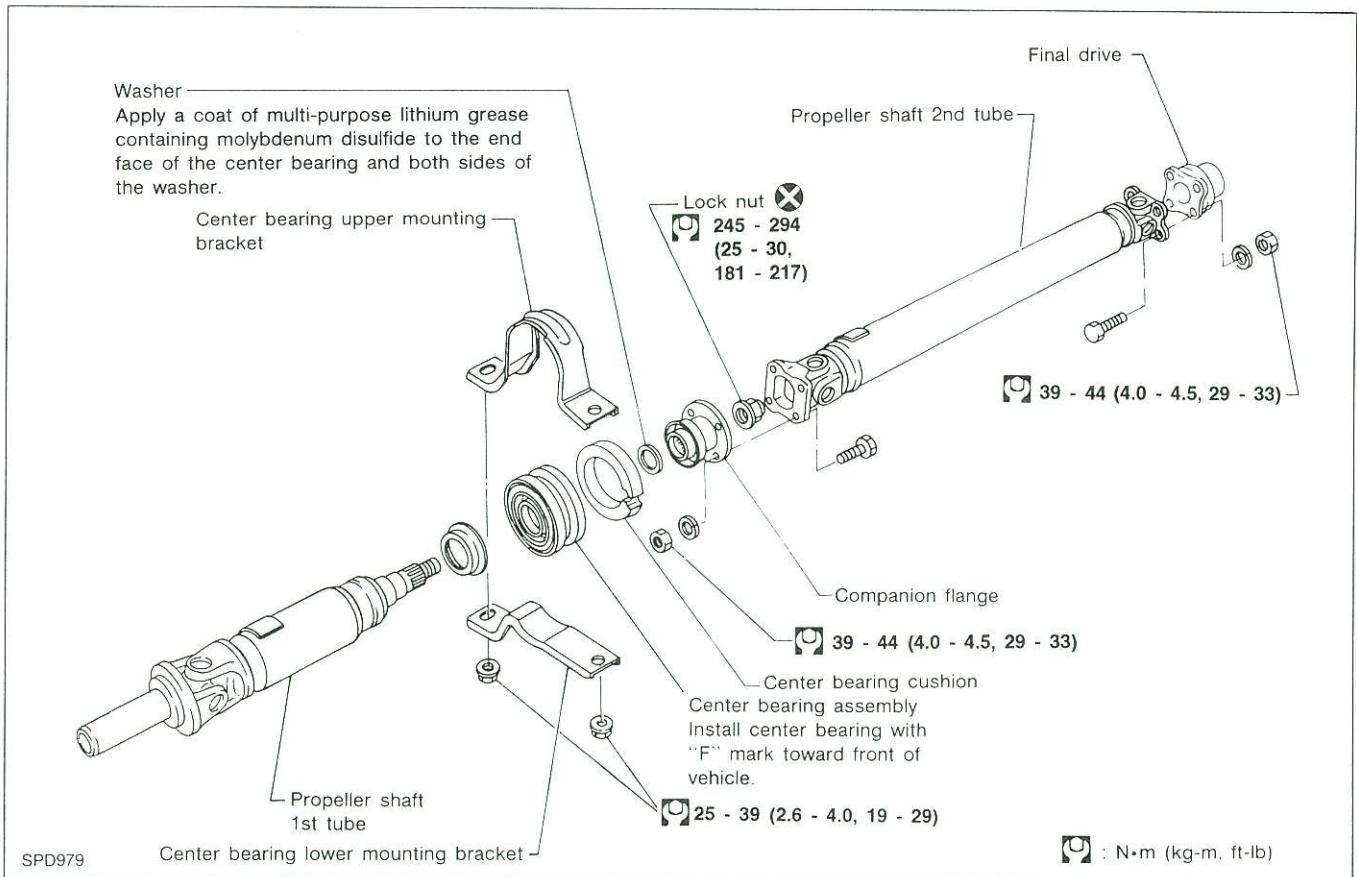
PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
ST30621000 (—) Drift	Installing pinion rear bearing outer race 
KV38100200 (J26233) Gear carrier side oil seal drift	Installing side oil seal 
KV38100500 (—) Gear carrier front oil seal drift	Installing front oil seal 
KV38100300 (J25523) Differential side bearing inner cone	Installing side bearing inner cone 
KV38100600 (J25267) Side bearing spacer drift	Installing side bearing spacer 
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	Measuring pinion bearing preload and total preload 
HT72400000 (—) Slide hammer	Removing differential case assembly 

PREPARATION

Tool number (Kent-Moore No.) Tool name	Description
(J34309) Differential shim selector	 <p>Adjusting bearing preload and gear height</p>
(J25269-4) Side bearing discs (2 Req'd)	 <p>Selecting pinion height adjusting washer</p>
(J8129) Spring gauge	 <p>Measuring carrier turning torque</p>
ST33290001 (J2581-A) Side bearing outer race puller	 <p>Removing and installing differential side bearing outer race</p>
KV38100401 (—) Pilot bearing drift	 <p>Removing pilot bearing, pilot bearing spacer and front bearing inner cone</p>

PROPELLER SHAFT



On-vehicle Service

PROPELLER SHAFT VIBRATION

If vibration is present at high speed, inspect propeller shaft runout first.

1. Raise rear wheels.
2. Measure propeller shaft runout at indicated points by rotating final drive companion flange with hands.

Runout limit: 0.6 mm (0.024 in)

Propeller shaft runout measuring points:

- Distance "A"
162 mm (6.38 in)
- Distance "B"
172 mm (6.77 in)
- Distance "C"
192 mm (7.56 in)

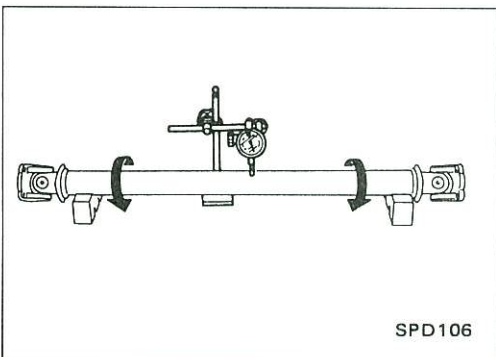
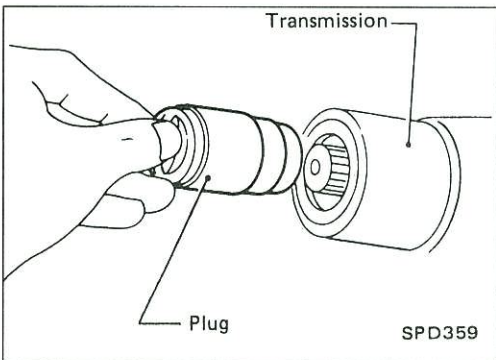
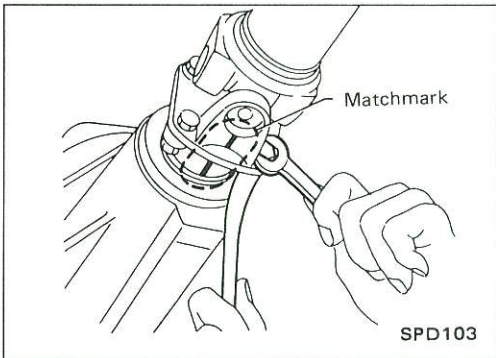
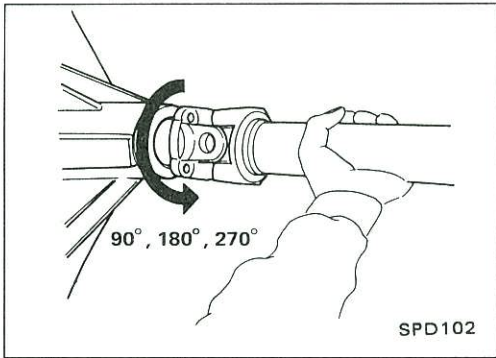
PROPELLER SHAFT

On-vehicle Service (Cont'd)

3. If runout exceeds specifications, disconnect propeller shaft at final drive companion flange; then rotate companion flange 90, 180 or 270 degrees and reconnect propeller shaft.
4. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
5. Perform road test.

APPEARANCE CHECKING

- Inspect propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.
- If center bearing is noisy or damaged, replace center bearing.



Removal and Installation

- Put matchmarks on flanges and separate propeller shaft from final drive.

- Draw out propeller shaft from transmission and plug up rear end of transmission rear extension housing.

Inspection

- Inspect propeller shaft runout. If runout exceeds specifications, replace propeller shaft assembly.

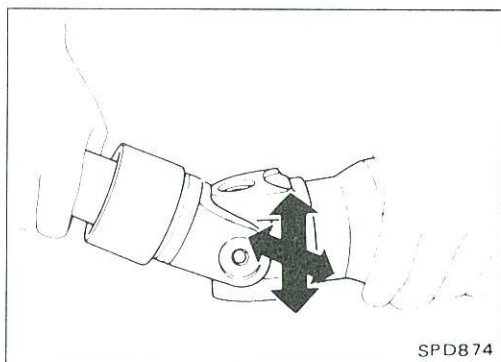
Runout limit: 0.6 mm (0.024 in)

PROPELLER SHAFT

Inspection (Cont'd)

- Inspect journal axial play.
If the play exceeds specifications, replace propeller shaft assembly.

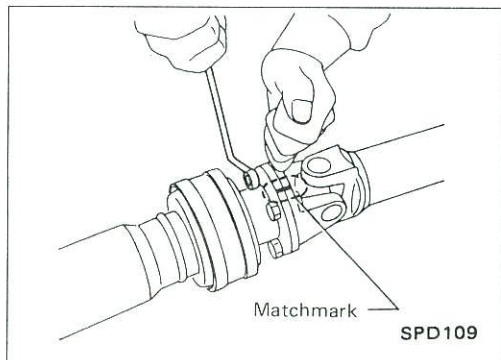
Journal axial play: 0 mm (0 in)



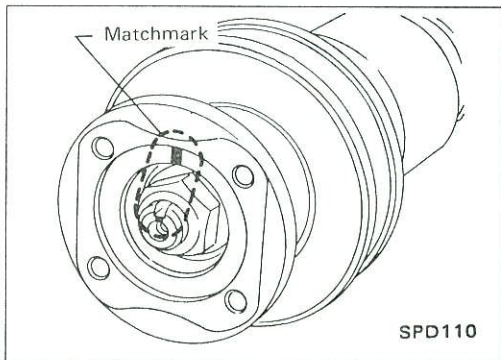
Disassembly

CENTER BEARING

1. Put matchmarks on flanges, and separate 2nd tube from 1st tube.

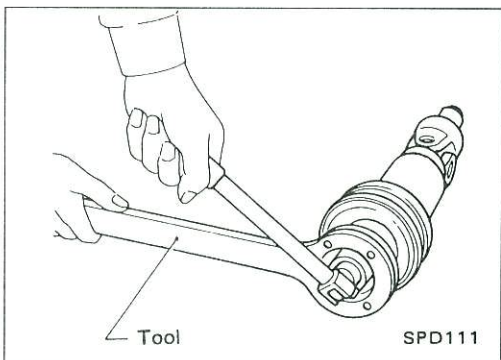


2. Put matchmarks on the flange and shaft.

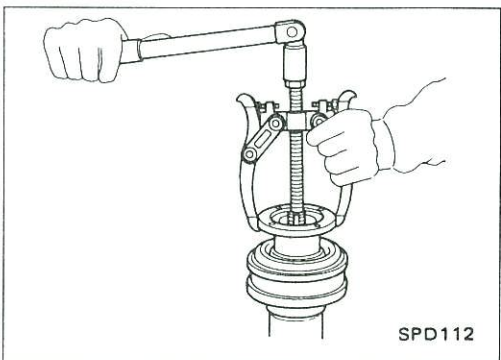


3. Remove lock nut with Tool.

Tool number: ST31520000 (—)



4. Remove companion flange with puller.

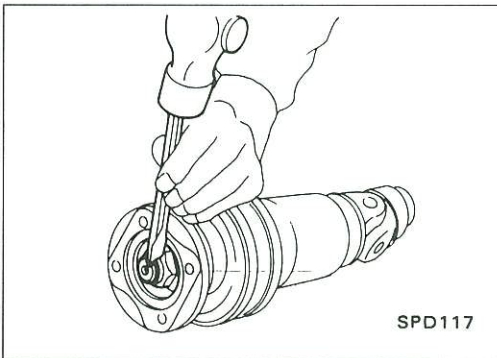
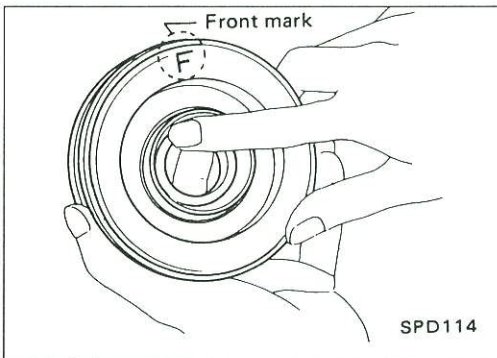
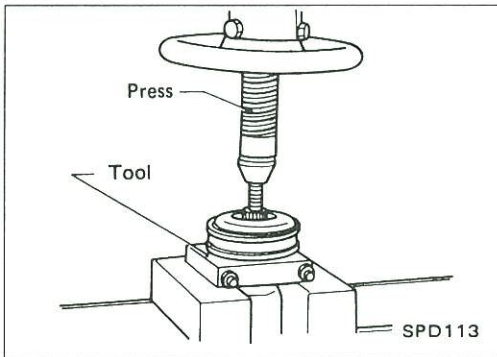


PROPELLER SHAFT

Disassembly (Cont'd)

5. Remove center bearing with Tool and press.

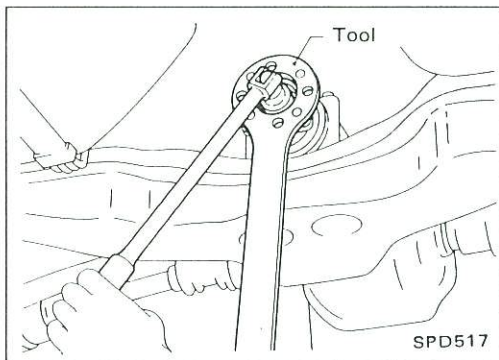
Tool number: ST30031000 (J22912-01)



Assembly

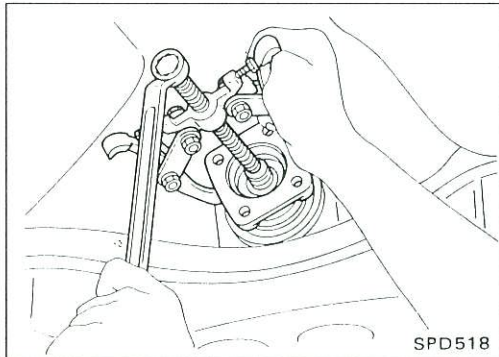
CENTER BEARING

- When installing center bearing, position the "F" mark on center bearing toward front of vehicle.
 - **Apply a coat of multi-purpose lithium grease containing molybdenum disulfide to the end face of the center bearing and both sides of the washer.**
-
- Stake the nut. Always use new one.
 - Align matchmarks when assembling tubes.

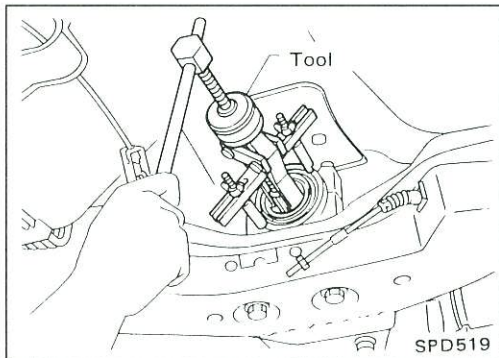


Front Oil Seal Replacement

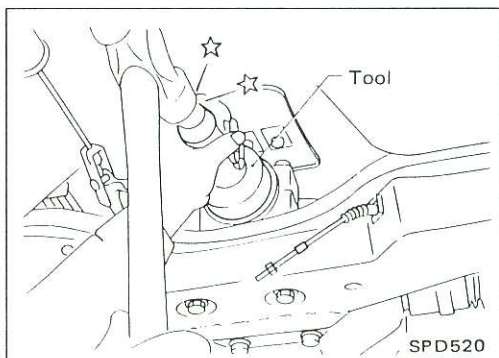
1. Remove propeller shaft.
2. Loosen drive pinion nut with Tool.
Tool number: ST31520000 (—)



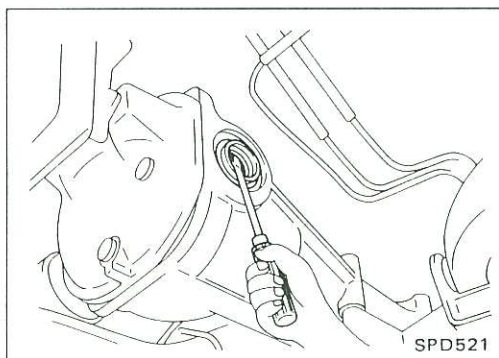
3. Remove companion flange.



4. Remove front oil seal with Tool.
Tool number: ST33290001 (J25810-A)



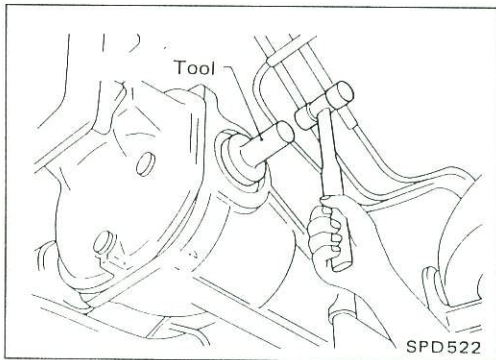
5. Apply multi-purpose grease to cavity at sealing lips of oil seal.
Press front oil seal into carrier.
Tool number: KV38100500 (—)
6. Install companion flange and drive pinion nut.
7. Install propeller shaft.



Side Oil Seal Replacement

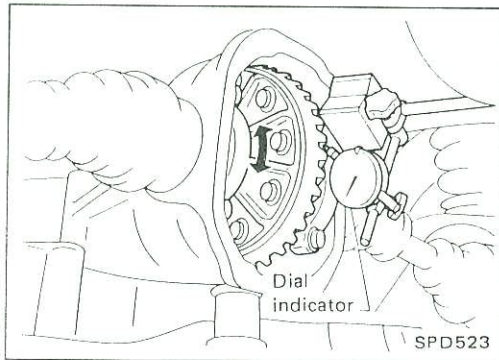
1. Remove drive shafts.
Refer to RA section.
2. Remove oil seal.

Side Oil Seal Replacement (Cont'd)



3. Apply multi-purpose grease to cavity at sealing lips of oil seal.
Press-fit oil seal into carrier.
Tool number: KV38100200 (J26233)
4. Install drive shafts.

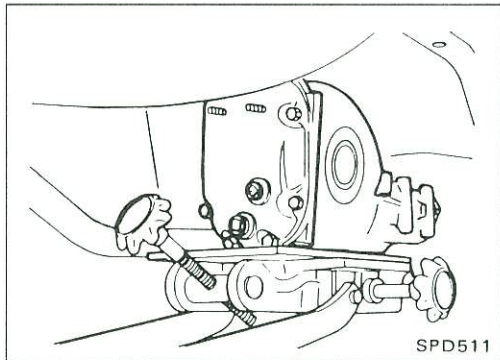
Ring Gear to Drive Pinion Backlash



1. Support carrier with a jack.
2. Remove rear cover.
3. Check ring gear to drive pinion backlash with a dial indicator, at several points. If it is not within specifications, adjust it after removing final drive assembly.

Ring gear to drive pinion backlash:
0.10 - 0.15 mm (0.0039 - 0.0059 in)

REMOVAL AND INSTALLATION



Removal

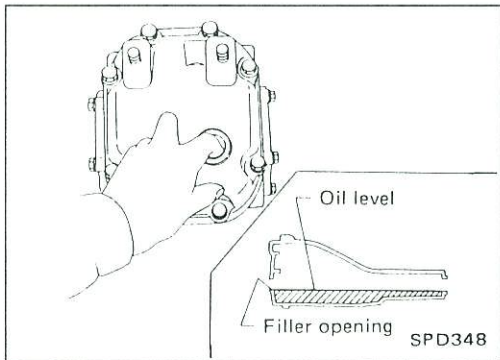
- Remove propeller shaft.

Plug up rear end of transmission rear extension housing.

- Remove drive shafts.
Refer to RA section.
- Pull off final drive backward together with jack.

CAUTION:

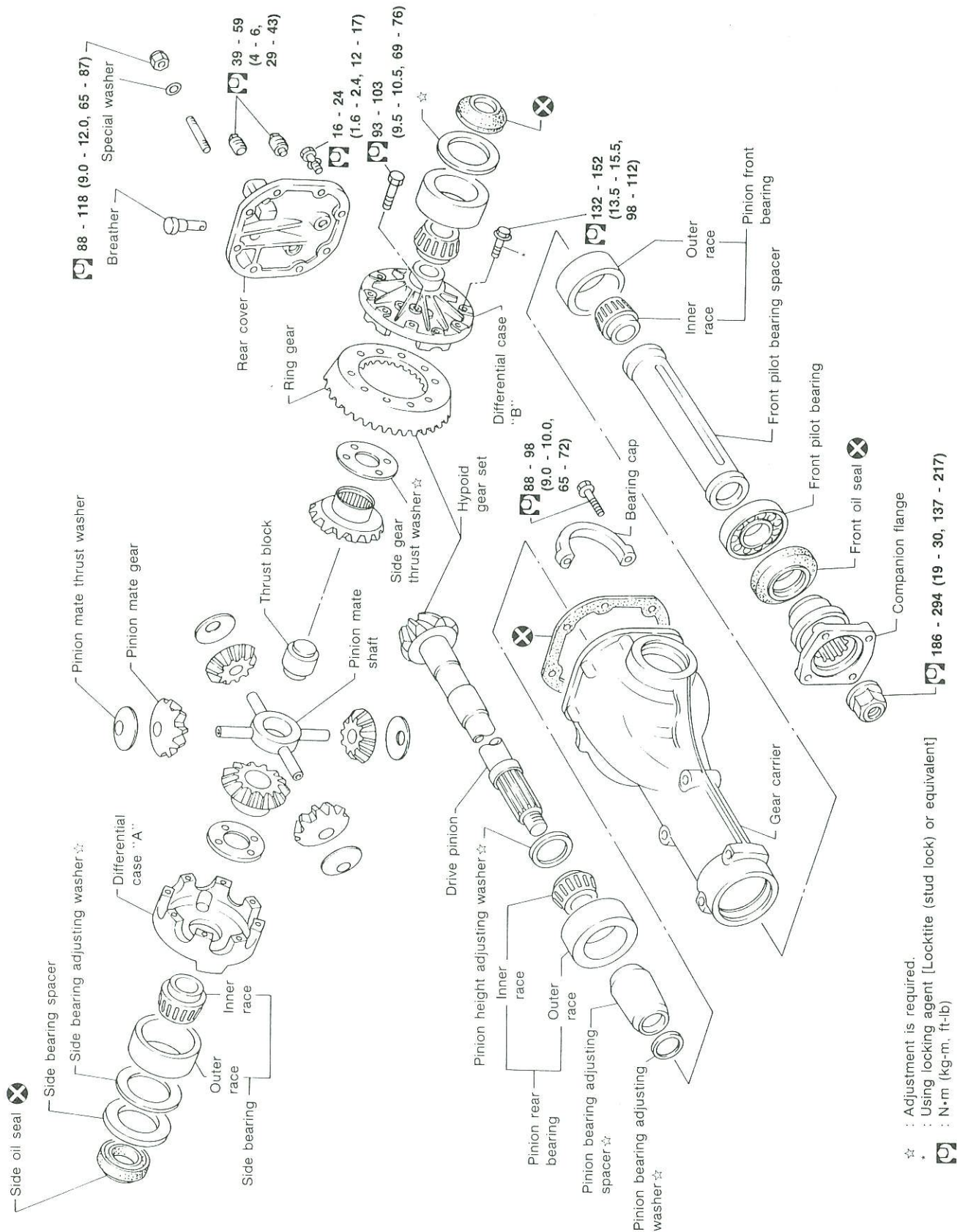
- Be careful not to damage spline, sleeve yoke and front oil seal, when removing propeller shaft.
- After final drive is removed, support suspension member on a stand to prevent its insulators being twisted or damaged.



Installation

- Fill final drive with recommended gear oil.

R200



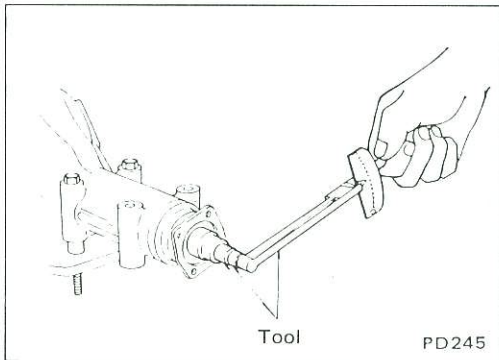
☆ : Adjustment is required.

* : Using locking agent [Locktite (stud lock) or equivalent]

⊗ : N·m (kg-m, ft-lb)

SPD978

DISASSEMBLY



Pre-inspection

Before disassembling final drive, perform the following inspection.

- Total preload
 - 1) Turn drive pinion in both directions several times to set bearing rollers.
 - 2) Check total preload with Tool.

Tool number: ST3127S000 (See J25765-A.)

Total preload:

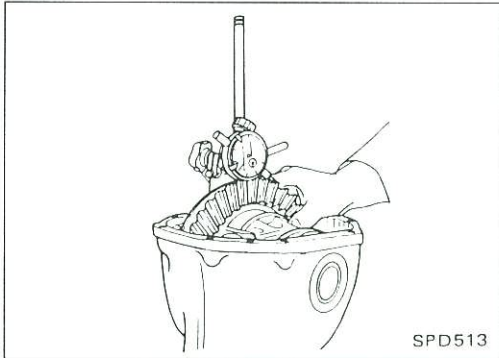
1.4 - 1.7 N·m

(14 - 17 kg-cm, 12 - 15 in-lb)

- Ring gear to drive pinion backlash
Check ring gear to drive pinion backlash with a dial indicator at several points.

Ring gear to drive pinion backlash:

0.10 - 0.15 mm (0.0039 - 0.0059 in)

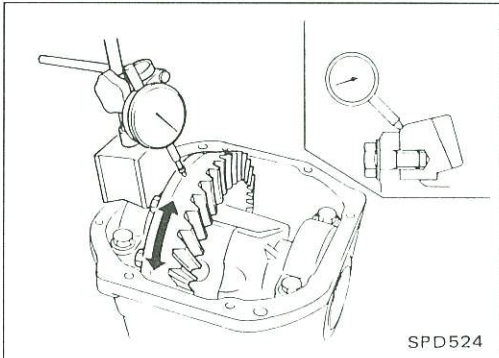


- Ring gear runout
Check runout of ring gear with a dial indicator.

Runout limit:

0.05 mm (0.0020 in)

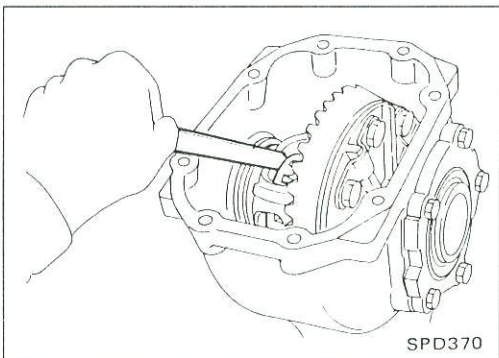
- Tooth contact
Check tooth contact. (Refer to Adjustment.)



- Side gear to pinion mate gear backlash
Measure clearance between side gear thrust washer and differential case with a feeler gauge.

Clearance between side gear thrust washer and differential case:

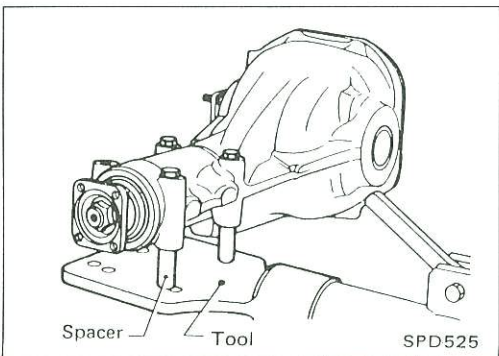
0.1 - 0.2 mm (0.004 - 0.008 in)



Differential Carrier

1. Using three 45 mm (1.77 in) spacers, mount carrier on Tool.

Tool number: KV38100800 (J25604-01)

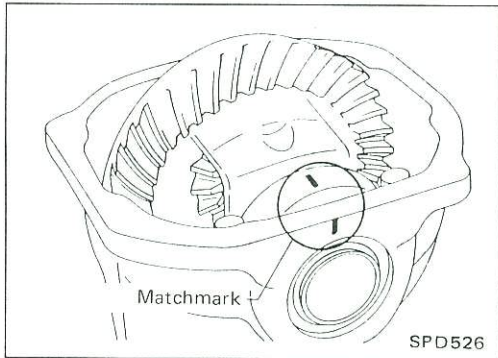


DISASSEMBLY

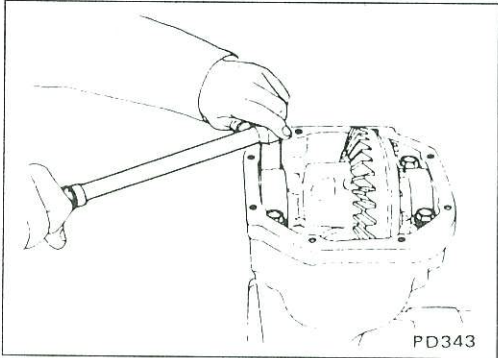
Differential Carrier (Cont'd)

2. Paint or punch matchmarks on one side of side bearing cap so it can be properly reinstalled.

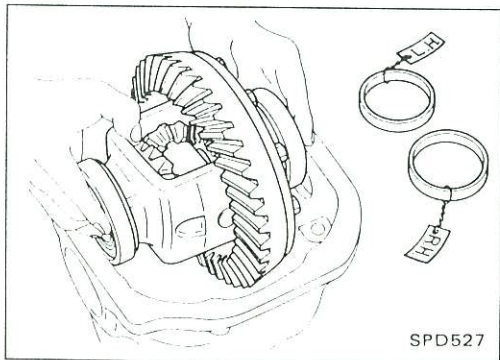
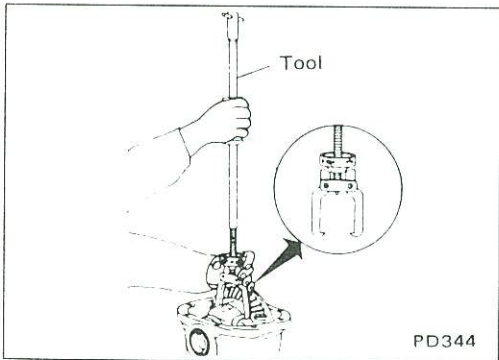
Bearing caps are line-bored during manufacture. Replace them in their proper positions.



3. Remove side bearing caps.



4. Lift differential case assembly out with Tool.
Tool number: HT72400000 (—)



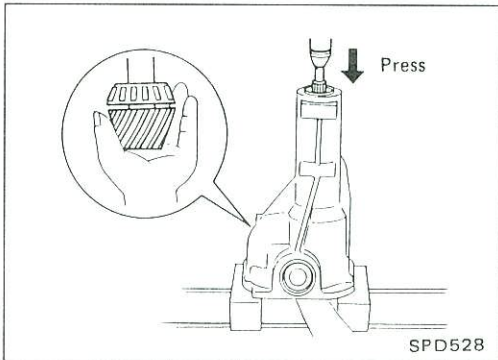
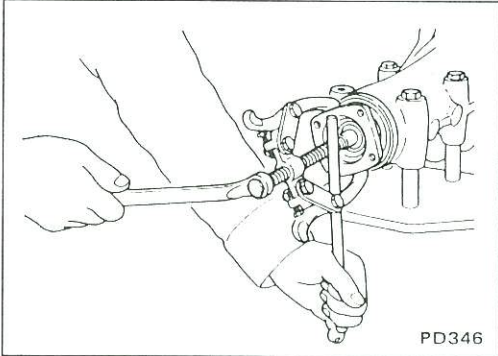
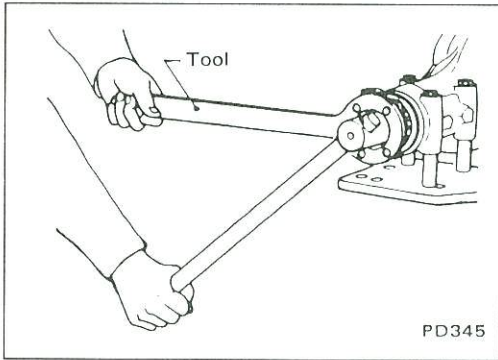
Keep the side bearing outer races together with inner cone — don't mix them up.

DISASSEMBLY

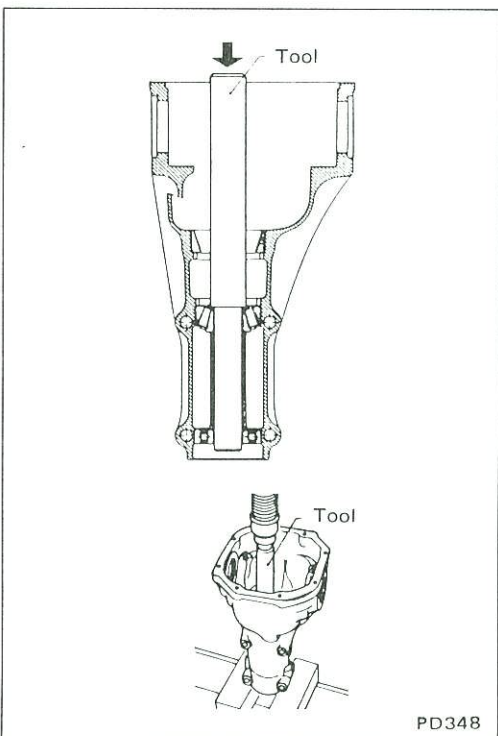
Differential Carrier (Cont'd)

5. Loosen drive pinion nut and pull off companion flange.

Tool number: ST31520000 (—)



6. Take out drive pinion together with rear bearing inner race, bearing spacer and adjusting washer.
7. Remove oil seal.

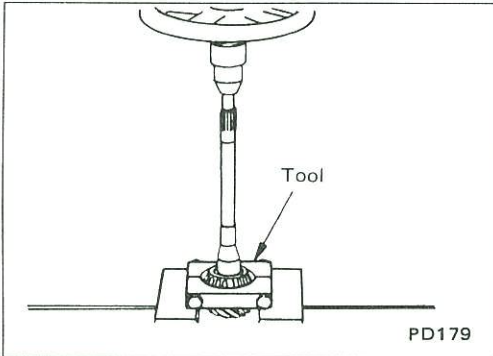
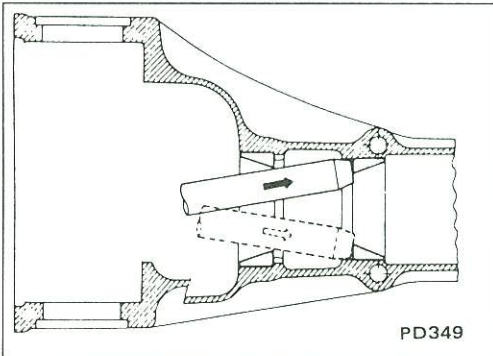


8. Remove pilot bearing together with pilot bearing spacer and front bearing inner cone with Tool.
Tool number: KV38100401 (—)

DISASSEMBLY

Differential Carrier (Cont'd)

9. Remove side oil seal.
10. Remove pinion bearing outer races with a brass drift.



11. Remove pinion rear bearing inner race and pinion height adjusting washer.

Tool number: ST30031000 (J22912-01)

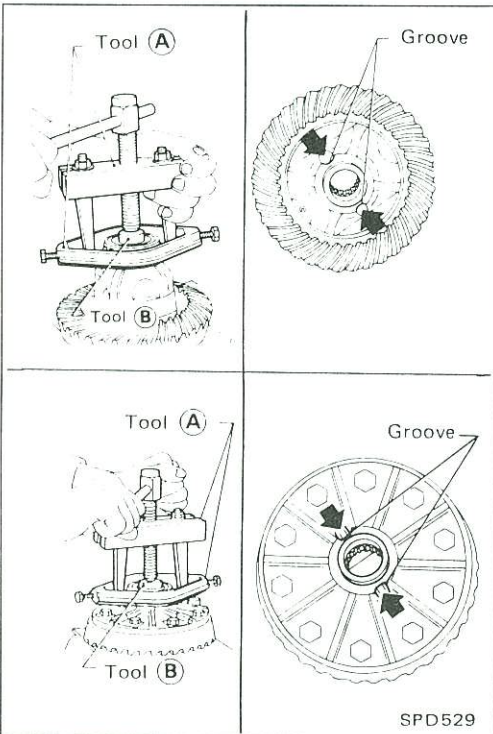
Differential Case

1. Remove side bearing inner races.

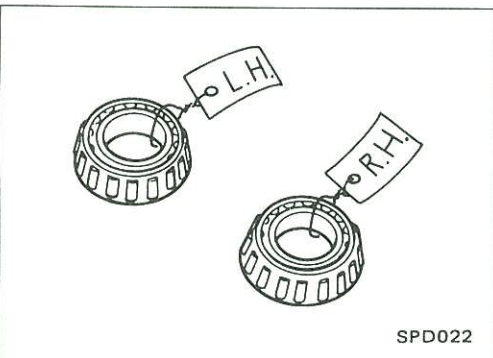
To prevent damage to bearing, engage puller paws with grooves.

Tool number:

- Ⓐ ST33051001 (—)
Equivalent tool (J22888)
- Ⓑ ST33061000 (J8107-2)

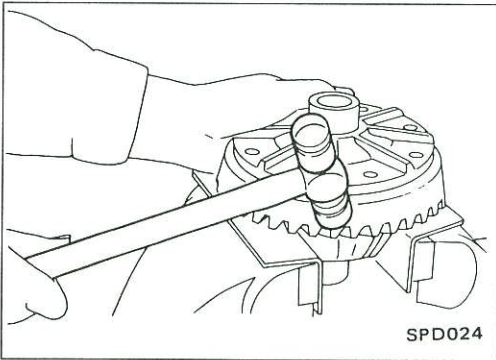


Do not mix the right and left hand parts.

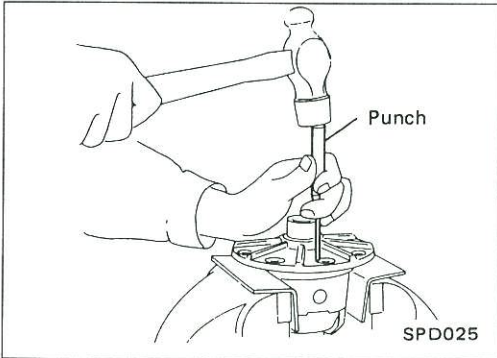


DISASSEMBLY

Differential Case (Cont'd)



2. Loosen ring gear bolts in a criss-cross fashion.
3. Tap ring gear off the gear case with a soft hammer.
Tap evenly all around to keep ring gear from binding.

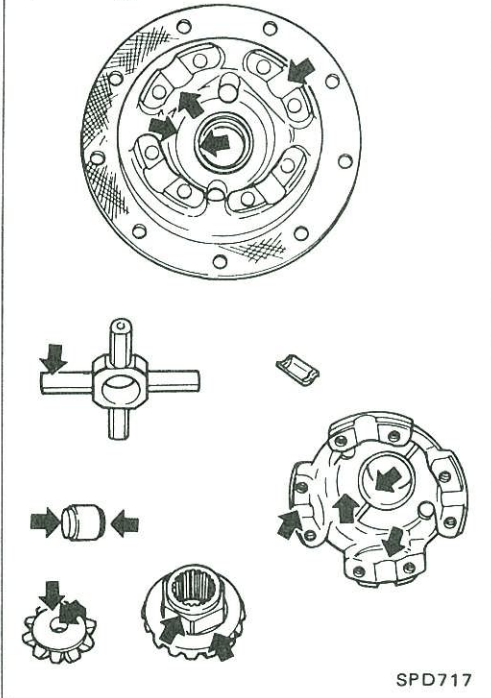


4. Punch off pinion mate shaft lock pin from ring gear side.
Lock pin is calked at pin hole mouth on differential case.

Ring Gear and Drive Pinion

Check gear teeth for scoring, cracking or chipping. If any damaged part is evident, replace ring gear and drive pinion as a set (hypoid gear set).

4-pinion type

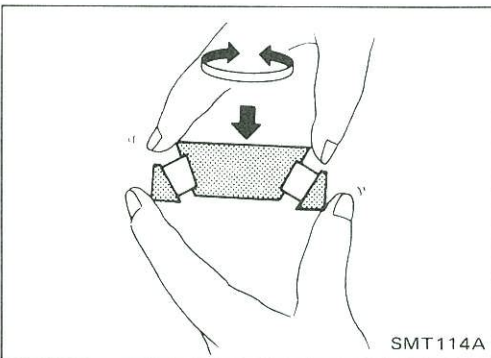


Differential Case Assembly

Check mating surfaces of differential case, side gears, pinion mate gears, pinion mate shaft, thrust block and thrust washers.

Bearing

1. Thoroughly clean bearing and dry with compressed air.
2. Check bearings for wear, scratches, pitching or flaking. Check tapered roller bearing for smooth rotation. If damaged, replace outer race and inner cone as a set.



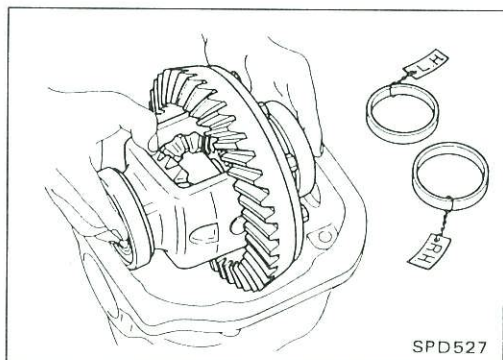
ADJUSTMENT

For quiet and reliable final drive operation, the following five adjustments must be made correctly.

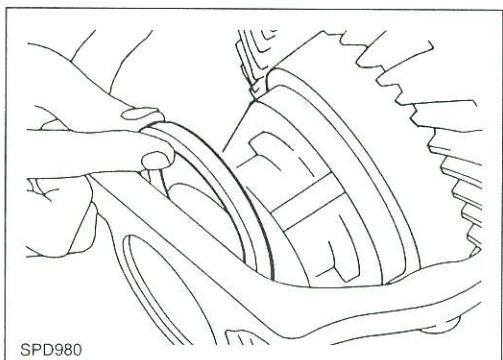
1. Side bearing preload
2. Pinion gear height
3. Pinion bearing preload
4. Ring gear to pinion backlash (Refer to ASSEMBLY.)
5. Ring and pinion gear tooth contact pattern

Side Bearing Preload

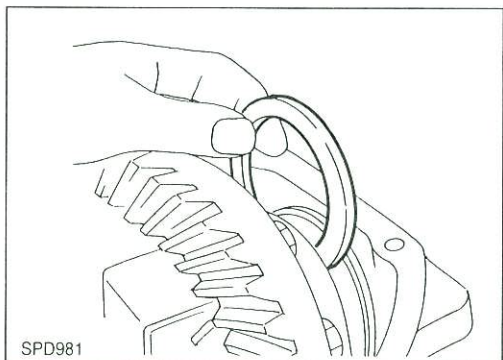
A selection of carrier side bearing preload shims is required for successful completion of this procedure.



1. Make sure all parts are clean and that the bearings are well lubricated with light oil or Dexron™ type automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.



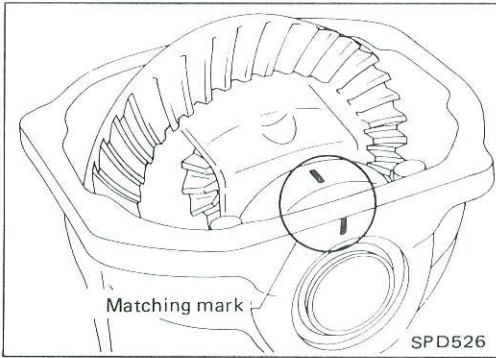
3. Put the side bearing spacer in place on the carrier end, opposite the ring gear.



4. Using the J-25267 side bearing spacer drift, place both of the original carrier side bearing preload shims on the gear end of the carrier.

ADJUSTMENT

Side Bearing Preload (Cont'd)



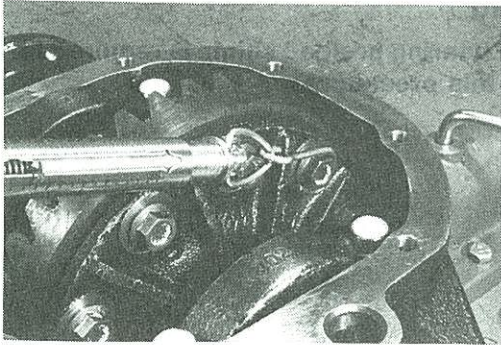
5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.

Specification:

88 - 98 N·m

(9 - 10 kg-m, 65 - 72 ft-lb)

6. Turn the carrier several times to seat the bearings.



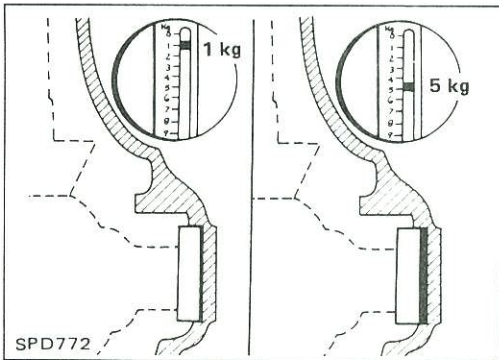
7. Measure the turning torque of the carrier at the ring gear retaining bolts with a spring gauge, J-8129.

Specification:

34.3 - 39.2 N

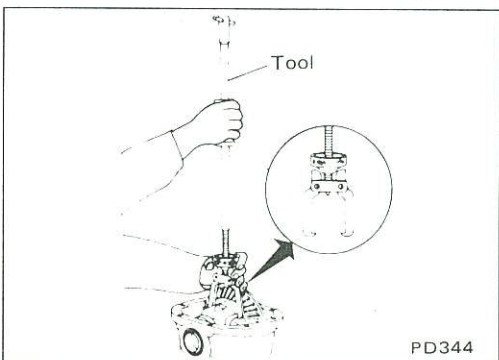
(3.5 - 4 kg, 7.7 - 8.8 lb)

of pulling force at the ring gear bolt.



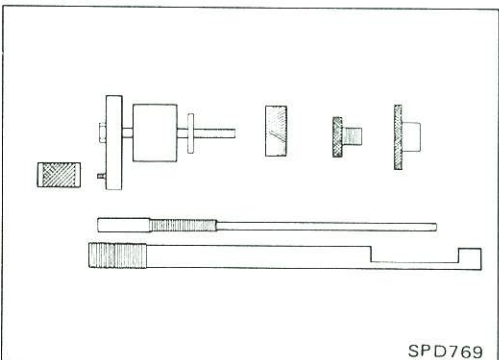
8. If the carrier turning torque is not within the specification range, increase or decrease the total thickness of the side bearing adjusting washers until the turning torque is correct. If the turning torque is less than the specified range, install washers of greater thickness; if the turning torque is greater than the specification, install thinner washers. See the S.D.S. section for washer dimensions and part numbers.

9. Record the total amount of washer thickness required for the correct carrier side bearing preload.



10. Remove the carrier from the final drive housing, saving the selected preload washers for later use during the assembly of the final drive unit.

Tool number: HT72400000 (—)

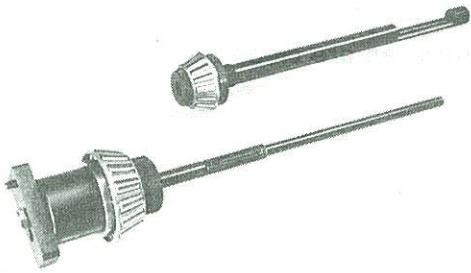


Pinion Gear Height and Pinion Bearing Preload

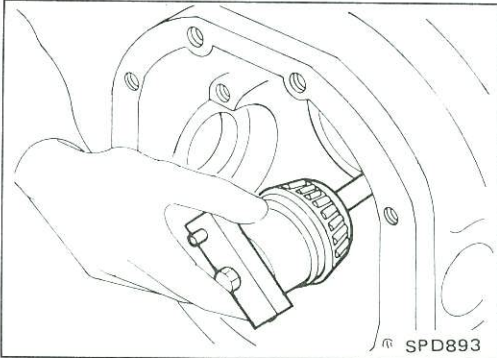
1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the pinion preload shim selector Tool, J-34309.

ADJUSTMENT

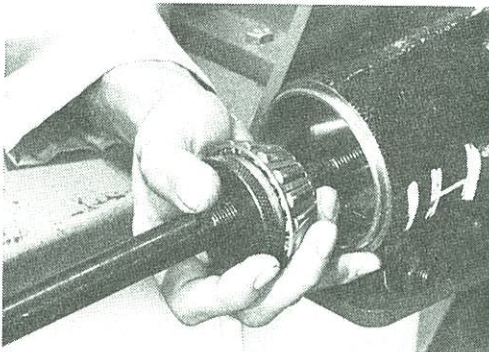
Pinion Gear Height and Pinion Bearing Preload (Cont'd)



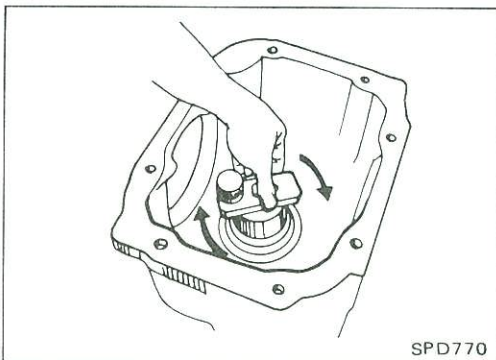
- **Front pinion bearing** — make sure the J-34309-3 front pinion bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the front pinion bearing pilot, J-34309-5, to secure the bearing in its proper position.
- **Rear pinion bearing** — the rear pinion bearing pilot, J-34309-8, is used to center the rear pinion bearing only. The rear pinion bearing locking seat, J-34309-4, is used to lock the bearing to the assembly.



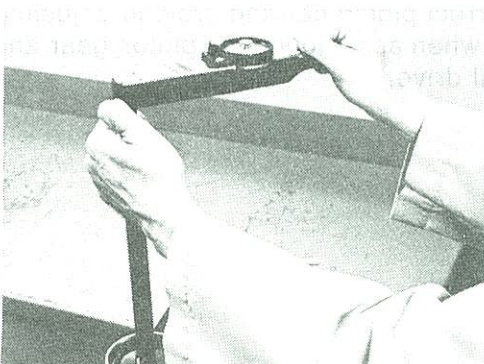
3. Place the pinion preload shim selector Tool, J-34309-1, gauge screw assembly with the pinion rear bearing inner cone installed into the final drive housing.



4. Assemble the front pinion bearing inner cone and the J-34309-2 gauge anvil together with the J-34309-1 gauge screw in the final drive housing. Make sure that the pinion height gauge plate, J-34309-16, will turn a full 360 degrees, and tighten the two sections together by hand.



5. Turn the assembly several times to seat the bearings.



6. Measure the turning torque at the end of the J-34309-2 gauge anvil using torque wrench J-25765A.

Turning torque specification:

1.0 - 1.3 N·m

(10 - 13 kg-cm, 8.7 - 11.3 in-lb)

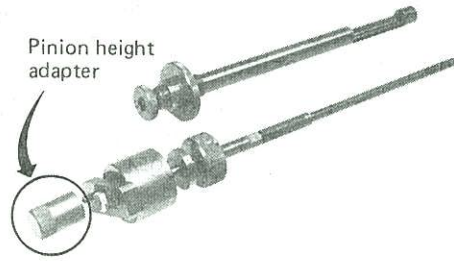
ADJUSTMENT

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

7. Place the J-34309-11 "R200A" pinion height adapter onto the gauge plate and tighten it by hand.

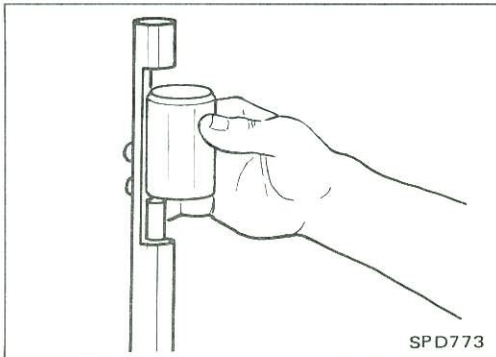
CAUTION:

Make sure all machined surfaces are clean.



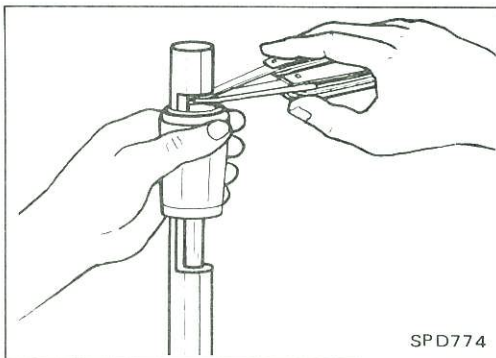
— PINION BEARING PRELOAD WASHER SELECTION —

8. Place the solid pinion bearing spacer, small end first, over the J-34309-2 gauge anvil and seat the small end squarely against the tip of the J-34309-1 gauge screw in the tool recessed portion.



9. Select the correct thickness of pinion bearing preload adjusting washer using a standard gauge of 3.5 mm (0.138 in) and your J-34309-101 feeler gauge. The exact measure you get with your gauges is the thickness of the adjusting washer required. Select the correct washer.

**Drive pinion bearing preload adjusting washer:
Refer to S.D.S.**

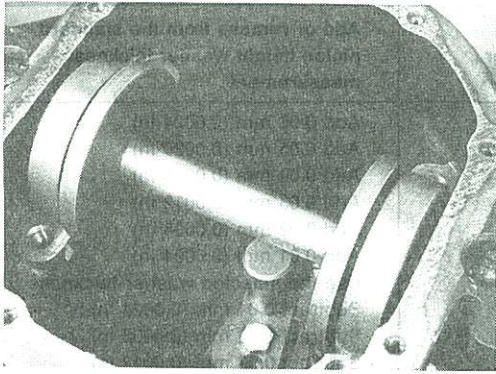


10. Set your selected, correct pinion bearing preload adjusting washer aside for use when assembling the pinion gear and bearings into the final drive.

ADJUSTMENT

Pinion Gear Height and Pinion Bearing Preload (Cont'd)

— PINION HEIGHT ADJUSTING WASHER SELECTION —



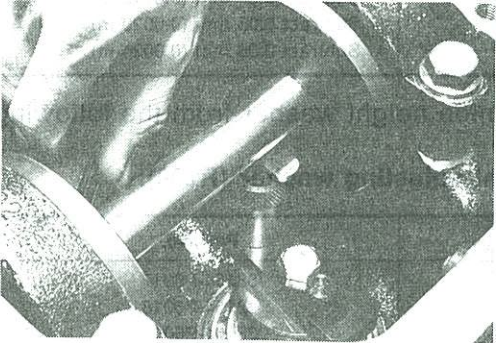
11. Now, position the side bearing discs, J-25269-4, and arbor firmly into the side bearing bores.

Install the side bearing caps and tighten the cap bolts.

Specification:

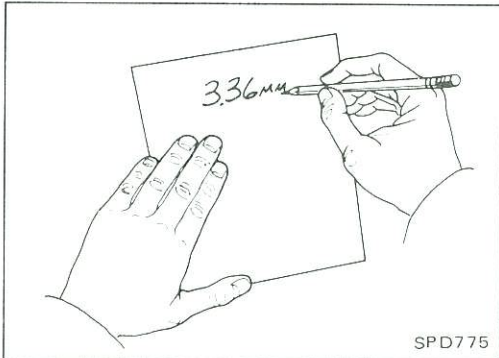
88 - 98 N·m

(9 - 10 kg-m, 65 - 72 ft-lb)

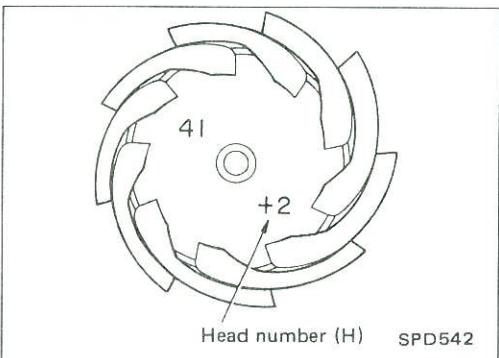


12. Select the correct standard pinion height adjusting washer thickness using a standard gauge of 3 mm (0.12 in) and your J-34309-101 feeler gauge. Measure the distance between the J-34309-10 pinion height adapter and the arbor.

13. Write down your exact total measurement.



SPD775



Head number (H) SPD542

14. Correct the pinion height washer size by referring to the "pinion head number."

There are two numbers painted on the pinion gear. The first one refers to the pinion and ring gear as a matched set and should be the same as the number on the ring gear. The second number is the "pinion head height number," and it refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer.

ADJUSTMENT

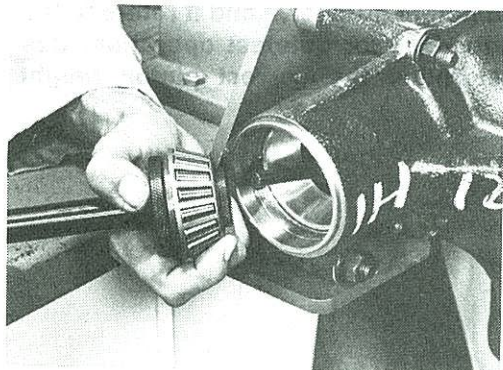
Pinion Gear Height and Pinion Bearing Preload (Cont'd)

Pinion head height number	Add or remove from the standard pinion height washer thickness measurement
- 6	Add 0.06 mm (0.0024 in)
- 5	Add 0.05 mm (0.0020 in)
- 4	Add 0.04 mm (0.0016 in)
- 3	Add 0.03 mm (0.0012 in)
- 2	Add 0.02 mm (0.0008 in)
- 1	Add 0.01 mm (0.0004 in)
0	Use the selected washer thickness
+ 1	Subtract 0.01 mm (0.0004 in)
+ 2	Subtract 0.02 mm (0.0008 in)
+ 3	Subtract 0.03 mm (0.0012 in)
+ 4	Subtract 0.04 mm (0.0016 in)
+ 5	Subtract 0.05 mm (0.0020 in)
+ 6	Subtract 0.06 mm (0.0024 in)

15. Select the correct pinion height washer from the following chart.

Drive pinion height adjusting washer (R200):

Thickness mm (in)	Part No.
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020
3.21 (0.1264)	38154-P6021
3.24 (0.1276)	38154-P6022
3.27 (0.1287)	38154-P6023
3.30 (0.1299)	38154-P6024
3.33 (0.1311)	38154-P6025
3.36 (0.1323)	38154-P6026
3.39 (0.1335)	38154-P6027
3.42 (0.1346)	38154-P6028
3.45 (0.1358)	38154-P6029
3.48 (0.1370)	38154-P6030
3.51 (0.1382)	38154-P6031
3.54 (0.1394)	38154-P6032
3.57 (0.1406)	38154-P6033
3.60 (0.1417)	38154-P6034
3.63 (0.1429)	38154-P6035
3.66 (0.1441)	38154-P6036



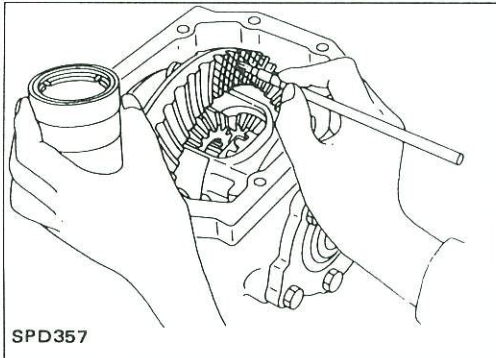
16. Remove the J-34309 pinion preload shim selector Tool from the final drive housing and disassemble to retrieve the pinion bearings.

ADJUSTMENT

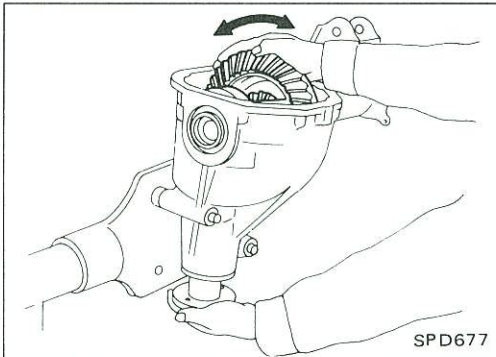
Tooth Contact

Gear tooth contact pattern check is necessary to verify correct relationship between ring gear and drive pinion.

Hypoid gear sets which are not positioned properly may be noisy, or have short life, or both. Low noise and a long life can be assured with a pattern check.

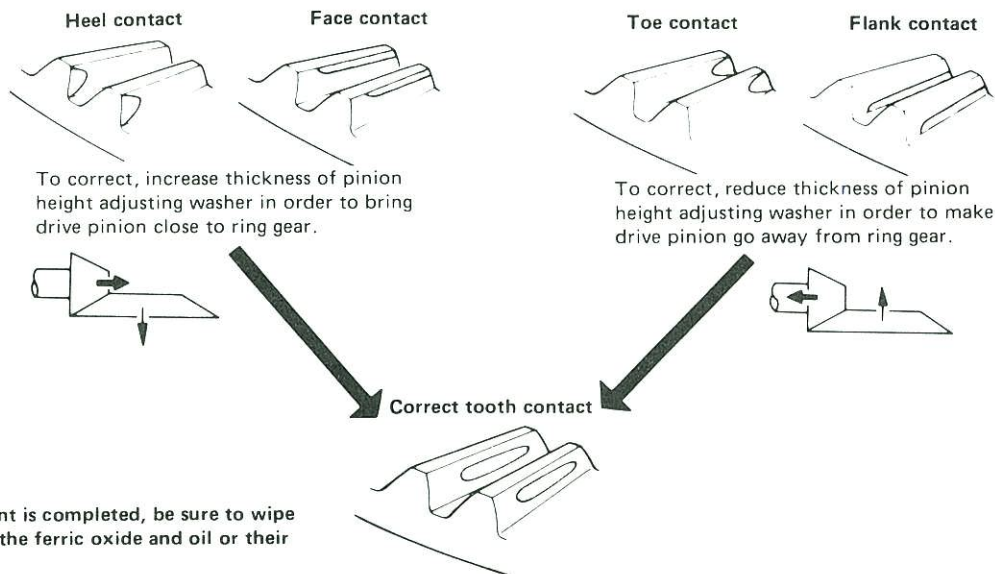


1. Thoroughly clean ring gear and drive pinion teeth.
2. Sparingly apply a mixture of powdered ferric oxide and oil or equivalent to 3 or 4 teeth of ring gear drive side.

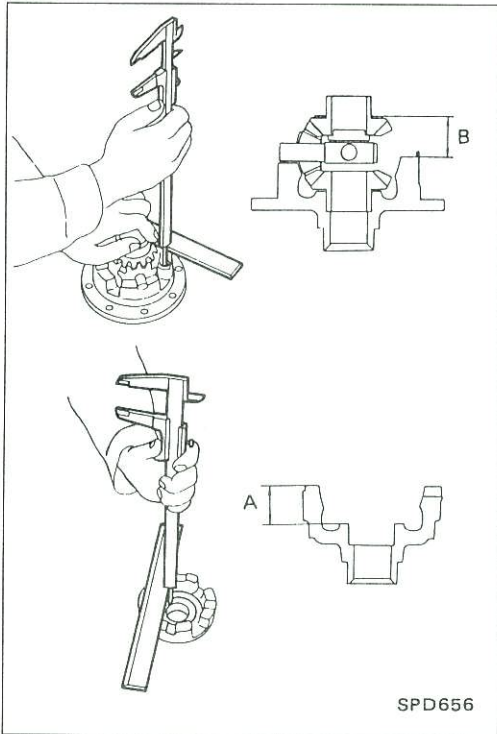


3. Hold companion flange steady and turn the ring gear in both directions.

Usually the pattern will be correct if you have calculated the shims correctly and the backlash is correct. However, in rare cases you may have to use trial-and-error processes until you get a good tooth contact pattern. The tooth pattern is the best indication of how well a differential has been set up.



SPD007



Differential Case

1. Measure clearance between side gear thrust washer and differential case.

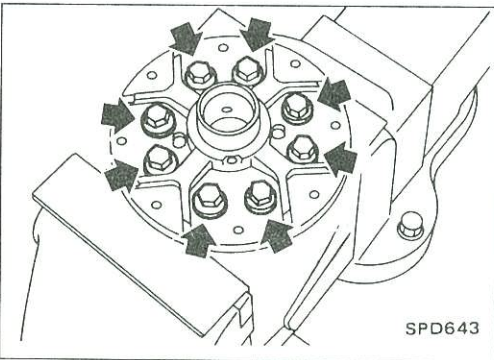
Clearance between side gear thrust washer and differential case (A — B):

0.10 - 0.20 mm (0.0039 - 0.0079 in)

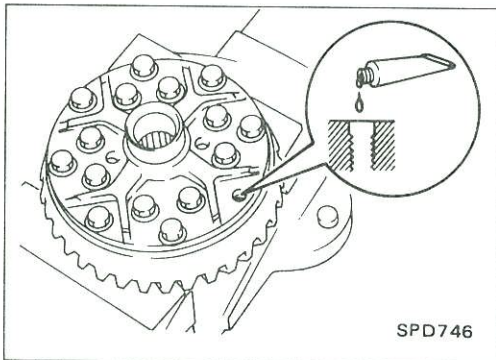
The clearance can be adjusted with side gear thrust washer.

(Refer to S.D.S.)

2. Apply gear oil to gear tooth surfaces and thrust surfaces and check to see they turn properly.



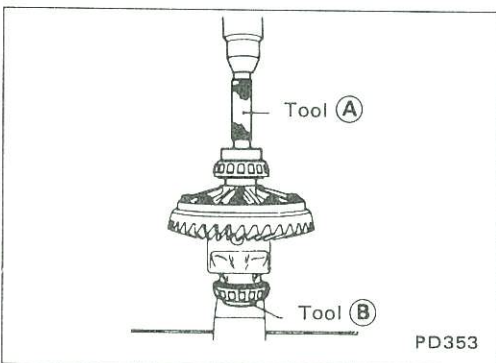
3. Install differential case L.H. and R.H.



4. Place differential case on ring gear.

5. Apply locking agent [Locktite (stud lock) or equivalent] to ring gear bolts, and install them.

Tighten bolts in a criss-cross fashion, lightly tapping bolt head with a hammer.



6. Press-fit side bearing inner cones on differential case with Tool.

Tool number:

(A) KV38100300 (J25523)

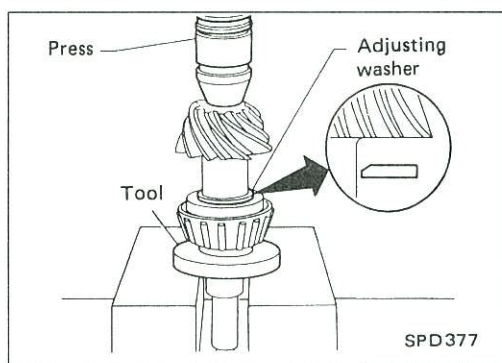
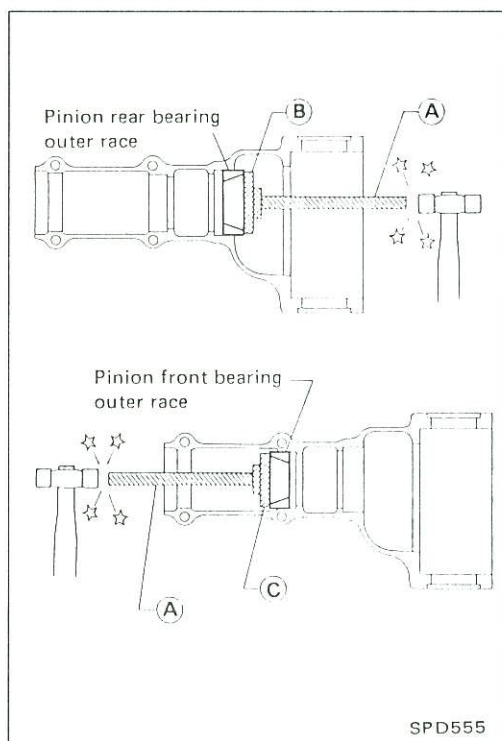
(B) ST33061000 (J8107-2)

Differential Carrier

1. Press-fit front and rear bearing outer races with Tools.

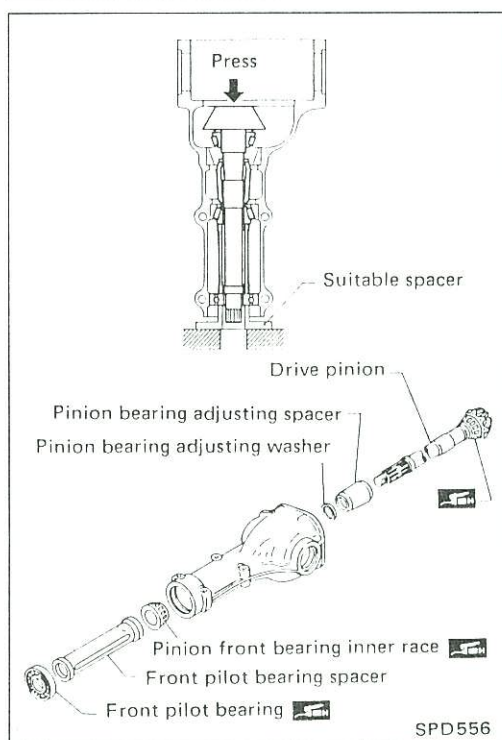
Tool number:

- (A) ST30611000 (J25742-1)
- (B) ST30621000 (—)
- (C) ST30613000 (J25742-3)



2. Select pinion height adjusting washer and pinion bearing adjusting washer spacer, referring to Adjustment.
3. Install pinion height adjusting washer in drive pinion, and press fit rear bearing inner race in it, with press and Tool.

Tool number: ST30901000 (—)

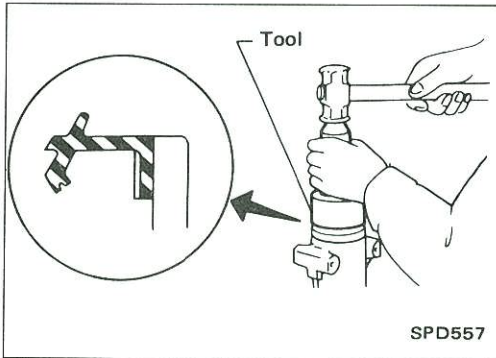


4. Set drive pinion assembly (as shown in figure to the left) in differential carrier and install drive pinion, with press and a suitable tool.

Stop when drive pinion touches bearing.

ASSEMBLY

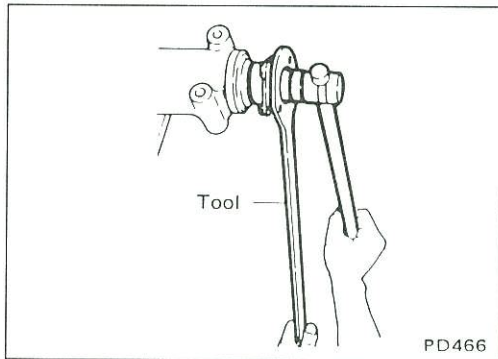
Differential Carrier (Cont'd)



5. Apply multi-purpose grease to cavity at sealing lips of oil seal.

Install front oil seal with Tool.

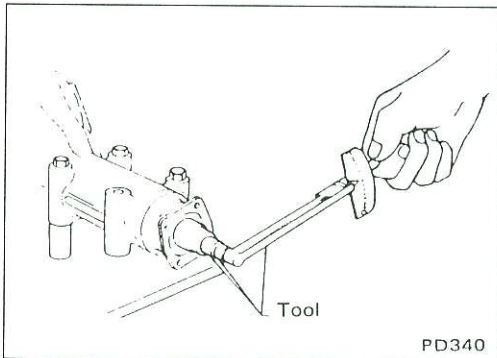
Tool number: KV38100500 (—)



6. Install companion flange, and tighten pinion nut to specified torque.

Ascertain that threaded portion of drive pinion and pinion nut are free from oil or grease.

Tool number: ST31520000 (—)



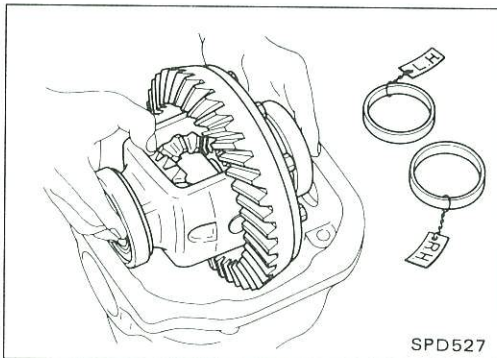
7. Turn drive pinion in both directions several times, and measure pinion bearing preload.

Pinion bearing preload:

1.1 - 1.4 N·m

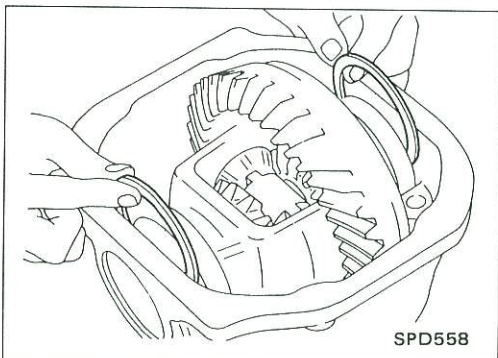
(11 - 14 kg-cm, 9.5 - 12.2 in-lb)

When pinion bearing preload is outside the specifications, replace pinion bearing adjusting washer and spacer with a different thickness.



8. Select side bearing adjusting washer. Refer to Adjustment.

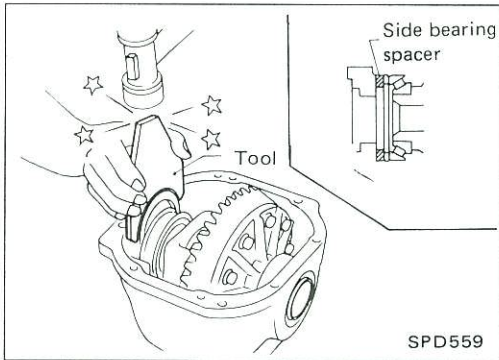
9. Install differential case assembly with side bearing outer races into gear carrier.



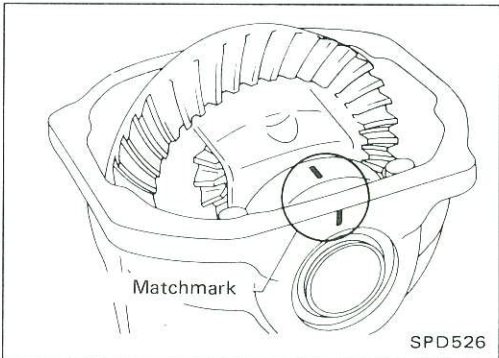
10. Insert left and right side bearing adjusting washers in place between side bearings and carrier.

ASSEMBLY

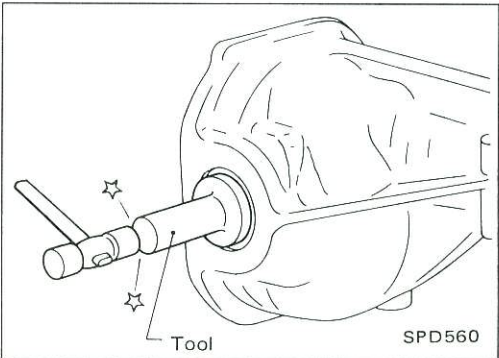
Differential Carrier (Cont'd)



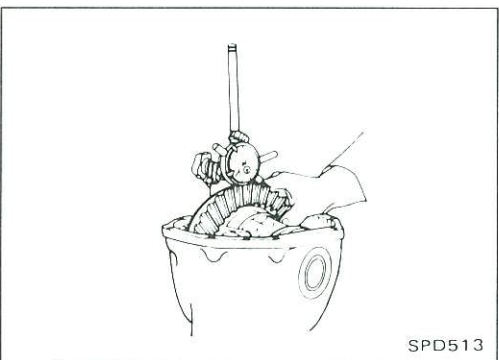
11. Drive in side bearing spacer with Tool.
Tool number: KV38100600 (J25267)



12. Align mark on bearing cap with that on gear carrier and install bearing cap on gear carrier.



13. Apply multi-purpose grease to cavity at sealing lips of oil seal.
Install side oil seal with Tool.
Tool number: KV38100200 (J26233)



14. Measure ring gear to drive pinion backlash with a dial indicator.

Ring gear to drive pinion backlash:

0.10 - 0.15 mm

(0.0039 - 0.0059 in)

- If backlash is too small, decrease thickness of left shim and increase thickness of right shim by the same amount.
If backlash is too great, reverse the above procedure.

Never change the total amount of shims as it will change the bearing preload.

ASSEMBLY

Differential Carrier (Cont'd)

15. Check total preload with Tool.

When checking preload, turn drive pinion in both directions several times to seat bearing rollers correctly.

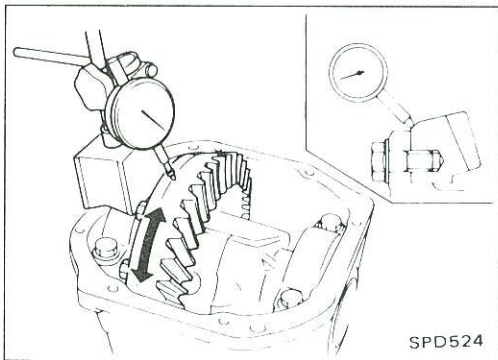
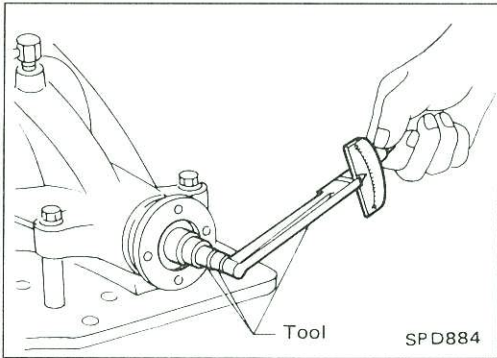
Total preload:

Value more than 0.29 N·m (3.0 kg-cm, 2.6 in-lb) added on measured value of drive pinion preload

- If preload is too great, add the same amount of shim to each side.
- If preload is too small, remove the same amount of shim to each side.

Never add or remove a different number of shims for each side as it will change ring gear to drive pinion backlash.

16. Recheck ring gear to drive pinion backlash because increase or decrease in thickness of shims will cause change of ring gear-to-pinion backlash.



17. Check runout of ring gear with a dial indicator.

Runout limit:

0.05 mm (0.0020 in)

- If backlash varies excessively in different places, the variance may have resulted from foreign matter caught between the ring gear and the differential case.
- If the backlash varies greatly when the runout of the ring gear is within a specified range, the hypoid gear set or differential case should be replaced.

18. Check tooth contact.

Refer to Adjustment.

19. Install rear cover and gasket.

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

Propeller Shaft

GENERAL SPECIFICATIONS

Unit: mm (in)

Propeller shaft model	3S71A-T
Number of joints	3
Coupling method with transmission	Sleeve type
Type of journal bearings	Shell type (Non-disassembly type)
Distance between yokes	71 (2.80)
Shaft length (Spider to spider)	
1st	545 (21.46)
2nd	560 (22.05), 575 (22.64)*
Shaft outer diameter	
1st	75 (2.95)
2nd	
Outer	75 (2.95)
Inner	63.5 (2.500)

*: Without A.B.S.

INSPECTION AND ADJUSTMENT

Unit: mm (in)

Propeller shaft model	3S71A-T
Propeller shaft runout limit	0.6 (0.024)
Measuring point	
A	162 (6.38)
B	172 (6.77)
C	192 (7.56)
Journal play	0 (0)

Final Drive

GENERAL SPECIFICATIONS

Final drive model	R200
Number of pinions	4
Ring gear pitch diameter mm (in)	205 (8.07)
Gear ratio	3.916
Number of gear teeth (Ring gear/drive pinion)	47/12
Oil capacity (Approx.) ℓ (US pt, Imp pt)	1.3 (2-3/4, 2-1/4)

INSPECTION AND ADJUSTMENT (Model R200)

Ring gear runout

Ring gear runout limit mm (in)	0.05 (0.0020)
-----------------------------------	---------------

Side bearing adjustment

Backlash between side gear and mate gear (Clearance between side gear to differential case) mm (in)	0.1 - 0.2 (0.004 - 0.008)
--	------------------------------

Available side gear thrust washers

Thickness mm (in)	Part number
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

Drive pinion height adjustment

Available pinion height adjusting washers

Thickness mm (in)	Part number
3.09 (0.1217)	38154-P6017
3.12 (0.1228)	38154-P6018
3.15 (0.1240)	38154-P6019
3.18 (0.1252)	38154-P6020
3.21 (0.1264)	38154-P6021
3.24 (0.1276)	38154-P6022
3.27 (0.1287)	38154-P6023
3.30 (0.1299)	38154-P6024
3.33 (0.1311)	38154-P6025
3.36 (0.1323)	38154-P6026
3.39 (0.1335)	38154-P6027
3.42 (0.1346)	38154-P6028
3.45 (0.1358)	38154-P6029
3.48 (0.1370)	38154-P6030
3.51 (0.1382)	38154-P6031
3.54 (0.1394)	38154-P6032
3.57 (0.1406)	38154-P6033
3.60 (0.1417)	38154-P6034
3.63 (0.1429)	38154-P6035
3.66 (0.1441)	38154-P6036

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

Final Drive (Cont'd)

Drive pinion preload adjustment

Drive pinion preload	
N·m (kg-cm, in-lb)	1.1 - 1.4
With front oil seal	(11 - 14, 9.5 - 12.2)

Available drive pinion bearing preload adjusting washers

Thickness mm (in)	Part number
3.80 - 3.82 (0.1496 - 0.1504)	38125-61001
3.82 - 3.84 (0.1504 - 0.1512)	38126-61001
3.84 - 3.86 (0.1512 - 0.1520)	38127-61001
3.86 - 3.88 (0.1520 - 0.1528)	38128-61001
3.88 - 3.90 (0.1528 - 0.1535)	38129-61001
3.90 - 3.92 (0.1535 - 0.1543)	38130-61001
3.92 - 3.94 (0.1543 - 0.1551)	38131-61001
3.94 - 3.96 (0.1551 - 0.1559)	38132-61001
3.96 - 3.98 (0.1559 - 0.1567)	38133-61001
3.98 - 4.00 (0.1567 - 0.1575)	38134-61001
4.00 - 4.02 (0.1575 - 0.1583)	38135-61001
4.02 - 4.04 (0.1583 - 0.1591)	38136-61001
4.04 - 4.06 (0.1591 - 0.1598)	38137-61001
4.06 - 4.08 (0.1598 - 0.1606)	38138-61001
4.08 - 4.10 (0.1606 - 0.1614)	38139-61001

Available drive pinion bearing preload adjusting spacers

Length mm (in)	Part number
55.10 (2.1693)	38165-B4002
55.40 (2.1811)	38165-B4003
55.70 (2.1929)	38165-B4004
56.00 (2.2047)	38165-61001

Total preload adjustment

Total preload	Value more than 0.29 N·m (3.0 kg-cm, 2.6 in-lb) added on measured value of drive pinion preload
Backlash of drive pinion and ring gear	0.10 - 0.15 (0.0039 - 0.0059)
mm (in)	

Available side bearing adjusting washers

Thickness mm (in)	Part number
2.00 (0.0787)	38453-N3100
2.05 (0.0807)	38453-N3101
2.10 (0.0827)	38453-N3102
2.15 (0.0846)	38453-N3103
2.20 (0.0866)	38453-N3104
2.25 (0.0886)	38453-N3105
2.30 (0.0906)	38453-N3106
2.35 (0.0925)	38453-N3107
2.40 (0.0945)	38453-N3108
2.45 (0.0965)	38453-N3109
2.50 (0.0984)	38453-N3110
2.55 (0.1004)	38453-N3111
2.60 (0.1024)	38453-N3112
2.65 (0.1043)	38453-N3113

FRONT AXLE & FRONT SUSPENSION

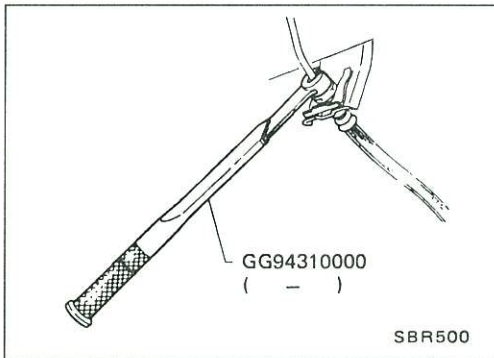
SECTION **FA**

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FA

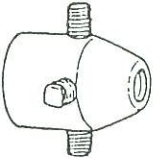
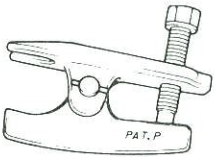

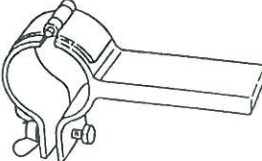
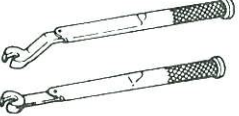
PRECAUTIONS



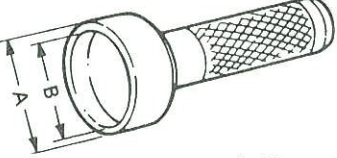
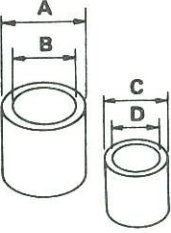
- When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.
*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- When removing each suspension part, check wheel alignment and adjust if necessary.
- Use Tool when removing or installing brake tubes.

PREPARATION

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
KV401021S0 (—) Bearing race drift	 <p>Installing wheel bearing outer race</p>
HT72520000 (J25730-A) Ball joint remover	 <p>Removing tie-rod outer end and lower ball joint</p>
HT71780000 (—) Spring compressor	 <p>Removing and installing coil spring</p>
ST35652000 (—) Strut attachment	 <p>Fixing strut assembly</p>
GG94310000 (—) Flare nut torque wrench	 <p>Removing and installing brake piping</p>

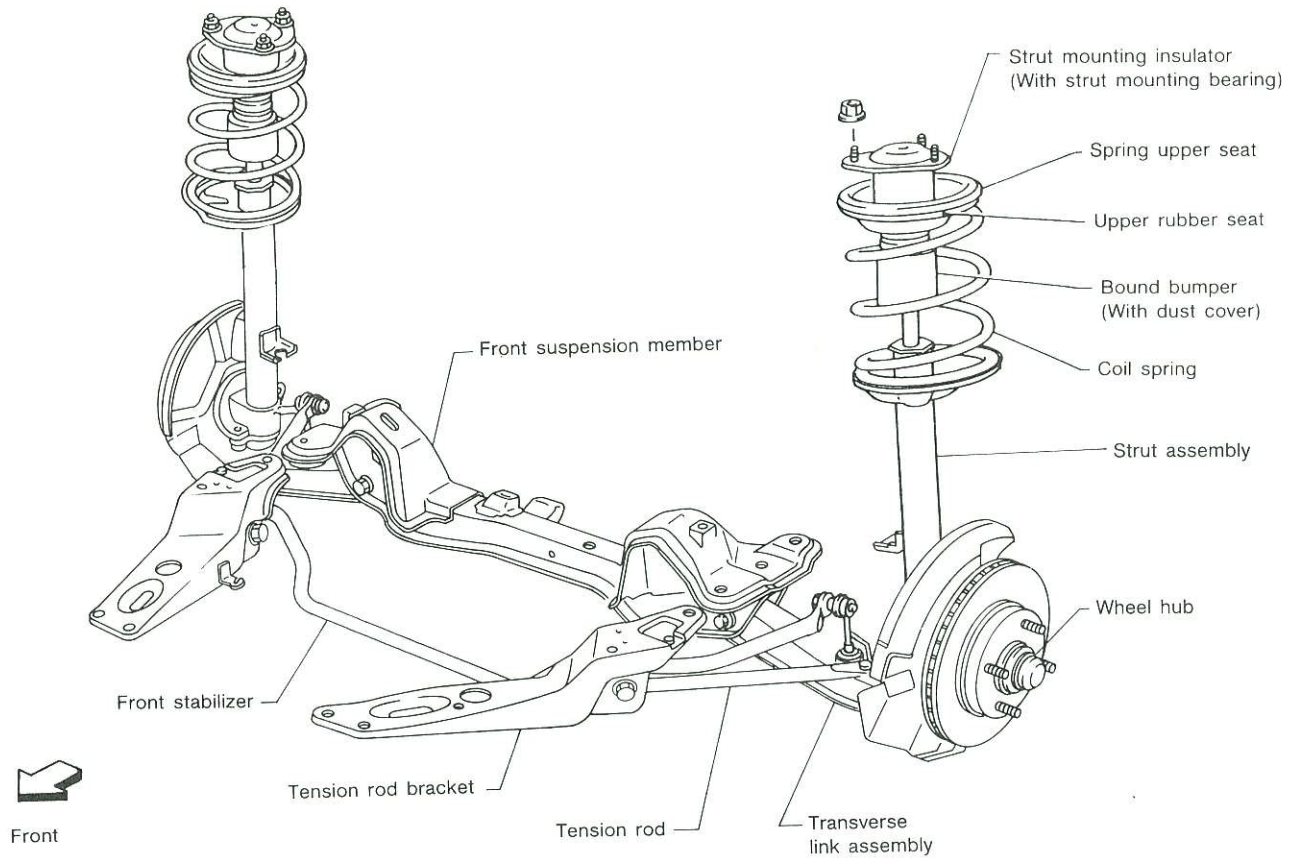
COMMERCIAL SERVICE TOOLS

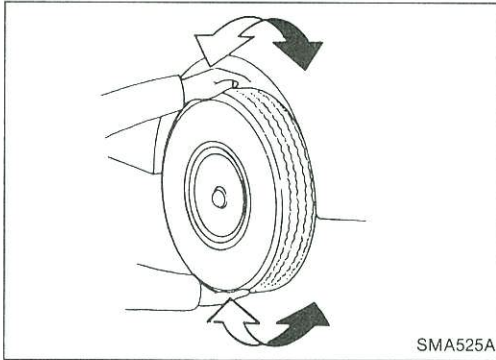
Tool name	Description
Front axle grease seal drift	 <p>A: 70 mm (2.76 in) dia. B: 60 mm (2.36 in) dia.</p> <p>Installing front axle grease seal</p>
Tension rod bushing drift	 <p>A: 75 mm (2.95 in) dia. B: 66 mm (2.60 in) dia. C: 62 mm (2.44 in) dia. D: 25 - 55 mm (0.98 - 2.17 in) dia.</p> <p>Removing and installing tension rod bushing</p>

FRONT AXLE AND FRONT SUSPENSION

When installing each rubber part, 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.

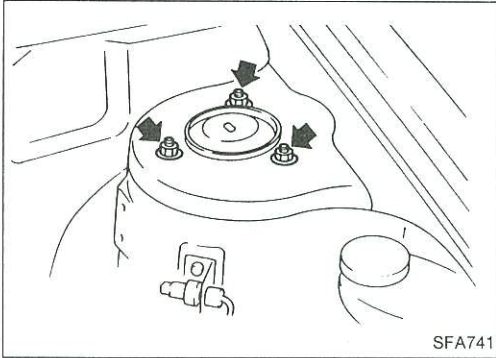




Front Axle and Front Suspension Parts

Check front axle and front suspension parts for looseness, cracks, wear or other damage.

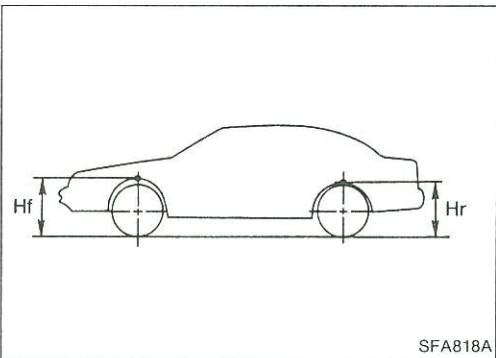
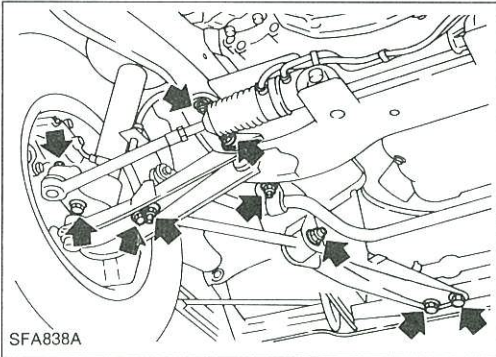
- Shake each front wheel to check for excessive play.



- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.

Tightening torque:

Refer to FRONT SUSPENSION.



- Check spring height from the top of the wheelarch to the ground.

- (1) Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).

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

- (2) Bounce the vehicle up and down several times before measuring.

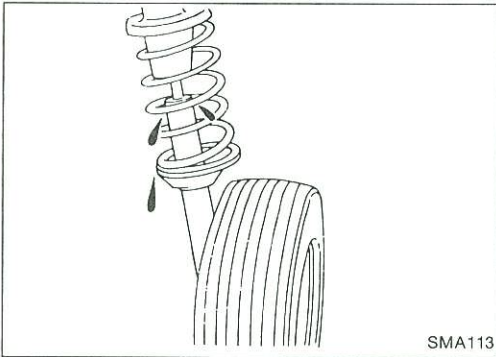
Wheelarch height:

Front (Hf): 673 mm (26.50 in)

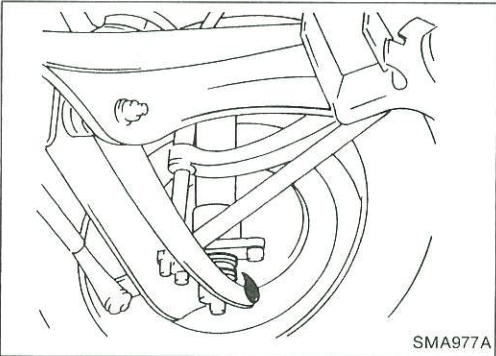
Rear (Hr): 664 mm (26.14 in)

- (3) Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.

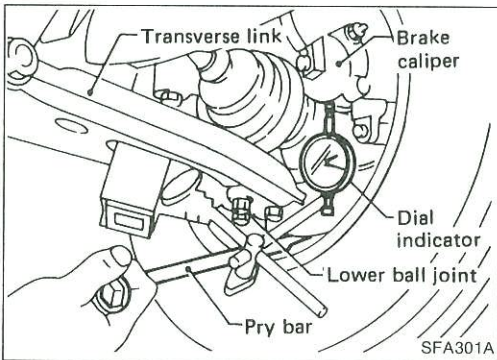
Front Axle and Front Suspension Parts (Cont'd)



- Check strut (Shock absorber) for oil leakage or damage.



- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.

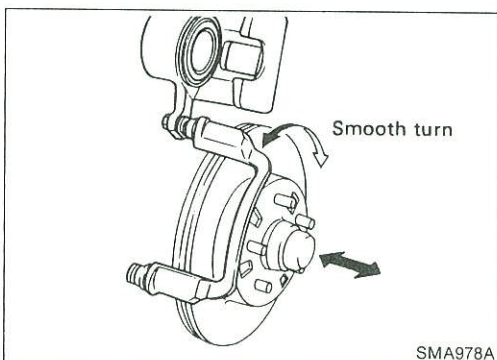


- Check suspension ball joint end play.
 - (1) Jack up front of vehicle and set the stands.
 - (2) Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
 - (3) Make sure front wheels are straight and brake pedal is depressed.
 - (4) Place a pry bar between transverse link and inner rim of road wheel.
 - (5) While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play:

0.1 - 1.3 mm (0.004 - 0.051 in)

- (6) If ball joint movement is beyond specifications, remove and recheck it.



Front Wheel Bearing

Check that wheel bearings operate smoothly, as well as axial end play and grease leakage.

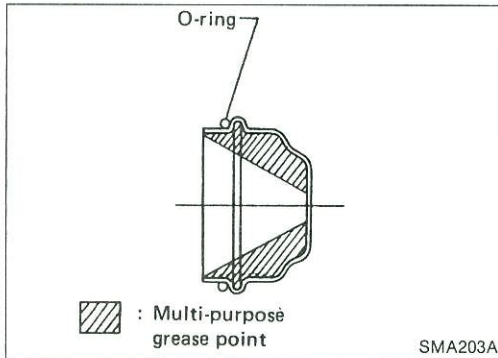
Axial end play limit: 0 mm (0 in)

Front Wheel Bearing (Cont'd)

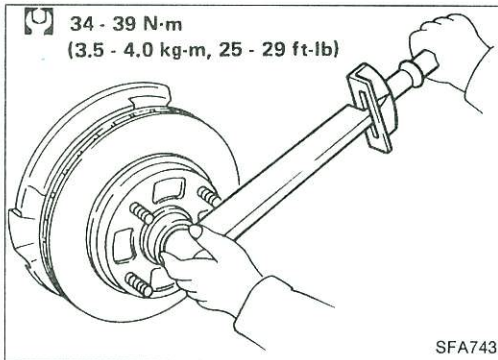
PRELOAD ADJUSTMENT

Be sure to adjust wheel bearing preload as described below after wheel bearing has been replaced or front axle has been reassembled.

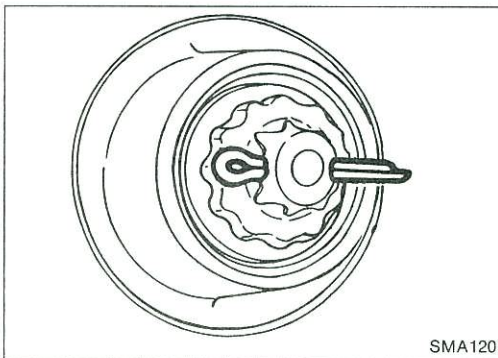
1. Before adjustment, thoroughly clean all parts to prevent dirt entry.



2. Apply recommended multi-purpose grease sparingly to the following parts.
 - Rubbing surface of spindle
 - Contact surface between lock washer and outer wheel bearing
 - Hub cap (as shown at the left)
 - Grease seal lip



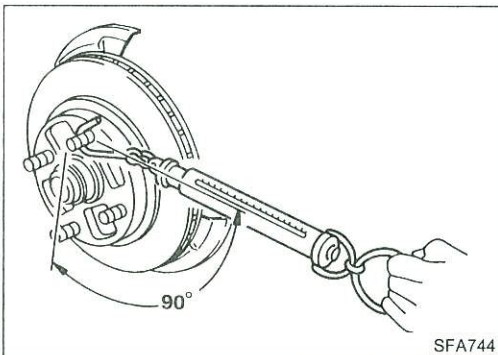
3. Tighten wheel bearing lock nut to the specified torque.
4. Turn wheel hub several times in both directions to seat wheel bearing correctly.
5. Again tighten wheel bearing nut to the specified torque.
6. Turn back wheel bearing lock nut at 90°.



7. Fit adjusting cap and new cotter pin.

Do not turn nut back for cotter pin insertion.

Align cotter pin slot, by retightening nut within 15°.



8. Measure wheel bearing preload and axial end play.

Axial end play limit: 0.05 mm (0.0020 in)

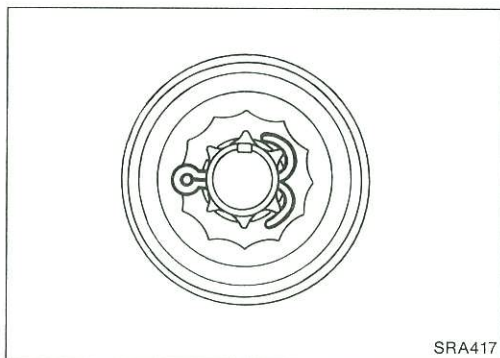
Wheel bearing preload

(As measured at wheel hub bolt):

13.7 N (1.4 kg, 3.1 lb) or less

Repeat above procedures until correct bearing preload is obtained.

Front Wheel Bearing (Cont'd)

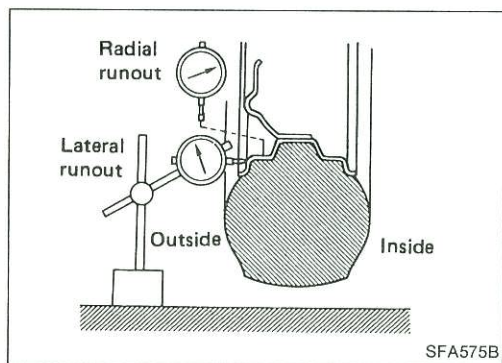


9. Spread cotter pin.
10. Install hub cap with new O-ring.

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.



PRELIMINARY INSPECTION

1. Check tires for wear and improper inflation.
2. Check wheel runout.

Wheel runout:

Refer to S.D.S.

3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly by using the standard bounce test.
7. Check vehicle posture (Unladen).

CAMBER, CASTER AND KINGPIN INCLINATION

Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

Camber:

-35' to 55'

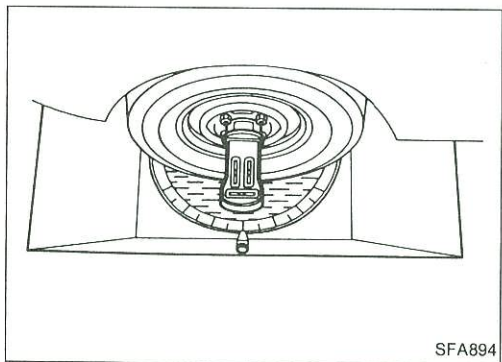
Caster:

3°55' - 5°25'

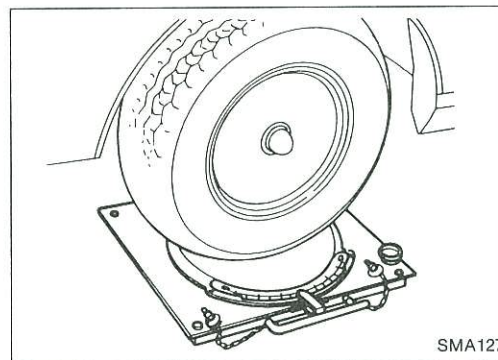
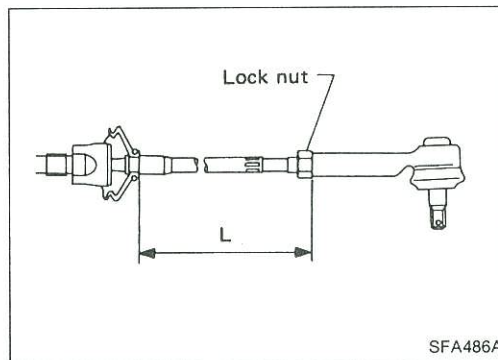
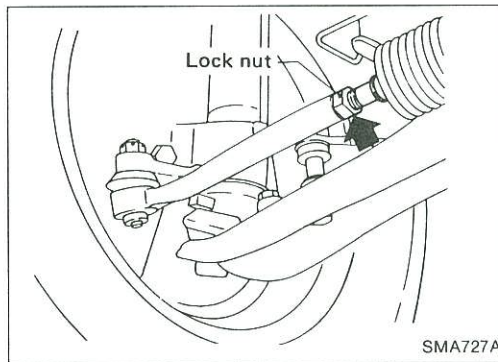
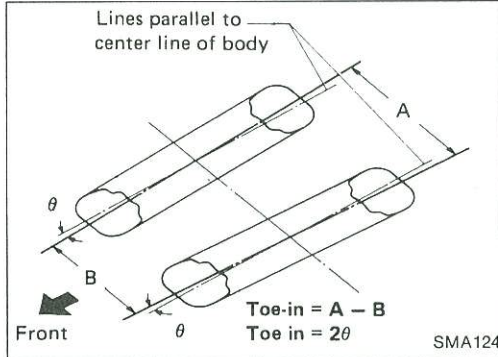
Kingpin inclination:

11°55' - 13°25'

2. If camber, caster and kingpin inclination are not within specification, inspect and replace any damaged or worn front suspension parts.



TOE-IN



2. Measure toe-in.
 - Measure distance “A” and “B” at the same height as hub center.

A - B: -1 to 1 mm (-0.04 to 0.04 in)
2θ: -5° to 5°

3. Adjust toe-in by varying the length of steering tie-rods.
 - (1) Loosen lock nuts.
 - (2) Adjust toe-in by screwing tie-rods in and out.

Refer to section ST.

- (3) Tighten lock nuts to specified torque.

Refer to section ST.

1. Set wheels in straight-ahead position and then move vehicle forward until front wheels rest on turning radius gauge properly.

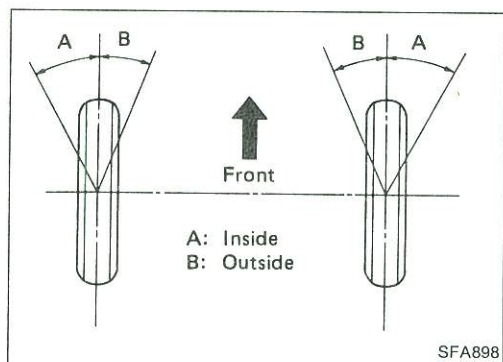
Front Wheel Alignment (Cont'd)

2. Rotate steering wheel all the way right and left; measure turning angle.

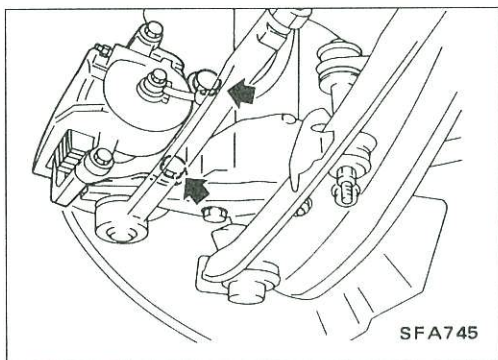
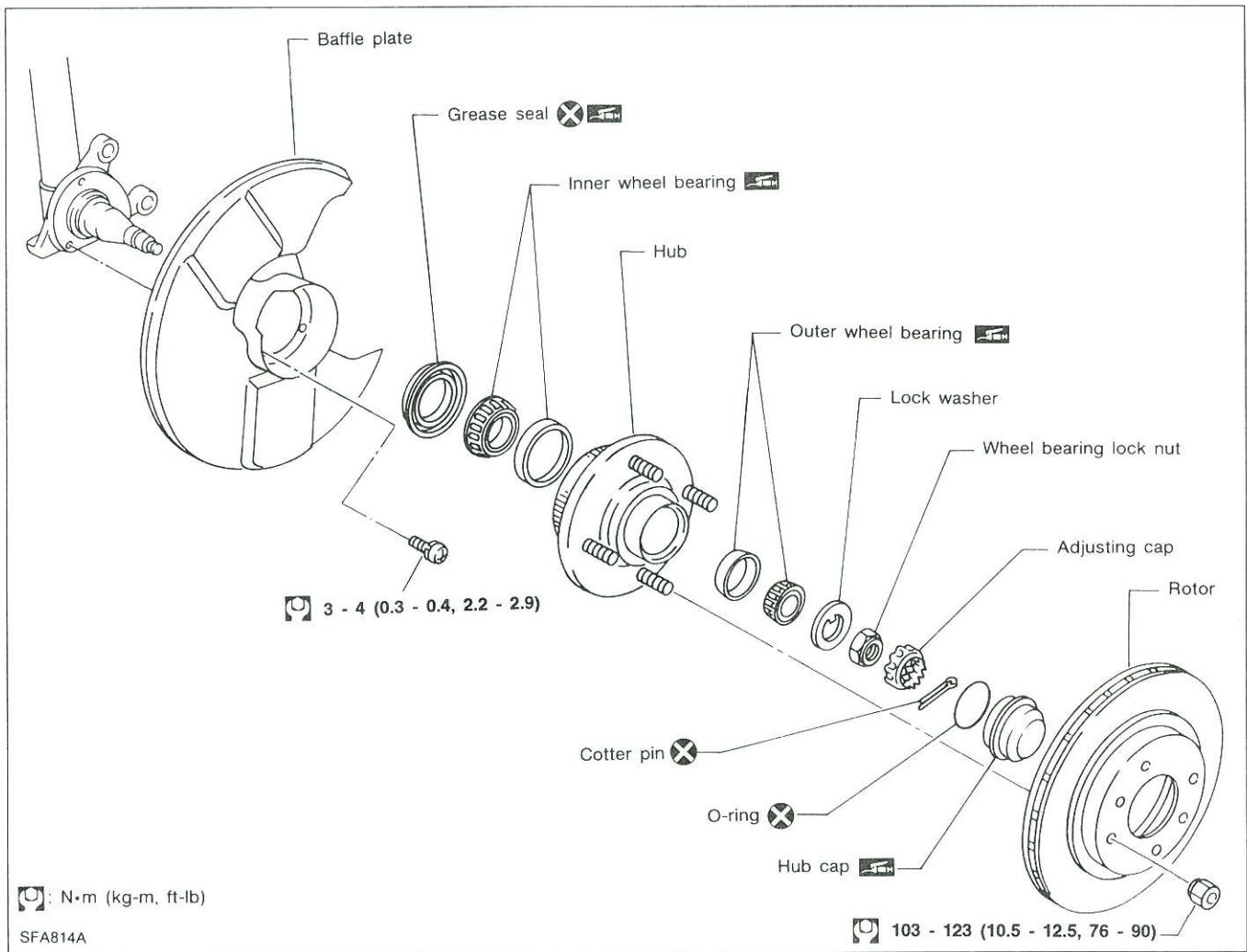
Wheel turning angle (Full turn):

Inside wheel: $40^{\circ}30'$ - $44^{\circ}30'$

Outside wheel: $33^{\circ}30'$

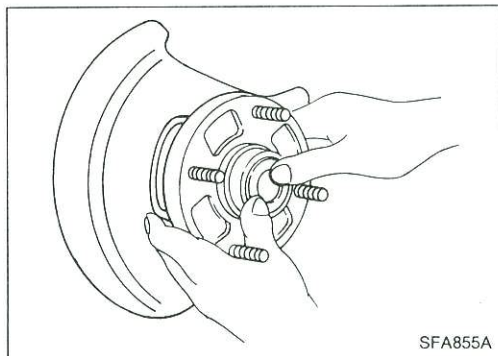


FRONT AXLE



Removal

- Remove brake caliper assembly and rotor.
Brake hose need not be disconnected from brake caliper. Be careful not to depress brake pedal, or piston will pop out. Do not pull or twist brake hose.

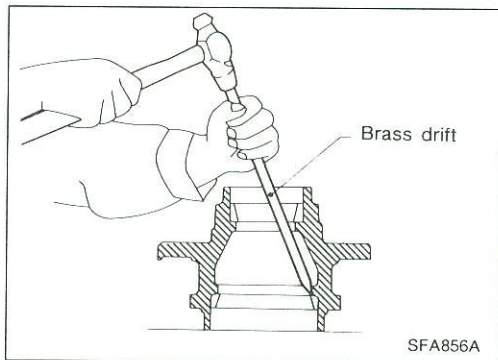


- Remove wheel hub and wheel bearing from spindle.
Be careful not to drop outer bearing.

FRONT AXLE

Removal (Cont'd)

- If bearing or bearing race needs to be replaced, drive out outer race from hub with a brass drift and replace bearing and race as a set.



Inspection

WHEEL BEARING

Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear, and replace if damaged.

WHEEL HUB

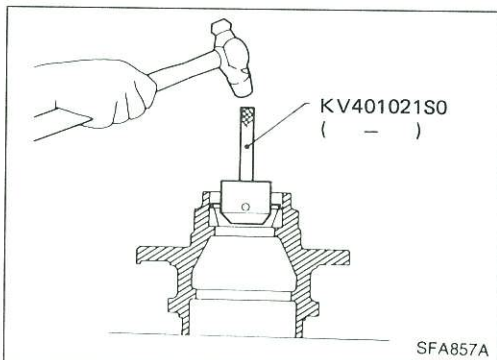
Check wheel hub for crack by a magnetic exploration or dyeing test, and replace if cracked.

KNUCKLE SPINDLE

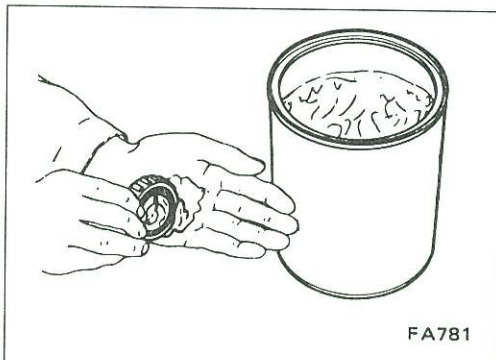
Check knuckle spindle for deformation, tapping mark, or cracks (by magnetic or dyeing test) and replace if damaged.

Installation

- Install bearing outer race with Tool until it seats in hub.

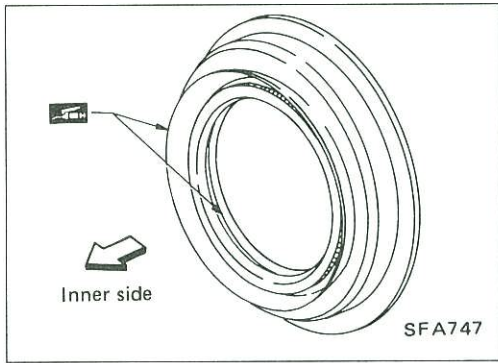


- Coat each bearing cone with recommended multi-purpose grease.

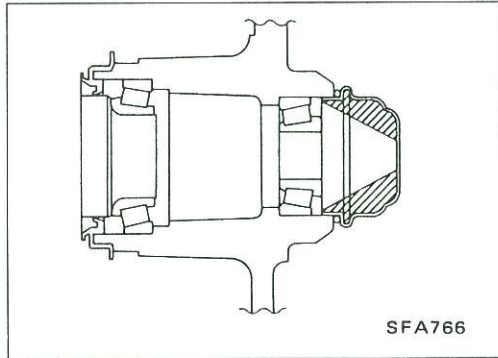


FRONT AXLE

Installation (Cont'd)



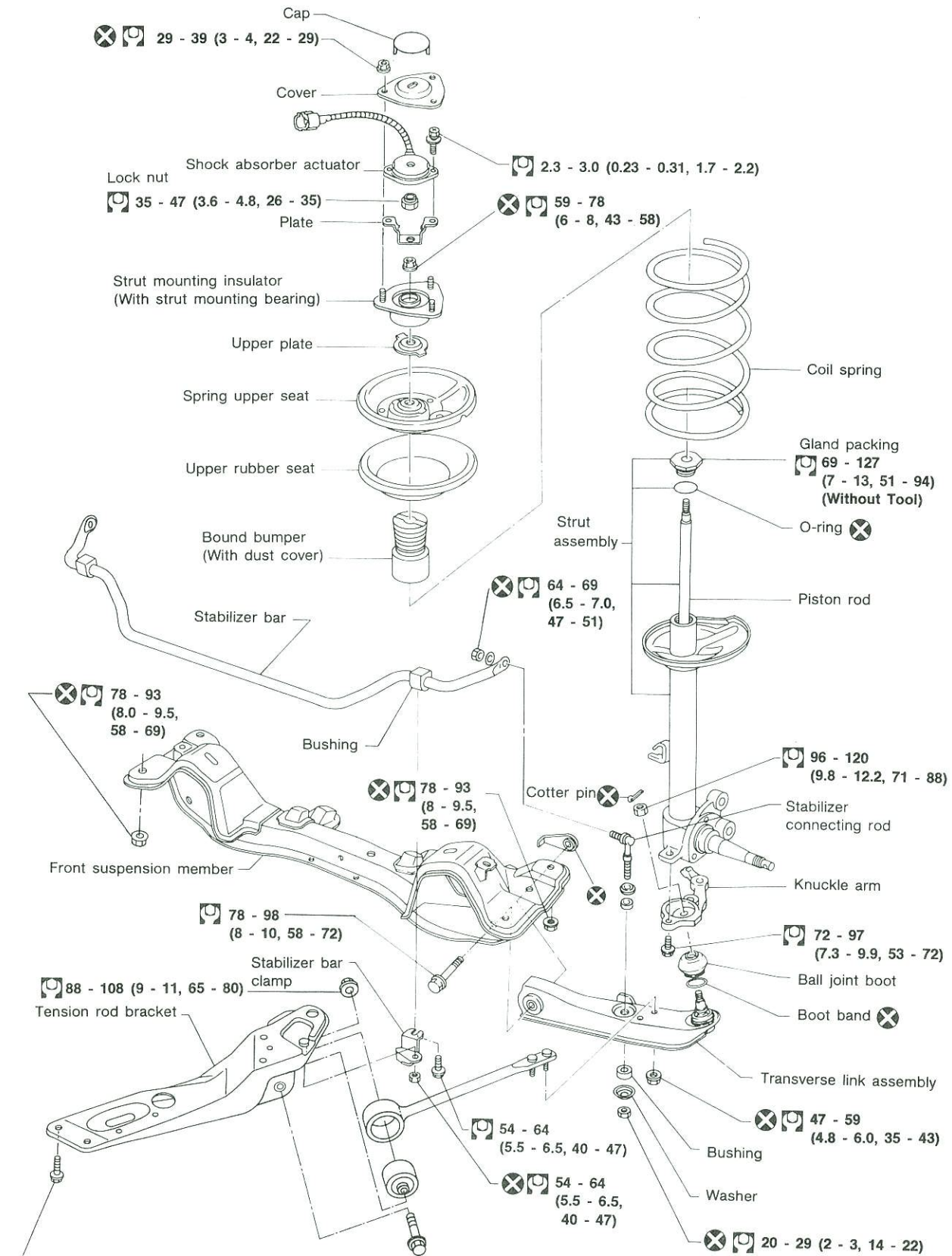
- Pack grease seal lip with recommended multi-purpose grease, then install it with suitable drift until it seats in hub.



- Pack hub and hub cap with recommended multi-purpose grease up to shaded portions.

- For wheel bearing adjustment, refer to CHECKING AND ADJUSTMENT — On-vehicle.

FRONT SUSPENSION



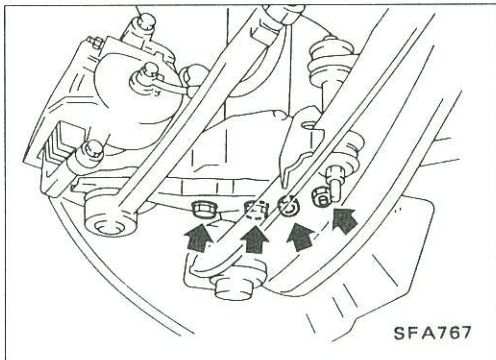
- When installing stabilizer bar, tension rod and transverse link, final tightening requires to be carried out under unladen condition* with tires on the ground.

* Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designed position.

: N·m (kg-m, ft-lb)

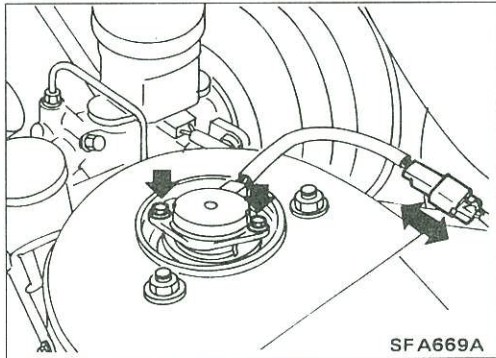
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FRONT SUSPENSION — Coil Spring and Strut Assembly

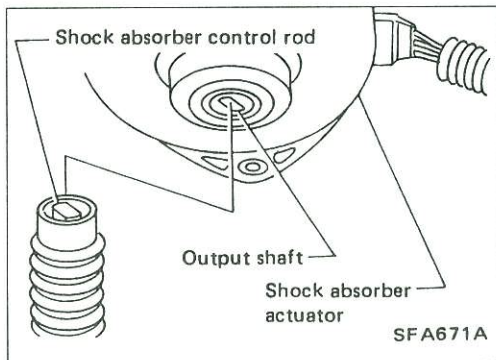


Removal and Installation

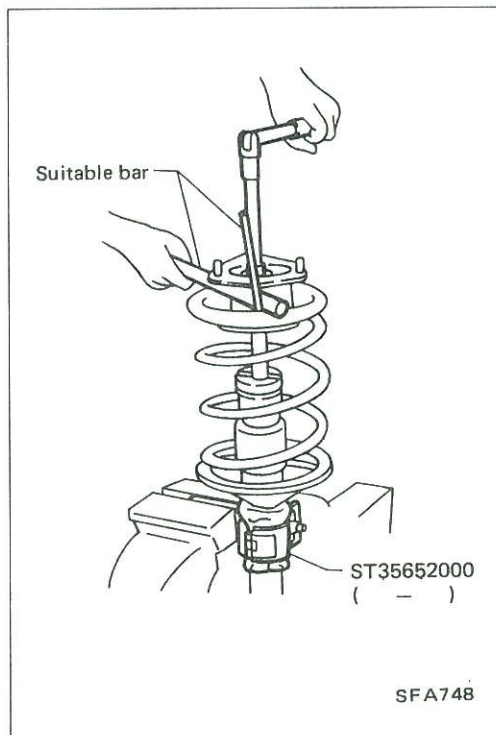
- Remove tension rod nuts and knuckle arm fixing bolts.
Make sure brake hose is secure and not twisted.



- Disconnect sub-harness connector and then remove shock absorber actuator fixing bolt.
 - Remove strut assembly fixing nut (to hoodledge).
- Do not remove piston rod lock nut on vehicle.**



Before installing actuator, ensure angle of shock absorber control rod is aligned with that of actuator output shaft. Otherwise, actuator may be damaged.



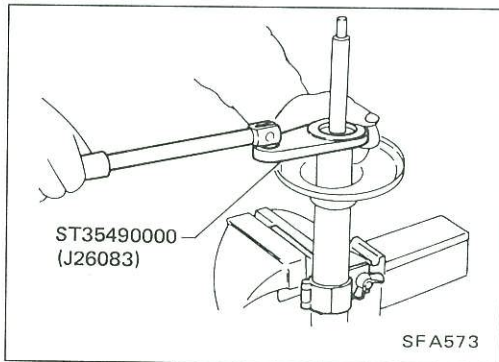
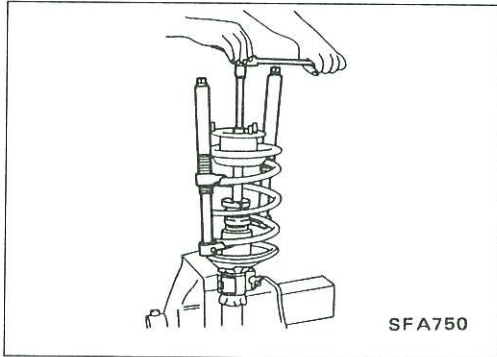
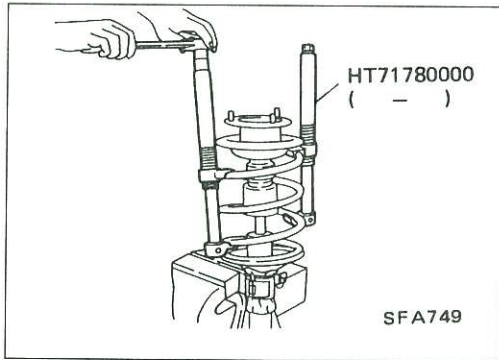
Disassembly

1. Set strut assembly on vice with attachment, then loosen piston rod lock nut.

Do not remove piston rod lock nut.

FRONT SUSPENSION — Coil Spring and Strut Assembly

Disassembly (Cont'd)



2. Compress spring with Tool so as to permit turning of strut mounting insulator by hand.
3. Remove piston rod lock nut. Then remove coil spring.
4. Remove gland packing with Tool.
 - **Avoid dirt and dust getting into gland packing portion.**
5. Retract piston rod by pushing it down until it bottoms. Then, slowly withdraw piston rod from cylinder together with piston guide.

Inspection

Wash all parts, except for nonmetallic parts, clean with suitable solvent and dry with compressed air.
Blow dirt and dust off of nonmetallic parts using compressed air.

STRUT ASSEMBLY

- Oil oozing out around gland packing does not need strut replacement.
If oil leakage is evident on spring seat, check piston rod gland packing and O-ring.
If oil leakage occurs on welded portion of outer strut casing, replace strut assembly.
- If shock absorber itself is malfunctioning, replace as shock absorber kit.

GLAND PACKING

Check gland packing for oil leakage. Replace gland packing if necessary.

FRONT SUSPENSION — Coil Spring and Strut Assembly

Inspection (Cont'd)

STRUT MOUNTING INSULATOR

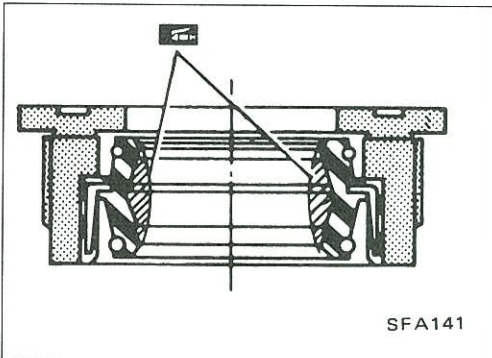
Check cemented rubber-to-metal portion for melting or cracks. Check rubber parts for deterioration. Replace if necessary.

THRUST SEAT

Check for cracks, deformation or other damage. Replace if necessary.

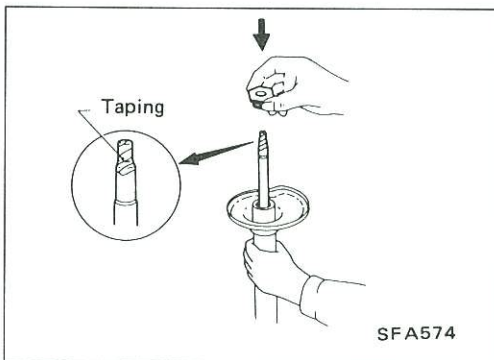
COIL SPRING

Check for cracks, deformation or other damage. Replace if necessary.



Assembly

- Lubricate sealing lip of gland packing.



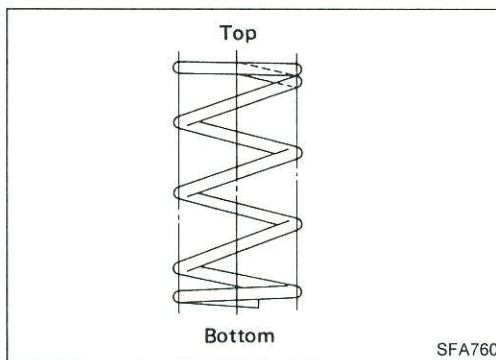
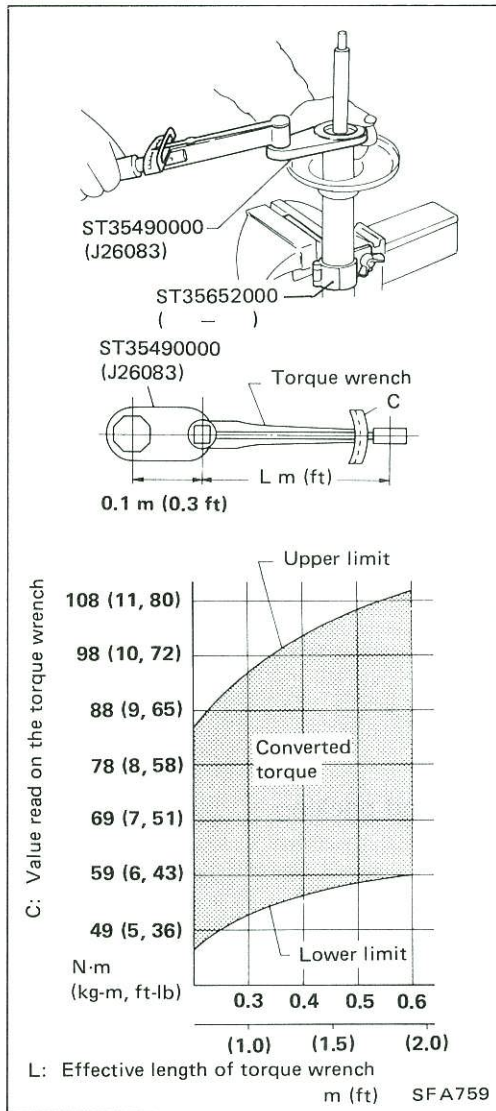
- Install gland packing.

Cover piston rod with tape so as not to damage oil sealing lip.

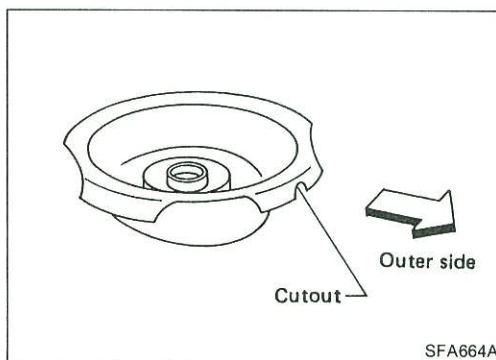
FRONT SUSPENSION — Coil Spring and Strut Assembly

Assembly (Cont'd)

- Tighten gland packing to the specified torque (refer to chart at left) with Tool.



- When installing coil spring, be careful not to reverse top and bottom direction. (top end is flat.)

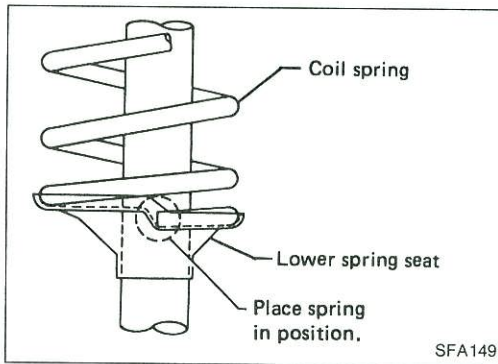


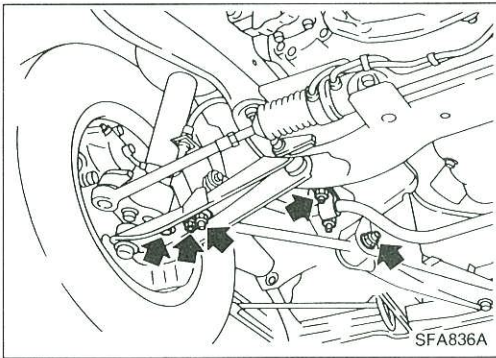
- Install upper spring seat with its cutout facing the outer side of vehicle.

FRONT SUSPENSION — Coil Spring and Strut Assembly

Assembly (Cont'd)

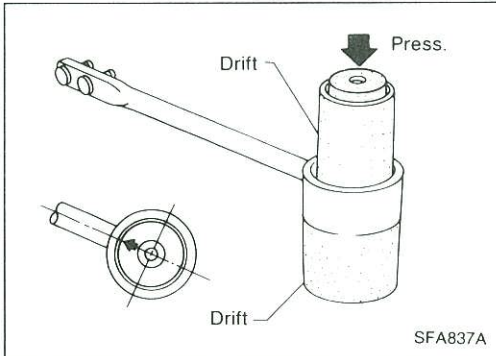
After placing spring in position on lower spring seat, release spring compressor gradually.



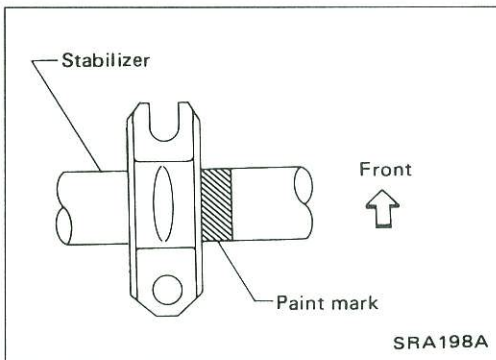


Removal and Installation

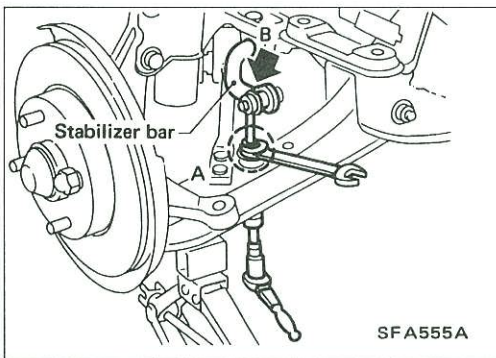
- Remove tension rod and stabilizer bar.



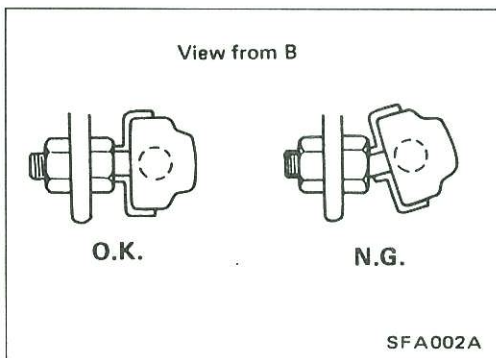
- When removing tension rod bushing, place one drift on lower side of bushing and the other on upper side, as shown at left, and press bushing out.
- Place arrow mark on bushing facing tension rod before installing bushing.



- When installing stabilizer, make sure that paint mark and clamp face in their correct directions.

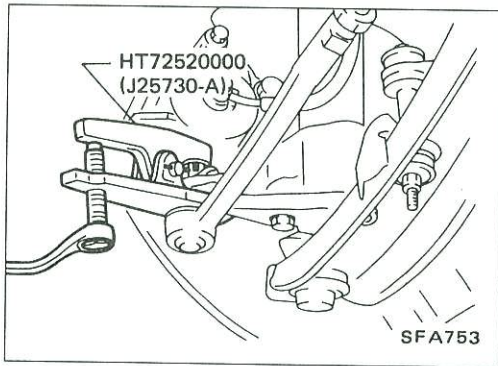


- When removing and installing stabilizer bar, fix portion A.



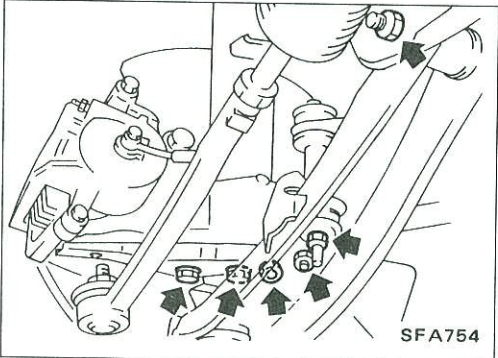
- Install stabilizer bar with ball joint socket properly placed.

FRONT SUSPENSION — Transverse Link Assembly

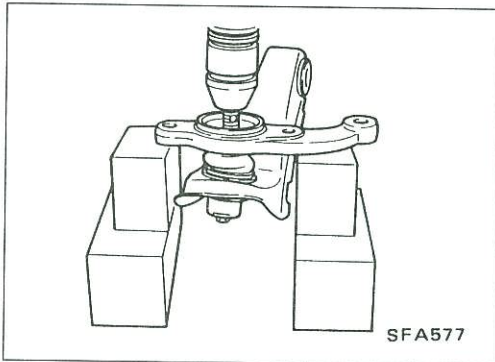


Removal and Installation

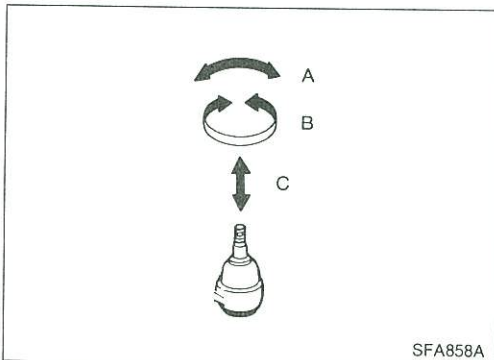
- Separate knuckle arm from tie-rod.



- Separate knuckle arm from strut. Remove stabilizer, tension rod and transverse link assembly.



- Separate ball joint from knuckle arm with press.
- Install transverse link assembly to front suspension member, first temporarily tighten nuts.



Inspection

- Check transverse link for damage, cracks, deformation; replace transverse link assembly if necessary.
- Check rubber bushing for damage, cracks and deformation; replace transverse link assembly if necessary.
- Check ball joint for play. If ball stud is worn, play in axial direction is excessive or joint is hard to swing, replace lower ball joint.

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

Swinging force "A":

(measuring point: cotter pin hole of ball stud)

24.5 - 80.4 N (2.5 - 8.2 kg, 5.5 - 18.1 lb)

Turning torque "B":

1.5 - 4.9 N·m (15 - 50 kg-cm, 13 - 43 in-lb)

Vertical end play "C":

0.1 - 1.3 mm (0.004 - 0.051 in)

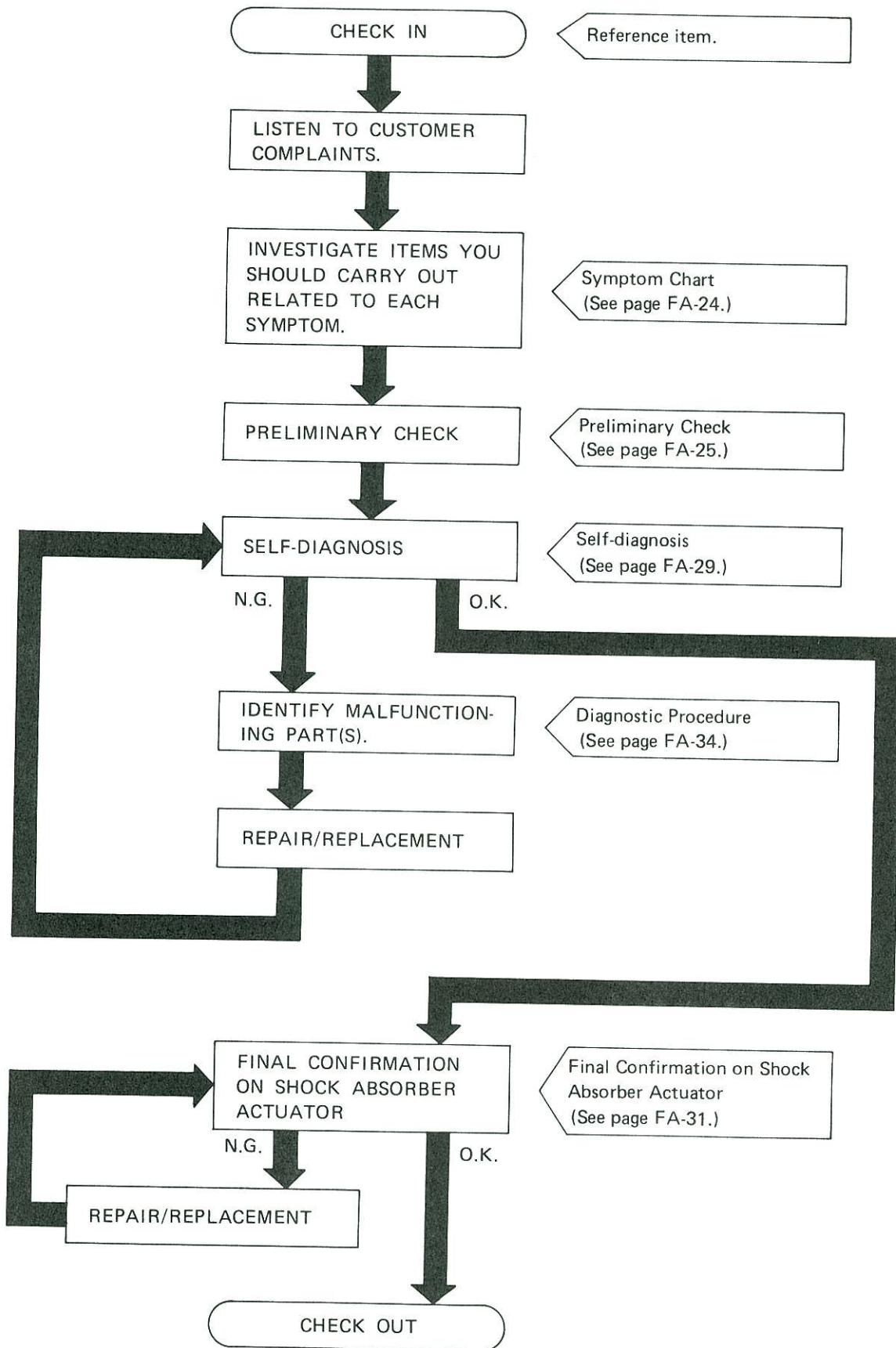
- Check dust cover for damage. Replace it and cover clamp if necessary.

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How to Perform Trouble Diagnoses for Quick and Accurate Repair

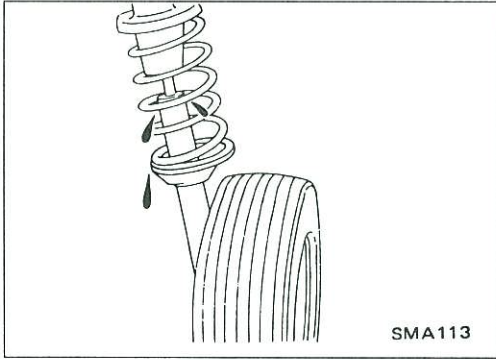
WORK FLOW



SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Symptom Chart

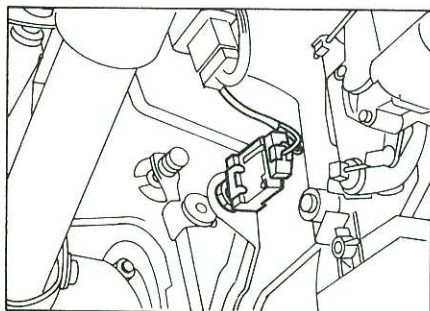
REFERENCE PAGE		FA-25	FA-34	FA-35	FA-37	FA-38	FA-40	FA-41	FA-42	FA-43	FA-31
SYMPTOM		Preliminary check	Select switch	Control unit	Vehicle speed sensor	Steering angle sensor	Stop lamp switch	Front shock absorber actuator	Rear shock absorber actuator	Sonar road surface sensor	Shock absorber
No indicator lamps come on.			<input type="radio"/>	<input type="radio"/>							
Self-diagnostic results	Self-diagnosis fails to start.		<input type="radio"/>	<input type="radio"/>							
	Vehicle speed signal is not entered.			<input type="radio"/>	<input type="radio"/>						
	Steering angle signal is not entered.			<input type="radio"/>		<input type="radio"/>					
	Brake signal is not entered.			<input type="radio"/>			<input type="radio"/>				
	Actuator drive circuit is shorted.			<input type="radio"/>				<input type="radio"/>	<input type="radio"/>		
	Sonar road surface sensor signal is not entered.			<input type="radio"/>						<input type="radio"/>	
Riding comfort is too "firm" or too "soft".		<input type="radio"/>		<input type="radio"/>				<input type="radio"/>	<input type="radio"/>		<input type="radio"/>
Damping force of shock absorber (for a particular wheel only) cannot be changed.		<input type="radio"/>						<input type="radio"/>	<input type="radio"/>		<input type="radio"/>



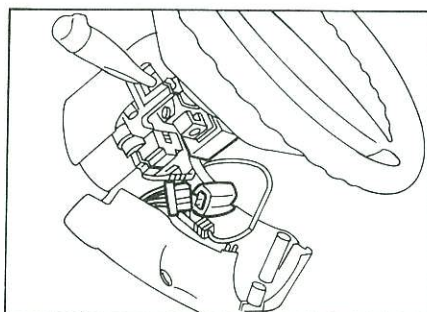
Preliminary Check

- Check strut (shock absorber) for oil leakage or other damage.

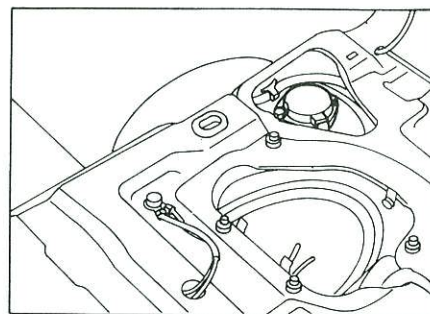
Component Parts and Harness Connector Location



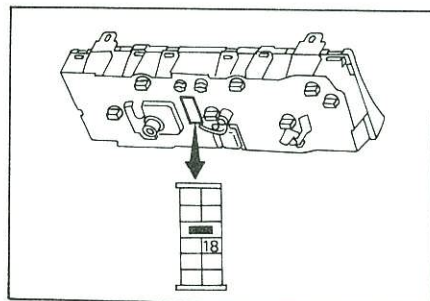
Stop lamp switch



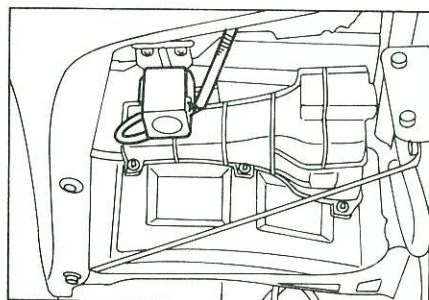
Steering angle sensor



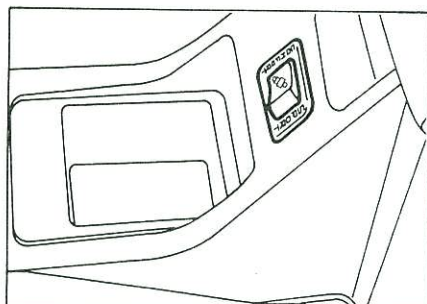
Rear shock absorber actuator



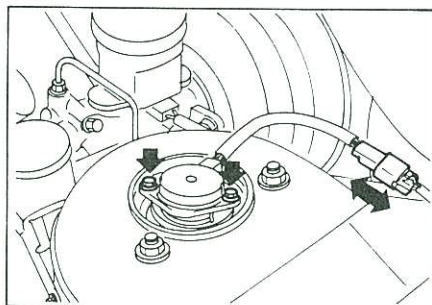
Vehicle speed sensor



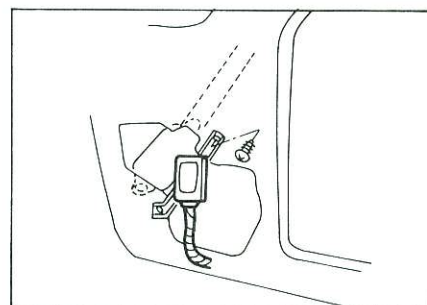
Sonar road surface sensor



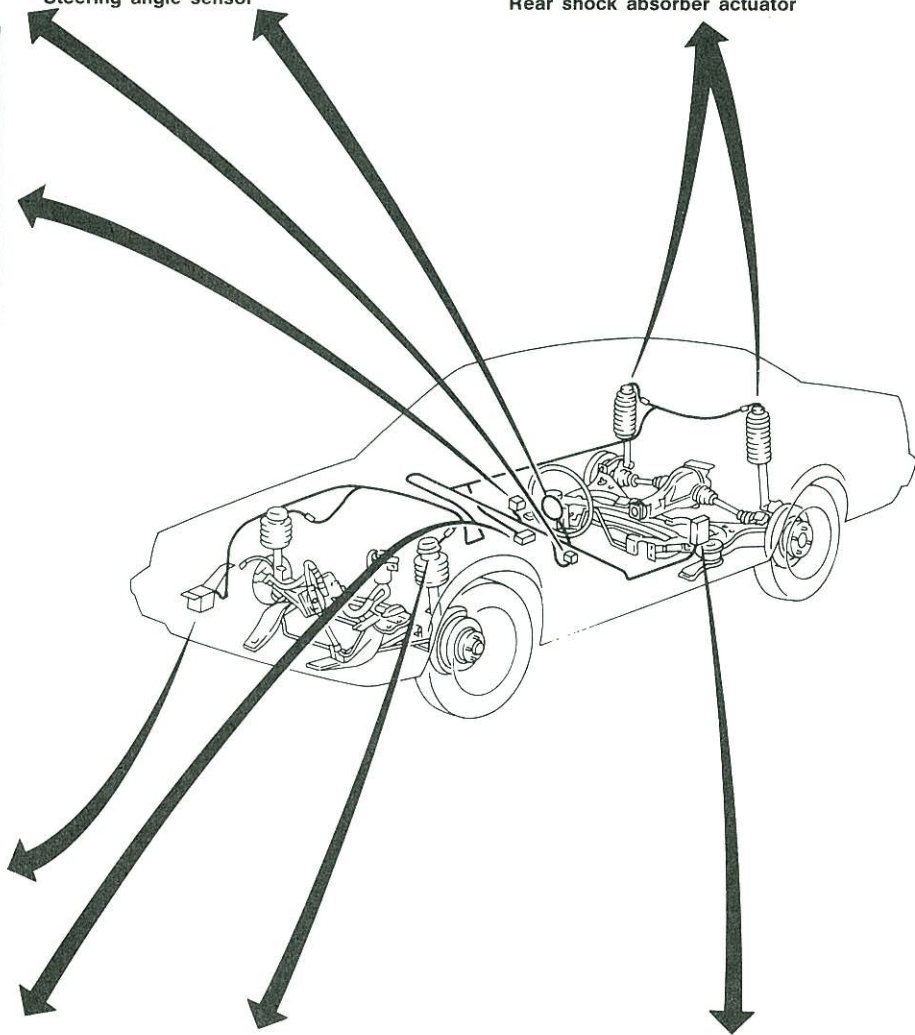
Select switch



Front shock absorber actuator

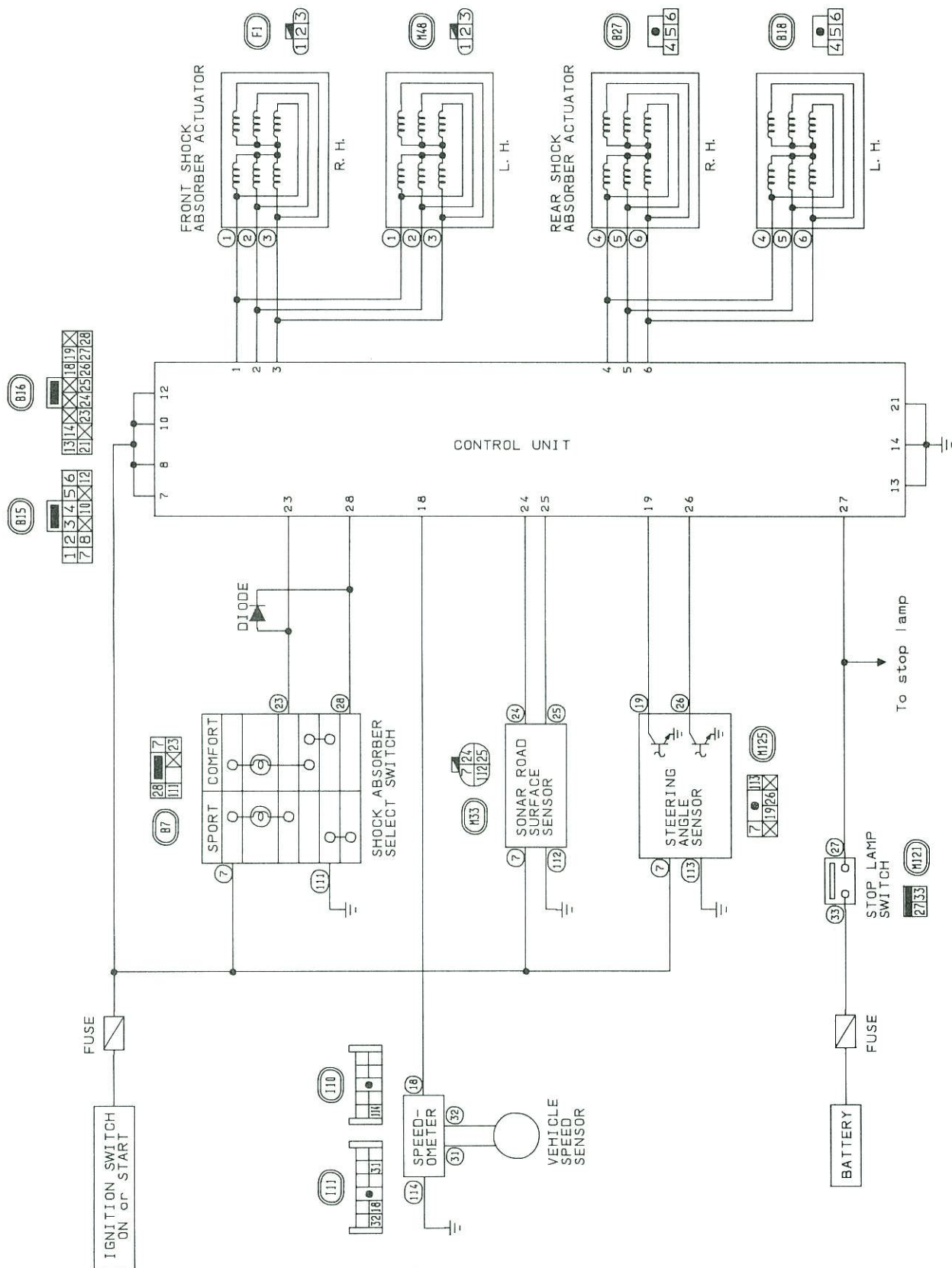


Control unit



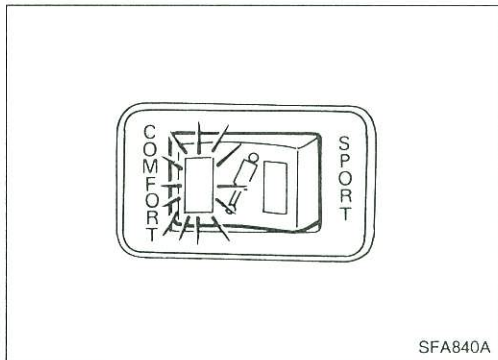
SFA839A

Circuit Diagram for Quick Pinpoint Check





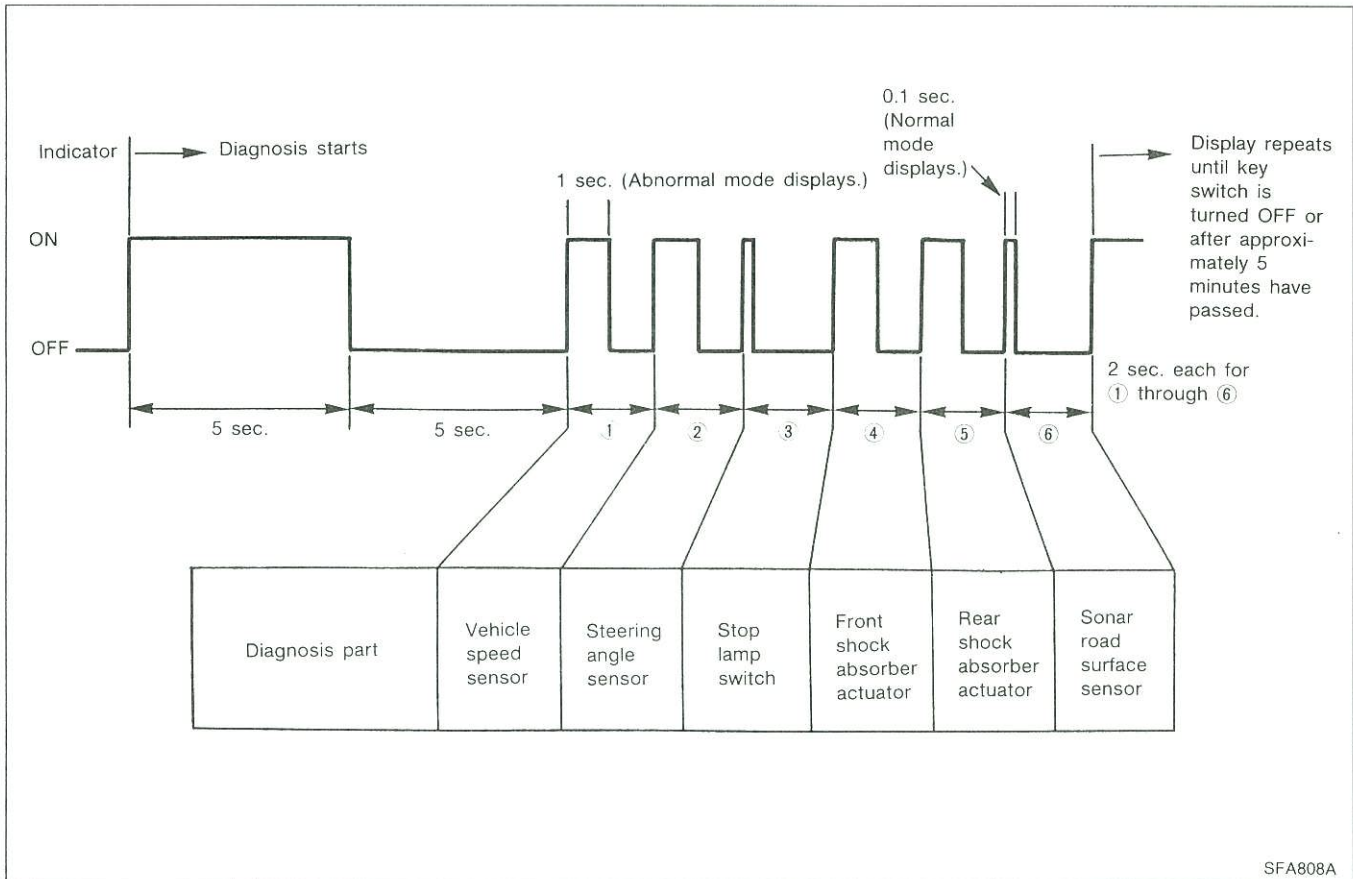
SONAR SUSPENSION SYSTEM — Trouble Diagnoses



Self-diagnosis

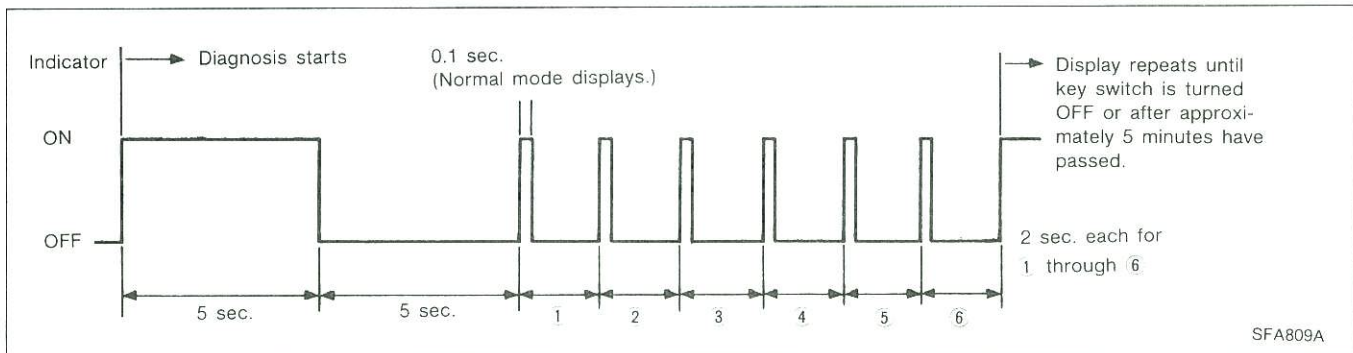
SELF-DIAGNOSIS PROCEDURES

- Input starting conditions for self-diagnosis.
 - Turn ignition switch "OFF".
 - Immediately start engine.
 - Within 10 seconds after engine has started, push select switch alternately to "COMFORT" and "SPORT" five times or more, ending up on "COMFORT".
 - Drive the vehicle forward at least 2 to 3 m (7 to 10 ft), turn steering wheel at 90° or more, stop the vehicle, depress brake pedal and release it.
- The self-diagnosis mode will then appear in the "COMFORT" position.



● When all systems are normal

When all systems are normal, the indicator displays normal mode (0.1 sec. ON).



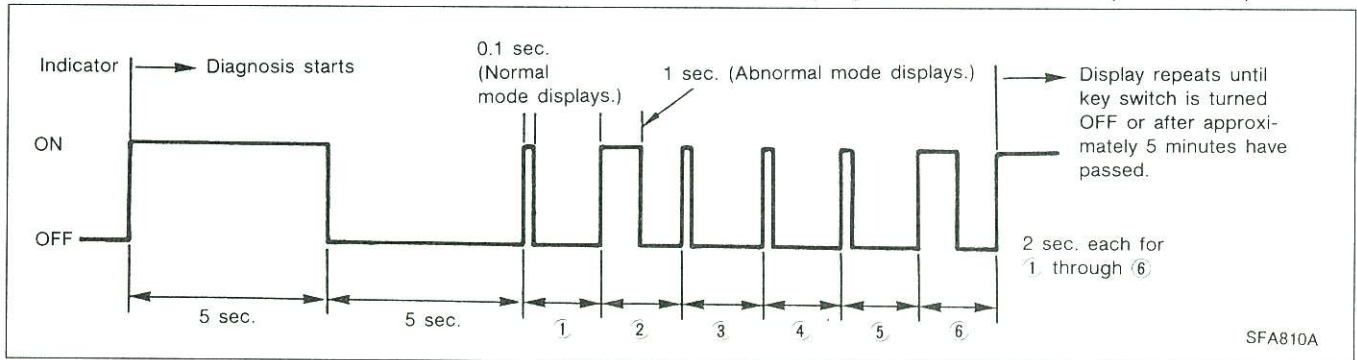
SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Self-diagnosis (Cont'd)

- When there is a system malfunction

Example: When ② steering angle sensor and ⑥ sonar road surface sensor experience malfunction.

The indicator displays abnormal mode (1 sec. ON).



CANCELING THE SELF-DIAGNOSIS FUNCTION

There are two methods of canceling the self-diagnosis function, as described below:

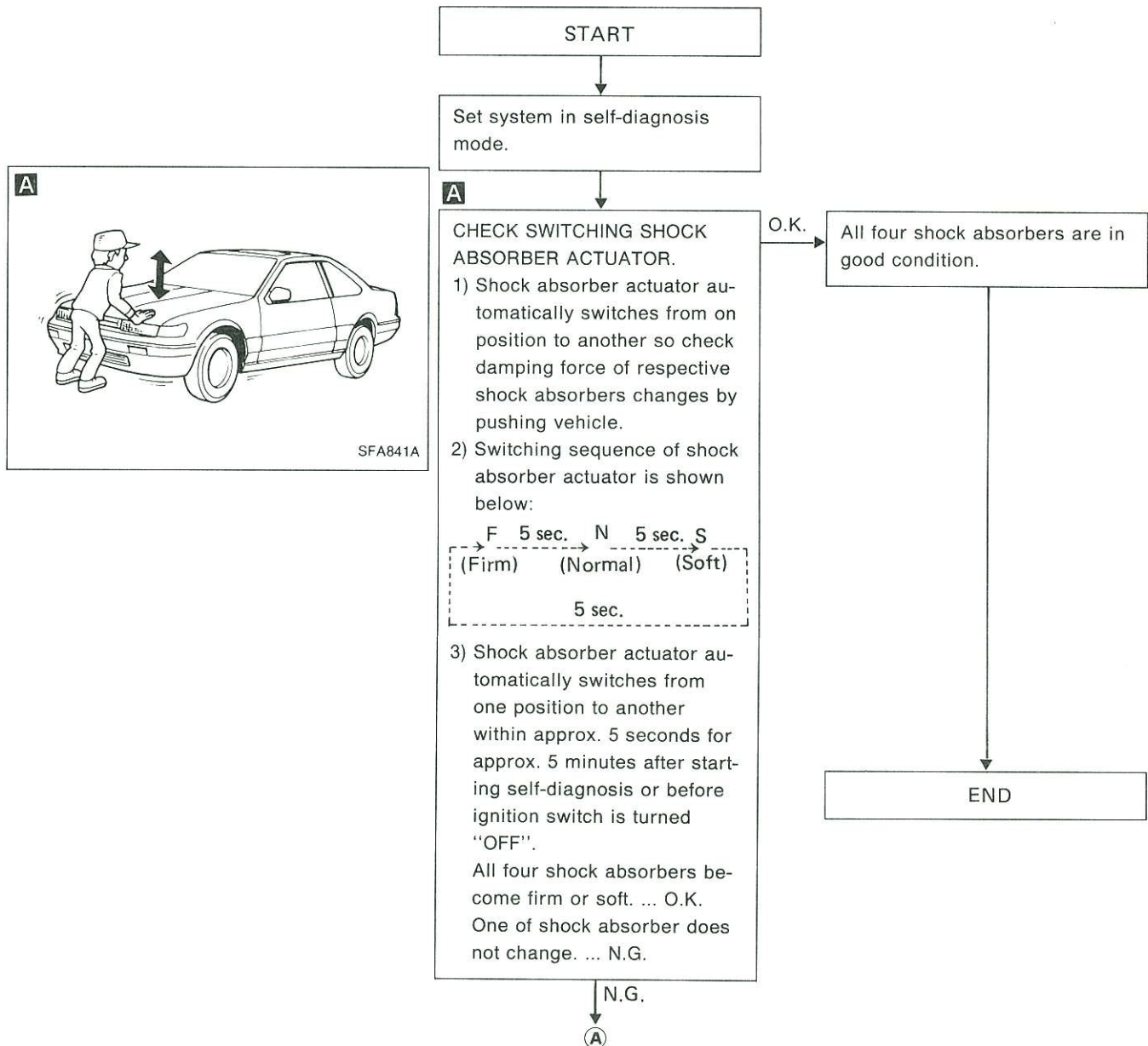
- The self-diagnosis system is canceled by turning ignition switch "OFF".
- After the self-diagnosing has been operated for approximately 5 minutes, the self-diagnosis system will be automatically canceled.

PRECAUTIONS DURING SELF-DIAGNOSIS

- When the distance between sonar road surface sensor and road surface is greater than 500 mm (19.69 in) (such as over a workpit) or when it is less than 200 mm (7.87 in), the surface sensor will indicate a malfunction.
- Place vehicle on a flat surface to provide proper self-diagnosing so that reflective surface of sonar road surface sensor is free from surface irregularities (i.e. holes, bumps, etc.).
- Self-diagnosis indication on shock absorber actuators shows only abnormalities of the command signal from control unit to actuators. For diagnosing problems on electrical circuit between control unit and actuators as well as malfunctions of actuators themselves, final confirmation should be performed using procedures described in "Final Confirmation on Shock Absorber Actuator". (See page FA-31.)

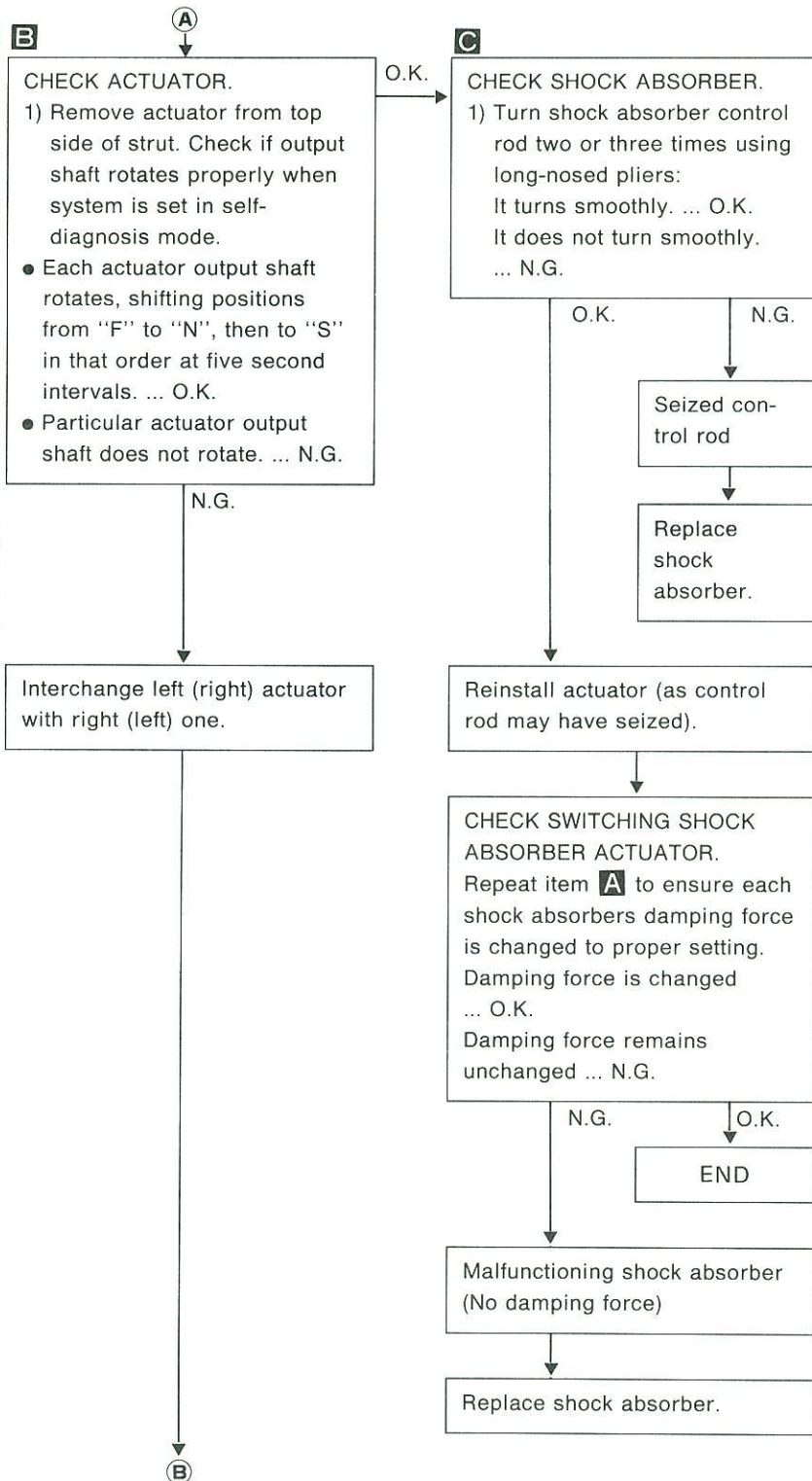
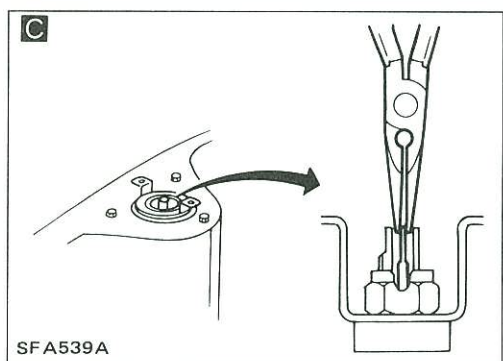
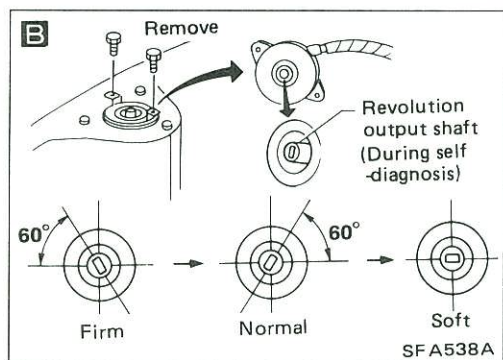
Final Confirmation on Shock Absorber Actuator

Check shock absorbers in self-diagnosis mode after repairing malfunctioning items.



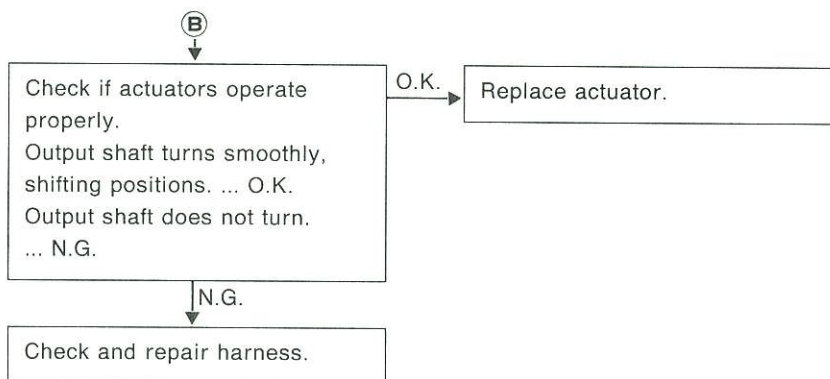
SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Final Confirmation on Shock Absorber Actuator (Cont'd)



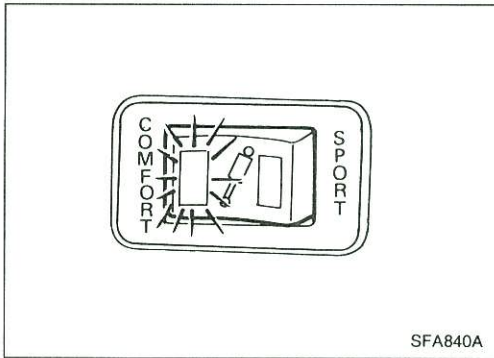
SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Final Confirmation on Shock Absorber Actuator (Cont'd)



Before installing actuator, ensure angle of shock absorber control rod is aligned with that of actuator output shaft. Otherwise, actuator may be damaged.

SONAR SUSPENSION SYSTEM — Trouble Diagnoses



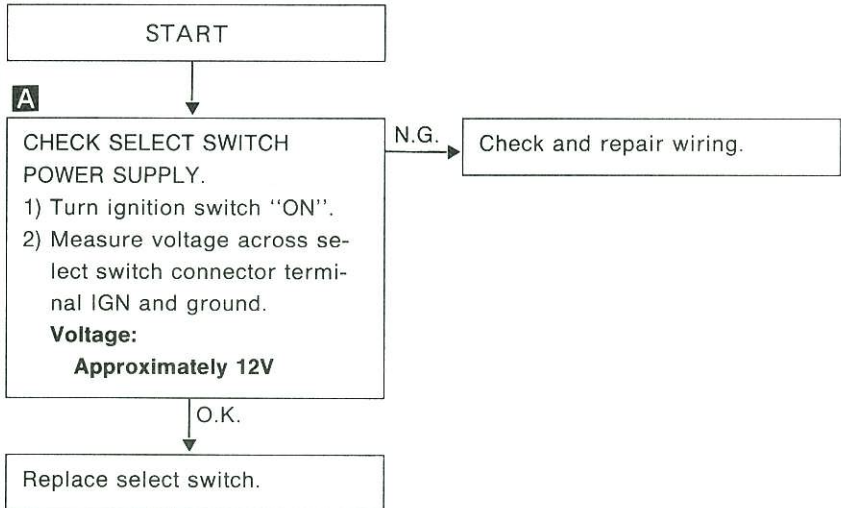
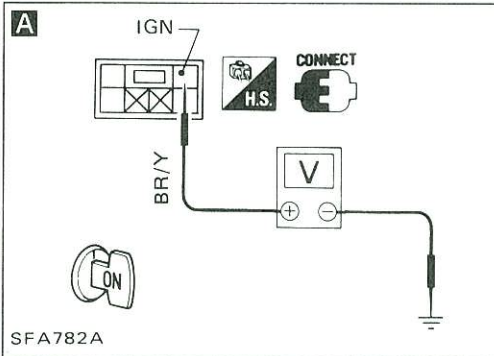
Diagnostic Procedure 1

SYMPTOM:

No indicator lamp comes on when ignition switch is turned "ON".

Normal condition (with ignition switch "ON")

- Select switch indicator lamp:
Either "COMFORT" or "SPORT" indicator corresponding to select switch position comes on.

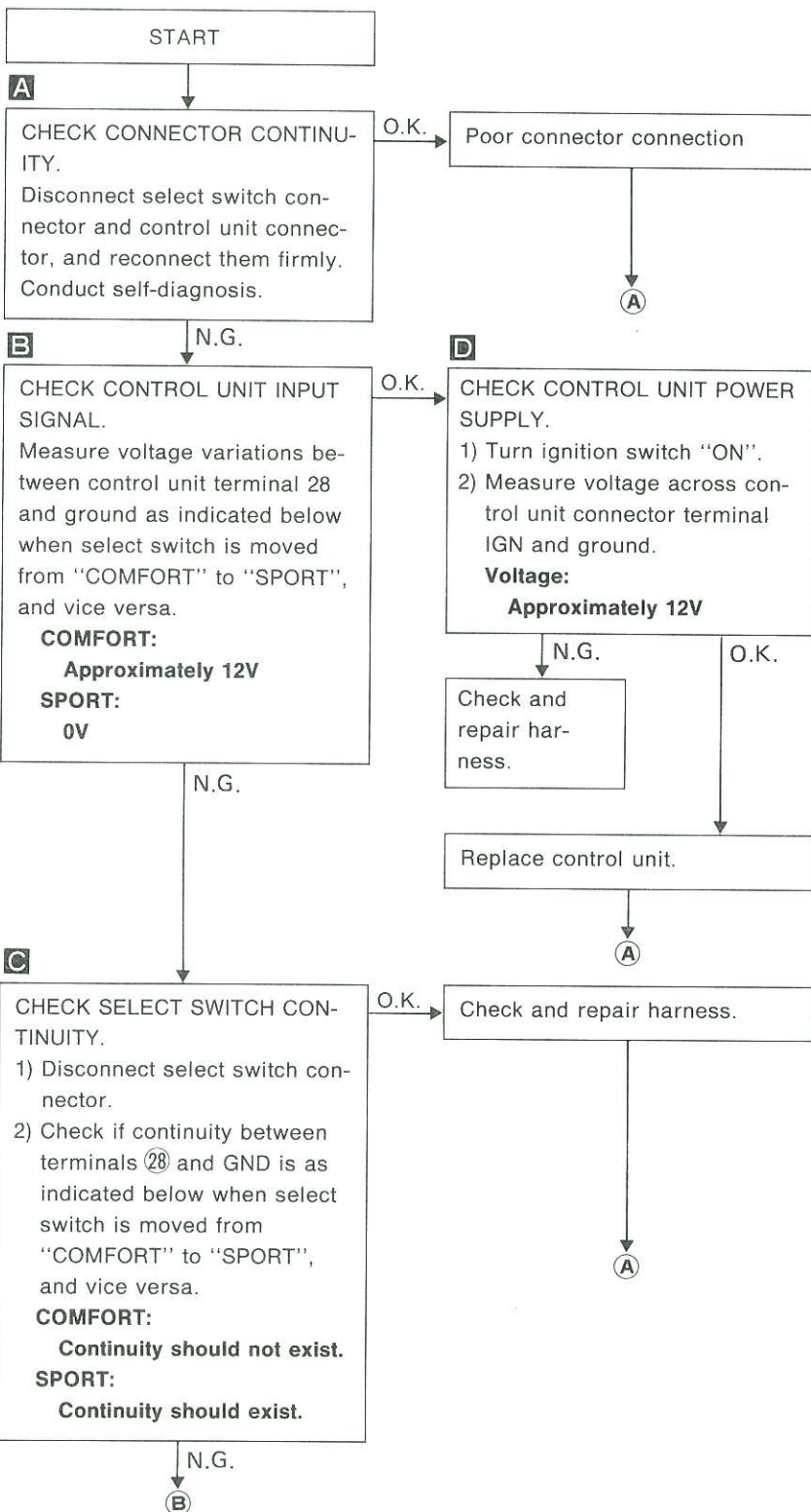
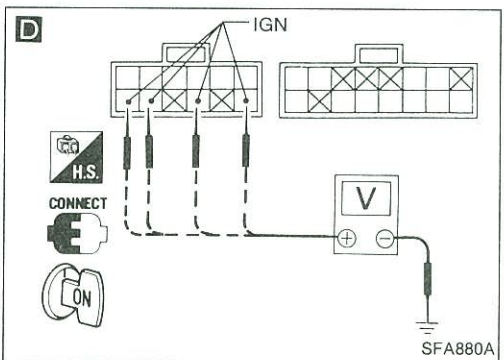
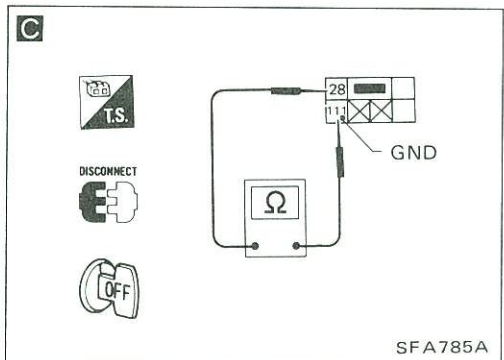
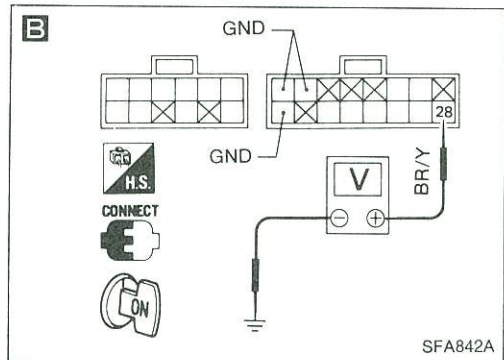
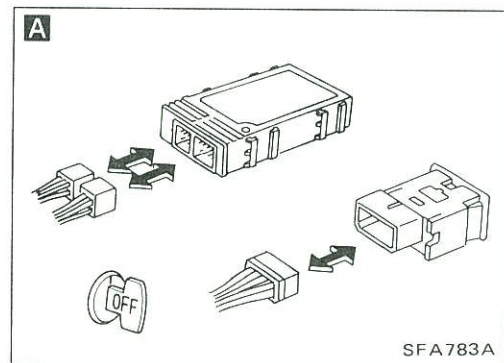


SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Diagnostic Procedure 2

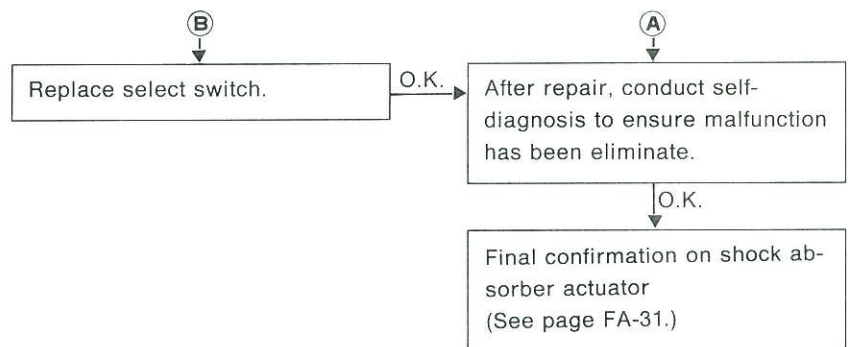
SYMPTOM:

System is not set in self-diagnosis mode.



SONAR SUSPENSION SYSTEM — Trouble Diagnoses

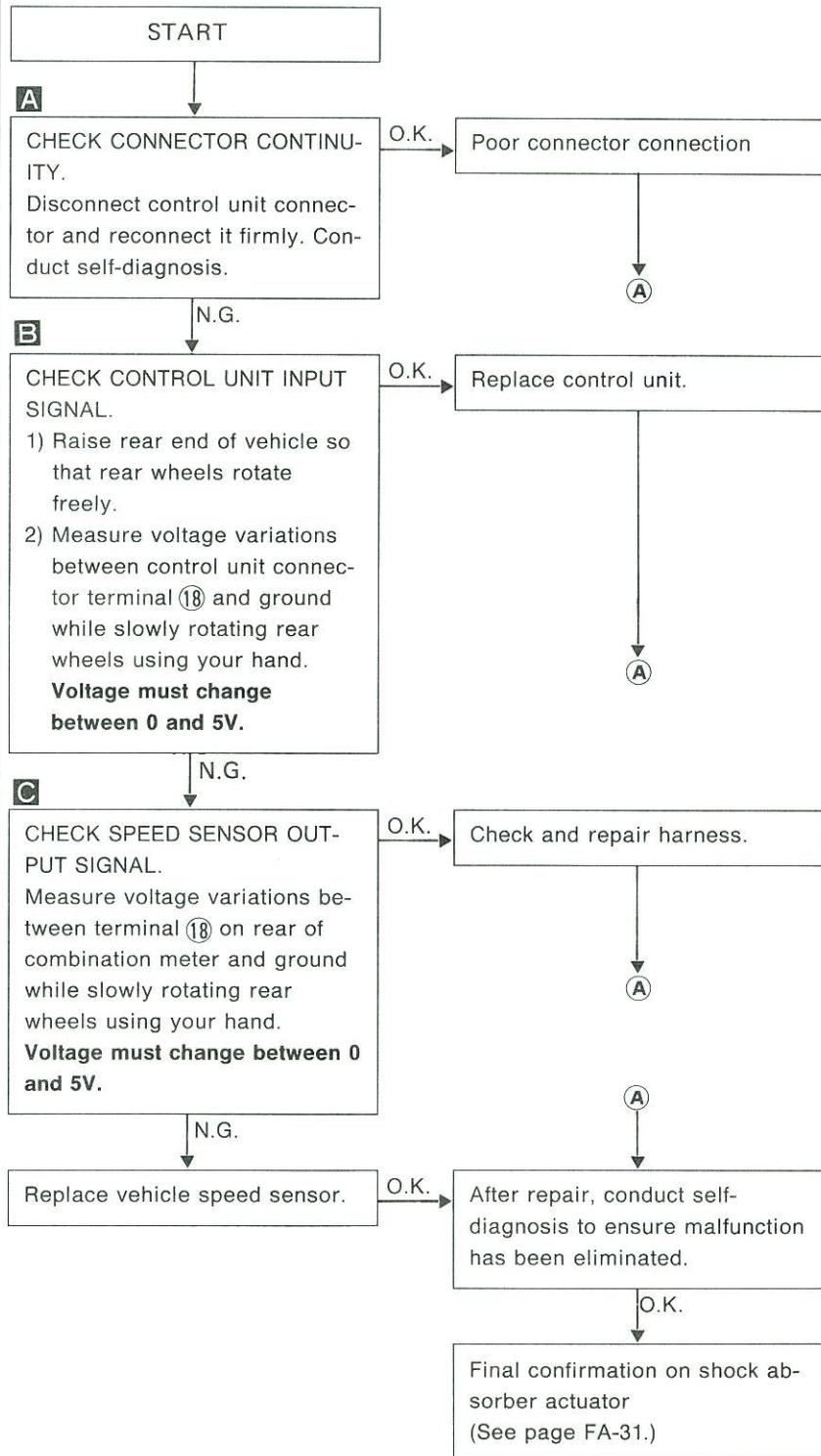
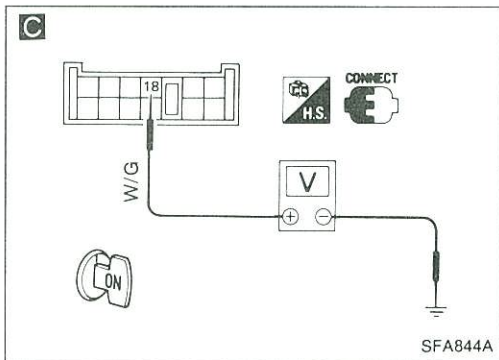
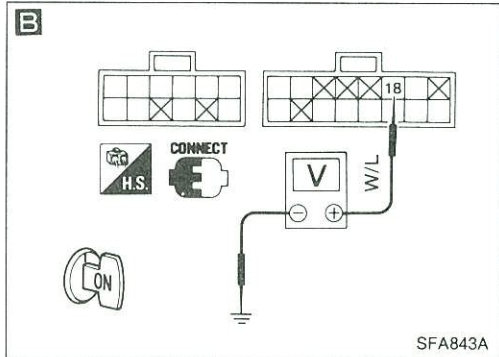
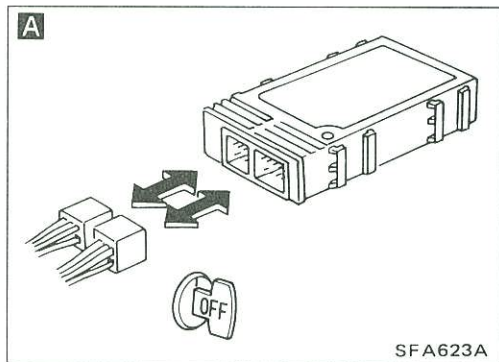
Diagnostic Procedure 2 (Cont'd)



Diagnostic Procedure 3

SYMPTOM:

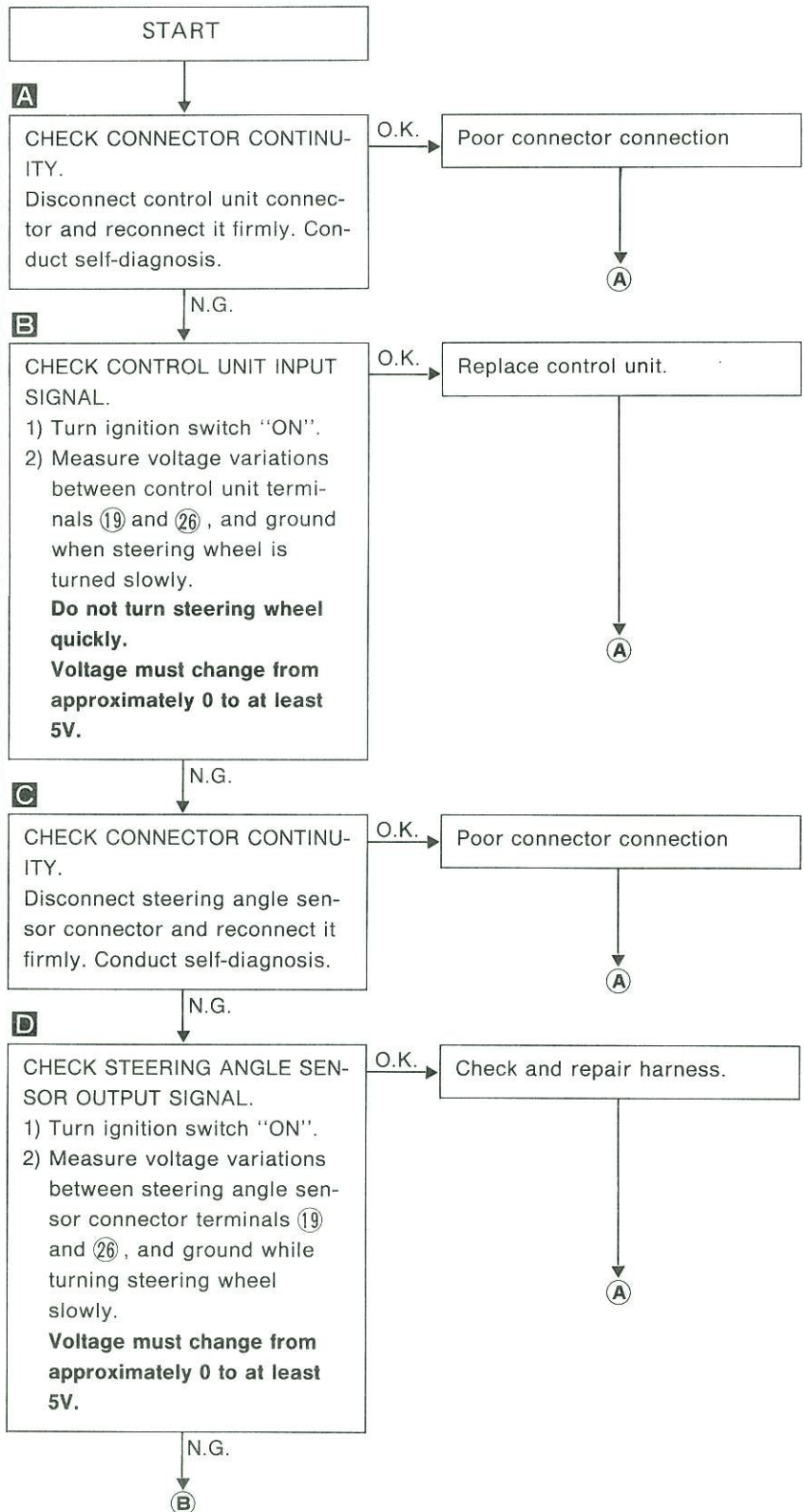
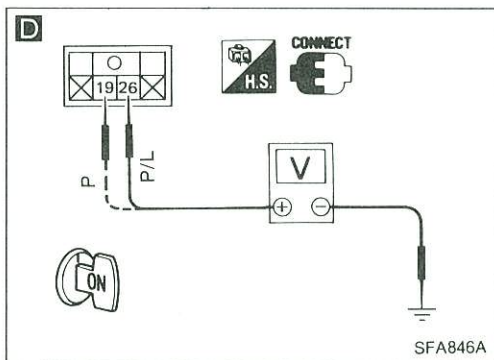
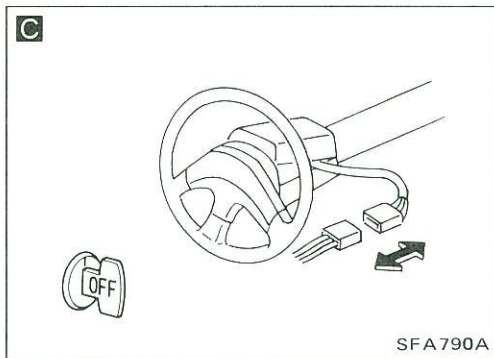
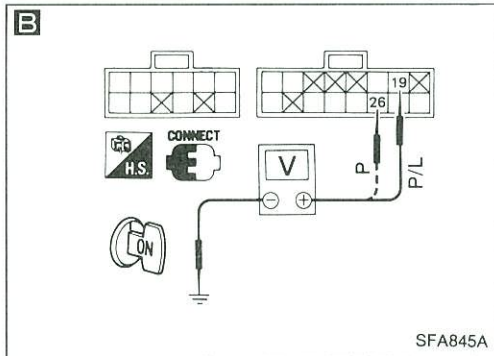
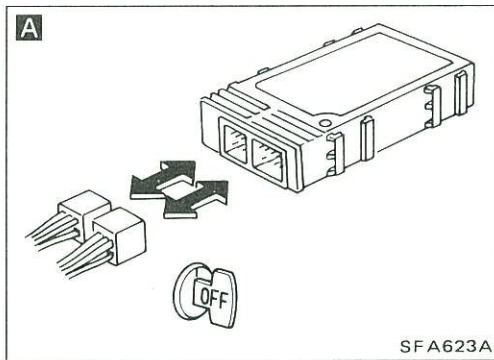
Vehicle speed sensor system malfunctions.



Diagnostic Procedure 4

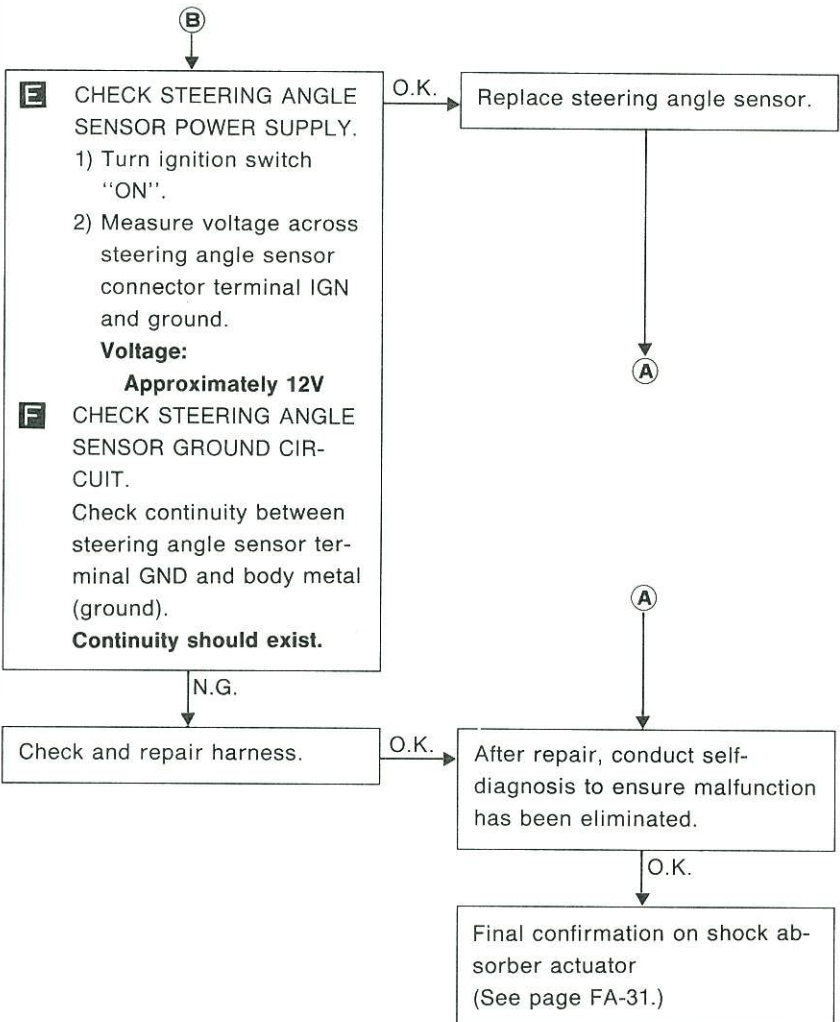
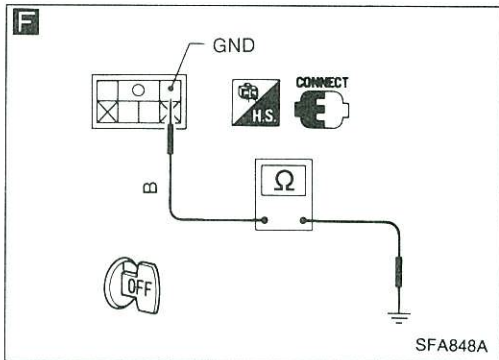
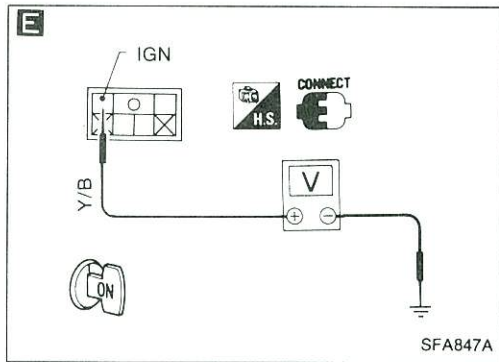
SYMPTOM:

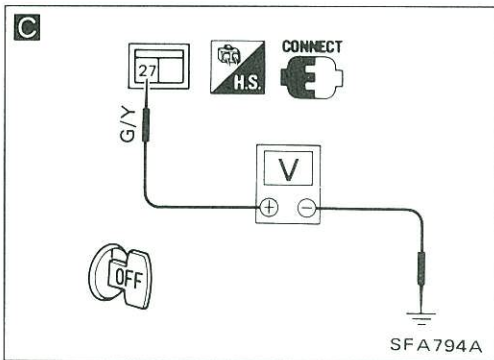
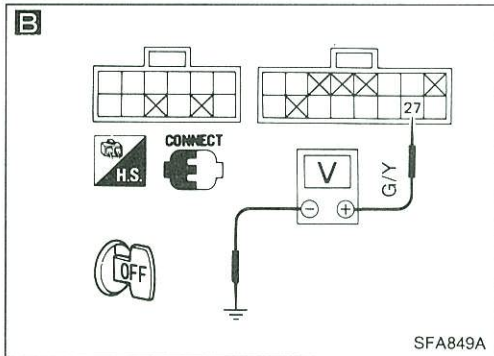
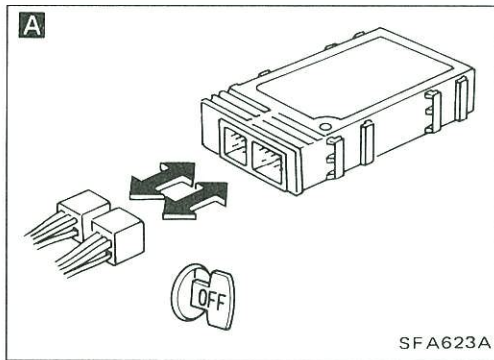
Steering angle sensor system malfunctions.



SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Diagnostic Procedure 4 (Cont'd)

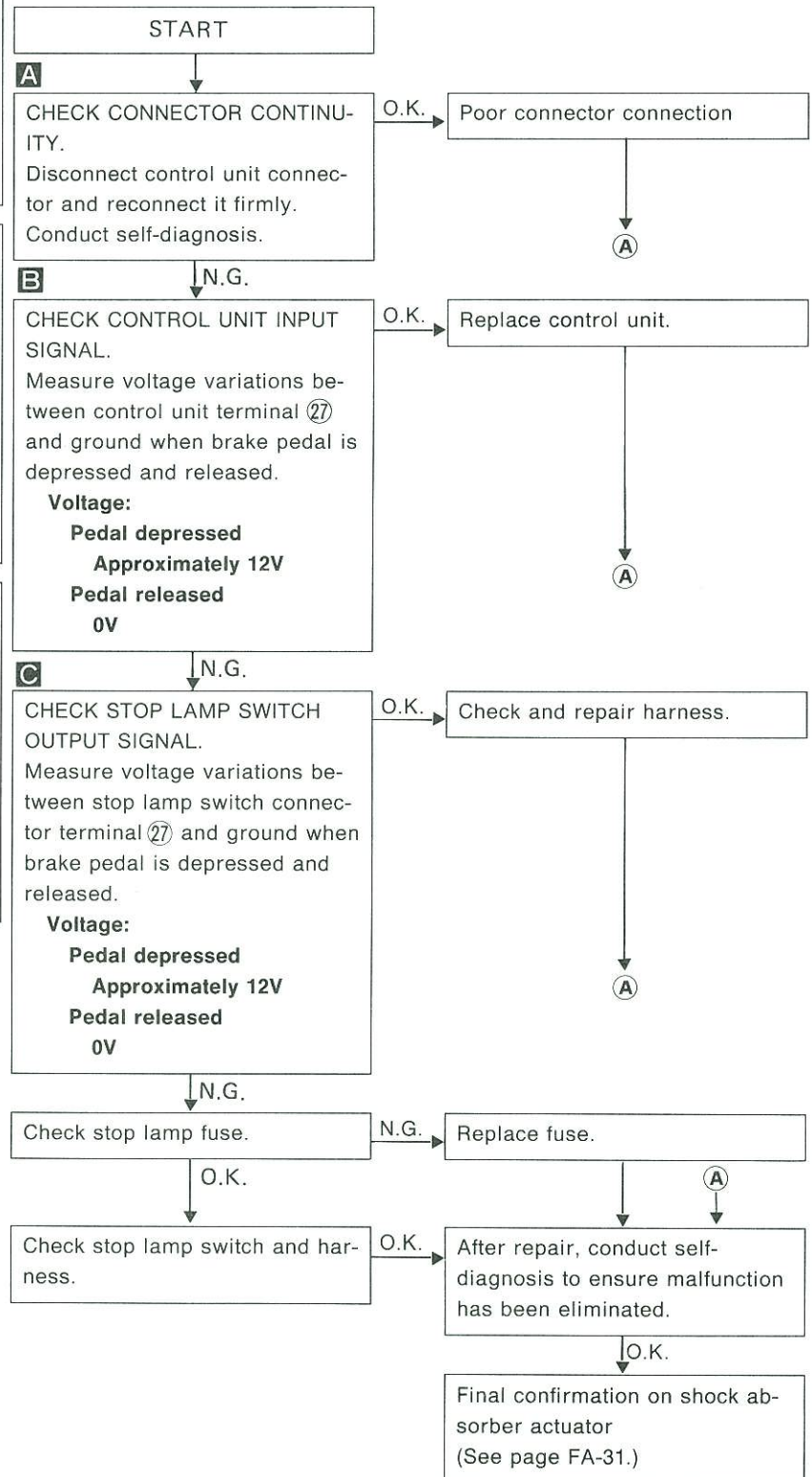


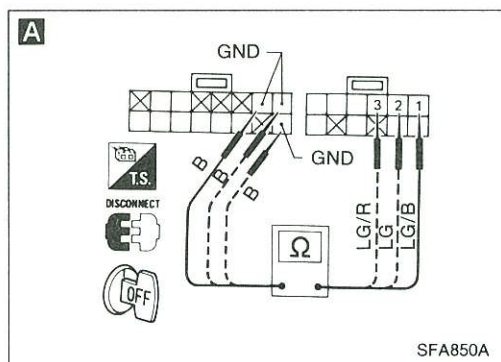


Diagnostic Procedure 5

SYMPTOM:

Brake signal system malfunctions.

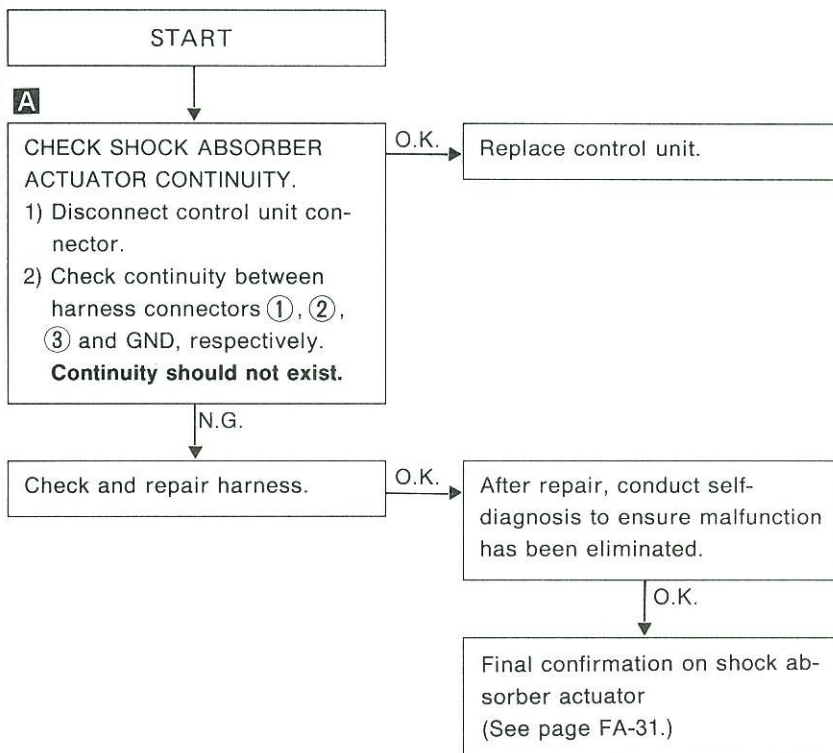


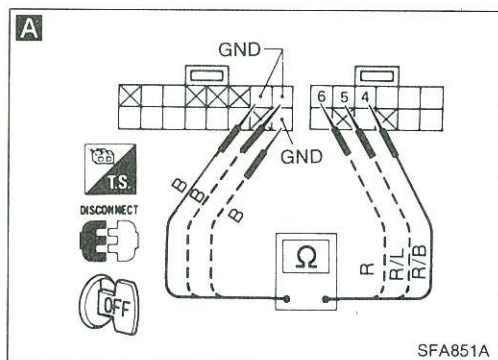


Diagnostic Procedure 6

SYMPTOM:

Front shock absorber actuator malfunctions.

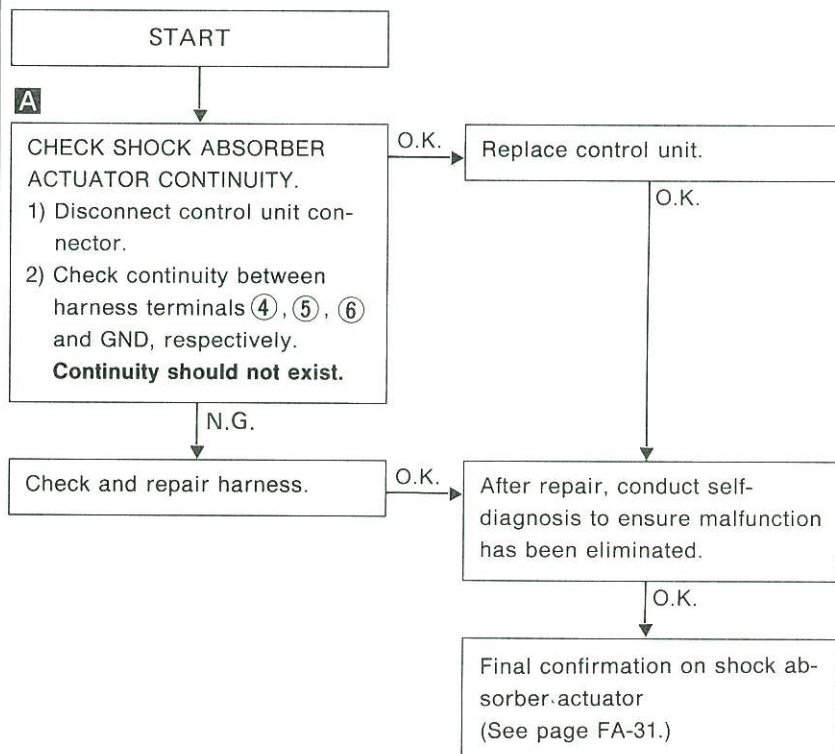


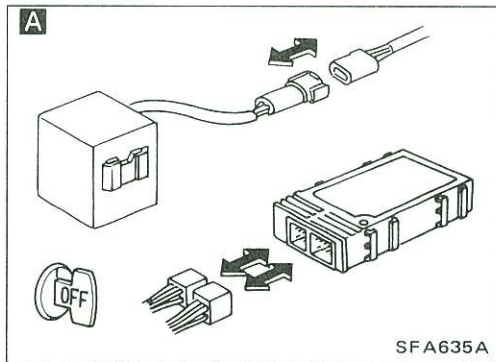


Diagnostic Procedure 7

SYMPTOM:

Rear shock absorber actuator malfunctions.

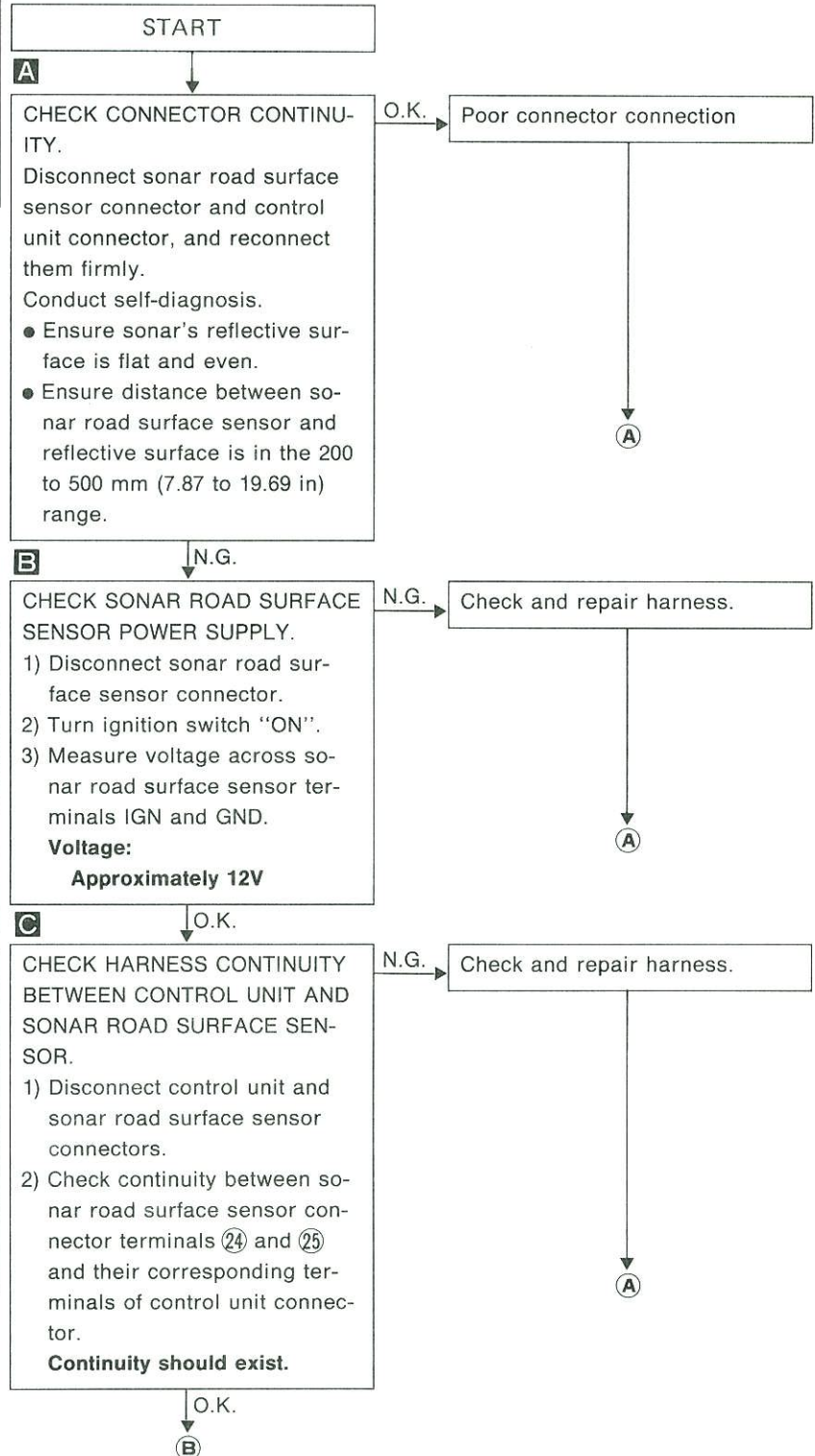
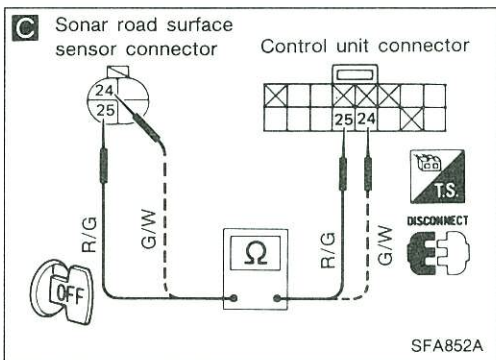
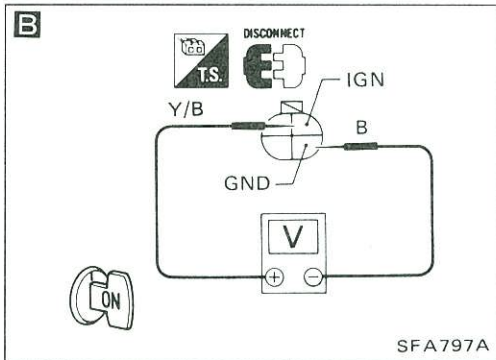




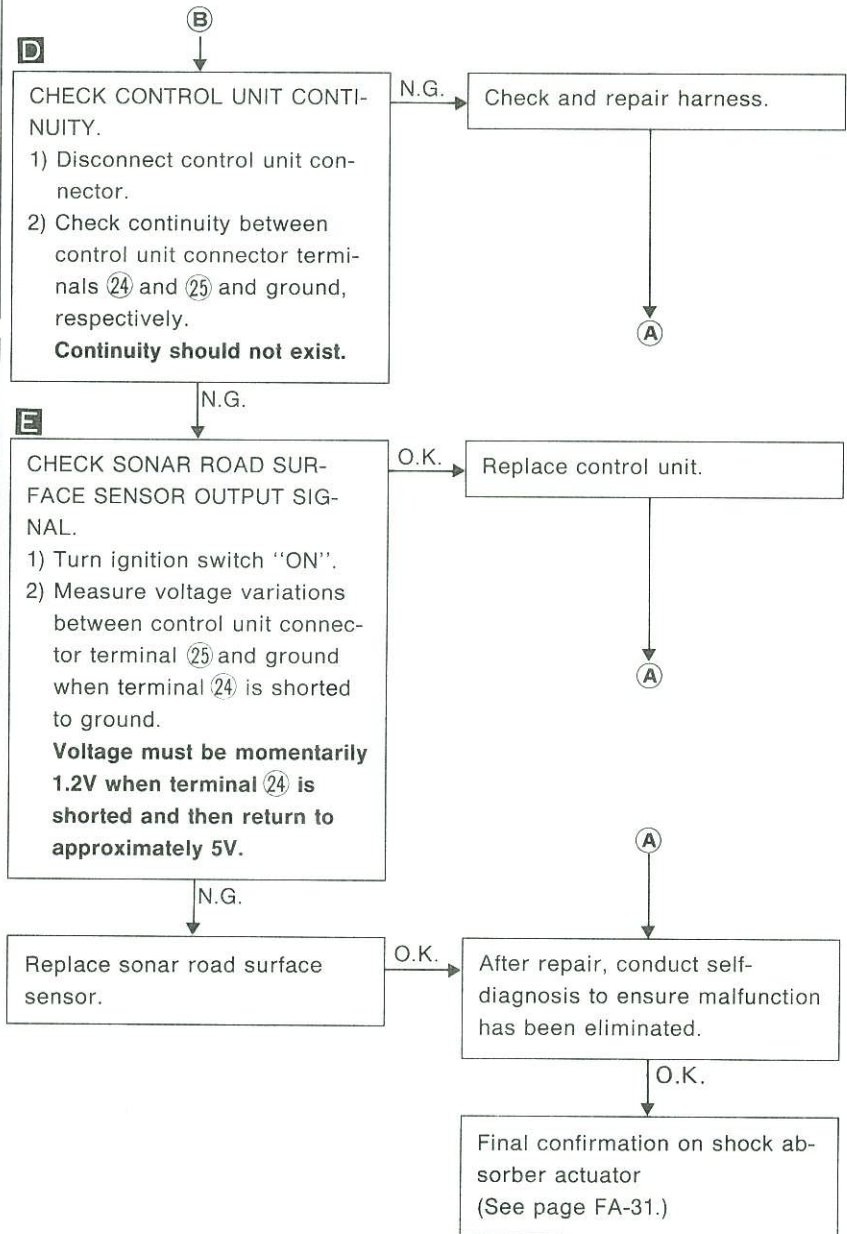
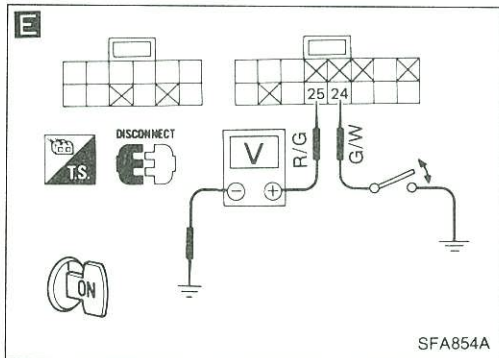
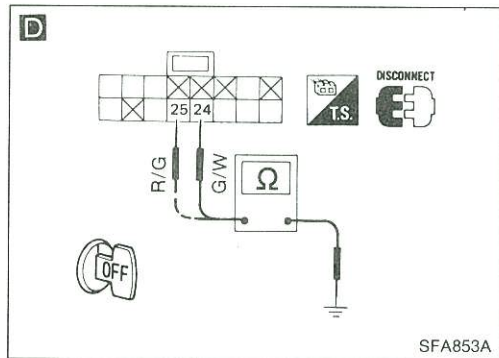
Diagnostic Procedure 8

SYMPTOM:

Sonar road surface sensor system malfunctions.



