

# 1992 Mazda B2200 B2600i Workshop Manual

## FOREWORD

This workshop manual is intended for use by service technicians of Authorized Mazda Dealers to help them service Mazda vehicles.

For proper repair and maintenance, a thorough familiarization with this manual is important, and it should always be kept in a handy place for quick and easy reference.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing. As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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**Mazda Motor Corporation  
HIROSHIMA, JAPAN**

### APPLICATION:

This manual is applicable to vehicles beginning with the Vehicle Identification Numbers (VIN) shown on the following page.

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## VEHICLE IDENTIFICATION NUMBERS (VIN)

JM2UF123 \* NO 250001 ~  
JM2UF223 \* NO 250001 ~  
JM2UF323 \* NO 250001 ~  
JM2UF113 \* NO 250001 ~  
JM2UF213 \* NO 250001 ~  
JM2UF313 \* NO 250001 ~  
JM2UF114 \* NO 250001 ~  
JM2UF314 \* NO 250001 ~  
JM2UF414 \* NO 250001 ~  
JM2UF614 \* NO 250001 ~  
JM2UF514 \* NO 250001 ~  
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# GENERAL INFORMATION

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**IMPORTANT INFORMATION****BASIC ASSUMPTIONS**

This workshop manual assumes that you have certain special tools that are necessary for the safe and efficient performance of service operations on Mazda vehicles and that you know how to use them properly. It also assumes that you are familiar with automobile systems and basic service and repair procedures. You should not attempt to use this manual unless these assumptions are correct and you understand the consequences described below.

**SAFETY RISK**

This manual contains certain notes, warnings, and other precautionary information that you should carefully read and follow to reduce the risk of personal injury to yourself or others and the risk of improper service that may damage the vehicle or render it unsafe. If there is no such information in regard to any specific service method, this does not mean there is no possibility that personal safety or vehicle safety will be jeopardized by the use of incorrect methods or tools.

**POSSIBLE LOSS OF WARRANTY**

The manufacturer's warranty on Mazda vehicles and engines can be voided if improper service or repairs are performed by persons other than those at an Authorized Mazda Dealer.

**WARNING ON LUBRICANTS AND GREASES**

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g., engine sump oils) are more irritating and more likely to cause serious effects, including skin cancer, in the event of gross and prolonged skin contact.

Wash skin thoroughly after work involving oil.

Protective hand cleaners may be of value provided they can be removed from the skin with water. Do not use gasoline, paraffin, or other solvents to remove oil from the skin.

Lubricants and greases may be slightly irritating to the eyes.

Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals.

9MUGIX-002



HOW TO USE THIS MANUAL

PREPARATION

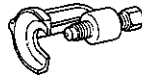
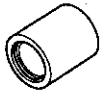
PREPARATION points out the needed SST for the service operation that follows. It is best to gather all necessary SST before beginning work.

Example:

**N TIE-ROD END BOOT AND STEERING GEAR BOOT**

**TIE-ROD END BOOT AND STEERING GEAR BOOT**

**PREPARATION**

49 0118 850C Puller, ball joint		49 H028 301 Installer, boot	
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9MU0NX-030

**SST NUMBER**  
49 H028 301  
Installer, boot

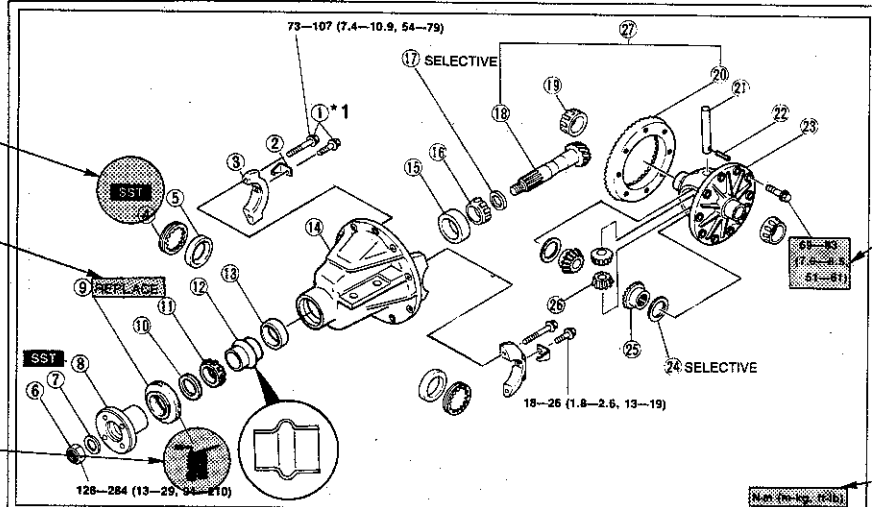
**SST NAME**  
**SST ILLUSTRATION**

9MUGIX-033

REPAIR PROCEDURE

1. Most repair operations begin with an overview illustration. It identifies the components, shows how the parts fit together, and visual parts inspections. If a damaged or worn part is found, repair or replace it as necessary.
2. Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration.
3. Pages related to service procedures are shown under the illustration. Refer to this information when servicing the related part.

Example:



**SHOWS NEEDS SST**

**SHOWS EXPENDABLE PARTS**

**SHOWS APPLICATION POINT OF OIL, ETC.**

**SHOWS TIGHTENING TORQUE SPECIFICATION \*2**

**SHOWS TIGHTENING TORQUE UNIT**

**SHOWS VISUAL INSPECTION INFORMATION**

1. Bolt  
2. Lock plate  
3. Bearing cup  
4. Adjusting screw  
5. Bearing outer race  
6. Locknut  
7. Washer  
8. Companion flange  
9. **REPLACE**  
10. **SST**  
11. **SST**  
12. **SST**  
13. **SST**  
14. **SST**  
15. **SST**  
16. Bearing inner race  
17. Spacer  
18. Drive pinion  
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99. **SELECTIVE**  
100. **SELECTIVE**

73-107 (7.4-10.9, 54-79)

128-284 (13-29, 94-110)

18-26 (1.8-2.6, 13-19)

Net (kg, lb)

Removal ..... page M-22  
Inspect for damage or rough cracks  
Installation ..... page M-24







Removal ..... page M-21  
Inspect splines and teeth for wear or damage  
Adjustment of height ..... page M-22  
Adjustment ..... page M-24

Removal ..... page M-21  
Inspect splines and teeth for wear or damage  
Adjustment of height ..... page M-22  
Adjustment ..... page M-24

\*1: The numbering (ex. ①) shows service procedure.  
\*2: Units shown in N-m (m-kg, ft-lb) unless otherwise specified.

**SYMBOLS**

There are 6 symbols for oil, grease, and sealant. These show the points of applying oil, grease, or sealant during servicing.

Symbol	Meaning	Kind
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	Only brake fluid
	Apply automatic transmission fluid	Only ATF
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly

9MUGIX-035

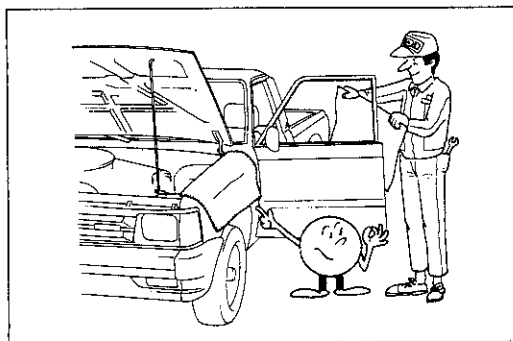
**Note**

When special oil or grease is needed, this is shown in the illustration.

**NOTES, CAUTIONS, AND WARNINGS**

As you read through the procedures, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. **NOTES** give you **added information** that will help you to complete a particular procedure. **CAUTIONS** are given to prevent you from making an error that could **damage the vehicle**. **WARNINGS** remind you to be especially careful in those areas where carelessness can cause **personal injury**. The following list contains some general WARNINGS you should follow when you work on a vehicle.

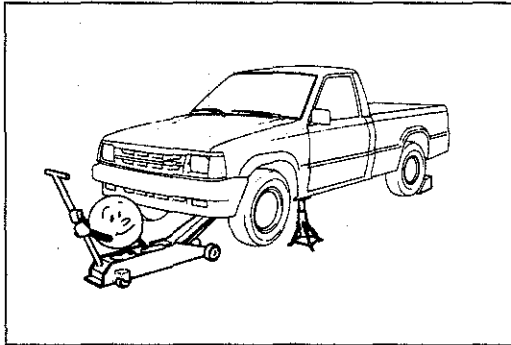
9MUGIX-036



9MUGIX-037

**FUNDAMENTAL PROCEDURES****PROTECTION OF THE VEHICLE**

Always be sure to cover fenders, seats, and floor areas before starting work.



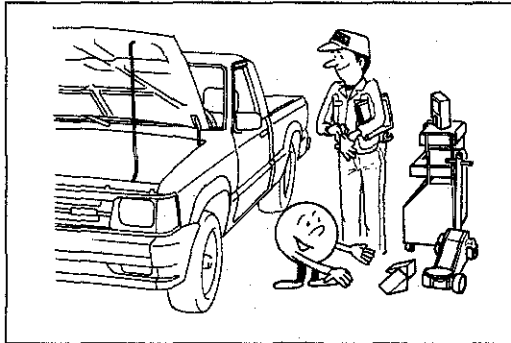
9MUGIX-003

**A WORD ABOUT SAFETY**

The following precautions must be followed when jacking up the vehicle.

1. Block the wheels.
2. Use only the specified jacking positions.
3. Support the vehicle with safety stands.

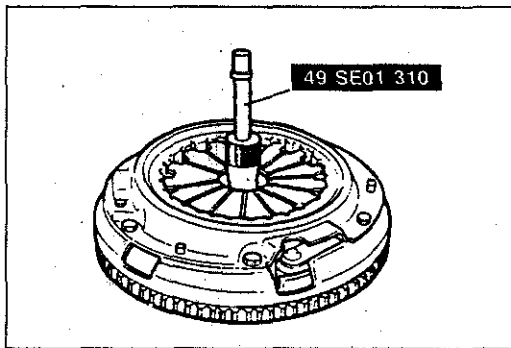
Start the engine only after making certain the engine compartment is clear of tools and people.



9MUGIX-038

**PREPARATION OF TOOLS AND MEASURING EQUIPMENT**

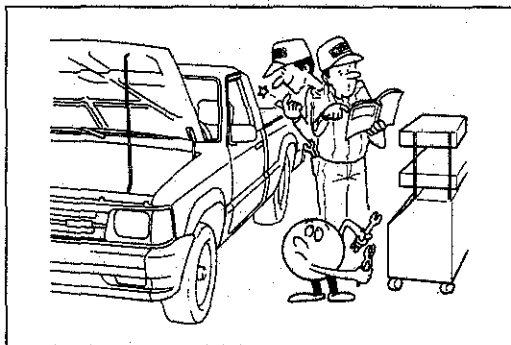
Be sure that all necessary tools and measuring equipment are available before starting any work.



47U0GX-005

**SPECIAL TOOLS**

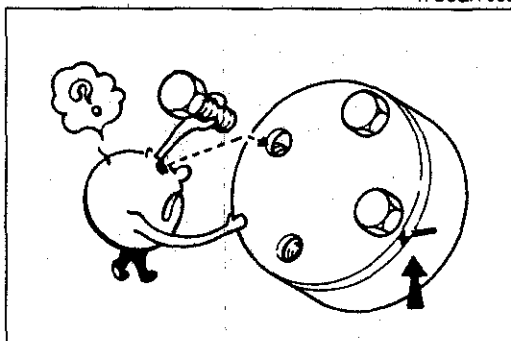
Use special tools when they are required.



47U0GX-006

**REMOVAL OF PARTS**

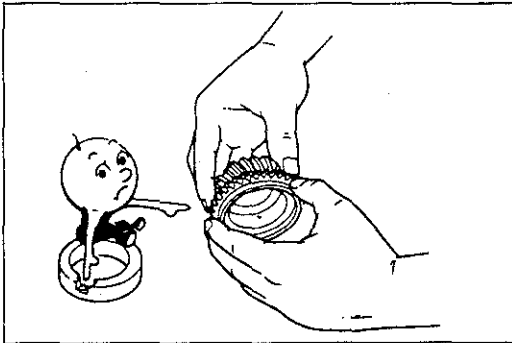
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



9MUGIX-039

**DISASSEMBLY**

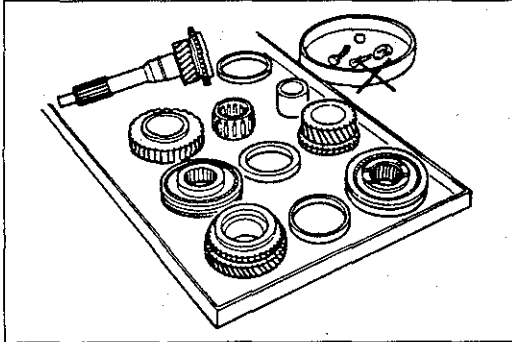
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



9MUGIX-040

### 1. Inspection of parts

When removed, each part should be carefully inspected for malfunctioning, deformation, damage, and other problems.

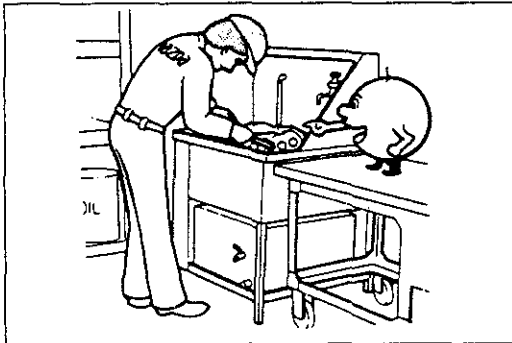


9MUGIX-041

### 2. Arrangement of parts

All disassembled parts should be carefully arranged for re-assembly.

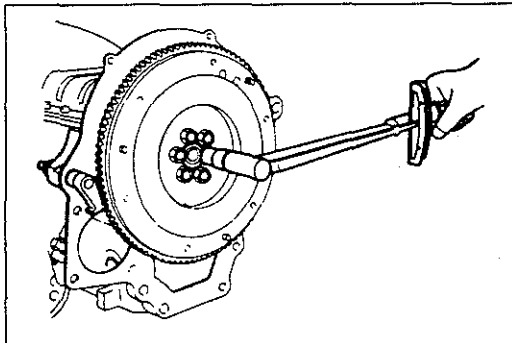
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



47U0GX-010

### 3. Cleaning parts for reuse

All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.



9MUGIX-004

### REASSEMBLY

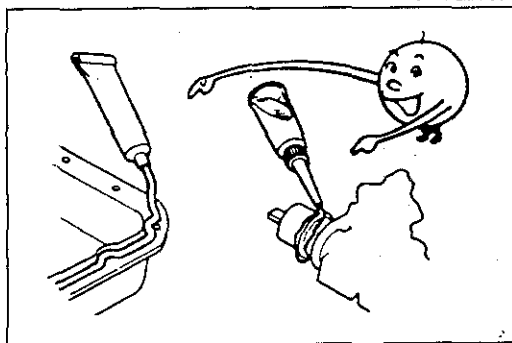
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts. Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in Section TD for tightening torques not mentioned in the main text.

If removed, these parts should be replaced with new ones:

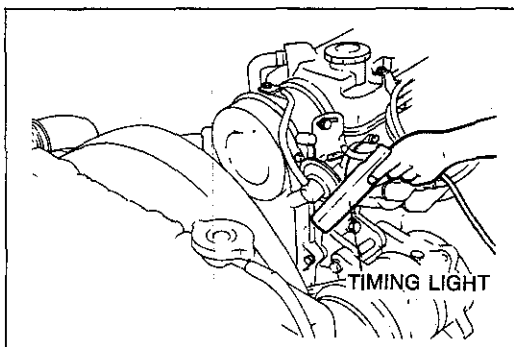
- |                |                 |
|----------------|-----------------|
| 1. Oil seals   | 2. Gaskets      |
| 3. O-rings     | 4. Lock washers |
| 5. Cotter pins | 6. Nylon nuts   |

Depending on location:

1. Sealant should be applied to gaskets.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



9MUGIX-042

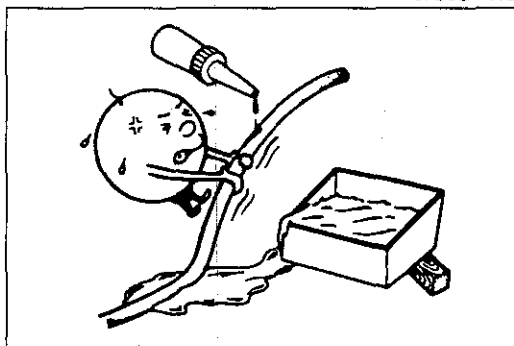


67U0GX-002

**ADJUSTMENTS**

Use suitable gauges and/or testers when making adjustments.

GI



9MUGIX-005

**RUBBER PARTS AND TUBING**

Prevent gasoline or oil from getting on rubber parts or tubing.

### JACK AND SAFETY STAND (RIGID RACK) POSITIONS

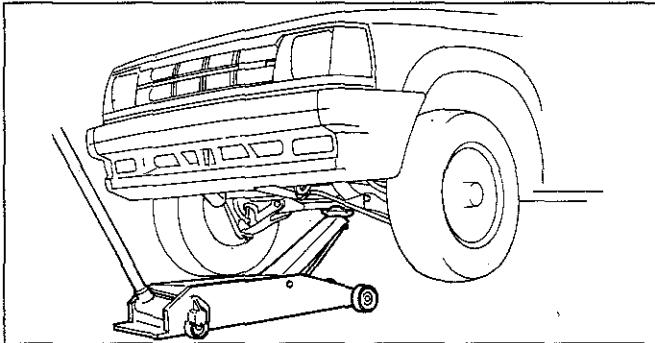
#### FRONT

##### Jack position:

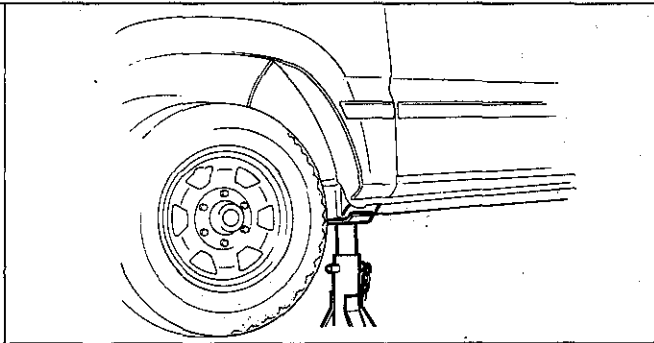
At the center of the crossmember

##### Safety stand positions:

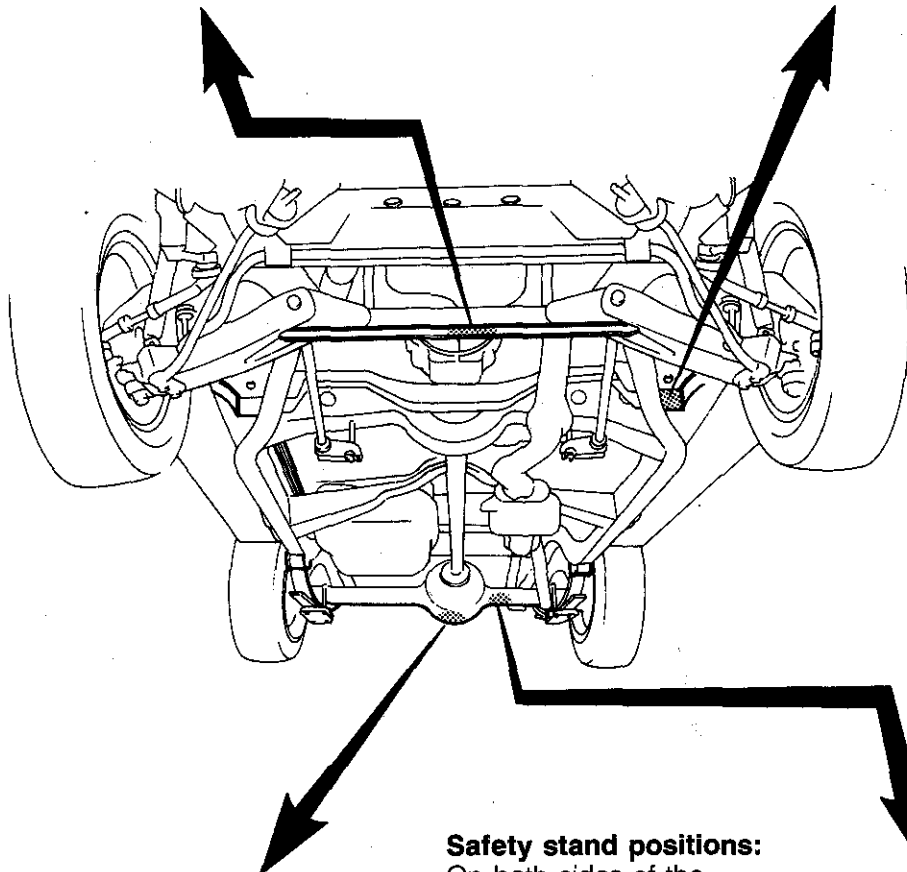
On both sides of the jack point



4EG0GX-018



4EG0GX-019



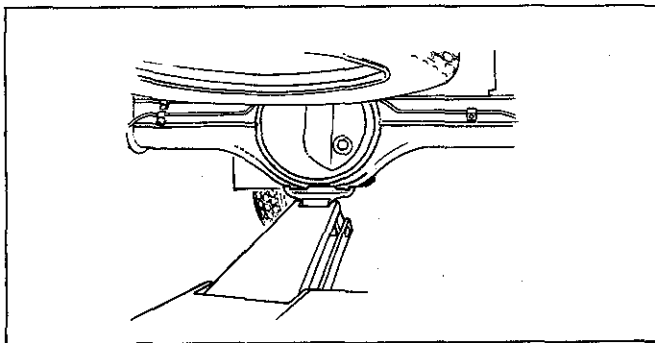
#### REAR

##### Jack position:

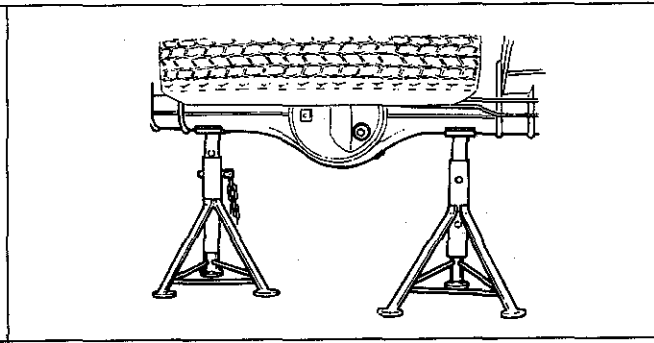
At the center of the differential

##### Safety stand positions:

On both sides of the differential



4EG0GX-021



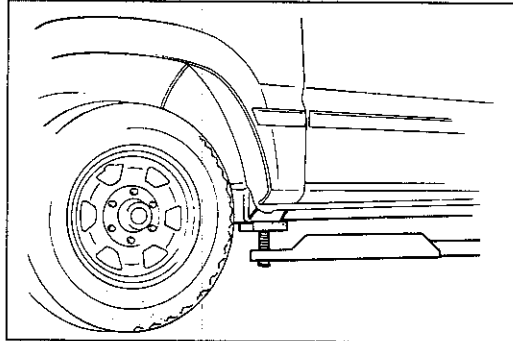
4EG0GX-022

VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

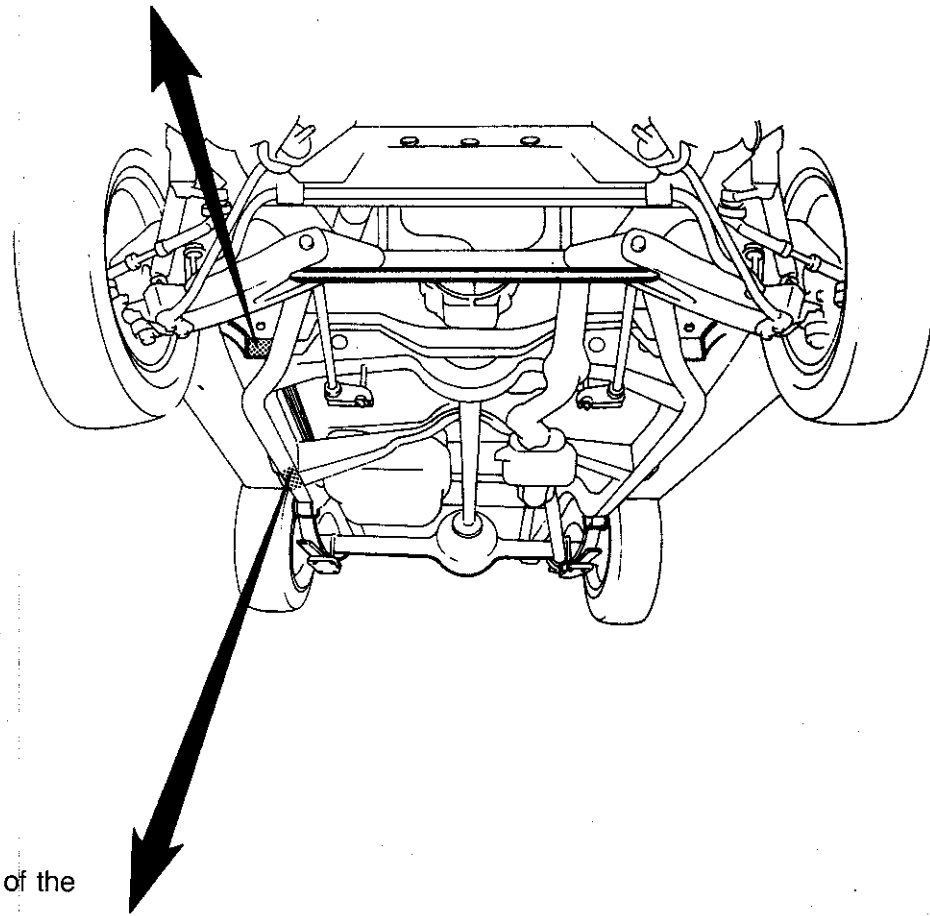
**FRONT**

**Jack point:**

On both sides of the jack point



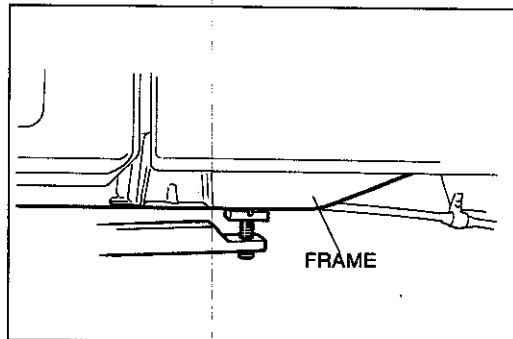
5BU0GX-002



**REAR**

**Leaf-spring:**

On both sides of the leaf-spring



4EG0GX-027

GI

## TOWING



FOR 4x4:  
SET THE REMOTE FREE WHEEL SYSTEM  
TO FREE MODE



0BUGIX-001

Proper towing equipment is necessary to prevent damage to the vehicle during any towing operation. Laws and regulations applicable to vehicles in tow must always be observed. Release the parking brake, place the shift lever in neutral, and set the ignition key in the ACC position. As a rule, towed vehicles should be pulled with the driving wheels off the ground.

**WITH MANUAL TRANSMISSION**

If the transmission, rear axle, and steering system are not damaged, the vehicle may be towed on all four wheels. If any of these components are damaged, use a towing dolly.

**WITH AUTOMATIC TRANSMISSION**

If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use a wheel dolly. With all 4 wheels on the ground, the vehicle may be towed only forward. In this case, do not exceed the following towing speed and/or distance or transmission damage could result.

	4x2	4x4
Towing speed	45 km/h (30 mph)	56 km/h (35 mph)
Towing distance	15 km (10 miles)	56 km (35 miles)

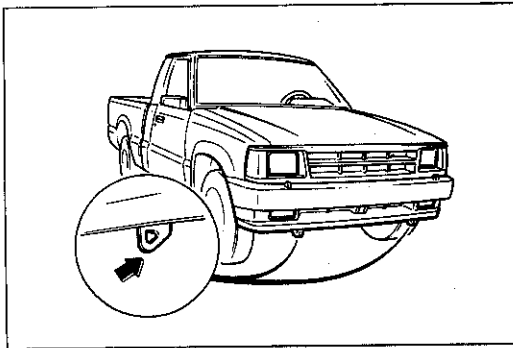
If towing speed and/or distance will exceed above-mentioned specifications, use one of three methods:

1. Place the rear wheels on a dolly.
2. Tow with the rear wheels off the ground.
3. Disconnect the propeller shaft. (4x4: rear propeller shaft)

If the transmission or rear axle is inoperative, tow the vehicle with its rear wheels off the ground or have the propeller shaft disconnected.

**CAUTION**

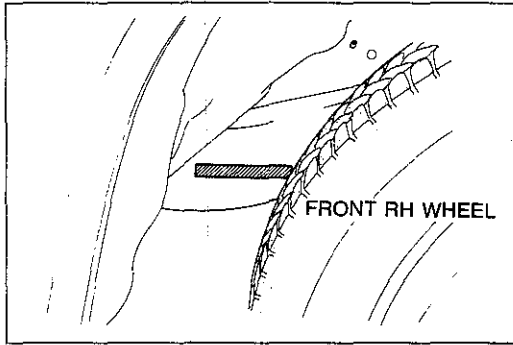
- a) The power assist for the brakes is inoperative while the engine is off.
- b) When either of the towing hooks is used, pull the cable or chain straight away from the hook and do not apply any sideways force to it. To further help prevent damage, do not take up slack too quickly in the cable or chain.
- c) The rear towing hook should be used only in an emergency situation (for example, to pull the vehicle from a ditch, snow, or mud).



4EG0GX-032



CHASSIS NUMBER LOCATION



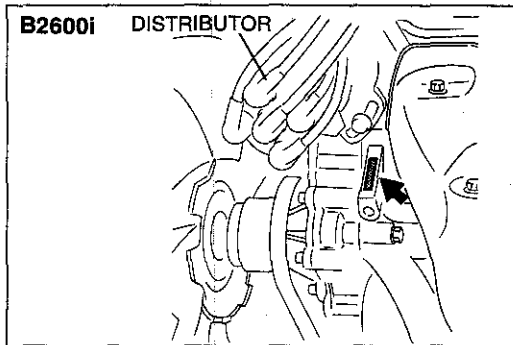
4BG0GX-005

UNITS

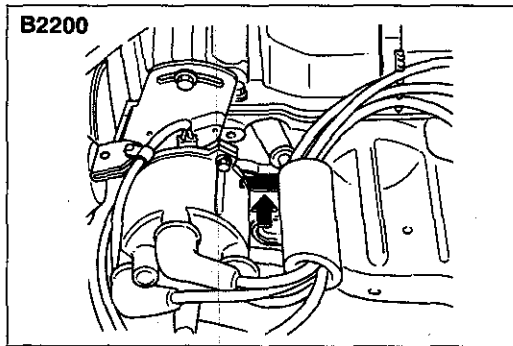
N·m (m·kg, ft·lb) ..	Torque
rpm .....	Revolutions per minute
A .....	Ampere(s)
V .....	Volt(s)
Ω .....	Ohm(s) (resistance)
kPa (kg/cm <sup>2</sup> , psi)	Pressure
mmHg (in Hg) ....	Pressure
	(usually positive)
	(usually negative)
W .....	Watt
mm (in) .....	Length

4BG0GX-008

ENGINE MODEL AND NUMBER LOCATION



4BG0GX-006

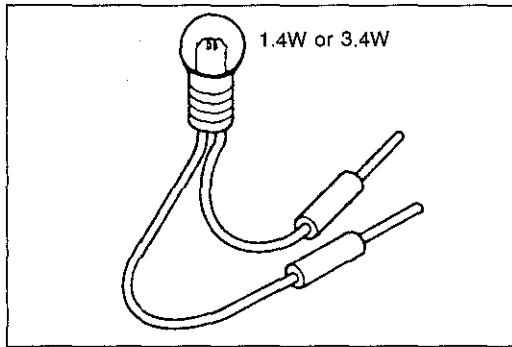


4BG0GX-007

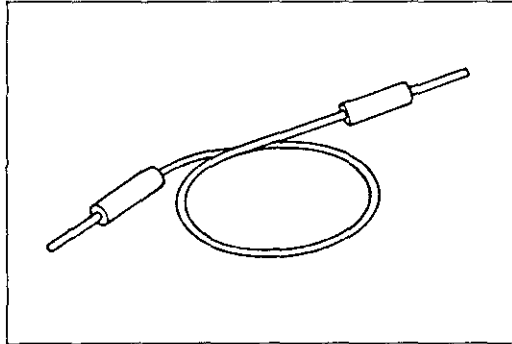
ABBREVIATIONS

ABDC .....	After bottom dead center
ABS .....	Anti-lock brake system
ACC .....	Accessories
A/C .....	Air conditioner
ACV .....	Air control valve
ATDC .....	After top dead center
A/T .....	Automatic transmission
ATF .....	Automatic transmission fluid
BAC .....	Bypass air control
BBDC .....	Before bottom dead center
BTDC .....	Before top dead center
EC-AT .....	Electronically-controlled automatic transmission
ECU .....	Engine control unit
EEC .....	Evaporative emission control system
EGR .....	Exhaust gas recirculation
ELR .....	Emergency locking retractor
ETR .....	Electrical tuning radio
EX .....	Exhaust
Fig. ....	Figure
HAT .....	Hydraulically-controlled automatic transmission
HLA .....	Hydraulic lash adjuster
IC .....	Integrated circuit
IG .....	Ignition
IN .....	Intake
INT .....	Intermittent
ISC .....	Idle speed control
LH .....	Left hand
LSD .....	Limited-slip differential
MAS .....	Mixture adjust screw
MIL .....	Malfunction indicator light
M/T .....	Manual transmission
MTR .....	Mechanical tuning radio
OD .....	Outer diameter
OFF .....	Switch off
ON .....	Switch on
PBV .....	Proportioning by-pass valve
PCV .....	Positive crankcase ventilation
P/S .....	Power steering
RFW .....	Remote free wheel hub
RH .....	Right hand
SW .....	Switch
TAS .....	Throttle adjust screw
TDC .....	Top dead center
VRS .....	Vibration reducing stiffener

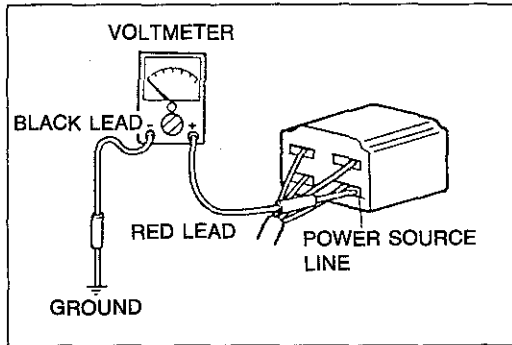
1BUGIX-001



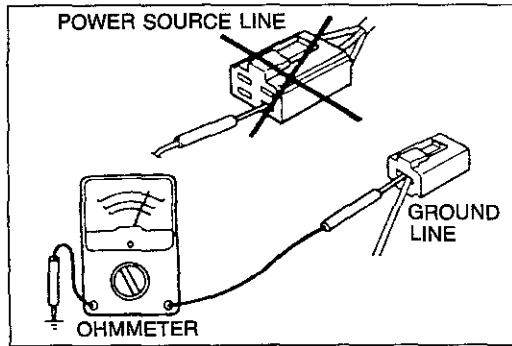
9BUGIX-003



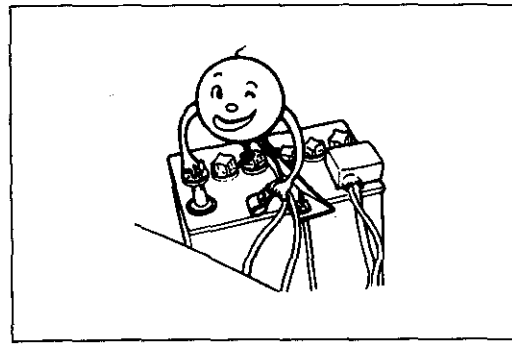
9MUGIX-020



9MUGIX-021



9MUGIX-045



9MUGIX-022

## CAUTION

### ELECTRICAL TROUBLESHOOTING TOOLS

#### Test Light

The test light, as shown in the figure, uses a 12V bulb. The two lead wires should be connected to probes. The test light is used for simple voltage checks and for checking for short circuits.

#### Caution

**When checking the control unit, never use a bulb over 3.4W.**

#### Jumper Wire

The jumper wire is used for testing by shorting across switch terminals and ground connections.

#### Caution

**Do not connect a jumper wire from the power source line to a body ground; this may cause burning or other damage to harnesses or electronic components.**

#### Voltmeter

The DC voltmeter is used to measure of circuit voltage. A voltmeter with a range of 15V or more is used by connecting the positive (+) probe (red lead wire) to the point where voltage is to be measured and the negative (-) probe (black lead wire) to a body ground.

#### Ohmmeter

The ohmmeter is used to measure the resistance between two points in a circuit and also to check for continuity and diagnosis of short circuits.

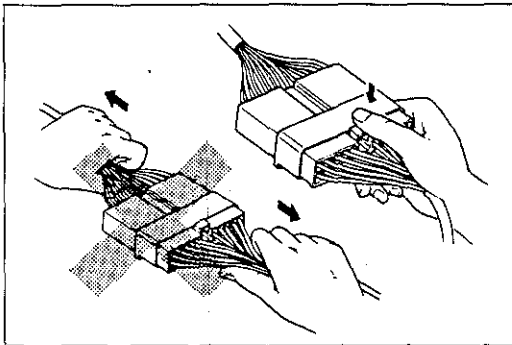
#### Caution

**Do not attempt to connect the ohmmeter to any circuit to which voltage is applied; this may burn or otherwise damage the ohmmeter.**

### CAUTION WITH ELECTRICAL PARTS

#### Battery Cable

Before disconnecting connectors or replacing electrical parts, disconnect the negative battery cable.

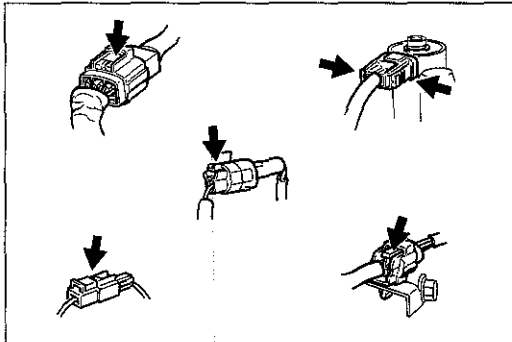


9MUGIX-023

### Connectors

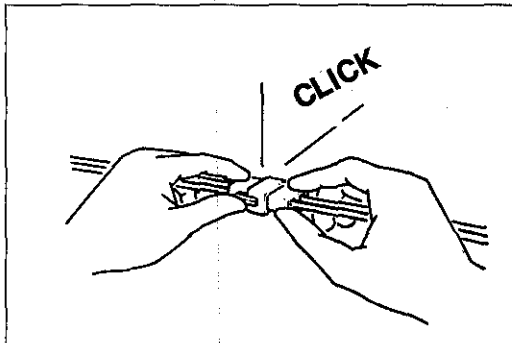
#### Removal of connector

Never pull on the wiring harness when disconnecting connectors.



9MUGIX-024

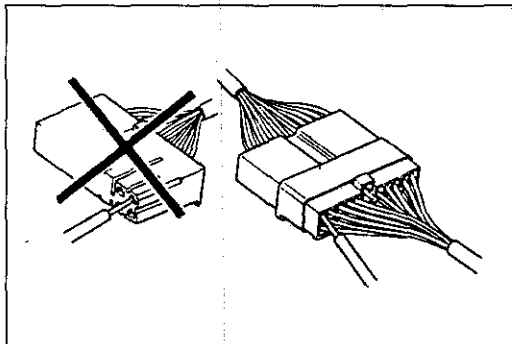
Connectors can be removed by pressing or pulling the lock lever as shown.



9MUGIX-025

#### Locking of connector

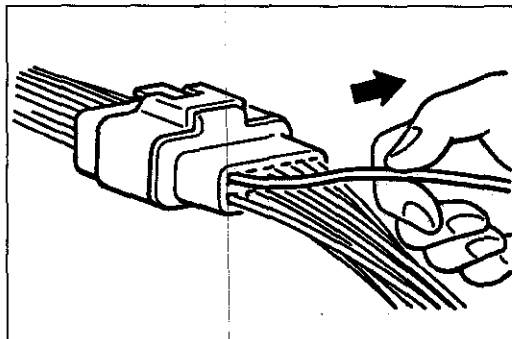
When locking connectors, make sure to listen for a click that will indicate they are securely locked.



9MUGIX-026

#### Inspection

When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wire harness side.

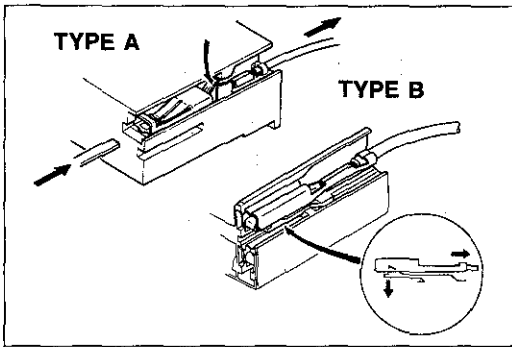


9MUGIX-027

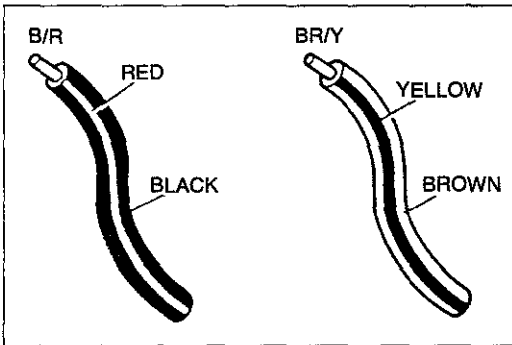
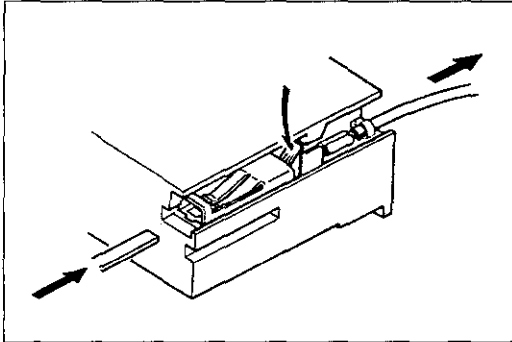
#### Terminals

#### Inspection

Pull lightly on individual wires to check that they are secured in the terminal.



9MUGIX-028



9MUGIX-029

### Replacement of terminals

Use the appropriate tools to remove the terminal as shown. When installing the terminal, be sure to insert it until it locks securely.

#### < Female >

Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.

#### < Male >

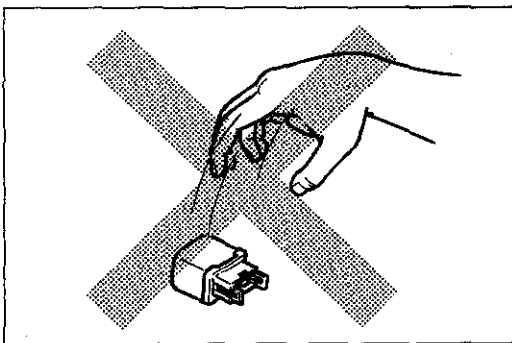
Same as the female type.

### Wiring Harness

#### Wiring color codes

Two-color wires are indicated by a two-color code symbol. The first letter indicates the base color of the wire and the second the color of the stripe.

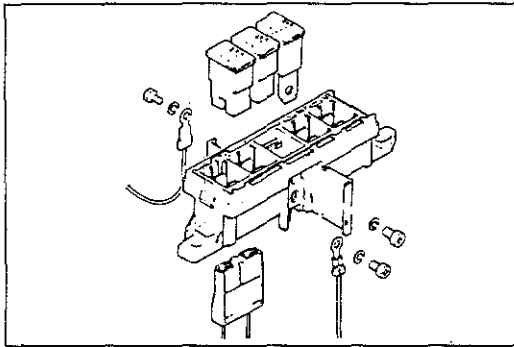
CODE	COLOR	CODE	COLOR
B	Black	O	Orange
BR	Brown	P	Pink
G	Green	R	Red
GY	Gray	V	Violet
L	Blue	W	White
LB	Light Blue	Y	Yellow
LG	Light Green	—	—



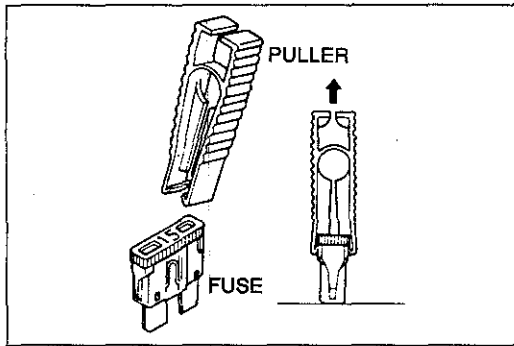
9MUGIX-030

### Sensors, Switches, and Relays

Handle sensors, switches, and relays carefully. Do not drop them or strike them against other parts.



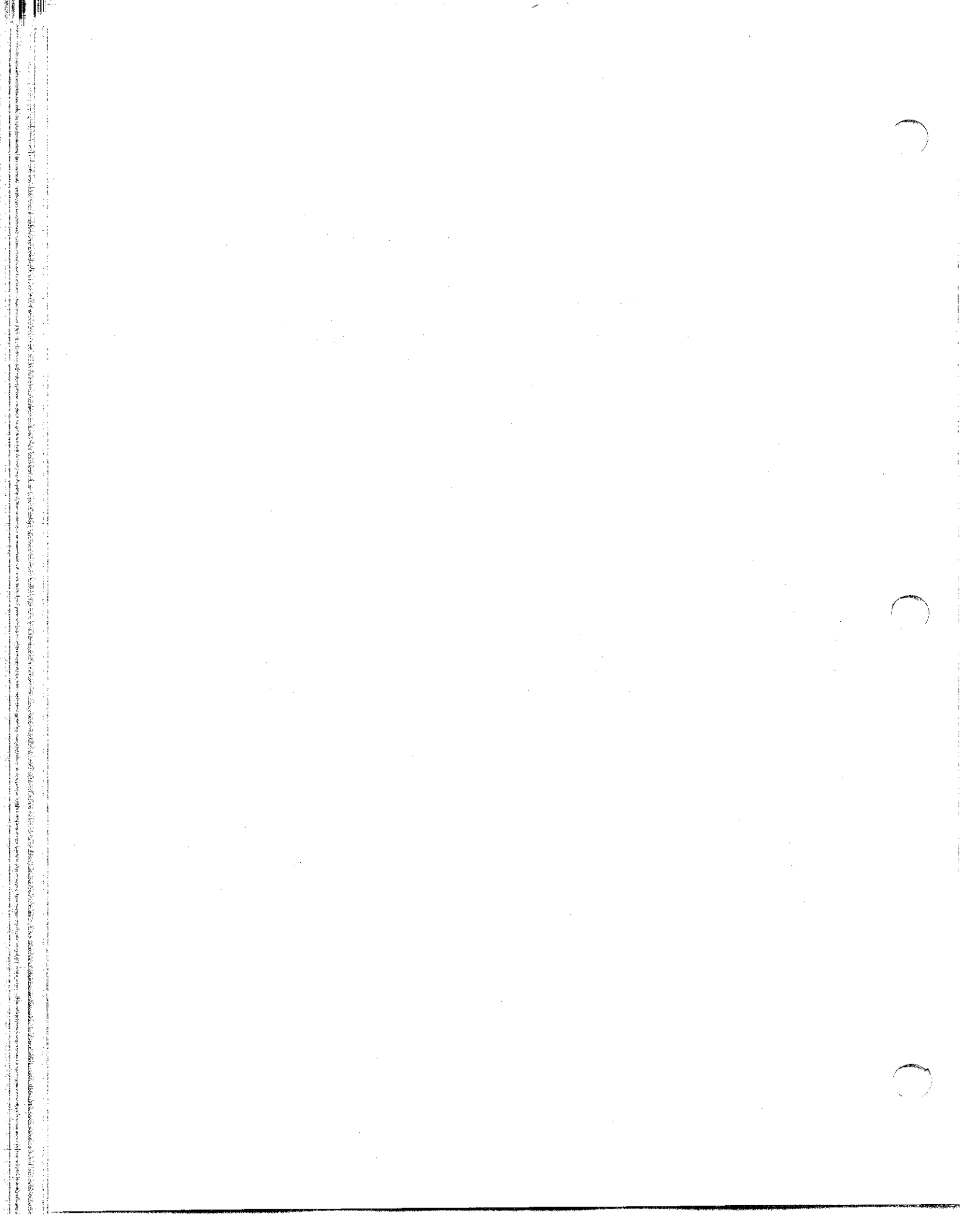
9MUGIX-031



9MUGIX-032

### Fuse Replacement

1. When replacing a fuse, be sure to replace it with one of specified capacity.  
If a fuse again fails after it has been replaced, the circuit probably has a short circuit and the wiring should be checked.
2. Be sure the negative battery terminal is disconnected before replacing a main fuse (80A).
3. When replacing a pull out fuse, use the fuse puller supplied in the fuse box cover.



# PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE SERVICES

**PRE-DELIVERY INSPECTION ..... A- 2**  
PRE-DELIVERY INSPECTION TABLE..... A- 2  
**SCHEDULED MAINTENANCE SERVICES**  
**(USA)..... A- 3**  
SCHEDULE 1  
(NORMAL DRIVING CONDITION) B2600i .. A- 3  
SCHEDULE 1  
(NORMAL DRIVING CONDITION) B2200 ... A- 7  
SCHEDULE 2  
(UNIQUE DRIVING CONDITION) B2600i.... A-10  
SCHEDULE 2  
(UNIQUE DRIVING CONDITION) B2200 .... A-13  
**SCHEDULED MAINTENANCE SERVICES**  
**(CANADA) ..... A-16**

## PRE-DELIVERY INSPECTION

## PRE-DELIVERY INSPECTION TABLE

Following items may be done at any time prior to delivery to your customer.

**1. EXTERIOR**

\* **INSPECT** and, if necessary, **ADJUST** the following items to specifications:

- Glass, exterior bright metal, and paint for damage
- Wheel lug nuts
  - Non-styled: 88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)
  - Styled: 118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)
- All weatherstrips for damage or detachment
- Operation of hood release and lock
- Operation of fuel lid opener (if equipped)
- Door operation and alignment
- Headlight aim

\* **INSTALL** the following parts:

- Wheel center caps (if equipped)
- Outside rearview mirror(s)

**2. UNDER HOOD—ENGINE OFF**

\* **INSPECT** and, if necessary, **ADJUST** the following items to specifications:

- Fuel, coolant and hydraulic lines, fittings, connections, and components for leaks
- Engine oil level
- Oil level in steering gearbox
- Power steering fluid level (if equipped)
- Brake and clutch master cylinder fluid levels
- Windshield washer reservoir fluid level
- Headlight cleaner reservoir fluid level (if equipped)
- Radiator coolant level
- Tightness of battery terminals

**3. INTERIOR**

\* **INSTALL** the following parts:

- Rubber stopper for inside rearview mirror
- \* **CHECK** the operations of the following items:
- Seat controls (sliding and reclining) and head rest
  - Door locks
  - Fold-Down rear seats (Cab Plus only)
  - Seat belts and warning system
  - Ignition switch and steering lock
  - Starter interlock switch (M/T only)
  - Shift-lock system and inhibitor switch (A/T only)
  - All lights, including warning and indicator lights (if equipped)
  - Horn, windshield wipers, and washers (if equipped)
  - Headlight cleaner (if equipped)
  - Radio and antenna (if equipped)
  - Cigarette lighter and clock (if equipped)

**INTERIOR (cont'd)**

- Heater, defroster, and air conditioner at different modes (if equipped)

\* **CHECK** the following items:

- Presence of spare fuse
- Upholstery and interior finish

\* **CHECK** and, if necessary, **ADJUST** the following items:

- Pedal height (With carpet) and free play of brake and clutch pedal

		Pedal height mm (in)	Free play mm (in)
Clutch pedal	B2600i	191—201 (7.52—7.91)	0.6—3.0 (0.02—0.12)
	B2200	181—191 (7.13—7.52)	
Brake pedal		180—185 (7.09—7.28)	4.0—7.0 (0.16—0.28)

- Parking brake ..... 7—12 notches/196N (20 kg, 44 lb)

**4. UNDER HOOD—ENGINE RUNNING AT OPERATING TEMPERATURE**

\* **CHECK** the following items:

- Throttle sensor (EGI)
- Operation of idle-up system for...
  - Air conditioner and automatic transmission (Carburetor)
- Automatic transmission fluid level
- Operation of dashpot (Carburetor)
- Carburetor float level
- Initial ignition timing:  $6 \pm 1^\circ$  BTDC (B2200)
- Idle speed: 800  $\pm 50$  rpm A/T; in P range (B2200)
- Operation of EGR control valve (Carburetor)
- Operation of idle switch (Carburetor)

**5. ON HOIST**

\* **CHECK** the following items:

- Operation of remote freewheel (4x4 only)
- Manual transmission oil level
- Transfer case oil level (4x4 only)
- Front axle oil level (4x4 only)
- Rear axle oil level
- Underside fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- Tires for cuts or bruises
- Steering linkage, suspension, exhaust system and all underside hardware for looseness or damage

**6. ROAD TEST**

\* **CHECK** the following items:

- Brake operation
- Clutch operation
- Steering control
- Operation of meters and gauge
- Squeaks, rattles or unusual noises
- Emergency locking retractors
- Cruise control system (if equipped)
- Operation of transfer case (4x4 only)

**7. AFTER ROAD TEST**

\* **CHECK** for necessary owner's information material, tools and spare tire in vehicle.

Following items must be done just before the delivery to your customer.

- Load test battery and charge if necessary
- Adjust tire pressure to the specification (Refer to Section Q)
- Clean outside of vehicle

Volts
Load test result

- Install fuses for accessories
- Remove seat and floor mat protective covers
- Vacuum and clean interior of vehicle
- Inspect installation of option parts with invoice

2BU0AX-002



## SCHEDULED MAINTENANCE SERVICES (USA)

Follow the Schedule 1 (Normal Driving Condition) if the vehicle is mainly operated where none of the following conditions apply. Contrary follow the Schedule 2 (Unique driving Condition) if any of the conditions below apply;

- Repeated short distance driving.
- Driving in dusty condition.
- Driving in extended use of brakes.
- Driving in areas using road salt or other corrosive materials.
- Driving on rough and/or muddy roads.
- Towing a trailer.
- Extended periods of idling and/or low speed operation.
- Driving for a prolonged period in cold temperature and/or extremely humid climates.

### SCHEDULE 1 (NORMAL DRIVING CONDITION)

#### B2600i

#### Chart symbols:

- I ... Inspect, and if necessary correct, clean or replace
- R ... Replace or change
- T ... Tighten
- L ... Lubricate
- C ... Clean

#### Remarks:

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance at the recommended intervals:

As for \* marked items in this maintenance chart, note the following points;

- \*1 Except for California vehicle, the Malfunction Indicator Light (MIL) comes ON at every 60,000 miles and 80,000 miles. If it comes ON, follow the described maintenance.
- \*2 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.
- \*3 This maintenance is required for Canada and all states except California. However, we recommend that it also be performed on California vehicle.

**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B2600i**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first								Service data and inspection point	Page				
		Months	7.5	15	22.5	30	37.5	45	52.5			60			
		×1,000 miles	7.5	15	22.5	30	37.5	45	52.5			60			
		×1,000 km	12	24	36	48	60	72	84	96					
<b>Engine</b>															
Engine oil			R	R	R	R	R	R	R	R	• Oil pan capacity: 4.5 liters (4.8 US qt, 4.0 Imp qt)	D-7			
Oil filter			R	R	R	R	R	R	R	R	• Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 Imp qt)	D-7			
Drive belts						I				I	• Check for damage • Tension	B2-5			
Air cleaner element						R				R	—	F2-116			
Oxygen sensor* <sup>1</sup>			Replace every 80,000 miles (128,000 km)								—	F2-182			
PCV valve* <sup>2</sup>										I	• Check operation	F2-163			
Hoses and tubes for emission* <sup>1</sup>										R	—	F2-7			
<b>IGNITION SYSTEM</b>															
Spark plug						R				R	• Plug gap: 1.0—1.1mm (0.039—0.043 in) • Recommended spark plugs	G-22			
											<table border="1"> <tr> <td>NGK</td> <td>ZFR5F-11* ZFR6F-11</td> </tr> <tr> <td>NIPPONDENSO</td> <td>KJ16CR-11* KJ20CR-11</td> </tr> </table>		NGK	ZFR5F-11* ZFR6F-11	NIPPONDENSO
NGK	ZFR5F-11* ZFR6F-11														
NIPPONDENSO	KJ16CR-11* KJ20CR-11														
											*Standard plug				
Ignition timing										I	• Ignition timing: 4—6° BTDC	G-24			
<b>FUEL SYSTEM</b>															
Idle speed				I* <sup>3</sup>						I* <sup>3</sup>	• Idle speed: 730—770 rpm (M/T) 750—790 rpm in P range (A/T)	F2-118			
Fuel filter										R	—	F2-149			
Fuel lines						I* <sup>2</sup>				I	• Fittings, connections and components for leaks	F2-143			
<b>COOLING SYSTEM</b>															
Cooling system				I		I				I	• Hoses for cracks or wear • Coolant level	E-5			
Engine coolant						R				R	• Coolant capacity With heater: 7.5 liters (7.9 US qt, 6.6 Imp qt) Without heater: 6.9 liters (7.3 US qt, 6.1 Imp qt)	E-5			

**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B2600i**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first									Service data and inspection point	Page
		Months	7.5	15	22.5	30	37.5	45	52.5	60		
		x1,000 miles	7.5	15	22.5	30	37.5	45	52.5	60		
	x1,000 km	12	24	36	48	60	72	84	96			
<b>CHASSIS AND BODY</b>												
Brake line hoses and connections					I					I	• Proper attachment and connections	P-5
Brake fluid					R					R	• Brake fluid: FMVSS 116 DOT3 or SAE J1703	P-2
Disc brakes (front)					I					I	• Caliper operation • Thickness of disc plate: Minimum...4x4 20mm (0.79 in) 4x2 18mm (0.71 in) • Thickness of pad: Minimum...3.0mm (0.118 in)	P-21
Drum brakes (rear)					I					I	• Wheel cylinder operation and leakage • Lining for wear or damage • Thickness of lining: Minimum...1.0mm (0.04 in) • Drum inner diameter: Maximum...261.5mm (10.30 in)	P-24
Manual steering gear oil					I					I	• Oil level (L dimension): 22mm (0.87 in) • Gear oil: API service GL-4 Viscosity: SAE 90	N-12
Steering operations and gear housing					I					I	• Operation and looseness • Fluid leakage or oozing • Free play: 5-20mm (0.20-0.79 in)	N-9
Steering linkage, tie rod ends and arms					I					I	• Check for looseness and damage • Check for excessive play	N-7
Suspension ball joints (front)					I					I	• Damage, looseness and grease leakage	R-16
Upper arm shafts					L					L	• Grease: NLGI No.2	R-21
Front wheel bearing					L					L	• Clean and check for damage • Repack or apply lithium grease (NLGI No.2)	M-25 M-27
Manual transmission oil										R	• Oil capacity 4x2: 2.8 liters (3.0 US qt, 2.5 Imp qt) 4x4: 3.2 liters (3.4 US qt, 2.8 Imp qt)	J2-7
Transfer case oil (4x4)										R	• Oil capacity: 2.0 liters (2.1 US qt, 1.8 Imp qt)	J3-7
Driveshaft dust boots (4x4)					I					I	• Cracking, damage, leakage and looseness	M-40
Propeller shaft joints			L		L			L		L	• Lubricate with grease	L-15



**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B2600i**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first								Service data and inspection point	Page	
		Months	7.5	15	22.5	30	37.5	45	52.5			60
		×1,000 miles	7.5	15	22.5	30	37.5	45	52.5			60
	×1,000 km	12	24	36	48	60	72	84	96			
<b>CHASSIS AND BODY</b>												
Automatic transmission fluid										R	• Replacement fluid capacity: Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)	K1-35 K2-43
Rear axle oil, (4 × 2, 4 × 4) Front axle oil (4 × 4)										R	• Oil capacity: Rear....1.7 liters (1.8 US qt, 1.5 Imp qt) Front....1.5 liters (1.6 US qt, 1.3 Imp qt)	M-4
Bolts and nuts on chassis and body					T					T	• Retighten all loose nuts and bolts	—
Exhaust system heat shield					I					I	• Insulation clearance	—
<b>AIR CONDITIONER SYSTEM</b>												
Refrigerant					Inspect the refrigerant amount annually						• Check refrigerant charge	U-28
Compressor					Inspect the operation annually						• Check compressor	U-31
All locks and hinges		L	L	L	L	L	L	L	L			

## SCHEDULE 1 (NORMAL DRIVING CONDITION)

**B2200**

### Chart symbols:

- I** .... Inspect, and if necessary correct, clean or replace
- R** .... Replace or change
- T** .... Tighten
- L** .... Lubricate
- C** .... Clean

### Remarks:

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance at the recommended intervals.

As for \* marked items in this maintenance chart, note the following points;

- \*1 Replacement of the timing belt is required at every 60,000 miles (96,000 km). Failure to replace the timing belt may result in damage to the engine.
- \*2 Except for California vehicles, the Malfunction Indicator Light (MIL) comes ON at every 60,000 miles and 80,000 miles. If it comes ON, follow the described maintenance.
- \*3 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.
- \*4 This maintenance is required for Canada and all states except California. However, we recommend that it also be performed on California vehicle.

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first								Service data and inspection point	Page	
		Months	7.5	15	22.5	30	37.5	45	52.5			60
		×1,000 miles	7.5	15	22.5	30	37.5	45	52.5			60
		×1,000 km	12	24	36	48	60	72	84			96
<b>Engine</b>												
Engine oil		R	R	R	R	R	R	R	R	R	• Oil pan capacity: 3.9 liters (4.1 US qt, 3.4 Imp qt)	D-7
Oil filter		R	R	R	R	R	R	R	R	R	• Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 Imp qt)	D-7
Choke system (Carburetor only)			C* <sup>4</sup>		C		C* <sup>4</sup>		C		• Spray cleaning agent	F1-94
Idle switch* <sup>3</sup> (Carburetor only)			I		I		I		I		—	F1-105
Drive belts					I				I		• Check for damage • Tension	B1-5
Air cleaner element					R				R		—	F1-80
Engine timing belt* <sup>1</sup>					Replace every 60,000 miles (96,000 km)						—	B1-8
Oxygen sensor* <sup>2</sup>					Replace every 80,000 miles (128,000 km)						—	F1-55
EGR control valve* <sup>2</sup> (Carburetor only)					Replace every 60,000 miles (96,000 km)						—	F1-62
PCV valve* <sup>3</sup>									I		• Check operation	F1-79
Hoses and tubes for emission* <sup>2</sup>									R		—	F1-10
HAC air filter (Carburetor only)									R		—	F1-76



**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B2200**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first								Service data and inspection point	Page										
		Months	7.5	15	22.5	30	37.5	45	52.5			60									
		x 1,000 miles	7.5	15	22.5	30	37.5	45	52.5			60									
	x 1,000 km	12	24	36	48	60	72	84	96												
<b>IGNITION SYSTEM</b>																					
Spark plugs						R				R	<ul style="list-style-type: none"> <li>Plug gap: 0.75—0.85mm (0.028—0.033 in)—Carburetor 1.0—1.1mm (0.039—0.043 in)—EGI</li> <li>Recommended spark plugs:</li> </ul> <table border="1"> <tr> <td></td> <td>NGK</td> <td>NIPPONDENSO</td> </tr> <tr> <td>Carburetor</td> <td>BPR5ES* BPR6ES</td> <td>W16EXR-U* W20EXR-U</td> </tr> <tr> <td>EGI</td> <td>BPR5ES-11* BPR6ES-11</td> <td>W16EXR-U11* W20EXR-U11</td> </tr> </table> <p>*Standard plug</p>		NGK	NIPPONDENSO	Carburetor	BPR5ES* BPR6ES	W16EXR-U* W20EXR-U	EGI	BPR5ES-11* BPR6ES-11	W16EXR-U11* W20EXR-U11	G-22
	NGK	NIPPONDENSO																			
Carburetor	BPR5ES* BPR6ES	W16EXR-U* W20EXR-U																			
EGI	BPR5ES-11* BPR6ES-11	W16EXR-U11* W20EXR-U11																			
Ignition timing										I	<ul style="list-style-type: none"> <li>Ignition timing: 5—7° BTDC</li> </ul>	G-24									
<b>FUEL SYSTEM</b>																					
Idle speed			I*4		I*4					I*4	<ul style="list-style-type: none"> <li>Idle speed: 800—850 (800 <sup>+5%</sup>) rpm A/T: in P range (Carburetor) 730—770 rpm (EGI M/T) 750—790 rpm in P range (EGI A/T)</li> </ul>	F1-112 F2-118									
Fuel lines					I*3					I	<ul style="list-style-type: none"> <li>Fittings, connections and components for leaks</li> </ul>	F1-4									
Fuel filter					R*4					R		F1-83									
<b>COOLING SYSTEM</b>																					
Cooling system			I		I					I	<ul style="list-style-type: none"> <li>Hoses for cracks or wear</li> <li>Coolant level</li> </ul>	E-5									
Engine coolant						R				R	<ul style="list-style-type: none"> <li>Coolant capacity: With heater... 7.5 liters (7.9 US qt, 6.6 Imp qt) Without heater.... 6.9 liters (7.3 US qt, 6.1 Imp qt)</li> </ul>	E-5									
<b>CHASSIS AND BODY</b>																					
Brake line hoses and connections						I				I	<ul style="list-style-type: none"> <li>Proper attachment and connections</li> </ul>	P-5									
Brake fluid						R				R	<ul style="list-style-type: none"> <li>Brake fluid: FMVSS 116 DOT3 or SAE J1703</li> </ul>	P-2									
Disc brakes (front)										I	<ul style="list-style-type: none"> <li>Caliper operation</li> <li>Thickness of disc plate: Minimum....18mm (0.71 in)</li> <li>Thickness of pad: Minimum....3.0mm (0.118 in)</li> </ul>	P-21									

**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B2200**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first								Service data and inspection point	Page	
		Months	7.5	15	22.5	30	37.5	45	52.5			60
		x1,000 miles	7.5	15	22.5	30	37.5	45	52.5			60
	x1,000 km	12	24	36	48	60	72	84	96			
Drum brakes (rear)					I					I	<ul style="list-style-type: none"> <li>Wheel cylinder operation and leakage</li> <li>Lining for wear or damage</li> <li>Thickness of lining: Minimum....1.0mm (0.04 in)</li> <li>Drum inner diameter: Maximum....261.5mm (10.30 in)</li> </ul>	P-24
Manual steering gear oil					I					I	<ul style="list-style-type: none"> <li>Oil level (L dimension): 22mm (0.87 in)</li> <li>Gear oil: API service GL-4 Viscosity: SAE 90</li> </ul>	N-12
Steering operations and gear housing					I					I	<ul style="list-style-type: none"> <li>Operation and looseness</li> <li>Fluid leakage or oozing</li> <li>Free play: 5-20mm (0.20-0.79 in)</li> </ul>	N-9
Steering linkage, tie rod ends and arms					I					I	<ul style="list-style-type: none"> <li>Check for looseness and damage</li> <li>Check for excessive play</li> </ul>	N-7
Suspension ball joints (front)					I					I	<ul style="list-style-type: none"> <li>Damage, looseness and grease leakage</li> </ul>	R-11
Upper arm shafts					L					L	<ul style="list-style-type: none"> <li>Grease: NLGI No.2</li> </ul>	R-21
Front wheel bearing					L					L	<ul style="list-style-type: none"> <li>Clean and check for damage</li> <li>Repack or apply lithium grease (NLGI No.2)</li> </ul>	M-33 M-35
Manual transmission oil										R	<ul style="list-style-type: none"> <li>Oil capacity: 5-speed 2.0 liters (2.1 US qt, 1.8 Imp qt)</li> </ul>	J1-7
Automatic transmission fluid										R	<ul style="list-style-type: none"> <li>Replacement fluid capacity: Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)</li> <li>Lubricate with grease</li> </ul>	K1-35 L-15
Rear axle oil										R	<ul style="list-style-type: none"> <li>Oil capacity: 1.2 liters (1.3 US qt, 1.1 Imp qt)</li> </ul>	M-4
Bolts and nuts on chassis and body					T					T	<ul style="list-style-type: none"> <li>Retighten all loose nuts and bolts</li> </ul>	-
Exhaust system heat shield					I					I	<ul style="list-style-type: none"> <li>Insulation clearance</li> </ul>	-
<b>AIR CONDITIONER SYSTEM</b>												
Refrigerant		Inspect the refrigerant amount annually								<ul style="list-style-type: none"> <li>Check refrigerant charge</li> </ul>	U-28	
Compressor		Inspect the operation annually								<ul style="list-style-type: none"> <li>Check compressor</li> </ul>	U-31	
All locks and hinges		L	L	L	L	L	L	L	L	L		

SCHEDULED MAINTENANCE SERVICES (USA)

A



**SCHEDULE 2 (UNIQUE DRIVING CONDITION)****B2600i****Chart symbols**

- I ... Inspect, and if necessary correct, clean or replace  
 A ... Adjust  
 R ... Replace or change  
 T ... Tighten  
 L ... Lubricate  
 C ... Clean

**Remarks:**

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance at the recommended intervals.

As for \* marked items in this maintenance chart, note the following points:

- \*1 Except for California vehicles, the Malfunction Indicator Light (MIL) comes ON at every 60,000 miles and 80,000 miles. If it comes ON, follow the described maintenance.  
 \*2 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.  
 \*3 This maintenance is required for Canada and all states except California. However, we recommend that it also be performed on California vehicle.

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first												Service data and inspection point	Page	
		Months	5	10	15	20	25	30	35	40	45	50	55			60
		x1,000 miles	5	10	15	20	25	30	35	40	45	50	55			60
		x1,000 km	8	16	24	32	40	48	56	64	72	80	88			96
<b>ENGINE</b>																
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	• Oil pan capacity: 4.5 liters (4.8 US qt, 4.0 Imp qt)	D-7
Oil filter		R	R	R	R	R	R	R	R	R	R	R	R	• Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 Imp qt)	D-7	
Drive belts							I						I	• Check for damage • Tension	B2-5	
Air cleaner element					I*3			R					I*3		—	F2-116
Oxygen sensor*1					Replace every 80,000 miles (128,000 km)									—	F2-182	
PCV valve*2													I	• Check operation	F2-163	
Hose and tube for emission*1													R	—	F2-7	



**SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)**  
**B2600i**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first												Service data and inspection point	Page										
		Months	5	10	15	20	25	30	35	40	45	50	55			60									
		×1,000 miles	5	10	15	20	25	30	35	40	45	50	55			60									
		×1,000 km	8	16	24	32	40	48	56	64	72	80	88			96									
<b>IGNITION SYSTEM</b>																									
Spark plug							R								R	<ul style="list-style-type: none"> <li>• Plug gap: 1.0—1.1mm (0.039—0.043 in)</li> <li>• Recommended spark plugs</li> </ul> <table border="1"> <tr> <td>NGK</td> <td>ZFR5F-11*</td> </tr> <tr> <td></td> <td>ZFR6F-11</td> </tr> <tr> <td>NIPPONDENSO</td> <td>KJ16CR-11*</td> </tr> <tr> <td></td> <td>KJ20CR-11</td> </tr> </table> <p>*Standard plug</p>	NGK	ZFR5F-11*		ZFR6F-11	NIPPONDENSO	KJ16CR-11*		KJ20CR-11	G-22
NGK	ZFR5F-11*																								
	ZFR6F-11																								
NIPPONDENSO	KJ16CR-11*																								
	KJ20CR-11																								
Ignition timing															I	<ul style="list-style-type: none"> <li>• Ignition timing: 4—6° BTDC</li> </ul>	G-24								
<b>FUEL SYSTEM</b>																									
Idle speed				I*3												I*3	<ul style="list-style-type: none"> <li>• Idle speed: 730—770 rpm (M/T)</li> <li>750—790 rpm in P range (A/T)</li> </ul>	F2-118							
Fuel filter															R	—	F2-149								
Fuel lines															I	<ul style="list-style-type: none"> <li>• Fittings, connections and components for leaks</li> </ul>	F2-143								
<b>COOLING SYSTEM</b>																									
Cooling system				I												I	<ul style="list-style-type: none"> <li>• Hoses for cracks or wear</li> <li>• Coolant level</li> </ul>	E-5							
Engine coolant															R	R	<ul style="list-style-type: none"> <li>• Coolant capacity</li> <li>With heater: 7.5 liters (7.9 US qt, 6.6 Imp qt)</li> <li>Without heater: 6.9 liters (7.3 US qt, 6.1 Imp qt)</li> </ul>	E-5							
<b>CHASSIS AND BODY</b>																									
Brake line hoses and connections																I	<ul style="list-style-type: none"> <li>• Proper attachment and connections</li> </ul>	P-5							
Brake fluid															R	R	<ul style="list-style-type: none"> <li>• Brake fluid: FMVSS 116 DOT3 or SAE J1703</li> </ul>	P-2							
Disc brakes (front)																	I	<ul style="list-style-type: none"> <li>• Caliper operation</li> <li>• Thickness of disc plate: Minimum...4 × 4 20mm (0.79 in)</li> <li>4 × 2 18mm (0.71 in)</li> <li>• Thickness of pad: Minimum...3.0mm (0.118 in)</li> </ul>	P-21						
Drum brakes (rear)																	I	<ul style="list-style-type: none"> <li>• Wheel cylinder operation and leakage</li> <li>• Lining for wear or damage</li> <li>• Thickness of lining: Minimum...1.0mm (0.04 in)</li> <li>• Drum inner diameter: Maximum...261.5mm (10.30 in)</li> </ul>	P-24						
Engine oil (For Puerto Rico)																	Replace every 3,000 miles (or 3 month)								

SCHEDULED MAINTENANCE SERVICES (USA)

A

2BU0AX-009  
A-11

**SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)**  
**B2600i**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first												Service data and inspection point	Page		
		Months	5	10	15	20	25	30	35	40	45	50	55			60	
		x1,000 miles	5	10	15	20	25	30	35	40	45	50	55			60	
	x1,000 km	8	16	24	32	40	48	56	64	72	80	88	96				
<b>CHASSIS AND BODY</b>																	
Steering operations and gear housing							I							I	<ul style="list-style-type: none"> <li>Operation and looseness</li> <li>Fluid leakage or oozing</li> <li>Free play: 5—20mm (0.20—0.79 in)</li> </ul>	N-9	
Steering linkage, tie rod ends and arms							I							I	<ul style="list-style-type: none"> <li>Check for looseness and damage</li> <li>Check for excessive play</li> </ul>	N-7	
Suspension ball joints (front)							I							I	<ul style="list-style-type: none"> <li>Damage, looseness and grease leakage</li> </ul>	R-16	
Upper arm shafts							L							L	<ul style="list-style-type: none"> <li>Grease: NLGI No.2</li> </ul>	R-21	
Front wheel bearing							L							L	<ul style="list-style-type: none"> <li>Clean and check for damage</li> <li>Repack or apply lithium grease (NLGI No.2)</li> </ul>	M-25 M-27	
Manual steering gear oil							I							I	<ul style="list-style-type: none"> <li>Oil level (L dimension): 22mm (0.87 in)</li> <li>Gear oil: API service GL-4 Viscosity: SAE 90</li> </ul>	N-12	
Automatic transmission fluid							R							R	<ul style="list-style-type: none"> <li>Replacement fluid capacity: Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)</li> </ul>	K1-35 K2-43	
Manual transmission oil							R							R	<ul style="list-style-type: none"> <li>Oil capacity: 4x2 2.8 liters (3.0 US qt, 2.5 Imp qt) 4x4 3.2 liters (3.4 US qt, 2.8 Imp qt)</li> </ul>	J2-7	
Rear axle oil, (4x2, 4x4) Front axle oil (4x4)							R							R	<ul style="list-style-type: none"> <li>Oil capacity: Rear...1.7 liters (1.8 US qt, 1.5 Imp qt) Front...1.5 liters (1.6 US qt, 1.3 Imp qt)</li> </ul>	M-4	
Bolts and nuts on chassis and body				T			T			T				T	<ul style="list-style-type: none"> <li>Retighten all loose nuts and bolts</li> </ul>	—	
Exhaust system heat shield							I							I	<ul style="list-style-type: none"> <li>Insulation clearance</li> </ul>	—	
Transfer case oil (4x4)							R							R	<ul style="list-style-type: none"> <li>Oil capacity: 2.0 liters (2.1 US qt, 1.8 Imp qt)</li> </ul>	J3-7	
Driveshaft dust boots (4x4)							I							I	<ul style="list-style-type: none"> <li>Cracking, damage, leakage and looseness</li> </ul>	M-40	
Propeller shaft joints				L			L			L				L	<ul style="list-style-type: none"> <li>Lubricate with grease</li> </ul>	L-15	
<b>AIR CONDITIONER SYSTEM</b>																	
Refrigerant															Inspect the refrigerant amount annually	<ul style="list-style-type: none"> <li>Check refrigerant charge</li> </ul>	U-28
Compressor															Inspect the operation annually	<ul style="list-style-type: none"> <li>Check compressor</li> </ul>	U-31
All locks and hinges		L	L	L	L	L	L	L	L	L	L	L	L	L			

**SCHEDULE 2 (UNIQUE DRIVING CONDITION)**

**B2200**

**Chart symbols:**

- I ... Inspect, and if necessary correct, clean or replace (Inspect, and if necessary replace.....Air cleaner element)
- R ... Replace or change
- T ... Tighten
- L ... Lubricate
- C ... Clean

**Remarks:**

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance at the recommended intervals.

As for \* marked items in this maintenance chart, note the following points;

- \*1 Replacement of the timing belt is required at every 60,000 miles (96,000 km). Failure to replace the timing belt may result in damage to the engine.
- \*2 Except for California vehicles, the Malfunction Indicator Light (MIL) comes ON at every 60,000 miles and 80,000 miles. If it comes ON, follow the described maintenance.
- \*3 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.
- \*4 This maintenance is required for Canada and all states except California. However, we recommend that it also be performed on California vehicle.

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first												Service data and inspection point	Page	
		Months	5	10	15	20	25	30	35	40	45	50	55			60
		x1,000 miles	5	10	15	20	25	30	35	40	45	50	55			60
		x1,000 km	8	16	24	32	40	48	56	64	72	80	88			96
<b>ENGINE</b>																
Engine oil		R	R	R	R	R	R	R	R	R	R	R	R	R	• Oil pan capacity: 3.9 liters (4.1 US qt, 3.4 Imp qt)	D-7
Oil filter		R	R	R	R	R	R	R	R	R	R	R	R	R	• Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 Imp qt)	D-7
Choke system (Carburetor only)				C*4				C			C*4			C	• Spray cleaning agent	F1-94
Idle switch*3 (Carburetor only)				I				I			I			I	—	F1-105
Drive belts								I						I	• Check for damage • Tension	B1-5
Air cleaner element				I*4				R			I*4			R	—	F1-80
Engine timing belt*1															Replace every 60,000 miles (96,000 km)	—
Oxygen sensor*2															Replace every 80,000 miles (128,000 km)	—
EGR control valve*2 (Carburetor only)															Replace every 60,000 miles (96,000 km)	—
PCV valve*3														I	• Check operation	F1-79
Hoses and tubes for emission*2														R	—	F1-10
HAC air filter (Carburetor only)														R	—	F1-76

**SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)  
B2200**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first												Service data and inspection point	Page											
		Months	5	10	15	20	25	30	35	40	45	50	55			60										
		× 1,000 miles	5	10	15	20	25	30	35	40	45	50	55			60										
		× 1,000 km	8	16	24	32	40	48	56	64	72	80	88	96												
<b>IGNITION SYSTEM</b>																										
Spark plugs								R							R	<ul style="list-style-type: none"> <li>Plug gap: 0.75—0.85mm (0.028—0.033 in)—Carburetor 1.0—1.1mm (0.039—0.043 in)—EGI</li> <li>Recommended spark plugs:</li> </ul> <table border="1"> <tr> <td></td> <td>NGK</td> <td>NIPPONDENSO</td> </tr> <tr> <td>Carburetor</td> <td>BPR5ES* BPR6ES</td> <td>W16EXR-U* W20EXR-U</td> </tr> <tr> <td>EGI</td> <td>BPR5ES-11* BPR6ES-11</td> <td>W16EXR-U11* W20EXR-U11</td> </tr> </table> <p>*Standard plug</p>		NGK	NIPPONDENSO	Carburetor	BPR5ES* BPR6ES	W16EXR-U* W20EXR-U	EGI	BPR5ES-11* BPR6ES-11	W16EXR-U11* W20EXR-U11	G-22
	NGK	NIPPONDENSO																								
Carburetor	BPR5ES* BPR6ES	W16EXR-U* W20EXR-U																								
EGI	BPR5ES-11* BPR6ES-11	W16EXR-U11* W20EXR-U11																								
Ignition timing															I	<ul style="list-style-type: none"> <li>Ignition timing: 5—7° BTDC</li> </ul>	G-24									
<b>FUEL SYSTEM</b>																										
Idle speed				I*4				I*4							I*4	<ul style="list-style-type: none"> <li>Idle speed: 800—850 (800 <sup>+50</sup>) rpm A/T: in P range (Carburetor) 730—770 rpm (EGI M/T) 750—790 rpm in P range (EGI A/T)</li> </ul>	F1-112 F2-118									
Fuel lines								I*3							I	<ul style="list-style-type: none"> <li>Fittings, connections and components for leaks</li> </ul>	F1-4									
Fuel filter								R*4							R	—	F1-83									
<b>COOLING SYSTEM</b>																										
Cooling system				I				I							I	<ul style="list-style-type: none"> <li>Hoses for cracks or wear</li> <li>Coolant level</li> </ul>	E-5									
Engine coolant								R							R	<ul style="list-style-type: none"> <li>Coolant capacity: With heater... 7.5 liters (7.9 US qt, 6.6 Imp qt) Without heater... 6.9 liters (7.3 US qt, 6.1 Imp qt)</li> </ul>	E-5									
Engine oil (For Puerto Rico)																Replace every 3,000 miles (or 3 month)										
<b>CHASSIS AND BODY</b>																										
Brake line hoses and connections								I							I	<ul style="list-style-type: none"> <li>Proper attachment and connections</li> </ul>	P-5									
Brake fluid								R							R	<ul style="list-style-type: none"> <li>Brake fluid: FMVSS 116 DOT3 or SAE J1703</li> </ul>	P-2									
Disc brakes (front)				I				I							I	<ul style="list-style-type: none"> <li>Caliper operation</li> <li>Thickness of disc plate: Minimum...18mm (0.71 in)</li> <li>Thickness of pad: Minimum...3.0mm (0.118 in)</li> </ul>	P-21									

**SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)**  
**B2200**

Maintenance operation	Interval	Number of months or miles (Kilometers), whichever comes first													Service data and inspection point	Page		
		Months	5	10	15	20	25	30	35	40	45	50	55	60				
		×1,000 miles	5	10	15	20	25	30	35	40	45	50	55	60				
		×1,000 km	8	16	24	32	40	48	56	64	72	80	88	96				
<b>CHASSIS AND BODY</b>																		
Drum brakes (rear)															I	<ul style="list-style-type: none"> <li>• Wheel cylinder operation and leakage</li> <li>• Lining for wear or damage</li> <li>• Thickness of lining: Minimum...1.0mm (0.04 in)</li> <li>• Drum inner diameter: Maximum...261.5mm (10.30 in)</li> </ul>	P-24	
Manual steering gear oil															I	<ul style="list-style-type: none"> <li>• Oil level (L dimension): 22mm (0.87 in)</li> <li>• Gear oil: API service GL-4 Viscosity: SAE90</li> </ul>	N-12	
Steering operations and gear housing															I	<ul style="list-style-type: none"> <li>• Operation and looseness</li> <li>• Fluid leakage or oozing</li> <li>• Free play: 5—20mm (0.20—0.79 in)</li> </ul>	N-9	
Steering linkage, tie rod ends and arms															I	<ul style="list-style-type: none"> <li>• Check for looseness and damage</li> <li>• Check for excessive play</li> </ul>	N-7	
Suspension ball joints (front)															I	<ul style="list-style-type: none"> <li>• Damage, looseness and grease leakage</li> </ul>	R-11	
Upper arm shafts															L	<ul style="list-style-type: none"> <li>• Grease: NLGI No.2</li> </ul>	R-21	
Front wheel bearing															L	<ul style="list-style-type: none"> <li>• Clean and check for damage</li> <li>• Repack or apply lithium grease (NLGI No.2)</li> </ul>	M-33 M-35	
Manual transmission oil															R	<ul style="list-style-type: none"> <li>• Oil capacity: 5-speed 2.0 liters (2.1 US qt, 1.8 Imp qt)</li> </ul>	J1-7	
Automatic transmission fluid															R	<ul style="list-style-type: none"> <li>• Replacement fluid capacity: Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)</li> </ul>	K1-35	
Rear axle oil															R	<ul style="list-style-type: none"> <li>• Lubricate with grease</li> <li>• Oil capacity: 1.2 liters (1.3 US qt, 1.1 Imp qt)</li> </ul>	L-15 M-4	
Bolts and nuts on chassis and body															T	<ul style="list-style-type: none"> <li>• Retighten all loose nuts and bolts</li> </ul>	—	
Exhaust system heat shield															I	<ul style="list-style-type: none"> <li>• Insulation clearance</li> </ul>	—	
<b>AIR CONDITIONER SYSTEM</b>																		
Refrigerant																Inspect the refrigerant amount annually	<ul style="list-style-type: none"> <li>• Check refrigerant charge</li> </ul>	U-28
Compressor																Inspect the operation annually	<ul style="list-style-type: none"> <li>• Check compressor</li> </ul>	U-31
All locks and hinges															L			

# A

## SCHEDULED MAINTENANCE SERVICES (CANADA)

### SCHEDULED MAINTENANCE SERVICES (CANADA)

Maintenance Interval  Maintenance Item	Number of months or miles (Kilometer), whichever comes first												
	Months	5	10	15	20	25	30	35	40	45	50	55	60
	× 1,000 km (× 1,000 miles)	8	16	24	32	40	48	56	64	72	80	88	96

#### ENGINE

Engine oil	R	R	R	R	R	R	R	R	R	R	R	R	R
Oil filter	R	R	R	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts	I	I	I	I	I	I	I	I	I	I	I	I	I
Engine timing belts	FOR 2200*1												R

#### AIR CLEANER

Air cleaner element			I				R			I			R
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#### IGNITION SYSTEM

Spark plugs							R						R
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#### COOLING SYSTEM

Engine coolant level and strength	I	I	I	I	I	I	I	I	I	I	I	I	I
Cooling system for leaks			I				I			I			I
Engine coolant							R						R

#### FUEL SYSTEM

Idle speed			I				I			I			I
Fuel lines and hoses							I*2						I
Fuel filter							R						R
Choke system	FOR CARB			C			C			C			C
Idle switch	FOR CARB			I			I			I			I
PCV valve	*2												I
HAC air filter	FOR CARB												R
Emission hoses and tubes	*3												R
EGR valve	FOR CARB												R
Oxygen sensor	*3	Replace every 128,000 kilometers											

#### CHASSIS & BODY

Automatic transmission fluid level	I	I	I	I	I	I	I	I	I	I	I	I	I
Transmission oil M/T and A/T							R						R
Oil level in final drive and transfer case (in models so equipped)	I	I	I	I	I	I	I	I	I	I	I	I	I
Differential oil							R						R
Transfer case oil (FOR 4×4)							R						R
Propeller shaft (FOR 4×4)			L				L			L			L
Drive shaft dust boots (FOR 4×4)							I						I
Brake lines and hoses							I						I
Brake and clutch fluid level	I	I	I	I	I	I	I	I	I	I	I	I	I
Brake fluid							R						R
Disc brakes			I				I			I			I
Rear drum brakes							I						I
Front wheel bearings							L						L
Tire inflation pressure and tire wear	I	I	I	I	I	I	I	I	I	I	I	I	I
Rotate tires	Rotate every 24,000 kilometers or every 15 months												
Manual steering gear oil level							I						I
Power steering fluid level	I	I	I	I	I	I	I	I	I	I	I	I	I
Steering operation and linkage (Includes four wheel alignment)							I						I
Steering gear housing for freeplay and effort							I						I
Suspension components front and rear							I						I

2BU0AX-014

## SCHEDULED MAINTENANCE SERVICES (CANADA)

# A

Maintenance Interval  Maintenance Item	Number of months or miles (Kilometer), whichever comes first												
	Months	5	10	15	20	25	30	35	40	45	50	55	60
	× 1,000 km	8	16	24	32	40	48	56	64	72	80	88	96
	(× 1,000 miles)	(5)	(10)	(15)	(20)	(25)	(30)	(35)	(40)	(45)	(50)	(55)	(60)

### CHASSIS & BODY

Upper arm shafts									L				
All chassis and body nuts and bolts				T					T			T	
Exhaust system heat shield									I				
All locks and hinges	L	L	L	L	L	L	L	L	L	L	L	L	L
Washer fluid level	I	I	I	I	I	I	I	I	I	I	I	I	L
Function of all lights	I	I	I	I	I	I	I	I	I	I	I	I	I

### AIR CONDITIONER SYSTEM (IF EQUIPPED)

Refrigerant	Inspect the refrigerant amount annually
Compressor	Inspect the operation annually

#### Note

- I** : Inspect, and if necessary correct, clean or replace.  
(Inspect, and if necessary replace...Air cleaner element 2200 only)
- R** : Replace or change
- T** : Tighten
- L** : Lubricate
- C** : Clean

After 60 months or 96,000 km (60,000 miles), continue to follow the described maintenance items and intervals periodically.

As for \*marked items in this maintenance chart, please pay attention to the following points.

- \* **1** : Replacement of the timing belt is required at every 96,000 km (60,000 miles).  
Failure to replace the timing belt may result in damage to the engine.
- \* **2** : This maintenance operation is recommended by Mazda. However, this maintenance is not necessary for emission warranty coverage or manufacturer recall liability.
- \* **3** : The Malfunction Indicator Light (MIL) comes ON at every 96,000 km and 128,000 km.  
If it comes ON, follow the described maintenance.

2BU0AX-015

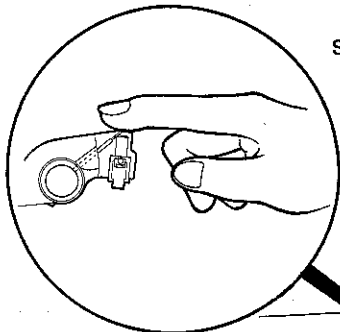
# ENGINE (B2600i)

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<b>INSTALLATION</b> .....	B2-79
PREPARATION .....	B2-79

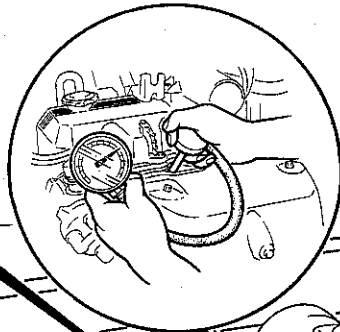


## INDEX

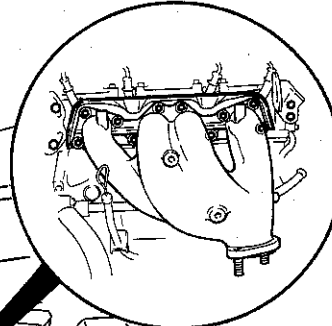
HYDRAULIC LASH ADJUSTER (HLA)  
INSPECTION, PAGE B2-6



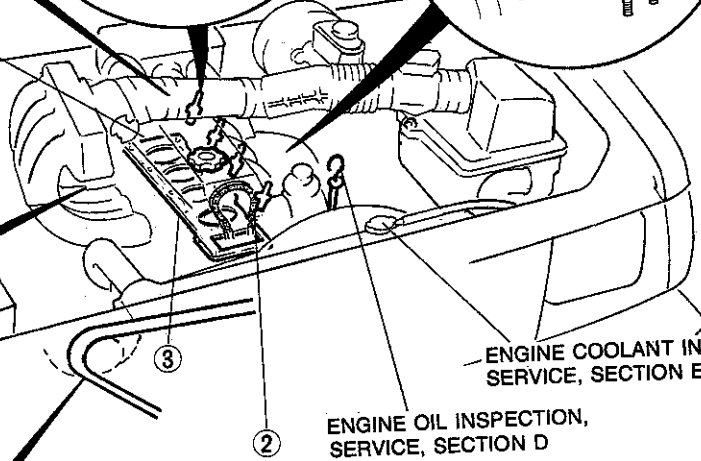
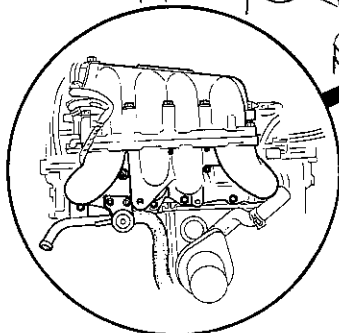
COMPRESSION  
INSPECTION, PAGE B2-6  
STANDARD: 1,255 kPa (12.8 kg/cm<sup>2</sup>, 182 psi)-270 rpm  
MINIMUM: 981 kPa (10.0 kg/cm<sup>2</sup>, 142 psi)-280 rpm



EXHAUST MANIFOLD  
TIGHTENING TORQUE  
22-28 (2.2-2.9, 16-21)

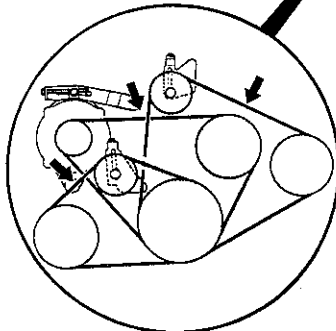


INTAKE MANIFOLD  
TIGHTENING TORQUE  
19-25 (1.9-2.6, 14-19)



ENGINE COOLANT INSPECTION,  
SERVICE, SECTION E

ENGINE OIL INSPECTION,  
SERVICE, SECTION D



DRIVE BELT ADJUSTING, PAGE B2-5

DRIVE BELT	DEFLECTION		
	NEW	USED	LIMIT
ALTERNATOR	10.0-12.0 (0.39-0.47)	11.0-13.0 (0.43-0.51)	16 (0.63)
P/S OIL PUMP	6.6-7.2 (0.26-0.28)	7.2-8.0 (0.28-0.31)	10 (0.39)
A/C compressor	8.5-10.0 (0.33-0.39)	10.0-11.5 (0.39-0.45)	15 (0.59)

mm (in)/98 N (10 kg, 22 lb)

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- |                             |            |                         |            |
|-----------------------------|------------|-------------------------|------------|
| 1. Engine                   |            |                         |            |
| Removal .....               | page B2-24 |                         |            |
| Disassembly .....           | page B2-29 |                         |            |
| Inspection and Repair ..... | page B2-39 |                         |            |
| Assembly .....              | page B2-52 |                         |            |
| Installation .....          | page B2-79 |                         |            |
|                             |            | 2. Timing chain         |            |
|                             |            | Removal .....           | page B2- 9 |
|                             |            | Installation .....      | page B2-10 |
|                             |            | Inspection .....        | page B2-51 |
|                             |            | 3. Cylinder head gasket |            |
|                             |            | Removal .....           | page B2-14 |
|                             |            | Installation .....      | page B2-17 |

OUTLINE

SPECIFICATIONS

Item		Engine	G6
Type			Gasoline, 4-cycle
Cylinder arrangement and number			In-line, 4 cylinders
Combustion chamber			Pentroof
Valve system			OHC, chain-driven
Displacement		cc (cu in)	2,606 (158.97)
Bore and stroke		mm (in)	92.0×98.0 (3.62×3.86)
Compression ratio			8.4
Compression pressure		kPa (kg/cm <sup>2</sup> , psi)-rpm	1,255 (12.8, 182)-270
Valve timing	IN	Open BTDC	10°
		Close ABDC	50°
	EX	Open BBDC	55°
		Close ATDC	15°
Valve clearance		IN mm (in)	0; Maintenance free
		EX mm (in)	0; Maintenance free
Idle speed (Test connector grounded) rpm		M/T	750 ± 20 (Neutral)
		A/T	770 ± 20 (P range)
Ignition timing (TEN terminal grounded)		BTDC	5° ± 1° at idle
Firing order			1-3-4-2

B2

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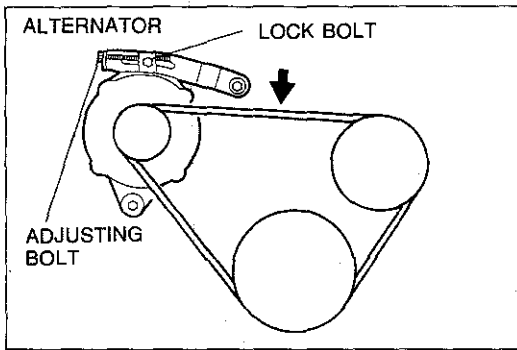
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Difficult starting</b>	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Replace	B2-40 B2-45, 47 B2-14
	<b>Malfunction of fuel system</b>	Refer to Section F2	
	<b>Malfunction of electrical system</b>	Refer to Section G	
<b>Poor idling</b>	<b>Malfunction of engine-related components</b> Malfunction of HLA Poor valve-to-valve seat contact Failed cylinder head gasket	Replace Repair or replace Replace	B2-45 B2-42 B2-14
	<b>Malfunction of fuel system</b>	Refer to Section F2	
<b>Excessive oil consumption</b>	<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair	B2-47 B2-45, 47
	<b>Oil working down</b> Worn valve seal Worn valve stem or guide	Replace Replace	B2-67 B2-40
	<b>Oil leakage</b>	Refer to Section D	

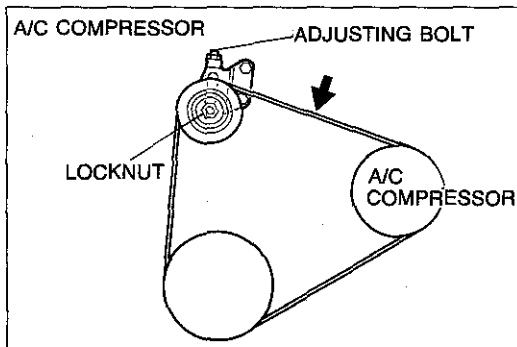
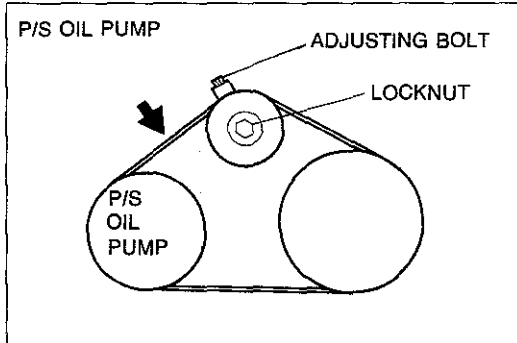
Problem	Possible Cause	Remedy	Page
<b>Insufficient power</b>	<b>Insufficient compression</b>		
	Malfunction of HLA	Replace	B2-45
	Compression leakage from valve seat	Repair	B2-42
	Seized valve stem	Replace	B2-40
<b>Abnormal combustion</b>	Weak or broken valve spring	Replace	B2-43
	Failed cylinder head gasket	Replace	B2-14
	Cracked or distorted cylinder head	Replace	B2-39
	Sticking, damaged, or worn piston ring	Replace	B2-47
	Cracked or worn piston	Replace	B2-47
	<b>Malfunction of fuel system</b>	Refer to Section F2	
	<b>Others</b>		
	Slipping clutch	Refer to Section H	
	Dragging brakes	Refer to Section P	
	Wrong size tires	Refer to Section Q	
<b>Engine noise</b>	<b>Malfunction of engine-related components</b>		
	Malfunction of HLA	Replace	B2-45
	Sticking or burned valve	Replace	B2-40
	Weak or broken valve spring	Replace	B2-43
	Carbon accumulation in combustion chamber	Eliminate carbon	—
	<b>Malfunction of fuel system</b>	Refer to Section F2	
	<b>Crankshaft or bearing related parts</b>		
	Excessive main bearing oil clearance	Replace or repair	B2-56
	Main bearing seized or heat-damaged	Replace	B2-49
	Excessive crankshaft end play	Replace or repair	B2-56
	Excessive connecting rod bearing oil clearance	Replace or repair	B2-57
	Connecting rod bearing seized or heat-damaged	Replace	B2-48
<b>Balance shaft related parts</b>			
Improper balancer chain tension	Adjust	B2-63	
Excessive balance shaft bushing oil clearance	Replace	B2-50	
Balance shaft bushing seized or heat-damaged	Replace	B2-50	
<b>Piston-related parts</b>			
Worn cylinder	Replace or repair	B2-45	
Worn piston or piston pin	Replace	B2-48	
Seized piston	Replace	B2-47	
Damaged piston ring	Replace	B2-47	
Bent connecting rod	Replace	B2-48	
<b>Valves or timing-related parts</b>			
Malfunction of HLA*	Replace	B2-45	
Broken valve spring	Replace	B2-43	
Excessive valve guide clearance	Replace	B2-41	
Malfunction of chain adjuster	Replace	B2- 8	
<b>Malfunction of cooling system</b>	Refer to Section E		
<b>Malfunction of fuel system</b>	Refer to Section F2		
<b>Others</b>			
Malfunction of water pump bearing	Refer to Section E		
Improper drive-belt tension	Adjust	B2- 5	
Malfunction of alternator bearing	Refer to Section G		
Exhaust gas leakage	Refer to Section F2		

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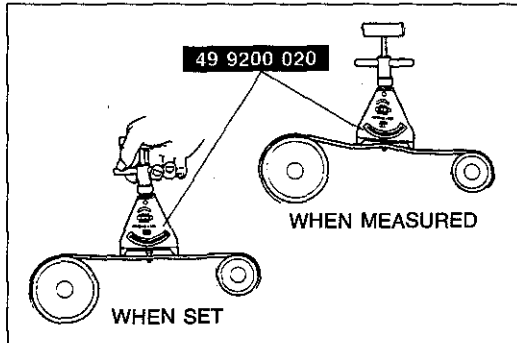
\* Tappet noise may occur if the engine is not operated for an extended period. The noise should disappear after the engine has reached normal operating temperature.



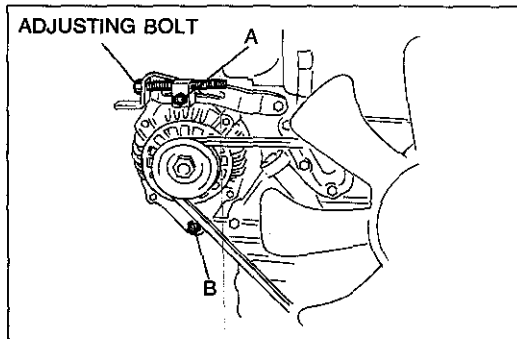
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2BU0B2-006

ENGINE TUNE-UP PROCEDURE

DRIVE BELT

1. Check the drive belts for wear, cracks, or fraying; replace if necessary.
2. Check the drive belt deflection by applying moderate pressure (98 N, 10 kg, 22 lb) midway between the pulleys.

Note

- a) Measure the belt deflection between the specified pulleys.
- b) A belt is considered "New" if it has been used on a running engine for less than five minutes. Set the deflection specified below accordingly.
- c) Check the belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped.

B2

3. If the deflection is not within specification, adjust it.

Deflection

mm (in)

Drive belt	New	Used	Limit
Alternator	10.0—12.0 (0.39—0.47)	11.0—13.0 (0.43—0.51)	16 (0.63)
P/S oil pump	6.6—7.2 (0.26—0.28)	7.2—8.0 (0.28—0.31)	10 (0.39)
A/C compressor	8.5—10.0 (0.33—0.39)	10.0—11.5 (0.39—0.45)	15 (0.59)

Drive belt tension check

Note

- a) Belt tension can be checked in place of belt deflection.
- b) Belt tension can be measured between any two pulleys.

4. Check the drive belt tension with the tension gauge.

Tension

N (kg, lb)

Drive belt	New	Used	Limit
Alternator	549—638 (56—65, 123.4—143.0)	461—549 (47—56, 103.6—123.4)	275 (28, 61.6)
P/S oil pump	412—471 (42—48, 92.4—105.6)	353—402 (36—41, 79.2—90.2)	196 (20, 44.0)
A/C compressor	559—638 (57—65, 125.7—143.0)	471—549 (48—56, 105.8—123.4)	284 (29, 63.8)

Adjustment

Caution

If a new belt is used, adjust belt deflection at the midpoint of "New" belt specification. A belt is considered "New" if it has been used on a running engine for less than five minutes.

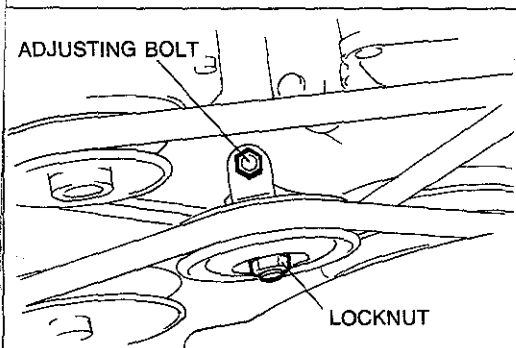
- (1) Alternator belt  
If necessary, loosen the alternator bolts and adjust the belt deflection by turning the adjusting bolt.

Tightening torque

- Bolt A: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)
- Bolt B: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

# B2

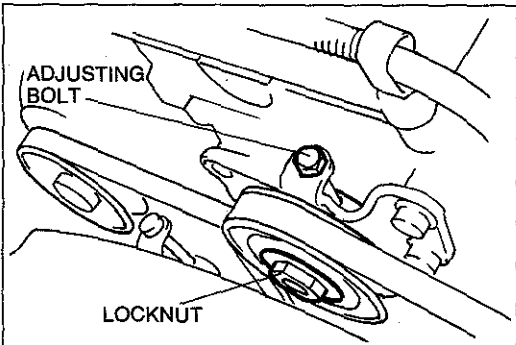
## ENGINE TUNE-UP PROCEDURE, COMPRESSION



9MU0B2-009

- (2) P/S oil pump belt  
If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

**Tightening torque:**  
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



9MU0B2-010

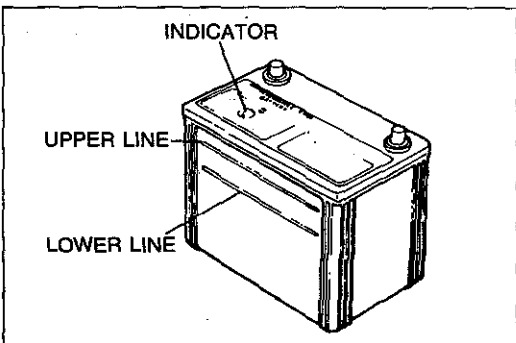
- (3) A/C Compressor belt  
If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

**Tightening torque:**  
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

### HLA TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action
1. Noise when engine is started immediately after oil is changed.	Oil leakage in oil passage	Run engine at 2000—3000 rpm. If noise stops after 2 second—10 minutes*, HLA is normal. If not, replace HLA.
2. Noise when engine is started after setting approx. one day.		
3. Noise when engine is started after cranking for 3 seconds or more.	Oil leakage in HLA	* Time required for engine oil to circulate within engine, includes tolerance for engine oil condition and ambient temperature.
4. Noise when engine is started after new HLA is installed		
5. Noise continues more than 10 minutes.	Insufficient oil pressure	Check oil pressure. (Refer to Section D.) If lower than specification, check for cause. <b>Oil pressure; 304—402 kPa (3.1—4.1 kg/cm<sup>2</sup>, 44—58 psi)-3000 rpm</b>
	Faulty HLA	(Refer to page B2-69) Press down rocker arm by hand. If it moves, replace HLA. If it does not move, HLA is normal. Measure valve clearance. If more than 0mm (0 in), replace HLA.
6. Noise occurs during idle after high-speed running	Incorrect oil amount	Check oil level. Drain or add oil as necessary.
	Deteriorated oil	Check oil quality. If deteriorated, replace with specified type and amount of oil.

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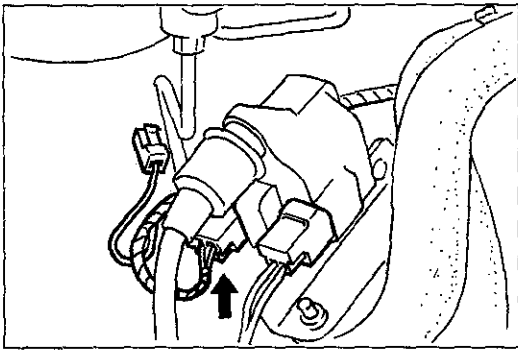
### COMPRESSION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following:

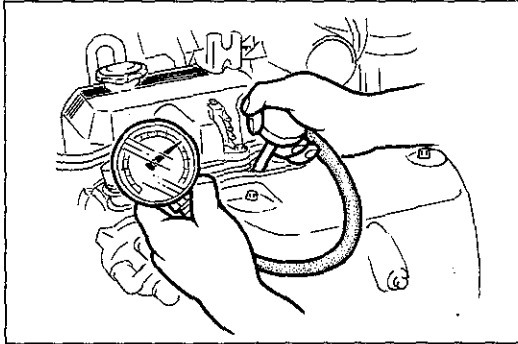
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Section F2.)

### INSPECTION

1. Check that the battery is fully charged. Recharge it if necessary.



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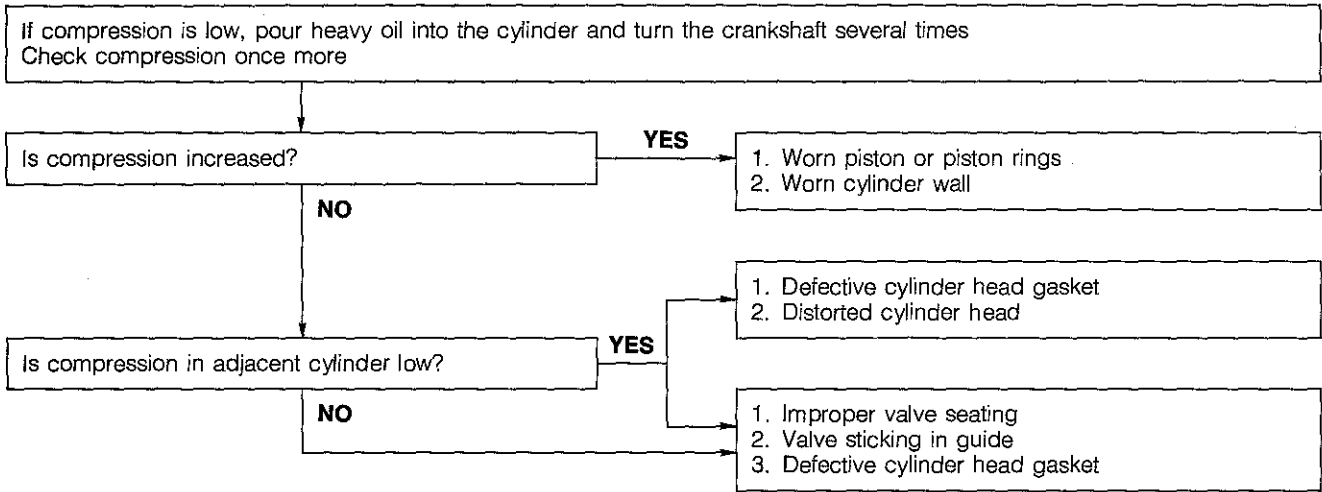
2. Warm up the engine to the normal operating temperature.
3. Turn it off for about 10 minutes to allow the exhaust manifold to cool.
4. Remove all spark plugs.
5. Disconnect the primary wire connector from the ignition coil.

B2

6. Connect a compression gauge to the No.1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Note the maximum gauge reading.
9. Check each cylinder.

**Compression:**  
 1,255 kPa (12.8 kg/cm<sup>2</sup>, 182 psi)-270 rpm  
**Minimum:**  
 981 kPa (10.0 kg/cm<sup>2</sup>, 142 psi)-280 rpm

**Possible Cause**



86U01X-022

### ON-VEHICLE MAINTENANCE

#### TIMING CHAIN

##### Preparation

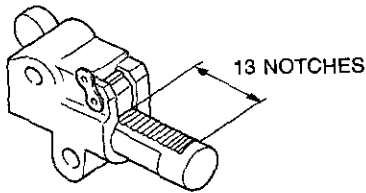
##### SST

49 S120 710

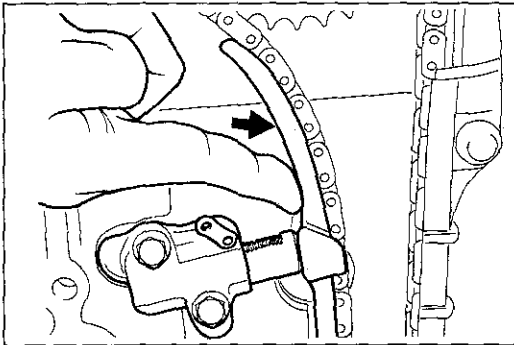
Holder, coupling  
flange



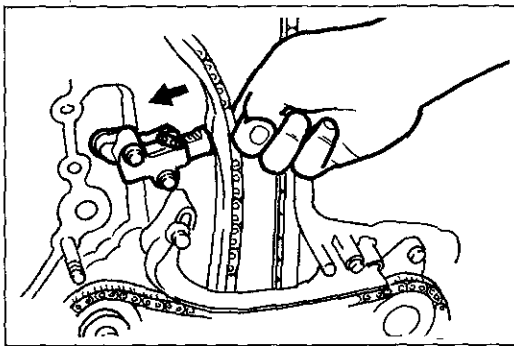
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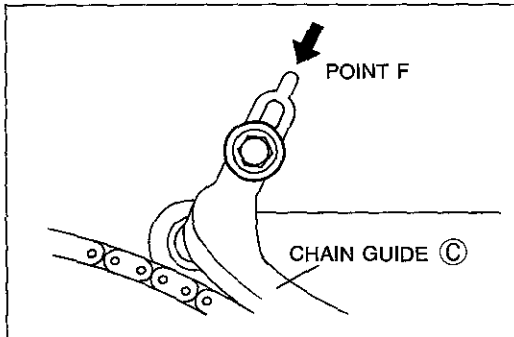
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9MU0B2-017



9MU0B2-018



9MU0B2-019

#### Pre-inspection Timing chain

1. Check the chain tension; if the sleeve protrudes 13 notches or more, replace the timing chain.

2. Push the chain lever in the direction of the arrow. If the excessive movement exists, there will be a chain adjuster malfunction or worn chain lever, chain guide, camshaft pulley and timing gear. Inspect and replace if necessary.

3. Push the chain adjuster sleeve in the direction of the arrow. If it moves back, the ratchet will be faulty. Replace the chain adjuster.

#### Balancer chain

##### Note

Balancer chain must be replaced if chain guide © bottoms at point F when adjusting.

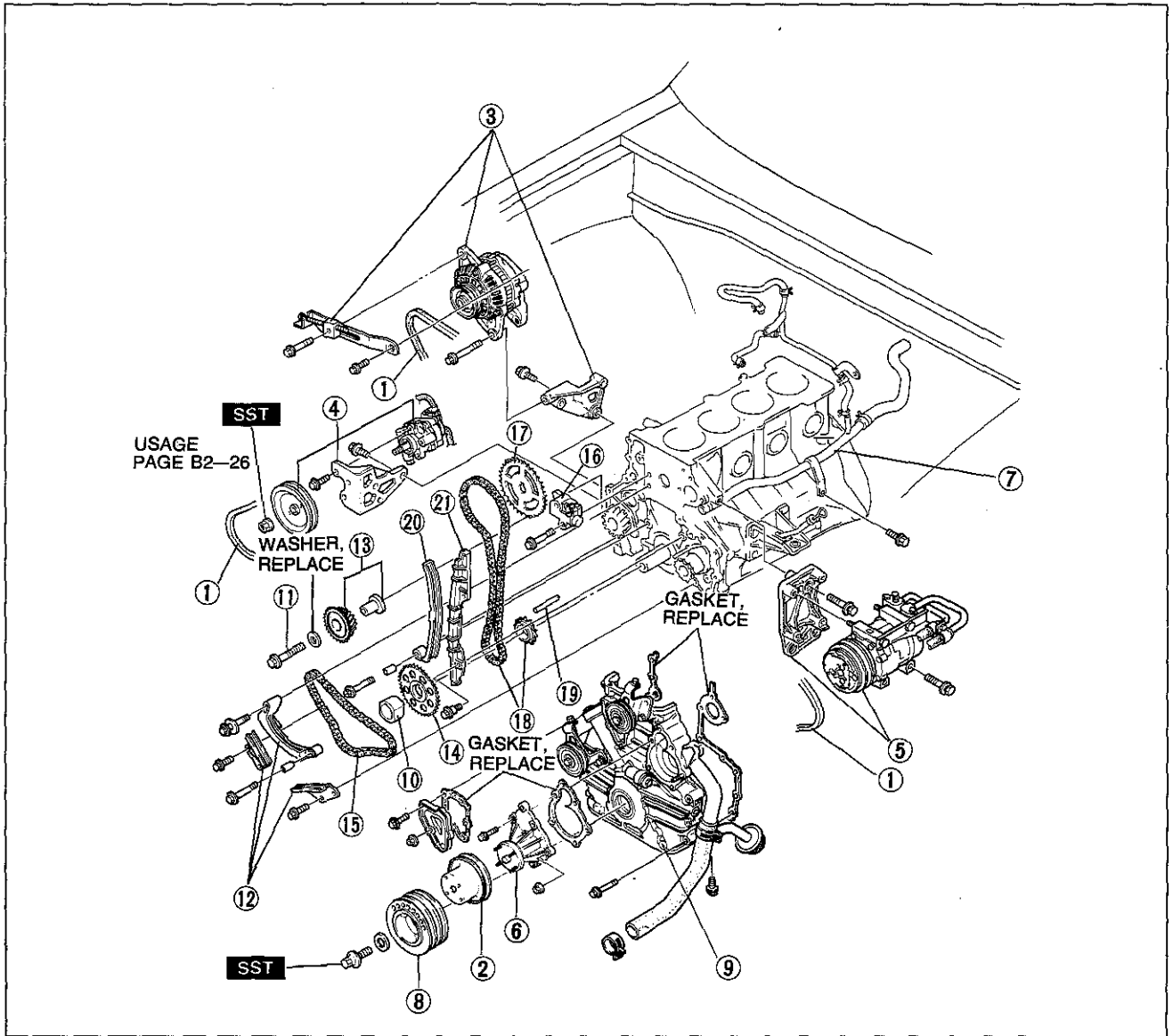
**Removal**

**Warning: Release the fuel pressure. (Refer to Section F2.)**

1. Disconnect the negative battery cable.
2. Drain the engine oil and coolant.
3. Remove the radiator cowl and cooling fan. (Refer to Section E.)
4. Remove the cylinder head. (Refer to page B2-14.)
5. Remove the oil pan. (Refer to Section D.)
6. Remove in the order shown in the figure referring to the **Removal note**.

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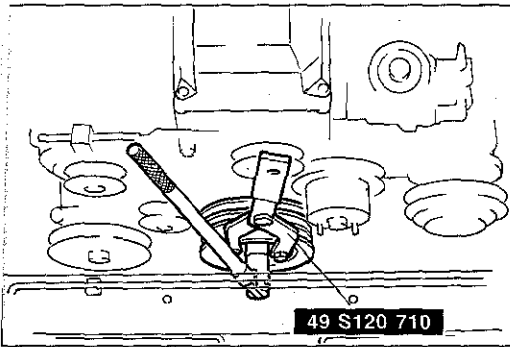
B2



9MU0B2-021

- |                                       |                                  |
|---------------------------------------|----------------------------------|
| 1. Drive belts                        | 12. Chain guides                 |
| 2. Water pump pulley                  | 13. Idler sprocket assembly      |
| 3. Alternator and bracket             | 14. Crankshaft sprocket          |
| 4. P/S oil pump and bracket           | 15. Balancer chain               |
| 5. A/C compressor and bracket         | 16. Chain adjuster               |
| 6. Water pump                         | 17. Camshaft pulley              |
| 7. Coolant bypass pipe                | 18. Timing chain and timing gear |
| 8. Crankshaft pulley                  | 19. Key                          |
| 9. Chain cover                        | 20. Chain lever                  |
| 10. Spacer                            | 21. Chain guide                  |
| 11. Idler sprocket assembly lock bolt |                                  |





9MU0B2-022

### Removal note

#### Crankshaft pulley

Remove the crankshaft pulley with the **SST**.

### Inspection

Inspection of timing chain related parts. (Refer to page B2-51.)

Inspection of balancer chain related parts. (Refer to page B2-51.)

### Installation

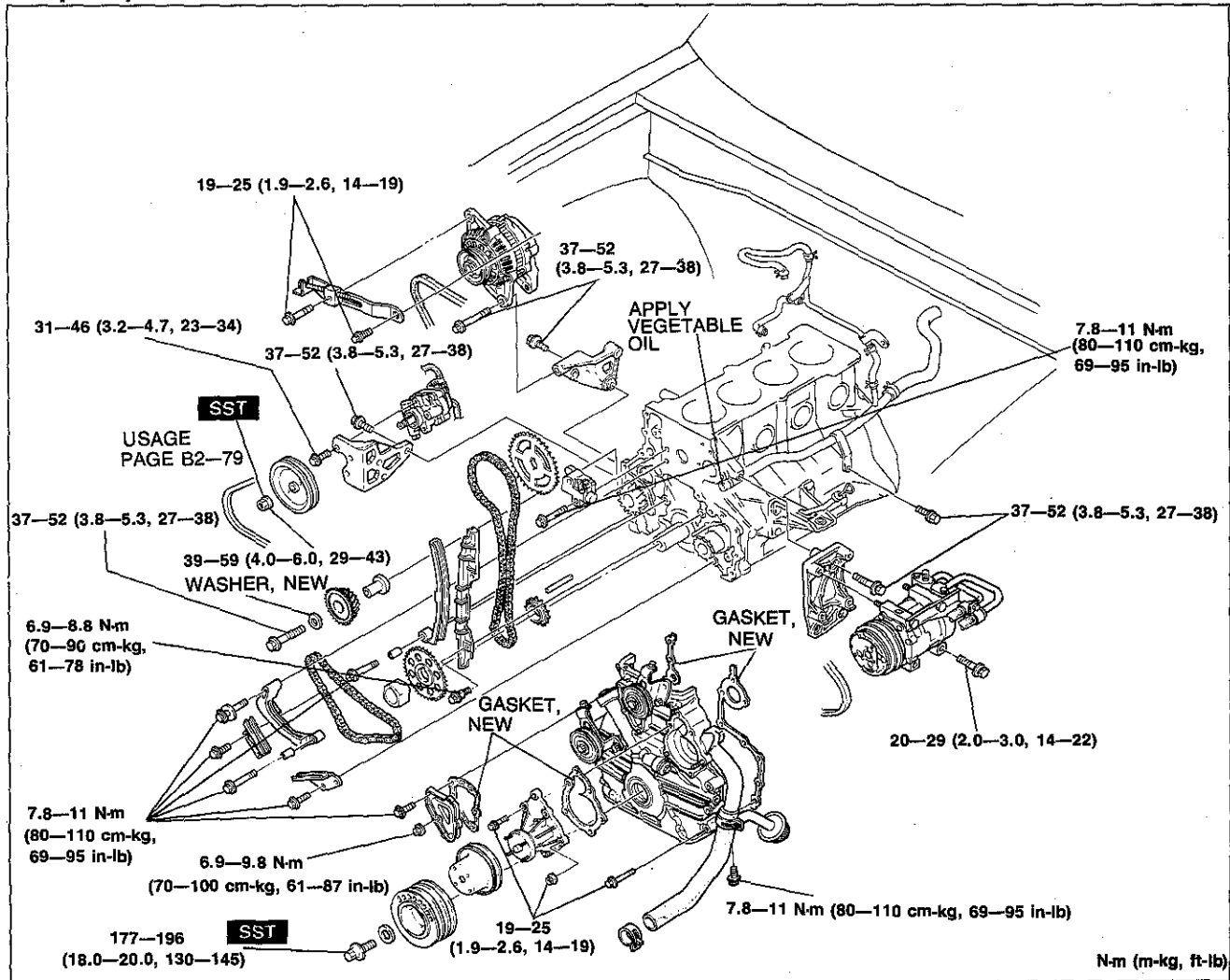
Install in the reverse order of removal referring to the **Installation note**.

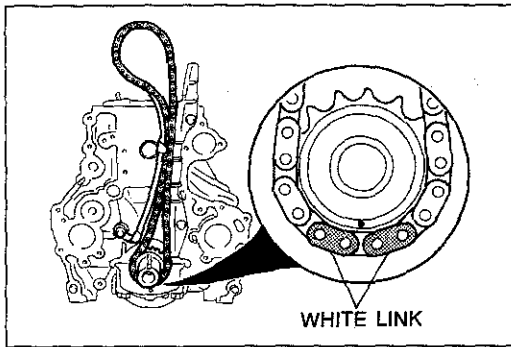
### Note

a) Position the hose clamp in the original location on the hose.

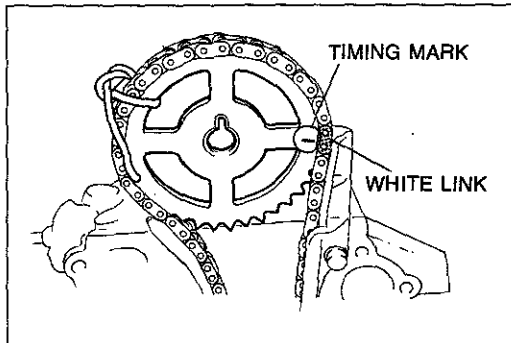
b) Squeeze the clamp lightly with large pliers to ensure a good fit.

### Torque Specifications

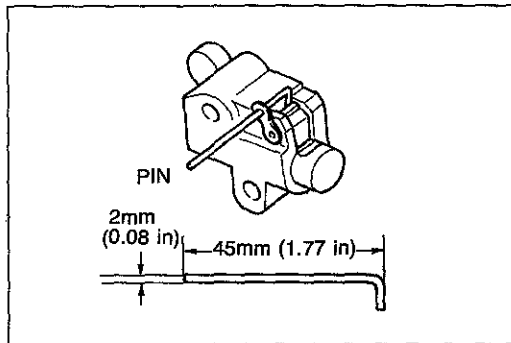




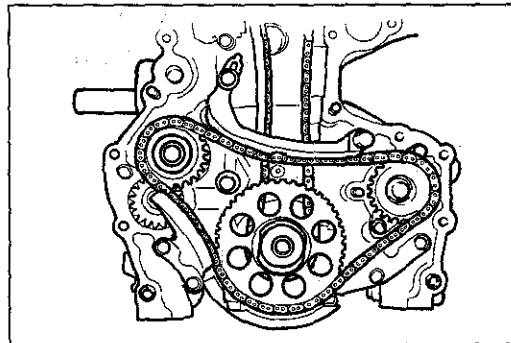
9MU0B2-024



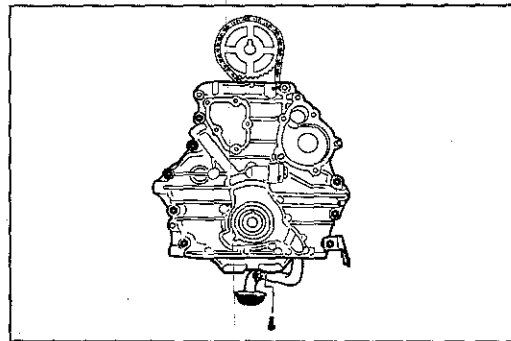
9MU0B2-025



9MU0B2-026



9BU0B2-024



9MU0B2-028

**Installation note**

**Timing chain**

1. Install the key onto the crankshaft.
2. Install the timing chain and the timing gear as shown.

**Camshaft pulley**

1. Assemble the camshaft pulley to the timing chain so that the mark on the pulley aligns with the white link on the chain.
2. Secure the pulley and the chain with a wire to prevent disengagement.

**Chain adjuster**

1. Insert the pin into the lever hole to hold the sleeve.
2. Install it onto the cylinder block.

**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

**Note**

Do not forget to remove the retaining pin before installing the service cover.

**Balancer chain related parts**

(Refer to page B2-60.)

**Chain cover**

1. Install the chain cover with new gaskets.

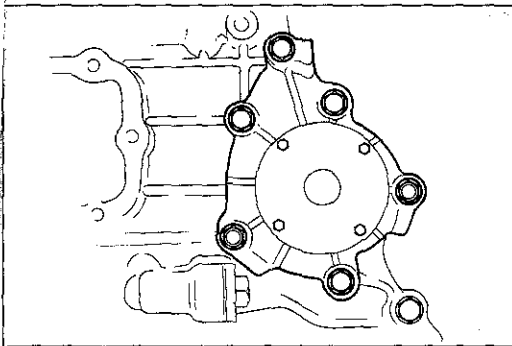
**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

2. Tighten the oil strainer stay bolt.

**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)



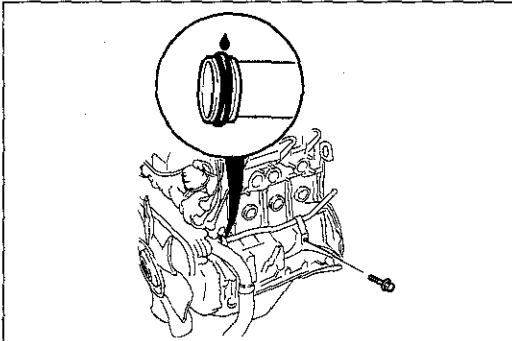
9MU0B2-029

### Water pump

Install the water pump with a new gasket.

#### Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



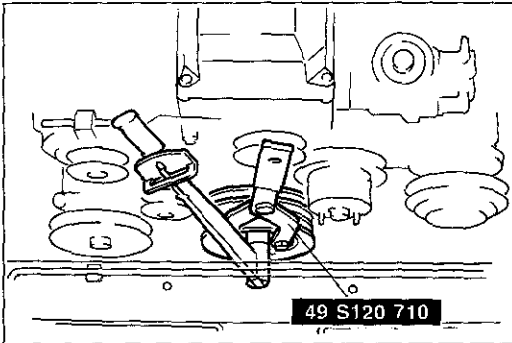
9BU0B2-025

### Coolant bypass pipe

Apply vegetable oil to the new O-ring and install the coolant bypass pipe.

#### Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



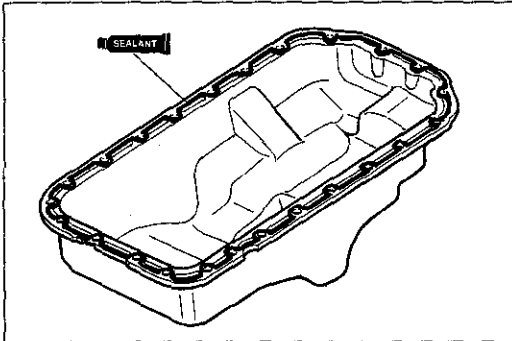
9MU0B2-031

### Crankshaft pulley

Install the crankshaft pulley with the SST.

#### Tightening torque:

177—196 N·m (18.0—20.0 m·kg, 130—145 ft·lb)



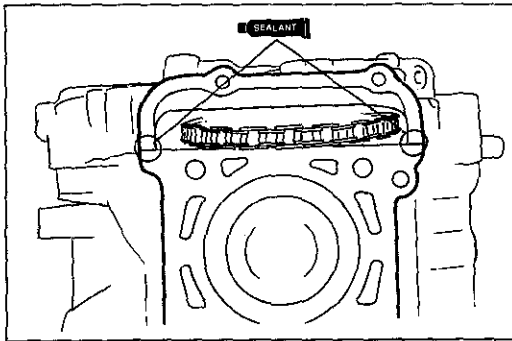
9MU0B2-032

### Oil pan

1. Apply a continuous bead of silicone sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
2. Install the oil pan.

#### Tightening torque:

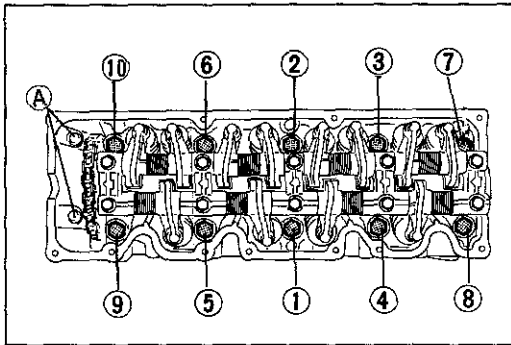
7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)



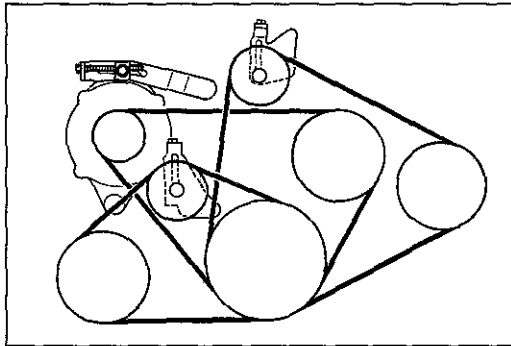
9MU0B2-033

### Cylinder head gasket

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Apply silicone sealant to the shaded area.
3. Place a new cylinder head gasket in position.



9MU0B2-034



9BU0B2-026

**Cylinder head**

1. Set the cylinder head in place.
2. Apply engine oil to the bolt threads and seat faces.
3. Tighten the cylinder head bolts in two or three steps in the order shown.

**Tightening torque:**

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

4. Tighten the remaining small cylinder head bolts (A).

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

**Steps After Installation**

1. Install the radiator cowl and cooling fan.  
(Refer to Section E.)
2. Adjust the drive belt tension. (Refer to page B2-5.)
3. Add engine oil and coolant to the specified levels.
4. Connect the negative battery cable.
5. Start the engine and do the following:
  - (1) Check for leakage of engine oil and coolant.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil and coolant levels.

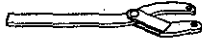
### CYLINDER HEAD GASKET

#### Preparation

#### SST

49 S120 710

Holder, coupling  
flange

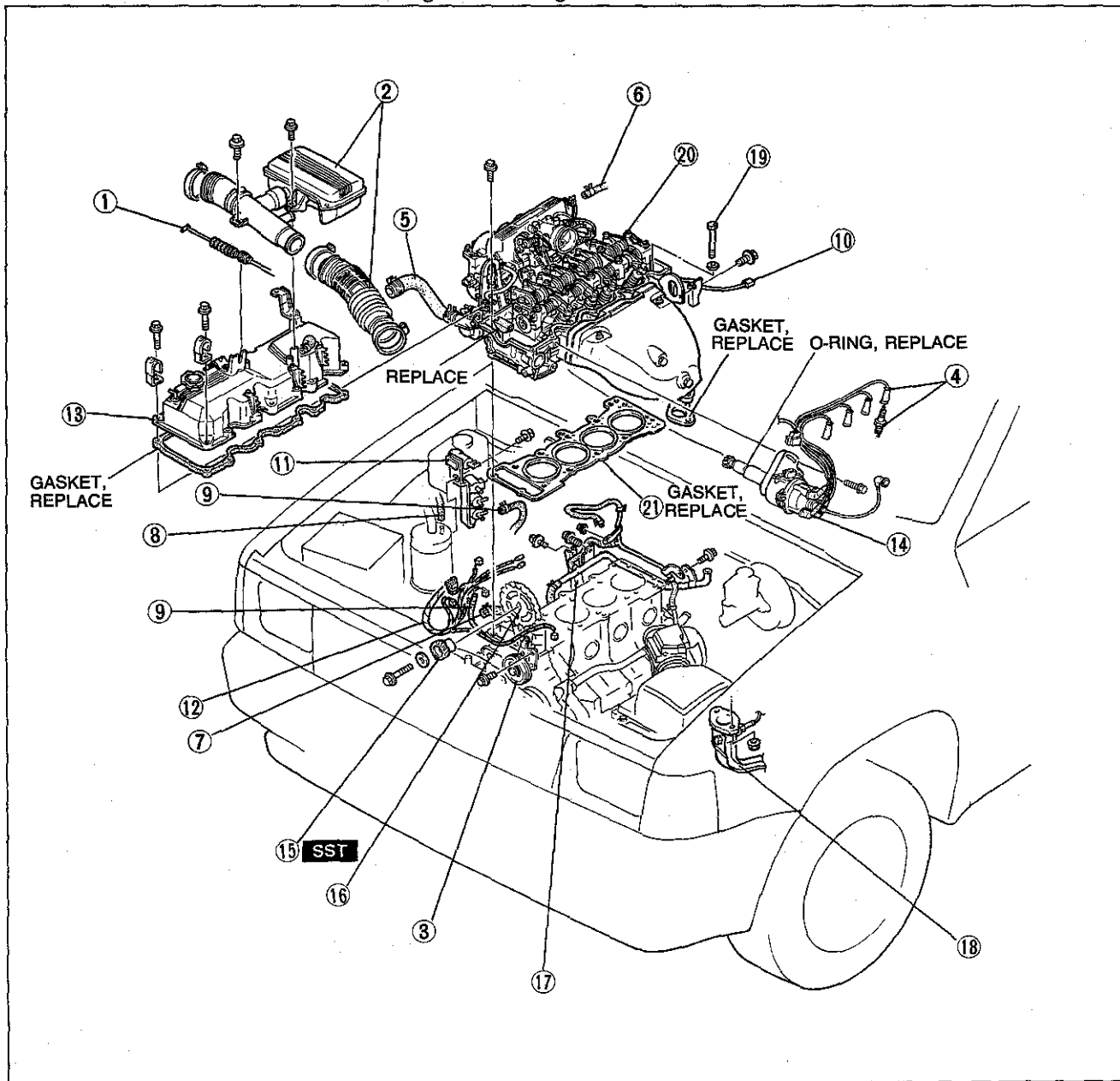


9BU0B2-048

#### Removal

**Warning: Release the fuel pressure. (Refer to Section F2.)**

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the order shown in the figure referring to the **Removal note**.

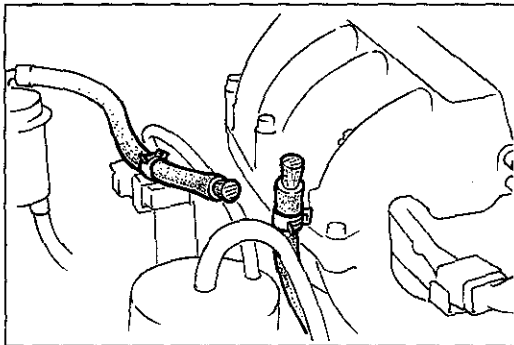


1BU0B2-003

1. Accelerator cable
2. Air intake pipe and resonance chamber
3. A/C drive belt and idler
4. High-tension lead and spark plug
5. Radiator upper hose
6. Brake vacuum hose
7. Oil cooler water hose
8. Canister hose
9. Fuel hose
10. Oxygen sensor connector
11. Solenoid valves

12. Emission harness connectors
13. Cylinder head cover
14. Distributor
15. Distributor drive gear
16. Camshaft pulley
17. Intake manifold bracket
18. Exhaust pipe and bracket
19. Cylinder head bolt
20. Cylinder head
21. Cylinder head gasket

9MU0B2-038



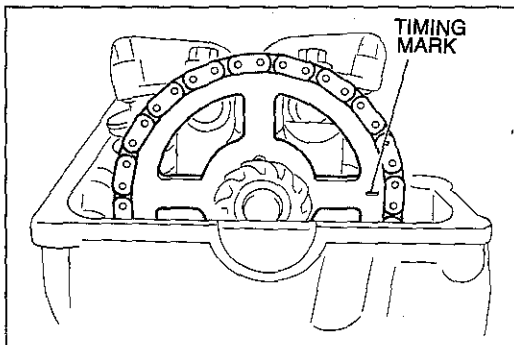
9MU0B2-039

**Removal note**  
**Fuel hose**

**Note**

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.



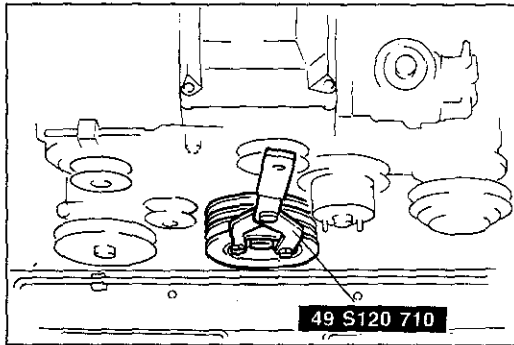
9MU0B2-040

**Distributor**

1. Turn the crankshaft pulley until the timing mark of the camshaft pulley is 90° degrees to the right as shown.
2. Check that the crankshaft pulley timing mark (yellow) is aligned with the indicator pin.
3. Remove the distributor.

**Caution**

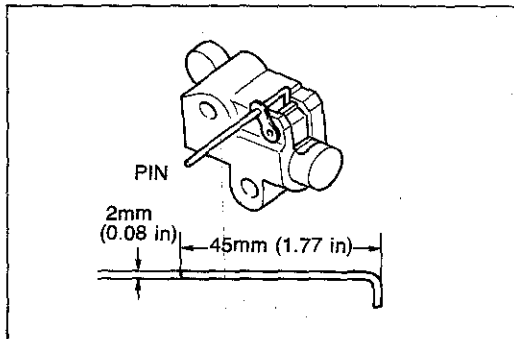
**Do not turn the crankshaft during removal and installation.**



9MU0B2-041

**Distributor drive gear**

1. Lock the crankshaft pulley with the **SST**.
2. Remove the distributor drive gear.



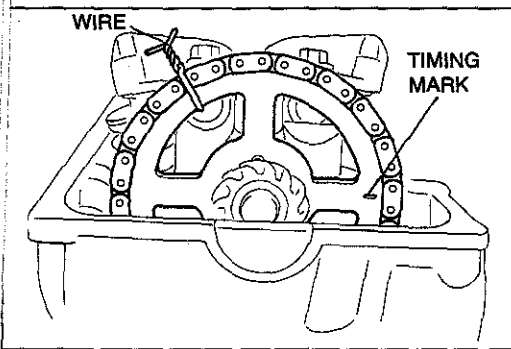
9MU0B2-042

**Camshaft pulley**

1. Remove the service cover on the chain cover.
2. Push the chain adjuster sleeve in toward the left and insert the pin as shown into the lever hole to hold it.

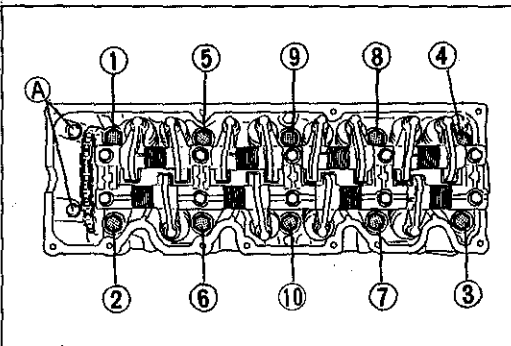
**Caution**

**Be especially careful that the pin does not fall.**



9MU0B2-043

3. Secure the camshaft pulley and the chain with a wire as shown.
4. Remove the camshaft pulley off the camshaft dowel pin.



9MU0B2-044

#### Cylinder head bolt

1. Remove the bolts (A).
2. Loosen the remaining cylinder head bolts in two or three steps in the order shown in the figure.

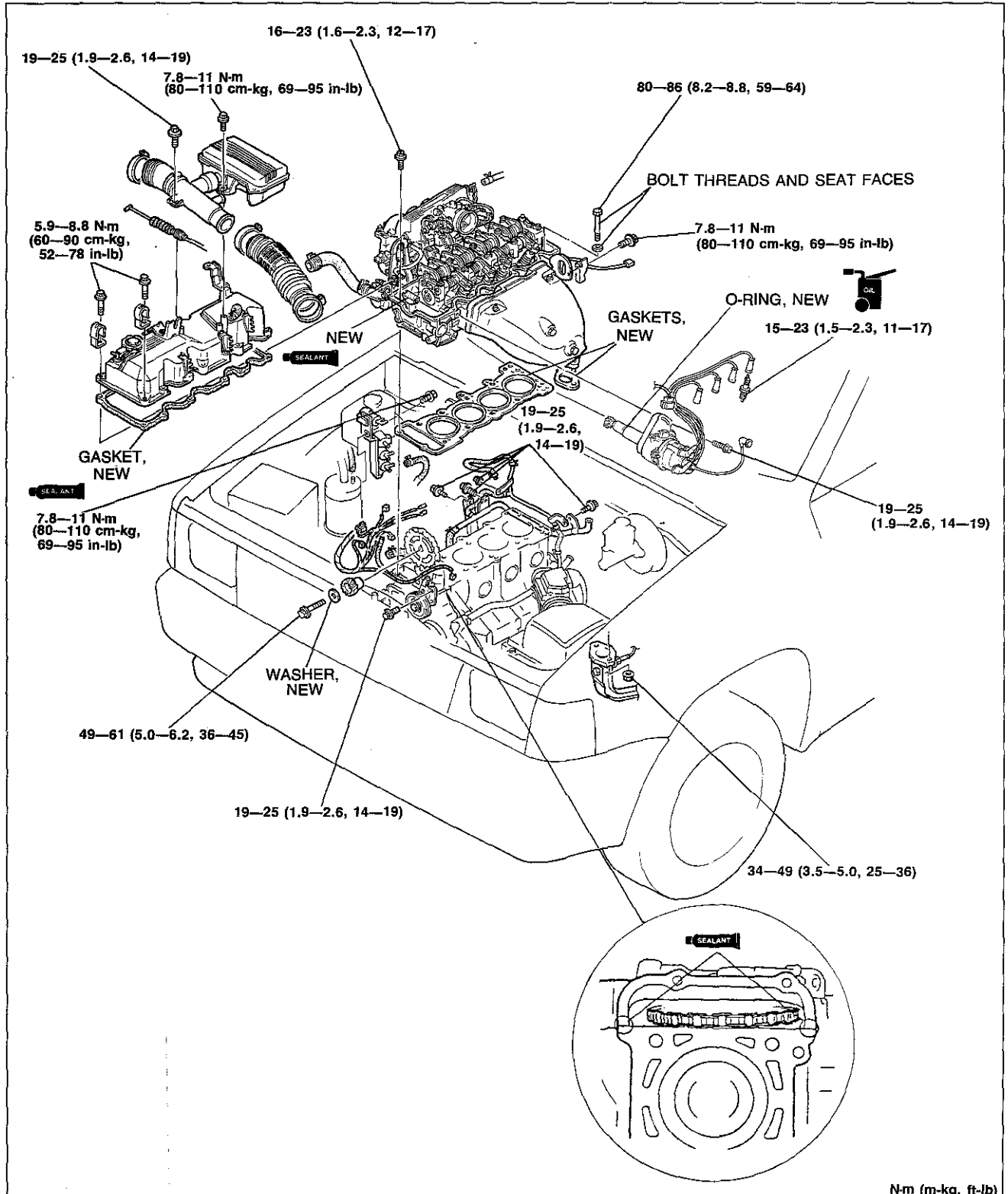
**Installation**

Install in the reverse order of removal referring to the **Installation note**.

**Note**

Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.

**Torque Specifications**

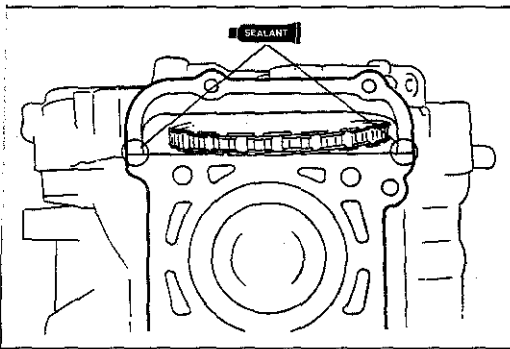


N-m (m-kg, ft-lb)

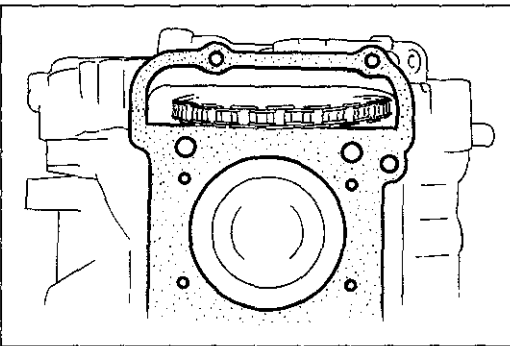
9MU0B2-045

B2-17

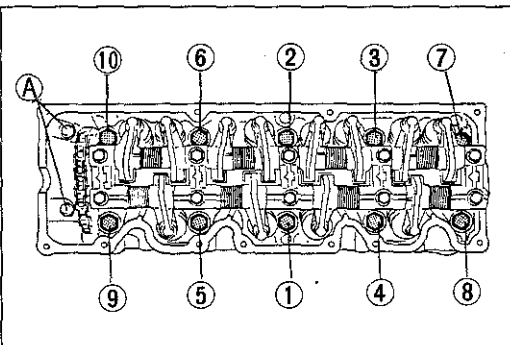




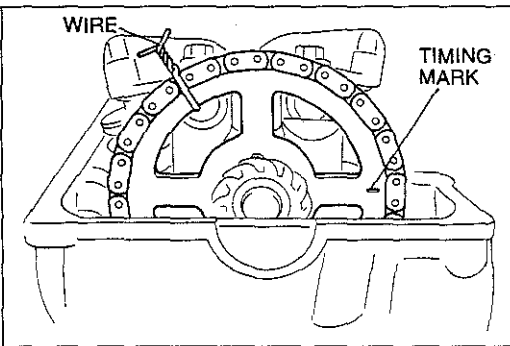
9MU0B2-046



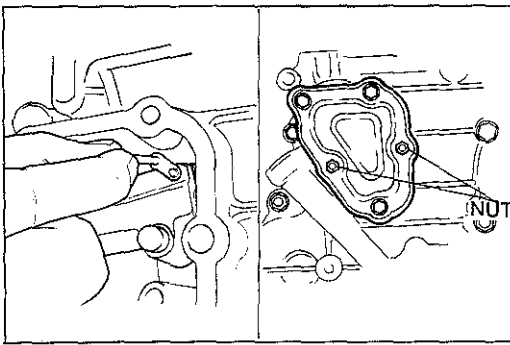
9MU0B2-047



9MU0B2-048



9MU0B2-049



9MU0B2-050

**Installation note**

**Cylinder head gasket**

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Apply silicone sealant to the shaded area.

3. Place a new cylinder head gasket in position.

**Cylinder head**

1. Set the cylinder head in place.
2. Apply engine oil to the bolt threads and seat faces.
3. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

**Tightening torque:**

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

4. Tighten the remaining small cylinder head bolts (A).

**Tightening torque:**

**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**

**Camshaft pulley**

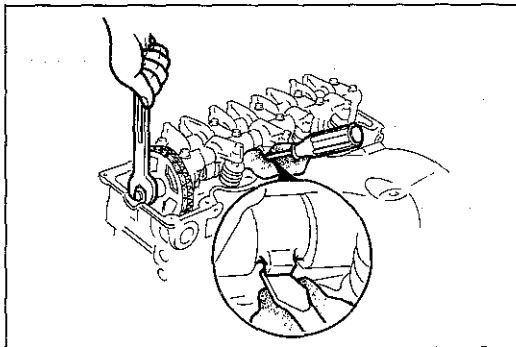
1. Install the camshaft pulley onto the camshaft dowel pin.
2. Remove the wire securing the camshaft pulley and the chain.

3. Remove the retaining pin from the chain adjuster.
4. Install the service cover with a new gasket.

**Tightening torque**

**Bolt: 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

**Nut: 6.9—9.8 N·m (70—100 cm·kg, 61—87 in·lb)**



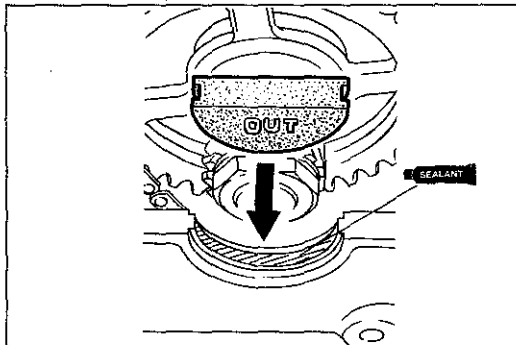
9MU0B2-051

**Distributor drive gear**

1. Install the distributor drive gear with a new washer and lock bolt.
2. Hold the camshaft with a screwdriver as shown in the figure.
3. Tighten the lock bolt.

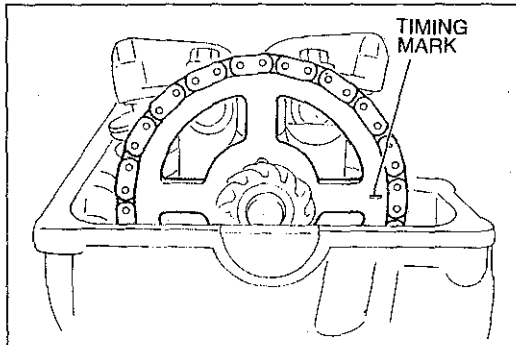
**Tightening torque:**

**49—61 N·m (5.0—6.2 m·kg, 36—45 ft·lb)**



2MU0B2-015

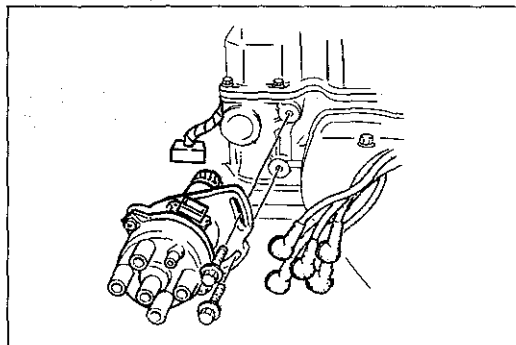
4. Apply sealant to the shaded area as shown, and install the new seal cover.



9MU0B2-053

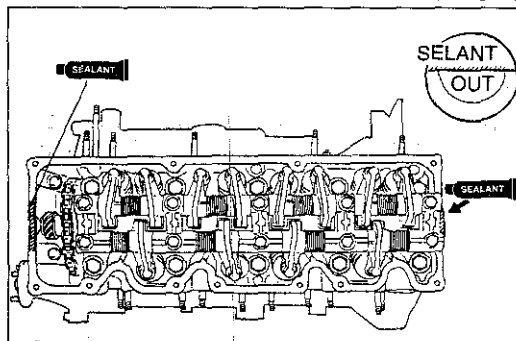
**Distributor**

1. Verify that the timing mark on the camshaft pulley is 90 degrees to the right, as shown.
2. Verify that the crankshaft pulley timing mark (yellow) is aligned with the indicator pin.



2MU0B2-016

3. Apply engine oil to the new O-ring and install it onto the distributor.
4. Apply engine oil to the distributor driven gear.
5. Align the marks and install the distributor.
6. Loosely tighten the distributor mounting bolt.



2MU0B2-017

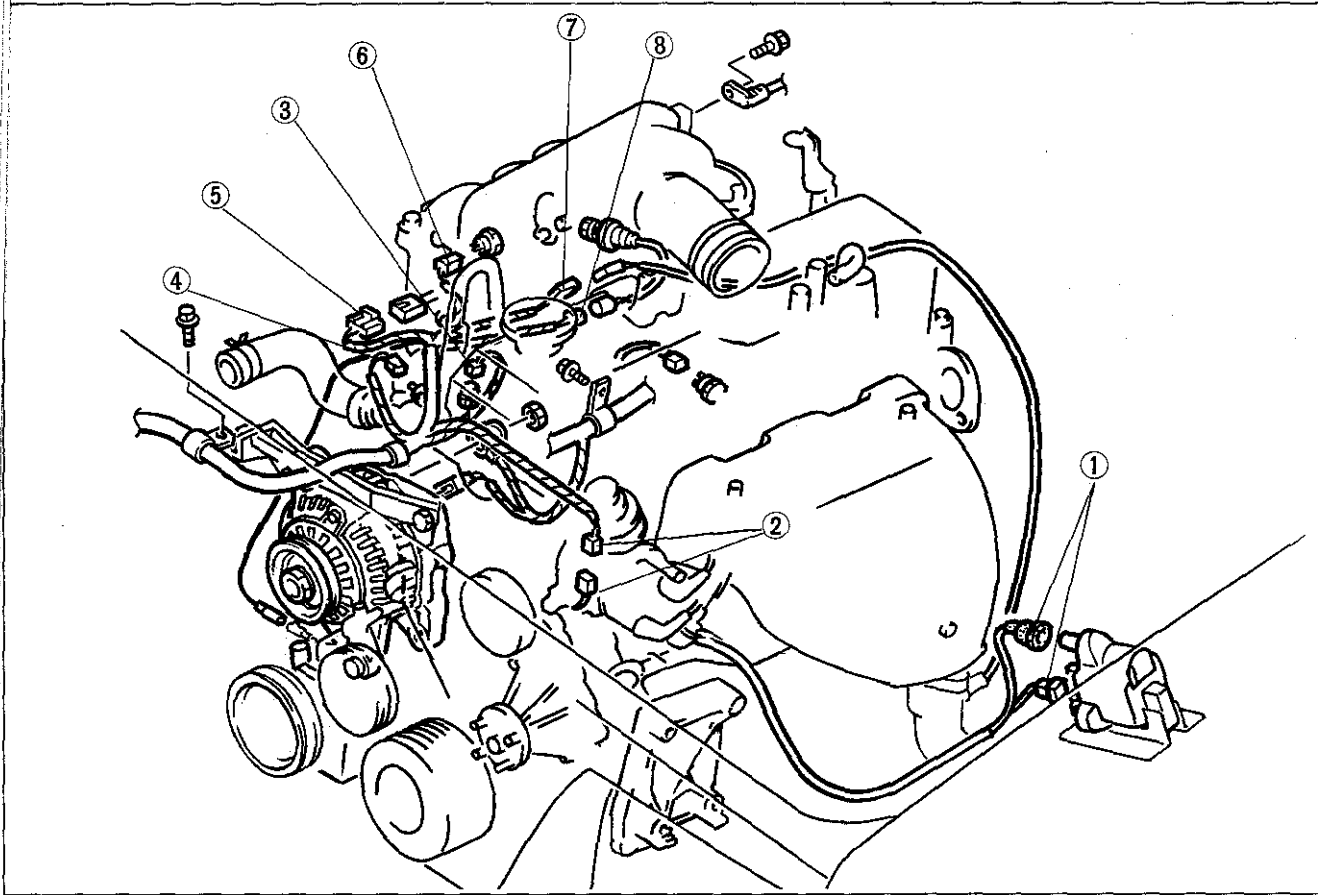
**Cylinder head cover**

1. Apply engine oil to the valves, rocker arms and timing chain.
2. Remove all old silicone sealant from the cylinder head and cover.
3. Coat a new gasket with silicone sealant, and install onto the cylinder head cover.
4. Apply silicone sealant to the shaded areas shown in the figure.
5. Install the cylinder head cover.

**Tightening torque:**

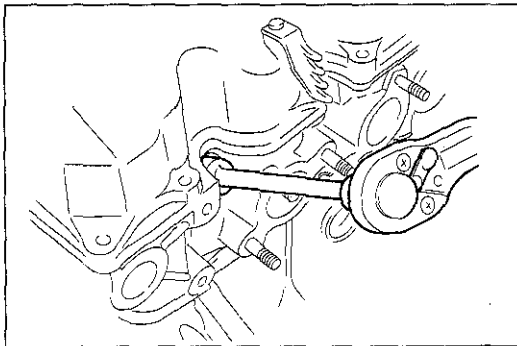
**5.9—8.8 N·m (60—90 cm·kg, 52—78 in·lb)**

## Emission harness connectors



9MU0B2-056

- |                       |                            |
|-----------------------|----------------------------|
| 1. IG coil            | 5. Injector harness        |
| 2. Distributor        | 6. Intake air thermosensor |
| 3. Water thermosensor | 7. Oxygen sensor           |
| 4. Heat gauge unit    | 8. Idle switch             |



2BU0B2-008

**Spark plug**

Install the spark plugs.

**Tightening torque:**

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)

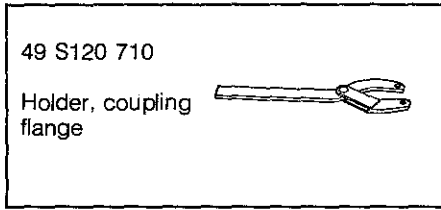
**Steps After Installation**

1. Add engine coolant to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine coolant.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil and coolant levels.

2BU0B2-008

**FRONT OIL SEAL**

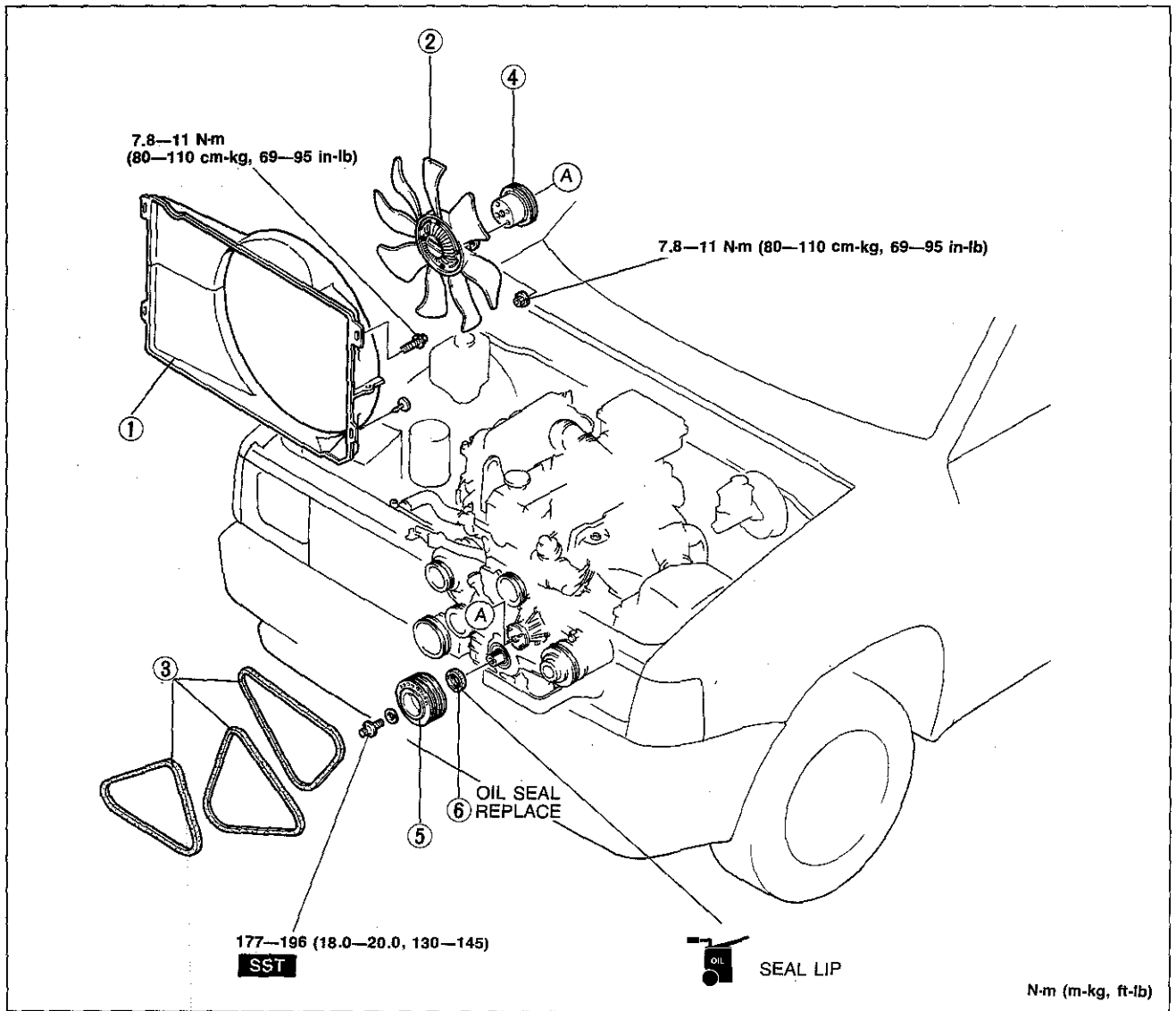
**Preparation**  
**SST**



9BU0B2-049

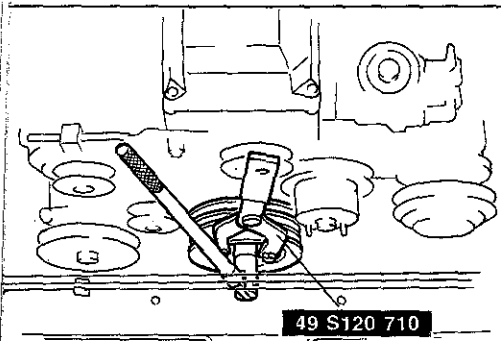
**Removal**

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove in the order shown in the figure referring to the **Removal note**.



1BU0B2-004

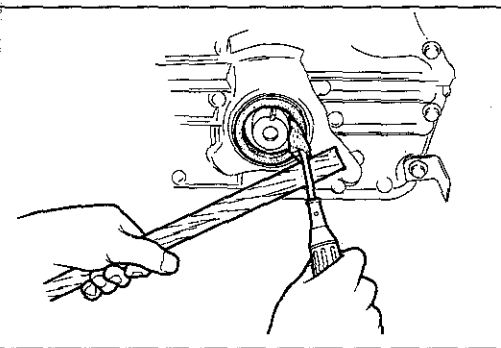
- |                  |                      |
|------------------|----------------------|
| 1. Radiator cowl | 4. Water pump pulley |
| 2. Cooling fan   | 5. Crankshaft pulley |
| 3. Drive belts   | 6. Front oil seal    |
| Adjustment.....  | page B2-5            |



9MU0B2-061

**Removal note****Crankshaft pulley**

Remove the crankshaft pulley with the SST.



9BU0B2-027

**Front oil seal**

Remove the front oil seal with a screwdriver as shown.

**Installation**

Install in the reverse order of removal referring to the **Installation note**.

**Caution**

**After radiator cowl installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowl.**

**If the fan touches the cowl, adjust the radiator cowl mounting position.**

**Note**

**Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.**

**Installation note****Front oil seal**

1. Apply engine oil to the new oil seal lip.
2. Fit the oil seal onto the chain cover.
3. Tap the oil seal in evenly using a suitable pipe.

**Oil seal outer diameter: 60mm (2.36 in)**

**Caution**

**The oil seal must be tapped in until it is flush with the edge of the chain cover.**

**Crankshaft pulley**

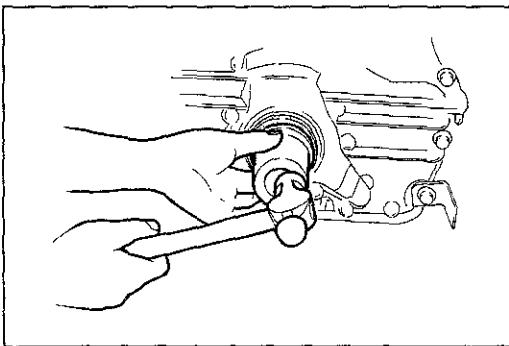
Install the crankshaft pulley with the SST.

**Tightening torque:**

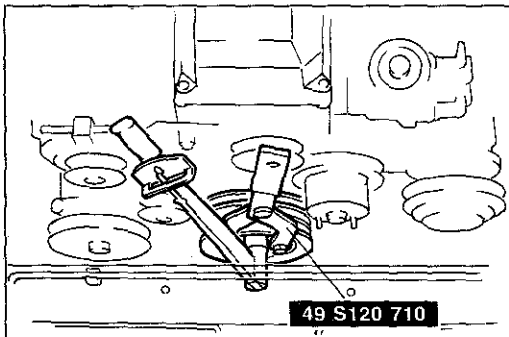
**177—196 N·m (18.0—20.0 m·kg, 130—145 ft·lb)**

**Steps After Installation**

1. Add engine oil to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine oil.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil levels.

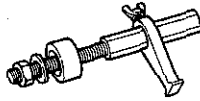



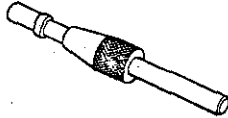


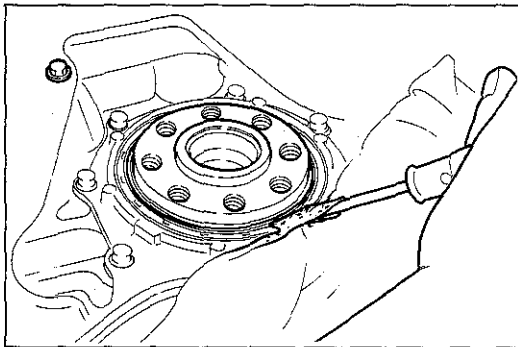
9BU0B2-028



9MU0B2-064

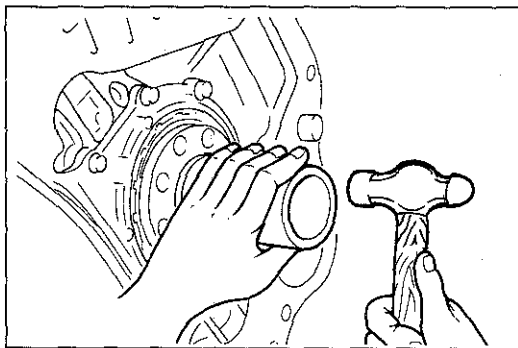
**REAR OIL SEAL  
Preparation  
SST**

<p>49 E011 1A0</p> <p>Ring gear brake set</p> 	<p>49 E011 105</p> <p>Stopper (Part of 49 E011 1A0)</p> 	<p>49 E011 103</p> <p>Shaft (Part of 49 E011 1A0)</p> 
<p>49 E011 104</p> <p>Collar (Part of 49 E011 1A0)</p> 	<p>49 SE01 310A</p> <p>Clutch disc centering tool</p> 	<p>2BU0B2-009</p>



**Removal**

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the transmission. (Refer to Section J2.)
4. Remove the clutch cover, clutch disc, and flywheel with the **SST (49 E011 1A0)** or equivalent and **(49 SE01 310A)**. (Refer to Section H.)
5. Remove the oil seal with a screw driver and a rag.



**Installation**

Install in the reverse order of removal referring to the **Installation note**.

**Installation note**

**Rear oil seal**

1. Apply engine oil to the new oil seal lip.
2. Fit the oil seal onto the rear cover.
3. Tap the oil seal in evenly using a suitable pipe.

**Oil seal outer diameter: 110mm (4.33 in)**

**Caution**

**The oil seal must be tapped in until it is flush with the edge of the rear cover.**

**Steps After Installation**

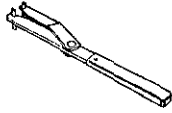
1. Add engine oil to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine oil.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil levels.

## REMOVAL

### PREPARATION SST

49 W023 585A

Adjust wrench

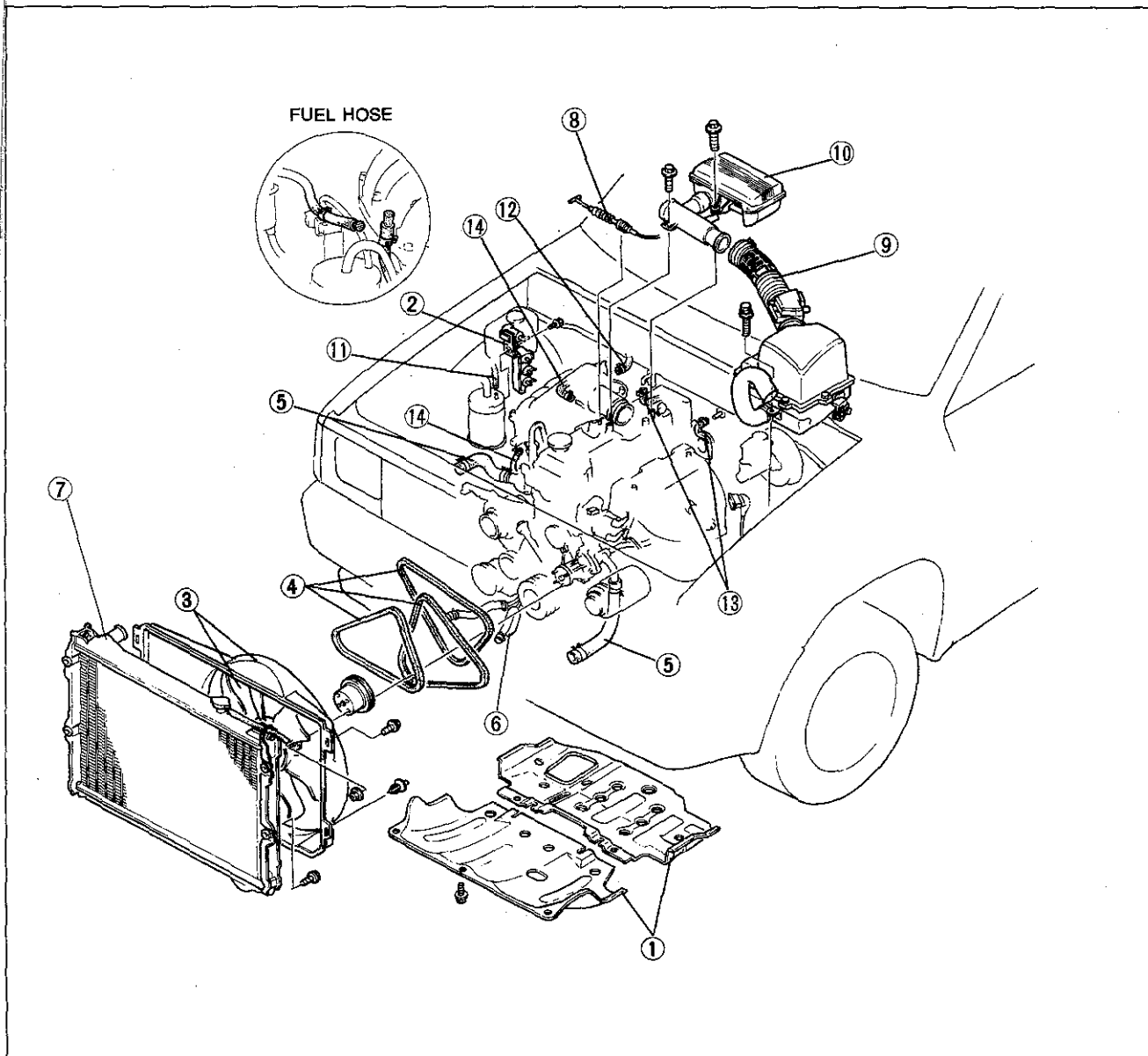


9MU0B2-069

### Warning: Release the fuel pressure. (Refer to Section F2.)

1. Disconnect the negative battery cable and remove the battery.
2. Remove the starter (Refer to Section G) and transmission. (Refer to Section J2.)
3. Drain the engine oil and coolant.
4. Remove in the order shown in the figure referring to the **Removal note**.

### STEP 1

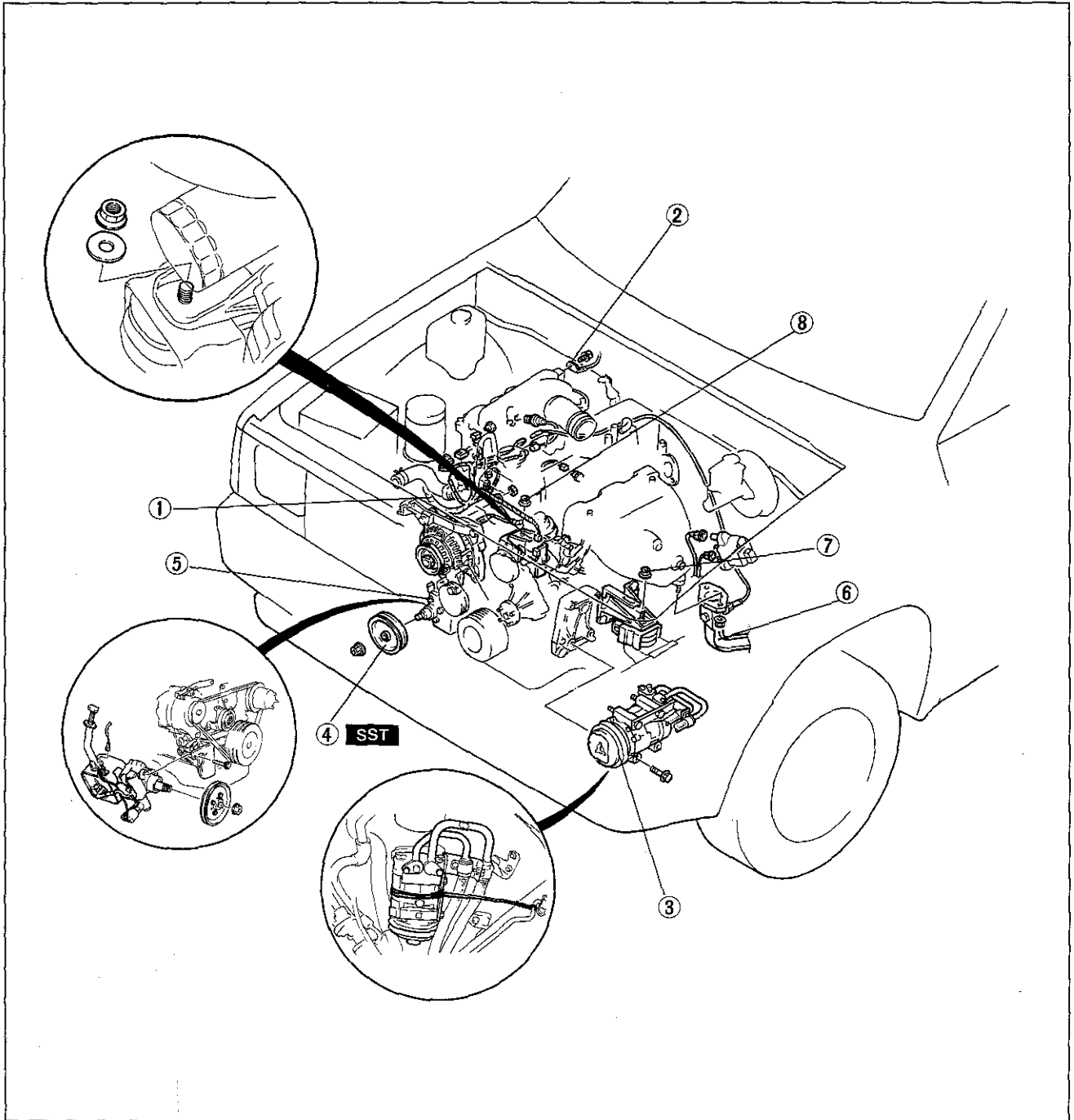


1BU0B2-005

- |                                     |                                |
|-------------------------------------|--------------------------------|
| 1. Undercover                       | 8. Accelerator cable           |
| 2. Solenoid valve                   | 9. Air cleaner                 |
| 3. Cooling fan and radiator cowling | 10. Resonance chamber assembly |
| 4. Drive belts                      | 11. Canister hose              |
| 5. Upper and lower radiator hoses   | 12. Brake vacuum hose          |
| 6. Oil cooler hose (A/T)            | 13. Heater hoses               |
| 7. Radiator                         | 14. Fuel hoses                 |

0BU0B2-003

STEP 2



9BU0B2-002

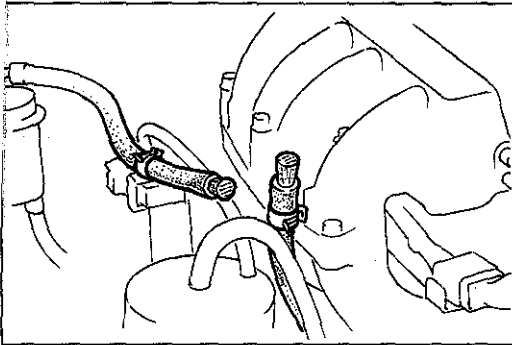
- |                                |                             |
|--------------------------------|-----------------------------|
| 1. Emission harness connectors | 5. P/S oil pump             |
| 2. Ground wire                 | 6. Exhaust pipe and bracket |
| 3. A/C compressor              | 7. Left engine mount nut    |
| 4. P/S oil pump pulley         | 8. Right engine mount nut   |



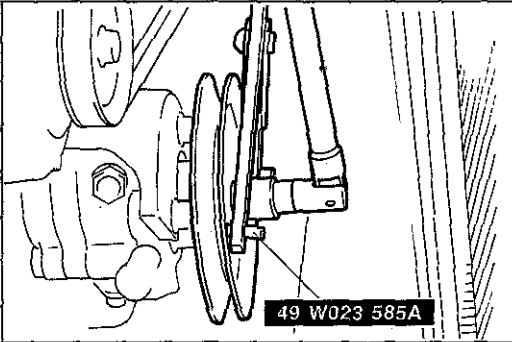
**REMOVAL****Removal note**  
**Fuel hose****Warning**

- a) Cover the hose with a rag because fuel will spray out when disconnecting.
- b) Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.

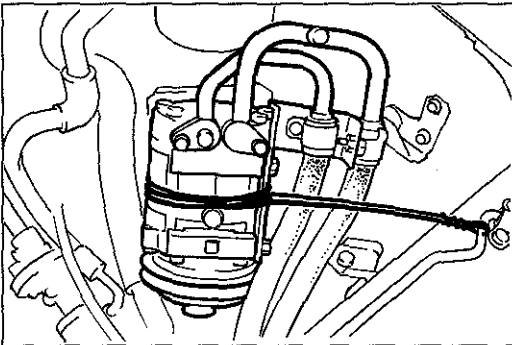


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49 W023 585A

9MU0B2-250



9BU0B2-003

**P/S oil pump pulley**

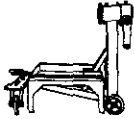
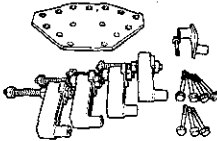
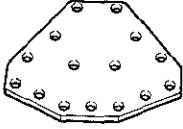
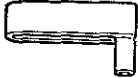


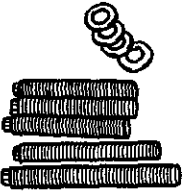

Remove the P/S oil pump pulley with the **SST**.

**P/S oil pump, A/C compressor**

Remove the P/S oil pump and A/C compressor with the hoses still connected to them; secure the pump and compressor as shown in the figure.

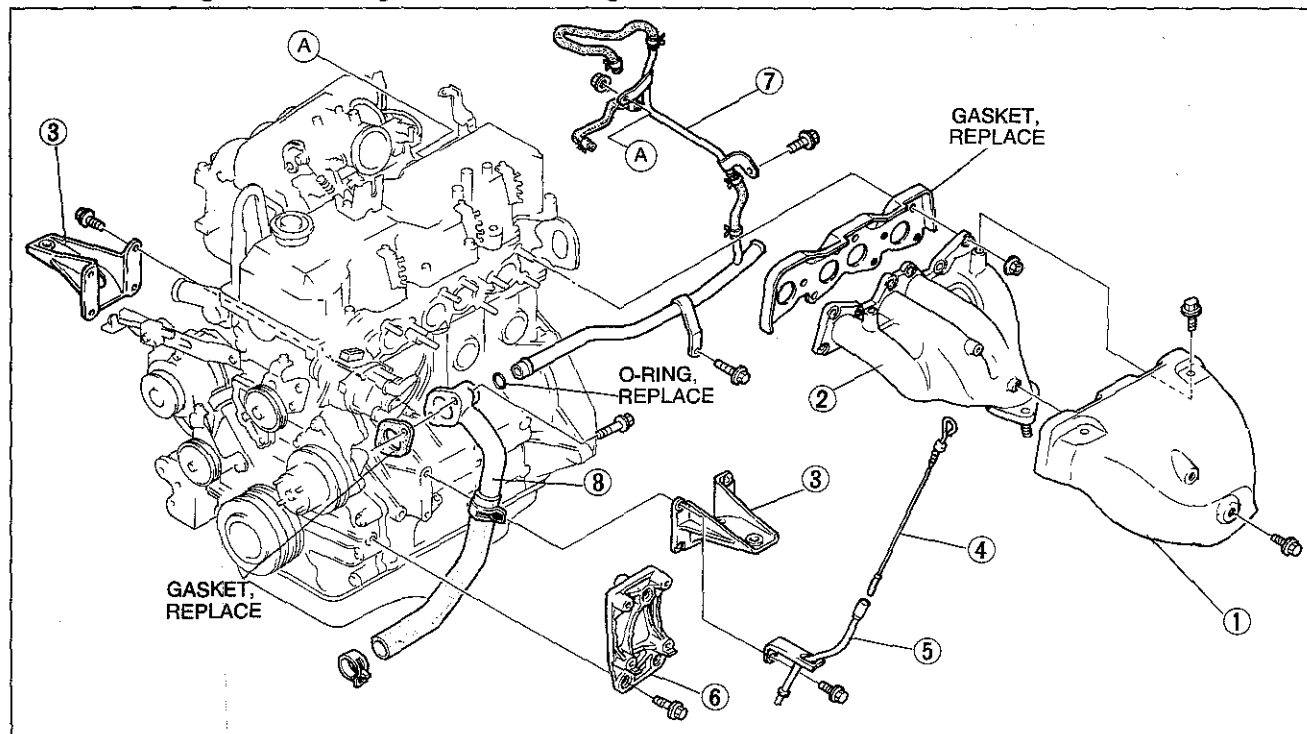
ENGINE STAND INSTALLATION

PREPARATION  
SST

<p>49 0107 680A Engine stand</p> 	<p>49 L010 1A0 Hanger, engine stand</p> 	<p>49 L010 101 Plate (Part of 49 L010 1A0)</p> 
<p>49 L010 102 Arms (Part of 49 L010 1A0)</p> 	<p>49 L010 103 Hooks (Part of 49 L010 1A0)</p> 	<p>49 L010 104 Nuts (Part of 49 L010 1A0)</p> 
<p>49 L010 105 Bolts (Part of 49 L010 1A0)</p> 	<p>49 L010 106 Bolts (Part of 49 L010 1A0)</p> 	<p>9MU0B2-073</p>

INSTALLATION

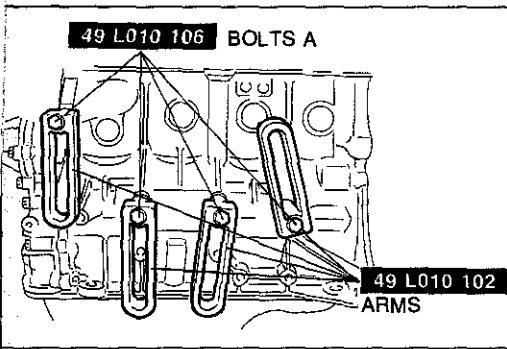
1. Remove the parts in the order shown in the figure.
2. Install the engine to the engine stand referring to the **Installation note**.



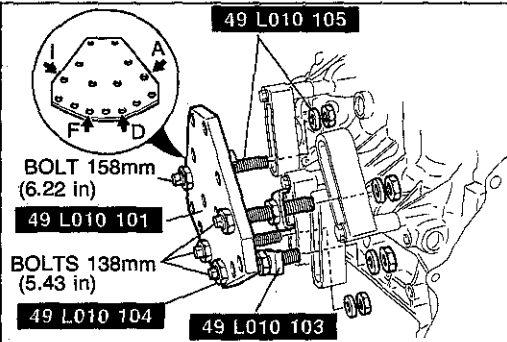
1BU0B2-006

1. Exhaust manifold insulator
2. Exhaust manifold
3. Engine mount
4. Oil level gauge

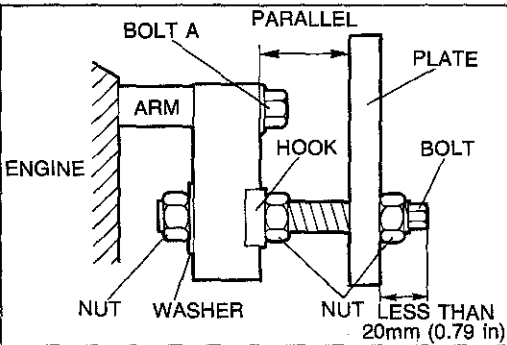
5. Oil level gauge pipe and stay
6. A/C compressor bracket
7. Coolant bypass pipe
8. Coolant inlet pipe



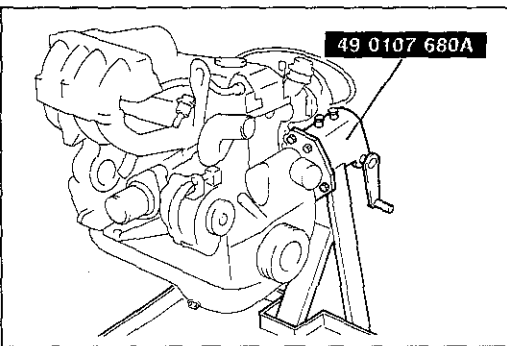
9BU0B2-051



9MU0B2-252



9MU0B2-253



9MU0B2-254

### Installation note

#### Engine hanger

1. Install the **SST (arms)** to the block holes as shown in the figure and loosely tighten the **SST (bolts A)**.

2. Assemble the **SST (bolts, nuts, hooks and plate)**.

3. Install the **SST** assembly to the respective arms while adjusting parallelism between the arms and plate by turning the bolts and nuts.

### Warning

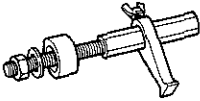



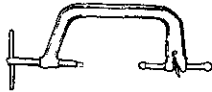
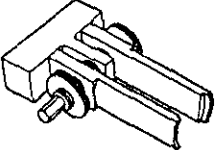
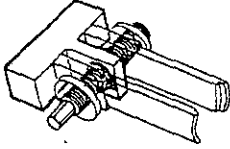
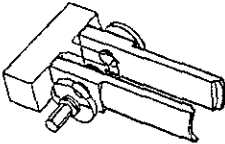
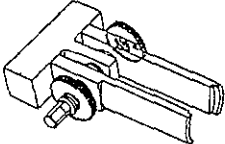

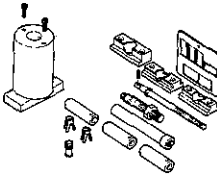
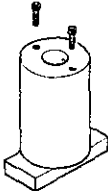
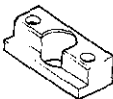
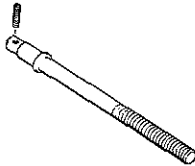
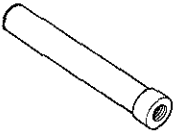



**Use special caution while turning the engine stand handle to prevent hand injury.**

4. Tighten the bolts and nuts to fix the **SST**.

5. Install the engine on the **SST**.

DISASSEMBLY

PREPARATION  
SST

<p>49 E011 1A0 Ring gear brake set</p> 	<p>49 E011 105 Stopper (Part of 49 E011 1A0)</p> 	<p>49 E011 103 Shaft (Part of 49 E011 1A0)</p> 
<p>49 E011 104 Collar (Part of 49 E011 1A0)</p> 	<p>49 0636 100A Arm, valve spring lifter</p> 	<p>49 B012 0A2 Pivot, valve spring lifter</p> 
<p>49 B012 012 Body (Part of 49 B012 0A2)</p> 	<p>49 B012 013 Foot (Part of 49 B012 0A2)</p> 	<p>49 B012 014 Lock nut (Part of 49 B012 0A2)</p> 
<p>49 1285 071 Puller, bearing</p> 	<p>49 L011 0A0 Piston pin setting tool set</p> 	<p>49 L011 001 Support block body (Part of 49 L011 0A0)</p> 
<p>49 L011 002 Support block head (Part of 49 L011 0A0)</p> 	<p>49 L011 004 Screw (Part of 49 L011 0A0)</p> 	<p>49 L011 006 Puller &amp; installer (Part of 49 L011 0A0)</p> 
<p>49 L011 009 Guide (Part of 49 L011 0A0)</p> 	<p>49 L011 010 Centering tool (Part of 49 L011 0A0)</p> 	<p>49 L011 011 Holder (Part of 49 L011 0A0)</p> 

2BU0B2-011

1. Code all identical parts (such as pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
2. Clean the parts with steam; blow off any remaining water with compressed air.

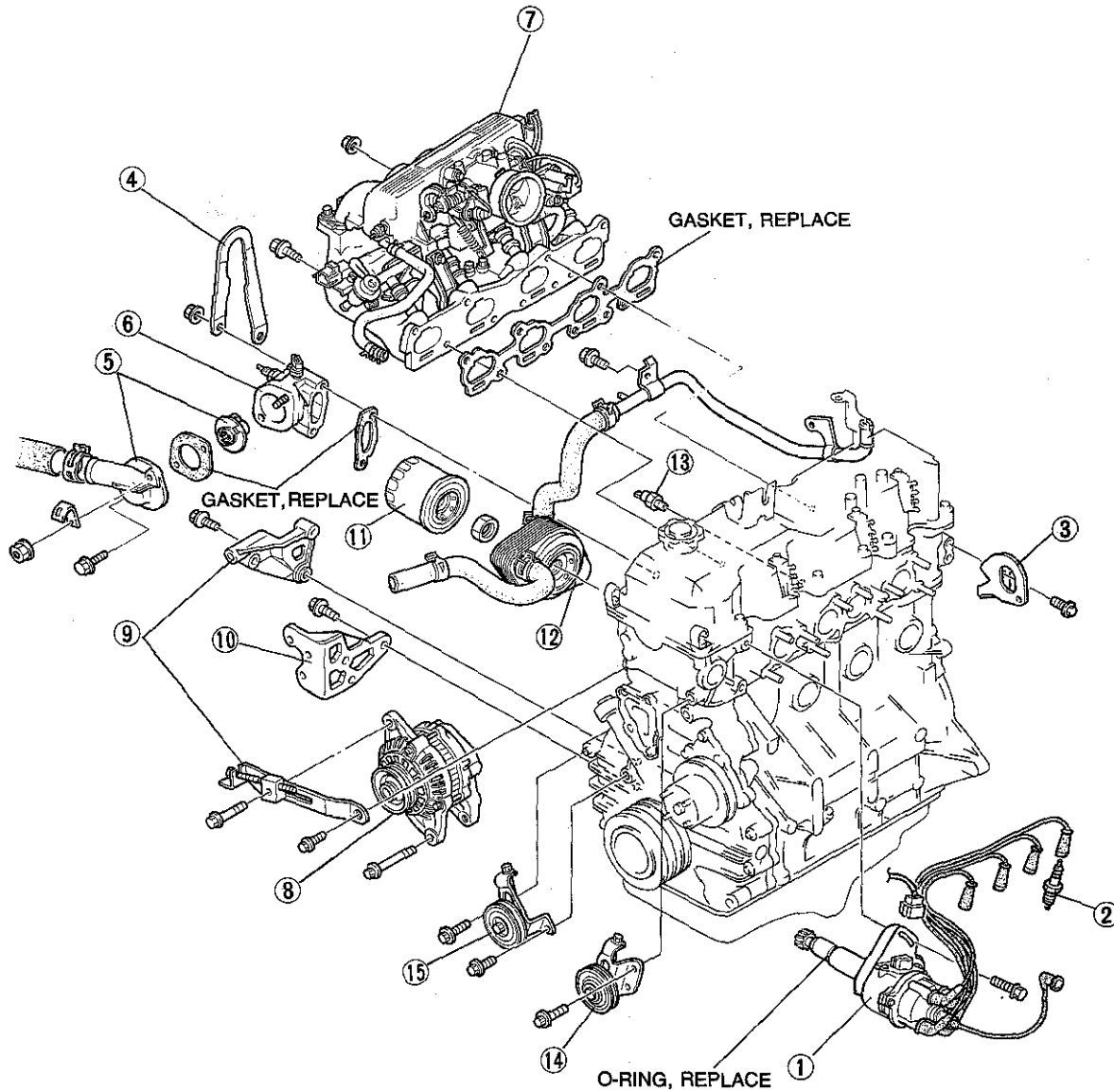
**Note**

**During the disassembly of any part or system, be sure to study its order of assembly. Also, note any deformation, wear, or damage.**

0BU0B2-019

### AUXILIARY PARTS

Remove in the order shown in the figure.

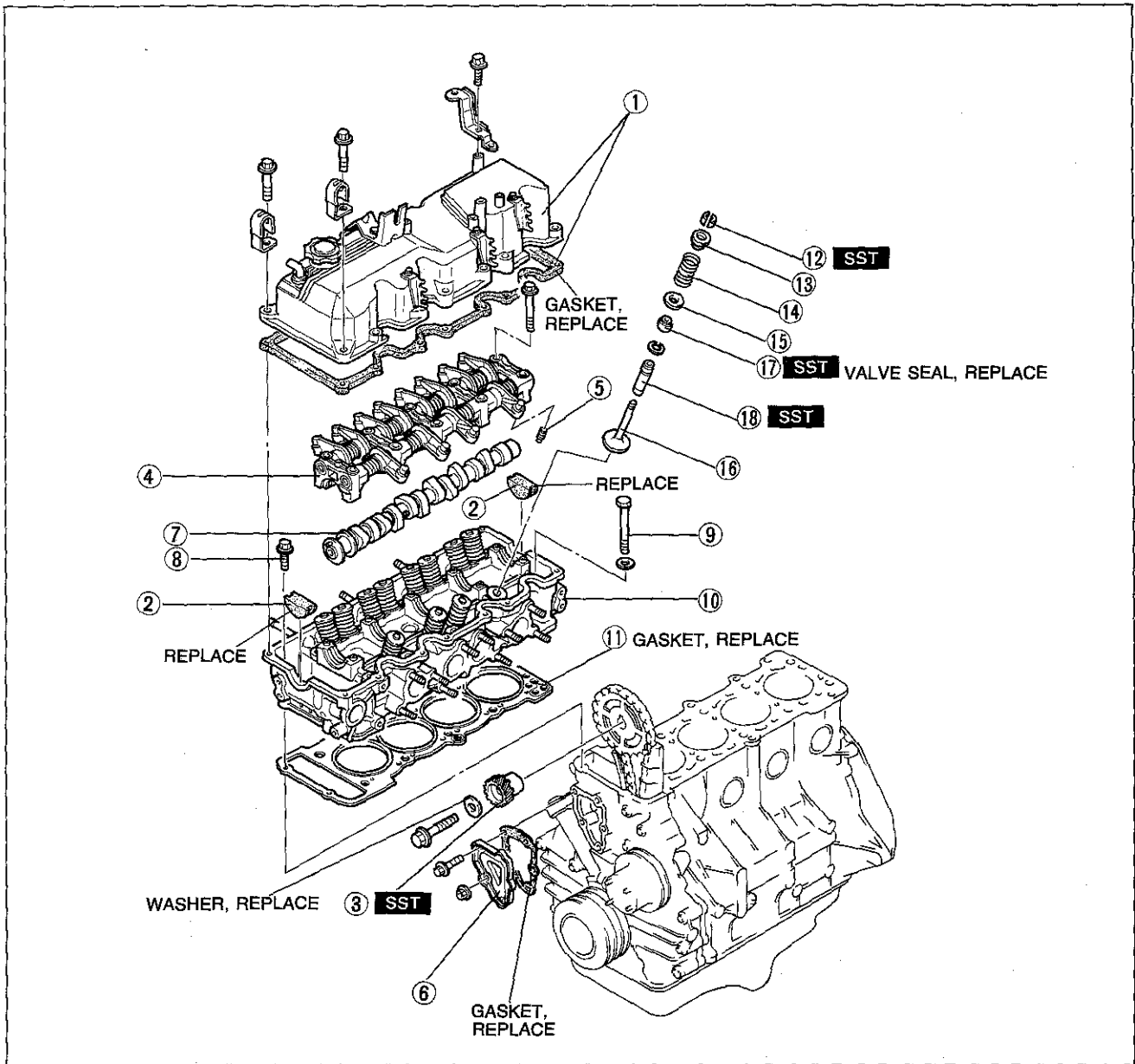


1BU0B2-007

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. Distributor and high-tension lead | 8. Alternator                   |
| 2. Spark plug                        | 9. Alternator bracket and strap |
| 3. Rear engine hanger                | 10. P/S oil pump bracket        |
| 4. Front engine hanger               | 11. Oil filter                  |
| 5. Thermostat and thermostat cover   | 12. Oil cooler                  |
| Service..... Section E               | 13. Oil pressure switch         |
| 6. Water outlet                      | 14. A/C idler bracket           |
| 7. Intake manifold assembly          | 15. P/S idler bracket           |

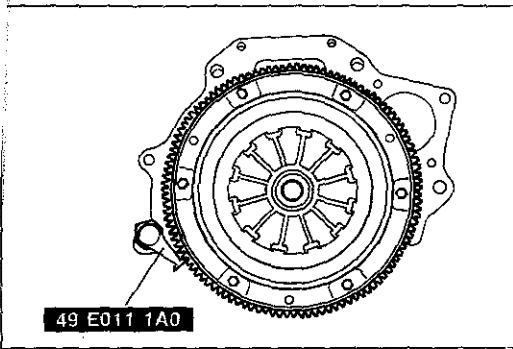
## CYLINDER HEAD

1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



1BU0B2-008

- |                                      |                             |
|--------------------------------------|-----------------------------|
| 1. Cylinder head cover and gasket    | 11. Cylinder head gasket    |
| 2. Seal cover                        | 12. Valve keepers           |
| 3. Distributor drive gear            | 13. Upper spring seat       |
| Inspect for wear or damage           | 14. Valve spring            |
| 4. Rocker arm and shaft assembly     | Inspection..... page B2-43  |
| Inspection..... page B2-45           | 15. Lower spring seat       |
| 5. Hydraulic lash adjuster (HLA)     | 16. Valve                   |
| Inspection..... page B2-45           | Inspection..... page B2-40  |
| 6. Service cover                     | 17. Valve seal              |
| 7. Camshaft                          | Inspect for wear or damage  |
| Inspection..... page B2-44           | 18. Valve guide             |
| 8. Timing chain cover attaching bolt | Inspection..... page B2-40  |
| 9. Cylinder head bolt                | Replacement..... page B2-41 |
| 10. Cylinder head                    |                             |
| Inspection..... page B2-39           |                             |



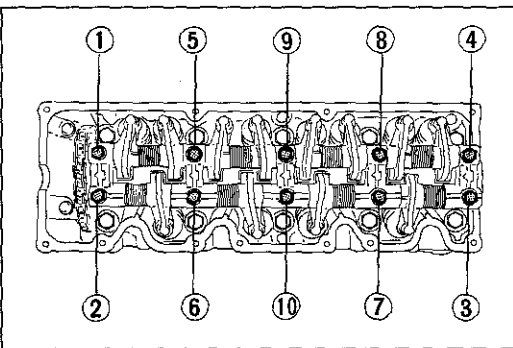
### Disassembly note

During disassembly, inspect the following.