Diagnostic Procedure 8 (Cont'd)



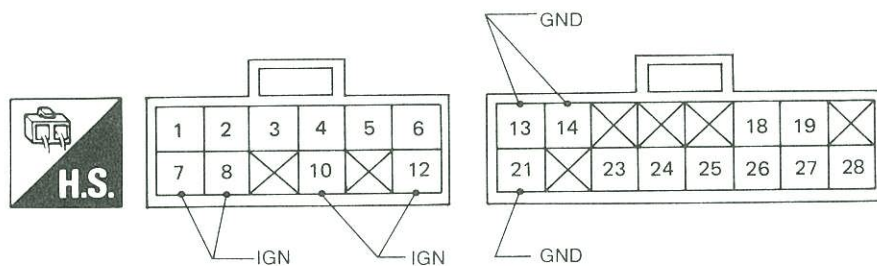
SONAR SUSPENSION SYSTEM — Trouble Diagnoses

Control Unit Inspection Table

The standard values (voltage) measured with an analog tester, in contact with the control unit terminal, are shown below:

Terminal No.	Application	Standard value
1	Front *S/A actuator command signal "S"	Approx. 12V Drops to 2V immediately on output of a command signal.
2	Front S/A actuator command signal "N"	
3	Front S/A actuator command signal "F"	
4	Rear S/A actuator command signal "S"	
5	Rear S/A actuator command signal "N"	
6	Rear S/A actuator command signal "F"	
7	Power	Approx. 12V
8	Power	
10	Power	
12	Power	
13	Ground	0V
14	Ground	
18	Vehicle speed sensor input	When rear wheels are slowly rotated by hand: Changes between 0V and approx. 5V.
19	Steering angle sensor input (1)	When steering wheel is being rotated: Changes between 0V and approx. 5V.
21	Ground	0V
23	Indicator lamp output	Illuminated: Approx. 0 - 1V Not illuminated: Approx. 11V
24	Sonar road surface oscillation order	Approx. 12V 1V on output of oscillation signal
25	Sonar road surface vehicle height input	Approx. 5V 1.2V on input of vehicle height signal
26	Steering angle sensor input (2)	When steering wheel is being rotated: Changes between 0V and approx. 5V.
27	Stop lamp switch input	Pressed: Approx. 12V Released: 0V
28	Select switch input	"COMFORT" position: 12V "SPORT" position: 0V

*S/A: Shock Absorbers



SFA811A

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

General Specifications

COIL SPRING

Wire diameter	mm (in)	13.8 (0.543)
Coil diameter	mm (in)	160.8 (6.33)
Free length	mm (in)	360 (14.17)
Spring constant	N/mm (kg/mm, lb/in)	22.0 (2.24, 125.4)
Identification color		Orange x 2

SHOCK ABSORBER (STRUT)

Piston rod diameter mm (in)	22 (0.87)		
Damping force [at 0.3 m (1.0 ft)/sec.]	Soft	Normal	Firm
N (kg, lb)	461 - 696 (47 - 71, 104 - 157)	883 - 1,314 (90 - 134, 198 - 295)	1,059 - 1,589 (108 - 162, 238 - 357)
Expansion			
Compression	216 - 353 (22 - 36, 49 - 79)	314 - 490 (32 - 50, 71 - 110)	333 - 510 (34 - 52, 75 - 115)

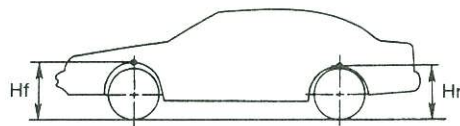
FRONT STABILIZER BAR

Stabilizer diameter	mm (in)	25 (0.98)
Identification color		Yellow

TENSION ROD

Rod diameter	mm (in)	20 (0.79)
--------------	---------	-----------

WHEELARCH HEIGHT (Unladen*)



SFA818A	
Applied model	All
Front (Hf)	mm (in) 673 (26.50)
Rear (Hr)	mm (in) 664 (26.14)

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

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

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*1)

Camber	degree	-35' to 55'
Caster	degree	3°55' - 5°25'
Kingpin inclination	degree	11°55' - 13°25'
Total toe-in	mm (in)	-1 to 1 (-0.04 to 0.04)
	degree	-5' to 5'
Front wheel turning angle*2	degree	
Inside		40°30' - 44°30'
Outside		33°30'

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

*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine at idle.

WHEEL RUNOUT (Radial and lateral)

Wheel type	Aluminum wheel
Radial runout limit	0.3 (0.012)
Lateral runout limit	
	mm (in)

WHEEL BEARING

Wheel bearing end play limit	0 (0)
mm (in)	
Wheel bearing lock nut	
Tightening torque	34 - 39
N·m (kg-m, ft-lb)	(3.5 - 4.0, 25 - 29)
Return angle	90°
degree	
Maximum wheel bearing preload measured at wheel hub bolt	13.7 (1.4, 3.1)
N (kg, lb)	

LOWER BALL JOINT

Swinging force at cotter pin hole	24.5 - 80.4
N (kg, lb)	(2.5 - 8.2, 5.5 - 18.1)
Turning torque	1.5 - 4.9
N·m (kg-cm, in-lb)	(15 - 50, 13 - 43)
Vertical end play	0.1 - 1.3 (0.004 - 0.051)
mm (in)	

REAR AXLE & REAR SUSPENSION

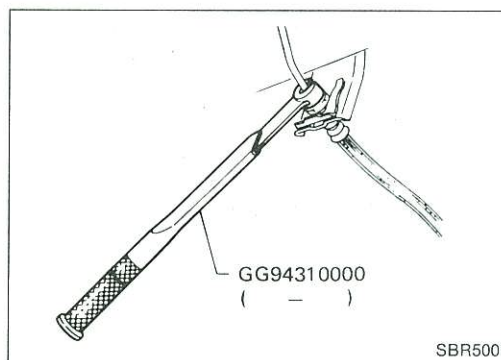
SECTION **RA**

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SERVICE DATA AND SPECIFICATIONS (S.D.S.)	RA-23

RA

PRECAUTIONS AND PREPARATION


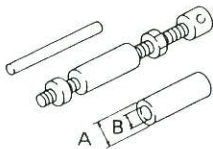
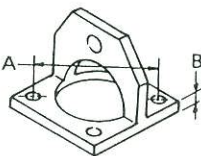

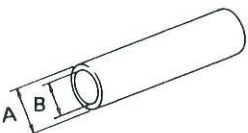


Precautions

- When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.
- *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
- Use Tool when removing or installing brake tubes.
- When removing each suspension part, check wheel alignment and adjust if necessary.

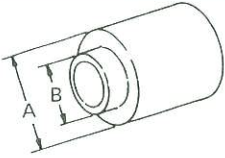
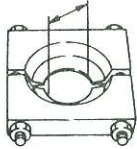
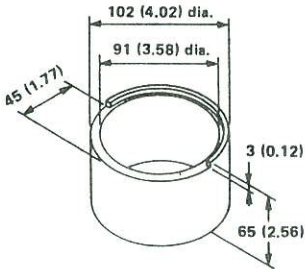
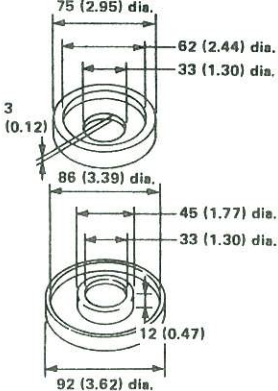
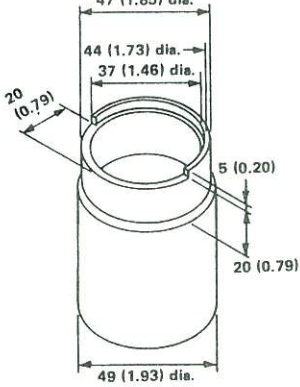
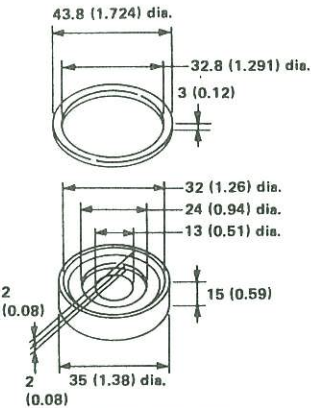
Preparation

SPECIAL SERVICE TOOLS

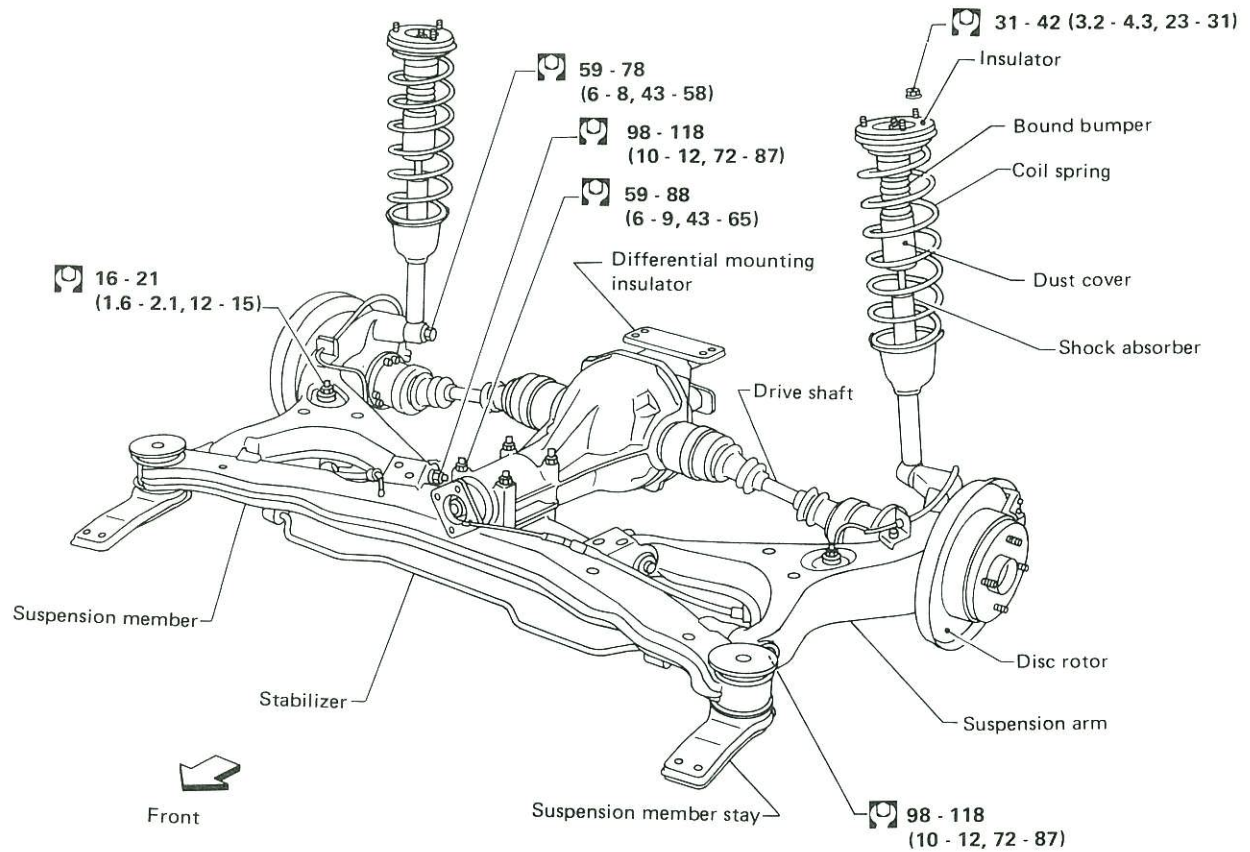
Tool number (Kent-Moore No.) Tool name	Description
GG94310000 (-) Flare nut torque wrench	 <p>Removing or installing each type of brake piping</p>
ST38280000 (-) Rear suspension arm bushing drift	 <p>A: 42 mm (1.65 in) dia. B: 32 mm (1.26 in) dia.</p> <p>Removing or installing rear suspension bushing</p>
ST07640000 (-) Axle stand	 <p>A: 114.3 mm (4.50 in) dia. B: 12 mm (0.47 in)</p> <p>Removing axle shaft</p>
ST36230000 (J25840-A) Sliding hammer	 <p>Removing rear axle shaft</p>
ST37750000 (J25863-01) Rear axle shaft bearing drift	 <p>A: 40 mm (1.57 in) dia. B: 31 mm (1.22 in) dia.</p> <p>Installing axle shaft bearing</p>

PRECAUTIONS AND PREPARATION

Preparation (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
ST37710000 (—) Rear axle grease seal drift	 <p>A: 60 mm (2.36 in) dia. B: 38 mm (1.50 in) dia.</p> <p>Installing grease seal</p>
ST30021000 (—) Bearing replacer	 <p>68 mm (2.68 in) dia.</p> <p>Removing outer bearing in rear suspension arm</p>
KV401052S0 (—) KV40105210 (—) KV40105220 (—) KV40105230 (—) Drift-suspension member insulator	  <p>Unit: mm (in)</p> <p>Removing or installing suspension member insulator</p>
KV401051S0 (—) KV40105110-1 (—) KV40105110-2 (—) KV40105120 (—) Drift-rear suspension arm bushing	  <p>Unit: mm (in)</p> <p>Removing or installing rear suspension arm bushing</p>

REAR AXLE AND REAR SUSPENSION

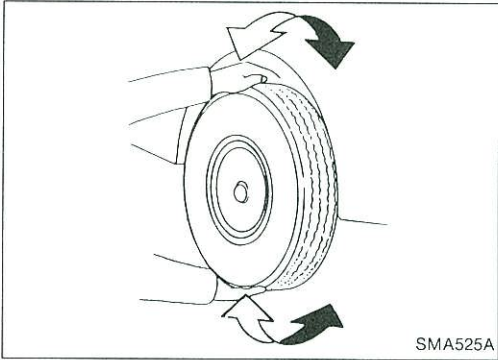


: N·m (kg-m, ft-lb)

Final tightening for rubber parts requires to 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.



Rear Axle and Rear Suspension Parts

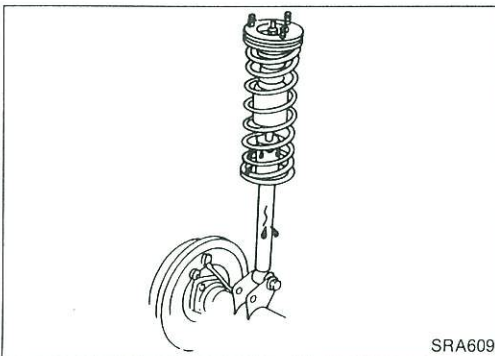
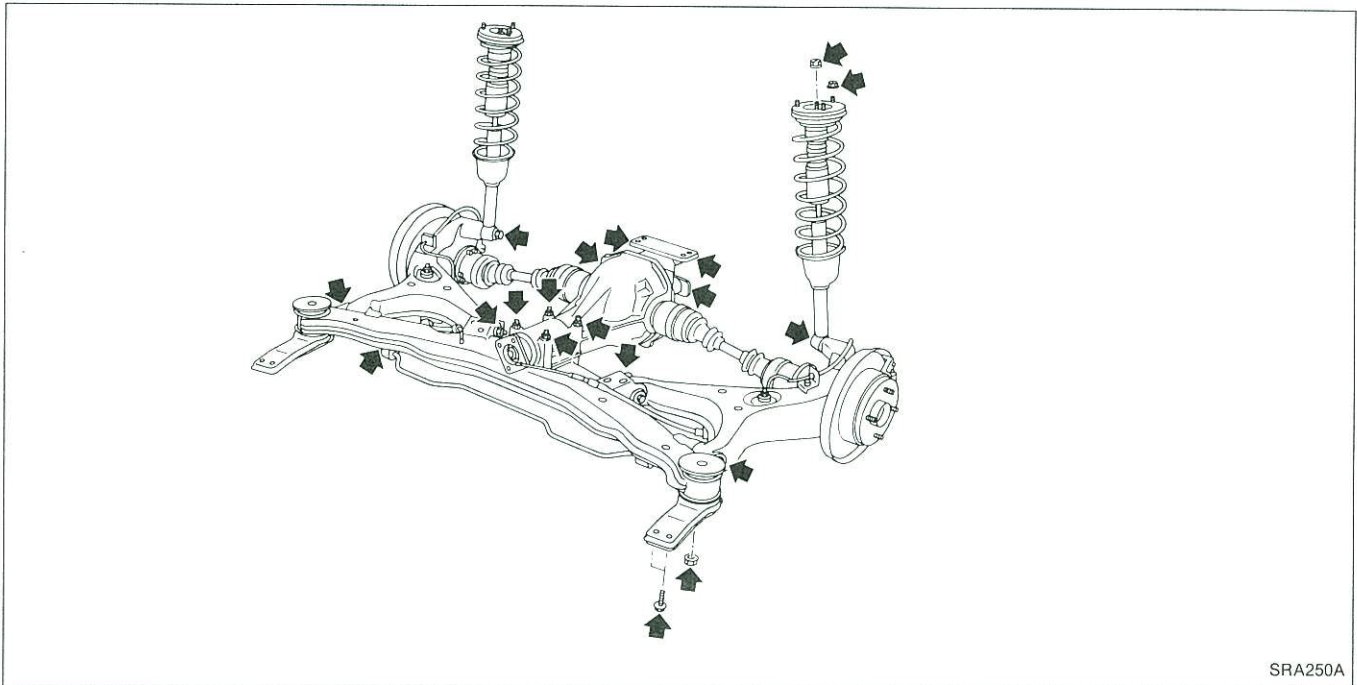
Check axle and suspension parts for looseness, wear or damage.

- Shake each rear wheel to check for excessive play.

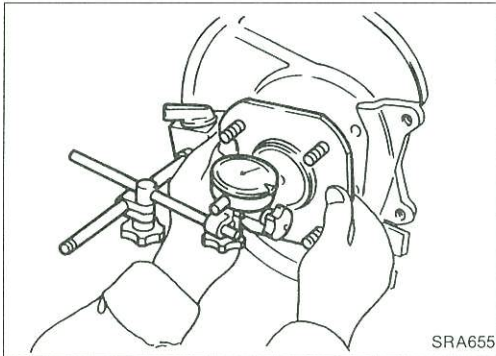
- Make sure that cotter pin is inserted.
- Retighten all nuts and bolts to the specified torque.

Tightening torque:

Refer to drawing in REAR SUSPENSION.

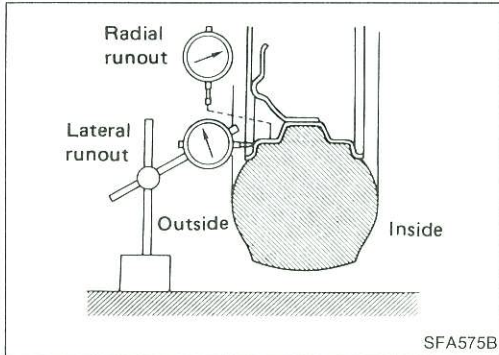


- Check shock absorber for oil leakage or other damage.
- Check wheelarch height — refer to CHECK AND ADJUSTMENT — On-vehicle in section FA.



Rear Wheel Bearing

- Check axial end play.
Axial end play limit:
0.05 mm (0.0020 in)
- Check that wheel bearings operate smoothly.
- Check tightening torque of wheel bearing lock nut.
⌚: 127 - 177 N·m (13 - 18 kg-m, 94 - 130 ft-lb)
- If there is any axial end play or wheel bearing does not turn smoothly, replace wheel bearing assembly. Refer to REAR AXLE.



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 S.D.S. in section FA.
 - 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.

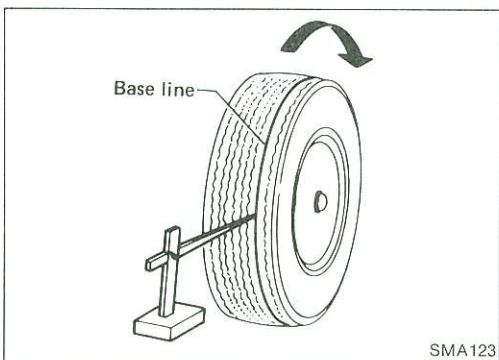
CAMBER

Camber is preset at factory and cannot be adjusted.

Camber:

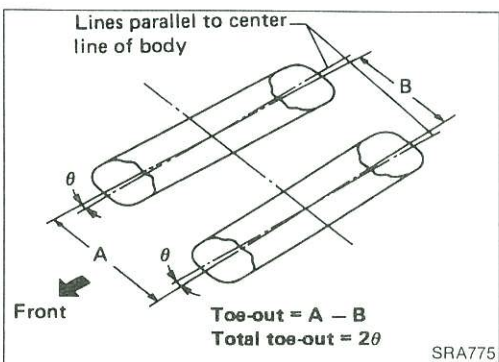
-1°5' to 0°25'

- If the camber is not within specification, inspect and replace any damaged or worn rear suspension parts.



TOE-OUT

1. Draw a base line across the tread.
- After lowering rear of vehicle, move it up and down to eliminate friction.



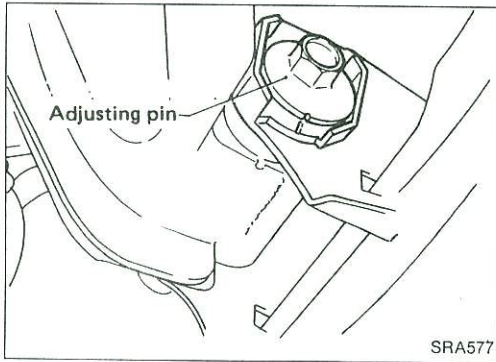
2. Measure toe-out.
- Measure distance "A" and "B" at the same height as hub center.

Toe-out:

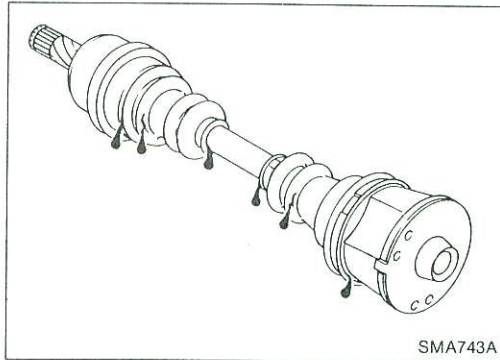
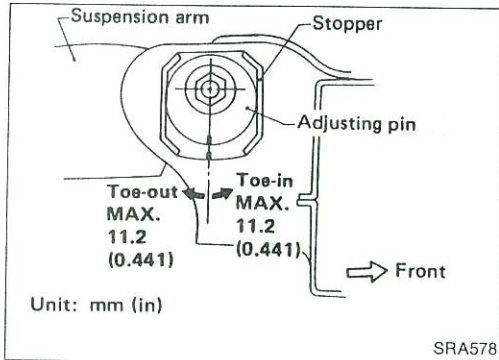
A — B 0.2 - 4.2 mm (0.008 - 0.165 in)
2θ 1' - 22'

CHECK AND ADJUSTMENT — On-vehicle

Rear Wheel Alignment (Cont'd)



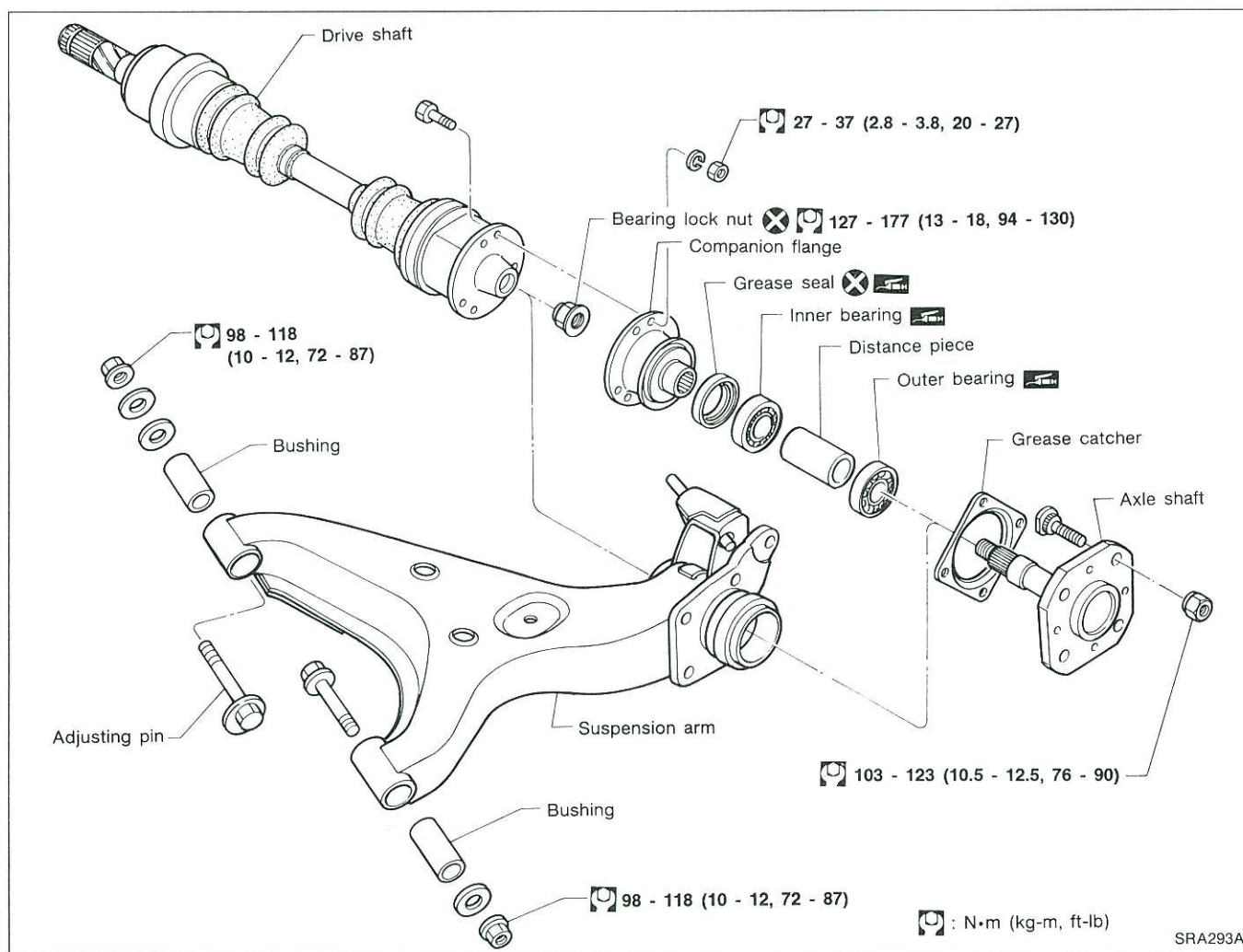
- If not within specification, turn the left and right adjusting pins equal amounts to adjust.



Drive Shaft

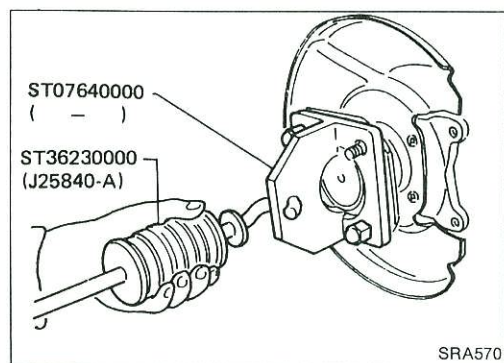
Check for grease leakage or other damage.

REAR AXLE



Disassembly

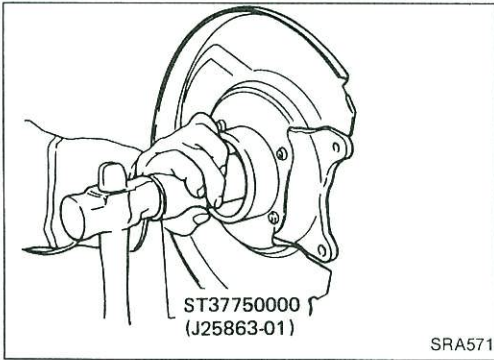
- Disconnect drive shaft. Refer to Drive Shaft for removal and installation.
- Remove wheel bearing lock nut while operating parking brake or brake pedal depressed.
- Remove brake caliper and rotor. Refer to section BR.



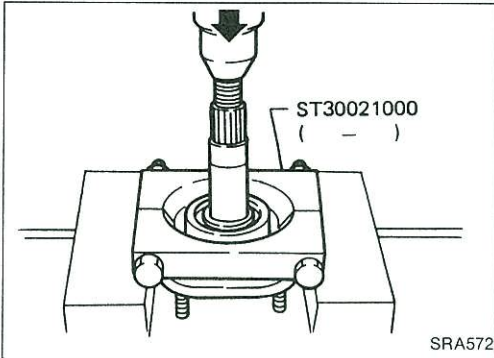
- Draw out rear axle shaft with Tool.

REAR AXLE

Disassembly (Cont'd)



- Remove companion flange and distance piece.
- Remove grease seal and inner bearing with Tool.



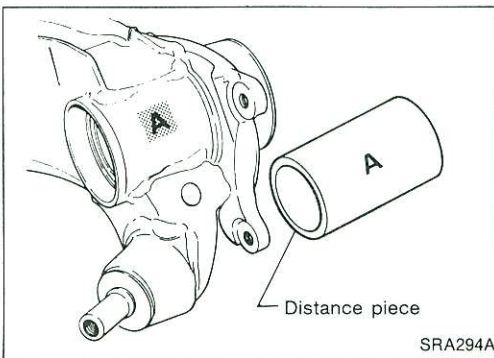
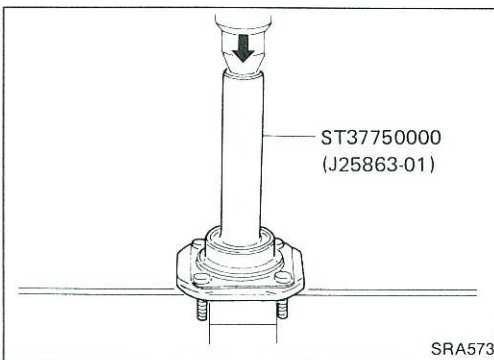
- Remove outer bearing from axle shaft with Tool.

Inspection

- Check wheel bearing for end play and rolling surface for flaking or wear. Replace if necessary.
- Check rear axle shaft for cracks, wear or deformation. Replace if necessary.
- Check companion flange for wear, deformation or other damage. Replace if necessary.
- Check distance piece for wear or other damage. Replace if necessary.
- Check grease seal for cracks, wear or deformation. Replace if necessary.

Assembly

- When installing wheel bearing, make sure that the sealed side of bearing faces outside.
- When installing outer bearing to rear axle shaft, use Tool.



- Select a distance piece according to the chart below.

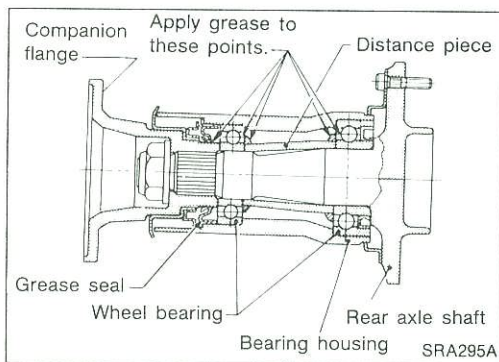
Bearing housing	Distance piece
A	A
B	B
C	C

When a distance piece is reused, make sure that both ends are not collapsed or deformed.

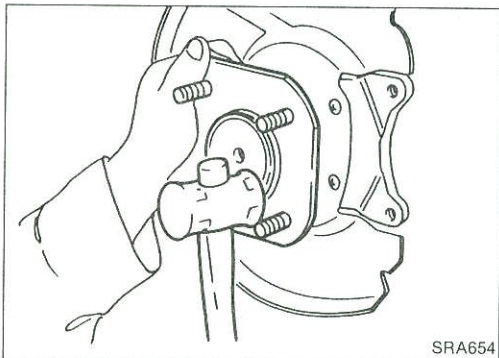
When installing, make sure that larger side faces axle shaft flange.

REAR AXLE

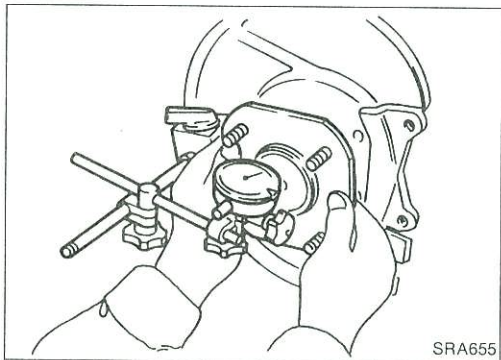
Assembly (Cont'd)



- Apply recommended multi-purpose grease to the portions indicated to the left.

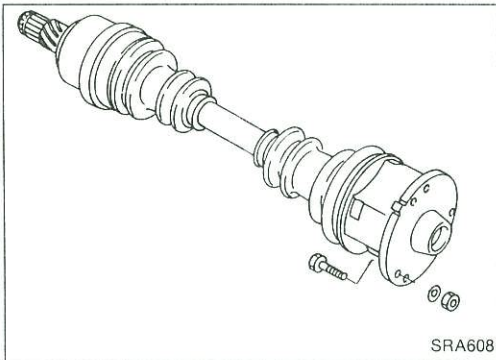


- Install rear axle shaft by slightly tapping with brass hammer.
- Tighten wheel bearing lock nut to the specified torque.
⌚: 127 - 177 N·m (13 - 18 kg-m, 94 - 130 ft-lb)
- Check that wheel bearing operates smoothly.
- Stake wheel bearing lock nut.



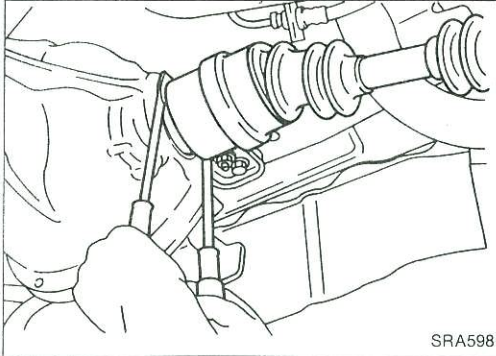
- Check wheel bearing axial end play.
Axial end play limit:
0.05 mm (0.0020 in)

REAR AXLE — Drive Shaft



Removal and Installation

Cover boots with waste cloth so as not to damage them when replacing.

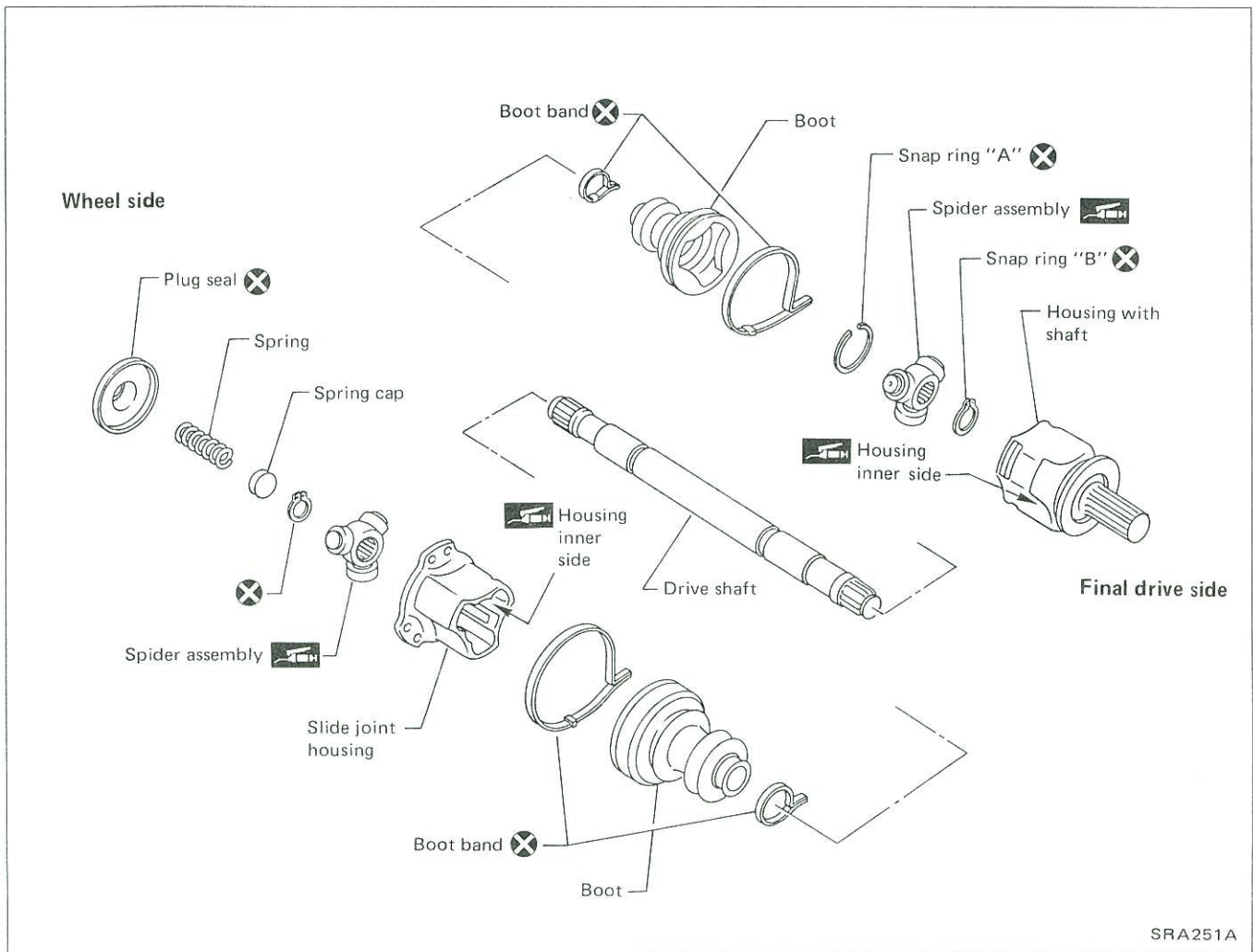


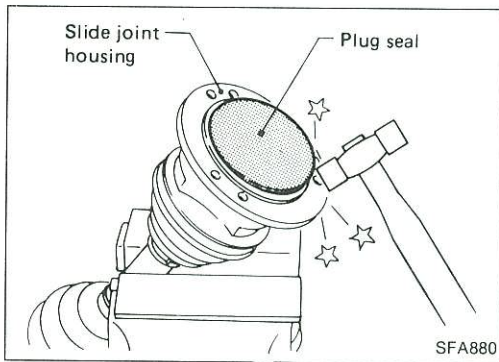
- Extract drive shaft from differential carrier by prying it with a suitable tool.

CAUTION:

Be careful not to damage oil seal of differential carrier.

Make sure that circular clip is properly meshed with side gear and will not come out.

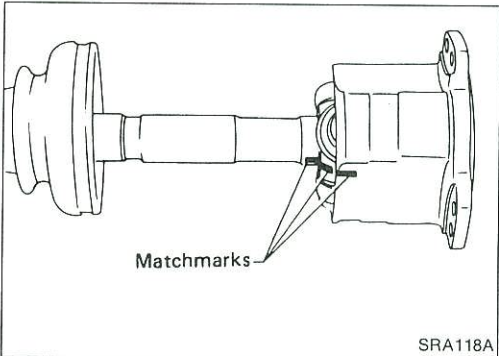




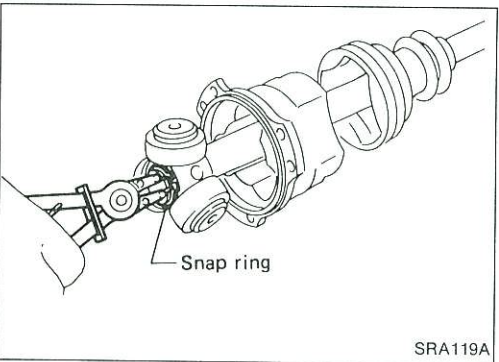
Disassembly

WHEEL SIDE

1. Remove plug seal from slide joint housing by lightly tapping around slide joint housing.



2. Remove boot bands.
3. Put matchmarks on slide joint housing and drive shaft before separating joint assembly.
4. Put matchmarks on spider assembly and drive shaft.



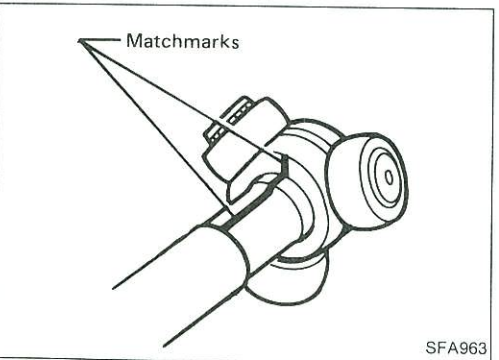
5. Pry off snap ring, then remove spider assembly.

CAUTION:

Do not disassemble spider assembly.

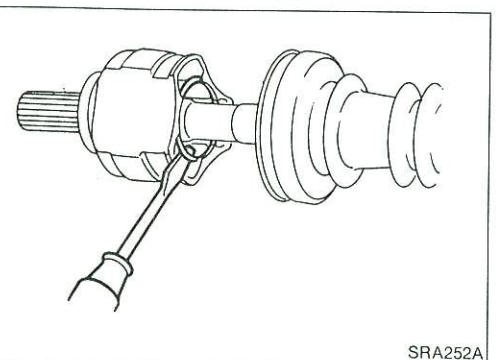
6. Draw out slide joint housing.
7. Draw out boot.

Cover drive shaft serration with tape to prevent damage to the boot.



FINAL DRIVE SIDE

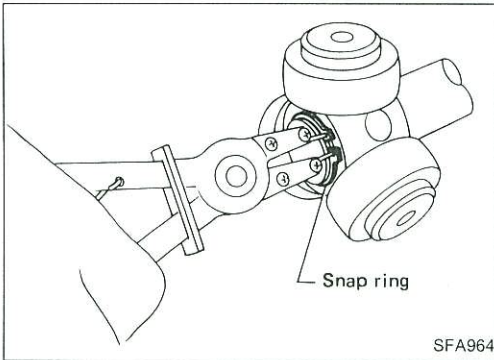
1. Remove boot bands.
2. Put matchmarks on housing together with shaft and drive shaft before separating joint assembly.
3. Put matchmarks on spider assembly and drive shaft.



4. Pry off snap ring "A" with a screwdriver, and pull out slide joint housing.

REAR AXLE — Drive Shaft

Disassembly (Cont'd)



5. Pry off snap ring "B", then remove spider assembly.

CAUTION:

Do not disassemble spider assembly.

6. Draw out boot.

Cover drive shaft serration with tape to prevent damage to the boot.

Inspection

Thoroughly clean all parts in cleaning solvent, and dry with compressed air. Check parts for deformation or other damage.

DRIVE SHAFT

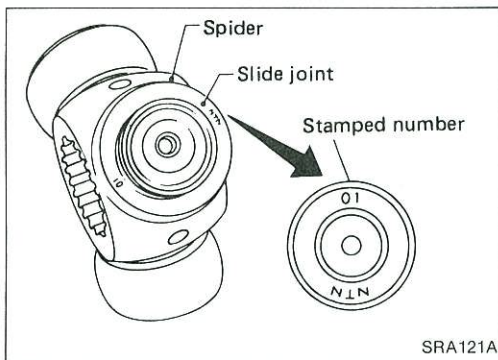
Replace drive shaft if it is twisted or cracked.

BOOT

Check boot for fatigue, cracks, or wear. Replace boot with new boot bands.

JOINT ASSEMBLY

- Check spider assembly for bearing, roller and washer damage. Replace spider assembly if necessary.
- Check housing for any damage. Replace housing set and spider assembly, if necessary.



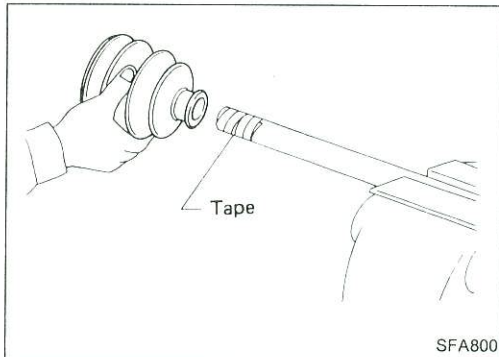
- When replacing only spider assembly, select a new spider assembly from among those listed in table below. Ensure the number stamped on sliding joint is the same as that stamped on new part.

Housing alone cannot be replaced. It must be replaced together with spider assembly.

Stamped number	Part No.
00	39720 10V10
01	39720 10V11
02	39720 10V12

Assembly

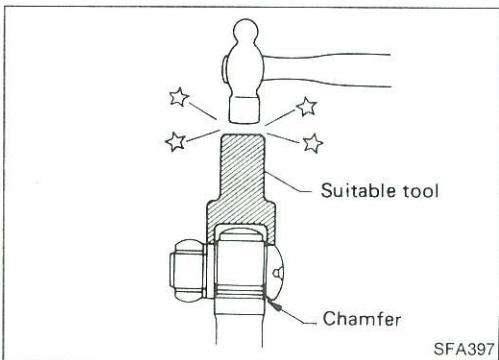
- After drive shaft has been assembled, make sure it moves smoothly over its entire range without binding.
- Use Nissan Genuine Grease or equivalent after every overhaul.



WHEEL SIDE

1. Install new small boot band, boot and slide joint housing to drive shaft.

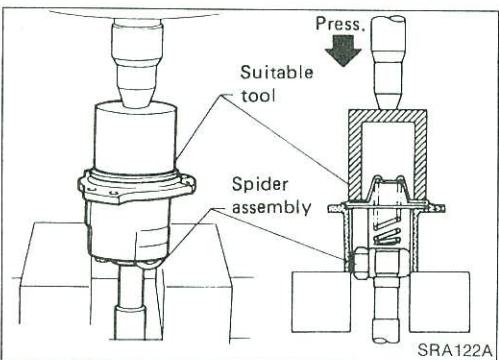
Cover drive shaft serration with tape to prevent damage to boot during installation.



2. Install spider assembly securely, making sure marks are properly aligned.

- Press-fit with spider assembly serration chamfer facing shaft.

3. Install new snap ring.

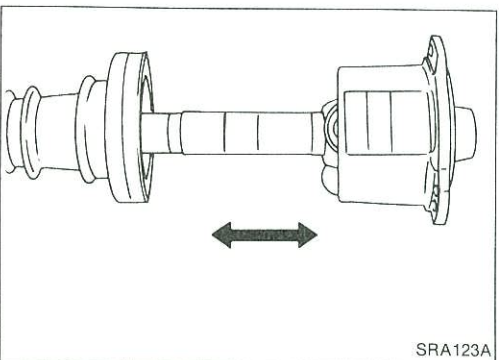


4. Install coil spring, spring cap and new plug seal to slide joint housing. Press plug seal.

Apply sealant to mating surface of plug seal.

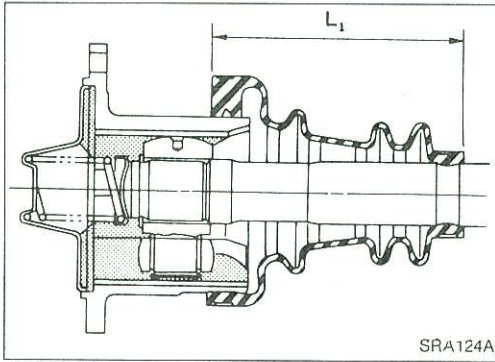
CAUTION:

- a. When pressing plug seal into place, hold it horizontal so that spring inside it does not tilt or fall down.
- b. Move shaft in axial direction to ensure that spring is installed properly. If shaft drags or if spring is not installed properly, remove plug seal and install a new one. Discard plug seal after removal.



REAR AXLE — Drive Shaft

Assembly (Cont'd)



5. Pack drive shaft with specified amount of grease.

Specified amount of grease:

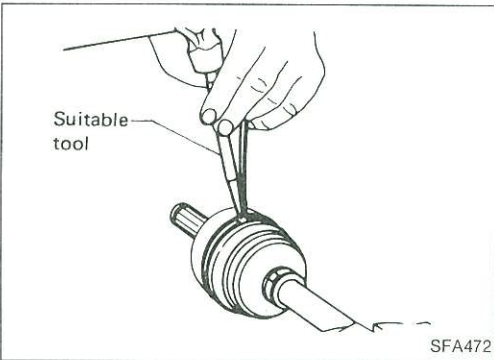
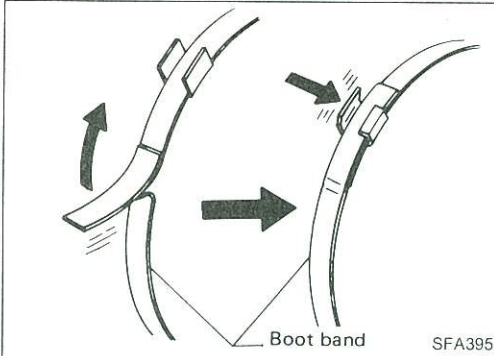
185 - 195 g (6.52 - 6.88 oz)

6. Set boot so that it does not swell and deform when its length is " L_1 ".

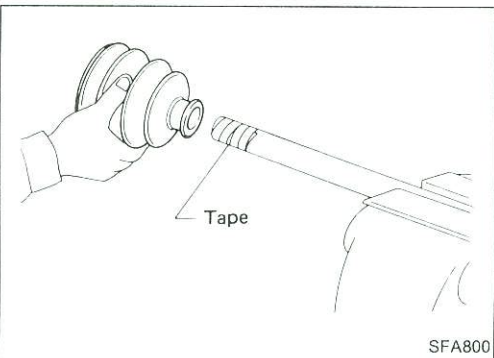
Length " L_1 ":

110.5 - 112.5 mm (4.35 - 4.43 in)

Make sure that boot is properly installed on the drive shaft groove.



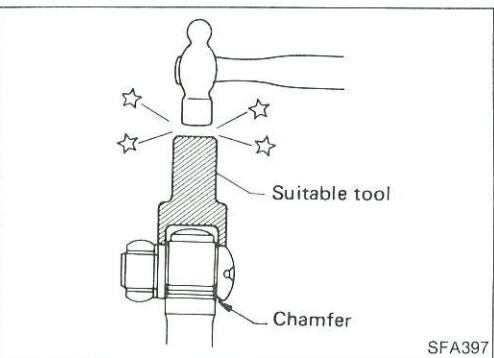
7. Lock new larger boot band securely with a suitable tool, then lock new smaller boot band.



FINAL DRIVE SIDE

1. Install new small boot band and boot on drive shaft.

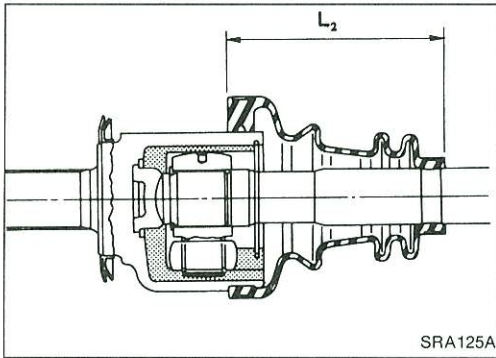
Cover drive shaft serration with tape to prevent damage to boot during installation.



2. Install spider assembly securely, making sure marks are properly aligned.
 - Press-fit with spider assembly serration chamfer facing shaft.
3. Install new snap ring.

REAR AXLE — Drive Shaft

Assembly (Cont'd)



4. Pack drive shaft with specified amount of grease.

Specified amount of grease:

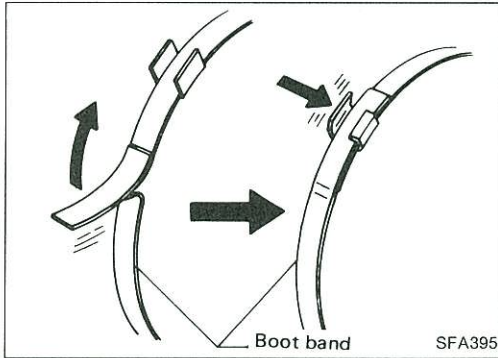
155 - 165 g (5.47 - 5.82 oz)

5. Install slide joint housing, then install new snap ring "A".
6. Set boot so that it does not swell and deform when its length is " L_2 ".

Length " L_2 ":

110.5 - 112.5 mm (4.35 - 4.43 in)

Make sure that boot is properly installed on the drive shaft groove.

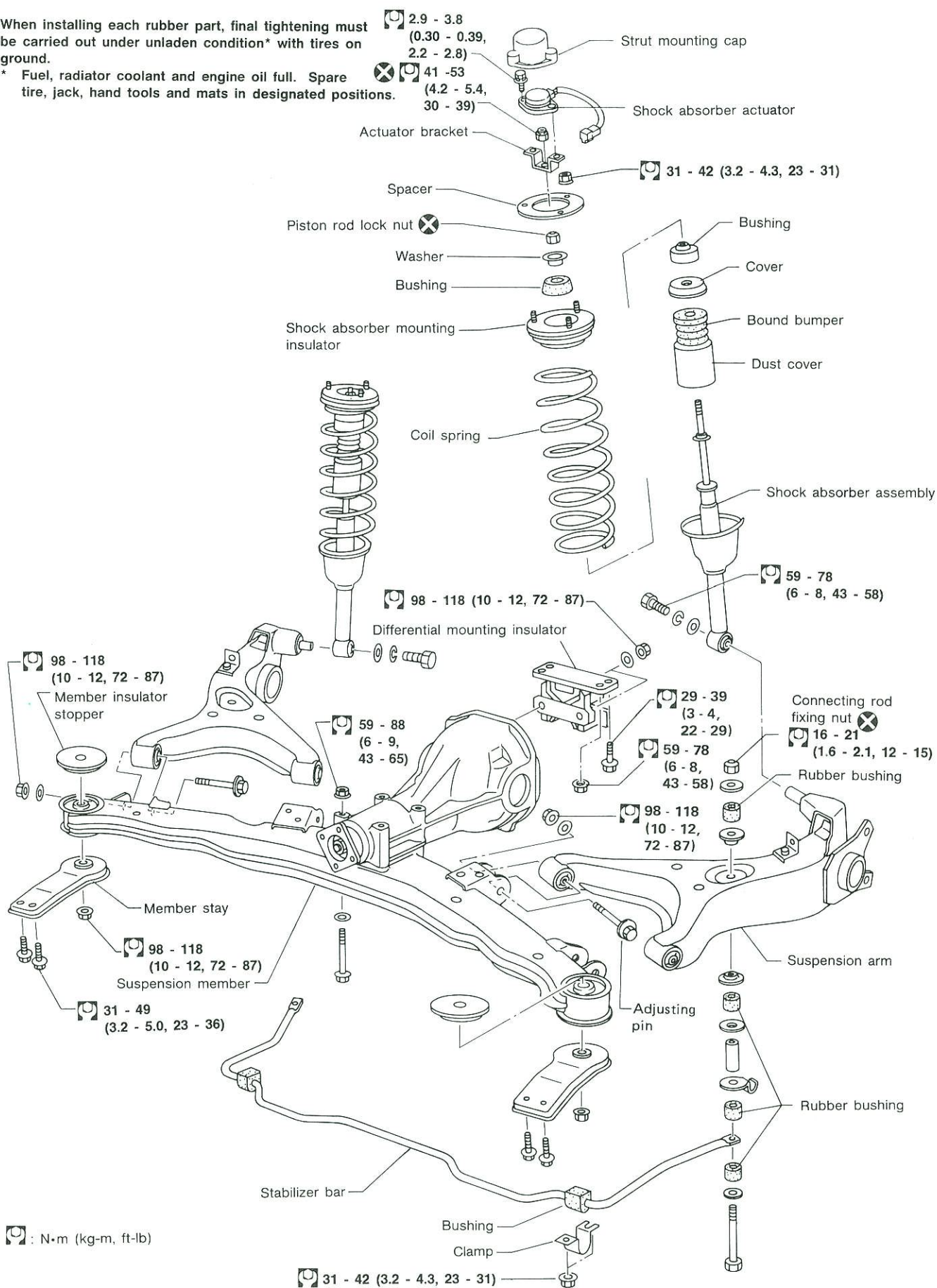


7. Lock new larger and smaller boot bands securely with a suitable tool.

REAR SUSPENSION

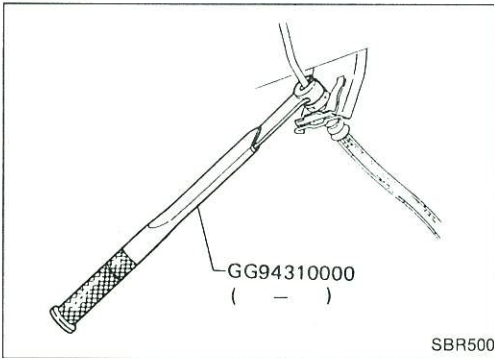
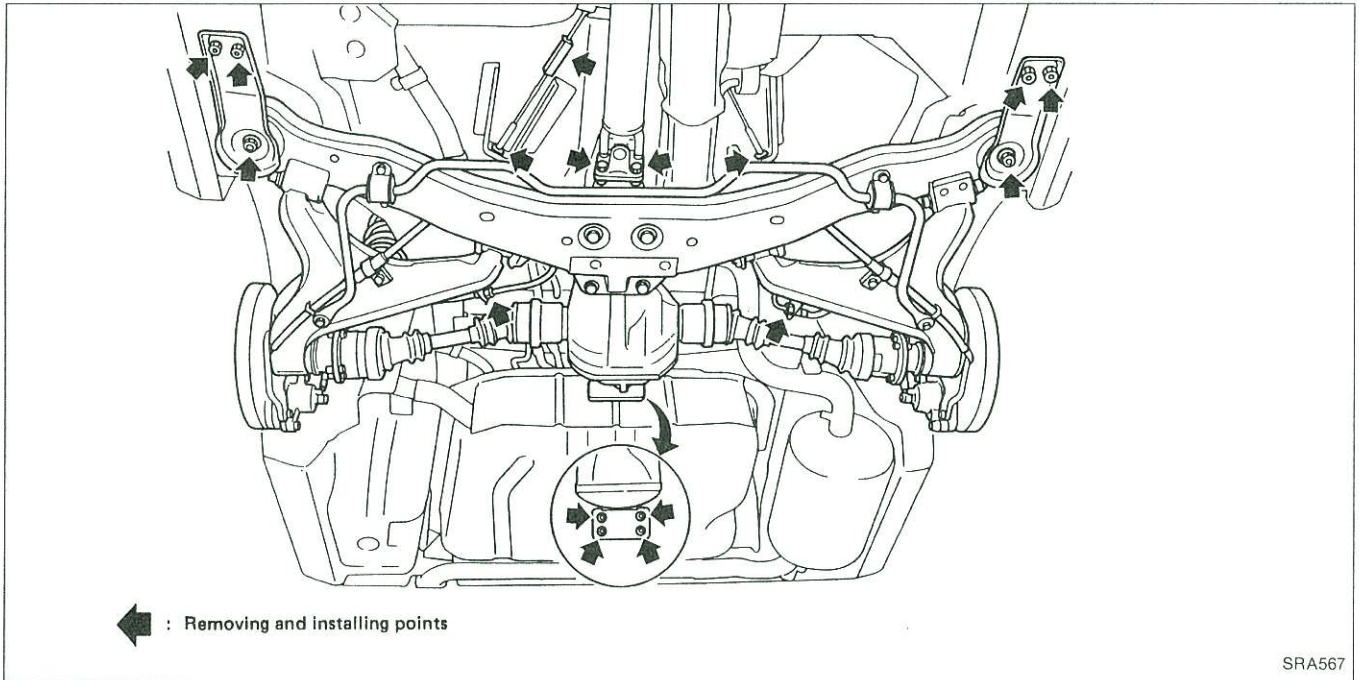
When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.

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

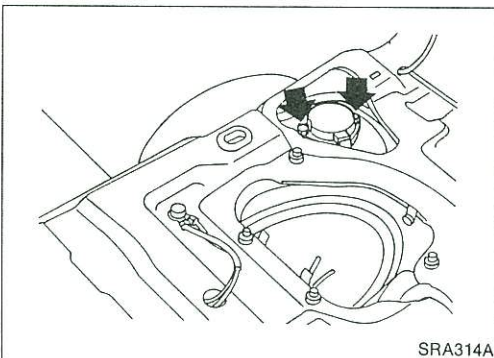


REAR SUSPENSION

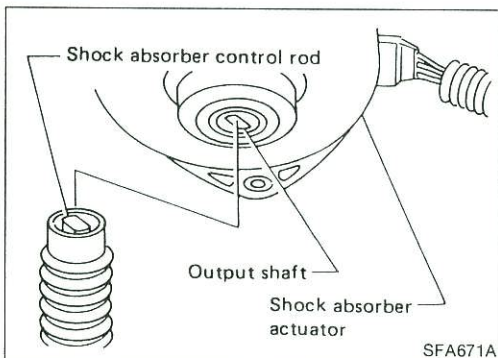
Removal and Installation



- Disconnect brake hydraulic line and parking brake cable.
- CAUTION:**
Use Tool when removing or installing brake tubes.
Final tightening for rubber parts requires to be carried out under unladen condition with tires on ground.
- Disconnect propeller shaft. Refer to section PD.

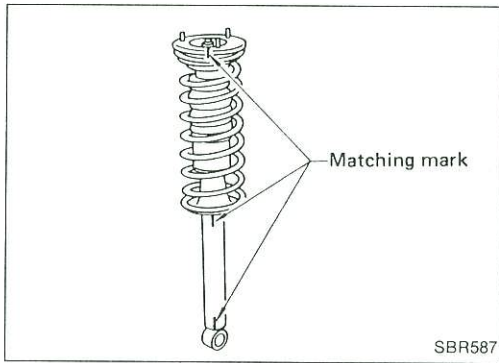


- Remove rear parcel shelf. Refer to section BF.
- Disconnect sub-harness connector.
- Remove strut mounting cap.
- Remove shock absorber actuator fixing bolts.
- Remove shock absorber upper end nuts.



- Before installing actuator, ensure angle of shock absorber control rod is aligned with that of actuator output shaft. Otherwise, actuator may be damaged.

REAR SUSPENSION



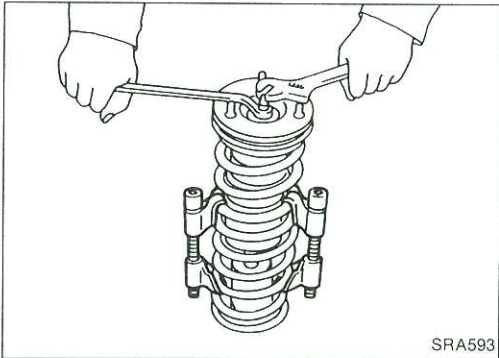
Coil Spring and Shock Absorber

REMOVAL

- Refer to Removal and Installation in REAR SUSPENSION.

DISASSEMBLY AND ASSEMBLY

Make matching marks on insulator and shock absorber before disassembling.



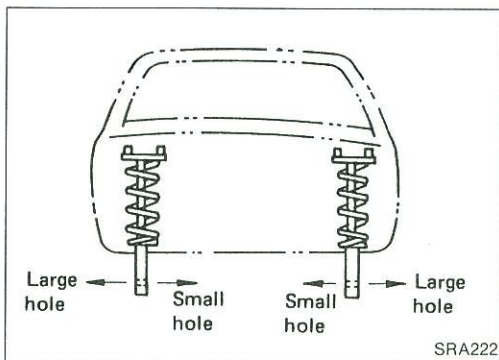
- Remove coil spring with a suitable tool.
- Tighten lock nut as far as it goes when assembling.

INSPECTION

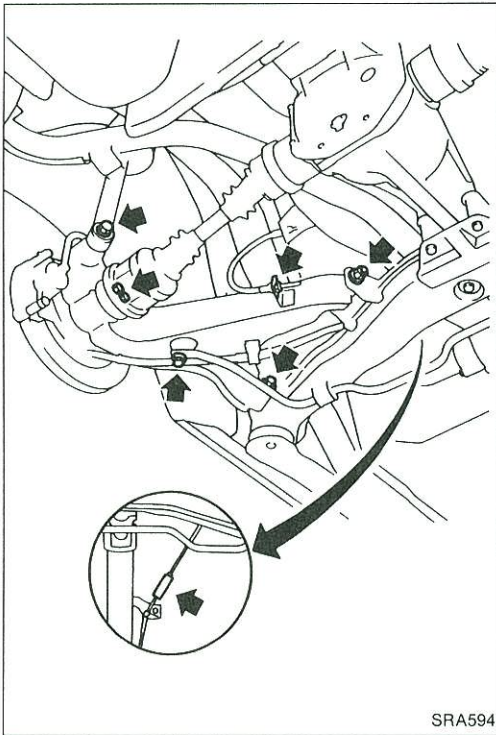
- Check coil spring for yield, deformation or cracks.
- Check coil spring specifications. Refer to S.D.S.
- Check shock absorber for oil leakage, cracks or deformation.
- Check shock absorber specifications. Refer to S.D.S.
- Check shock absorber mounting insulator and other rubber parts for wear, cracks or deformation. Replace if necessary.
- Check sonar suspension system. Refer to SONAR SUSPENSION SYSTEM — Trouble Diagnoses in section FA.

INSTALLATION

Install shock absorber so that the larger hole on the lower end faces out.



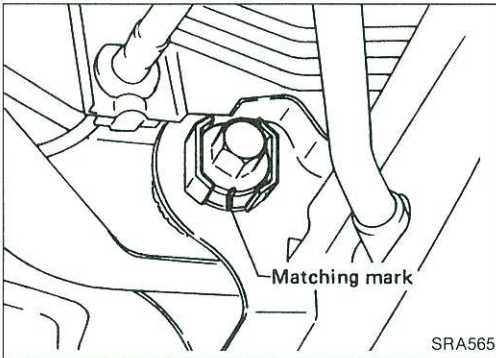
REAR SUSPENSION



SRA594

Suspension Arm

- Remove axle shaft assembly. Refer to Disassembly in REAR AXLE.
- Remove stabilizer bar bolt.
- Disconnect parking cable.
- Disconnect shock absorber lower end.



SRA565

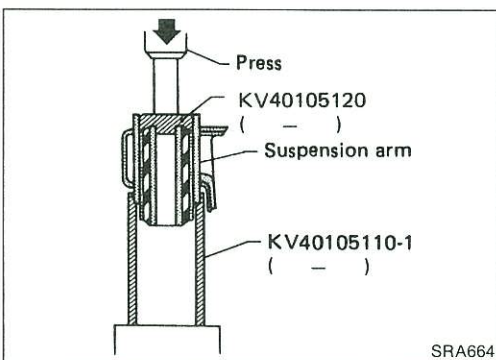
- Remove suspension arm pin.

Before removing, put matching mark on suspension arm pin.

- When installing, tighten suspension arm pin nut to specified torque after installing wheels and placing vehicle on ground under the unladen condition.
- Adjust wheel alignment after installing suspension arm. Refer to Rear Wheel Alignment in CHECK AND ADJUSTMENT — On-vehicle.

INSPECTION

- Check suspension arm for deformation or cracks. Replace if necessary.



SRA664

Suspension Arm Bushing

REMOVAL

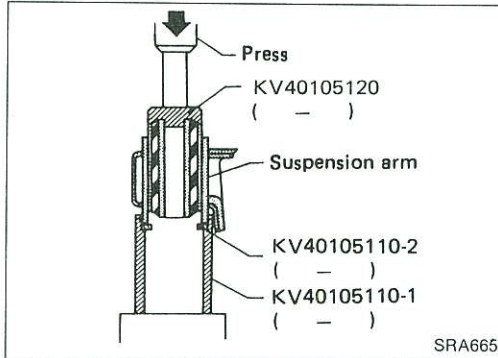
- Remove bushing with Tool.

REAR SUSPENSION

Suspension Arm Bushing (Cont'd)

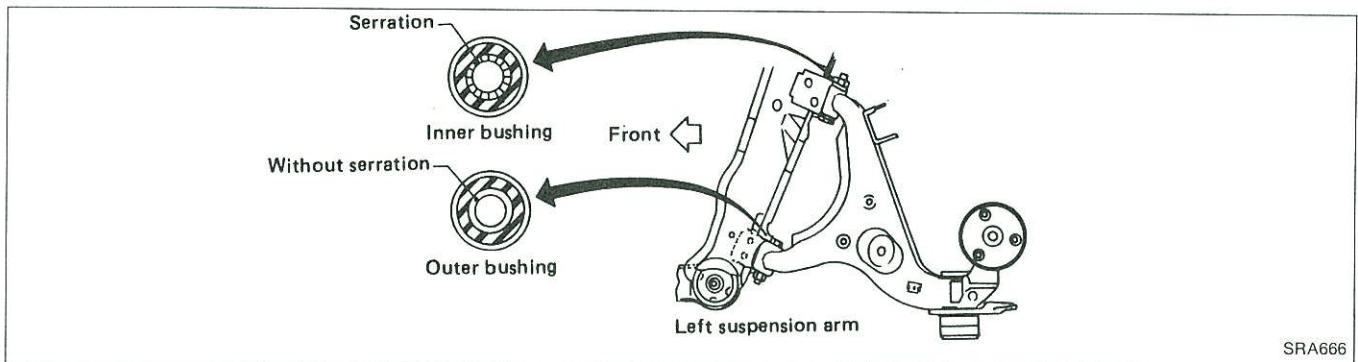
INSPECTION

- Check rubber bushings for wear or other damage. Replace if necessary.



INSTALLATION

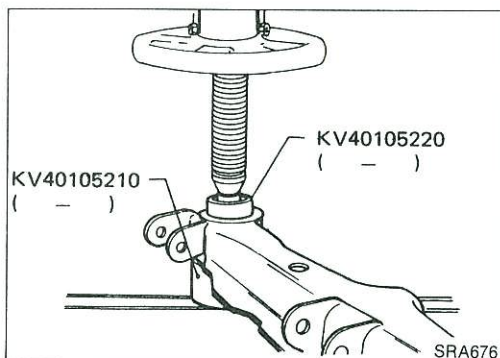
- Install bushing with Tool.
- Avoid misusing of inner bushing and outer bushing.**



Suspension Member

INSPECTION

- Check differential mounting insulator for deformation or cracks. Replace if necessary.
- Check suspension member for deformation or cracks. Replace if necessary.
- Check insulator on suspension member for deformation or cracks. Replace if necessary.

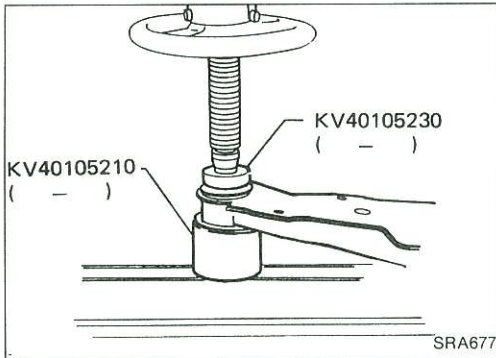


- a. If member insulator is deformed or cracked, replace using Tool.

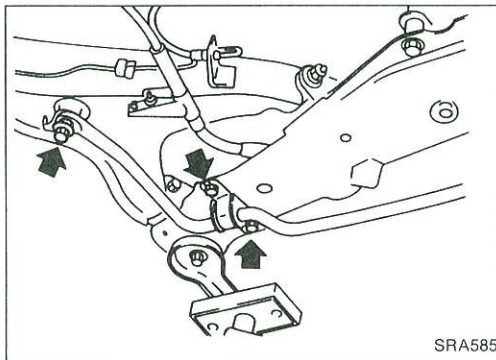
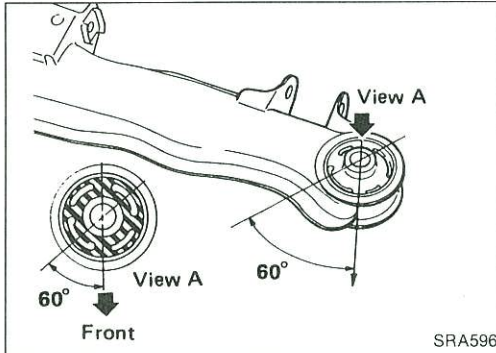
Insulator diameter:
76.3 mm (3.004 in)

REAR SUSPENSION

Suspension Member (Cont'd)



- b. Install member insulator from bottom of suspension member with Tool. Be sure to install in its proper place.



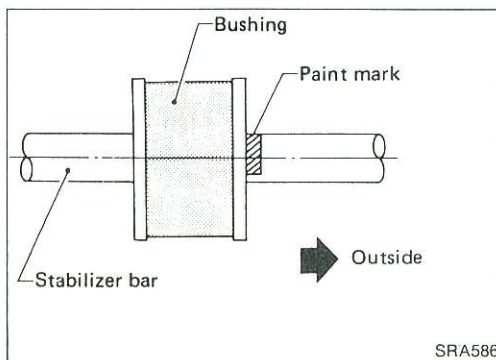
Stabilizer Bar

REMOVAL

Remove connecting rod and clamp.

INSPECTION

- Check stabilizer bar for deformation or cracks. Replace if necessary.
- Check rubber bushings for deterioration or cracks. Replace if necessary.



INSTALLATION

- Install bushing, aligning with paint mark.

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

General Specifications

COIL SPRING

Model	All
Wire diameter mm (in)	12 (0.47)
Coil diameter mm (in)	110 (4.33)
Free length mm (in)	374.5 (14.74)
Spring constant N/mm (kg/mm, lb/in)	23.3 (2.38, 133.3)
Identification color	Orange

SHOCK ABSORBER

Model	All
Piston rod diameter mm (in)	12.5 (0.492)
Damping force [at 0.3 m (1.0 ft)/sec.] N (kg, lb)	Soft Normal Firm
Expansion	324 - 500 (33 - 51, 73 - 112) 765 - 1,157 (78 - 118, 172 - 260) 1,059 - 1,589 (108 - 162, 238 - 357)
Compression	157 - 275 (16 - 28, 35 - 62) 363 - 559 (37 - 57, 82 - 126) 432 - 647 (44 - 66, 97 - 146)

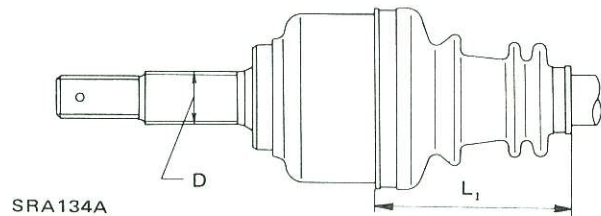
REAR STABILIZER BAR

Stabilizer diameter mm (in)	22.2 (0.874)
-----------------------------	--------------

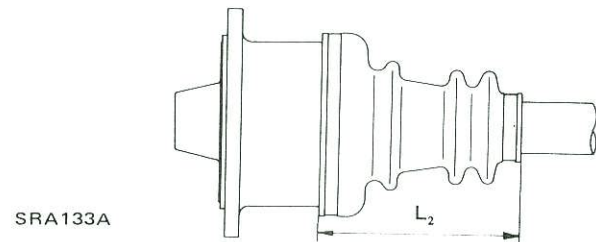
DRIVE SHAFT

Joint type	
Final drive side	TS82C
Wheel side	TS82F
Diameter mm (in)	
Final drive side "D"	30 (1.18)
Grease	
Quality	Nissan genuine grease or equivalent
Specified amount g (oz)	
Final drive side	155 - 165 (5.47 - 5.82)
Wheel side	185 - 195 (6.52 - 6.88)
Boot length mm (in)	
Final drive side "L ₁ "	110.5 - 112.5 (4.35 - 4.43)
Wheel side "L ₂ "	

Final drive side



Wheel side



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

Inspection and Adjustment

WHEEL ALIGNMENT (Unladen*)

Camber	degree	—1°5' to 0°25'
Total toe-out	mm (in)	0.2 - 4.2 (0.008 - 0.165)
	degree	1' - 22'

WHEEL RUNOUT (Radial and lateral)

Wheel type		Aluminum wheel
Radial runout limit	mm (in)	0.3 (0.012)
Lateral runout limit	mm (in)	

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

WHEEL BEARING

Axial end play limit	mm (in)	0.05 (0.0020)
Wheel bearing lock nut		
Tightening torque		127 - 177
N·m (kg-m, ft-lb)		(13 - 18, 94 - 130)

BRAKE SYSTEM

SECTION **BR**

CONTENTS

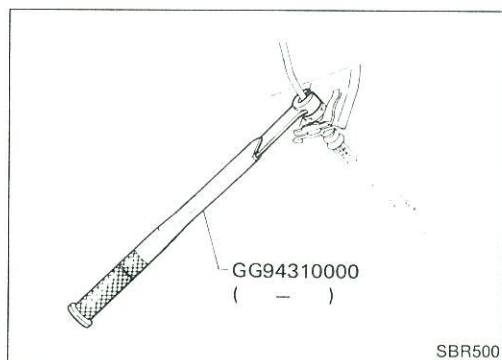
PRECAUTIONS AND PREPARATION	BR- 2
CHECK AND ADJUSTMENT	BR- 3
AIR BLEEDING	BR- 4
BRAKE HYDRAULIC LINE	BR- 5
CONTROL VALVE	BR- 7
BRAKE PEDAL AND BRACKET	BR- 8
MASTER CYLINDER	BR-10
BRAKE BOOSTER	BR-13
VACUUM HOSE	BR-15
FRONT DISC BRAKE	BR-17
REAR DISC BRAKE	BR-21
REAR DISC BRAKE — Parking Drum Brake	BR-25
PARKING BRAKE CONTROL	BR-28
ANTI-LOCK BRAKING SYSTEM	BR-30
TROUBLE DIAGNOSES	BR-34
SERVICE DATA AND SPECIFICATIONS (S.D.S.)	BR-58

BR

PRECAUTIONS AND PREPARATION

Precautions

- Use brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
- To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.
- Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of hydraulic system.



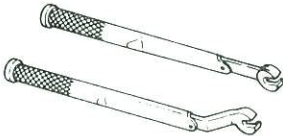


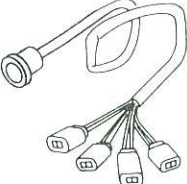
- Use Tool when removing and installing brake tube.

WARNING:

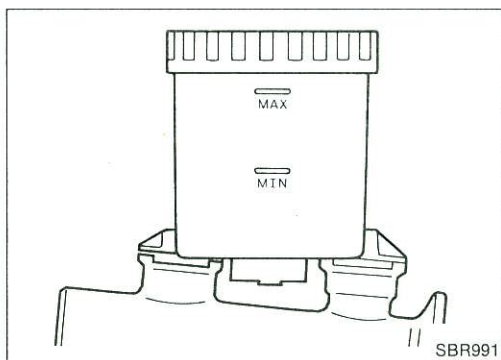
- Clean brake pads and shoes with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

Preparation

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.) Tool name	Description
GG94310000 (—) Flare nut torque wrench	 Removing and installing each brake piping
KV991V0010 (—) Brake fluid pressure gauge	 Measuring brake fluid pressure
KV999P1000 (—) A.B.S. checker	 Checking brake fluid pressure of A.B.S. actuator
KV999P1010 (—) A.B.S. checker adapter harness	 Checking brake fluid pressure of A.B.S. actuator

CHECK AND ADJUSTMENT



Checking Brake Fluid Level

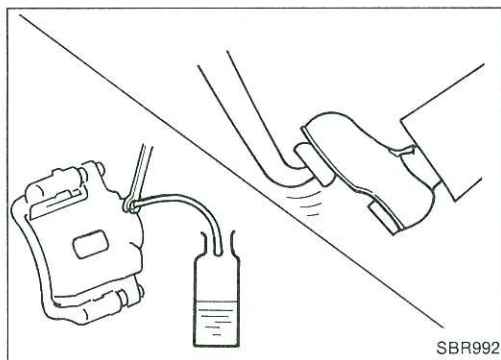
- Check fluid level in reservoir tank. It should be between Max. and Min. lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- When brake warning lamp comes on even when parking brake lever is released, check brake system for leaks.

Checking Brake Line

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.



Changing Brake Fluid

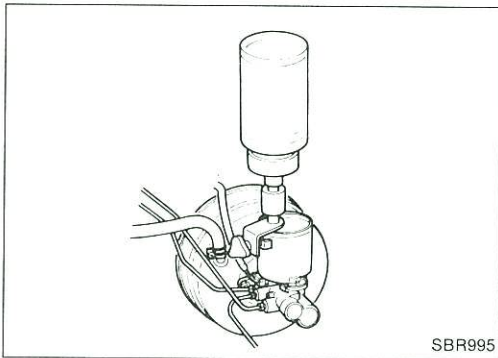
CAUTION:

- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

1. Connect a vinyl tube to each air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Refill until new brake fluid comes out of each air bleeder valve.

Use same procedure as in bleeding hydraulic system to refill brake fluid.

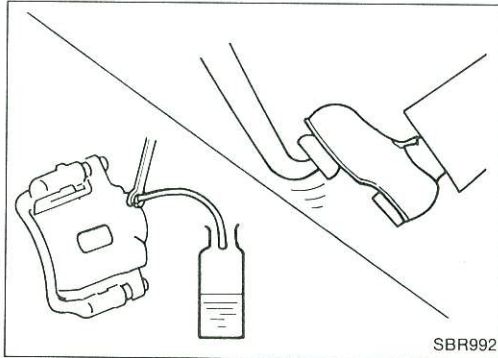
Refer to "Bleeding Procedure" in "AIR BLEEDING".



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.

Without Anti-lock Braking System:

Left rear caliper



Right rear caliper



Left front caliper



Right front caliper

With Anti-lock Braking System:

Left rear caliper



Right rear caliper



Left front caliper



Right front caliper



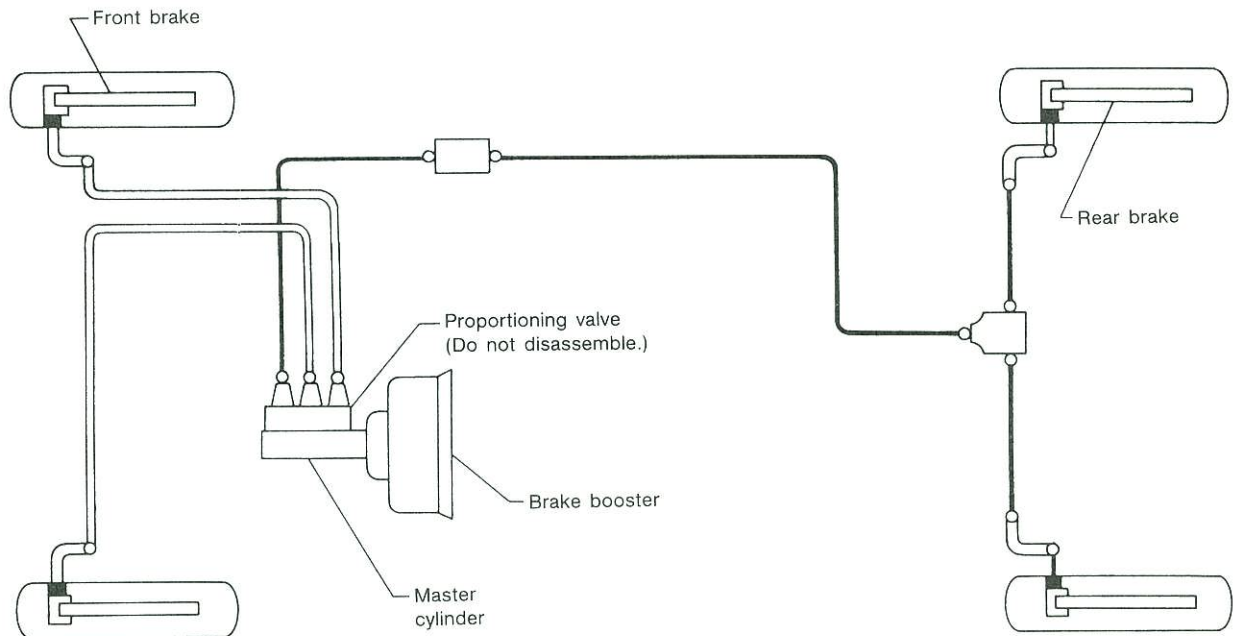
Front side air bleeder on A.B.S. actuator



Rear side air bleeder on A.B.S. actuator

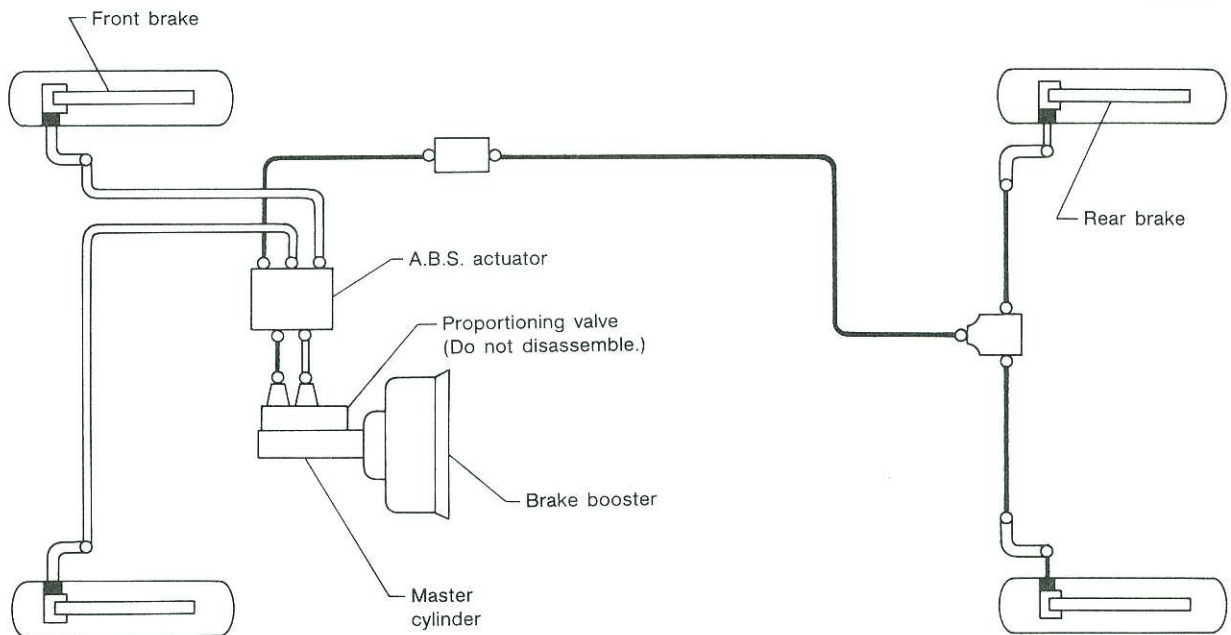
BRAKE HYDRAULIC LINE



Without Anti-lock Braking System




With Anti-lock Braking System (A.B.S.)

SBR709B

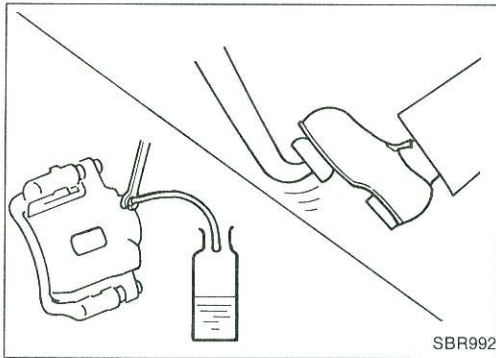


 : Primary line
 : Secondary line

 : N·m (kg-m, ft-lb)
 ○ : Flare nut
 15 - 18 (1.5 - 1.8, 11 - 13)
 ■ : Connecting bolt
 17 - 20 (1.7 - 2.0, 12 - 14)

SBR953A

BRAKE HYDRAULIC LINE



Removal

CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut securing brake tube to hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting hydraulic line.
5. All hoses must be free from excessive bending, twisting and pulling.



Inspection

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

Installation

CAUTION:

- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.

1. Tighten all flare nuts and connecting bolts.

Specification:

Flare nut

15 - 18 N·m

(1.5 - 1.8 kg-m, 11 - 13 ft-lb)

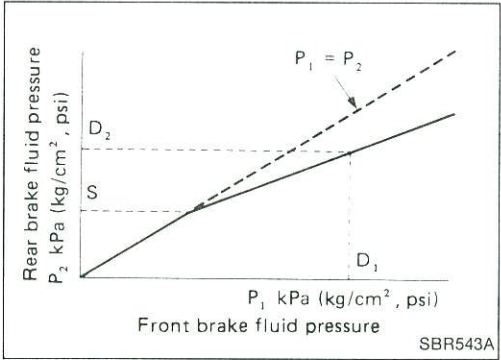
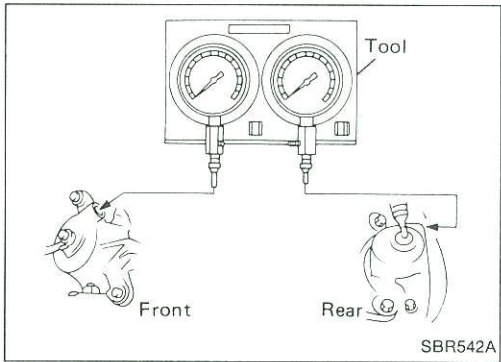
Connecting bolt

17 - 20 N·m

(1.7 - 2.0 kg-m, 12 - 14 ft-lb)

2. Refill until new brake fluid comes out of each air bleeder valve.
3. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

CONTROL VALVE



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.

1. Connect Tool to air bleeders of front and rear brakes on either L.H. and R.H. side.

Tool number: KV991V0010

(—)

2. Bleed air from the Tool.
3. Check fluid pressure by depressing brake pedal.

For models with A.B.S. disconnect harness connectors from A.B.S. actuator before checking.

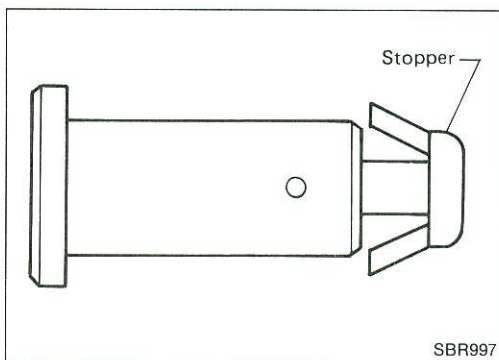
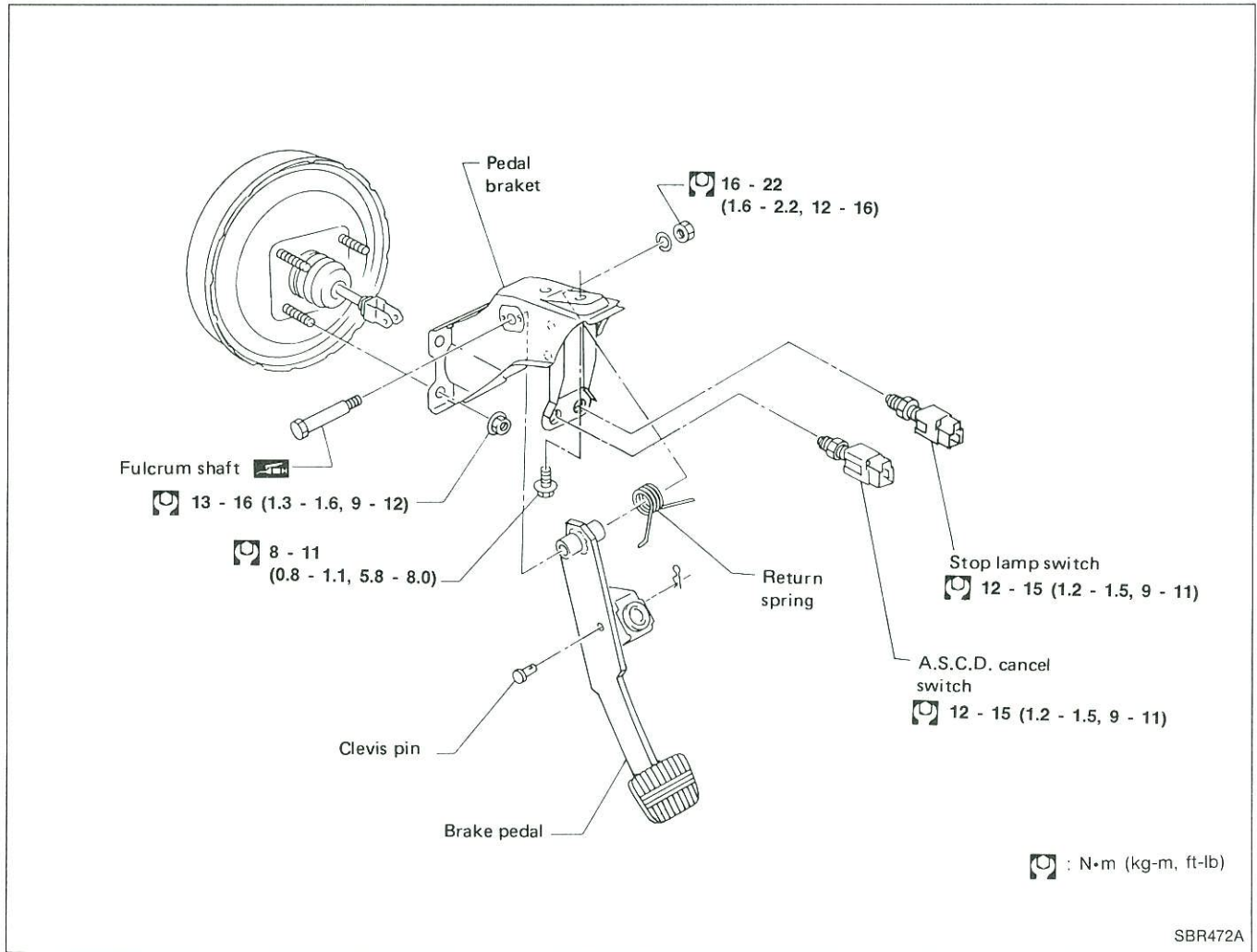
Unit: kPa (kg/cm², psi)

Applied pressure (Front brake)	D_1	6,375 (65, 924)
Output pressure (Rear brake)	D_2	4,119 - 4,511 (42 - 46, 597 - 654)

4. Bleed air after disconnecting the Tool. Refer to "Bleeding Procedure" in "AIR BLEEDING".

BRAKE PEDAL AND BRACKET

Removal and Installation

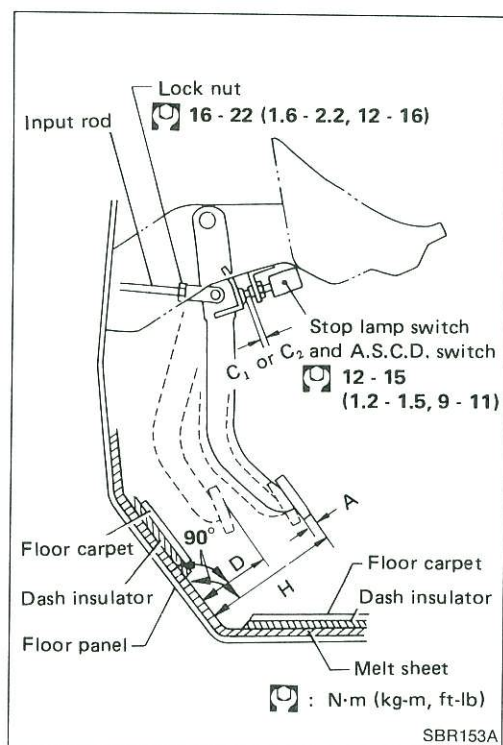


Inspection

Check brake pedal for following items.

- Brake pedal bend
- Clevis pin deformation
- Crack of any welded portion
- Crack or deformation of clevis pin stopper

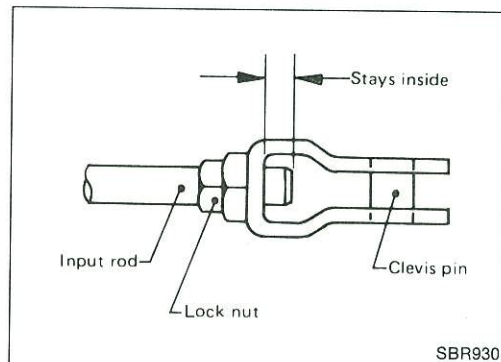
BRAKE PEDAL AND BRACKET



Adjustment

Check brake pedal free height from dash reinforcement panel. Adjust if necessary.

- H:** Free height
199 - 209 mm (7.83 - 8.23 in)
- D:** Depressed height
110 mm (4.33 in) or less
Under force of 490 N (50 kg, 110 lb)
with engine running
- C₁, C₂:** Clearance between pedal stopper and threaded end of stop lamp switch and A.S.C.D. switch
0.3 - 1.0 mm (0.012 - 0.039 in)
- A:** Pedal free play
1 - 3 mm (0.04 - 0.12 in)



1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.

Make sure that tip of input rod stays inside.

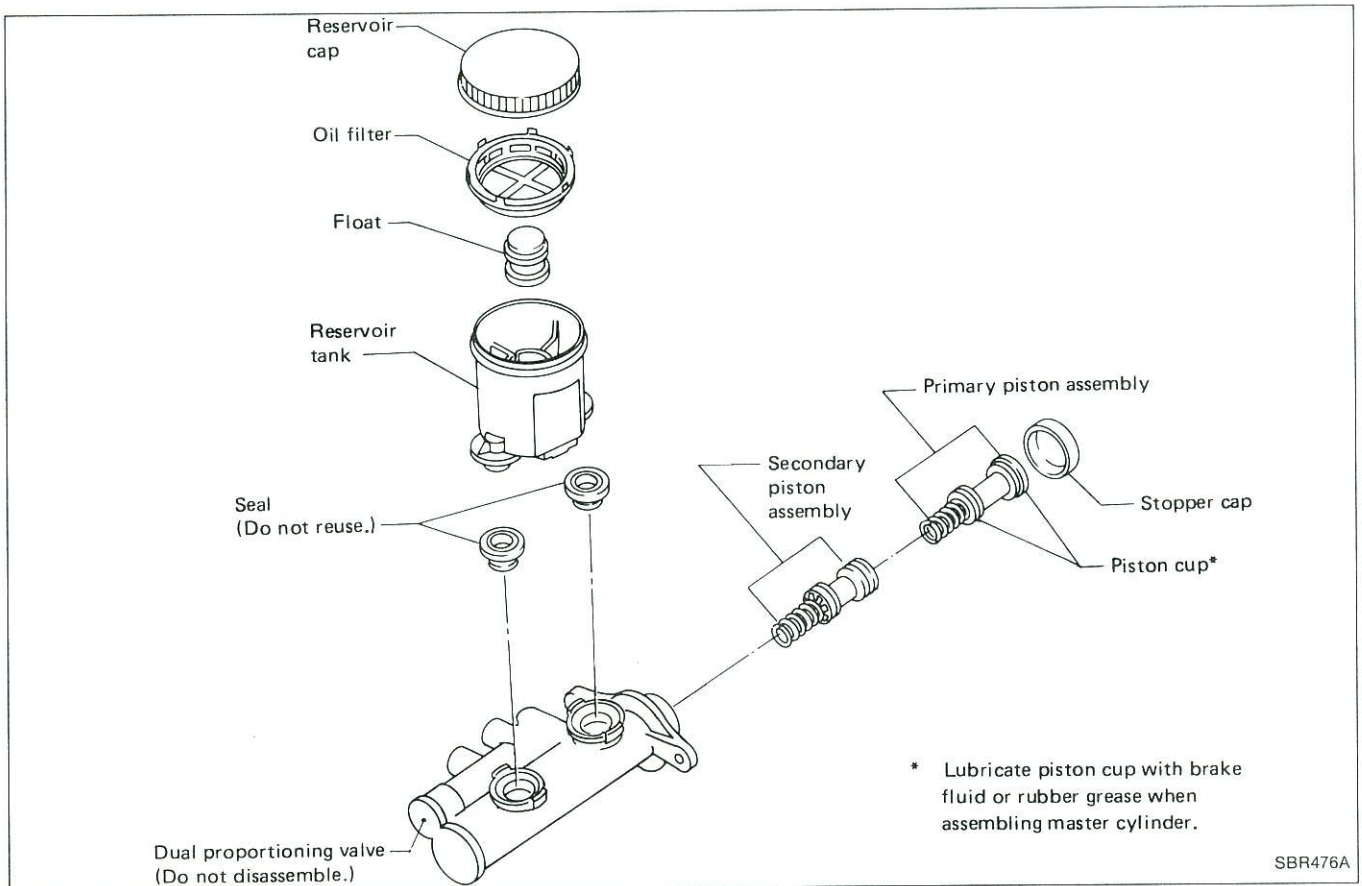
2. Loosen lock nut and adjust clearance "C₁" and "C₂" with stop lamp switch and A.S.C.D. switch respectively. Then tighten lock nuts.
3. Check pedal free play.

Make sure that stop lamps go off when pedal is released.

4. Check brake pedal's depressed height while engine is running.

If depressed height is below specified value, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.); then make necessary repairs.

MASTER CYLINDER

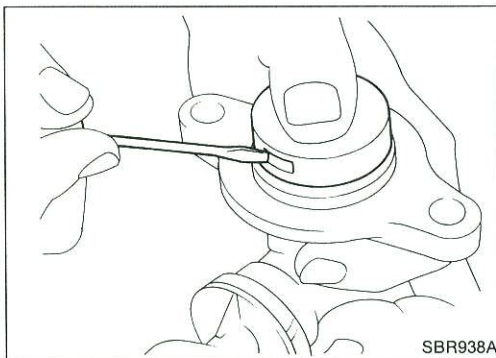


Removal

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.

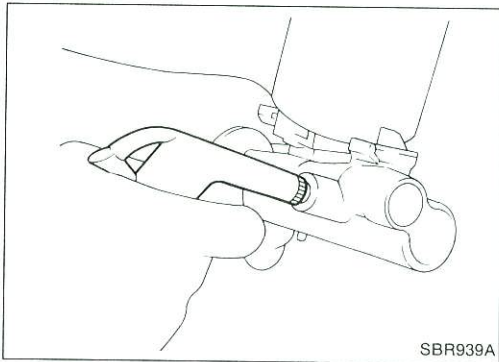


Disassembly

1. Bend claws of stopper cap outward.

MASTER CYLINDER

Disassembly (Cont'd)



2. Remove piston assemblies.

If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.

3. Draw out reservoir tank.

Inspection

Check for the following items.

Replace any part if damaged.

Master cylinder:

- Pin holes or scratches on inner wall.

Piston:

- Deformation of or scratches on piston cups.

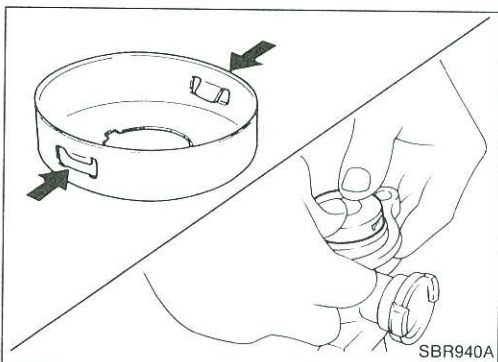
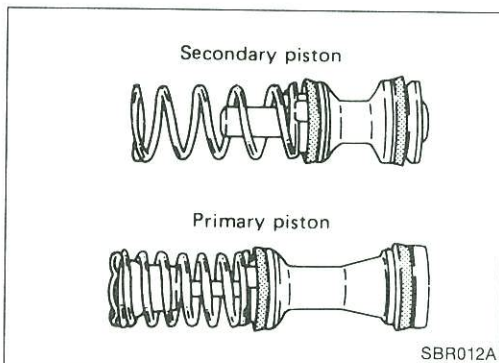
Stopper cap:

- Damage or excessive deformation of claws.

Assembly

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.



2. Bend claws inward.
3. Install stopper cap.
4. Install seals.
5. Push reservoir tank into master cylinder.

MASTER CYLINDER

Installation

CAUTION:

- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.

1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Fit flare nuts to master cylinder.
3. Tighten mounting nuts.

Specification:

8 - 11 N·m

(0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)

4. Tighten flare nuts.

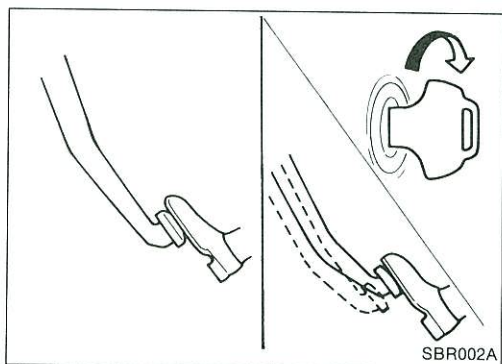
Specification:

15 - 18 N·m

(1.5 - 1.8 kg-m, 11 - 13 ft-lb)

5. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

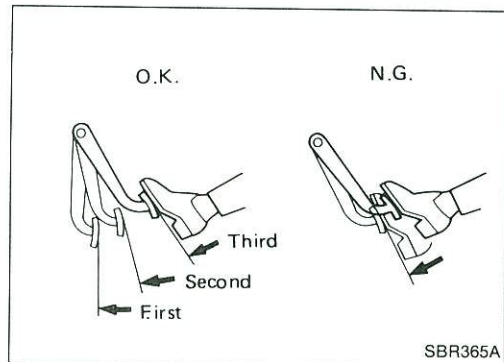
BRAKE BOOSTER



On-vehicle Service

OPERATING CHECK

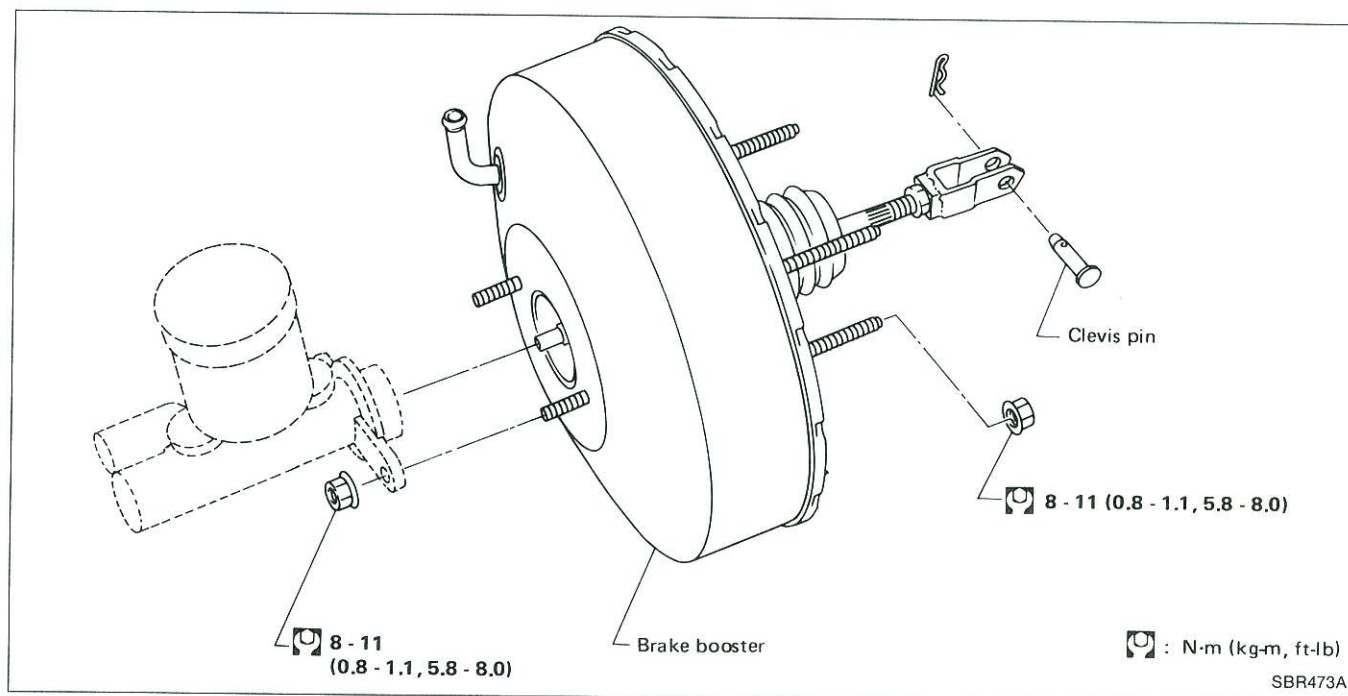
- Depress brake pedal several times with engine off, and check that there is no change in pedal stroke.
- Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.



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



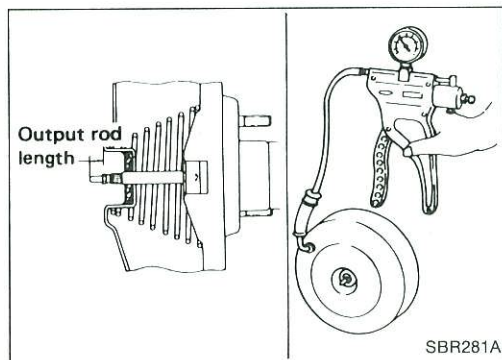
CAUTION:

- 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.

BRAKE BOOSTER

Removal (Cont'd)

1. Remove master cylinder. Refer to "Removal" in "MASTER CYLINDER".
2. Remove clevis pin (brake pedal to booster input rod).
3. Remove mounting nuts (brake pedal bracket to booster).
4. Draw out brake booster.



Inspection

OUTPUT ROD LENGTH CHECK

1. Supply brake booster with vacuum of -66.7 kPa (-500 mmHg, -19.69 inHg) using a handy vacuum pump.
2. Check output rod length.

Specified length:

10.275 - 10.525 mm (0.4045 - 0.4144 in)

Installation

CAUTION:

- Be careful not to deform or bend brake pipes, during installation of booster.
 - Replace clevis pin if damaged.
 - Refill with new brake fluid "DOT 3".
 - Never reuse drained brake fluid.
1. Fit booster, then secure mounting nuts (brake pedal bracket to master cylinder) lightly.
 2. Connect brake pedal and booster input rod with clevis pin.
 3. Secure mounting nuts.

Specification:

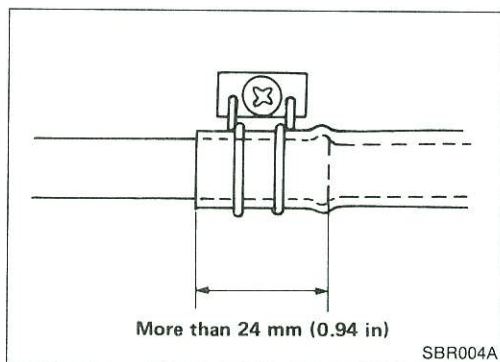
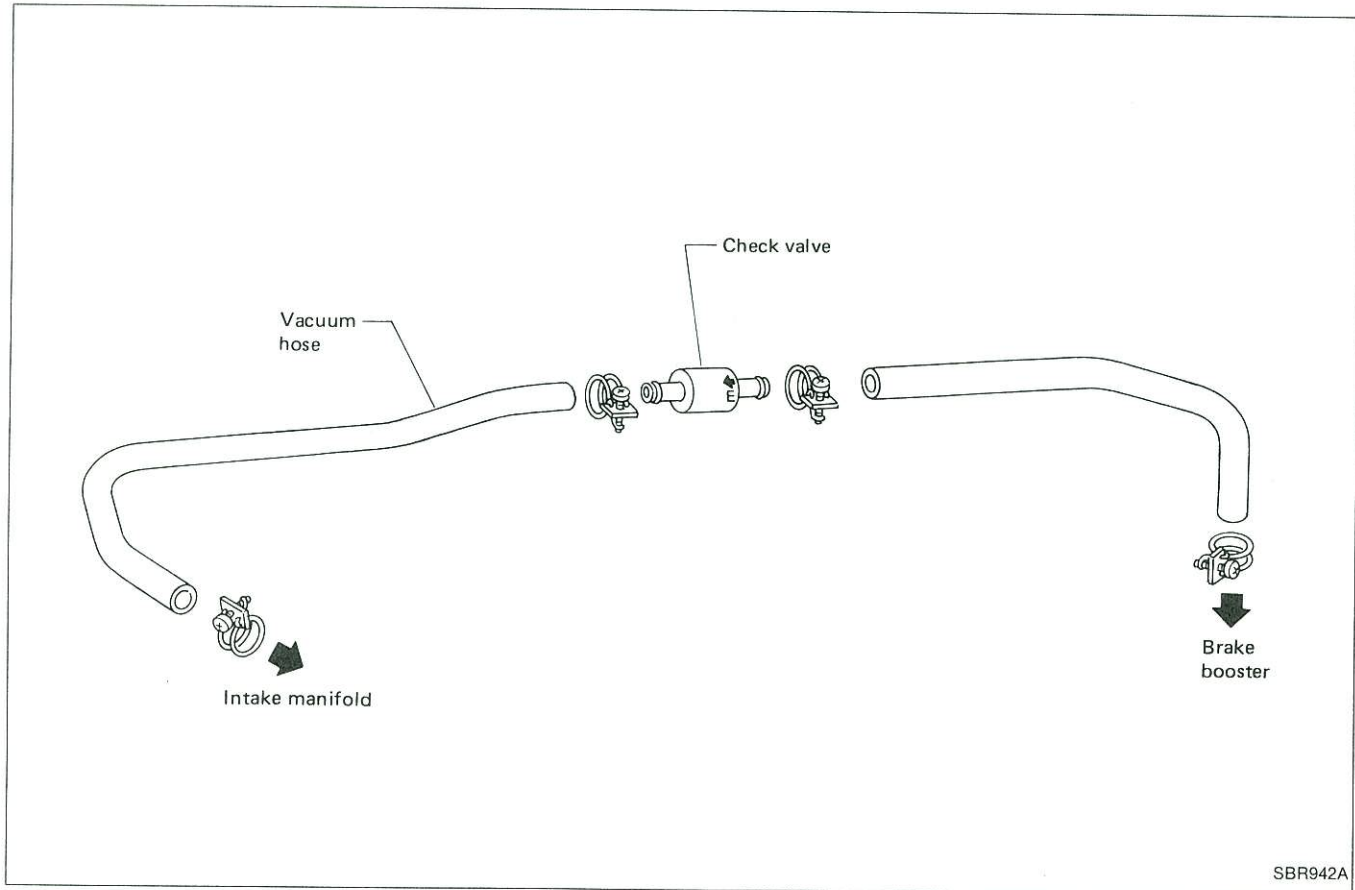
8 - 11 N·m

(0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)

4. Install master cylinder. Refer to "Installation" in "MASTER CYLINDER".
5. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

VACUUM HOSE

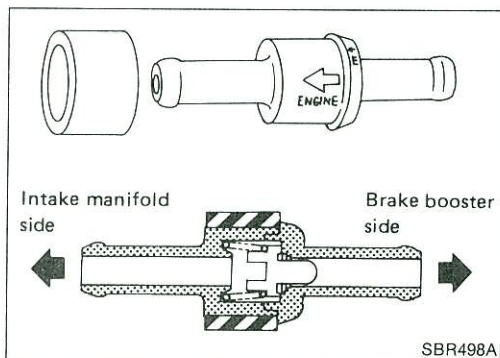
Removal and Installation



CAUTION:

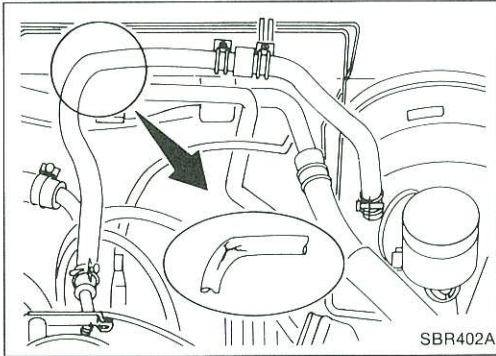
When installing vacuum hoses, pay attention to the following points.

- Do not apply any oil or lubricants to vacuum hose and check valve.
- Insert vacuum tube into vacuum hose more than 24 mm (0.94 in).



- Install check valve, paying attention to its direction.

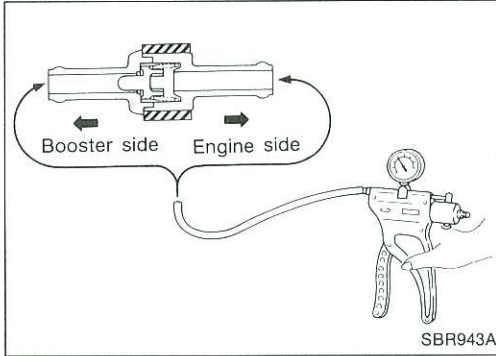
VACUUM HOSE



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.

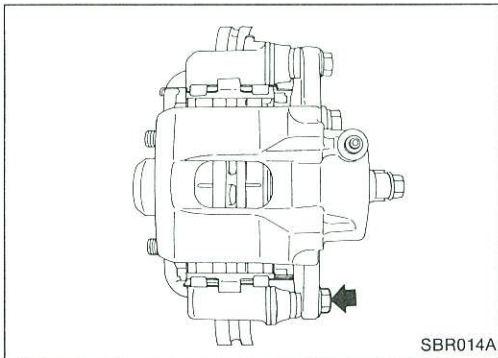
Pad Replacement

WARNING:

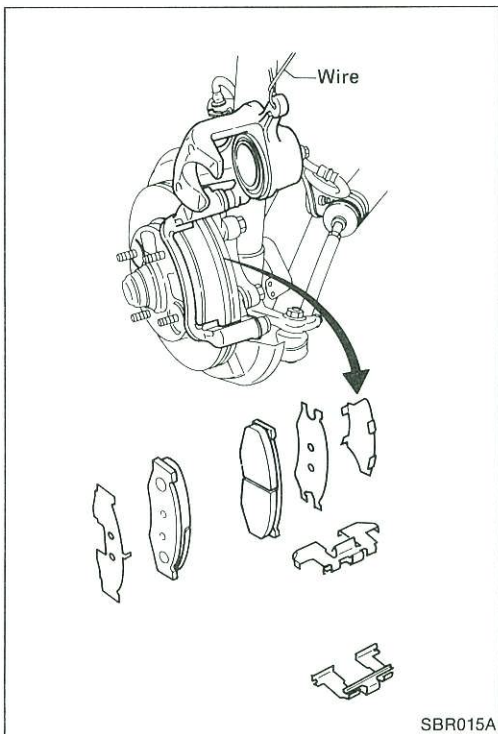
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

- When cylinder body is open, do not depress brake pedal because piston will pop out.
- Be careful not to damage piston boot or get oil on rotor. Always replace shims in replacing pads.
- If shims are rusted or show peeling of 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.



1. Remove master cylinder reservoir cap.
2. Remove pin bolt.



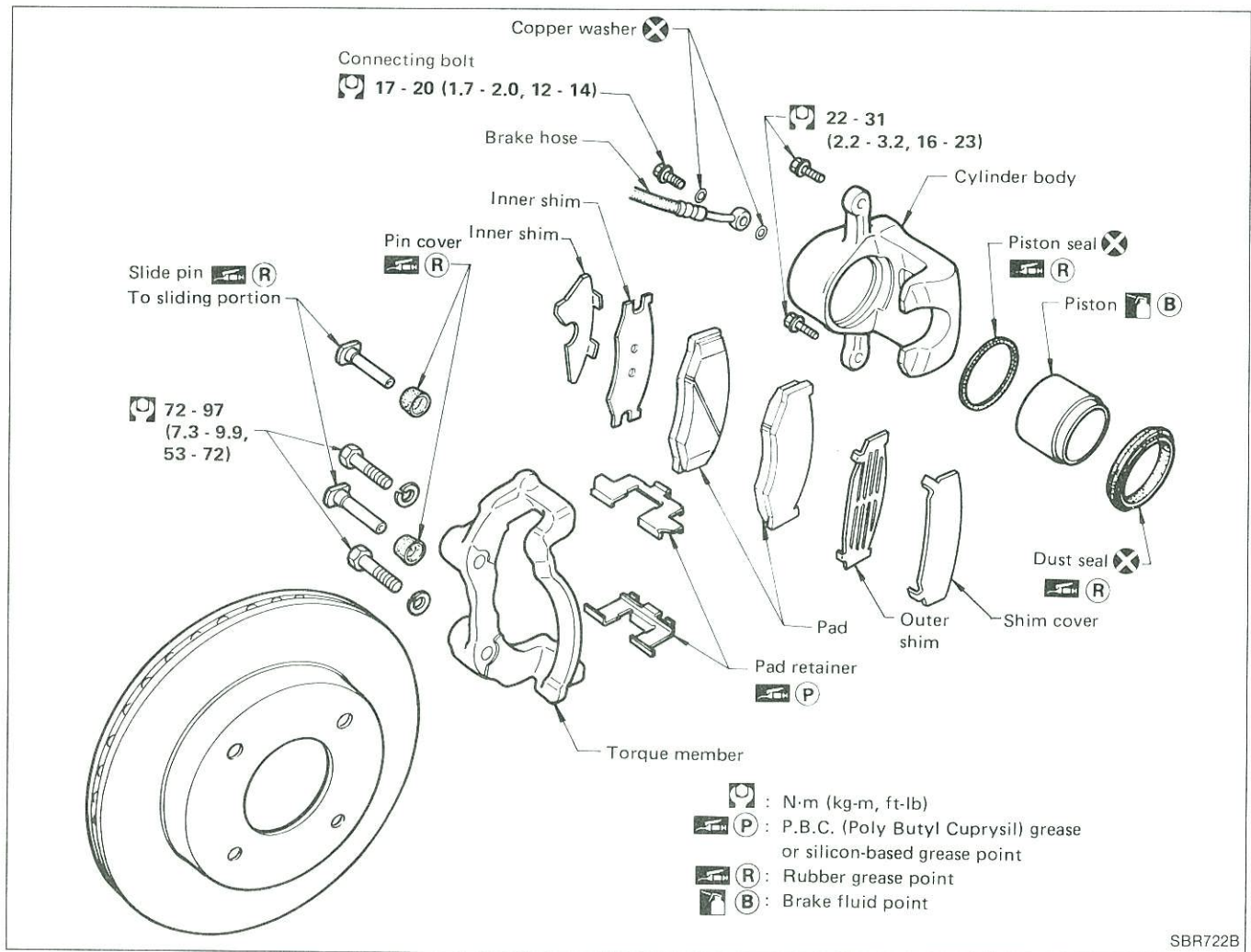
3. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.

Pad wear limit:

2.0 mm (0.079 in)

Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

FRONT DISC BRAKE



SBR722B

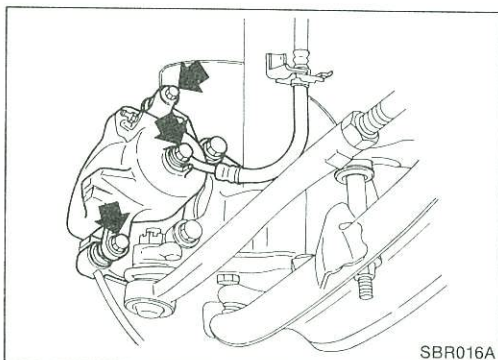
Removal

WARNING:

Clean brake pads with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

Suspend caliper assembly with wire so as not to stretch brake hose.

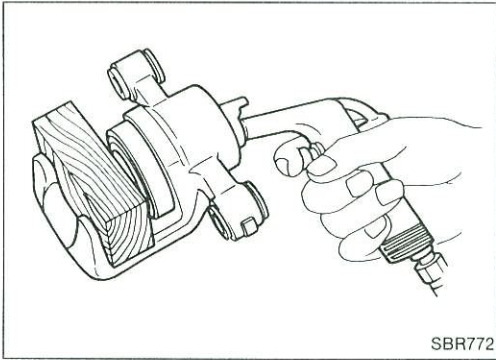


SBR016A

Remove torque member fixing bolts and connecting bolt.

It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly.

FRONT DISC BRAKE



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 suitable tool.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:

Use brake fluid to clean. Never use mineral oil.

PISTON

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

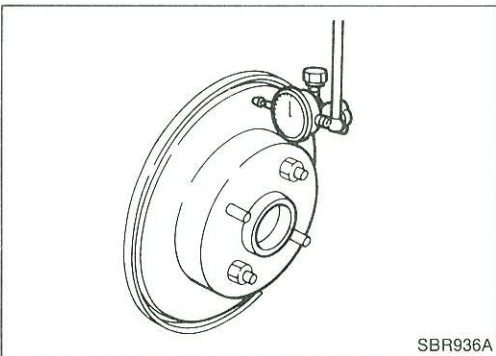
SLIDE PIN, PIN BOLT, AND PIN COVER

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

Inspection — Rotor

RUBBING SURFACE

Check rotor for roughness, cracks or chips.



RUNOUT

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

Make sure that axial end play is within the specifications before measuring. Refer to section RA.

Rotor repair limit:

Maximum runout

(Total indicator reading at center of rotor pad contact surface)

0.07 mm (0.0028 in)

FRONT DISC BRAKE

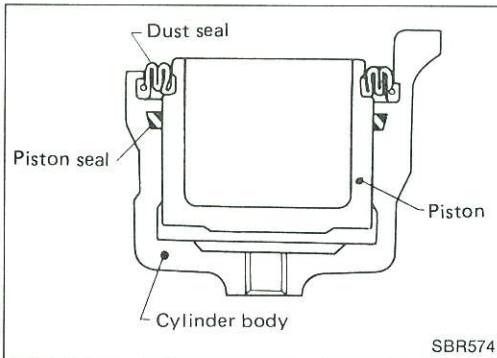
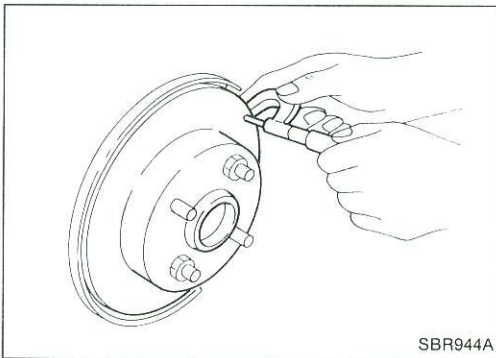
Inspection — Rotor (Cont'd)

THICKNESS

Rotor repair limit:

Minimum thickness

20.0 mm (0.787 in)



Assembly

CAUTION:

Pay attention to piston seal direction.

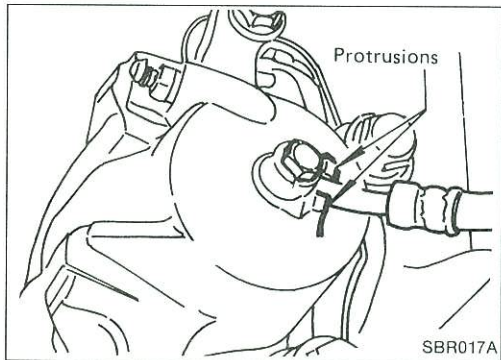
1. With dust seal fitted to piston, insert dust seal into groove on cylinder body and install piston.
2. Properly secure dust seal.

Installation

CAUTION:

- Refill with new brake fluid "DOT 3".
- Never reuse drained brake fluid.

1. Install brake hose to caliper securely.
2. Install all parts and secure all bolts.
3. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".



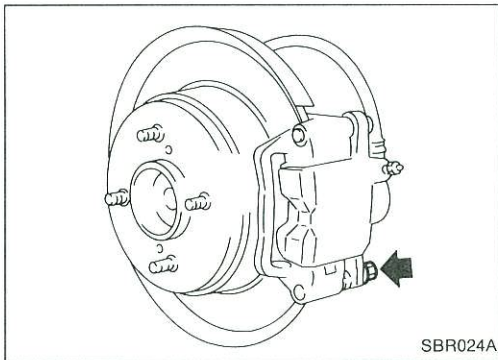
Pad Replacement

WARNING:

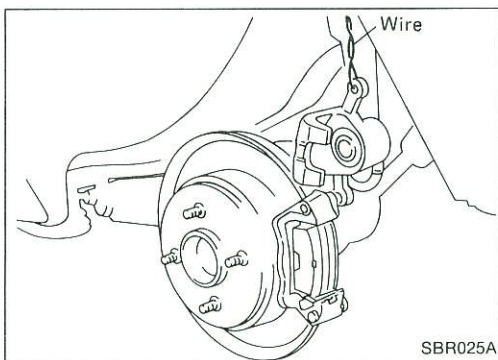
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

- When cylinder body is open, do not depress brake pedal because piston will pop out.
- Be careful not to damage piston boot or get oil on rotor. Always replace shims in replacing pads.
- If shims are rusted or show peeling of rubber coat, replace them with new shims.
- It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.



1. Remove master cylinder reservoir cap.
2. Remove pin bolt.



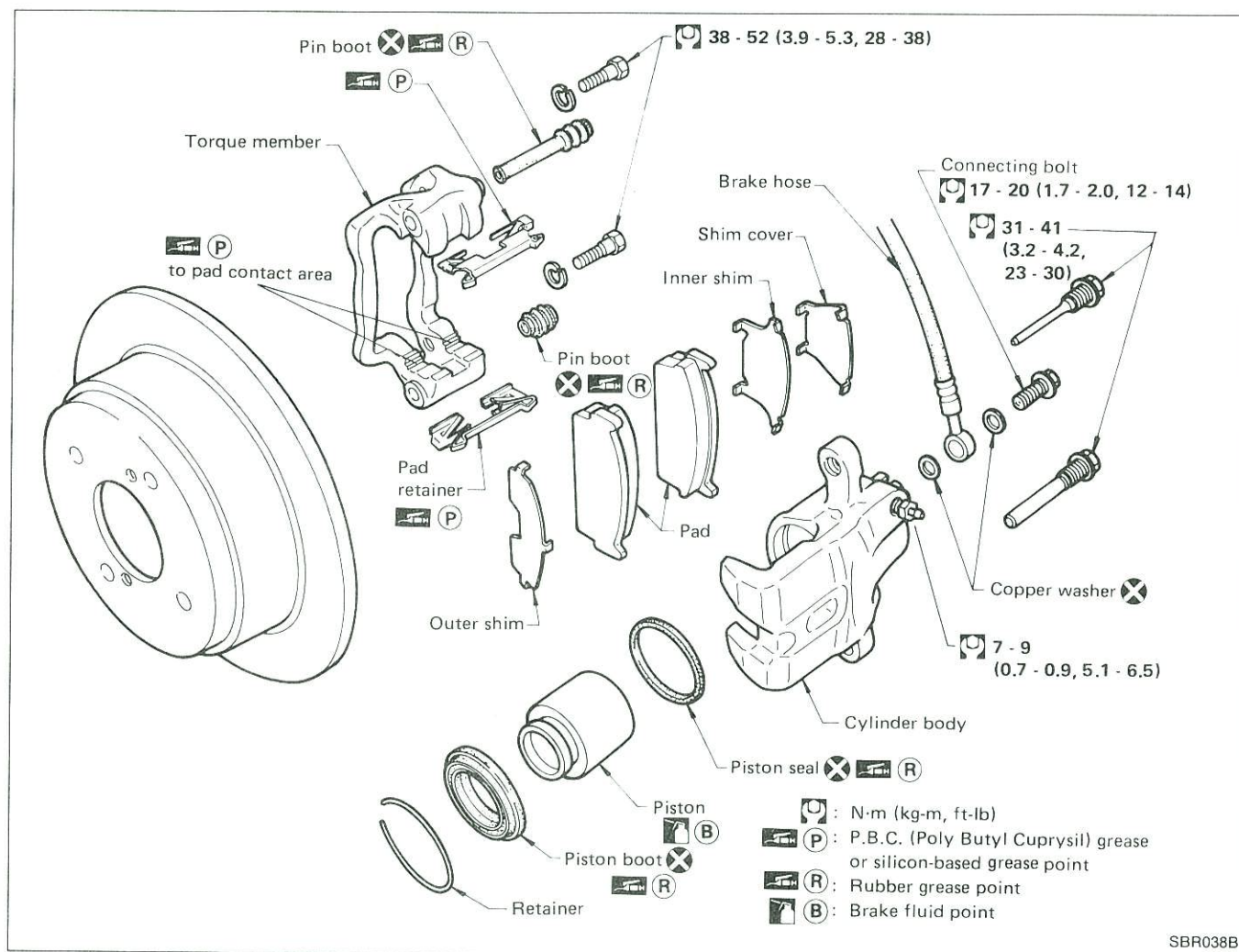
3. Open cylinder body upward. Then remove pad retainers, and inner and outer shims.

Pad wear limit:

2.0 mm (0.079 in)

Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

REAR DISC BRAKE



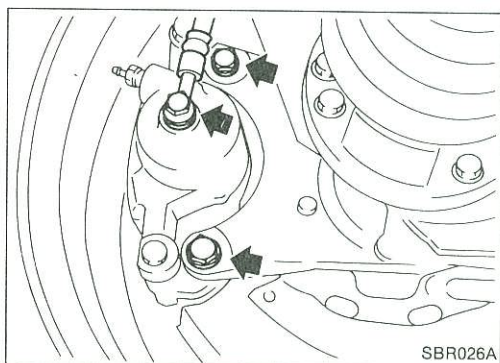
Removal

WARNING:

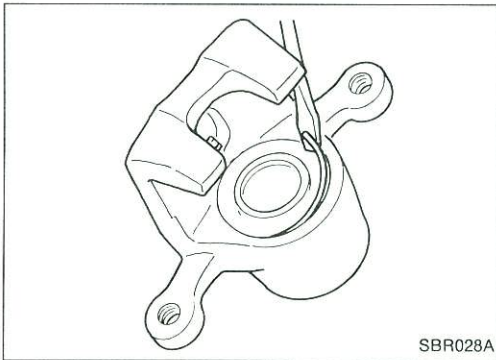
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

Suspend caliper assembly with wire so as not to stretch brake hose.



Remove torque member fixing bolts and connecting bolt. It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly.



Disassembly

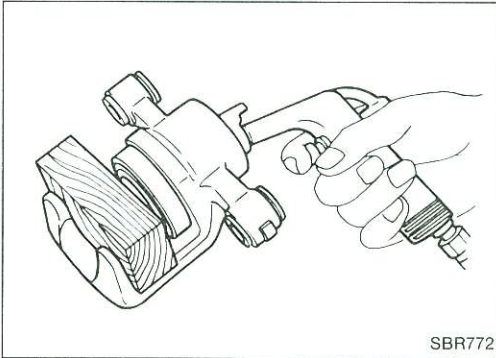
WARNING:

Do not place your fingers in front of piston.

CAUTION:

Do not scratch or score cylinder wall.

1. Remove dust cover retainer with a screwdriver.



2. Push out piston with dust seal with compressed air.

3. Remove piston seal with suitable tool.

Inspection — Caliper

CYLINDER BODY

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:

Use brake fluid to clean. Never use mineral oil.

PISTON

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

SLIDE PIN, PIN BOLT, AND PIN COVER

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

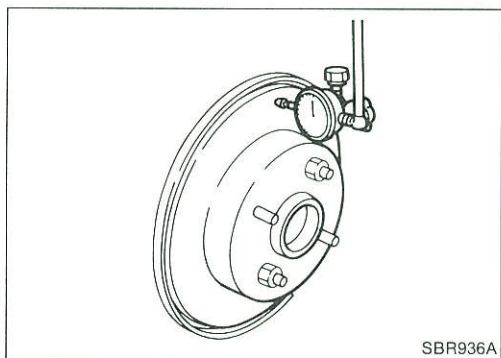
Inspection — Rotor

RUBBING SURFACE

Check rotor for roughness, cracks or chips.

REAR DISC BRAKE

Inspection — Rotor (Cont'd)



RUNOUT

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

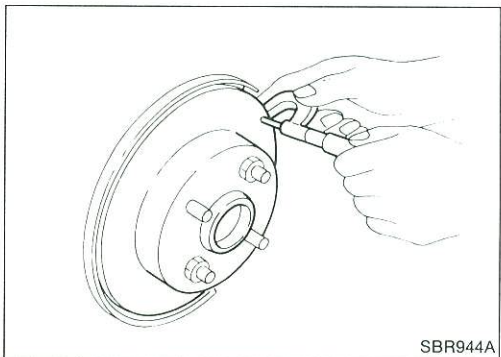
Make sure that axial end play is within the specifications before measuring. Refer to section RA.

Rotor repair limit:

Maximum runout

(Total indicator reading at center of rotor pad contact surface)

0.07 mm (0.0028 in)

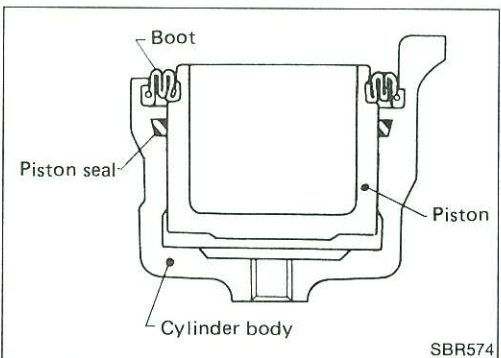


THICKNESS

Rotor repair limit:

Minimum thickness

9.0 mm (0.354 in)

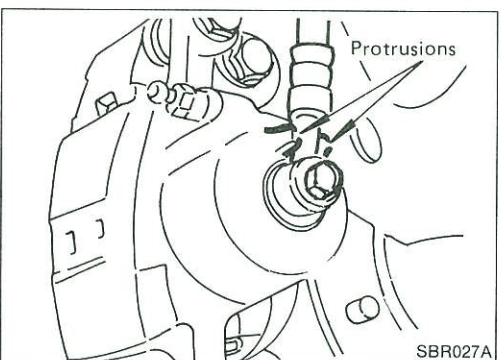


Assembly

CAUTION:

Pay attention to piston seal direction.

1. With dust seal fitted to piston, insert dust seal into groove on cylinder body and install piston.
2. Properly secure dust seal. Then install retainer.



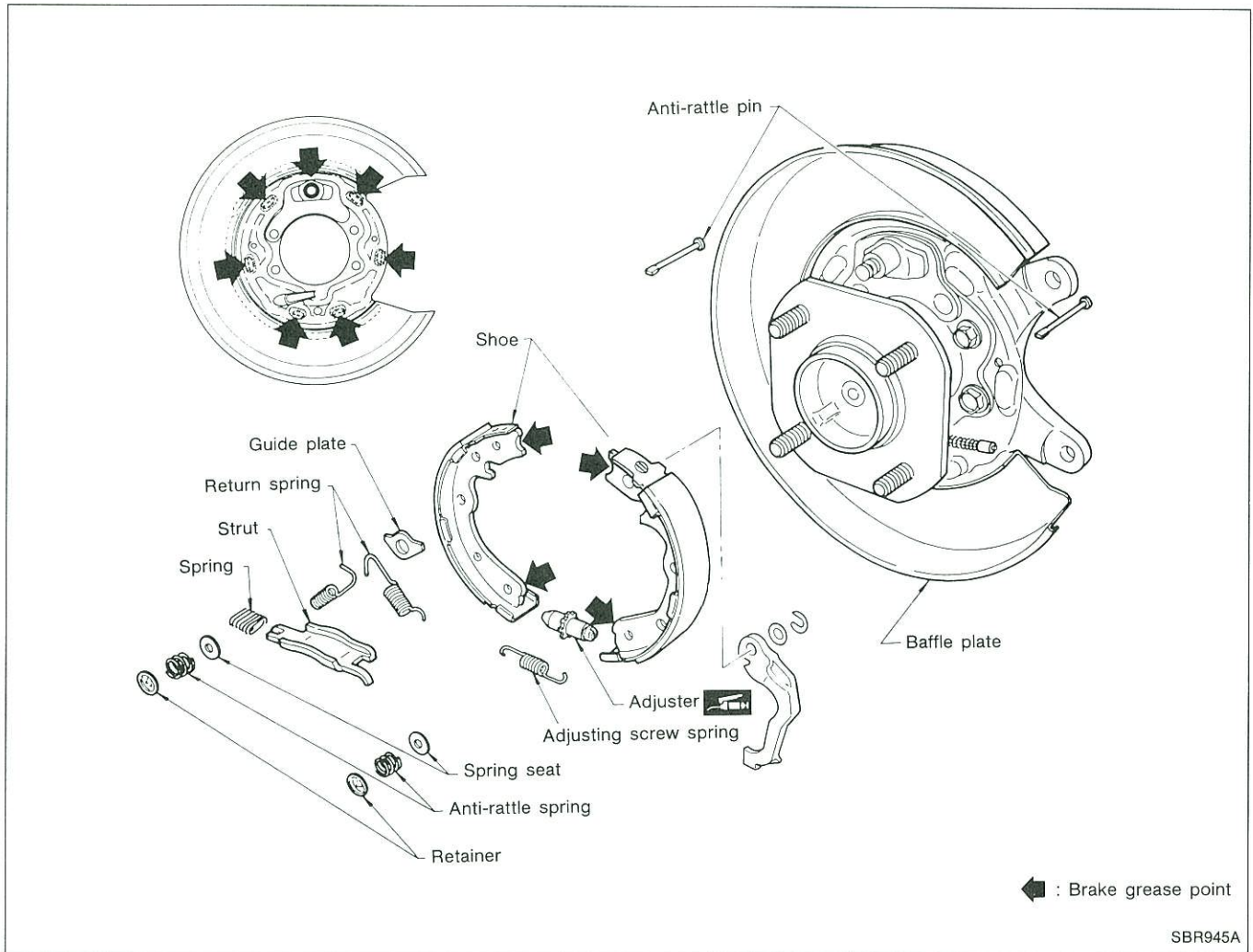
Installation

CAUTION:

- **Refill with new brake fluid "DOT 3".**
- **Never reuse drained brake fluid.**

1. Install brake hose to caliper securely.
2. Install all parts and secure all bolts.
3. Bleed air. Refer to "Bleeding Procedure" in "AIR BLEEDING".

REAR DISC BRAKE — Parking Drum Brake



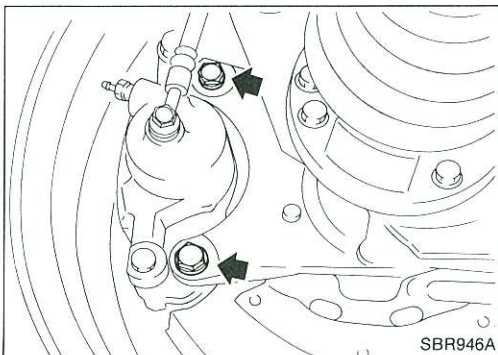
Removal

WARNING:

Clean brake lining with a vacuum dust collector to minimize the hazard of airborne asbestos or other materials.

CAUTION:

Make sure parking brake lever is released completely.

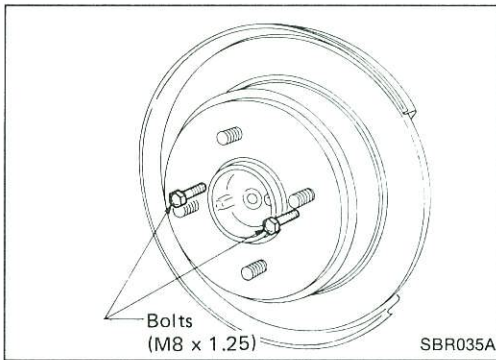


1. Remove torque member fixing bolts (Rear disc brake assembly mounting bolts).

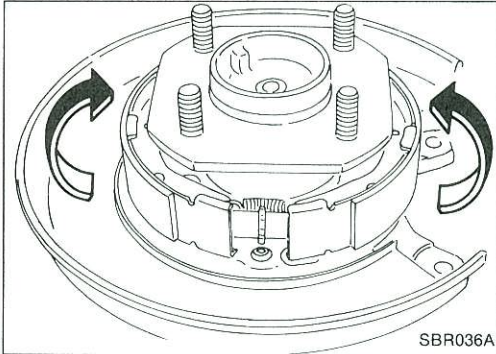
Suspend caliper assembly with wire so as not to stretch brake hose.

REAR DISC BRAKE — Parking Drum Brake

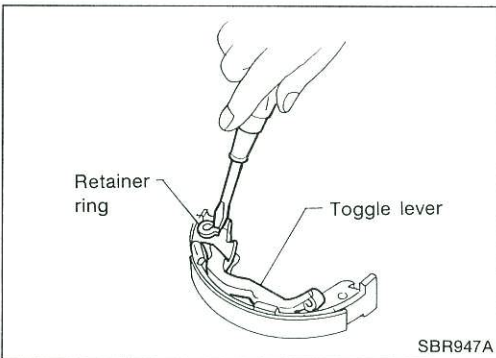
Removal (Cont'd)



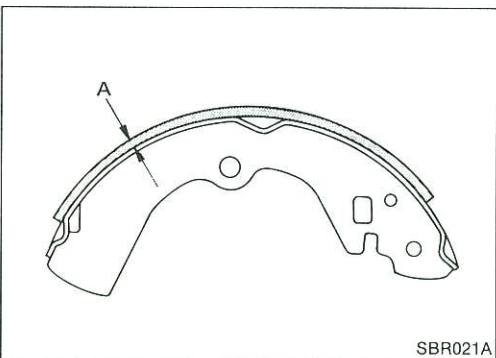
2. Remove disc rotor (With parking drum brake).
Tighten two bolts gradually if disc rotor is hard to remove.



3. After removing retainer, remove spring by rotating shoes.
Be careful not to damage parking brake cable when separating it.
4. Remove adjuster.
5. Remove strut.
6. Disconnect parking brake cable from toggle lever.



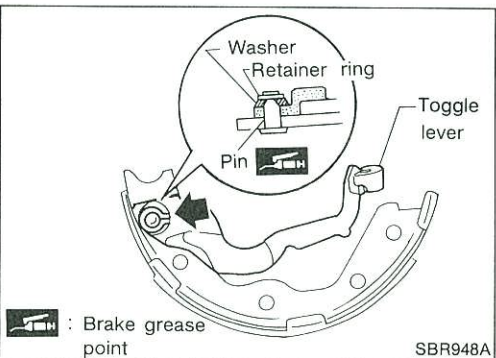
7. Remove retainer ring with a suitable tool. Then separate toggle lever and brake shoe.



Inspection

Check lining thickness.

Lining wear limit (A):
1.5 mm (0.059 in)

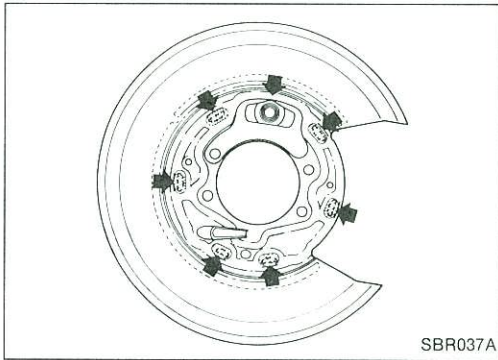


Installation

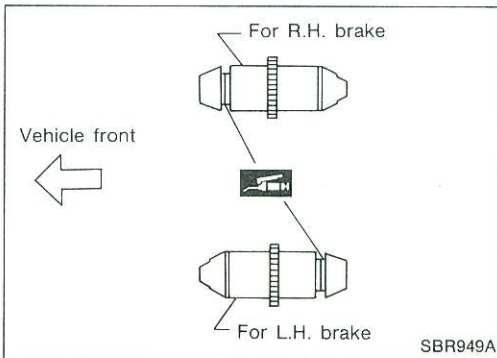
1. Fit toggle lever to brake shoe with retainer ring.
Pay attention to retainer ring direction.

REAR DISC BRAKE — Parking Drum Brake

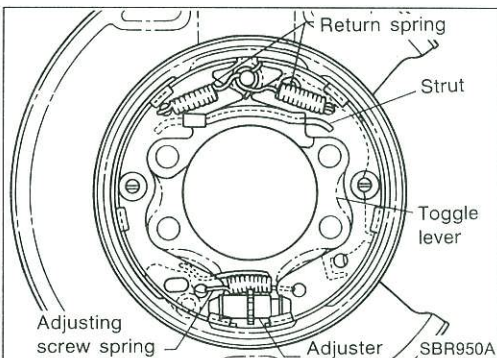
Installation (Cont'd)



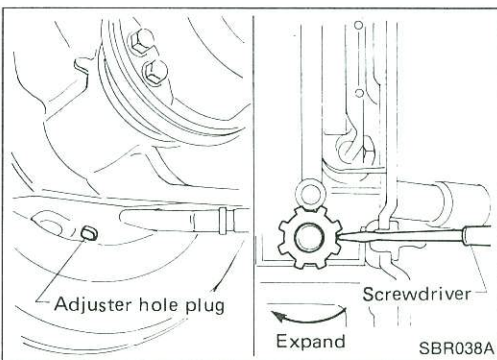
2. Apply brake grease to the contact areas shown at left.



3. Shorten adjuster by rotating it.
Pay attention to direction of adjuster.
4. Connect parking brake cable to toggle lever.
5. Install all parts.



6. Check all parts are installed properly.
Pay attention to direction of adjuster.



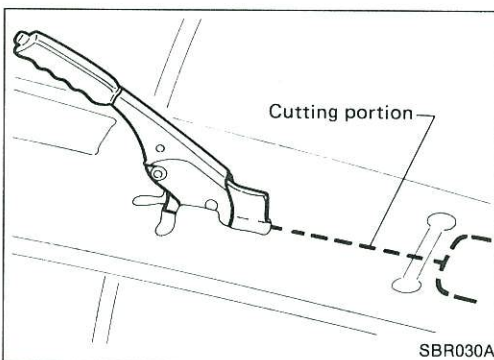
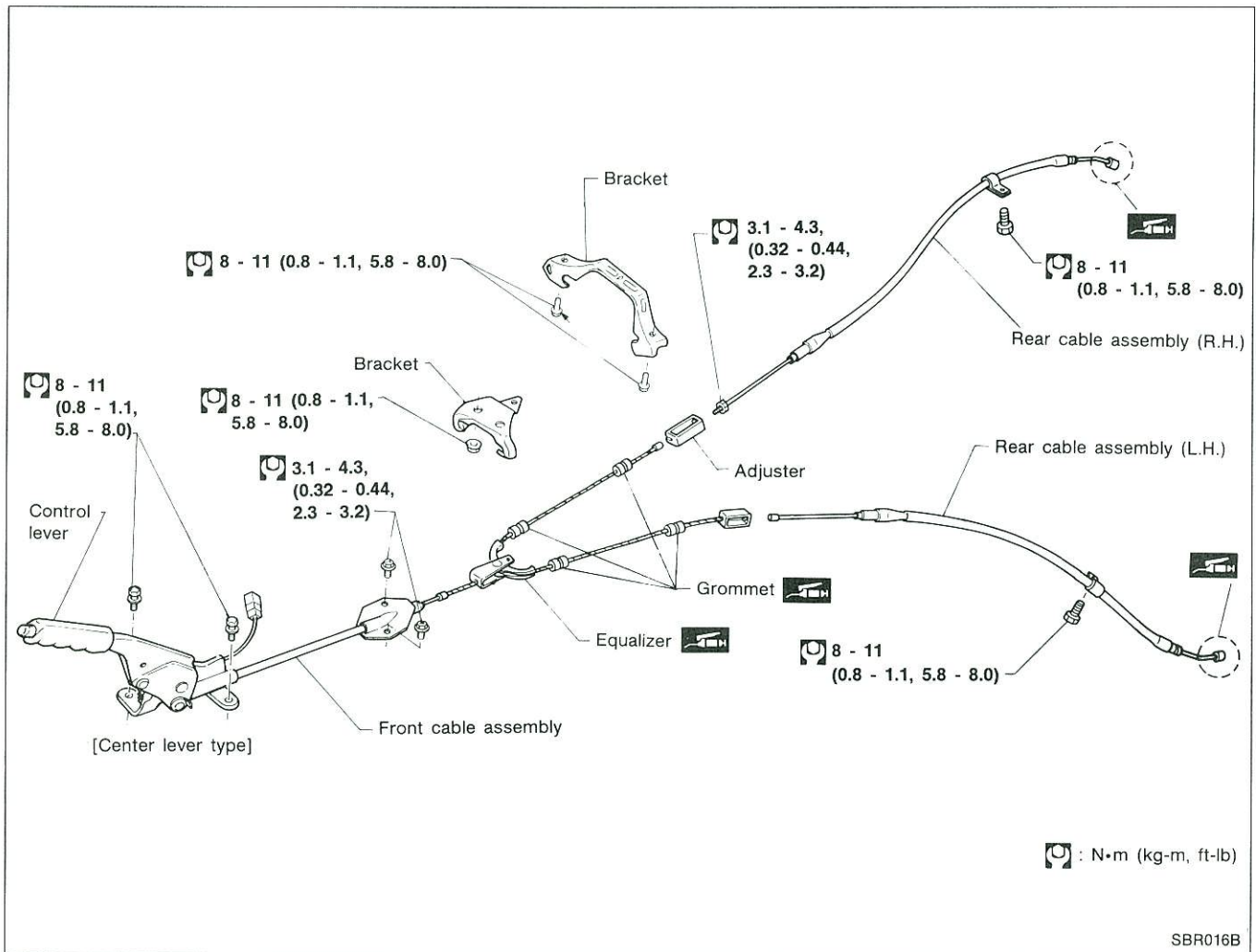
Shoe Clearance Adjustment

1. Remove adjuster hole plug, and turn down adjuster wheel with a screwdriver until shoe touches brake drum.
Make sure that parking control lever is released completely.
2. Return adjuster wheel 7 to 8 latches.
3. Install adjuster hole plug, and make sure that there is no drag between shoes and brake drum when rotating disc rotor.
4. Adjust parking brake cable. Refer to "Adjustment" in "PARKING BRAKE CONTROL".

Breaking in Drum and Lining

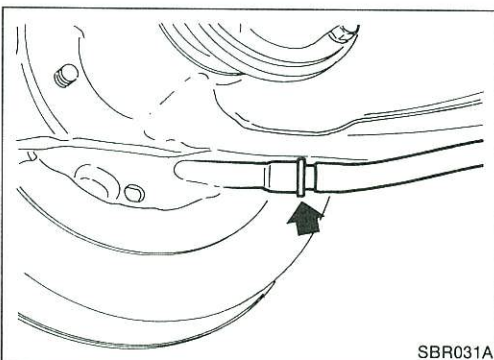
1. Using either low or 2nd transmission speed, drive the unloaded vehicle on a safe, level and dry road.
2. Depress the release button of parking brake lever, then pull the lever with a force of 98 N (10 kg, 22 lb).
3. While holding the lever, continue to drive the vehicle forward 100 m (328 ft) at approximately 35 km/h (22 MPH).
4. While holding the lever, drive the vehicle in reverse 10 m (33 ft) at approximately 10 km/h (6 MPH).
5. Repeat steps 1 through 3 three times and then repeat only step 4 one more time.

PARKING BRAKE CONTROL



Removal and Installation

- To replace parking brake cable, cut carpet at the area shown at left.



- Install rear cable by tapping the flanged section of cable cover with a hammer and punch.

Be careful not to damage cable.

Make sure there is no free play after installation.

PARKING BRAKE CONTROL

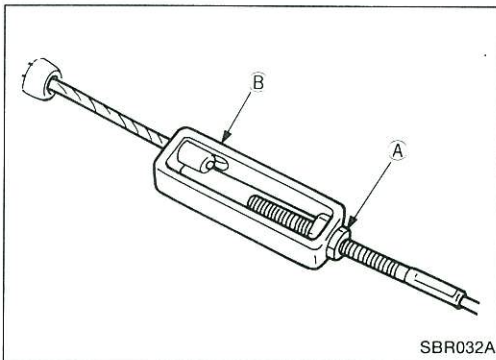
Inspection

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.

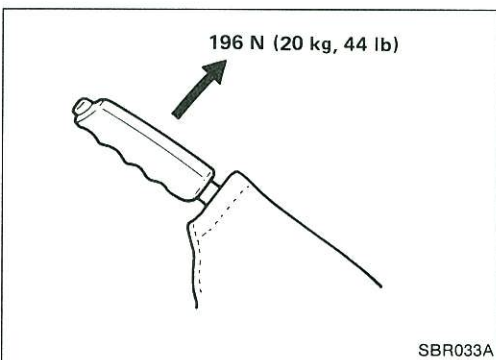
Adjustment

Adjust control lever stroke as follows:

On models equipped with parking drum brake, perform shoe clearance adjustment before adjusting control lever stroke.



1. Loosen lock nut (A), rotate adjuster (B).
2. Tighten lock nut (A).



3. Pull control lever with specified amount of force. Check lever stroke.

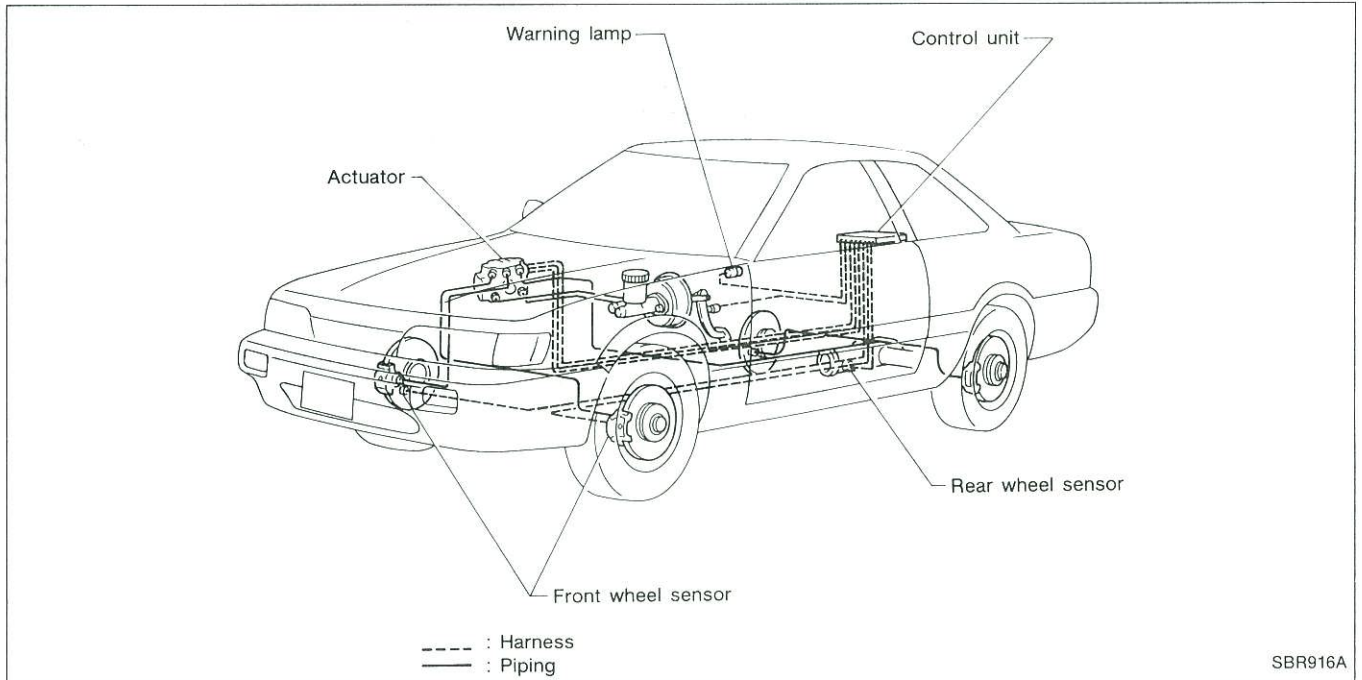
Number of notches: 8 - 9

4. Bend parking brake warning lamp switchplate so that brake warning lamp goes on when ratchet at parking brake lever is pulled "A" notches and goes off when fully released.

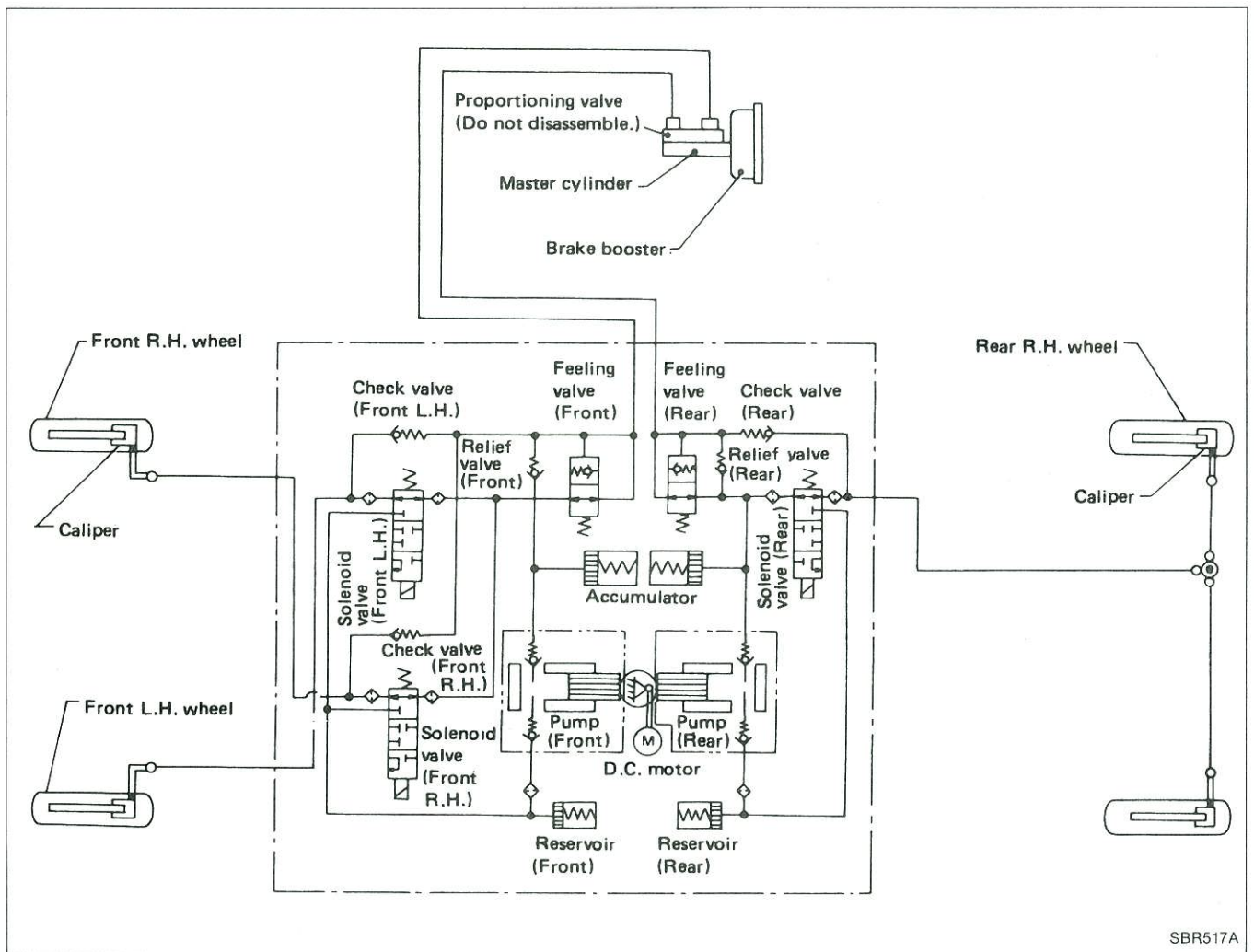
Number of notches "A": 2

ANTI-LOCK BRAKING SYSTEM

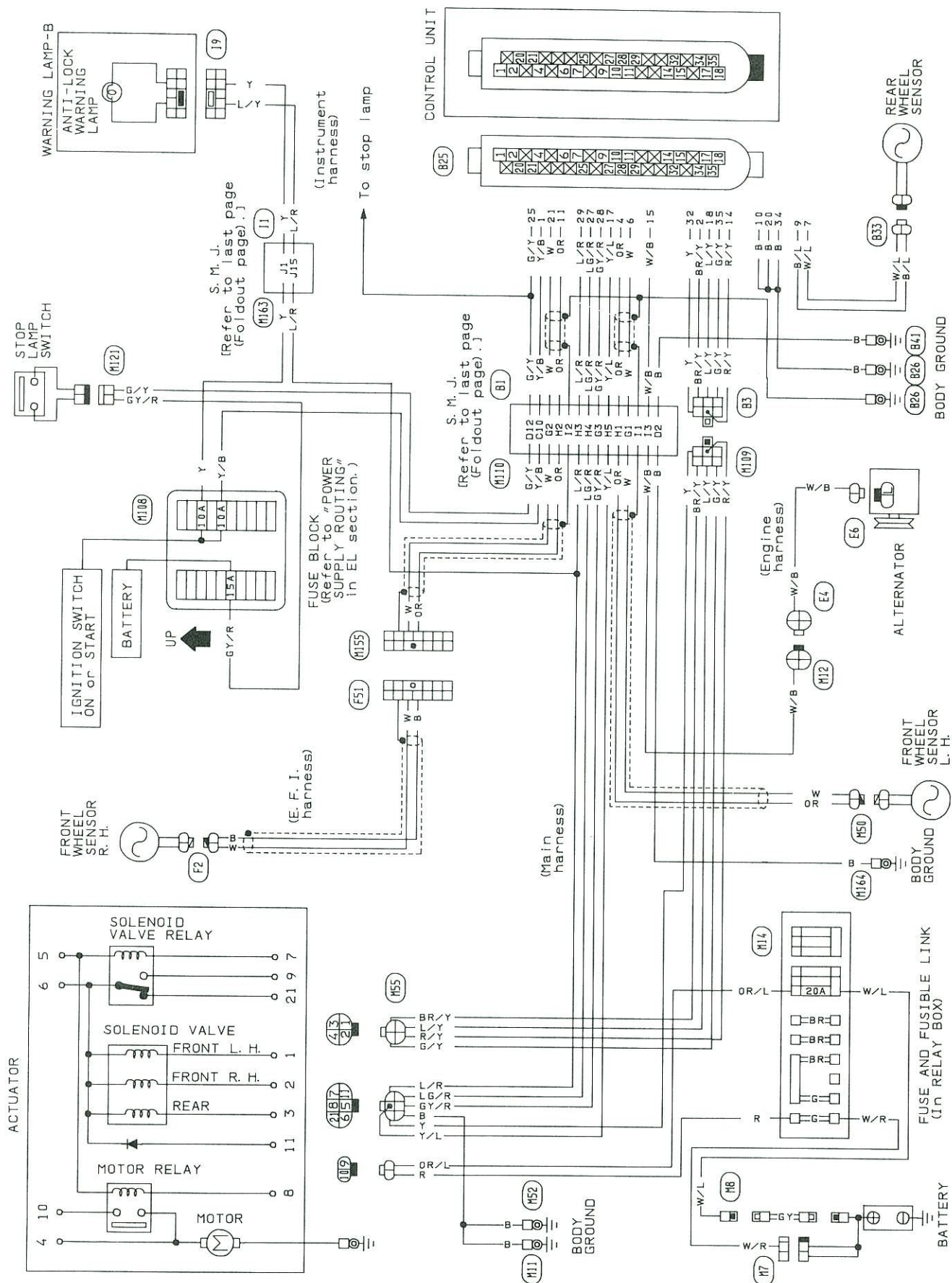
System Components



Hydraulic Circuit



Wiring Diagram



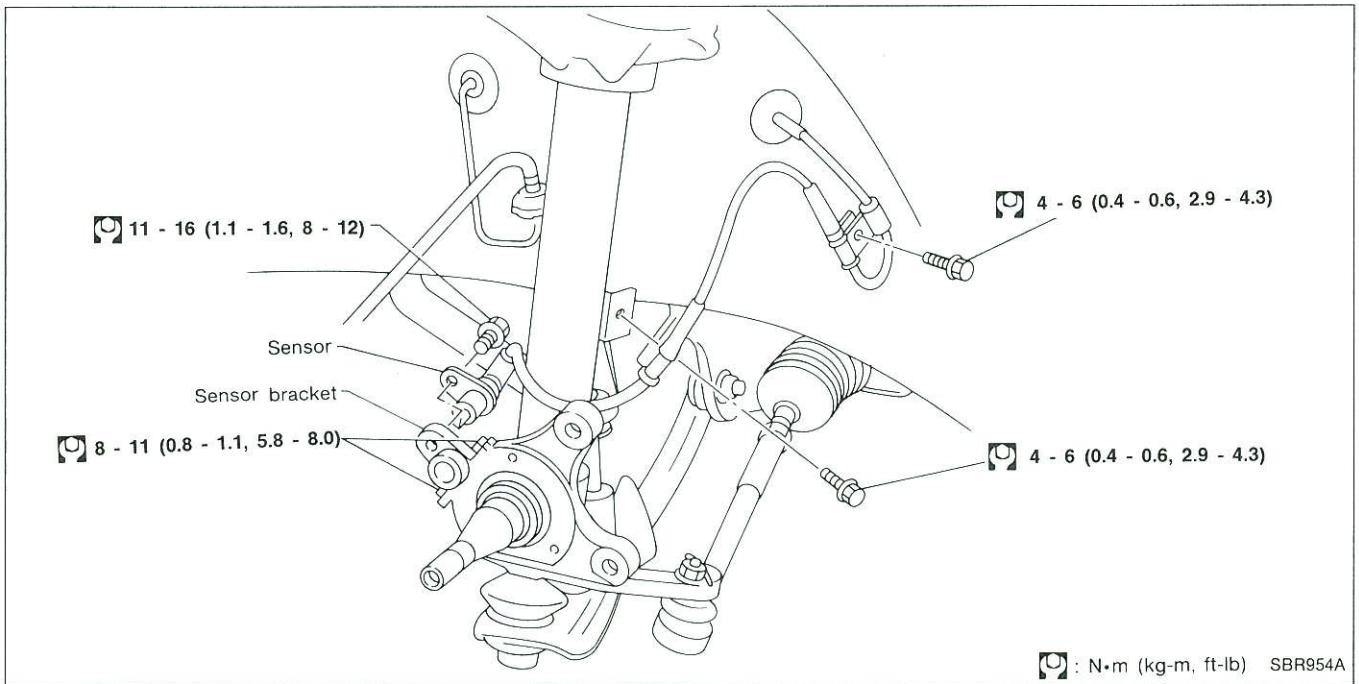
ANTI-LOCK BRAKING SYSTEM

Removal and Installation

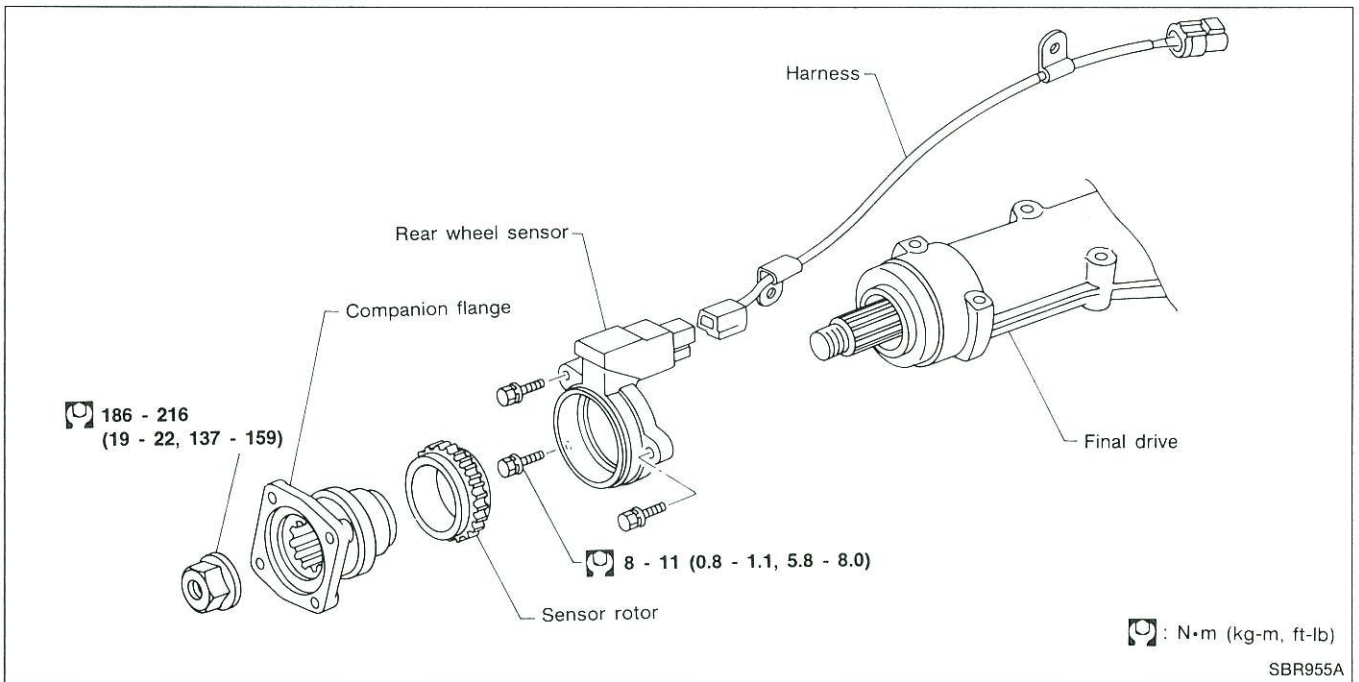
CAUTION:

Be careful not to damage sensor edge and sensor rotor teeth.

FRONT WHEEL SENSOR

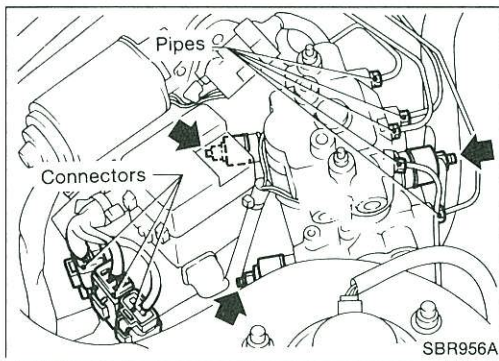
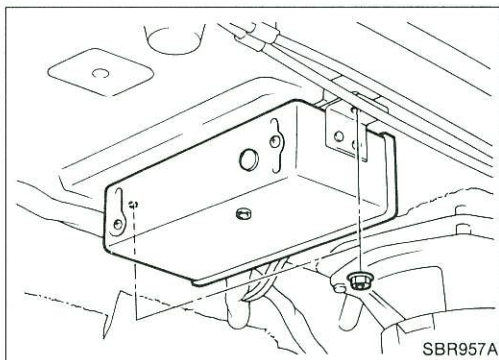


REAR WHEEL SENSOR



ANTI-LOCK BRAKING SYSTEM

Removal and Installation (Cont'd) CONTROL UNIT



Removal

ACTUATOR

1. Disconnect battery cable.
2. Drain brake fluid. Refer to "Changing Brake Fluid" in "CHECK AND ADJUSTMENT".
3. Disconnect connectors, brake pipes and remove fixing nuts.

Installation

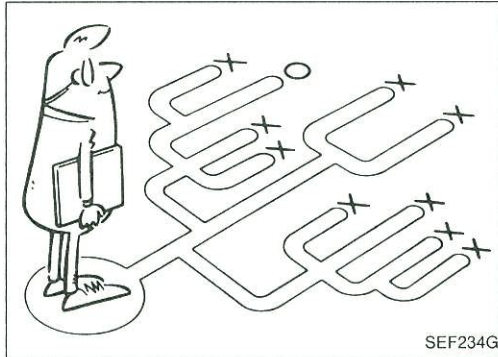
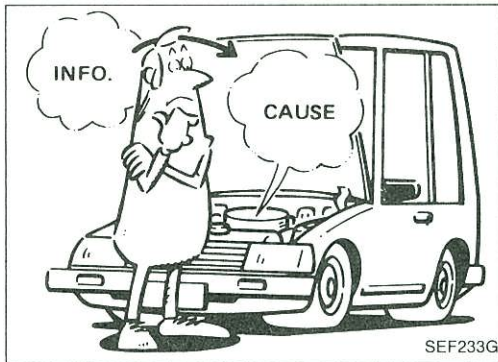
CAUTION:

After installation, refill brake fluid. Then bleed air. Refer to "CHECK AND ADJUSTMENT" and "AIR BLEEDING" respectively.

1. Connect brake pipes temporarily.
2. Secure fixing nuts.
3. Torque brake pipes.
4. Connect connectors and battery cable.

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How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The A.B.S. system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional problems such as air leaks in the booster or lines, lack of brake fluid, or other problems with brake system.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

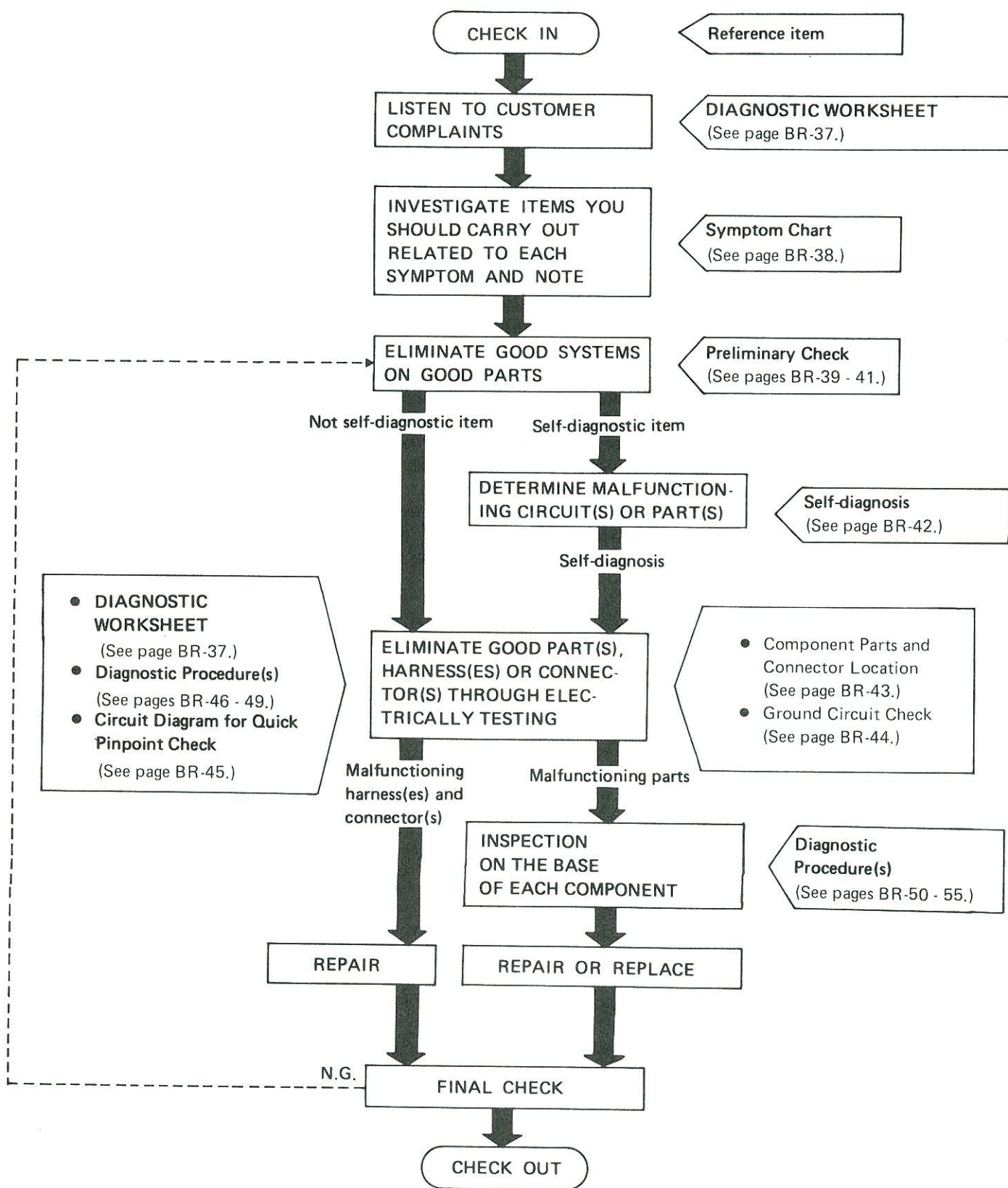
A visual check only may not find the cause of the problems, so a road test should be performed.

Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a A.B.S. 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 A.B.S. controlled vehicle.

TROUBLE DIAGNOSES

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



TROUBLE DIAGNOSES

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

KEY POINTS

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

DIAGNOSTIC WORKSHEET

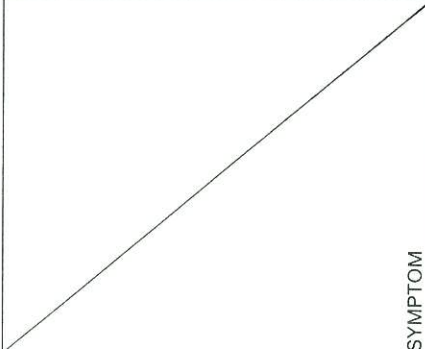
There are many kinds of operating conditions that lead to customer complaints, even if the system is normal. A good grasp of such conditions can make trouble-shooting faster and more accurate. In general, feelings for a problem depend on each customer's information. It is therefore important to fully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

Worksheet sample

Customer name MR/MS		Model & Year			VIN		
Engine #		Trans.			Mileage		
Incident Date		Manuf. Date			In Service Date		
Symptoms	<input type="checkbox"/> Pedal vibration and noise	<input type="checkbox"/> Warning ac- tivate	<input type="checkbox"/> Long stop- ping distance	<input type="checkbox"/> Abnormal pedal action	<input type="checkbox"/> A.B.S. doesn't work	<input type="checkbox"/> A.B.S. works but warning activates	<input type="checkbox"/> A.B.S. works frequently
Engine conditions		<input type="checkbox"/> When starting <input type="checkbox"/> After starting <input type="checkbox"/> Engine speed: 5,000 rpm or more					
Road conditions		<input type="checkbox"/> Low friction road (<input type="checkbox"/> Snow <input type="checkbox"/> Gravel <input type="checkbox"/> Other) <input type="checkbox"/> Protrusion					
Driving conditions		<input type="checkbox"/> High speed cornering <input type="checkbox"/> Vehicle speed: Greater than 10 km/h (6 MPH) <input type="checkbox"/> Vehicle speed: 10 km/h (6 MPH) or less <input type="checkbox"/> Vehicle is stopped					
Applying brake conditions		<input type="checkbox"/> Suddenly <input type="checkbox"/> Gradually					
Other conditions		<input type="checkbox"/> Operation of electrical equipment <input type="checkbox"/> Large pedal stroke <input type="checkbox"/> Operation of clutch					

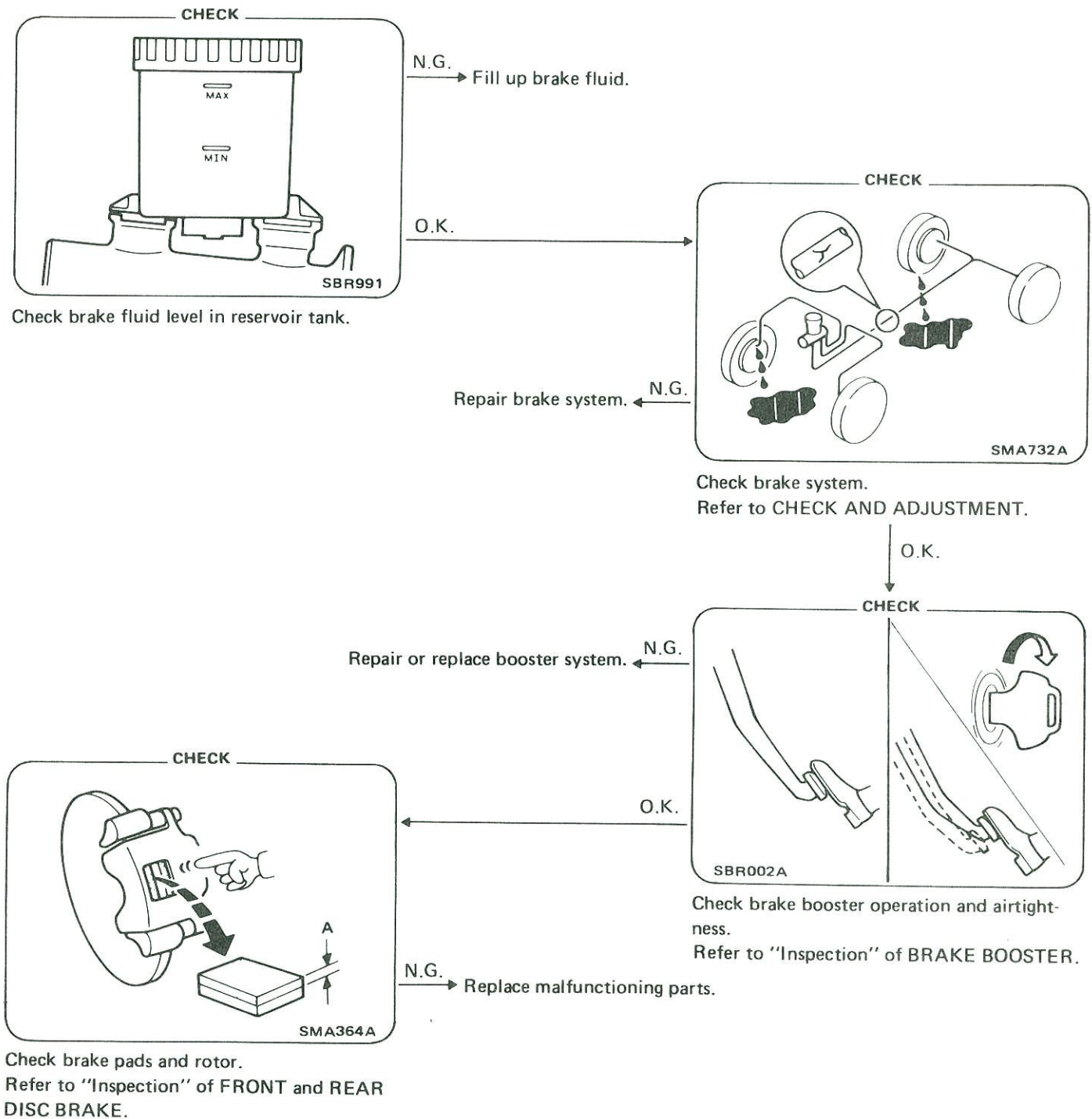
TROUBLE DIAGNOSES

Symptom Chart

PROCEDURE	Electrical Components Inspection	BR-56	Actuator inspection						<input type="radio"/>	
	Ground Circuit Check	BR-44	Motor ground						<input type="radio"/>	
Diagnostic Procedure (Select inspection with L.E.D. flashing No.)		BR-44	Control unit ground						<input type="radio"/>	
		BR-55	Diagnostic Procedure 11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-54	Diagnostic Procedure 10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-53	Diagnostic Procedure 9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-52	Diagnostic Procedure 8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-51	Diagnostic Procedure 7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diagnostic Procedure		BR-50	Diagnostic Procedure 6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-49	Diagnostic Procedure 5							<input type="radio"/>
		BR-49	Diagnostic Procedure 4					<input type="radio"/>		
		BR-48	Diagnostic Procedure 3				<input type="radio"/>			
		BR-48	Diagnostic Procedure 2			<input type="radio"/>				
Preliminary Check		BR-46	Diagnostic Procedure 1	<input type="radio"/>						
		BR-41	Preliminary Check 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		BR-41	Preliminary Check 3	<input type="radio"/>	<input type="radio"/>					
		BR-40	Preliminary Check 2		<input type="radio"/>			<input type="radio"/>		
		BR-39	Preliminary Check 1			<input type="radio"/>	<input type="radio"/>			
	REFERENCE PAGE				SYMPTOM					
					Pedal vibration & noise					
					Warning activates					
					Long stopping distance					
					Abnormal pedal action					
					A.B.S. doesn't work					
					A.B.S. works but warning activates					

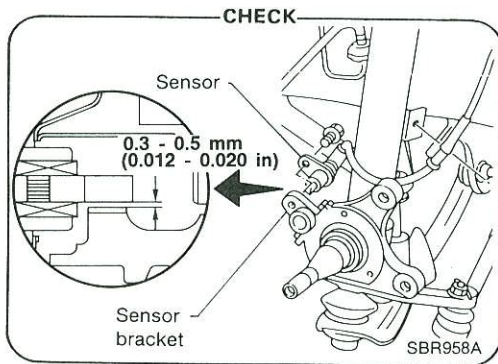
TROUBLE DIAGNOSES

Preliminary Check 1



TROUBLE DIAGNOSES

Preliminary Check 2

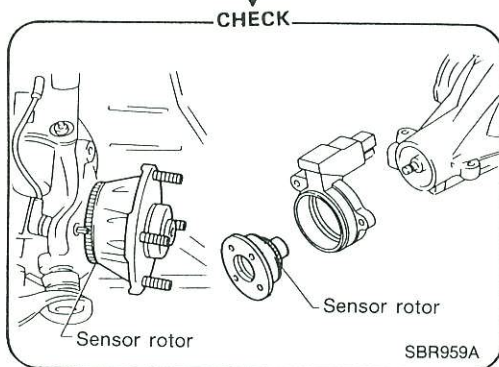


Check sensor clearance.

Clearance:

0.3 - 0.5 mm
(0.012 - 0.020 in)

O.K.



Check sensor rotor for teeth damage.

N.G.

When out of specification, align sensor by sliding sensor bracket.

Check sensor for the following items:

- Dust, foreign materials, etc., at fastening portion
- Improper installation
- Breakage

O.K.

N.G.

Repair or replace malfunctioning sensor.

N.G.

Replace sensor rotor with wheel hub or companion flange as a set.

TROUBLE DIAGNOSES

Preliminary Check 3

CHECK

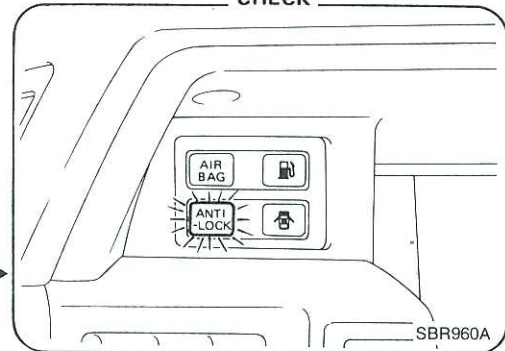
See page BR-43.

Measure each sensor resistance.
0.8 - 1.2 kΩ

Preliminary Check 3, 4

Preliminary Check 4

CHECK



Check warning lamp activation.
When ignition switch is turned on, warning lamp turns on.

N.G. → Replace.

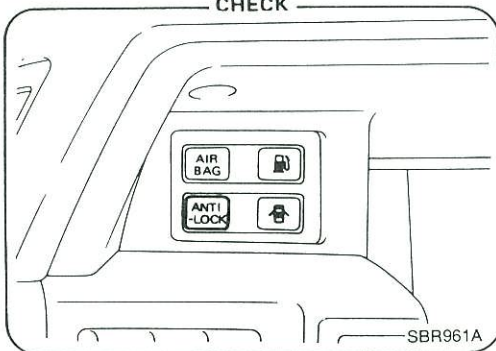
O.K. →

O.K. →

N.G. ↓

Check fuse.
Check bulb condition and remedy.

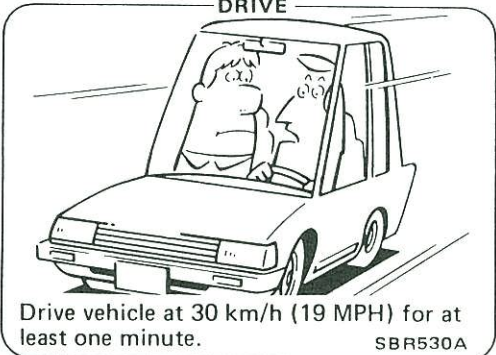
CHECK



Check warning lamp for deactivation.
When engine starts, warning lamp deactivates.

O.K. ↓

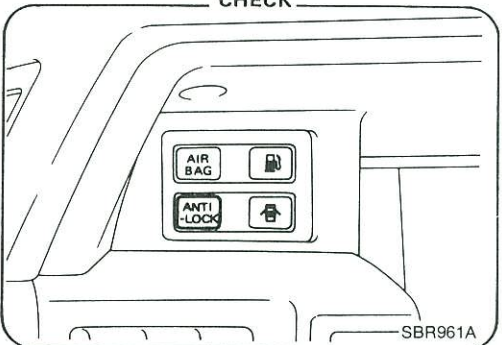
DRIVE



Drive vehicle at 30 km/h (19 MPH) for at least one minute.

SBR530A

CHECK



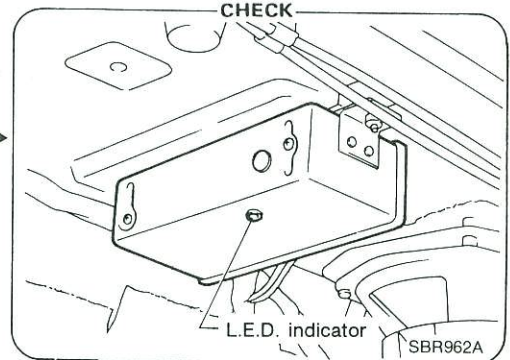
Ensure warning lamp remains off while driving.

N.G. →

O.K. →

If Preliminary Check 2 is not performed
and there is abnormal A.B.S. operation,
perform Preliminary Check 2.

CHECK



- Keep engine on and running.
- Count the number of L.E.D. flashes during 5 to 10 second "OFF" period.

Go to Self-diagnosis.
(See page BR-42.)

TROUBLE DIAGNOSES

Self-diagnosis

CHECKING THE NUMBER OF L.E.D. FLASHES

When a problem occurs in the A.B.S., the warning light on the instrument panel comes on. As shown in the Table, the control unit performs self-diagnosis.

To obtain satisfactory self-diagnosing results, the vehicle must be driven above 30 km/h (19 MPH) for at least one minute before the self-diagnosis is performed. After the vehicle is stopped, the number of L.E.D. flashes is counted while the engine is running.

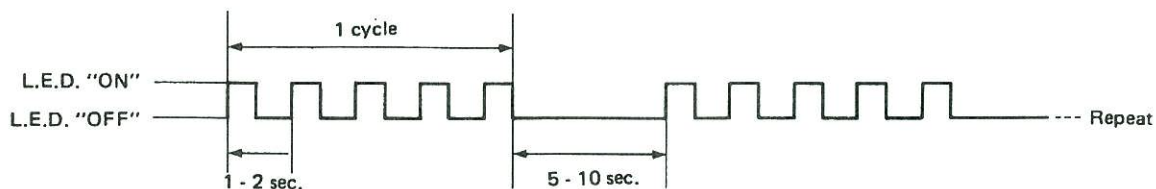
The L.E.D. is located on the control unit, identifying a malfunctioning part or unit by the number of flashes. Both the warning light and the L.E.D. persistently activate, even after a malfunctioning part or unit has been repaired, unless the ignition switch is turned "OFF". After repairs, turn the ignition switch "OFF". Then start the engine and drive the vehicle over 30 km/h (19 MPH) for at least one minute to ensure that the malfunctioning part or unit has been repaired properly.

If more than two circuits malfunction at the same time, the L.E.D. will flash to indicate one of the malfunctioning circuits. After the circuit has been repaired, the L.E.D. will then flash to indicate that the other circuit is malfunctioning.

No. of L.E.D. flashes	Malfunctioning part or unit	Diagnostic Procedure
1	Left front actuator solenoid circuit	Diagnostic Procedure 6
2	Right front actuator solenoid circuit	
3 or 4	Rear actuator solenoid circuit	
5	Left front wheel sensor circuit	Diagnostic Procedure 7
6	Right front wheel sensor circuit	
7 or 8	Rear wheel sensor circuit	
9	Motor and motor relay	Diagnostic Procedure 8
10	Solenoid valve relay	Diagnostic Procedure 9
16 or continuous	Control unit	Diagnostic Procedure 10
Warning activates and L.E.D. "OFF"	Power supply or ground circuit for control unit	Diagnostic Procedure 11

Example

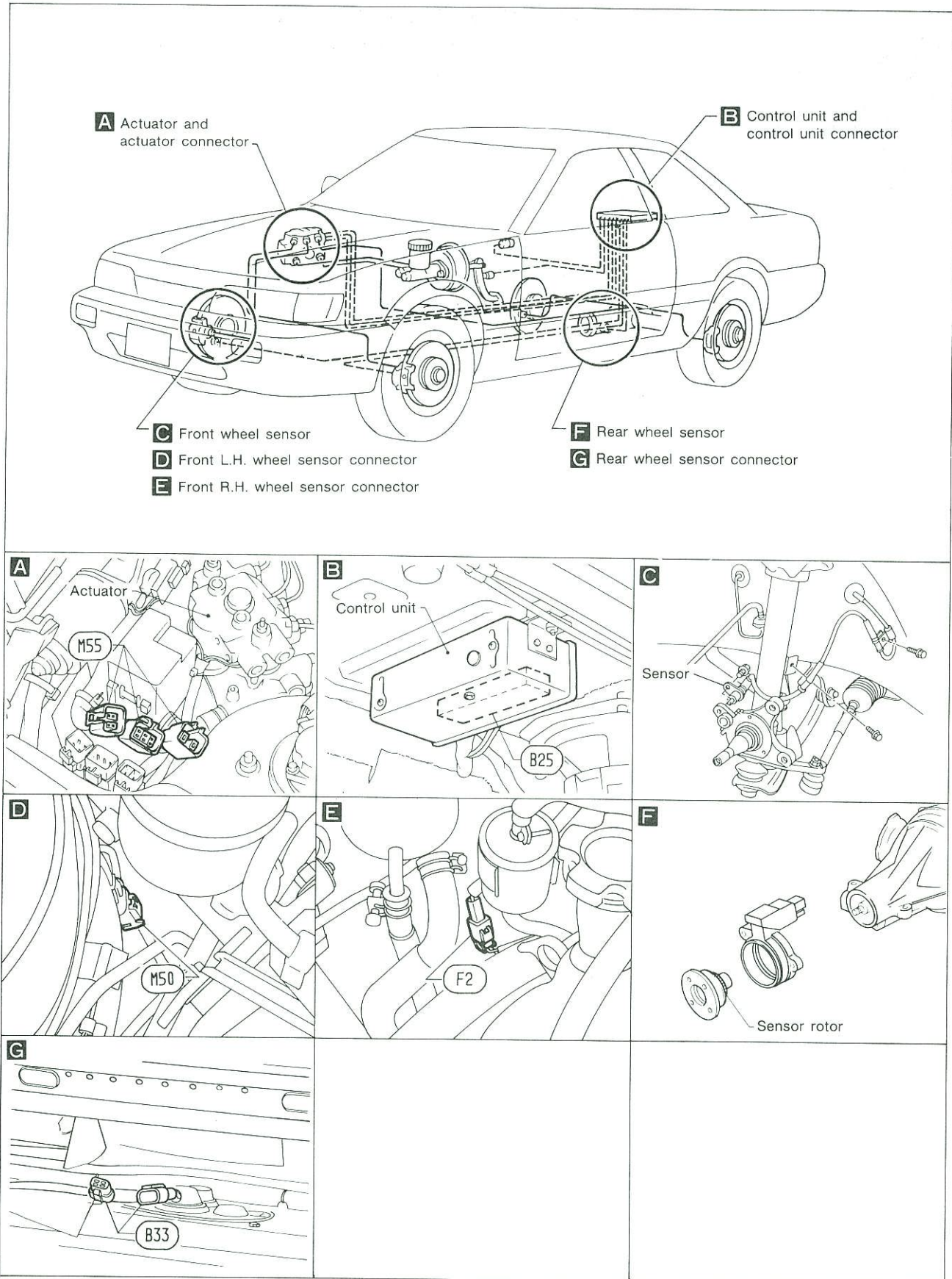
Improper operation of left front rotor sensor circuit

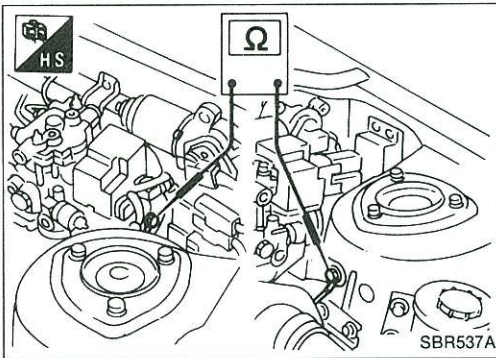


SBR531A

TROUBLE DIAGNOSES

Component Parts and Connector Location

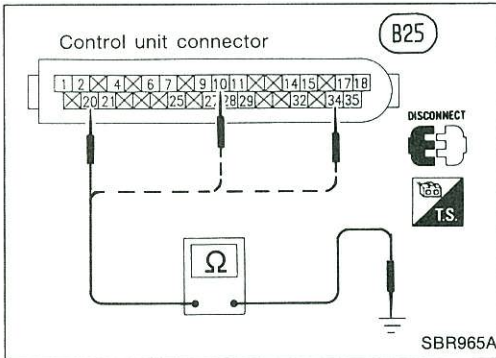




Ground Circuit Check

ACTUATOR MOTOR GROUND

- Check resistance between both terminals.
Resistance: 0Ω

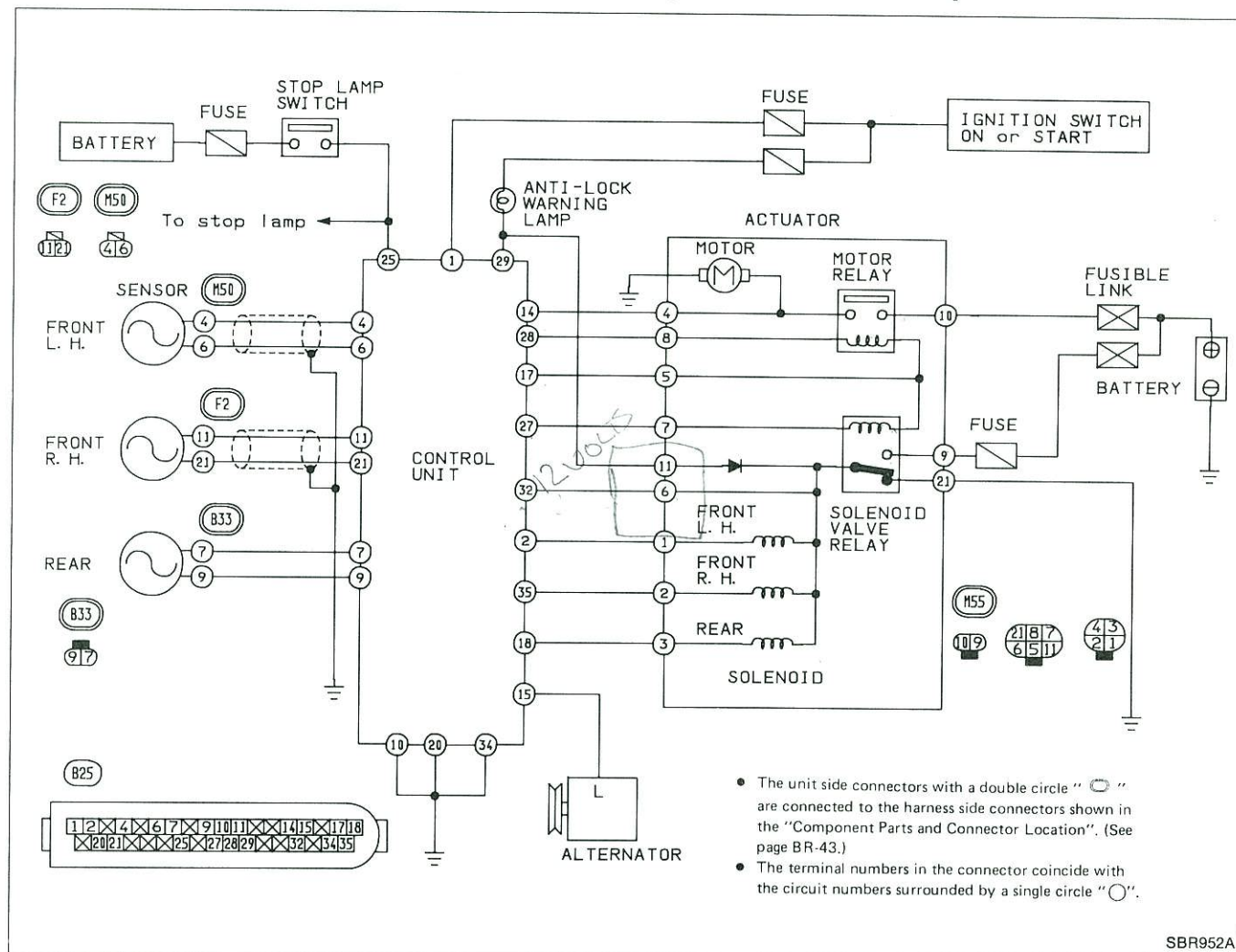


CONTROL UNIT GROUND

- Check resistance between both terminals.
Resistance: 0Ω

TROUBLE DIAGNOSES

Circuit Diagram for Quick Pinpoint Check

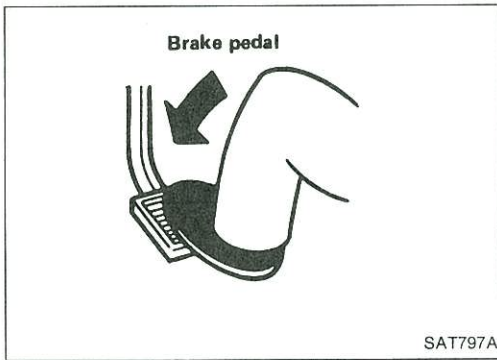


SBR952A

Diagnostic Procedure 1

SYMPTOM: Pedal vibration and noise

Refer to worksheet result.



Check whether the symptom appears only when brake is applied suddenly.

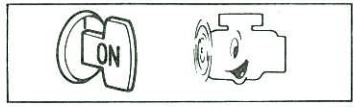
Yes → When brake is normally applied, A.B.S. works and produces pedal vibration or noise.

No →

Check whether the symptom appears only when engine is started.

Yes → Refer to Preliminary Check 4 result.

No →



Check whether the symptom appears only when the vehicle speed is within 10 km/h (6 MPH) after starting engine.

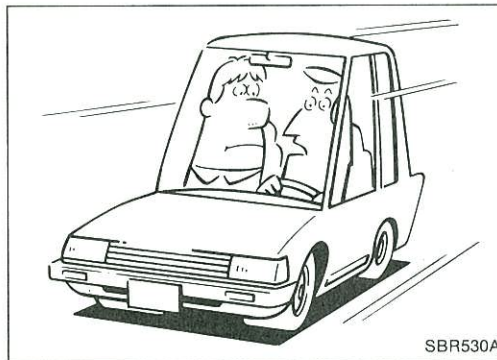
Yes → Check whether the symptom disappears within 5 seconds.

No →

No → (A)

Yes →

A.B.S. may sometimes operate when load is high and voltage is low due to insufficient alternator output.



Check whether the symptom appears while the vehicle is being driven.

No → (A)

Yes →

Check whether the symptom appears when brake is applied gradually.

Yes → (B)

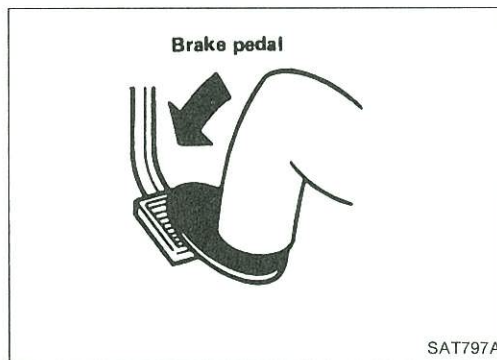
No (Appears when brake is not applied.) → Check if there are any conditions, among those listed below, when symptom appears.

- Shifting
- Operating clutch
- Passing protrusion

No → (B)

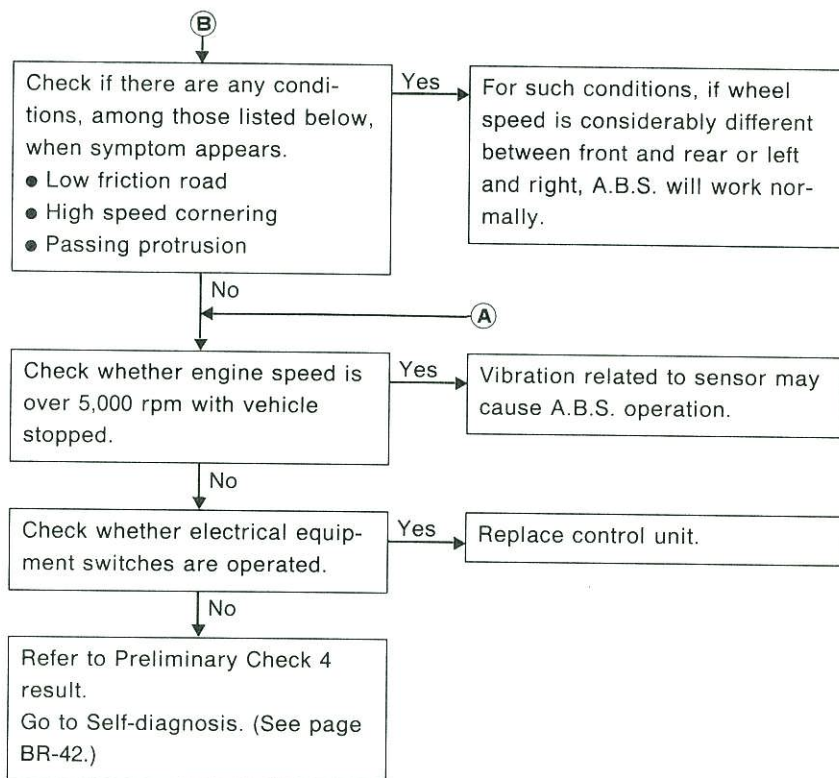
Yes →

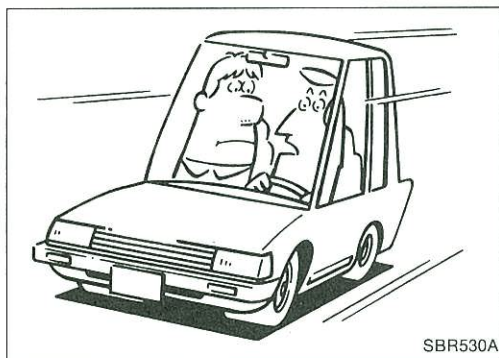
Under these conditions individual wheel speed can change suddenly. This may sometimes cause the A.B.S. to operate.



TROUBLE DIAGNOSES

Diagnostic Procedure 1 (Cont'd)

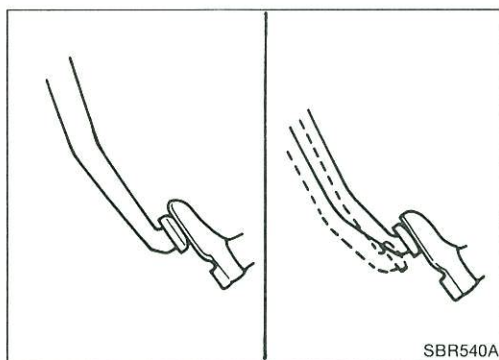
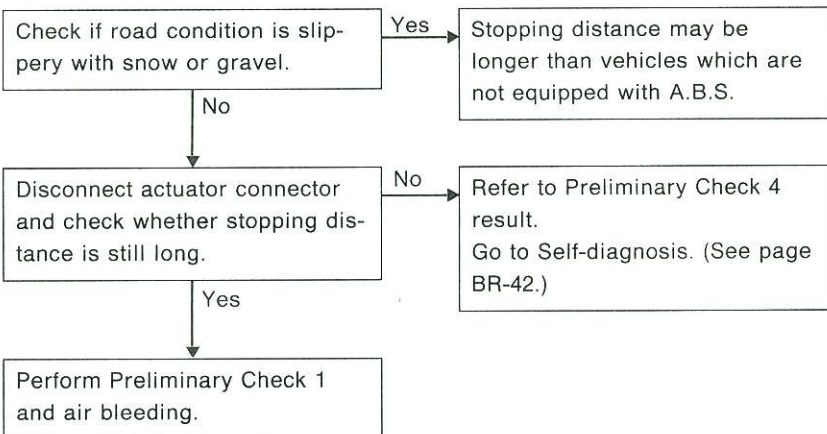




Diagnostic Procedure 2

SYMPTOM: Long stopping distance

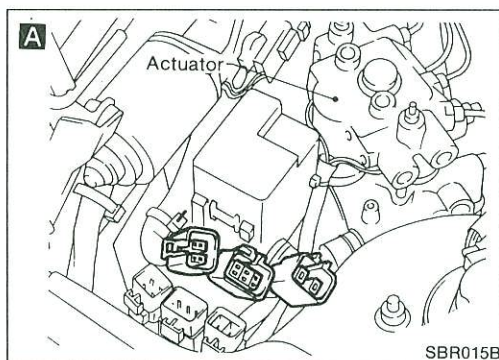
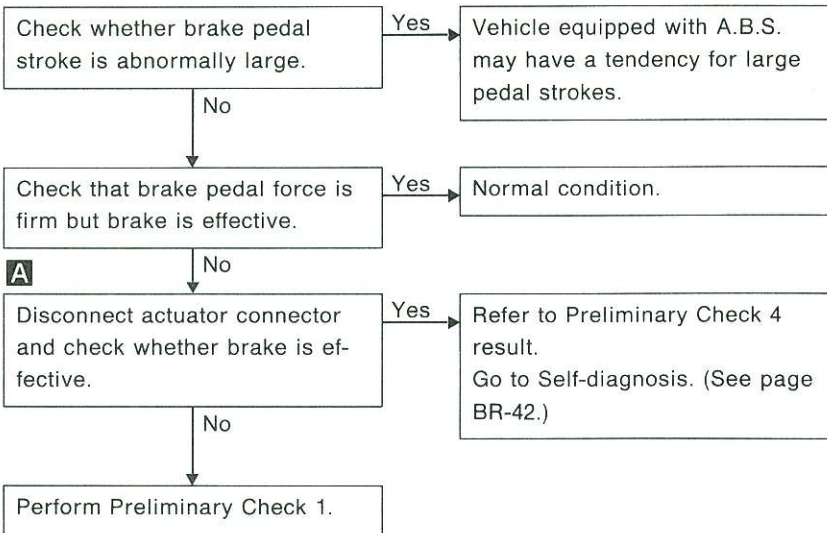
Refer to worksheet results.



Diagnostic Procedure 3

SYMPTOM: Abnormal pedal action

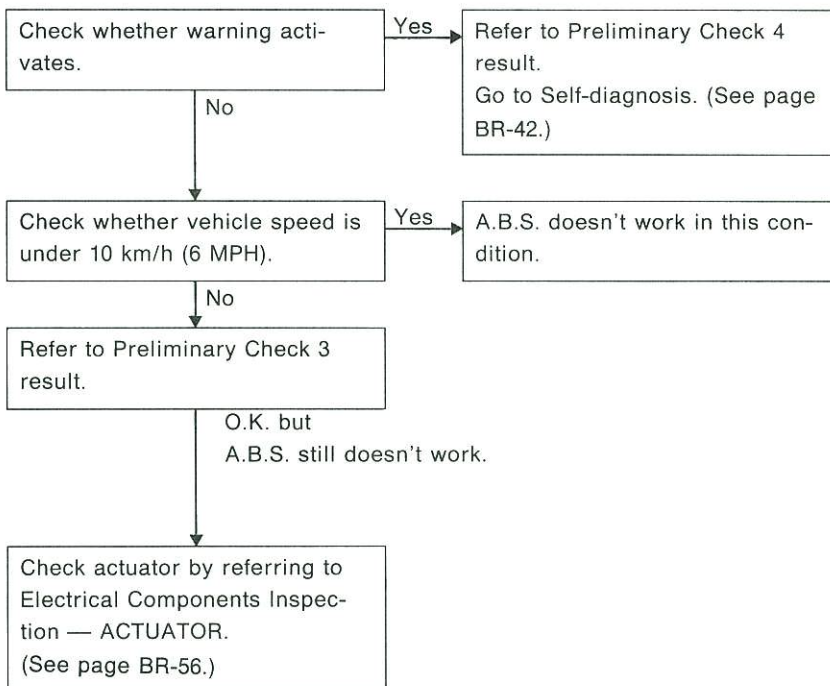
Refer to worksheet results.



Diagnostic Procedure 4

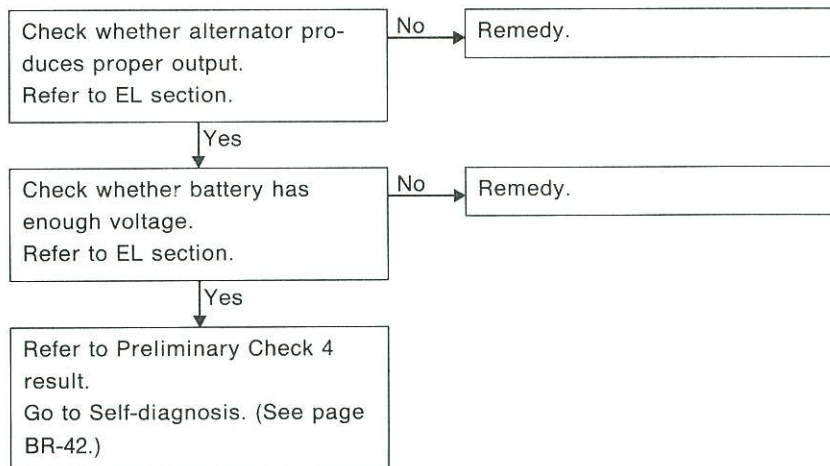
SYMPTOM: A.B.S. doesn't work.

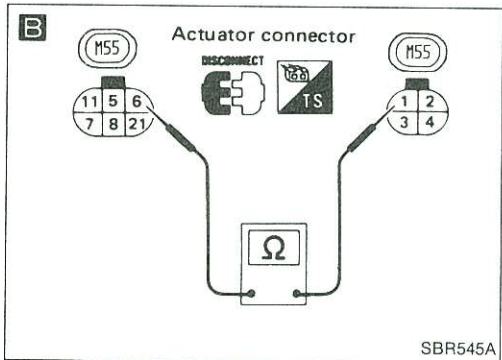
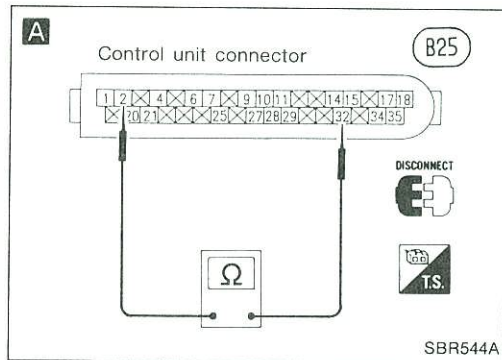
Refer to worksheet results.



Diagnostic Procedure 5

SYMPTOM: A.B.S. works but warning activates.





Diagnostic Procedure 6

ACTUATOR SOLENOID (L.E.D. flashing number 1 - 4)

INSPECTION START

Remove battery negative terminal connector.

A

CHECK SOLENOID VALVE RESISTANCE.

Disconnect control unit connector.

Check resistance between control unit connector (vehicle side) terminals.

Flashing number 1:

Terminals ③② and ②

Flashing number 2:

Terminals ③② and ③⑤

Flashing number 3 or 4:

Terminals ③② and ①⑧

Resistance: 0.7 - 1.6Ω

O.K.

Replace control unit.

B

N.G.

Disconnect actuator connector.
Check resistance between actuator connector (actuator side) terminals.

Flashing number 1:

Terminals ⑥ and ①

Flashing number 2:

Terminals ⑥ and ②

Flashing number 3 or 4:

Terminals ⑥ and ③

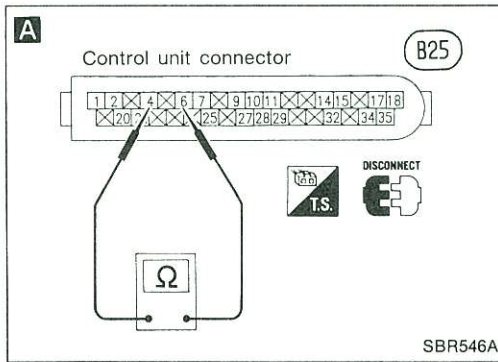
Resistance: 0.7 - 1.6Ω

O.K.

Repair harness between actuator connector and control unit connector.

N.G.

Replace actuator.



Diagnostic Procedure 7

WHEEL SPEED SENSOR (L.E.D. flashing number 5 - 8)

INSPECTION START

Remove battery negative terminal connector.

A

CHECK SPEED SENSOR RESISTANCE.

Disconnect control unit connector.

Check resistance between control unit connector (vehicle side) terminals.

Flashing number 5:

Terminals ④ and ⑥

Flashing number 6:

Terminals ⑪ and ⑫

Flashing number 7 or 8:

Terminals ⑦ and ⑨

Resistance: 0.8 - 1.2 kΩ

O.K.

Replace control unit.

N.G.

Refer to Preliminary Check 3 result.

Check whether sensor has 0.8 - 1.2 kΩ resistance.

N.G.

Replace sensor.

O.K.

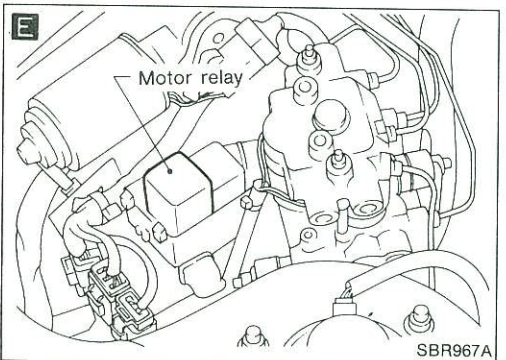
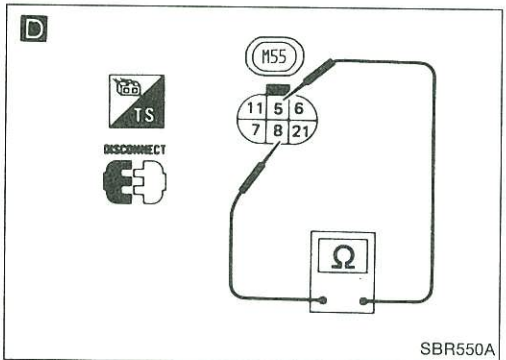
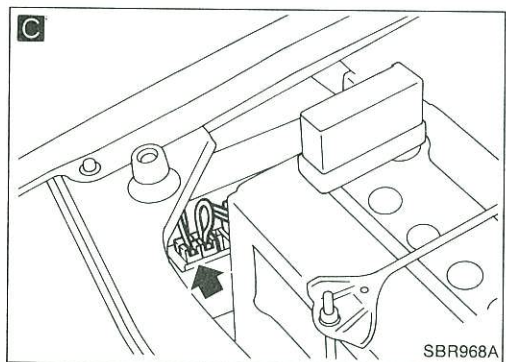
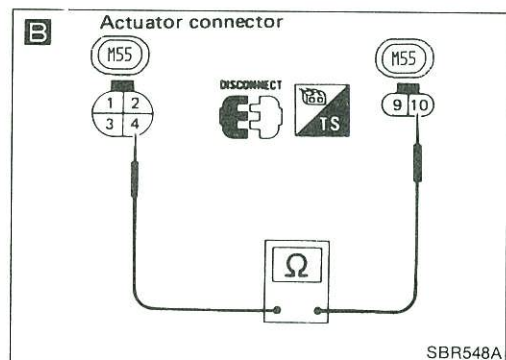
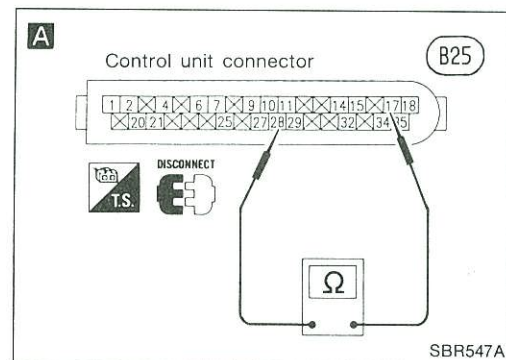
Repair harness between sensor connector and control unit connector.

Diagnostic Procedure 8

ACTUATOR MOTOR RELAY (L.E.D. flashing number 9)

INSPECTION START

Remove battery negative terminal connector.



A

CHECK MOTOR RELAY SOLENOID RESISTANCE.

Disconnect control unit connector.

Check resistance between control unit connector (vehicle side) terminals ⑰ and ⑳.

Resistance: 45 - 55Ω

O.K.

B

CHECK MOTOR RELAY DEACTIVATION.

Disconnect actuator connector.

Check continuity between actuator connector (actuator side) terminals ④ and ⑩.

No

C

Check if motor's fusible link is blown.

Yes

Replace fusible link.

N.G.

D

Disconnect actuator connector.

Check resistance between actuator connector (actuator side) terminals ⑧ and ⑤.

Resistance: 45 - 55Ω

O.K.

N.G.

E

Replace motor relay.

Repair harness between actuator and control unit.

E

Replace motor relay.

No

Perform Electrical Components Inspection — ACTUATOR. (See page BR-56.)

O.K.

N.G.

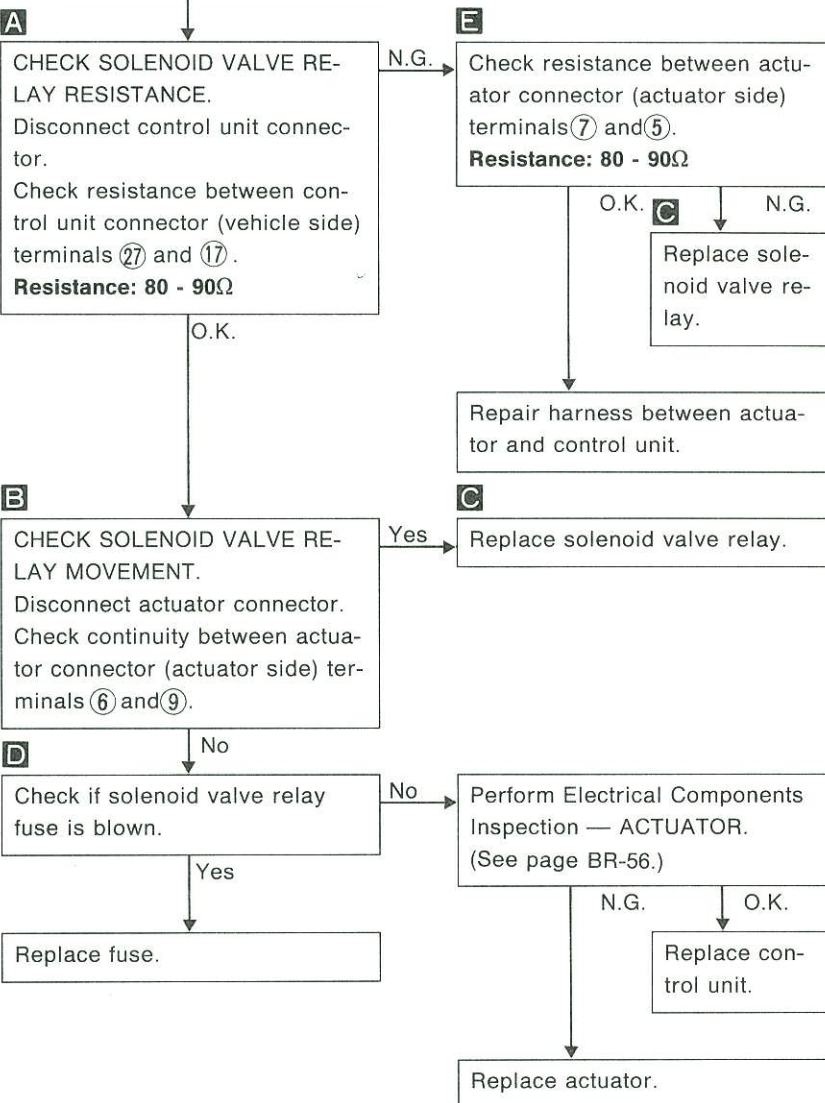
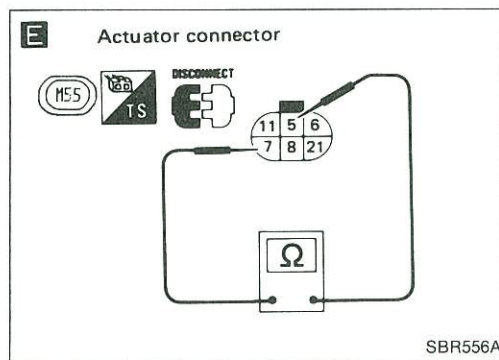
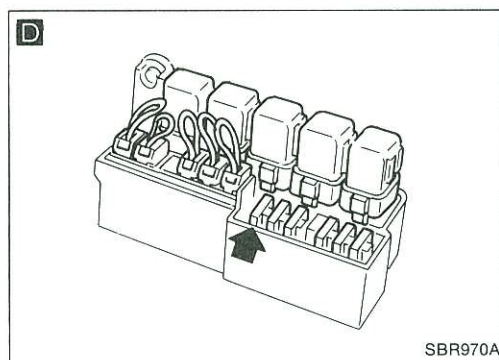
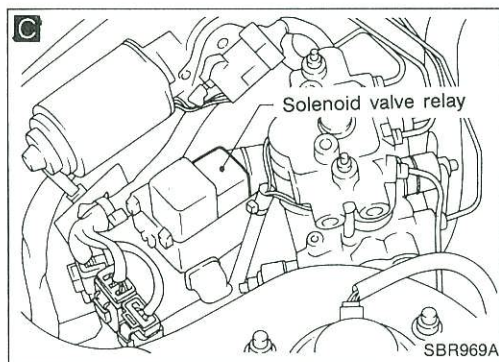
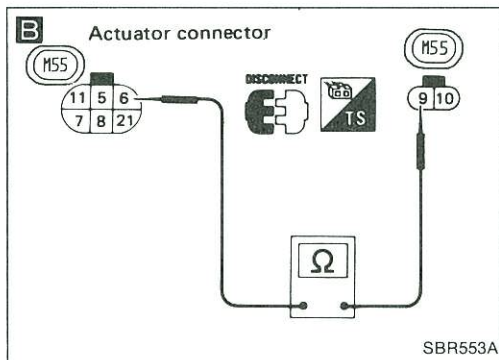
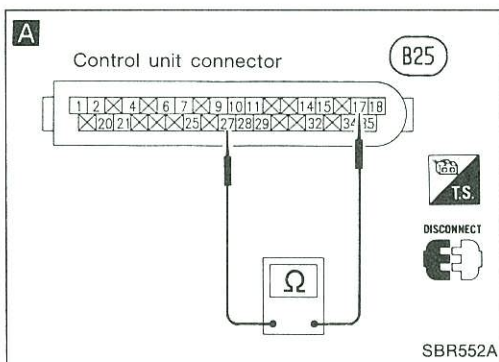
Replace actuator.

Replace control unit.

Diagnostic Procedure 9

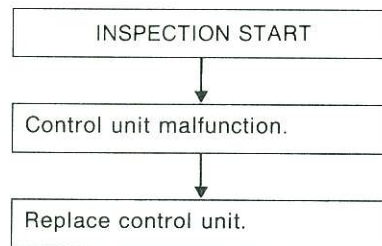
ACTUATOR SOLENOID VALVE RELAY (L.E.D. flashing number 10)

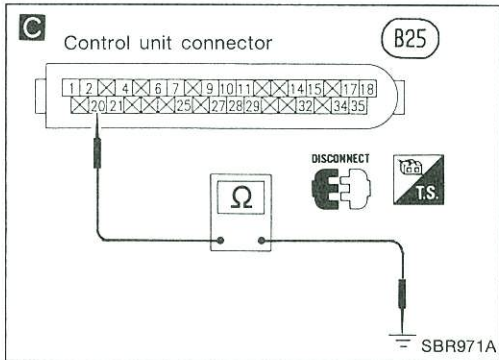
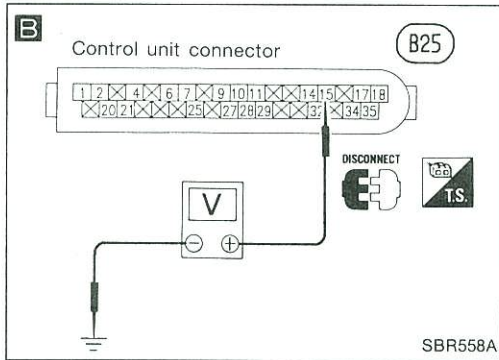
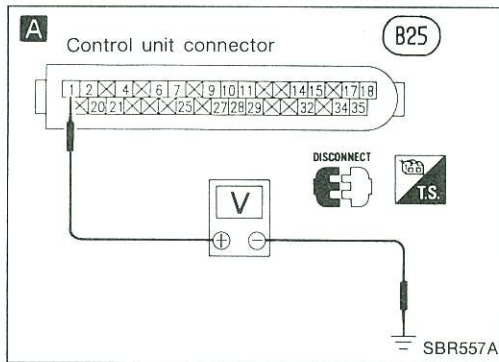
INSPECTION START
Remove battery negative terminal connector.



Diagnostic Procedure 10

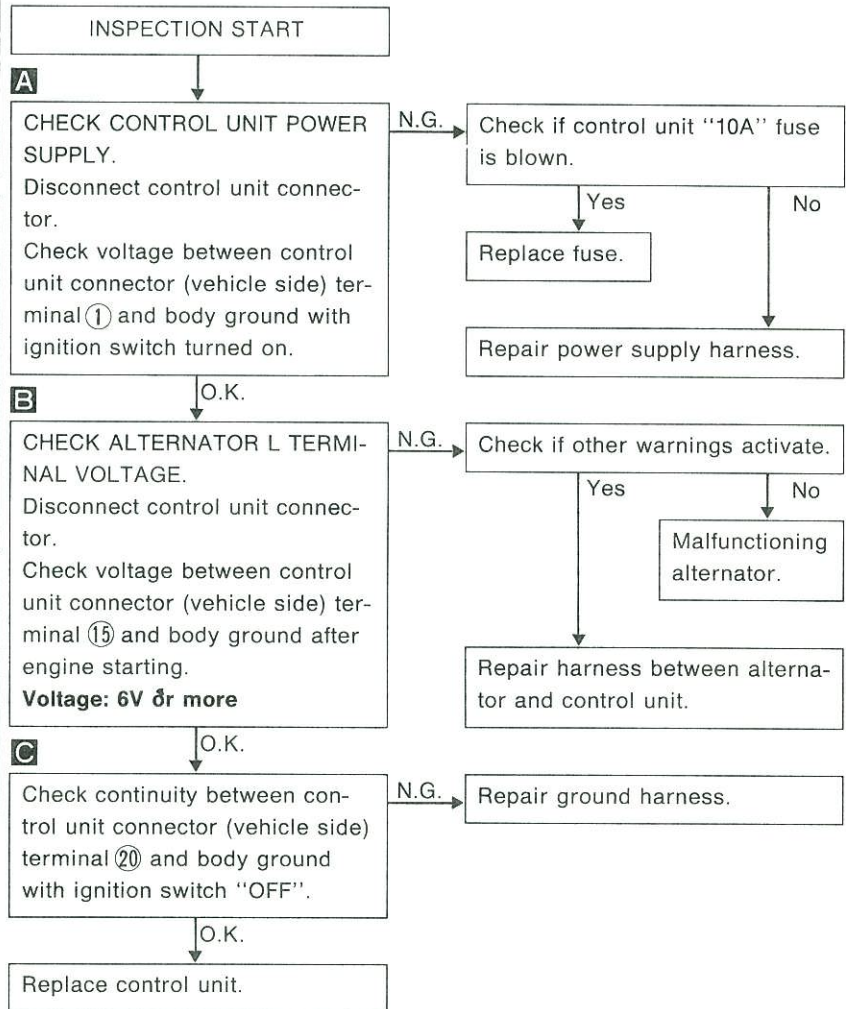
CONTROL UNIT (L.E.D. flashing number 16)





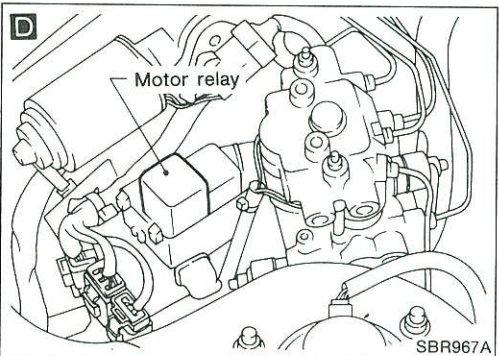
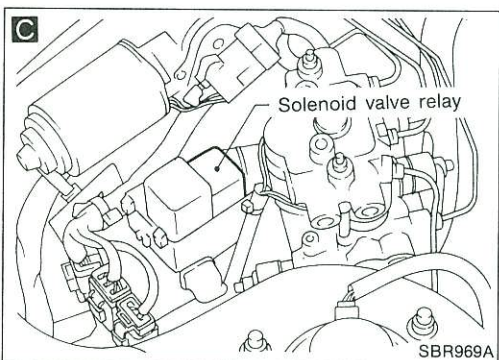
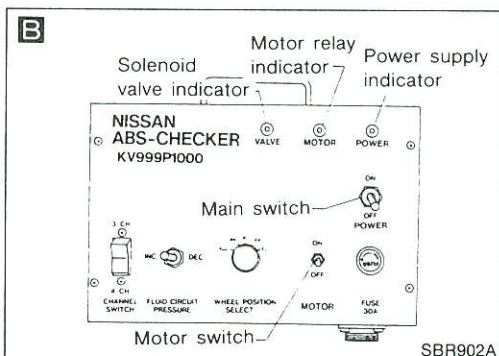
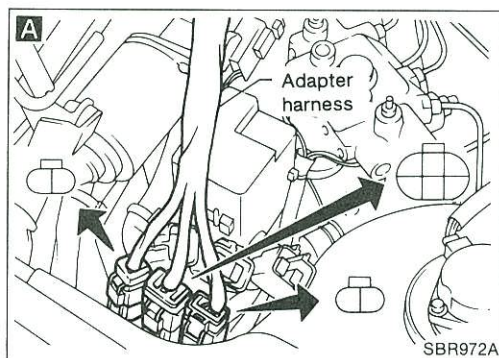
Diagnostic Procedure 11

CONTROL UNIT OR POWER SUPPLY AND GROUND CIRCUIT (Warning activates but L.E.D. comes off.)



Electrical Components Inspection

ACTUATOR (Not self-diagnostic item)



INSPECTION START

A Connect A.B.S. checker to actuator connector and vehicle harness with battery terminal connected and all checker switch turning off.
Use harness for 3 channel.
Set channel select switch to 3 channel.

B Turn checker main switch on.
Check power supply indicator for coming on.

No → Replace battery with fully charged new one, if checker connection is correct.

Yes
B Check checker valve relay indicator for coming on.

No → **C** Replace solenoid valve relay, if checker connection is correct.

Yes
B Step A Select one valve — FL, FR or RR. (valves corresponding to each wheel position.)
Select brake circuit pressure decreasing position by switch then turn motor switch on.
Select pressure increasing position.

B Check motor relay indicator for coming on while motor switch is turned on.

No → **D** Replace motor relay, if checker connection is correct.

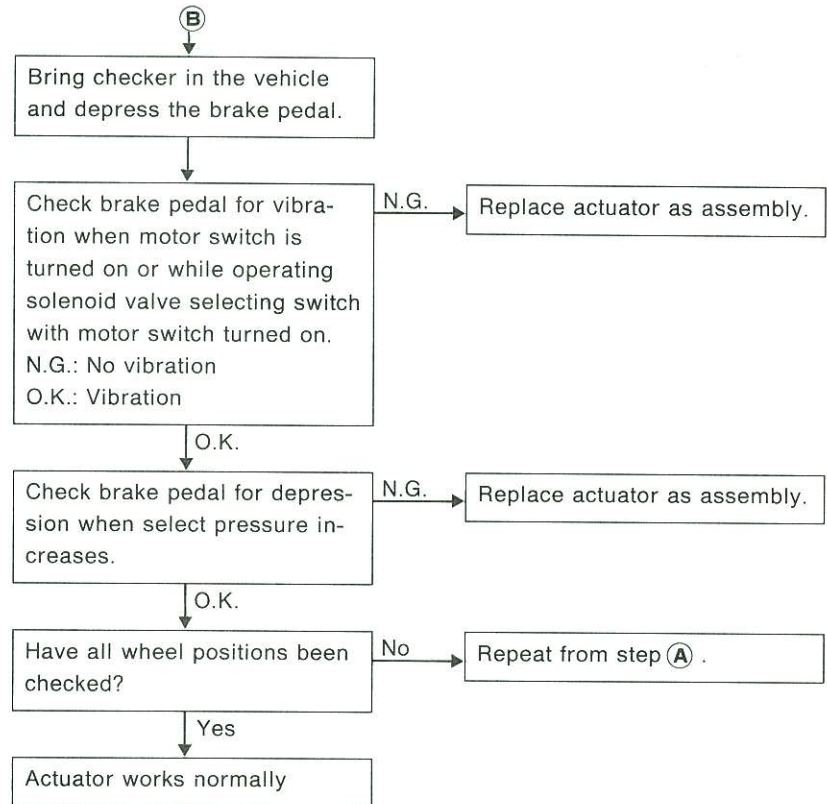
Yes
Check motor for operational sound beside the actuator in a quiet place.

No → Replace actuator as assembly, if Diagnostic Procedures 6 - 11 are already performed and checker connection is correct.

Yes
B

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)



CAUTION:

Do not set checker at pressure decrease position for more than 5 seconds at a time. Actuator solenoid valve may be damaged.

General Specifications

BRAKE SYSTEM

Front brake	
Brake model	CL28VB
Cylinder bore diameter mm (in)	60.6 (2.386)
Pad length x width x thickness mm (in)	129 x 43 x 11 (5.08 x 1.69 x 0.43)
Rotor outer diameter x thickness mm (in)	274 x 22 (10.79 x 0.87)
Rear brake	
Brake model	AD14
Cylinder bore diameter mm (in)	42.8 (1.685)
Pad length x width x thickness mm (in)	93.8 x 33.4 x 10 (3.693 x 1.315 x 0.39)
Rotor outer diameter x thickness mm (in)	266 x 10 (10.47 x 0.39)

Parking brake	
Brake model	DS17HB
Lining length x width x thickness mm (in)	165.1 x 35 x 3.3 (6.50 x 1.38 x 0.130)
Drum inner diameter mm (in)	172 (6.77)
Master cylinder	
Cylinder bore diameter mm (in)	25.40 (1)
Control valve	
Valve model	Proportioning valve (within master cylinder)
Sprit point x reducing ratio kPa (kg/cm ² , psi)	2,942 (30, 427) x 0.4
Brake booster	
Booster model	M195T
Diaphragm diameter mm (in)	Primary: 205 (8.07) Secondary: 180 (7.09)
Brake fluid	
Recommended brake fluid	DOT 3

Inspection and Adjustment

FRONT & REAR DISC BRAKE

Unit: mm (in)

Item \ Brake model	CL28VB	AD14
Pad wear limit		
Minimum thickness	2.0 (0.079)	
Rotor repair limit		
Minimum thickness	20.0 (0.787)	9.0 (0.354)
Maximum runout	0.07 (0.0028)	

BRAKE PEDAL

Unit: mm (in)

Free height	199 - 209 (7.83 - 8.23)
Depressed height [Under force of 490 N (50 kg, 110 lb) with engine running]	110 (4.33) or less
Clearance between pedal stopper and threaded end of switches	0.3 - 1.0 (0.012 - 0.039)
Pedal free play at pedal pad	1.0 - 3.0 (0.039 - 0.118)

PARKING BRAKE

Unit: mm (in)

Item	Brake model	DS17HB
Lining wear limit		
Minimum thickness		1.5 (0.059)
Drum repair limit		
Inner diameter (Max.)		173.0 (6.81)

PARKING BRAKE LEVER

Item	Control type	Center lever
Number of notches [Under force of 196 N (20 kg, 44 lb)]		8 - 9
Number of notches when warning lamp comes on		2 or less

STEERING SYSTEM

SECTION **ST**

CONTENTS

PRECAUTIONS	ST- 2
PREPARATION	ST- 3
ON-VEHICLE INSPECTION	ST- 5
STEERING WHEEL AND STEERING COLUMN	ST-10
POWER STEERING GEAR AND LINKAGE (Model PR26SC)	ST-13
POWER STEERING OIL PUMP	ST-25
SERVICE DATA AND SPECIFICATIONS (S.D.S.)	ST-28

ST

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in **section BF** of this Service Manual.

WARNING:

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


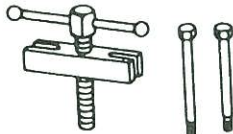
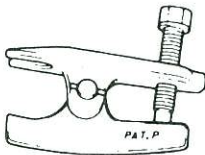
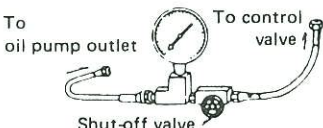
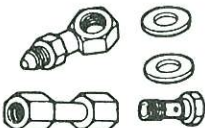
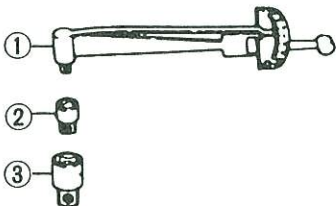
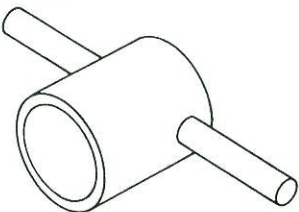
Steering System

- 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 A.T.F.* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.

*: Automatic transmission fluid


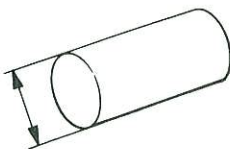
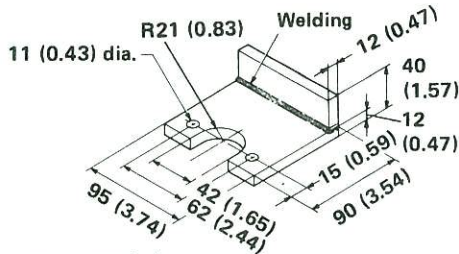
PREPARATION

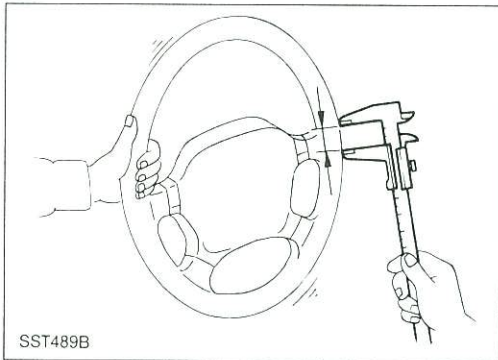
SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
KV48100700 (J26364) Torque adapter	 Measuring pinion rotating torque
ST27180001 (J25726-A) Steering wheel puller	 Removing and installing steering wheel
HT72520000 (J25730-A) Ball joint remover	 Removing ball joint
ST27091000 (J26357) Pressure gauge	 Measuring oil pressure
KV48102500 (—) Pressure gauge adapter	 Measuring oil pressure
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	 Measuring turning torque
KV48104400 (—) Rack seal ring reformer	 Reforming teflon ring

PREPARATION

COMMERCIAL SERVICE TOOLS

Tool name	Description
Rear oil seal drift	<div>Installing rear oil seal</div>  <div>28 mm (1.10 in) dia.</div>
Pinion oil seal drift	<div>Installing pinion oil seal</div>  <div>35 mm (1.38 in) dia.</div>
Oil pump attachment	<div>Disassembling and assembling oil pump</div>  <div>Unit: mm (in) SST481A</div>



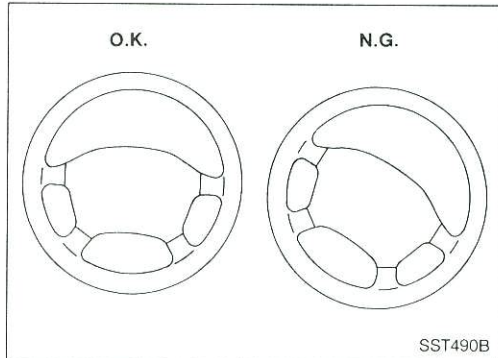
Checking Steering Wheel Play

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.



Checking Neutral Position on Steering Wheel

Pre-checking

- Make sure that wheel alignment is correct.

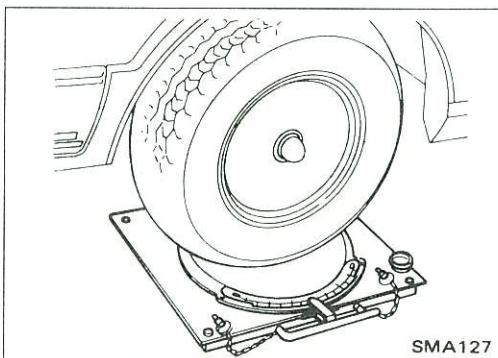
Wheel alignment:

Refer to section FA for S.D.S.

- 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.

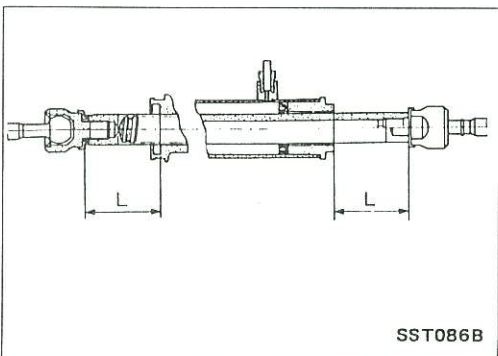


Front Wheel Turning Angle

- Rotate steering wheel all the way right and left; measure turning angle.

Turning angle of full turns:

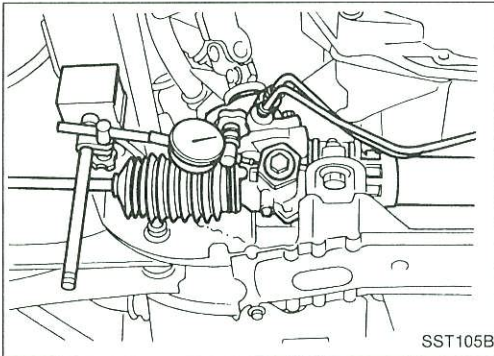
Refer to section FA for S.D.S.



- If it is not within specification, check rack stroke.

Rack stroke "L":

Refer to S.D.S.



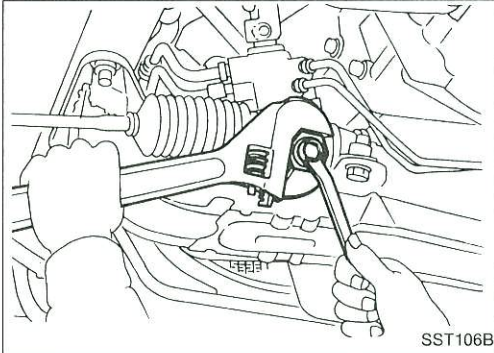
Checking Gear Housing Movement

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.
 - Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.Turn off ignition key while checking.

Movement of gear housing:

$\pm 2 \text{ mm } (\pm 0.08 \text{ in})$ or less

2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.

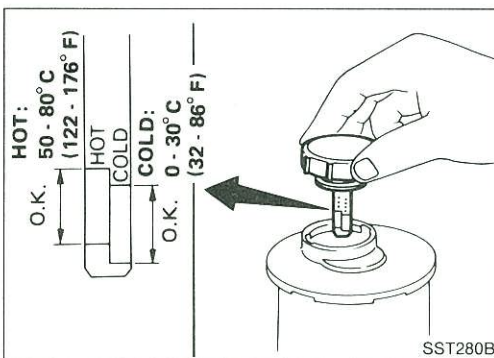


Adjusting Rack Retainer

- Perform this driving test on a flat road.
1. Check whether vehicle moves in a straight line when steering wheel is released.
 2. Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx. 20°) position.
- If any abnormality is found, correct it by resetting adjusting screw.

Checking and Adjusting Drive Belts

Refer to section MA for Drive Belt Inspection.



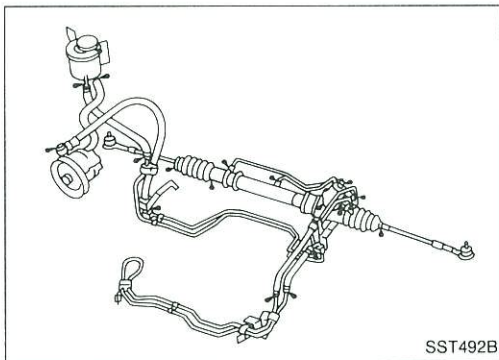
Checking Fluid Level

Check fluid level.

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

CAUTION:

- Do not overfill.
- Recommended fluid is Automatic Transmission Fluid "DEXRON™" type.



Checking Fluid Leakage

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

1. Run engine at idle speed or 1,000 rpm.

Make sure temperature of fluid in oil tank rises to 60 to 80°C (140 to 176°F).

2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

Do not overtighten connector as this can damage O-ring, washer and connector.

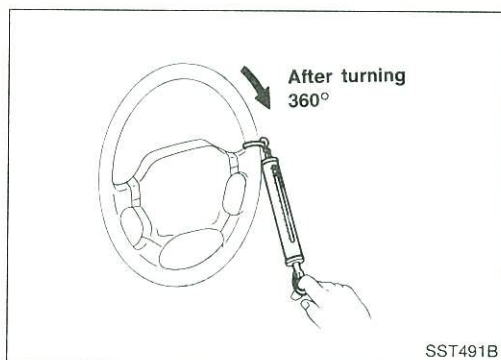
Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear ground.
2. Add fluid into oil tank to specified level. Meanwhile, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.

Repeat steering wheel operation until fluid level no longer decreases.

3. Start engine.
Repeat step 2 above.
- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.
 - a. Generation of air bubbles in reservoir tank
 - b. Generation of clicking noise in oil pump
 - c. Excessive buzzing in oil pump

While the vehicle is stationary or while turning the steering wheel slowly, fluid noise may occur in the valve or oil pump. This noise is inherent in this steering system, and it will not affect performance or durability of the system.



Checking Steering Wheel Turning Force

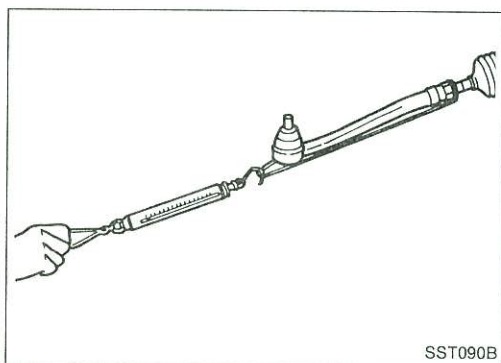
1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Steering wheel turning force:

29 N (3 kg, 7 lb) or less



5. If steering wheel turning force is out of specifications, check rack sliding force to detect condition of steering gear assembly.
 - a. Disconnect steering column lower joint and knuckle arms from the gear.
 - b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
 - c. While pulling tie-rod slowly in the ± 11.5 mm (± 0.453 in) range from the neutral position, make sure rack sliding force is within specification.

Average rack sliding force:

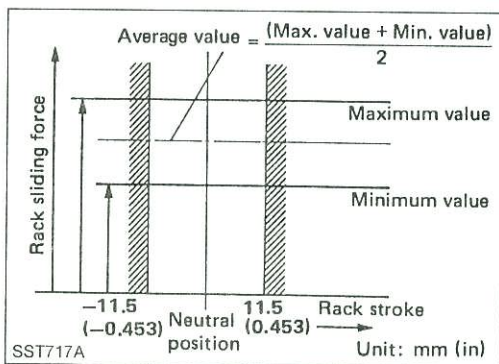
235 - 284 N (24 - 29 kg, 53 - 64 lb)

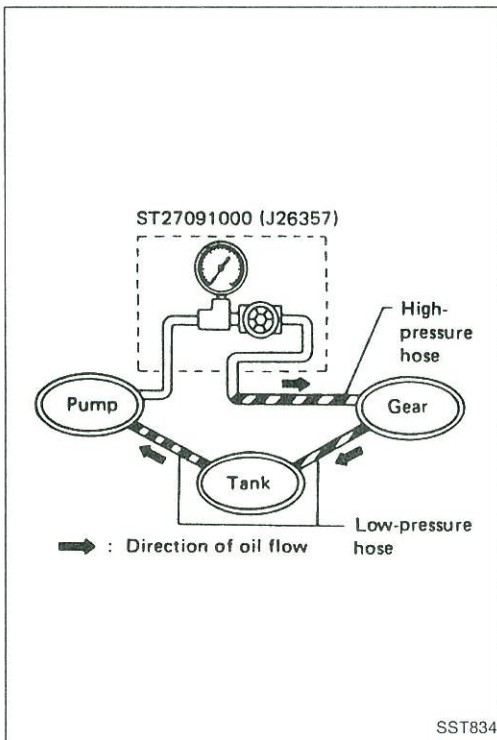
- d. Check sliding force outside above range.

Maximum rack sliding force:

Not more than 39 N (4 kg, 9 lb) beyond above value

6. If rack sliding force is not within specification, overhaul steering gear assembly.





Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve. Then bleed air. (See "Bleeding Hydraulic System".)
2. Run engine.

Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, oil pressure in oil pump will increase to relief pressure, resulting in an abnormal rise in oil temperature.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

Oil pump maximum standard pressure:

7,649 - 8,238 kPa (78 - 84 kg/cm², 1,109 - 1,194 psi)

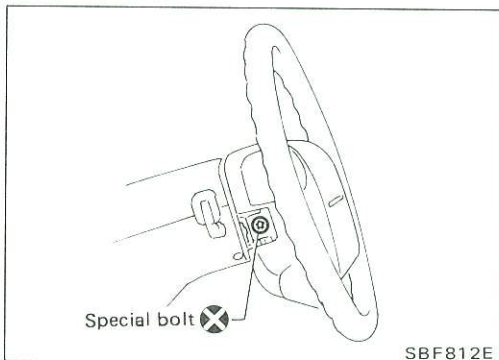
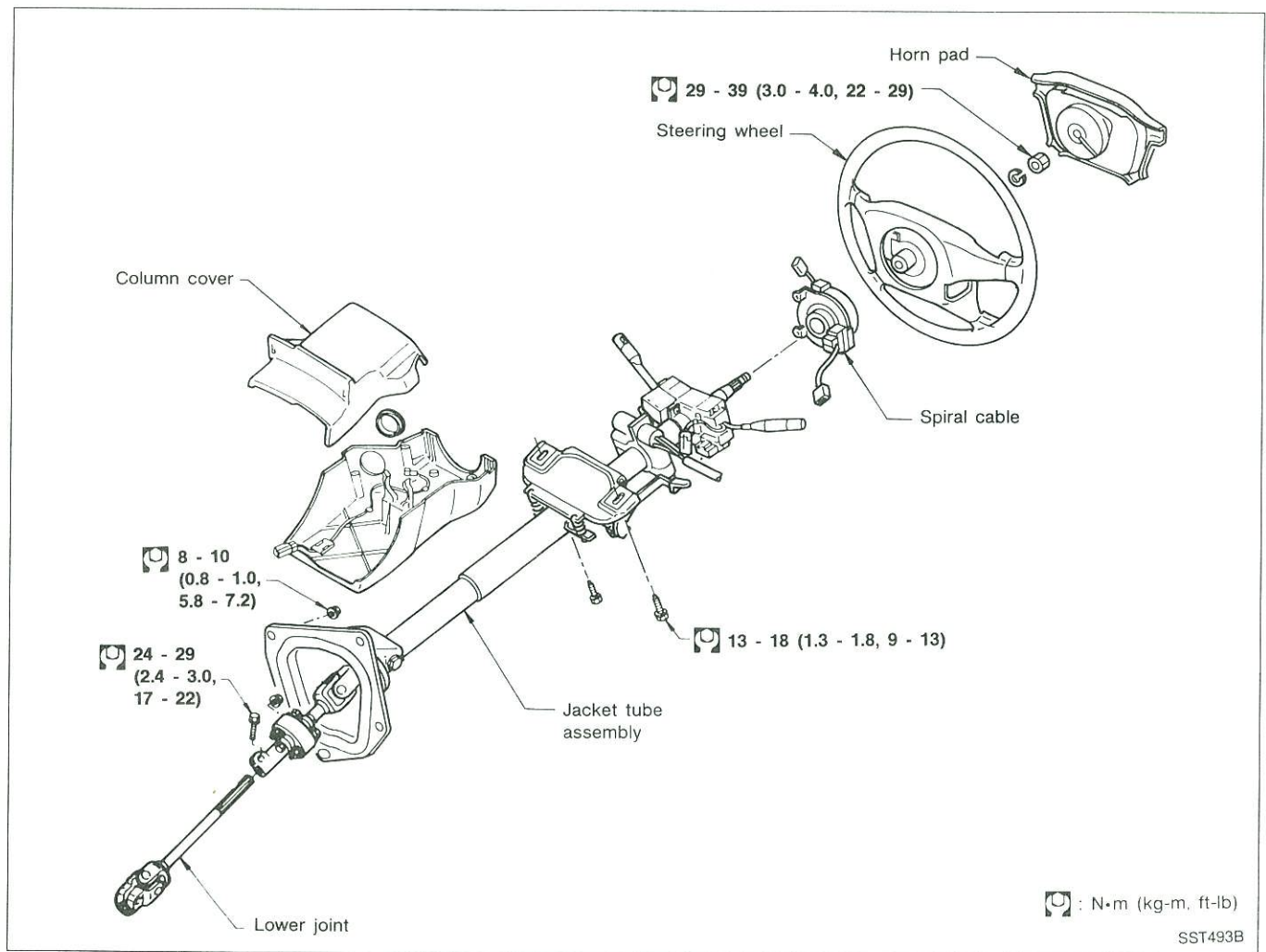
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.
 - When pressure reaches standard pressure, gear is damaged.
 - When pressure remains below standard pressure, pump is damaged.

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.

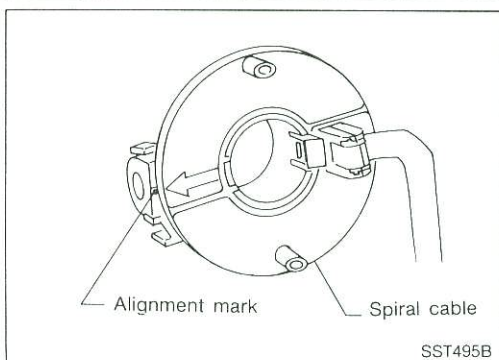
STEERING WHEEL AND STEERING COLUMN



Removal and Installation

STEERING WHEEL

Refer to section BF for Air Bag Module and Spiral Cable Removal.



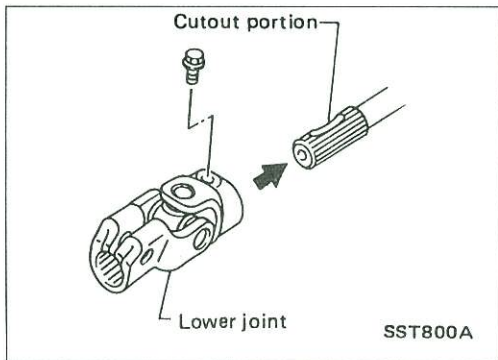
STEERING COLUMN

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.

STEERING WHEEL AND STEERING COLUMN

Removal and Installation (Cont'd)

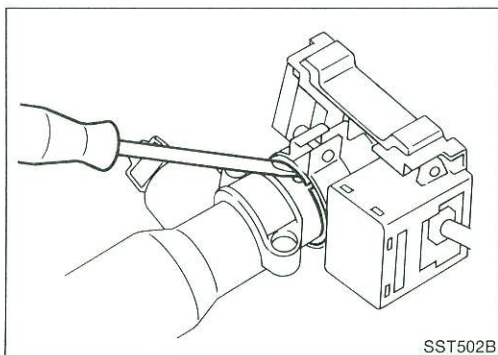
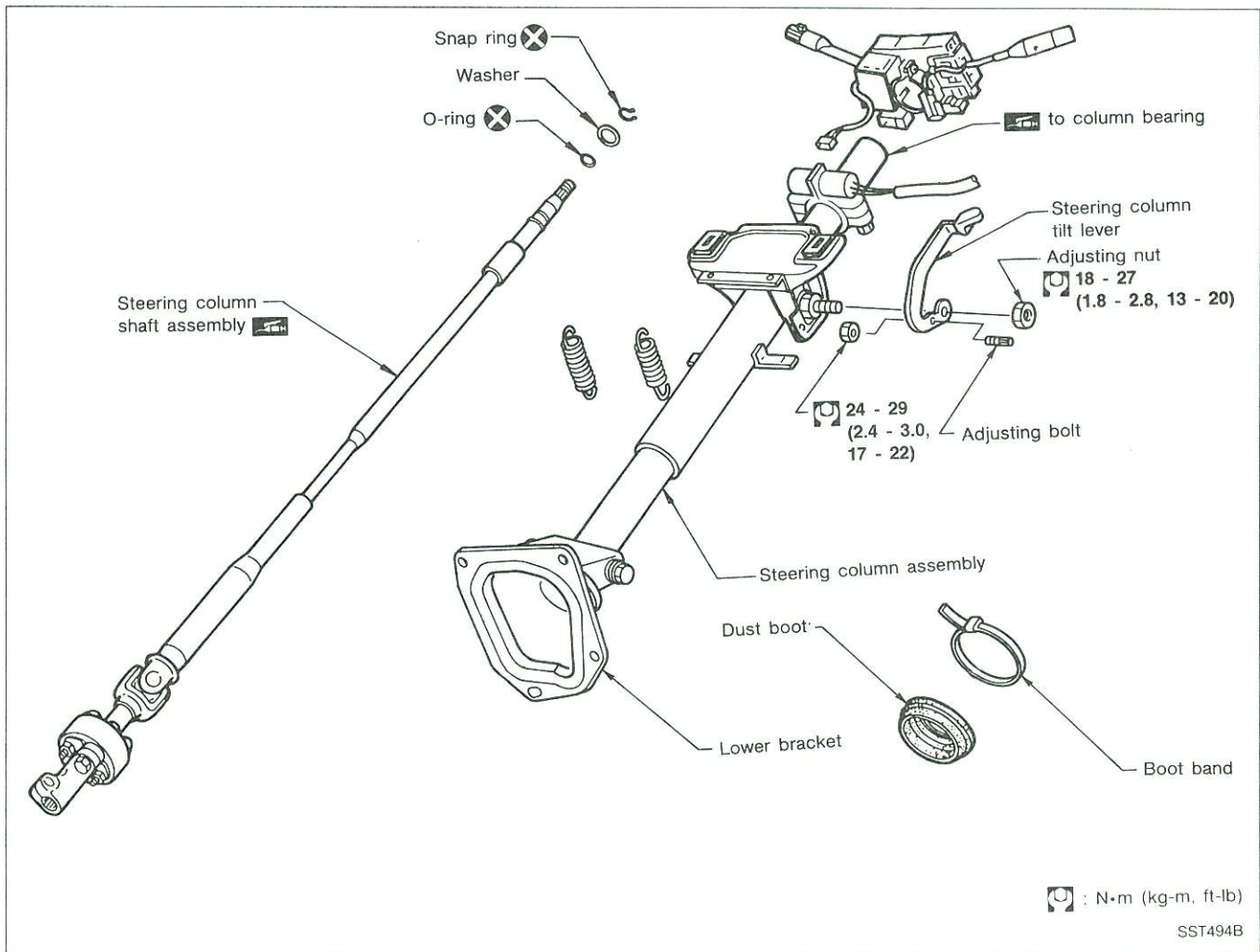


- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

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 the neutral position when driving straight ahead.

Disassembly and Assembly

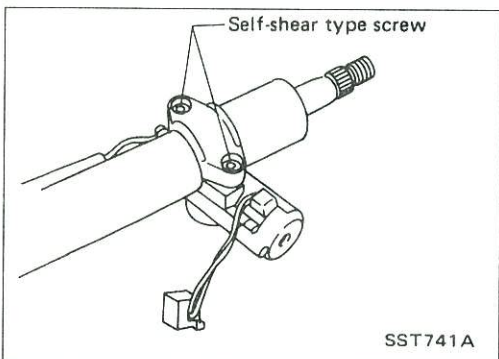
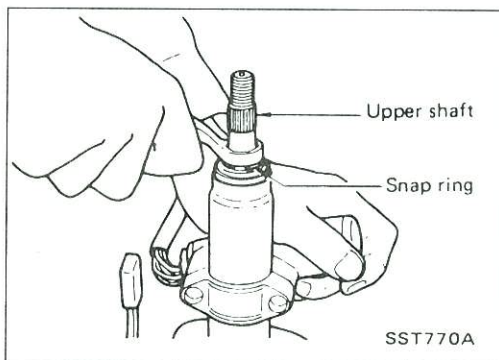


- When disassembling and assembling, unlock steering lock with key.
- To remove combination switch, insert a suitable tool between mating portions. Lift switch with bracket and pull it out.

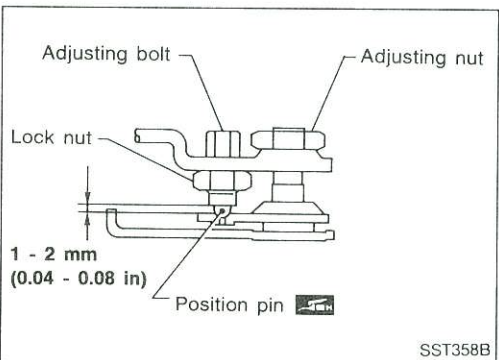
STEERING WHEEL AND STEERING COLUMN

Disassembly and Assembly (Cont'd)

- Install snap ring on upper shaft with box wrench.



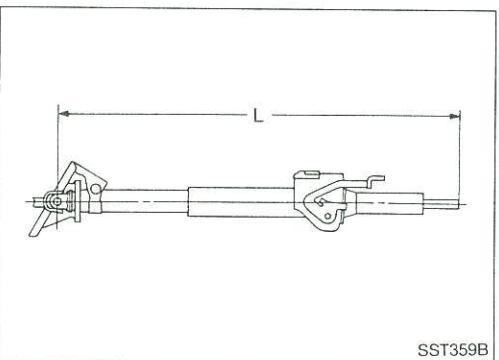
- Steering lock
 - a. Break self-shear type screws with a drill or other appropriate tool.
 - b. Install self-shear type screws and then cut off self-shear type screw heads.



Tilt mechanism

Adjust tilt lever as follows:

- (1) When tilt lever is in the lock position, tighten adjusting nut securely.
- (2) Turn tilt lever to the free position and check that steering column moves smoothly without binding.
- (3) Return tilt lever to the lock position. Make sure there is no movement of steering column when steering wheel is pushed up or down by force.
- (4) Check position pin to see it works smoothly.



Inspection

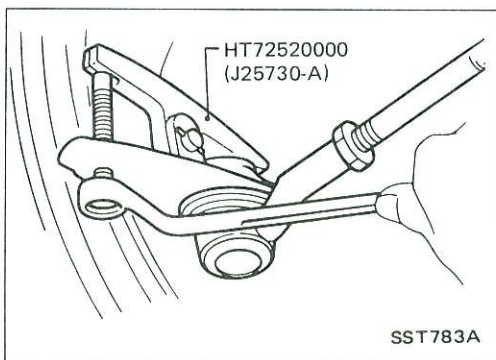
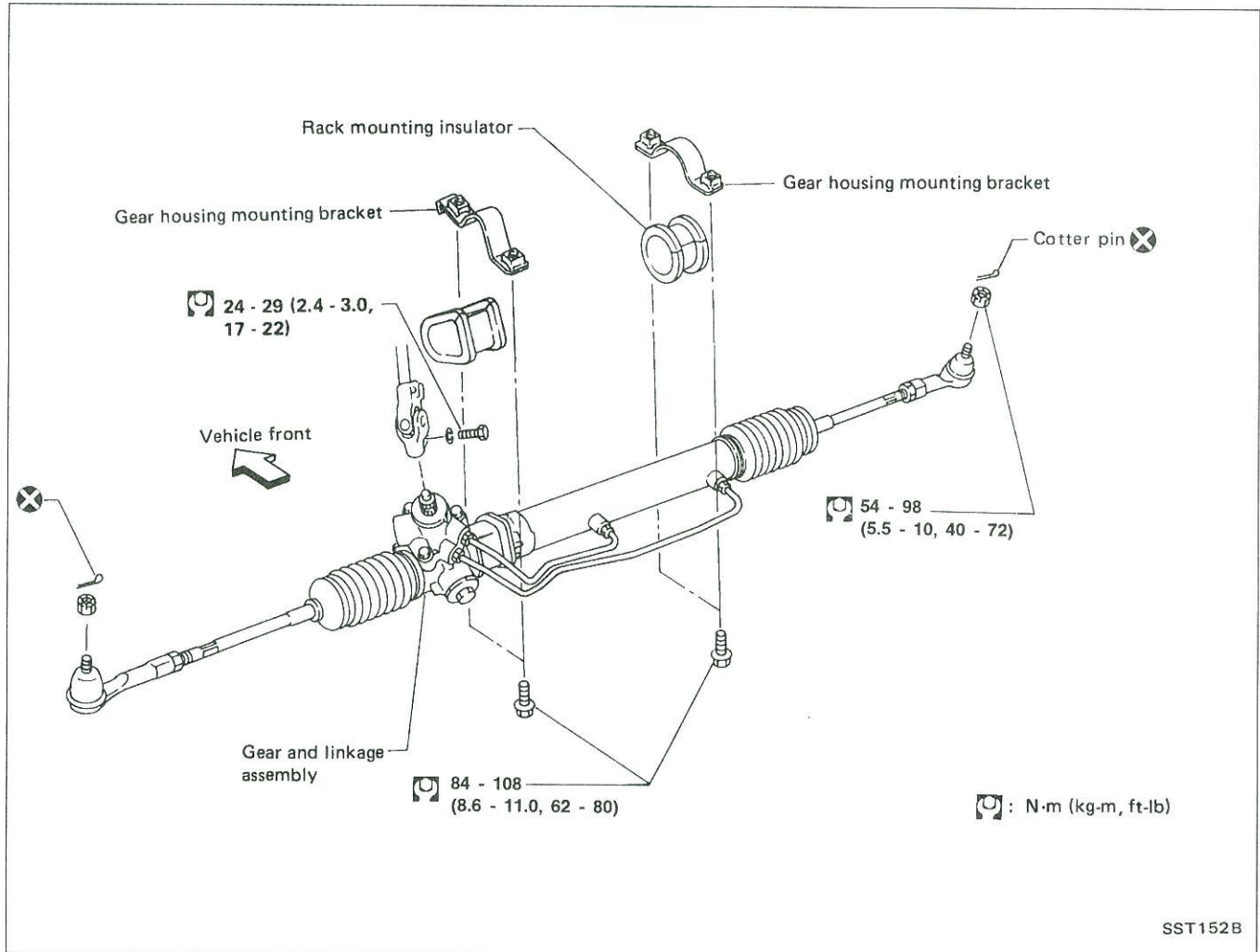
- When steering wheel can not be rotated smoothly, check the steering column for the following matters and replace damaged parts.
 - a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.
 - b. Check steering column shaft, lower shaft and jacket tube for deformation or breakage. Replace if necessary.
- When the vehicle is involved in a light collision, check steering column length " L_1 ". If it is not within specifications, replace steering column as an assembly.

Steering column length " L_1 ":

745.2 - 746.8 mm (29.34 - 29.40 in)

POWER STEERING GEAR AND LINKAGE (Model PR26SC)

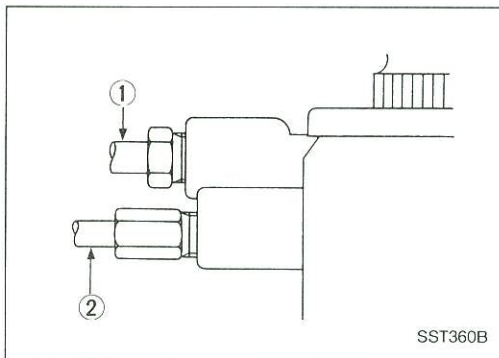
Removal and Installation



- Detach tie-rod outer sockets from knuckle arms with Tool.

POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Removal and Installation (Cont'd)



- Install pipe connector.
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or damaged connector O-ring.
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.

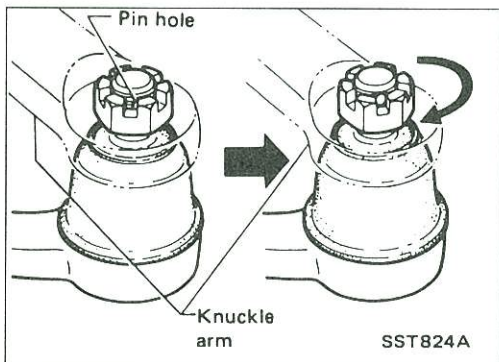
Connector tightening torque:

Low-pressure side "1"

27 - 39 N·m (2.8 - 4.0 kg-m, 20 - 29 ft-lb)

High-pressure side "2"

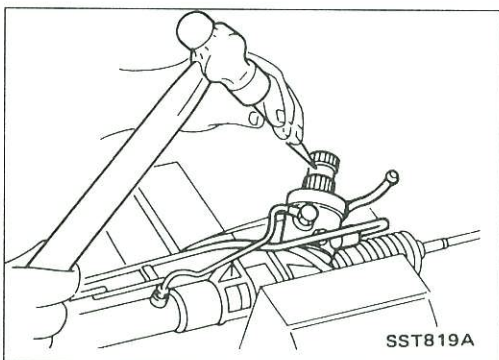
15 - 25 N·m (1.5 - 2.5 kg-m, 11 - 18 ft-lb)



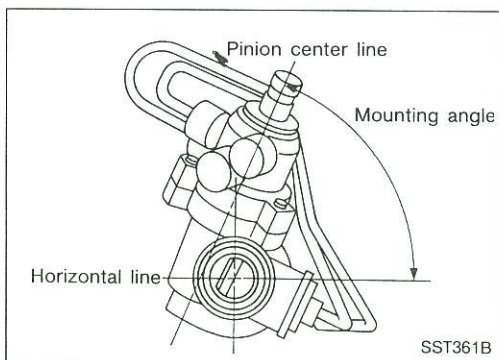
- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:

Tightening torque must not exceed 98 N·m (10 kg-m, 72 ft-lb).



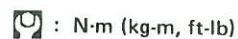
- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matching mark on pinion shaft and pinion housing to record neutral position of gear.
- To install, set left and right dust boots to equal deflection, and attach lower joint by aligning matching marks of pinion shaft and pinion housing.



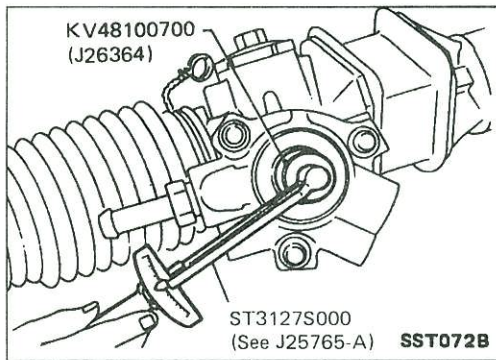
- Mount steering gear and linkage assembly with respect to the horizontal.

Mounting angle: 67.3°

Disassembly and Assembly

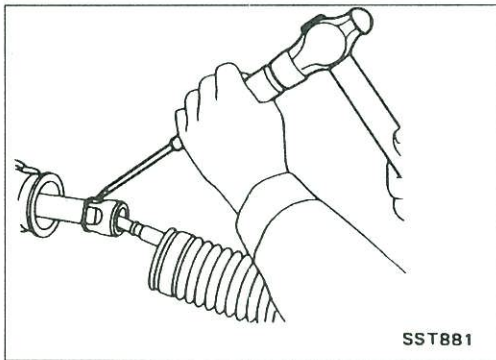


POWER STEERING GEAR AND LINKAGE (Model PR26SC)

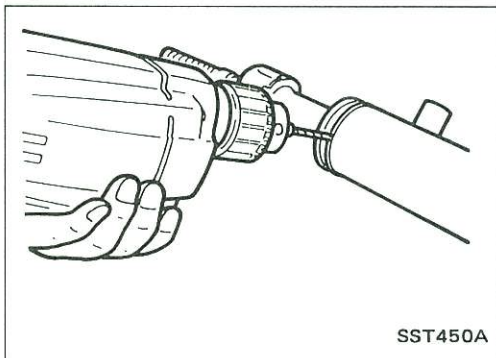


Disassembly

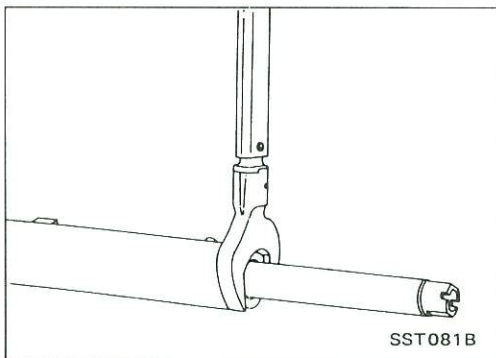
1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.
 - **Before measuring, disconnect gear housing tube and drain fluid.**
 - **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip 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.



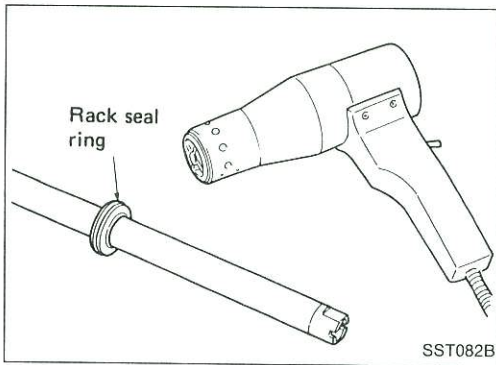
7. Drill staked portion of gear housing end with drill of 2 to 2.5 mm (0.079 to 0.098 in) diameter, until the staking is eliminated.



8. Remove end cover assembly with a suitable tool.
9. Draw out rack assembly.

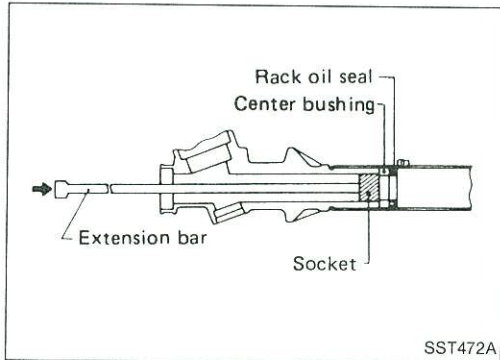
POWER STEERING GEAR AND LINKAGE (Model PR26SC)

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 "DEXRON™" type, and blow dry with compressed air, if available.

BOOT

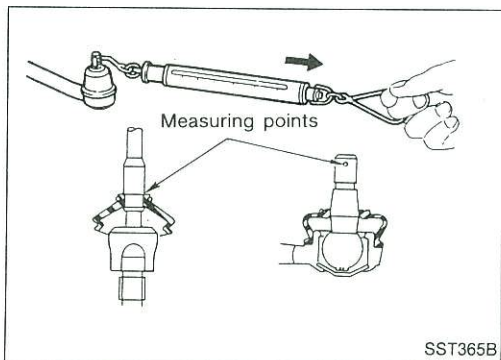
Check condition of boot. If cracked excessively, replace it.

RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it.

PINION ASSEMBLY

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if necessary.



TIE-ROD OUTER AND INNER SOCKET

- Check ball joint for swinging force.

Tie-rod outer ball joint:

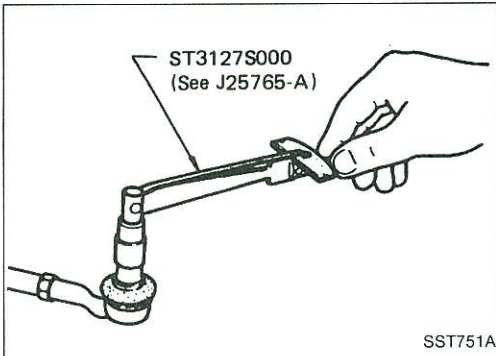
Refer to S.D.S.

Tie-rod inner ball joint:

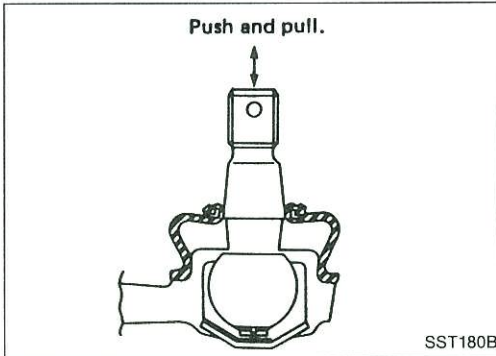
Refer to S.D.S.

POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Inspection (Cont'd)



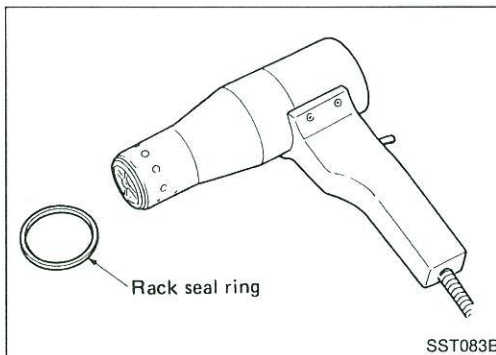
- Check ball joint for rotating torque.
Tie-rod outer ball joint:
Refer to S.D.S.



- Check ball joint for axial end play.
Tie-rod outer ball joint:
Refer to S.D.S.
Tie-rod inner ball joint:
Refer to S.D.S.
- Check condition of dust cover. If cracked excessively, replace it.

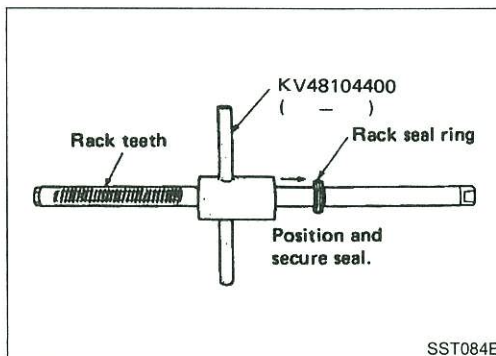
GEAR HOUSING CYLINDER

Check gear housing cylinder for scratches or other damage. Replace if necessary.



Assembly

1. Using a heat gun, heat rack seal ring (made of Teflon) to approximately 40°C (104°F) and install it onto rack with your hand.

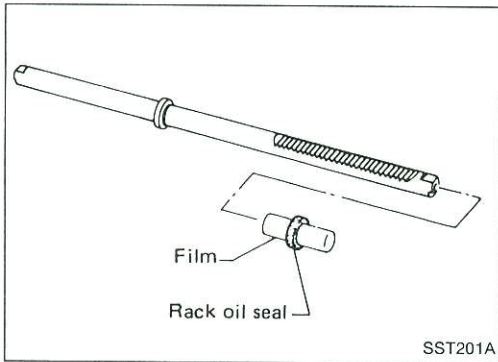


2. Using Tool, compress periphery of rack seal ring to position and secure it on rack.

Always insert Tool from the rack gear side.

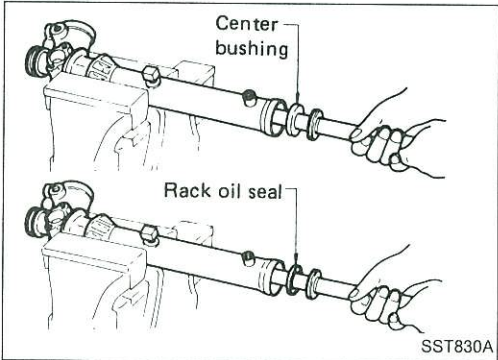
POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Assembly (Cont'd)

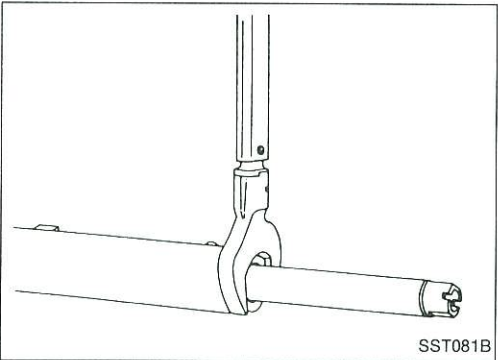


3. Insert rack oil seal.

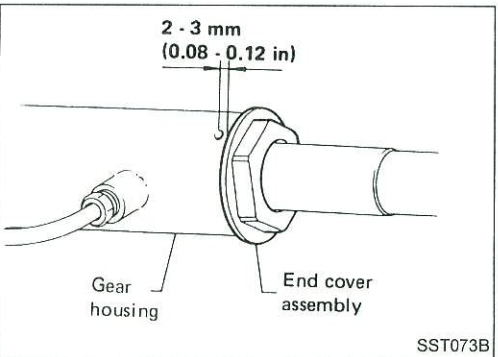
- Place plastic film into rack oil seal to prevent damage by rack teeth.
- Always remove plastic film after rack oil seal is positioned properly.
- Make sure lips of rack oil seal face each other.



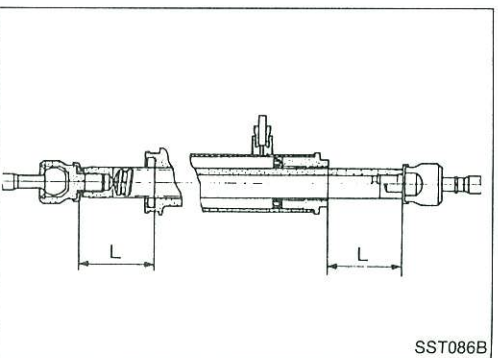
4. Install center bushing and rack oil seal with rack assembly.



5. Tighten end cover assembly with a suitable tool.



6. Fasten end cover assembly to gear housing by staking.

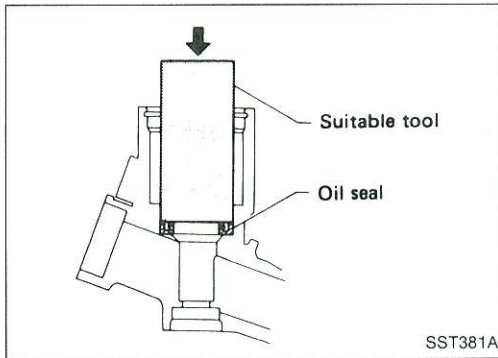


7. Set rack gear in the neutral position.

Rack stroke "L":
Refer to S.D.S.

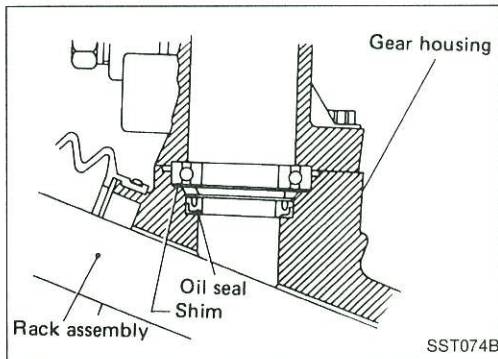
POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Assembly (Cont'd)

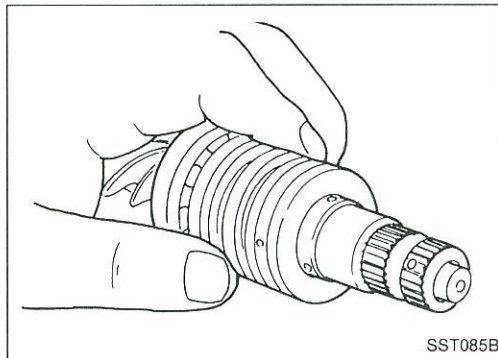


8. Coat seal lip of oil seal with multi-purpose grease and install it to pinion housing of gear housing with a suitable tool.

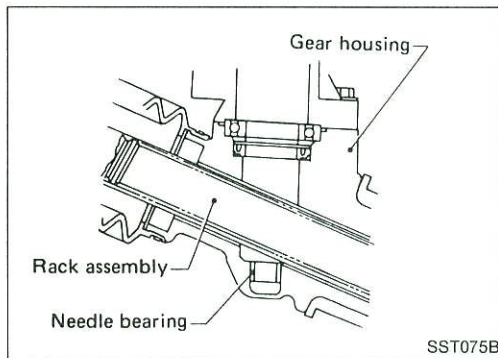
Make sure lip of oil seal faces up when installed.



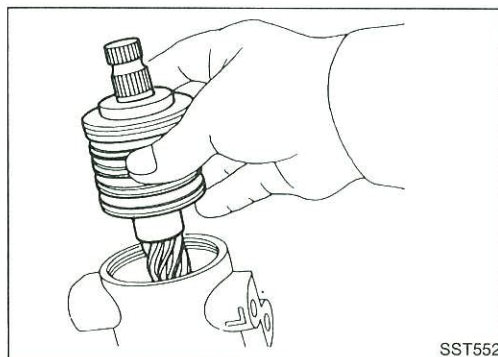
9. Install pinion bearing adjusting shim(s).
- Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



10. Install pinion seal ring on pinion gear assembly.
- Using a heat gun, heat pinion seal ring to approximately 40°C (104°F) before installing it onto pinion gear assembly.
 - Make sure pinion seal ring is properly settled in valve groove.



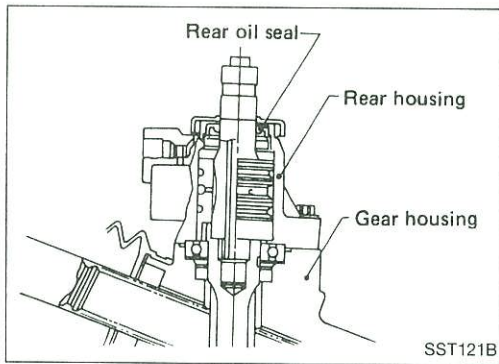
11. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip before installing pinion assembly in gear housing.



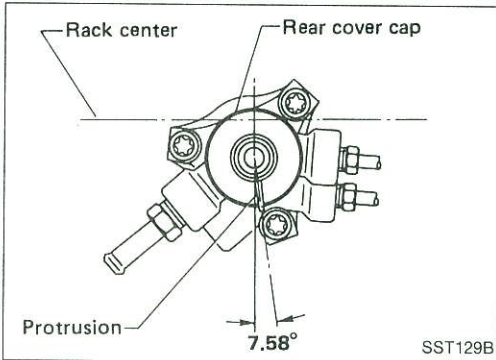
12. Install pinion assembly to pinion housing of gear housing.
- Be careful not to damage pinion oil seal.**

POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Assembly (Cont'd)

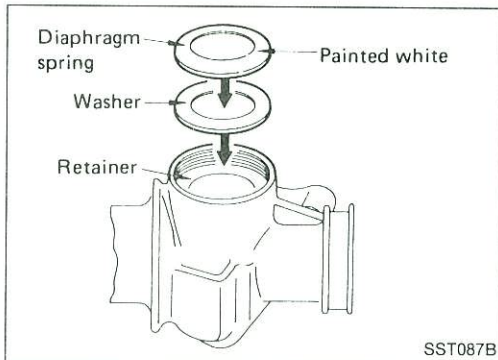


13. Apply a coat of multi-purpose grease to rear oil seal lip before installing rear housing.



14. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure at left when rack is centralized.

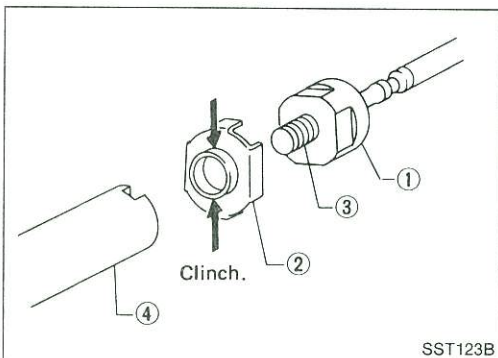
Be careful not to damage worm ring and oil seal.



15. Install diaphragm spring at retainer.

- Always install retainer, spring washer and diaphragm spring in that order.
- Make sure convex end (painted white) of diaphragm spring faces outward when installing.

16. Install retainer spring and adjusting screw temporarily.

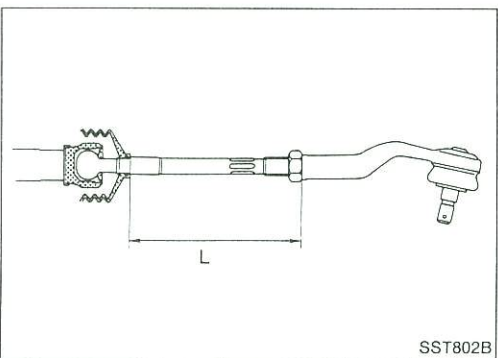


17. Install new lock plate.

- Attach lock plate ② to side rod inner socket ①.
- Apply locking sealant to inner socket threads ③. Screw inner socket into rack ④ and tighten to specified torque.
- Clinch two places of lock plate at rack's groove.

CAUTION:

To prevent scratching the boot, remove burrs from lock plate.

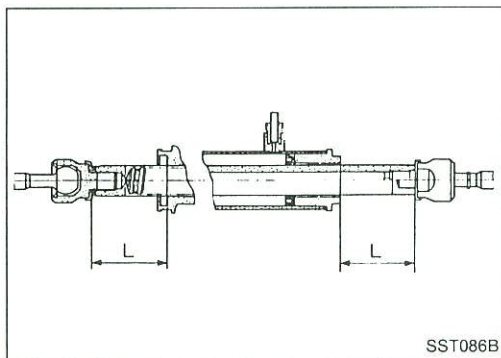


18. Tighten outer socket lock nut.

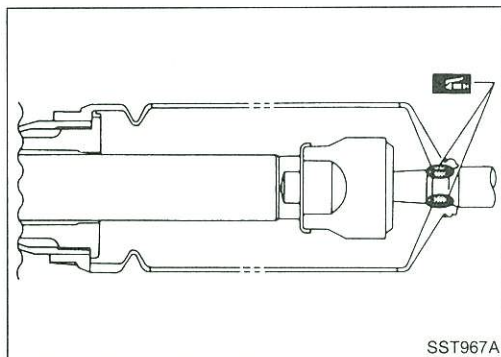
Tie-rod length "L":

Refer to S.D.S.

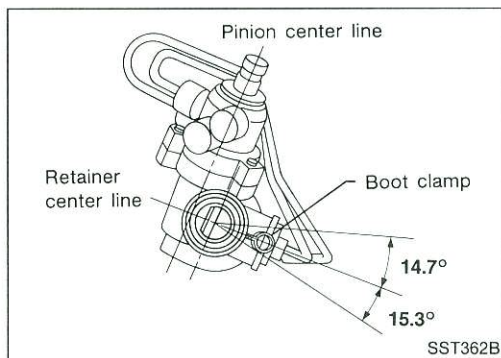
Assembly (Cont'd)



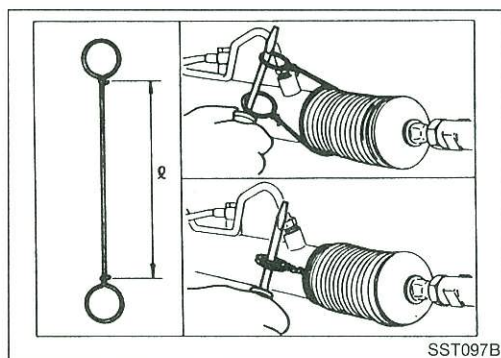
19. Measure rack stroke.
Rack stroke "L":
Refer to S.D.S.



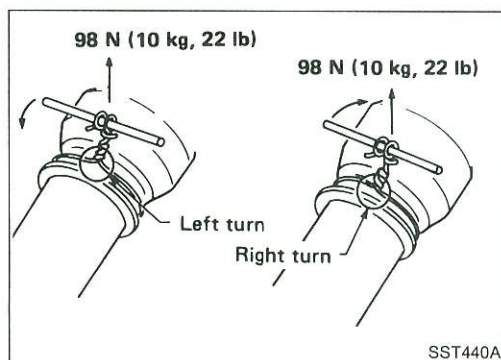
20. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.



21. Install boot clamps.
- Install boot clamps where they will not interfere with other parts.



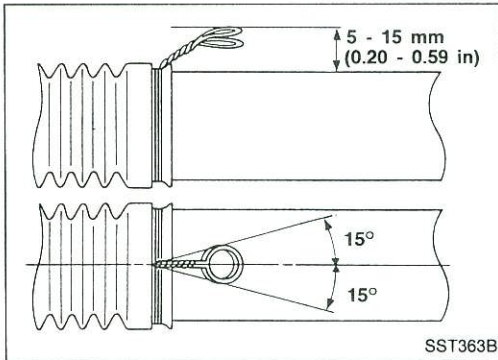
- To install, wrap boot clamp around boot groove twice. Tighten clamp by twisting rings at both ends 4 to 4-1/2 turns with screwdriver while pulling with a force of approx. 98 N (10 kg, 22 lb).



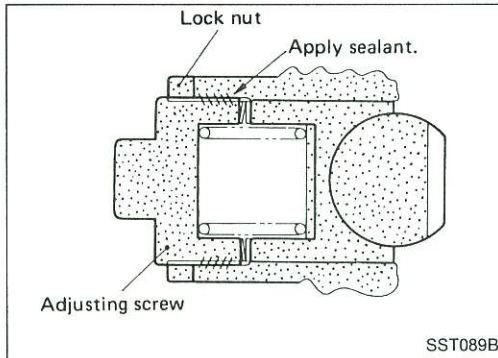
- Twist boot clamp in the direction shown in figure at left.

POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Assembly (Cont'd)



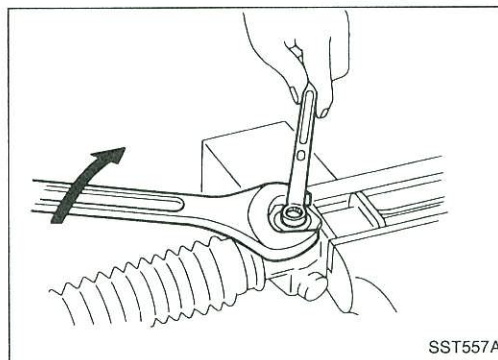
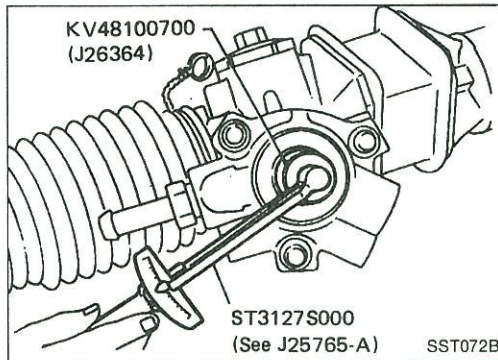
- After twisting boot clamp, bend twisted portion inward so it does not contact boot.



Adjustment

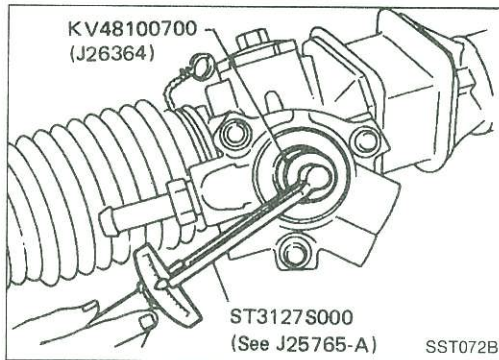
Adjust pinion rotating torque as follows:

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 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.2 N·m (2 kg-cm, 1.7 in-lb).
6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of 180° from neutral position.
Stop the gear at the point of maximum torque.
8. Loosen adjusting screw, then retighten it to 4.9 N·m (50 kg-cm, 43 in-lb).
9. Loosen adjusting screw by 70° to 110°.
10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.



POWER STEERING GEAR AND LINKAGE (Model PR26SC)

Adjustment (Cont'd)



11. Measure pinion rotating torque.

Within $\pm 100^\circ$ from the neutral position:

Average rotating torque

0.8 - 1.3 N·m (8 - 13 kg-cm, 6.9 - 11.3 in-lb)

Maximum torque deviation

0.4 N·m (4 kg-cm, 3.5 in-lb)

Except for above measuring range:

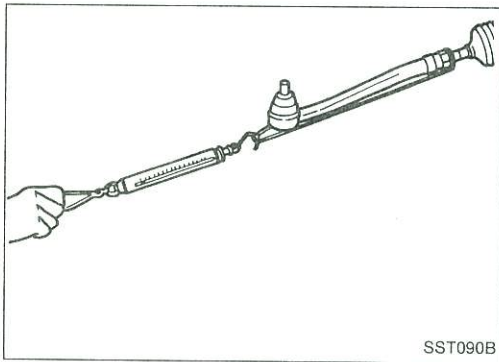
Maximum rotating torque

1.9 N·m (19 kg-cm, 16 in-lb)

Maximum force deviation

0.6 N·m (6 kg-cm, 5.2 in-lb)

- 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.



12. Check rack sliding force on vehicle as follows:

- Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
- Connect all piping and fill with steering fluid.
- Start engine and bleed air completely.
- Disconnect steering column lower joint from the gear.
- Keep engine at idle and make sure steering fluid has reached normal operating temperature.
- While pulling tie-rod slowly in the ± 11.5 mm (± 0.453 in) range from the neutral position, make sure rack sliding force is within specification.

Average rack sliding force:

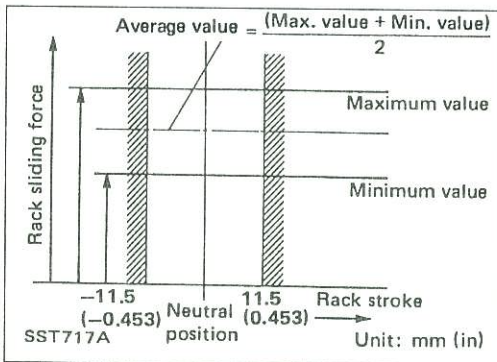
235 - 284 N (24 - 29 kg, 53 - 64 lb)

- Check sliding force outside above range.

Maximum rack sliding force:

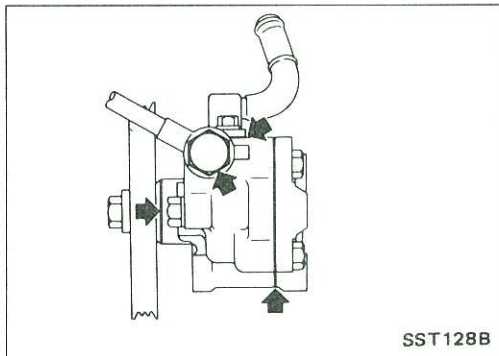
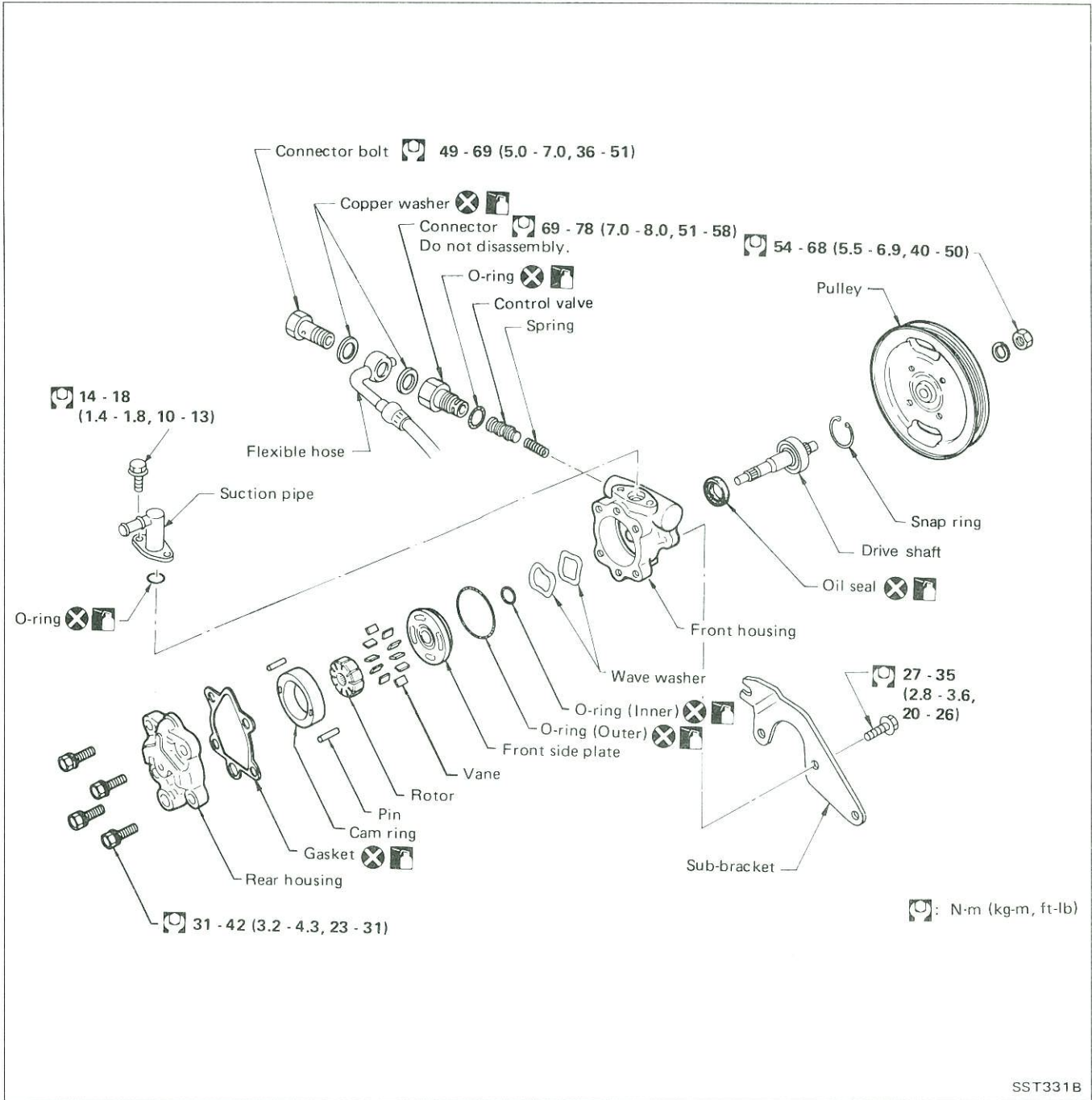
Not more than 39 N (4 kg, 9 lb) beyond above value

- If rack sliding force is not within specification, readjust by repeating adjustment procedure from the beginning.
- If rack sliding force is still out of specification after readjustment, gear assembly needs to be replaced.



POWER STEERING OIL PUMP

Disassembly and Assembly



Pre-disassembly Inspection

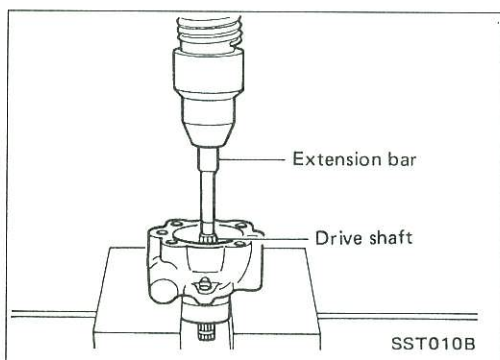
Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance.

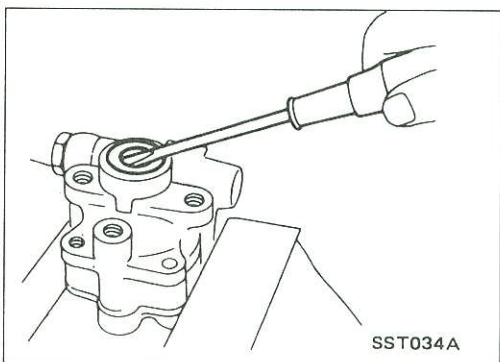
Disassembly

CAUTION:

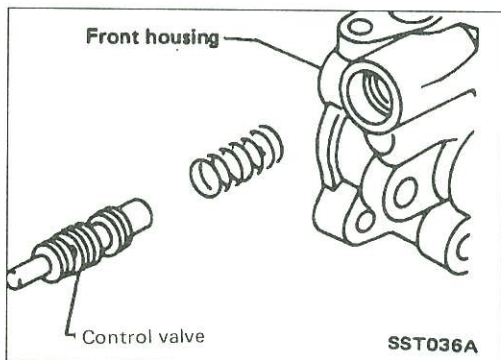
- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
- Disassemble in as clean a place as possible.
- Clean your hands before disassembly.
- Do not use rags; use nylon cloths or paper towels.
- Follow the procedures and cautions in the Service Manual.
- 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.

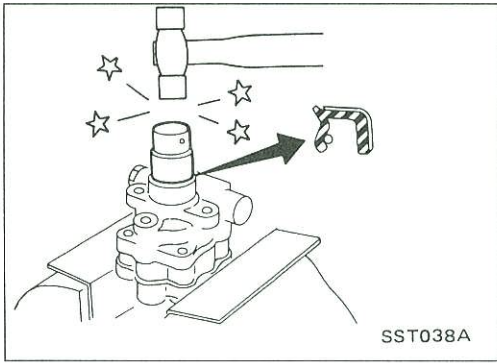


- Remove connector.
Be careful not to drop control valve.

Inspection

Inspect each component part for wear, deformation, scratches, and cracks. If damage is found, replace the part.

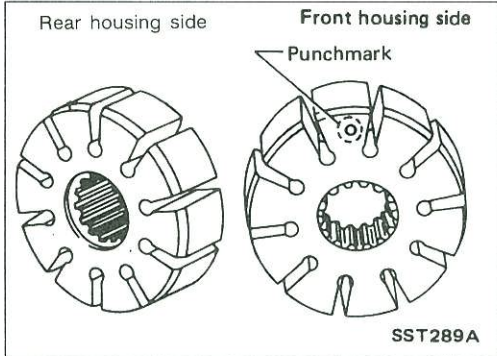
POWER STEERING OIL PUMP



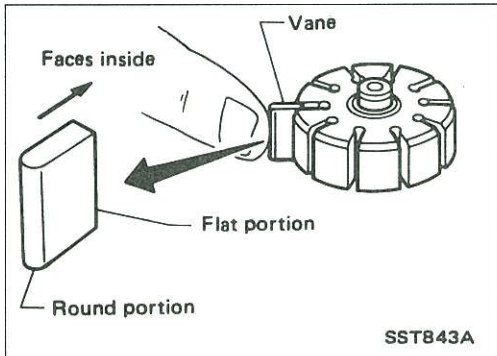
Assembly

Assemble oil pump, noting the following instructions.

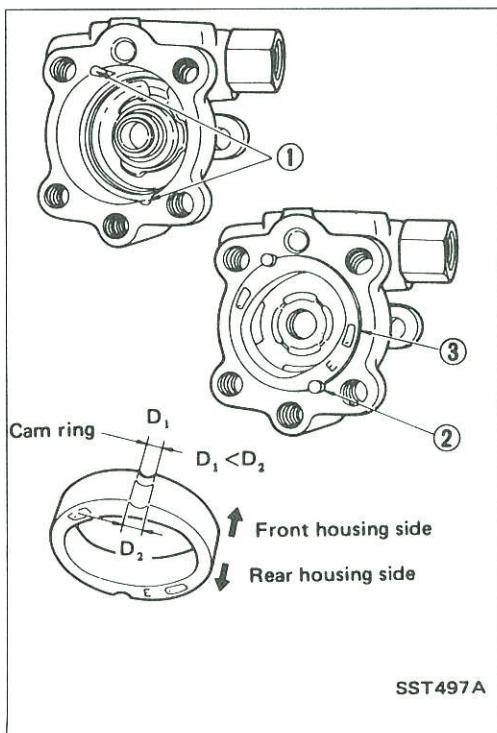
- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with A.T.F. when assembling.



- Pay attention to the direction of rotor.



- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.



- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

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

General Specifications

Applied model	All
Steering model	Power steering
Steering gear type	PR26SC
Steering overall gear ratio	18.3
Turns of steering wheel (Lock to lock)	3.1
Steering column type	Collapsible, tilt

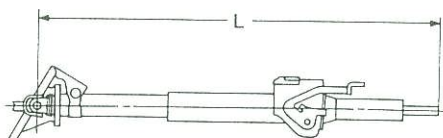
Inspection and Adjustment

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)	745.2 - 746.8 (29.34 - 29.40)
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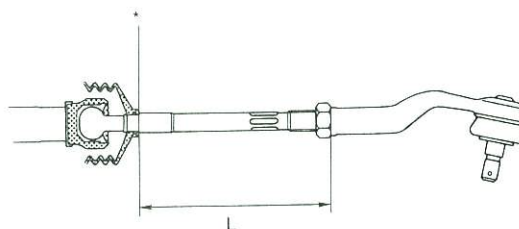


SST359B

STEERING GEAR AND LINKAGE

Steering gear type	PR26SC
Side rod outer ball joint	
Swinging force at cotter pin hole N (kg, lb)	6.9 - 67.7 (0.7 - 6.9, 1.5 - 15.2)
Rotating torque N·m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Axial end play mm (in)	0.5 (0.020) or less
Side rod inner ball joint	
Swinging force* N (kg, lb)	28.4 - 259.9 (2.9 - 26.5, 6.4 - 58.4)
Rotating torque N·m (kg-cm, in-lb)	1.0 - 8.8 (10 - 90, 8.7 - 78.1)
Axial end play mm (in)	0 (0)
Side rod standard length "L" mm (in)	143.5 (5.65)

*: Measuring point



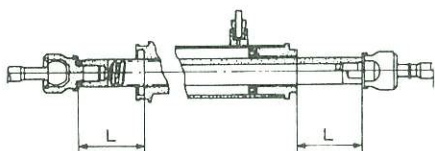
SST801B

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

Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE (Cont'd)

Steering gear type	PR26SC
Rack stroke "L" mm (in)	71 (2.80)



SST086B

Retainer adjustment	
Adjusting screw	
Initial tightening torque N·m (kg-cm, in-lb)	4.9 - 5.9 (50 - 60, 43 - 52)
Retightening torque after loosening	0.2 (2, 1.7)
Tightening torque after gear has settled	4.9 (50, 43)
Returning angle degree	70° - 110°
Pinion gear preload without gear oil N·m (kg-cm, in-lb)	
Within ±100° from the neutral position	
Average rotating torque	0.78 - 1.27 (8.0 - 13.0, 6.9 - 11.3)
Maximum torque deviation	0.4 (4, 3.5)
Except above range	
Maximum rotating torque	1.9 (19, 16)
Maximum torque deviation	0.6 (6, 5.2)

POWER STEERING

Rack sliding force	N (kg, lb)
Without gear oil	
Within ±5.5 mm (±0.217 in) from the neutral position	122.6 - 166.7 (12.5 - 17.0, 27.6 - 37.5)
Except above range	122.6 - 186.3 (12.5 - 19.0, 27.6 - 41.9)
Under normal operating oil pressure	
Within ±11.5 mm (±0.453 in) from the neutral position	235 - 284 (24 - 29, 53 - 64)
Except above range	Not more than 39 (4, 9) beyond above value
Steering wheel turning force when idle (Measured at one full turn from the neutral position)	29 (3, 7) or less
	N (kg, lb)
Normal operating temperature of power steering fluid	60 - 80 (140 - 176) °C (°F)
Fluid capacity (Approximate)	0.9 (1, 3/4) ℓ (US qt, Imp qt)
Oil pump maximum pressure	7,649 - 8,238 kPa (kg/cm ² , psi) (78 - 84, 1,109 - 1,194)

SECTION **BF**

CONTENTS

GENERAL SERVICING	
(Including all clips & fasteners)	BF- 2
BODY END	BF- 6
DOOR	
(Including "Power Window" and "Power Door Lock")	BF-12
INSTRUMENT PANEL	BF-20
INTERIOR AND EXTERIOR	
(In EXTERIOR, including "Weatherstrips")	BF-22
SEAT	BF-31
SUN ROOF	BF-34
WINDSHIELD AND WINDOWS	BF-37
MIRROR — Door Mirror	BF-42
BODY ALIGNMENT	BF-44
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)	BF-49
TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)	BF-63

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".

BF

★ For seat belt, refer to MA section.

Precautions

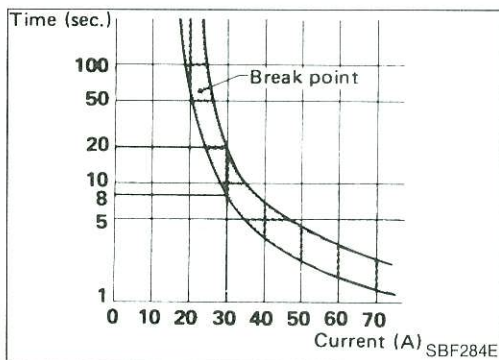
- When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
- Handle trim, molding, instruments, grille, etc. carefully during removal or installation. Be careful not to soil or damage them.
- Apply sealing compound where necessary when installing parts.
- When applying sealing compound, be careful that the sealing compound does not protrude from parts.
- When replacing any metal parts (for example body outer panel, members, etc.), be sure to take rust prevention measures.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) "AIR BAG"

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

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



Circuit Breaker Inspection

For example, when current is 30A, the circuit is broken within 8 to 20 seconds.



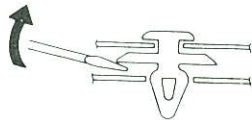
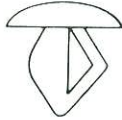

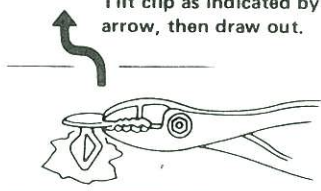





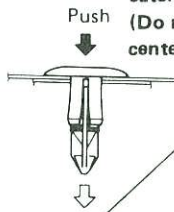
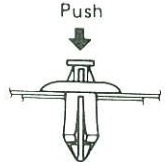
Circuit breakers are used in the following systems.

- Power window & power door lock
- Power seat
- Power sun roof

GENERAL SERVICING


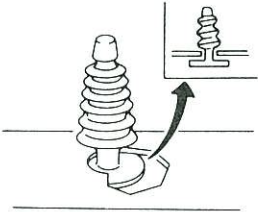
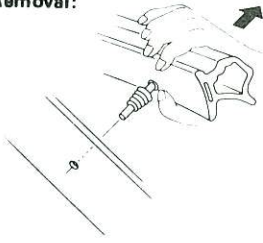
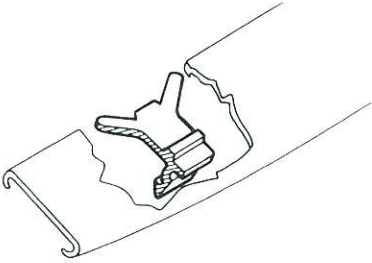
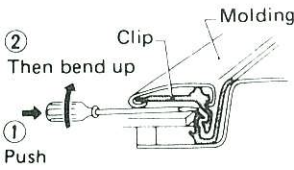
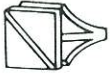
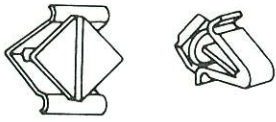



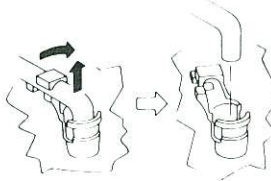


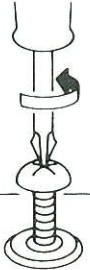
Clip and Fastener

- 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.

No.	Symbol	Shape	Removal & Installation
C101	 SBF092B	 SBF109B	<p>Removal: Remove by bending up with a flat-bladed screwdriver.</p>  SBF094B
C105	 SBF141B	 SBF142B	<p>Removal: Tilt clip as indicated by arrow, then draw out.</p>  SBF143B
C106	 SBF089B	 SBF090B	<p>Removal: Remove with a flat-bladed screwdrivers or plier.</p>  SBF091B
C203	 SBF318C	 SBF319C	<p>Push center pin to catching position. (Do not remove center pin by hitting it.)</p>  <p>Installation:</p>  SBF 708E

GENERAL SERVICING

Clip and Fastener (Cont'd)

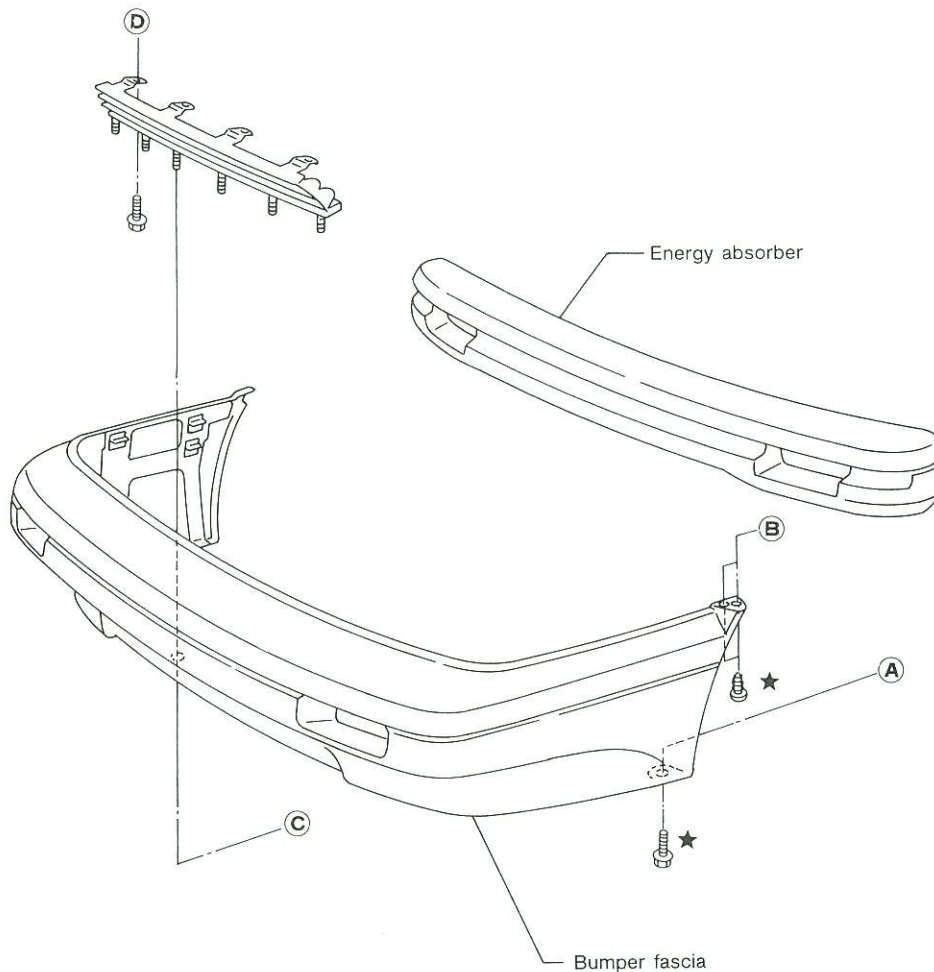
No.	Symbol	Shape	Removal & Installation
C103	 SBF103B	 SBF104B	Removal:  SBF147B
CE106	 SBF653B		Removal:  SBF654B
CG101	 SBF144B	 SBF145B	<div> Removal  Rotate 45° to remove. </div> <div> Installation  SBF085B </div>
CR103	 SBF768B		Removal: Holder portion of clip must be spread out to remove rod.  SBF770B
CS102	 SBF138B	 SBF139B	Removal: Screw out with a Phillips screwdriver.  SBF140B

GENERAL SERVICING

NOTE

Body Front End

- Hood adjustment: Adjust at hinge portion.
- Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood locks engaging mechanism.
- Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.



REMOVAL — Front bumper assembly

1. Remove bumper fascia securing bolts (A) and screws (B).
2. Remove bumper reinforcement stay bolts and loosen nuts.
3. Pull out bumper assembly.

INSTALLATION — Front bumper assembly

- Insert pins of bumper reinforcement stay into body holes.

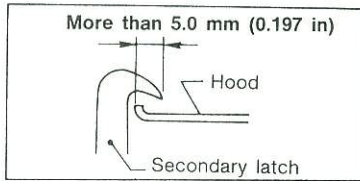
BODY END

Body Front End (Cont'd)

Hood lock adjustment

- Adjust hood so that hood primary lock meshes at a position 1 to 1.5 mm (0.039 to 0.059 in) lower than fender.
- After hood lock adjustment, adjust bumper rubber.
- When securing hood lock, ensure it does not tilt. Striker must be positioned at the center of hood primary lock.
- After adjustment, ensure that hood primary and secondary lock operate properly.

Hood lock secondary latch hooking length



Bumper rubber adjustment

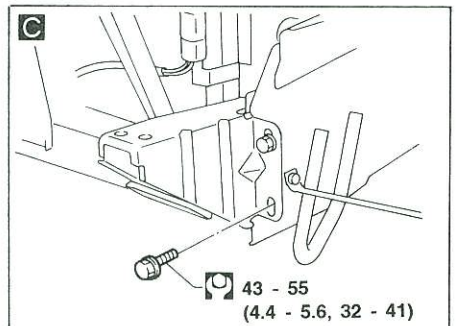
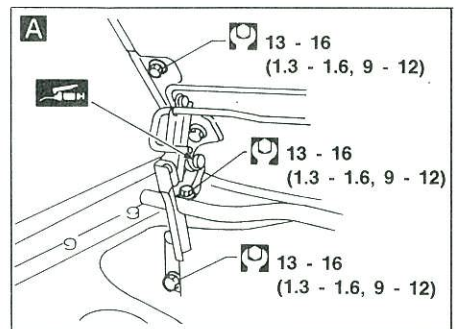
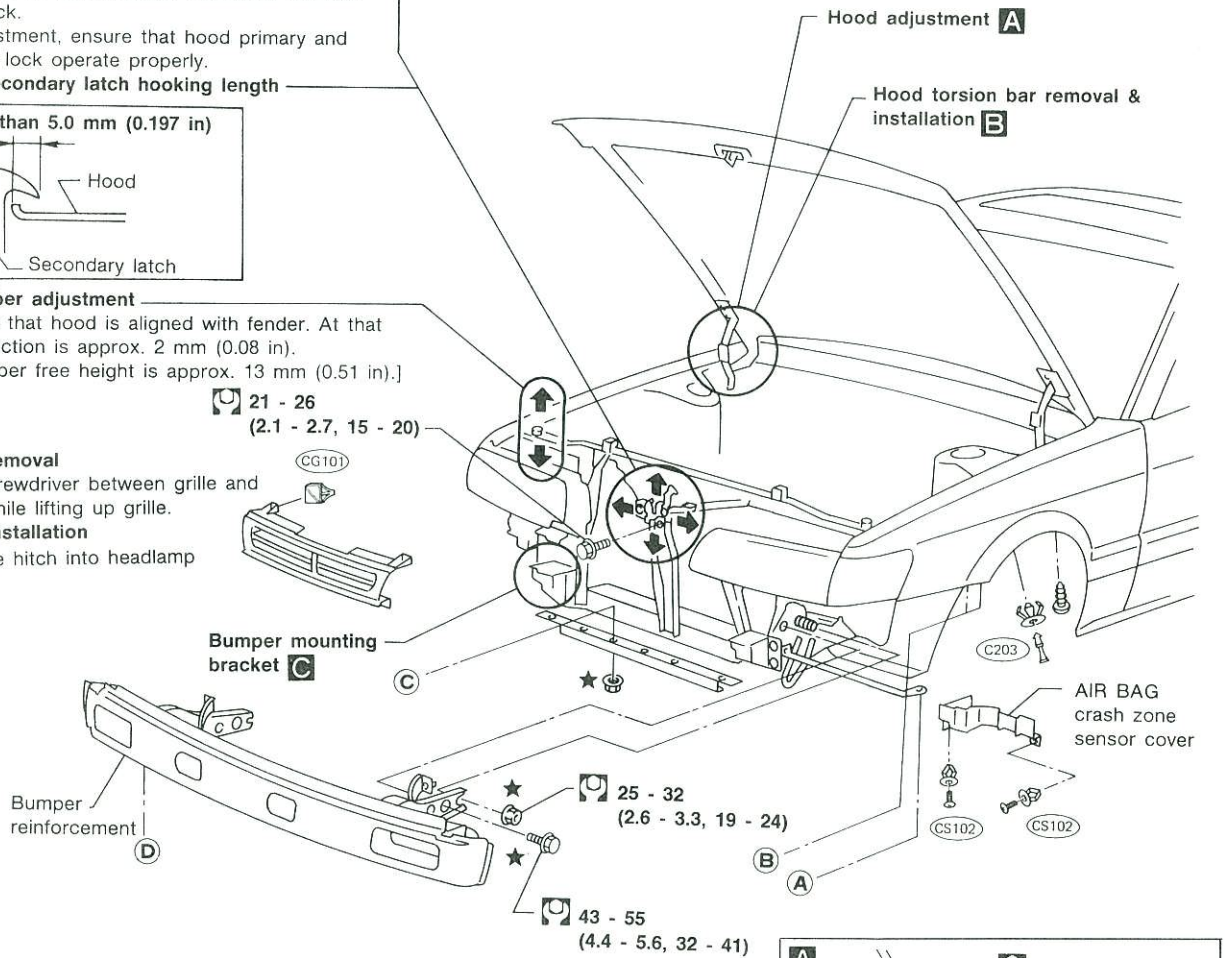
- Adjust so that hood is aligned with fender. At that time deflection is approx. 2 mm (0.08 in).
- [Bumper rubber free height is approx. 13 mm (0.51 in).]

Front grille removal

- Set ⊖ screwdriver between grille and bumper while lifting up grille.

Front grille installation

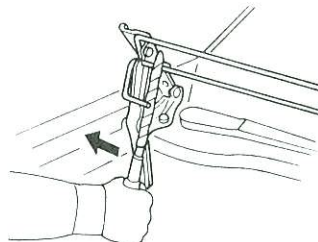
- Insert grille hitch into headlamp finisher.



- ★ : Bumper assembly mounting bolts, nuts & screws
- ⊖ : N·m (kg-m, ft-lb)

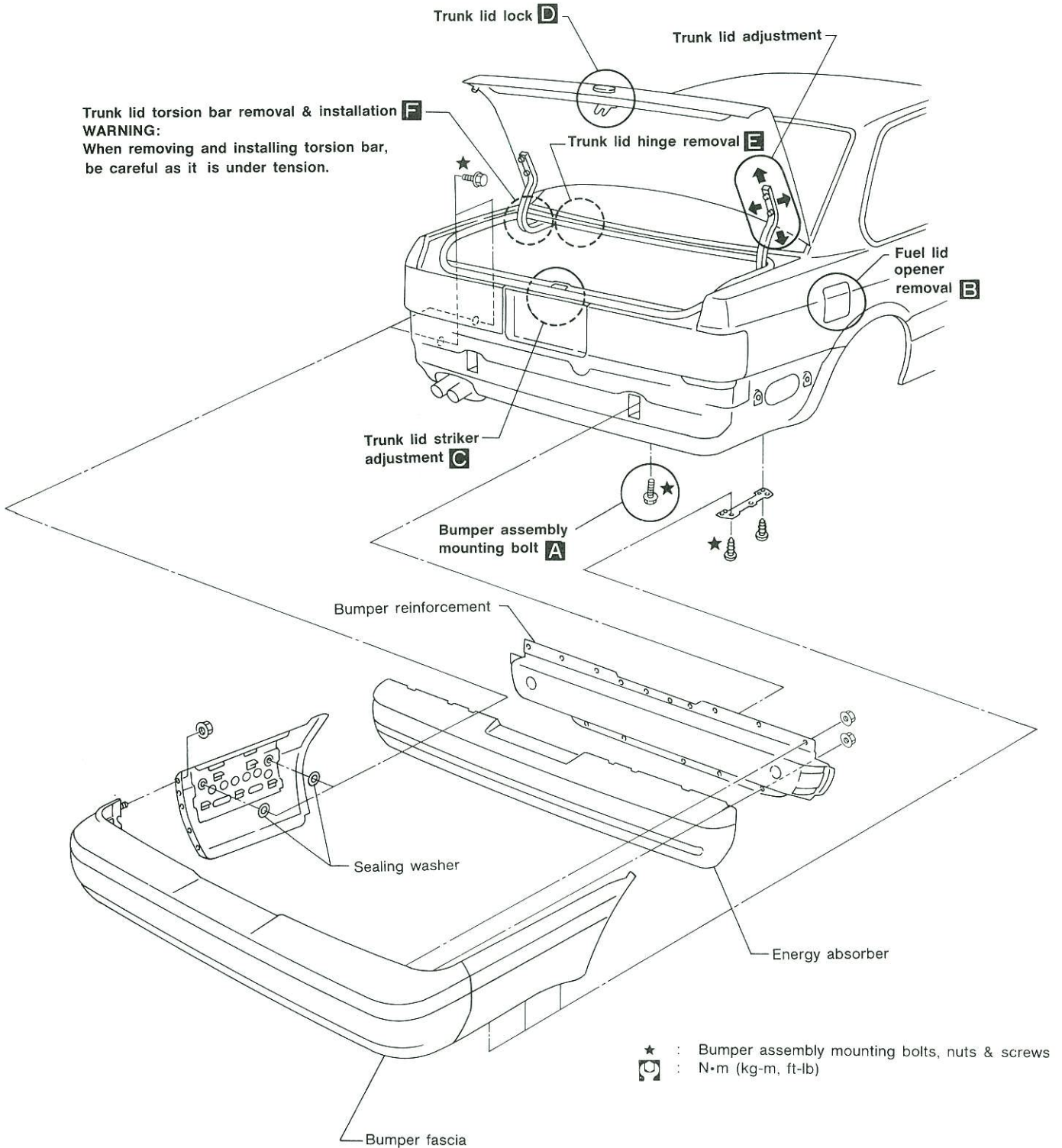
B

WARNING:
When removing and installing torsion bar, be careful as it is under tension.



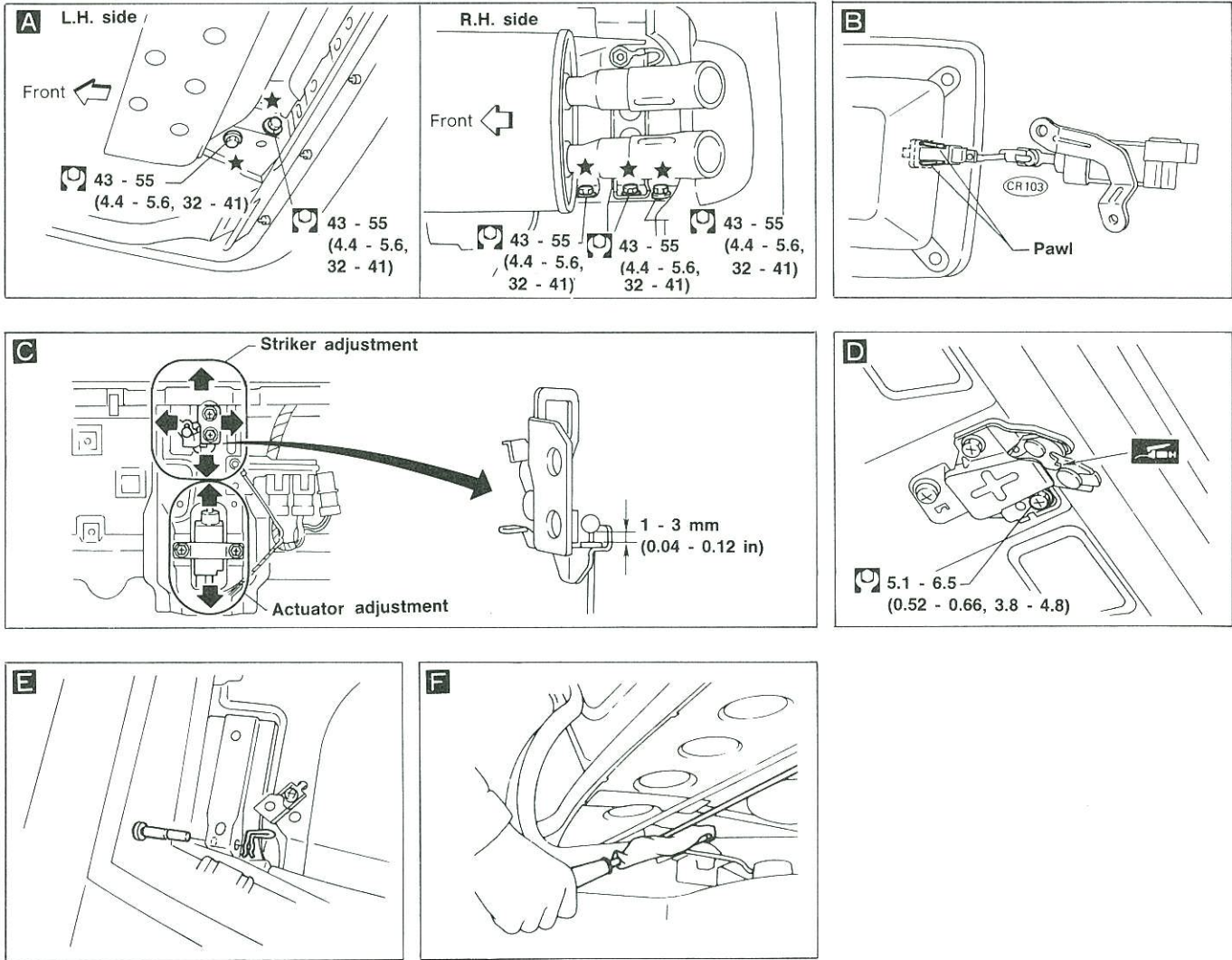
Body Rear End and Opener

- 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.
- After installation, make sure that trunk lid and fuel filler lid open smoothly.



BODY END

Body Rear End and Opener (Cont'd)



SBF121F

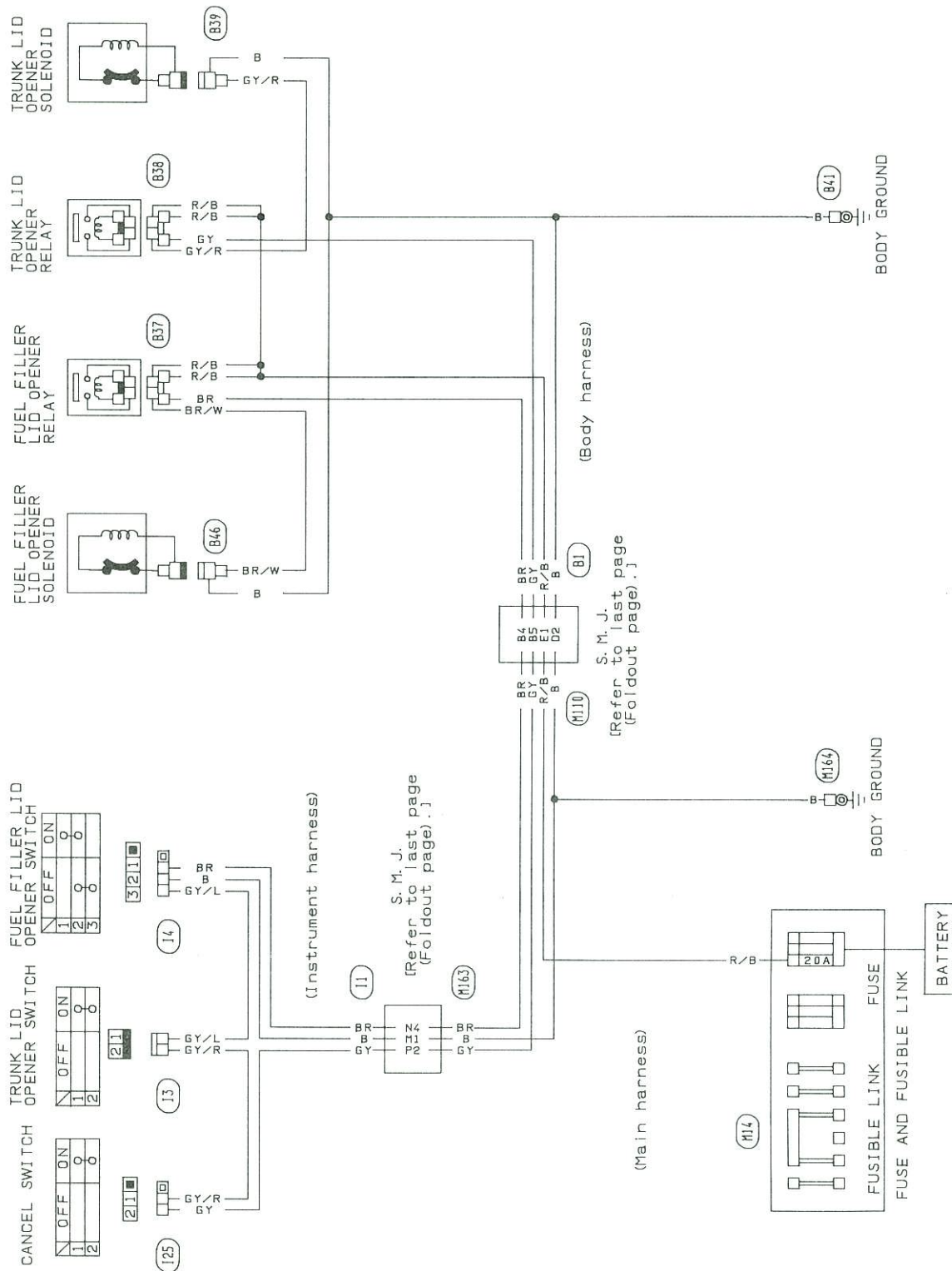
REMOVAL — Rear bumper assembly

1. Remove bumper fascia securing bolts from luggage room and screws from the bottom.
2. Remove bumper assembly mounting bolts **A**.
3. Pull out bumper assembly.

BODY END

Body Rear End and Opener (Cont'd)

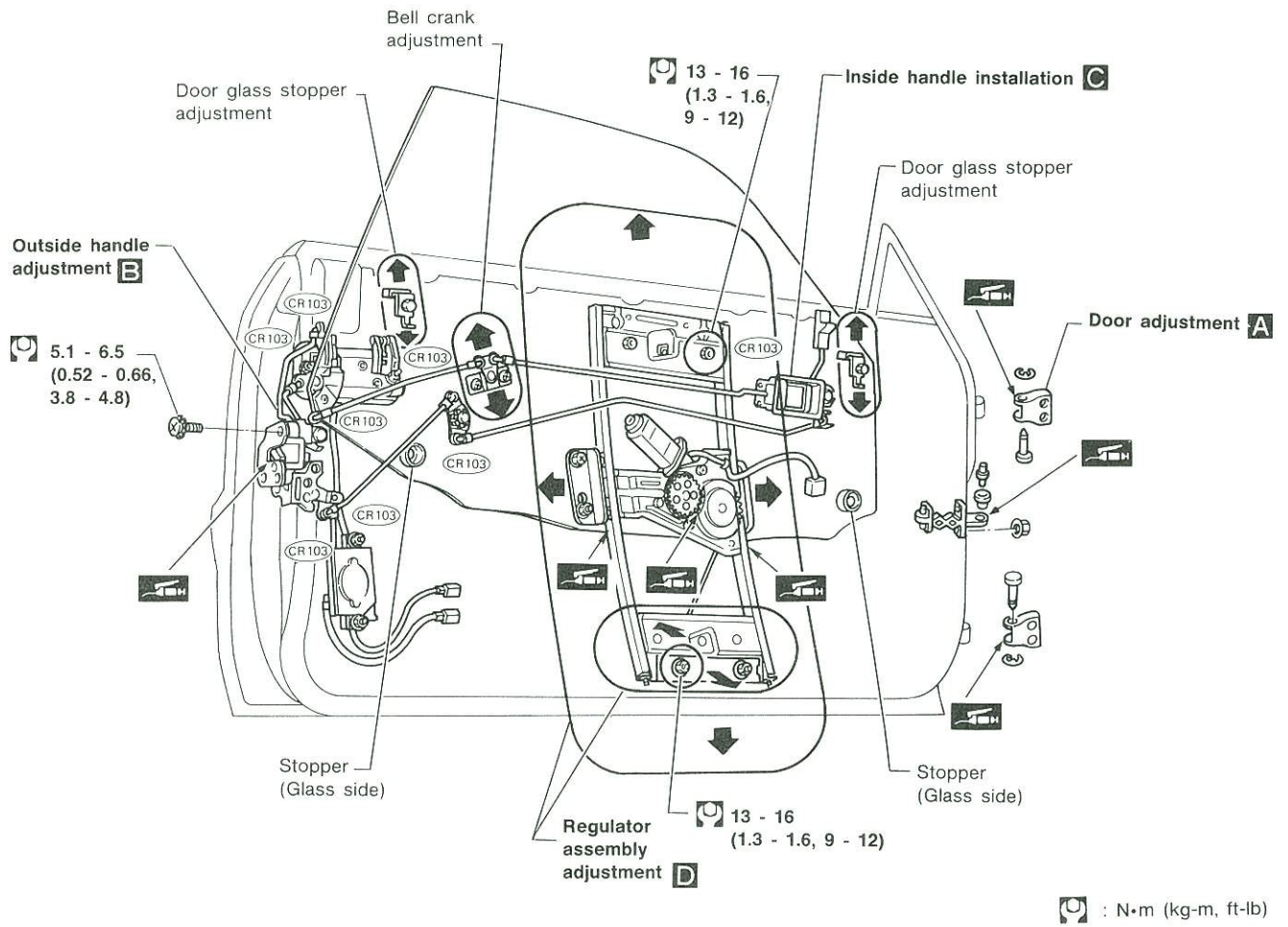
TRUNK LID OPENER AND FUEL FILLER LID OPENER/WIRING DIAGRAM



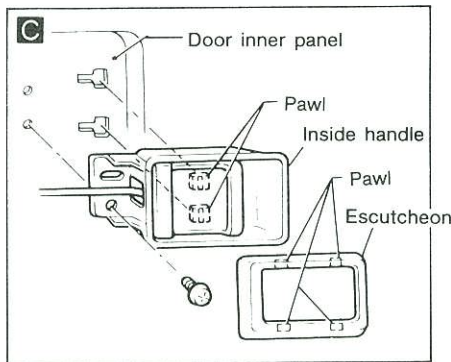
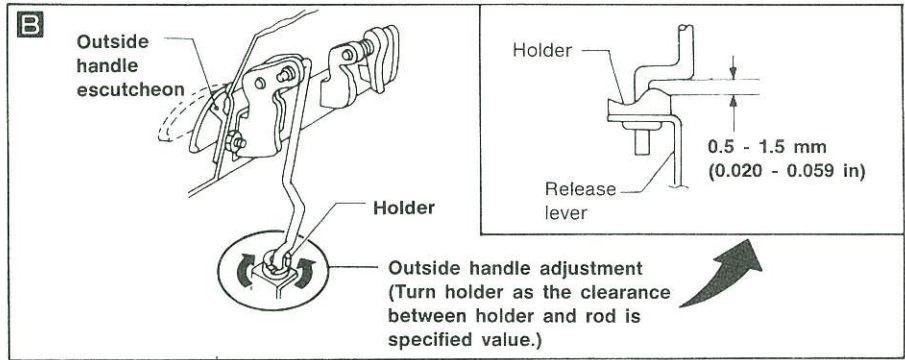
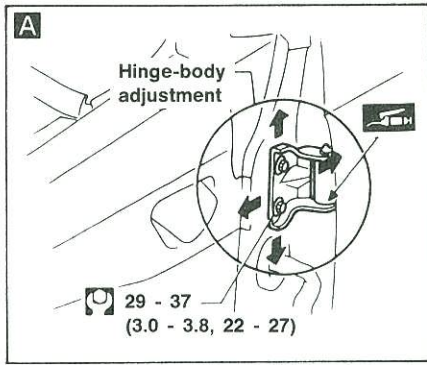
BODY END

NOTE

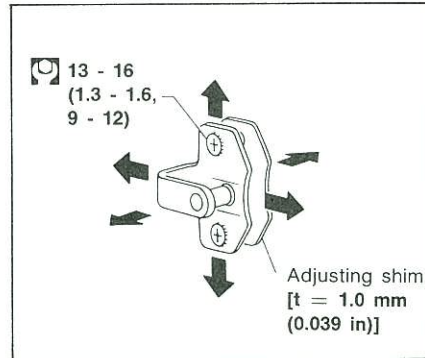
DOOR



DOOR

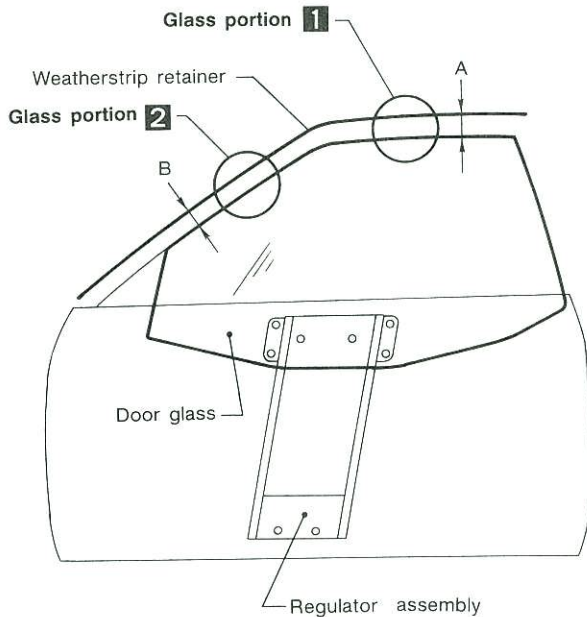


Striker adjustment



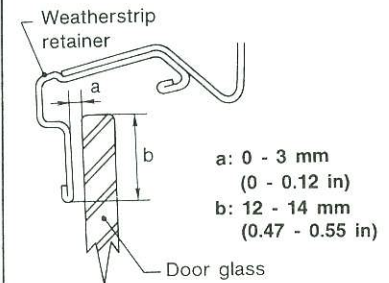
- D**
- Remove weatherstrip from retainer.

- Door glass-to-retainer clearances A and B
- Adjust so that clearances A and B are equal.
- Ensure door glass is not tilted.

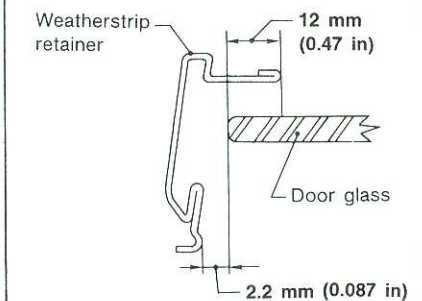


Glass portion 1

- Adjust to provide proper light surface contact of glass and retainer.

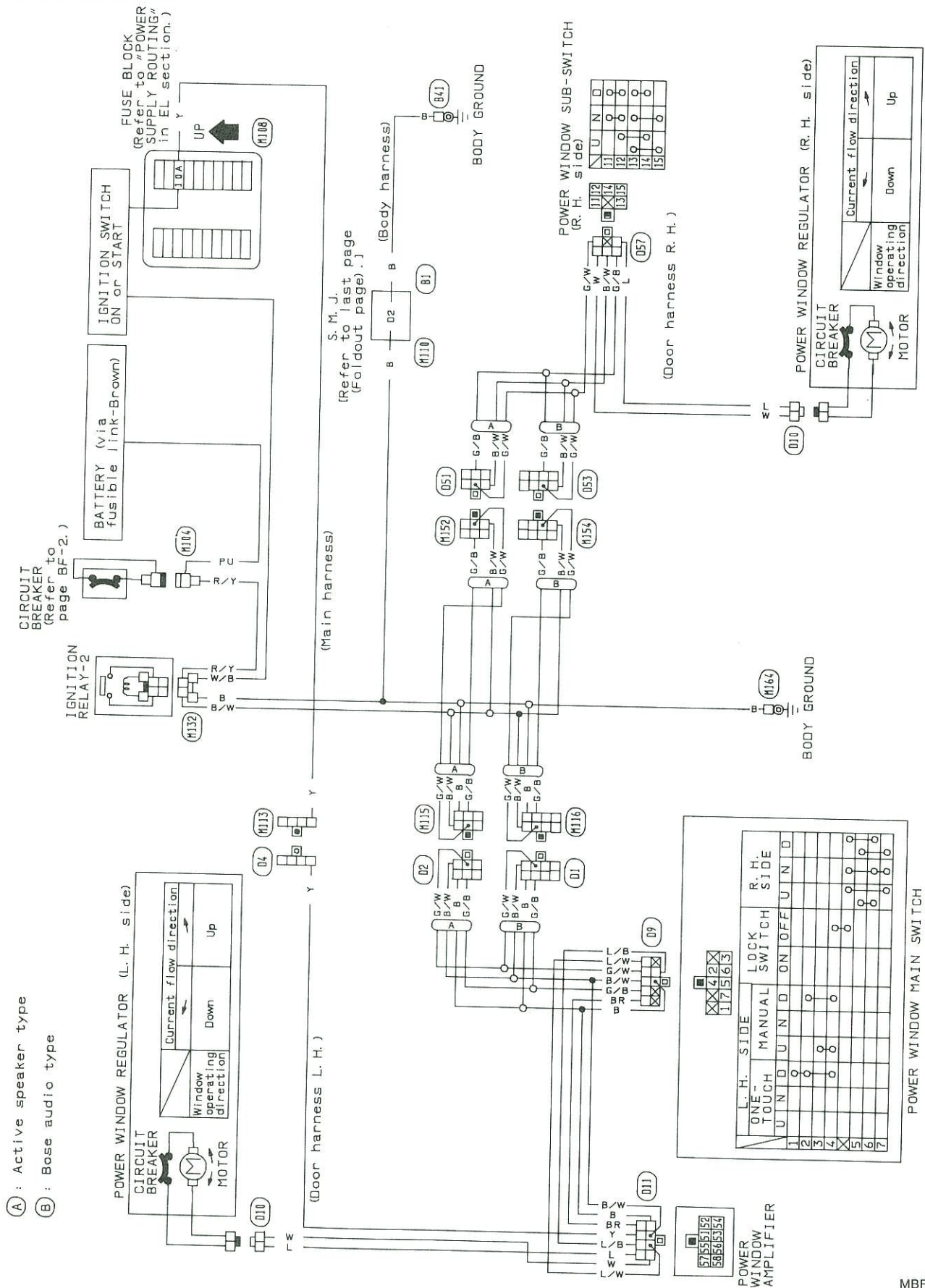


Glass portion 2



Power Window

WIRING DIAGRAM



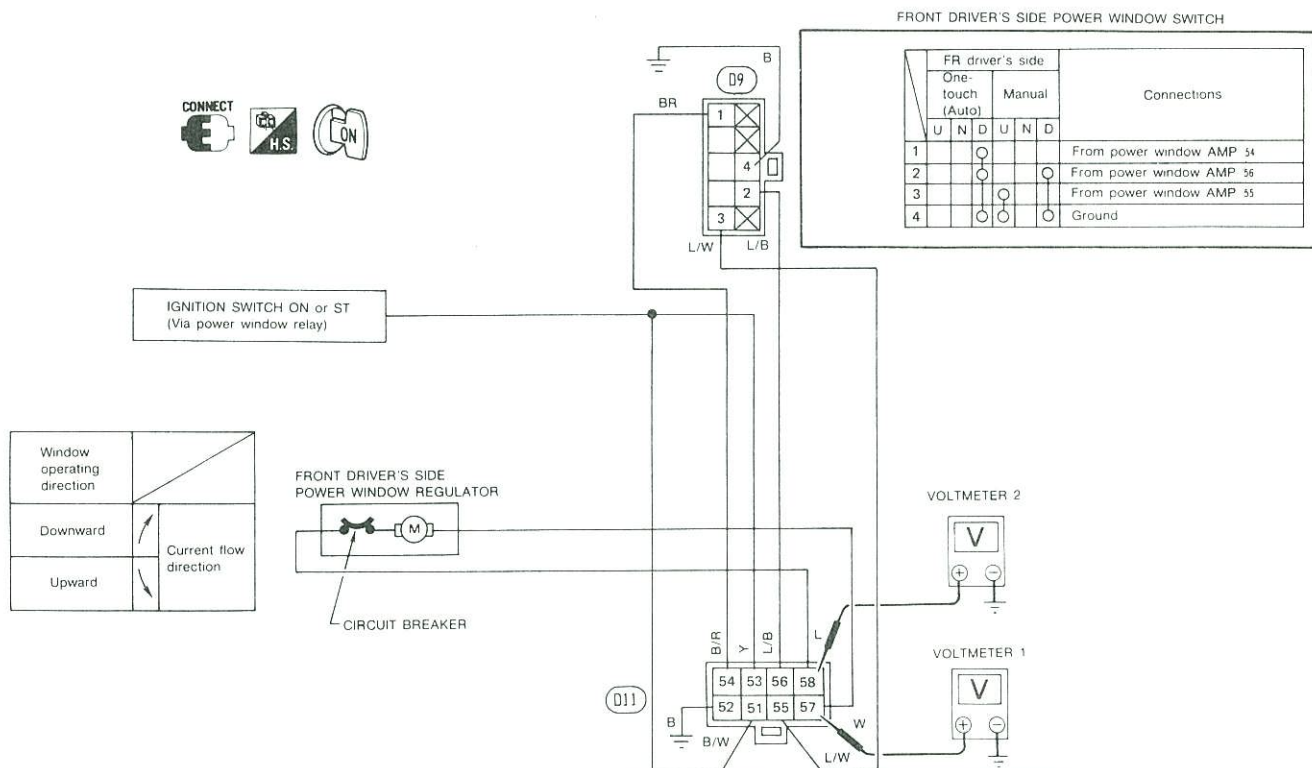
DOOR

Power Window (Cont'd)

POWER WINDOW AMP. INSPECTION

Carry out the inspections below.

- (1) Power source and ground: Battery voltage should exist between terminals 51 and 52.
- (2) Input signals: Battery voltage should exist between terminal 53 and ground (IGN "ON" or "ST").
Continuity should exist between terminal 54, 55 or 56 and ground in "ON" condition, and should not exist in "OFF" condition.
- (3) Output signals: Battery voltage shown in the chart should exist.



AMP OPERATION							
	Connections	Operations					
		Manual operation			One-touch (Auto) operation		
		N	UP	Down	N	Down	N
51	Power source (IGN)	12V	12V	12V	12V	12V	12V
52	Ground	Ground	Ground	Ground	Ground	Ground	Ground
53	From ignition SW (ON or ST)	12V	12V	12V	12V	12V	12V
54	To FR driver's side power window SW (AUTO) (1)	OFF	OFF	OFF	OFF	ON	OFF
55	To FR driver's side power window SW (UP) (3)	OFF	ON	OFF	OFF	OFF	OFF
56	To FR driver's side power window SW (DOWN) (2)	OFF	OFF	ON	OFF	ON	OFF
57	FR driver's side regulator (Upward power source) VOLT METER 1	Approx. 0V	Approx. over 9V	Approx. 0V	Approx. 0V	Approx. 0V	Approx. 0V
58	FR driver's side regulator (Downward power source) VOLT METER 2	Approx. 0V	Approx. 0V	Approx. over 9V	Approx. 0V	Approx. over 9V	Approx. over 9V
Regulator Operating Condition		Stop	Upward operation	Downward operation	Stop	Starting	Keeping operation until fully open, then stops automatically
						Downward operation	

Carry out the operation check in this chart from left to right continuously

POWER WINDOW AMP — Driver's side door

[illegible]

DOOR

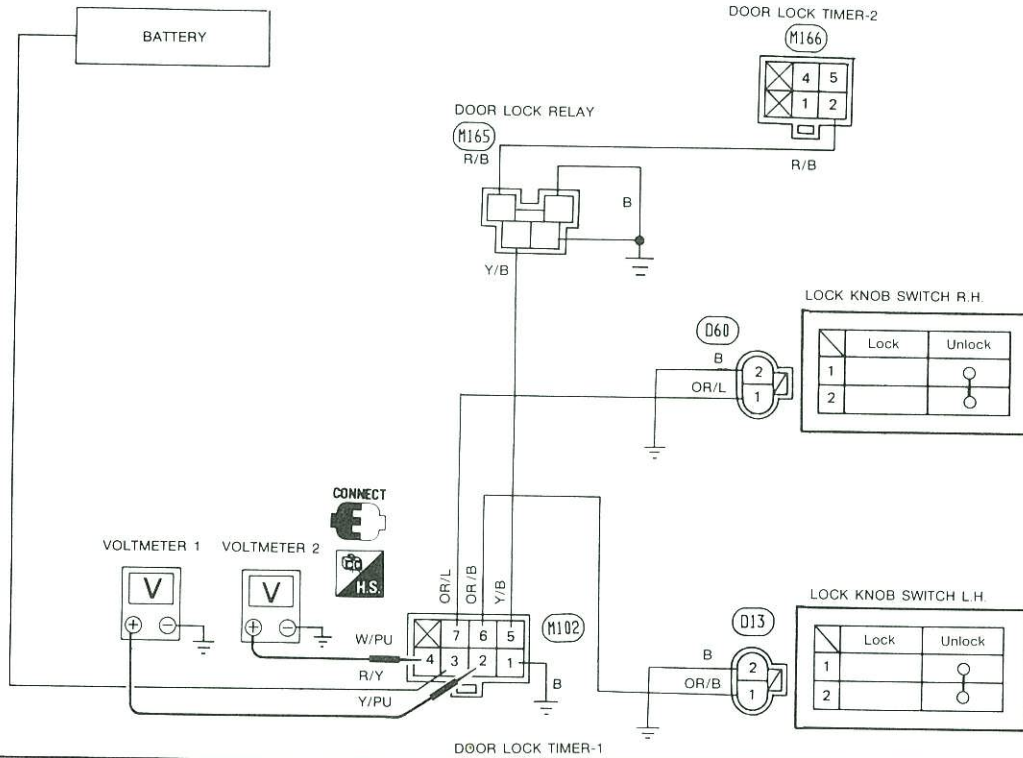
Power Door Lock (Cont'd)

DOOR LOCK TIMER INSPECTION

Door lock timer-1

- Carry out the inspections below.

- (1) Power source and ground: Battery voltage should exist between terminals ③ and ①.
- (2) Input signals: Continuity should exist between terminals ⑤, ⑥, ⑦ and ground in "ON" condition, and should not exist in "OFF" condition.
- (3) Output signals: Voltage shown in the chart should exist.



Connections		Operations							
		Door lock key switch R.H.			Lock knob switch L.H.			Lock knob switch R.H.	
		N	Between N and lock	Lock	Lock → Unlock → Lock	Lock → Unlock → Lock	Lock → Unlock → Lock	Lock → Unlock	Lock → Unlock
3	Power source	12V	12V	12V	12V	12V	12V	12V	12V
1	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
5	Input signal	Door lock relay (Input signal for lock)	OFF	ON	OFF	—	—	OFF	OFF
6		Lock knob switch L.H.	—	—	—	OFF	ON	OFF	—
7		Lock knob switch R.H.	—	—	—	—	—	OFF	ON
2	Output signal	Door lock actuator (Lock power source) VOLT METER 1	0V	12V (Approx. 110 sec.) → 0V	0V	0V	12V (Approx. 1.0 sec.) → 0V	0V	0V
4		Door lock actuator (Unlock power source) VOLT METER 2	0V	0V	0V	12V (Approx. 1.0 sec.) → 0V	0V	0V	12V (Approx. 1.0 sec.) → 0V

- Carry out the complete inspection in the chart from left to right.

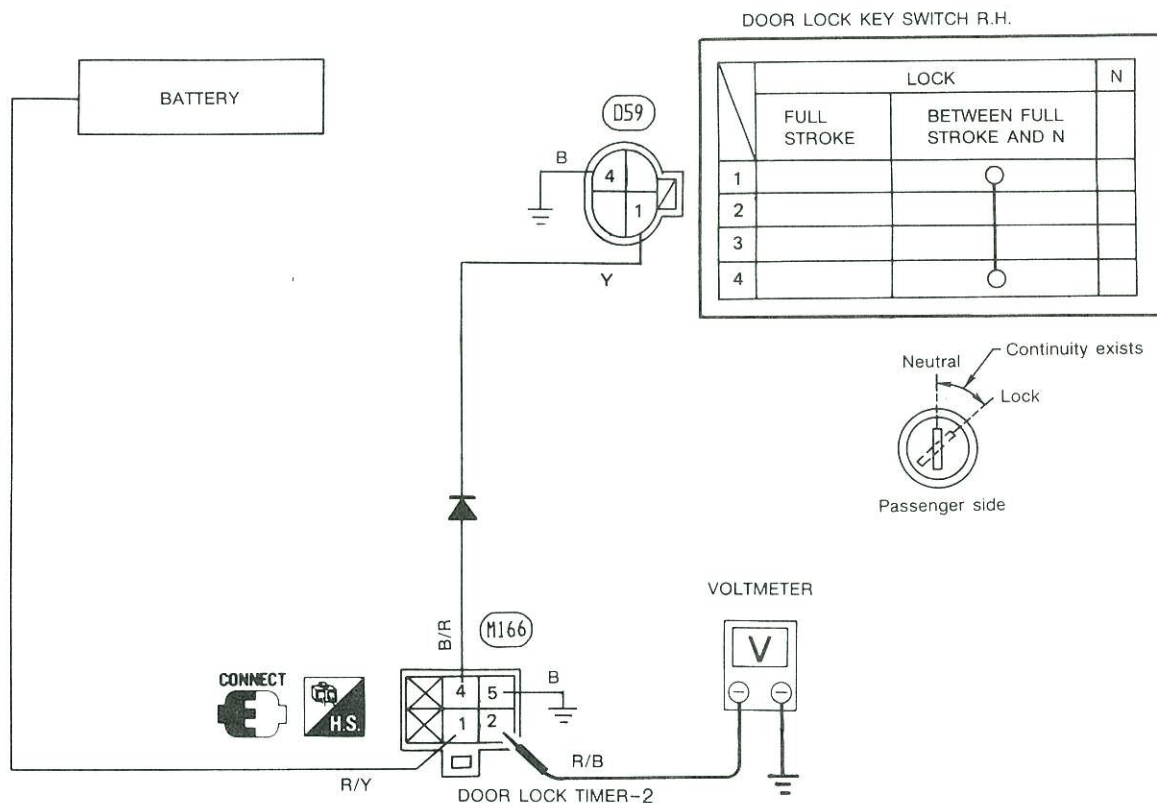
DOOR

Power Door Lock (Cont'd)

Door lock timer-2

- 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 terminal ④ and ground in "ON" condition, and should not exist in "OFF" condition.
- (3) Output signals: Battery voltage shown in the chart should exist between terminal ② and ground.



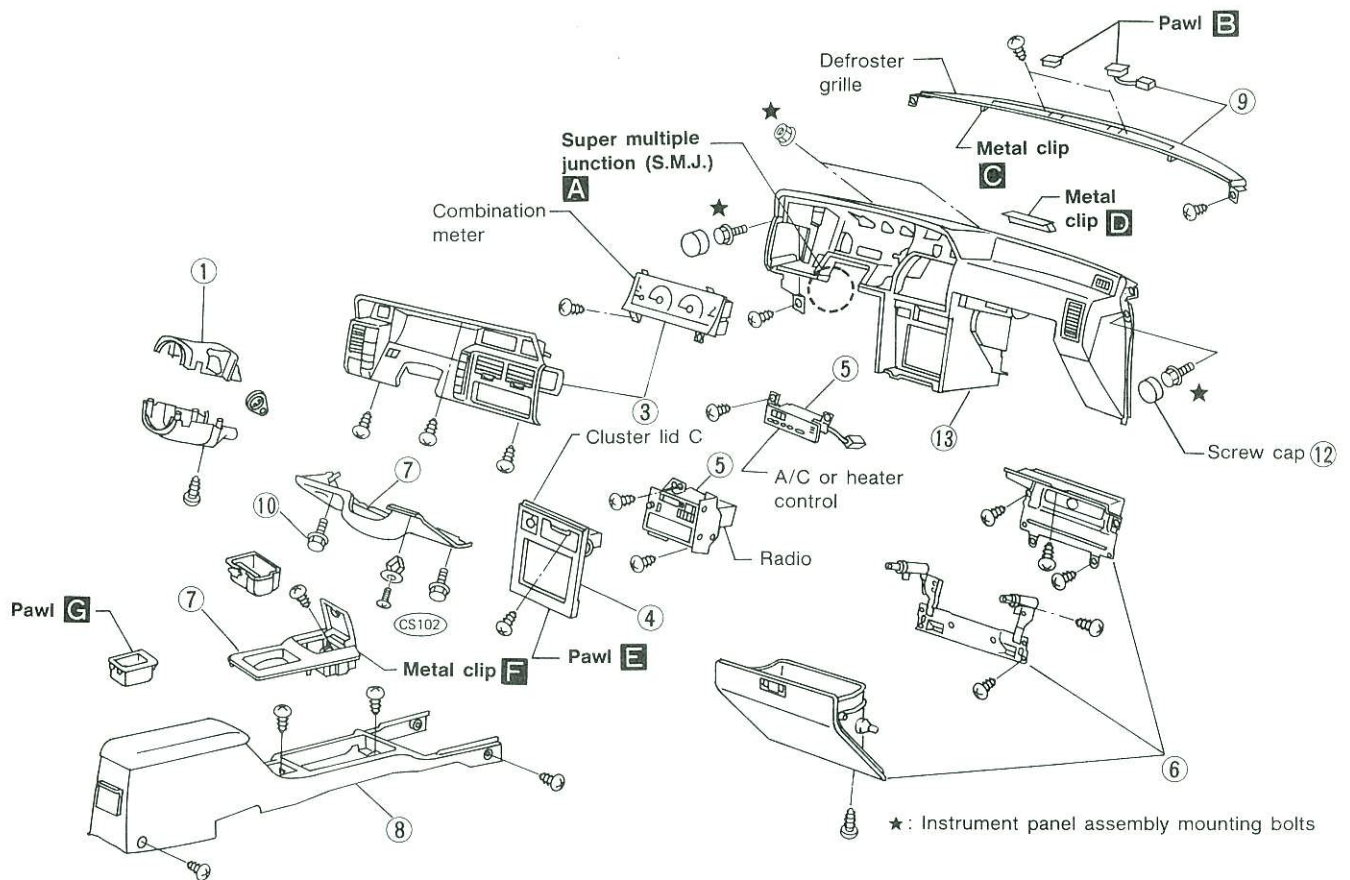
Connections		Operations		
		Door lock key switch R.H.		
		Neutral	Between neutral and lock	Lock
1	Power source	12V	12V	12V
5	Ground	Ground	Ground	Ground
4	Input signal Door lock Key switch R.H. ①	OFF	ON	OFF
2	Output signal Door lock relay VOLTMETER	0V	12V (Approx. 1.0 sec.) → 0V	0V

- Carry out the complete inspection in the chart from left to right.

DOOR

NOTE

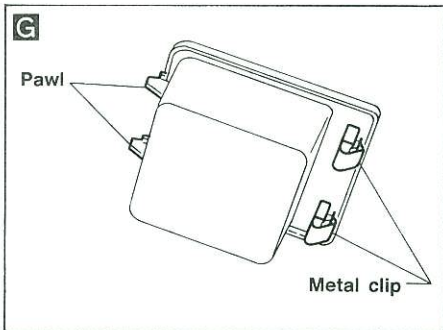
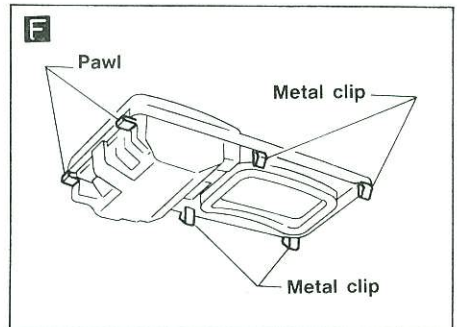
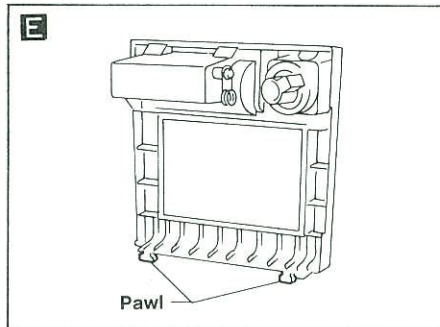
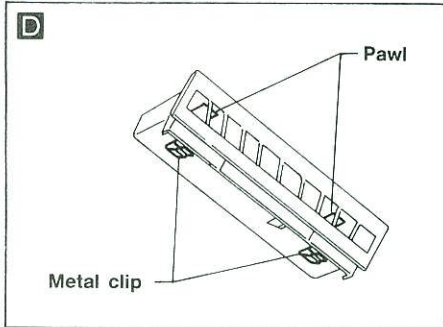
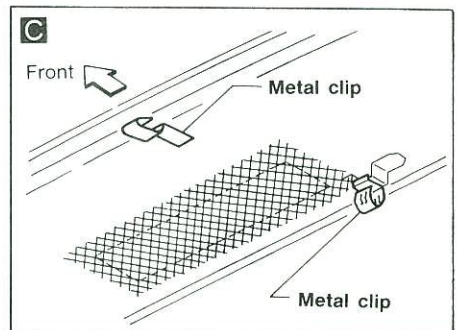
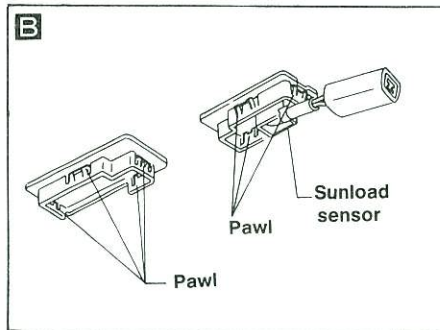
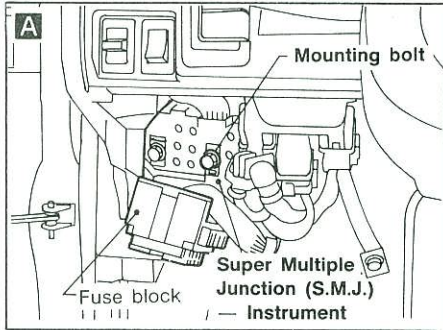
INSTRUMENT PANEL



REMOVAL — Instrument panel assembly

- ① Remove steering column covers and steering column securing bolts.
- ② Remove front pillar garnish and instrument lower finishers.
- ③ Remove cluster lid and combination meter.
- ④ Remove heater control finisher and cluster lid C.
- ⑤ Remove radio and A/C or heater control.
- ⑥ Remove glove box lower finisher and glove box (10 screws).
- ⑦ Remove instrument reinforcement (4 screws) and A/T shift lever cover.
- ⑧ Remove floor console box (6 screws).
- ⑨ Remove defroster grille and sensors.
- ⑩ Remove hood lock cable bracket (2 screws) and rear heater ducts.
- ⑪ Remove fuse block (2 screws) and disconnect S.M.J.
- ⑫ Remove combination switch and instrument securing screw caps.
- ⑬ Remove instrument panel assembly (4 bolts, 2 nuts and 2 screws).

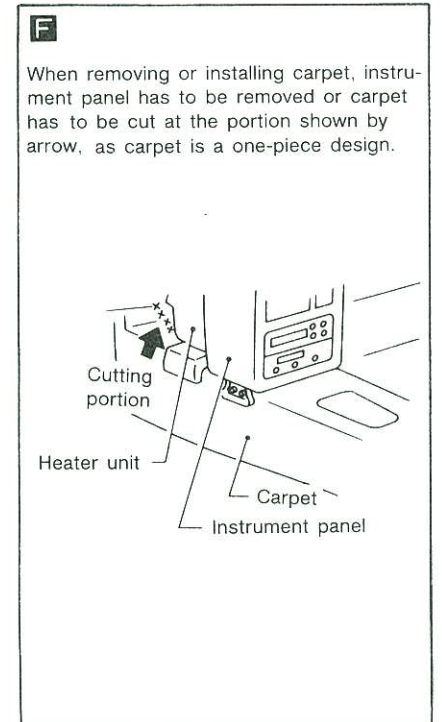
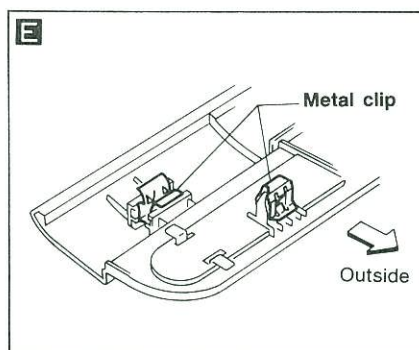
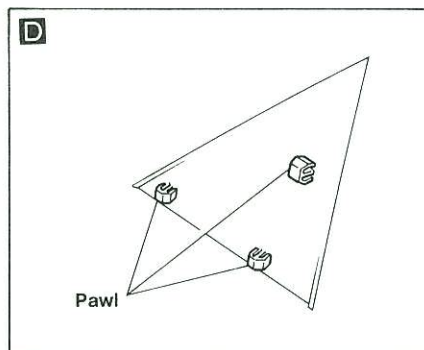
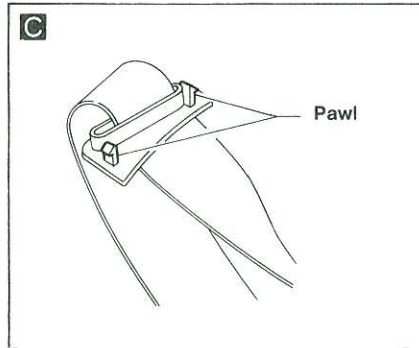
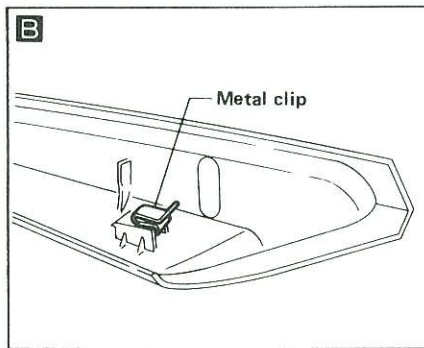
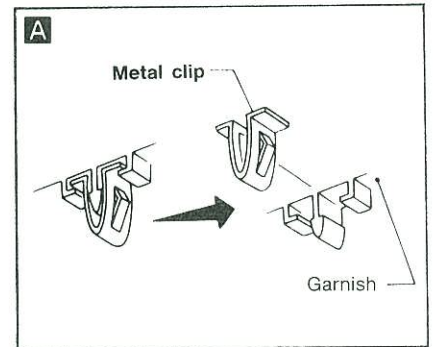
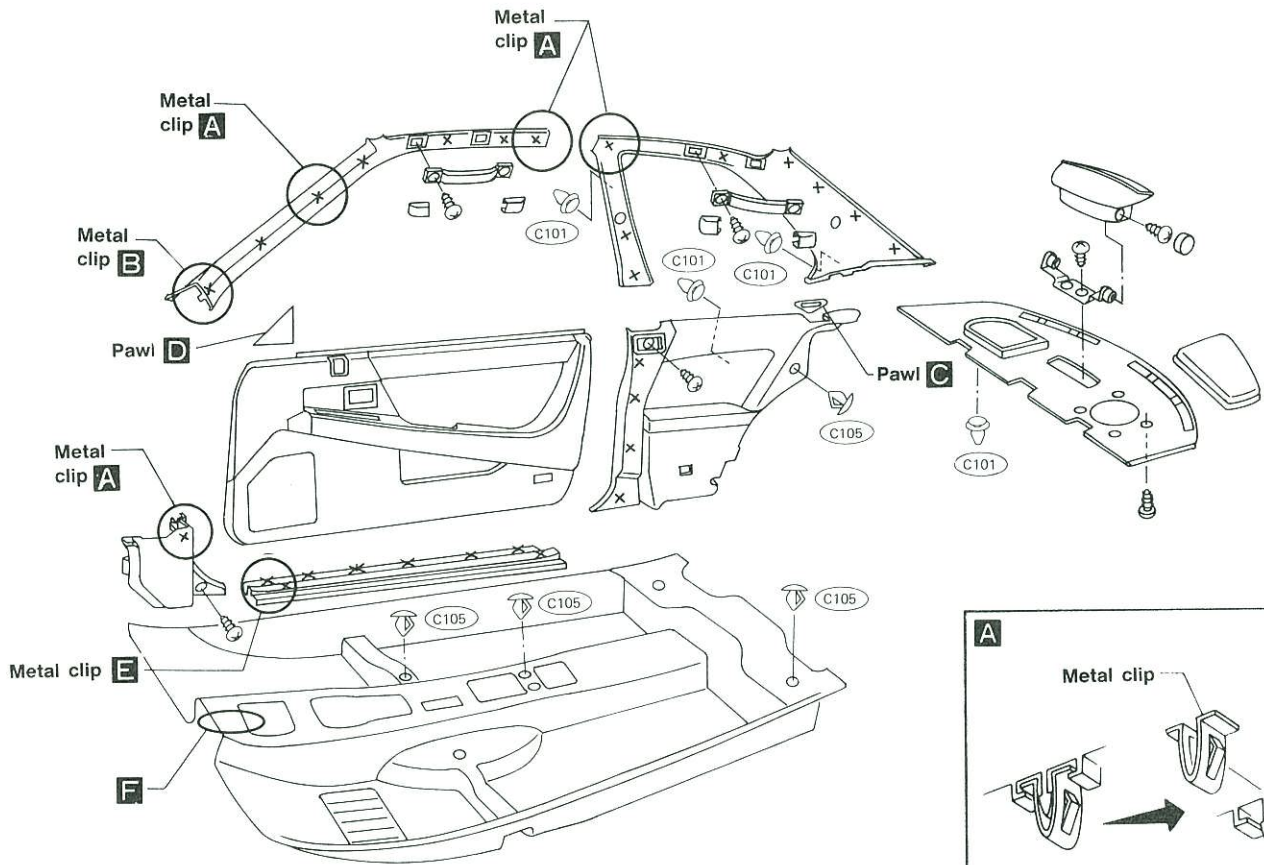
INSTRUMENT PANEL



SBF123F

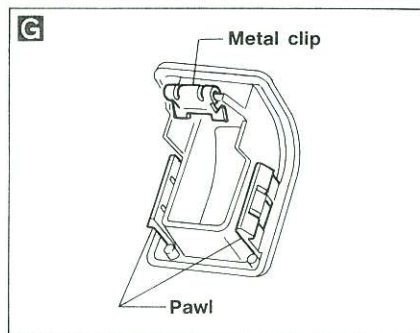
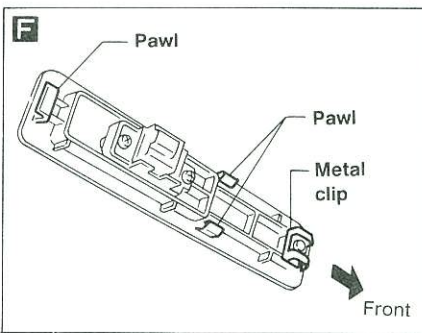
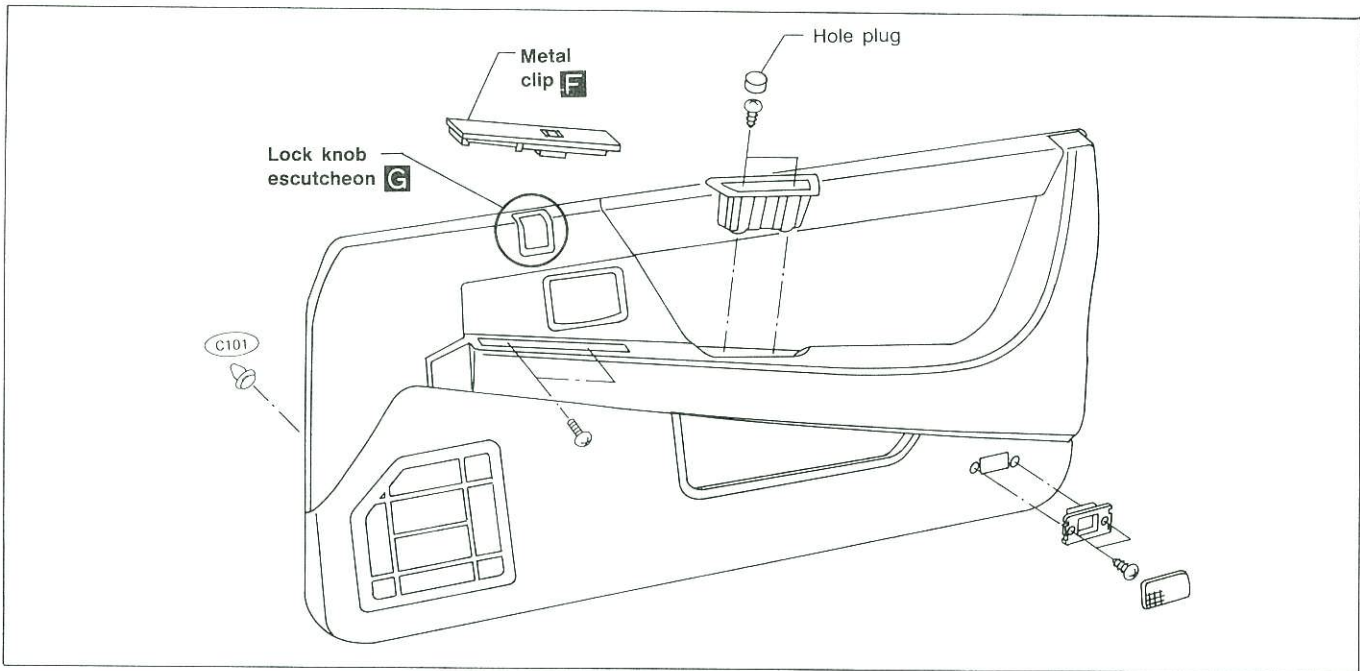
Interior

SIDE AND FLOOR TRIM — Passenger room



INTERIOR AND EXTERIOR

Interior (Cont'd)



SBF124F

REMOVAL — Door finisher assembly

1. Remove power window switch (F) and disconnect connectors.
2. Remove lock knob escutcheon and door step lamp.
3. Disconnect door step lamp connector and remove screws from power window switch hole.
4. Remove door finisher assembly

REMOVAL — Front pillar garnish

1. Remove assist strap and body side welt.
2. Remove front pillar garnish.

REMOVAL — Rear quarter garnish

1. Remove assist strap and rear seatback.
2. Remove screw at center pillar of side finisher and body side welt.
3. Remove rear quarter garnish while pulling outside side finisher.

REMOVAL — Rear side finisher

1. Remove rear seat and screw at center pillar
2. Remove body side welt and rear side finisher.

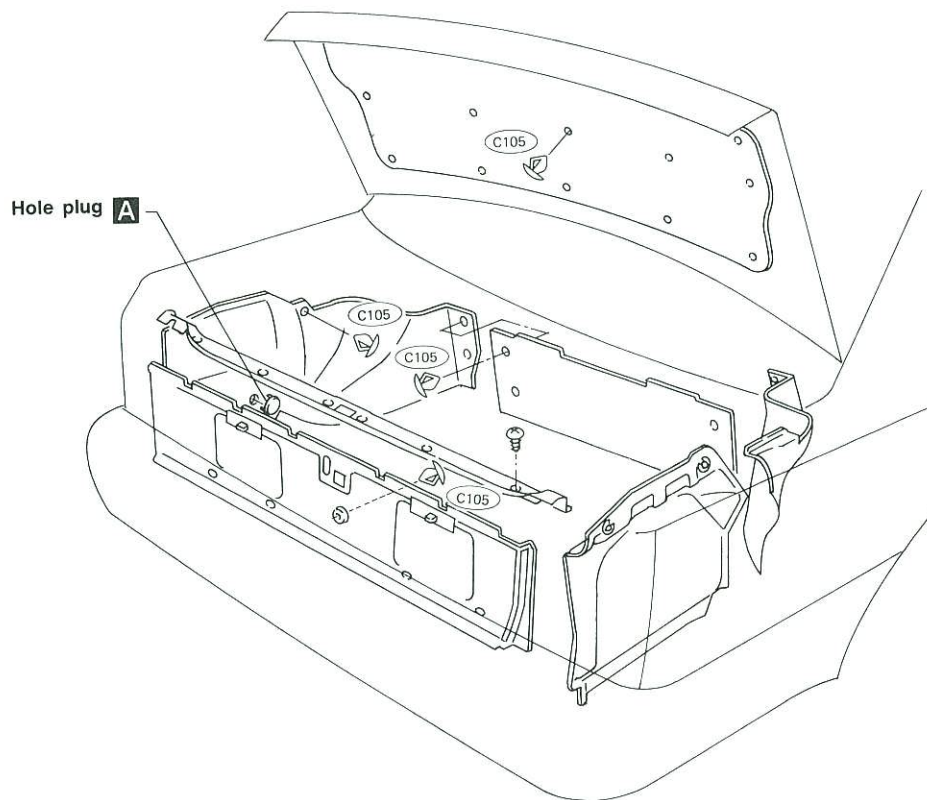
REMOVAL — Floor carpet

1. Remove front seats and rear seat cushion.
2. Remove floor console box and front seat belts.
3. Remove kick plate and rear side finisher.
4. Cut part of floor carpet and remove floor carpet.

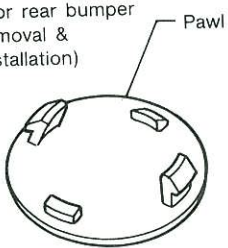
INTERIOR AND EXTERIOR

Interior (Cont'd)

LUGGAGE ROOM TRIM — Trunk space



A Hole plug
(For rear bumper
removal &
installation)

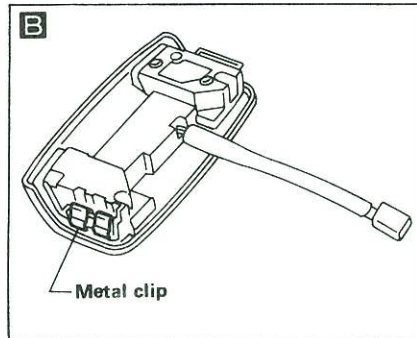
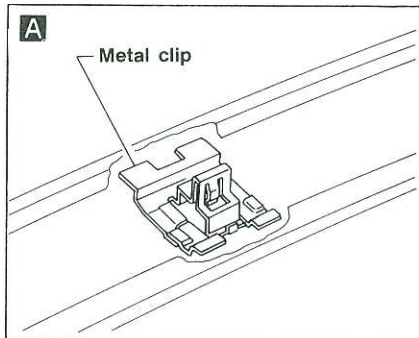
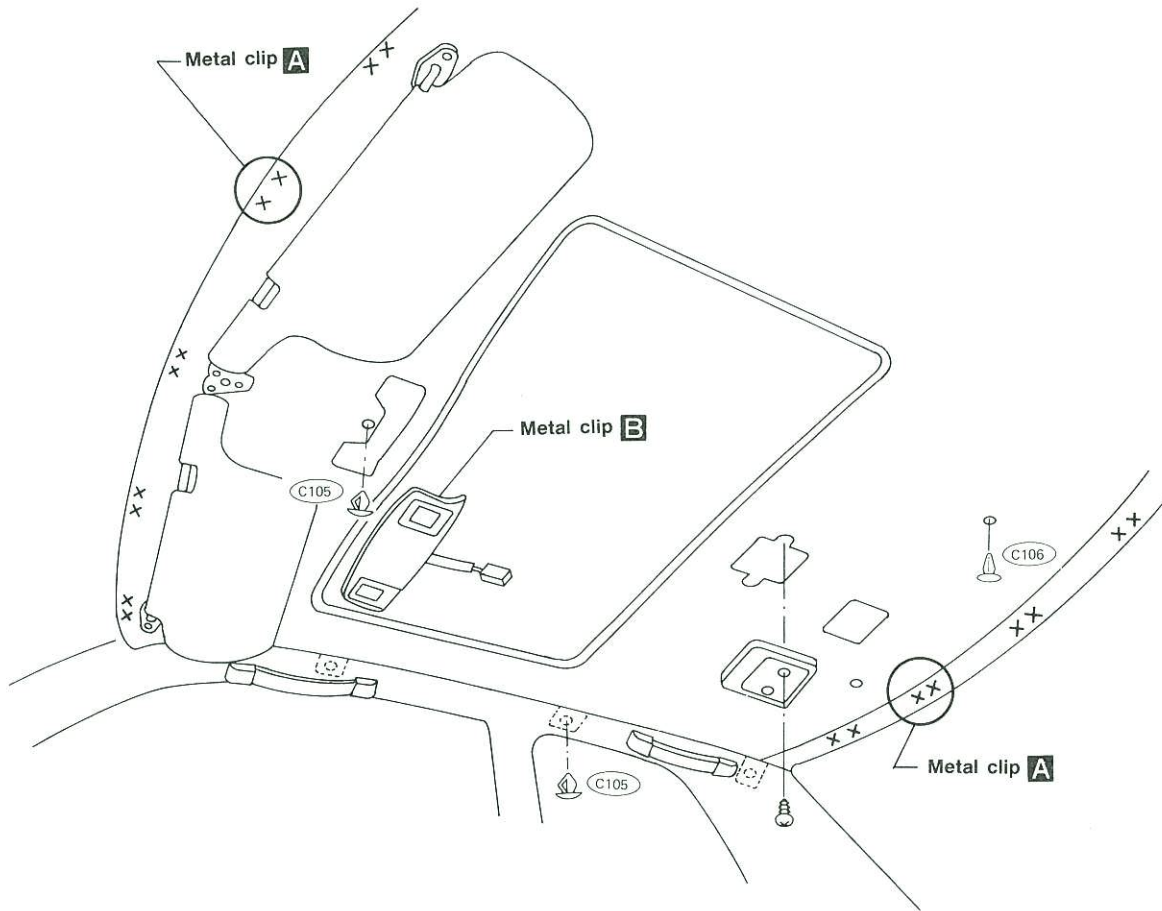


SBF125F

INTERIOR AND EXTERIOR

Interior (Cont'd)

ROOF TRIM



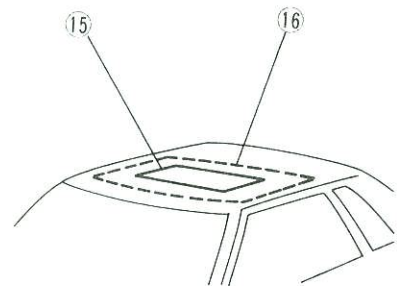
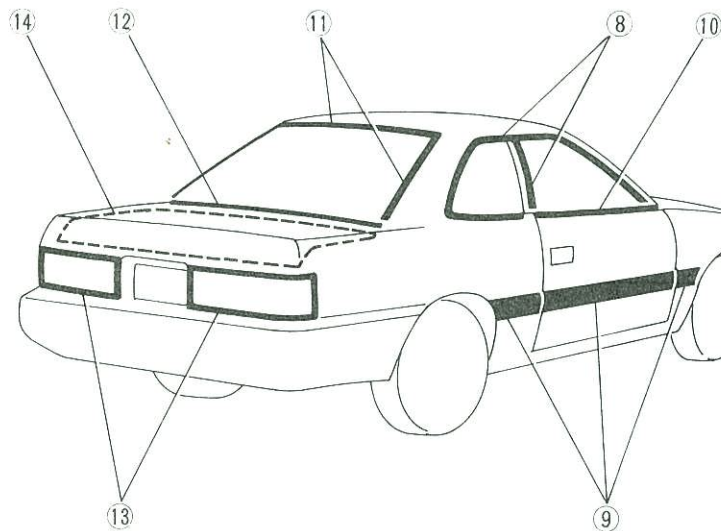
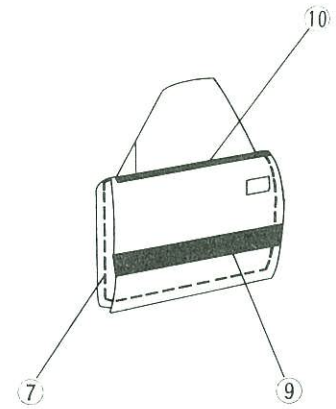
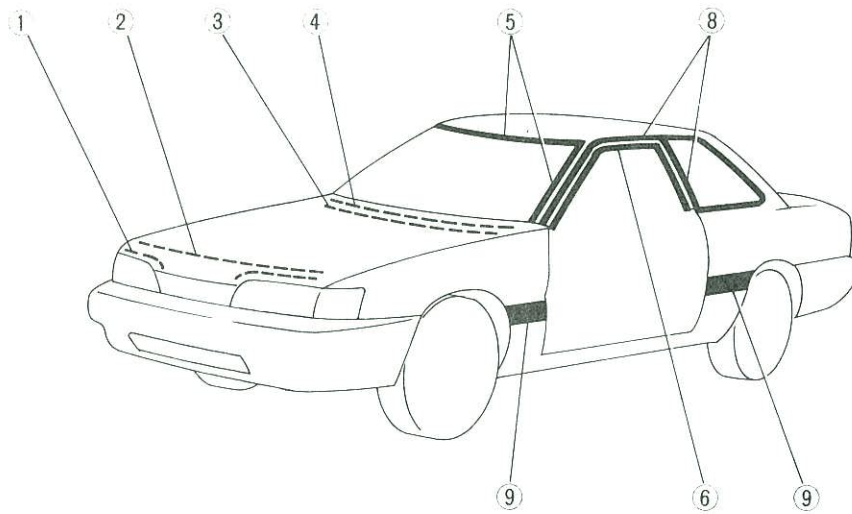
SBF126F

REMOVAL — headlining cloth

1. Remove sunvisors, assist straps, room lamp and inside mirror.
2. Remove body side welts.
3. Remove front pillar garnishes, rear quarter garnishes and roof finishers.
4. Remove clips and headlining cloth.

INTERIOR AND EXTERIOR

Exterior

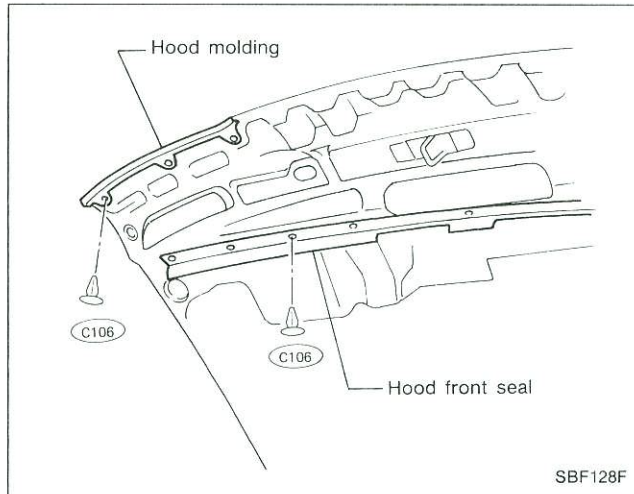


SBF127F

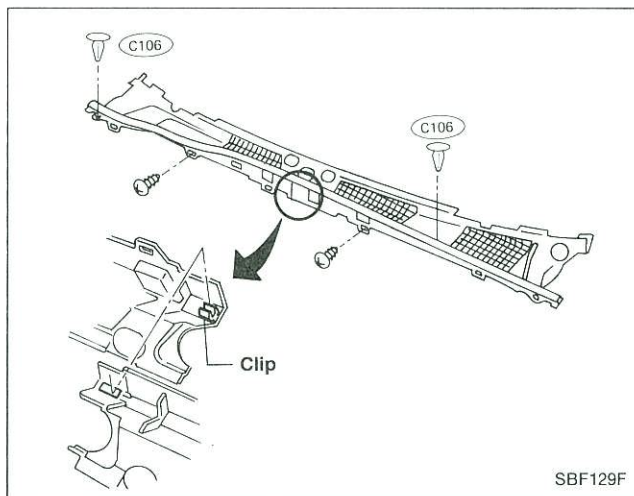
INTERIOR AND EXTERIOR

Exterior (Cont'd)

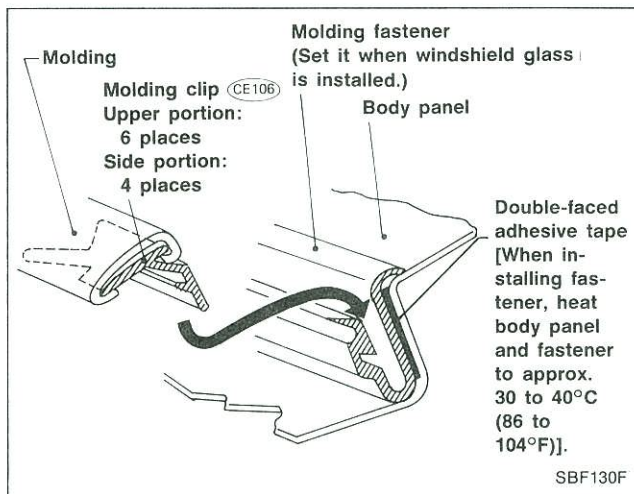
① ② Hood molding and hood front seal



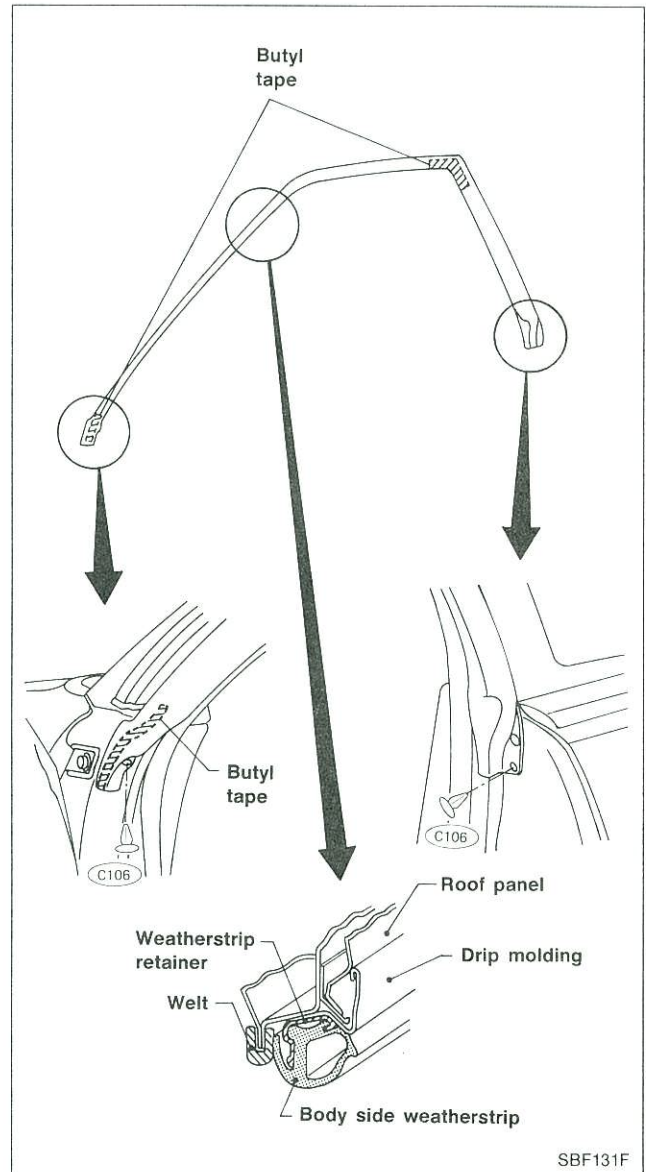
③ ④ Cowl top seal and cowl top grille



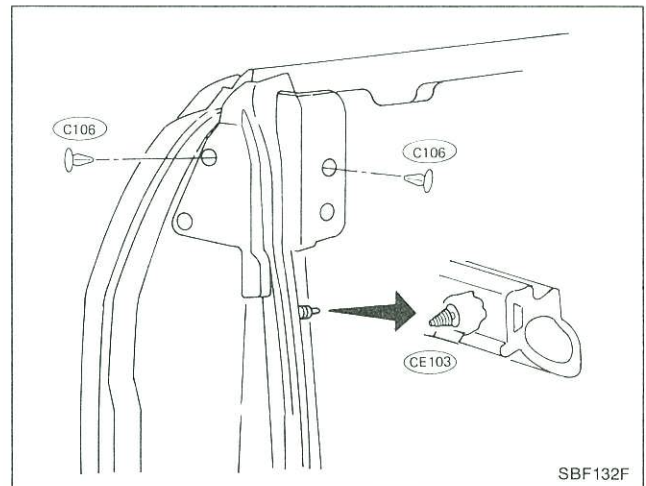
⑤ Windshield upper molding and side molding



⑥ Body side weatherstrip



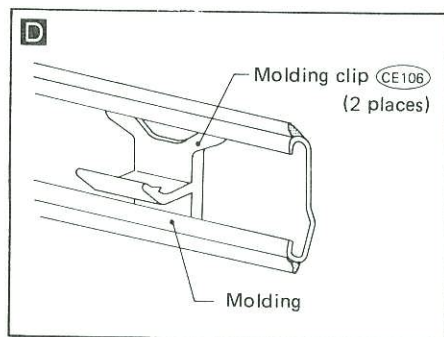
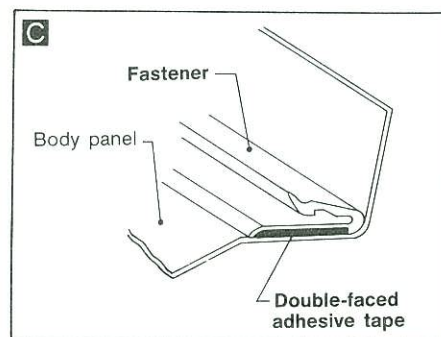
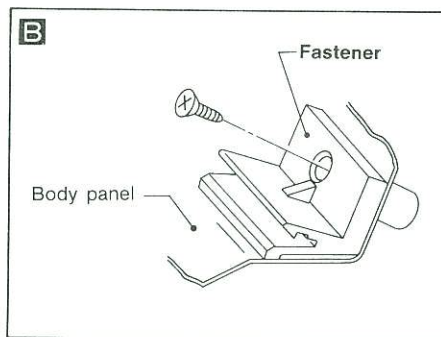
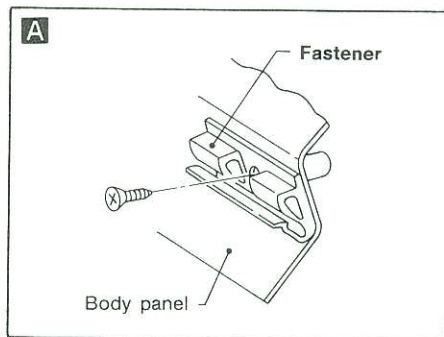
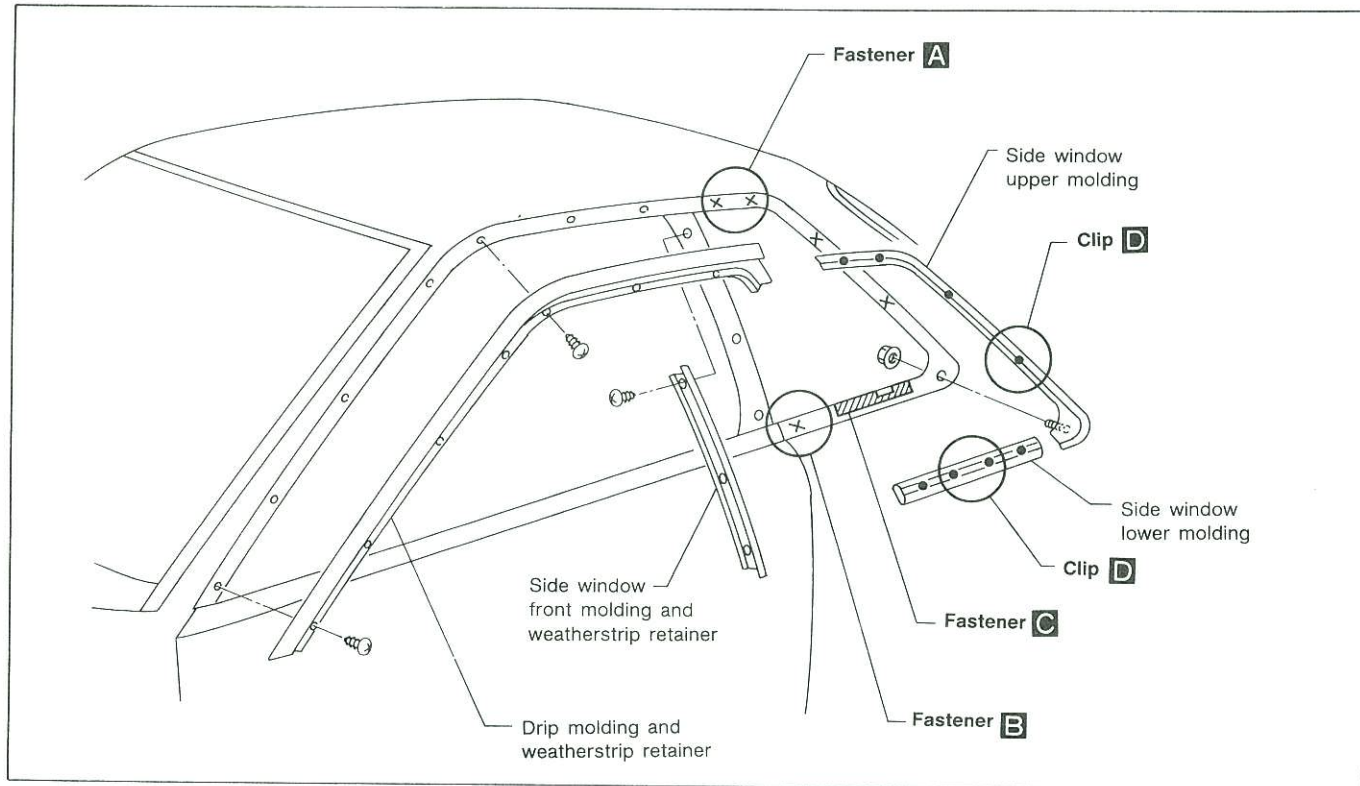
⑦ Door weatherstrip



INTERIOR AND EXTERIOR

Exterior (Cont'd)

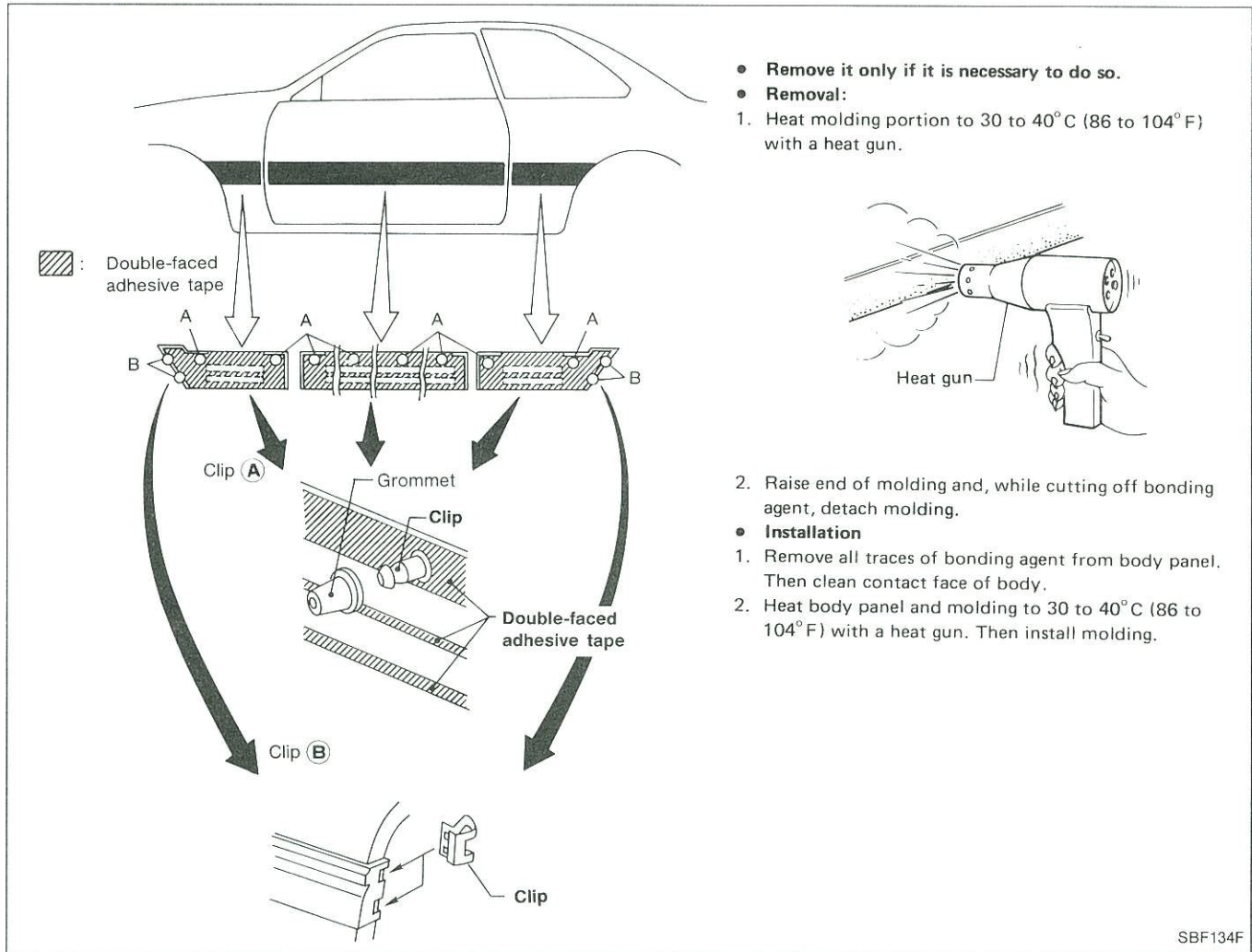
⑧ Drip molding



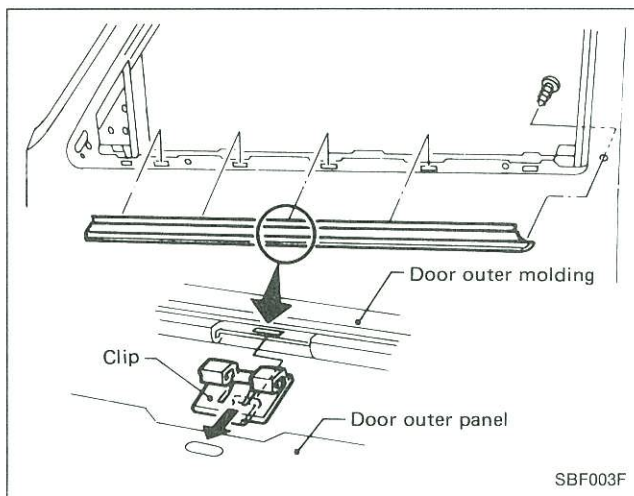
INTERIOR AND EXTERIOR

Exterior (Cont'd)

⑨ Side guard molding



⑩ Door waist outside molding



⑪ Rear window upper molding and side molding

Basically the same as windshield upper molding. Refer to "⑤ Windshield upper molding and side molding".

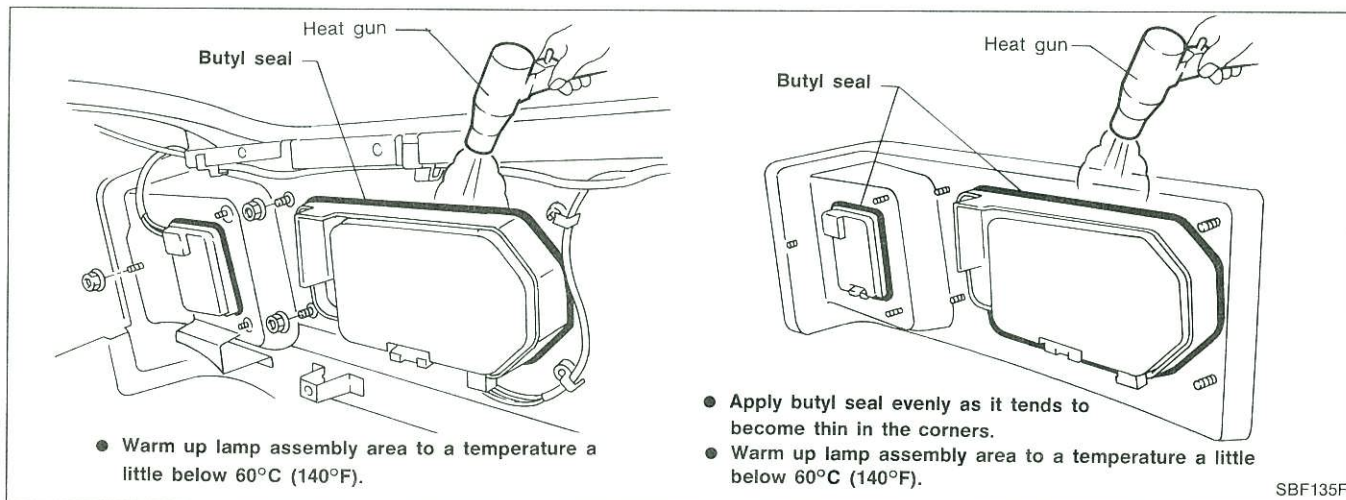
⑫ Rear window lower molding

Mounted with screws.

INTERIOR AND EXTERIOR

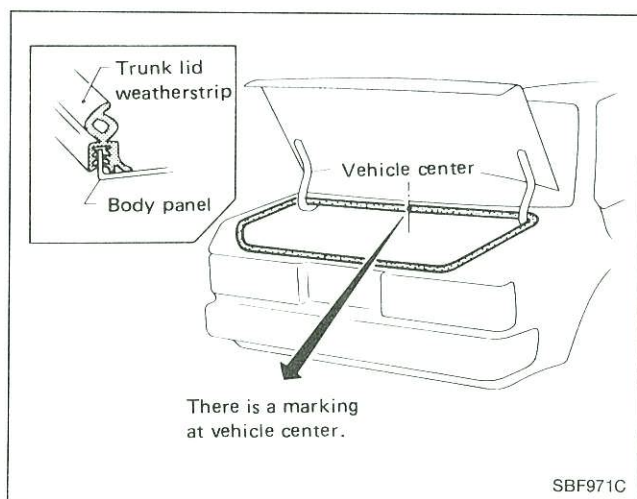
Exterior (Cont'd)

⑬ Rear combination lamp



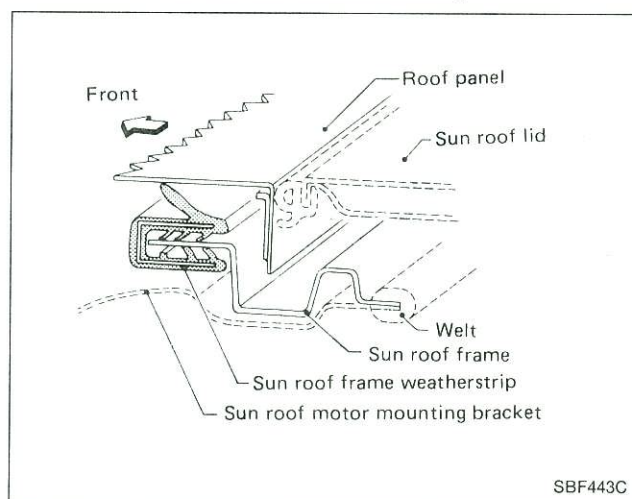
SBF135F

⑭ Trunk lid weatherstrip



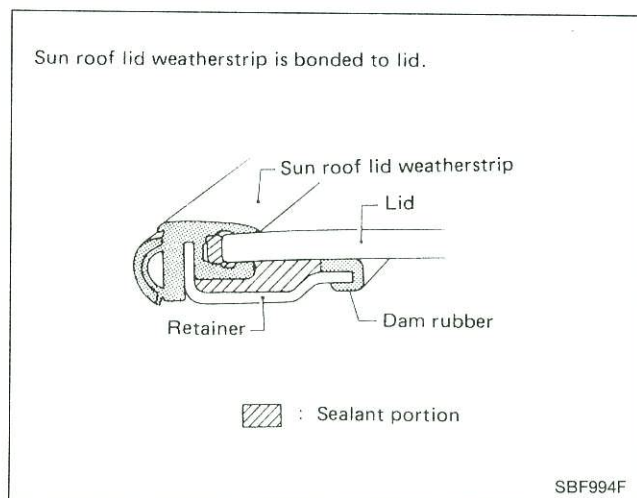
SBF971C

⑮ Sun roof frame weatherstrip



SBF443C

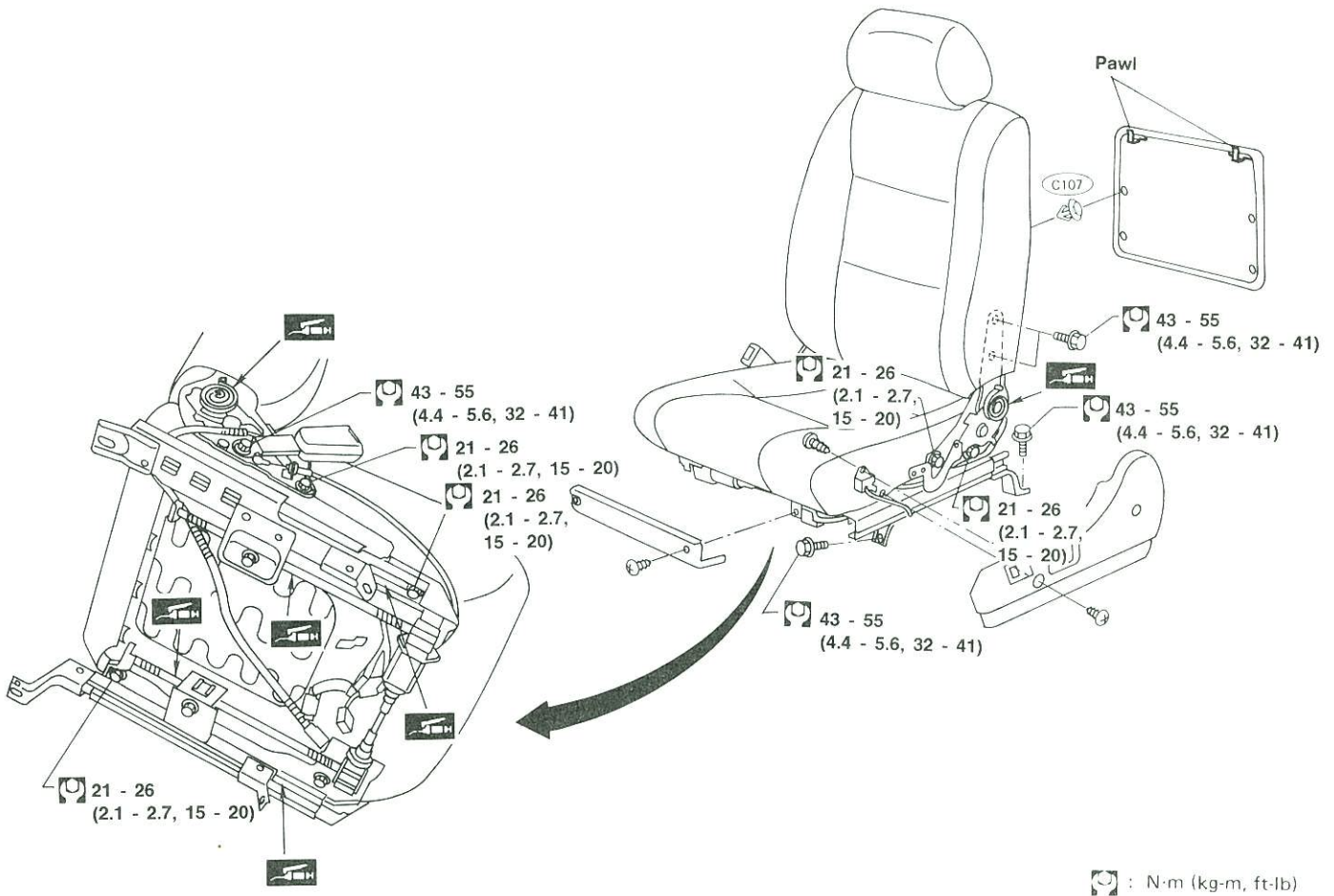
⑯ Sun roof lid weatherstrip



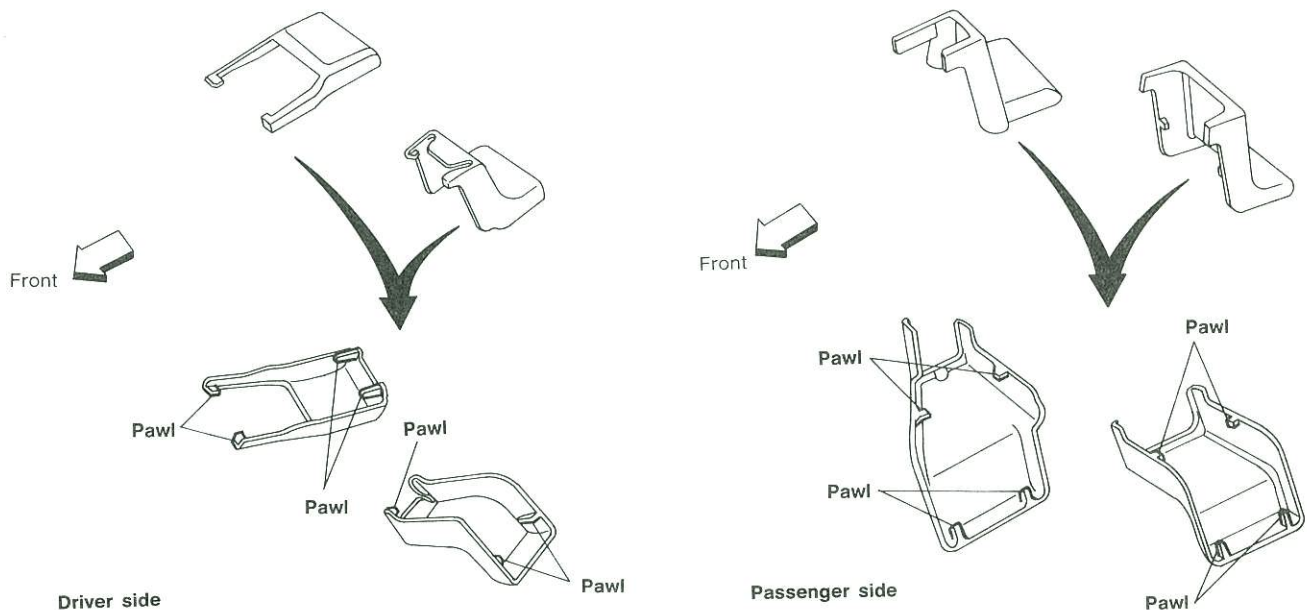
SBF994F

- When removing or installing the seat trim, carefully handle it to keep dirt out and avoid damage.