1. Camshaft end play (Refer to page B2-45.)
2. Camshaft journal oil clearance (Refer to page B2-44.)

### Distributor drive gear

1. Set the **SST** or equivalent against the flywheel (M/T) or drive plate (A/T).
2. Remove the distributor drive gear.

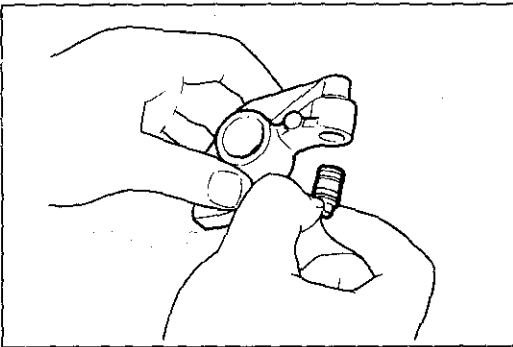


### Rocker arm and shaft assembly

1. Loosen the bolts in two or three steps in the order shown in the figure.
2. Remove the rocker arm and shaft assembly together with the bolts.

### Caution

**Do not mix up the parts of the rocker arm and shaft assembly.**

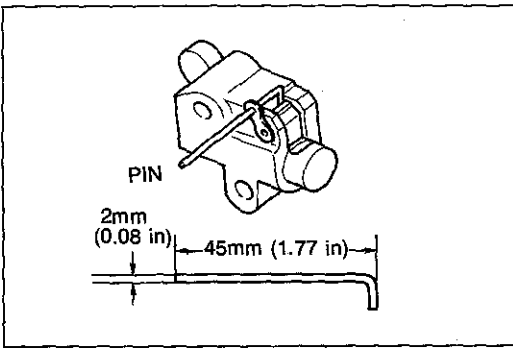


### Hydraulic lash adjuster (HLA)

Remove the HLA by hand. If this is difficult, remove it with pliers.

### Caution

**Do not remove the HLA unless necessary because oil leakage will occur if the O-ring is damaged.**



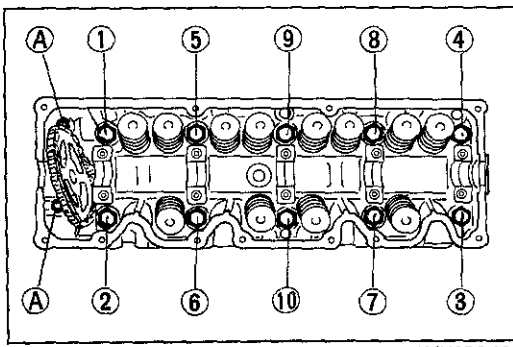
### Camshaft

1. Remove the service cover on the chain cover.
2. Push the chain adjuster sleeve in toward the left and insert the pin as shown into the lever hole to hold it.

### Caution

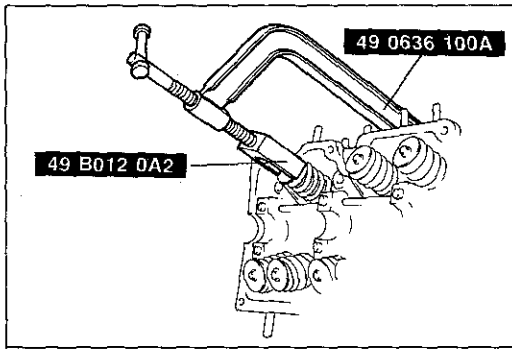
**Be especially careful that the pin does not fall.**

3. Remove the camshaft.



### Cylinder head bolt

1. Remove the bolt (A).
2. Loosen the remaining cylinder head bolts in two or three steps in the order shown in the figure.



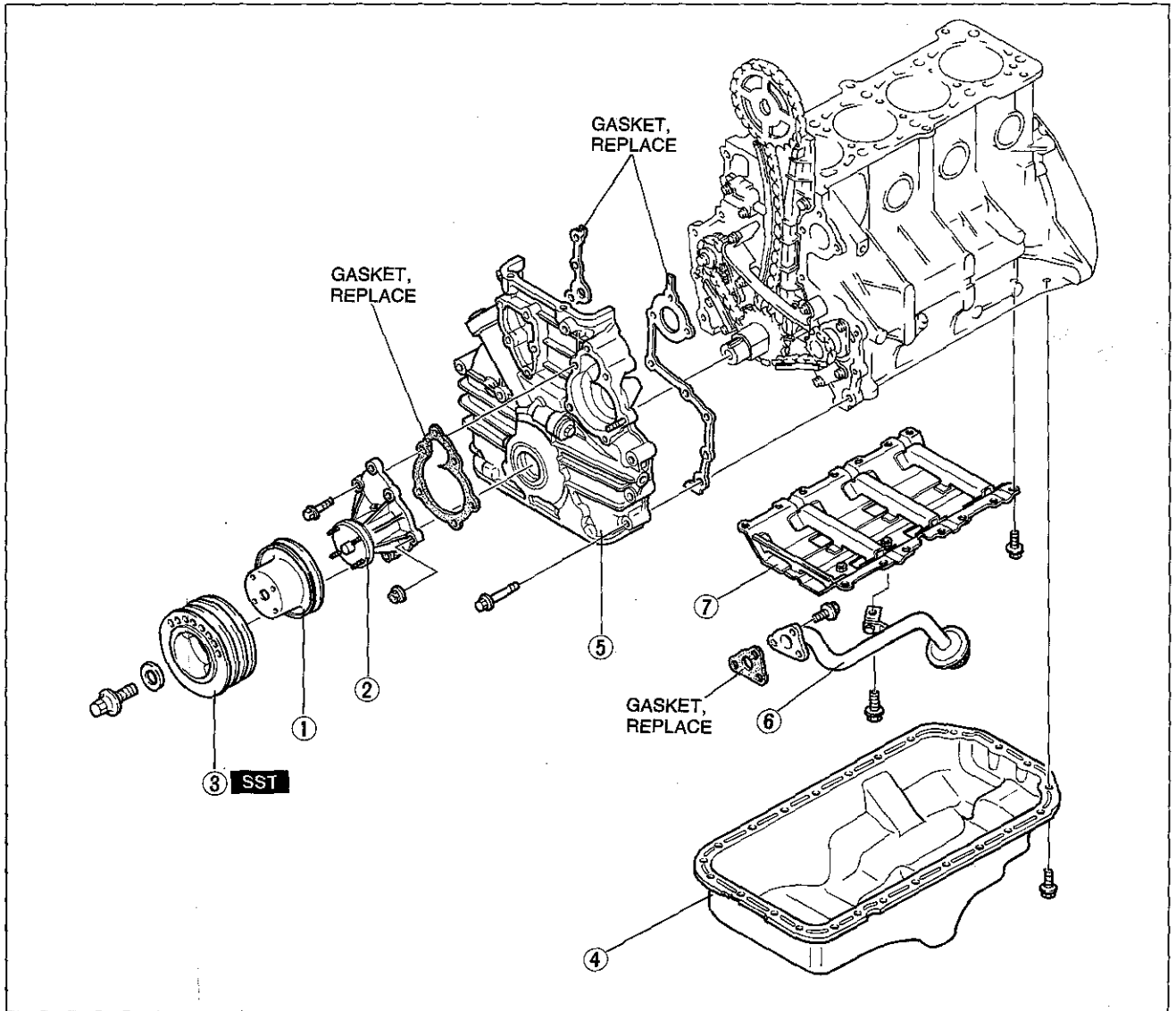
9MU0B2-085

**Valve**

Remove the valves from the cylinder head with the **SST**.

**CHAIN CASE AND OIL PAN**

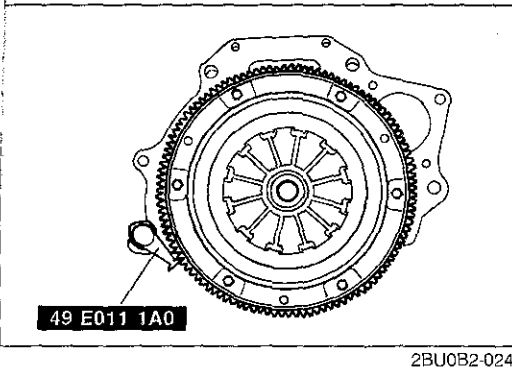
1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



1BU0B2-009

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Water pump pulley</li> <li>2. Water pump<br/>Service ..... Section E</li> <li>3. Crankshaft pulley</li> </ol> | <ol style="list-style-type: none"> <li>4. Oil pan<br/>Inspect for damage</li> <li>5. Chain cover</li> <li>6. Oil strainer</li> <li>7. Vibration reducing stiffener (VRS)</li> </ol> |
|---|---|





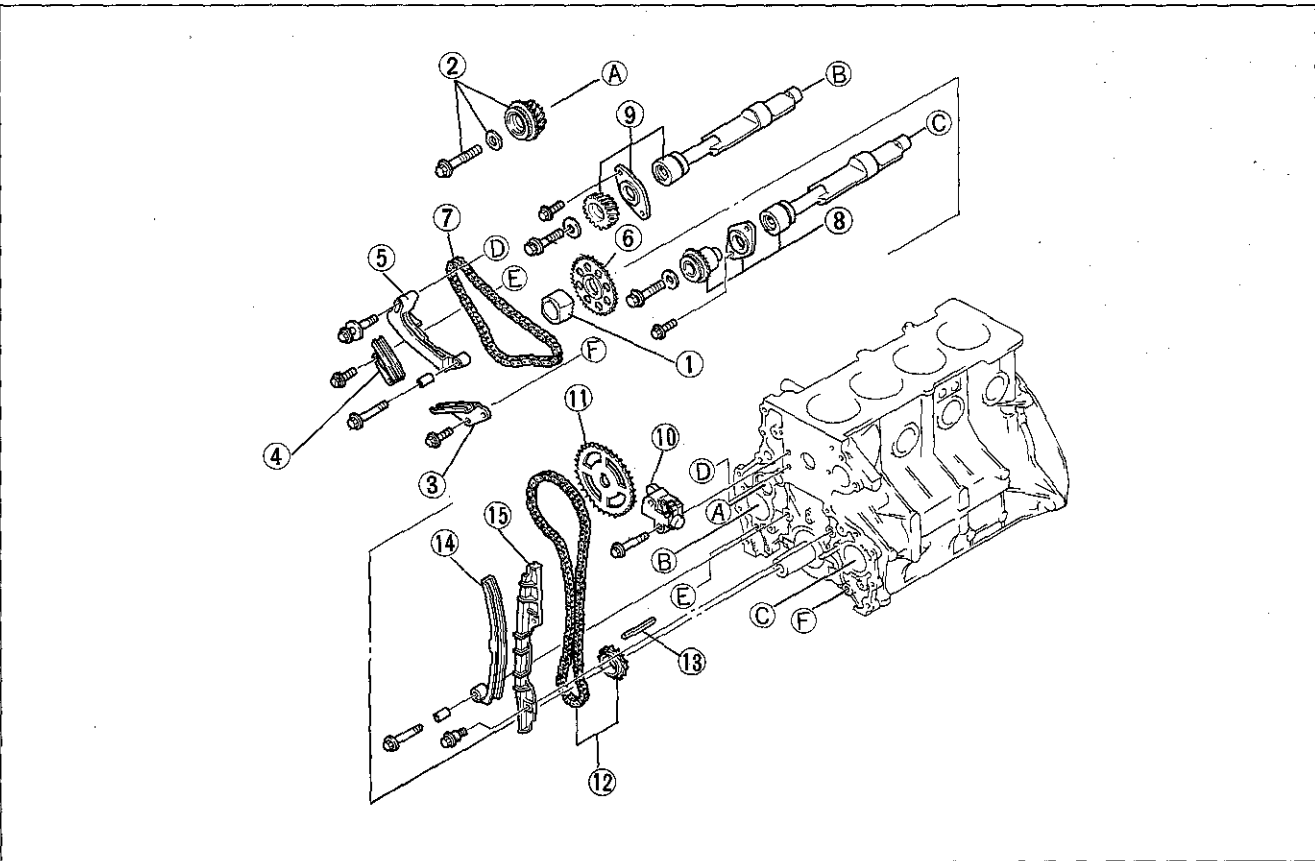
### Disassembly note

#### Crankshaft pulley

1. Set the **SST** or equivalent against the flywheel (M/T) or drive plate (A/T).
2. Remove the crankshaft pulley.

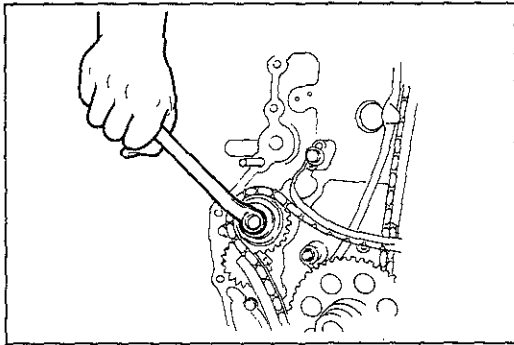
### BALANCER CHAIN AND TIMING CHAIN

1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



2BU0B2-031

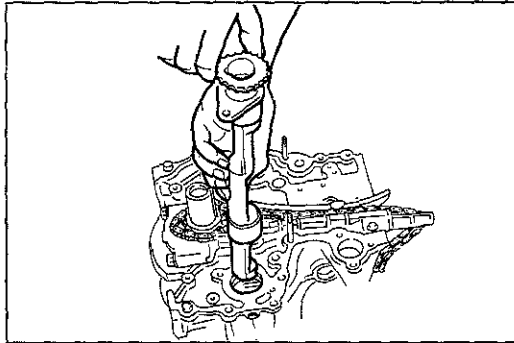
- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 1. Spacer                            | 9. Right balance shaft assembly  |
| 2. Idler sprocket assembly lock bolt | Inspection ..... page B2-50      |
| 3. Chain guide A                     | 10. Chain adjuster               |
| Inspect for wear or damage           | Inspection ..... page B2- 8      |
| 4. Chain guide B                     | 11. Camshaft pulley              |
| Inspect for wear or damage           | Inspect for wear or damage       |
| 5. Chain guide C                     | 12. Timing chain and timing gear |
| Inspect for wear or damage           | Inspection ..... page B2-51      |
| 6. Crankshaft sprocket               | 13. Key                          |
| Inspect for wear or damage           | 14. Chain lever                  |
| 7. Balancer chain                    | Inspect for wear or damage       |
| Inspect for wear or damage           | 15. Chain guide                  |
| 8. Left balance shaft assembly       | Inspect for wear or damage       |
| Inspection ..... page B2-50          |                                  |



9MU0B2-089

**Disassembly note****Idler sprocket assembly lock bolt**

Loosen the idler sprocket assembly lock bolt, before removing the chain guides.



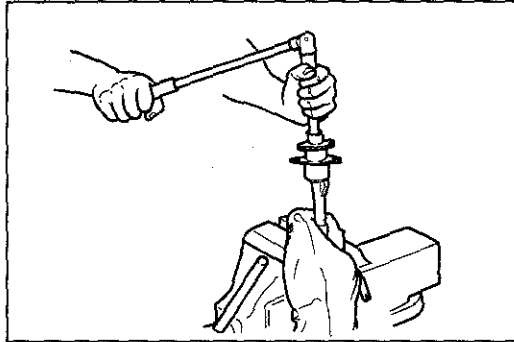
9MU0B2-090

**Left and right balance shaft assembly**

1. Remove the thrust plate lock bolts.
2. Pull out the balance shaft assembly.

**Caution**

**Do not damage the balance shaft journal and bushing when pulling out the assembly.**



9MU0B2-091

3. Disassemble the balance shaft assembly.

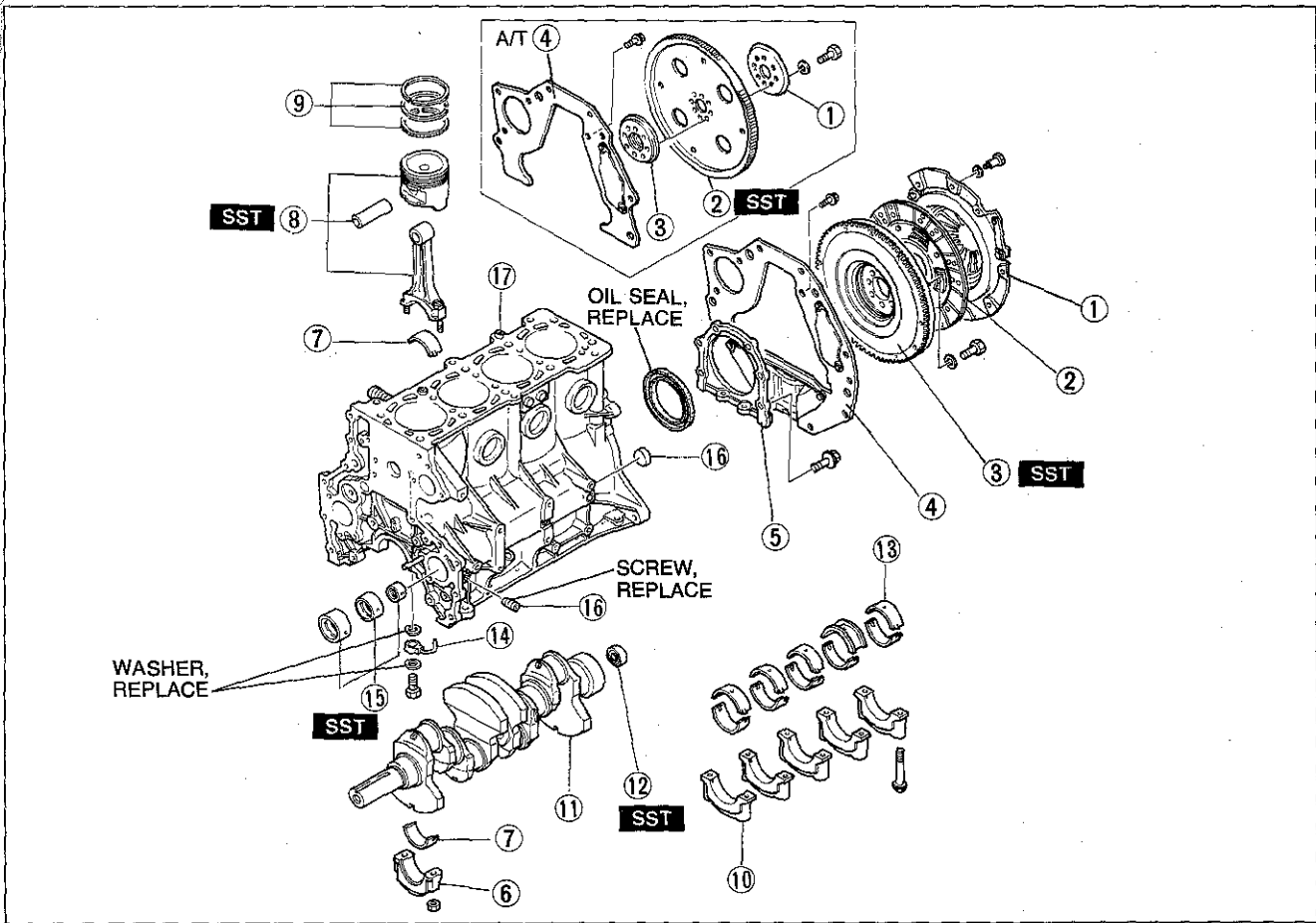
**Caution**

**Do not use a vise on the journals during disassembly.**

4. Distinguish the left and right balance shaft for correct assembly because the both shafts and the thrust plates are shaped the same.

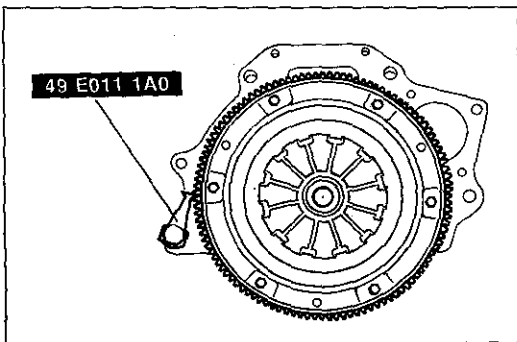
### CYLINDER BLOCK

1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



2BU0B2-018

- |  |   |
|--|---|
| 1. Clutch cover (M/T), Plate (A/T)       | 10. Main bearing cap                    |
| 2. Clutch disc (M/T), Drive plate (A/T)  | 11. Crankshaft                          |
| 3. Flywheel (M/T), Adapter (A/T)         | Inspection..... page B2-49              |
| 4. End plate                             | 12. Pilot bearing (M/T)                 |
| 5. Rear cover                            | 13. Main bearing                        |
| 6. Connecting rod cap                    | Inspect for peeling, scoring, or damage |
| 7. Connecting rod bearing                | 14. Oil jet                             |
| Inspect for peeling, scoring, or damage  | 15. Balance shaft bushing               |
| 8. Connecting rod, piston and piston pin | Replacement..... page B2-50             |
| Inspection..... pages B2-47, 48          | 16. Blind plug and screw                |
| 9. Piston ring                           | Replacement..... page B2-51             |
| Inspection..... page B2-47               | 17. Cylinder block                      |
|  | Inspection..... page B2-45              |

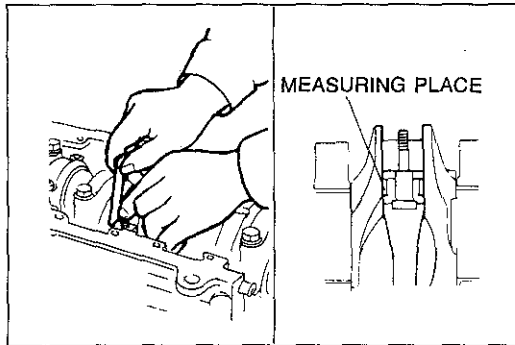


#### Disassembly note

#### Clutch cover and flywheel (M/T) or drive plate

Remove the clutch cover and flywheel (M/T), or drive plate (A/T) with the **SST** or equivalent.

2BU0B2-025

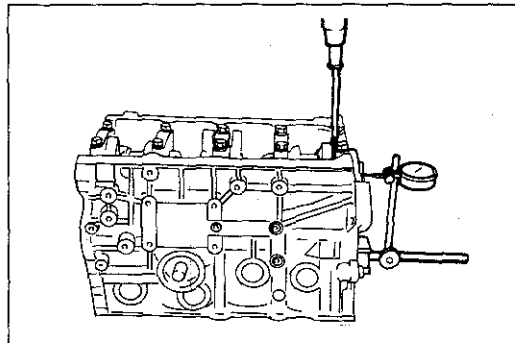


9BU0B2-033

**Connecting rod and cap**

Before removing the connecting rod, clean the bearing, connecting rod, and crankpin, and measure the following:

1. Connecting rod side clearance (Refer to page B2-58.)
2. Crankpin oil clearance (Refer to page B2-57.)

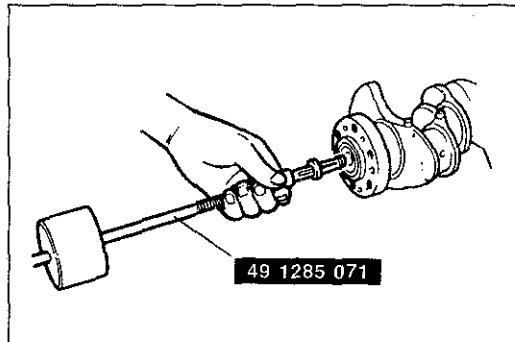


9BU0B2-034

**Main bearing cap**

Before removing the main bearing caps, clean the bearings, main journals, and caps, and measure the following points.

1. Crankshaft end play (Refer to page B2-56.)
2. Main journal oil clearance (Refer to page B2-56.)



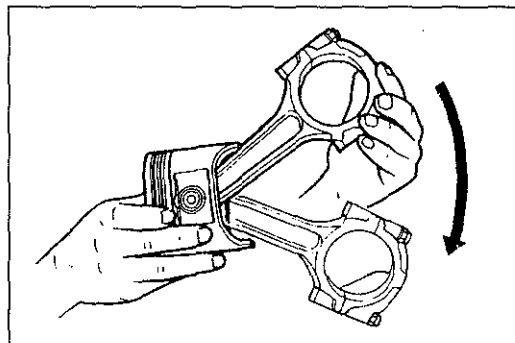
9BU0B2-035

**Pilot bearing**

1. Before removing the pilot bearing, inspect for sticks or excessive resistance by turning the bearing while applying force in the axial direction.
2. Remove the pilot bearing from the crankshaft with the **SST** if necessary.

**Note**

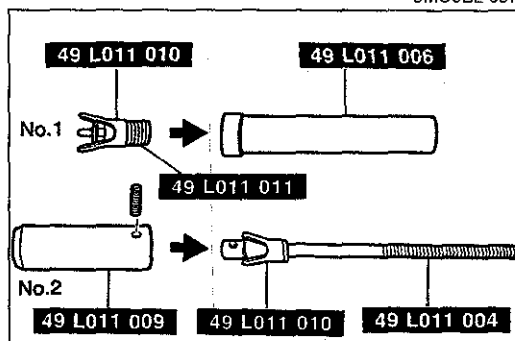
**When replacing and/or cleaning the crankshaft, remove the pilot bearing.**



9MU0B2-097

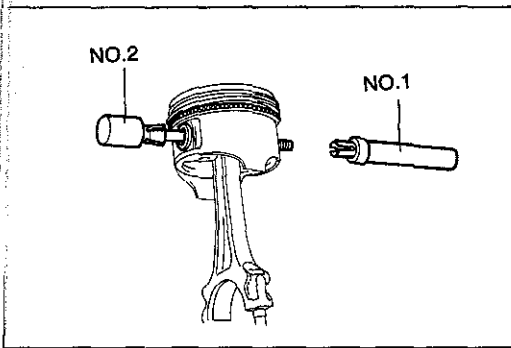
**Piston and connecting rod**

1. Before disassembling the piston and connecting rod, check the oscillation torque as shown. If the large end does not drop by its own weight, replace the piston or the piston pin.



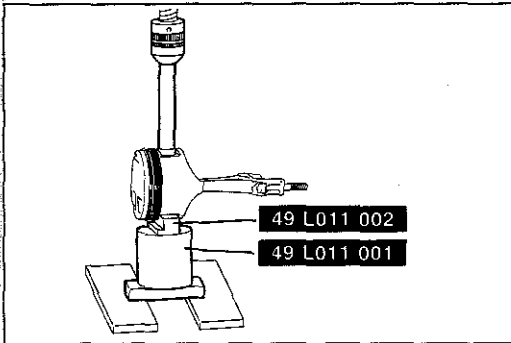
9MU0B2-098

2. Assemble the **SST** as shown.

**DISASSEMBLY (CYLINDER BLOCK)**

9MU0B2-099

3. Insert the **SST** No.2 into the piston pin as shown and fully screw in the **SST** No.1.

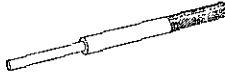
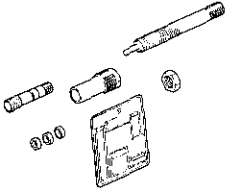
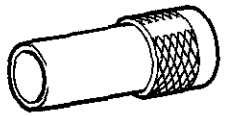
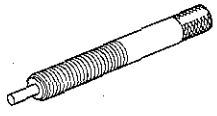

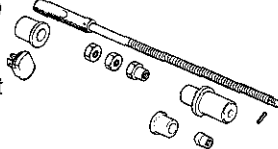
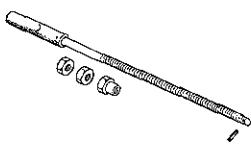
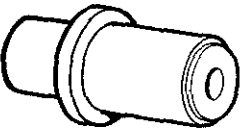
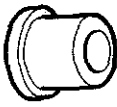



9MU0B2-100

4. Mount the piston and connecting rod in the **SST** as shown.
5. Press out the piston pin.  
While removing the piston pin, check the pressure. If it is lower than **4,905 N (500 kg, 1,100 lb)**, replace the piston pin or connecting rod.

INSPECTION AND REPAIR

PREPARATION  
SST

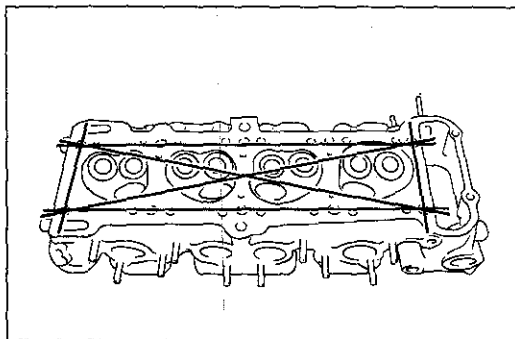
<p>49 0249 010A</p> <p>Remover &amp; installer, valve guide</p> 	<p>49 L012 0A0</p> <p>Installer set, valve seal &amp; valve guide</p> 	<p>49 L012 002</p> <p>Body (Part of 49 L012 0A0)</p> 
<p>49 L012 003</p> <p>Installer (Part of 49 L012 0A0)</p> 	<p>49 L012 004</p> <p>Nut (Part of 49 L012 0A0)</p> 	<p>49 L011 2A0</p> <p>Replacer, balance shaft bushing</p> 
<p>49 L011 201</p> <p>Shaft (Part of 49 L011 2A0)</p> 	<p>49 L011 202</p> <p>Attachment (Part of 49 L011 2A0)</p> 	<p>49 L011 203</p> <p>Attachment (Part of 49 L011 2A0)</p> 
<p>49 L011 204</p> <p>Attachment (Part of 49 L011 2A0)</p> 	<p>9MU0B2-101</p>	

1. Clean all parts, being sure to remove any gasket fragments, dirt, oil or grease, carbon, moisture residue, or other foreign materials.
2. Inspection and repairs must be performed in the order specified.

**Caution**

**Do not damage the joints or friction surfaces of aluminum alloy components (such as the cylinder head or pistons).**

9MU0B2-102

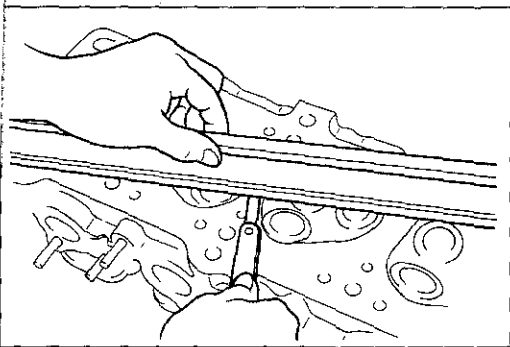


9MU0B2-103

**Cylinder Head**

1. Inspect the cylinder head for damage, cracks, and leakage of water or oil. Replace if necessary.
2. Measure the cylinder head distortion in the six directions shown in the figure.

**Distortion: 0.15mm (0.006 in) max.**



9MU0B2-104

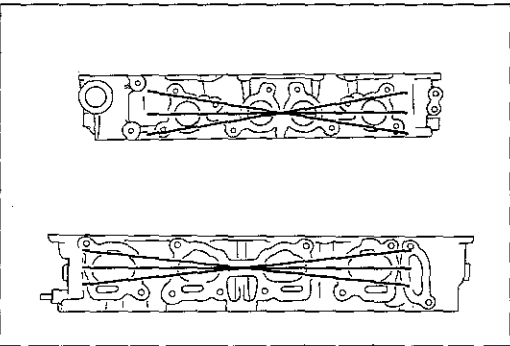
- If the cylinder head distortion exceeds specification, grind the cylinder head surface.  
If the cylinder head height is not within specification, replace it.

**Height:** 89.95—90.05mm (3.541—3.545 in)  
**Grinding:** 0.20mm (0.008 in) max.

### Note

Before grinding the cylinder head, first check the following. Replace if necessary.

- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play

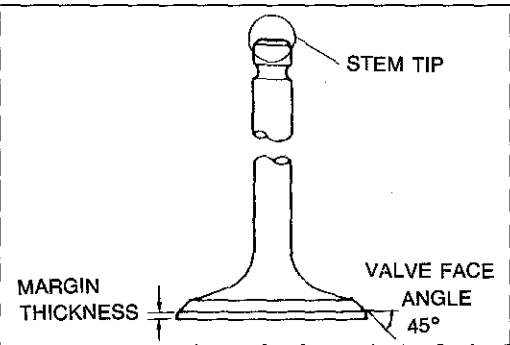


9MU0B2-105

- Measure the manifold contact surface distortion in the six directions shown in the figure.

**Distortion:** 0.15mm (0.006 in) max.

- If distortion exceeds specification, grind the surface or replace the cylinder head.



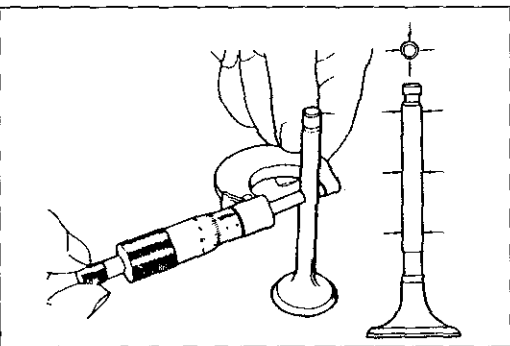
9MU0B2-106

### Valve and Valve Guide

- Inspect each valve for the following. Replace or resurface if necessary.
  - (1) Damaged or bent stem
  - (2) Roughness or damage to face
  - (3) Damage or uneven wear of stem tip
- Check the valve head margin thickness. Replace if necessary.

### Margin thickness

**IN :** 1.0mm (0.039 in)  
**EX :** 1.5mm (0.059 in)



1BU0B2-012

- Measure the valve length.

### Length

**Standard** IN : 112.69mm (4.4367 in)  
EX : 113.82mm (4.4812 in)  
**Minimum** IN : 112.29mm (4.4209 in)  
EX : 113.42mm (4.4654 in)

- Measure the valve stem diameter.

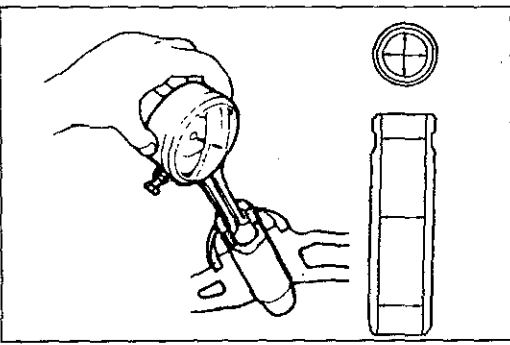
### Diameter

**IN :** 6.970—6.985mm (0.2744—0.2750 in)  
**EX :** 6.965—6.980mm (0.2742—0.2748 in)

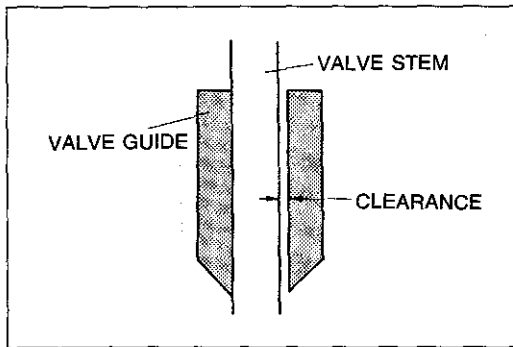
- Measure the valve guide inner diameter.

### Inner diameter

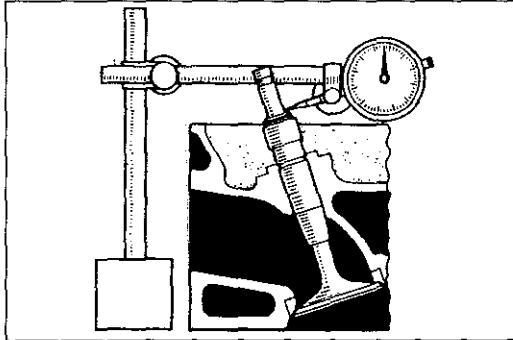
**IN :** 7.01—7.03mm (0.2760—0.2768 in)  
**EX :** 7.01—7.03mm (0.2760—0.2768 in)



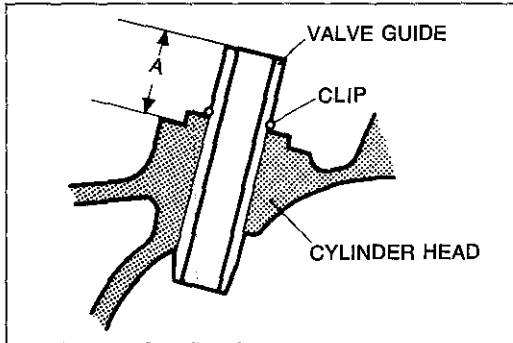
9MU0B2-108



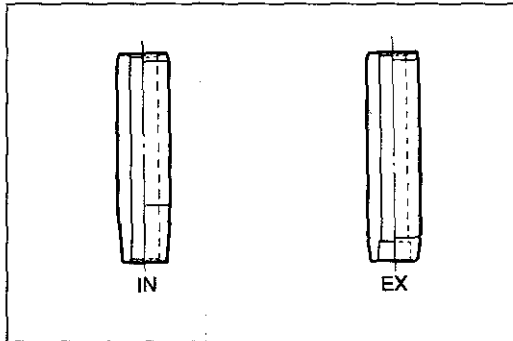
86U01X-081



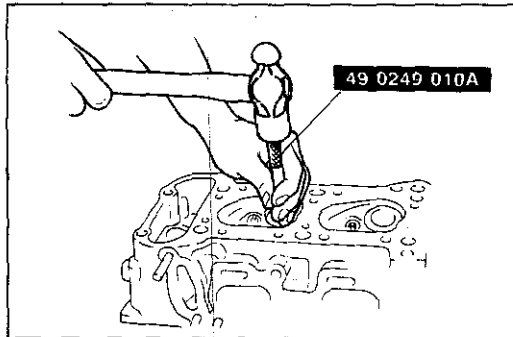
9MU0B2-109



1BU0B2-020



9MU0B2-111



9MU0B2-112

6. Measure the valve stem-to-guide clearance.

(1) Method No.1

Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

(2) Method No.2

Measure the valve stem play at a point close to the valve guide with the valve lifted slightly off the valve seat.

#### Clearance

IN : 0.025—0.060mm (0.0010—0.0024 in)

EX : 0.030—0.065mm (0.0012—0.0026 in)

Maximum: 0.20mm (0.008 in)

7. If the clearance exceeds the maximum, replace the valve and/or valve guide.

8. Check the valve guide projection height (dimension A in the figure). Replace if necessary.

Height: 23.5—24.2mm (0.925—0.953 in)

#### Note

The retainer clip is used on only the original equipment valve guide.

#### Replacement of valve guide

#### Note

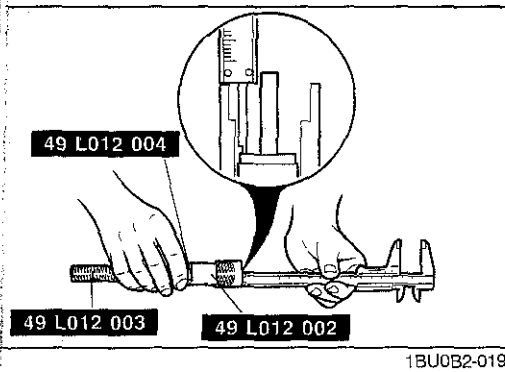
a) Although the shapes of the intake and exhaust valve guides are different, use the exhaust valve guide on both sides as a replacement.

b) There is no retainer groove in the replacement valve guide.

#### Removal

Remove the valve guide from the side opposite the combustion chamber with the SST.

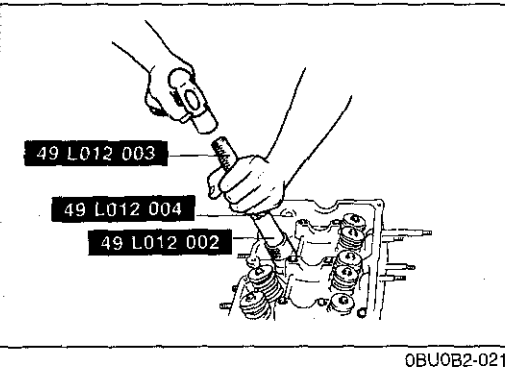


**Installation**

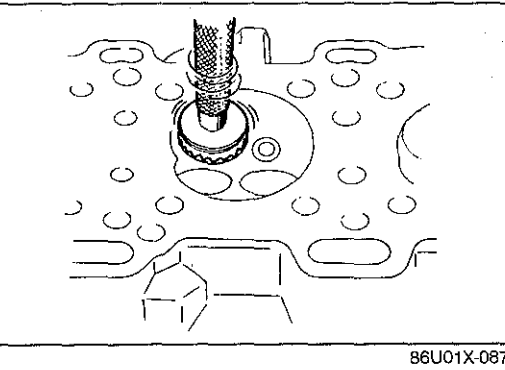
1. Assemble the **SST** so that the depth **L** is as specified.

**Depth L: 23.5—24.2mm (0.925—0.953 in)**

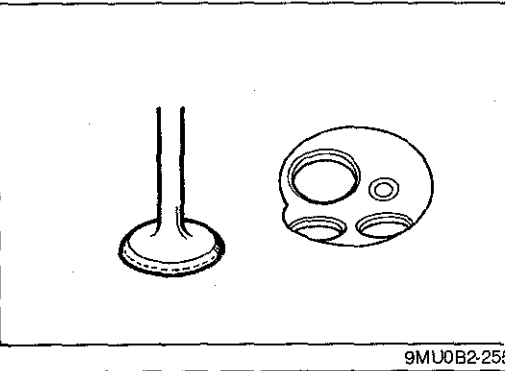
2. Tighten the locknut.



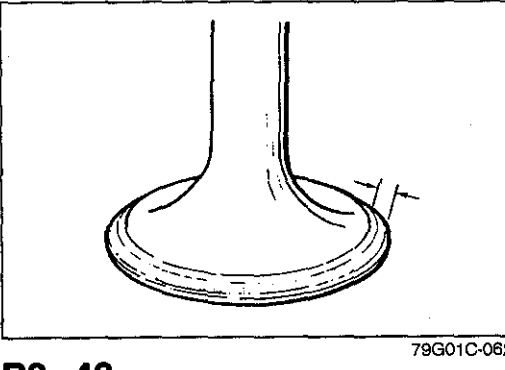
3. Tap the new valve guide in from the side opposite the combustion chamber until the **SST** contacts the cylinder head.
4. Check that the valve guide projection height is within specification.
5. If not within specification, repeat steps 1—4.

**Valve Seat**

1. Inspect the contact surface of the valve seat and valve face for the following:
  - (1) Roughness
  - (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.

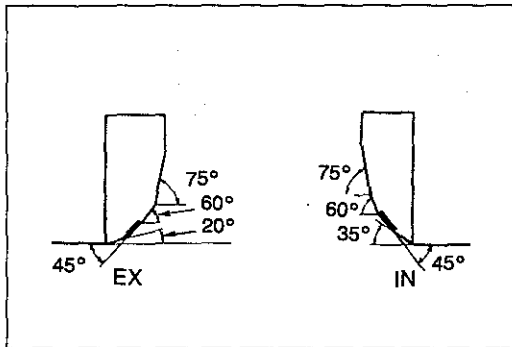


3. Apply a thin coat of Prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
  - (1) If blue does not appear 360° around the valve face, replace the valve.
  - (2) If blue does not appear 360° around the valve seat, resurface the seat.

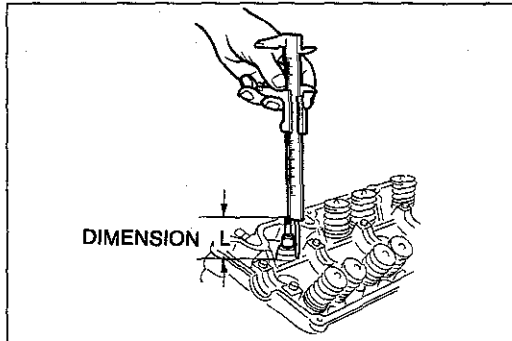


5. Check the seat contact width.

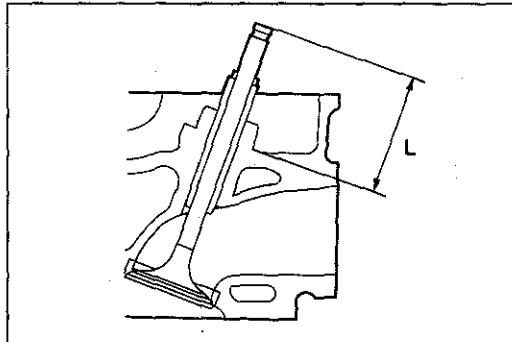
**Width: 1.2—1.6mm (0.047—0.063 in)**



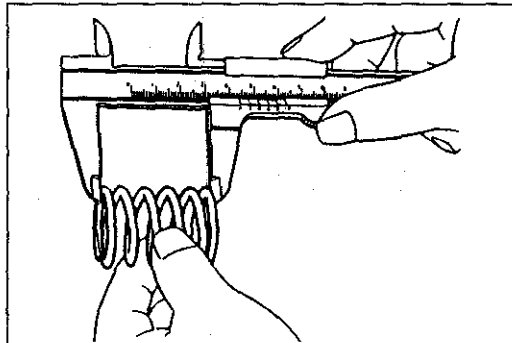
9MU0B2-115



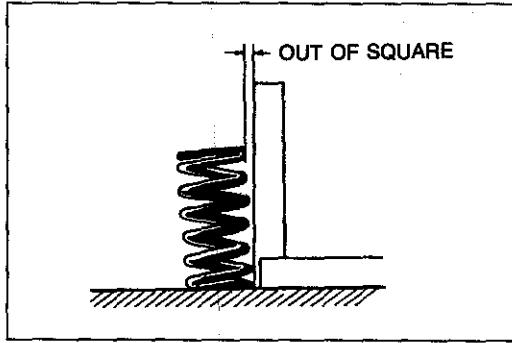
9MU0B2-256



9MU0B2-257



2BU0B2-012



9MU0B2-117

6. Check that the valve seating position is at the center of the valve face.
  - (1) If the valve seating position is too high, correct the valve seat with a **60°** cutter.
  - (2) If the valve seating position is too low, correct the valve seat with a **35° (IN)** or **20° (EX)** cutter.
7. Seat the valve to the valve seat with a lapping compound.

8. Check the sinking of the valve seat. Measure protruding length (dimension **L**) of each valve stem.

**Dimension L**

**IN : 49.0mm (1.929 in)**

**EX: 49.0mm (1.929 in)**

- (1) If **L** is as below, it can be used as it is.

**IN : 49.0—49.5mm (1.929—1.949 in)**

**EX: 49.0—49.5mm (1.929—1.949 in)**

- (2) If **L** is as below, insert a spacer between the spring seat and cylinder head to adjust.

**IN : 49.5—50.5mm (1.949—1.988 in)**

**EX: 49.5—50.5mm (1.949—1.988 in)**

- (3) If **L** is more than as below, replace the cylinder head.

**IN : 50.5mm (1.988 in)**

**EX: 50.5mm (1.988 in)**

**Valve Spring**

1. Inspect each valve spring for cracks or damage.
2. Check the free length and out of square. Replace if necessary.

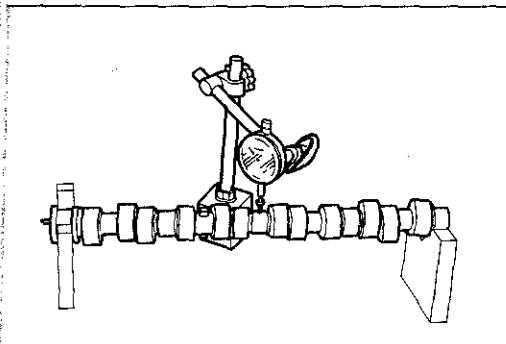
**Free length**

**Standard: 50.05mm (1.970 in)**

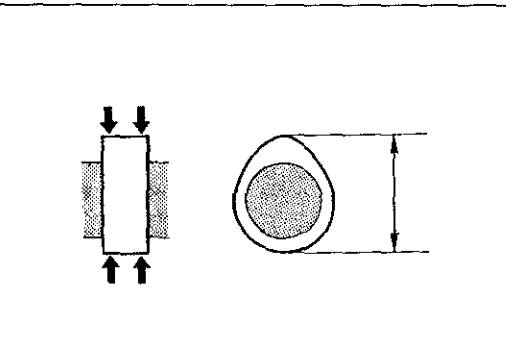
**Minimum length:**

**43.0mm (1.693 in) with a set load of 195—221 N·m (19.9—22.6 m·kg, 144—163 ft·lb)**

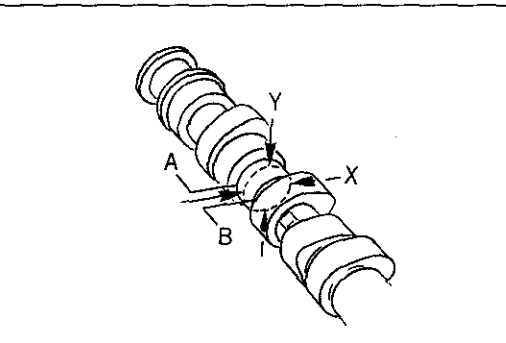
**Out of square: 1.75mm (0.069 in) max.**



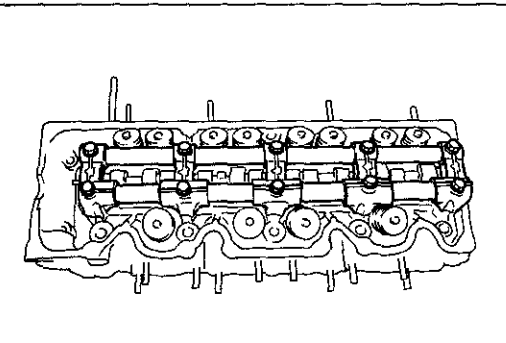
86U01X-092



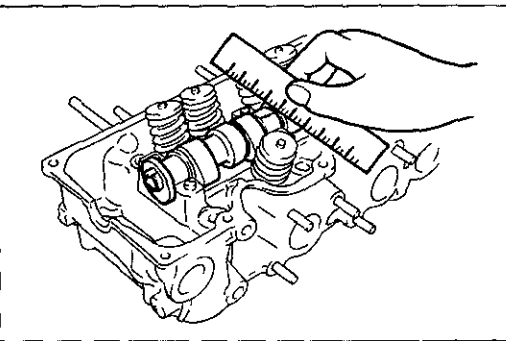
1BU0B2-013



1BU0B2-014



9MU0B2-120



9MU0B2-121

**Camshaft**

1. Set the front and rear journals on V-blocks.  
Check the camshaft runout. Replace if necessary.

**Runout: 0.03mm (0.0012 in) max.**

2. Check the cam for wear or damage. Replace if necessary.
3. Check the cam lobe height at the two points as shown.

**Height**

**IN : 41.714mm (1.6423 in)**

**EX : 41.988mm (1.6531 in)**

**Minimum**

**IN : 41.514mm (1.6344 in)**

**EX : 41.788mm (1.6452 in)**

4. Measure the journal diameters in X and Y directions at the two points (A and B) as shown.

**Diameter**

**No.1 and No.5:**

**29.940—29.965mm (1.1788—1.1797 in)**

**No.2, No.3 and No.4:**

**29.910—29.935mm (1.1776—1.1786 in)**

**Out-of-round: 0.05mm (0.002 in) max.**

5. Measure the oil clearance of the camshaft and camshaft caps.

- (1) Remove any oil, or dirt from the journals and bearing surface.
- (2) Set the camshaft on the cylinder head.
- (3) Position the Plastigauge on top of the journals in the axial direction.
- (4) Place the camshaft caps and rocker arm shafts in position; then tighten them to the specified torque.

**Tightening torque:**

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

- (5) Remove the camshaft caps and measure the oil clearance at each cap.

**Oil clearance**

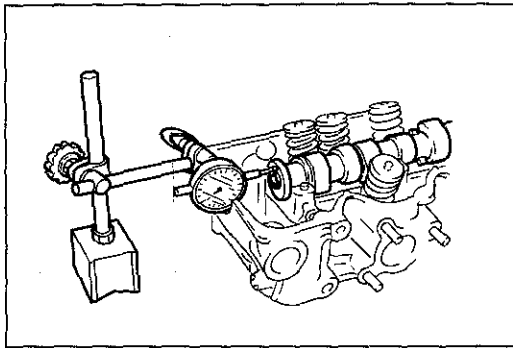
**No.1 and 5: 0.035—0.085mm (0.0014—0.0033 in)**

**No.2, No.3 and No.4:**

**0.065—0.115mm (0.0026—0.0045 in)**

**Maximum: 0.15mm (0.006 in)**

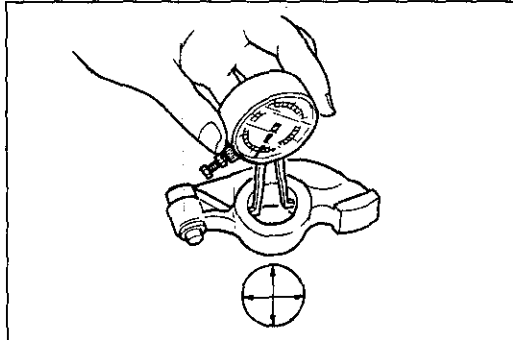
- (6) If the oil clearance exceeds the maximum, replace the cylinder head.



9MU0B2-122

6. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft or the cylinder head.

**End play: 0.02—0.15mm (0.0008—0.0059 in)**  
**Maximum: 0.20mm (0.008 in)**

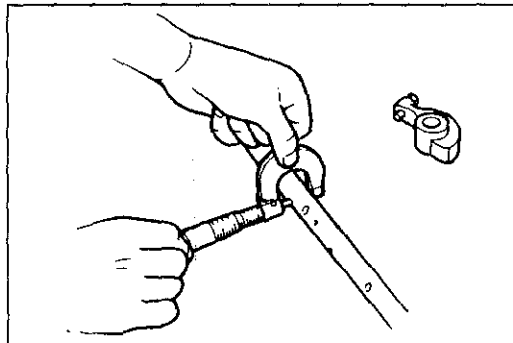


9MU0B2-123

### Rocker Arm and Rocker Arm Shaft

1. Check for wear or damage to the contact surfaces of the rocker arm shaft and the rocker arm. Replace if necessary.
2. Check the oil clearance between the rocker arm and shaft. Replace if necessary.
  - (1) Measure the rocker arm inner diameter.

**Diameter: 21.000—21.033mm (0.8268—0.8281 in)**



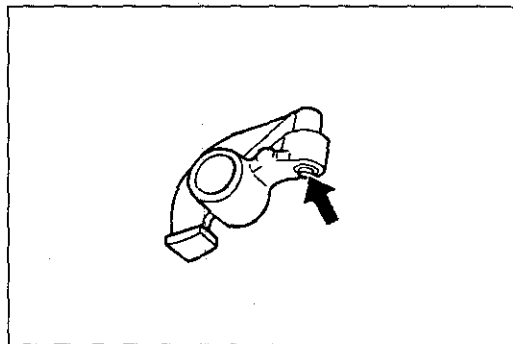
9MU0B2-124

- (2) Measure the rocker arm shaft diameter.

**Diameter: 20.959—20.980mm (0.8252—0.8260 in)**

- (3) Subtract the shaft diameter from the rocker arm diameter.

**Oil clearance: 0.020—0.074mm (0.0008—0.0029 in)**  
**Maximum: 0.10mm (0.004 in)**



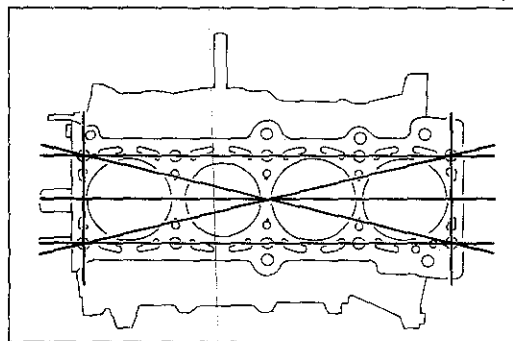
9MU0B2-258

### Hydraulic Lash Adjuster (HLA)

Check the HLA face for wear or damage. Replace if necessary.

#### Caution

**Do not remove the HLA unless necessary because oil leakage will occur if the O-ring is damaged.**

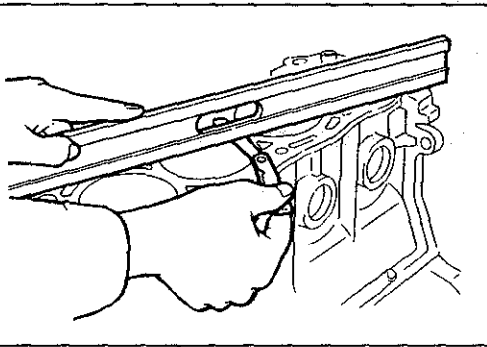


86U01X-100

### Cylinder Block

1. Check the cylinder block. Repair or replace if necessary.
  - (1) Leakage damage
  - (2) Cracks
  - (3) Scoring of wall
2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

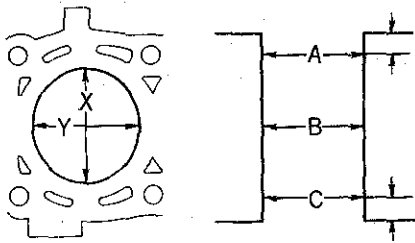
**Distortion: 0.15mm (0.006 in) max.**



9MU0B2-125

3. If the distortion exceeds the maximum, repair by grinding, or replace the cylinder block.

**Height: 316.5mm (12.46 in)**  
**Grinding: 0.20mm (0.008 in) max.**



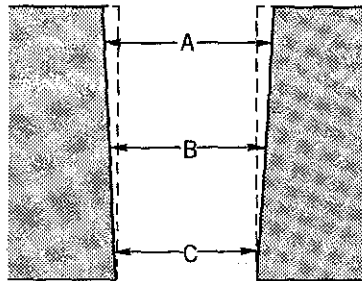
9MU0B2-126

4. Measure the cylinder bore in X and Y directions at three levels (A, B, and C) in each cylinder as shown.

**Cylinder bore**

mm (in)

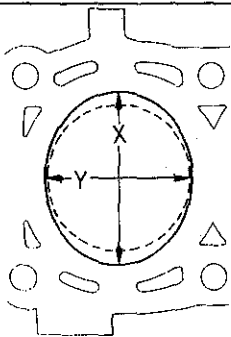
Size	Bore	Diameter
Standard		92.000—92.022 (3.6220—3.6230)
0.25 (0.010) oversize		92.250—92.272 (3.6320—3.6330)
0.50 (0.020) oversize		92.500—92.522 (3.6420—3.6430)



9MU0B2-259

- (1) If the cylinder bore exceeds the maximum, rebore the cylinder to oversize.
- (2) If the difference between the measurements A and C exceeds the maximum taper, rebore the cylinder to oversize.

**Taper: 0.019mm (0.0007 in) max.**



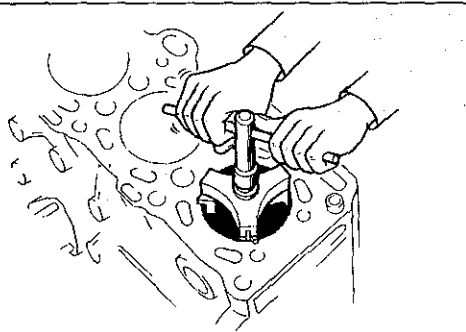
9MU0B2-260

- (3) If the difference between the measurements X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**Out-of-round: 0.019mm (0.0007 in) max.**

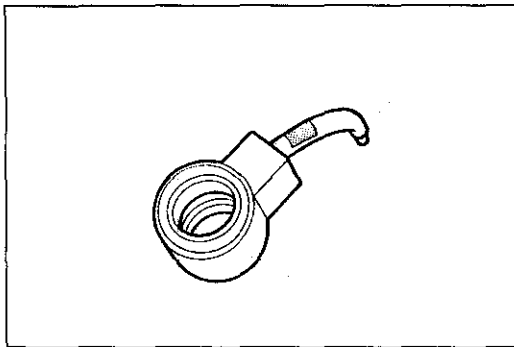
**Caution**

**The boring size should be based on the size of an oversize piston and be the same for all cylinders.**



86U01X-102

5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



9MU0B2-261

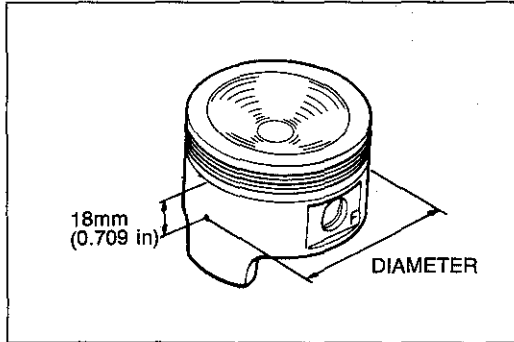
**Oil Jet**

1. Check the oil jet for clogging.

**Note**

**Make sure the oil passages are not clogged.**

2. Make sure the ball moves smoothly.



9MU0B2-127

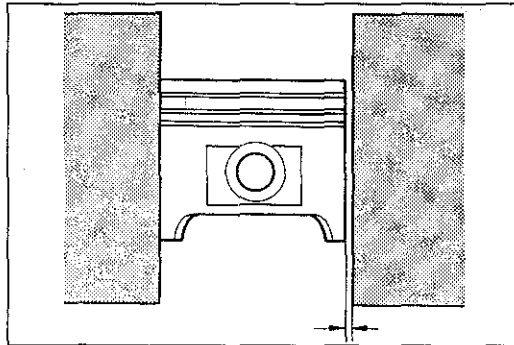
**Piston**

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle (90°) to the piston pin, **18mm (0.709 in)** below the oil ring land lower edge.

**Piston diameter**

mm (in)

Size	Piston	Diameter
Standard		91.935—91.955 (3.6194—3.6202)
0.25 (0.010) oversize		92.185—92.205 (3.6293—3.6301)
0.50 (0.020) oversize		92.435—92.455 (3.6391—3.6400)



9MU0B2-128

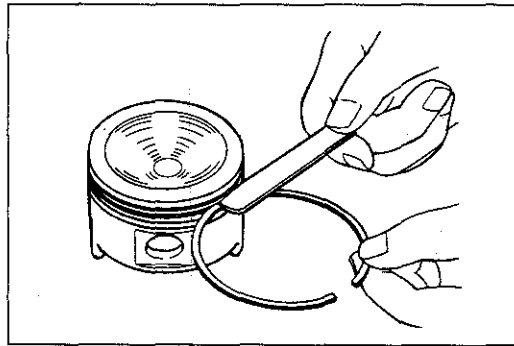
3. Check the piston-to-cylinder clearance.

**Clearance: 0.058—0.074mm (0.0023—0.0029 in)**  
**Maximum: 0.15mm (0.006 in)**

4. If the clearance exceeds the maximum, replace the piston or rebores the cylinders to fit oversize pistons.

**Note**

**If the piston is replaced, the piston rings must also be replaced.**



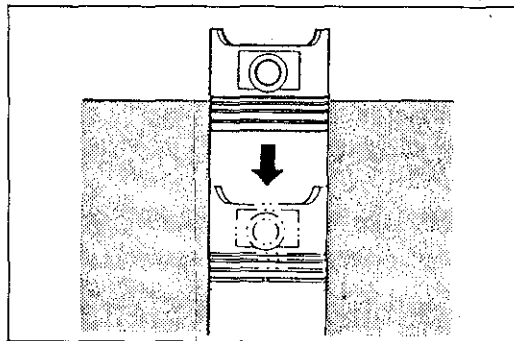
9MU0B2-262

**Piston and Piston Rings**

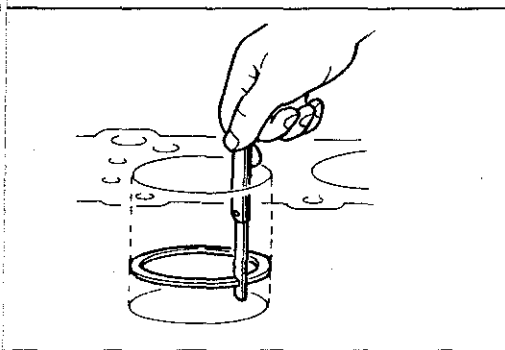
1. Measure the piston ring to ring land clearance around the entire circumference by using a new piston ring.

**Clearance (Top and Second):**  
**0.03—0.07mm (0.0012—0.0028 in)**  
**Maximum: 0.15mm (0.006 in)**

2. If the clearance exceeds the maximum, replace the piston.
3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace if necessary.
4. Insert the piston ring into the cylinder by hand and use the piston to push it to the bottom of the ring travel.



9MU0B2-263

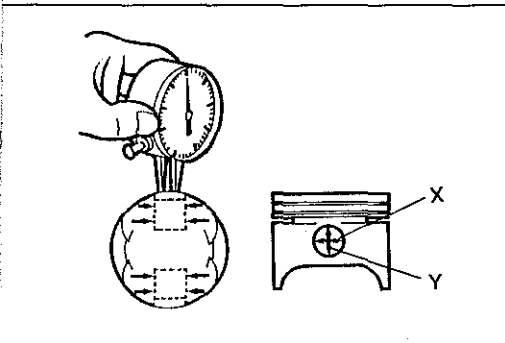


9MU0B2-129

5. Measure each piston ring end gap with a feeler gauge. Replace if necessary.

**End gap**

- Top : 0.20—0.35mm (0.008—0.014 in)**
- Second: 0.25—0.40mm (0.010—0.016 in)**
- Oil rail : 0.20—0.70mm (0.008—0.028 in)**
- Maximum: 1.0mm (0.039 in)**

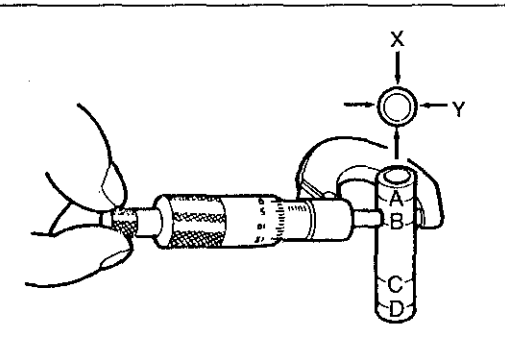


89U01X-085

**Piston and Piston Pin**

1. Measure the piston pin hole diameter in X and Y directions at four points.

**Diameter: 22.988—23.000mm (0.9050—0.9055 in)**



9MU0B2-264

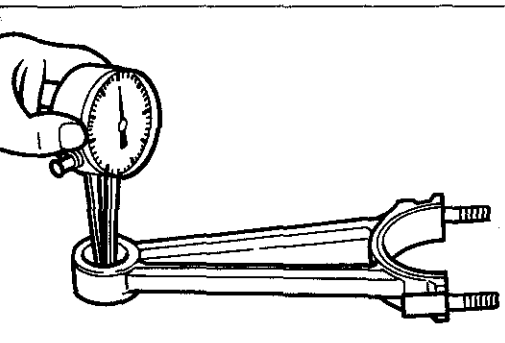
2. Measure the piston pin diameter in X and Y directions at four points.

**Diameter: 22.974—22.980mm (0.9045—0.9047 in)**

3. Check the piston pin-to-piston clearance.

**Clearance: 0.008—0.026mm (0.0003—0.0010 in)**

4. If the clearance exceeds the specification, replace the piston and/or piston pin.



89U01X-087

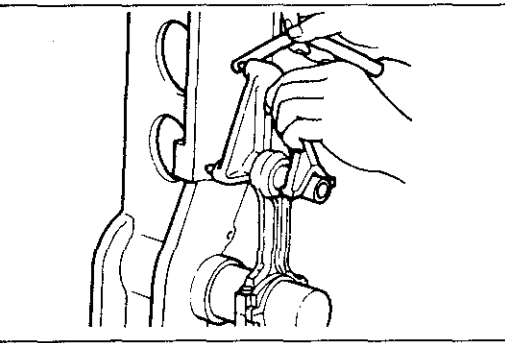
**Connecting Rod**

1. Measure the connecting rod small end bore.

**Diameter: 22.943—22.961mm (0.9033—0.9040 in)**

2. Check the interference between the small end bore and piston pin.

**Interference: 0.013—0.037mm (0.0005—0.0015 in)**



2BU0B2-019

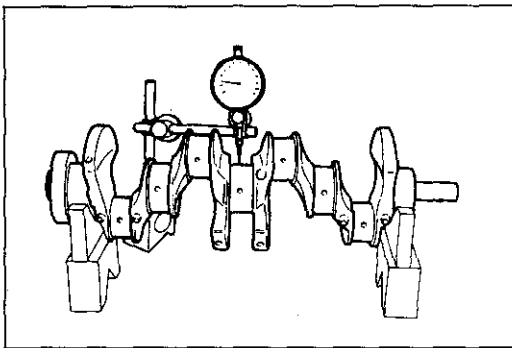
3. Check each connecting rod for bend. Repair or replace if necessary.

**Bend: 0.249mm (0.0098 in) max.**

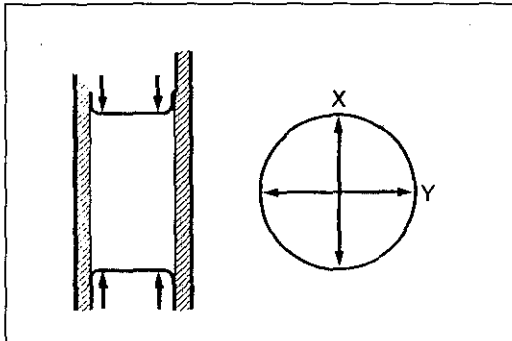
**Length (Center to Center):  
166.45—166.55mm (6.553—6.557 in)**

**Caution**

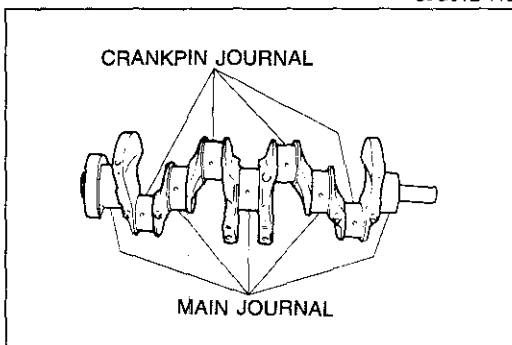
**If the connecting rod is replaced, the connecting rod cap and bolts must also be replaced because they are a matched set.**



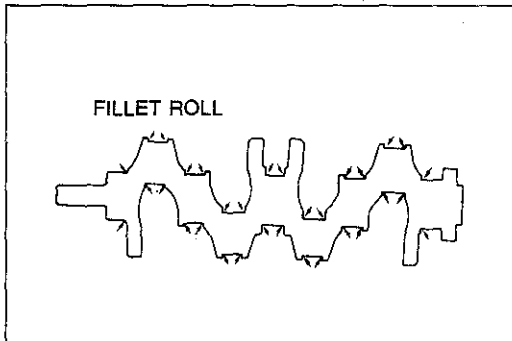
9MU0B2-131



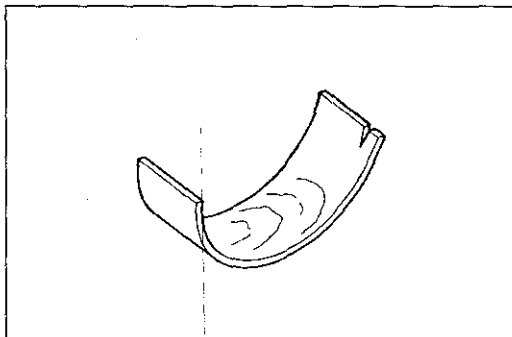
69G01B-118



9MU0B2-265



69G01B-120



79G01C-077

**Crankshaft**

1. Check the journals and pins for damage, scoring, or oil hole clogging.
2. Set the crankshaft on V-blocks.
3. Check the crankshaft runout at the center journal. Replace if necessary.

**Runout: 0.03mm (0.0012 in) max.**

4. Measure each journal diameter in X and Y directions at two places.

**Main journal**

**Diameter: 59.937—59.955mm (2.3597—2.3604 in)**

**Minimum: 59.89mm (2.358 in)**

**Out-of-round: 0.05mm (0.0020 in) max.**

**Crankpin journal**

**Diameter: 50.940—50.955mm (2.0055—2.0061 in)**

**Minimum: 50.89mm (2.004 in)**

**Out-of-round: 0.05mm (0.0020 in) max.**

5. If the diameter is below the minimum, grind the journals to match an undersize bearing.

**Undersize bearing: 0.25mm (0.010 in),  
0.50mm (0.020 in), 0.75mm (0.030 in)**

**Main journal diameter undersize**

mm (in)

Bearing size	Journal diameter
0.25 undersize	59.687—59.705 (2.3499—2.3506)
0.50 undersize	59.437—59.455 (2.3400—2.3407)
0.75 undersize	59.187—59.205 (2.3302—2.3309)

**Crankpin journal diameter undersize**

mm (in)

Bearing size	Journal diameter
0.25 undersize	50.690—50.705 (1.9957—1.9963)
0.50 undersize	50.440—50.455 (1.9858—1.9864)
0.75 undersize	50.190—50.205 (1.9760—1.9766)

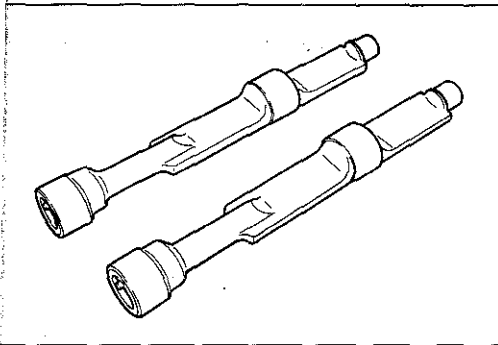
**Caution**

**Do not grind the fillet roll.**

**Main Bearing and Connecting Rod Bearing**

Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.





9MU0B2-132

**Balance Shaft**

Check the journals for wear, damage or seizure. If excessive damage or seizure is evident, check the bushings and oil clearance. If necessary, replace the balance shaft, bushings, or both.

**Oil clearance**

- Front : 0.050—0.115mm (0.0020—0.0045)
- Center: 0.080—0.145mm (0.0031—0.0057)
- Rear : 0.080—0.145mm (0.0031—0.0057)

**Balance Shaft Bushing Replacement Removal**

**Note**

**Bushing removal must be in the order of front, center and finally rear.**

1. Assemble the **SST** for each bushing so that length "L" of the **SST** is longer than specified.
2. Turn the cylinder block vertically so that the bushings can be removed straight downward.
3. Set the assembled **SST** against the respective bushing and tap it out with a hammer.

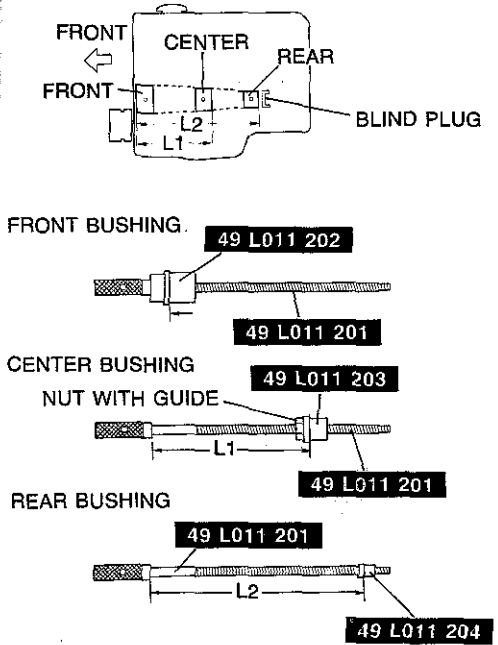
**Note**

**The blind plug must be removed when servicing. It can be reused.**

4. Remove the blind screw of the removed bushing.

- L1: 229mm (9.0 in)
- L2: 326mm (12.8 in)

**REMOVAL**



9MU0B2-133

**Installation**

**Note**

**Bushing installation must be in the order of rear, center, and finally front.**

1. Assemble the **SST** for each bushing as shown so that length "L" of the **SST** is as specified.

- L1: 309—310mm (12.17—12.20 in)
- L2: 202—203mm (7.95—7.99 in)

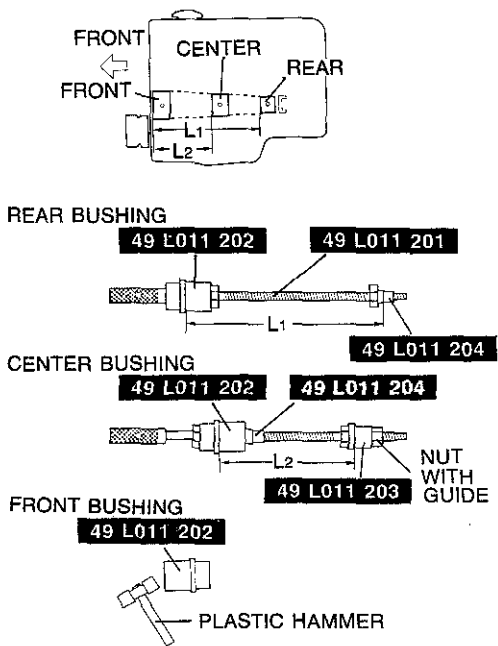
2. Turn the cylinder block vertically so that the bushings can be installed straight downward.
3. Install the bushing with the **SST** so that the bushing guide hole is aligned with the block guide hole.

**Caution**

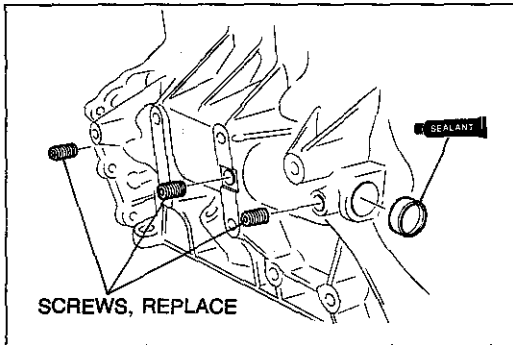
**Do not use a iron hammer, use a plastic hammer on the SST when installing the front bushing.**

4. Confirm the guide hole alignment by looking through the blind screw hole. If they are not aligned, remove the bushing and reinstall it.

**INSTALLATION**

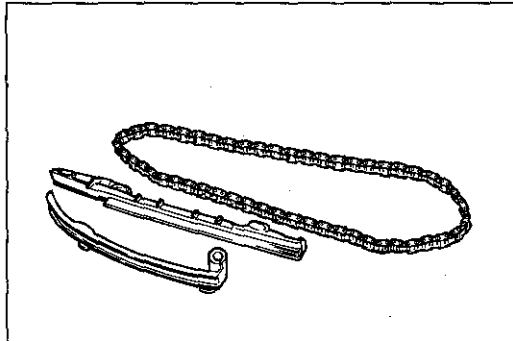


9MU0B2-134



9MU0B2-135

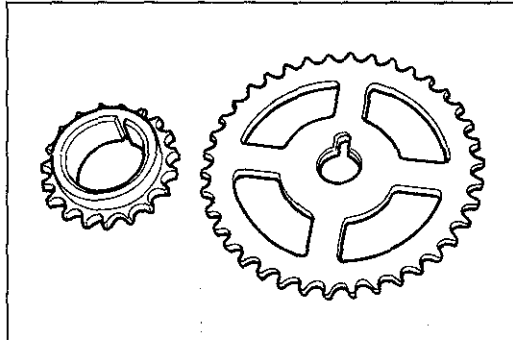
5. Install new blind screws.
6. Apply sealant to the blind plug and install it in the cylinder block.



9MU0B2-136

**Timing Chain, Chain Lever, and Chain Guide**

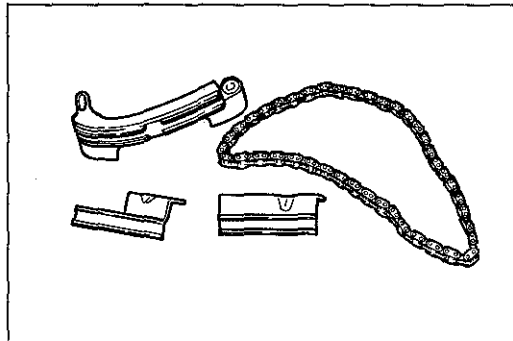
1. Check the timing chain for wear, damage, and cracks. Replace if necessary.
2. Check the rubber of the chain lever for wear, damage, peeling, and cracks. Replace if necessary.



9MU0B2-137

**Timing Gear and Camshaft Pulley**

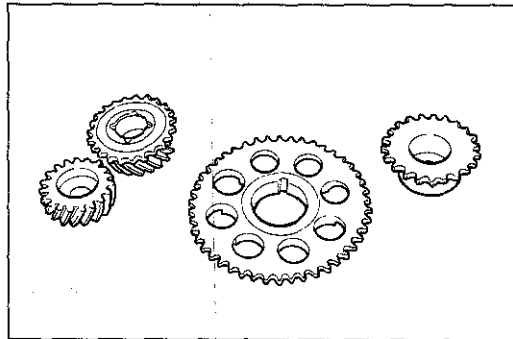
Check the timing gear and camshaft pulley for wear, damage, and cracks. Replace if necessary.



9MU0B2-138

**Balancer Chain and Chain Guide**

1. Check the balancer chain for wear, damage, and cracks. Replace if necessary.
2. Check the rubber of the chain lever for wear, damage, peeling, and cracks. Replace if necessary.



9BU0B2-036

**Crankshaft Sprocket and Balance Shaft Sprocket**

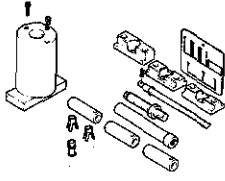
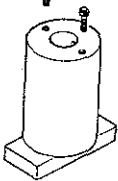

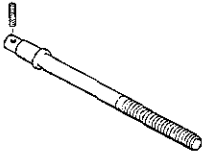
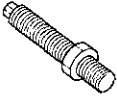
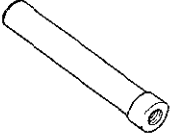



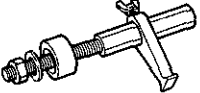



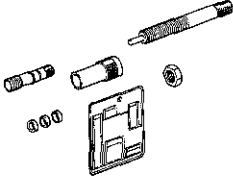

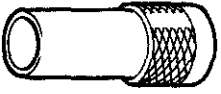


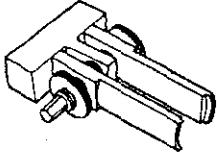
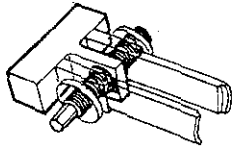
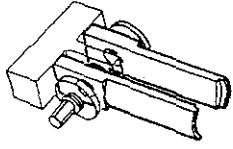
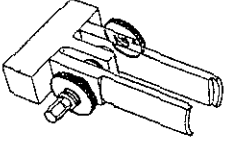
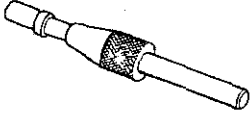
Check the crankshaft sprocket and balance shaft sprocket for wear, damage, and cracks. Replace if necessary.

**Caution**

If the right balance shaft gear or the idler sprocket assembly is worn or damaged, replace both as an assembly.

## ASSEMBLY

### PREPARATION

<p>49 L011 0A0</p> <p>Piston pin setting tool set</p> 	<p>49 L011 001</p> <p>Support block body (Part of 49 L011 0A0)</p> 	<p>49 L011 002</p> <p>Support block head (Part of 49 L011 0A0)</p> 
<p>49 L011 004</p> <p>Screw (Part of 49 L011 0A0)</p> 	<p>49 L011 005</p> <p>Stopper bolt (Part of 49 L011 0A0)</p> 	<p>49 L011 006</p> <p>Puller &amp; installer (Part of 49 L011 0A0)</p> 
<p>49 L011 009</p> <p>Guide (Part of 49 L011 0A0)</p> 	<p>49 L011 010</p> <p>Centering tool (Part of 49 L011 0A0)</p> 	<p>49 L011 011</p> <p>Holder (Part of 49 L011 0A0)</p> 
<p>49 E011 1A0</p> <p>Ring gear brake set</p> 	<p>49 E011 105</p> <p>Stopper (Part of 49 E011 1A0)</p> 	<p>49 E011 103</p> <p>Shaft (Part of 49 E011 1A0)</p> 
<p>49 E011 104</p> <p>Collar (Part of 49 E011 1A0)</p> 	<p>49 L012 0A0</p> <p>Installer set, valve seal &amp; valve guide</p> 	<p>49 L012 001</p> <p>Installer (Part of 49 L012 0A0)</p> 
<p>49 L012 002</p> <p>Body (Part of 49 L012 0A0)</p> 	<p>49 L012 005</p> <p>Spacer (Part of 49 L012 0A0)</p> 	<p>49 0636 100A</p> <p>Arm, valve spring lifter</p> 
<p>49 B012 0A2</p> <p>Pivot, valve spring lifter</p> 	<p>49 B012 012</p> <p>Body (Part of 49 B012 0A2)</p> 	<p>49 B012 013</p> <p>Foot (Part of 49 B012 0A2)</p> 
<p>49 B012 014</p> <p>Lock nut (Part of 49 B012 0A2)</p> 	<p>49 SE01 310A</p> <p>Centering tool, clutch disc</p> 	<p>2BU0B2-013</p>

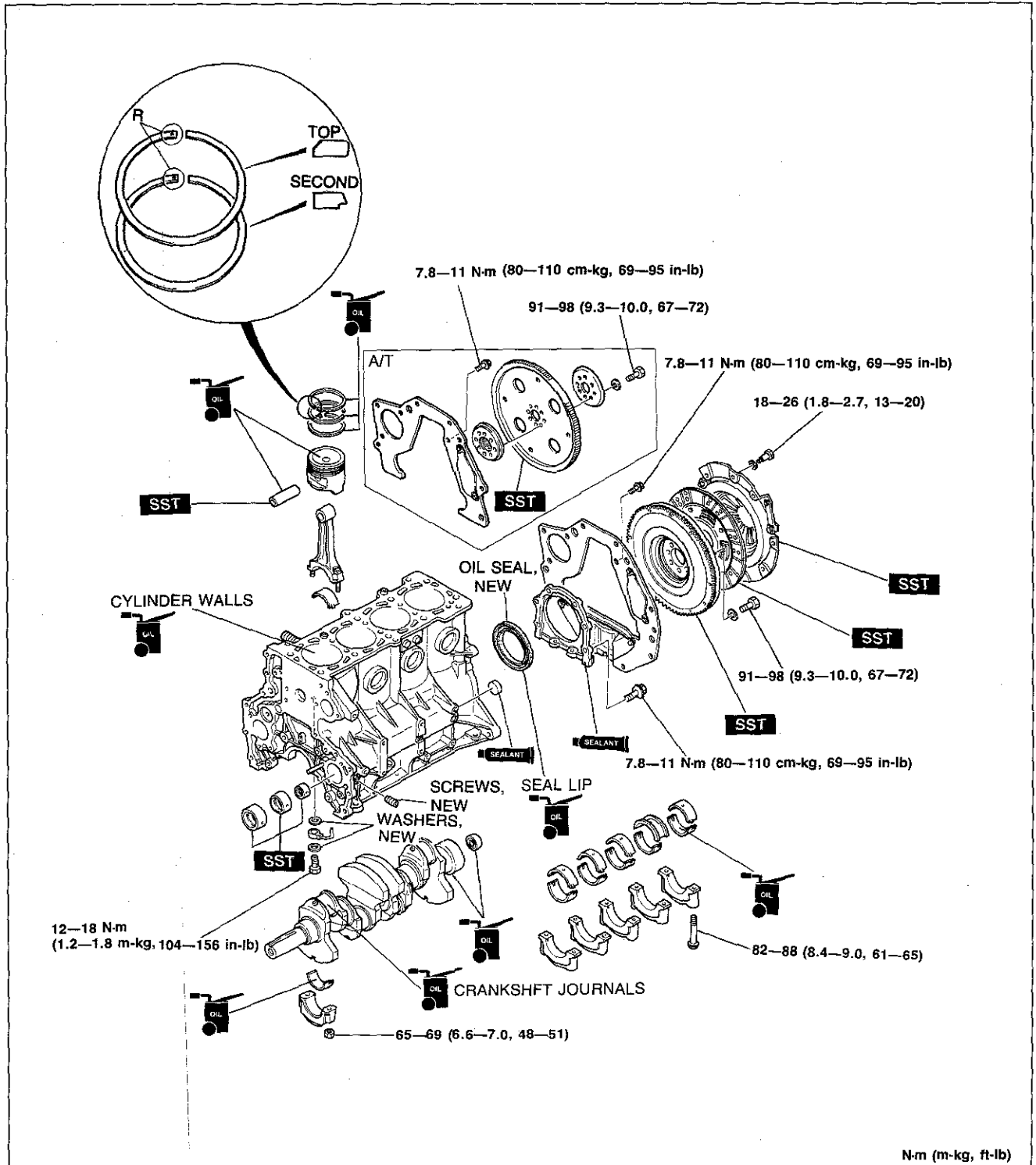
1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

**Caution**

**Do not reuse gaskets or oil seals.**

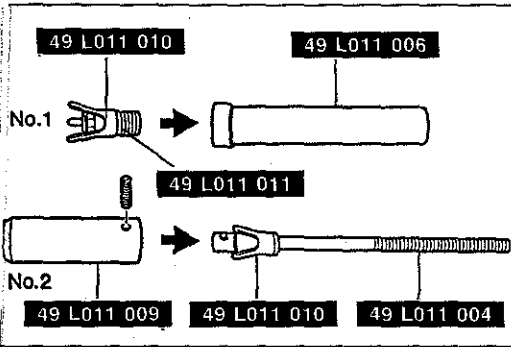
9MU0B2-141

**CYLINDER BLOCK  
Torque Specifications**

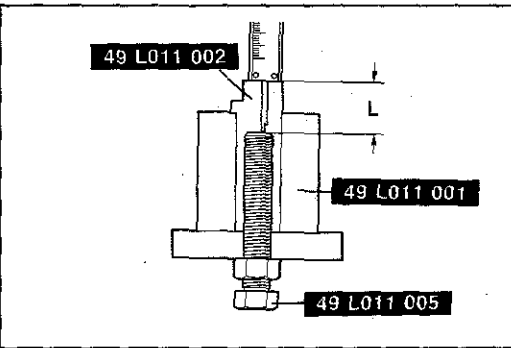


N-m (m-kg, ft-lb)

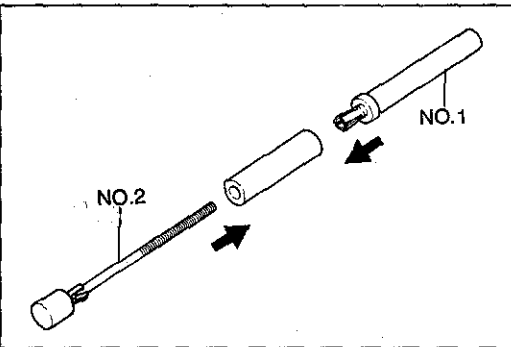
9MU0B2-142



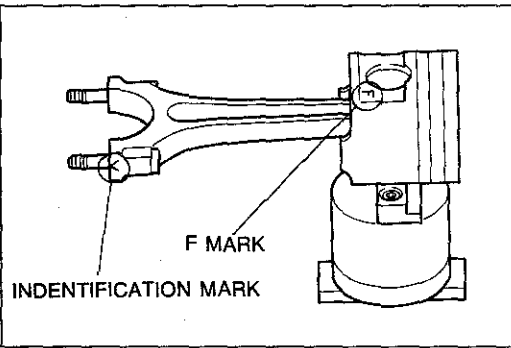
9MU0B2-143



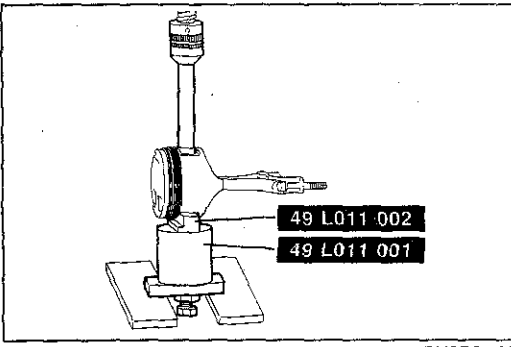
1BU0B2-016



9MU0B2-145



9MU0B2-146



9BU0B2-038

**Connecting Rod**

1. Assemble the **SST** as shown.

2. Set the **stopper bolt** (49 L011 005) so that the depth **L** is as specified.

**Depth L: 59.5—59.7mm (2.343—2.350 in)**

3. Tighten the locknut.

4. Insert the **SST** No.2 into the piston pin as shown and fully screw in the **SST** No.1.

5. Apply engine oil to the piston pin.

6. Set the piston on the **SST** with the **F** mark facing upward.

7. Align the identification mark to the cap of the large end of connecting rod and **F** mark on the piston as shown in the figure.

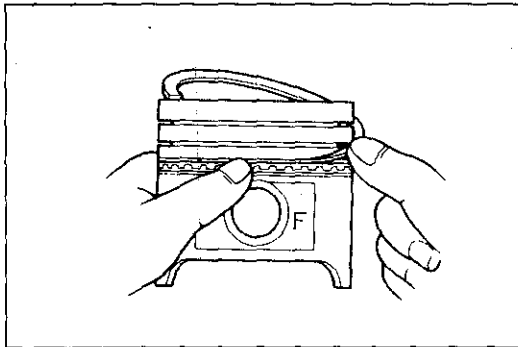
8. Press the piston pin into the piston and connecting rod until the **SST** contacts the stopper bolt.

9. While inserting the piston pin, check the pressure force. If it is less than specified, replace the piston pin or the connecting rod.

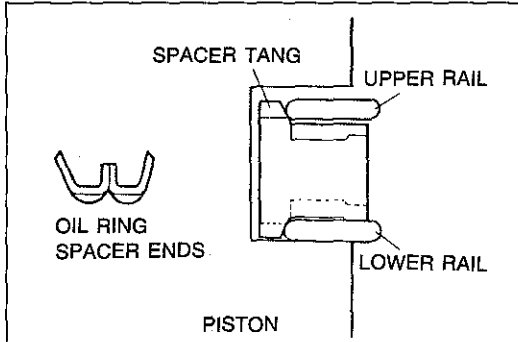
**Pressure force:**

**4,905—14,715 kN (500—1,500 kg, 1,100—3,300 lb)**

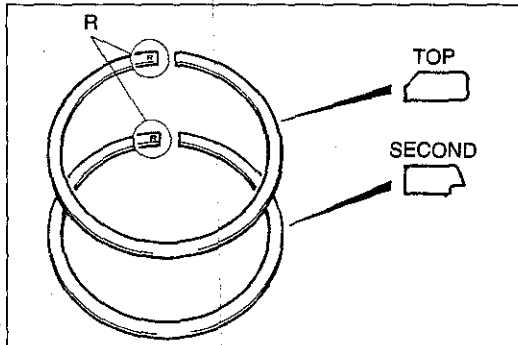
10. Check the oscillation torque of the connecting rod. (Refer to page B2-37.)



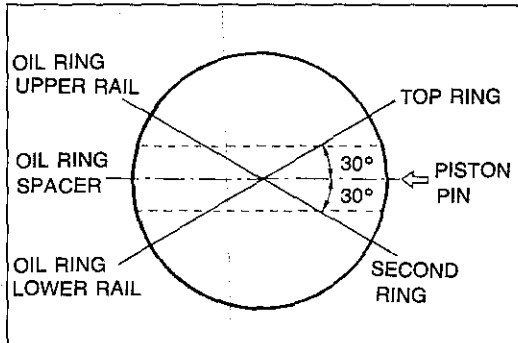
69G01A-144



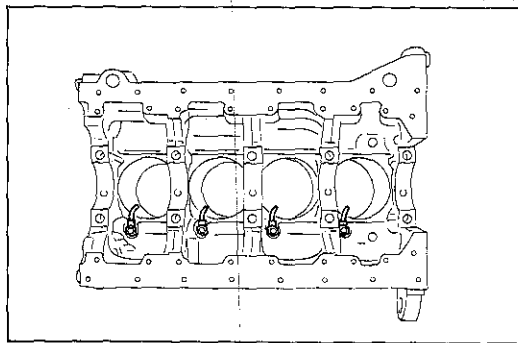
69G01A-145



9MU0B2-148



69G01A-147



0BU0B2-022

## Piston Ring

1. Install the three-piece oil rings on the pistons.
  - (1) Apply engine oil to the oil ring spacer and rails.
  - (2) Install the oil ring spacer so that the opening faces upward.
  - (3) Install the upper rail and lower rail.

### Note

- a) The upper rail and lower rail are the same.
- b) Each rail can be installed with either face upward.

2. Check that both rails are expanded by the spacer tangs as shown in the figure by checking that both rails turn smoothly in both directions.

3. Install the second ring to the piston first; then install the top ring. Use a piston ring expander.

### Caution

- a) The ring must be installed so that the "R" marks face upward.
- b) The second ring must be installed with the scraper face downward.

4. Apply a liberal amount of clean engine oil to the second and top piston rings.

5. Position the opening of each ring as shown in the figure.

## Oil Jet

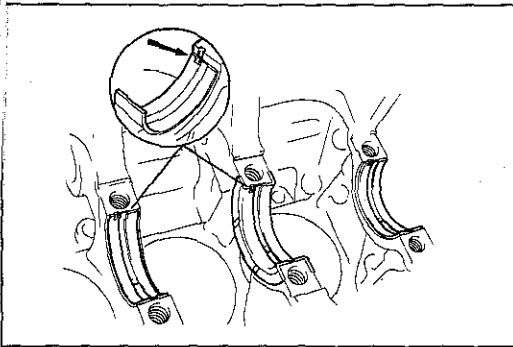
1. Install the new gaskets of the oil jet.
2. Install the oil jet as shown in the figure.

### Tightening torque:

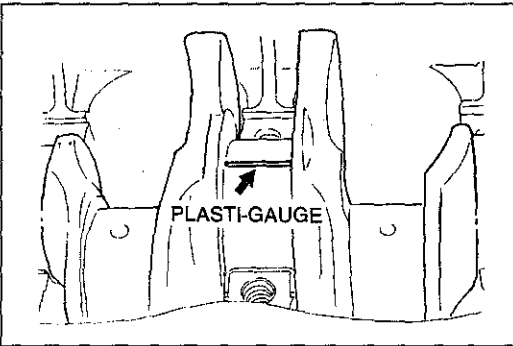
12—18 N·m (1.2—1.8 m·kg, 8.7—13 ft·lb)

### Note

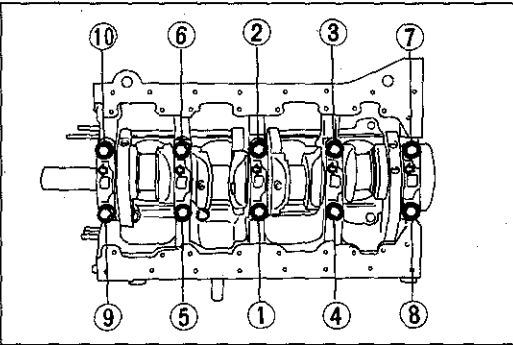
The shapes of the cylinder jet valves are the same for all cylinders.



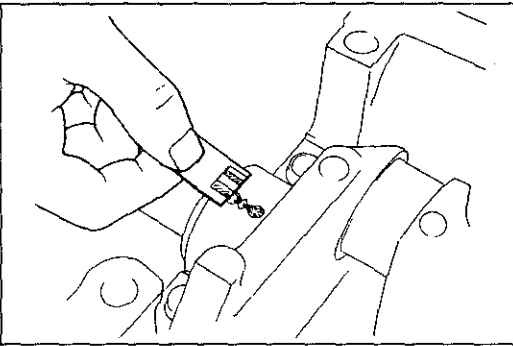
9MU0B2-150



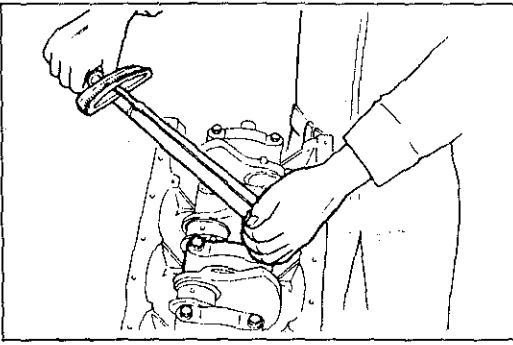
9MU0B2-266



86U01X-123



9BU0B2-040



9MU0B2-274

### Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as described.

### Note

**The No.4 bearing has thrust shoulders in the cylinder block.**

### Oil clearance inspection

- (1) Remove any foreign material and oil from the journals and bearings.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft in the cylinder block.
- (4) Position the Plastigauge on top of the journals in the axial direction.
- (5) Install the main bearing caps along with the lower main bearings according to the cap number and ← mark.
- (6) Tighten the caps in two or three steps in the order in the figure.

### Tightening torque:

**82—88 N·m (8.4—9.0 m·kg, 61—65 ft·lb)**

### Caution

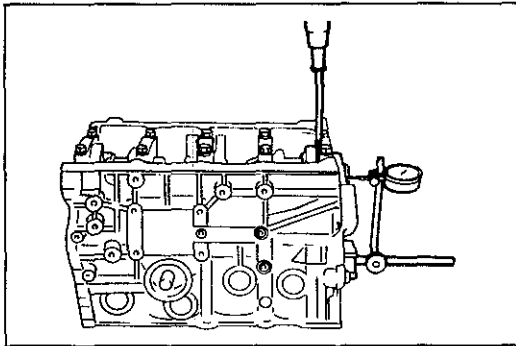
**Do not rotate the crankshaft when measuring the oil clearances.**

- (7) Remove the main bearing caps, and measure the Plastigauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance.  
If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings.  
(Refer to page B2-49.)

**Oil clearance: 0.025—0.044mm (0.0010—0.0017 in)**

**Maximum: 0.08mm (0.0031 in)**

2. Apply a liberal amount of engine oil to the main bearings and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and ← mark.
4. Verify that the crankshaft rotates smoothly by hand.

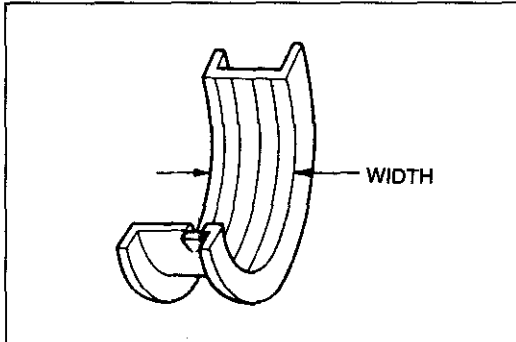


9MU0B2-267

5. Inspect the crankshaft end play.

**End play: 0.08—0.18mm (0.0031—0.0071 in)**  
**Maximum: 0.30mm (0.0118 in)**

6. If the end play exceeds specification, grind the crankshaft and use an undersize center main bearing.



9MU0B2-268

### Center main bearing width

#### Standard:

25.94—25.99mm (1.021—1.023 in)

0.25mm (0.010 in) **oversize:**

26.04—26.09mm (1.025—1.027 in)

0.50mm (0.020 in) **oversize:**

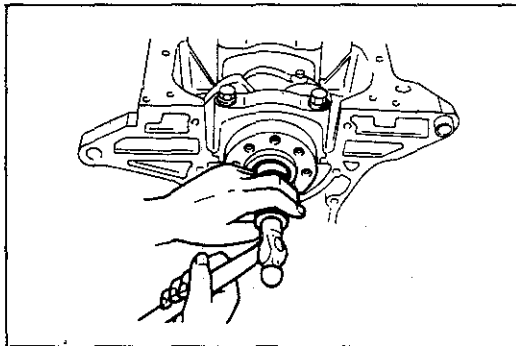
26.12—26.17mm (1.028—1.030 in)

0.75mm (0.030 in) **oversize:**

26.20—26.25mm (1.031—1.033 in)

#### Note

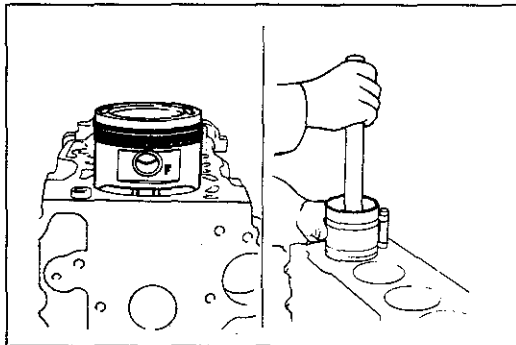
**Wider thrust width is available only in an undersize No.4 main bearing**



76G01B-075

### Pilot Bearing

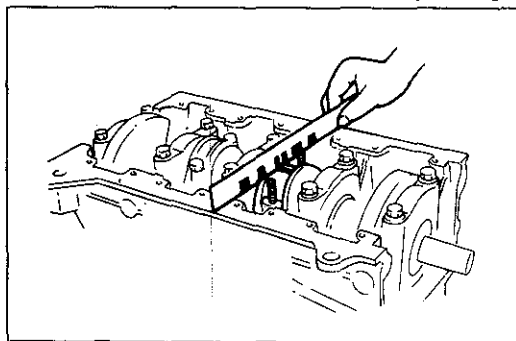
1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30—34mm, 1.18—1.34 in) against the outer race of the bearing; then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



9MU0B2-269

### Piston and Connecting Rod Assembly

1. Apply a liberal amount of clean engine oil to the cylinder walls, pistons, and rings.
2. Check the piston rings for the end gap alignment.
3. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston installer tool (commercially available).



9MU0B2-152

### Connecting Rod Cap

1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

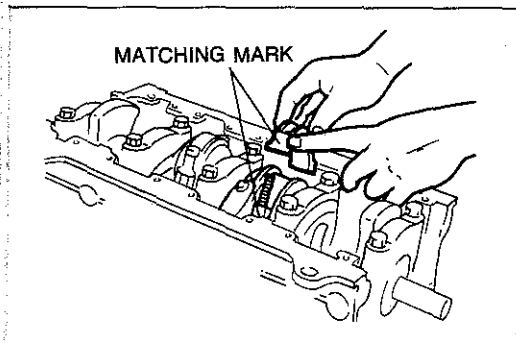
#### Connecting rod cap tightening torque:

65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)

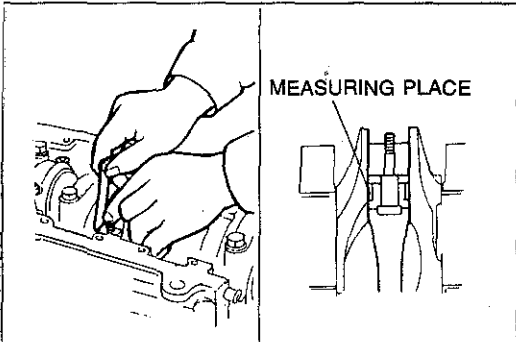
**Oil clearance: 0.027—0.067mm (0.0011—0.0026 in)**

**Maximum: 0.10mm (0.0039 in)**

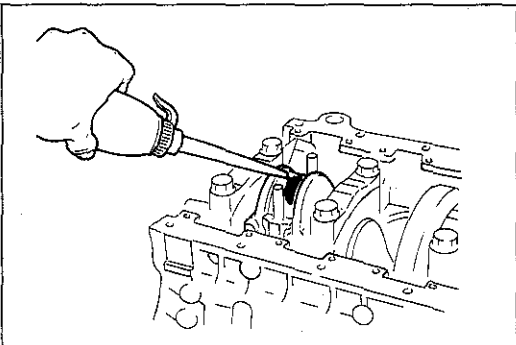




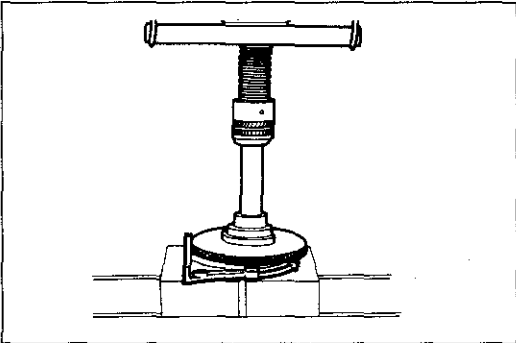
9BU0B2-041



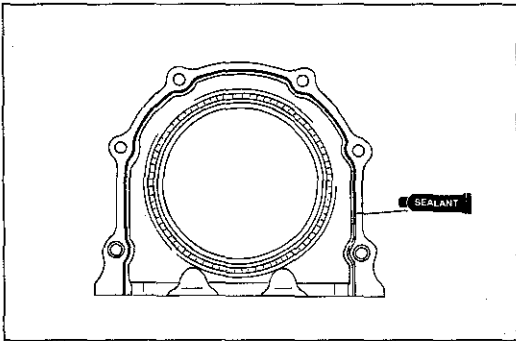
9MU0B2-270



9MU0B2-154



9BU0B2-042



9MU0B2-155

### Caution

Align the matching marks on the cap and on the connecting rod when installing the connecting rod cap.

- If the oil clearance exceeds specification, grind the crankshaft and use undersize bearings. (Refer to page B2-49.)

- Check the side clearance of each connecting rod without the cap installed.

**Side clearance: 0.110—0.262mm (0.0043—0.0103 in)**  
**Maximum: 0.30mm (0.012 in)**

If the clearance exceeds the maximum, replace the connecting rod.

- Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
- Install the connecting rod cap with the alignment marks aligned.

### Tightening torque:

**65—69 N·m (6.6—7.0 m·kg, 48—51 ft·lb)**

- Verify that the crankshaft rotates smoothly by hand.

### Rear Cover

- Apply engine oil to the rear cover and new oil seal lip.
- Press the oil seal into the rear cover.

**Oil seal outer diameter: 110mm (4.33 in)**

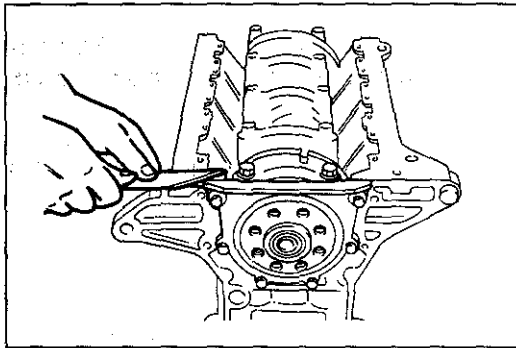
### Caution

The oil seal must be pressed in until it is flush with the edge of the rear cover.

- Remove any dirt or other material from the contact surface.
- Apply a continuous bead of silicon sealant to the rear cover groove.
- Install the rear cover.

### Tightening torque:

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

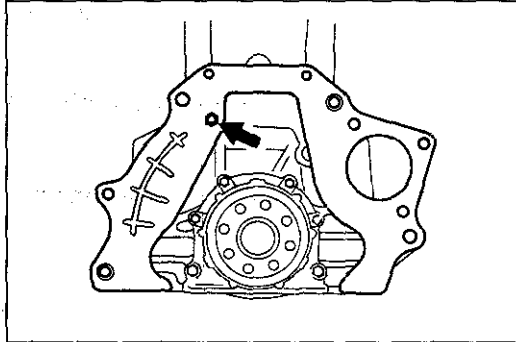


9MU0B2-156

- Cut away the portion of the sealant that projects from the rear cover assembly toward the oil pan side.

**Caution**

**Do not scratch the rear cover assembly.**



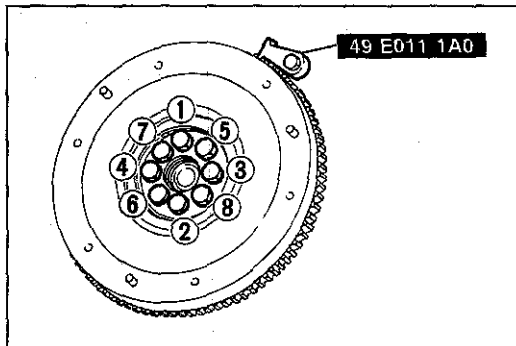
9MU0B2-157

**End Plate**

Install the end plate.

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



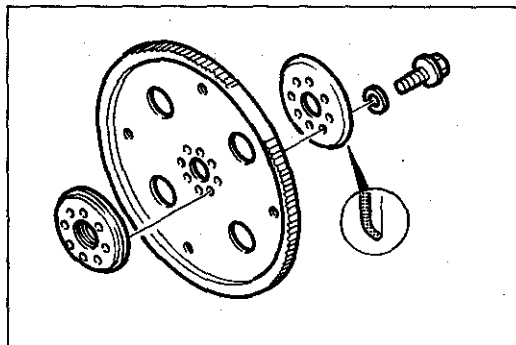
2BU0B2-026

**Flywheel (M/T), Drive Plate (A/T)  
(M/T)**

- Install, and tighten the flywheel with the **SST** or equivalent.

**Tightening torque:**

**91—98 N·m (9.3—10.0 m·kg, 67—72 ft·lb)**



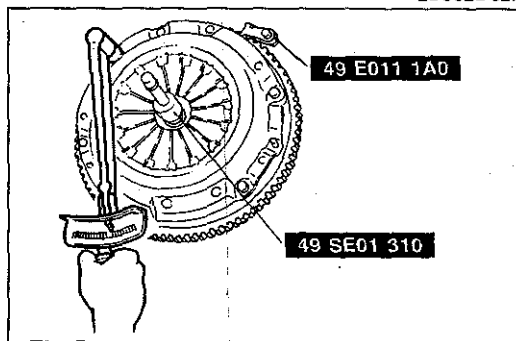
2BU0B2-027

**(A/T)**

- Install, and tighten the drive plate adapter, drive plate, and plate with the **SST (49 E011 1A0)** or equivalent.

**Tightening torque:**

**91—98 N·m (9.3—10.0 m·kg, 67—72 ft·lb)**



2BU0B2-028

**Clutch Disc and Clutch Cover (M/T)**

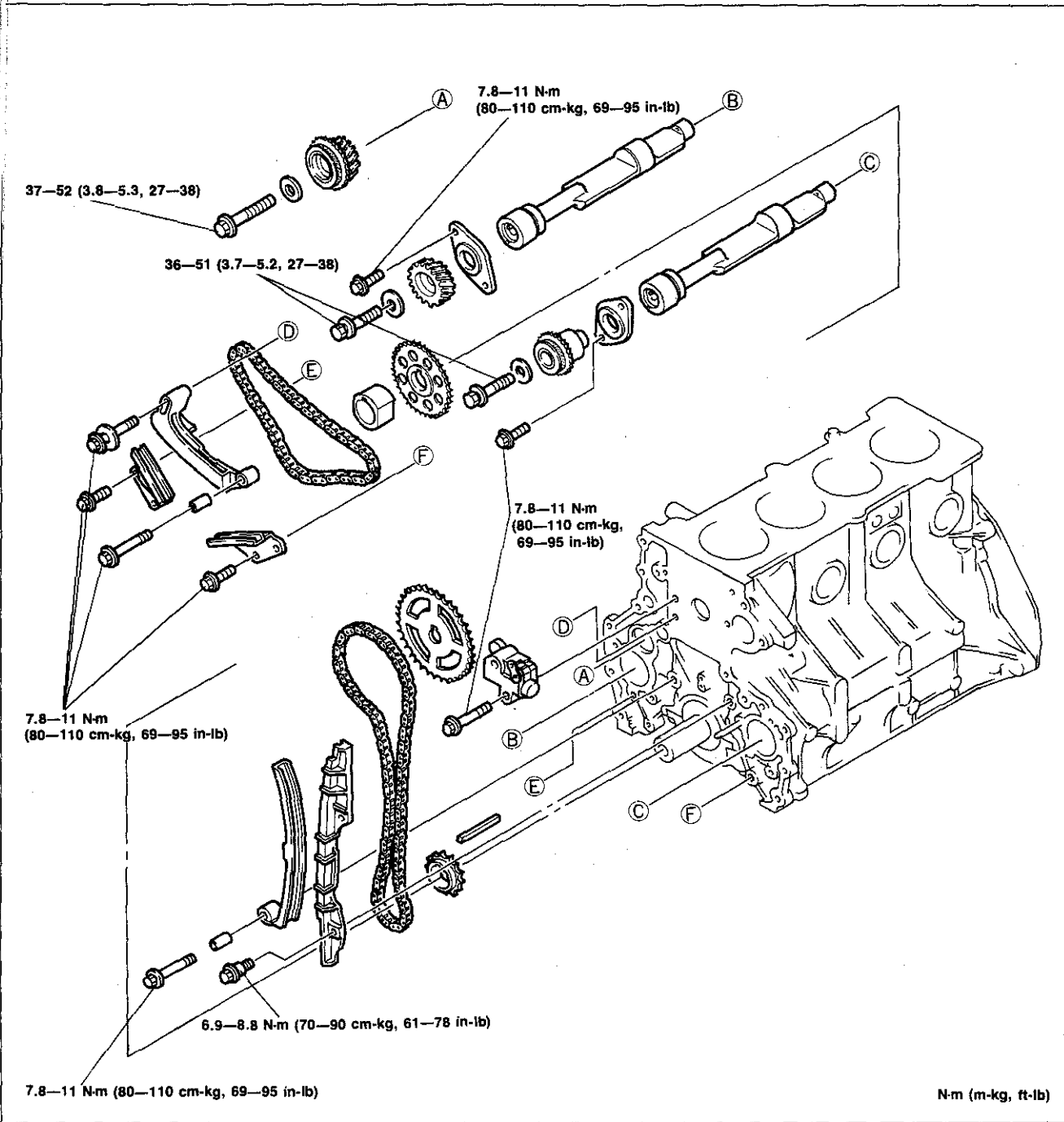
Install the clutch disc and clutch cover using the **SST** or equivalent.

(Refer to Section H.)

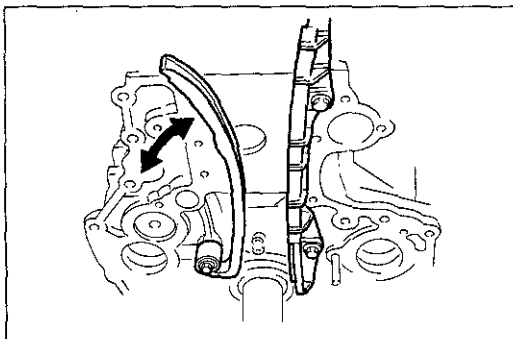
**Tightening torque:**

**18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)**

### BALANCER CHAIN AND TIMING CHAIN Torque Specification



9MU0B2-162



9MU0B2-163

#### Chain Guide and Chain Lever

1. Install the chain guide.

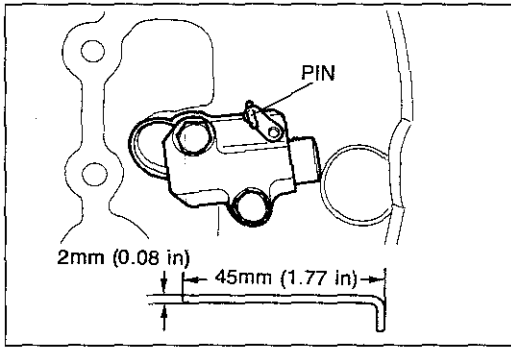
#### Tightening torque:

**6.9-8.8 N-m (70-90 cm-kg, 61-78 in-lb)**

2. Install the chain lever and check that it moves smoothly in the directions indicated.

#### Tightening torque:

**7.8-11 N-m (80-110 cm-kg, 69-95 in-lb)**



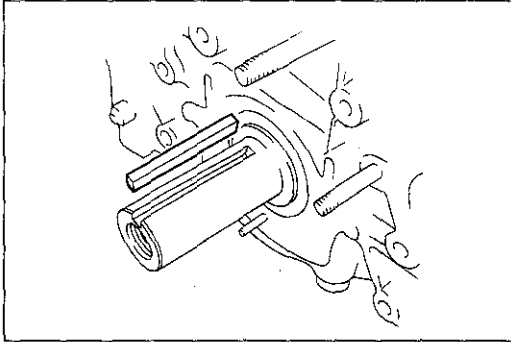
9MU0B2-164

### Chain Adjuster

1. Push the chain adjuster sleeve in toward the left and insert the pin into the lever hole, as shown to hold it.
2. Install the chain adjuster.

### Tightening torque:

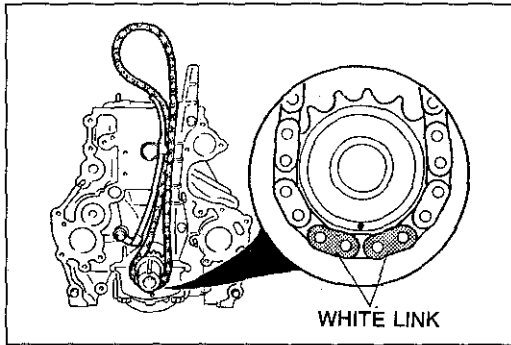
7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)



9MU0B2-165

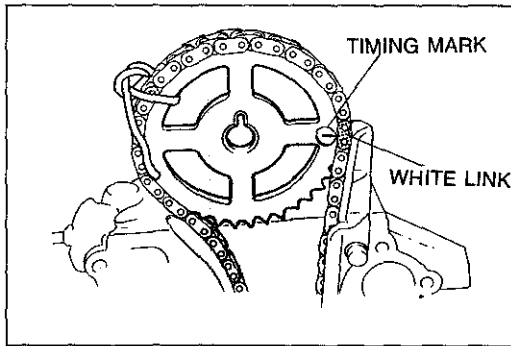
### Timing Chain and Timing Gear

1. Install the key onto the crankshaft.



9MU0B2-166

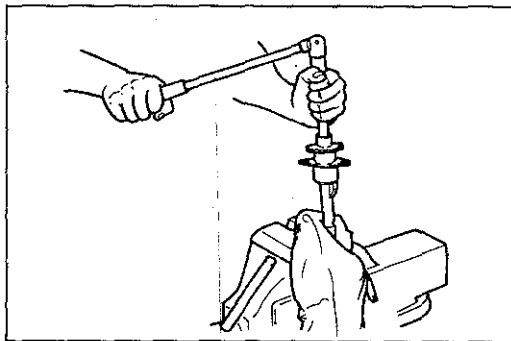
2. Install the timing chain and timing gear as shown.



9MU0B2-167

### Camshaft Pulley

1. Install the camshaft pulley so that the timing mark on the pulley aligns with the white link of the timing chain.
2. Secure the camshaft pulley and the timing chain with a wire, and temporarily rest it on between the chain lever and guide.



9MU0B2-168

### Left and Right Balance Shaft

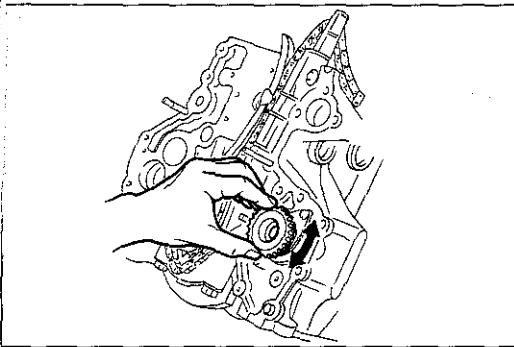
1. Assemble the left and right balance shaft.

### Caution

Do not use a vise on the journals during assembly.

### Tightening torque:

36—54 N·m (3.7—5.5 m·kg, 27—40 ft·lb)



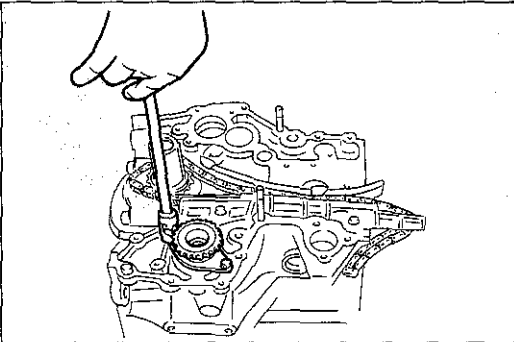
9MU0B2-169

2. Insert the left and right balance shaft assembly into the cylinder block.

**Caution**

**Do not damage the balance shaft bushings and journals during installation.**

3. Loosely tighten the thrust plate lock bolts.
4. Confirm the smooth rotation of the balance shafts.

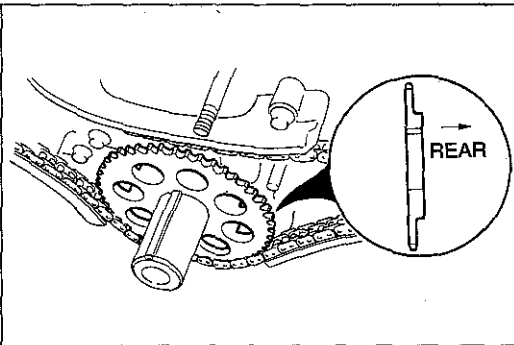


9MU0B2-170

5. Tighten the thrust plate lock bolts.

**Tightening torque:**

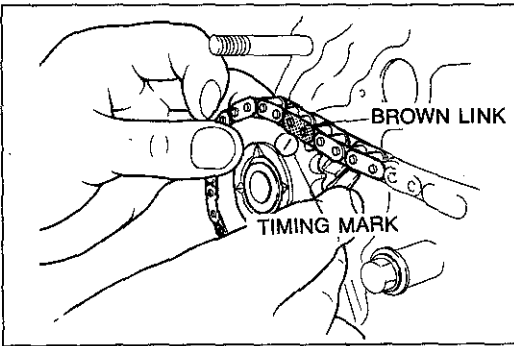
**7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



9MU0B2-171

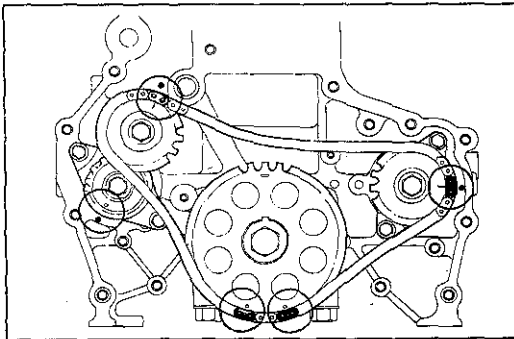
**Balancer Chain**

1. Install the crankshaft sprocket.



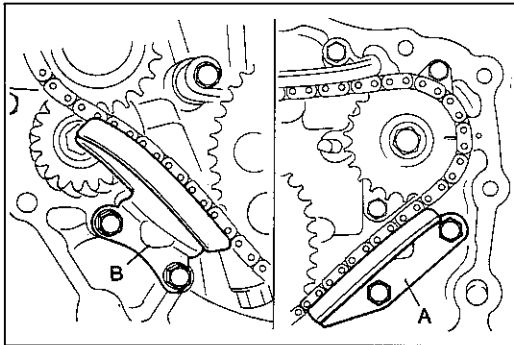
2BU0B2-032

2. Set the balancer chain on the idler sprocket assembly so that the timing mark on the idler sprocket assembly and the brown link of the balancer chain align.



2BU0B2-033

3. Install the balancer chain so that the five (5) alignment marks on the chain, sprocket, and block align, and attach the idler sprocket assembly to the cylinder block.
4. Loosely tighten the idler sprocket assembly lock bolt.

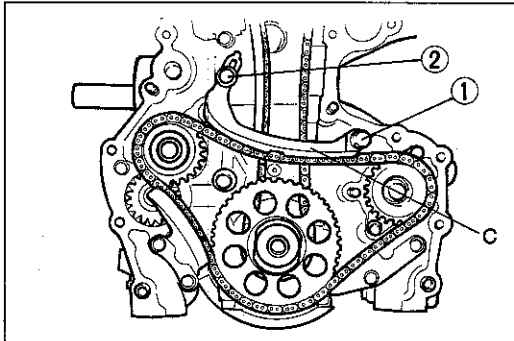


2BU0B2-034

5. Install the chain guide A and B.

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



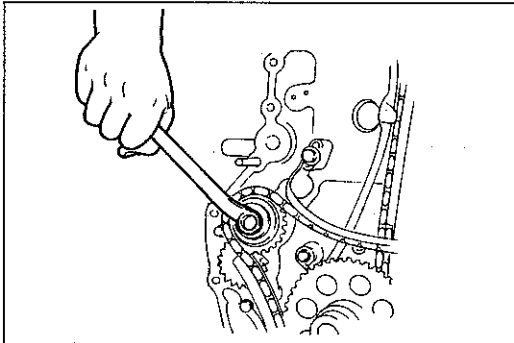
2BU0B2-035

6. Install the chain guide C, and tighten the bolt ① and loosely tighten the adjusting bolt ② (M/T).

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

Install the chain guide C, and loosely tighten the bolt ① and adjusting bolt ② (A/T).



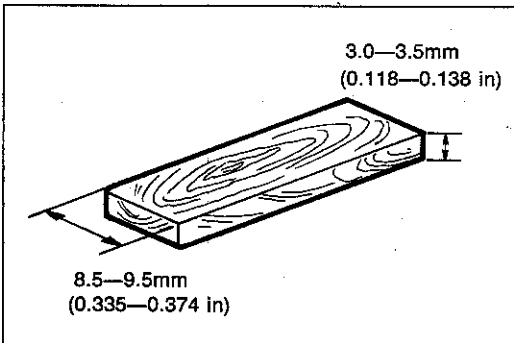
2BU0B2-036

7. Tighten the idler sprocket assembly lock bolt.

**Tightening torque:**

**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**

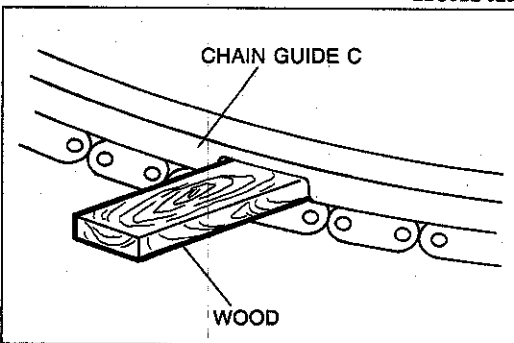
8. Install the spacer.



2BU0B2-029

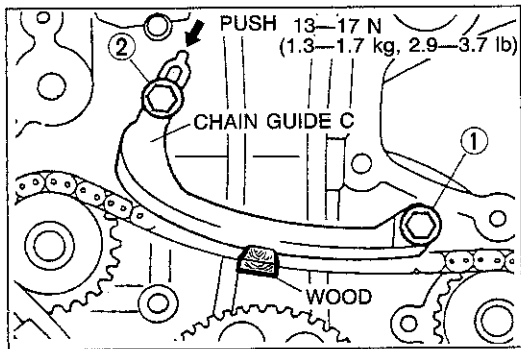
**Adjustment of balancer chain tension**

1. Fabricate a piece of hard wood as shown.



0BU0B2-011

2. Insert the piece of hardwood in the notch in chain guide C.



3. Push chain guide C with a force of 13—17 N (1.3—1.7 kg, 2.9—3.7 lb) and tighten adjusting bolt ② and bolt ①.

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

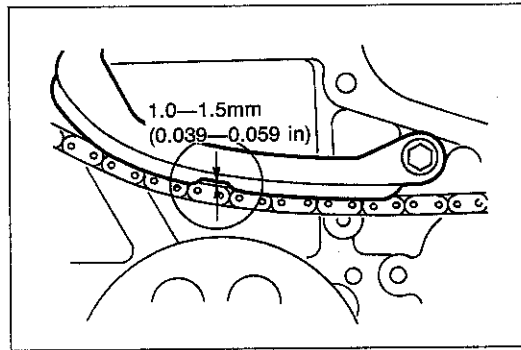
4. Remove the wood from between the chain and chain guide C.

**Caution**

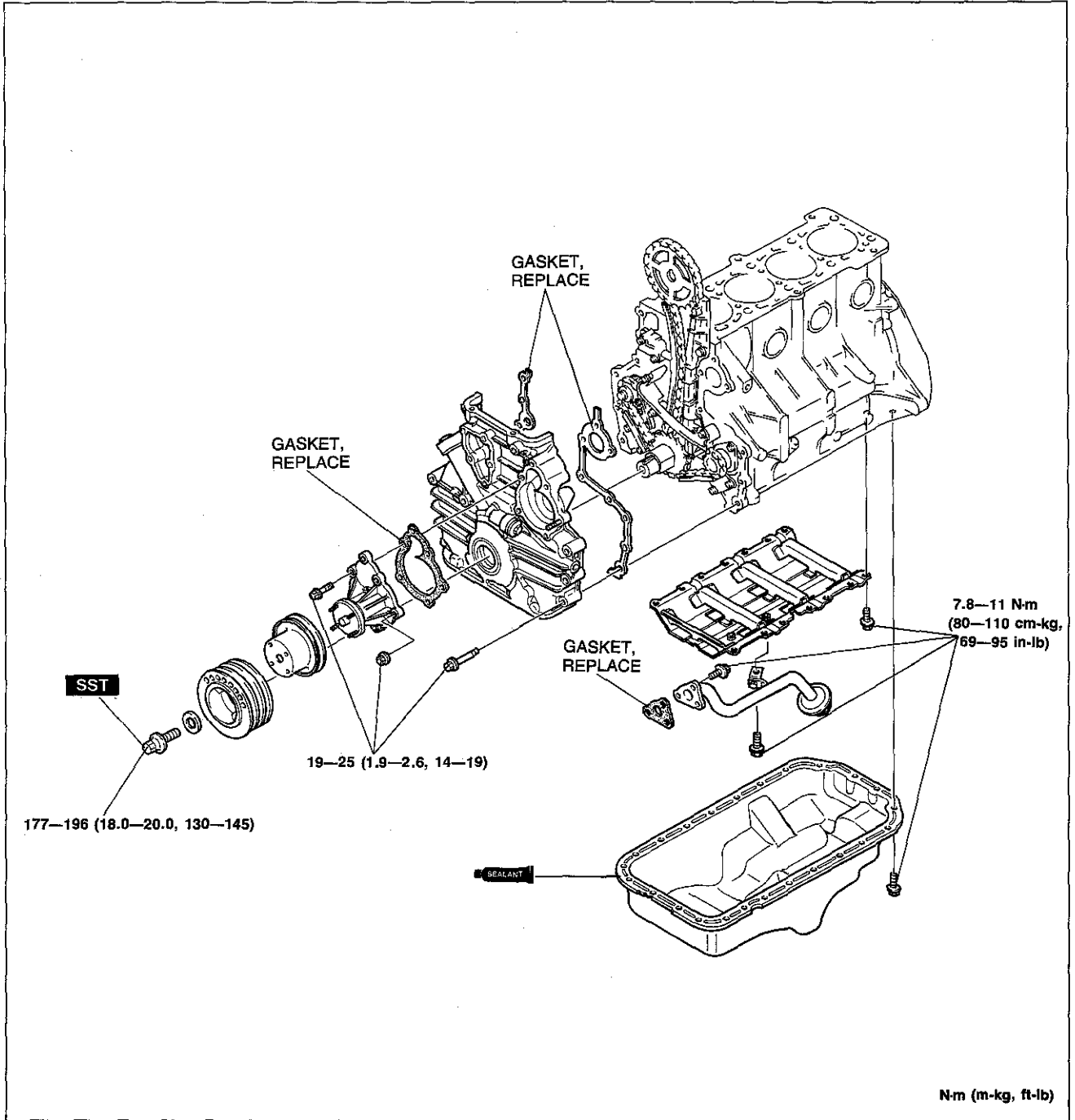
**Do not leave any wood shavings around the chain and chain guide.**

5. Measure the chain slack.

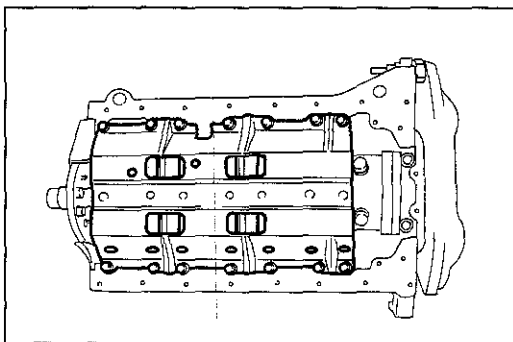
**Specification: 1.0—1.5mm (0.039—0.059 in)**



CHAIN CASE AND OIL PAN  
Torque Specifications



9MU0B2-180



9MU0B2-181

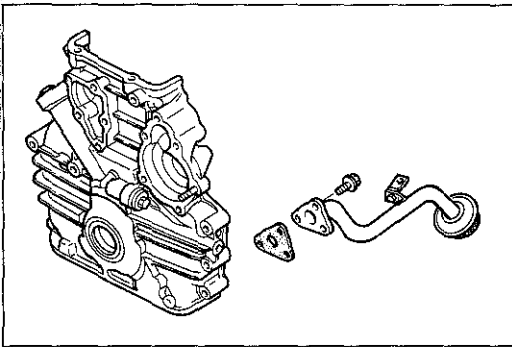
**Vibration Reducing Stiffener (VRS)**

Install the vibration reducing stiffener.

**Tightening torque:**

7.8-11 N-m (80-110 cm-kg, 69-95 in-lb)





9MU0B2-182

### Oil Strainer

Install the oil strainer with a new gasket onto the chain cover.

#### Tightening torque:

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

### Chain Cover

1. Install the chain cover onto the cylinder block with new gaskets.

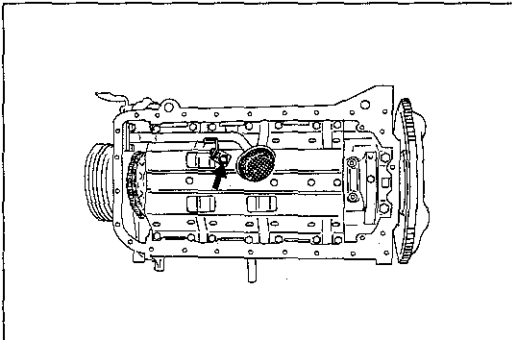
#### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

2. Tighten the oil strainer stay bolt.

#### Tightening torque:

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



9MU0B2-183

### Oil Pan

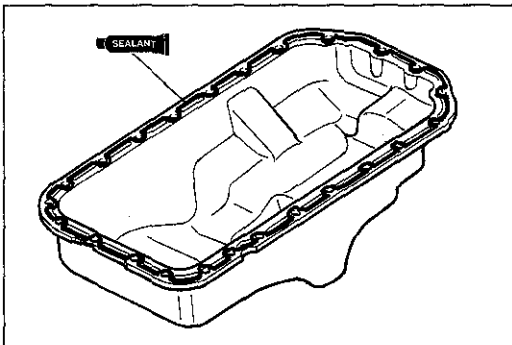
1. Remove any old sealant from the bolts and bolt holes. If the old sealant cannot be removed, replace the bolt as necessary.
2. Apply a continuous bead of silicon sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
3. Apply locking agent to the bolt threads.

### Caution

**After the sealant is applied, the oil pan must be secured within 30 minutes.**

### Note

**New bolts of the G6 engine do not need extra locking agent because they come with it already applied.**



9BU0B2-043

4. Install the oil pan.

#### Tightening torque:

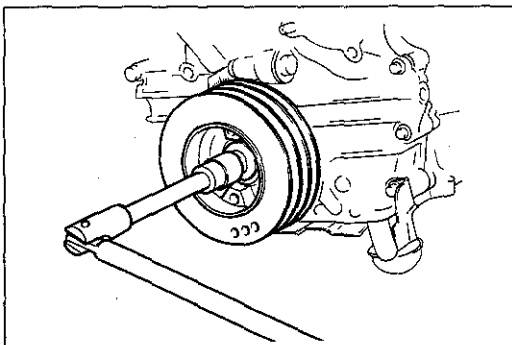
**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

### Crankshaft Pulley

1. Reverse the direction of the **SST (49 E301 060)**.
2. Install the crankshaft pulley, washer and bolt.
3. Tighten the lock bolt.

#### Tightening torque:

**177—196 N·m (18.0—20.0 m·kg 130—145 ft·lb)**



9MU9B2-185

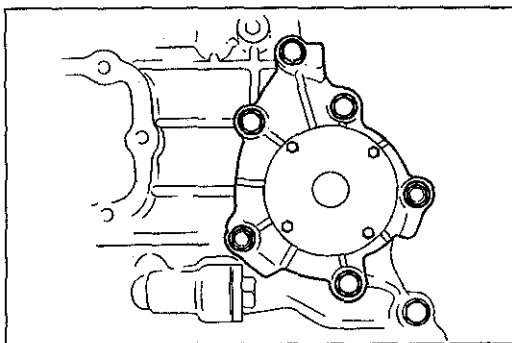
### Water Pump

1. Remove any dirt or old gasket fragments from the water pump mounting surface.
2. Install the water pump along with a new gasket.

#### Tightening torque:

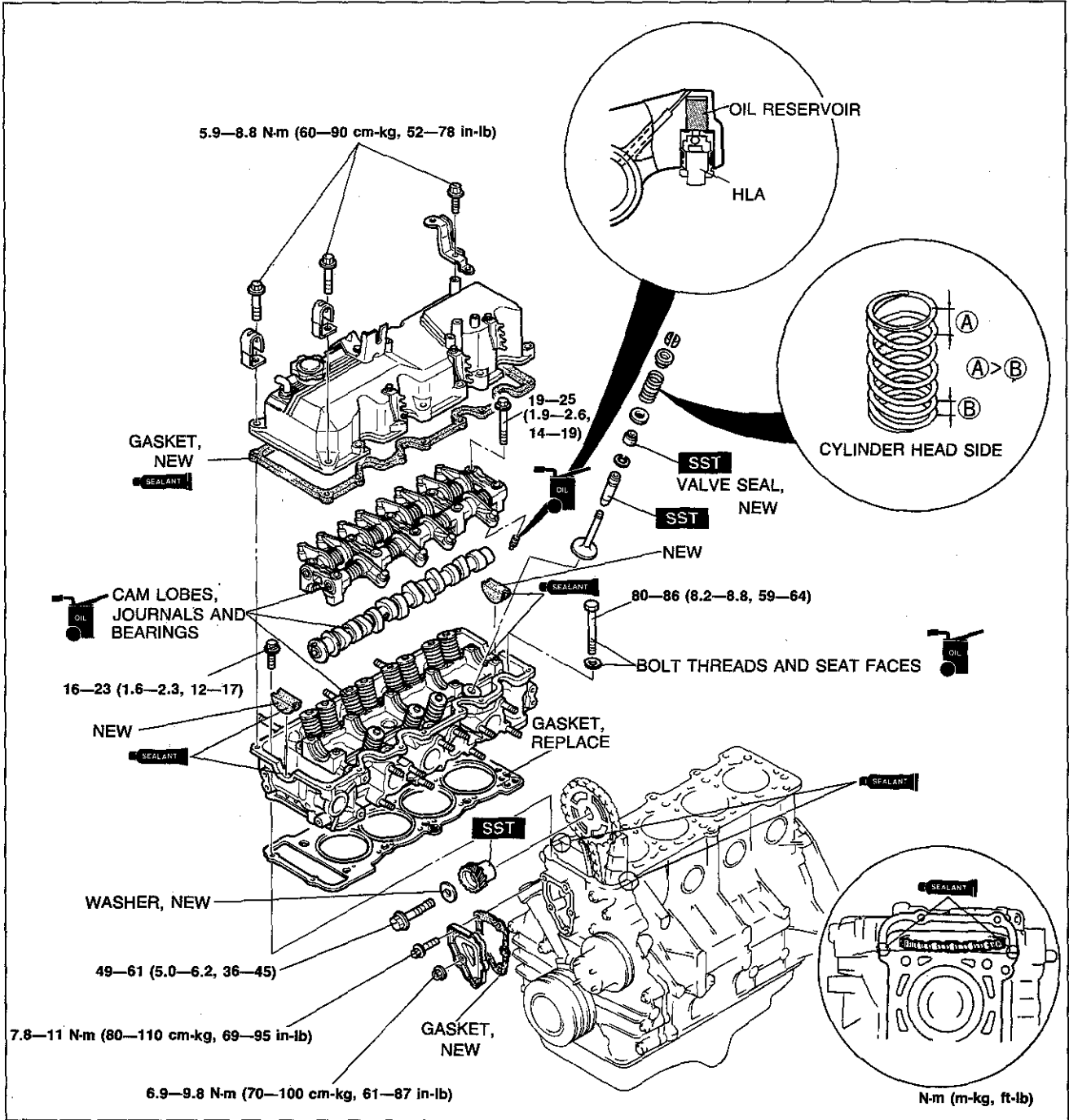
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

3. Temporarily install the water pump pulley.

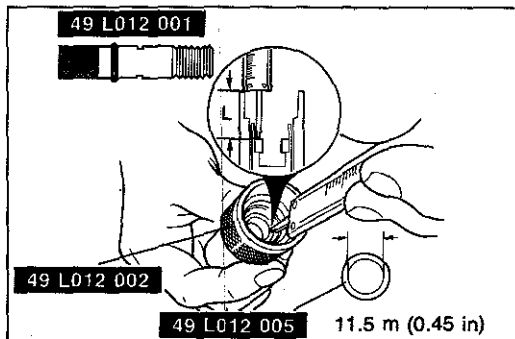


9MU0B2-186

**CYLINDER HEAD  
Torque Specifications**



9MU0B2-187

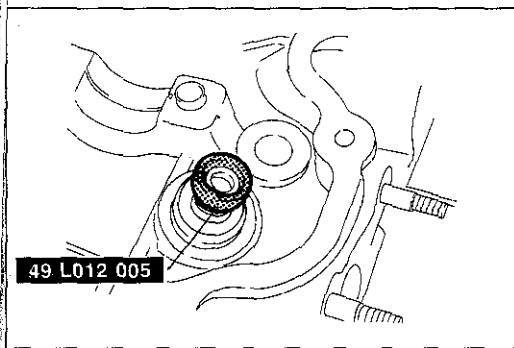


9MU0B2-188

**Valve Seal**

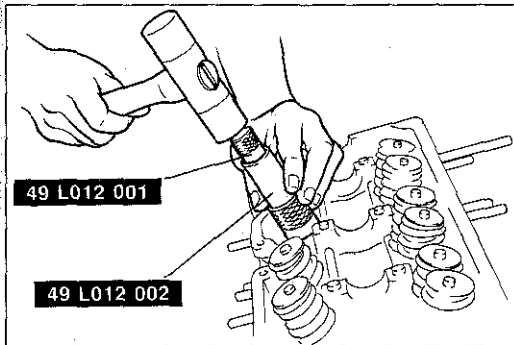
1. Assemble the **SST** as shown so that the depth **L** is as specified.

**Depth L: 23.5—24.1mm (0.925—0.949 in)**



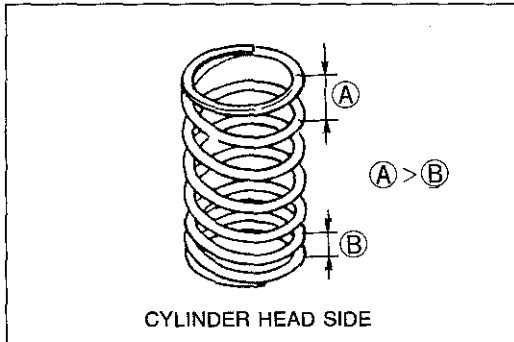
0BU0B2-024

2. Install the new valve seal onto the valve guide.
3. Install the **SST** onto the valve seal.



9MU0B2-190

4. Tap the valve seal in until the **SST** contacts the cylinder head.



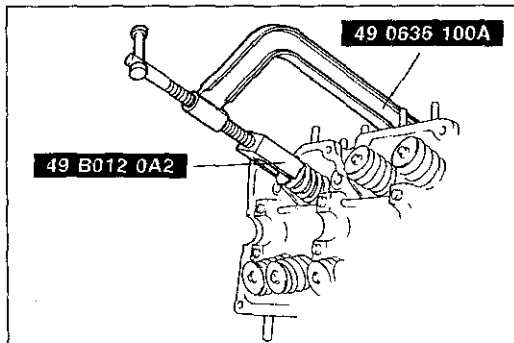
86U01X-144

### Valve and Valve Spring

1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

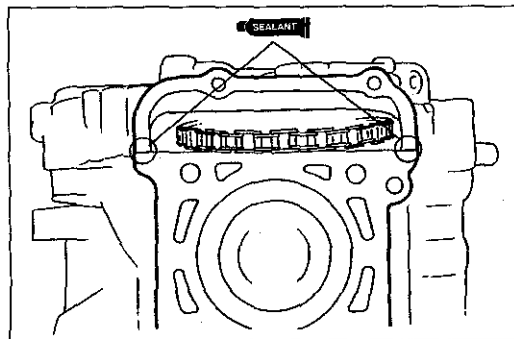
#### Note

**Install the valve spring with the closer pitch toward the cylinder head.**



86U01X-145

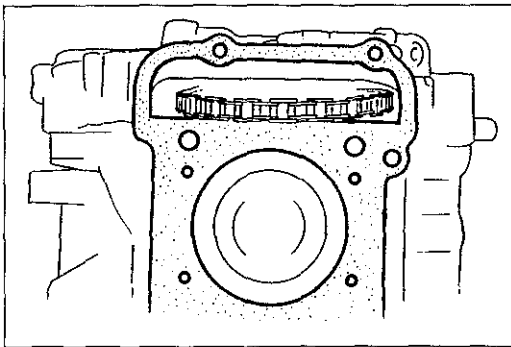
4. Compress the valve spring with the **SST**; then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.



9MU0B2-191

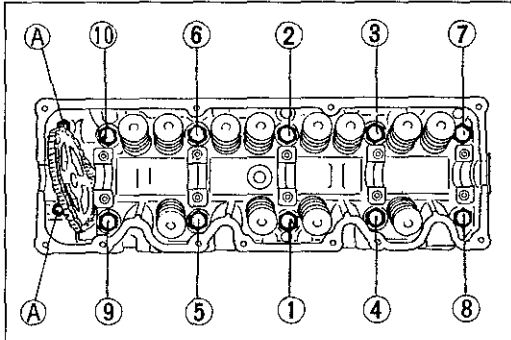
### Cylinder Head Gasket

1. Thoroughly remove all dirt and oil with a rag from the top of the cylinder block.
2. Apply silicone sealant to the shaded area.



9MU0B2-192

- Place a new cylinder head gasket in position.



9MU0B2-193

### Cylinder Head

- Set the cylinder head in place.
- Apply engine oil to the bolt threads and seat faces.
- Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

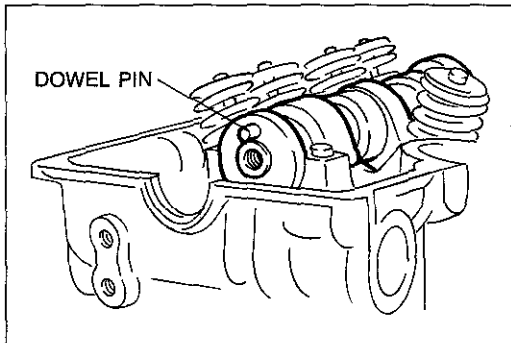
#### Tightening torque:

**80—86 N·m (8.2—8.8 m·kg, 59—64 ft·lb)**

- Tighten the remaining small cylinder head bolts (A).

#### Tightening torque:

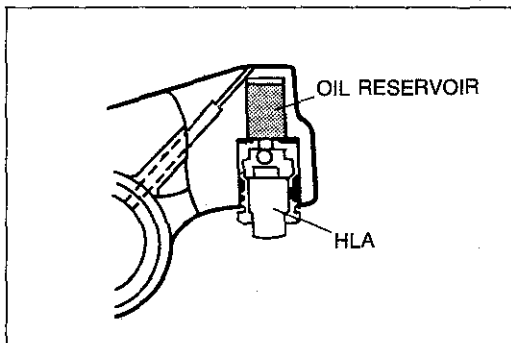
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



86U01X-148

### Camshaft

- Apply a liberal amount of engine oil to the journals and bearings.
- Place the camshaft in position with the dowel pin facing straight up.



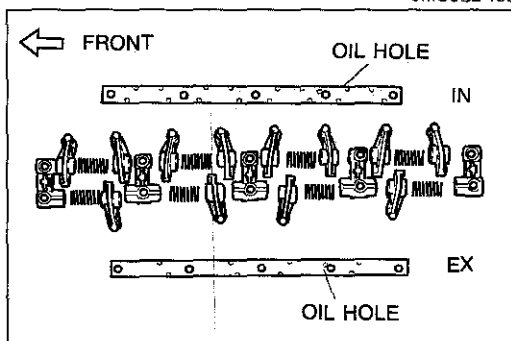
9MU0B2-159

### Hydraulic Lash Adjuster (HLA)

- Pour engine oil into the oil reservoir in the rocker arm.
- Apply engine oil to the HLA.
- Carefully install the HLA into the rocker arm.

#### Caution

**Do not damage the O-ring when installing the HLA.**



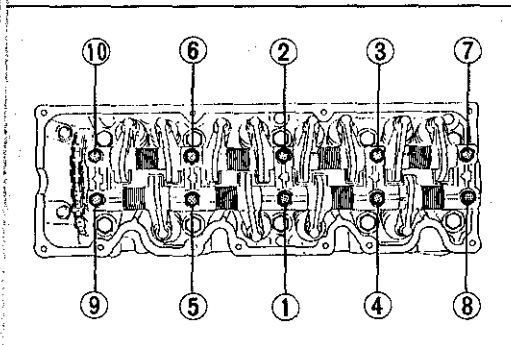
9MU0B2-194

### Camshaft Cap, Rocker Arm and Shaft Assembly

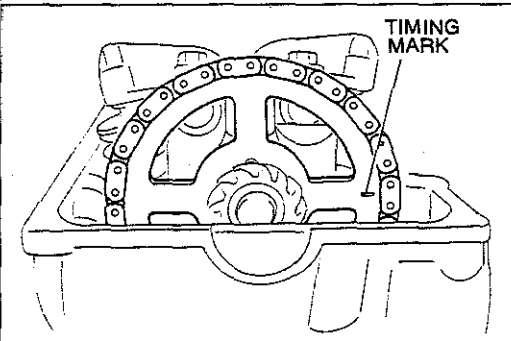
- Assemble the rocker arm and shaft assembly as shown in the figure according to the cap number and ← mark.

#### Note

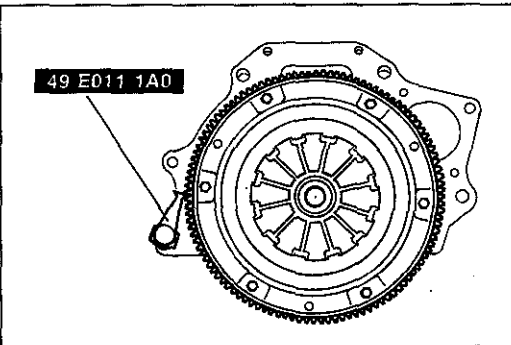
- The intake side shaft has twice as many oil holes as the exhaust side shaft.
- The No.4 camshaft cap has an oil hole from the cylinder head; be certain it is installed correctly.



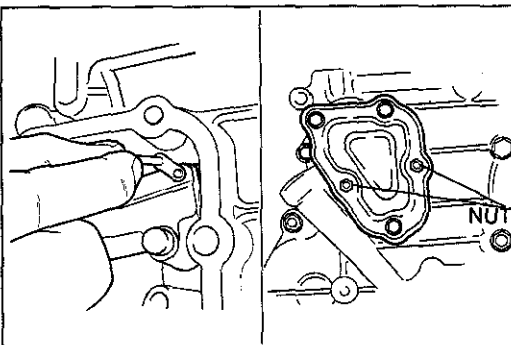
9MU0B2-195



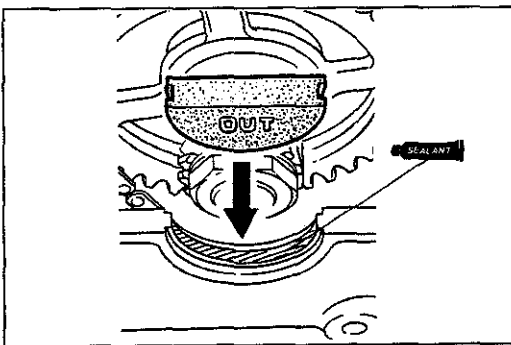
9MU0B2-196



2BU0B2-030



0MU0B2-025



2MU0B2-020

2. Apply a liberal amount of clean engine oil to the cam lobes and journals.
3. Install the rocker arm and shaft assemblies. Tighten the bolts in two or three steps in the order shown in the figure.

### Tightening torque:

**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

### Distributor Drive Gear

1. Verify that the timing mark of the camshaft pulley and the white link of the timing chain align.
2. Install the camshaft pulley onto the camshaft dowel pin.
3. Remove the securing wire.

4. Install the distributor drive gear, new washer, and lock bolt.
5. Install the **SST** or equivalent against the flywheel.
6. Tighten the lock bolt.

### Tightening torque:

**49—61 N·m (5.0—6.2 m·kg, 36—45 ft·lb)**

7. Remove the chain adjuster sleeve retaining pin.

### Caution

**Be especially careful that the pin does not fall.**

8. Install the service cover with a new gasket.

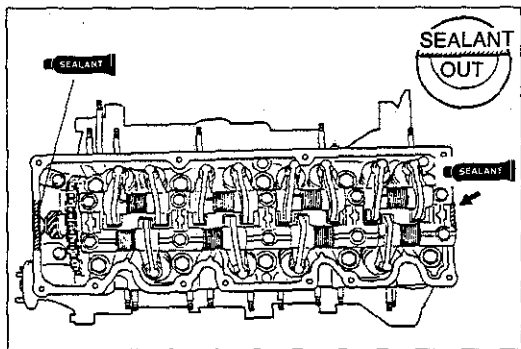
### Tightening torque

**Bolt: 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

**Nut: 6.9—9.8 N·m (70—100 cm·kg, 61—87 in·lb)**

### Seal Cover

Apply sealant to the shaded area as shown, and install the new seal cover.



2MU0B2-021

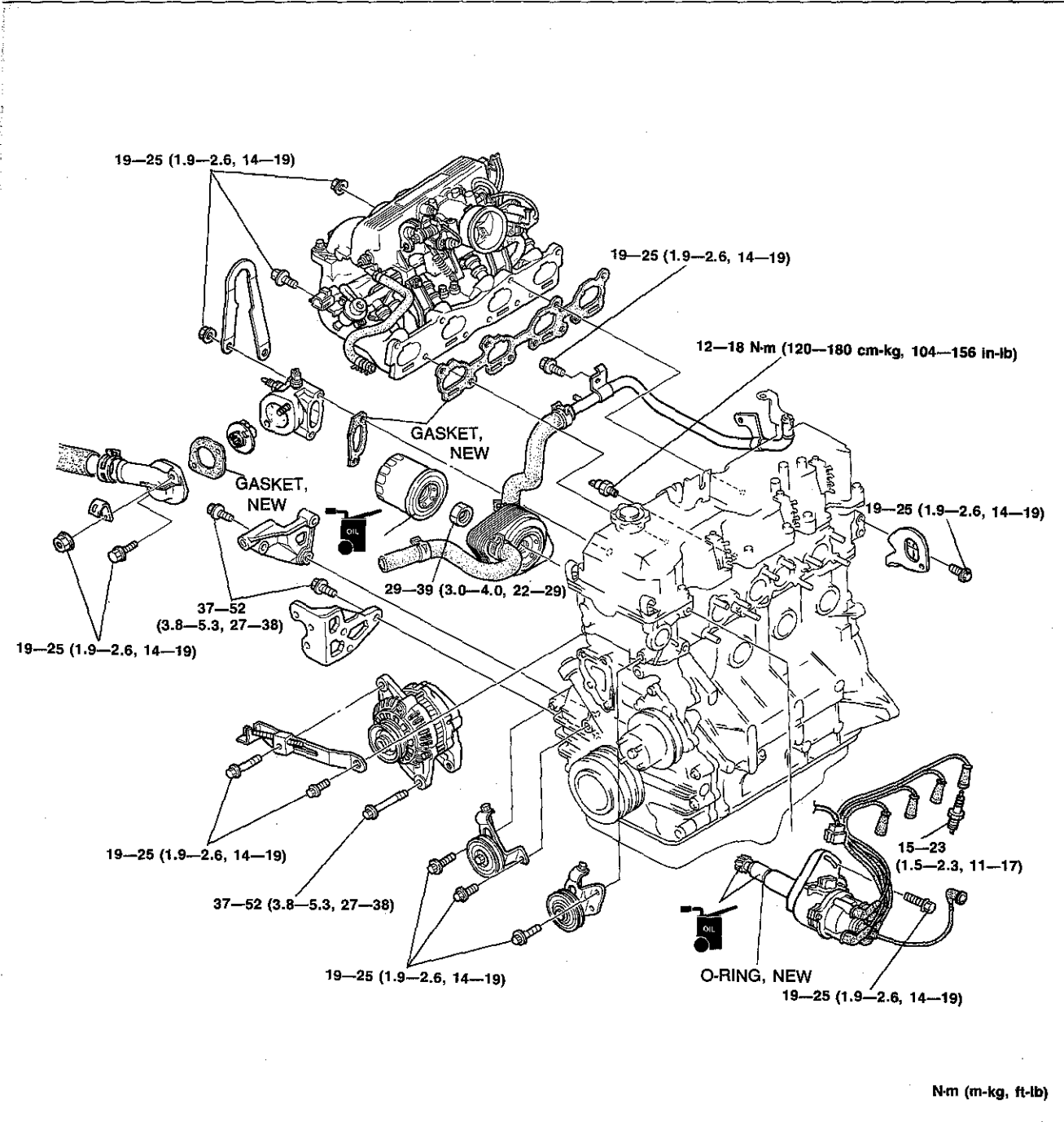
### Cylinder Head Cover

1. Apply engine oil to the valves, rocker arms and timing chain.
2. Remove all old silicone sealant from the cylinder head and cover.
3. Coat a new gasket with silicone sealant, and install onto the cylinder head cover.
4. Apply silicone sealant to the shaded areas shown in the figure.
5. Install the cylinder head cover.

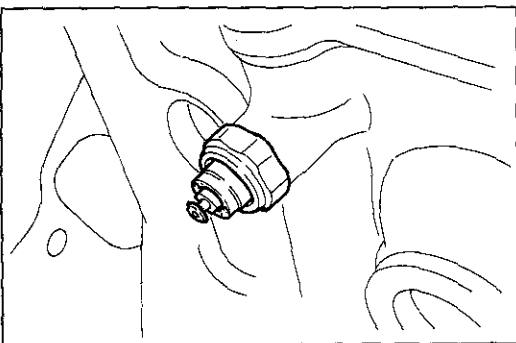
### Tightening torque:

**5.9—8.8 N·m (60—90 cm·kg, 52—78 in·lb)**

AUXILIARY PARTS  
Torque Specification



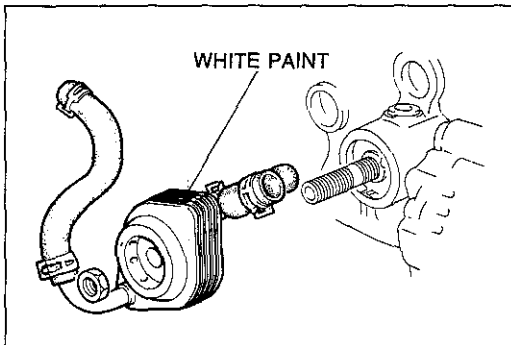
9MU0B2-201



**Oil Pressure Switch**  
Install the oil pressure switch.

**Tightening torque:**  
12-18 N-m (120-180 cm-kg, 104-156 in-lb)

2BU0B2-022



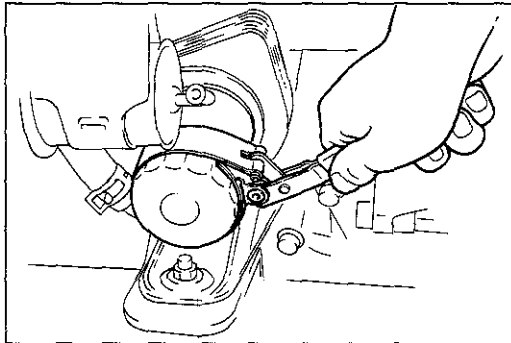
9MU0B2-203

**Oil Cooler**

Install the oil cooler so that the white paint is at the top.

**Tightening torque:**

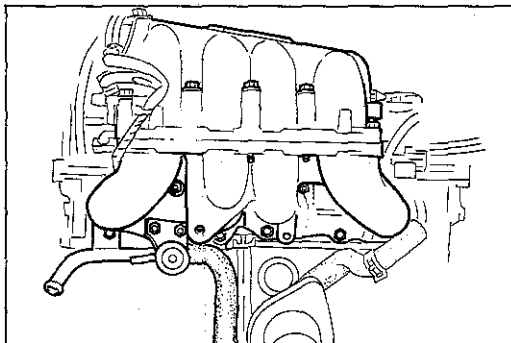
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



9MU0B2-204

**Oil Filter**

1. Apply a small amount of engine oil to the rubber seal of the new filter.
2. Install the oil filter and tighten it by hand until the rubber seal contacts the base.
3. Then tighten the filter 1-1/6 turn with a wrench.



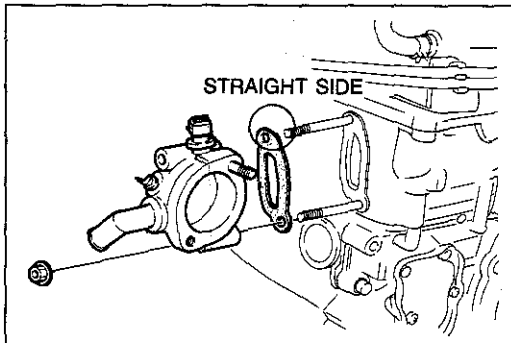
9MU0B2-205

**Intake Manifold Assembly**

1. Place the new gasket in position.
2. Install the intake manifold assembly.
3. Tighten the bolts and nuts in two or three steps.

**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



0BU0B2-026

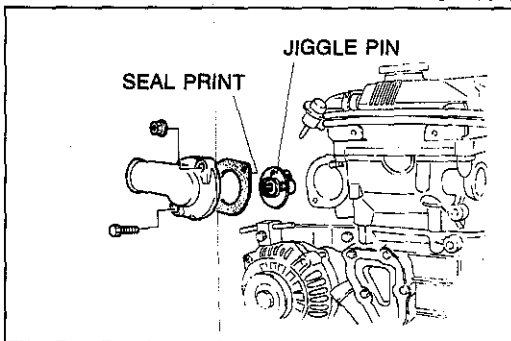
**Water Outlet**

1. Install the new water outlet gasket with the straight side upward.
2. Install the water outlet.

**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

3. Connect the oil cooler hose.



9MU0B2-207

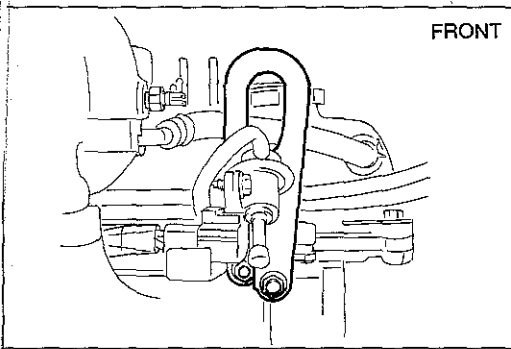
**Thermostat and Thermostat Cover**

1. Install the thermostat into the water outlet with the jiggle pin at the top.
2. Position a new gasket with the printed side facing the water outlet.
3. Install the thermostat cover.

**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)





FRONT

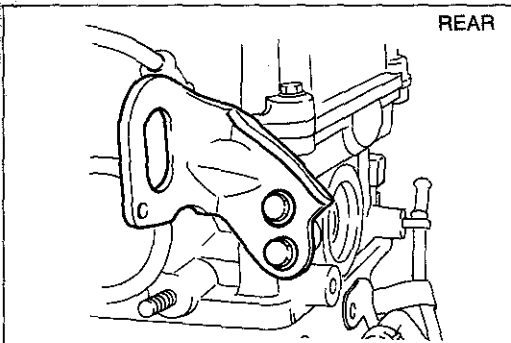
9MU0B2-208

### Engine Hanger

Install the front and rear engine hangers.

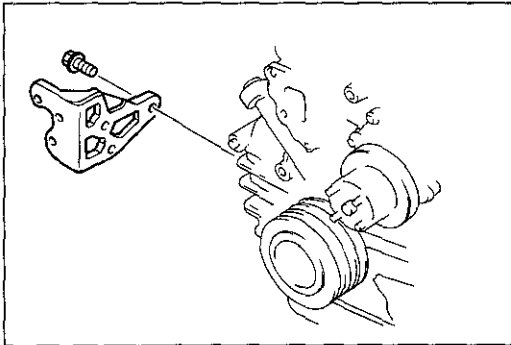
#### Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



REAR

9MU0B2-272



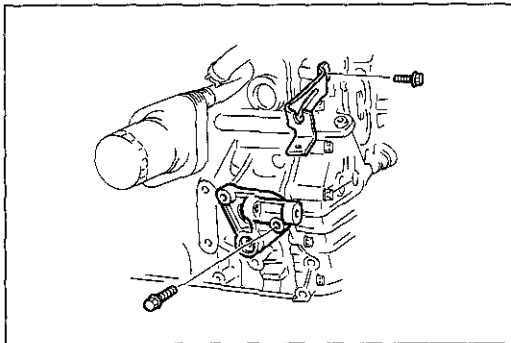
9MU0B2-273

### P/S Oil Pump Bracket

Install the P/S oil pump bracket.

#### Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



9MU0B2-209

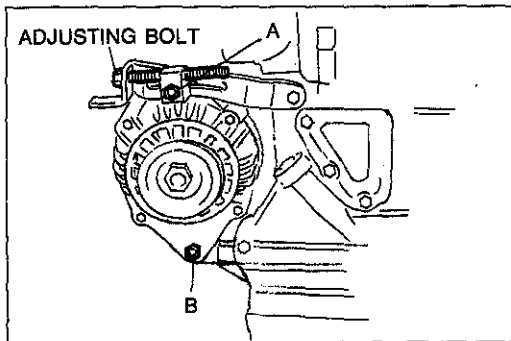
### Alternator

1. Install the alternator strap and bracket.

#### Tightening torque

Bracket: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

Strap : 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



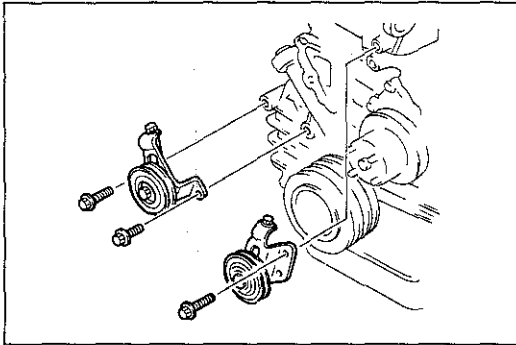
9MU0B2-210

2. Install the alternator.

#### Tightening torque

Bolt A: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Bolt B: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)



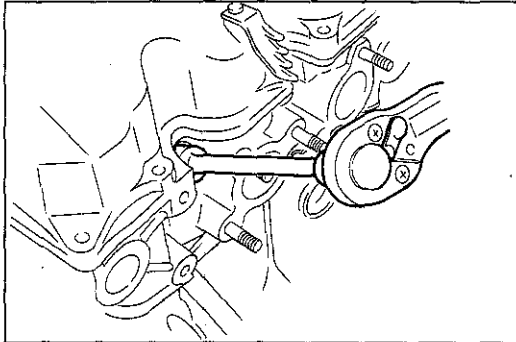
9MU0B2-211

**A/C Idler Bracket and P/S Idler Bracket**

Install the A/C idler bracket and P/S idler bracket.

**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



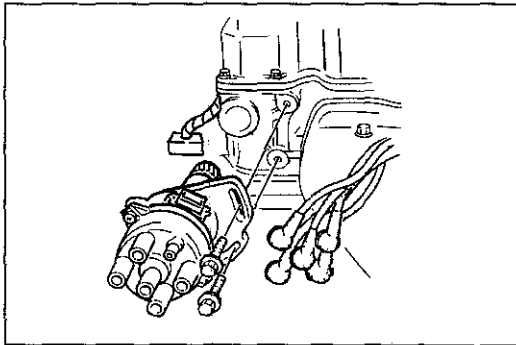
2BU0B2-014

**Spark Plug**

Install the spark plugs.

**Tightening torque:**

15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)



9MU0B2-212

**Distributor**

1. Verify that the crankshaft pulley timing mark (yellow) is aligned with the indicator pin.
2. Apply engine oil to the O-ring and install it onto the distributor.
3. Apply engine oil to the distributor driven gear.
4. Align the marks and install the distributor.
5. Loosely tighten the distributor mounting bolt.

**High-tension Lead**

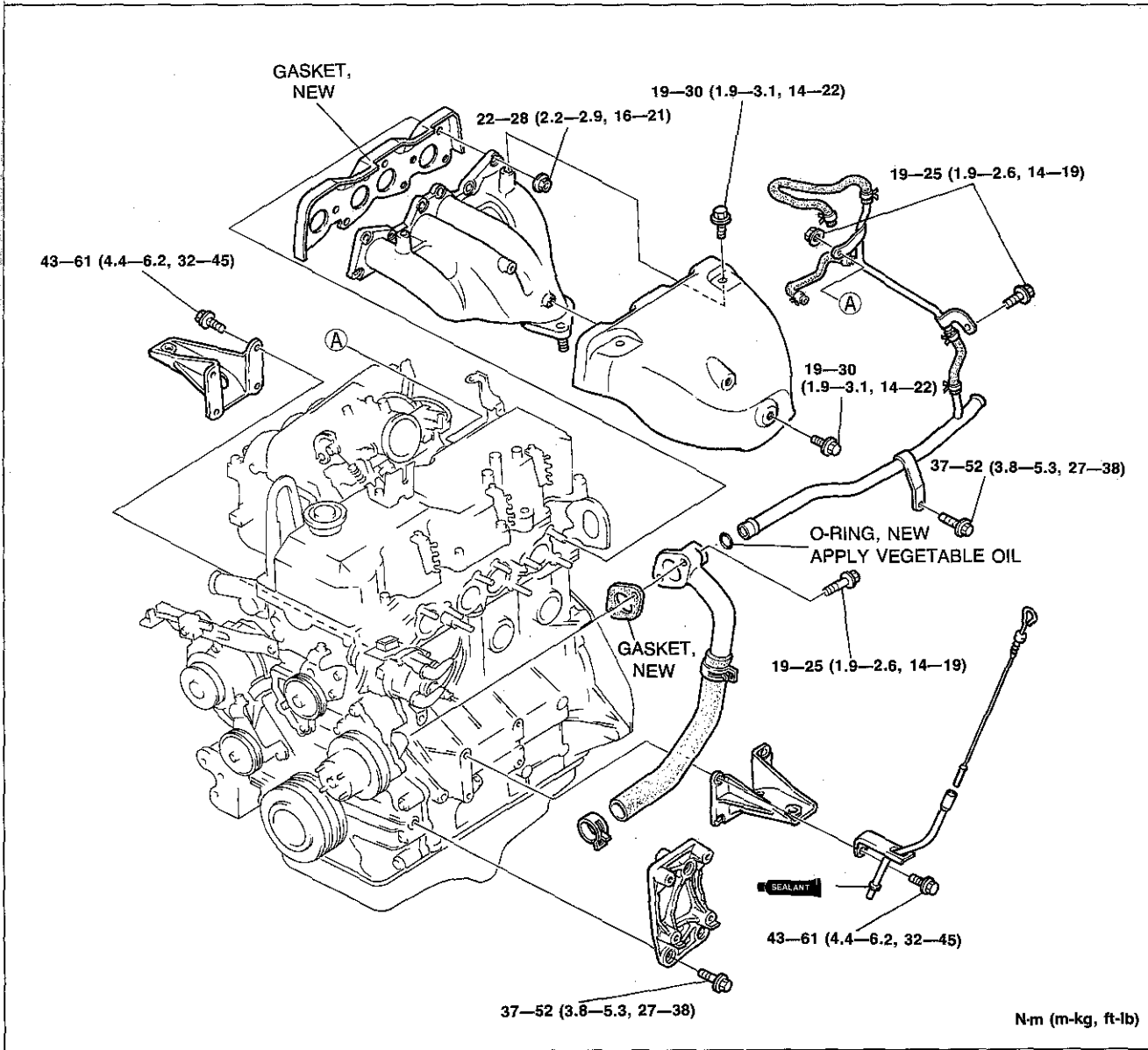
Install the high-tension leads.

### ENGINE STAND REMOVAL

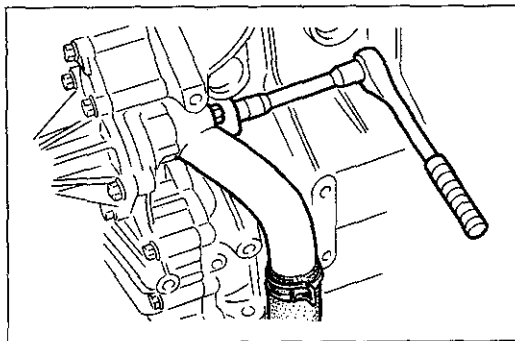
#### REMOVAL

1. Remove the engine from the engine stand.
2. Remove the **SST** from the engine.
3. Install in the following sequence.

#### Torque Specifications



9MU0B2-213



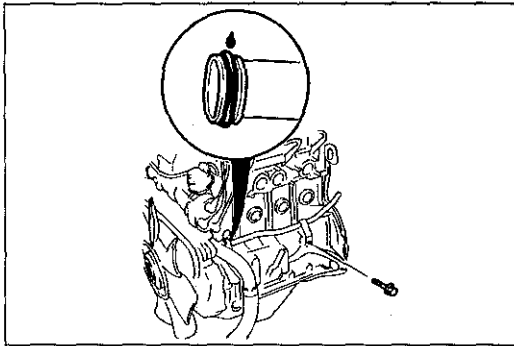
9MU0B2-214

#### Coolant Inlet Pipe and Bypass Pipe

1. Install the coolant inlet pipe with a new gasket.

#### Tightening torque:

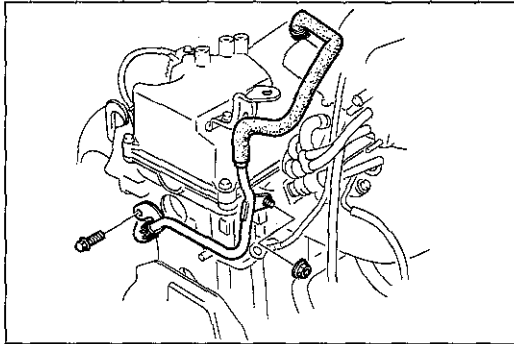
**19-25 N-m (1.9-2.6 m-kg, 14-19 ft-lb)**



2MU0B2-023

2. Apply vegetable oil to the new O-ring.
3. Install the coolant bypass pipe.

**Tightening torque:**  
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



9MU0B2-216

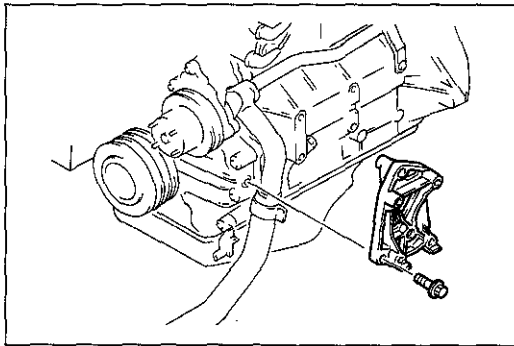
4. Tighten the intake manifold nut.

**Tightening torque:**  
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

5. Tighten the bolt.

**Tightening torque:**  
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

6. Connect the water hose to the BAC valve.

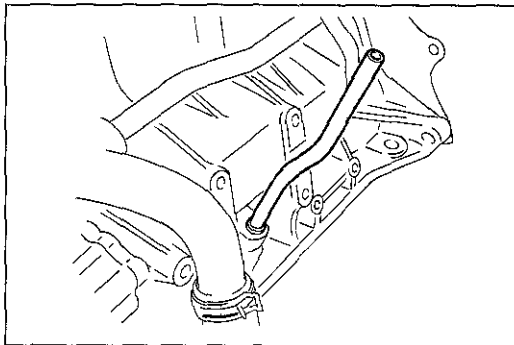


9MU0B2-217

**A/C Compressor Bracket**

Install the A/C compressor bracket.

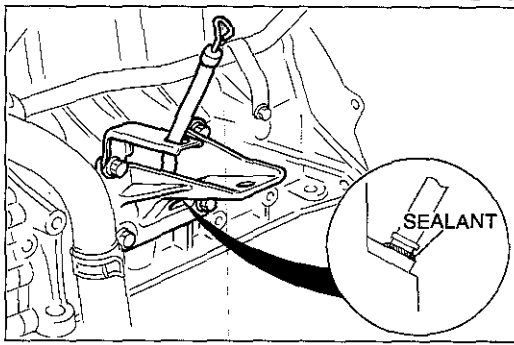
**Tightening torque:**  
**37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)**



9MU0B2-218

**Oil Level Gauge Pipe and Left Engine Mount**

1. Tap in the oil level gauge pipe.

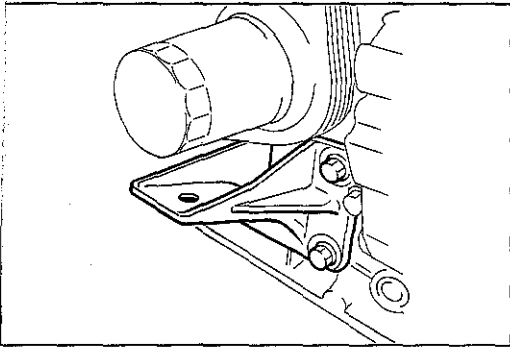


9MU0B2-219

2. Slide the oil level gauge stay over the gauge pipe.
3. Apply sealant to the shaded area in the figure.
4. Install the left engine mount and gauge stay.

**Tightening torque:**  
**43—61 N·m (4.4—6.2 m·kg, 32—45 ft·lb)**

5. Install the oil level gauge.



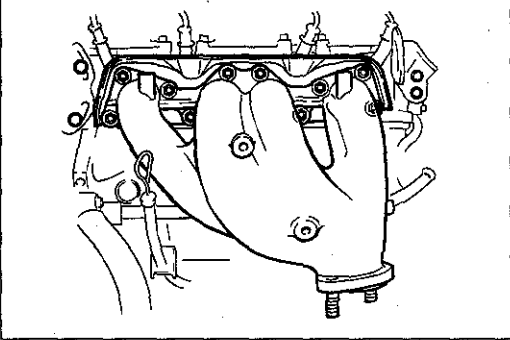
9MU0B2-220

**Right Engine Mount**

Install the right engine mount.

**Tightening torque:**

**43—61 N-m (4.4—6.2 m-k<sub>g</sub>, 32—45 ft-lb)**



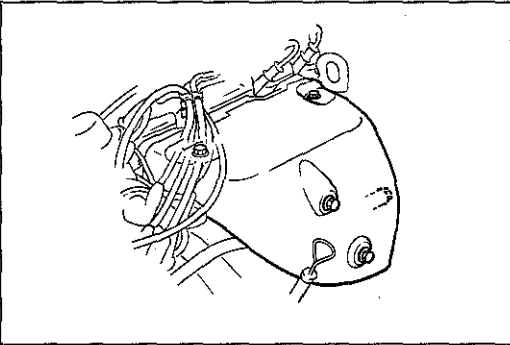
9MU0B2-221

**Exhaust Manifold**

1. Install the exhaust manifold with a new gasket.
2. Tighten the nuts in two or three steps.

**Tightening torque:**

**22—28 N-m (2.2—2.9 m-k<sub>g</sub>, 16—21 ft-lb)**



9MU0B2-222

**Exhaust Manifold Insulator**

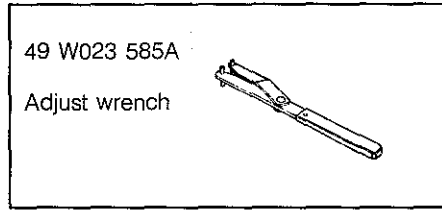
Install the exhaust manifold insulator.

**Tightening torque:**

**19—30 N-m (1.9—3.1 m-k<sub>g</sub>, 14—22 ft-lb)**

INSTALLATION

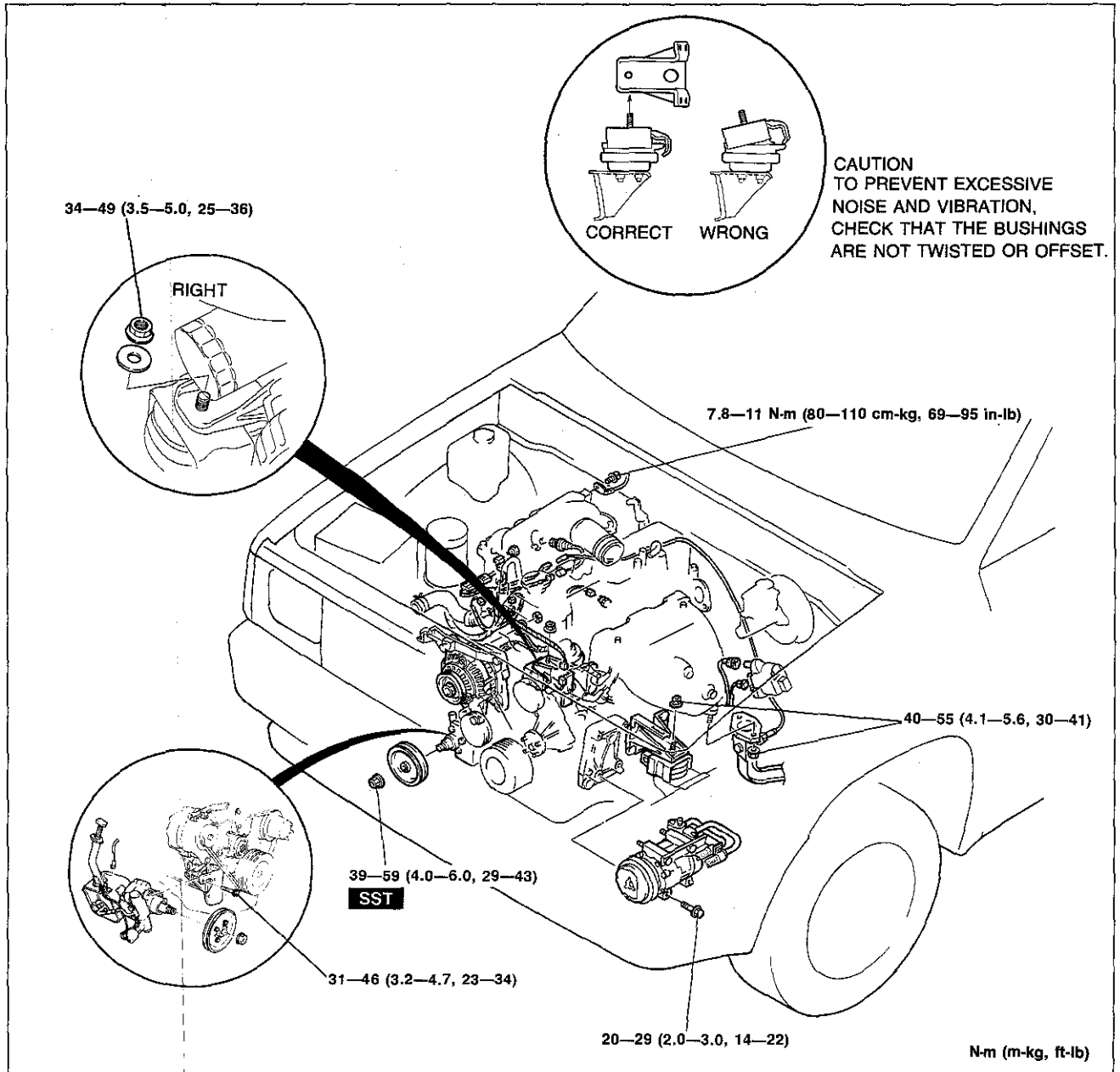
PREPARATION  
SST

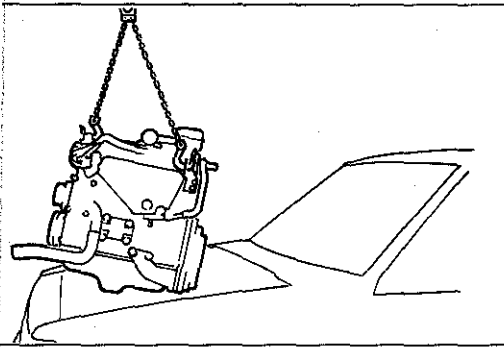


Tighten all bolts and nuts to the specified torques.

**Warning: Be sure the vehicle is securely supported.**

STEP 1  
Torque Specifications

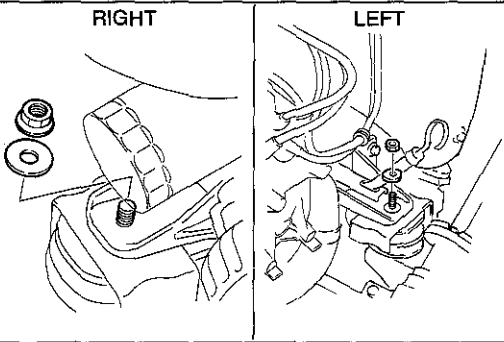




9BU0B2-046

### Engine

1. Suspend the engine horizontally.
2. Install the engine in the engine compartment being careful not to damage the piping.

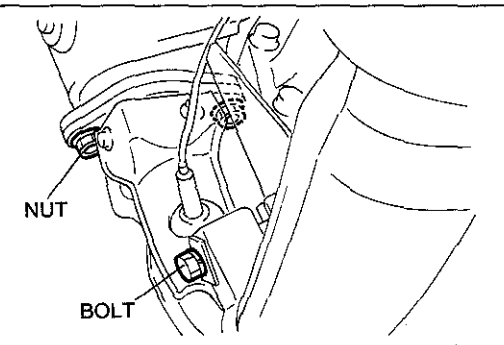


9BU0B2-011

3. Tighten the engine mount nuts.

### Tightening torque:

**34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**



9MU0B2-231

### Exhaust Pipe and Bracket

1. Install the exhaust pipe.

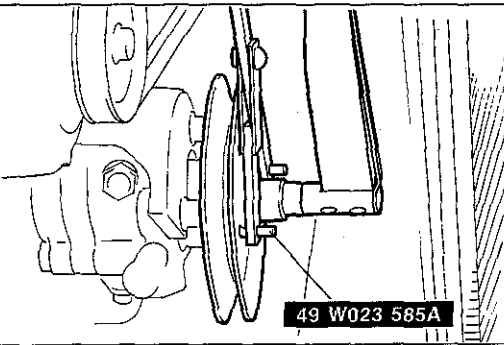
### Tightening torque

**Nut: 34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**

2. Tighten the bracket bolt.

### Tightening torque

**Bolt: 21—27 N·m (2.1—2.8 m·kg, 15—20 ft·lb)**



9BU0B2-053

### P/S Oil Pump

1. Install the P/S oil pump.

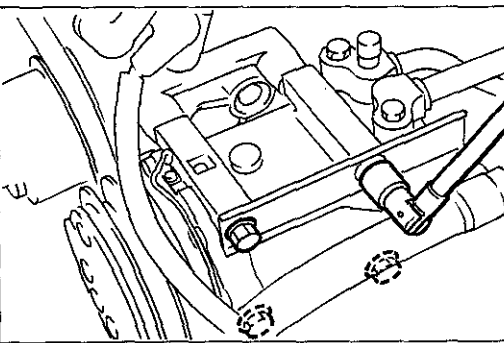
### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

2. Install the P/S oil pump pulley with the SST.

### Tightening torque:

**39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)**



0BU0B2-027

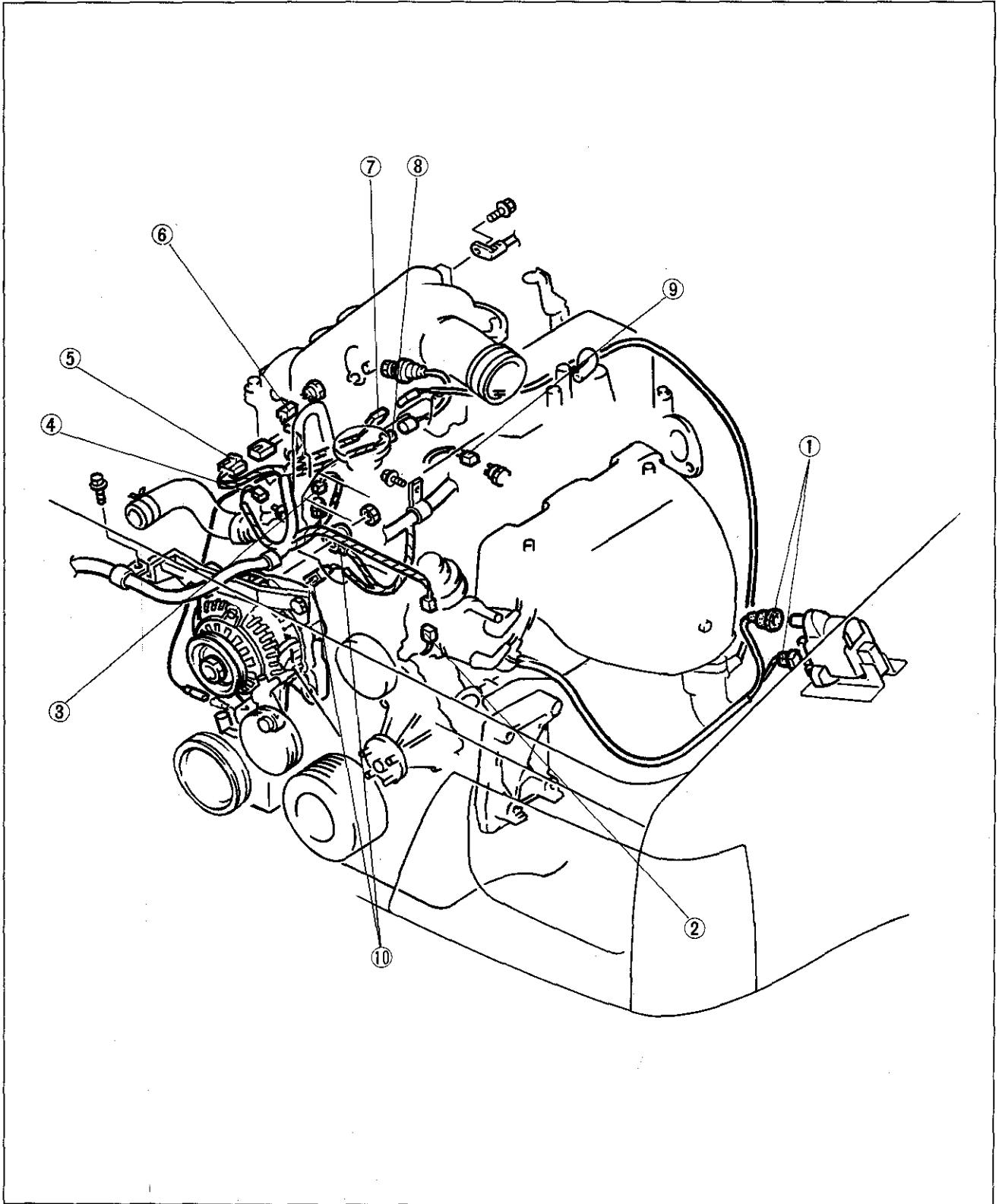
### A/C Compressor

Install the A/C compressor.

### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

Emission Harness Connectors

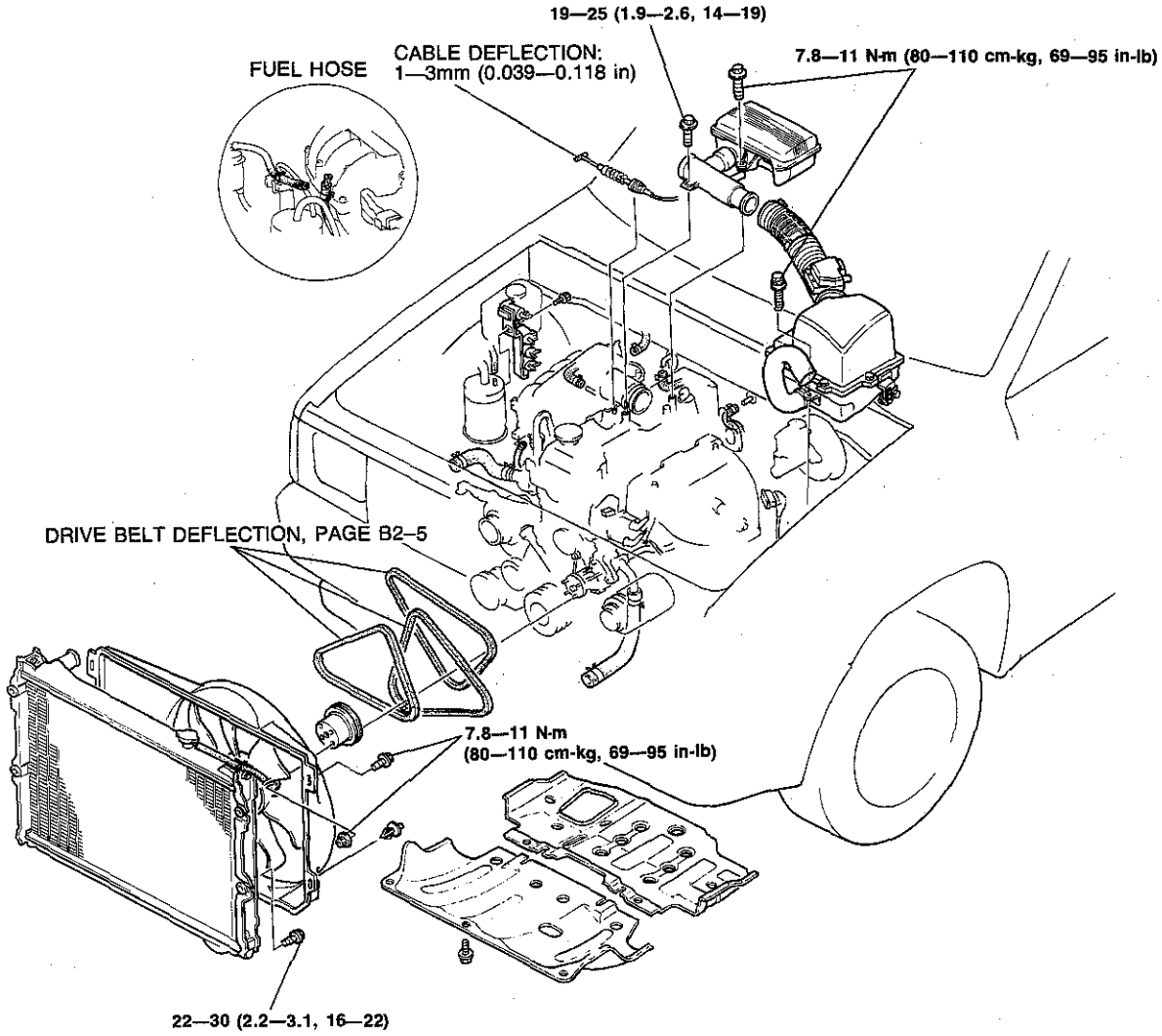


9MU0B2-237

- |                     |                          |
|---------------------|--------------------------|
| 1. IG coil          | 6. Intake air thermostat |
| 2. Distributor      | 7. Oxygen sensor         |
| 3. Water thermostat | 8. Idle switch           |
| 4. Heat gauge unit  | 9. Oil pressure switch   |
| 5. Injector harness | 10. Alternator           |

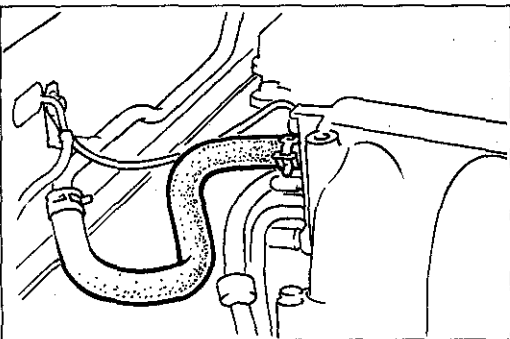


STEP 3  
Torque Specifications



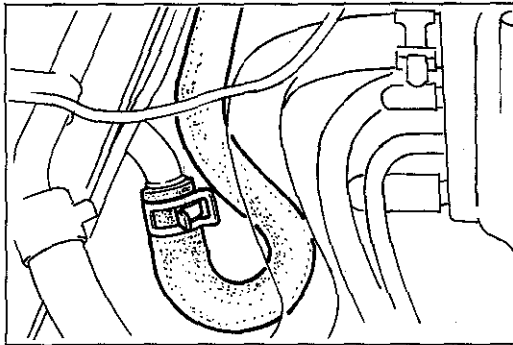
N-m (m-kg, ft-lb)

9MU0B2-238



**Brake Vacuum Hose**  
Connect the brake vacuum hose.

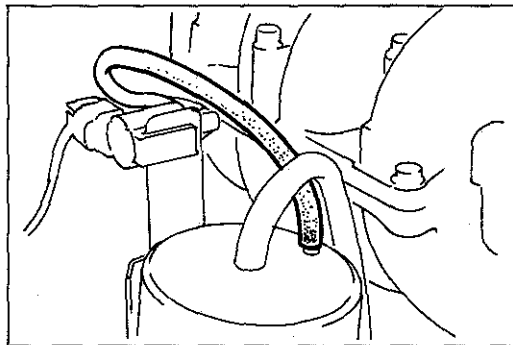
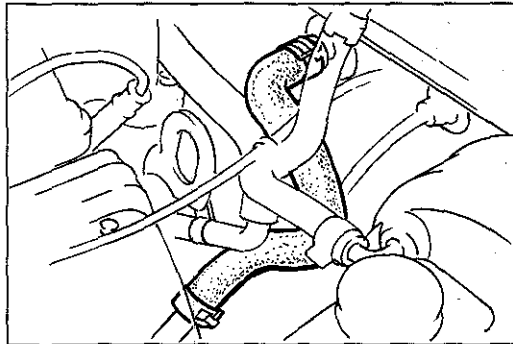
9MU0B2-239



9MU0B2-240

**Heater Hose**

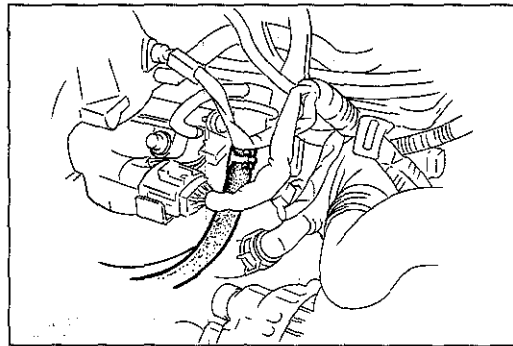
Connect the heater hoses.



9MU0B2-241

**Canister Hose**

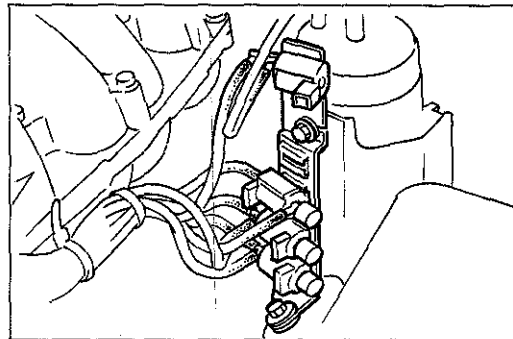
Connect the canister hose.



9MU0B2-242

**Fuel Hoses**

Connect the fuel hoses.



9BU0B2-012

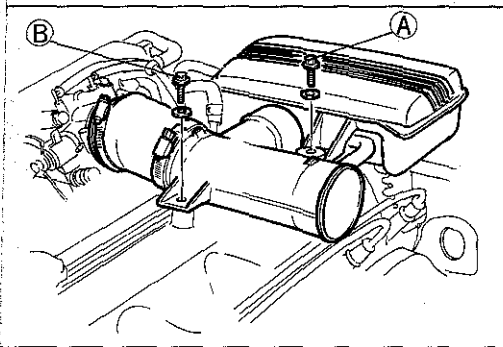
**Solenoid Valve**

1. Install the solenoid valve.

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Connect the emission harness connector.



9MU0B2-244

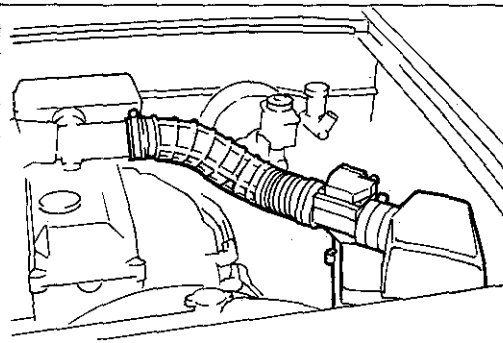
**Resonance Chamber Assembly**

Install the resonance chamber assembly.

**Tightening torque**

**Bolt A: 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

**Bolt B: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



9MU0B2-245

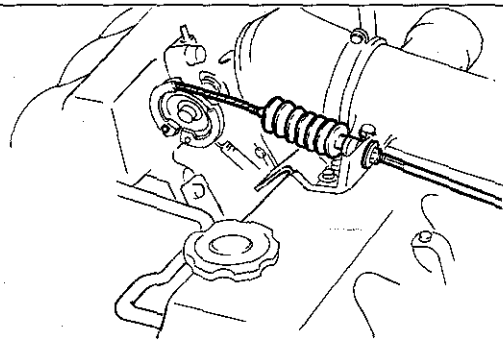
**Air Cleaner**

1. Install the air cleaner.

**Tightening torque:**

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

2. Connect the airflow meter connector.

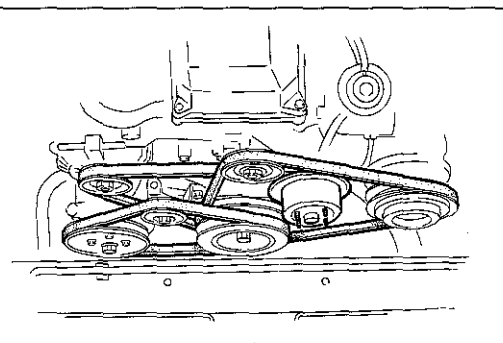


9MU0B2-246

**Accelerator Cable**

Install the accelerator cable.

**Cable deflection: 1—3mm (0.039—0.118 in)**



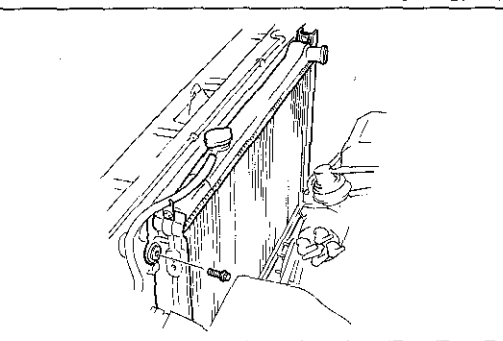
9MU0B2-247

**Drive Belt**

Install and adjust the drive belt deflection.  
(Refer to page B2-5.)

**Note**

**Alternator drive belt can be adjusted after cooling fan installation.**



0BU0B2-013

**Radiator**

1. Install the radiator.

**Tightening torque:**

**22—30 N·m (2.2—3.1 m·kg, 16—22 ft·lb)**

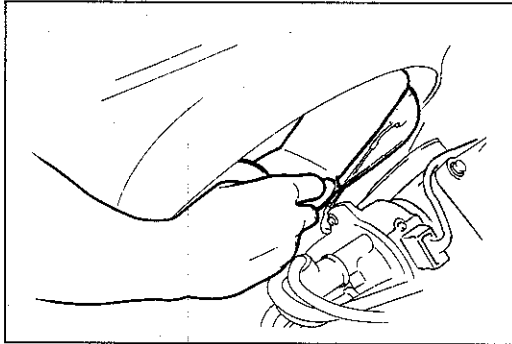
2. Connect the radiator harness, and coolant reservoir hose.  
3. Connect the oil cooler hoses. (A/T)

4. Connect the upper and lower radiator hoses.

**Note**

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

9MU0B2-249



9BU0B2-047

**Cooling Fan and Radiator Cowling**

Install the cooling fan and radiator cowling.

**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

**Caution**

After radiator cowling installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowling. If the fan touches the cowling, adjust the radiator cowling mounting position.

**Engine Oil**

Add the specified amount and type of engine oil. (Refer to Section D.)

**Coolant**

Close the drain plug; then fill the radiator and reservoir tank with the specified amount and type of coolant. (Refer to Section E.)

**Transmission**

Install the manual transmission. (Refer to Section J2.)  
Install the automatic transmission. (Refer to Section K2.)

**Starter**

Install the starter. (Refer to Section G.)

**Check Engine Condition**

1. Check for leaks.
2. Perform engine adjustments if necessary.
3. Perform a road test.
4. Recheck the oil and coolant levels.

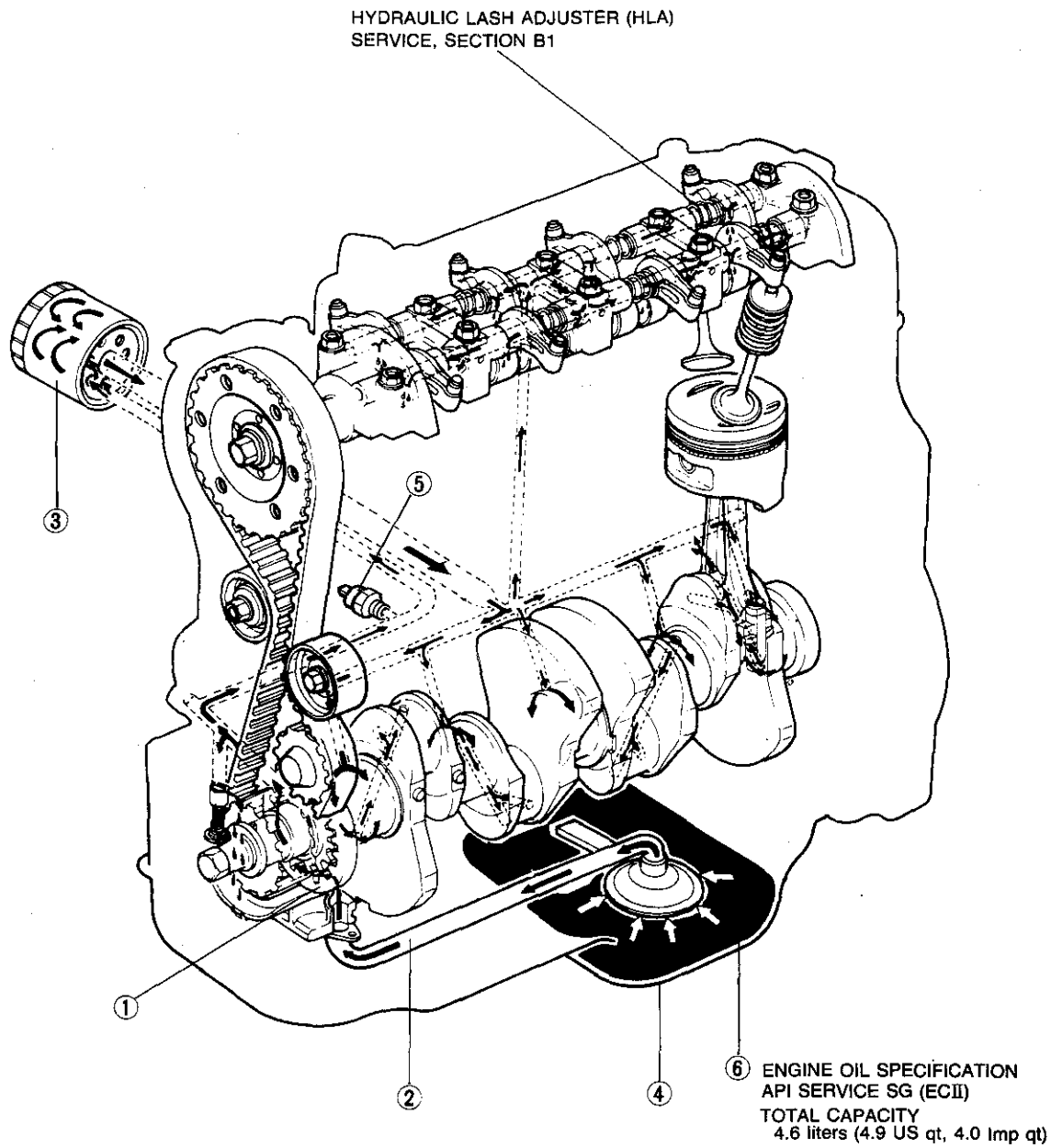
0BU0B2-014

# LUBRICATION SYSTEM

- INDEX..... D- 2**
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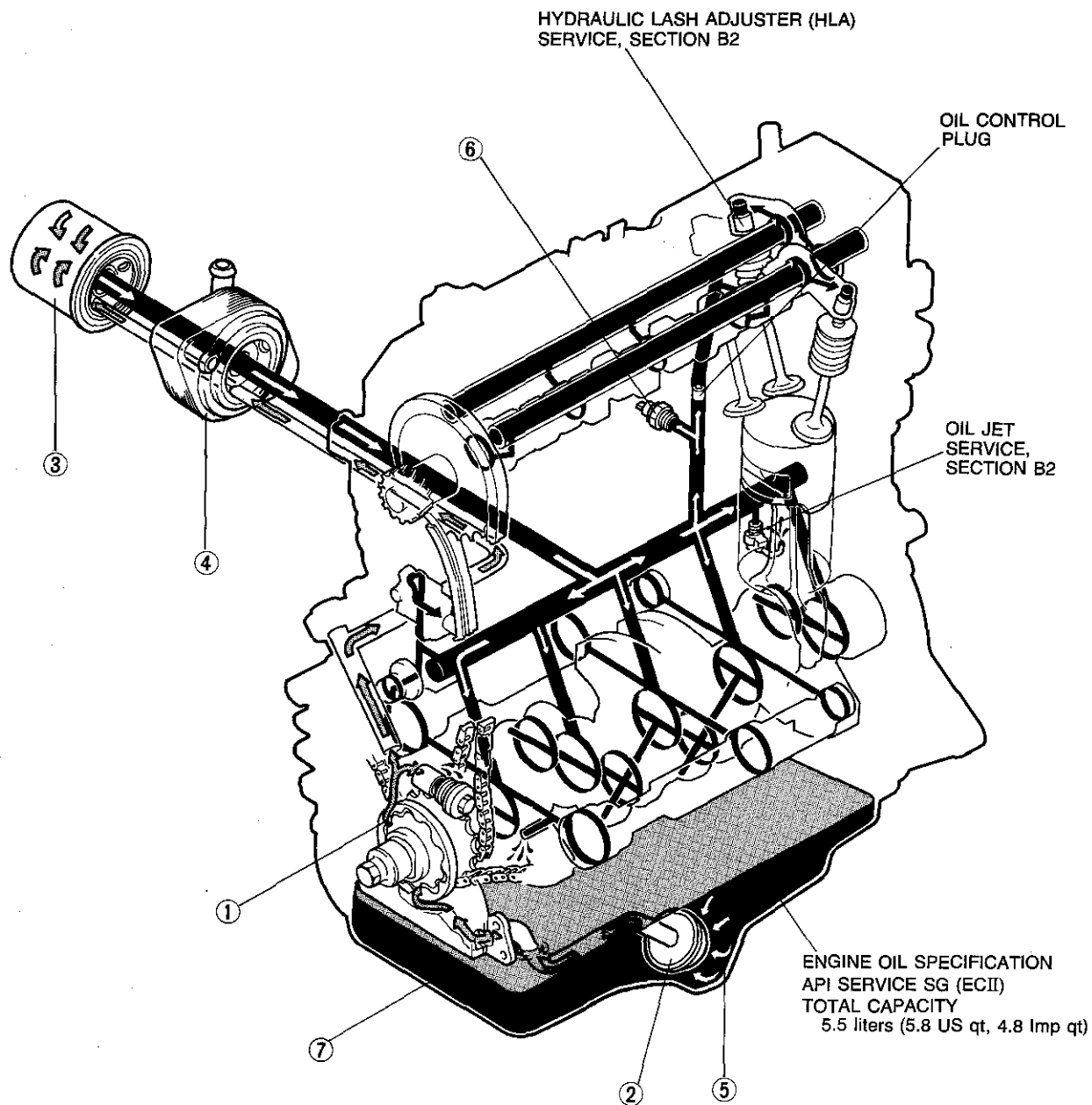
B2200 (F2 ENGINE)



9MU0DX-002

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**B2600i (G6 ENGINE)**



2BU0DX-003

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**D****OUTLINE****OUTLINE****SPECIFICATIONS  
F2 ENGINE**

Lubrication system		Force-fed type
Oil pump	Type	Trochoid gear
	Relief pressure	kPa (kg/cm <sup>2</sup> , psi) 294—392 (3.0—4.0, 43—57)
Oil filter	Type	Full-flow, paper element
	Relief pressure differential	kPa (kg/cm <sup>2</sup> , psi) 78—118 (0.8—1.2, 11—17)
Oil pressure switch activation pressure		kPa (kg/cm <sup>2</sup> , psi) 2—25 (0.02—0.25, 0.28—3.60)
Oil capacity	Total (dry engine)	liters (US qt, Imp qt) 4.6 (4.9, 4.0)
	Oil pan	liters (US qt, Imp qt) 3.9 (4.1, 3.4)
	Oil filter	liter (US qt, Imp qt) 0.22 (0.23, 0.19)
Engine oil		API service SG Energy Conserving II (EC II)

1BU0DX-001

**G6 ENGINE**

Lubrication system		Force-fed type
Oil pump	Type	Trochoid gear
	Relief pressure	kPa (kg/cm <sup>2</sup> , psi) 392—491 (4.0—5.0, 57—71)
Oil filter	Type	Full-flow, paper element
	Relief pressure differential	kPa (kg/cm <sup>2</sup> , psi) 78—118 (0.8—1.2, 11—17)
Oil pressure switch activation pressure		kPa (kg/cm <sup>2</sup> , psi) 29 (0.3, 4.3)
Oil capacity	Total (dry engine)	liters (US qt, Imp qt) 5.5 (5.8, 4.8)
	Oil pan	liters (US qt, Imp qt) 4.5 (4.8, 4.0)
	Oil filter	liter (US qt, Imp qt) 0.22 (0.23, 0.19)
Engine oil		API service SG Energy Conserving II (EC II)

1BU0DX-002

**Recommended SAE Viscosity**

Temperature	(°C)	-30	-20	-10	0	10	20	30	40	50
	(°F)	-20	0	20	40	60	80	100	120	
Engine oil										
	<p>5W-30</p> <p>10W-30</p>									

1BU0DX-003



**TRUBLESHOOTING GUIDE**

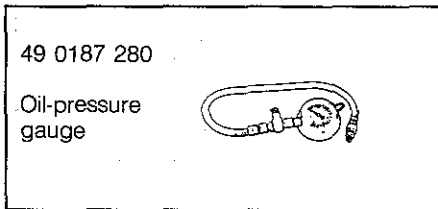
Problem	Possible Cause	Remedy	Page
<b>Engine hard starting</b>	Improper engine oil Insufficient engine oil	Replace Add oil	D- 7 D- 7
<b>Excessive oil consumption</b>	Oil working up or down  Oil leakage	Refer to Section B1 (F2 engine) or B2 (G6 engine) Repair	—
<b>Oil pressure drop</b>	Insufficient oil Oil leakage Worn and/or damaged oil pump gear Worn plunge (inside oil pump) or weak spring Clogged oil strainer Excessive main bearing or connecting rod bearing clearance	Add oil Repair Replace Replace Clean Refer to Section B1 (F2 engine) or B2 (G6 engine)	D- 7 — D-12, 13 D-14 —
<b>Warning lamp illuminates while engine is running</b>	Oil pressure drop Malfunction of oil pressure switch Malfunction of electrical system	As described above Refer to Section T Refer to Section T	—

9BU0DX-002

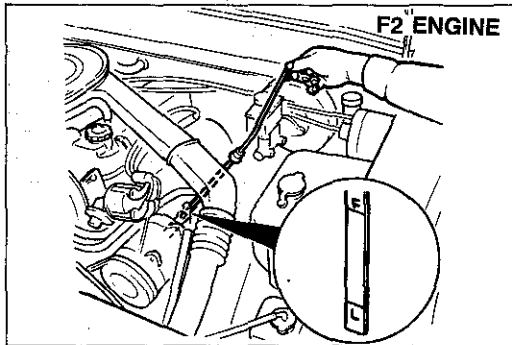
D

**ON-VEHICLE INSPECTION**

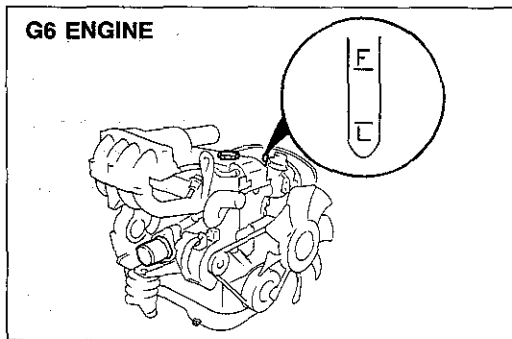
**PREPARATION**  
**SST**



9MU0DX-008



9MU0DX-009



9MU0DX-999

**ENGINE OIL**

1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the oil-level gauge and check the oil level and condition.
5. Add or replace oil if necessary.

**Note**

The distance between the L and F marks on the level gauge represents 1.0 liter (1.06 US qt, 0.88 Imp qt).

# D

## ON-VEHICLE INSPECTION (OIL PRESSURE)

### OIL PRESSURE

1. Remove the oil pressure switch.
2. Screw the **SST** into the pressure switch installation hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at 3,000 rpm, and note the gauge reading.

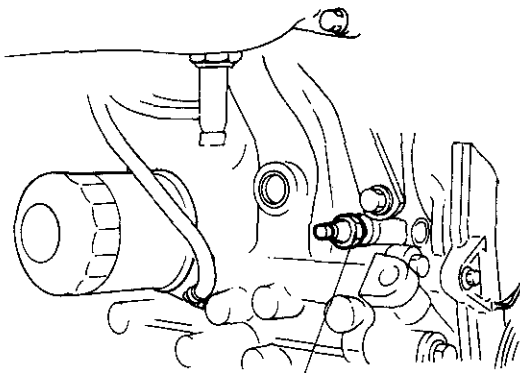
### Oil pressure

kPa (kg/cm<sup>2</sup>, psi)

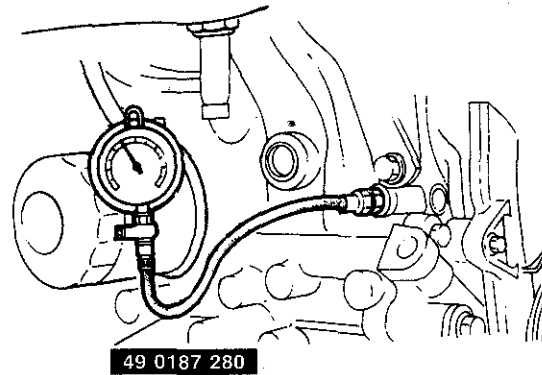
Engine	F2	G6
1,000 rpm	147—245 (1.5—2.5, 21—36)	108—206 (1.1—2.1, 16—30)
3,000 rpm	294—392 (3.0—4.0, 43—57)	304—402 (3.1—4.1, 44—58)

5. If the pressure is not as specified, check for the cause, and repair. (Refer to Troubleshooting Guide.)

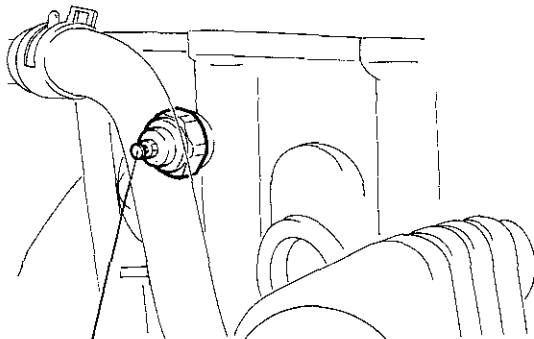
### F2 ENGINE



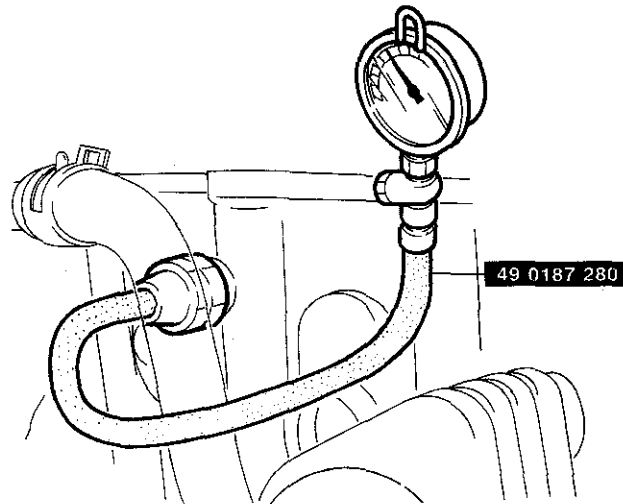
12—18 N·m (1.2—1.8 m·kg, 8.7—13 ft·lb)

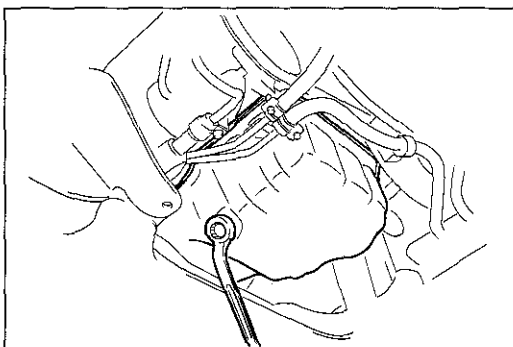


### G6 ENGINE

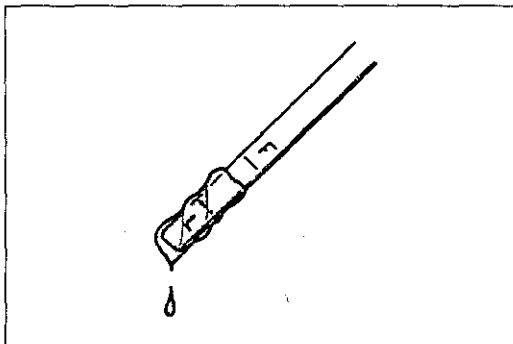


12—18 N·m (1.2—1.8 m·kg, 8.7—13 ft·lb)

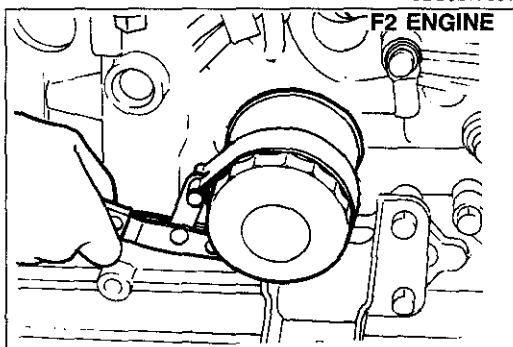




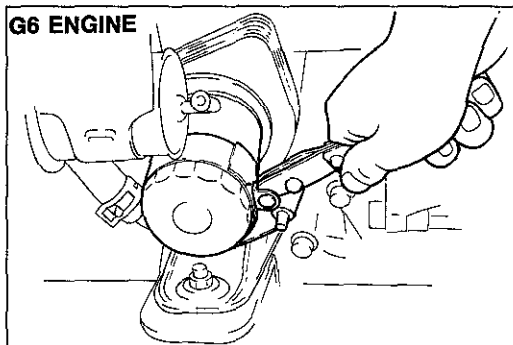
9MU0DX-011



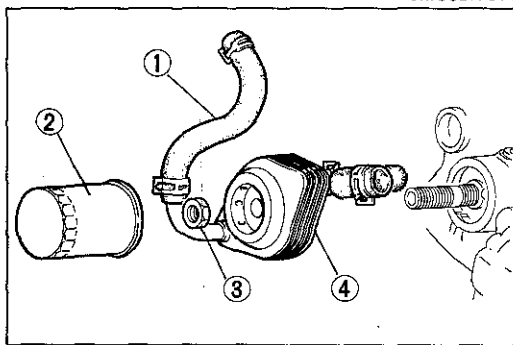
9BU0DX-009



9MU0DX-013



9MU0DX-014



1BU0DX-004

**ON-VEHICLE MAINTENANCE**

**ENGINE OIL Replacement**

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a suitable container.

**Warning**

**Be careful when draining; the oil is hot.**



4. Install the drain plug and a new gasket.

**Tightening torque:**

**29—41 N·m (3.0—4.2 m·kg, 22—30 ft·lb)**

5. Refill the engine with the specified type and amount of engine oil.
6. Refit the oil filler cap.

**Oil pan capacity:**

**3.9 liters (4.1 US qt, 3.4 Imp qt) ..... F2 Engine**  
**4.5 liters (4.8 US qt, 4.0 Imp qt)..... G6 Engine**

7. Recheck the oil level after the engine has been run.

**OIL FILTER Replacement**

1. Remove the oil filter with a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.
3. Apply a small amount of engine oil to the rubber seal of the new filter.
4. Install the oil filter until the rubber seal contacts the base, and then tighten the filter 1-1/6 turn with a wrench.
5. Start the engine and inspect for leaks around the filter seal.
6. Check the oil level and add oil if necessary.

**Oil filter capacity:**

**0.22 liter (0.23 US qt, 0.19 Imp qt)**

**OIL COOLER (G6 ENGINE) Removal and Installation**

Remove in the order shown in the figure. Install in the reverse order of removal.

1. Water hose
2. Oil filter
3. Nut
4. Oil cooler

**Nut tightening torque:**

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

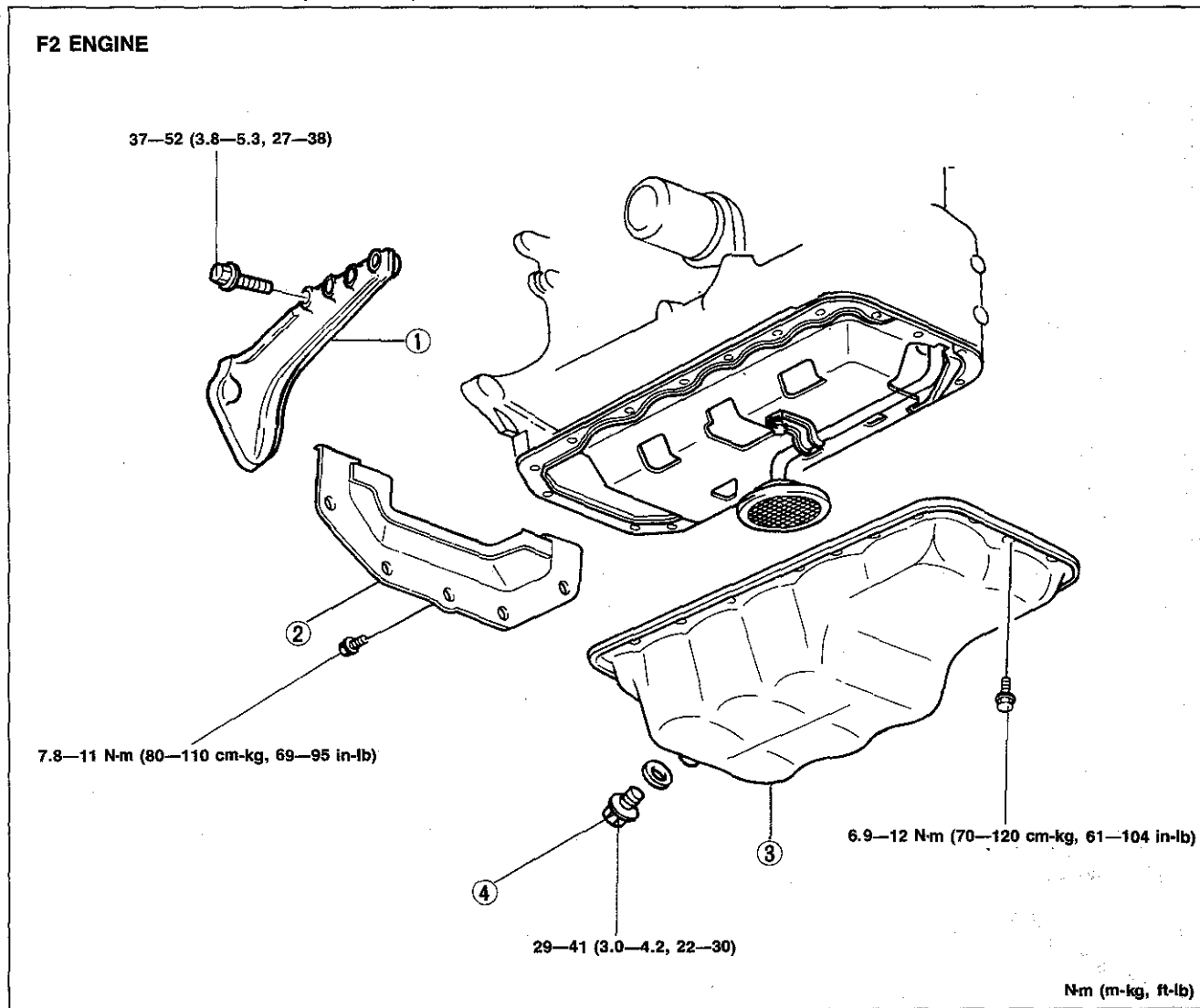
# D

## ON-VEHICLE MAINTENANCE (OIL PAN)

### OIL PAN

#### Removal

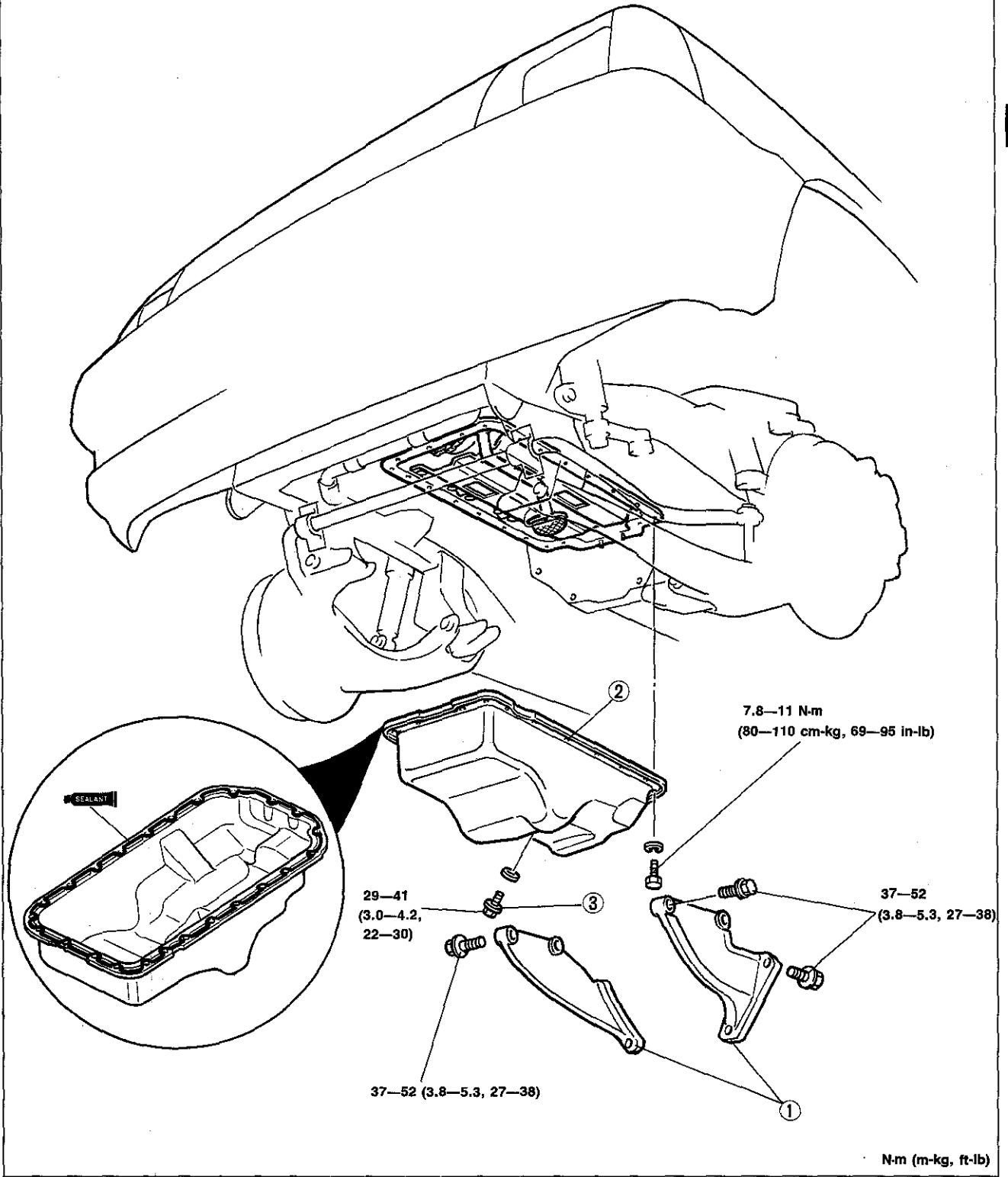
1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the undercover.
4. Remove the front differential assembly (G6 Engine: Refer to Section M) and center link (Refer to Section N).
5. Remove in the order shown in the figure, referring to the **Removal note**.
6. Inspect all parts and repair or replace as necessary.



1BU0DX-005

1. Gusset plate
2. Clutch undercover
3. Oil pan  
Inspect for cracks, deformation, or damage
4. Drain plug  
Inspect for damage to threads

G6 ENGINE



- 1. Gusset plate
- 2. Oil pan  
Inspect for cracks, deformation, or damage

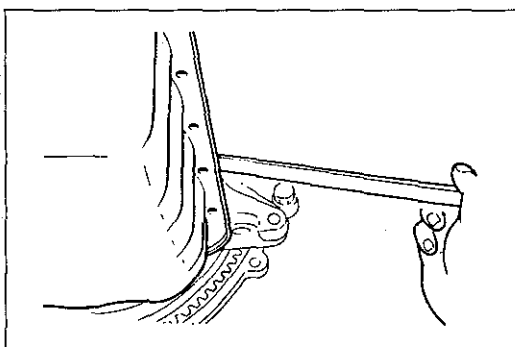
- 3. Drain plug  
Inspect for damage to threads

N-m (m-kg, ft-lb)

9BU0DX-005

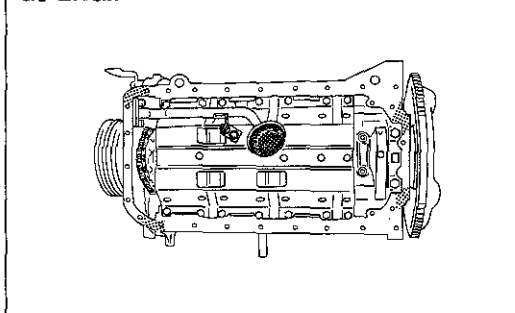
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## ON-VEHICLE MAINTENANCE (OIL PAN)



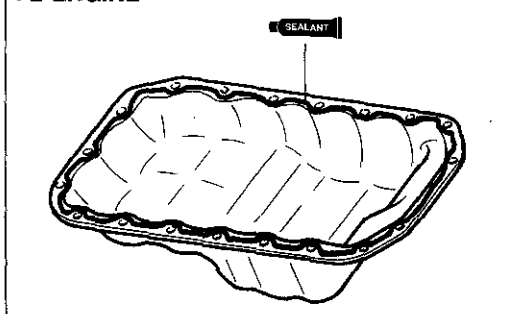
9MU0DX-018

### G6 ENGINE

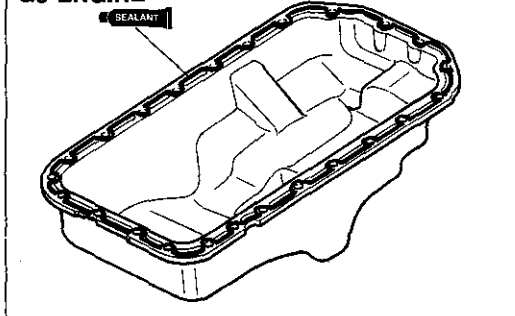


9BU0DX-010

### F2 ENGINE



### G6 ENGINE



9BU0DX-011

### Removal note

#### Oil pan

1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the cylinder block to separate them.
3. Remove the oil pan.

### Caution

**Do not bend the oil pan when prying it loose.**

### Installation

Install in the reverse order of removal referring to the **installation note**.

### Installation note

#### Oil pan

1. Remove any old sealant from the bolts and bolt holes. If the old sealant can not be removed, replace the bolts as necessary.
2. Remove any dirt or other material from the contact surfaces.
3. (With gasket)  
Apply sealant to the shaded areas shown in the figure (G6 engine). Then install a new gasket.

(Without gasket)

Apply sealant continuously to the oil pan around the inside of the bolt holes and overlap the ends.

### Caution

**a) Do not apply sealant to both the cylinder block side and oil pan side.**

**b) After the sealant is applied, the oil pan must be secured within 30 minutes.**

4. Apply locking agent to the bolt threads. (G6 engine)

### Note

**New bolts of the G6 engine do not need extra locking agent because they come with it already applied.**

5. Install the oil pan.

### Tightening torque:

**6.9—12 N·m**

**(70—120 cm·kg, 61—104 in·lb) ..... F2 Engine**

**7.8—11 N·m**

**(80—110 cm·kg, 69—95 in·lb)..... G6 Engine**

### Step After Installation

1. Add engine oil to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine oil.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil levels.

9MU0DX-030

**OIL PUMP**  
Preparation  
SST

49 S120 710

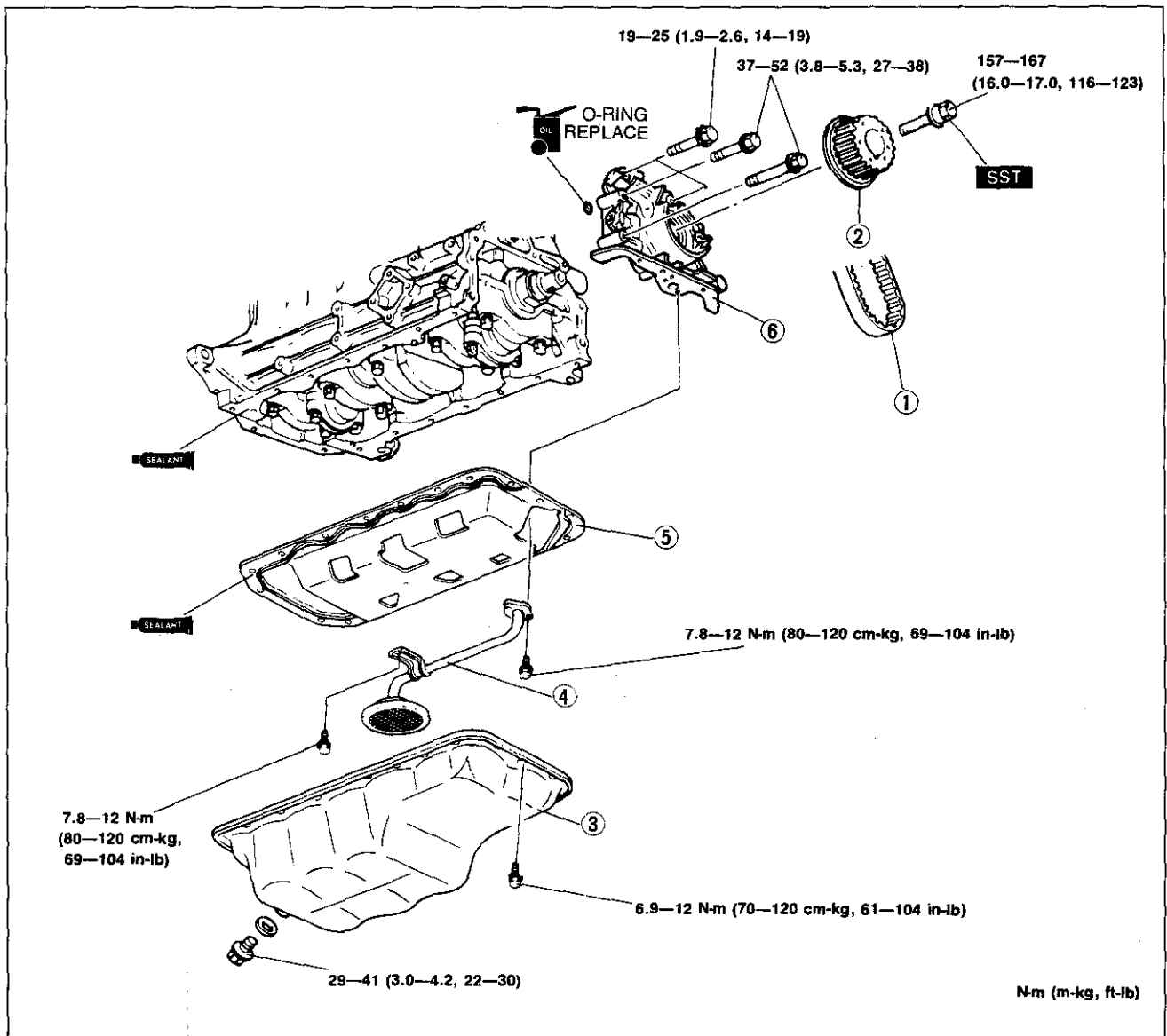
Holder, coupling  
flange



9BU0DX-015

**Removal**  
**F2 Engine**

1. Remove the engine. (Refer to Section B1.)
2. Remove in the order shown in the figure, referring to the **Removal note**.

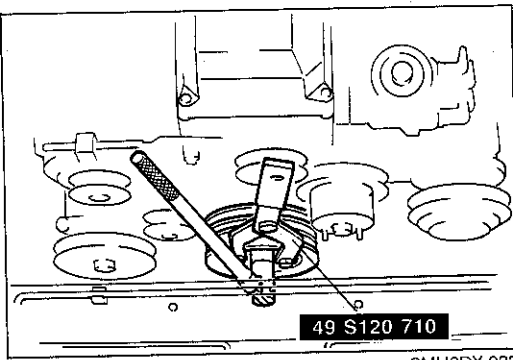


2BU0DX-001

- |                                      |                 |
|--------------------------------------|-----------------|
| 1. Timing belt (Refer to Section B1) | 4. Oil strainer |
| 2. Timing belt pulley                | 5. Stiffener    |
| 3. Oil pan                           | 6. Oil pump     |

# D

## ON-VEHICLE MAINTENANCE (OIL PUMP)



### Removal note

#### Crankshaft pulley lock bolt

Hold the crankshaft pulley with the **SST** and remove the lock bolt.

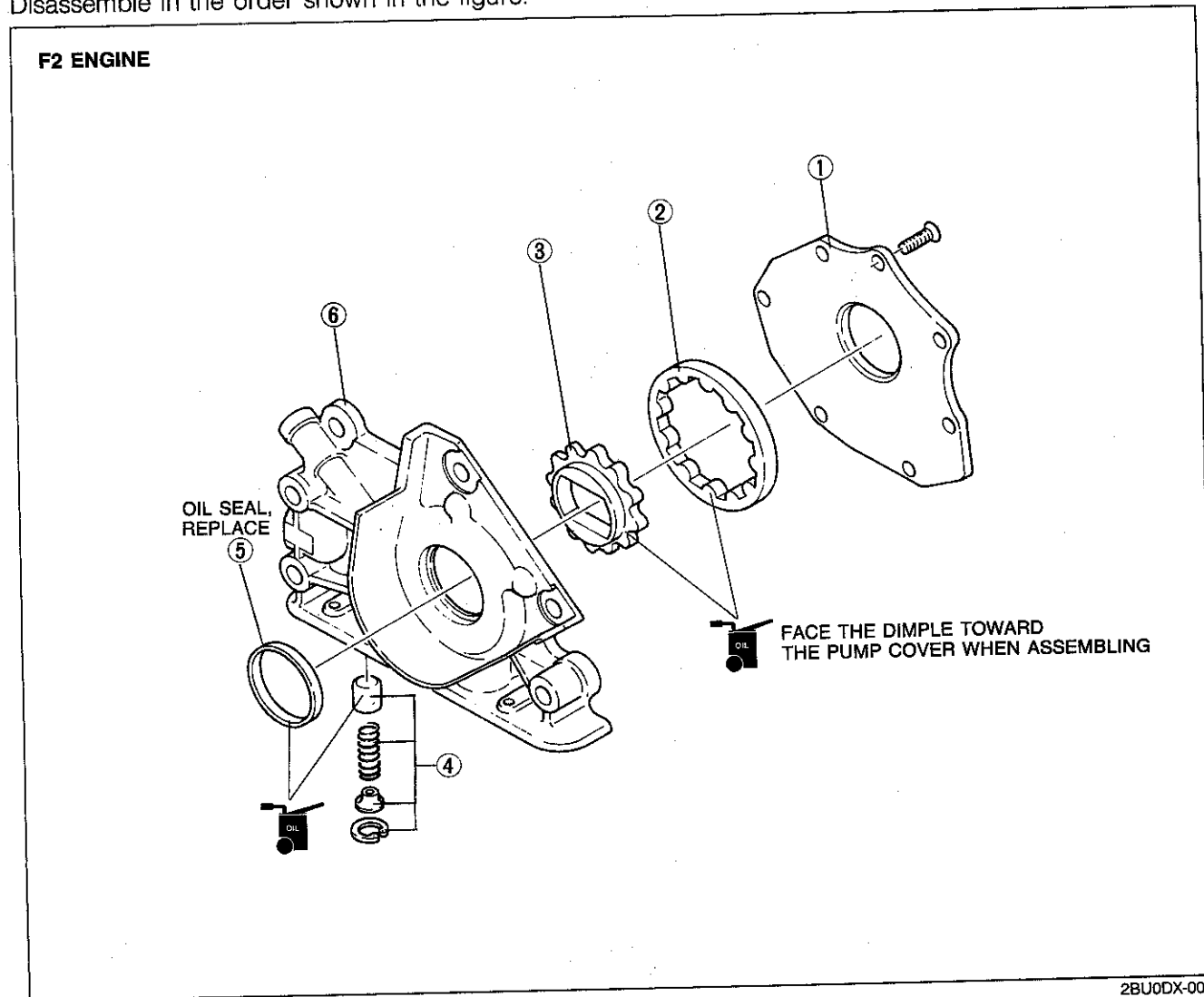
### Removal

#### G6 Engine

1. Remove the engine. (Refer to Section B2.)
2. Remove the chain case, referring to Section B2 (TIMING CHAIN ON-VEHICLE MAINTENANCE).

### Disassembly

Disassemble in the order shown in the figure.

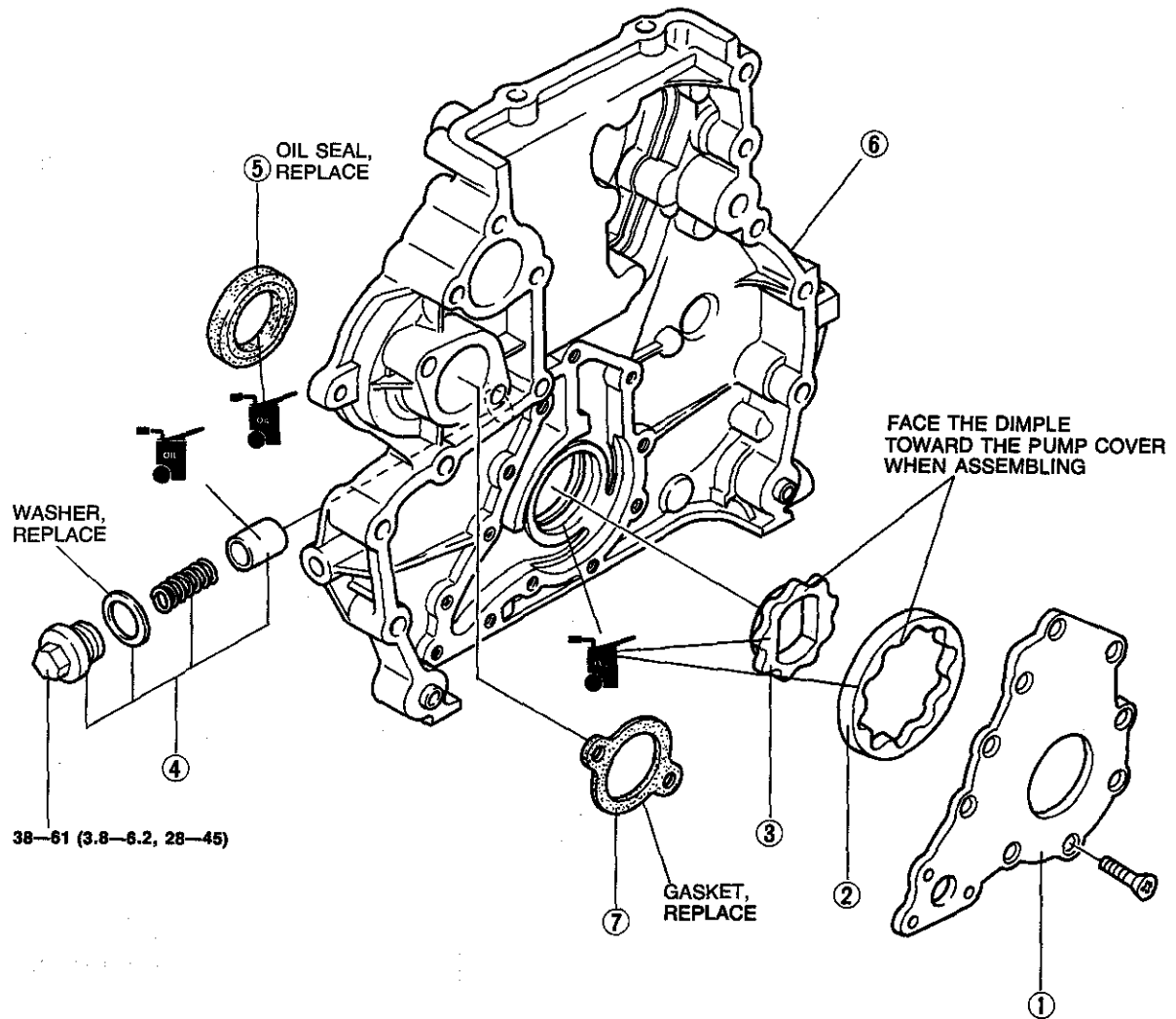


1. Pump cover
2. Outer rotor
3. Inner rotor

4. Pressure relief valve
5. Oil seal
6. Oil pump body



G6 ENGINE



N-m (m-kg, ft-lb)

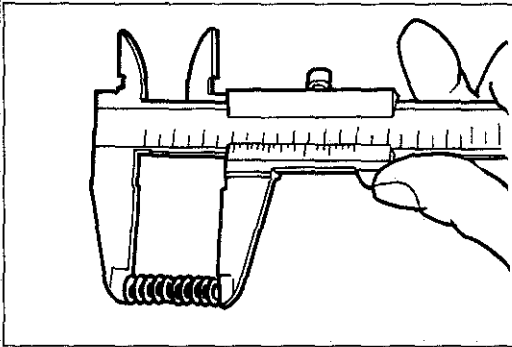
9MU0DX-025

- 1. Pump cover
- 2. Outer rotor
- 3. Inner rotor

- 4. Pressure relief valve
- 5. Oil seal
- 6. Oil pump body
- 7. Water inlet pipe gasket

# D

## ON-VEHICLE MAINTENANCE (OIL PUMP)



9MU0DX-026

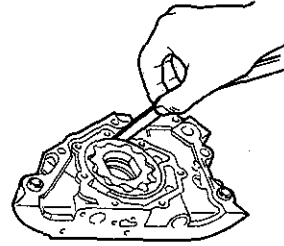
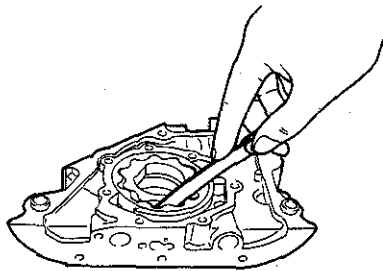
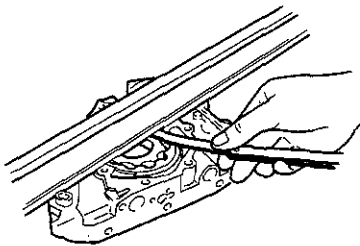
### Inspection

1. Check the following and replace any faulty parts.
  - (1) Distorted or damaged oil pump body or cover
  - (2) Worn or damaged plunger
  - (3) Weak or broken plunger spring

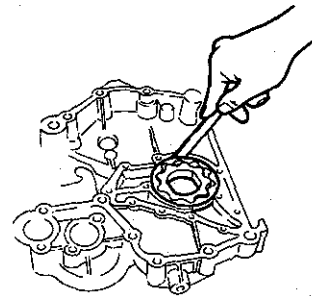
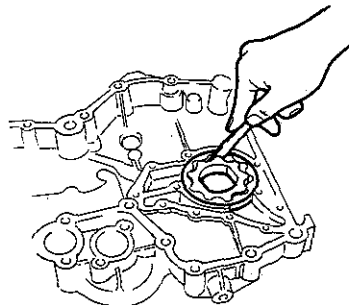
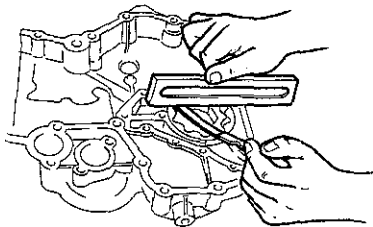
**Free length: 46.4mm (1.827 in)**

2. Measure the following clearances.

### F2 ENGINE



### G6 ENGINE



9BU0DX-012

**Side clearance:**  
0.10mm (0.0039 in) max.

**Tooth tip clearance:**  
0.18mm (0.0071 in) max.

**Outer rotor to pump body:**  
0.20mm (0.0078 in) max.

### Assembly

Assemble in the reverse order of disassembly, referring to the **Assembly note**.

### Assembly note

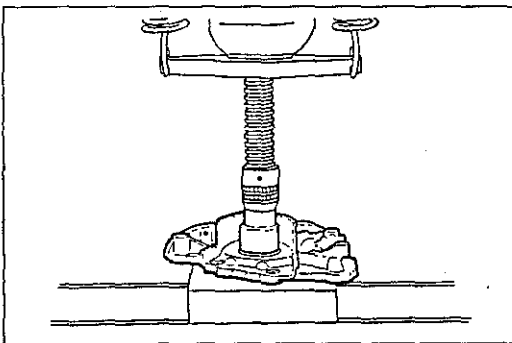
#### Oil seal

1. Apply engine oil to the pump body and new oil seal lip.
2. Press the oil seal in evenly using a suitable pipe.

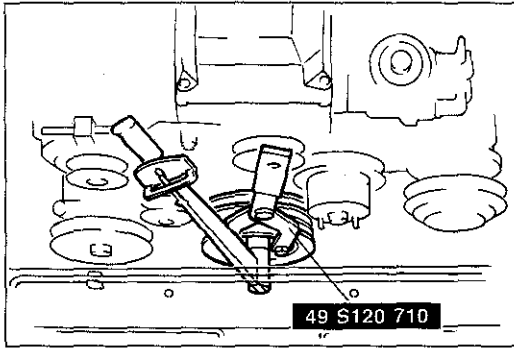
**Oil seal outer diameter: 48mm (1.89 in)... F2 Engine**  
**60mm (2.36 in)... G6 Engine**

### Caution

The oil seal must be pressed in until it is flush with the edge of the oil pump body.



9MU0DX-028



9BU0DX-013

**Installation**

Install in the reverse order of removal, referring to the **Installation note**.

**Installation note****Crankshaft pulley lock bolt**

Install the crankshaft lock bolt with the **SST**.

**Tightening torque:**

**157—167 N·m (16.0—17.0 m·kg, 116—123 ft·lb)**

**Steps After Installation**

1. Add engine oil and coolant to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine oil or coolant.
  - (2) Perform engine adjustment if necessary.
  - (3) Recheck the oil and coolant levels.

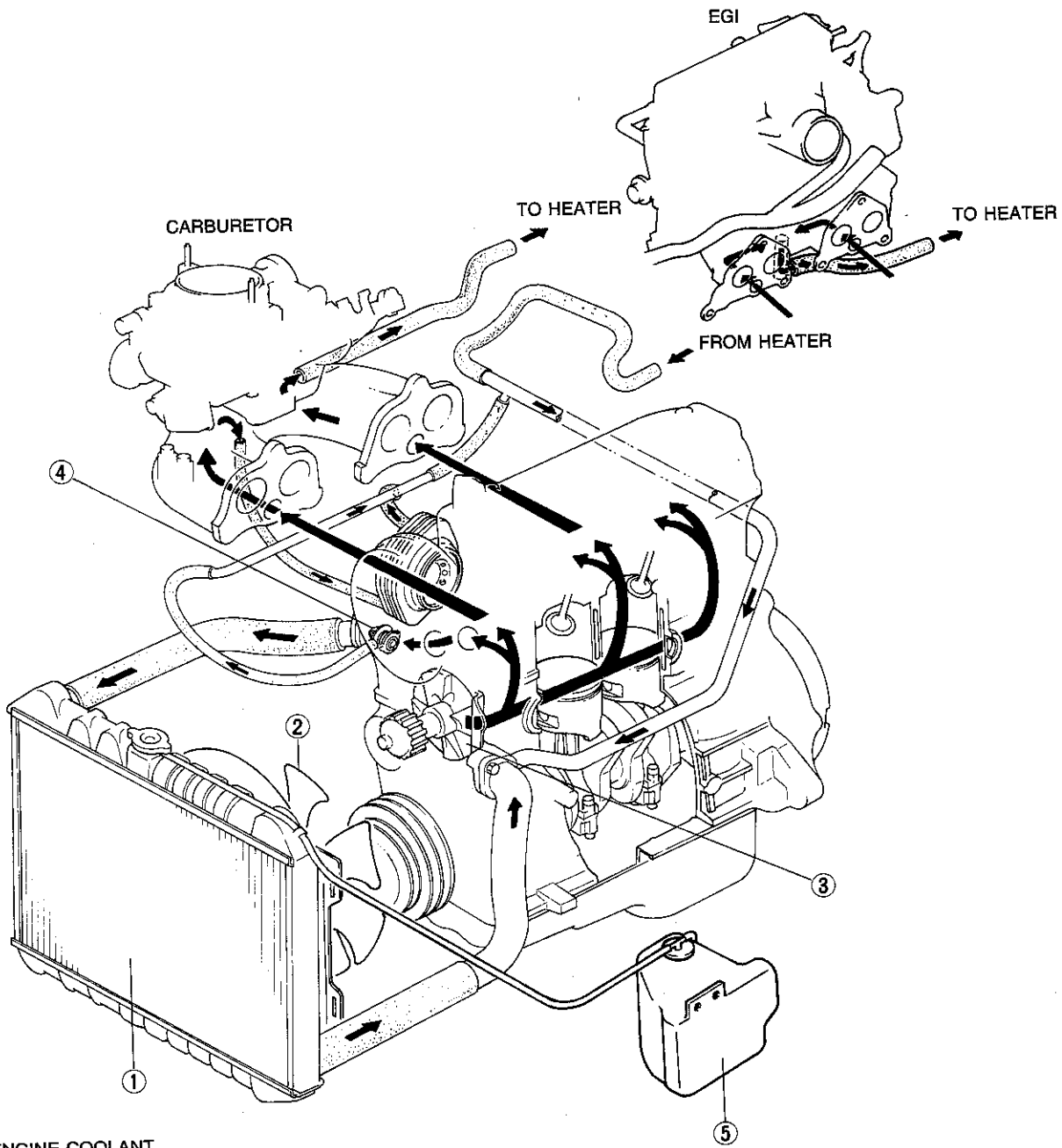
# COOLING SYSTEM

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2BU0EX-001

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B2200 (F2 ENGINE)



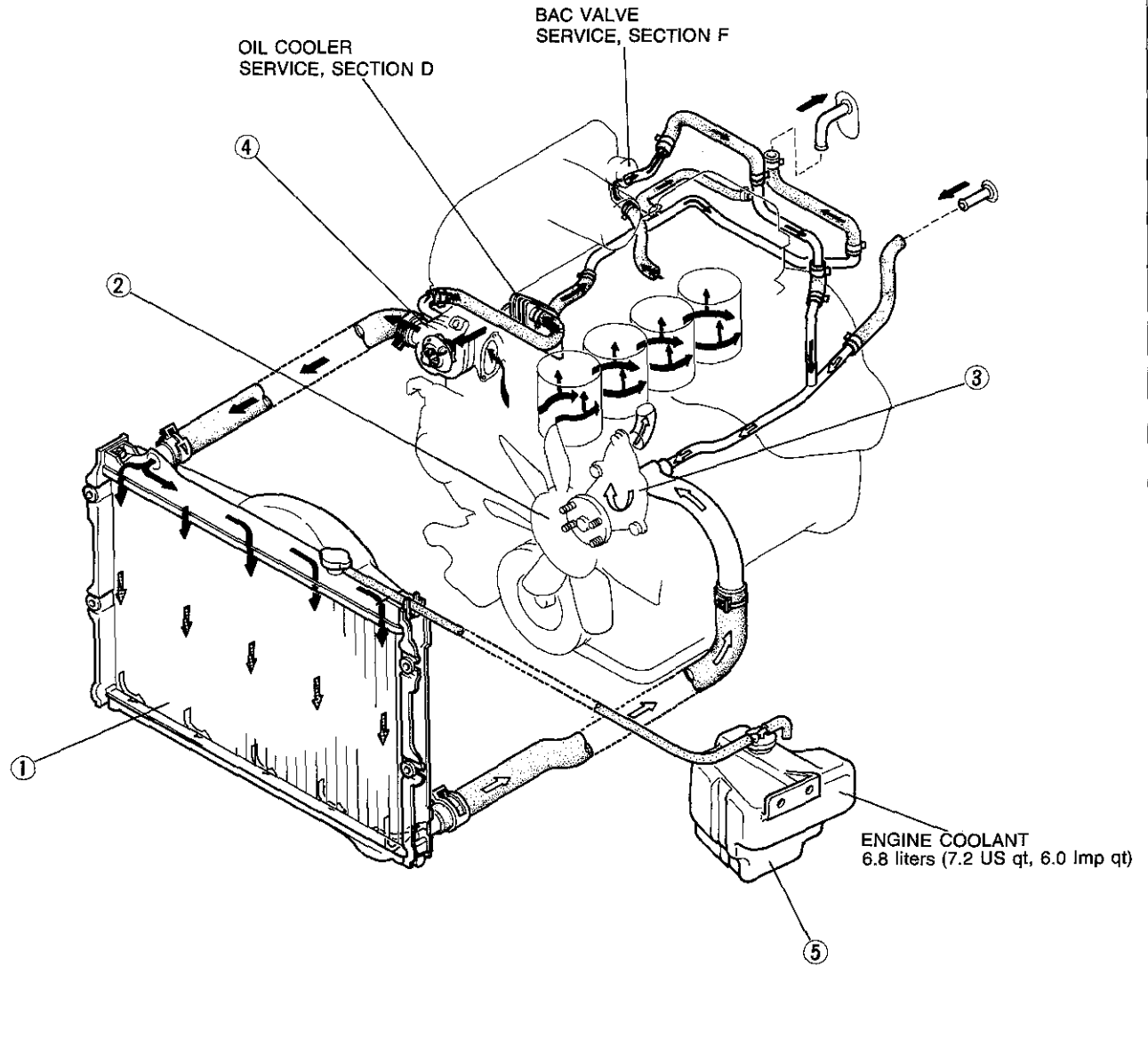
ENGINE COOLANT  
 WITH HEATER: 7.5 liters (7.9 US qt, 6.61 Imp qt)  
 WITHOUT HEATER: 7.0 liters (7.4 US qt, 6.2 Imp qt)

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B2600i (G6 ENGINE)



2MU0EX-003

- |   |   |
|---|---|
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|---|---|

## OUTLINE

## SPECIFICATIONS

Item		Engine model	F2	G6
Cooling system			Water-cooled, forced circulation	
Coolant capacity	liters (US qt, Imp qt)	With heater	7.5 (7.9, 6.6)	7.5 (7.9, 6.6)
		Without heater	6.9 (7.3, 6.1)	6.9 (7.3, 6.1)
Water pump	Type		Centrifugal	
	Water seal		Unified mechanical seal	
Thermostat	Type		Wax	Wax, two-stage
	Opening temperature	°C (°F)	86.5—89.5 (188—193)	Main: 86.5—89.5 (188—193) Sub : 83.5—86.5 (182—188)
	Full-open temperature	°C (°F)	100 (212)	100 (212)
	Full-open lift	mm (in)	8.5 (0.33) min.	Main: 8.0 (0.31) min. Sub : 1.5 (0.06) min.
Radiator	Type		Corrugated fin	
	Cap valve opening pressure	kPa (kg/cm <sup>2</sup> , psi)	74—103 (0.75—1.05, 11—15)	
Cooling fan	Type		Thermo-modulated	
	Switching temperature OFF → ON °C (°F)	M/T	55—65 (131—149)..... linear	68—92 (154—198)..... linear
		A/T	65—75 (149—167)..... linear	—
	Number of blades	M/T	7	8
		A/T	8	—
	Outer diameter of blade mm (in)	M/T	380 (15.0)	410 (16.1)
A/T		410 (16.1)	—	

1BU0EX-001


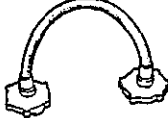

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Overheating</b>	Insufficient coolant	Add	E— 5
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	E— 7
	Radiator cap malfunction	Replace	E— 6
	Cooling fan malfunction	Replace	E— 6
	Thermostat malfunction	Replace	E—10
	Water passage clogged	Clean	E— 5
	Water pump malfunction	Replace	E— 8
<b>Corrosion</b>	Impurities in coolant	Replace	E— 5

9MU0EX-005

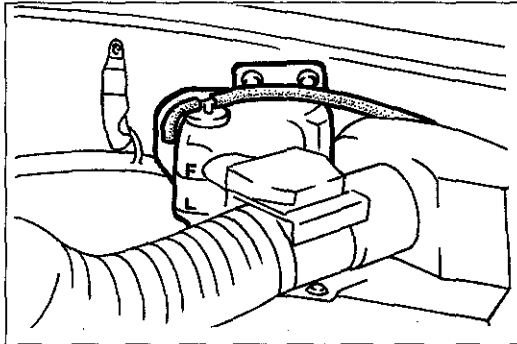
ON-VEHICLE INSPECTION

PREPARATION  
SST

<p>49 9200 145</p> <p>Radiator cap tester adapter set</p> 	<p>49 9200 146</p> <p>Adapter A (Part of 49 9200 145)</p> 	<p>49 9200 147</p> <p>Adapter B (Part of 49 9200 145)</p> 
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9MU0EX-006

E



9MU0EX-007

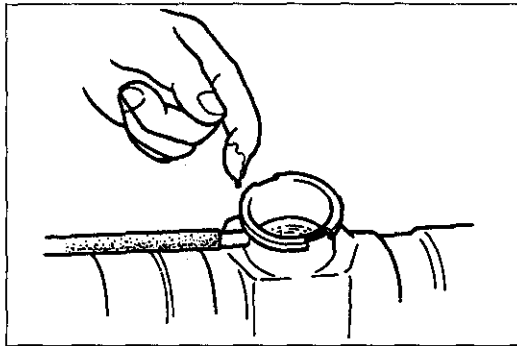
ENGINE COOLANT

Coolant Level (Engine cold)

1. Check that the coolant level is near the radiator inlet port.
2. Check that the coolant level in the coolant reservoir is between the FULL and LOW marks.  
Add coolant if necessary.

Warning

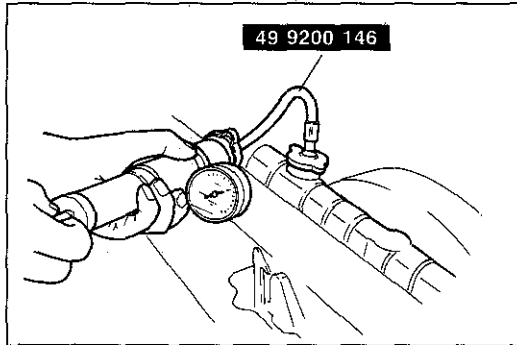
- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when removing it.



9MU0EX-008

Coolant Quality

1. Check that there is no build up of rust or scales around the radiator cap or radiator filler neck.
2. Check that coolant is free of oil.
3. Replace the coolant if necessary.



9MU0EX-009

Coolant Leakage

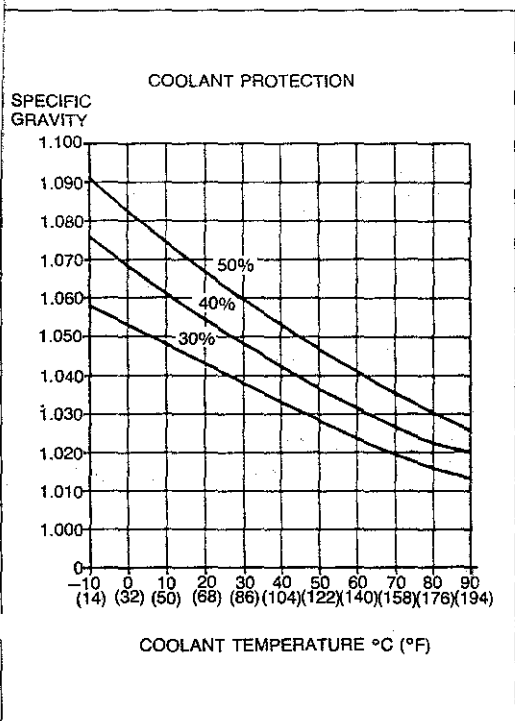
1. Connect a tester and SST to the radiator inlet port.
2. Apply **103 kPa (1.05 kg/cm<sup>2</sup>, 15 psi)** pressure to the system.
3. Check that the pressure is held.  
If not, check for coolant leakage.

Warning

When removing either the radiator cap or the tester, loosen it slowly until the pressure in the radiator is released, and then remove it.



## REPLACEMENT, AIR BLEEDING AND REFILLING SYSTEM



### Coolant Protection

#### Caution

- a) Do not use alcohol- or methanol-based coolant.
- b) Use only soft (demineralized) water in the coolant mixture.

1. Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.
2. Determine the coolant protection by referring to the graph shown.  
If the coolant protection is not proper, add water or coolant.

### Antifreeze solution mixture percentage

Coolant protection	Volume percentage		Gravity at 20°C (68°F)
	Water	Coolant	
Above -16°C (3°F)	65	35	1.054
Above -26°C (-15°F)	55	45	1.066
Above -40°C (-40°F)	45	55	1.078

05U0EX-010

## REPLACEMENT

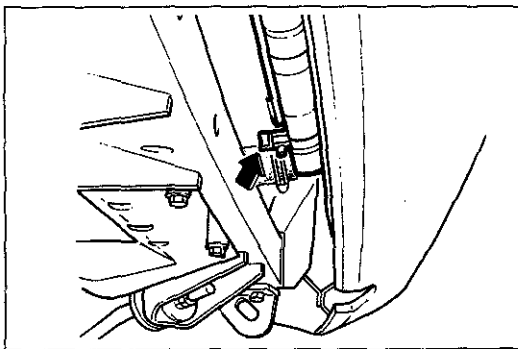
#### Warning

- a) Never open the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when loosening.
- c) When removing the radiator cap, loosen it slowly to the first stop until the pressure in the radiator is released, and then remove it.
- d) Use caution when draining hot coolant.

#### Caution

- a) Do not use alcohol- or methanol-based coolant.
- b) Use only soft (demineralized) water in the coolant mixture.
- c) Before loosening the radiator drain plug, verify that the radiator drain hose faces straight down.

1. Remove the radiator cap and loosen the drain plug.
2. Drain the coolant into a suitable container.
3. Fill with the proper amount and mixture of ethylene glycol-based coolant.



## AIR BLEEDING AND REFILLING SYSTEM

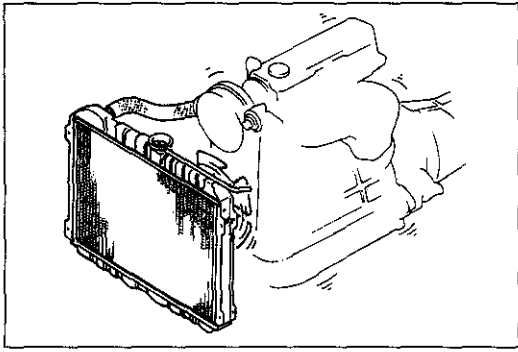
When the coolant is drained, bleed the cooling system after refilling it.

1. Slowly pour the coolant into the radiator up to the coolant filler port.

**Filling pace: 2 l (2.1 US qt, 1.8 Imp qt)/min. max.**

2. Fill the coolant reservoir up to the FULL level.
3. Install the radiator cap securely and start the engine.

2BU0EX-005



2BU0EX-006

- Run the engine at idle speed until it reaches normal operating temperature.

**Caution**

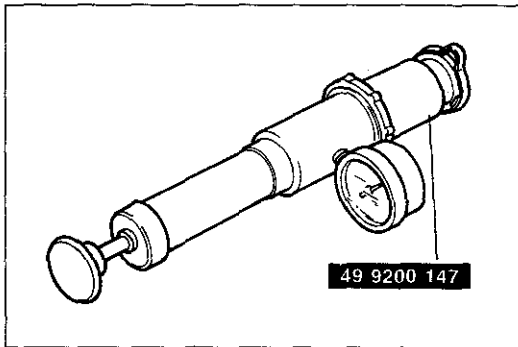
**If the temperature increase beyond normal, there is excessive air in the system. Stop the engine, allow the engine to cool, and repeat Steps 1—3.**

- Run the engine above idle several times as specified.

**Speed: 2,200—2,800 rpm × 5 sec.**

**E**

- Stop the engine and wait till the system is cooled down. Remove the radiator cap and check the coolant level. If the coolant level has dropped, repeat the operation from Step 1.



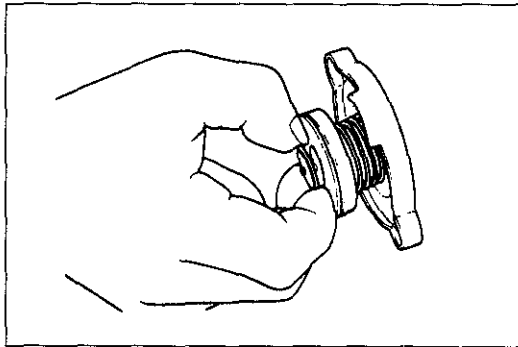
49 9200 147

9MU0EX-013

**RADIATOR CAP**

**Radiator Cap Valve**

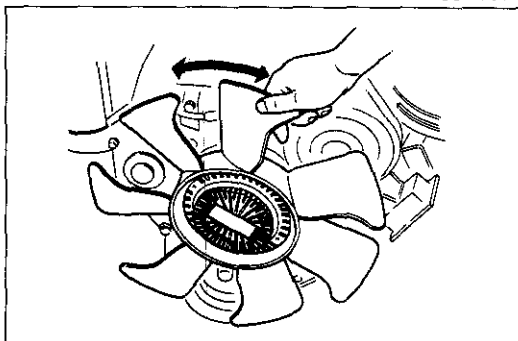
- Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
- Attach the radiator cap to a tester with the **SST**. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm<sup>2</sup>, 11—15 psi)**.
- Wait about 10 seconds; then check that the pressure has not decreased.



9MU0EX-014

**Negative Pressure Valve**

- Pull the negative-pressure valve to open it. Check that it closes completely when released.
- Check for damage on the contact surfaces and for cracked or deformed seal packing.
- Replace the radiator cap if necessary.



9MU0EX-015

**COOLING FAN**

**Inspection**

- Inspect the following items. Replace if necessary.
  - Fluid leakage from the fan-drive clutch
  - Deformation of the bimetal
  - Excessive play of the cooling fan bearing
  - Grease leakage from the cooling fan bearing
- When the engine is warm, turn the cooling fan by hand and check that resistance is felt. Replace the fan-drive clutch if necessary.

# ON-VEHICLE MAINTENANCE (RADIATOR)

## ON-VEHICLE MAINTENANCE

### RADIATOR

#### Removal, Inspection and Installation

1. Drain the engine coolant.
2. Remove in the order shown in the figure.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal.

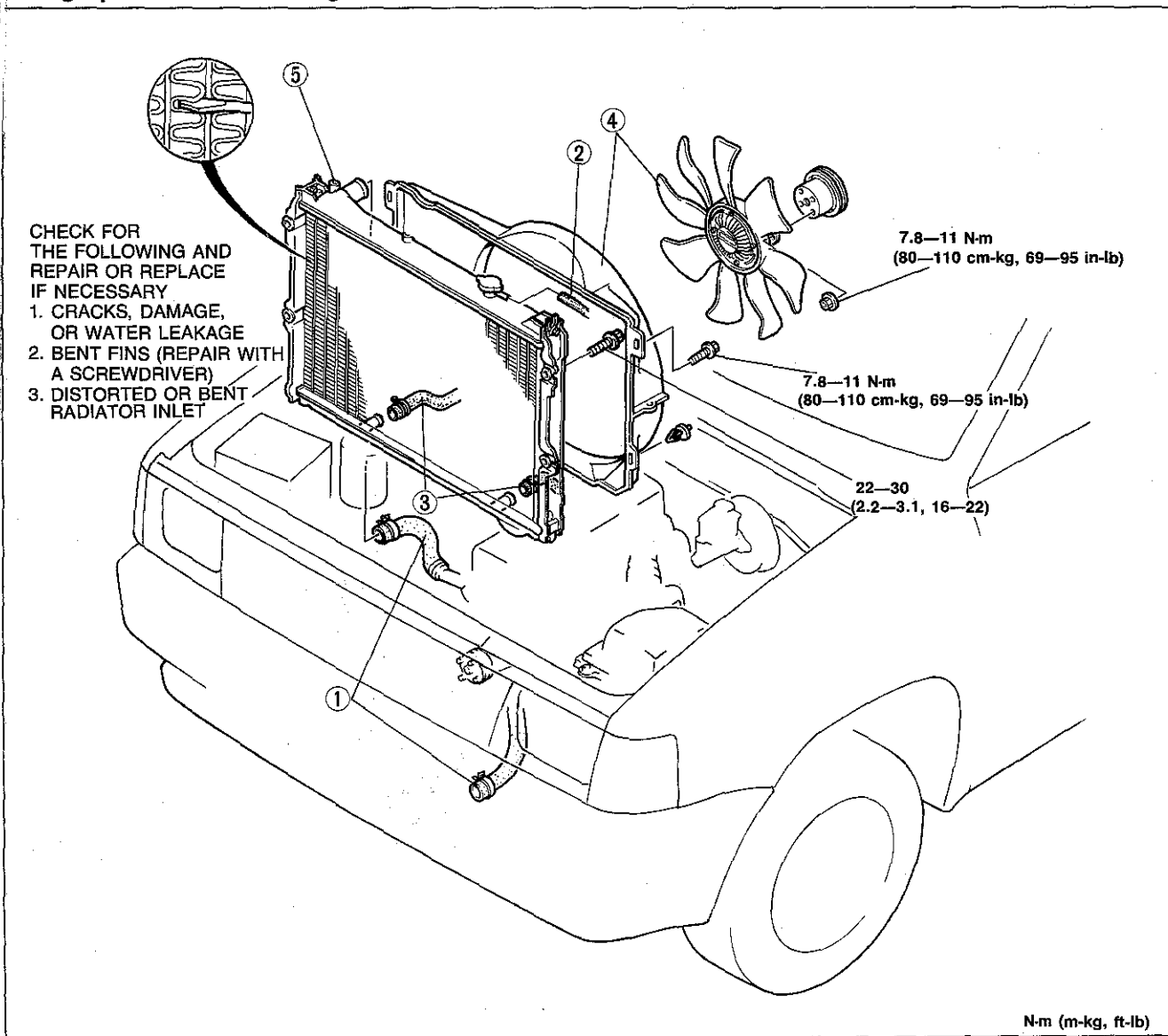
#### Caution

After radiator cowling installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowling.

If the fan touches the cowling, adjust the radiator cowling mounting position.

#### Note

Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.



1. Upper and lower radiator hoses
2. Coolant reservoir hose
3. ATF hose (A/T)

4. Cooling fan and radiator cowling
5. Radiator

**WATER PUMP**

**Removal, Inspection, and Installation**

1. Disconnect the negative battery cable.
2. Turn the crankshaft so that the No.1 cylinder is at TDC of compression. (F2 Engine)
3. Drain the engine coolant.
4. Remove in the order shown in the figure.
5. Inspect all parts and repair or replace as necessary.
6. Install in the reverse order of removal.

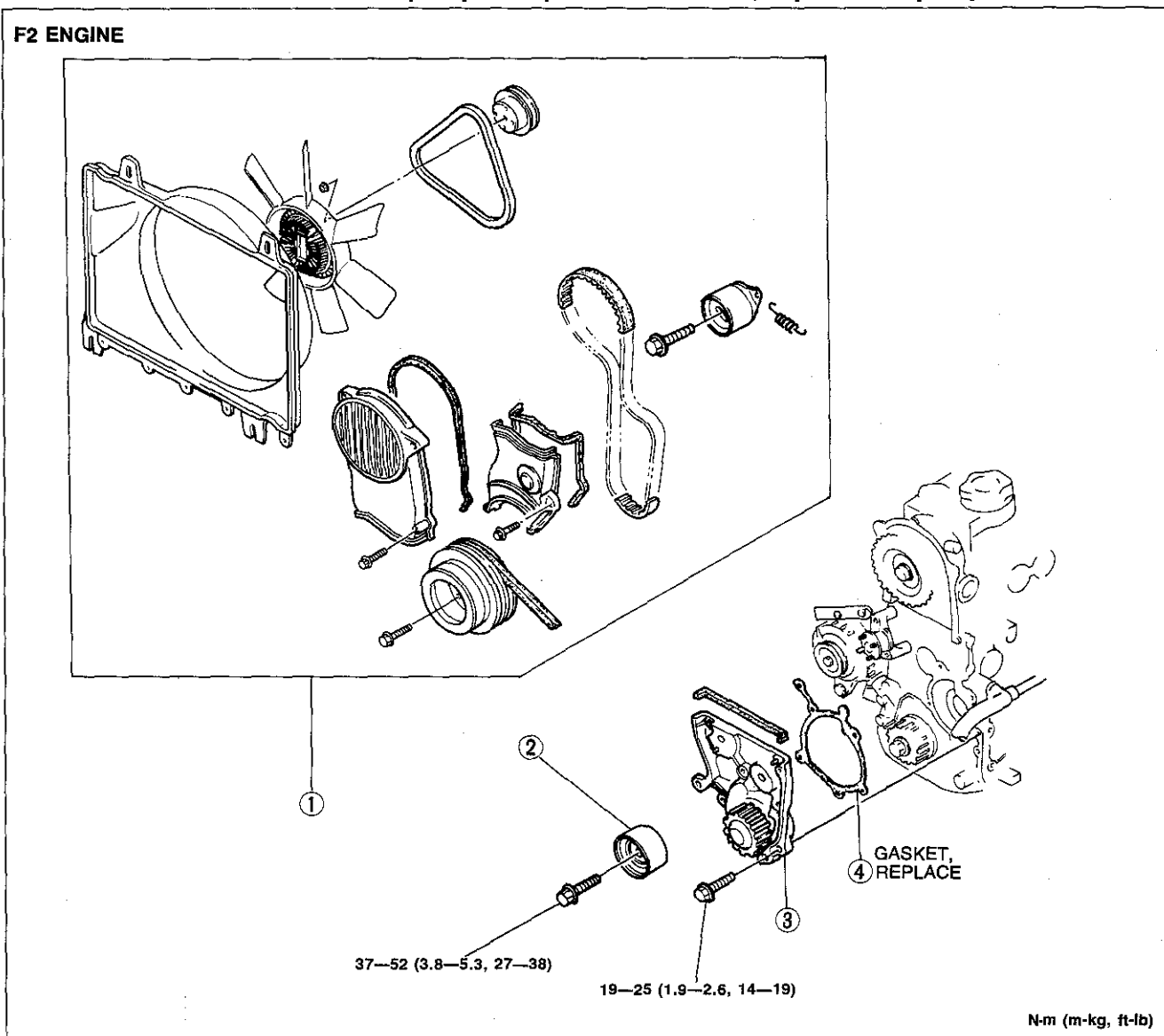
**Caution**

After radiator cowling installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowling.

If the fan touches the cowling, adjust the radiator cowling mounting position.

**Note**

Do not disassemble the water pump. If a problem is found, replace the pump as a unit.



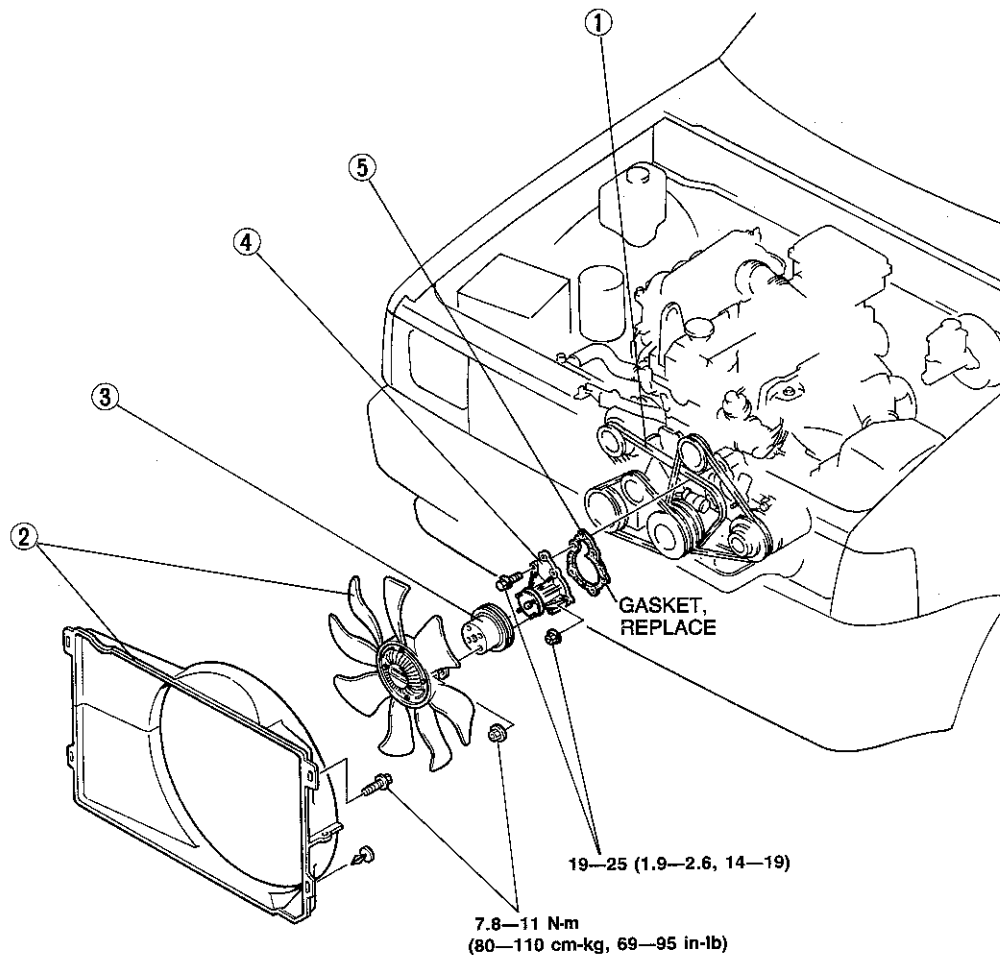
1. Timing belt (Refer to Section B1.)
2. Timing belt idler pulley

3. Water pump  
Inspect for body cracks and damaged gasket surface
4. Gasket

1BU0EX-003

# ON-VEHICLE MAINTENANCE (WATER PUMP)

G6 ENGINE



9MU0EX-019

- 1. Drive belt  
Adjustment ..... Section B2
- 2. Cooling fan and radiator cowling
- 3. Water pump pulley

- 4. Water pump  
Inspect body cracks and damaged gasket  
surface
- 5. Gasket

## Steps After Installation

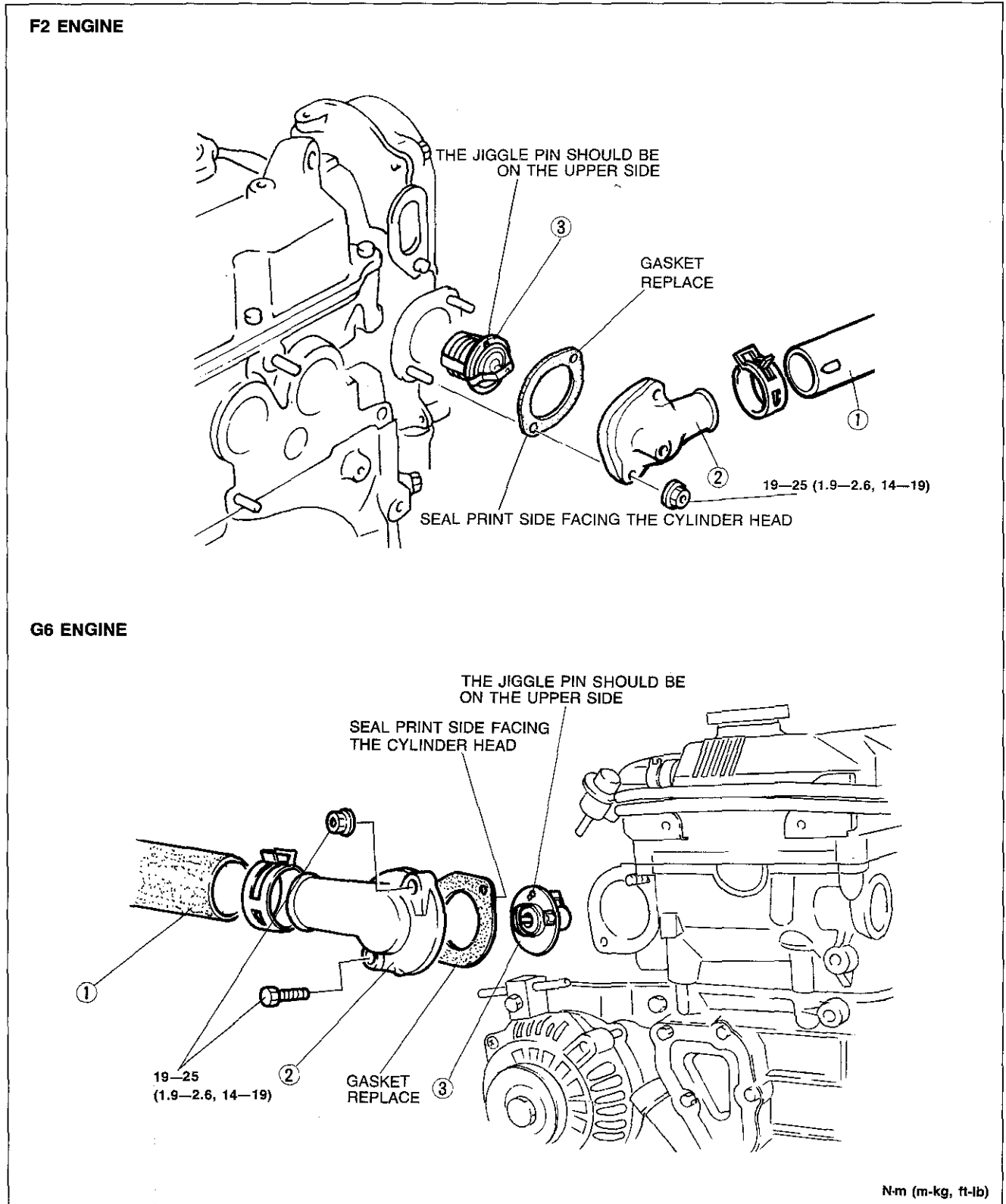
- 1. Add engine coolant to the specified levels.
- 2. Connect the negative battery cable.
- 3. Start the engine and do the following:
  - (1) Check for leakage of engine coolant.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the coolant levels.

9MU0EX-020

THERMOSTAT

Removal

1. Drain the engine coolant.
2. Remove in the order shown in the figure.

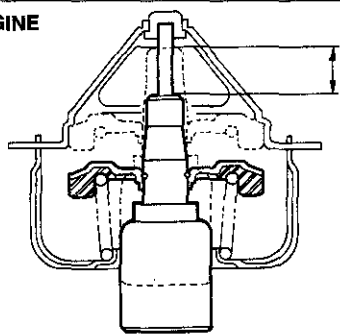


1. Upper radiator hose
2. Thermostat cover

3. Thermostat Inspection ..... page E-12

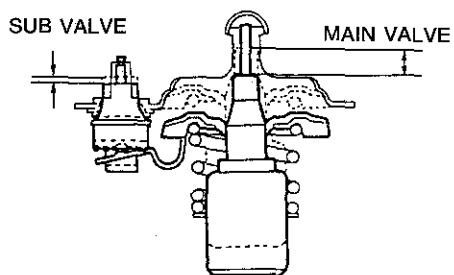
## ON-VEHICLE MAINTENANCE (THERMOSTAT)

F2 ENGINE



9BU0EX-005

G6 ENGINE



9BU0EX-006

**Inspection**

Check the thermostat and replace if necessary.

1. Visually check that the valve is airtight.
2. Place the thermostat in water with a thermometer.  
Increase the water temperature, and check the following.

Item	Engine	F2	G6
Initial opening temperature °C (°F)		86.5—89.5 (188—193)	Main: 86.5—89.5 (188—193) Sub : 83.5—86.5 (182—188)
Full-open temperature °C (°F)		100 (212)	100 (212)
Full-open lift mm (in)		8.5 (0.33) min.	Main: 8.0 (0.31) min. Sub : 1.5 (0.06) min.

**Installation**

Install in the reverse order of removal.

**Note**

**Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.**

9MU0EX-024

**Steps After Installation**

1. Add engine coolant to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine coolant.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the coolant levels.

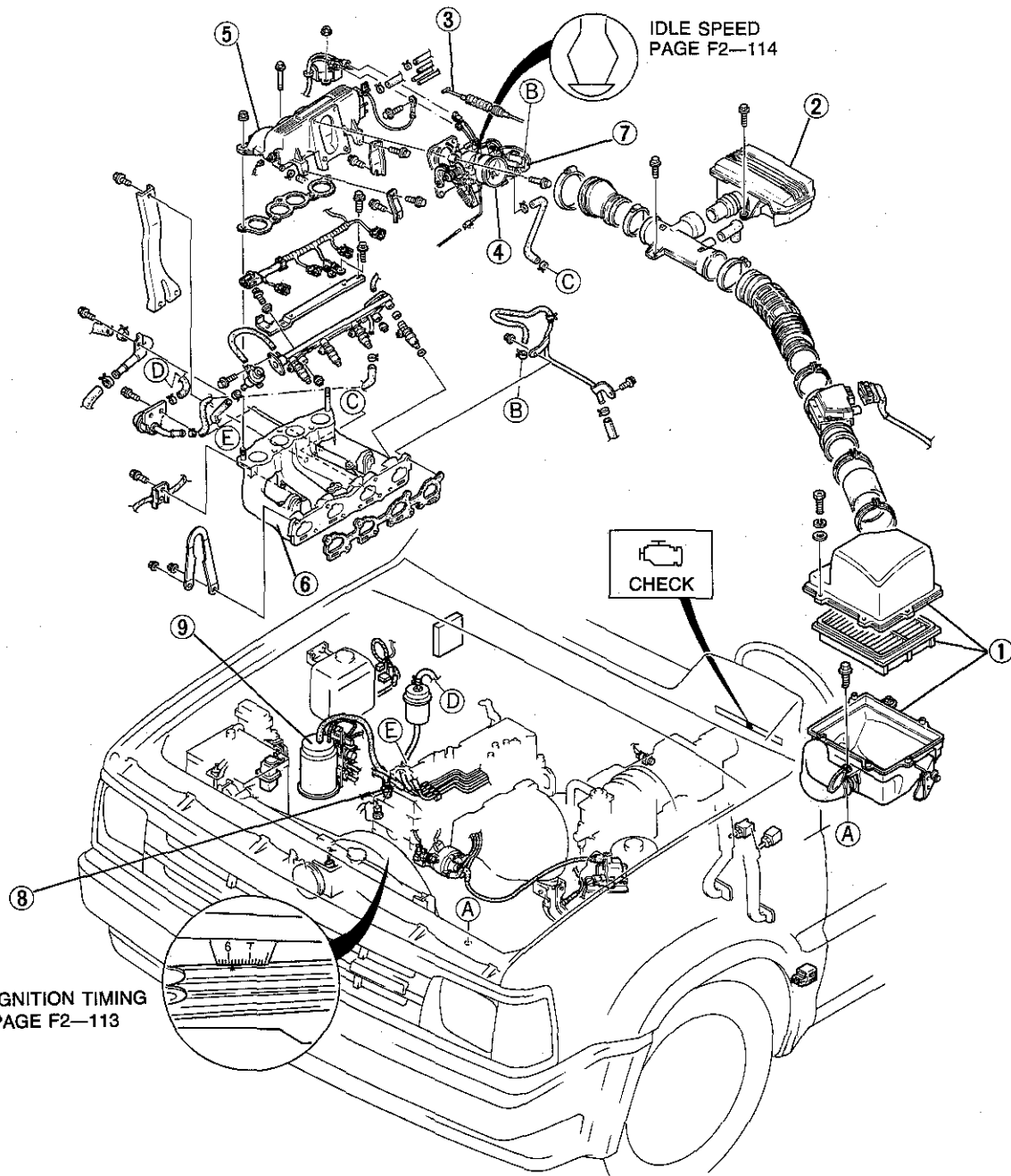
9MU0EX-025

# FUEL AND EMISSION CONTROL SYSTEMS (EGI)

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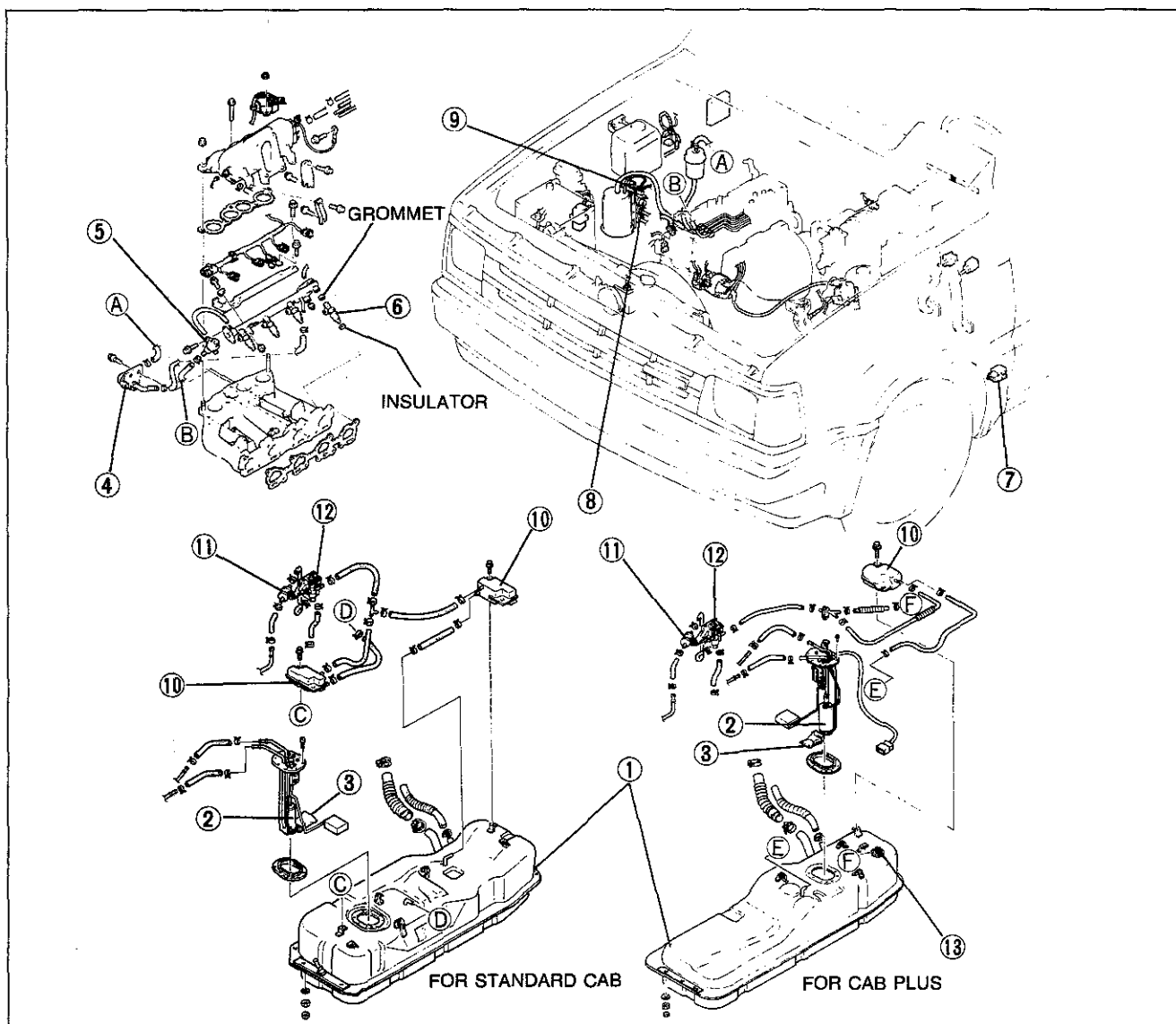


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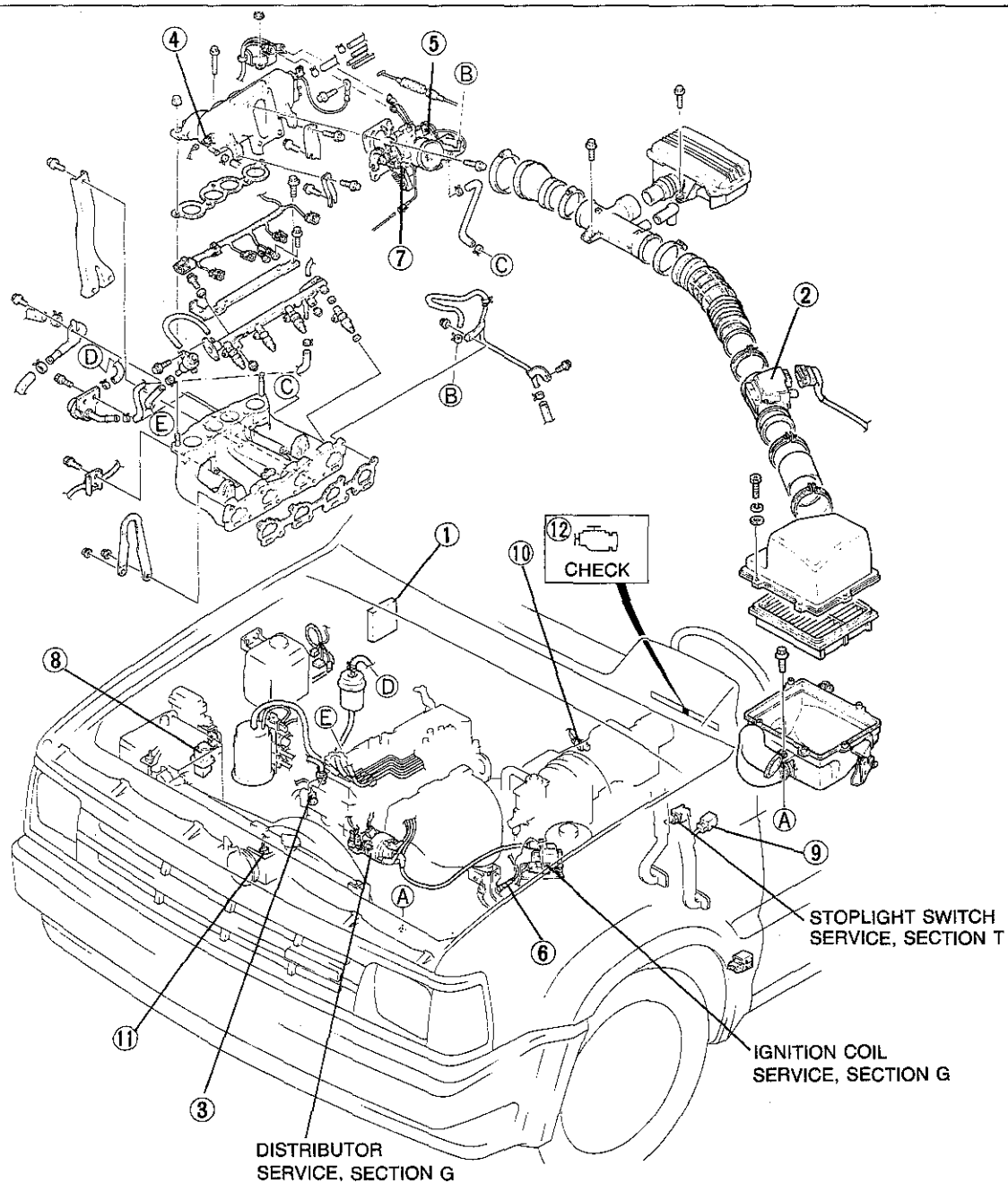
- |   |   |
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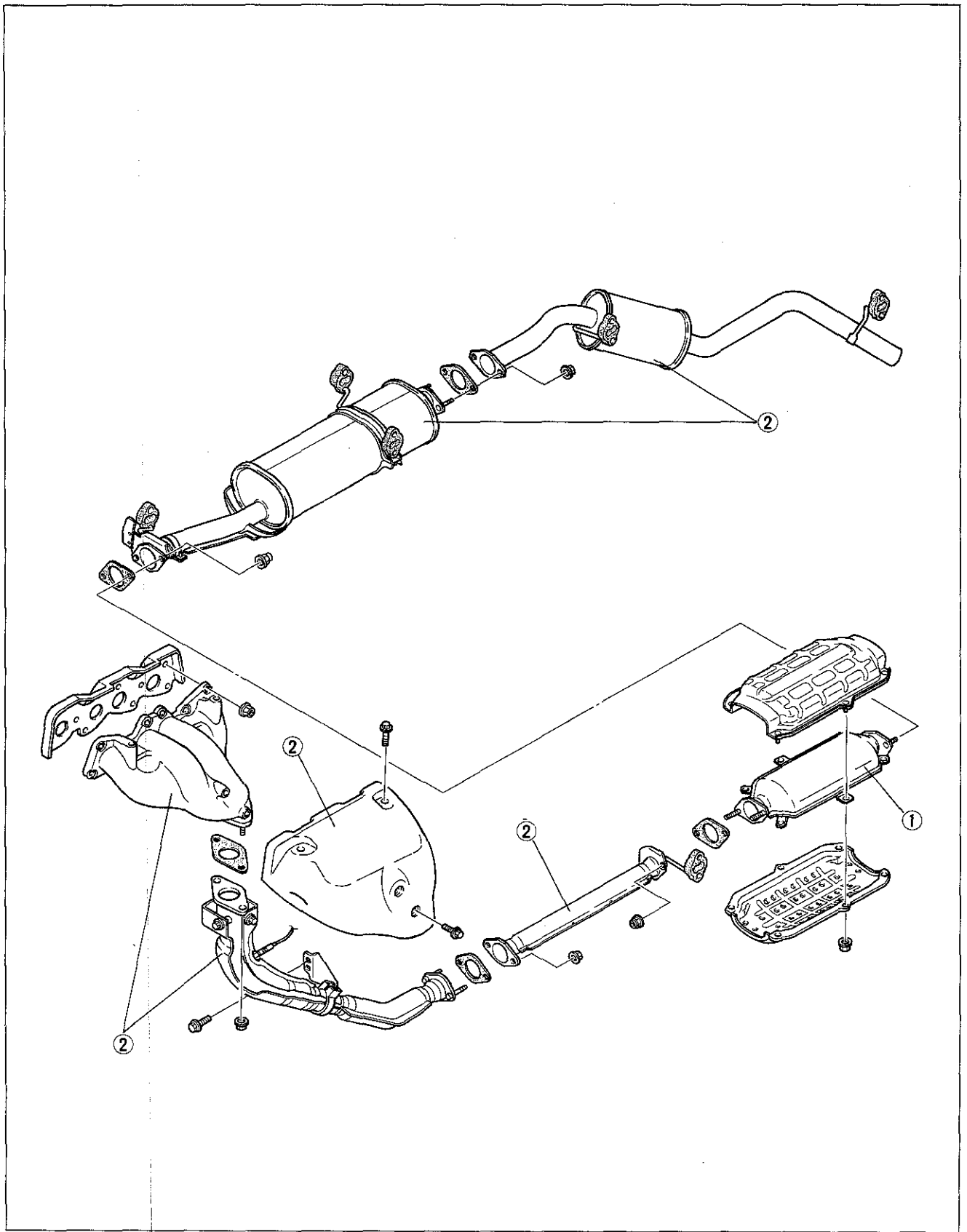
2BU0F2-042

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2BU0F2-043

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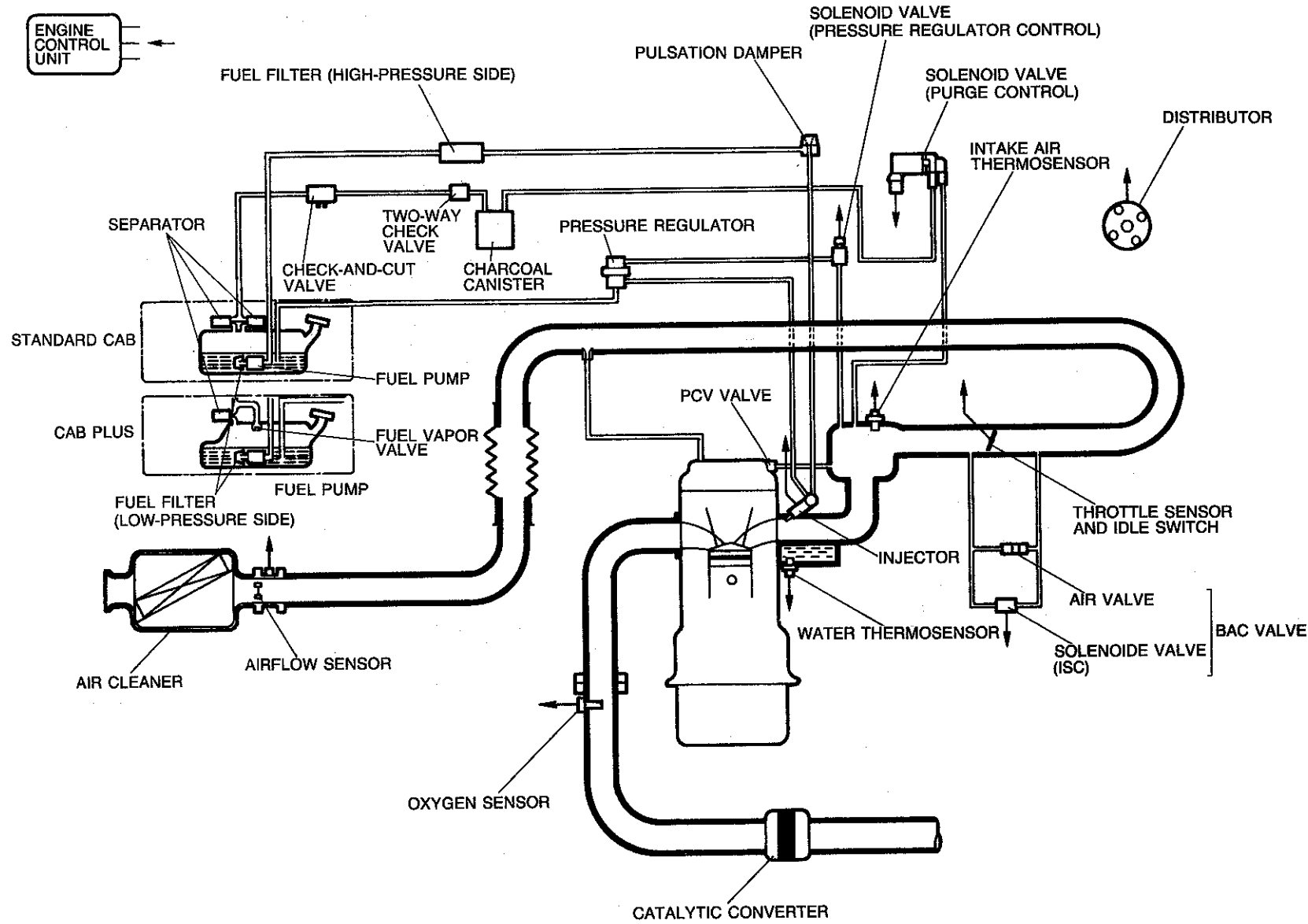


F2

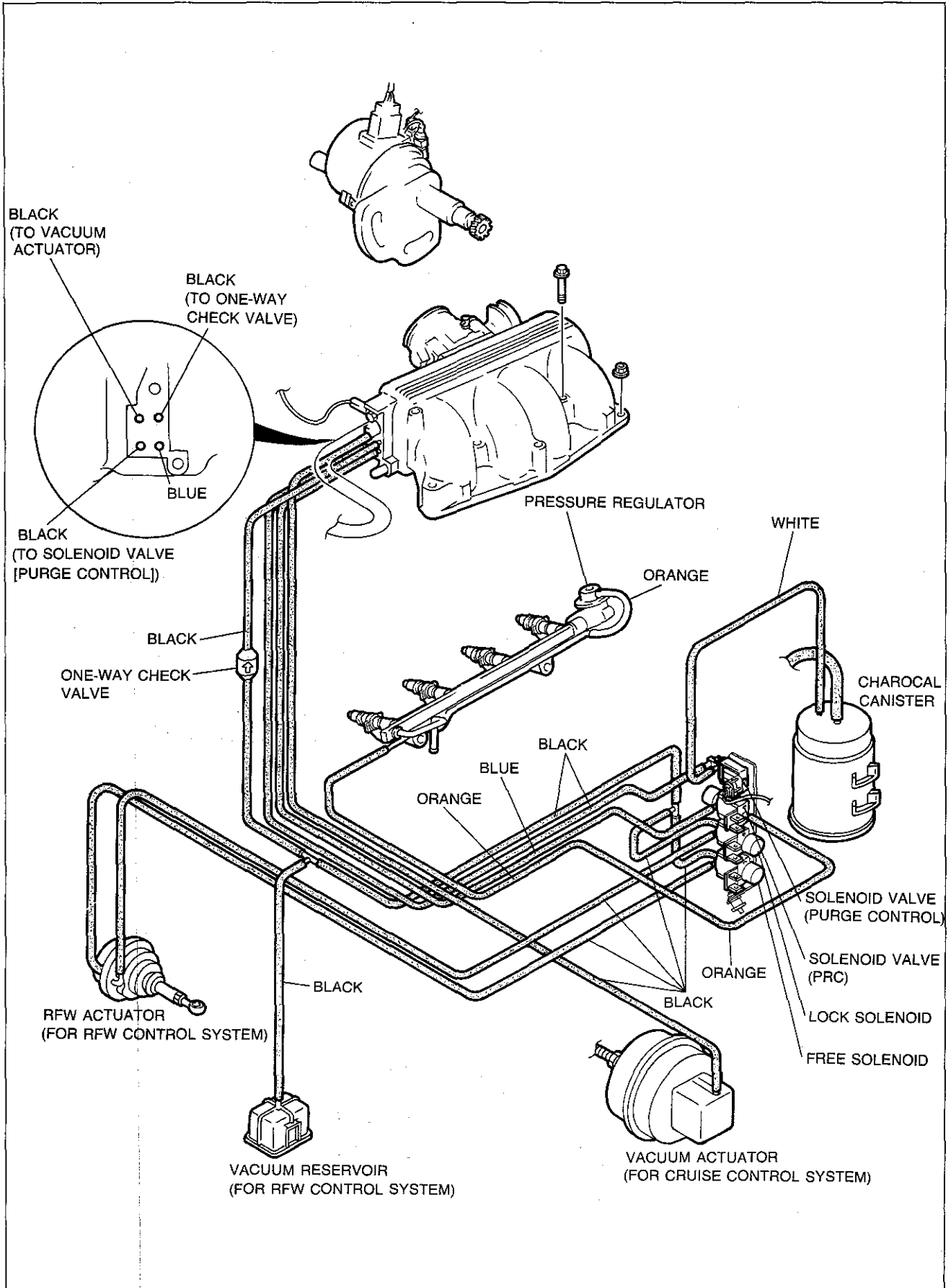
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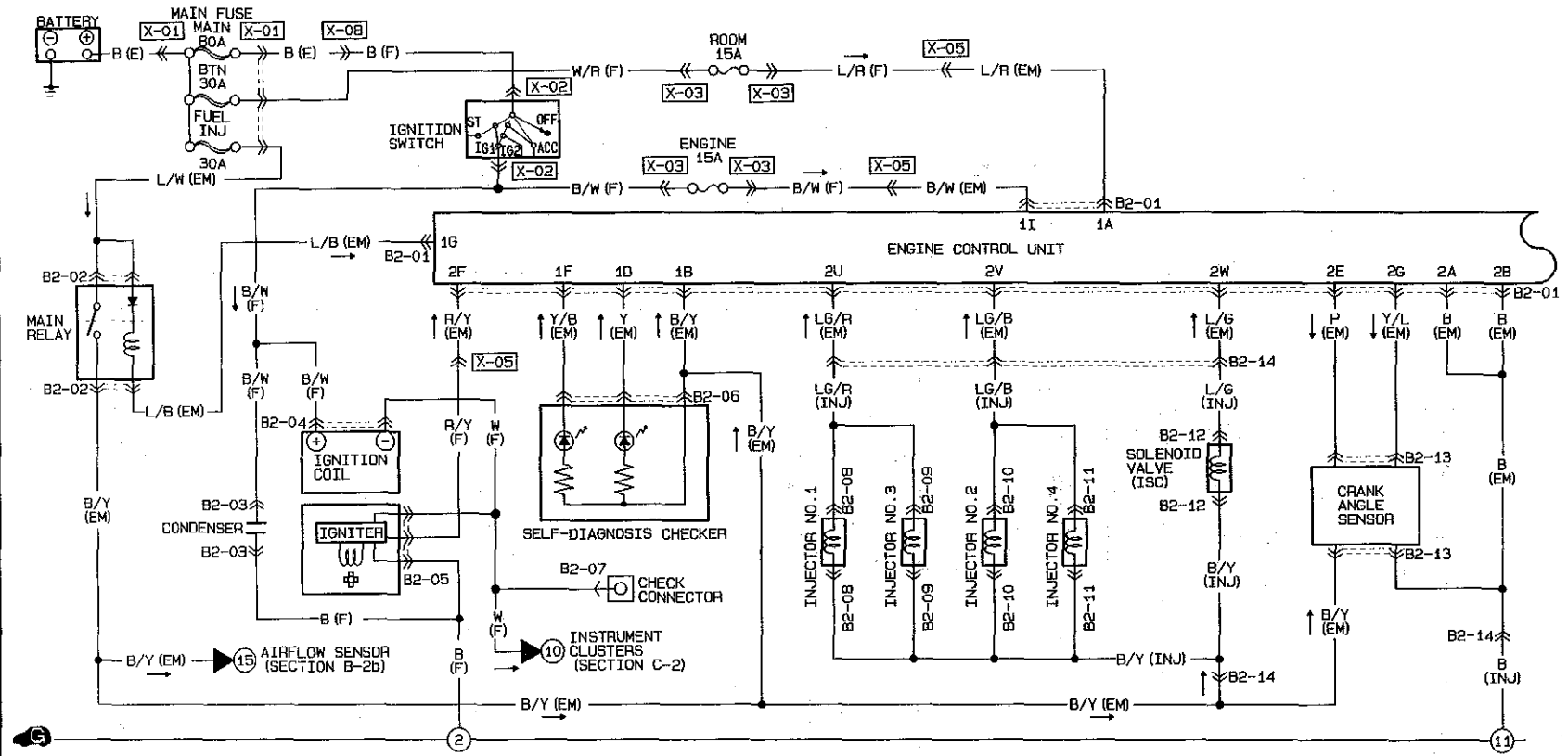


VACUUM HOSE ROUTING DIAGRAM



F2

2.2L: EGI ■ IGNITION SYSTEM ■ ENGINE CONTROL SYSTEM

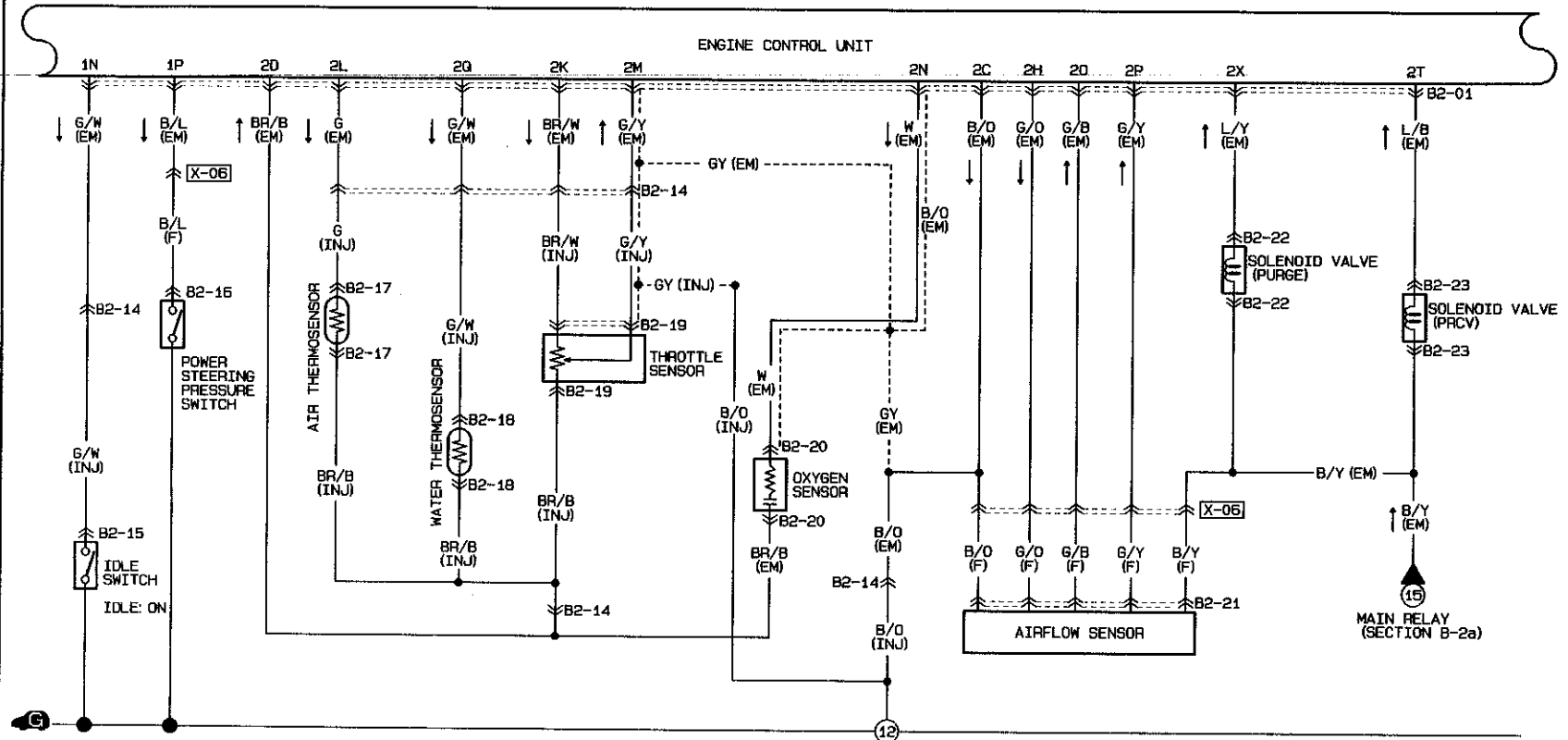


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1U	1S	1Q	1O	1K	1I	1G	1E	1C	1A	2Y	2W	2U	2S	2Q	2O	2N	2M	2K	2I	2G	2E	2C	2A																																																																																														
R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R	* L/G	LG/R	* G/W	G/B	G/Y	BR/W	* Y/L	P	B/O	B	* L/Y	LG/B	L/B	* G/Y	W	G	* G/O	R/Y	BR/B	B																																																																																							
B/Y	*	*	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y																																																																																																											
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B	2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B																																																																																														
<b>B2-04 IGNITION COIL (F)</b> 		<b>B2-05 IGNITER (F)</b> 		<b>B2-06 SELF-DIAGNOSIS CHECKER (EM)</b> 		<b>B2-07 CHECK CONNECTOR (F)</b> 		<b>B2-08 INJECTOR NO.1 (INJ)</b> 		<b>B2-09 INJECTOR NO.3 (INJ)</b> 		<b>B2-10 INJECTOR NO.2 (INJ)</b> 																																																																																																									
<b>B2-11 INJECTOR NO.4 (INJ)</b> 		<b>B2-12 SOLENOID VALVE (ISC) (INJ)</b> 		<b>B2-13 CRANK ANGLE SENSOR (EM)</b> 		<b>B2-14 CONNECTOR BETWEEN EMISSION (EM) &amp; INJECTOR (INJ)</b> 		<b>(INJ)</b> 																																																																																																													

9MUDF2-007

2.2L: EGI ■ ENGINE CONTROL SYSTEM

B-2b



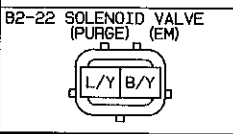
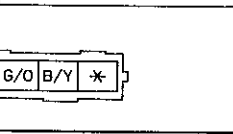
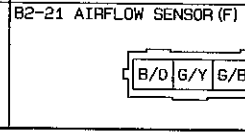
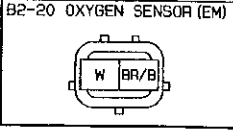
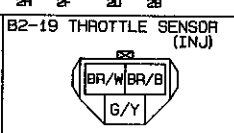
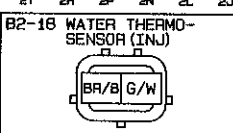
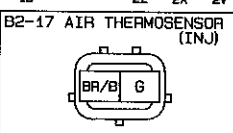
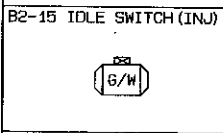
B2-01 ENGINE CONTROL UNIT (EM)

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R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R
B/Y	*	*	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
*	L/G	LG/R	*	G/W	G/B	G/Y	BR/W	*	Y/L	P	B/O	B
*	L/Y	LG/B	L/B	*	G/Y	W	G	*	G/O	R/Y	BR/B	B
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B

B2-14 CONNECTOR BETWEEN EMISSION (EM) & INJECTOR (INJ)

(EM)	G/W	B/Y	L/G	G/Y	BR/B	LG/B
(INJ)	G/W	G	B	B/O	BR/W	LG/R
(EM)	LG/B	BR/B	G/Y	L/G	B/Y	G/W
(INJ)	LG/R	BR/W	B/O	B	G	G/W



OUTLINE

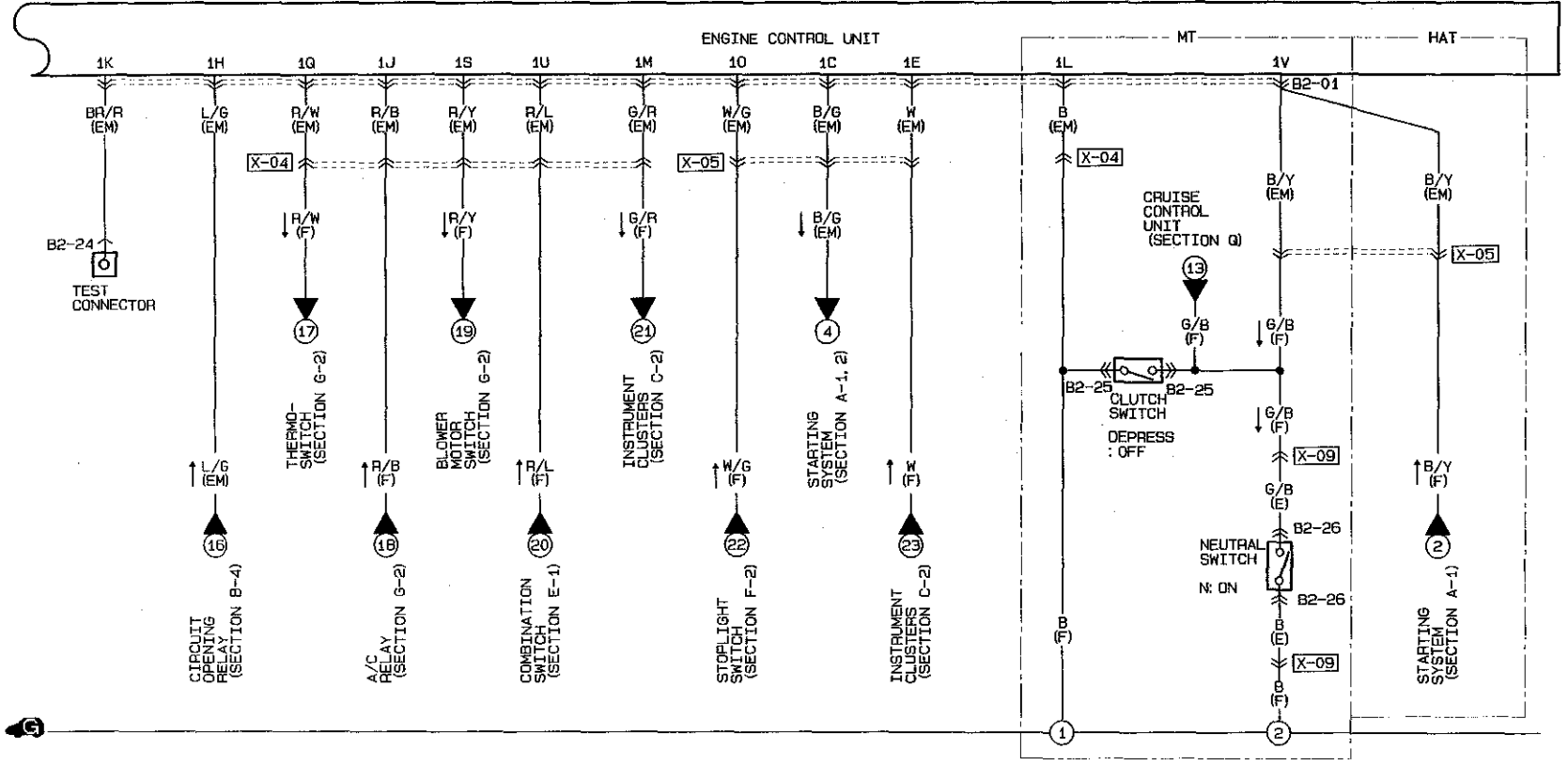
F2-9

F2

F2



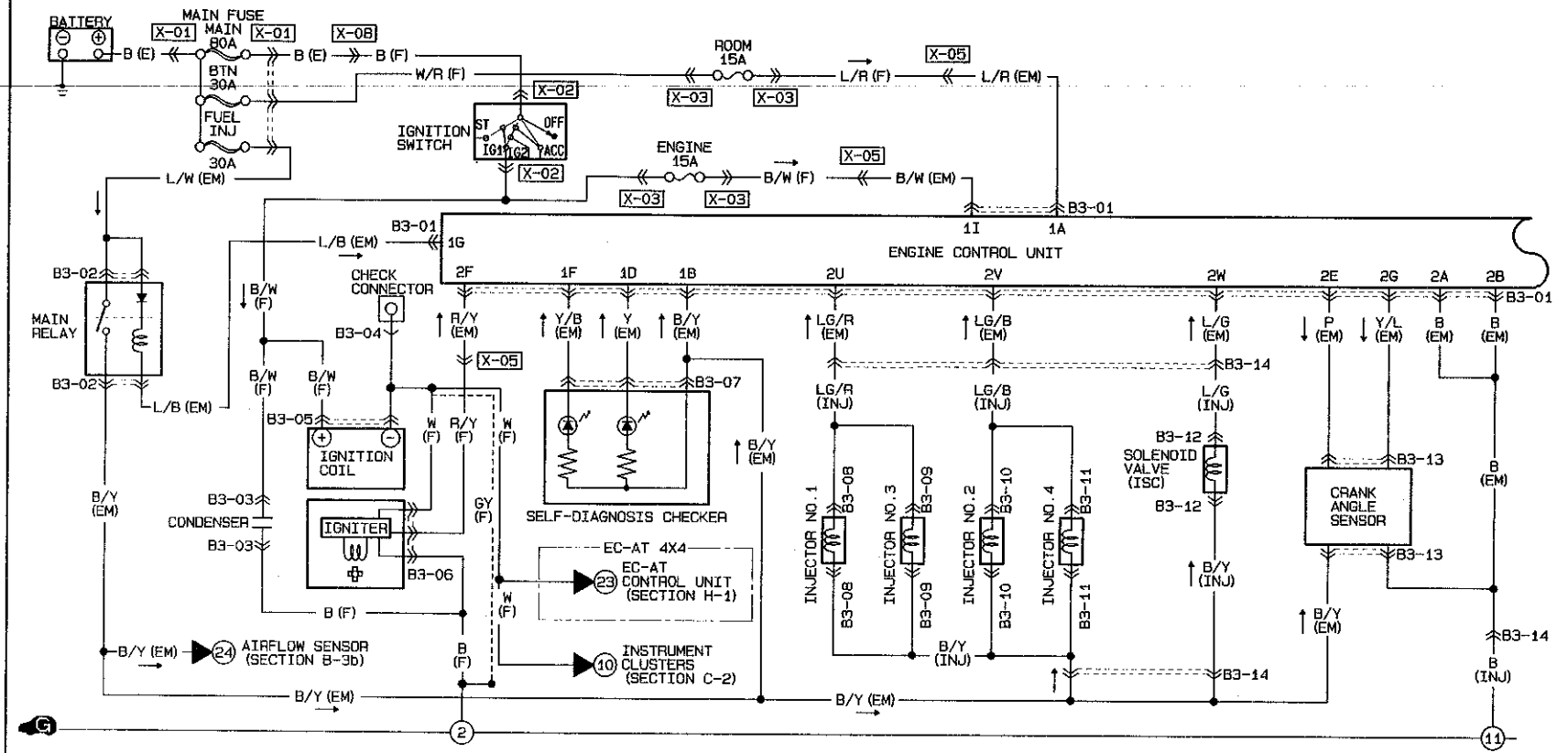
2.2L: EGI ■ ENGINE CONTROL SYSTEM



<b>B2-01 ENGINE CONTROL UNIT (EM)</b> <table border="1"> <tr> <td>1U</td><td>1S</td><td>1O</td><td>1O</td><td>1K</td><td>1I</td><td>1G</td><td>1E</td><td>1C</td><td>1A</td><td></td><td></td> </tr> <tr> <td>R/L</td><td>R/Y</td><td>R/W</td><td>W/G</td><td>G/R</td><td>BR/R</td><td>B/W</td><td>L/B</td><td>W</td><td>B/G</td><td>L/R</td><td></td> </tr> <tr> <td>B/Y</td><td>*</td><td>*</td><td>B/L</td><td>G/W</td><td>B</td><td>R/B</td><td>L/G</td><td>Y/B</td><td>Y</td><td>B/Y</td><td></td> </tr> <tr> <td>1V</td><td>1T</td><td>1R</td><td>1P</td><td>1N</td><td>1L</td><td>1J</td><td>1H</td><td>1F</td><td>1D</td><td>1B</td><td></td> </tr> </table>												1U	1S	1O	1O	1K	1I	1G	1E	1C	1A			R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R		B/Y	*	*	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y		1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B		<b>B2-24 TEST CONNECTOR (EM)</b> 						<b>B2-25 CLUTCH SWITCH (F)</b> 					
1U	1S	1O	1O	1K	1I	1G	1E	1C	1A																																																														
R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R																																																													
B/Y	*	*	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y																																																													
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B																																																													
<b>B2-26 NEUTRAL SWITCH (E)</b> 																																																																							

2.6L ■ IGNITION SYSTEM ■ ENGINE CONTROL SYSTEM

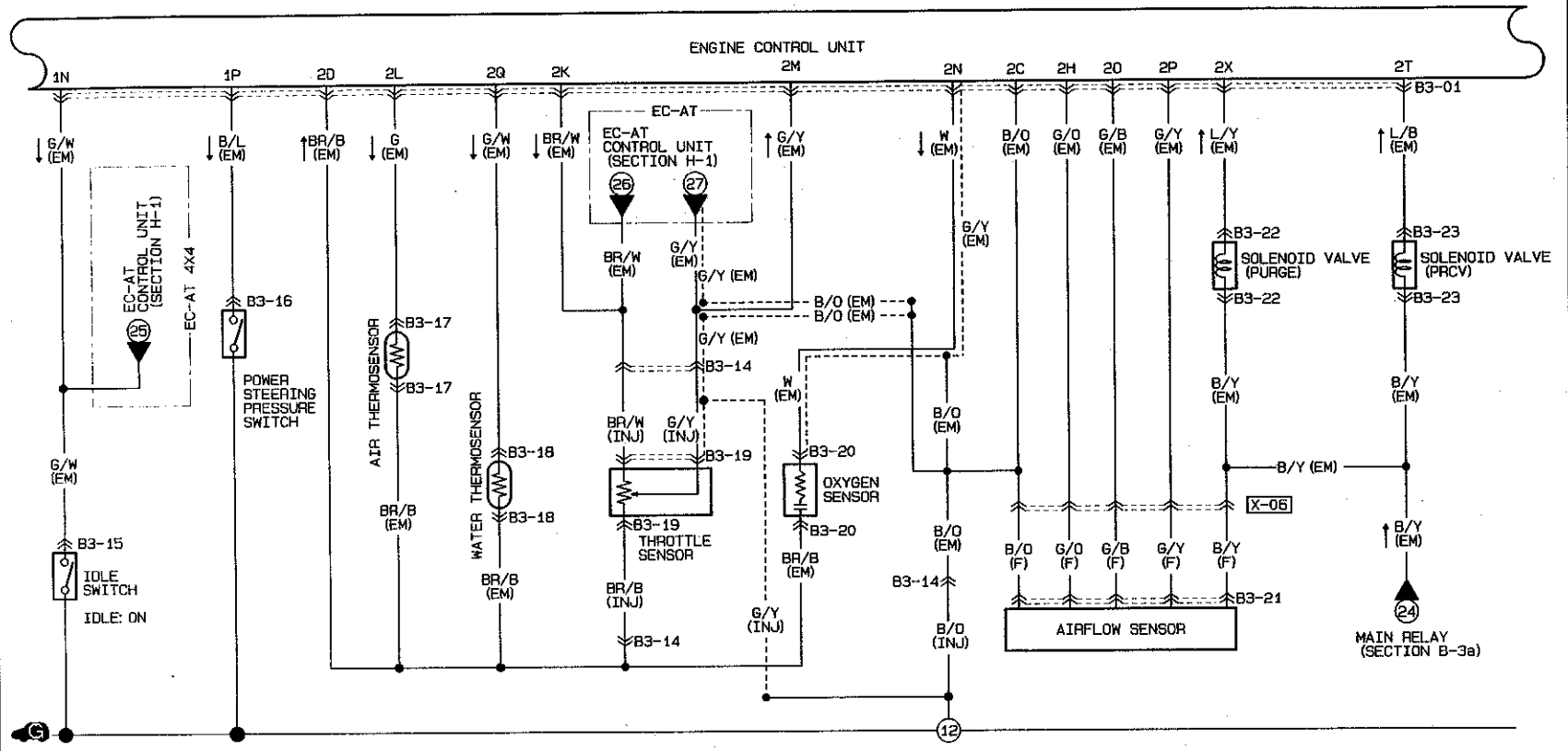
B-3a



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1U	1S	1G	1D	1K	11	1G	1E	1C	1A	2Y	2H	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A																																																																																						
R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R	L	L/G	LG/R	*	G/W	G/B	G/Y	BR/W	*	Y/L	P	B/O	B																																																																																					
B/Y	*	B	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y	*	L/Y	LG/B	L/B	*	G/Y	W	G	*	G/O	R/Y	BR/B	B																																																																																					
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B	2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B																																																																																					
<b>B3-04 CHECK CONNECTOR (F)</b> 		<b>B3-05 IGNITION COIL (F)</b> 		<b>B3-06 IGNITER (F)</b> 		<b>B3-07 SELF-DIAGNOSIS CHECKER (EM)</b> 		<b>B3-08 INJECTOR NO.1 (INJ)</b> 		<b>B3-09 INJECTOR NO.3 (INJ)</b> 		<b>B3-10 INJECTOR NO.2 (INJ)</b> 																																																																																																
<b>B3-11 INJECTOR NO.4 (INJ)</b> 		<b>B3-12 SOLENOID VALVE (ISC) (INJ)</b> 		<b>B3-13 CRANK ANGLE SENSOR (EM)</b> 		<b>B3-14 CONNECTOR BETWEEN EMISSION (EM) &amp; INJECTOR (INJ)</b> <table border="1"> <tr> <td>(EM)</td> <td>B/Y</td><td>L/G</td><td>G/Y</td><td>BR/B</td><td>LG/B</td> <td>(INJ)</td> <td>LG/B</td><td>BR/B</td><td>G/Y</td><td>L/G</td><td>B/Y</td> </tr> <tr> <td></td> <td>B/Y</td><td>B</td><td>B/O</td><td>BR/W</td><td>LG/R</td> <td></td> <td>LG/R</td><td>BR/W</td><td>B/O</td><td>B</td><td>B/Y</td> </tr> </table>						(EM)	B/Y	L/G	G/Y	BR/B	LG/B	(INJ)	LG/B	BR/B	G/Y	L/G	B/Y		B/Y	B	B/O	BR/W	LG/R		LG/R	BR/W	B/O	B	B/Y																																																																									
(EM)	B/Y	L/G	G/Y	BR/B	LG/B	(INJ)	LG/B	BR/B	G/Y	L/G	B/Y																																																																																																	
	B/Y	B	B/O	BR/W	LG/R		LG/R	BR/W	B/O	B	B/Y																																																																																																	

OUTLINE

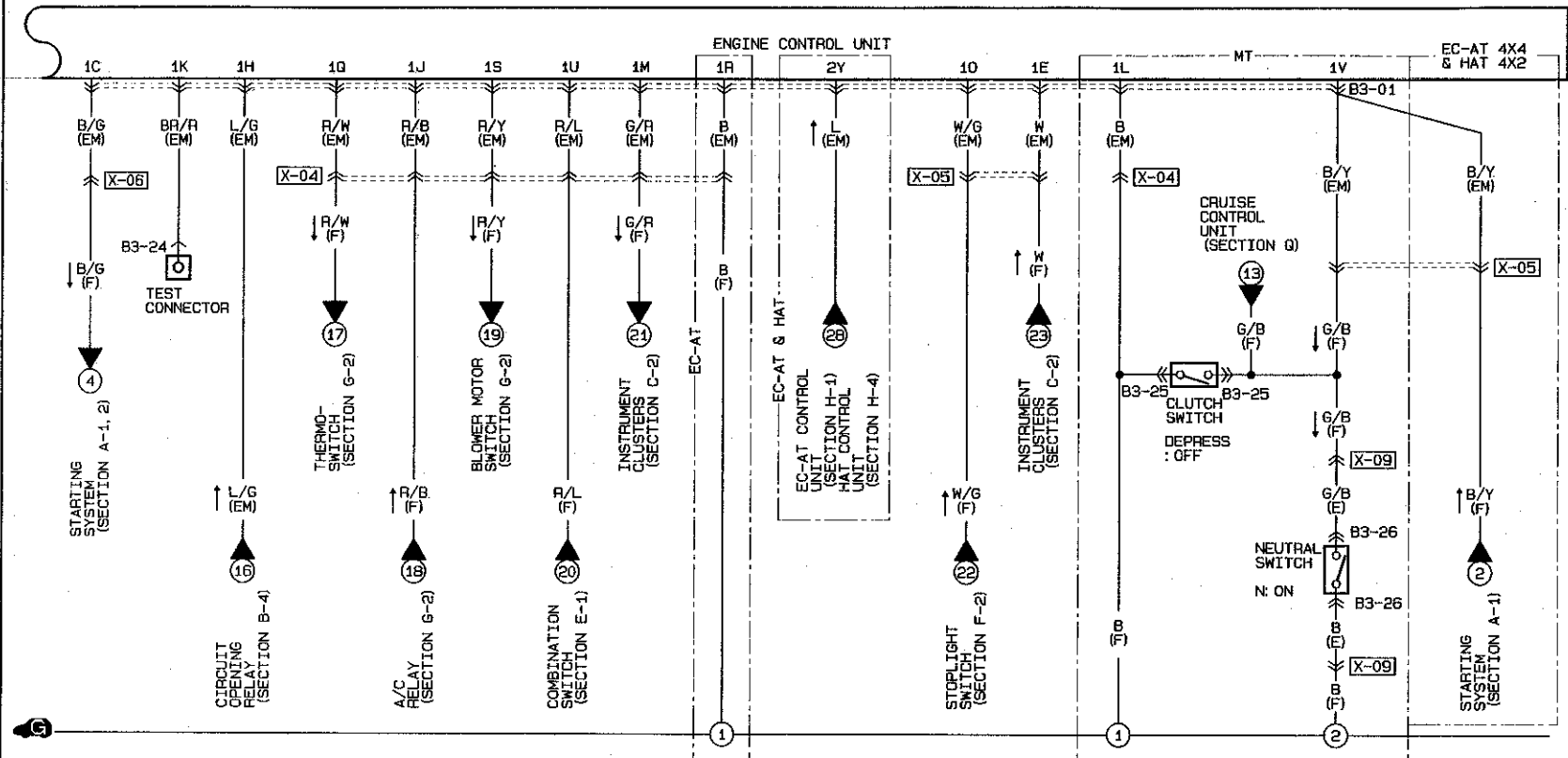
2.6L ENGINE CONTROL SYSTEM



<b>B3-01 ENGINE CONTROL UNIT (EM)</b> <table border="1"> <tr> <td>1U</td><td>1S</td><td>1Q</td><td>1P</td><td>1N</td><td>1L</td><td>1J</td><td>1H</td><td>1G</td><td>1F</td><td>1E</td><td>1D</td><td>1C</td><td>1A</td> </tr> <tr> <td>R/L</td><td>R/Y</td><td>R/W</td><td>W/G</td><td>G/R</td><td>BR/R</td><td>B/W</td><td>L/B</td><td>W</td><td>B/G</td><td>L/R</td><td></td><td></td><td></td> </tr> <tr> <td>B/Y</td><td>*</td><td>B</td><td>B/L</td><td>G/W</td><td>B</td><td>R/B</td><td>L/G</td><td>Y/B</td><td>Y</td><td>B/Y</td><td></td><td></td><td></td> </tr> </table>										1U	1S	1Q	1P	1N	1L	1J	1H	1G	1F	1E	1D	1C	1A	R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R				B/Y	*	B	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y				<b>B3-14 CONNECTOR BETWEEN EMISSION (EM) &amp; INJECTOR (INJ)</b> <table border="1"> <tr> <td>2Y</td><td>2M</td><td>2U</td><td>2S</td><td>2Q</td><td>2O</td><td>2M</td><td>2K</td><td>2I</td><td>2G</td><td>2E</td><td>2C</td><td>2A</td> </tr> <tr> <td>L</td><td>L/G</td><td>L/G/R</td><td>*</td><td>G/W</td><td>G/B</td><td>G/Y</td><td>BR/W</td><td>*</td><td>Y/L</td><td>P</td><td>B/O</td><td>B</td> </tr> <tr> <td>*</td><td>L/Y</td><td>L/G/B</td><td>L/B</td><td>*</td><td>G/Y</td><td>W</td><td>G</td><td>*</td><td>G/O</td><td>R/Y</td><td>BR/B</td><td>B</td> </tr> </table>										2Y	2M	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	L	L/G	L/G/R	*	G/W	G/B	G/Y	BR/W	*	Y/L	P	B/O	B	*	L/Y	L/G/B	L/B	*	G/Y	W	G	*	G/O	R/Y	BR/B	B
1U	1S	1Q	1P	1N	1L	1J	1H	1G	1F	1E	1D	1C	1A																																																																																							
R/L	R/Y	R/W	W/G	G/R	BR/R	B/W	L/B	W	B/G	L/R																																																																																										
B/Y	*	B	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y																																																																																										
2Y	2M	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A																																																																																								
L	L/G	L/G/R	*	G/W	G/B	G/Y	BR/W	*	Y/L	P	B/O	B																																																																																								
*	L/Y	L/G/B	L/B	*	G/Y	W	G	*	G/O	R/Y	BR/B	B																																																																																								
<b>B3-15 IDLE SWITCH (EM)</b> 			<b>B3-16 POWER STEERING PRESSURE SWITCH (EM)</b> 			<b>B3-17 AIR THERMOSENSOR (EM)</b> 			<b>B3-18 WATER THERMOSENSOR (EM)</b> 			<b>B3-19 THROTTLE SENSOR (INJ)</b> 																																																																																								
<b>B3-20 OXYGEN SENSOR (EM)</b> 			<b>B3-21 AIRFLOW SENSOR (F)</b> 			<b>B3-22 SOLENOID VALVE (PURGE) (EM)</b> 			<b>B3-23 SOLENOID VALVE (PRCV) (EM)</b> 																																																																																											

2.6L ■ ENGINE CONTROL SYSTEM

B-3c



B3-01 ENGINE CONTROL UNIT (EM)

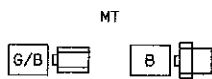
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B/Y	*	B	B/L	G/W	B	R/B	L/G	Y/B	Y	B/Y
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
L	L/G	LG/R	*	G/W	G/B	G/Y	BR/W	*	Y/L	P	B/O	B
*	L/Y	LG/B	L/B	*	G/Y	W	G	*	G/O	R/Y	BR/B	B
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B

B3-24 TEST CONNECTOR (EM) B3-25 CLUTCH SWITCH (F)

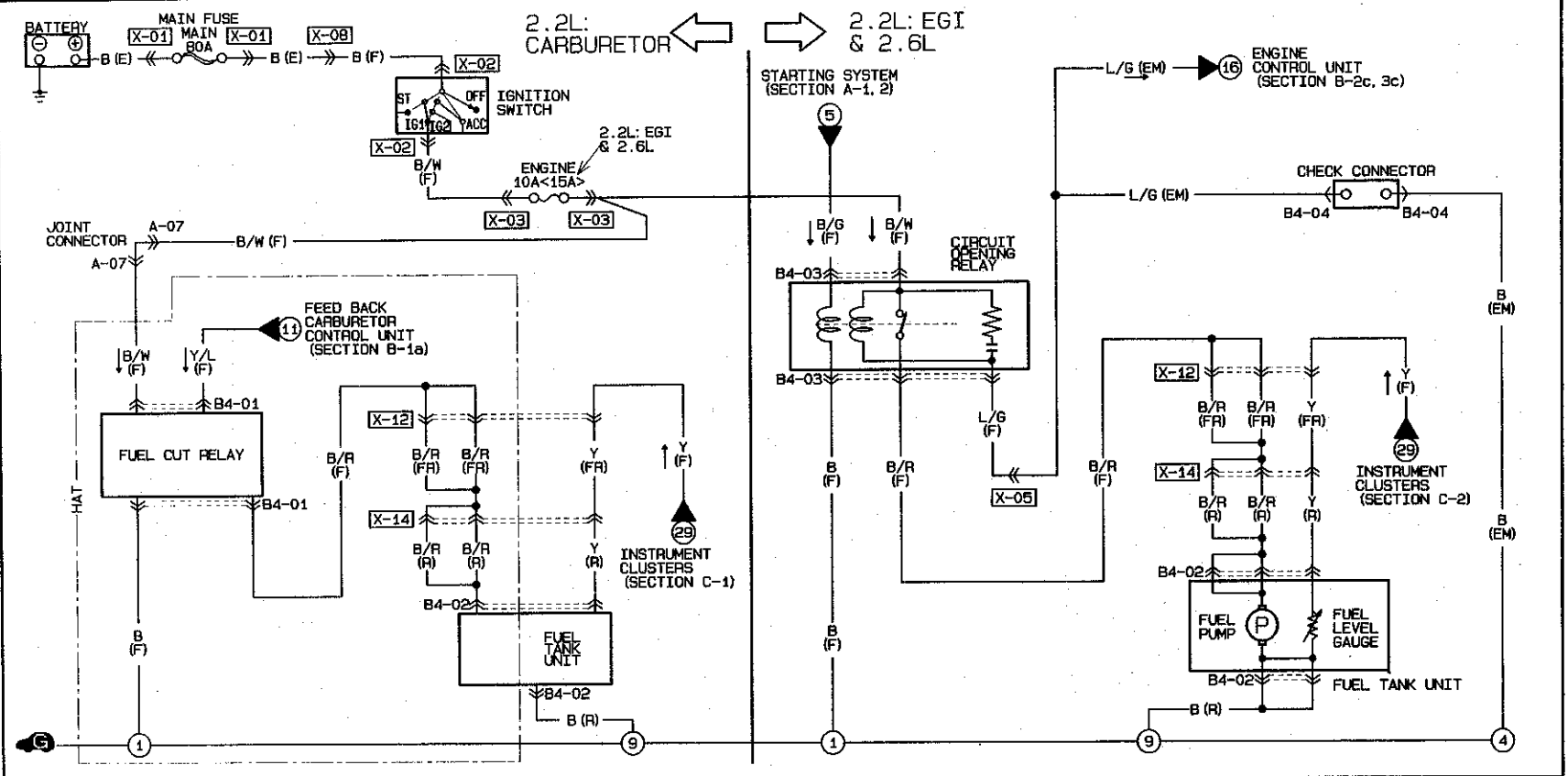


B3-26 NEUTRAL SWITCH (E)



OUTLINE

FUEL CONTROL SYSTEM



<p>B4-01 FUEL CUT RELAY (F)</p> <table border="1"> <tr><td>B</td><td>*</td><td>Y/L</td></tr> <tr><td>*</td><td>B/W</td><td>B/R</td></tr> </table> <p>HAT 2.2L CARBURETOR</p>	B	*	Y/L	*	B/W	B/R	<p>B4-02 FUEL TANK UNIT (R)</p> <table border="1"> <tr><td>*</td></tr> <tr><td>B</td><td>Y</td></tr> </table> <p>MT 2.2L CARBURETOR</p>	*	B	Y	<p>HAT 2.2L CARBURETOR</p> <table border="1"> <tr><td>B</td><td>B/R</td></tr> <tr><td>*</td><td>Y</td></tr> </table>	B	B/R	*	Y	<p>2.2L EGI &amp; 2.6L</p> <table border="1"> <tr><td>B</td><td>Y</td><td>B/R</td></tr> <tr><td>B</td><td>*</td><td>B/R</td></tr> </table>	B	Y	B/R	B	*	B/R	<p>B4-03 CIRCUIT OPENING RELAY (F)</p> <table border="1"> <tr><td>B/G</td><td>B/W</td><td>B/R</td></tr> <tr><td>B</td><td>*</td><td>L/G</td></tr> </table> <p>2.2L EGI &amp; 2.6L</p>	B/G	B/W	B/R	B	*	L/G	<p>B4-04 CHECK CONNECTOR (EM)</p> <table border="1"> <tr><td>L/G</td></tr> <tr><td>B</td></tr> </table> <p>2.2L EGI &amp; 2.6L</p>	L/G	B	<p>A-07 JOINT CONNECTOR (F)</p> <table border="1"> <tr><td>B/W</td><td>*</td></tr> <tr><td>( ) ... HAT</td><td>B/W</td></tr> </table>	B/W	*	( ) ... HAT	B/W
B	*	Y/L																																			
*	B/W	B/R																																			
*																																					
B	Y																																				
B	B/R																																				
*	Y																																				
B	Y	B/R																																			
B	*	B/R																																			
B/G	B/W	B/R																																			
B	*	L/G																																			
L/G																																					
B																																					
B/W	*																																				
( ) ... HAT	B/W																																				

**SPECIFICATIONS**

Item		Specification
Idle speed*1	rpm	M/T: 730—770, A/T: 750—790 (P range)
Ignition timing*1	BTDC	<b>G6:</b> 4—6°, <b>F2:</b> 5—7°
<b>Throttle body</b>		
Type	Horizontal draft (1 barrel)	
Throat diameter	mm (in)	<b>G6:</b> 55 (2.2) <b>F2:</b> 50 (2.0)
	No.1	
	No.2	
<b>Fuel pump</b>		
Type	Impeller (in-tank)	
Output pressure	kPa (kg/cm <sup>2</sup> , psi)	441—589 (4.5—6.0, 64—85)
<b>Fuel filter</b>		
Type	Low-pressure side	Nylon element
	High-pressure side	Paper element
<b>Pressure regulator</b>		
Type	Diaphragm	
Regulating pressure	kPa (kg/cm <sup>2</sup> , psi)	265—314 (2.7—3.2, 38—46)
<b>Injector</b>		
Type	High-ohmic	
Type of drive	Voltage	
Resistance	Ω	12—16 (at 20°C, 68°F)
Volume	<b>G6:</b> 74—89 cc (4.51—5.43 cu in)/15 sec. <b>F2:</b> 50—62 cc (3.05—3.78 cu in)/15 sec.	
<b>BAC valve (solenoid valve [Idle speed control])</b>		
Solenoid resistance	Ω	7.7—9.3 (at 23°C, 73°F)
<b>Solenoid valve (Purge control)</b>		
Solenoid resistance	Ω	30—34 (at 20°C, 68°F)
<b>Water thermosensor</b>		
Resistance	kΩ	-20°C (-4°F)      14.5—17.8 20°C (68°F)      2.2—2.7 80°C (176°F)      0.28—0.35
<b>Intake air thermosensor</b>		
Resistance	kΩ	25°C (77°F)      29.7—36.3 85°C (185°F)      3.3—3.7
<b>Circuit opening relay</b>		
Resistance	Ω	STA—E <sub>1</sub> 21—43 B—Fc      109—226 B—Fp      ∞
<b>Fuel tank</b>		
Capacity	liters (US gal, Imp gal)	56 (14.8, 12.3)
<b>Air cleaner</b>		
Element type	Dry	
<b>Accelerator cable</b>		
Free play	mm (in)	1—3 (0.039—0.118)
<b>Fuel</b>		
Specification	Unleaded regular (RON 87 or higher)	

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\*1..... Test connector grounded

COMPONENT DESCRIPTIONS

Component	Function	Remarks
<b>Air cleaner</b>	Filters air entering throttle body	
<b>Airflow sensor</b>	Detects amount of intake air; sends signal to engine control unit	
<b>Air valve</b>	When cold, supplies bypass air into dynamic chamber	<ul style="list-style-type: none"> <li>• Engine speed increased to shorten warm-up period</li> <li>• Thermowax type</li> <li>• Installed in BAC valve</li> </ul>
<b>Atmospheric pressure sensor</b>	Detects atmospheric pressure	In ECU
<b>BAC valve</b>	Supplies bypass air into dynamic chamber	Consists of air valve and ISC valve
<b>Catalytic converter</b>	Reduces HC, CO, and NOx by chemical reaction	Monolith type
<b>Charcoal canister</b>	Stores gas tank fumes when engine stopped	
<b>Check connector</b>	For Self-Diagnosis Checker	6-pin connector (Green)
<b>Check-and-cut valve</b>	Releases excessive pressure or vacuum in fuel tank to atmosphere	
<b>Circuit opening relay</b>	Voltage for fuel pump while engine running	
<b>Clutch switch</b>	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal depressed
<b>Crank angle sensor (In distributor)</b>	<ol style="list-style-type: none"> <li>1. Detects No.1 cylinder TDC; sends signal to engine control unit</li> <li>2. Detects engine speed; sends signal to engine</li> </ol>	For determining fuel injection timing
<b>Dynamic chamber</b>	Interconnects all cylinders	
<b>Engine control unit</b>	<p>Detects following:</p> <ol style="list-style-type: none"> <li>1. Engine speed</li> <li>2. No.1 piston TDC</li> <li>3. Intake air amount</li> <li>4. Engine coolant temperature</li> <li>5. Ignition ON signal</li> <li>6. Throttle valve opening angle</li> <li>7. Throttle valve fully closed</li> <li>8. Air/fuel ratio (Oxygen concentration)</li> <li>9. In-gear condition</li> <li>10. Intake air temperature</li> <li>11. Atmospheric pressure</li> <li>12. A/C operation</li> <li>13. P/S operation</li> <li>14. E/L operation</li> <li>15. Cranking signal</li> <li>16. Test signal (idle speed, malfunction code No.)</li> <li>17. Braking signal</li> </ol> <p>Controls operation of the following:</p> <ol style="list-style-type: none"> <li>1. Fuel injection system</li> <li>2. Idle speed control</li> <li>3. Pressure regulator control system</li> <li>4. Purge control system</li> <li>5. Fail-safe function</li> <li>6. Monitor function</li> <li>7. Burn-off system</li> <li>8. Ignition timing control system</li> <li>9. Fuel pump</li> <li>10. A/C (cut off)</li> <li>11. Main relay control</li> </ol>	<ol style="list-style-type: none"> <li>1. Ne-Signal</li> <li>2. G-signal</li> <li>3. Airflow sensor</li> <li>4. Water thermosensor</li> <li>5. Ignition switch</li> <li>6. Throttle sensor</li> <li>7. Idle switch</li> <li>8. Oxygen sensor</li> <li>9. Neutral and clutch switches</li> <li>10. Intake air thermosensor (on dynamic chamber)</li> <li>11. Atmospheric pressure sensor (In ECU)</li> <li>12. A/C switch</li> <li>13. P/S pressure switch</li> <li>14. Headlight and blower switches</li> <li>15. Ignition switch (START position)</li> <li>16. Test connector</li> <li>17. Stoplight switch</li> </ol>

Component	Function	Remarks
Fuel filter	Filters particles from fuel	
Fuel pump	Provides fuel to injectors	<ul style="list-style-type: none"> <li>Operates while engine running</li> <li>Installed in fuel tank</li> </ul>
Fuel vapor valve	Prevents fuel from flowing into charcoal canister	
Idle switch	Detects when throttle valve fully closed; sends signal to engine control unit	Installed on throttle body
Igniter	Receives spark signal from signal ECU and generates high voltage to ignition coil	
Ignition switch (START position)	Sends engine cranking signal to engine control unit	
Injector	Injects fuel into intake port	<ul style="list-style-type: none"> <li>Controlled by signals from engine control unit</li> <li>High-ohmic injector</li> <li>Two port injector nozzle (G6)</li> </ul>
Intake air thermosensor	Detects intake air temperature; sends signal to engine control unit	Installed on dynamic chamber
Main relay	Supplies electric current to injectors and engine control unit.	
MIL (Malfunction indicator lamp)	(For Federal and Canada) Lamp illuminates to indicate the maintenance schedule for the emission control system	Every 60,000 and 80,000 miles (Federal) or 90,000 and 130,000 km (Canada)
	(For California) Lamp illuminates when input device malfunctions	Test connector not grounded
	(For California) Lamp flashers to indicate malfunction code No. of input and output devices	Test connector grounded
Neutral switch	Detects in-gear condition; sends signal to engine control unit	Switch ON when neutral
Oxygen sensor	Detects oxygen concentration; sends signal to engine control unit	Zirconia ceramic and platinum coating
PCV valve	Controls amount of blowby gas introduced into engine	
P/S pressure switch	Detects P/S operation; sends signal to engine control unit	P/S: ON when steering wheel turned right or left
Pressure regulator	Adjusts fuel pressure supplied to injectors	
Resonance chamber (G6)	Improves mid-range torque characteristics	
Separator	Prevents fuel from flowing into charcoal canister	
Solenoid valve	Idle speed control	Controls bypass air amount  <ul style="list-style-type: none"> <li>Controlled by duty signal from engine control unit</li> <li>With integrated air valve</li> <li>Controls idle-up</li> </ul>
	Pressure regulator control	Controls vacuum to pressure regulator  Cuts vacuum passage when hot
	Purge control	Controls evaporative fumes from canister to intake manifold
Stoplight switch	Detects braking operation (deceleration); sends signal to engine control unit	



Component	Function	Remarks
Test connector	For Self-Diagnosis Checker and idle speed Ignition timing adjustment	1-pin connector (Green)
Throttle body	Controls intake air quantity	Integrated throttle sensor and idle switch
Throttle sensor	Detects throttle valve opening angle; sends signal to engine control unit	Installed on throttle body
Two-way check valve	Controls pressure in fuel tank	
Water thermosensor	Detects coolant temperature; sends signal to engine control unit	

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TRUBLESHOOTING GUIDE

RELATIONSHIP CHART

TEST CONNECTOR		X	X	X	○	X	X	X	X	X	○
IGNITION SWITCH (ON POSITION)		X	X	X	X	X	X	X	○	X	X
IGNITION SWITCH (START POSITION)		○	○	X	○	X	○	○	X	X	○
HEADLIGHT AND BLOWER SWITCH		X	X	X	○	X	X	X	X	X	X
P/S PRESSURE SWITCH		X	X	X	○	X	X	X	X	X	X
A/C SWITCH		X	X	X	○	X	X	○	X	X	X
NEUTRAL AND CLUTCH SWITCH		○	X	X	○	○	X	○	X	X	X
STOPLIGHT SWITCH		○	X	X	X	X	X	X	X	X	X
IDLE SWITCH		○	X	X	○	○	○	X	X	X	○
ATMOSPHERIC PRESSURE SENSOR		○	X	X	○ F2 X G6	X	X	X	X	X	X
THROTTLE SENSOR		○	X	X	X	X	○	○	X	X	X
INTAKE AIR THERMOSENSOR		○	X	X	X	X	○	X	X	X	X
AIRFLOW SENSOR		○	X	X	○	○	X	X	○	X	○
OXYGEN SENSOR		○	X	X	X	○	X	X	X	X	X
WATER THERMOSENSOR		○	X	X	○	○	○	X	○	X	○
DISTRIBUTOR	(Ne-SIGNAL)	○	○	X	○	○	○	X	○	○	○
	(G-SIGNAL)	X	○	X	X	X	X	X	X	X	X
INPUT DEVICES	OUTPUT DEVICES	FUEL INJECTION AMOUNT									
		FUEL INJECTION TIMING									
		AIR VALVE									
		ISC VALVE									
		SOLENOID VALVE (PURGE CONTROL)									
		SOLENOID VALVE (PRESSURE REGULATOR CONTROL)									
		A/C RELAY (A/C CUT-OFF)									
		AIRFLOW SENSOR (BURN-OFF)									
		CIRCUIT OPENING RELAY (FUEL PUMP CONTROL)									
		IGNITER (IGNITION TIMING CONTROL)									

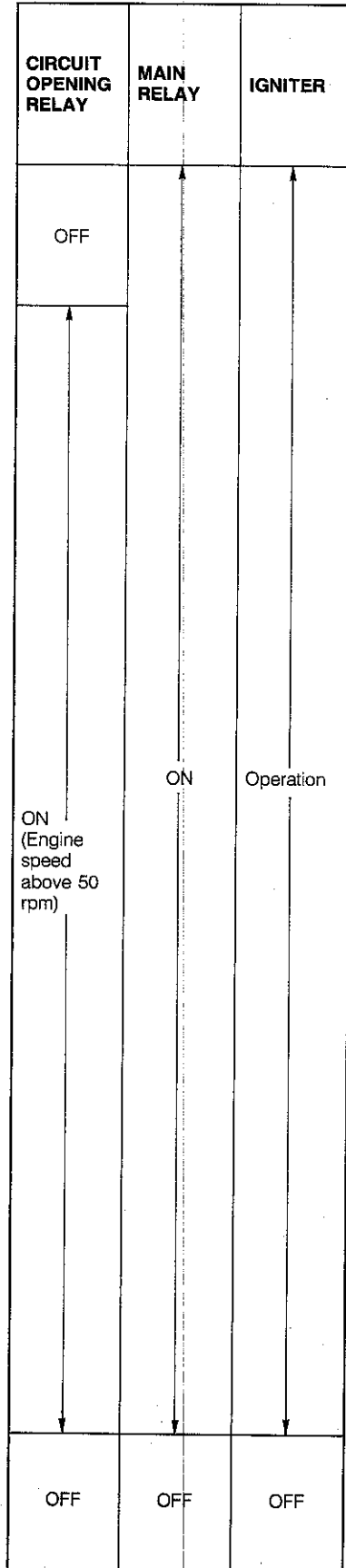
### ENGINE CONTROL OPERATION CHART Input Devices and Engine Conditions

ENGINE CONDITIONS	APPROXIMATE TIME (BASED ON 10—16°C or 50—60°F AMBIENT)	SENSORS							
		DISTRIBUTOR		WATER THERMISTOR	OXYGEN SENSOR	AIRFLOW SENSOR	INTAKE AIR THERMISTOR	THROTTLE SENSOR	ATMOSPHERIC PRESSURE SENSOR (IN ECU)
		(G-SIGNAL)	(No-SIGNAL)						
CRANKING —COLD ENGINE • COLD AIR • COLD COOLANT	Zero				Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	
COLD START —FAST IDLE • COLD AIR • COLD COOLANT	One minutes			Cool to warm: medium voltage (3.5V and dropping)	Sensor cold: low to high voltage (0—0.9V)	Low volume airflow: low to high voltage (2.4—2.6V)		Closed throttle: low voltage (0.3—0.7V)	
COLD DRIVEAWAY —PART THROTTLE • COLD AIR • COLD COOLANT	Two minutes								
WARM DRIVEAWAY —PART THROTTLE • WARM AIR • WARM COOLANT	Three minutes			Warm: medium voltage (Approx. 0.7V and dropping)	Sensor warm: high voltage (0.9V)	Moderate volume airflow: low to medium voltage (3.0V)		Part throttle: medium voltage (1—3.5V)	Sends voltage signal to ECU that varies with altitude: voltage (approx. 4V at sea level)
HOT CRUISE • WARM AIR • WARM COOLANT		Sends No.1 cylinder TDC signal to ECU	Sends engine speed signal to ECU		Sensor hot: switching from high voltage (0.9V) ↓ to low voltage (0.1V)	Moderate to strong volume of airflow: (3.8V)	Cool to warm: medium voltage (1.4—3.4V)		
HOT ACCELERATION —60% THROTTLE									
HOT ACCELERATION —WIDE OPEN THROTTLE	More than four minutes			Hot: low voltage (Approx. 0.4V)	High voltage (0.9V)	Strong volume of airflow: (4.0V)		Wide open throttle: high voltage (Approx. 4.0V)	
DECELERATION —CLOSED THROTTLE					Low voltage (0V)				
HOT CURB IDLE —EXTENDED					Switching from high to low voltage (0.75—0.25V)	Low volume of airflow: (2.4V)		Closed throttle: low voltage (0.3—0.7V)	
HOT ENGINE SHUTDOWN	—	OFF	OFF	OFF	Sensor hot: low voltage (0.1V) until sensor cools	OFF	OFF	OFF	OFF

SWITCHES									
IDLE SWITCH	STOP-LIGHT SWITCH	NEUTRAL AND CLUTCH SWITCHES	A/C SWITCH	P/S PRESSURE SWITCH	HEAD-LIGHT SWITCH	BLOWER SWITCH	IGNITION SWITCH		TEST CONNECTOR
							START POSITION	ON POSITION	
Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Sends signal to ECU (approx. 12V)	Signal has no effect on ECU	Signal has no effect on ECU
Low voltage signal to ECU (below 1.5V)	Brake pedal depressed: sends signal to ECU (approx. 12V)	In neutral: low voltage signal to ECU (approx. 0V)							
High voltage signal to ECU (battery voltage)	No signal send to ECU (below 1.5V)	Driving in any gear: high voltage signal to ECU (battery voltage)	A/C switch ON: sends signal to ECU (battery voltage) A/C switch OFF: no signal to ECU (below 1.5V)	Steering wheel turned: low voltage signal to ECU (below 1.5V) Steering wheel straight ahead: high voltage signal to ECU (battery voltage)	Headlight switch ON: low voltage signal to ECU (below 1.5V) Headlight switch OFF: high voltage signal to ECU (battery voltage)	Blower switch ON: low voltage signal to ECU (below 1.5V) Blower switch OFF: high voltage signal to ECU (battery voltage)	No signal to ECU (below 1.5V)	Sends signal to ECU (battery voltage)	Connector not grounded: high voltage signal to ECU (battery voltage)
Low voltage signal to ECU (below 1.5V)	Brake pedal depressed: sends signal to ECU (approx. 12V)	In neutral: low voltage signal to ECU (approx. 0V)							Low voltage signal to ECU when connector grounded (below 1.5V)
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

### Output Devices and Engine Conditions

ENGINE CONDITIONS	OUTPUT DEVICES APPROXIMATE TIME (BASED ON 10-16°C or 50-60°F AMBIENT)	INJECTOR		BAC VALVE		SOLENOID VALVE (PURGE CONTROL)	SOLENOID VALVE (PRESSURE REGULATOR CONTROL)	A/C RELAY (A/C CUT-OFF)	AIRFLOW SENSOR (BURN-OFF)
		INJECTION	INJECTION TIMING	AIR VALVE	ISC VALVE				
CRANKING —COLD ENGINE • COLD AIR • COLD COOLANT	Zero		All cylinders each ignition pulse			OFF (Purge cut)		OFF (A/C ON)	
COLD START —FAST IDLE • COLD AIR • COLD COOLANT	One minute	Rich		Open (coolant temperature: below 50°C 122°F)	Large amount of bypass air			ON (A/C OFF: approx. 5 sec.)	
COLD DRIVEAWAY —PART THROTTLE • COLD AIR • COLD COOLANT	Two minutes								
WARM DRIVEAWAY —PART THROTTLE • WARM AIR • WARM COOLANT	Three minutes	Rich and lean	2-group			Operates (Duty values [purge gas amount] change)	OFF (Vacuum to pressure regulator)	OFF (A/C ON)	
HOT CRUISE • WARM AIR • WARM COOLANT					Small amount of bypass air				OFF
HOT ACCELERATION —60% THROTTLE								ON (A/C CUT)	
HOT ACCELERATION —WIDE OPEN THROTTLE		Rich							
DECELERATION —CLOSED THROTTLE	More than four minutes		Fuel cut	Closed	Large and small amount of bypass air	OFF (Purge cut)		OFF (A/C ON)	
HOT CURB IDLE —EXTENDED		Rich and lean	2-group		Small amount of bypass air		After starting: ON during hot start only (Vacuum cut)		
HOT ENGINE SHUTDOWN	—		Does not inject		OFF	OFF	OFF	OFF	ON (Burn-off)



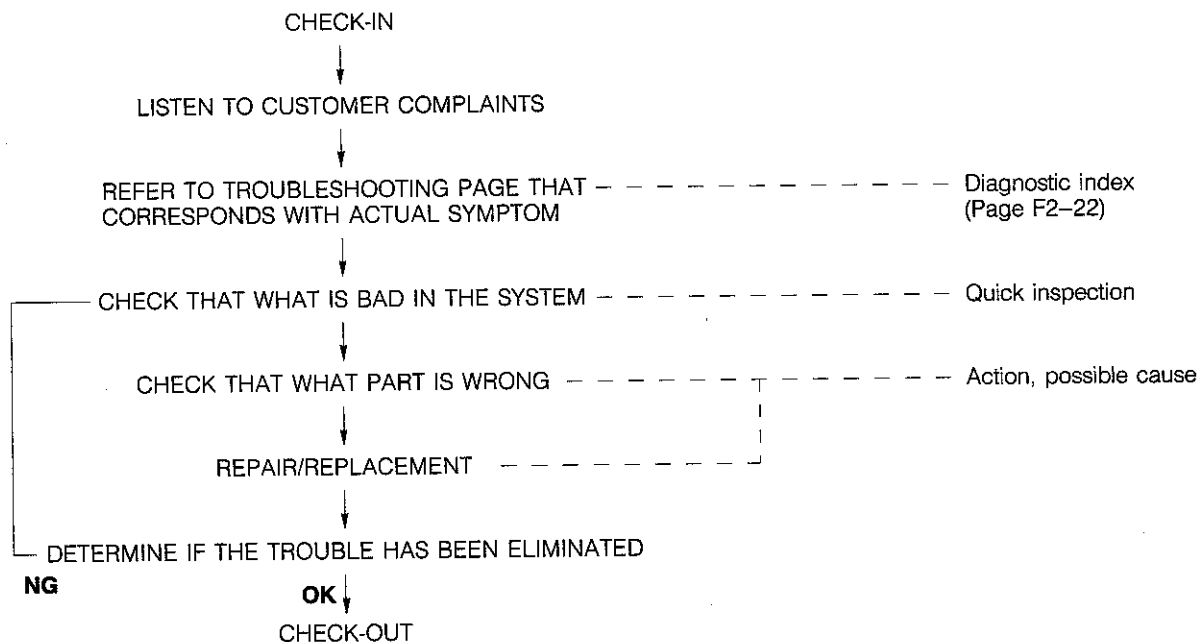
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### HOW TO USE THIS SECTION

#### Introduction

Most of the fuel and emission control system is electronically controlled. Thus, it is sometimes difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a drivability complaint. The customer is often a good source of information on such problems, especially intermittent ones. Through talks with the customer, one can find out what the symptoms are and under what conditions they occur.

#### Work flow



9MU0F2-011

### How to read the troubleshooting chart

F2 TROUBLESHOOTING GUIDE		TROUBLESHOOTING GUIDE F2	
SYMPTOM TROUBLESHOOTING		TEST CONNECTION	
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code (D1) with ECU. Check connector (Green-ORV) ground.	Yes: Check for cause by referring to check sequence. Do to next step. No: Do to next step.	
2	Check for spots by disconnecting high voltage lead wire (mainly).	Yes: Check ignition system (refer to ignition system troubleshooting). No: Check engine parts in the position.	
3	Check for fuel pump operating sound from fuel filter unit (ON-ON, fuel connector or color 5 pins connected).	Yes: Check circuit opening relay action (D1). No: Check circuit opening relay action (D1). Yes: Check fuel pump operation. No: Replace fuel pump.	
4	Check fuel tank pressure (ON-ON, Test connector (Yellow-5 pins) connected). Fuel tank pressure: 24.5-28.5 kPa (1.7-2.1 kgf/cm²).	Yes: Go to next step. No: Check fuel pump pressure. Yes: Reduce pressure regulator pressure. No: Replace fuel pump.	
5	Check for motor operating sound while operating.	Yes: Go to next step. No: Check voltage at ECU (D1) terminals (M-2, M-3, M-4, M-5, M-6, M-7, M-8, M-9, M-10). Voltage: 12V (D1) terminals (M-2, M-3, M-4, M-5, M-6, M-7, M-8, M-9, M-10). No: Do to next step.	
6	Check connector between check connector for schematics (D1) and engine ECU (D1). Substitute a well-known ECU. Check in the condition involves.	Yes: Do to next step. No: Check ground point from ECU (D1) terminal with BIT. Yes: ECU malfunction. Do to next step. No: Repair ground circuit. Yes: Low compression. Do to next step.	

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7

**WARNING:** BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE. (REFER TO PAGE F2-160)

Left page shows the troubleshooting procedure

- QUICK INSPECTION
- ACTION
- POSSIBLE CAUSE AND DETAILED INSPECTION

Right page illustrates how to perform QUICK INSPECTION

Crank normally but won't start (No combustion)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code (01) with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-127		
		No	Go to Step 2				
2	Check for spark by disconnecting high-tension lead while cranking	Yes	Go to Step 3				
		No	Check ignition system (Refer to ignition system troubleshooting)		G-19		
3	Check for fuel pump operating sound from fuel filler port [IGN ON, Test connector (White: 1-pin) grounded]	Yes	Check if engine starts in this condition	Yes	Check circuit opening relay switching operation	F2-159	
				Yes	Check circuit opening relay circuit (IGN: START)		
		No	Check circuit opening relay switching operation	F2-159	Yes	Check circuit opening relay circuit	F2-159
					Yes	Check fuel pump circuit	F2-157
			No	Check fuel pump operation			

**STEP:**

This shows the order of troubleshooting. Proceed with troubleshooting by steps.

**QUICK INSPECTION:**

This describes an easy inspection necessary to determine the malfunction of parts quickly.

**ACTION:**

This recommends the appropriate action to take as a result (Yes or No) of the QUICK INSPECTION. How to perform the action is shown on the reference page.

**POSSIBLE CAUSE AND DETAILED INSPECTION:**

This shows the possible point of malfunction. The detailed inspection is shown on the reference page.

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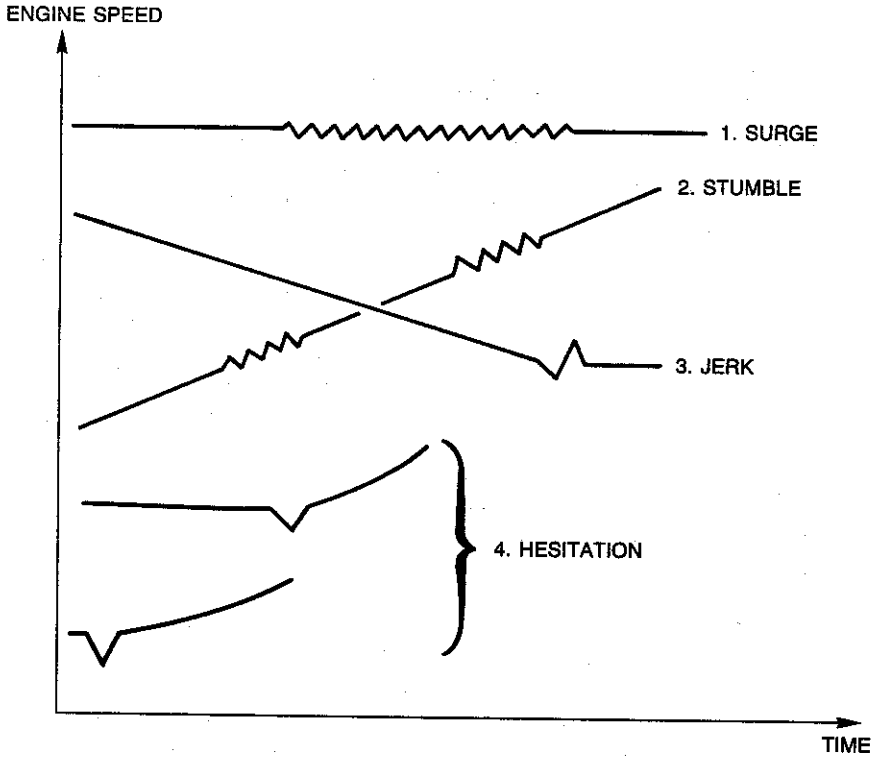
## DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEMS	REMARKS	PAGE
1	No cranks	Refer to Section G	
2	Cranks normally but won't start	No combustion	F2- 28
3	Cranks normally but hard to start (Always)		F2- 30
4	Cranks normally but hard to start (Only when engine is cold)		F2- 34
5	Cranks normally but hard to start (Only when engine is warm)		F2- 36
6	Cranks normally but hard to start (Only after heat soak)		F2- 38
7	Cranks normally but won't start (Intermittent)	No combustion	F2- 40
8	Rough idle (Always)		F2- 42
9	Rough idle (Only when engine is cold)		F2- 46
10	Rough idle (Only when engine is warm)		F2- 48
11	Rough idle (Only after heat soak)		F2- 52
12	Rough idle just after starting		F2- 56
13	Low idle speed (When A/C, P/S, E/L is ON)	Idle speed down and keeps low speed	F2- 58
14	High idle speed after warm up		F2- 60
15	Idle hunting or surging		F2- 62
16	Engine stall at idle (Always)		F2- 64
17	Engine stall at idle (Only when engine is cold)		F2- 66
18	Engine stall at idle (Only when engine is warm)		F2- 68
19	Engine stall at idle (When A/C or P/S or E/L is ON)		F2- 70
20	Engine stall during start up		F2- 72
21	Engine stall on deceleration		F2- 74
22	Engine stall at idle (Intermittent)		F2- 78
23	Hesitates/Stumble on acceleration	Includes start up	F2- 80
24	Hesitates at steady speed		F2- 82
25	Jerking on acceleration		F2- 84
26	Knocking		F2- 86
27	Poor acceleration		F2- 88
28	Lack of power		F2- 92
29	Bucking at high speed		F2- 96
30	Bucking on deceleration		F2- 98
31	Poor fuel economy		F2-100
32	High oil consumption/White exhaust smoke		F2-102
33	Afterburn on deceleration		F2-104
34	Rotten egg smell		F2-106
35	Gasoline fumes		F2-108
36	MIL always ON	(Federal and Canada) Odometer does not indicate emission system parts replacement time, but MIL is ON (California) Engine condition is OK, but MIL is ON	F2-110
37	MIL never ON	(Federal and Canada) Emission system parts replacement time has come, but MIL never ON (California) Self-diagnosis checker indicates malfunction code No., but MIL never ON	F2-112
38	A/C does not work		F2-114

1BU0F2-095

**Description of Drivability**

- (1) SURGE: Continuous soft jerking during cruise.
- (2) STUMBLE: Mild jerking during acceleration.
- (3) JERK: Shock occurring when the accelerator pedal is depressed just after deceleration.
- (4) HESITATION: Flat spot occurring just after the accelerator pedal is depressed.