Front Seat

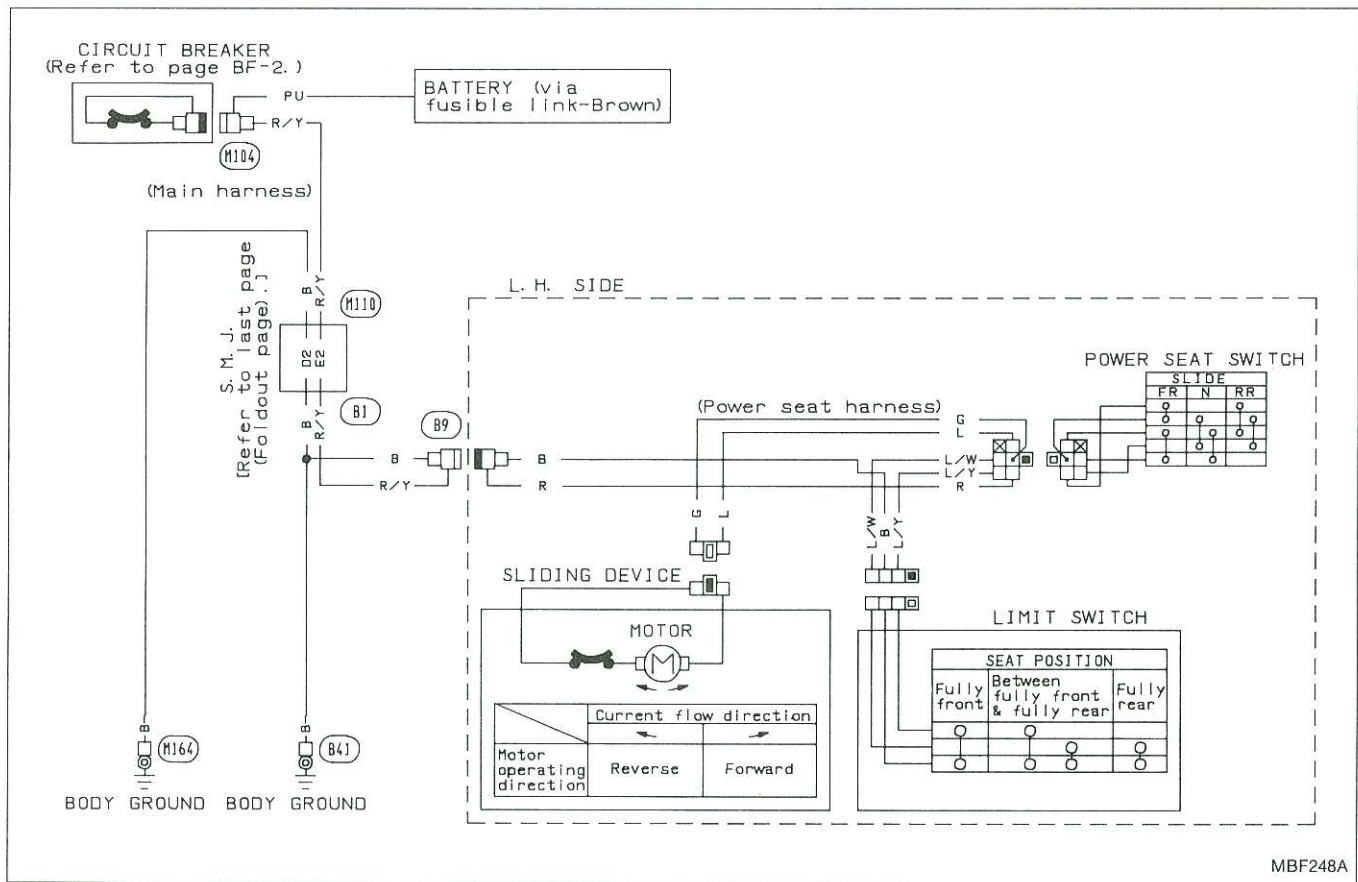


Slide rail rear cover



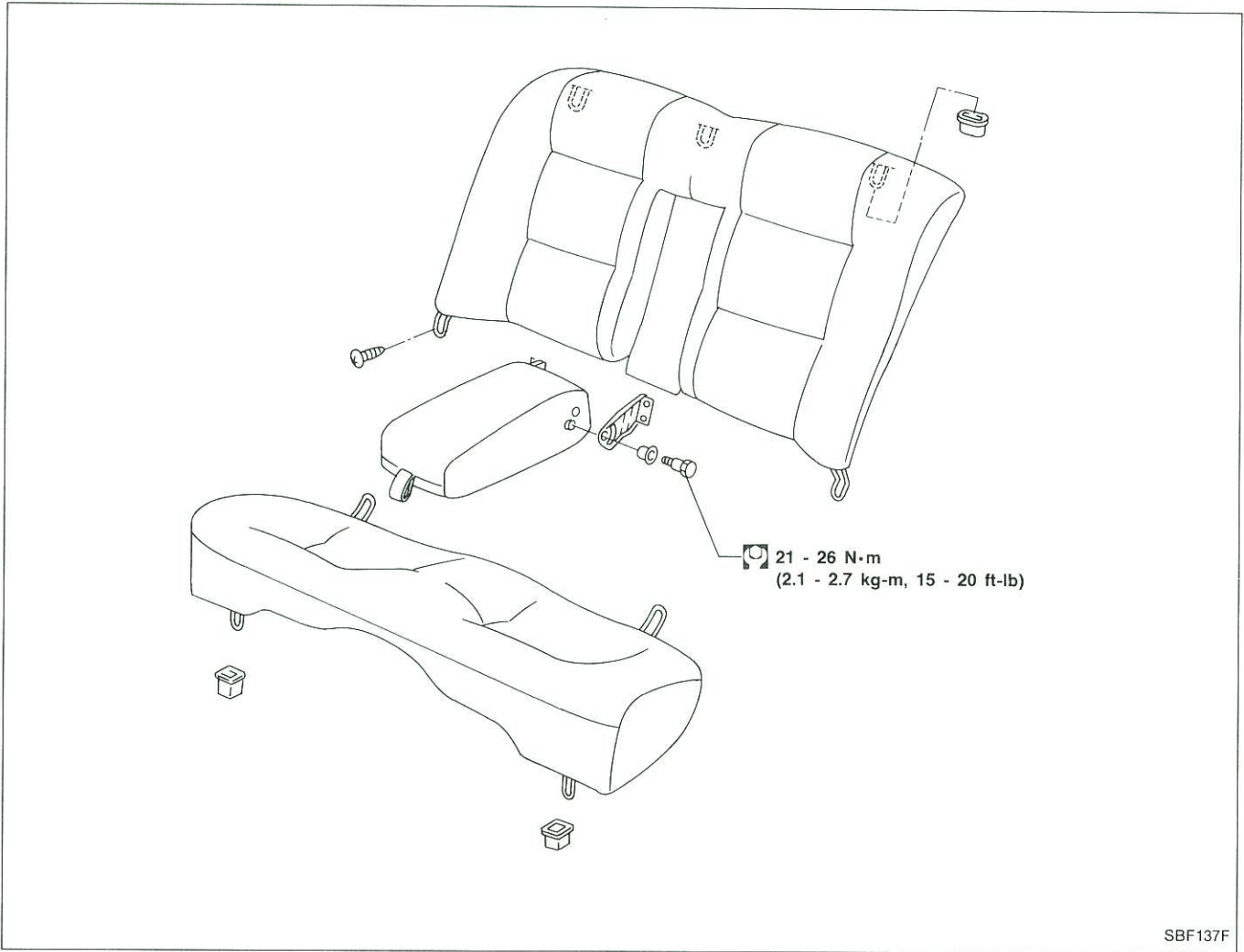
Front Seat (Cont'd)

POWER SEAT/WIRING DIAGRAM



SEAT

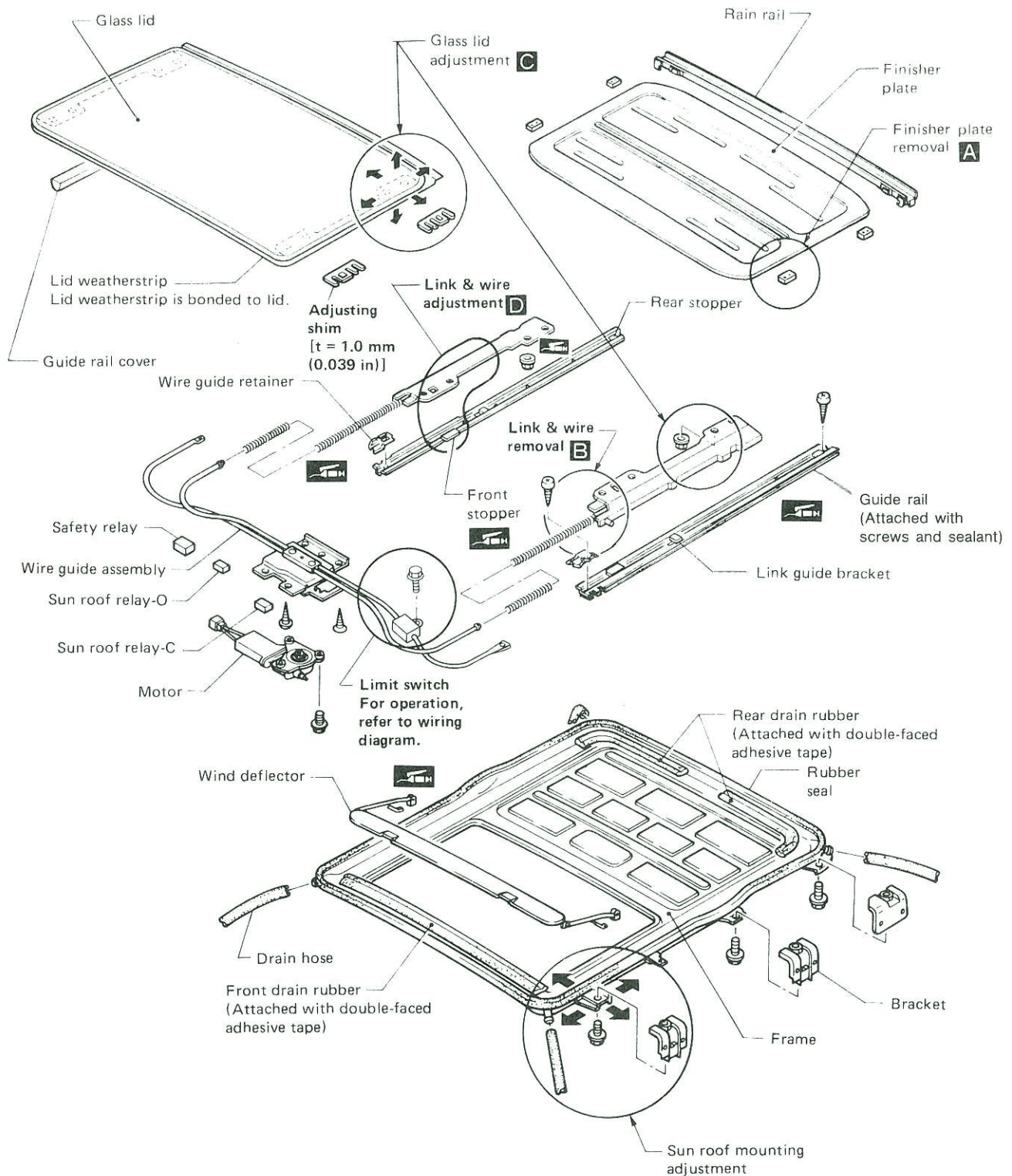
Rear Seat



SUN ROOF

Electric Sun Roof

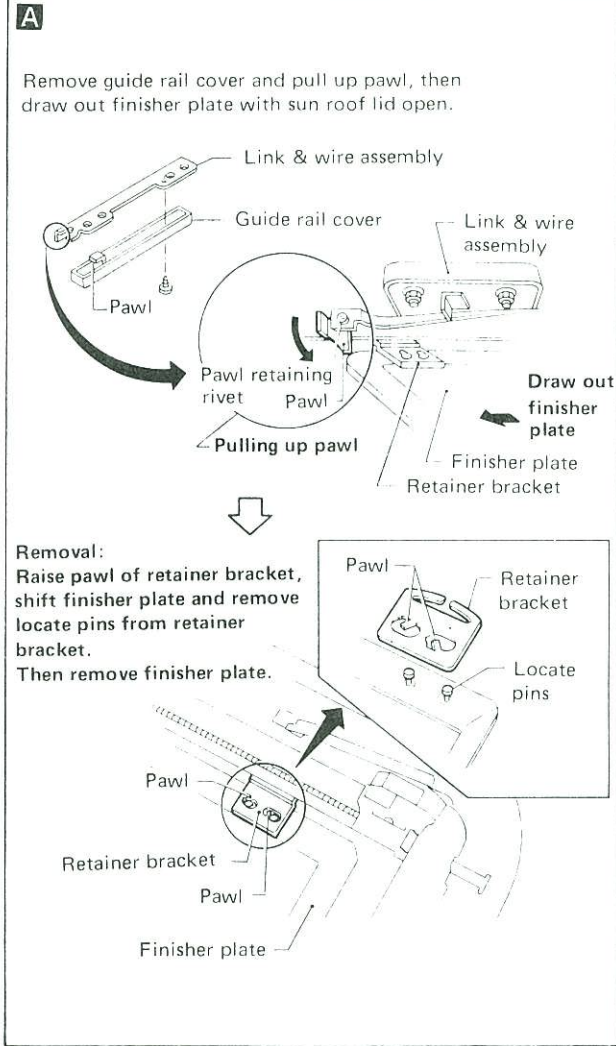
- After any adjustment, check sun roof operation and lid alignment.
- Handle finisher plate and glass lid with care so not to damage it.
- It is desirable for easy installation to mark each point before removal.



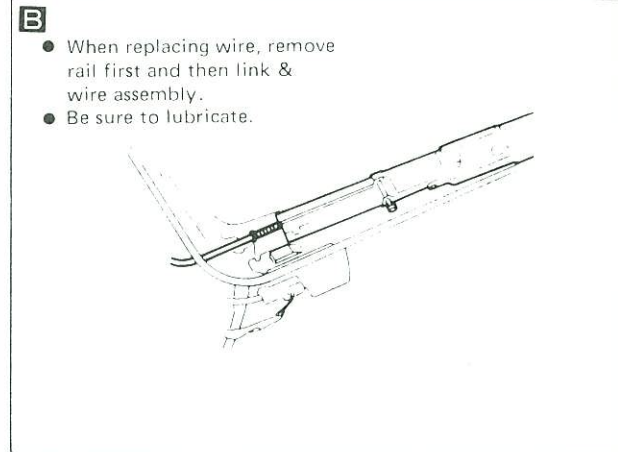
SUN ROOF

Electric Sun Roof (Cont'd)

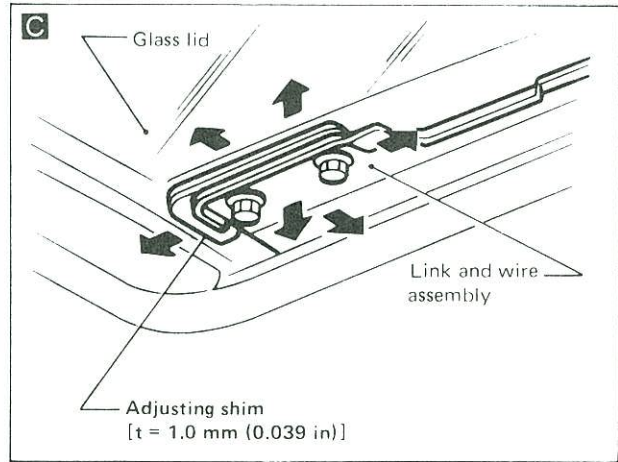
Finisher plate removal & installation



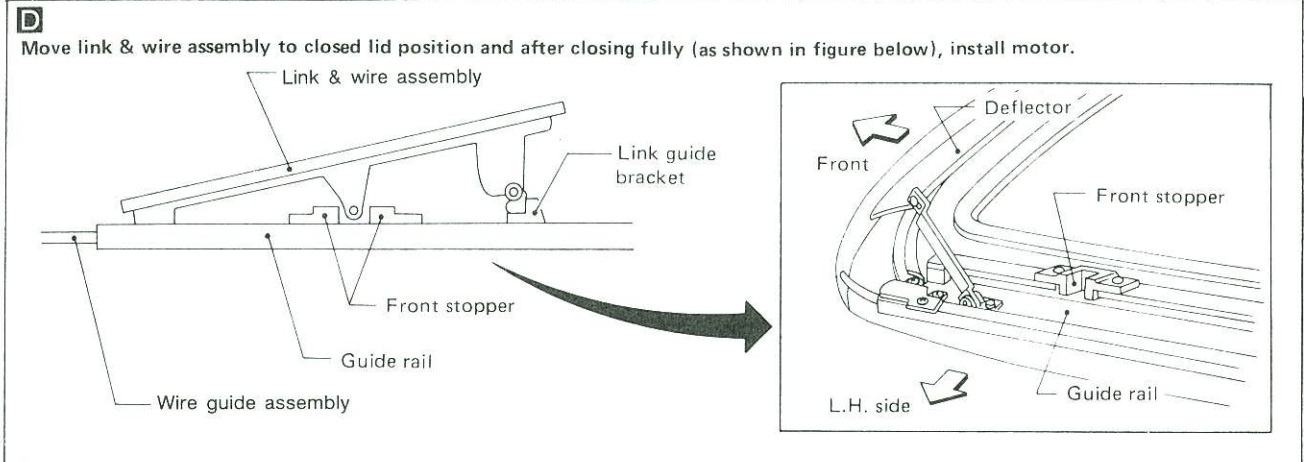
Link & wire removal & installation



Glass lid adjustment

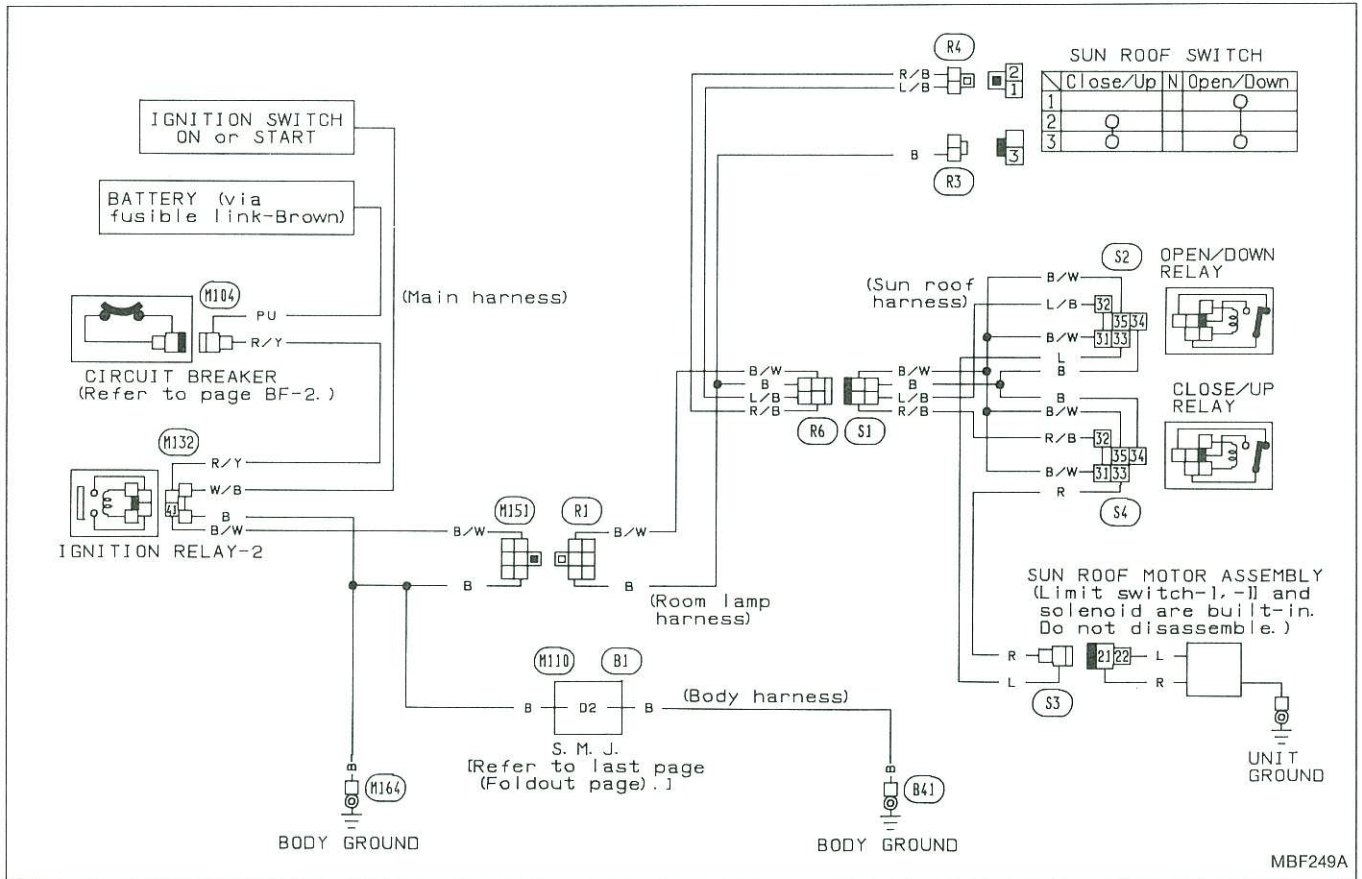


Link & wire adjustment



SUN ROOF

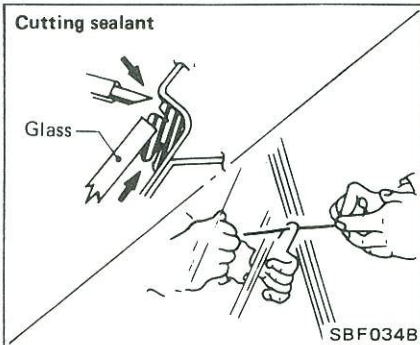
Wiring Diagram



Windshield and Rear Window

REMOVAL

After removing moldings, remove glass.



CAUTION:

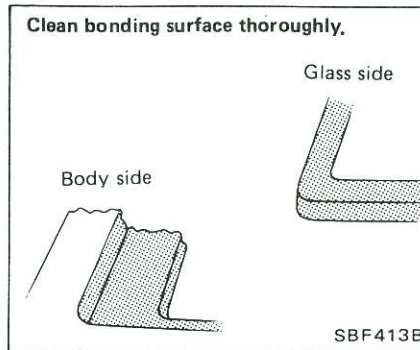
Be careful not to scratch glass when removing.

INSTALLATION

- Use genuine Nissan Sealant kit or equivalent. Follow instructions furnished with it.
- After installation, the vehicle should remain stationary for about 24 hours.
- Do not use sealant which is more than 12 months past its production date.
- Do not leave cartridge unattended with its cap open.
- Keep primers and sealant in a cool, dry place. Ideally, sealant should be stored in a refrigerator.
- Be sure to install moldings.

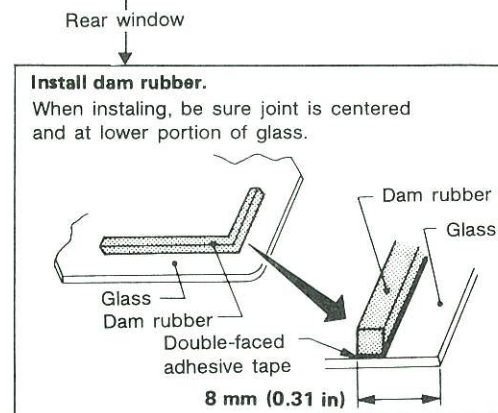
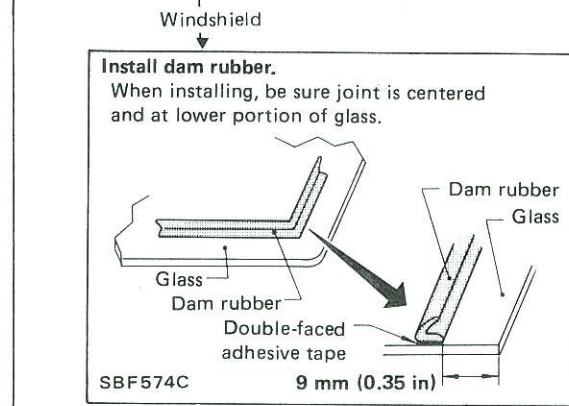
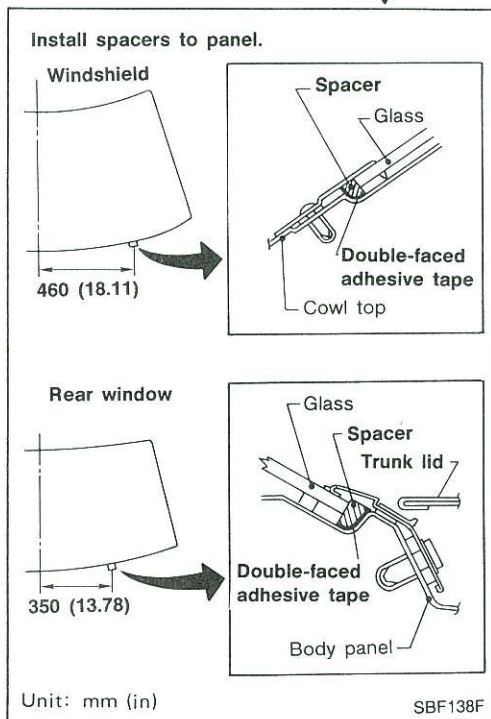
WARNING:

Keep heat or open flames away as primers are flammable.



Body side

Glass side



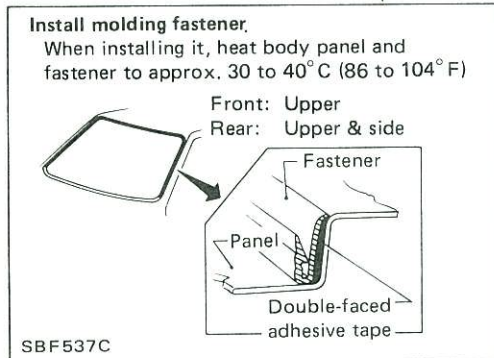
A

B

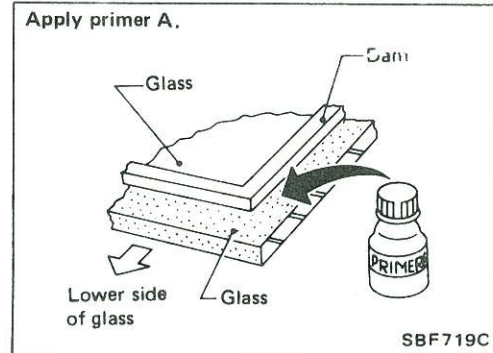
WINDSHIELD AND WINDOWS

Windshield and Rear Window (Cont'd)

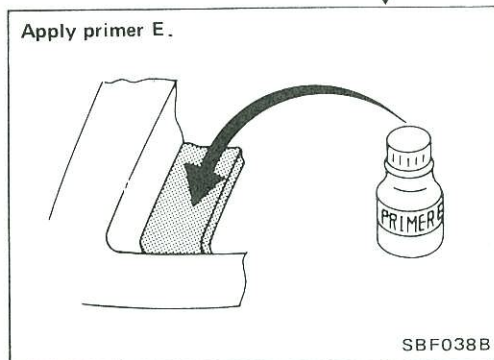
A



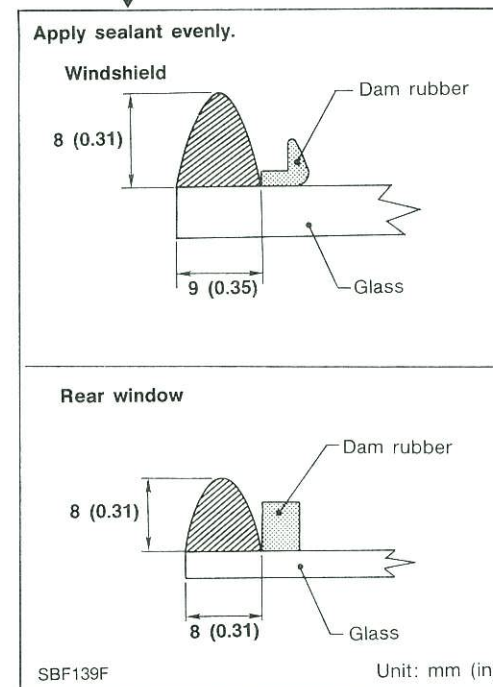
B



CAUTION:
Allow primers to dry for 10 to 15 minutes before proceeding to the next step.



CAUTION:
Allow primers to dry for 10 to 15 minutes before proceeding to the next step.



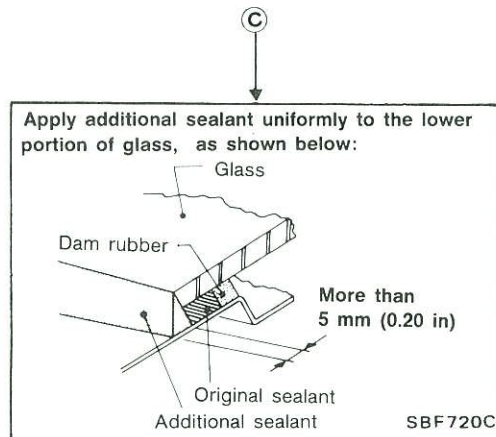
Set glass in position and press glass lightly and evenly.

CAUTION:
Windshield glass should be installed within 15 minutes of applying sealant: sealant starts to harden 15 minutes after it is applied.

C

WINDSHIELD AND WINDOWS

Windshield and Rear Window (Cont'd)



Check for water leakage.

Apply sealant to upper & side molding fixing portion.

Set upper and side moldings.

Install lower molding.

CAUTION:

For sealant drying period, refer to "Drying Time for Sealant".

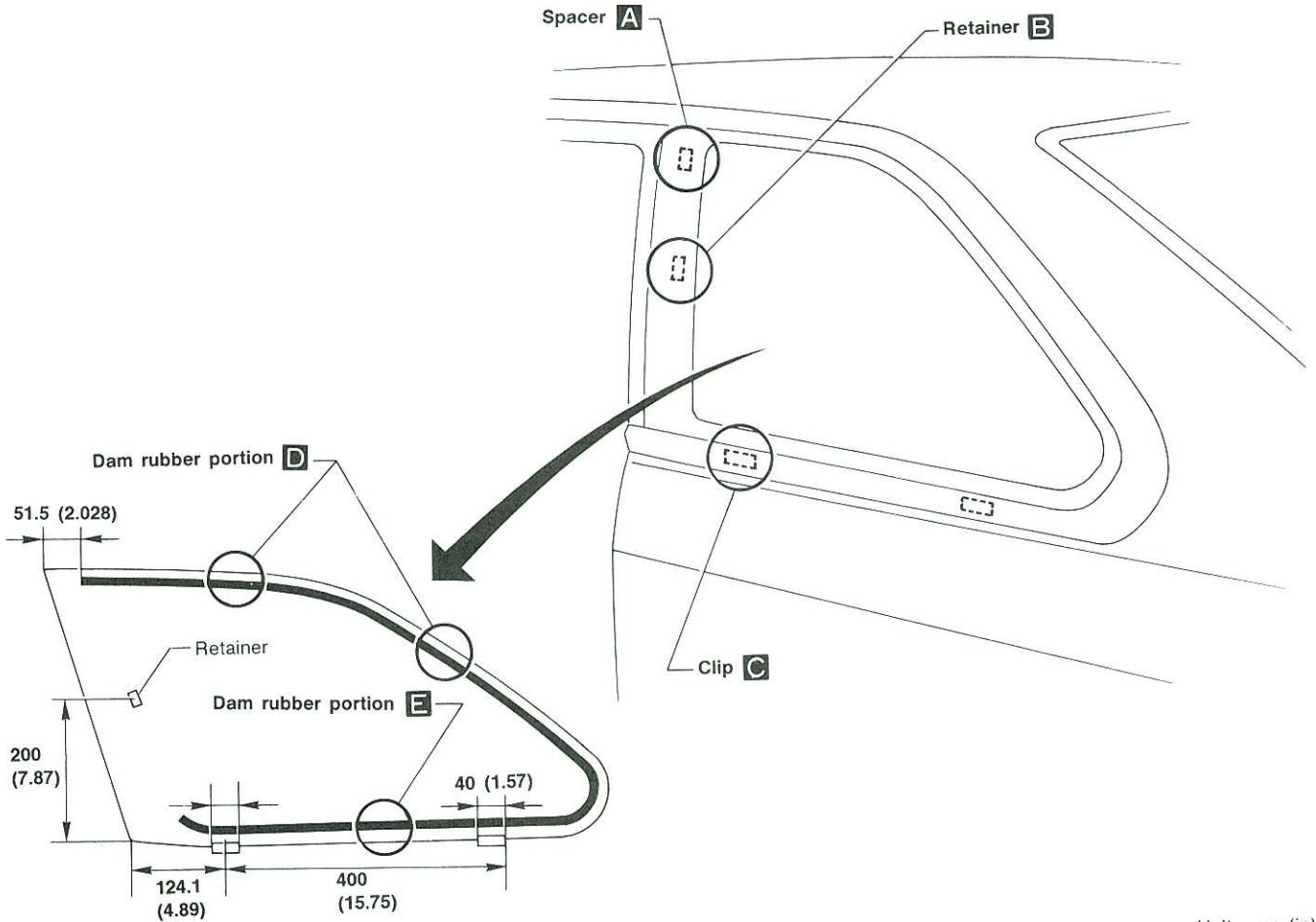
CAUTION:

Molding must be installed securely so that it is in position and leaves no gap.

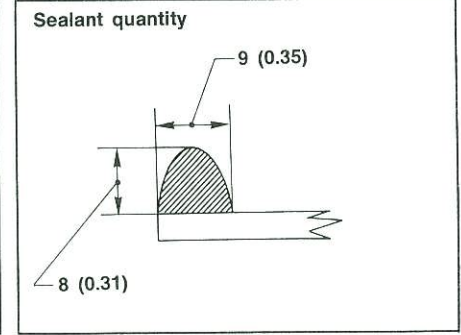
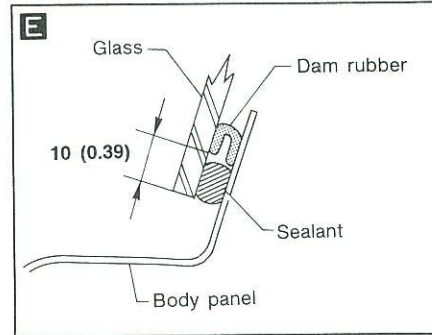
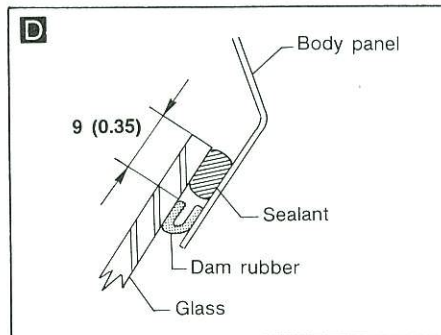
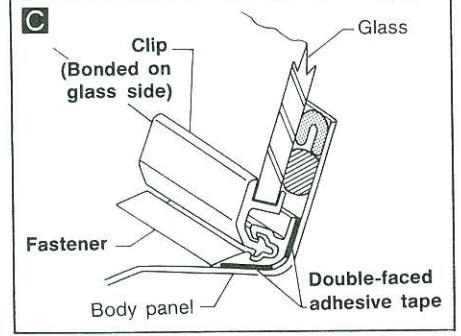
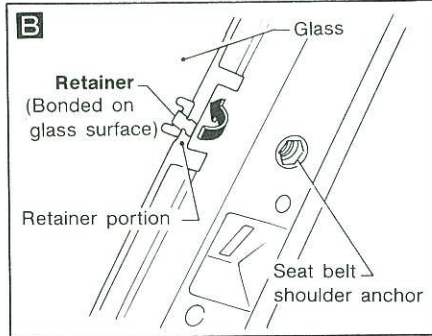
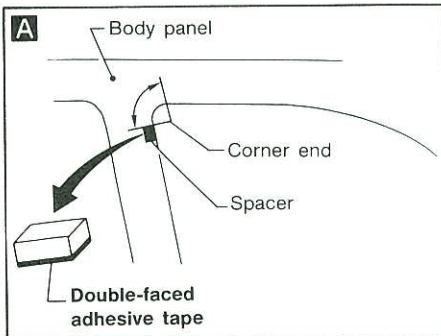
For details of moldings, refer to "Exterior".

Side Window

- For mounting and removing moldings, refer to "Exterior". (See page BF-26.)



Unit: mm (in)



Drying Time for Sealant

Reference: Time required for sealant to dry to desired hardness.

Unit: days

Temperature °C (°F)	Relative humidity %	Windshield, rear window and side window		
		90	50	25
40 (104)		1.0	1.5	3.0
25 (77)		1.5	2.0	4.0
5 (41)		2.5	6.5	10.5

CAUTION:

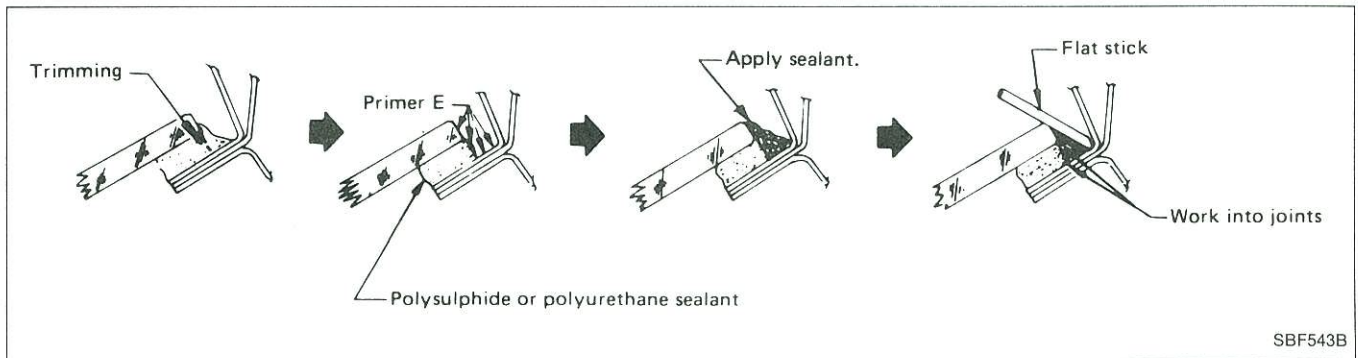
Advise the user of the fact that vehicle should not be driven on rough roads or surfaces until sealant has properly vulcanized.

Repairing Water Leaks for Windshield and Rear Window

Leaks can be repaired without removing and reinstalling glass.

If water is leaking between caulking material and body or between glass and caulking material, determine the extent of the leak by applying water while pushing glass outward.

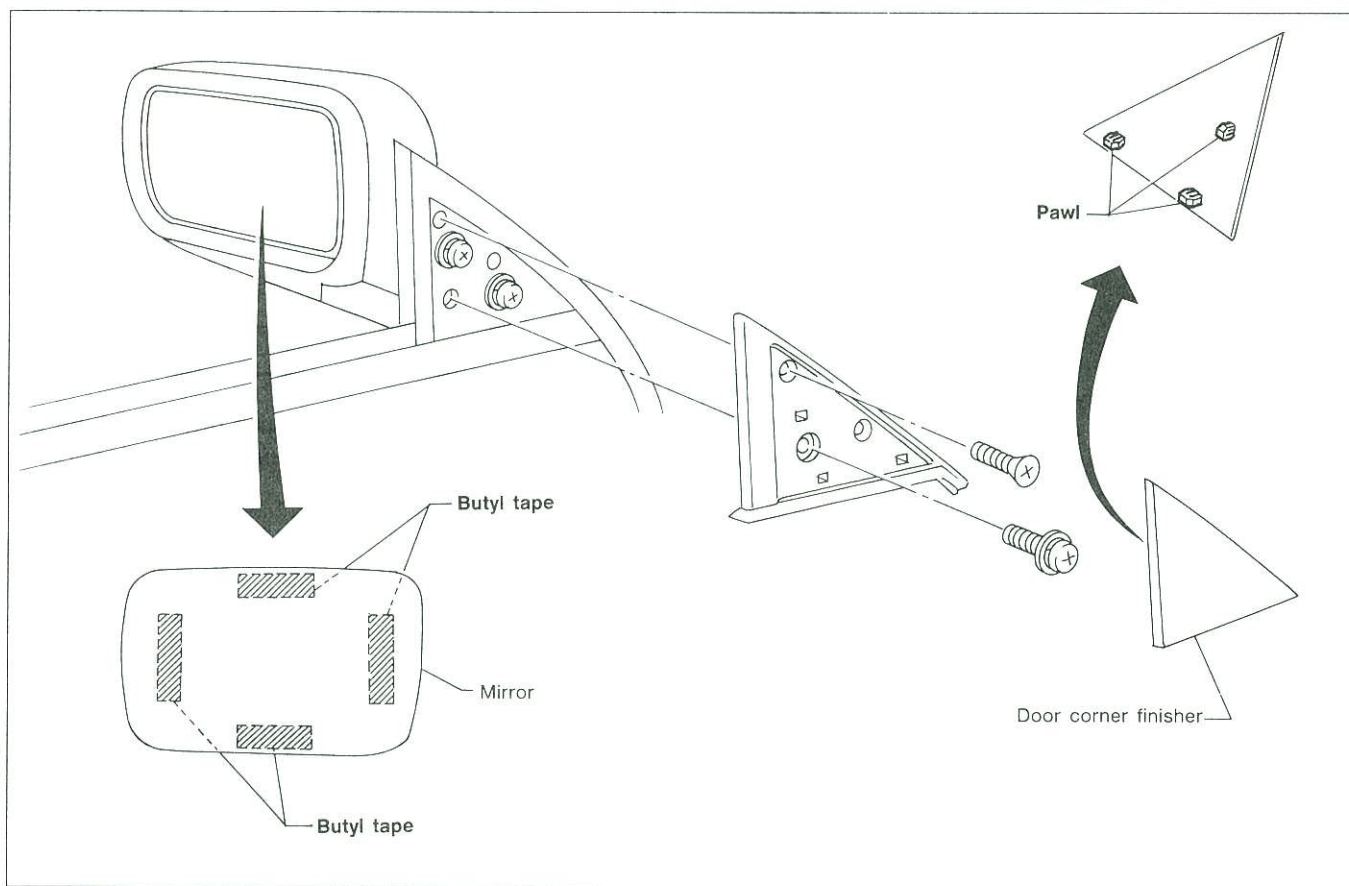
To stop the leak, apply primer and then sealant to the leak point.



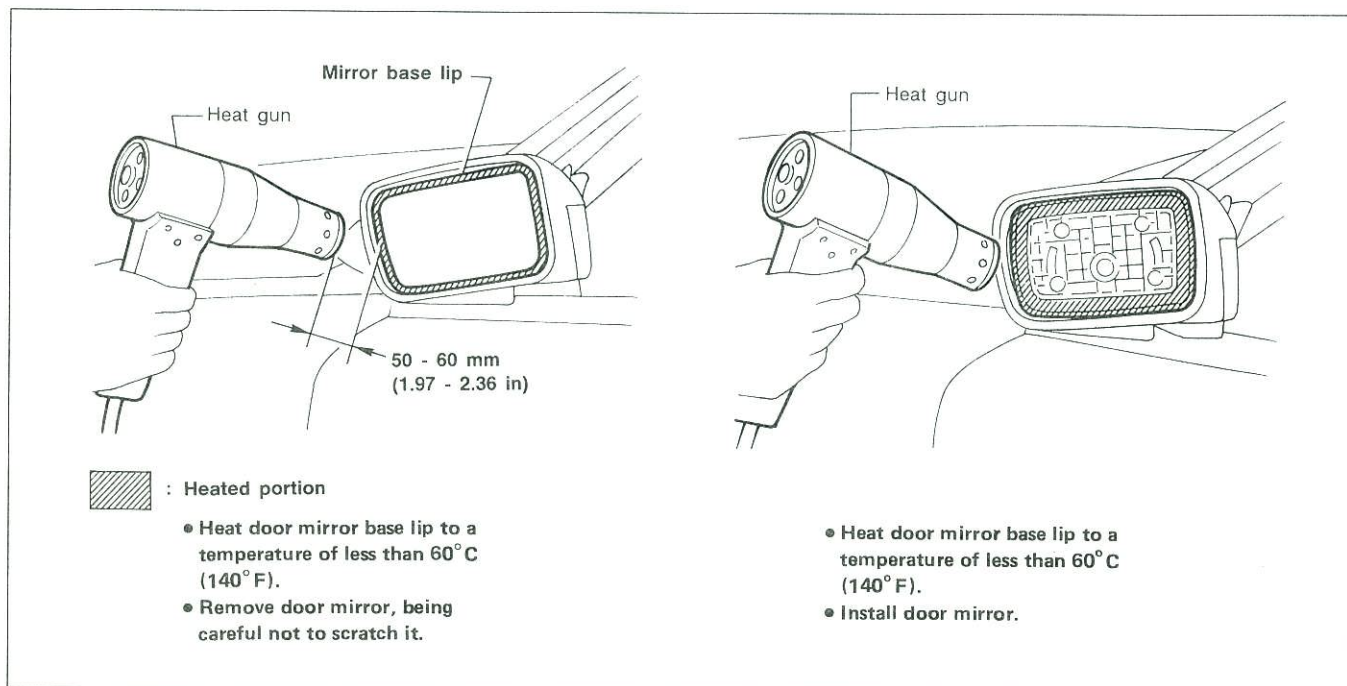
Afterwards, install molding securely.

MIRROR

Door Mirror



MIRROR REMOVAL AND INSTALLATION

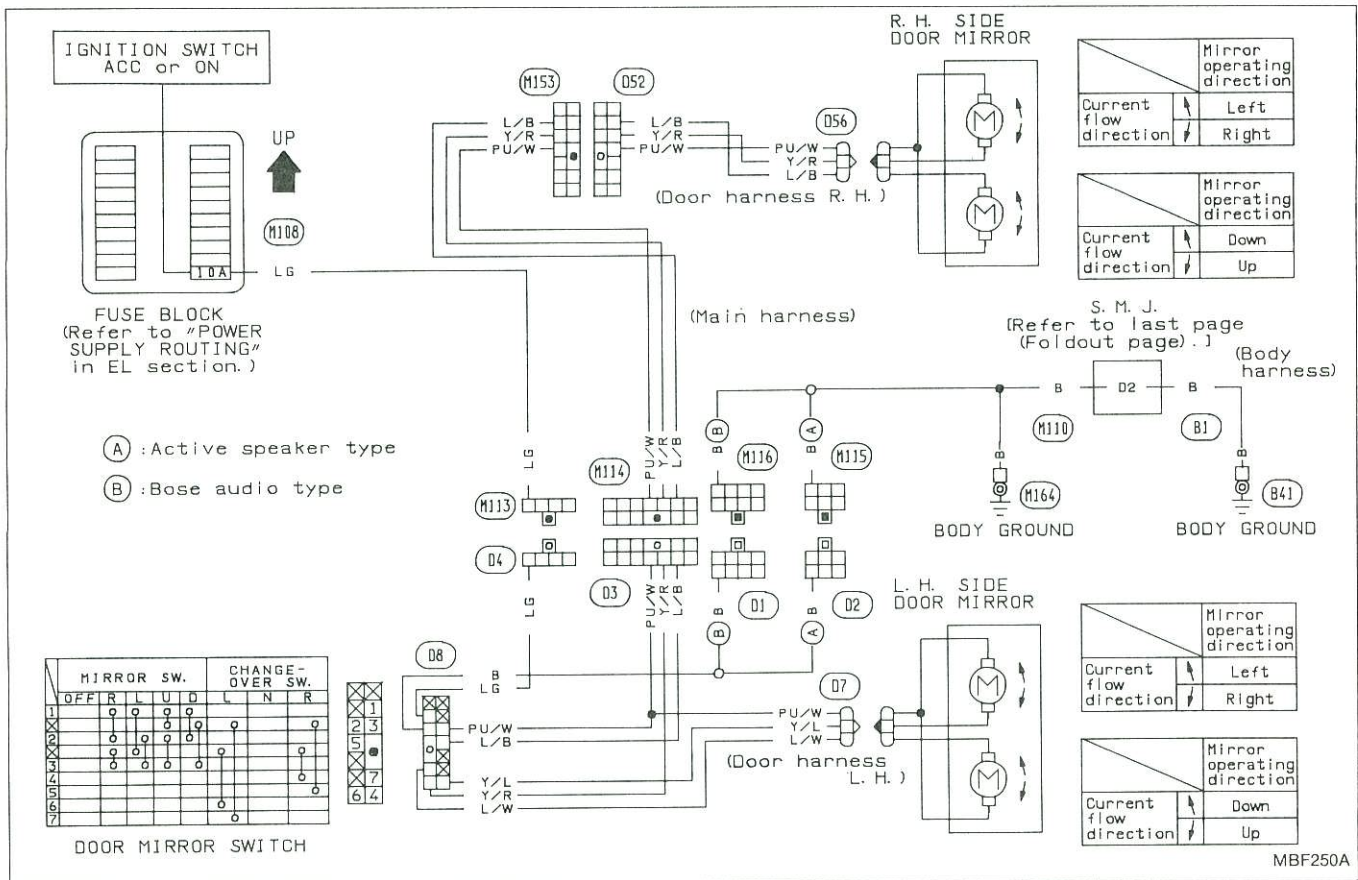


SBF141F

MIRROR

Door Mirror (Cont'd)

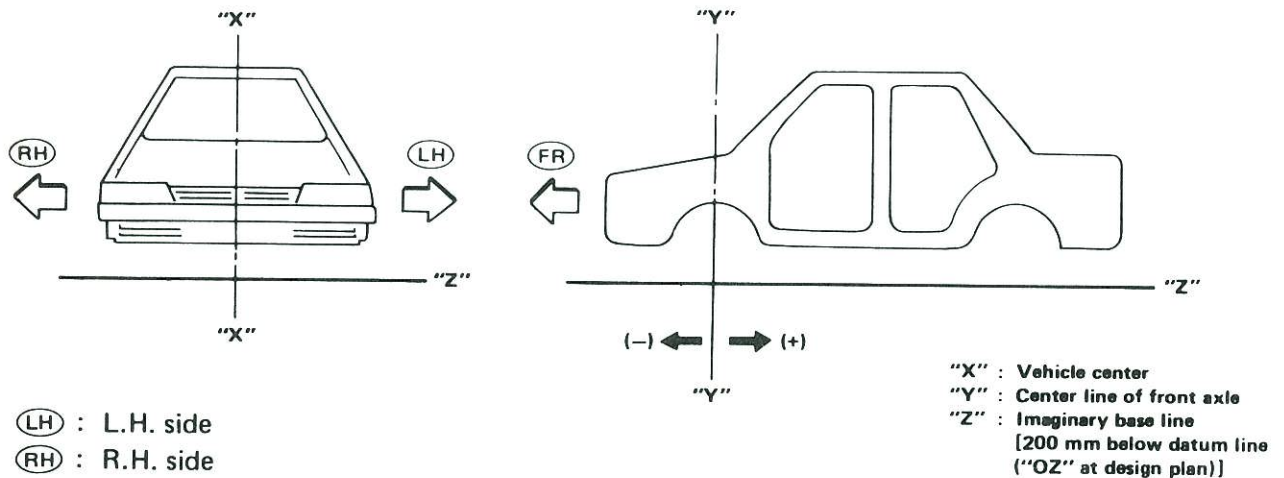
WIRING DIAGRAM



MBF250A

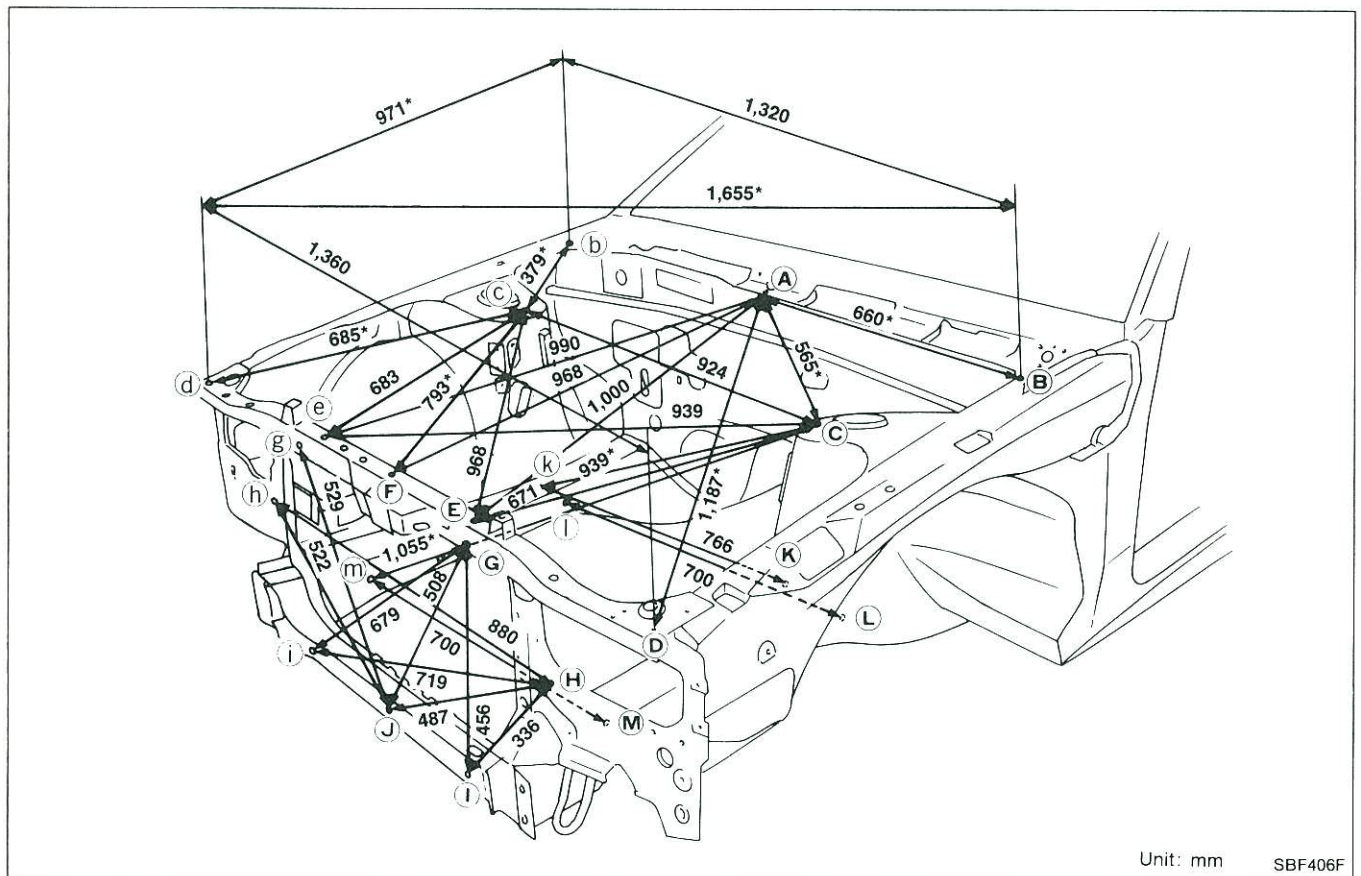
BODY ALIGNMENT

- All dimensions indicated in figures are actual ones.
- When a tram tracking gauge is used, adjust both pointers to equal length and check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements should be taken at the center of the mounting holes.
- An asterisk (*) following the value at the measuring point indicates that the measuring point on the other side is symmetrically the same value.
- The coordinates of the measurement points are the distances measured from the standard line of "X", "Y" and "Z".



Engine Compartment

MEASUREMENT

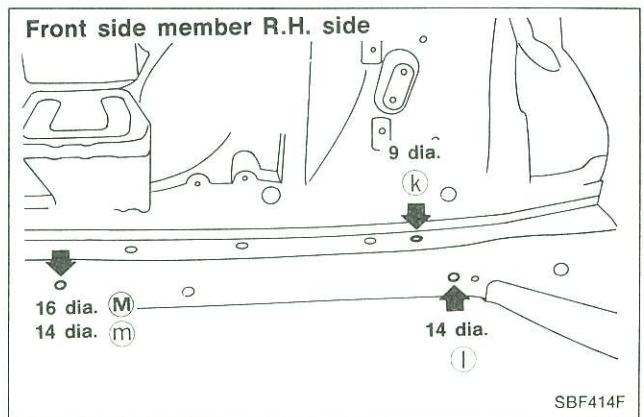
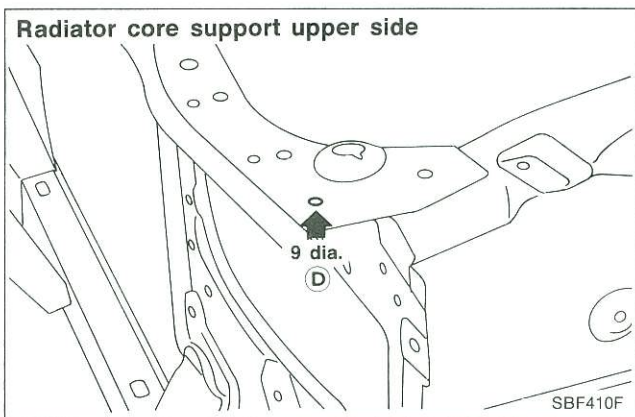
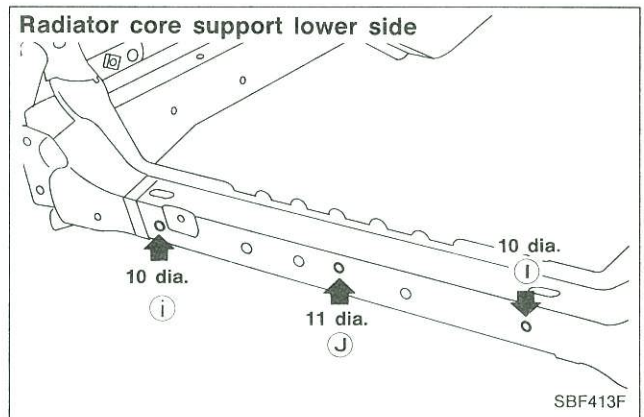
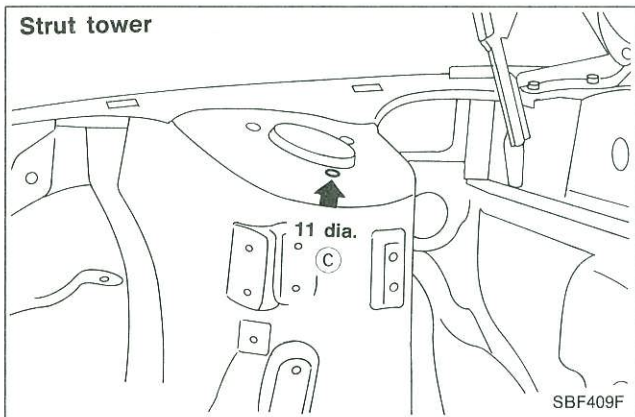
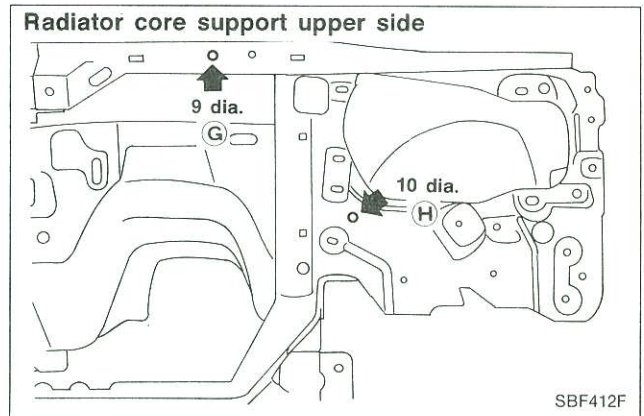
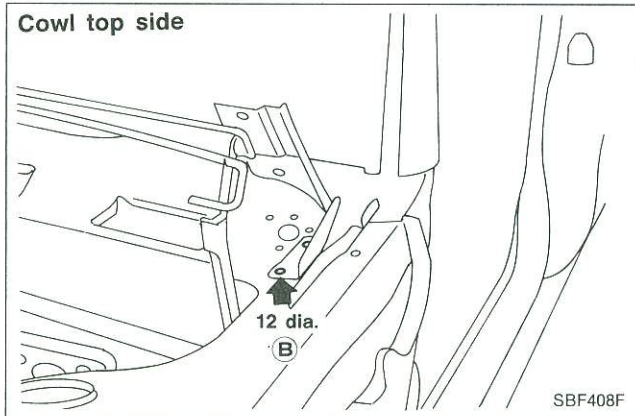
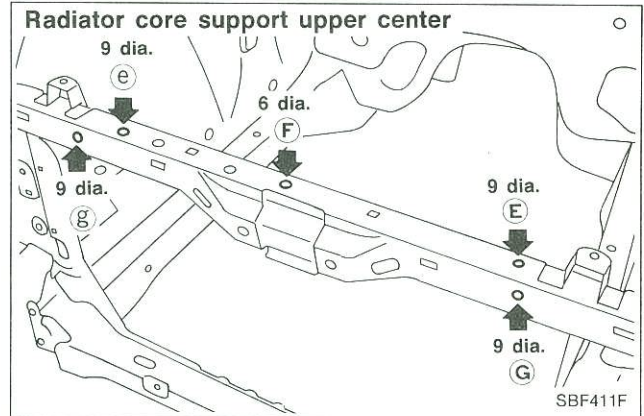
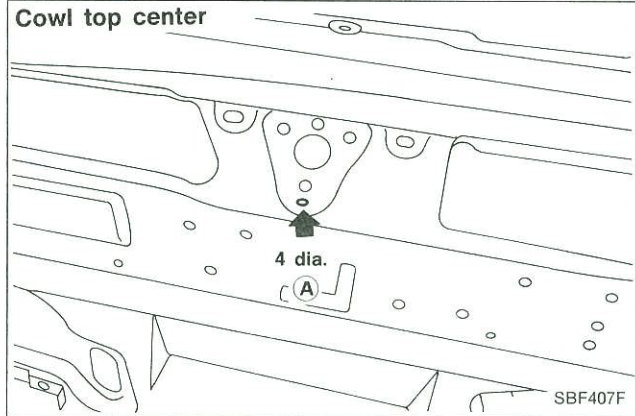


BODY ALIGNMENT

Engine Compartment (Cont'd)

Unit: mm

MEASUREMENT POINTS



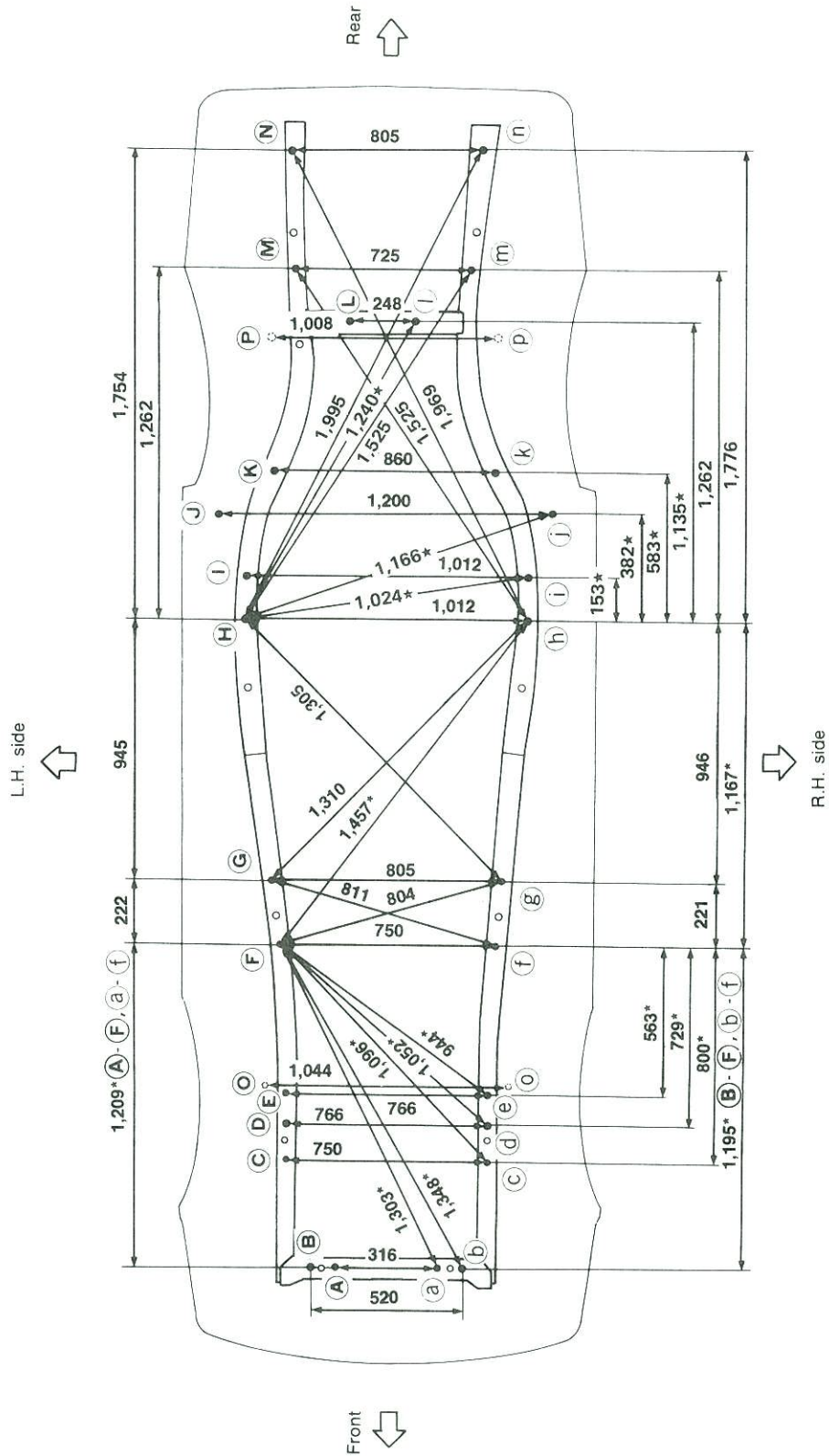
BODY ALIGNMENT

Underbody

MEASUREMENT

Unit: mm

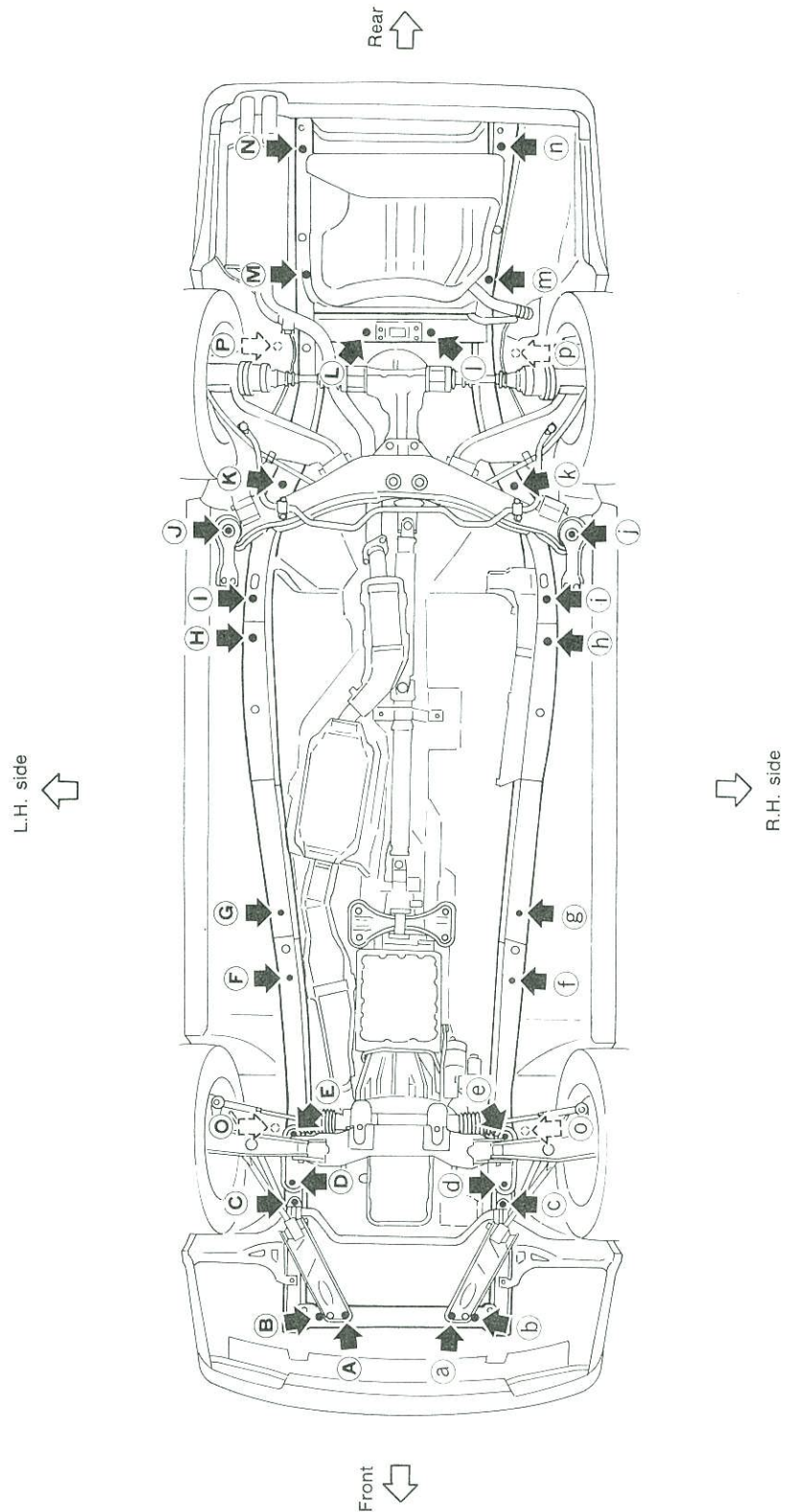
All dimensions indicated in these figures are actual ones.
(There are no projected dimensions.)



BODY ALIGNMENT

Underbody (Cont'd)

MEASUREMENT POINTS



BODY ALIGNMENT

Underbody (Cont'd)

Unit: mm

Radiator core lower support, front side member, front suspension mounting lower member and front side member center extension

L.H. side ←

Coordinates:

(A), a
X: 158
Y: -605
Z: 244.5

(G), LH
X: 406
Y: 800
Z: 141.8

(B), b
X: 260
Y: -605
Z: 244.5

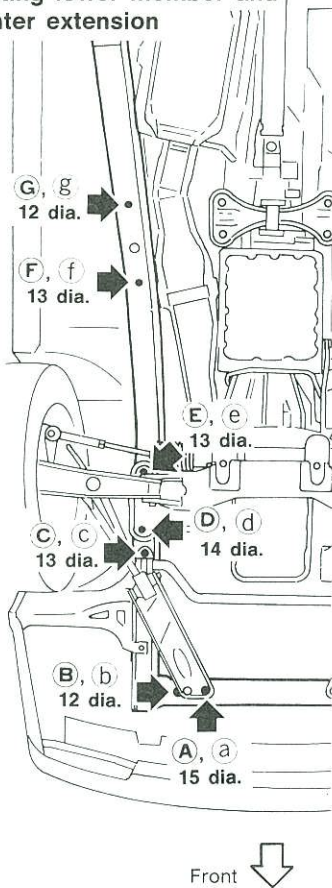
g, RH
X: 398.6
Y: 800
Z: 141.8

(C), c
X: 375
Y: -206
Z: 290

(D), d
X: 383
Y: -134
Z: 290

(E), e
X: 383
Y: 37
Z: 290

(F), f
X: 375
Y: 580
Z: 141.8



SBF415F

Front side member rear extension, rear side member, rear side member extension and rear suspension mounting bolt top

↑ Rear

Coordinates:

(H), h
X: 506
Y: 1,740
Z: 139

(M) LH
X: 361,5
Y: 2,970
Z: 383.6

(I), i
X: 506
Y: 1,893
Z: 136.7

(m) RH
X: 363
Y: 2,970
Z: 383.6

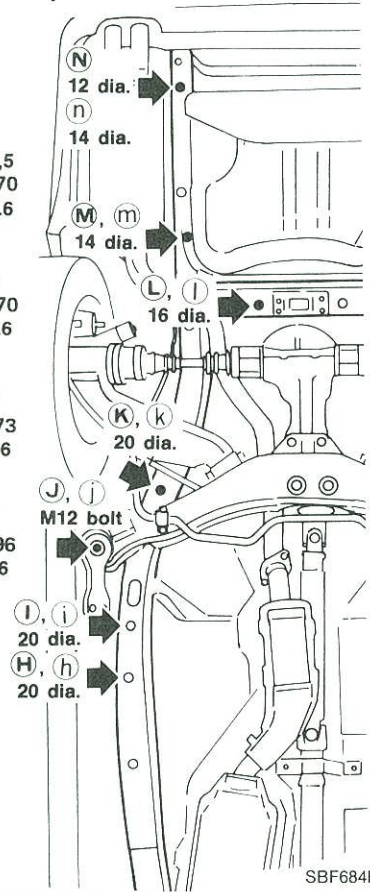
(J), j
X: 600
Y: 2,110
Z: 156.6

(N) LH
X: 397
Y: 3,473
Z: 383.6

(K), k
X: 430
Y: 2,303
Z: 272.1

(n) RH
X: 408
Y: 3,496
Z: 383.6

(L), l
X: 124
Y: 2,775
Z: 404.8



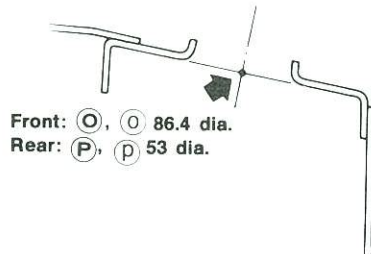
SBF684F

Front and rear strut tower centers

Coordinates:

(O), o
X: 521.9
Y: 48.8
Z: 793.3

(P), p
X: 504.1
Y: 2,679.3
Z: 867.4



SBF685F

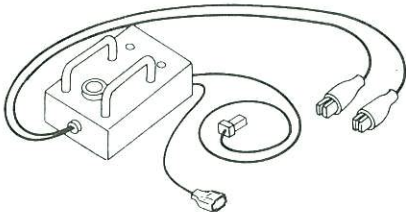
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Precautions for SRS "AIR BAG" Service

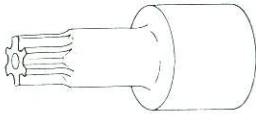

- Do not use a circuit tester to check SRS circuits.
- Before servicing the SRS, turn ignition switch "OFF", disconnect battery ground cable and wait for at least 10 minutes. For approximately ten minutes after the cables are removed, it is still possible for the air bag to inflate. Therefore, do not 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 "xxxx" 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 special 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 three crash zone sensors and the wiring harness.

Preparation for SRS "AIR BAG" Service

SPECIAL SERVICE TOOL

Tool number (Kent-Moore No.) Tool name	Description
(J38381) Deployment tool	<div>Disposing of air bag module</div> 

COMMERCIAL SERVICE TOOLS

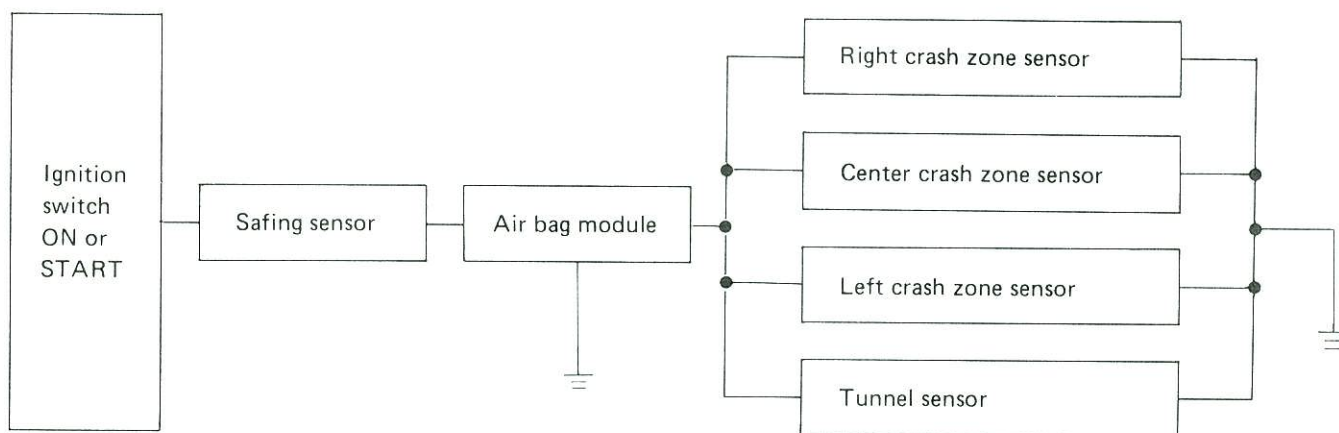
Tool name	Description
Special torx bit	<div>Use for special bolt (tamper resistant screw)</div> 
Spiral cable stopper	<div>Avoiding unexpected spiral cable rotation.</div> 

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Description

The air bag deploys when any of the four sensors (right crash zone sensor, center crash zone sensor, left 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
	Right	Center	Left			
ON	ON				ON	ON
ON		ON			ON	ON
ON			ON		ON	ON
ON				ON	ON	ON



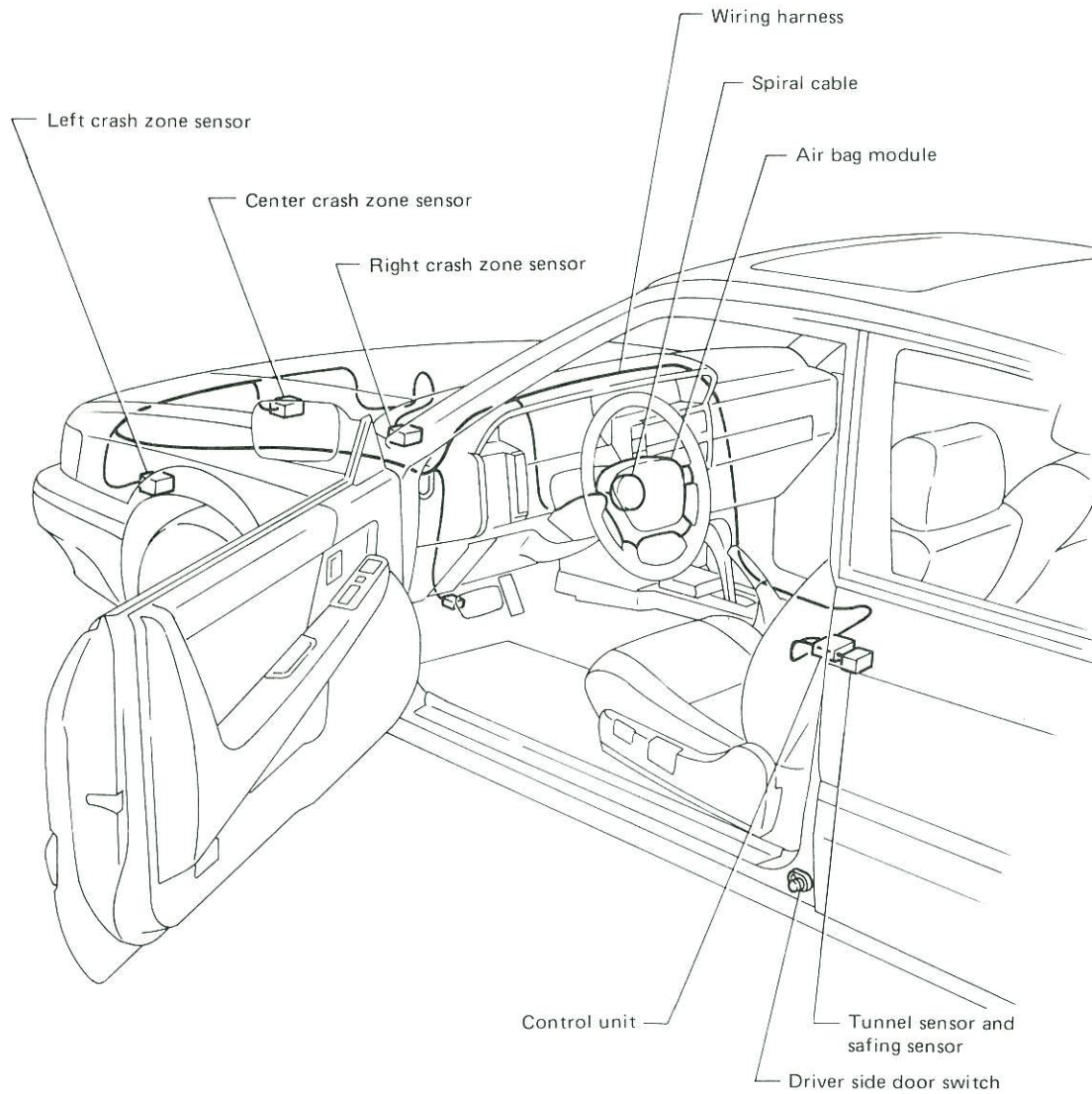
SBF215F

Self-diagnosis

The control unit (diagnostic unit) diagnoses the SRS circuit. When the ignition key is in the "ON" or "START" position, the "AIR BAG" warning lamp will illuminate for about 7 seconds and then turn off. This means that the system is operational.

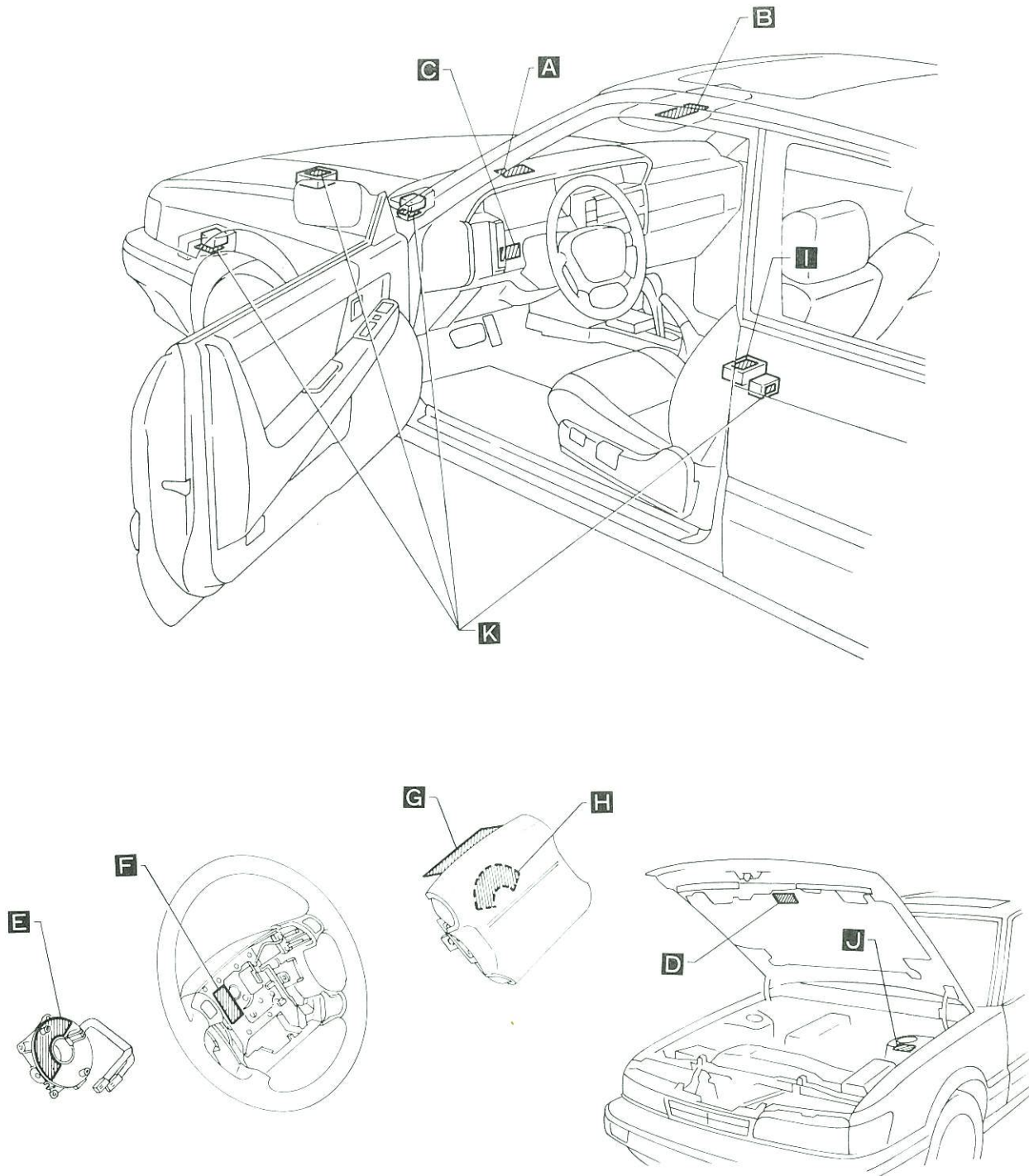
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

SRS Component Parts Location



Caution Labels

The CAUTION LABELS are important when servicing air bags in the field. If they are dirty or damaged, replace them with new ones.



SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Caution Labels (Cont'd)

A

DRIVER-AIRBAG

B

INFORMATION

SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.) TO REDUCE INJURY TO THE DRIVER IN A FRONTAL COLLISION.
- THE SYSTEM IS DESIGNED TO SUPPLEMENT THE ACCIDENT PROTECTION PROVIDED BY THE DRIVER'S SEAT BELT. BUT IT IS NOT A SUBSTITUTE FOR THE BELT SYSTEM.
- ALWAYS WEAR YOUR SEAT BELT WHEN THE CAR IS IN USE.
- THE SYSTEM MUST BE INSPECTED 10 YEARS AFTER DATE OF MANUFACTURE, AS NOTED ON THE CERTIFICATION LABEL LOCATED ON THE LEFT FRONT DOOR.
- THE "AIRBAG" LAMP WILL LIGHT MOMENTARILY WHEN THE IGNITION KEY IS TURNED TO THE "ON" OR "START" POSITION. THIS MEANS THE SYSTEM IS OPERATIONAL.
- HOWEVER, IF ANY OF THE FOLLOWING CONDITIONS OCCUR, THE SYSTEM MUST BE SERVICED:
 1. THE "AIR BAG" LAMP DOES NOT GO ON AS DESCRIBED ABOVE.
 2. THE "AIRBAG" LAMP FLASHES INTERMITTENTLY OR REMAINS ON.
 3. ANY PORTION OF THE FRONT END OF THE CAR IS DAMAGED.
 4. THE AIR BAG HAS DEPLOYED.
- SEE YOUR OWNER'S MANUAL FOR DETAILS ABOUT THE FUNCTIONING, SERVICE, AND DISPOSAL PROCEDURES FOR THE SYSTEM.

C

NOTICE

SRS AIRBAG

- THIS CAR IS EQUIPPED WITH A DRIVER AIR BAG AS A 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 S.R.S. ELECTRICAL WIRING AND CONNECTORS ARE COLORED YELLOW.
- DO NOT USE ELECTRICAL TEST EQUIPMENT ON THESE CIRCUITS.
- TAMPERING WITH OR DISCONNECTING THE S.R.S. WIRING AND CONNECTORS COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAG OR MAKE THE SYSTEM INOPERATIVE, WHICH MAY RESULT IN SERIOUS INJURY.

E

CAUTION

SRS AIRBAG

- BEFORE ASSEMBLY;
 - LINE UP THE FRONT WHEELS STRAIGHT AHEAD.
 - ALIGN THE ARROW WITH THE YELLOW MARK ON THE SIDE GEAR.
 - READ SERVICE MANUAL.
- NO SERVICEABLE PARTS INSIDE.
- DO NOT DISASSEMBLE OR TAMPER.

F

WARNING

SRS AIRBAG

- BEFORE MOUNTING STEERING WHEEL;
- MAKE SURE THAT THE FRONT WHEELS ARE IN STRAIGHT-AHEAD POSITION.
 - ALIGN THE ARROW WITH THE YELLOW MARK ON THE SIDE GEAR. (SPIRAL CABLE)
 - READ SERVICE MANUAL.

G

WARNING

SRS AIRBAG

- THIS AIRBAG MODULE CANNOT BE REPAIRED.
- USE DIAGNOSTIC INSTRUCTIONS TO DETERMINE IF THE UNIT IS OPERATIONAL.
- IF NOT OPERATIONAL, REPLACE AND DISPOSE OF THE ENTIRE UNIT AS DIRECTED IN THE INSTRUCTIONS.
- UNDER NO CIRCUMSTANCES SHOULD A DIAGNOSIS BE PERFORMED USING ELECTRICALLY POWERED TEST EQUIPMENT OR PROBING DEVICES.
- TAMPERING OR MISHANDLING CAN RESULT IN PERSONAL INJURY.
- STORE THE REMOVED AIRBAG MODULE WITH THE PAD SURFACE UP.
- FOR SPECIAL HANDLING OR STORAGE REFER TO SERVICE MANUAL.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Caution Labels (Cont'd)



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.



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.



CAUTION SRS AIRBAG

- TO AVOID DAMAGING THE S.R.S. SPIRAL CABLE, WHICH COULD MAKE THE SYSTEM INOPERATIVE, REMOVE THE STEERING WHEEL BEFORE REMOVING THE STEERING LOWER JOINT.



WARNING

SRS AIRBAG

- DO NOT DISASSEMBLE OR TAMPER.
- DISMANTLING AND INSTALLATION SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL.

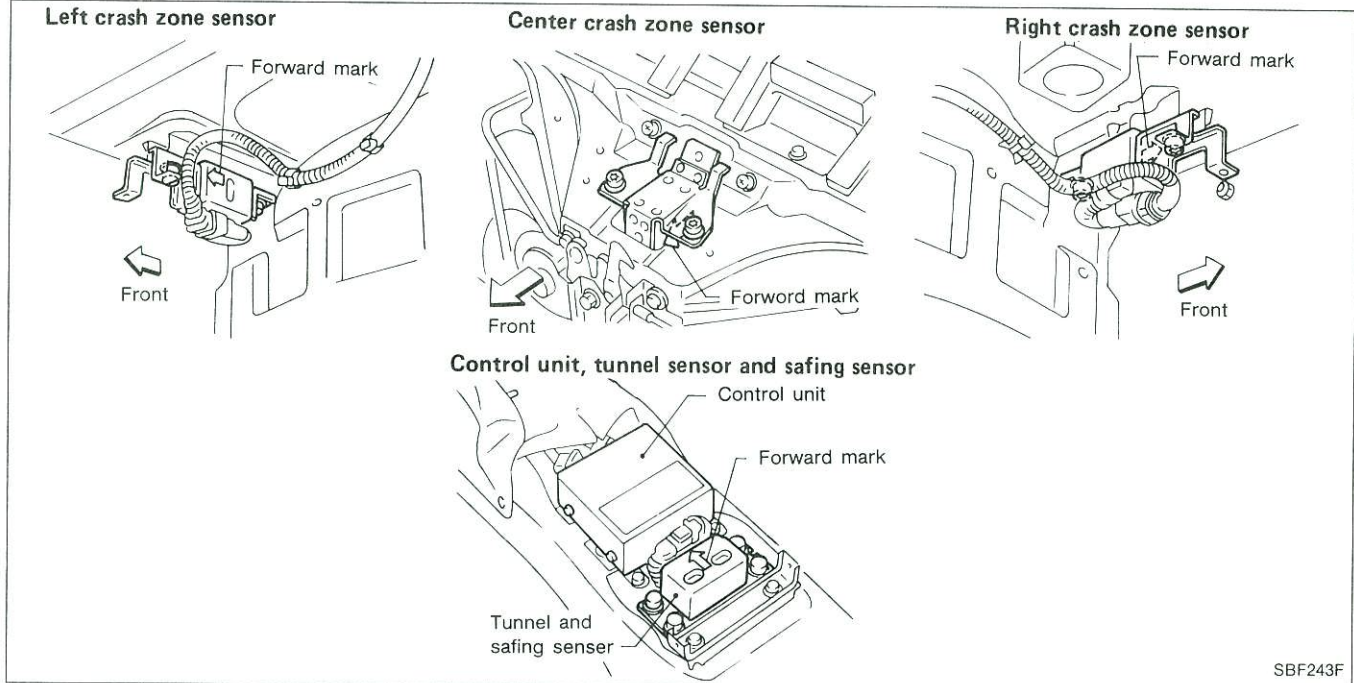
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)



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 unit — Airbag
 - Check case and bracket for dents, cracks or deformities.
 - Check connectors for damage, and terminals for deformities.
 - (3) Main harness and instrument harness
 - Check connectors for poor connections.
 - Check harnesses for binds, connectors for damage, and terminals deformities.
 - (4) Spiral cable
 - Visually check lock (engagement) pins and combination switch for damage.
 - Check connectors, flat cable and protective tape for damage.
 - Check steering wheel for noise, binds or difficult operation.

Maintenance Items (Cont'd)

(5) Steering wheel

- Check harness (built into steering wheel) and connectors for damage, and terminals for deformities.
- Install air bag module to check fit or alignment with steering wheel.
- Check steering wheel for excessive free play.

(6) Air bag module

- Remove air bag module from steering wheel. Check harness cover and connectors for damage, terminals for deformities, and harness for binds.
- Install air bag module to steering wheel to check fit or alignment with the wheel.

CAUTION:

Replace previously used screws with new ones.

Removal and Installation — Control Unit and Sensors

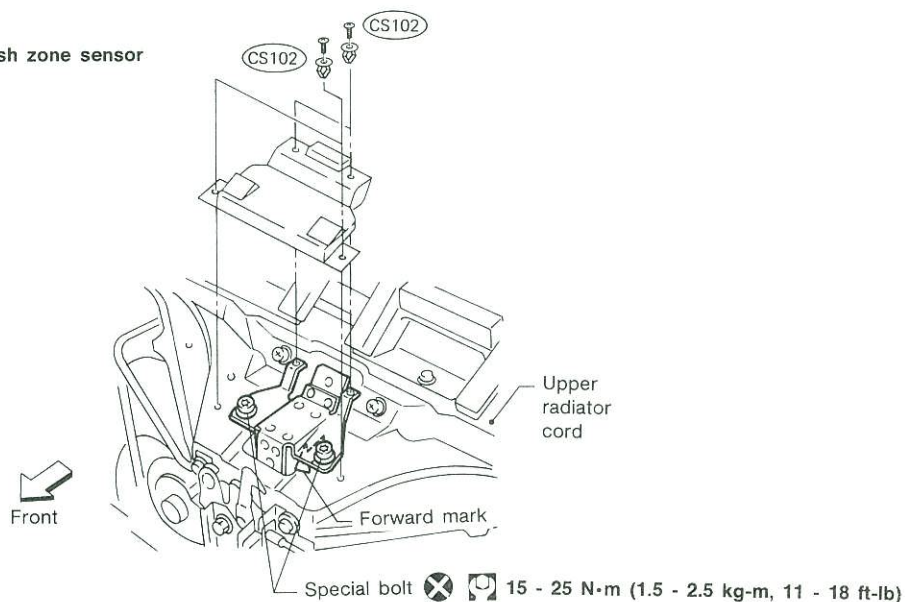
CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect battery ground cable and wait for at least 10 minutes.**
- **The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.**
- Check all sensors for proper installation.
- Check all sensors to ensure they are free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones.
- Check sensor brackets to ensure they are free of deformities or rust.

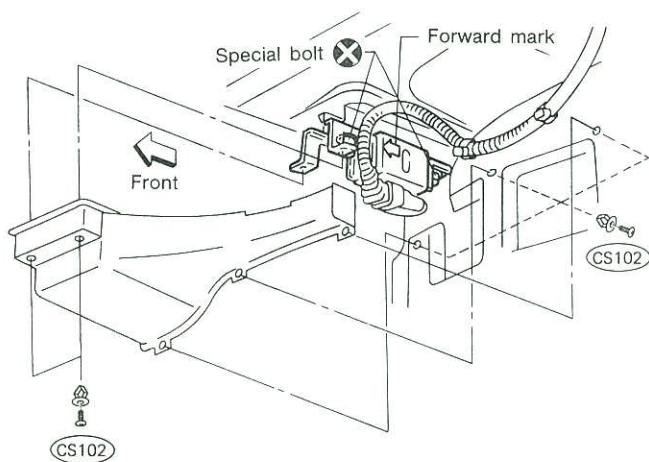
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Removal and Installation — Control Unit and Sensors (Cont'd)

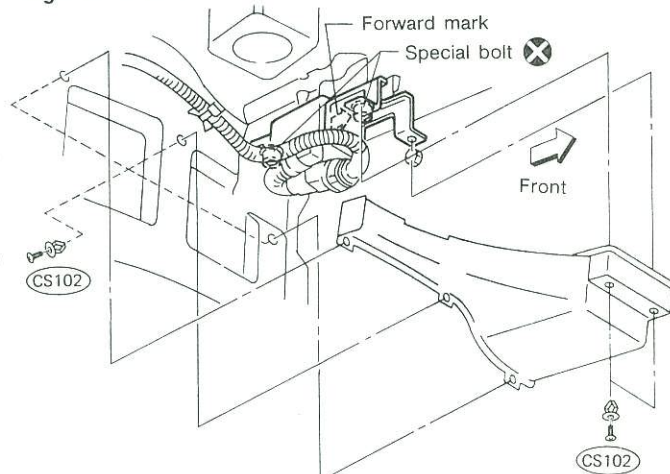
Center crash zone sensor



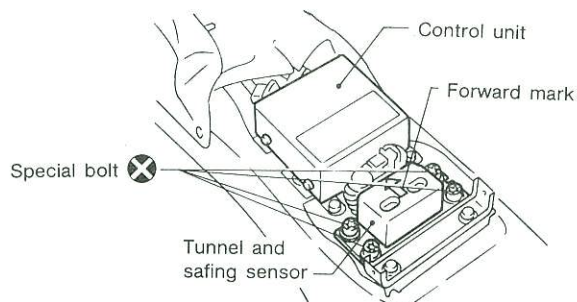
Left crash zone sensor



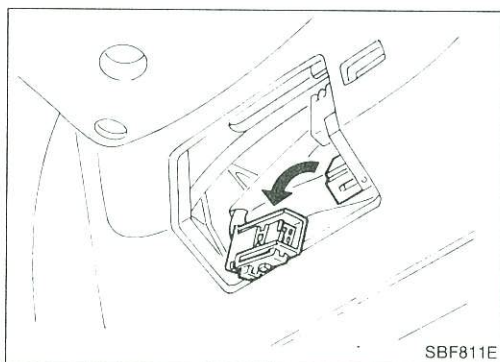
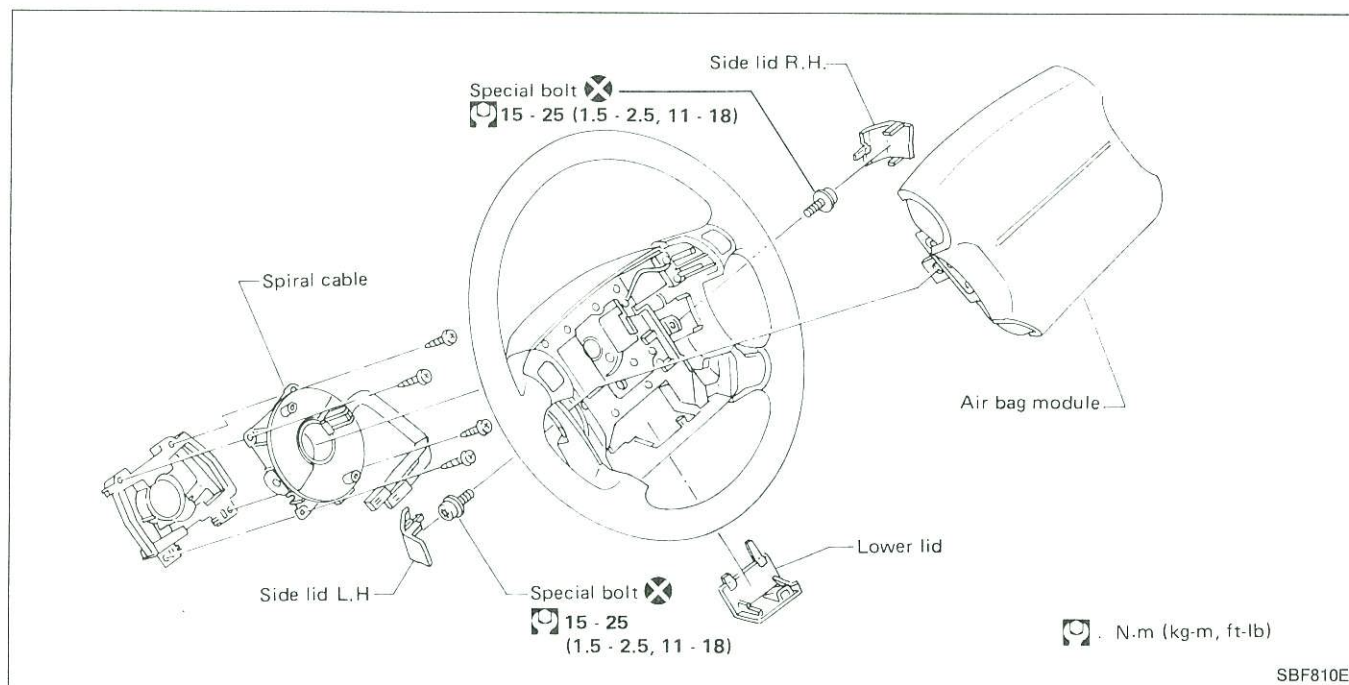
Right crash zone sensor



Control unit, tunnel sensor and safing sensor



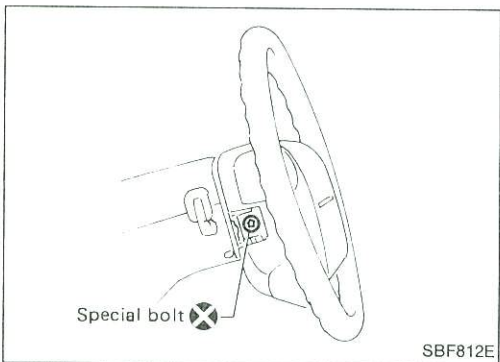
Removal — Air Bag Module and Spiral Cable



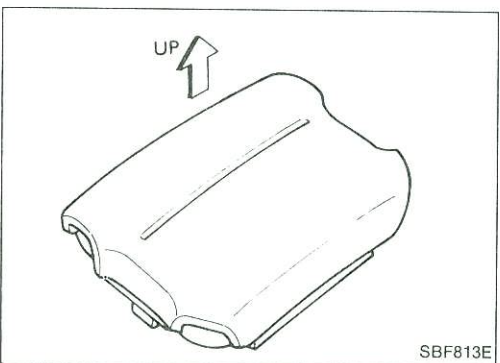
CAUTION:

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 T50H torx bit, remove left and right special bolts. Air bag module can then be removed.

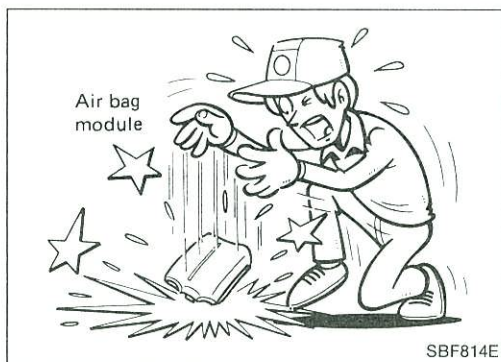


CAUTION:

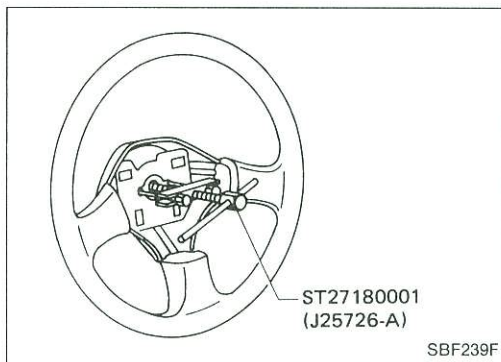
- Always place air bag module with pad side facing upward.
- Do not attempt to disassemble air bag module.
- The special bolts are coated with bonding agent. Discard old ones after removal; replace with new ones.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

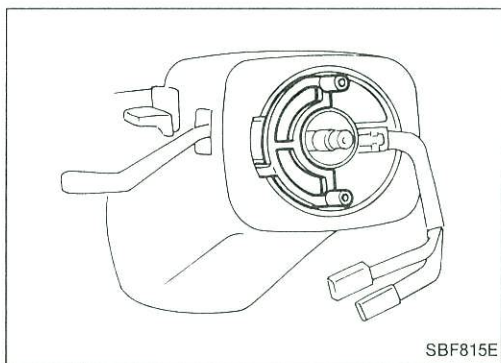
Removal — Air Bag Module and Spiral Cable (Cont'd)



- Do not drop or impact air bag module. If any portion is deformed or cracked, replace the module.
- Do not expose the air bag module to temperatures exceeding 100°C (212°F).
- Do not allow oil, grease or water to come in contact with the air bag module.



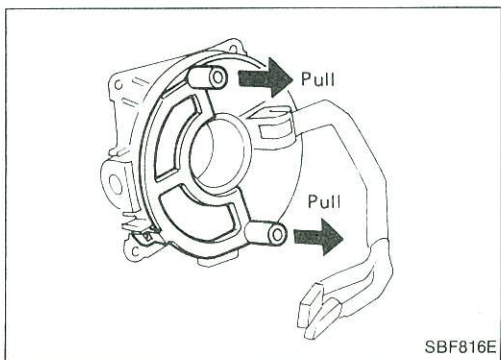
3. Set steering wheel in the neutral position.
4. Disconnect horn connector and remove nuts.
5. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.



6. 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

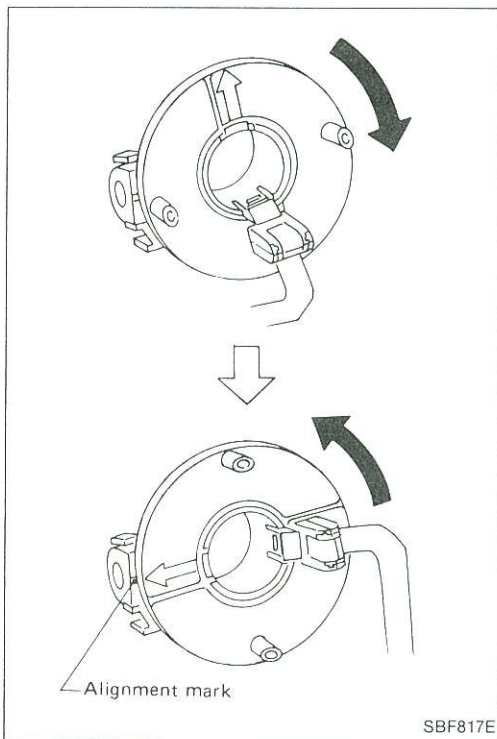
1. Connect spiral cable connector and tighten with screws. Install steering column cover.



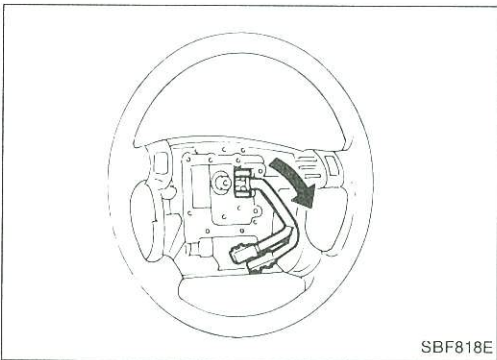
2. Remove stopper by pulling two pin guides.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

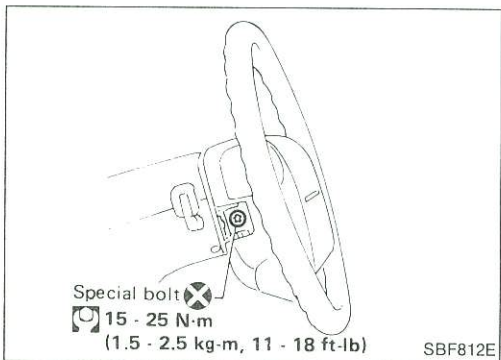
Installation — Air Bag Module and Spiral Cable (Cont'd)



- Alignment of spiral cable with neutral position
If stopper is not used, align spiral cable with neutral position as follows:
Turn spiral cable clockwise until it catches stopper. Then, back spiral cable off approximately two turns until yellow alignment mark appears on left gear. Align arrow mark "←" of spiral cable with this yellow mark.



3. Install steering wheel setting spiral cable pin guides, and pull spiral cable through.
4. Connect horn connector and engage spiral cable with pawls in steering wheel.
5. Tighten nuts.

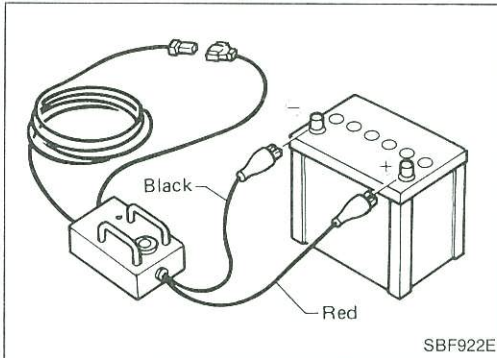


6. Position air bag module and tighten with new special bolts.
7. Connect air bag module connector.
8. Install all lids.

9. Conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT or warning lamp check.)

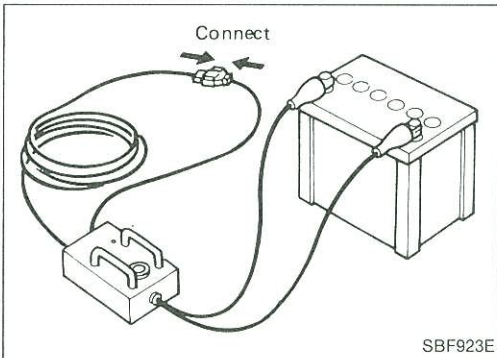
Scrapping the Air Bag

Before scrapping an air bag module or a vehicle equipped with an SRS air bag, be sure to deploy air bag.



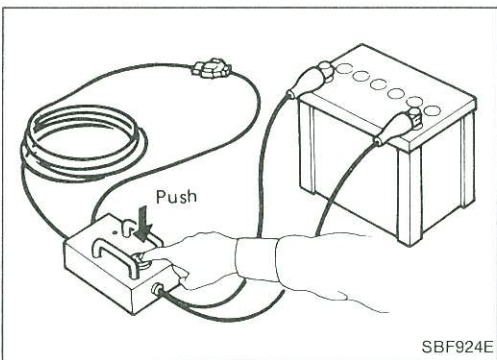
CONNECTING TO BATTERY

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.

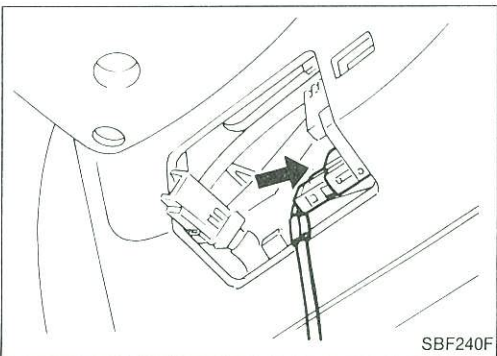


DEPLOYMENT TOOL CHECK

Connect check connector.



Push deployment tool switch to "ON" to ensure green light illuminates. If it does not, replace the deployment tool.



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.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

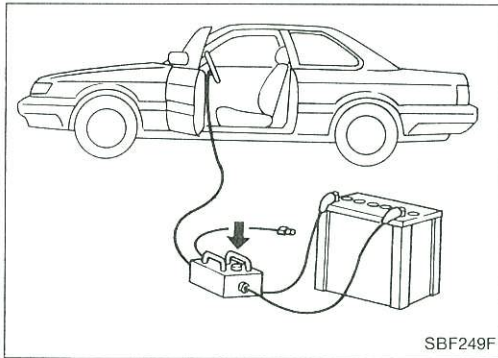
Scrapping the Air Bag (Cont'd)

DEPLOYMENT

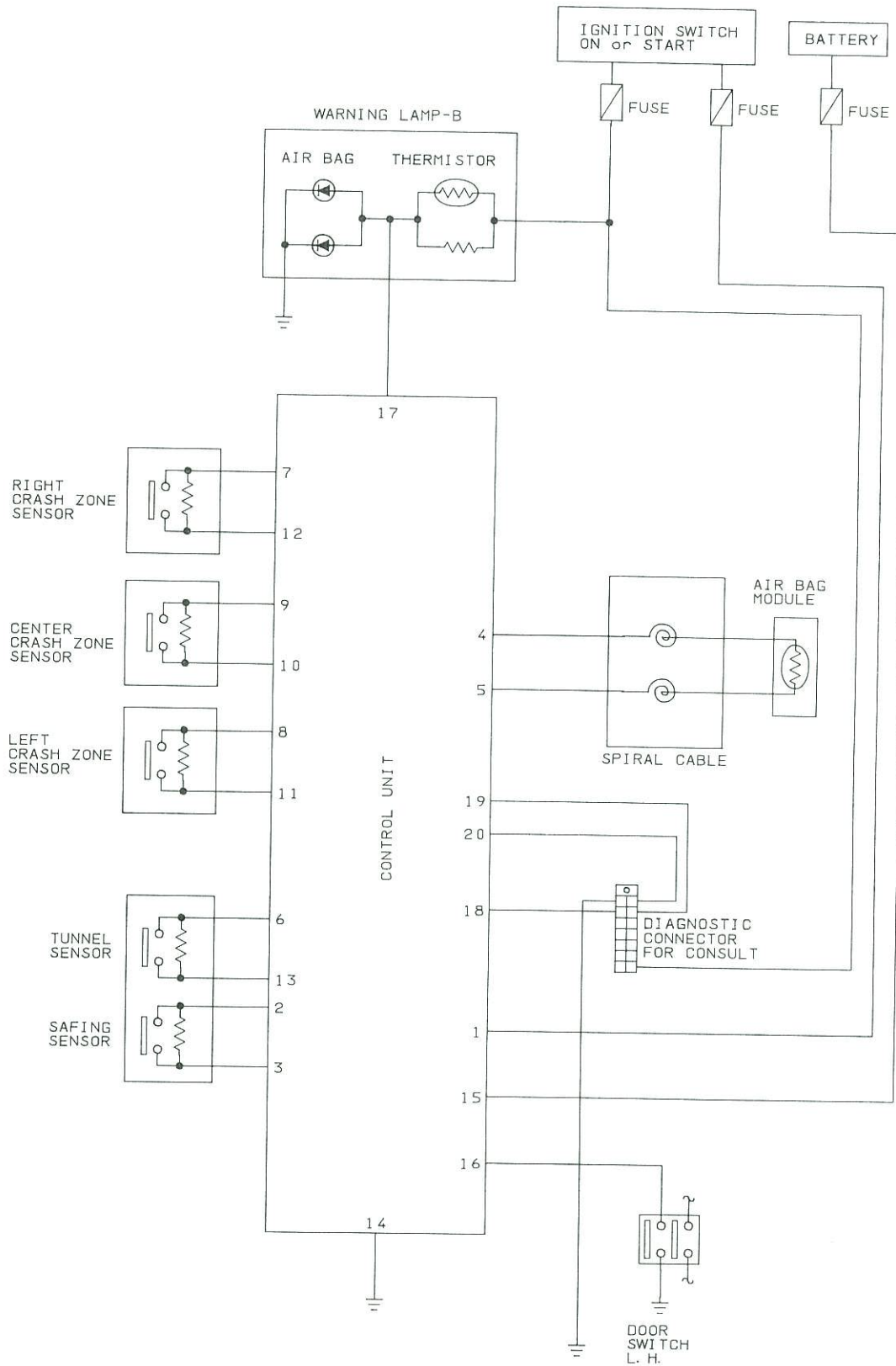
Press deployment tool switch. Green light will illuminate and air bag will deploy.

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.



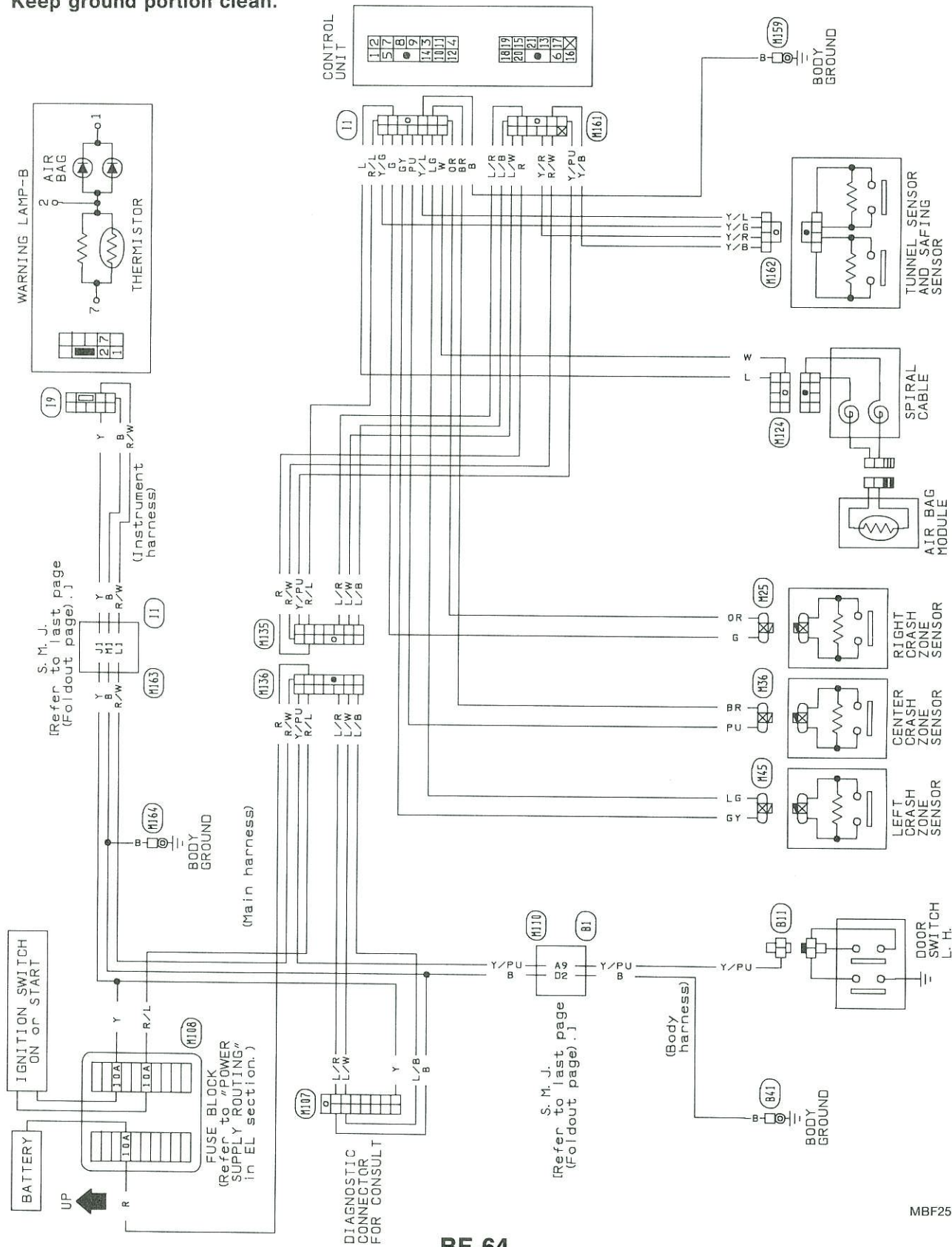
Schematic

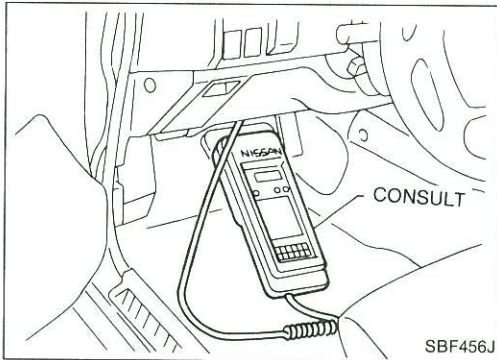


Wiring Diagram

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.



TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

Self-diagnosis (Cont'd)

Self-diagnosis results

Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
**** NO FAILURE ****	Normal. The SRS "Air Bag" is in good order.	—
SAFING SENSOR [OPEN/LWR-GND-SHORT]	The circuit for the safing sensor is open or the wire from the safing sensor to the control unit (terminal No. 3) is shorted.	1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor unit)
SAFING SENSOR [SHORT/LWR-VB-SHORT]	Both of the wires for the safing sensor are shorted or the wire from the safing sensor to the control unit (terminal No. 3) is shorted to some power supply circuit.	3. Replace the control unit. 4. Replace the main harness.
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.
AIRBAG MODULE [VB-SHORT]	The circuit for the air bag module is shorted to some power supply circuit. (including the spiral cable)	3. Replace the air bag module. (Before disposing of it, it must be deployed.)
AIRBAG MODULE [GND-SHORT]	The circuit for the air bag module is shorted. (including the spiral cable)	4. Replace the control unit. 5. Replace the main harness.
TUNNEL SENSOR [OPEN/UPR-VB-SHORT]	The circuit for the tunnel sensor is open or the wire from the control unit (terminal No. 6) to the tunnel sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the tunnel sensor. (safing sensor and tunnel sensor unit)
TUNNEL SENSOR [SHORT]	The circuits for the tunnel sensor are shorted to each other.	3. Replace the control unit. 4. Replace the main harness.
CRASH ZONE SEN-RH [OPEN/UPR-VB-SHORT]	The circuit for the right crash zone sensor is open or the wire from the control unit (terminal No. 7) to the right crash zone sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the right crash zone sensor.
CRASH ZONE SEN-RH [SHORT]	The circuits for the right crash zone sensor are shorted to each other.	3. Replace the control unit. 4. Replace the main harness.
CRASH ZONE SEN-LH [OPEN/UPR-VB-SHORT]	The circuit for the left crash zone sensor is open or the wire from the control unit (terminal No. 8) to the left crash zone sensor is shorted to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the left crash zone sensor.
CRASH ZONE SEN-LH [SHORT]	The circuits for the left crash zone sensor are shorted to each other.	3. Replace the control unit. 4. Replace the main harness.
CRASH ZONE SEN-CTR [OPEN/UPR-VB-SHORT]	The circuit for the center crash zone sensor is open or the wire from the control unit (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.
CRASH ZONE SEN-CTR [SHORT]	The circuits for the center crash zone sensor are shorted to each other.	3. Replace the control unit. 4. Replace the main harness.
CONTROL UNIT	The control unit (diagnostic unit) is out of order.	1. Visually check the wiring harness connections. 2. Replace the control unit. 3. Replace the main harness.

TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

Self-diagnosis (Cont'd)

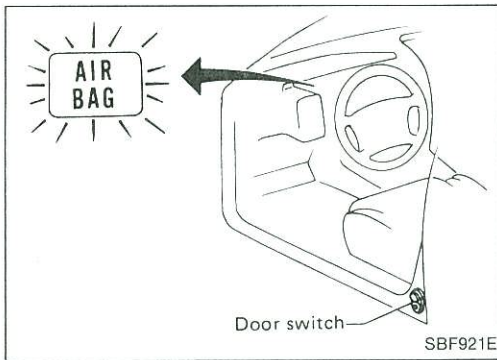
Failure parts group [Present] and [Initial]	Explanation	Repair order * Recheck SRS at each replacement.
INDEFINITE FAILURES	A problem which cannot be specified occurs because more than two parts are out of order.	<ol style="list-style-type: none">1. See the SELF-DIAGNOSIS RESULT 2 failure parts group [initial], then repair as necessary.2. Visually check the wiring harness connections.3. Replace the control unit.4. Replace all sensors, the spiral cable and air bag module.5. Replace the main harness.

Self-diagnosis (Cont'd)

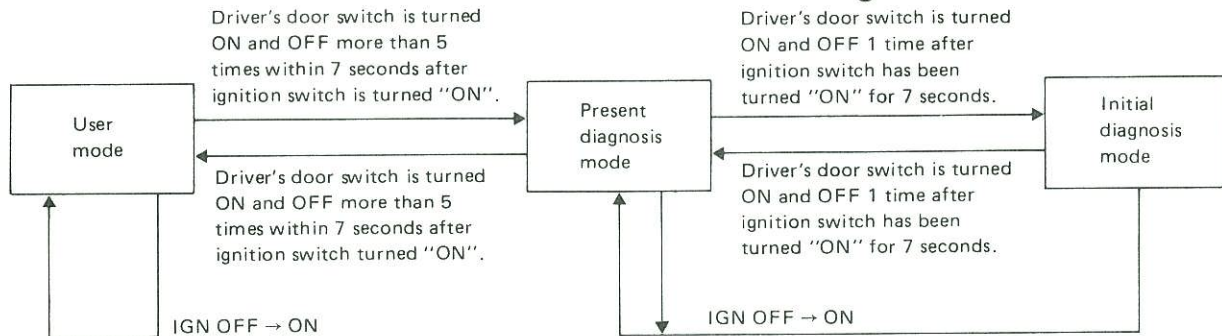
USING THE WARNING LAMP

Self-diagnosis results can be also read by using the "AIR BAG" warning lamp.

The "Air bag" warning lamp operates as shown below:



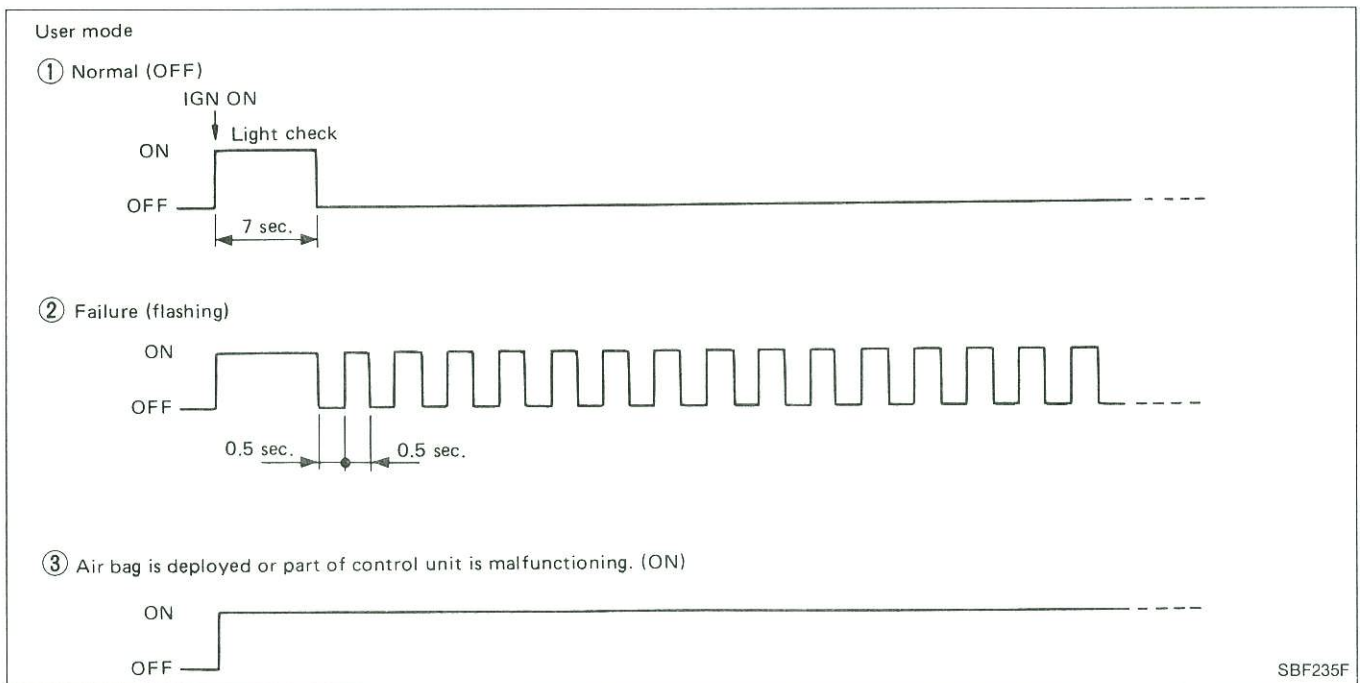
How to alternate self-diagnoses



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.

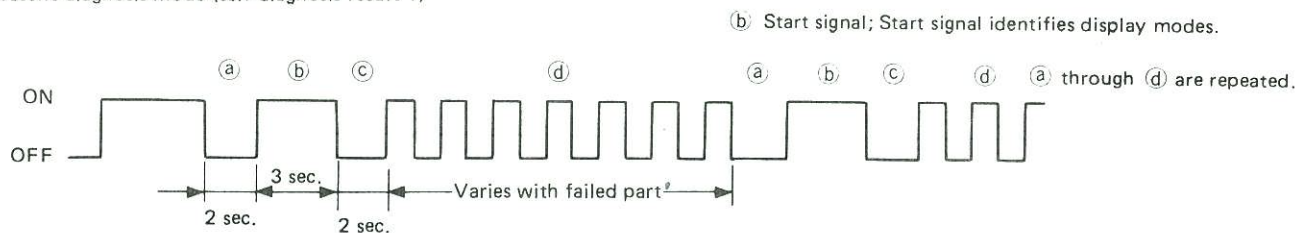
- After repairing malfunctioning part, attempt to clear self-diagnosis results from memory.
- If a malfunctioning part is not completely repaired, information stored in memory will not be cleared.



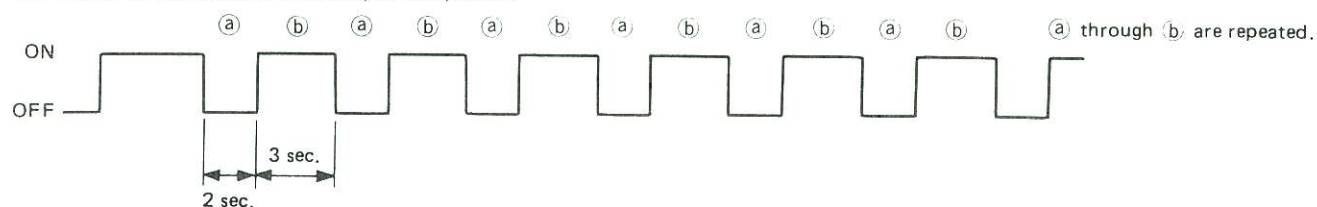
TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

Self-diagnosis (Cont'd)

Present diagnosis mode (self-diagnosis result 1)

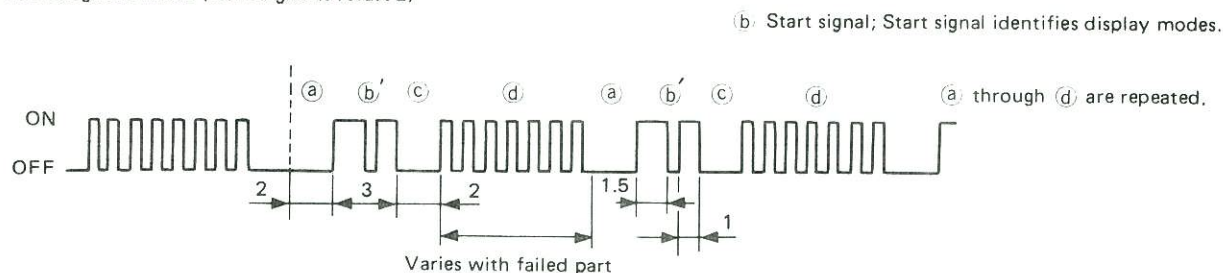


- No failure (or intermittent failure/repair completion)



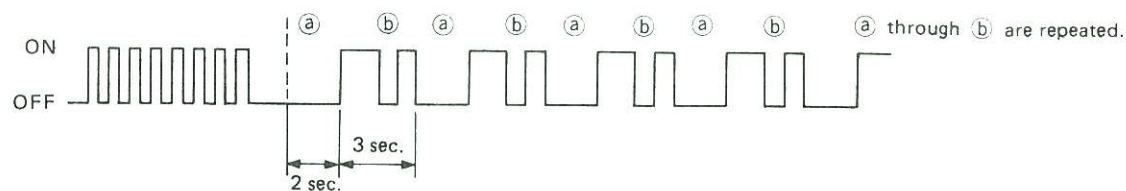
SBF236F

Initial diagnosis mode (self-diagnosis result 2)



Unit: sec.

- No failure



SBF237F

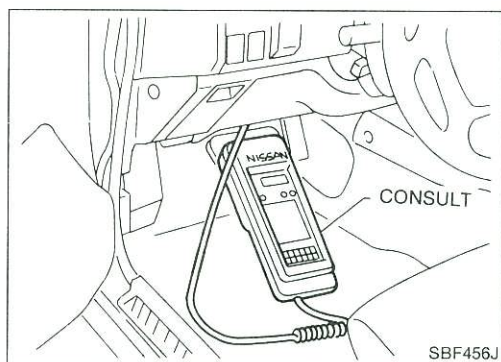
Self-diagnosis results in present- and initial-diagnosis modes can be identified by number of flashes (d). Refer to Table on next page for failed parts.

TROUBLE DIAGNOSES — Supplemental Restraint System (SRS)

Self-diagnosis (Cont'd)

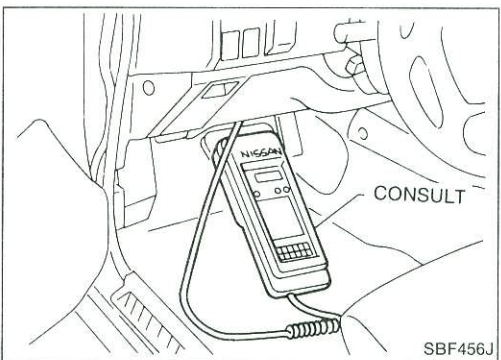
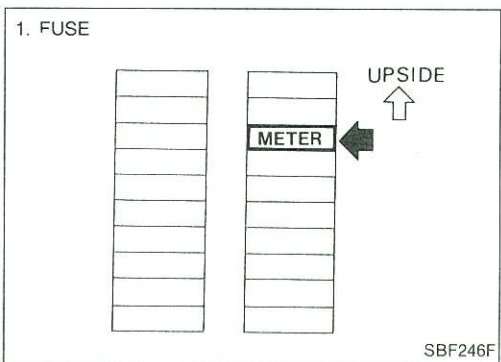
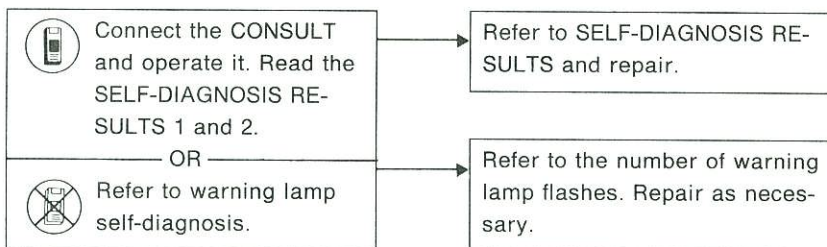
Warning lamp flashing times and repair

Flash code (d) (# 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.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the safing sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
2	The circuit for the air bag module is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the spiral cable. 3. Replace the air bag module. (Before disposing of it, it must be deployed.) 4. Replace the control unit. 5. Replace the main harness.
3	The circuit for the tunnel sensor is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the tunnel sensor. (safing sensor and tunnel sensor unit) 3. Replace the control unit. 4. Replace the main harness.
4	The circuit for the right crash zone sensor is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the right crash sensor. 3. Replace the control unit. 4. Replace the main harness.
5	The circuit for the left crash zone sensor is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the left crash zone sensor. 3. Replace the control unit. 4. Replace the main harness.
6	The circuit for the center crash zone sensor is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the center crash zone sensor. 3. Replace the control unit. 4. Replace the main harness.
7	The control unit (diagnostic unit) is out of order.	<ol style="list-style-type: none"> 1. Visually check the wiring harness connections. 2. Replace the control unit. 3. Replace the main harness.
8	More than two parts groups are out of order.	<ol style="list-style-type: none"> 1. See the SELF-DIAGNOSIS RESULT 2 failure parts group [Initial], then repair it. 2. Visually check the wiring harness connections. 3. Replace the control unit. 4. Replace all sensors, spiral cable and air bag module. 5. Replace the main harness.



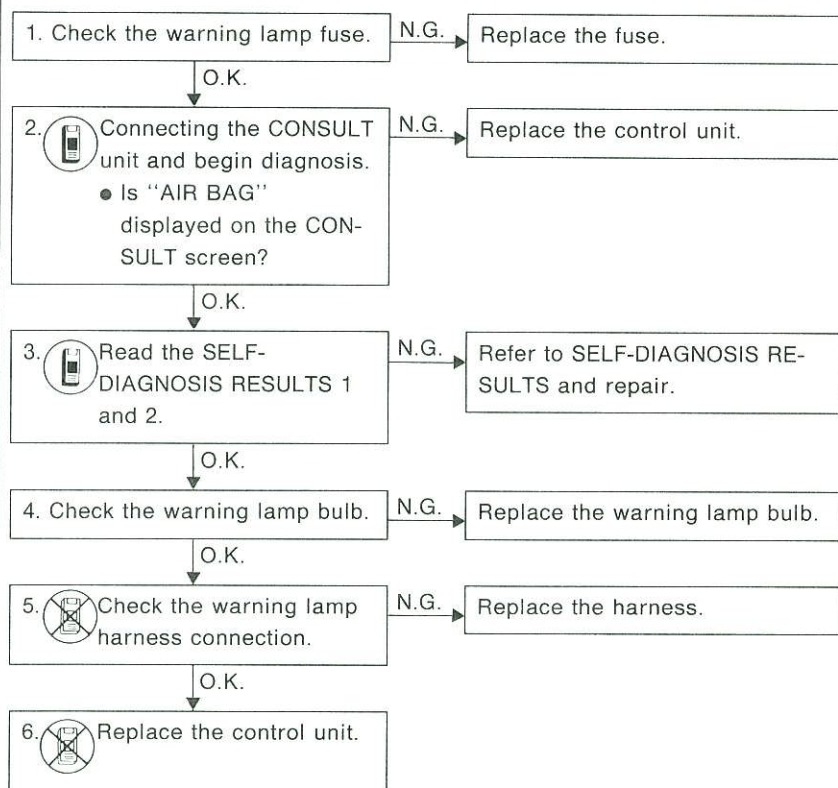
Diagnostic Procedure 1

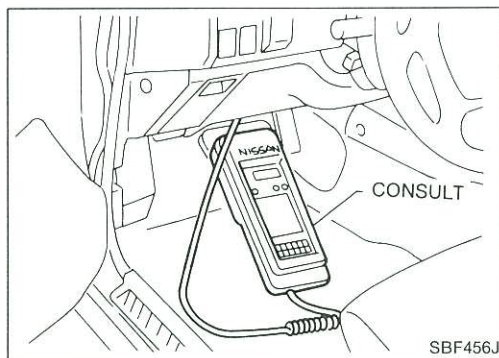
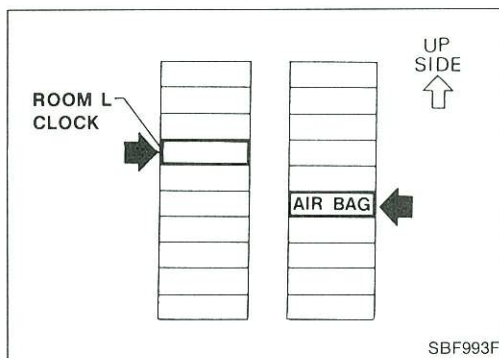
SYMPTOM: Warning lamp flashes.



Diagnostic Procedure 2

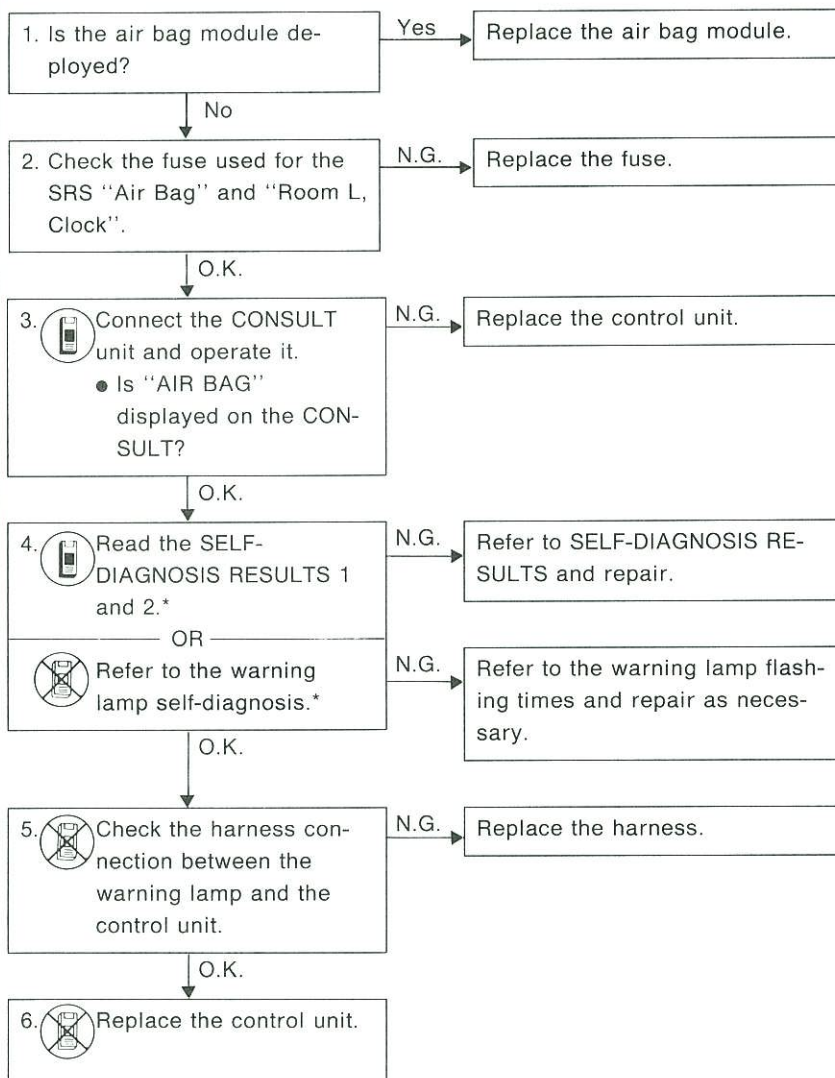
SYMPTOM: Warning lamp does not come on.





Diagnostic Procedure 3

SYMPTOM: Warning lamp does not go off.



*: Recheck SRS after each replacement.

Collision Diagnosis

To repair the SRS "AIR BAG", perform the following steps.

- ① Check the control unit (diagnostic unit).
 - Connect CONSULT and then erase the memory. (However, the memory may not clear.)

OR

- Check "AIR BAG" warning lamp and perform the following twice: turn driver's door switch ON and OFF 5 times within 7 seconds after ignition switch turned "ON".

↓
If "AIR BAG" warning lamp comes on continuously.

Replace the control unit.

- ② Remove the deployed air bag module.
- ③ Check the SRS components using the table shown below:
 - If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones.
- ④ Conduct self-diagnosis using CONSULT or "AIR BAG" warning lamp to ensure entire SRS operates properly except open circuit of air bag module.
- ⑤ Install new air bag module.

	Inspection (when air bag deploys in collision)	Inspection (when air bag does not deploy in low-speed collision)
Steering wheel	(1) Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. (2) Install air bag module to check fit or alignment with steering wheel. (3) Check steering wheel for excessive free play.	
In-compartment sensor	(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.	
All sensors (except those affected by collision)		
Air bag module	Replace air bag module.	(1) Remove air bag module from steering wheel. Check harness cover and connectors for damage, terminals for deformities, and harness for binds. (2) Install air bag module to steering wheel to check fit or alignment with the wheel. (3) Replace screws with new ones.
Harness connector (Main and Instrument harness)	(1) Check connectors for poor connections. (2) Check harness for binding, connectors for damage, and terminals for deformities.	
Spiral cable	(1) Visually check lock (engagement) pins and combination switch for damage. (2) Check connectors, flat cable and protective tape for damage. (3) Check steering wheel for noise, binds or heavy operation.	
Control unit	Replace control unit (diagnostic unit).	(1) Check case and bracket for dents, cracks or deformities. (2) Check connectors for damage, and terminals for deformities.

HEATER & AIR CONDITIONER

SECTION **HA**

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When you read wiring diagrams:

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

When you perform trouble diagnoses, read GI section, “HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES”.

HA

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

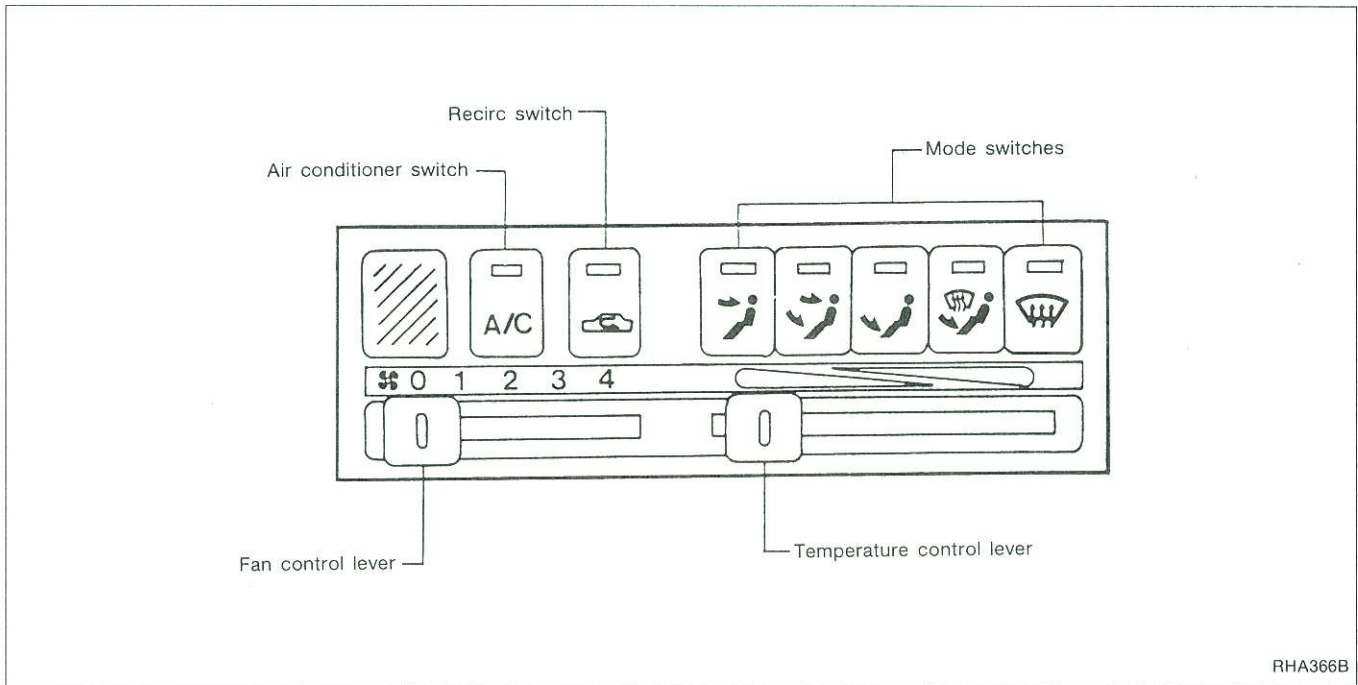
WARNING:

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

Features — Manual Air Conditioner

This push control system operates the intake and mode door motors to activate the doors corresponding to each button. 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".

Control Operation — Manual Air Conditioner



FAN CONTROL LEVER

This lever turns the fan ON and OFF, and controls fan speed.

MODE SWITCHES

These switches allow you to select the outlet air flow.

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.

AIR CONDITIONER SWITCH

Start the engine, move the fan control lever to the desired (1 to 4) position and push the air conditioner switch to turn ON the air conditioner. The indicator light will come on when the air conditioner is ON. To stop the air conditioner, push the switch again to return it to the original position.

The air conditioner cooling function operates only when the engine is running.

Introduction — Auto Air Conditioner

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 — Auto Air Conditioner

Air mix door control

The air mix door is automatically controlled so that in-vehicle temperature will reach, and be maintained at the operator selected "set temperature". For a given set temperature, the mix door position will depend on: Ambient temperature, in-vehicle temperature, amount of sunload, and intake air temperature.

Fan speed control

The blower speed is automatically controlled, with the actual speed (for a given set temperature) depending on: Ambient temperature, in-vehicle temperature, amount of sunload, intake air temperature, and mix door position. Additionally, when the system is turned on, the blower will start slowly and then increase speed (over a period of approximately 5 seconds) until the objective speed is reached. When cold starting in cold ambient temperatures, the blower operation will be delayed to prevent blowing cold air on the occupants feet.

Intake door control

The intake door position will be determined by: Ambient temperature, in-vehicle temperature, and whether the compressor is on or off.

Outlet door control

The outlet door position will be determined by: Ambient temperature, in-vehicle temperature, intake air temperature, and amount of sunload.

Compressor clutch control

The compressor operation (ON-OFF) is automatically controlled by the ambient sensor to prevent compressor damage in very cold ambient temperatures.

Recirculation switch

If the operator does not want outside air, the RECIRC switch should be pushed. The passenger compartment air will be recirculated for approx. 10 minutes, then the RECIRC function will be automatically canceled.

Self-diagnostic system

The self-diagnostic system consists of five steps. Each step can be accessed by pushing the switches on the automatic amplifier.

STEP 1: Checks L.E.D.s and segments of the display.

STEP 2: Checks each sensor circuit for open or short circuit.

STEP 3: Checks mode door position.

STEP 4: Checks operation of each actuator.

STEP 5: Checks temperature detected by each sensor.

AUXILIARY TRIMMER MECHANISM: Set temperature trimmer.

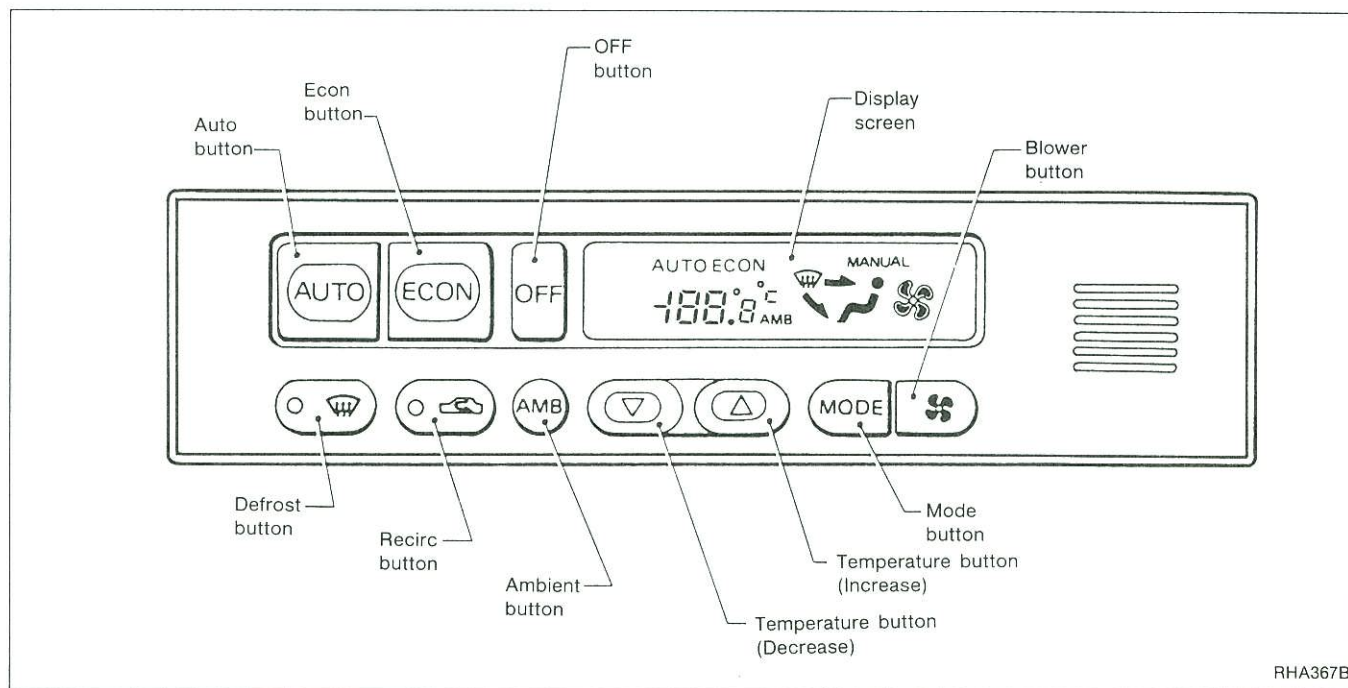
Memory function

When the ignition switch is turned from "ON" to "OFF", the auto amplifier stores the set temperature and inputs of various switches in its memory. When the ignition switch is turned from "OFF" to "ON", the system begins operation with the information stored in the memory, then immediately compensates for the actual operating conditions.

Refrigeration cycle

Refer to page HA-10 for the description of the refrigeration cycle.

Control Operation — Auto Air Conditioner



RHA367B

DISPLAY SCREEN

Displays the operational status of the system.

AUTO BUTTON

The compressor, air inlet door, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.

ECON BUTTON

Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature.

TEMPERATURE INCREASE/DECREASE BUTTON

Increases or decreases the set temperature.

OFF BUTTON

The compressor and blower are off, the air inlet door is set to the outside air position, and the air outlet doors are set to the foot (70% foot and 30% defrost) position. In the off position the ATC system uses the vehicle's "flow through" ventilation to try to maintain the interior temperature based on the temperature set when the system was last operating.

BLOWER BUTTON

Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):

low , medium low , medium high , high

MODE BUTTON

Manual control of the air discharge outlets. There selections are available (as shown on the display screen):

face , bi-level , foot

AMBIENT BUTTON

Shows the ambient (outside) air temperature on the display screen for 5 seconds.

DESCRIPTION — Overall System

Control Operation — Auto Air Conditioner (Cont'd)

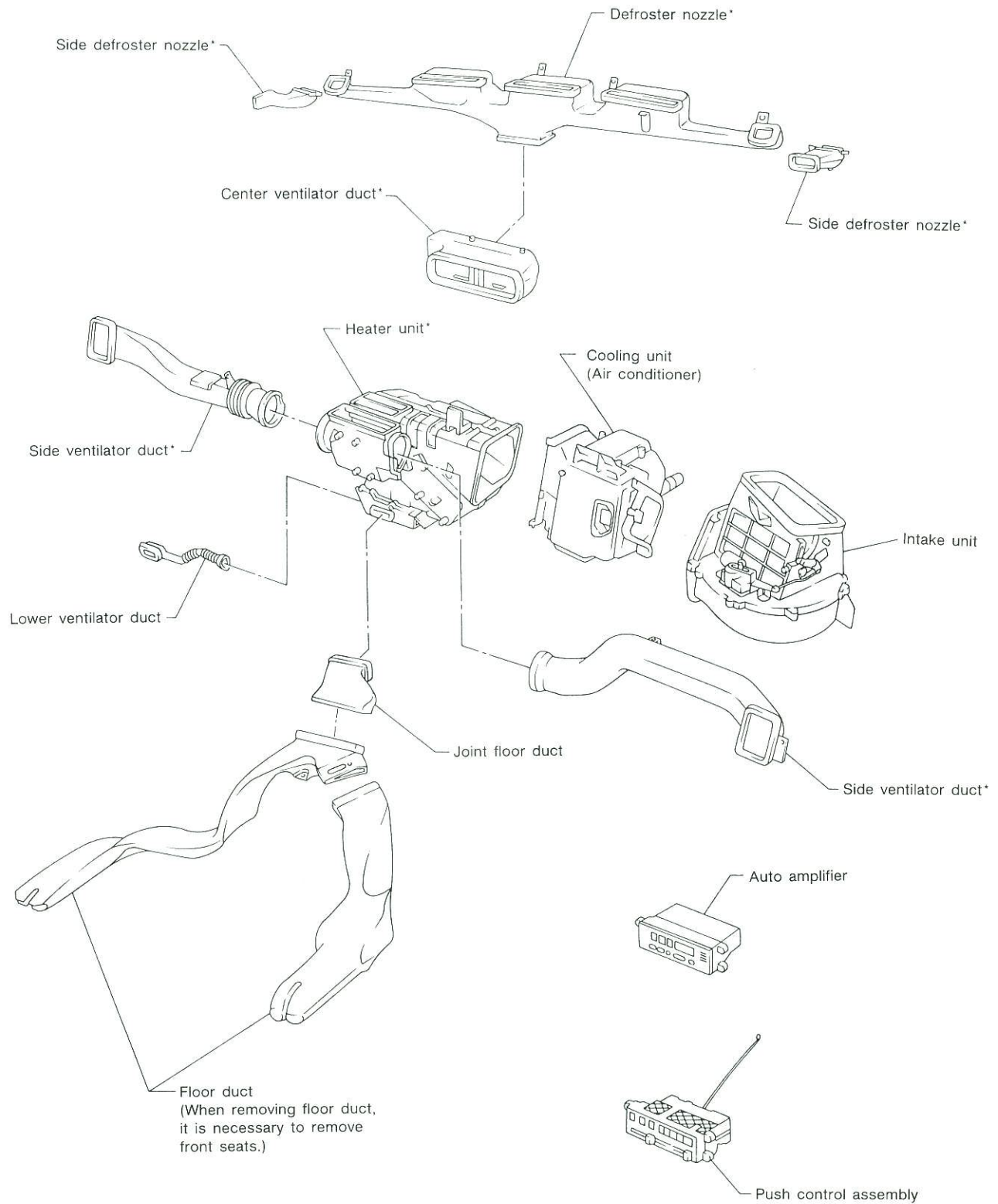
RECIRC BUTTON

Positions the air inlet door to the recirculation position for 10 minutes, after which automatic control resumes.

DEFROST BUTTON

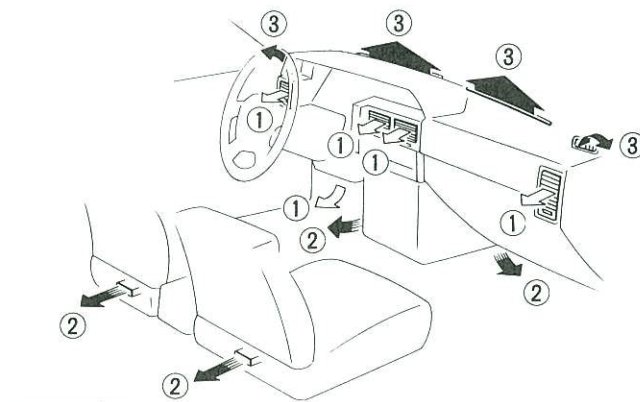
Positions the air discharge doors to the defrost position. Also positions the air inlet door to the outside air position. The compressor operates at ambient temperature approx. 2°C (35°F) or above.

Component Layout

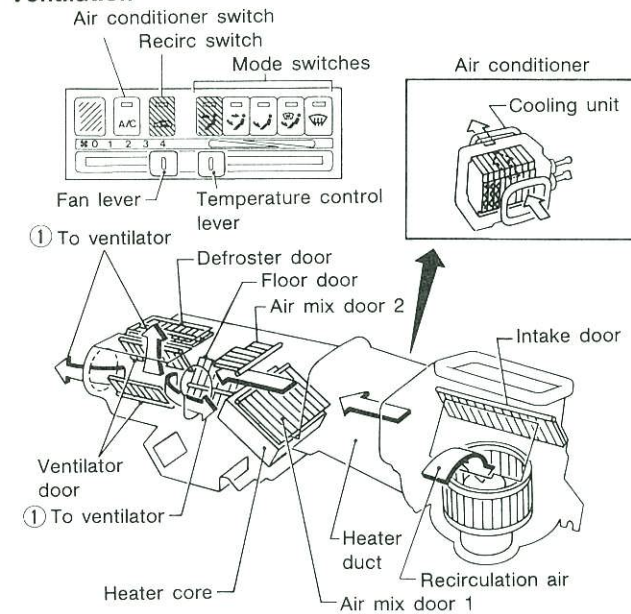


*: For removal, it is necessary to remove instrument assembly.

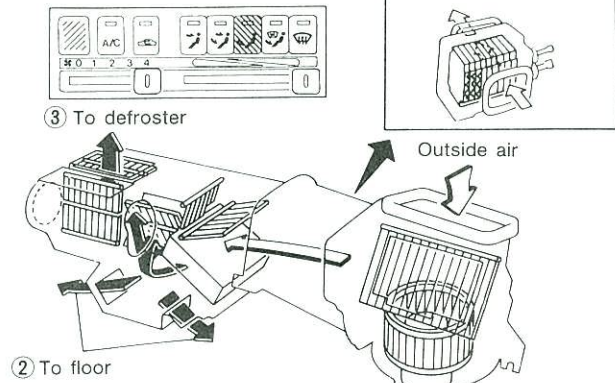
Air Flow — Manual Air Conditioner



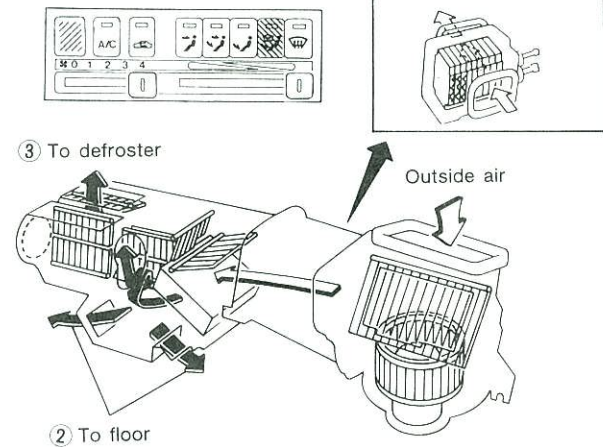
Ventilation



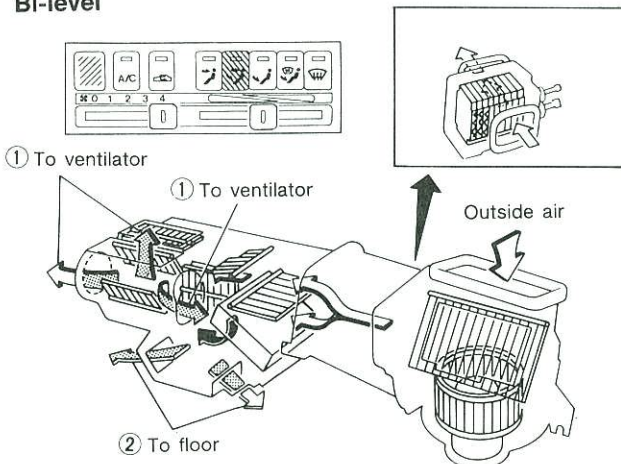
Floor



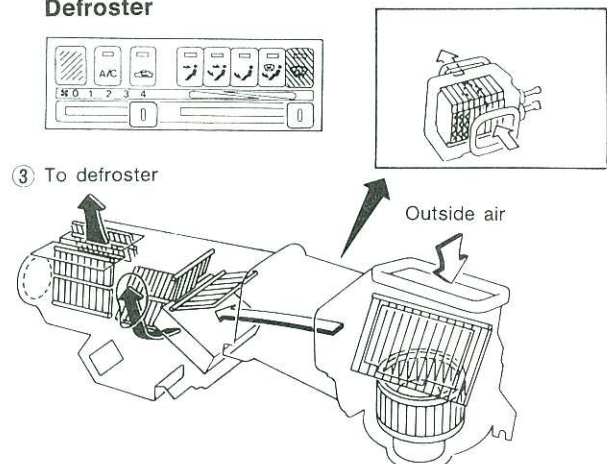
Floor and defroster



Bi-level



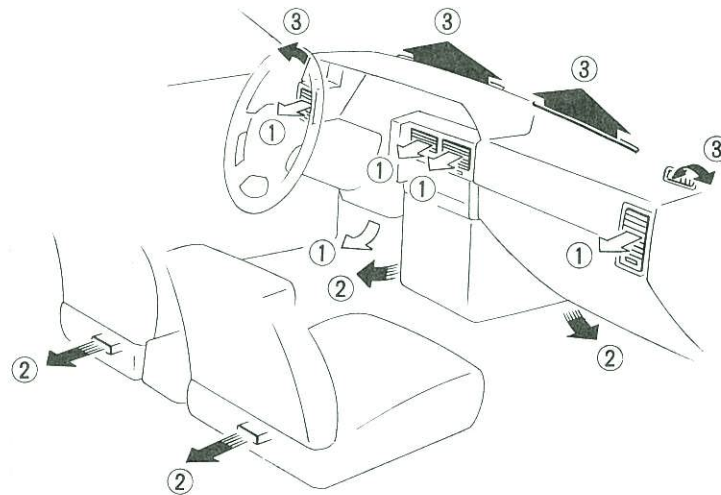
Defroster



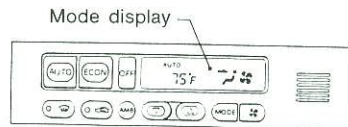
: Air passed through heater core
 : Mixed air (+)
 : Air not passed through heater core

DESCRIPTION — Overall System

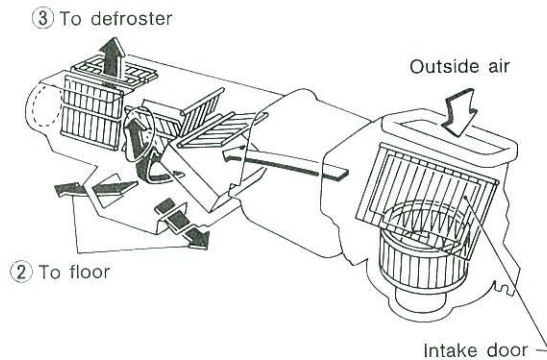
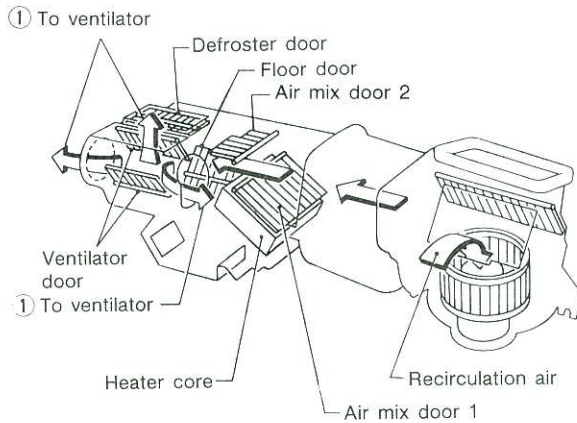
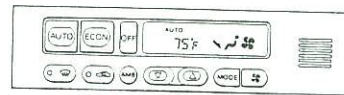
Air Flow — Auto Air Conditioner



Ventilation



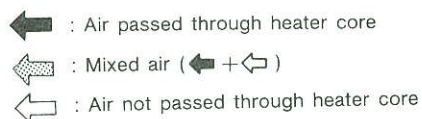
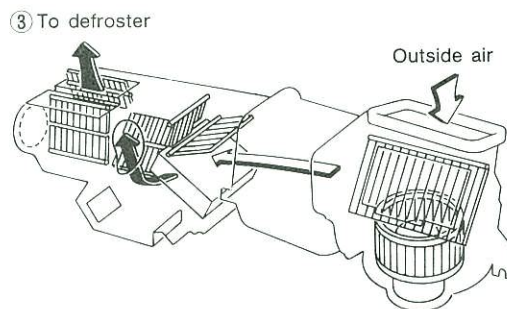
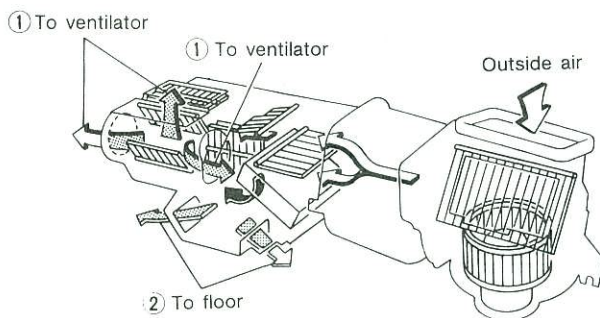
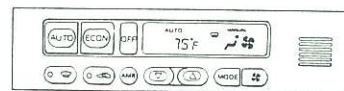
Floor



Bi-level



Defroster



Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the receiver drier, through the evaporator, and back to the compressor.

The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

FREEZE PROTECTION

When the A/C is switched on, the compressor runs continuously, and the evaporator pressure is controlled by a suction throttle valve (S.T.V.) to prevent freeze up.

REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

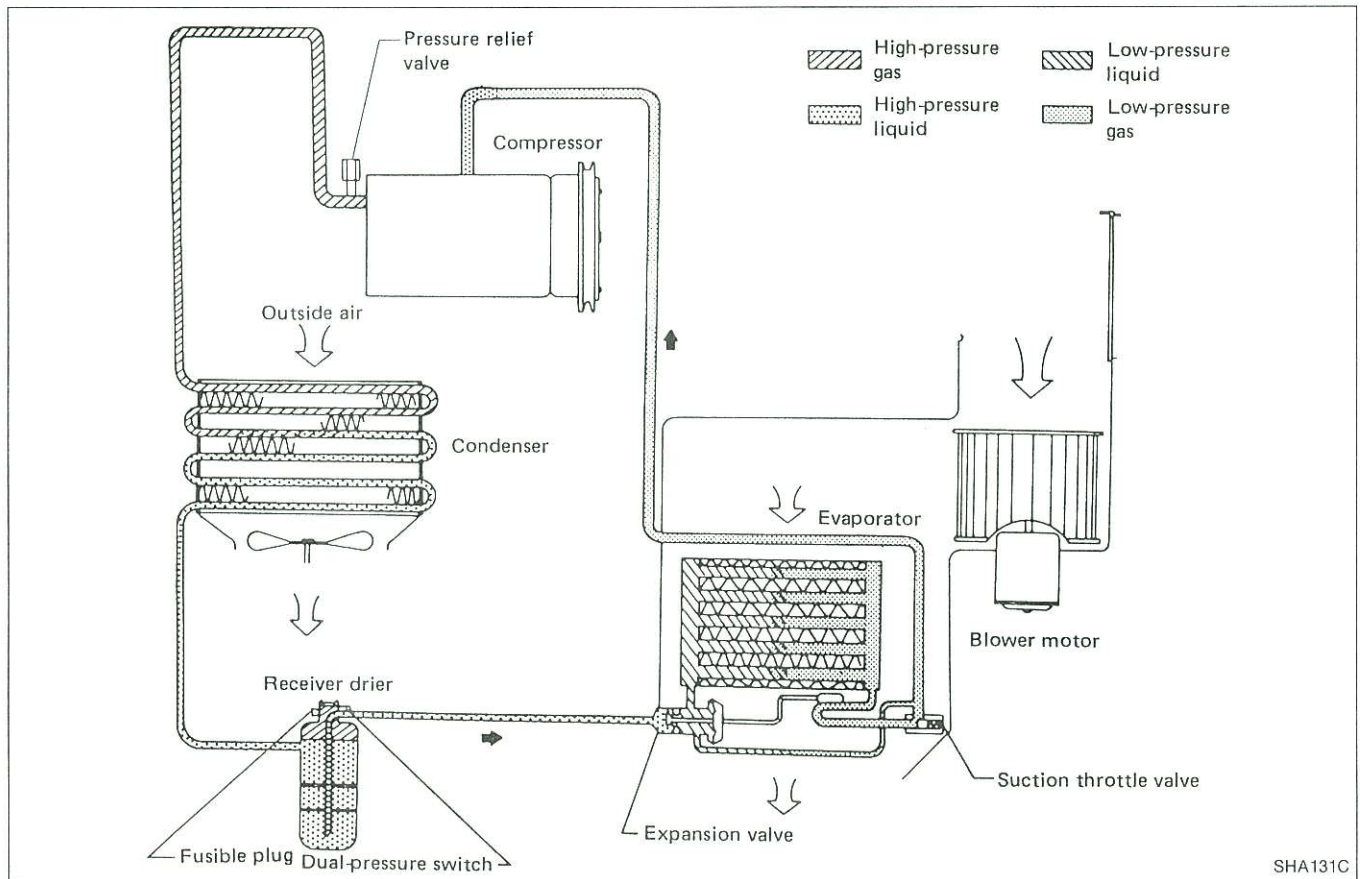
The refrigerant system is protected against excessively high or low pressures by the dual-pressure switch, located on the receiver drier. If the system pressure rises above, or falls below the specifications, the dual-pressure switch opens to interrupt the compressor operation.

Fusible plug

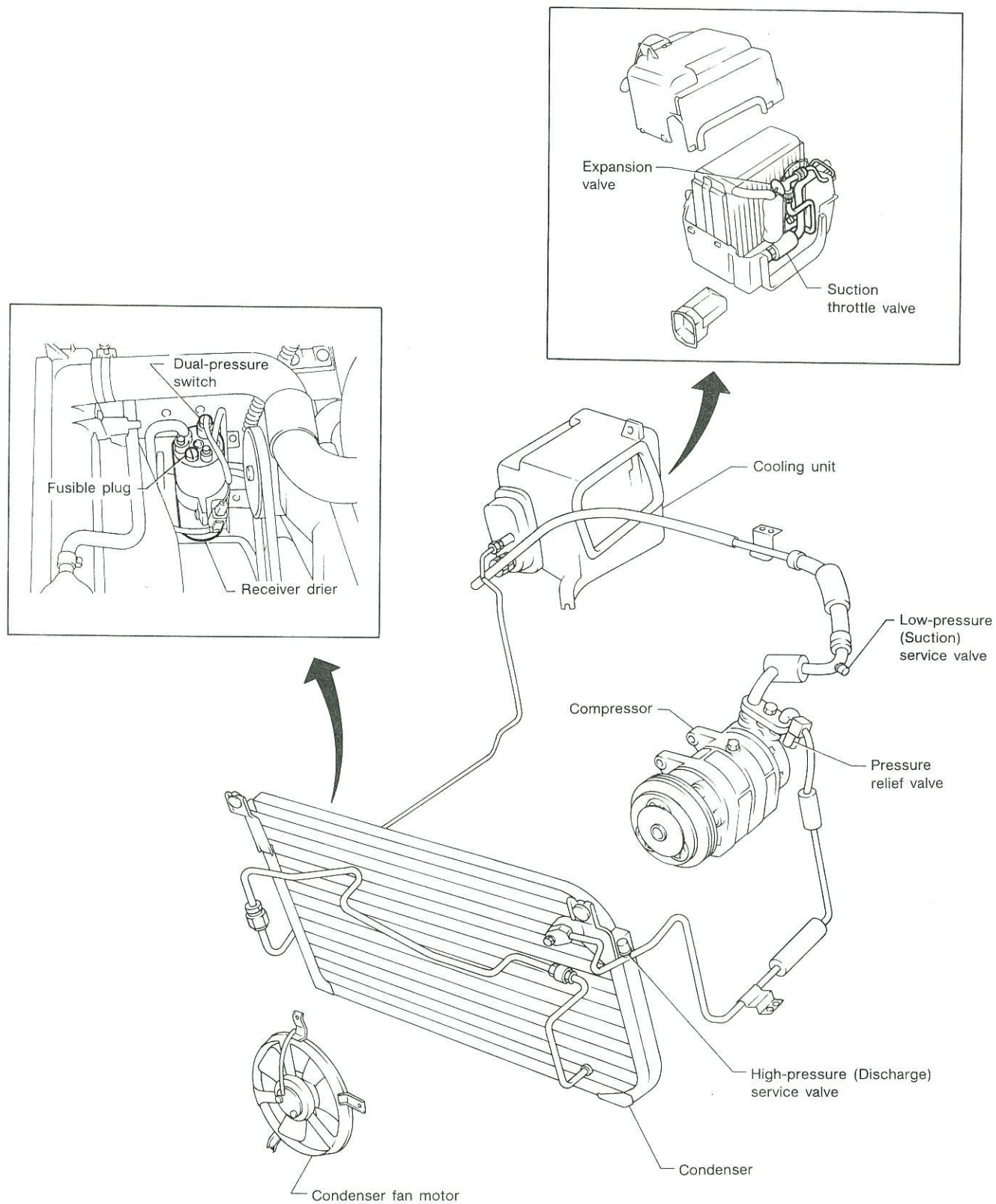
Open at temperature above 105°C (221°F), thereby discharging refrigerant to the atmosphere. If this plug is melted and opened, check the refrigerant line and replace receiver drier.

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/cm², 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



Refrigerant System



PRECAUTIONS

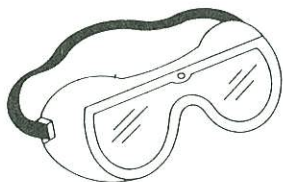
Precautions for the Handling of Refrigerant

- Always wear eye protection when working around the system.
- Always be careful that refrigerant does not come in contact with your skin.
- Do not release refrigerant into the air. Use your refrigerant recycling equipment to capture the refrigerant every time you need to discharge an air conditioning system.
- Keep refrigerant containers stored below 40°C (104°F) and never drop from high places.
- Work in well-ventilated area because refrigerant gas evaporates quickly and breathing may become difficult due to the lack of oxygen.
- Keep refrigerant away from open flames because poisonous gas will be produced if it burns.
- Do not increase can temperature beyond 40°C (104°F) in charging.
- Do not heat refrigerant container with an open flame. There is a danger that container will explode.

CAUTION:

- Do not use steam to clean surface of condenser or evaporator. Be sure to use cold water or compressed air.
- Do not use compressed air to clean out a contaminated A/C tube or hose. Shake the line over a clean, white paper towel. If it contains obvious moisture or contaminants, replace it. Do not blow out the line with refrigerant.

Goggles

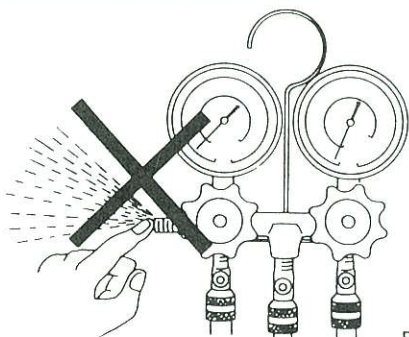


RHA260B

Gloves

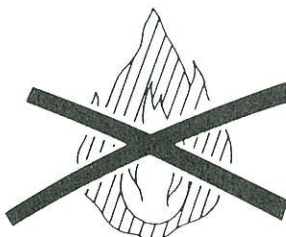


RHA261B



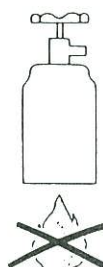
RHA676B

Avoid Open Flame



RHA262B

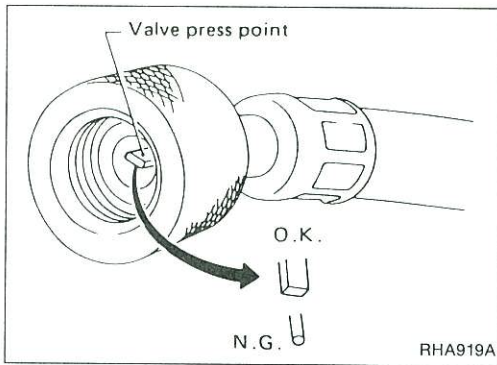
No Direct Heat on Container



RHA263B

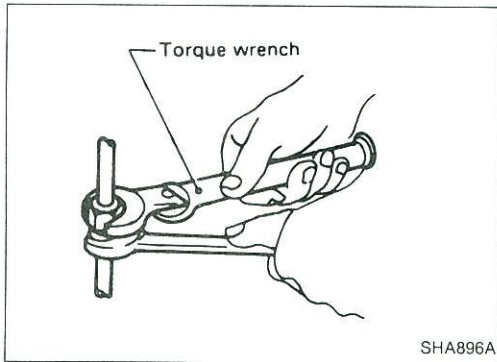
PRECAUTIONS

Precautions for the Handling of Refrigerant (Cont'd)



- Do not use manifold gauge set whose press point shape is different from that shown. Otherwise, insufficient evacuating may occur.

- Do not over-tighten service valve cap.
- Follow the manufacturer's instructions for discharging into your refrigerant recycling equipment.



Precautions for Refrigerant Connection

WARNING:

Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

- Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.
- When connecting tubes, always use a torque wrench and a back-up wrench.

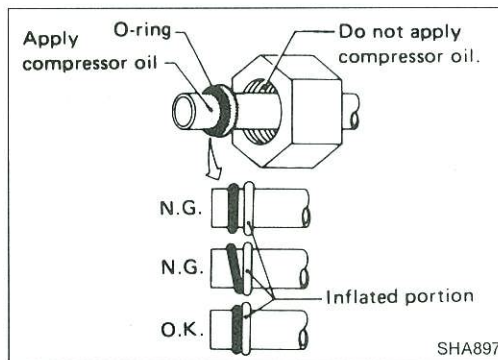
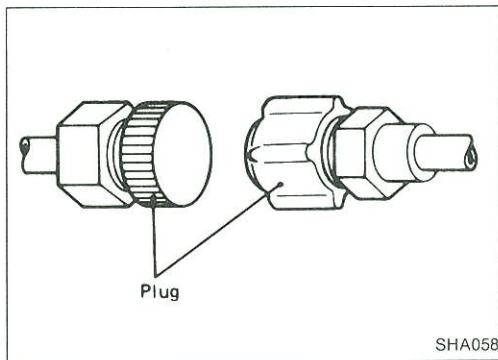
PRECAUTIONS

Precautions for Refrigerant Connection (Cont'd)

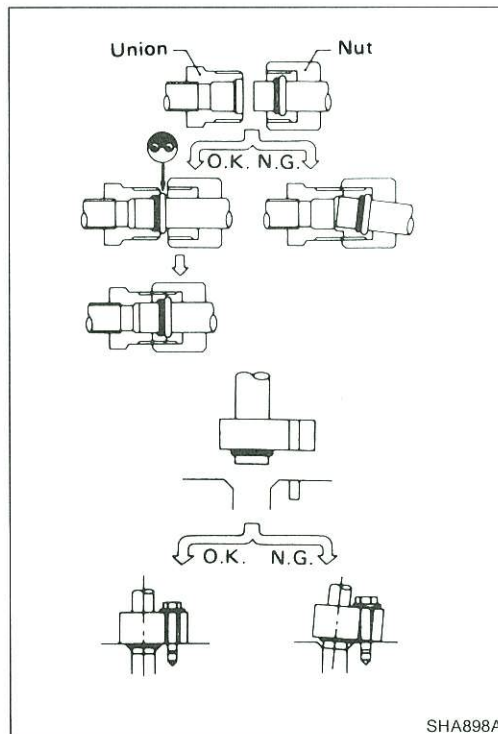
- After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.

CAUTION:

- When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.
- Before installing any air conditioner component that has been stored in a cool location to a vehicle that has been exposed to the hot sun, leave the component as it is for some time in a hot location with its seal cap unremoved. This step is necessary to prevent condensation of moisture inside the cold component.
- Thoroughly remove moisture from the refrigeration system before charging the refrigerant.



- Always replace used O-rings.
- When connecting tube, apply compressor oil to portions shown in illustration. Be careful not to apply oil to threaded portion.
- O-ring must be closely attached to inflated portion of tube.



- After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.
- After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.

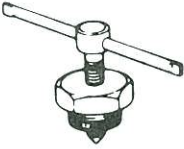

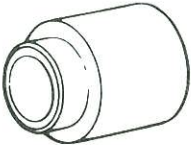
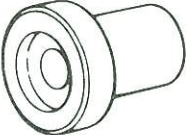

PRECAUTIONS

Precautions for Servicing Compressor

- Plug all openings to prevent moisture and foreign matter from entering.
- Do not leave compressor on its side or upside down for more than 10 minutes.
- When replacing or repairing compressor, check compressor oil level in system.
- When replacing with a new compressor, drain specified oil from new compressor. Refer to COMPRESSOR OIL.
- Be sure there is no oil or dirt on frictional surface of clutch disc and pulley.
- When replacing compressor clutch, be careful not to scratch shaft or bend pulley.
- When replacing compressor clutch assembly, do not forget BREAK-IN OPERATION.

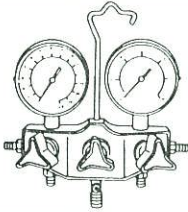
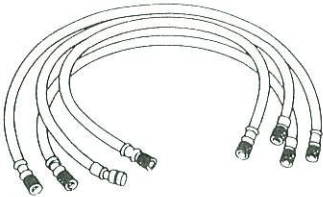
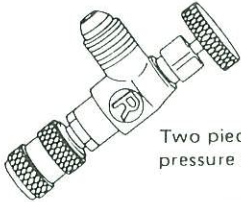
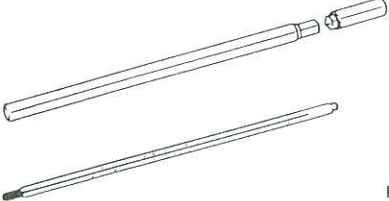
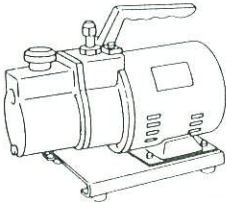
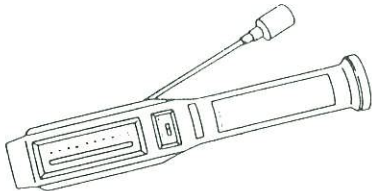
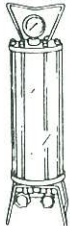
PREPARATION

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description
KV99232022 (J26571-A) Clutch disc puller	 Removing clutch disc
KV99231010 (J37877) Clutch disc wrench	 Removing shaft nut and clutch disc
KV99233040 (J26720-A) Puller pilot	 Removing pulley
KV99234160 (J37879) Pulley installer	 Installing pulley
KV99235160 (J37882) Nut wrench	 Removing lock nut



PREPARATION

Service Tools

Tool name	Description
Manifold gauge (3-valve type)	 <p>RHA570B</p> <p>Discharging, evacuating and charging refrigerant</p>
Charging hose (Four)	 <p>RHA571B</p> <p>Discharging, evacuating and charging refrigerant</p>
Adapter valve	 <p>Two pieces on each high pressure and low pressure line</p> <p>RHA573B</p> <p>Discharging, evacuating and charging refrigerant</p>
Thermometer	 <p>RHA574B</p> <p>Checking temperature</p>
Vacuum pump	 <p>RHA575B</p> <p>Evacuating</p>
Gas leak detector	 <p>RHA577B</p> <p>Checking refrigerant leaks</p>
Charging cylinder	 <p>RHA578B</p> <p>Checking amount of refrigerant and charging refrigerant</p>

PREPARATION

Service Tools (Cont'd)

Tool name	Description
Weight scale	<div></div> <div>Checking amount of refrigerant</div> <div>RHA579B</div>
Refrigerant recycling equipment	<div></div> <div>Capturing and recycling refrigerant</div> <div>SHA732C</div>

For details of such handling methods, refer to the Instruction Manual attached to each of the service tools.

PREPARATION

Service Tools (Cont'd)

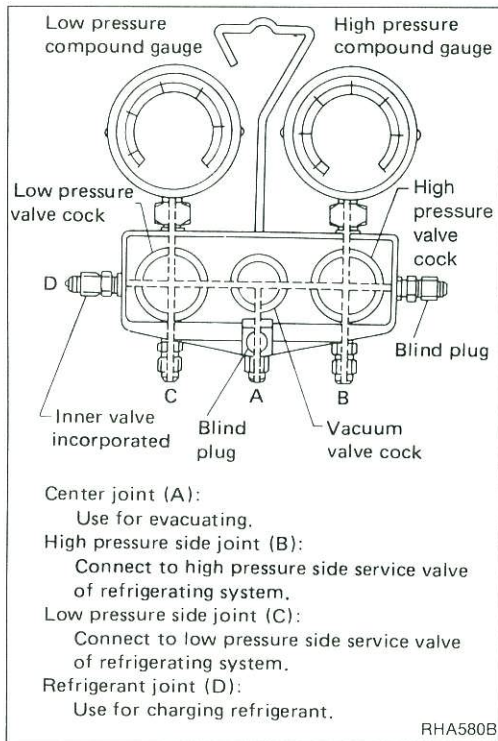
HANDLING METHOD AND STRUCTURE

Manifold gauge

The manifold gauge is used to measure the operating pressure accurately in the high pressure and low pressure lines of the refrigerating system. The high pressure gauge measures from -101.3 kPa (-760 mmHg , -29.92 inHg) to $2,942 \text{ kPa}$ (30 kg/cm^2 , 427 psi), and the low pressure gauge measures generally from -101.3 kPa (-760 mmHg , -29.92 inHg) to $1,471 \text{ kPa}$ (15 kg/cm^2 , 213 psi).

CAUTION:

- When installing the gauge to the refrigerating system, use utmost care not to mistake high pressure and low pressure line connections. (Wrong connections will lead to a damaged gauge.)
- Before evacuating, confirm that the gauge has a negative pressure scale. (If not, the gauge will be damaged.)

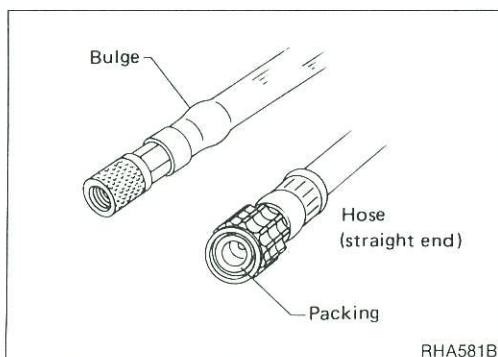


Charging hose

1. Completely tighten high pressure valve, low pressure valve and vacuum pump valve cocks of gauge manifold.
2. Connect charging hoses to high and low pressure lines.
3. Connect charging hose fitted with valve core to charging cylinder.
4. Connect vacuum pump hose to vacuum pump.

High and low pressure hoses are color coded to prevent wrong connection.

High pressure line hose	Red
Low pressure line hose	Yellow
Vacuum pump hose	Blue or green



CAUTION:

- Check each hose for cracks. If found, discard the hose.
- Do not use any hose if bulges are found.
- Check the rubber packing. If any deterioration or cracks are found, replace it with a new one.

PREPARATION

Service Tools (Cont'd)

Installing the adapter valve

Install the adapter valve to each of the high pressure and low pressure service valves so that air purging from the charging hose can be omitted. This also ensures that refrigerant leakage upon disconnection of the hose can be prevented.

1. Before connecting the adapter valve to the on-vehicle service valve, turn the adapter valve handle fully counterclockwise to retract the pin.

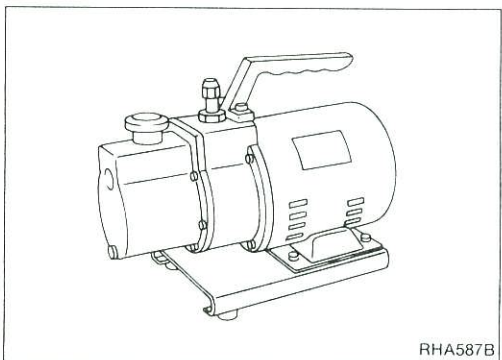
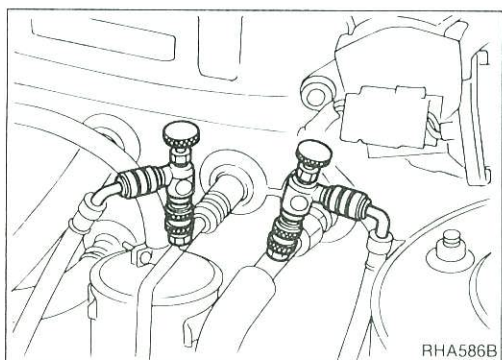
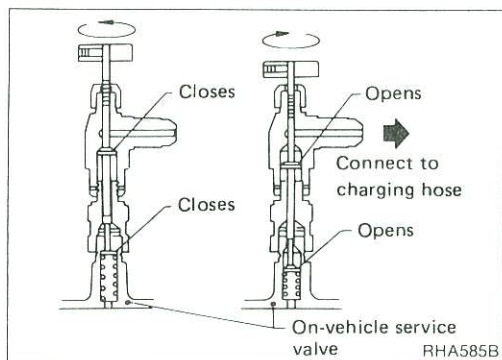
CAUTION:

Check the packing for any sign of deterioration or cracks. If any abnormality is found, replace it with a new one.

2. Connect the charging hose to the adapter valve.

Turning the handle clockwise will cause the on-vehicle service valve pin to be pushed open by the adapter valve pin, thus opening the refrigerant passage.

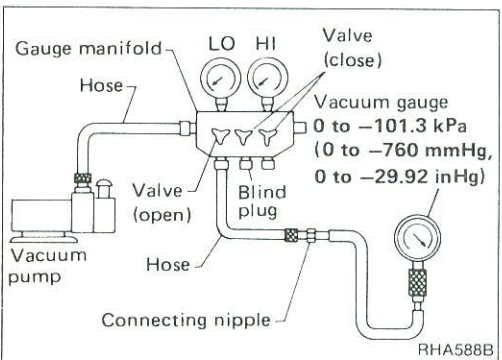
Turning the handle counterclockwise will close the passage. Before removing the adapter valve from the on-vehicle service valve, be sure to fully turn the handle counterclockwise to shut off the refrigerant passage.



Vacuum pump

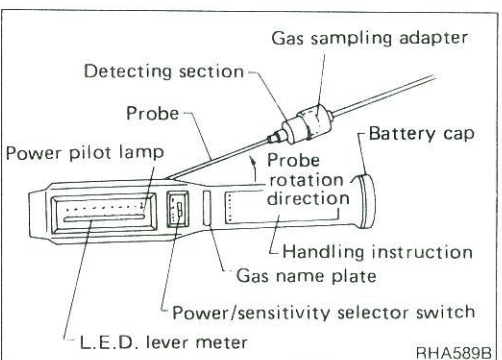
The vacuum pump is used to purge air and moisture from the inside of the refrigeration system by evacuation, thereby ensuring proper functioning of the air conditioner system.

Check the vacuum pump to see that the vacuum pump capacity is greater than -100.0 kPa (-750 mmHg, -29.53 inHg).



Vacuum pump performance check procedure

1. Connect the vacuum gauge to the system.
2. Run the vacuum pump, and check to see that the needle pointers of the gauge manifold and vacuum gauge move smoothly, indicating a similar value.
3. After running the vacuum pump for two or three minutes, read the vacuum gauge. The measured value indicates the capacity of the vacuum pump.



Gas leak detector

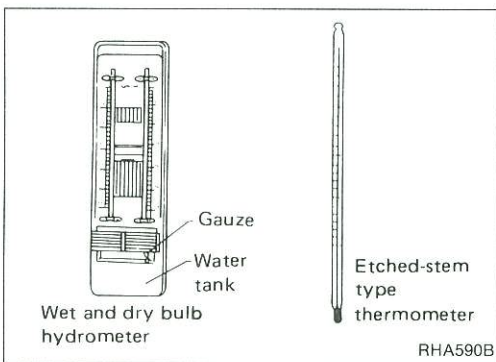
The gas leak detector is used to check whether the refrigeration system is leaking. The detector is available in two types; halide torch or electrical. The features of these gas leak detectors are listed on the next page.

PREPARATION

Service Tools (Cont'd)

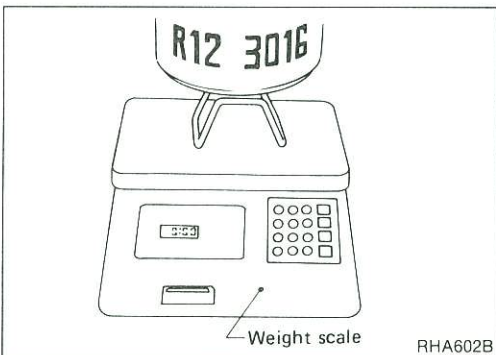
Type		Detection ability	Features
Halide torch		200 g (7.05 oz)/year (thin green)	<ul style="list-style-type: none"> ● Low price ● Low sensitivity ● Less safe because of the use of flame for detection
Electrical	Discharge type (Suction type)	3 - 50 g (0.11 - 1.76 oz)/year	<ul style="list-style-type: none"> ● Easy handling ● Medium sensitivity ● Each point needs two or more seconds for detection.
	Positive ion emission type (Suction type)	2 g (0.07 oz)/year	<ul style="list-style-type: none"> ● High sensitivity ● High price ● Warm-up time is needed because a heater is incorporated.
Other simple checking method: Change in vacuum when evacuating		1 kg (2 lb)/month; if 13.3 kPa (100 mmHg, 3.94 inHg) change in vacuum is detected in 10 minutes.	<ul style="list-style-type: none"> ● Can be used easily in refrigerant charging operation. ● Detection ability is very low with vacuum gauge in gauge manifold.

- Leakage inspection of a refrigeration system needs a sensitivity greater than 20 g (0.71 oz)/year.
- The actual amount of leak is estimated at 5 to 10 times the detected amount.
- Insufficient cooling may be felt if leakage exceeds 150 to 200 g (5.29 to 7.05 oz).



Temperature gauge

Use to check the air conditioner performance. An etched stem type thermometer may be used. A hygrometer must also be used because the air conditioner performance depends on the humidity.



Scale

Measure the weight of the refrigerant to determine how much the refrigerant is charged.

PREPARATION

Service Tools (Cont'd)

Charging cylinder

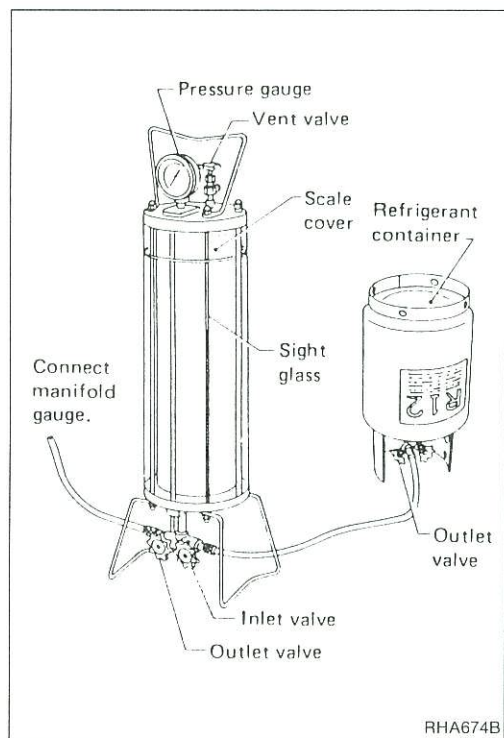
The charging cylinder is used to correctly measure the amount of refrigerant to be charged.

Features

- With the charging cylinder, the operator can measure correctly the amount of refrigerant to be charged into the system.
- Change in the refrigerant volume due to a change in temperature and pressure can be supplemented, and this ensures correct charging of refrigerant.

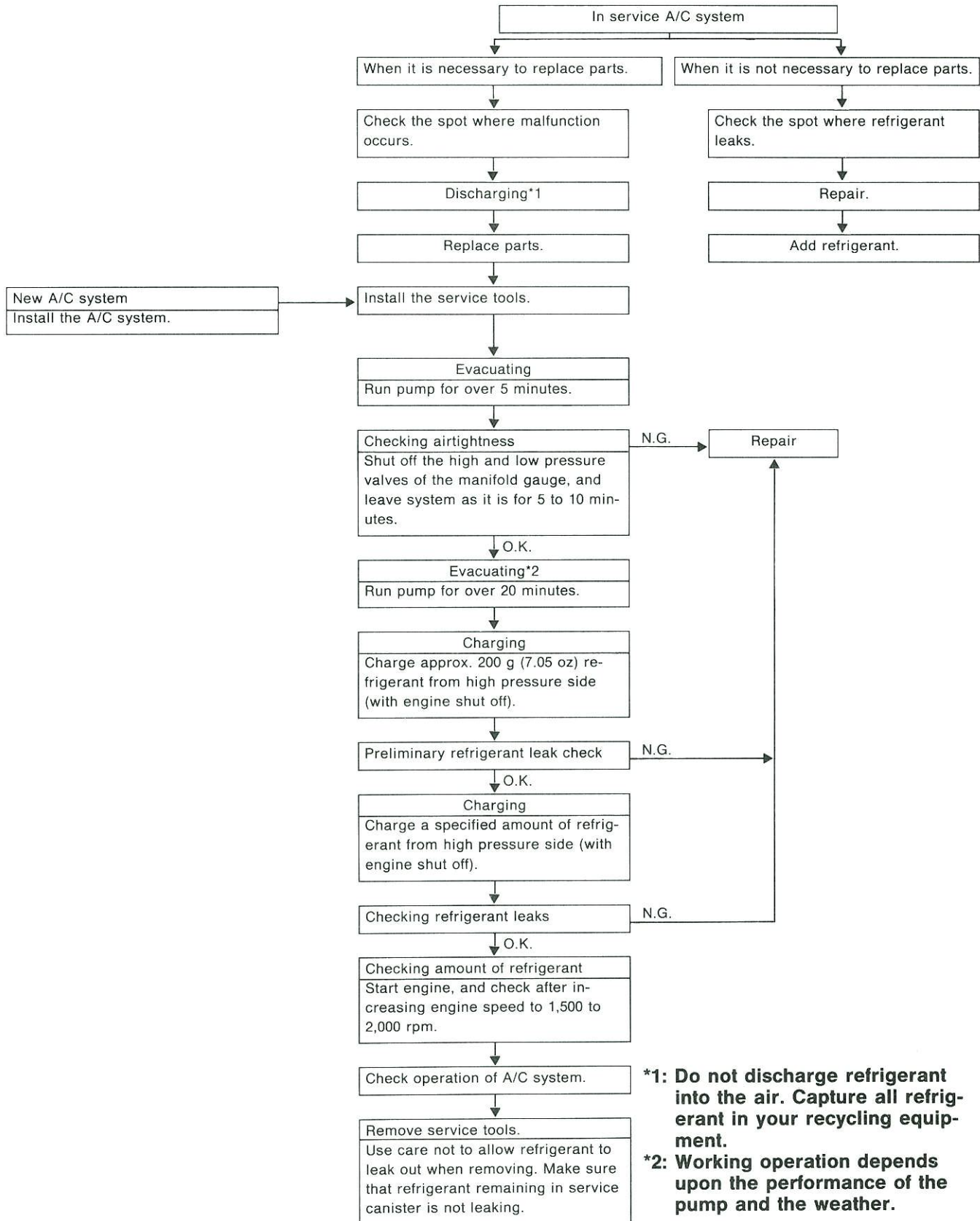
CAUTION:

- **Never attempt to carry the charging cylinder containing refrigerant.**
- **Do not put the charging cylinder in a hot place. If the temperature and pressure of the refrigerant in the cylinder increase, the safety valve will be pushed open and the refrigerant will be released into the atmosphere.**
- **Do not expose the cylinder to the direct sunlight.**
- **Do not over-charge the refrigerant so that it exceeds the maximum limit of the cylinder.**
- **Do not charge the cylinder with more refrigerant than is needed.**



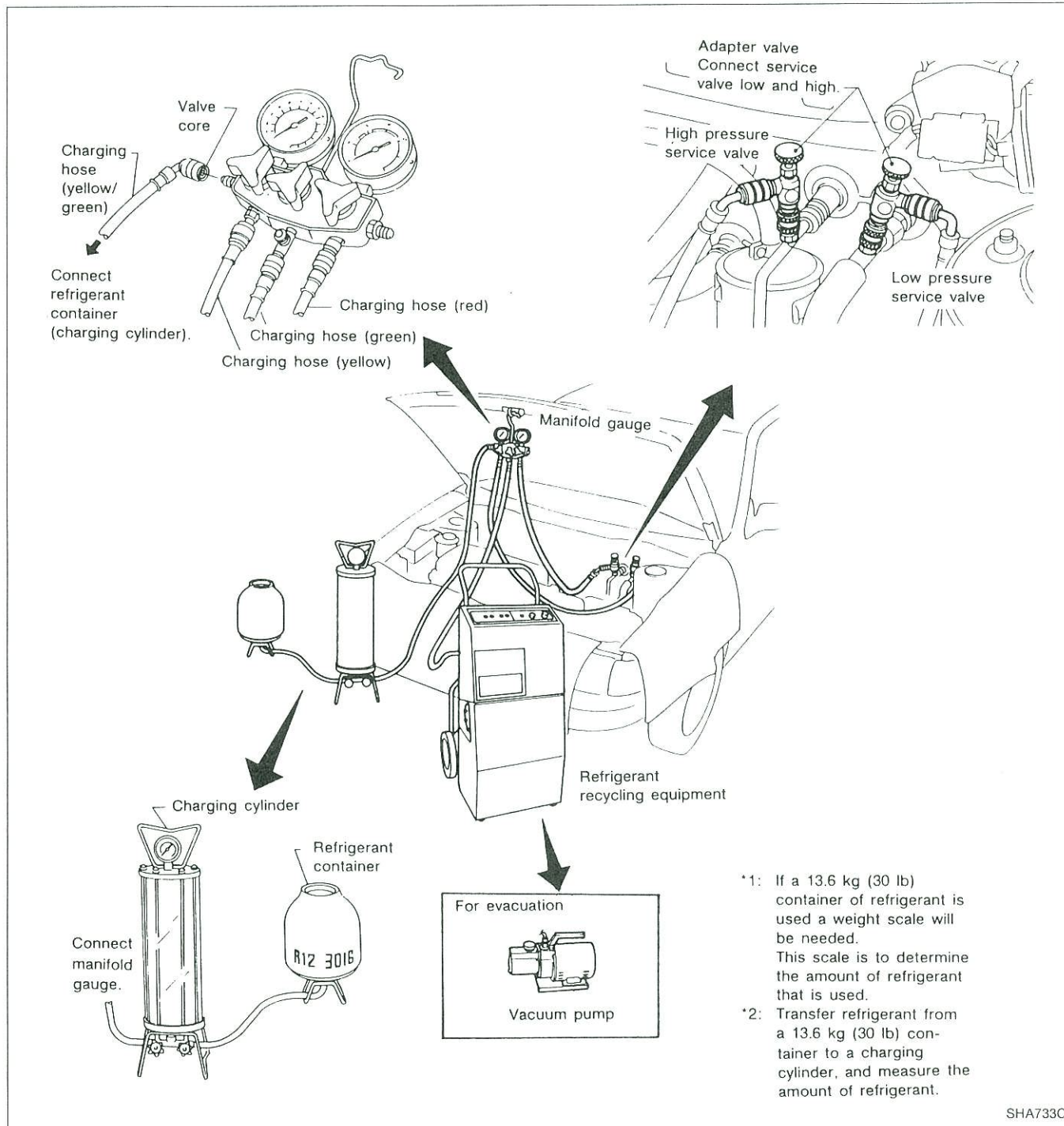
DISCHARGING, EVACUATING, CHARGING AND CHECKING

Work Procedure



Setting of Service Tools

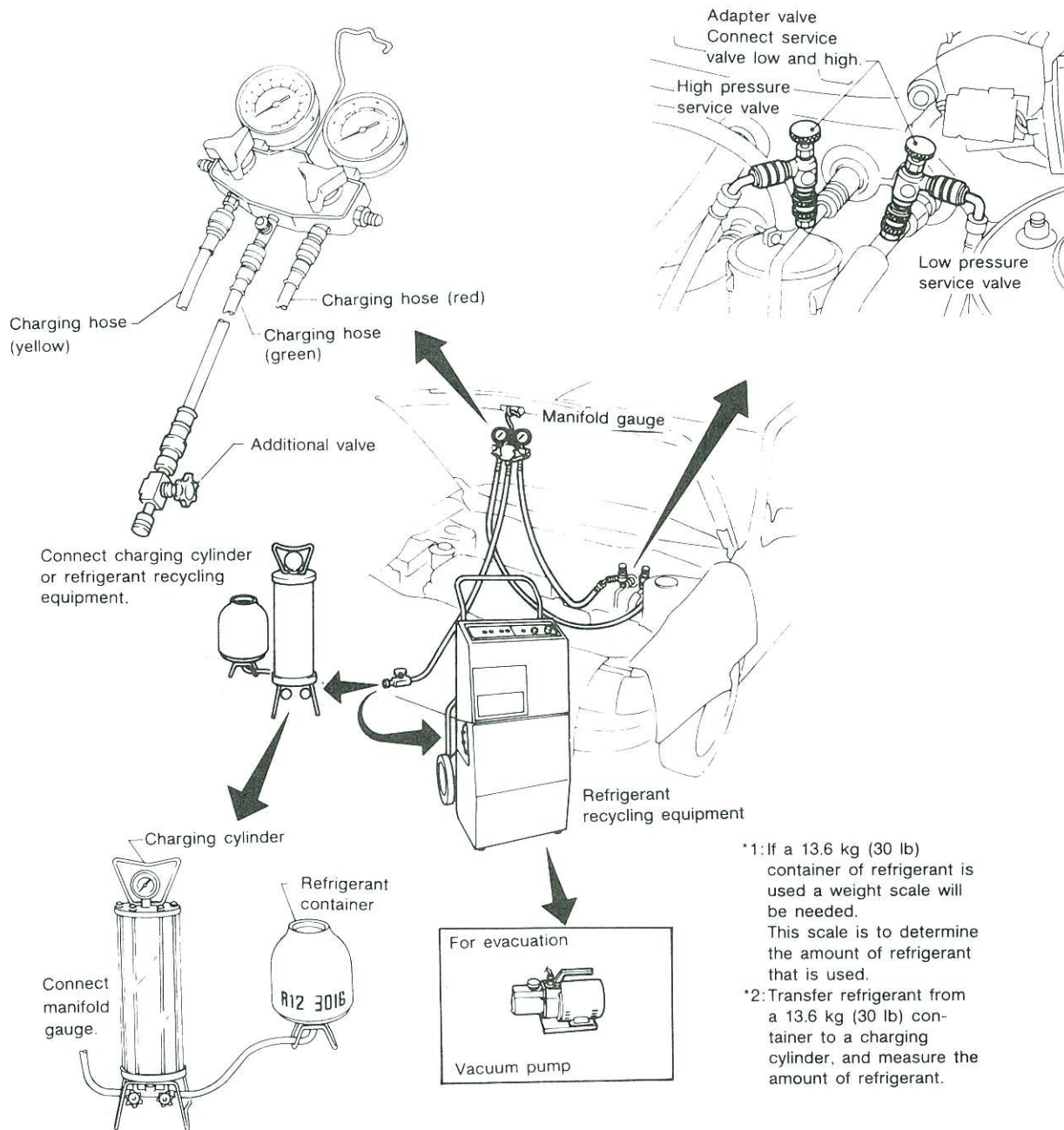
Make sure that the service tools are set as indicated below and that no refrigerant is leaking.



DISCHARGING, EVACUATING, CHARGING AND CHECKING

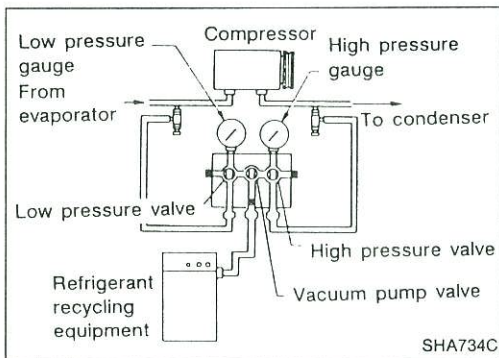
Setting of Service Tools (Cont'd)

When a 3-valve type manifold gauge is unavailable, use a 2-valve type manifold gauge with one additional valve at the end of the charging hose.



SHA761C

DISCHARGING, EVACUATING, CHARGING AND CHECKING

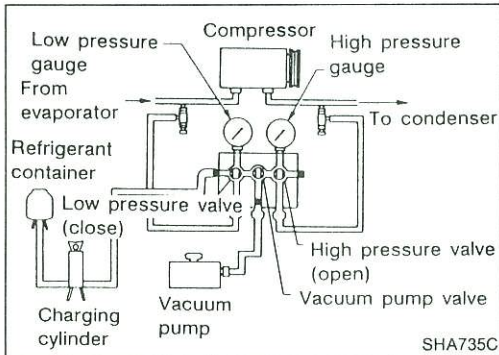


Discharging

WARNING:

Discharge only into your recycling equipment. Do not release refrigerant into the air.

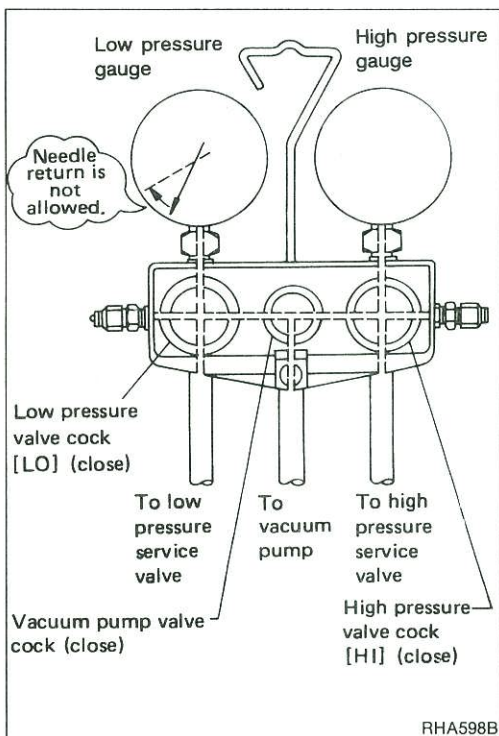
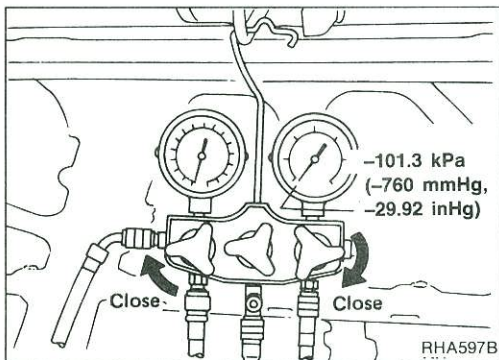
Slowly open the valves to discharge the refrigerant. If they are opened quickly, compressor oil will also be discharged.



Evacuation

EVACUATION PROCEDURE

1. Completely tighten the low pressure and high pressure adapter valves. Turn on the high and low pressure service valves.
2. Open the high and low pressure valves and vacuum pump valve of the manifold gauge set.
3. Run the vacuum pump.
4. Perform evacuation for more than five minutes to stabilize the vacuum inside the system. Check to ensure that the low pressure gauge indicates -98.6 to -101.3 kPa (-740 to -760 mmHg, -29.13 to -29.92 inHg).
5. Shut off the high and low pressure valves and vacuum pump valve of the manifold gauge set.



CHECKING AIRTIGHTNESS

1. Shut off the high and low pressure valves and vacuum pump valve of the manifold gauge set, and leave the system as it is for 5 to 10 minutes.
2. Make sure that the needle of the low pressure gauge will not move back toward the atmospheric pressure side (gauge pressure 0).

If any reverse movement is noted, it indicates poor system airtightness. Service the system until airtightness is complete. If pressure changes approx. 13.3 kPa (100 mmHg, 3.94 inHg) in 10 minutes, the refrigerant in the system will be exhausted in about one month.

DISCHARGING, EVACUATING, CHARGING AND CHECKING

Evacuation (Cont'd)

MAINTENANCE

If inadequate airtightness is detected, check and service the following portions:

Leak from pipe joints	Leak from manifold gauge set
<ul style="list-style-type: none">● Contaminated, damaged, or deformed O-ring● No oil applied when connecting pipe● Excessive or insufficient tightening of pipe joint	<ul style="list-style-type: none">● Malfunctioning hose● Improper installation of manifold● Malfunctioning valve● Malfunctioning packing

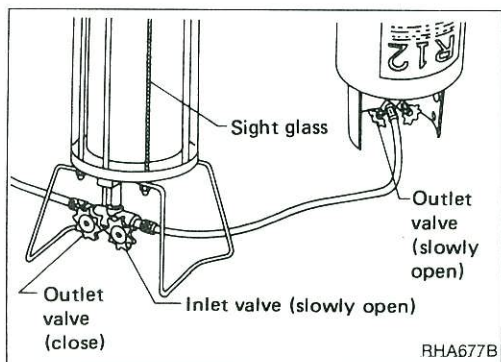
EVACUATION

If no abnormality is found during the airtightness check, perform evacuation again for more than 20 minutes.

1. Run the vacuum pump.
2. Open the high and low pressure valve and vacuum pump valve of the manifold gauge set.
3. Evacuate for more than 20 minutes.
4. Close the high and low pressure valves and vacuum pump valve of the manifold gauge set.

Charging Refrigerant

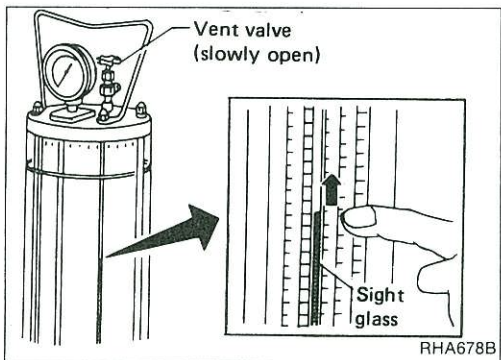
Install the charging cylinder correctly to the vehicle. Refer to "Setting of Service Tools".