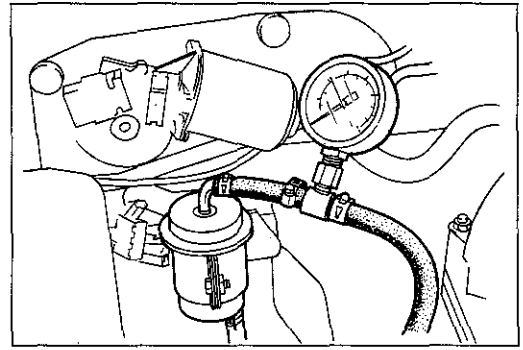
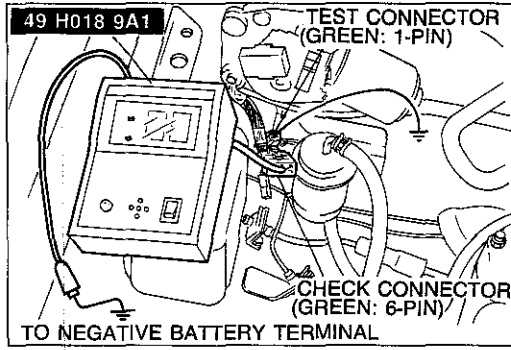
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### SYMPTOM TROUBLESHOOTING

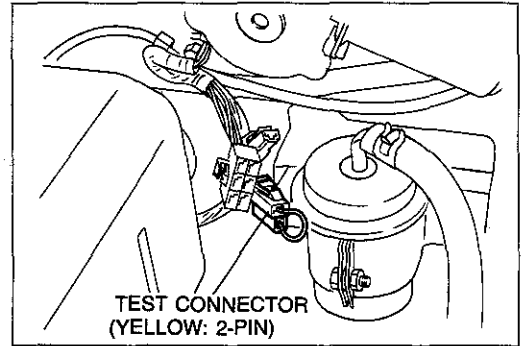
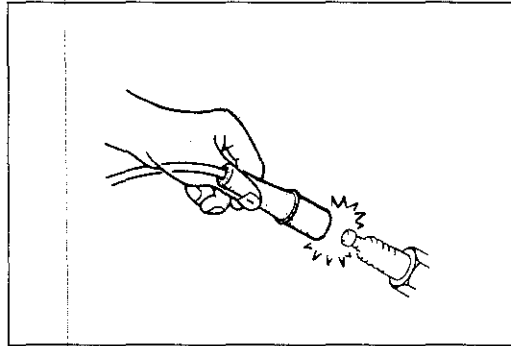
Crank normally but won't start (No combustion)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code (02) with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-123		
		No	Go to Next Step				
2	Check for spark by disconnecting high-tension lead while cranking	Yes	Go to Next Step				
		No	Check ignition system (Refer to ignition system troubleshooting)			Section G	
3	Check for fuel pump operating sound from fuel filler port [IGN ON, Test connector (Yellow: 2-pin) connected]	Yes	Check if engine starts in this condition	Yes	Check circuit opening relay switching operation	F2-153	
				No	Go to Next Step		
		No	Check circuit opening relay switching operation	F2-153	Yes	Check circuit opening relay circuit	F2-153
					No	Check fuel pump operation	F2-151
No	Replace circuit opening relay	F2-153					
4	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure:</b> 265—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—46 psi)	Yes	Go to Next Step				
		No	Check fuel pump maximum pressure  <b>Fuel pump maximum pressure:</b> 441—588 kPa (4.5—6.0 kg/cm <sup>2</sup> , 64—85 psi)	F2-150	Yes	Replace pressure regulator	F2-155
					No	Replace fuel pump	F2-152
5	Check for injector operating sound while cranking	Yes	Go to Next Step				
		No	Check voltage at ECU (2U) and (2V) terminals with SST  <b>Voltage:</b> Approx. 12V (IGN ON)	F2-175	Yes	Check throttle sensor	F2-181
					Yes	Replace ECU	F2-175
					No	Check wiring for short or open	
No	Poor ground circuit from ECU (2A) terminal (Check terminal voltage with SST)	F2-175					
6	Substitute a well-known ECU Check if the condition improves	Yes	ECU malfunction				
		No	Check ground circuit from ECU (2B) terminal with SST  <b>Voltage:</b> 0V (IGN ON)	F2-175	Yes	Go to Next Step	
No	Poor ground circuit						
7					Low compression	Section B2	

1BU0F2-006

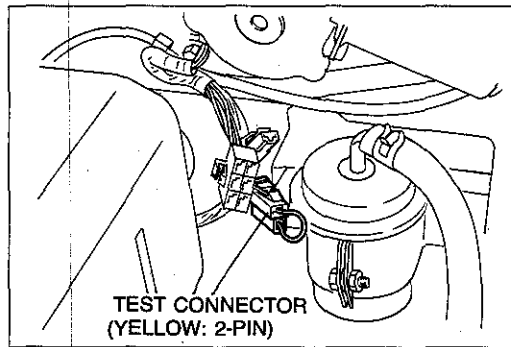
STEP 1



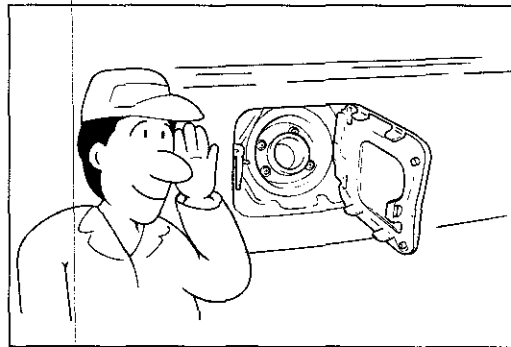
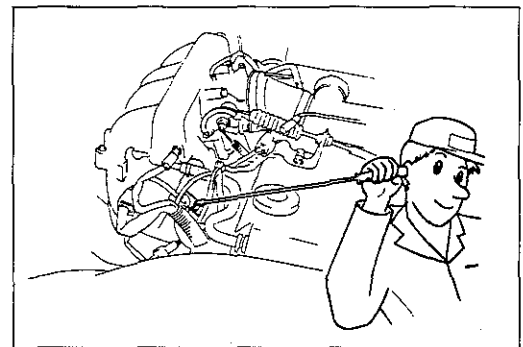
STEP 2



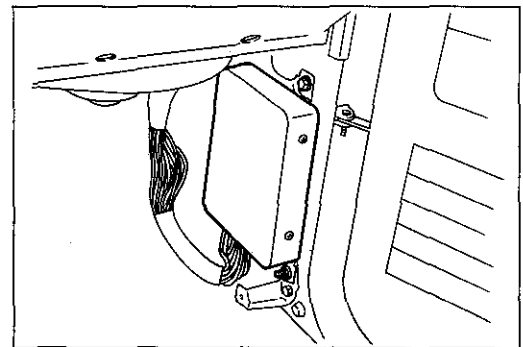
STEP 3



STEP 5



STEP 6

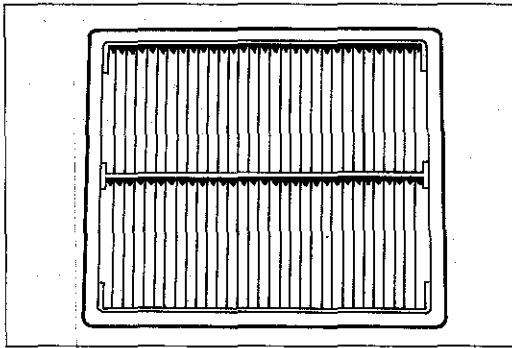


STEP 4

**WARNING**  
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

Crank normally but hard to start (Always)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check if vacuum hoses and the air hoses are connected correctly	Yes	Go to Next Step				
		No	Connect correctly				
2	Check air cleaner element for clogging	Yes	Go to Next Step				
		No	Clean air cleaner element				
3	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing			F2-117	
4	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector (If step 3 OK)	F2-156
					No	Check spark plug	Section G
						Check high-tension lead	Section G
Check distributor cap	Section G						
5	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
						Check wiring short or open	
<b>Terminals Resistance</b>							
(B/Y)—(LG/B)		6—8Ω					
(B/Y)—(LG/R)							
6	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure:</b> 265—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—46 psi)	Yes	Go to Next Step				
		No	Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging		
				No	Replace fuel filter	F2-149	
			Check fuel pump maximum pressure	F2-150	Yes	Replace pressure regulator	F2-155
		No	Replace fuel pump	F2-152			
<b>Fuel pump maximum pressure:</b> 441—588 kPa (4.5—6.0 kg/cm <sup>2</sup> , 64—85 psi)							

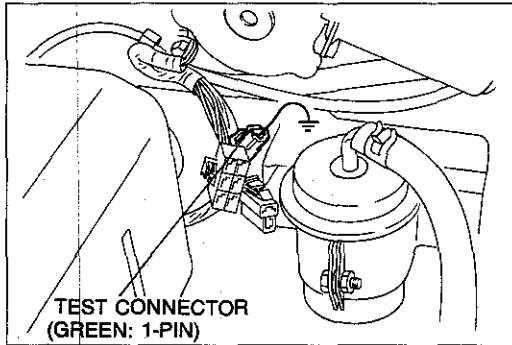
STEP 2



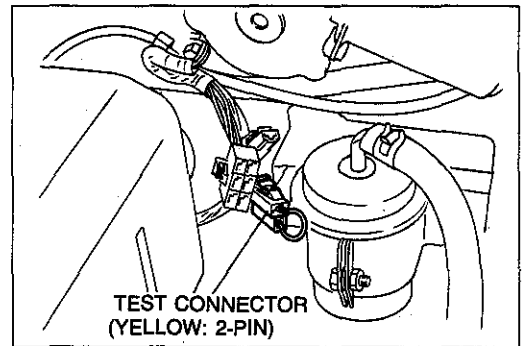
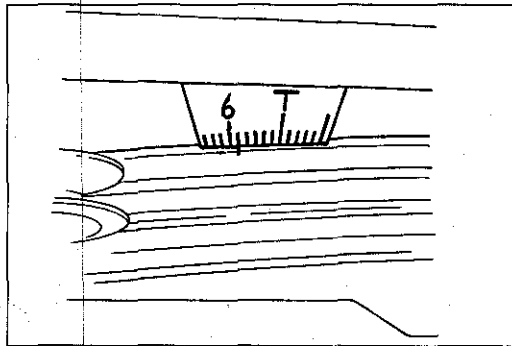
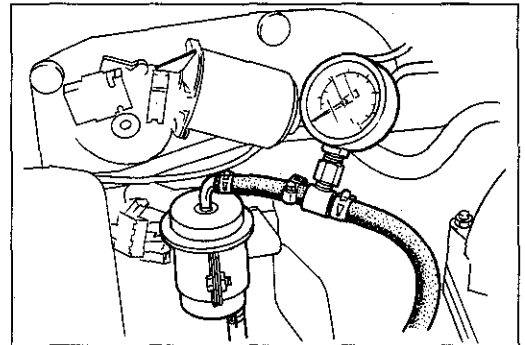
STEP 6

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**

STEP 3

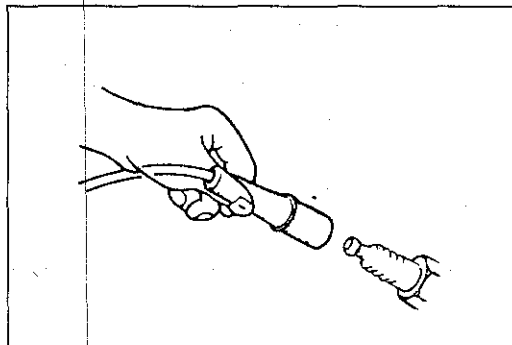


TEST CONNECTOR  
(GREEN: 1-PIN)

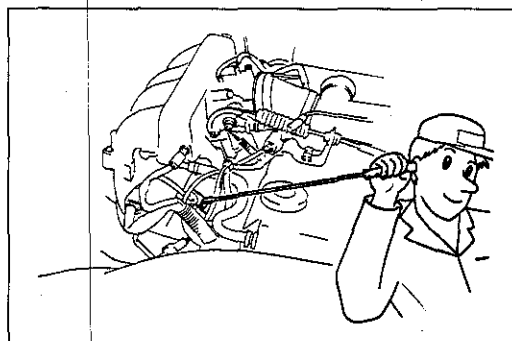


TEST CONNECTOR  
(YELLOW: 2-PIN)

STEP 4



STEP 5



**TROUBLESHOOTING GUIDE**

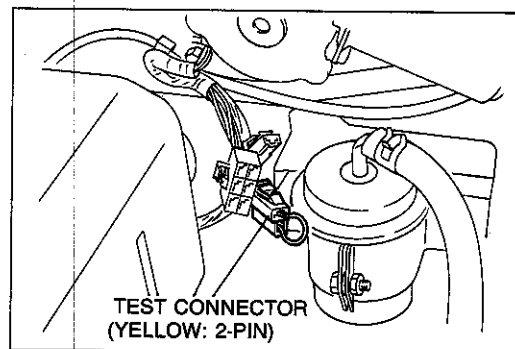
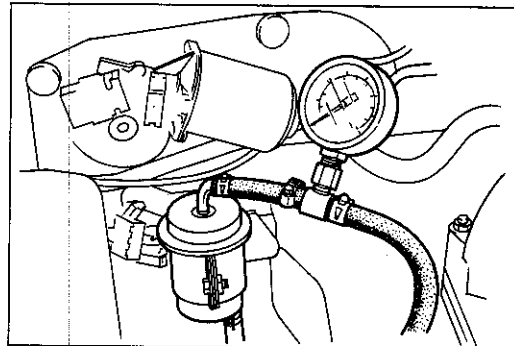
**Cranks normally but hard to start (Always) (Cont'd)**

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
7	Operate fuel pump [IGN ON, Test connector (Yellow: 2-pin) connected] Turn ignition switch OFF and ob- serve fuel pressure <b>for 5 minutes</b>  <b>Fuel pressure:</b> <b>More than</b> <b>147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)</b>	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	<b>F2-150</b>	No	Replace fuel pump	<b>F2-152</b>
			Check pressure regulator pres- sure drop	<b>F2-154</b>	Yes	Check injector fuel leakage	<b>F2-157</b>
				No	Replace pressure regulator	<b>F2-155</b>	
8					Check compression	<b>Section B2</b>	

2BU0F2-004

## STEP 7

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**



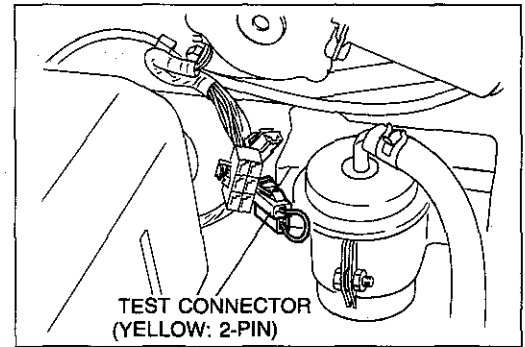
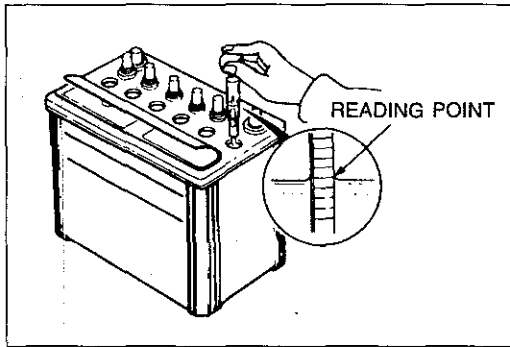


Cranks normally but hard to start (Only when engine is cold)

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check specific gravity of battery using a hydrometer  <b>Specific gravity: Above 1.200</b>	Yes	Go to Next Step			
		No	Recharge battery		<b>Section G</b>	
2	Check for malfunction code (09) (26) with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>	
		No	Go to Next Step			
3	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step			
			Check ignition system [Refer to ignition system troubleshooting (Misfire)]	<b>Section G</b>	Check spark plug	<b>Section G</b>
					Check high-tension lead	<b>Section G</b>
					Check distributor cap	<b>Section G</b>
4	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step			
		No	Check for fuel leaks			
			Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging	
				No	Replace fuel filter	<b>F2-149</b>
		Check fuel pump maximum pressure	<b>F2-150</b>	Yes	Replace pressure regulator	<b>F2-155</b>
No	Replace fuel pump			<b>F2-152</b>		
5	Disconnect ISC valve connector when engine is cold Check if idle speed decreases during warm up	Yes	Go to Next Step			
		No		Check if BAC valve (air valve) opens when cold	<b>F2-142</b>	
6	Check voltage at ECU (1C) terminal with SST  <b>Voltage: Approx. 10V (while cranking)</b>	Yes	Go to Next Step			
		No	Check starter interlock switch	<b>Section G</b>	Yes	Check related wiring
					No	Replace switch
7	Check voltage at ECU (2Q) terminal with SST  <b>Voltage: Approx. 2.5V (IGN ON, Engine coolant temperature 20°C [68°F])</b>	Yes	Go to Next Step			
		No		Check water thermosensor	<b>F2-179</b>	
8			Check compression	<b>Section B2</b>		

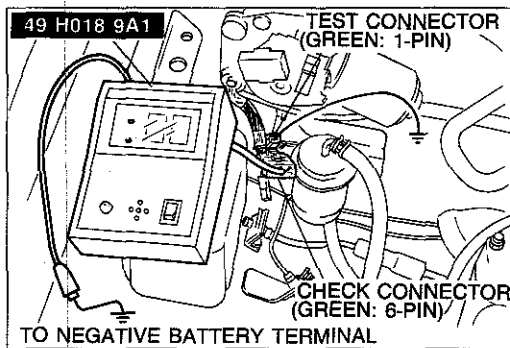
1BU0F2-008

STEP 1

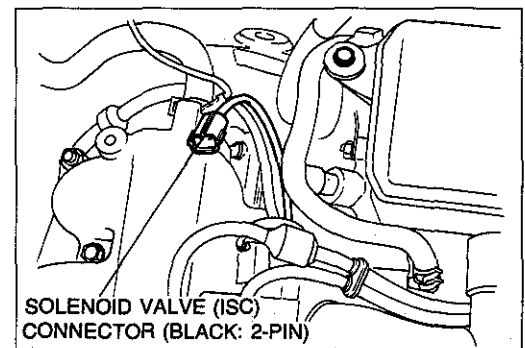


TEST CONNECTOR (YELLOW: 2-PIN)

STEP 2

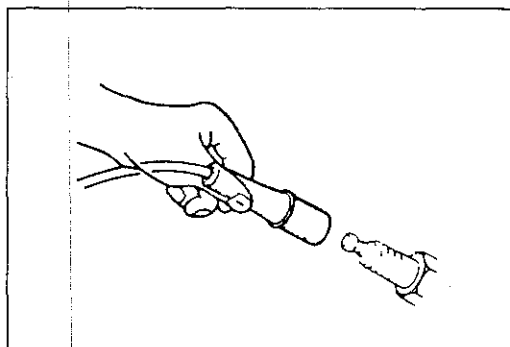


STEP 5

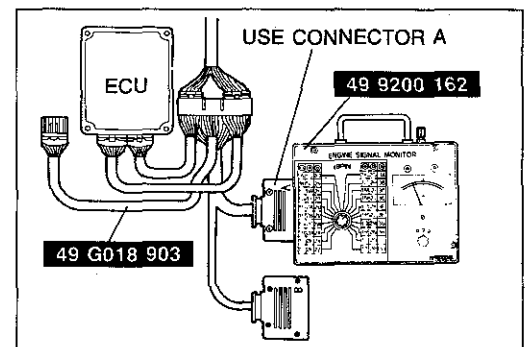


SOLENOID VALVE (ISC) CONNECTOR (BLACK: 2-PIN)

STEP 3

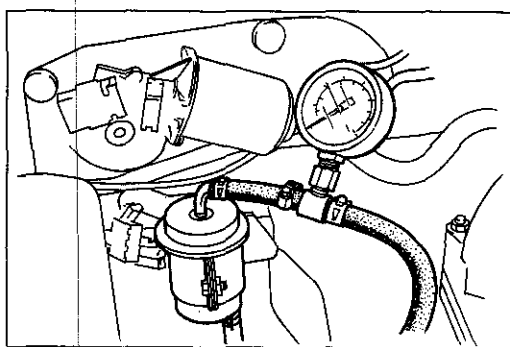
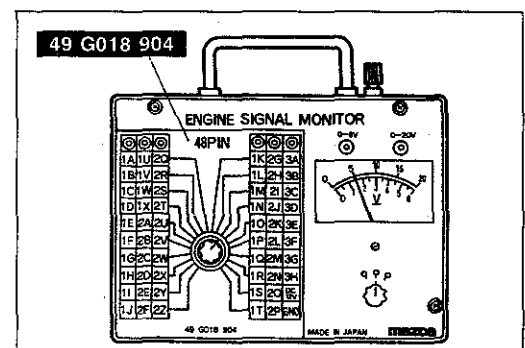


STEP 6



STEP 4

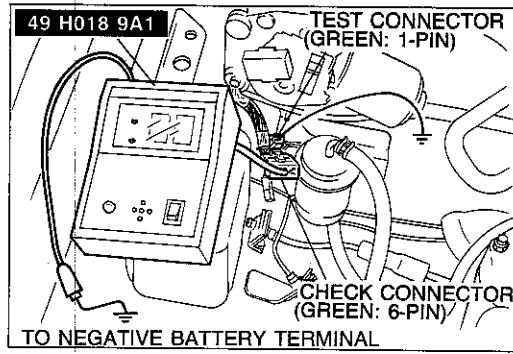
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



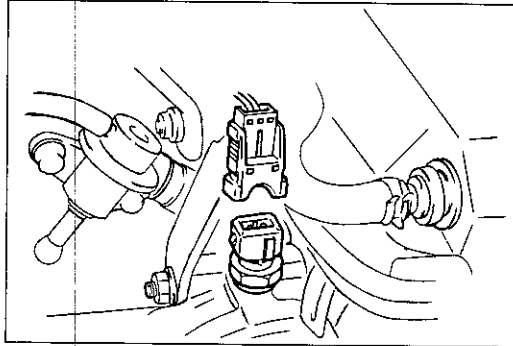
Crank normally but hard to start (Only when engine is warm)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			<b>F2-122</b>	
		No	Go to Next Step				
2	Disconnect water thermosensor connector Check if condition improves	Yes	Check water thermosensor connector condition as follows: 1. Shake connector and check if condition changes 2. Check condition of terminal (burned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor	<b>F2-179</b>	
				No	Poor contact of water thermosensor connector		
		No	Go to Next Step				
3	Operate fuel pump [IGN ON, Test connector (Yellow: 2-pin) connected] Turn ignition switch OFF and observe fuel pressure <b>for 5 minutes</b>  <b>Fuel pressure: More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)</b>	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	<b>F2-150</b>	No	Replace fuel pump	<b>F2-152</b>
			Check pressure regulator pressure drop	<b>F2-154</b>	Yes	Check injector fuel leakage	<b>F2-157</b>
				No	Replace pressure regulator	<b>F2-155</b>	
4		ECU malfunction					

1BU0F2-009

STEP 1

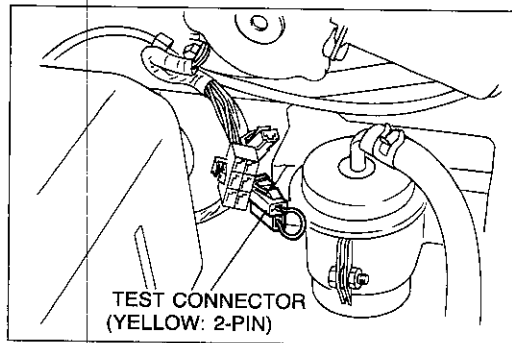
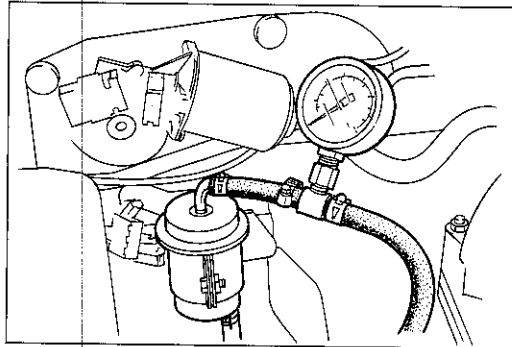


STEP 2



STEP 3

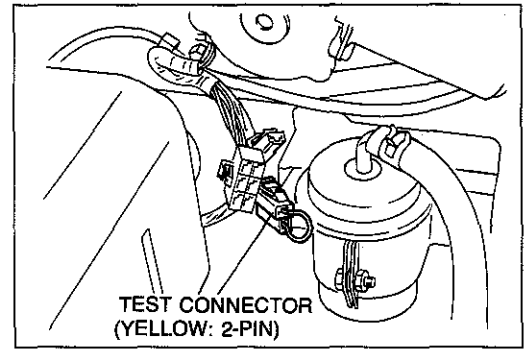
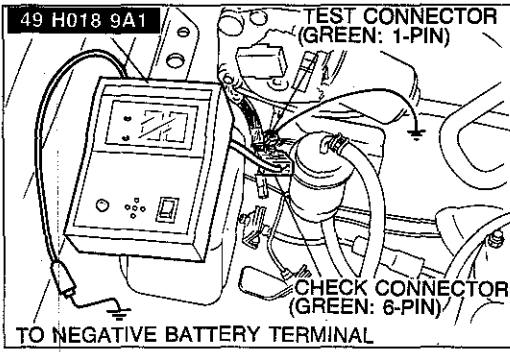
**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**



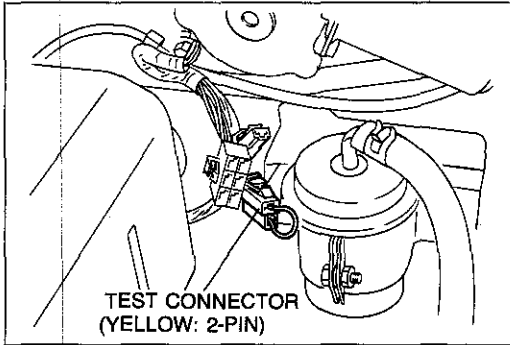
Crank normally but hard to start (Only after heat soak)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next Step				
2	Circulate fuel by operating fuel pump <b>for 20 seconds</b> [IGN ON, Test connector (Yellow: 2-pin) connected] Check if condition improves	Yes	Go to Step 3				
		No	Go to Step 4				
3	Disconnect vacuum hose from pressure regulator Check if condition improves	Yes	Check the components related to pressure regulator control system	Check water thermo-sensor	F2-179		
				Check intake air thermosensor	F2-180		
				Check solenoid valve (PRC)	F2-160		
				ECU malfunction (Check (2T) terminal voltage)	F2-175		
		No	Go to Next Step				
4	Operate fuel pump [IGN ON, Test connector (Yellow: 2-pin) connected] Turn ignition switch OFF and observe fuel pressure <b>for 5 minutes</b>  <b>Fuel pressure: More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)</b>	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	F2-150	No	Replace fuel pump	F2-152
			Check pressure regulator pressure drop	F2-154	Yes	Check injector fuel leakage	F2-155
				No	Replace pressure regulator	F2-155	
5	Change fuel with specified one  Check if condition improves	Yes	Poor fuel quality				
		No	Go to Next Step				
6		ECU malfunction					

1BU0F2-010

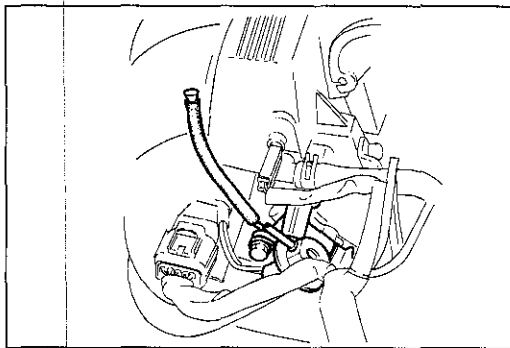
STEP 1



STEP 2

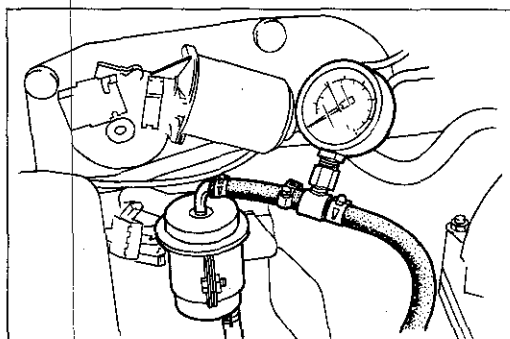


STEP 3



STEP 4

**WARNING**  
BEFORE CONNECTING FUEL  
PRESSURE GAUGE, RELEASE  
FUEL PRESSURE FROM FUEL  
SYSTEM TO REDUCE POSSIBILITY  
OF INJURY OR FIRE  
(REFER TO PAGE F2-144)



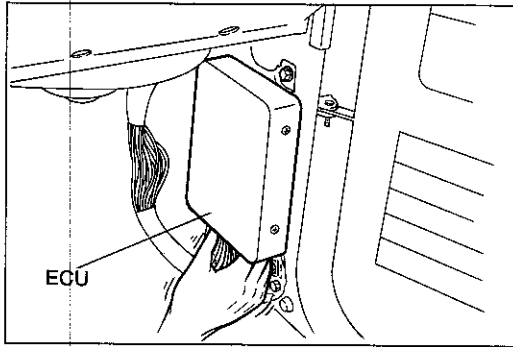
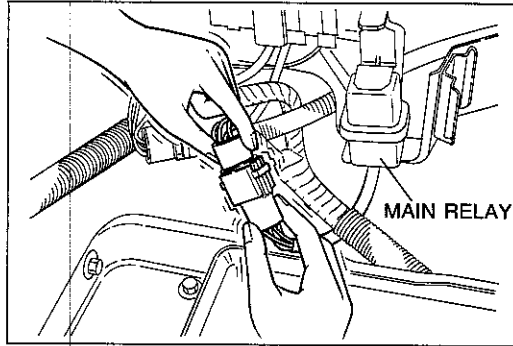
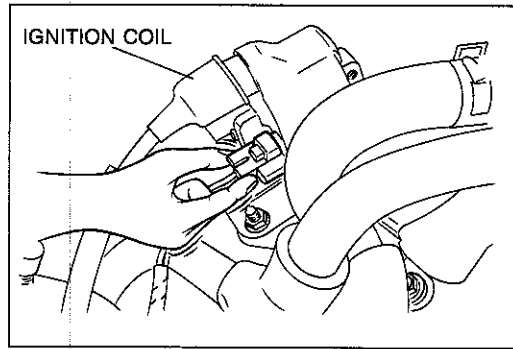
**TROUBLESHOOTING GUIDE**

**Cranks normally but won't start (Intermittent)**

STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Shake connector of ignition coil, main relay and ECU while cranking Check if the engine starts	Yes There may be a poor contact of the connector. Repair or replace the wiring	
		No Go to troubleshooting "Cranks normally but hard to start (Always)"	<b>F2-30</b>

1BU0F2-096

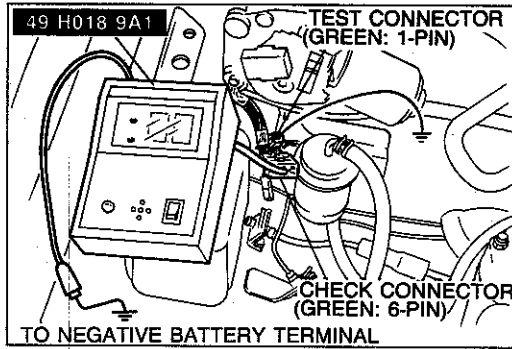
STEP 1



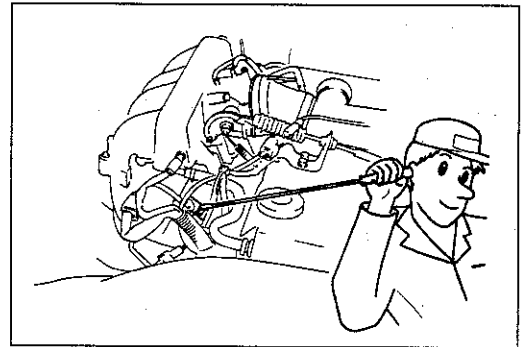


Rough idle (Always)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence			F2-122	
		No	"88" flashing Check voltage at ECU (2C) terminal with SST  <b>Voltage: 0V (IG ON)</b>	F2-175	Yes	Replace ECU	F2-175
					No	Poor ground circuit	
"00" Go to Next Step							
2	Check ignition at idle after warm up <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing (If possible)			F2-117	
3	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector (If Step 3 OK)	F2-156
					No	Check spark plug	Section G
						Check high-tension lead	Section G
				Check distributor cap	Section G		
4	Check idle speed after warm up <b>Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust idle speed (If possible)			F2-118	
5	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
				Check wiring short or open			
		<b>Terminals</b>	<b>Resistance</b>				
		(B/Y)—(LG/B) (BY)—(LG/R)	6—8Ω				
6	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected] <b>Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step				
		No	Check for fuel leakage				
			Substitute a good fuel filter and retest	Yes	Replace fuel filter	F2-149	
			Check fuel pump maximum pressure	F2-150	Yes	Replace pressure regulator	F2-155
			No	Replace fuel pump	F2-152		
		<b>Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)</b>					
7	Check intake manifold vacuum at idle <b>Vacuum: 500—540 mmHg (19.7—21.3 inHg)</b>	Yes	Go to Next Step				
		No	Check for air leaks	F2-137	Yes	Intake air system components damaged	F2-137
						Vacuum and intake air hoses loose or damaged	
						Bolts or nuts loose	
						Gaskets damaged	
			No	Check throttle valve closing condition	F2-138		

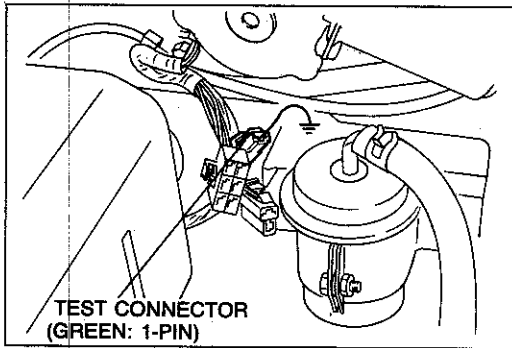
STEP 1



STEP 5

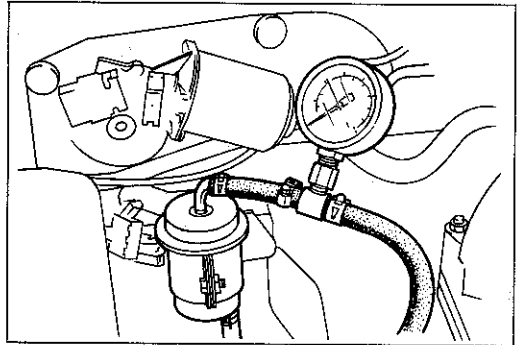
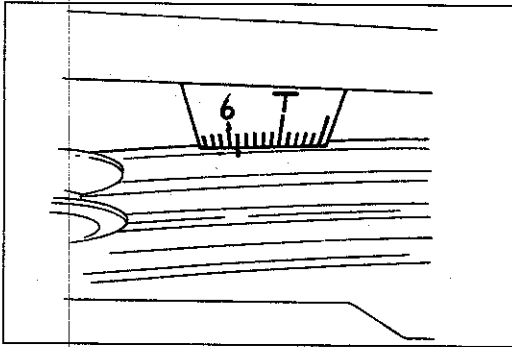


STEP 2

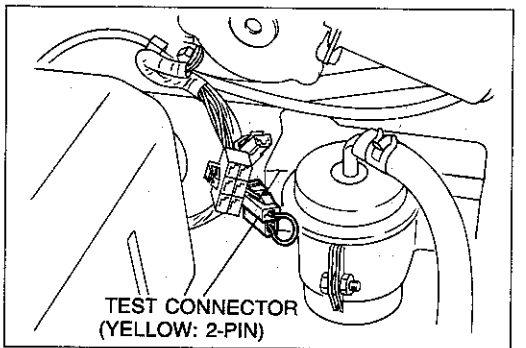
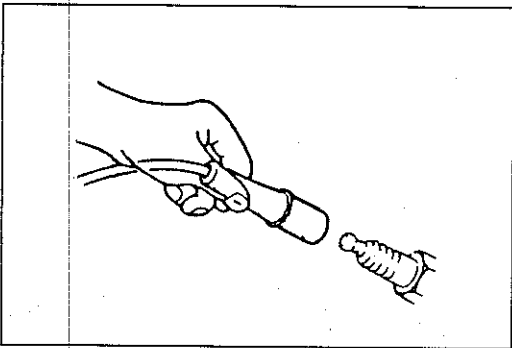


STEP 6

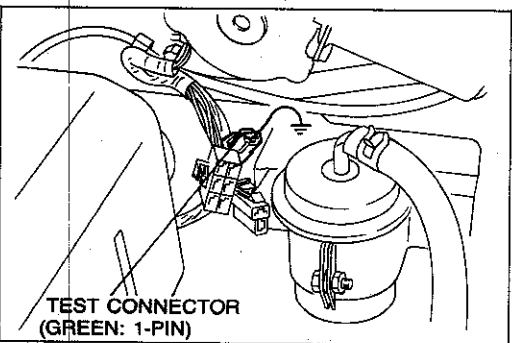
**WARNING**  
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



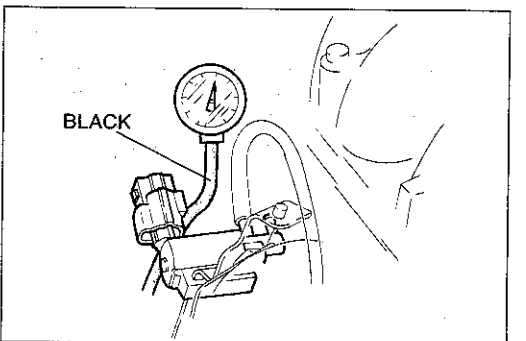
STEP 3



STEP 4



STEP 7

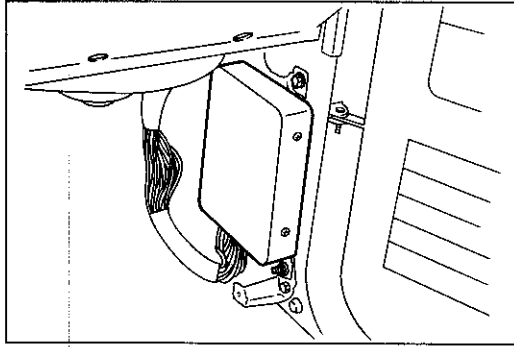


**TROUBLESHOOTING GUIDE**

Rough idle (Always) (Cont'd)						
STEP	QUICK INSPECTION		ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION
8	Substitute a well-known ECU Check if condition improves	Yes				ECU malfunction
		No	Check voltage at ECU (2C) terminal with SST  <b>Voltage: 0V (IGN ON)</b>	F2-178	Yes	Go to Next Step
					No	Poor ground circuit
9					Check compression	<b>Section B2</b>

2BU0F2-005

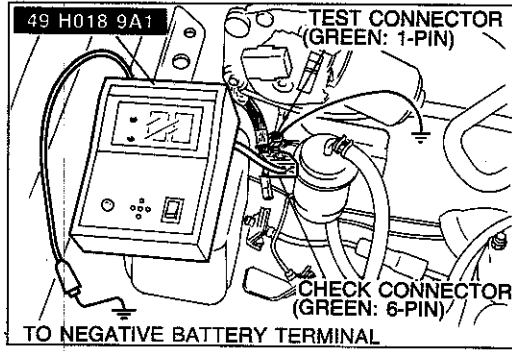
STEP 8



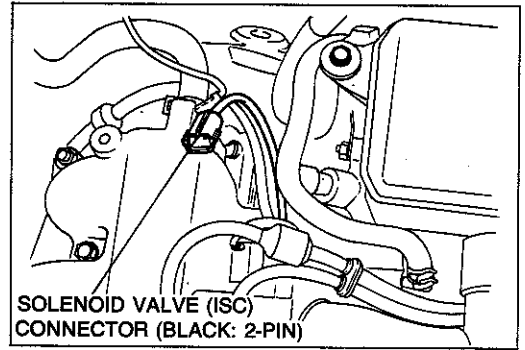
Rough idle (Only when engine is cold)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			<b>F2-122</b>	
		No	Go to Next Step				
2	Check ignition at idle after warm up  <b>Ignition timing:</b> <b>BTDC 4—6° (G6)</b> <b>5—7° (F2)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing (If possible)				<b>F2-117</b>
3	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	<b>Section G</b>	Yes	Replace injector (If step 4 OK)	<b>F2-156</b>
					No	Check spark plug	<b>Section G</b>
						Check high-tension lead	<b>Section G</b>
Check distributor cap	<b>Section G</b>						
4	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	<b>F2-157</b>	Yes	Check wiring short or open	<b>F2-157</b>
					No	Injector malfunction (Check resistance)	
						Wiring short or open	
<b>Terminals Resistance</b> (B/Y)-(LG/B) <b>6—8Ω</b> (B/Y)-(LG/R)							
5	Disconnect ISC valve connector at idle when engine is cold Check if idle speed decreases during warm up	Yes	Go to Next Step				
		No				Check if BAC valve (air valve) opens when cold	<b>F2-142</b>
6	Check if specified engine oil is used	Yes	Go to Next Step				
		No	Change engine oil to specified oil				
7	Substitute a well-known ECU Check if condition improves	Yes				ECU malfunction	
		No				Check airflow sensor	<b>F2-179</b>

2BU0F2-006

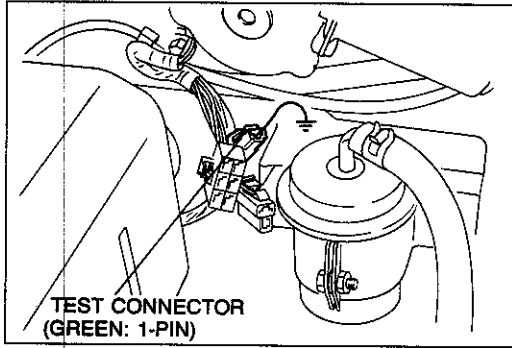
STEP 1



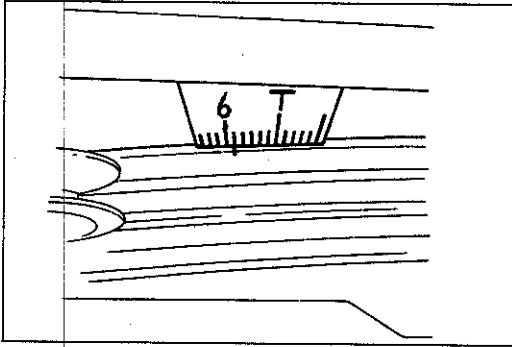
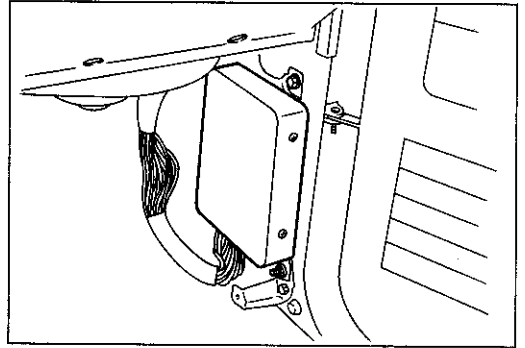
STEP 5



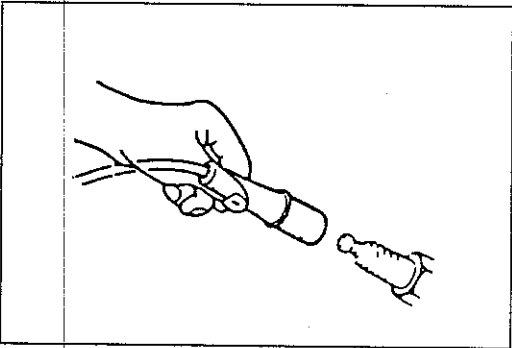
STEP 2



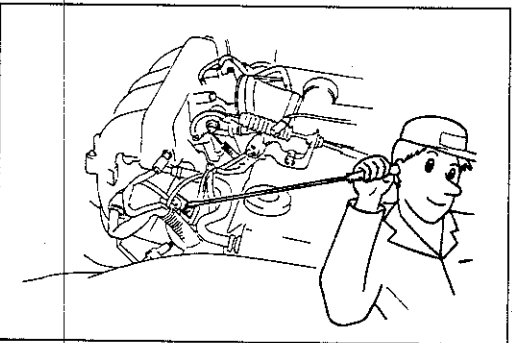
STEP 7



STEP 3

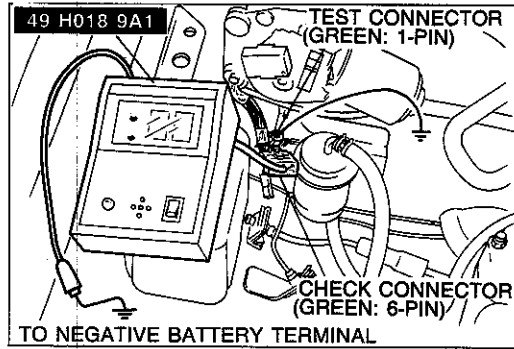


STEP 4

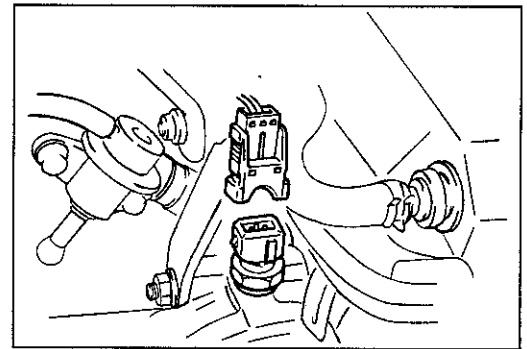


Rough idle (Only when engine is warm)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Run engine at <b>2,000 rpm</b> for more than <b>20 seconds</b> Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next Step				
2	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T)</b> <b>750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust idle speed (if possible)		F2-117		
3	Check for flashing of SST monitor lamp after warm up  <b>Monitor lamp: Flashes more than 8 times/10 seconds at 2,000—3,000 rpm</b>  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step				
		No			Replace oxygen sensor	F2-183	
4	Disconnect ISC valve connector after warm up Check if engine speed drops	Yes	Go to Next Step				
		No			Check ISC valve	F2-142	
5	Disconnect water thermosensor connector Check if condition improves	Yes	Check water thermosensor connector condition as follows: 1. Shake connector and check if condition changes 2. Check condition of terminal (burned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor	F2-179	
				No	Poor contact of water thermosensor connector		
		No	Go to Next Step				
6	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector (if step 7 OK)	F2-156
					No	Check spark plug	Section G
						Check high-tension lead	Section G
Check distributor cap	Section G						
Note: If spark plug is wet, injector may be leaking							

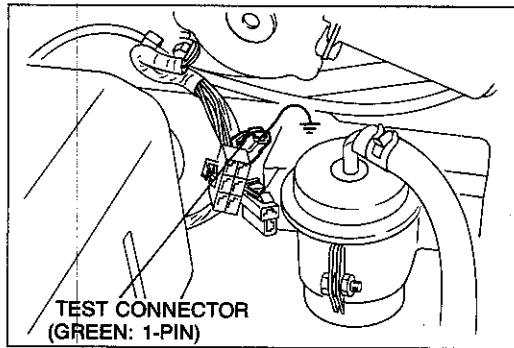
STEP 1



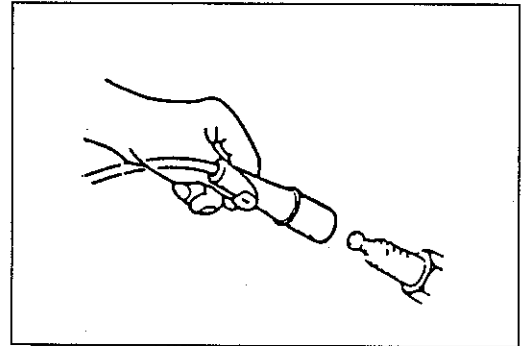
STEP 5



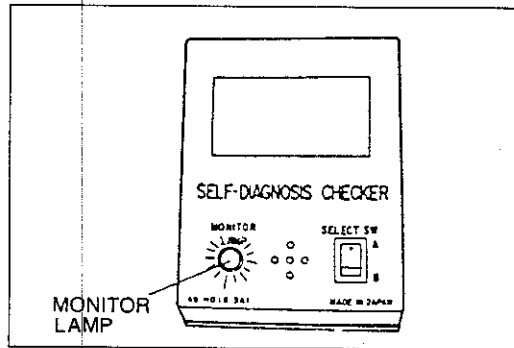
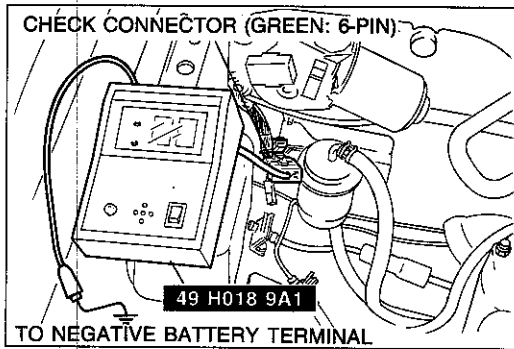
STEP 2



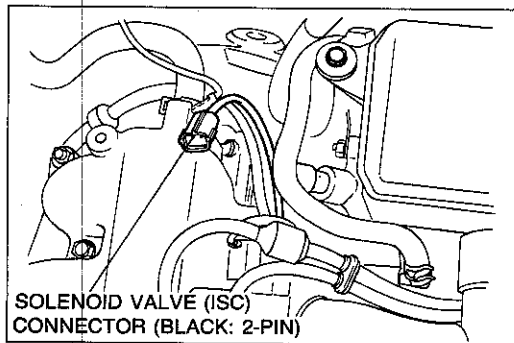
STEP 6



STEP 3



STEP 4

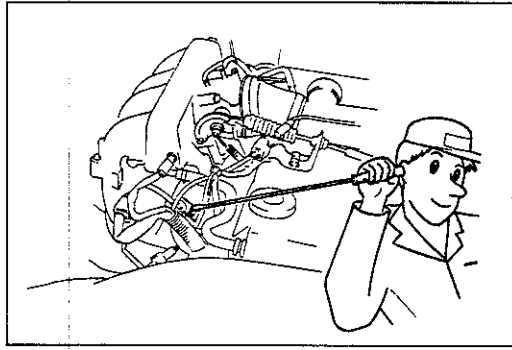




Rough idle (Only when engine is warm) (Cont'd)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
						Check wiring short or open	
Terminals	Resistance						
(B/Y)-(L/G/B)	6-8Ω						
8	Check for air leaks by listening for sucking noise	Yes	Go to Next Step				
		No			Intake air system components damaged	F2-137	
					Vacuum and intake air hoses loose or damaged		
					Bolts or nuts loose		
Gaskets damaged							
9					Check compression	Section B2	

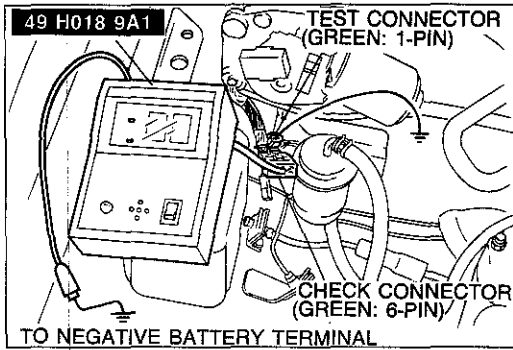
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STEP 7

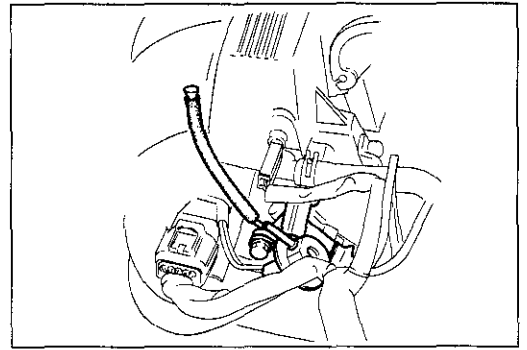


Rough idle (Only after heat soak)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Run engine at, <b>2,000 rpm</b> for more than <b>20 seconds</b> Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>		
		No	Go to Next Step				
2	Check switches with SST Neutral switch Clutch switch [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to check sequence		<b>F2-134</b>		
3	Check for flashing of SST monitor lamp after warm up  <b>Monitor lamp: Flashes more than 8 times 10 seconds at 2,000—3,000 rpm</b>  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step				
		No		Replace oxygen sensor	<b>F2-183</b>		
4	Disconnect vacuum hose from pressure regulator Check if condition improve	Yes	Check components related to pressure regulator control system	Check water thermo-sensor	<b>F2-179</b>		
				Check intake air thermosensor	<b>F2-180</b>		
				Check solenoid valve (PRC)	<b>F2-160</b>		
				ECU malfunction (Check (2T) terminal voltage)	<b>F2-175</b>		
		No	Go to Next Step				
5	Run engine at idle and stop it Observe fuel pressure for <b>5 minutes</b>  <b>Fuel pressure: More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)</b>	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	<b>F2-150</b>	No	Replace fuel pump malfunction	<b>F2-152</b>
				<b>F2-150</b>	Yes	Check injector fuel leakage	<b>F2-157</b>
					No	Replace pressure regulator	<b>F2-155</b>
6	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	<b>Section G</b>	Yes	Replace injector (If step 3 OK)	<b>F2-156</b>
					No	Check spark plug	<b>Section G</b>
						Check high-tension lead	<b>Section G</b>
Check distributor cap	<b>Section G</b>						

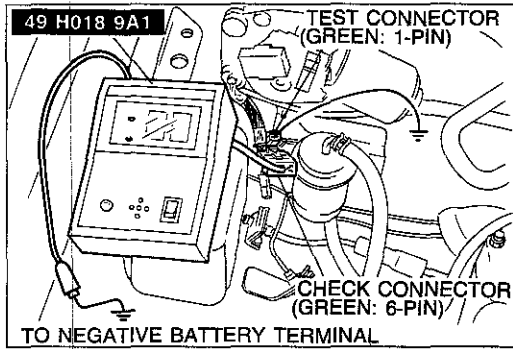
STEP 1



STEP 4

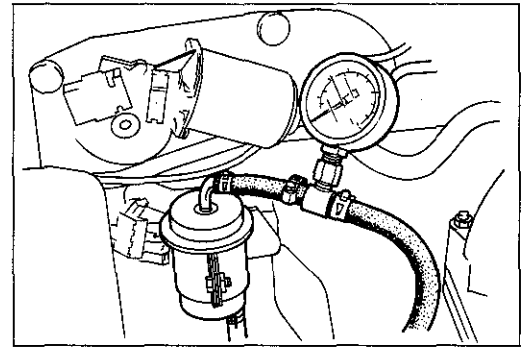
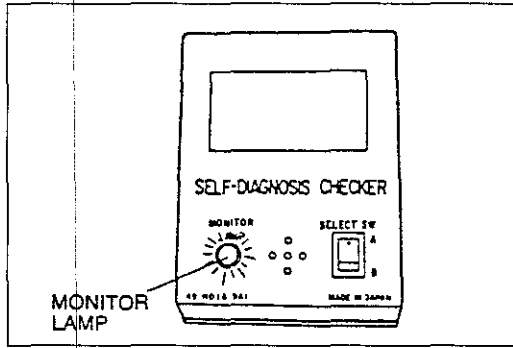


STEP 2

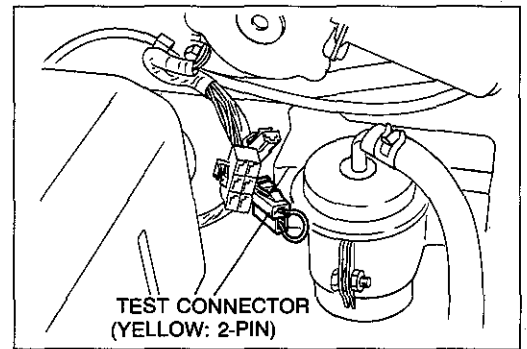
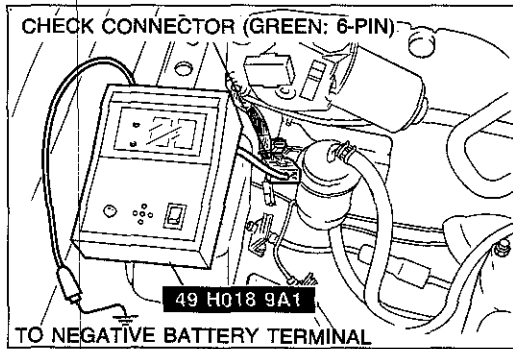


STEP 5

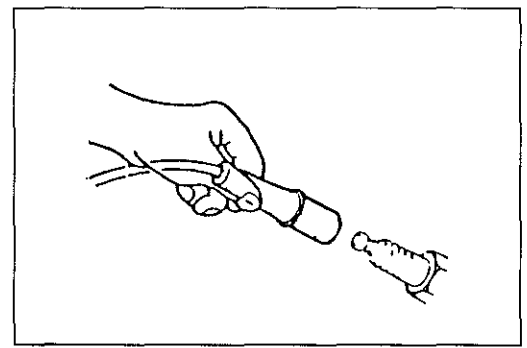
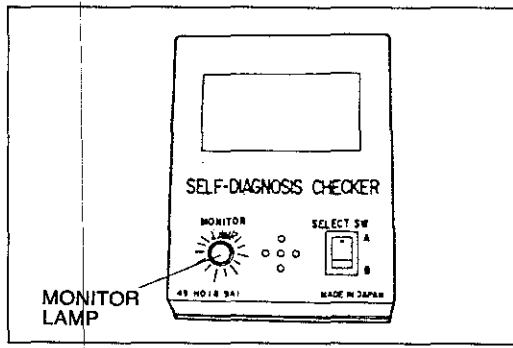
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



STEP 3



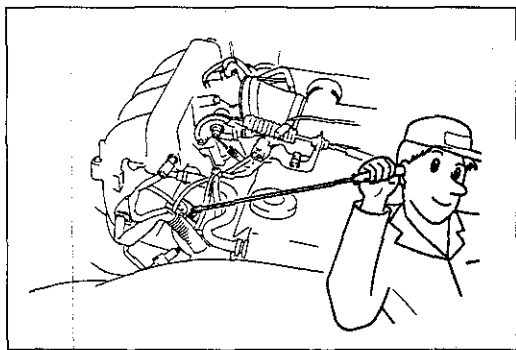
STEP 6



Rough idle (Only after heat soak) (Cont'd)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
						Check wiring short or open	
<table border="1"> <tr> <th>Terminals</th> <th>Resistance</th> </tr> <tr> <td>(B/Y)-(LG/B)</td> <td rowspan="2">6-8Ω</td> </tr> <tr> <td>(B/Y)-(LG/R)</td> </tr> </table>	Terminals	Resistance	(B/Y)-(LG/B)	6-8Ω	(B/Y)-(LG/R)		
Terminals	Resistance						
(B/Y)-(LG/B)	6-8Ω						
(B/Y)-(LG/R)							
8	Change fuel to specified grade	Yes				Poor fuel quality	
		No	Go to Next Step				
	Check if condition improves						
9						ECU malfunction	

1BUOF2-014

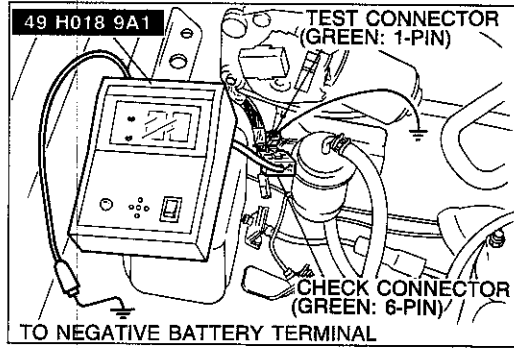
STEP 7



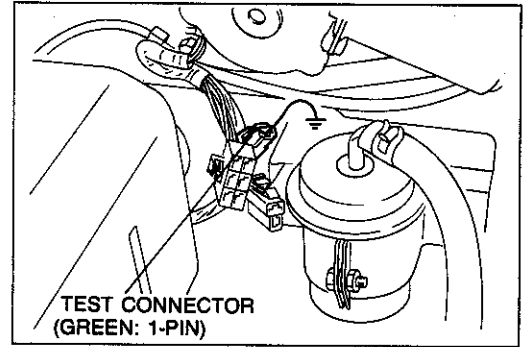
Rough idle just after starting							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>		
		No	Go to Next Step				
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to check sequence		<b>F2-134</b>		
3	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing		<b>F2-117</b>		
4	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Try to adjust idle speed	<b>F2-118</b>	Yes	Idle-speed misadjustment	
					No	Check accelerator cable free play	<b>F2-139</b>
						Check ISC valve (Stuck closed)	<b>F2-142</b>
Check throttle body	<b>F2-138</b>						
5	Substitute a well-known ECU Check if condition improves	Yes			ECU malfunction		
		No	Check voltage at ECU (1C) terminal with SST  <b>Voltage:</b> Approx. 10V (While cranking)	<b>F2-175</b>	Yes	Go to Next Step	
					No	Check starter interlock switch	<b>Section G</b>
				Check related wiring			
6					Poor quality engine oil		

2BU0F2-008

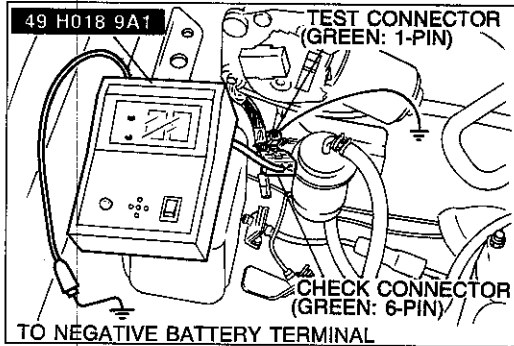
STEP 1



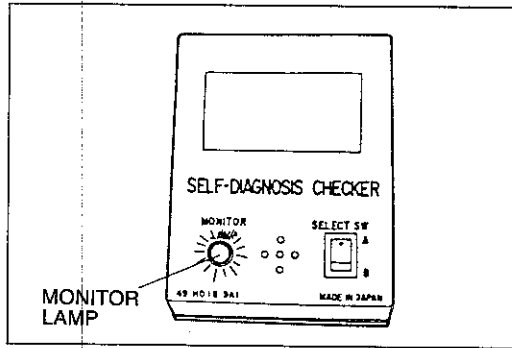
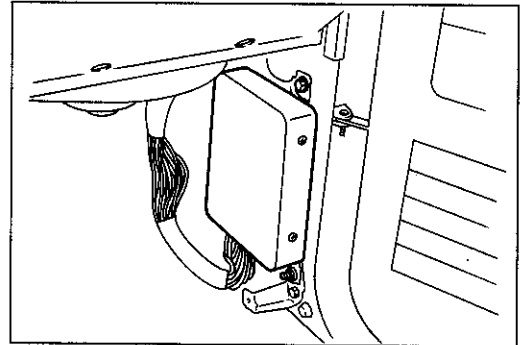
STEP 4



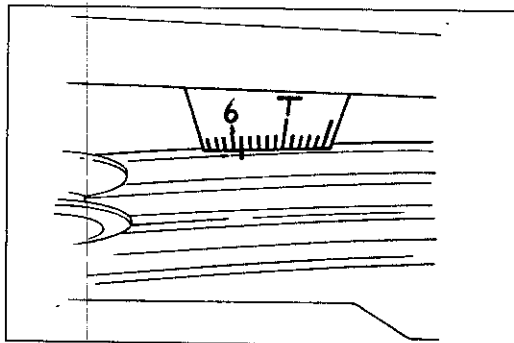
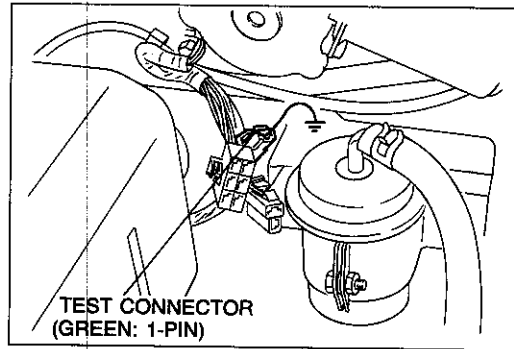
STEP 2



STEP 5



STEP 3





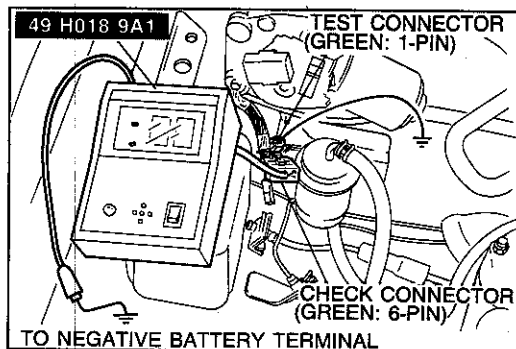
Low idle speed (When A/C, P/S, E/L is ON)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence <b>F2-122</b>
		No	Go to Next Step
2	Disconnect ISC valve connector at idle Check if the condition does not change	Yes	Go to Next Step
		No	Check coolant level <b>F2-116</b>
			Check engine oil <b>F2-116</b>
3	Check switches with SST Idle switch Neutral switch Clutch switch [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step
		No	Check for cause by referring to check sequence <b>F2-134</b>
4	Check continuity between test connector (Green: 1-pin) and ground		Wiring short to ground

2BU0F2-045

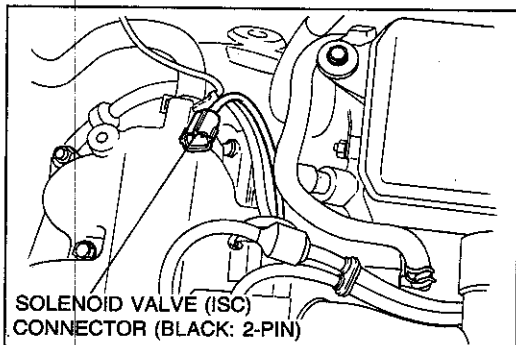
**Note:**

In case of low idle speed with A/C ON, if the problem cannot be solved by the above steps, it may be an A/C compressor malfunction. (Refer to Section U.)

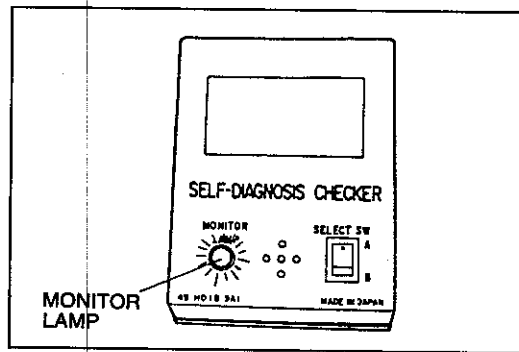
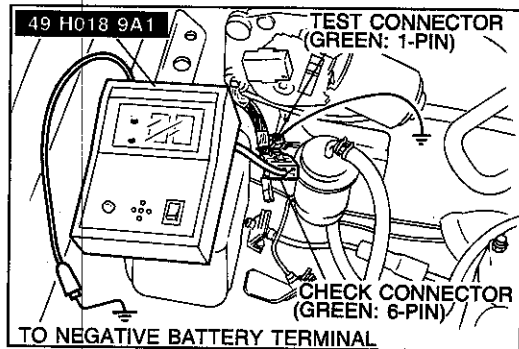
STEP 1



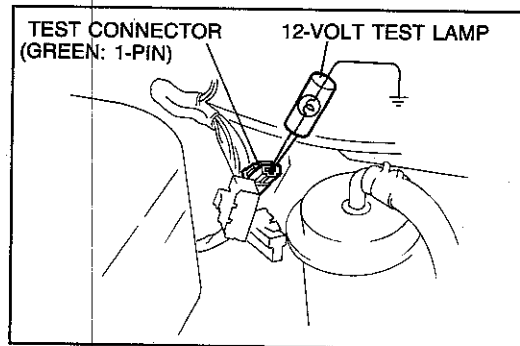
STEP 2



STEP 3



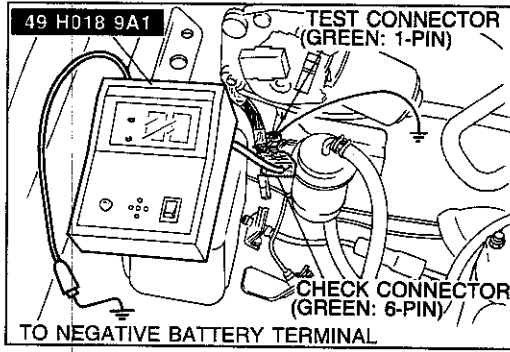
STEP 4



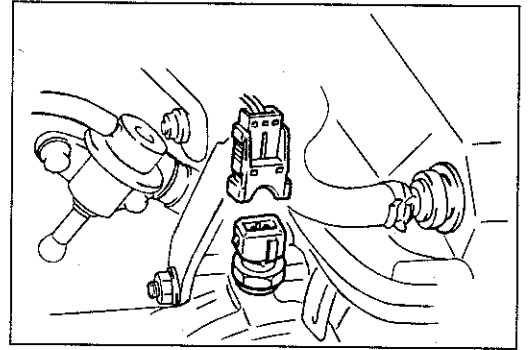
High idle speed after warm up					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122
		No	Go to Next Step		
2	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step		
		No	Adjust ignition timing		F2-117
3	Check if throttle valve is fully closed when accelerator released	Yes	Go to Next Step		
		No	Check if throttle linkage is correctly installed and operates freely		F2-137
4	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T)</b> <b>Idle speed: 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes			Check ISC valve F2-142
		No	Try to adjust idle speed F2-118	Yes	Idle speed misadjustment
				No	Go to Next Step
5	Disconnect ISC valve connector at idle when engine is cold Check if idle speed decreases during warm up	Yes	Go to Next Step		
		No			Check air valve F2-142
6	Disconnect water thermosensor connector and check if condition improves	Yes	Check water thermosensor connector condition as follows: 1. Shake connector and check if condition changes 2. Check condition of terminal (burned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor F2-179
				No	Poor contact of water thermosensor connector
		No	Go to Next Step		
7				ECU malfunction	

2BU0F2-009

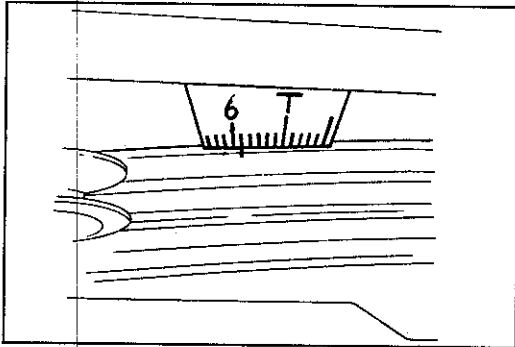
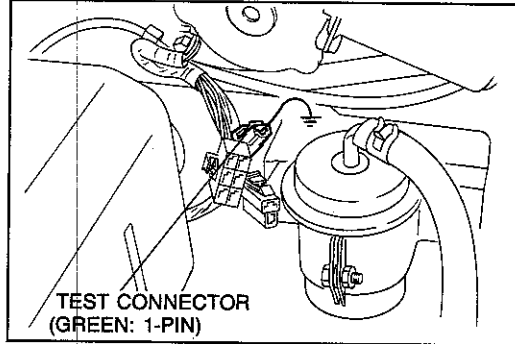
STEP 1



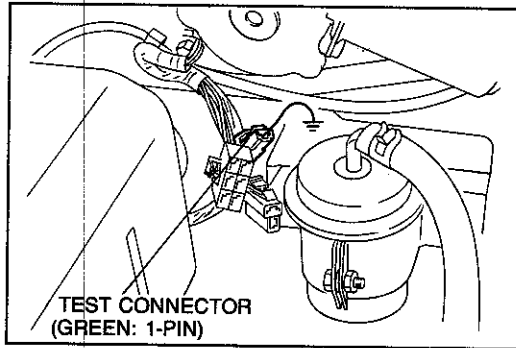
STEP 6



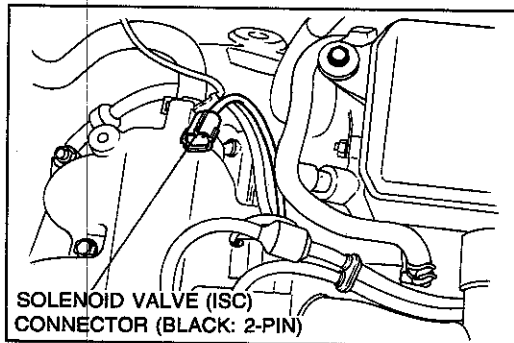
STEP 2



STEP 4



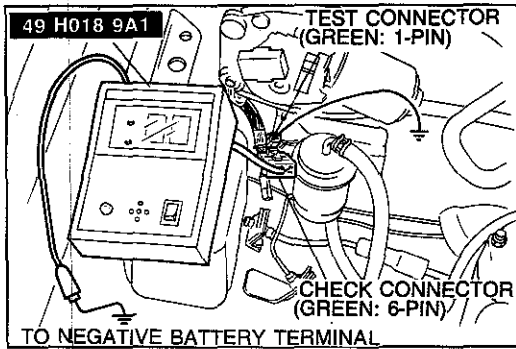
STEP 5



Idle hunting or surging							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	(If trouble occurs only at warm condition) Run engine at <b>2,000 rpm</b> for more than <b>20 seconds</b> Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>		
		No	Go to Next Step				
2	(If trouble occurs only at warm condition) Check for flashing of SST monitor lamp after warm up  <b>Monitor lamp:</b> <b>Flashes more than 8 times 10 seconds at 2,000—3,000 rpm</b>  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step				
		No		Replace oxygen sensor	<b>F2-183</b>		
3	Check intake manifold vacuum at idle  <b>Vacuum: G6 500—540 mmHg (19.7—21.3 inHg)</b> <b>F2 510—550 mmHg (20.1—21.7inHg)</b>	Yes	Go to Next Step				
		No	Check for air leaks	<b>F2-137</b>	Yes	Intake air system components damaged	<b>F2-137</b>
						Vacuum and air intake hoses loose or damaged	
						Bolts or nuts loose	
			No	Check throttle body	<b>F2-138</b>		
4	Pinch PCV hose Check if condition improves	Yes		Check PCV valve	<b>F2-163</b>		
		No	Go to Next Step				
5	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure:</b> <b>265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step				
		No	Check for fuel leaks				
			Substitute a good fuel filter and retest	Yes	Replace fuel filter	<b>F2-149</b>	
			Check fuel pump maximum pressure	<b>F2-144</b>	Yes	Replace pressure regulator	<b>F2-155</b>
	No	Replace fuel pump		<b>F2-152</b>			
		<b>Fuel pump maximum pressure:</b> <b>441—588 kPa (4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)</b>					
6		ECU malfunction					

2BU0F2-010

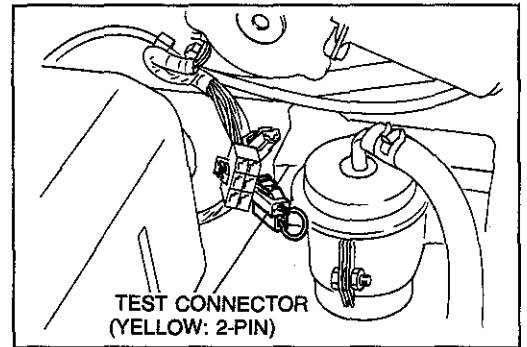
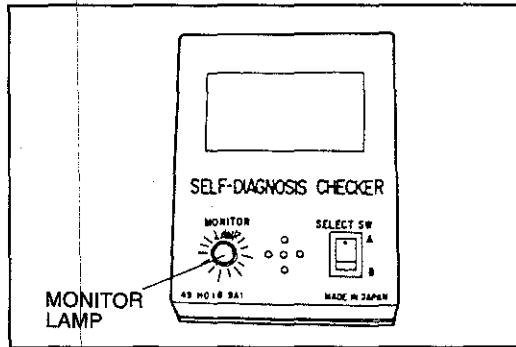
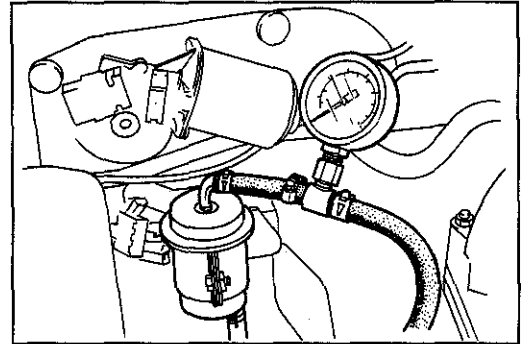
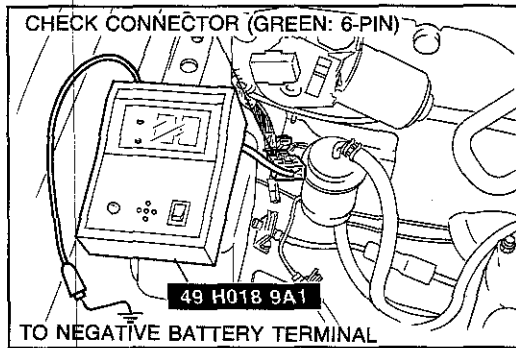
STEP 1



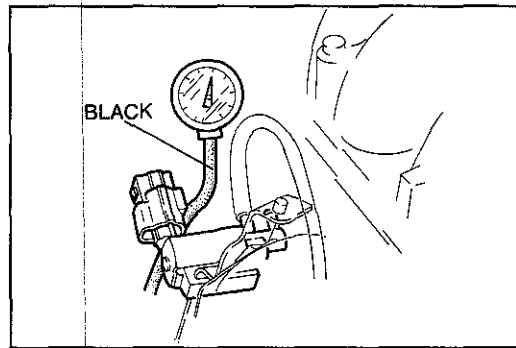
STEP 5

**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

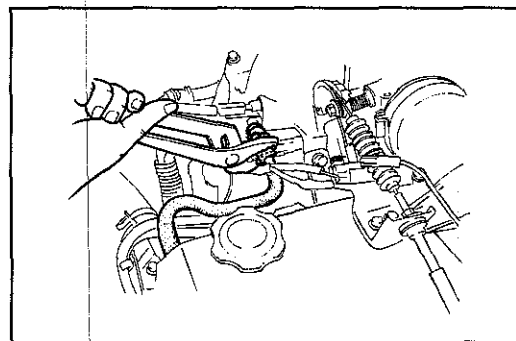
STEP 2



STEP 3



STEP 4

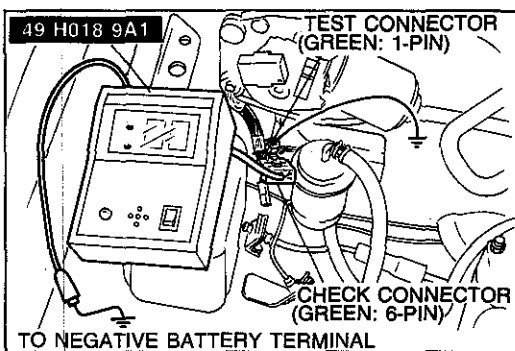


TROUBLESHOOTING GUIDE

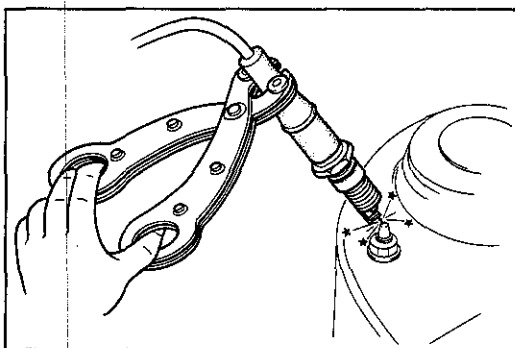
Engine stall at idle (Always)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence		F2-122	
		No	Go to Next Step			
2	Check if strong blue spark is visible at spark plug while cranking	Yes	Go to Next Step			
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Check spark plug	Section G
					Check high-tension lead	Section G
					Check distributor cap	Section G
3	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step			
		No	Check for fuel leaks			
			Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging	
				No	Replace fuel filter	F2-149
			Check fuel pump maximum pressure	F2-144	Yes	Replace pressure regulator
	No	Replace fuel pump		F2-152		
4	Check if vacuum hoses and the air hoses are connected correctly	Yes	Go to Next Step			
		No	Connect correctly			
5			Airflow sensor	F2-179		
6			ECU malfunction			

1BU0F2-018

STEP 1

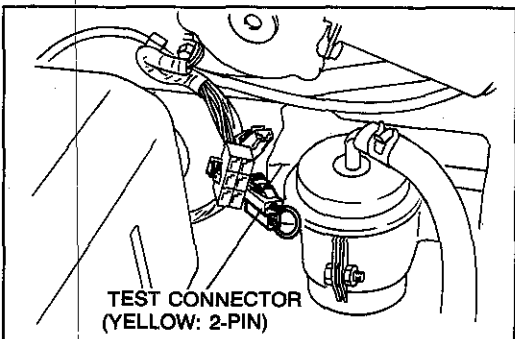
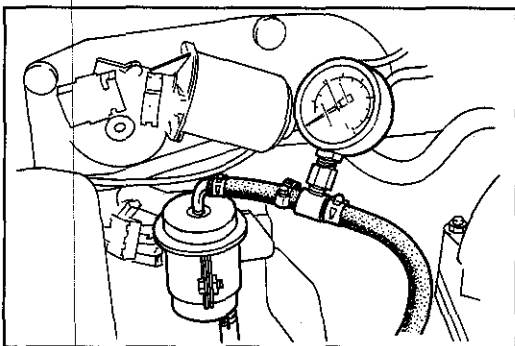


STEP 2



STEP 3

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**





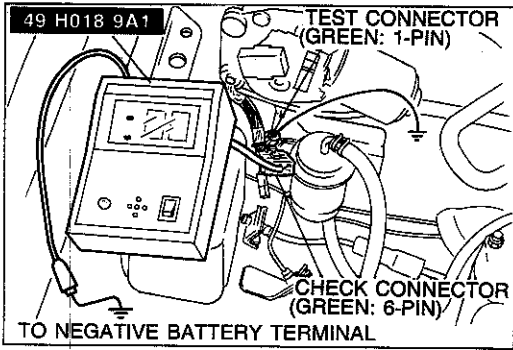
**TROUBLESHOOTING GUIDE**

**Engine stall at idle (Only when engine is cold)**

STEP	QUICK INSPECTION		ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence	<b>F2-122</b>
		No	Go to Next Step	
2				Check BAC valve (air valve) <b>F2-142</b>
3				ECU malfunction

1BU0F2-019

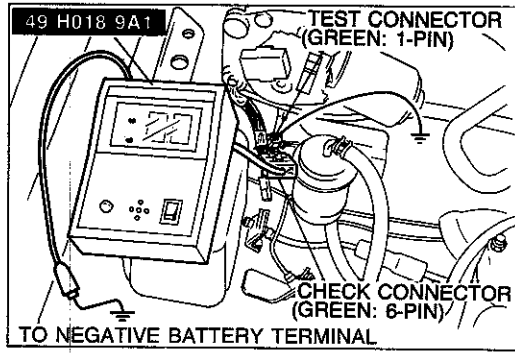
STEP 1



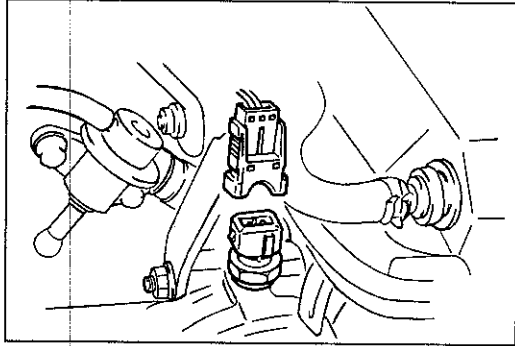
Engine stall at idle (Only when engine is warm)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>	
		No	Go to Next Step			
2	Disconnect water thermosensor connector Check if condition improves	Yes	Check water thermosensor connector as follows: 1. Shake connector and check if condition changes 2. Check condition of terminal (burned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor	<b>F2-179</b>
				No	Poor contact of water thermosensor connector	
		No	Go to Next Step			
3					ECU malfunction	

1BU0F2-020

STEP 1



STEP 2



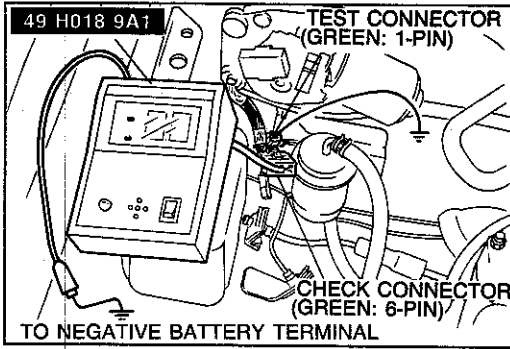
Engine stall at idle (When A/C, P/S, E/L is ON)					
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence <b>F2-122</b>		
		No	Go to Next Step		
2	Check switches with SST • Headlight switch • Blower switch [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step		
		No	Check for cause by referring to check sequence <b>F2-134</b>		
3	Disconnect ISC valve connector at idle [Test connector (Green: 1-pin) grounded] Check if the condition does not change	Yes	Go to Next Step		
		No	<table border="1"> <tr> <td>Check ISC valve</td> <td><b>F2-142</b></td> </tr> <tr> <td>Check engine oil</td> <td><b>F2-116</b></td> </tr> </table>	Check ISC valve	<b>F2-142</b>
Check ISC valve	<b>F2-142</b>				
Check engine oil	<b>F2-116</b>				
4	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step		
		No	Adjust idle speed <b>F2-118</b>		
5			ECU malfunction		

2BU0F2-011

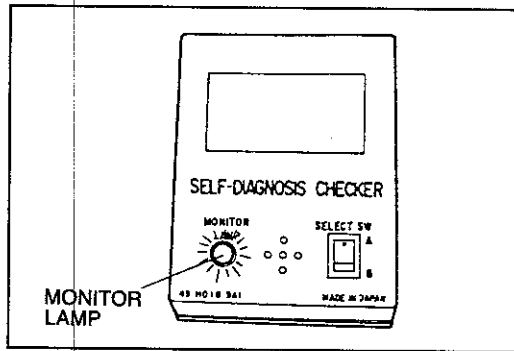
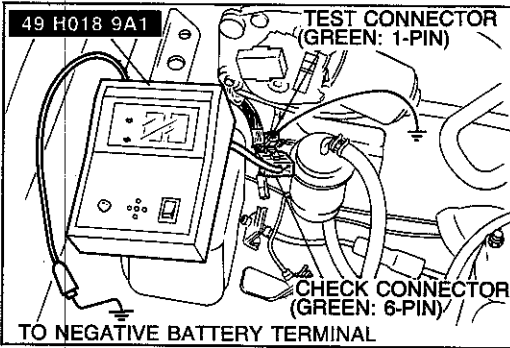
**Note:**

Engine stalls at idle with A/C ON, if the trouble cannot be fixed after checking above steps, it may be A/C compression malfunction (See Section U).

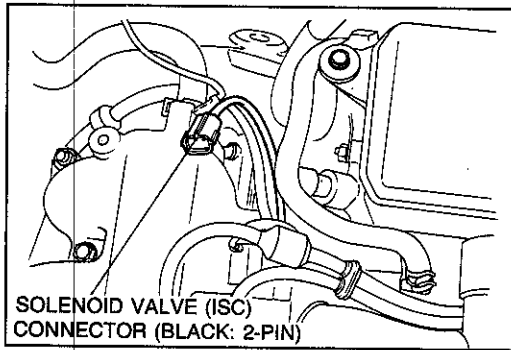
STEP 1



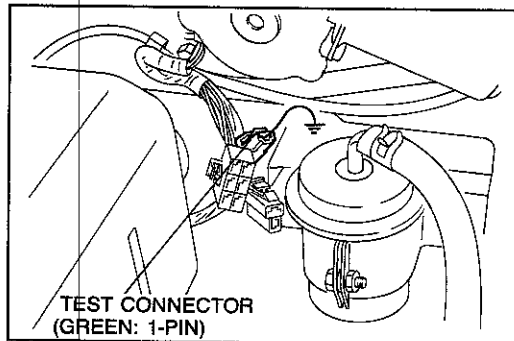
STEP 2



STEP 3



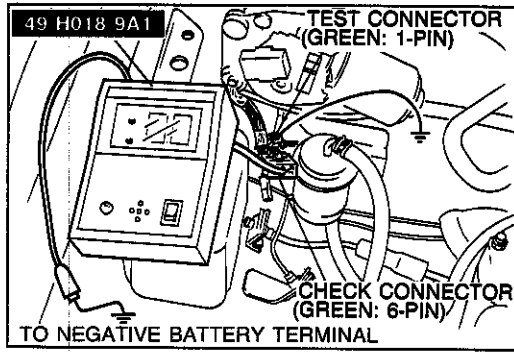
STEP 4



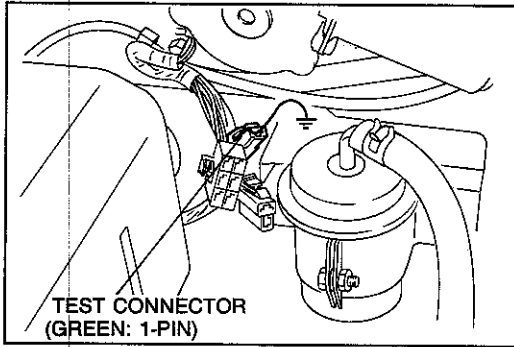
Engine stall during start up						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122	
		No	Go to Next Step			
2	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Adjust idle speed		F2-118	
3	Check for injector operating sound at idle	Yes	Go to Next Step			
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open
					No	Check injector resistance
				Terminal Resistance	Check wiring	
(B/Y)-(LG/B) (B/Y)-(LG/R)	6—8Ω					
4	Check ignition timing at idle after warm up  <b>Ignition timing: BTDC 4—6° (G6) 5—7° (F2)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Adjust ignition timing		F2-117	
5		ECU malfunction				

2BU0F2-012

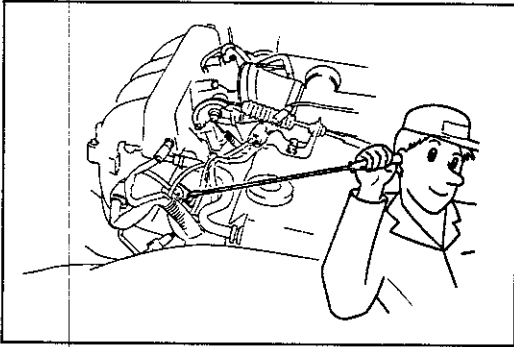
STEP 1



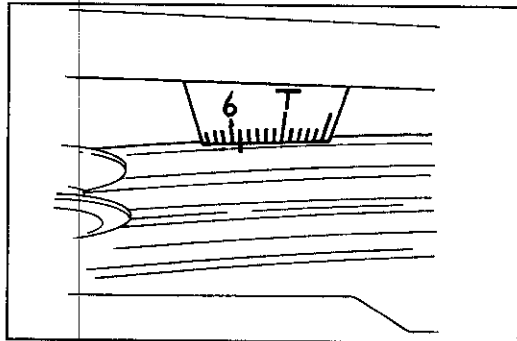
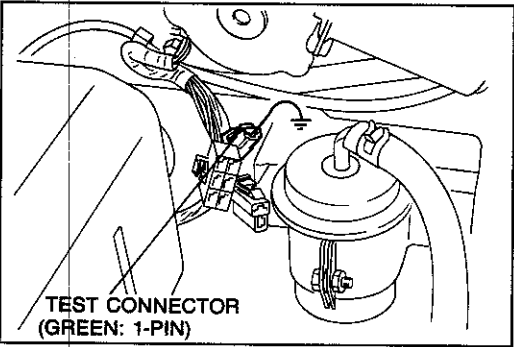
STEP 2



STEP 3



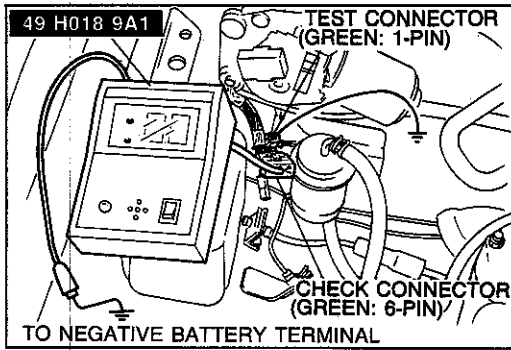
STEP 4



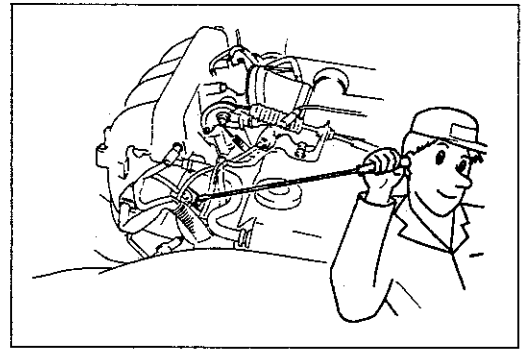


Engine stall on deceleration						
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IG ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			F2-122
		No	Go to Next Step			
2	Check idle switch and stoplight switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Check for cause by referring to check sequence			F2-134
3	Check for flashing of monitor lamp after warm up  <b>Monitor lamp: Flashes more than 8 times/10 seconds at 2,000—3,000 rpm</b>  [The connector (Green: 1-pin) not grounded]	Yes	Go to Next Step			
		No				Replace oxygen sensor
4	Check for fuel cut operation during deceleration  <b>Fuel cut: after warm up Above 1,600 rpm (G6) Above 1,900 rpm (F2)</b>	Yes	Go to Next Step			
		No	Check water thermosensor	F2-179	Yes	Replace ECU
				No	Replace water thermosensor	F2-179

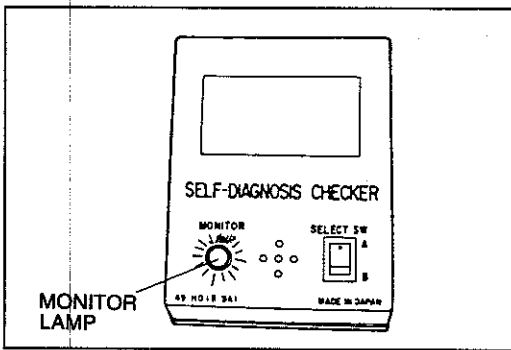
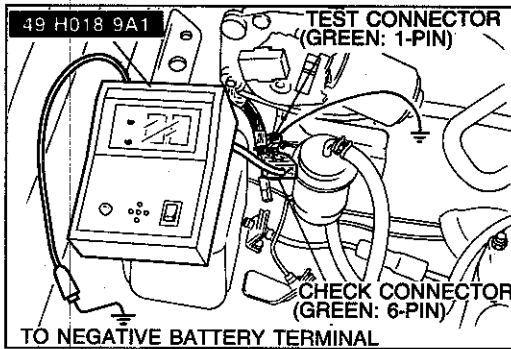
STEP 1



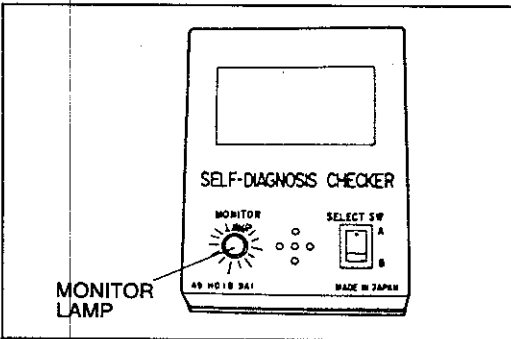
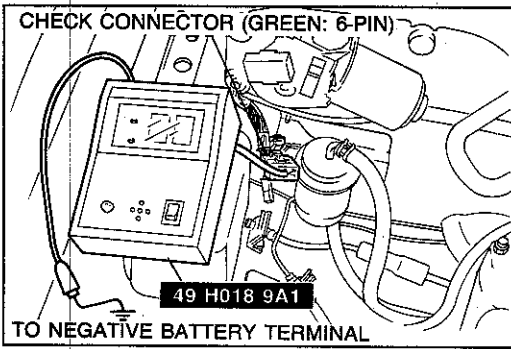
STEP 4



STEP 2



STEP 3

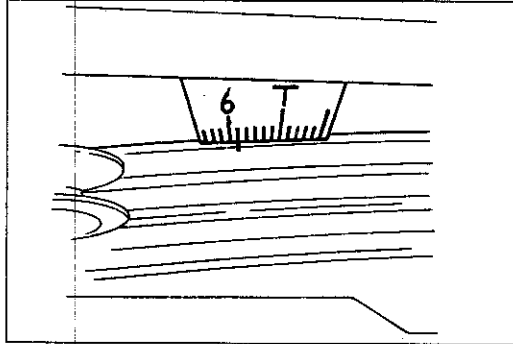
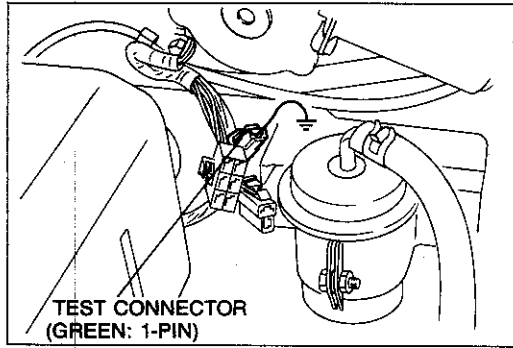


### Engine stall on deceleration (Cont'd)

STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
5	Check idle speed after warm up  <b>Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)</b>  [Test connector (Green: 1-pin) grounded]	Yes Go to Next Step	F2-117
		No Adjust idle speed (If possible)	
6	Check ignition timing at idle after warm up  <b>Ignition timing: BTDC 4—6° (G6) 5—7° (F2)</b>  [Test connector (Green: 1-pin) not grounded]	Yes Go to Next Step	F2-117
		No Adjust ignition timing	
7		Check ISC valve	F2-142

2BU0F2-013

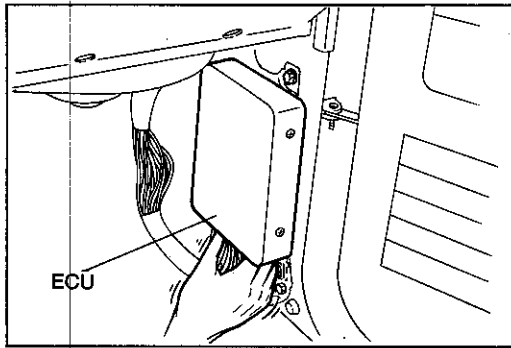
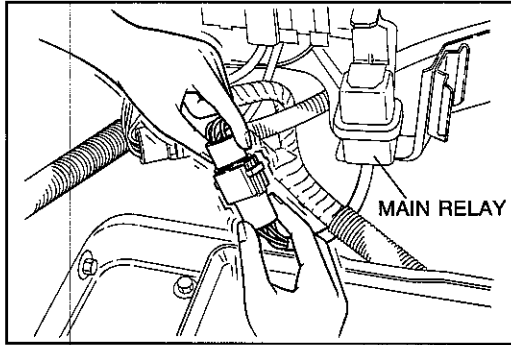
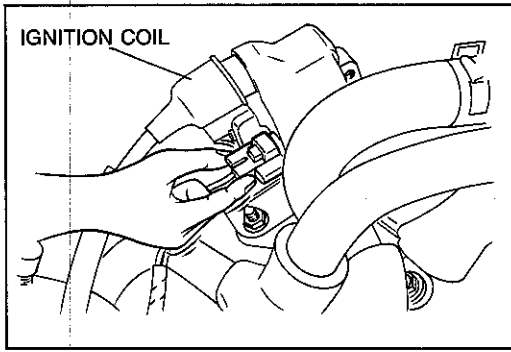
STEP 5  
6



Engine stall at idle (Intermittent)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Shake connector of ignition coil, main relay and ECU while cranking Check if the engine starts	Yes	There may be a poor contact at the connector. Repair or replace the wiring
		No	Go to troubleshooting "Engine stall at idle (Always)"

F2-64  
1BU0F2-098

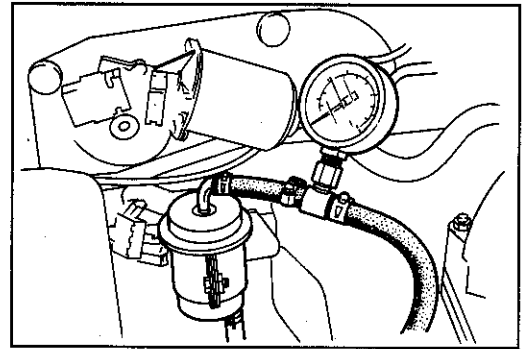
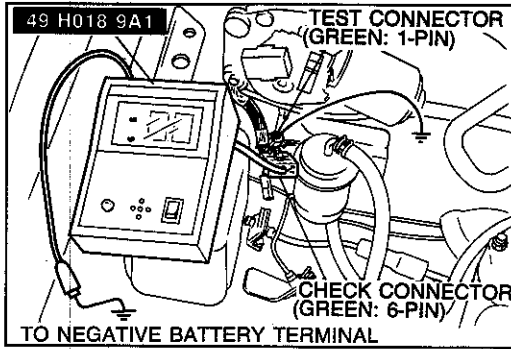
STEP 1



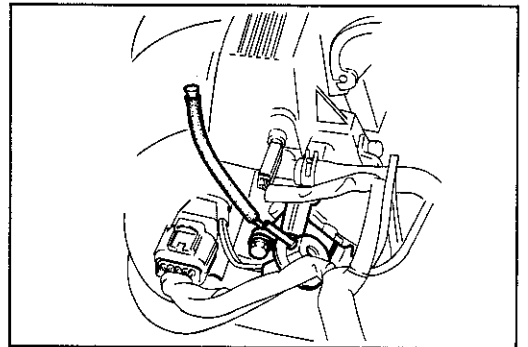
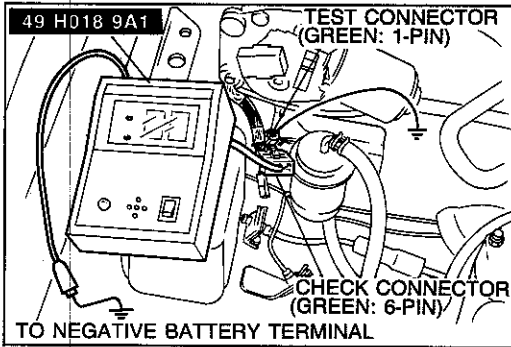
Hesitates/Stumbles on acceleration						
QUICK	INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at <b>2,000 rpm</b> for <b>20 seconds</b> and stop it Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>	
		No	Go to Next Step			
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Check for cause by referring to check sequence		<b>F2-134</b>	
3	Disconnect oxygen sensor connector Check if condition improves	Yes		Check oxygen Sensor	<b>F2-182</b>	
		No	Go to Next Step			
4	Check fuel line pressure while accelerating (Vacuum hose to pressure regulator disconnected)  <b>Fuel line pressure: Keeps 265—314 kPa 2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step			
		No	Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging	
				No	Replace fuel filter	<b>F2-149</b>
		Replace pressure regulator	<b>F2-155</b>			
5	Check for air leaks with throttle valve open by listening for sucking noise	Yes		Intake air system components damaged	<b>F2-137</b>	
				Vacuum and intake air hoses loose or damaged		
				Bolts or nuts loose		
Gaskets damaged						
No	Go to Next Step					
6	Substitute a well-known ECU Check if condition improves	Yes		ECU malfunction		
				No	Check airflow sensor	<b>F2-179</b>
						Check throttle body
		Check spark plug	<b>Section G</b>			
7	Check other systems			Clutch slipping	<b>Section H</b>	

2BU0F2-046

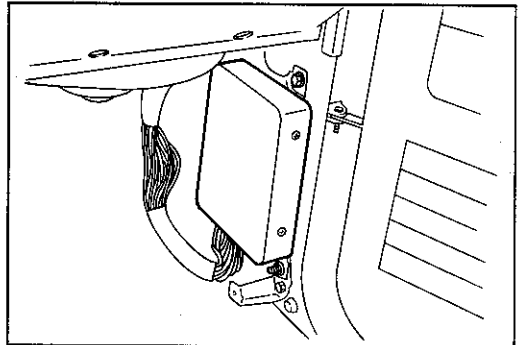
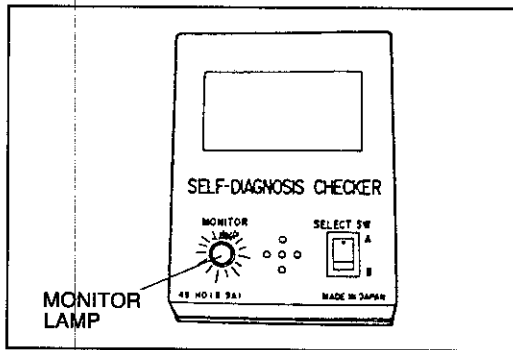
STEP 1



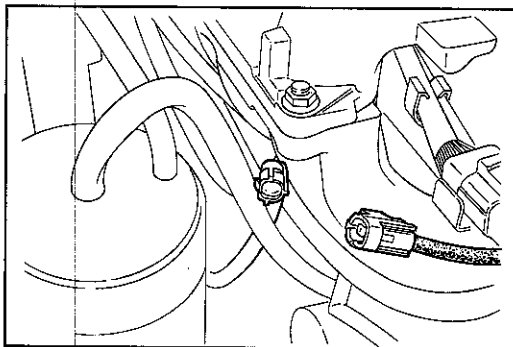
STEP 2



STEP 6



STEP 3



STEP 4

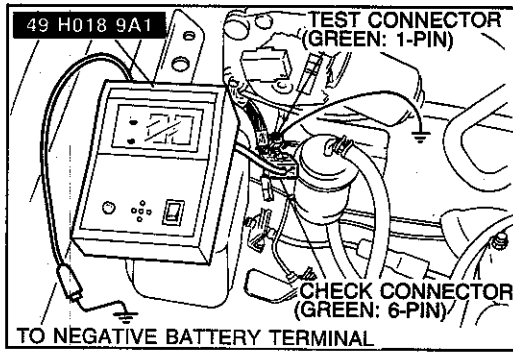
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



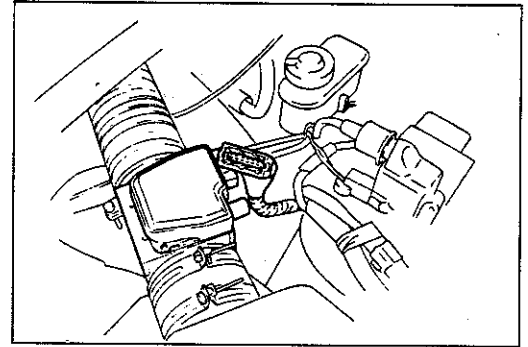
Hesitates at steady speed					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Run engine at <b>2,000 rpm</b> for <b>20 seconds</b> and stop it Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>
		No	Go to Next Step		
2	Disconnect oxygen sensor connector Check if condition improves	Yes		Check oxygen sensor	<b>F2-182</b>
		No	Go to Next Step		
3	Check for air leaks with throttle valve open by listening for sucking noise	Yes	Go to Next Step		
		No		Intake air system components damaged	<b>F2-137</b>
				Vacuum and intake air hoses loose or damaged	
				Nuts or bolts loose	
	Gasket damaged				
4	Check fuel line pressure while accelerating (Vacuum hose to pressure regulator disconnected)  <b>Fuel line pressure: Keeps 265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step		
		No	Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging
				No	Replace fuel filter
		Replace pressure regulator	<b>F2-155</b>		
5	Check condition of ignition coil and airflow meter connectors (Burned or damaged)	Yes		Poor contact	
		No	Go to Next Step		
6	Gradually open throttle valve Check if engine speed increases smoothly	Yes	Go to Next Step		
		No		Check airflow sensor	<b>F2-179</b>
				Check throttle body	<b>F2-138</b>
			Check throttle sensor	<b>F2-181</b>	
7				Check spark plug	<b>Section G</b>
8	Change fuel to specified grade Check if condition improves	Yes		Poor fuel quality	
		No	Go to Next Step		
9				ECU malfunction	

2BU0F2-047

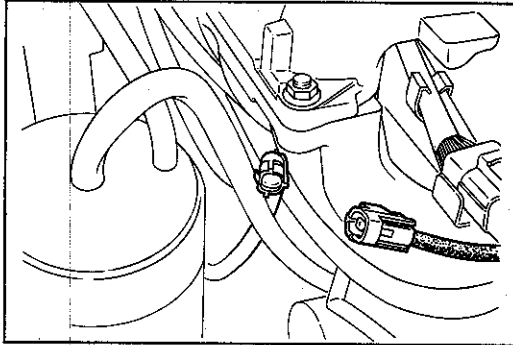
STEP 1



STEP 5

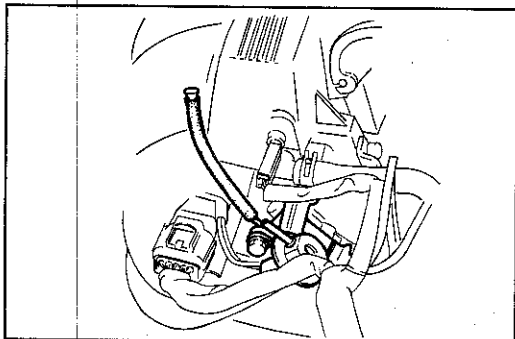
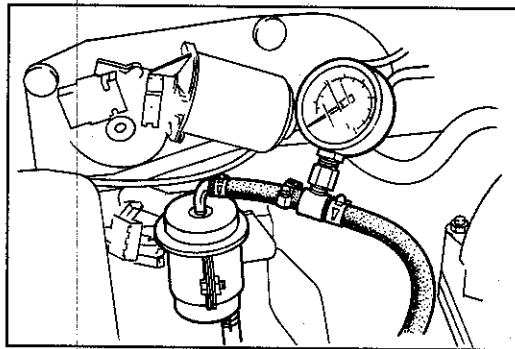


STEP 2



STEP 4

**WARNING**  
BEFORE CONNECTING FUEL  
PRESSURE GAUGE, RELEASE  
FUEL PRESSURE FROM FUEL  
SYSTEM TO REDUCE POSSIBILITY  
OF INJURY OR FIRE  
(REFER TO PAGE F2-144)

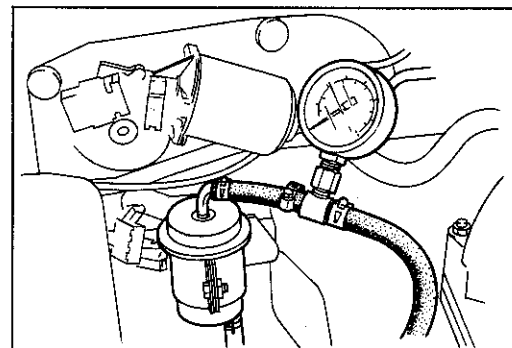
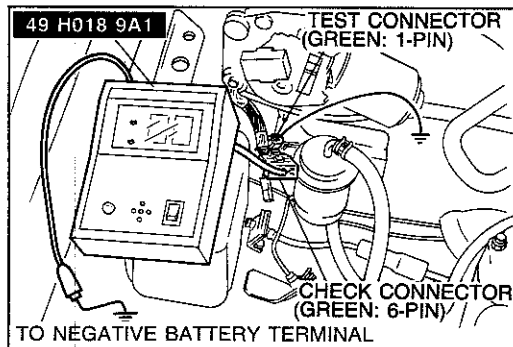


TROUBLESHOOTING GUIDE

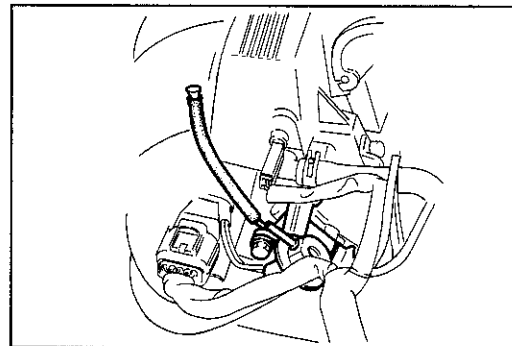
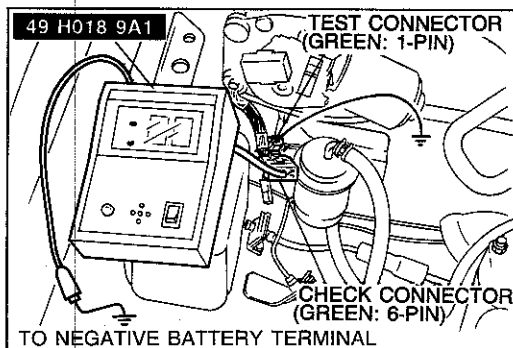
Jerking on acceleration						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at <b>2,000 rpm</b> for <b>20 seconds</b> and stop it Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>	
		No	Go to Next Step			
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Check for cause by referring to check sequence		<b>F2-134</b>	
3	Disconnect oxygen sensor connector Check if condition improves	Yes		Check oxygen Sensor	<b>F2-182</b>	
		No	Go to Next Step			
4	Check fuel line pressure while accelerating (Vacuum hose to pressure regulator disconnected)  <b>Fuel line pressure: Keeps 265—314 kPa 2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step			
		No	Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging	
				No	Replace fuel filter	<b>F2-149</b>
			Replace pressure regulator	<b>F2-155</b>		
5	Check for air leaks with throttle valve open by listening for sucking noise	Yes		Intake air system components damaged	<b>F2-137</b>	
				Vacuum and intake air hoses loose or damaged		
				Bolts or nuts loose		
				Gaskets damaged		
6	Substitute a well-known ECU Check if condition improves	Yes		ECU malfunction		
		No		Check airflow sensor	<b>F2-179</b>	
				Check throttle body	<b>F2-138</b>	
				Check spark plug	<b>Section G</b>	
7	Check other systems			Clutch slipping	<b>Section H</b>	

2BU0F2-048

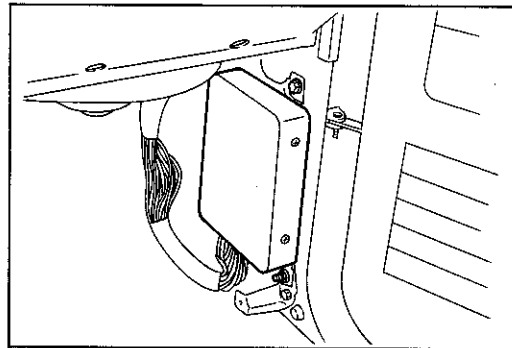
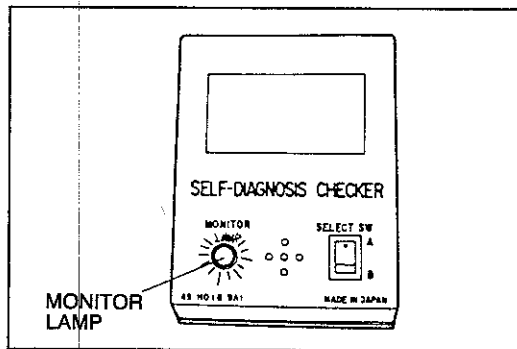
STEP 1



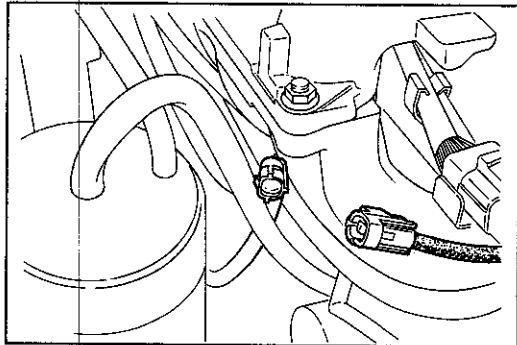
STEP 2



STEP 6



STEP 3



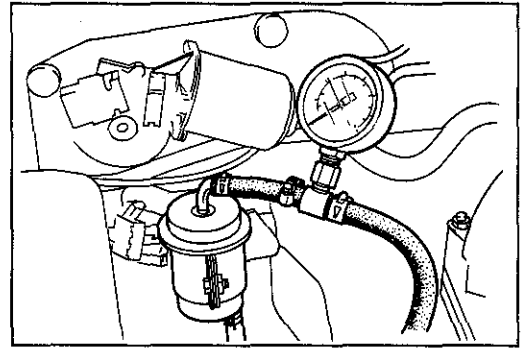
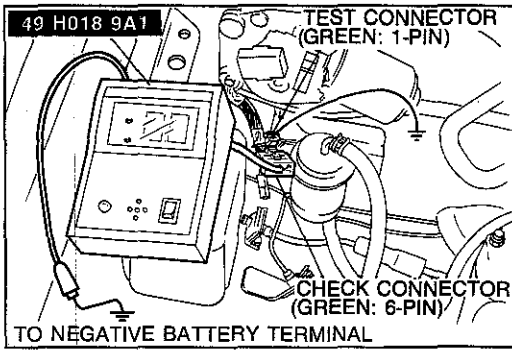
STEP 4

**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

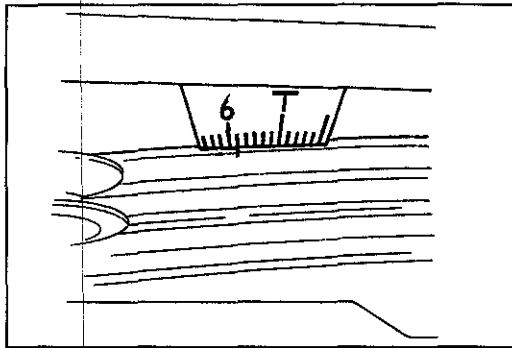
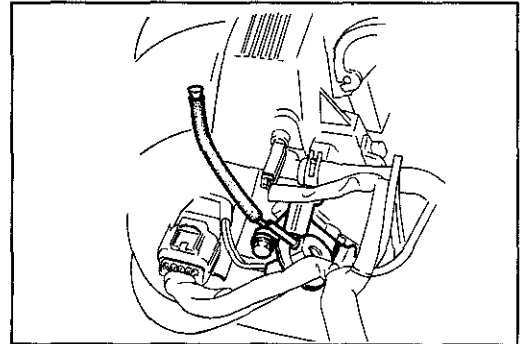
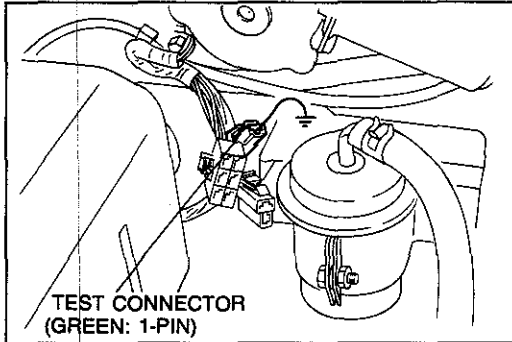
Knocking						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence		F2-122	
		No	Go to Step 2			
2	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4-6° (M/T) 5-7° (A/T, P range)  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step			
		No	Adjust ignition timing			F2-117
3	Disconnect water thermosensor connector Check if condition improves	Yes			Check water thermo-sensor	F2-179
		No	Go to Next Step			
4	Check vacuum routing (Refer to page F2-7)	Yes	Go to Next Step			
		No			Vacuum hose	
5	Observe fuel line pressure while accelerating from idle  <b>Fuel line pressure:</b> Keeps 265-314 kPa (2.7-3.2 kg/cm <sup>2</sup> , 38-46 psi)  (Vacuum hose to pressure regulator disconnected)	Yes	Go to Next Step			
		No	Check fuel pump maximum pressure	F2-150	Yes	Replace fuel filter
				No	Replace fuel pump	F2-152
						<b>Fuel pump maximum pressure:</b> 441-588 kPa (4.5-6.0 kg/cm <sup>2</sup> , 64-85 psi)
6					Check airflow sensor	F2-179
7					Check spark plug	Section G
8	Change fuel to specified grade Check if condition improves	Yes			Poor fuel quality	
		No	Go to Next Step			
9	Check cooling system			Thermostat		
				Radiator		
10				ECU malfunction		

2BU0F2-014

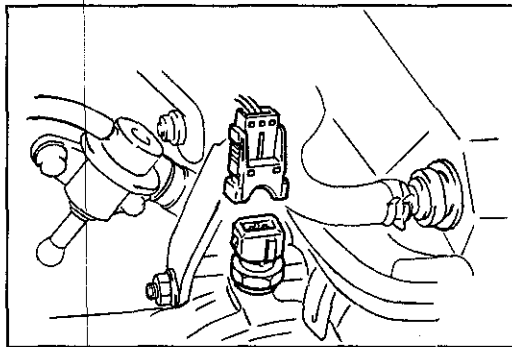
STEP 1



STEP 2



STEP 3

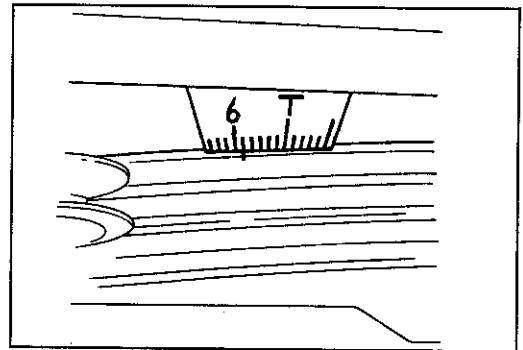
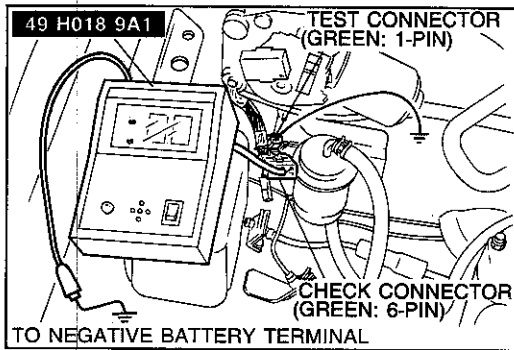


STEP 5

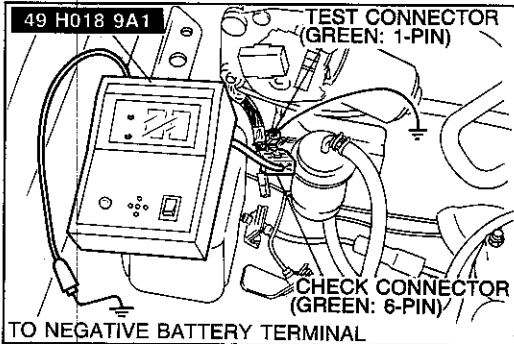
**WARNING**  
BEFORE CONNECTING FUEL  
PRESSURE GAUGE, RELEASE  
FUEL PRESSURE FROM FUEL  
SYSTEM TO REDUCE POSSIBILITY  
OF INJURY OR FIRE  
(REFER TO PAGE F2-144)

Poor acceleration							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			<b>F2-122</b>	
		No	Go to Next Step				
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to check sequence			<b>F2-134</b>	
3	Disconnect high-tension lead of each cylinder at idle. Check if engine condition changes [ISC valve connector disconnected]	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector	<b>F2-156</b>
					No	Check spark plug	<b>Section G</b>
						Check high-tension	<b>Section G</b>
Check distributor cup	<b>Section G</b>						
4	Check ignition at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing			<b>F2-117</b>	
5	Check for air leaks by listening for sucking noise	Yes			Intake air system components damaged	<b>F2-137</b>	
					Vacuum and air intake hoses loose or damaged		
					Nuts or bolts loose		
Gasket damaged							
No	Go to Next Step						
6	Observe fuel line pressure while accelerating from idle  <b>Fuel line pressure:</b> Keeps 265—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—46 psi)  [Vacuum hose to pressure regulator disconnected]	Yes	Go to Next Step				
		No	Check if fuel filter has been replaced according to maintenance schedule		No	Replace pressure regulator	<b>F2-155</b>
Yes	Replace fuel filter				<b>F2-149</b>		

STEP 1

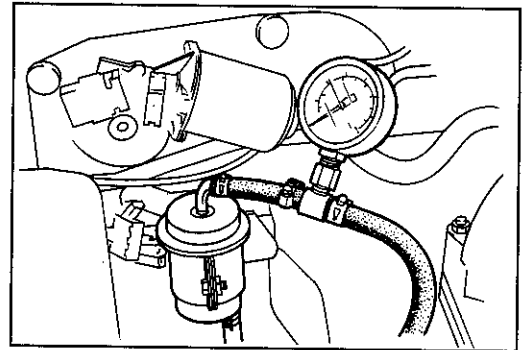
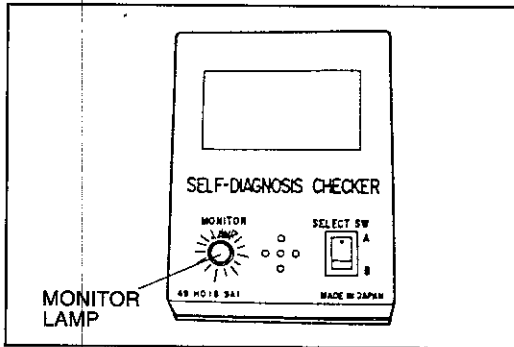


STEP 2

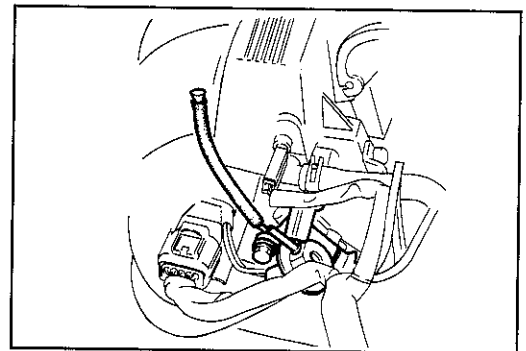
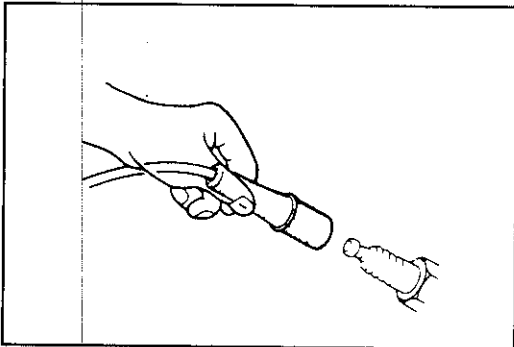


STEP 6

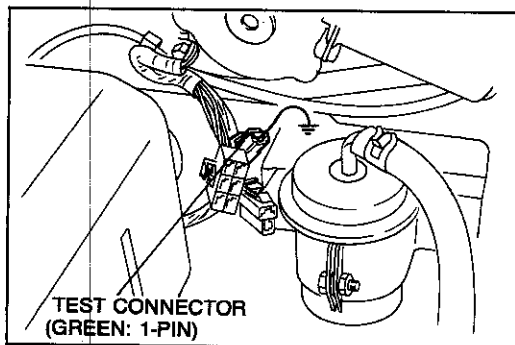
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



STEP 3



STEP 4

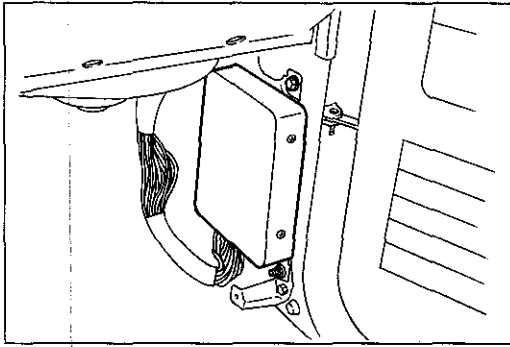




Poor acceleration (Cont'd)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Gradually depress accelerator from idle Check if engine speed increases smoothly	Yes	Go to Next Step				
		No	Check accelerator cable free play	F2-139	Yes	Check airflow sensor	F2-179
					No	Check throttle body	F2-138
8	Check fuel to specified grade Check if condition improves	Yes				Poor fuel quality	
		No	Go to Next Step				
9	Substitute a well-known ECU Check if condition improves	Yes				ECU malfunction	
		No	Go to Next Step				
10	Check other systems				Clutch slipping	Section H	
					Transmission (M/T)	Section J2	
					Brake dragging	Section P	
					Belt tension	Section Q	

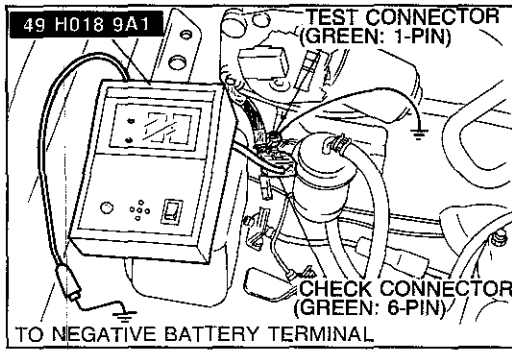
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STEP 9

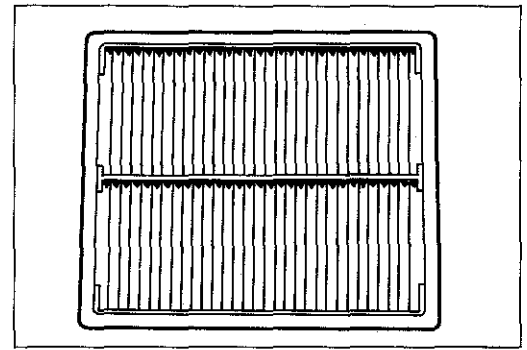


Lack of power							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code and (only high-altitude) with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Step 2 (High-altitude) Go to Step 3 (Others)				
2	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing		F2-117		
3	Disconnect ISC valve connector and the high-tension lead of each cylinder Check if condition changes	Yes	Go to Next Step				
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector (If step 4 OK)	F2-156
					No	Check high-tension lead	Section G
						Check distributor cap	Section G
Check spark plug	Section G						
4	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMINJ-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
				Check wiring short or open			
5	Check air cleaner element for clogging	Yes	Go to Next Step				
		No	Clean air cleaner element				
6	Check for air leaks by listening for sucking noises • At idle • When throttle valve is open	Yes			Intake air system	F2-137	
					Components damaged		
					Vacuum and air intake hoses loose or damaged		
					Nuts or bolts loose		
					Gasket damaged		

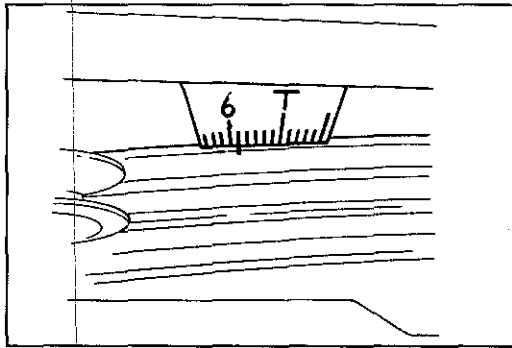
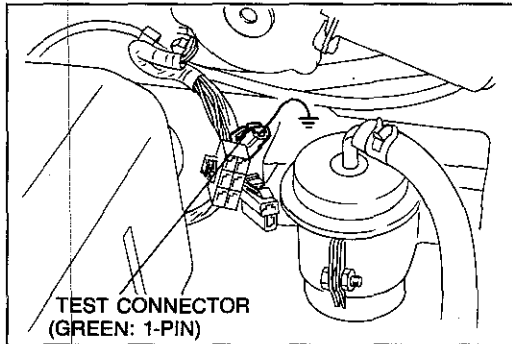
STEP 1



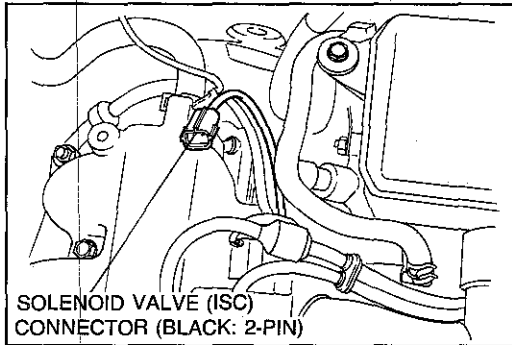
STEP 5



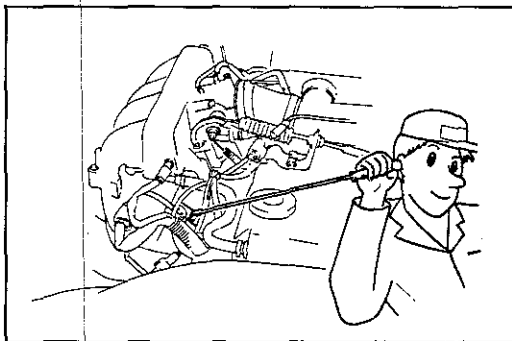
STEP 2



STEP 3



STEP 4

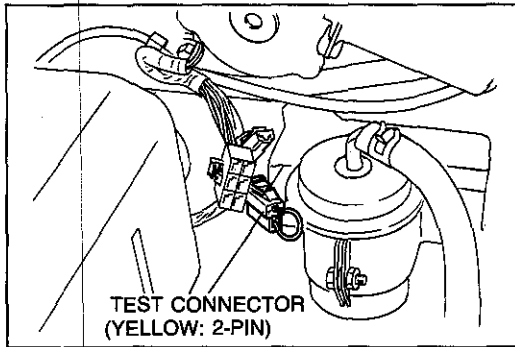
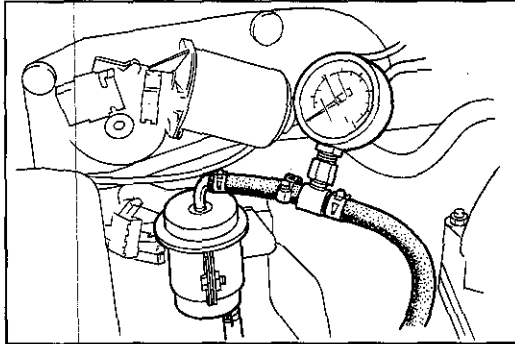


Lack of power (Cont'd)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
7	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  <b>Fuel line pressure:</b> <b>265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>	Yes	Go to Next Step				
		No	Check for fuel leakage				
			Substitute a good fuel filter and retest	Yes	Replace fuel filter	<b>F2-149</b>	
			Check fuel pump maximum pressure	<b>F2-150</b>	Yes	Replace pressure regulator	<b>F2-155</b>
No	Replace fuel pump	<b>F2-152</b>					
8	Check fuel line pressure at idle  <b>Fuel line pressure:</b> <b>216—264 kPa (2.2—2.7 kg/cm<sup>2</sup>, 31—38 psi)</b>	Yes	Go to Next Step				
		No		Replace pressure regulator	<b>F2-155</b>		
9	Check if fuel line pressure drops while accelerating (Vacuum hose disconnected)	Yes	Check if fuel filter has been replaced according to maintenance schedule	Yes	Check fuel line for clogging		
				No	Replace fuel filter		
10	Check exhaust system for damage	Yes	Go to Next Step				
		No	Repair or replace	<b>F2-161</b>			
11	Check A/C, P/S and alternator belts tensions	Yes	Go to Next Step				
		No	Adjust belt tension	<b>Sections B1, B2</b>			
12	Check if accelerator can be depressed fully	Yes	Go to Next Step				
		No	Check accelerator cable	Yes	Throttle body	<b>F2-138</b>	
				No	Accelerator cable	<b>F2-139</b>	
13	Substitute a well-known ECU Check if condition improves	Yes	ECU malfunction				
		No	Check airflow sensor				<b>F2-179</b>
			Check throttle sensor				<b>F2-181</b>
			Go to Next Step				
14	Substitute a specified fuel Check if condition improves	Yes	Poor fuel quality				
		No	Go to Next Step				
15	Check other systems			Brake			
				Clutch			
				Engine			

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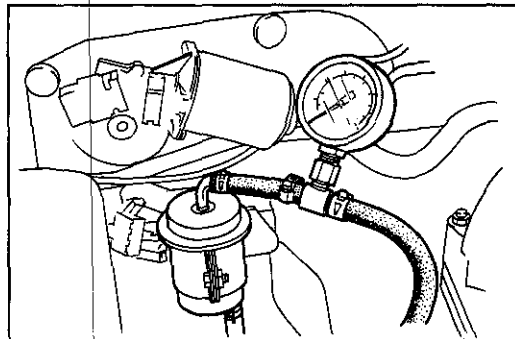
STEP 7

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**

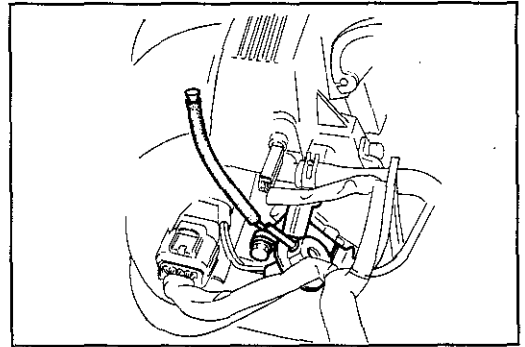


STEP 8

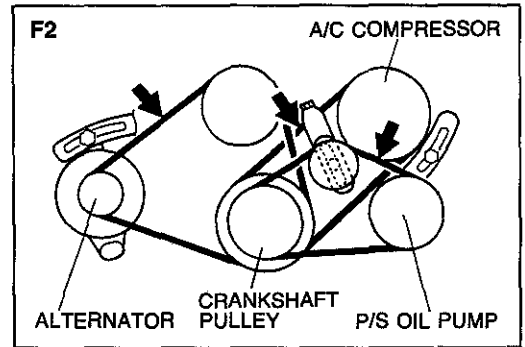
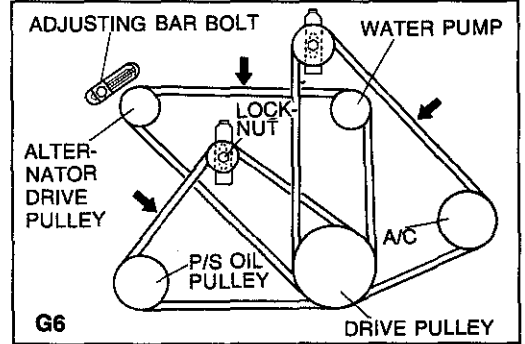
**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**



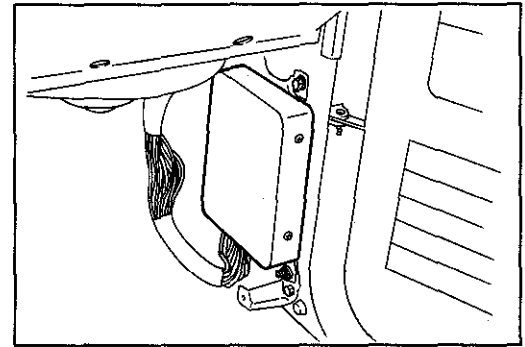
STEP 9



STEP 11



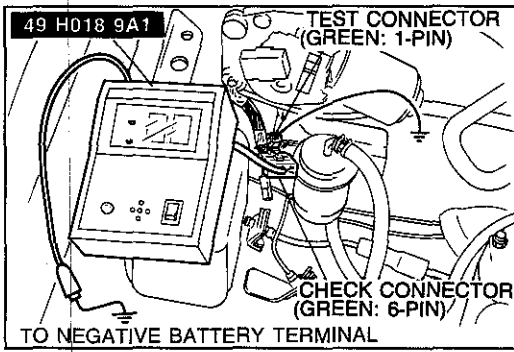
STEP 13



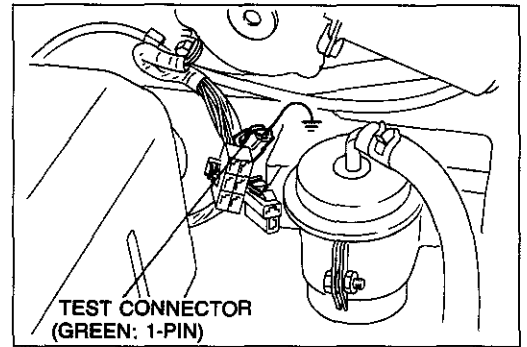
Bucking at high speed						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at <b>2,000 rpm</b> for more than <b>20 seconds</b> Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		<b>F2-122</b>	
		No	Go to Next Step			
2	Disconnect oxygen sensor connector Check if condition improves	Yes		Check oxygen sensor	<b>F2-182</b>	
		No	Go to Next Step			
3	Observe fuel line pressure while accelerating from idle  <b>Fuel line pressure: Keeps 265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)</b>  [Vacuum hose to pressure regulator disconnected]	Yes	Go to Next Step		<b>F2-155</b>	
		No	Check if fuel filter has been replaced according to maintenance schedule	Yes		Check fuel line for clogging
				No		Replace fuel filter
				Replace pressure regulator		
4	Check for air leaks by listening sucking noise	Yes	Go to Next Step		<b>F2-137</b>	
		No		Intake air system components damaged		
				Vacuum and air intake hoses loose or damaged		
				Nuts or bolts loose		
		Gasket damaged				
5	Check ignition timing at idle after warm up  <b>Ignition timing: BTDC 4—6° (G6) 5—7° (F2)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step		<b>F2-117</b>	
		No	Adjust ignition timing			
6	Gradually open throttle valve from idle check if engine speed increases smoothly	Yes	Go to Next Step		<b>F2-179</b>	
		No		Check airflow sensor		
7				Check spark plug	<b>Section G</b>	
8				ECU malfunction		

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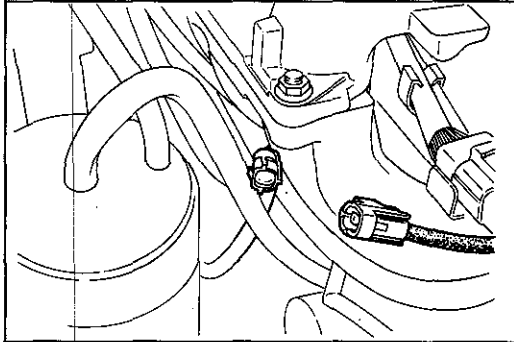
STEP 1



STEP 5

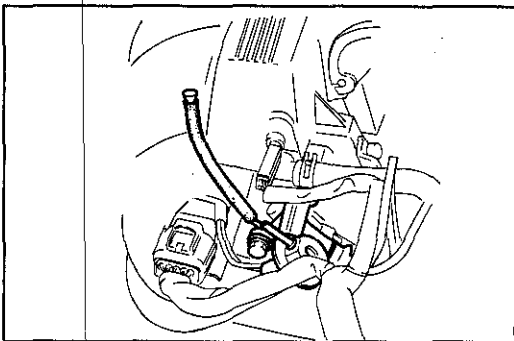
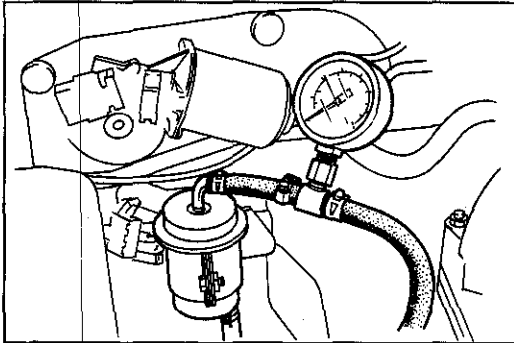


STEP 2



STEP 3

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**

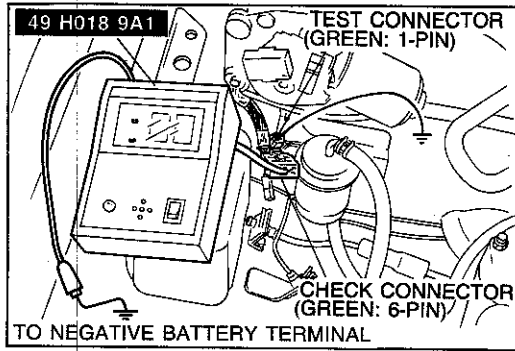




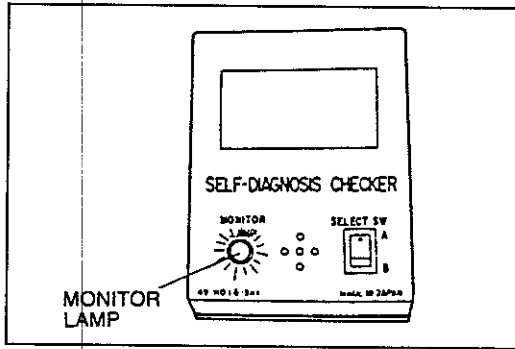
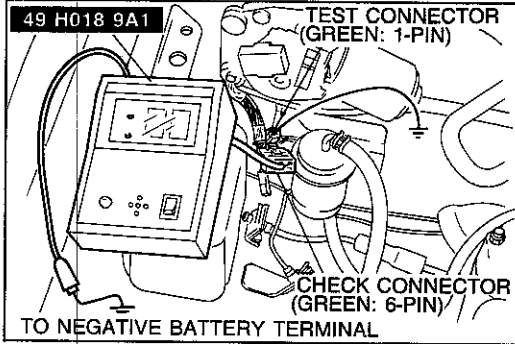
Bucking on deceleration			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence <b>F2-122</b>
		No	Go to Next Step
2	Check switches with SST [IGN ON, Test connector (Green: 1-pin) grounded] • Idle switch • Stoplight switch	Yes	Go to Next Step
		No	Check for cause by referring to the check sequence <b>F2-134</b>
3	Substitute a well-known ECU Check if condition improves	Yes	ECU malfunction
		No	Check throttle sensor <b>F2-181</b> Go to Next Step
4			Check spark plug <b>Section G</b>
5			Check clutch slipping
6			Check compression between cylinders <b>Section B2</b>

1BU0F2-032

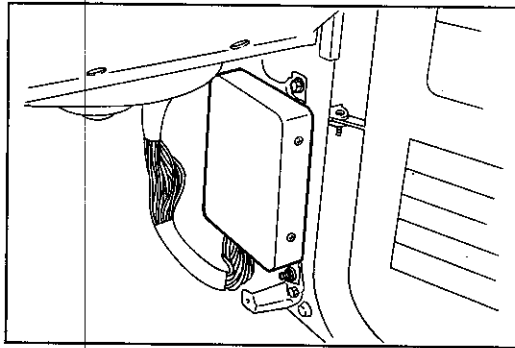
STEP 1



STEP 2



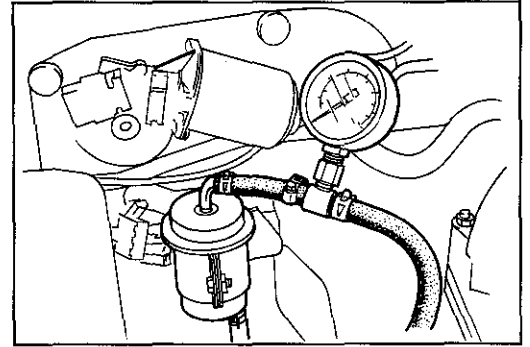
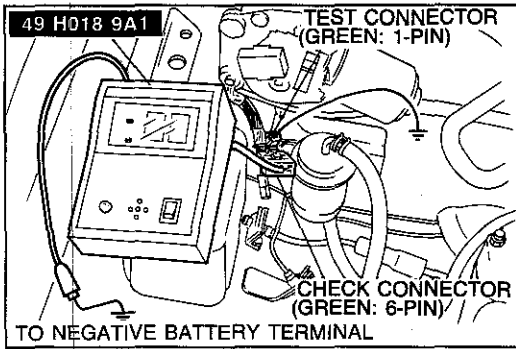
STEP 3



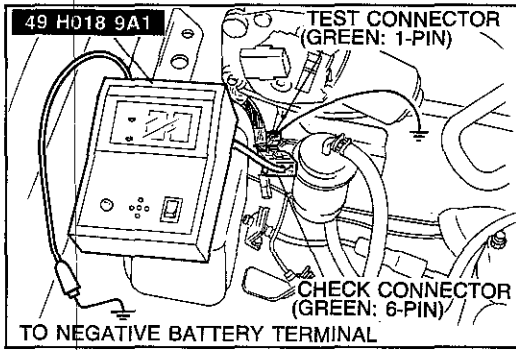
Poor fuel economy							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run the engine at <b>2,000 rpm</b> for more than <b>20 seconds</b> after warm up and stop it. Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			<b>F2-122</b>	
		No	Go to Next Step				
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to check sequence			<b>F2-134</b>	
3	Check for flashing of monitor lamp after warm up  <b>Monitor lamp: Flashes more than 8 times /10 seconds at 2,000—3,000 rpm</b>  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step				
		No			Replace oxygen sensor	<b>F2-183</b>	
4	Check fuel line pressure at idle  <b>Fuel line pressure: 196—255 kPa (2.0—2.6 kg/cm<sup>2</sup>, 28—37 psi)</b>	Yes	Go to Next Step				
		No	Check vacuum line to pressure regulator for clogging or air leakage	Yes	Vacuum line clogging or damaged	<b>F2-7</b>	
				No	Check solenoid valve (PRC)	<b>F2-160</b>	
					ECU malfunction (Check (2T) terminal voltage)	<b>F2-175</b>	
Replace pressure regulator	<b>F2-155</b>						
5	Check for fuel cut operation during deceleration  <b>Fuel cut: after warm up Above 1,600 rpm (G6) Above 1,900 rpm (F2)</b>	Yes	Go to Next Step				
		No	Check water thermometer	<b>F2-179</b>	Yes	Replace ECU	<b>F2-175</b>
				No	Replace water thermometer	<b>F2-179</b>	
6	Check ignition timing at idle after warm up  <b>Ignition timing: BTDC 4—6° (G6) 5—7° (F2)</b>  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing				<b>F2-117</b>
7	Check other systems				Clutch slipping	<b>Section H</b>	
					Brake	<b>Section P</b>	
					Tire air pressure	<b>Section Q</b>	

2BU0F2-018

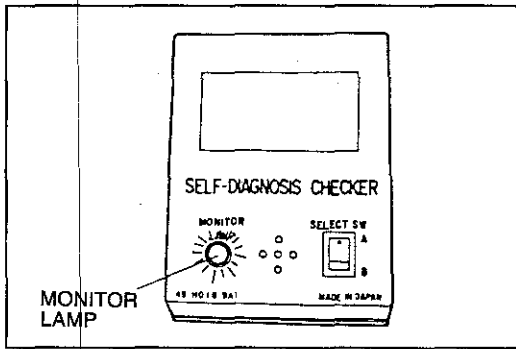
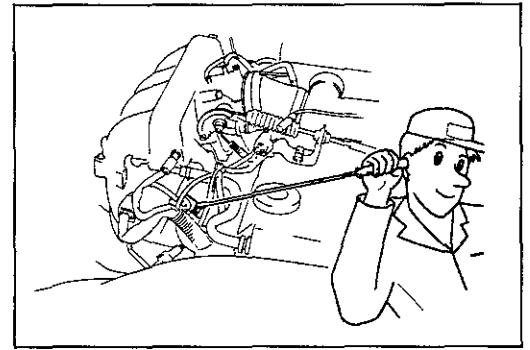
STEP 1



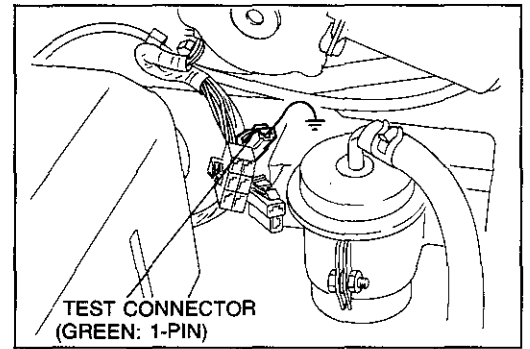
STEP 2



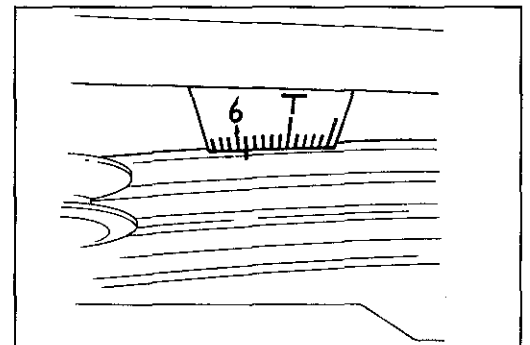
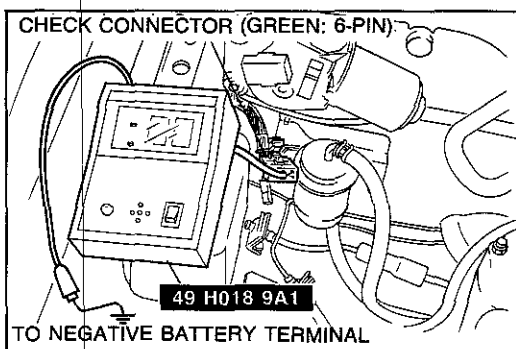
STEP 5



STEP 6



STEP 3



STEP 4

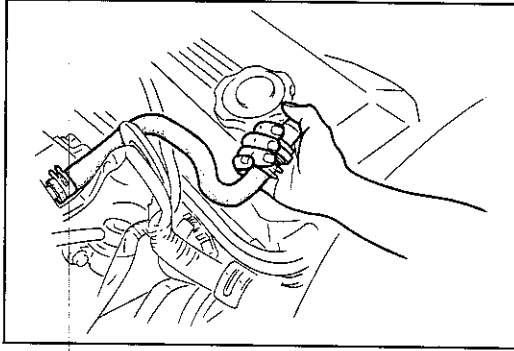
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

## TROUBLESHOOTING GUIDE

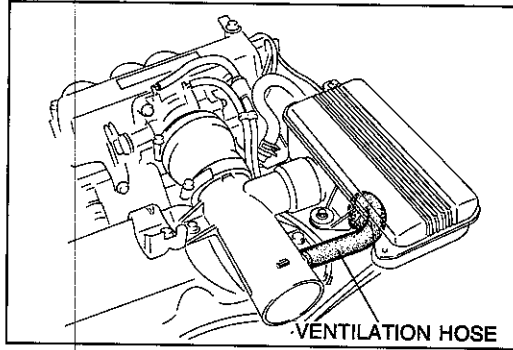
High oil consumption/White exhaust smoke					
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for oil leak from engine	Yes	Repair or replace		
		No	Go to Next Step		
2	Disconnect PCV valve from engine Check if vacuum is felt at idle	Yes	Go to Next Step		
		No	Check PCV valve	<b>F2-163</b>	Yes
				No	Replace PCV valve
3	Check that ventilation hose is installed correctly	Yes	Go to Next Step		
		No	Install ventilation hose correctly		
4	Possible malfunction of engine Check for cause by referring to the check sequence of Section B2				

1BU0F2-034

STEP 2



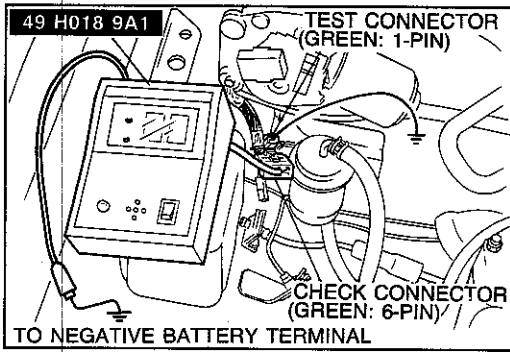
STEP 3



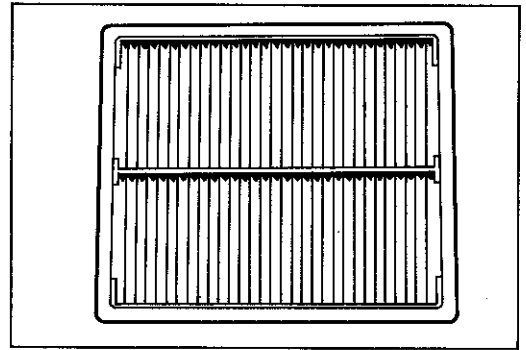
Afterburn on deceleration							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence		F2-122		
		No	Go to Next Step				
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to the check sequence		F2-134		
3	Check ignition timing at idle after warm up  <b>Ignition timing:</b> BTDC 4—6° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing		F2-117		
4	Check air cleaner element for clogging	Yes	Go to Next Step				
		No	Clean air cleaner element				
5	Check fuel cut operation during deceleration  <b>Fuel cut: after warm up</b> Above 1,600 rpm (G6) Above 1,900 rpm (F2)	Yes	Go to Next Step				
		No	Check water thermosensor	F2-179	Yes	ECU malfunction Check (2Q) terminal voltage	F2-175
					No	Replace water thermosensor	F2-179
6	Run engine at idle and stop it (IG OFF) Observe fuel pressure for 5 minutes  <b>Fuel pressure:</b> More than 147 kPa (1.5 kg/cm <sup>2</sup> , 21 psi)	Yes	Go to Next Step				
		No	Check fuel pump for pressure drop	F2-150	No	Replace fuel pump	F2-152
					Yes	Check injector fuel leakage	F2-157
							No
7					Check compression	Section B2	
					Check valve timing	Section B2	

2BU0F2-019

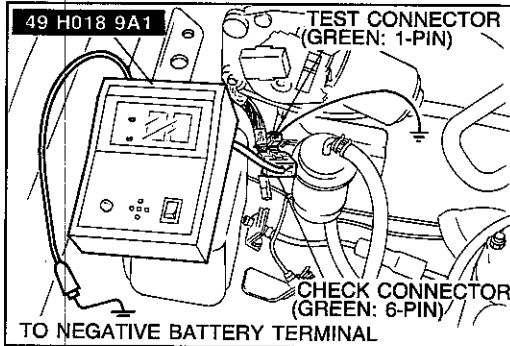
STEP 1



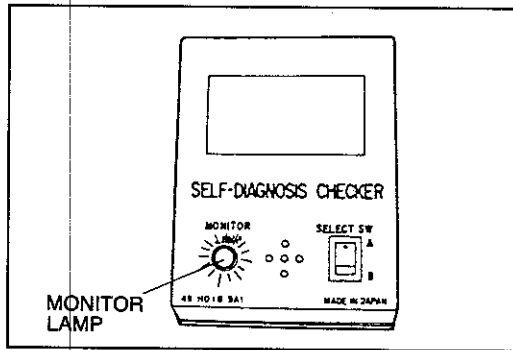
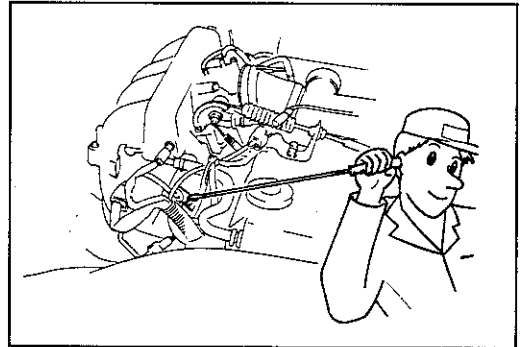
STEP 4



STEP 2



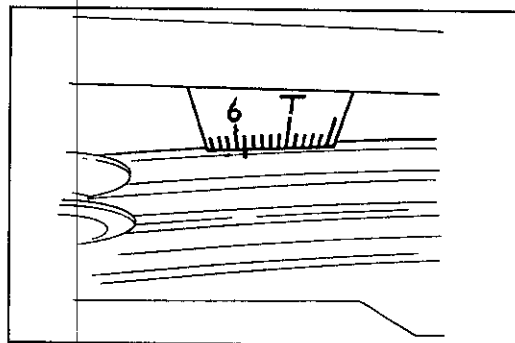
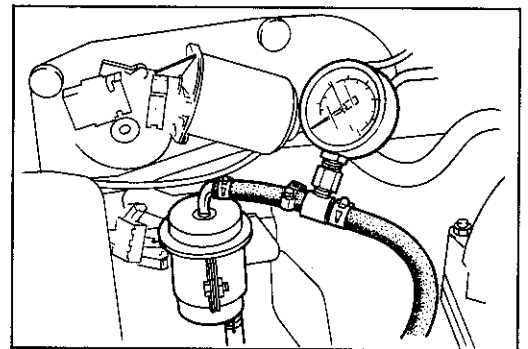
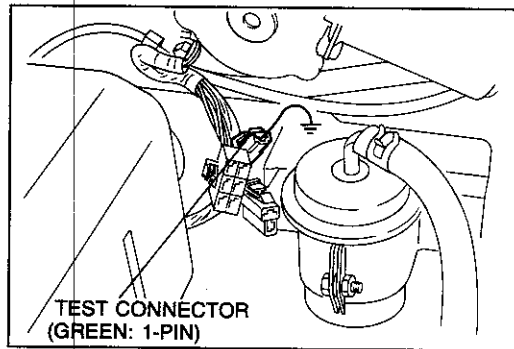
STEP 5



STEP 6

**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

STEP 3





**TROUBLESHOOTING GUIDE**

<b>Rotten egg smell</b>			
<b>STEP</b>	<b>QUICK INSPECTION</b>	<b>ACTION</b>	<b>POSSIBLE CAUSE AND DETAILED INSPECTION</b>
1	Change fuel to specified grade Check if condition improves		Poor fuel quality

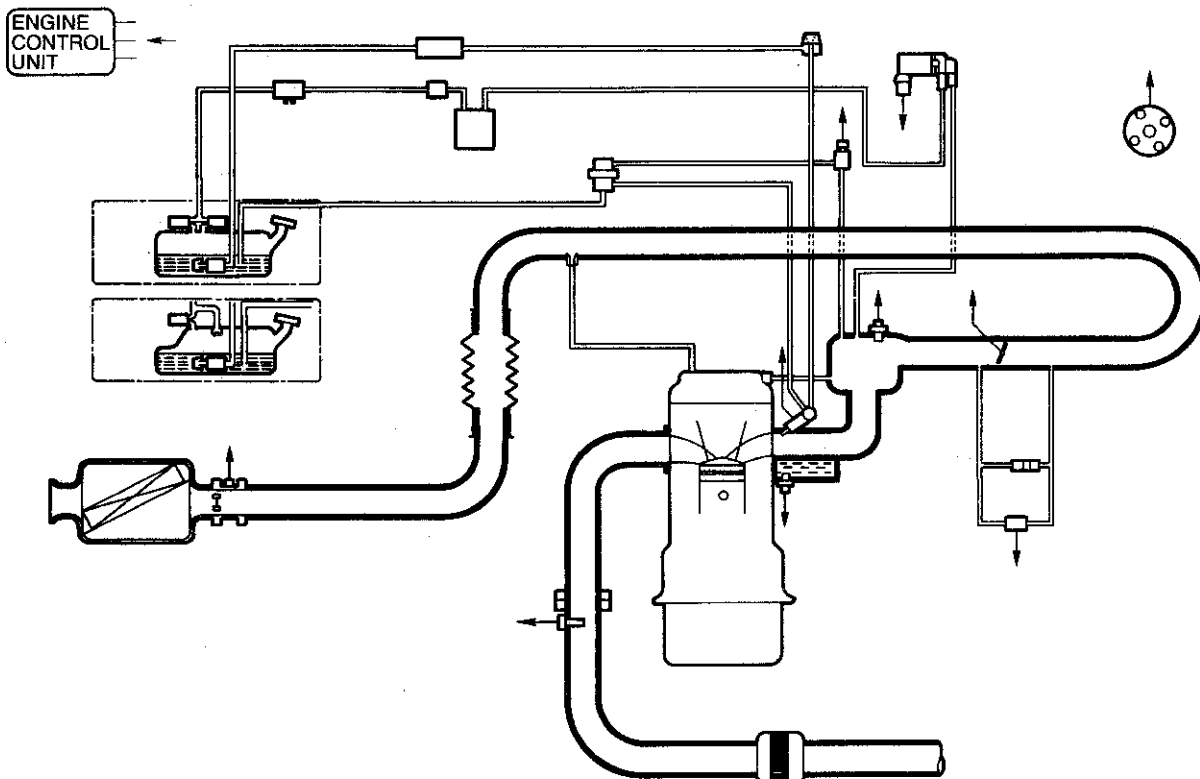
9MU0F2-050



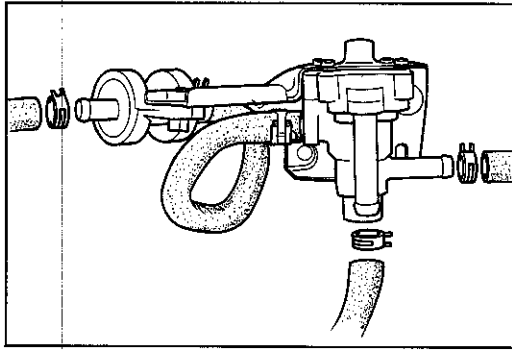
Gasoline fumes							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for leaks	Yes	Replace				
		No	Go to Next Step				
2	Check if fumes are emitted from check-and-cut valve	Yes	Check check-and-cut valve	F2-166	Yes	Check two-way check valve Purge line clogging	F2-166
					No	Replace check-and-cut valve	F2-166
		No	Go to Next Step				
3	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to the check sequence			F2-122	
		No	Go to Next Step				
4	Check switches with SST • Idle switch • Neutral switch • Clutch switch [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Check for cause by referring to the check sequence			F2-134	
5	Run engine at idle. Ground the solenoid valve (Purge control) terminal-wire (L/Y) and disconnect vacuum hose (white) from solenoid valve. Check for vacuum at solenoid valve	Yes				ECU malfunction Check (2X) terminal voltage	F2-175
		No				Replace solenoid valve (Purge control)	F2-165

2BU0F2-049

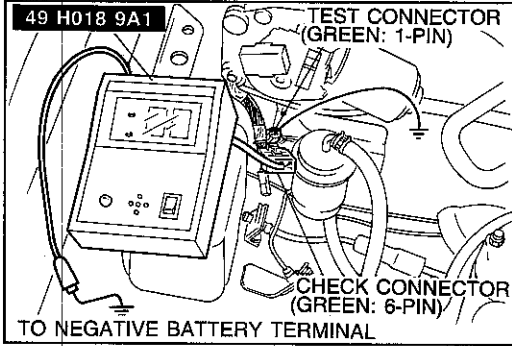
### STEP 1



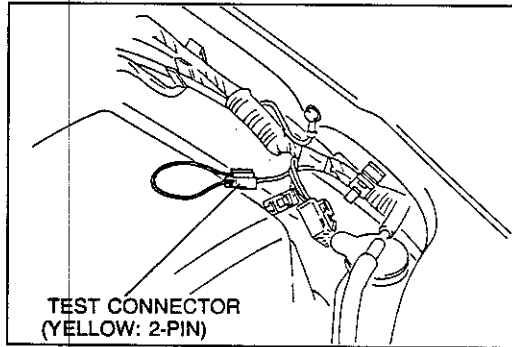
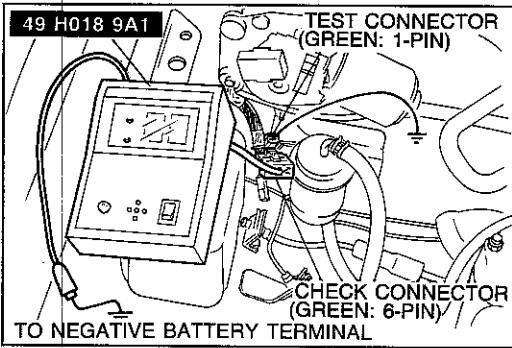
STEP 2



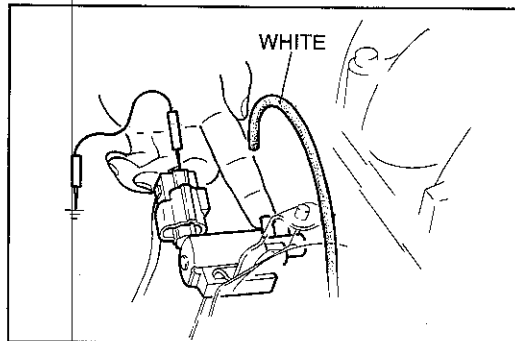
STEP 3



STEP 4



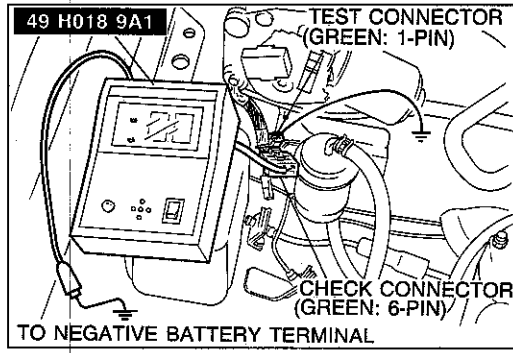
STEP 5



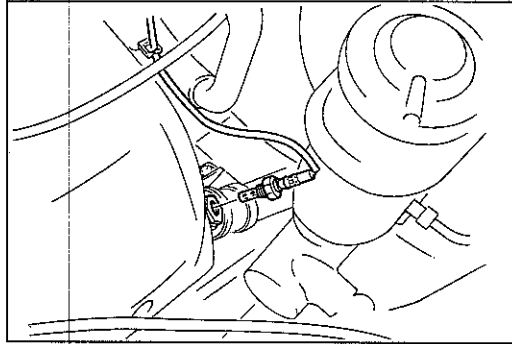
MIL always ON							
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	(California) Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]		"88" Replace ECU				
			"00" Wiring between ECU (1E) terminal and MIL short to ground				
2	(Federal and Canada) Check if emission system parts replacement time has come  <b>Emission system parts replacement schedule: Every 60,000 and 80,000 miles (Federal) or 90,000 and 130,000 km (Canada)</b>		Yes	Check if MIL has been reset by exchanging MIL set connector	Yes	Replace mileage sensor	Section T
			No		No	Reset the MIL	F2-187
			No			Replace mileage sensor	Section T

1BU0F2-037

STEP 1



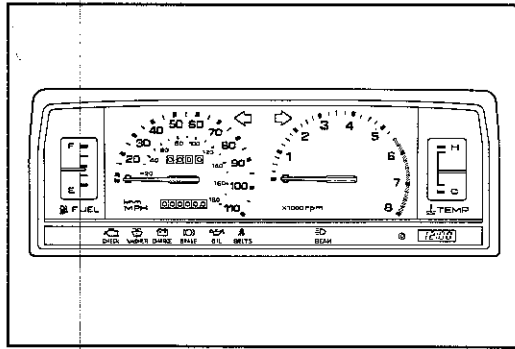
STEP 2



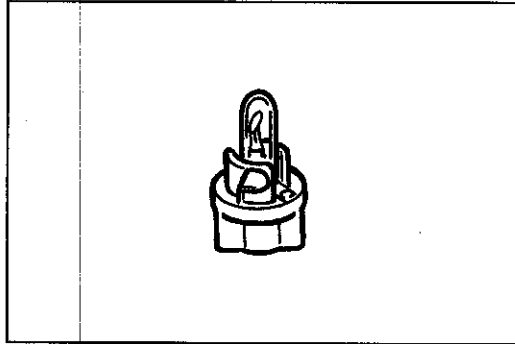
MIL never ON							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if other indicator lamps illuminate	Yes	Go to Next Step				
		No	Check power supply circuit to combination meter		<b>Section T</b>		
2	Check bulb of the MIL	Yes	(California only) Ground ECU (1E) terminal Check if MIL illuminates	Yes	Replace ECU	<b>F2-175</b>	
				No	Wiring between ECU and MIL open		<b>F2-187</b>
					(Federal and Canada) MIL set connector loose or disconnected		
		(Federal and Canada) Replace mileage sensor		<b>Section T</b>			
		No	Replace				

1BU0F2-038

STEP 1



STEP 2



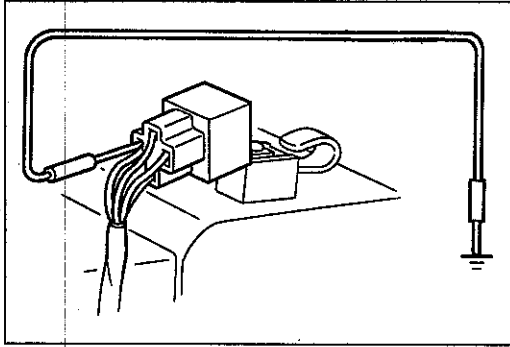


### A/C does not work

STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check if condenser fan operates when grounding A/C relay terminal-wire (L/W) (IGN ON)	Yes	Check voltage at ECU (1Q) terminal with SST Voltage at idle after warm up: 0V (A/C and blower switches ON)	F2-175	Yes	ECU malfunction (Check (1J) terminal voltage)	F2-175
					Wiring between ECU (1J) and A/C relay open		
		No	A/C system malfunction	Section U			
No	Check A/C system		Section U				

1BU0F2-039

STEP 1

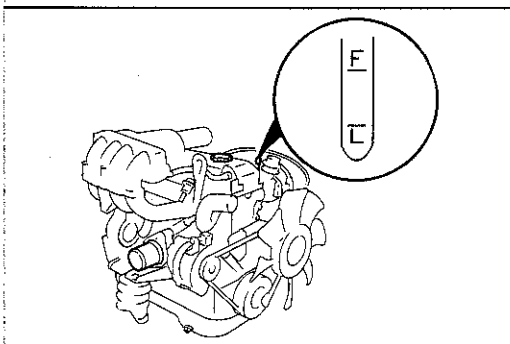


### ENGINE TUNE-UP

#### BASIC INSPECTION

##### Engine Oil

Check the engine oil level and condition with the oil level gauge.  
Add or change the oil if necessary.



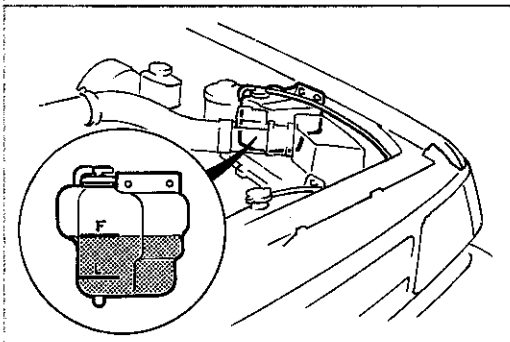
9MU0F2-057

##### Coolant Level (Cold engine)

#### Warning

- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap while carefully removing it.

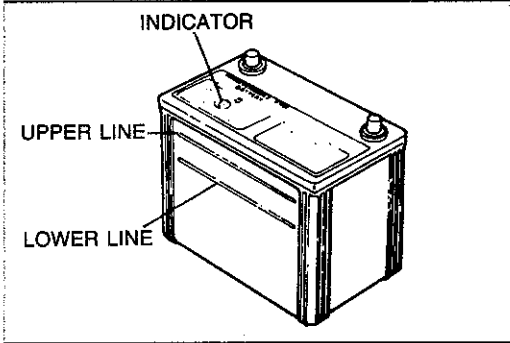
1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks.  
Add coolant if necessary.



9MU0F2-058

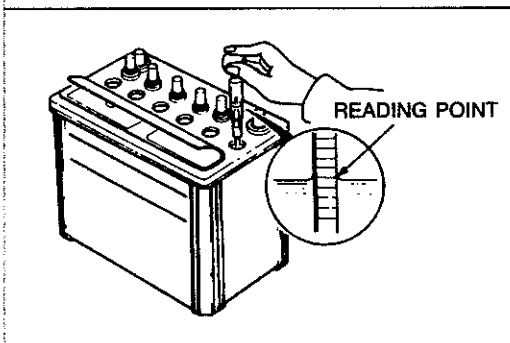
#### Battery

1. Check for corrosion on the terminals and for loose cable connections.  
If necessary, clean the clamps and tighten them firmly.
2. Check that the electrolyte level is between the UPPER and LOWER marks.  
Add distilled water if necessary.



9MU0F2-059

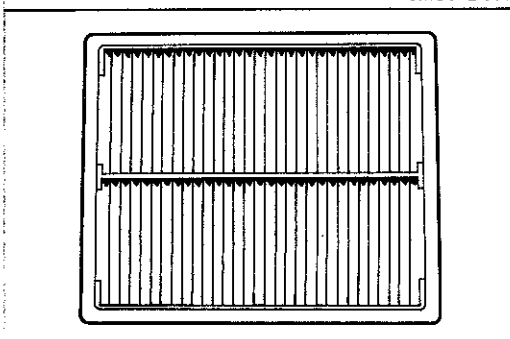
3. Check the specific gravity by using a hydrometer. If the specific gravity reading is **1.200 or less**, recharge the battery. (Refer to Section G.)



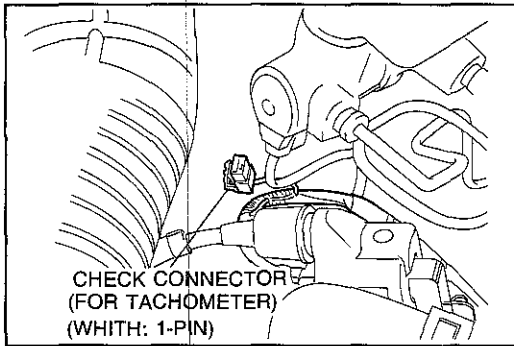
9MU0F2-060

#### Air Cleaner Element

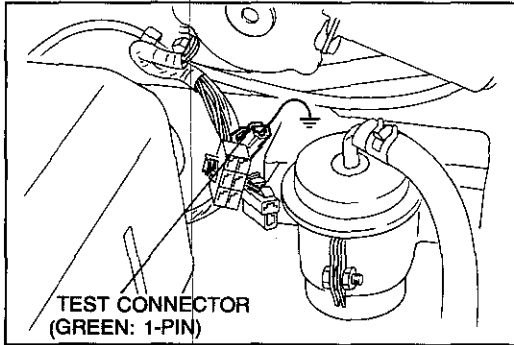
Visually check the air cleaner element for excessive dirt, damage, or oil. Clean or replace it if necessary.



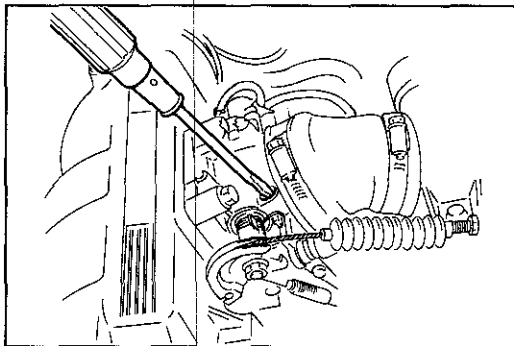
9MU0F2-061



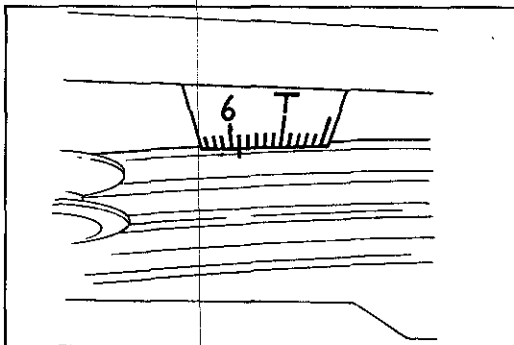
9MU0F2-062



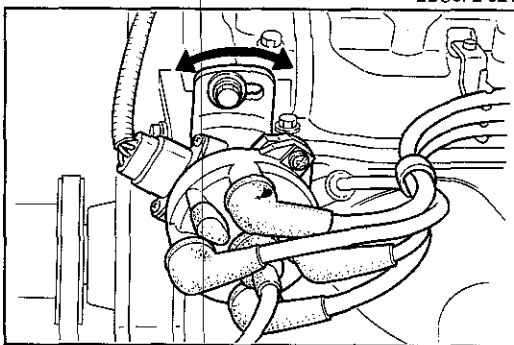
9BU0F2-127



2BU0F2-020



2BU0F2-021



9BU0F2-129

**ADJUSTMENT**

**Preparation**

1. Check the condition of the engine (spark plugs, leaks in hoses, etc.).
2. Make sure all accessories are OFF.
3. Warm up the engine to the normal operating temperature.
4. Connect a tachometer and a timing light to the engine.

**Ignition Timing**

1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
3. Connect a jumper wire between the test connector (Green: 1-pin) and a ground.

4. Check the idle speed. Set it to the specified speed if necessary. (Refer to page F2-118.)

**Idle speed: 730—770 rpm (M/T)**  
**750—790 rpm (A/T, P range)**

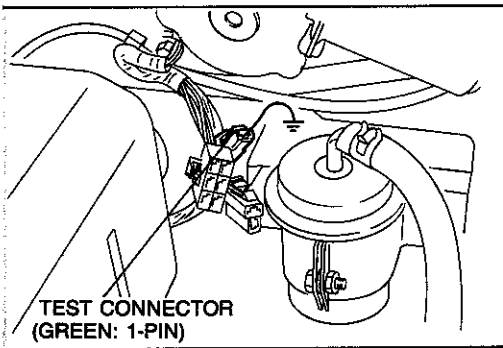
5. Check if the timing mark (Yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

**Ignition timing: 4—6° BTDC (G6)**  
**5—7° BTDC (F2)**

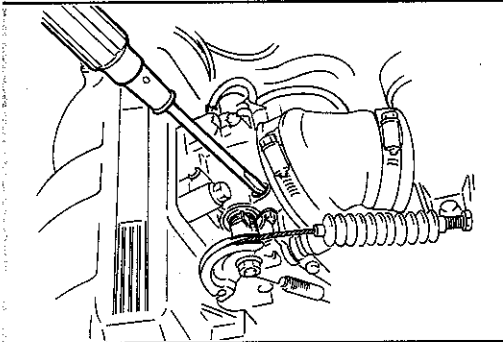
6. If the marks are not aligned, loosen the distributor lock bolts, and turn the distributor to make the adjustment.
7. Tighten the distributor lock bolts to the specified torque.

**Tightening torque:**  
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

8. Remove the jumper wire.



9MU0F2-067

**Idle Speed**

1. Ground the test connector to the body with a jumper wire.
2. Connect the tachometer to the engine.

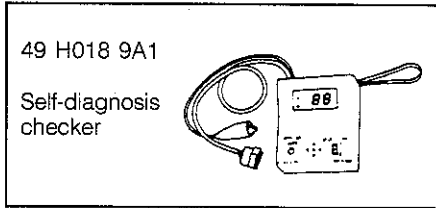
3. Check that the idle speed is within specification.

**Idle speed: 730—770 rpm (M/T)**  
**750—790 rpm (A/T, P range)**

4. If the idle speed is not within specification, adjust the idle by turning the air adjusting screw.
5. After adjusting the idle speed, disconnect the jumper wire from the test connector.

**TROUBLESHOOTING WITH SST**

**PREPARATION  
SST**

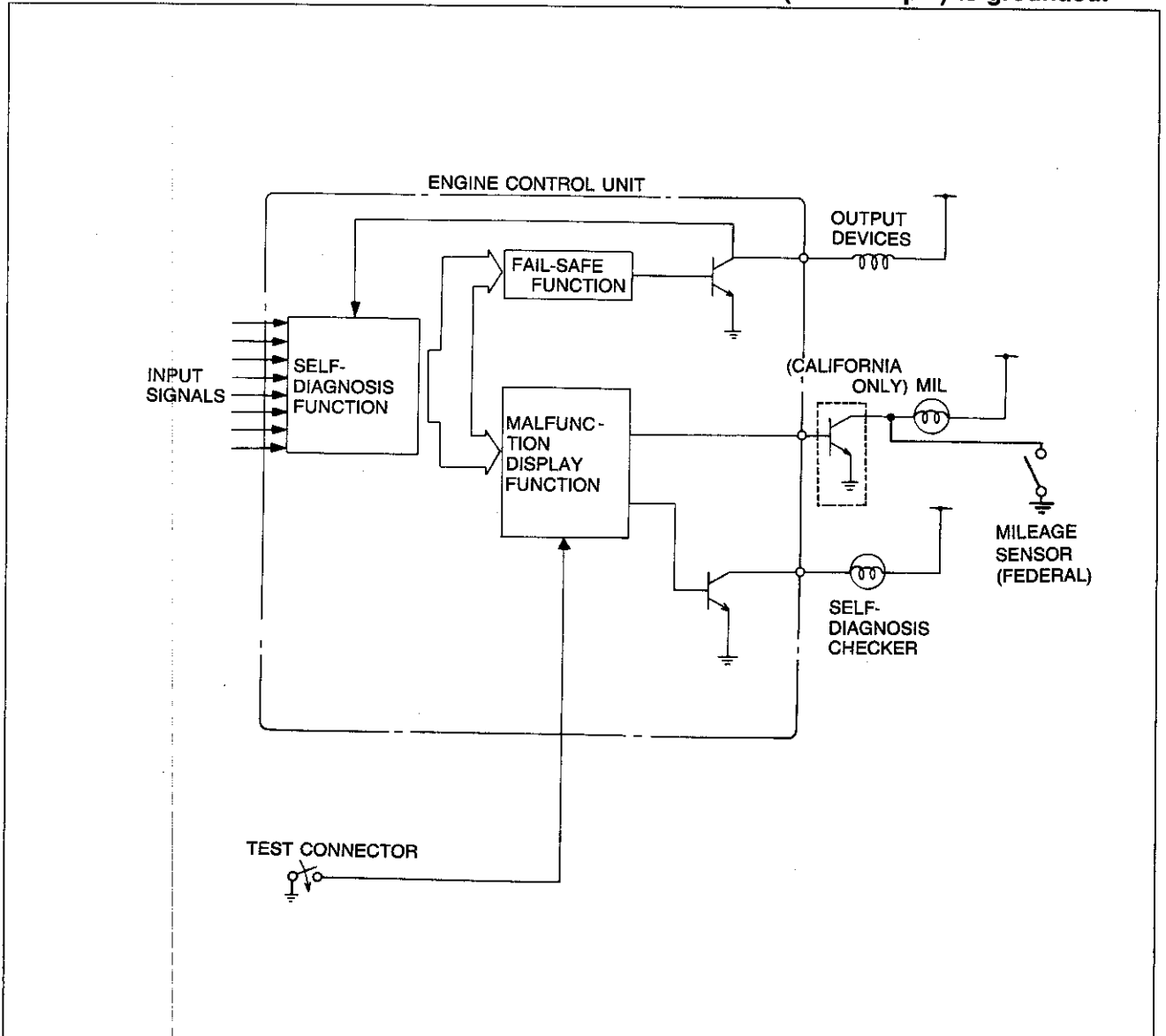


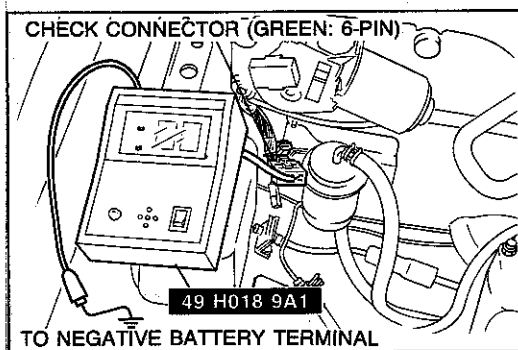
9MU0F2-069

When troubles occur in the main input devices or output devices, check for the cause using the **SST**. Failures of each input and output device are indicated and retrieved from the engine control unit as malfunction code numbers.

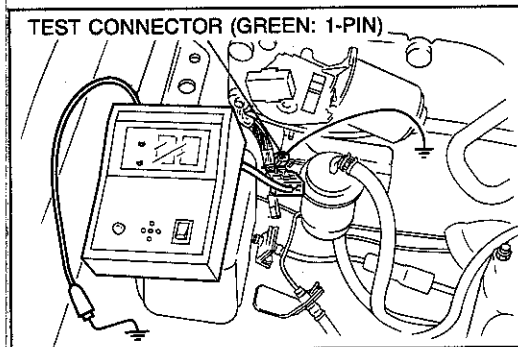
**Note**

The engine control unit constantly checks for malfunction of the input devices. But, the engine control unit checks for malfunction of output devices only in a 3 second period after the ignition switch is turned ON and the test connector (Green: 1-pin) is grounded.

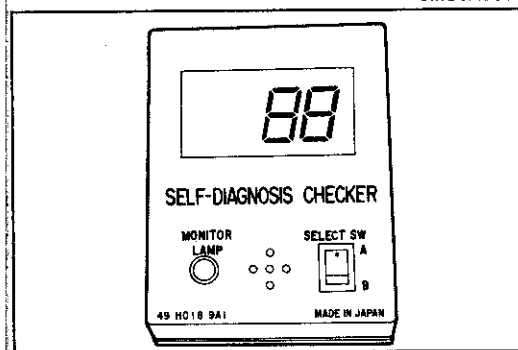




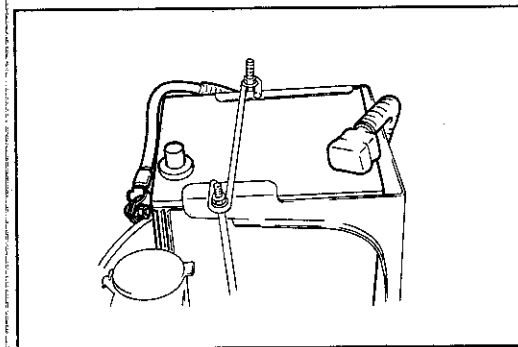
9BU0F2-130



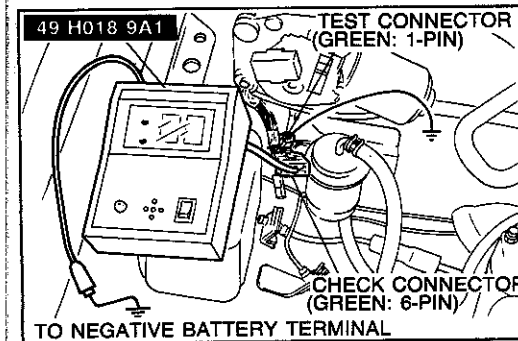
9MU0F2-557



1BU0F2-100



9MU0F2-073



9MU0F2-560

### INSPECTION PROCEDURE

1. Connect the **SST** to the check connector (Green: 6-pin) and the negative battery terminal.
2. Set the select switch to position A.

#### Note

The check connector is located near the fuel filter.

3. Ground the test connector (Green: 1-pin) with a jumper wire.

#### Note

The test connector is located near the check connector for Self-Diagnosis Checker.

4. Turn the ignition switch ON.
5. Check that **88** flashes on the digital display and the buzzer sounds for **3 sec** after turning the ignition switch ON.
6. If **88** does not flash, check the main relay (Refer to page F2-186.) power supply circuit, and check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **20 sec**, check for a short circuit between the engine control unit (1F) terminal and check connector (Green, 6-pin); then replace the engine control unit if necessary and perform steps 3 and 4 again.
8. Note the code numbers and check for the causes by referring to the check sequences shown on pages **from F2-123 to F2-132**. Repair as necessary.

#### Note

Cancel the code numbers by performing the after-repair procedure after repairing.

### AFTER-REPAIR PROCEDURE

1. Cancel the memory of malfunctions by disconnecting the negative battery cable and depressing the brake pedal for **at least five seconds**; then reconnect the negative battery cable.
2. Connect the **SST** to the check connector (Green: 6-pin).
3. Ground the test connector (Green: 1-pin) with a jumper wire.
4. Turn the ignition switch ON, but do not start the engine for **six seconds**.
5. Start and warm up the engine, then run it at **2,000 rpm for three minutes**.
6. Check that no code numbers are displayed.

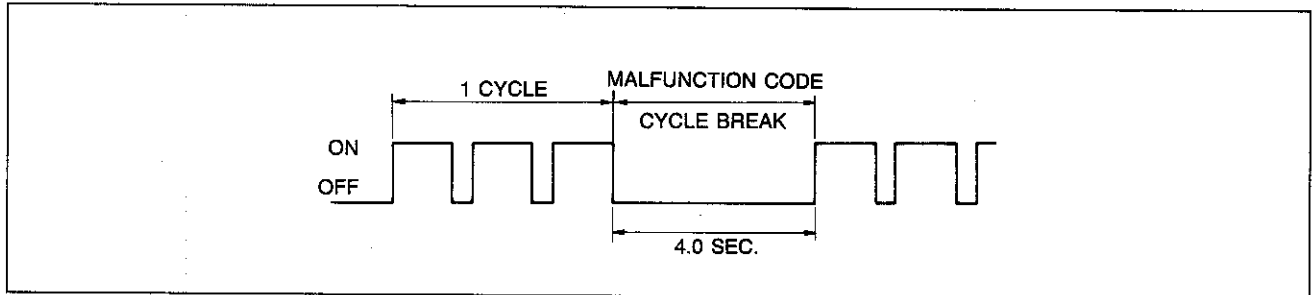
**PRINCIPLE OF CODE CYCLE**

Malfunction codes are determined as shown below

86U04A-017

**1. Code cycle break**

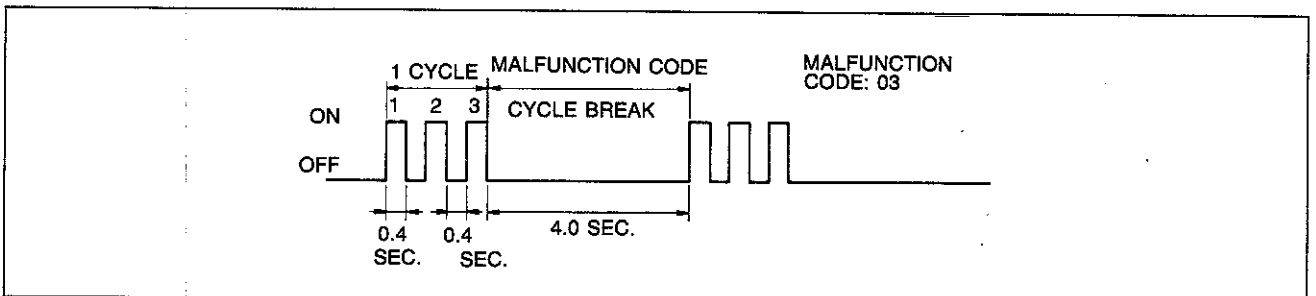
The time between malfunction code cycles is 4.0 sec (the time the MIL (California only) and the buzzer are off).



9BU0F2-050

**2. Second digit of malfunction code (ones position)**

The digit in the ones position of the malfunction code represents the number of times the MIL (California only) and the buzzer are on 0.4 sec during one cycle.

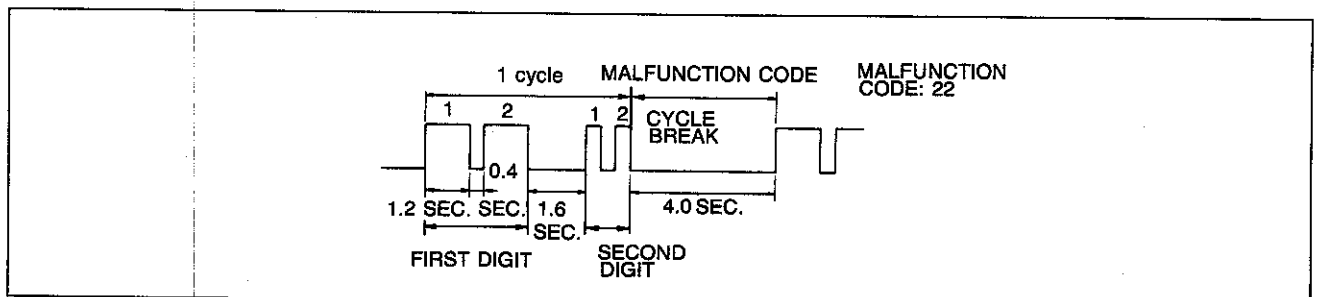


9BU0F2-051

**3. First digit of malfunction code (tens position)**

The digit in the tens position of the malfunction code represents the number of times the MIL (California only) and the buzzer are on 1.2 sec during one cycle.


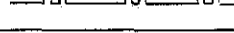



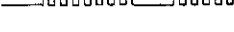





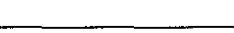

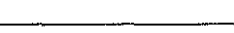





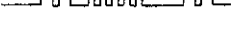

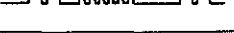


It should also be noted that the light goes off for 1.6 sec. between the long and short pulses of the MIL (California only) and the buzzer.



9BU0F2-052



### CODE NUMBERS

Malfunction display		Sensor or subsystem	Self-diagnosis	Fail-safe
Code No.	Pattern of output signal (Self-Diagnosis Checker or MIL (California only))			
02	ON  OFF 	Ne signal	No Ne signal	—
03	ON  OFF 	G signal	No G signal	Cancels 2-group injection
08	ON  OFF 	Airflow sensor	Open or short circuit	Basic fuel injection amount fixed as for two driving modes (1) Idle switch: ON (2) Idle switch: OFF
09	ON  OFF 	Water thermosensor	Open or short circuit	Maintains constant 20°(68°F) command
11	ON  OFF 	Intake air thermosensor (dynamic chamber)	Open or short circuit	Maintains constant 20°C (68°F) command
12	ON  OFF 	Throttle sensor	Open or short circuit	Maintains constant command of throttle valve fully open
14	ON  OFF 	Atmospheric pressure sensor	Open or short circuit	Maintains constant command of sea level pressure
15	ON  OFF 	Oxygen sensor (Inactivation)	Sensor output continues less than 0.45V 180 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation
17	ON  OFF 	Oxygen sensor (Inversion)	Sensor output not changed 20 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation
25	ON  OFF 	Solenoid valve (pressure regulator control)	Open or short circuit	—
26	ON  OFF 	Solenoid valve (purge control)		—
34	ON  OFF 	Solenoid valve (idle speed control)		—

2BU0F2-023

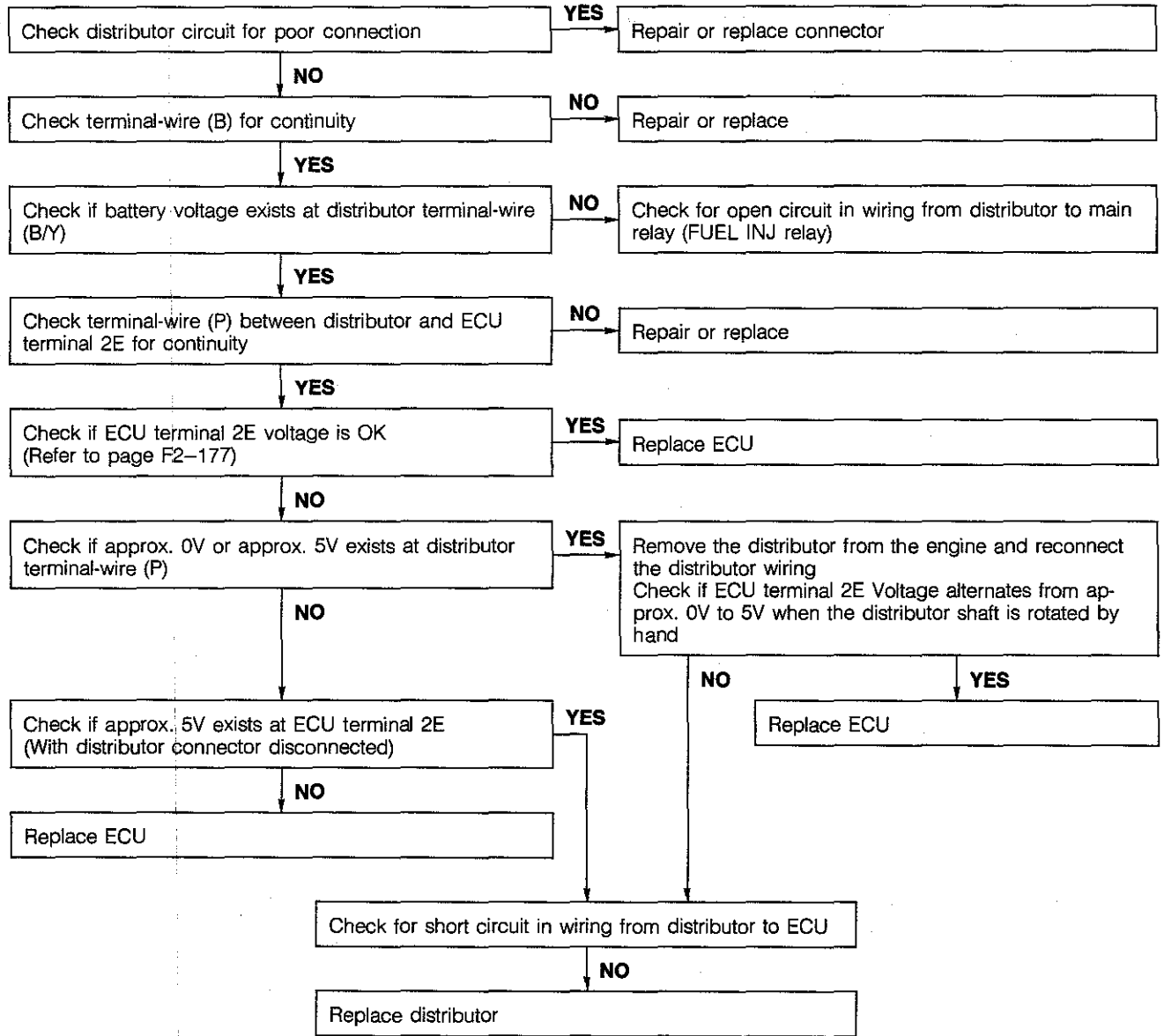
#### Caution

- If there is more than one failure present, the lowest number malfunction code is displayed first, the remaining codes are displayed in order.
- After repairing all failures, turn off the ignition switch, disconnect the negative battery cable for more than 20 seconds to erase the memory of a malfunction code from the engine control unit.

If a malfunction code number is shown on the **SST**, check the following chart along with the wiring diagram.

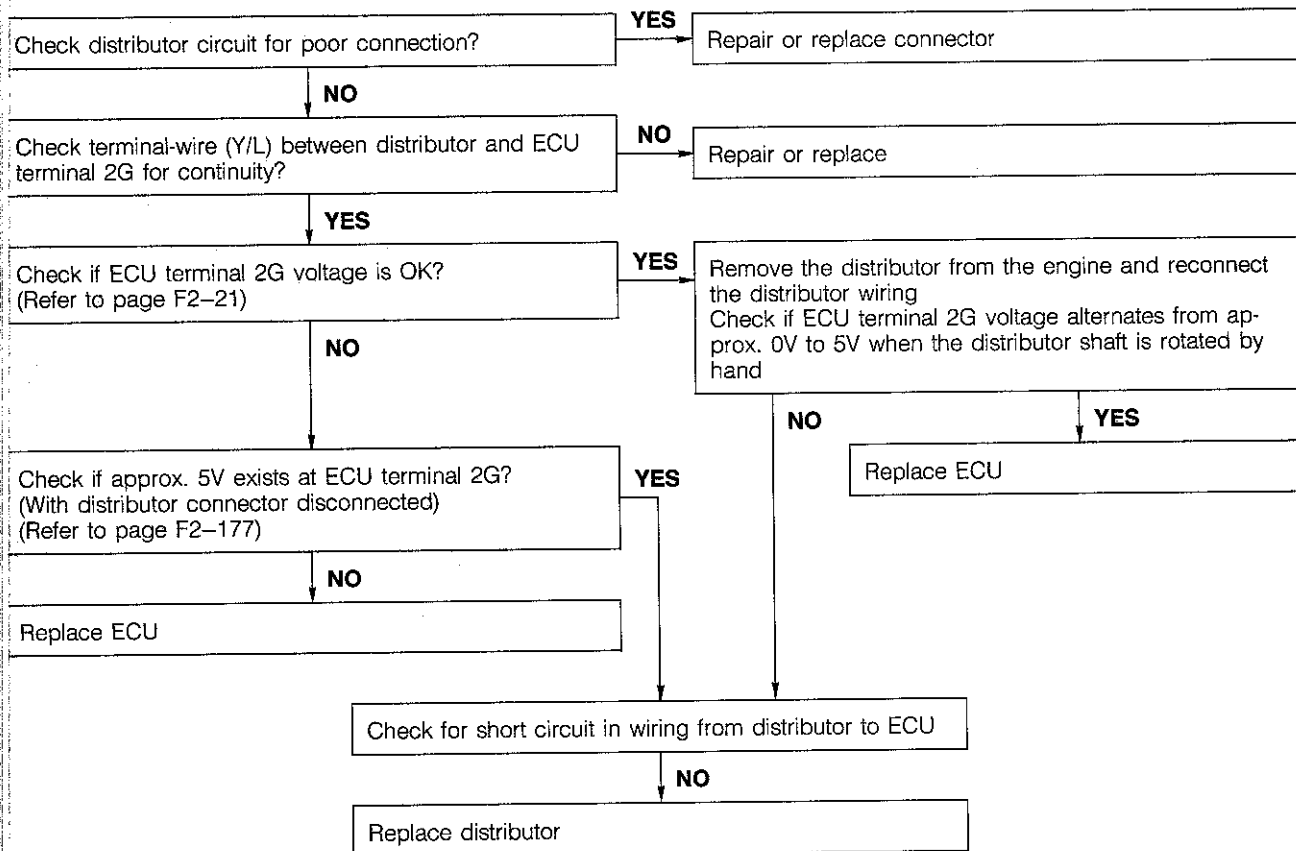
**Code No.02 (Distributor Ne-signal)**

**PC: Possible Cause**



1BU0F2-101

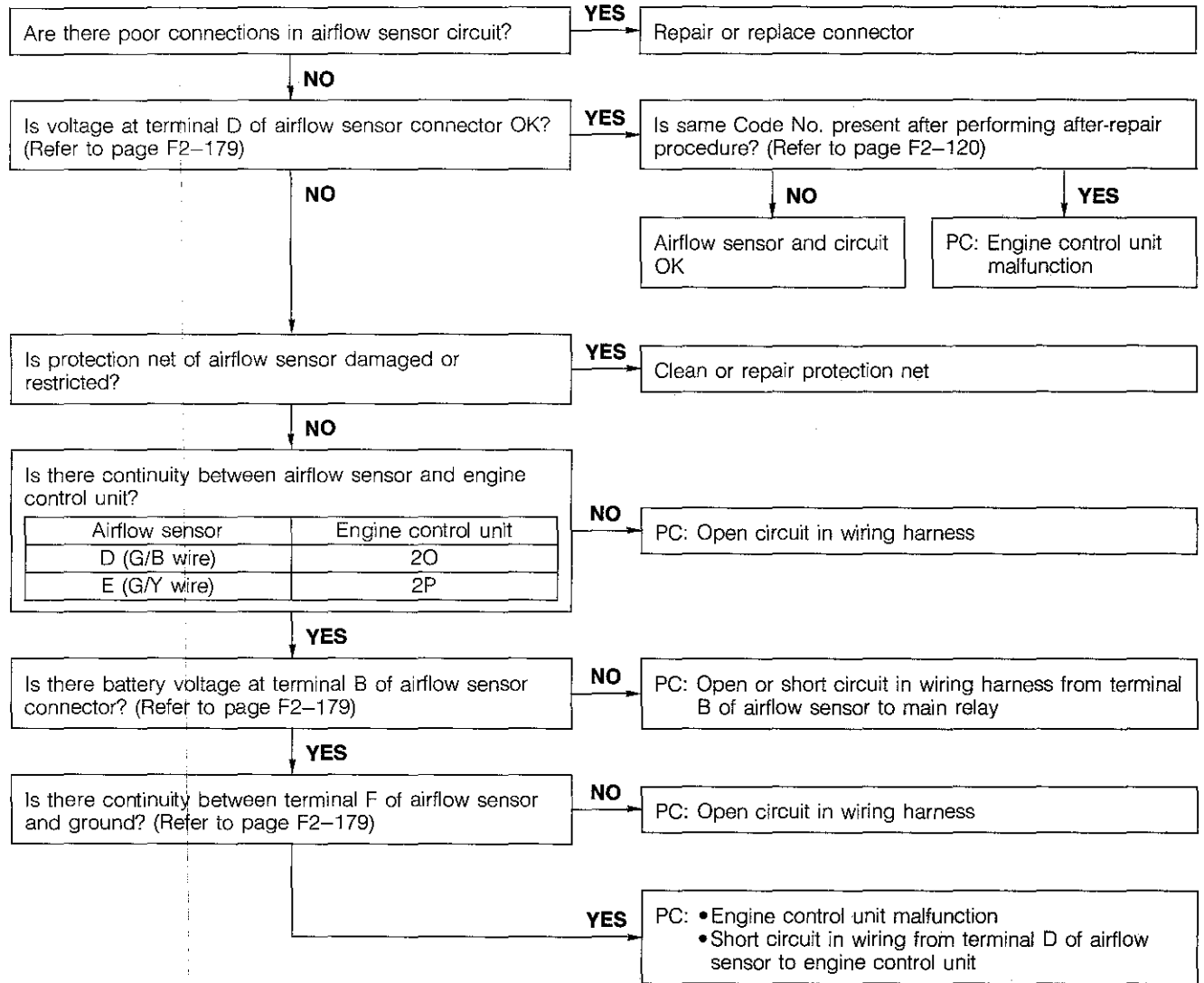
### Code No.03 (Distributor G-signal)



1BU0F2-102

Code No.08 (Airflow sensor)

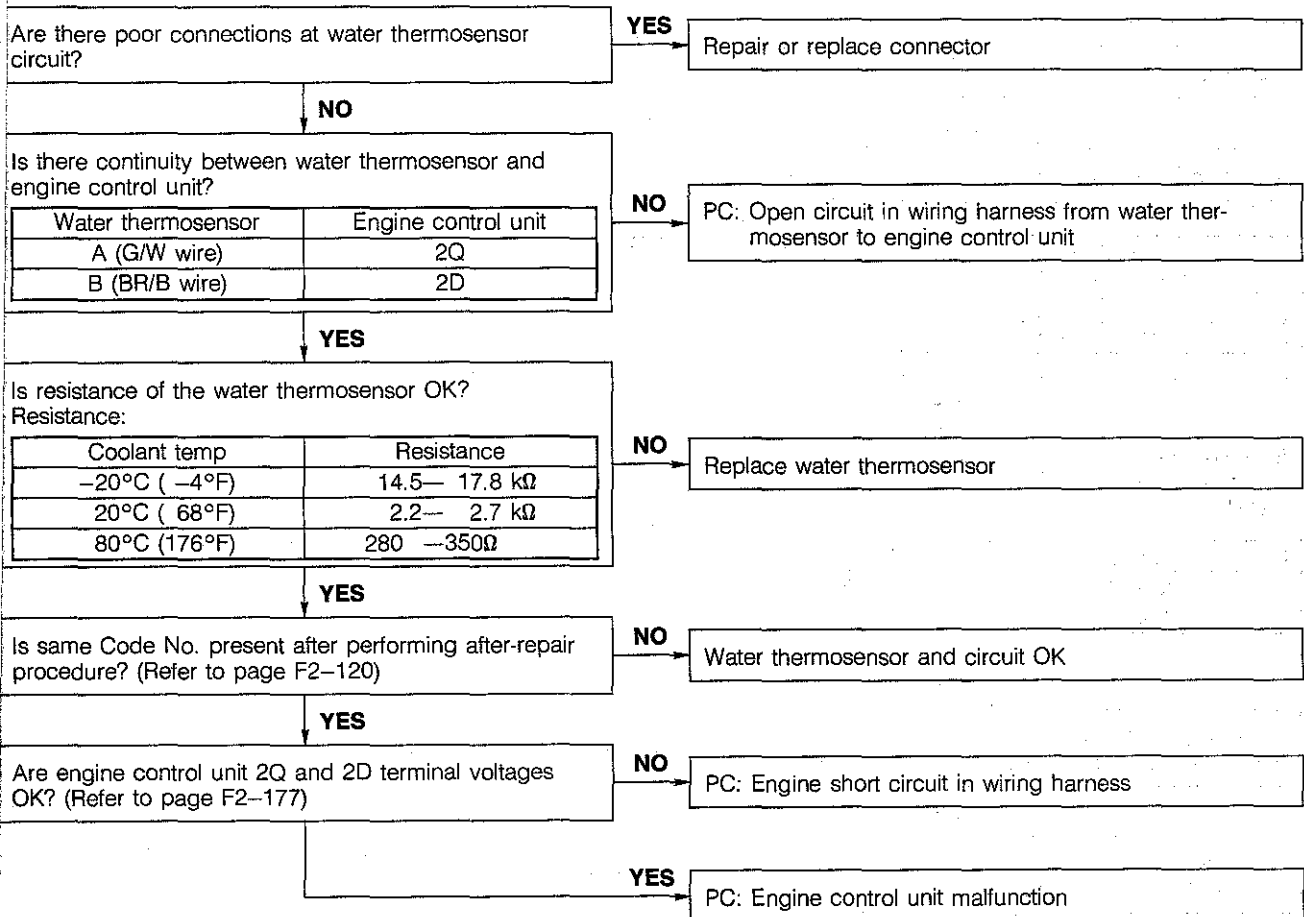
PC: Possible Cause



2BU0F2-024

Code No.09 (Water thermosensor)

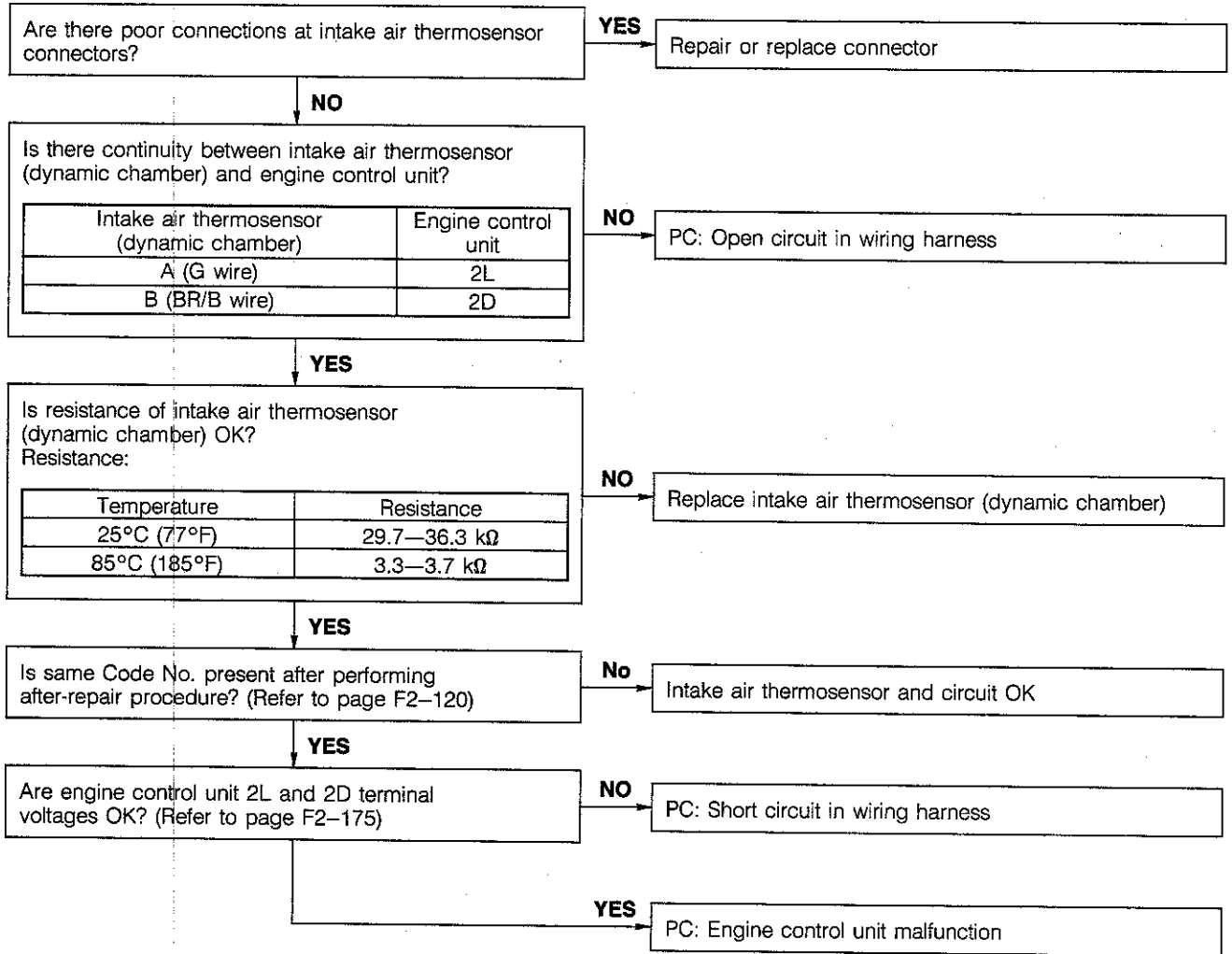
PC: Possible Cause



1BU0F2-041

No.11 Code (Intake air thermosensor)

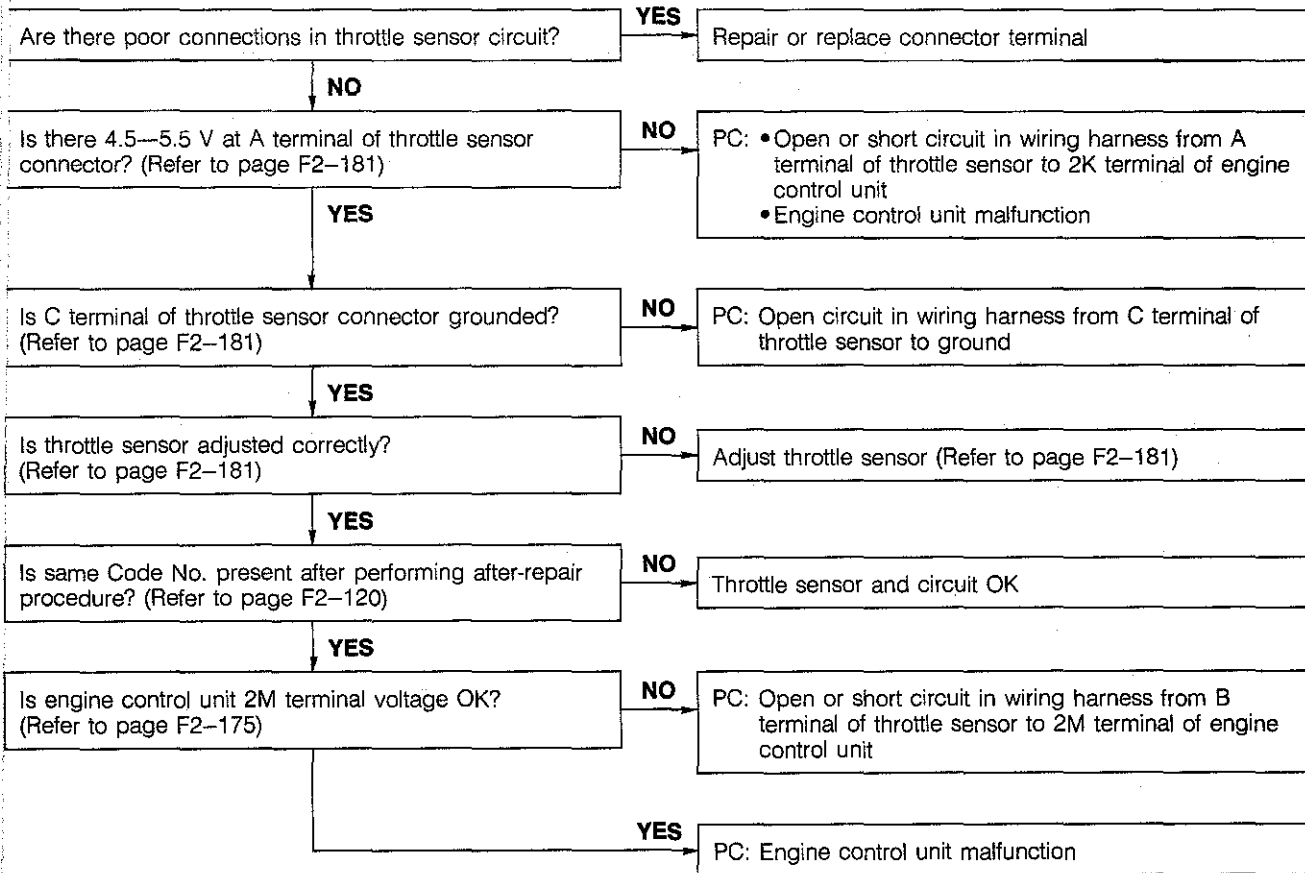
PC: Possible Cause



1BU0F2-042

### Code No.12 (Throttle sensor)

**PC: Possible cause**



1BU0F2-043

### Code No.14 (Atmospheric pressure sensor in ECU)

Replace ECU

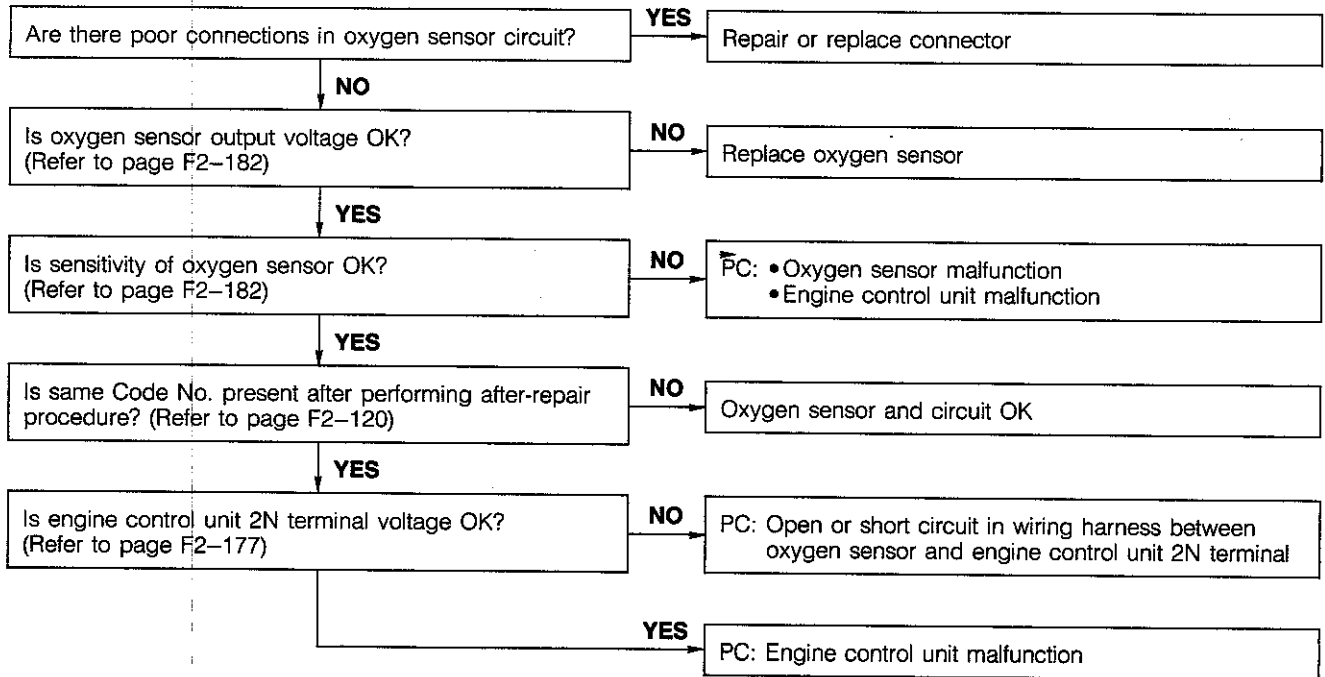
0BU0F2-053

Code No.15 (Oxygen sensor—Inactivation)

PC: Possible Cause

Note

When Codes No.15 and 17 are present at the same time, first perform the checking procedure for Code No.17. (Refer to page F2-130.)

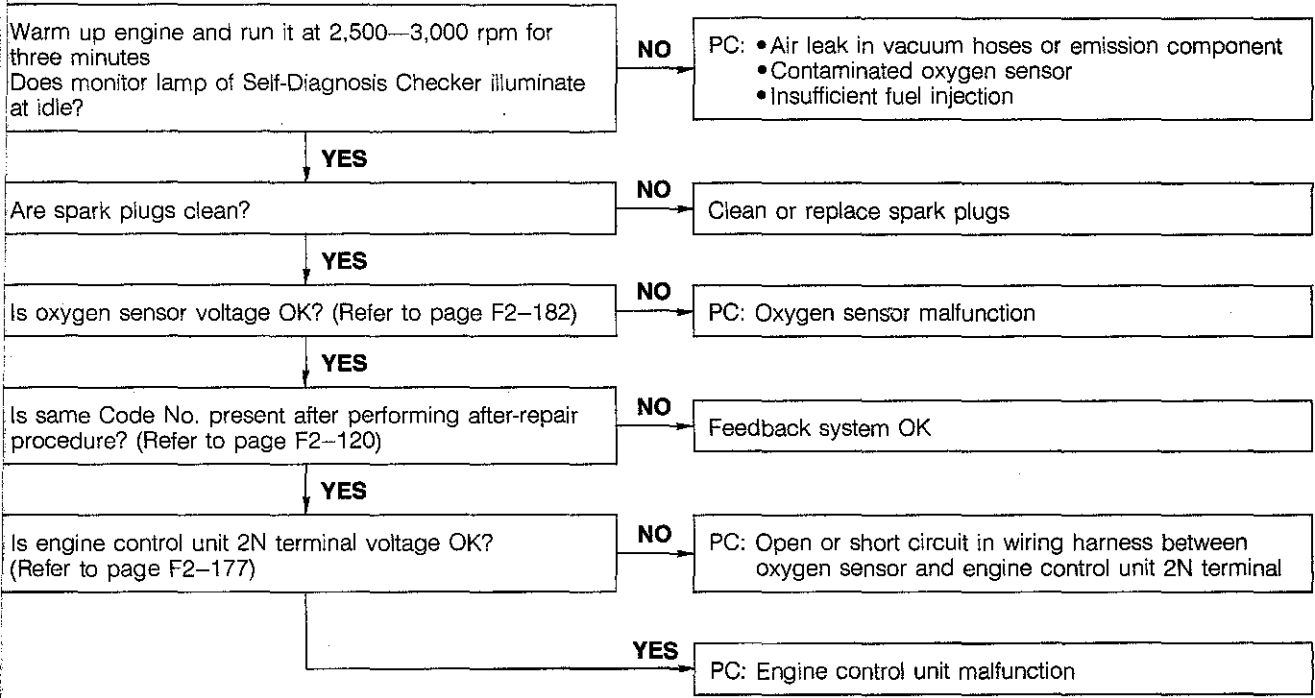


2BU0F2-025



Code No.17 (Oxygen sensor—Inversion)

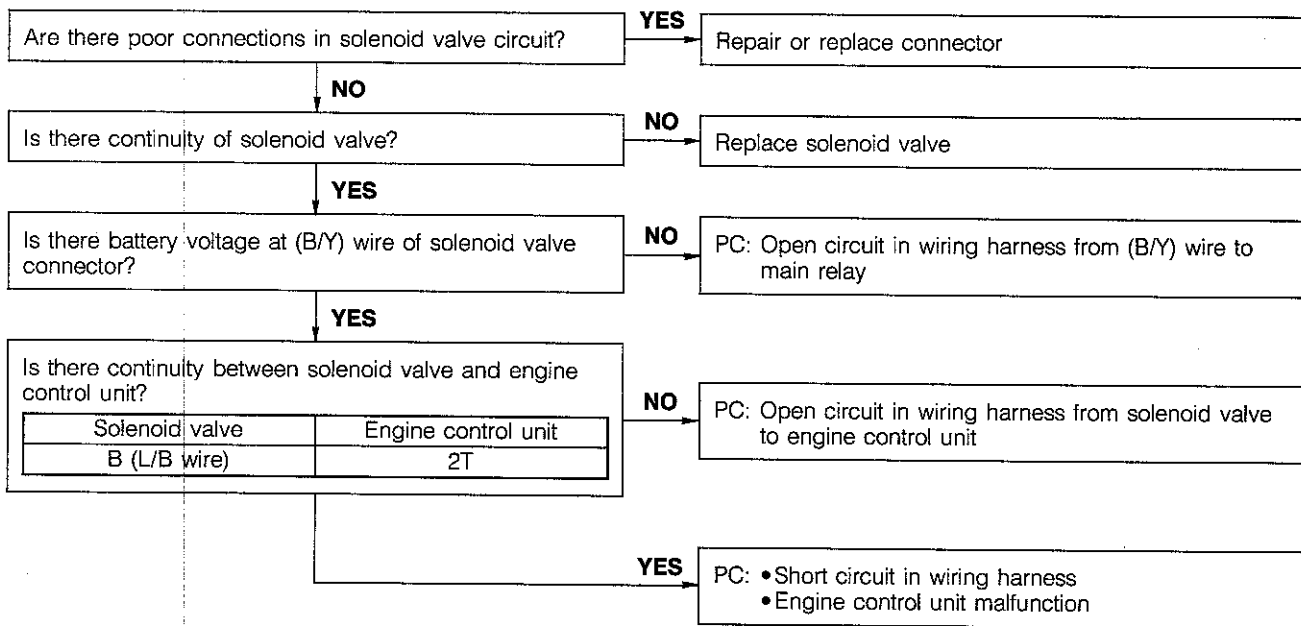
PC: Possible Cause



2BU0F2-026

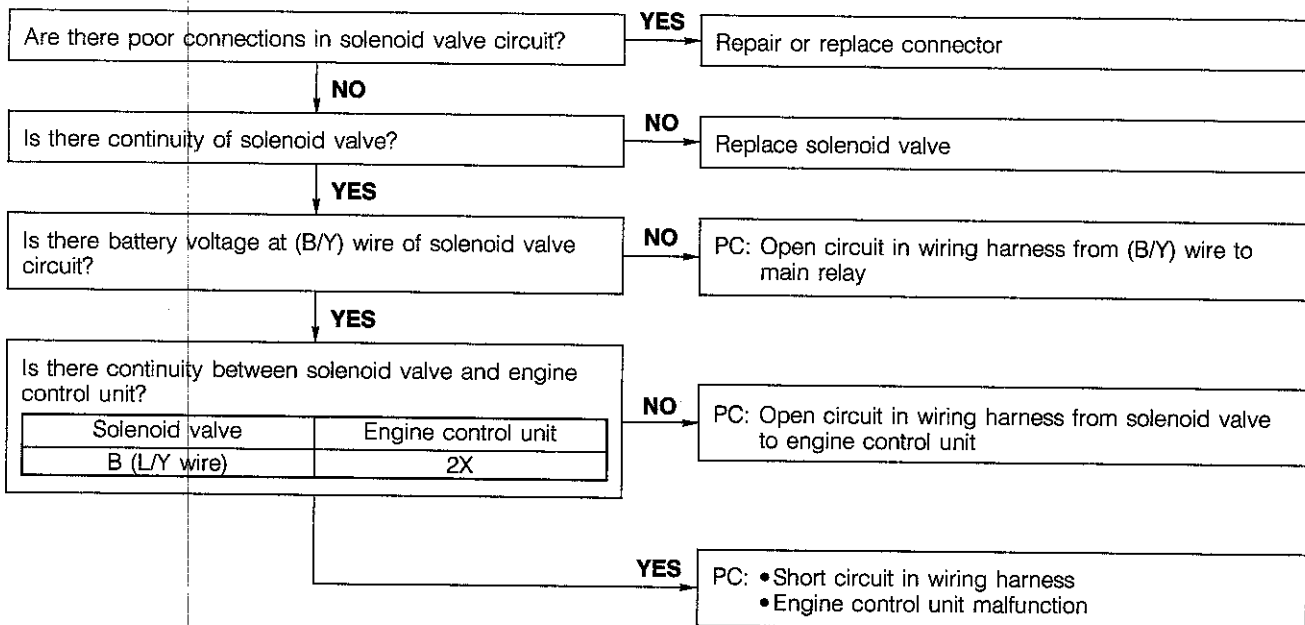
**Code No.25 (Solenoid valve—Pressure regulator control)**

**PC: Possible Cause**



0BU0F2-056

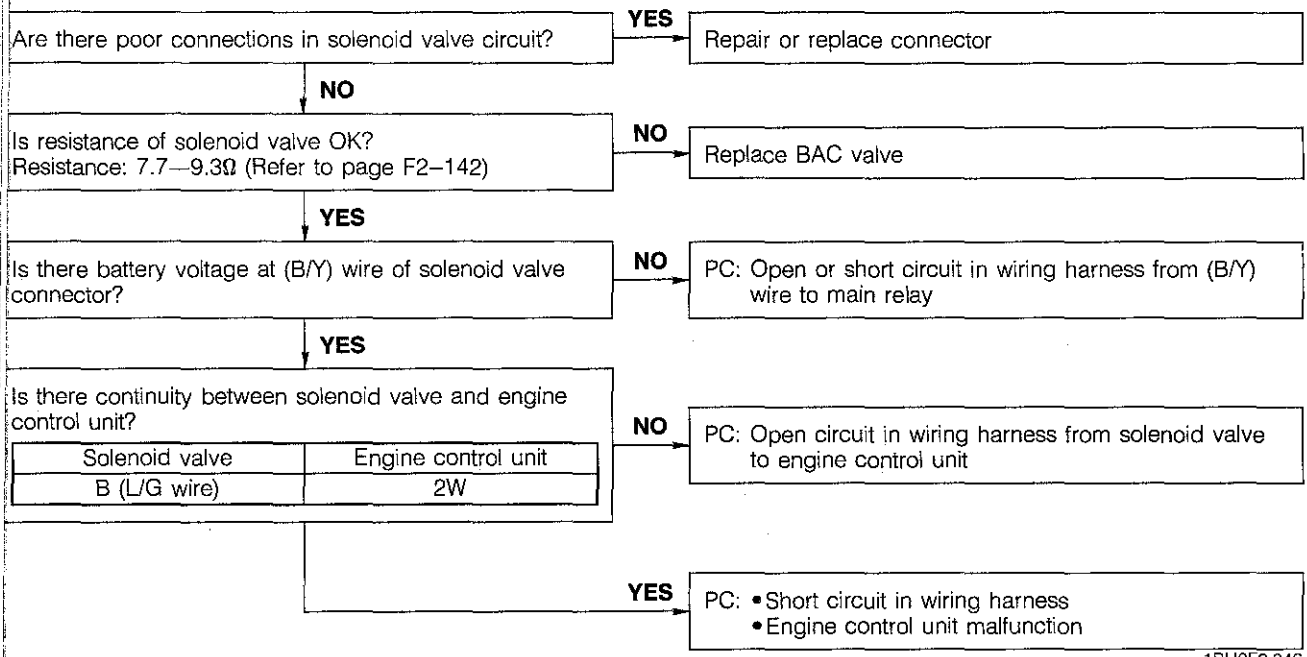
**Code No.26 (Solenoid valve—Purge control)**



0BU0F2-057

Code No.34 (Solenoid valve—Idle speed control (ISC))

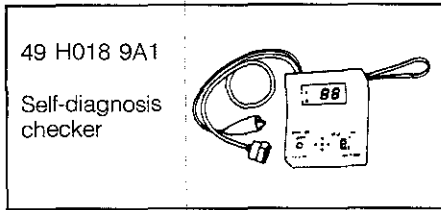
PC: Possible Cause



1BU0F2-046

SWITCH MONITOR FUNCTION

PREPARATION  
SST

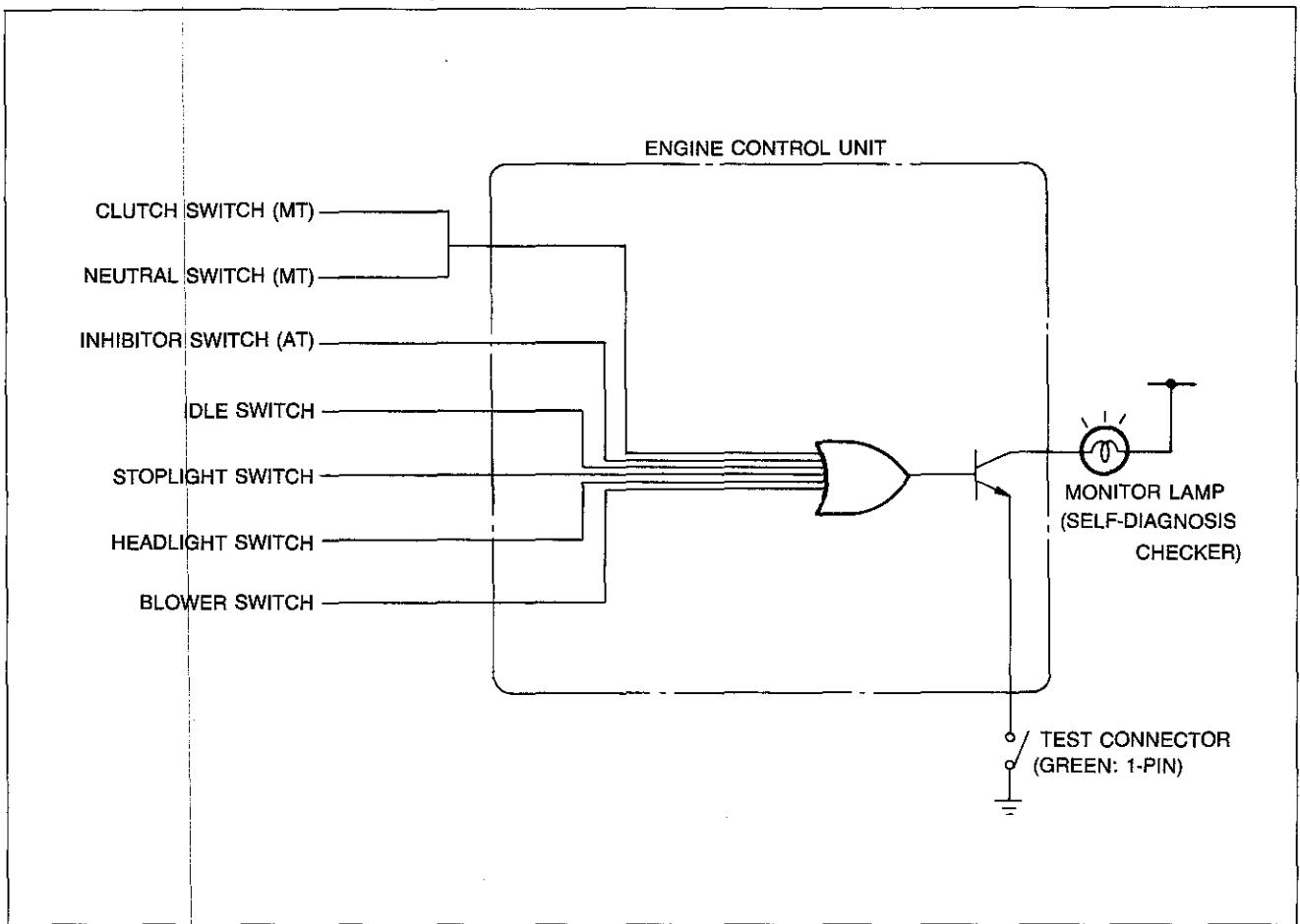


9MU0F2-244

Individual switches can be monitored by the SST.

**Note**

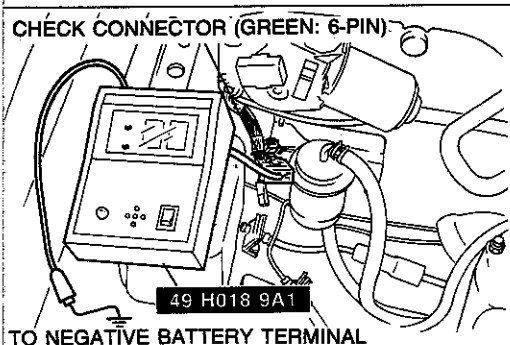
The test connector must be grounded and the ignition switch ON (engine stopped).



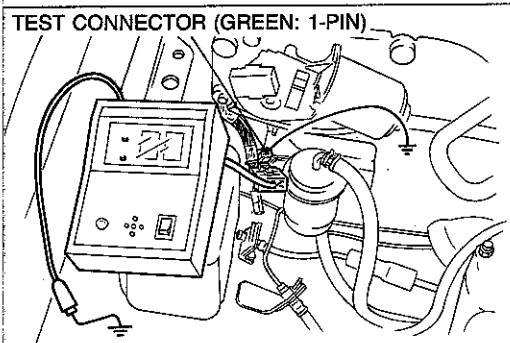
9BU0F2-064

Switch		Self-Diagnosis Checker (Monitor lamp)		Remark
		Light ON	Light OFF	
Clutch switch	(MT)	Pedal released	Pedal depressed	In gear
Neutral switch	(MT)	In gear	Neutral	Clutch pedal released
Inhibitor switch	(AT)	L, S, D or R range	N or P range	—
Idle switch		Pedal depressed	Pedal released	—
Stoplight switch		Pedal depressed	Pedal released	—
Headlight switch		ON	OFF	Headlights/small lights: ON
Blower switch		ON	OFF	Blower motor ON

0BU0F2-059



86U04A-034



86U04A-035

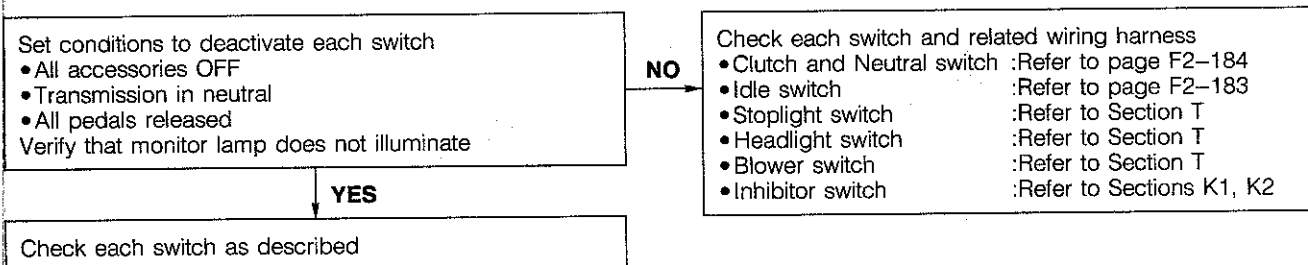
### INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect the **SST** to the check connector (Green, 6-pin) and the negative battery terminal.
3. Connect a jumper wire between the test connector (Green, 1-pin) and a ground.
4. Turn the ignition switch ON. Check if monitor lamp illuminates when each switch is made to function as described below.

### Caution

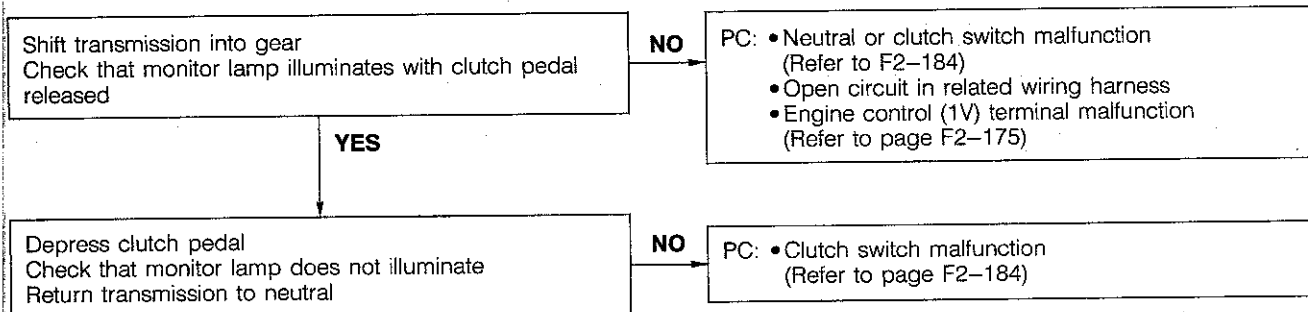
- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

### Procedure



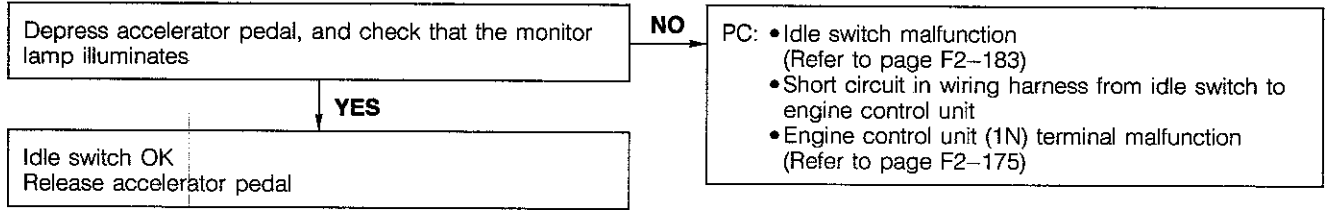
2BU0F2-027

### Neutral and Clutch switch (M/T)



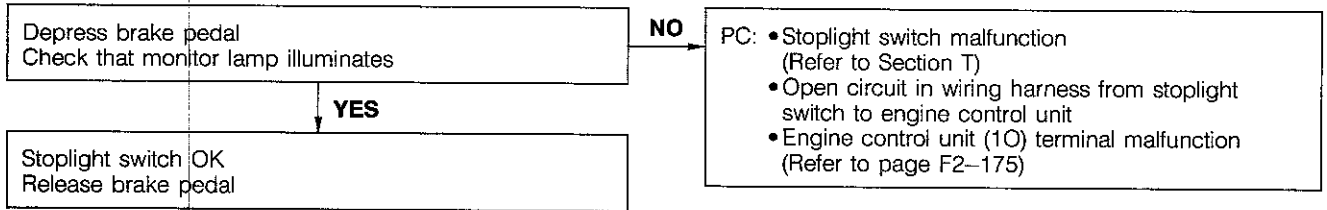
1BU0F2-048

**Idle switch**



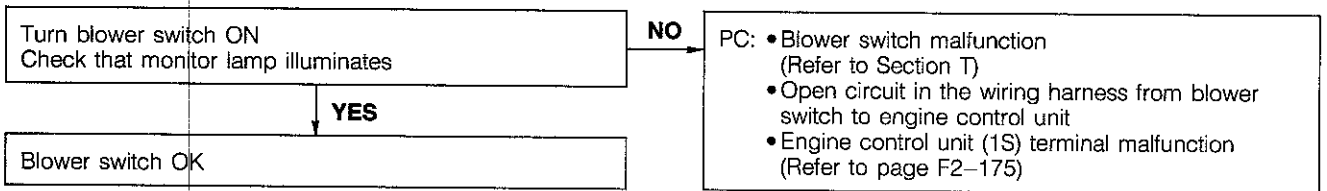
1BU0F2-049

**Stoplight switch**



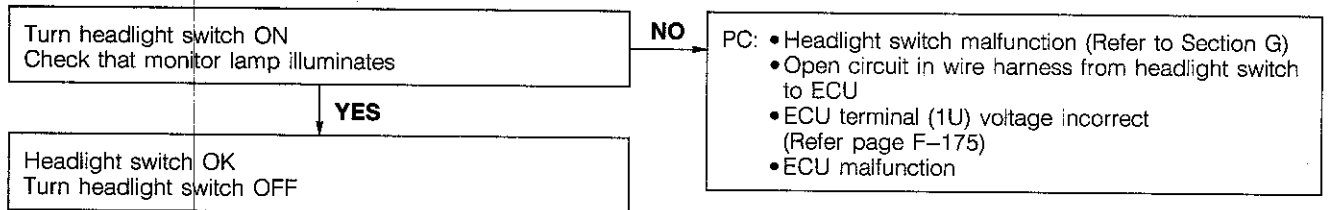
1BU0F2-050

**Blower switch**



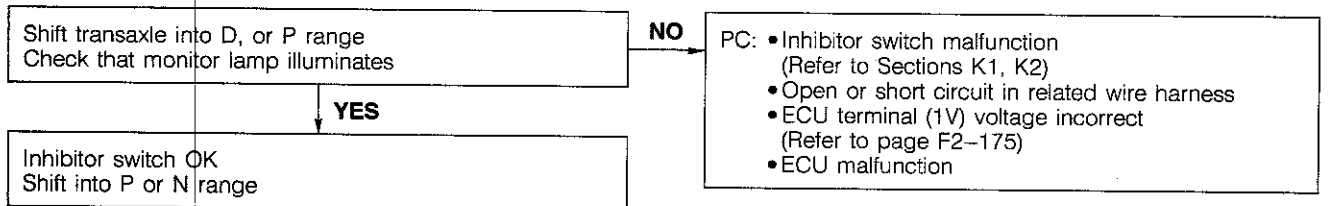
1BU0F2-051

**Headlight switch**



1BU0F2-052

**Inhibitor switch (AT)**



## SWITCH MONITOR FUNCTION

### Headlight switch

Turn ON headlight switch  
Check that monitor lamp illuminates

NO

PC: • Headlight switch malfunction  
(Refer to Section T)  
• Open circuit in wiring harness from headlight  
switch to engine control unit  
• Engine control unit (1U) terminal malfunction  
(Refer to page F2-175)

YES

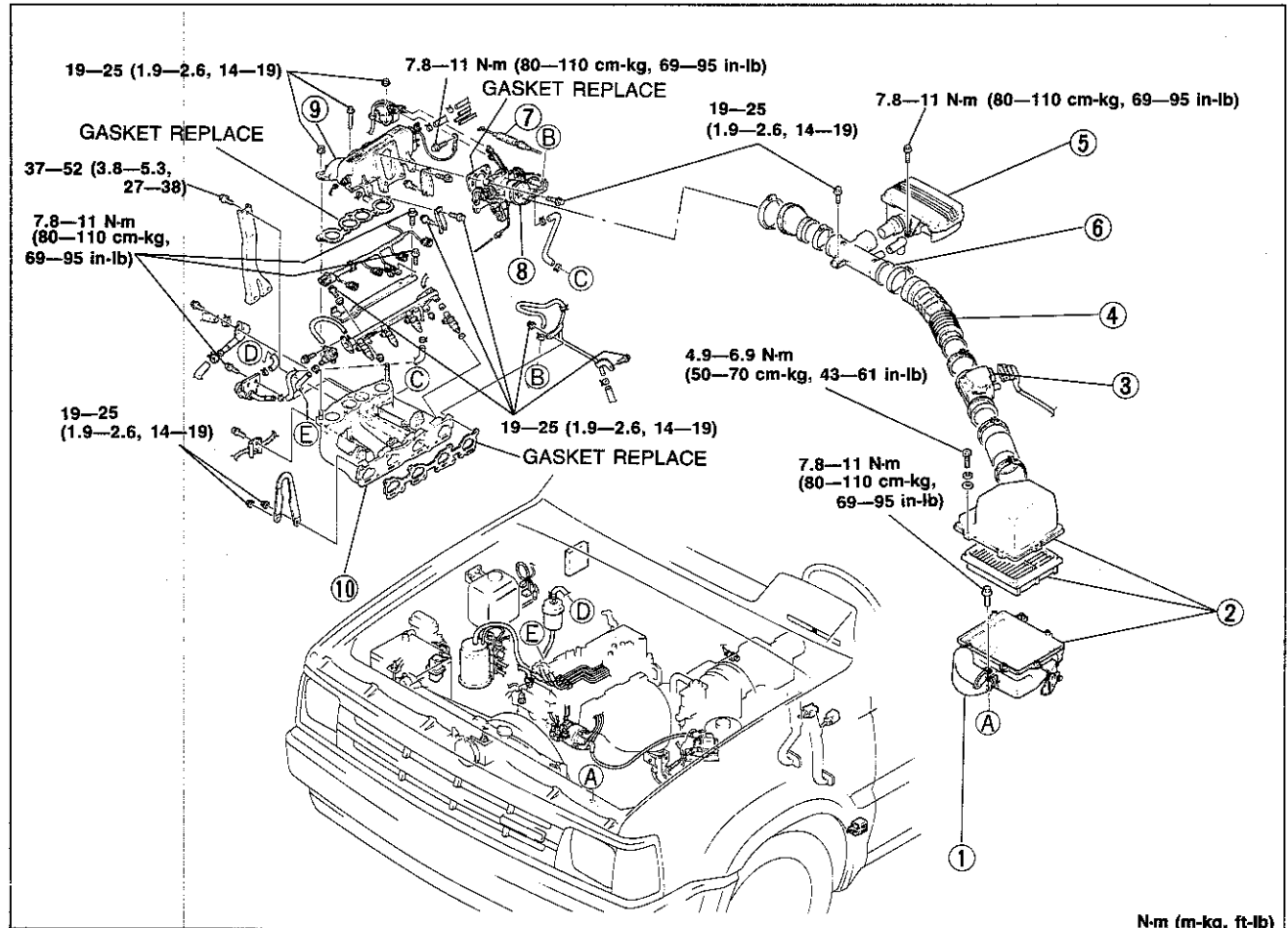
Headlight switch OK  
Turn OFF headlight switch

1BU0F2-054

INTAKE AIR SYSTEM

STRUCTURAL VIEW

This system controls the air required to operate the engine. The system consists of the air cleaner, the air pipe, the resonance chamber, the throttle body, the dynamic chamber, and the intake manifold.



N-m (m-kg, ft-lb)  
1BU0F2-055

Inspection

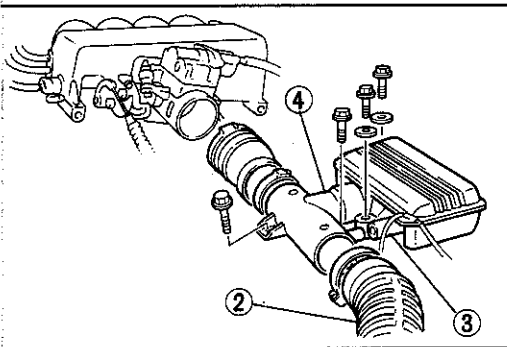
1. Check for air leaks by listening for sucking noises.
2. Visually check the components for damage and replace if necessary.

- |   |  |   |
|---|--|---|
| <ol style="list-style-type: none"> <li>1. Air duct<br/>Inspect for damage</li> <li>2. Air cleaner<br/>Inspect for excessive dirt, damage, or oil</li> <li>3. Airflow sensor<br/>Inspection and Replacement<br/>..... page F2-179</li> <li>4. Air hose<br/>Inspect for damage</li> </ol> | <ol style="list-style-type: none"> <li>5. Resonance chamber (G6)<br/>Inspect for damage</li> <li>6. Air pipe<br/>Inspect for damage</li> <li>7. Accelerator cable<br/>Inspection and Replacement<br/>..... page F2-139</li> <li>8. Throttle body<br/>Removal and Inspection<br/>..... page F2-138</li> </ol> | <ol style="list-style-type: none"> <li>9. Dynamic chamber<br/>Inspect for damage<br/>Removal and Installation .. page F2-139</li> <li>10. Intake manifold<br/>Inspect for damage<br/>Removal and Installation .. page F2-140</li> </ol> |
|---|--|---|

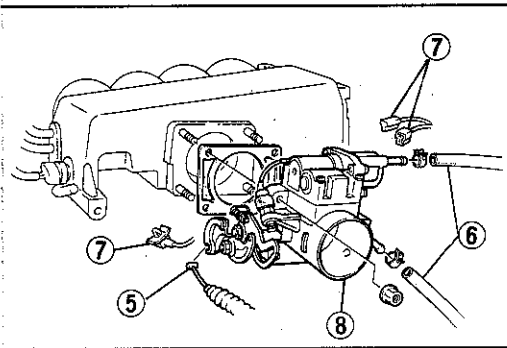
Caution

- a) The air cleaner must be replaced at the intervals outlined in the maintenance schedule.
- b) Never drive the vehicle without the air cleaner element, otherwise, damage to the airflow sensor (hot wire) will occur.
- c) Never use an oil permeated air cleaner element, otherwise, contamination of the hot wire will occur.

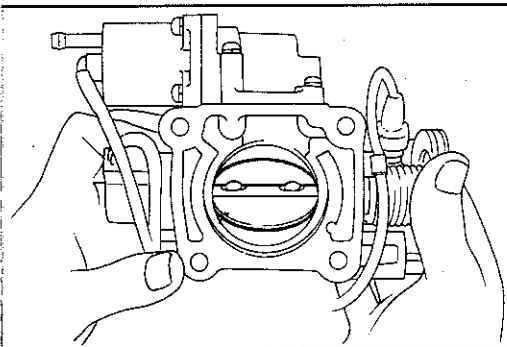




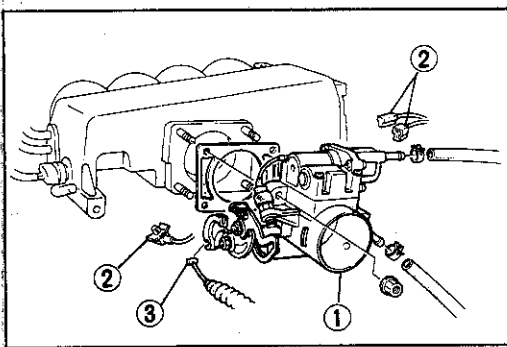
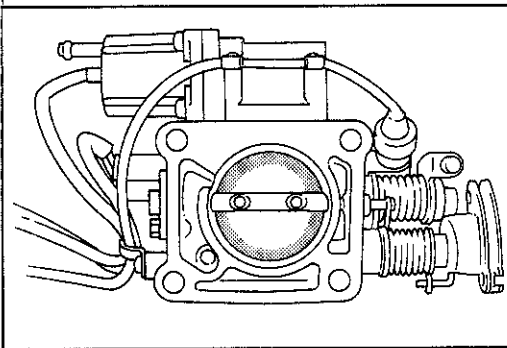
2BU0F2-029



0BU0F2-069



0MU0F2-641



0BU0F2-070

**THROTTLE BODY**

**Removal**

1. Disconnect the negative battery terminal.
2. Disconnect the air hose.
3. Disconnect the ventilation hose.
4. Remove the air pipe and resonance chamber (G6).

5. Remove the accelerator cable from the throttle lever.

**Note**

- Before disconnecting the water hoses, drain the engine coolant.

6. Disconnect the water hoses.
7. Disconnect the connectors for the solenoid valve (ISC), the throttle sensor, and idle switch.
8. Remove the throttle body.

**Inspection**

1. Check that the throttle valve is fully closed.
2. Check that the throttle valve move smoothly when the throttle lever is moved from fully closed to fully open.
3. Replace the throttle body if necessary.

**Caution**

- Do not remove the thin seal coating from the throttle valve or bore.

**Installation**

1. Install the throttle body.

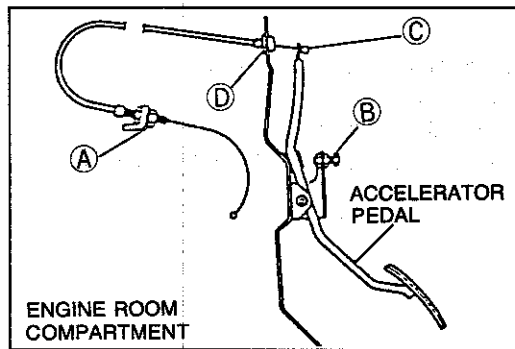
**Note**

- Use a new gasket.

**Tightening torque:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

2. Connect the connectors.
3. Install the accelerator cable.



9MU0F2-107

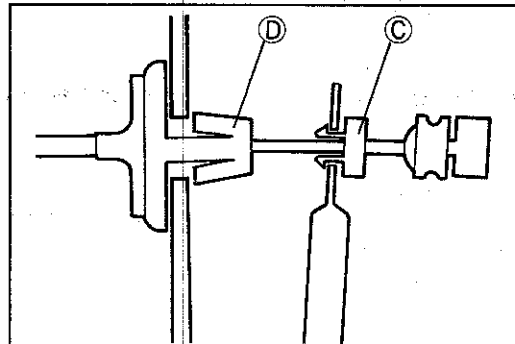
**ACCELERATOR CABLE**

**Inspection**

1. Check deflection of the cable. If deflection exceeds **1—3mm (0.039—0.118 in)**, adjust it by turning nuts A.
2. Depress the accelerator pedal to the floor and check that the throttle valve opens fully. Adjust with bolt B if necessary.

**Replacement**

1. Remove the accelerator cable from the throttle lever.
2. Loosen the throttle adjustment nuts and remove the cable from the bracket.
3. Compress the taps of stay C and remove the accelerator cable from the pedal arm.
4. Compress the taps of stay D and push the cable through the fire wall.
5. Remove the accelerator cable.
6. Install in the reverse order of removal.
7. Adjust deflection of the cable after installation.

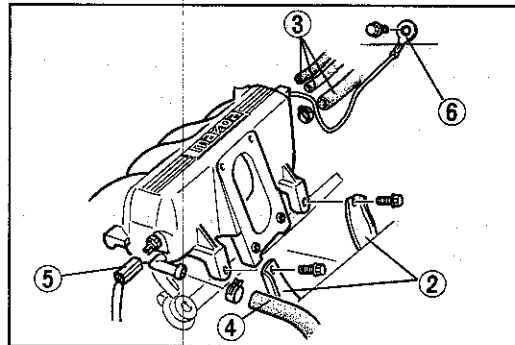


9MU0F2-108

**DYNAMIC CHAMBER**

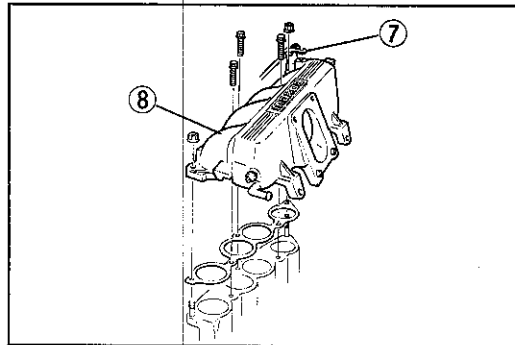
**Removal**

1. Remove the throttle body. (Refer to page F2-138.)
2. Remove the dynamic chamber brackets.
3. Disconnect the vacuum hoses.
4. Disconnect the PCV hose.
5. Disconnect the intake air thermosensor connector.
6. Disconnect the ground wire.



1BU0F2-103

7. Remove the injector harness bracket.
8. Remove the dynamic chamber.



9MU0F2-110

**Installation**

Install in the reverse order of removal.

**Note**

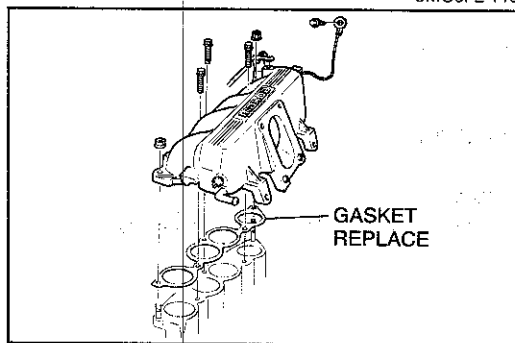
Use a new gasket.

**Tightening torque**

**Dynamic chamber and dynamic chamber bracket:**  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

**Ground wire:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

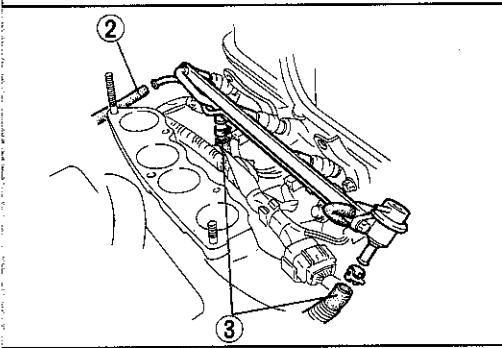


9MU0F2-111

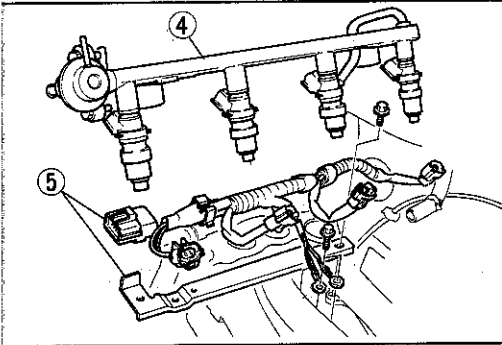
### INTAKE MANIFOLD Removal

#### Warning

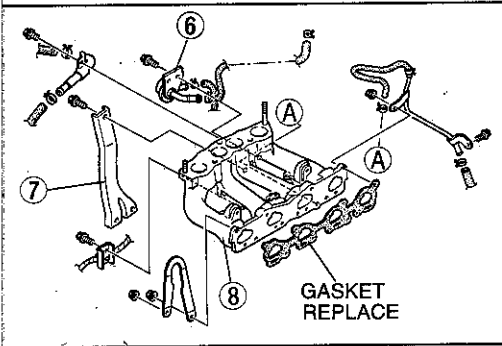
Before removal, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)



1BU0F2-057



9MU0F2-113



9MU0F2-114

1. Remove the dynamic chamber. (Refer to page F2-139.)
2. Disconnect the vacuum hoses.
3. Disconnect the fuel hoses.

4. Remove the delivery pipe and injectors.
5. Remove the injector harness and the bracket.

6. Remove the pulsation damper.
7. Remove the intake manifold bracket.
8. Remove the intake manifold.

#### Installation

Install in the reverse order of removal.

#### Note

Use a new gasket.

#### Tightening torque

Intake manifold and delivery pipe:

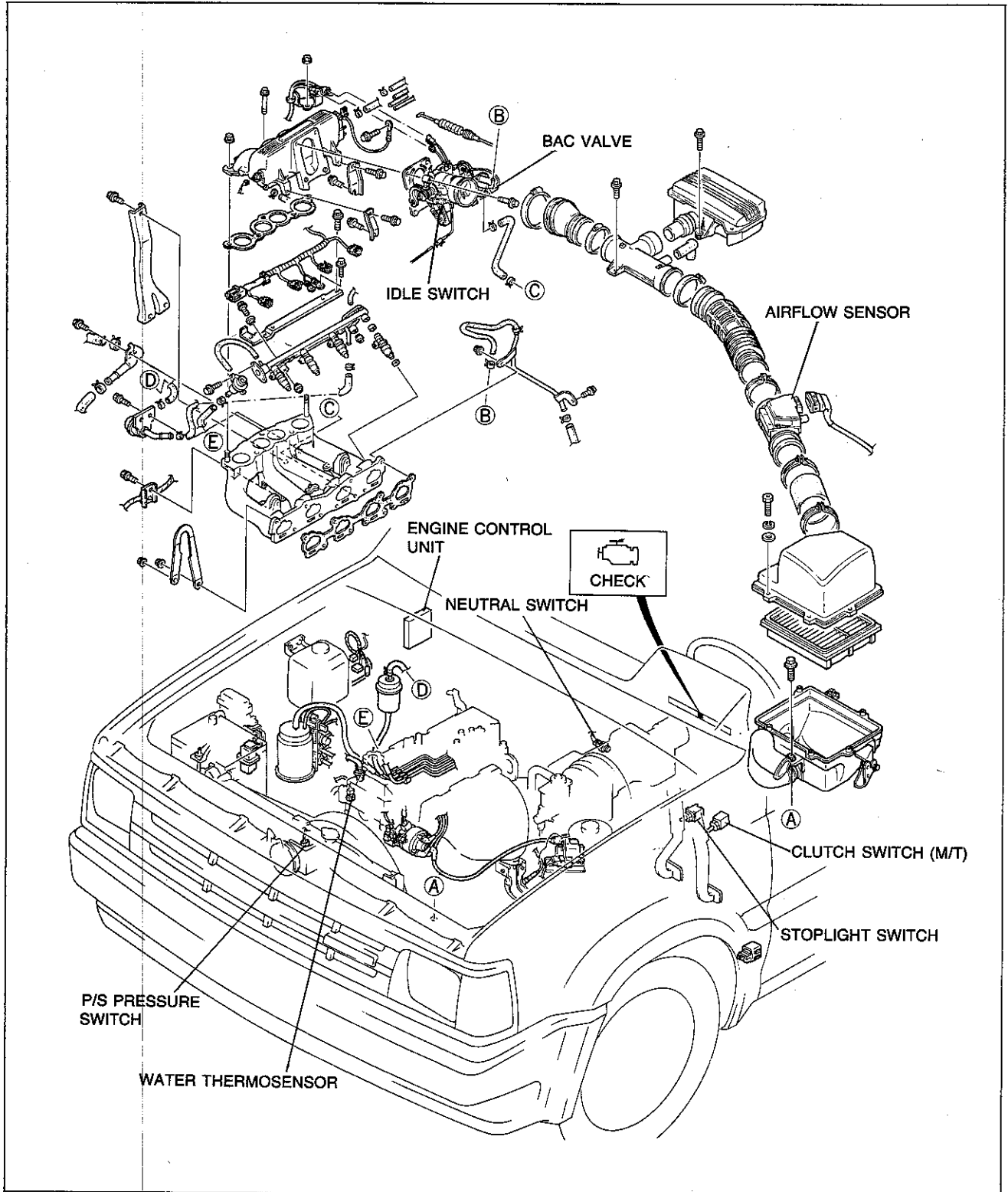
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Pulsation damper and injector harness bracket:

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

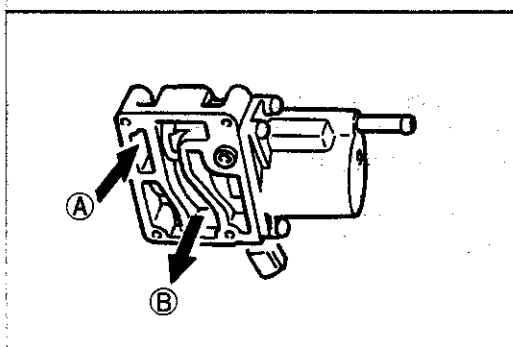
IDLE SPEED CONTROL (ISC) SYSTEM

DESCRIPTION

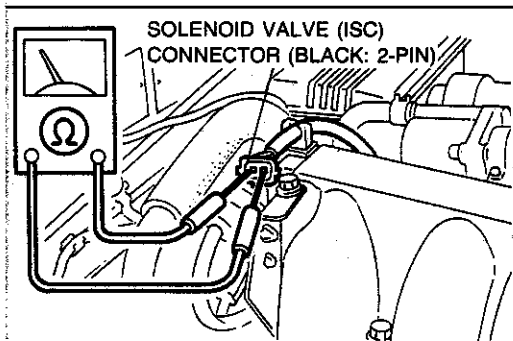


9MU0F2-115

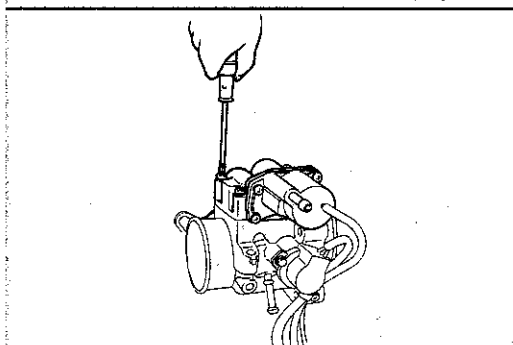
To improve idle smoothness, the ISC system controls the intake air amount by regulating the bypass air amount that passes through the throttle body. This system consists of the BAC valve and the control system. The BAC valve consists of the air valve that functions only when the engine is cold and the solenoid valve (ISC) that works throughout the entire engine speed range.



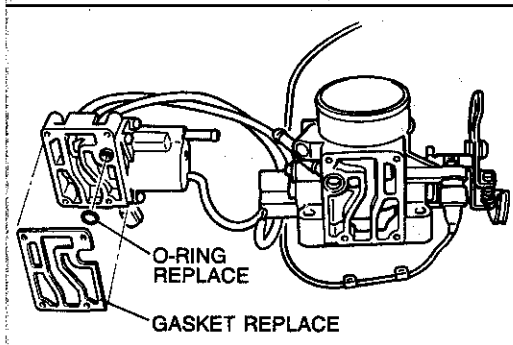
1BU0F2-058



9MU0F2-117



9MU0F2-118



9MU0F2-119

**BAC VALVE****Inspection****Air valve**

1. Remove the BAC valve from the throttle body.
2. Blow air through the valve from port A and check that air comes out of port B when the BAC valve is cold.
3. Place the BAC valve into hot water (**more than 80°C [176°F] for one minute**).
4. Blow air through the valve from port A and check that no air comes out of port B.
5. If not correct, replace the BAC valve.

**Solenoid valve (ISC)**

1. Disconnect the solenoid valve (ISC) connector.
2. Connect an ohmmeter to the terminals of the solenoid valve.
3. Check the resistance.

**Resistance (at 23°C [73°F]): 7.7—9.3Ω**

4. If not as specified, replace the BAC valve.

**Removal**

1. Remove the screws.
2. Remove the BAC valve from the throttle body.

**Installation****Caution**

- Install a new gasket and new O-ring.

1. Remove any dirt or old sealant from the contact surfaces.
2. Tighten the screws.

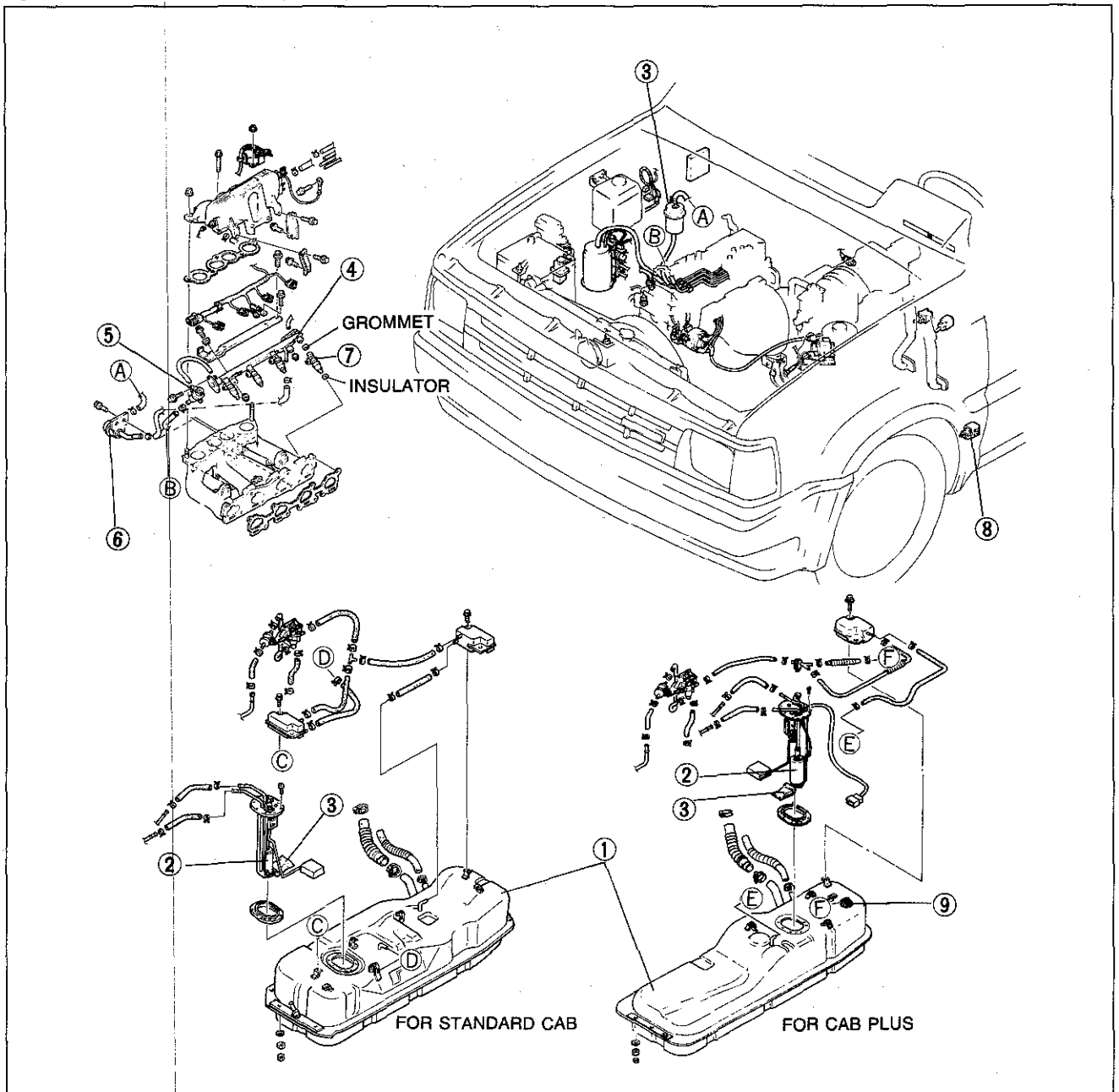
**Tightening torque:**

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**

FUEL SYSTEM

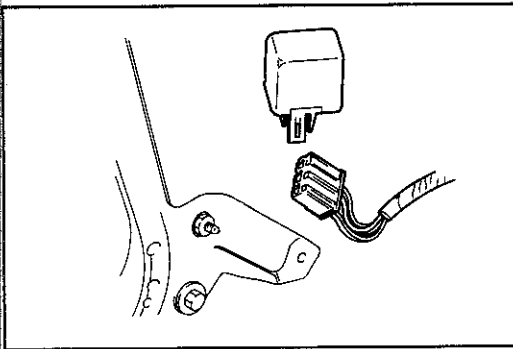
STRUCTURAL VIEW

This system supplies the necessary fuel for combustion at a constant pressure to the fuel injectors. Fuel is metered and injected into intake manifold according to the injection control signals from the engine control unit. It consists of the fuel tank, the fuel pump, the fuel filters, the delivery pipe, the pressure regulator, the injectors, and the circuit opening relay.

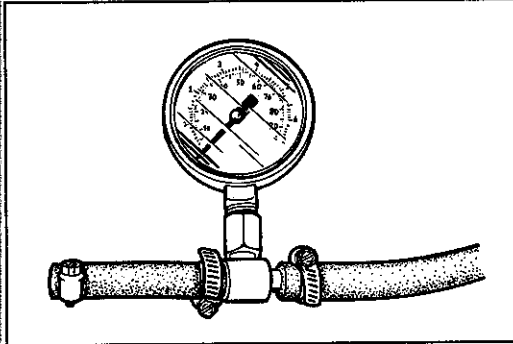


2BUOF2-050

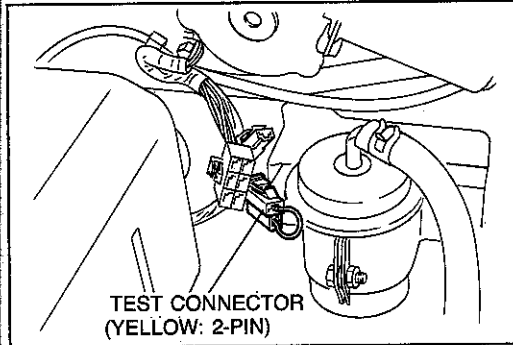
- |  |   |   |
|--|---|---|
| <p>1. Fuel tank<br/>Removal..... page F2-147<br/>Installation ..... page F2-148</p> <p>2. Fuel pump<br/>Inspection..... page F2-150<br/>Replacement. page F2-152</p> | <p>3. Fuel filter<br/>Replacement. page F2-149</p> <p>4. Delivery pipe</p> <p>5. Pressure regulator<br/>Inspection..... page F2-154<br/>Replacement. page F2-155</p> <p>6. Pulsation damper<br/>Inspection, Removal, and<br/>Installation ... page F2-155</p> | <p>7. Injector<br/>Removal..... page F2-156<br/>Inspection ..... page F2-157<br/>Installation..... page F2-158</p> <p>8. Circuit opening relay<br/>Inspection, Removal, and<br/>Installation .... page F2-153</p> <p>9. Fuel vapor valve<br/>Inspect for damage</p> |
|--|---|---|



9BU0F2-076



9MU0F2-122



9MU0F2-123

**PRECAUTION****Fuel Pressure Release and Servicing Fuel System**

Fuel in the fuel system remains under high pressure even when the engine is not running.

- a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
  1. Start the engine.
  2. Disconnect the circuit opening relay connector.
  3. After the engine stalls, turn off the ignition switch.
  4. Reconnect the circuit opening relay connector.

- b) Use a rag as protection from fuel spray when disconnecting the hoses.  
Plug the hoses after removal.

- c) When inspecting the fuel system, use a suitable fuel pressure gauge.

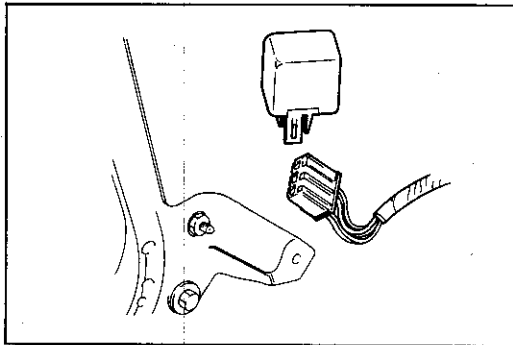
**Caution**

**Install hose clamps to secure the fuel pressure gauge to the fuel filter and the fuel main hose to prevent fuel leakage.**

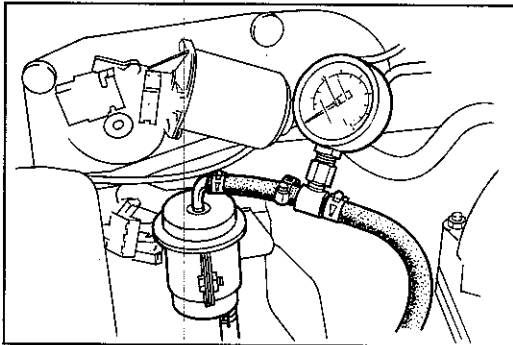
**Priming Fuel System**

After releasing the fuel system pressure for repairs or inspection the system must be primed to avoid excessive cranking when first starting the engine. Follow the steps below.

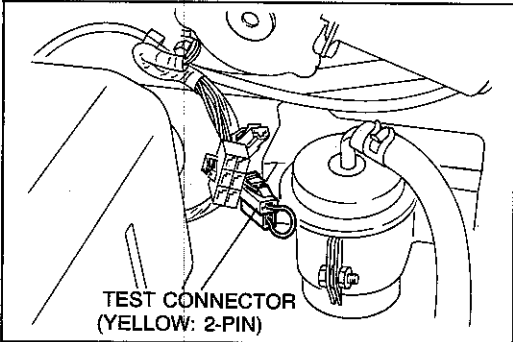
1. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
2. Turn the ignition switch ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper wire.



1BU0F2-060



9MU0F2-125



TEST CONNECTOR  
(YELLOW: 2-PIN)

9MU0F2-126

**SYSTEM INSPECTION**  
**Fuel System Pressure Drop**

**Warning**

Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)

1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON for **10 seconds** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 minutes**.

**Fuel pressure:**

**More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)**

8. If not as specified, perform the following inspection.
  - Fuel pump fuel pressure drop (Refer to page F2-150.)
  - Pressure regulator fuel pressure drop (Refer to page F2-154.)
  - Injector fuel leakage (Refer to page F2-157.)

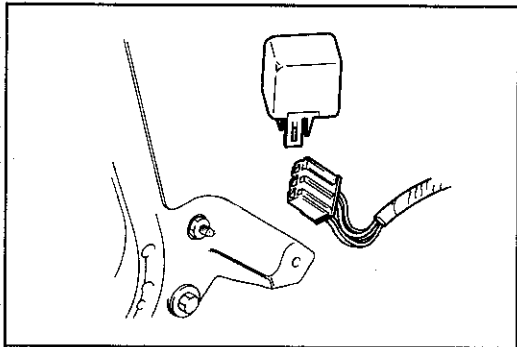
1BU0F2-061



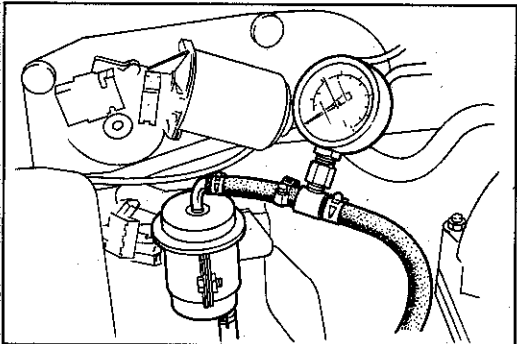
### Fuel Line Pressure

#### Warning

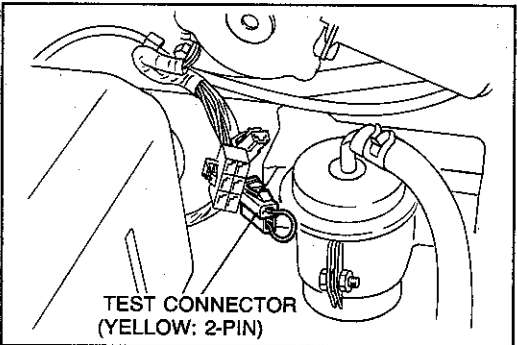
Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)



1BU0F2-062



9MU0F2-129



TEST CONNECTOR  
(YELLOW: 2-PIN)

1BU0F2-063

1. Disconnect the negative battery terminal.
2. Install the fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.

4. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON.
6. Measure the fuel line pressure.

#### Fuel line pressure:

**265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)**

Low pressure— Check fuel line and filter for clogging. Check fuel pump maximum pressure. (Refer to page F2-150.)

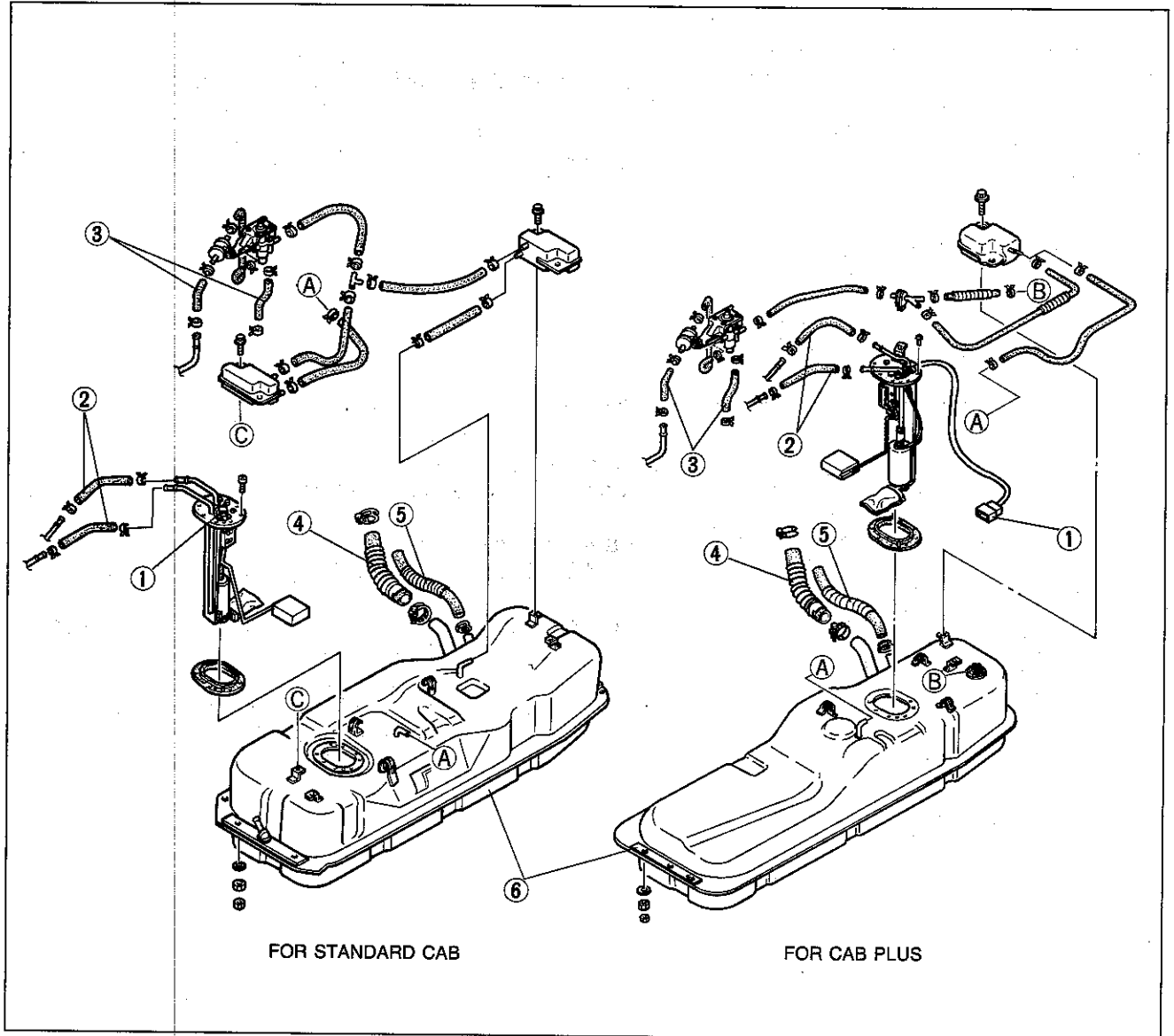
High pressure— Replace the pressure regulator. (Refer to page F2-155.)

**FUEL TANK  
Removal**

**Warning**

- a) Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- b) When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.

1. Remove the fuel filler cap.
2. Remove in the order shown in the figure.



1BU0F2-064

**Note**

**Drain the fuel from the fuel tank before removing the tank.**

- 1. Fuel pump connector
- 2. Fuel hoses
- 3. Evaporative hoses
- 4. Fuel filler hose

- 5. Breather hose
- 6. Fuel tank

Inspect for cracks and corrosion  
Repair or replace if necessary

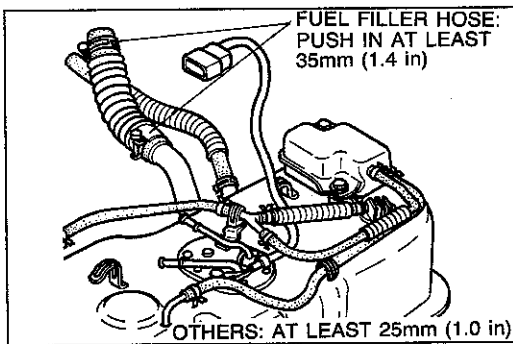
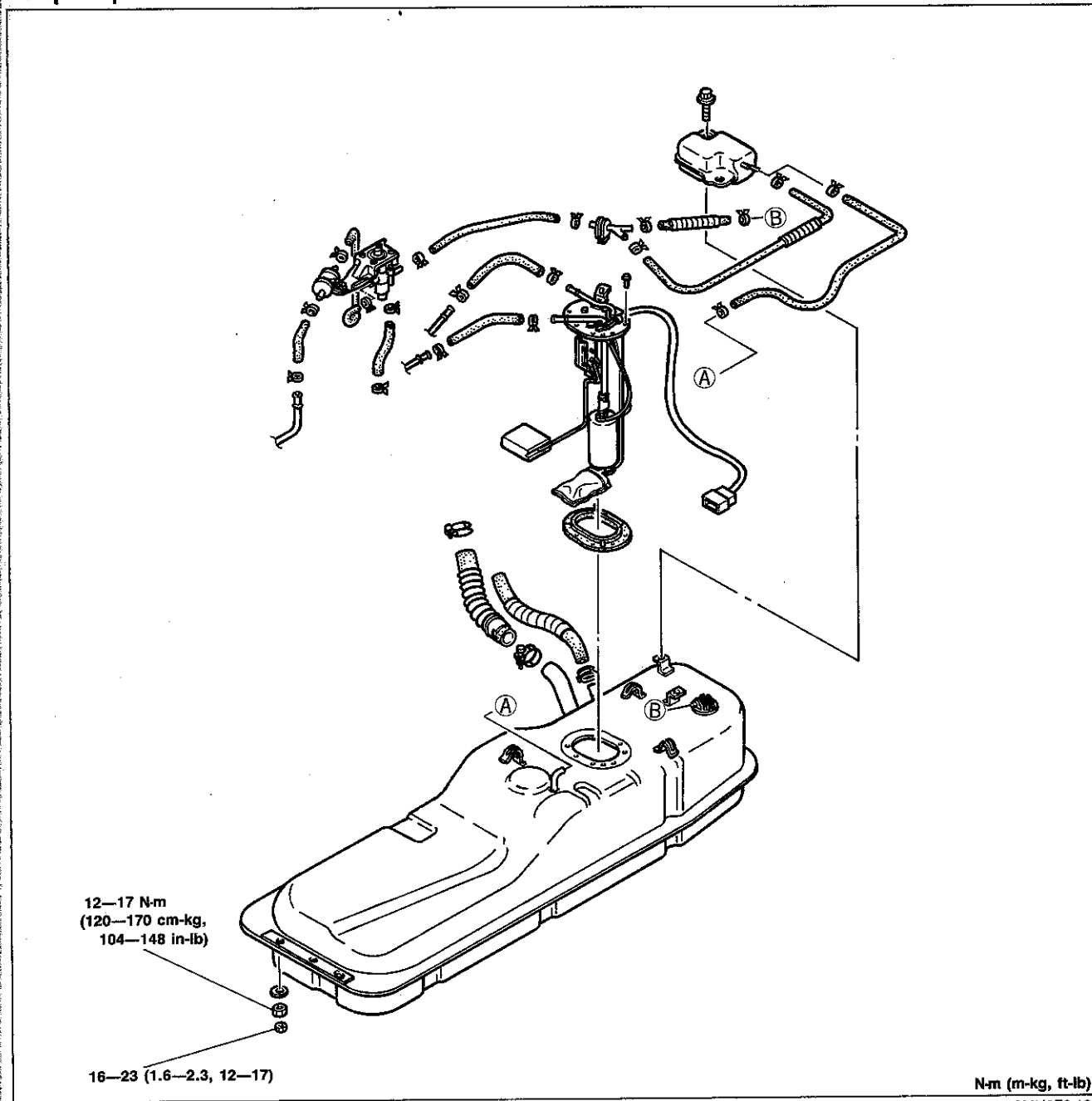
**Warning**

**Before repairing the fuel tank, clean it thoroughly with steam to remove all explosive gas.**

### Installation

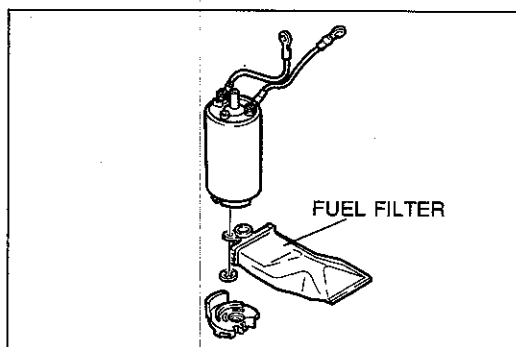
Install in the reverse order of removal, referring to **Installation Note**.

### Torque Specifications

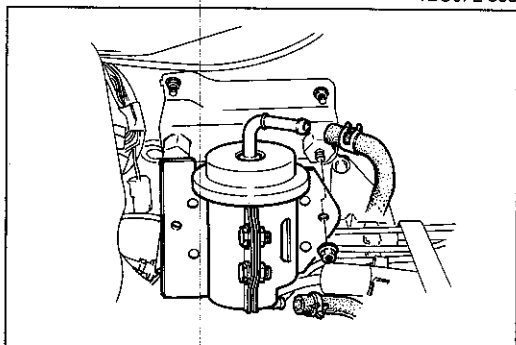


### Installation note

1. Push the ends of the main fuel hose, fuel return hose, and evaporation hoses onto the fuel tank fittings **at least 25mm (1.0 in)**.
2. Push the fuel filler hose onto the fuel tank pipe and filler pipe **at least 35mm (1.4 in)**.



1BU0F2-065



9MU0F2-135

**FUEL FILTER****Replacement****Low-pressure side (In-tank filter)**

Refer to page F2-152.

**High-pressure side**

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

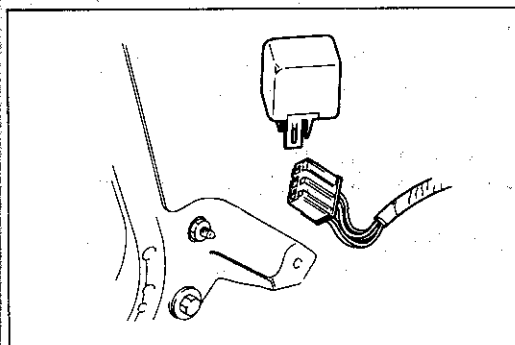
**Warning**

**Always work away from sparks or open flames.**

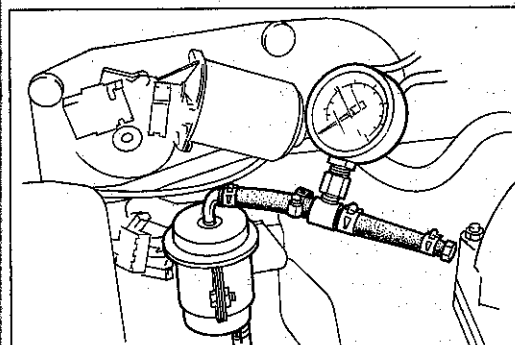
1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and bracket.
3. Install in the reverse order of removal.

**Note**

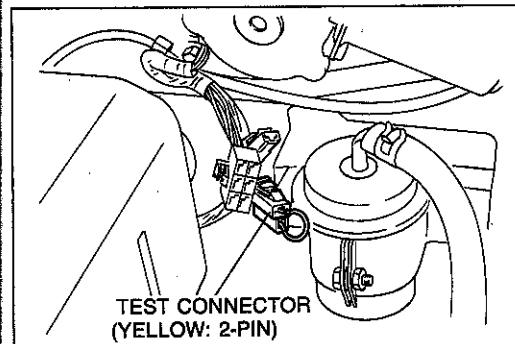
**When installing the filter, push the fuel hoses fully onto the fuel filter.**



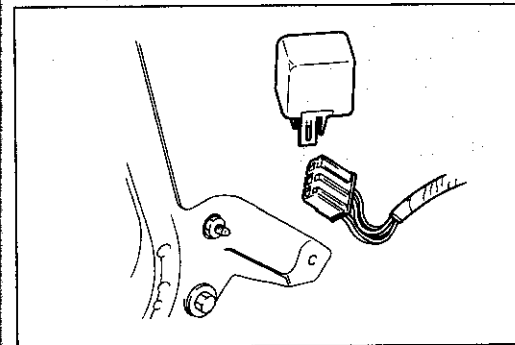
1BU0F2-066



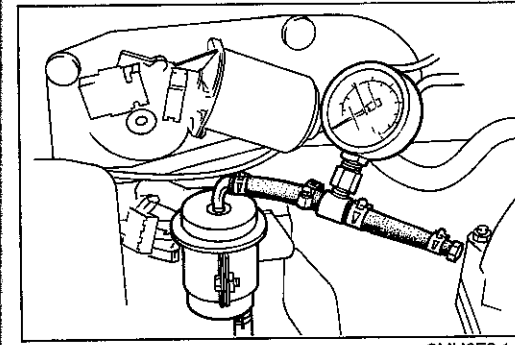
9MU0F2-138

TEST CONNECTOR  
(YELLOW: 2-PIN)

9BU0F2-084



1BU0F2-067



9MU0F2-141

**FUEL PUMP****Inspection****Fuel pressure drop**

Only if fuel system pressure drop is not as specified, check fuel pressure drop for fuel pump.

**Warning**

**Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)**

1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge to the outlet of the fuel filter and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)
3. Connect the negative battery terminal.

4. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON **for 10 seconds** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 minutes**.

**Fuel pressure:**

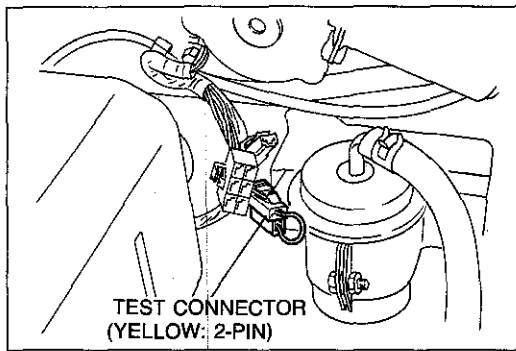
**More than 343 kPa (3.5 kg/cm<sup>2</sup>, 50 psi)**

8. If not as specified, replace the fuel pump.

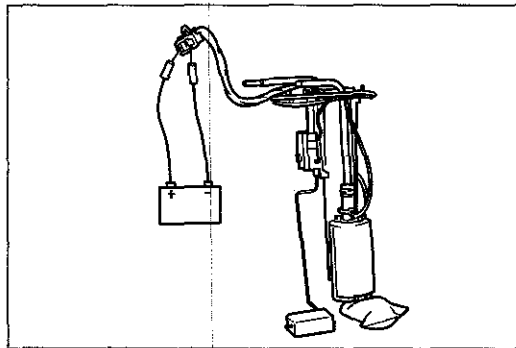
**Fuel pump maximum pressure****Warning**

**Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)**

1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge to the outlet of the fuel filter and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)
3. Connect the negative battery terminal.



9MU0F2-142



2BU0F2-030

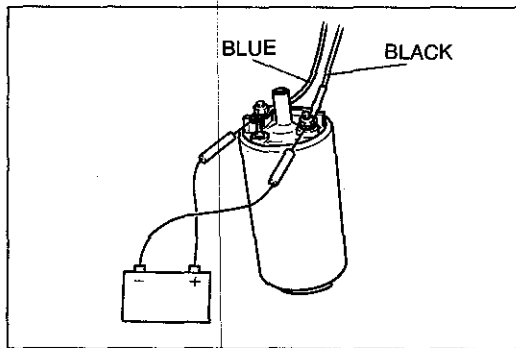
4. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON to operate the fuel pump.
6. Measure the fuel pump maximum pressure.

**Fuel pump maximum pressure:**  
**441—589 kPa (4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)**

7. Turn the ignition switch OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.

**Fuel pump operation**

- Only when fuel pump operating sound is not heard from fuel filler port (with IGN ON and test connector [yellow: 2-pin] connected) and circuit opening relay is normal
1. Remove the fuel pump and fuel tank gauge unit. (Refer to page F2-152.)
  2. Apply battery voltage to the fuel pump connector terminal-wire (B/R) and ground terminal-wire (B).  
 Check that the fuel pump operates.  
 Operates————— Check wiring between circuit opening relay and fuel pump connector and between fuel pump connector and ground for open or short circuit  
 Does not operate—Go to next step



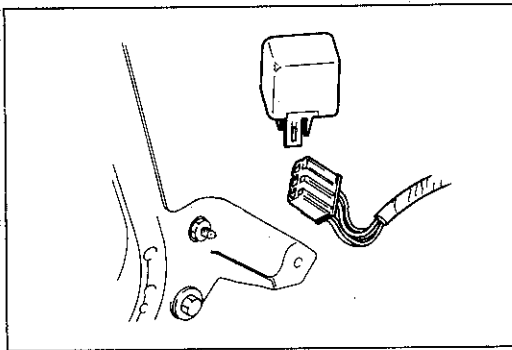
2BU0F2-031

3. Apply battery voltage and a ground to the fuel pump terminals and check if the fuel pump operates.  
 Operates————— Check wiring between fuel pump connector and fuel pump for open or short circuit  
 Does not operate—Replace fuel pump

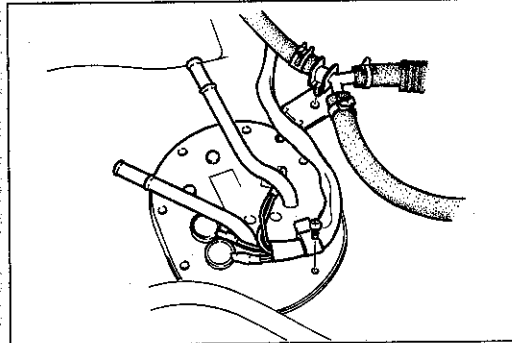
### Replacement

#### Warning

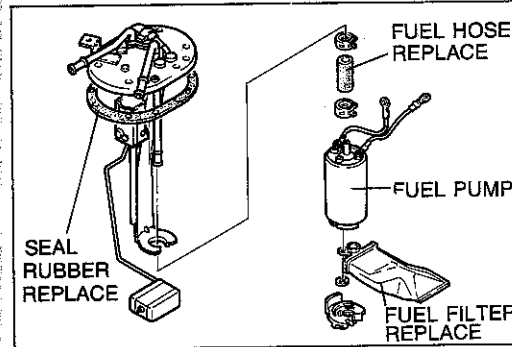
- a) Before performing the following procedures, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- b) When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.



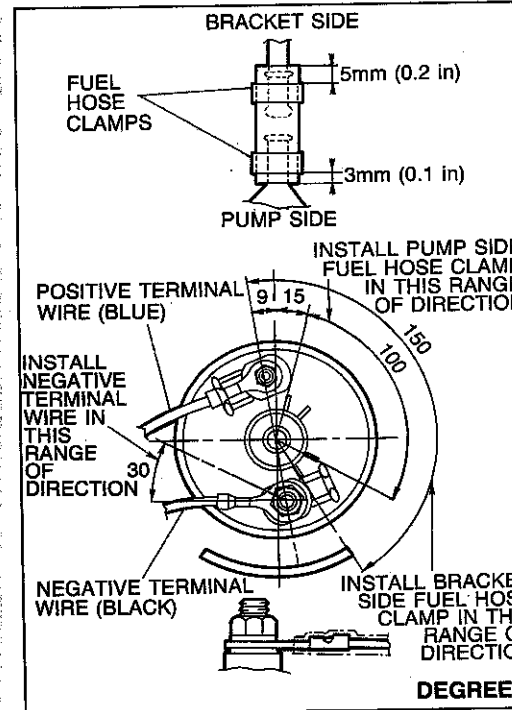
1BU0F2-069



1BU0F2-070



1BU0F2-071



9BU0F2-139

1. Remove the fuel tank. (Refer to page F2-147.)
2. Remove the fuel pump and fuel tank gauge unit assembly.

3. Remove the fuel pump.
4. Install in the reverse order of removal, referring to **Installation note**.
5. After installation, confirm that the fuel pump and fuel level gauge operates correctly. (Refer to page F2-151 and Section T.)

#### Installation note

##### Fuel filter

Use a new fuel filter.

##### Fuel pump terminals

1. Install the fuel pump terminals as shown.
2. Tighten the nuts with the specified torque.

#### Tightening torque:

**Positive terminal (Blue).....1.2—2.0 N·m**  
(12—20 cm·kg, 10—17 in·lb)

**Negative terminal (Black)....2.3—3.4 N·m**  
(23—33 cm·kg, 20—29 in·lb)

##### Fuel hose

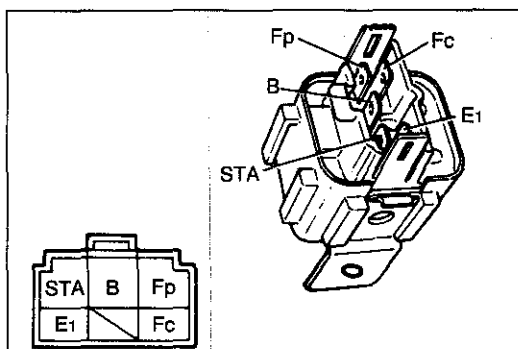
1. Use a new fuel hose.
2. Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.
3. Install clamps as shown.

##### Fuel pump

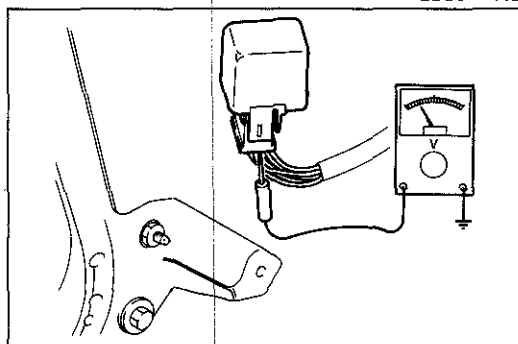
Install the fuel pump to the bracket correctly.

##### Seal rubber

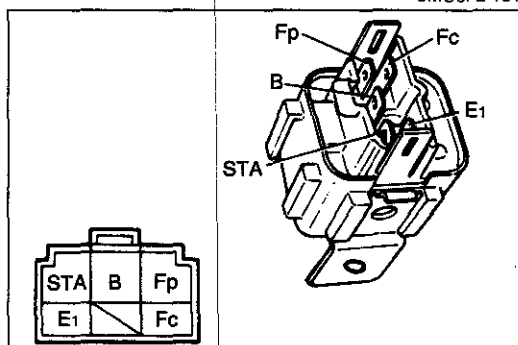
Use a new seal rubber.



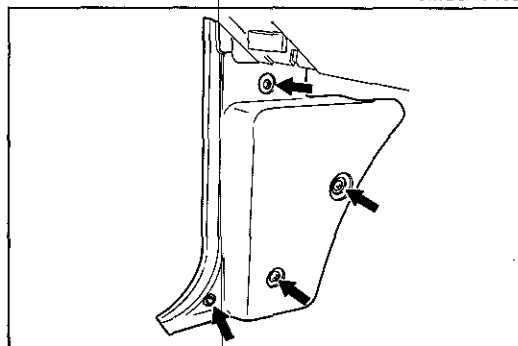
2BU0F2-032



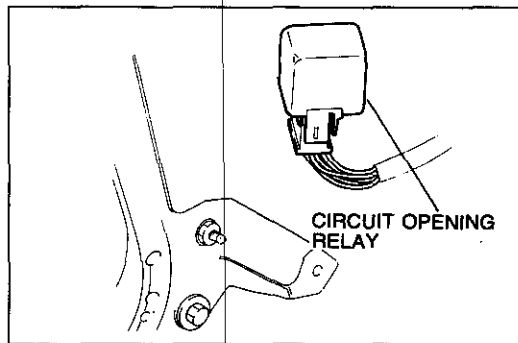
9MU0F2-151



9MU0F2-152



9BU0F2-091



9BU0F2-092

**CIRCUIT OPENING RELAY**

**Inspection**

**Switching operation**

Apply battery voltage and a ground to the terminals below and check the circuit opening relay operation as described.

12V	Grounded	Correct result
STA	E1	B-Fp: Continuity
B	Fc	Fp: Battery voltage

If not as specified, replace the circuit opening relay.

**Relay circuit**

Check voltage between the terminals and a ground with a voltmeter.

Condition	Terminal	Fp	Fc	B	STA	E1
Ignition switch: ON		0V	12V	12V	0V	0V
Ignition switch: START		12V	0V	12V	12V	0V
At idle		12V	0V	12V	0V	0V

If not as specified, check the related wiring harness.

**Resistance**

Check resistance between the terminals using an ohmmeter.

Between terminals	Resistance (Ω)
STA-E1	21—43
B-Fc	109—226
B-Fp	∞

If not as specified, replace the circuit opening relay.

**Removal**

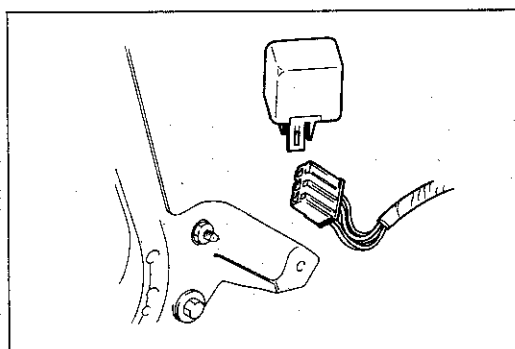
1. Remove the front side trim on the driver's side.

2. Remove the circuit opening relay.

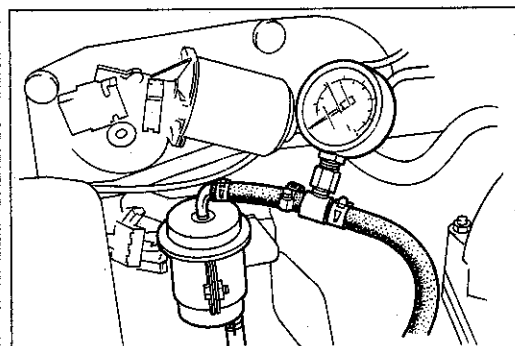
**Installation**

Install in the reverse order of removal.

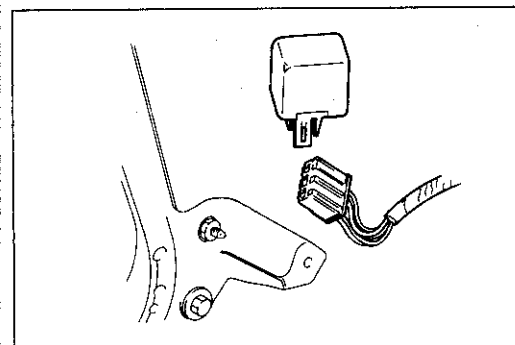




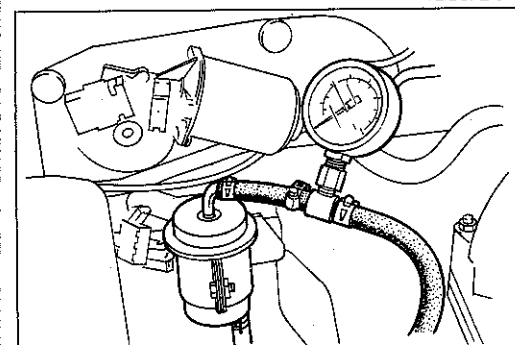
1BU0F2-072



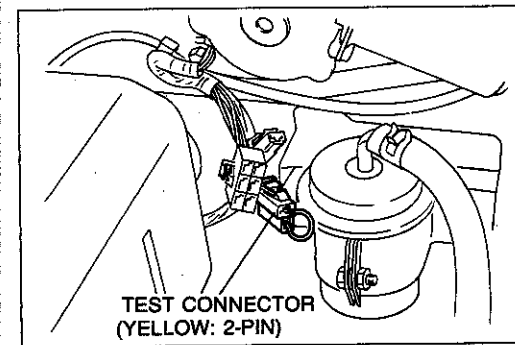
0BU0F2-082



1BU0F2-073



9BU0F2-137

TEST CONNECTOR  
(YELLOW: 2-PIN)

9BU0F2-095

**PRESSURE REGULATOR****Inspection****Fuel line pressure****Warning**

**Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)**

1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

**Fuel line pressure:**

**196—255 kPa (2.0—2.6 kg/cm<sup>2</sup>, 28—37 psi)**

**Fuel pressure drop**

Only if fuel system pressure drop is not as specified and fuel pump pressure drop is as specified

**Warning**

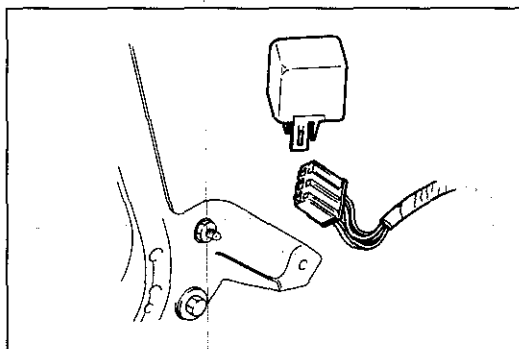
**Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)**

1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Plug the fuel return hose from the pressure regulator.
4. Connect the negative battery terminal.
5. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
6. Turn the ignition switch ON for 10 seconds to operate the fuel pump.
7. Turn the ignition switch OFF and disconnect the jumper wire.
8. Observe the fuel pressure for 5 minutes.

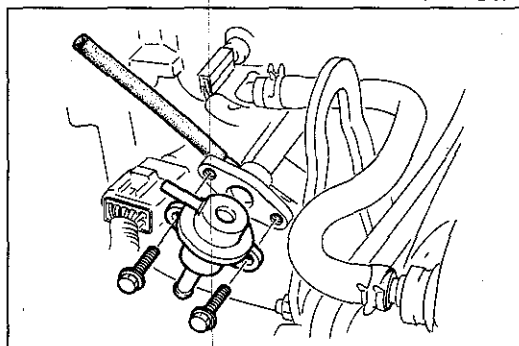
**Fuel pressure:**

**More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)**

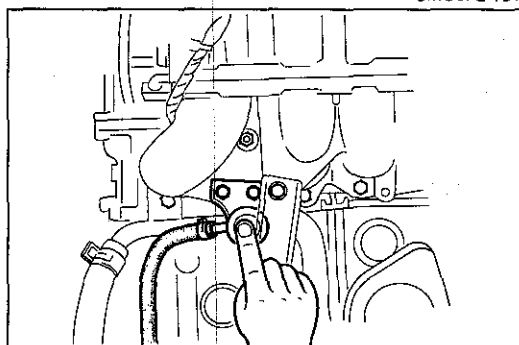
9. If as specified, replace the pressure regulator.



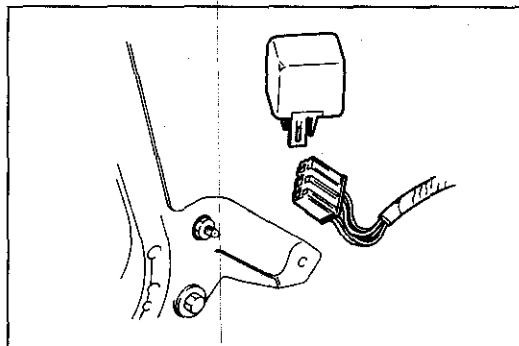
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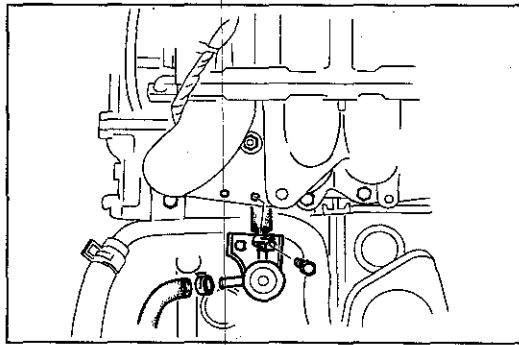
9MU0F2-161



2BU0F2-033



1BU0F2-075



9BU0F2-135

**Replacement**

**Warning**

- a) Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- b) When replacing fuel system parts, keep sparks, cigarettes, and open flames away from the fuel and all parts.

1. Disconnect the vacuum hose.
2. Disconnect the fuel return hose.
3. Remove the pressure regulator.

**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

4. Install in the reverse order of removal.

**PULSATION DAMPER**

**Inspection (G6)**

1. Place a finger on the screw of the pulsation damper head.
2. Check that pulsation is felt while the engine is running.

**Removal**

**Warning**

- a) Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- b) When replacing fuel system parts, keep sparks, cigarettes, and open flames away from the fuel and all parts.

1. Disconnect the fuel hoses.
2. Remove the pulsation damper.

**Installation**

Install in the reverse order of removal.

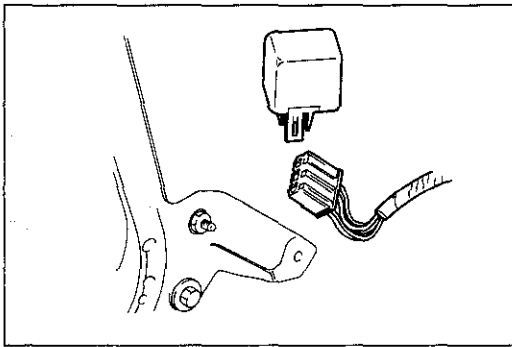
**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

### INJECTOR Removal

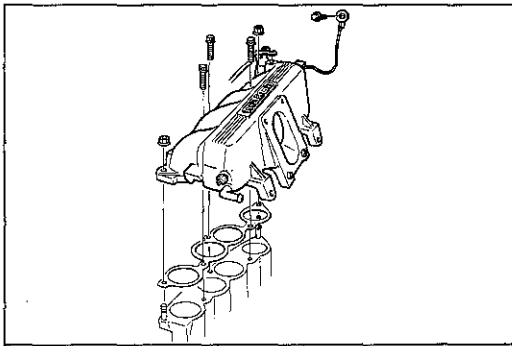
#### Warning

- a) Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- b) When servicing the fuel system, keep sparks, cigarettes, and open flames away from the fuel.



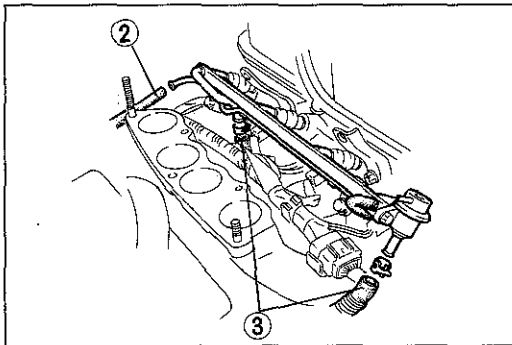
1BU0F2-076

1. Remove the dynamic chamber. (Refer to page F2-139.)



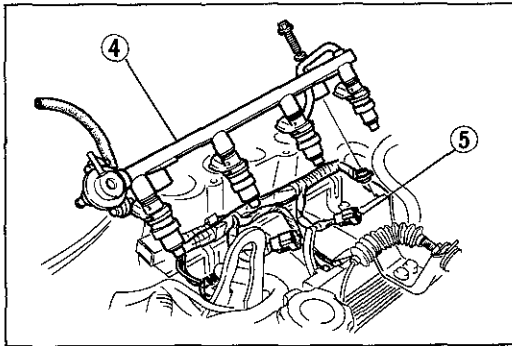
1BU0F2-077

2. Disconnect the vacuum hose.
3. Disconnect the fuel hoses.



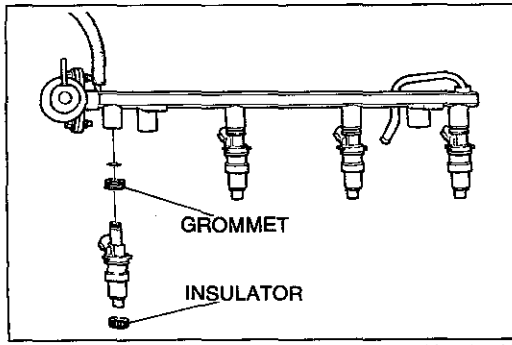
9MU0F2-164

4. Remove the delivery pipe with the pressure regulator.
5. Disconnect the injector connectors.

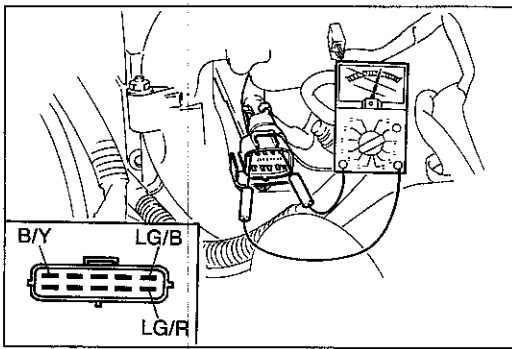


9MU0F2-165

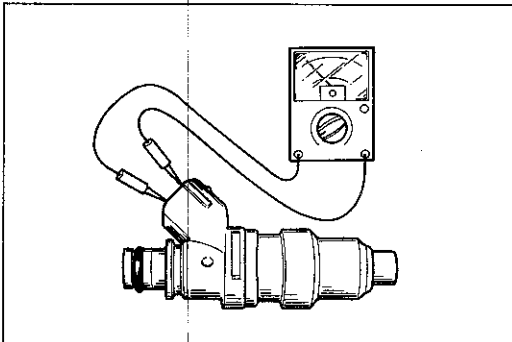
6. Remove the grommets, injectors, and insulators.



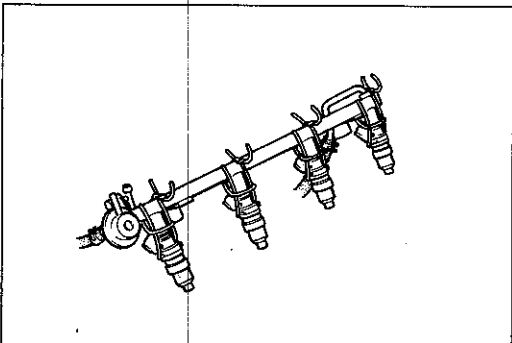
9MU0F2-166



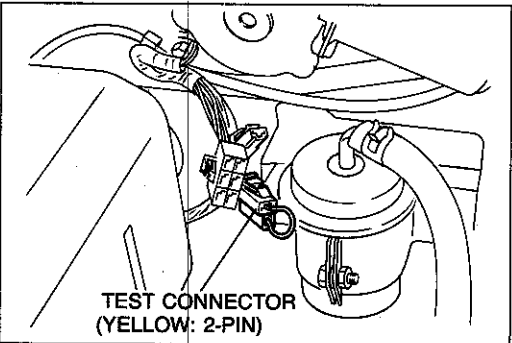
9MU0F2-167



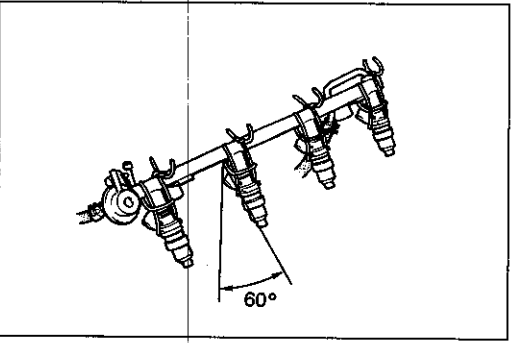
1BU0F2-078



1BU0F2-079



9MU0F2-170



9MU0F2-171

**Inspection**

**Injector resistance (On-vehicle inspection)**

(When no injector operating sound is heard)

1. Check resistance at the injector harness connector (EMINJ-01) with an ohmmeter.

Inoperative injector	Terminals	Resistance
No.1 and/or 2	(B/Y)—(LG/B)	6—8Ω
No.3 and/or 4	(B/Y)—(LG/R)	6—8Ω

Correct——Check related wiring harness

Not correct——Check injector resistance  
(Component inspection)

**Injector resistance (Component inspection)**

1. Remove the injector. (Refer to page F2-156.)
2. Check resistance of the injector with an ohmmeter.

**Resistance: 12—16Ω**

Correct——Check related wiring harness.

Not correct——Replace injector.

**Fuel leakage test**

1. Remove the injectors and the delivery pipe. (Refer to page F2-156.)
2. Affix the injectors to the delivery pipe with wire.

**Caution**

**Affix the injectors firmly to the delivery pipe so that no movement of the injectors is possible.**

**Warning**

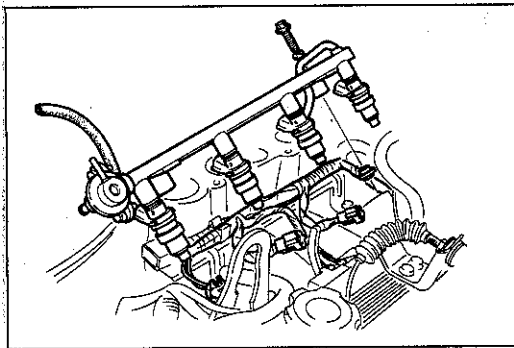
**Be extremely careful when working with fuel. Always work away from sparks or open flames.**

3. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire. Turn the ignition switch ON **for 10 seconds**.
4. Turn the ignition switch OFF and clean the nozzles.
5. Turn the ignition switch ON.

6. Tilt the injectors **approx. 60 degrees** and check that no fuel leaks from the injector nozzles.
7. If fuel leaks from an injector, replace it.

**Note**

**After 1 minute a drop of fuel from the injector is acceptable.**



9MU0F2-172

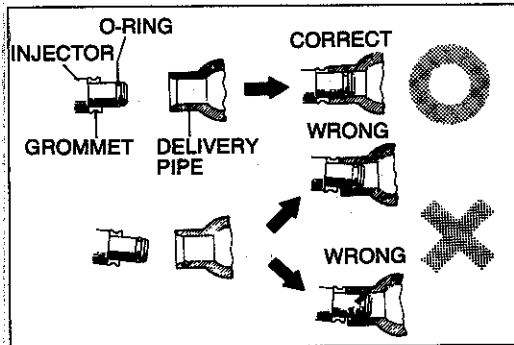
### Installation

Install in the reverse order of removal, referring to **Installation note**.

### Tightening torque

**Delivery pipe:**

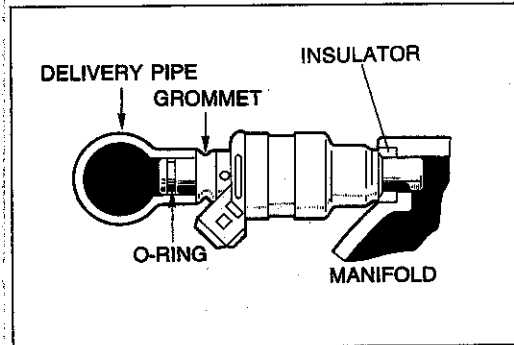
**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**



9MU0F2-173

### Installation note

1. Use new injector O-rings.
2. Apply a small amount of engine oil to the O-rings before installing.

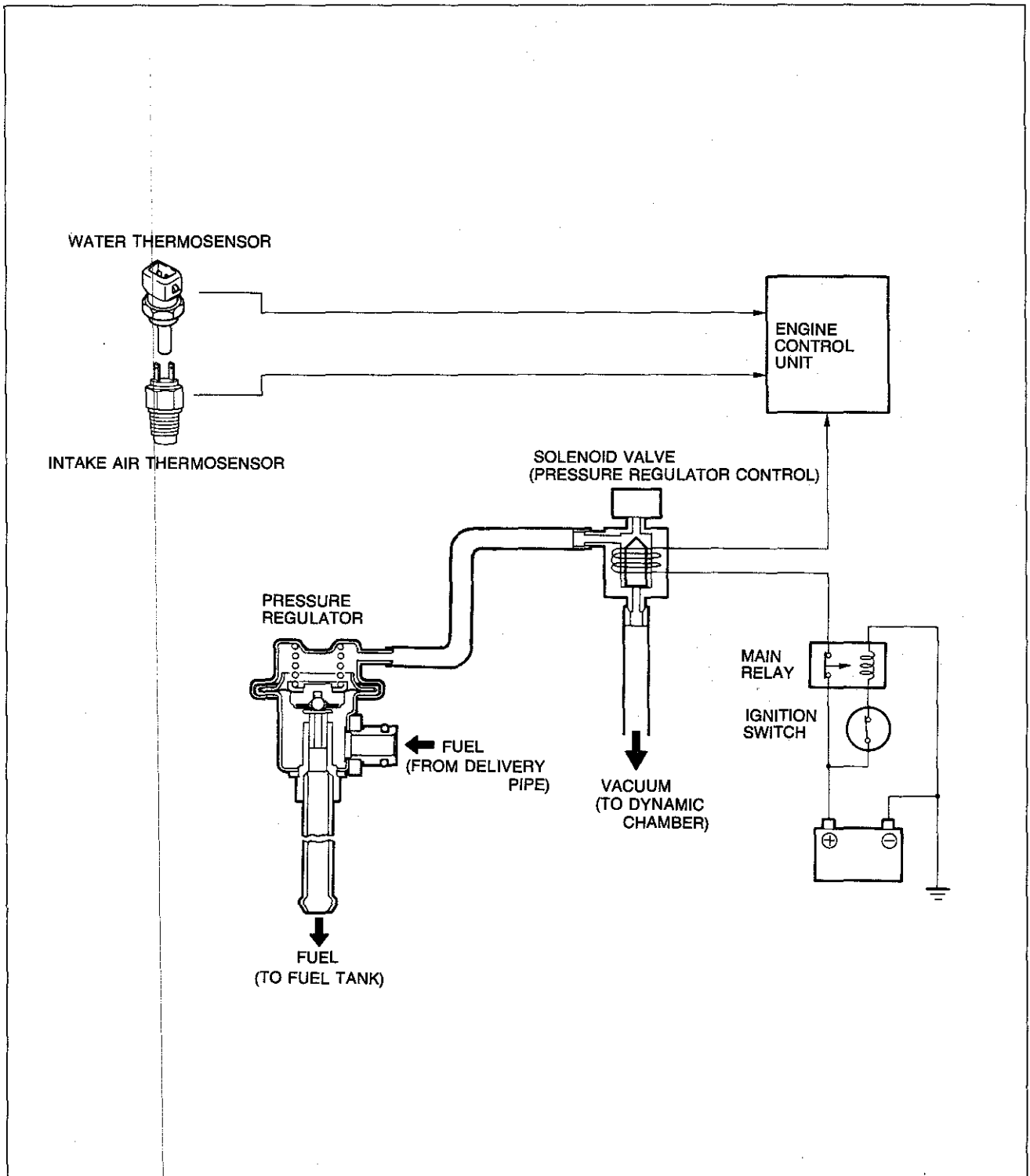


9MU0F2-174

3. Install the injectors and the injector insulators.

PRESSURE REGULATOR CONTROL (PRC) SYSTEM

DESCRIPTION



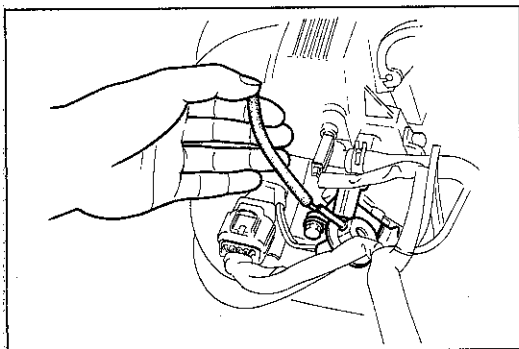
1BU0F2-080

To prevent percolation of the fuel during idle shortly after the engine is restarted, vacuum to the pressure regulator is cut, and the fuel injection pressure is increased to slightly **more than 284 kPa (2.9 kg/cm<sup>2</sup>, 41 psi)**.

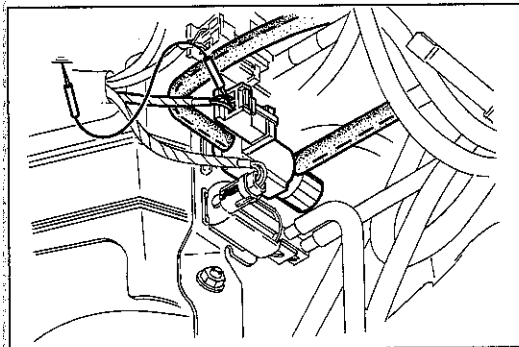
**Specified time: Approx. 120 seconds**

**Operating condition: Coolant temperature — above 90°C (194°F)**

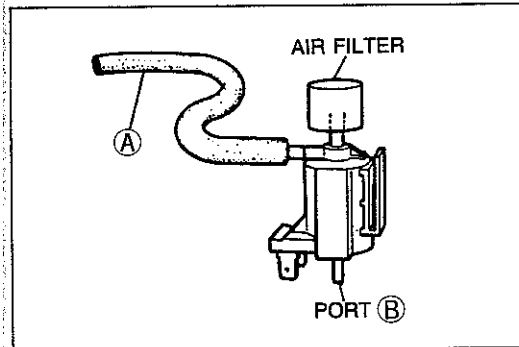
**Intake air temperature — above 75°C (167°F)—G6, 65°C (149°F)—F2**



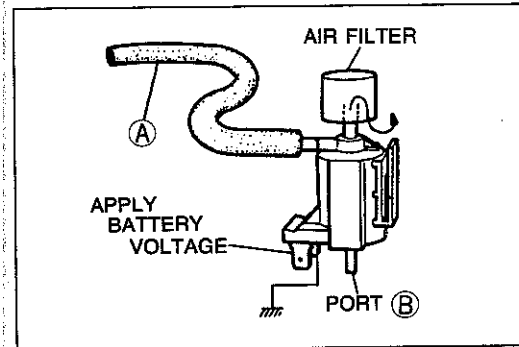
9MU0F2-176



9MU0F2-177



9MU0F2-178



2BU0F2-034

### SOLENOID VALVE (PRESSURE REGULATOR CONTROL) On-vehicle Inspection

1. Start the engine and run it at idle.
2. Disconnect the vacuum hose (Orange) from the pressure regulator. Verify that vacuum is felt.
3. Ground the solenoid valve terminal wire (L/B) with a jumper wire. Check that no vacuum is felt.
4. If vacuum exists, check the solenoid valve.

### Solenoid Valve (Pressure Regulator Control)

1. Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from port (A).
3. Check that air flows from port (B).
4. Disconnect the solenoid valve connector.
5. Connect battery voltage and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from the port (A).
7. Check that air flows from the valve air filter.
8. If not as specified, replace the solenoid valve.

EXHAUST SYSTEM

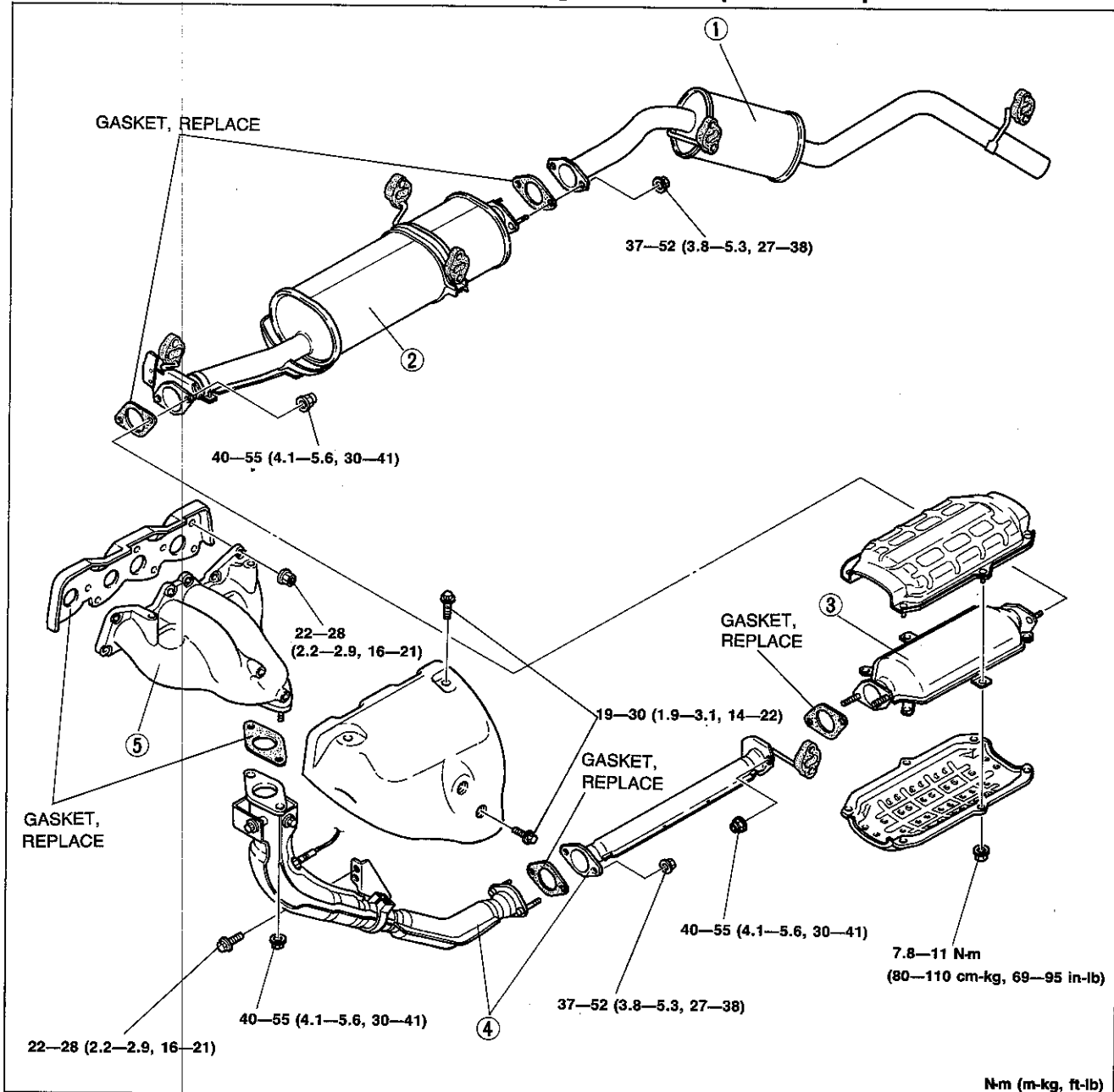
COMPONENTS

Removal, Inspection, and Installation

1. Remove in the sequence shown in the figure.
2. Check the exhaust component parts and replace as necessary.
3. Install in the reverse order of removal.

Note

When installing the exhaust system parts, tighten to the specified torque.



1. After-silencer  
Inspect for deterioration and restriction
2. Main silencer  
Inspect for deterioration and restriction
3. Catalytic converter  
Inspection..... page F2-168

4. Front exhaust pipe  
Inspect for deterioration and restriction
5. Exhaust manifold  
Inspect for damage



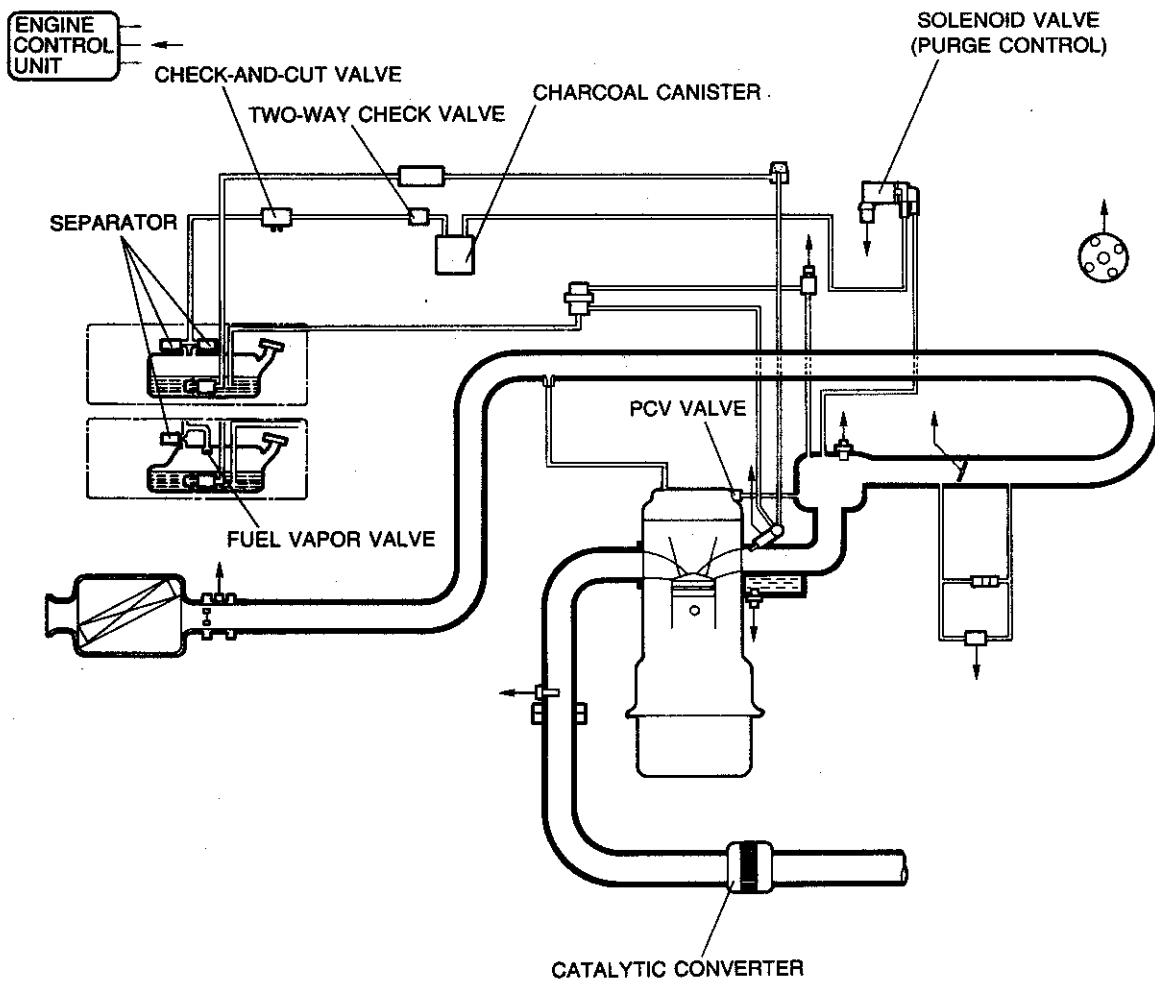
# F2 OUTLINE OF EMISSION CONTROL SYSTEM

## OUTLINE OF EMISSION CONTROL SYSTEM

### STRUCTURAL VIEW

To reduce CO, HC, and NOx emissions, the following systems are employed.

1. Positive crankcase ventilation (PCV) system
2. Evaporative emission control system
3. Catalytic converter



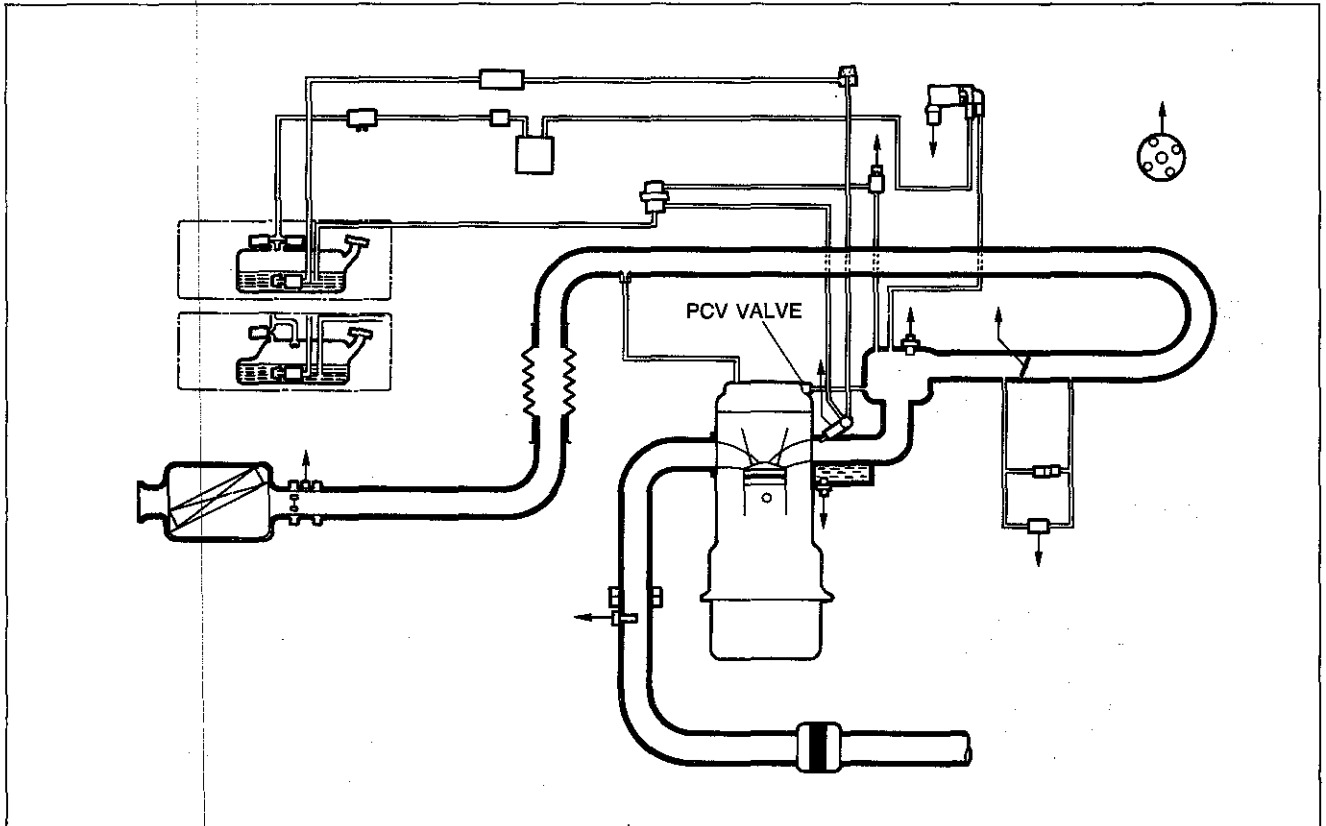
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

**DESCRIPTION**

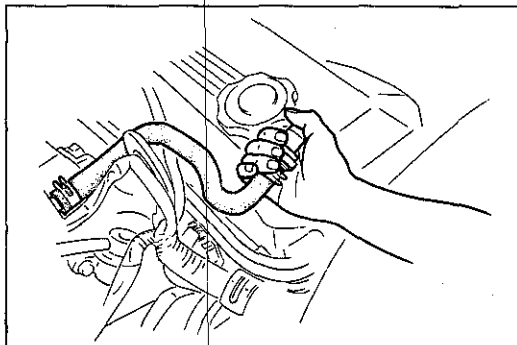
The PCV valve is operated by the intake manifold vacuum.

When the engine is running at idle, the PCV valve is opened slightly and a small amount of blowby gas is drawn into the dynamic chamber to be burned.

At higher engine speeds, the PCV valve is opened further, allowing a larger amount of blowby gas to be drawn into the dynamic chamber.



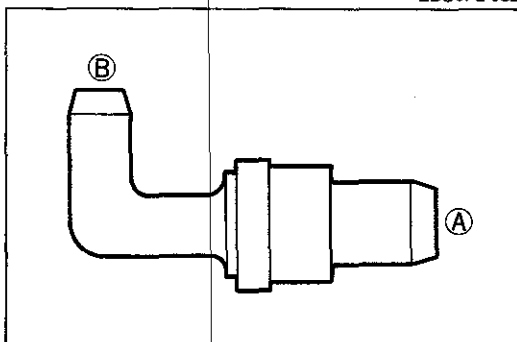
9MU0F2-182



2BU0F2-052

**PCV VALVE Inspection**

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve together with the ventilation hose from the cylinder head cover.
3. Block the PCV valve opening.
4. Verify that vacuum is felt.

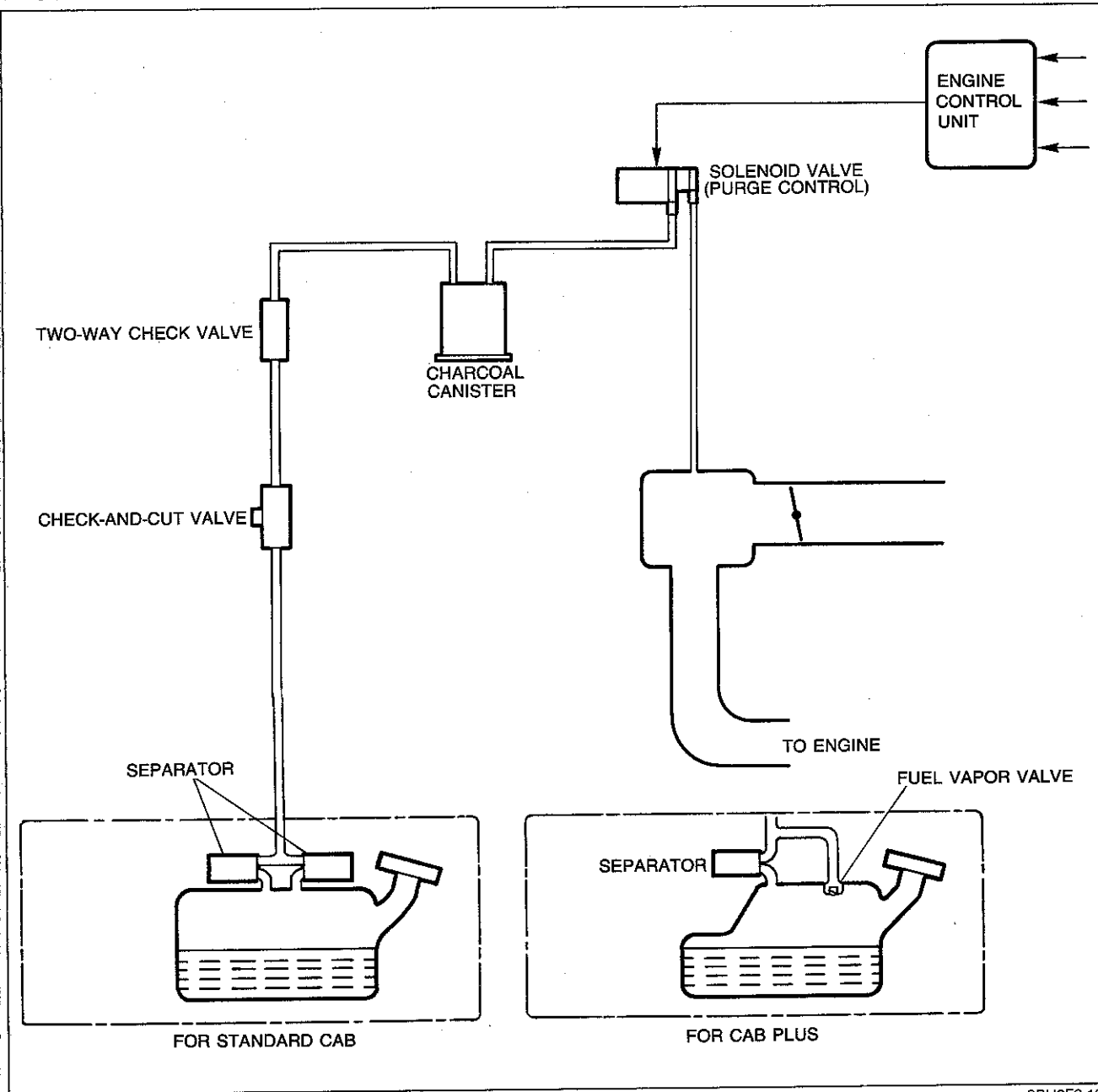


9MU0F2-184

5. Remove the PCV valve.
6. Blow through the valve from port (A) and verify that air comes out of port (B).
7. Blow through the valve from port (B) and verify that no air comes out of port (A).
8. Replace the PCV valve if necessary.

## EVAPORATIVE EMISSION CONTROL SYSTEM

## DESCRIPTION

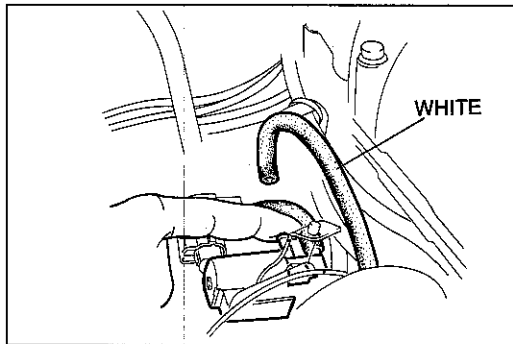


The evaporative emission control system consists of the separator, the fuel vapor valve, the check-and-cut valve, the two-way check valve, the charcoal canister, the solenoid valve (purge control), the engine control unit, and the input devices. The amount of evaporative fumes introduced into the engine and burned is controlled by the solenoid valve to correspond to the engine's operating conditions. To maintain best engine performance, the solenoid valve is controlled by the engine control unit.

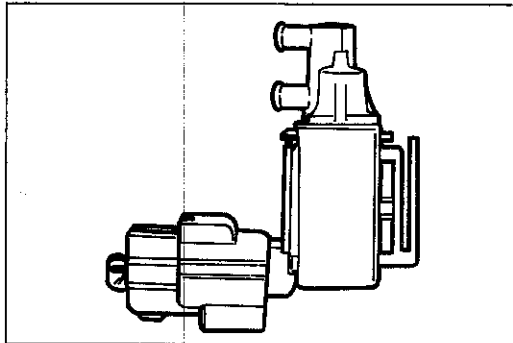
**Operation**

The solenoid valve (purge control) is controlled by duty signals from the engine control unit to perform purging of the charcoal canister. Purging is done when these conditions are met:

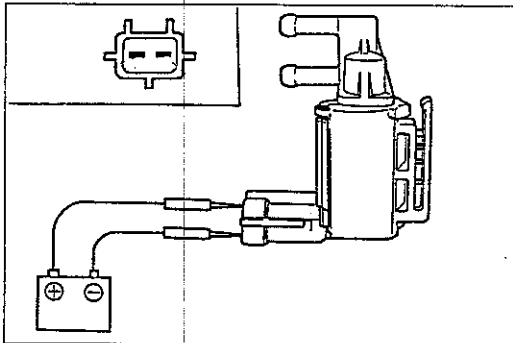
- (1) After warm up
- (2) Driving in gear
- (3) Accelerator pedal depressed (idle switch OFF)
- (4) Oxygen sensor functioning normally



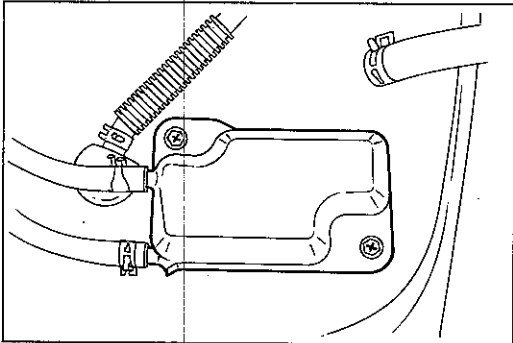
9MU0F2-186



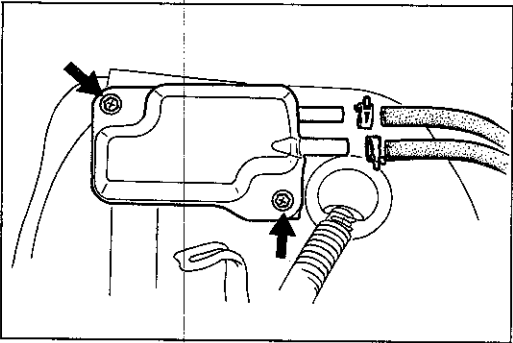
9MU0F2-187



9MU0F2-188



1BU0F2-082



1BU0F2-083

**SOLENOID VALVE (PURGE CONTROL)**

**On-vehicle Inspection**

1. Warm up the engine to normal operating temperature.
2. Run the engine at idle.
3. Disconnect the vacuum hose (White) from the solenoid valve and check that no vacuum is felt at the solenoid valve.
4. If not as specified, check the solenoid valve.

**Solenoid Valve (Purge Control)**

1. Disconnect the vacuum hoses from the charcoal canister and the dynamic chamber.
2. Check that no air flows through the valve.

3. Disconnect the solenoid valve connector and connect **12V** and a ground to the terminals of the solenoid valve.
4. Check that the air flows through the valve.
5. If not as specified, replace the solenoid valve.

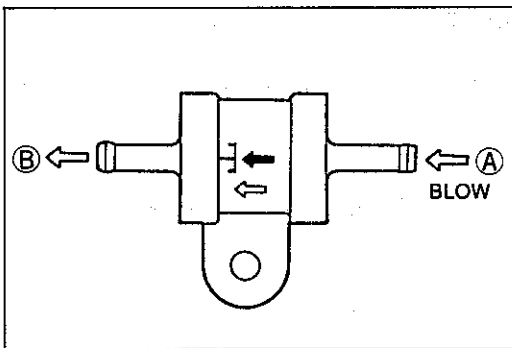
**SEPARATOR**

**Inspection**

1. Remove the fuel tank. (Refer to page F2-147.)
2. Visually check the separator for damage, replace it if necessary.

**Replacement**

1. Remove the fuel tank. (Refer to page F2-147.)
2. Disconnect the fuel hoses.
3. Remove the separator.
4. Install in the reverse order of removal.

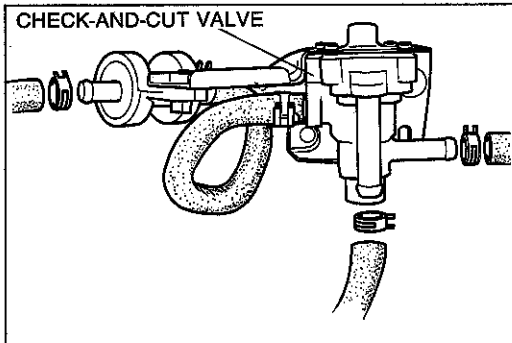


9MU0F2-192

### TWO-WAY CHECK VALVE

#### Inspection

1. Remove the valve.
2. Blow through the valve from (A) and check that airflows.
3. Blow through the valve from (B) and check that air does not flow.



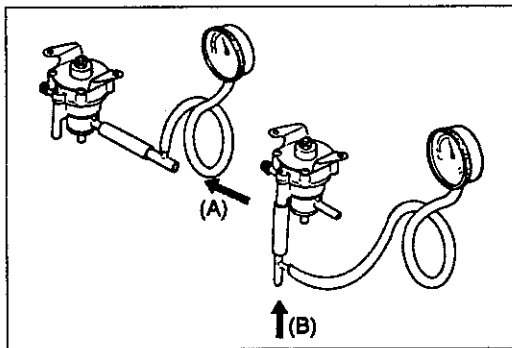
9BU0F2-106

### Replacement

1. Remove the two-way check valve along with the check-and-cut valve.
2. Disconnect the hoses.
3. Remove the two-way check valve.
4. Install in the reverse order of removal.

#### Note

**When connecting the hoses, be sure to connect them in the correct positions.**



9BU0F2-107

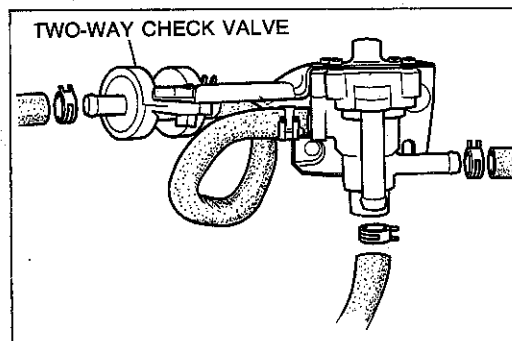
### CHECK-AND-CUT VALVE

#### Inspection

1. Remove the check-and-cut valve.
2. Connect a pressure gauge to the passage connected to the fuel tank.
3. Blow through the valve from port A and verify that the valve opens at **5.39—6.87 kPa (0.055—0.07 kg/cm<sup>2</sup>, 0.78—1.00 psi)**.
4. Remove the pressure gauge and connect it to the passage to atmosphere.
5. Blow through the valve from port B and verify that the valve opens at **0.98—4.91 kPa (0.01—0.05 kg/cm<sup>2</sup>, 0.14—0.71 psi)**.

#### Note

**The test must be performed with the valve held horizontally. Otherwise, the ball in the valve will move out of position and close the passage.**



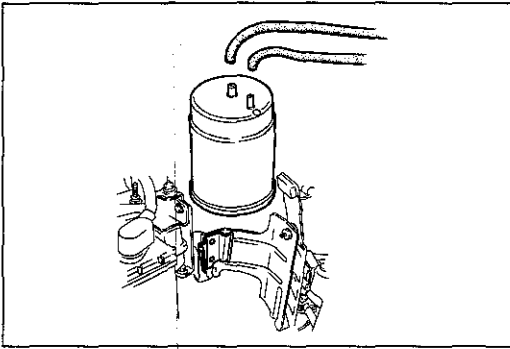
9BU0F2-108

### Replacement

1. Remove the check-and-cut valve along with the two-way check valve.
2. Disconnect the hoses.
3. Remove the check-and-cut valve.
4. Install in the reverse order of removal.

#### Note

**When connecting the hoses, be sure to connect them in the correct positions.**



1BU0F2-084

**CHARCOAL CANISTER****Inspection**

Visually check for damage and replace the charcoal canister if necessary.

**Replacement**

1. Slide the charcoal canister out of the bracket.
2. Disconnect the two hoses.
3. Install in the reverse order of removal.

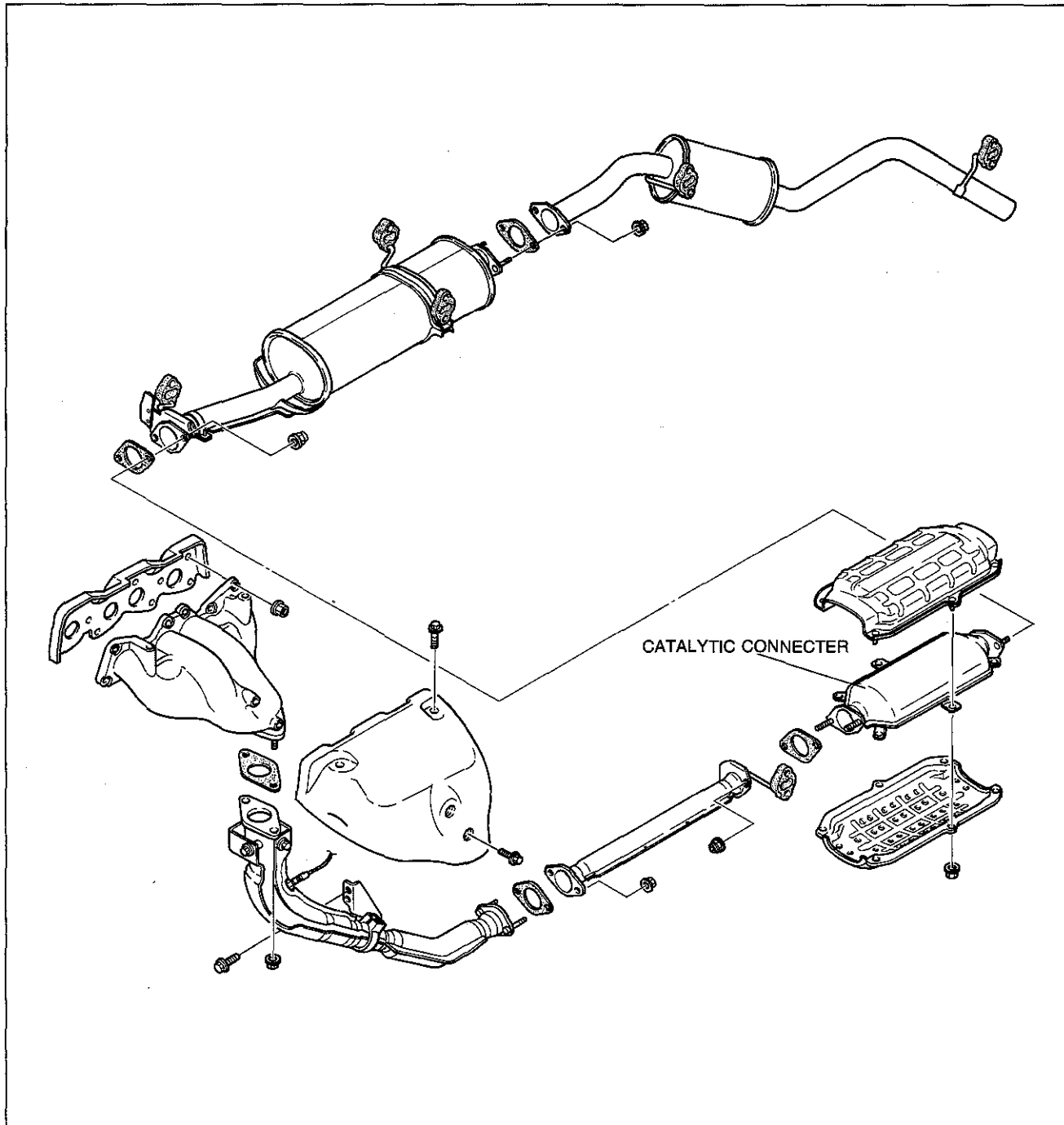
**FUEL VAPOR VALVE**

Refer to page F2-143.

## CATALYTIC CONVERTER SYSTEM

## DESCRIPTION

The catalytic converter reduces CO, HC, and NOx by chemical reaction. The converter contains platinum and rhodium compounds. The converter is a three-way catalyst type with a volume of **2,370 cc (144.6 cu in)**.



1BU0F2-085

## CATALYTIC CONVERTER

## Inspection

Check the catalytic converter for deterioration or restriction. Check for damage to the insulation covers welded to the catalytic converter. Replace the catalytic converter when necessary. (Refer to page F2-161.)

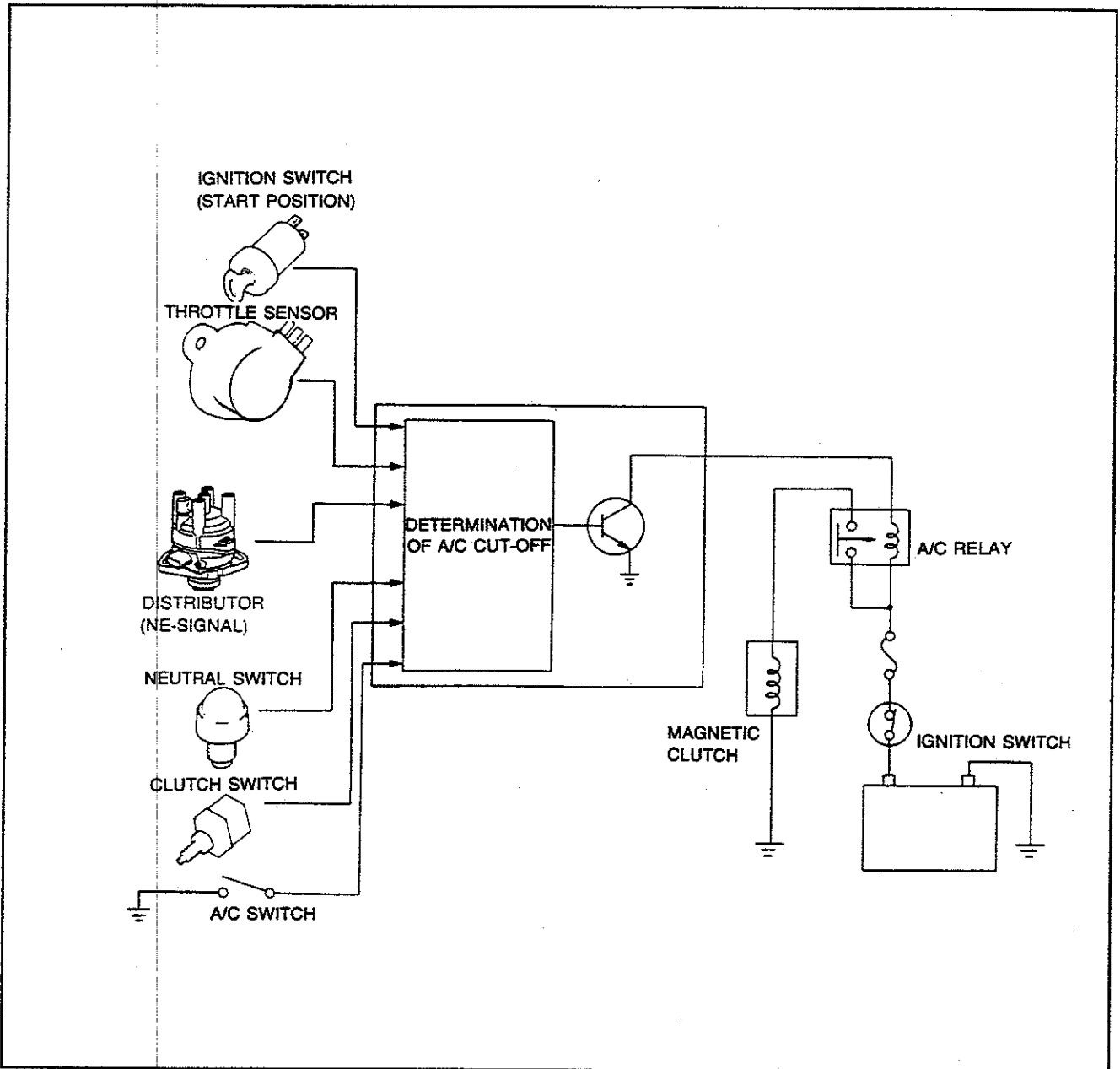
## Note

If the insulation cover touches the catalytic converter housing, excessive heat at the floor of the vehicle will occur.

**A/C CUT OFF SYSTEM**

**DESCRIPTION**

An A/C cut-off system is used to improve idle smoothness just after starting the engine and to improve acceleration performance.



9BU0F2-110

**Operation**

**After engine has been starting**

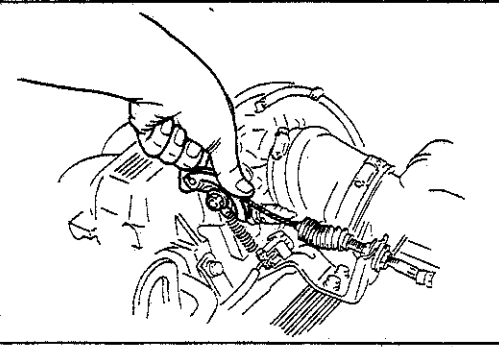
The A/C is cut-off just after the engine is started for **approx. 5 sec.**

**Acceleration**

The A/C is cut-off under the conditions below.

Control	Condition	Cut-off period
Throttle valve opening	More than half throttle	Approx. 10 sec.
Transmission	Except Neutral	
Clutch pedal	Released	





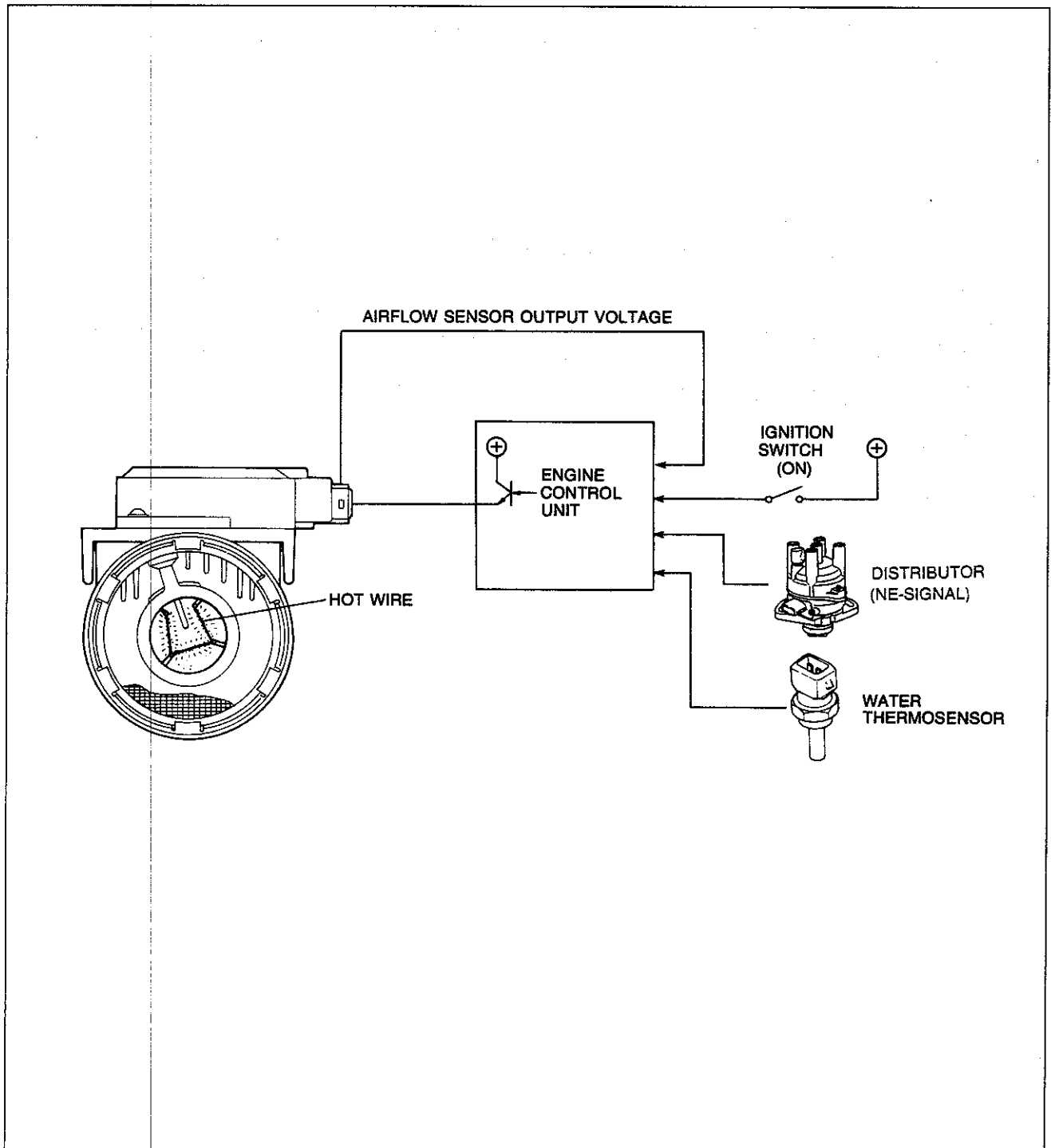
9BU0F2-111

**INSPECTION**

1. Shift the transmission into gear.
2. Turn the ignition switch, A/C, and blower switch ON. Condenser fan operates.
3. Fully open the throttle valve and check that the condenser fan stops.
4. Shift the transmission into neutral.
5. Start the engine.
6. **Check that the magnetic clutch of A/C compressor does not operate for approx. 5 seconds after starting.**
7. If not as specified, check the throttle sensor (Refer to page F2-181) and engine control unit (1J) terminal voltage (Refer to page F2-176).

## BURN-OFF CONTROL SYSTEM

## DESCRIPTION



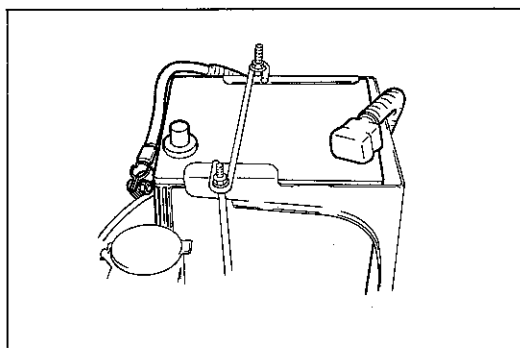
9MU0F2-201

The airflow sensor is equipped with a self-cleaning feature that momentarily super-heats the hot wire to burn off contaminants that may have collected on the wire.

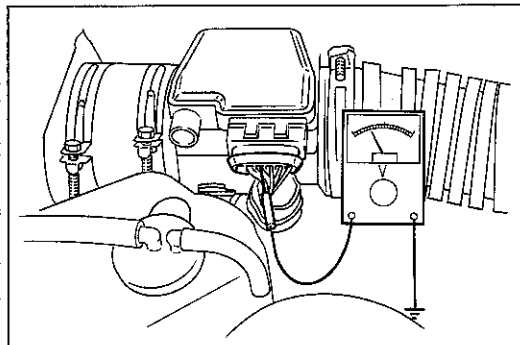
**Operation**

Burn-off occurs after the engine has been stopped (ignition switch OFF), and the following conditions are met.

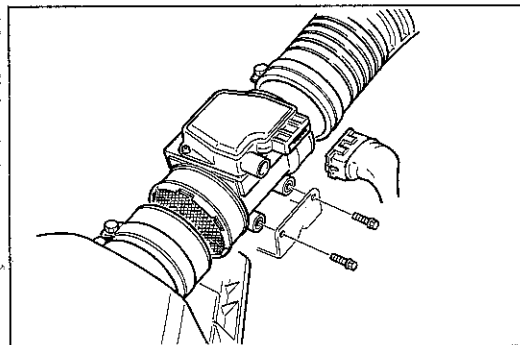
- a) Engine has run at **more than 1,500 rpm for 5 seconds** after warm-up.
- b) More than the prescribed amount of intake air has passed through the airflow sensor since the previous burn-off operation.



2BU0F2-036



1BU0F2-087



1BU0F2-088

**INSPECTION**

Only if the airflow sensor output voltage is not as specified

1. Disconnect the negative battery terminal for more than 20 seconds and reconnect it.

2. Warm up the engine to the normal operating temperature.
3. Remove the rubber boot from the airflow sensor connector.
4. Run the engine for three minutes at **approx. 2,000 rpm** in neutral.
5. Turn the ignition switch OFF and check the voltage at the airflow sensor terminal wire (G/O) and terminal (2H) of the engine control unit. (Refer to page F2-177.)

**Voltage:**


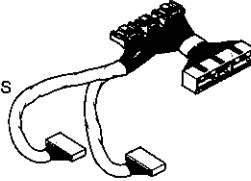
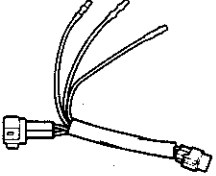
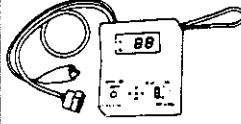
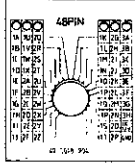
**Approx. 0V just after ignition switch OFF.**

**Approx. 8—12V momentarily 2—5 seconds after ignition switch OFF.**

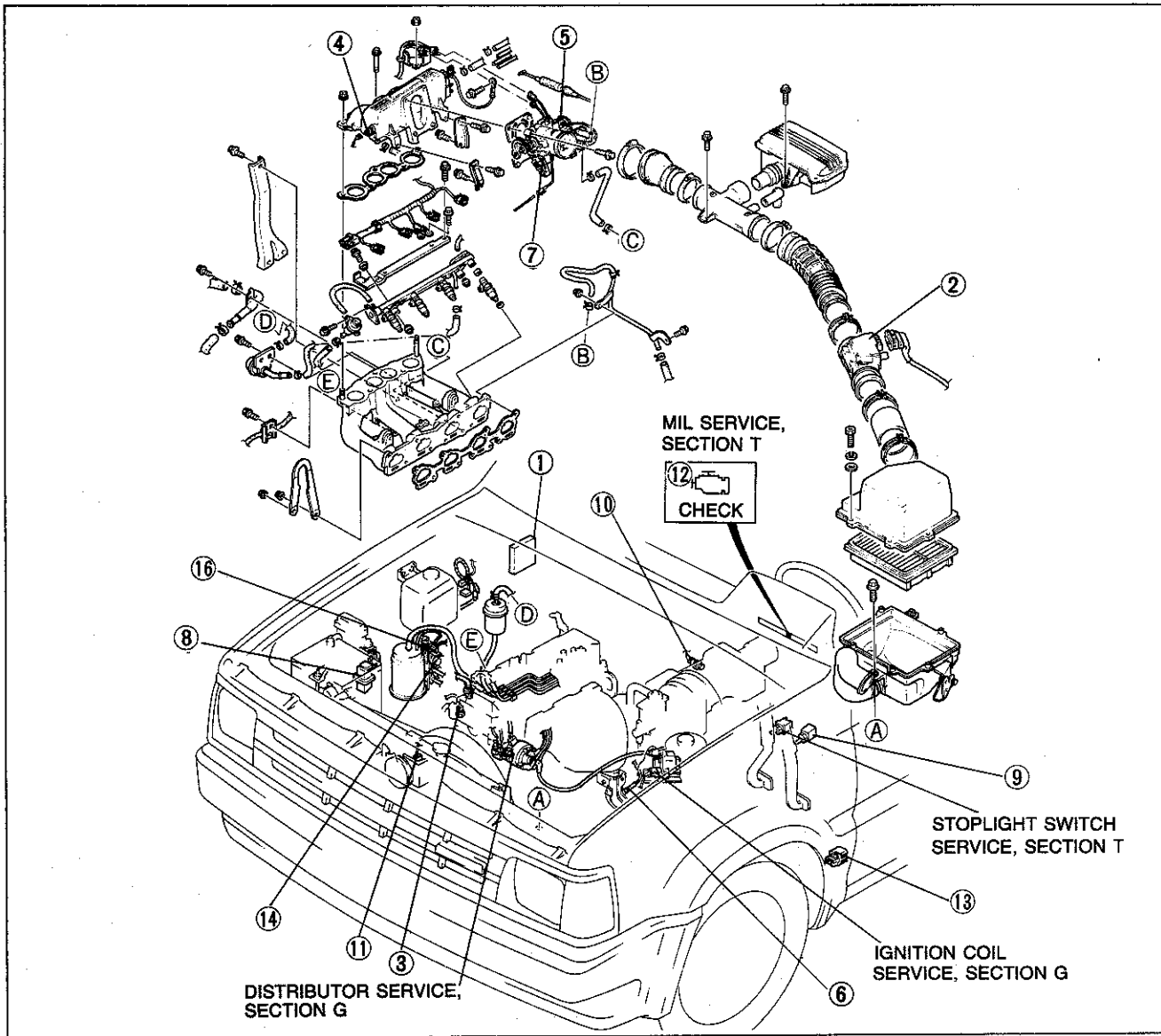
6. If as specified, replace the airflow sensor.
7. If not as specified, check the voltage at the engine control unit (2P), (2Q), and (1I) terminals (Refer to page F2-177.) and the related wiring harness.

CONTROL SYSTEM

PREPARATION  
SST

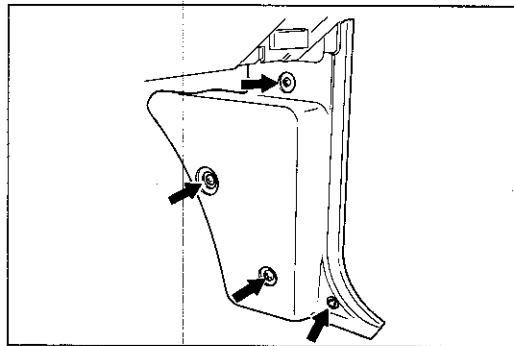
<p>49 9200 162 Engine signal monitor</p>		<p>49 G018 903 Adapter harness</p> 	<p>49 G018 901 Adapter harness</p> 
<p>49 H018 9A1 Self-diagnosis checker</p> 		<p>49 G018 904 Sheet</p> 	<p>OBU0F2-075</p>

### STRUCTURAL VIEW

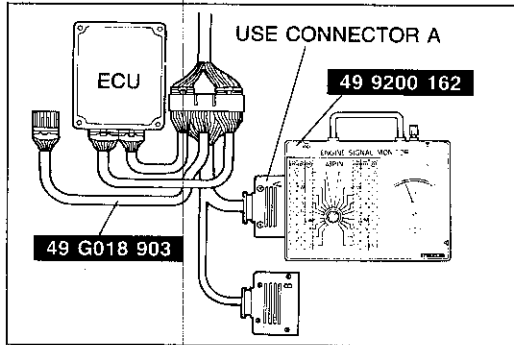


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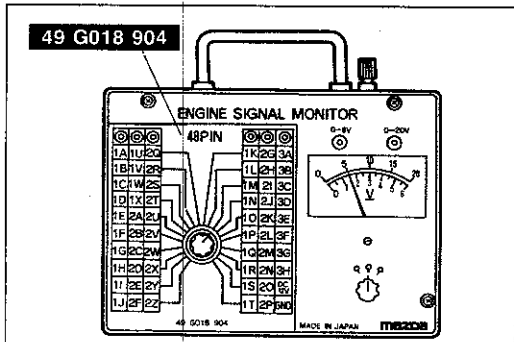
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|--|--|---|
| 1. Engine control unit<br>Inspection ..... page F2-175   | 6. Oxygen sensor<br>Inspection ..... page F2-182<br>Replacement<br>..... page F2-183 | 11. P/S pressure switch<br>Inspection and<br>Replacement<br>..... page F2-185         |
| 2. Airflow sensor<br>Inspection and<br>Replacement<br>..... page F2-179                                  | 7. Idle switch<br>Inspection ..... page F2-183                                       | 12. Malfunction indicator lamp<br>(MIL)<br>How to reset<br>MIL ..... page F2-187      |
| 3. Water thermosensor<br>Removal and Inspection<br>..... page F2-179<br>Installation ..... page F2-180   | 8. Main relay<br>Inspection ..... page F2-184  | 13. Circuit opening relay<br>Inspection, Removal, and<br>Installation ... page F2-153 |
| 4. Intake air thermosensor<br>Inspection and<br>Replacement<br>..... page F2-180                         | 9. Clutch switch<br>Inspection and<br>Replacement<br>..... page F2-184               | 14. Solenoid valve (PRC)<br>Inspection ..... page F2-160                              |
| 5. Throttle sensor<br>Inspection and Adjustment<br>..... page F2-181<br>Replacement<br>..... page F2-182 | 10. Neutral switch<br>Inspection and<br>Replacement<br>..... page F2-184             | 15. Solenoid valve (Purge control)<br>Inspection ..... page F2-165                    |



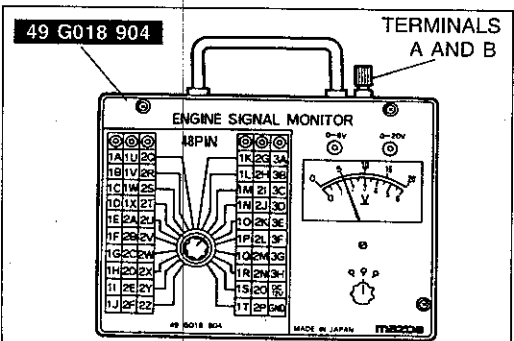
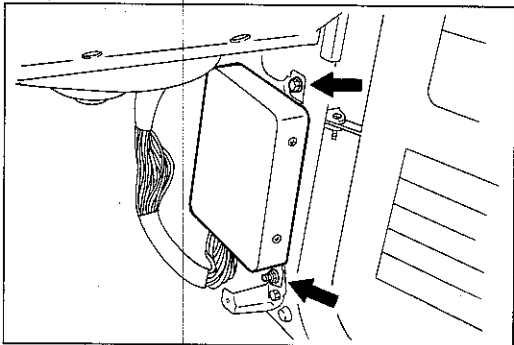
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9MU0F2-191

**ENGINE CONTROL UNIT**

**Inspection**

1. Remove the front side trim on the passenger's side.

2. Connect the **SST** to the engine control unit.

3. Place the **SST (Sheet)** on the **Engine Signal Monitor**.

4. Measure the voltage at each terminal.  
(Refer to pages F2-176 to F2-178.)

5. If any ECU terminal voltage is incorrect, check the related input or output devices and wiring. If no problem is found, replace the ECU. (Refer to above.)

**Caution**

**Never apply voltage to SST terminals A and B.**

### Terminal voltage

V<sub>B</sub>: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
1A	—	—	Battery	Constant	V <sub>B</sub>	For backup
1B	○		Main relay	Ignition switch OFF	0V	
				Ignition switch ON	V <sub>B</sub>	
				During burn-off (airflow sensor)		
1C	○		Ignition switch (Start position)	While cranking	0V	
				Ignition switch ON	0V	
1D		○	Self-Diagnosis Checker (Monitor lamp)	Test connector (Green: 1-pin) grounded For 3 seconds after ignition switch OFF→ON (Lamp illuminates)	4.5—5.5V	With Self-Diagnosis Checker
				After 3 seconds (Lamp does not illuminate)	V <sub>B</sub>	
				Test connector (Green: 1-pin) not grounded at idle. Monitor lamp ON	4.5—5.5V	
				Test connector (Green: 1-pin) not grounded at idle. Monitor lamp OFF	V <sub>B</sub>	
1E		○	Malfunction indicator lamp (California only)	For 3 seconds after ignition switch OFF→ON (Lamp illuminates)	Below 2.5V	Test connector (Green: 1-pin) grounded
				After 3 seconds (Lamp does not illuminate)	V <sub>B</sub>	
				Lamp illuminates	Below 2.5V	
				Lamp not illuminate	V <sub>B</sub>	
1F		○	Self-Diagnosis checker (Code number)	For 3 seconds after ignition switch OFF→ON (Buzzer sounds)	Below 2.5V	<ul style="list-style-type: none"> <li>• With Self-Diagnosis Checker</li> <li>• Test connector (Green: 1-pin) grounded</li> </ul>
				After 3 seconds (Buzzer does not sound)	V <sub>B</sub>	
				Buzzer sounds	Below 2.5V	
				Buzzer not sounded	V <sub>B</sub>	
1G		○	Main relay	Ignition switch OFF	V <sub>B</sub>	
				During burn-off (airflow sensor)	0V	
				Ignition switch ON		
1H		○	Circuit opening relay	Ignition switch ON	V <sub>B</sub>	
				During cranking or at idle	Below 2.5V	
1I	○		Ignition switch (ON position)	Ignition switch OFF	0V	
				Ignition switch ON	V <sub>B</sub>	
1J		○	A/C relay	Ignition switch ON	V <sub>B</sub>	Blower motor: ON
				For 10 seconds After fully depressing accelerator pedal with A/C switch ON (A/C does not operate) (in-gear, ignition switch ON)	V <sub>B</sub>	
				After 10 seconds	Below 2.5V	
				For 5 seconds after cranking with A/C switch ON (A/C does not operate)	V <sub>B</sub>	
				After 5 seconds (A/C operates)	Below 2.5V	
				A/C switch ON at idle	Below 2.5V	
				A/C switch OFF at idle	V <sub>B</sub>	
1K	○		Test connector	Test connector (Green: 1-pin) not grounded	V <sub>B</sub>	Ignition switch ON
				Test connector (Green: 1-pin) grounded	0V	
1L	○		Ground (M/T)	Ignition switch ON	0V	
				Open (A/T)	V <sub>B</sub>	
1M	○		Speed sensor (A/T)	Ignition switch ON	0 or 4.5V—5.5V	
				Idle	4.5—5.5V	
1N	○		Idle switch	Accelerator pedal released	0V	Ignition switch ON
				Accelerator pedal depressed	V <sub>B</sub>	
1O	○		Stoplight switch	Brake pedal released	0V	Ignition switch ON
				Brake pedal depressed	V <sub>B</sub>	
1P	○		P/S pressure switch	Ignition switch ON	V <sub>B</sub>	
				P/S ON (at idle)	0V	
				P/S OFF (at idle)	V <sub>B</sub>	
1Q	○		A/C switch	A/C switch ON (Ignition switch ON)	Below 2.5V	Blower motor: ON
				A/C switch OFF (Ignition switch ON)	V <sub>B</sub>	

## Terminal voltage

V<sub>B</sub>: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
1R	○		Ground (EC-AT)	Ignition switch ON	0V	For G6
				Open (M/T, HAT)	Ignition switch ON	
1S	○		Blower switch	Blower OFF	V <sub>B</sub>	Ignition switch ON
				Blower ON	Below 1.5V	
1T	—	—	—	—	—	—
1U	○		Headlight switch	Headlight ON	V <sub>B</sub>	
				Headlight OFF	Below 1.5V	
1V	○		Neutral or clutch switch (Inhibitor switch)	Neutral or clutch pedal depressed (P or N ranges)	0V	Ignition switch ON
				Other condition	V <sub>B</sub>	
2A	—	—	Ground (E01)	Constant	0V	
2B	—	—	Ground (E02)	Constant	0V	
2C	—	—	Ground (E1)	Constant	0V	
2D	—	—	Ground (E2)	Constant	0V	
2E		○	Distributor	Ignition switch ON	0 or 5V	Ne-Signal
				Idle	2V	
2F		○	Igniter	Ignition switch ON	0 or 5V	Ignition-timing signal
				Idle	Approx. 0.5V	
2G	○		Distributor	Ignition switch ON	0 or 5V	G-Signal
				Idle	Approx. 1.2V	
2H		○	Airflow sensor (Burn-off)	Just after ignition switch OFF	0V	Burn-off functions momentarily
				Burn off (2-5 seconds after ignition switch OFF) (Refer to page F2-174)	8-12V	
2I	—	—	—	—	—	—
2J	—	—	—	—	—	—
2K		○	Vref	Ignition switch ON	4.5-5.5V	
2L	○		Intake air thermosensor (Dynamic chamber)	At 20°C (68°F)	Approx. 2.5V	
2M	○		Throttle sensor	Accelerator pedal released	Approx. 0.5V	Ignition switch ON
				Accelerator pedal fully depressed	Approx. 4.3V	
2N	○		Oxygen sensor	Ignition switch ON	0V	Needle moves from 0V to 1V
				Idle (Cold engine)	0V	
				Idle (After warm up)	0-1.0V	
				Increase engine speed (After warm up)	0.5-1.0V	
				Deceleration	0-0.4V	
2O	○		Airflow sensor (Intake air mass)	Ignition switch ON	1.0-2.0V	
				Idle (After warm up)	1.9-2.6V	
				Increase engine speed (After warm up)	2-5V	
2P	○		Airflow sensor (Ground)	Constant	0V	
2Q	○		Water thermosensor	Engine coolant temperature 20°C (68°F)	Approx. 2.5V	Ignition switch ON
				After warm up	Approx. 0.4V	
2R	—	—	—	—	—	—
2S	—	—	—	—	—	—
2T		○	Solenoid valve (PRC)	For 120 seconds after ignition switch OFF → ON	Below 2.5V	During hot condition. Coolant temp. above 90°C (194°F) Intake air temp. above 75°C (167°F)
				For 120 seconds after starting	Below 2.5V	
				Ignition switch ON	V <sub>B</sub>	
2U		○	Injector G6 (No.3, 4) F2 (No.1, 3)	Ignition switch ON	V <sub>B</sub>	* Engine Signal Monitor: Green and red lights flash
				Idle	V <sub>B</sub>	



### Terminal voltage

V<sub>B</sub>: Battery voltage

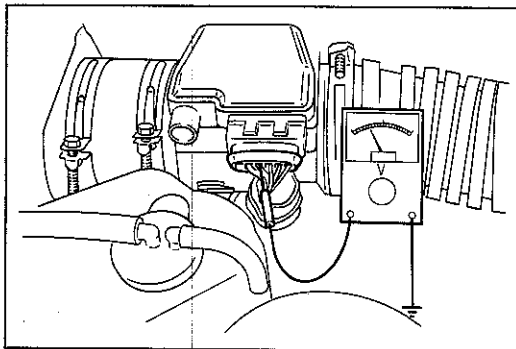
Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
2V		○	Injector G6 (No.1, 2) F2 (No.2, 4)	Ignition switch ON	V <sub>B</sub>	* Engine Signal Monitor: Green and red lights flash
				Idle	V <sub>B</sub>	
2W		○	Solenoid valve (Idle speed control)	Ignition switch ON	Approx. 11V	Engine signal monitor: Green and red lights flash
				Idle	Approx. 10V	
2X		○	Solenoid valve (Purge control)	Ignition switch ON	V <sub>B</sub>	* Engine signal monitor: Green and red lights flash
				Idle	V <sub>B</sub>	
				Driving in gear	5—1.5V*	
2Y		○	HAT control unit	Ignition switch ON	V <sub>B</sub>	For G6 HAT
				Accelerator for pedal fully depressed	0V	
2Y		○	EC-AT control unit	At sea level	V <sub>B</sub>	For G6 EC-AT Ignition switch ON
				At high altitude (800 m [2,624 ft])	0V	
2Z	—	—	—	—	—	—

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### Terminal location

2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	U	S	Q	O	M	K	I	G	E	C	A
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	V	T	R	P	N	L	J	H	F	D	B

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**AIRFLOW SENSOR**

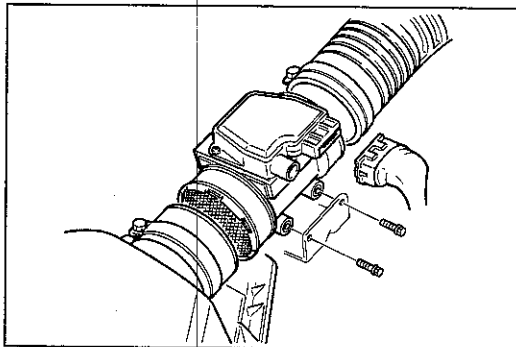
**Inspection**

1. Remove the rubber boot from the airflow sensor connector.
2. Check terminal voltages with a voltmeter.

Terminal wire	Condition	Ignition switch ON	Engine running
B/Y (Power supply)		Battery voltage	
G/O (Burn-off)		0V	
G/B (Airflow mass)		1.0—2.0V	1.9—5V
G/Y (Ground)		0V	
B/O (Ground)		0V	

3. If not as specified, check the wiring harness for an open or short circuit.  
If the wiring harness is OK, check the burn-off operation. (Refer to page F2-172.)
4. If the burn-off operation is as specified, replace the airflow sensor.

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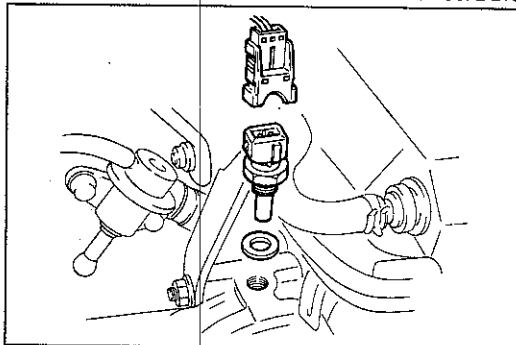
**Replacement**

1. Disconnect the connector.
2. Loosen the air hose clamps.
3. Remove the bolts.
4. Remove and replace the airflow sensor.

**Caution**

**Install the airflow sensor with the arrow on the sensor aligned with airflow direction.**

5. Tighten the hose clamps.
6. Reconnect the connector to the sensor.

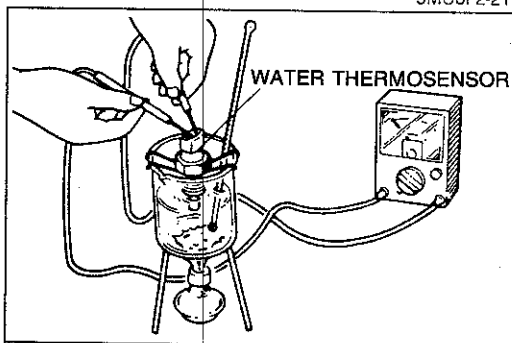


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**WATER THERMOSENSOR**

**Removal**

1. Disconnect the water thermosensor connector.
2. Remove the water thermosensor.



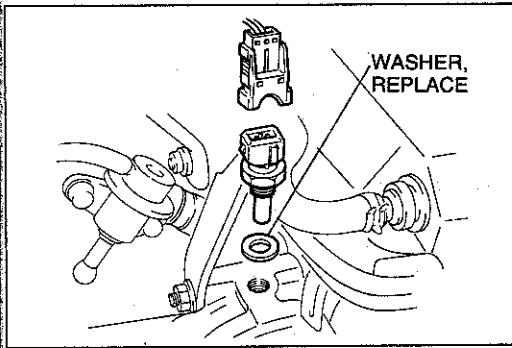
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**Inspection**

1. Place the sensor in water with a thermometer and heat the water gradually.
2. Check resistance of the sensor with an ohmmeter.

Coolant	Resistance
-20°C ( -4°F)	14.5 —17.8 kΩ
20°C ( 68°F)	2.2 — 2.7 kΩ
80°C (176°F)	0.28— 0.35 kΩ

3. If not as specified, replace the water thermosensor.



9MU0F2-219

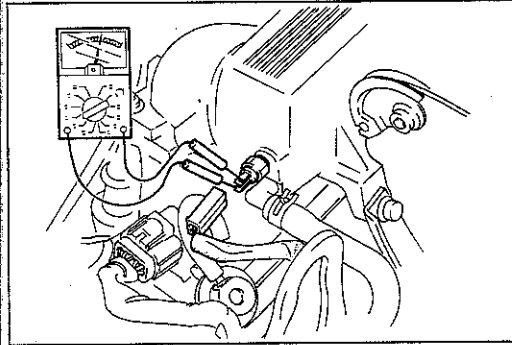
### Installation

1. Install the water thermosensor and a new washer.

### Tightening torque:

**25—29 N·m (2.5—3.0 m·kg, 18—22 ft·lb)**

2. Connect the water thermosensor connector.



9MU0F2-220

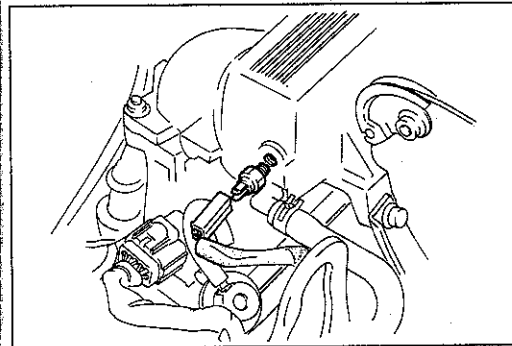
### INTAKE AIR THERMOSENSOR (IN DYNAMIC CHAMBER)

#### Inspection

1. Disconnect the intake air thermosensor connector.
2. Connect an ohmmeter to the sensor terminals.
3. Check resistance of the sensor.

Temperature	Resistance
25°C ( 77°F)	29.7—36.3 kΩ
85°C (185°F)	3.3— 3.7 kΩ

4. If not as specified, replace the intake air thermosensor.



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### Replacement

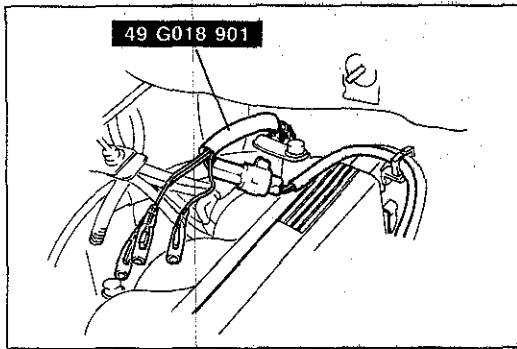
1. Disconnect the intake air thermosensor connector.
2. Remove the sensor.
3. Install the sensor.

### Note

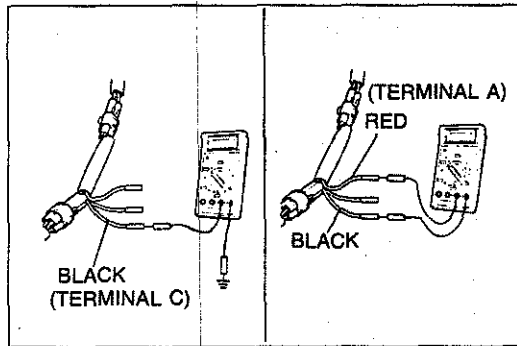
**When installing the sensor, tighten to the specified torque.**

### Tightening torque:

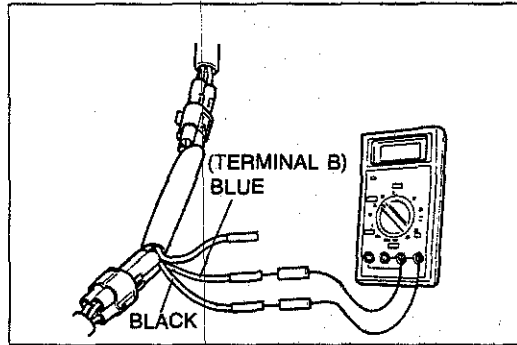
**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



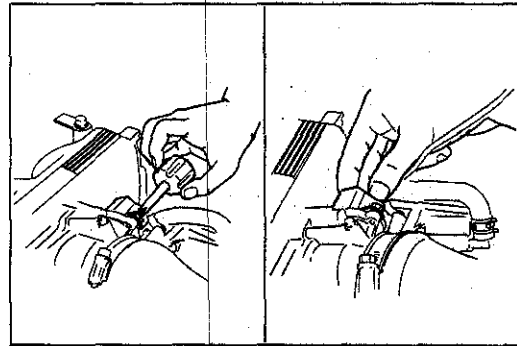
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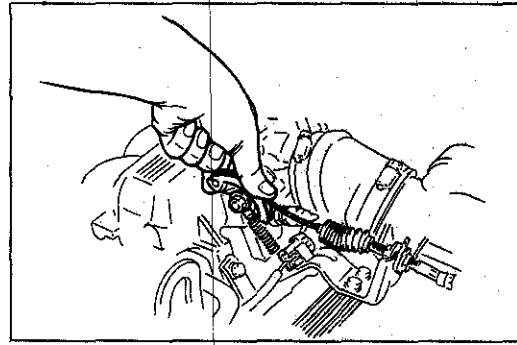
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9MU0F2-224



9MU0F2-225



9MU0F2-226

**THROTTLE SENSOR**

**Caution**

Use a precision voltmeter with a scale of 0.01V to inspect or adjust the throttle sensor.

**Inspection and Adjustment**

1. Remove the air hose from the throttle body.
2. Disconnect the throttle sensor connector (3-pin).
3. Connect the **SST** between the throttle sensor and the wiring harness.
4. Turn the ignition switch ON.
5. Make sure that the throttle valve is fully closed.
6. Measure BLACK and RED wire voltages. Check that the voltages are as specified.

**Voltage**

**BLACK wire: 0V**

**RED wire : 4.5—5.5V**

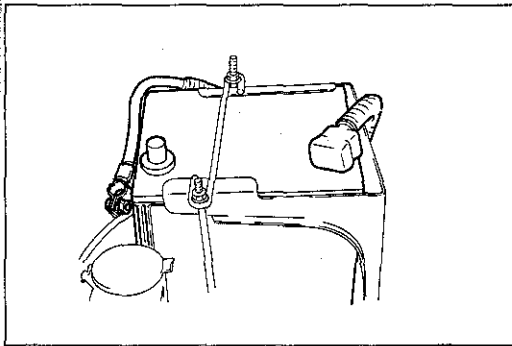
7. If not as specified, check the battery voltage and wiring harness. If these are OK, replace the engine control unit.
8. Record the RED wire voltage.
9. Check that BLUE wire voltage for the recorded RED wire voltage is as specified.

RED wire voltage (V)	BLUE wire voltage (V)	RED wire voltage (V)	BLUE wire voltage (V)
4.50—4.59	0.37—0.54	5.10—5.19	0.42—0.61
4.60—4.69	0.38—0.55	5.20—5.29	0.43—0.62
4.70—4.79	0.39—0.56	5.30—5.39	0.44—0.63
4.80—4.89	0.40—0.57	5.40—5.49	0.44—0.64
4.90—4.99	0.40—0.58	5.50	0.44—0.66
5.00—5.09	0.41—0.60		

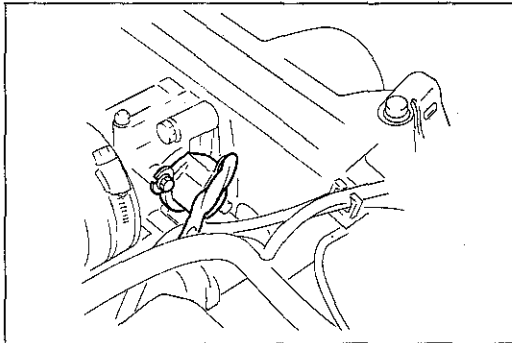
10. If not as specified, loosen the throttle sensor mounting screws and adjust BLUE wire voltage by rotating the throttle sensor.  
After adjusting the voltage, tighten the throttle sensor mounting screws and recheck the voltage.

11. Hold the throttle valve fully open.
12. Check that BLUE wire voltage for the recorded RED wire voltage is as specified.

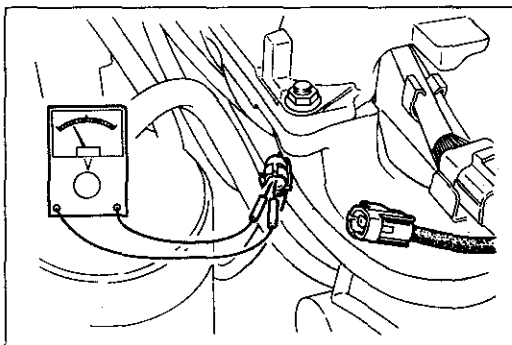
RED wire voltage (V)	BLUE wire voltage (V)	RED wire voltage (V)	BLUE wire voltage (V)
4.50—4.59	3.58—4.23	5.10—5.19	4.05—4.79
4.60—4.69	3.66—4.32	5.20—5.29	4.13—4.88
4.70—4.79	3.74—4.41	5.30—5.39	4.21—4.98
4.80—4.89	3.82—4.51	5.40—5.49	4.29—5.07
4.90—4.99	3.90—4.60	5.50	4.29—5.17
5.00—5.09	3.97—4.70		



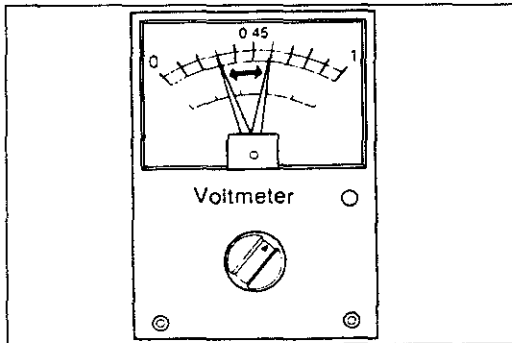
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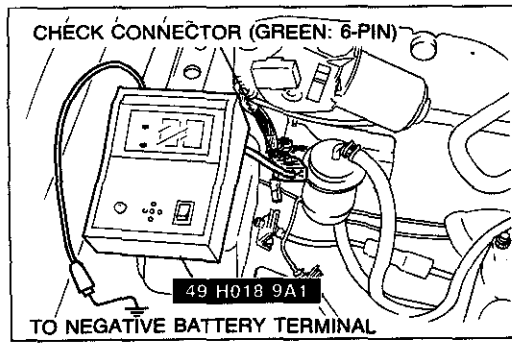
9MU0F2-228



9MU0F2-229



9MU0F2-230



9MU0F2-231

13. If not as specified, replace the throttle sensor.
14. Turn the ignition switch OFF.
15. Disconnect the **SST** and reconnect the throttle sensor connector.
16. Disconnect the negative battery terminal and depress the brake pedal for **at least 5 seconds** to eliminate the control unit malfunction memory created during inspection.

### Replacement

1. Disconnect the throttle sensor connector.
2. Remove the throttle sensor mounting screws and the sensor.
3. Install the throttle sensor and tighten the screws.

### OXYGEN SENSOR

#### Inspection of Terminal Voltage

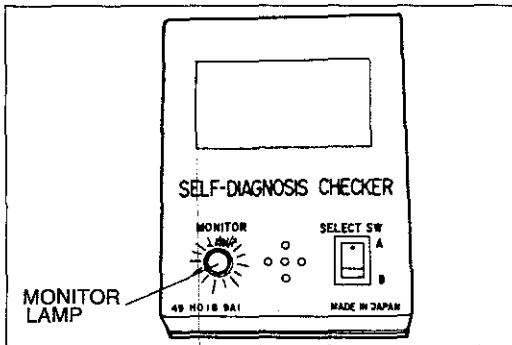
1. Warm up the engine and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Connect a voltmeter between the oxygen sensor and a ground.
4. Run the engine at **4,500 rpm** until the voltmeter indicates **approx. 0.7V**.
5. Increase and decrease the engine speed suddenly several times. Check to see that when the speed is increased the meter reads between **0.5V—1.0V** and when the speed is decreased it reads between **0V—0.4V**.
6. If not as specified, replace the oxygen sensor.

#### Inspection of Sensitivity

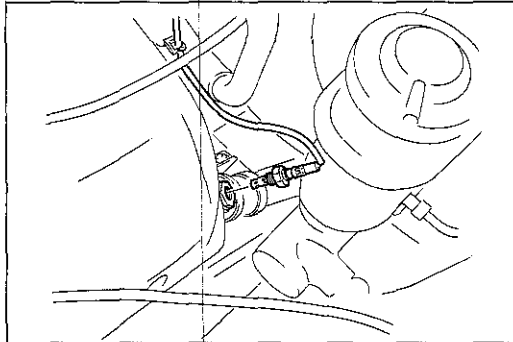
1. Warm up the engine to the normal operating temperature.
2. Connect the **SST** to the check connector (Green: 6-pin) and the negative battery terminal.