PRELIMINARY CHARGING OF REFRIGERANT-1

1. Make sure that the inlet and outlet valves of the charging cylinder are closed.
2. Slowly open the outlet valve of a refrigerant container [13.6 kg (30 lb)].
3. Slowly open the inlet valve of the charging cylinder.

The refrigerant will flow into the sight glass of the charging cylinder as the valve is opened.

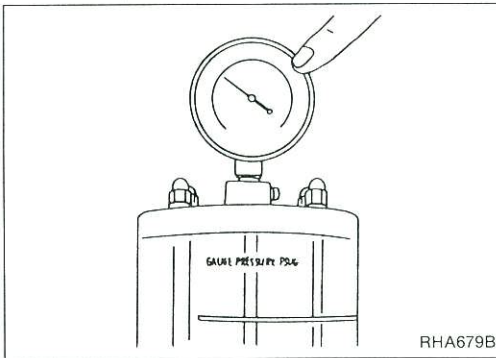


4. Slowly open the upper vent valve to release pressure from the charging cylinder. While doing so, continue charging until the required amount of refrigerant is reached.

The refrigerant volume changes with the temperature and pressure. It is necessary to charge refrigerant with a little more than the required amount (indicated on the sight glass).

5. Close the inlet valve and upper vent valve of the charging cylinder.

Charging Refrigerant (Cont'd)

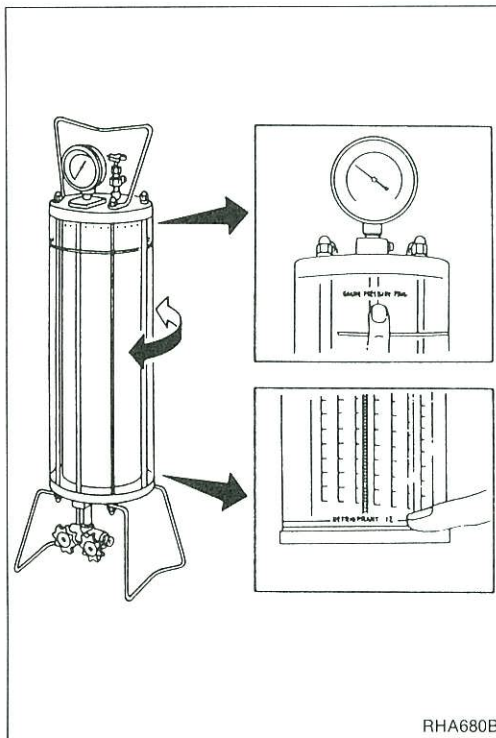


6. Turn on the heater switch (the charging cylinder is provided with a heater.)

The refrigerant charging time can be reduced by heating the refrigerant to increase its pressure. In this case, do not allow the pressure in the cylinder to rise higher than 1,030 kPa (10.5 kg/cm², 150 psi). (If pressure rises above this level, turn off the heater.) The pressure in the charging cylinder can be measured by the upper pressure gauge.

EVACUATION AND AIRTIGHTNESS CHECK

Refer to "EVACUATION PROCEDURE" and "CHECKING AIRTIGHTNESS" in "Evacuation".



SETTING OF FLOW METER

1. Rotate the charging cylinder main body until the scale for R12 is at the correct position on the sight glass.
2. Read the charging cylinder pressure gauge.
3. Rotate the charging cylinder so that the scale of the charging cylinder agrees with the pressure value indicated on the pressure gauge.
4. Open the outlet valve of the charging cylinder.

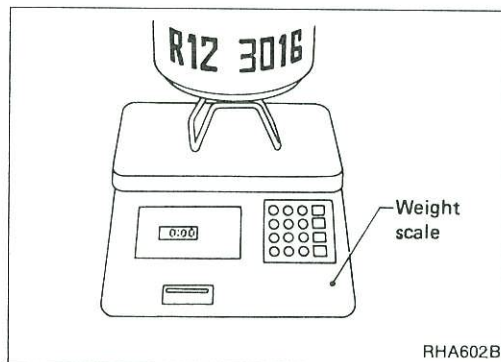
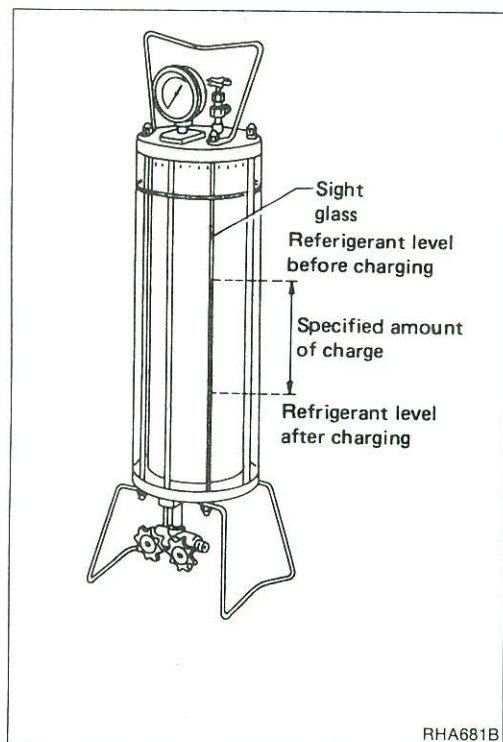
Charging Refrigerant (Cont'd)

CALCULATING CHARGING AMOUNT OF REFRIGERANT

1. Record the amount of refrigerant in the sight glass before charging.
2. Subtract the required amount of refrigerant (charge quantity specified for the vehicle) from the amount of refrigerant recorded in step 1. Charge refrigerant into the system until the remaining value equals to the value indicated on the sight glass.

Example:

Level in sight glass: 3 lb 8 oz Charge specification (from S.D.S.) 2.0 - 2.4 lb. Calculate charge quantity into lb and oz as follows: 1 lb = 16 oz, and 0.1 lb = 1.6 oz, so that 2.0 lb = 32 oz, 2.4 lb = 32 + (4 x 1.6) = 32 + 6.4 = 38.4, round off to 38. Therefore our charge quantity will be between 32 and 38 oz, or 2 lb 0 oz to 2 lb 6 oz. Subtract 2 lb 6 oz from the level in the sight glass (3 lb 8 oz) = 1 lb 2 oz. This will be our ending point.



If a flow meter is not available, the amount of charged refrigerant also can be determined by subtracting the weight of the canister measured after charging from its weight measured before charging.

Charging Refrigerant (Cont'd)

PRELIMINARY CHARGING OF REFRIGERANT-2

1. Slowly open the high pressure side valve of the manifold gauge to charge refrigerant from the high pressure side.
2. Close the high pressure valve after charging approx. 200 g (7.05 oz) refrigerant.

CAUTION:

The refrigerant in the charging cylinder is kept in the liquid state, so the refrigerant should be charged from high pressure side. Do not start the engine with the high pressure valve kept open.

PRELIMINARY CHECK FOR REFRIGERANT LEAKS

Refer to "PRELIMINARY CHECK FOR REFRIGERANT LEAKS" in "Charging Refrigerant".

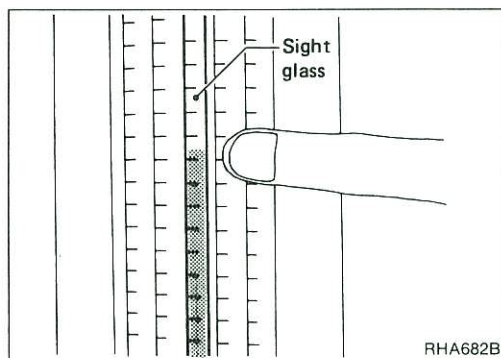
CHARGING REFRIGERANT

1. Slowly open the high pressure valve of the manifold gauge, and charge the calculated amount of refrigerant in "CALCULATING CHARGING AMOUNT OF REFRIGERANT".

CAUTION:

The refrigerant in the charging cylinder is kept in the liquid state, so the refrigerant should be charged from high pressure side. Do not start the engine with the high pressure valve kept open.

2. Close the high pressure valve of the manifold gauge.
3. Make sure that the calculated amount of refrigerant is in the sight glass.
4. Close the charging cylinder outlet valve.
5. Turn off the heater if it is on (when using heater equipped type).



Inspection for Refrigerant Leaks

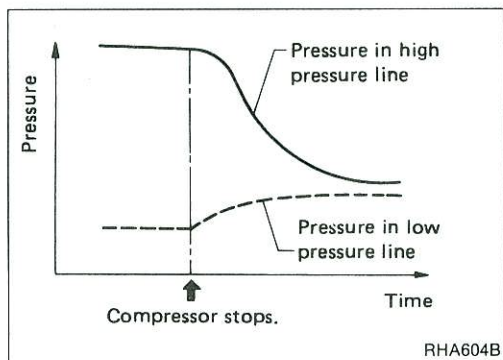
WORK PROCEDURE

To facilitate inspection for refrigerant leaks, establish the following conditions:

- Start the engine.
- Run the air conditioner.
- Set the blower fan control to MAX.
- Set the temperature control to FULL COLD.
- Run the refrigerant system for more than 5 minutes after setting the above-mentioned conditions (to circulate the refrigerant through the system).

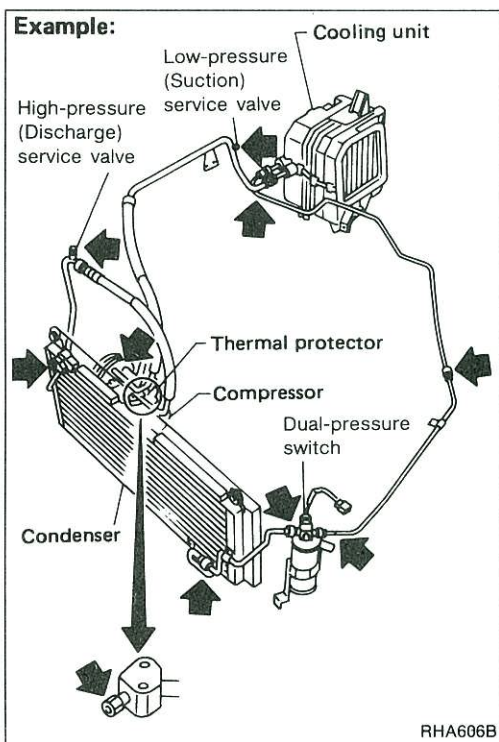
DISCHARGING, EVACUATING, CHARGING AND CHECKING

Inspection for Refrigerant Leaks (Cont'd)



Refrigerant leaks should be checked immediately after stopping the engine, beginning with the high pressure line, using a gas leak detector. This is because the pressure in the high pressure line drops gradually after the refrigerant circulation stops while the pressure in the low pressure line rises gradually as shown in the graph. Leaks can be detected easily when pressure is high.

To prevent detecting errors, make sure that there is no refrigerant vapor or tobacco smoke in the vicinity of the vehicle. It is also necessary to shield the vehicle from the wind so that the leaking refrigerant is not blown away.



INSPECTION POINTS

Check carefully each of the tube joints. To check, wipe the portion to be checked with waste cloth, and move the tester probe all around the joint.

Compressor

Check the shaft seals and bolt holes, and also around the magnet clutch.

Receiver drier

Check the pressure valve, safety valve and the fusible plug mounts.

Service valve

Check all around the service valves. Ensure that the valve core is not loose. The service valve cap must be attached to the valve (to prevent leak). Also check that there are no foreign objects inside the cap.

Inside of cooling unit

To check, insert the leak tester probe into the drain hose immediately after stopping the engine. (Keep the probe inserted for more than 10 seconds.)

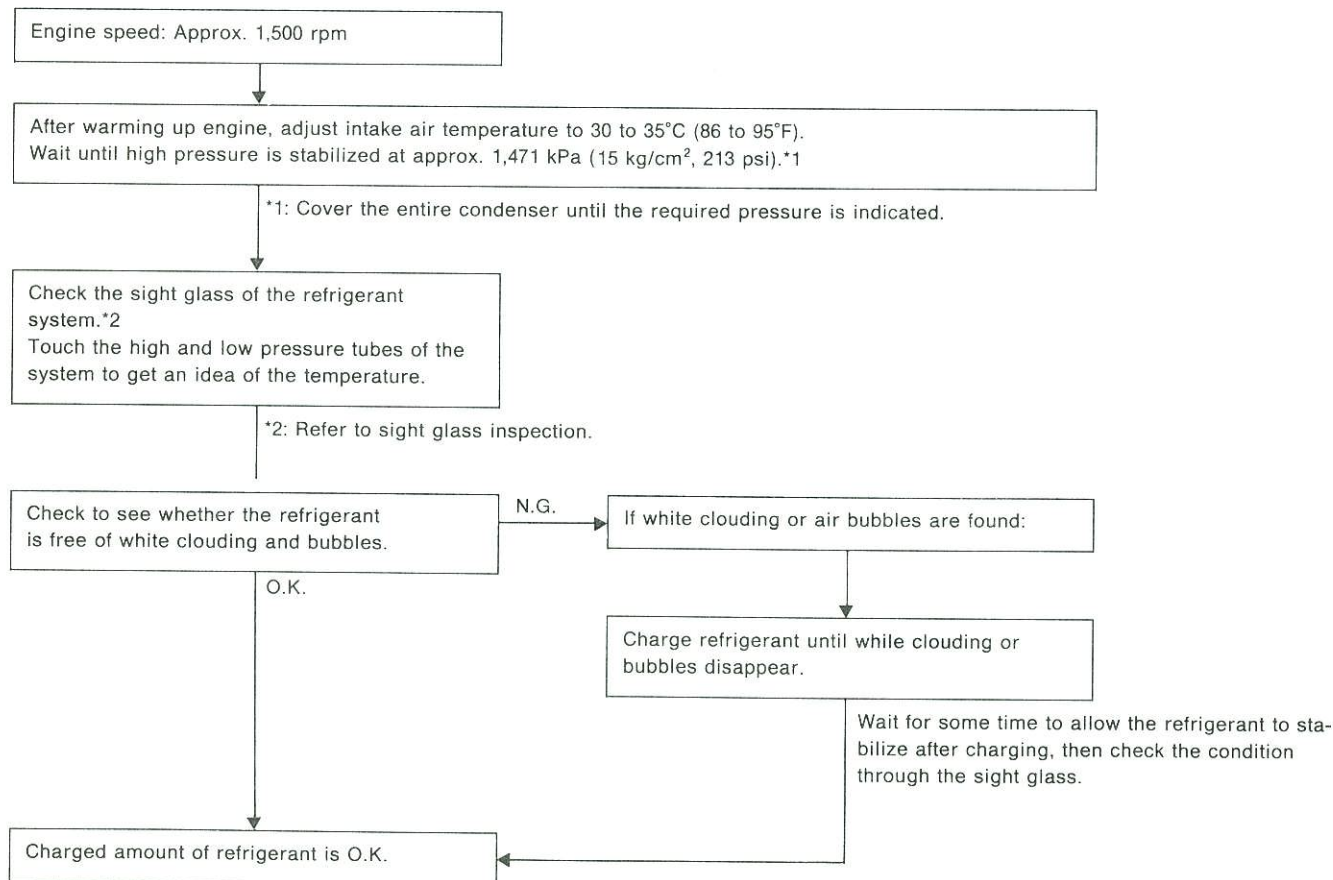
Confirmation of Amount of Charged Refrigerant

The amount of refrigerant charged into the system can be observed through the sight glass by watching the flow of the refrigerant and by reading the high pressure and low pressure manifold gauges under the following conditions:

CONDITIONS

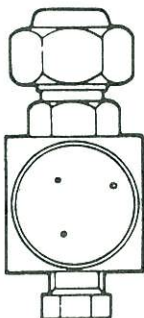
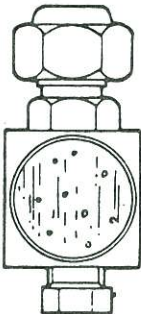

- Doors:
Close completely.
- Window glasses:
Close completely.
- Intake door position:
RECIRC
- Mode door position:
VENT
- Blower fan:
HI
- TEMP control:
Optional (Set so that intake air temperature is 30 to 35°C (86 to 95°F).
- AIR CON switch:
ON
- Engine speed:
Approx. 1,500 rpm
Approx. 1,500 rpm

WORK PROCEDURE



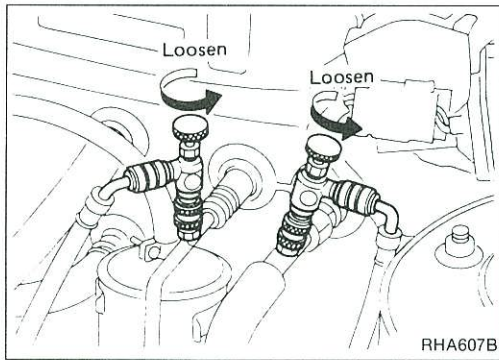
DISCHARGING, EVACUATING, CHARGING AND CHECKING

Confirmation of Amount of Charged Refrigerant (Cont'd)

Amount of charge Check item	Appropriate	Refrigerant is insufficient	Almost no refrigerant	Overcharged, or air in system
Temperature of high and low pressure pipes	High pressure side is hot while low pressure side is cold.	High pressure side is warm and low pressure side is somewhat cold.	No difference is felt between high and low pressure sides.	High pressure side is very hot.
Flow of refrigerant viewed through sight glass	Mostly transparent. Occasionally some bubbles are seen when engine rpm is increased or decreased. 	Bubbles are always flowing. Refrigerant is cloudy. 	Nothing is visible. 	If overcharged, no bubbles are seen. If there is air in the system, large bubbles are seen.
Pressure	Normal high pressure: 1,373 - 1,765 kPa (14 - 18 kg/cm ² , 199 - 256 psi) Normal low pressure: 147 - 294 kPa (1.5 - 3 kg/cm ² , 21 - 43 psi)	Both high and low pressure values are insufficient.	High pressure value is very small.	Both high and low pressure values are excessive.
Action to take	Air bubbles may be generated when the receiver drier strainer is clogged, or when the expansion valve is opened excessively.	Add refrigerant after checking for leaks.	Check the refrigerant system.	Stop the compressor and extract excessive refrigerant. If air is found, perform evacuation, then charge the specified amount of refrigerant.

CAUTION:

The condition of bubbles seen through the sight glass as well as the intake and discharge pressures are influenced by the ambient temperature, wind velocity, weather, and by the air temperature in front of the condenser, etc.



Recovery Procedure

REMOVAL OF REFRIGERANT CHARGING DEVICE

1. Completely loosen the adapter valves of the low pressure and high pressure lines.

The inner valve of the adapter valve will prevent the refrigerant from leaking out.

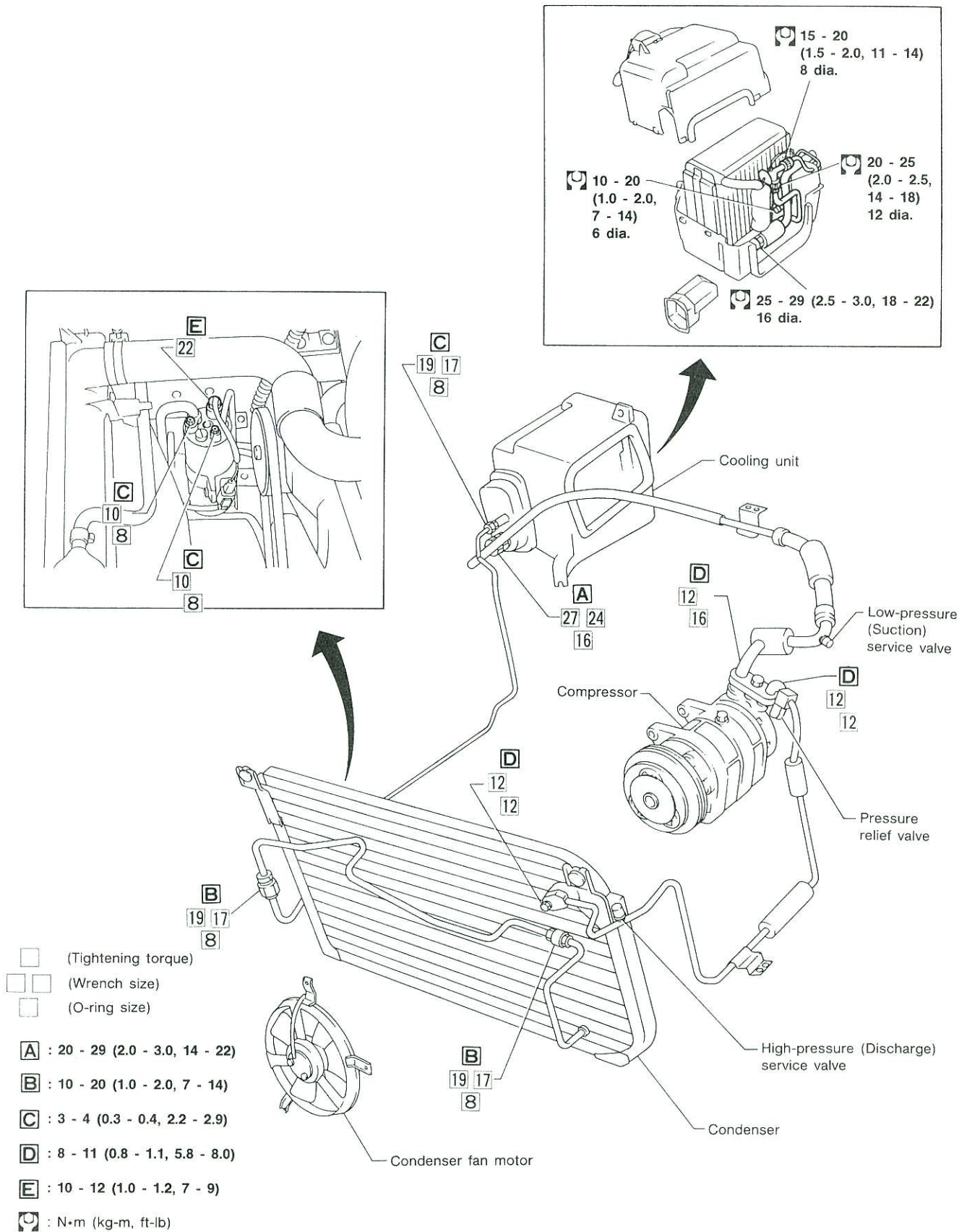
2. Remove both the high-pressure and low-pressure side adapter valves from the on-vehicle service valve.

If adapter valve is not used for charging, proceed as follows to minimize the refrigerant discharge into the atmosphere.

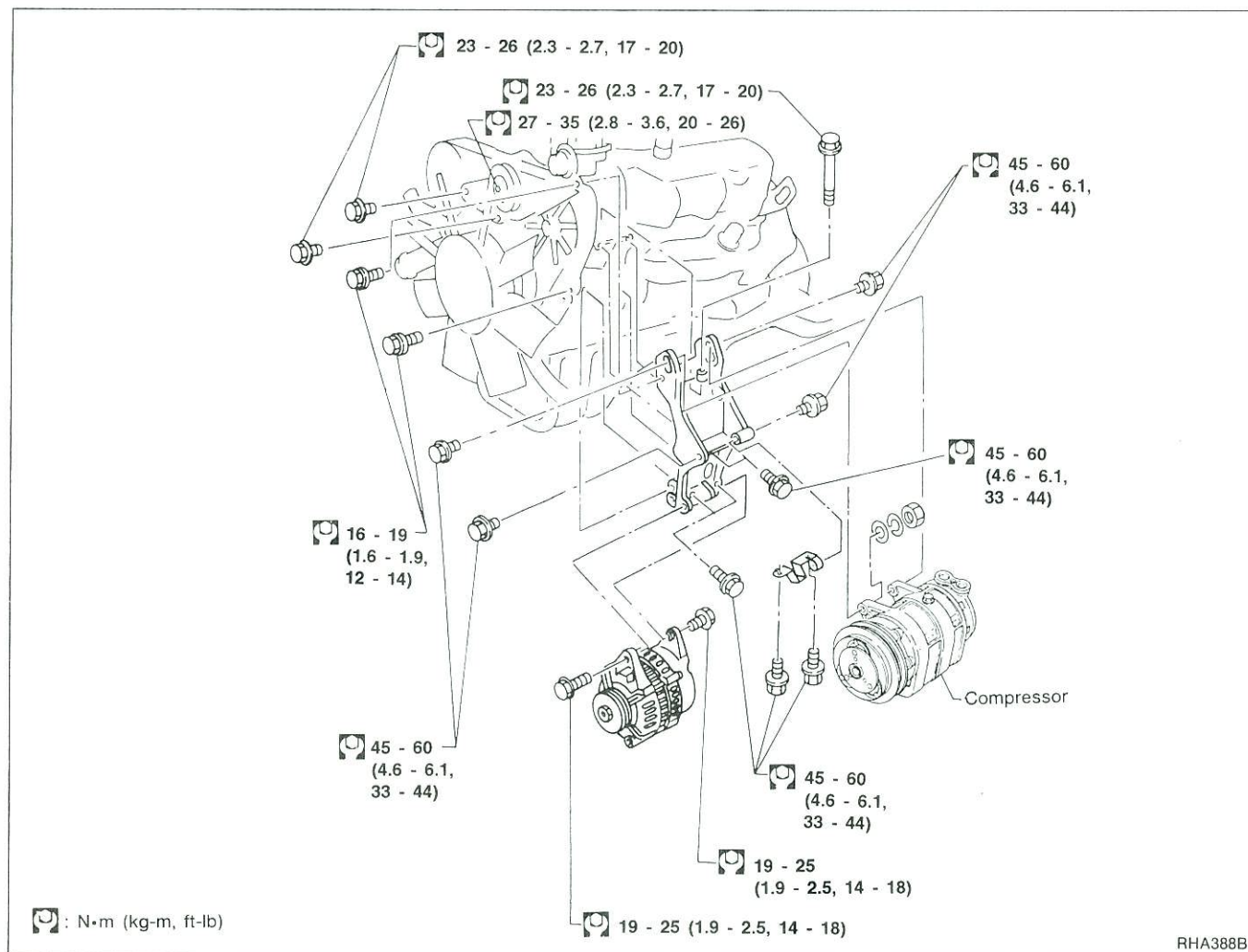
3. Loosen the nut of the low pressure charging hose while pressing it against the service valve to prevent refrigerant leakage.
4. After loosening the nut, quickly remove the charge valve from the service valve.
5. Wait until the high pressure gauge indication drops to below 981 kPa (10 kg/cm², 142 psi), then similarly disconnect the high pressure charging hose.

Refrigerant Lines

- Refer to pages HA-13 - 14 regarding "Precautions for Refrigerant Connections".



Compressor Mounting



Belt Tension

- Refer to MA section.

Fast Idle Control Device (F.I.C.D.)

- Refer to EF & EC section.

General

When replacing any refrigerant cycle component part of a compressor, condenser, liquid tank, cooling unit, etc., it is essential to drain the refrigerant in advance.

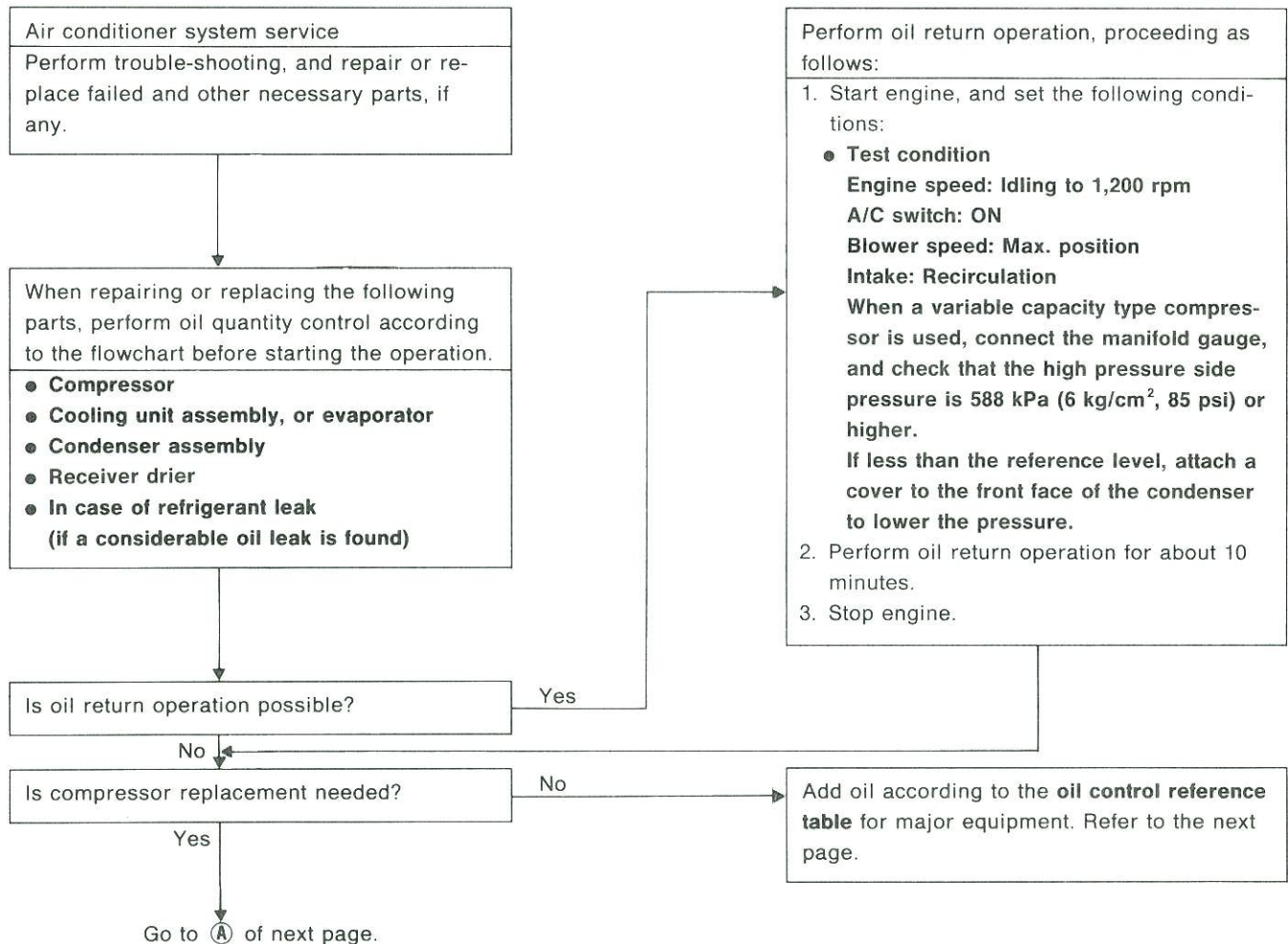
The refrigerant has a large affinity for the compressor oil, and a part of the oil is always circulating throughout the cycle together with the refrigerant. In other words, the oil is distributed throughout the cycle. Before draining the refrigerant, it is therefore necessary to collect as much compressor oil as possible by performing the oil return operation. If the compressor oil is not replenished, or added fully after replacing component parts of refrigerant cycle, the following trouble may occur:

- **Insufficient oil: Seized compressor**
- **Excessive oil: Poor cooling (Excess oil attached to parts obstructs normal heat exchange.)**

For this reason, whenever replacing any parts of the refrigerant cycle (except the compressor), it is necessary to replenish the compressor oil removed together with such parts. On the other hand, a new compressor contains a specified amount of compressor oil, and simple installation of the new compressor results in excessive oil quantity in the cycle. To prevent this, the oil must be extracted from the cycle so that the optimum oil quantity can be ensured inside the refrigerant cycle.

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.



COMPRESSOR OIL — Checking and Adjusting

Checking and Adjusting (Cont'd)

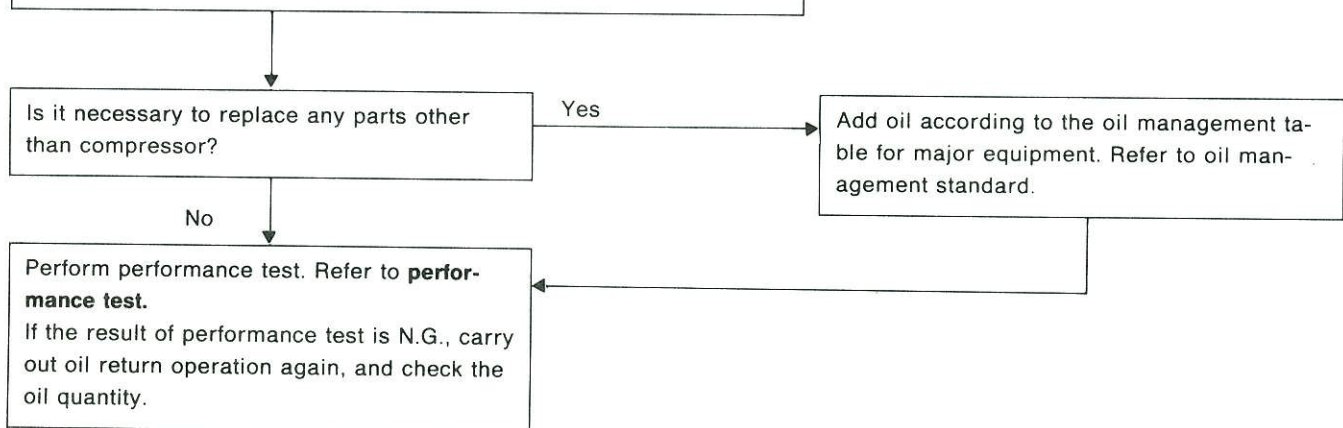
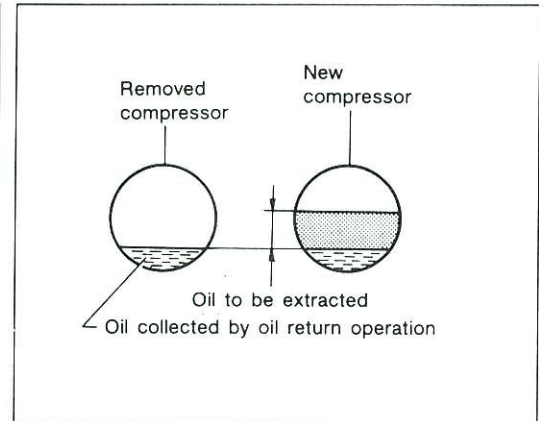
A
↓

Remove compressor oil from the new compressor according to the following table so that the remaining amount of oil in the new compressor is equal to the amount of recollected oil in the removed compressor.

Unit: ml (US fl oz, Imp fl oz)

	Oil quantity contained in new compressor		Amount of collected oil	Amount of oil extracted from new compressor
Rotary type	DKV14C DKV14B	200 (6.8, 7.0)	70 (2.4, 2.5) or over	200 (6.8, 7.0) — [Amount collected + 20 (0.7, 0.7)]
			Below 70 (2.4, 2.5)	110 (3.7, 3.9)
	NVR140 NVR140S	200 (6.8, 7.0)	90 (3.0, 3.2) or over	200 (6.8, 7.0) — [Amount collected + 20 (0.7, 0.7)]
			Below 90 (3.0, 3.2)	90 (3.0, 3.2)
Swash plate type	DKS16H DKS16N	200 (6.8, 7.0)	130 (4.4, 4.6) or over	200 (6.8, 7.0) — [Amount collected + 20 (0.7, 0.7)]
			Below 130 (4.4, 4.6)	70 (2.4, 2.5)
	MKS170 MJS130	150 (5.1, 5.3)	—	80 (2.7, 2.8)
Variable displacement type	V-5	236 (8.0, 8.3)	95 (3.2, 3.3) or over	236 (8.0, 8.3) — [Amount collected + 20 (0.7, 0.7)]
			Below 95 (3.2, 3.3)	150 (5.1, 5.3)

Precharged amount of oil for some models differs from figures listed above. Refer to S.D.S. of each model when servicing compressor oil.



COMPRESSOR OIL — Checking and Adjusting

Oil Management Standard for Major Equipment

When any major unit of the air conditioner has been replaced, add the following amount of oil.

Major unit	Amount of oil to be added		Remarks
	mℓ (US fl oz, Imp fl oz)	Percent (%) ^{*1}	
Cooling unit, evaporator	45 - 75 (1.5 - 2.5, 1.6 - 2.6)	30	Add compressor oil little by little from the low pressure side of the system cycle.
Condenser	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	20	
Liquid tank	15 - 25 (0.5 - 0.8, 0.5 - 0.9)	10	
In case of refrigerant leak	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	—	Add if large of oil leak is indicated. ^{*2}
	—	—	Addition of oil is not required if no oil leak is indicated.

^{*1}: The percentage of the total amount of system oil

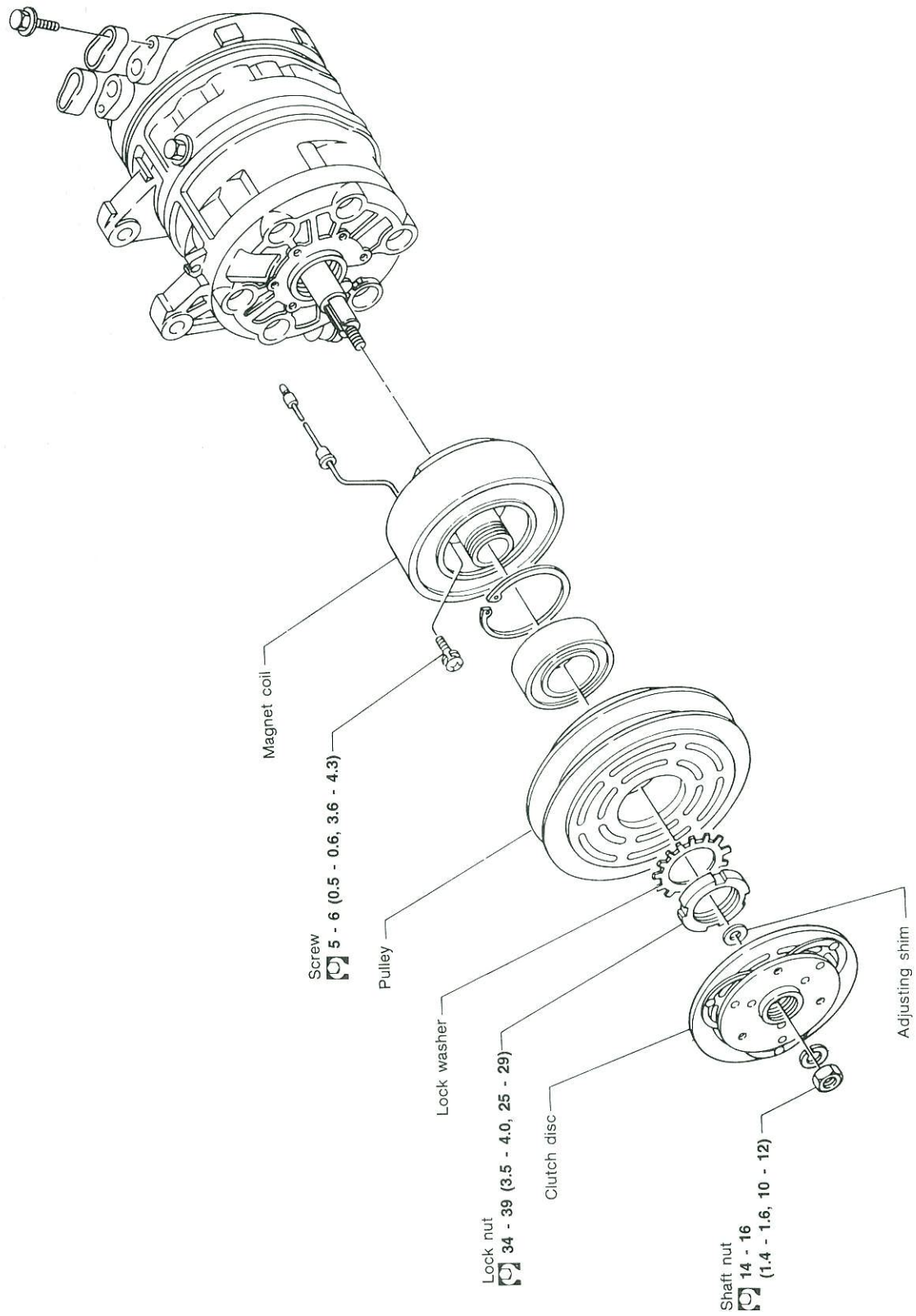
^{*2}: Sudden leakage of refrigerant due to fusion of a fusible plug, opening of a relief valve, or damage of a component may accompany oil leak.

Compressor Oil

The recommended brand of compressor oil for a car air conditioner system is shown below. For the oil quantity, refer to the section “**Checking and Adjusting**”.

SUNISO 5GS or equivalent

COMPRESSOR — Model DKS-16H (ZEXEL make)

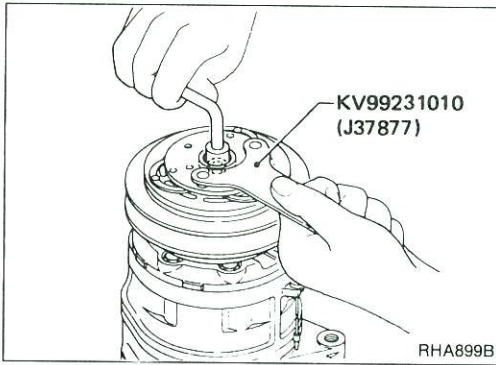


\square : N·m (kg-m, ft-lb)

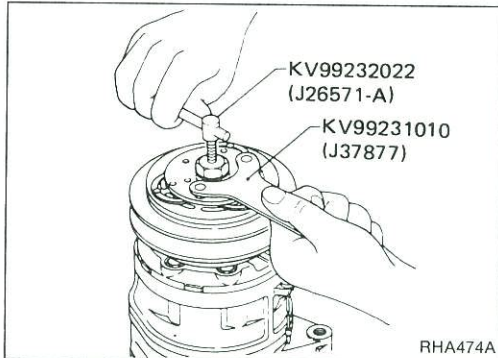
Compressor Clutch

REMOVAL

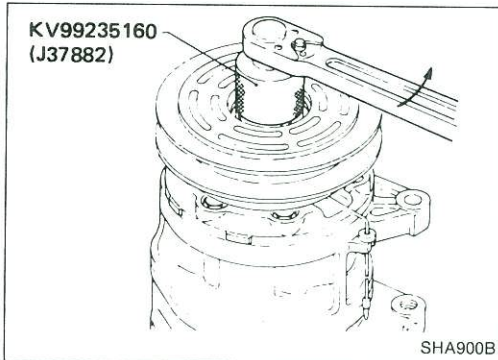
- When removing shaft nut, hold clutch disc with clutch disc wrench.



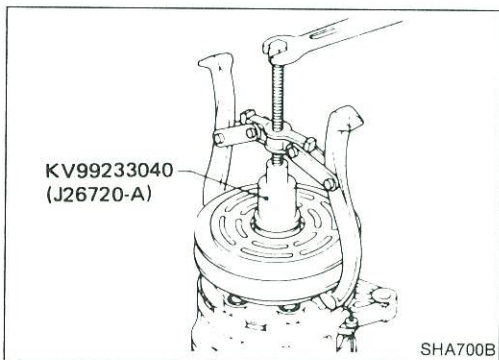
- Using clutch disc puller, clutch disc can be removed easily.



- Bend down pawl of lock washer.
- When removing pulley, remove lock nut with nut wrench.



- Remove the pulley by hand. If difficult, use puller pilot.



Compressor Clutch (Cont'd)

INSPECTION

Clutch disc

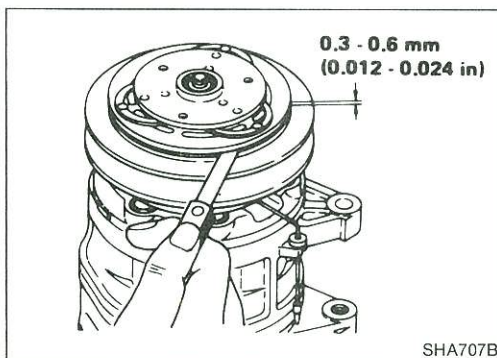
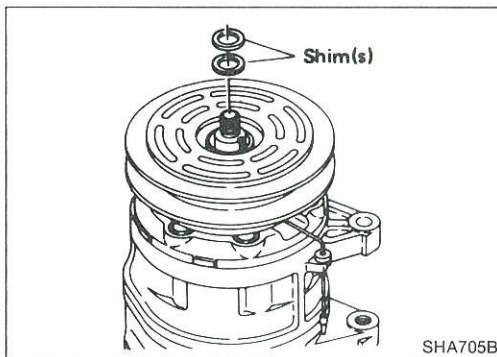
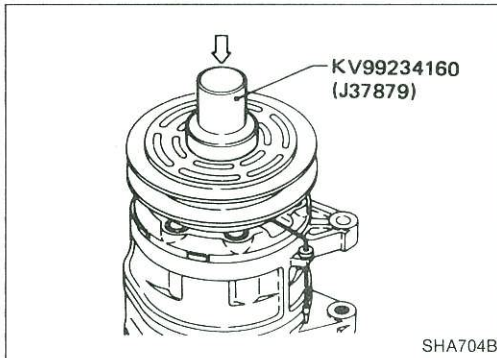
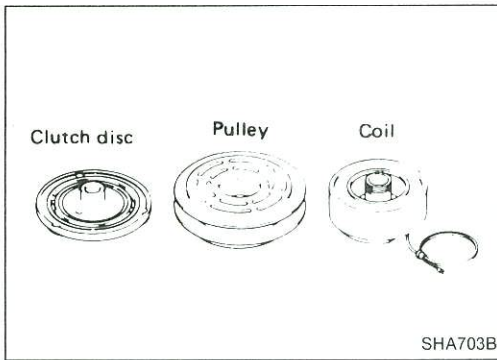
If the contact surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

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 drive plate should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil

Check coil for loose connection or cracked insulation.



INSTALLATION

- Install the key in the keyway on the compressor drive shaft.
- Install the coil to compressor (lead wire up) and tighten the mounting screws.
- Install the lead wire with its holder into the hold.

- Install lock washer and nut with nut wrench.
- Bend one pawl of the lock washer up against the nut to prevent the nut from loosening.

- Check to ensure that the clutch clearance is between 0.3 to 0.6 mm (0.012 to 0.024 in). Adjust the clearance using shim(s) as necessary.

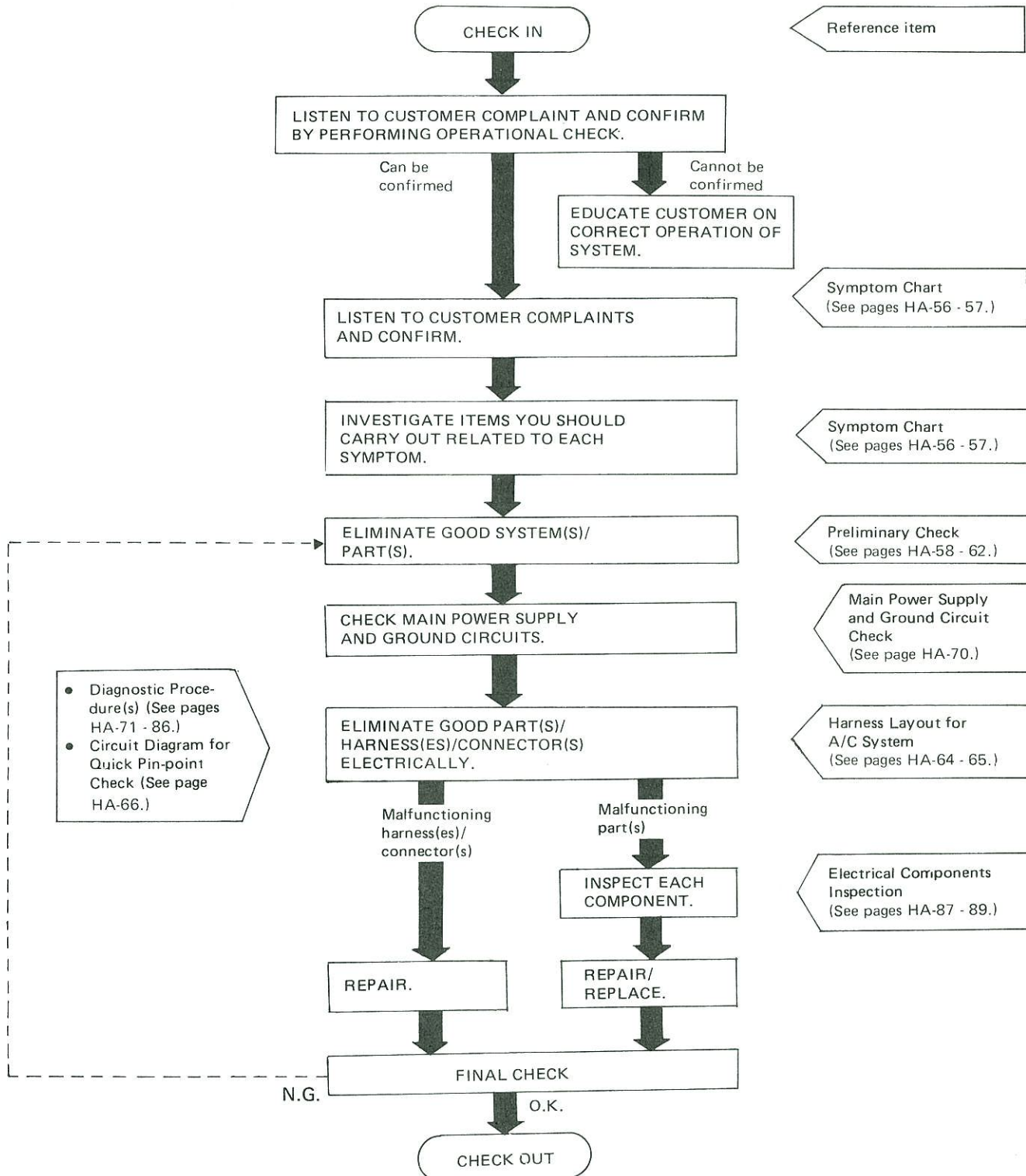
BREAK-IN OPERATION

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.

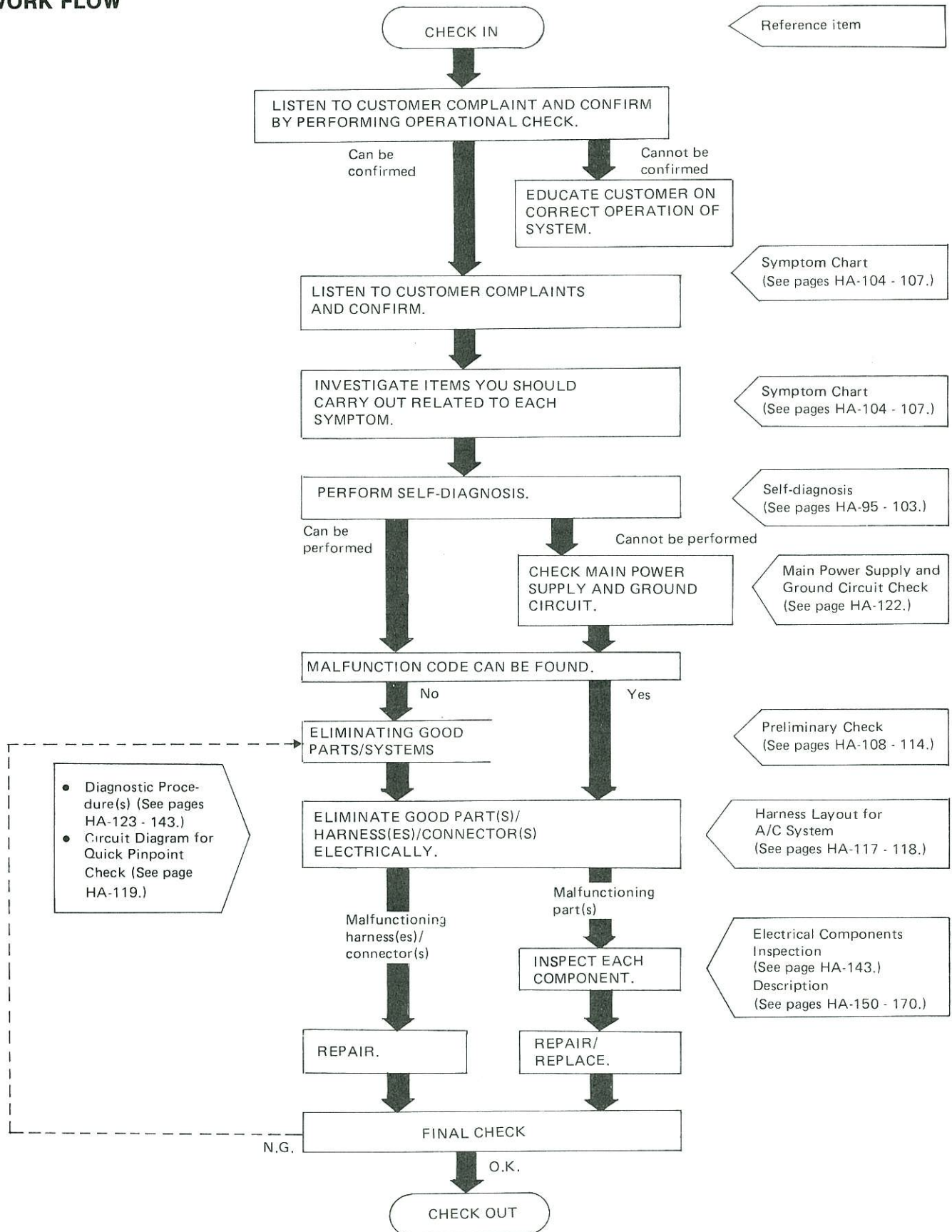
How to Perform Trouble Diagnoses for Quick and Accurate Repair — Manual Air Conditioner

WORK FLOW



How to Perform Trouble Diagnoses for Quick and Accurate Repair — Auto Air Conditioner

WORK FLOW



Operational Check — Manual Air Conditioner

The purpose of the operational check is to confirm that the system operates as it should. The systems which are checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase.

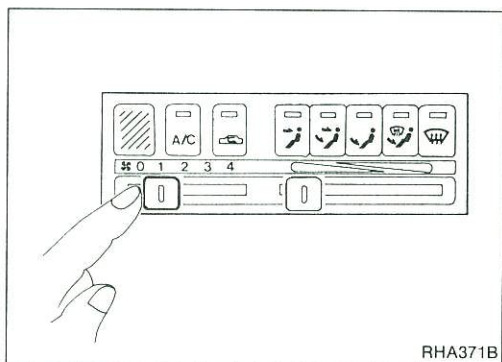
CONDITIONS:

Engine running at normal operating temperature.

PROCEDURE:

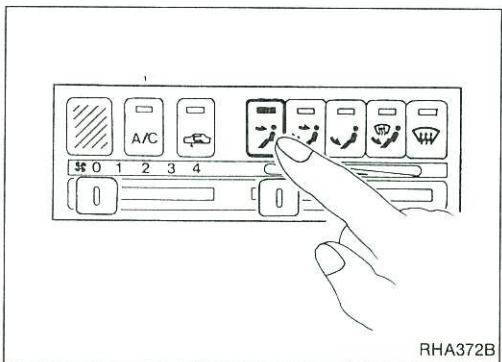
1. Check blower

- 1) Slide Fan lever to 1-speed.
Blower should operate on 1-speed.
- 2) Then slide Fan Lever to 2-speed.
- 3) Continue checking blower speed until all four speeds are checked.
- 4) Leave blower on 4-speed.



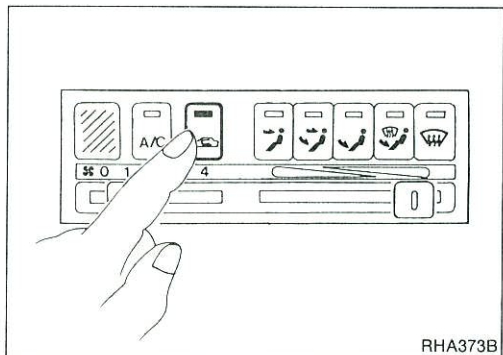
2. Check discharge air

- 1) Press the VENT button.
VENT indicator should light.
- 2) Confirm that all discharge air comes out of face vents.
- 3) Press the B/L button.
B/L indicator should light.
- 4) Confirm that discharge air comes out of face vents and foot vents.
- 5) Press the FOOT button.
FOOT indicator should light.
- 6) Confirm that discharge air comes out of foot vents, with some air from defroster vents.
- 7) Press the F/D button.
F/D indicator should light.
- 8) Confirm that discharge air comes out of foot vents, with some air from defroster vents, and that intake door position is at FRE.
- 9) Press the DEF button.
DEF indicator should light.
- 10) The discharge air should be coming only from defroster vents. At the same time compressor should turn ON and intake door position be at FRE.



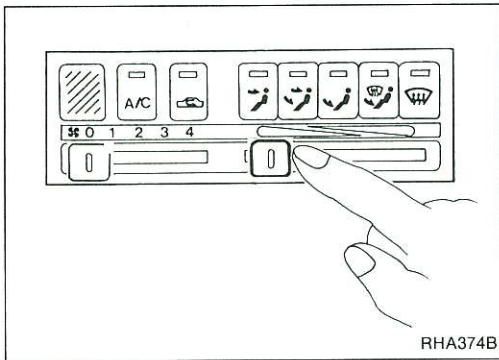
3. Check recirc

- 1) Press RECIRC button.
RECIRC indicator should light.
- 2) Listen for intake door position change (you should hear blower sound change slightly).



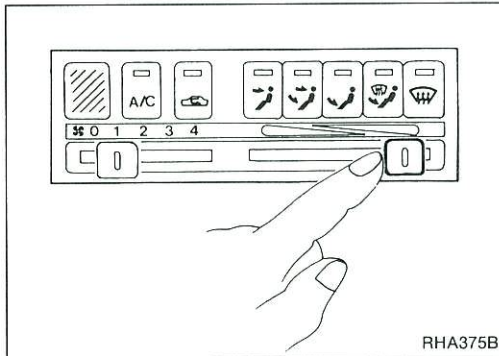
DIAGNOSES — Overall System

Operational Check — Manual Air Conditioner (Cont'd)



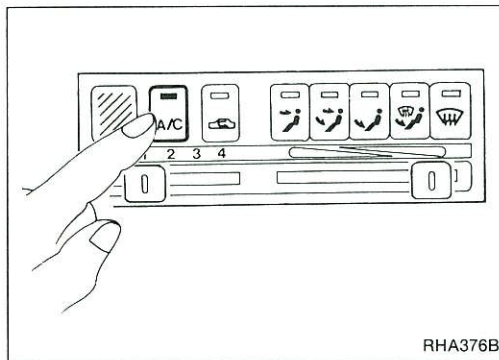
4. Check temperature decrease

- 1) Slide temperature control lever to full cold.
- 2) Check for cold air at discharge air outlets.



5. Check temperature increase

- 1) Slide temperature control lever to full hot.
- 2) Check for hot air at discharge air outlets.



6. Check air conditioner switch

Move the fan control lever to the desired (1 to 4-speed) position and push the air conditioner button to turn ON the air conditioner.

The indicator light should come on when air conditioner is ON.

Operational Check — Auto Air Conditioner

The purpose of the operational check is to confirm that the system operates as it should. The systems which will be checked are the blower, mode (discharge air), ambient display, intake air, defrost, econ, auto, temperature decrease, temperature increase, and the memory function.

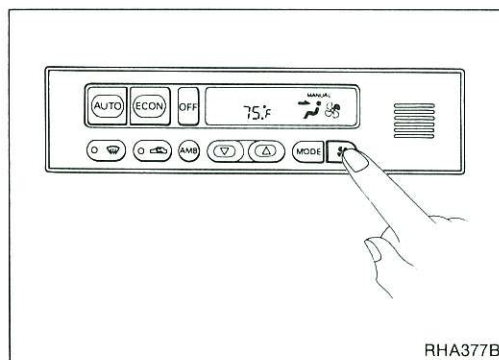
CONDITIONS:

Engine running at normal operating temperature.

PROCEDURE:

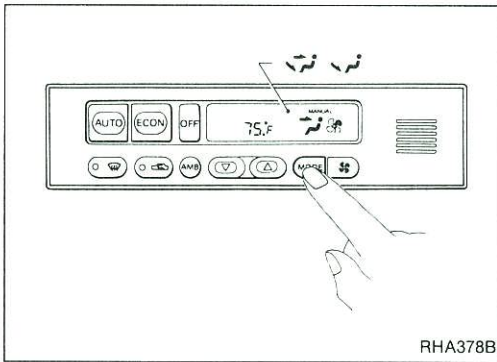
1. Check blower

- 1) Press FAN button one time.
MANUAL should appear on the display.
Blower should operate on low speed, and the fan symbol should have one blade lit ().
- 2) Press FAN button one more time.
- 3) Continue checking blower speed and fan symbol until all four speeds have been checked.
- 4) Leave blower on high speed.






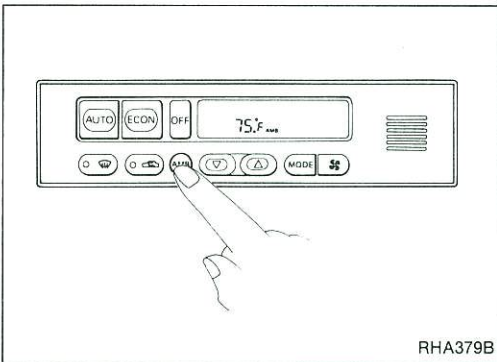
DIAGNOSES — Overall System

Operational Check — Auto Air Conditioner (Cont'd)



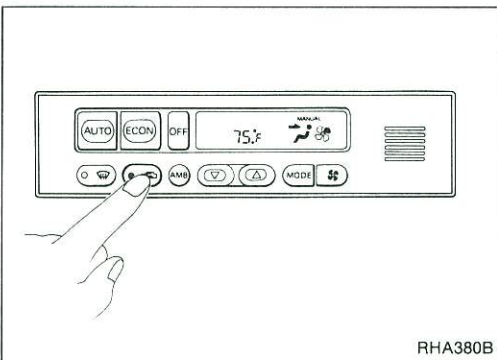
2. Check discharge air

- 1) Press the MODE button one time.
Display should show air to the face ().
- 2) Confirm that all discharge air comes out the face vents.
- 3) Press MODE button one more time.
Display should show air to face and foot (bi-level) ().
- 4) Confirm that discharge air comes out the face and foot vents.
- 5) Press MODE button one more time.
Display should show air to foot ().
- 6) Confirm that discharge air comes mostly from the foot outlets, with some air from the defroster outlets.
- 7) Leave the system in the foot mode.



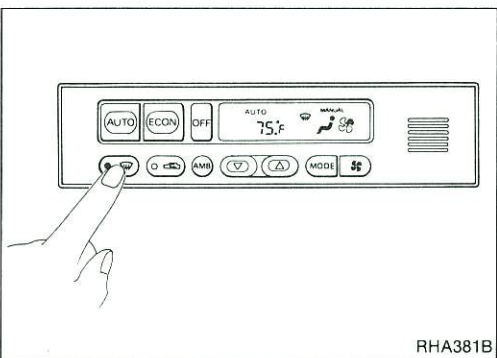
3. Check ambient display

- 1) Press the AMB button.
Display should show the outside (ambient) temperature for approximately 5 seconds.




4. Check recirc

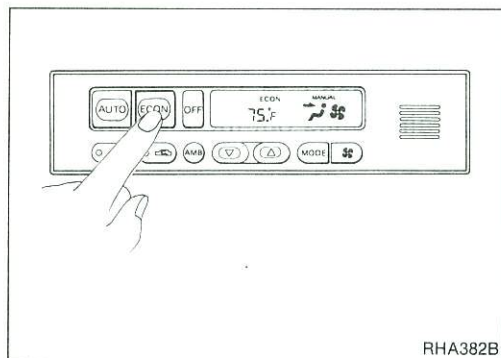
- 1) Press RECIRC button.
RECIRC indicator should light.
- 2) Listen for intake door position change (you should hear blower sound change slightly).



5. Check defrost

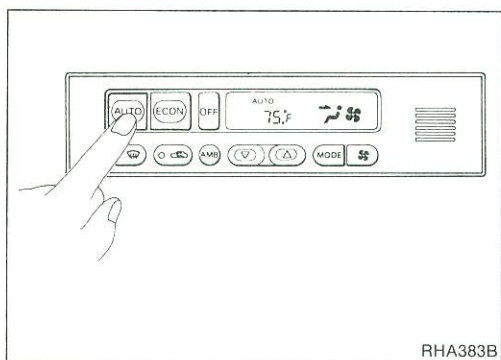
- 1) Press defrost button.
- 2) Check that RECIRC is canceled.
The discharge air should be coming only from the defrost vents.
- 3) Confirm that the compressor clutch is engaged (visual inspection).
The display should indicate AUTO, MANUAL, and defrost ().

Operational Check — Auto Air Conditioner (Cont'd)



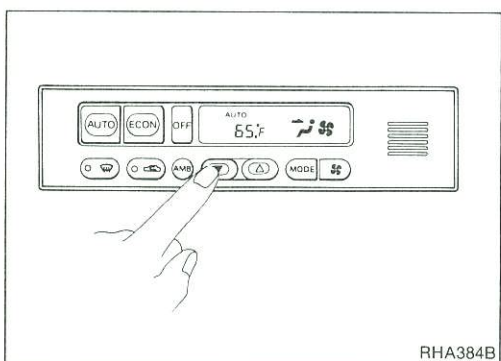
6. Check ECON mode

- 1) Press ECON button.
Defrost should be canceled.
Discharge air outlet will depend on ambient, in-vehicle, and set temperatures.
Display should indicate ECON (no AUTO, no MANUAL).
- 2) Confirm that the compressor clutch is not engaged (visual inspection).



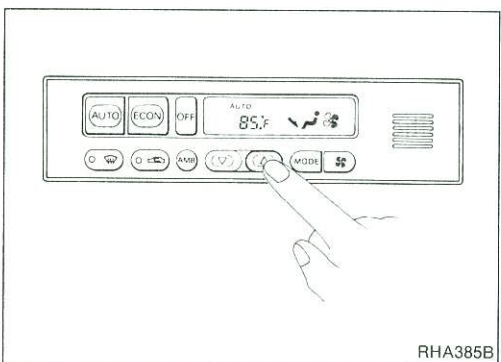
7. Check AUTO mode

- 1) Press AUTO button.
- 2) Confirm that the compressor clutch engages (audio or visual inspection).
Display should indicate AUTO (no ECON, no MANUAL).
(Discharge air will depend on ambient, in-vehicle, and set temperatures).



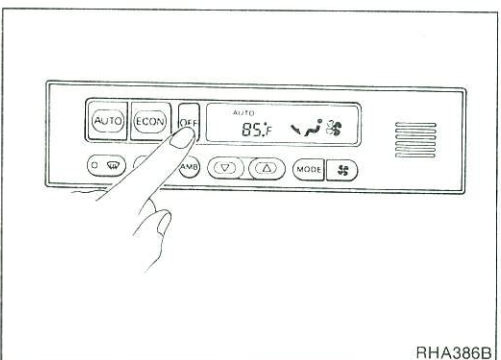
8. Check temperature decrease

- 1) Press the temperature decrease button until 18°C (65°F) is displayed.
- 2) Check for cold air at discharge air outlets.



9. Check temperature increase

- 1) Press the temperature increase button until 32°C (85°F) is displayed.
- 2) Listen for changes in blower speed as set temperature changes.
- 3) Check for hot air at discharge air outlets.



10. Check memory function

- 1) Press off button.
- 2) Turn the ignition off.
- 3) Wait 15 seconds.
- 4) Turn the ignition on.
- 5) Press the AUTO button.
- 6) Confirm that the set temperature remained at 32°C (85°F).

Performance Chart

TEST CONDITION — For Manual Air Conditioner

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. lever position: Max. COLD

Air control lever position:  (Ventilation)

 (REC) switch:  (Recirculation) set

FAN lever position: Max. position

Engine speed: 1,500 rpm

Time required before starting testing after air conditioner starts operating: More than 10 minutes

BEFORE CONDUCTING A PERFORMANCE TEST, DISCONNECT THE AMBIENT SENSOR HARNESS CONNECTOR AND, USING A JUMPER CABLE, MAKE A SHORT CIRCUIT.

TEST CONDITION — For Auto Air Conditioner

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

 switch (P.T.C.): 65°F set

 (mode) switch:  (Ventilation) set

 (REC) switch:  (Recirculation) set

 (fan) switch: Max. speed set

Engine speed: 1,500 rpm

Time required before starting testing after air conditioner starts operating: More than 10 minutes

DIAGNOSES — Overall System

Performance Chart (Cont'd)

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)	5.6 - 7.4 (42 - 45)
	25 (77)	8.6 - 10.8 (47 - 51)
	30 (86)	11.6 - 14.0 (53 - 57)
	35 (95)	14.6 - 17.4 (58 - 63)
60 - 70	20 (68)	7.4 - 9.6 (45 - 49)
	25 (77)	10.8 - 13.2 (51 - 56)
	30 (86)	14.0 - 17.0 (57 - 63)
	35 (95)	17.4 - 20.6 (63 - 69)

Ambient air temperature-to-compressor pressure table

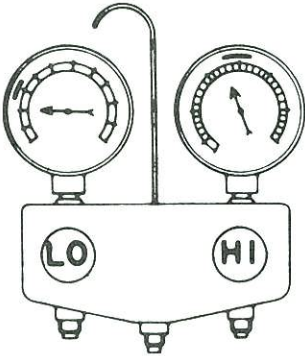
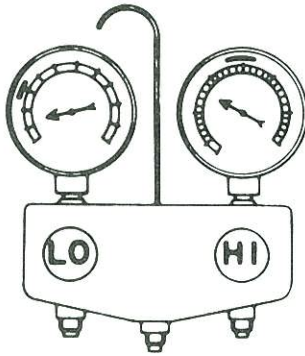
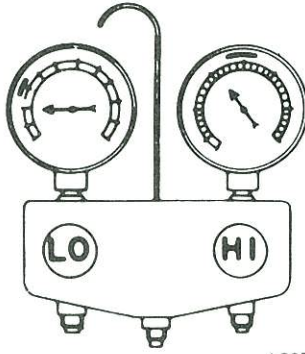
Ambient air		High-pressure (Discharge side) kPa (kg/cm ² , psi)	Low-pressure (Suction side) kPa (kg/cm ² , psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	1,098 - 1,373 (11.2 - 14.0, 159 - 199)	88 - 118 (0.9 - 1.2, 13 - 17)
	25 (77)	1,216 - 1,419 (12.4 - 15.2, 176 - 216)	98 - 137 (1.0 - 1.4, 14 - 20)
	30 (86)	1,334 - 1,628 (13.6 - 16.6, 193 - 236)	108 - 147 (1.1 - 1.5, 16 - 21)
	35 (95)	1,451 - 1,785 (14.8 - 18.2, 210 - 259)	127 - 157 (1.3 - 1.6, 18 - 23)
	40 (104)	1,569 - 1,922 (16.0 - 19.6, 228 - 279)	137 - 186 (1.4 - 1.9, 20 - 27)

Performance Test Diagnoses

Characteristics revealed by the manifold gauge readings for the air conditioning system are shown in the following.

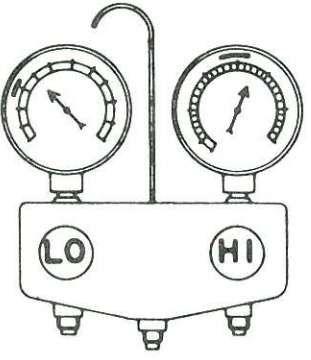
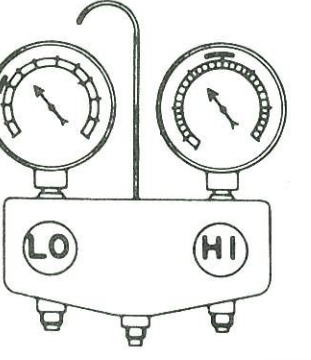
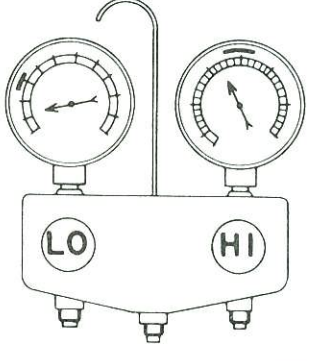
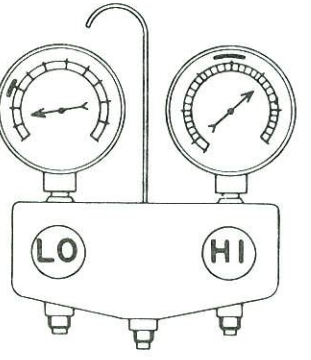
For how to do the performance test, refer to the item "Performance Chart".

In the following table, the portion smeared with ink on each gauge scale indicates the range showing that the air conditioning system is in good order. This range is described in Performance Chart.

Condition	Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  AC352A	Insufficient cooling. Bubbles appear in sight glass. Refrigerant is low, or leaking slightly.	1. Leak test. 2. Repair leak. 3. Charge system. Evacuate, as necessary, and recharge system.
ALMOST NO REFRIGERANT  AC353C	No cooling action. A lot of bubbles or something like mist appears in sight glass. Serious refrigerant leak.	Stop compressor immediately. 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
MALFUNCTIONING EXPANSION VALVE  AC354A	Slight cooling. Sweat or frosting on expansion valve inlet. Expansion valve restricts refrigerant flow. • Expansion valve is clogged. • Expansion valve is inoperative. Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

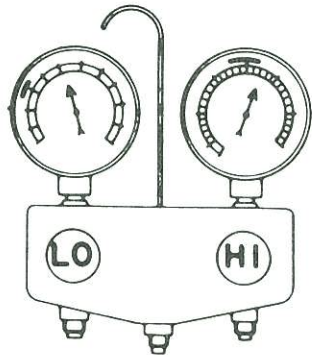
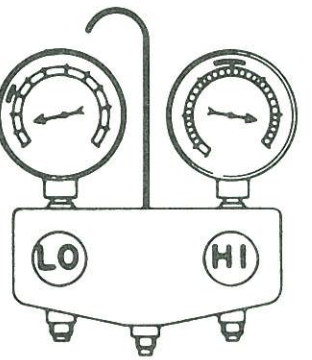
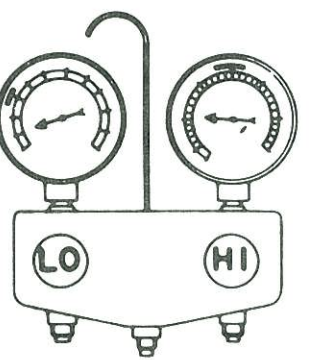
DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Condition	Probable cause	Corrective action
 <p style="text-align: center;">AC355A</p>	<p>Insufficient cooling. Sweat on suction line.</p>	<p>Expansion valve allows too much refrigerant through evaporator.</p> <p>Check valve for operation. If suction side does not show a pressure decrease, replace valve.</p>
 <p style="text-align: center;">AC356A</p>	<p>No cooling. Sweat or frosting on suction line.</p>	<p>Malfunctioning expansion valve.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.
MALFUNCTIONING SUCTION THROTTLE VALVE		
 <p style="text-align: center;">AC357A</p>	<p>Insufficient cooling. Frosted evaporator.</p>	<p>Suction throttle valve is inoperative.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.
 <p style="text-align: center;">AC358A</p>	<p>Insufficient cooling.</p>	<p>Suction throttle valve restricts refrigerant flow.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

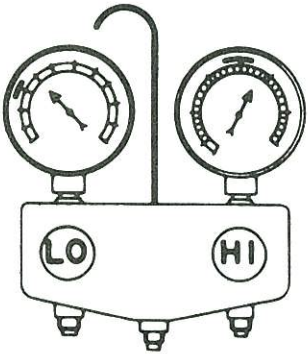
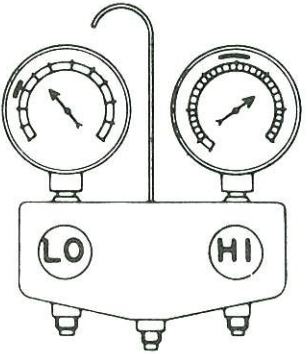
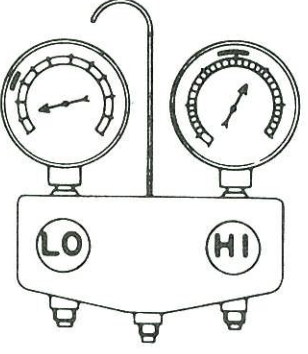
DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Condition	Probable cause	Corrective action
<div style="border: 1px solid black; padding: 2px;">MALFUNCTIONING CONDENSER</div> <div>  </div> <div>AC361A</div>	<p>No cooling action: engine may overheat. Bubbles appear in sight glass of drier. Suction line is very hot.</p>	<p>Usually a malfunctioning condenser.</p> <ul style="list-style-type: none"> ● Check condenser fan motor. (Go to Diagnostic Procedure 6.) ● Check fan belt and fluid coupling. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheating. ● Check for refrigerant overcharging. <p>If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.</p>
<div style="border: 1px solid black; padding: 2px;">HIGH-PRESSURE LINE BLOCKED</div> <div>  </div> <div>AC362A</div>	<p>Insufficient cooling. Frosted high-pressure liquid line.</p>	<p>Drier clogged, or restriction in high-pressure line.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
<div style="border: 1px solid black; padding: 2px;">MALFUNCTIONING COMPRESSOR</div> <div>  </div> <div>AC363A</div>	<p>Insufficient cooling.</p>	<p>Internal problem in compressor, or damaged gasket and valve.</p> <ol style="list-style-type: none"> 1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Condition	Probable cause	Corrective action
<p>TOO MUCH OIL IN SYSTEM (Excessive)</p>  <p align="center">AC364A</p>	<p>Insufficient cooling.</p> <p>Too much oil circulates with refrigerant, causing the cooling capacity of the system to be reduced.</p>	<p>Refer to COMPRESSOR OIL for correcting oil level.</p>
<p>AIR IN SYSTEM</p>  <p align="center">AC459A</p>	<p>Insufficient cooling.</p> <p>Sight glass shows occasional bubbles.</p> <p>Air mixed with refrigerant in system.</p>	<ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
<p>MOISTURE IN SYSTEM</p>  <p align="center">AC360A</p>	<p>After short operation, suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As a warning of this, reading vibrates around 39 kPa (0.4 kg/cm², 6 psi)</p> <p>Drier is saturated with moisture. Moisture has frozen in expansion valve. Refrigerant flow is restricted.</p>	<ol style="list-style-type: none"> 1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30-minutes evacuating three times.) 4. Recharge system.

Contents

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Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE	Preliminary Check					Diagnostic Procedure						Main Power Supply and Ground Circuit Check			
REFERENCE PAGE	HA-58	HA-59	HA-60	HA-61	HA-62	HA-71 - 73	HA-74 - 75	HA-76	HA-77 - 80	HA-81 - 84	HA-85 - 86	HA-70	HA-70	HA-70	HA-70
SYMPTOM	Preliminary check 1	Preliminary check 2	Preliminary check 3	Preliminary check 4	Preliminary check 5	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	Diagnostic procedure 6	15A Fuses (#4 - #5)	10A Fuses (#10)	10A Fuses (#20)	Push control unit
A/C does not blow cold air.		①				○			○			○	○		
Blower motor does not rotate.		①				②						○			
Air outlet does not change.				①			②						○		○
Intake door does not change in VENT, B/L or FOOT mode.								①					○		○
Intake door is not set at "FRESH" in DEF or F/D mode.	①							○					○		○
Magnet clutch does not engage with A/C switch and fan switch are ON.		①							②				○	○	
Magnet clutch does not engage in DEF mode.		①	②						○				○	○	
Illumination or indicators of push control unit do not come on.										①			○		
Condenser fan motor does not operate.											①		○		
Noise					①										

①, ② : The number means checking order.

○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

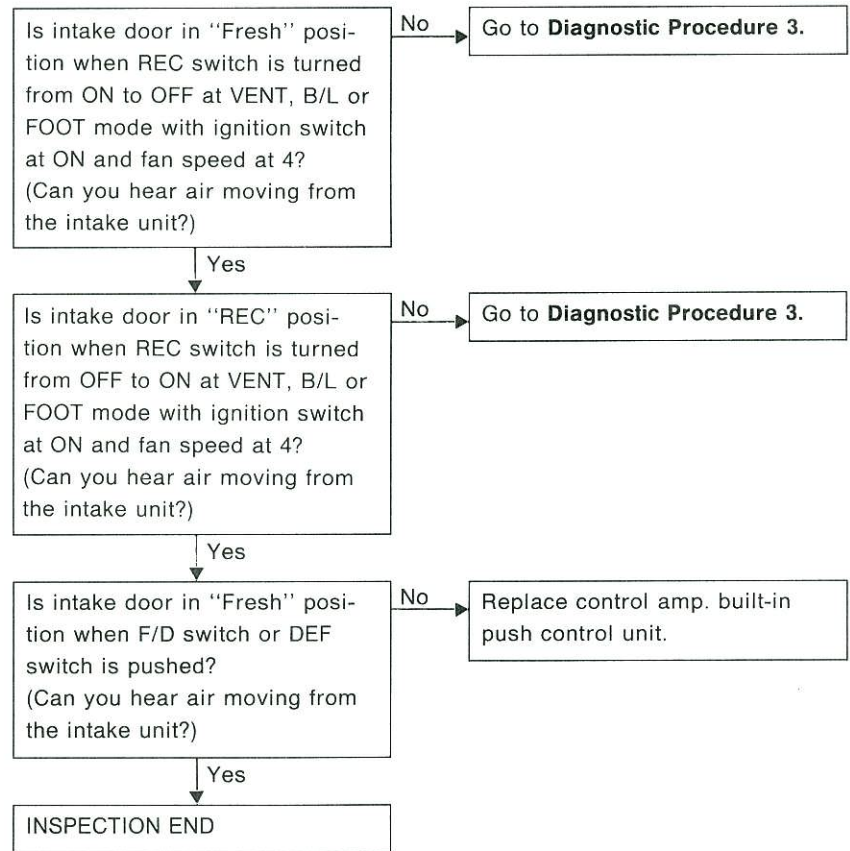
Symptom Chart (Cont'd)

[illegible]

Preliminary Check

PRELIMINARY CHECK 1

Intake door is not set at "FRESH" in DEF or F/D mode.

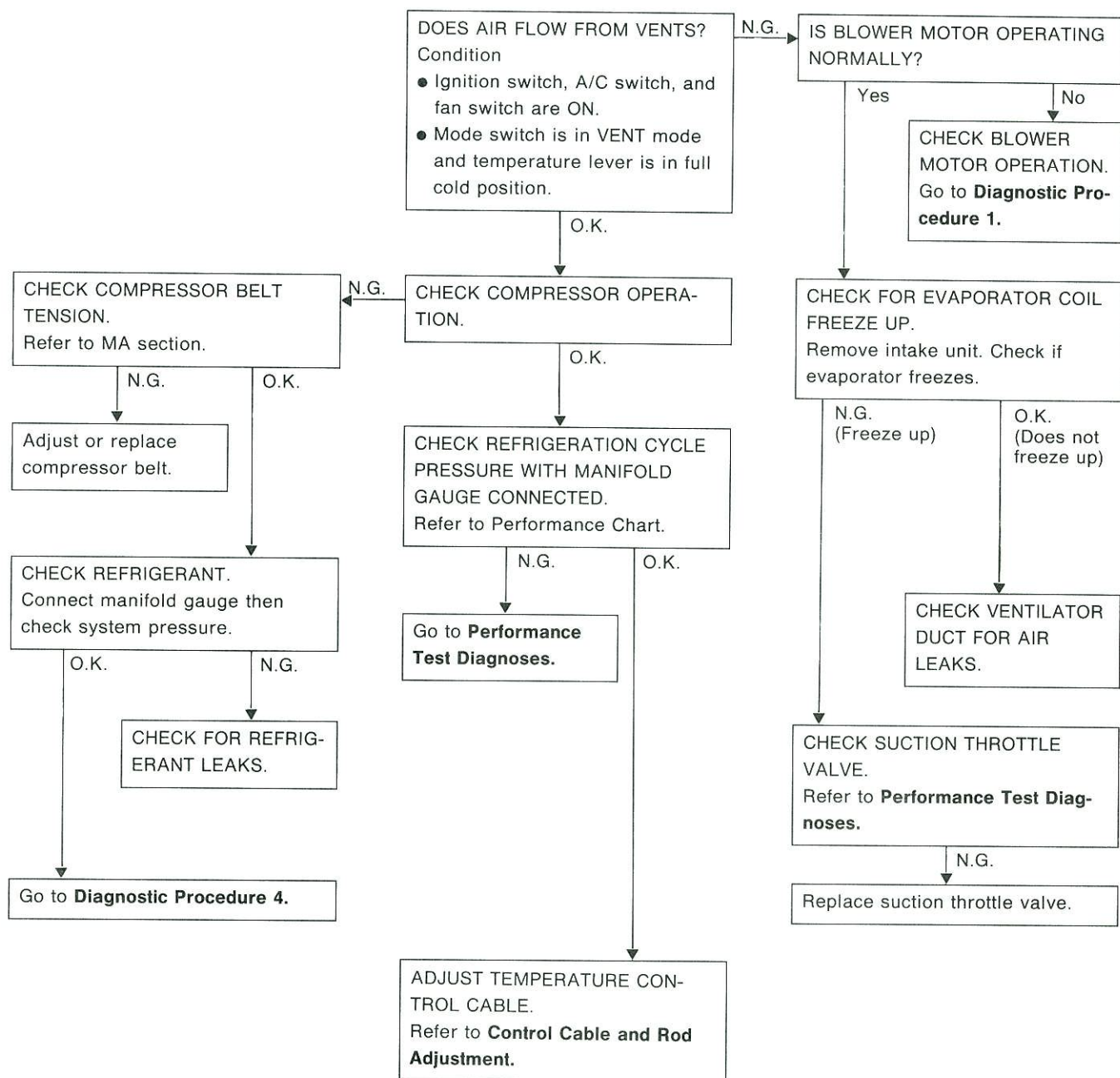


TROUBLE DIAGNOSES — Manual Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.

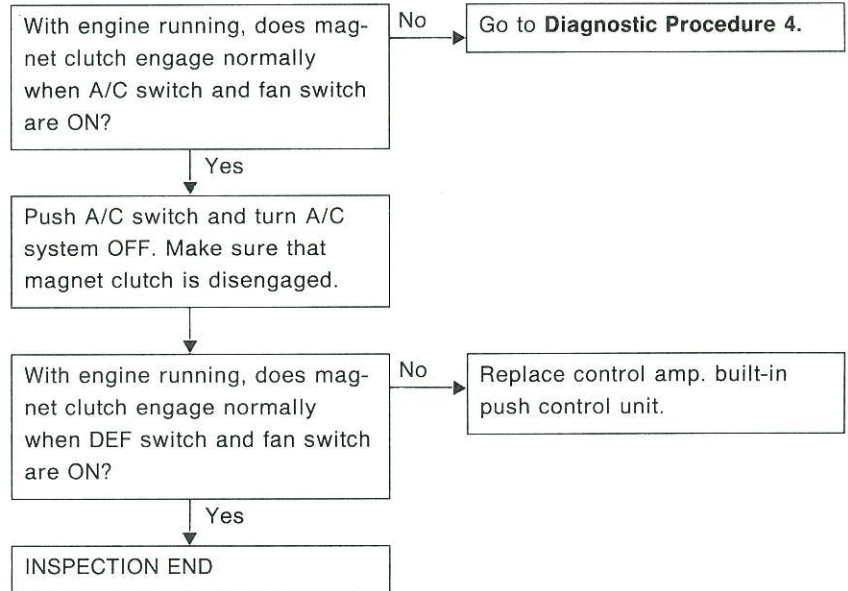


Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Magnet clutch does not engage in DEF mode.

- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.













TROUBLE DIAGNOSES — Manual Air Conditioner

Preliminary Check (Cont'd)






PRELIMINARY CHECK 4

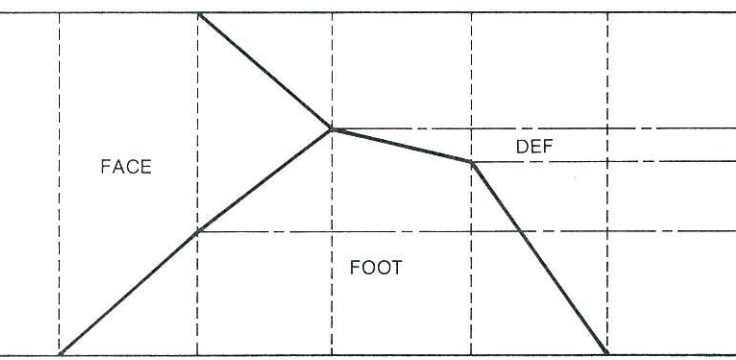
Air outlet does not change.

DOES AIR COME OUT FROM EACH DUCT NORMALLY WHEN EACH MODE SWITCH IS PUSHED WITH IGNITION SWITCH AT ON? No → Go to Diagnostic Procedure 2.

Switch		Indicator illuminates					Air outlet
							
Mode		○					VENT
			○				FOOT & VENT
				○			FOOT & DEF
					○		FOOT & DEF
						○	DEF

Air distribution ratios

VENT	B/L	FOOT	F/D	DEF	
					(%)
					100
					65
					55
					35
					0



RHA391B

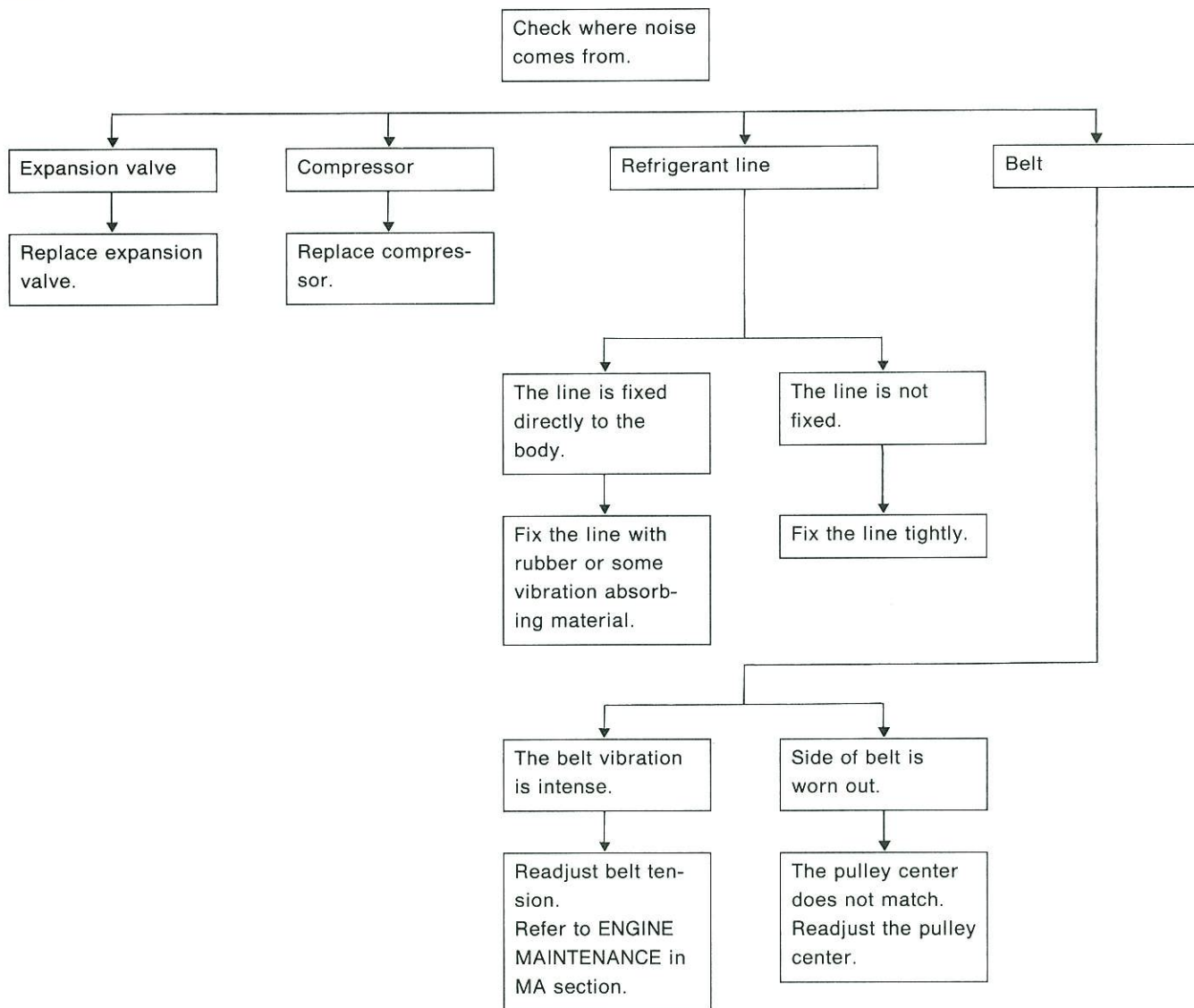
Yes

INSPECTION END

Preliminary Check (Cont'd)

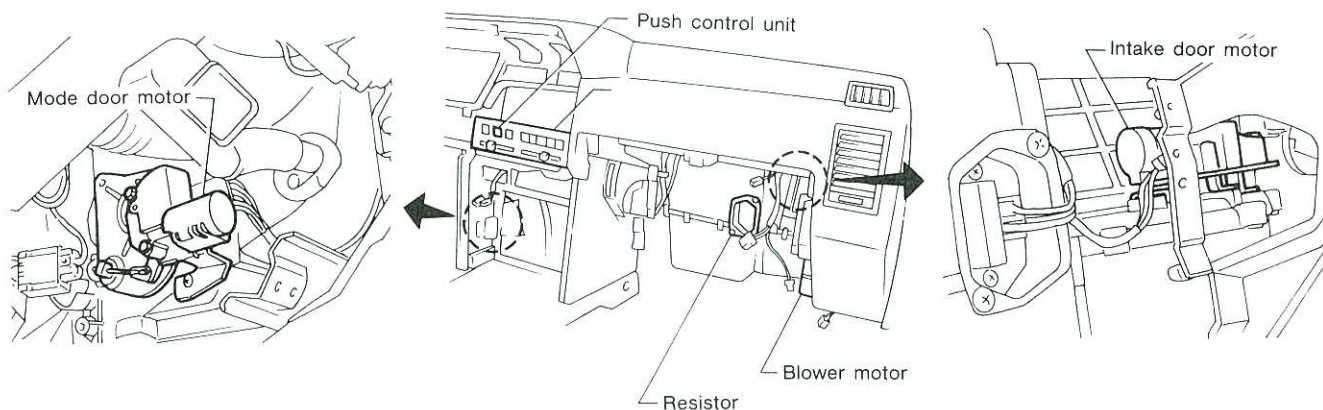
PRELIMINARY CHECK 5

Noise

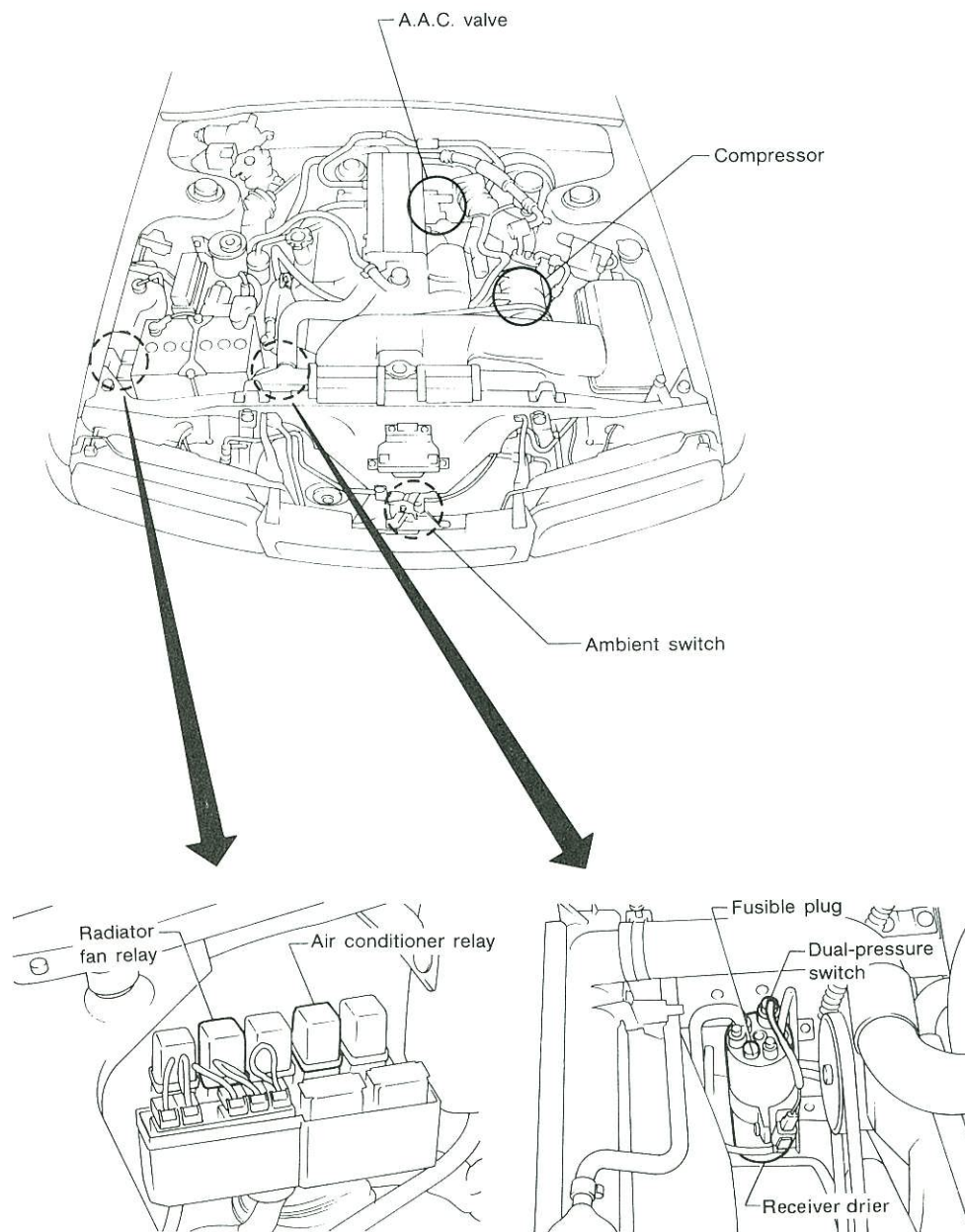


A/C Component Layout

Passenger compartment

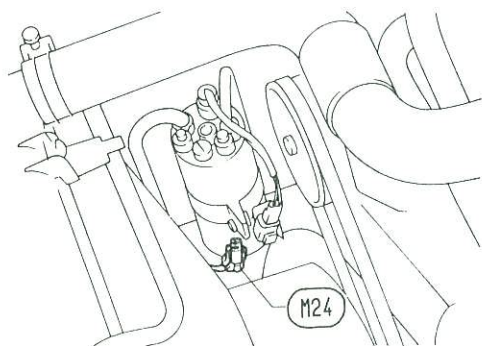
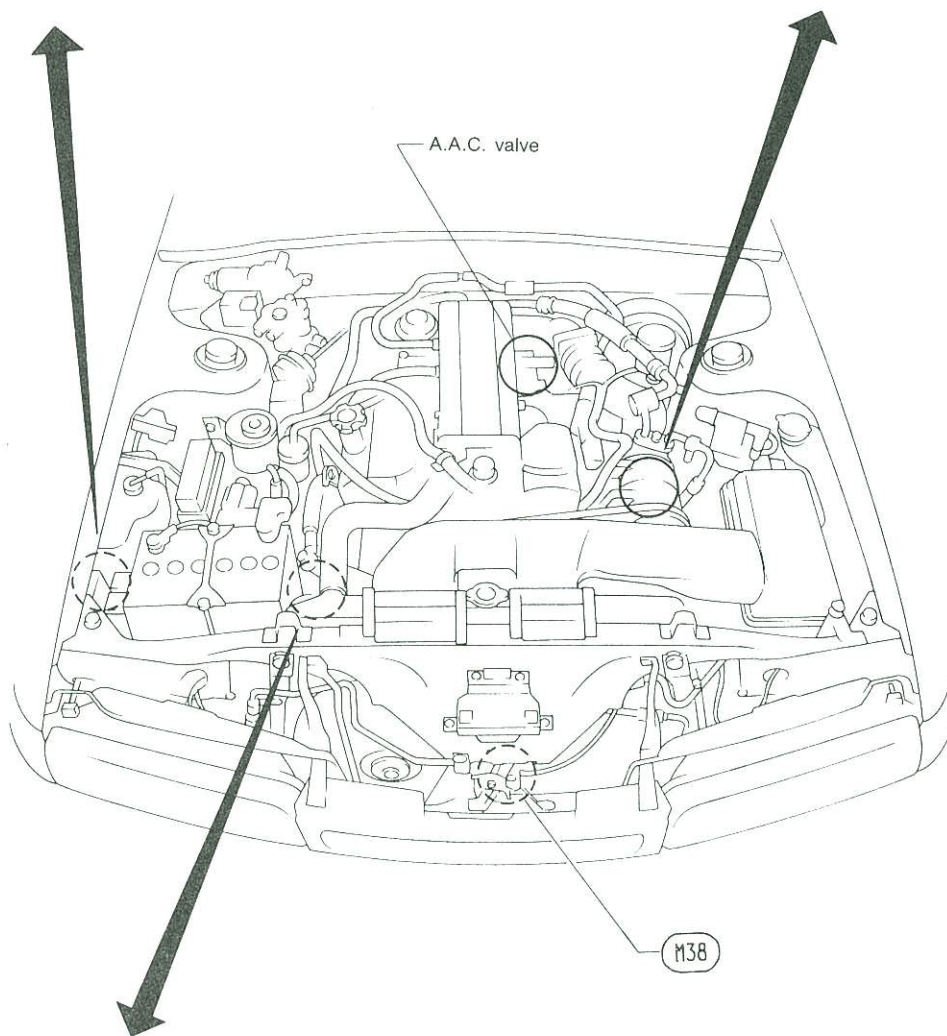
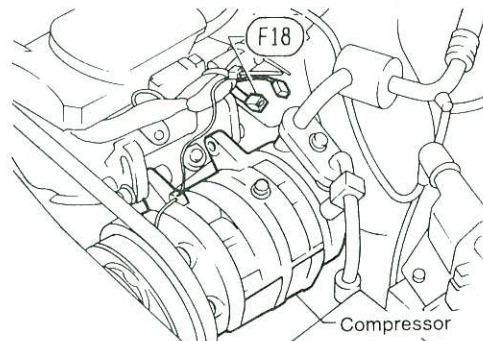
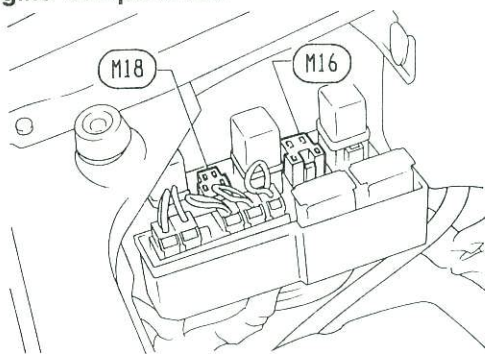


Engine compartment



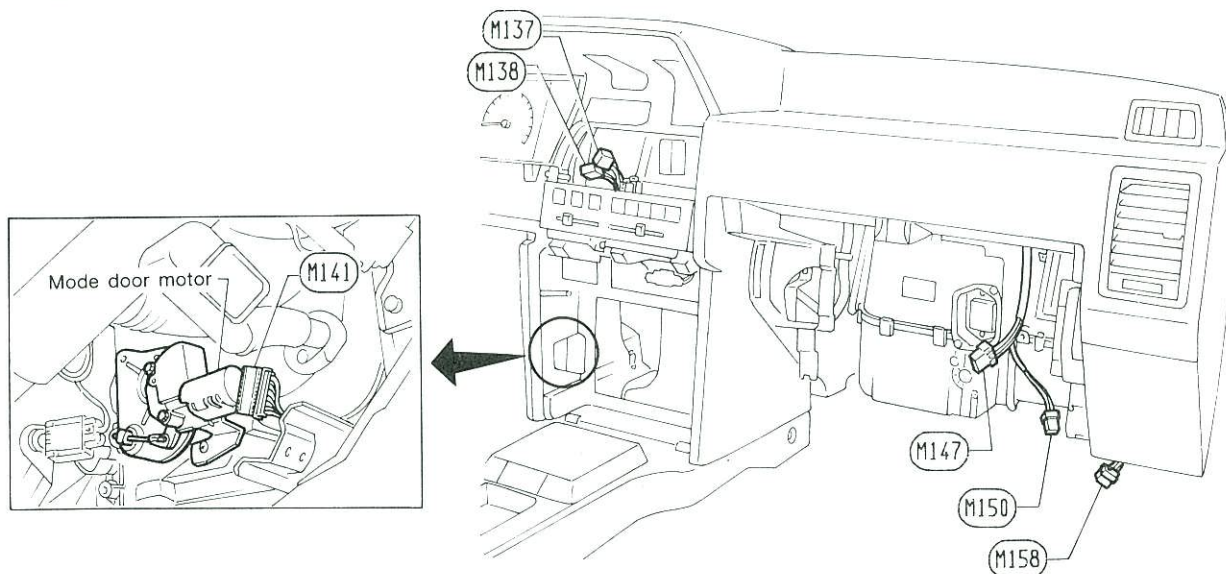
Harness Layout for A/C System

Engine compartment



Harness Layout for A/C System (Cont'd)

Passenger compartment



RHA481B

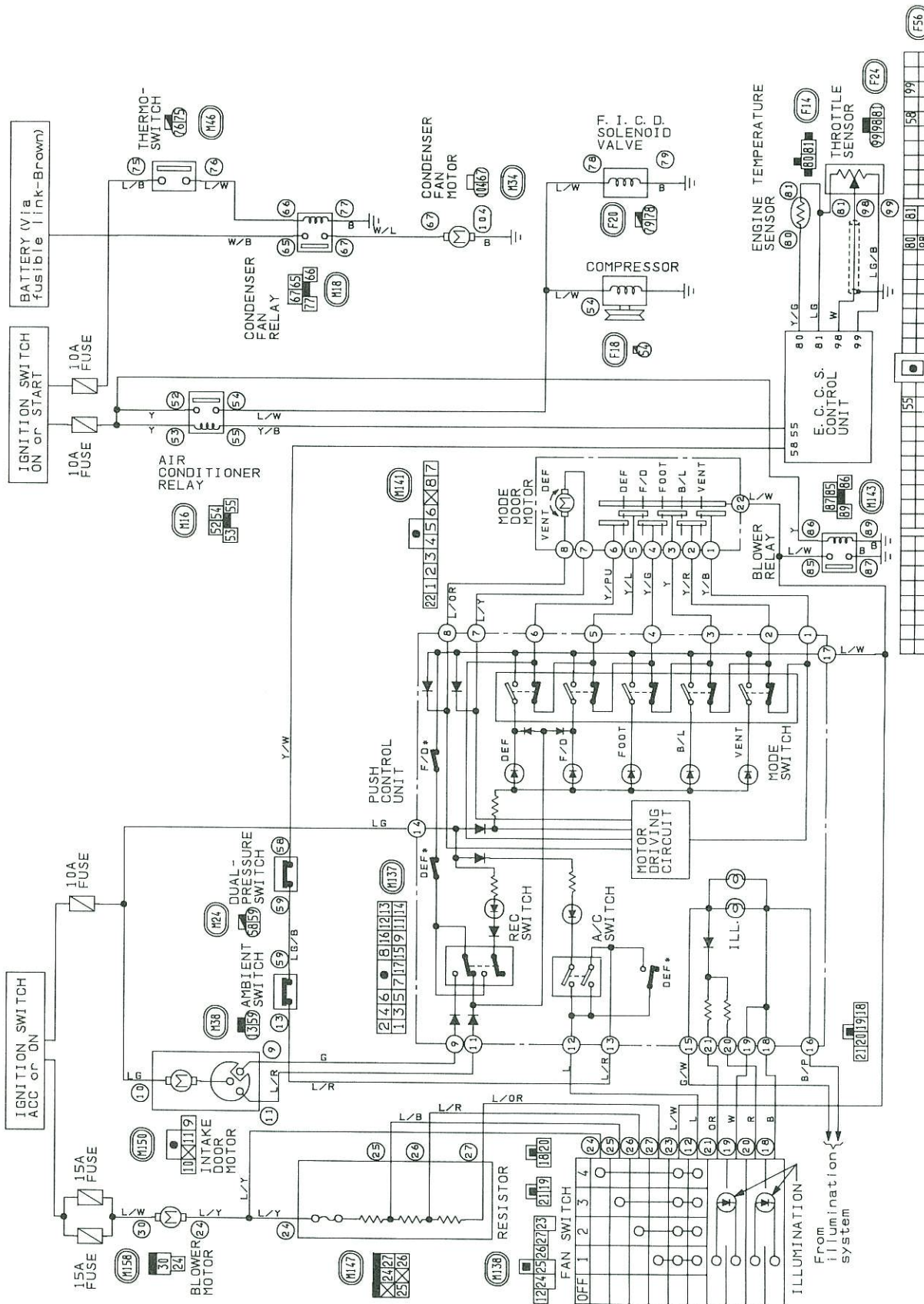
Main harness

- (M16) : A/C relay
- (M18) : Condenser fan relay
- (M24) : Dual-pressure switch
- (M34) : Condenser fan motor
- (M38) : Ambient switch
- (M46) : Thermoswitch
- (M137) : Push control unit
- (M138) : Fan switch
- (M141) : Mode door motor
- (M143) : Blower relay
- (M147) : Resistor
- (M150) : Intake door motor
- (M158) : Blower motor

E.F.I. harness

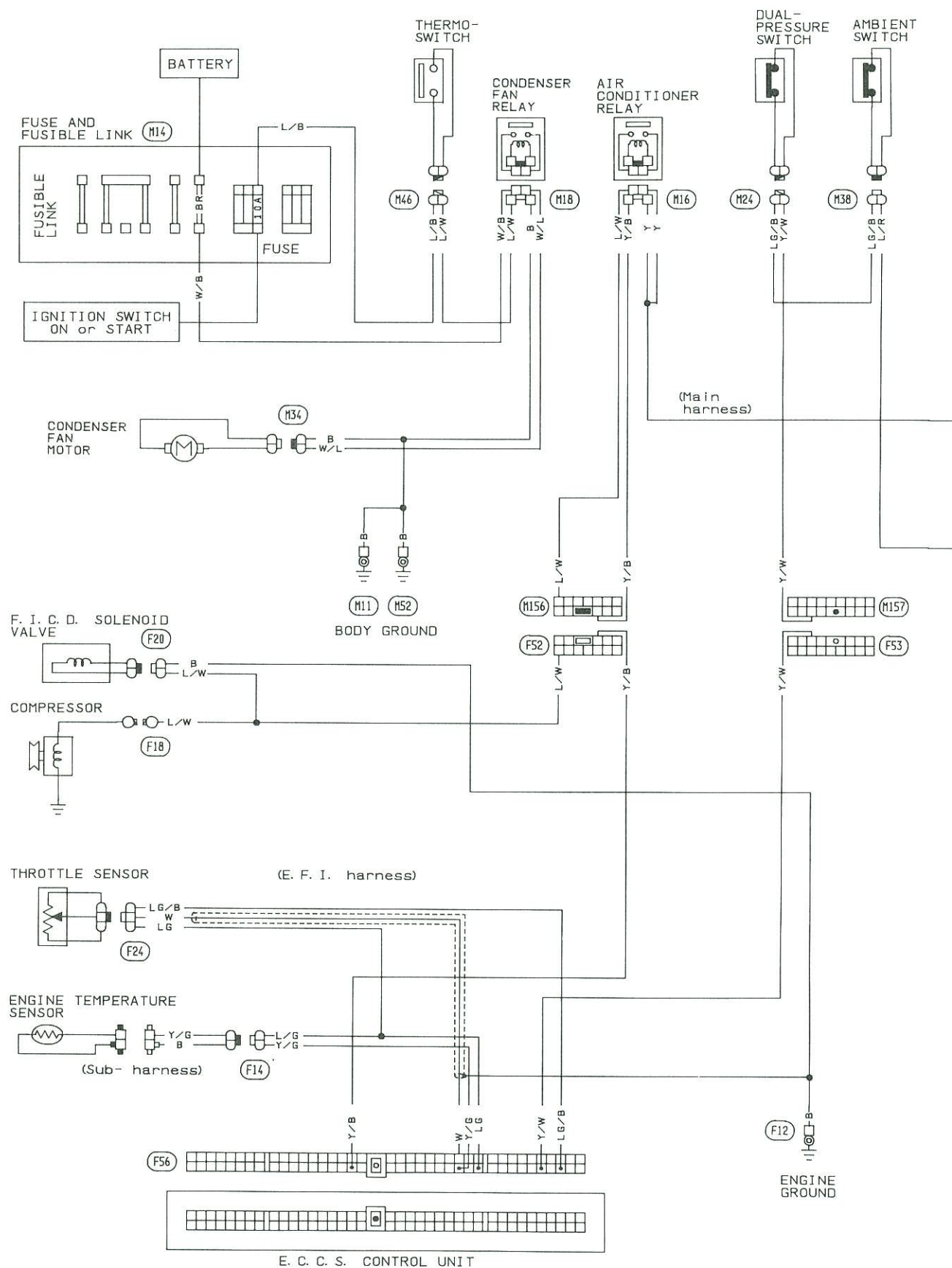
- (F18) : Compressor

Circuit Diagram for Quick Pinpoint Check



NOTE

Wiring Diagram



Wiring Diagram (Cont'd)

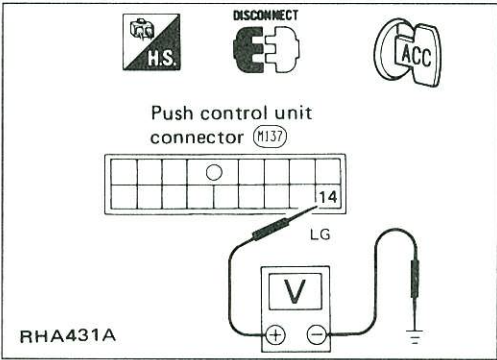


Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

Refer to “POWER SUPPLY ROUTING” in EL section and A/C ELECTRICAL CIRCUIT.

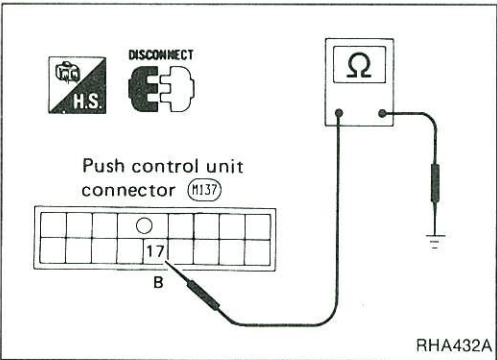


PUSH CONTROL UNIT CHECK

Check power supply circuit for push control unit with ignition switch at ACC.

1. Disconnect push control unit harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ⑭ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
⑭	Body ground	Approx. 12V



Check body ground circuit for push control unit with ignition switch ON.

1. Disconnect push control unit harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑰ and body ground.

TROUBLE DIAGNOSES — Manual Air Conditioner

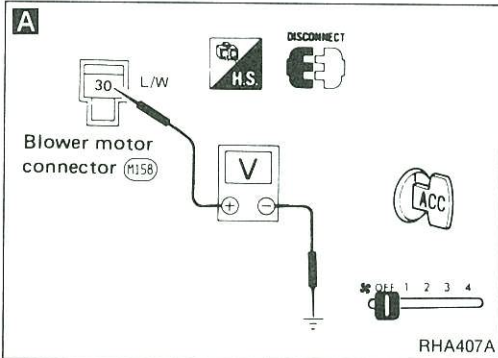
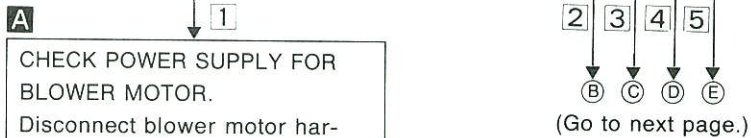
	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

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.



CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. 30 and body ground?

N.G. Check 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

B

O.K.

Check circuit continuity between blower motor harness terminal No. 24 and body ground.

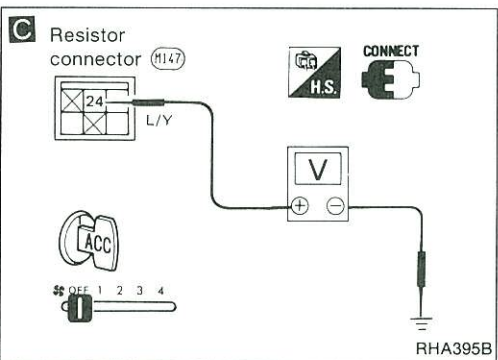
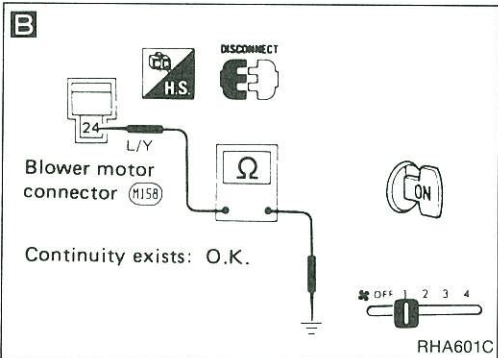
N.G. Reconnect blower motor harness connector.

O.K.

CHECK BLOWER MOTOR.
(Refer to Electrical Components Inspection.)

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. 24 and body ground?

N.G. Disconnect blower motor and resistor harness connectors.

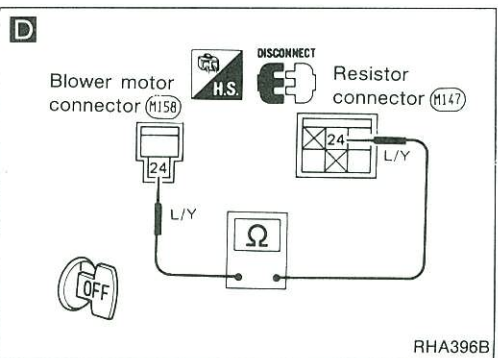
D Note

Check circuit continuity between blower motor harness terminal No. 24 and resistor harness terminal No. 24.

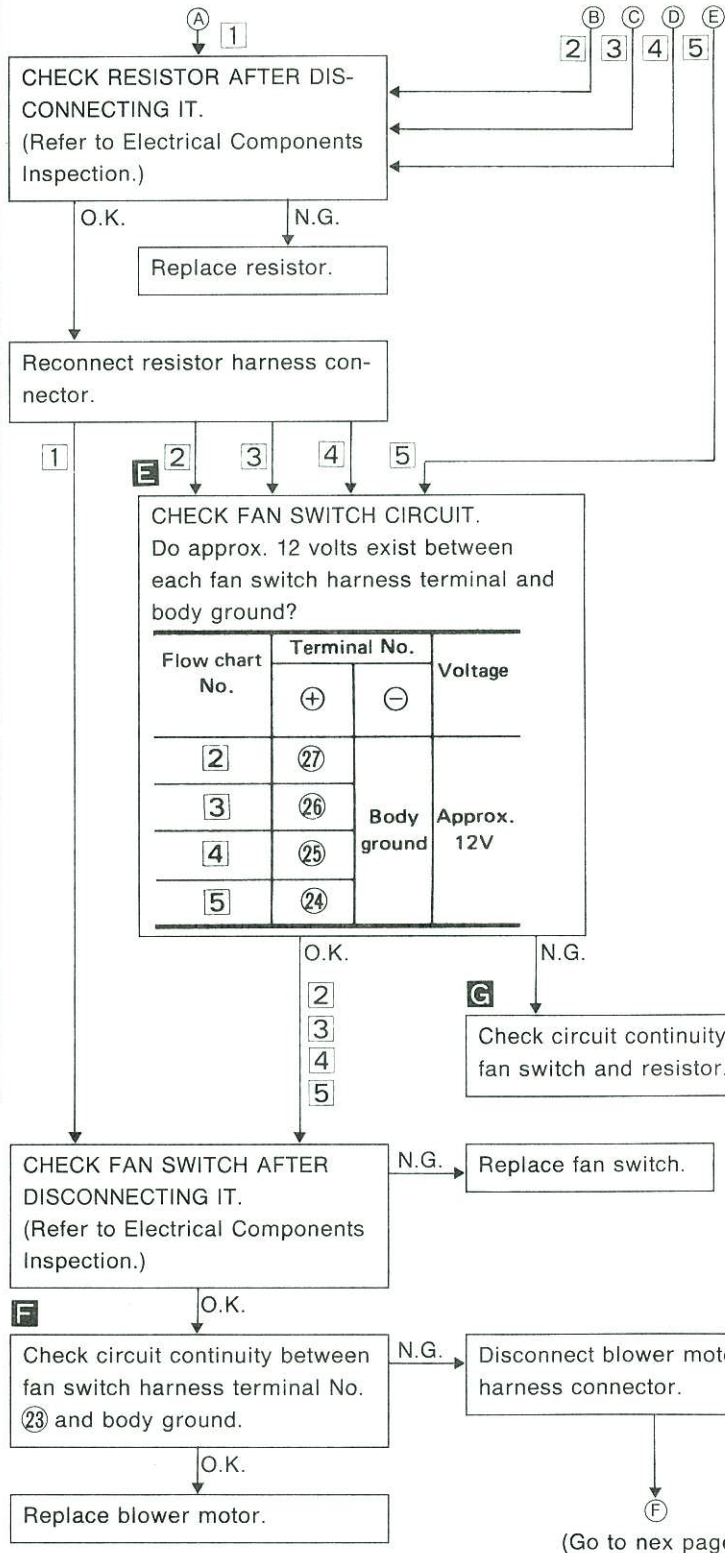
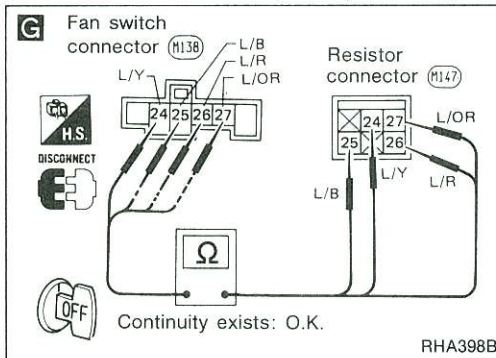
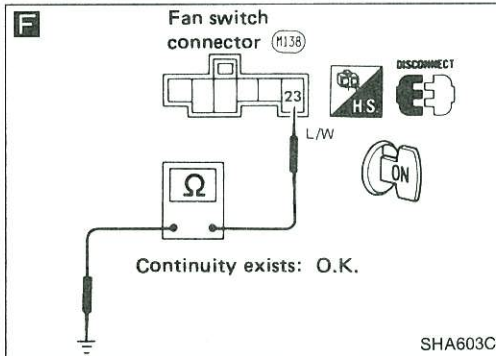
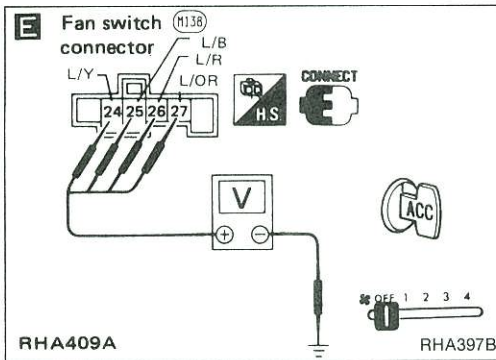
(Go to next page.)

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



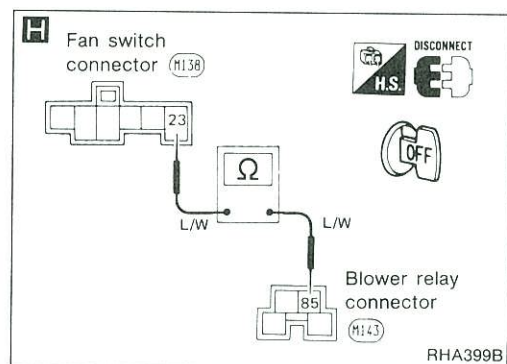
Diagnostic Procedure 1 (Cont'd)

**Note:**

If the result is N.G. after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

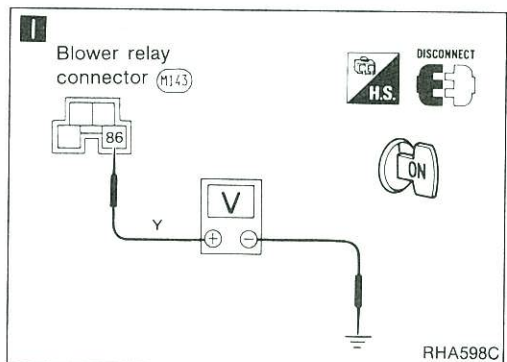
Diagnostic Procedure 1 (Cont'd)



H Note
Check circuit continuity between fan switch harness terminal No. ②③ and blower relay harness terminal No. ⑧⑤.

I O.K.
CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. ⑧⑥ and body ground?

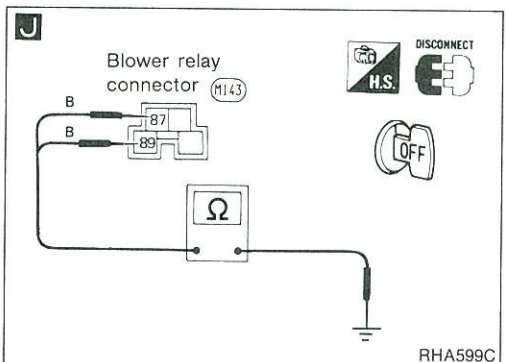
N.G. → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)



O.K.
J Note
Check circuit continuity between blower relay harness terminal No. ⑧⑦, ⑧⑨ and body ground.

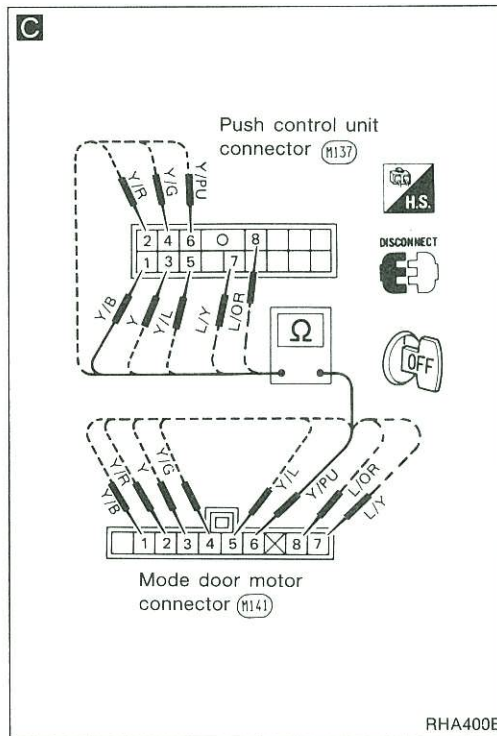
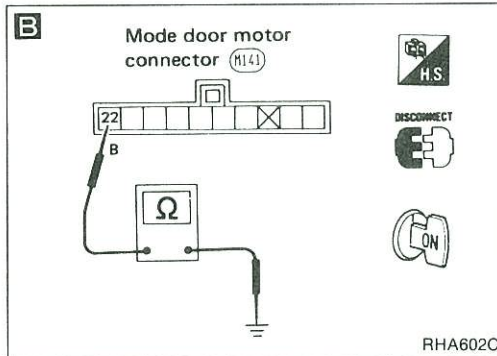
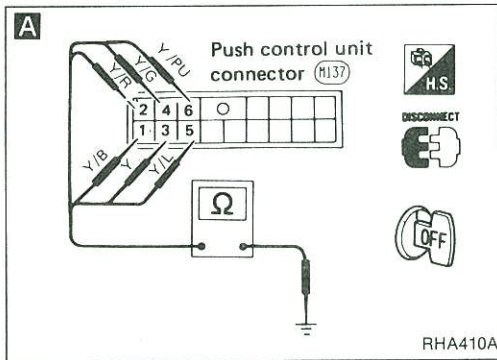
O.K.
CHECK BLOWER RELAY AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

N.G. → Replace blower relay.



Note:

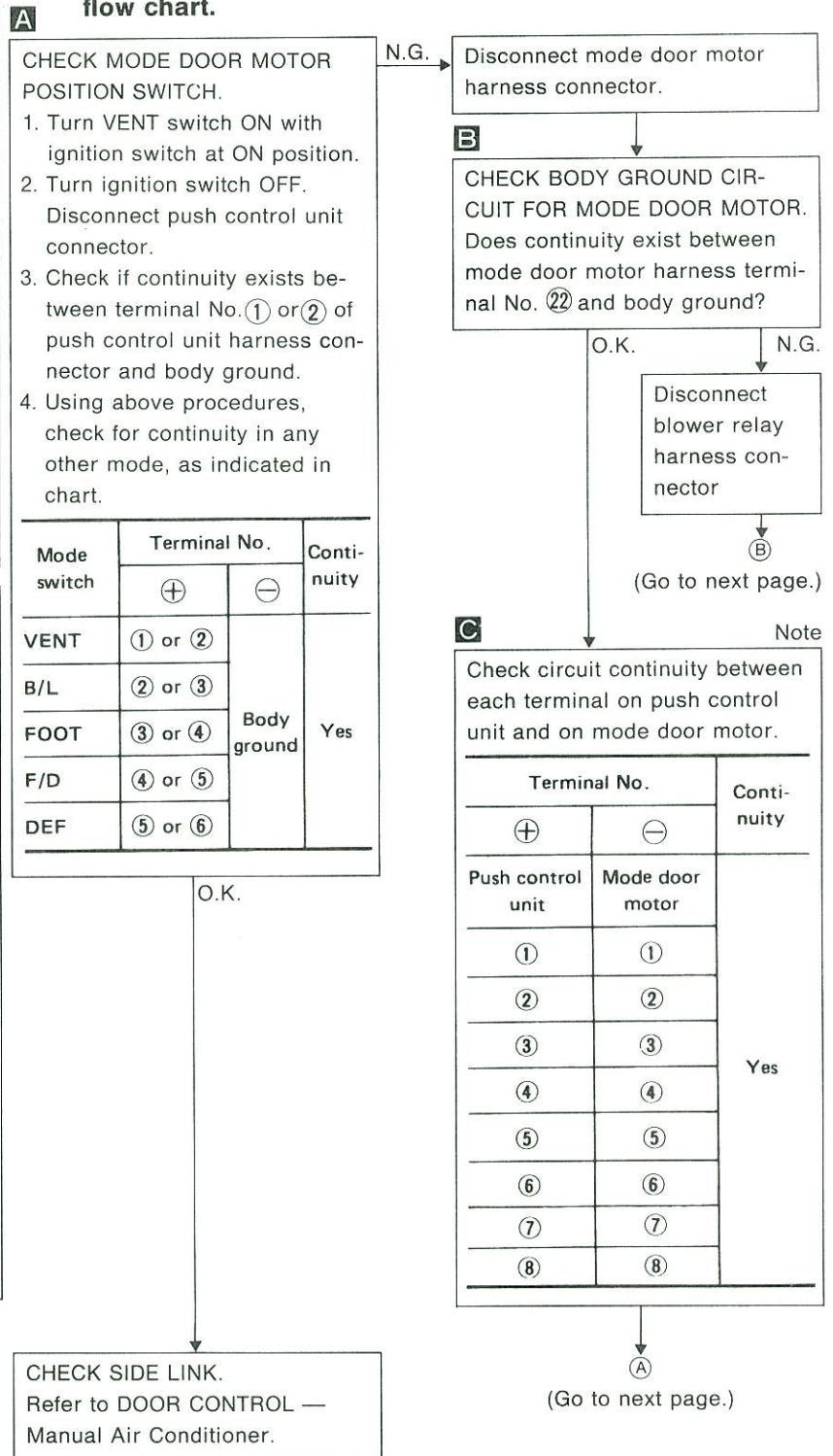
If the result is N.G. after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

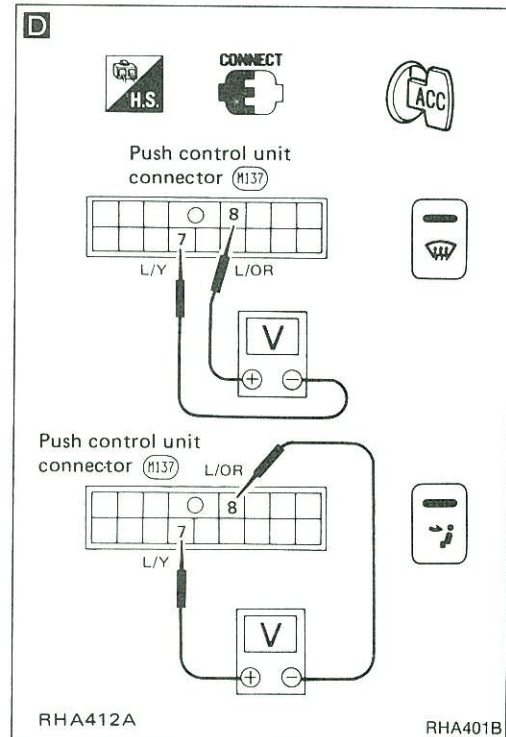
- Perform **PRELIMINARY CHECK 4** and **Main Power Supply and Ground Circuit Check** before referring to the following flow chart.



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 2 (Cont'd)



Reconnect push control unit and mode door motor harness connectors.

D

CHECK FOR OUTPUT OF PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ⑦ and ⑧ when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"?

Terminal No.		Mode door motor	
⑦	⑧	Mode door operation	Direction of linkage rotation
⊖	⊖	Stop	Stop
⊖	⊕	VENT → DEF	Clock-wise
⊕	⊖	DEF → VENT	Counter-clock-wise

N.G.

Replace control amp. built-in push control unit.

B

E

Note

Check circuit continuity between mode door motor harness terminal No. ②② and blower relay harness terminal No. ⑧⑤.

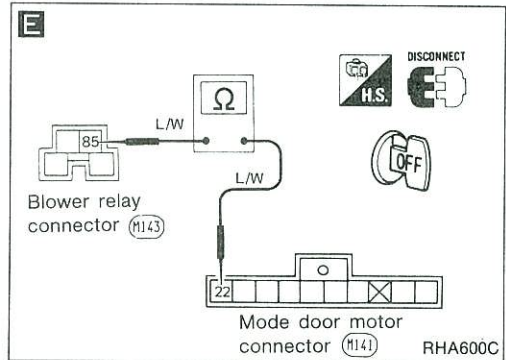
O.K.

F

CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. ⑧⑥ and body ground?

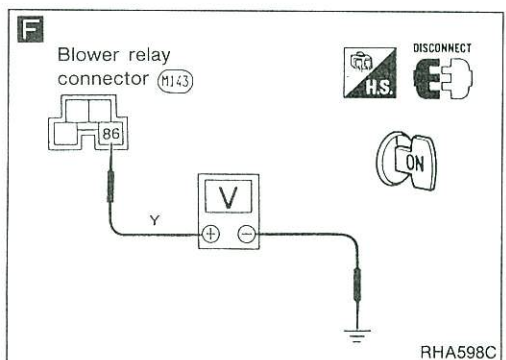
O.K.

N.G.



O.K.

Replace mode door motor.



G

Note

Check circuit continuity between blower relay harness terminal No. ⑧⑦, ⑧⑨ and body ground.

O.K.

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

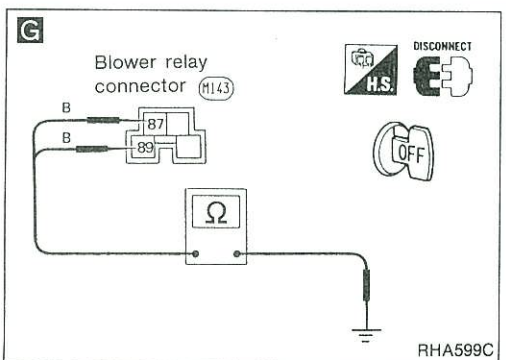
N.G.

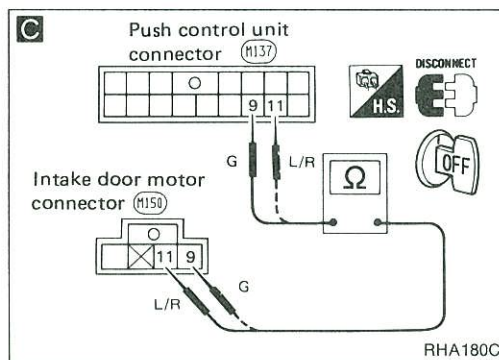
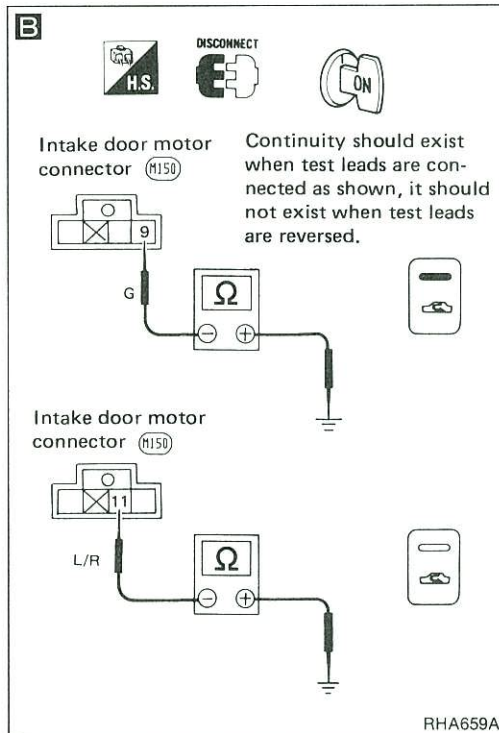
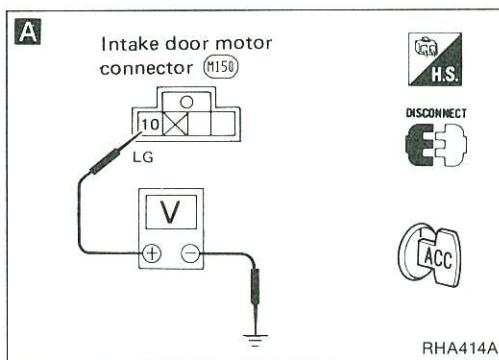
Replace blower relay.

Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

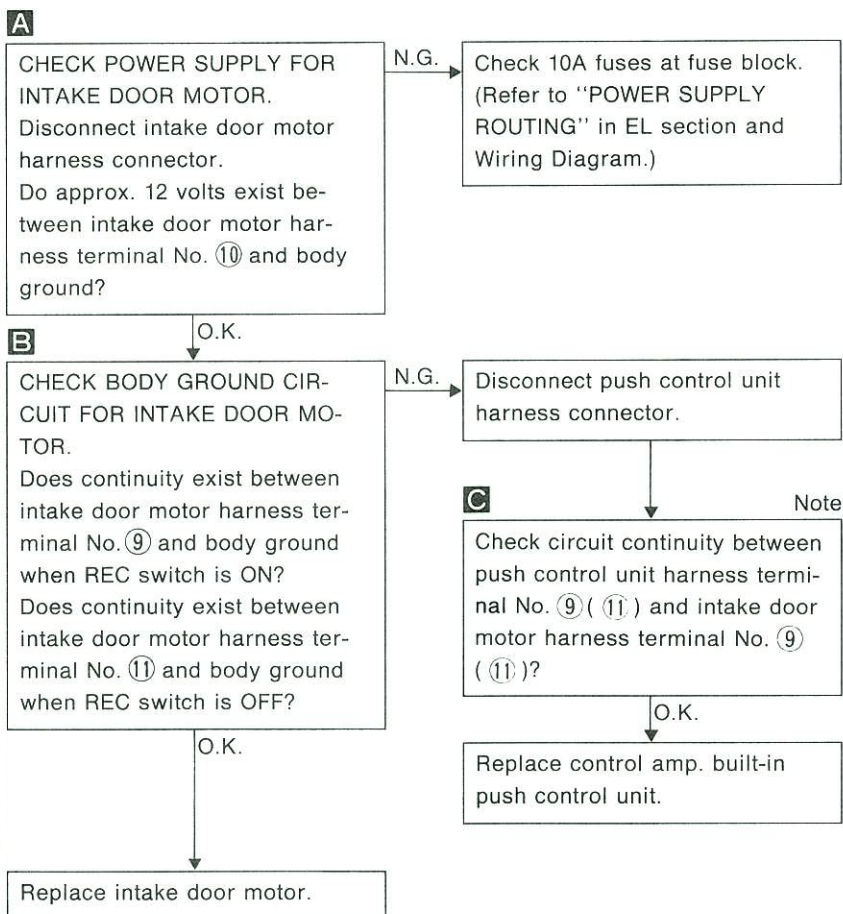




Diagnostic Procedure 3

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.

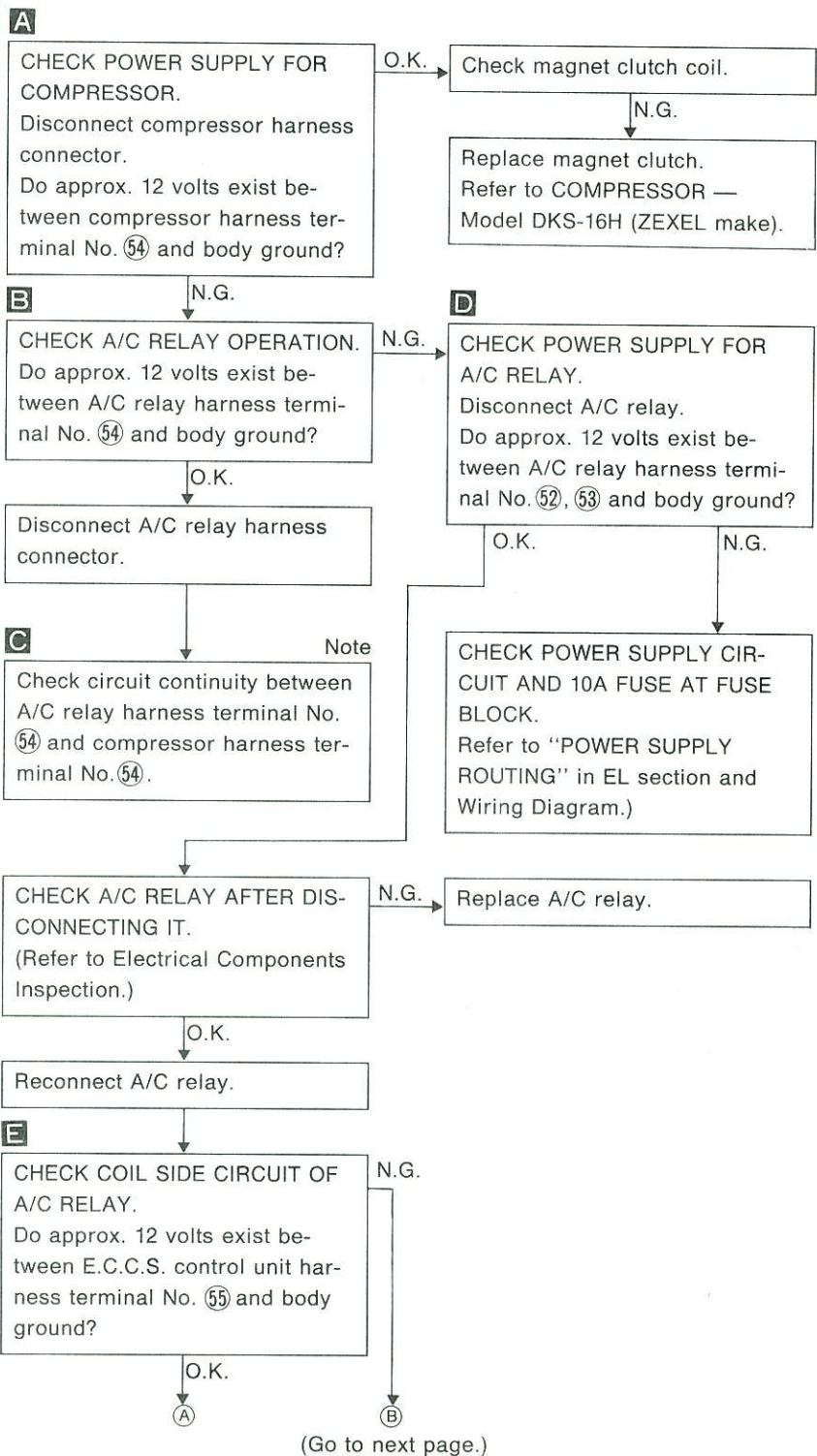
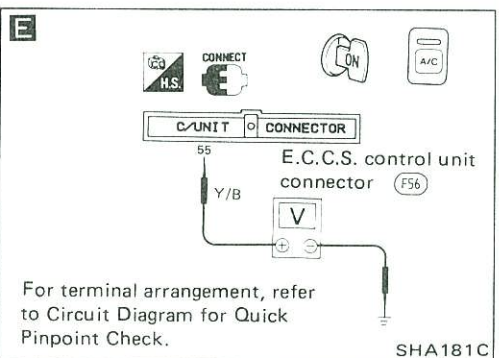
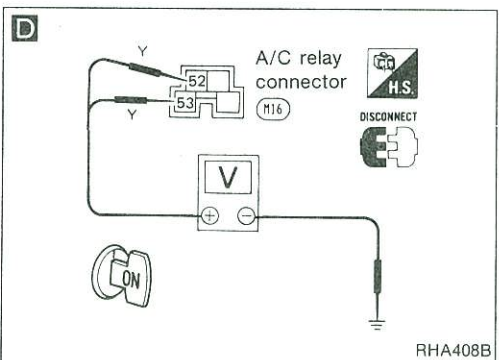
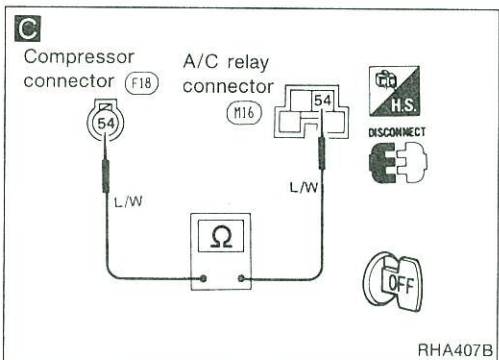
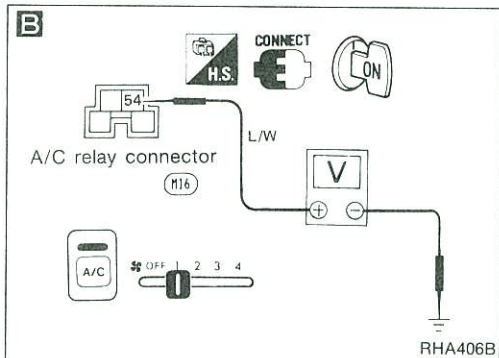
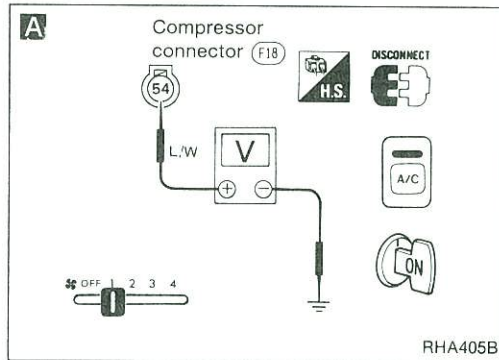


Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 4

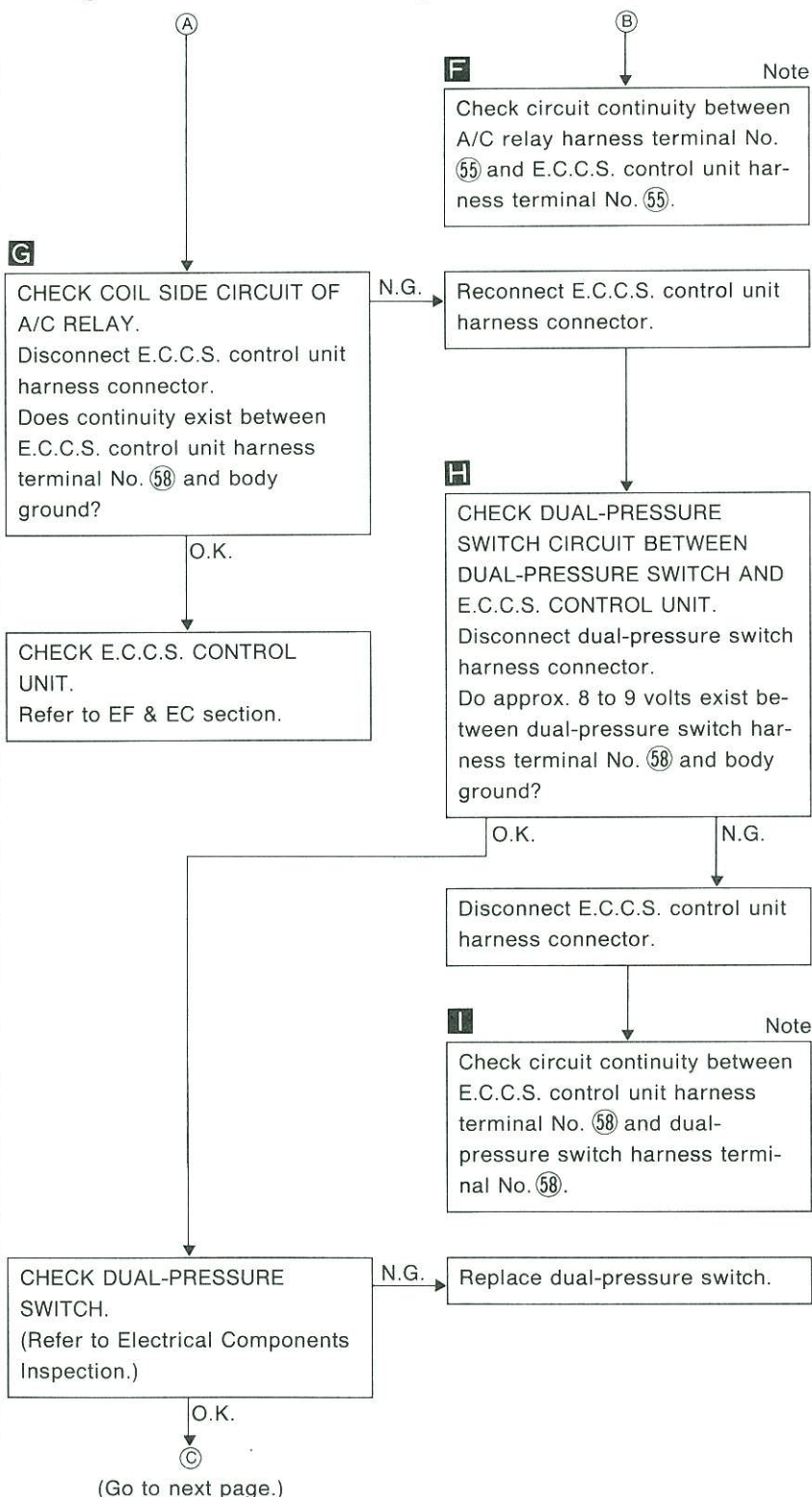
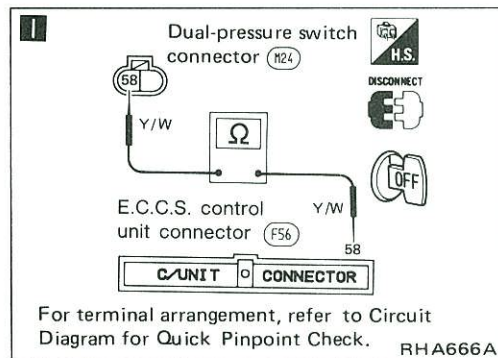
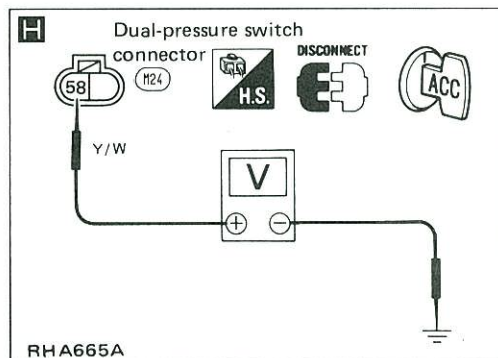
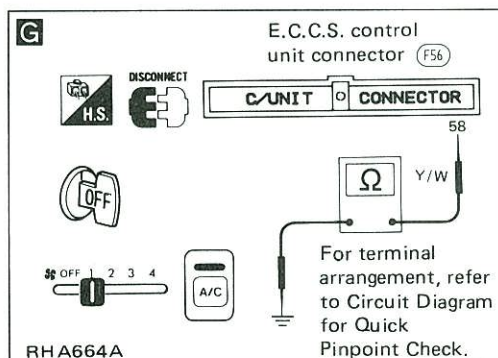
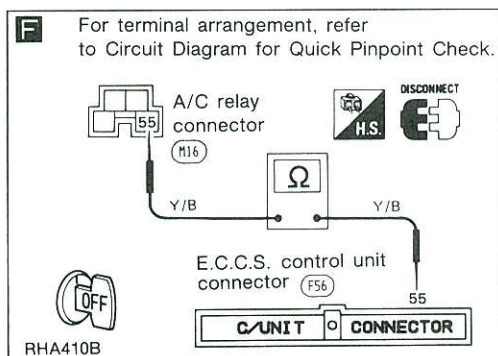
SYMPTOM: Magnet clutch does not engage with A/C switch and fan switch are ON.

- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

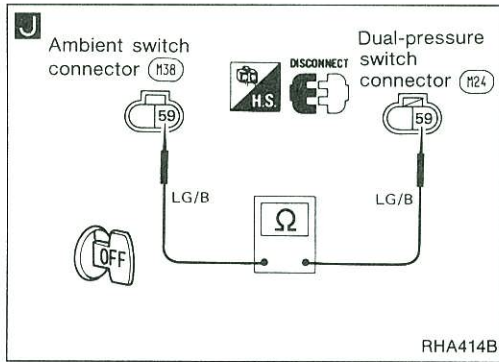
Diagnostic Procedure 4 (Cont'd)



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 4 (Cont'd)



Disconnect ambient switch harness connector.

Note

Check continuity between dual-pressure switch harness terminal No. ⑤⑨ and ambient switch harness terminal No. ⑤⑨.

O.K.

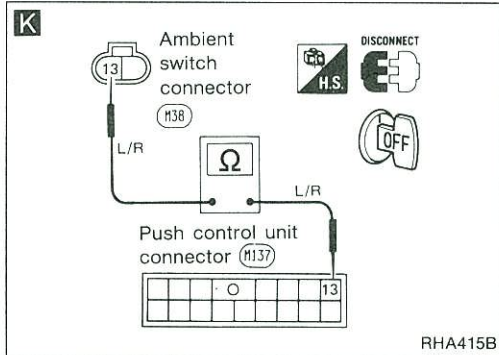
CHECK AMBIENT SWITCH.
(Refer to Electrical Components Inspection.)

N.G.

Replace ambient switch.

O.K.

Disconnect push control unit harness connector.



Note

Check circuit continuity between ambient switch harness terminal No. ⑬ and push control unit harness terminal No. ⑬.

O.K.

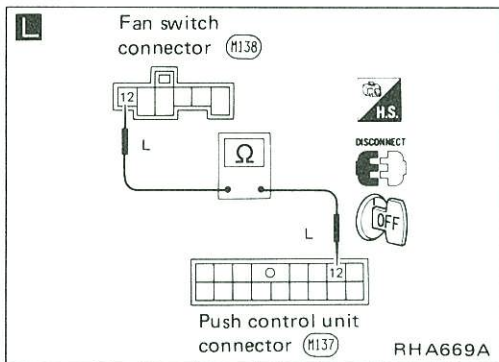
CHECK A/C SWITCH OF PUSH CONTROL UNIT.
(Refer to Electrical Components Inspection.)

N.G.

Replace control amp. built-in push control unit.

O.K.

Disconnect fan switch harness connector.



Note

Check circuit continuity between push control unit harness terminal No. ⑫ and fan switch harness terminal No. ⑫.

O.K.

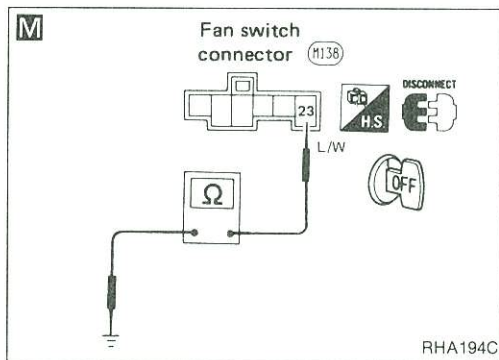
D

(Go to next page.)

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 4 (Cont'd)



M

↓

D

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. ②③ and body ground?

N.G.

N

Note

Check circuit continuity between fan switch harness terminal No. ②③ and blower relay harness terminal No. ⑧⑤.

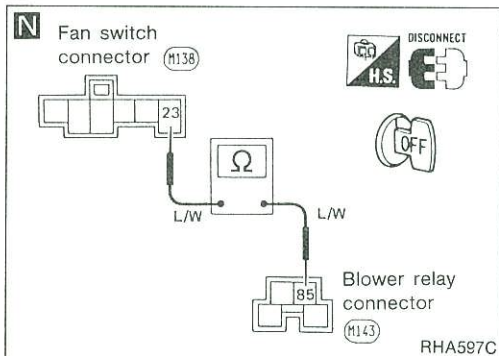
O.K.

O.K.

CHECK FAN SWITCH.
(Refer to Electrical Components Inspection.)

N.G.

Replace fan switch.



O

CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. ⑧⑥ and body ground?

N.G.

Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

P

Check circuit continuity between blower relay harness terminal No. ⑧⑦, ⑧⑨ and body ground.

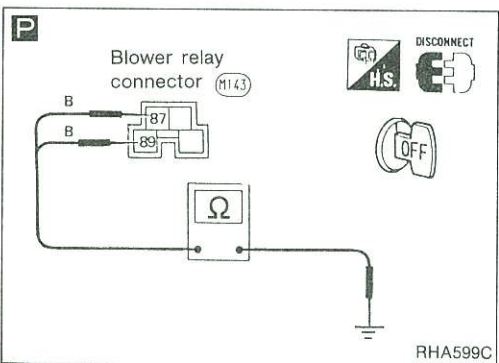
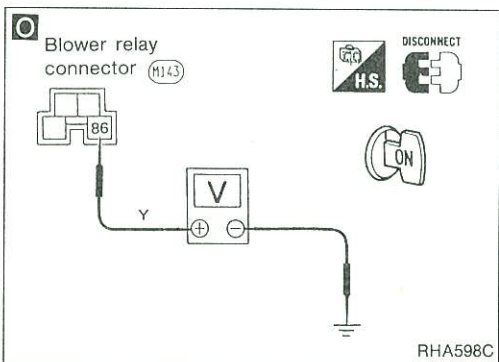
Note

O.K.

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

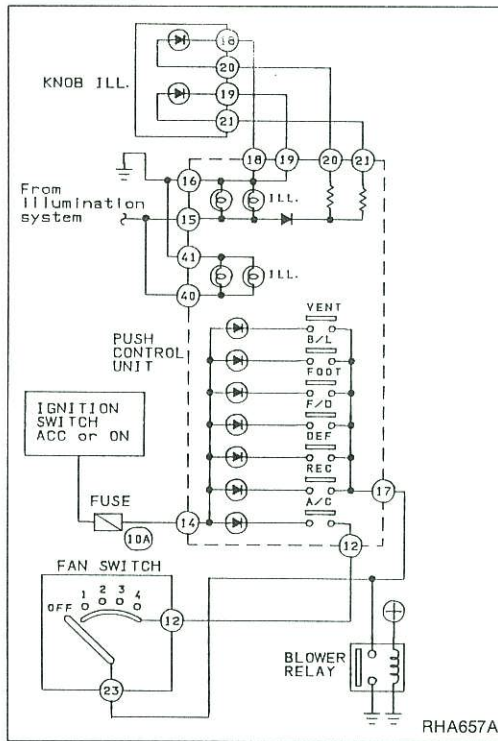
N.G.

Replace blower relay.



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 5

SYMPTOM: Illumination or indicators of push control unit do not come on.

- Perform Main Power Supply and Ground Circuit Check before referring to the following flow chart.

Turn ignition switch and lighting switch ON.

CHECK ILLUMINATION AND INDICATORS.

- Turn A/C, REC and fan switches ON.
- Push VENT, B/L, FOOT, F/D and DEF switches in order.
- Check for incidents and follow the repairing methods as shown:

INCIDENTS								"How to repair"
ILL.	VENT	B/L	FOOT	F/D	DEF	REC	A/C	
X	○	○	○	○	○	○	○	Go to DIAGNOSTIC PROCEDURE 5-1.
△	○	○	○	○	○	○	X	Go to DIAGNOSTIC PROCEDURE 5-2.
○	X	X	X	X	X	X	X	Go to DIAGNOSTIC PROCEDURE 5-3.
△	△						△	Replace control amp. built-in push control unit.
○	X	X	X	X	X	X	○	Replace control amp. built-in push control unit.
△	X	X	X	X	X	X	○	Go to DIAGNOSTIC PROCEDURE 5-4.

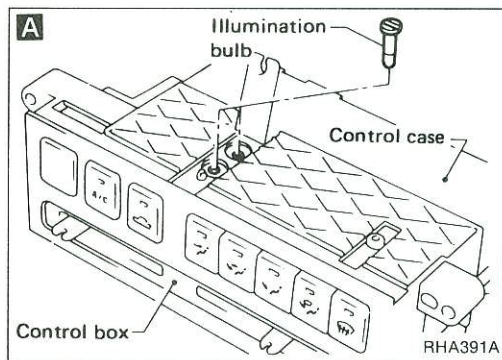
○: Illumination or indicator comes on.

X: Illumination or indicator does not come on.

△: Some indicators for VENT, B/L, FOOT, F/D, DEF or REC come on.

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-1



CHECK THE OTHER ILLUMINATION SYSTEMS EXCEPT FOR A/C SYSTEM.

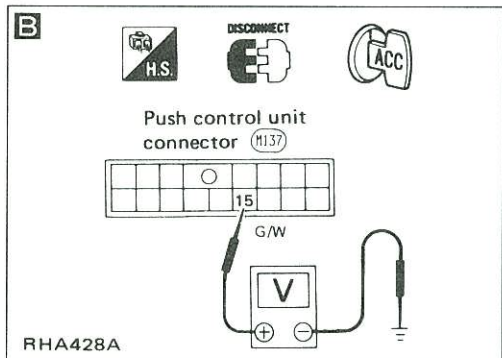
Do the other illumination come on with ignition switch and lighting switch ON?

N.G.

CHECK ILLUMINATION SYSTEM.
Refer to Illumination/Wiring Diagram in EL section.

O.K.

Turn ignition switch and lighting switch OFF.



A

CHECK ILLUMINATION BULB.
Remove push control unit and disconnect harness connectors. Remove illumination bulb(s) and check them.

N.G.

Replace illumination bulb(s).

O.K.

B

CHECK POWER SUPPLY FOR ILLUMINATION WITH LIGHTING SWITCH ON.
Do approx. 12 volts exist between push control unit harness terminal No. ⑮ and body ground?

N.G.

CHECK POWER SUPPLY FOR A/C ILLUMINATION SYSTEM.
Refer to Illumination/Wiring Diagram in EL section.

O.K.

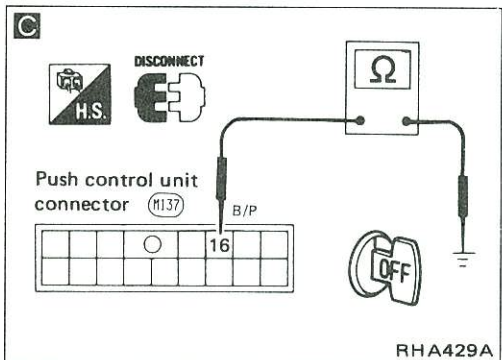
C

Note

CHECK BODY GROUND CIRCUIT FOR ILLUMINATION.
Does continuity exist between push control unit harness terminal No. ⑯ and body ground?

O.K.

Replace control amp. built-in push control unit.



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-2

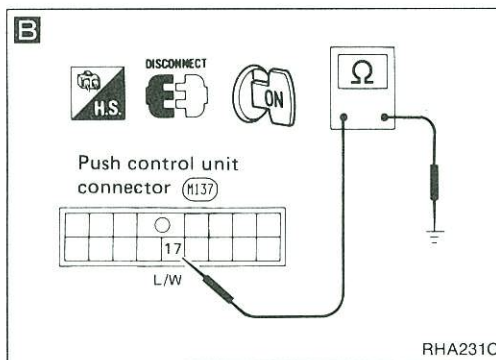
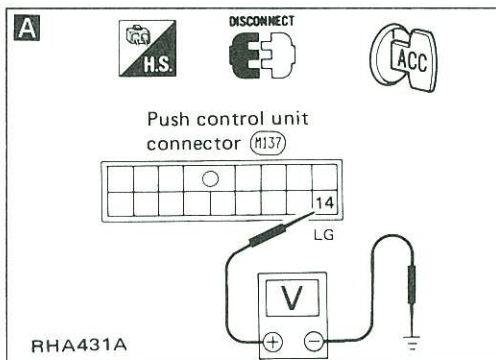
CHECK MAGNET CLUTCH OPERATION.
Does magnet clutch operate normally when engine ON. A/C switch, fan switch are ON?

N.G.

Go to Diagnostic Procedure 4.

O.K.

Replace control amp. built-in push control unit.



DIAGNOSTIC PROCEDURE 5-3

Turn ignition switch and lighting switch OFF.

Disconnect push control unit harness connector.

A CHECK POWER SUPPLY FOR PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ⑭ and body ground?

N.G.

Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

B CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.
Does continuity exist between push control unit harness terminal No. ⑰ and body ground?

Note

O.K.

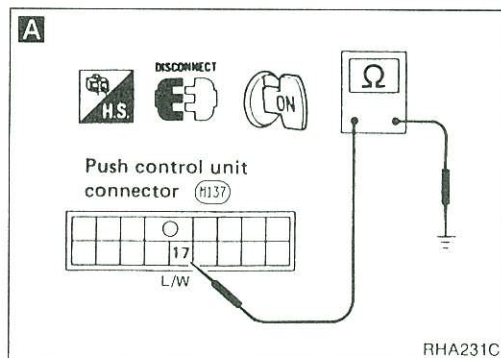
Replace control amp. built-in push control unit.

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-4



Turn ignition switch and lighting switch OFF.

Disconnect push control unit harness connector.

A Note

CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.

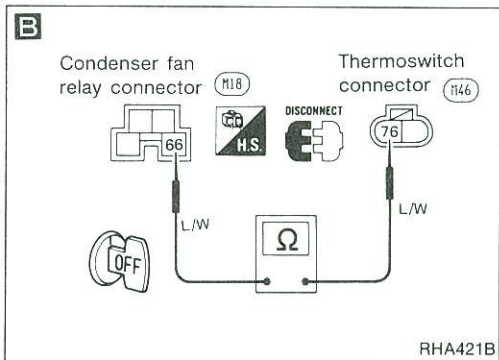
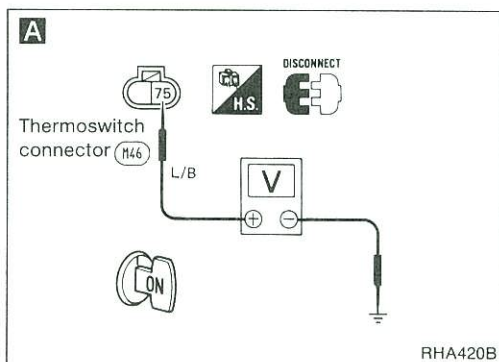
Does continuity exist between push control unit harness terminal No. ⑰ and body ground?

O.K.

Replace control amp. built-in push control unit.

Note:

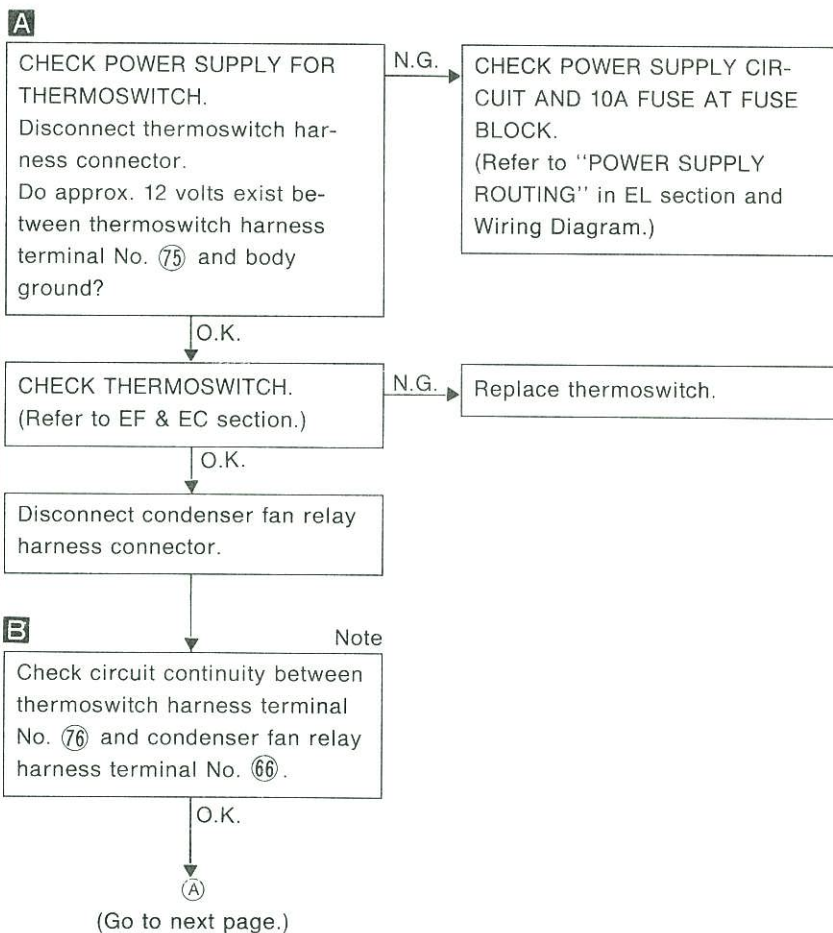
If the result is N.G. after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 6

SYMPTOM: Radiator fan motor does not operate.

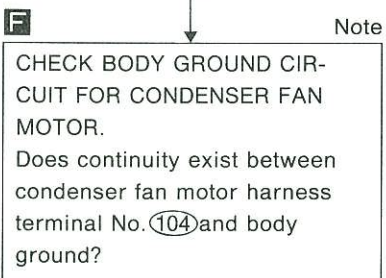
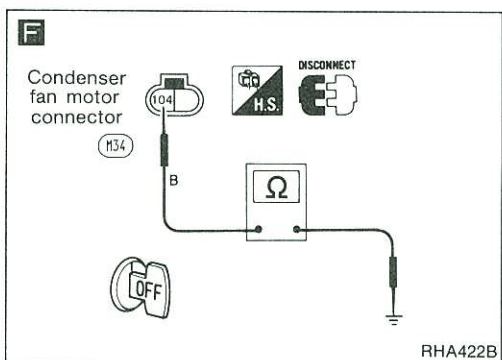
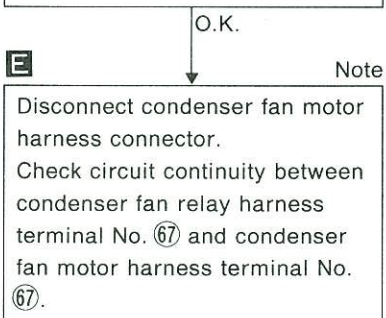
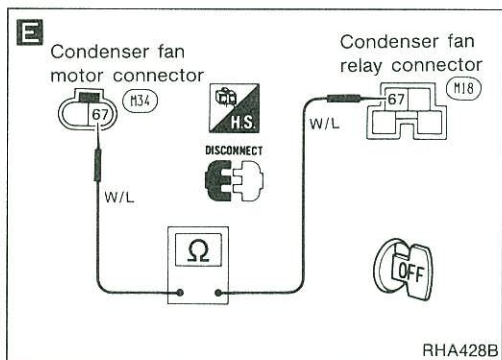
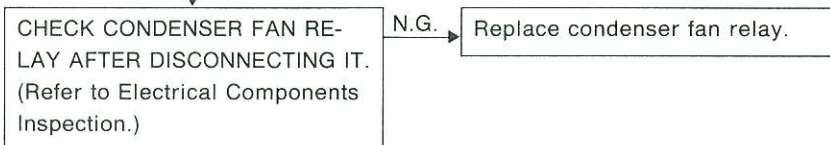
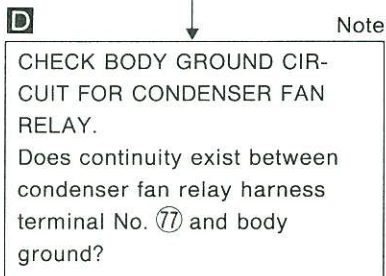
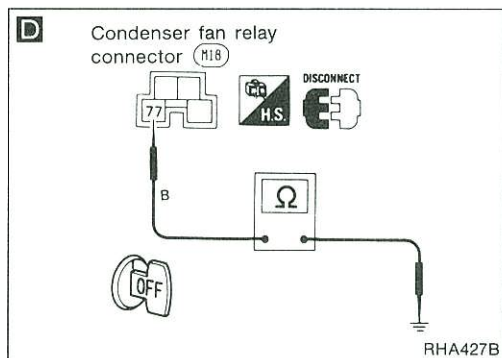
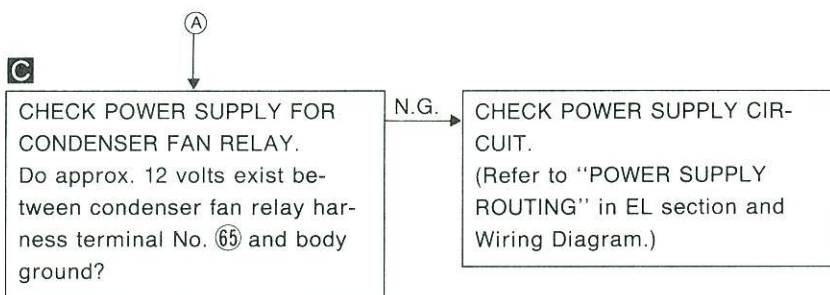
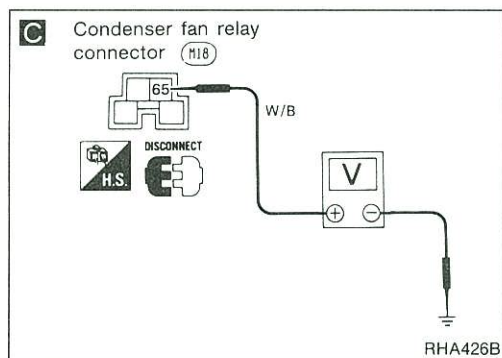
- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 6 (Cont'd)



Replace condenser fan motor.

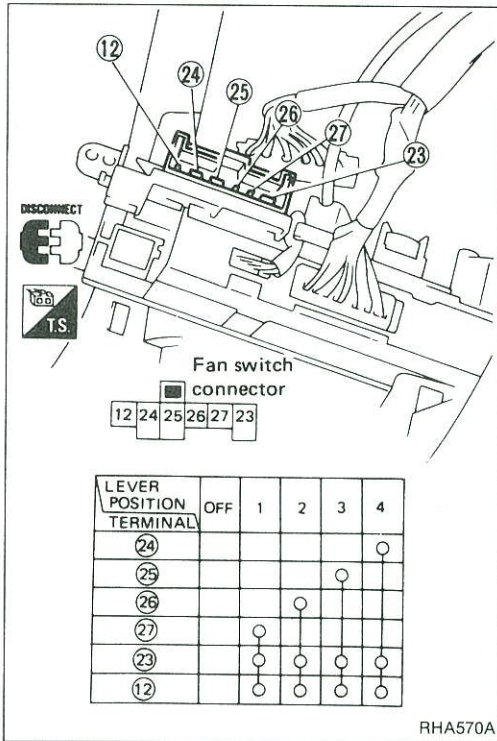
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Electrical Components Inspection

FAN SWITCH

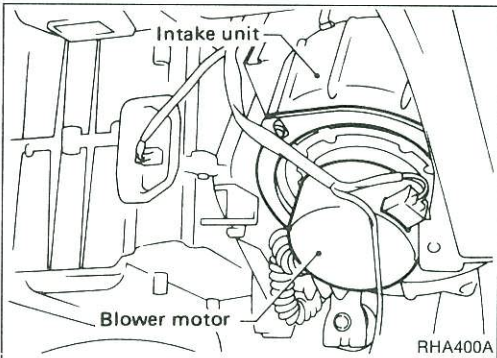
Check continuity between terminals at each switch position.



BLOWER MOTOR

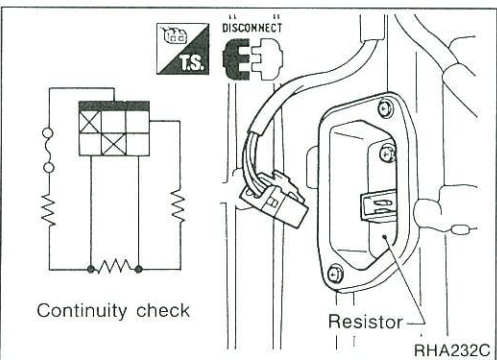
Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.



BLOWER RESISTOR

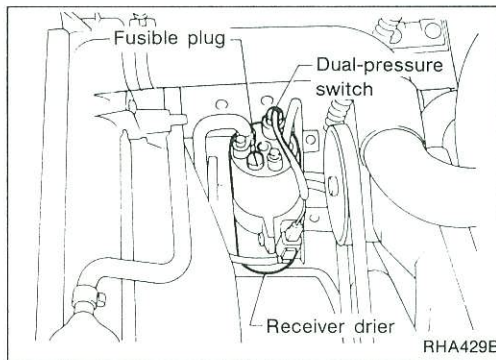
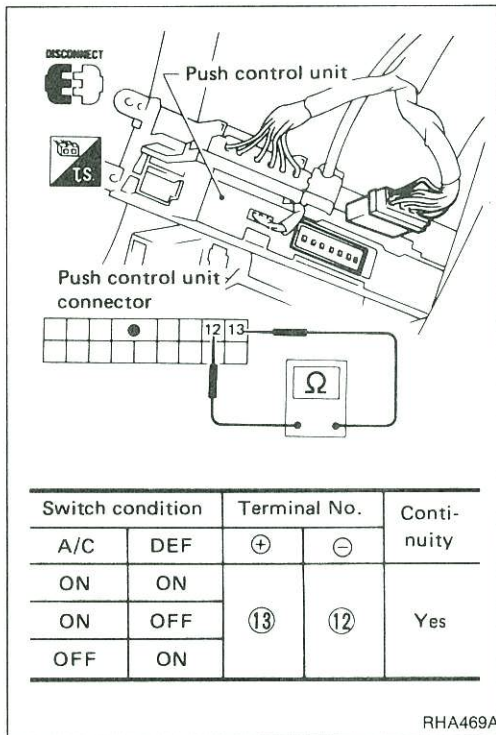
Check continuity between terminals.



Electrical Components Inspection (Cont'd)

A/C SWITCH

Check continuity between terminals at each switch position.



DUAL-PRESSURE SWITCH

High-pressure side line pressure kPa (kg/cm ² , psi)	Operation	Continuity
Decreasing to 177 - 216 (1.8 - 2.2, 26 - 31) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 177 - 235 (1.8 - 2.4, 26 - 34) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327)	Turn ON	Exists

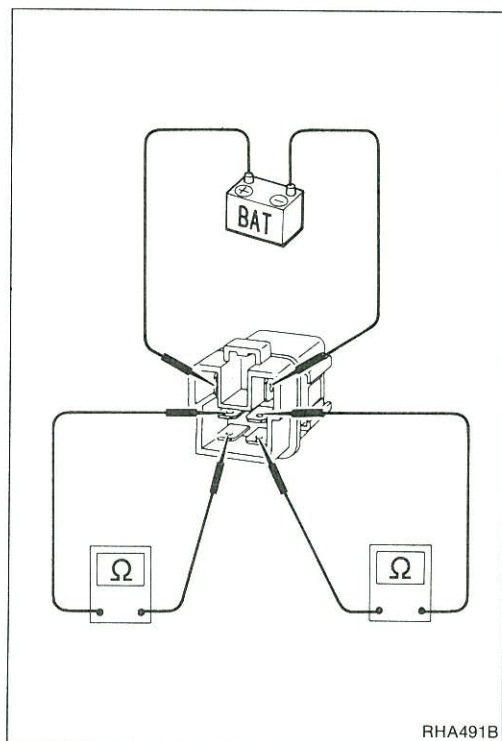
AMBIENT SWITCH

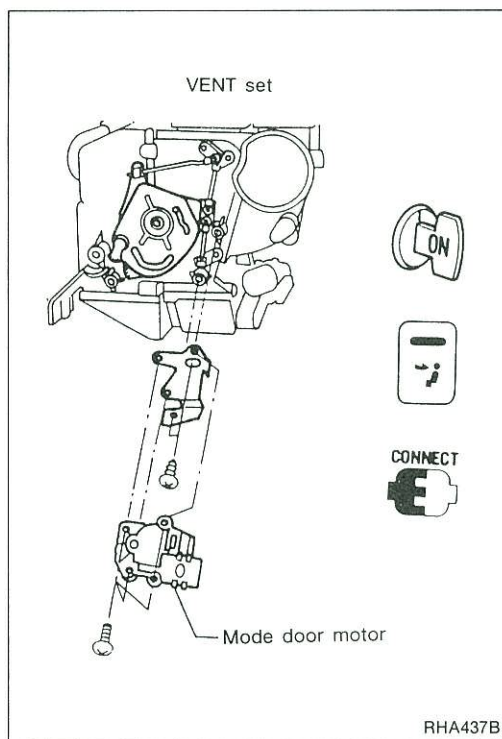
Ambient temperature °C (°F)	Operation
Increasing to approx. 0 - 3 (32 - 37)	Turn OFF
Decreasing to approx. 2 - 5 (36 - 41)	Turn ON

Electrical Components Inspection (Cont'd)

A/C RELAY AND CONDENSER FAN RELAY

Check circuit continuity between terminals by supplying 12 volts to coil side terminals of the relay.

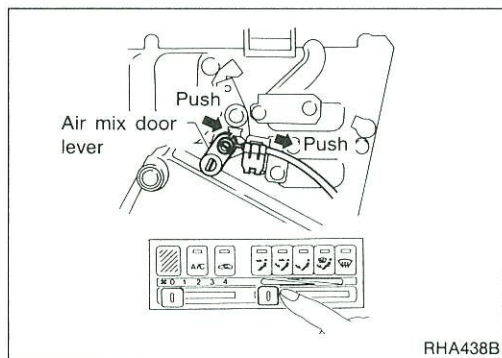




Control Cable and Rod Adjustment

MODE DOOR

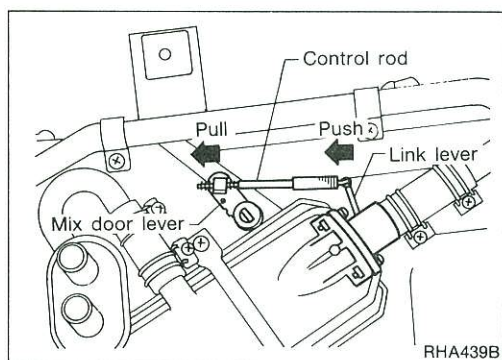
1. Move side link with hand and hold mode door in VENT mode.
2. Install mode door motor on heater unit and connect it to body harness.
3. Turn ignition switch to ON.
4. Turn VENT switch ON.
5. Attach mode door motor rod to side link rod holder.
6. Turn DEF switch ON. Check that side link operates at the fully-open position. Also turn VENT switch ON to check that side link operates at the fully-open position.



TEMPERATURE CONTROL CABLE

- Slide temperature control lever to full cold. Push air mix door lever in direction of arrow. Pull on outer cable in direction of arrow and then clamp it.

After positioning control cable, check it operates properly.



WATER COCK CONTROL ROD

- When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever. Reconnect and readjust temperature control cable.

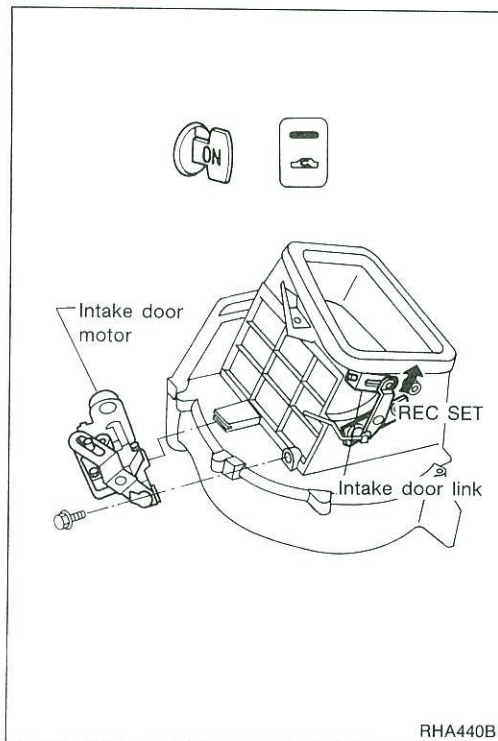
1. Push air mix door lever in direction of arrow.
2. Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

After connecting control rod, check it operates properly.

Control Cable and Rod Adjustment (Cont'd)

INTAKE DOOR

1. Connect the intake door motor harness connector before installing to the 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.



NOTE

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(25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)	HA-127
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(-21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)	HA-128
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SYMPTOM: In-vehicle sensor circuit is shorted.	
(-22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)	HA-129

Contents (Cont'd)

Diagnostic Procedure 8

SYMPTOM: Intake sensor circuit is shorted.

(-24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) HA-130

Diagnostic Procedure 9

SYMPTOM: sunload sensor circuit is shorted.

(-25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) HA-131

Diagnostic Procedure 10

SYMPTOM: P.B.R. circuit is shorted.

(-26 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.) HA-132

Diagnostic Procedure 11

SYMPTOM: Condenser fan motor does not operate. HA-132

Diagnostic Procedure 12

SYMPTOM: Mode door motor does not operate normally. HA-133

Diagnostic Procedure 13

SYMPTOM: Intake door motor does not operate normally. HA-135

Diagnostic Procedure 14

SYMPTOM: Air mix door motor does not operate normally. HA-137

Diagnostic Procedure 15

SYMPTOM: Blower motor operation is malfunctioning under out of

Starting Fan Speed Control. HA-138

Diagnostic Procedure 16

SYMPTOM: Magnet clutch does not engage after performing

Preliminary Check 6. HA-141

Diagnostic Procedure 17







SYMPTOM: Self-diagnosis cannot be performed. HA-143

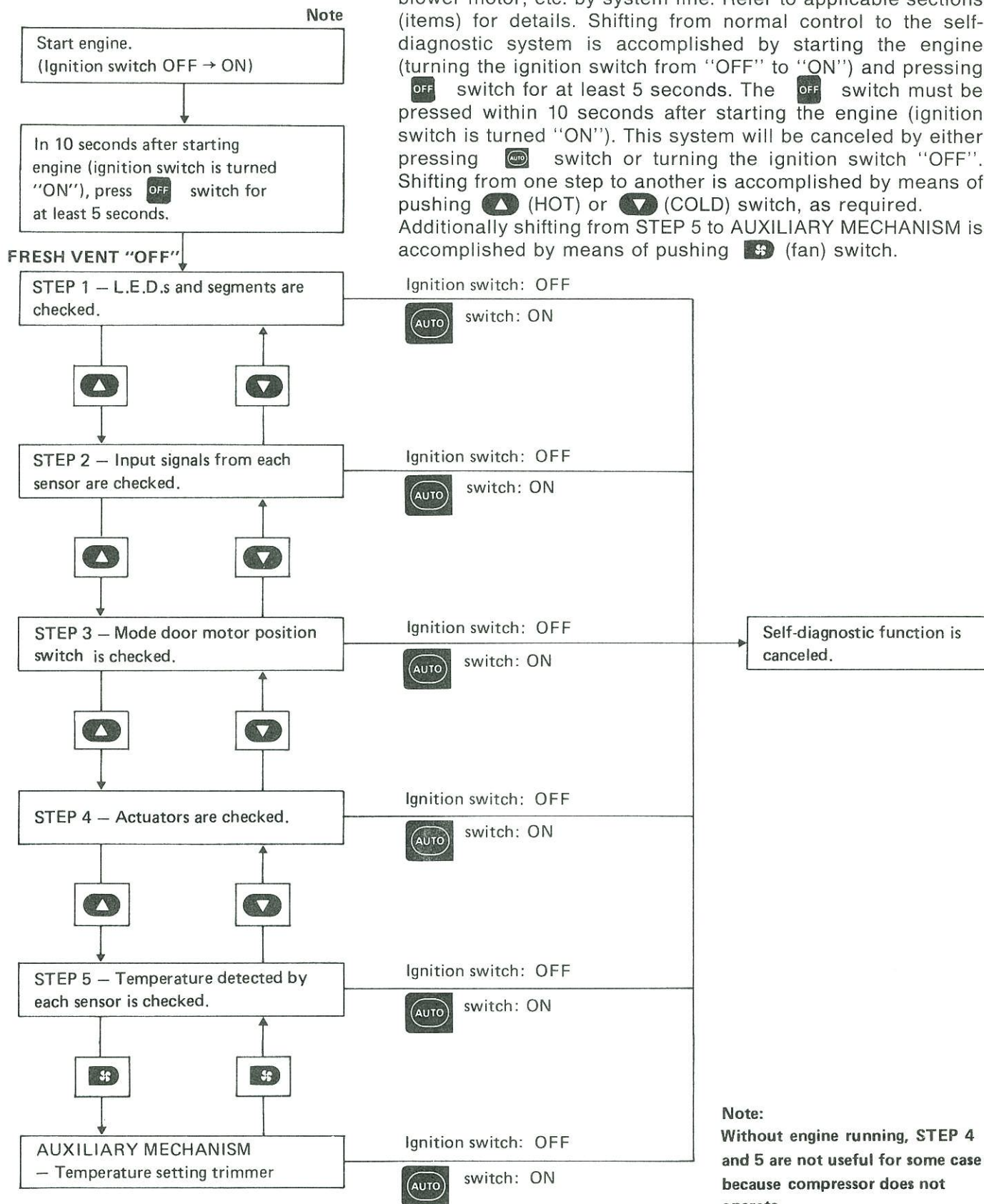
Electrical Components Inspection HA-143

Control Rod Adjustment HA-144

Self-diagnosis

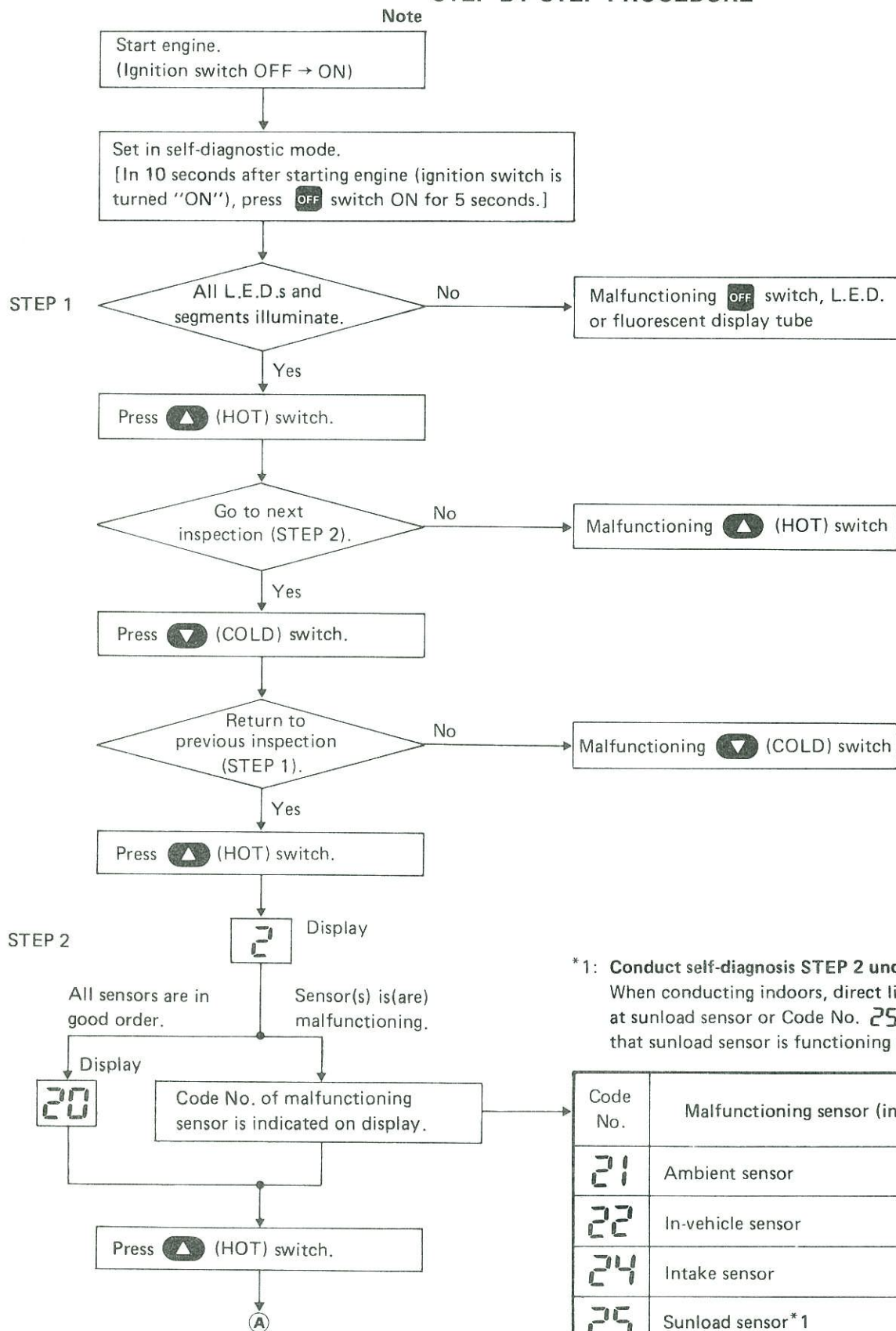
INTRODUCTION AND GENERAL DESCRIPTION

The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from "OFF" to "ON") and pressing  switch for at least 5 seconds. The  switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing  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.



TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd) STEP BY STEP PROCEDURE



* 1: Conduct self-diagnosis STEP 2 under sunshine.
When conducting indoors, direct light (more than 60W) at sunload sensor or Code No. **25** will indicate despite that sunload sensor is functioning properly.

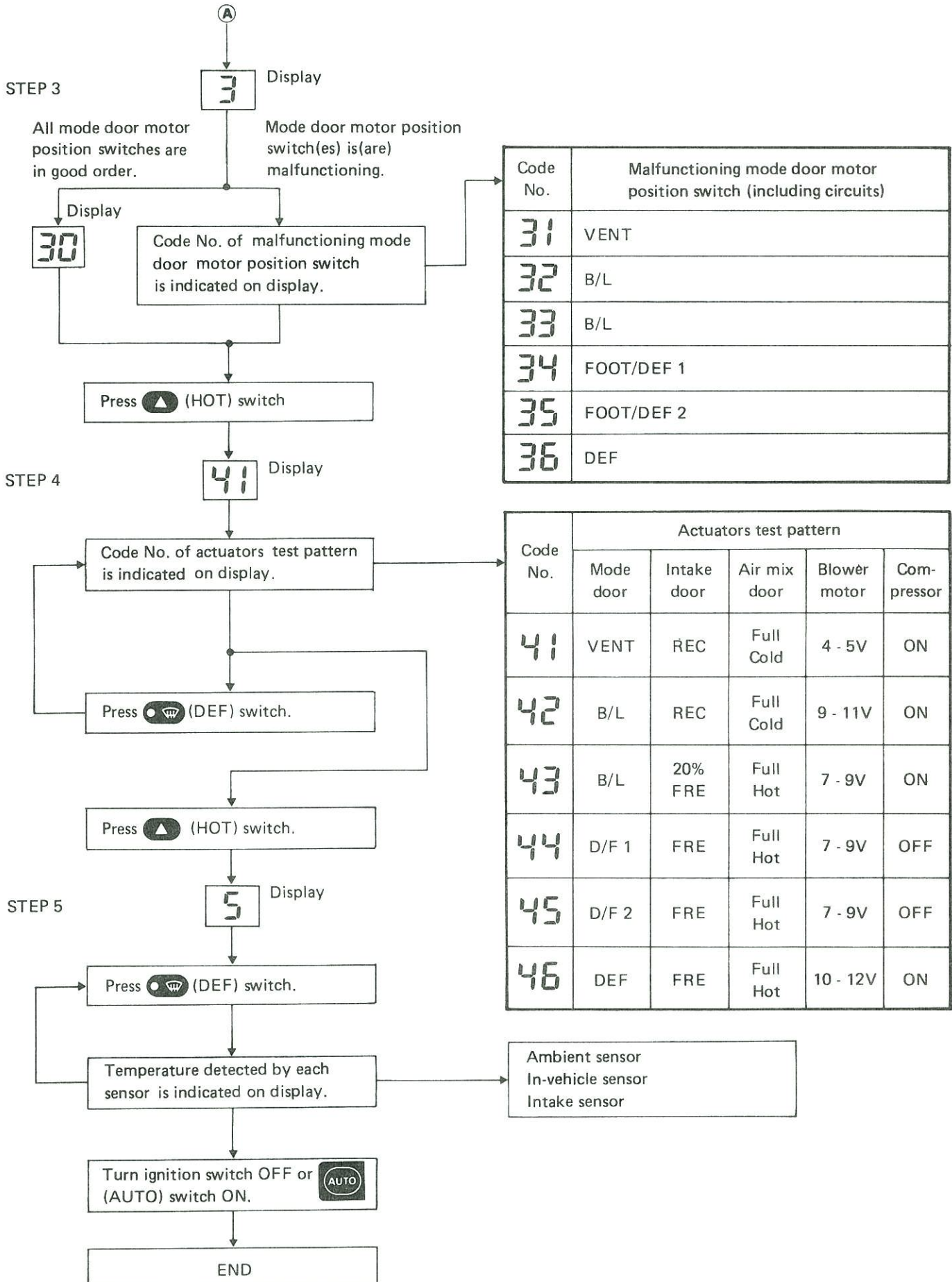
Code No.	Malfunctioning sensor (including circuits)
21	Ambient sensor
22	In-vehicle sensor
24	Intake sensor
25	Sunload sensor* 1
26	P.B.R.

Note:

Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd)

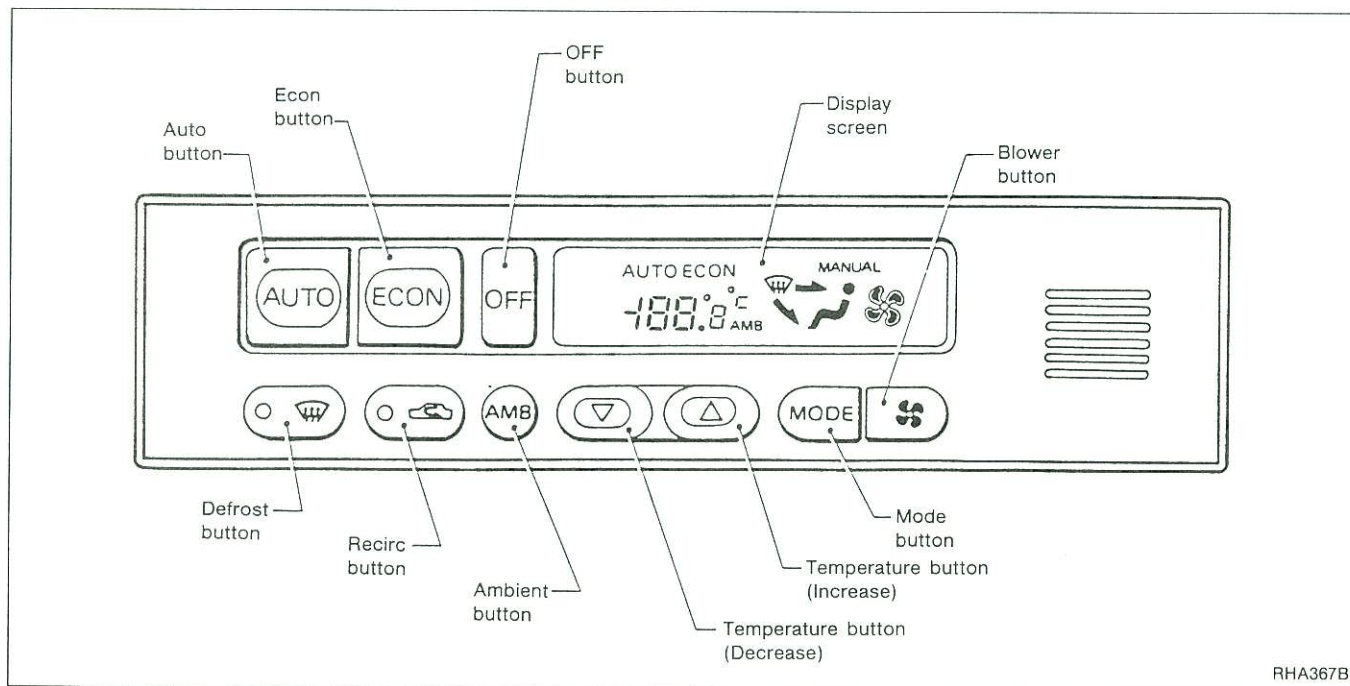


Self-diagnosis (Cont'd)

HOW TO INTERPRET THE RESULTS

STEP 1: Checks L.E.D.s and segments

When switch's L.E.D. and segments are in good order in STEP 1 mode, the corresponding L.E.D. and fluorescent display tube will illuminate.



RHA367B

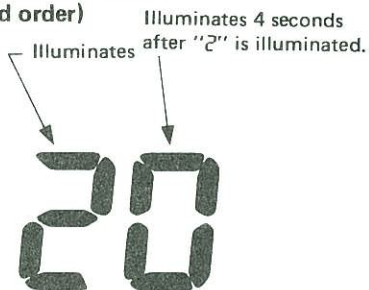
Display malfunction



RHA502A

If L.E.D.s or segments malfunction, L.E.D. does not come on or display shows incomplete segment.

Display (when all sensors are in good order)



RHA499A

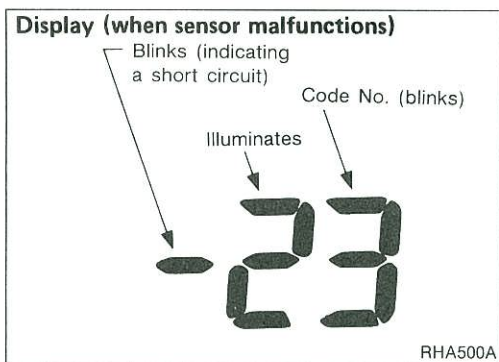
STEP 2: Checks each sensor circuit for open or short circuit

Display shows "2" in STEP 2 mode.

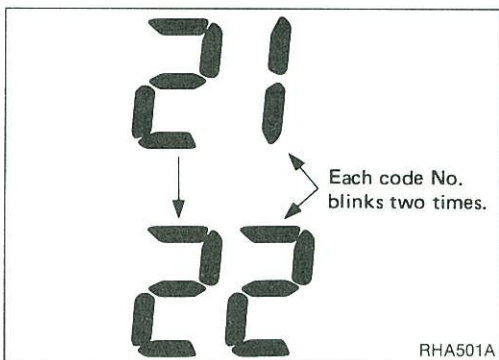
When all sensors are in good order, display shows "20".

It takes approximately 4 seconds to check all sensors.

Self-diagnosis (Cont'd)



If a sensor is malfunctioning, the corresponding code No. blinks on display. A short circuit is identified by a blinking “-” mark preceding mode number.



If two or more sensors malfunction, corresponding code Nos. respectively blink two times.

Sensors and abnormalities

If a circuit is opened or shorted, display shows its code No. when input corresponds with any of following conditions.

Code No.	Sensor	Open circuit	Short circuit
21	Ambient sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
22	In-vehicle sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
24	Intake sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
25	Sunload sensor*2	Less than 0.0319 mA	Greater than 1.147 mA
26	P.R.B.*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.

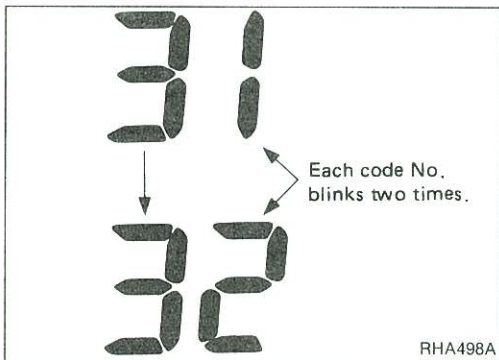
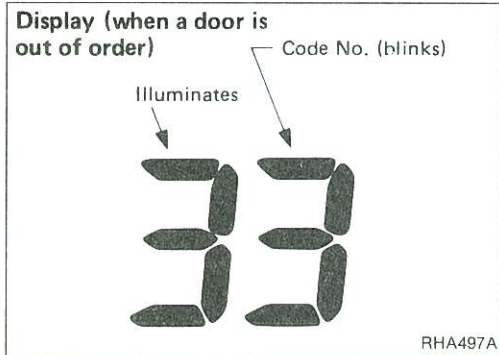
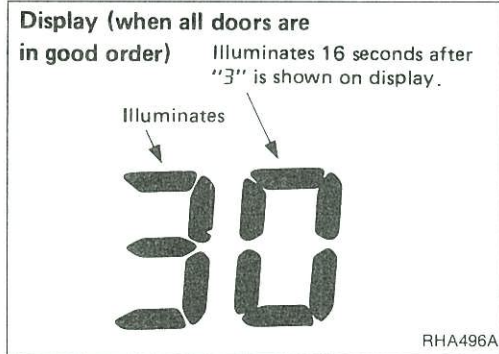
Self-diagnosis (Cont'd)

STEP 3: Checks mode door position

Display shows "3" in STEP 3 mode.

When all doors are in good order, display will then show "30".

It takes approximately 16 seconds to check all mode doors.

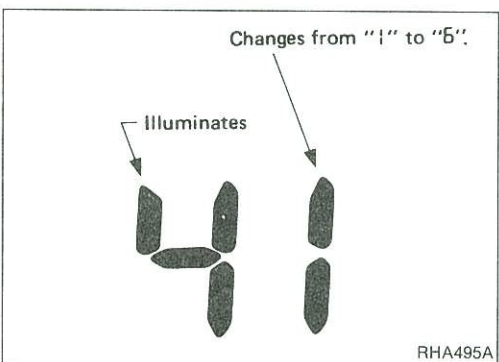


When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

Code No.	31	32	33	34	35	36
Malfunctioning part	VENT	B/L	B/L	F/D 1	F/D 2	DEF


If two or more mode doors are out of order, corresponding code numbers respectively blink two times.

If any mode door motor position switch is malfunctioning, mode door motor will also malfunction.



STEP 4: Checks operation of each actuator

Display shows "41" in STEP 4 mode.

When  (DEF) switch is pressed one time, display shows "42". Thereafter, each time the switch is pressed, display advances one number at a time, up to "45", then returns to "41".

Self-diagnosis (Cont'd)

During inspection in STEP 4 mode, auto amplifier will forcefully transmit an output to the affected actuators in response to code No. shown on display, as indicated in table below.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.





Code No.	41	42	43	44	45	46
Actuator						
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
Blower motor	4 - 5 V	9 - 11 V	7 - 9 V	7 - 9 V	7 - 9 V	10 - 12 V
Compressor	ON	ON	ON	OFF	OFF	ON

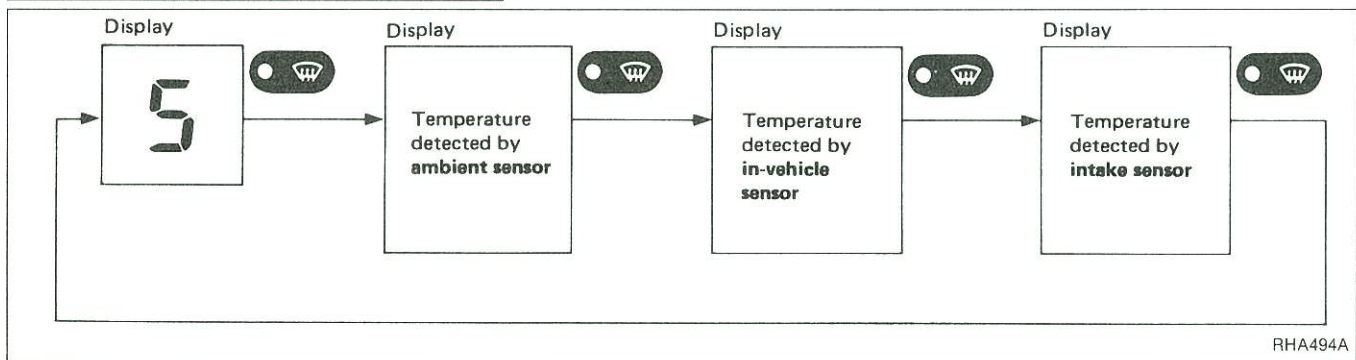
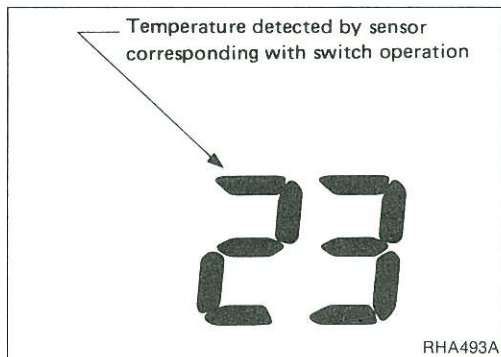
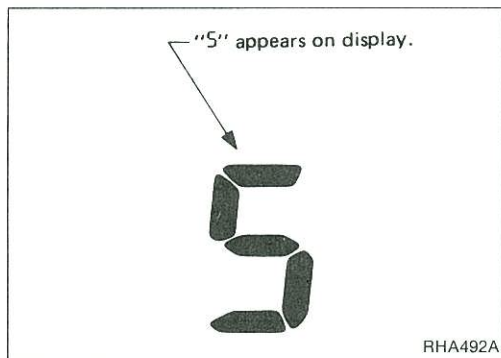
Operating condition of each actuator cannot be checked by indicators.

Self-diagnosis (Cont'd)

STEP 5: Checks temperature detected by sensors

Display shows "5" in STEP 5 mode.

- When  (DEF) switch is pressed one time, display shows temperature detected by ambient sensor.
- When  (DEF) switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When  (DEF) switch is pressed third time, display shows temperature detected by intake sensor.
- When  (DEF) switch is pressed fourth time, display returns to original presentation "5".






If temperature shown on display greatly differs from actual temperature, check sensor circuit at first then inspect sensor itself according to the procedures described in **Electrical Components Inspection**.

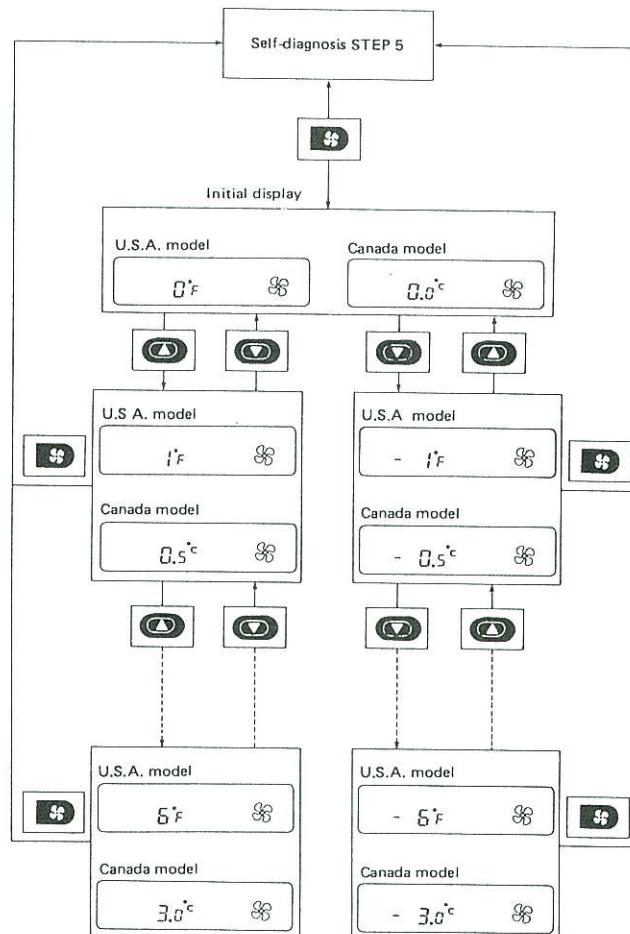
Self-diagnosis (Cont'd)

AUXILIARY MECHANISM (Temperature setting trimmer)

This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of $\pm 3^{\circ}\text{C}$ ($\pm 6^{\circ}\text{F}$).

Operating procedures for this trimmer are as follows:

Starting with STEP 5 under "Self-diagnostic mode", press  (fan) switch to set air conditioning system in auxiliary mode. Then, press either  (HOT) or  (COLD) switch as desired. Temperature will change at a rate of 0.5°C (1°F) each time a switch is pressed.



RHA491A

When battery cable is disconnected, trimmer operation is canceled and temperature set becomes that of initial condition i.e. 0°C (0°F).

TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE			Self-diagnosis						Preliminary Check								Diagnostic Procedure											
REFERENCE PAGE				HA-96, 98	HA-96, 98	HA-97, 100	HA-97, 100	HA-97, 102	HA-95, 103	HA-108	HA-109	HA-110	HA-111	HA-112	HA-113	HA-114	HA-62, 114	HA-123	HA-124	HA-125	HA-126	HA-127	HA-128	HA-129	HA-130	HA-131	HA-132	HA-132
SYMPTOM			STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Diagnostic Procedure 11	
Air outlet does not change.			①	②	○	○	○		③									○	○	○	○	○	○	○	○	○	○	
Intake door does not change.			①	②		○	○			③								○	○	○	○	○	○	○	○	○	○	
Insufficient cooling			○	○	○	○	○	○	○	○	①		○	○	○	○		○	○	○	○	○	○	○	○	○	○	○
Insufficient heating			○	○	○	○	○	○	○	○		①	○		○			○	○	○	○	○	○	○	○	○	○	○
Blower motor operation is malfunctioning.			①	②		○	○						③					○	○	○	○	○	○	○	○	○	○	
Magnet clutch does not engage.			①	②		○	○								③			○	○	○	○	○	○	○	○	○	○	
Discharged air temperature does not change.			①	②		○	○									③		○	○	○	○	○	○	○	○	○	○	
Noise																①												
Result of Self-diagnosis STEP 2	21	Ambient sensor circuit is open.	①	②			③											④										
	22	In-vehicle sensor circuit is open.	①	②			③												④									
	24	Intake sensor circuit is open.	①	②			③													④								
	25	Sunload sensor circuit is open.	①	②																	③							
	26	P.B.R. circuit is open.	①	②																		③						

①, ②: The number means checking order.