#### Note

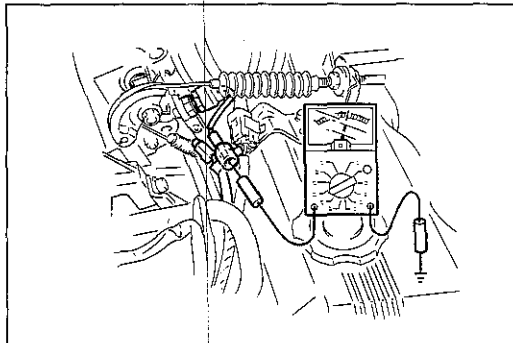
**Do not ground the test connector (Green: 1-pin) during inspecting the oxygen sensor sensitivity.**



9MU0F2-232



9MU0F2-233



1BU0F2-093

- Increase the engine speed to **between 2,000 and 3,000 rpm**, and check that the monitor lamp flashes for **10 seconds**.

**Monitor lamp: Flashes more than 8 times/10 seconds**

**Replacement**

- Disconnect the oxygen sensor connector.
- Remove the oxygen sensor.
- Install and tighten the oxygen sensor to specified torque.

**Tightening torque:**

**29—49 N·m (3—5 m·kg, 22—36 ft·lb)**

- Connect the oxygen sensor connector.

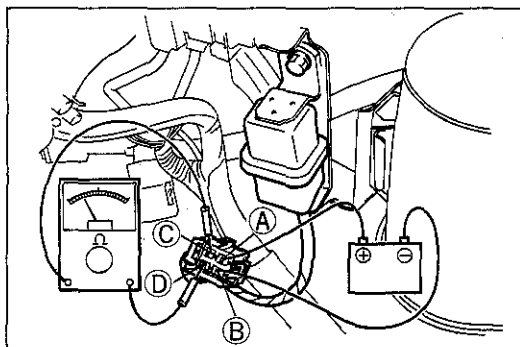
**IDLE SWITCH**

**Inspection**

- Disconnect the idle switch connector.
- Check continuity between the switch and a ground.

Throttle valve	Continuity
Fully closed	Yes
Open	No

- If not as specified, check the condition of the wiring harness of the idle switch. Replace the idle switch and the throttle body as an assembly, if necessary. (Refer to page F2-136.)



2BU0F2-040

### MAIN RELAY

#### Inspection

1. Check that a clicking sound is heard at the main relay when turning the ignition switch ON and OFF.
2. Apply battery voltage to terminal (A) and ground terminal (B) of the main relay.
3. Use an ohmmeter to check continuity of the terminals as shown.

V<sub>B</sub>: Battery voltage

Operation Terminals	V <sub>B</sub> not applied	V <sub>B</sub> applied
C-D	NO continuity	Continuity

4. If not as specified replace the main relay.

### CLUTCH SWITCH

#### Inspection

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Pedal	Continuity
Depressed	Yes
Released	No

4. If not as specified, replace the clutch switch.

### NEUTRAL SWITCH

#### Inspection

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Transmission	Continuity
In neutral	Yes
In other range	No

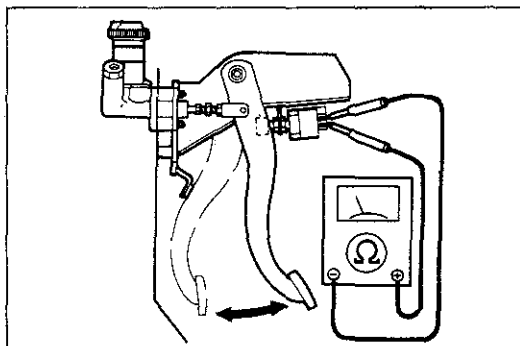
4. If not as specified, replace the neutral switch.

### Replacement

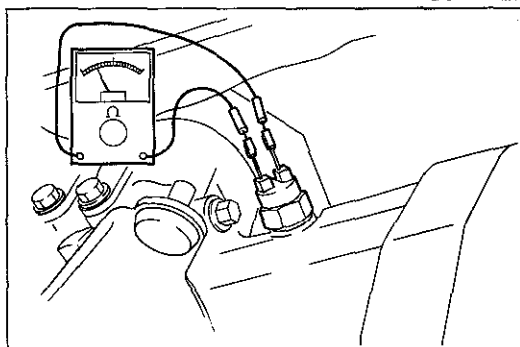
Replace the neutral switch as shown in the figure.

#### Tightening torque:

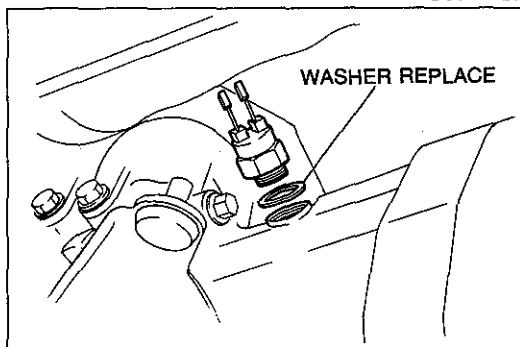
39—59 N·m (4—6 m·kg, 29—43 ft·lb)



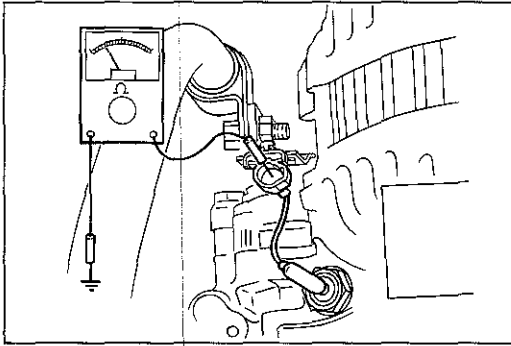
9BU0F2-122



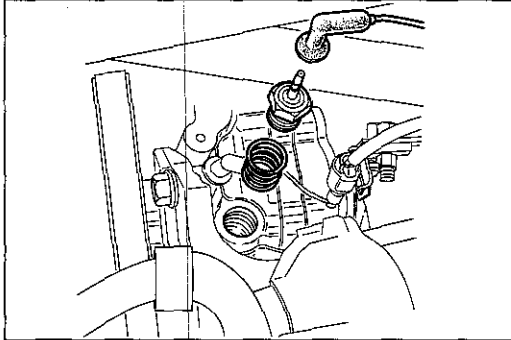
9BU0F2-123



0BU0F2-084



9MU0F2-241



0BU0F2-085

**POWER STEERING PRESSURE SWITCH****Inspection**

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the switch.
3. Start the engine. Check continuity of the switch while turning the steering wheel at idle.

P/S	Continuity
Turning	Yes
Not turning	No

4. If not as specified, replace the P/S pressure switch.

**Replacement**

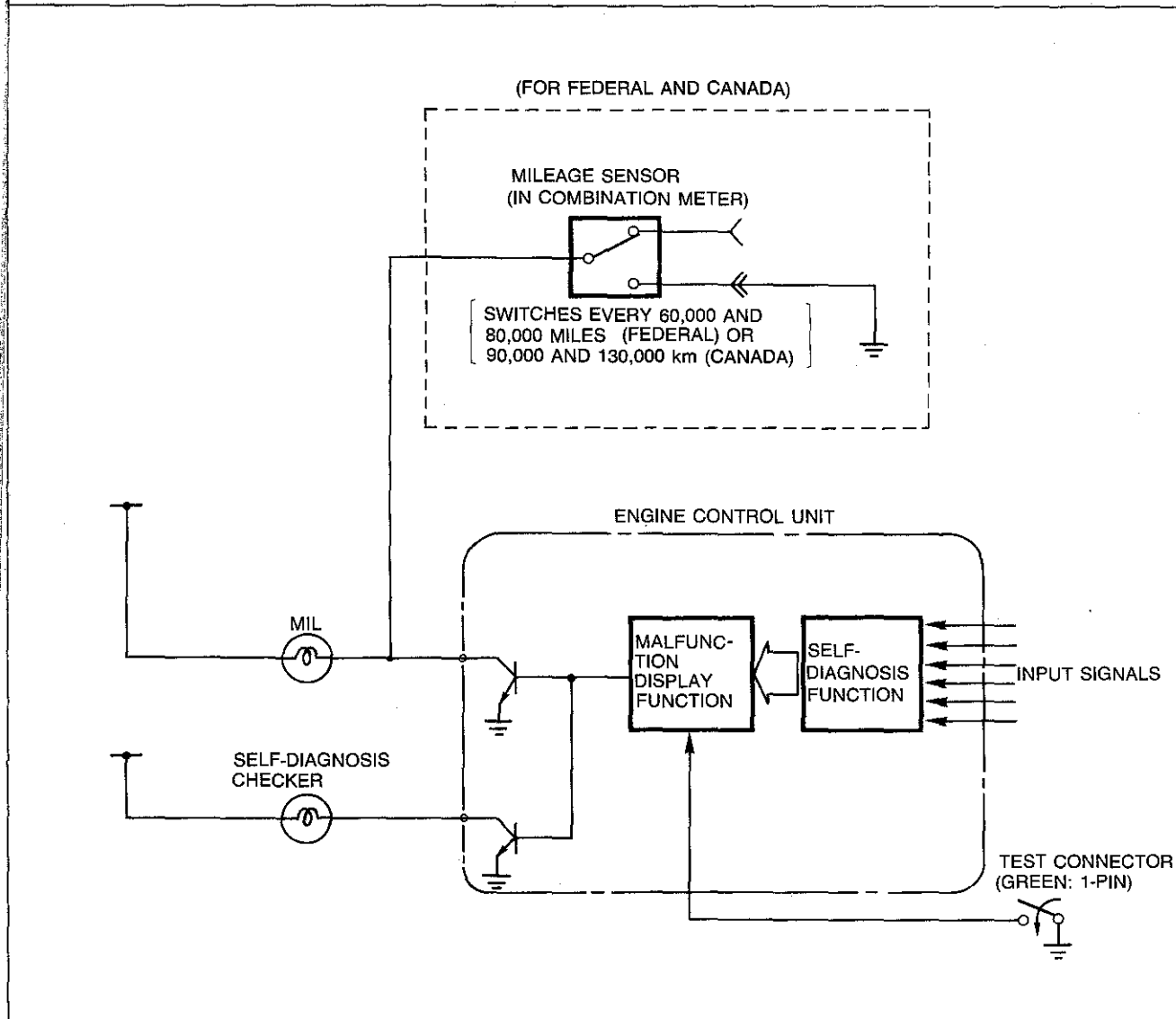
Replace the P/S pressure switch as shown in the figure.

**Tightening torque:**

**29—39 N·m (3—4 m·kg, 22—29 ft·lb)**



### MALFUNCTION INDICATOR LAMP (MIL)



1BU0F2-094

#### (For Federal and Canada)

The MIL is equipped to indicate the maintenance schedule for the emission control system. The MIL comes on every 60,000 and 80,000 miles (Federal) or 90,000 and 130,000 km (Canada) by the operation of the mileage sensor in the combination meter.

#### Note

- a) When the MIL comes on, replace the specified emission control system part. (Refer to Scheduled Maintenance.)
- b) After replacing the specified emission control system part, reset the MIL. (Refer to page F2-187.)

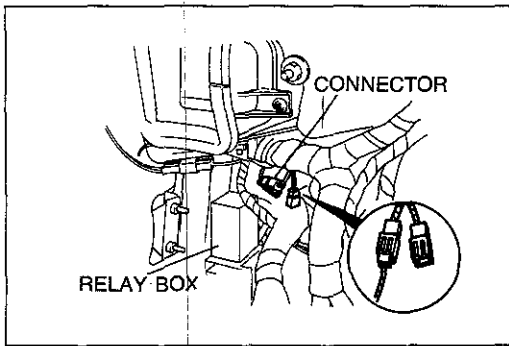
#### Caution

If the combination meter assembly is replaced, remove the odometer from the old unit and install it in the new meter assembly.

#### (For California)

The MIL comes on to warn the driver of an input device malfunction as it is occurring during driving or engine running (test connector [Green: 1-pin] not grounded).

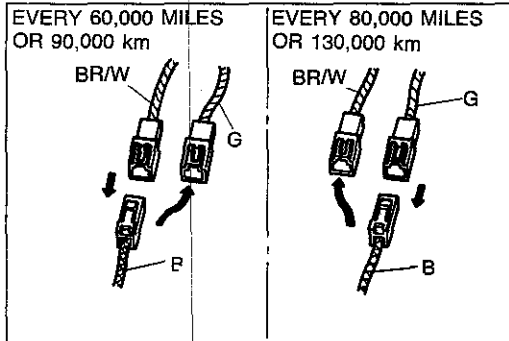
The MIL flashes in the same pattern as the Self-Diagnosis Checker to indicate to the technician a malfunction of an input or output device when the test connector (Green: 1-pin) is grounded. (Refer to page F2-121.)



**How To Reset the MIL (For Federal and Canada)**

To reset the MIL, change the connection of the connector as shown in the figure.

9BU0F2-125

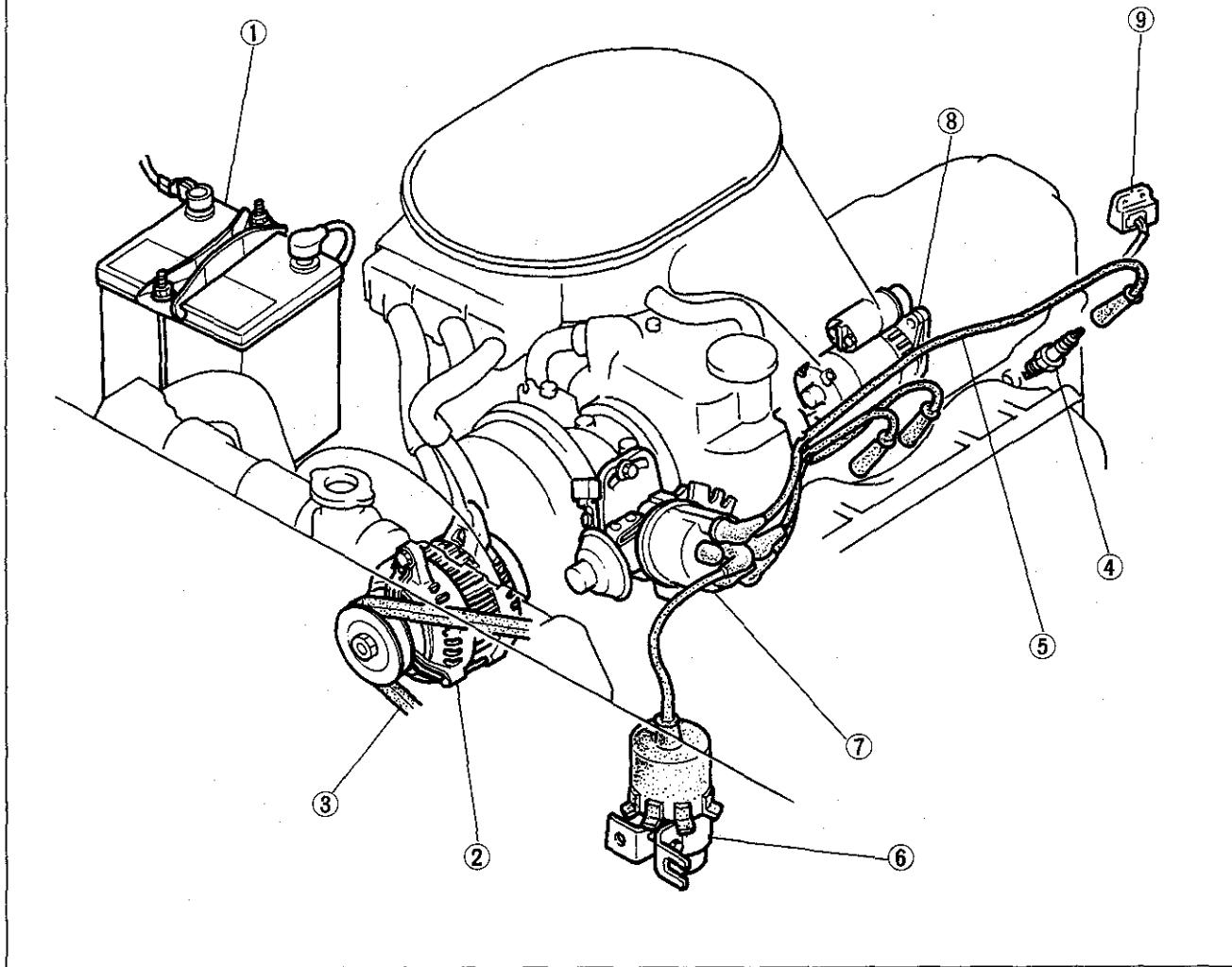


# ENGINE ELECTRICAL SYSTEM

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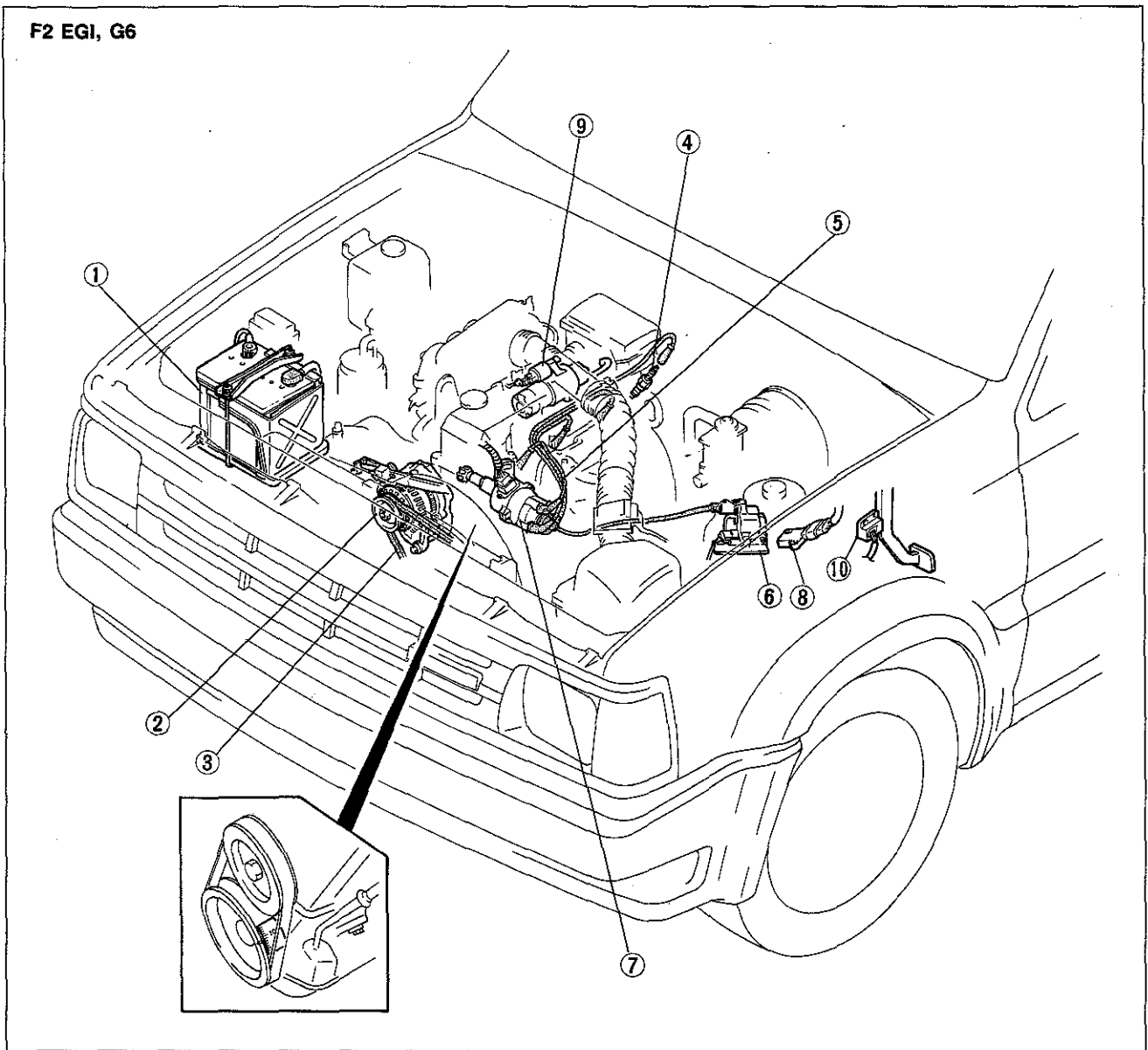
F2 CARBURETOR



1BU0GX-002

- |   |   |   |
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|---|---|---|

F2 EGI, G6



1BU0GX-003

- |  |  |  |
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|--|--|--|

### OUTLINE

### SPECIFICATIONS

Item		Engine	F2 Carburetor	F2 EGI	G6
Battery	Voltage	V	12, Negative ground		
	Type and capacity (20-hour rate)		50D20R 75D26R Maintenance-free	50D20R (USA) 75D26R (Canada) Maintenance-free	50D20R 80D26R Maintenance-free
Dark current* <sup>1</sup>		mA	MAX. 20.0		
Alternator	Type		A.C.		
	Output	V-A	12-55		12-60
	Regulator type		Transistorized (built-in IC regulator)		
	Regulated voltage	V	14.1—14.7		
	Brush length mm (in)	Standard	21.5 (0.846)		
		Minimum	8.0 (0.315)		
	Drive belt deflection mm (in)/98 N (10 kg, 22 lb)	New	7—8 (0.28—0.31)		10—12 (0.39—0.47)
Used		8—9 (0.31—0.35)		11—13 (0.43—0.51)	
Starter	Type		Non-reduction (M/T) Coaxial reduction (A/T)	Reduction	
	Output	V-kW	12-0.95 (M/T) 12-1.4 (A/T)		12-1.2 (M/T) 12-1.4 (A/T)
	Brush length mm (in)	Standard	17.0 (0.669) (M/T) 17.5 (0.689) (A/T)		16.0 (0.630) (M/T) 17.0 (0.669) (A/T)
		Minimum	11.5 (0.453) (M/T) 10.0 (0.394) (A/T)		9.0 (0.354) (M/T) 11.5 (0.453) (A/T)
Distributor	Type		Fully transistorized (HEI)	Electronic spark advance (Photo-diode type)	
	Centrifugal spark advance (Crank angle/Engine speed) degree/rpm		0/1,000 11.0/2,500 11.0/3,500 16.0/4,400		
		Vacuum spark advance (Crank angle/Vacuum) degree/mmHg (inHg)			
Ignition timing			5—7°	5—7° (Test connector grounded)	5—7° (Test connector grounded)
Spark plug	Type	NGK	BPR5ES* <sup>2</sup> BPR6ES	BPR5ES-11* <sup>2</sup> BPR6ES-11	ZFR5F-11* <sup>2</sup> ZFR6F-11
		NIPPONDENSO	W16EXR-U* <sup>2</sup> W20EXR-U	W16EXR-U11* <sup>2</sup> W20EXR-U11	KJ16CR-11* <sup>2</sup> KJ20CR-11
	Plug gap	mm (in)	0.75—0.85 (0.028—0.033)	1.0—1.1 (0.039—0.043)	
	Firing order		1—3—4—2		

\*<sup>1</sup> Dark current is the constant flow of current while the ignition switch is OFF.  
(i.e. Engine control unit, Audio, etc.)

\*<sup>2</sup> Standard plug

TROUBLESHOOTING GUIDE

Problem	Page
Will not crank	G-5
Discharged battery	G-5
Crank slowly	G-6

**Will not Crank**

**On-vehicle check**

"Clicks" when ignition switch turned ON.  
 (Ignition switch and interlock switch OK.)  
 Check battery and starter.

Possible cause	Remedy	Page
Battery and related parts Poor contact of battery terminal(s) Poor grounding of negative cable Insufficient voltage caused by battery malfunction Voltage drop caused by discharged battery	Clean and tighten Clean and repair Replace Repair or recharge	G-7 G-7 G-7, 8 G-7
Ignition switch and related parts Poor contact at ignition switch Loose connector(s) Broken wire between ignition switch and magnetic switch	Repair or replace Repair Repair or replace	Section T Section T Section T
Interlock switch malfunction	Repair or replace	G-41
Starter Loose wiring and/or connectors Burnt magnetic switch contact plate or improper contact Worn parts Others	Repair or replace Replace Replace Repair or replace	G-34, 35, 36 G-34, 35, 36 G-34, 35, 36 G-34, 35, 36

1BU0GX-004

**Discharged battery**

\* Numbers show checking order.

Condition	Related parts	Battery	Alternator	V-belt
		Vehicle not started for extended period	1	
Electrical load	Heavy use	1	2	
	Load left ON	1		
Normal use		3	2	1

Part	Remedy	Page
Battery	Recharge or replace	G-7, 8
Alternator	Repair or replace	G-14, 15, 18
V-belt	Adjust or replace	G-18

1BU0GX-005

**Crank Slowly**

Possible cause	Remedy	Page
Battery and related parts		
Poor contact of battery terminal(s)	Clean and tighten	G-7
Poor grounding of negative cable	Clean and repair	G-7
Insufficient voltage caused by battery malfunction	Replace	G-7, 8
Voltage drop caused by discharged battery	Repair or recharge	G-7
Starter		
Loose wiring and/or connectors	Repair or replace	G-34, 35, 36
Burnt magnetic switch contact plate or improper contact	Replace	G-34, 35, 36
Worn parts	Replace	G-34, 35, 36
Others	Repair or replace	G-34, 35, 36

**Misfire**

No spark, Weak spark

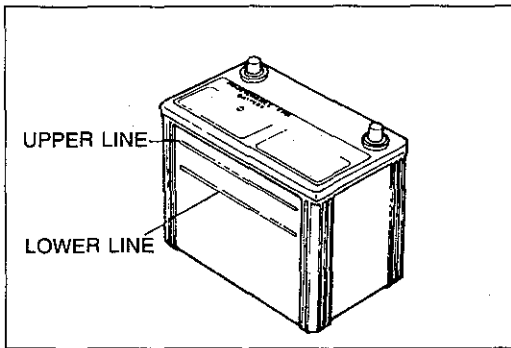
**Refer**Refer to Ignition  
System  
Troubleshooting**Page**

G-21

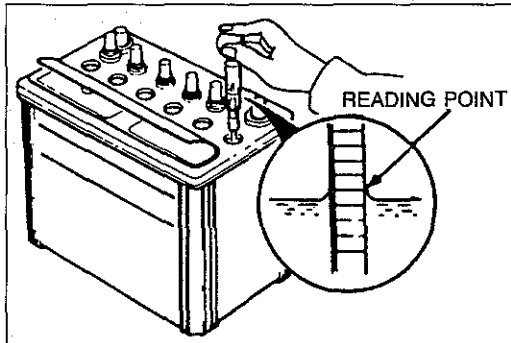
1BU0GX-006



**BATTERY**



0BU0GX-009



1BU0GX-007

Temperature [°C (°F)]	Specific gravity of electrolyte
-40 (-40)	1.322
-30 (-22)	1.315
-20 (- 4)	1.308
-10 ( 14)	1.301
0 ( 32)	1.294
10 ( 50)	1.287
20 ( 68)	1.280
30 ( 86)	1.273
40 (104)	1.266
50 (122)	1.259
60 (140)	1.252

Charged rate ; 100%

9BU0GX-009

**BATTERY**

**PRECAUTION (F2 Carburetor)**

After reconnecting the positive battery terminal, be sure that the charcoal canister is in the lowest position in its bracket.

**INSPECTION**

**Terminal and cable**

1. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat them with grease after tightening the terminal.
2. Inspect for corroded or frayed battery cables.
3. Check the rubber protector on the positive terminal for proper coverage.

**Electrolyte Level**

1. Check whether or not the electrolyte level lies between the "UPPER LEVEL" and the "LOWER LEVEL" lines.
2. If low, add distilled water to the "UPPER LEVEL" line. Do not overfill.



**Specific Gravity**

1. Measure the specific gravity with a hydrometer.
2. If the specific gravity reading is less than specified, recharge the battery.

**Specification: 1.27—1.29 (at 20°C [68°F])**

**RECHARGING**

Battery	Slow charge (A)	Quick charge (A)
50D20R	Under 5	Max. 20
75D26R 80D26R	Under 6.5	

**Slow Charging**

It is not necessary to remove the vent caps to perform a slow charge.

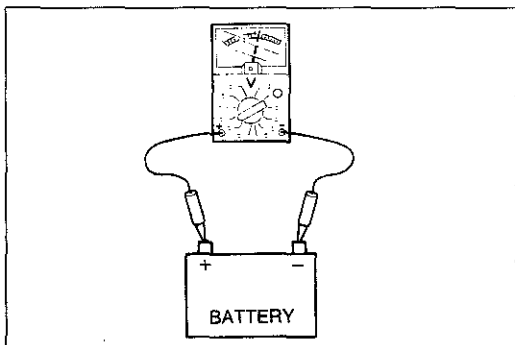
**Quick Charging**

Remove the battery from the vehicle and remove all the vent caps to perform a quick charge.

**Warning**

- a) Before performing maintenance or recharging the battery, turn off all accessories and stop the engine.
- b) The negative cable must be removed first and installed last.

0BU0GX-060

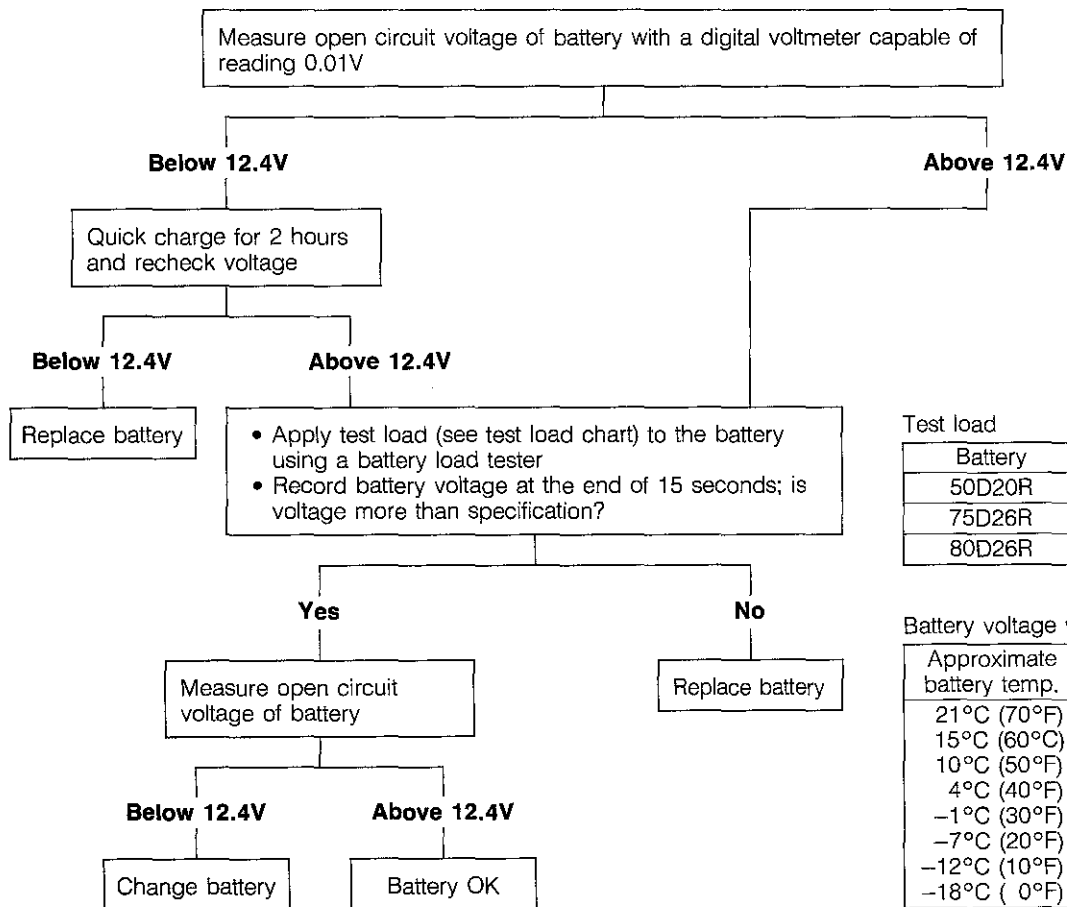


9MU0GX-008

**DIAGNOSIS**  
**Voltage check**

1. Disconnect the battery terminals from the battery.
2. Connect a voltmeter to the battery.

**Battery discharge test**



Test load

Battery	Load (A)
50D20R	150
75D26R	195
80D26R	195

Battery voltage with load

Approximate battery temp.	Minimum voltage (V)
21°C (70°F)	9.6
15°C (60°C)	9.5
10°C (50°F)	9.4
4°C (40°F)	9.3
-1°C (30°F)	9.1
-7°C (20°F)	8.9
-12°C (10°F)	8.7
-18°C ( 0°F)	8.5

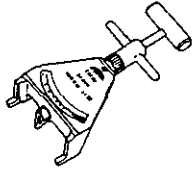
1BU0GX-008

## ALTERNATOR

### PREPARATION SST

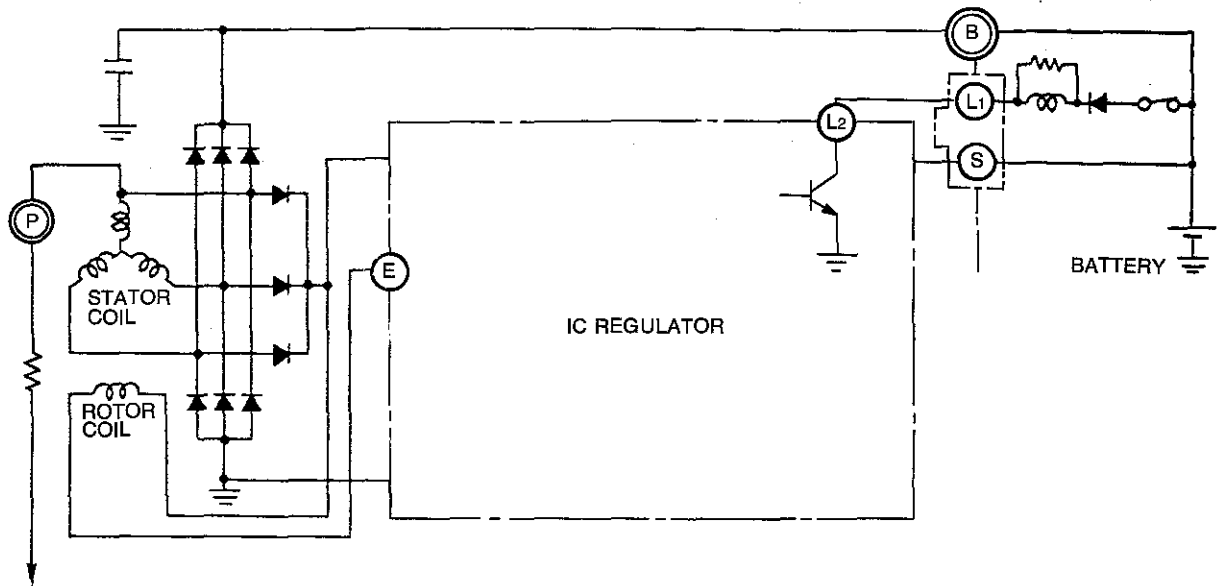
49 9200 020

Tension gauge,  
v-ribbed belt

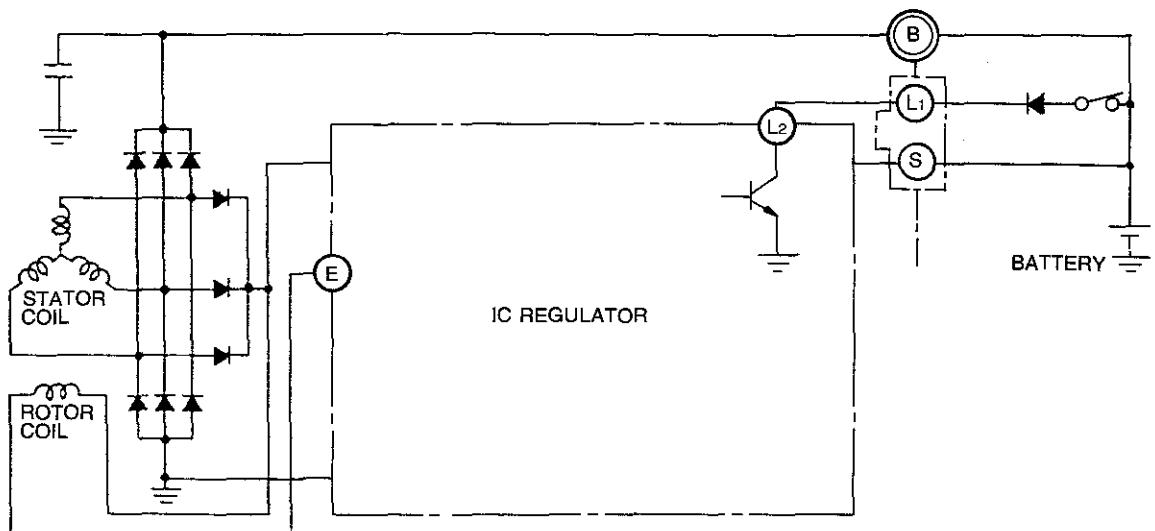


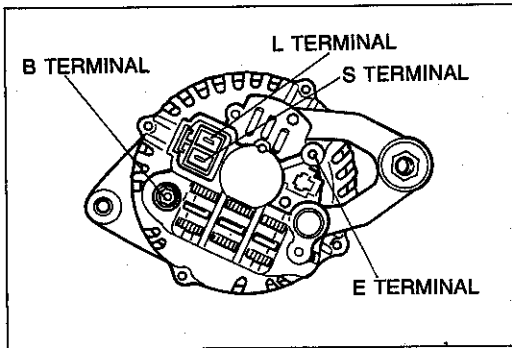
2BU0GX-003

### F2 CARBURETOR, F2 EGI

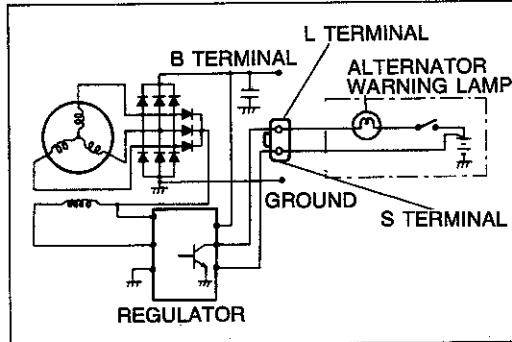


G6





0BU0GX-010



0BU0GX-011

**Caution**

- a) Be sure the battery connections are not reversed, because this will damage the rectifier.
- b) Do not use high-voltage testers such as a megger, because they will damage the rectifier.
- c) Remember that battery voltage is always applied to the alternator B terminal.
- d) Do not ground the L terminal while the engine is running.
- e) Do not start the engine while the connector is disconnected from the L and S terminals.

**SELF DIAGNOSIS SYSTEM**

The alternator has a self-diagnostic function to warn of the following problems in the charging system.

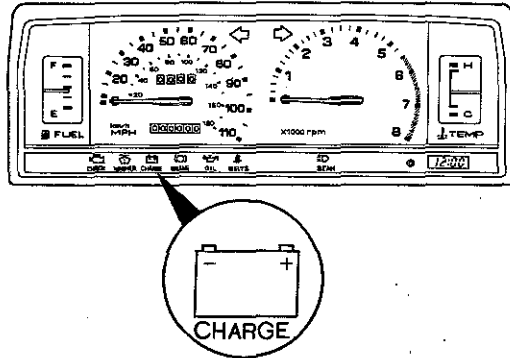
If a problem arises, the alternator warning lamp illuminates.

1. S circuit open
2. No voltage output
3. Field circuit open
4. B circuit open
5. Voltage output too high

## TROUBLESHOOTING

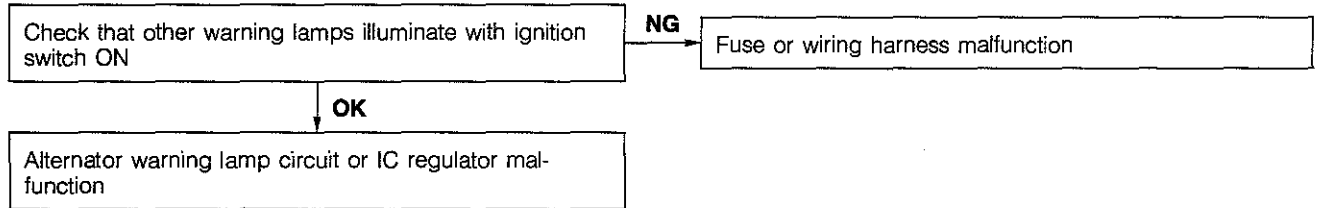
### Preliminary Check

1. Turn the ignition switch ON, and check that the alternator warning lamp illuminates.
2. Start the engine, and check that the alternator warning lamp goes off.



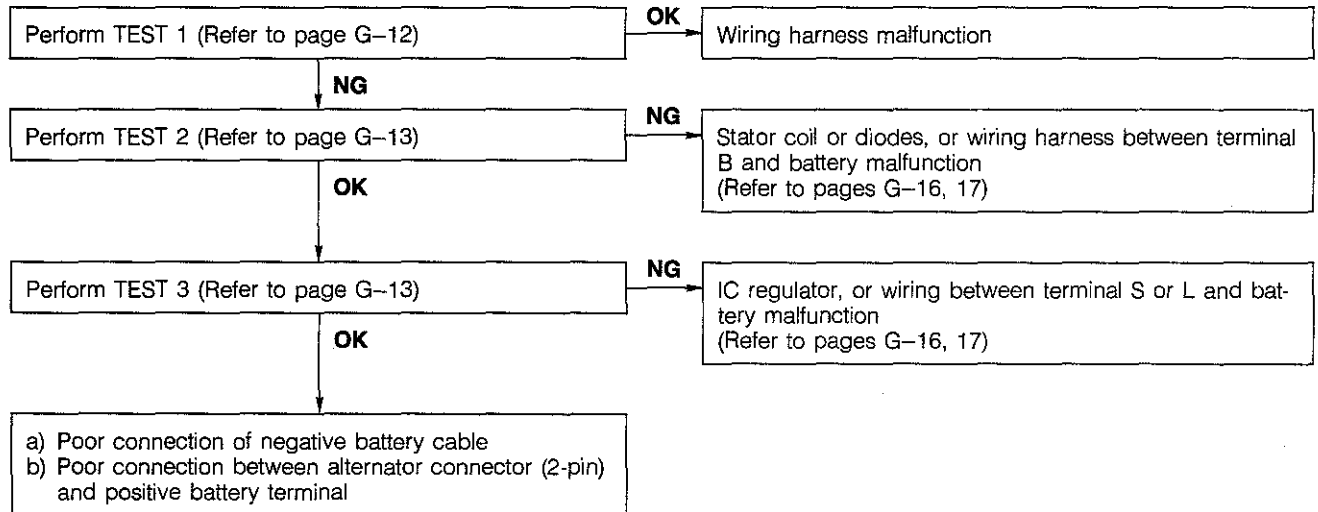
9MU0GX-011

### 1. Alternator warning lamp will not illuminate



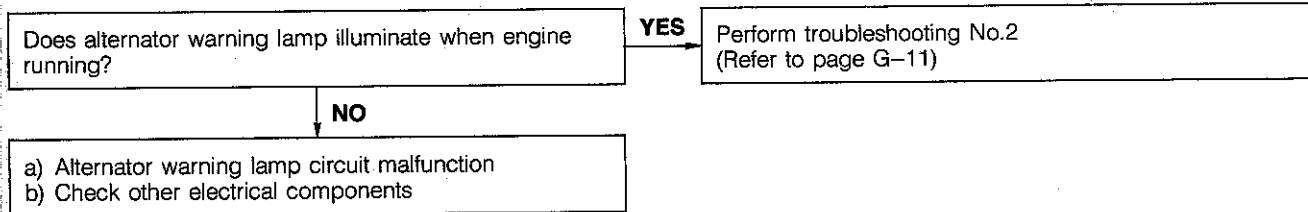
0BU0GX-012

### 2. Alternator warning light illuminates when engine running



1BU0GX-009

### 3. Battery discharged



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### Warning

**Disconnect the negative battery terminal before disconnecting or connecting terminal B.**

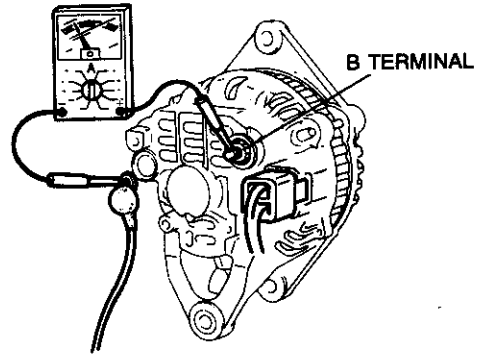
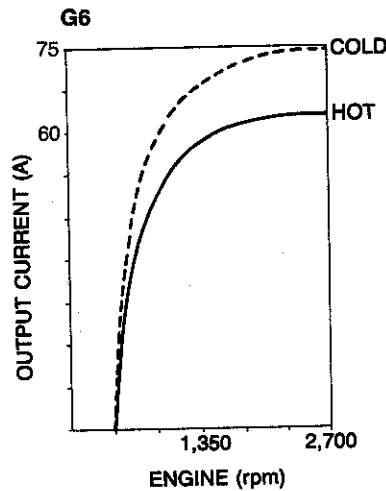
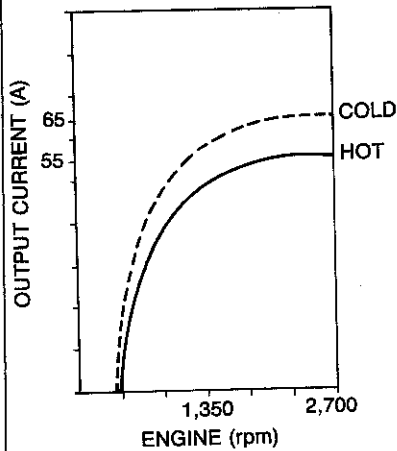
### TEST 1

1. Connect an ammeter (**75A min.**) between the terminal B wire and terminal B.
2. Turn all headlights and accessories on and depress the brake pedal.
3. Start the engine and check that output current is as specified at **2,500—3,000 rpm.**

**Output current: 55A or more.....F2 carburetor, F2 EGI  
60A or more.....G6**

**Caution  
Do not ground terminal B.**

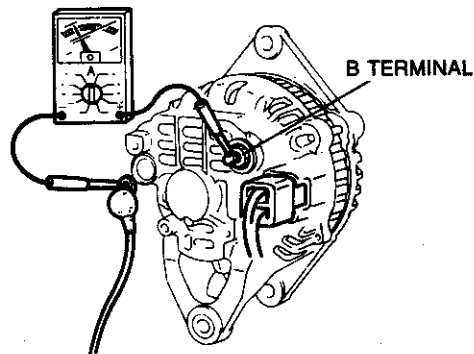
**F2 CARBURETOR, F2 EGI**



0BU0GX-014

**TEST 2**

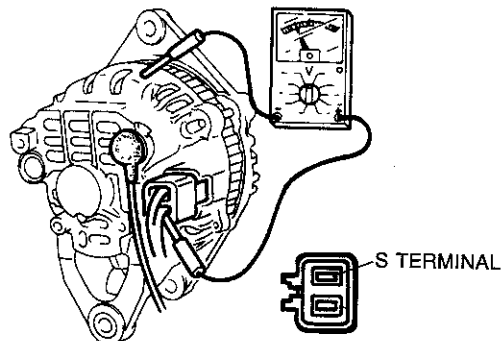
1. Turn all electric loads off and release the brake pedal.
2. Start the engine and check that output current is **5A or more** at **2,500—3,000 rpm**.



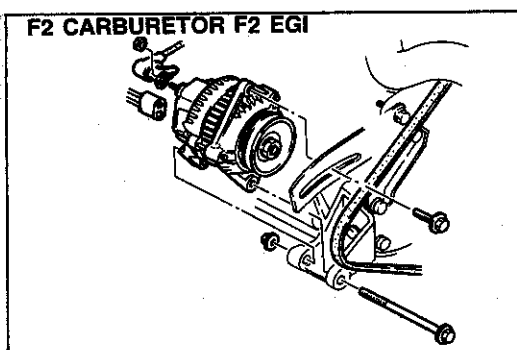
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**TEST 3**

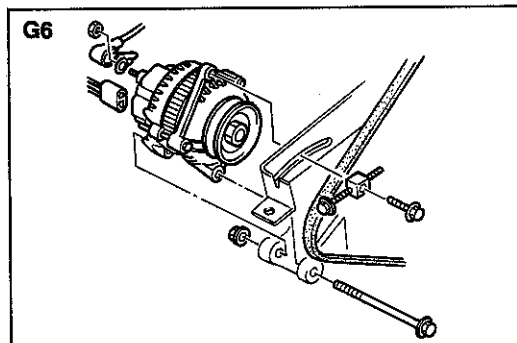
1. Turn all electric loads off and release the brake pedal.
2. Start the engine and check that output voltage between terminal L or S and ground is within specification at **2,500—3,000 rpm**.

**Voltage: 14.1—14.7V**

0BU0GX-016



9BU0GX-015

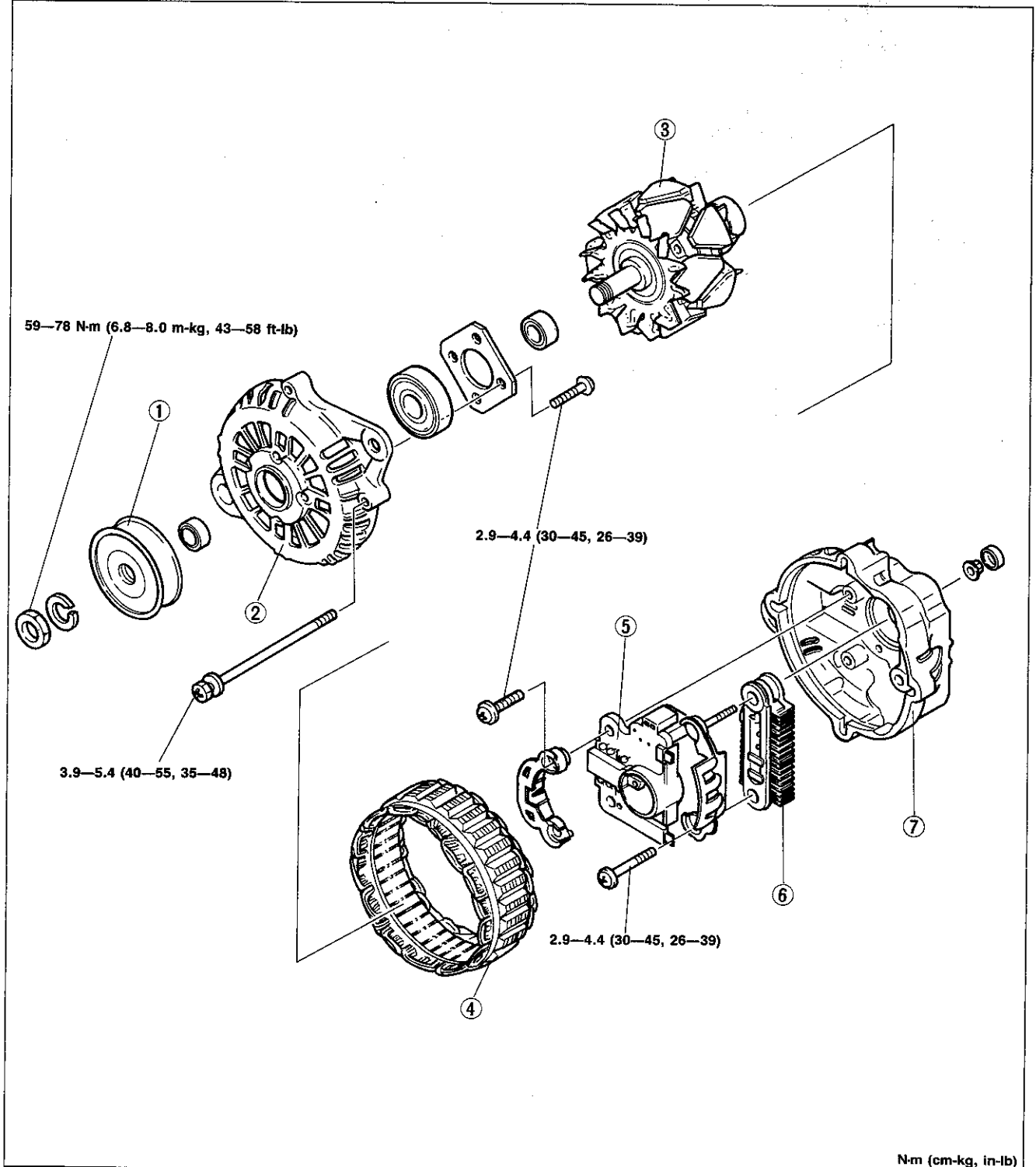
**REMOVAL**

1. Disconnect the negative battery cable.
2. Disconnect the wire and connector from the alternator.
3. Remove the alternator bolts.
4. Remove the V-belt.
5. Remove the alternator.



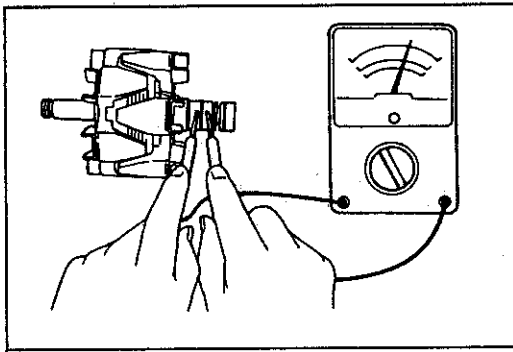
## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

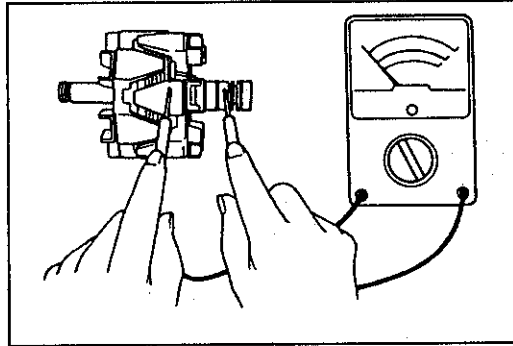


2BU0GX-005

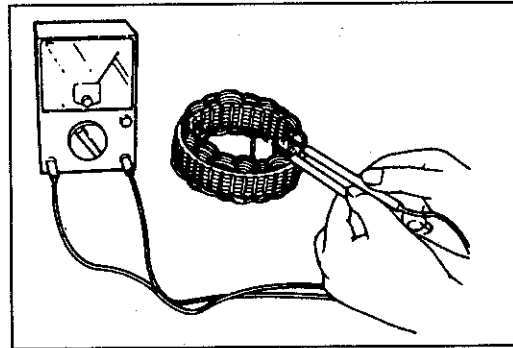
- |                          |           |
|--------------------------|-----------|
| 1. Pulley                |           |
| 2. Front bracket         |           |
| 3. Rotor                 |           |
| Inspection .....         | page G-16 |
| 4. Stator                |           |
| Inspection .....         | page G-16 |
| 5. Brush holder assembly |           |
| Inspection .....         | page G-17 |
| 6. Rectifier             |           |
| Inspection .....         | page G-17 |
| 7. Rear bracket          |           |



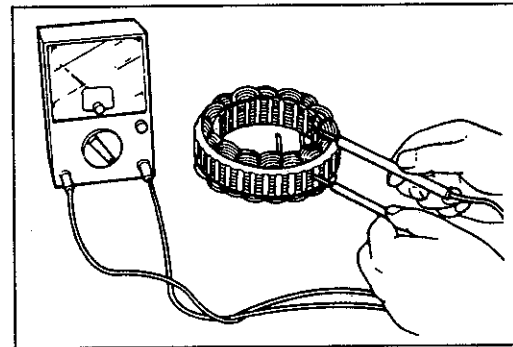
0BU0GX-018



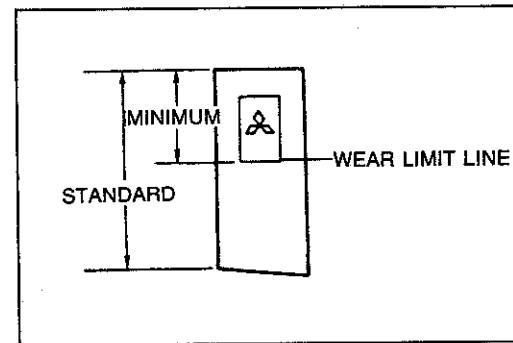
9MU0GX-059



9MU0GX-060



9MU0GX-061



0BU0GX-019

**INSPECTION****Rotor**

1. Wiring damage
  - (1) Check the resistance between the slip rings by using an ohmmeter.

**Specification: Approx. 3.5—4.5Ω [at 20°C (68°F)]**

- (2) If it is not within specification, replace the rotor

2. Ground of the field coil
  - (1) Check for continuity between the slip ring and the core by using an ohmmeter.
  - (2) Replace the rotor if there is continuity.
3. Slip ring surface
 

If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.

**Stator**

1. Wiring damage
  - (1) Check for continuity between the stator coil leads by using an ohmmeter.
  - (2) Replace the stator if there is no continuity.

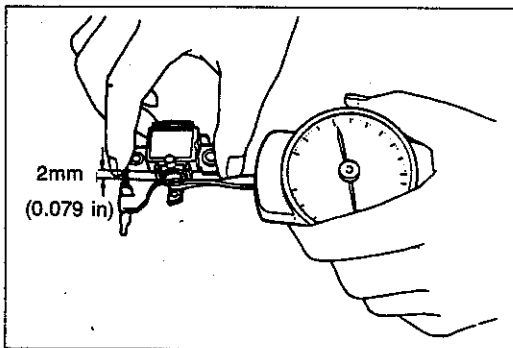
2. Ground of the stator coil
  - (1) Check for continuity between the stator coil leads and the core by using a circuit tester.
  - (2) Replace the stator if there is continuity.

**Brush**

If the brushes are worn almost to or beyond the limit, replace them.

**Standard: 21.5mm (0.846 in)**

**Minimum: 8.0mm (0.315 in)**



0BU0GX-020

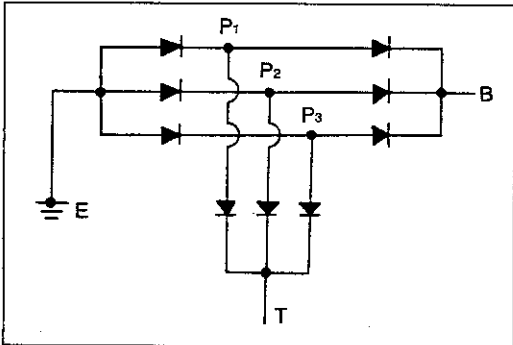
### Brush Spring

1. Measure the force of the brush spring by using a spring pressure gauge.
2. Replace the spring if necessary.

**Standard force: 3.1—4.3 N (320—440 g, 11.2—15.5 oz)**  
**Minimum: 1.6—2.4 N (160—240 g, 5.6—8.5 oz)**

### Note

**Read the spring pressure gauge at the brush tip projection of 2mm (0.079 in).**



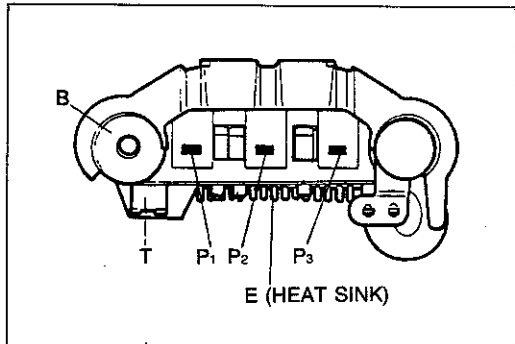
0BU0GX-021

### Rectifier

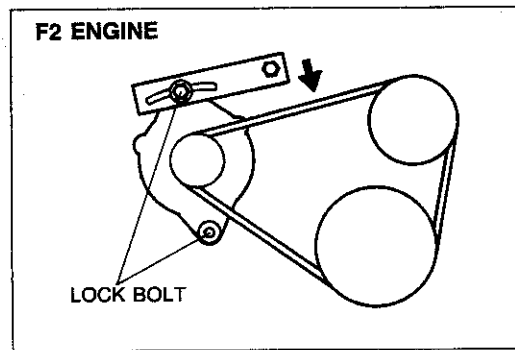
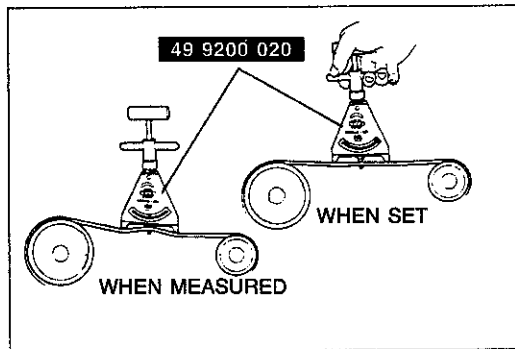
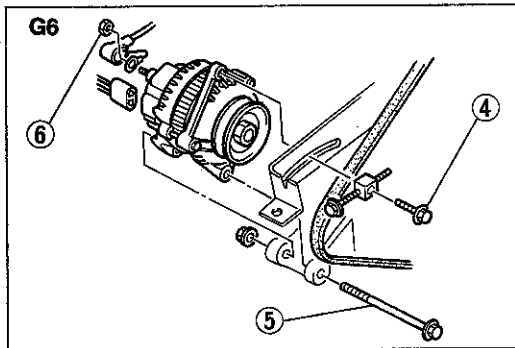
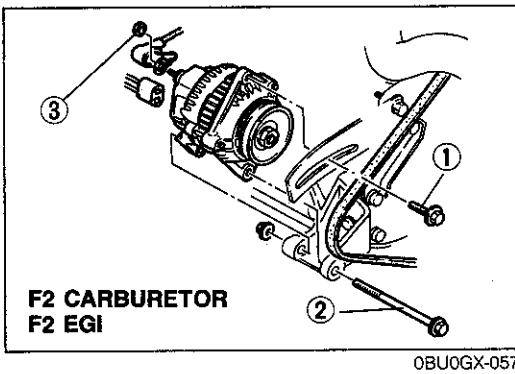
1. Check for continuity of the diodes by using an ohmmeter.

Negative (Black)	Positive (Red)	Continuity
E	P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	Yes
B		No
T		No
P <sub>1</sub> , P <sub>2</sub> , P <sub>3</sub>	E	No
	B	Yes
	T	Yes

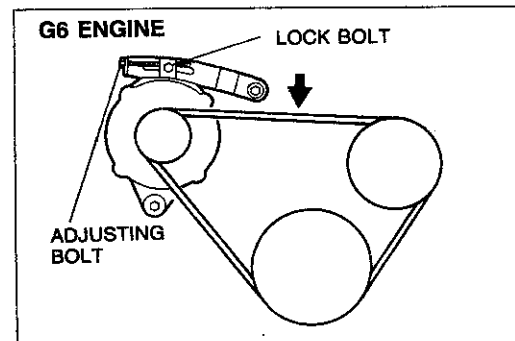
2. Replace the rectifier.



86U05X-025



2BU0GX-006



2BU0GX-007

INSTALLATION

**Note**  
When installing the alternator, tighten the bolts to the specified torque.

Install in the reverse order of removal.

Tightening torque

- Bolt ①: 31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)
- Bolt ②: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)
- Nut ③: 4.9—6.9 N·m (0.5—0.7 m·kg, 43—61 in·lb)
- Bolt ④: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)
- Bolt ⑤: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)
- Nut ⑥: 4.9—6.9 N·m (0.5—0.7 m·kg, 43—61 in·lb)

V-BELT TENSION

Adjustment

1. Loosen the alternator mounting bolt and adjusting bolt and adjust the tension.

Standard tension

Note

- a) Belt tension can be checked in place of belt deflection.
- b) Belt tension can be measured between any two pulleys.

Using the **SST**, check the belt tension.

N (kg, lb)

Belt	F2 (Carburetor, EGI)	G6
Alternator	New: 491—540 (50—55, 110.0—121.0)	New: 549—638 (56—65, 123.2—143.0)
	Used: 392—491 (40—50, 88.0—110.0)	Used: 461—549 (47—56, 103.4—123.2)
		Limit: 275 (28, 61.6)

Deflection

Note

- a) Check the drive belt deflection by applying immoderate pressure midway between the pulleys shown in the figure.
- b) A belt is considered "new" if it has been used on a running engine for less than five minutes. Set the deflection accordingly.
- c) Check the belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped.

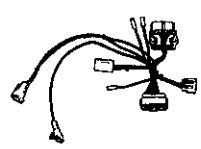
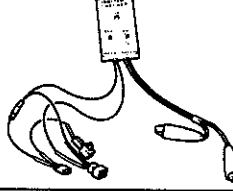
mm (in)/98 N (10 kg, 22 lb)

Belt	F2 (Carburetor, EGI)	G6
Alternator	New: 7.0—8.0 (0.28—0.31)	New: 10.0—12.0 (0.39—0.47)
	Used: 8.0—9.0 (0.31—0.35)	Used: 11.0—13.0 (0.43—0.51)
		Limit: 16 (0.63)

2. Tighten all bolts and recheck the tension.

IGNITION SYSTEM

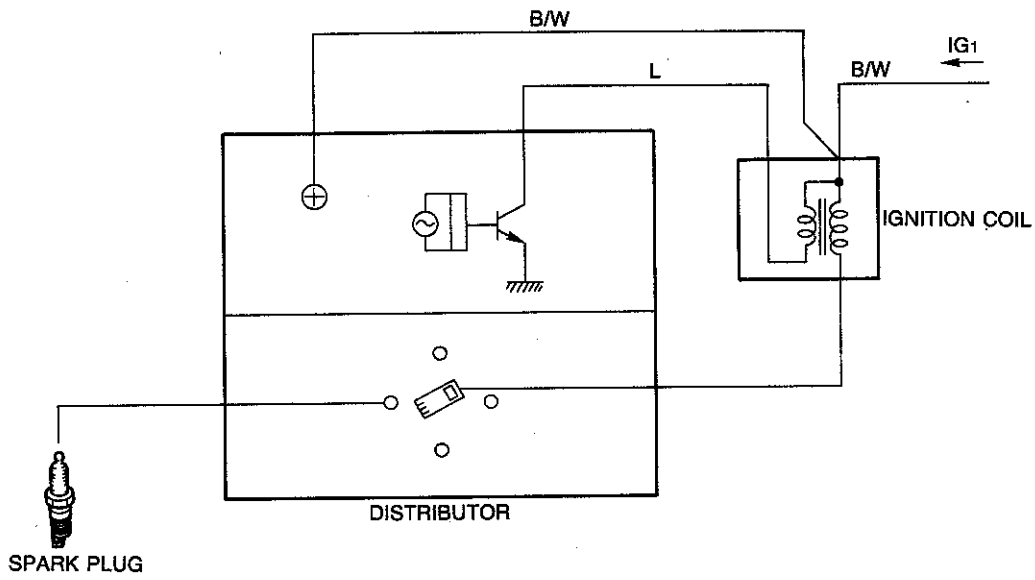
PREPARATION  
SST

<p>49 N018 001 Adapter harness</p>		<p>49 F018 002 Igniter Checker</p>	
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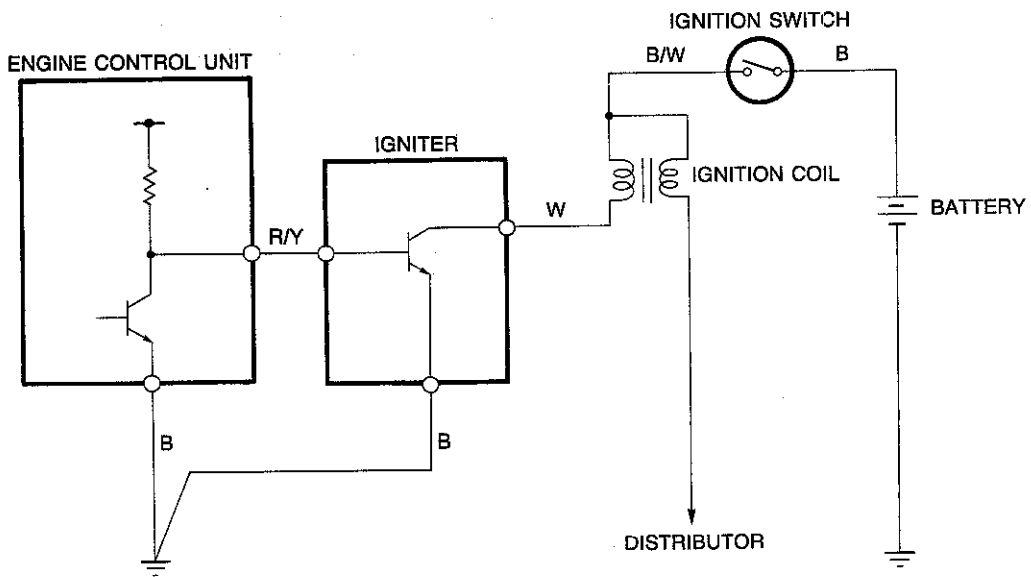
2BU0GX-008

# IGNITION SYSTEM

## F2 CARBURETOR



## F2 EGI, G6

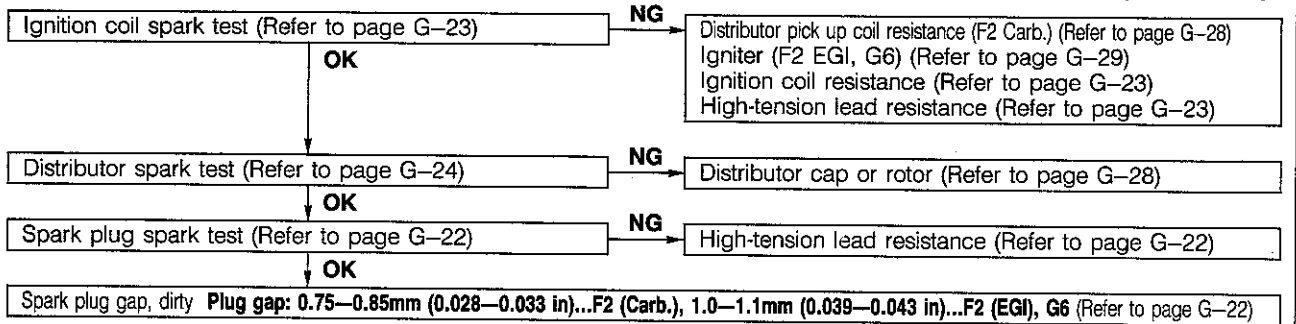


## TROUBLESHOOTING

### MISFIRE (NO SPARK, WEAK SPARK)

All cylinders

**Note:** When check spark test, hold lead with insulated pliers approx. 5–10mm (0.20–0.39 in) from a ground or cap.

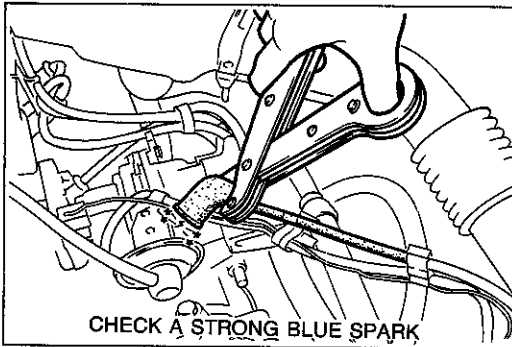


### Some cylinder(s)

Spark plug gap, dirty **Plug gap: 0.75–0.85mm (0.028–0.033 in)...F2 (Carb.), 1.0–1.1mm (0.039–0.043 in)...F2 (EGI), G6** (Refer to page G-22)  
High-tension lead resistance (Refer to page G-22)  
Distributor cap (Refer to page G-28)

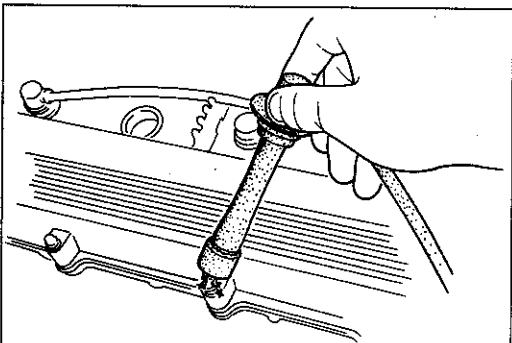
1BU0GX-012

### Ignition coil spark test



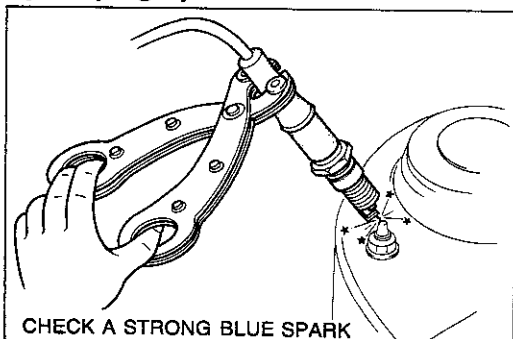
9MU0GX-064

### Distributor spark test



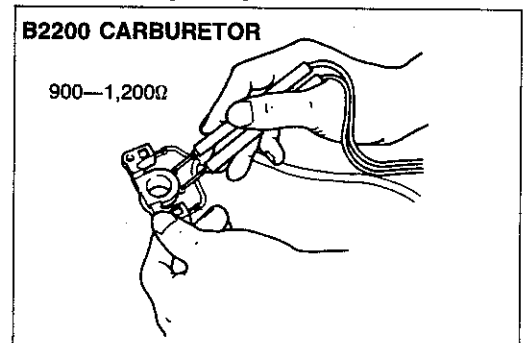
9MU0GX-066

### Spark plug spark test



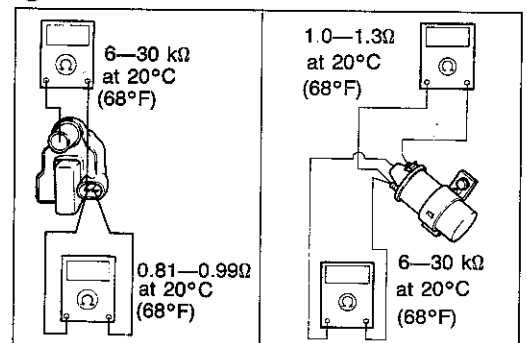
9MU0GX-068

### Distributor pickup coil resistance



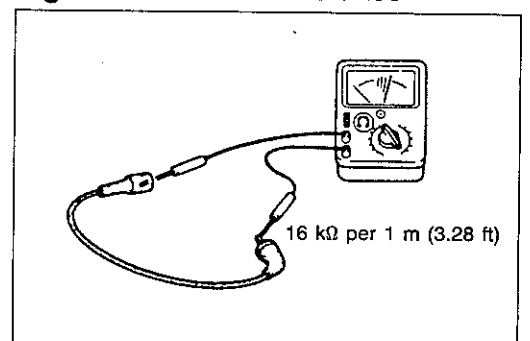
9BU0GX-052

### Ignition coil resistance

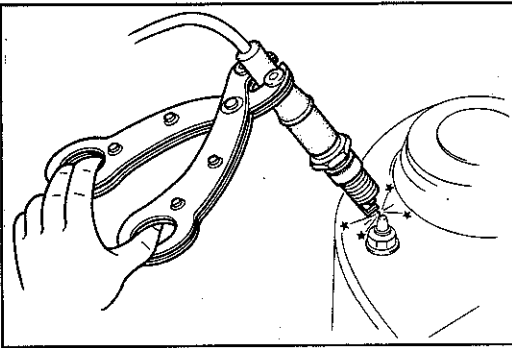


9MU0GX-067

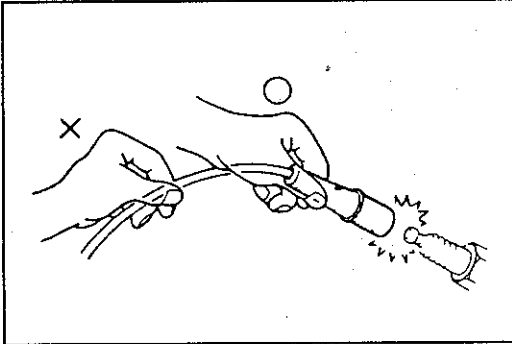
### High-tension lead resistance



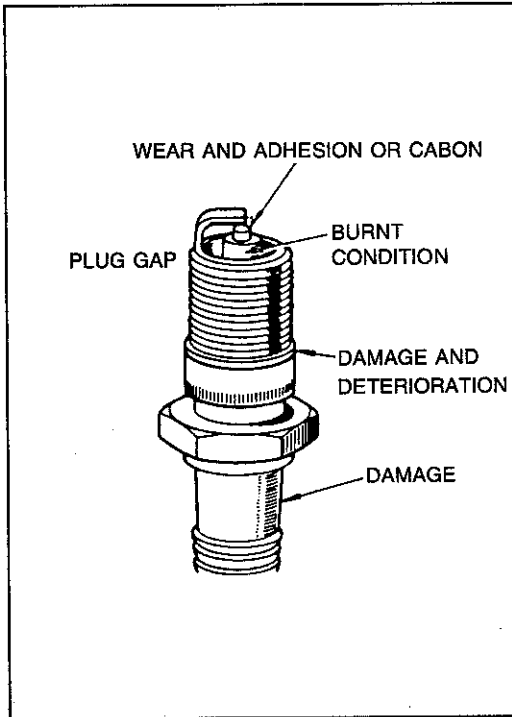
9MU0GX-069



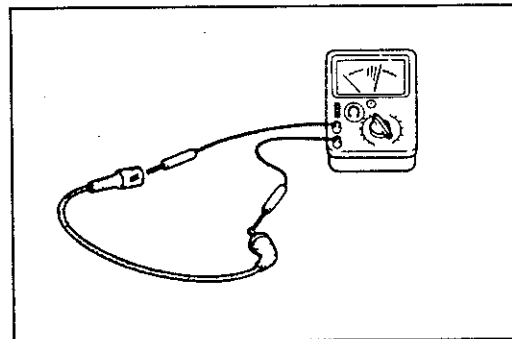
9MU0GX-031



9MU0GX-032



0BU0GX-027



63U05X-026

## SPARK PLUGS

### SPARK TEST

1. Disconnect the high-tension lead from the spark plug.
2. Connect a new spark plug to the high-tension lead.
3. Hold it with insulated pliers **approx. 5—10mm (0.20—0.39 in)** from a ground.
4. Crank the engine and verify that a strong blue spark is visible.

### REMOVAL AND INSTALLATION

Note the following points:

1. When the spark plug lead is to be pulled off, be sure to pull the boot itself, and not the wire.
2. Tighten the spark plugs to the specified torque.

#### Spark plug tightening torque:

**15—23 N·m (1.5—2.3 m·kg, 11—17 ft·lb)**

### INSPECTION

Check the following points. If a problem is found, replace the spark plug.

1. Damaged insulation
2. Worn electrodes
3. Carbon deposits  
If cleaning is necessary, use a plug cleaner or a wire brush.  
Clean the upper insulator also.
4. Damaged gasket

#### Plug gap:

**0.75—0.85mm (0.028—0.033 in).. F2 (Carburetor)**  
**1.0—1.1mm (0.039—0.043 in)..... F2 (Egi), G6**

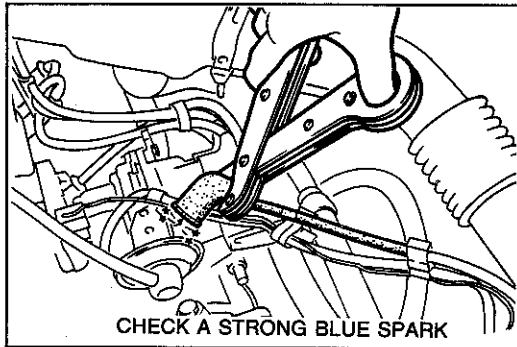
## HIGH-TENSION LEADS

### INSPECTION

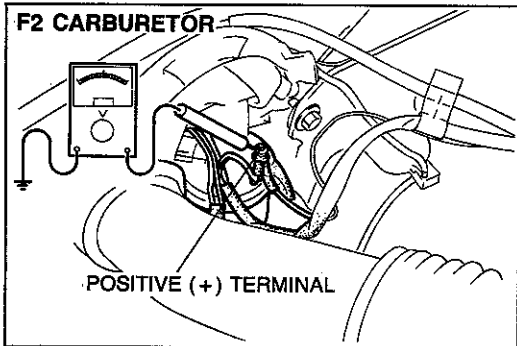
Use an ohmmeter to measure the resistance.

**Resistance: 16 kΩ per 1 m (3.28 ft)**

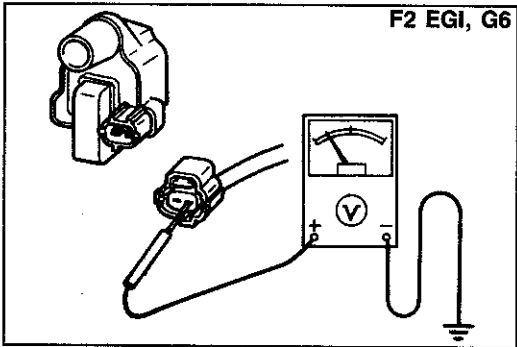




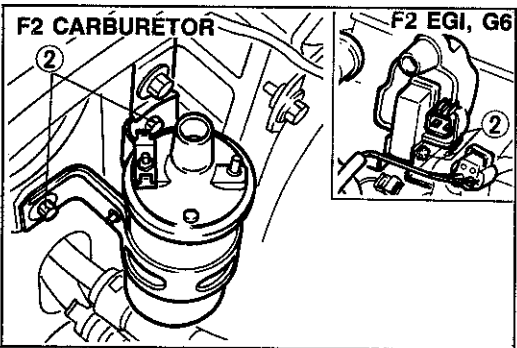
9MU0GX-033



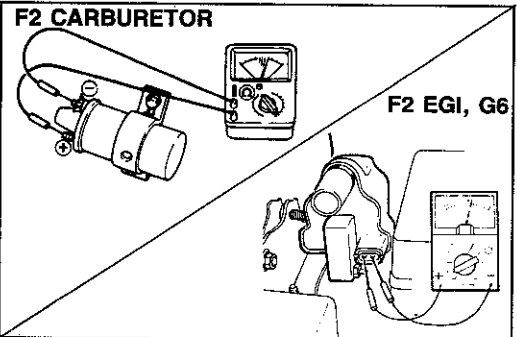
9MU0GX-071



F2 EGI, G6



0BU0GX-028



0BU0GX-029

## IGNITION COIL

### SPARK TEST

1. Disconnect the ignition coil lead from the distributor.
2. Hold it with insulated pliers **approx. 5—10mm (0.20—0.39 in)** from a ground.
3. Crank the engine and verify that a strong blue spark is visible.

4. If there is no spark, check for voltage at the positive (+) terminal of the ignition coil with the ignition switch in the ON position.

**Voltage: Approx. 12V**

5. If there is no voltage, check the main fuse, ignition switch, and wiring harness.

### REMOVAL AND INSTALLATION

1. Disconnect the distributor lead and wires.
2. Remove the two installation bolts.
3. Install in the reverse order of removal.

### INSPECTION

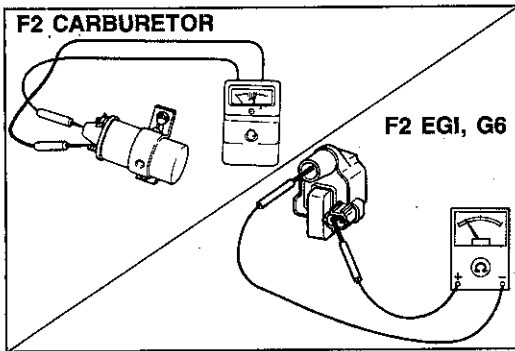
#### Primary Coil

Use an ohmmeter and check resistance in the primary coil. If it is not within specification, replace the coil.

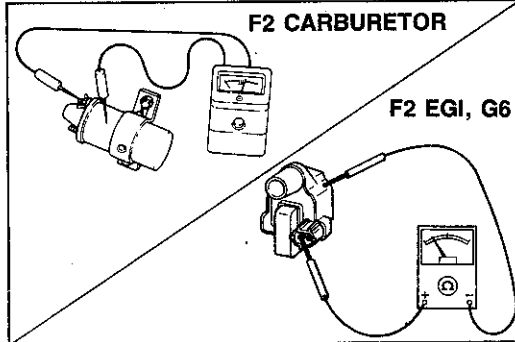
**Primary coil resistance (at 20°C [68°F])**

**F2 Carburetor: 1.0—1.3Ω**

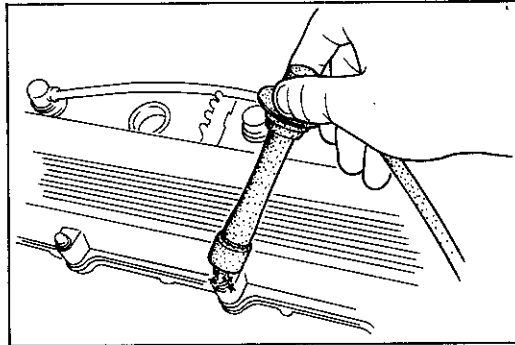
**F2 EGI, G6: 0.81—0.99Ω**



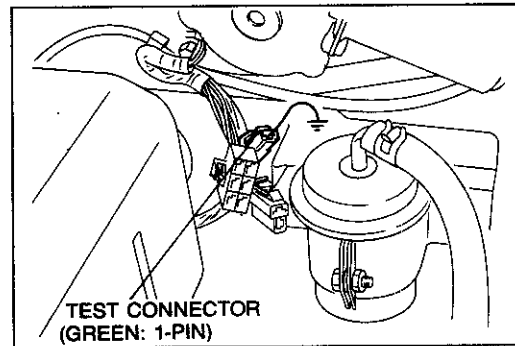
0BU0GX-030



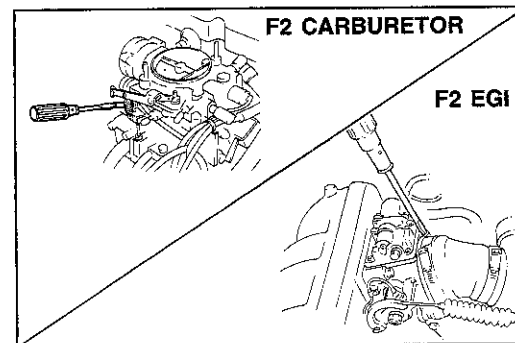
86U05X-046



9MU0GX-036



0BU0GX-031



0BU0GX-032

### Secondary Coil

Use an ohmmeter and measure resistance of the secondary coil. If it is not within specification, replace the coil.

#### Secondary coil resistance (at 20°C [68°F])

F2 Carburetor: 6—30 kΩ

F2 EGI, G6: 6—30 kΩ

### Insulation of Case

Use a **500V megger** tester to measure the insulation resistance between the primary terminal and the case.

The standard reading is **10 mΩ or more**.

## DISTRIBUTOR

### ON-VEHICLE INSPECTION

#### SPARK TEST

1. Disconnect the distributor lead from the distributor.
2. Hold it with insulated pliers **approx. 5—10mm (0.20—0.39 in)** from the connector.
3. Crank the engine and verify that a strong blue spark is visible.

#### IGNITION TIMING

1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
3. Connect a jumper wire between the test connector (green, 1-pin) and ground. **(F2 EGI, G6)**

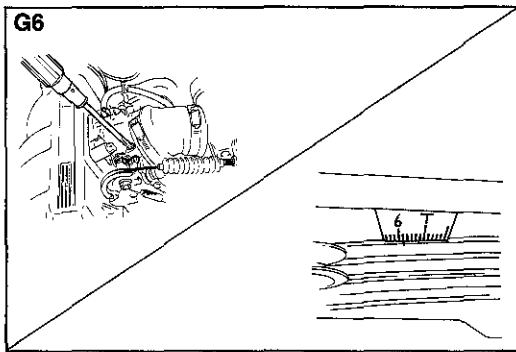
4. Check the idle speed, set it to the specified speed if necessary.

#### Idle speed:

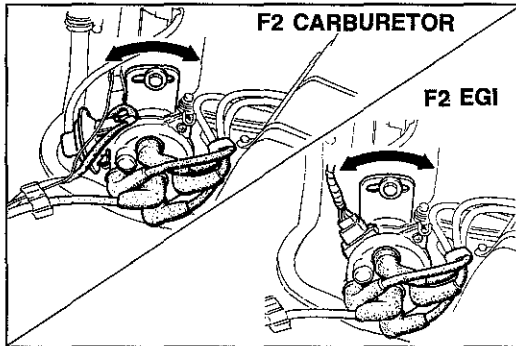
(RPM)

	F2 Carburetor	F2 EGI	G6
M/T	800—850	730—770	730—770
A/T	(800 ±5%)	750—790	750—790

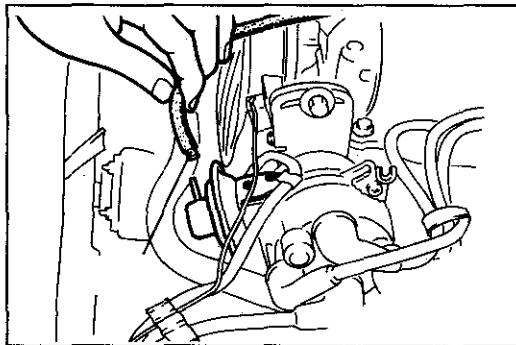
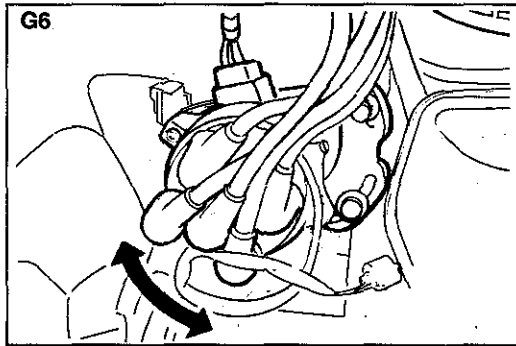
(M/T: Neutral, A/T P range)



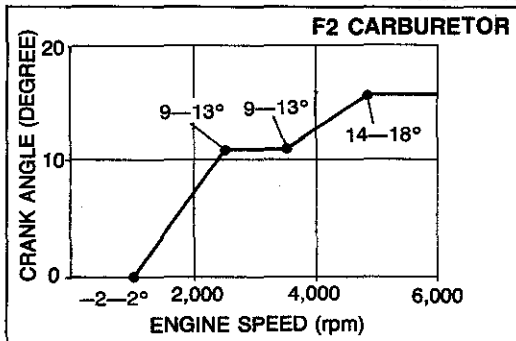
0BU0GX-033



0BU0GX-034



0BU0GX-035



5. Verify that the timing mark on the crankshaft pulley and the mark on the timing belt cover are aligned.

**Ignition timing: 5—7° BTDC (F2 Carburetor, F2 EGI)  
4—6° BTDC (G6)**

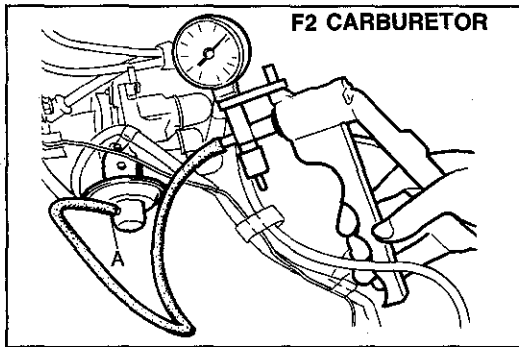
6. If the mark is not aligned, loosen the distributor lock nut or bolts and turn the distributor housing to make the adjustment.
7. Tighten the distributor lock nut or bolts to specified torque.

**Tightening torque:  
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**

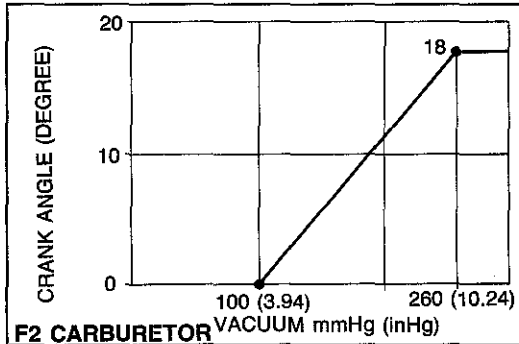
8. Disconnect the jumper wire from the test connector. (F2 EGI, G6)

## SPARK ADVANCE CONTROL Centrifugal (F2 Carburetor only)

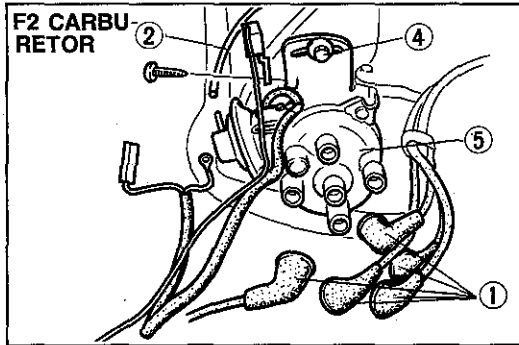
1. Warm up the engine to operating temperature.
2. Check that the idle speed and ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control, and plug the ends of the hoses.
4. While gradually increasing the engine speed, use a timing light to check the advance angle on the pulley.  
Excess advance..... weak governor spring  
(if the governor spring is broken, the advance will rise very high)  
Insufficient advance .. governor weight or cam malfunction



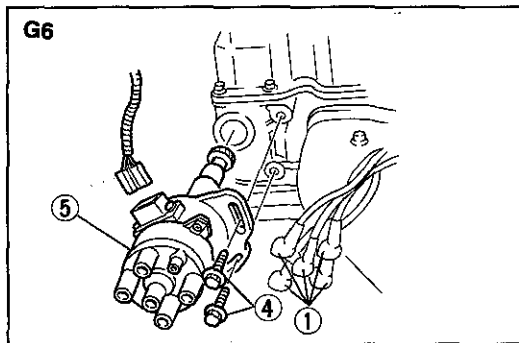
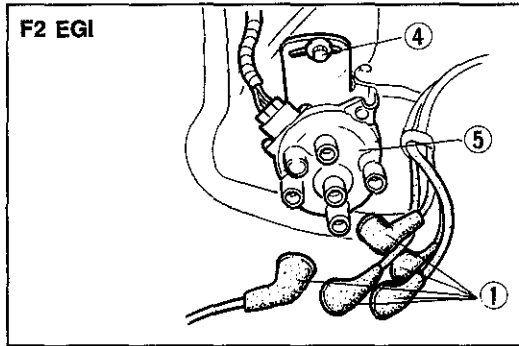
0BU0GX-036



0BU0GX-037



0BU0GX-038



### Vacuum (F2 Carburetor only)

1. Warm up the engine to operating temperature.
2. Check that the idle speed and ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control, and plug the ends of the hoses.
4. Run the engine at idle.
5. Attach a vacuum pump to the control A and check by using the timing, light while applying vacuum.

### Electronic Advance Inspection (F2 EGI, G6)

1. Verify that the ignition timing advances with engine acceleration.

### REMOVAL

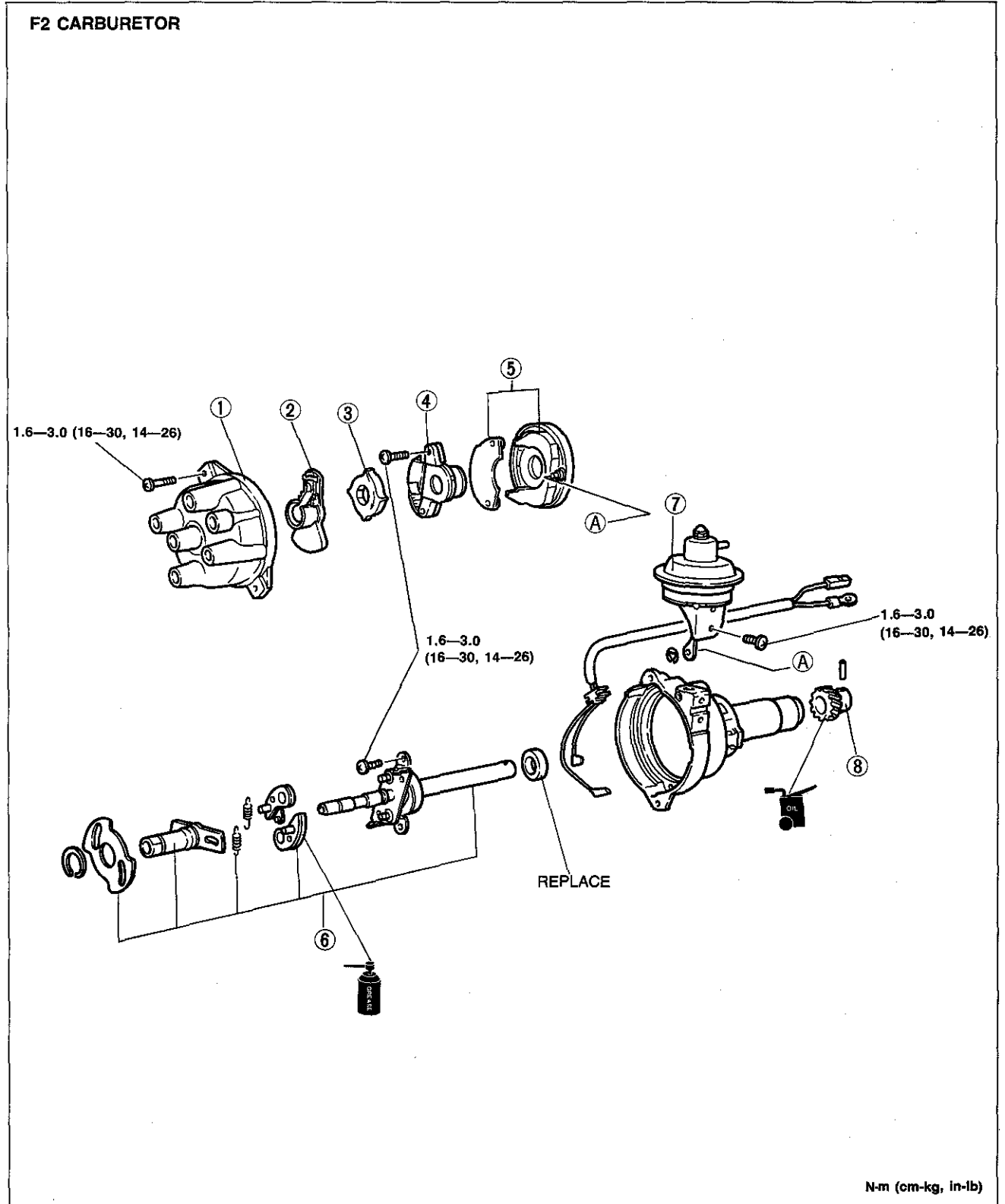
1. Remove the high-tension leads.
2. Disconnect the vacuum hose (F2 carburetor only) and wiring.
3. Turn the crankshaft so that No.1 cylinder is at top dead center of compression.
4. Loosen the distributor locknut or bolts.
5. Remove the distributor.

### Note

**Do not turn the crankshaft after the distributor has been removed.**

## DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



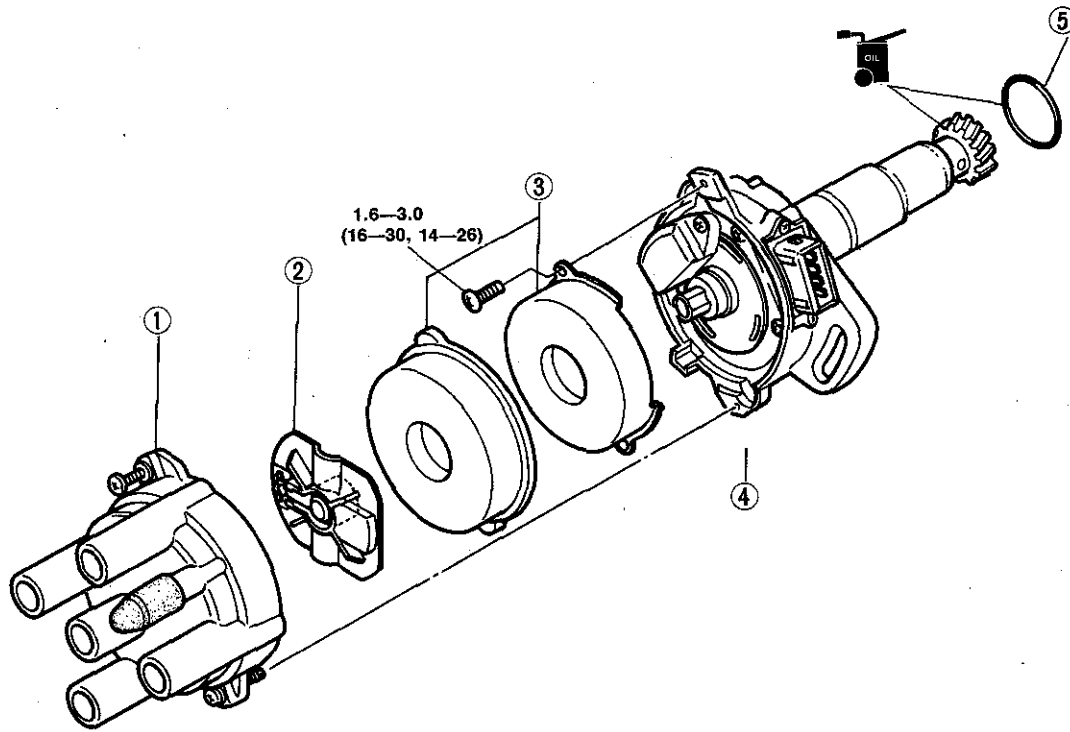
9BU0GX-031

1. Cap
2. Rotor
3. Reluctor

4. Pickup coil with igniter
5. Breaker
6. Governor set

7. Vacuum control unit
8. Driven gear

F2 EGI, G6

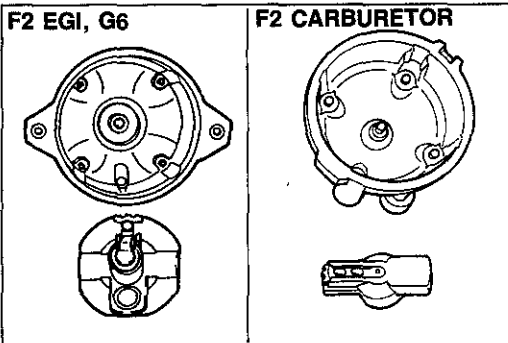


N-m (cm-kg, in-lb)

0BU0GX-039

- 1. Cap
- 2. Rotor
- 3. Cover

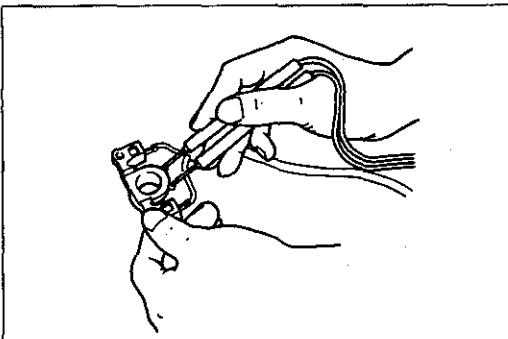
- 4. Crank angle sensor
- 5. O-ring



0BU0GX-040

**INSPECTION**  
**Cap and Rotor**

- 1. Check for corrosion, damage, and cracks.
- 2. Replace if necessary.



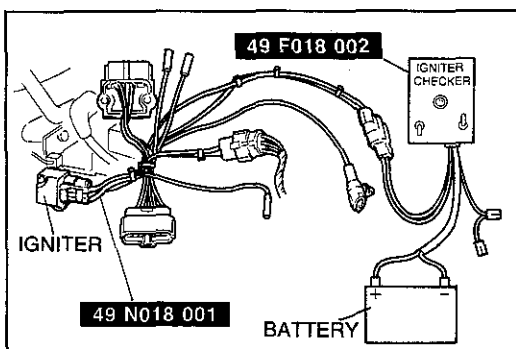
0BU0GX-041

**Pickup Coil with Igniter (F2 Carburetor only)**

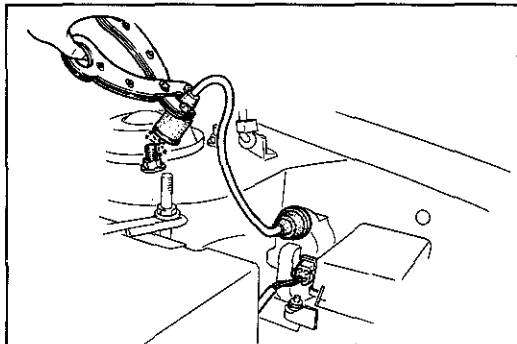
- 1. Connect an ohmmeter to the pickup coil.
- 2. Measure the resistance.

**Resistance: 900—1,200Ω**

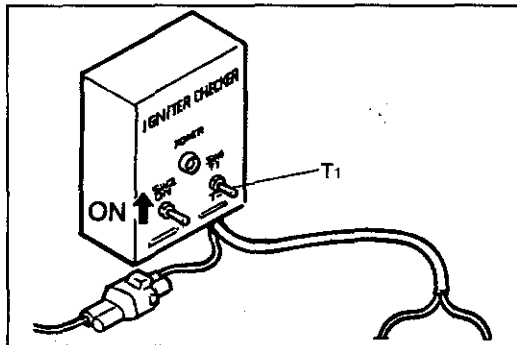
- 3. If it is not within specification, replace it.



0BU0GX-042



93A0GX-048



93A0GX-072

## IGNITER (F2 EGI, G6)

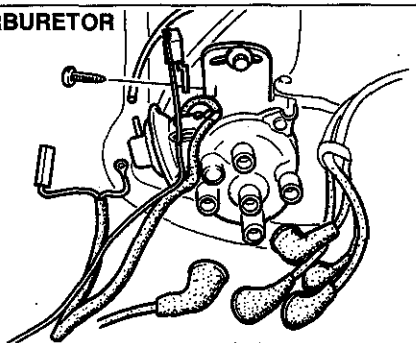
1. Disconnect the igniter connector.
2. Connect the **SST** between the igniter and the wiring harness.
3. Connect the connector (4-pin) of the **SST (Igniter Checker)** to the adapter harness.
4. Connect the power leads of the **SST (Igniter Checker)** to the battery.
5. Turn the ignition switch ON.
6. Disconnect the high-tension coil lead from the distributor and hold it **5—10mm (0.20—0.39in)** from a ground.

### Caution

**Hold the SW2 ON for no longer than one second.**

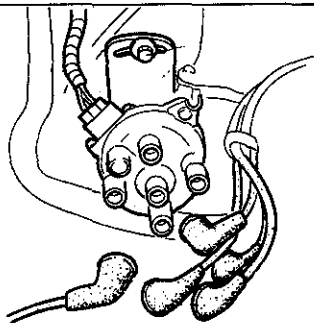
7. Flip the SW2 ON and OFF, and verify that strong blue sparks are discharged from the high-tension lead.

F2 CARBURETOR



1BU0GX-013

F2 EGI



9BU0GX-055

## INSTALLATION

**Note**

After installing the distributor, adjust the ignition timing. (Refer to page G-24.)

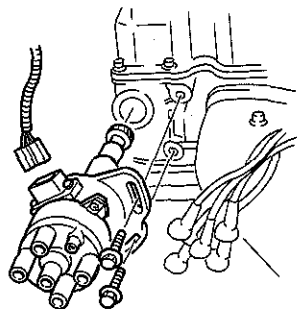
Verify that the No.1 cylinder is at top dead center and align the distributor matching marks.

1. Install the distributor and connect the high-tension leads and distributor connector.
2. Tighten the locknut or bolts to the specified torque.

**Torque specification:**

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

G6

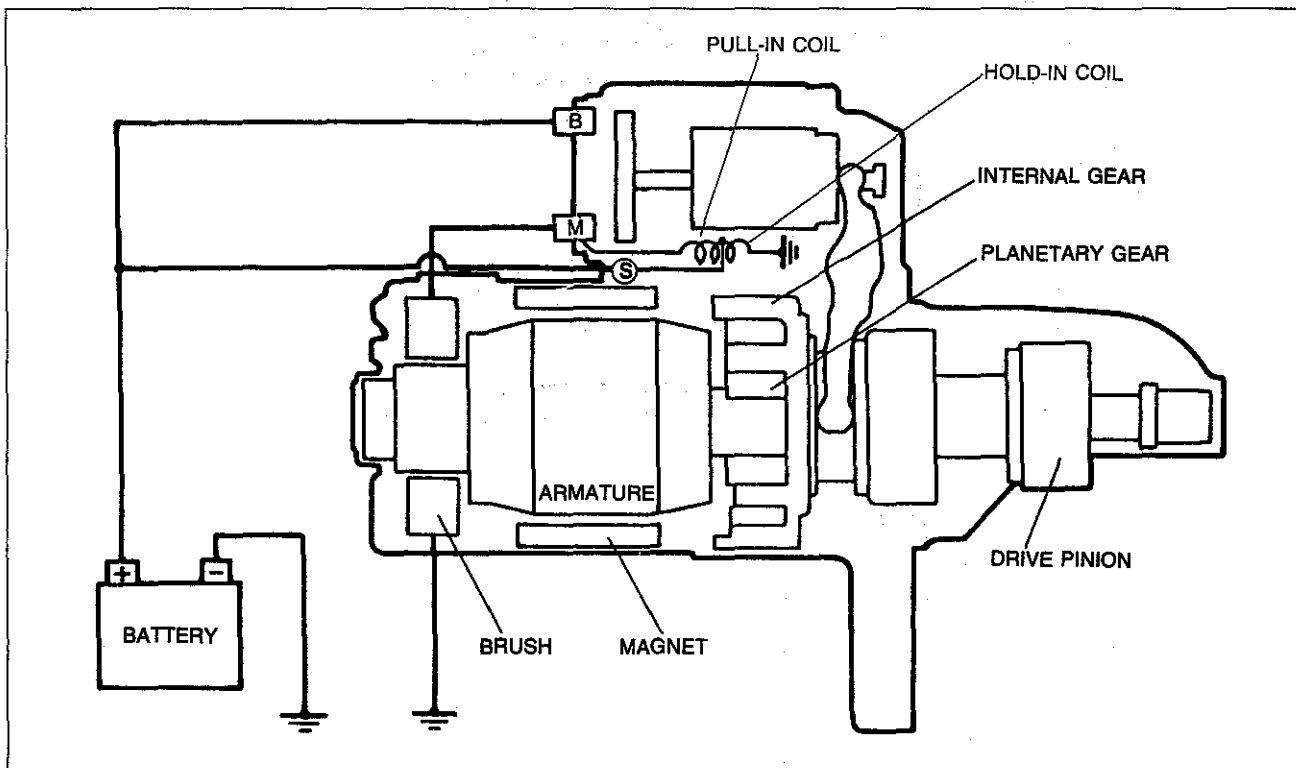




STARTING SYSTEM

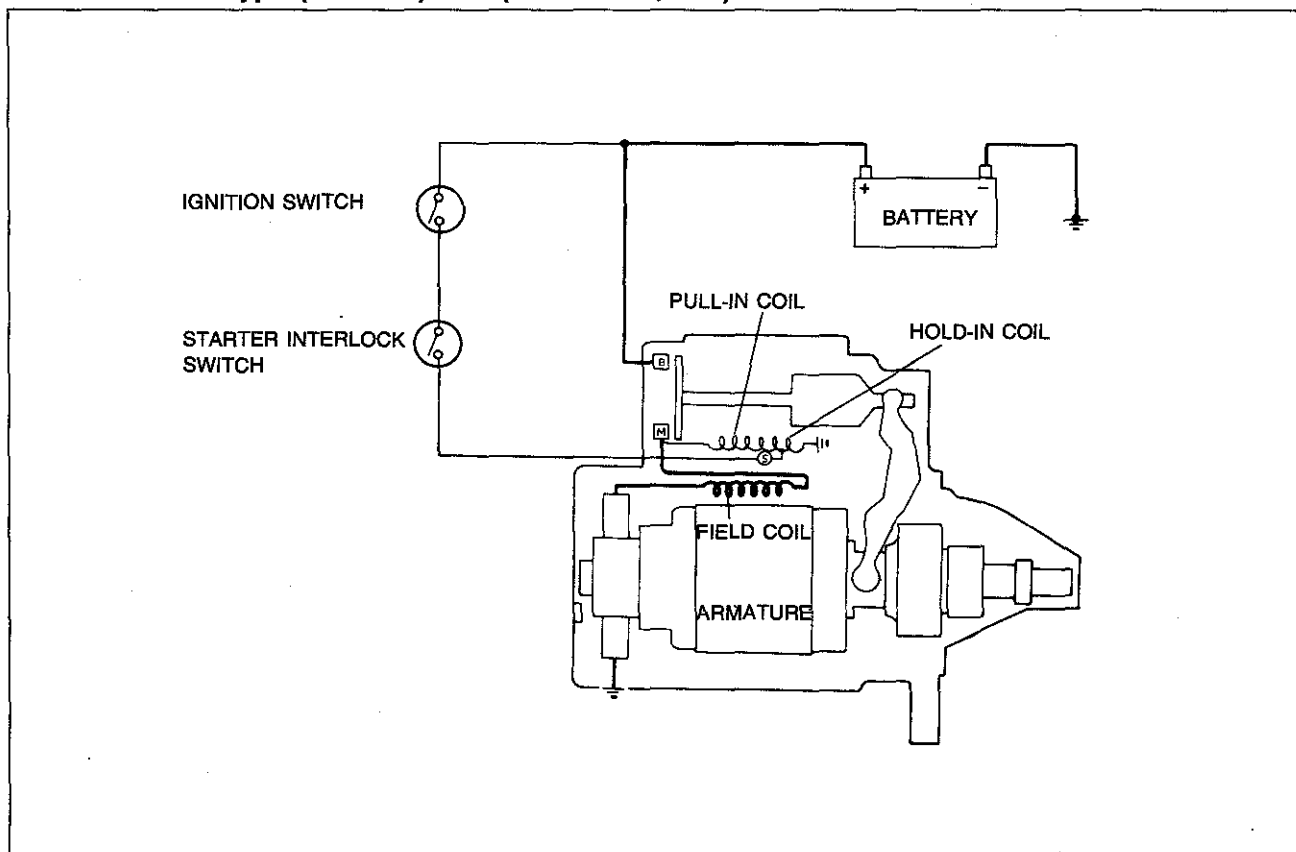
STARTER

Coaxial Reduction Type (1.4 kW)—F2 (Carburetor, EGI) A/T



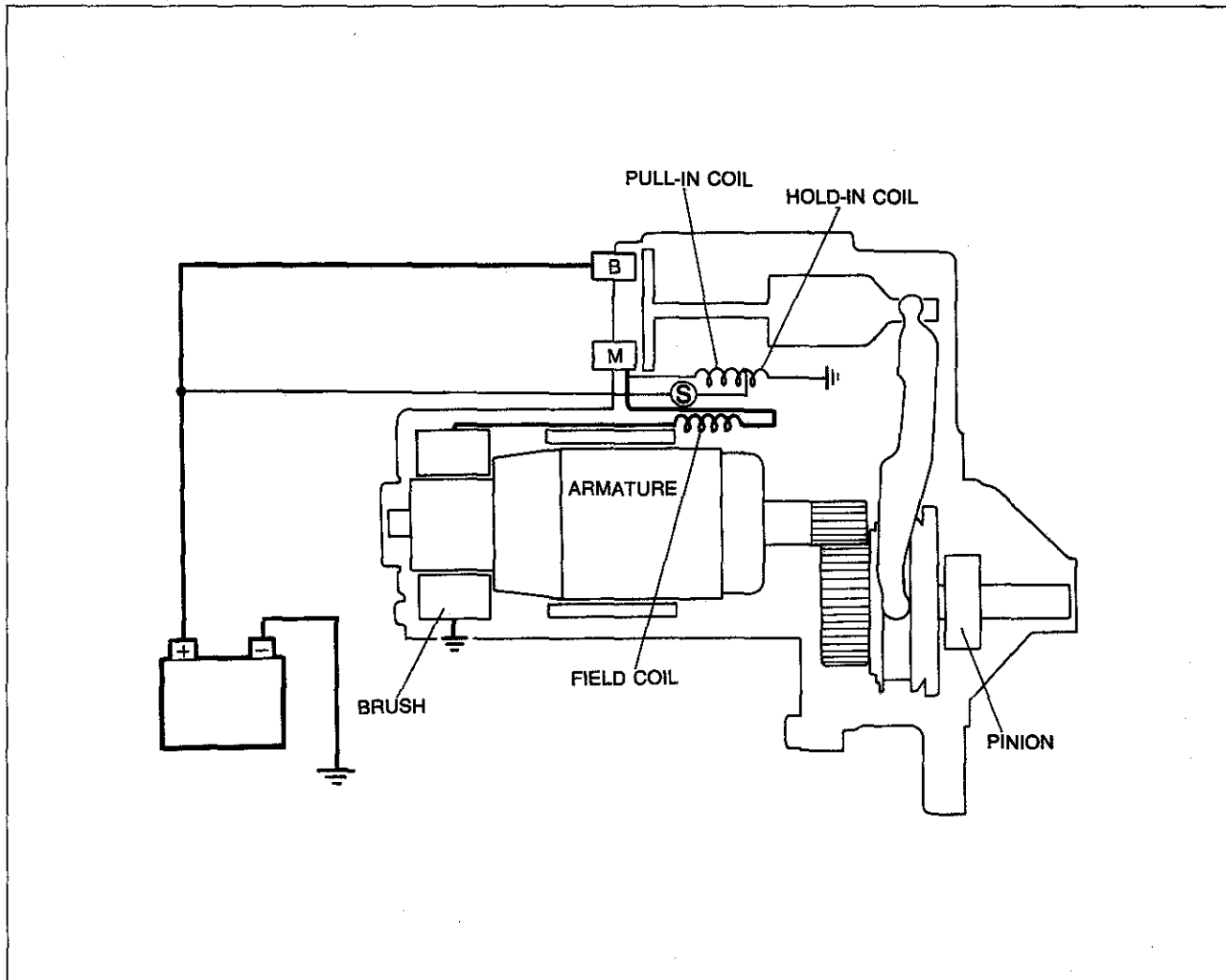
OBU0GX-043

Non-Reduction Type (0.95 kW)—F2 (Carburetor, EGI) M/T

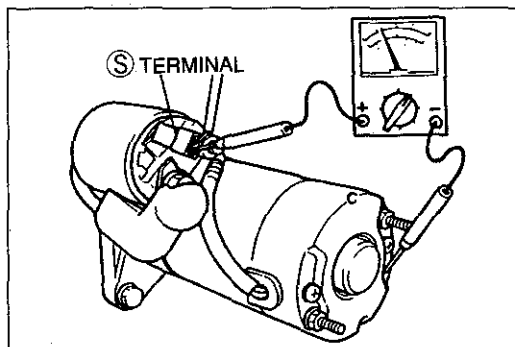


OBU0GX-044

Reduction Type (1.2 kW)—G6 M/T, (1.4 kW)—G6 A/T



0BU0GX-045



9MU0GX-072

**ON-VEHICLE INSPECTION**

Charge the battery fully before starting the following inspection.

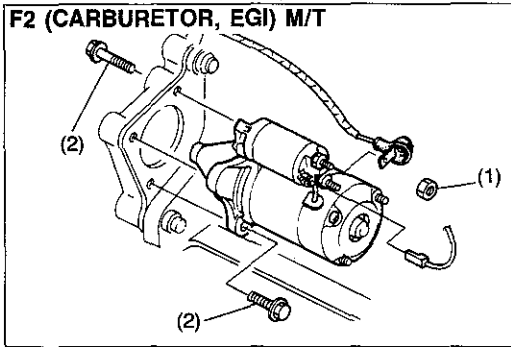
1. Turn the ignition switch to the start position.
2. Check that the starter motor operates.
3. If the starter does not operate, check the voltage between S terminal and ground by using a voltmeter.
4. If the voltage is **8V or more**, the starter is malfunctioning.
5. If **less than 8V**, the wiring harness is malfunctioning.

**Caution**

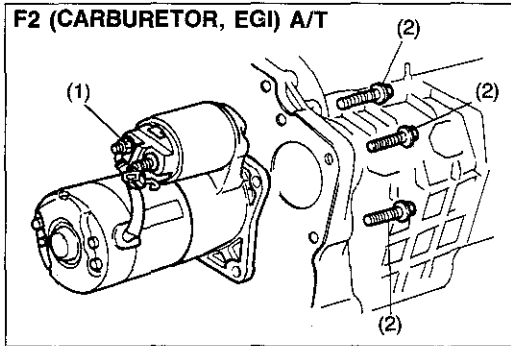
If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

**Note**

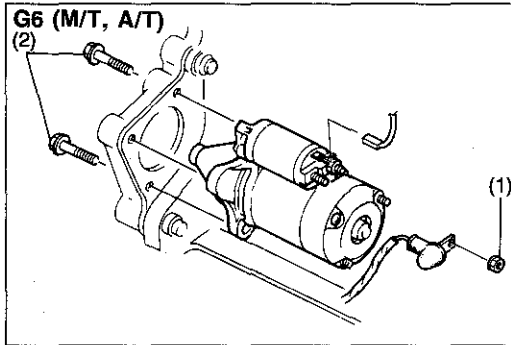
The cranking speed is greatly affected by the viscosity of the engine oil.



9MU0GX-073



0BU0GX-058



## REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the wiring from the starter.
3. Raise the front of the vehicle and support it with safety stands.
4. Remove the starter bolts.
5. Draw out the starter from lower side of the vehicle.

### Note

**Remove the lowest starter bolt last.**

Install in the reverse order of removal.

### Tightening torque

**F2 (Carburetor, EGI)—M/T, A/T**

**Nut (1):**

8.8—13 N·m (90—130 cm·kg, 78—113 in·lb)

**Bolt (2):**

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

**G6—M/T, A/T**

**Nut (1):**

9.8—12 N·m (100—120 cm·kg, 87—104 in·lb)

**Bolt (2):**

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

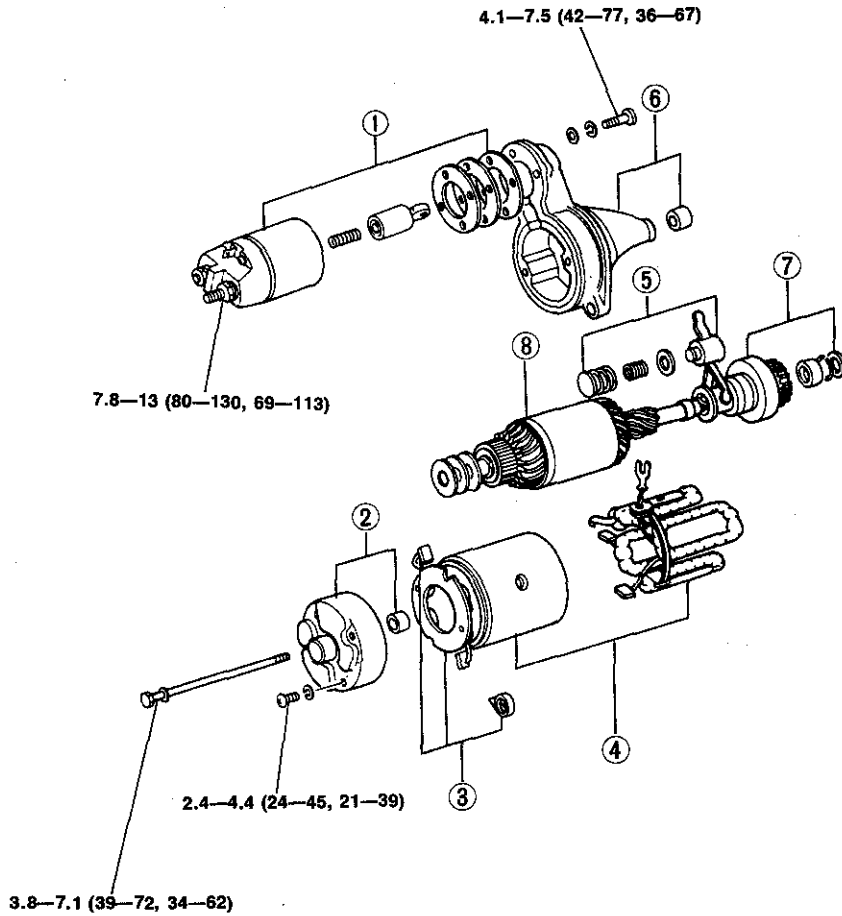
# G

## STARTING SYSTEM

### DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Inspect the component parts.
3. Assemble in the reverse order of disassembly.

**F2 (CARBURETOR, EGI) M/T  
(NON-REDUCTION TYPE 0.95 kW)**



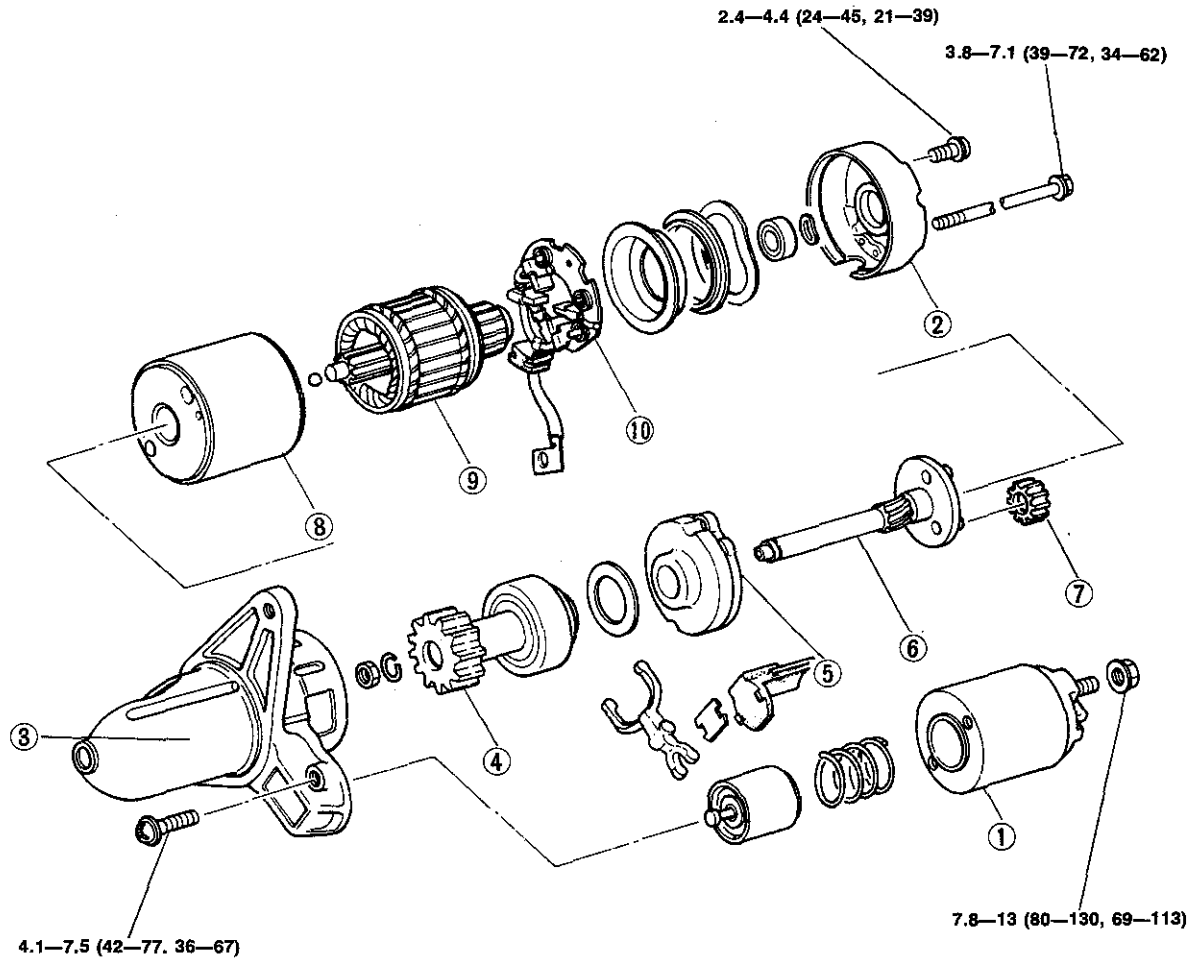
N-m (cm-kg, in-lb)

1BU0GX-014

- |                          |           |
|--------------------------|-----------|
| 1. Magnetic switch       |           |
| Inspection.....          | page G-38 |
| 2. Rear housing          |           |
| 3. Brush holder assembly |           |
| Inspection.....          | page G-39 |
| 4. Field coil            |           |
| Inspection.....          | page G-38 |

- |                 |           |
|-----------------|-----------|
| 5. Lever        |           |
| 6. Front cover  |           |
| 7. Drive pinion |           |
| 8. Armature     |           |
| Inspection..... | page G-37 |

F2 (CARBURETOR, EGI) A/T  
(COAXIAL REDUCTION TYPE 1.4 kW)



N·m (cm·kg, in·lb)

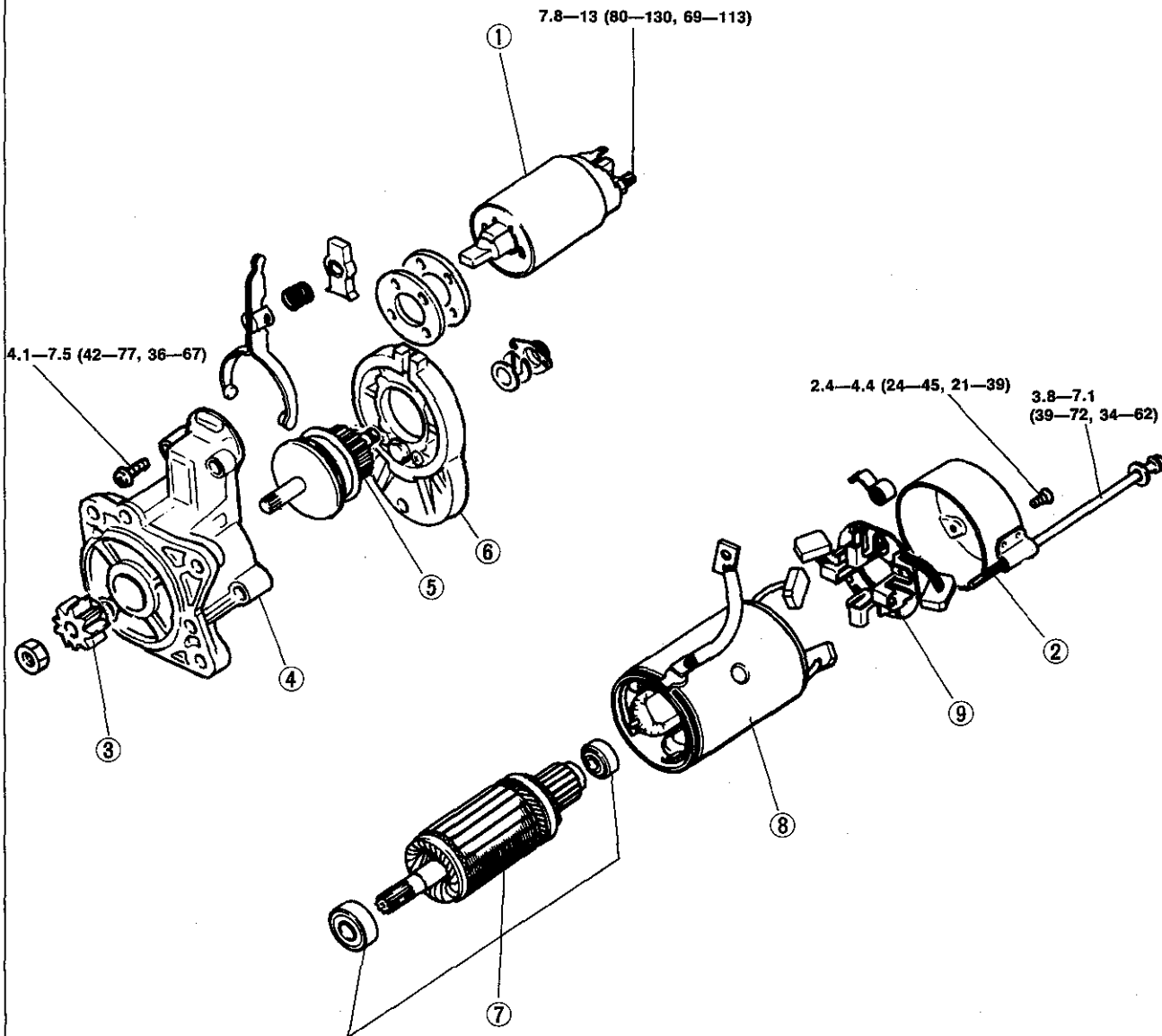
1BU0GX-015

- 1. Magnetic switch  
Inspection..... page G-38
- 2. Rear housing
- 3. Front cover
- 4. Drive pinion
- 5. Internal gear
- 6. Gear shaft

- 7. Planetary gear
- 8. Magnet coil  
Inspection..... page G-38
- 9. Armature  
Inspection..... page G-37
- 10. Brush holder assembly  
Inspection..... page G-39

**STARTING SYSTEM**

**G6 (M/T, A/T)**  
**(REDUCTION TYPE M/T 1.2 kW, A/T 1.4 kW)**

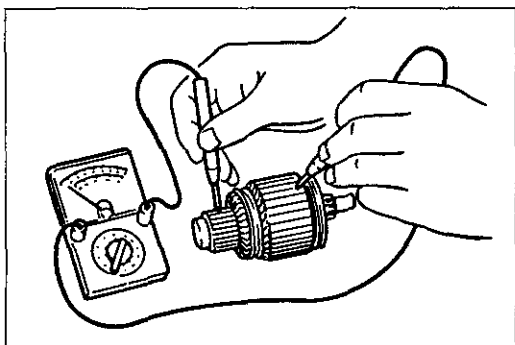


**N-m (cm-kg, in-lb)**

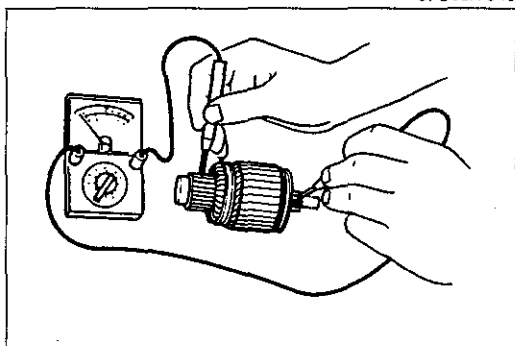
1BU0GX-016

- 1. Magnetic switch  
 Inspection..... page G-38
- 2. Rear housing
- 3. Drive pinion
- 4. Front cover
- 5. Reduction gear
- 6. Center bracket

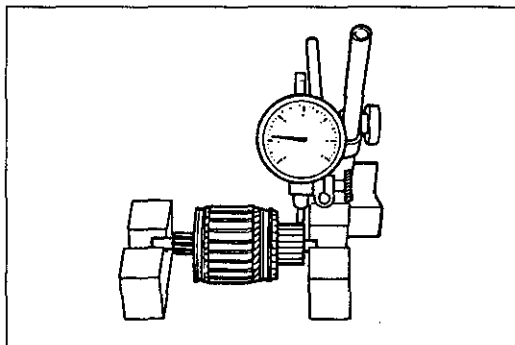
- 7. Armature  
 Inspection..... page G-37
- 8. Field coil  
 Inspection..... page G-38
- 9. Brush holder assembly  
 Inspection..... page G-39



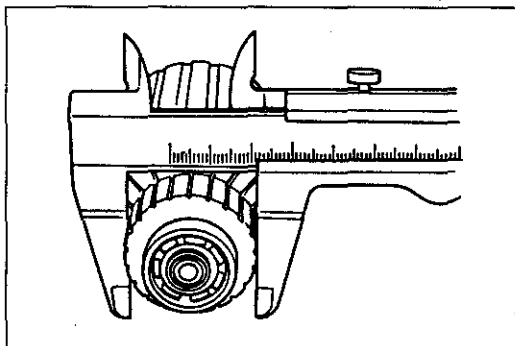
67U05X-048



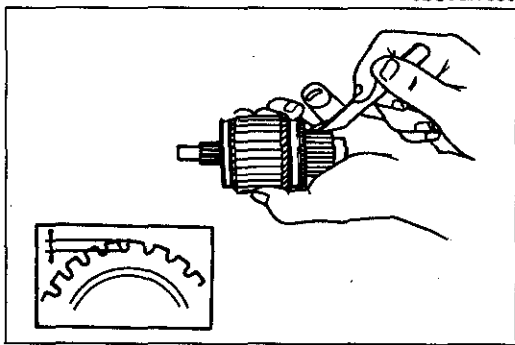
67U05X-049



0BU0GX-049



0BU0GX-050



9MU0GX-075

**INSPECTION**

**Armature**

1. Ground of armature coil  
Check for continuity between the commutator and the core with a circuit tester. Replace the armature if there is continuity.
2. Insulation of armature coil  
Check for continuity between the commutator and the shaft with a circuit tester. Replace the armature if there is continuity.
3. Vibration of the commutator
  - (1) Place the armature on V blocks, and measure the vibration by using a dial gauge.
  - (2) If the vibration is at limit or more, repair with a lathe so that it becomes standard or replace the armature.

Engine	F2 (Carburetor, EGI)	G6
Standard vibration mm (in)	0.05 (0.002)	0.03 (0.001)
Limit mm (in)	0.1 (0.004)	0.05 (0.002)

**Note**

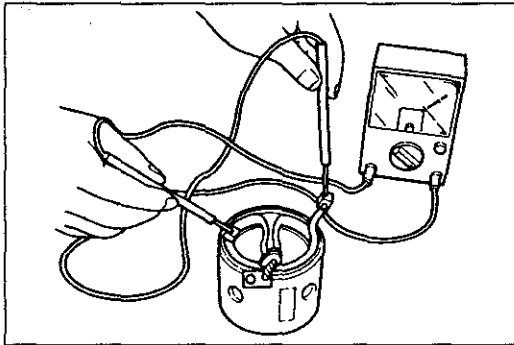
**Before checking, be sure that there is no play in the bearings.**

4. Outer diameter of the commutator  
Replace the armature if the outer diameter of the commutator is grind limit or less.
5. Roughness of the commutator surface  
If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it by using a lathe or fine sandpaper.

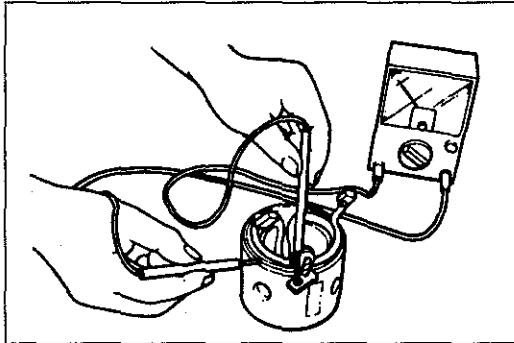
Engine	F2 (Carburetor, EGI) M/T	F2 (Carburetor, EGI) A/T	G6 M/T	G6 A/T
Grind limit mm (in)	31.4 (1.24)	28.8 (1.13)	27.4 (1.08)	31.4 (1.24)

6. Segment groove depth  
If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

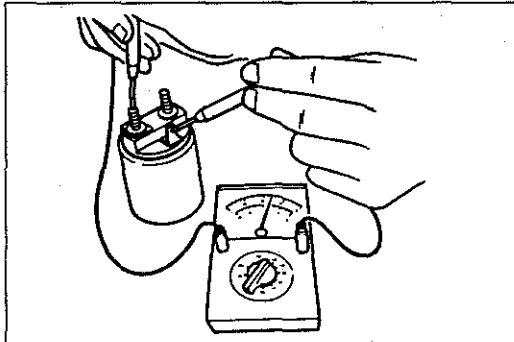
**Standard depth: 0.5—0.8mm (0.020—0.031 in)**  
**Limit depth: 0.2mm (0.008 in)**



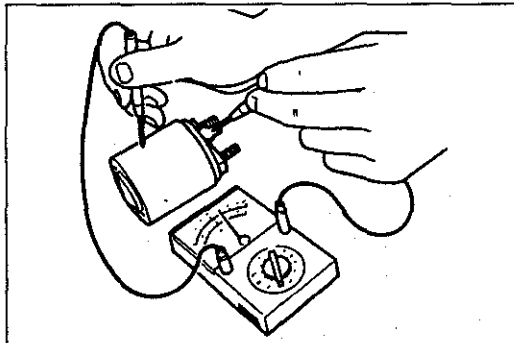
4BG05X-085



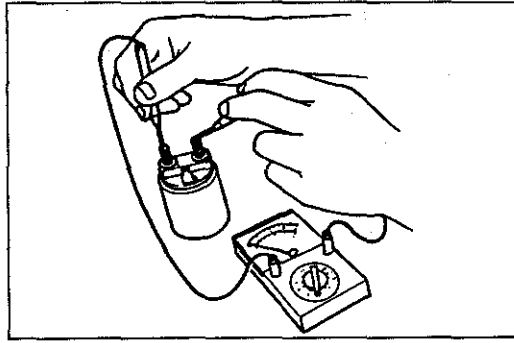
4BG05X-086



67U05X-053



67U05X-054



67U05X-055

**Field Coil**

## 1. Wiring damage

- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.

## 2. Ground of the field coil

- (1) Check for continuity between the connector and yoke by using a circuit tester.
- (2) Repair or replace the yoke assembly if there is continuity.

## 3. Installation of the field coil

- Replace the yoke assembly if the field coil is loose.

**Magnetic Switch**

## 1. Wiring damage (S terminal — M terminal).

- Check for continuity between the S terminal and the M terminal with a circuit tester. Replace the magnetic switch if there is no continuity.

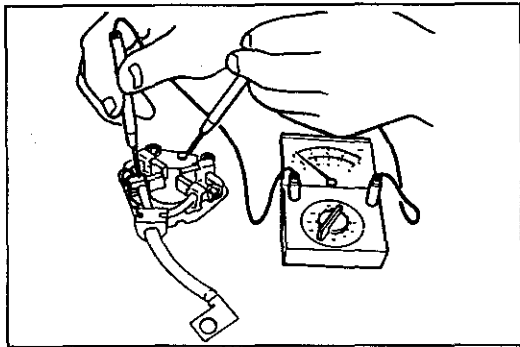
## 2. Wiring damage (S terminal — body)

- Check for continuity between the S terminal and the body with a circuit tester.
- Replace the magnetic switch if there is no continuity.

## 3. Ground of magnetic switch

- Check for continuity between the M and B terminals with a circuit tester. Replace the magnetic switch if there is continuity.

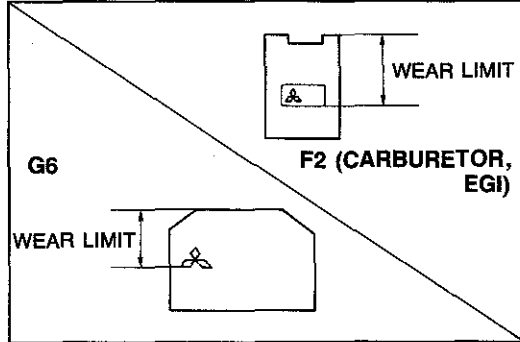




9MU0GX-076

**Brush and Brush Holder**  
**Insulation of brush holder**

Check for continuity between the insulated brush and the plate with a circuit tester. Replace the brush holder if there is continuity.

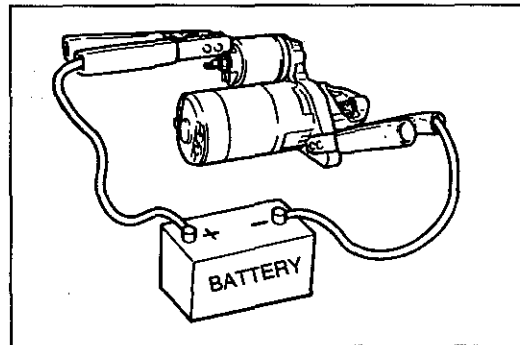


0BU0GX-051

**Brush**

If the brushes are worn beyond the wear limit or if the wear is near the limit, replace the brushes.

Type	F2 (Carburetor, EGI) M/T	F2 (Carburetor, EGI) A/T	G6 M/T	G6 A/T
Standard mm (in)	17.0 (0.669)	17.5 (0.689)	16.0 (0.630)	17.0 (0.669)
Minimum mm (in)	11.5 (0.453)	10.0 (0.394)	9.0 (0.354)	11.5 (0.453)



0BU0GX-052

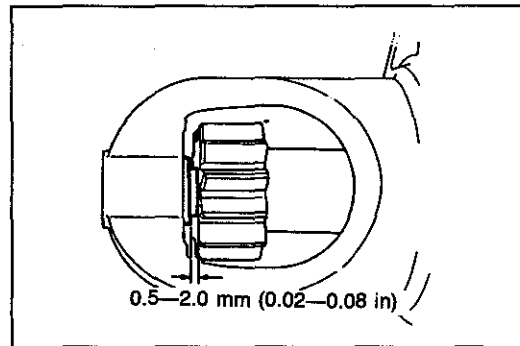
**CHECKING OPERATION**

**Magnetic Switch**

Make the following tests:

**Pull-out test [F2 (Carburetor, EGI) A/T and G6 (M/T, A/T)]**

Check that the pinion is pulled out when 12V are connected to the S terminal and the body is grounded.

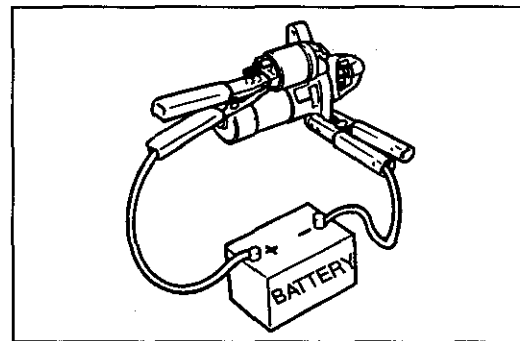


9BU0GX-043

Measure the pinion gap while the pinion is pulled out.

**Specification: 0.5—2.0mm (0.02—0.08 in)**

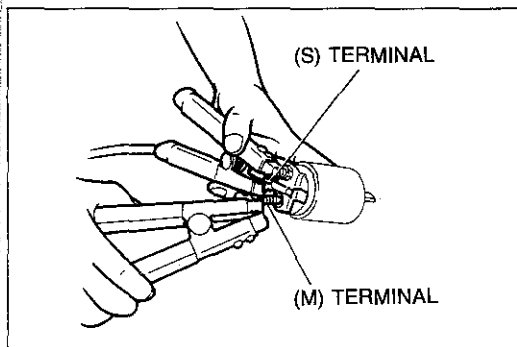
Adjust the pinion gap with an adjust washer (drive housing front cover—magnetic switch) if it is not within specification.



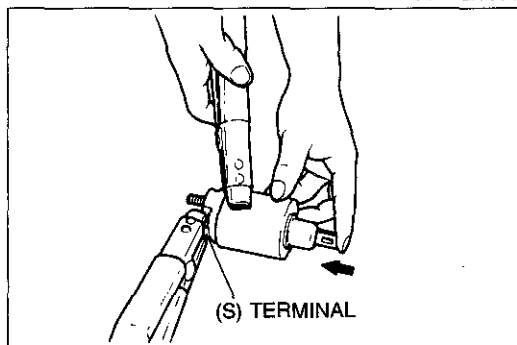
0BU0GX-053

**Return test [F2 (Carburetor, EGI) A/T and G6 (M/T, A/T)]**

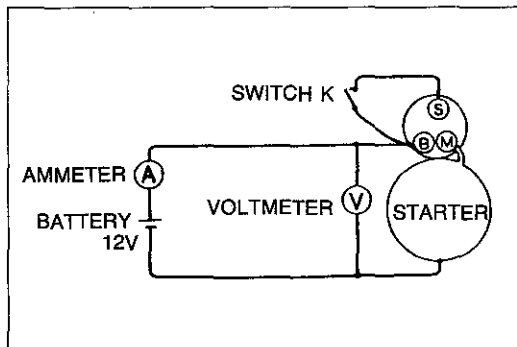
1. Disconnect the motor wire from the M terminal, and then connect the battery power to the M terminal and ground the body.
2. Pull out the overrunning clutch with a screwdriver. Check that the overrunning clutch returns to its original position when released.



OBU0GX-054



OBU0GX-055



OBU0GX-056

**Pull-In Test [F2 (Carburetor, EGI) M/T]**

1. Connect the positive battery terminal to the magnetic switch (S) terminal.
2. Ground the magnetic switch (M) terminal.
3. Make sure the plunger is pulled into the switch.

**Hold-In Test [F2 (Carburetor, EGI) M/T]**

1. Connect the positive battery terminal to the magnetic switch (S) terminal.
2. Ground the magnetic switch body.
3. Push the plunger into the switch.
4. Make sure the plunger stays in the in position.

**No-Load Test**

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

**Note**

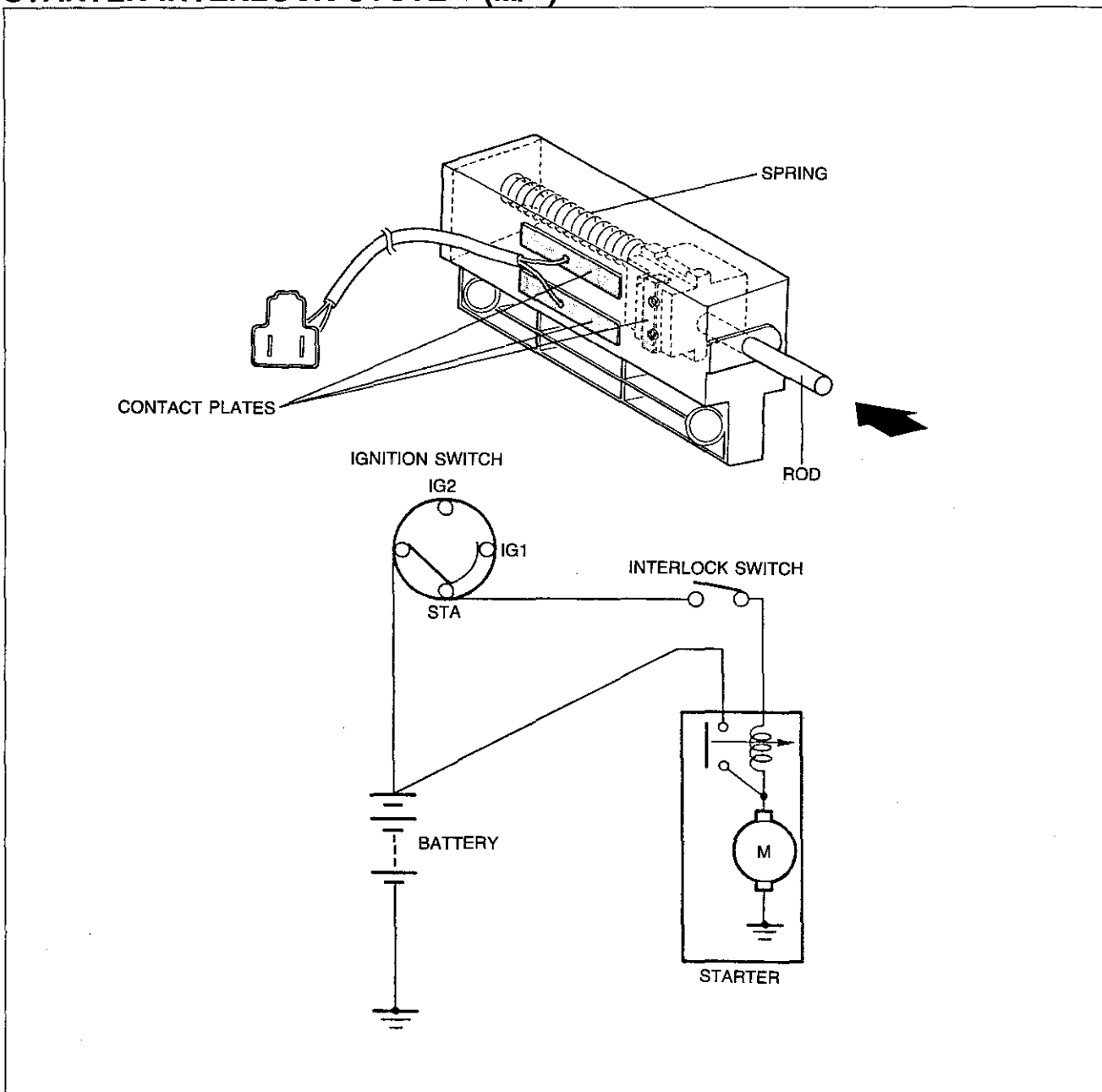
**Use heavy gauge wires and tighten each terminal fully.**

2. Close switch K to run the starter.
3. Check for the following:

Engine	[F2 (Carburetor, EGI) M/T]	[F2 (Carburetor, EGI) A/T]	G6 M/T	G6 A/T
Type (kW)	0.95	1.4	1.2	1.4
Voltage (V)	11.5	11.0	11.5	11.5
Current (A)	60 max.	90 max.	90 max.	100 max.
Gear shaft speed (rpm)	6,600 min.	3,000 min.	4,000 min.	3,000 min

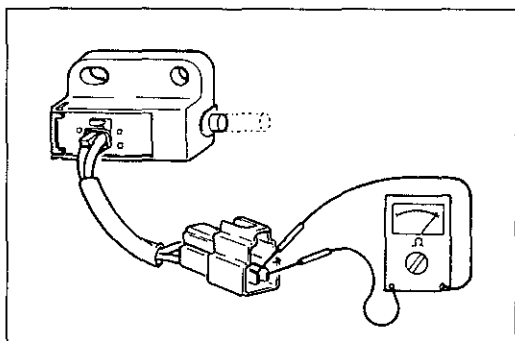
4. If any abnormality is noted, check for the cause according to "Inspection".

STARTER INTERLOCK SYSTEM (M/T)



9MU0GX-078

This system is similar to that of the inhibitor switch on an A/T vehicle. If the clutch pedal is not depressed during starting, battery power will not be supplied to the starter and it will not operate.



77U05X-016

**INTERLOCK SWITCH Inspection**

1. Disconnect the interlock switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Pedal	Continuity
Depressed	Yes
Released	No

4. Replace the switch, if necessary.

# CLUTCH

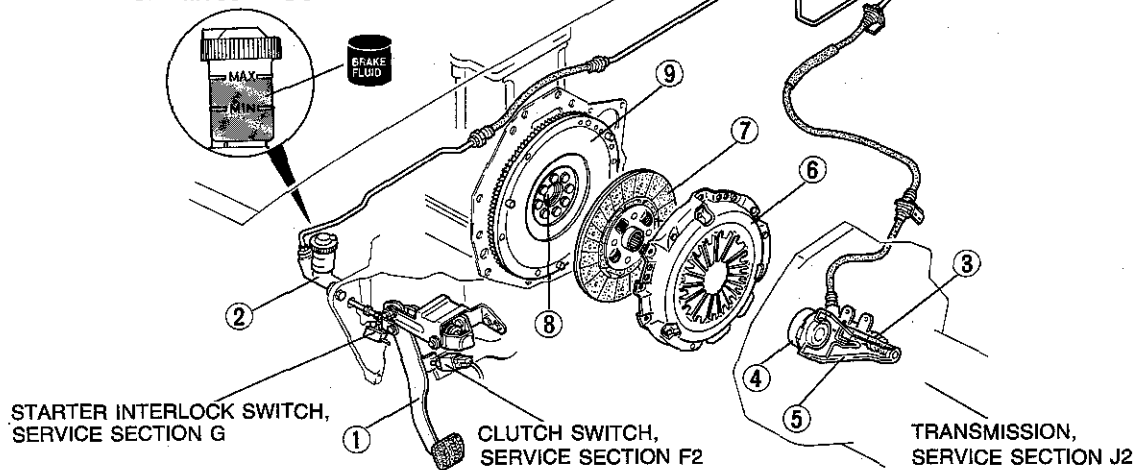
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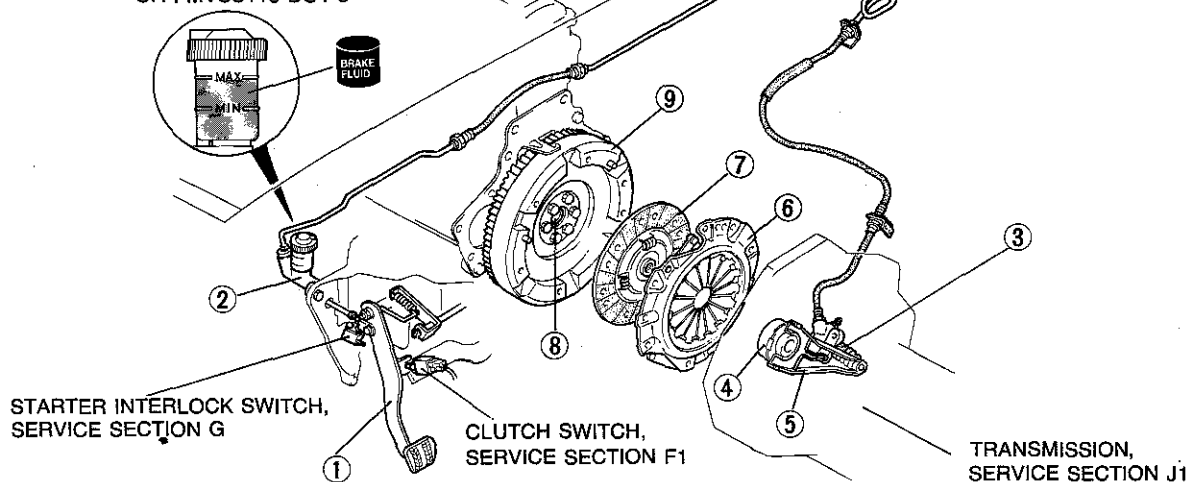
**B2600i**

FLUID SPECIFICATION  
SAE J1703  
OR FMVSS116 DOT-3



**B2200**

FLUID SPECIFICATION  
SAE J1703  
OR FMVSS116 DOT-3



2BU0HX-002

- |  |   |   |
|--|---|---|
| 1. Clutch pedal<br>Adjustment..... page H- 5<br>Removal, Inspection, and<br>Installation..... page H- 6                            | 4. Release bearing<br>Removal and<br>Installation..... page H-16<br>Inspection..... page H-18 | 7. Clutch disc<br>Removal and<br>Installation..... page H-16<br>Inspection..... page H-18 |
| 2. Clutch master cylinder<br>Removal and<br>Installation..... page H- 8<br>Overhaul..... page H-10<br>Air bleeding..... page H- 9  | 5. Release fork<br>Removal and<br>Installation..... page H-16                                 | 8. Pilot bearing<br>B2200..... Section B1<br>B2600i..... Section B2                       |
| 3. Clutch release cylinder<br>Removal and<br>Installation..... page H-12<br>Overhaul..... page H-13<br>Air bleeding..... page H- 9 | 6. Clutch cover<br>Removal and<br>Installation..... page H-16<br>Inspection..... page H-18    | 9. Flywheel<br>Removal and<br>Installation..... page H-16<br>Inspection..... page H-19    |

OUTLINE

SPECIFICATIONS

Item		Model	B2600i	B2200	
Clutch control			Hydraulic		
Clutch cover	Type		Diaphragm spring		
	Set load	N (kg, lb)	5,494 (560, 1,232)	4,807 (490, 1,078)	
Clutch disc	Outer diameter	mm (in)	250 (9.84)	225 (8.86)	
	Inner diameter	mm (in)	160 (6.30)	150 (5.91)	
	Thickness	Pressure plate side	mm (in)	3.5 (0.14)	4.1 (0.16)
		Flywheel side	mm (in)	3.5 (0.14)	
Clutch pedal	Type		Suspended		
	Pedal ratio		6.0		
	Full stroke	mm (in)	135 (5.32)		
	Height	mm (in)	191—201 (7.52—7.91)	181—191 (7.13—7.52)	
Master cylinder inner diameter		mm (in)	15.87 (0.625)		
Release cylinder inner diameter		mm (in)	19.05 (0.750)		
Clutch fluid			SAE J1703 or FMVSS116 DOT-3		

1BU0HX-001

H

TROUBLESHOOTING GUIDE

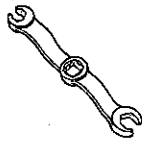
Problem	Possible Cause	Remedy	Page
<b>Slipping</b>	Clutch disc facing worn excessively	Replace	H-16
	Clutch disc facing surface hardened or oil on surface	Repair or replace	H-16
	Pressure plate damaged	Repair or replace	H-16
	Diaphragm spring damaged or weakened	Replace	H-16
	Insufficient clutch pedal play	Adjust	H- 5
	Clutch pedal sticking	Repair or replace	H- 6
	Flywheel damaged	Repair or replace	H-16
<b>Faulty disengagement</b>	Excessive runout or damaged clutch disc	Replace	H-16
	Clutch disc splines rusted or worn	Remove rust or replace	H-16
	Oil on facing	Repair or replace	—
	Diaphragm spring weakened	Replace	H-16
	Excessive clutch pedal play	Adjust	H- 5
	Insufficient clutch fluid	Add fluid	H- 2
	Leakage of clutch fluid	Locate and repair or replace	—
<b>Clutch vibrates when accelerating</b>	Oil on facing	Repair or replace	H-16
	Torsion spring weakened	Replace	H-16
	Clutch disc facing hardened or damaged	Repair or replace	H-16
	Clutch disc facing rivets loose	Replace	H-16
	Pressure plate damaged or excessive runout	Replace	H-16
	Flywheel surface hardened or damaged	Repair or replace	H-16
	Loose or worn engine mount	Tighten or replace	—
<b>Clutch pedal sticking</b>	Pedal shaft not properly lubricated	Lubricate or replace	H- 6
<b>Abnormal noise</b>	Clutch release bearing damaged	Replace	H-16
	Poor lubrication of release bearing sleeve	Lubricate or replace	H-16
	Torsion spring weakened	Replace	H-16
	Excessive crankshaft end play	Repair	Refer to Section B
	Pilot bearing worn or damaged	Replace	H-16
	Worn pivot points of release fork	Repair or replace	H-16

2BU0HX-003

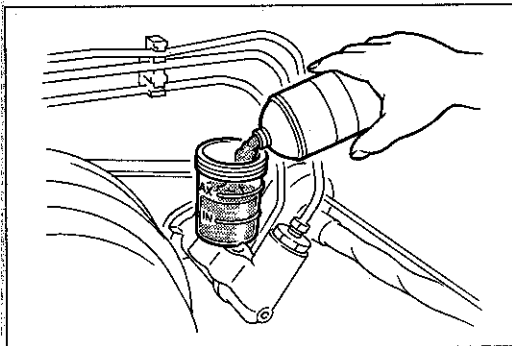
## CLUTCH FLUID

PREPARATION  
SST

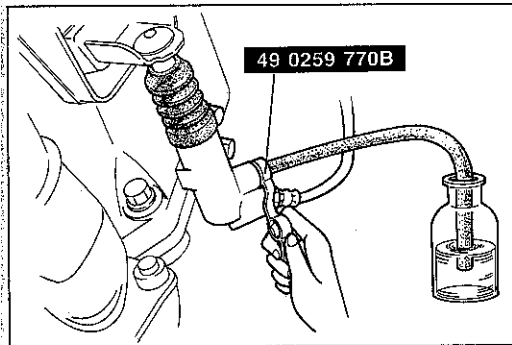
49 0259 770B  
Wrench, flare nut



9MU0HX-005



9MU0HX-006



9BU0HX-005

## REPLACEMENT

**Note**

The fluid in the reserve tank must be maintained at the 3/4 level or higher during replacement.

**Caution**

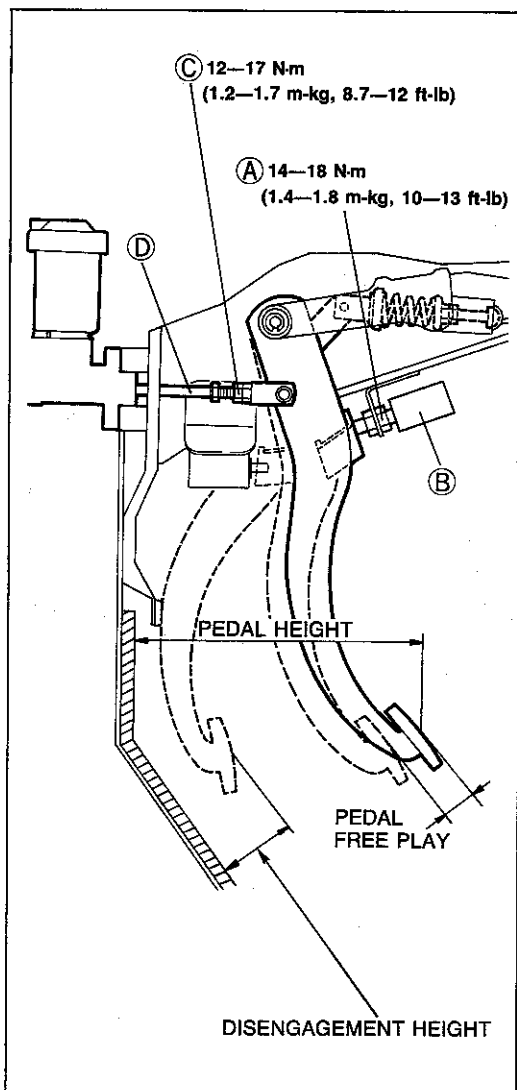
- a) Be careful not to spill clutch fluid on a painted surface. If this should happen, wash it off immediately.
- b) Do not mix different brands of clutch fluid.
- c) Do not reuse the clutch fluid which was drained out.

1. Draw the fluid from the reserve tank with a suction pump.
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
3. Place the other end of the vinyl hose in a container.
4. Slowly pump the clutch pedal several times.
5. With the clutch pedal depressed, loosen the bleeder screw with the **SST** to let fluid escape. Close the bleeder screw with the **SST**.
6. Repeat Steps 4 and 5 until only clean fluid is seen.
7. Tighten the bleeder screw.

**Tightening torque:**

5.9—6.9 N·m (60—70 cm·kg, 52—61 in·lb)

8. Add fluid to the MAX mark.
9. Check for correct clutch operation.



9BU0HX-006

## CLUTCH PEDAL

### ADJUSTMENT

#### Clutch Pedal Height Inspection

Measure the distance from the upper surface of the pedal pad to the carpet.

#### Pedal height

**B2600i: 191—201mm (7.52—7.91 in)**

**B2200 : 181—191mm (7.13—7.52 in)  
(With carpet)**

If necessary, adjust the pedal height.

#### Adjustment

1. Loosen locknut (A) and turn clutch switch (B) until the height is correct.
2. Tighten locknut (A).

#### Tightening torque:

**14—18 N·m (1.4—1.8 m·kg, 10—13 ft·lb)**

3. After the adjustment, inspect the pedal free play.

### Clutch Pedal Free Play

#### Inspection

Depress the clutch pedal by hand until clutch resistance is felt.

**Pedal free play: 0.6—3.0mm (0.02—0.12 in)**

**Total pedal free play: 5—13mm (0.20—0.51 in)**

If necessary, adjust the pedal free play.

#### Adjustment

1. Loosen locknut (C) and turn push rod (D) until pedal free play is correct.
2. Check that the disengagement height from the upper surface of the pedal height to the carpet is correct when the pedal is fully depressed.

#### Minimum disengagement height

**B2600i: 71mm (2.80 in)**

**B2200 : 66mm (2.60 in)**

**(With carpet)**

3. Tighten locknut (C).

#### Tightening torque:

**12—17 N·m (1.2—1.7 m·kg, 8.7—12 ft·lb)**

4. After adjustment, inspect the pedal height.

H



# H

## CLUTCH PEDAL

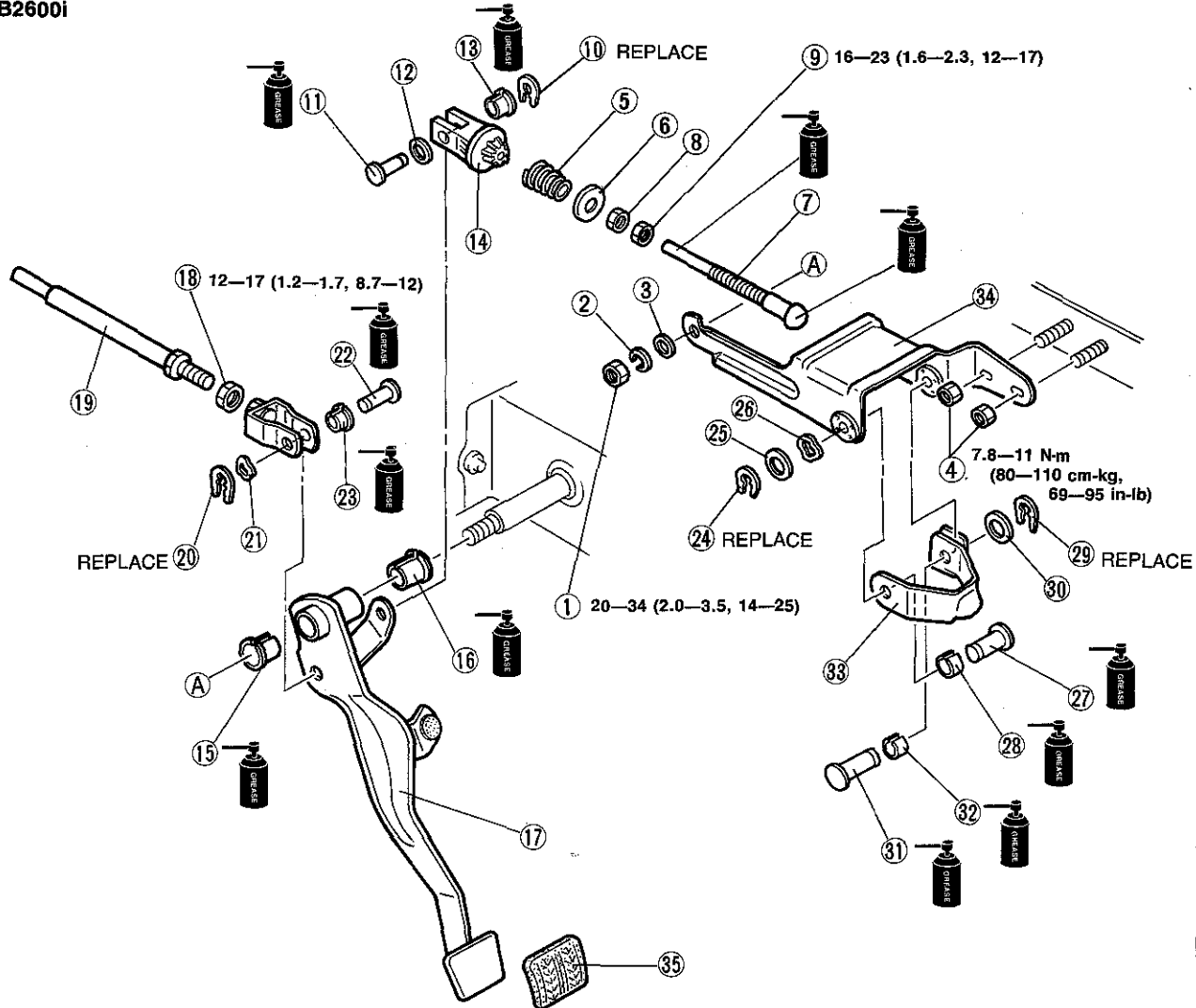
### REMOVAL, INSPECTION, AND INSTALLATION

Remove in the order shown in the figure.  
Inspect all parts and repair or replace as necessary.  
Install in the reverse order of removal.

#### Note

Apply white grease to the bushings and pins when installing.

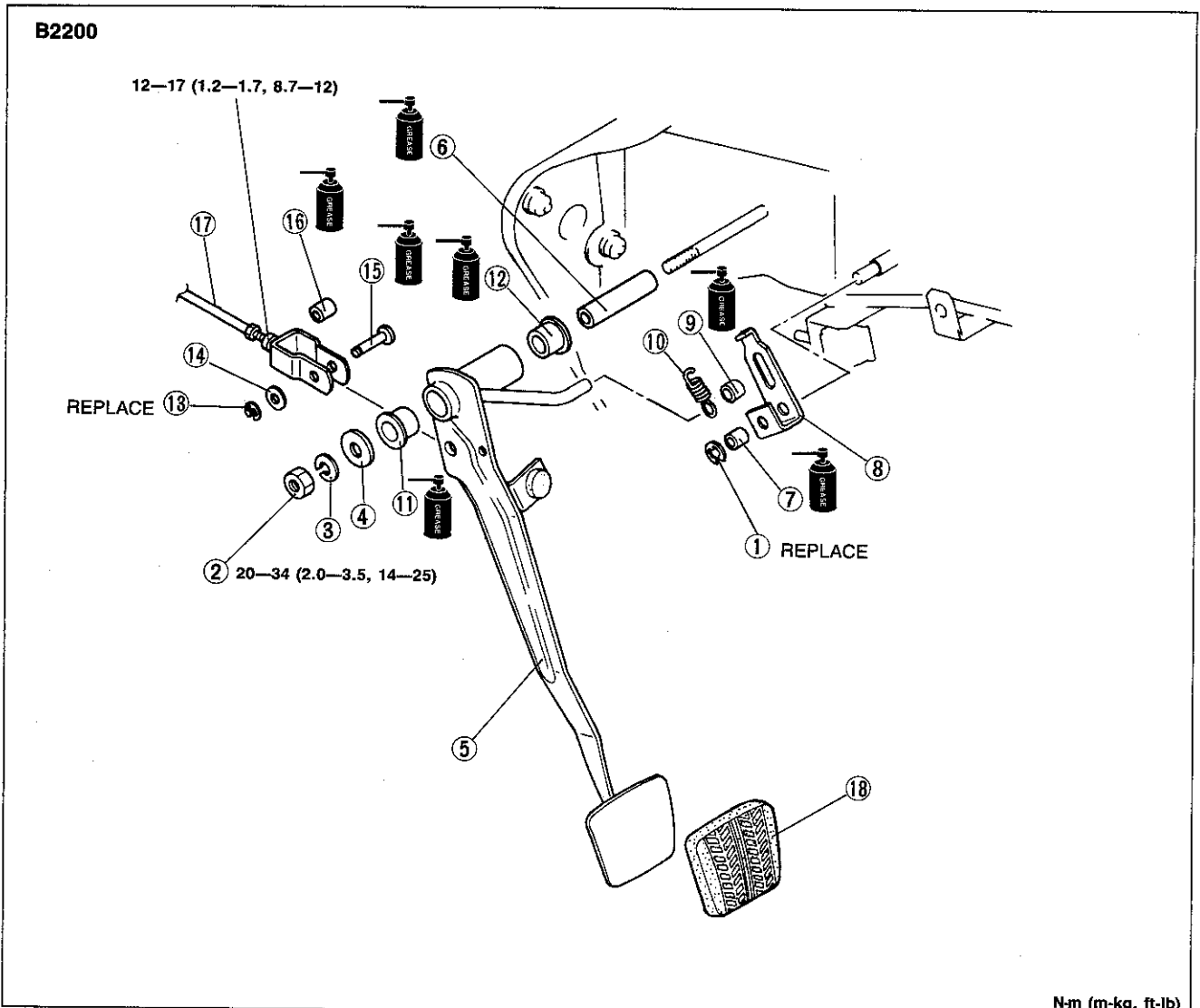
B2600i



N-m (m-kg, ft-lb)

0BU0HX-001

- |                          |                          |                     |
|--------------------------|--------------------------|---------------------|
| 1. Nut                   | 14. Spring seat          | 25. Spacer          |
| 2. Lock washer           | 15. Bushing              | 26. Wave washer     |
| 3. Spacer                | 16. Bushing              | 27. Pin             |
| 4. Nut                   | 17. Clutch pedal         | 28. Bushing         |
| 5. Assist spring         | Adjustment..... page H-5 | Inspect for wear    |
| Adjustment..... page H-7 | 18. Nut                  | 29. Clip            |
| 6. Spring seat           | 19. Push rod             | 30. Spacer          |
| 7. Clutch pedal rod      | Inspect for damage or    | 31. Pin             |
| 8. Assist spring nut     | bending                  | 32. Bushing         |
| 9. Locknut               | 20. Clip                 | 33. Assist lever    |
| 10. Clip                 | 21. Wave washer          | 34. Assist bracket  |
| 11. Pin                  | 22. Pin                  | 35. Pedal pad       |
| 12. Spacer               | 23. Bushing              | Inspect for wear or |
| 13. Bushing              | 24. Clip                 | damage              |



N-m (m-kg, ft-lb)  
0BU0HX-002

- |                     |                         |                               |
|---------------------|-------------------------|-------------------------------|
| 1. Clip             | 8. Clutch assist lever  | 16. Spacer                    |
| 2. Nut              | 9. Assist lever bushing | 17. Push rod                  |
| 3. Washer           | 10. Spring              | Inspect for damage or bending |
| 4. Spacer           | 11. Bushing             | 18. Pedal pad                 |
| 5. Clutch pedal     | 12. Bushing             | Inspect for wear or damage    |
| Adjustment..... H-5 | 13. Clip                |                               |
| 6. Spacer           | 14. Spacer              |                               |
| 7. Bushing          | 15. Pin                 |                               |

**Adjustment (B2600i)**

**Assist spring**

1. Turn the assist spring nut until the spring length is correct.

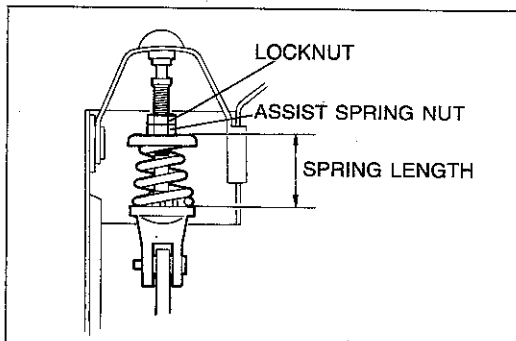
**Standard spring length:**  
36.5—37.5mm (1.44—1.48 in)

2. Tighten the locknut.

**Tightening torque:**  
16—23 N-m (1.6—2.3 m-kg, 12—17 ft-lb)

**Clutch pedal height and free play**

Refer to page H-5.



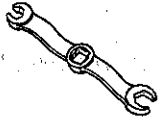
9MU0HX-010

### CLUTCH MASTER CYLINDER

#### PREPARATION SST

49 0259 770B

Wrench, flare nut



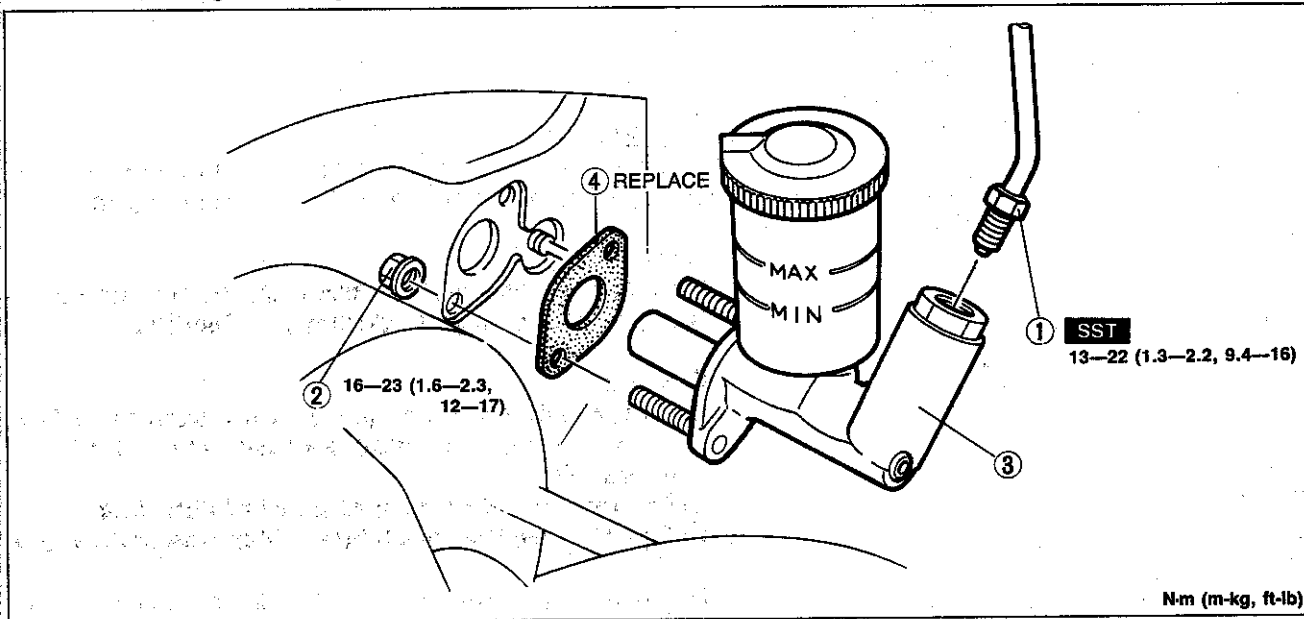
9MU0HX-011

#### REMOVAL AND INSTALLATION

Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

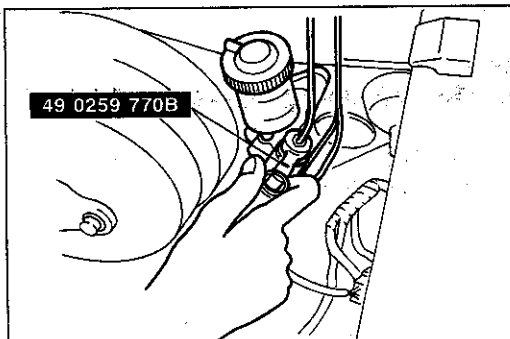
#### Caution

**Clutch fluid will damage painted surfaces. Be sure to use a container or rags to collect it. If fluid does get on a painted surface, wipe it off immediately with a rag.**



9BU0HX-010

- |                             |                           |           |
|-----------------------------|---------------------------|-----------|
| 1. Clutch pipe              | 3. Clutch master cylinder | 4. Gasket |
| Removal..... page H- 8      | Overhaul..... page H-10   |           |
| Installation..... page H- 9 | Check for fluid leakage   |           |
|                             | from the cylinder bore.   |           |
| 2. Nut                      | AIR BLEEDING              |           |
|                             | ..... page H- 9           |           |



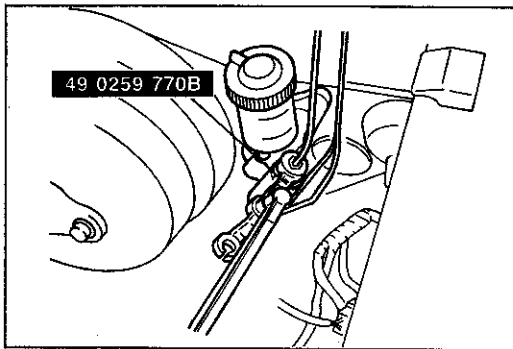
49 0259 770B

9MU0HX-013

#### Removal note

##### Clutch pipe

Disconnect the clutch pipe with the **SST**.



1BU0HX-002

## Installation note

### Clutch pipe

Tighten the clutch pipe with the **SST**.

### Tightening torque:

**13—22 N·m (1.3—2.2 m·kg, 9.4—16 ft·lb)**

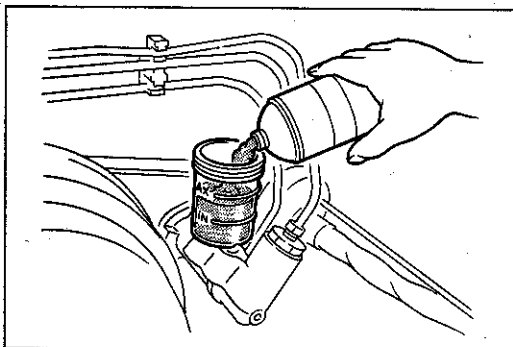
### Air Bleeding

After installation, bleed the clutch system.  
(Refer to below.)

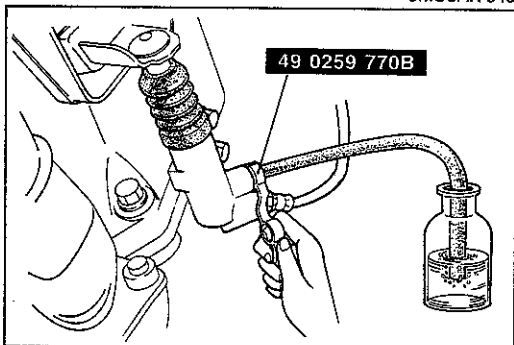
### Inspection and Adjustment

#### Clutch pedal height and free play

Refer to page H-5



9MU0HX-049



9BU0HX-012

## AIR BLEEDING

The clutch hydraulic system must be bled to remove air introduced whenever a hydraulic line is disconnected.

### Note

**The fluid in the reserve tank must be maintained at the 3/4 level or higher during air bleeding.**

### Caution

**a) Clutch fluid will damage a painted surface. If fluid does get on a painted surface, wipe it off immediately.**

**b) Do not mix different brands of clutch fluid.**

**c) Do not reuse the clutch fluid which was drained out.**

1. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
2. Insert the other end of the vinyl hose in a clear container.
3. Slowly pump the clutch pedal several times.
4. While depressing the pedal, loosen the bleeder screw with the **SST** to let fluid and air escape.  
Close the bleeder screw with the **SST**.
5. Repeat Steps 3 and 4 until no air bubbles are seen in the fluid.
6. Tighten the bleeder screw.

### Tightening torque:

**5.9—6.9 N·m (60—70 cm·kg, 52—61 in·lb)**

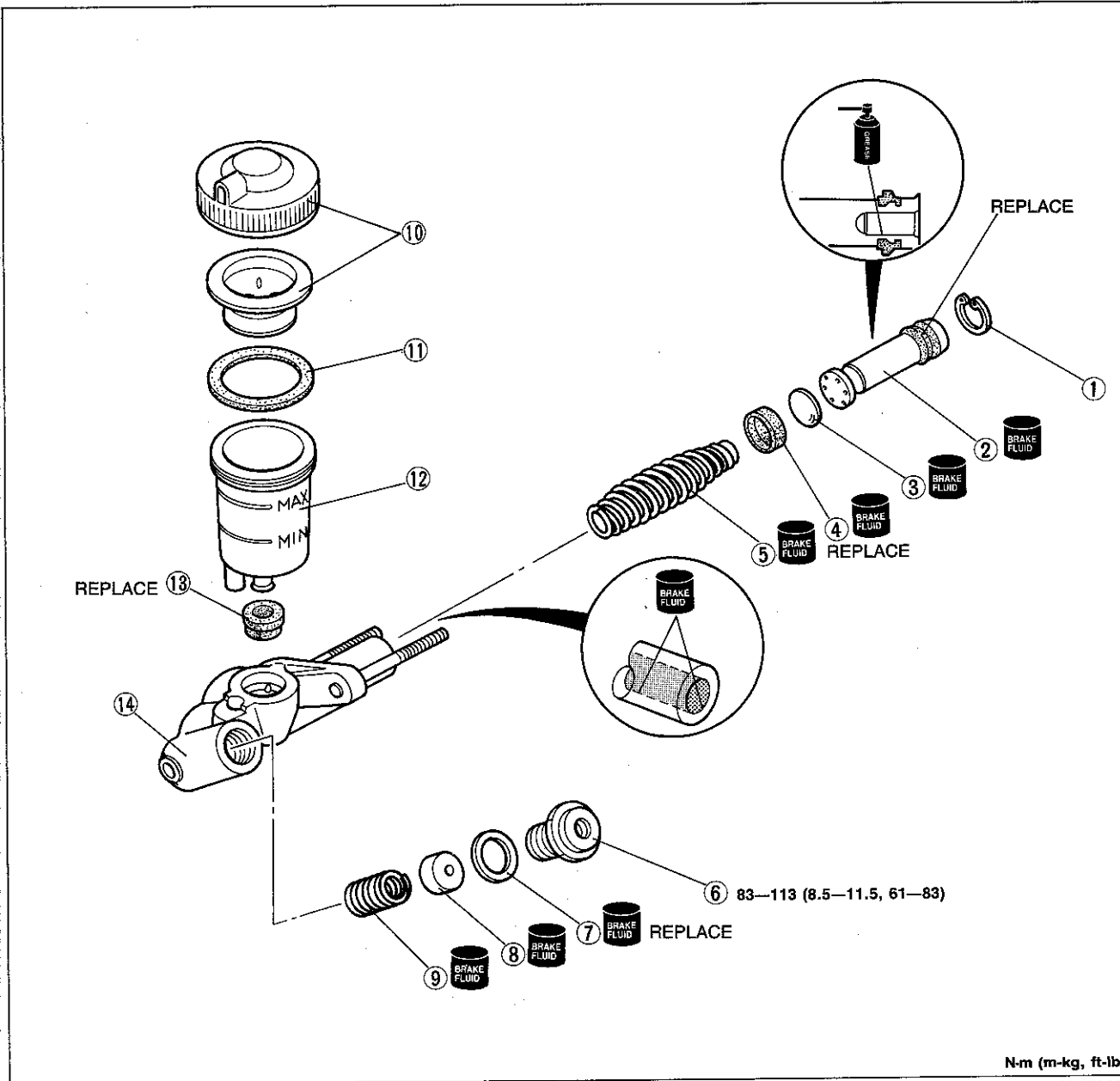
7. Check for correct clutch operation.
8. Verify that there is no fluid leakage.

### OVERHAUL

Disassemble in the order shown in the figure, referring to **Disassembly note**.  
 Inspect all parts and repair or replace as necessary.  
 Assemble in the reverse order of disassembly, referring to **Assembly note**.

### Caution

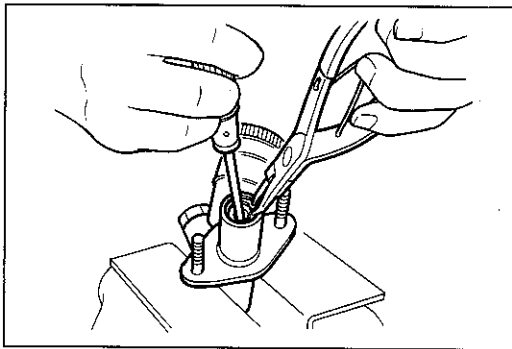
**Clean the disassembled parts in solvent and blow through all ports and passages with compressed air.**



N-m (m-kg, ft-lb)

0BU0HX-003

- |   |   |  |
|---|---|--|
| 1. Snap ring<br>Removal..... page H-11<br>Installation..... page H-12   | 3. Spacer   | 10. Tank cap baffle  |
| 2. Piston and secondary cup assembly<br>Removal..... page H-11<br>Inspect for wear, scoring, or cracks<br>Installation..... page H-11 | 4. Primary cup                                    | 11. Packing  |
|   | 5. Return spring                                  | 12. Reserve tank   |
|   | 6. Joint bolt                                     | 13. Bushing  |
|   | 7. Packing  | 14. Master cylinder body<br>Inspect cylinder bore for scoring or corrosion |
|   | 8. One-way valve piston<br>Removal..... page H-11 |  |
|   | 9. Return spring                                  |  |



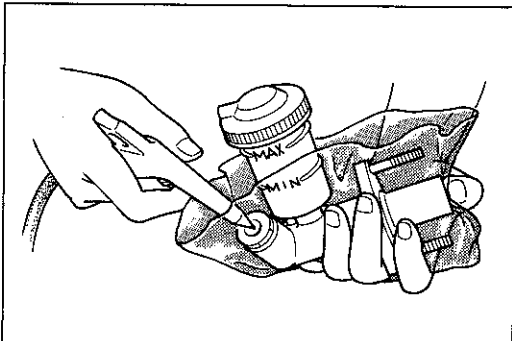
9MU0HX-018

## Disassembly note Snap ring

### Note

**Do not damage the push rod contact surface of the piston.**

Press down on the piston and remove the snap ring with snap-ring pliers.



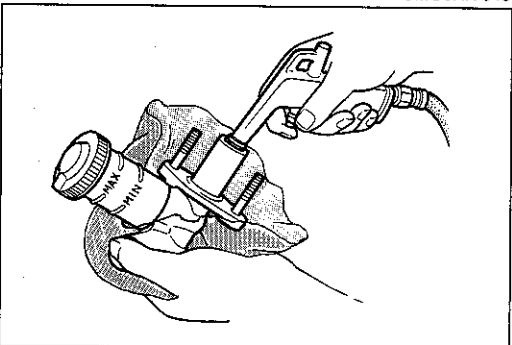
9MU0HX-019

## Piston and secondary cup assembly

### Caution

**Hold a rag over the master cylinder to prevent the piston and secondary cup assembly from jumping out.**

Remove the piston and secondary cup assembly, spacer, and primary cup by applying compressed air through the clutch pipe installation hole.



9MU0HX-020

## One-way valve piston and return spring

### Caution

**Hold a rag over the master cylinder to prevent the piston and spring from jumping out.**

Remove the piston by applying compressed air through the cylinder bore.

## Assembly note

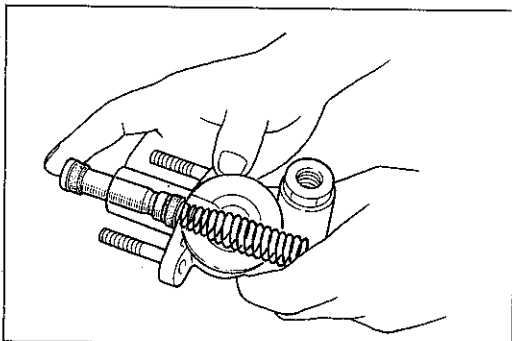
### Caution

- Before assembly, make sure all parts are completely clean.**
- Do not mix different brands of clutch fluid.**
- Do not reuse the clutch fluid which was drained out.**
- Apply the specified clutch fluid to the piston and secondary cup assembly, spacer, primary cup, and cylinder bore before assembly.**
- Replace parts with new ones whenever specified to do so.**

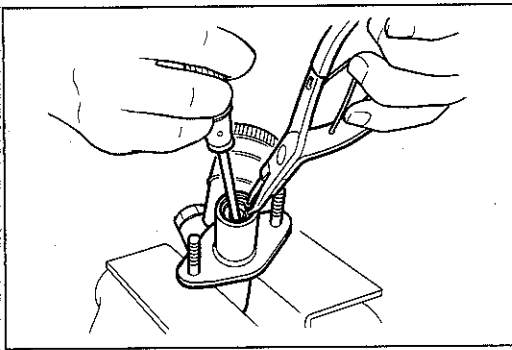
9MU0HX-021

## Piston and secondary cup assembly

Install the spring, primary cup, spacer, and piston and secondary cup assembly, noting the proper direction of the parts. (Refer to page H-10.)



9BU0HX-014



9MU0HX-023

### Snap ring

#### Note

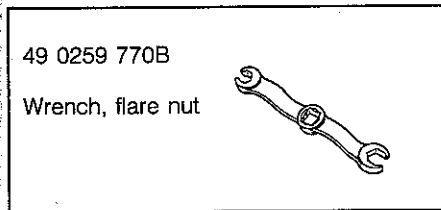
Do not damage the push rod contact surface of the piston.

While pressing the piston, install the snap ring.

## CLUTCH RELEASE CYLINDER

### PREPARATION

#### SST



49 0259 770B

Wrench, flare nut

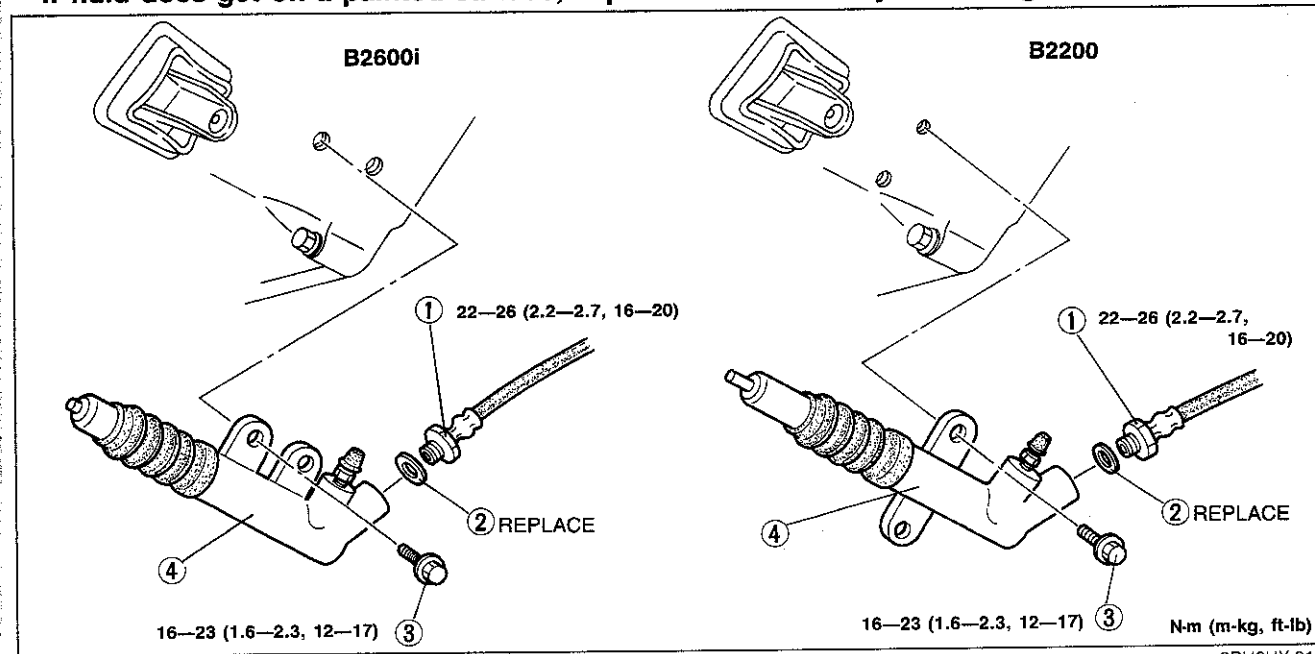
9MU0HX-024

### REMOVAL AND INSTALLATION

Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

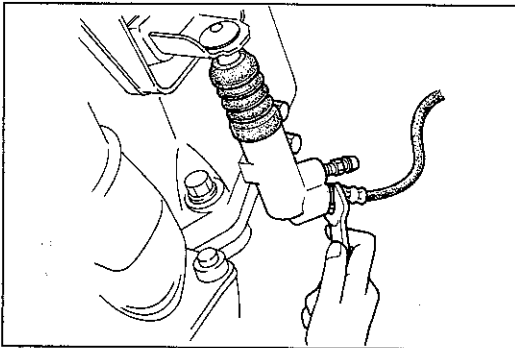
#### Caution

Clutch fluid will damage painted surfaces. Be sure to use a container or rags to collect it.  
If fluid does get on a painted surface, wipe it off immediately with a rag.



1. Flexible hose  
Removal ..... page H-13  
Installation ..... page H-13
2. Packing
3. Bolt

4. Clutch release cylinder  
Remove boot and check for fluid leakage  
Overhaul..... page H-13  
AIR BLEEDING..... page H- 9



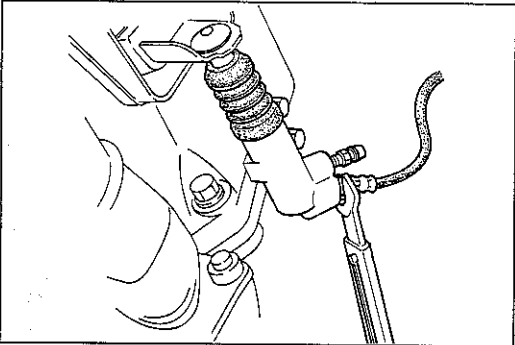
9BU0HX-016

**Removal note**  
Flexible hose

**Caution**

- a) After disconnecting the flexible hose, plug the flexible hose to avoid fluid leakage.
- b) The flexible hose must not be twisted.

Disconnect the flexible hose.



9BU0HX-017

**Installation note**  
Flexible hose

Tighten the flexible hose.

**Tightening torque:**

**22—26 N·m (2.2—2.7 m·kg, 16—20 ft·lb)**

**Air Bleeding**

After installation, bleed the clutch system.  
(Refer to page H-9.)

**OVERHAUL**

Disassemble in the order shown in the figure, referring to **Disassembly note**.  
Inspect all parts and repair or replace as necessary.  
Assemble in the reverse order of disassembly.

**Caution**

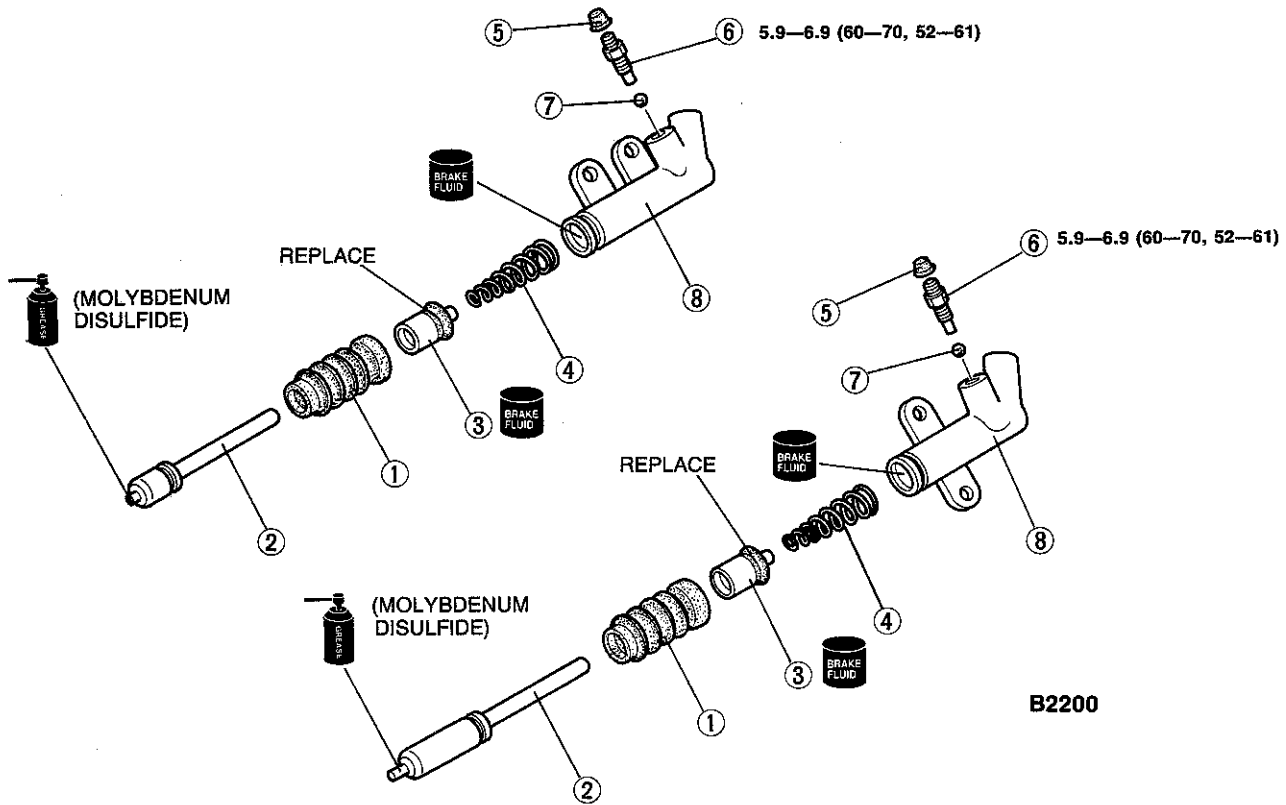
- a) Clean the disassembled parts in solvent and blow through all ports and passages with compressed air.
- b) Before assembly, make sure all parts are completely clean.
- c) Apply the specified clutch fluid to the piston and cup assembly and cylinder bore before assembly.

2BU0HX-006



## CLUTCH RELEASE CYLINDER

B2600i



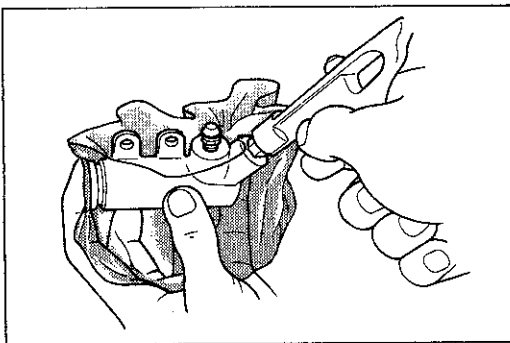
N-m (cm-kg, in-lb)

9BU0HX-018

- 1. Boot
- 2. Push rod
- 3. Piston and cup assembly  
Removal..... page H-14  
Inspect for wear, scoring,  
or cracks

- 4. Spring
- 5. Bleeder cap
- 6. Bleeder screw
- 7. Steel ball

- 8. Release cylinder body  
Inspect cylinder bore for  
scoring or corrosion



9BU0HX-019

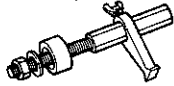
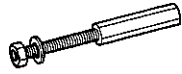


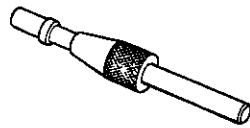
### Disassembly note Piston and cup assembly

**Caution**  
Hold a rag over the release cylinder to prevent the piston and cup assembly from jumping out.

Remove the piston and cup assembly by applying compressed air through the flexible hose installation hole.

CLUTCH UNIT

PREPARATION  
SST

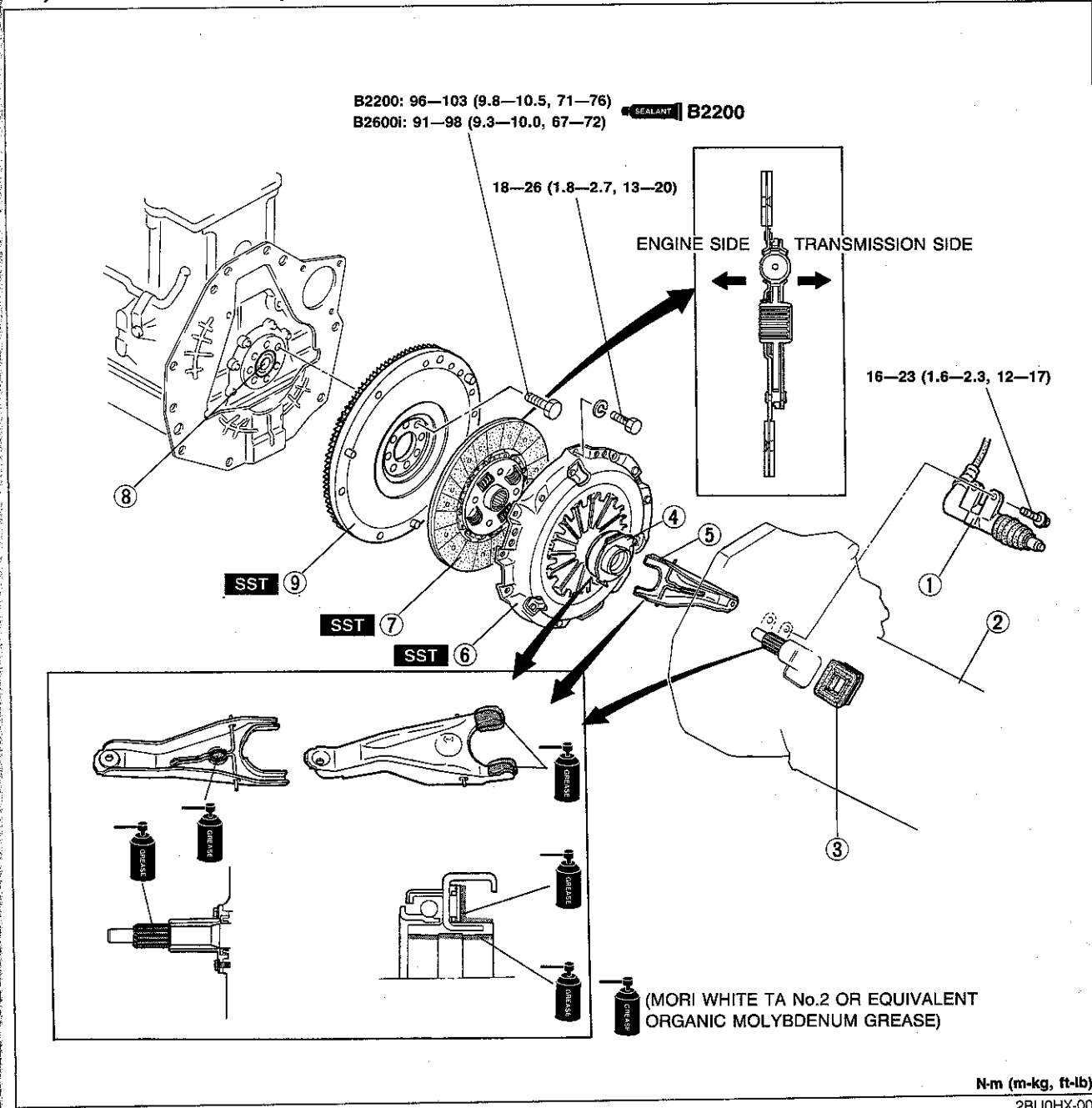
<p>49 E011 1A0 Brake set, ring gear</p> 	<p>49 E011 103 Shaft (Part of 49 E011 1A0)</p> 	<p>49 E011 104 Collar (Part of 49 E011 1A0)</p> 
<p>49 E011 105 Stopper (Part of 49 E011 1A0)</p> 	<p>49 SE01 310A Center tool, clutch disc</p> 	<p>2BU0HX-004</p>

### REMOVAL AND INSTALLATION

Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

#### Note

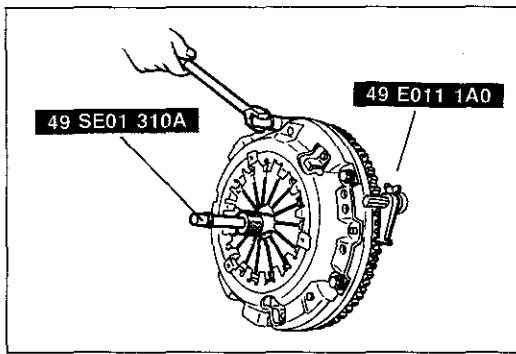
- a) Remove the clutch release cylinder with the flexible hose connected.
- b) Do not remove the pilot bearing unless necessary.



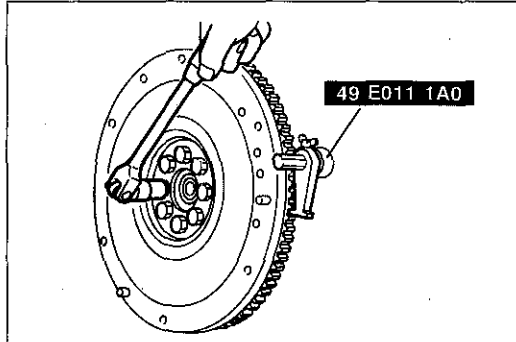
- 1. Clutch release cylinder
- 2. Transmission  
Service..... Section J1 or J2
- 3. Boot
- 4. Release bearing  
Inspection ..... page H-18
- 5. Release fork

- 6. Clutch cover  
Removal..... page H-17  
Inspection ..... page H-18  
Installation..... page H-18
- 7. Clutch disc  
Removal..... page H-17  
Inspection ..... page H-18  
Installation..... page H-17

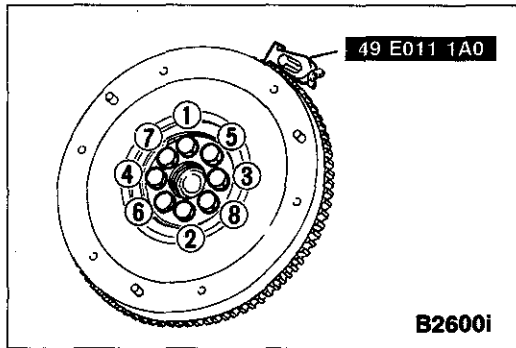
- 8. Pilot bearing  
B2200 ..... Section B1  
B2600i ..... Section B2
- 9. Flywheel  
Removal..... page H-17  
Inspection ..... page H-19  
Installation..... page H-17



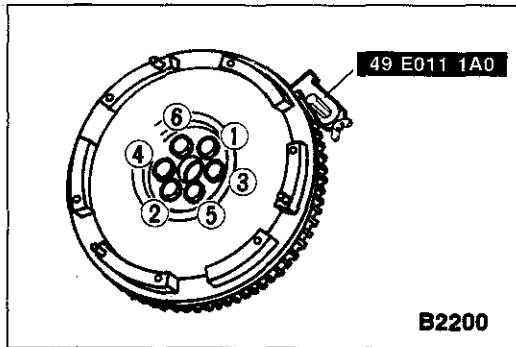
2BU0HX-007



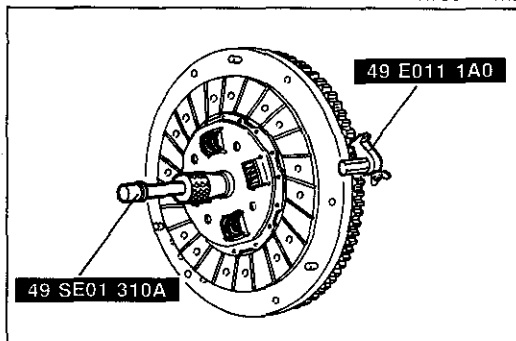
2BU0HX-008



B2600i  
2BU0HX-009



B2200  
9BU0HX-023



9BU0HX-024

## Removal note

### Clutch cover and disc

1. Install the **SST** or equivalent.
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released. Then remove the clutch cover and disc.

### Flywheel

1. Hold the flywheel with the **SST** or equivalent.
2. Remove the flywheel.

## Installation note

### Flywheel

1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it. (B2200)
2. Apply sealant to the bolt threads. (B2200)
3. Install the flywheel and **SST** or equivalent.
4. Tighten the bolts in the pattern shown.

### Tightening torque

**B2600i:** 91—98 N·m (9.3—10.0 m·kg, 67—72 ft·lb)

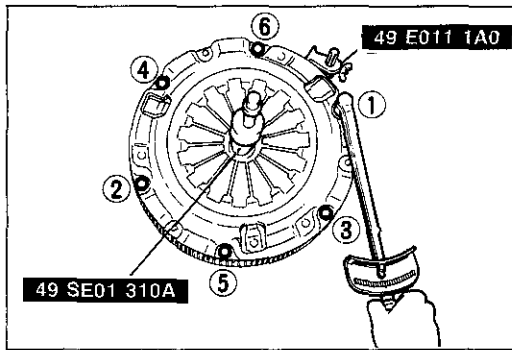
### Tightening torque

**B2200:** 96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)

### Clutch disc

1. Clean the clutch disc splines and main drive gear splines, then apply Mori White TA No.2 or equivalent organic molybdenum grease.
2. Set the clutch disc into position with the **SST**.

# H CLUTCH UNIT, RELEASE BEARING, CLUTCH COVER, CLUTCH DISC



## Clutch cover

1. Align the dowel holes with the flywheel dowels.
2. Tighten the bolts evenly and gradually in the pattern shown with the **SST** or equivalent.

## Tightening torque:

**18–26 N·m (1.8–2.7 m·kg, 13–20 ft·lb)**

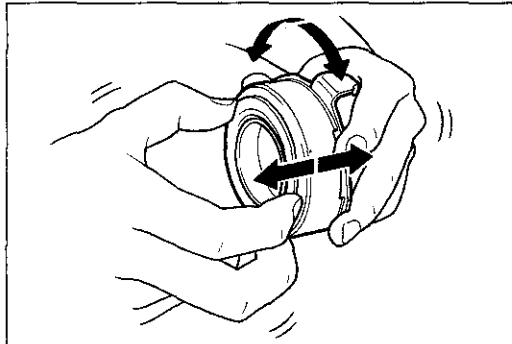
## RELEASE BEARING

### INSPECTION

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.

### Note

**The clutch release bearing is a sealed bearing and must not be washed in solvent.**



## CLUTCH COVER

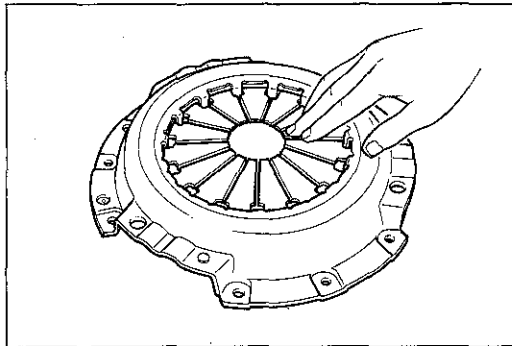
### INSPECTION

1. Inspect the contact surface of the clutch disc for scoring, cracks, or burning, repair or replace as necessary.

### Note

**Minor scoring or burning should be removed with emery paper.**

2. Inspect the contact surface of the clutch release bearing for wear or cracks. If there is wear or cracks, replace the clutch cover.



## CLUTCH DISC

### INSPECTION

1. Inspect the lining surface for burning or oil contamination. Replace it if it is badly burned or oil soaked.

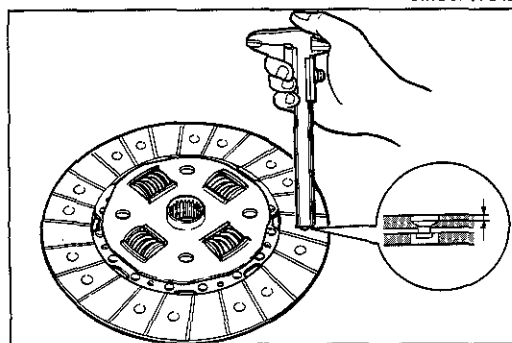
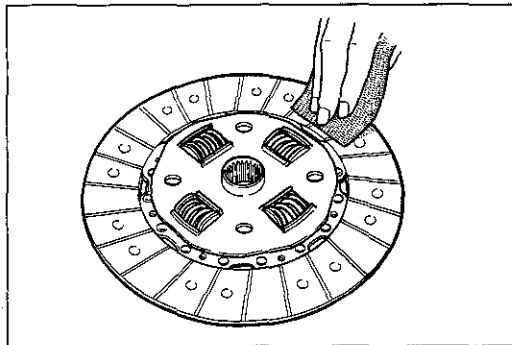
### Note

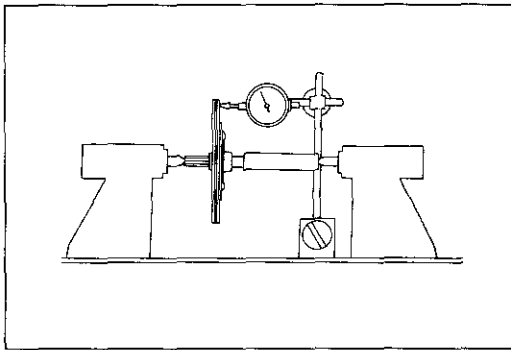
**Use sandpaper if the trouble is minor.**

2. Inspect for loose facing rivets or torsion springs. Replace the clutch disc if any are loose.

3. Measure the thickness of the lining at a rivet head on both sides with vernier calipers. Replace it if less than minimum.

**Minimum thickness: 0.3mm (0.012 in)**





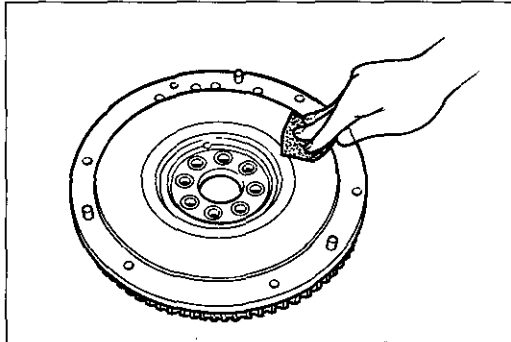
9BU0HX-025

4. Measure the clutch disc runout with a dial indicator. Replace the clutch disc if runout is excessive.

**Maximum runout**

**B2600i: 1.0mm (0.039 in)**

**B2200 : 0.7mm (0.028 in)**



9MU0HX-046

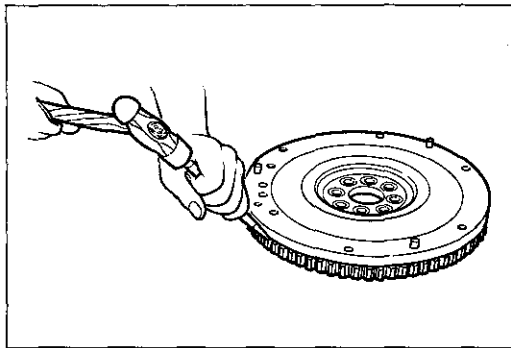
## FLYWHEEL

### INSPECTION

1. Inspect the contact surface of the clutch disc for scoring, cracks, or burning, repair or replace as necessary.

**Note**

**Minor scoring or burning should be removed with emery paper.**



1BU0HX-003

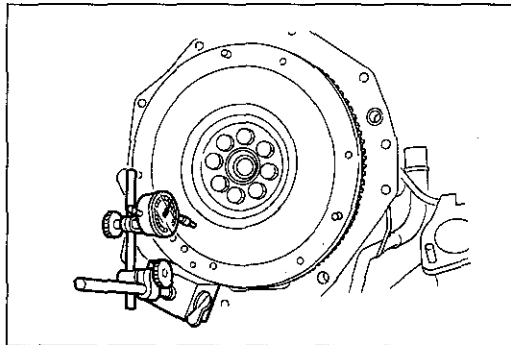
2. Inspect the ring gear teeth for wear or damage. If necessary, replace the ring gear as follows:

(1) Heat the ring gear with a blowtorch. Tap around the gear to remove it from the flywheel.

(2) Heat the new ring gear to **250—300°C (482—572°F)**; then fit it onto the flywheel.

**Note**

**The beveled side of the ring gear must face the engine side.**



9MU0HX-048

3. Measure the flywheel runout with a dial indicator. Replace the flywheel if runout is excessive.

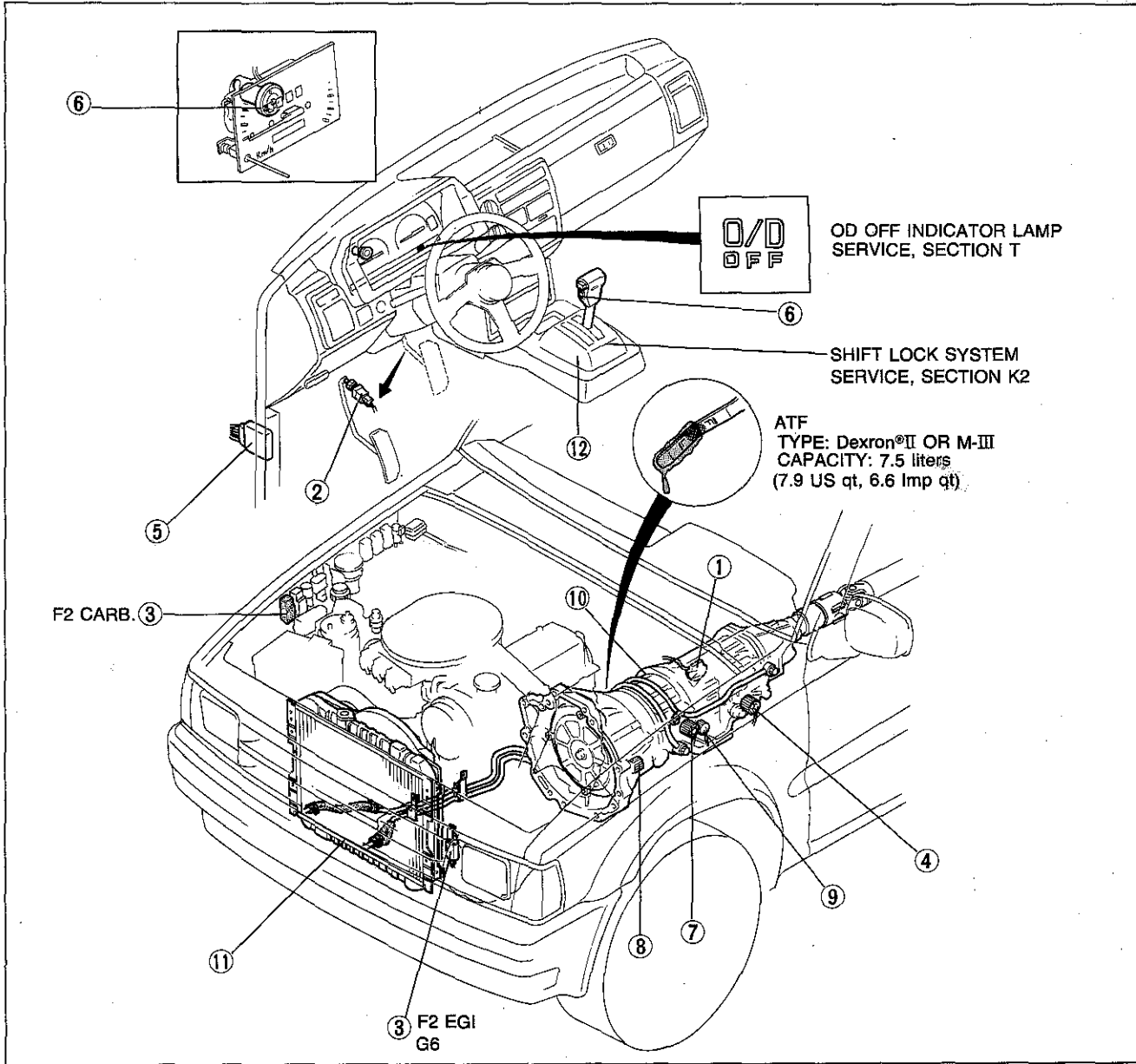
**Maximum runout: 0.2 mm (0.008 in)**

# AUTOMATIC TRANSMISSION (Hydraulically-Controlled)

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K1

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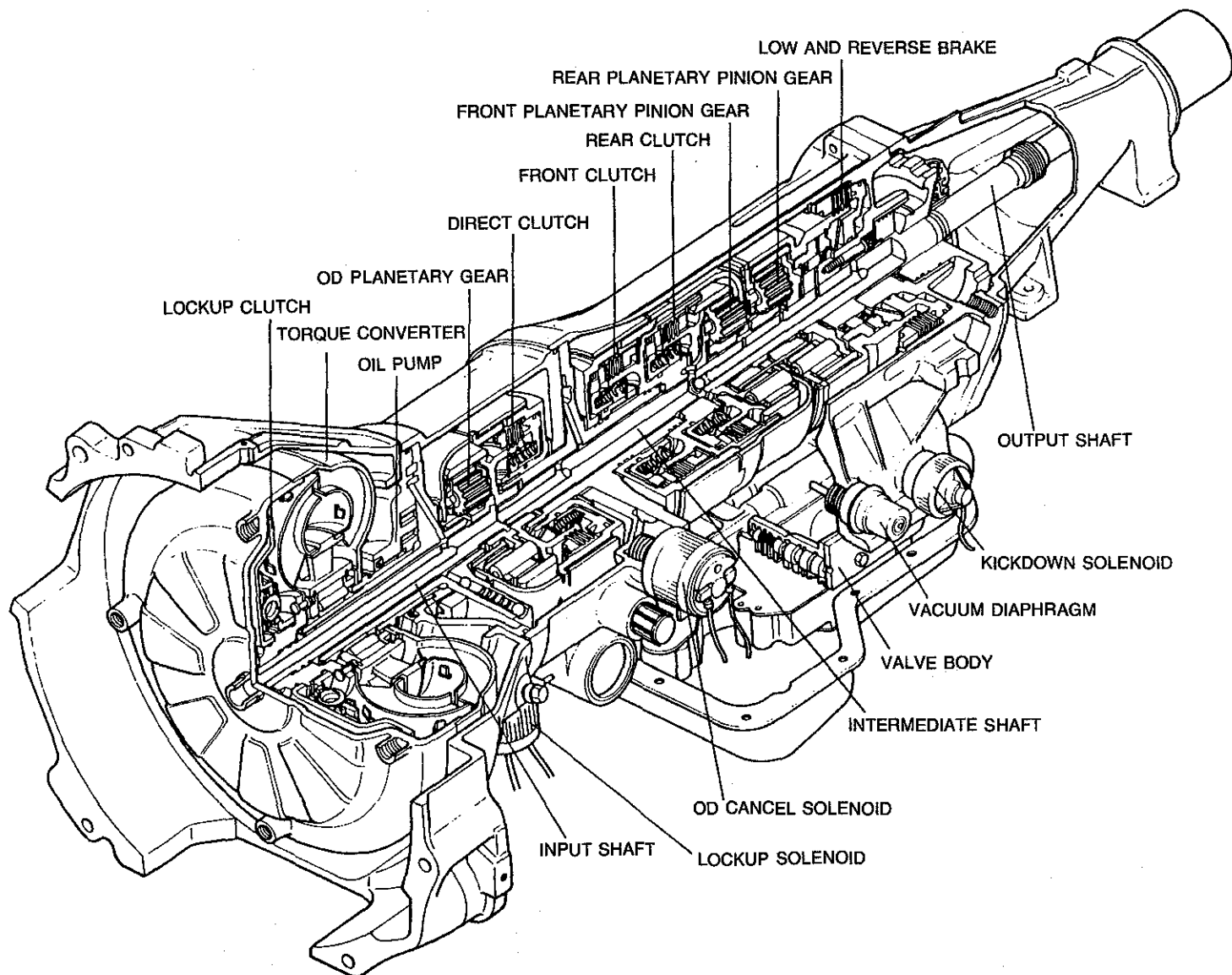
OUTLINE

SPECIFICATIONS

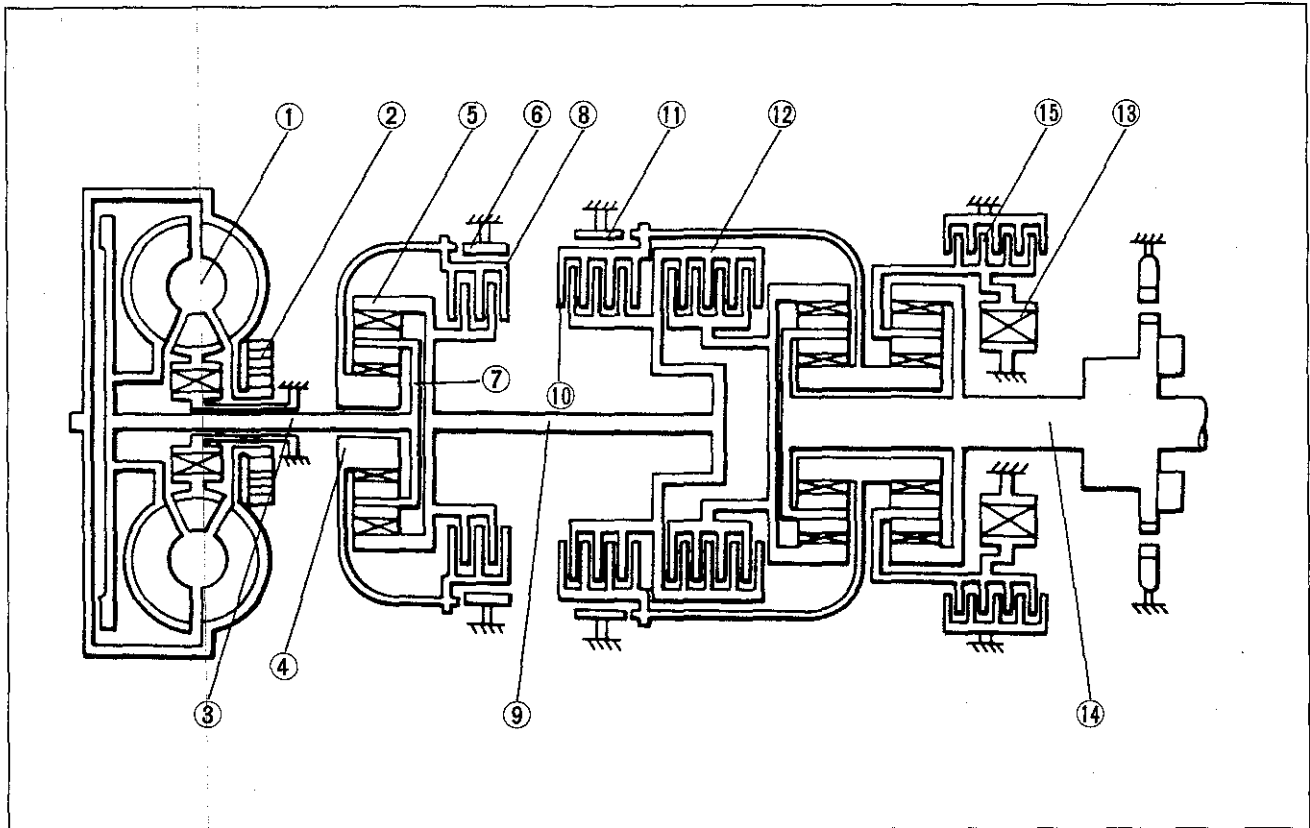
Item	Transmission/Engine		N4A-HL	
			F2	G6
Torque converter stall torque ratio			1.900	
Gear ratio	1st		2.841	
	2nd		1.541	
	3rd		1.000	
	OD (4th)		0.720	
	Reverse		2.400	
Number of drive/driven plates	Direct clutch		2/2	
	Front clutch		3/5	4/5
	Rear clutch		5/5	
	Low and reverse brake		5/5	
Servo diameter (Piston outer diameter/retainer inner diameter) mm (in)	OD band servo		60/40 (2.36/1.57)	60/36 (2.36/1.42)
	2nd band servo		72/44 (2.83/1.73)	80/56 (3.15/2.21)
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III	
	Capacity liters (US qt, Imp qt)	Total	7.5 (7.9, 6.6)	
		Oil pan	4.0 (4.2, 3.5)	

2BU0K1-001

K1



POWER FLOW DIAGRAM



9MUOK2-004

K1

- |                     |                                |                           |
|---------------------|--------------------------------|---------------------------|
| 1. Torque converter | 6. OD brake band               | 11. 2nd brake band        |
| 2. Oil pump         | 7. OD planetary pinion carrier | 12. Rear clutch           |
| 3. Input shaft      | 8. Direct clutch               | 13. One-way clutch        |
| 4. OD sun gear      | 9. Intermediate shaft          | 14. Output shaft          |
| 5. OD clutch hub    | 10. Front clutch               | 15. Low and reverse brake |

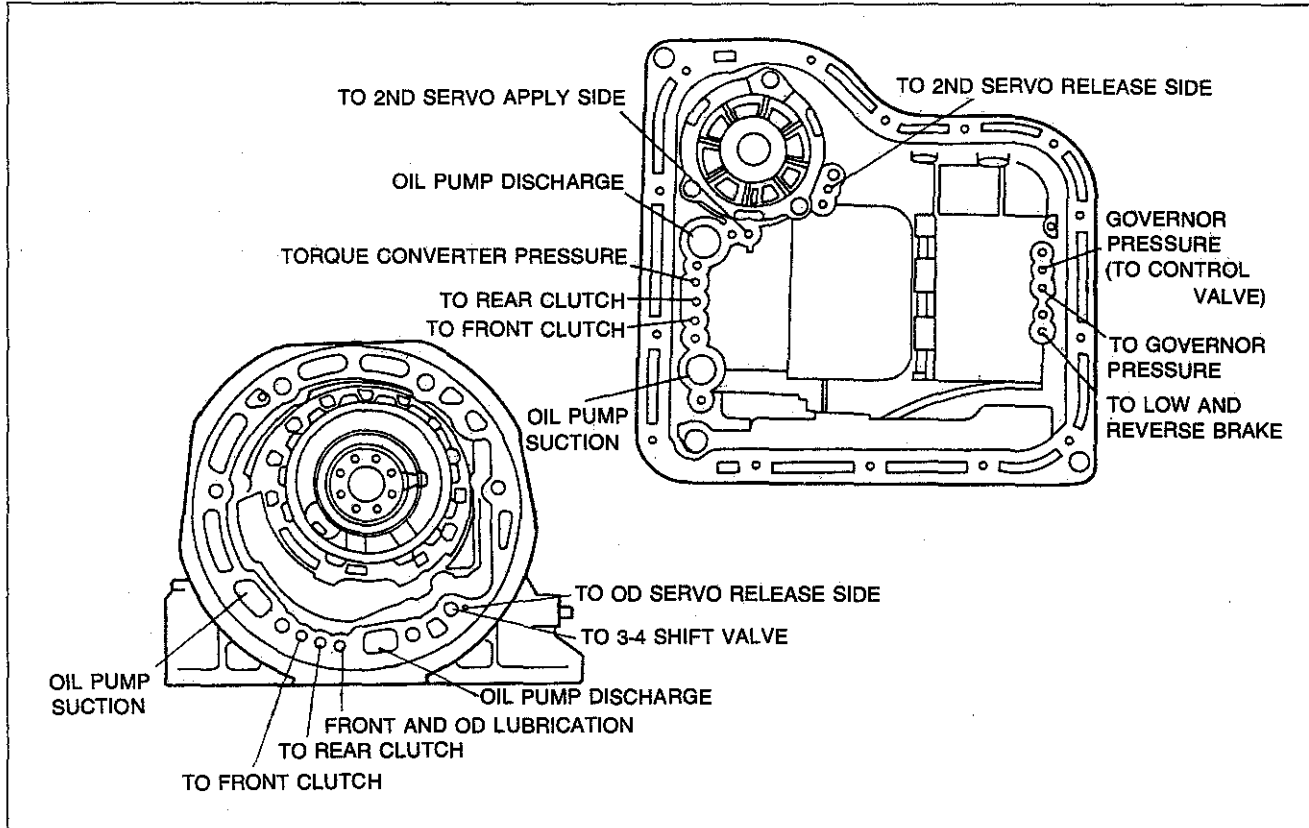
OPERATION OF COMPONENTS

Range	Gear	Direct clutch	OD band servo		Front clutch	Rear clutch	2nd band servo		Low and reverse brake	One-way clutch
			Operation	Release			Operation	Release		
P	—	○	⊙	○					○	
R	Reverse	○	⊙	○	○		○		○	
N	—	○	⊙	○						
D	1st	○	⊙	○		○				○
	2nd	○	⊙	○		○	○			
	3rd	○	⊙	○	○	○	⊙	○		
	OD		○		○	○	⊙	○		
2	—	○	⊙	○		○	○			
1	2nd	○	⊙	○		○	○			
	1st	○	⊙	○		○			○	

⊙ : Operates although the band servos remain deactivated because of the larger release pressure side area. Brake band does not operate.

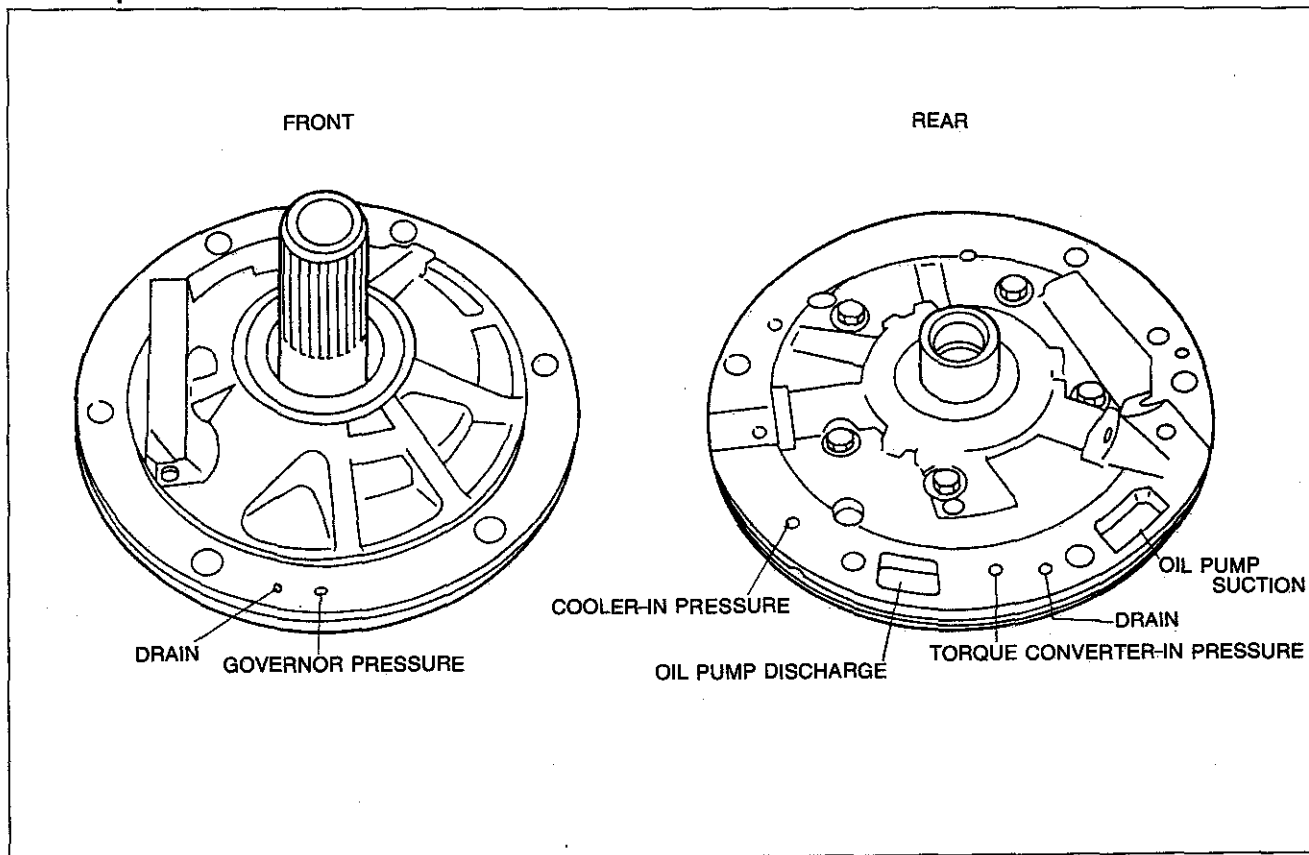
9MUOK2-005

### FLUID PASSAGE LOCATIONS Transmission Case



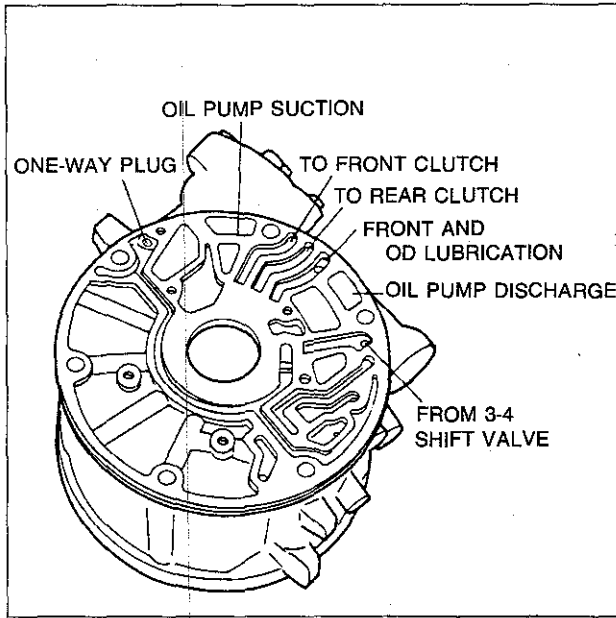
9MU0K2-006

### Oil Pump



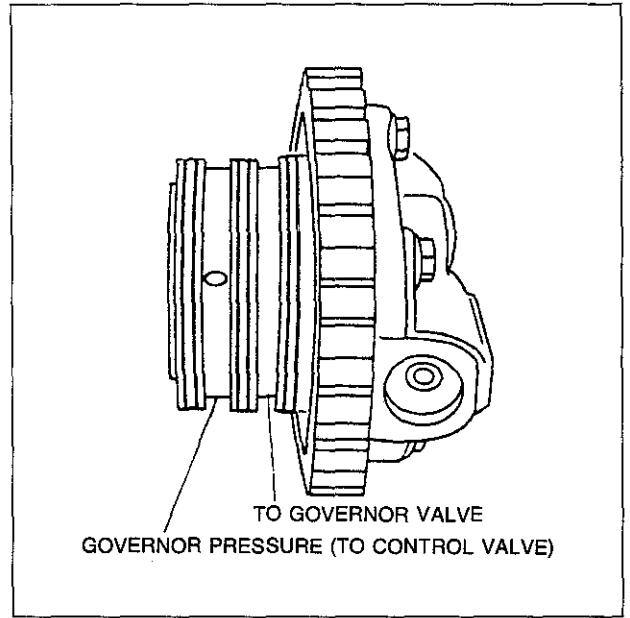
9MU0K2-007

OD Case



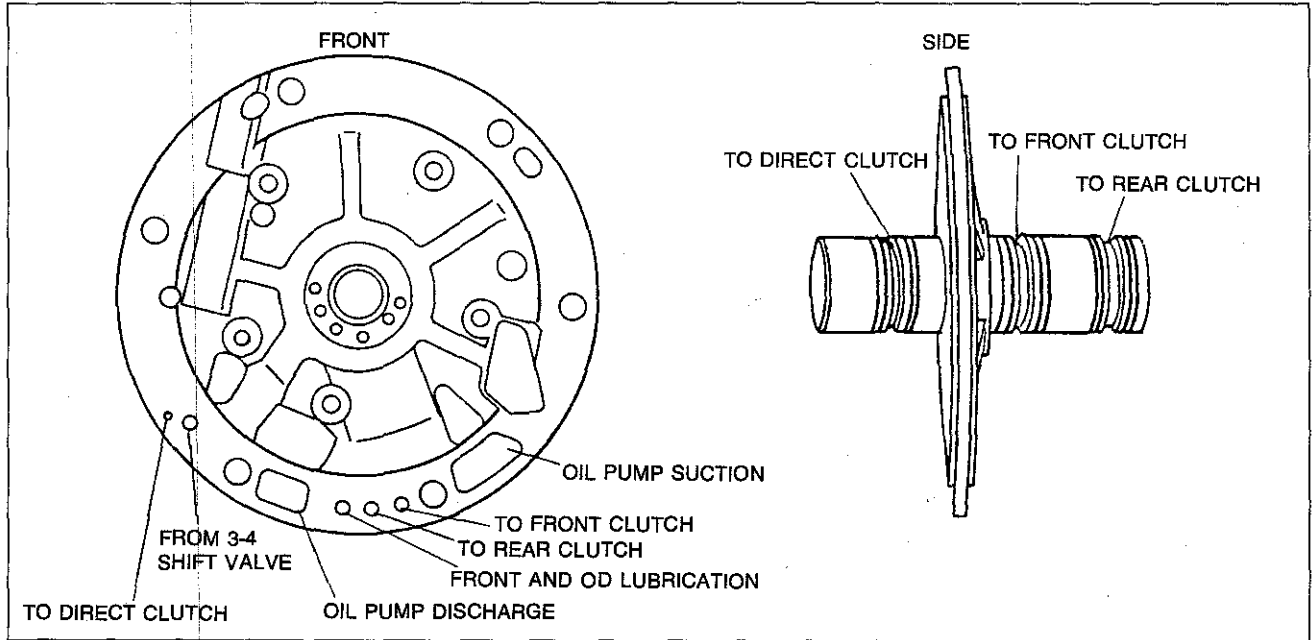
9MU0K2-008

Parking Gear (Oil Distributor)



9MU0K2-009

Drum Support



9MU0K2-010

K1

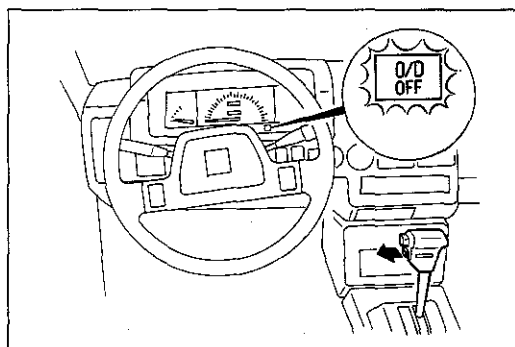
### TROUBLESHOOTING

#### GENERAL NOTE

A problem with the automatic transmission may be caused by the engine or the transmission powertrain, hydraulic control system, or the electronic control system.

When troubleshooting, from these points, which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

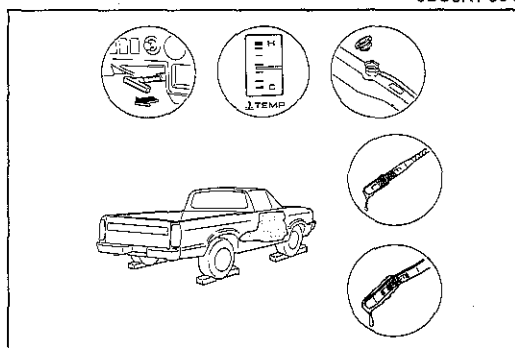
9MU0K2-011



0BU0K1-004

#### Step 1: Electrical System Inspection

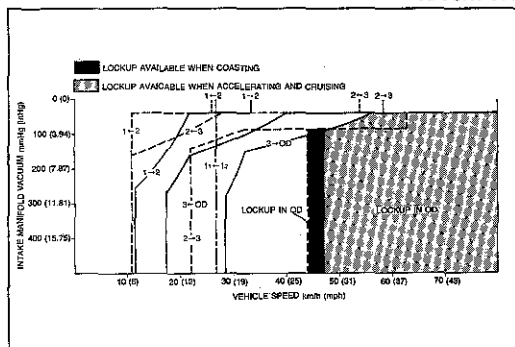
Check the electrical system. (Refer to page K1-13.)



0BU0K1-005

#### Step 2: Mechanical System Test

Check the engine stall speed, time lag, line pressure, and governor pressure. (Refer to page K1-14.)



0BU0K1-006

#### Step 3: Road Test

Check the shift points and shift schedule, and check for shift shock. (Refer to page K1-22.)

If the above 3 steps are followed, the cause of the problem should be located.

Another guide to faster location of the causes of problems, the QUICK DIAGNOSIS CHART, is on pages K-9 to 12.

In this chart, numbers are used to indicate the components that may be the cause of 56 possible problems. It is necessary to check only those components indicated by numbers during each steps of the troubleshooting process to locate the cause of the problem quickly.

9BU0KX-007

**QUICK DIAGNOSIS CHART**

The QUICK DIAGNOSIS CHART shows different problems and the relationship of components that might be the cause.

1. Components indicated in the "Adjustment" column indicate the possibility that the problem may result from an incorrect adjustment.  
Check the adjustment of each component, and readjust if necessary.
2. Components indicated in the "Electrical System Inspection" column can be checked for malfunction through this inspection.
3. Components indicated in the "Mechanical System Test" column can be checked for malfunction by the results of the oil pressure test.
4. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
5. The numbers in the chart indicate the order of inspection for detecting malfunctions.
6. Circled numbers indicate that the transmission must be removed from the vehicle.
7. The checking, adjusting, repair, and replacement procedures for components are described in the page(s) shown in the "Reference page" column.

9MUOK2-016

Inspection point and reference page		ON VEHICLE										OFF VEHICLE																				
		Pre-liminary		Electronic control system				Hydraulic control system				Powertrain																				
		K1-33	K1-127	Section F1	K1-25	K1-26,27	Section G	K1-28	K1-28	K1-29	K1-107	K1-14	K1-18,20,21	K1-98	K1-92	K1-61	K1-68	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K1-71	K1-76	K1-61	K1-68	K1-87	K1-83	K1-54,81,84	K1-95
<b>Item</b>	ATF level and condition	Shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Kickdown switch, Kickdown solenoid, and wiring	Ignition switch and starter	OD OFF switch	OD cancel solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD band servo	2nd band servo	Accumulator	Transmission air check	OD cancel valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2nd brake band	Low and reverse brake	One-way clutch	Planetary gear	Parking gear	
Adjustment	X	X	X	X	X					X					X	X																
Electrical System Inspection					X		X	X	X																							
Mechanical System Test												X								X	X	X	X	X	X	X	X	X	X	X		
Road Test														X								X	X	X	X	X	X	X	X	X		
Engine starting	Engine does not start in N or P range		2	3		1																										
	Engine starts in ranges other than N, and P ranges		1	2																												
Accelerating	Vehicle does not move in D range (moves in 1, 2, and R ranges)		1								2	3																		④		
	Vehicle does not move in forward ranges (moves in R range) Extremely poor acceleration		1	2							3	4					5							⑥								
	Vehicle does not move in R range (moves in forward range) Extremely poor acceleration		1	2							3	4					5							⑦	⑧		⑥					
	Vehicle does not move in any range		1	2							3	4					5		⑥		⑧										⑦	
	Slippage felt when accelerating		1	2						6	3	4					5		⑦													
	Vehicle moves in N range			1									2												③							
	Excessive creep				1																											
	No creep at all		1	2	3								4						⑤													
	Low max. speed and poor acceleration		1	2	6						3	4	5								⑫		⑨	⑩	⑪		⑦	⑧				

K1

## TROUBLESHOOTING

Inspection point and reference page	ON VEHICLE										OFF VEHICLE																							
	Pre-liminary		Electronic control system				Hydraulic control system				Powertrain																							
	K1-33	K1-127	Section F1	K1-25	Section G		K1-28	K1-28	K1-29	K1-107	K1-14	K1-18,20,21	K1-98	K1-92	K1-61	K1-68	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K1-71	K1-76	K1-61	K1-68	K1-87	K1-83	K1-54,81,84	K1-95			
ATF level and condition	Shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Kickdown switch, Kickdown solenoid, and wiring	Ignition switch and starter	OD OFF switch	OD cancel solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD band servo	2nd band servo	Accumulator	Transmission air check	OD cancel valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2nd brake band	Low and reverse brake	One-way clutch	Planetary gear	Parking gear				
Does not shift from 1st to 2nd	1		3					2				4	5		6		7							8										
Does not shift from 2nd to 3rd	1		3					2				4	5		6		7					6												
Does not shift from 3rd to OD	1		3			8	9	2				4	5	6			7	12				10			11									
Lockup does not occur in OD								3					1	2					5						4									
Does not shift from OD to 3rd	1					6	7	2				3	4				5	11				8	9	10										
Does not shift from 3rd to 2nd or from OD to 2nd	1							2				3	4	5			6					7		8	9									
Does not shift from 2nd to 1st or from 3rd to 1st	1							2				3	4	5			6								7			8						
Does not kickdown when accelerator depressed in 3rd within kickdown range	1		2					3				4	5												6									
Does not kickdown when accelerator depressed in OD within kickdown range	1		2					3				4	5									6												
Excessive engine speed when accelerated in 3rd due to delayed kickdown	1	2										3	4	5			6					7												
Excessive engine speed when accelerated in OD due to delayed kickdown	1	2										3	4	5			6								7									
Does not shift from 3rd to 2nd on D range to 2-range shift	1	2										3	4	5								6			7									
Does not shift from 3rd to 1st on D range to 1-range shift	1	2										3	4	5	6							7			8									



Inspection point and reference page	ON VEHICLE											OFF VEHICLE																			
	Pre-liminary		Electronic control system					Hydraulic control system				Powertrain																			
	K1-33	K1-127	Section F1	K1-25	K1-26,27	Section G	K1-28	K1-28	K1-29	K1-107	K1-14	K1-18,20,21	K1-98	K1-92	K1-61	K1-68	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K1-71	K1-76	K1-61	K1-68	K1-87	K1-83	K1-54,81,84	K1-95
ATF level and condition	Shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Kickdown switch, Kickdown solenoid, and wiring	Ignition switch and starter	OD OFF switch	OD cancel solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD band servo	2nd band servo	Accumulator	Transmission air check	OD cancel valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2nd brake band	Low and reverse brake	One-way clutch	Planetary gear	Parking gear	
Shift shock	Excessive N range to D range shift shock		1						2	3	4												5								
	Excessive 1st to 2nd shift shock	1							2	3				4		5		7								6					
	Excessive 2nd to 3rd shift shock								1	2	3			4				6								5					
	Excessive 3rd to OD shift shock								1	2	3						5							4							
	Vehicle brakes when shifted from 1st to 2nd	1										2															3	5			
	Vehicle brakes when shifted from 2nd to 3rd	1											3		2													4			
	Vehicle brakes when shifted from 3rd to OD	1											3		2									4							
	Shift shock felt when accelerator released and deceleration occurs	1			3					2	4	5	6			7															
	Excessively large 2nd to 1st shock in 1 range	1								2	3	4	5																	6	
	Shift point	Excessively high 1st to 2nd, 2nd to 3rd, and 3rd to OD shift points	1			3				2	4	5	6																		
Excessively high OD to 3rd, 3rd to 2nd, and 2nd to 1st shift points		1			3				2	4	5	6																			
Kickdown operates or engine overruns when depressing pedal in 3rd beyond kickdown vehicle speed limit		1	2								3	4	5										6								
Kickdown operates or engine overruns when depressing pedal in OD beyond kickdown vehicle speed limit		1	2									3	4	5											6						
Shift sequence	Shifts directly from 1st to 3rd	1										2	3			4									5						
	Shifts directly from 1st to OD	1											2	3		4							5								
	Shifts from 2nd to 1st, or 2nd to 3rd in 2 range		1							2	3																				
	Shifts from 1st to 2nd, or 2nd to 3rd in 1 range		1									2																			

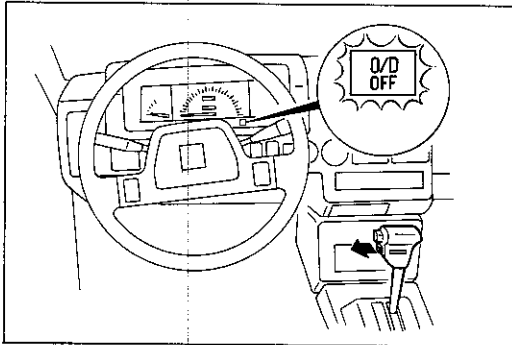
Inspection point and reference page	ON VEHICLE										OFF VEHICLE																					
	Pre-liminary		Electronic control system				Hydraulic control system				Powertrain																					
	K1-33	K1-127	Section F1	K1-25	K1-26,27	Section G	K1-28	K1-28	K1-29	K1-107	K1-14	K1-18,20,21	K1-98	K1-92	K1-61	K1-68	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K1-71	K1-76	K1-61	K1-68	K1-87	K1-83	K1-84,81,84	K1-95	
ATF level and condition	Shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Kickdown switch, Kickdown solenoid, and wiring	Ignition switch and starter	OD OFF switch	OD cancel solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD band servo	2nd band servo	Accumulator	Transmission air check	OD cancel valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2nd brake band	Low and reverse brake	One-way clutch	Planetary gear	Parking gear		
Slipping	Little shift shock or excessive slippage while 1st to 2nd shifting	1	2						3	4	5		6			7											⑧					
	Little shift shock or excessive slippage while 2nd to 3rd shifting	1	2						3	4	5		6			7							⑧									
	Little shift shock or excessive slippage while 3rd to OD shifting	1	2						3	4	5		6			7								⑧								
	No shift shock or engine overruns when shifting 1st to 2nd	1	2	4					3	5	6					7				⑨						⑧						
	Engine overruns or slips when shifting OD to 3rd	1							2	3	4			5	6							⑦	⑧		⑨							
	Engine overruns or slips when shifting 3rd to 2nd	1							2	3				4	5								⑥		⑦							
Noise	Transmission noisy in P and N ranges	1								2										③												
	Transmission noisy in D, 2, 1, and R ranges	1								2										④			③					⑤	⑥			
Others	No engine braking in 1 range	1								2	3					4											⑤					
	Vehicle moves in P range or parking gear not disengaged when P range disengaged		1																											②		
	Transmission overheats	1		4							5	6		2	3		7			⑭	⑮	⑧	⑨	⑩	⑪	⑫	⑬			⑯		
	White smoke discharged from exhaust while running	1							2	3	4	5					6			⑬	⑭	⑦	⑧	⑨	⑩	⑪	⑫			⑮		
	Abnormal odor from oil level gauge pipe	1																		⑧	⑨	②	③	④	⑤	⑥	⑦			⑩		
	Transmission shifts to OD even when OD OFF switch depressed						1	2									③															
	Vehicle surges in OD								1																							

OBUOK1-007

## ELECTRICAL SYSTEM INSPECTION

In this inspection, the function of the electrical control system (inhibition of OD and lockup) and components are checked.

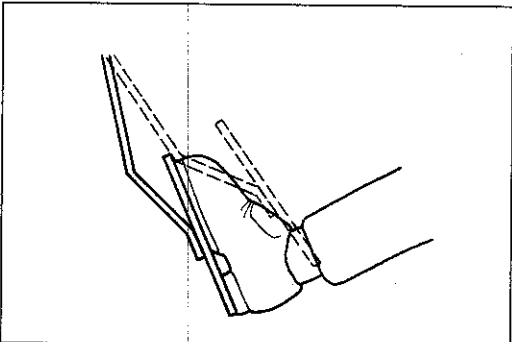
9MU0K2-018



0BU0K1-008

**OD OFF SWITCH FUNCTION**

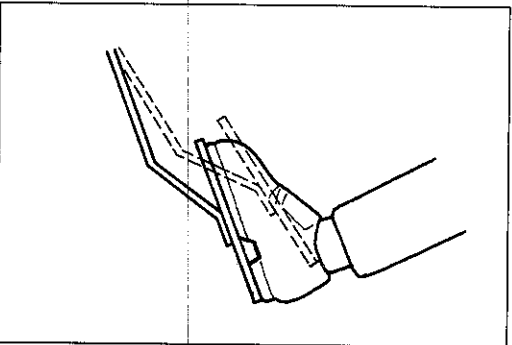
1. Drive the vehicle in D range.
2. Check that OD and lockup are provided.
3. Depress the OD OFF switch, and check that OD and lock-up operations are canceled.
4. If not correct, check the OD OFF switch, OD cancel solenoid, and lockup solenoid.  
(Refer to pages K1-28, 29.)



0BU0K1-009

**KICKDOWN AND 4-3 SWITCH FUNCTION****Kickdown Switch Function**

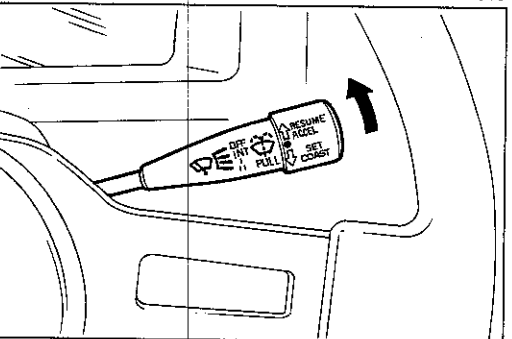
1. Drive the vehicle in D range.
2. Depress the accelerator pedal 7/8 or more, and check the kickdown.
3. If it is not correct, check the kickdown switch, kickdown solenoid and kickdown relay.  
(Refer to pages K1-26, 27.)



0BU0K1-010

**4-3 Switch Function**

1. Drive the vehicle in OD below 100 km/h (62 mph) in D range.
2. Depress the accelerator pedal 6/8 of its maximum, and check that OD is canceled.
3. If not correct, check the 4-3 switch.  
(Refer to page K1-26.)



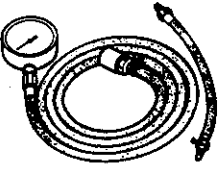


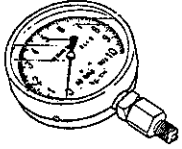
1BU0K1-003

**CRUISE CONTROL SWITCH FUNCTION**

1. Turn the main cruise control switch ON.
2. Drive the vehicle in OD below 100 km/h (62 mph) and above 40 km/h (25 mph) in D range.
3. Set the cruise control for operation.
4. Depress the SET switch, and check that the OD is canceled.
5. Accelerate to OD, turn the RESUME switch, and check that the OD is canceled.
6. If not correct, check the cruise control operation.  
(Refer to Section T.)

### MECHANICAL SYSTEM TEST

#### PREPARATION SST

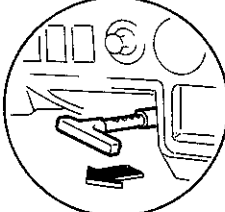
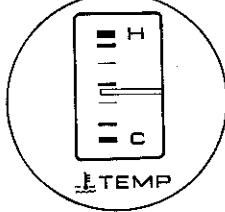
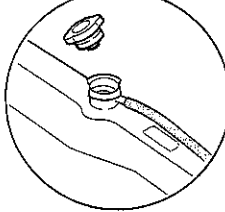
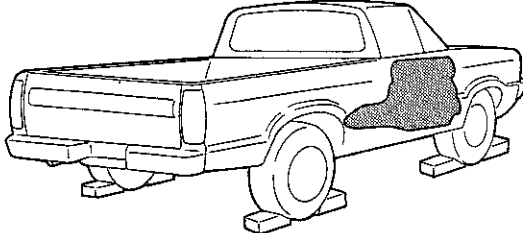
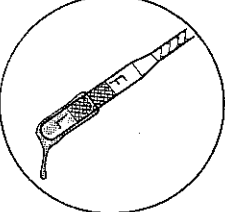
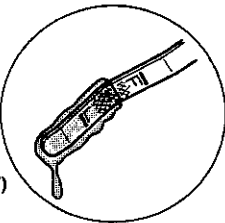
49 0378 400A Gauge set, oil pressure 	49 H075 406 Adapter oil pressure gauge 	49 H019 002 Adapter 
49 B019 901 Gauge, oil pressure 	1BU0K1-004	

#### STALL TEST

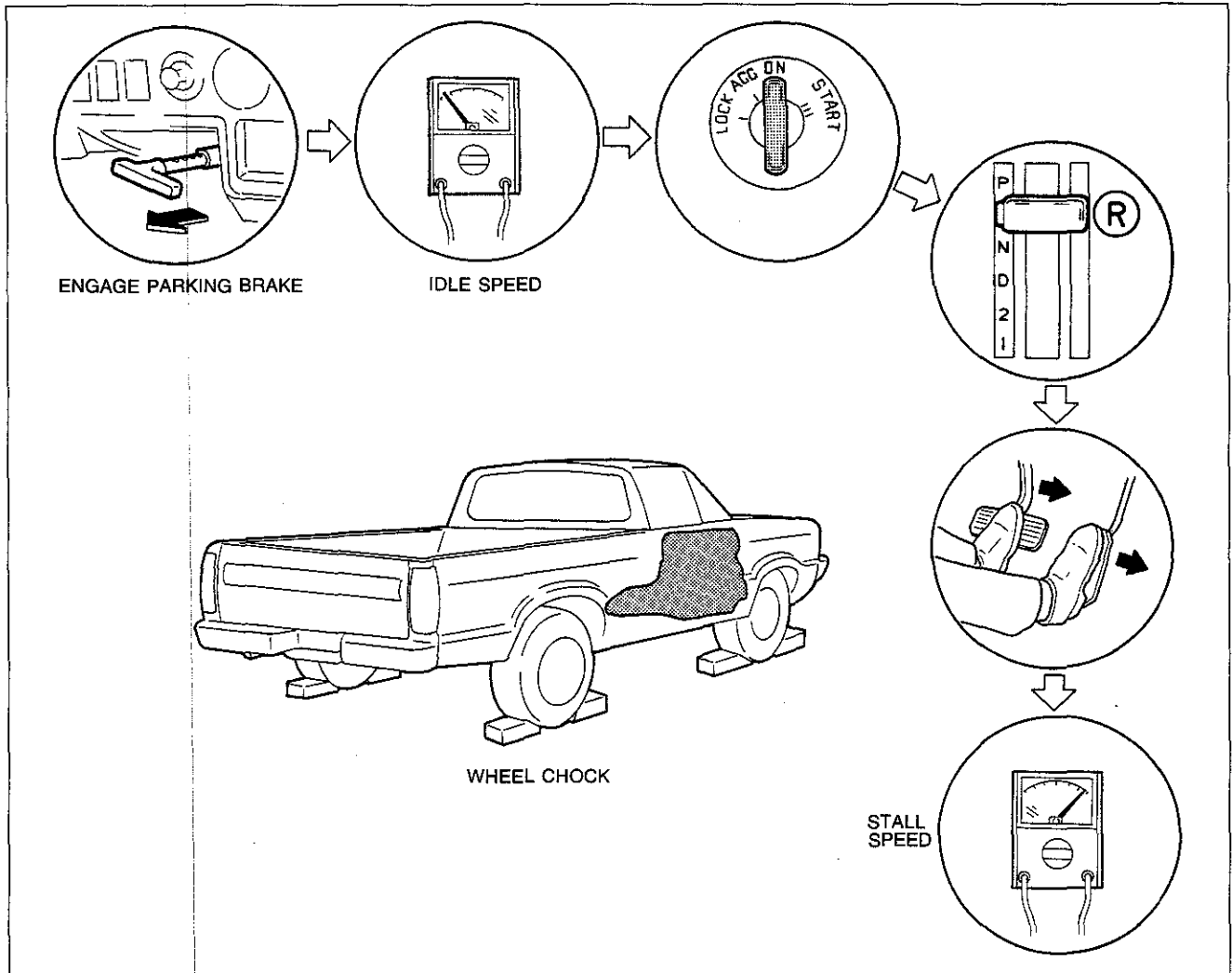
This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

#### Preparation

1. Check the engine coolant, engine oil, and ATF levels before testing.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (60—70°C, 140—158°F).
3. Engage the parking brake and use wheel chocks at front and rear of the wheels.

ENGAGE PARKING BRAKE	WARM UP ENGINE	COOLANT LEVEL
		
		ENGINE OIL LEVEL 
WHEEL CHOCK		ATF LEVEL 
TEMPERATURE: 60—70°C (140—158°F)		

## Procedure



2BU0K1-002

1. Connect a tachometer to the engine.
2. Start the engine and check the idle speed in P range. (Refer to Sections F1, F2.)

**Idle speed****F2 Carb.** : 800—850 (800  $\pm 5\%$ ) rpm**F2 EGI, G6:** 750—790 rpm

3. Shift the selector lever to R range.

**Caution****Step 4 must be performed within 5 seconds to prevent possible transmission damage.**

4. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right foot.

**Caution****Step 5 must be performed within 5 seconds to prevent possible transmission damage.**

5. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.

**Caution****Idling for at least one minute is to cool the ATF and to prevent deterioration of the fluid.**

6. Move the selector lever to N range and let the engine idle for at least one minute.

### Caution

**Be sure to allow sufficient cooling time between each stall test.**

7. Perform the stall test for the following ranges in the same manner.

- (1) D range
- (2) 2 range
- (3) 1 range

### Engine stall speed

**F2 EGI : 1,850—2,250 rpm**

**F2 Carb.: 1,800—2,200 rpm**

**G6 : 2,100—2,500 rpm**

0BUOK1-014

### Evaluation of Stall Test

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transmission case
			Stuck pressure regulator valve
			Direct clutch slipping
	In D, 2, and 1 ranges	Rear clutch slipping	
	In D range only	One-way clutch slipping	
In 2 range only	Brake band slipping		
In R range only		Low and reverse brake slipping	
		Front clutch slipping	
		Perform road test to determine if this is caused by low and reverse brake or front clutch, as follows: a) Effective engine braking in 1 range.....Front clutch b) No engine braking in 1 range.....Low and reverse brake	
Within specification	All shift control elements within transmission are functioning normally		
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

9MUOK2-027

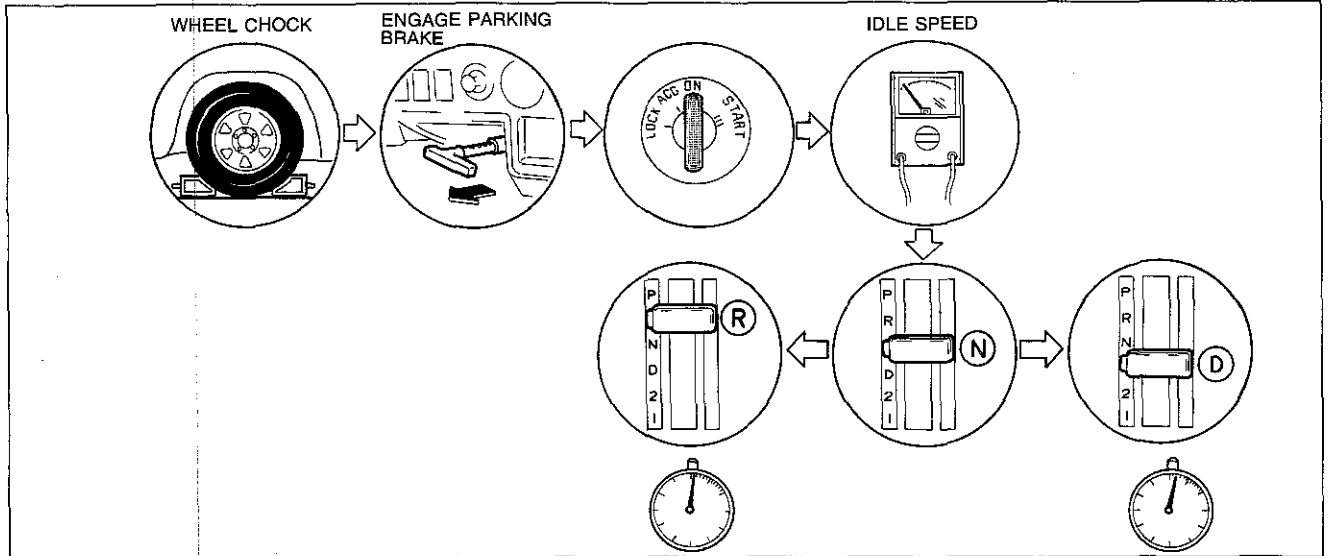
**TIME LAG TEST**

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step measures this time lag for checking condition of the front, rear, and one-way clutch; low and reverse brake; and orifice check valve.

**Preparation**

Perform the preparation procedure shown in STALL TEST. (Refer to page K1-14.)

**Procedure**



2BU0K1-003

1. Start the engine and check the idle speed in P range. (Refer to Sections F1, F2.)

**Idle speed**

F2 Carb. : 800—850 (800  $\pm$  5%) rpm

F2 EGI, G6: 750—790 rpm

2. Shift from N range to D range.
3. Use a stop watch to measure the time it takes from shifting until shock is felt.

**Caution**

**Idling for at least one minute is to cool the ATF and prevent deterioration of the fluid.**

4. Shift the selector to N range and run the engine at idle for at least one minute or more.

**Note**

**Make three measurements for each test and take the average value.**

5. Perform the test for N range to R range in the same manner.

<b>Specified time lag:</b>	N → D range .....	0.5—1.0 second
	N → R range .....	0.5—1.0 second

**Evaluation of Time Lag Test**

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure
		Rear clutch slipping
		One-way clutch slipping
	Less than specification	Excessive line pressure
N → R shift	More than specification	Insufficient line pressure
		Low and reverse brake slipping
		Front clutch slipping
	Less than specification	Stuck orifice check valve
		Excessive line pressure

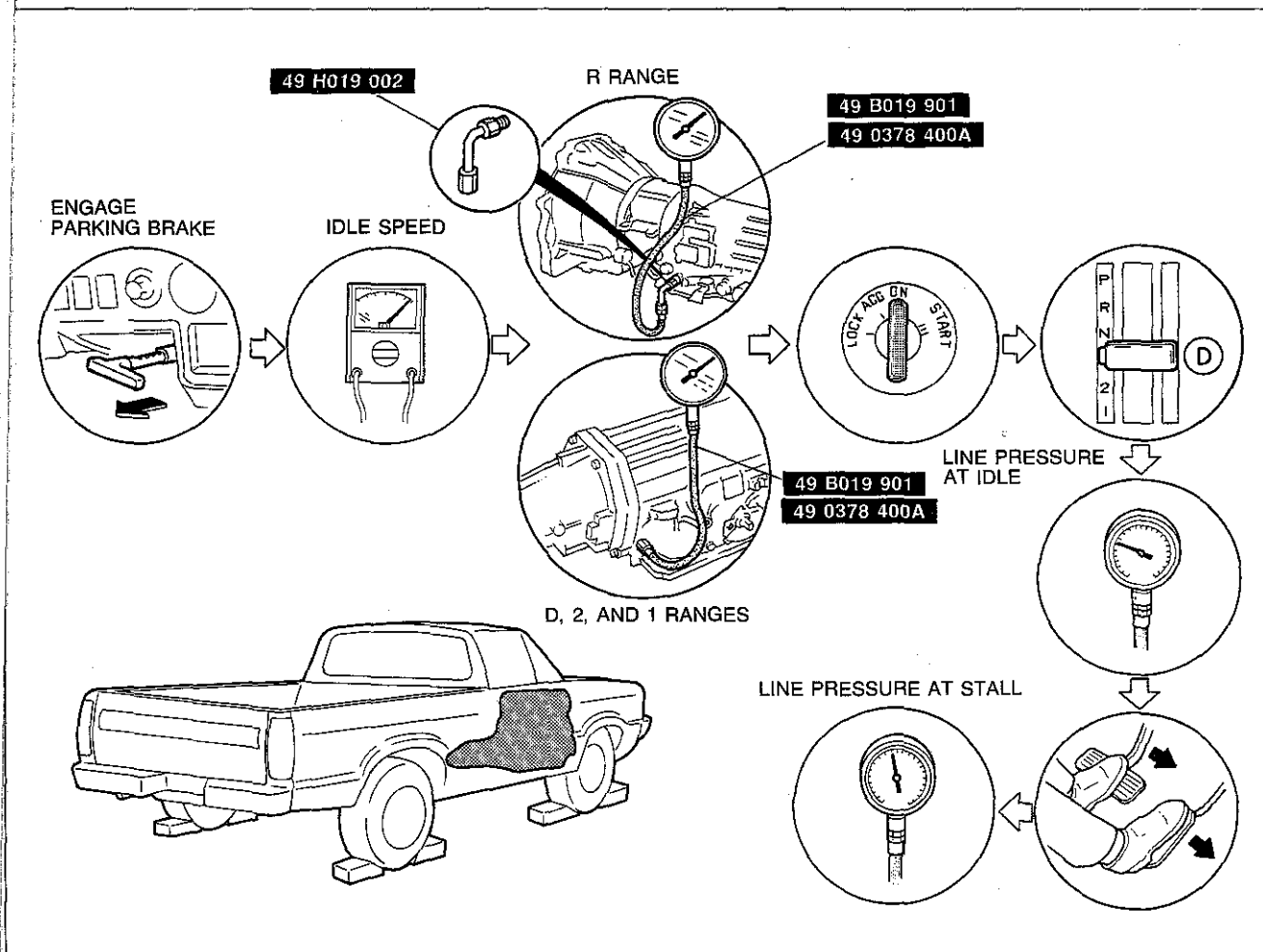
9MU0K2-029

**LINE PRESSURE TEST**

This test measures line pressures for checking the hydraulic components and inspecting for oil leakage.

**Preparation**

1. Perform the preparation procedure shown in STALL TEST.
2. Connect a tachometer to the engine.
3. Connect the **SST** to the line pressure inspection hole(s).

**Procedure**

2BU0K1-004

1. Start the engine and check the idle speed in P range. (Refer to Sections F1, F2.)

**Idle speed**

F2 Carb. : 800—850 (800  $\pm$  5%) rpm

F2 EGI, G6: 750—790 rpm

2. Shift the selector lever to D range and read the line pressure at idle.

**Caution**

**Step 3 must be performed within 5 seconds to prevent possible transmission damage.**

3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.

**Caution**

**Step 4 must be performed within 5 seconds to prevent possible transmission damage.**

4. Read the line pressure as soon as the engine speed becomes constant; then release the accelerator pedal.



**Caution**

**Idling for at least one minute is to cool the ATF and prevent deterioration of the fluid.**

5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and at the engine stall speeds for each range in the same manner.

**Specified line pressure:**

Range	Pressure kPa (kg/cm <sup>2</sup> , psi)			
	Idle		Stall	
	F2 engine	G6 engine	F2 engine	G6 engine
D, 1	294—392 (3.0—4.0, 43—57)		932—1,128 (9.5—11.5, 135—164)	1,118—1,315 (11.4—13.4, 162—191)
2	589—1,148 (6.0—11.7, 85—166)	1,010—1,570 (10.3—16.0, 146—228)	981—1,177 (10.0—12.0, 142—172)	1,403—1,599 (14.3—16.3, 203—232)
R	520—657 (5.3—6.7, 75—95)	549—687 (5.6—7.0, 80—100)	1,736—1,923 (17.7—19.6, 252—279)	2,188—2,374 (22.3—24.2, 317—344)

0BU0K1-017

**Evaluation of Line Pressure Test**

Condition		Possible cause
Below standard	In all ranges	Worn oil pump
		Fluid leakage from the oil pump, control valve, or transmission case
		Stuck pressure regulator valve
		Fluid leakage from the direct clutch and/or OD band servo release side
	In D, 1, and 2 ranges	Fluid leakage from the rear clutch or governor hydraulic circuit, or both
In R range only	Fluid leakage from the low and reverse brake hydraulic circuit	
Excessive line pressure at idle		Leaking or disconnected vacuum hose
		Leaking vacuum diaphragm

9MU0K2-032

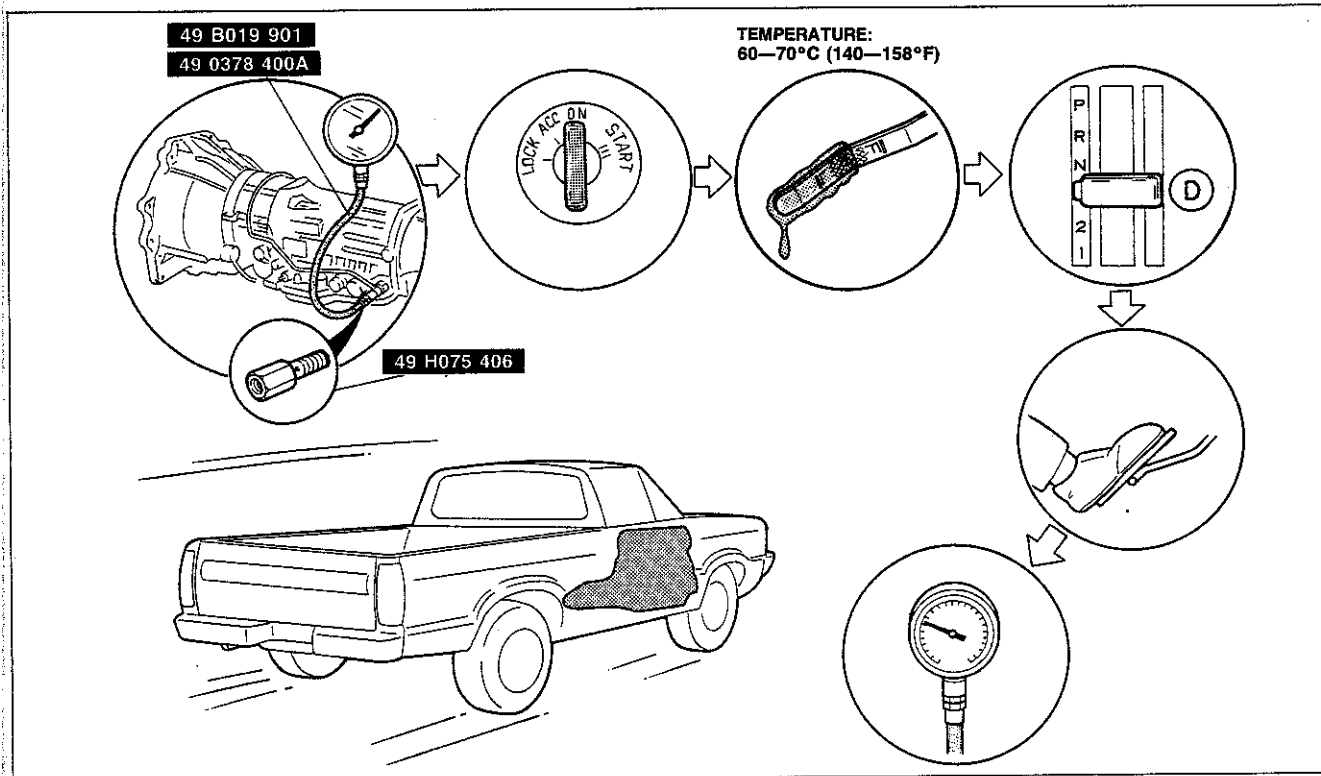
### GOVERNOR PRESSURE TEST

This test checks governor pressures for inspecting hydraulic components and for oil leakage.

#### Preparation

1. Connect the **SST** to the governor pressure output hole.
2. Place the **SST** inside the vehicle.
3. Start the engine and warm up the ATF; then check the ATF level.

#### Procedure



2BU0K1-005

1. Start the engine and check the idle speed in P range.

#### Idle speed

F2 Carb. : 800—850 (800  $\pm$ 50) rpm

F2 EGI, G6: 750—790 rpm

2. Drive the vehicle in D range.
3. Read the governor pressure at the speeds listed in the table below.

#### Specified governor pressure:

Vehicle speed km/h (mph)	Governor pressure kPa (kg/cm <sup>2</sup> , psi)		
	F2 EGI	F2 Carb.	G6
30 (19)	69—128 (0.7—1.3, 10—18)	88—147 (0.9—1.5, 13—21)	78—137 (0.8—1.4, 11—20)
55 (34)	157—235 (1.6—2.4, 23—34)	196—275 (2.0—2.8, 28—40)	186—265 (1.9—2.7, 27—38)
85 (53)	314—412 (3.2—4.2, 46—60)	412—510 (4.2—5.2, 60—74)	392—491 (4.0—5.0, 57—71)

0BU0K1-019

#### Evaluation of Governor Pressure Test

Condition	Possible cause
Not within specification	Fluid leakage from line pressure hydraulic circuit
	Fluid leakage from governor pressure hydraulic circuit
	Defective or stuck governor valve

9MU0K2-035

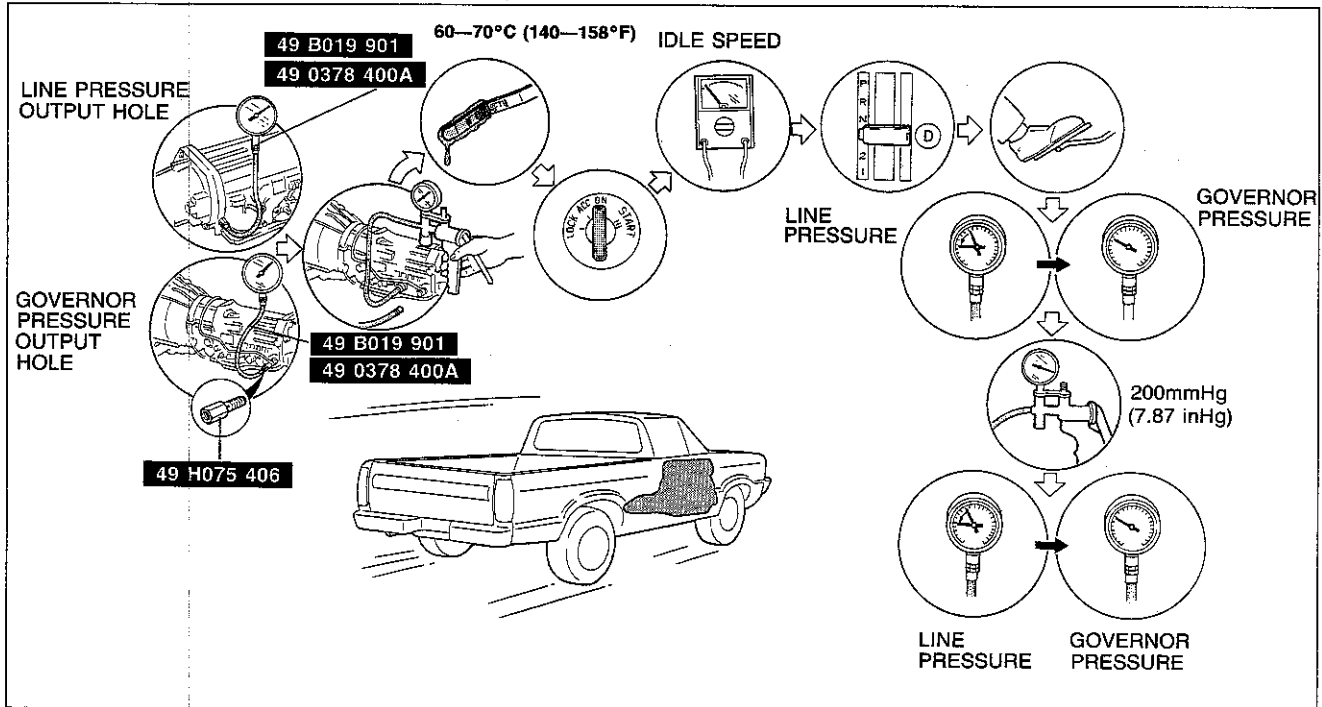
**LINE PRESSURE CUTBACK POINT TEST**

This test checks line pressure cutback point for checking of the hydraulic components.

**Preparation**

1. Connect the **SST** to the line pressure output hole and the governor pressure output hole.
2. Place the **SST** inside the vehicle.
3. Disconnect the hose and plug it to the vacuum diaphragm.
4. Connect a vacuum pump to the vacuum diaphragm and place the pump inside the vehicle.
5. Start the engine and warm up the ATF; then check the ATF level.

**Procedure**



2BU0K1-006

1. Start the engine and check the idle speed in P range.

**Idle speed**

**F2 Carb.** : 800—850 (800 ±5%) rpm  
**F2 EGI, G6:** 750—790 rpm

2. Gradually accelerate the vehicle in D range.
3. Read the governor pressure at the point where the line pressure suddenly drops.
4. Apply **200 mmHg (7.87 inHg)** vacuum, and repeat Steps 2 and 3.

**Specified governor pressure:**

Vacuum mmHg (inHg)	Governor pressure kPa (kg/cm <sup>2</sup> , psi)		
	F2 EGI	F2 Carb.	G6
Atmospheric pressure	108—167 (1.1—1.7, 16—24)	137—196 (1.4—2.0, 20—28)	128—186 (1.3—1.9, 18—27)
200 (7.87)	59—118 (0.6—1.2, 9—17)	69—128 (0.7—1.3, 10—18)	78—137 (0.8—1.4, 11—20)

0BU0K1-021

**Evaluation of Cutback Point Test**

Condition	Possible cause
Not within specification	Missing diaphragm rod, rod length incorrect, or both
	Stuck valve in control valve

9MU0K2-038

### ROAD TEST

This step is performed to inspect for problems in the various ranges. If these tests show any problems, refer to the mechanical sections to adjust or replace.

#### Caution

Perform the test at normal ATF operating temperature (60—70°C, 140—158°F).

#### D-RANGE TEST

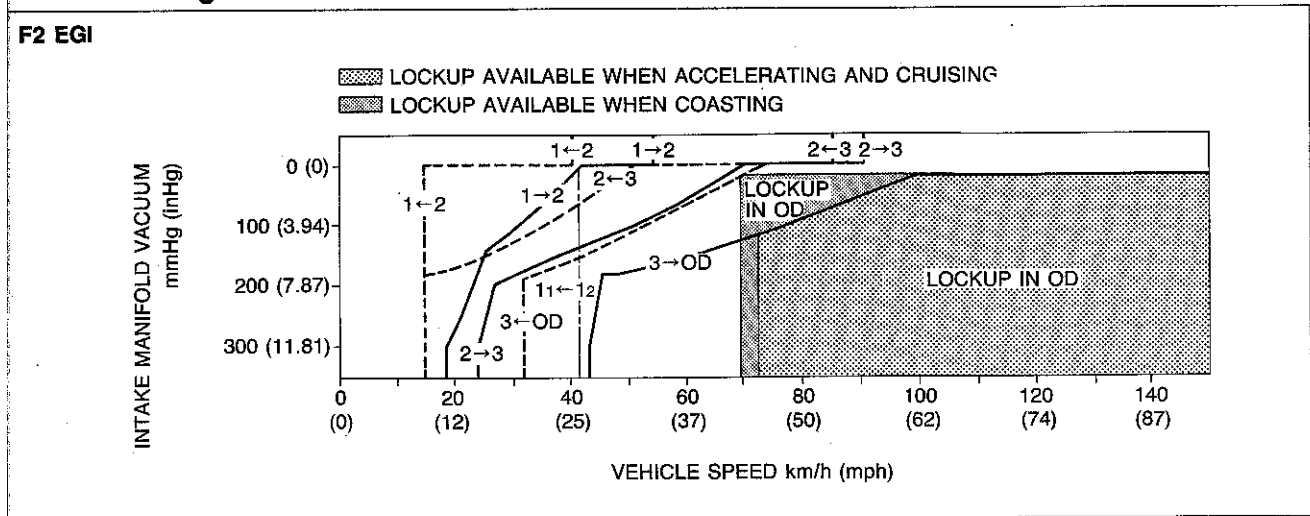
##### Shift Point, Shift Pattern, and Shift Shock

1. Shift the selector lever to D range and depressed the OD OFF switch.
2. Accelerate the vehicle with half and full throttle opening.
3. Check that 1-2, 2-3 and 3-OD upshifts and downshifts and lockup are obtained. The shift points must be as shown in the D range shift diagram.

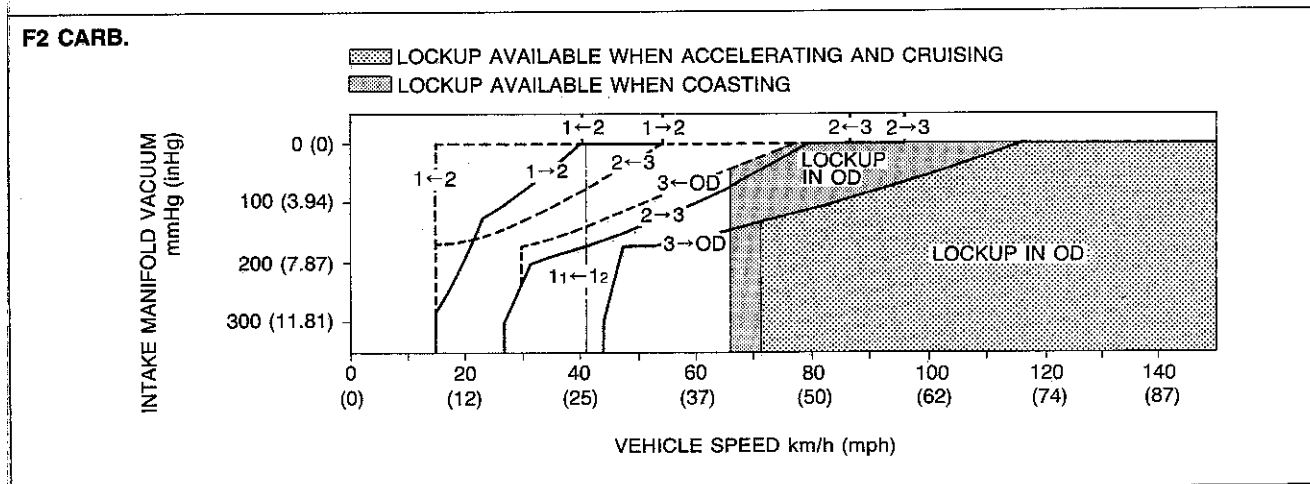
#### Note

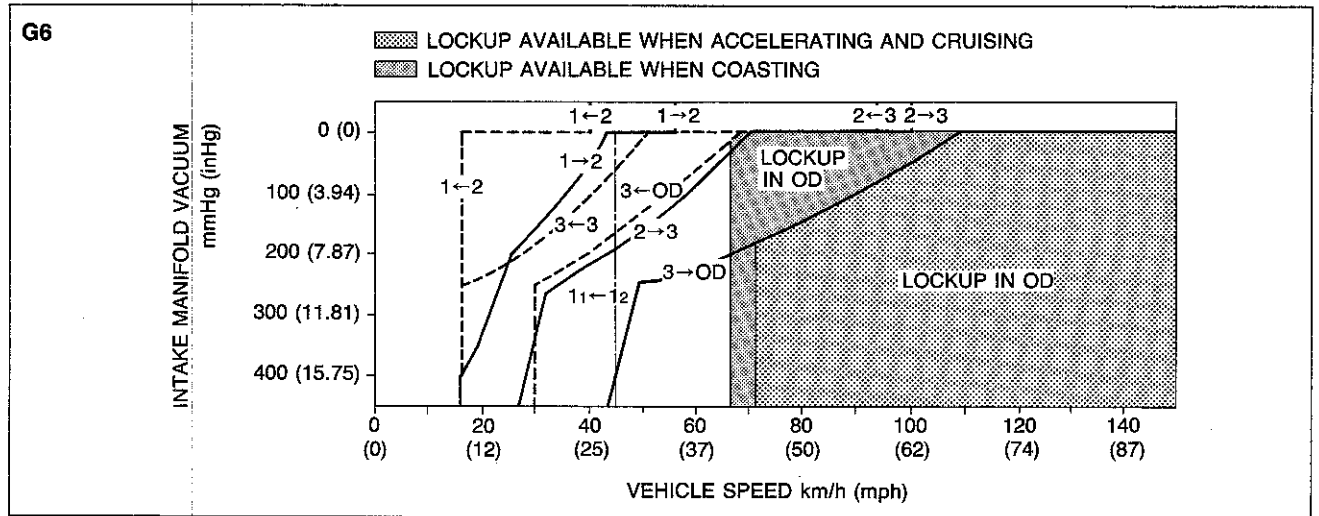
- a) Vehicle speed on a chassis roller may not meet the specified shift diagram because of incorrect tire size.
  - b) There is no lockup or OD when the OD OFF switch is released.
4. Check the upshifts and downshifts for shift shock or slippage.
  5. While driving in 3rd shift the selector lever to 2 range and check that 3-2 downshift immediately occurs, then decelerate and check that engine braking effect is felt in 2nd gear.

#### Basic shift diagram



OBUOK1-022





### Noise and Vibration

Drive the vehicle in OD (lockup), OD (no lockup), and 3rd. Check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause made with extreme care.**

### Kickdown

Drive the vehicle in OD, 3rd, and 2nd gears and check that kickdown occurs for OD→3, 2, or 1; 3→2, or 1; 2→1 and that the shift points are as shown in the basic shift diagram.

### 2-RANGE TEST

#### Shift Pattern

1. Shift the selector lever to 2 range.
2. Accelerate the vehicle in 2 range and check that 2nd gear is held.

### Noise and vibration

Drive the vehicle in 2nd gear and check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause made with extreme care.**

### 1-RANGE TEST

#### Shift Pattern

1. Shift the selector lever to 1 range.
2. Accelerate the vehicle in 1 range and check that 1st gear is held.

### Noise and vibration

Drive the vehicle in 1st gear and check for abnormal noise or vibration.

#### Note

**Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause made with extreme care.**

### P-RANGE TEST

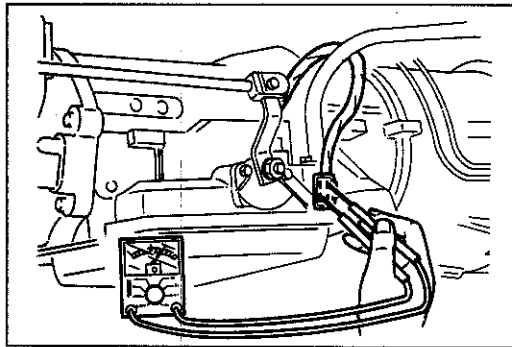
1. Shift into P range on a gentle slope, release the brake, and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at **maximum of 4 km/h (2.5 mph)** on a level surface, and check that the vehicle stops.

9MU0K2-040

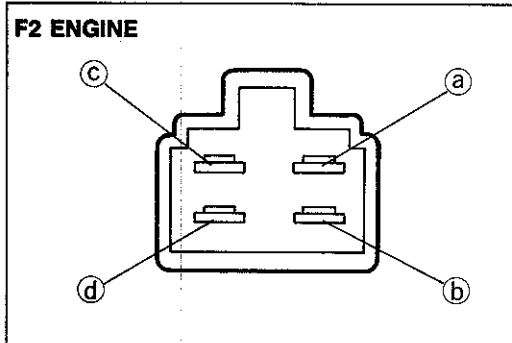
### Vehicle speed at gearshift table

Range	Throttle condition (Manifold vacuum)	Shifting	Vehicle speed km/h (mph)			
			F2 EGI	F2 Carb.	G6	
D	Fully opened	D <sub>1</sub> →D <sub>2</sub>	51—57 (32—35)	52—58 (32—36)	53—59 (33—37)	
		D <sub>2</sub> →D <sub>3</sub>	93—99 (58—61)	88—94 (55—58)	97—103 (60—64)	
		OD→D <sub>3</sub>	Above 84 (52)	Above 83 (51)	Above 91 (56)	
		D <sub>3</sub> →D <sub>2</sub>	84—90 (52—56)	83—89 (51—55)	91—97 (56—60)	
		D <sub>2</sub> →D <sub>1</sub>	37—43 (23—27)	38—44 (24—27)	37—43 (23—27)	
	Half throttle 200 mmHg (7.87 inHg)	D <sub>1</sub> →D <sub>2</sub>	16—22 (10—14)	20—26 (12—16)	23—29 (14—18)	
		D <sub>2</sub> →D <sub>3</sub>	29—35 (18—22)	24—30 (15—18)	40—46 (25—29)	
		D <sub>3</sub> →OD	43—49 (27—30)	42—48 (26—30)	64—70 (40—43)	
		Lockup ON (OD)	68—74 (42—46)	70—76 (43—47)	68—74 (42—46)	
		Lockup OFF (OD)	63—69 (39—43)	66—72 (41—45)	63—69 (39—43)	
		OD→D <sub>3</sub>	26—32 (16—20)	29—35 (18—22)	36—42 (22—26)	
		D <sub>3</sub> →D <sub>2</sub>	12—18 (7—11)	12—18 (7—11)	25—31 (16—19)	
		D <sub>2</sub> →D <sub>1</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)	
	Fully closed	D <sub>1</sub> →D <sub>2</sub>	12—18 (7—11)	16—22 (10—14)	13—19 (8—12)	
		D <sub>2</sub> →D <sub>3</sub>	24—30 (15—19)	21—27 (13—17)	24—30 (15—19)	
		D <sub>3</sub> →OD	41—47 (25—29)	40—46 (25—29)	40—46 (25—29)	
		OD→D <sub>3</sub>	26—32 (16—20)	29—35 (18—22)	27—33 (17—20)	
		D <sub>3</sub> →D <sub>2</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)	
		D <sub>2</sub> →D <sub>1</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)	
	1	—	1 <sub>2</sub> →1 <sub>1</sub>	38—44 (24—27)	38—44 (24—27)	41—47 (25—29)

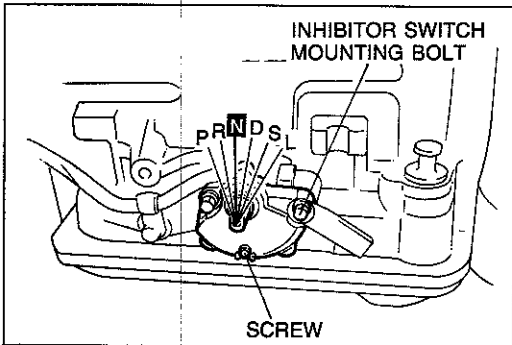
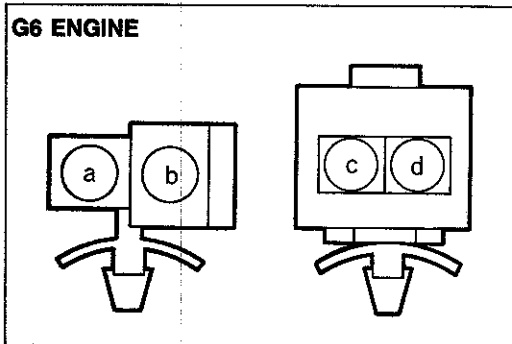
0BUOK1-023



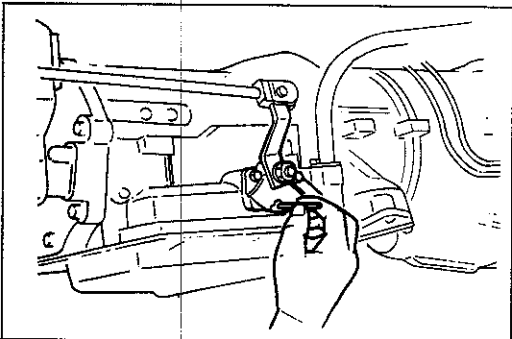
0BU0K1-024



1BU0K1-008



9MU0K2-048



9MU0K2-049

**ELECTRONIC SYSTEM COMPONENTS**

**INHIBITOR SWITCH**

**Inspection**

**Operation**

1. Check that the starter operate with the ignition switch at START position and the selector in the P and in the N range only, and that it does not operate in any other position.
2. Check that the backup lights illuminate when shifted to the R range with the ignition switch ON.
3. Check the inhibitor switch if it is not as specified.

**Continuity**

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the control linkage from the manual shaft.
3. Disconnect the inhibitor switch connector.
4. Check continuity of the terminals as shown.

Position	Connector terminal			
	a	b	c	d
P	○—○			
R			○—○	
N	○—○			
D, 1, 2				

○—○ : Indicates continuity

5. If not correct, adjust the inhibitor switch.
6. If correct, check or adjust the selector lever and control linkage.

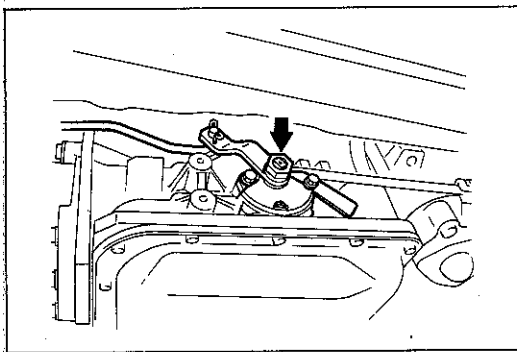
**Adjustment**

1. Move the manual shaft to N position.
2. Loosen the inhibitor switch mounting bolts.
3. Remove the screw on the switch body and move the inhibitor switch so that the screw hole is aligned with the small hole inside the switch. Check their alignment by inserting an **approx. 2.0mm (0.079 in)** diameter pin through the holes.
4. Tighten the mounting bolts and remove the pin.

**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

5. Install and tighten the screw in the switch body.
6. Check the continuity of the inhibitor switch.
7. If not correct, replace the inhibitor switch.

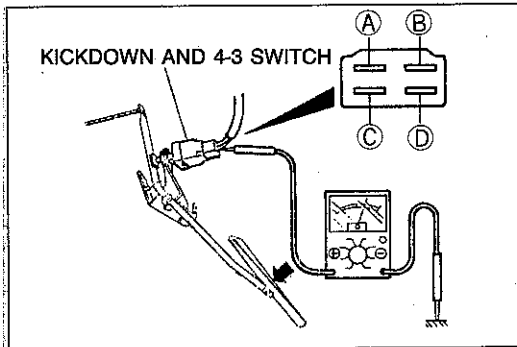


9MU0K2-050

8. Connect the control linkage.

### Tightening torque:

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**



2BU0K1-007

### KICKDOWN AND 4-3 SWITCH

#### Inspection

#### Kickdown switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal ③ (YG).

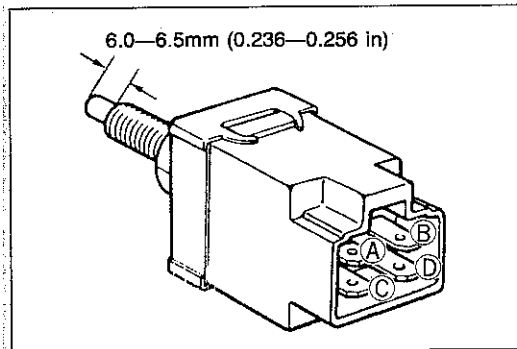
**V<sub>B</sub>: Battery voltage**

Terminal voltage	Depressed
V <sub>B</sub>	7/8—8/8 (Full)
0V	0/8—7/8

3. If not correct, check the continuity between terminals.

#### Kickdown switch continuity

1. Disconnect the connector.
2. Check the continuity between terminals ③ and ④ when the tip of the switch is depressed **6.0—6.5mm (0.236—0.256 in)**.
3. If not correct, replace the switch.
4. If correct, adjust the switch.



9MU0K2-052

#### 4-3 switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal ① (GB).

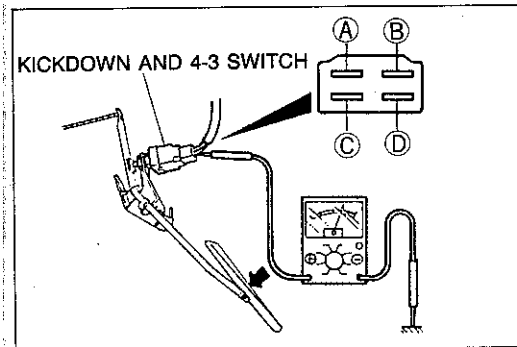
**V<sub>B</sub>: Battery voltage**

Terminal voltage	Depressed
V <sub>B</sub>	6/8—8/8
0V	0/8—5/8

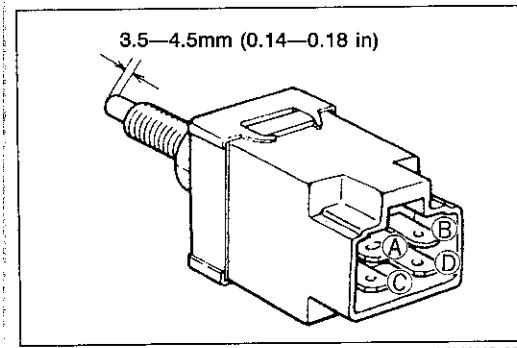
3. If not correct, check the continuity between terminals.

#### 4-3 switch continuity

1. Disconnect the connector.
2. Check the continuity between terminals ① and ② when the tip of the switch is depressed **3.5—4.5mm (0.14—0.18 in)**.
3. If not correct, replace the switch.
4. If correct, adjust the switch.

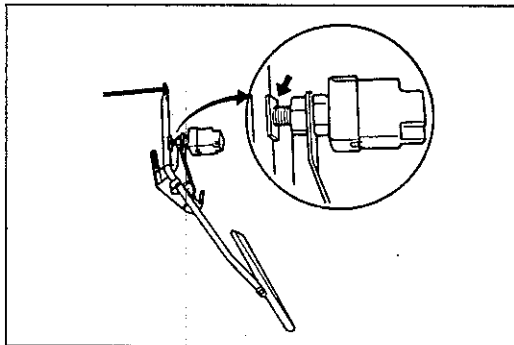


2BU0K1-008

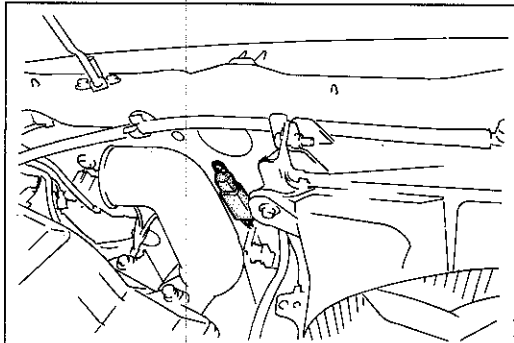


9MU0K2-054

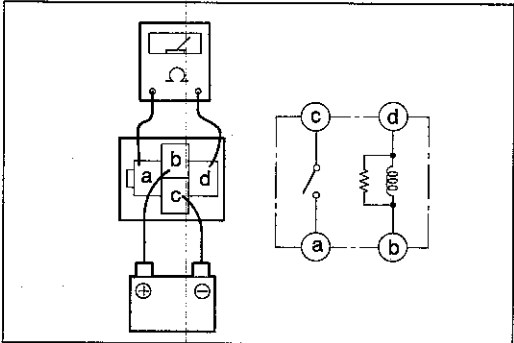




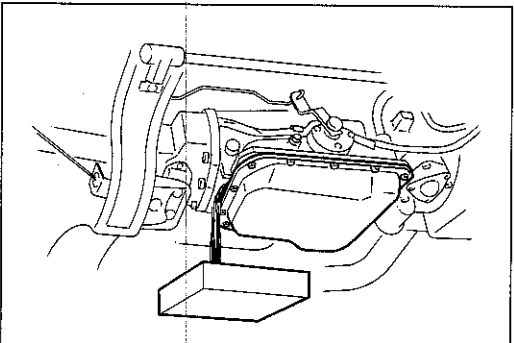
9MU0K2-055



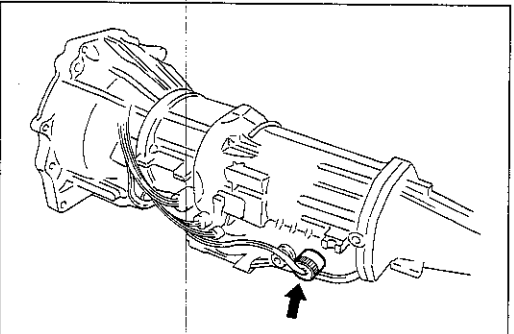
9MU0K2-068



9MU0K2-069



9MU0K2-056



9MU0K2-057

**Adjustment**

1. Disconnect the connector.
2. Loosen the locknut and back the switch out fully.
3. Depress the accelerator pedal fully and hold it.
4. With the accelerator pedal fully down, turn the kickdown switch clockwise until it turns ON (clicking sound heard). Then, turn switch 1/4 turn further clockwise.
5. Tighten the locknut and release the accelerator pedal.

**Tightening torque:**

**14—18 N·m (1.4—1.8 m·kg, 10—13 ft·lb)**

6. Reconnect the connector.
7. Depress the accelerator pedal fully and verify that the kickdown switch clicks at the fully depressed position.

**KICKDOWN RELAY****Inspection**

1. Remove the kickdown relay.
2. Connect a battery and an ohmmeter as shown.
3. First check that there is continuity; then disconnect the battery and check that there is no continuity.
4. If not correct, replace the relay.

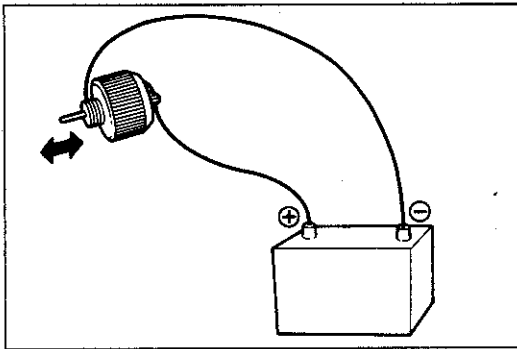
**KICKDOWN SOLENOID****Inspection**

1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts and drain **approx. 1.0 liter (1.1 US qt, 0.9 Imp qt)** of ATF.
3. Tighten the oil pan mounting bolts.

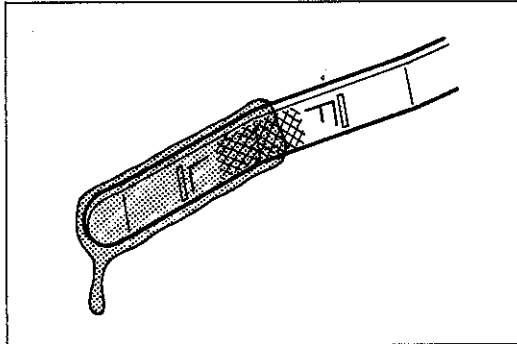
**Tightening torque:**

**5.9—7.8 N·m (60—80 cm·kg, 52—69 in·lb)**

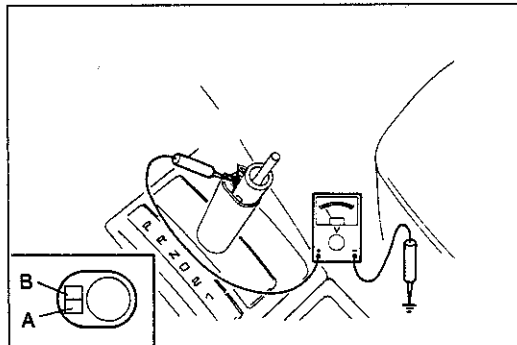
4. Remove the kickdown solenoid.



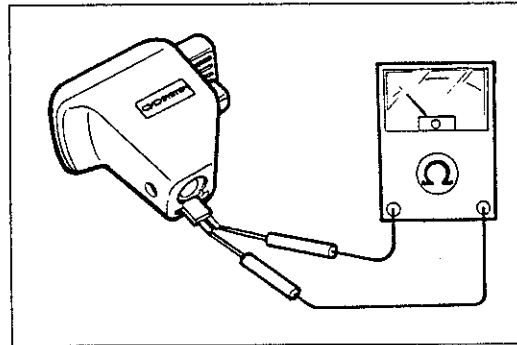
2BU0K1-009



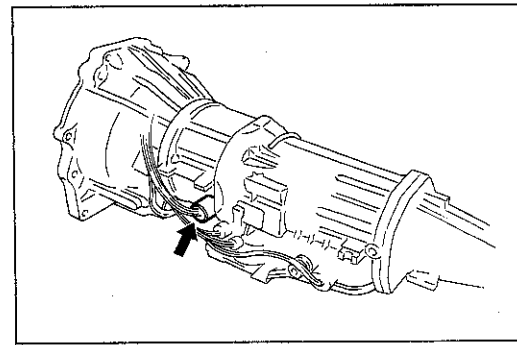
0BU0K1-025



2BU0K1-010



9BU0KX-031



0BU0K1-026

5. Apply battery voltage to the kickdown solenoid and verify that the kickdown solenoid clicks.
6. If not correct, replace the kickdown solenoid.
7. Apply the ATF to the new O-ring and install it to the solenoid; then install the kickdown solenoid.

8. Add ATF to the correct level. (Refer to page K1-33.)

### OD OFF SWITCH

#### Inspection

#### Terminal voltage

1. Remove the selector lever knob.
2. Turn the ignition switch ON.
3. Check the voltage between terminal A and ground, and between terminal B and ground.

V<sub>B</sub>: Battery voltage

Terminal	Terminal voltage
A and ground	0V
B and ground	V <sub>B</sub>

4. If correct, check continuity between the terminals.
5. If not correct, check the wiring harness.

#### Continuity

1. Check continuity of the terminals.

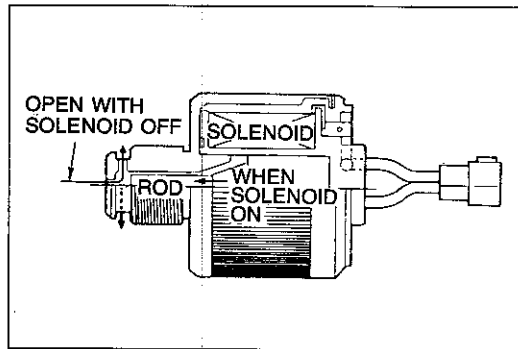
Continuity	Switch
Yes	Released
No	Depressed

2. If not correct, replace the selector lever knob.

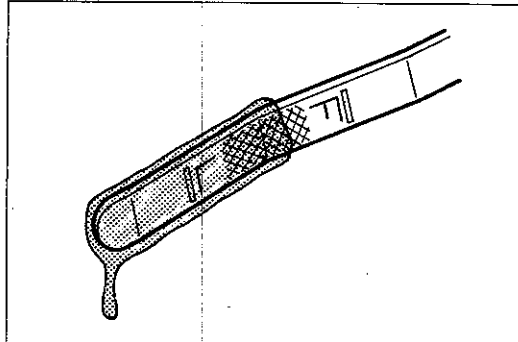
### OD CANCEL SOLENOID

#### Inspection

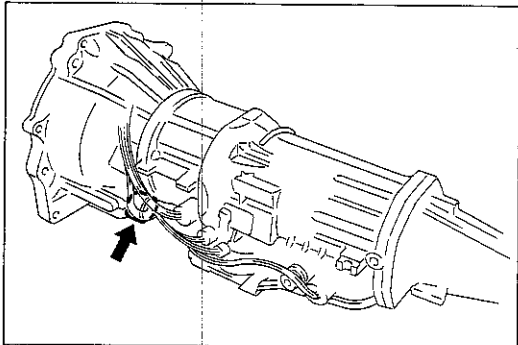
1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF as described in KICKDOWN SOLENOID section. (Refer to page K1-27.)
3. Remove the OD cancel solenoid.



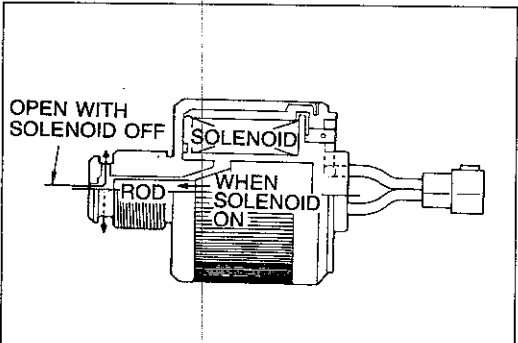
2BU0K1-011



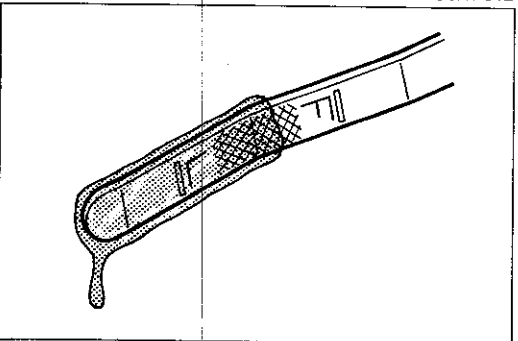
0BU0K1-027



0BU0K1-028



2BU0K1-012



0BU0K1-029

4. Apply battery voltage to the solenoid and verify operation of the solenoid.

**Note**

The oil passage should close when current is applied and open when it is cut off.

5. If not correct, replace the OD cancel solenoid.
6. Apply the ATF to the new O-ring and install it to the solenoid; then install the OD cancel solenoid.

7. Add ATF to the correct level. (Refer to page K1-33.)

**LOCKUP SOLENOID**

**Inspection**

1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF as described in KICKDOWN SOLENOID section. (Refer to page K1-27.)
3. Remove the lockup solenoid.

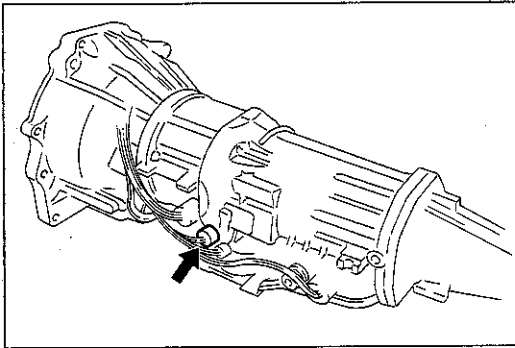
4. Apply battery voltage to the solenoid and verify operation of the solenoid.

**Note**

The oil passage should close when current is applied and open when it is cut off.

5. If not correct, replace the lockup solenoid.
6. Apply the ATF to the new O-ring and install it to the solenoid; then install the lockup solenoid.

7. Add ATF to the correct level. (Refer to page K1-33.)

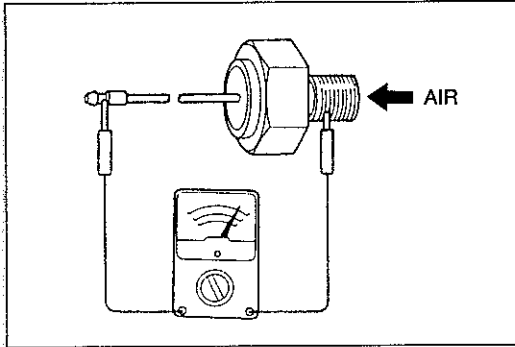


0BU0K1-030

### OIL PRESSURE SWITCH

#### Inspection

1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF as described in KICKDOWN SOLENOID section. (Refer to page K1-27.)
3. Remove the oil pressure switch.

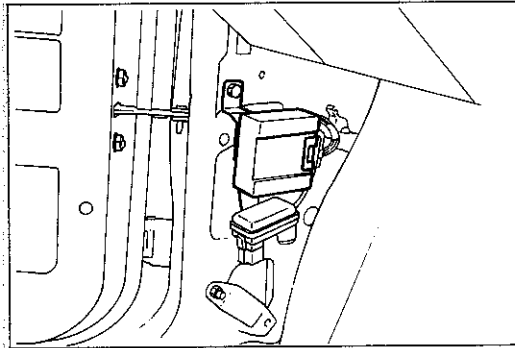


0BU0K1-031

4. Use air pressure to verify operation of the switch.

Continuity	Pressure
Yes	Less than 49 kPa (0.5 kg/cm <sup>2</sup> , 7.1 psi)
No	More than 294 kPa (3.0 kg/cm <sup>2</sup> , 42.7 psi)

5. If not correct, replace the oil pressure switch.
6. Apply the ATF to the new O-ring and install it to the solenoid; then install the oil pressure switch.
7. Add ATF to the correct level. (Refer to page K1-33.)



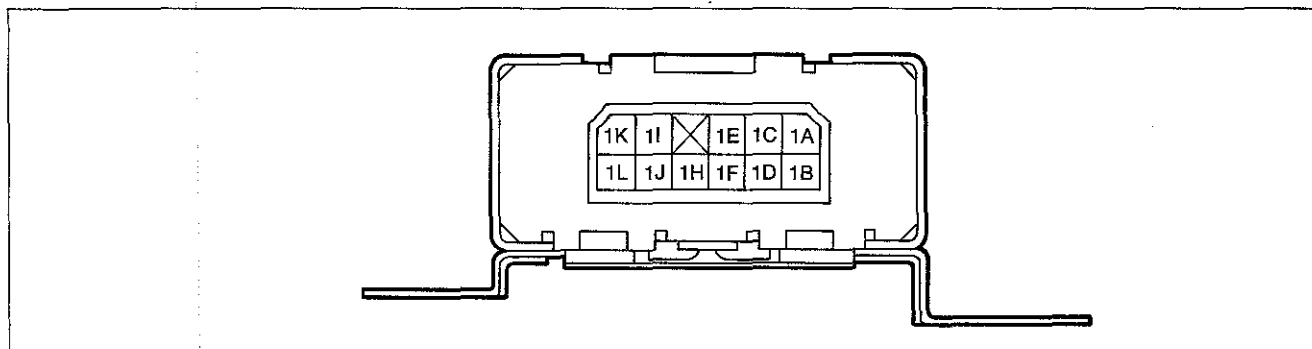
2BU0K1-013

### 4AT CONTROL UNIT

#### Inspection

1. Turn the IG switch OFF, and make sure the control unit F terminal is grounded.
2. Turn ON the IG switch, and make sure the E terminal voltage is battery voltage.

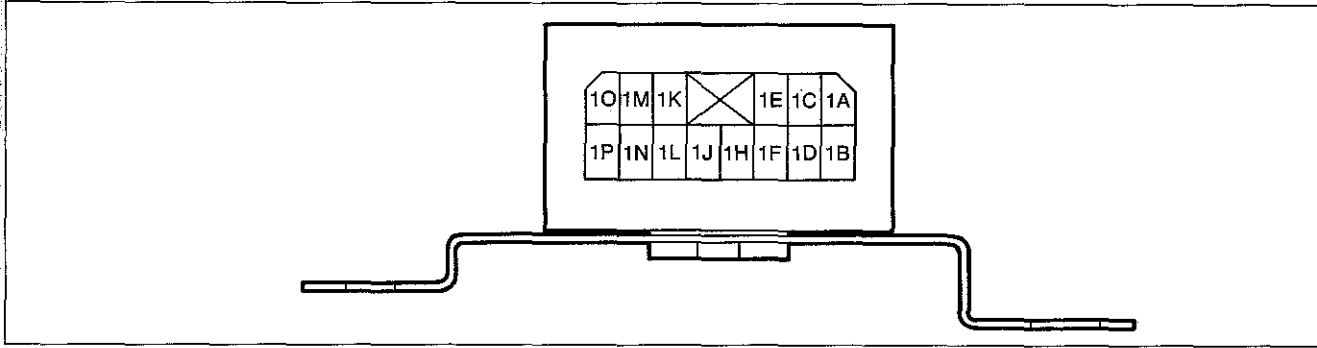
## F2 engine

V<sub>B</sub>: Battery voltage

Terminal	Connected to	Voltage	Condition
1A (Output)	OD cancel solenoid	V <sub>B</sub>	Solenoid OFF: •OD gear position
		Below 1.5V	Solenoid ON: •1st, 2nd, and 3rd gear positions in forward ranges •P, R, and N ranges
1B (Ground)	—	0V	Constant
1C	—	—	—
1D	—	—	—
1E (Input)	OD OFF switch	V <sub>B</sub>	OD OFF switch depressed (ON): •OD not available
		0V	OD OFF switch released (OFF): •OD available
1F (Input)	Cruise control unit	V <sub>B</sub>	Normal conditions
		Below 1.5V	Set or Resume switch ON, or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle: cruise control operation)
1H (Input)	Kickdown relay	V <sub>B</sub>	Kickdown relay OFF: •Other than conditions below
		Below 1.5V	Kickdown relay ON: •Kickdown switch On (throttle opening more than 7/8)
1I (Input)	Speed sensor	1.5–7V	During driving
		Approx. 7V or below 1.5V	Vehicle stopped
1J	—	—	—
1K (Input)	4-3 switch	V <sub>B</sub>	Switch ON: •Throttle opening 6/8–8/8
		0V	Switch OFF: •Other than conditions above
1L	—	—	—

2BU0K1-014

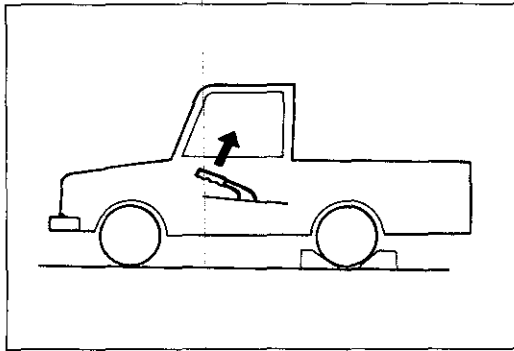
### G6 engine



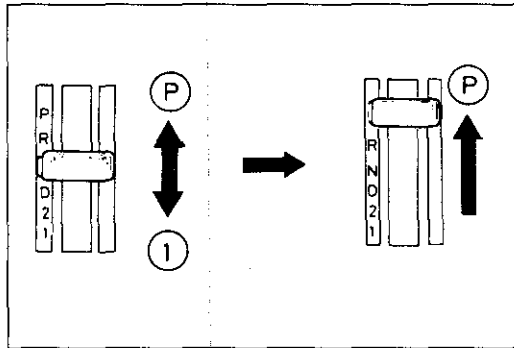
**V<sub>B</sub>: Battery voltage**

Terminal	Connected to	Voltage	Condition
1A (Battery power)	Battery	V <sub>B</sub>	Ignition switch ON
		0V	Ignition switch OFF
1B (Ground)	Battery ground	0V	Constant
1C (Input)	OD OFF switch	V <sub>B</sub>	OD OFF switch depressed (ON): •OD not available
		0V	OD OFF switch released (OFF): •OD available
1D	—	—	—
1E (Input)	4-3 switch	V <sub>B</sub>	Switch ON: •Throttle opening 6/8—8/8
		0V	Switch OFF: •Other than conditions above
1F (Input)	Oil pressure switch	V <sub>B</sub>	Switch OFF: •1st, 2nd, and 3rd gear positions in forward ranges •P, R, and N ranges
		0V	Switch ON: •OD gear position
1H (Input)	Engine control unit	V <sub>B</sub>	2Y terminal of engine control unit voltage V <sub>B</sub> •Normal condition
		0V	2Y terminal of engine control unit voltage 0V •Throttle fully—open position
1I	—	—	—
1J (Input)	Cruise control unit	V <sub>B</sub>	Normal conditions
		Below 1.5V	Set or Resume switch ON, or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle: cruise control operation)
1K (Output)	OD cancel solenoid	V <sub>B</sub>	Solenoid OFF: •OD gear position
		Below 1.5V	Solenoid ON: •1st, 2nd, and 3rd gear positions in forward ranges •P, R, and N ranges
1L (Input)	Speed sensor	1.5—7V	During driving
		Approx. 7V or below 1.5V	Vehicle stopped
1M (Input)	Kickdown relay	V <sub>B</sub>	Kickdown relay OFF: •Other than conditions below
		Below 1.5V	Kickdown relay ON: •Kickdown switch ON (throttle opening more than 7/8)
1N (Output)	Lockup solenoid	V <sub>B</sub>	Solenoid OFF: •Non-lockup
		Below 1.5V	Solenoid ON: •Lockup

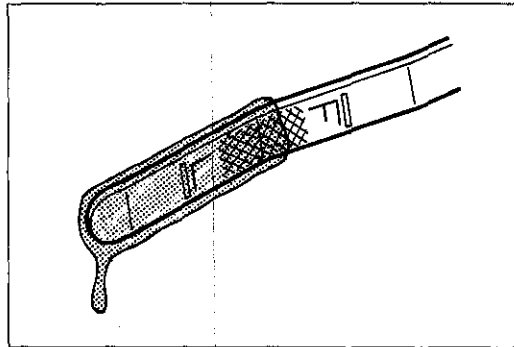
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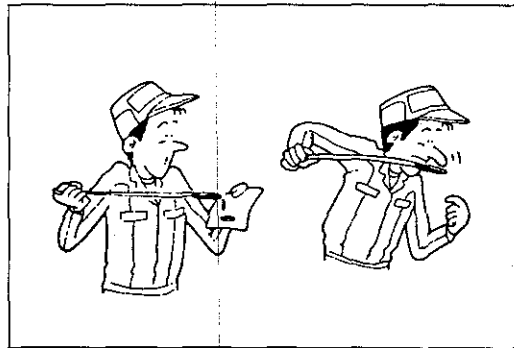
1BU0K1-009



79G07C-126



2BU0K1-016



79G07C-128

## AUTOMATIC TRANSMISSION FLUID (ATF)

### INSPECTION

#### Level

1. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.

#### Note

**Place the vehicle on a flat, level surface.**

2. Warm up the engine until the ATF reaches **60—70°C (140—158°F)**.

3. While the engine is idling, shift the selector lever from P to 1 and back again.

4. Let the engine idle.

5. Shift the selector lever to P.

6. Ensure that the ATF level is between the notches on the transmission level gauge. Add ATF to specification if necessary.

**ATF type: Dexron®II or M-III**

#### Condition

1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

#### Note

**Determine whether or not the automatic transmission should be disassembled by observing the condition of the ATF carefully.**

**If the ATF is muddy and varnished, it indicates burned drive plates.**

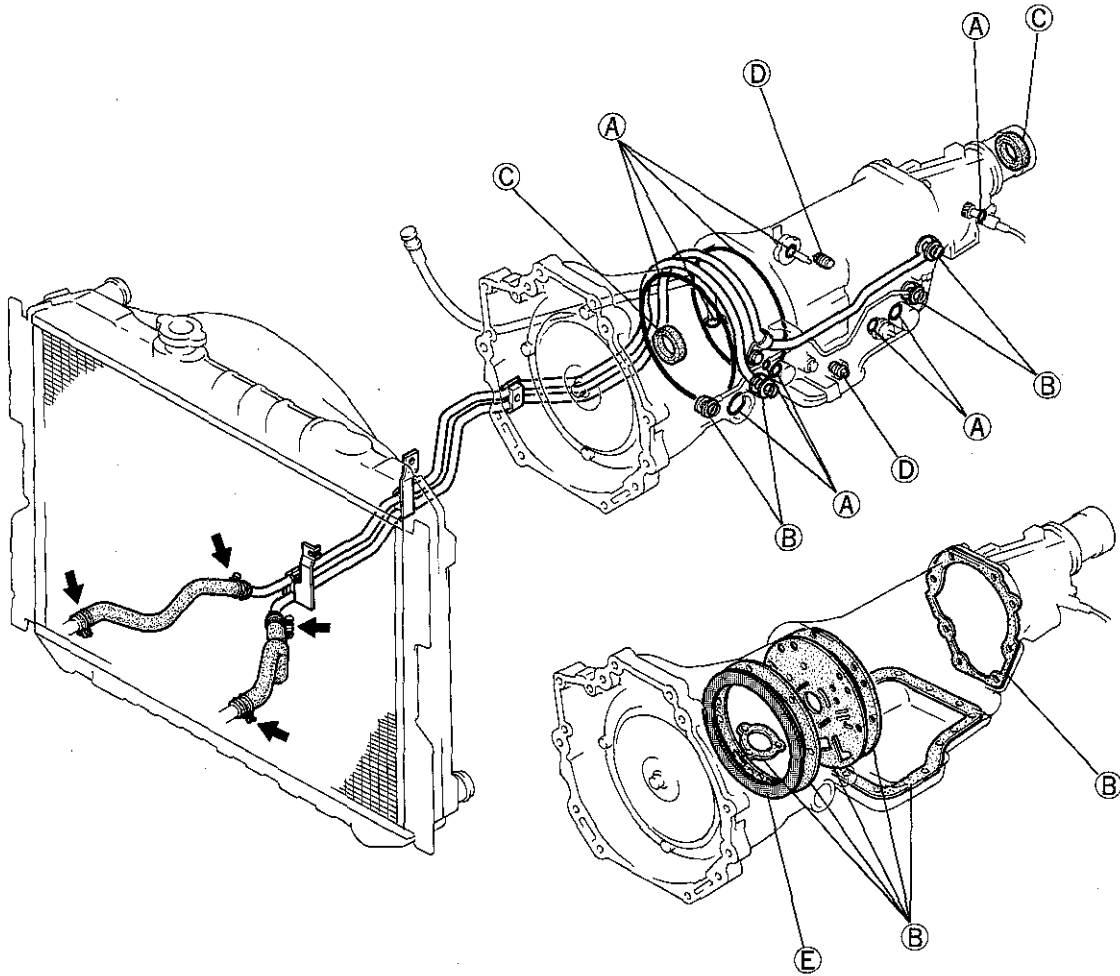
# K1

## AUTOMATIC TRANSMISSION FLUID (ATF)

### Fluid leaks

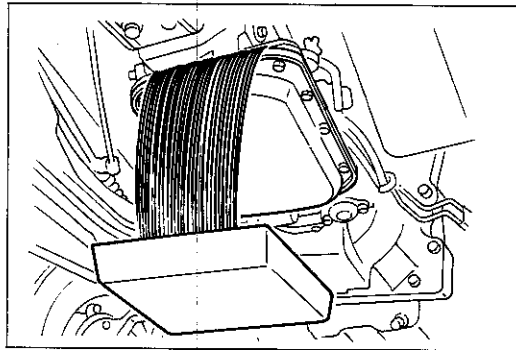
Check for fluid leaks of the transmission as shown below; repair or replace as necessary.

1. Gaskets, O-ring, and plugs
2. Oil hoses, oil pipes, and connections
3. Oil cooler

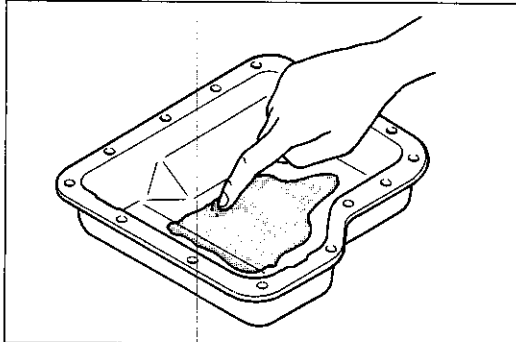


- (A) ..... O-RING
- (B) ..... GASKET
- (C) ..... OIL SEAL
- (D) ..... PLUG
- (E) ..... OTHERS

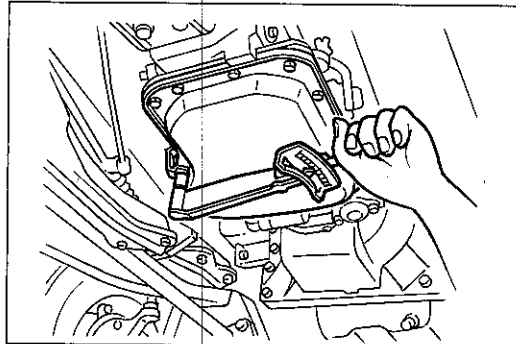




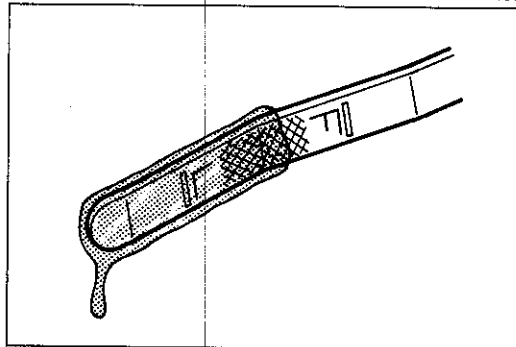
9BU0KX-451



9BU0KX-452



9BU0KX-453



2BU0K1-017

## Replacement

1. Jack up the vehicle and support it with safety stands.

## Warning

**Be careful when draining ; the ATF is hot.**

2. Loosen the oil pan installation bolts, and drain the ATF into a container.

3. Remove the oil pan and gasket.
4. Clean the oil pan and the magnet.

5. Install the oil pan along with a new gasket.

## Tightening torque:

**5.9—7.8 N·m (60—80 cm·kg, 52—69 in·lb)**

6. Add approx. **4.0 liters (4.2 US qt, 3.5 Imp qt)** ATF, and check the ATF level. (Refer to page K1-33.)

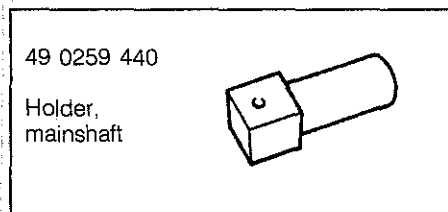
**Specified ATF: Dexron® II or M-III**

## TRANSMISSION

## TRANSMISSION UNIT (REMOVAL AND INSTALLATION)

## Preparation

## SST

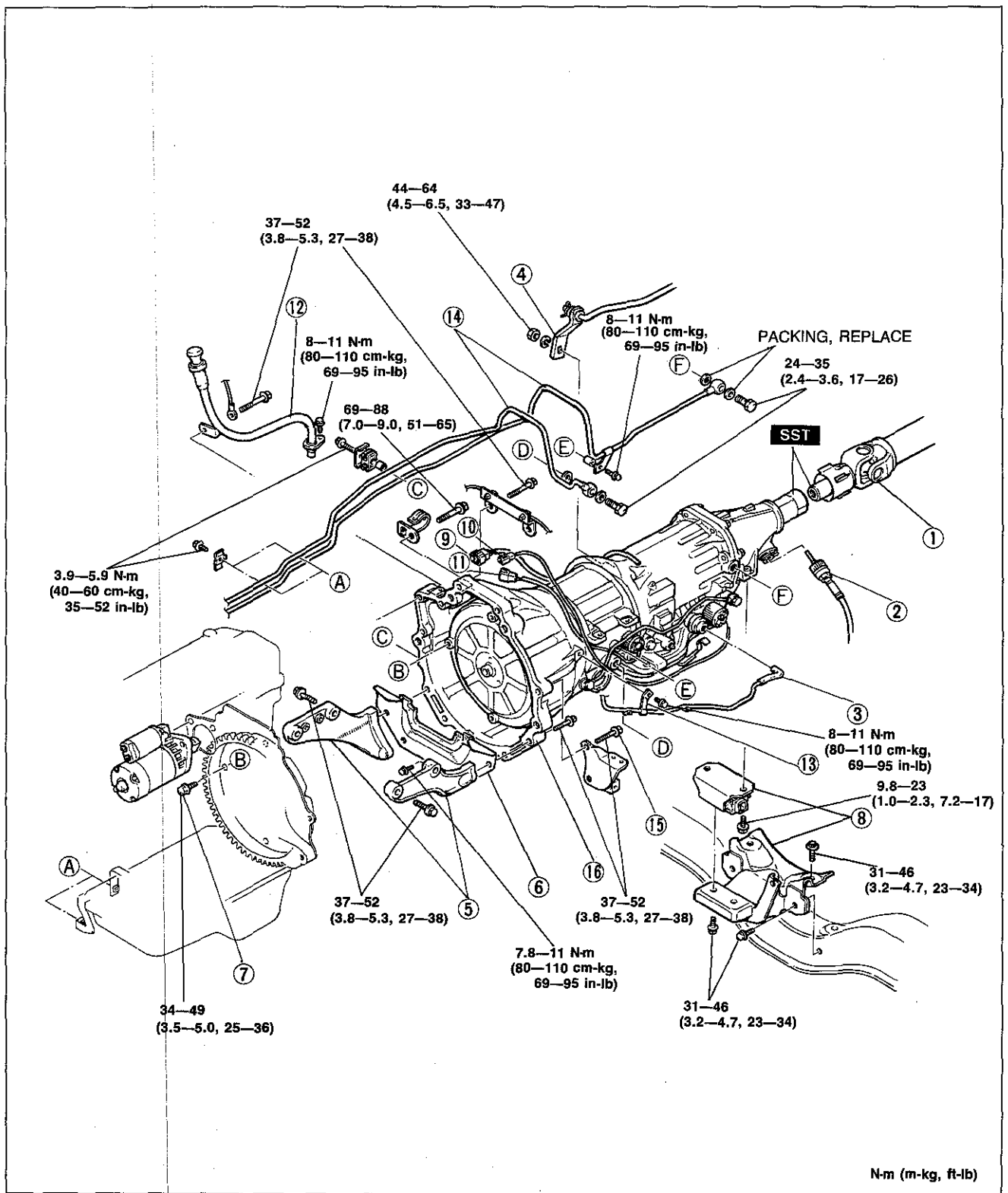


1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the ATF into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.

**Caution**

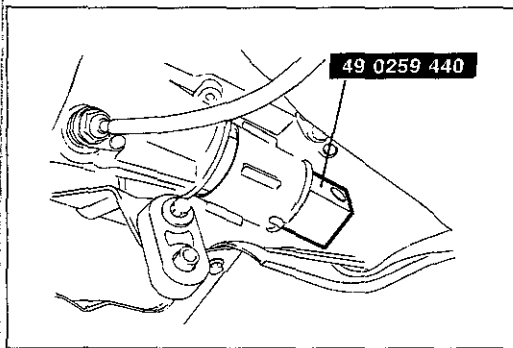
**Do not turn the transmission over before removing the oil pan.**

5. After removal, remove the oil pan to check condition of the transmission.
6. Install in the order shown in the figure, referring to **Installation Note**.
7. Fill the transmission with the specified amount and type of the ATF after installation.
8. Warm up the engine, and inspect for oil leakage and transmission operation.



2BU0K1-019

- |   |  |                                     |
|---|--|-------------------------------------|
| 1. Propeller shaft<br>Removal..... page K1-38 | 7. Torque converter attaching<br>bolt<br>Installation .... page K1-126 | 11. OD cancel solenoid<br>connector |
| 2. Speedometer cable                          | 8. Mission mount bracket (A/T<br>lower 30mm (1.2 in))                  | 12. Level gauge pipe                |
| 3. Vacuum hose                                | 9. Inhibitor SW connector  | 13. Vacuum pipe bracket             |
| 4. Shift lever                                | 10. Kickdown solenoid connector  | 14. Oil cooler pipe                 |
| 5. Gusset plate                               |  | 15. Mission mount bolt              |
| 6. Undercover                                 |  | 16. Automatic transmission          |



9BU0KX-040

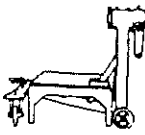
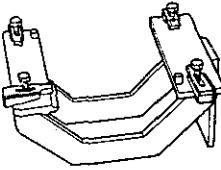
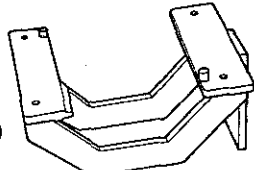
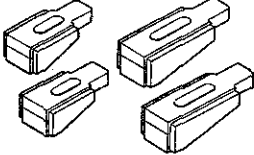
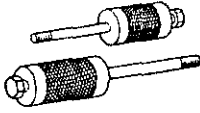
### Removal note Propeller shaft

When the propeller shaft is removed from the extension housing, immediately insert the **SST** into the extension housing to prevent oil leakage.

### TRANSMISSION UNIT (DISASSEMBLY)

#### Preparation

#### SST

<p>49 0107 680A</p> <p>Engine stand</p> 	<p>49 U019 0A0A</p> <p>Transmission hanger</p> 	<p>49 H075 495B</p> <p>Body (Part of 49 U019 0A0A)</p> 
<p>49 U019 003</p> <p>Holder (Part of 49 U019 0A0A)</p> 	<p>49 0378 390</p> <p>Puller, oil pump</p> 	<p>1BU0K1-010</p>

#### Precaution

#### General notes:

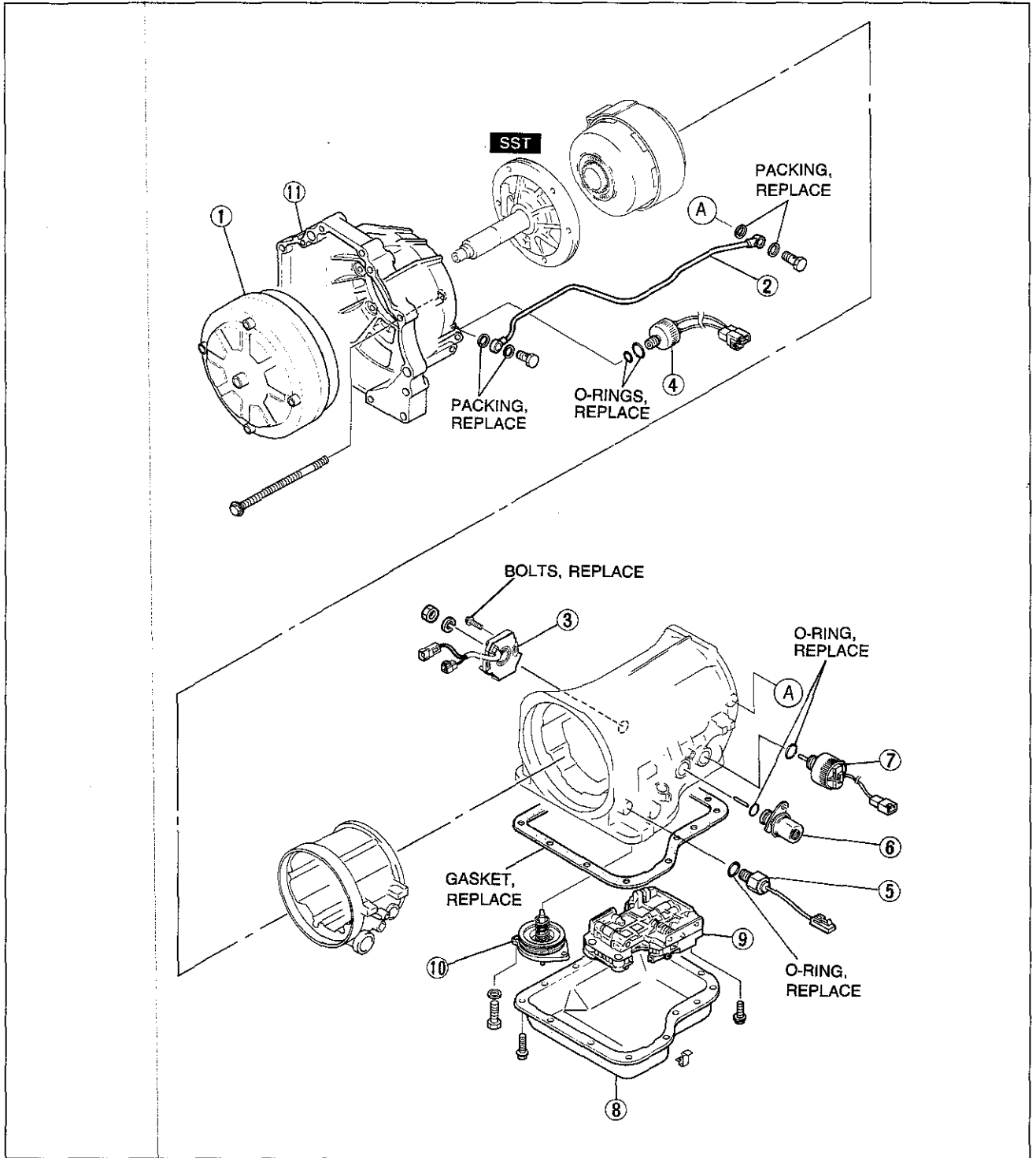
1. Disassemble transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light alloy case joints.
4. Never use rags during disassembly; they may leave particles that can clog fluid passages.
5. Several parts resemble one another; organize them so they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when a clutch or brake band is burned; or when the ATF has degenerated.

#### Cleaning notes:

1. Clean the transmission exterior thoroughly with steam or cleaning solvents, or both, before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

9MU0K2-083

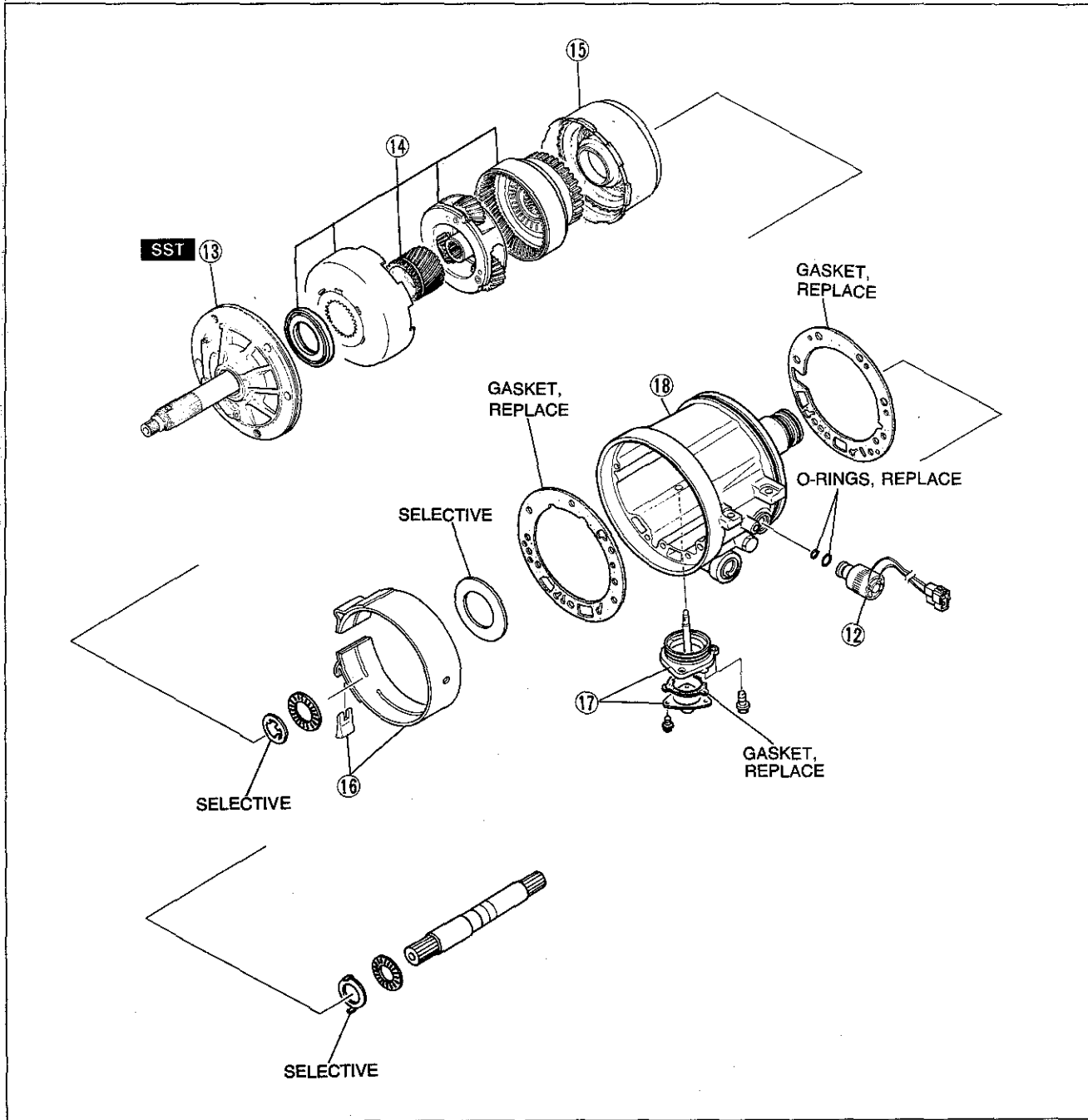
Components



1BU0K1-011

- |  |   |  |
|--|---|--|
| 1. Torque converter<br>Inspection ..... page K1-49                               | 5. Oil pressure switch (G6 engine)<br>Inspection .... page K1- 30 | 9. Control valve body<br>Disassembly, and<br>Inspection .. page K1- 98 |
| 2. Governor pressure pipe  | 6. Vacuum diaphragm<br>Inspection .... page K1-107                | Assembly ..... page K1-104   |
| 3. Inhibitor switch<br>Inspection ..... page K1-25<br>Adjustment..... page K1-25 | 7. Kickdown solenoid<br>Inspection .... page K1- 27               | 10. 2nd band servo<br>Disassembly, and<br>Inspection .. page K1- 68    |
| 4. Lockup solenoid (G6 engine)<br>Inspection ..... page K1-31                    | 8. Oil pan  | Assembly ..... page K1- 69   |
|  |   | 11. Converter housing  |

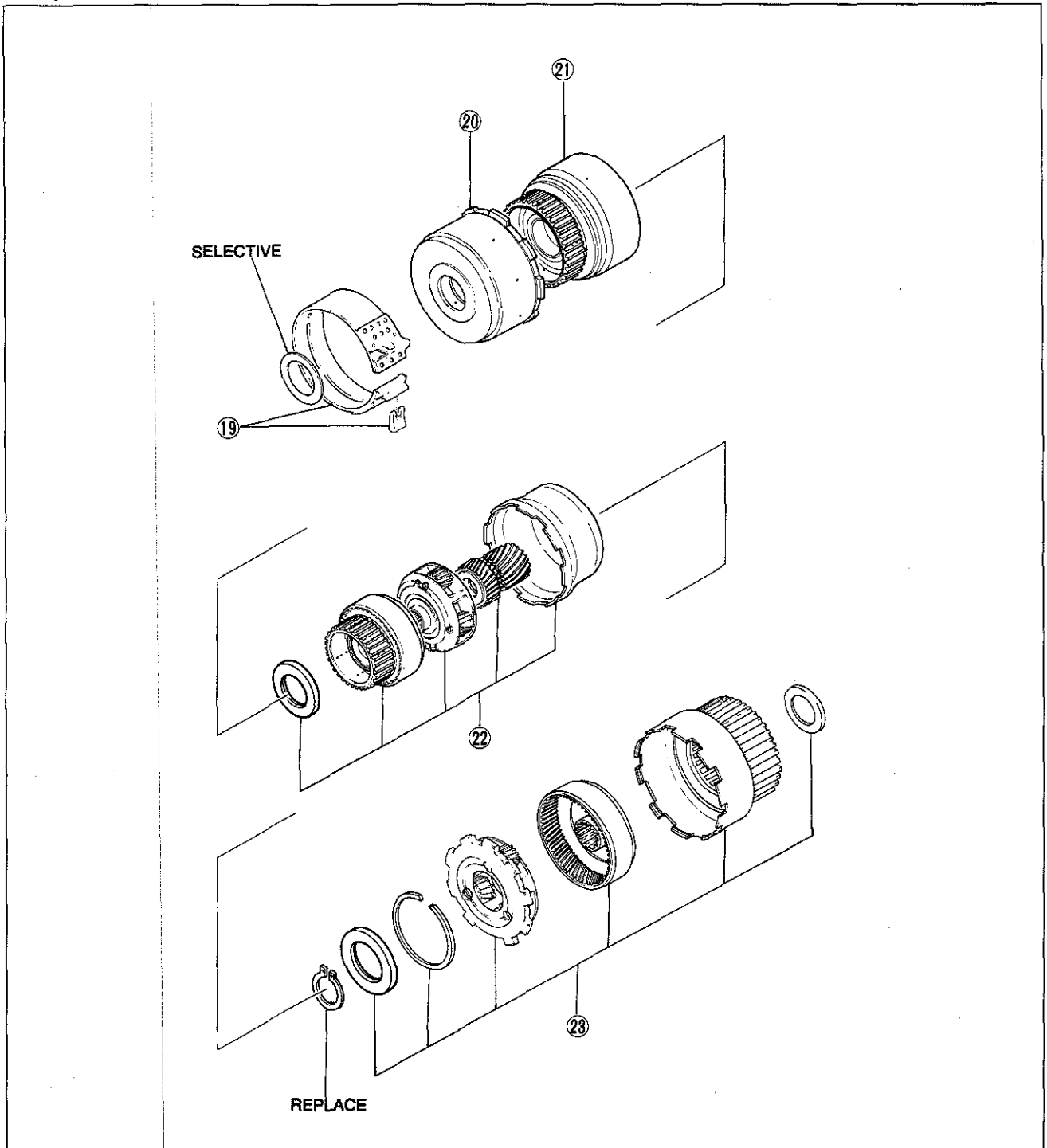
### Components (cont'd)



0BU0K1-038

- |   |   |   |
|---|---|---|
| <p>12. OD cancel solenoid<br/>Inspection ..... page K1-27</p> <p>13. Oil pump<br/>Disassembly, and<br/>Inspection .... page K1-50<br/>Assembly ..... page K1-52</p> <p>14. OD connecting shell and OD<br/>planetary gear unit<br/>(OD sun gear, OD planetary<br/>pinion carrier, OD clutch hub)<br/>Disassembly, and<br/>Inspection .... page K1-54<br/>Assembly ..... page K1-55</p> | <p>15. Direct clutch<br/>Disassembly, and<br/>Inspection .... page K1-55<br/>Assembly ..... page K1-59</p> <p>16. OD brake band and band<br/>strut</p> <p>17. OD band servo and cover<br/>Disassembly, and<br/>Inspection .... page K1-61<br/>Assembly ..... page K1-62</p> | <p>18. Drum support, accumulator,<br/>and OD case<br/>Disassembly, and<br/>Inspection .... page K1-64<br/>Assembly ..... page K1-65</p> |
|---|---|---|

Components (cont'd)



0BU0K1-039

19. 2nd brake band and band strut

20. Front clutch  
Disassembly, and  
Inspection .... page K1-71  
Assembly ..... page K1-74

21. Rear clutch  
Disassembly, and  
Inspection .... page K1-76  
Assembly ..... page K1-79

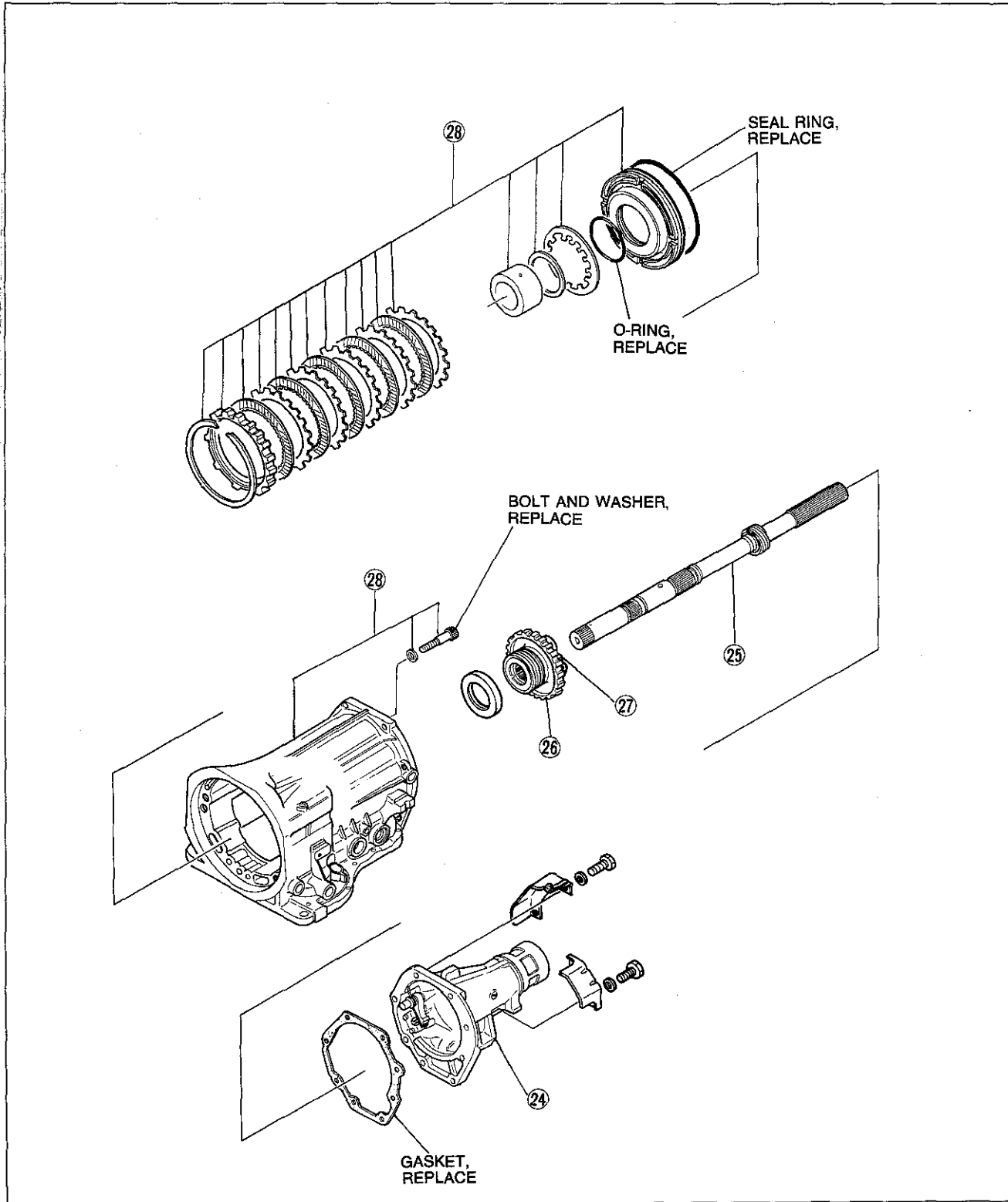
22. Connecting shell and front planetary gear unit (rear clutch hub, front planetary pinion carrier, rear sun gear)

Disassembly, and  
Inspection .... page K1-81  
Assembly ..... page K1-82

23. Rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch)

Disassembly, and  
Inspection .... page K1-83  
Assembly ..... page K1-85

### Components (cont'd)



0BU0K1-040

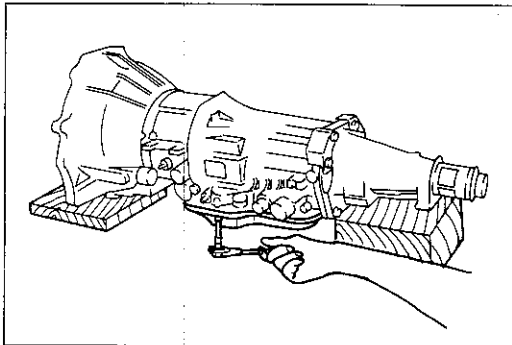
24. Extension housing  
Disassembly, and  
Inspection .... page K1-95  
Assembly ..... page K1-96

27. Governor  
Disassembly, and  
Inspection .... page K1-92  
Assembly ..... page K1-93

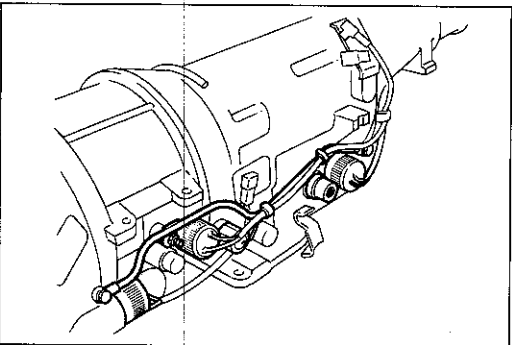
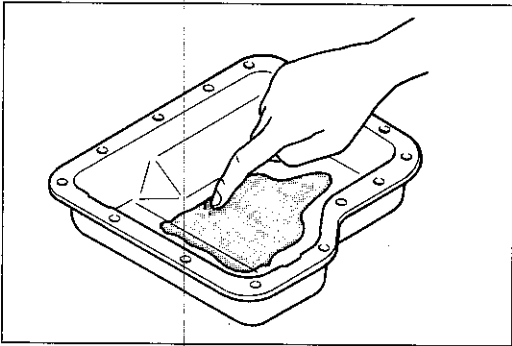
28. Low and reverse brake  
Disassembly, and  
Inspection .... page K1-87  
Assembly ..... page K1-90

25. Output shaft  
26. Parking gear

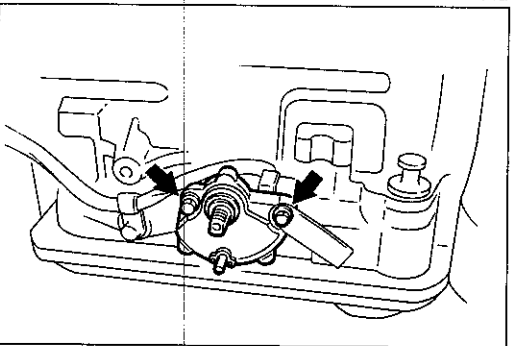




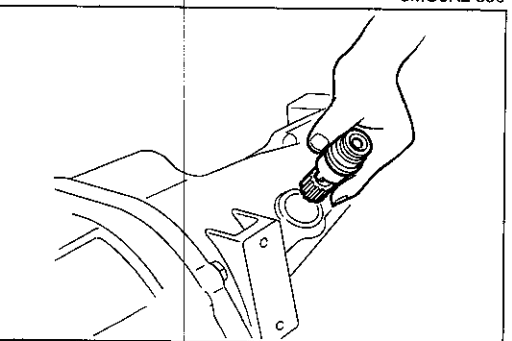
9MU0K2-093



1BU0K1-012



9MU0K2-090



9MU0K2-091

**Procedure**

**Caution**

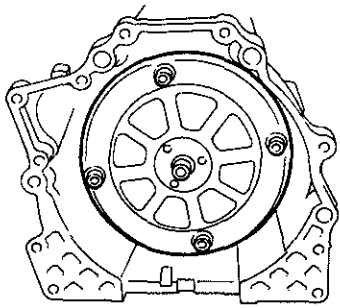
**Keep the transmission oil pan-down so that any foreign material will remain in the pan.**

1. Place the transmission on wooden blocks under the converter housing and the extension housing.
2. Remove the oil pan and gasket.  
Examine any material found in the pan or on the magnet to determine the condition of the transmission.  
Clutch facing material..... Drive plate and brake band wear  
Steel (magnetic) ..... Bearing, gear, and driven plate wear  
Aluminum (nonmagnetic) .... Bushings or cast aluminum parts wear  
If large amounts of material are found, replace the torque converter and carefully check the transmission for the cause.
3. Install the oil pan with a few bolts to protect the valve body.

**Caution**

**Do not leave the vacuum rod in the tip of the vacuum diaphragm after removal.**

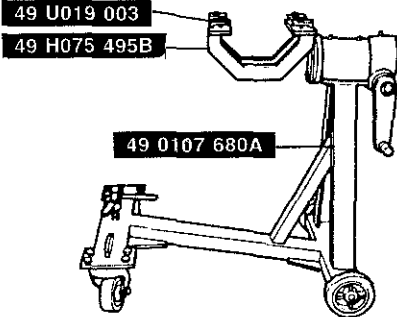
4. Remove the governor pressure pipe, kickdown solenoid, vacuum diaphragm, oil pressure switch (G6 engine), OD cancel solenoid, and lockup solenoid (G6 engine).
5. Remove the inhibitor switch.
6. Remove the speedometer driven gear from the extension housing.
7. Remove the O-ring from the speedometer driven gear.



9MU0K2-092

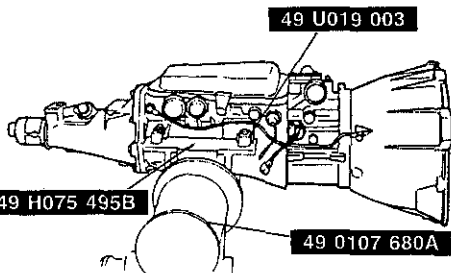
**Caution**  
**Be careful not to spill the ATF when removing the torque converter.**

8. Remove the torque converter.



9MU0K2-088

9. Assemble the **SST** as shown.

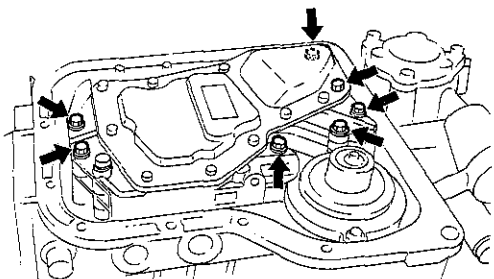


9MU0K2-095

10. Mount the transmission onto the **SST**.  
 11. Remove the oil pan and gasket.

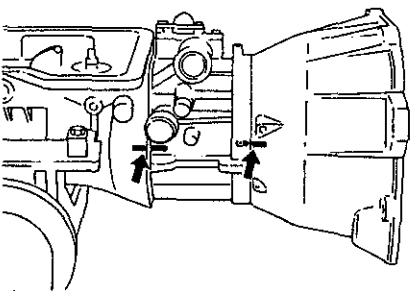
**Note**  
**Neatly arrange bolts of different lengths for proper reassembly.**

12. Remove the control valve body as shown in the figure.

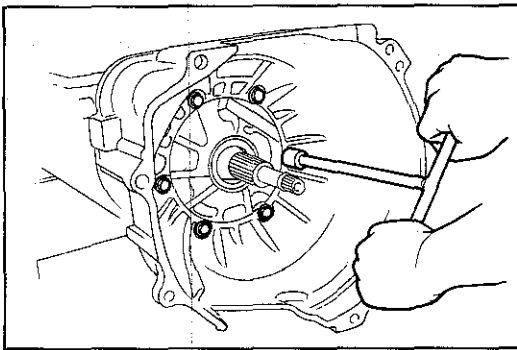


9MU0K2-097

13. Mark the converter housing, OD case, and transmission case for proper reassembly.

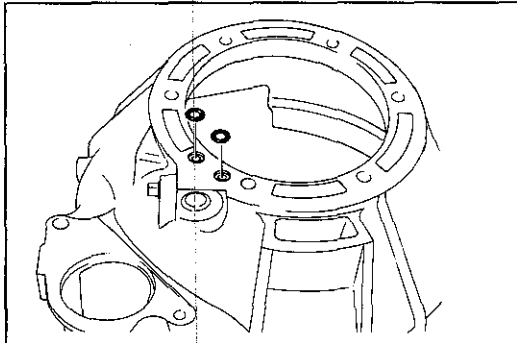


9MU0K2-098



9MU0K2-099

14. Remove the converter housing from the OD case.

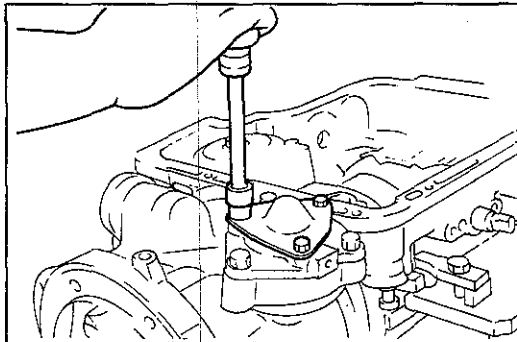


9MU0K2-100

15. Remove the O-rings from the converter housing.

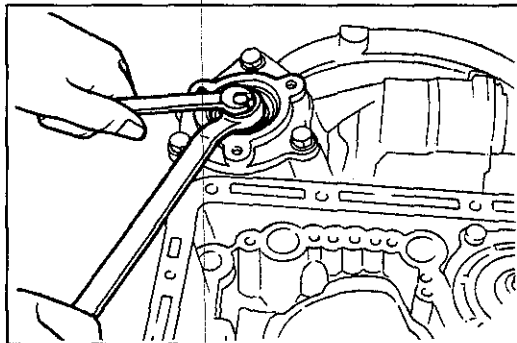
**Caution**  
Do not damage the converter housing.

16. Clean the sealing compound from the converter housing.



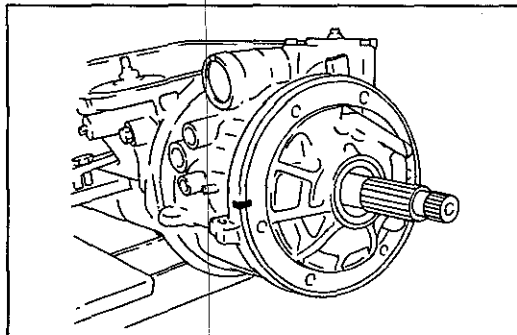
9MU0K2-101

17. Remove the OD band servo cover and gasket.



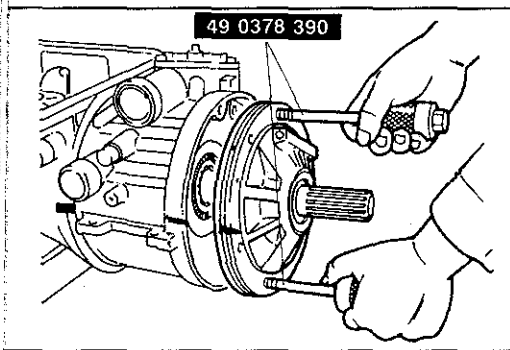
9MU0K2-102

18. Loosen the OD band servo locknut and tighten the piston stem.



9MU0K2-103

19. Mark the OD case and oil pump for proper reassembly.

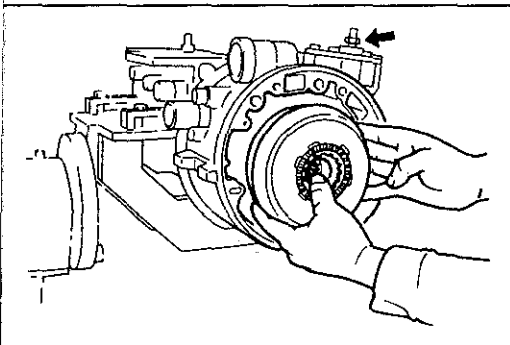


9MU0K2-105

20. Install the **SST** to the oil pump assembly.

**Caution**

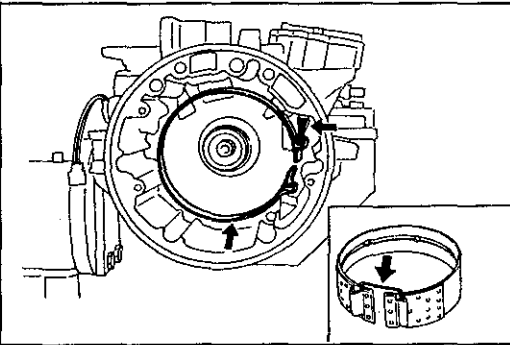
**Carefully remove the oil pump to prevent the OD connection shell, sun gear, and planetary pinion carrier from falling out.**



9MU0K2-106

21. Remove the oil pump assembly from the OD case by sliding weights of the **SST** evenly then remove the **SST** from the oil pump.

22. Loosen the piston stem of the OD band servo. Remove the OD connecting shell and OD planetary gear unit (OD sun gear, OD planetary pinion carrier, OD clutch hub), and direct clutch.

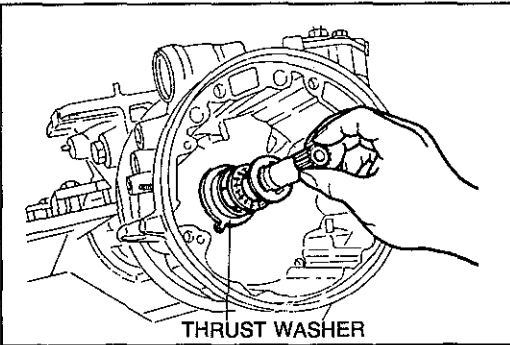


9MU0K2-107

**Caution**

**To prevent the brake lining from cracking or peeling, do not stretch the OD brake band. Secure it with a wire clip.**

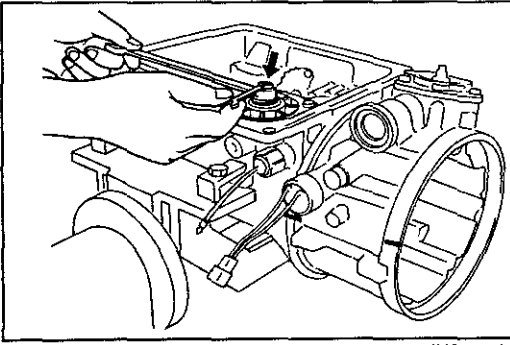
23. Remove the OD brake band and band strut.



9MU0K2-108

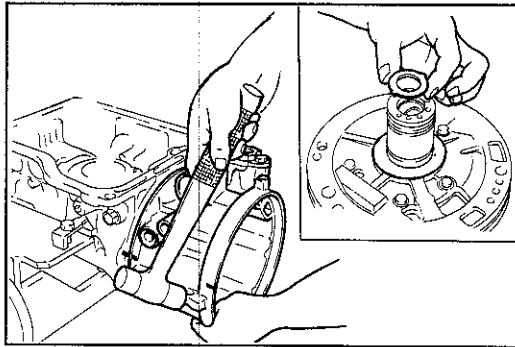
24. Remove the bearing races, bearing, and thrust washer. Inspect the following parts and repair or replace as necessary. Remove the intermediate shaft.

- 1) Bearing  
Inspect for damage or rough rotation
- 2) Bearing race  
Inspect bearing surface for scoring or scratches

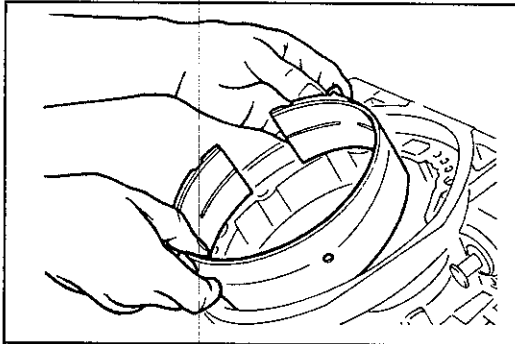


9MU0K2-109

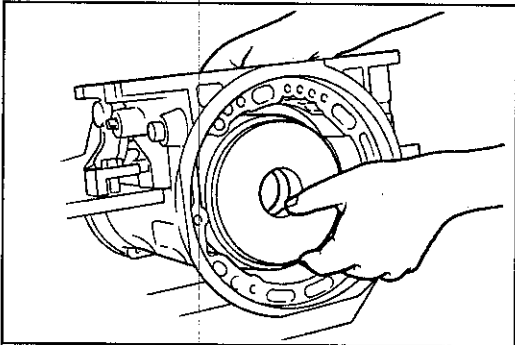
25. Loosen the 2nd band servo locknut and tighten the piston stem.



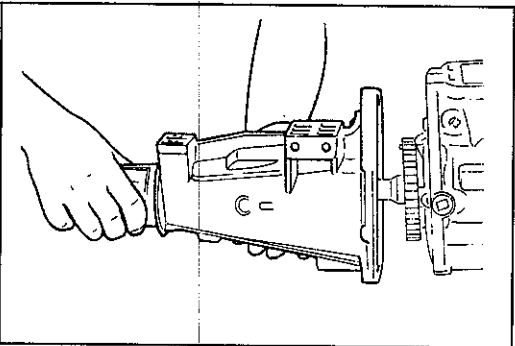
9MU0K2-110



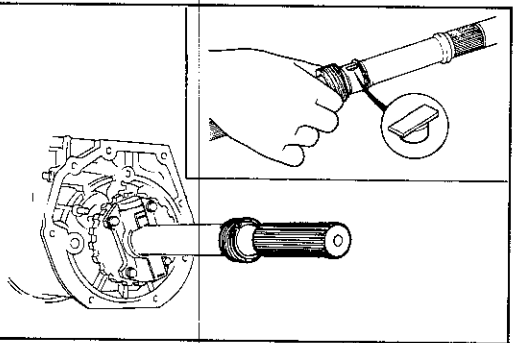
9MU0K2-111



9MU0K2-112



9MU0K2-113



2BU0K1-020

**Caution****Do not lose the bearing race.**

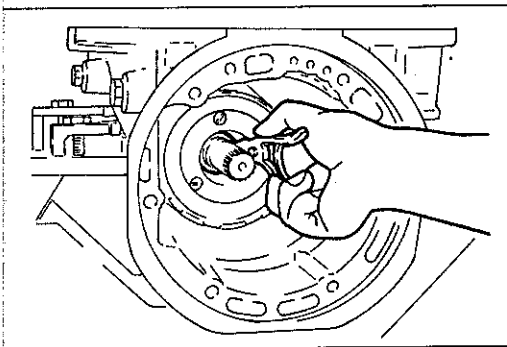
26. Separate the drum support, accumulator and OD case from the transmission case by tapping it lightly with a plastic hammer. Remove the gasket.
27. Remove the bearing race and thrust washer from the drum support, accumulator and OD case.

**Caution****To prevent the brake lining from cracking or peeling, do not stretch the 2nd band brake. Secure it with a wire clip.**

28. Loosen the piston stem of the 2nd band servo. Remove the 2nd brake band and band strut.
29. Remove the front clutch, rear clutch, connecting shell, and front planetary gear unit (rear clutch hub, front planetary pinion carrier, rear sun gear) as a unit.

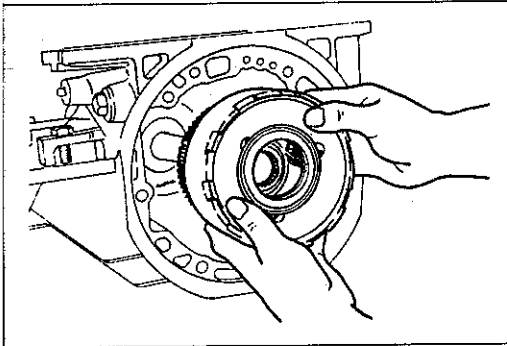
30. Remove the extension housing and gasket.

31. Remove the rear snap ring and speedometer drive gear.
32. Remove the key and front snap ring.



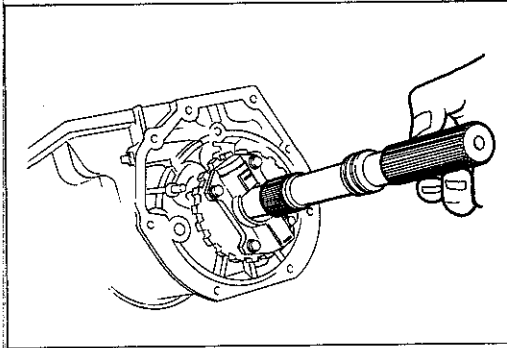
9MU0K2-115

33. Remove the snap ring from the output shaft with snap ring pliers.



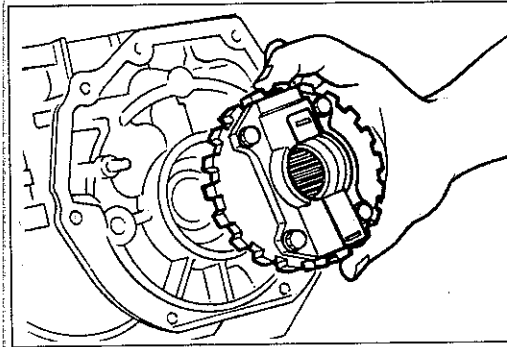
9MU0K2-116

34. Remove the rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch).



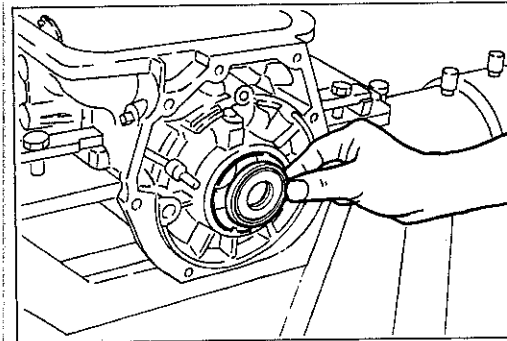
9MU0K2-117

35. Pull out the output shaft.



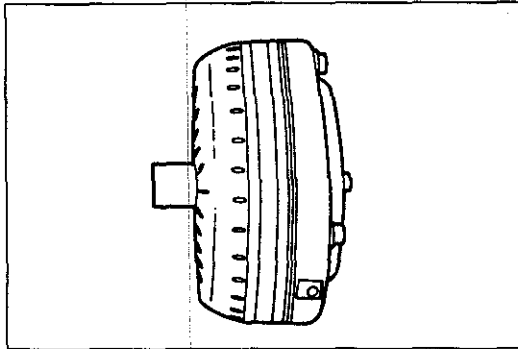
9MU0K2-430

36. Remove the governor valve and parking gear as a unit.

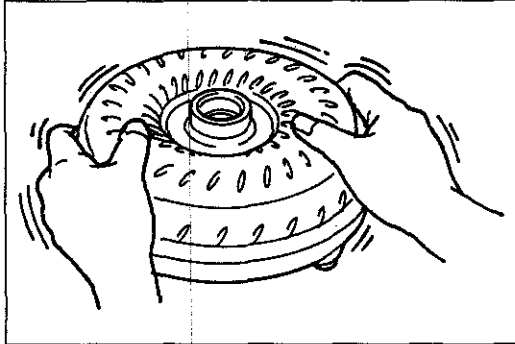


9MU0K2-118

37. Remove the bearing.  
Inspect the following parts and repair or replace as necessary.  
Bearing  
Inspect for damage or rough rotation.



9MU0K2-119



15U0KX-113

**TORQUE CONVERTER**

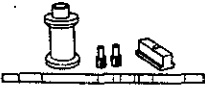


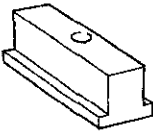
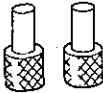
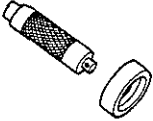


**Inspection**

1. Check the outside of the converter for damage and cracks, and replace the torque converter if there is any problem.
2. Check for rust on the pilot hub or on the boss, and remove it completely if there is any.

**Washing inside the converter**

1. Drain any ATF remaining in the converter.
2. Pour in solvent (**0.5 liter, 0.5 US qt, 0.4 Imp qt**).
3. Shake the converter to clean the inside. Pour out the solvent.
4. Pour in ATF.
5. Shake the converter to clean the inside. Pour out the ATF.

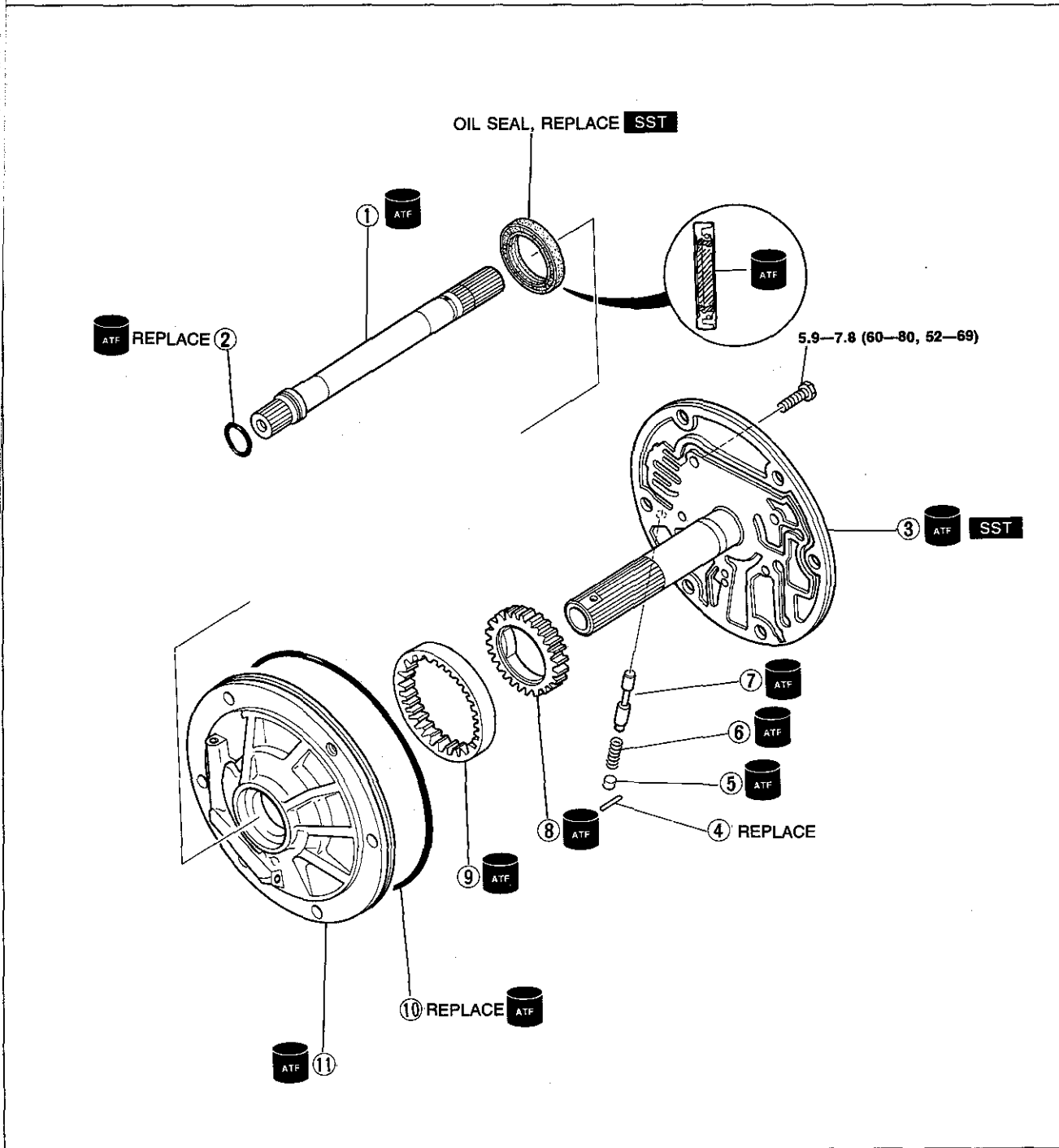
**OIL PUMP  
Preparation  
SST**

<p>49 S019 0A0 Set centering tool</p> 	<p>49 S019 001 Holder (Part of 49 S019 0A0)</p> 	<p>49 S019 002 Shaft (Part of 49 S019 0A0)</p> 
<p>49 S019 003 Stand (Part of 49 S019 0A0)</p> 	<p>49 S019 004 Pin (Part of 49 S019 0A0)</p> 	<p>49 G030 795 Installer, Oil seal</p> 
<p>49 G030 796 Body (Part of 49 G030 795)</p> 	<p>49 G030 797 Handle (Part of 49 G030 795)</p> 	<p style="text-align: right;">9MU0K2-121</p>

### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

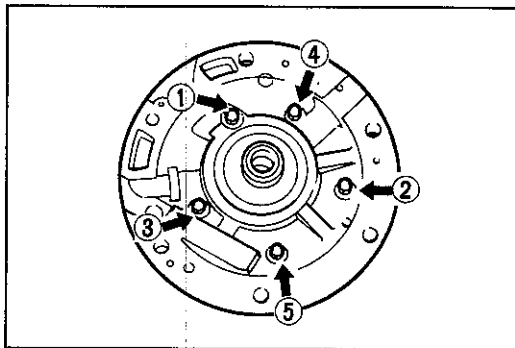
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1BU0K1-014

- |                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|
| 1. Input shaft              | 7. Lockup control valve     | 9. Outer gear               |
| 2. O-ring                   | Inspect for sticking, scor- | Removal..... page K1-51     |
| 3. Oil pump cover           | ing, or scratches           | Inspection ..... page K1-52 |
| Inspection ..... page K1-51 | 8. Inner gear               | 10. O-ring                  |
| 4. Roll pin                 | Removal..... page K1-51     | 11. Oil pump housing        |
| 5. Plug                     | Inspection ..... page K1-51 | Inspection ..... page K1-51 |
| 6. Spring                   |                             |                             |
| Inspection ..... page K1-52 |                             |                             |



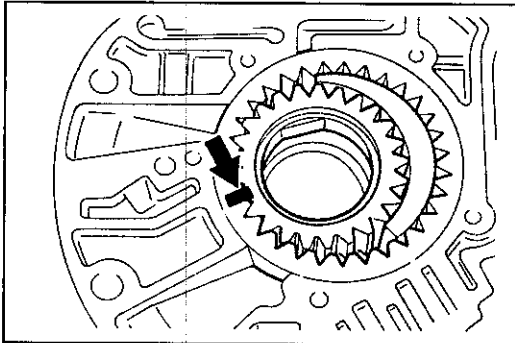


9MU0K2-123

**Disassembly note**

**Oil pump cover**

Loosen the mounting bolts evenly in the pattern shown, and remove the oil pump cover from the oil pump housing.



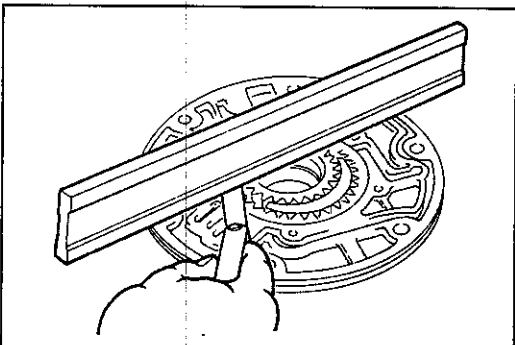
9MU0K2-124

**Inner gear and outer gear**

**Caution**

**Do not use a punch to mark the gears.**

Mark the inner and outer gear positions, and remove the gears from the housing.



9MU0K2-126

**Inspection**

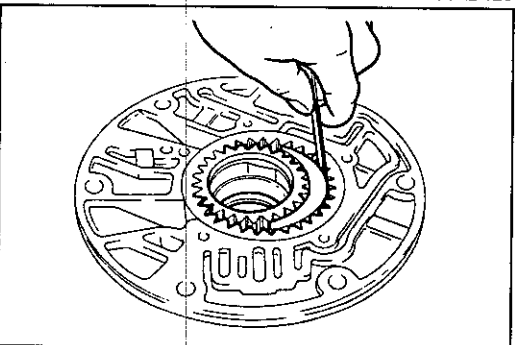
**Clearance**

1. Measure the clearance between the gears and the pump cover.

**Standard clearance:**

**0.02—0.04mm (0.0008—0.0016 in)**

**Maximum clearance: 0.08mm (0.0031 in)**



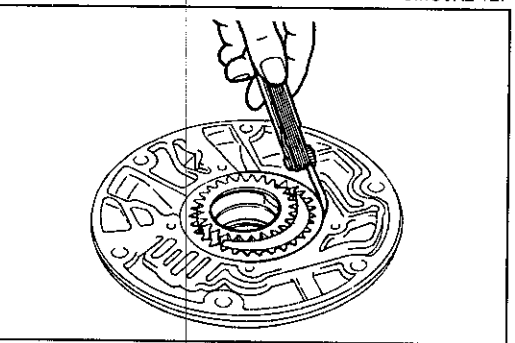
9MU0K2-127

2. Measure the clearance between the outer gear teeth tip and the crescent.

**Standard clearance:**

**0.14—0.21mm (0.0055—0.0083 in)**

**Maximum clearance: 0.25mm (0.0098 in)**



9MU0K2-128

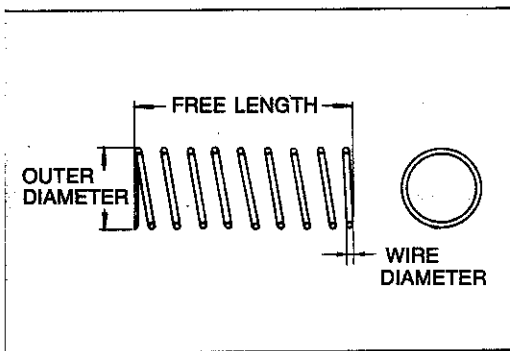
3. Measure the side clearance between the outer gear the and housing.

**Standard clearance:**

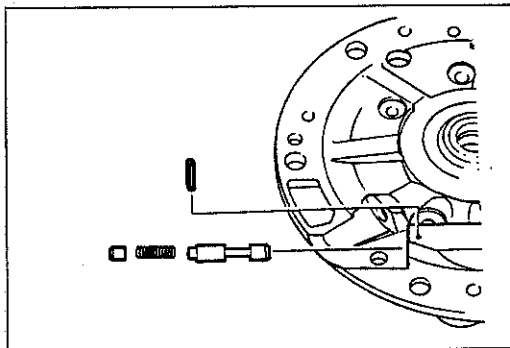
**0.05—0.20mm (0.0020—0.0079 in)**

**Maximum clearance: 0.25mm (0.0098 in)**

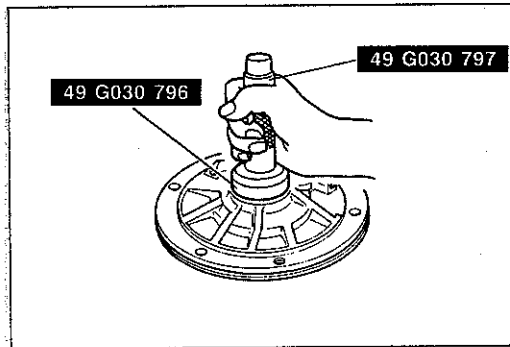
4. If not within specification, replace the oil pump assembly.