○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart (Cont'd)

Diagnostic Procedure		Main Power Supply and Ground Circuit Check	Electrical Components Inspection														
Diagnostic Procedure 12	HA-133 - 134	HA-122															
Diagnostic Procedure 13	HA-135 - 136	HA-122															
Diagnostic Procedure 14	HA-137	HA-122															
Diagnostic Procedure 15	HA-138 - 140	HA-122															
Diagnostic Procedure 16	HA-141 - 142	HA-122															
Diagnostic Procedure 17	HA-143	HA-122															
Auto amp.		HA-122															
10A Fuse #23		HA-122															
15A Fuses #4 and #5		HA-122															
10A Fuse #10		HA-122															
10A Fuse #20		HA-122															
Ambient sensor		HA-152															
In-vehicle sensor		HA-150 - 151															
Intake sensor		HA-153 - 154															
Sunload sensor		HA-152 - 153															
P.B.R.		HA-161 - 162															
Air mix door motor		HA-160 - 161															
Mode door motor		HA-147, HA-162 - 163															
Intake door motor		HA-147, HA-156 - 158															
Blower motor		HA-87															
Fan control amp.		—															
Blower high relay		HA-89, 143															
A/C relay		HA-89, 143															
Dual-pressure switch		HA-88, 143															
Magnet clutch (Compressor)		HA-42															
Auto amp.		—															
E.C.C.S. control unit		Refer to EF & EC section.															
Condenser fan relay																	
Condenser fan motor																	
Thermoswitch																	
Harness		—															

TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart (Cont'd)

PROCEDURE			Self-diagnosis					Preliminary Check								Diagnostic Procedure												
REFERENCE PAGE																												
<div></div> <div>SYMPTOM</div>			STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Diagnostic Procedure 11	
			HA-96, 98	HA-96, 98	HA-97, 100	HA-97, 100	HA-97, 102	HA-95, 103	HA-108	HA-109	HA-110	HA-111	HA-112	HA-113	HA-114	HA-62, 114	HA-123	HA-124	HA-125	HA-126	HA-127	HA-128	HA-129	HA-130	HA-131	HA-132	HA-132	
Result of Self-diagnosis STEP 2	-21	Ambient sensor circuit is shorted.	①	②			③															④						
	-22	In-vehicle sensor circuit is shorted.	①	②			③															④						
	-24	Intake sensor circuit is shorted.	①	②			③																④					
	-25	Sunload sensor circuit is shorted.	①	②																					③			
	-26	P.B.R. circuit is shorted.	①	②																						④		
Radiator fan motor does not operate.																										①		
Mode door motor does not operate normally.			①	②	③	④	○										○	○	○	○	○	○	○	○	○	○		
Intake door motor does not operate normally.			①	②		③	○										○	○	○	○	○	○	○	○	○	○		
Air mix door motor does not operate normally.			①	②		③	○										○	○	○	○	○	○	○	○	○			
Blower motor operation is malfunctioning under out of Starting Fan Speed Control.			①	②		○	○						③				○	○	○	○	○	○	○	○	○			
Magnet clutch does not operate after performing Preliminary Check 6.			①	②		○	○							③			○		○									
Self-diagnosis cannot be performed.																												

①, ②: The number means checking order.

○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart (Cont'd)

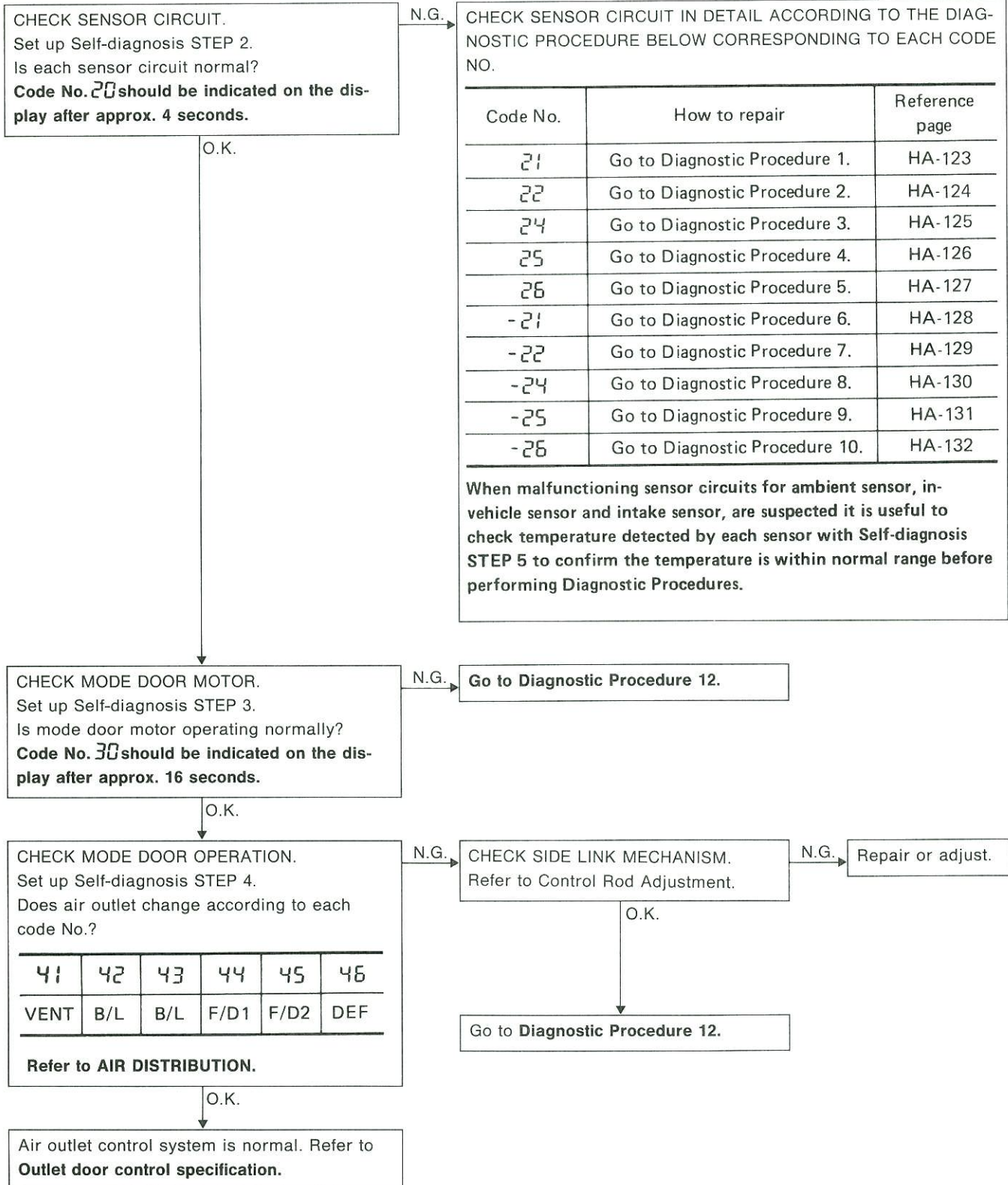
Diagnostic Procedure		Main Power Supply and Ground Circuit Check	Electrical Components Inspection											
	Diagnostic Procedure 12													HA-133 - 134
	Diagnostic Procedure 13													HA-135 - 136
	Diagnostic Procedure 14													HA-137
	Diagnostic Procedure 15													HA-138 - 140
	Diagnostic Procedure 16													HA-141 - 142
	Diagnostic Procedure 17													HA-143
	Auto amp.													HA-122
	10A Fuse #23													HA-122
	15A Fuses #4 and #5													HA-122
	10A Fuse #10													HA-122
	10A Fuse #20													HA-122
	Ambient sensor													HA-152
	In-vehicle sensor													HA-150 - 151
	Intake sensor													HA-153 - 154
	Sunload sensor													HA-152 - 153
	P.B.R.													HA-161 - 162
	Air mix door motor													HA-160 - 161
	Mode door motor													HA-147, HA-162 - 163
	Intake door motor													HA-147, HA-156 - 158
	Blower motor													HA-87
	Fan control amp.													—
	Blower high relay													HA-89, 143
	A/C relay													HA-89, 143
	Dual-pressure switch													HA-88, 143
	Magnet clutch (Compressor)													HA-42
	Auto amp.													—
	E.C.C.S. control unit													Refer to EF & EC section.
	Condenser fan relay													
	Condenser fan motor													
	Thermoswitch													
	Harness													—

Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change.

- Perform Self-diagnosis STEP 1 before referring to the flow chart.



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	Reference page
21	Go to Diagnostic Procedure 1.	HA-123
22	Go to Diagnostic Procedure 2.	HA-124
24	Go to Diagnostic Procedure 3.	HA-125
25	Go to Diagnostic Procedure 4.	HA-126
26	Go to Diagnostic Procedure 5.	HA-127
-21	Go to Diagnostic Procedure 6.	HA-128
-22	Go to Diagnostic Procedure 7.	HA-129
-24	Go to Diagnostic Procedure 8.	HA-130
-25	Go to Diagnostic Procedure 9.	HA-131
-26	Go to Diagnostic Procedure 10.	HA-132

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor, are suspected it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K.

CHECK INTAKE DOOR MOTOR OPERATION.
Set up Self-diagnosis STEP 4.
Does intake air change according to each code No.?

N.G.

CHECK INTAKE DOOR ROD or LEVER MECHANISM.
Refer to Control Rod Adjustment.

N.G.

Repair or Adjust.

O.K.

Go to Diagnostic Procedure 13.

O.K.

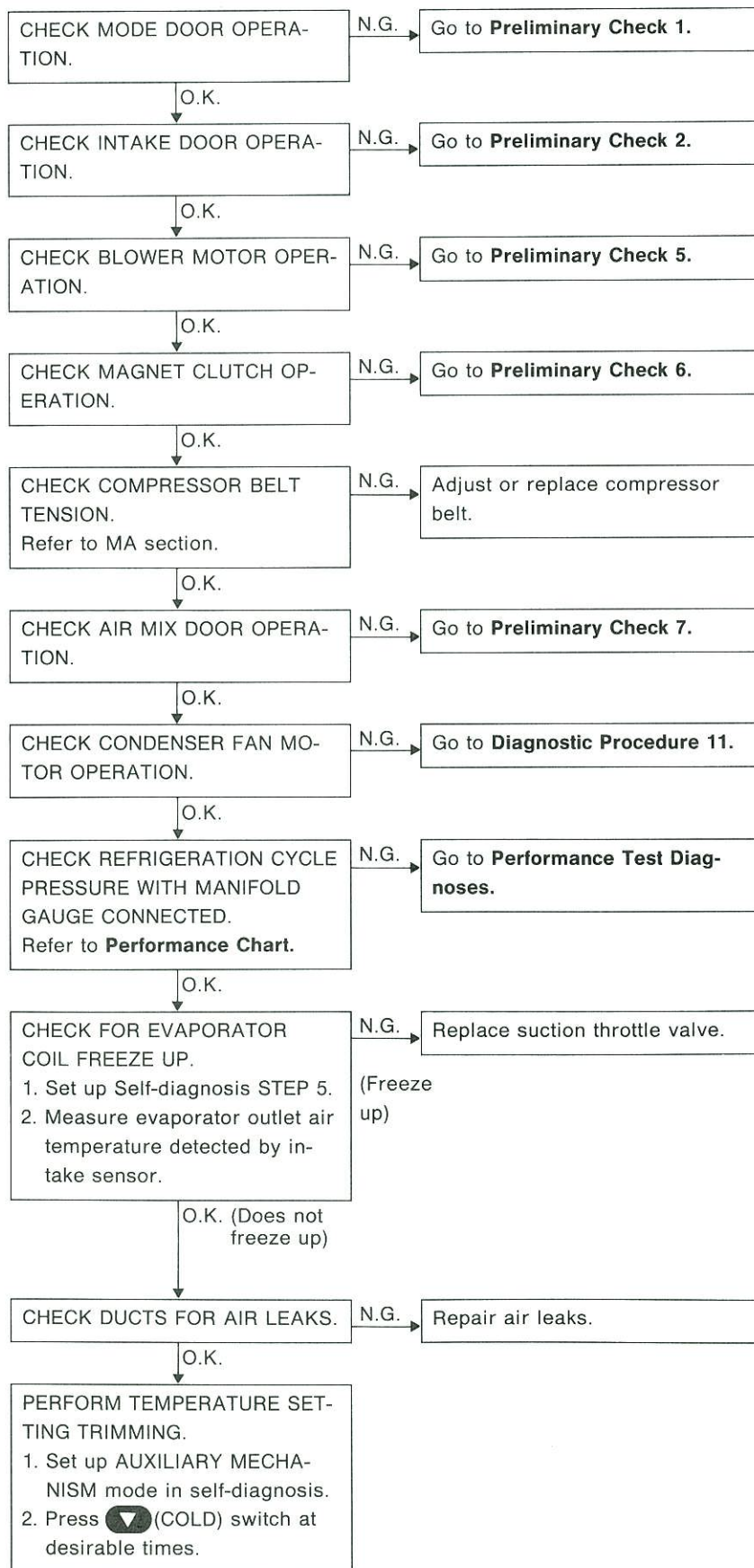
41	42	43	44	45	46
REC	REC	20% FRE	FRE	FRE	FRE

Intake door control system is normal.
Refer to Intake door control specification.

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

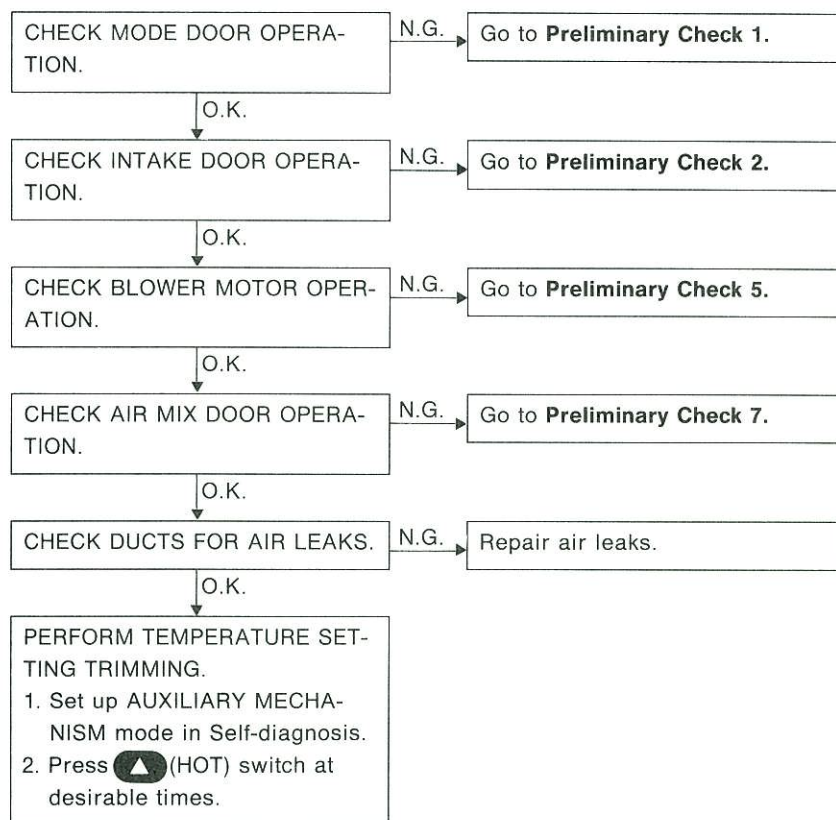
Insufficient cooling



Preliminary Check (Cont'd)

PRELIMINARY CHECK 4

Insufficient heating

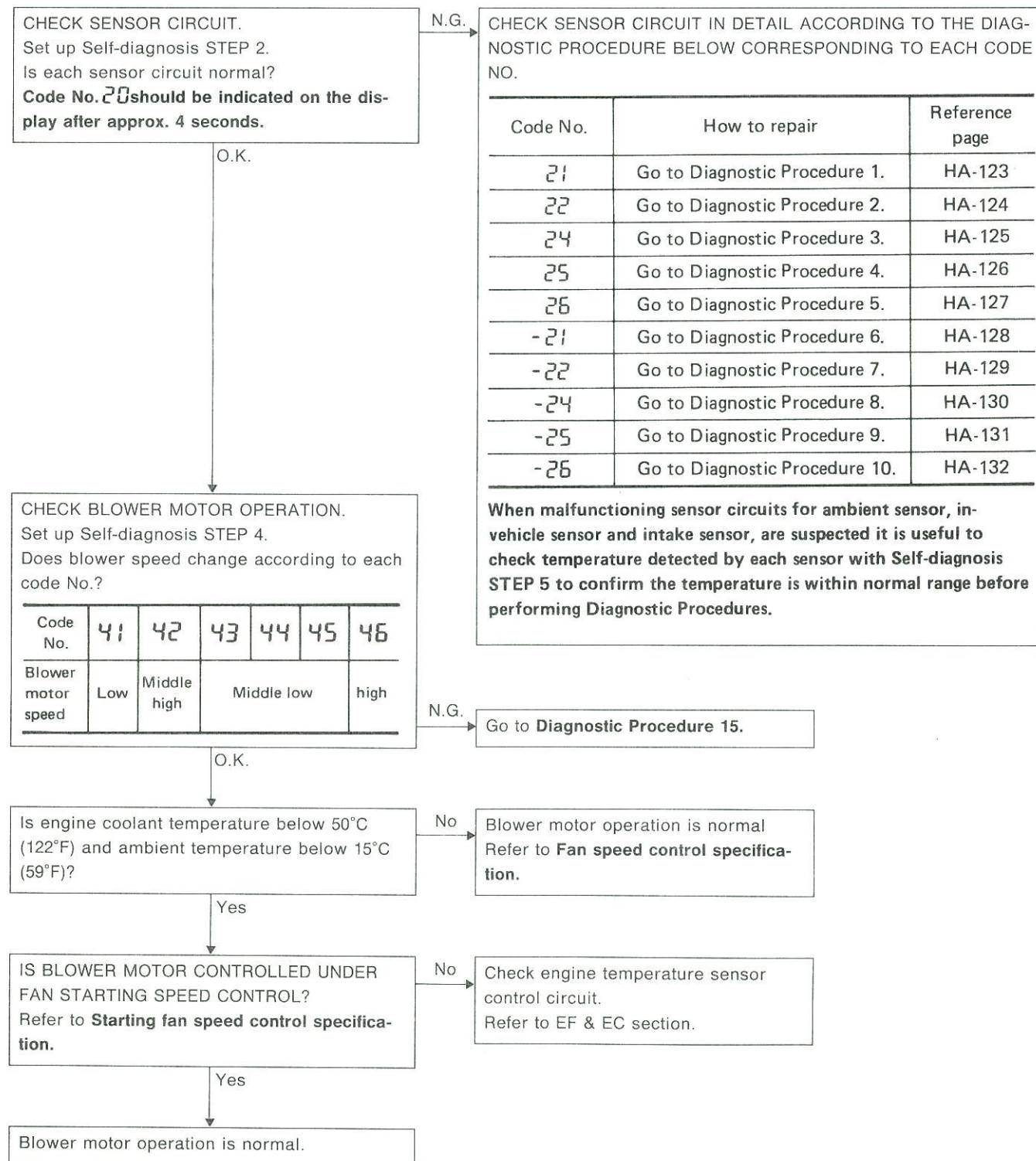


Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.

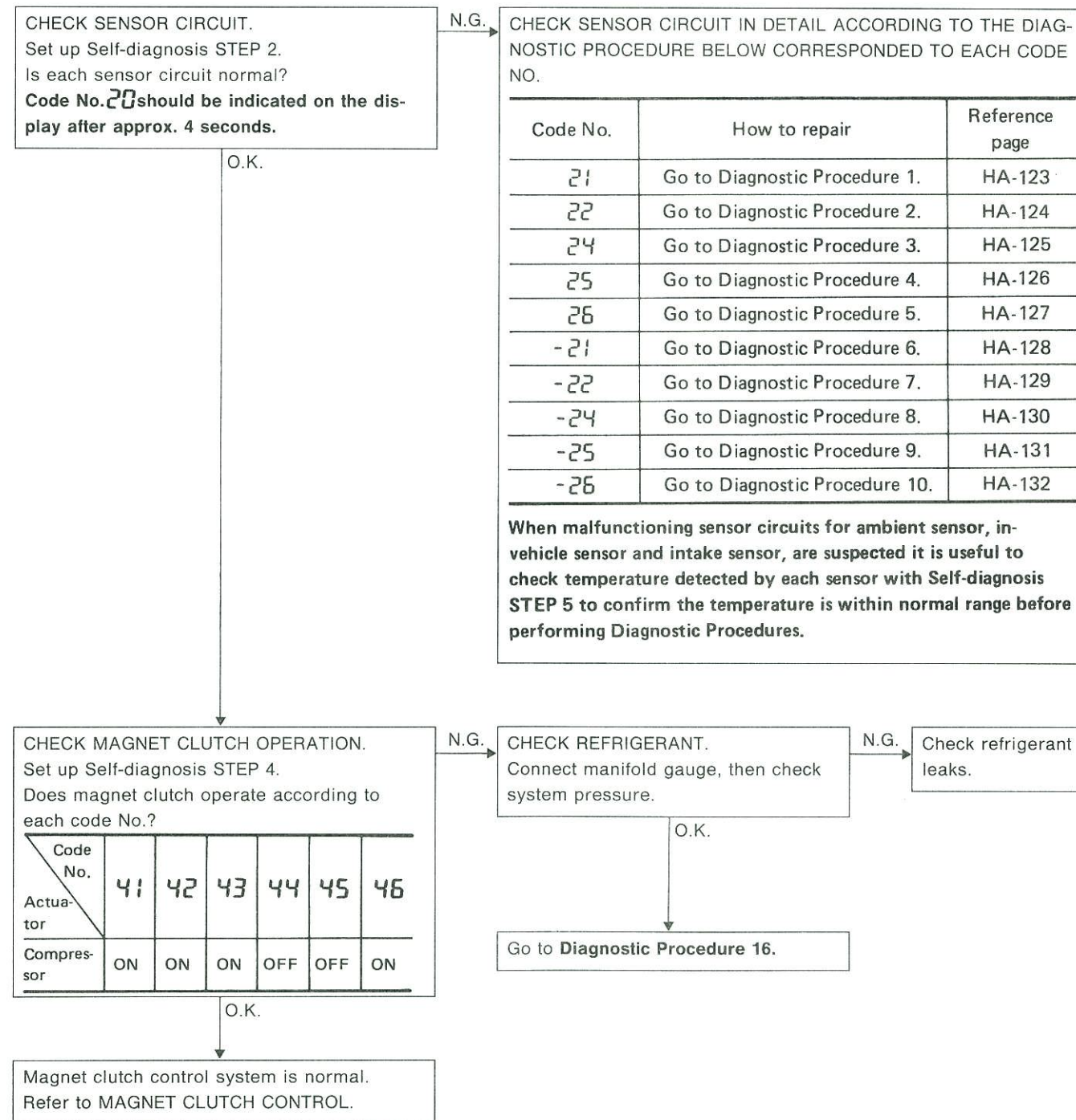


Preliminary Check (Cont'd)

PRELIMINARY CHECK 6

Magnet clutch does not engage.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.

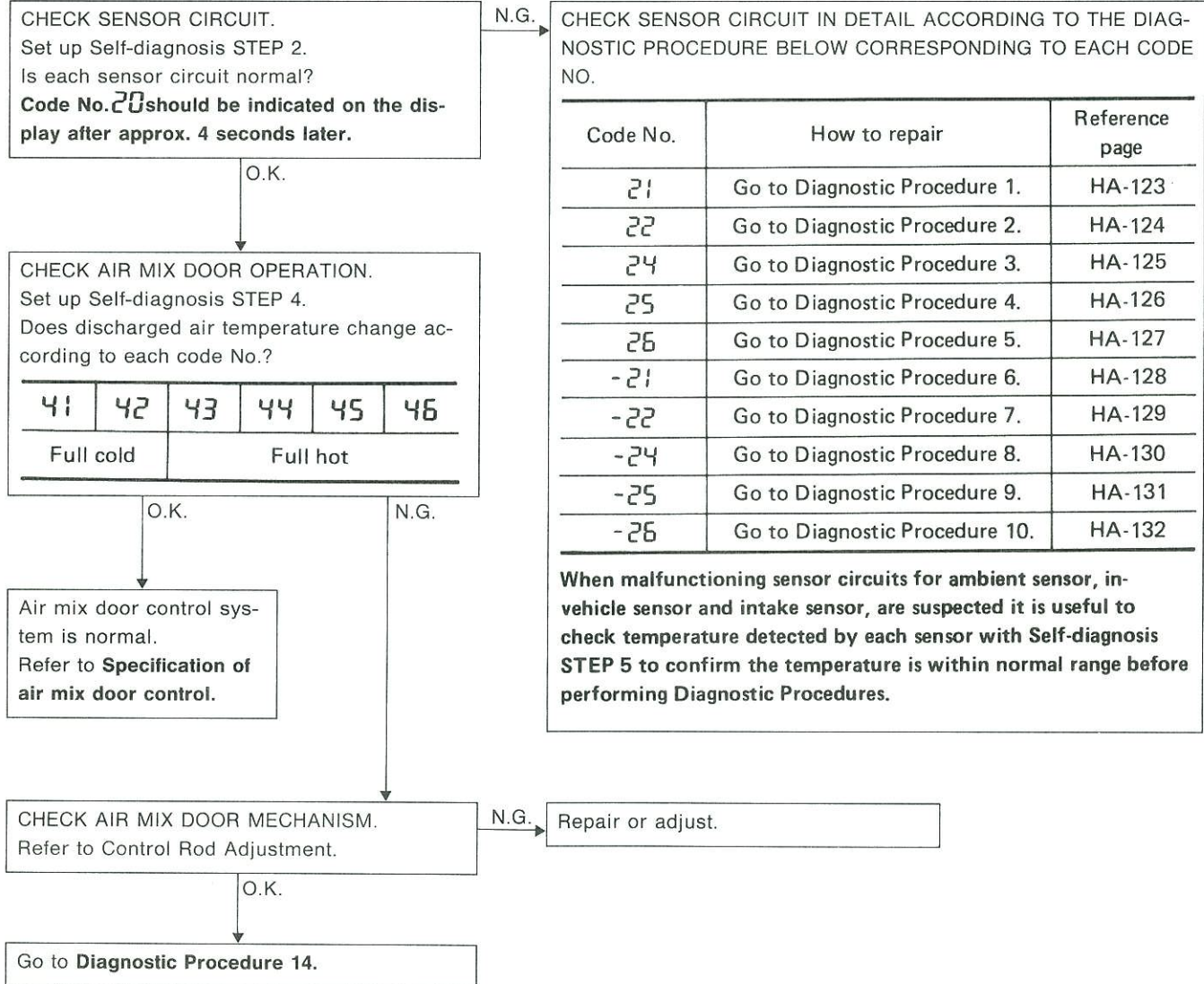


Preliminary Check (Cont'd)

PRELIMINARY CHECK 7

Discharged air temperature does not change.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.



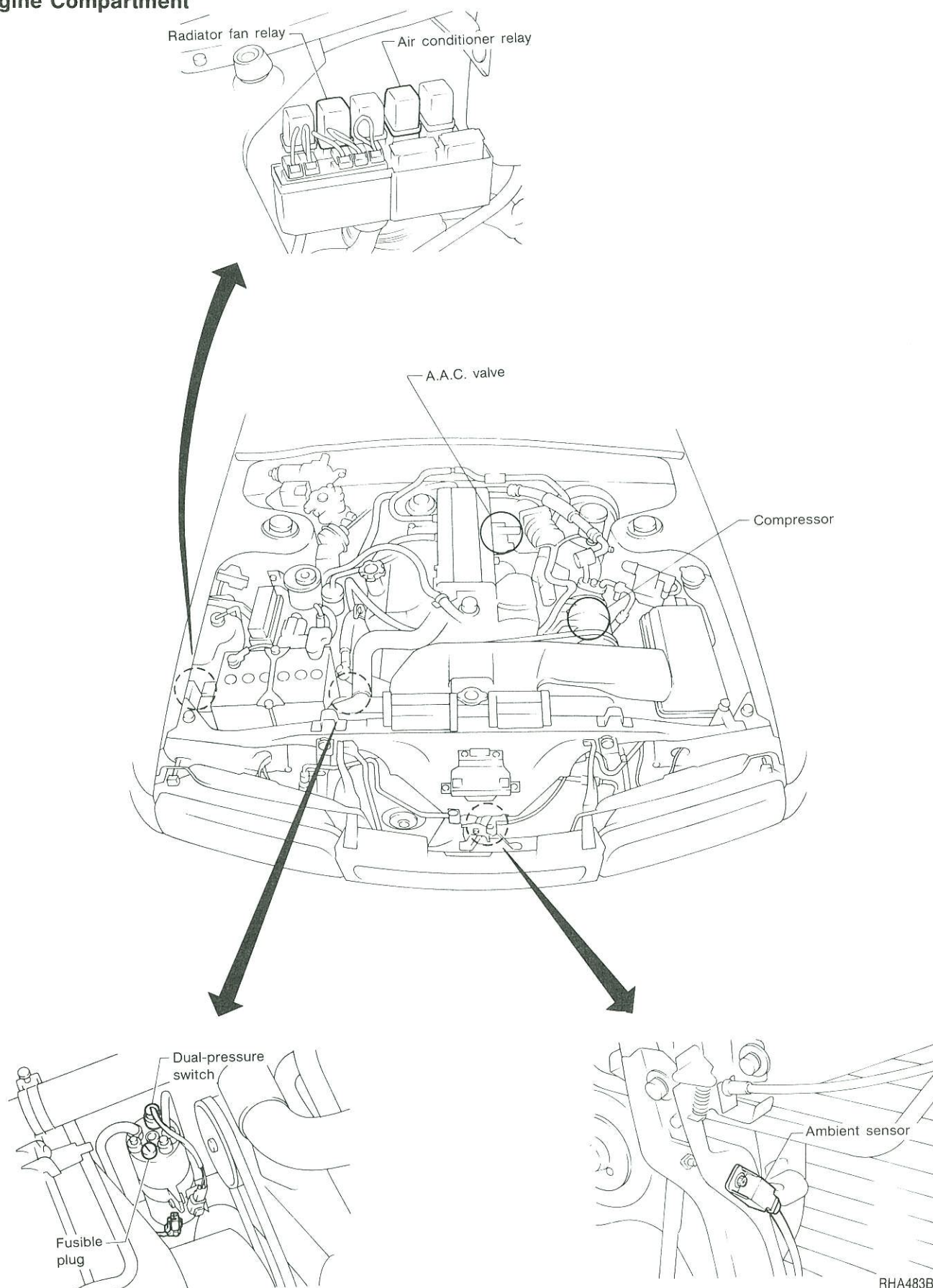
PRELIMINARY CHECK 8

Noise

- Refer to HA-62.

A/C Electrical Component Layout

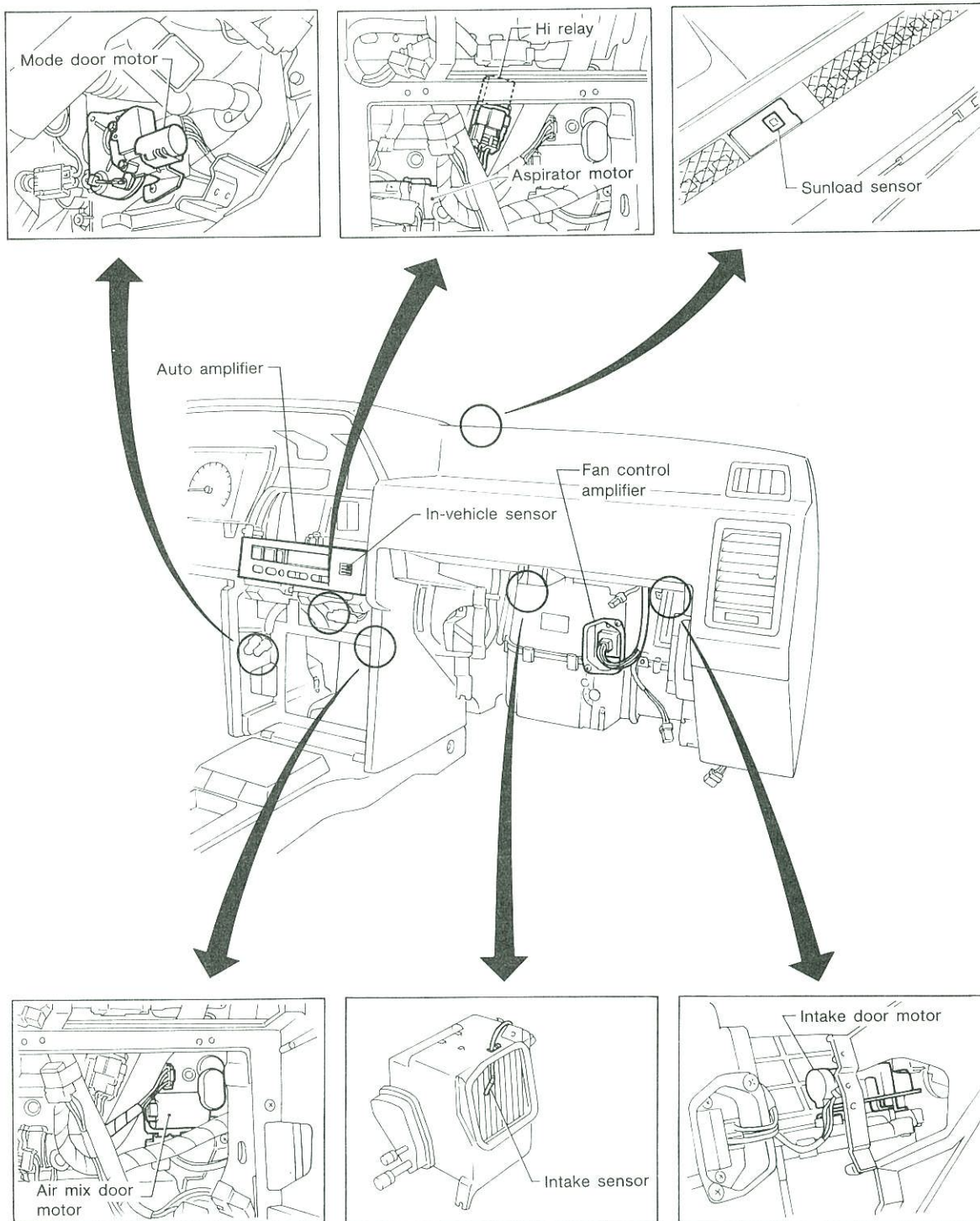
Engine Compartment



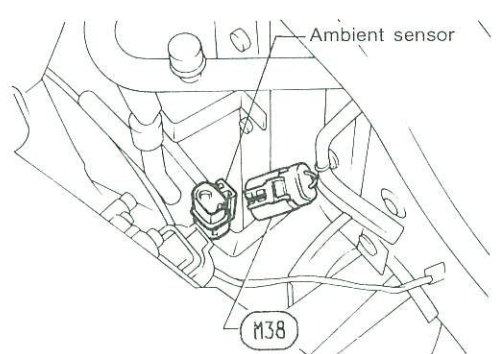
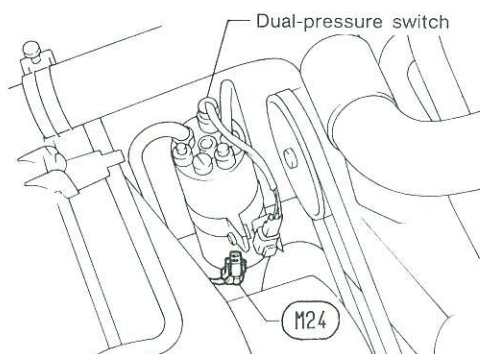
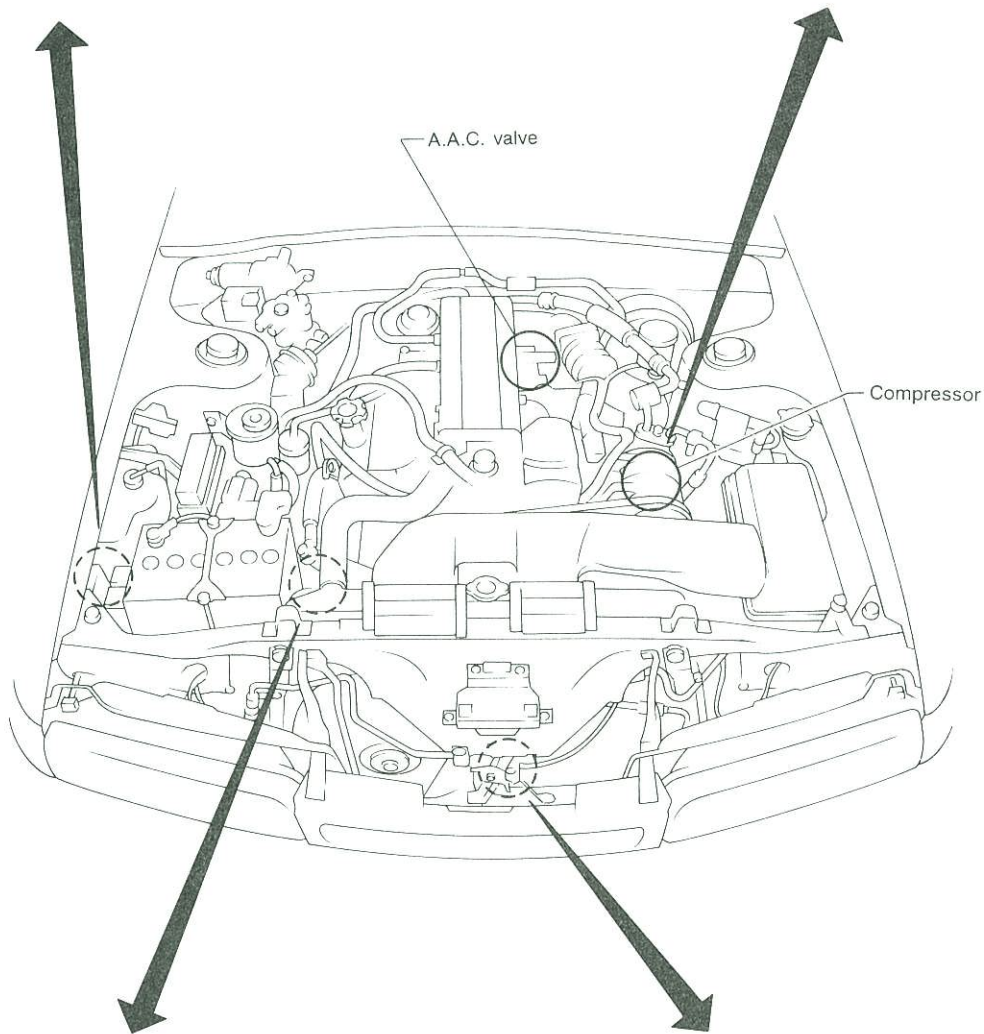
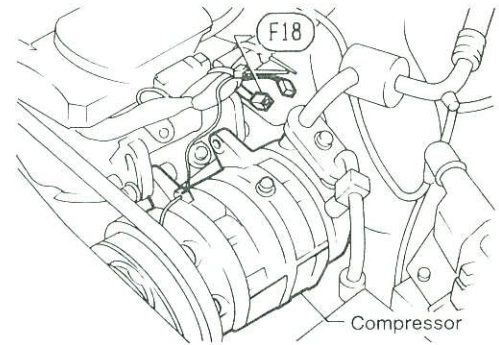
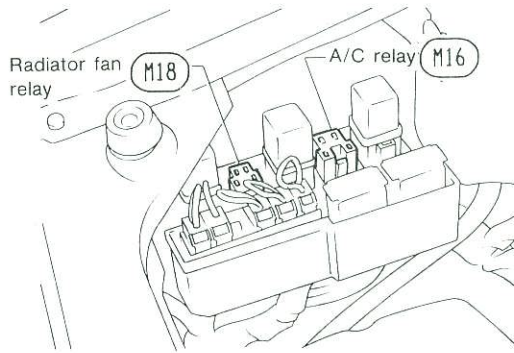
RHA483B

A/C Electrical Component Layout (Cont'd)

Passenger compartment

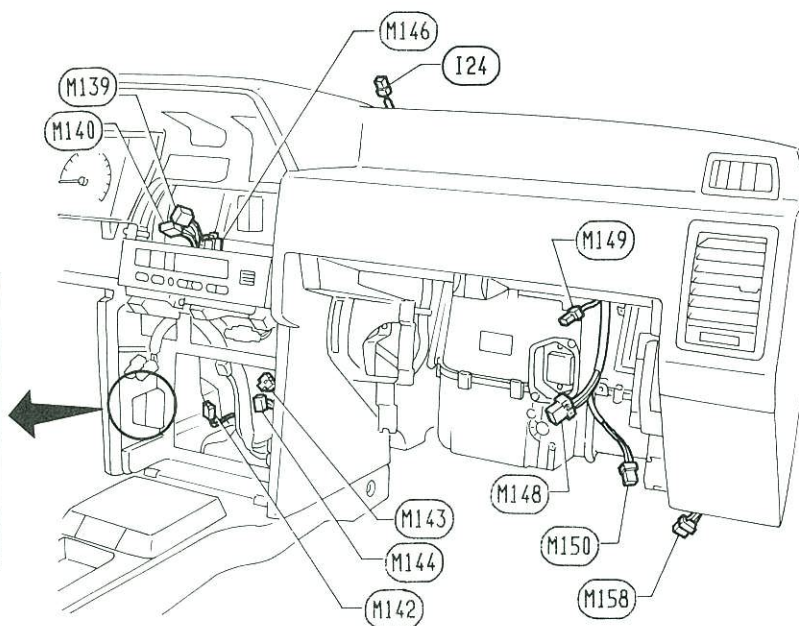
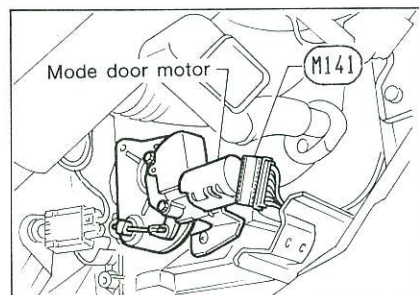


Harness Layout for A/C System



Harness Layout for A/C System (Cont'd)

Passenger compartment



RHA490B

Main harness

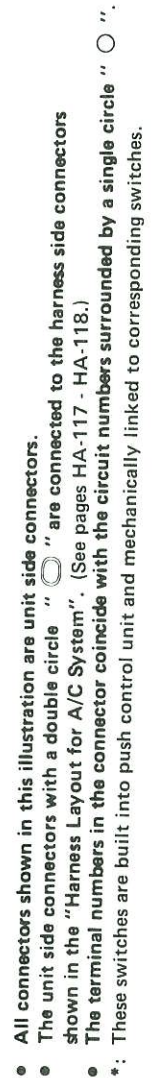
- (M16) : A/C relay
- (M18) : Condenser fan relay
- (M24) : Dual-pressure switch
- (M34) : Condenser fan motor
- (M38) : Ambient sensor
- (M46) : Thermoswitch
- (M139) : Auto amp.
- (M140) : Auto amp.
- (M141) : Mode door motor
- (M142) : Aspirator fan motor
- (M143) : Blower HI relay
- (M144) : Air mix door motor
- (M146) : In-vehicle sensor
- (M148) : Fan control amp.
- (M149) : Intake sensor
- (M150) : Intake door motor
- (M158) : Blower motor

Instrument harness

- (I24) : Sunload sensor

E.F.I. harness

- (F14) : Engine temperature sensor
- (F18) : Compressor



Wiring Diagram (Cont'd)

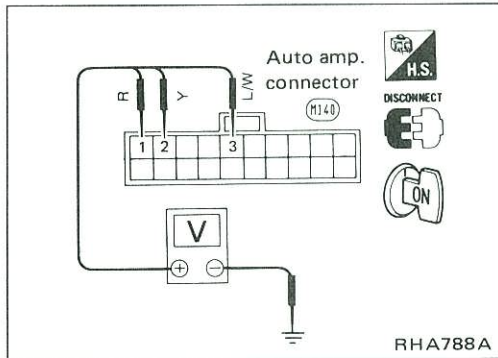


Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR AUTO A/C SYSTEM

Check power supply circuit for auto air conditioning system.

Refer to “POWER SUPPLY ROUTING” in EL section and Wiring Diagram.

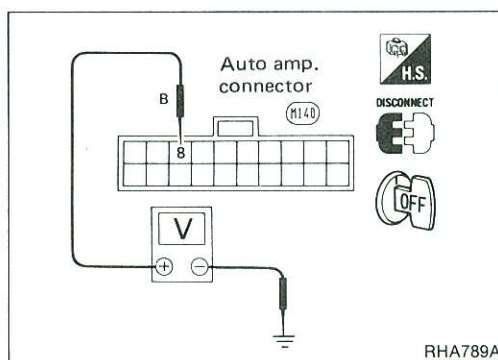


AUTO AMP. CHECK

Check power supply circuit for auto amp. with ignition switch ON.

1. Disconnect auto amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ①, ②, ③ and body ground.

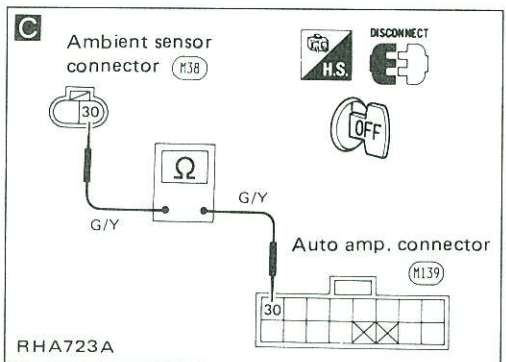
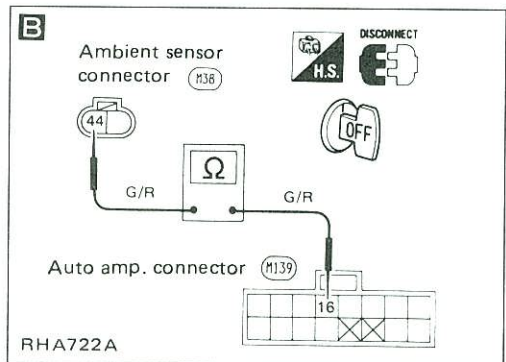
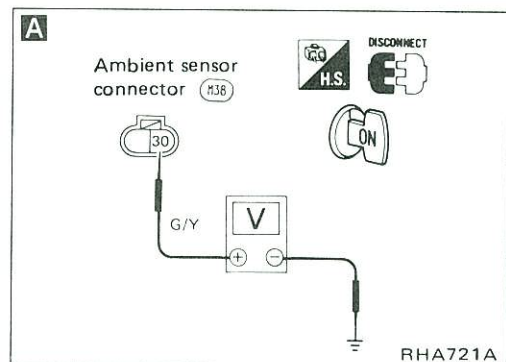
Voltmeter terminal		Voltage
⊕	⊖	
①	Body ground	Approx. 12V
②		
③		



Check body ground circuit for auto amp. with ignition switch OFF.

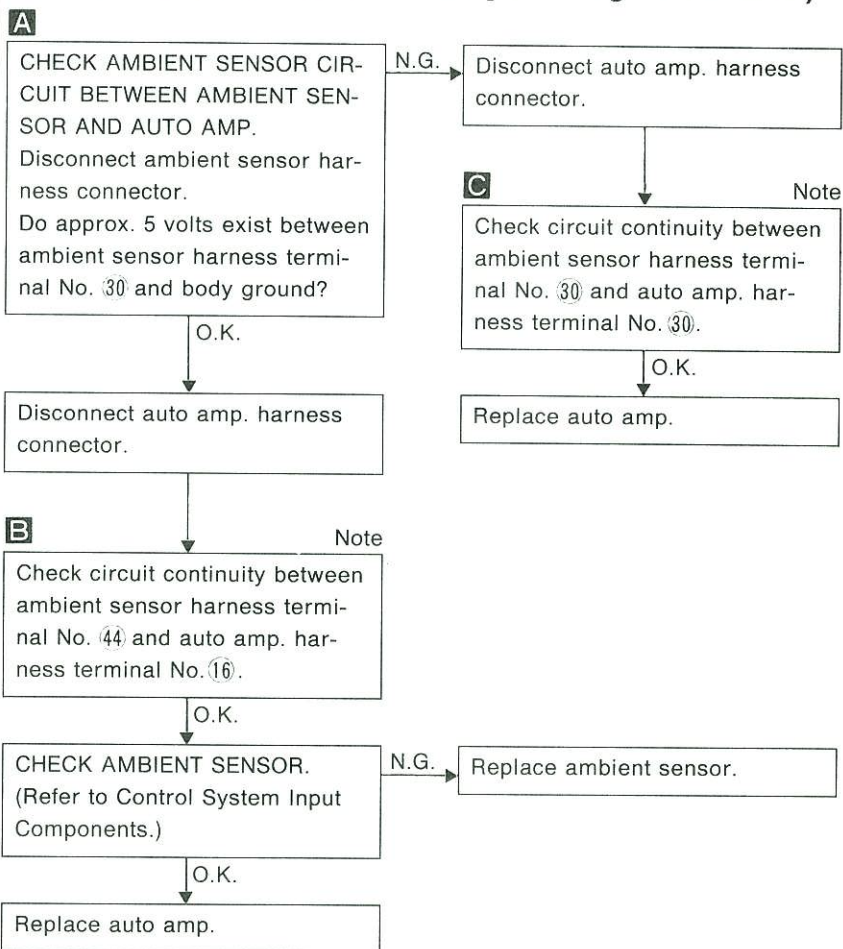
1. Disconnect auto amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑧ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑧	Body ground	Yes



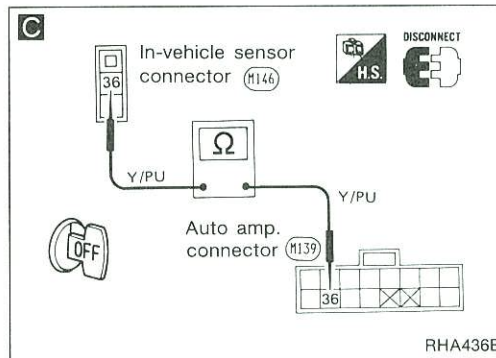
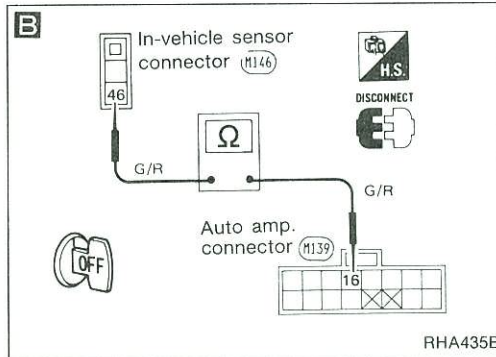
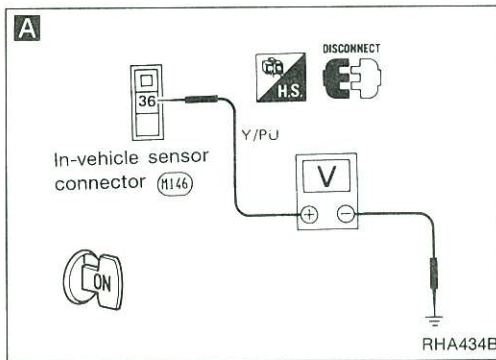
Diagnostic Procedure 1

SYMPTOM: Ambient sensor circuit is open. (21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



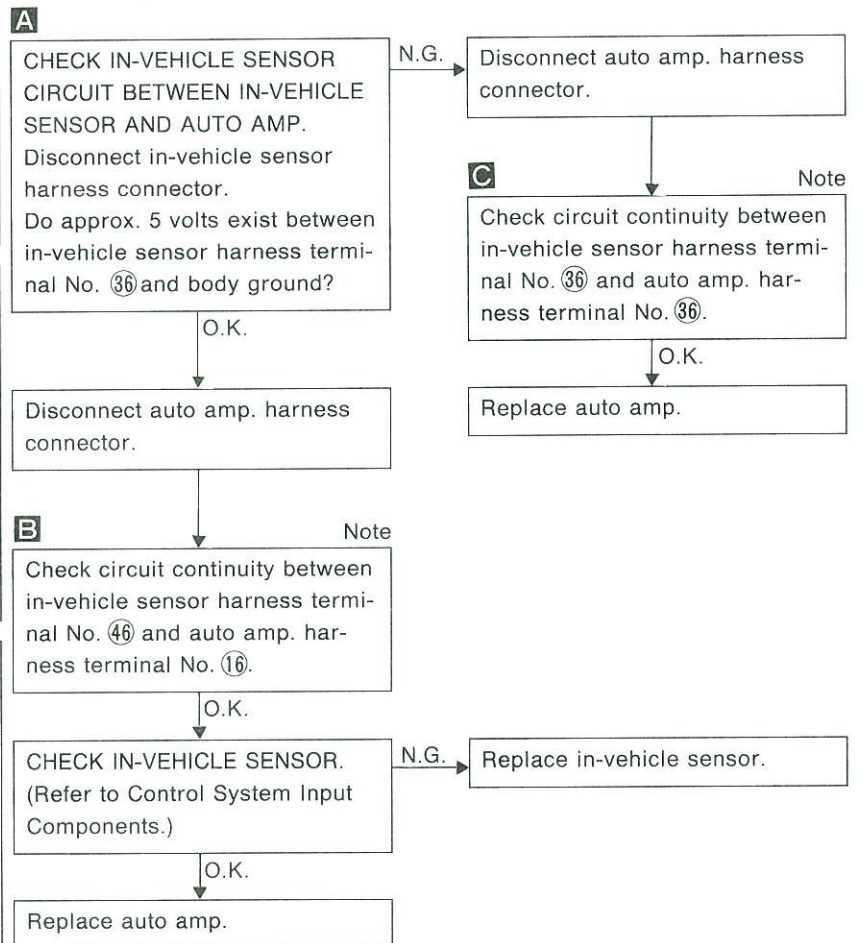
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 2

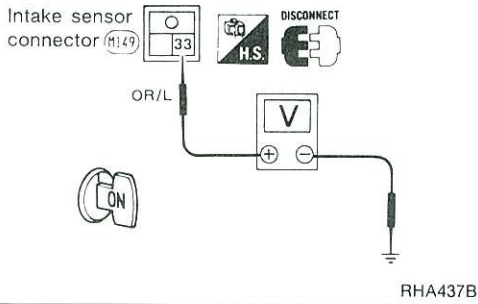
SYMPTOM: In-vehicle sensor circuit is open. (22 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



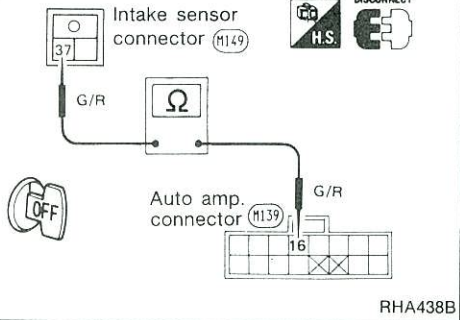
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

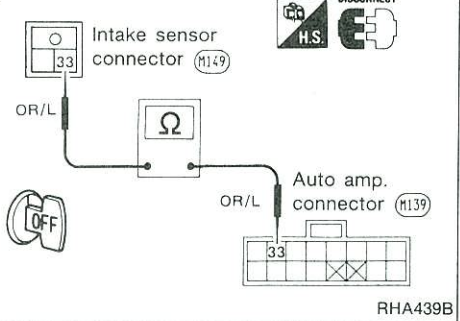
A



B



C



Diagnostic Procedure 3

SYMPTOM: Intake sensor circuit is open. (24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)

A

CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP.
Disconnect intake sensor harness connector.
Do approx. 5 volts exist between intake sensor harness terminal No. 33 and body ground?

N.G.

Disconnect auto amp. harness connector.

O.K.

Disconnect auto amp. harness connector.

B

Note

Check circuit continuity between intake sensor harness terminal No. 37 and auto amp. harness terminal No. 16.

O.K.

CHECK INTAKE SENSOR.
(Refer to Control System Input Components.)

N.G.

Replace intake sensor.

O.K.

Replace auto amp.

C

Note

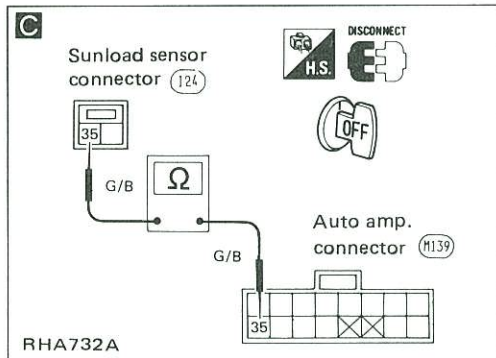
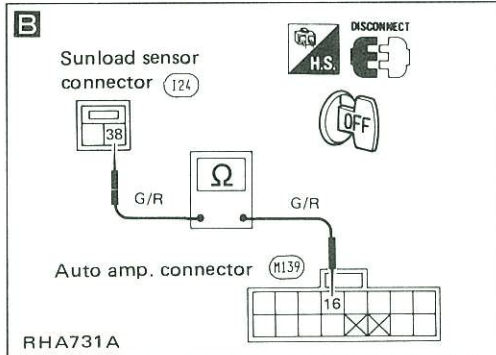
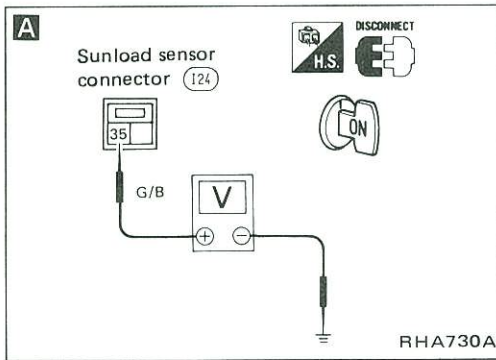
Check circuit continuity between intake sensor harness terminal No. 33 and auto amp. harness terminal No. 33.

O.K.

Replace auto amp.

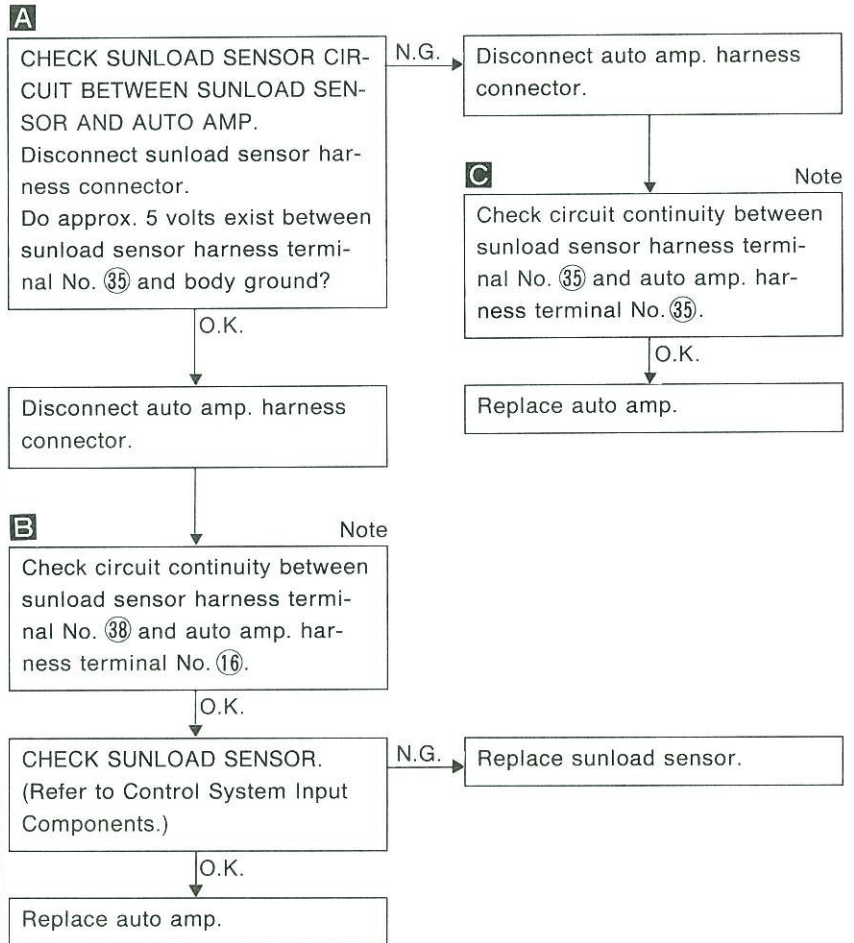
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



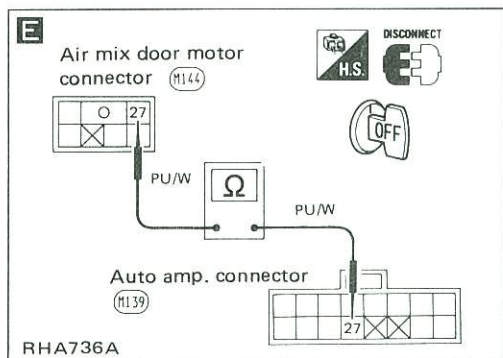
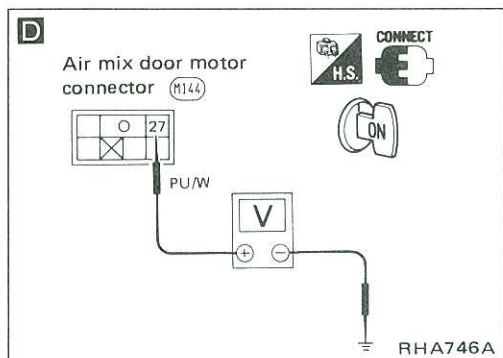
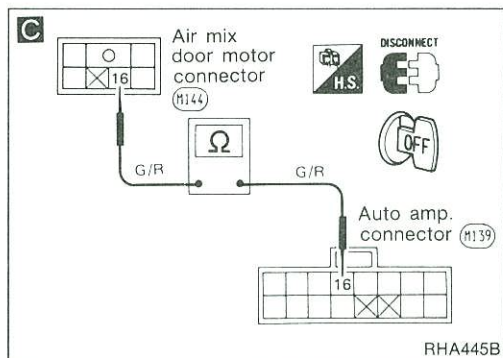
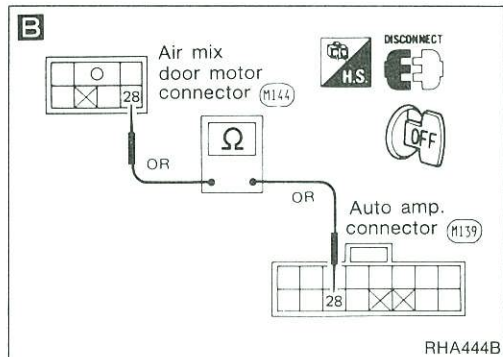
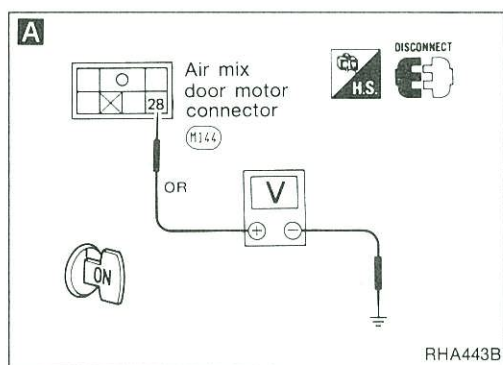
Diagnostic Procedure 4

SYMPTOM: Sunload sensor circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



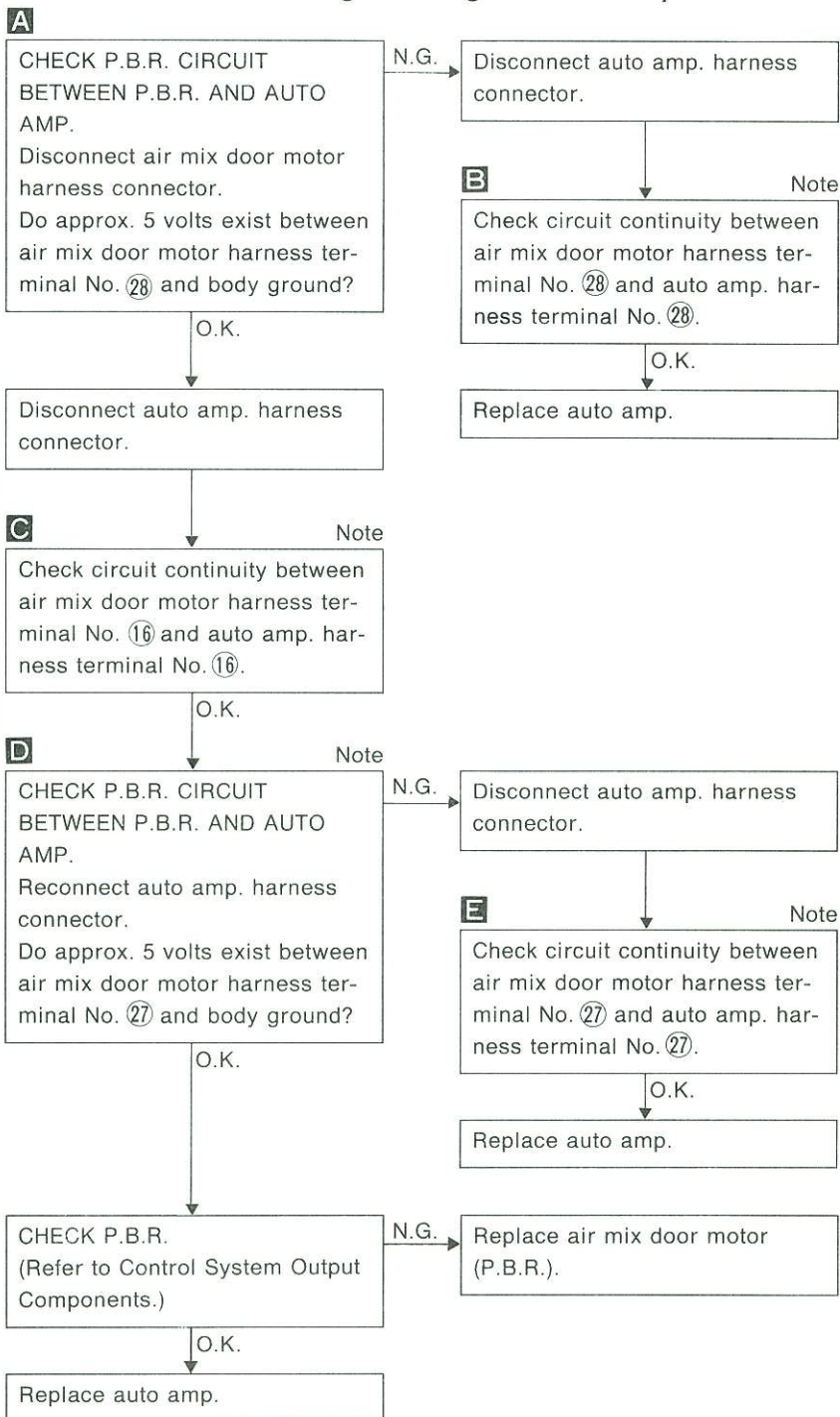
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



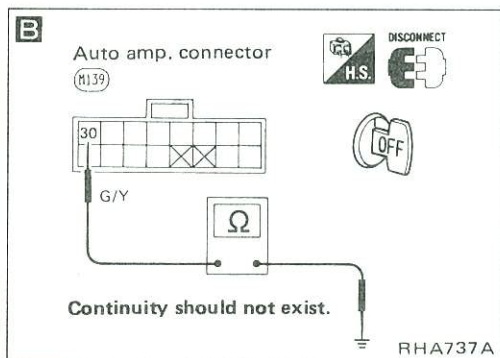
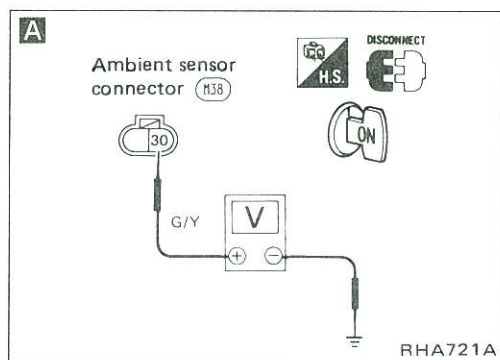
Diagnostic Procedure 5

SYMPTOM: P.B.R. circuit is open. (25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



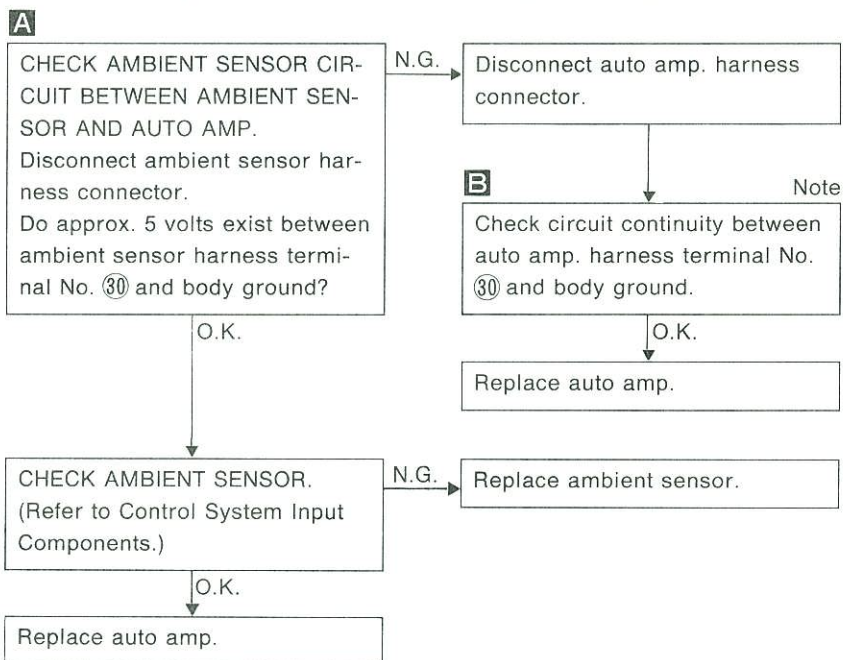
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



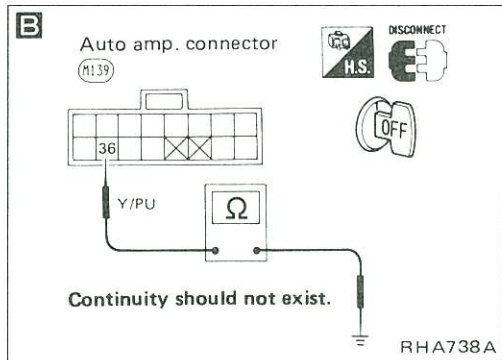
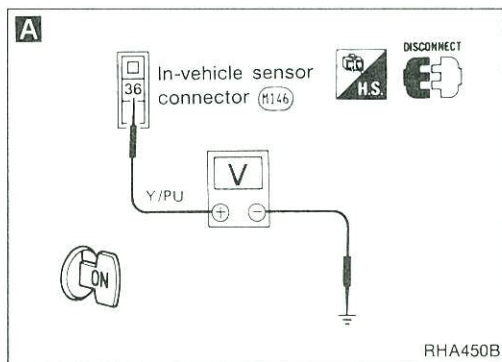
Diagnostic Procedure 6

SYMPTOM: Ambient sensor circuit is shorted. (-2! is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



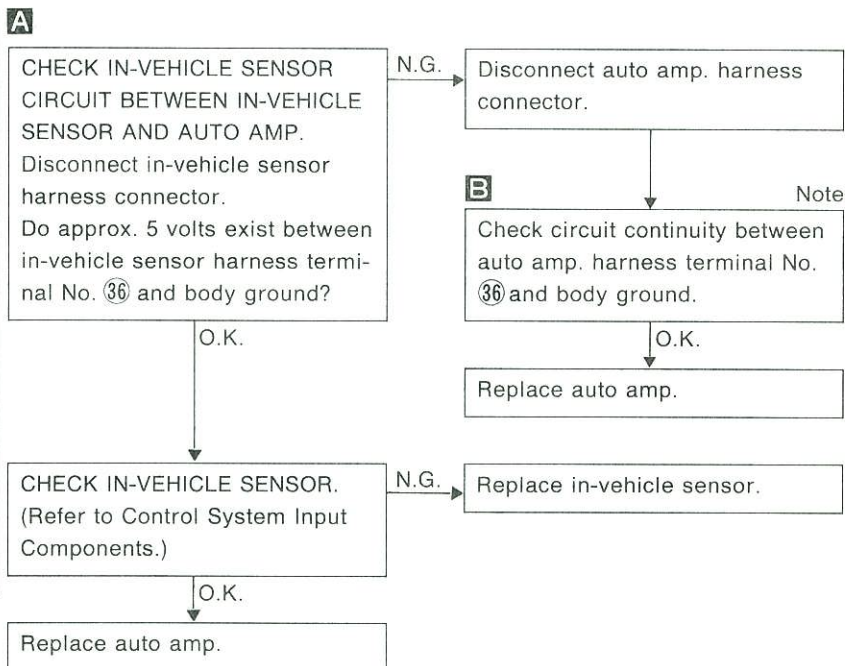
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector short.



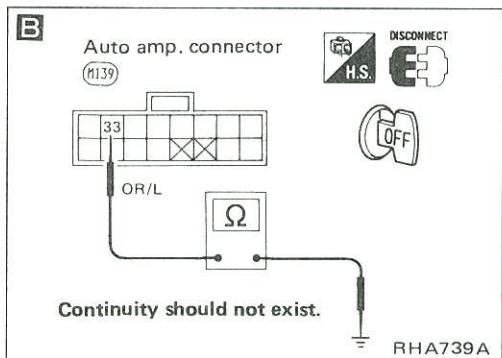
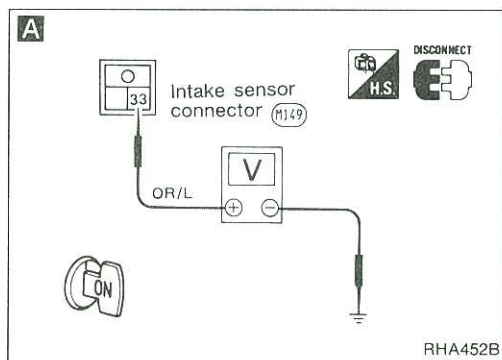
Diagnostic Procedure 7

SYMPTOM: In-vehicle sensor circuit is shorted. (— is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



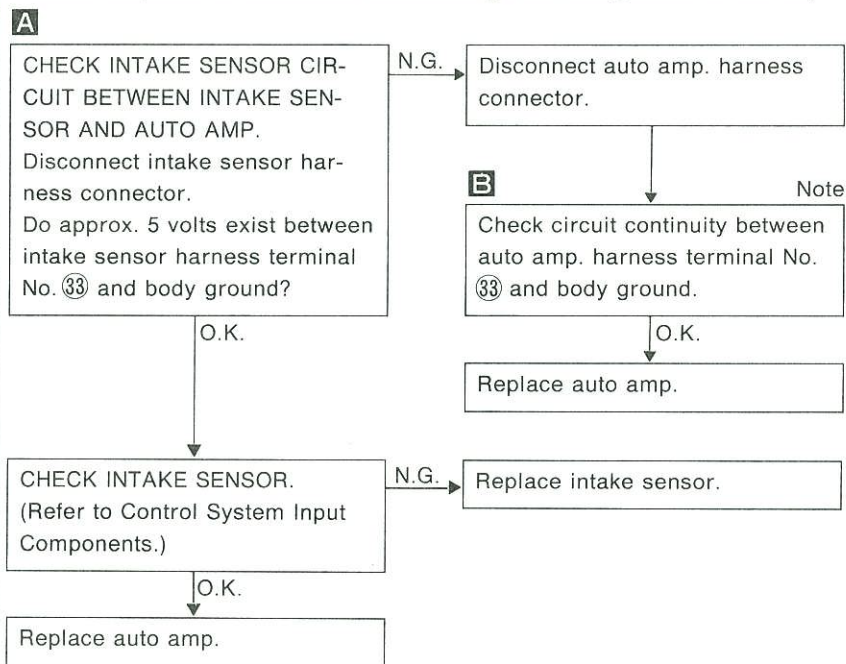
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector short.



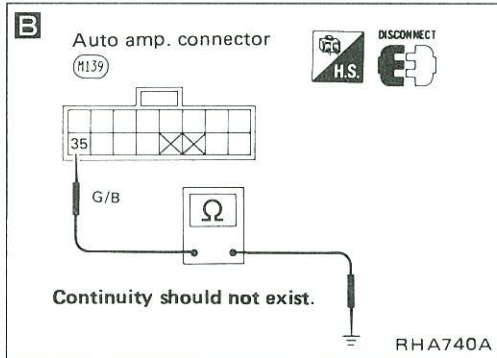
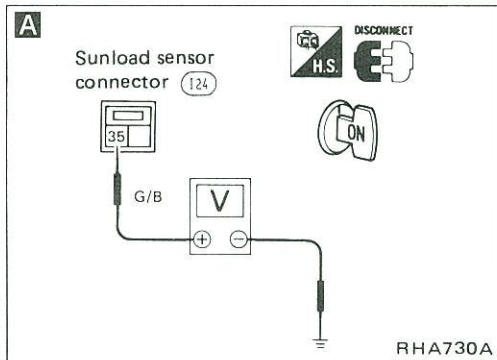
Diagnostic Procedure 8

SYMPTOM: Intake sensor circuit is shorted. (-24 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



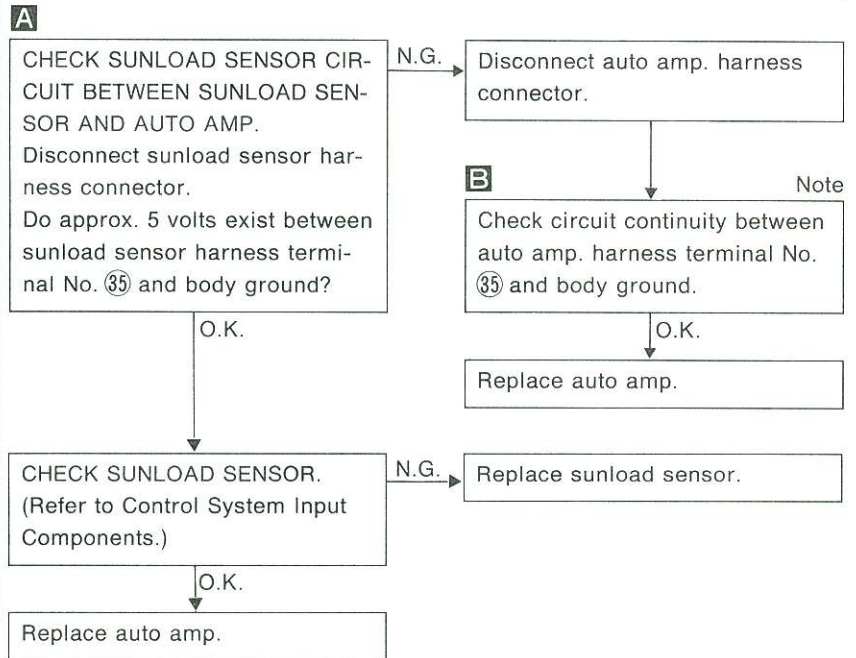
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector short.



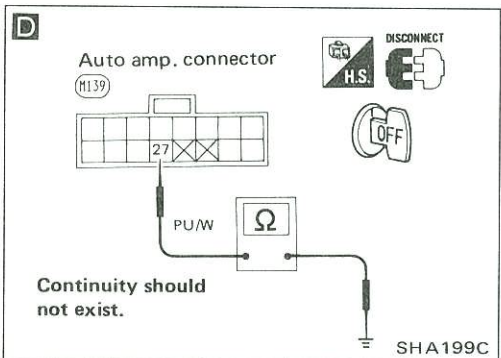
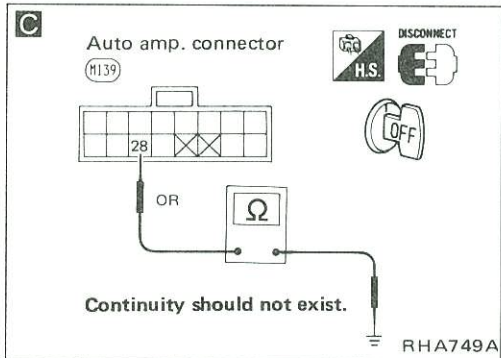
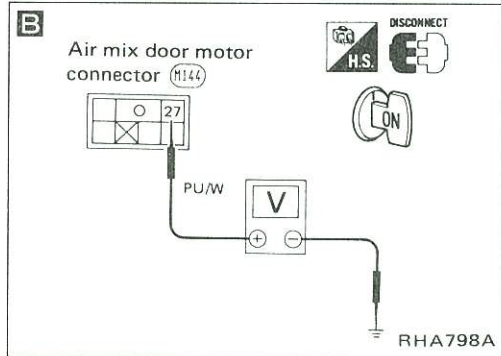
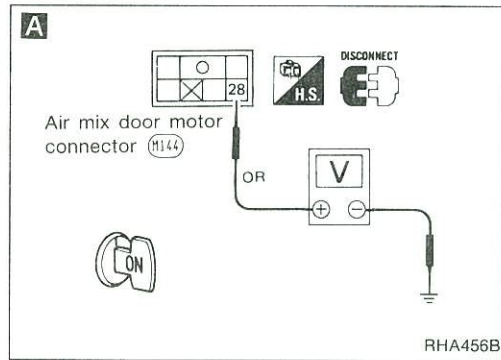
Diagnostic Procedure 9

SYMPTOM: Sunload sensor circuit is shorted. (-25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



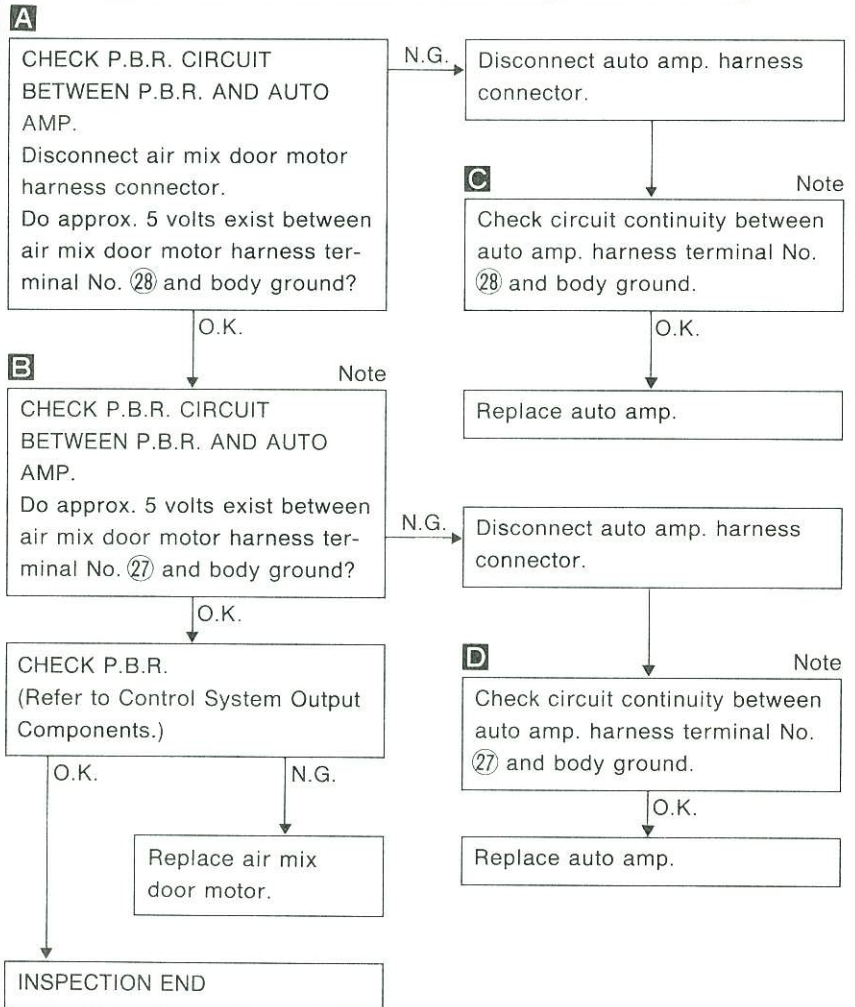
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector short.



Diagnostic Procedure 10

SYMPTOM: P.B.R. circuit is shorted. (-28 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



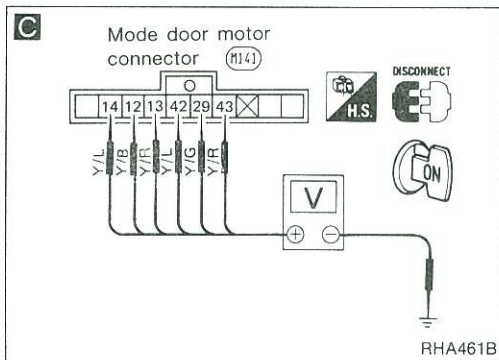
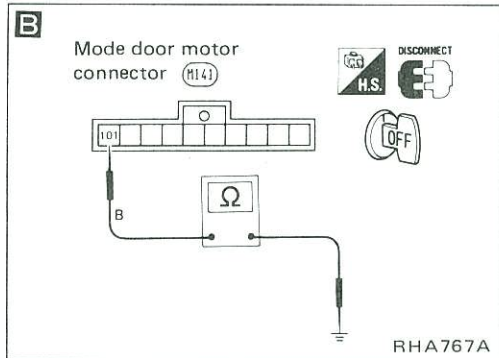
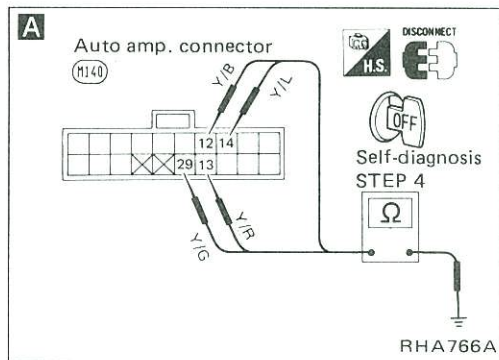
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector short.

Diagnostic Procedure 11

SYMPTOM: Condenser fan motor does not operate.

- Refer to HA-84.



Diagnostic Procedure 12

SYMPTOM: Mode door motor does not operate normally.

- Perform Self-diagnosis STEPS 1 to 4 before referring to the following flow chart.

- A**
- CHECK MODE DOOR MOTOR POSITION SWITCH.
1. Set up code No. 41 in Self-diagnosis STEP 4.
 2. Disconnect auto amp. harness connector after turning ignition switch OFF.
 3. Check if continuity exists between terminal No. ⑫ or ⑭ of auto amp. harness connector and body ground.
 4. Using above procedure, check for continuity in any other mode, as indicated in chart.

Code No.	Condition	Terminal No.		Continuity
		+	-	
41	VENT	⑫ or ⑭		Yes
42 or 43	B/L	⑫ or ⑬		
44	F/D 1	⑬ or ⑭	Body ground	
45	F/D 2	⑭ or ⑲		
46	DEF	⑬ or ⑲		

O.K.

INSPECTED END

N.G. → Disconnect mode door motor harness connector.

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.		Voltage
+	-	
⑭	Body ground	Approx. 5V
⑫		
⑬		
⑫		
⑲		
⑫		

O.K.

Reconnect mode door motor harness connector.

Ⓐ

(Go to next page.)

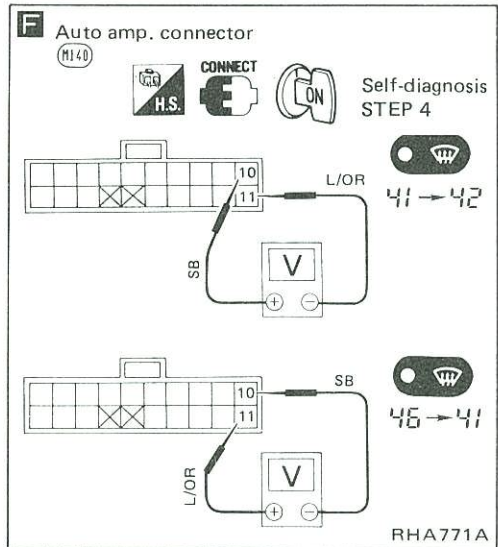
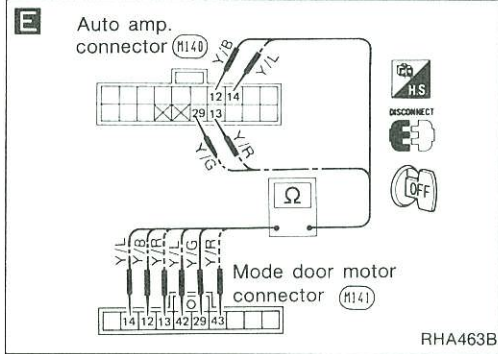
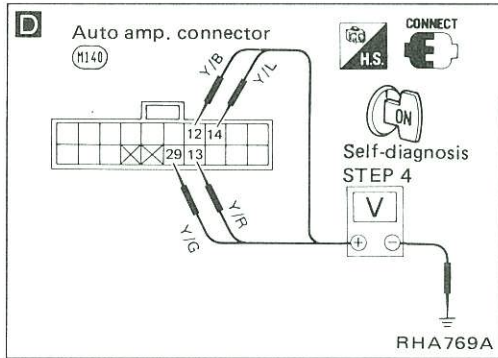
Ⓑ

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 12 (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.				Body ground
		14	12	13	29	
41	VENT	0V	0V	5V	5V	Body ground
42 or 43	B/L	5V	0V	0V	5V	
44	D/F 1	0V	5V	0V	5V	
45	D/F 2	0V	5V	5V	0V	
46	DEF	5V	5V	0V	0V	

0V: Approx. 0V
5V: Approx. 5V

O.K. →

N.G. → Replace mode door motor.

F CHECK FOR OUTPUT OF AUTO AMP.
Do approx. 10.5 volts exist between auto amp. harness terminals No. ⑩ and ⑪ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

Code No.	Mode door motor operation	Terminal No.		Voltage V
		⑩	⑪	
41 → 42	VENT → B/L	+	-	Approx. 10.5
46 → 41	DEF → VENT	-	+	
-	Stop	-	-	0

O.K. → Replace mode door motor.

E Check circuit continuity between each terminal on auto amp. and on mode door motor.

Note

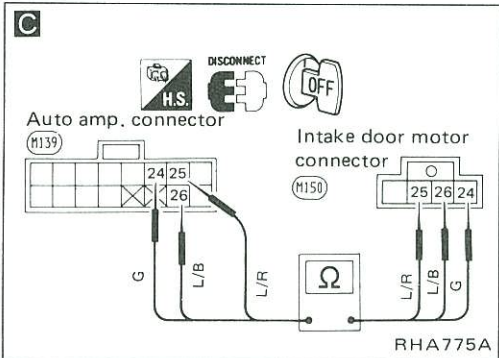
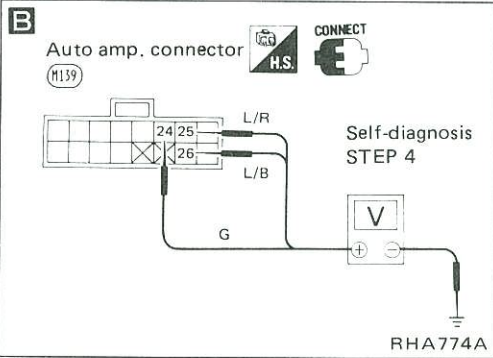
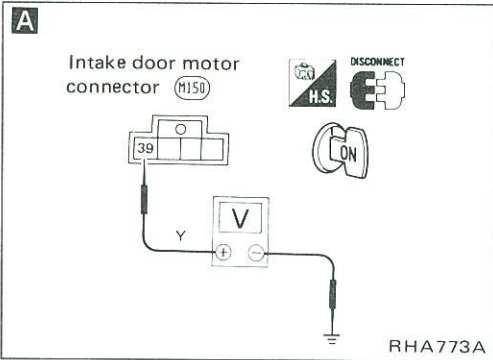
Terminal No.		Continuity
+	-	
Auto amp. ②⑨	Mode door motor ②⑨	Yes
①③	①③ or ④③	
①②	①②	
①④	①④ or ④②	

O.K. →

Replace auto amp.

Note:

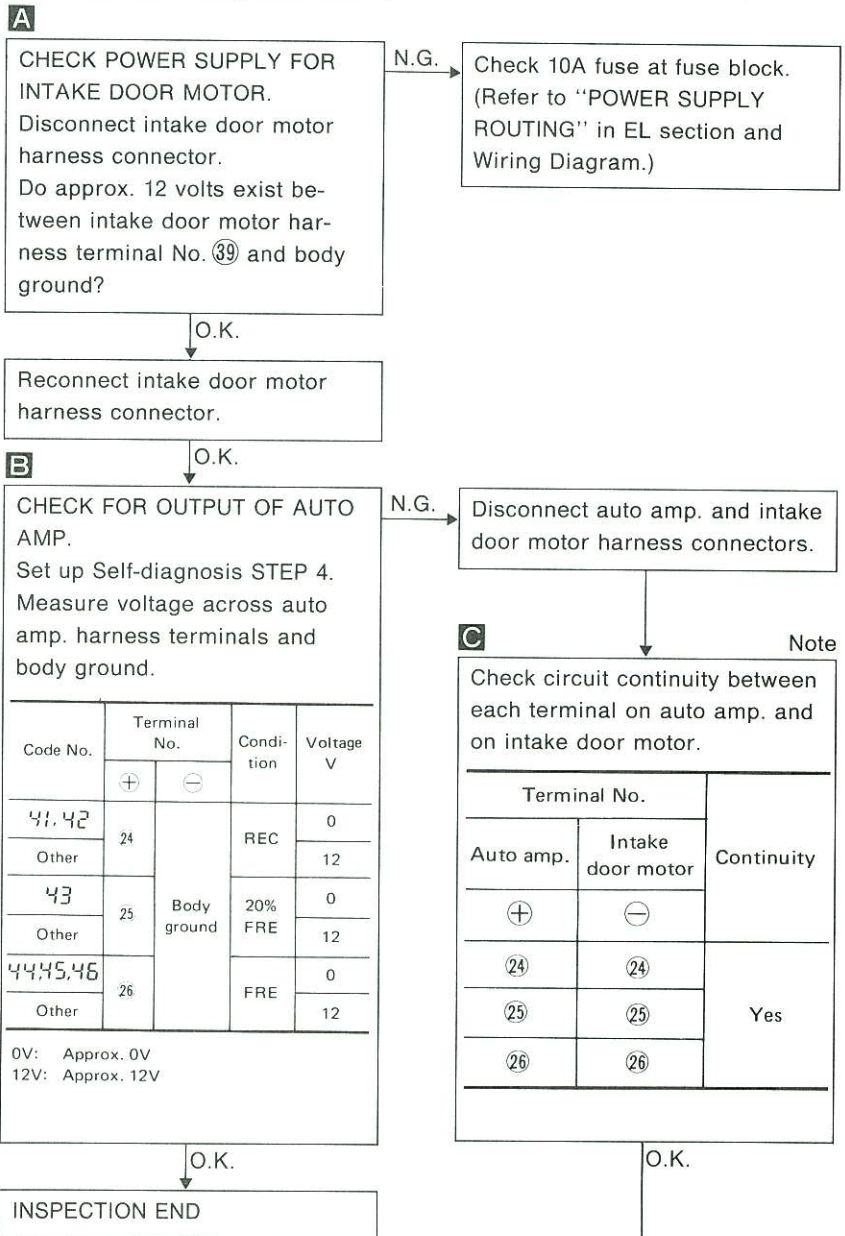
If the result is N.G. after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 13

SYMPTOM: Intake door motor does not operate normally.

- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.

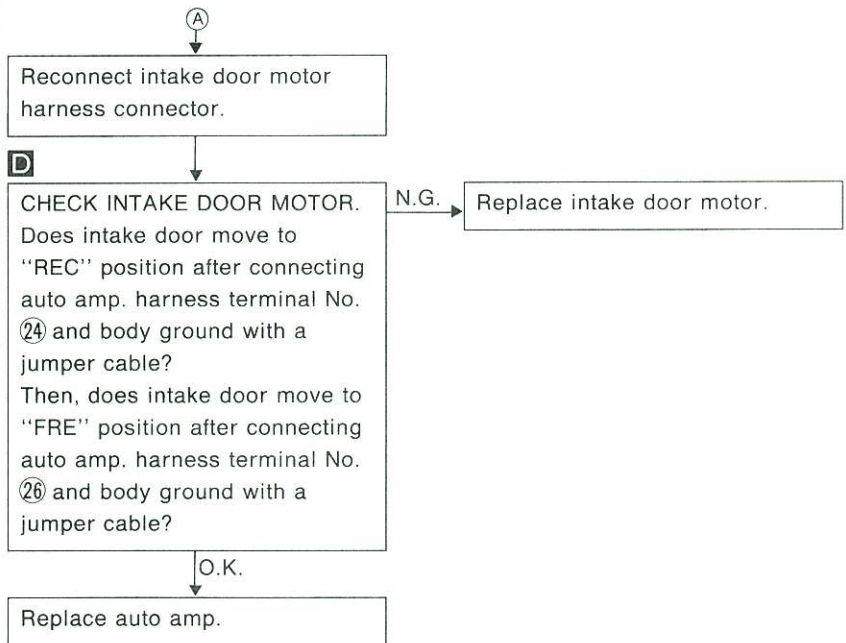
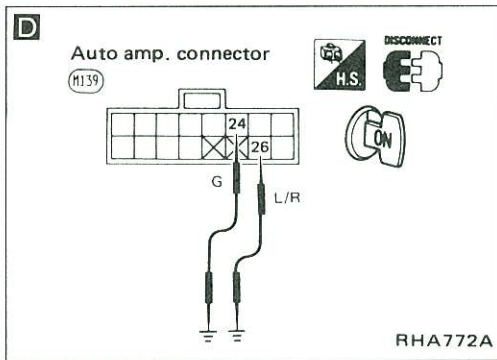


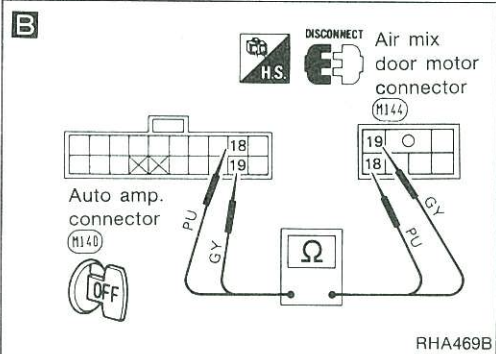
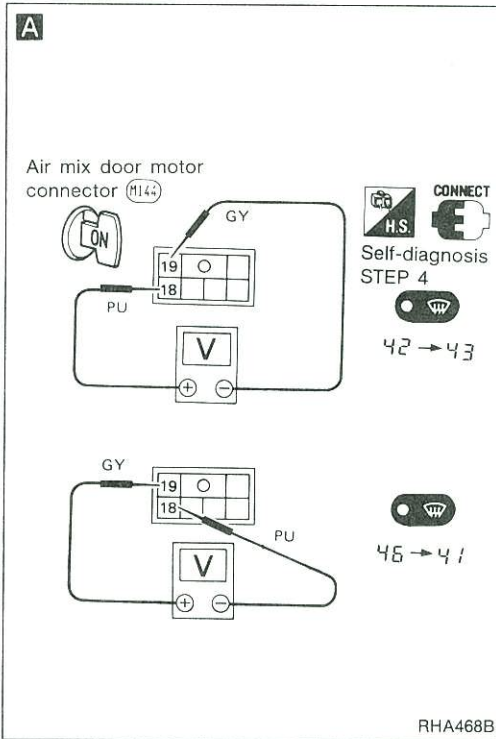
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 13 (Cont'd)

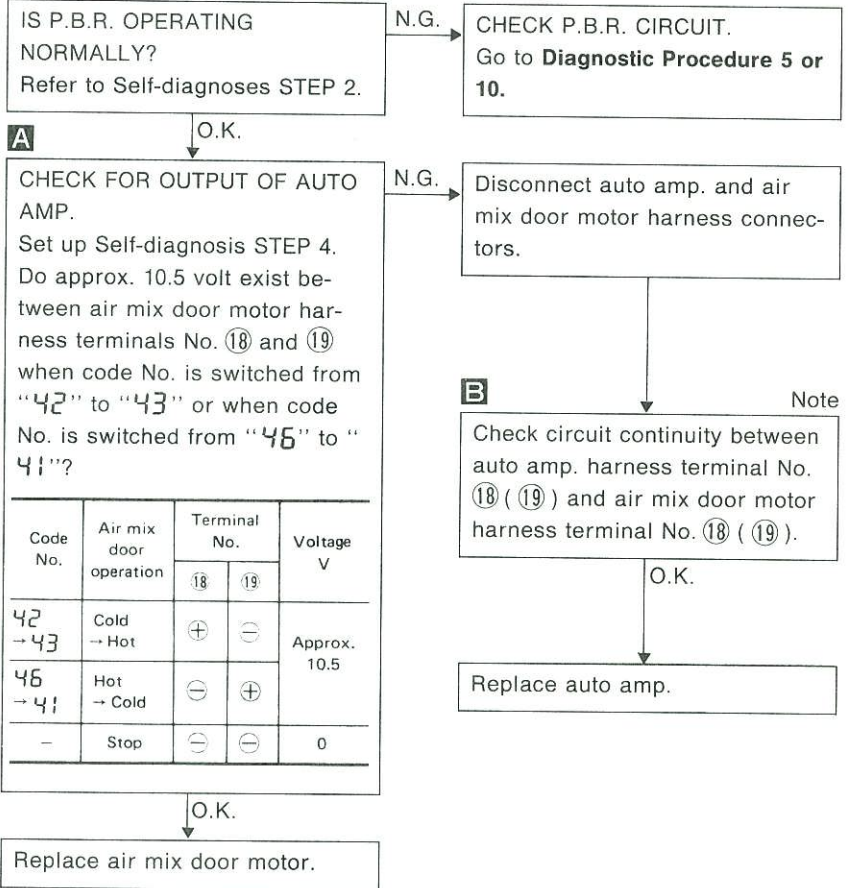




Diagnostic Procedure 14

SYMPTOM: Air mix door motor does not operate normally.

- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.



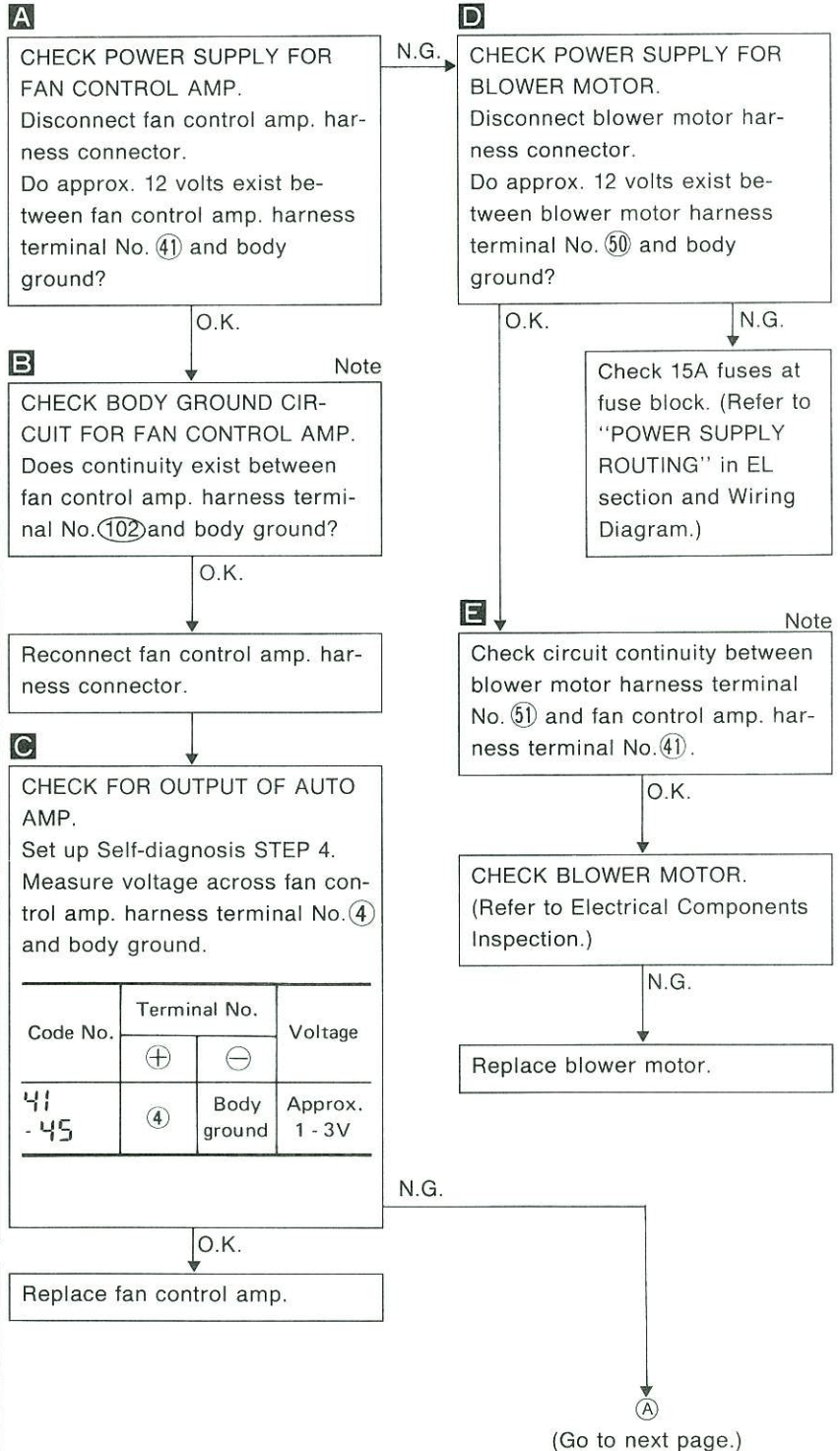
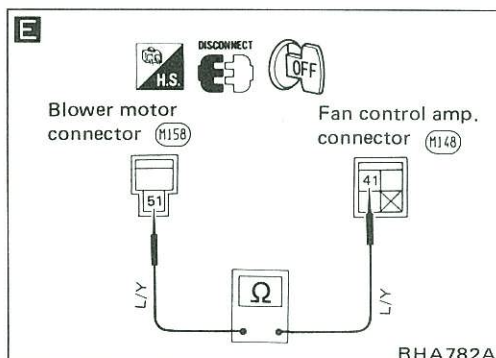
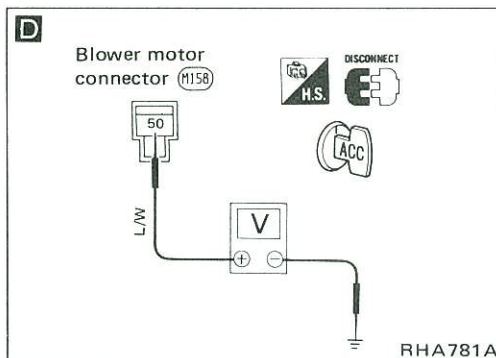
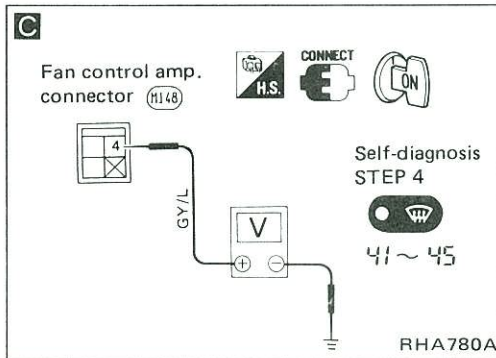
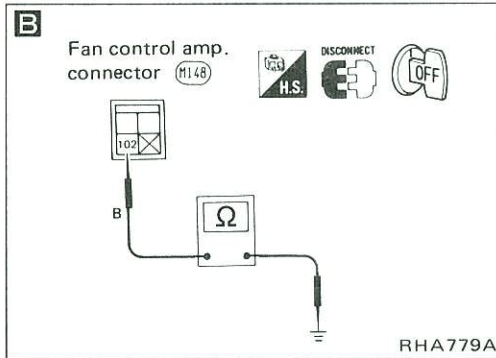
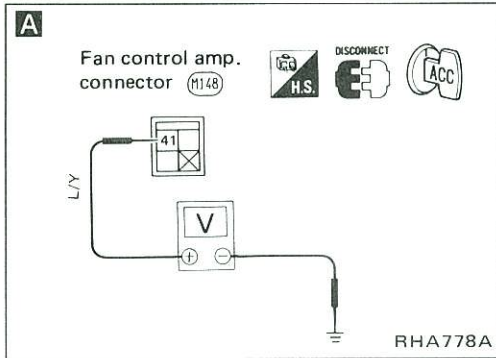
Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 15

SYMPTOM: Blower motor operation is malfunctioning under out of Starting Fan Speed Control.

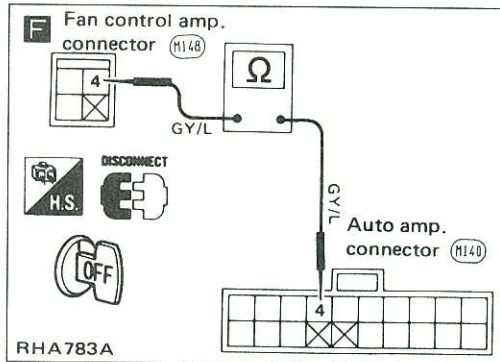
- Perform Preliminary Check 5 before referring to the following flow chart.



Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 15 (Cont'd)



A

Disconnect auto amp. and fan control amp. harness connector.

F Note

Does continuity exist between auto amp. harness terminal No. ④ and fan control amp. harness terminal No. ④?

O.K.

G

CHECK POWER SUPPLY FOR HI RELAY.
Do approx. 12 volts exist between Hi relay harness terminals No. ④⑩, ⑤① and body ground?

N.G.

Check 10A or 15A fuses at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

O.K.

H Note

CHECK BODY GROUND CIRCUIT FOR HI RELAY.
Does continuity exist between Hi relay harness terminal No. ⑩③ and body ground?

O.K.

CHECK HI RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G.

Replace Hi relay.

O.K.

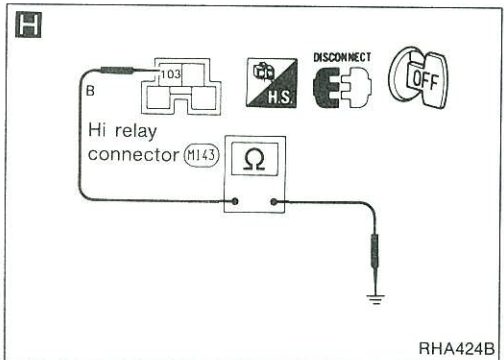
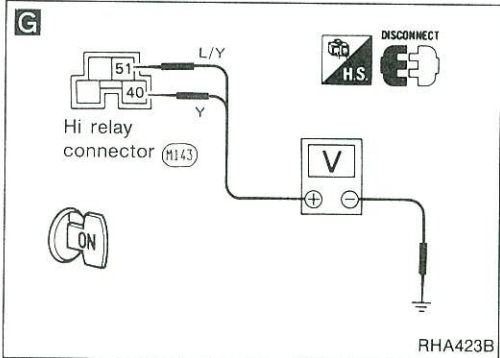
Reconnect Hi relay.

B

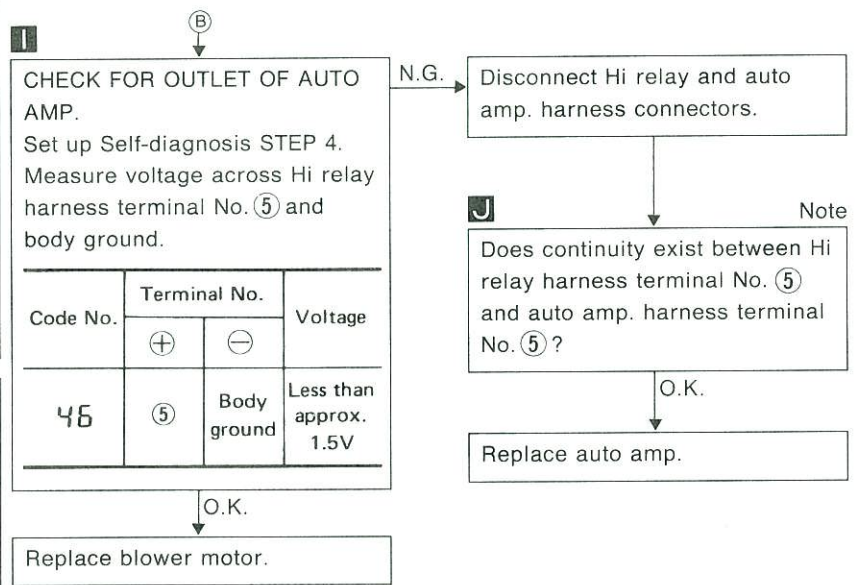
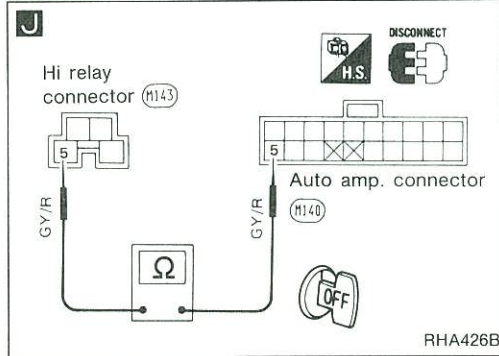
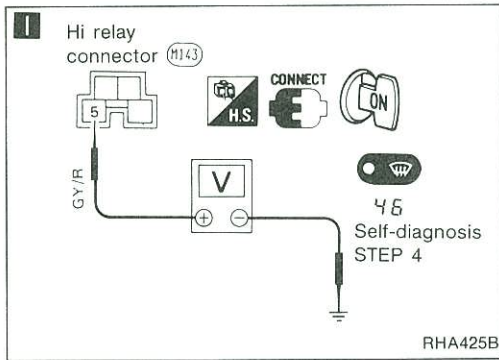
(Go to next page.)

Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.



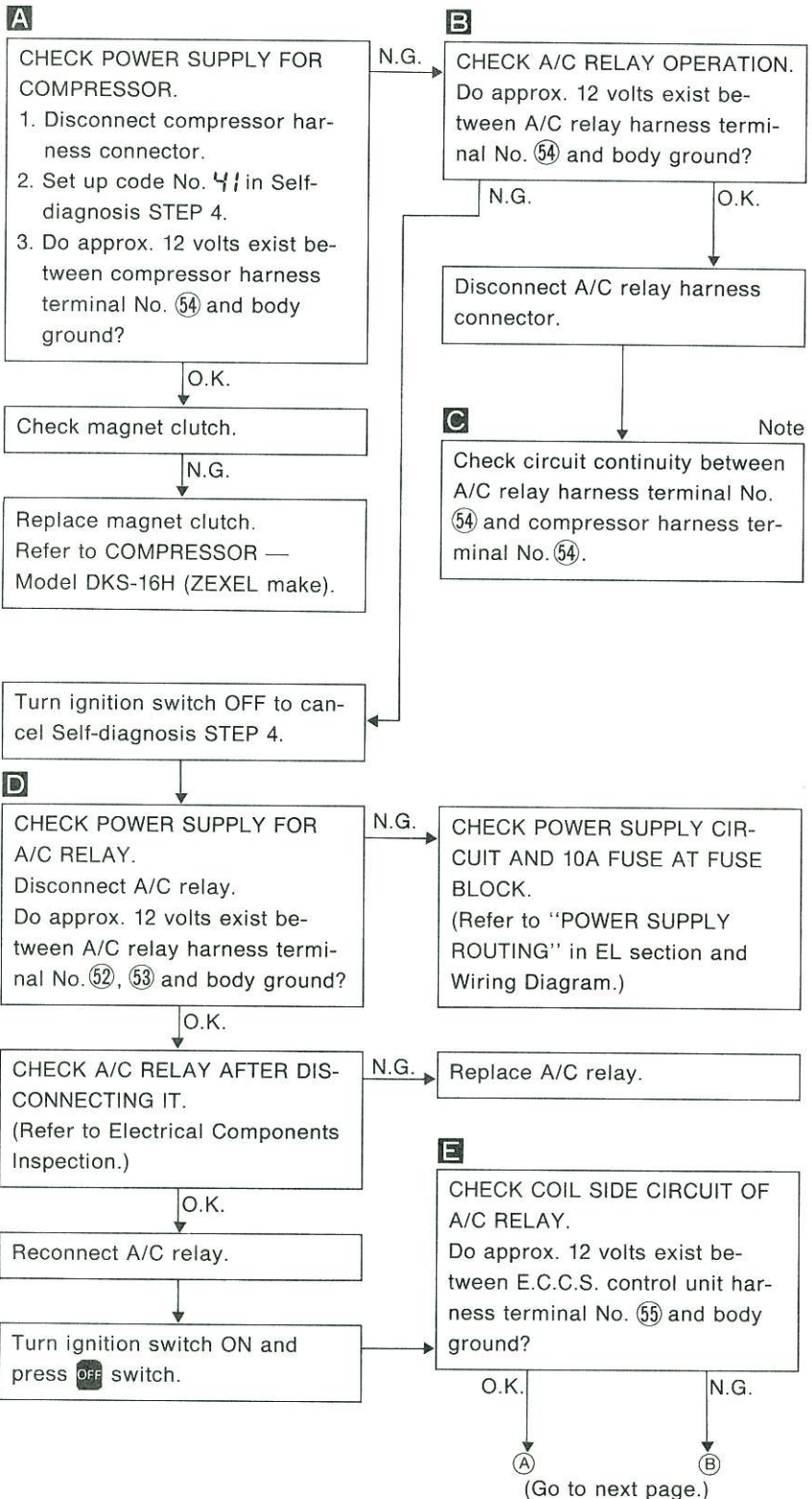
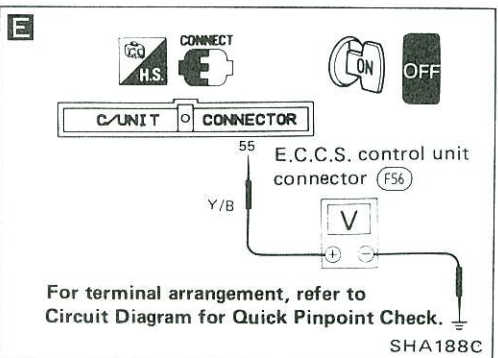
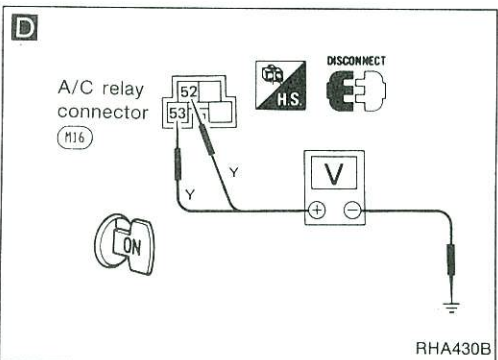
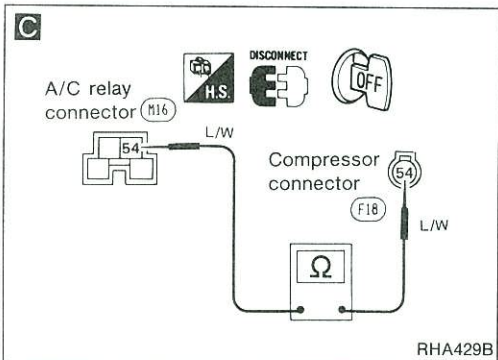
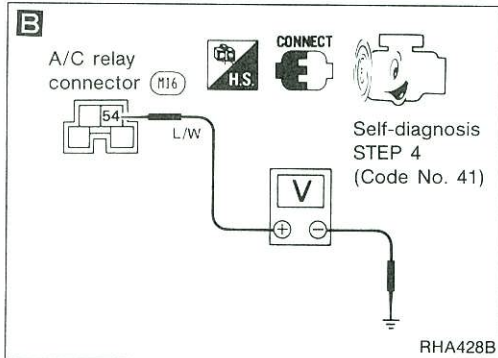
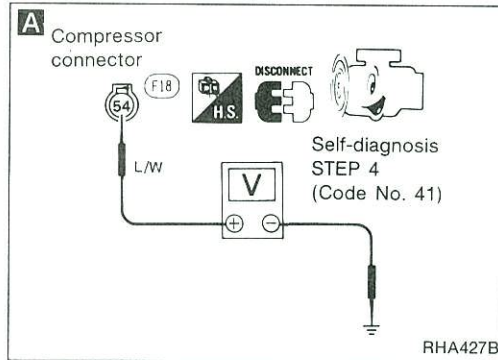
Diagnostic Procedure 15 (Cont'd)



Diagnostic Procedure 16

SYMPTOM: Magnet clutch does not engage after performing Preliminary Check 6.

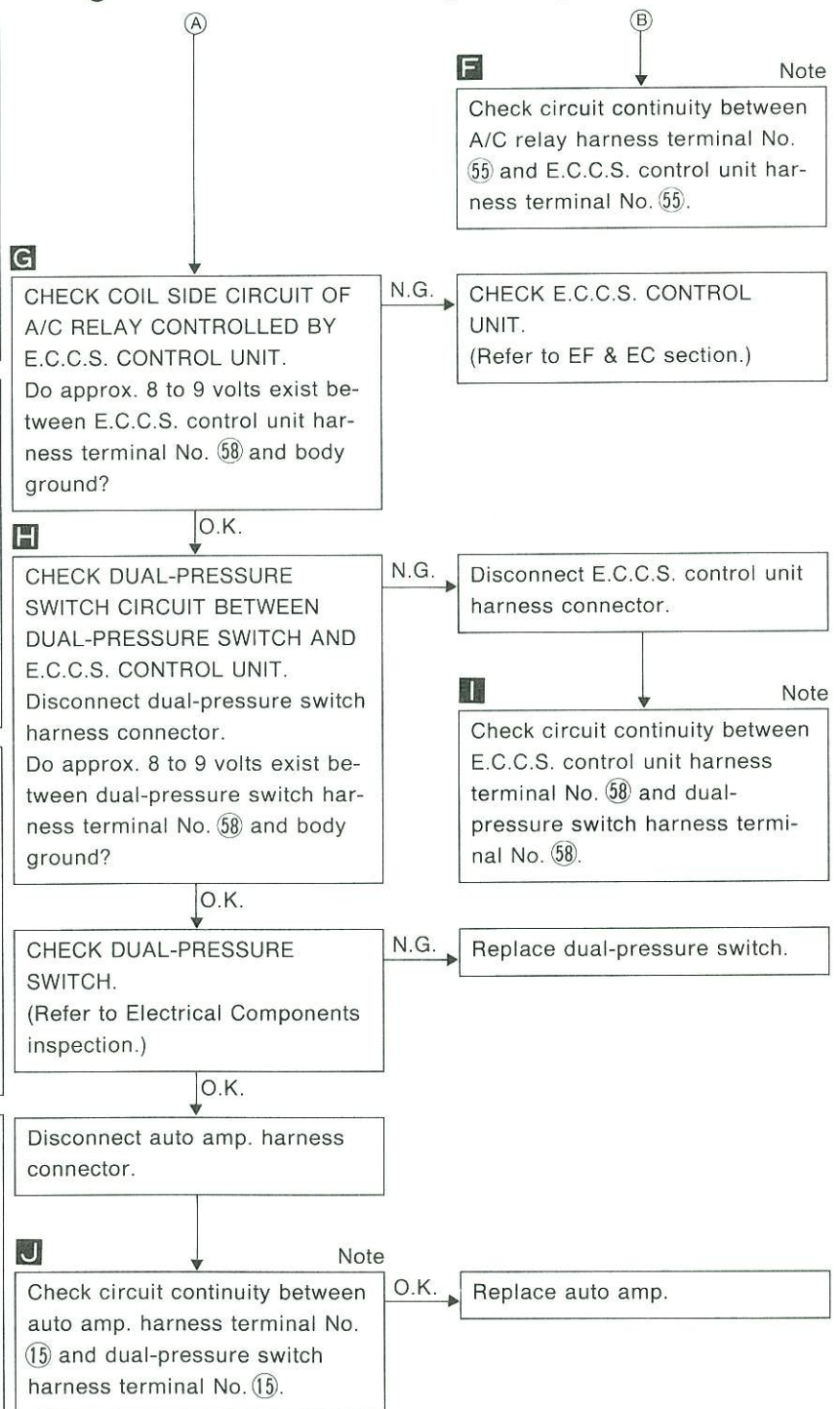
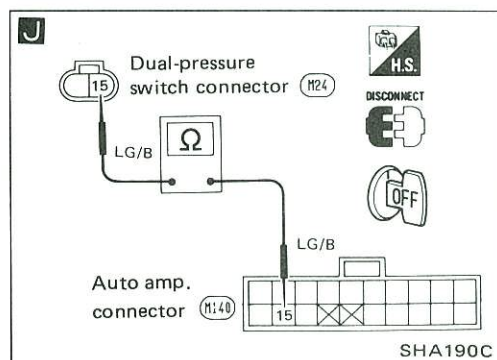
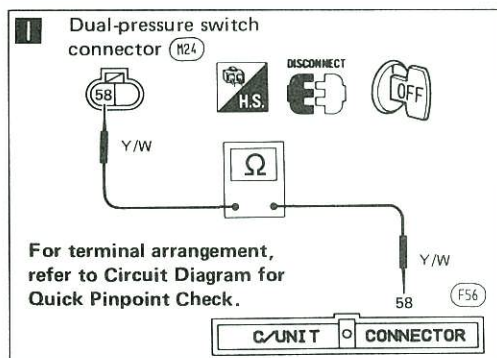
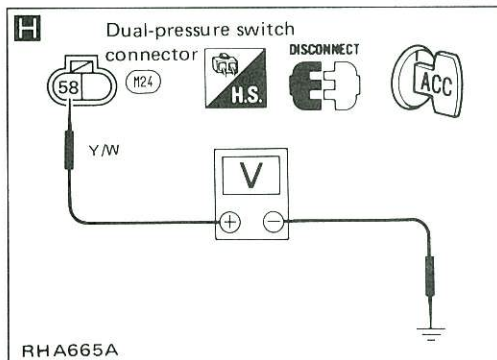
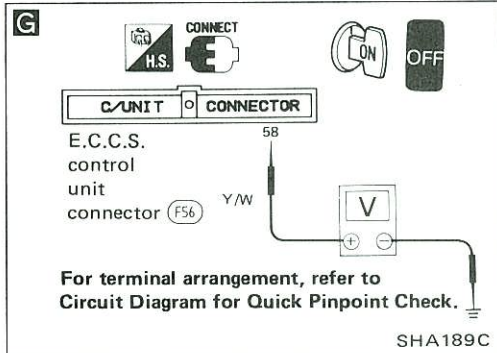
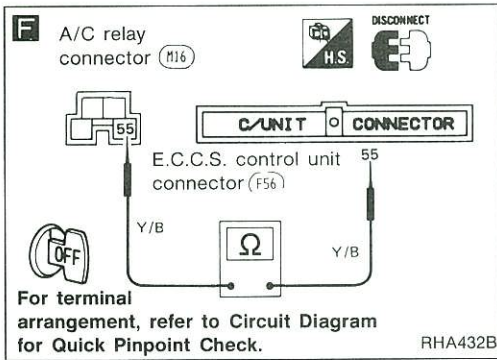
- Perform Preliminary Check 6 before referring to the flow chart.



Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 16 (Cont'd)

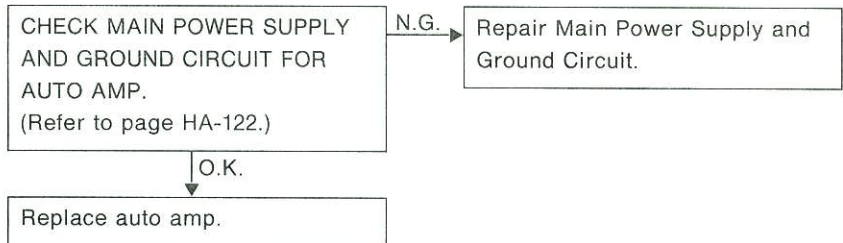


Note:

If the result is N.G. after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 17

SYMPTOM: Self-diagnosis cannot be performed.



Electrical Components Inspection

BLOWER MOTOR

- Refer to page HA-87.

HI RELAY

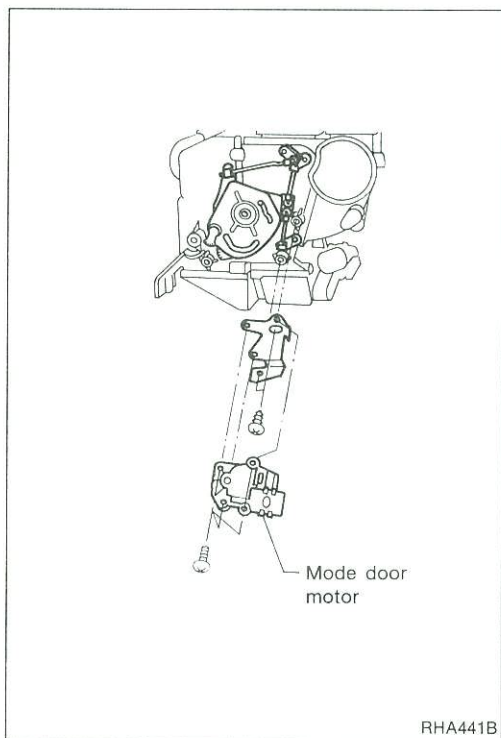
- Inspection method is the same as that of A/C relay. Refer to page HA-89.

A/C RELAY

- Refer to page HA-89.


DUAL-PRESSURE SWITCH

- Refer to page HA-88.

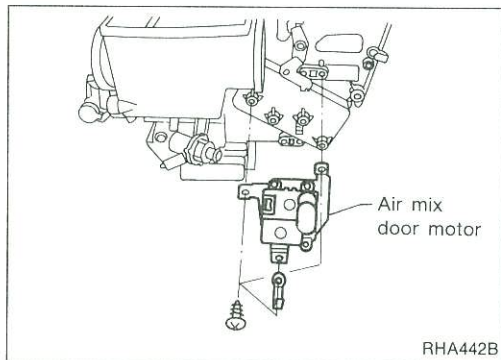


Control Rod Adjustment

MODE DOOR

1. Install mode door motor on heater unit and connect it to body harness.
2. Set up code No. **41** in Self-diagnosis STEP 4.
3. Move side link by hand and hold mode door in VENT mode.
4. Attach mode door motor rod to side link rod holder.
5. Check mode door operates properly when changing code No. **41** to **46** by pushing  (DEF) switch.

41	42	43	44	45	46
VENT	B/L	B/L	D/F1	D/F2	DEF




AIR MIX DOOR

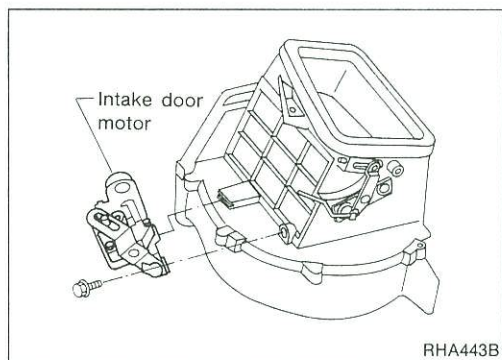
1. Install air mix door motor on heater unit and connect it to body harness.
2. Set up code No. **41** in Self-diagnosis STEP 4.
3. Move air mix door lever by hand and hold it at full cold position.
4. Attach air mix door lever to rod holder.
5. Check air mix door operates properly when changing code No. **41** to **46** by pushing  (DEF) switch.

41	42	43	44	45	46
Full Cold			Full Hot		

Control Rod Adjustment (Cont'd)

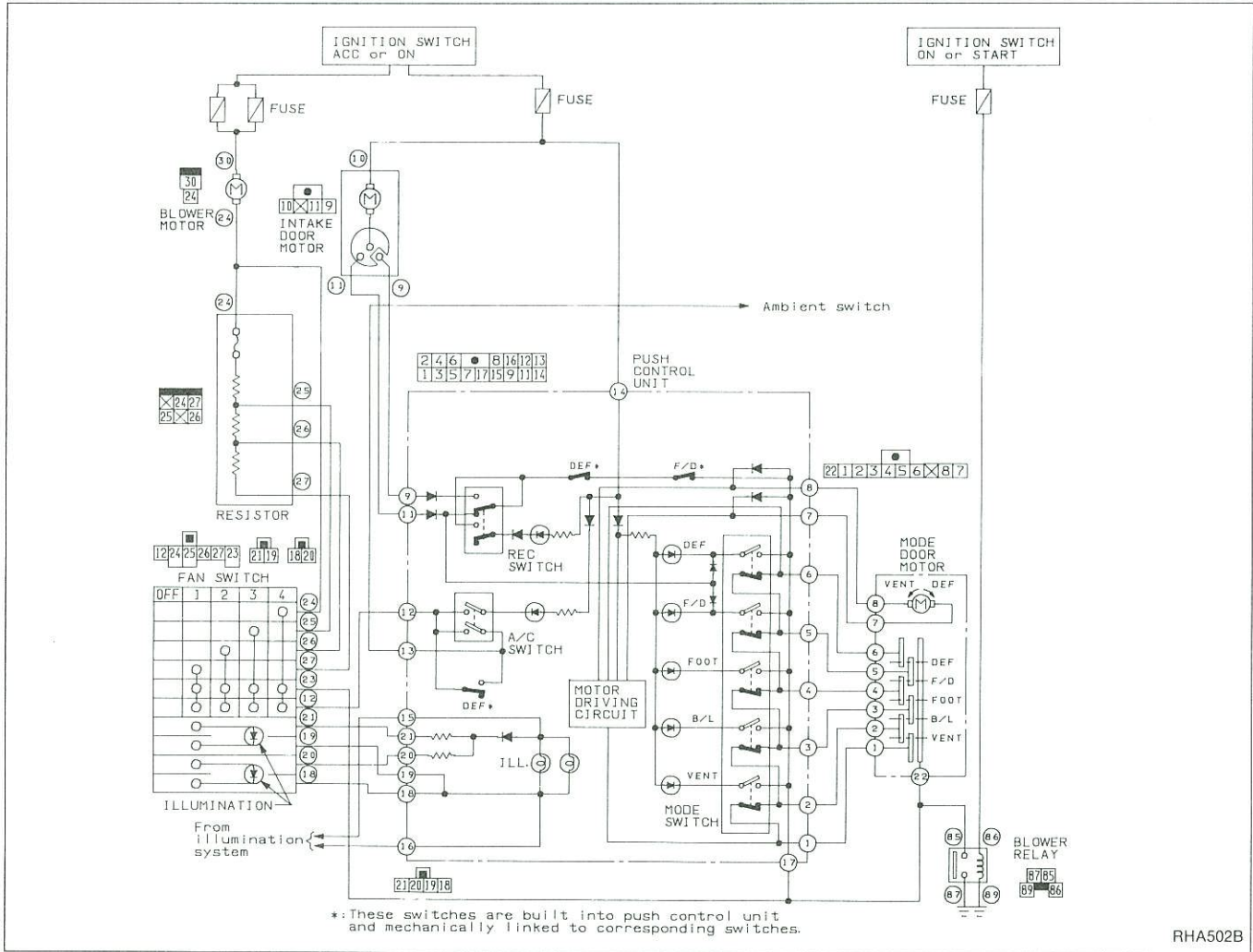
INTAKE DOOR

1. Install intake door motor on intake unit and connect it to body harness.
2. Set up code No. **41** in Self-diagnosis STEP 4.
3. Move intake door link by hand and hold it at REC position.
4. Attach intake door lever to rod holder.
5. Check intake door operates properly when changing code No. **41** to **46** by pushing  (DEF) switch.



41	42	43	44	45	46
REC		20% FRE	FRE		

Push Control System



RHA502B

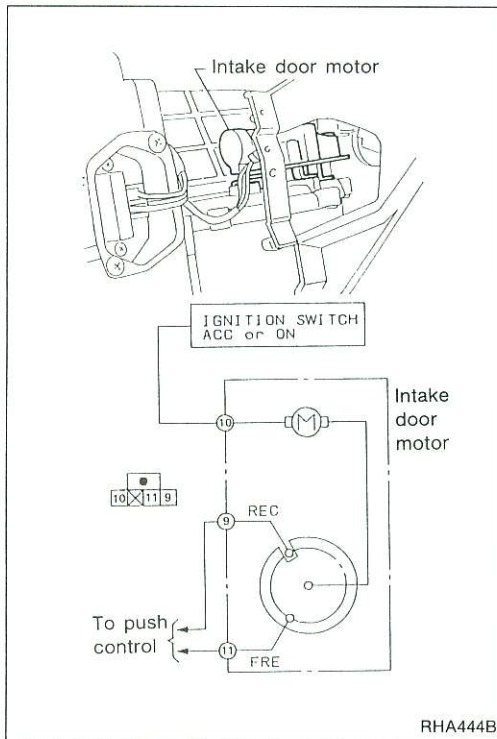
This push control system operates the intake and mode door motors to activate their corresponding doors.

SWITCHES AND THEIR CONTROL FUNCTIONS

Switch	Indicator illuminates							Air outlet	Intake air	Compressor
	A/C									
A/C	○									ON*1
Mode		○						VENT		
			○					B/L		
				○				FOOT		
					○			F/D	FRE	
						○		DEF	FRE	ON*1
							○*2		REC*2	

*1: Compressor operation depends on ambient temperature.

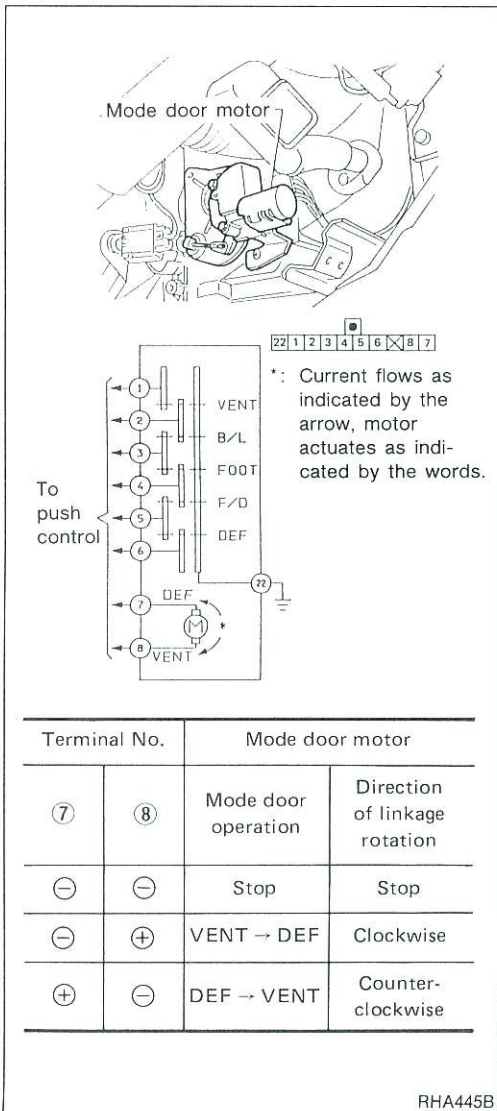
*2: Depending on mode switch position



Intake Door Motor

The intake door motor is installed on the front portion of the intake unit. Using a rod and link it opens and closes the intake door.

When the REC switch is ON (OFF), the ground line of the intake door motor is switched from terminal 11 to 9 (9 to 11). This causes the motor to start because the position switch contacts built into it are set to the current flow position. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction.

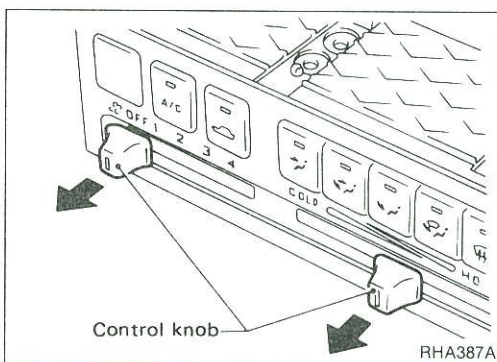
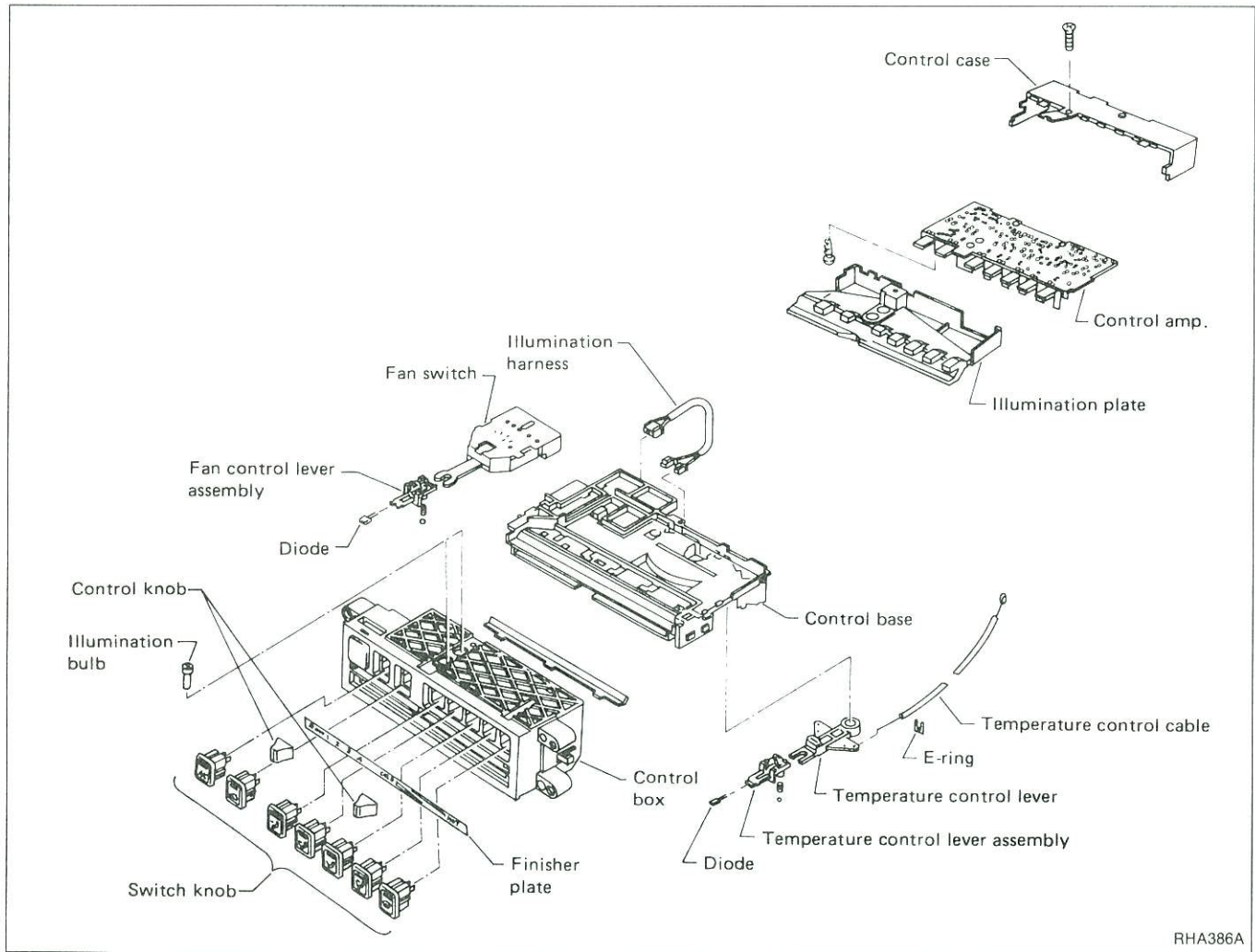


Mode Door Motor

The mode door motor is located on the left side of the heater unit. Through the side link it opens and closes the vent, foot and defroster door.

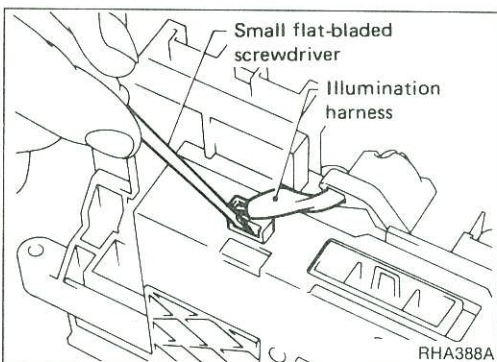
When one mode switch is pushed, the position switch built into it reads the corresponding mode to determine the direction of the motor rotation. As soon as the desired mode is set, the position switch stops the motor.

Overhaul — Push control unit assembly



1. Remove control knobs.

Wrap knobs with a cloth and withdraw in direction indicated by arrow as shown in figure at left. Be careful not to scratch knobs during removal.



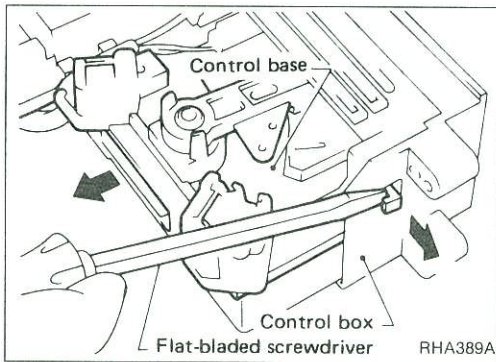
2. Disconnect illumination harness connectors.

SYSTEM DESCRIPTION — Push Control

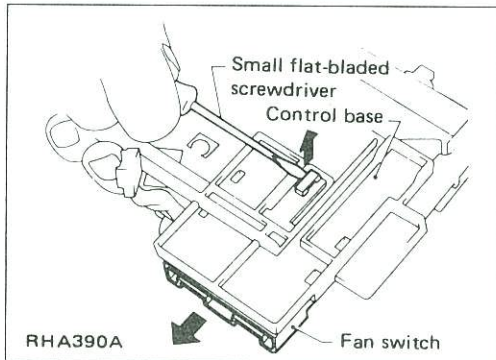
Overhaul — Push control unit assembly (Cont'd)

3. Remove control base.

Undo hook at each end of control box and remove control base from control box by moving it in direction indicated by arrow.

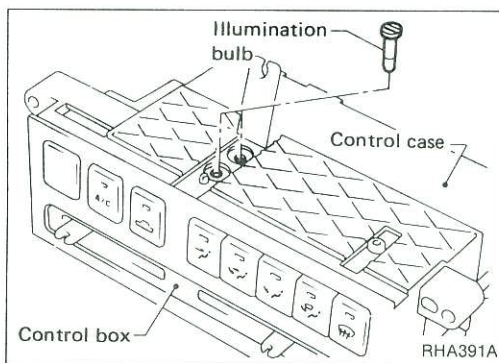


4. Remove fan switch.



5. Remove switch knobs.

Wrap finisher with a cloth and remove knobs using pliers or similar tool. Be careful not to scratch finisher's surface.



6. Remove illumination bulb.
7. Remove control case.

8. Remove illumination plate.

Be careful not to scratch control amp. when removing illumination plate.

9. Remove finisher plate.

10. Remove control amp.

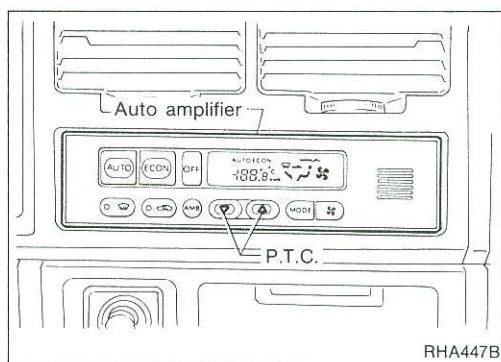
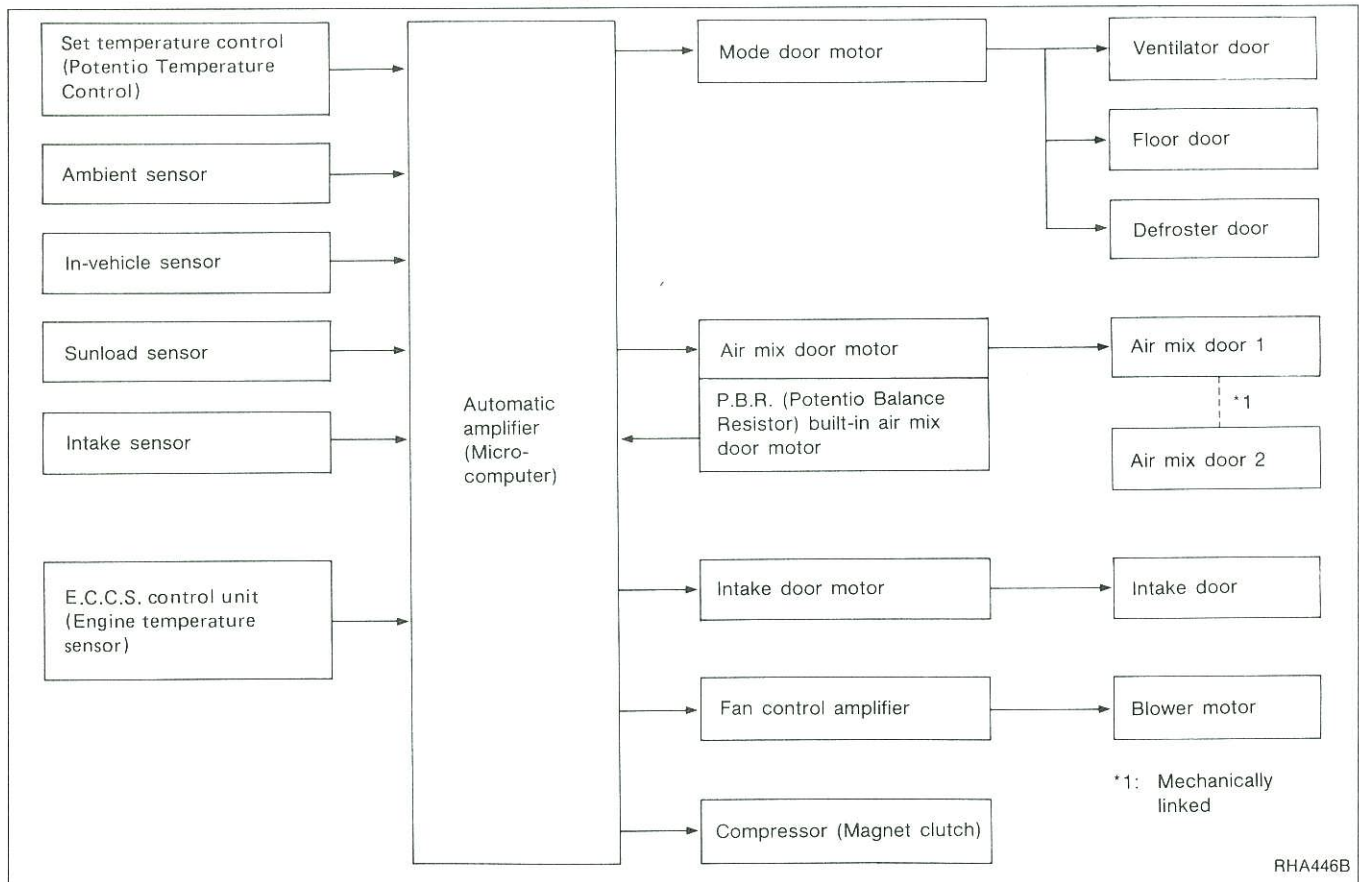
Be careful not to damage substrate when removing.

11. Disconnect temperature control cable.

12. Installation is in reverse order of removal.

Overview of Control System

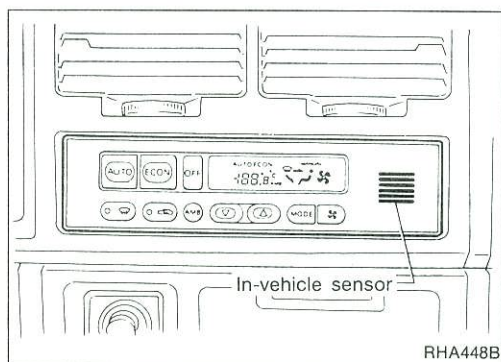
The control system consists of a) input sensors and switches, b) the automatic amplifier (microcomputer), and c) outputs. The relationship of these components is shown in the diagram below:



Control System Input Components

POTENTIO TEMPERATURE CONTROL (P.T.C.)

The P.T.C. is built into the auto amplifier. It can be set at an interval of 0.5°C (1.0°F) through both (HOT) and (COLD) control switches. Setting temperature is digitally displayed.



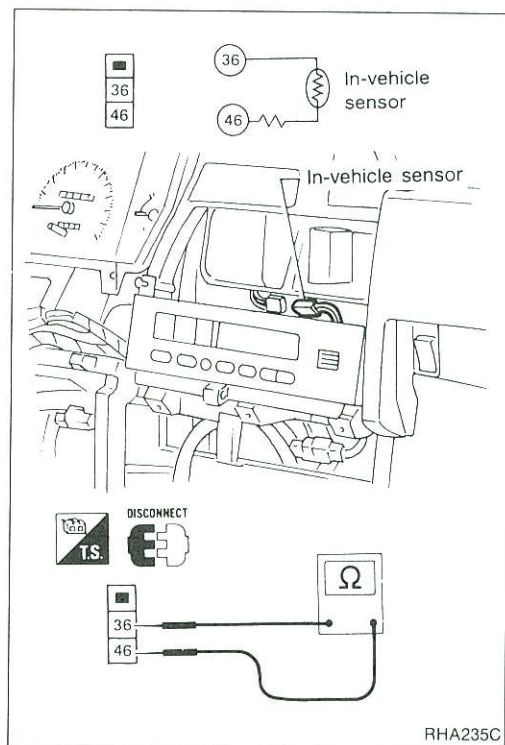
IN-VEHICLE SENSOR

The in-vehicle sensor is attached to the control finisher. It converts variations in temperature of compartment air drawn from the aspirator motor into a resistance value which is then input into the auto amplifier. (A more detailed description of the aspirator motor is shown on the following page.)

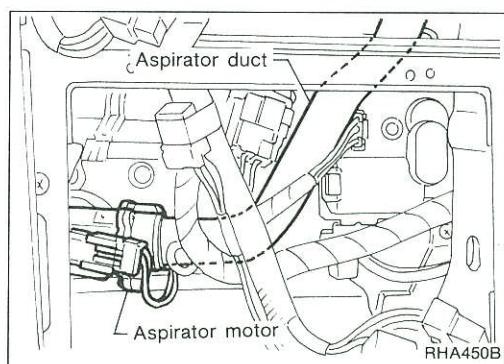
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

After disconnecting in-vehicle sensor harness connector, measure resistance between terminals 36 and 46 at sensor harness side, using the table below.



Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.64
-30 (-22)	28.90
-25 (-13)	21.89
-20 (-4)	16.78
-15 (5)	13.01
-10 (14)	10.20
-5 (23)	8.08
0 (32)	6.47
5 (41)	5.23
10 (50)	4.27
15 (59)	3.52
20 (68)	2.93
25 (77)	2.47
30 (86)	2.09
35 (95)	1.79
40 (104)	1.55
45 (113)	1.35
50 (122)	1.19
55 (131)	1.05
60 (140)	0.94
65 (149)	0.85



ASPIRATOR MOTOR

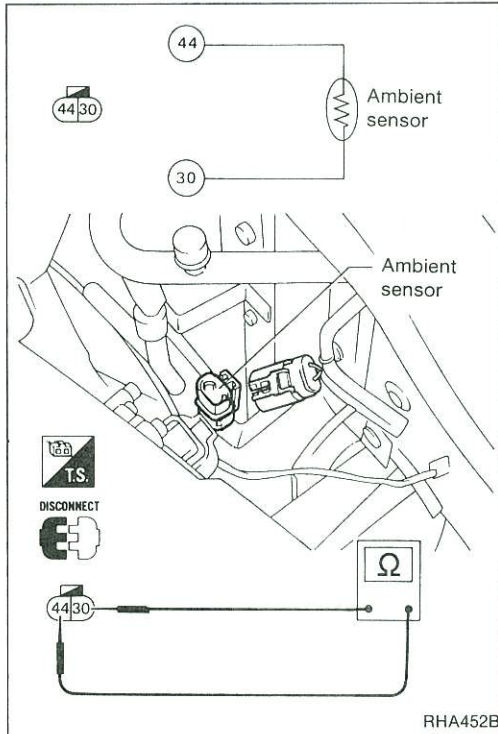
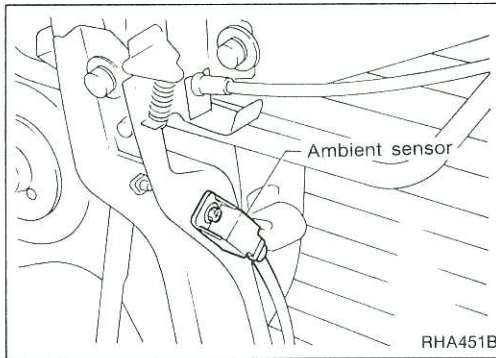
The aspirator motor is located in front of the heater unit. The aspirator motor activates when the ignition switch is "ON". The aspirator is connected to the in-vehicle sensor via the aspirator duct so that the in-vehicle sensor monitors the compartment temperature. The aspirator continuously draws in a very small amount of compartment air.

Control System Input Components (Cont'd)

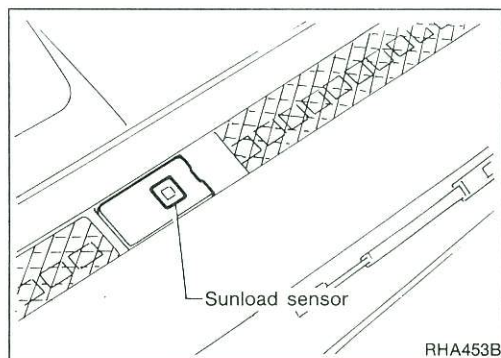
AMBIENT SENSOR

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 ③⑩ and ④④ at sensor harness side, using the table below.



Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.35
-30 (-22)	28.62
-25 (-13)	21.61
-20 (-4)	16.50
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57



SUNLOAD SENSOR

The sunload sensor is located on the right defroster grille. It detects sunload entering through windshield by means of a photo diode and converts it into a current value which is then input to the auto amplifier.

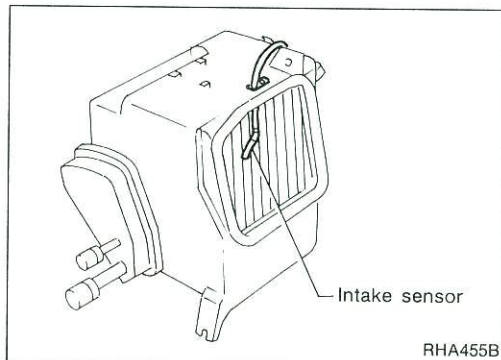
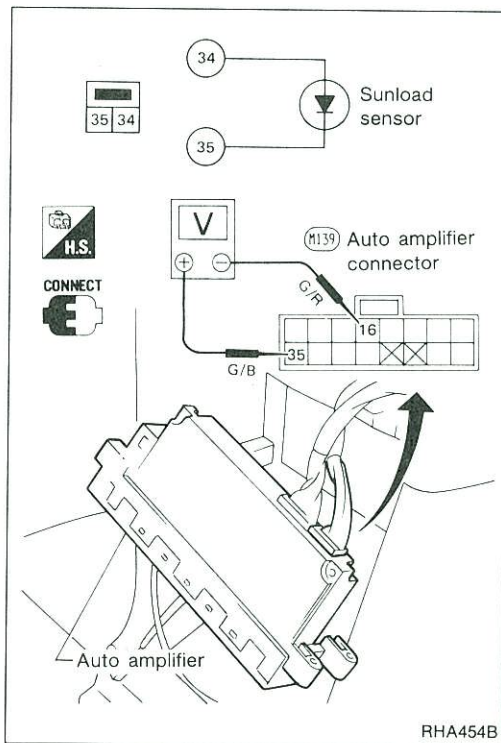
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

Measure voltage between terminals ①⑥ and ③⑤ at vehicle harness side, using the table below.

Input current mA	Output voltage V
0	5.0
0.1	4.1
0.2	3.1
0.3	2.2
0.4	1.3
0.5	0.4

- When checking sunload sensor, select a place where sun shines directly on it.



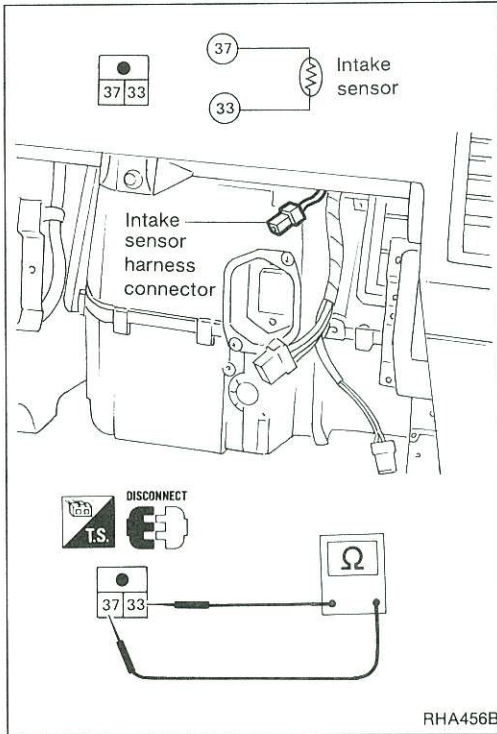
INTAKE SENSOR

The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the auto amplifier.

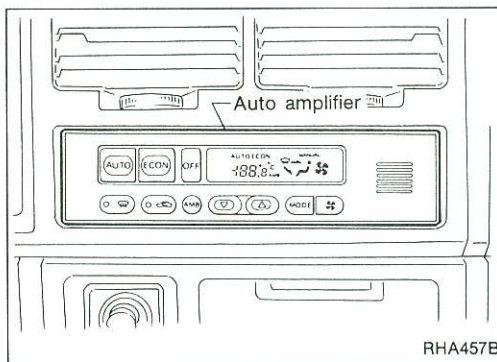
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

After disconnecting intake sensor harness connector, measure resistance between terminals ③③ and ③⑦ at sensor harness side, using the table below.



Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.35
-30 (-22)	28.62
-25 (-13)	21.61
-20 (-4)	16.50
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57



Control System Automatic Amplifier (Auto amp.)

The auto amplifier has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.

The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (P.T.C.) are directly entered into auto amplifier.

Self-diagnostic functions are also built into auto amplifier to provide quick check of malfunctions in the auto air conditioner system.

Control System Automatic Amplifier (Auto amp.) (Cont'd)

AMBIENT TEMPERATURE INPUT PROCESS

The automatic amplifier includes a "processing circuit" for the ambient sensor input. When the temperature detected by the ambient sensor increases quickly, the processing circuit allows the auto amp. to recognize an ambient temperature increase of only 0.33°C (0.6°F) per 100 seconds.

As an example, consider stopping for a cup of coffee after high speed driving. Even though the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase because heat radiated from the engine compartment can radiate to the front grille area (where the ambient sensor is located).

SUNLOAD INPUT PROCESS

The auto amp. also includes a processing circuit which "average" the variations in detected sunload over a period of time. This prevents drastic swings in the A.T.C. system operation due to small or quick variations in detected sunload.

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the A.T.C. system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.

Control System Output Components

INTAKE DOOR CONTROL

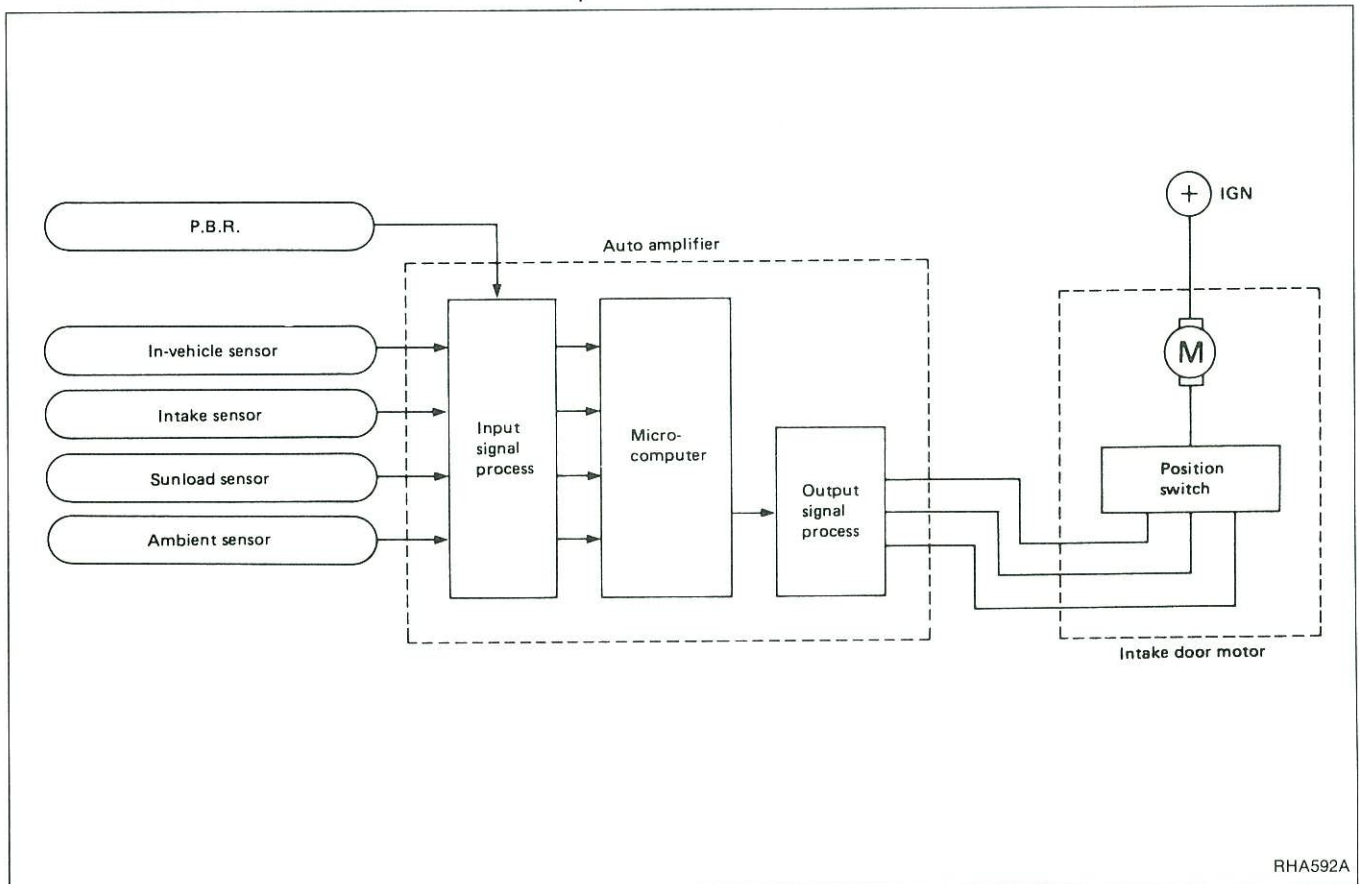
Components parts

Intake door control system components are:

- 1) Auto amplifier
- 2) Intake door motor
- 3) P.B.R.
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor

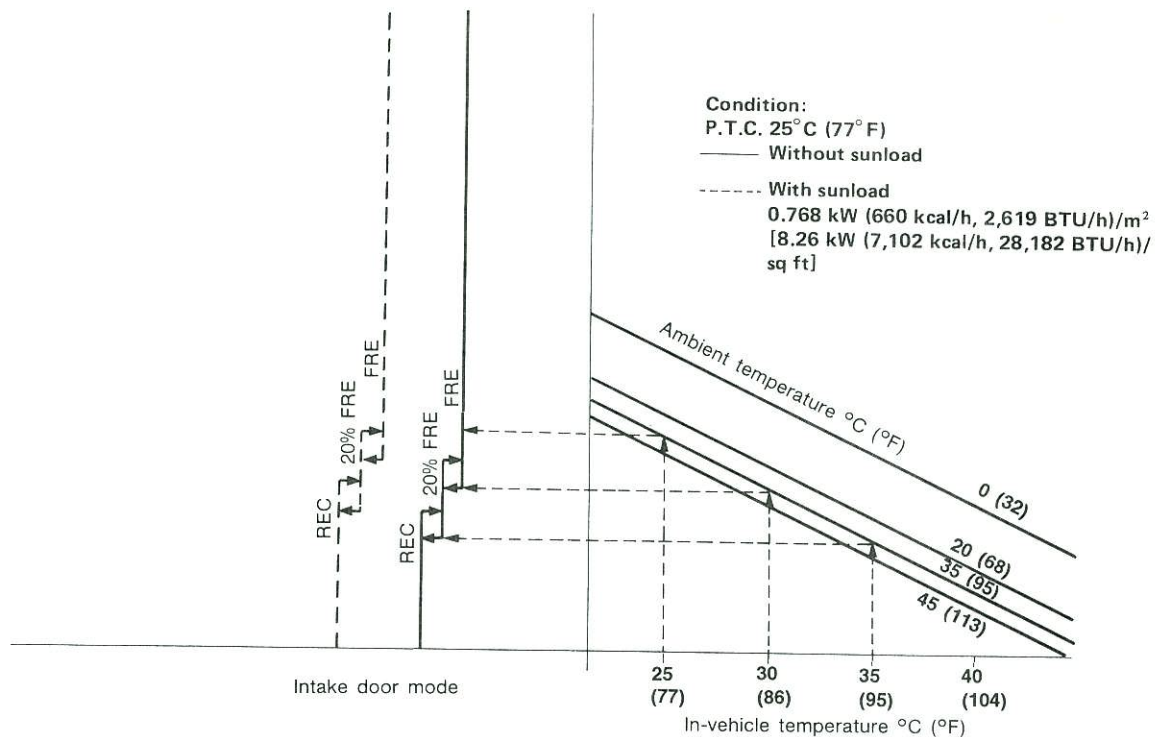
System operation

The intake door control determines intake door position based on the ambient temperature and the in-vehicle temperature. When the ECON, DEF, or OFF buttons are pushed, the auto amplifier sets the intake door at the "Fresh" position.



Control System Output Components (Cont'd)

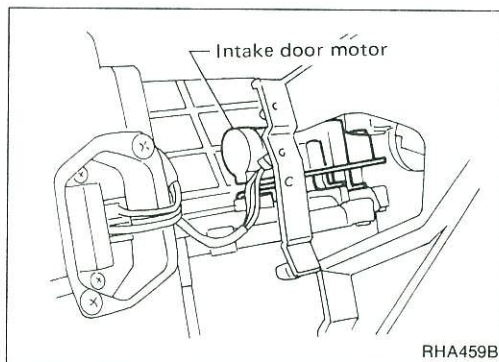
Intake door control specification



Example:

- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 35°C (95°F), intake door is set automatically at REC position to make in-vehicle temperature cool down efficiently.
- In-vehicle temperature will lower and when 30°C (86°F) is reached, intake door will shift to 20% FRE position.
- In the state when in-vehicle temperature reaches the objective temperature 25°C (77°F), intake door is set at FRE position.

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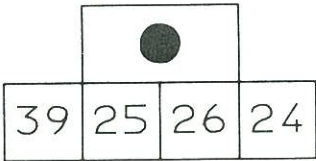


INTAKE DOOR MOTOR

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.

SYSTEM DESCRIPTION — Auto Air Conditioner

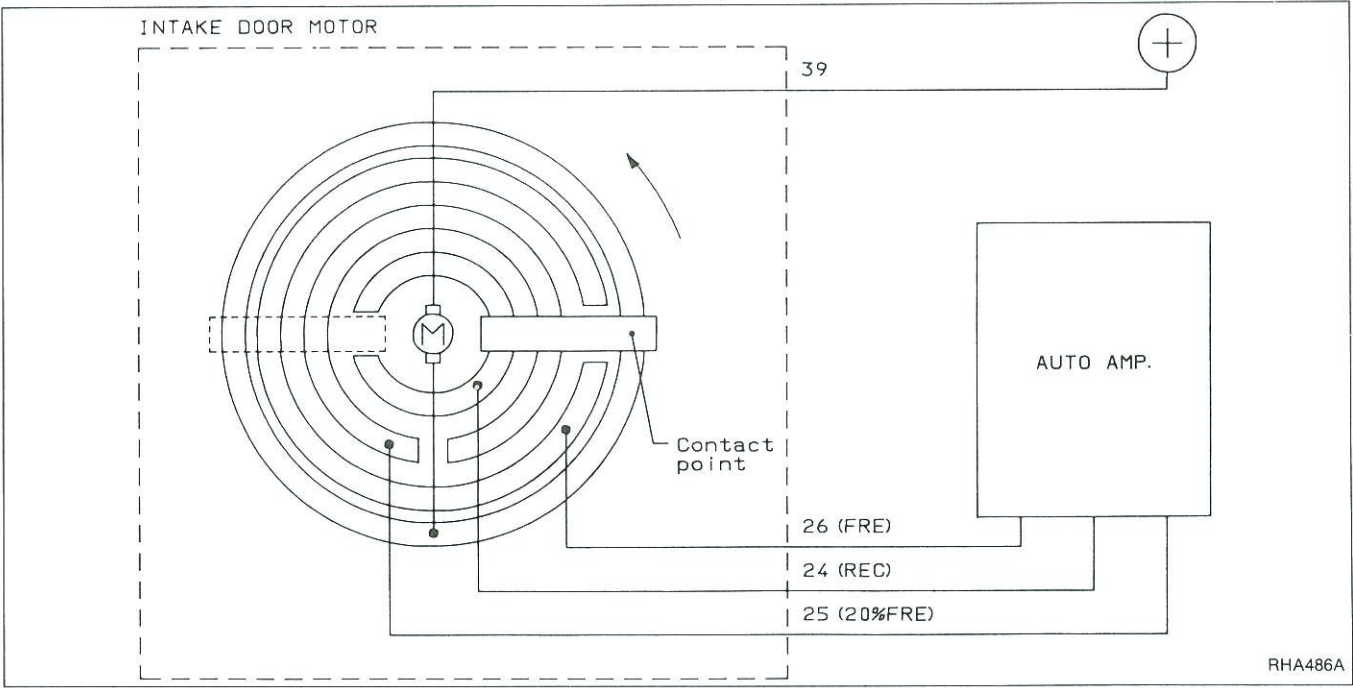
Control System Output Components (Cont'd)



24	25	26	Intake door operation	Direction of lever rotation
CL	OP	OP	REC	Clockwise
OP	CL	OP	20% FRE	
OP	OP	CL	FRE	

OP: Open
CL: Close

RHA485A



RHA486A

Control System Output Components (Cont'd)

AIR MIX DOOR CONTROL (Automatic temperature control)

Component parts

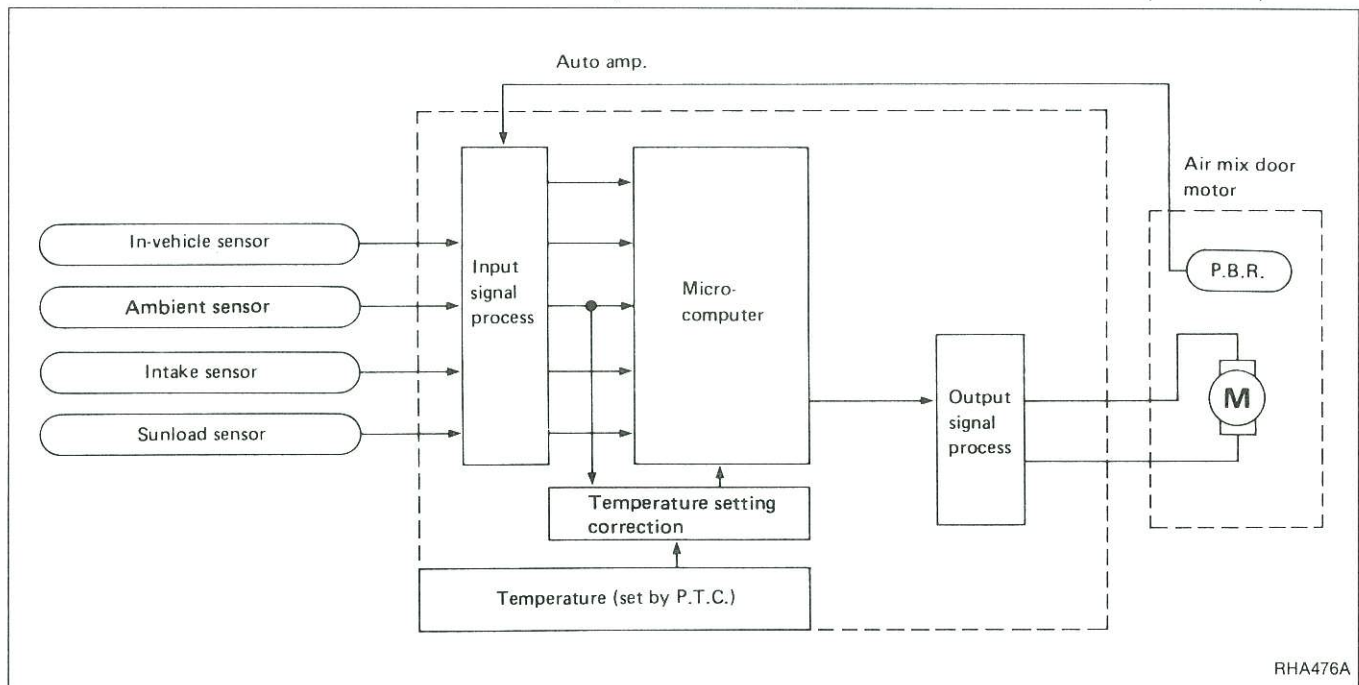
Air mix door control system components are:

- 1) Auto amplifier
- 2) Air mix door motor (P.B.R.)
- 3) In-vehicle sensor
- 4) Ambient sensor
- 5) Sunload sensor
- 6) Intake sensor

System operation

Temperature set by Potentio Temperature Control (P.T.C.) is compensated through setting temperature correction circuit to determine target temperature.

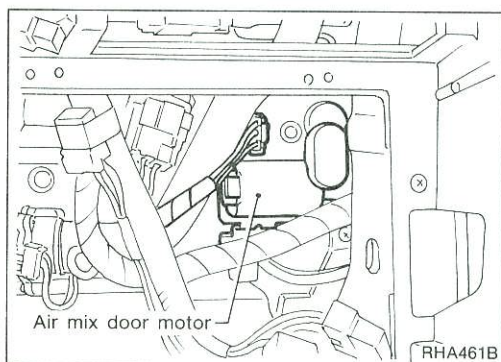
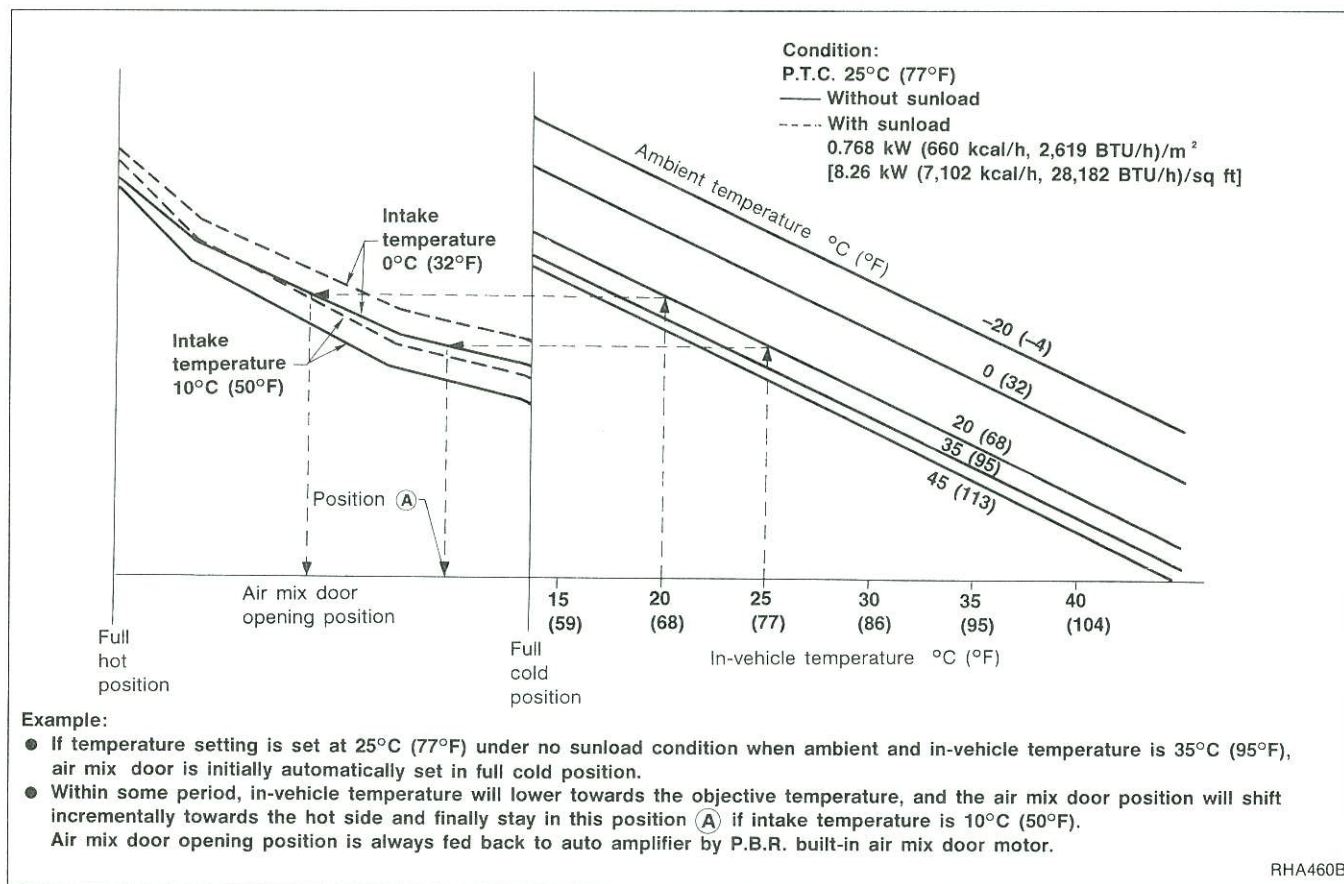
Auto amplifier will operate air mix door motor to set air conditioning system in HOT or COLD position, depending upon relationship between conditions (target temperature, sunload, in-vehicle temperature and ambient temperature) and conditions (air mix door position and intake air temperature).



SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

Air mix door control specification



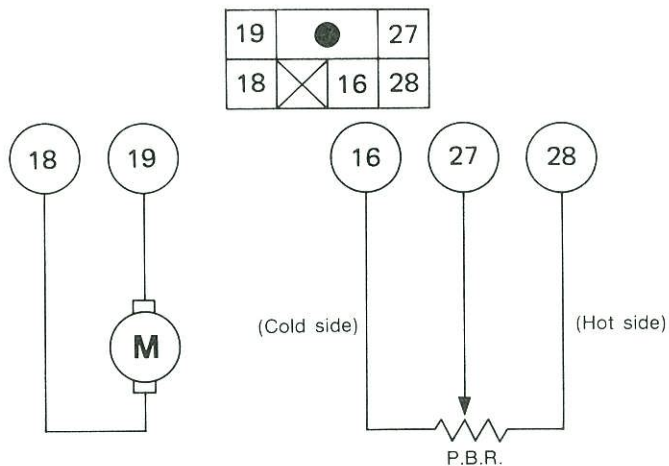
AIR MIX DOOR MOTOR

The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and air mix door position is then fed back to the auto amplifier by P.B.R. built-in air mix door motor.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

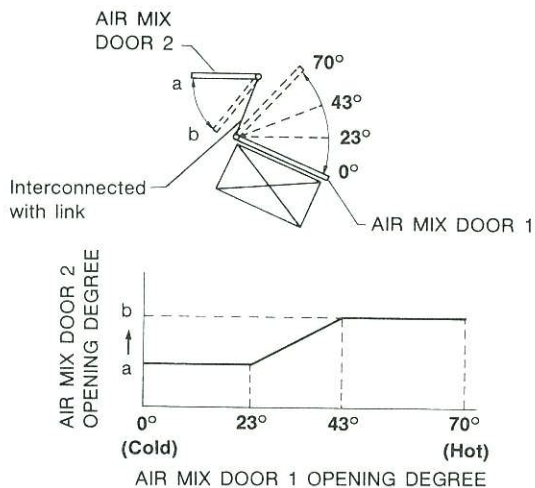
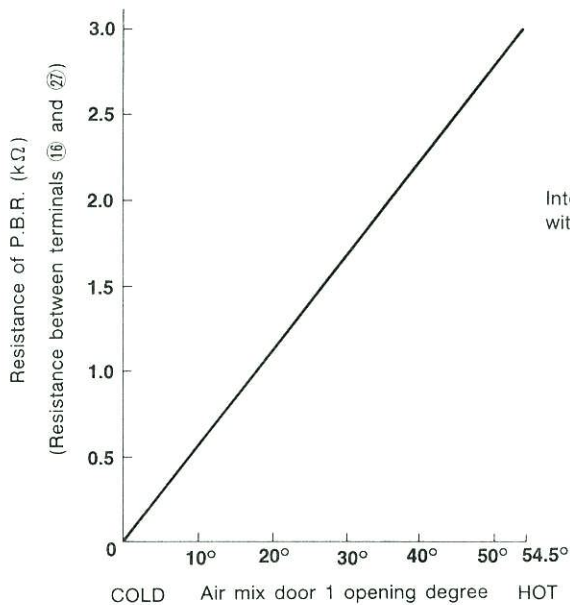
Air mix door motor operation



18	19	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Upward)
⊖	⊖	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Downward)

RHA462B

Characteristics of P.B.R.

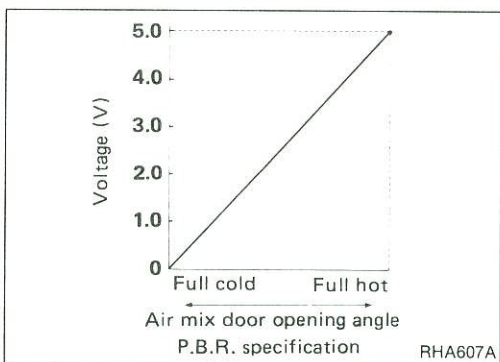
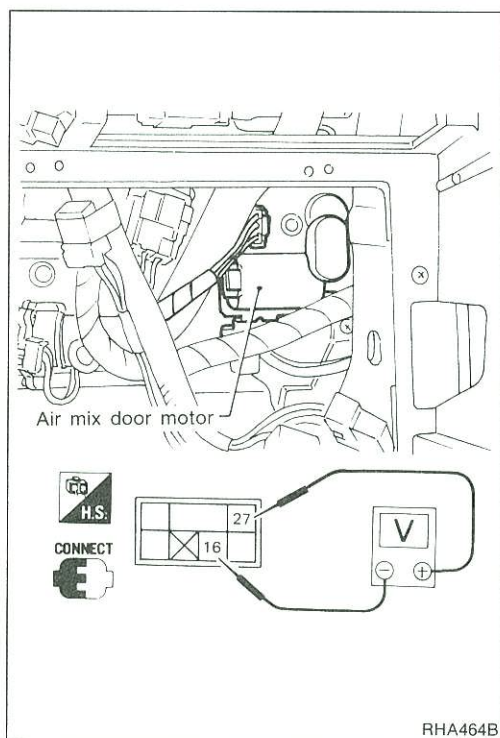


RHA463B

Control System Output Components (Cont'd)

P.B.R.

Measure voltage between terminals ②⑦ and ①⑥ at vehicle harness side.



Ignition switch: ON

- Ensure tester pointer deflects smoothly when P.T.C. is moved from 18°C (65°F) to 32°C (85°F) and vice versa.

WATER COCK

The water cock lever is linked to the air mix door shaft, so the amount of hot water flowing to the heater core is a function of the aperture of the air mix door.

OUTLET DOOR CONTROL

Component parts

Outlet door control system components are:

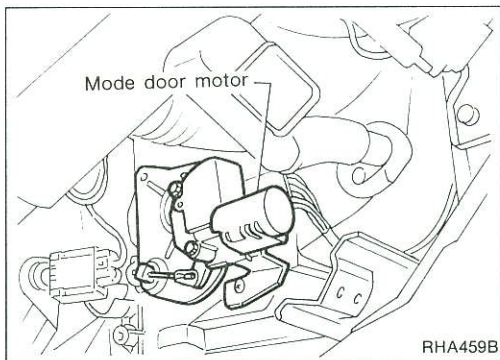
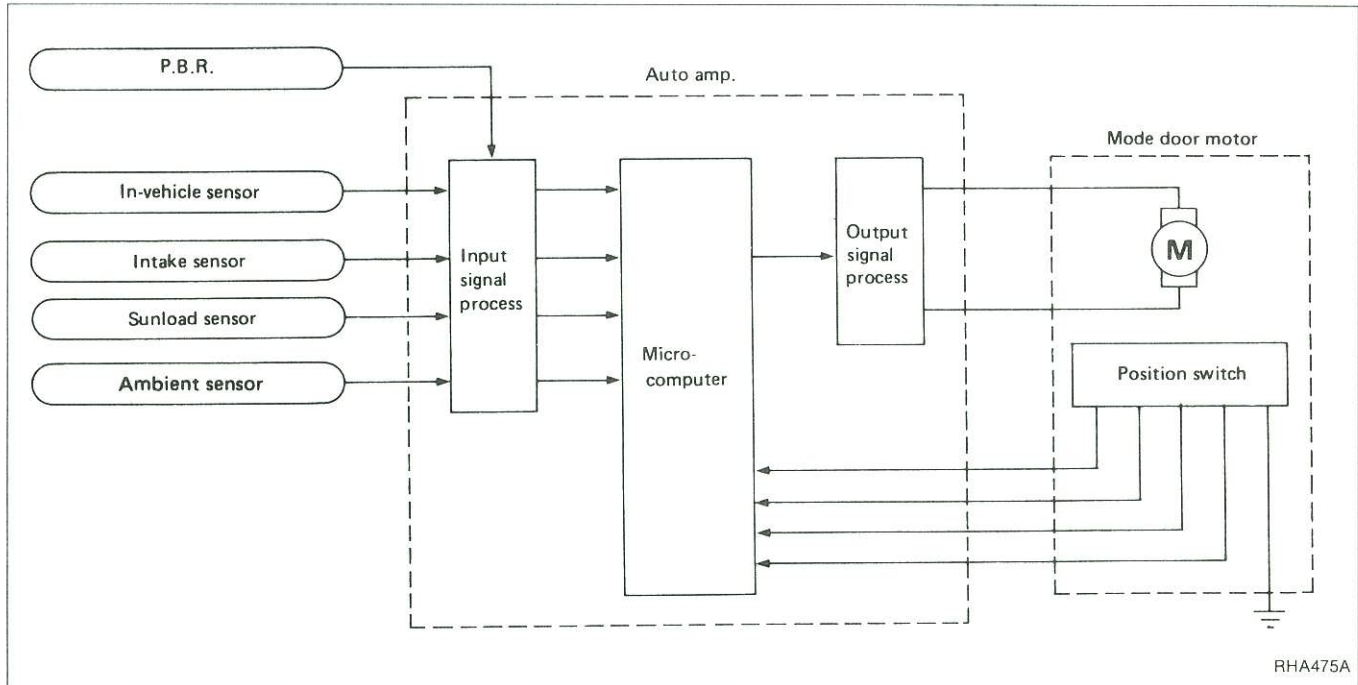
- 1) Auto amplifier
- 2) Mode door motor
- 3) P.B.R.
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor

Control System Output Components (Cont'd)

System operation

The auto amplifier computes the air outlet conditions according to the ambient temperature and the in-vehicle temperature. The computed outlet conditions are then corrected for sunload to determine air outlets through which air is discharged into the passenger compartment.

When the air outlets is automatically selected as FOOT/DEF, the actual outlet will be either F/D1 or F/D2 depending on the target temperature and the ambient temperature.

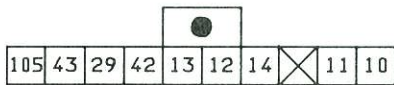


MODE DOOR MOTOR

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.

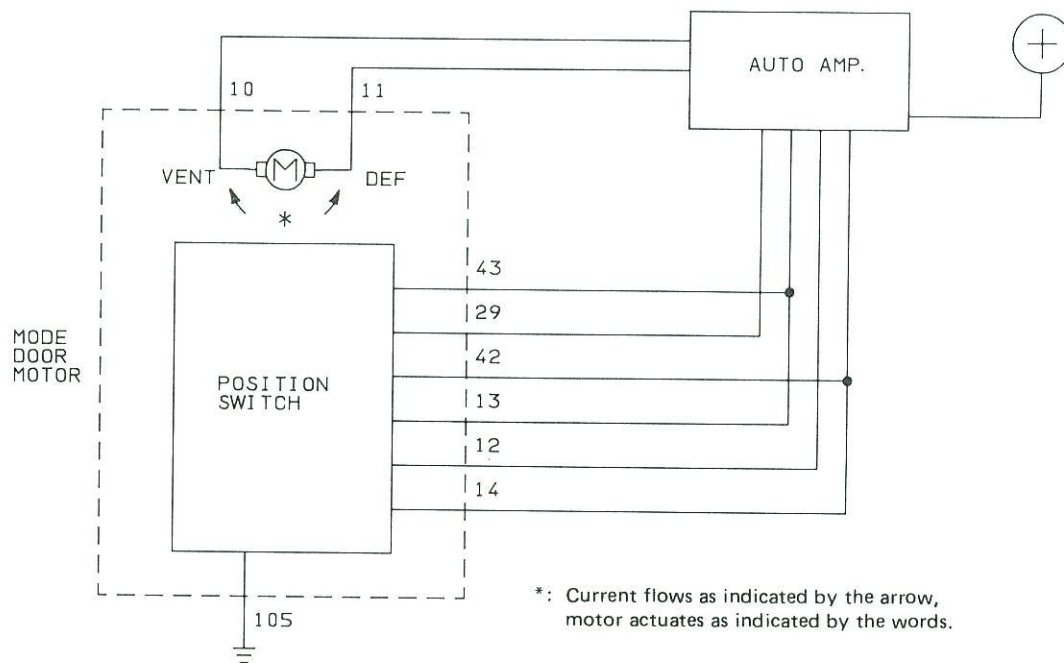
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



10	11	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Clockwise
⊖	⊖	STOP	STOP
⊖	⊕	DEF → VENT	Counterclockwise

RHA465B

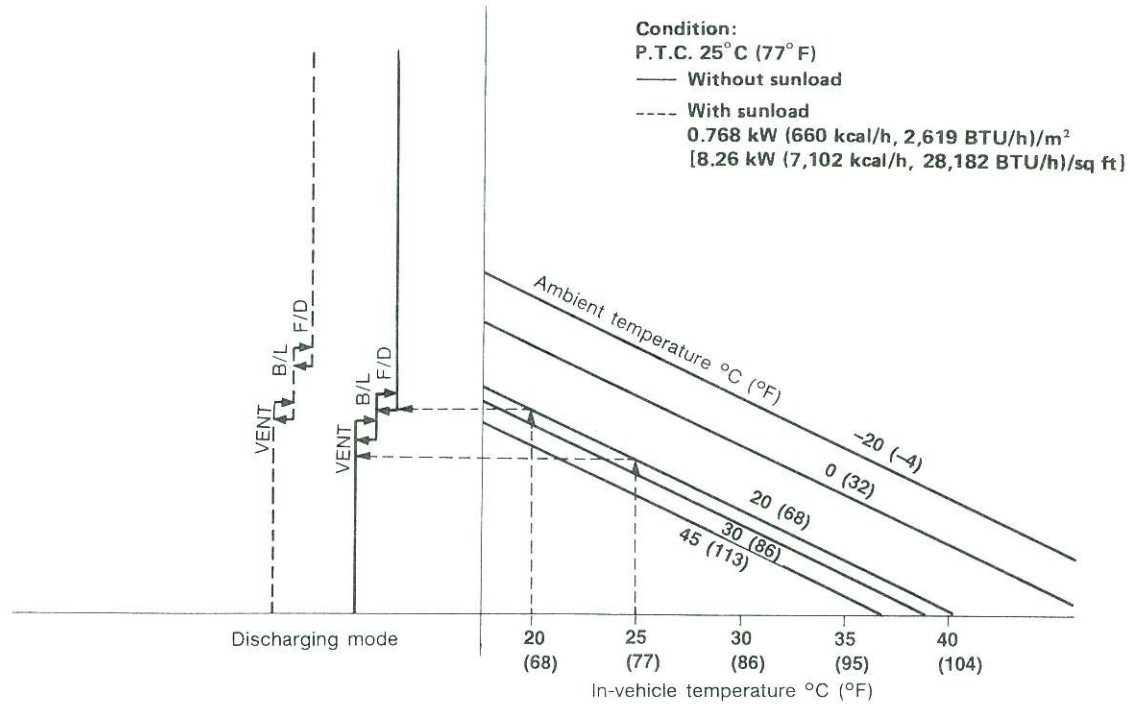


RHA488A

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

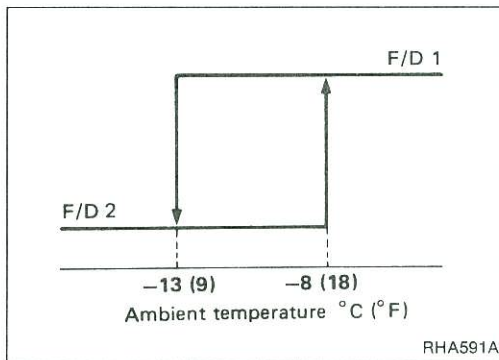
Outlet door control specification



Example:

- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 20°C (68°F), mode door is set automatically at F/D position.
- Then in-vehicle temperature will lower and when objective temperature 25°C (77°F) is reached mode door will shift from F/D position to VENT.

RHA466B



FOOT/DEF mode specification

When the air outlet is automatically selected as F/D, and the target temperature is high, the air outlet is fixed at F/D 1. When the target temperature is low, the air outlet will be either F/D 1 or F/D 2 depending on the ambient temperature.

- When the ambient temperature decreases to -13°C (9°F), air outlet is changed from F/D 1 to F/D 2.
- When the ambient temperature increases to -8°C (18°F), air outlet is changed from F/D 2 to F/D 1.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

FAN SPEED CONTROL

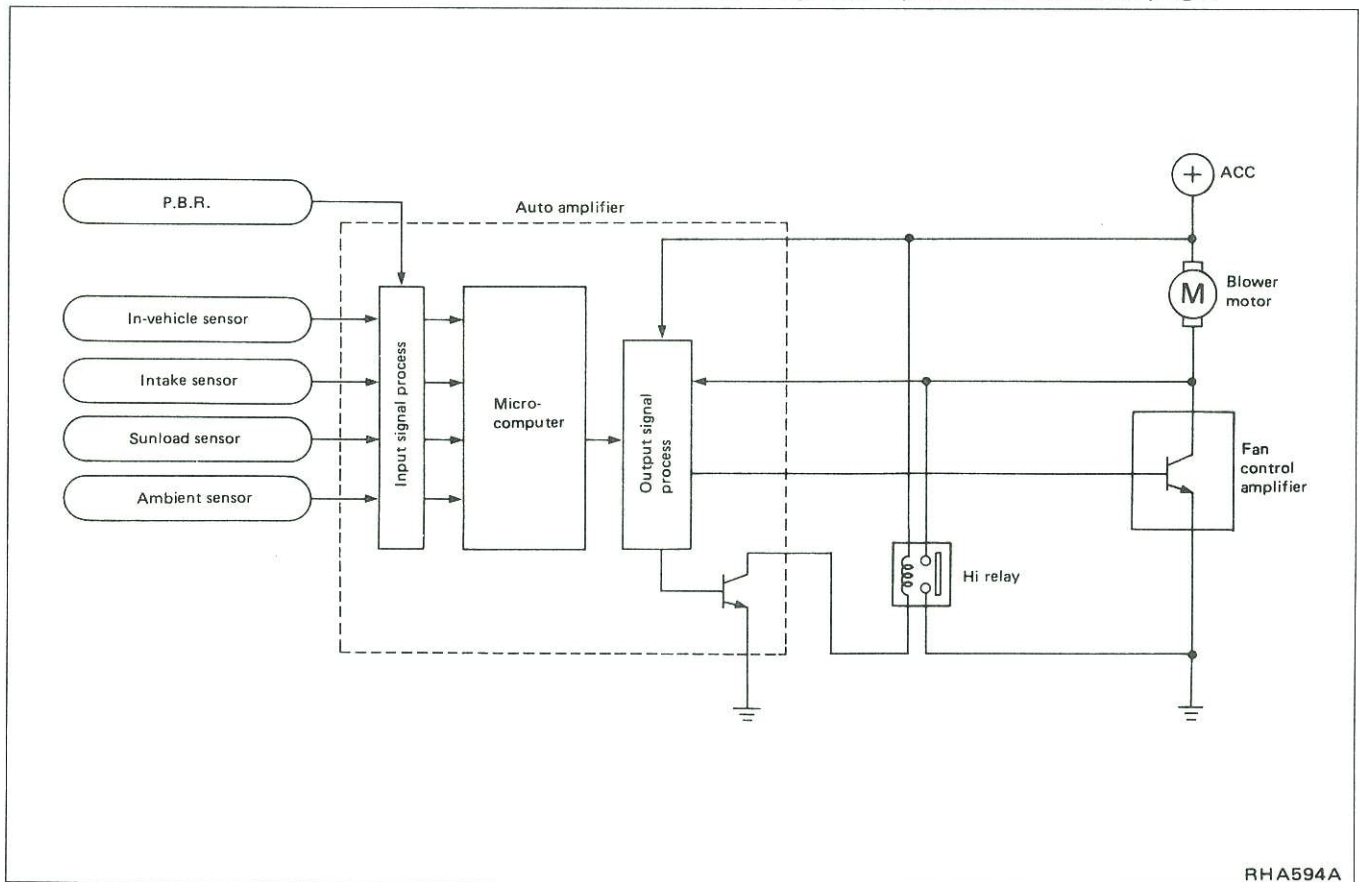
Component parts

Fan speed control system components are:

- 1) Auto amplifier
- 2) Fan control amplifier
- 3) P.B.R.
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor
- 8) Hi relay
- 9) E.C.C.S. control unit (Engine temperature sensor)

System operation

For description of system operation, see next page.



RHA594A

AUTOMATIC MODE

In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the P.B.R., in-vehicle sensor, sunload sensor, and ambient sensor. The blower motor applied voltage ranges from approximately 5 volts (lowest speed) to 12 volts (highest speed).

The control blower speed (in the range of 5 to 10.5V), the automatic amplifier supplies a signal to the fan control amplifier. Based on this signal, the fan control amplifier controls the current flow from the blower motor to ground. If the computed blower voltage (from automatic amplifier) is above 10.5 volts, the high blower relay is activated. The high blower relay provides a direct path to ground (bypassing the fan control amplifier), and the blower motor operates at high speed.

Control System Output Components (Cont'd)

STARTING FAN SPEED CONTROL

Start up from “COLD SOAK” condition (Automatic mode)

In a cold start up condition where the engine temperature is below 50°C (122°F) and the ambient temperature is below 15°C (59°F), the blower will not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the ambient and engine temperature.

In the most extreme case (very low ambient) the blower starting delay will be 150 seconds. After this delay, the blower will operate at low speed until the engine 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. 6V). During low or no sunload conditions, the low speed will drop to “low” low speed (approx. 5V).

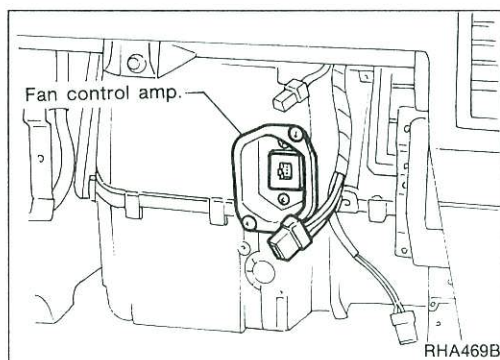
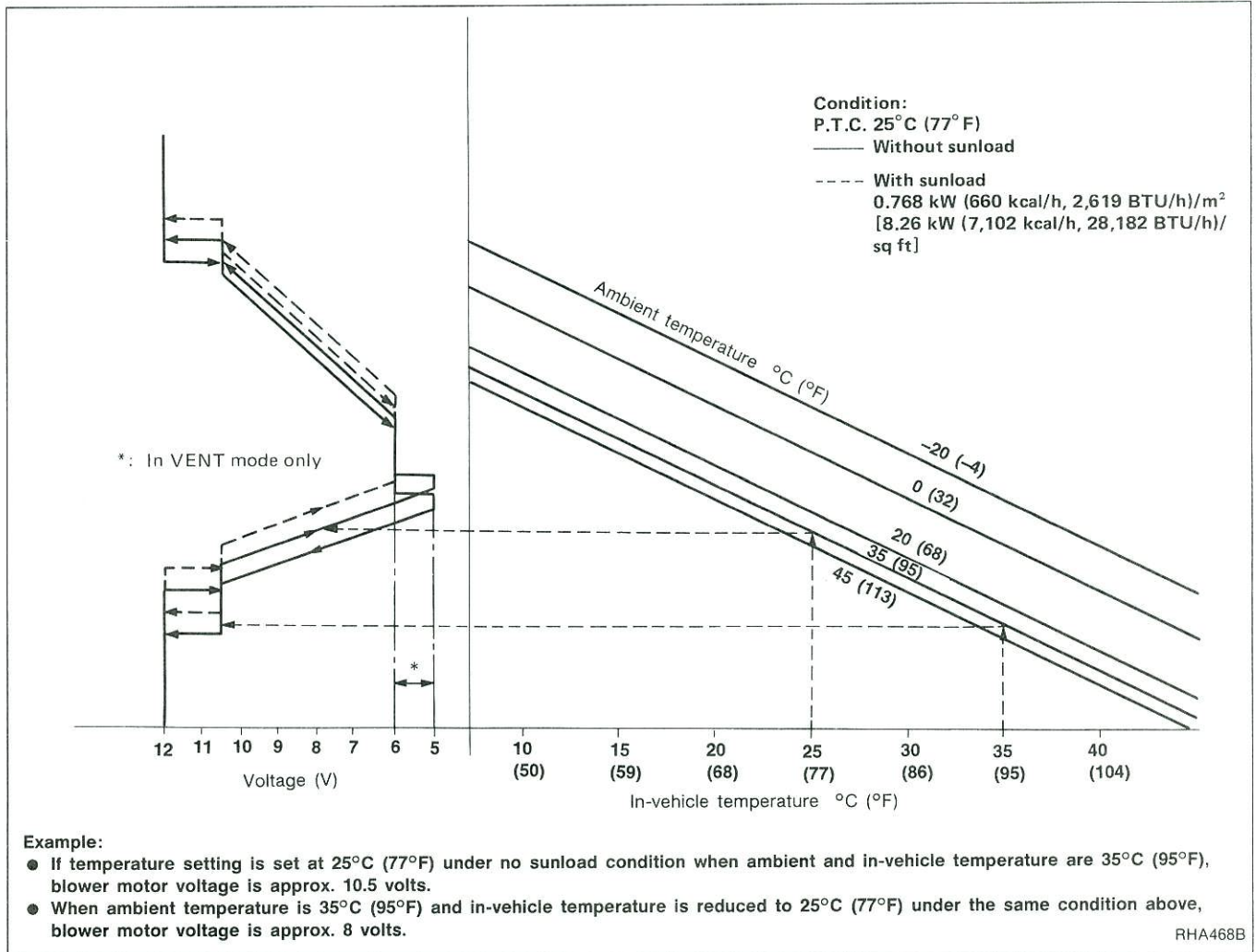
Ambient

When the ambient temperature is in the “moderate” range [10 to 15°C (50 to 59°F)], the computed blower voltage will be compensated (reduced) by up to 3.5V (depending on the blower speed). In the “extreme” ambient ranges [below 0°C (32°F) and above 20°C (68°F)] the computed objective blower voltage is not compensated at all. In the ambient temperature ranges between “moderate” and “extreme” [0 to 10°C (32 to 50°F) and 15 to 20°C (59 to 68°F)], the amount of compensation (for a given blower speed) varies depending on the ambient temperature.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

Fan speed control specification

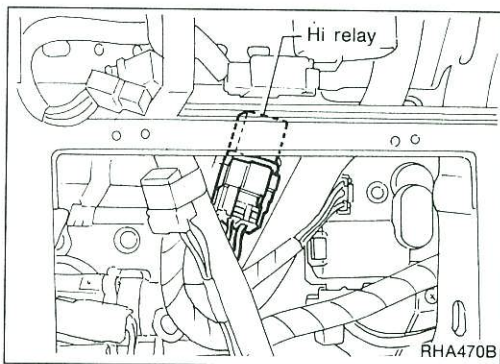
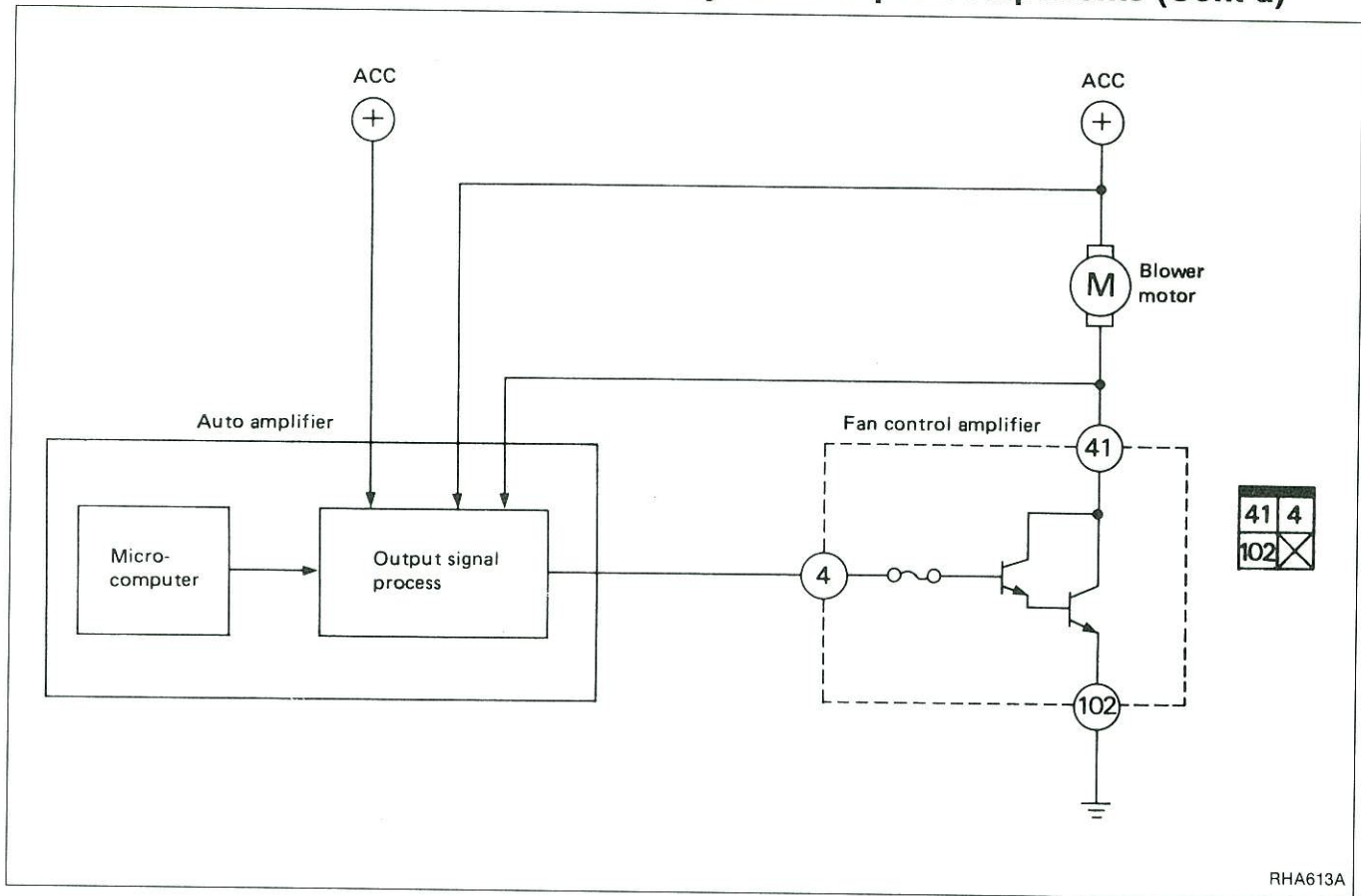


FAN CONTROL AMPLIFIER

The fan control amplifier is located on the cooling unit. It amplifies a 12-step base current flowing from the auto amplifier to change blower speed.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



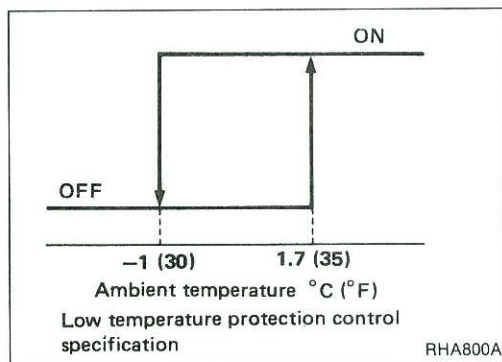
HI RELAY

The Hi relay is located on the heater unit. It receives a signal from the auto amplifier to operate the blower motor at high speed.

Control System Output Components (Cont'd)

MAGNET CLUTCH CONTROL

Auto amplifier controls compressor operation by ambient temperature and signal from E.C.C.S. control unit.



Low temperature protection control

Auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by ambient temperature sensor.

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

General Specifications

COMPRESSOR

Model	ZEXEL make DKS-16H
Type	Swash plate
Displacement cm ³ (cu in)/Rev.	167 (10.19)
Cylinder bore x stroke mm (in)	37.0 x 25.8 (1.457 x 1.016)
Direction of rotation	Clockwise (viewed from drive end)
Drive belt	Poly V

LUBRICATION OIL

Model	ZEXEL make DKS-16H
Type	SUNISO 5GS
Capacity mℓ (US fl oz, Imp fl oz)	
Total in system	200 (6.8, 7.0)
Compressor (Service parts) charging amount	200 (6.8, 7.0)

REFRIGERANT

Type	R-12
Capacity kg (lb)	0.8 - 0.9 (1.8 - 2.0)

Inspection and Adjustment

ENGINE IDLING SPEED (When A/C is ON)

- Refer to EF & EC section.

BELT TENSION

- Refer to Checking Drive Belts (MA section).

COMPRESSOR

Model	DKS-16H
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)

ELECTRICAL SYSTEM

SECTION **EL**

When you read wiring diagrams:

- Read GI section, "HOW TO READ WIRING DIAGRAMS".

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STANDARDIZED RELAY	EL- 4
POWER SUPPLY ROUTING	EL- 6
BATTERY	EL- 9
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CHARGING SYSTEM — Alternator —	EL- 29
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SPECIAL SERVICE TOOL	EL-139
SUPER MULTIPLE JUNCTION (S.M.J.)	EL-141

WIRING DIAGRAM REFERENCE CHART

E.C.C.S. (Ignition system)	EF & EC SECTION
AUTOMATIC TRANSMISSION CONTROL SYSTEM, SHIFT LOCK SYSTEM	AT SECTION
SONAR SUSPENSION SYSTEM	FA SECTION
ANTI-LOCK BRAKING SYSTEM	BR SECTION
TRUNK LID AND FUEL FILLER LID OPENER, POWER WINDOW AND	
POWER DOOR LOCK, SRS "AIR BAG", POWER SEAT, SUN ROOF, DOOR MIRROR	BF SECTION
HEATER AND AIR CONDITIONER	HA SECTION

EL

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 unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

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

HARNESS CONNECTOR

Description

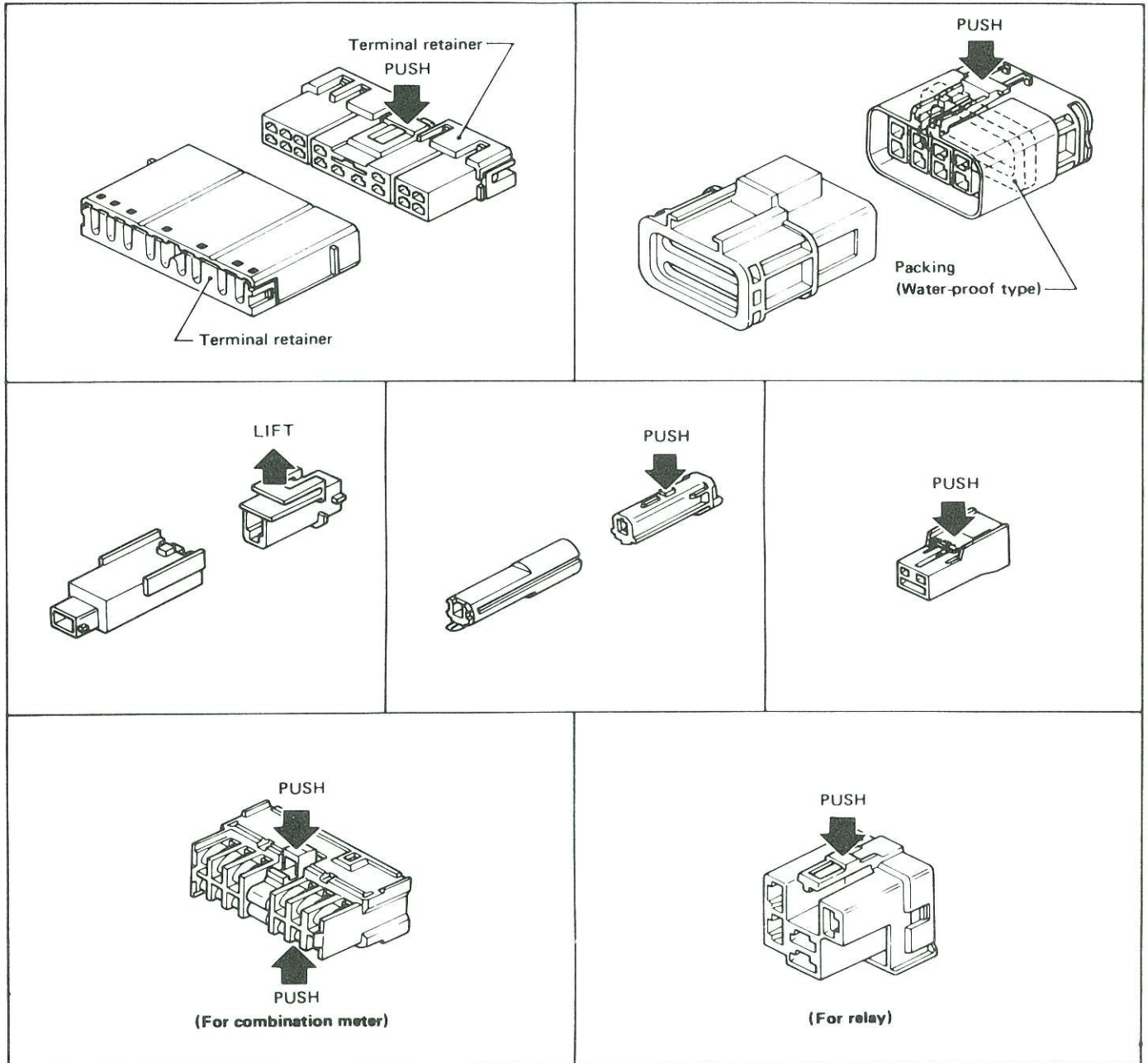
HARNESS CONNECTOR

- All harness connectors have been modified to prevent accidental loosing or disconnection.
- The connector can be disconnected by pushing or lifting the locking section.

CAUTION:

Do not pull the harness when disconnecting the connector.

[Example]



SEL769D

STANDARDIZED RELAY

Description

NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.

	NORMAL OPEN RELAY	NORMAL CLOSED RELAY	MIXED TYPE RELAY
SW 1 "OFF"	<p>Does not flow</p>	<p>Flows</p>	<p>Flows</p> <p>Does not flow</p>
SW 1 "ON"	<p>Flows</p>	<p>Does not flow</p>	<p>Does not flow</p> <p>Flows</p>

SEL881H

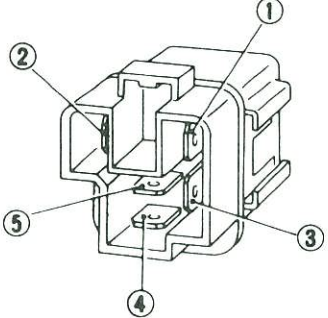
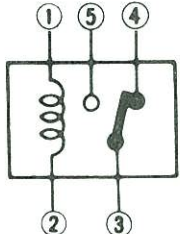
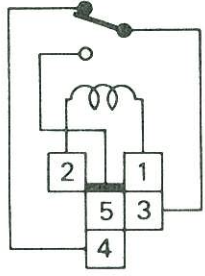
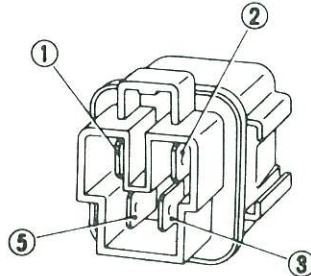
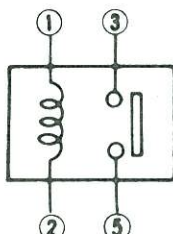
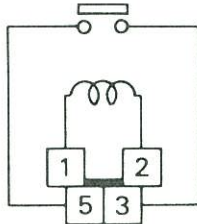
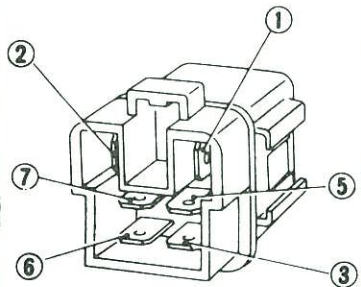
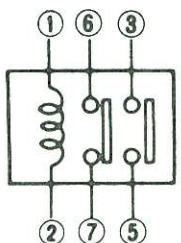
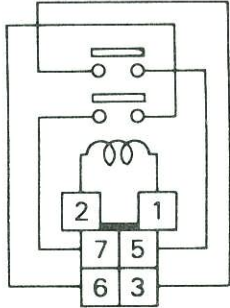
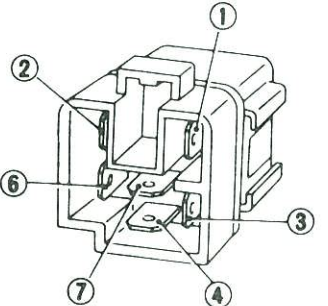
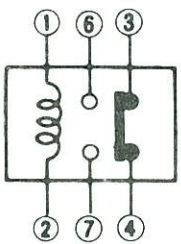
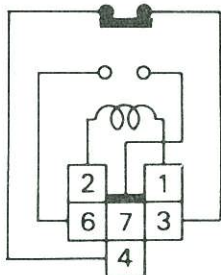
TYPE OF STANDARDIZED RELAYS

1M 1 Make 2M 2 Make
 1T 1 Transfer 1M·1B 1 Make 1 Break

1M	2M
1T	1M·1B

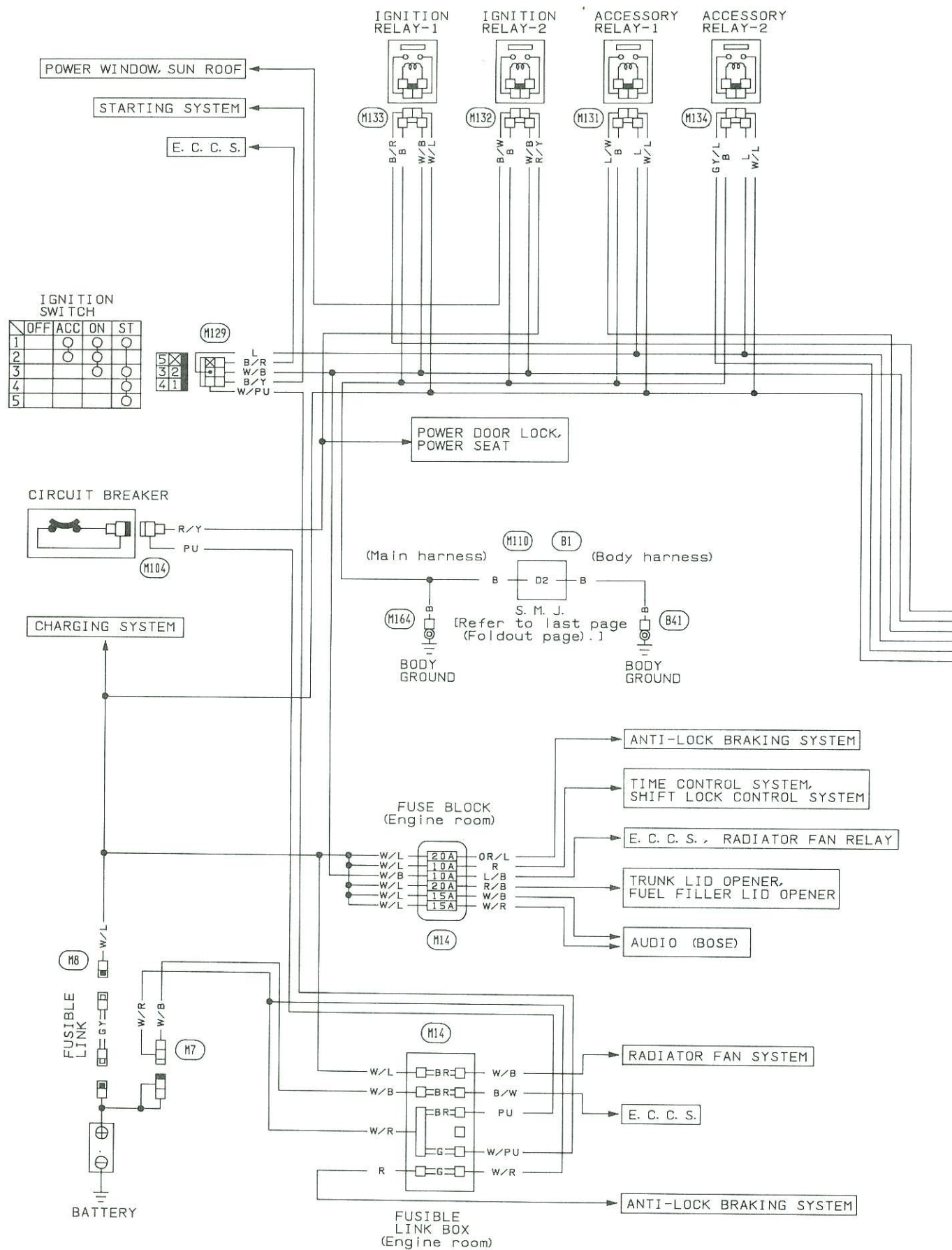
SEL882H

STANDARDIZED RELAY

Type	Outer view	Circuit	Connector symbol and connection	Case color
1T				BLACK
1M				BLUE or GREEN
2M				BROWN
1M-1B				GRAY

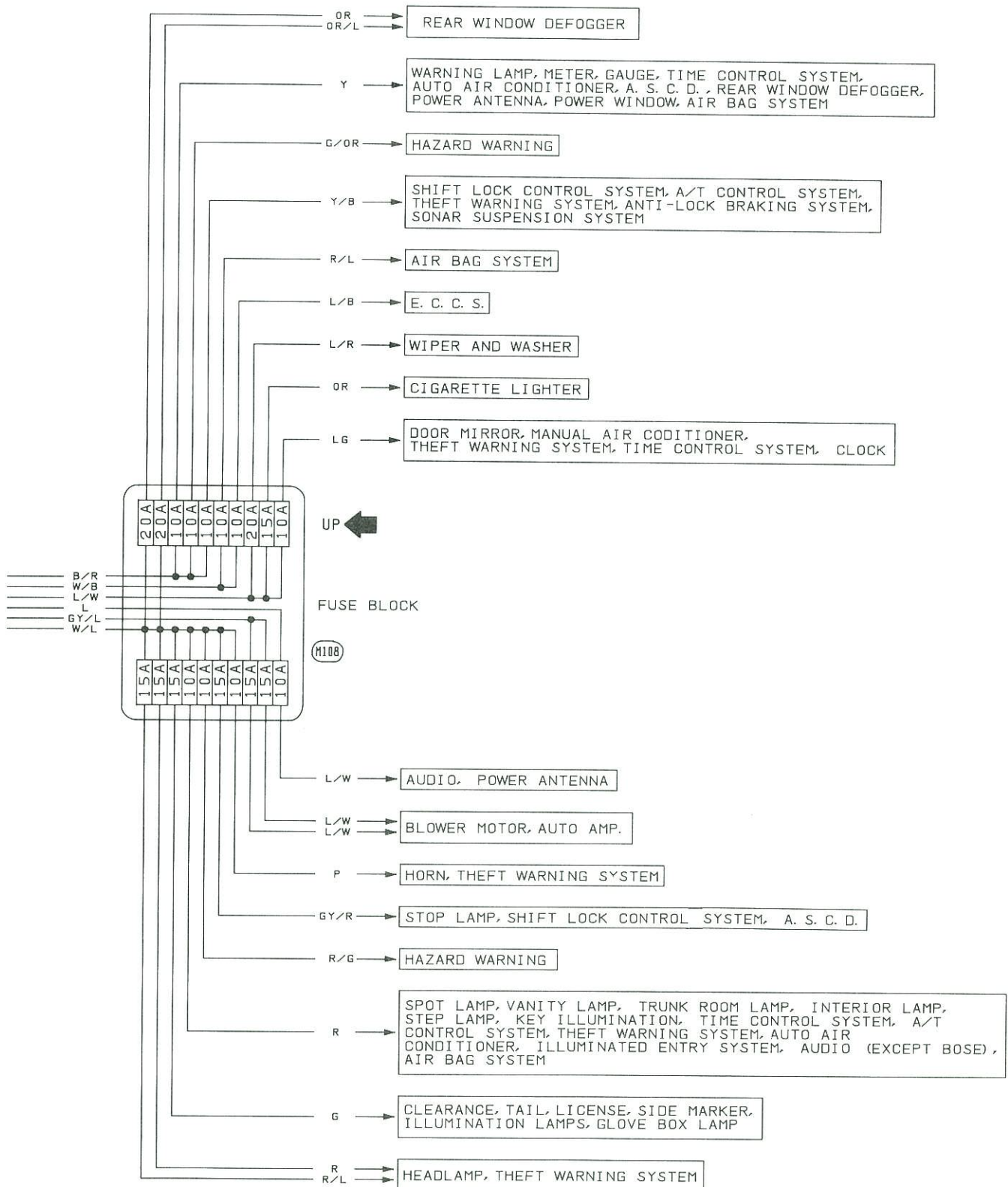
SEL883H

Wiring Diagram

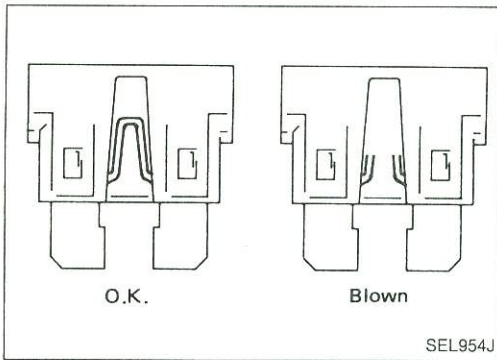


POWER SUPPLY ROUTING

Wiring Diagram (Cont'd)

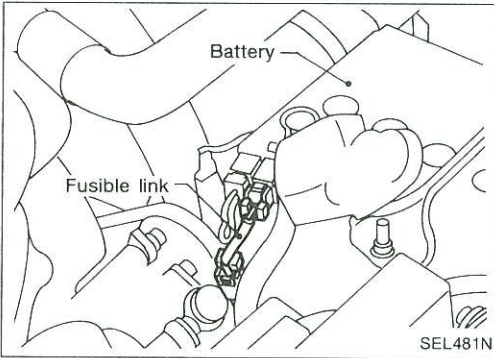


POWER SUPPLY ROUTING



Fuse

- If fuse is blown, be sure to eliminate cause of problem before installing new fuse.
- Use fuse of specified rating. Never use fuse of more than specified rating.
- Do not install fuse in oblique direction; always insert it into fuse holder properly.
- Remove fuse for clock if vehicle is not used for a long period of time.



Fusible Link

A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

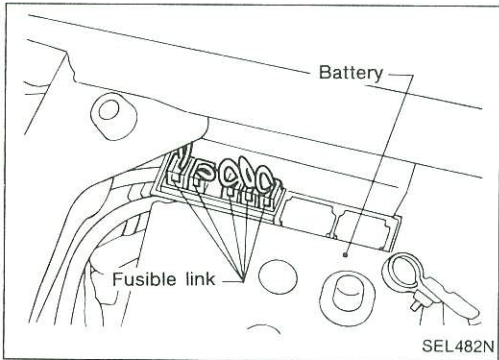
CAUTION:

- If fusible link should melt, it is possible that 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.
- Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure that it does not come into contact with any other wiring harness, or vinyl or rubber parts.

FUSIBLE LINK (Wire type) VARIATION

Color	Maximum amperage (A)
Brown	15
Green	20
Red	30
Black	35
Gray	40

*Temperature condition: Less than 80°C (176°F)



BATTERY

CAUTION:

- If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.
- After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.
- Never add distilled water through the hole used to check specific gravity.

How to Handle Battery

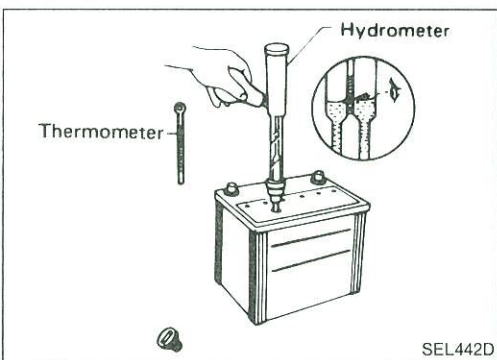
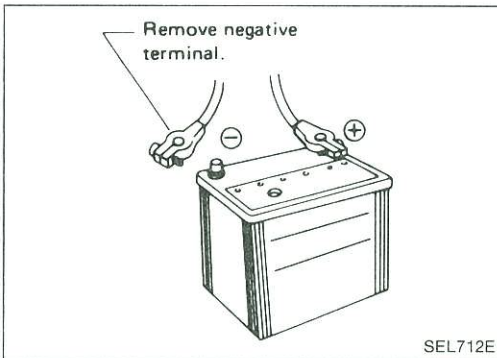
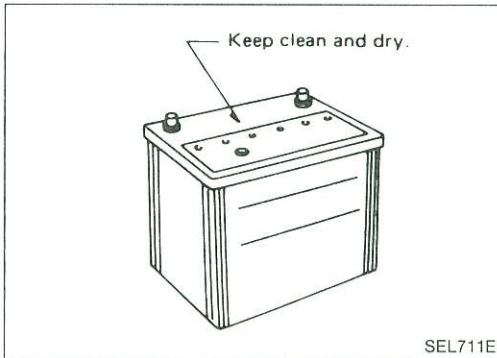
METHODS OF PREVENTING OVER-DISCHARGE

The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
If the top surface of a battery is wet with electrolyte or water, leakage current will cause the battery to discharge. Always keep the battery clean and dry.

- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)

- Check the charge condition of the battery.
Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent overdischarge.



CHECKING ELECTROLYTE LEVEL

WARNING:

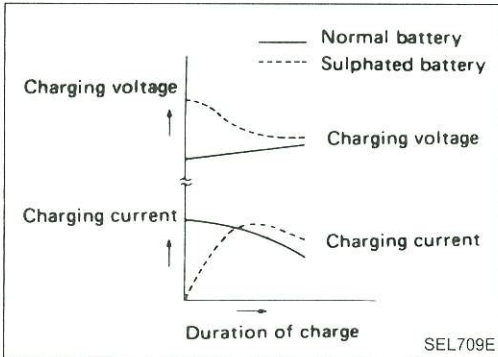
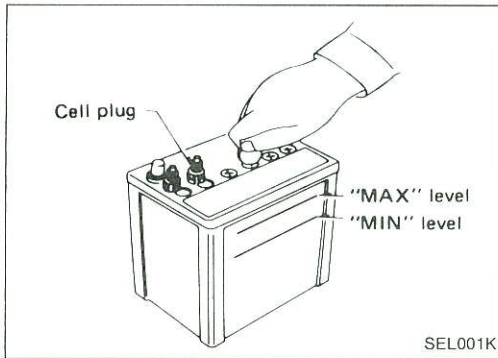
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If the acid contacts the eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

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.

BATTERY

How to Handle Battery (Cont'd)

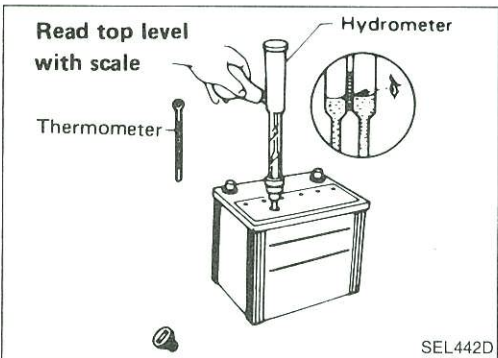
- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



SULPHATION

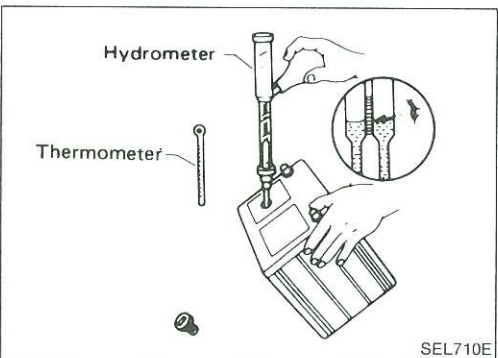
When a battery has been left unattended for a long period of time and has a specific gravity of less than 1.100, it will be completely discharged, resulting in sulphation on the cell plates.

Compared with a battery discharged under normal conditions, the current flow in a "sulphated" battery is not as smooth although its voltage is high during the initial stage of charging, as shown in the figure at the left.



SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.



- When electrolyte level is too low, tilt battery case to raise it for easy measurement.

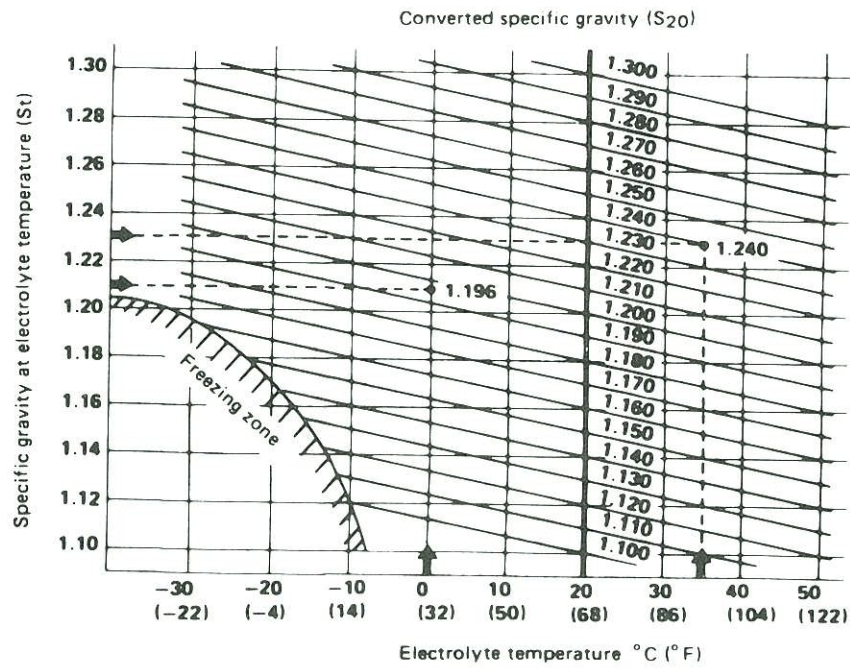
2. Convert into specific gravity at 20°C (68°F).

Example:

- When electrolyte temperature is 35°C (95°F) and specific gravity of electrolyte is 1.230, converted specific gravity at 20°C (68°F) is 1.240.
- When electrolyte temperature is 0°C (32°F) and specific gravity of electrolyte is 1.210, converted specific gravity at 20°C (68°F) is 1.196.

BATTERY

How to Handle Battery (Cont'd)

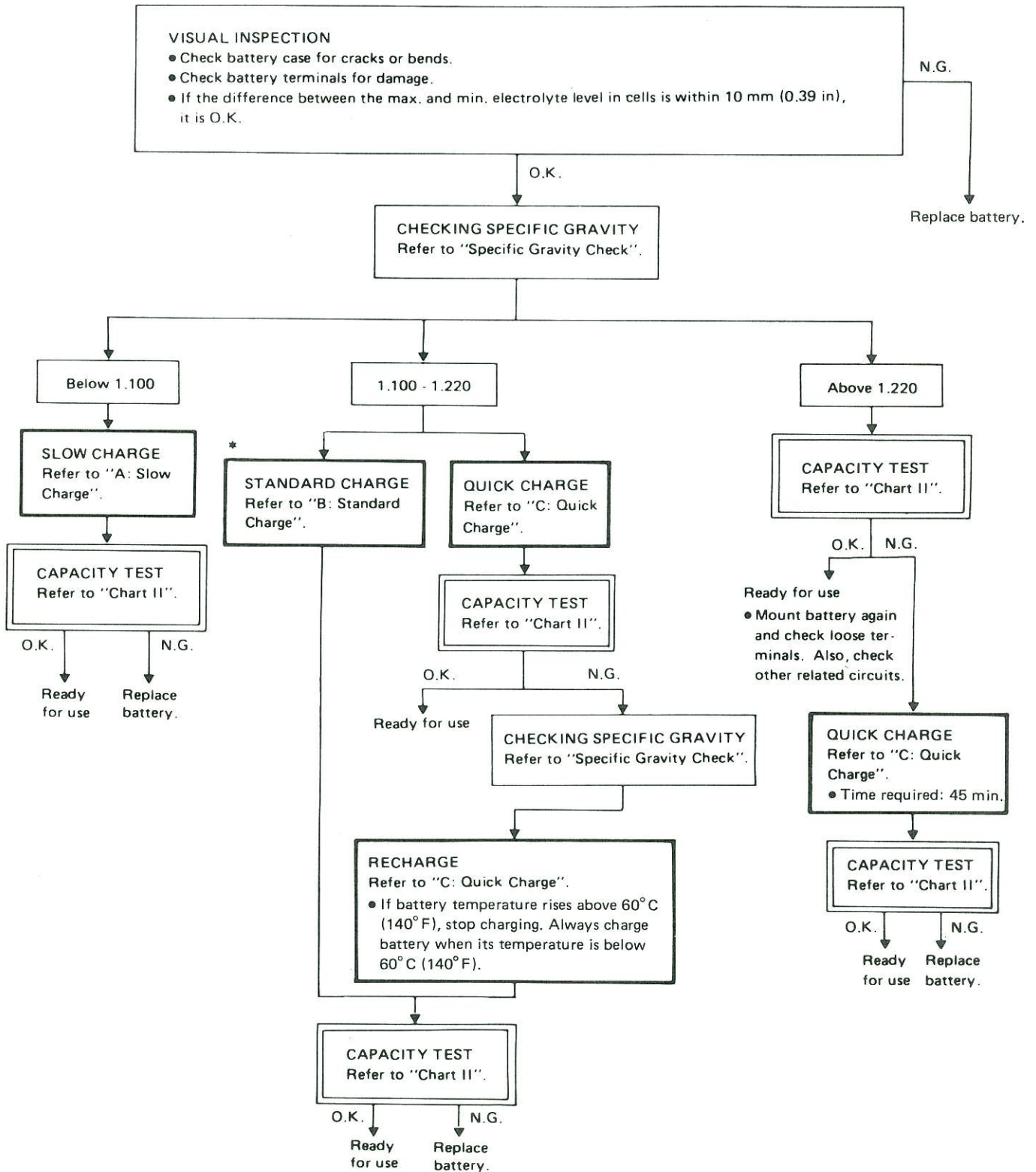


SEL042D

BATTERY

Battery Test and Charging Chart

Chart I

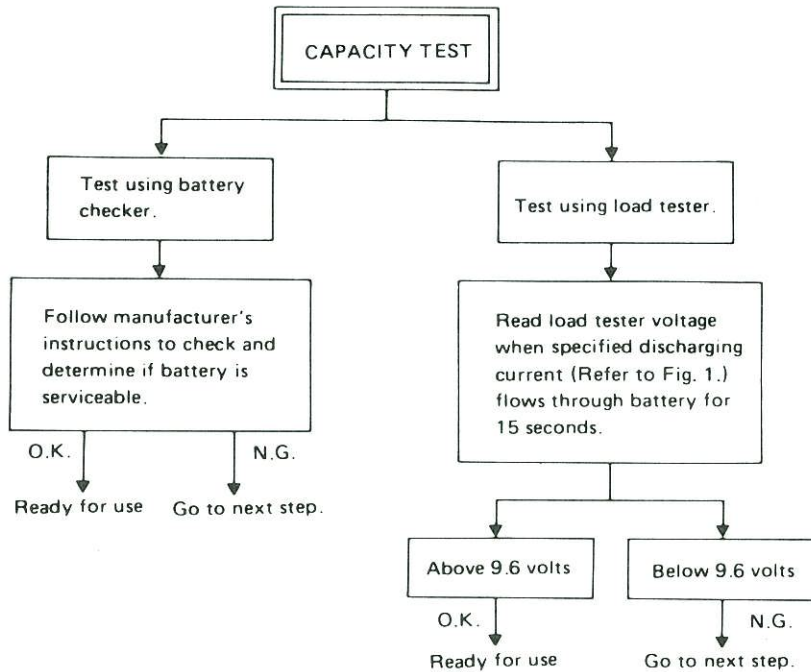


* "STANDARD CHARGE" is recommended in case that the vehicle is in storage after charging.

BATTERY

Battery Test and Charging Chart (Cont'd)

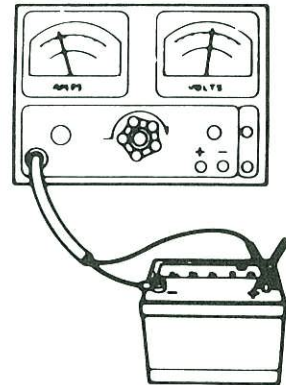
Chart II



- Check battery type and determine the specified current using the following table.

Fig. 1 DISCHARGING CURRENT (Load tester)

Type	Current (A)
28B19R(L)	90
34B19R(L)	99
46B24R(L)	135
55B24R(L)	135
50D23R(L)	150
55D23R(L)	180
65D26R(L)	195
80D26R(L)	195
75D31R(L)	210
95D31R(L)	240
95E41R(L)	300
130E41R(L)	330



SEL697B

BATTERY

Battery Test and Charging Chart (Cont'd)

A: SLOW CHARGE

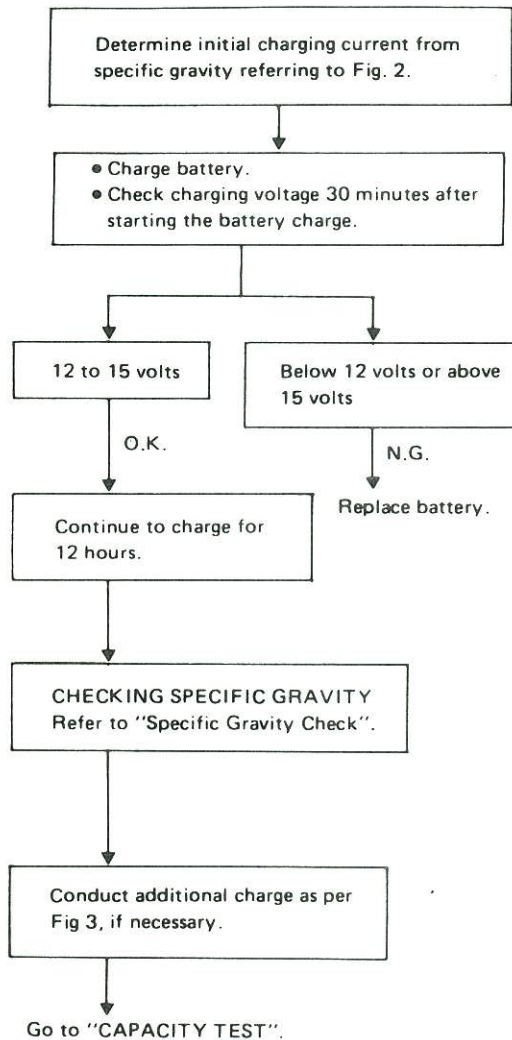
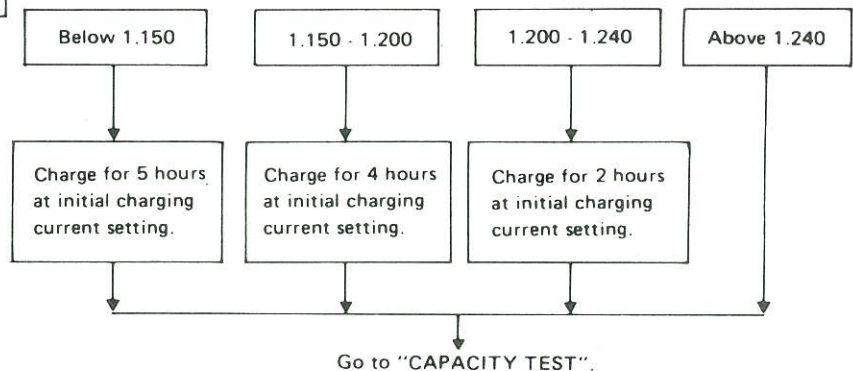


Fig. 2 INITIAL CHARGING CURRENT SETTING (Slow charge)

BATTERY TYPE CON- VERTED SPECIFIC GRAVITY	28B19R(L) 34B19R(L)	46B24R(L) 55B24R(L)	50D23R(L) 55D23R(L)	65D26R(L) 80D26R(L)	75D31R(L)	95D31R(L) 95E41R(L)	130E41R(L)
Below 1.100	4.0 (A)	5.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)	10.0 (A)	14.0 (A)

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 3 ADDITIONAL CHARGE (Slow charge)



CAUTION:

- Set charging current to value specified in Fig. 2. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

BATTERY

Battery Test and Charging Chart (Cont'd)

B: STANDARD CHARGE

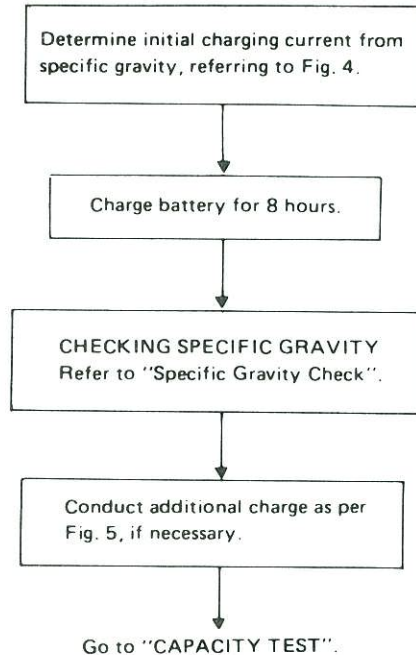
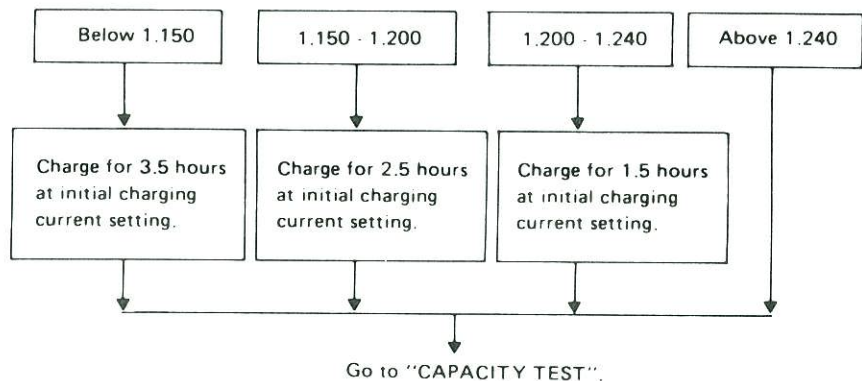


Fig. 4 INITIAL CHARGING CURRENT SETTING
(Standard charge)

BATTERY TYPE CON- VERTED SPECIFIC GRAVITY	28B19R(L) 34B19R(L)	46B24R(L) 55B24R(L)	50D23R(L) 55D23R(L)	65D26R(L) 80D26R(L)	75D31R(L)	95D31R(L) 95E41R(L)	130E41R(L)
1.100 - 1.130	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	8.0 (A)	9.0 (A)	13.0 (A)
1.130 - 1.160	3.0 (A)	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	8.0 (A)	11.0 (A)
1.160 - 1.190	2.0 (A)	3.0 (A)	4.0 (A)	5.0 (A)	6.0 (A)	7.0 (A)	9.0 (A)
1.190 - 1.220	2.0 (A)	2.0 (A)	3.0 (A)	4.0 (A)	5.0 (A)	5.0 (A)	7.0 (A)

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

Fig. 5 ADDITIONAL CHARGE (Standard charge)



CAUTION:

- Do not use standard charge method on a battery whose specific gravity is less than 1.100.
- Set charging current to value specified in Fig. 4. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).

BATTERY

Battery Test and Charging Chart (Cont'd)

C: QUICK CHARGE

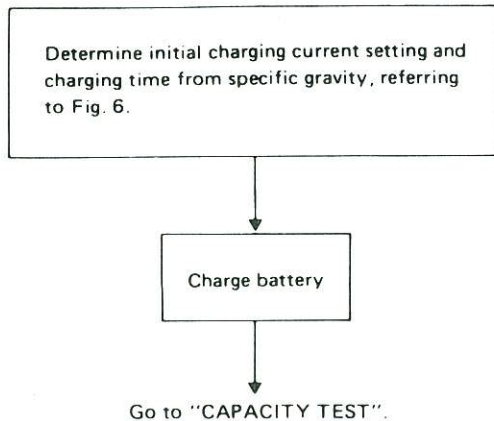


Fig. 6 INITIAL CHARGING CURRENT SETTING AND CHARGING TIME (Quick charge)

BATTERY TYPE CUR- RENT [A] CON- VERTED SPECIFIC GRAVITY	28B19R(L) 34B19R(L)	46B24R(L) 55B24R(L) 50D23R(L)	55D33R(L) 65D26R(L) 80D26R(L)	75D31R(L) 95D31R(L) 95E41R(L)	130E41R(L)
	10 (A)	15 (A)	20 (A)	30 (A)	40 (A)
1.100 - 1.130	2.5 hours				
1.130 - 1.160	2.0 hours				
1.160 - 1.190	1.5 hours				
1.190 - 1.220	1.0 hours				
Above 1.220	0.75 hours (45 min.)				

- Check battery type and determine the specified current using the table shown above.
- After starting charging, adjustment of charging current is not necessary.

CAUTION:

- Do not use quick charge method on a battery whose specific gravity is less than 1.100.
- Set initial charging current to value specified in Fig. 6. If charger is not capable of producing specified current value, set its charging current as close to that value as possible.
- Keep battery away from open flame while it is being charged.
- When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
- Be careful of a rise in battery temperature because a large current flow is required during quick-charge operation.
If battery temperature rises above 60°C (140°F), stop charging. Always charge battery when its temperature is below 60°C (140°F).
- Do not exceed the charging time specified in Fig. 6, because charging battery over the charging time can cause deterioration of the battery.

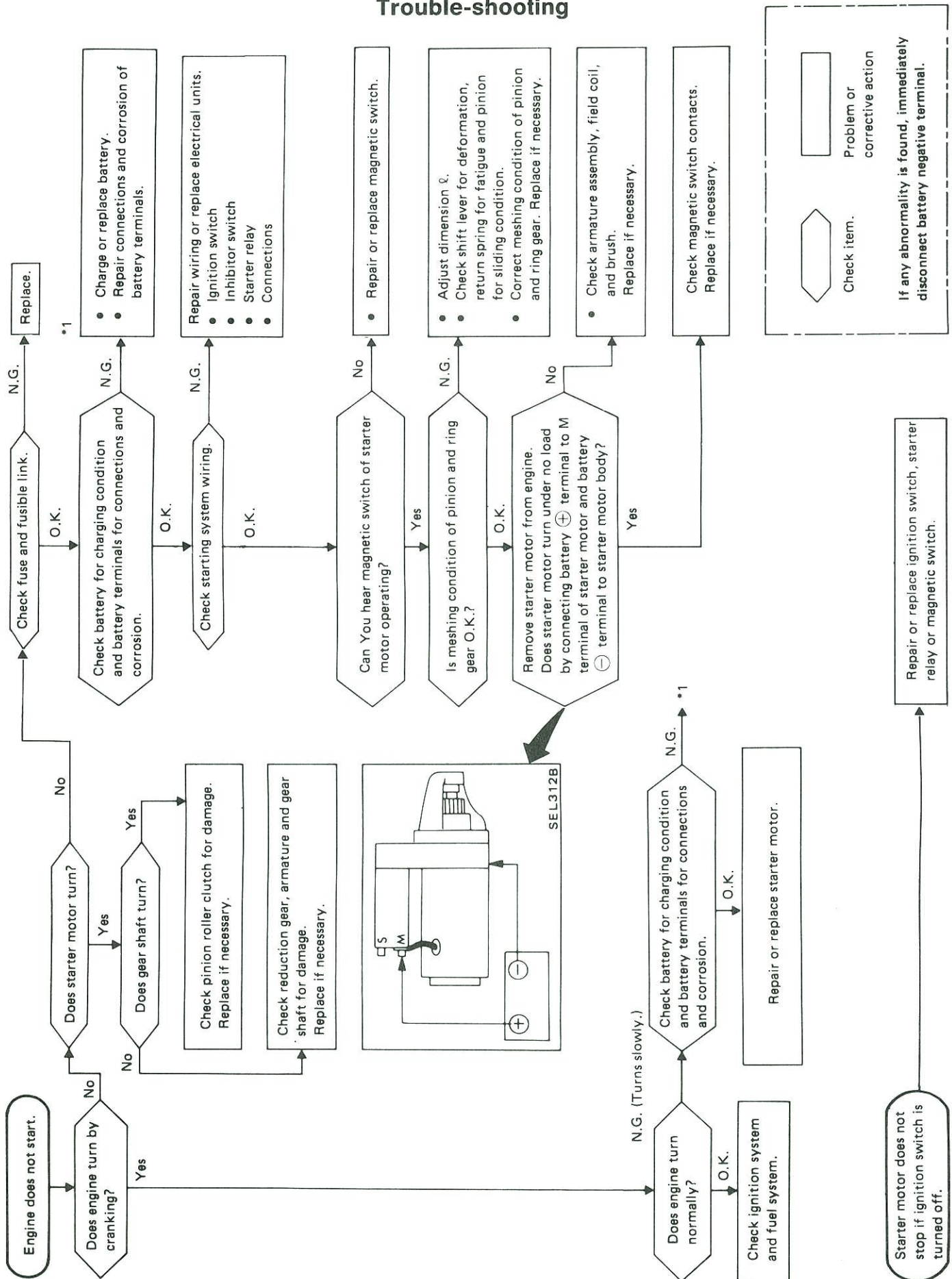
Service Data and Specifications (S.D.S.)

		Standard	Option
		65D26R	80D26R
Type			
Capacity	V-AH	12-65	

Wiring Diagram

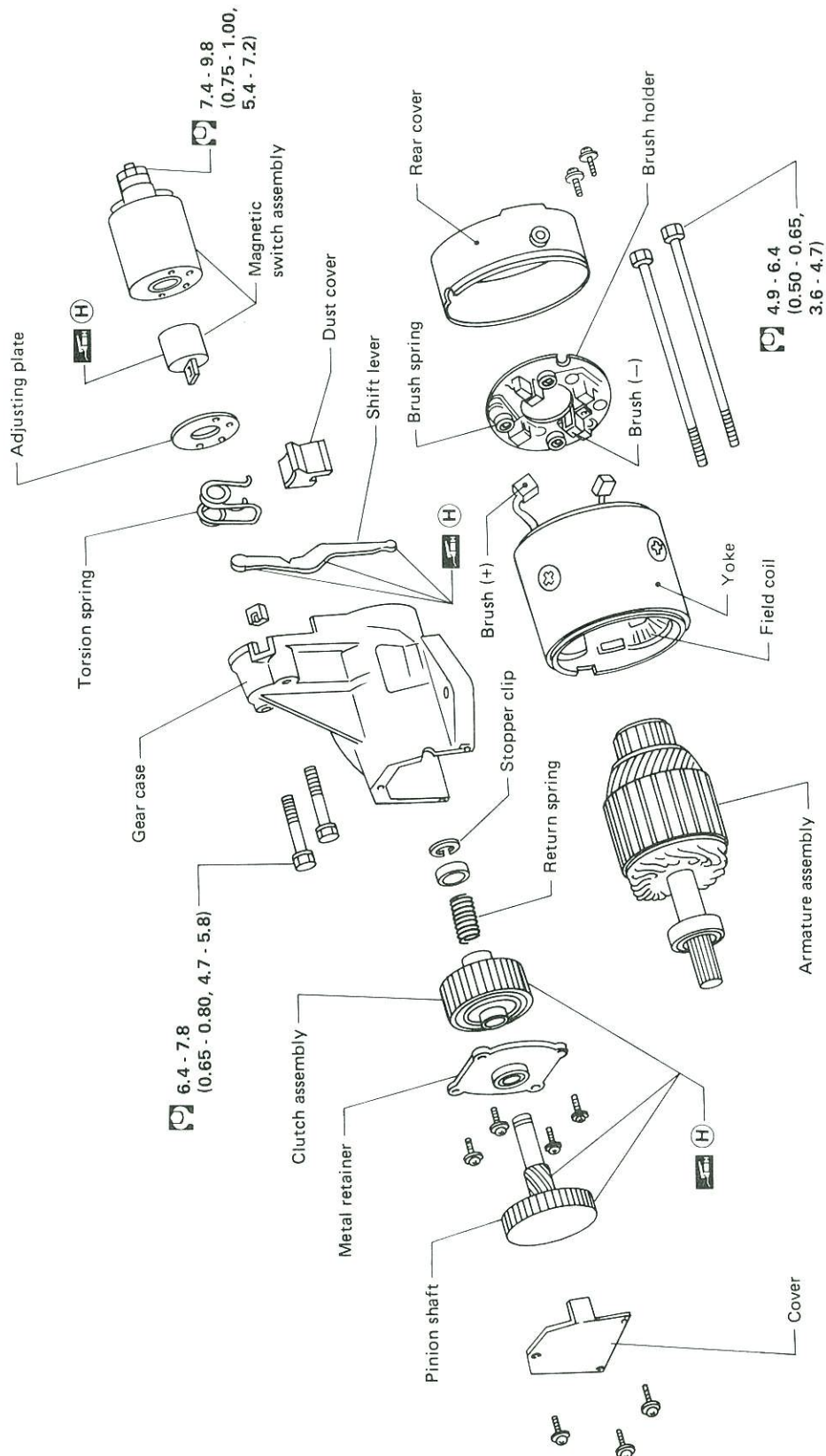


Trouble-shooting



Construction

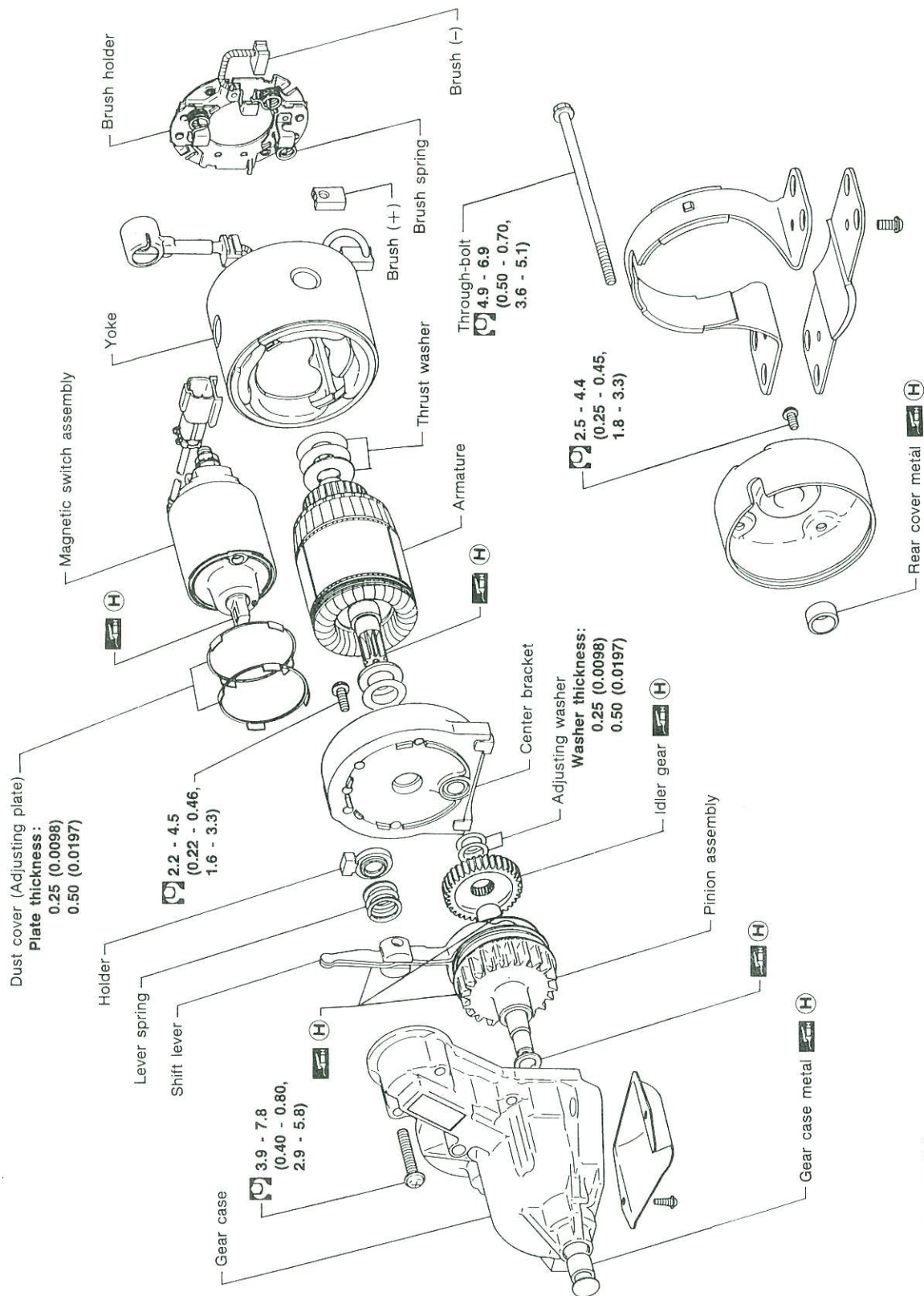
S114-484



: N·m (kg-m, ft-lb)
 : High-temperature grease points

Construction (Cont'd)

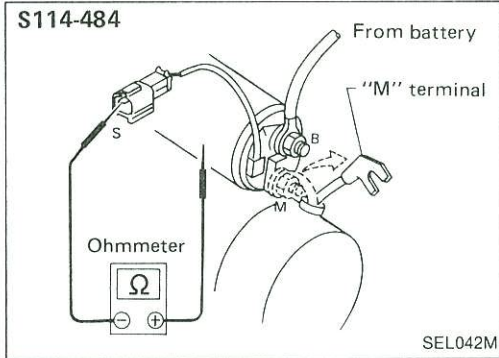
M3T26785



Unit: mm (in)

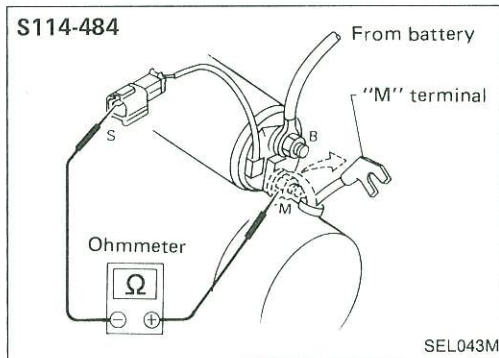
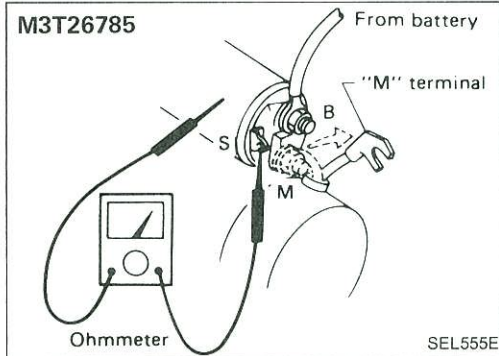
: N·m (kg-m, ft-lb)

 H : High-temperature grease point

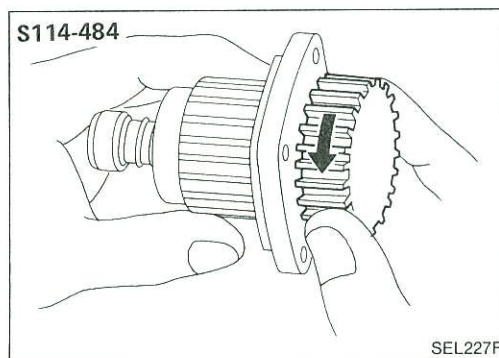
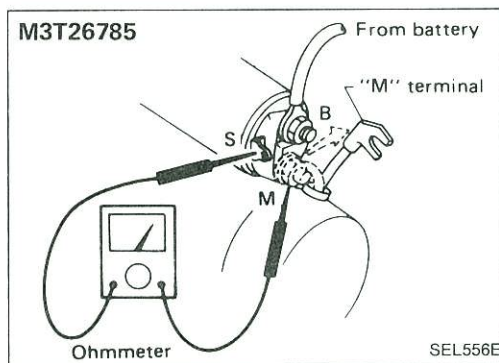


Magnetic Switch Check

- Disconnect battery ground cable before starting to check.
- Disconnect "M" terminal of starter motor.
- 1. Continuity test (between "S" terminal and switch body).
- No continuity ... Replace.



- 2. Continuity test (between "S" terminal and "M" terminal).
- No continuity ... Replace.

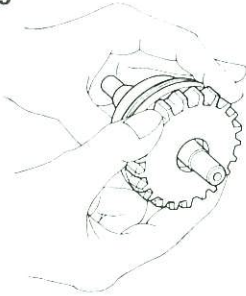


Pinion/Clutch Check

1. Inspect pinion teeth.
 - Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
 - If it does not lock (or locks) in either direction or unusual resistance is evident ... Replace.

Pinion/Clutch Check (Cont'd)

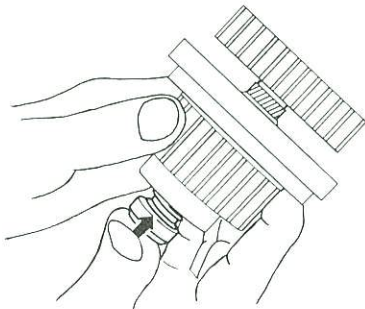
M3T26785



SEL048D

REDUCTION GEAR TYPE

3. Inspect reduction gear teeth.
 - Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
4. Check pinion movement.
 - If it is hard to move, apply high-temperature grease or, if necessary, replace.



SEL228F

Brush Check

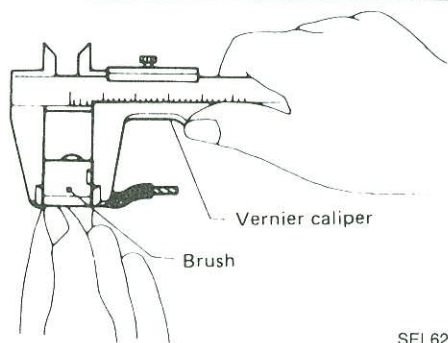
BRUSH

Check wear of brush.

Wear limit length:

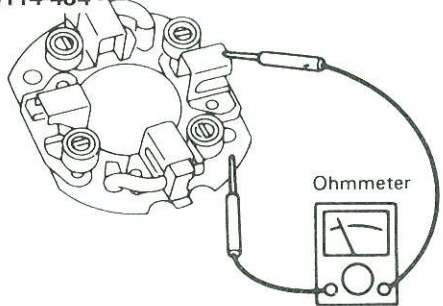
Refer to S.D.S.

- Excessive wear ... Replace.



SEL626B

S114-484

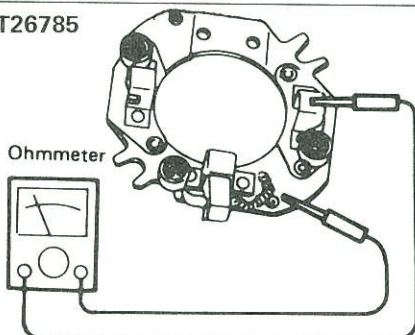


SEL568B

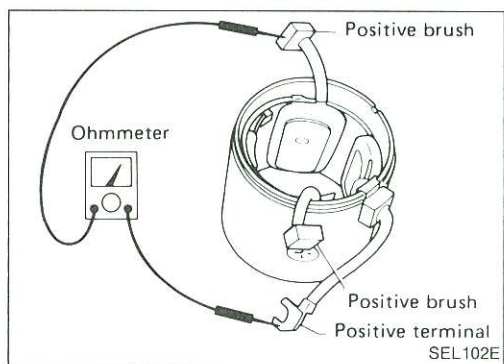
BRUSH HOLDER

1. Perform insulation test between brush holder (positive side) and its base (negative side).
 - Continuity exists. ... Replace.
2. Check brushes to see if they move smoothly.
 - If brush holder is bent, replace it; if sliding surface is dirty, clean.

M3T26785

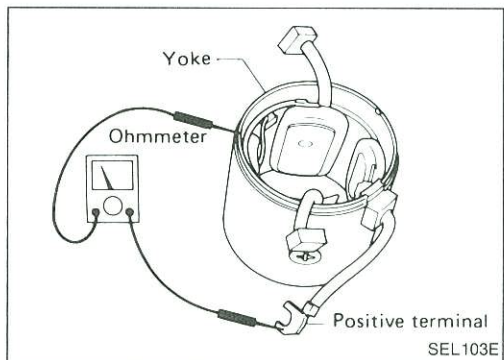


SEL627B



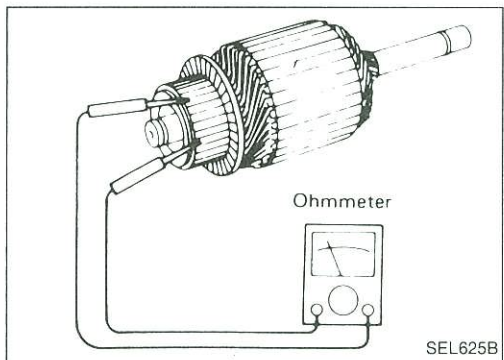
Field Coil Check

1. Continuity test (between field coil positive terminal and positive brushes).
- No continuity ... Replace yoke.



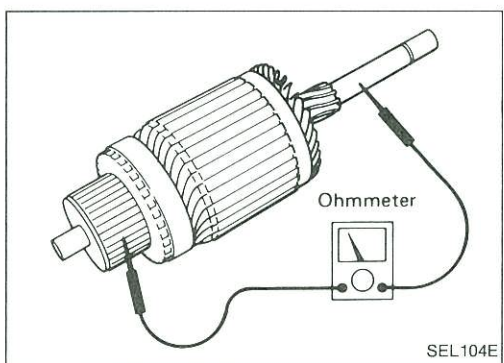
2. Insulation test (between field coil positive terminal and yoke).

- Continuity exists. ... Replace yoke.

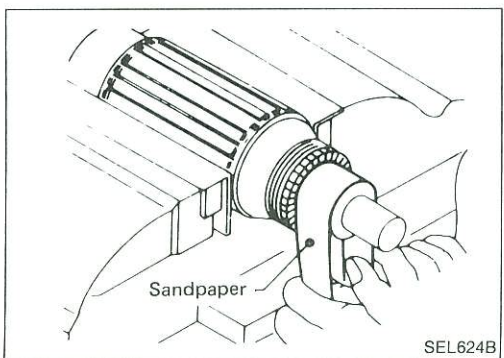


Armature Check

1. Continuity test (between two segments side by side).
- No continuity ... Replace.

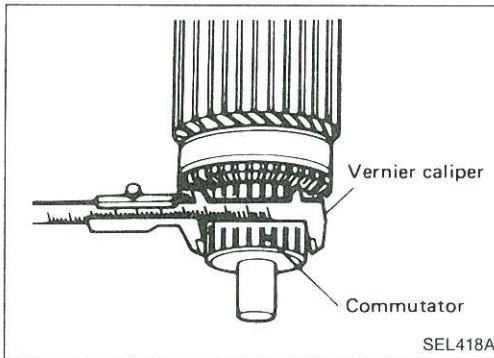


2. Insulation test (between each commutator bar and shaft).
- Continuity exists. ... Replace.



3. Check commutator surface.
- Rough ... Sand lightly with No. 500 - 600 sandpaper.

Armature Check (Cont'd)

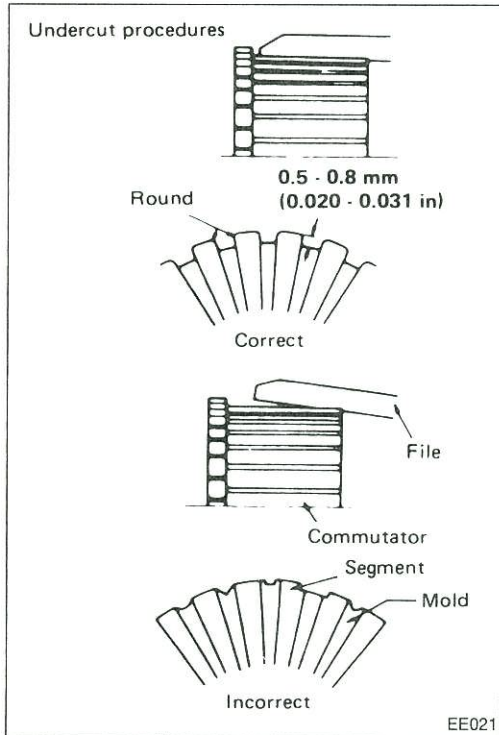


4. Check diameter of commutator.

Commutator minimum diameter:

Refer to S.D.S.

- Less than specified value ... Replace.



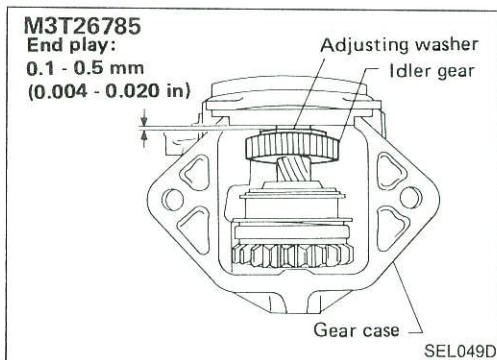
5. Check depth of insulating mold from commutator surface.
- Less than 0.2 mm (0.008 in) ... Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in)

Assembly

Carefully observe the following instructions.

HIGH-TEMPERATURE GREASE POINT

- Rear metal cover
- Gear metal case
- Frictional pinion surface
- Moving portion of shift lever
- Magnetic switch plunger



- a. After assembling gear case, pinion assembly, idler gear, adjusting washers and center bracket, turn idler gear with your hand in axial direction and adjust end play to the 0.1 to 0.5 mm (0.004 to 0.020 in) range using adjusting washer(s).
- b. Check pinion to see if its engagement length is correct.

Assembly (Cont'd)

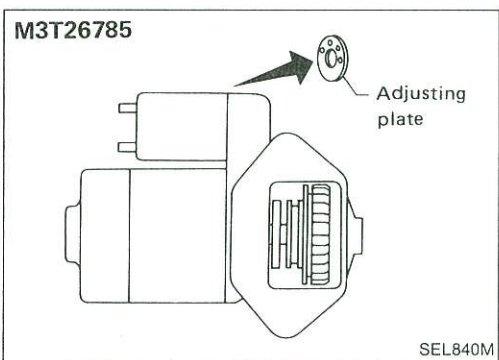
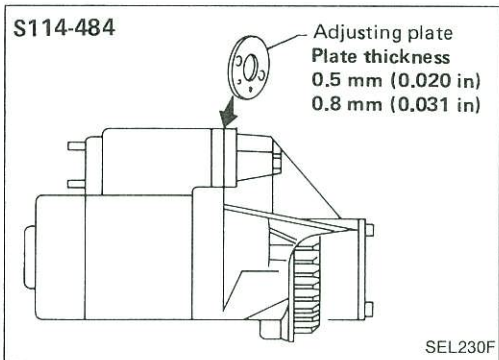
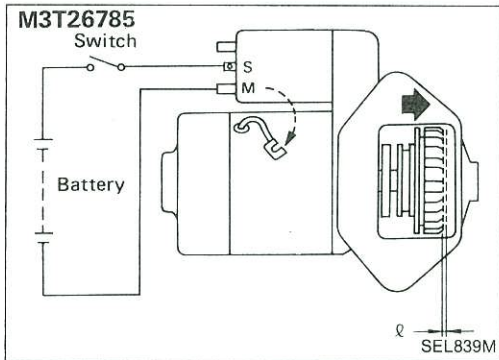
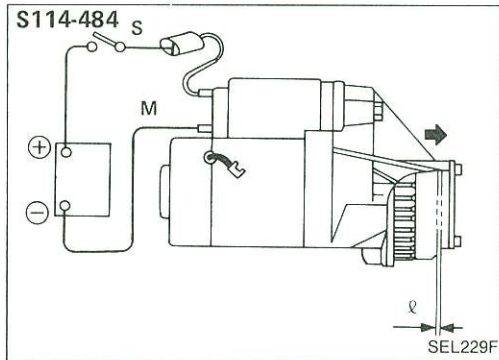
PINION PROTRUSION LENGTH ADJUSTMENT

Reduction gear type

Compare movement "ℓ" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

Movement "ℓ":

Refer to S.D.S.



- Not in the specified value ... Adjust using adjusting plate.

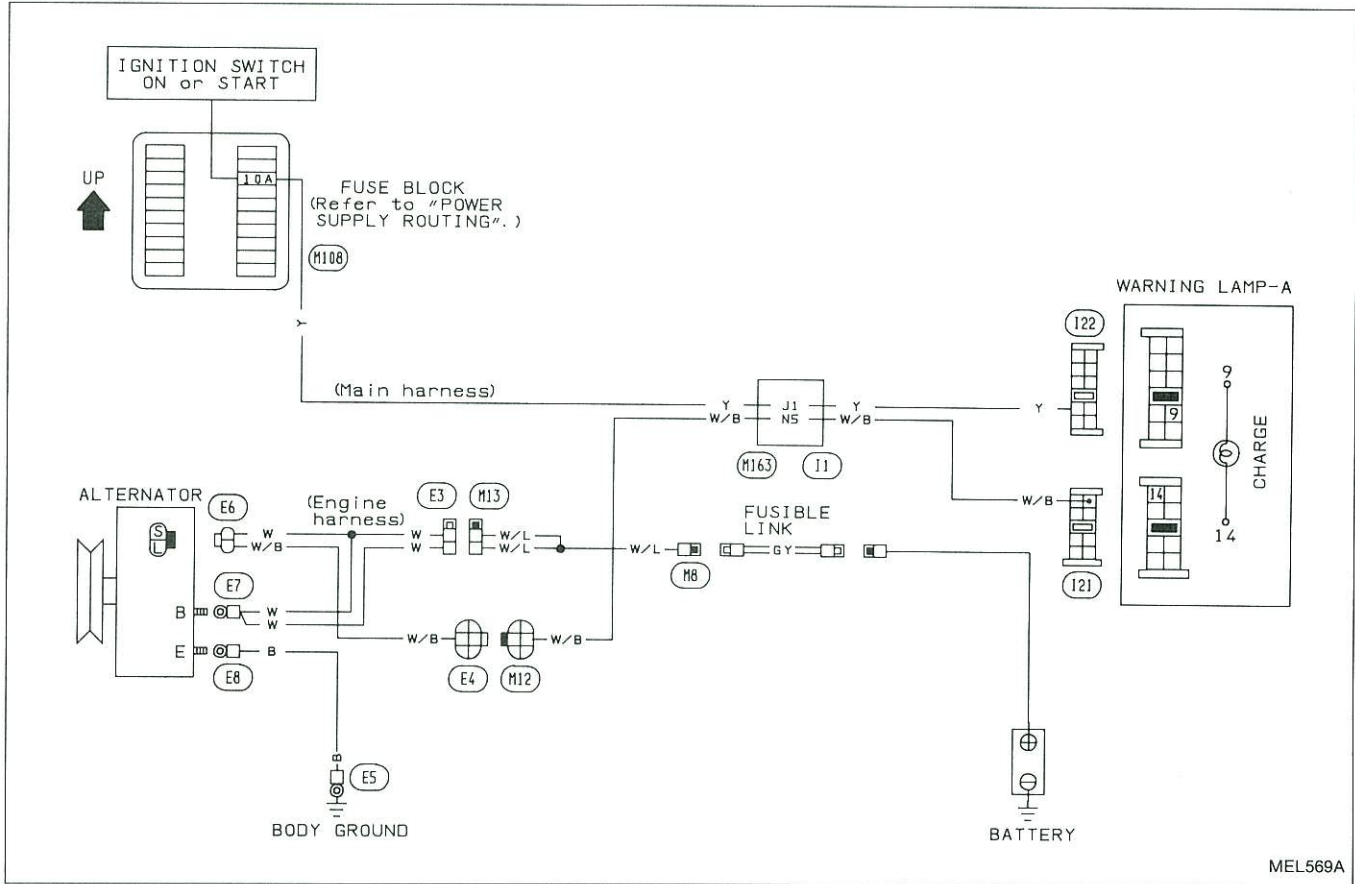
Service Data and Specifications (S.D.S.)

STARTER MOTOR

Type		S114-484	M3T26785
		HITACHI	MITSUBISHI
		Reduction gear type	
System voltage	V	12	
No-load			
Terminal voltage	V	11.0	
Current	A	Less than 100	70
Revolution	rpm	More than 3,000	2,200
Minimum diameter of commutator	mm (in)	32.0 (1.260)	38.1 (1.500)
Minimum length of brush	mm (in)	12.0 (0.472)	11.5 (0.453)
Brush spring tension	N (kg, lb)	17.7 - 21.6 (1.8 - 2.2, 4.0 - 4.9)	13.7 - 25.5 (1.4 - 2.6, 3.1 - 5.7)
Movement 'Q' in height of pinion assembly	mm (in)	0.05 - 0.8 (0.0020 - 0.0315)	0.3 - 2.0 (0.012 - 0.079)
Clearance of bearing metal and armature shaft	mm (in)	—	—
Clearance 'Q' between pinion front edge and pinion stopper	mm (in)	—	—

CHARGING SYSTEM

Wiring Diagram



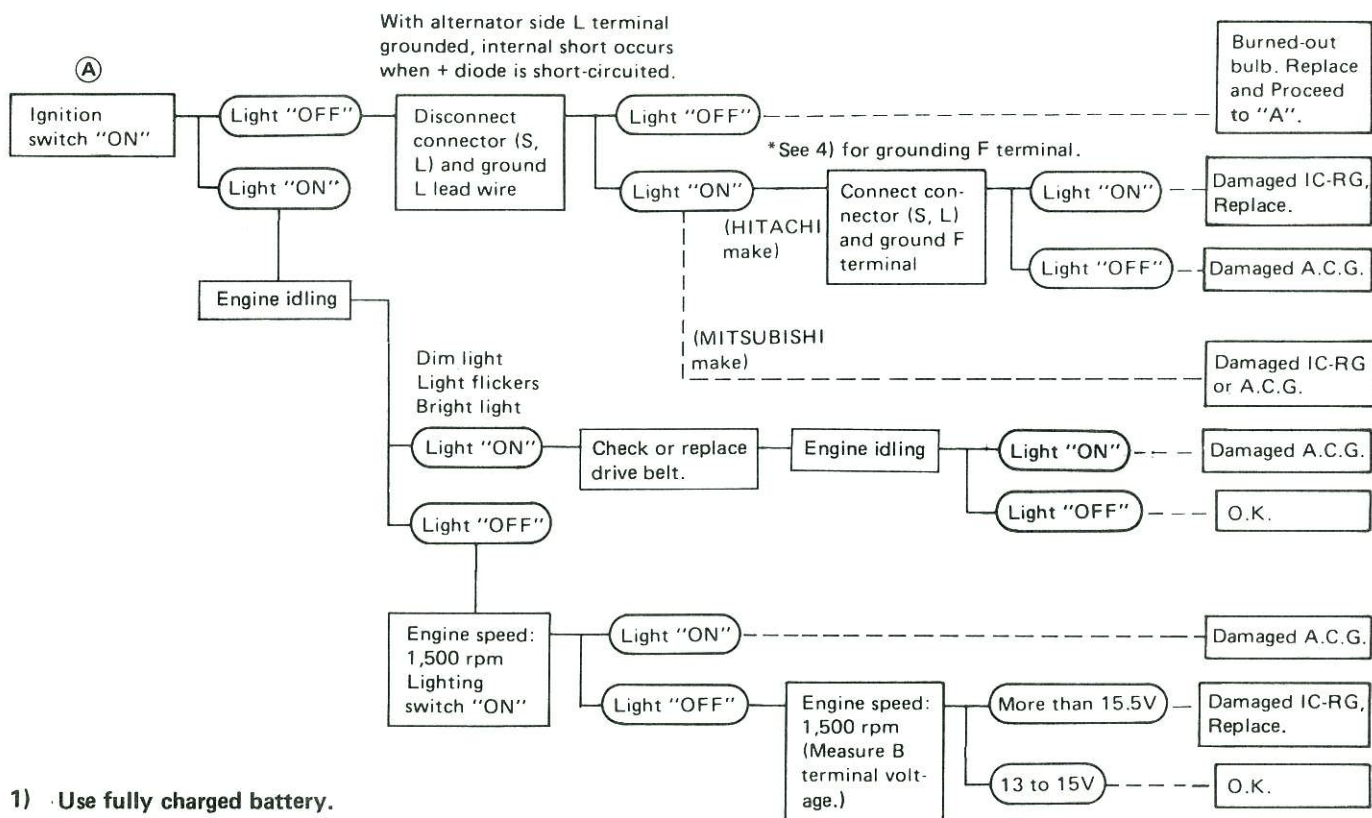
CHARGING SYSTEM

Trouble-shooting

Before conducting an alternator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test. The alternator can be checked easily by referring to the Inspection Table.

Before starting trouble-shooting, inspect the fusible link.

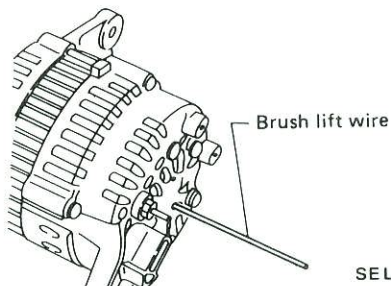
WITH IC REGULATOR



- 1) Use fully charged battery.
- 2) Light : Charge warning light
A.C.G. : Alternator parts except IC regulator
IC-RG : IC regulator
O.K. : IC alternator is in good condition.
- 3) When reaching "Damaged A.C.G.", remove alternator from vehicle and disassemble, inspect and correct or replace faulty parts.
- 4) *Method of grounding F terminal (HITACHI make only)

Gasoline engine model

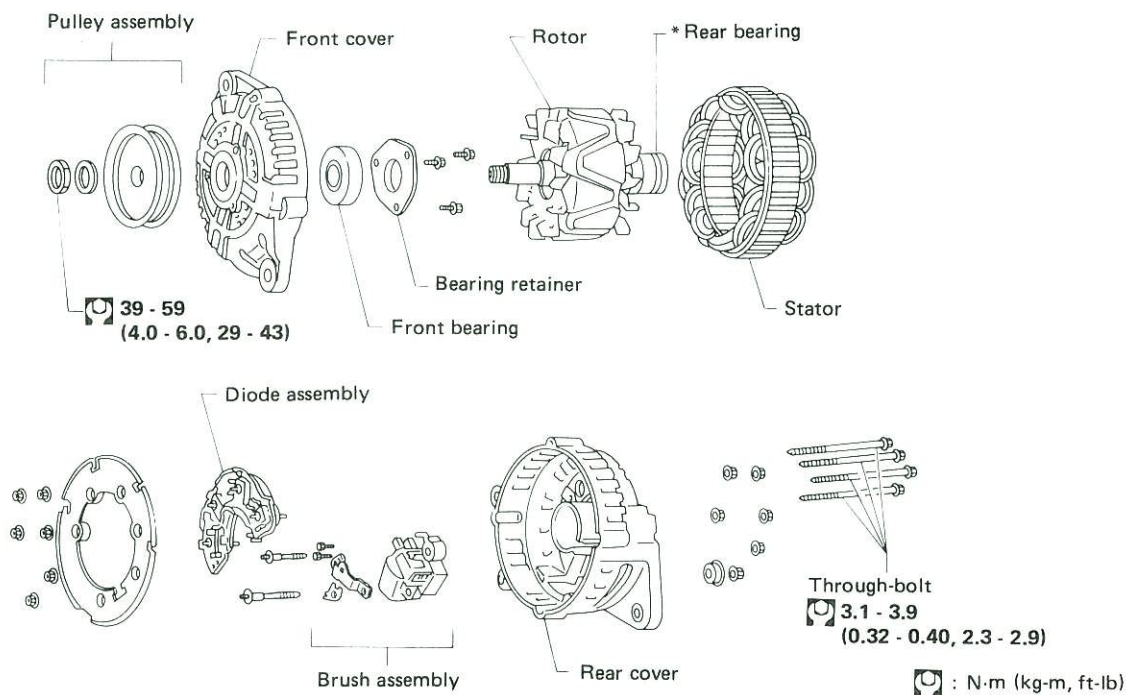
Contact tip of wire with brush and attach wire to alternator body.



- 5) Terminals "S", "L", "B" and "E" are marked on rear cover of alternator.

Construction

LR190-714

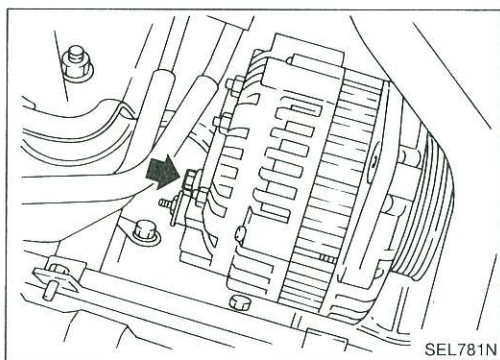


SEL686N

***Rear bearing**

CAUTION:

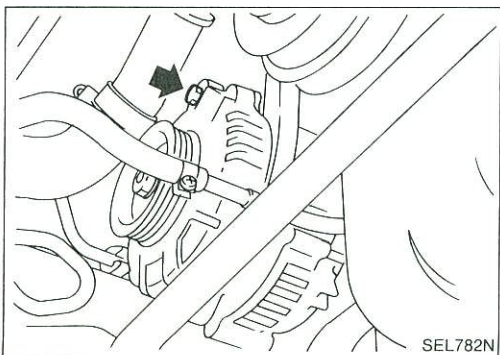
Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. Be careful not to lose this ring during removal.



Removal and Installation

REMOVAL

1. Loosen alternator belt.
2. Remove alternator adjusting bar.
3. Remove harness connector and cable from alternator.
4. Remove alternator mounting rear bolt.

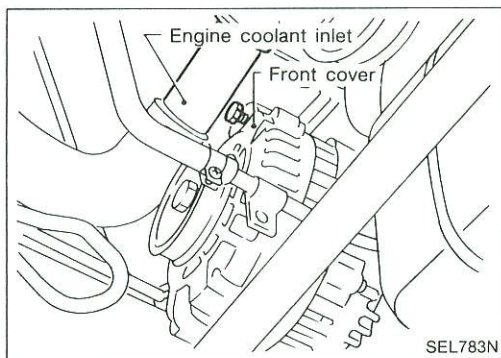


5. Loosen alternator mounting front bolt.

Removal and Installation (Cont'd)

6. Remove alternator with alternator front mounting bolt.

Front alternator mounting bolt cannot be removed or installed separately due to insufficient clearance between alternator front cover and engine coolant inlet.



INSTALLATION

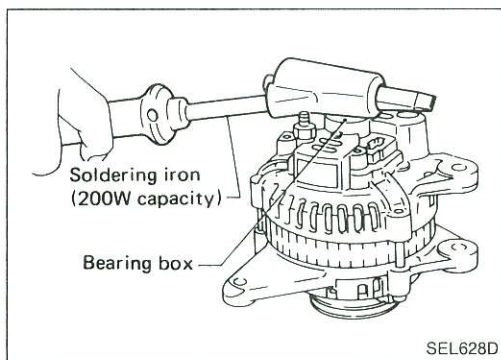
- Installation procedure is in reverse order of removal.

Disassembly

REAR COVER REMOVAL

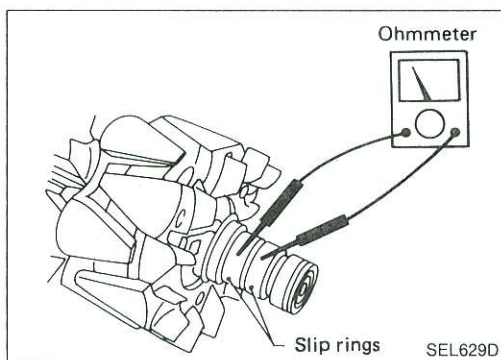
CAUTION:

Rear cover may be hard to remove because a ring is used to lock outer race of rear bearing. To facilitate removal of rear cover, heat just bearing box section with a 200W soldering iron. Do not use a heat gun, as it can damage diode assembly.



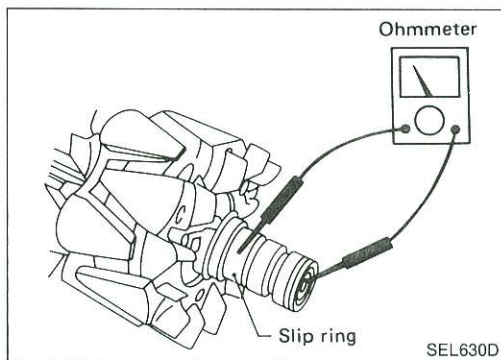
Rotor Slip Ring Check

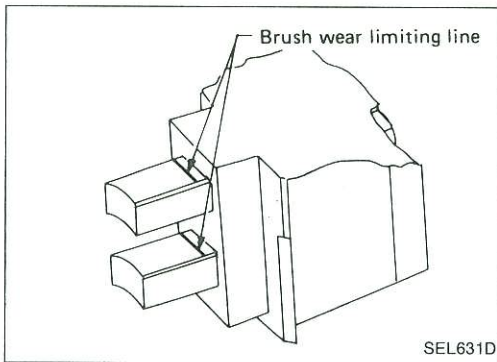
1. Continuity test
 - No continuity ... Replace rotor.



2. Insulator test
 - Continuity exists ... Replace rotor.
3. Check slip ring for wear.

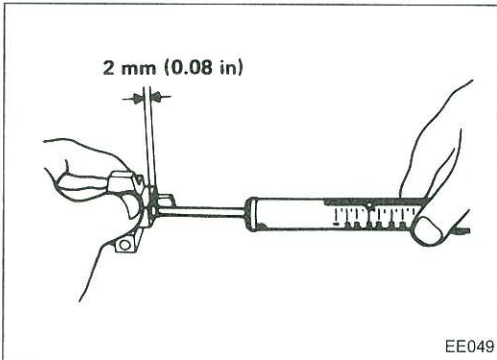
Slip ring minimum outer diameter:
Refer to S.D.S.





Brush Check

1. Check smooth movement of brush.
 - Not smooth ... Check brush holder and clean.
2. Check brush for wear.
 - Replace brush if it is worn down to the limit line.

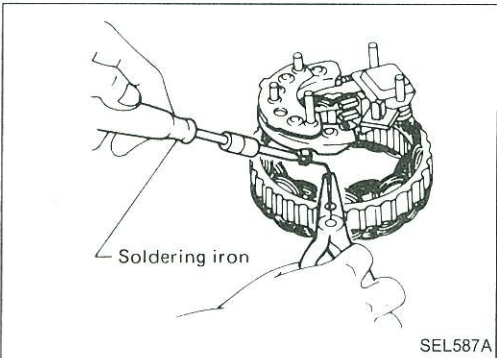


3. Check brush lead wire for damage.
 - Damaged ... Replace.
4. Check brush spring pressure.

Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.

Spring pressure:
Refer to S.D.S.

- Not within the specified values ... Replace.

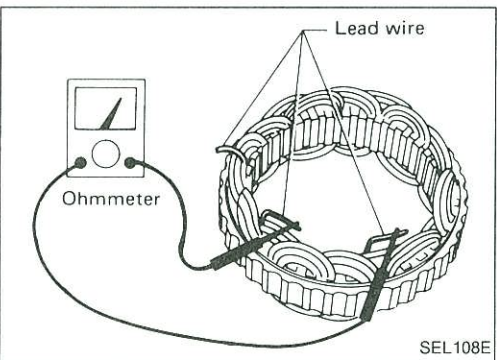


Stator Check

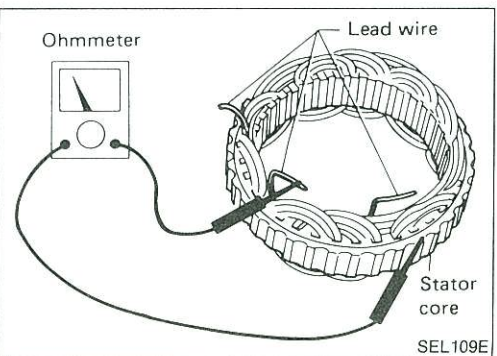
To test the stator or diode, you must separate them by unsoldering the connecting wires.

CAUTION:

Use only as much heat as required to melt solder. Otherwise, diodes will be damaged by excessive heat.



1. Continuity test
 - No continuity ... Replace stator.



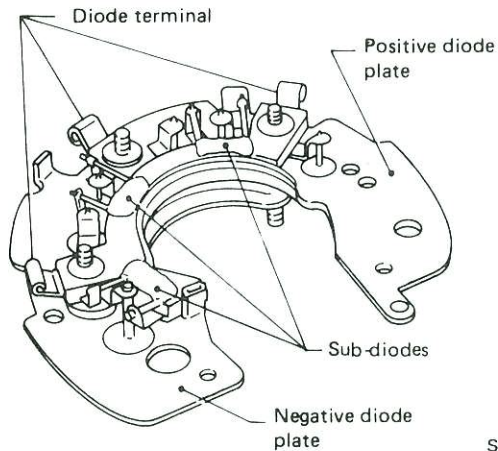
2. Ground test
 - Continuity exists ... Replace stator.

Diode Check

MAIN DIODES

- Use an ohmmeter to check condition of diodes as indicated in chart below.
- If any of the test results is not satisfactory, replace diode assembly.

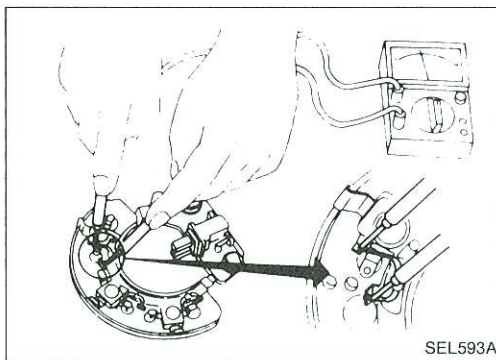
	Ohmmeter probes		Continuity
	Positive ⊕	Negative ⊖	
Diodes check (Positive side)	Positive diode plate	Diode terminals	Yes
	Diode terminals	Positive diode plate	No
Diodes check (Negative side)	Negative diode plate	Diode terminals	No
	Diode terminals	Negative diode plate	Yes



SEL768D

SUB-DIODES

- Attach ohmmeter's probe to each end of diode to check for continuity.
- Continuity is N.G. ... Replace diode assembly.



Assembly

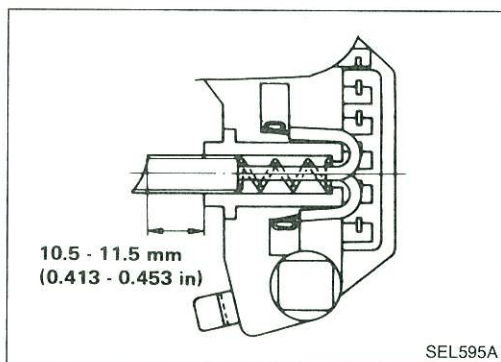
Carefully observe the following instructions.

- When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.

Assembly (Cont'd)

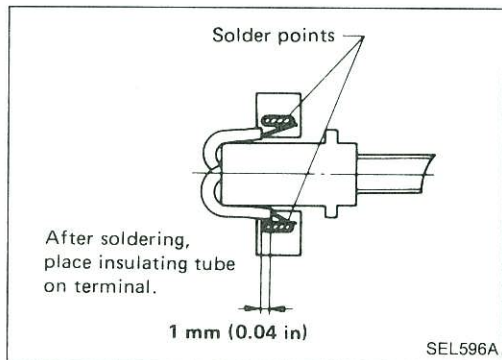
WHEN SOLDERING BRUSH LEAD WIRE

- (1) Position brush so that it extends 10.5 - 11.5 mm (0.413 - 0.453 in) from brush holder.



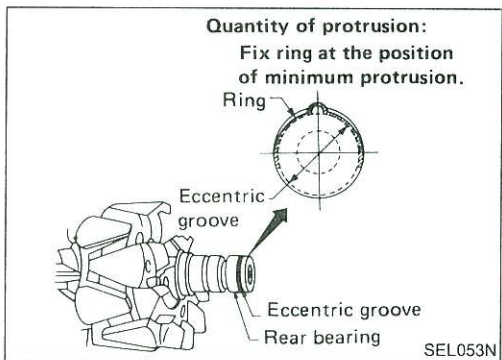
- (2) Coil lead wire 1.5 times around terminal groove. Solder outside of terminal.

When soldering, be careful not to let solder adhere to insulating tube as it will weaken the tube and cause it to break.



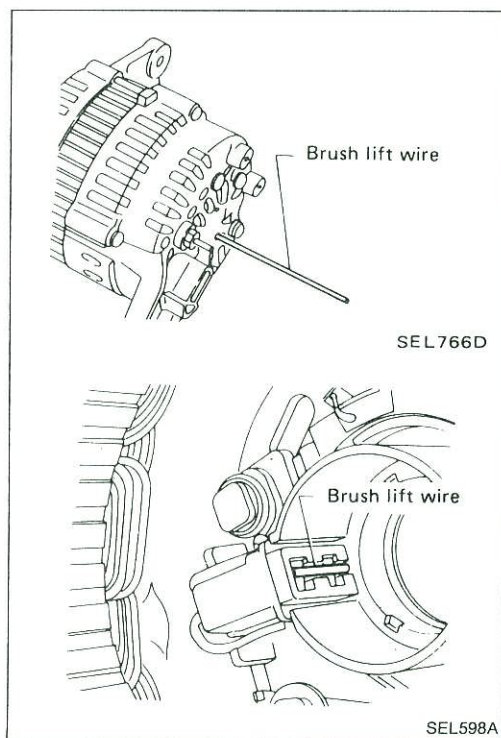
RING FITTING IN REAR BEARING

- Fix ring into groove in rear bearing so that it is as close to the adjacent area as possible.



REAR COVER INSTALLATION

- (1) Before installing front cover with pulley and rotor with rear cover, push brush up with fingers and retain brush by inserting brush lift wire into brush lift hole from outside.
- (2) After installing front and rear sides of alternator, pull out brush lift wire.



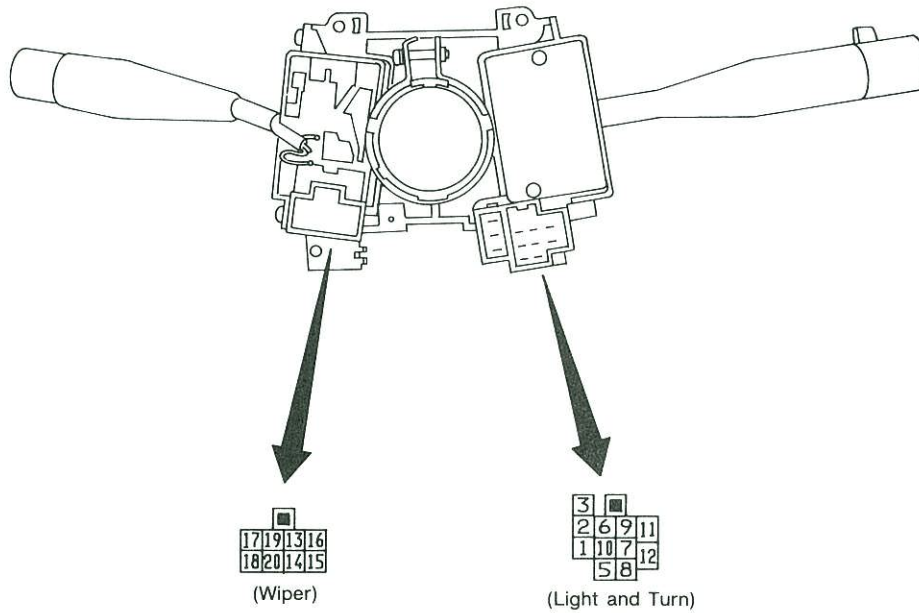
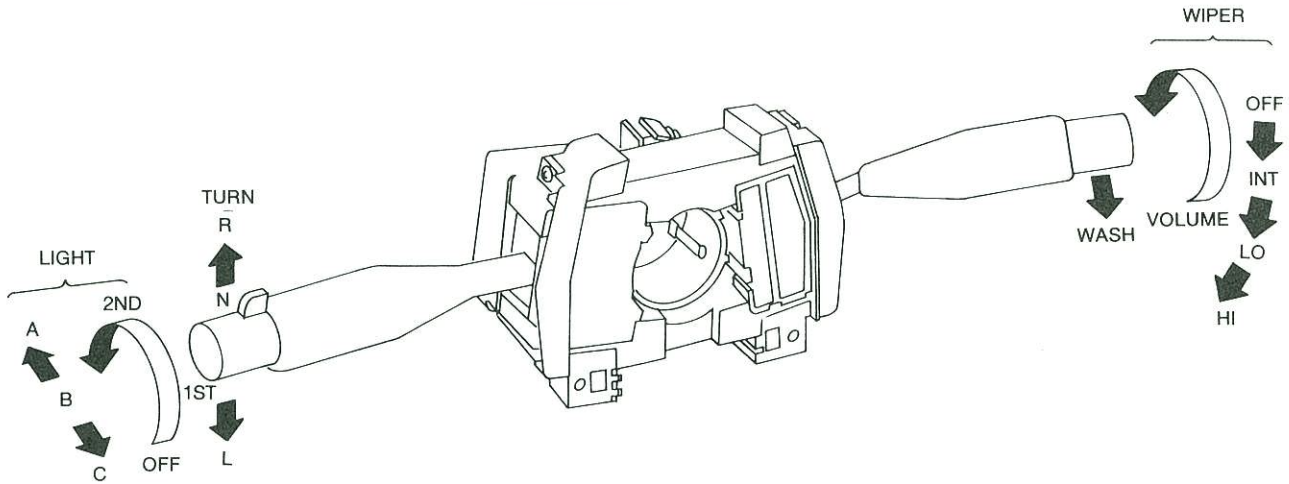
Service Data and Specifications (S.D.S.)

ALTERNATOR

Type		LR190-714
		HITACHI make
Applied engine		VG30E
Nominal rating	V-A	12-90
Ground polarity		Negative
Minimum revolution under no-load (when 13.5 volts is applied)	rpm	Less than 950
Hot output current	A/rpm	More than 22/1,300 More than 65/2,500 More than 80/5,000
Regulated output voltage	V	14.1 - 14.7
Minimum length of brush	mm (in)	More than 6.0 (0.236)
Brush spring pressure	N (g, oz)	1.471 - 3.432 (150 - 350, 5.29 - 12.34)
Slip ring minimum outer diameter	mm (in)	More than 30.6 (1.205)

COMBINATION SWITCH

Check

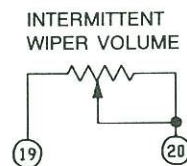


LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5									
6									
7									
8									
9									
10									
11									
12									

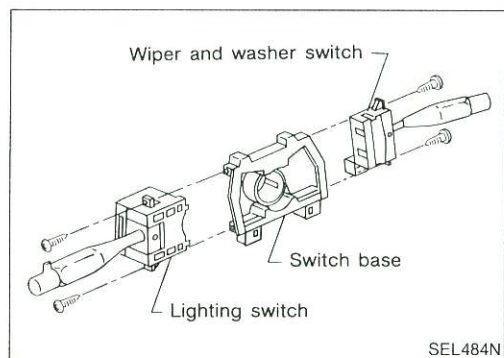
WIPER SWITCH

	OFF	INT	LO	HI	WASH
13					
14					
15					
16					
17					
18					



TURN SIGNAL SWITCH

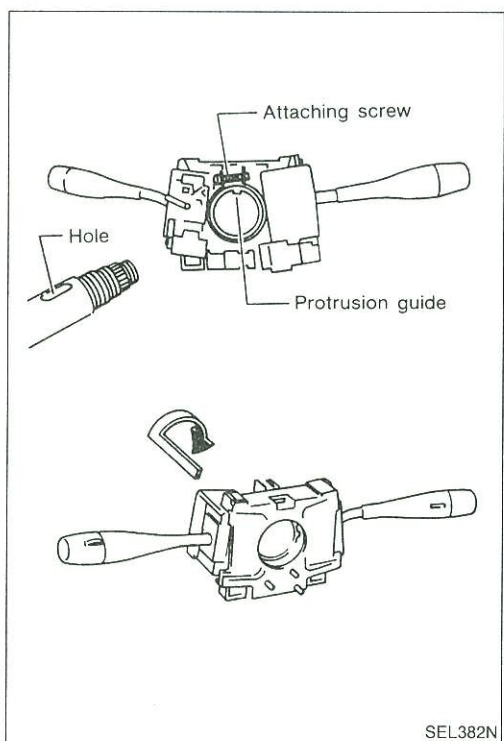
	R	N	L
1			
2			
3			



Replacement

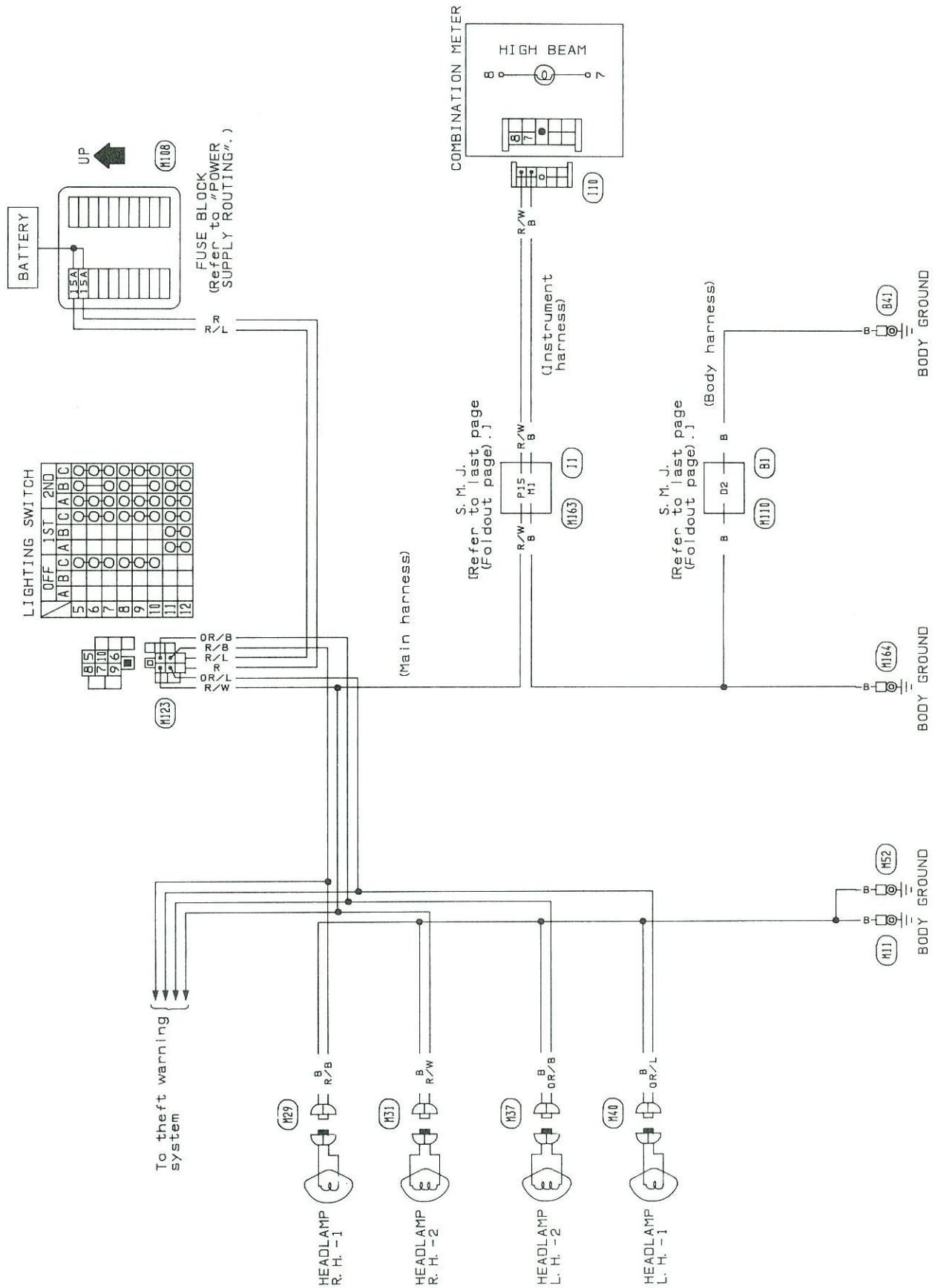
For removing/installing air bag module and spiral cable, refer to BF section.

- Each switch can be replaced without removing combination switch base.
- To remove combination switch base, remove base attaching screw and turn after pushing on it.

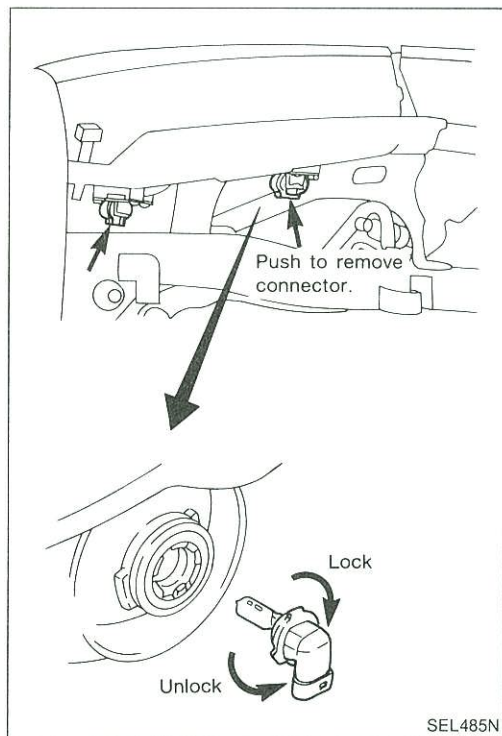


HEADLAMP

Wiring Diagram



HEADLAMP



Bulb Replacement

The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.

- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect battery negative cable.
2. Disconnect harness connector from rear end of bulb.
3. Turn plastic base counterclockwise until it is free from headlamp reflector, then remove it.
4. Remove headlamp bulb. Do not shake or rotate bulb when removing it.
5. Install in the reverse order of removal.

CAUTION:

- **Do not leave the bulb out of the headlamp reflector for a long period of time as dust, moisture, smoke, etc. may enter the headlamp body and affect the performance of the headlamp. Thus, the headlamp bulb should not be removed from the headlamp reflector until just before a replacement bulb is to be installed.**

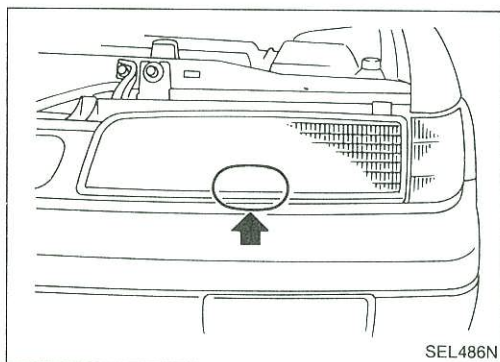
Aiming Adjustment

When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

If any aimer is not available, aiming adjustment can be done as follows:

For details, refer to the regulations in your own country.

- a. **Keep all tires inflated to correct pressures.**
- b. **Place vehicle and tester on one and same flat surface.**
- c. **See that there is no-load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).**



AIMER ADJUSTMENT MARK

When using a mechanical aimer, adjust adapter legs to the data marked on the headlamps.

Example:

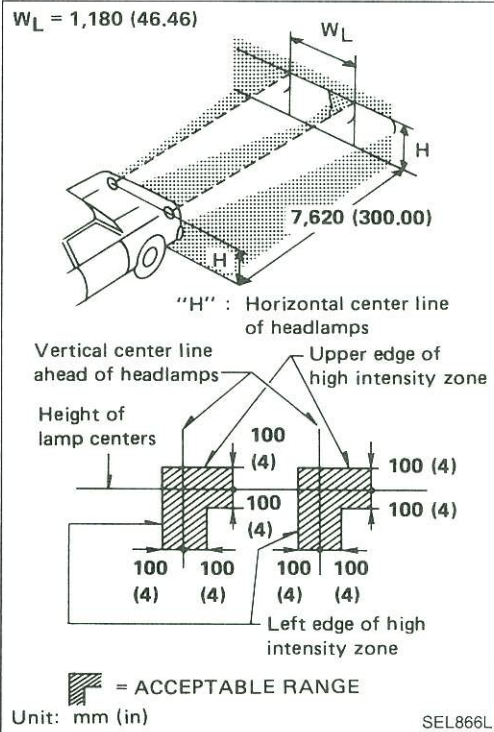
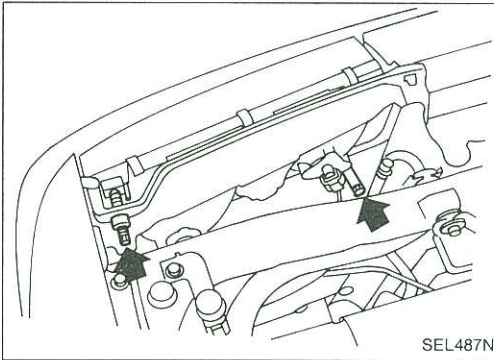
4H2V
└─ Vertical side: 2
└─ Horizontal side: 4

HEADLAMP

Aiming Adjustment (Cont'd)

LOW BEAM

1. Turn headlamp low beam on.
 2. Use adjusting screws to perform aiming adjustment.
- **First tighten the adjusting screw all the way and then make adjustment by loosening the screw.**



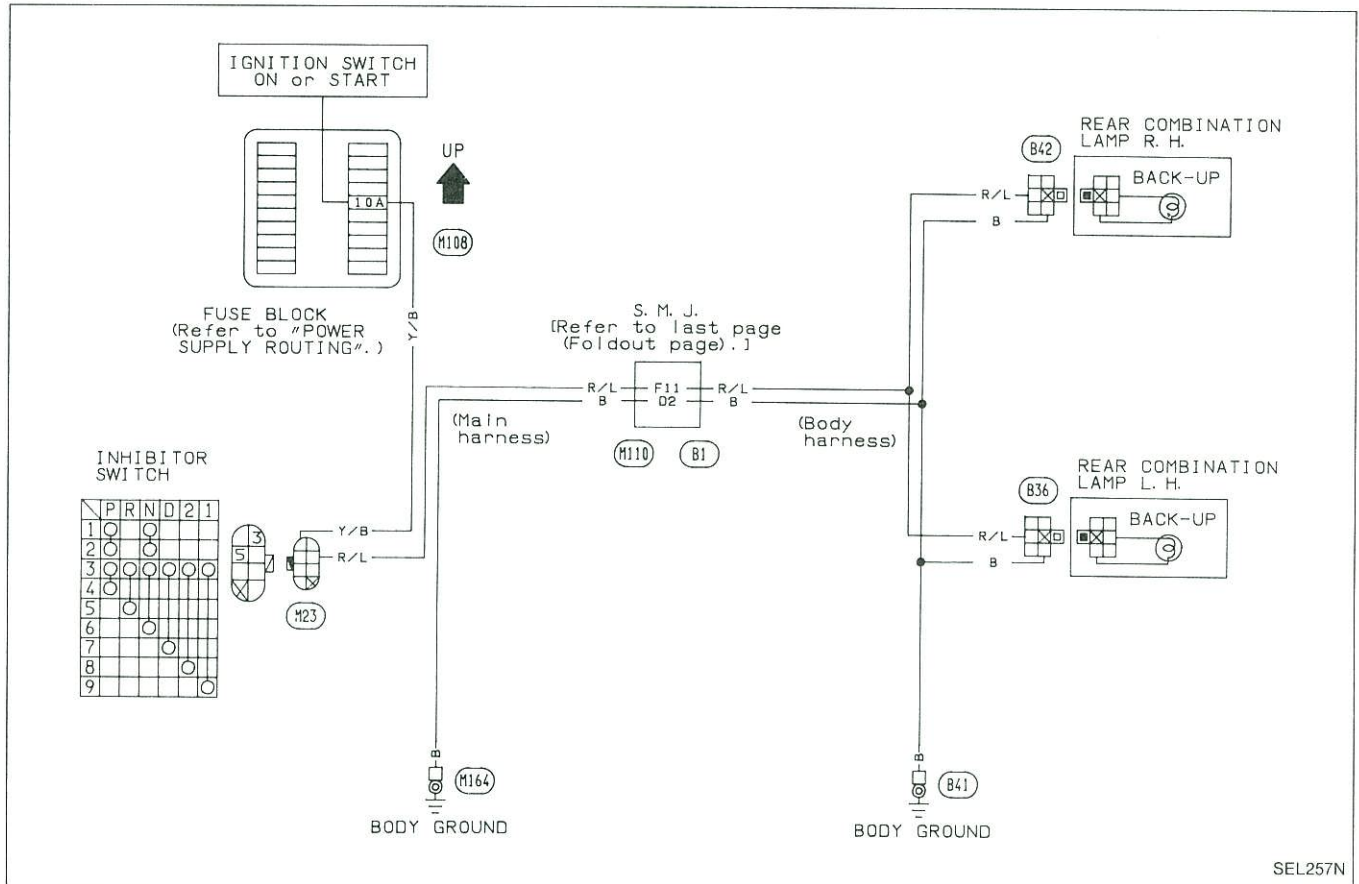
- **Adjust headlamps so that upper edge and left edge of high intensity zone are within the acceptable range as shown at left.**
 - **Dotted lines in illustration show center of headlamp.**
- "H": Horizontal center line of headlamps
- "W_L": Distance between each headlamp center

Clearance, License, Tail and Stop Lamps/Wiring Diagram

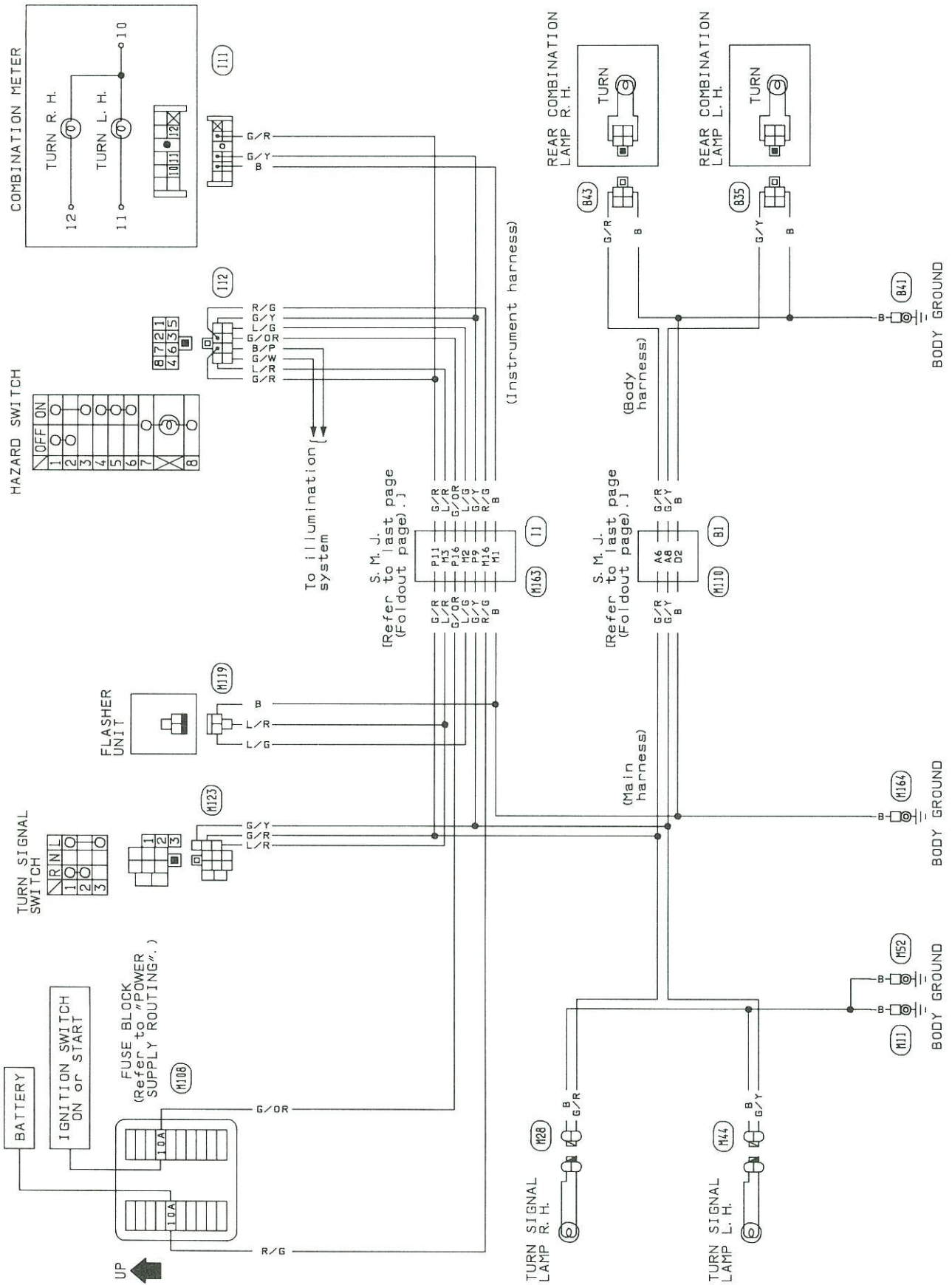


EXTERIOR LAMP

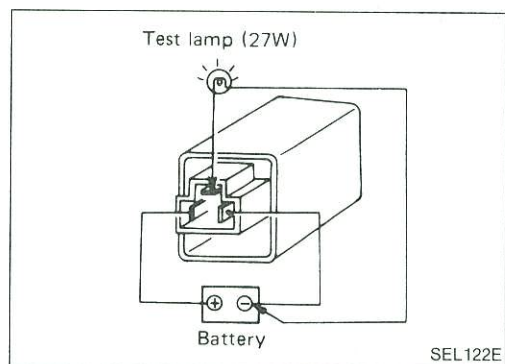
Back-up Lamp/Wiring Diagram



Turn Signal and Hazard Warning Lamps/Wiring Diagram



EXTERIOR LAMP



Combination Flasher Unit Check

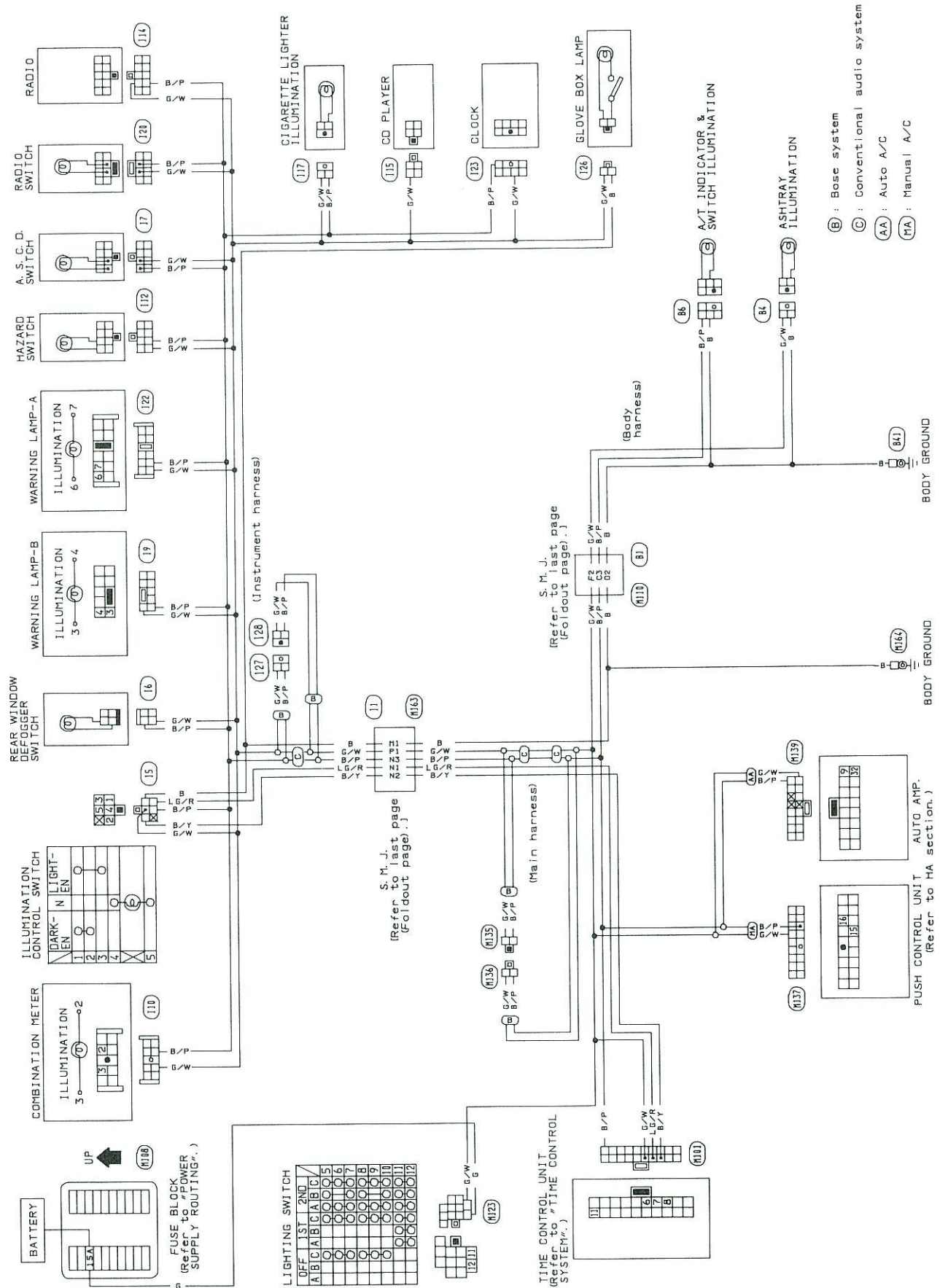
- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the combination flasher unit, as shown. Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit.

Bulb Specifications

	Wattage (12 volt)	Bulb No.
Headlamp (Semi-sealed beam)		
High (Inside)	65	9005
Low (Outside)	55	9006
Front turn signal lamp	27	1156
Front clearance lamp	3.8	194
Front side marker lamp	3.8	194
Rear combination lamp		
Turn signal	27	1156
Stop/Tail	27/8	1157
Tail	3.8	194
Back-up	27	1156
Rear side marker lamp	3.8	194
License plate lamp	8	67
High-mounted stop lamp	18	921
Interior lamp	10	—
Spot lamp	10	—
Step lamp	3.4	—
Trunk room lamp	3.4	158

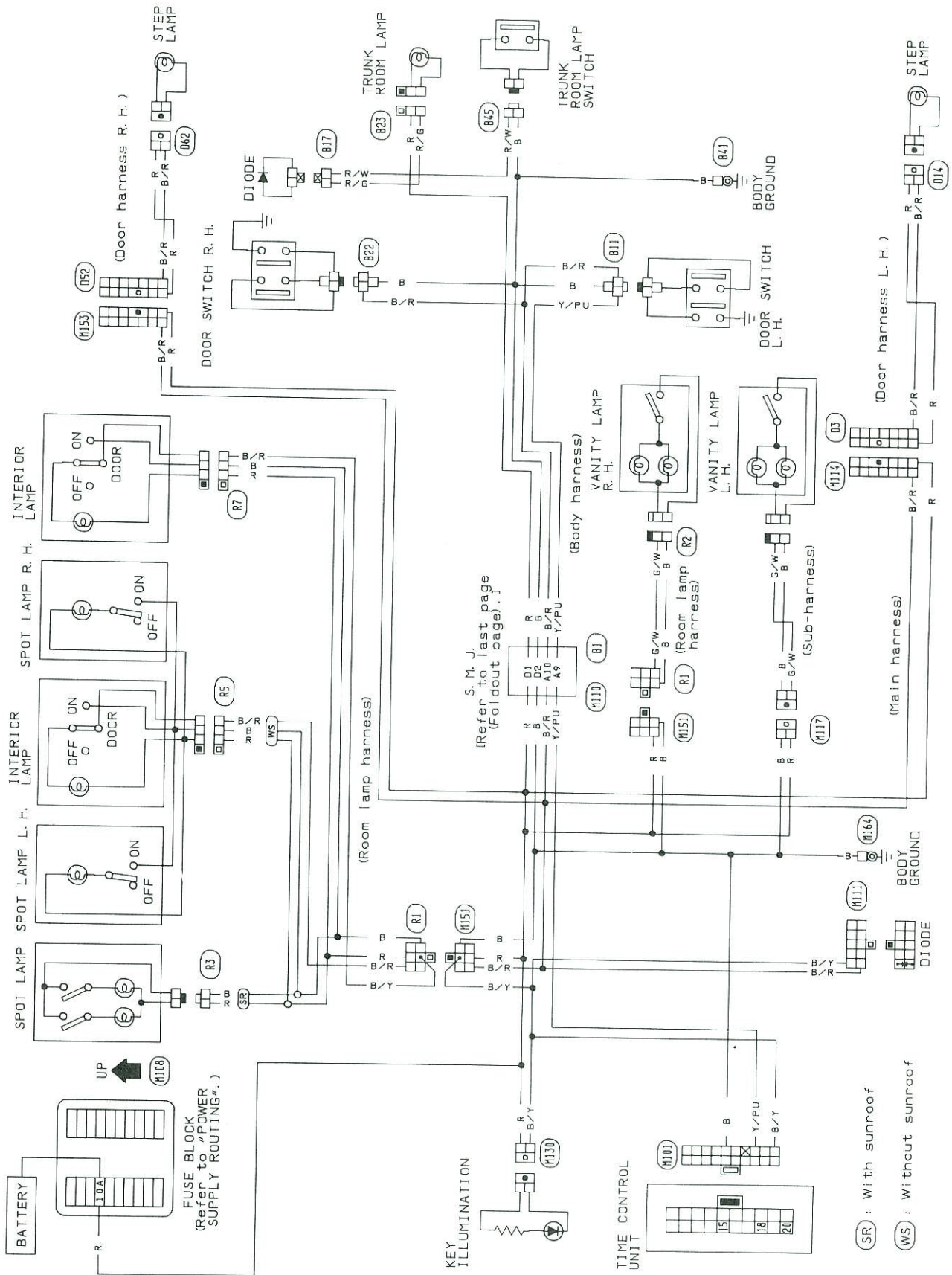
INTERIOR LAMP

Illumination/Wiring Diagram

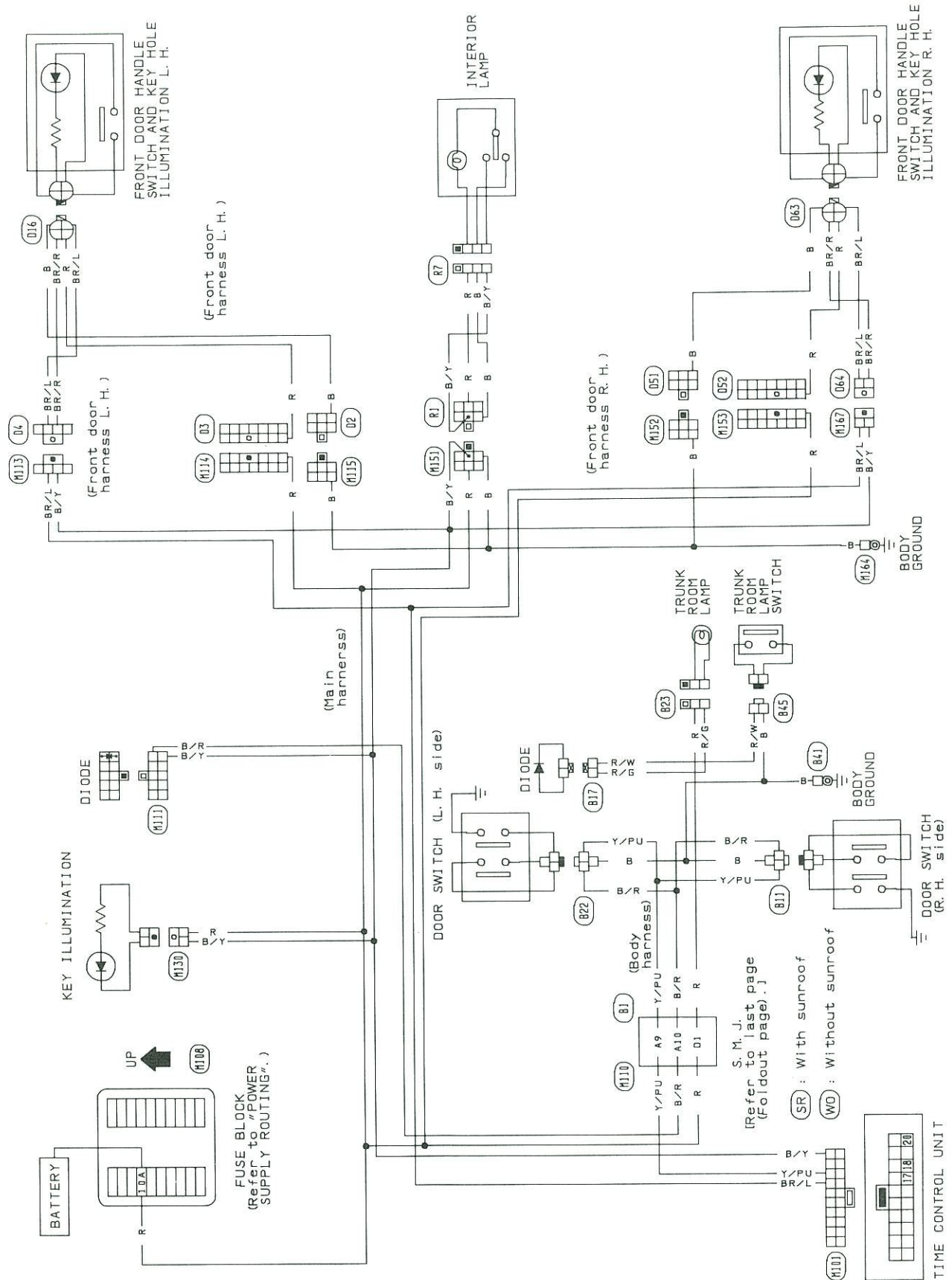


INTERIOR LAMP

Interior, Spot, Step and Trunk Room Lamps/ Wiring Diagram

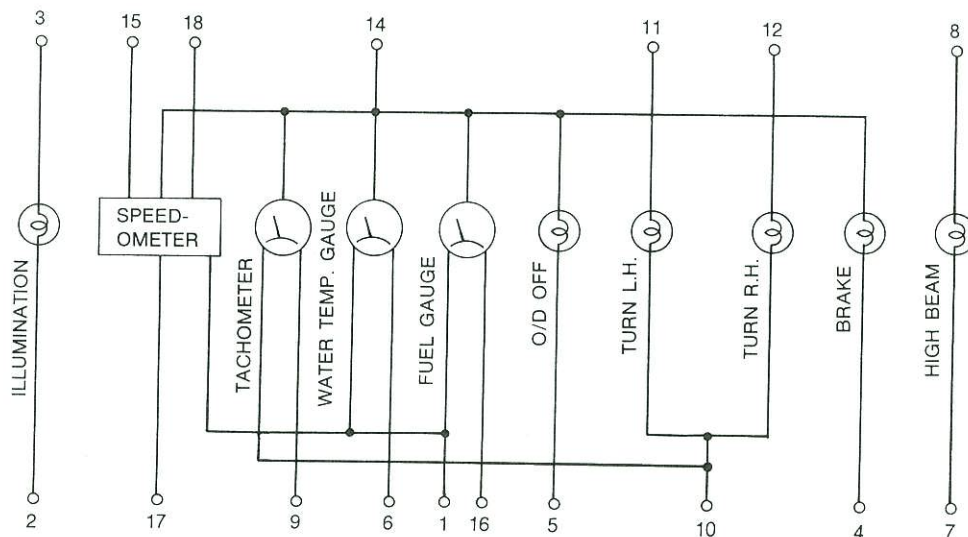
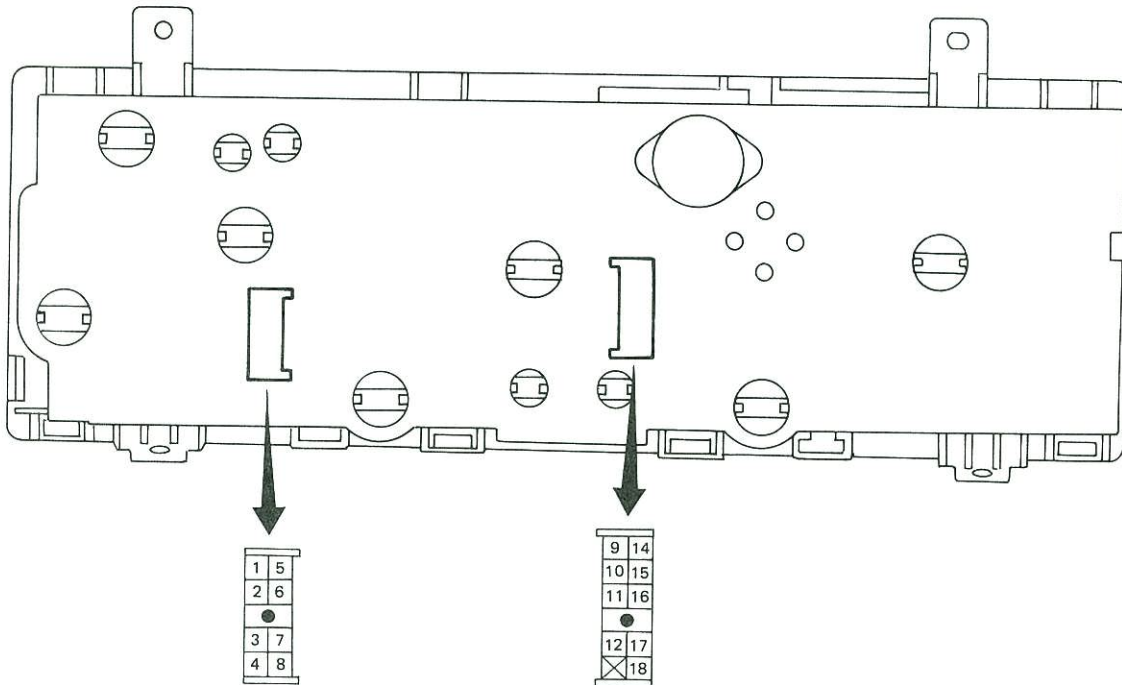
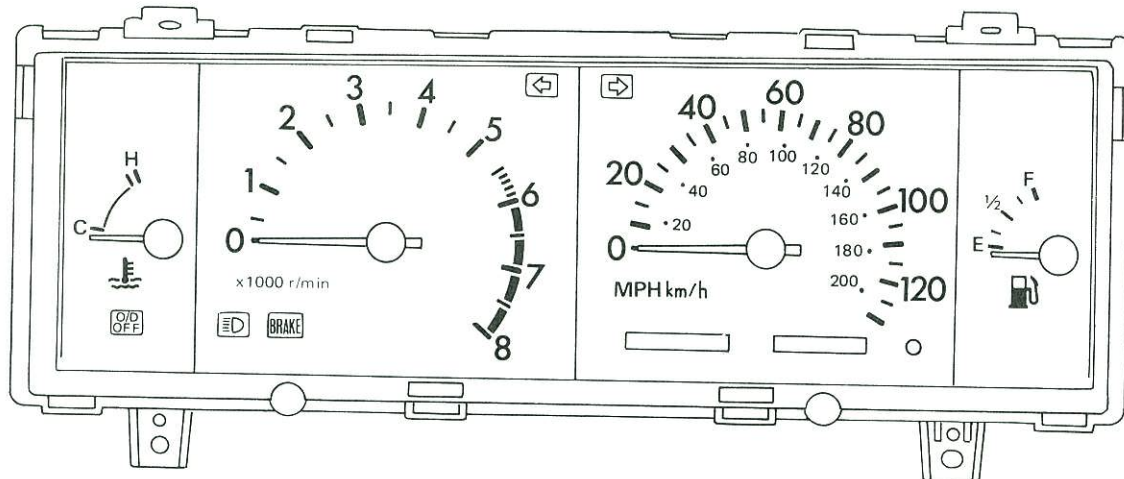


Illuminated Entry System and Key Illumination/ Wiring Diagram



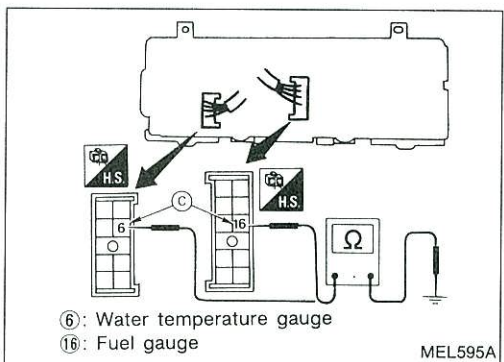
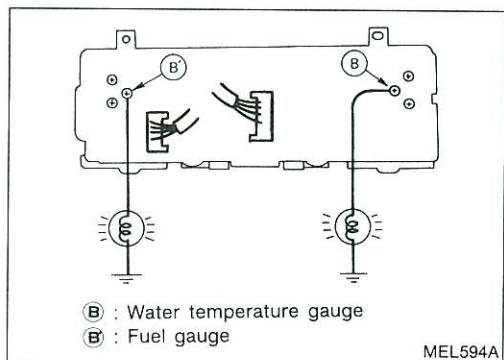
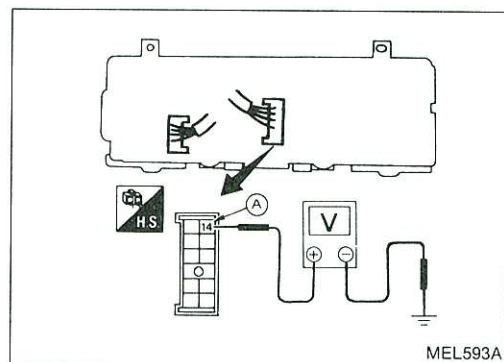
METER AND GAUGES

Combination Meter





Inspection/Fuel Gauge and Water Temperature Gauge



INSPECTION START

CHECK POWER SOURCE

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

N.G.

Check the following items.

- 1) Harness continuity between battery terminal and combination meter
- 2) Ignition relay-1
- 3) Fusible link and fuse
- 4) Ignition switch

O.K.

CHECK GAUGE OPERATION

- 1) Turn ignition switch "ON".
- 2) Connect terminal Ⓑ, Ⓑ' and ground with wire through 3.4 W test bulb.
- 3) Check operation of gauge.
Gauge should move smoothly to full scale.

N.G.

Repair or replace gauge.

O.K.

Check harness continuity between component and combination meter Ⓒ.

N.G.

Repair or replace.

O.K.

CHECK COMPONENT

Check gauge units and harness.
Refer to "Fuel Tank Gauge Unit Check", "Thermal Transmitter Check".

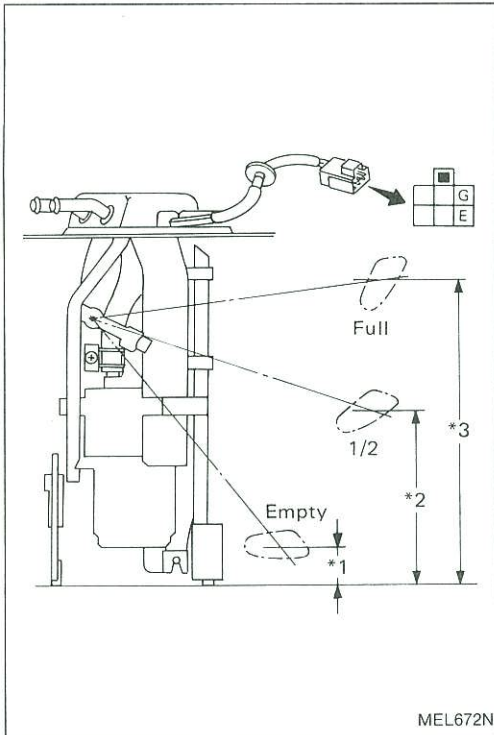
N.G.

Repair or replace.
Refer to FE section. (Fuel tank gauge unit)

O.K.

Reinstall any part removed.

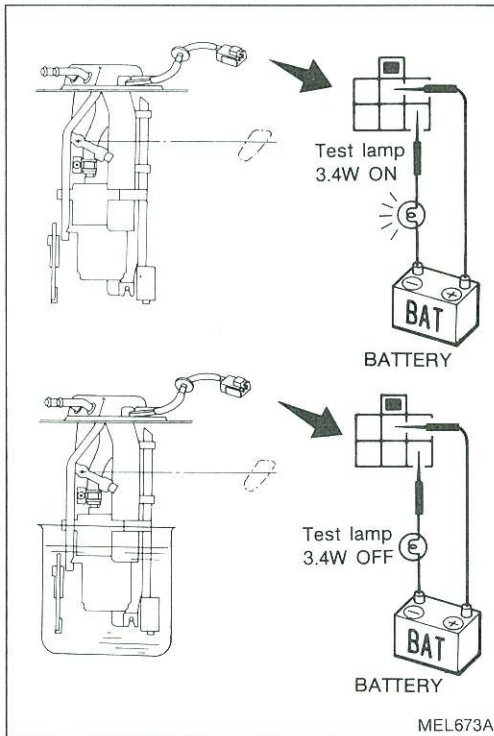
INSPECTION END



Fuel Tank Gauge Unit Check

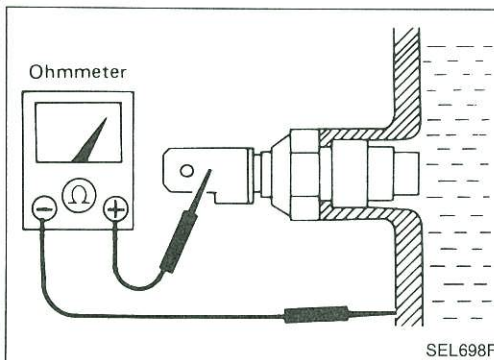
- For removal, refer to FE section.
- Check the resistance between terminals **G** and **E**.

Ohmmeter		Float position mm (in)			Resistance value (Ω)
(+)	(-)				
G	E	*3	Full	187 (7.36)	Approx. 4 - 6
		*2	1/2	110 (4.33)	Approx. 31 - 34
		*1	Empty	26 (1.02)	Approx. 80 - 83



Fuel Warning Lamp Sensor Check

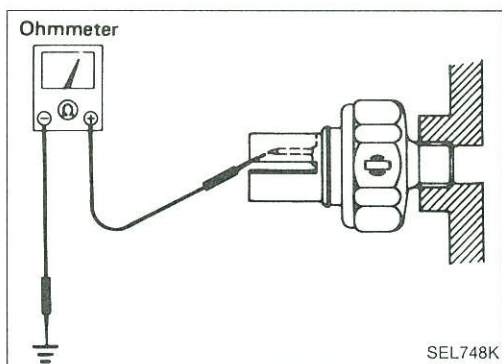
- It will take a short time for the bulb to light.



Thermal Transmitter Check

Check the resistance between the terminals of thermal transmitter and body ground.

Water temperature	Resistance
60°C (140°F)	Approx. 20 - 90Ω
100°C (212°F)	Approx. 21 - 24Ω

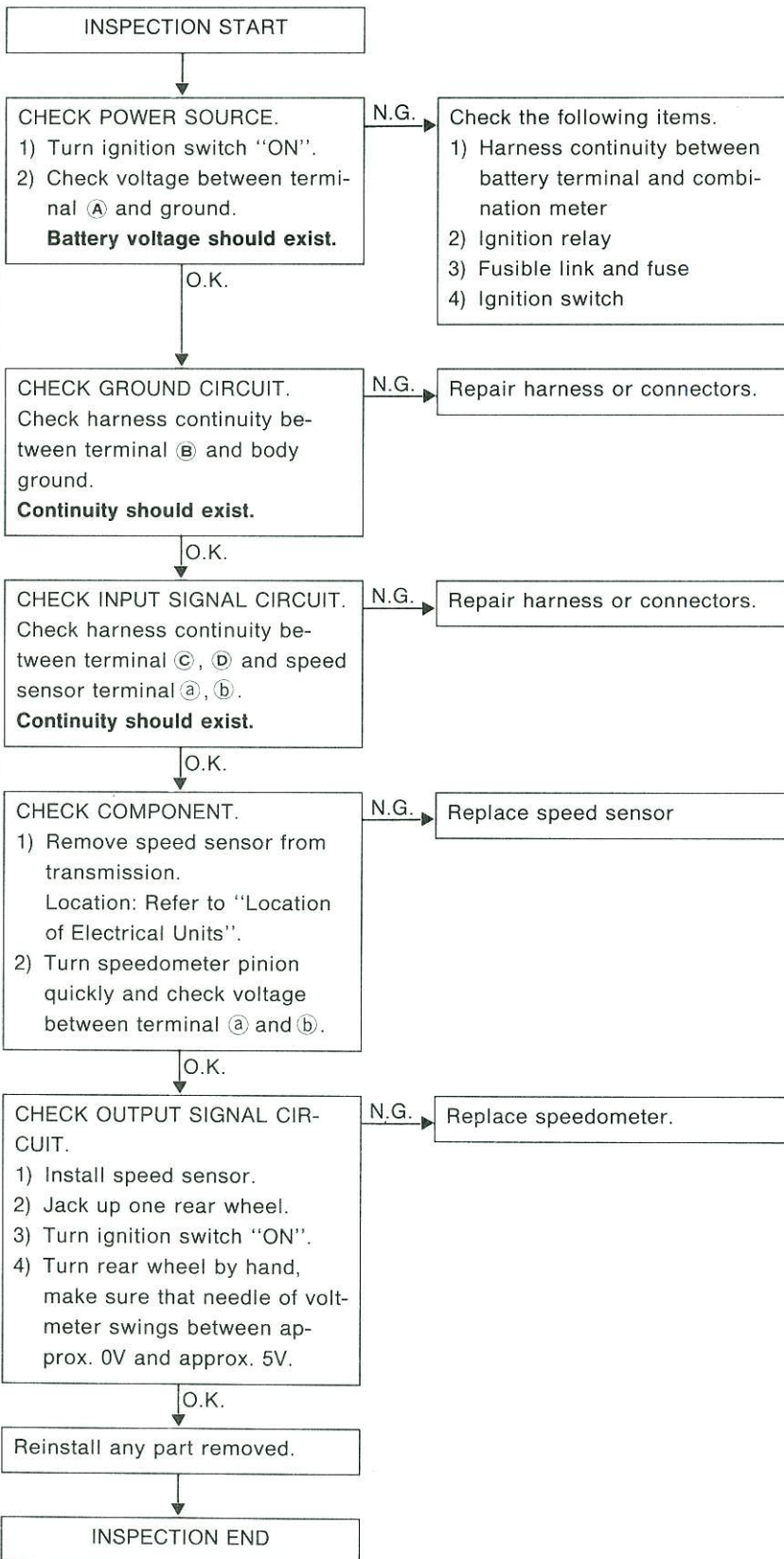
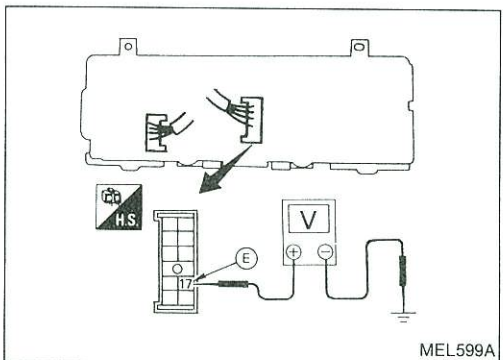
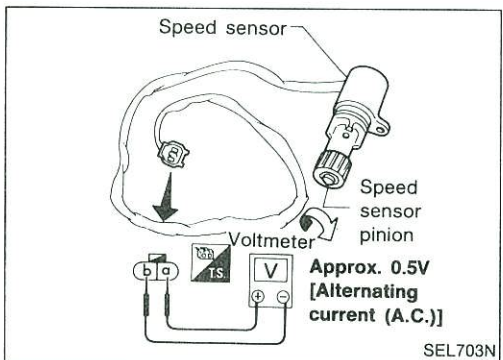
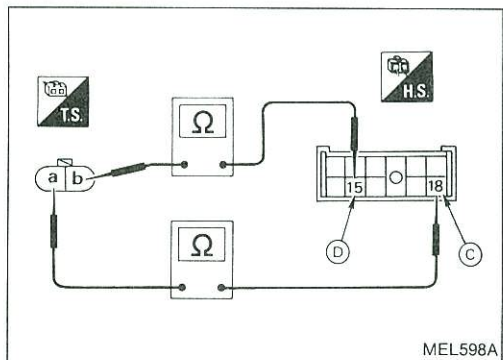
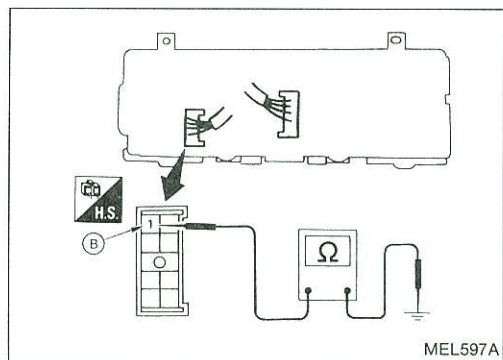
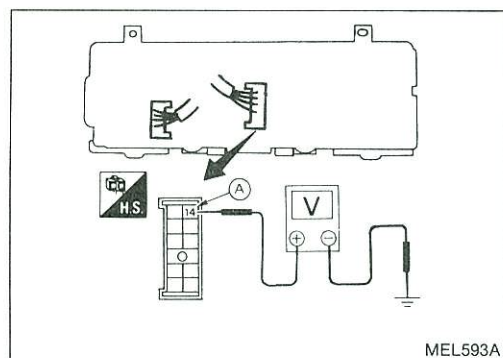


Oil Pressure Switch Check

Check the continuity between the terminals of oil pressure switch and body ground.

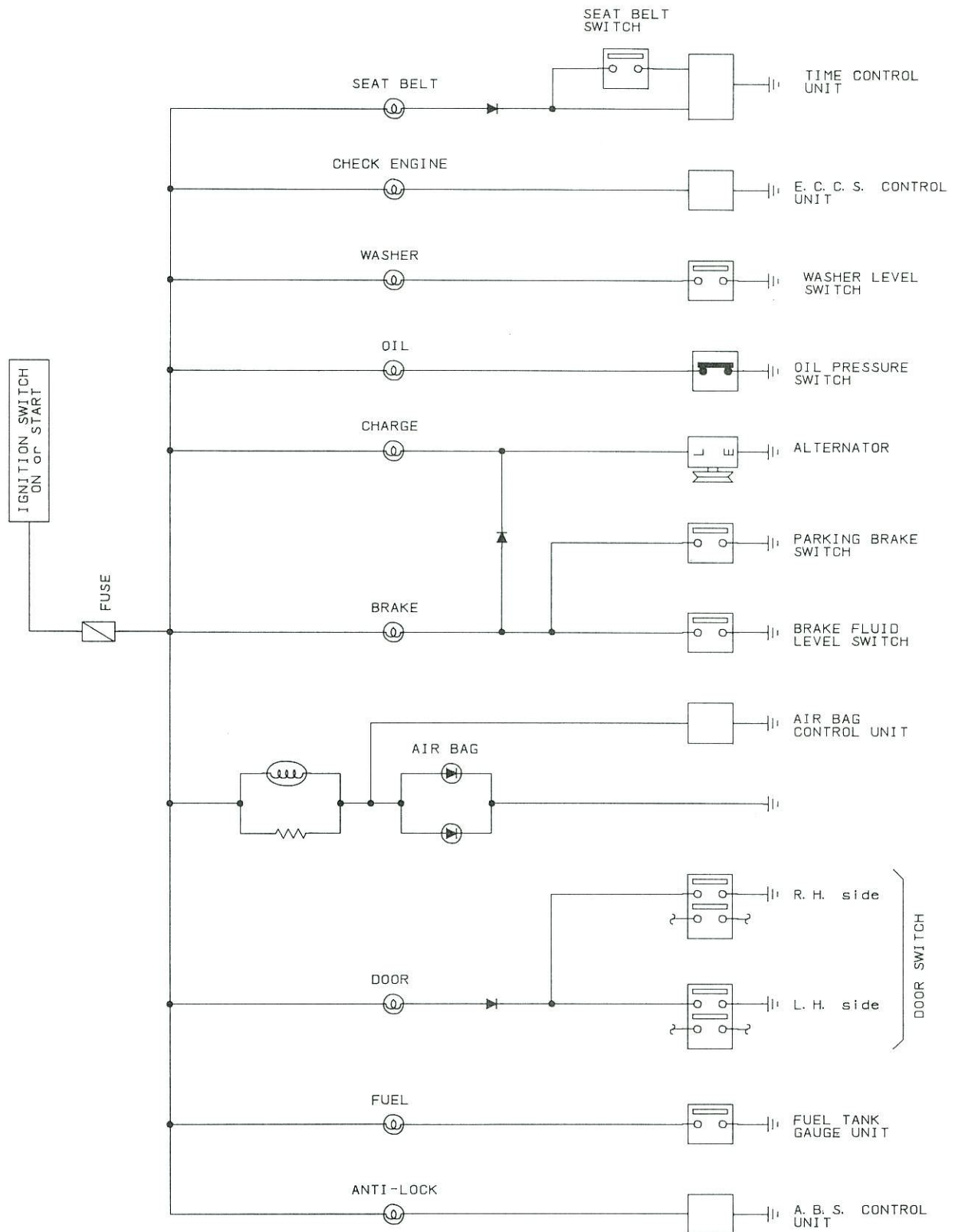
	Oil pressure kPa (kg/cm ² , psi)	Continuity
Engine start	More than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	NO
Engine stop	Less than 10 - 20 (0.1 - 0.2, 1.4 - 2.8)	YES

Inspection/Speed Sensor Signal Circuit



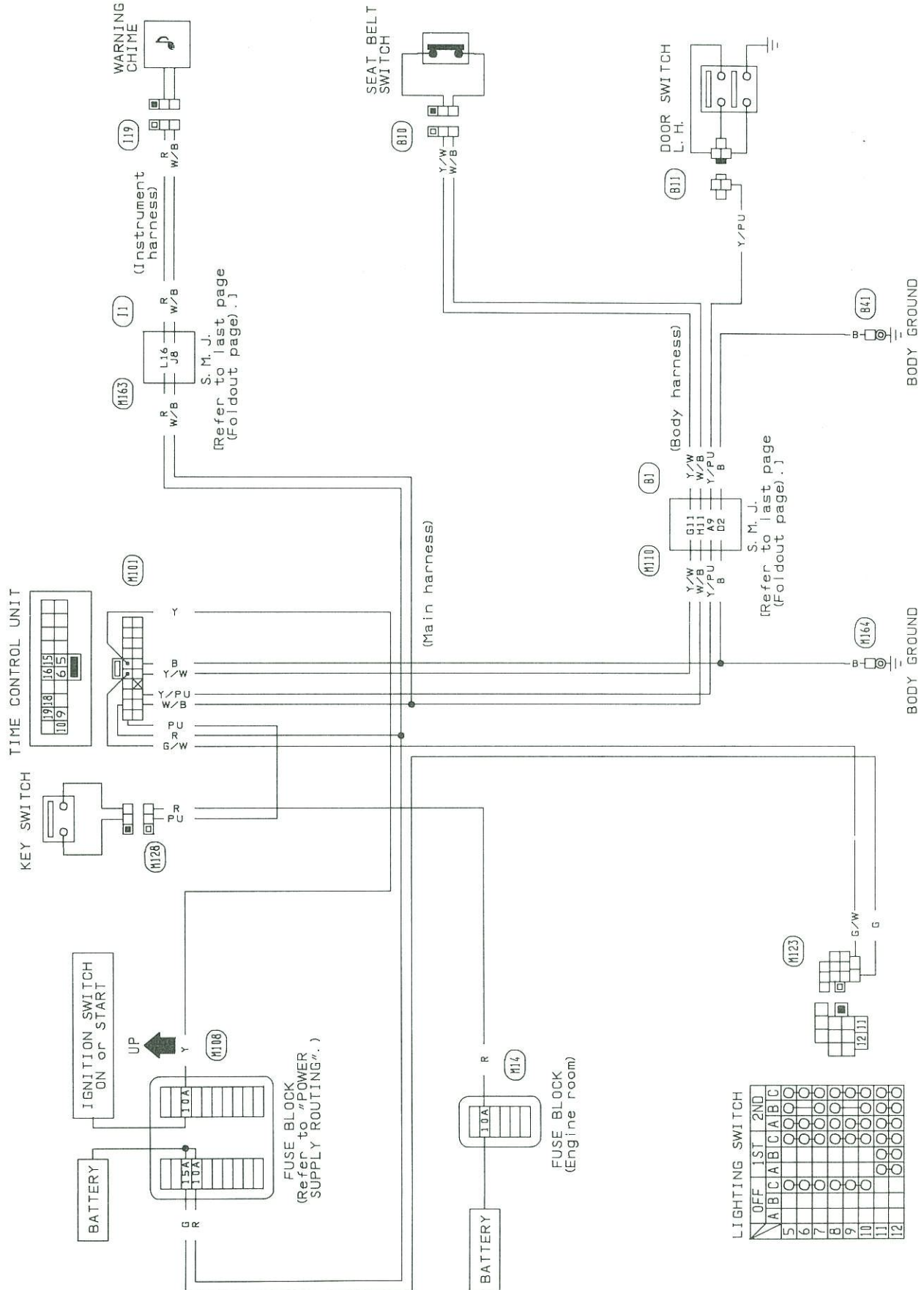
WARNING LAMPS AND CHIME

Warning Lamps/Schematic

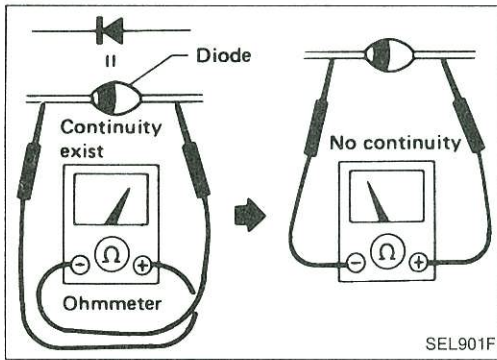




Warning Chime/Wiring Diagram

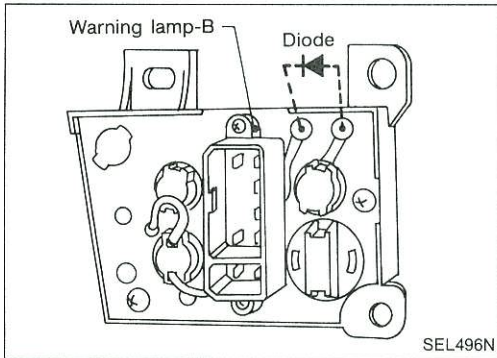


WARNING LAMPS AND CHIME

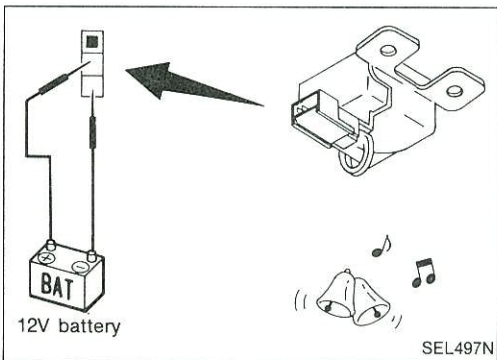


Diode Check

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.



- Diode for warning lamp is built into the warning lamp-B printed circuit.



Warning Chime Check

TIME CONTROL SYSTEM

Description

FUNCTION

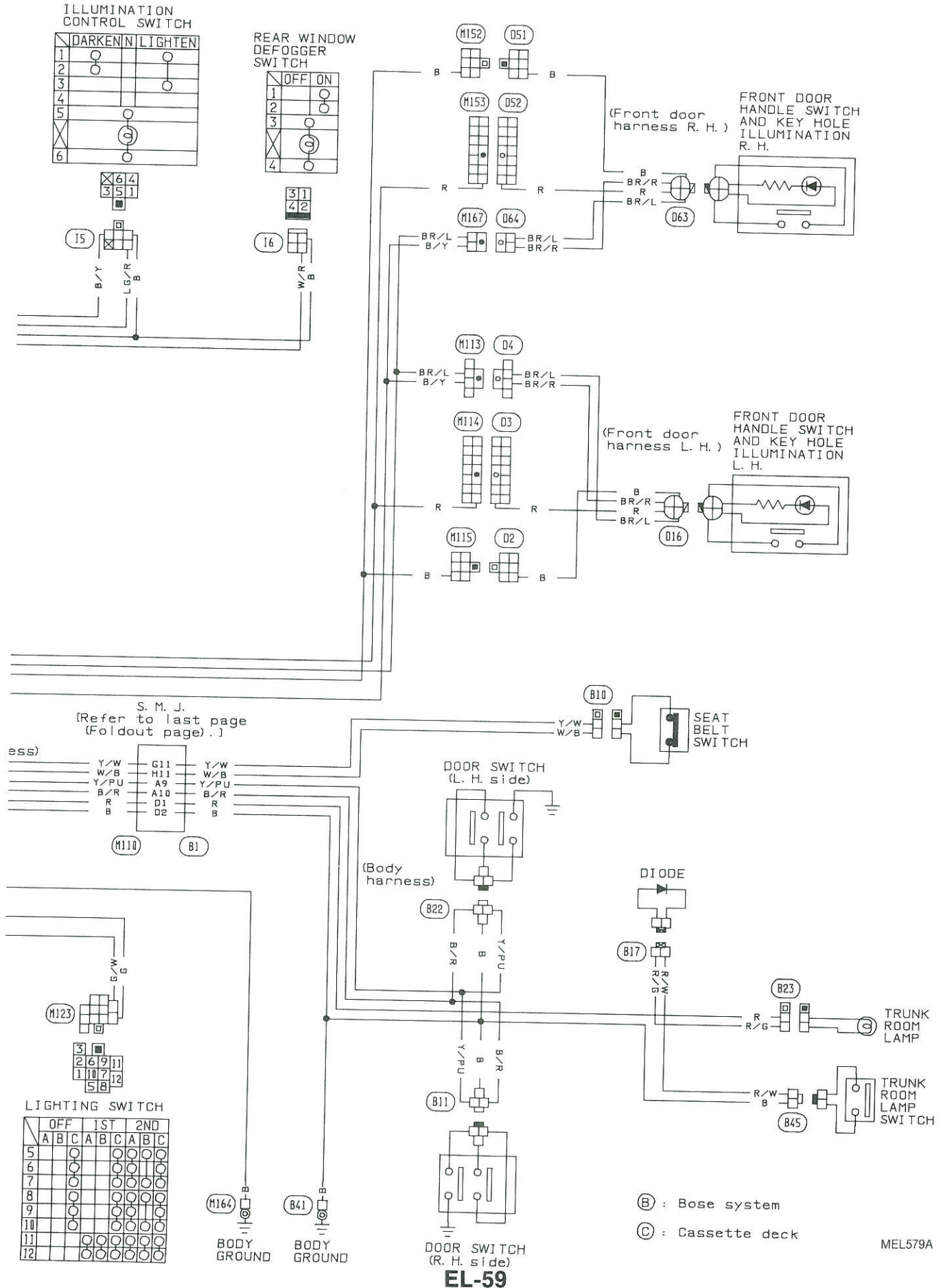
- Time control unit has the following functions.

Item		Details of control
1, 2	Intermittent wiper control	Regulates intermittent time from approximately 3 to 23 seconds depending on the intermittent wiper volume setting.
3	Washer and wiper combination control	Wiper is operated in conjunction with washer switch.
4	Light warning chime timer	When driver's door is opened with light switch ON and ignition switch OFF, warning chime sounds.
5	Ignition key warning chime timer	When driver's door is opened with ignition switch OFF, warning chime sounds.
6	Seat belt warning chime timer	Sounds warning chime for about 7 seconds if ignition switch is turned "ON" when seat belt switch is "ON" (seat belt is unfastened).
7	Seat belt warning lamp timer	Seat belt warning lamp blinks for about 7 seconds when ignition switch is turned to "ON".
8	Rear defogger timer	Rear defogger operates for about 15 minutes when defogger switch is ON.
9	Interior lamp timer	Fades out interior lamp when driver's side door is opened and closed.
10	Door key hole illumination	Illuminates for about 7 seconds when door outside handle is pulled.
11	Illumination control	The brightness of the instrument panel light can be adjusted.

Wiring Diagram



TIME CONTROL SYSTEM



TIME CONTROL SYSTEM

Trouble Diagnoses

SYMPTOM CHART

PROCEDURE		Preliminary Check			Main Power Supply and Ground Circuit Check		Diagnostic Procedure										
REFERENCE PAGE		EL-61	EL-61	EL-61	EL-62		EL-64	EL-65	EL-65	EL-66	EL-67	EL-68	EL-69	EL-69	EL-70	EL-71	EL-72
SYMPTOM		Procedure 1	Procedure 2	Procedure 3	Main power supply and Ground circuit		Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Diagnostic Procedure 11
Wiper & washer	Intermittent wiper does not operate.				○		○										
	Intermittent time of wiper cannot be adjusted.							○									
	Wiper and washer activate individually but not in combination.								○								
Warning	Light warning chime does not activate.	○			○					○							
	Ignition key warning chime does not activate.		○		○						○						
	Seat belt warning chime does not activate.			○	○							○					
	Seat belt warning lamp does not come on, or does not go off after coming on.				○								○				
Rear defogger	Rear defogger does not activate, or go off after activating.				○									○			
Illumination	Interior lamp does not fade out after driver's door is closed.				○										○		
	Door key hole illumination does not come on even if door handle is pulled.				○											○	
	Illumination control does not actuate.																○

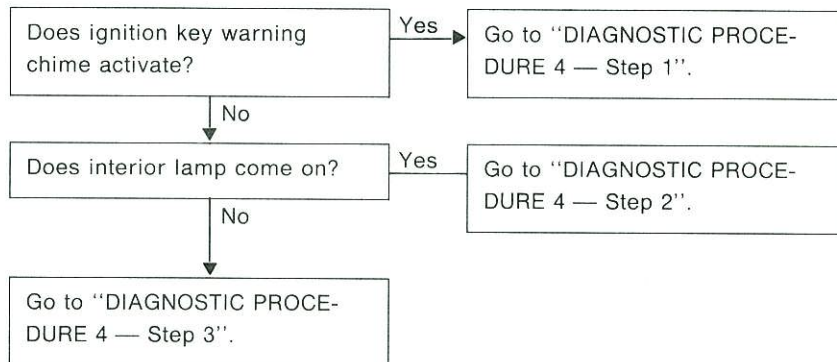
TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

PRELIMINARY CHECK

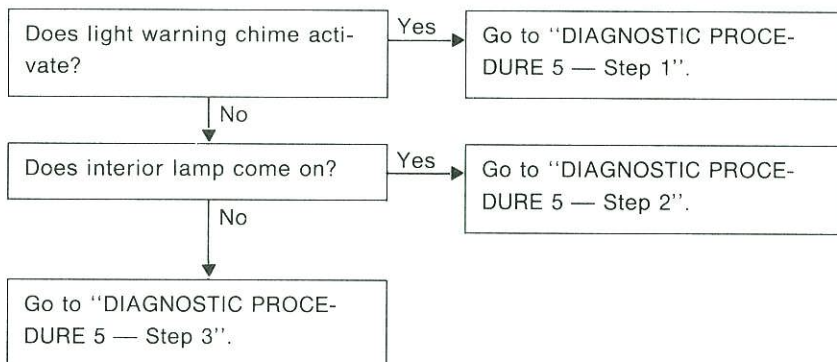
Preliminary check 1

- Light warning chime does not activate.



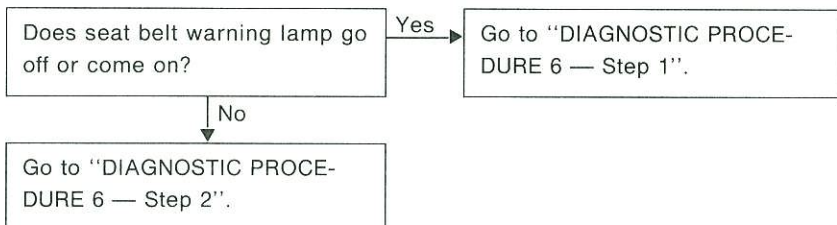
Preliminary check 2

- Ignition key warning chime does not activate.



Preliminary check 3

- Seat belt warning chime does not activate.



TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

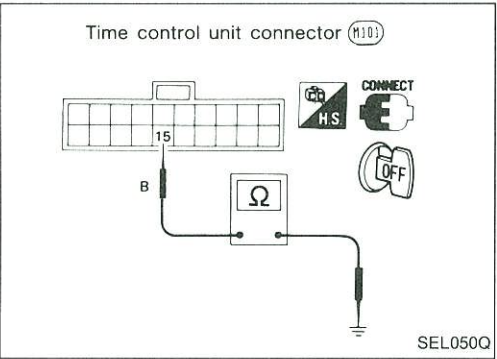
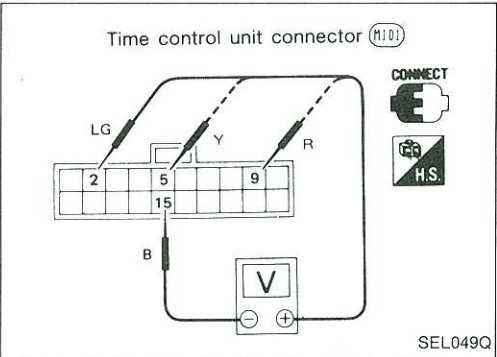
MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

Main power supply

Terminals	Battery voltage existence condition		
	Ignition switch position		
	OFF	ACC	ON
⑨ - ⑮	Yes	Yes	Yes
⑤ - ⑮	No	No	Yes
② - ⑮	No	Yes	Yes

Ground circuit

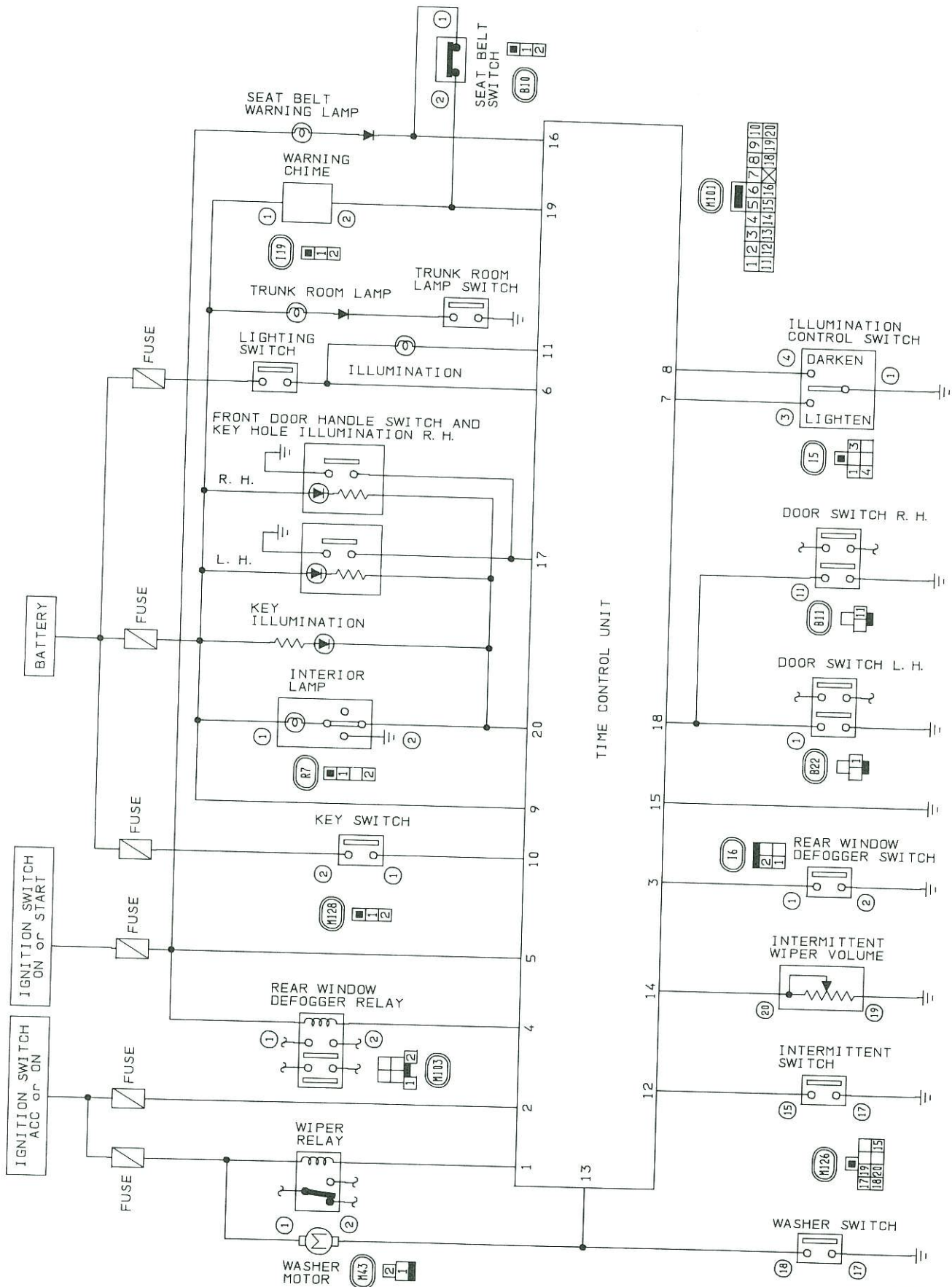
Terminals	Continuity
⑮ - Ground	Yes



TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



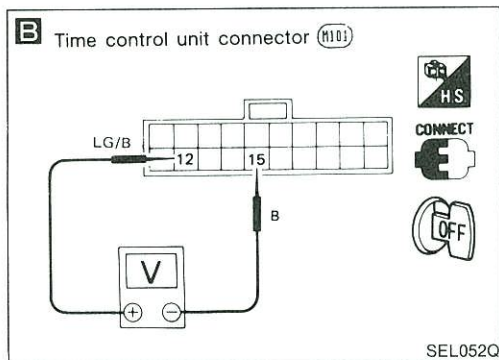
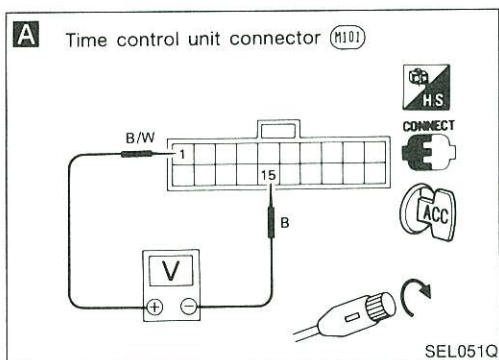
MEL640A

TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: Intermittent wiper does not operate.



A

WIPER RELAY OUTPUT SIGNAL CHECK

- 1) Turn ignition switch to "ACC".
- 2) Turn wiper switch to "INT" or "OFF".
- 3) Measure voltage between control unit harness terminals ① and ⑮.

Condition of wiper switch	Voltage [V]
OFF	Approx. 12
INT	Pointer swings from 0 to 12 every 3 to 23 seconds

O.K.

Check wiper relay.
Refer to "WIPER AND WASHER".

O.K.

N.G.

Replace wiper relay.

Check wiper relay circuit.

N.G.

B

INTERMITTENT SWITCH INPUT SIGNAL CHECK

Measure voltage between control unit harness terminals ⑫ and ⑮.

Condition of wiper switch	Voltage [V]
OFF	Approx. 12
INT	0

N.G.

Check wiper switch.
Check harness continuity between T.C.U. and wiper switch.

O.K.

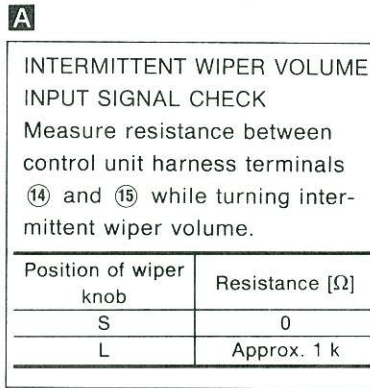
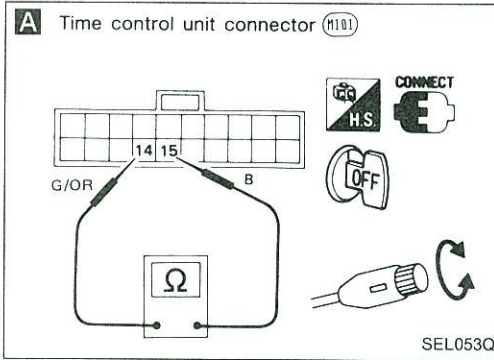
Replace control unit.

TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

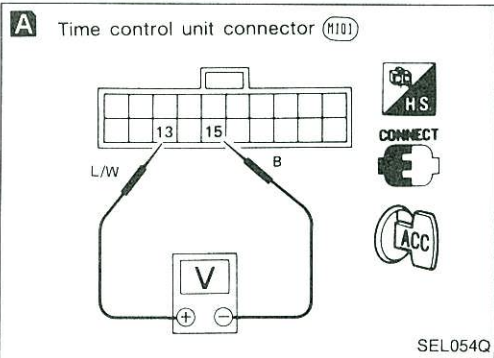
SYMPTOM: Intermittent time of wiper cannot be adjusted.



O.K. → Replace control unit.

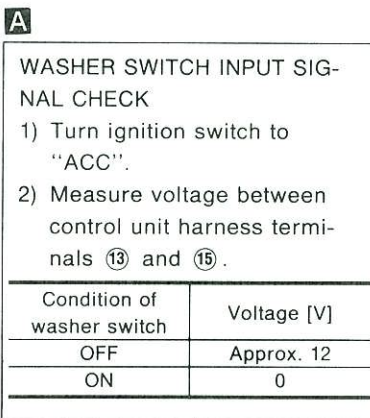
N.G.

Check intermittent wiper volume.
Check harness continuity between T.C.U. and wiper switch.



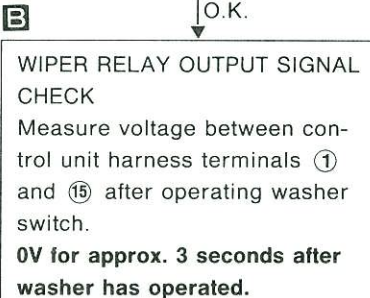
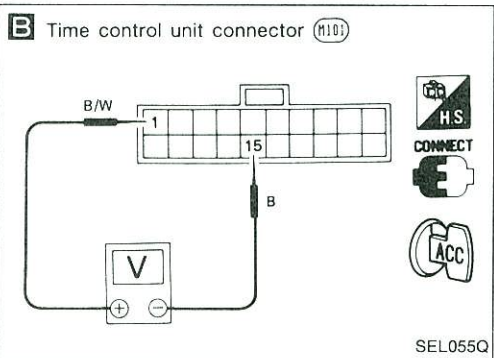
DIAGNOSTIC PROCEDURE 3

SYMPTOM: Wiper and washer activate individually but not in combination.



N.G. → Check harness continuity between T.C.U. and washer switch.

O.K.



N.G. → Replace control unit.

O.K.

Replace wiper relay.

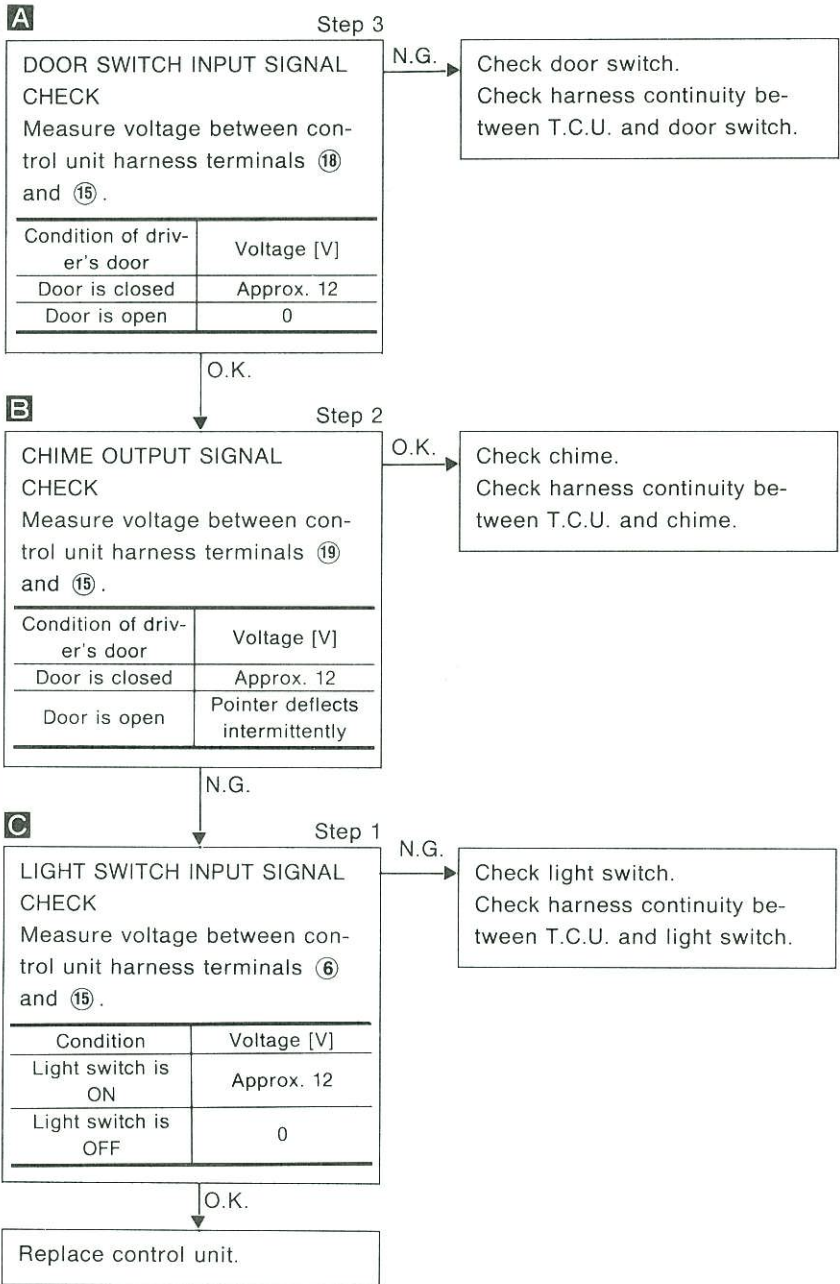
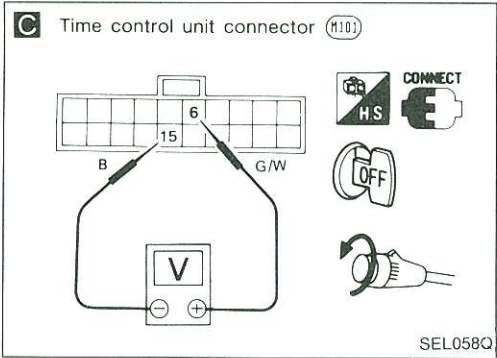
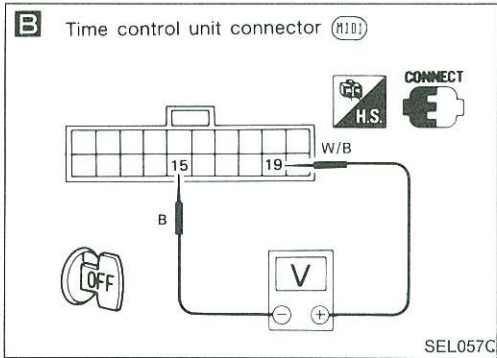
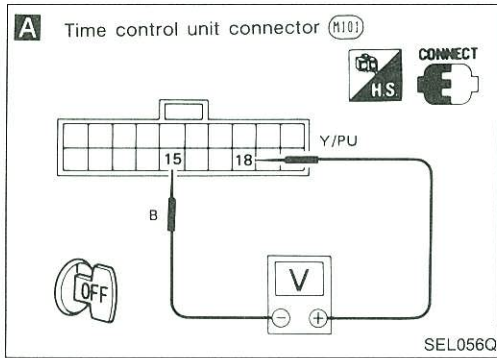
TIME CONTROL SYSTEM

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.



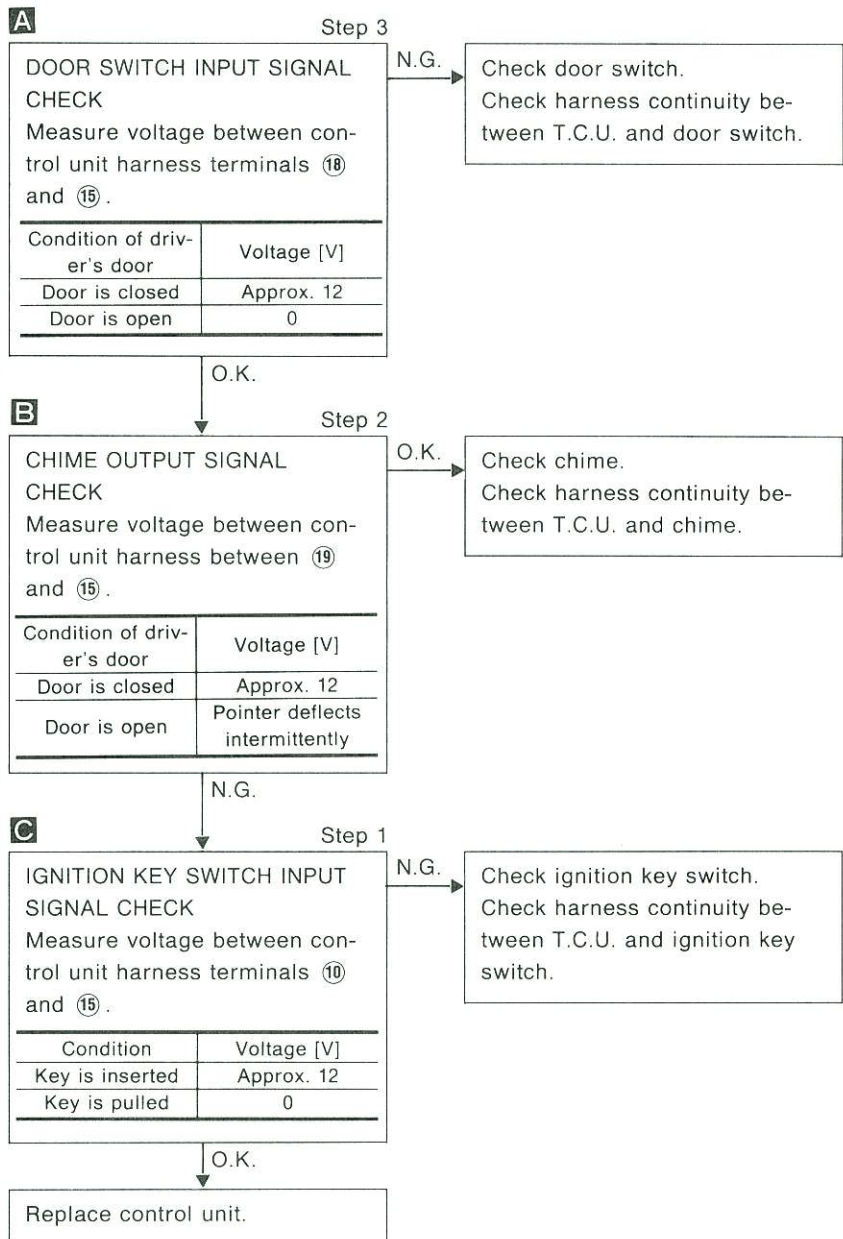
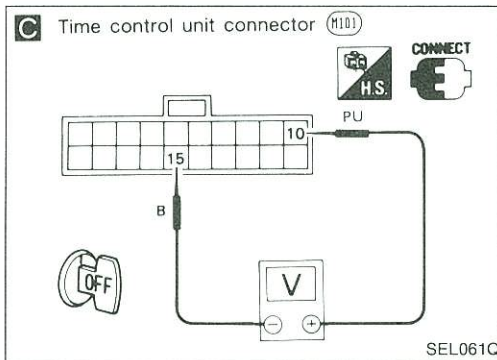
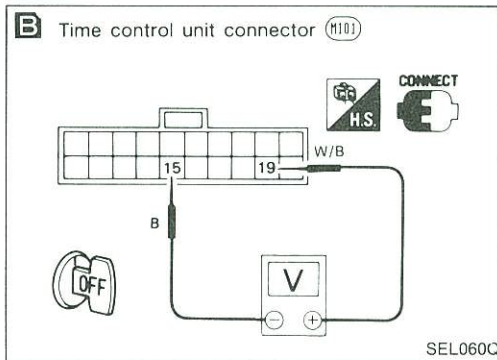
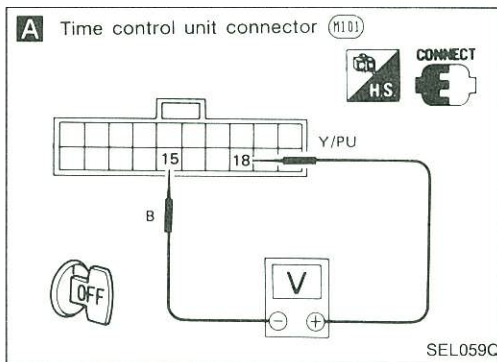
TIME CONTROL SYSTEM

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.



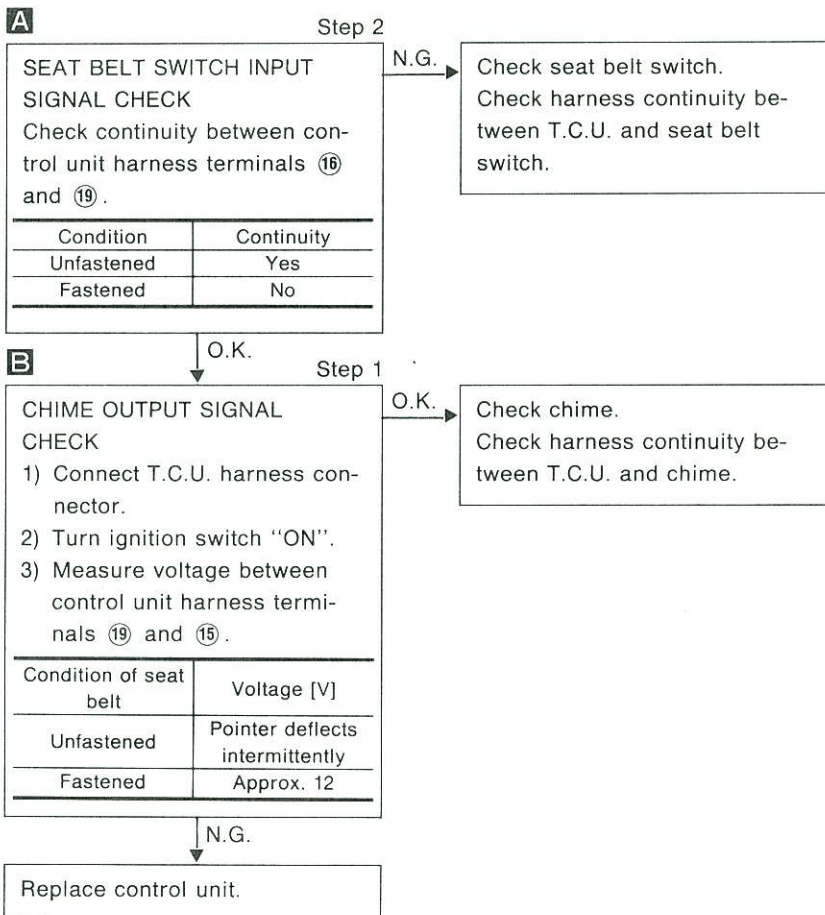
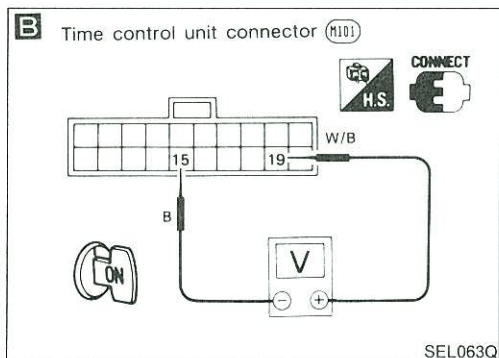
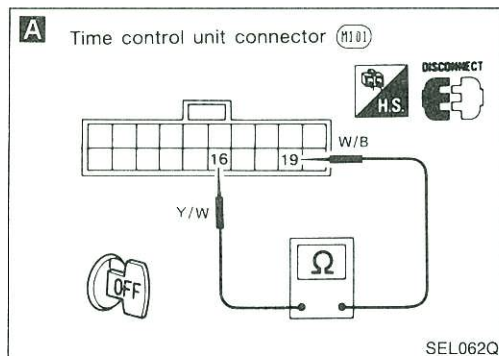
TIME CONTROL SYSTEM

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.

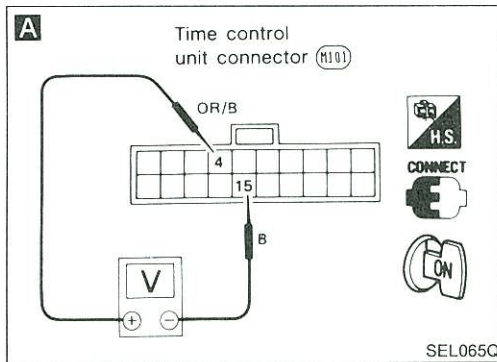
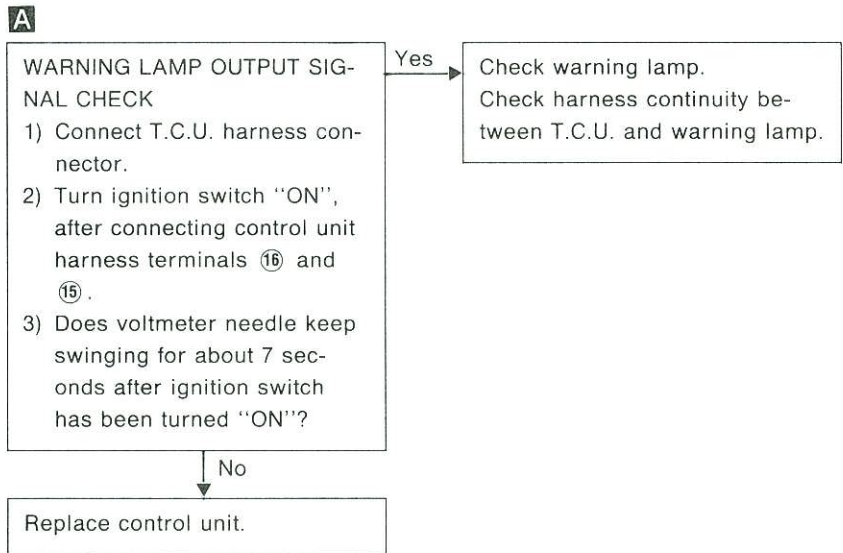
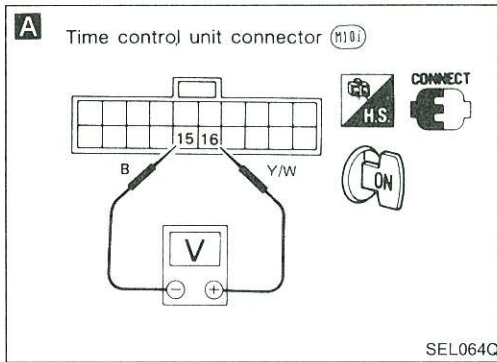


TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

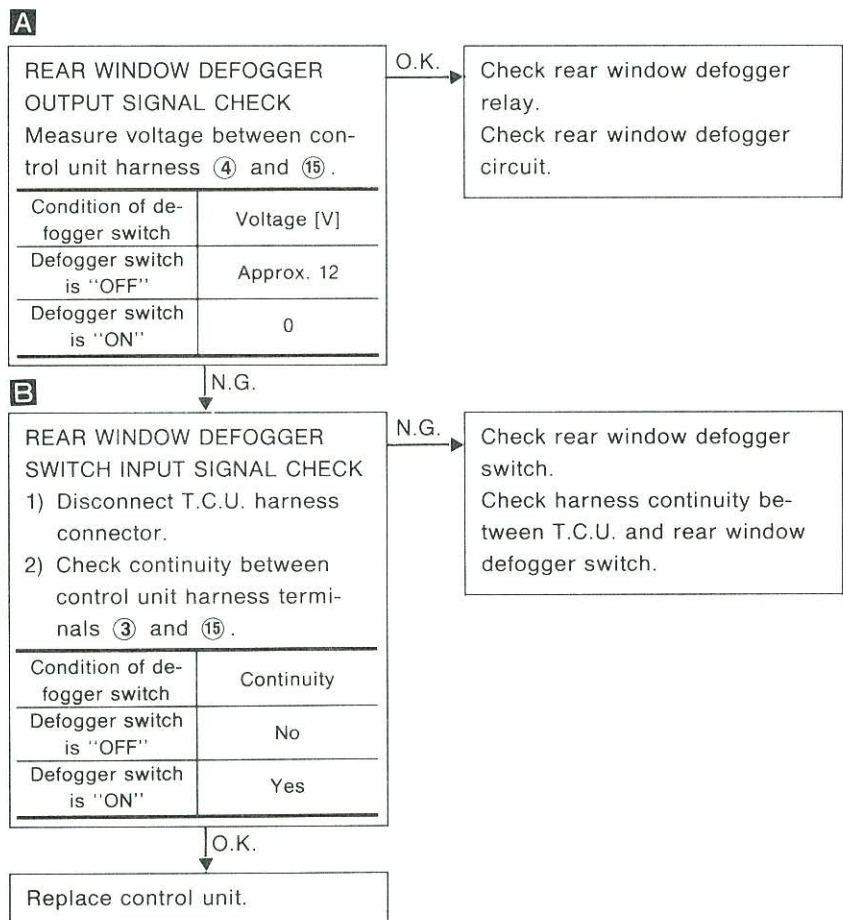
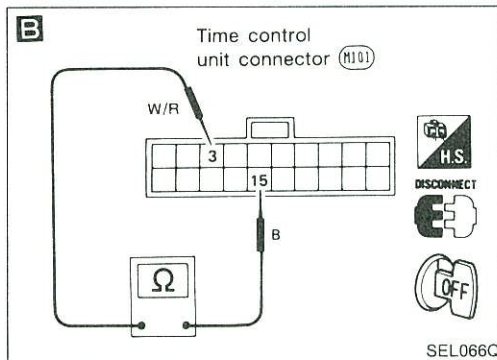
DIAGNOSTIC PROCEDURE 7

SYMPTOM: Seat belt warning lamp does not come on, or does not go off after coming on.



DIAGNOSTIC PROCEDURE 8

SYMPTOM: Rear defogger does not activate, or does not go off after activating.

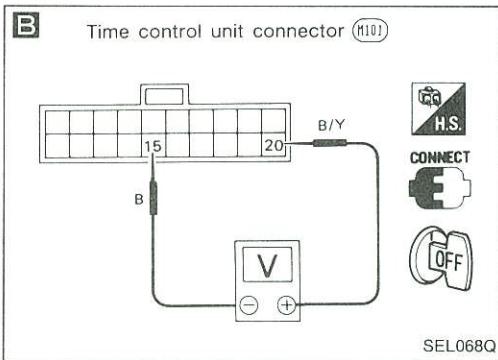
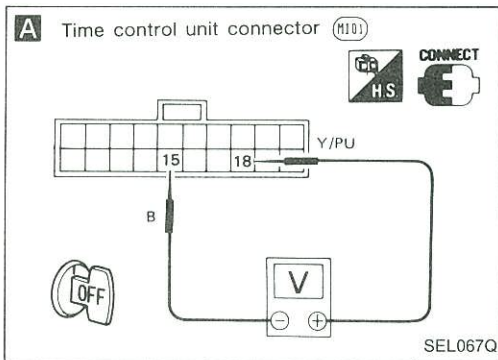


TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 9

SYMPTOM: Interior lamp does not fade out after driver's door is closed.



A

DOOR SWITCH INPUT SIGNAL CHECK

Measure voltage between control unit harness terminals ⑮ and ⑰.

Condition of driver's door	Voltage [V]
Door is closed	Approx. 12
Door is open	0

N.G.

Check door switch.
Check harness continuity between T.C.U. and door switch.

O.K.

B

INTERIOR LAMP SIGNAL CHECK

Measure voltage between control unit harness terminals ⑳ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	0 → Approx. 12
Door is open	0

O.K.

Check interior lamp and harness between T.C.U. and interior lamp.

N.G.

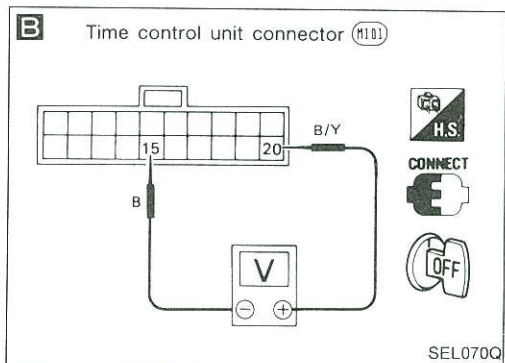
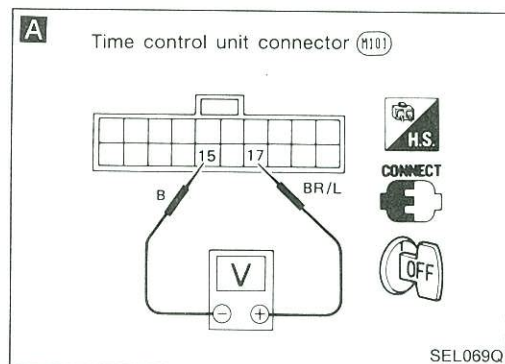
Replace T.C.U.

TIME CONTROL SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 10

SYMPTOM: Door key hole illumination does not come on even if door handle is pulled.



A

DOOR SWITCH INPUT SIGNAL CHECK

Measure voltage between control unit harness terminals ⑰ and ⑮.

Condition of driver's handle	Voltage [V]
Handle is pulled	0
Handle is released	Approx. 12

N.G.

Check door handle switch.
Check harness continuity between T.C.U. and door handle switch.

O.K.

B

KEY HOLE ILLUMINATION SIGNAL CHECK

Measure voltage between control unit harness terminals ⑳ and ⑮.

Condition of driver's door	Voltage [V]
Door is closed	0 → Approx. 12
Door is open	0

O.K.

Check key hole illumination and harness between T.C.U. and key hole illumination.

N.G.

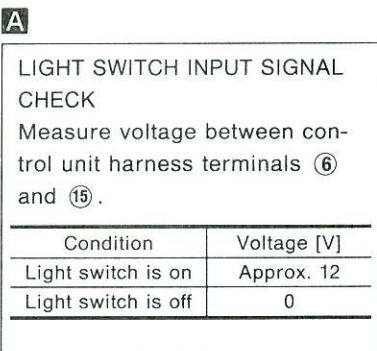
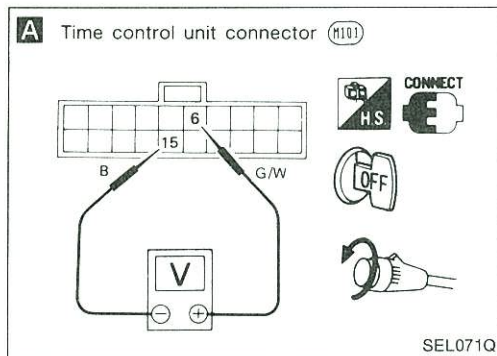
Replace T.C.U.

TIME CONTROL SYSTEM

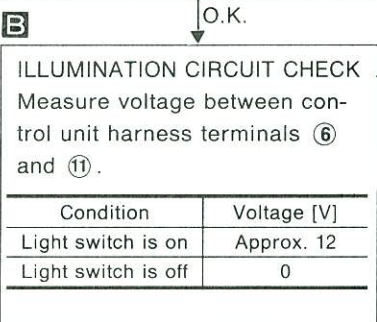
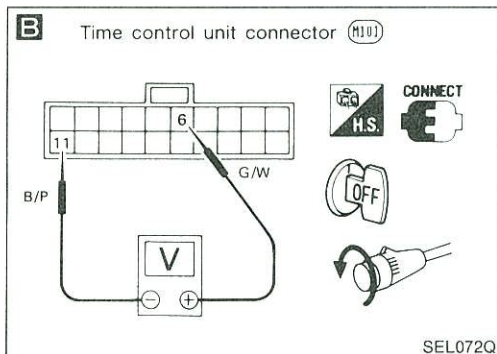
Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 11

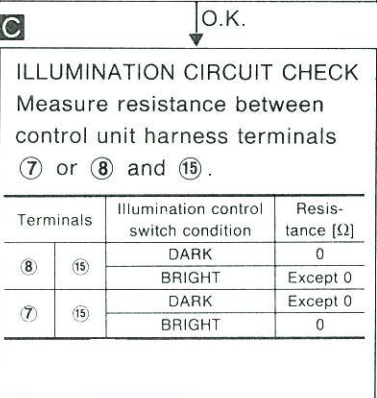
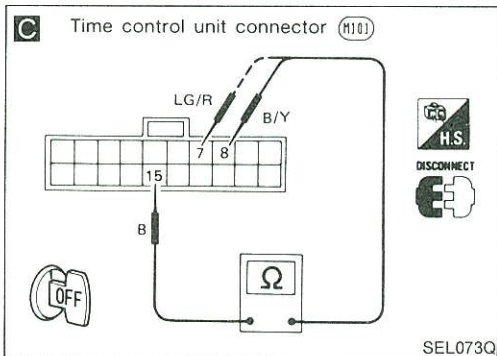
SYMPTOM: Illumination control does not activate.



N.G. → Check light switch.
Check harness continuity between T.C.U. and light switch.



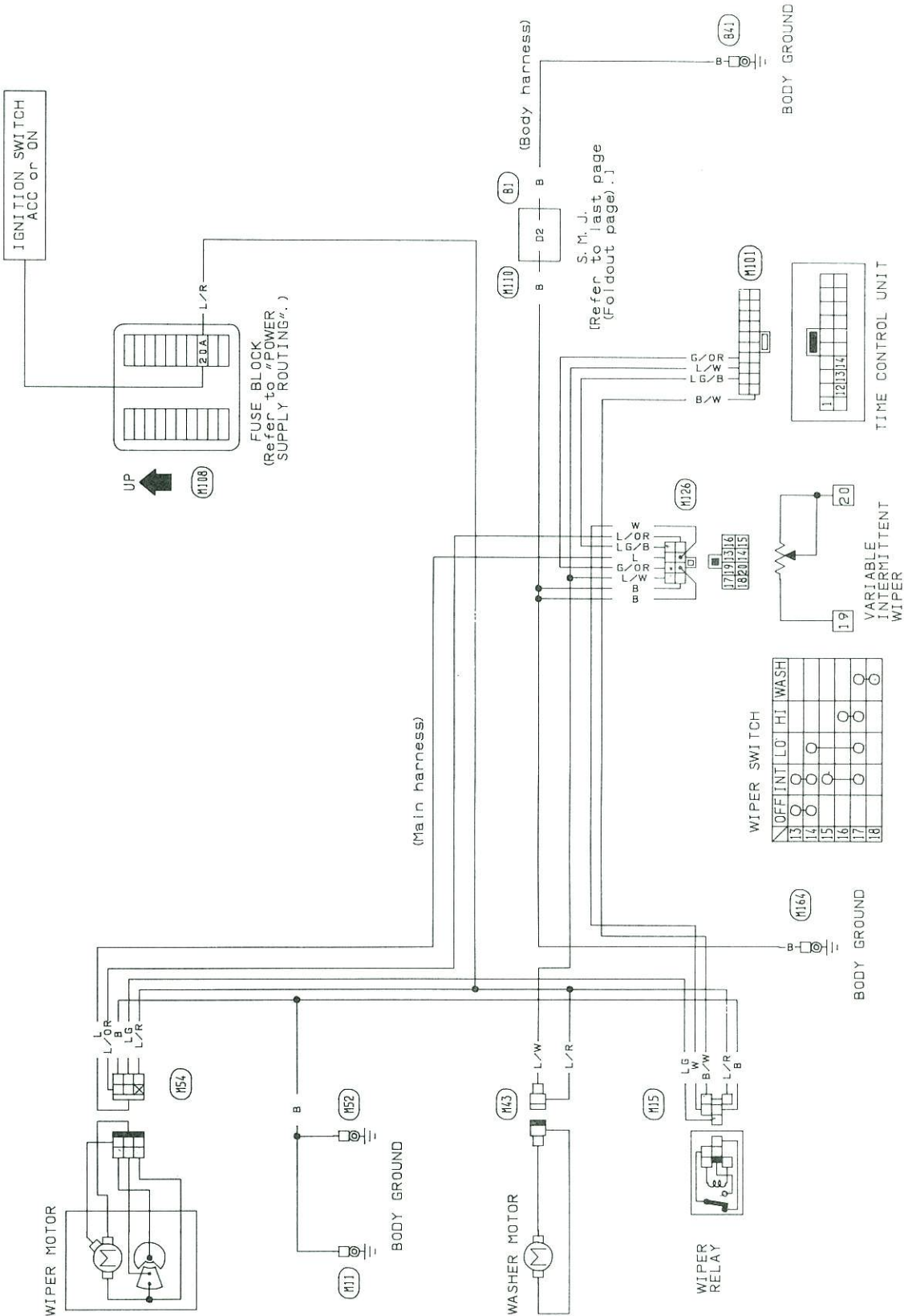
N.G. → Check meter illumination.
Check harness continuity of illumination circuit.



N.G. → Check illumination control switch.
Check harness continuity between T.C.U. and illumination switch.

O.K. → Replace T.C.U.

Front Wiper and Washer/Wiring Diagram



WIPER AND WASHER

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 "L₁" or "L₂" 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 "L₁" & "L₂".
- Tighten windshield wiper arm nuts to specified torque.

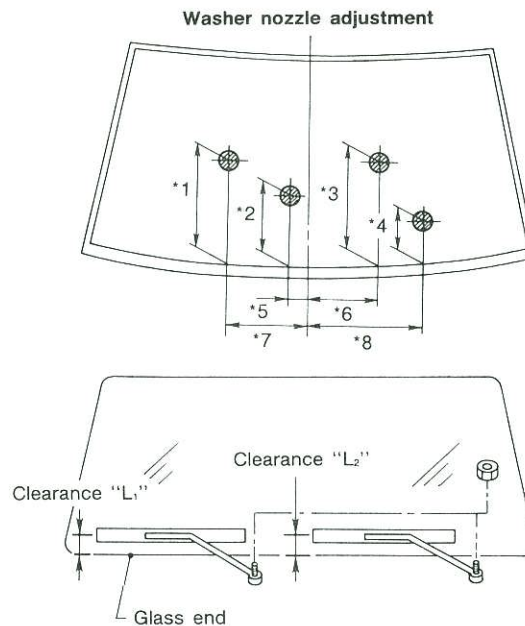
Clearance "L₁": 25 - 35 mm (0.98 - 1.38 in)

Clearance "L₂": 35 - 45 mm (1.38 - 1.77 in)

Windshield wiper:

⌚: 13 - 18 N·m (1.3 - 1.8 kg-m, 9 - 13 ft-lb)

Windshield wiper and washer

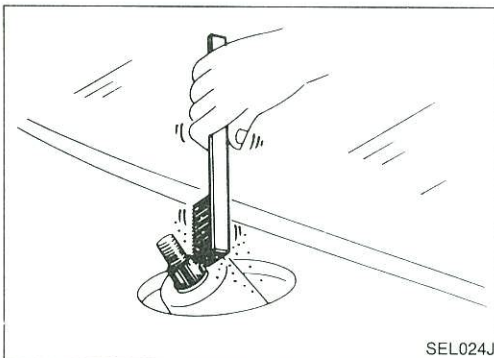


*1:	460 (18.11)
*2:	200 (7.87)
*3:	405 (15.94)
*4:	235 (9.25)
*5:	135 (5.31)
*6:	200 (7.87)
*7:	305 (12.01)
*8:	432 (17.01)

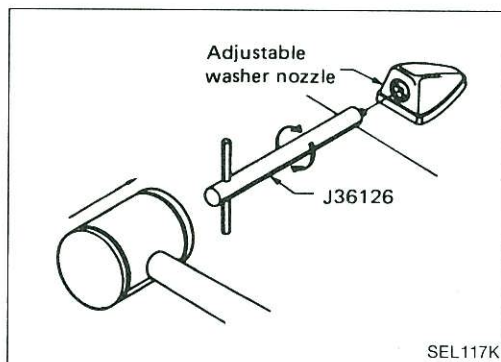
Unit: mm (in)

All the diameters of these circles are less than 80 (3.15).

SEL498N



- Before reinstalling wiper arm, clean up the pivot area as illustrated. This will reduce possibility of wiper arm looseness.

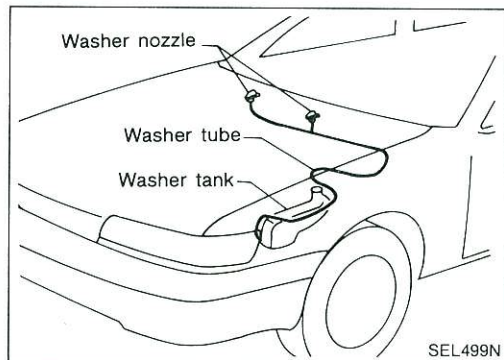


Washer Nozzle Adjustment

- Using Tool J36126, adjust windshield washer nozzle to correct its spray pattern.

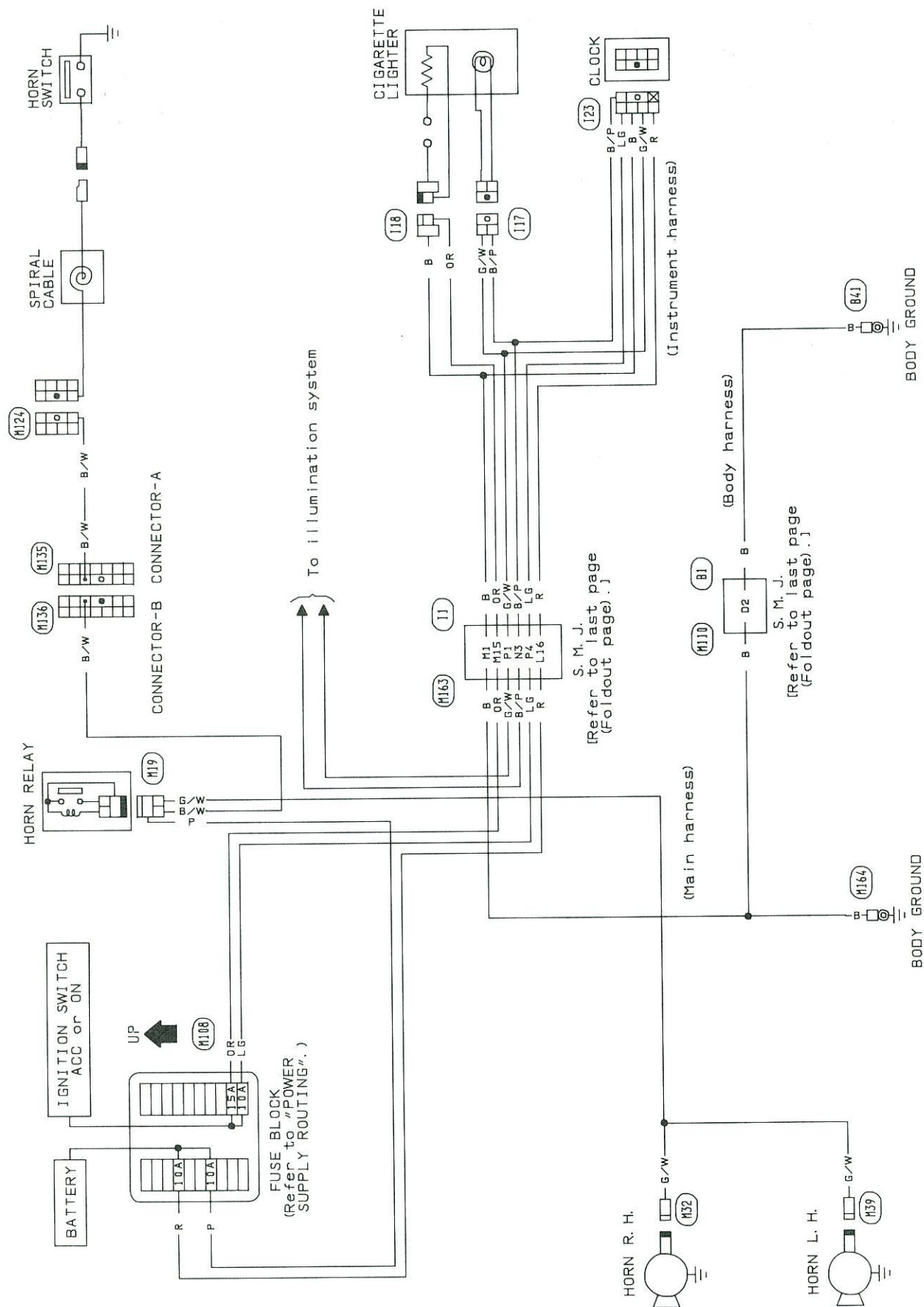
Before attempting to turn the nozzle, gently tap the end of Tool to free the nozzle.

This will prevent “rounding out” the small female square in the center of the nozzle.



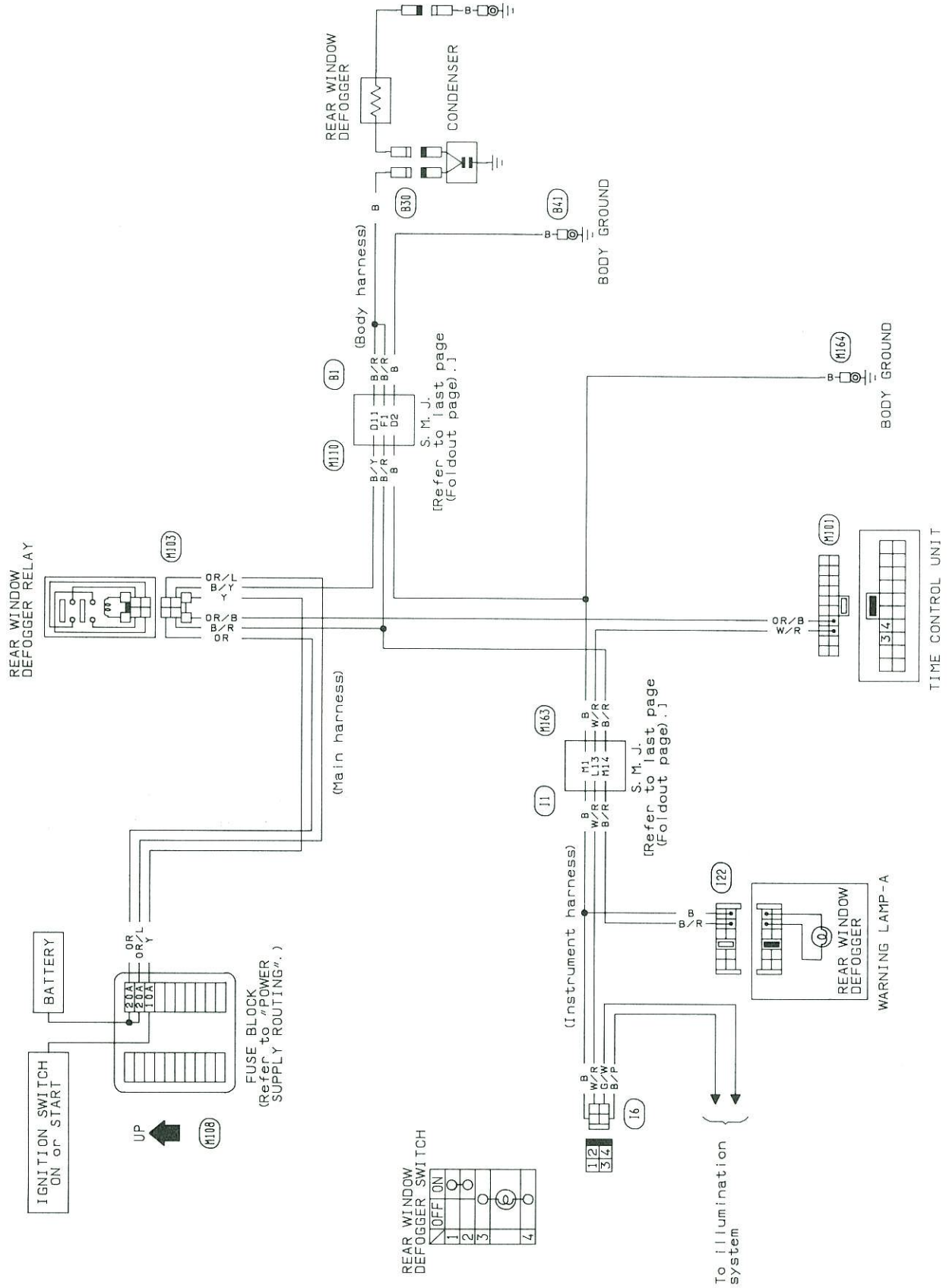
HORN, CIGARETTE LIGHTER, CLOCK

Wiring Diagram

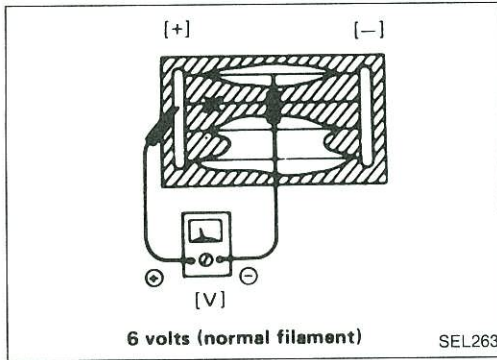


REAR WINDOW DEFOGGER

Wiring Diagram

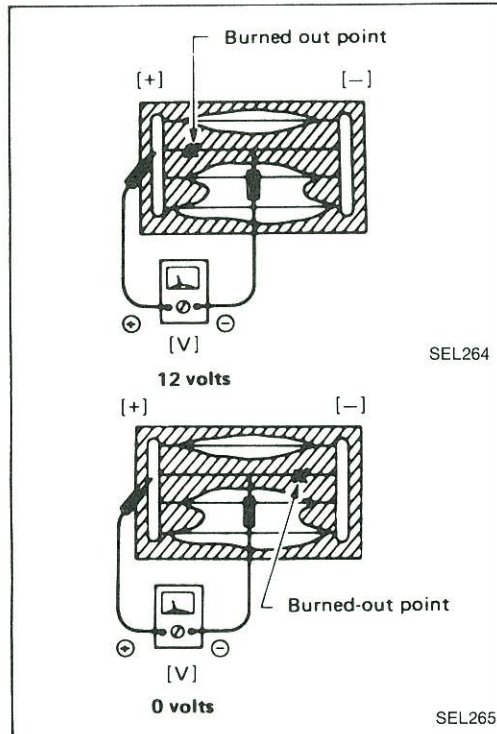


REAR WINDOW DEFOGGER

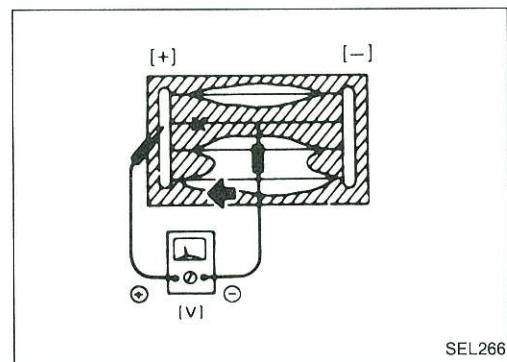


Filament Check

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.

REAR WINDOW DEFOGGER

Filament Repair

REPAIR EQUIPMENT

1. Conductive silver composition (Dupont No. 4817 or equivalent)
2. Ruler 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

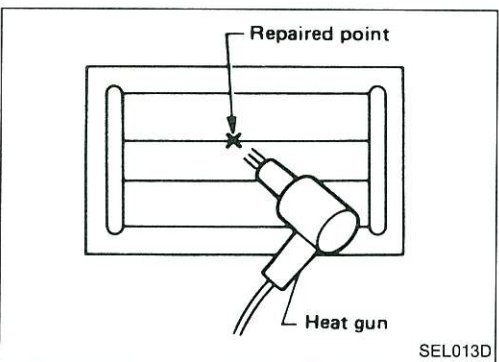
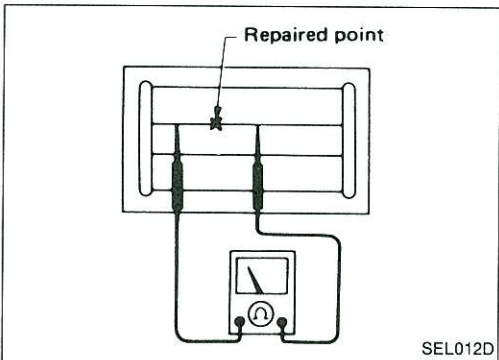
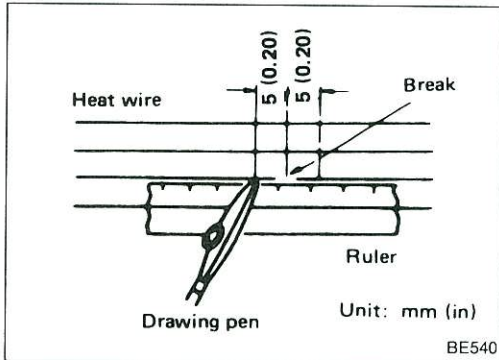
REPAIRING PROCEDURE

1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.

3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.
4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

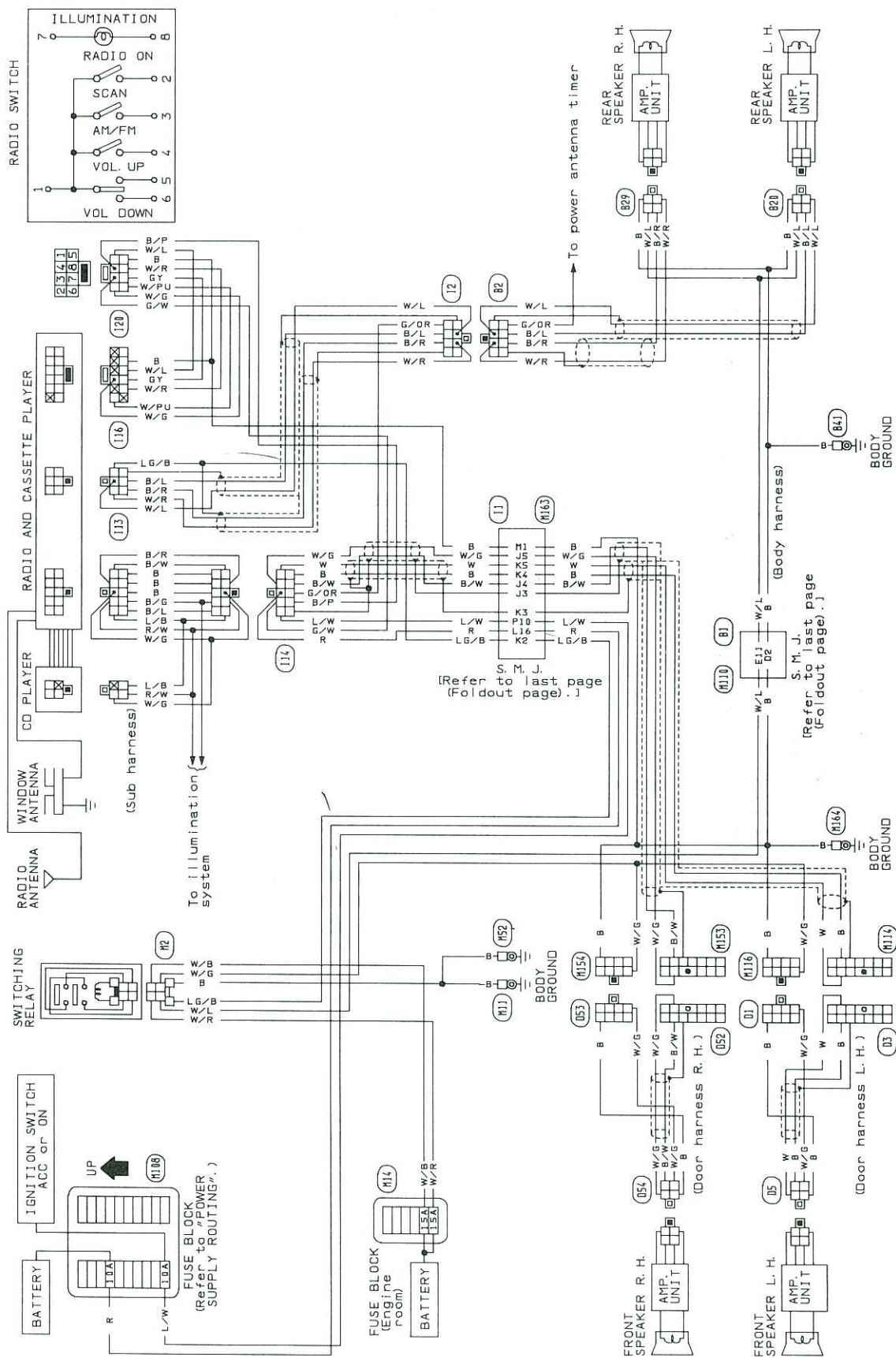
Do not touch repaired area while test is being conducted.



5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

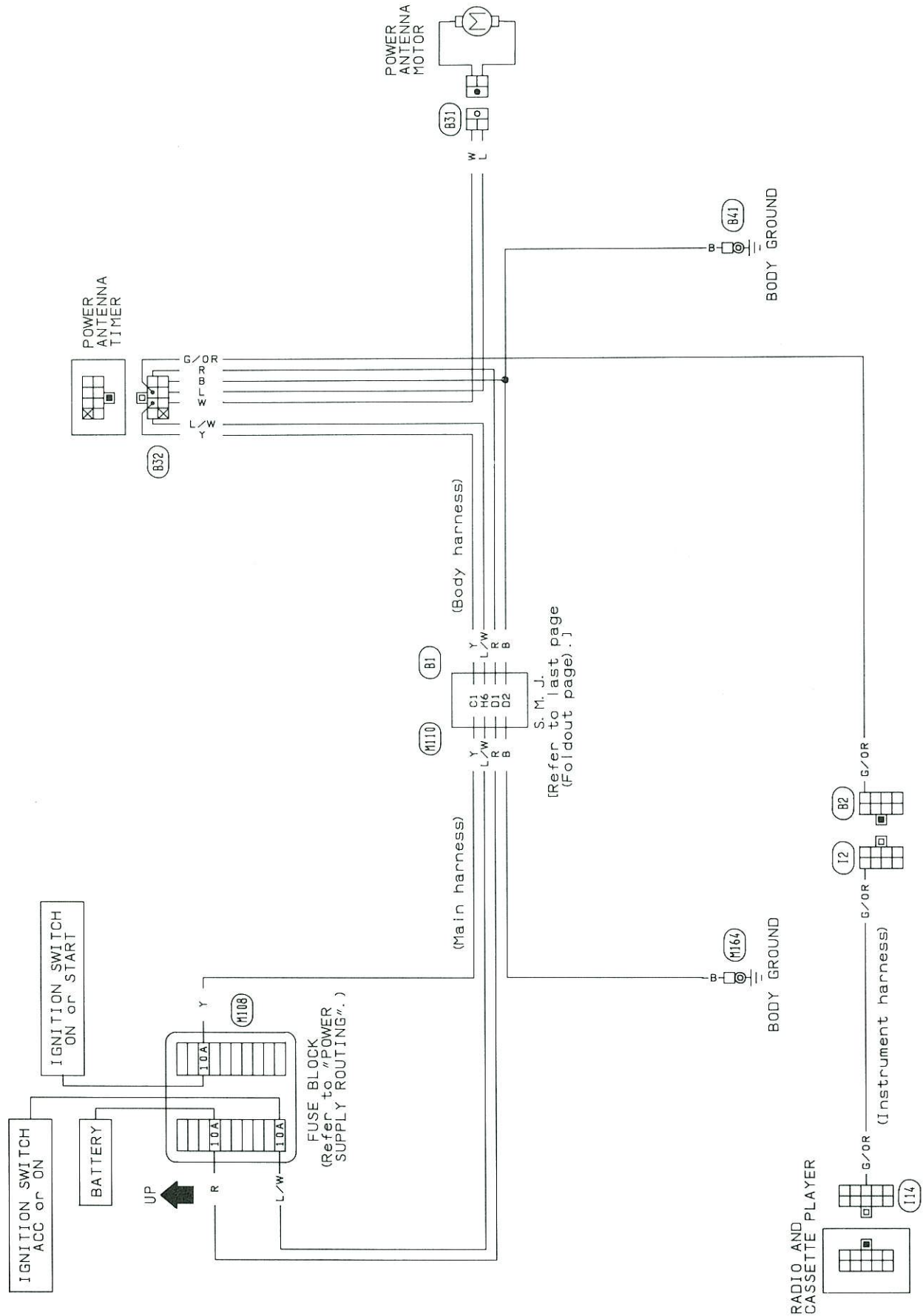
Audio/Wiring Diagram

BOSE SYSTEM



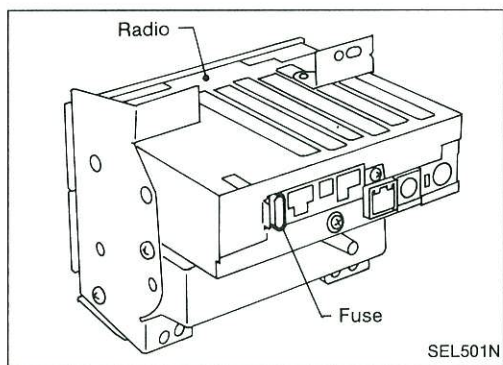
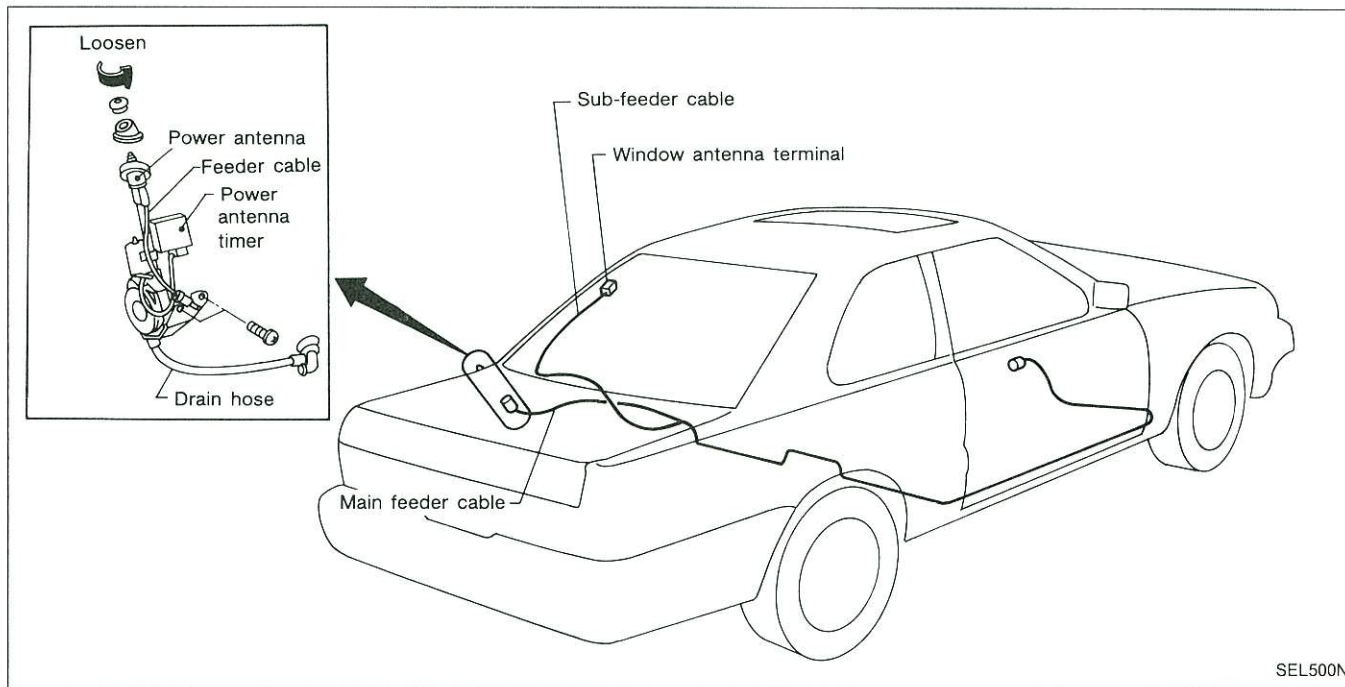
Audio/Wiring Diagram (Cont'd)

Power Antenna/Wiring Diagram

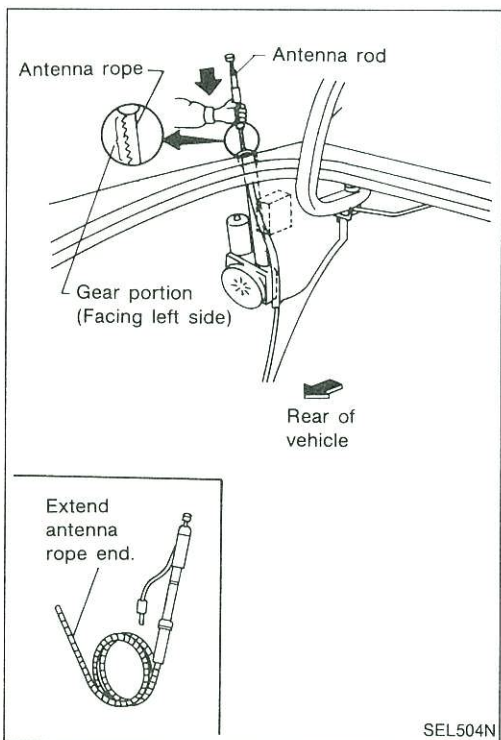
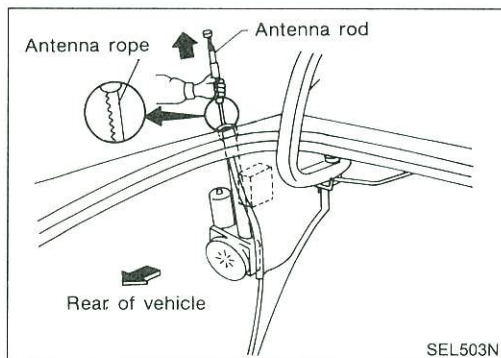
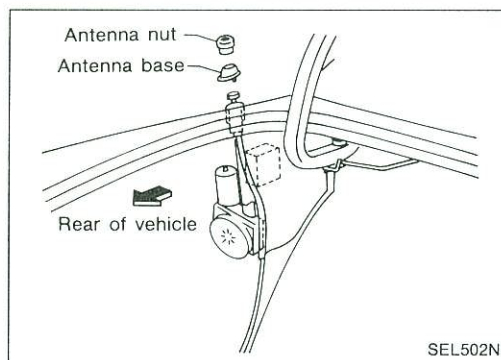


AUDIO AND POWER ANTENNA

Location of Antenna



Radio Fuse Check



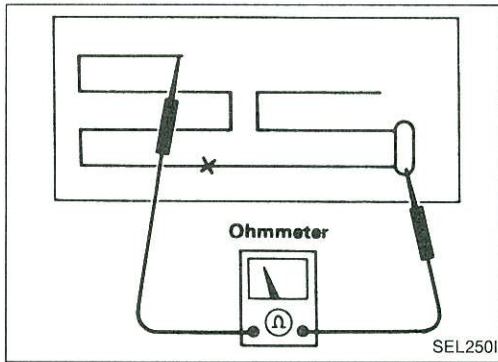
Antenna Rod Replacement

REMOVAL

1. Remove antenna nut and antenna base.
2. Withdraw antenna rod while raising it by operating antenna motor.

INSTALLATION

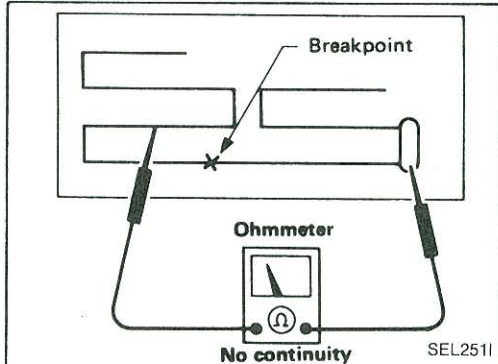
1. Lower antenna rod by operating antenna motor.
2. Insert gear section of antenna rope into place with it facing toward antenna motor.
3. As soon as antenna rope is wound on antenna motor, stop antenna motor. Insert antenna rod lower end into antenna motor pipe.
4. Retract antenna rod completely by operating antenna motor.
5. Install antenna nut and base.



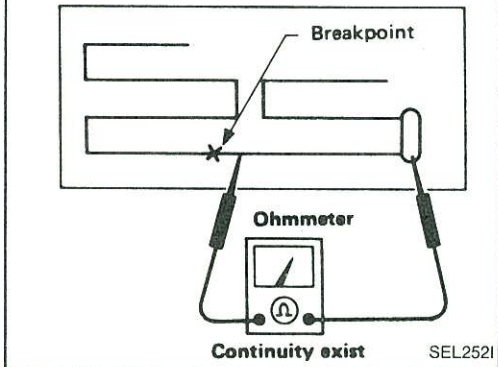
Window Antenna Repair

ELEMENT CHECK

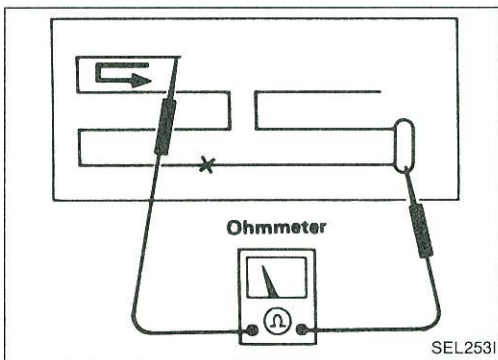
1. Attach probe circuit tester (in ohm range) to antenna terminal on each side.



2. If an element is broken, no continuity will exist.



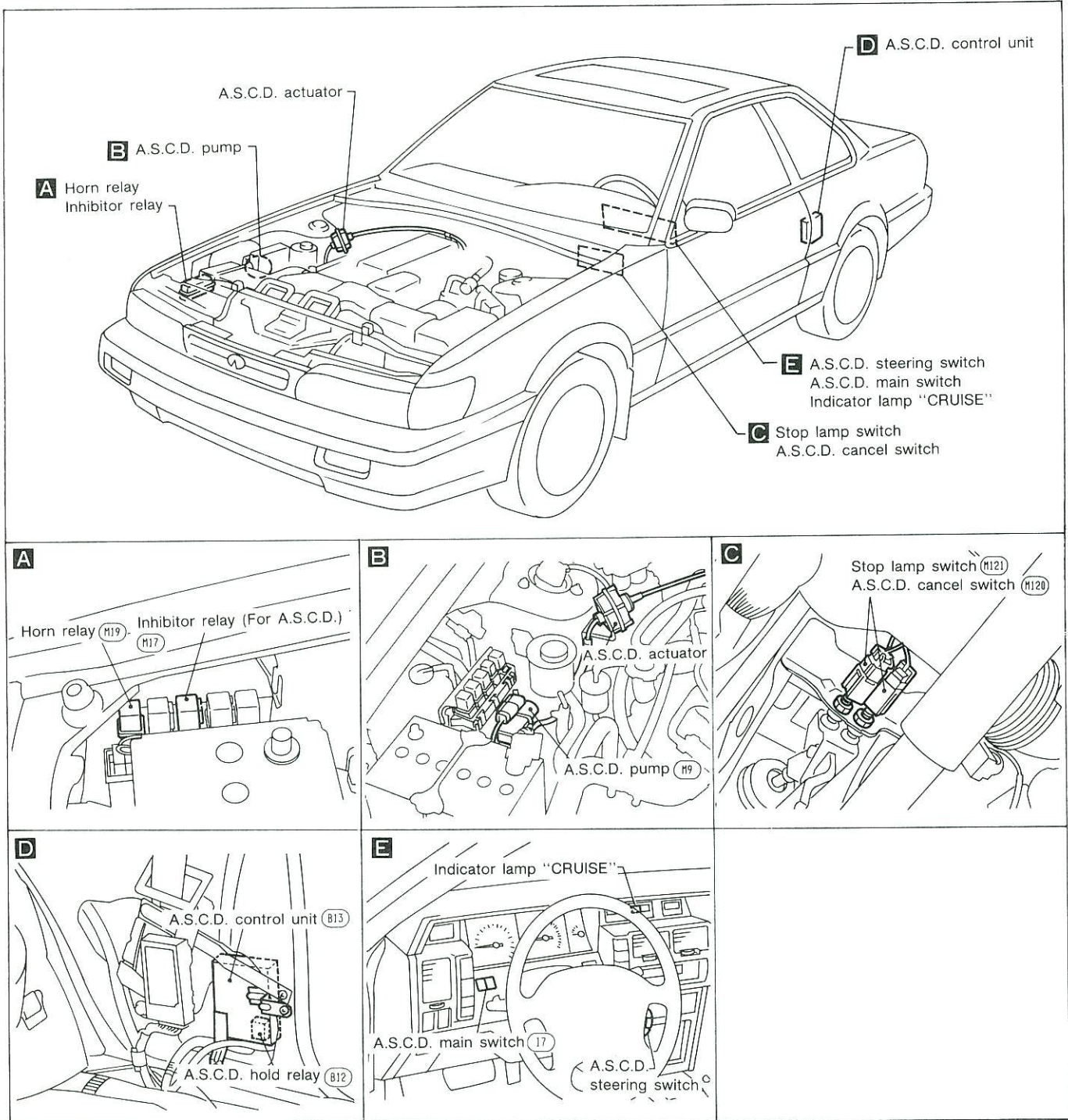
3. To locate broken point, move probe to left and right along element to determine point where tester needle swings abruptly.



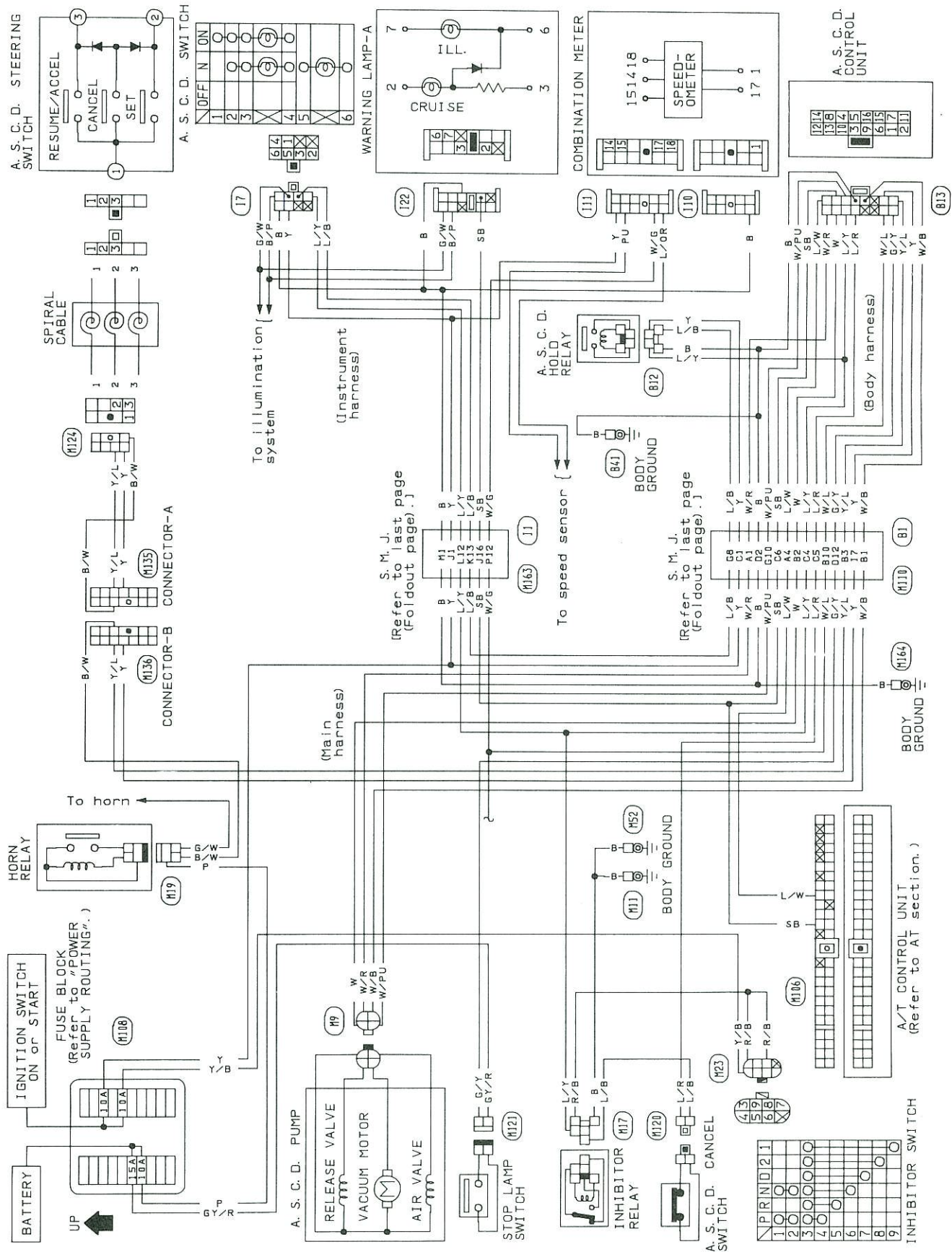
ELEMENT REPAIR

Refer to REAR WINDOW DEFOGGER "Filament Repair".

Component Parts and Harness Connector Location



Wiring Diagram



AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses

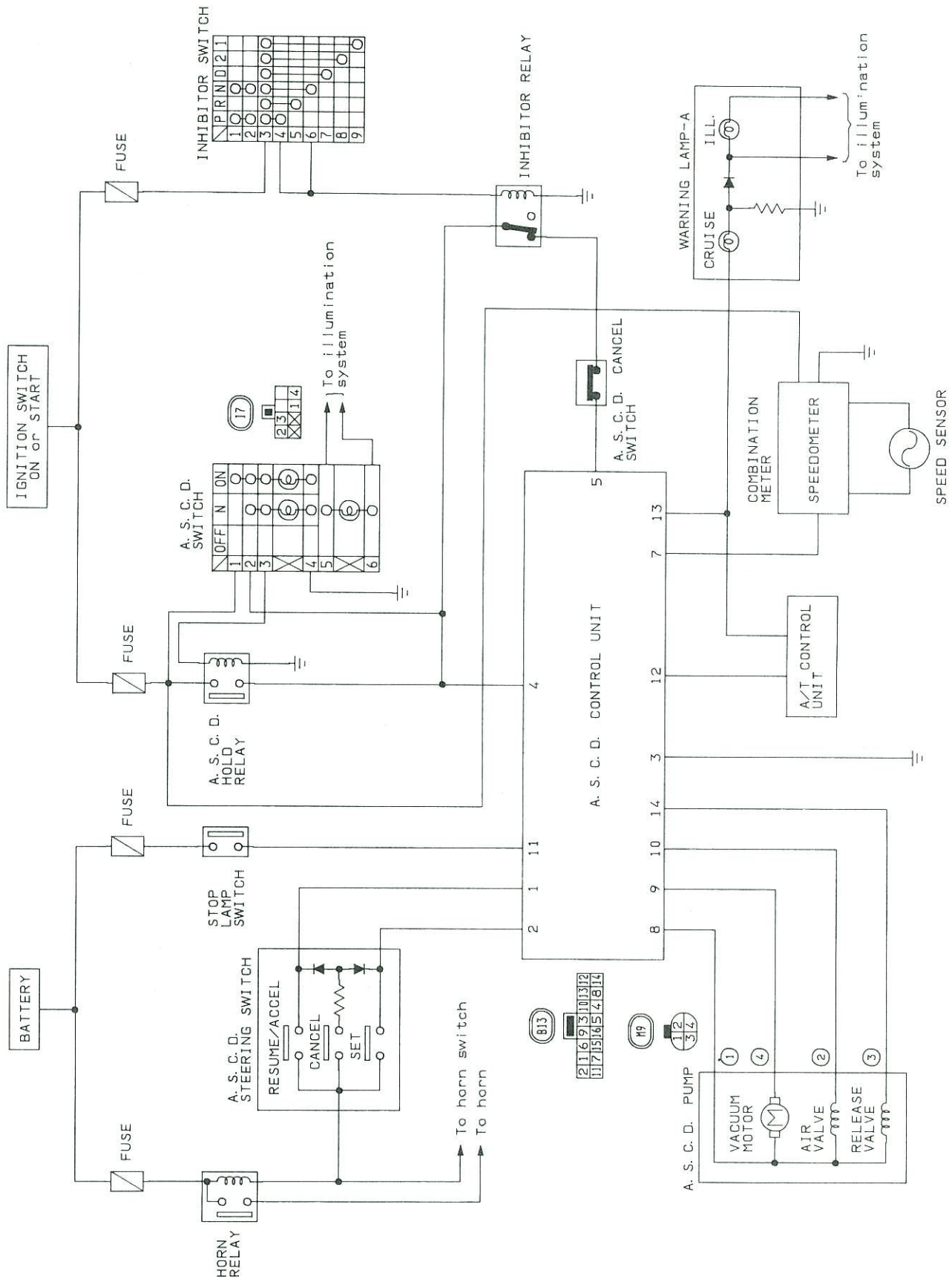
SYMPTOM CHART

PROCEDURE	Diagnostic Procedure								Electrical Components Inspection						
REFERENCE PAGE	EL-90	EL-92	EL-92	EL-93	EL-94	EL-95	EL-96	EL-97	EL-98	EL-99	EL-100	EL-100	EL-100	EL-101	EL-101
SYMPTOM	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	A.S.C.D. wire adjustment	A.S.C.D. actuator/A.S.C.D. pump	A.S.C.D. main switch	A.S.C.D. steering switch	A.S.C.D. cancel switch and stop lamp switch	Inhibitor switch (For A/T models)	Speed sensor
A.S.C.D. control unit cannot be set properly.	<input type="radio"/>									<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engine hunts		<input type="radio"/>							<input type="radio"/>	<input type="radio"/>					
Large difference between set speed and actual vehicle speed.			<input type="radio"/>						<input type="radio"/>	<input type="radio"/>					
Deceleration is greatest immediately after A.S.C.D. has been set.				<input type="radio"/>					<input type="radio"/>	<input type="radio"/>					
ACCEL switch will not operate.	<input type="radio"/>				<input type="radio"/>							<input type="radio"/>			
RESUME switch will not operate.	<input type="radio"/>					<input type="radio"/>						<input type="radio"/>	<input type="radio"/>		
Set speed cannot be cancelled.							<input type="radio"/>		<input type="radio"/>	<input type="radio"/>			<input type="radio"/>		
"CRUISE" indicator lamp blinks.								<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	<input type="radio"/>		

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK

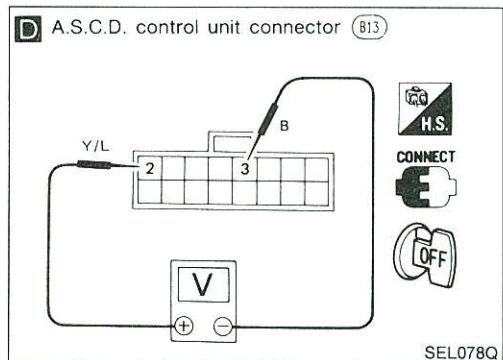
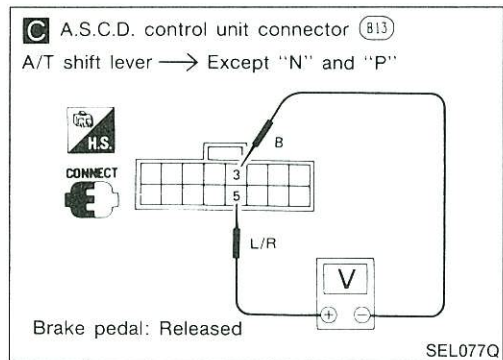
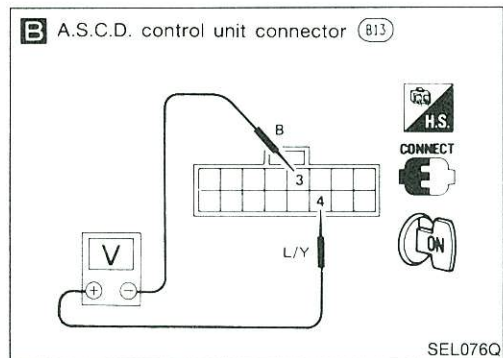
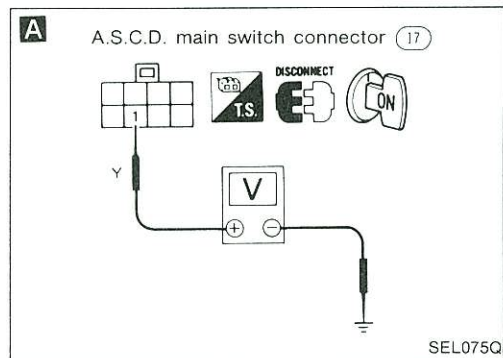


AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: A.S.C.D. control cannot be set.



Turn A.S.C.D. main switch "OFF" and "ON" to make sure indicator illuminates.

O.K.

A

CHECK POWER SUPPLY FOR A.S.C.D. MAIN SWITCH.

1. Disconnect main switch harness connector.
2. Do approx. 12 volts exist between main switch harness terminal ① and body ground?

No

Yes

Check fuse and harness.

CHECK A.S.C.D. MAIN SWITCH.
Refer to "Electrical Components Inspection".
CHECK A.S.C.D. HOLD RELAY.

B

CHECK POWER SUPPLY CIRCUIT FOR A.S.C.D. CONTROL UNIT.

1. Turn A.S.C.D. main switch "ON".
2. Check voltage between control unit harness terminal ④ and ③.

Battery voltage should exist.

N.G.

Check continuity between control unit harness terminal ④ and A.S.C.D. hold relay.

O.K.

C

CHECK CUT-OFF CIRCUIT FOR A.S.C.D. CONTROL UNIT.

Check voltage between control unit harness terminals ⑤ and ③.

Battery voltage should exist.

N.G.

CHECK A.S.C.D. CANCEL SWITCH AND INHIBITOR SWITCH (A/T models).
Refer to "Electrical Components Inspection".
CHECK INHIBITOR RELAY.

O.K.

D

CHECK SET/COAST SWITCH CIRCUIT FOR A.S.C.D. CONTROL UNIT.

1. Push and hold SET/COAST button on A.S.C.D. steering switch.
2. Check voltage between control unit harness terminals ② and ③.

Battery voltage should exist.

N.G.

Does horn work?

No

Yes

Check fuse and horn relay.

CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

O.K.

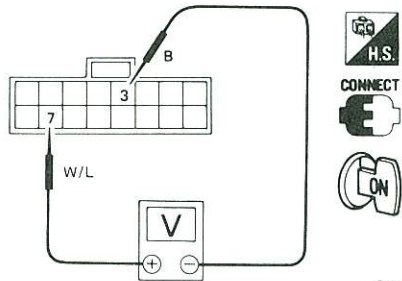
A

(Next page)

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

E A.S.C.D. control unit connector (813)



SEL079Q

E

CHECK SPEED SENSOR CIRCUIT.

1. Apply wheel chocks and jack up front of vehicle.
2. Connect voltmeter between control unit harness terminals ⑦ and ③.
3. Slowly turn front wheel.
4. Check deflection of voltmeter pointer.

N.G.

CHECK SPEED SENSOR. Refer to "Electrical Components Inspection".

O.K.

CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP.

Refer to "Electrical Components Inspection".

N.G.

Replace A.S.C.D. actuator/A.S.C.D. pump.

O.K.

F

CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP CIRCUIT.

1. Check voltage between control unit harness terminals ⑧ and ③.
- Voltage is 0V.**
2. Disconnect A.S.C.D. control unit connector.
3. Measure resistance between control unit harness terminals ⑧ and ⑨, ⑩, ⑭.

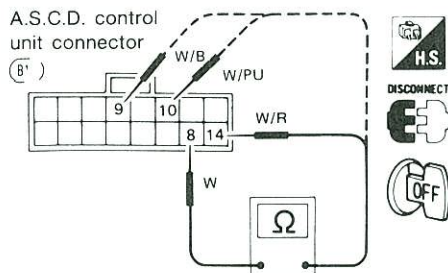
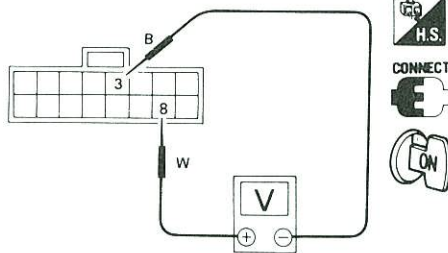
N.G.

Repair short or open circuit in A.S.C.D. actuator/A.S.C.D. pump harness.

O.K.

Replace A.S.C.D. control unit.

F A.S.C.D. control unit connector (813)



SEL080Q

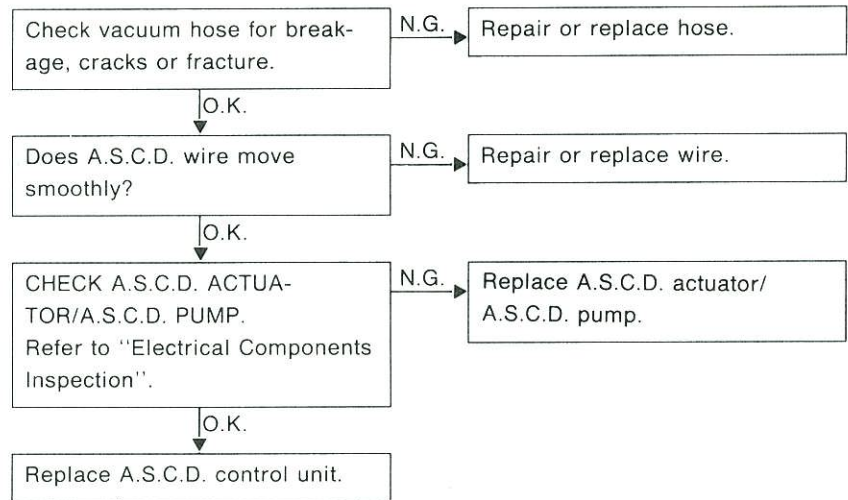
Terminals		Resistance [Ω]
⑧	⑨	Approx. 8 - 45
	⑩	Approx. 65
	⑭	Approx. 65

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

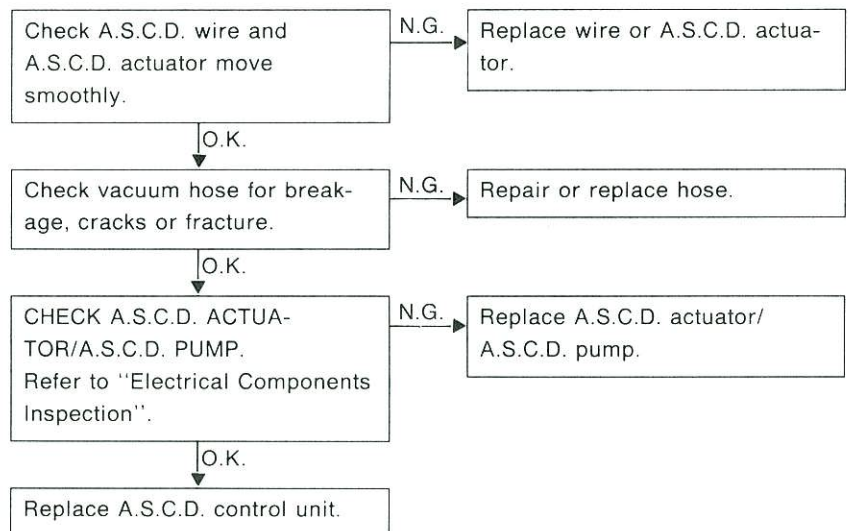
DIAGNOSTIC PROCEDURE 2

SYMPTOM: Engine hunts.



DIAGNOSTIC PROCEDURE 3

SYMPTOM: Large difference between set vehicle speed and actual speed.

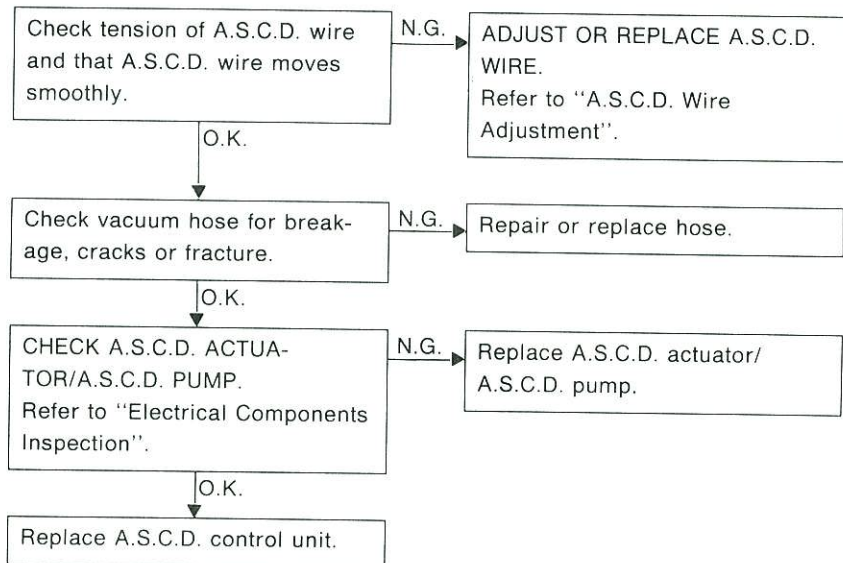


AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Deceleration is greatest immediately after A.S.C.D. has been set.

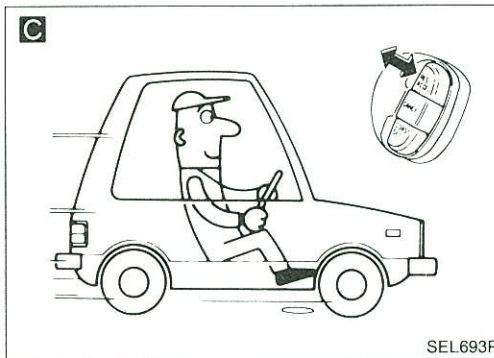
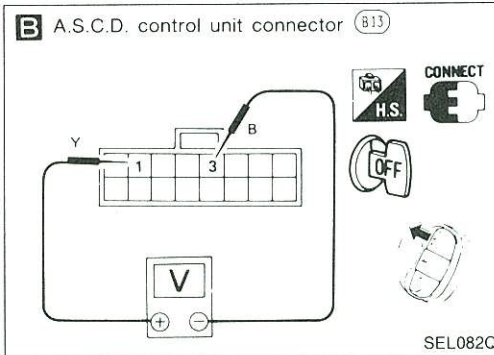
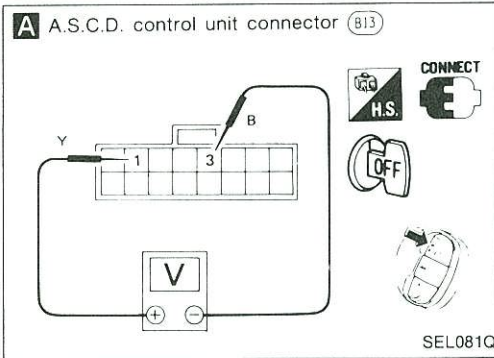


AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: ACCEL switch will not operate.



Check constant-speed function for operating using SET/COAST switch.

N.G.

Go to "DIAGNOSTIC PROCEDURE 1".

O.K.

A Check voltage between control unit harness terminals ① and ③ after pressing and holding RESUME/ACCEL switch.

N.G.

Battery voltage should exist.

O.K.

B Check voltage between control unit harness terminals ① and ③ after releasing RESUME/ACCEL switch.

N.G.

Voltage is 0V.

CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

O.K.

C Does vehicle accelerate when RESUME/ACCEL switch is pressed?

No

Replace control unit.

Yes

C Does vehicle maintain the new (faster) speed when RESUME/ACCEL switch is released?

No

Replace control unit.

Yes

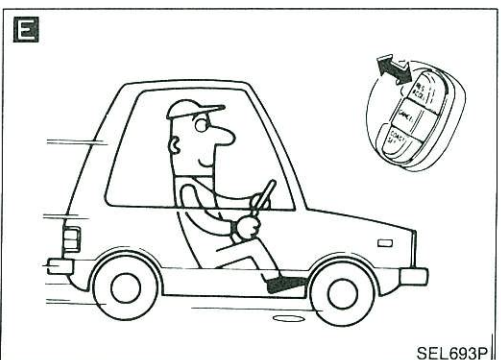
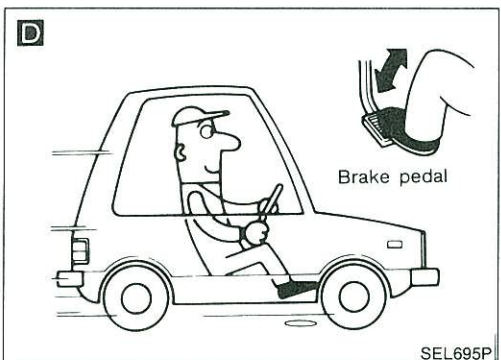
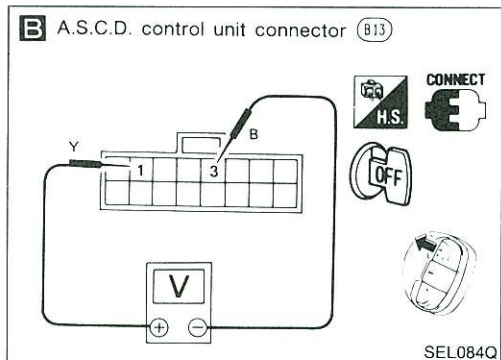
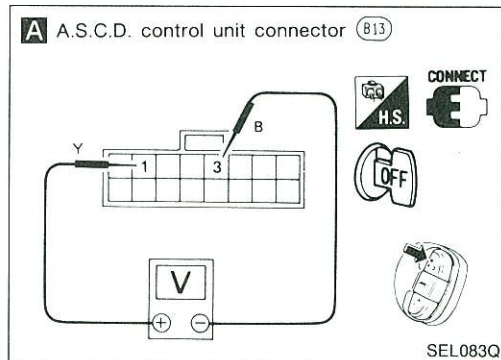
System is O.K.

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 6

SYMPTOM: RESUME switch will not operate.



Check constant-speed function for operation using SET/COAST switch.

N.G.

Go to "DIAGNOSTIC PROCEDURE 1".

A

O.K.

Check voltage between control unit harness terminals ① and ③ after pressing and holding RESUME/ACCEL switch.

Battery voltage should exist.

N.G.

B

O.K.

Check voltage between control unit harness terminals ① and ③ after releasing RESUME/ACCEL switch.

Voltage is 0V.

N.G.

CHECK A.S.C.D. STEERING SWITCH.
Refer to "Electrical Components Inspection".

C

O.K.

Set vehicle speed at 80 km/h (50 MPH) by pressing SET/COAST switch.

D

O.K.

While cruising at set speed, depress and release brake pedal.

O.K.

Does speed control disengage and "CRUISE" lamp turn off?

No

CHECK STOP LAMP SWITCH AND A.S.C.D. CANCEL SWITCH.
Refer to "Electrical Components Inspection".

Yes

E

O.K.

Above 48 km/h (30 MPH), press and release "RESUME/ACCEL" switch.

O.K.

Does vehicle return to previously set speed [80 km/h (50 MPH)]?

No

Replace control unit.

Yes

System is O.K.

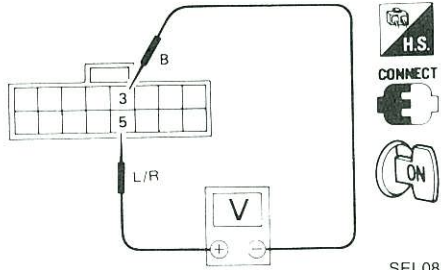
AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

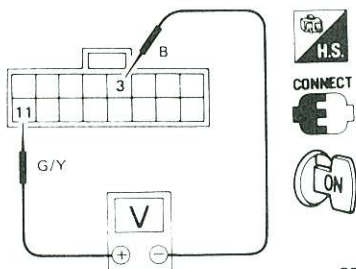
DIAGNOSTIC PROCEDURE 7

SYMPTOM: Set speed cannot be cancelled.

A A.S.C.D. control unit connector (813)



B A.S.C.D. control unit connector (813)



A

CHECK A.S.C.D. CANCEL SWITCH AND INHIBITOR SWITCH CIRCUIT.

1. Turn A.S.C.D. main switch "ON".
2. Check voltage between control unit harness terminals (5) and (3).

Conditions		Voltage [V]
A.S.C.D. cancel switch	Depressed	0
	Released	Approx. 12
A/T shift lever position is at any position except N or P.		Approx. 12
A/T shift lever position is at N or P.		0

N.G.

CHECK A.S.C.D. CANCEL SWITCH AND INHIBITOR SWITCH.
Refer to "Electrical Components Inspection".

B

CHECK STOP LAMP SWITCH CIRCUIT.
Check voltage between control unit harness terminals (11) and (3).

Condition		Voltage [V]
Stop lamp switch	Depressed	Approx. 12
	Released	0

N.G.

CHECK STOP LAMP SWITCH.
Refer to "Electrical Components Inspection".

Check A.S.C.D. wire moves smoothly.

N.G.

Replace A.S.C.D. wire.

CHECK A.S.C.D. ACTUATOR/A.S.C.D. PUMP.
Refer to "Electrical Components Inspection".

N.G.

Replace A.S.C.D. actuator/
A.S.C.D. pump.

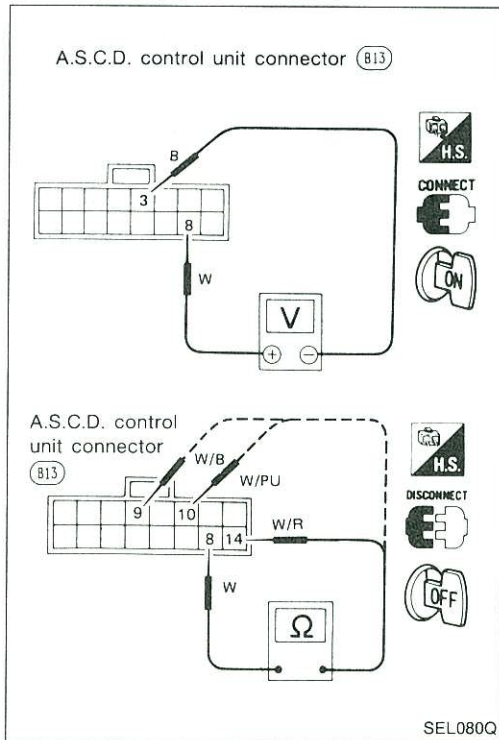
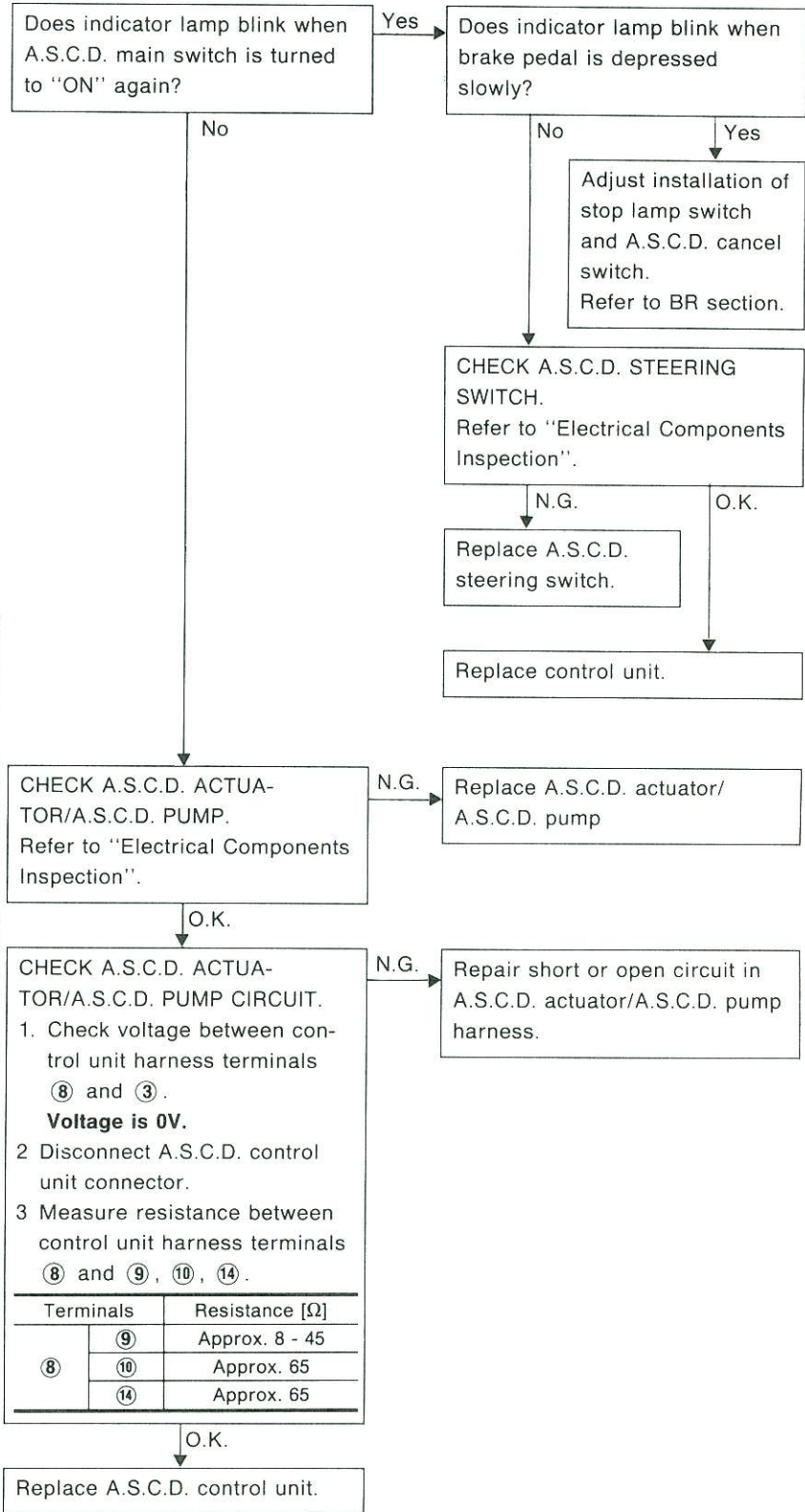
Replace A.S.C.D. control unit.

AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 8

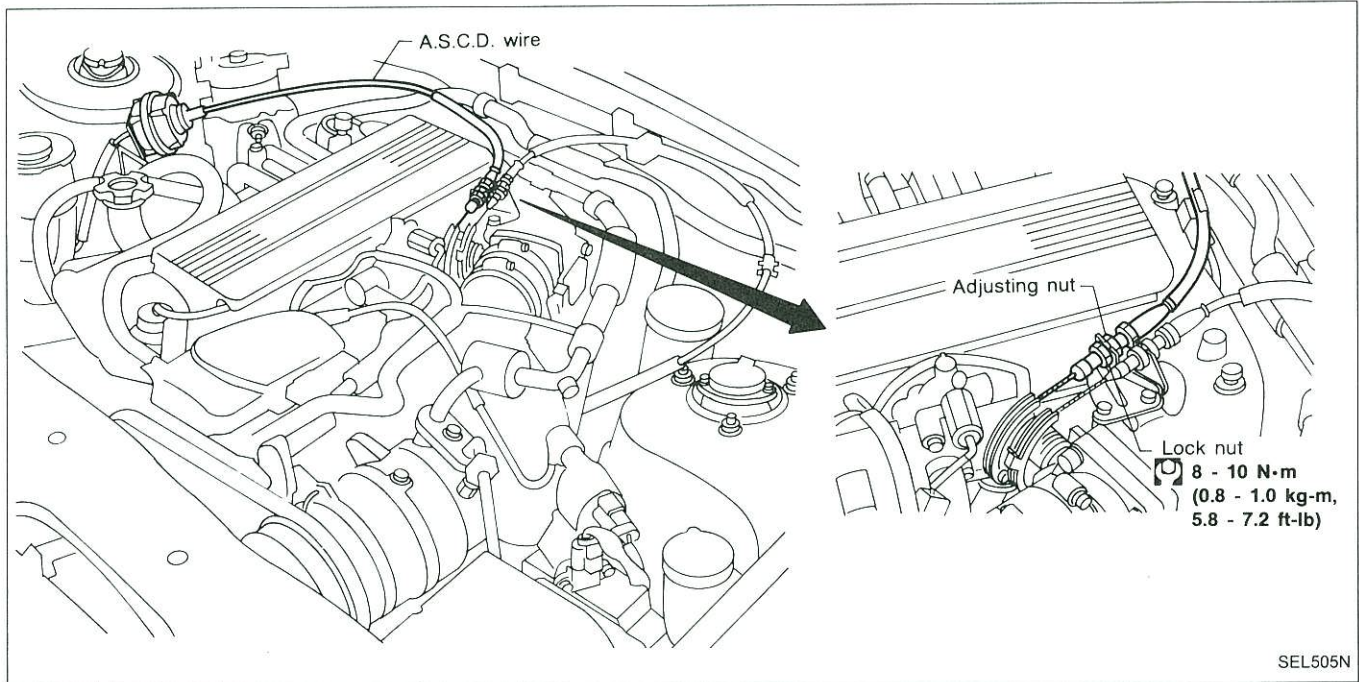
SYMPTOM: "CRUISE" indicator lamp blinks.



AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

A.S.C.D. WIRE ADJUSTMENT



CAUTION:

- Be careful not to twist A.S.C.D. wire when removing it.
- Do not tense A.S.C.D. wire excessively during adjustment.

After confirming that accelerator wire is properly adjusted, adjust the tension of A.S.C.D. wire in the following manner.

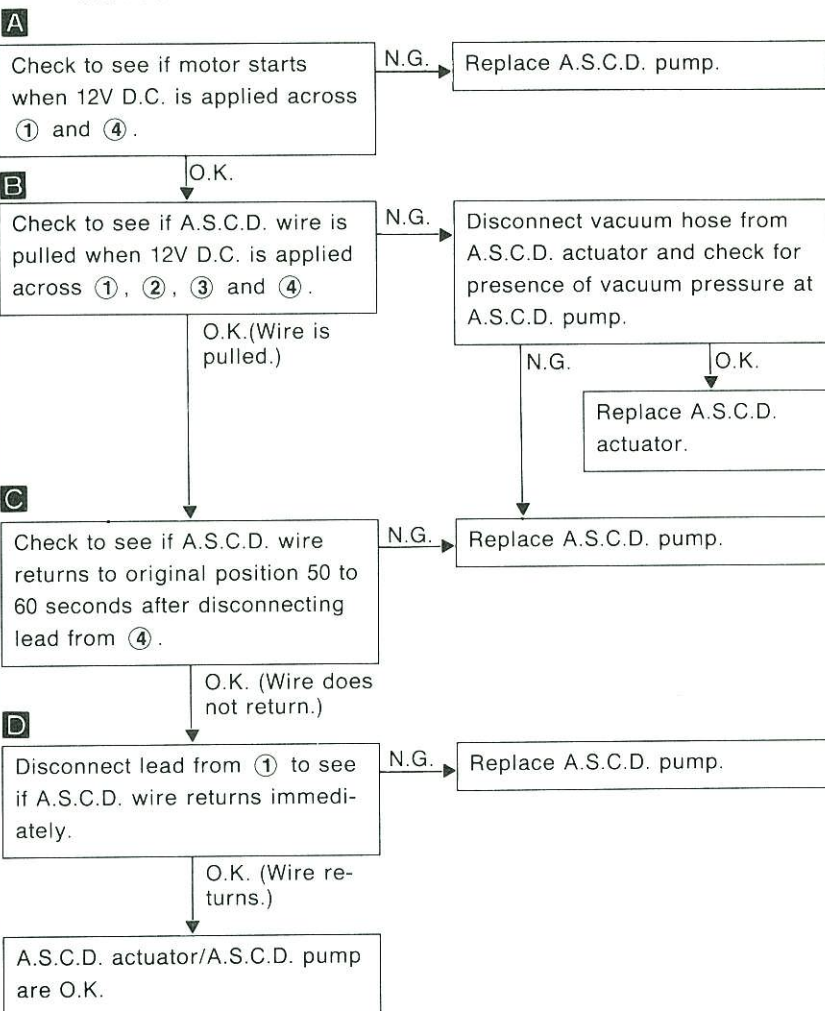
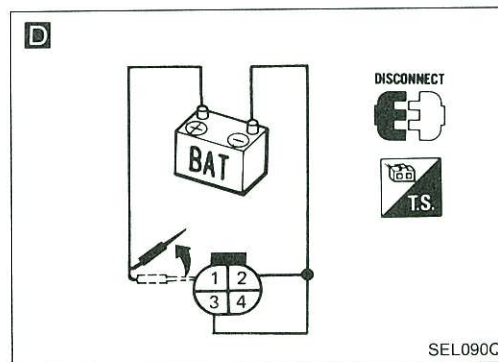
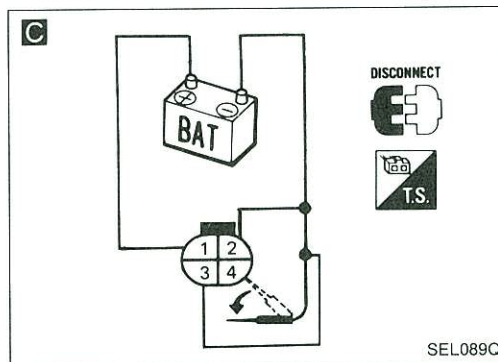
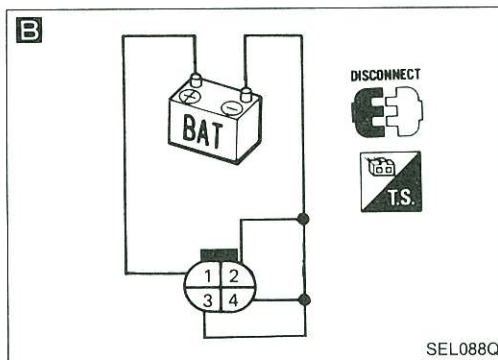
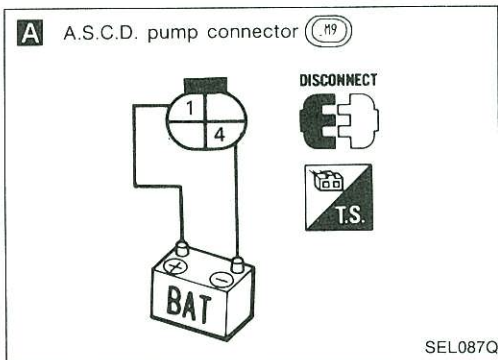
- (1) After adjusting the length of the accelerator wire, turn a securing nut by 1/2 to 1 turn from throttle open starting position to the wire loosening direction to fix. (Must be securing carried out to prevent response delay of operation of the A.S.C.D.)
- (2) Securely tighten lock nut to hold adjusting nut in place.

Trouble Diagnoses (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

A.S.C.D. actuator/A.S.C.D. pump

1. Disconnect A.S.C.D. actuator/A.S.C.D. pump connector.
2. Check A.S.C.D. actuator/A.S.C.D. pump operations as shown.

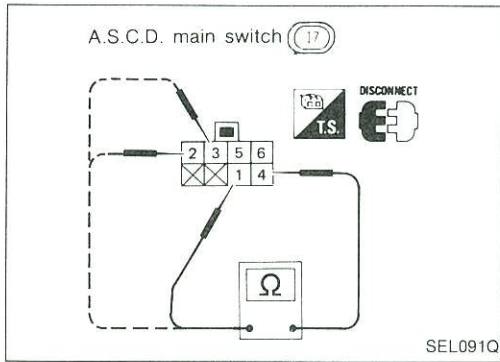


AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

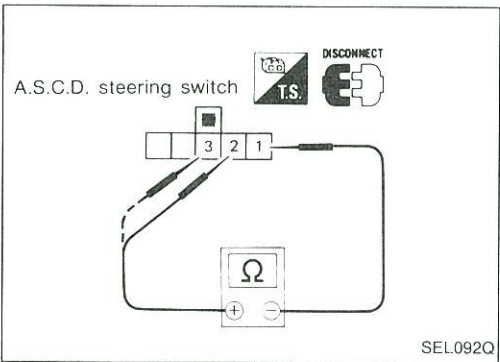
Trouble Diagnoses (Cont'd)

A.S.C.D. main switch

Check continuity between terminals by pushing switch to each position.



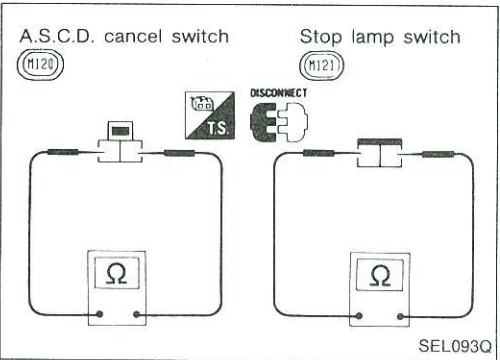
Terminals	1	2	3	4	5	6
Switch position						
ON						
N						
OFF						



A.S.C.D. steering switch

Check continuity between terminals by pushing each button.

Terminal	1	2	3
Button			
SET/COAST			
RESUME/ACCEL			
CANCEL			



A.S.C.D. cancel switch and stop lamp switch

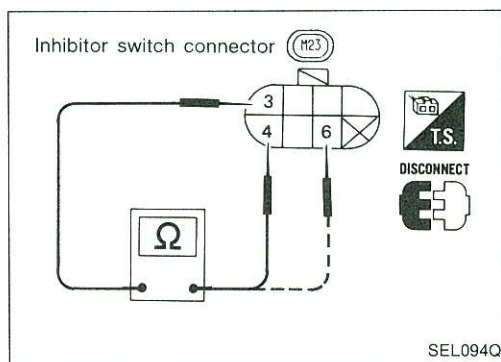
Condition	Continuity	
	A.S.C.D. cancel switch	Stop lamp switch
When brake pedal is depressed	No	Yes
When brake pedal is released	Yes	No

Check each switch after adjusting brake pedal — refer to BR section.

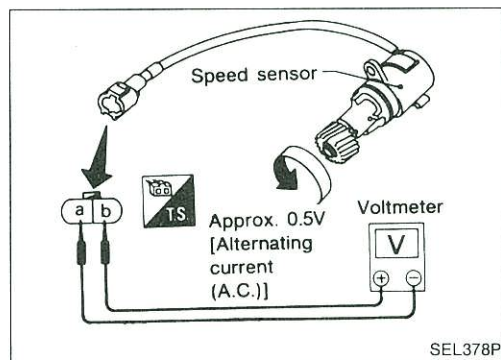
AUTOMATIC SPEED CONTROL DEVICE (A.S.C.D.)

Trouble Diagnoses (Cont'd)

Inhibitor switch



Condition	Continuity
When shift lever position is "N" or "P"	Yes
When shift lever position is any position except "N" or "P"	No



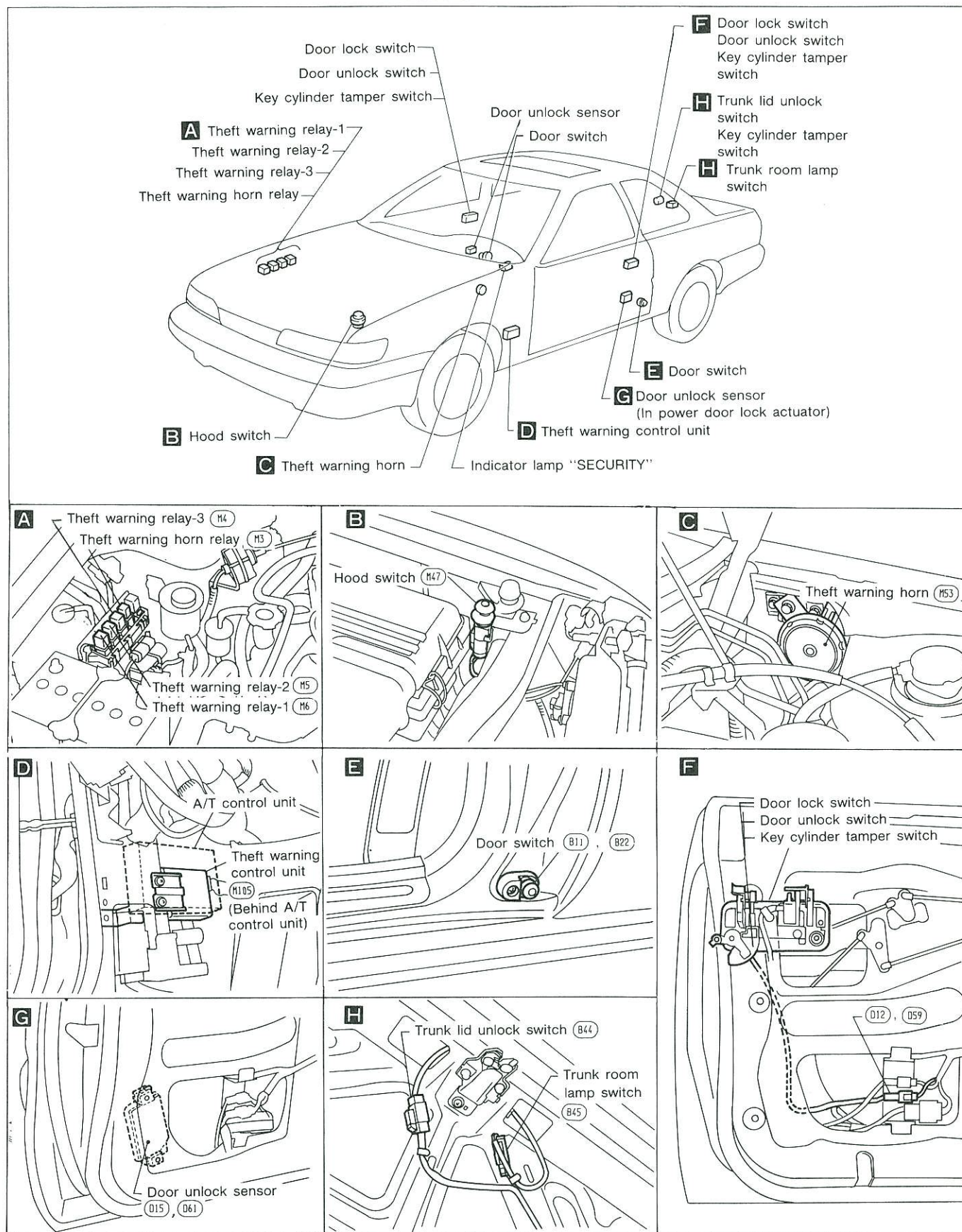
Speed sensor

1. Remove speed sensor from transaxle.
2. Turn speedometer pinion quickly and measure voltage across **a** and **b**.

NOTE

THEFT WARNING SYSTEM

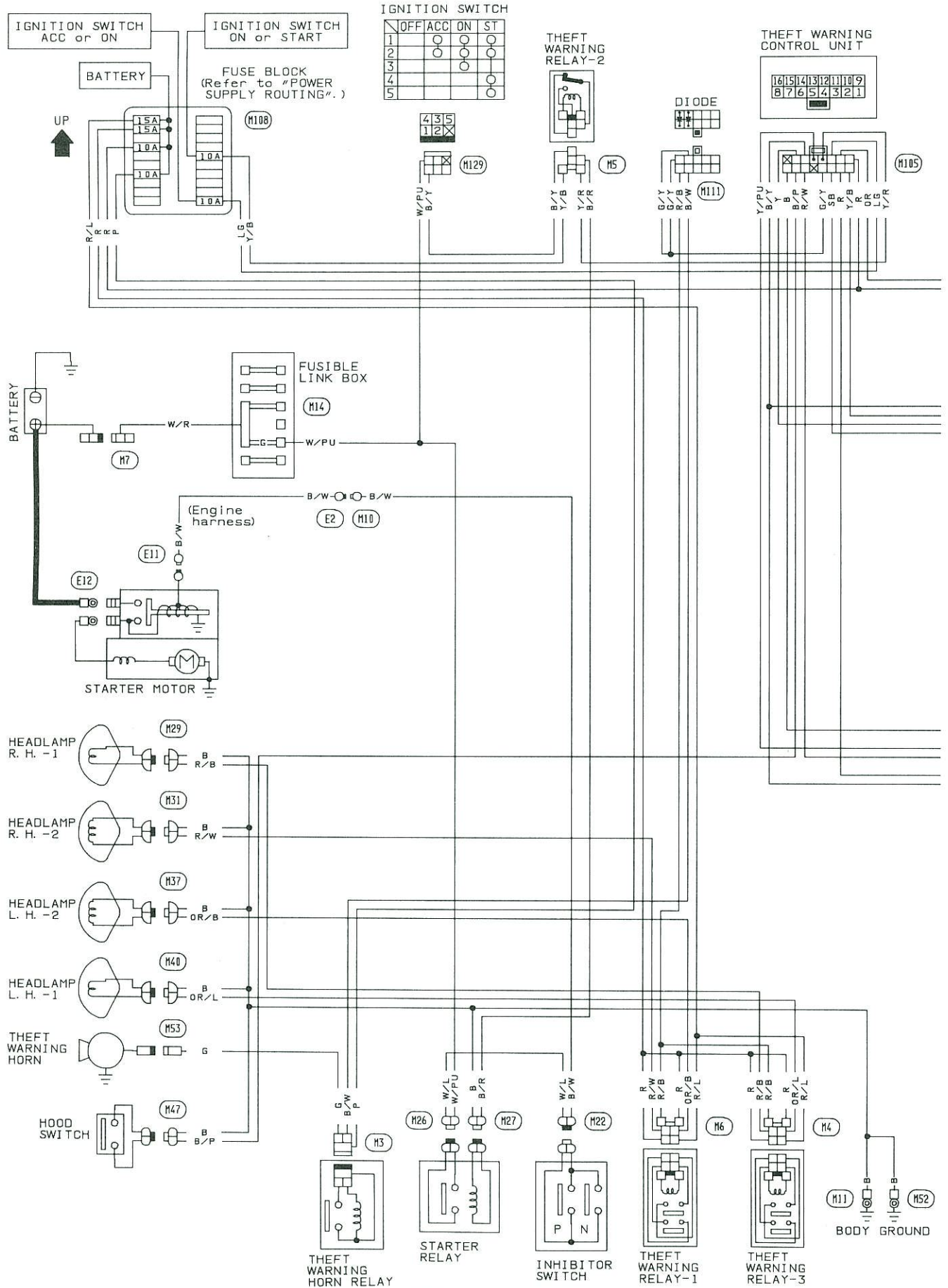
Component Parts and Harness Connector Location



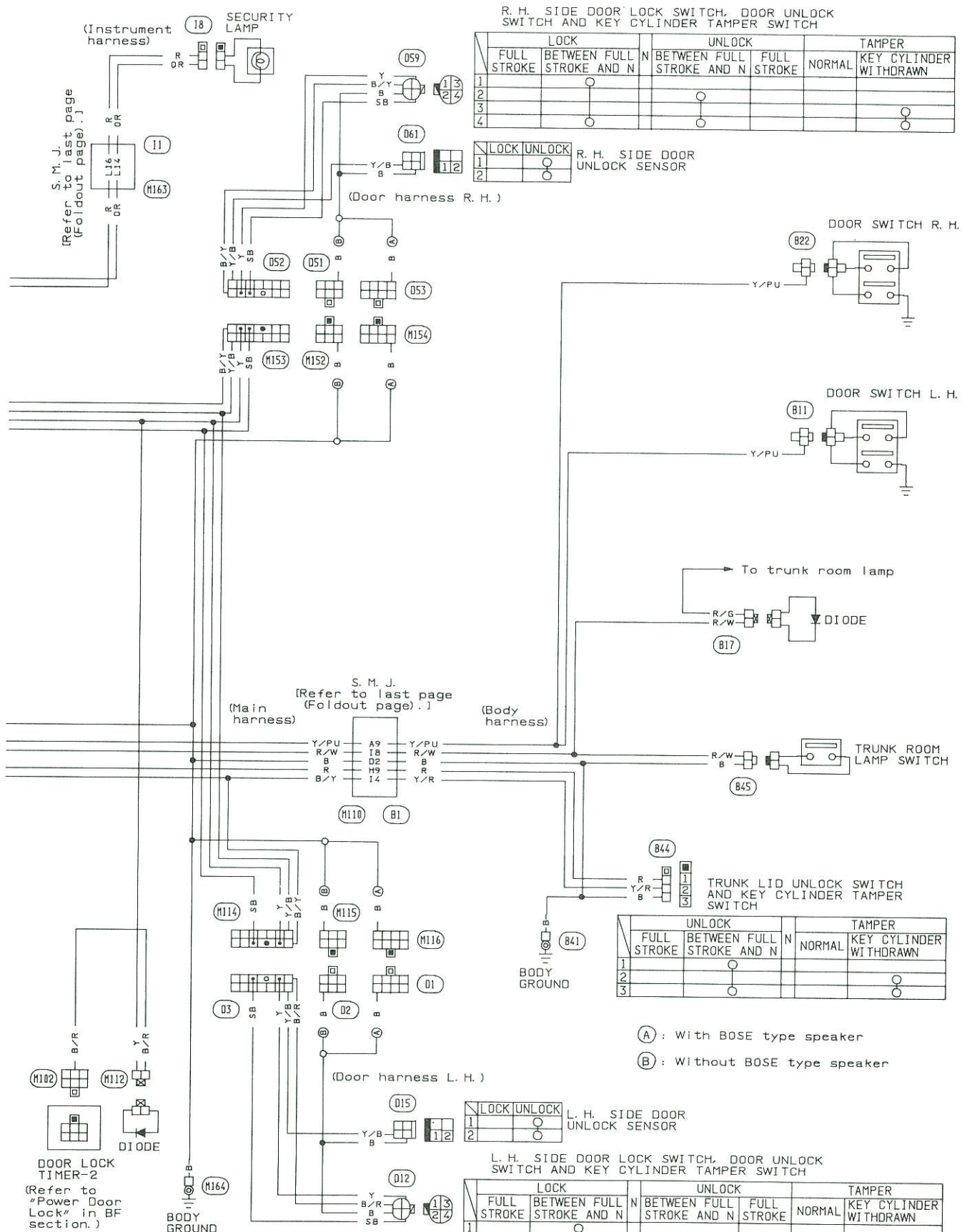
SEL095Q

THEFT WARNING SYSTEM

Wiring Diagram



Wiring Diagram (Cont'd)



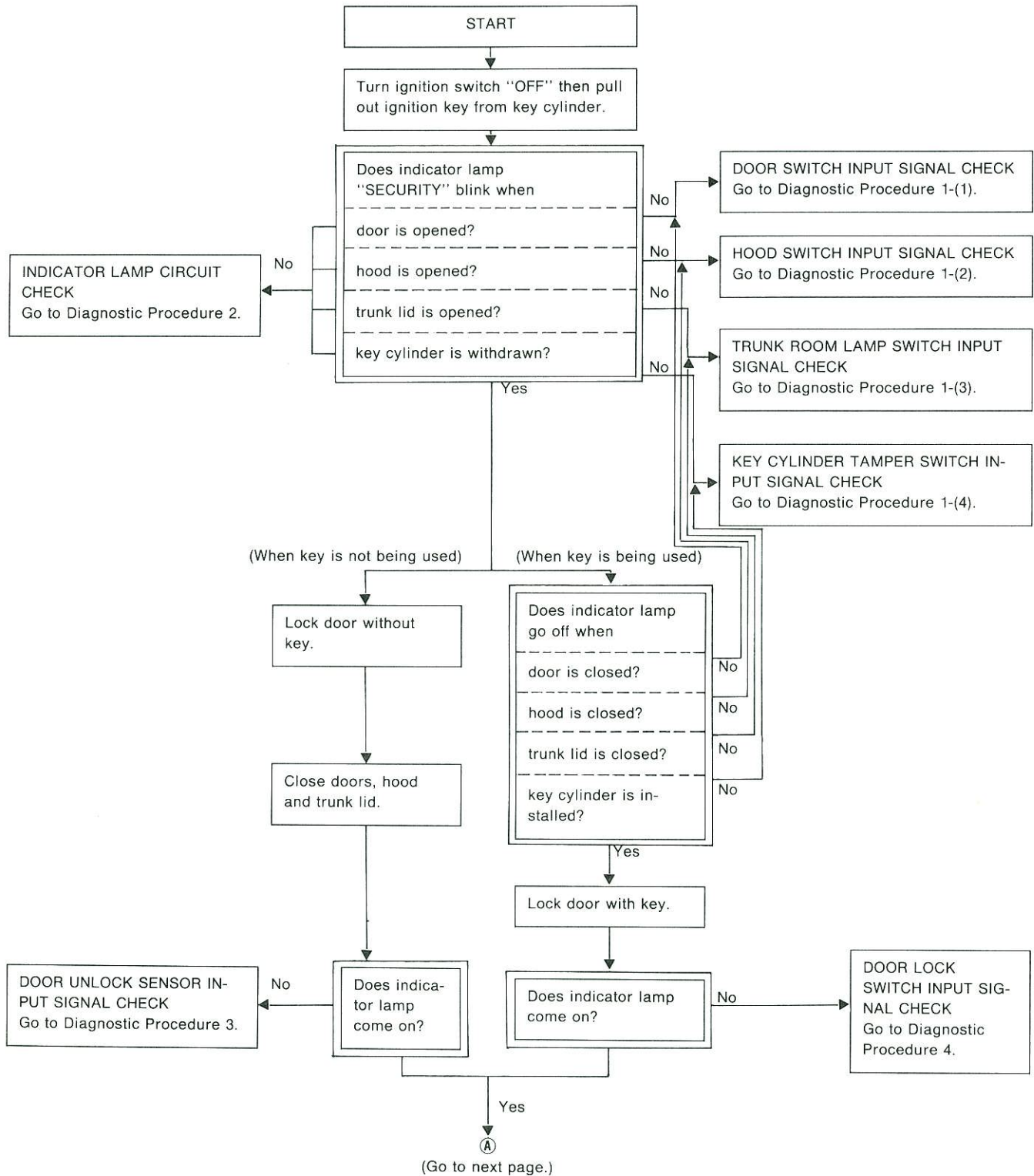
MEL585A

THEFT WARNING SYSTEM

Trouble Diagnoses

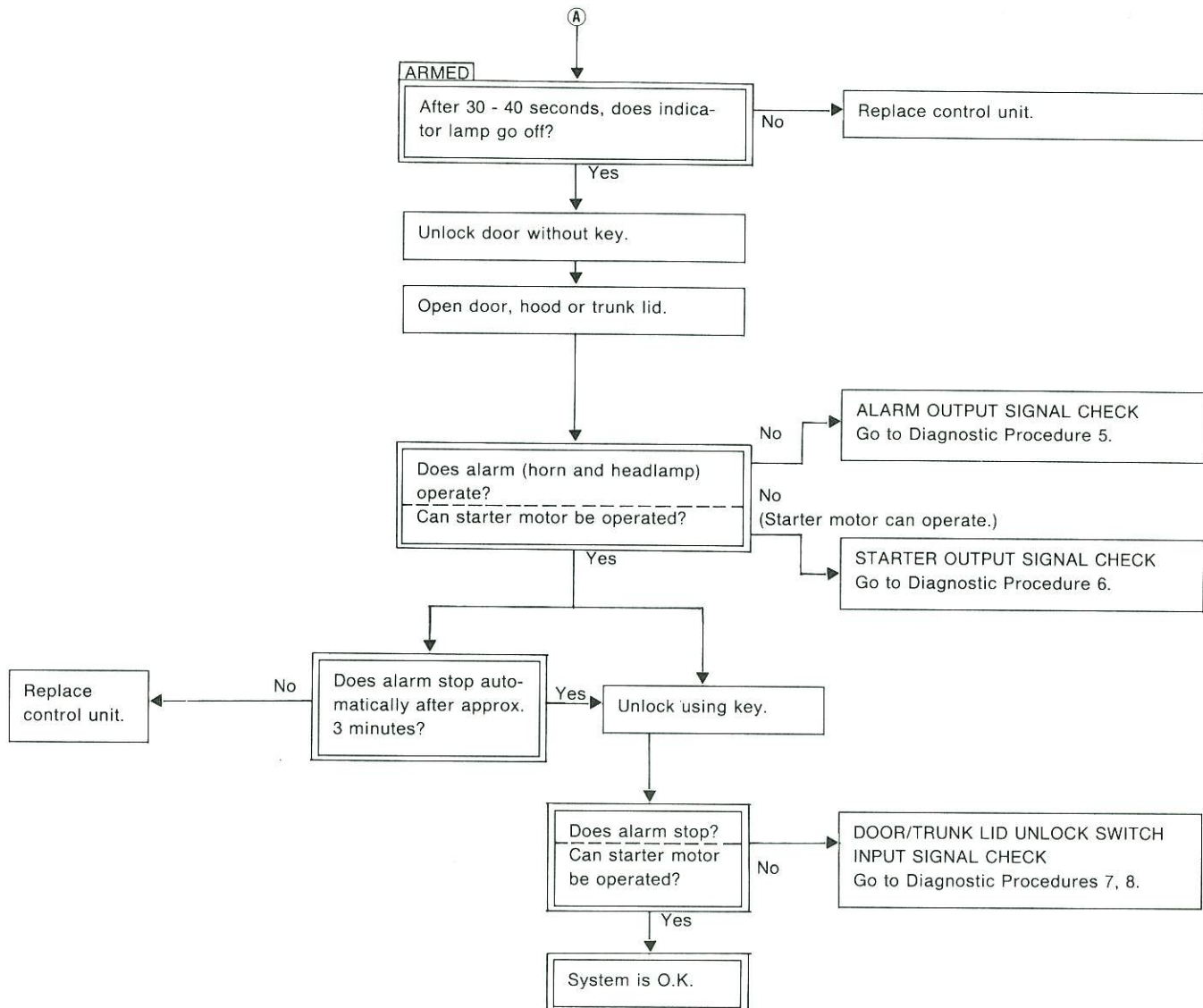
SYSTEM OPERATION CHECK

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.



THEFT WARNING SYSTEM

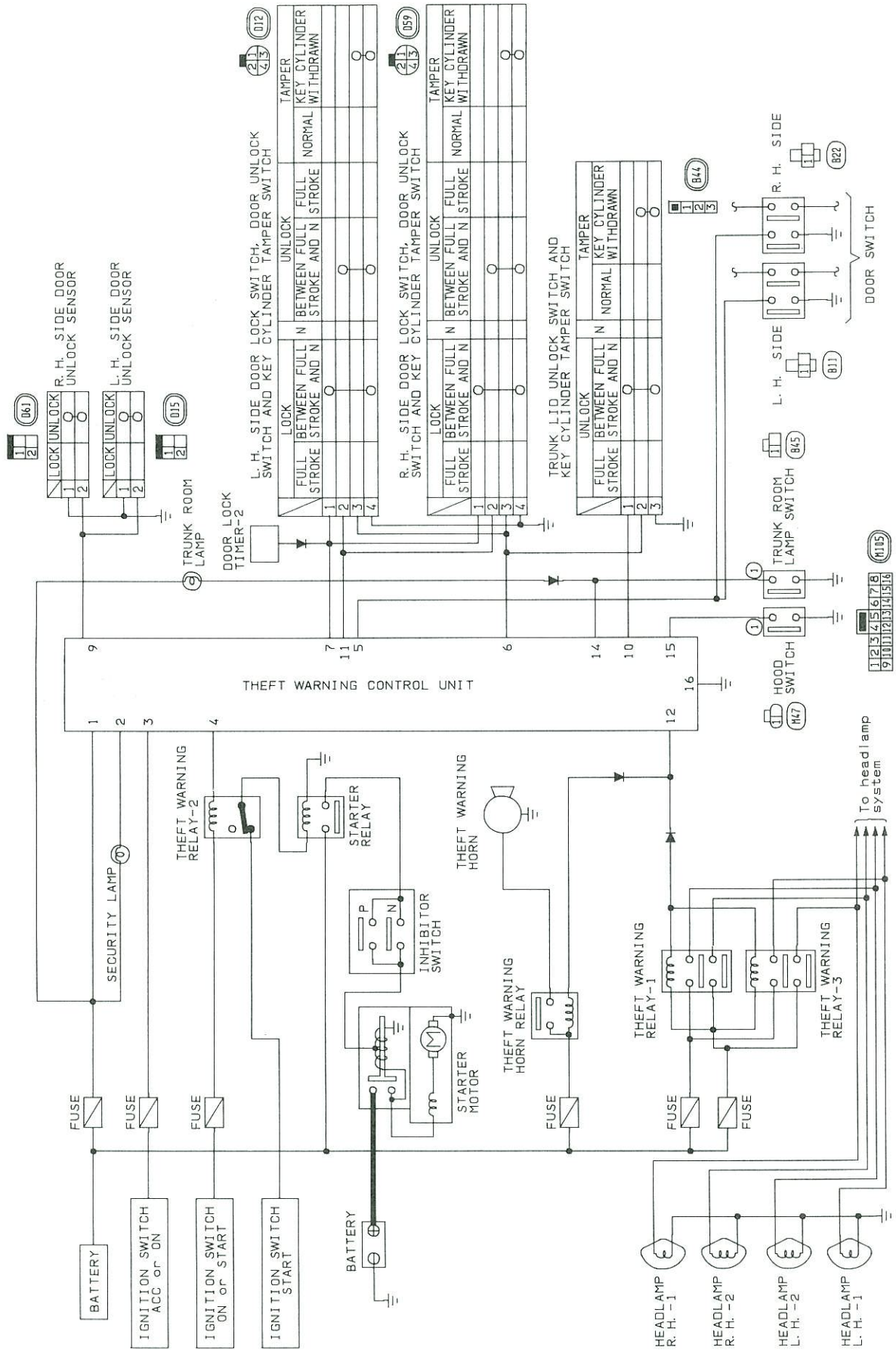
Trouble Diagnoses (Cont'd)



THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

CIRCUIT DIAGRAM FOR QUICK PINPOINT CHECK



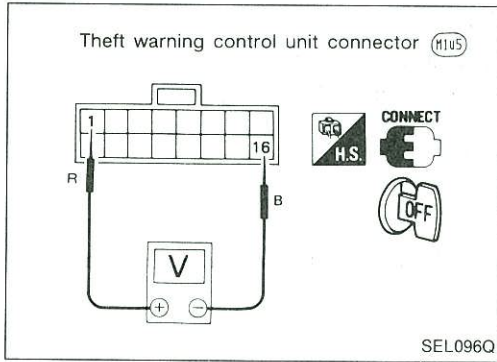
THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

POWER SUPPLY AND GROUND CIRCUIT CHECK

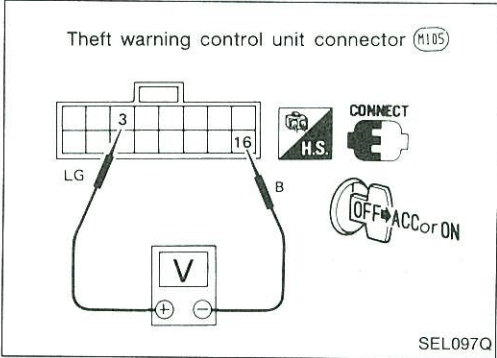
Main power supply circuit check

Terminals	Ignition switch position		
	OFF	ACC	ON
① - ⑯	Battery voltage	Battery voltage	Battery voltage



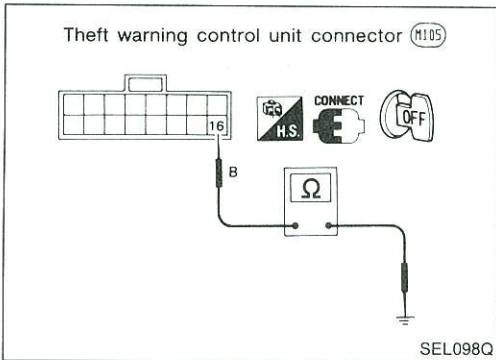
Power supply circuit check for system cancel

Terminals	Ignition switch position		
	OFF	ACC	ON
③ - ⑯	0V	Battery voltage	Battery voltage



Ground circuit check

Terminals	Continuity
⑯ - Ground	Yes



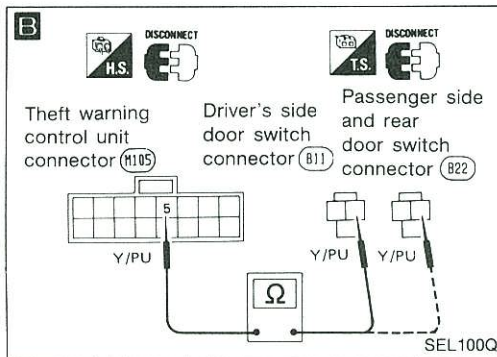
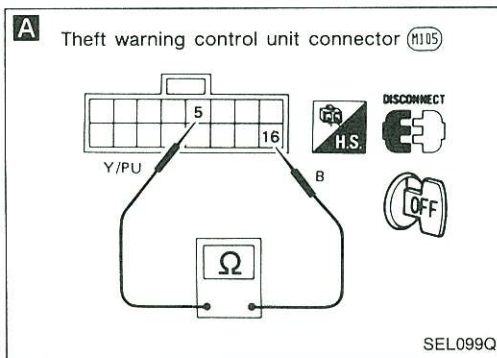
THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 1

SYMPTOM: ● Indicator lamp does not blink.
● Indicator lamp remains blinking.

Diagnostic procedure 1-(1)



A

DOOR SWITCH INPUT SIGNAL CHECK

Check continuity between control unit harness terminals ⑤ and ⑯.

Condition	Continuity
All doors are closed	No
At least one door is open	Yes

O.K. → Go to Diagnostic Procedure 2.

N.G.

DOOR SWITCH CHECK

Refer to "Electrical Components Inspection".

N.G. → Replace door switch.

O.K.

B

DOOR SWITCH CIRCUIT CHECK

Check harness continuity between control unit harness terminal ⑤ and door switch harness terminal.

Continuity should exist.

N.G. → Repair harness or connectors.

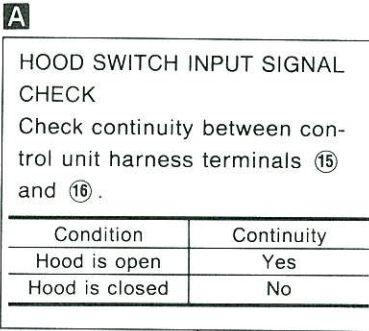
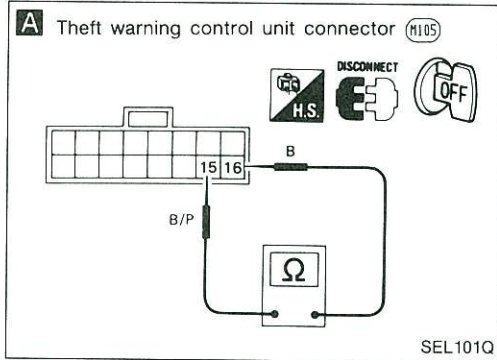
O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

Diagnostic procedure 1-(2)



O.K. → Go to Diagnostic Procedure 2.

N.G.

Check hood switch and hood fitting condition.

N.G. → Adjust installation of hood switch or hood.

O.K.

HOOD SWITCH CHECK
Refer to "Electrical Components Inspection".

N.G. → Replace hood switch.

O.K.

HOOD SWITCH CIRCUIT CHECK

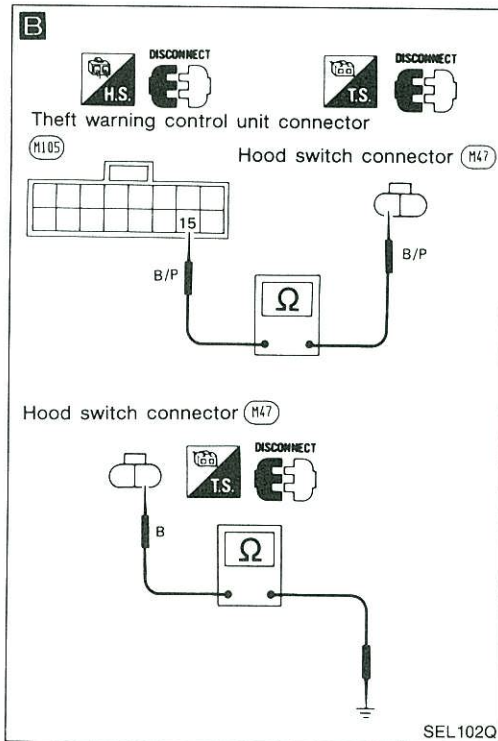
- Check harness continuity between control unit harness terminal (15) and hood switch harness terminal.
- Check harness continuity between hood switch terminal and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

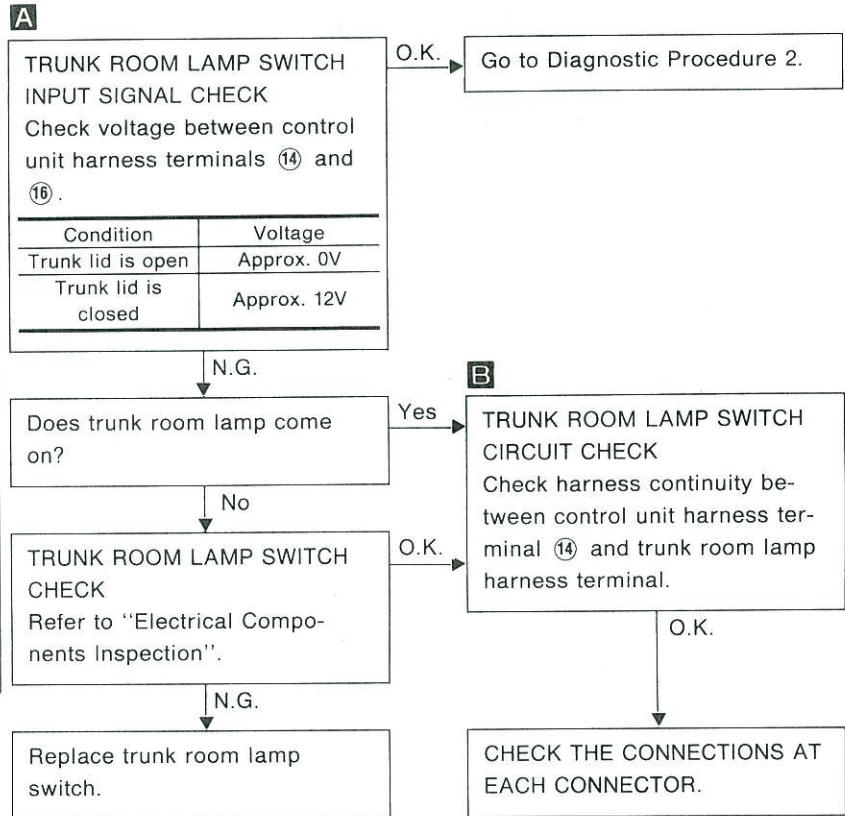
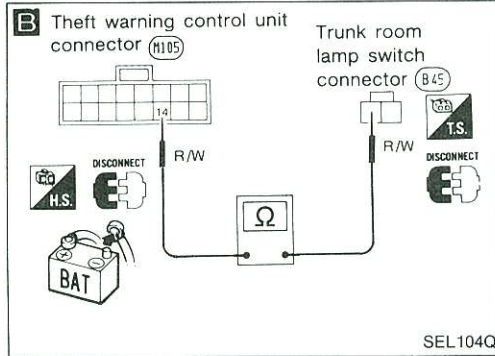
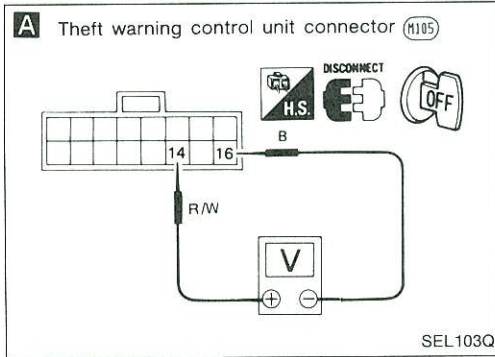
CHECK THE CONNECTIONS AT EACH CONNECTOR.



THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

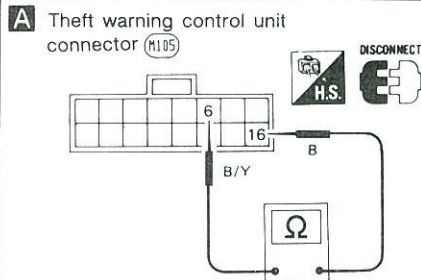
Diagnostic procedure 1-(3)



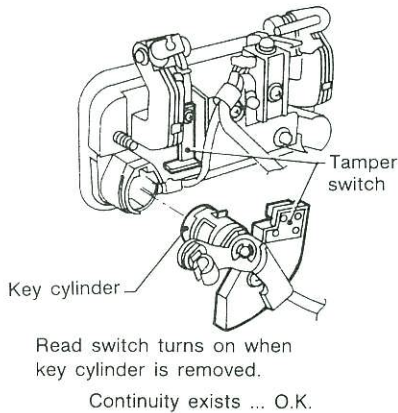
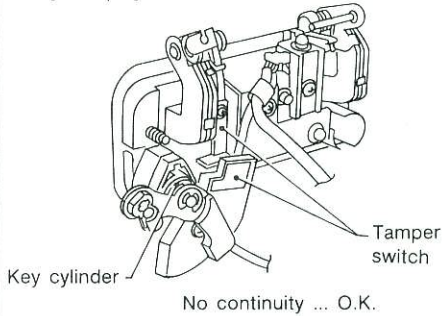
THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

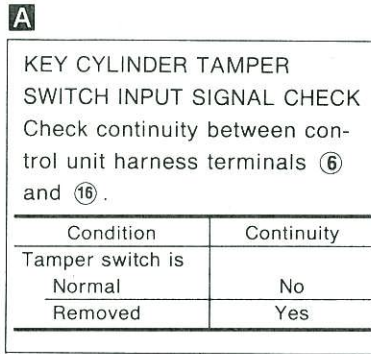
Diagnostic procedure 1-(4)



[Example]



SEL105Q

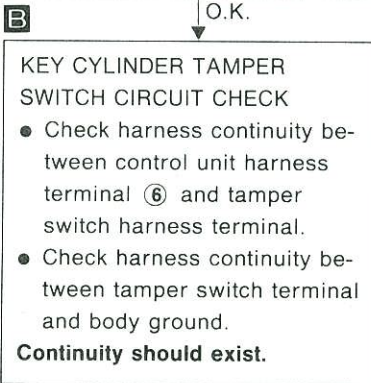


N.G.



N.G.

Replace key cylinder tamper switch.

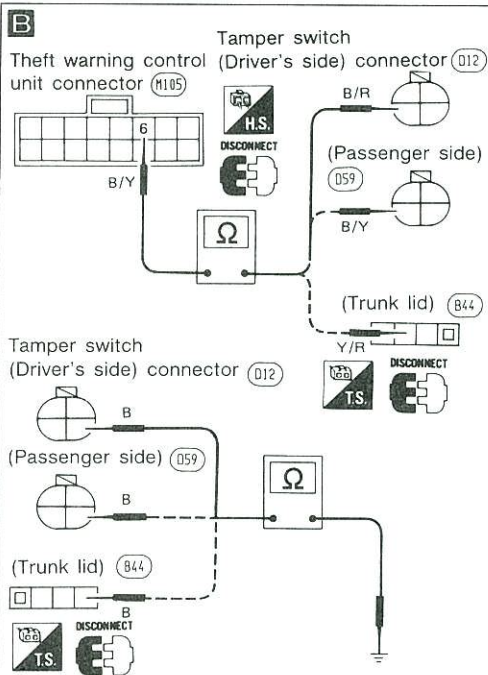


N.G.

Repair harness and connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.



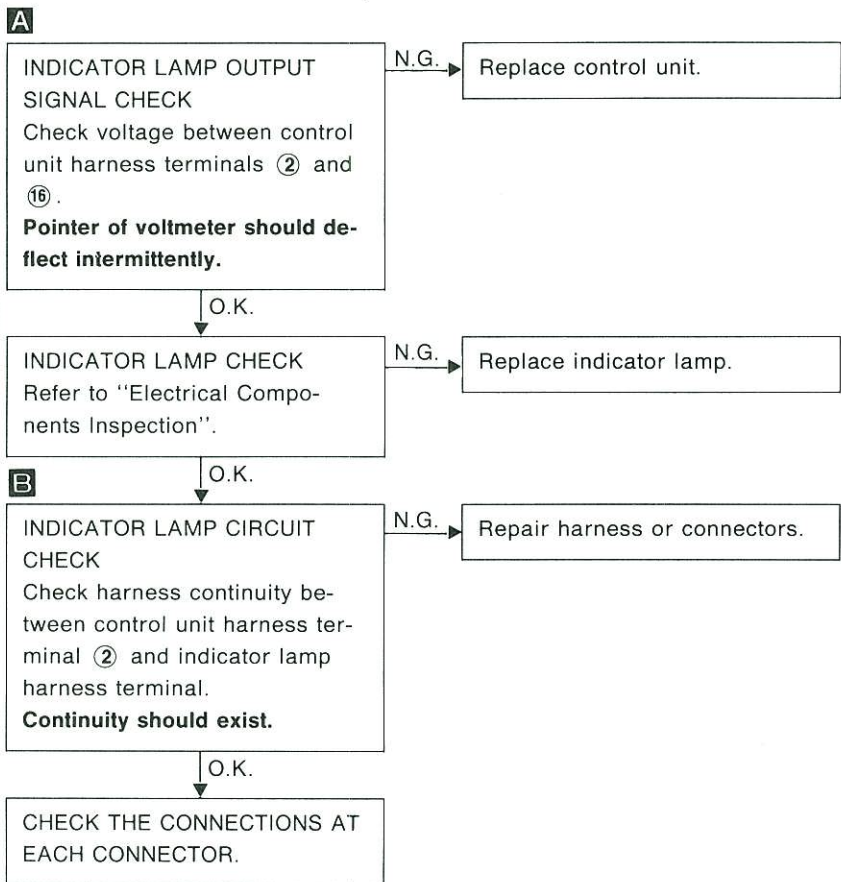
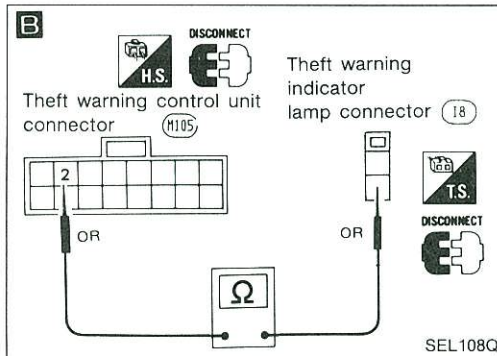
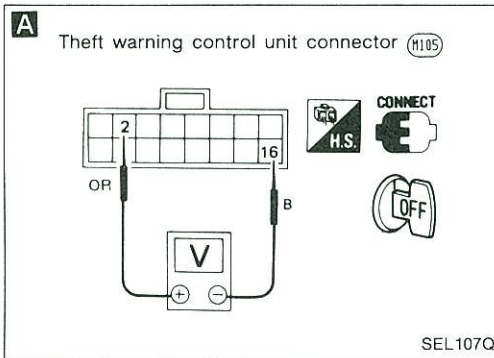
SEL106Q

THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 2

SYMPTOM: Indicator lamp does not blink.

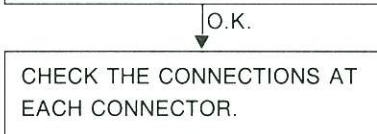
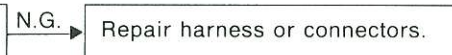
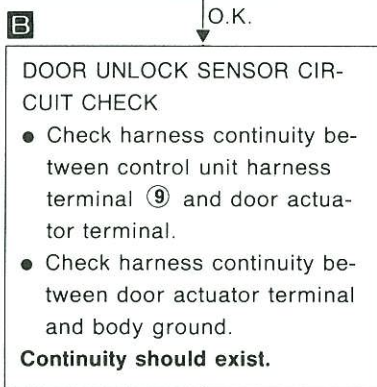
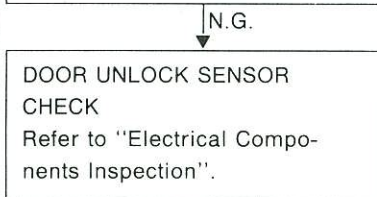
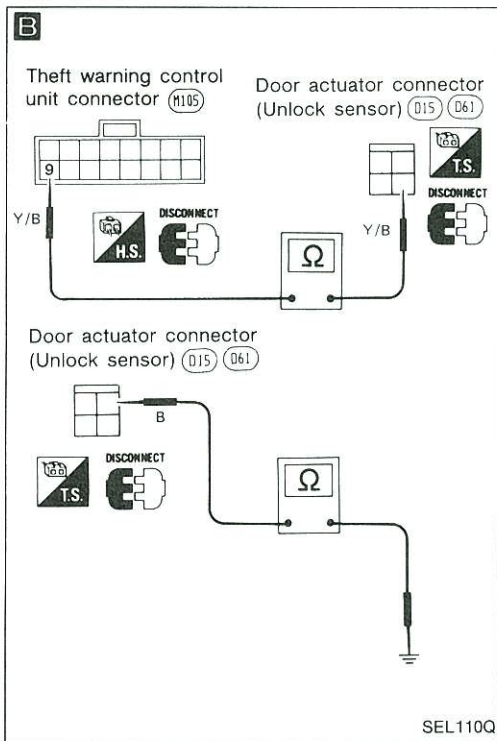
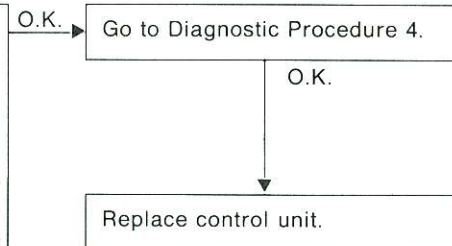
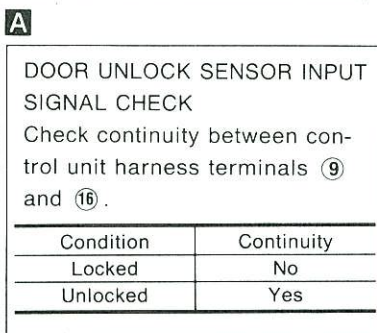
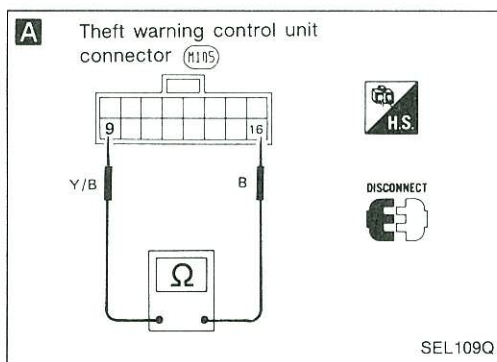


THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 3

SYMPTOM: Indicator lamp does not come on.

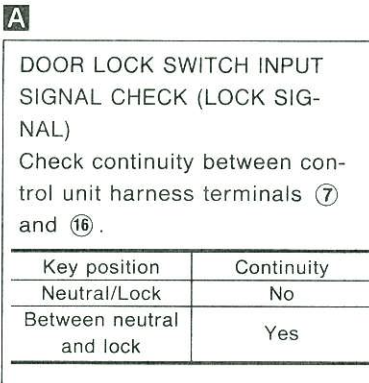
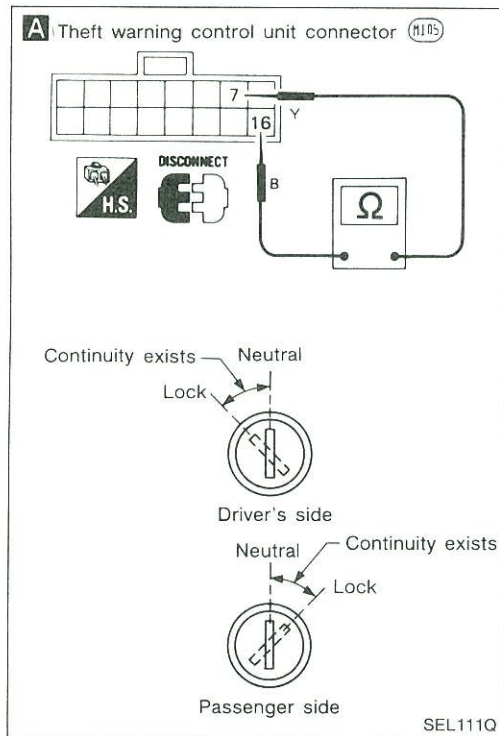


THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 4

SYMPTOM: Indicator lamp does not come on.

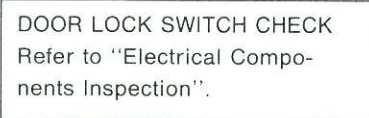


O.K. Go to Diagnostic Procedure 3.

O.K.

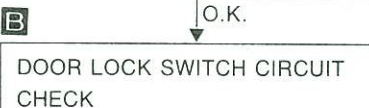
Replace control unit.

N.G.



N.G. Replace key cylinder switch.

O.K.

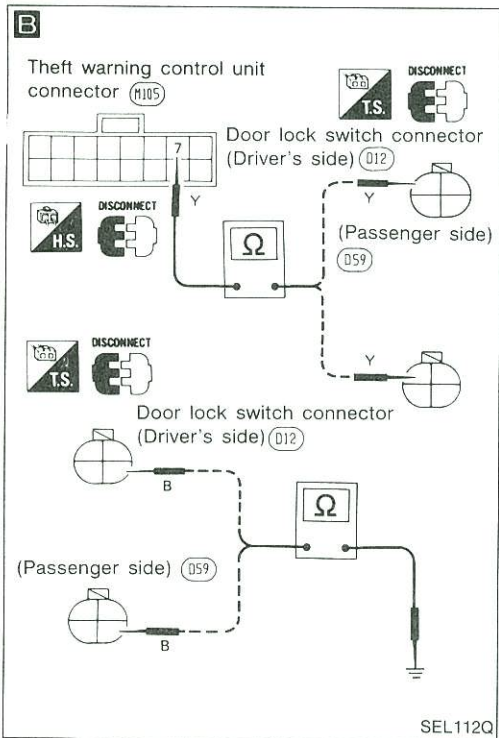


N.G. Repair harness or connectors.

- Check harness continuity between control unit harness terminal ⑦ and door lock switch terminal.
 - Check harness continuity between door lock switch terminal and body ground.
- Continuity should exist.**

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

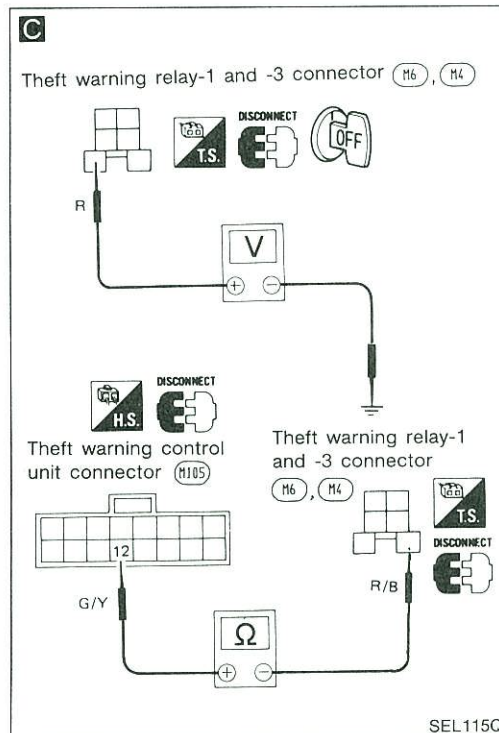
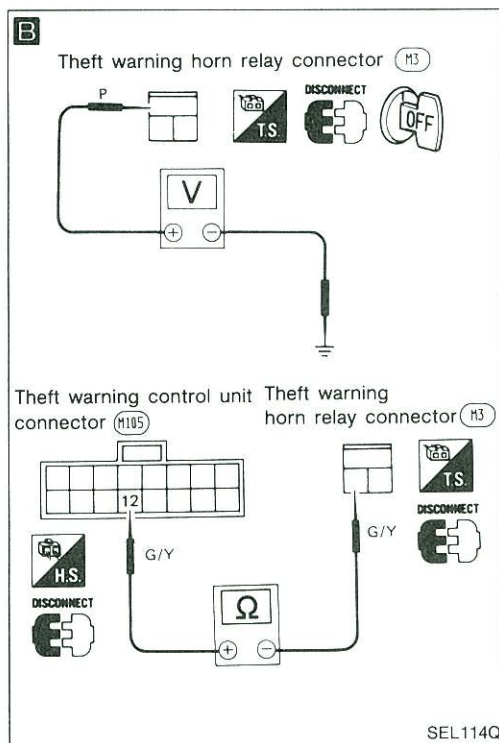
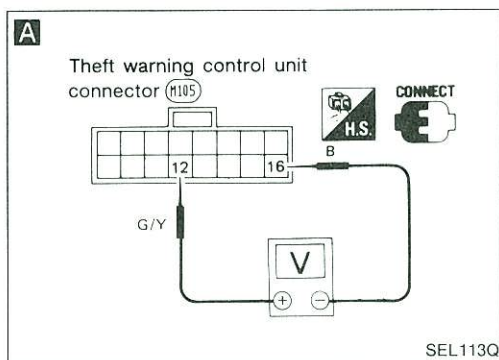


THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 5

SYMPTOM: Alarm does not operate.



A

ALARM SIGNAL OUTPUT CHECK

Check voltage between control unit harness terminals ⑫ and ⑯.

Condition	Voltmeter
Except alarm phase	12V
Alarm phase	Pointer deflects intermittently

N.G.

Replace control unit.

O.K.

Check theft warning horn relay.

N.G.

Replace relay.

O.K.

B

THEFT WARNING HORN CIRCUIT CHECK

Check if voltage across theft warning horn relay harness terminal and body is 12V.

Check continuity between theft warning horn relay terminal and control unit harness terminal ⑫.

Continuity should exist.

N.G.

Repair harness and connectors.

O.K.

Check theft warning relay-1 and -3.

N.G.

Replace theft warning relay-1 and -3.

O.K.

C

THEFT WARNING HEADLAMP CIRCUIT CHECK

Check if voltage across theft warning relay-1 and -3 harness terminals and body is 12V.

Check continuity between theft warning relay-1 and -3 terminals and control unit harness terminal ⑫.

N.G.

Repair harness and connectors.

O.K.

Does headlamp come on when turning lighting switch "ON"?

No

Check headlamp system. Refer to "HEADLAMP".

Yes

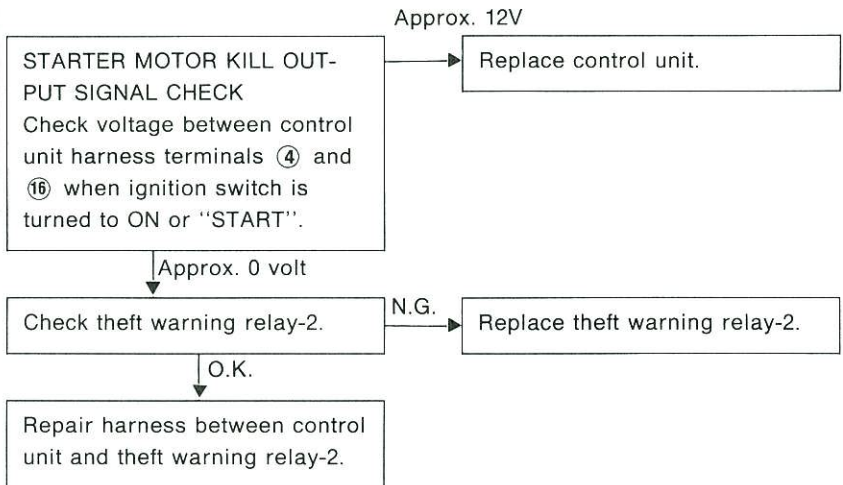
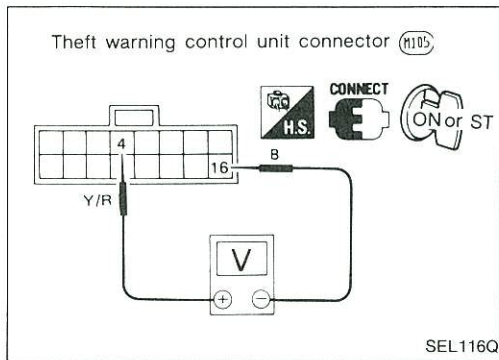
Repair harness and connectors between lamp relay and headlamp.

THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 6

SYMPTOM: STARTER MOTOR can be operated. (Starter killed phase)

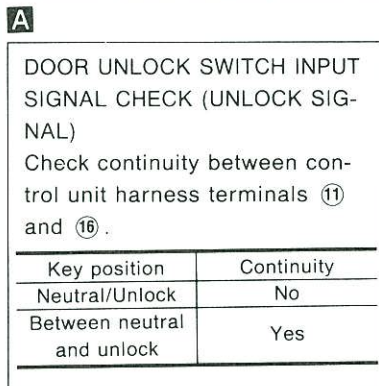
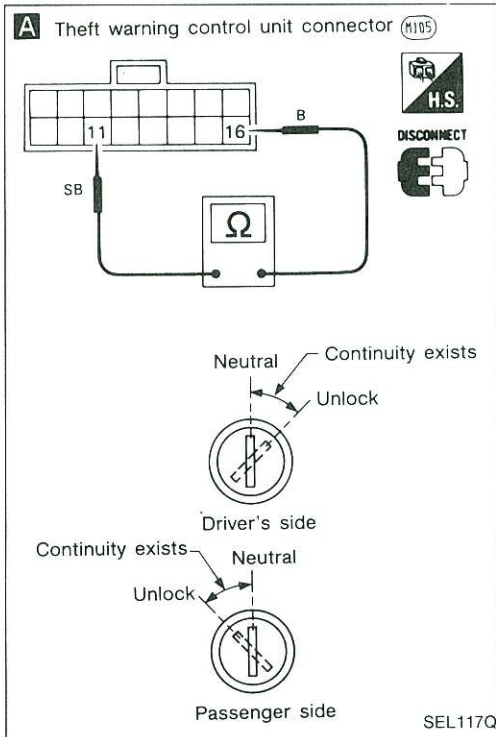


THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

DIAGNOSTIC PROCEDURE 7

SYMPTOM: Alarm does not stop even if stop signal is given.



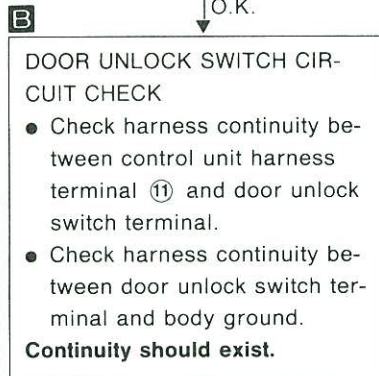
O.K. → Replace control unit.

N.G.



N.G. → Replace key cylinder switch.

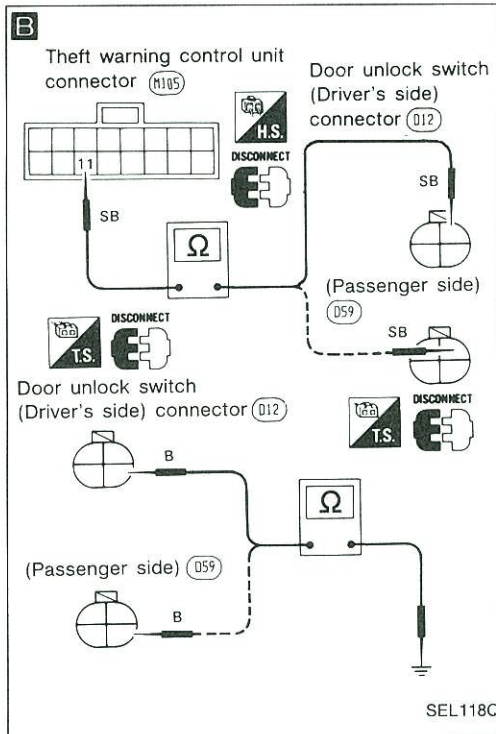
O.K.



N.G. → Repair harness or connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

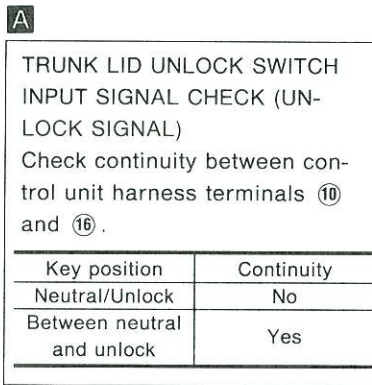
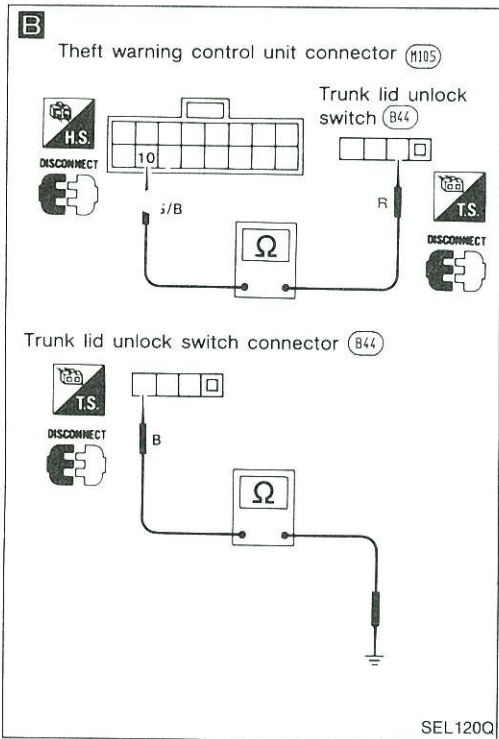
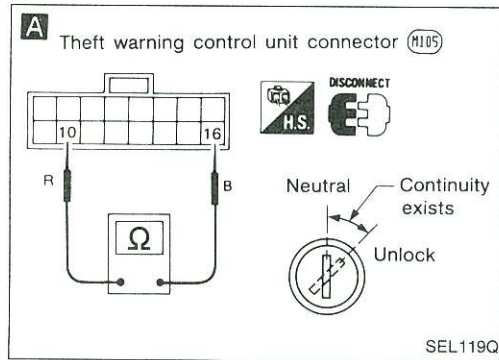


THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

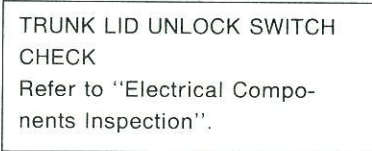
DIAGNOSTIC PROCEDURE 8

SYMPTOM: Alarm does not stop even if stop signal is given.



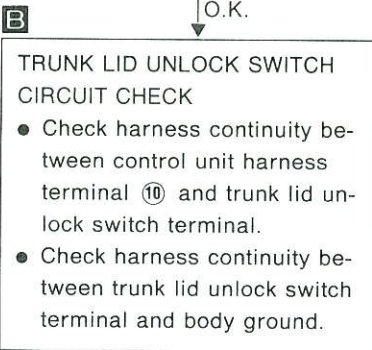
O.K. → Replace control unit.

N.G.



N.G. → Replace key cylinder switch.

O.K.



N.G. → Repair harness or connectors.

O.K.

CHECK THE CONNECTIONS AT EACH CONNECTOR.

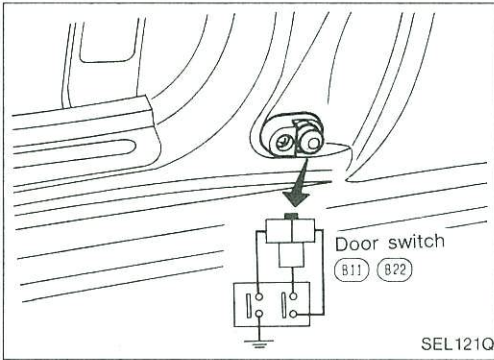
THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

ELECTRICAL COMPONENTS INSPECTION

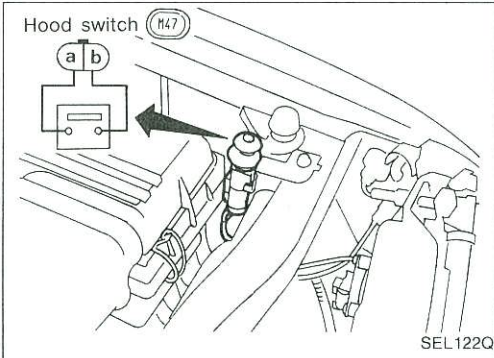
Door switches

Check continuity between terminal and switch body.



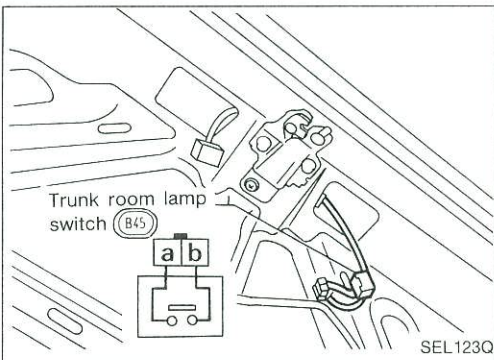
Hood switch

Check continuity between terminals when hood switch is pushed and released.



Terminal \	Pushed	Released
a		○
b		○

Trunk room lamp switch



Terminal \	Trunk lid Closed	Open
a		○
b		○

THEFT WARNING SYSTEM

Trouble Diagnoses (Cont'd)

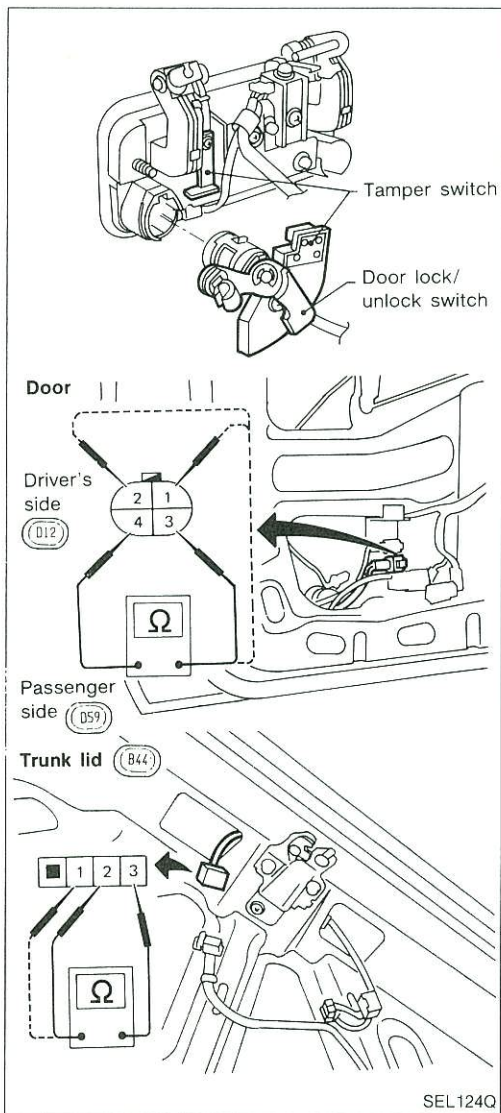
Key cylinder tamper switch, door lock switch and door unlock switch

● Door

	TAMPER SWITCH		DOOR LOCK SWITCH		DOOR UNLOCK SWITCH	
	Key cylinder is installed	Key cylinder is removed	Full stroke	Between full stroke and neutral	Neutral	Between full stroke and neutral
1				○		
2				○		○
3		○		○		○
4		○		○		○

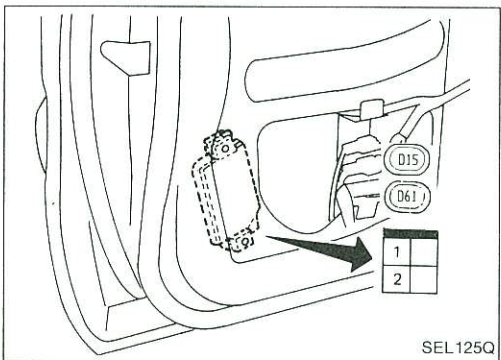
Trunk lid

	TAMPER SWITCH		Trunk lid unlock switch		
	Key cylinder is installed	Key cylinder is removed	Full stroke	Between full stroke and neutral	Neutral
1				○	
2		○		○	
3		○		○	



Door unlock sensor

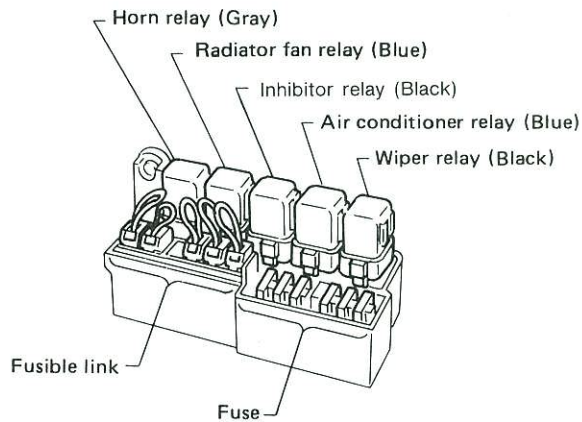
	LOCK	UNLOCK
1		○
2		○



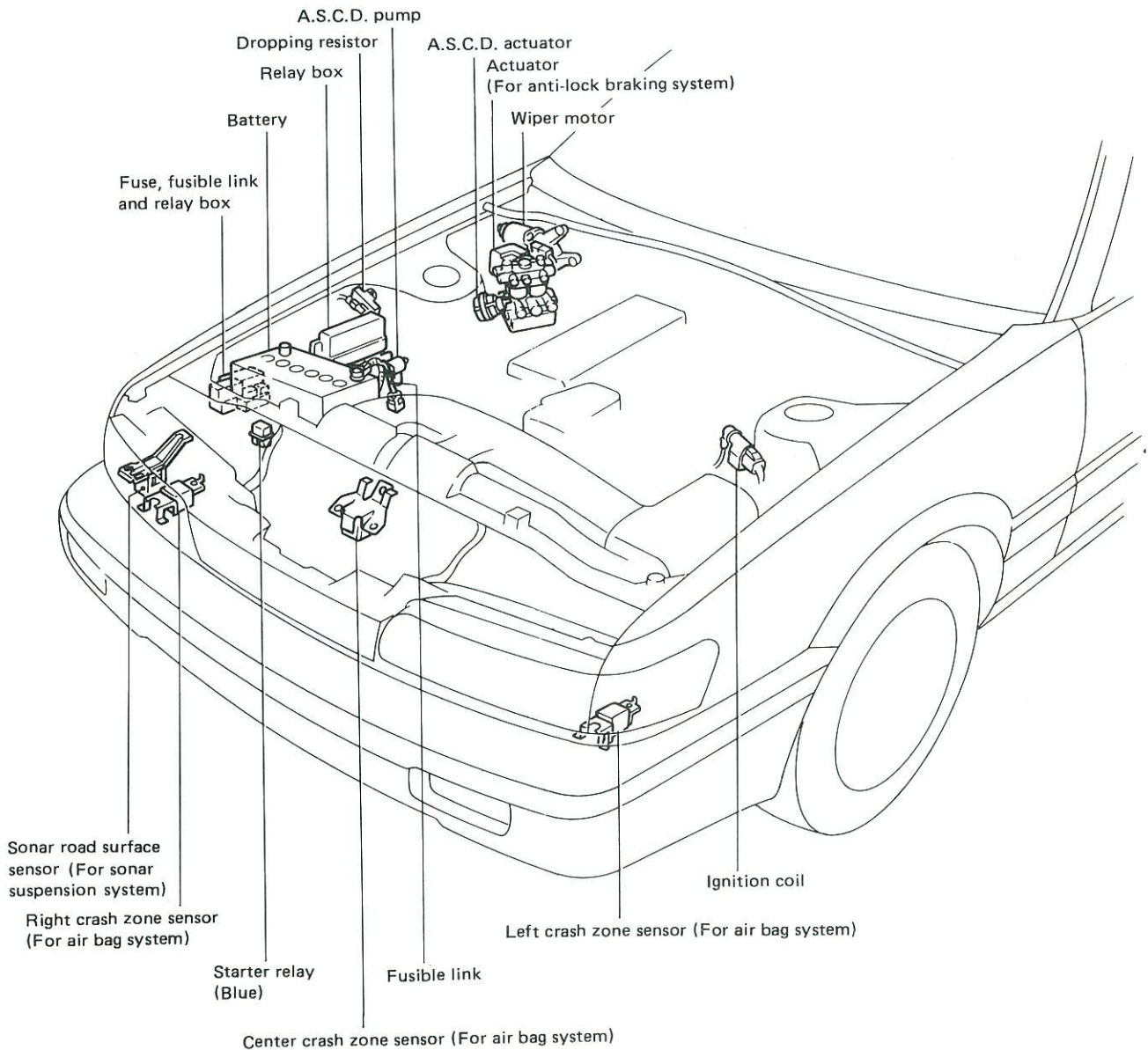
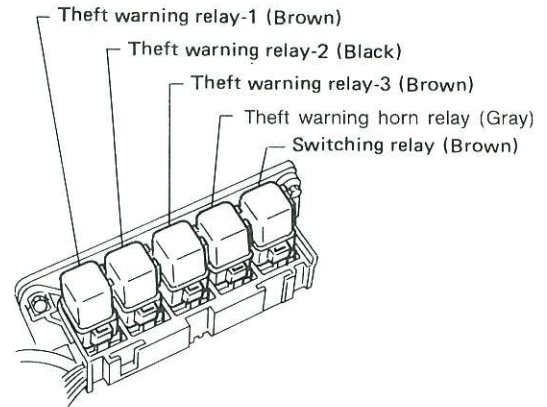
LOCATION OF ELECTRICAL UNITS

Engine Compartment

Fuse, fusible link and relay box

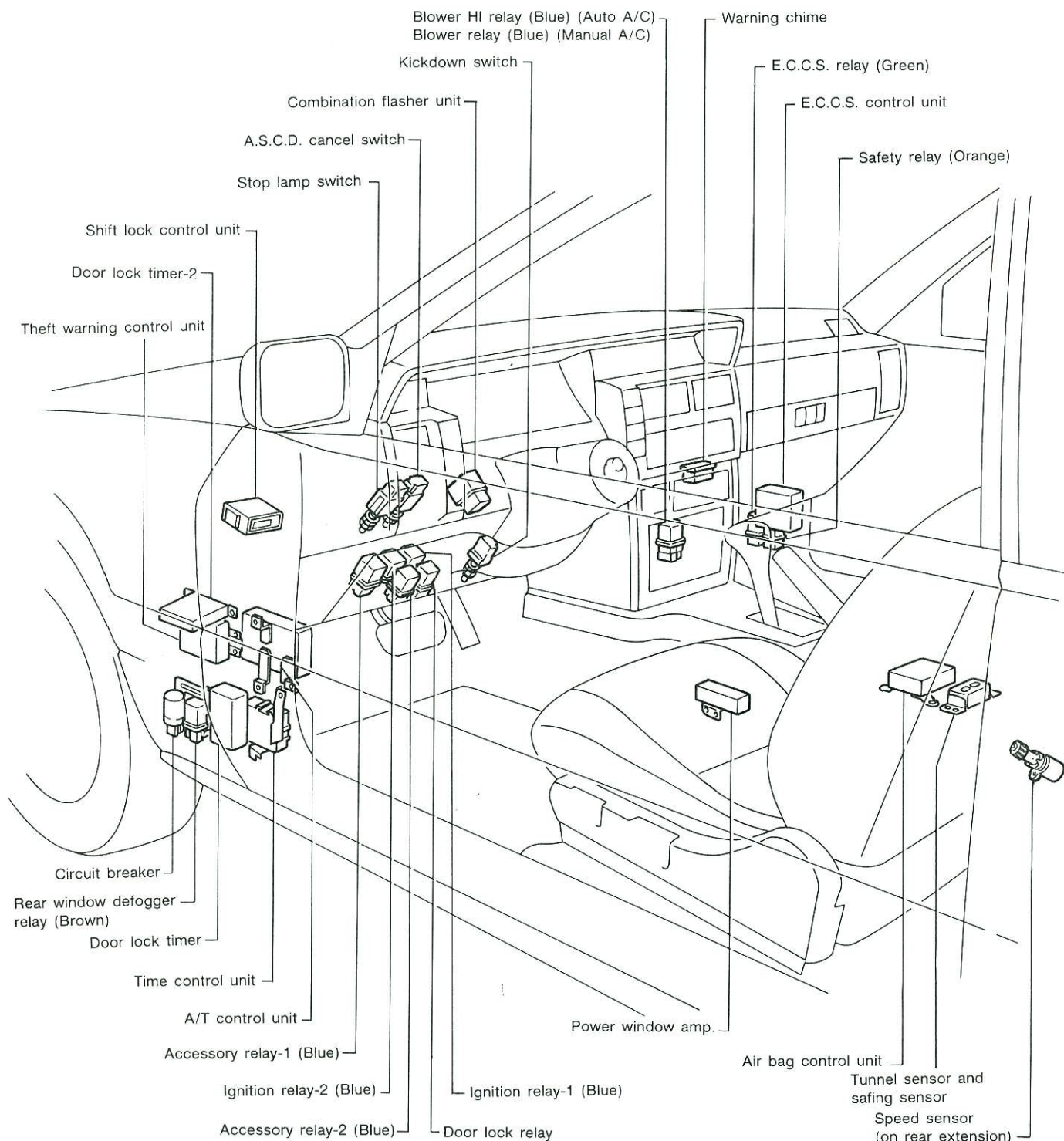


Relay box



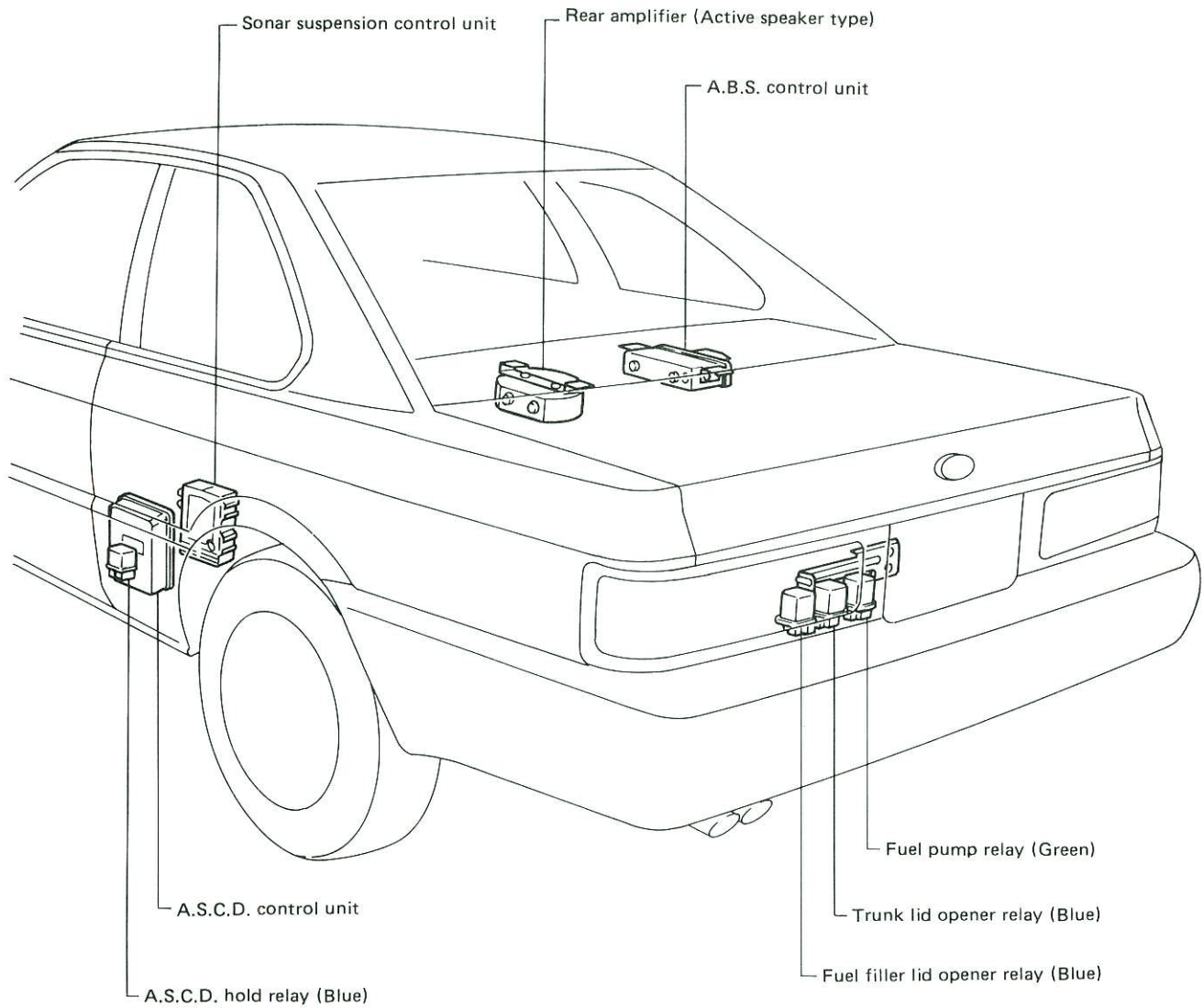
LOCATION OF ELECTRICAL UNITS

Passenger Compartment



LOCATION OF ELECTRICAL UNITS

Luggage Compartment

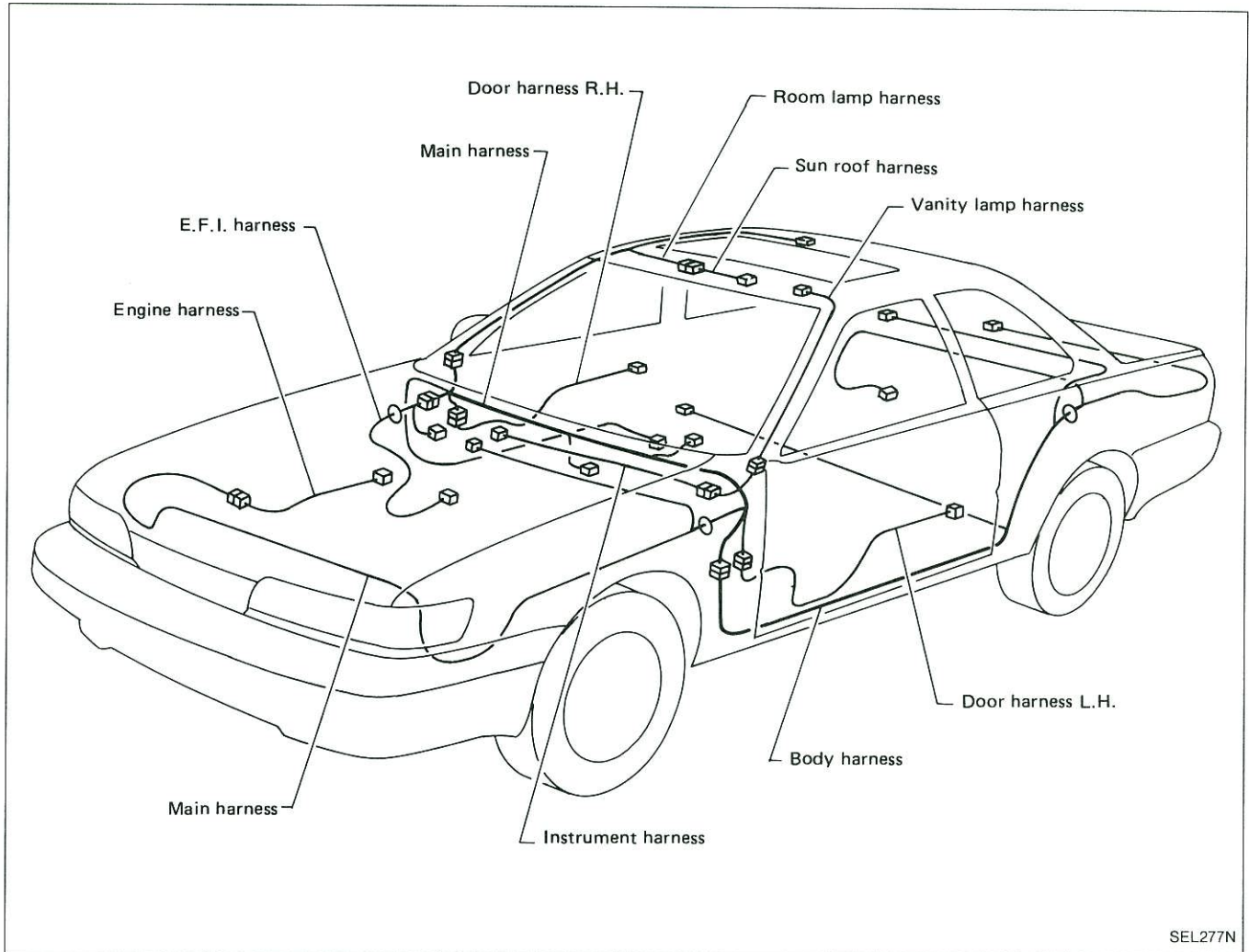


LOCATION OF ELECTRICAL UNITS

NOTE

HARNESS LAYOUT

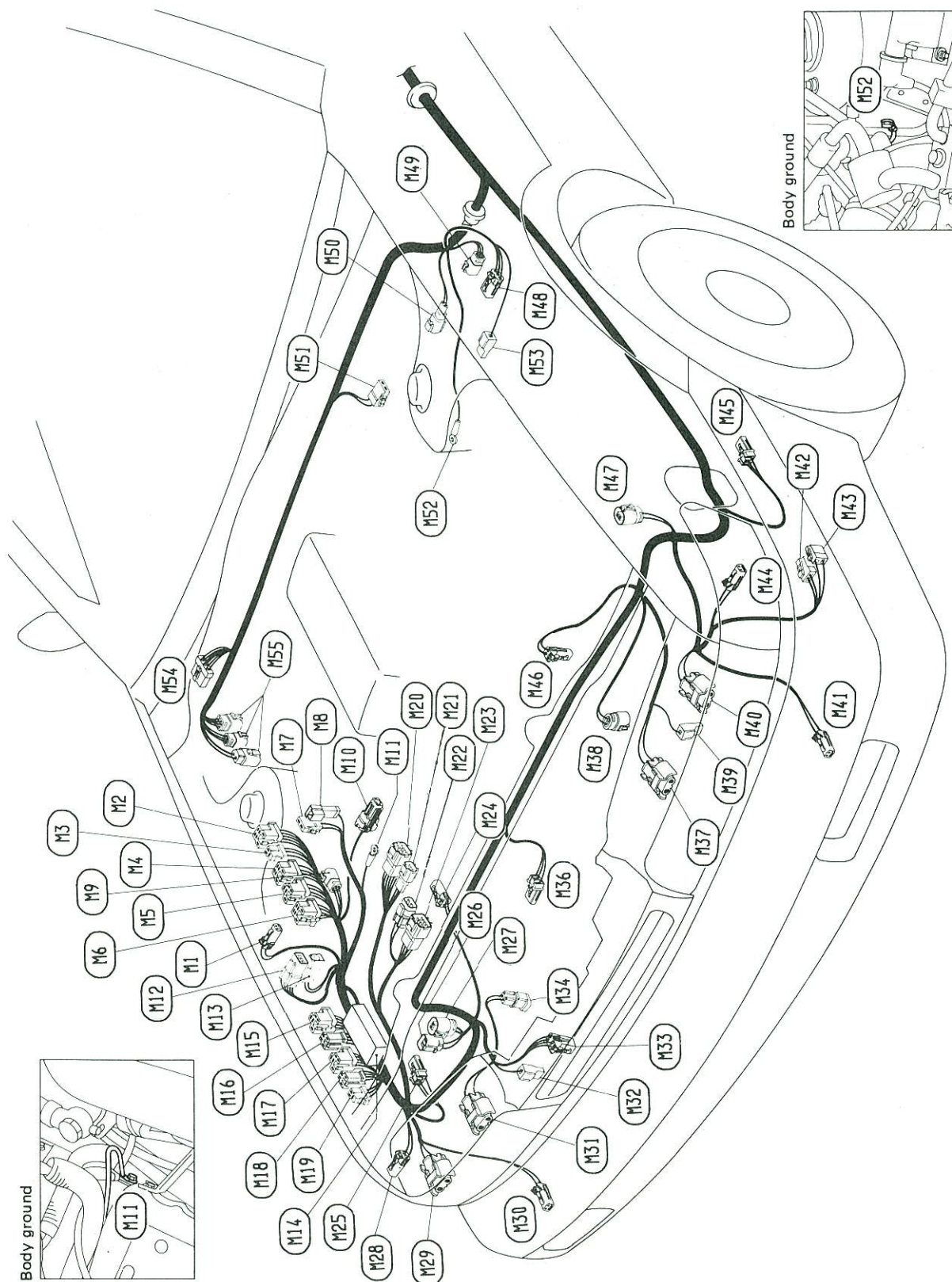
Outline



HARNESS LAYOUT

Main Harness

ENGINE COMPARTMENT



HARNESS LAYOUT

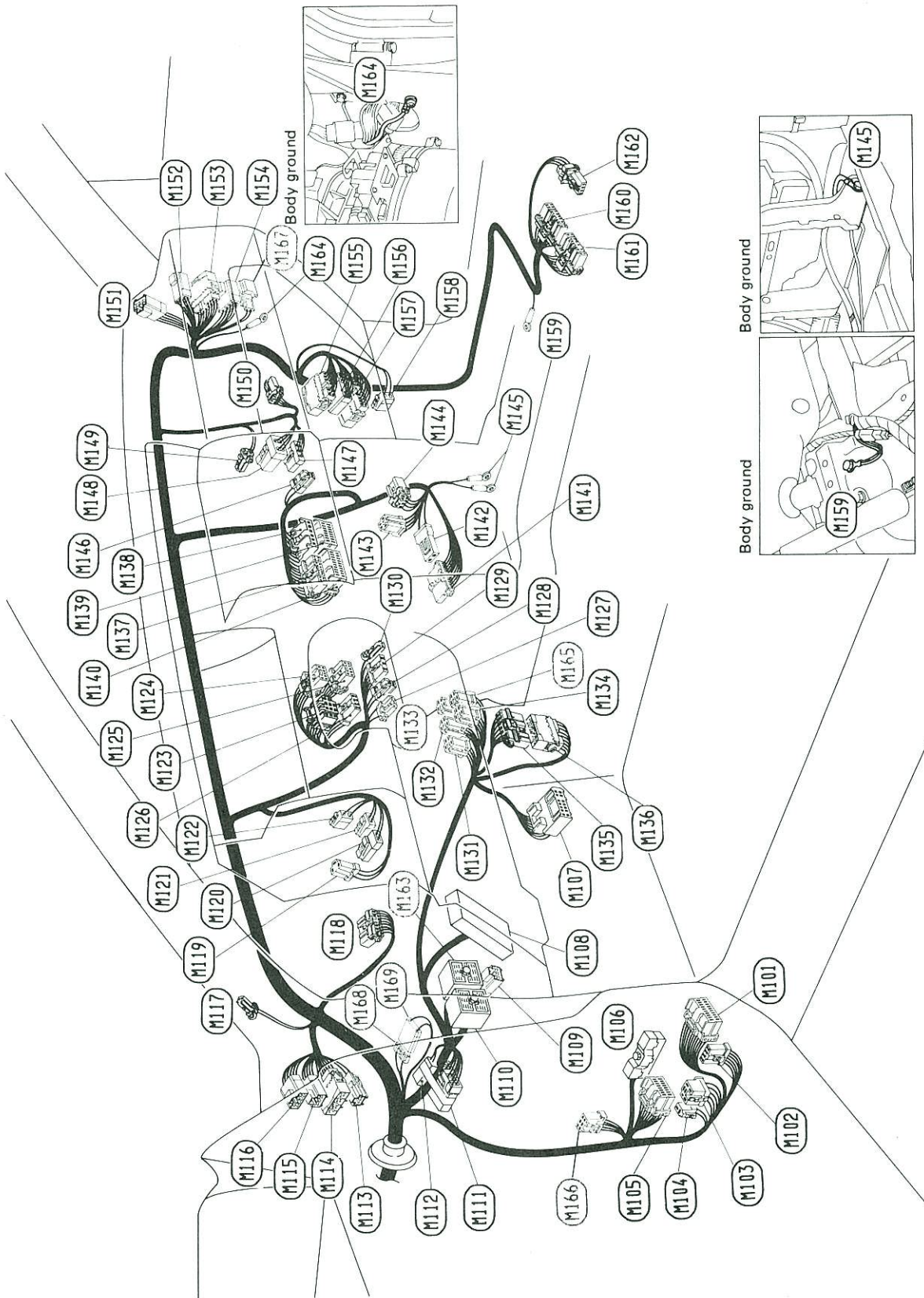
Main Harness (Cont'd)

(H1)	: Dropping resistor	(H30)	: Front clearance lamp R.H.
(H2)	: Switching relay	(H31)	: Headlamp R.H.-2
(H3)	: Theft warning horn relay	(H32)	: Horn R.H.
(H4)	: Theft warning relay-3	(H33)	: Sonar road surface sensor
(H5)	: Theft warning relay-2	(H34)	: Radiator fan motor
(H6)	: Theft warning relay-1	(H35)	: Center crash zone sensor (Air bag)
(H7)	: Battery	(H37)	: Headlamp L.H.-2
(H8)	: Fusible link	(H38)	: Ambient switch (Manual A/C)
(H9)	: A.S.C.D. pump		: Ambient sensor (Auto A/C)
(H10)	: To (E2)	(H39)	: Horn L.H.
(H11)	: Body ground	(H40)	: Headlamp L.H.-1
(H12)	: To (E4)	(H41)	: Front clearance lamp L.H.
(H13)	: To (E3)	(H42)	: Washer sensor
(H14)	: Fusible link box & Fuse block	(H43)	: Washer motor
(H15)	: Wiper relay	(H44)	: Front turn signal lamp L.H.
(H16)	: Air conditioner relay	(H45)	: Left crash zone sensor (Air bag)
(H17)	: Inhibitor relay	(H46)	: Thermoswitch
(H18)	: Radiator fan relay	(H47)	: Hood switch
(H19)	: Horn relay	(H48)	: Front shock absorber actuator-L.H. (For sonar suspension system)
(H20)	: To terminal cord assembly	(H49)	: To (F27)
(H21)	: Revolution sensor	(H50)	: Front sensor L.H. (For anti-lock braking system)
(H22)	: Inhibitor switch	(H51)	: Brake fluid level switch
(H23)	: Inhibitor switch	(H52)	: Body ground
(H24)	: Dual-pressure switch	(H53)	: Theft warning horn
(H25)	: Right crash zone sensor (Air bag)	(H54)	: Wiper motor
(H26)	: Starter relay	(H55)	: Actuator (For anti-lock braking system)
(H27)	: Starter relay		
(H28)	: Front turn signal lamp R.H.		
(H29)	: Headlamp R.H.-1		

HARNESS LAYOUT

Main Harness (Cont'd)

PASSENGER COMPARTMENT



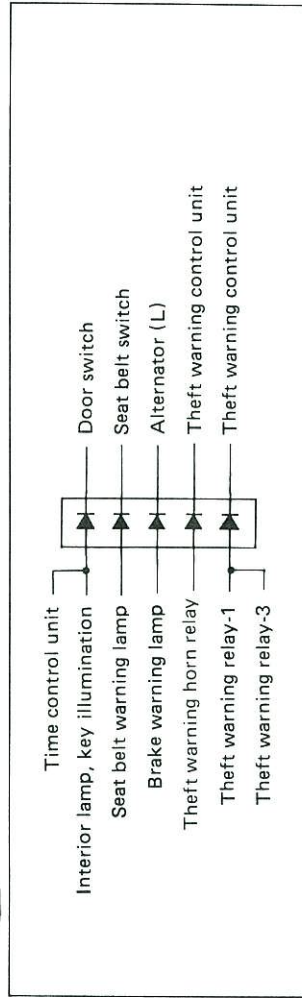
HARNESS LAYOUT

Main Harness (Cont'd)

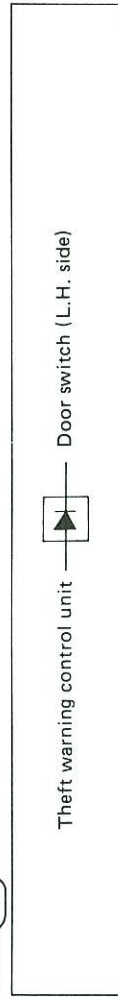
(M101)	: Time control unit	(M139)	: Auto air conditioner amp. (Auto A/C)
(M102)	: Door lock timer-1	(M140)	: Auto air conditioner amp. (Auto A/C)
(M103)	: Rear window defogger relay	(M141)	: Mode door motor (A/C)
(M104)	: Circuit breaker	(M142)	: Aspirator fan (Auto A/C)
(M105)	: Theft warning control unit	(M143)	: Blower relay (Manual A/C)
(M106)	: A/T control unit		Blower HI relay (Auto A/C)
(M107)	: Diagnostic connector	(M144)	: Air mix door motor (Auto A/C)
(M108)	: Fuse block	(M145)	: Body ground
(M109)	: To (B3)	(M146)	: In-vehicle sensor (Auto A/C)
(M110)	: To (B1) (S.M.J.)	(M147)	: Resistor (Manual A/C)
(M111)	: Diode	(M148)	: Fan control amp. (Auto A/C)
(M112)	: Diode	(M149)	: Intake sensor (Auto A/C)
(M113)	: To (D4)	(M150)	: Intake door motor
(M114)	: To (D3)	(M151)	: To (R1)
(M115)	: To (D2)		
(M116)	: To (D1)		
(M117)	: To sub-harness (Vanity lamp)		
(M118)	: Shift lock control unit		
(M119)	: Combination flasher unit		
(M120)	: A.S.C.D. cancel switch		
(M121)	: Stop lamp switch		
(M122)	: Kickdown switch		
(M123)	: Lighting switch		
(M124)	: A.S.C.D. steering switch, horn switch and air bag module		
(M125)	: Steering angle sensor		
(M126)	: Wiper switch		
(M127)	: Key lock solenoid		
(M128)	: Key-in switch		
(M129)	: Ignition switch		
(M130)	: Key illumination		
(M131)	: Accessory relay-1		
(M132)	: Ignition relay-2		
(M133)	: Ignition relay-1		
(M134)	: Accessory relay-2		
(M135)	: Connector-A		
(M136)	: Connector-B		
(M137)	: Push control unit (Manual A/C)		
(M138)	: Fan switch (Manual A/C)		

(M152)	: To (D51)	(M152)	: To (D51)
(M153)	: To (D52)	(M153)	: To (D52)
(M154)	: To (D53)	(M154)	: To (D53)
(M155)	: To (F51)	(M155)	: To (F51)
(M156)	: To (F52)	(M156)	: To (F52)
(M157)	: To (F53)	(M157)	: To (F53)
(M158)	: Blower motor	(M158)	: Blower motor
(M159)	: Body ground	(M159)	: Body ground
(M160)	: Air bag control unit	(M160)	: Air bag control unit
(M161)	: Air bag control unit	(M161)	: Air bag control unit
(M162)	: Tunnel sensor and safing sensor (Air bag)	(M162)	: Tunnel sensor and safing sensor (Air bag)
(M163)	: (T1)	(M163)	: (T1)
(M164)	: Body ground	(M164)	: Body ground
(M165)	: Door lock relay	(M165)	: Door lock relay
(M166)	: Door lock timer-2	(M166)	: Door lock timer-2
(M167)	: To (D64)	(M167)	: To (D64)
(M168)	: To (M169)	(M168)	: To (M169)
(M169)	: To (M168)	(M169)	: To (M168)

Diode (M111)

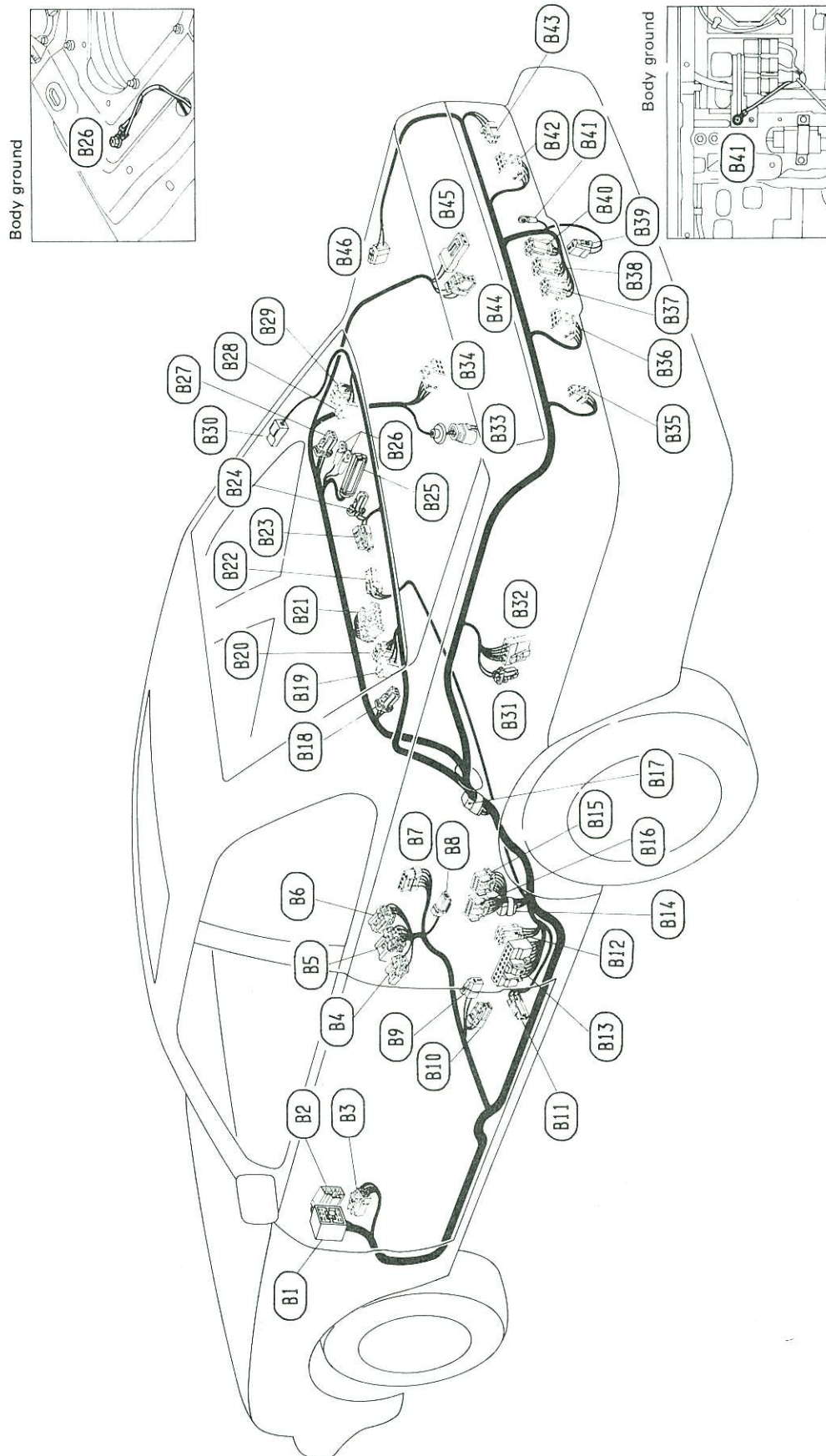


Diode (M112)



HARNESS LAYOUT

Body Harness

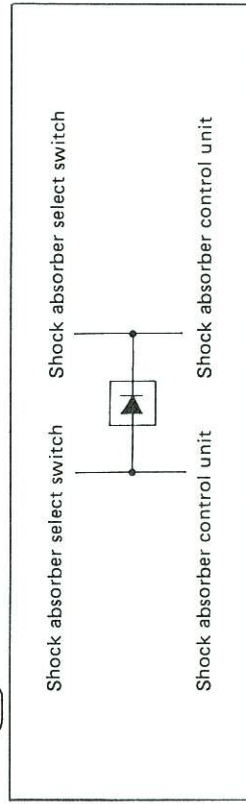


HARNESS LAYOUT

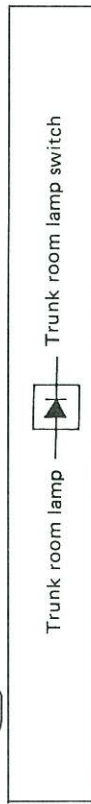
Body Harness (Cont'd)

- 81 : To 4110 (S.M.J.)
 82 : To 12
 83 : To 4119
 84 : Ash tray illumination
 85 : Shift lock solenoid and detention switch
 86 : Overdrive switch and A/T indicator illumination
 87 : Shock absorber select switch
 (For sonar suspension system)
 88 : Parking brake switch
 89 : To power seat harness L.H.
 90 : Seat belt switch
 91 : Door switch L.H.
 92 : A.S.C.D. hold relay
 93 : A.S.C.D. control unit
 94 : Diode
 95 : Sonar suspension control unit
 96 : Sonar suspension control unit
 97 : Diode
 98 : Rear shock absorber actuator L.H.
 99 : Rear speaker L.H. (Active speaker type)
 100 : Rear speaker L.H. (BOSE type)
 101 : Rear amplifier (Active speaker type)
 102 : Door switch R.H.
 103 : Trunk room lamp
 104 : High-mounted stop lamp
 105 : A.B.S. control unit
 106 : Body ground
 107 : Rear shock absorber actuator R.H.
 (For sonar suspension system)
- 828 : Rear speaker R.H.
 (Active speaker type)
 829 : Rear speaker R.H. (BOSE type)
 830 : Rear window defogger
 831 : Power antenna motor
 832 : Power antenna timer
 833 : Rear sensor braking
 (For anti-lock braking system)
 834 : Fuel tank gauge unit
 835 : Rear combination lamp L.H.
 836 : Rear combination lamp L.H.
- 837 : Fuel filler lid opener relay
 838 : Trunk lid opener relay
 839 : Trunk lid opener solenoid
 840 : Fuel pump relay
 841 : Body ground
 842 : Rear combination lamp R.H.
 843 : Rear combination lamp R.H.
 844 : Trunk room unlock switch
 845 : Trunk room lamp switch
 846 : Fuel filler lid opener solenoid

Diode 814

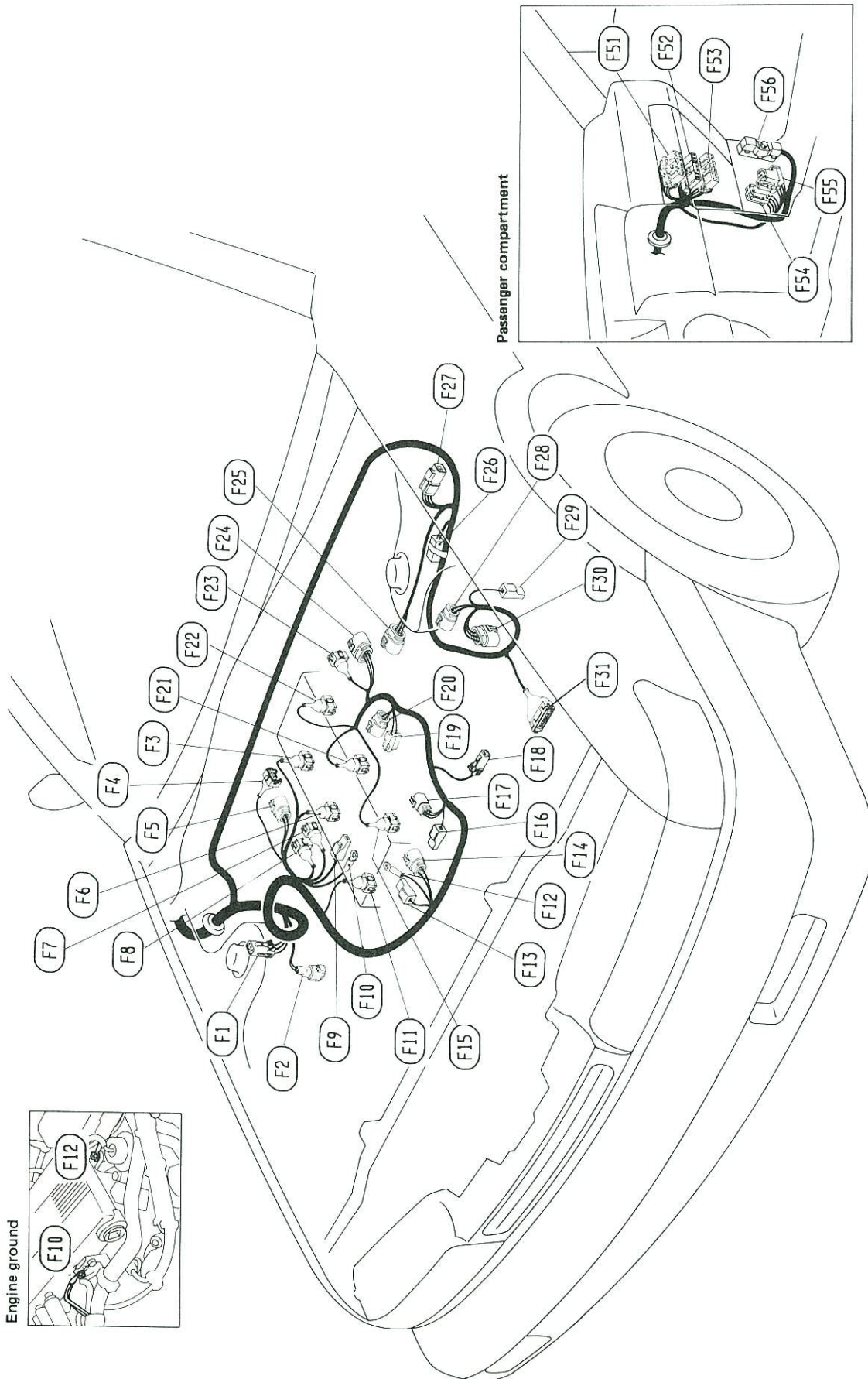


Diode 817



HARNESS LAYOUT

E.F.I. Harness

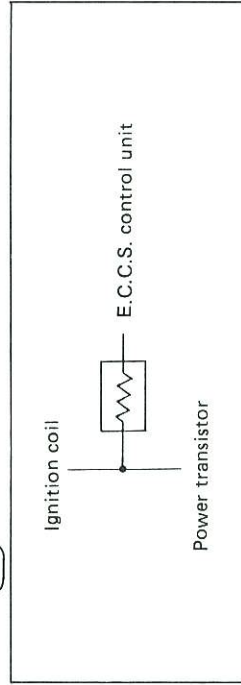


HARNESS LAYOUT

E.F.I. Harness (Cont'd)

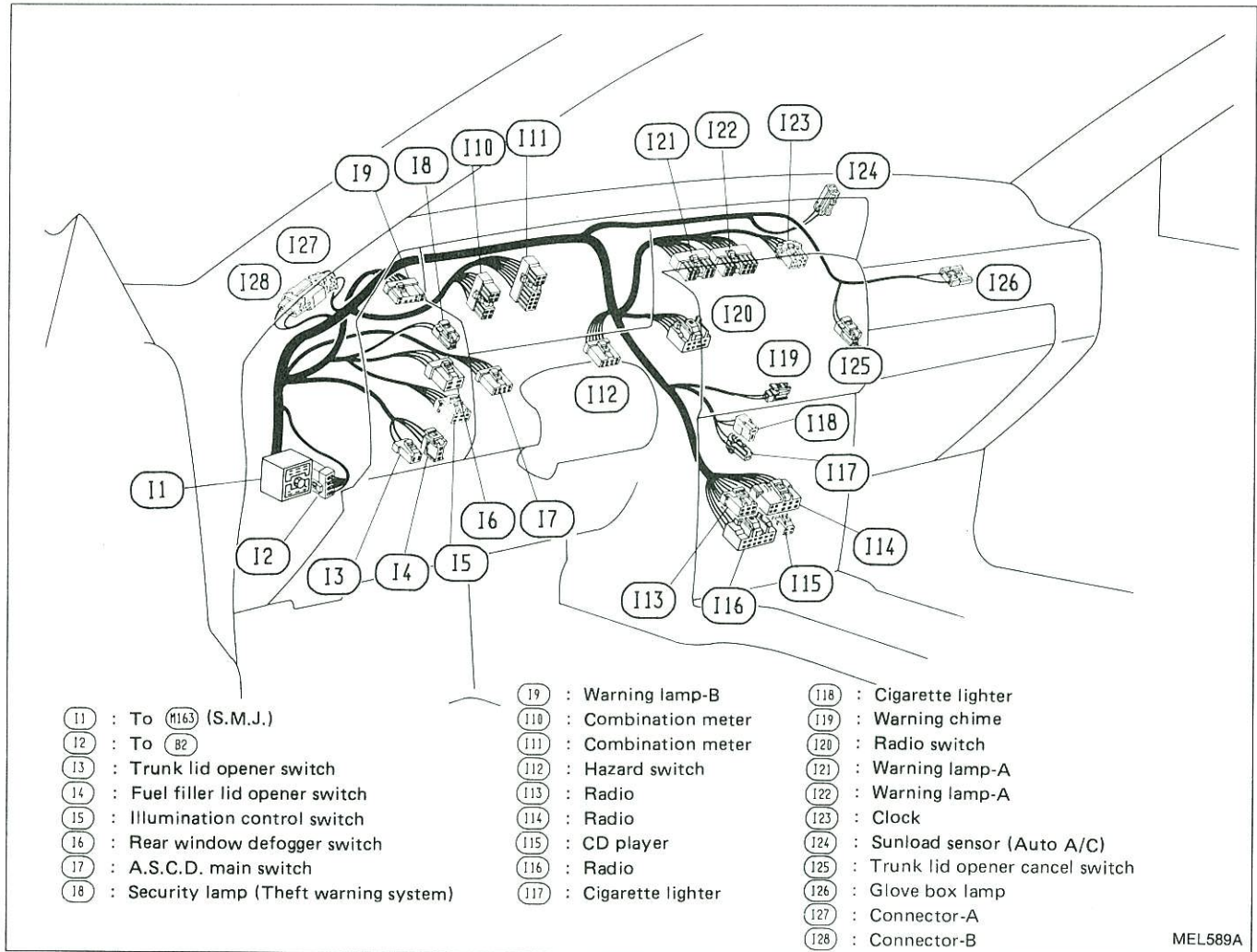
(F1)	: Front shock absorber actuator R.H. (For sonar suspension system)	(F20)	: F.I.C.D. control solenoid valve	(F30)	: Power transistor
(F2)	: Front sensor R.H. (For anti-lock braking system)	(F21)	: Injector No. 4	(F31)	: Air flow meter
(F3)	: Injector No. 5	(F22)	: Injector No. 6	Passenger compartment	
(F4)	: E.G.R. control solenoid valve	(F23)	: Throttle valve switch	(F51)	: To (M155)
(F5)	: Exhaust gas temperature sensor (For California)	(F24)	: Throttle sensor	(F52)	: To (M156)
(F6)	: Injector No. 3	(F25)	: Exhaust gas sensor	(F53)	: To (M157)
(F7)	: Pressure regulator control solenoid valve	(F26)	: Resistor and condenser	(F54)	: E.C.C.S. relay
(F8)	: Air regulator	(F27)	: To (M19)	(F55)	: Safety relay
(F9)	: Thermal transmitter	(F28)	: Ignition coil	(F56)	: E.C.C.S. control unit
(F10)	: Engine ground	(F29)	: Ignition coil		
(F11)	: Injector No. 1				
(F12)	: Engine ground				
(F13)	: Fuel temperature sensor				
(F14)	: Sub-harness (To engine temperature sensor)				
(F15)	: Injector No. 2				
(F16)	: Distributor				
(F17)	: Crank angle sensor				
(F18)	: Compressor (A/C)				
(F19)	: A.A.C. valve				

Resistor (F26)

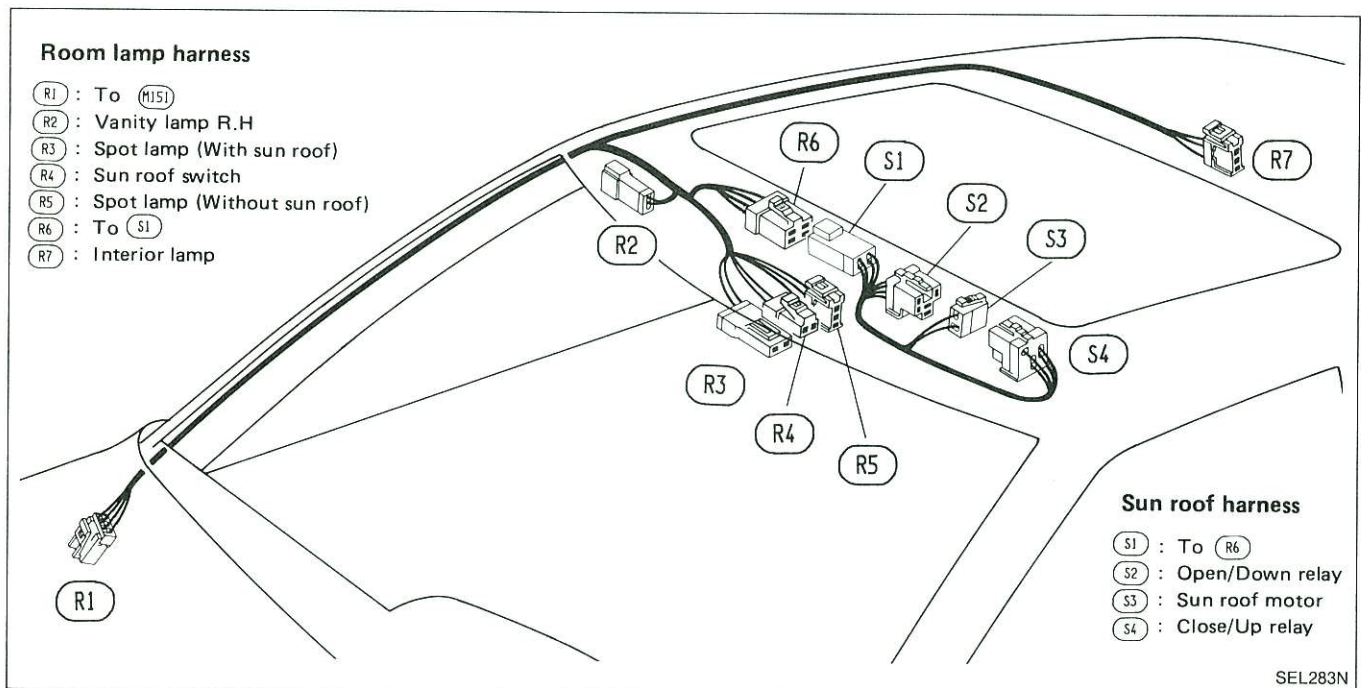


HARNESS LAYOUT

Instrument Harness



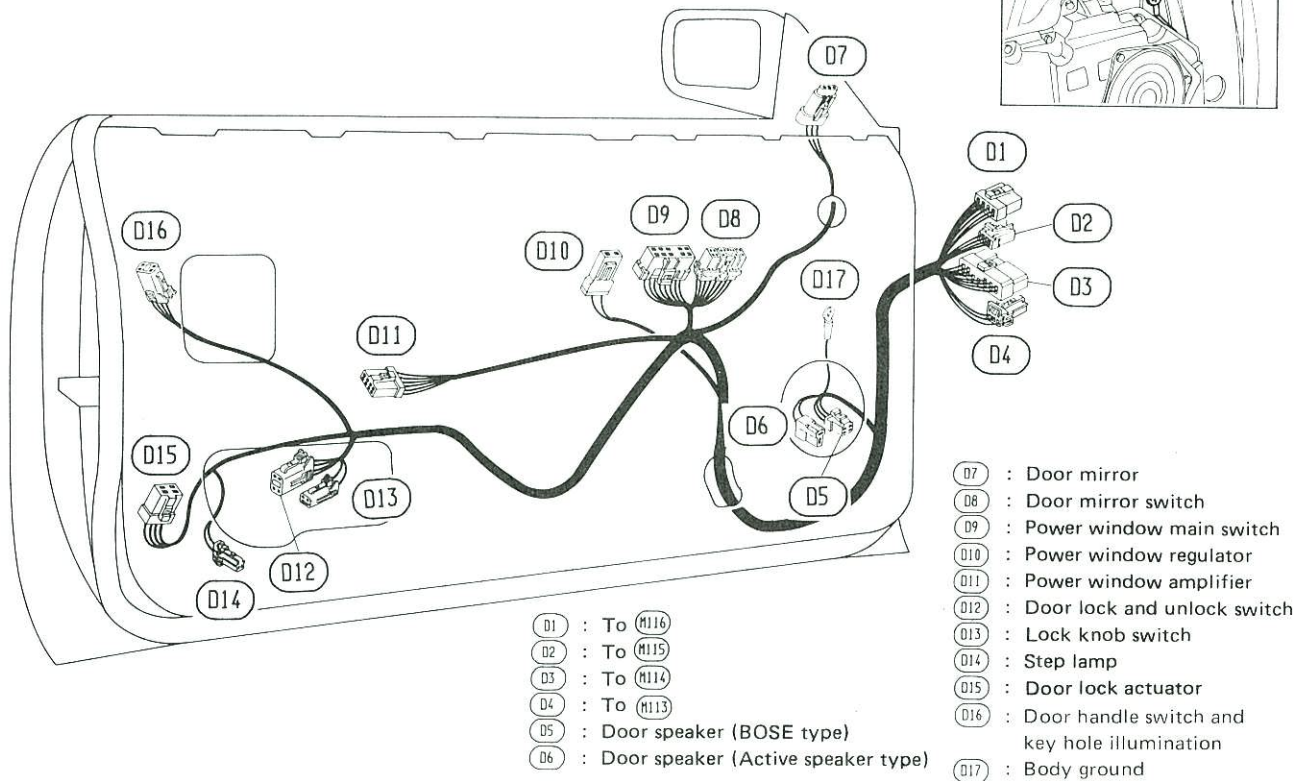
Room Lamp and Sun Roof Harness



HARNESS LAYOUT

Door Harness

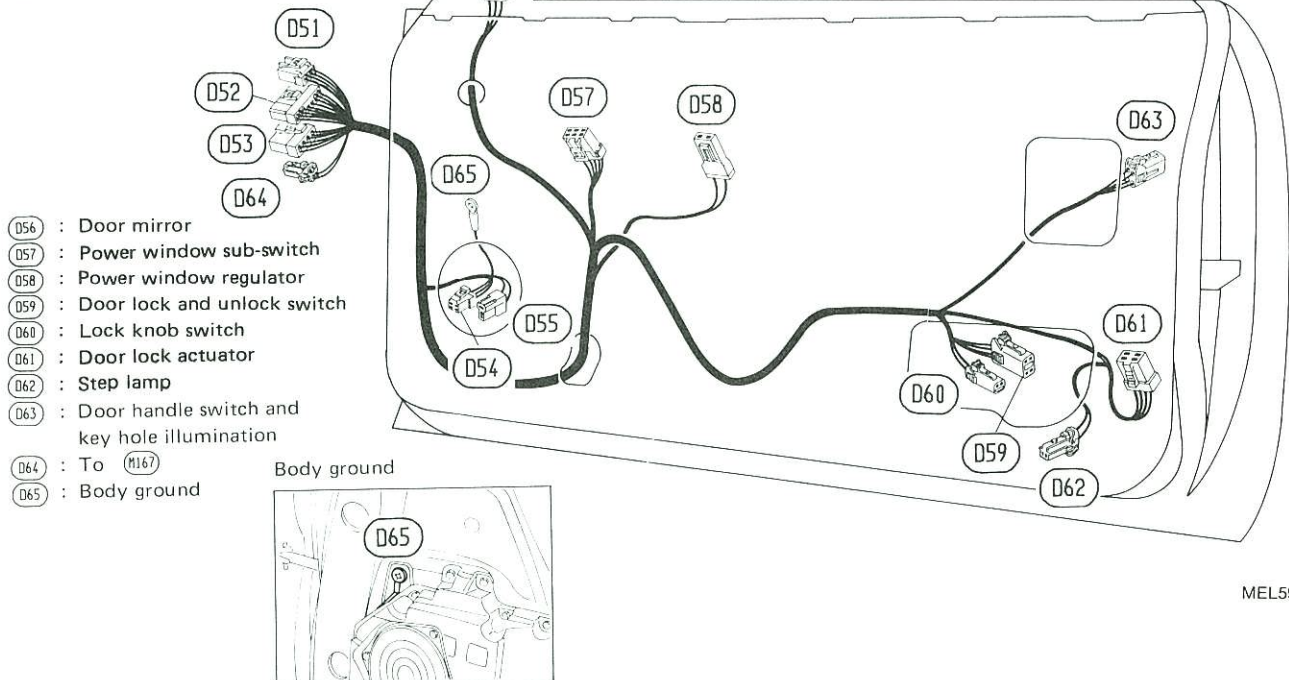
L.H. SIDE



R.H. SIDE

MEL590A

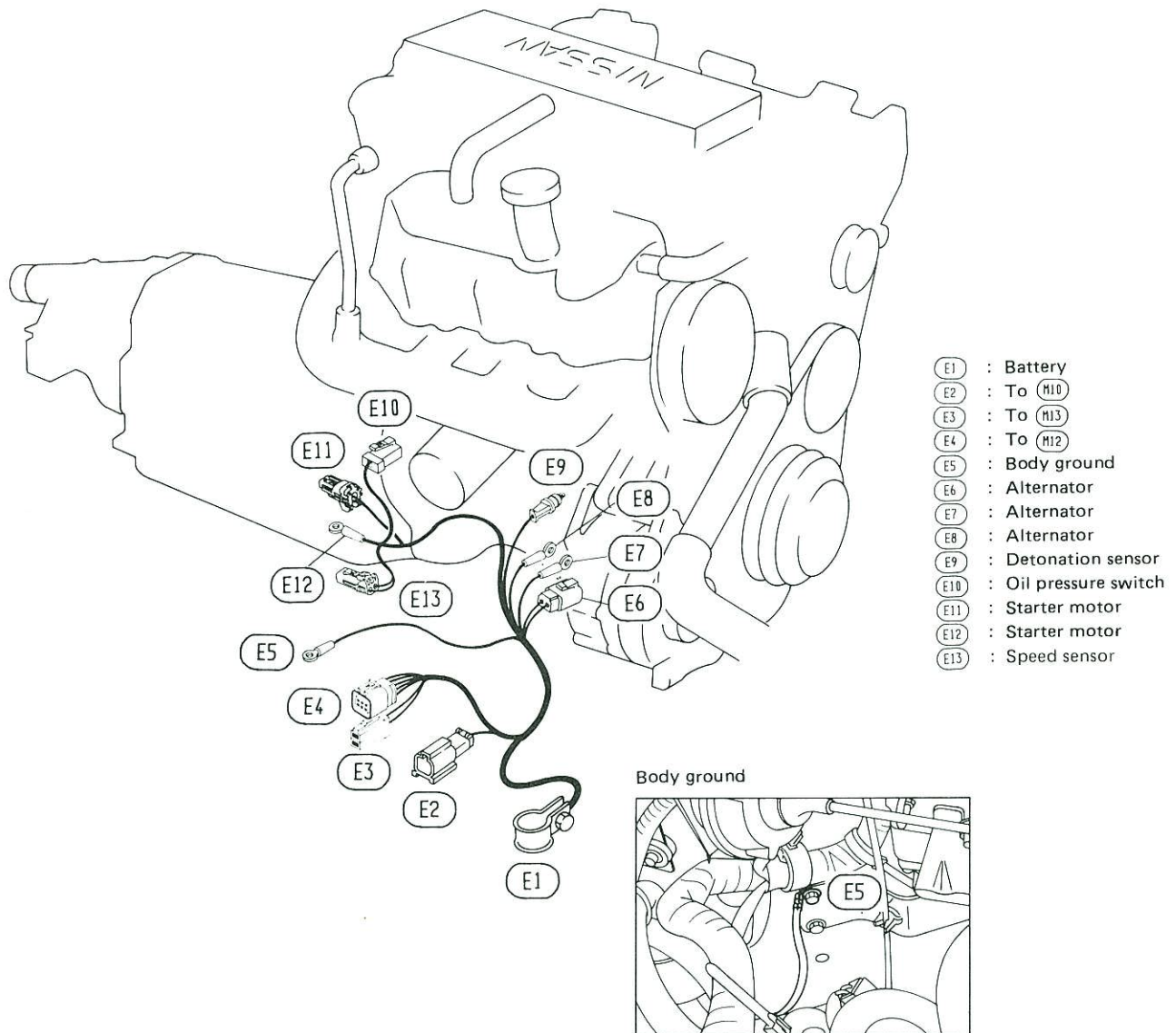
- D51 : To M152
- D52 : To M153
- D53 : To M154
- D54 : Door speaker (BOSE type)
- D55 : Door speaker (Active speaker type)



MEL591A

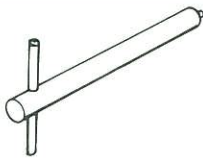
HARNESS LAYOUT

Engine Harness



MEL592A

SPECIAL SERVICE TOOL

Tool Number	Tool name
(J35126)	Washer nozzle adjusting tool
	

SPECIAL SERVICE TOOL

NOTE

SUPER MULTIPLE JUNCTION (S.M.J.)

Terminal Arrangement

MAIN HARNESS

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
D1	D2					D11	D12				
E1	E2					E11	E12				
F1	F2					F11	F12				
G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12

J1	K1	L1	M1	N1	P1
J2	K2	L2	M2	N2	P2
J3	K3	L3	M3	N3	
J4	K4	L4	M4	N4	P4
J5	K5	L5	M5	N5	P5
J6					P6
J7					P7
J8					P8
J9					P9
J10					P10
J11					P11
J12	K12	L12	M12	N12	P12
J13	K13	L13	M13	N13	P13
J14	K14	L14	M14	N14	
J15	K15	L15	M15	N15	P15
J16	K16	L16	M16	N16	P16



I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12
H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
F1	F2					F11	F12				
E1	E2					E11	E12				
D1	D2					D11	D12				
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12

J16	K16	L16	M16	N16	P16
J15	K15	L15	M15	N15	P15
J14	K14	L14	M14	N14	
J13	K13	L13	M13	N13	P13
J12	K12	L12	M12	N12	P12
J11					P11
J10					P10
J9					P9
J8					P8
J7					P7
J6					P6
J5	K5	L5	M5	N5	P5
J4	K4	L4	M4	N4	P4
J3	K3	L3	M3	N3	
J2	K2	L2	M2	N2	P2
J1	K1	L1	M1	N1	P1

ENGINE ROOM HARNESS

INSTRUMENT HARNESS

E.C.C.S. CONTROL UNIT



101	102	103	104	105	106	107	108	1	2	3	4	5	6	7	8	9	10	21	22	23	24	25	26	27	28	29	30	41	42	43	44	45	46	47	48	49	50
109	110	111	112	113	114	115	116	11	12	13	14	15	16	17	18	19	20	31	32	33	34	35	36	37	38	39	40	51	52	53	54	55	56	57	58	59	60

View from harness side

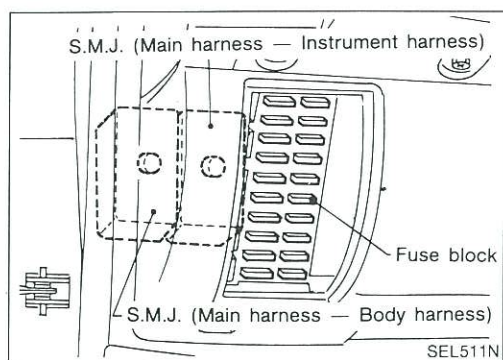
A/T CONTROL UNIT

1	2	3	4	9	10	11	12	13	14	15	23	24	25	26	27	28	29	30	31	32	33	34	35
5	6	7	8	16	17	18	19	20	21	22	36	37	38	39	40	41	42	43	44	45	46	47	48



View from harness side

SUPER MULTIPLE JUNCTION (S.M.J.)



INSTALLATION

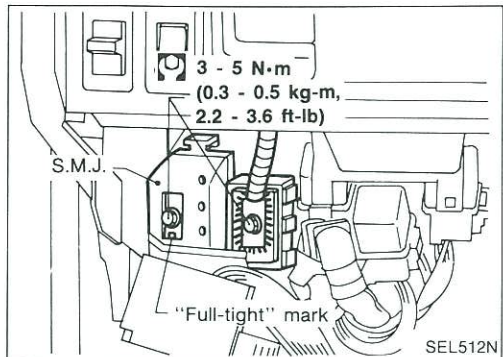
To install S.M.J., tighten bolts until orange "full-tight" mark appears and then retighten to specified torque as required.

: 3 - 5 N·m

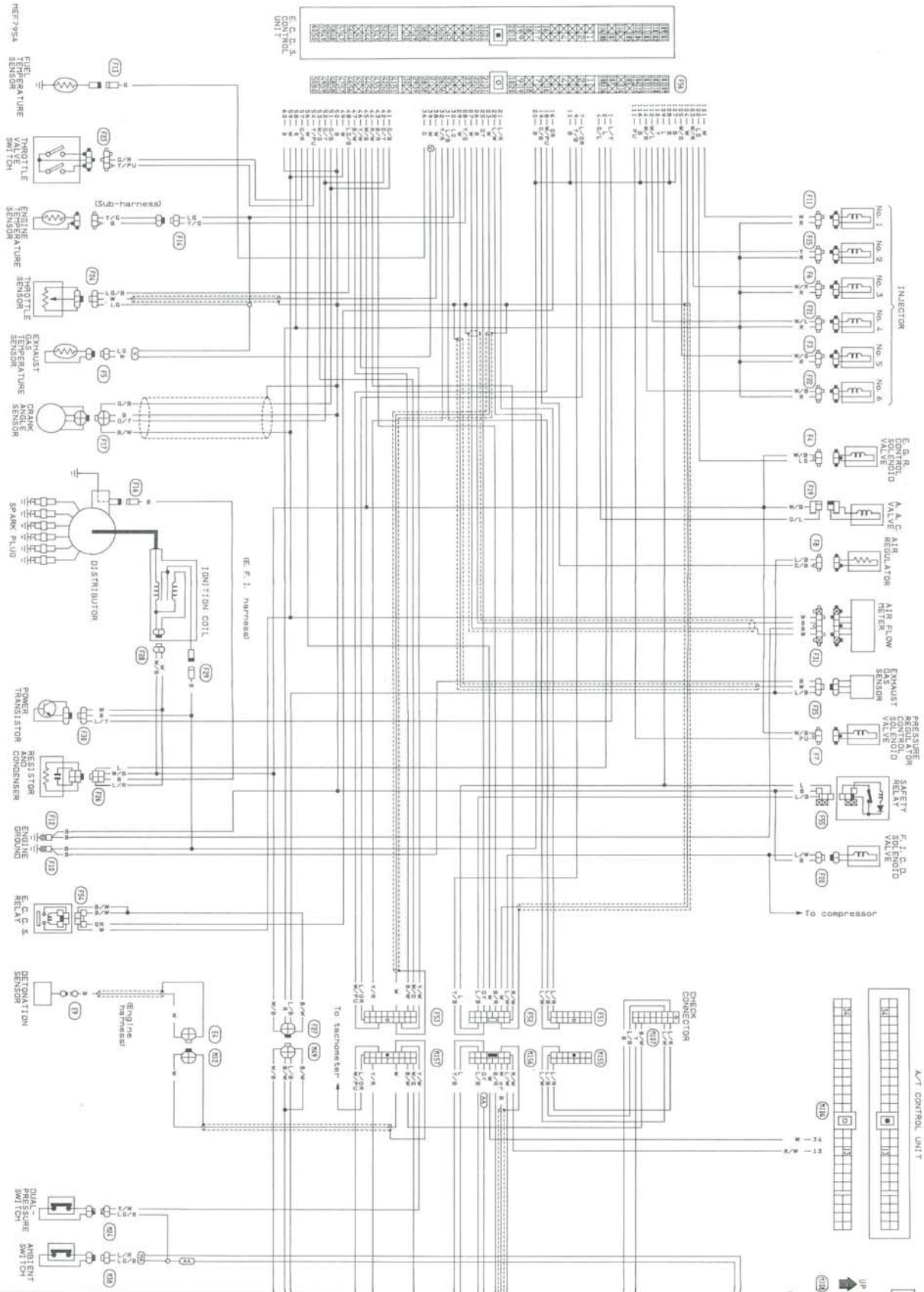
(0.3 - 0.5 kg-m, 2.2 - 3.6 ft-lb)

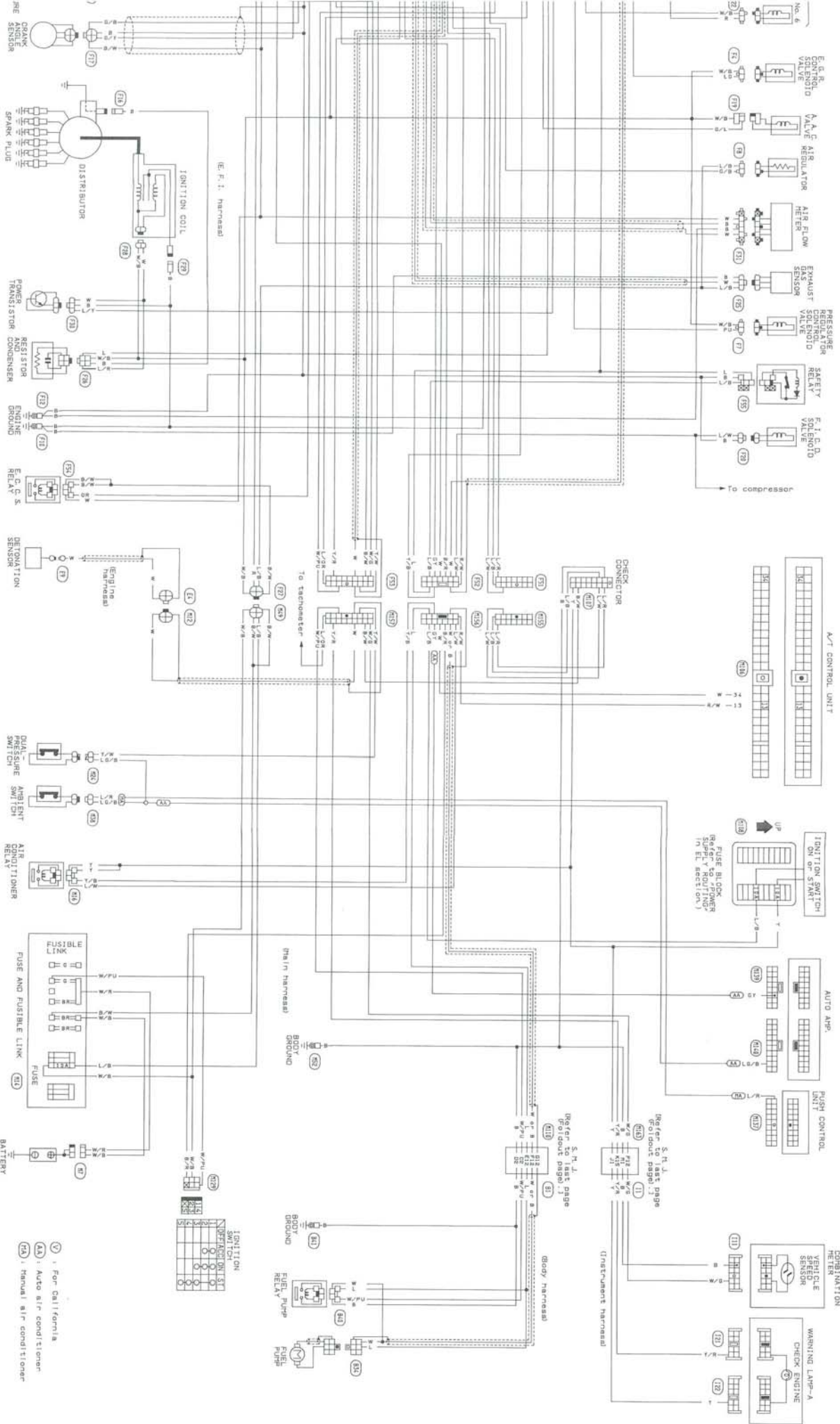
CAUTION:

Do not overtighten bolts, otherwise, they may be damaged.

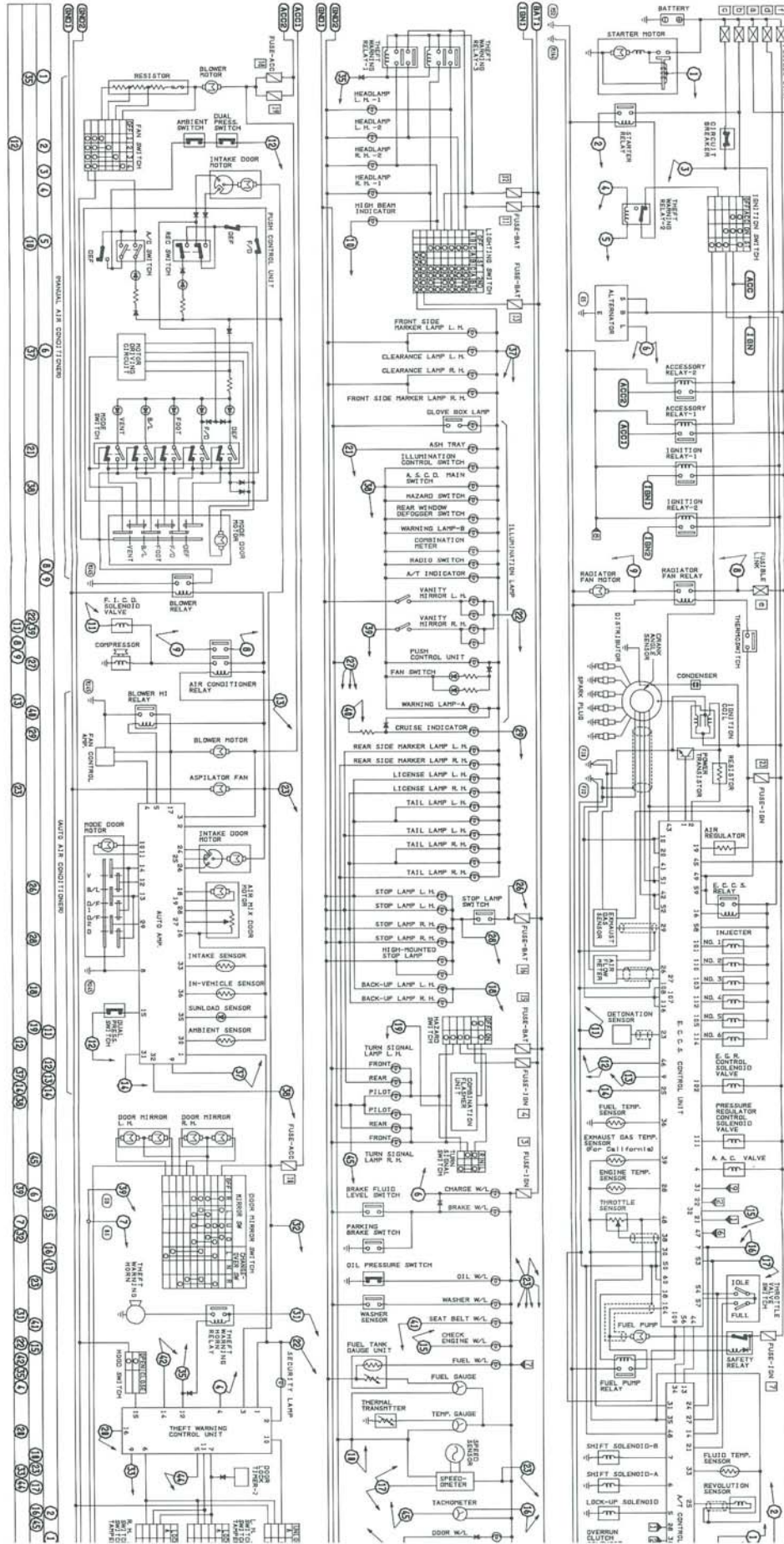


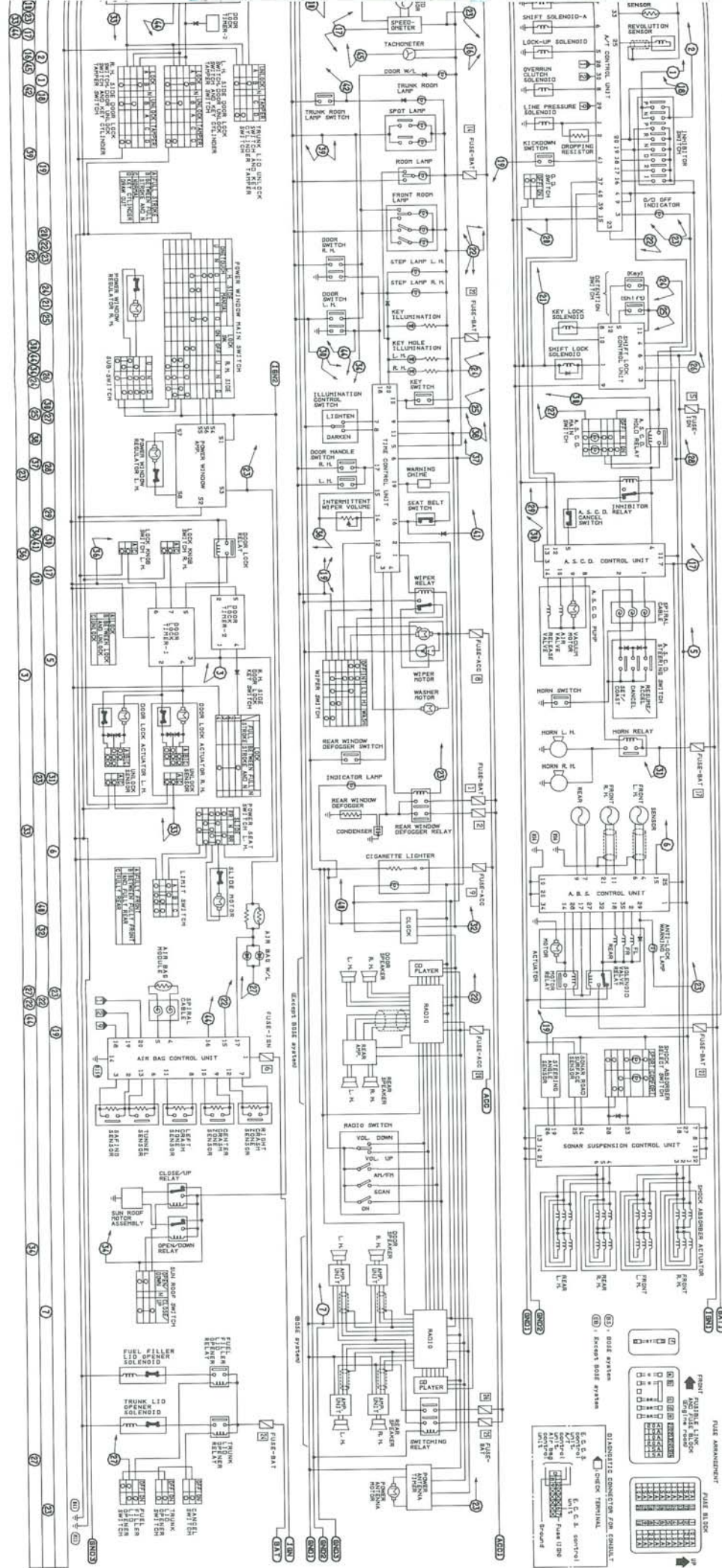
1991 INFINITI M30 E. C. C. S. WIRING DIAGRAM





1991 INFINITI M30 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