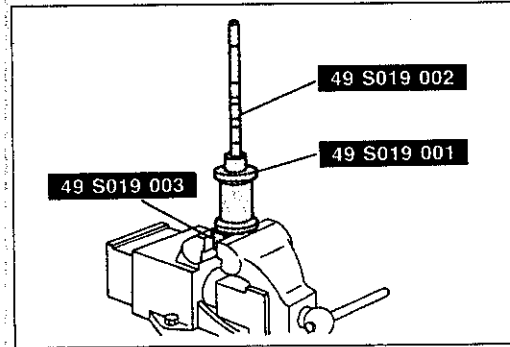
OBU0K1-043



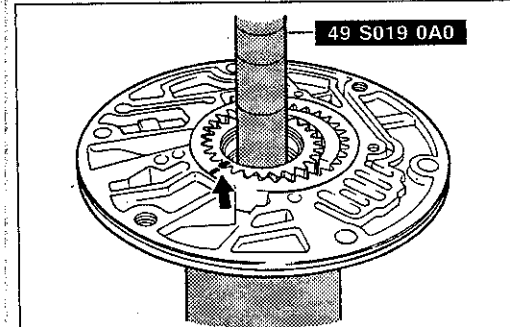
1BU0K1-015



9MU0K2-131



9MU0K2-132



9MU0K2-133

### Spring

1. Measure the spring specifications.

### Specifications

Engine	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
F2 EGI	5.5 (0.217)	25.0 (0.984)	15.0	0.7 (0.028)
F2 Carb.	5.5 (0.217)	26.3 (1.035)	15.5	0.7 (0.028)
G6	5.5 (0.217)	24.7 (0.972)	15.5	0.7 (0.028)

2. If not within specification, replace the spring.

### Assembly procedure

1. Apply ATF to the lockup control valve, spring, and plug, and install them into the oil pump housing.
2. Tap in the new roll pin.

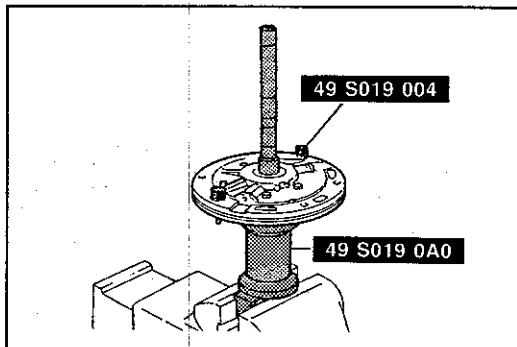
3. Apply ATF to a new oil seal, and install it with the **SST**.

### Note

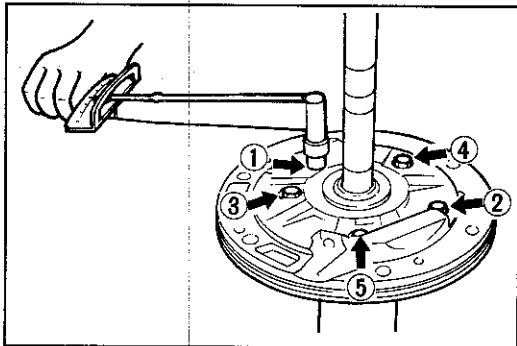
**Use protective plates to prevent damaging the SST.**

4. Assemble the **SST** and secure it in a vice.

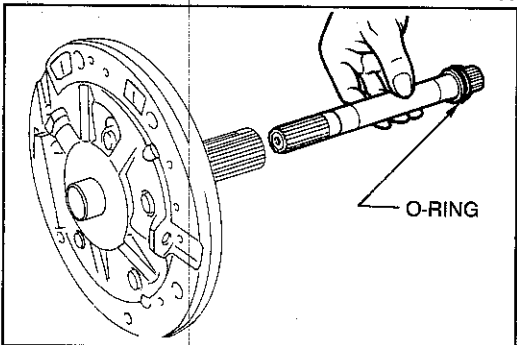
5. Apply ATF to the new O-ring, and place it on the pump cover.
6. Set the pump housing on the **SST**.
7. Apply ATF to the inner and outer gears, and install them in the pump housing with their matching marks toward the pump cover.



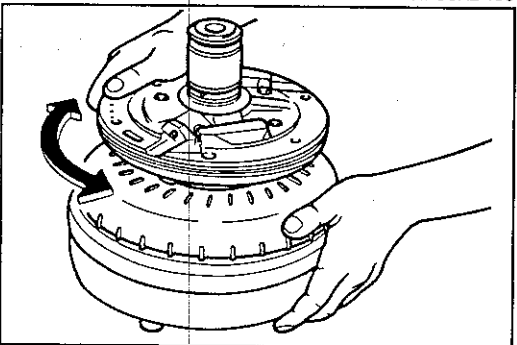
9MU0K2-134



9MU0K2-135



9MU0K2-136



9MU0K2-137

8. Set the pump cover on the **SST**.

**Caution**

**Do not damage the oil seal with the splines of the oil pump cover.**

9. Install the **SST** (pins) for alignment.

10. Tighten the bolts evenly and gradually in the order shown.

**Tightening torque:**

**5.9—7.8 Nm (60—80 cm-kg, 52—69 in-lb)**

11. Apply ATF to a new O-ring, and install it onto the input shaft.

12. Apply ATF to the input shaft, and install it into the oil pump.

13. Set the oil pump on the torque converter, and verify that the pump turns smoothly.

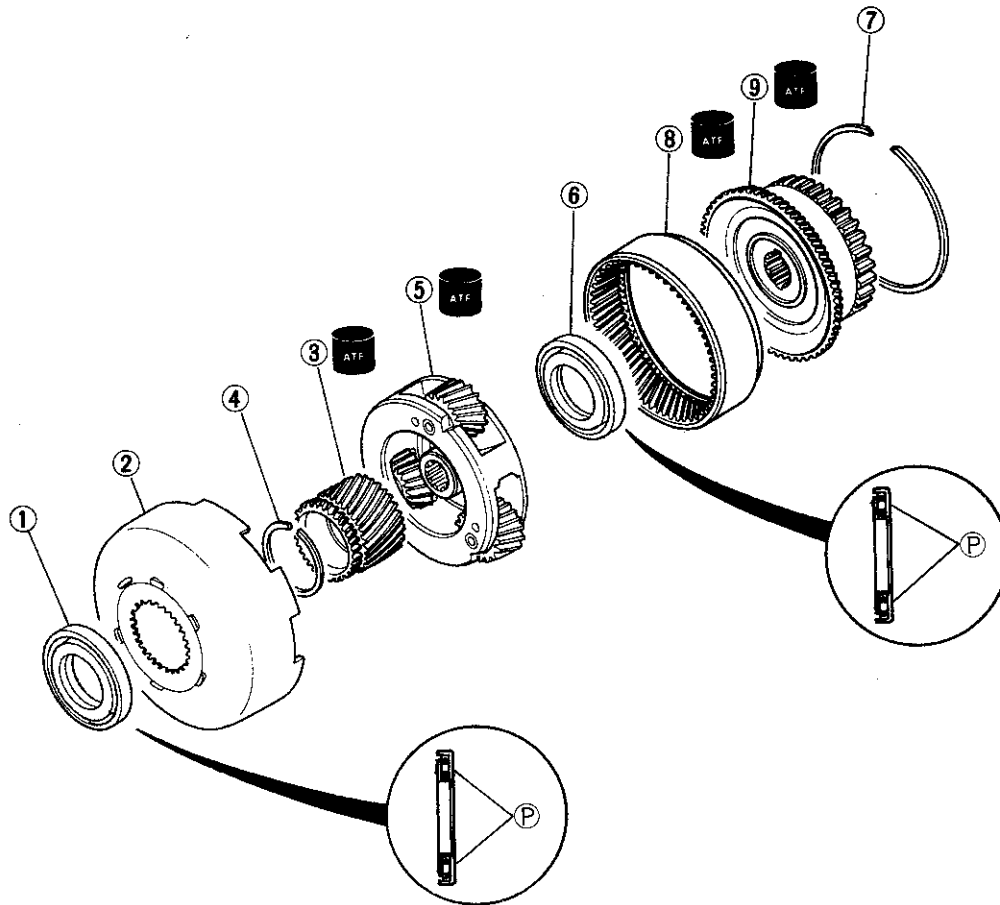
### OD CONNECTING SHELL AND OD PLANETARY GEAR UNIT (OD SUN GEAR, OD PLANETARY PINION CARRIER, OD CLUTCH HUB)

#### Disassembly and Inspection

Disassemble in the order shown in the figure.

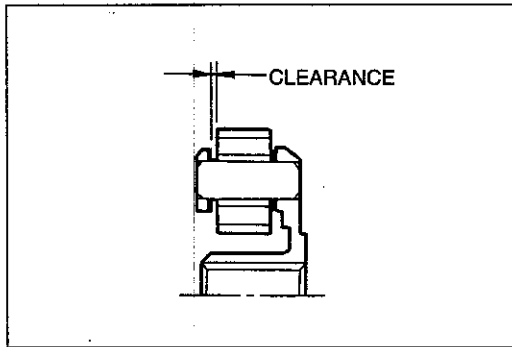
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1BU0K1-016

- |   |  |   |
|---|--|---|
| <p>1. Bearing<br/>Inspect for damage or rough rotation</p> <p>2. OD connecting shell</p> <p>3. Sun gear<br/>Inspect individual gear teeth for damage, wear, or cracks</p> <p>4. Snap ring</p> | <p>5. OD planetary pinion carrier<br/>Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears<br/>Inspection ..... page K1-55</p> <p>6. Bearing<br/>Inspect for damage or rough rotation</p> | <p>7. Snap ring</p> <p>8. Internal gear<br/>Inspect individual gear teeth for damage, wear, or cracks</p> <p>9. OD clutch hub</p> |
|---|--|---|



9MU0K2-248

### Inspection

#### OD planetary pinion carrier

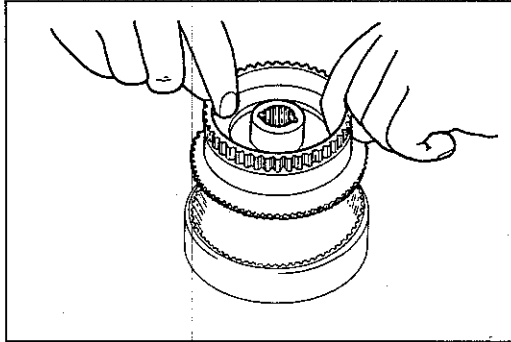
1. Measure the clearance between the pinion washer and the planetary pinion carrier.

#### Clearance

**Standard: 0.2—0.7mm (0.008—0.028 in)**

**Maximum: 0.8mm (0.031 in)**

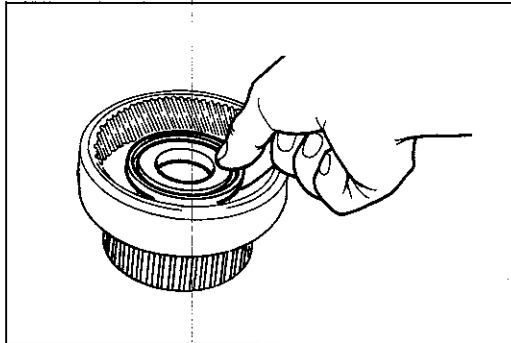
2. If not within specification, replace the planetary pinion carrier.



1BU0K1-017

### Assembly procedure

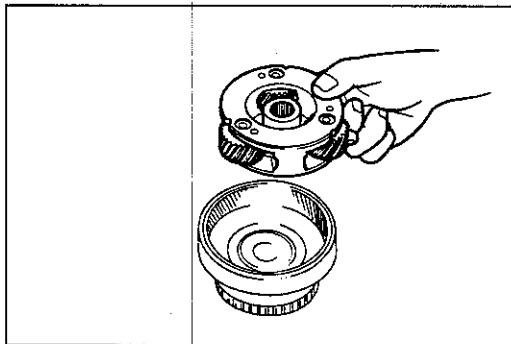
1. Apply ATF to the OD clutch hub and internal gear, and assemble them with the snap ring.



0BU0K1-045

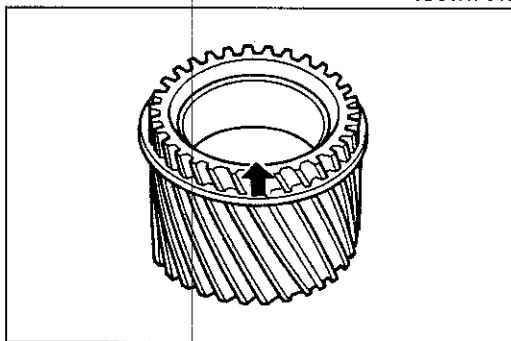
2. Apply petroleum jelly to the bearing, and install it onto the OD clutch hub with the black surface facing upward.

**Bearing outer diameter: 70.0mm (2.756 in)**



0BU0K1-046

3. Apply ATF to the OD planetary pinion carrier, and install it into the internal gear.

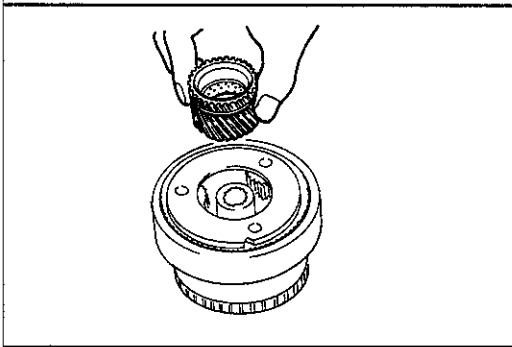


0BU0K1-047

### Note

**Pay close attention to the front and rear directions of the sun gear. The grooved side (arrow) is the front.**

4. Install the snap ring onto the sun gear.



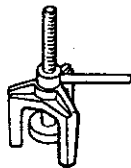
0BU0K1-048

5. Apply ATF to the sun gear, and install it into the OD planetary pinion carrier.

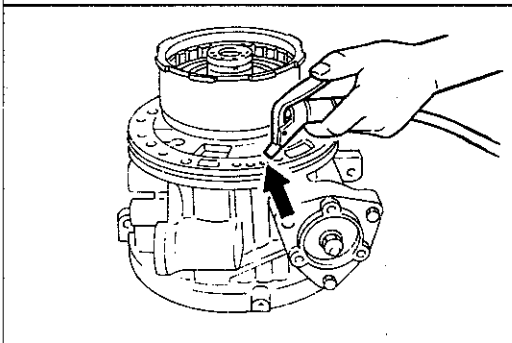
### DIRECT CLUTCH Preparation SST

49 0378 375

Compressor,  
clutch spring



9MU0K2-138



9MU0K2-139

### Preinspection

#### Direct clutch operation

1. Install the direct clutch onto the drum support along with the seal rings.  
Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

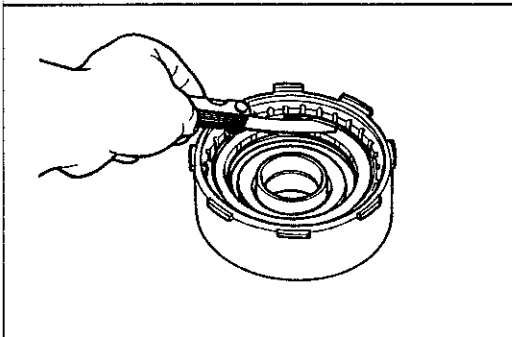
2. Verify that the retaining plate moves toward the snap ring.  
If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace as necessary when assembling.

#### Clearance between retaining plate and snap ring

Measure the clearance between the retaining plate and the snap ring.

**Clearance: 1.6—1.8mm (0.063—0.071 in)**

Select and install the correct retaining plate when assembling.



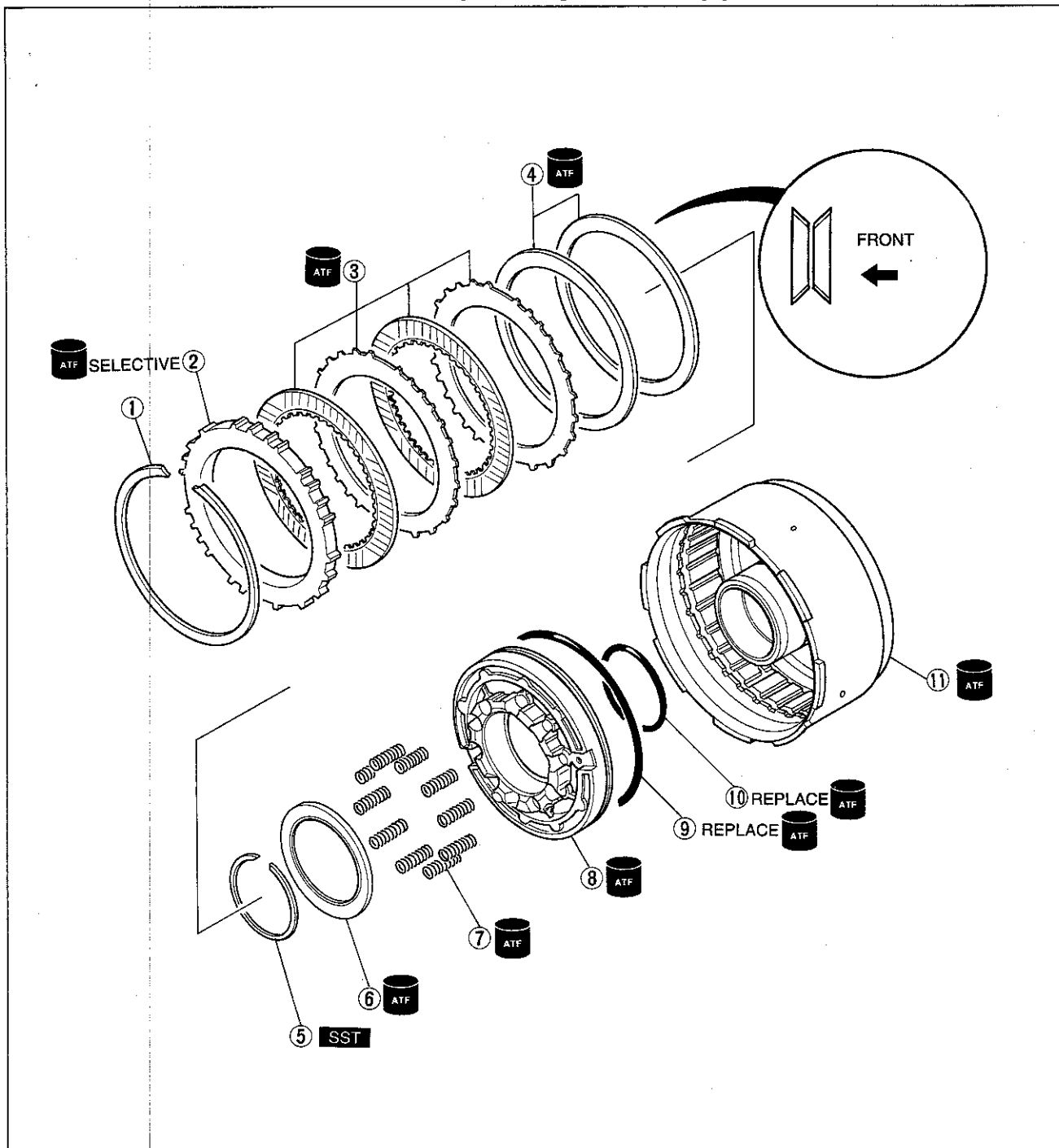
9MU0K2-140

**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

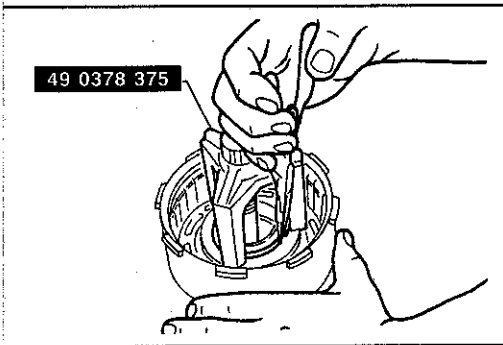
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1BU0K1-018

- |                                   |                               |                        |
|-----------------------------------|-------------------------------|------------------------|
| 1. Snap ring                      | 6. Spring retainer            | 9. Seal ring           |
| 2. Retaining plate                | 7. Return spring              | 10. O-ring             |
| 3. Drive plates and driven plates | Inspection ..... page K1-58   | 11. Direct clutch drum |
| Inspect for wear or burning       |                               |                        |
| Inspection ..... page K1-58       |                               |                        |
| 4. Dished plates                  | 8. Clutch piston              |                        |
| 5. Snap ring                      | Inspect balls for sticking by |                        |
| Removal ..... page K1-58          | shaking piston                |                        |
|                                   | Removal ..... page K1-58      |                        |
|                                   | Inspection ..... page K1-58   |                        |

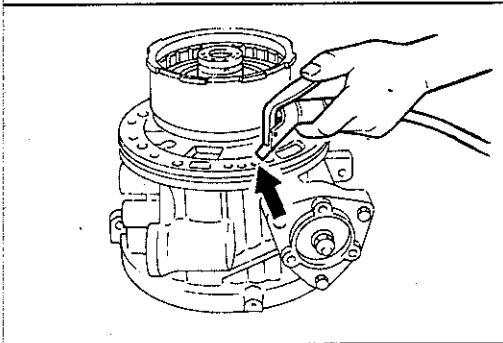


9MU0K2-142

### Disassembly note Snap ring

**Caution**  
Do not damage the snap ring.

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

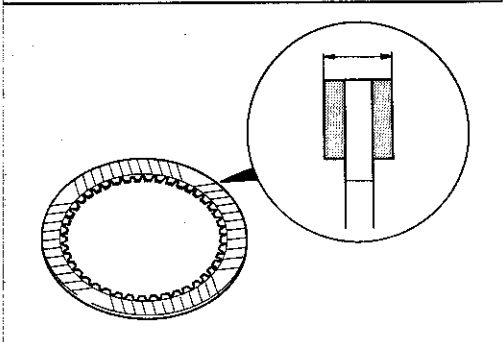


9MU0K2-143

### Clutch piston

1. Install the direct clutch drum onto the drum support along with the seal rings.
2. Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



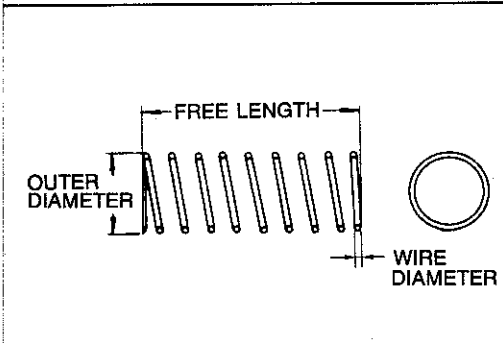
9MU0K2-144

### Inspection Drive plate

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 1.6mm (0.063 in)**  
**Minimum thickness: 1.4mm (0.055 in)**

2. If not within specification, replace the drive plates.



9MU0K2-145

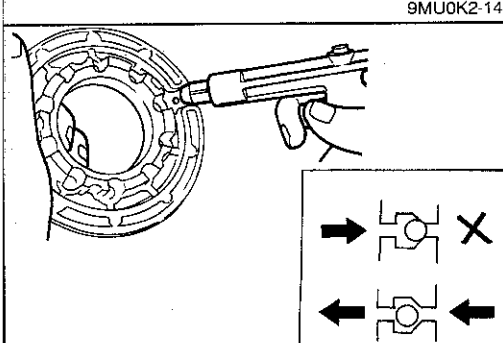
### Return spring

1. Measure the spring specifications.

### Specifications

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
8.0 (0.315)	30.5 (1.201)	14.5	1.3 (0.051)

2. If not within specification, replace the return spring.



9MU0K2-146

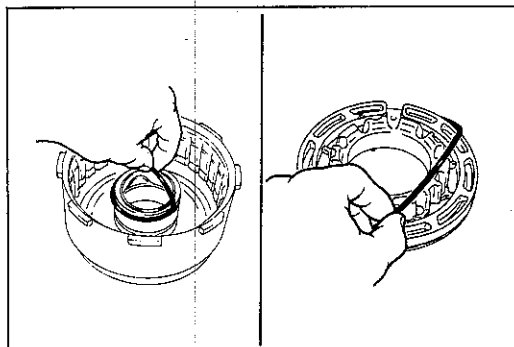
### Clutch piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

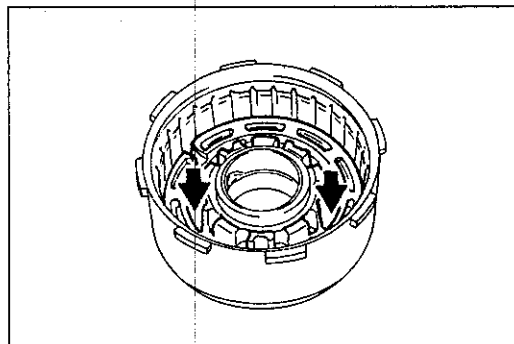
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

3. If not correct, replace the clutch piston.

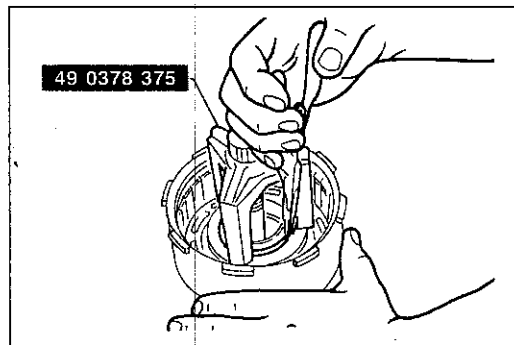




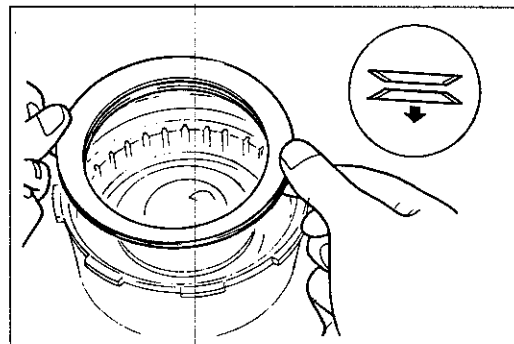
1BU0K1-019



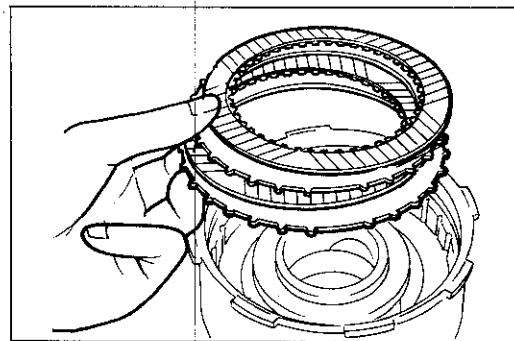
9MU0K2-148



9MU0K2-149



9MU0K2-150



9MU0K2-151

**Assembly procedure**

1. Apply ATF to a new O-ring and install it onto the rear clutch drum.
2. Apply ATF to a new seal ring and install it onto the piston.

3. Apply ATF to the inside of the direct clutch drum.

**Caution**

**Apply even pressure to the outer edge of the piston to avoid damaging the seal rings when installing.**

4. Install the piston in the direct clutch drum.

**Caution**

- a) Do not overexpand the snap ring when installing.
- b) Do not align the snap ring end-gap with the spring retainer stop.

5. Install the springs and spring retainer and compress them with the **SST**.
6. Install the snap ring.

7. Install the dished plates as shown.

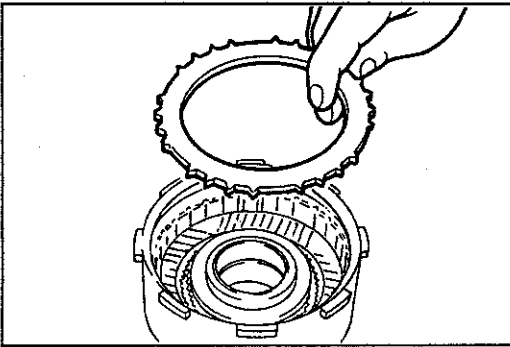
**Caution**

**Align the flats of the drive plates with the lubrication hole of the clutch drum, then set them into the drum.**

**Note**

**Installation order:  
Driven-Drive-Driven-Drive**

8. Apply ATF to the drive plates and driven plates and install them into the direct clutch drum.



9BU0KX-124

**Caution**

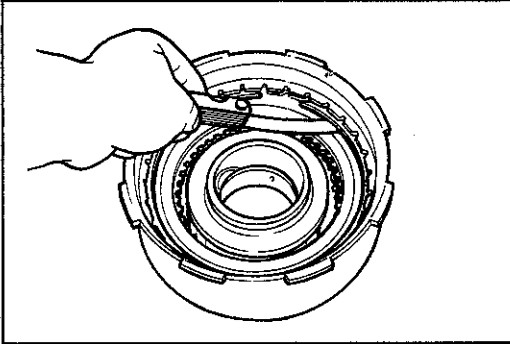
**Align the flat portion of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.**

9. Install the retaining plate.

**Caution**

**Do not deform the snap ring.**

10. Install the snap ring.



9MU0K2-153

11. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Clearance: 1.6—1.8mm (0.063—0.071 in)**

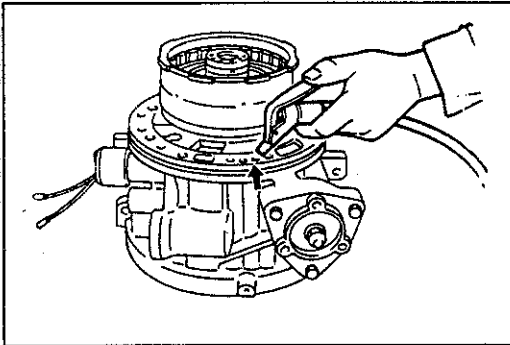
**Retaining plate sizes**

mm (in)

5.6 (0.220)	5.8 (0.228)	6.0 (0.236)
6.2 (0.244)	6.4 (0.252)	6.6 (0.260)
6.8 (0.268)	7.0 (0.276)	

**Caution**

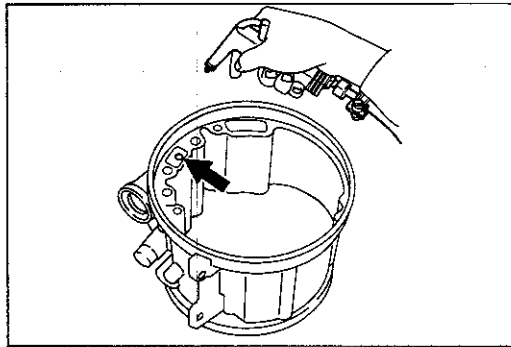
**Apply air for no more than three(3) seconds.**



9MU0K2-154

12. Install the direct clutch onto the drum support along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 67 psi) max.**



9MU0K2-432

## OD BAND SERVO

### Preinspection

### OD band servo operation

1. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

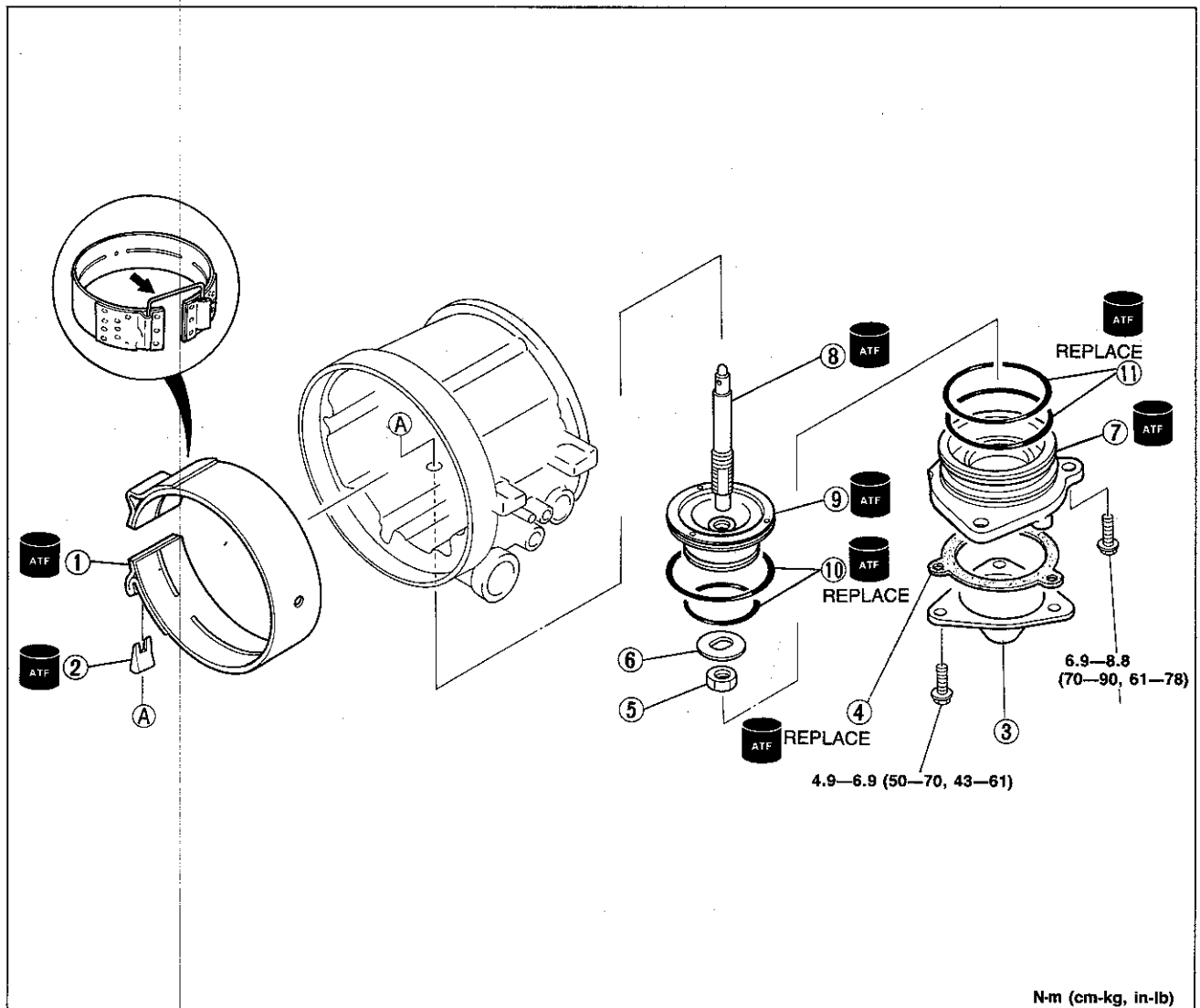
2. Verify that the piston stem moves to the brake band.  
If not, the seal rings or the oil seal may be damage or the piston assembly may be sticking.  
Inspect them, and replace as necessary when assembling.

### Disassembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

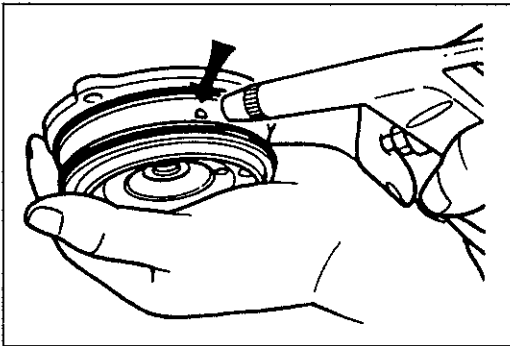
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



N-m (cm-kg, in-lb)

1BU0K1-020

- |  |                |   |
|--|----------------|---|
| 1. Brake band<br>Inspect for wear or burning | 5. Nut         | 9. Piston assembly<br>Removal..... page K1-62 |
| 2. Band strut                                | 6. Washer      | 10. Seal rings                                |
| 3. OD band servo cover                       | 7. Body        | 11. O-rings                                   |
| 4. Gasket                                    | 8. Piston stem |   |



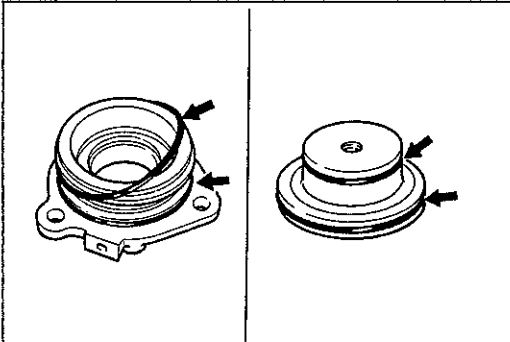
9MU0K2-192

### Disassembly note

#### Piston assembly

Remove the piston assembly from the body by applying compressed air through the oil passage hole.

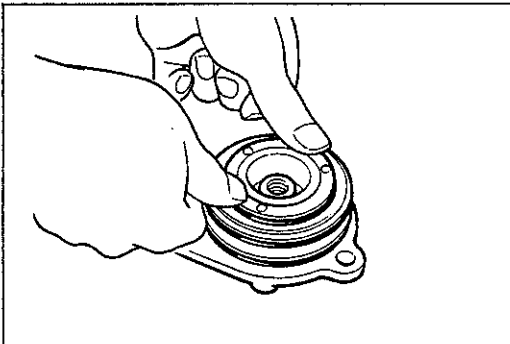
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



1BU0K1-021

### Assembly procedure

1. Apply ATF to the new seal rings, and install them onto the body.
2. Apply ATF to the new O-rings, and install them onto the piston assembly.



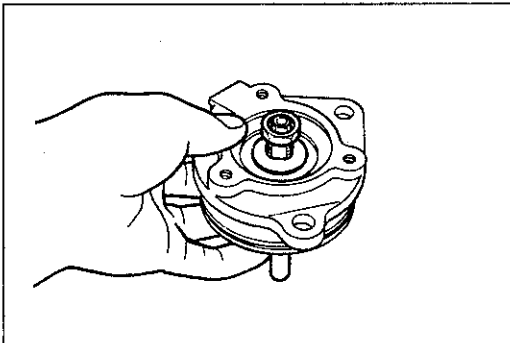
9MU0K2-195

3. Apply ATF to the piston assembly and body.

### Caution

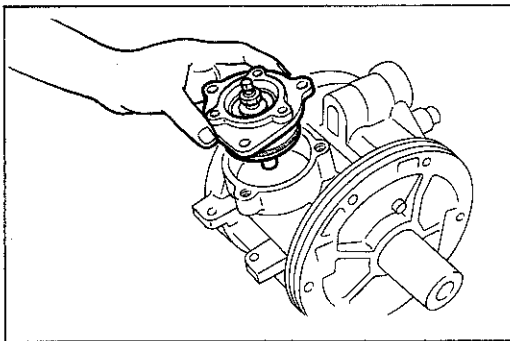
**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

4. Press the piston assembly in the body.



9MU0K2-196

5. Apply ATF to the piston stem and washer, and install them into the body.
6. Loosely tighten the nut.

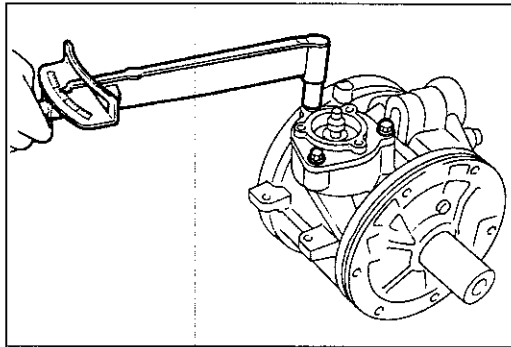


9MU0K2-197

### Caution

**Apply even pressure to the outside edge of the body to avoid damaging the O-ring when installing.**

7. Apply ATF to a new gasket, and install it onto the OD case.
8. Install the piston assembly.

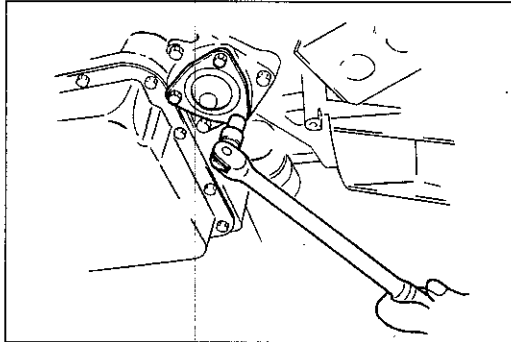


1BU0K1-022

9. Install and tighten the bolts.

**Tightening torque:**

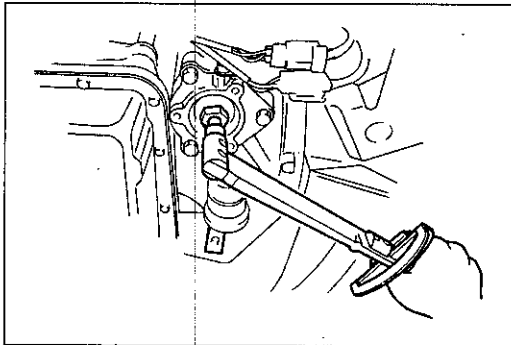
**9.8—14.7 N·m (1.0—1.5 m·kg, 7.2—10.8 ft·lb)**



9MU0K2-199

**On-vehicle Adjustment**

1. Remove the OD band servo cover and gasket.



1BU0K1-023

2. Loosen the locknut and tighten the piston stem.

**Tightening torque:**

**6.9—9.8 N·m (0.7—1.0 m·kg, 5.1—7.2 ft·lb)**

3. Loosen the stem the number of turns shown below.

**Stem: 2 turns**

4. Tighten the locknut.

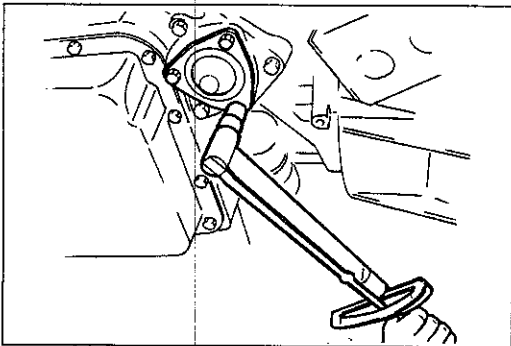
**Tightening torque:**

**15—40 N·m (1.5—4.0 m·kg, 11—30 ft·lb)**

5. Install a new gasket and the OD band servo cover.

**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

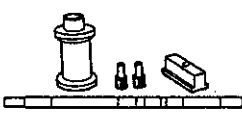
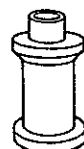
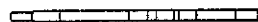
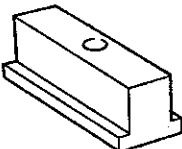



9MU0K2-431

### DRUM SUPPORT, ACCUMULATOR, AND OD CASE

#### Preparation

#### SST

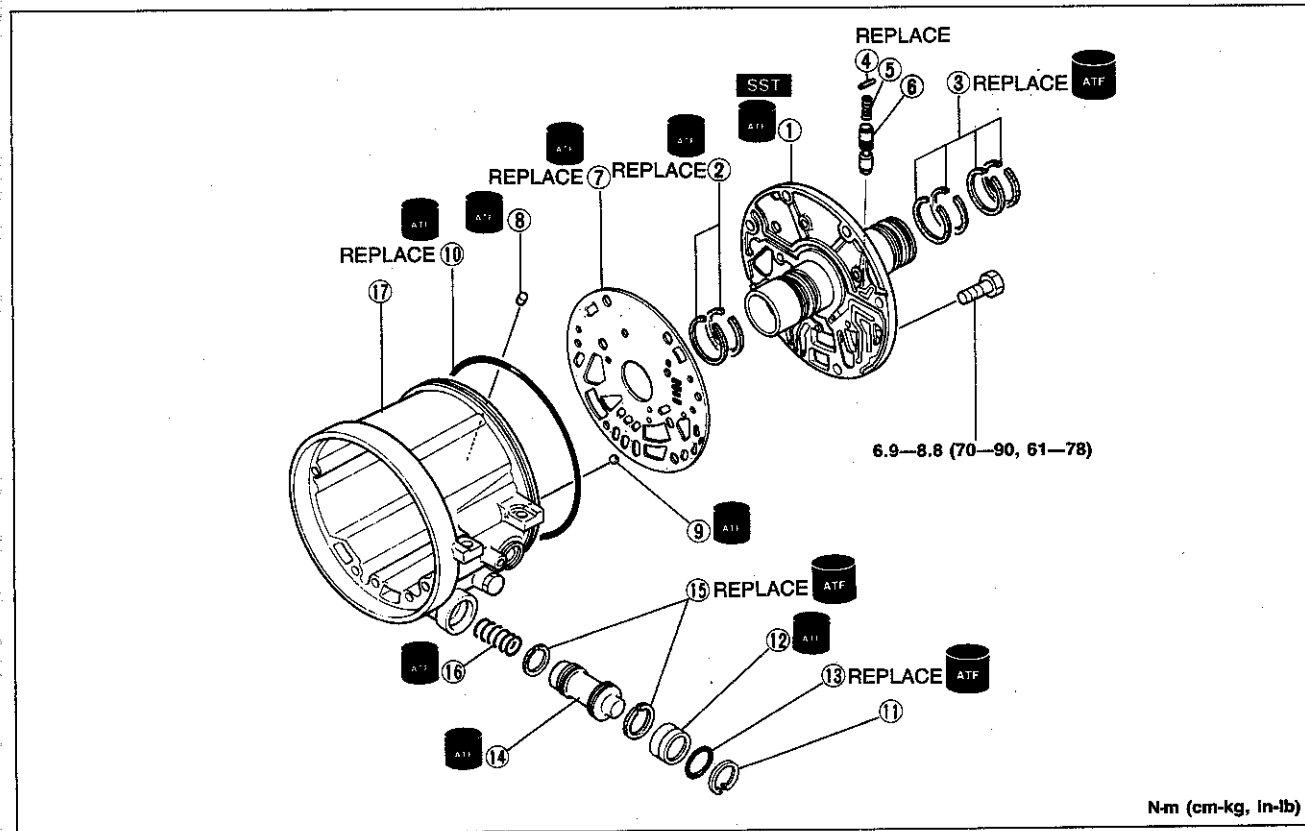
<p>49 S019 0A0</p> <p>Set, centering tool</p> 	<p>49 S019 001</p> <p>Holder (Part of 49 S019 0A0)</p> 	<p>49 S019 002</p> <p>Shaft (Part of 49 S019 0A0)</p> 
<p>49 S019 003</p> <p>Stand (Part of 49 S019 0A0)</p> 	<p>49 S019 004</p> <p>Pin (Part of 49 S019 0A0)</p> 	<p style="text-align: right;">9MU0K2-232</p>

#### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

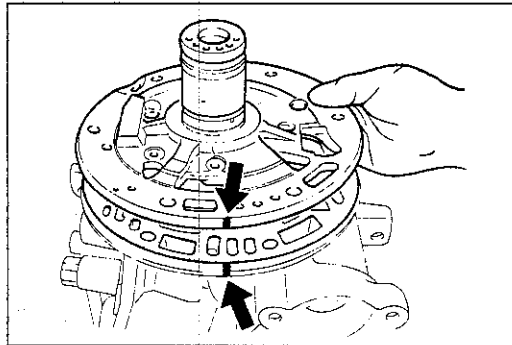
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



N-m (cm-kg, in-lb)

1BU0K1-024

- |  |   |  |
|--|---|--|
| <p>1. Drum support<br/>Removal..... page K1-65<br/>Inspection ..... page K1-65</p> <p>2. Seal rings</p> <p>3. Seal rings</p> <p>4. Roll pin</p> <p>5. Spring<br/>Inspection ..... page K1-65</p> | <p>6. OD cancel valve<br/>Inspect for sticking, scoring, or scratches</p> <p>7. Gasket</p> <p>8. One-way valve</p> <p>9. Steel ball</p> <p>10. Seal ring</p> <p>11. Snap ring</p> | <p>12. Accumulator plug<br/>Removal..... page K1-65</p> <p>13. O-ring</p> <p>14. Accumulator piston</p> <p>15. Seal rings</p> <p>16. Spring<br/>Inspection ..... page K1-65</p> <p>17. OD case</p> |
|--|---|--|

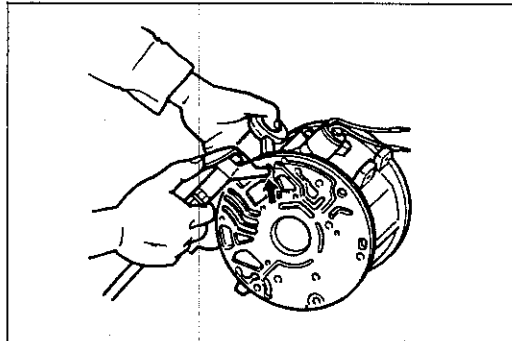


9MU0K2-234

**Disassembly note**

**Drum support**

Mark the OD case and drum support for proper reassembly, then remove the drum support.

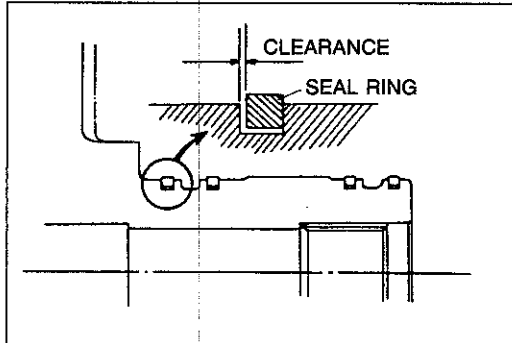


9MU0K2-235

**Accumulator plug**

Remove the accumulator plug, piston, and spring by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MU0K2-236

**Inspection**

**Drum support**

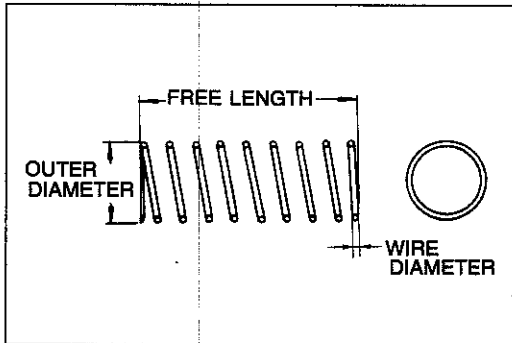
1. Apply ATF to the new seal rings and install them into the seal ring grooves of the drum support.
2. Measure the clearance between the seal rings and the seal ring grooves.

**Clearance**

**Standard: 0.04—0.16mm (0.0016—0.0063 in)**

**Maximum: 0.40mm (0.016 in)**

3. If not within specification, replace the drum support.



0BU0K1-052

**Spring**

1. Measure the spring specifications.

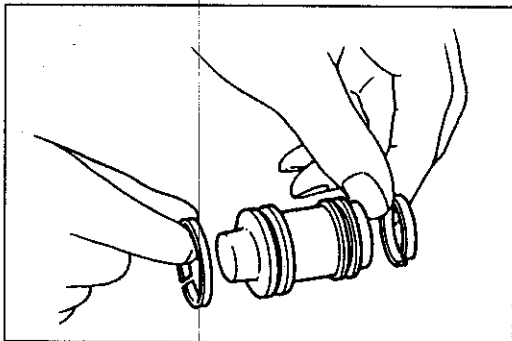
**Specifications**

Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Spring				
OD cancel	4.95 (0.195)	23.0 (0.906)	14.8	0.65 (0.026)
Accumulator	14.85 (0.585)	39.7 (1.563)	9.3	1.8 (0.071)

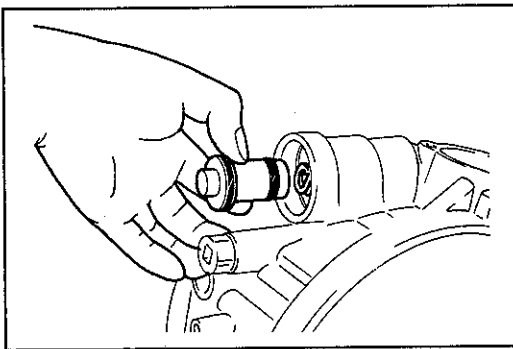
2. If not within specification, replace the spring.

**Assembly procedure**

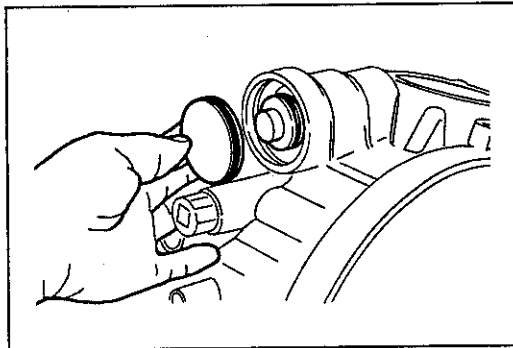
1. Apply ATF to the new seal rings, and install them onto the accumulator piston.



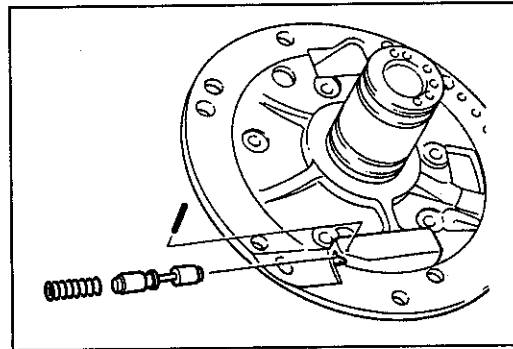
1BU0K1-025



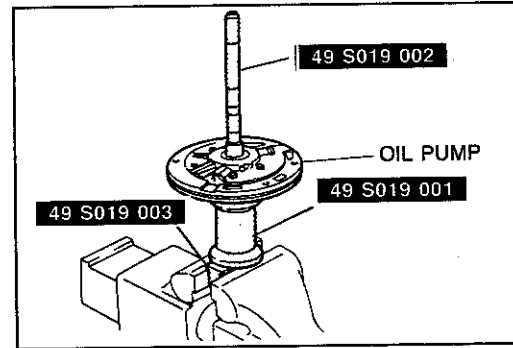
9MU0K2-239



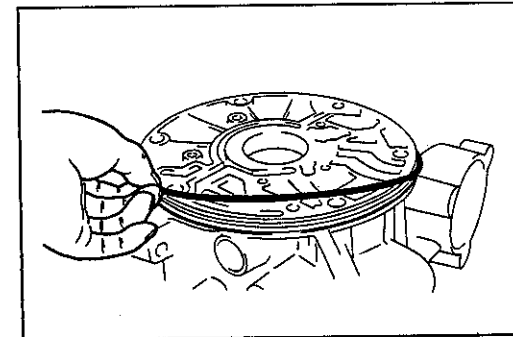
9MU0K2-240



0BU0K1-053



9MU0K2-242



9MU0K2-243

### Caution

**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

2. Apply ATF to the spring and accumulator piston, and install them into the OD case.

3. Apply ATF to a new O-ring, and install it on the accumulator plug.
4. Install the accumulator plug and snap ring.

### Caution

**Apply air for no more than three(3) seconds.**

5. Check the accumulator operation by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0kg/cm<sup>2</sup>, 57 psi) max.**

6. Apply ATF to the OD cancel valve and spring, and install it into the drum support.
7. Tap in a new roll pin.

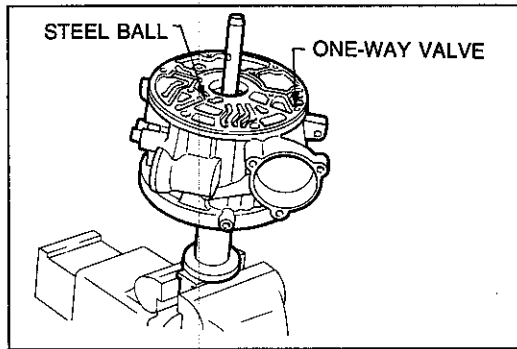
### Note

**Use protective plates to prevent damaging the SST.**

8. Set the oil pump onto the SST.

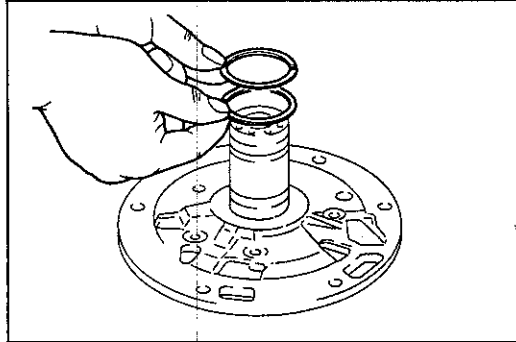
9. Apply ATF to a new seal ring, and install it onto the drum support.





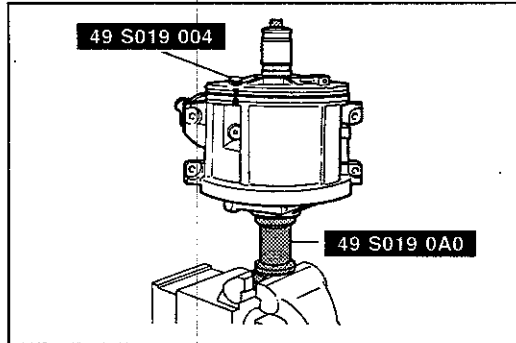
9MU0K2-244

10. Apply ATF to the OD case, and mount it onto the oil pump.
11. Install the steel ball and the one-way valve.



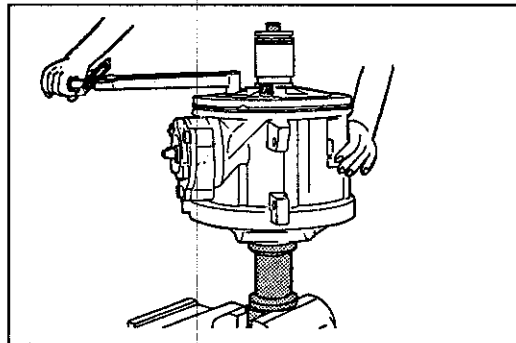
9MU0K2-245

12. Apply ATF to the new seal rings, and install them onto the drum support.



9MU0K2-246

13. Apply ATF to the drum support, and install the support and a new gasket onto the OD case, aligning the marks.
14. Install the **SST** (pins).

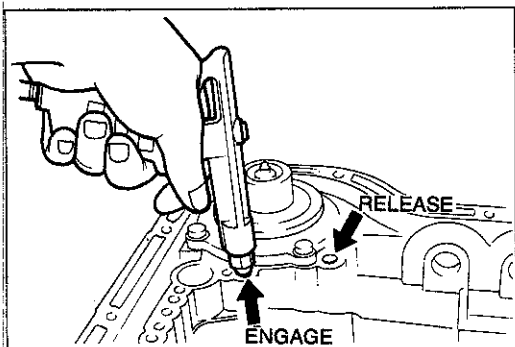


79G07C-284

15. Tighten the drum support mounting bolts.

**Tightening torque:**

**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



9MU0K2-202

### 2ND BAND SERVO

#### Preinspection

#### 2ND band servo operation

1. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

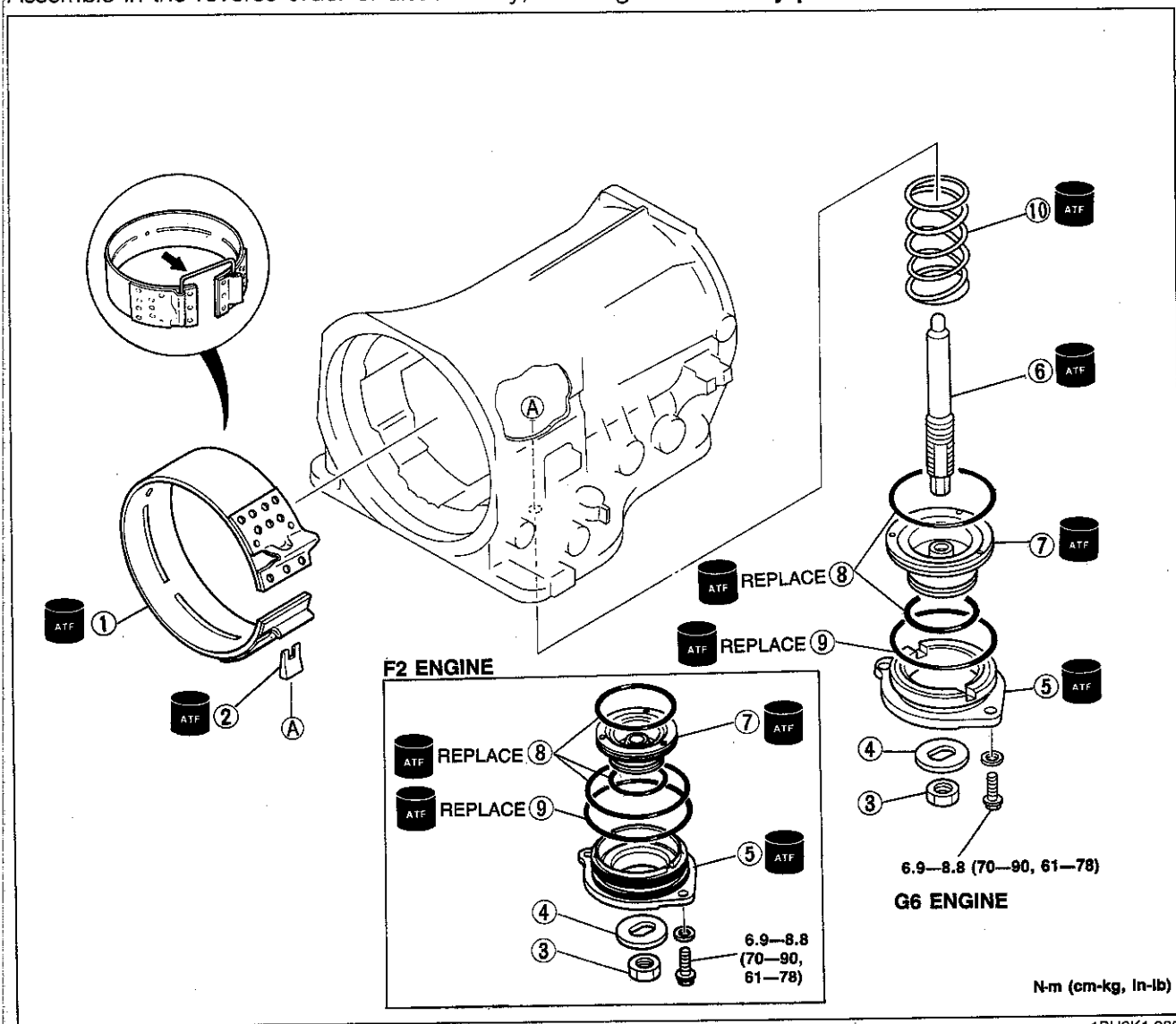
2. Verify that the piston stem moves to the brake band.  
If not, the seal rings or the oil seal may be damage or the piston assembly may be sticking.  
Inspect them, and replace as necessary when assembling.

### Disassembly and Inspection

Disassemble in the order shown in the figure.

Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



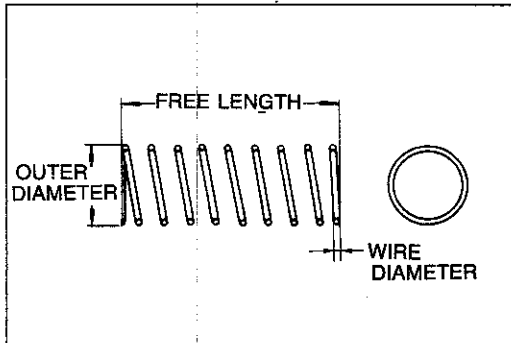
1BU0K1-026

- 1. Brake band  
Inspect for wear or burning
- 2. Band strut
- 3. Nut

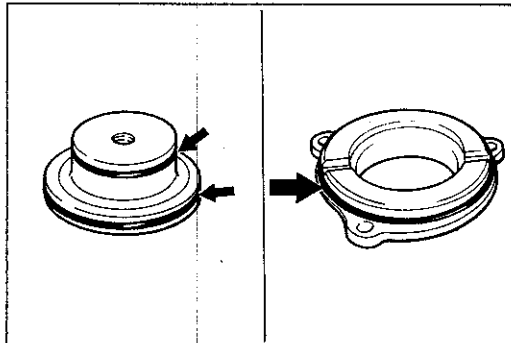
- 4. Washer
- 5. Body
- 6. Piston stem
- 7. Piston assembly

- 8. D-ring
- 9. O-ring
- 10. Return spring

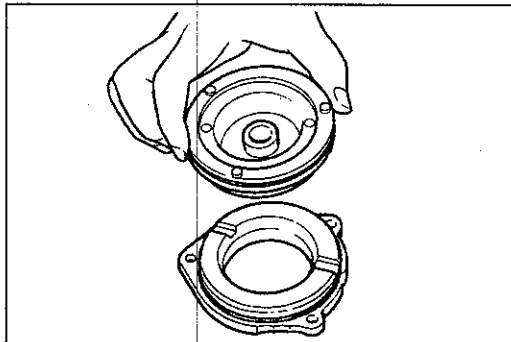
Inspection ..... page K1-69



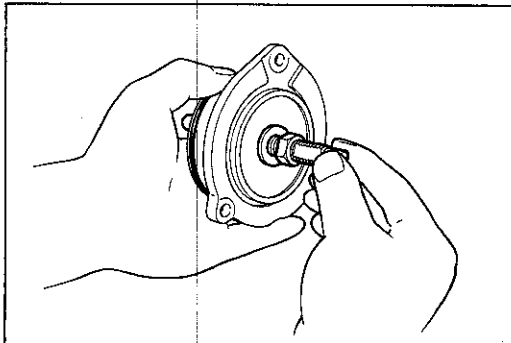
OBU0K1-055



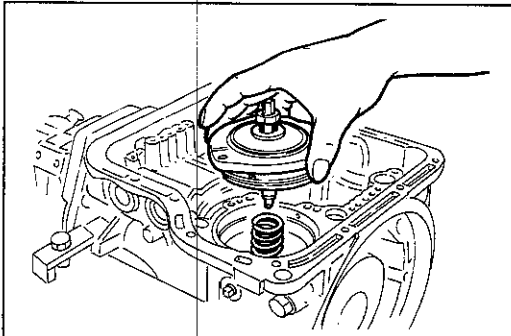
1BU0K1-027



9MU0K2-205



9MU0K2-206



9MU0K2-207

**Inspection**  
**Return spring**

1. Measure the spring specifications.

**Specifications**

Engine	Free length mm (in)	Wire dia. mm (in)
F2	36.0 (1.417)	3.5 (0.138)
G6	38.7 (1.542)	3.5 (0.138)

2. If not within specification, replace the return spring.

**Assembly procedure**

**Note**

**Install the D-rings with the swelling surface outward.**

1. Apply ATF to the D-rings, and install them onto the piston assembly.
2. Apply ATF to a new O-ring, and install it onto the piston assembly.

3. Apply ATF to the piston assembly and body.

**Caution**

**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

4. Press the piston assembly into the body.

5. Apply ATF to the piston stem and washer, and install them into the body.

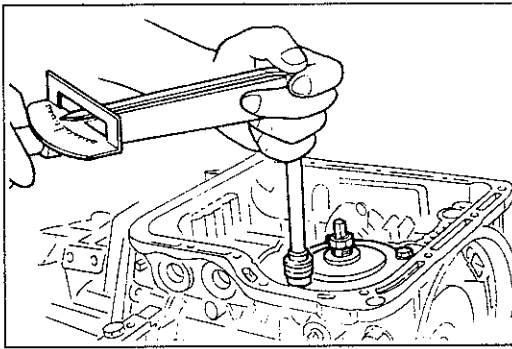
6. Loosely tighten the nut.

7. Apply ATF to the return spring, and install it into the transmission case.

**Caution**

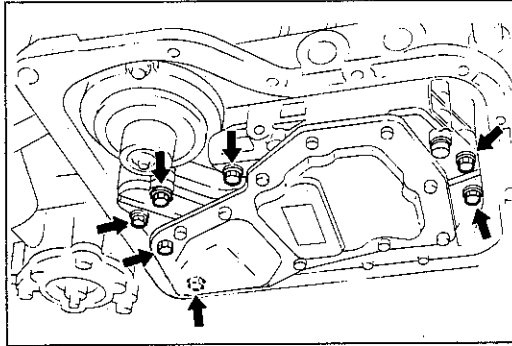
**Apply even pressure to the outside edge of the body to avoid damaging the O-ring when installing.**

8. Install the piston assembly.



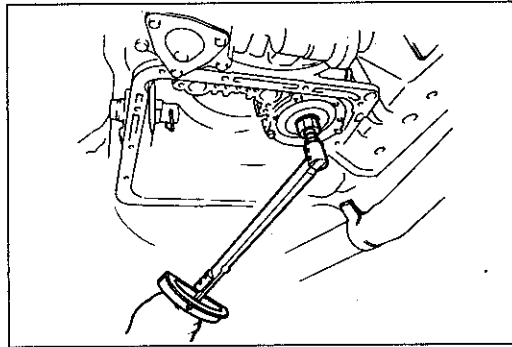
9. Install and tighten the bolts.

**Tightening torque:**  
6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



### On-vehicle Adjustment

1. Remove the valve body assembly.

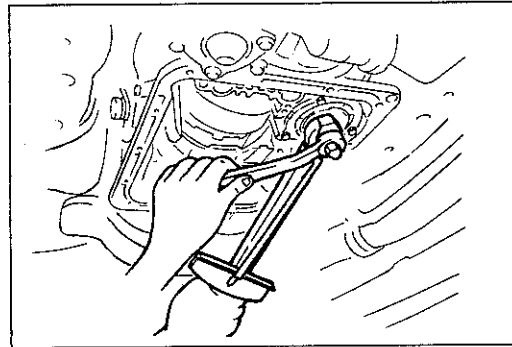


2. Loosen the locknut and tighten the piston stem.

**Tightening torque:**  
11.8—14.7 N·m (1.2—1.5 m·kg, 8.7—10.8 ft·lb)

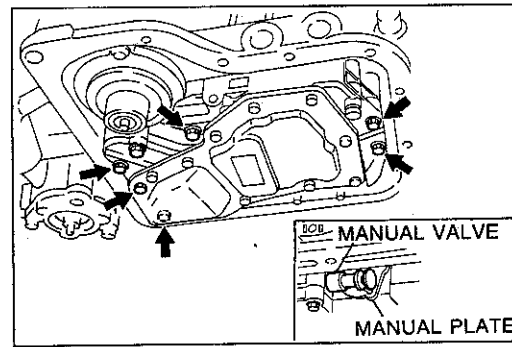
3. Loosen the stem the number of turns shown below.

**Stem: 3 turns**



4. Hold the stem and tighten the locknut.

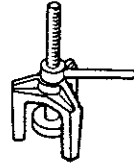
**Tightening torque:**  
15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)



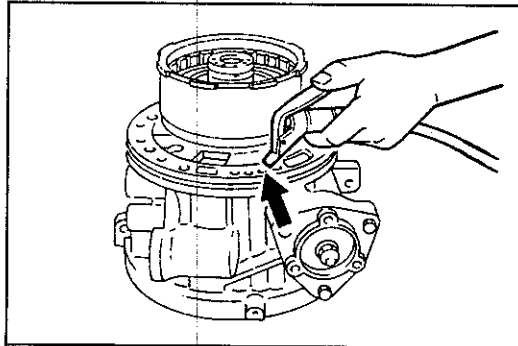
5. Install the valve body assembly.

## FRONT CLUTCH Preparation SST

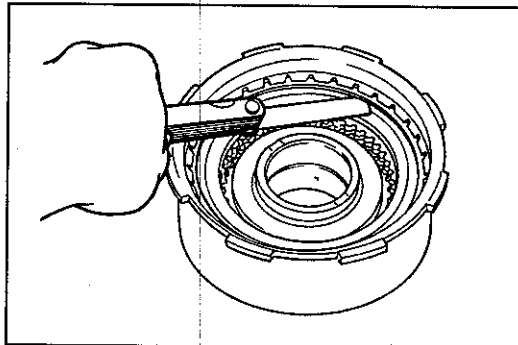
49 0378 375

Compressor,  
clutch spring

9MU0K2-155



9MU0K2-156



0BU0K1-056

### Preinspection

#### Front clutch operation

1. Install the front clutch onto the drum support along with the seal rings.

Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace when assembling.

#### Clearance between retaining plate and snap ring

Measure the clearance between the retaining plate and the snap ring.

#### Clearance

**F2 engine: 1.6—1.8mm (0.063—0.071 in)**

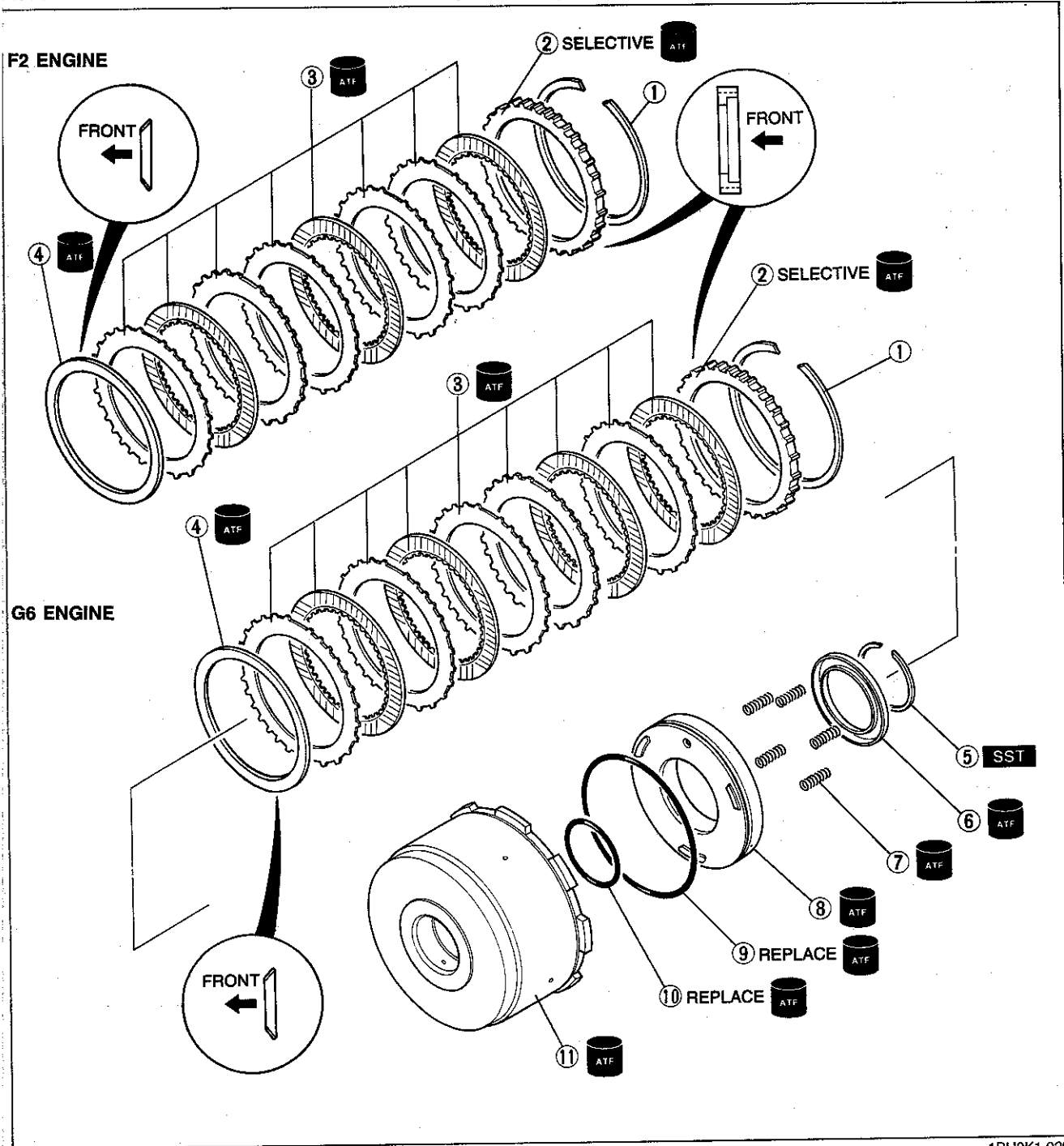
**G6 engine: 0.9—1.1mm (0.035—0.043 in)**

Select and install the correct retaining plate when assembling.

### Disassembly and Inspection

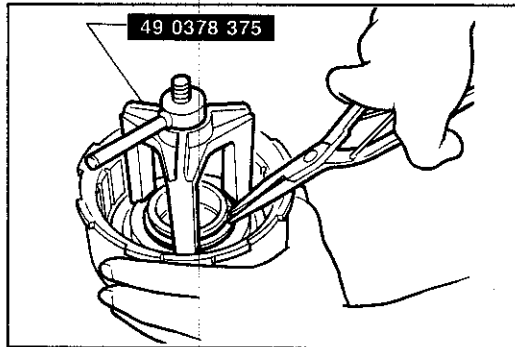
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1BU0K1-029

- |   |   |                       |
|---|---|-----------------------|
| 1. Snap ring  | 6. Spring retainer  | 9. Seal ring          |
| 2. Retaining plate  | 7. Return spring  | 10. O-ring            |
| 3. Drive plates and driven plates<br>Inspect for wear or burning<br>Inspection ..... page K1-73 | Inspection ..... page K1-73   | 11. Front clutch drum |
| 4. Dished plates  | 8. Clutch piston  |                       |
| 5. Snap ring  | Inspection balls for sticking by<br>shaking piston<br>Removal ..... page K1-73<br>Inspection ..... page K1-73 |                       |
| Removal ..... page K1-73  |   |                       |



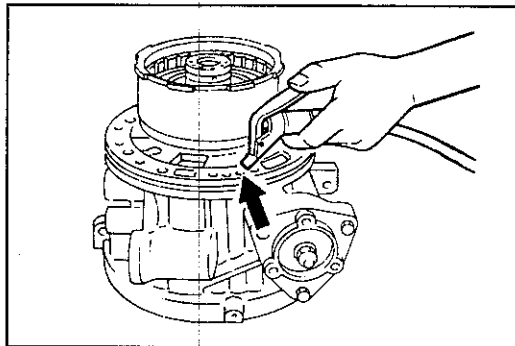
9MU0K2-159

**Disassembly note**  
**Snap ring**

**Caution**

**Do not damage the snap ring.**

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

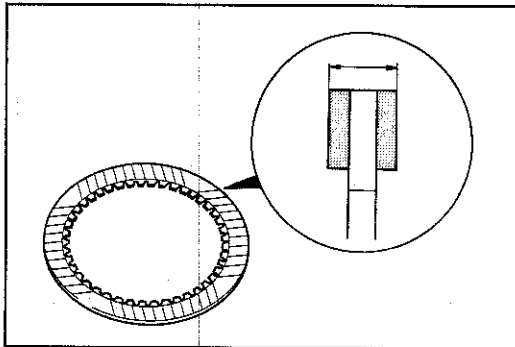


9MU0K2-160

**Clutch piston**

1. Install the front clutch drum onto the drum support along with seal rings.
2. Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



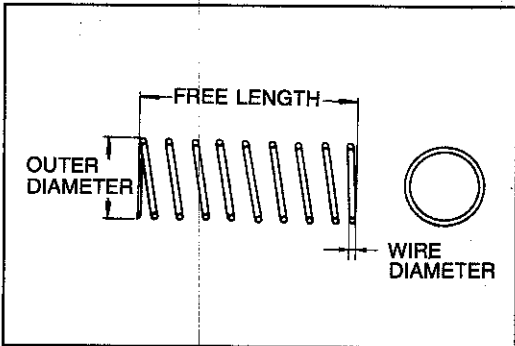
9MU0K2-161

**Inspection**  
**Drive plate**

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 1.6mm (0.063 in)**  
**Minimum thickness: 1.4mm (0.055 in)**

2. If not within specification, replace the drive plates.



9MU0K2-162

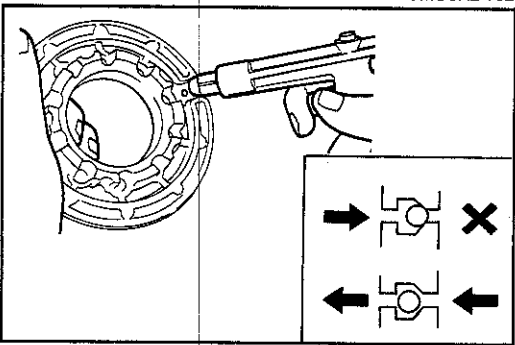
**Return spring**

1. Measure the spring specifications.

**Specifications**

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
8.0 (0.315)	30.5 (1.201)	14.5	1.3 (0.051)

2. If not within specification, replace the return spring.



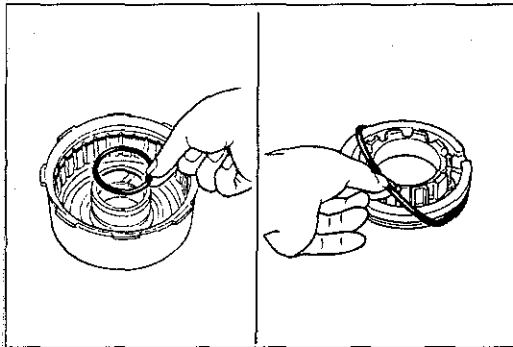
9MU0K2-163

**Clutch piston**

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

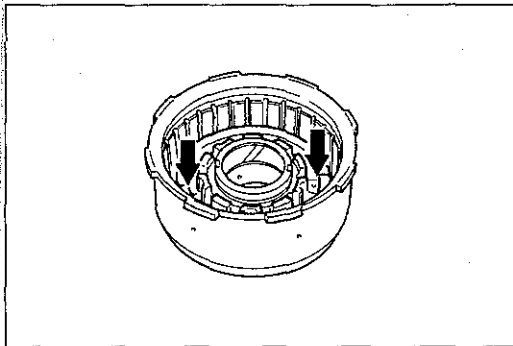
3. If not correct, replace the clutch piston.



1BU0K1-030

### Assembly procedure

1. Apply ATF to a new O-ring and install it onto the front clutch drum.
2. Apply ATF to a new seal ring and install it onto the piston.

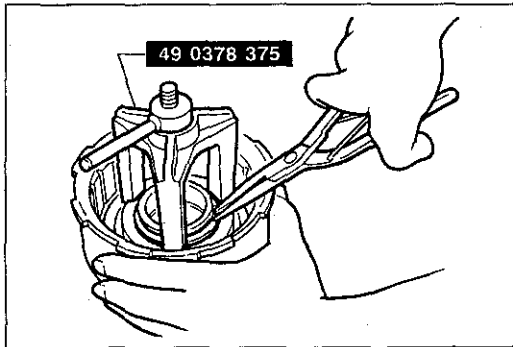


9MU0K2-165

### Caution

**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

3. Apply ATF to the inside of the front clutch drum.
4. Install the piston in the front clutch drum.

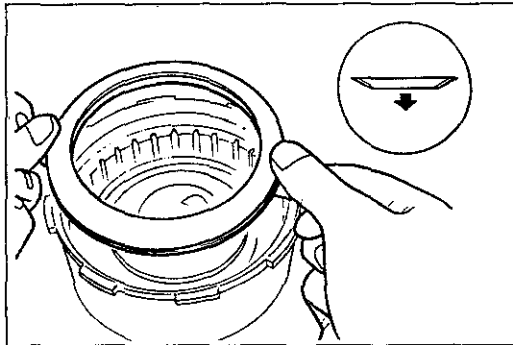


9MU0K2-166

### Caution

- a) Do not overexpand the snap ring when installing.
- b) Do not align the snap ring end-gap with the spring retainer stop.

5. Install the springs and spring retainer, then compress them with the **SST**.
6. Install the snap ring.



9MU0K2-167

7. Install the dished plates as shown.

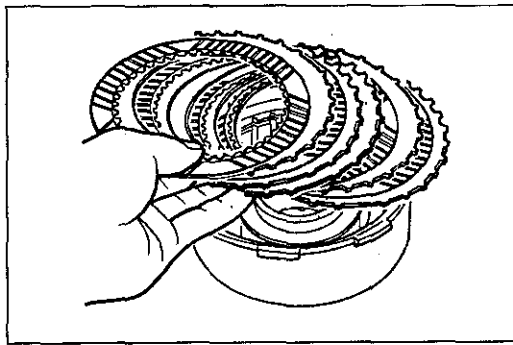
### Caution

**Align the flats of the drive plates with the lubrication hole of the clutch drum, then set them into the drum.**

### Note

**Installation order (F2 engine):  
Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive**

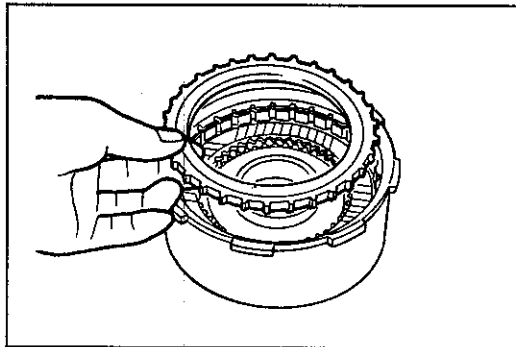
**Installation order (G6 engine):  
Driven-Drive-Driven-Drive-Driven-Driven-Drive-Driven-Drive**



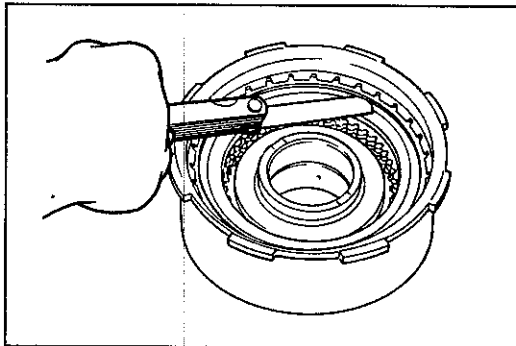
0BU0K1-058

8. Apply ATF to the drive plates and driven plates and install them into the front clutch drum.

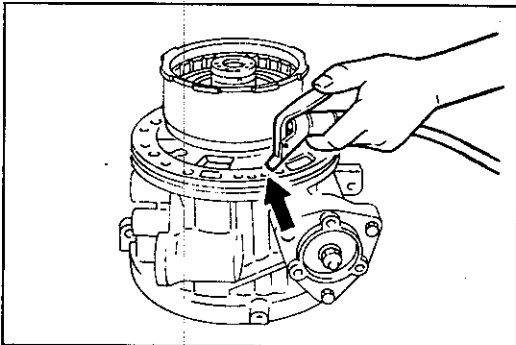




9MU0K2-169



0BU0K1-059



9MU0K2-171

**Caution**

**Align the flats of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.**

9. Install the retaining plate with the step facing upward.

**Caution**

**Do not deform the snap ring.**

10. Install the snap ring.
11. Measure the clearance between the retaining plate and snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Clearance**

**F2 engine: 1.6—1.8mm (0.063—0.071 in)**  
**G6 engine: 0.9—1.1mm (0.035—0.043 in)**

**Retaining plate sizes**

**F2 engine:**

mm (in)

5.0 (0.197)	5.2 (0.205)	5.4 (0.213)
5.6 (0.220)	5.8 (0.228)	6.0 (0.236)

**G6 engine:**

mm (in)

5.6 (0.220)	5.8 (0.228)	6.0 (0.236)
6.2 (0.244)	6.4 (0.252)	6.6 (0.260)
6.8 (0.268)	7.0 (0.276)	

**Caution**

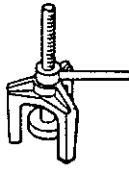
**Apply air for no more than three(3) seconds.**

12. Install the front clutch onto the drum support along with the seal rings. Apply compressed air through the oil passage and check the clutch operation.

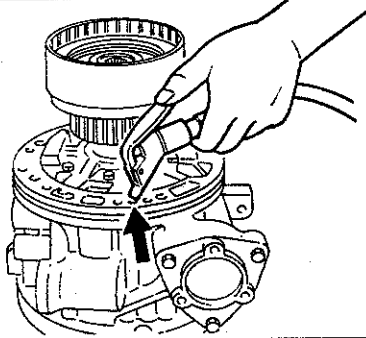
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

## REAR CLUTCH Preparation AST

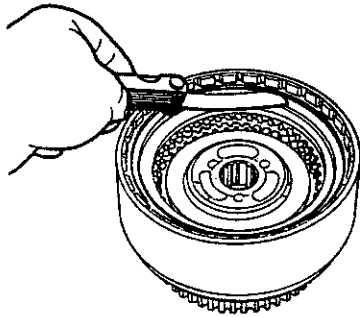
49 0378 375

Compressor,  
clutch spring

9MU0K2-172



9MU0K2-173



0BU0K1-060

### Preinspection Rear clutch operation

1. Install the rear clutch onto the drum support along with the seal rings. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace when assembling.

### Clearance between retaining plate and snap ring

Measure the clearance between the retaining plate and the snap ring.

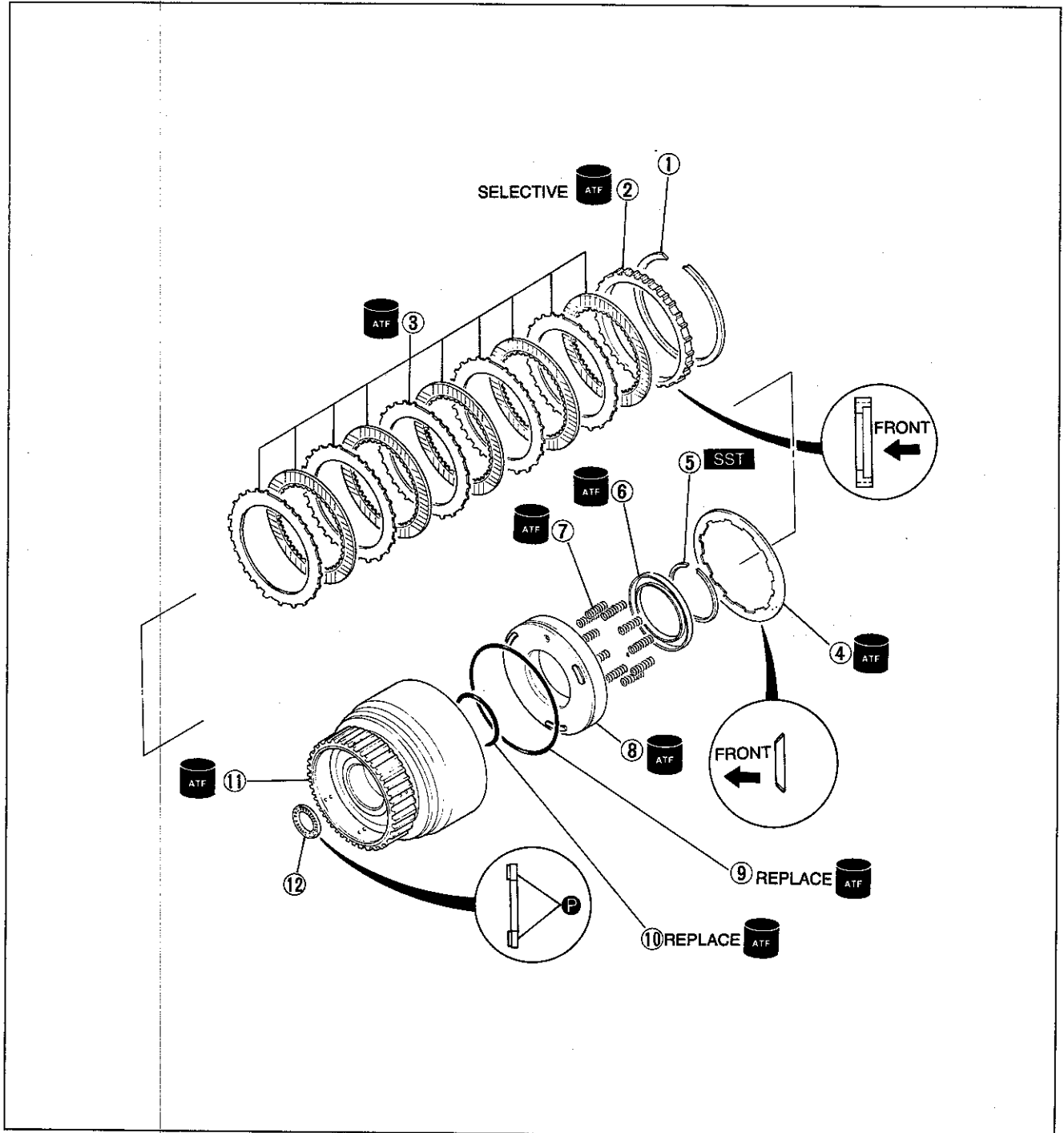
**Clearance: 0.8—1.0mm (0.031—0.039 in)**

If not within specification, replace the dished plate, drive plates, driven plates, and retaining plate when assembling.

**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.

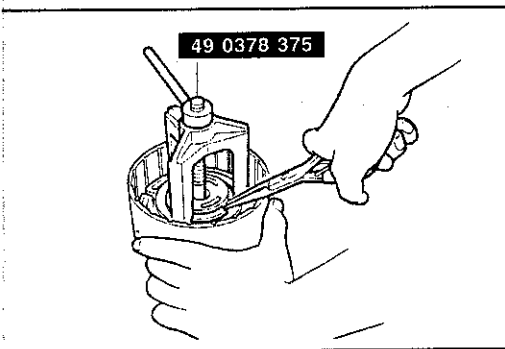


2BU0K1-021

- 1. Snap ring
- 2. Retaining plate
- 3. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... page K1-78
- 4. Dishes plate
- 5. Snap ring  
Removal..... page K1-78

- 6. Spring retainer
- 7. Return spring  
Inspection ..... page K1-78
- 8. Clutch piston  
Inspect balls for sticking by  
shaking, piston  
Removal..... page K1-78  
Inspection ..... page K1-78

- 9. Seal ring
- 10. O-ring
- 11. Rear clutch drum  
Inspect for damage or  
rough rotation
- 12. Bearing



9MU0K2-176

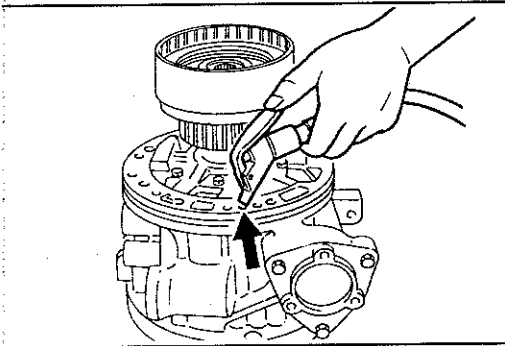
### Disassembly note

#### Snap ring

#### Caution

**Do not damage the snap ring.**

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

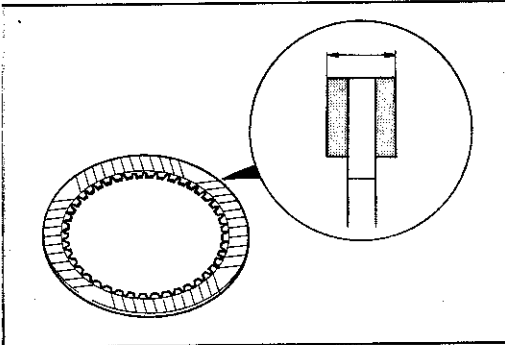


9MU0K2-177

### Clutch piston

1. Install the rear clutch drum onto the drum support along with the seal rings.
2. Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MU0K2-178

### Inspection

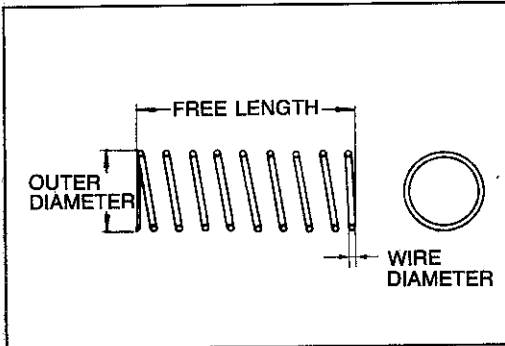
#### Drive plate

1. Measure the facing thickness in three places and determine the average of the three readings.

**Standard thickness: 1.6mm (0.063 in)**

**Minimum thickness: 1.4mm (0.055 in)**

2. If not within specification, replace the drive plates.



9MU0K2-179

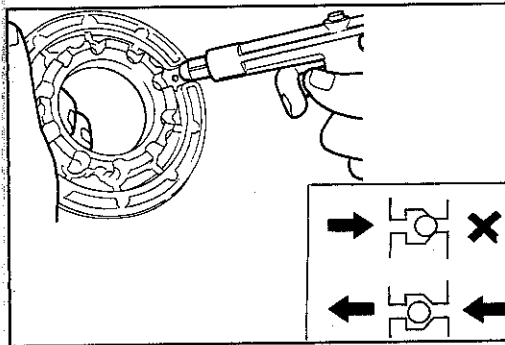
### Return spring

1. Measure the spring specifications.

### Specifications

Outer dia. mm (in)	Free length mm (in)	No. of coils	wire dia. mm (in)
8.0 (0.315)	30.5 (1.201)	14.5	1.3 (0.051)

2. If not within specification, replace the return spring.



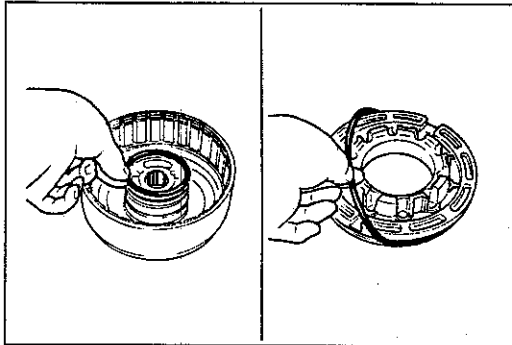
9MU0K2-180

### Clutch piston

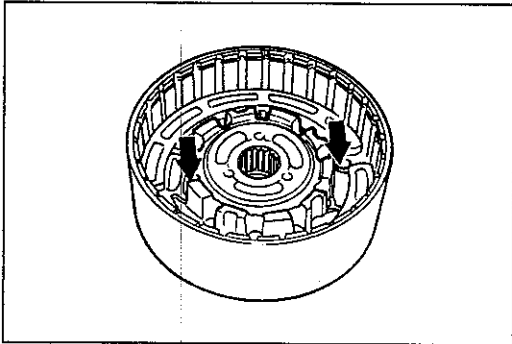
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57psi) max.**

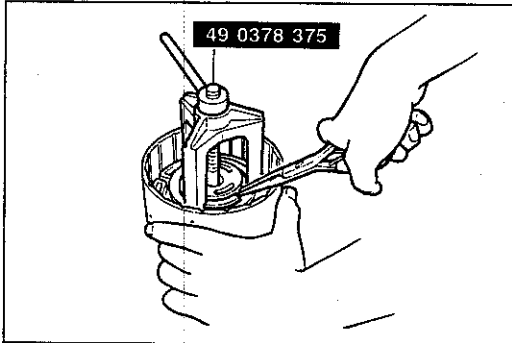
3. If not correct, replace the clutch piston.



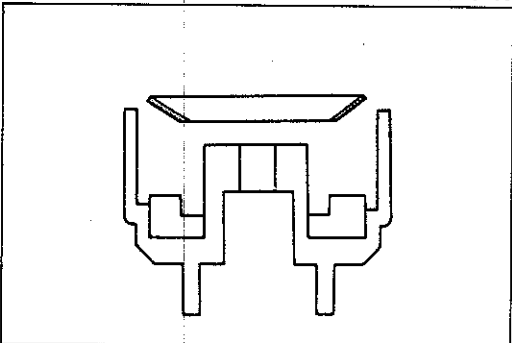
1BU0K1-032



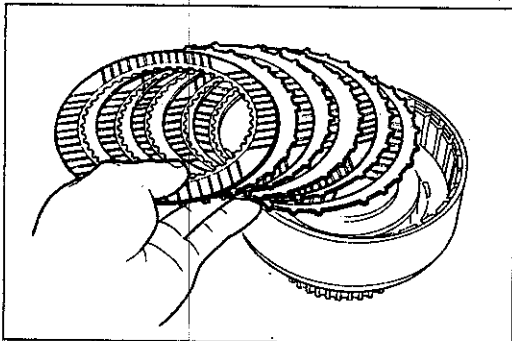
9MU0K2-182



9MU0K2-183



9MU0K2-184



9MU0K2-185

**Assembly procedure**

1. Apply ATF to a new O-ring and install it onto the rear clutch drum.
2. Apply ATF to a new seal ring and install it onto the piston.

3. Apply ATF to the inside of the rear clutch drum.

**Caution**

**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

4. Install the piston in the rear clutch drum.

**Caution**

- a) Do not overexpand the snap ring when installing.
- b) Do not align the snap ring end-gap with the spring retainer stop.

5. Install the springs and spring retainer and compress them with the **SST**.
6. Install the snap ring.

7. Install the dished plate as shown.

**Caution**

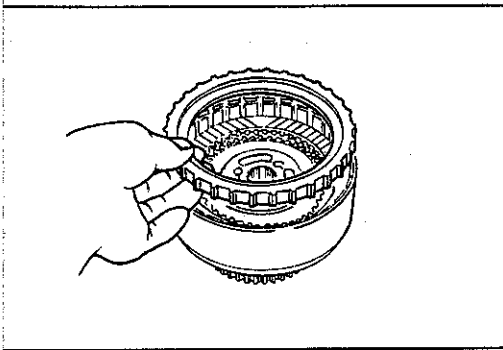
**Align the flats of the drive plates with the lubrication hole of the clutch drum, then set them into the drum.**

**Note**

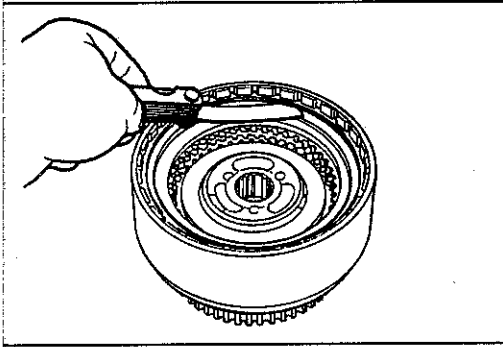
**Installation order:**

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

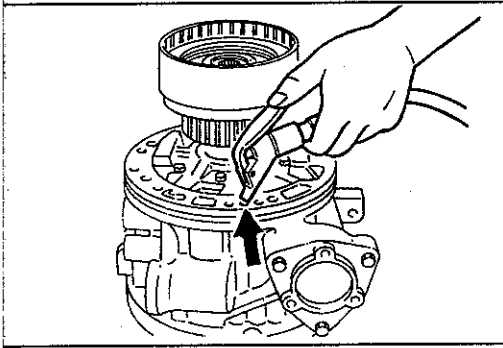
8. Apply ATF to the drive plates and driven plates and install them into the rear clutch drum.



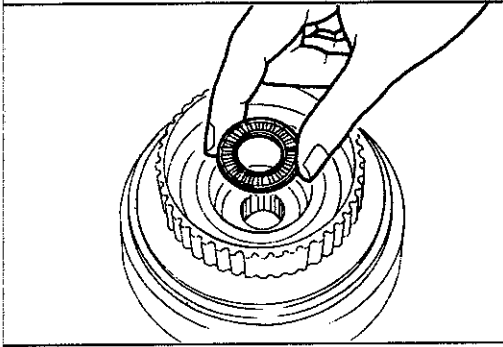
9MU0K2-186



0BU0K1-062



9MU0K2-188



0BU0K1-145

**Caution**

**Align the flats of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.**

- Install the retaining plate with the step facing upward.

**Caution**

**Do not deform the snap ring.**

- Install the snap ring.

- Measure the clearance between the retaining plate and snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Clearance: 0.8—1.0mm (0.031—0.039 in)**

**Retaining plate sizes**

mm (in)

9.4 (0.370)	9.6 (0.378)	9.8 (0.386)
10.0 (0.394)	10.2 (0.402)	10.4 (0.409)
10.6 (0.417)		

**Caution**

**Apply air for no more than three(3) seconds.**

- Install the rear clutch onto the drum support along with the seal rings.  
Apply compressed air to the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

- Apply petroleum jelly to the bearing race, and install it onto the rear clutch drum.

**Bearing race outer diameter: 51.5mm (2.028 in)**

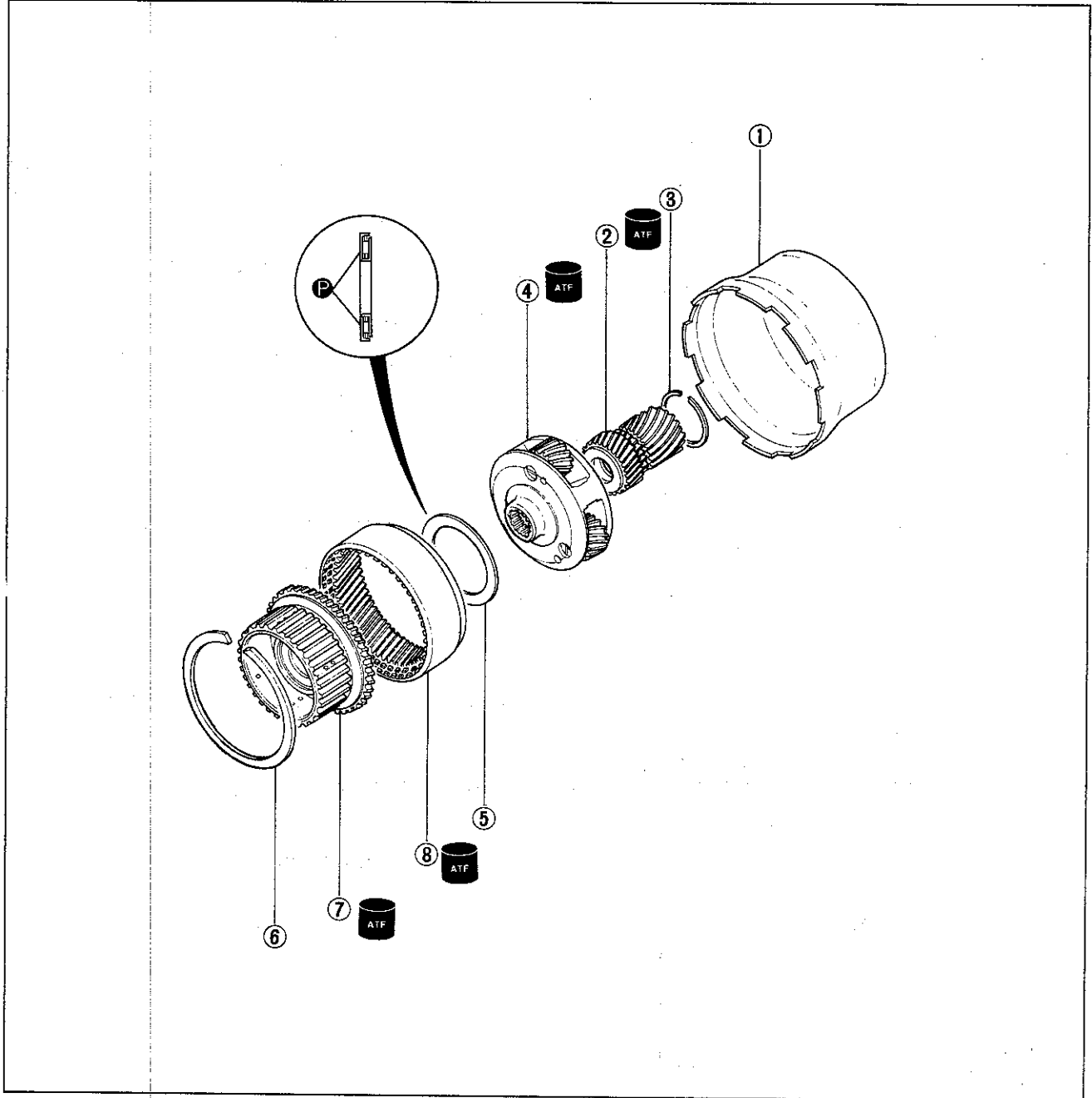
**CONNECTING SHELL AND FRONT PLANETARY GEAR UNIT  
(REAR CLUTCH HUB, FRONT PLANETARY PINION CARRIER, REAR SUN GEAR)**

**Disassembly and Inspection**

Disassemble in the order shown in the figure.

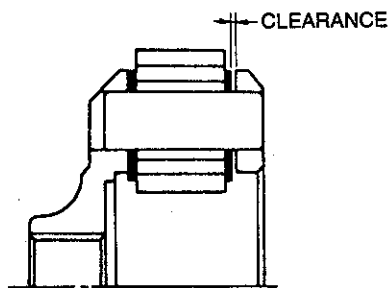
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1BU0K1-033

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Connecting shell</li> <li>2. Front sun gear<br/>Inspect individual gear teeth for damage, wear, or cracks</li> <li>3. Snap ring</li> <li>4. Front planetary pinion carrier<br/>Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears<br/>Inspection..... page K1-80</li> </ul> | <ul style="list-style-type: none"> <li>5. Bearing<br/>Inspect for damage or rough rotation</li> <li>6. Snap ring</li> <li>7. Rear clutch hub</li> <li>8. Internal gear<br/>Inspect individual gear teeth for damage, wear, or cracks</li> </ul> |
|--|---|



9MU0K2-257

### Inspection

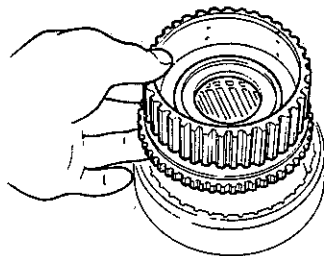
#### Front planetary pinion carrier

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

#### Clearance

**Standard : 0.2—0.7mm (0.008—0.028 in)**  
**Maximum: 0.8mm (0.031 in)**

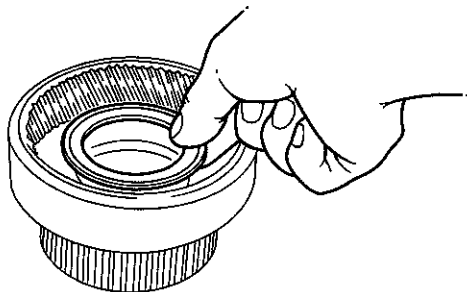
2. If not within specification, replace the planetary pinion carrier.



1BU0K1-034

### Assembly procedure

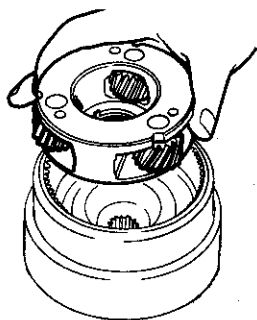
1. Apply ATF to the rear clutch hub and internal gear, and assemble them with the snap ring.



0BU0K1-064

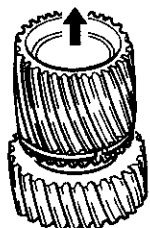
2. Apply petroleum jelly to the bearings, and install it onto the rear clutch hub with the black surface facing upward.

**Bearing outer diameter: 70.0mm (2.756 in)**



0BU0K1-065

3. Apply ATF to the front planetary pinion carrier, and install it into the internal gear.



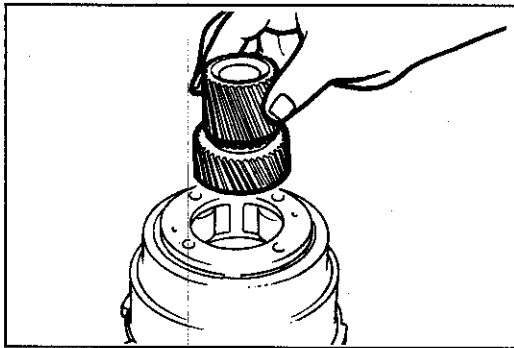
0BU0K1-066

### Note

**Pay close attention to the front and rear directions of the sun gear. The grooved side (arrow) is the front.**

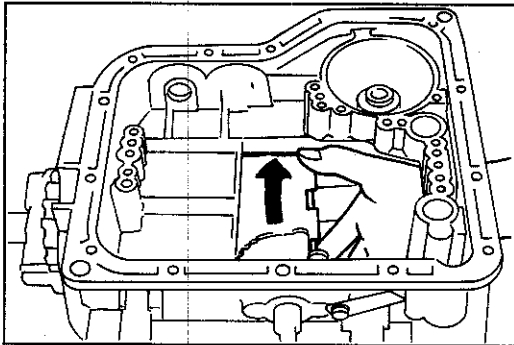
4. Install the snap ring onto the sun gear.





0BLUOK1-067

5. Apply ATF to the sun gear, and install it into the front planetary pinion carrier.



9MUOK2-263

**REAR PLANETARY GEAR UNIT  
(CONNECTING DRUM, REAR PLANETARY PINION  
CARRIER, ONE-WAY CLUTCH)**

**Preinspection**

**One-way clutch operation**

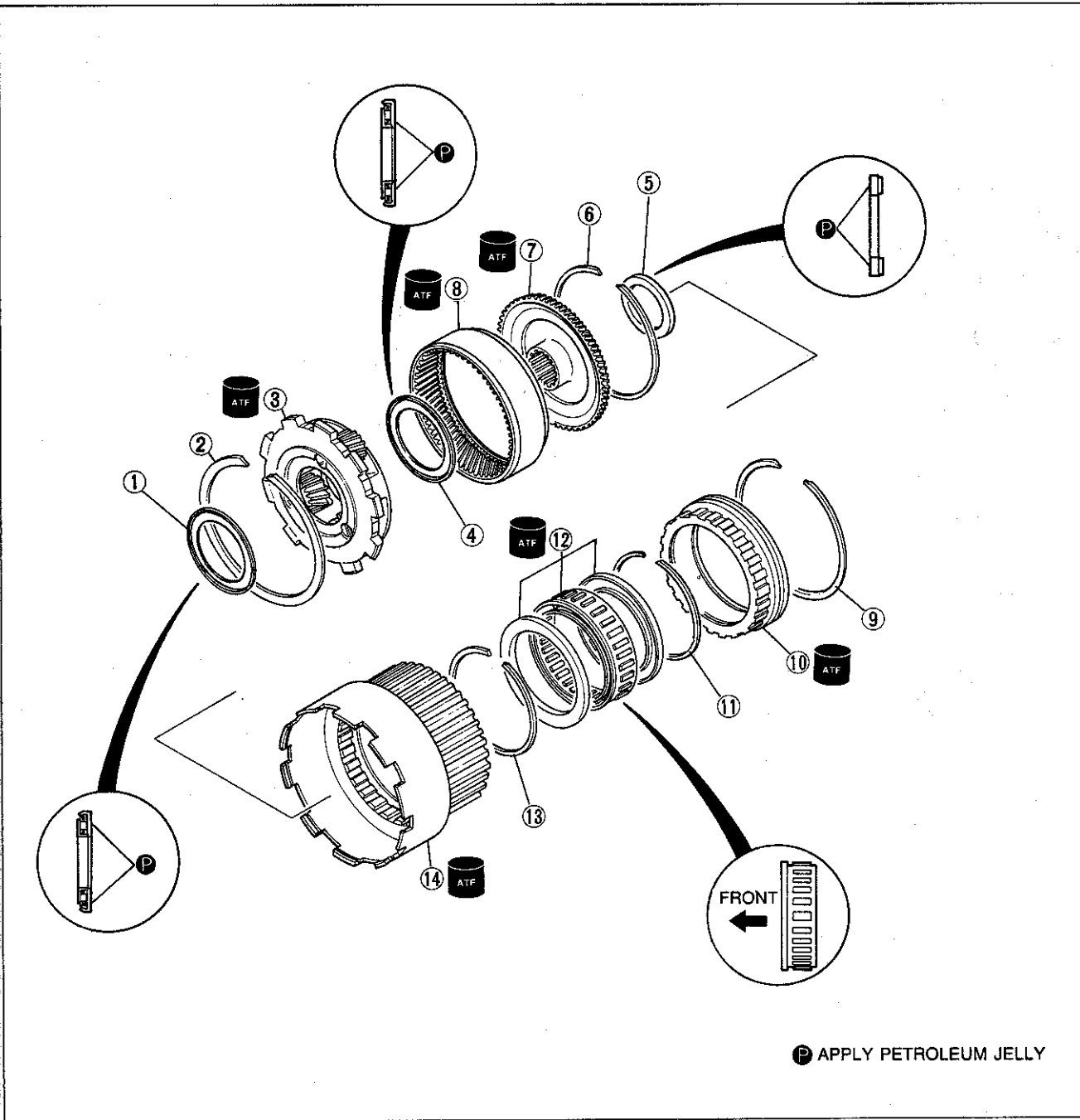
Install the rear planetary gear unit and check that the rear planetary gear unit rotate smoothly when turned clockwise and locked when turned counterclockwise. If not, replace the one-way clutch.

### Disassembly and Inspection

Disassemble in the order shown in the figure.

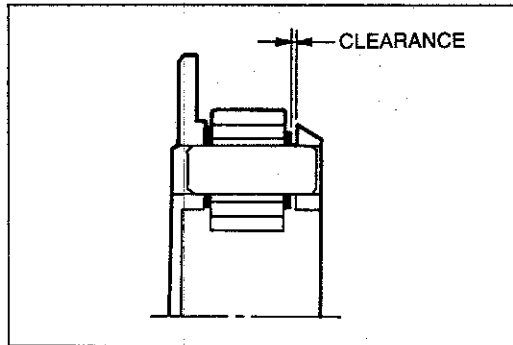
Inspect all parts, and repair or replace as necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.

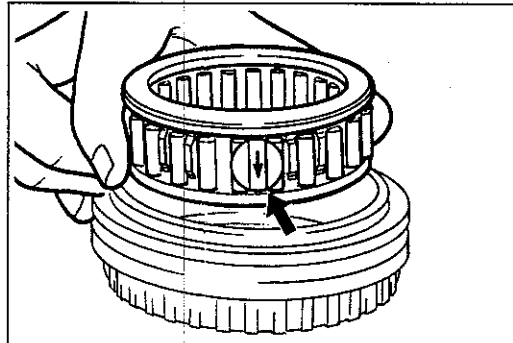


1BU0K1-035

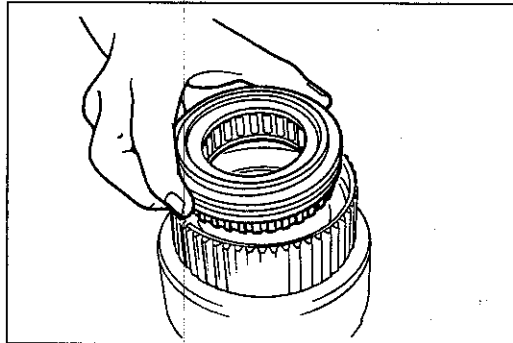
- |   |   |  |
|---|---|--|
| <p>1. Bearing<br/>Inspect for damage or rough rotation</p> <p>2. Snap ring</p> <p>3. Rear planetary pinion carrier<br/>Inspect individual gears teeth for damage, wear, or cracks, and rotation of pinion gears<br/>Inspection ..... page K1-85</p> | <p>4. Bearing<br/>Inspect for damage or rough rotation</p> <p>5. Bearing<br/>Inspect for damage or rough rotation</p> <p>6. Snap ring</p> <p>7. Drive flange<br/>Inspect individual gears teeth for damage, wear, or cracks</p> | <p>8. Internal gear<br/>Inspect individual gears teeth for damage, wear, or cracks</p> <p>9. Snap ring</p> <p>10. One-way clutch outer race</p> <p>11. Snap ring</p> <p>12. One-way clutch</p> <p>13. Snap ring</p> <p>14. Connecting drum</p> |
|---|---|--|



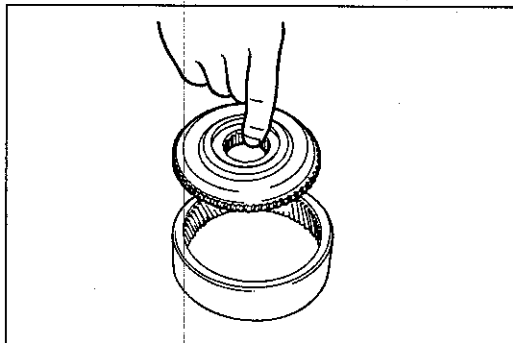
9MU0K2-266



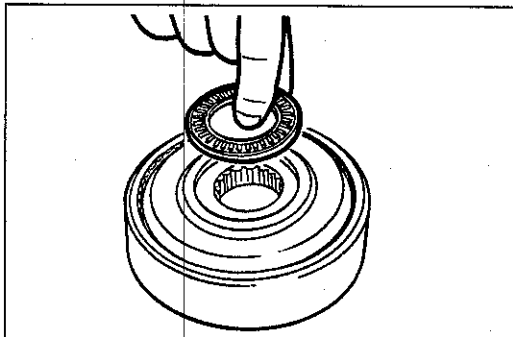
1BU0K1-036



9MU0K2-269



9MU0K2-270



9MU0K2-271

**Inspection**

**Rear planetary pinion carrier**

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

**Clearance**

**Standard: 0.2—0.7mm (0.008—0.028 in)**

**Maximum: 0.8mm (0.031 in)**

2. If not within specification, replace the planetary pinion carrier.

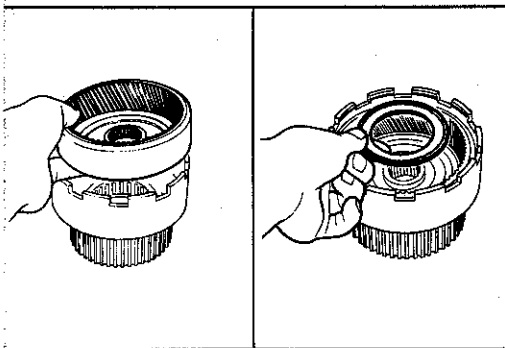
**Assembly procedure**

**Caution**

**Install the side indicated by an arrow in the figure toward the front when inserting the one-way clutch into the one-way clutch outer race.**

1. Install the snap ring in the one-way clutch outer race.
2. Apply ATF to the one-way clutch, and install it into the one-way clutch outer race.
3. Apply ATF to the connecting drum, and install it into the one-way clutch outer race.
4. Install the snap ring.
5. Apply ATF to the drive flange and internal gear, and install it into the internal gear.
6. Install the snap ring.
7. Apply petroleum jelly to the bearing, and install it onto the drive flange.

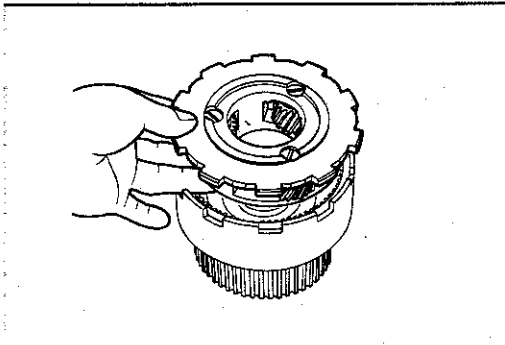
**Bearing outer diameter: 47.0mm (1.850 in)**



0BU0K1-069

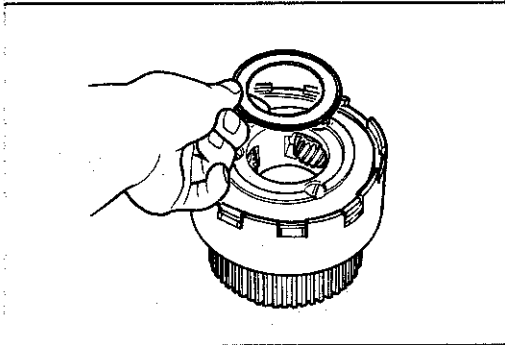
8. Install the internal gear and the drive flange into the connecting drum.
9. Apply petroleum jelly to the bearing, and install it into the drive flange with the black surface facing upward.

**Bearing outer diameter: 70.0mm (2.756 in)**



0BU0K1-070

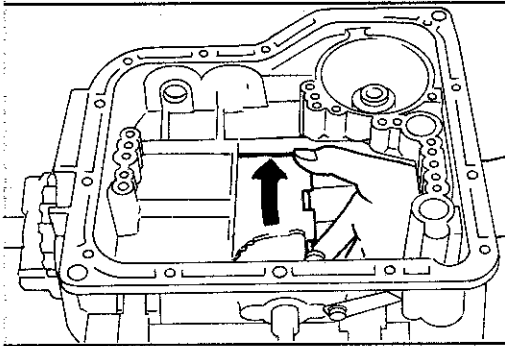
10. Apply ATF to the rear planetary pinion carrier, and install it into the connecting drum.
11. Install the snap ring.



0BU0K1-071

12. Apply petroleum jelly to the bearing, and install it into the bearing race with the black surface facing upward.

**Bearing race outer diameter: 70.0mm (2.756 in)**

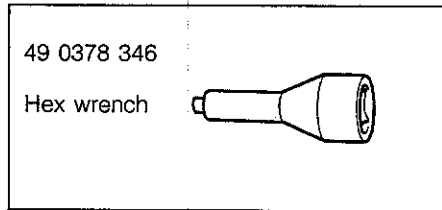


0BU0K1-072

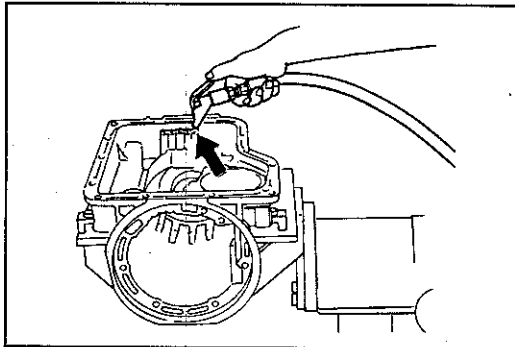
**Note**

**If it turns counterclockwise, the one-way clutch is installed upside down.**

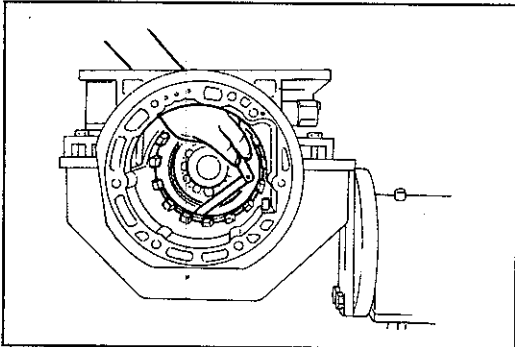
13. Check the one-way clutch operation by turning right and left. It should turn clockwise only, and locked counterclockwise.

**LOW AND REVERSE BRAKE****Preparation****SST**

9MU0K2-213



9MU0K2-214



9MU0K2-215

**Preinspection****Low and reverse brake operation**

1. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace as necessary when assembling.

**Clearance between retaining plate and snap ring**

Measure the clearance between the retaining plate and the snap ring.

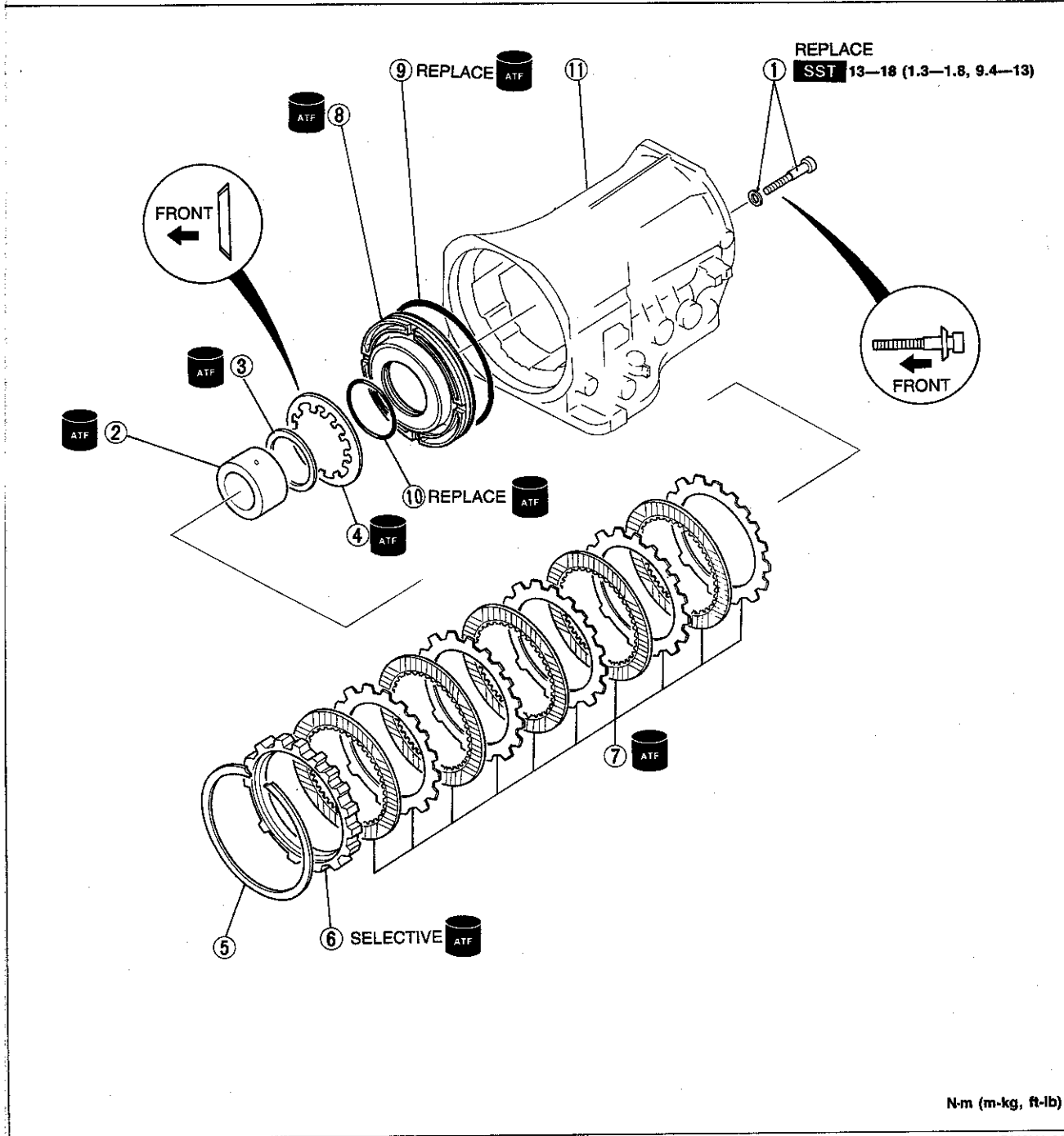
**Clearance: 0.8—1.05mm (0.031—0.041 in)**

Select and install the correct retaining plate when assembling.

### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

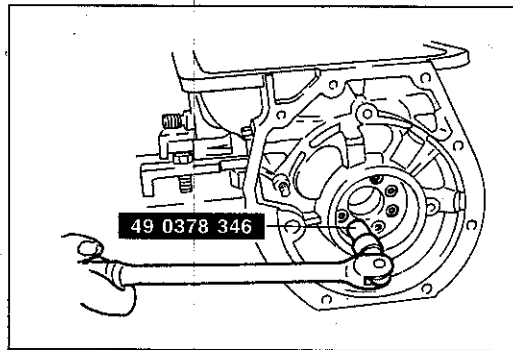
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



N-m (m-kg, ft-lb)

1BUOK1-037

- |   |   |                       |
|---|---|-----------------------|
| 1. Allen head bolts and dished washers                  | 7. Drive plates and driven plates<br>Inspect for wear or burning                | 9. Seal ring          |
| 2. One-way clutch inner race<br>Removal..... page K1-89 | 8. Low and reverse brake piston<br>Inspect balls for sticking by shaking piston | 10. O-ring            |
| 3. Thrust washer  |   | 11. Transmission case |
| 4. Return spring<br>Inspection..... page K1-89          |   |                       |
| 5. Snap ring  |   |                       |
| 6. Retaining plate                                      |   |                       |

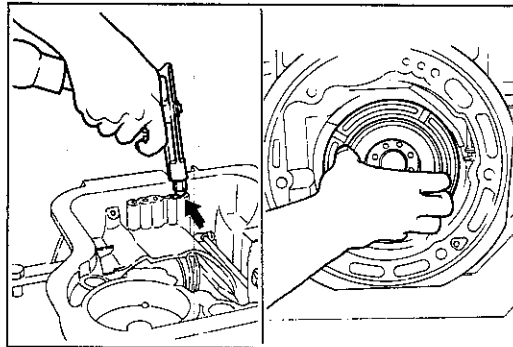


9MU0K2-217

**Disassembly note**

**One-way clutch inner race**

1. Remove the allen head bolts from the rear of the transmission case with the **SST**.
2. Remove the one-way clutch inner race, thrust washer, and piston return spring.

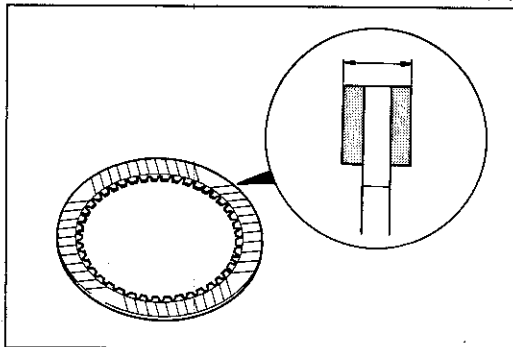


9MU0K2-218

**Low and reverse brake piston**

Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



0BU0K1-074

**Inspection**

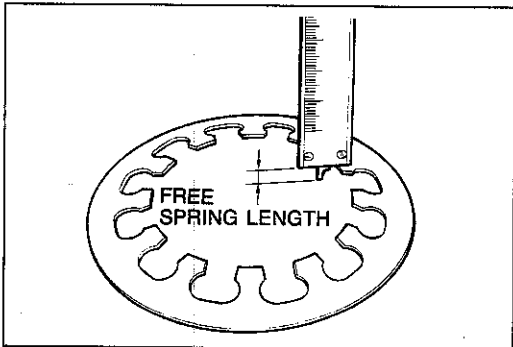
**Drive plate**

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 2.0mm (0.079 in)**

**Minimum thickness: 1.8mm (0.071 in)**

2. If not within specification, replace the drive plates.



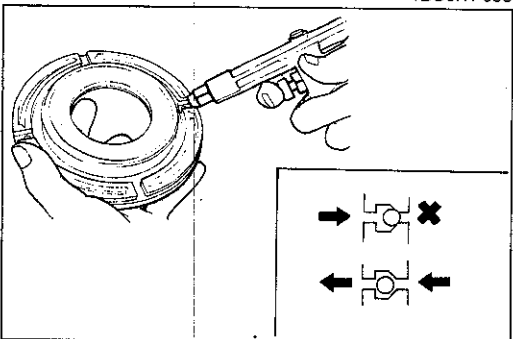
1BU0K1-038

**Return spring**

1. Measure the return spring free length.

**Spring free length: 5.9—6.2mm (0.232—0.244 in)**

2. If not within specification, replace the return spring.



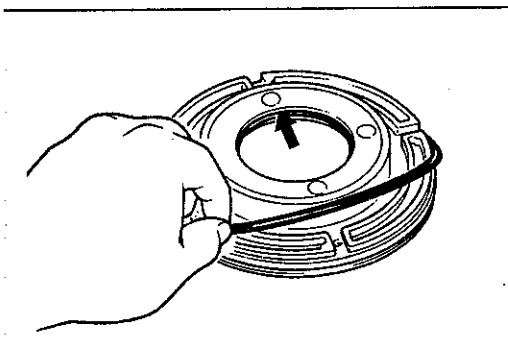
9MU0K2-221

**Clutch piston**

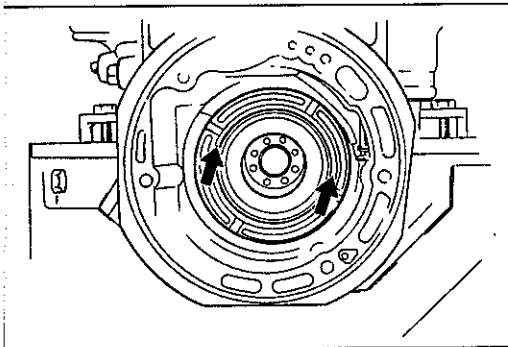
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

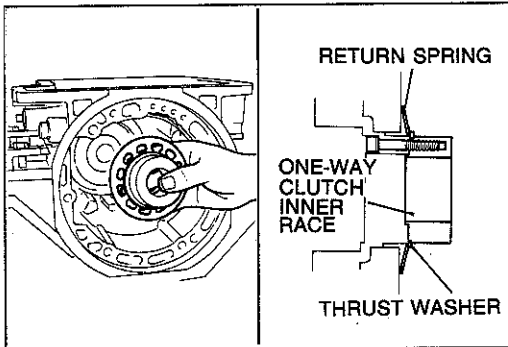
3. If not correct, replace the clutch piston.



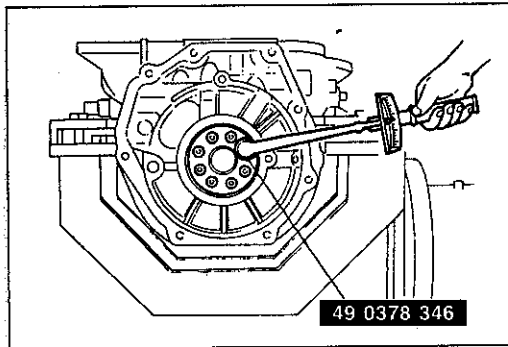
1BU0K1-039



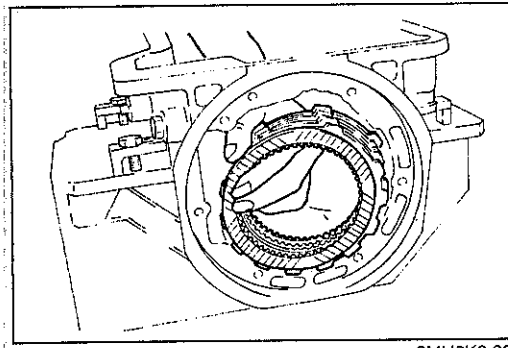
9MU0K2-223



9MU0K2-224



1BU0K1-040



9MU0K2-226

### Assembly procedure

1. Apply ATF to a new O-ring and install it onto the piston.
2. Apply ATF to a new seal ring and install it onto the piston.

### Caution

Apply even pressure to the outside edge of the piston to avoid damaging the seal ring and O-ring when installing.

3. Install the low and reverse brake piston.
4. Apply ATF to the one-way clutch inner race, thrust washer, and return spring.
5. Assemble the one-way clutch inner race, thrust washer, and return spring, and install them in the transmission case.
6. Check that the return spring, thrust washer, and rings are properly positioned before securing the bolts.

### Note

Do not reuse the bolts and washers.

7. Tighten the inner race mounting new bolts and new washer with the SST.

### Tightening torque:

13—18 N·m (1.3—1.8 m·kg, 9.4—13 ft·lb)

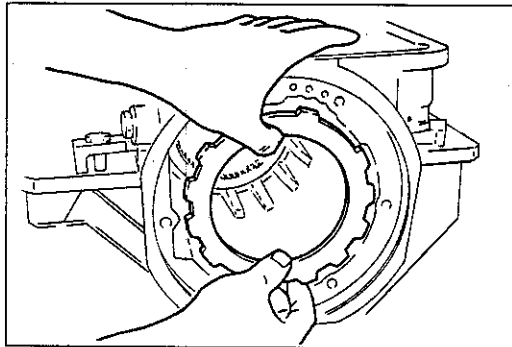
### Note

#### Installation order:

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

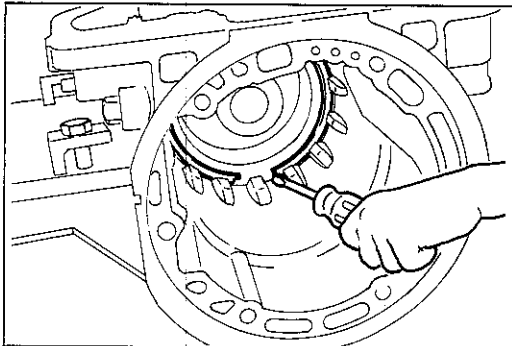
8. Apply ATF to the driven plates and driven plates, and install them into the transmission case.





9MU0K2-227

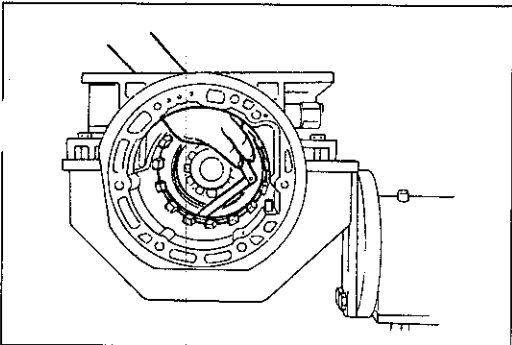
9. Install the retaining plate.



9MU0K2-228

**Caution**  
Do not deform the snap ring.

10. Install the snap ring with a screwdriver.



9MU0K2-229

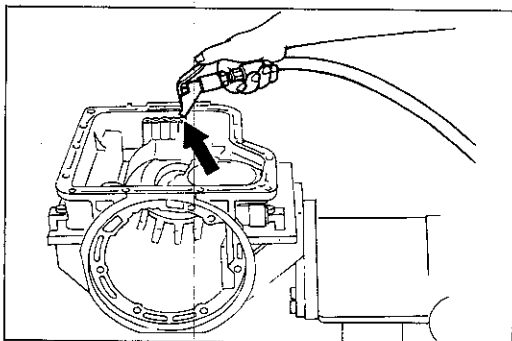
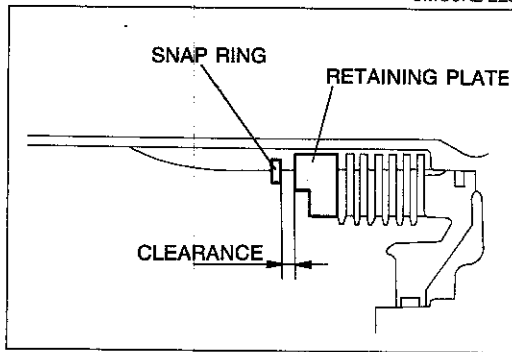
11. Measure the clearance between the snap ring and the retaining plate with a feeler gauge. If not within specification, adjust the clearance by installing the proper retaining plate.

**Clearance: 0.8—1.05mm (0.031—0.041 in)**

**Retaining plate sizes**

mm (in)

7.8 (0.307)	8.0 (0.315)	8.2 (0.323)
8.4 (0.331)	8.6 (0.339)	8.8 (0.346)

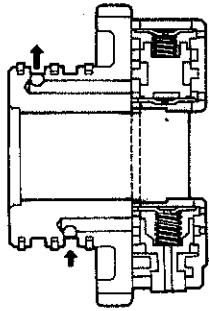


9MU0K2-231

**Caution**  
Apply air for no more than three(3) seconds.

12. Check operation of the piston by applying compressed air through the oil passage of the low and reverse brake.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MU0K2-433

### GOVERNOR Preinspection Governor valve operation

#### Caution

The compressed air must be less than 500 kPa (5.0 kg/cm<sup>2</sup>, 71 psi) and should not be applied for more than five(5) seconds.

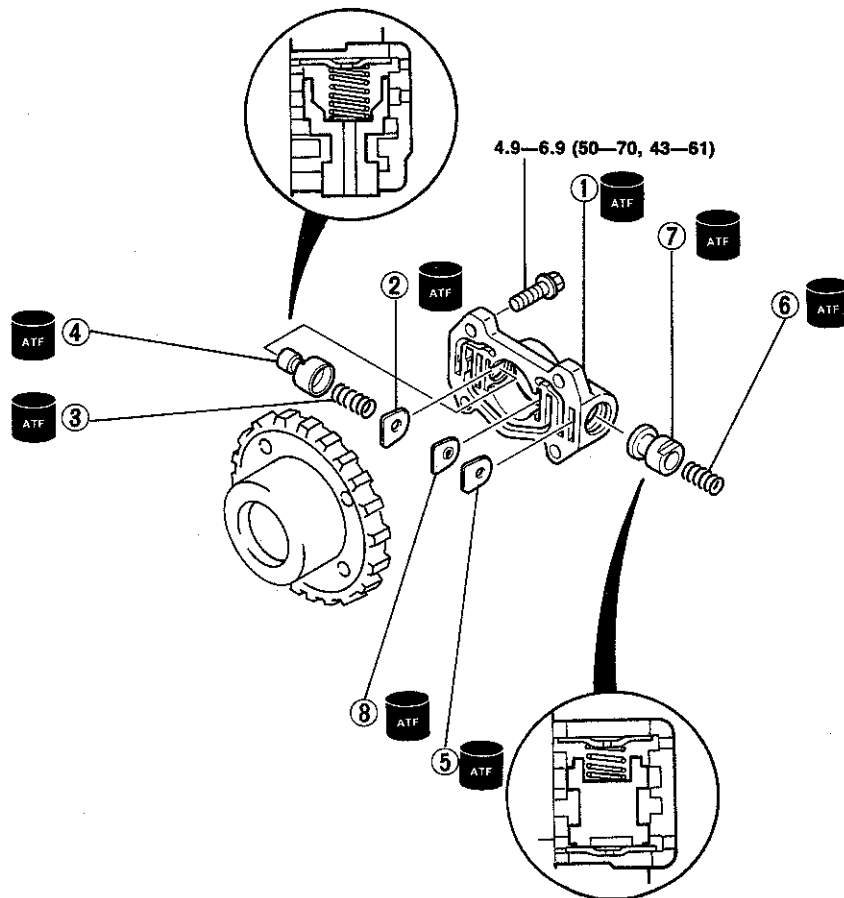
Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown.

### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

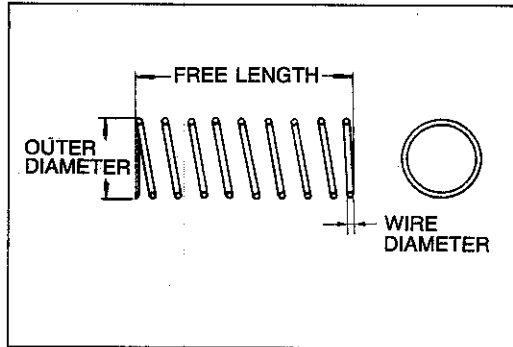
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



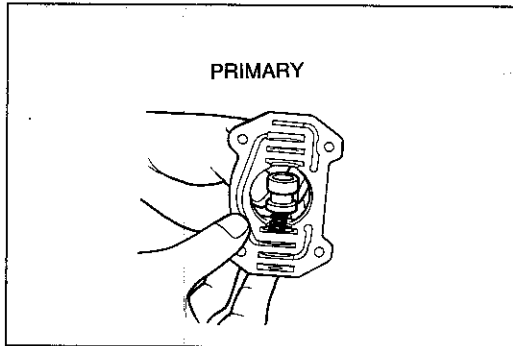
N·m (cm·kg, in·lb)

1BU0K1-041

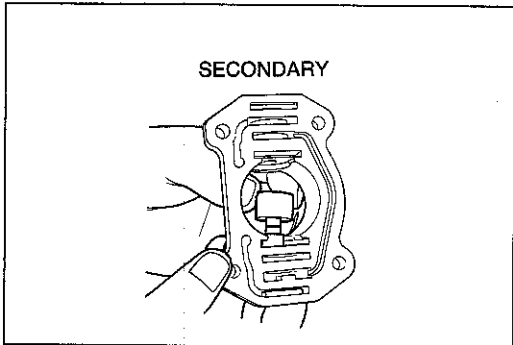
- |   |   |   |
|---|---|---|
| 1. Governor valve body<br>Inspect for damage or scoring     | 4. Secondary governor valve<br>Inspect for sticking, scoring or scratches | 7. Primary governor valve<br>Inspect for sticking, scoring or scratches |
| 2. Retainer plate   | 5. Retainer plate   | 8. Retainer plate   |
| 3. Secondary governor spring<br>Inspection ..... page K1-93 | 6. Primary governor spring<br>Inspection ..... page K1-93                 |   |



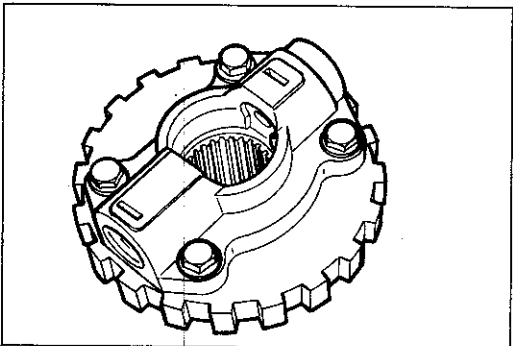
0BU0K1-076



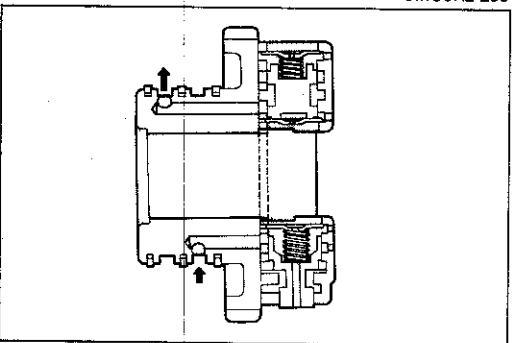
1BU0K1-042



9MU0K2-298



9MU0K2-299



9MU0K2-434

**Inspection**

**Secondary and primary governor springs**

1. Measure the spring specifications.

**Specifications**

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Secondary	F2 Carb.	9.0 (0.354)	21.7 (0.854)	10.0	0.8 (0.031)
	F2 EGI	9.2 (0.362)	25.2 (0.992)	7.5	0.7 (0.028)
	G6	9.0 (0.354)	21.7 (0.854)	10.0	0.8 (0.031)
Primary		8.75 (0.344)	21.8 (0.858)	7.0	0.45 (0.018)

2. If not within specification, replace the spring.

**Assembly procedure**

1. Apply ATF to the primary governor valve, primary spring, and retainer plate, and install them into the governor valve body.

2. Apply ATF to the secondary governor valve, secondary spring, and retainer plate, and install them into the governor valve body.

3. Install the governor assembly onto the parking gear.

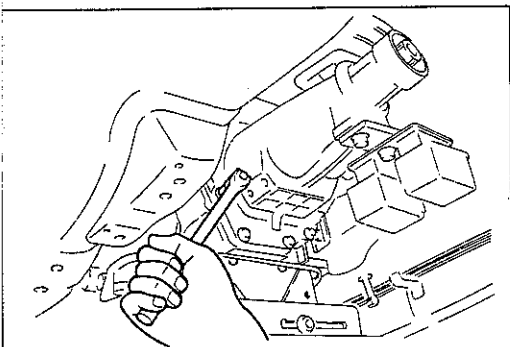
**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

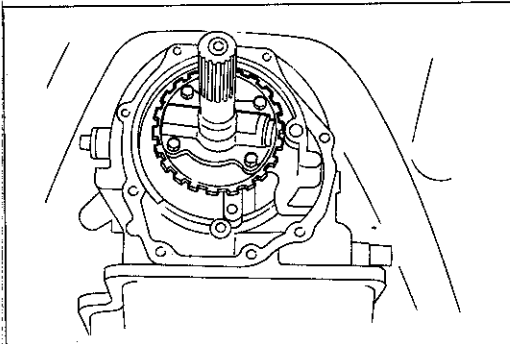
**Caution**

**The compressed air must be less than 500 kPa (5.0 kg/cm<sup>2</sup>, 71 psi) and should not be applied for more than five(5) seconds.**

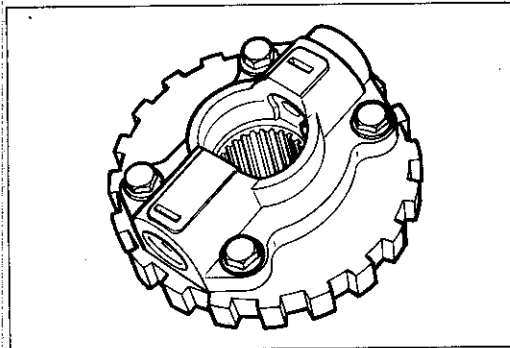
4. Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown in the figure.



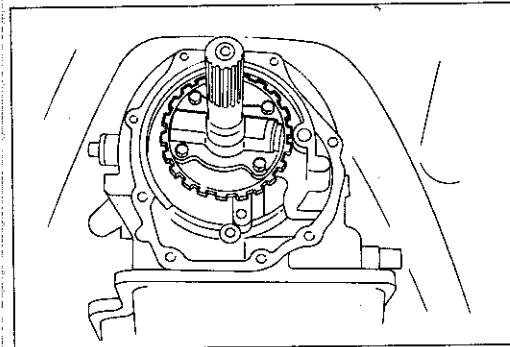
0BU0K1-077



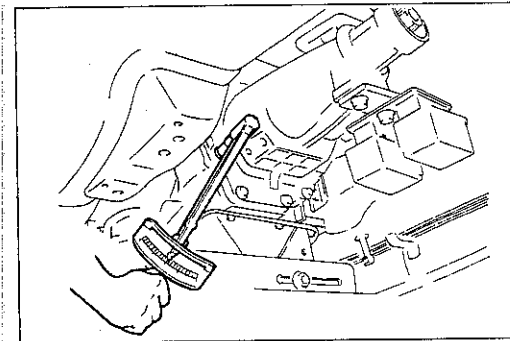
9MU0K2-301



9MU0K2-302



9MU0K2-303



0BU0K1-078

**On-vehicle Removal**

1. Remove the extension housing. (Refer to page K1-95.)
2. Remove the speedometer drive gear.

3. Remove the governor and parking gear.
4. Separate the governor from the parking gear.

**On-vehicle Installation**

1. Install the governor onto the parking gear.

**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

2. Install the governor and parking gear onto the output shaft, and secure it with a new snap ring.

3. Install the speedometer drive gear.
4. Install the extension housing. (Refer to page K1-95.)

## EXTENSION HOUSING AND PARKING MECHANISM Disassembly and Inspection

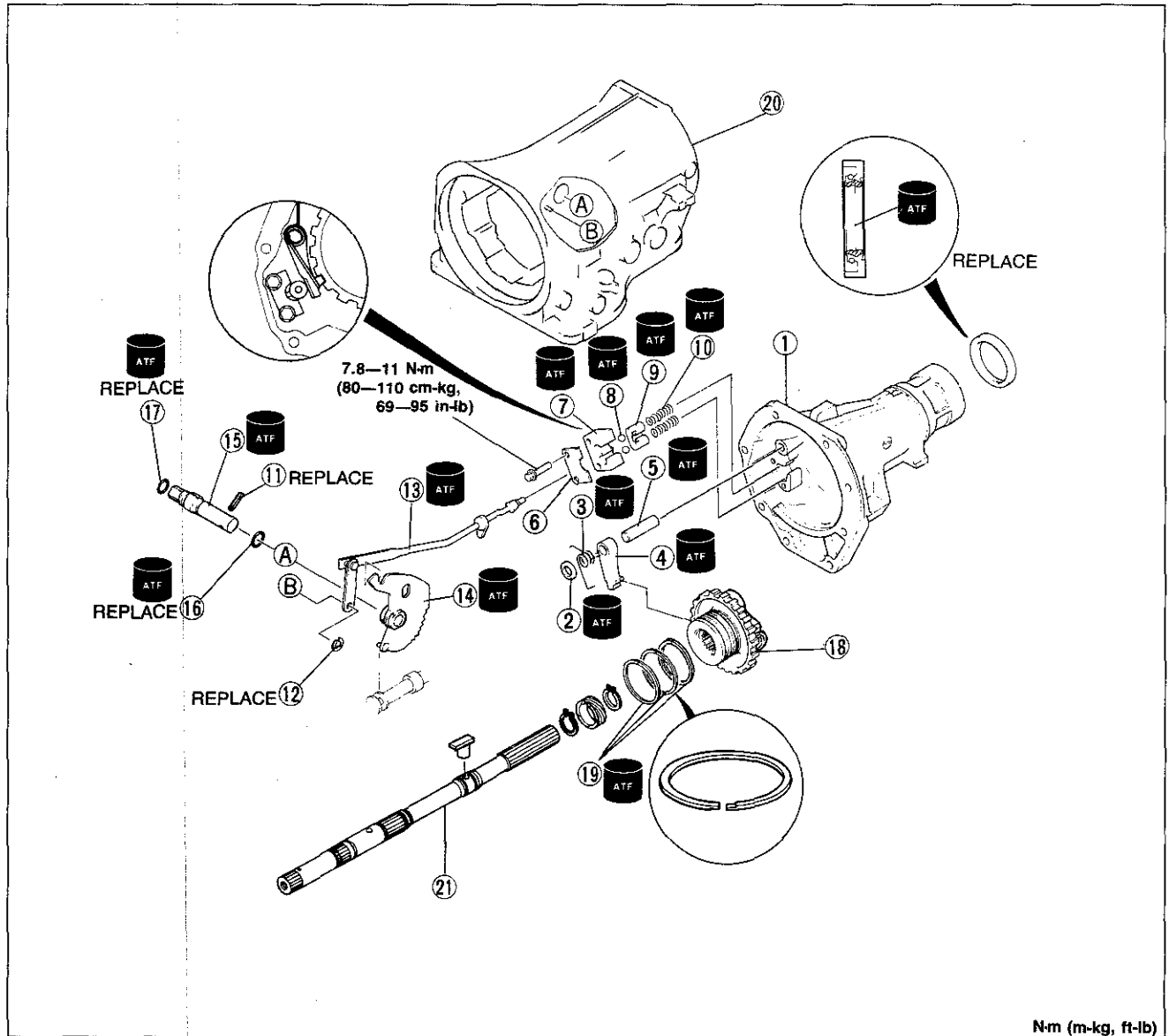
### Caution

Do not remove the oil seal if not necessary for repairs.

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace if necessary.

Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



N-m (m-kg, ft-lb)

2BU0K1-022

- 1. Extension housing
- 2. Dowel spacer
- 3. Return spring
- 4. Parking pawl
- 5. Pawl shaft
- 6. Retainer plate
- 7. Actuator support
- 8. Steel ball
- 9. Retainer
- 10. Spring

Inspection ..... page K1-96

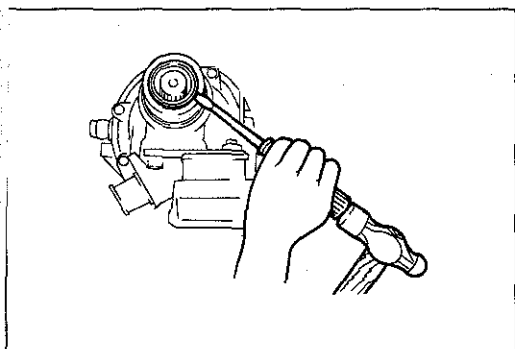
- 11. Roll pin
- 12. Retaining ring
- 13. Parking rod
- 14. Manual plate
- 15. Manual shaft
- 16. O-ring
- 17. O-ring

Inspect individual gear teeth for damage or wear and condition of spring

- 18. Parking gear
- 19. Seal rings
- 20. Transmission case
- 21. Output shaft

Inspection ..... page K1-96

Inspect splines for damage or wear



9MU0K2-276

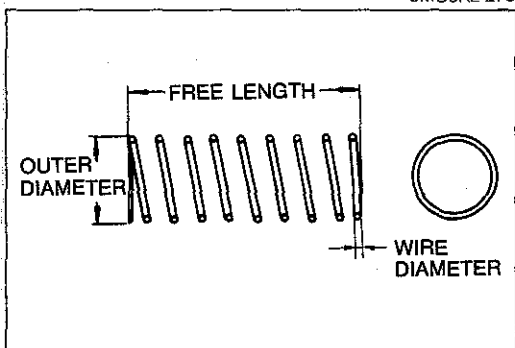
### Disassembly note

#### Oil seal

#### Caution

**Do not remove the seal unless necessary.**

Remove the oil seal with a screwdriver.



9MU0K2-277

### Inspection

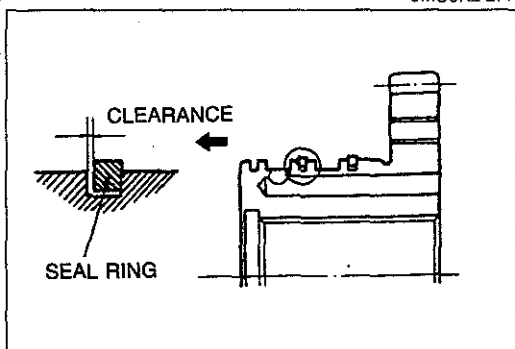
#### Spring

1. Measure the spring specifications.

### Specifications

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
7.2 (0.283)	32.0 (1.260)	14.0	0.7 (0.028)

2. If not within specification, replace the spring.



9BU0KX-084

### Oil distributor

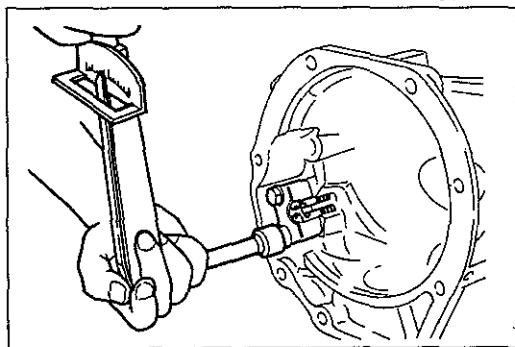
1. Measure the clearance between the seal rings and the grooves.

#### Clearance

**Standard: 0.04—0.16mm (0.0016—0.0063 in)**

**Maximum: 0.40mm (0.016 in)**

2. If not within specification, replace the parking gear.



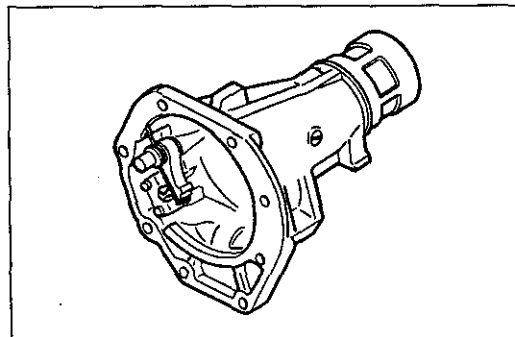
1BU0K1-044

### Assembly procedure

1. Apply ATF to a new oil seal, and install it into the extension housing.
2. Apply ATF to the springs and retainer and install them into the extension housing.
3. Apply ATF to the steel balls and actuator support and install them into the extension housing.
4. Apply ATF to the retainer plate, and install it into the extension housing.

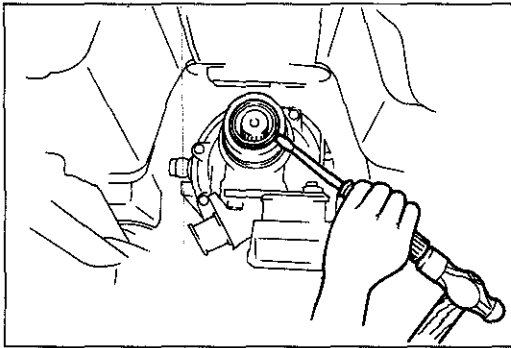
#### Tightening torque:

**7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)**



9MU0K2-280

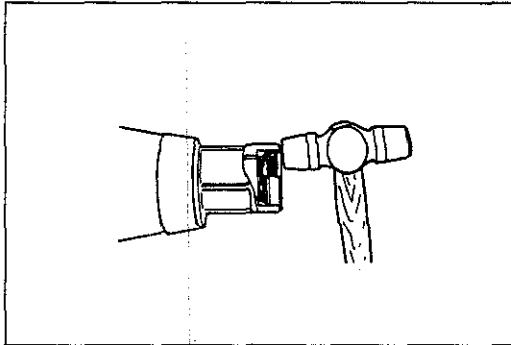
5. Apply ATF to the pawl shaft, and install it into the extension housing.
6. Apply ATF to the parking pawl and return spring, and install them into the extension housing.
7. Apply ATF to the dowel spacer, and install it into the extension housing.



9MU0K2-342

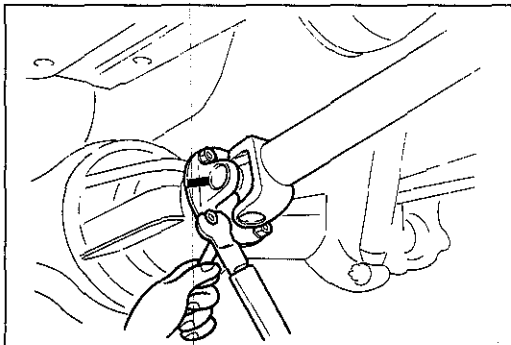
**OIL SEAL  
On-vehicle Replacement**

1. Remove the propeller shaft. (Refer to Section L.)
2. Pry the oil seal from the extension housing.



9BU0KX-085

3. Coat the new oil seal lip with ATF.
4. Install the oil seal squarely into the extension housing with a plastic hammer.



9MU0K2-344

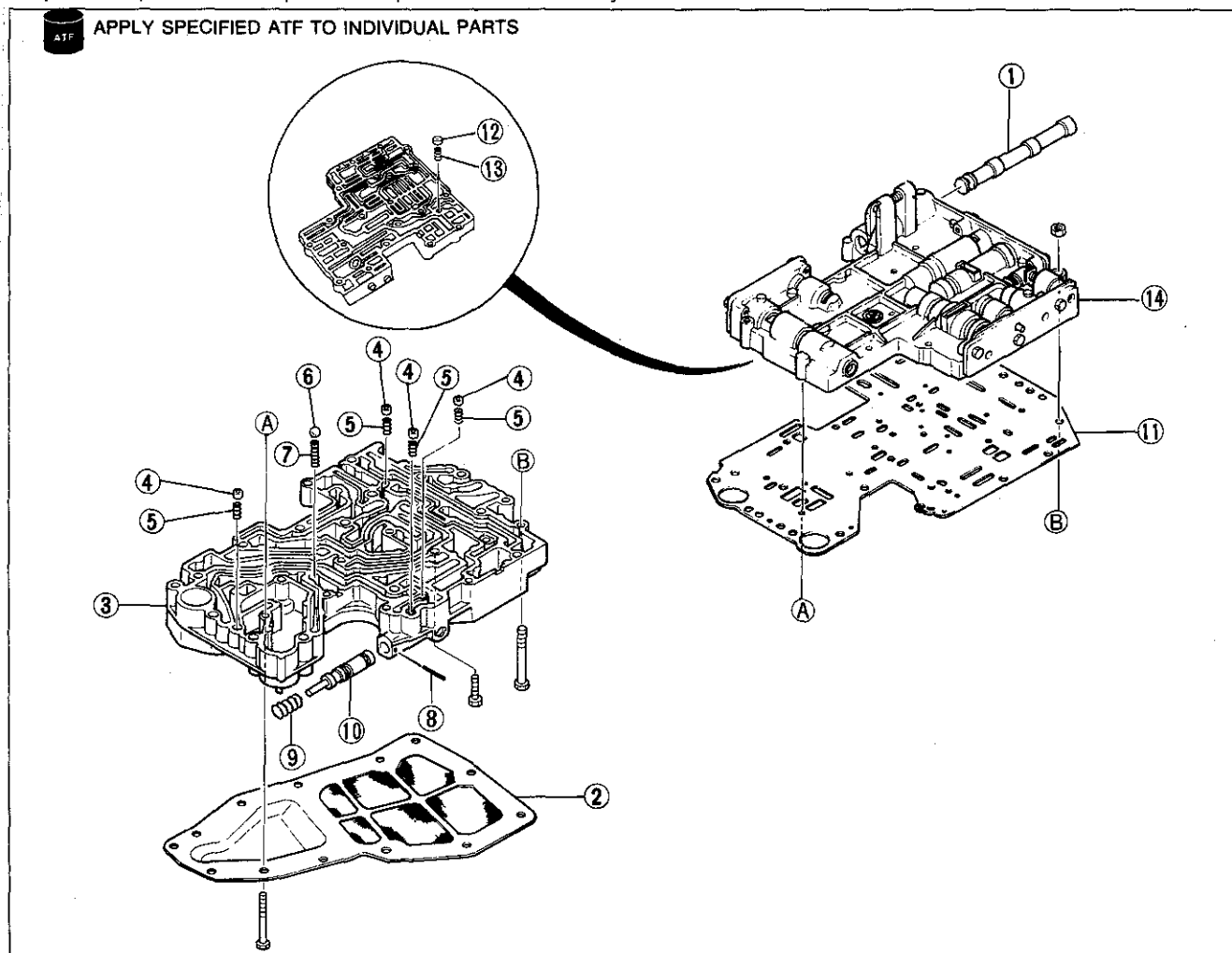
5. Install the propeller shaft. (Refer to Section L.)

### CONTROL VALVE BODY Disassembly and Inspection

#### Caution

- a) Be especially careful when handling the control valve because it consists of the most precise and delicate parts of the transmission.
- b) Neatly arrange the removed parts to avoid confusing them with similar parts.
- c) Clean the removed parts with cleaning solvent and dry them with compressed air.  
Clean out all holes and passages with compressed air.

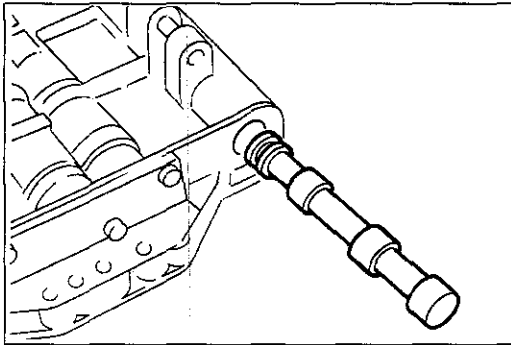
Disassemble in the order shown in the figure, referring to **Disassembly procedure**.  
Inspect all parts and repair or replace as necessary.



2BU0K1-023

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Manual valve<br/>Inspect for sticking, scoring, or scratches</li> <li>2. Oil strainer<br/>Inspect for clogging or damage</li> <li>3. Lower valve body<br/>Inspect for damage or scoring</li> <li>4. Orifice check valve</li> <li>5. Orifice check spring<br/>Inspection ..... page K1-100</li> <li>6. Throttle relief ball</li> <li>7. Throttle relief spring<br/>Inspection ..... page K1-100</li> <li>8. Roll pin</li> </ol> | <ol style="list-style-type: none"> <li>9. 3-2 timing spring<br/>Inspection ..... page K1-100</li> <li>10. 3-2 timing valve<br/>Inspect for sticking and scoring</li> <li>11. Separate plate<br/>Inspect fluid passage for clogging or damage</li> <li>12. Orifice check valve</li> <li>13. Orifice check spring (F2 engine)<br/>Inspection ..... page K1-100</li> <li>14. Upper valve body<br/>Disassembly and Inspection .. page K1-101<br/>Assembly ..... page K1-102</li> </ol> |
|--|--|

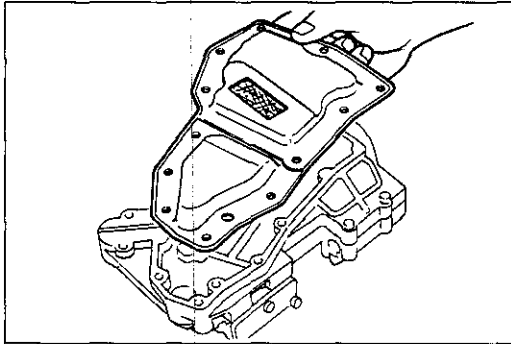




1BU0K1-046

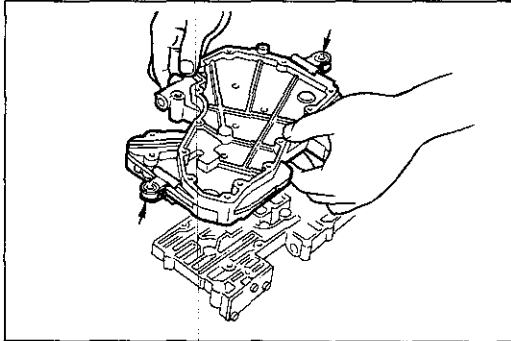
### Disassembly Procedure

1. Remove the manual valve.



9MU0K2-307

2. Remove the oil strainer.

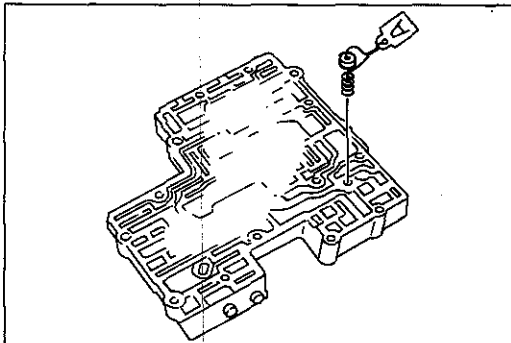


9MU0K2-308

3. Hold the lower valve body and separate plate together with a large clip.

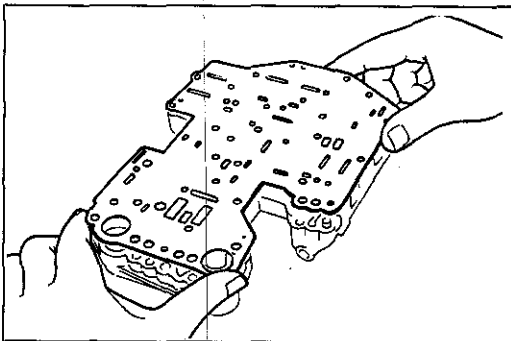
4. Remove the bolts.

5. Remove the lower valve body.



0BU0K1-081

6. Remove the orifice check valve and spring (F2 engine) from the upper valve body.



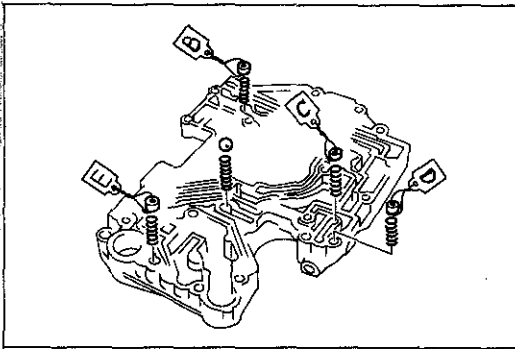
9MU0K2-310

7. Remove the holding clip.

### Caution

**Remove the separate plate gently to avoid losing the orifice check valves and springs and the throttle relief ball and spring in the valve body.**

8. Remove the separate plate.

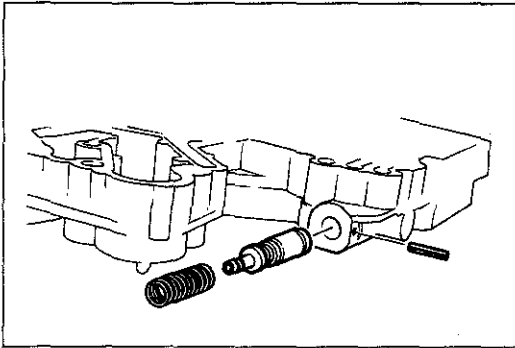


9MU0K2-311

**Note**

Tag the orifice check valves as shown for proper reassembly.

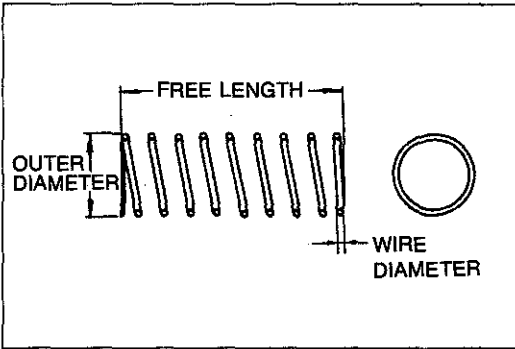
9. Remove the orifice check valves, throttle relief ball, and springs.



2BU0K1-024

10. Remove the roll pin.

11. Remove the 3-2 timing valve and spring.



9MU0K2-313

**Inspection**

1. Measure the spring specifications.

If not within specification, replace the spring(s).

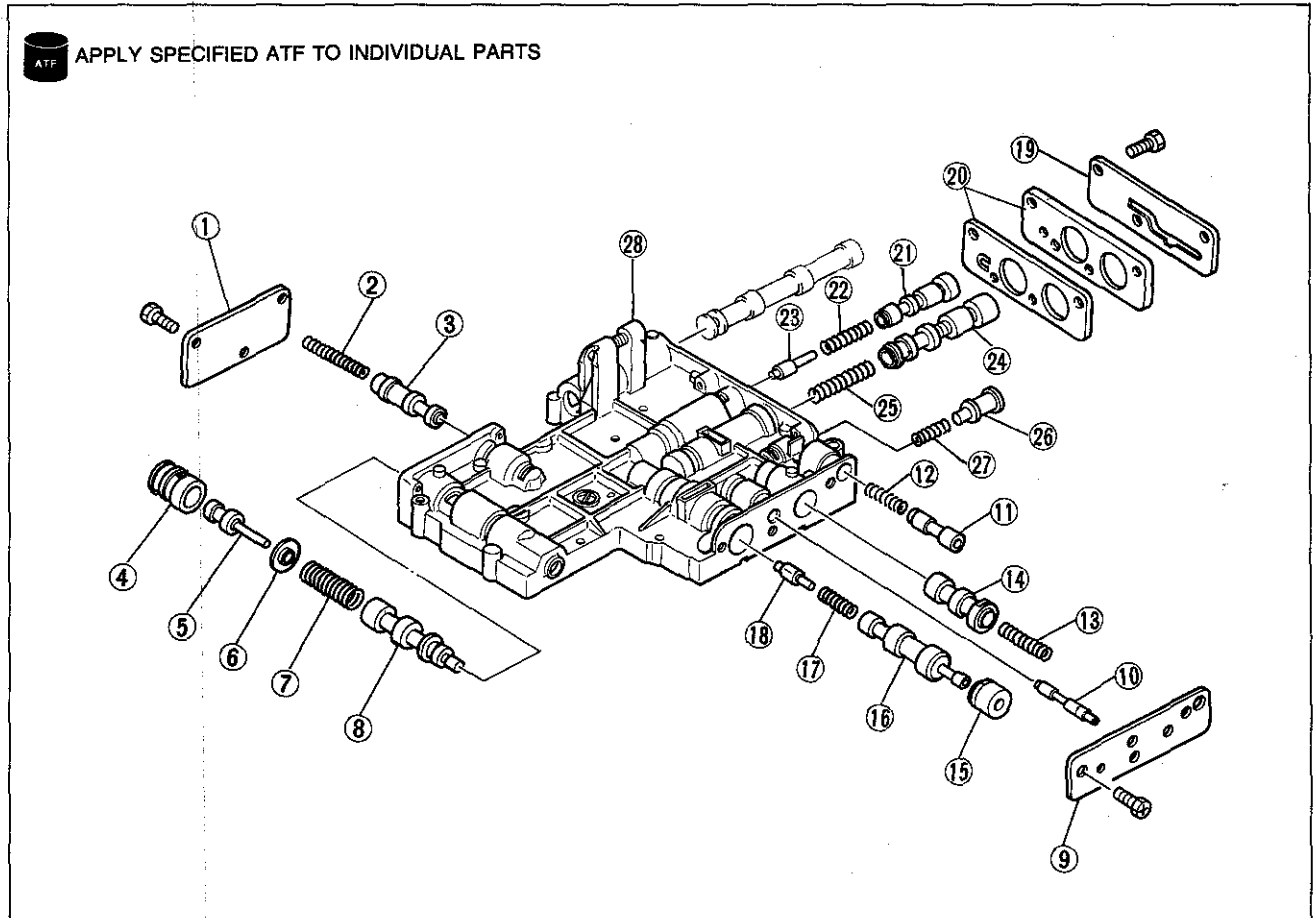
Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Orifice check		5.0 (0.197)	15.5 (0.610)	12.0	0.23 (0.009)
Throttle relief		6.5 (0.256)	26.8 (1.055)	16.0	0.9 (0.035)
3-2 timing	F2	7.5 (0.295)	23.2 (0.913)	11.0	0.8 (0.031)
	G6	7.4 (0.291)	20.7 (0.815)	11.0	0.9 (0.035)

1BU0K1-047

**UPPER VALVE BODY**

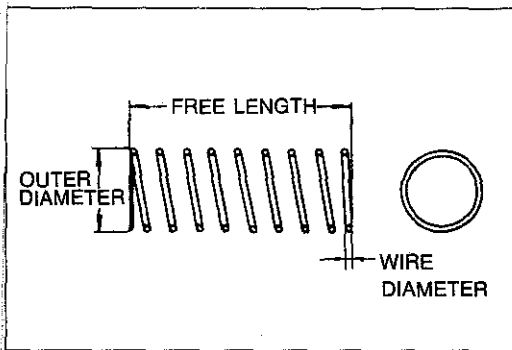
**Disassembly and Inspection**

Disassemble in the order shown in the figure.  
Inspect all parts, and repair or replace as necessary.



0BU0K1-083

- |   |  |  |
|---|--|--|
| <p>1. Side plate D</p> <p>2. Second lock spring<br/>Inspection .... page K1-102</p> <p>3. Second lock valve<br/>Inspect for sticking, scoring, or scratches</p> <p>4. Pressure regulator sleeve<br/>Inspect for sticking, scoring, or scratches</p> <p>5. Pressure regulator plug<br/>Inspect for sticking, scoring, or scratches</p> <p>6. Pressure regulator valve<br/>Inspect for sticking, scoring, or scratches</p> <p>7. Pressure regulator spring<br/>Inspection .... page K1-102</p> <p>8. Pressure regulator valve<br/>Inspect for sticking, scoring, or scratches</p> <p>9. Side plate B</p> <p>10. Vacuum throttle valve<br/>Inspect for sticking, scoring, or scratches</p> | <p>11. Downshift valve<br/>Inspect for sticking, scoring, or scratches</p> <p>12. Downshift spring<br/>Inspection .... page K1-102</p> <p>13. Throttle backup spring<br/>Inspection .... page K1-102</p> <p>14. Throttle backup valve<br/>Inspect for sticking, scoring, or scratches</p> <p>15. 3-4 shift sleeve<br/>Inspect for sticking, scoring, or scratches</p> <p>16. 3-4 shift valve<br/>Inspect for sticking, scoring, or scratches</p> <p>17. 3-4 shift spring<br/>Inspection .... page K1-102</p> <p>18. 3-4 shift plug<br/>Inspect for sticking, scoring, or scratches</p> <p>19. Side plate A</p> | <p>20. Separators (G6 engine)</p> <p>21. 2-3 shift valve<br/>Inspect for sticking, scoring, or scratches</p> <p>22. 2-3 shift spring<br/>Inspection .... page K1-102</p> <p>23. 2-3 shift plug<br/>Inspect for sticking, scoring, or scratches</p> <p>24. 1-2 shift valve<br/>Inspect for sticking, scoring, or scratches</p> <p>25. 1-2 shift spring<br/>Inspection .... page K1-102</p> <p>26. Pressure modifier valve<br/>Inspect for sticking, scoring, or scratches</p> <p>27. Pressure modifier spring<br/>Inspection .... page K1-102</p> <p>28. Upper valve body<br/>Inspect for damage or scoring</p> |
|---|--|--|



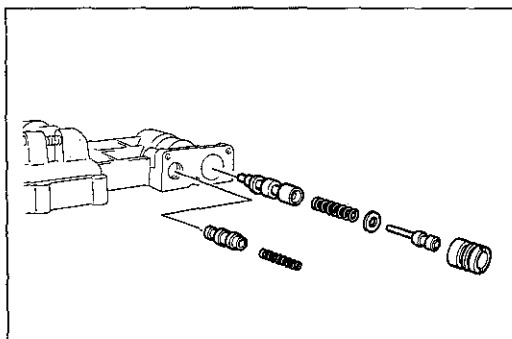
9MU0K2-316

### Inspection

1. Measure the springs specifications.
2. If not within specification, replace the spring(s).

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Second lock		5.55 (0.219)	33.5 (1.319)	18.0	0.55 (0.022)
Pressure regulator		11.7 (0.461)	43.0 (1.692)	15.0	1.2 (0.047)
Downshift		5.55 (0.219)	21.9 (0.862)	14.0	0.55 (0.022)
Throttle backup	F2	7.3 (0.287)	36.0 (1.417)	16.0	0.8 (0.031)
	G6	7.4 (0.291)	29.8 (1.173)	13.5	0.9 (0.035)
3-4 shift	F2 EGI	7.2 (0.283)	28.1 (1.106)	12.0	0.8 (0.031)
	F2 Carb.	7.3 (0.287)	25.24 (0.994)	13.0	0.9 (0.035)
	G6	6.6 (0.260)	30.3 (1.193)	14.6	0.8 (0.031)
2-3 shift	F2 EGI	6.9 (0.272)	41.0 (1.614)	20.0	0.7 (0.028)
	F2 Carb.	6.9 (0.272)	31.6 (1.244)	16.25	0.8 (0.031)
	G6	7.3 (0.287)	42.0 (1.654)	17.6	0.75 (0.030)
1-2 shift		6.65 (0.262)	32.2 (1.268)	18.0	0.65 (0.026)
Pressure modifier	F2 EGI, G6	8.6 (0.339)	15.5 (0.610)	7.5	0.6 (0.024)
	F2 Carb.	9.1 (0.358)	18.5 (0.728)	7.4	0.6 (0.024)

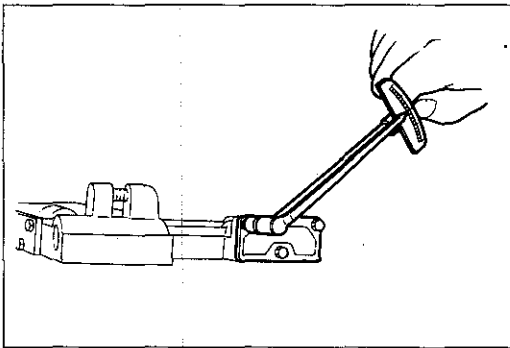
0BU0K1-084



9MU0K2-318

### Assembly

1. Insert the pressure regulator valve, spring, spring seat, plug, and sleeve into the lower valve body.
2. Insert the second lock valve and spring into the lower valve body.

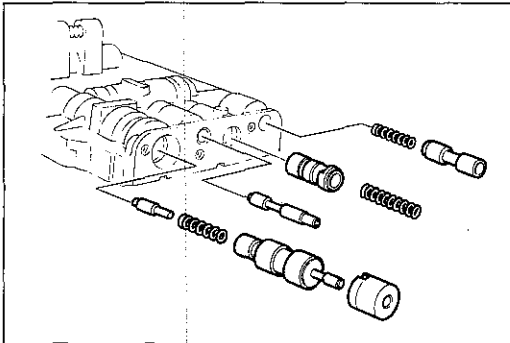


9MU0K2-319

3. Install side plate D in position where it will not interfere with the set plate.
4. Tighten the installation bolts.

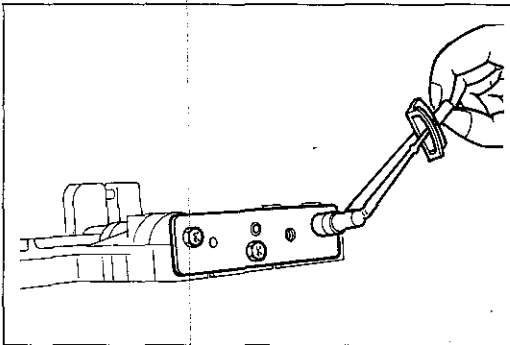
**Tightening torque:**

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**



9MU0K2-320

5. Insert the downshift valve, and spring into the lower valve body.
6. Insert the throttle backup valve, and spring into the lower valve body.
7. Insert the vacuum throttle valve, into the lower valve body.
8. Insert the 3-4 shift plug, spring, valve, and sleeve into the lower valve body.
9. Install side plate B so that it will not contact the vacuum throttle valve.

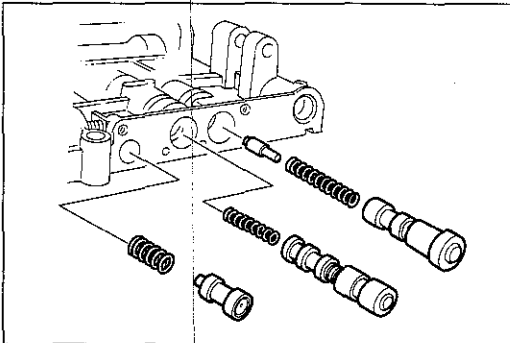


9MU0K2-321

10. Tighten the installation bolts.

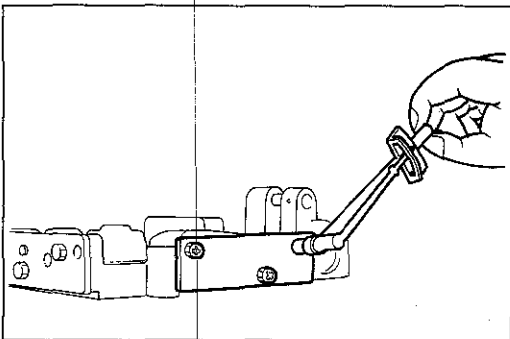
**Tightening torque:**

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**



0BU0K1-085

11. Insert the pressure modifier valve and spring into the lower valve body.
12. Insert the 1-2 shift valve and spring into the lower valve body.
13. Insert the 2-3 shift valve, spring, and plug into the lower valve body.



0BU0K1-146

14. Install the separators (G6 engine) and side plate A so that it will not interfere with the set plate.
15. Tighten the installation bolts.

**Tightening torque:**

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**

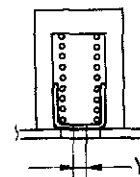
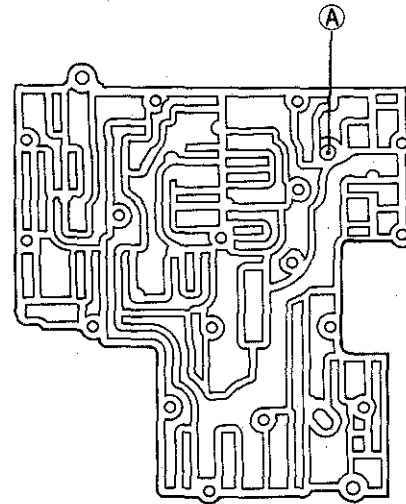
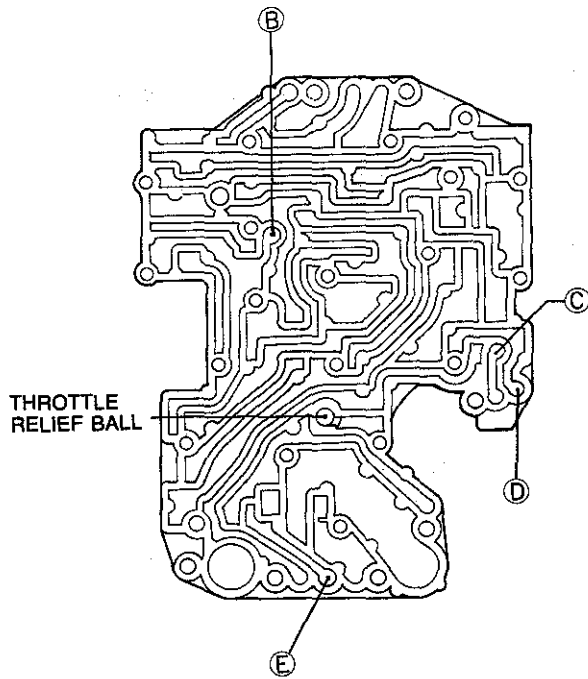
### CONTROL VALVE BODY

#### Assembly

#### Orifice check valve location

LOWER VALVE BODY SIDE

UPPER VALVE BODY SIDE

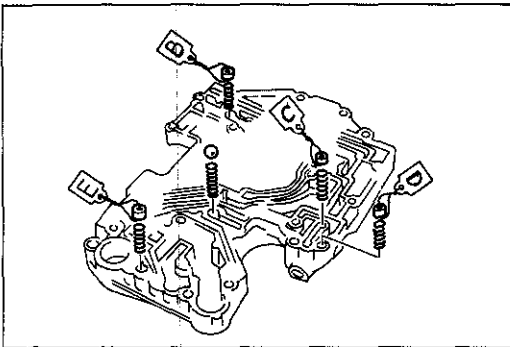


9MU0K2-324

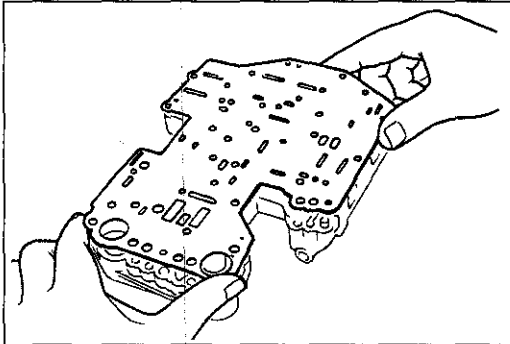
#### Orifice check valve specifications

		Y diameter	
		F2 engine	G6 engine
Upper valve body side	(A)	φ 2.0 (0.079)	
	(B)	φ 1.5 (0.059)	
Lower valve body side	(C)	φ 1.3	φ 1.7 (0.067)
	(D)	φ 2.0	φ 2.2 (0.087)
	(E)	φ 2.0 (0.079)	

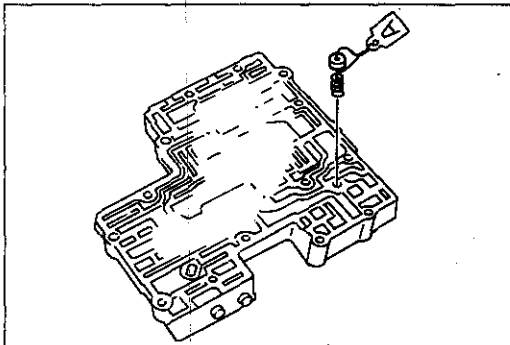
0BU0K1-086



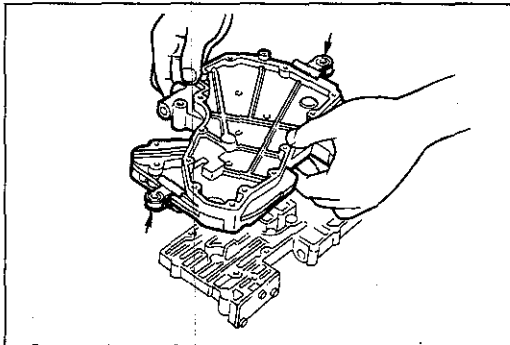
1BU0K1-048



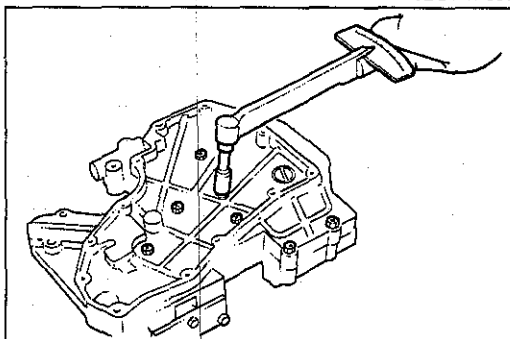
0BU0K1-088



0BU0K1-089



0BU0K1-090



0BU0K1-091

### Assembly Procedure

#### Note

**Be sure the orifice check valve and throttle relief ball are properly inserted. (Refer to page K1-104.)**

1. Install the orifice check valves and springs, and the throttle relief ball and spring to the lower valve body.

2. Position the separate plate on the lower valve body. Align the plate and valve body, and hold them together with large clips.

#### Note

**Be sure the orifice check valve and throttle relief ball are properly inserted. (Refer to page K1-104.)**

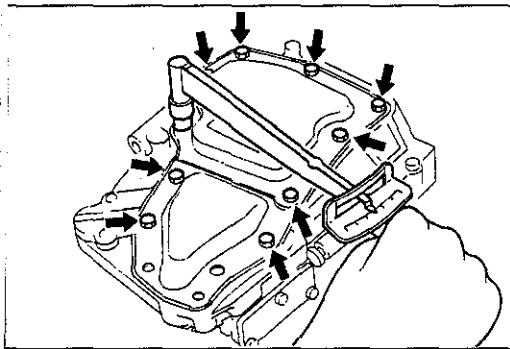
3. Install the orifice check valve and spring (F2 engine) to the upper valve body.

4. Turn over the lower valve body and separate plate and set them onto the upper valve body.
5. Remove the holding clips.

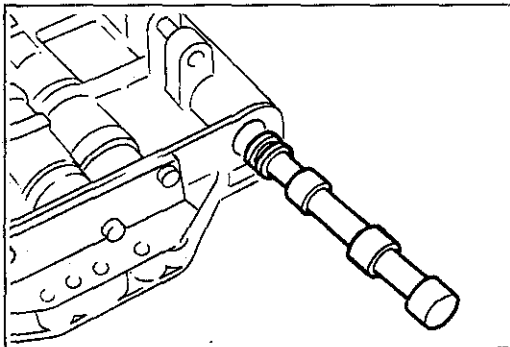
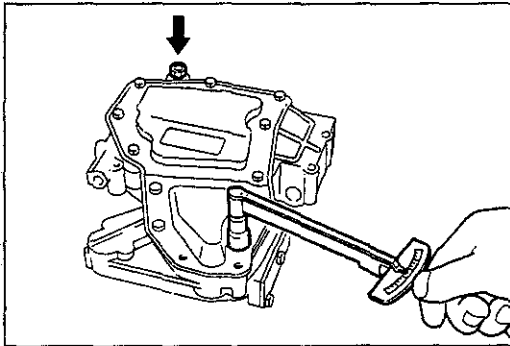
6. Install and tighten the installation bolts.

#### Tightening torque:

**2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)**



0BU0K1-092



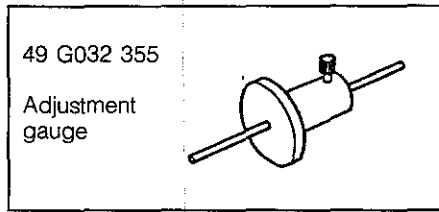
0BU0K1-093

7. Install the oil strainer.

**Tightening torque****Bolt: 2.9—3.9 N·m (30—40 cm·kg, 26—35 in·lb)****Nut: 4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

8. Insert the manual valve into the lower valve body.

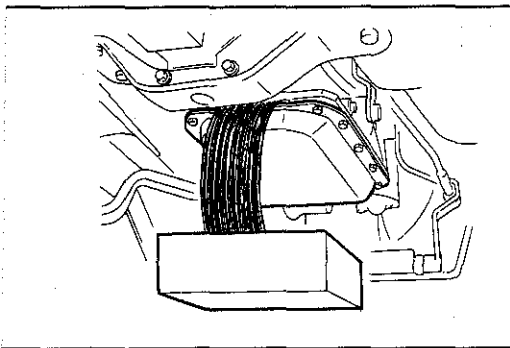


**VACUUM DIAPHRAGM****Preparation  
SST**

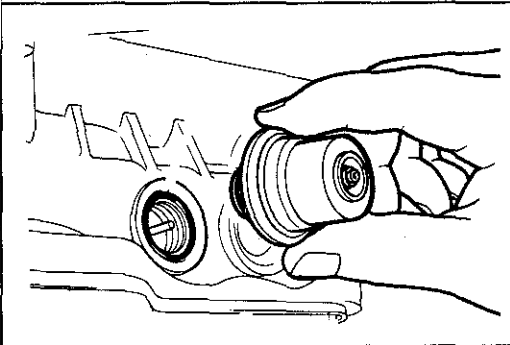
9MU0K2-345

**General note****Excessive shift shock and improper shifting often indicate a vacuum diaphragm malfunction.**

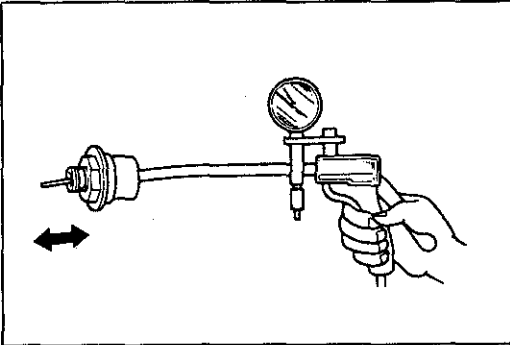
9MU0K2-346



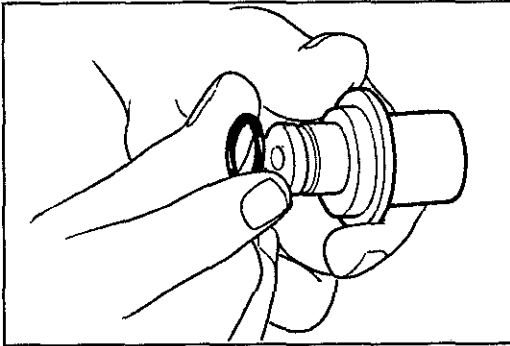
9MU0K2-347



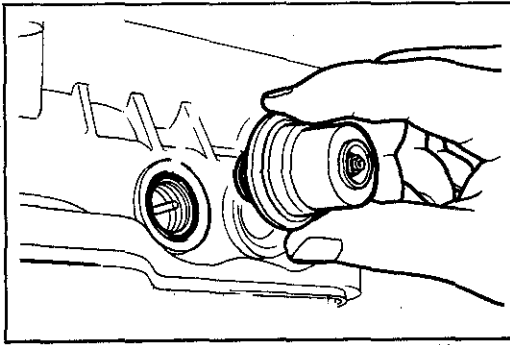
9MU0K2-348



9MU0K2-349



9MU0K2-350



9MU0K2-351

**On-vehicle Removal**

1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts, and drain **approx. 1.0 liter (1.1 US qt, 0.9 Imp qt)** of ATF.

3. Disconnect the vacuum hose.

**Caution**

**When removing the vacuum diaphragm, do not drop the vacuum diaphragm rod into the oil pan.**

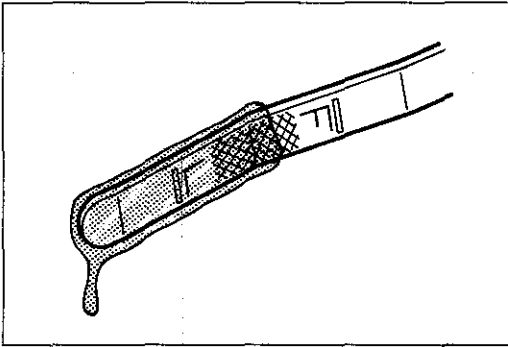
4. Remove the vacuum diaphragm, O-ring, and vacuum diaphragm rod.

**Inspection**

1. Check that the vacuum diaphragm rod moves when vacuum is applied to the vacuum diaphragm.
2. If not correct, replace the vacuum diaphragm.

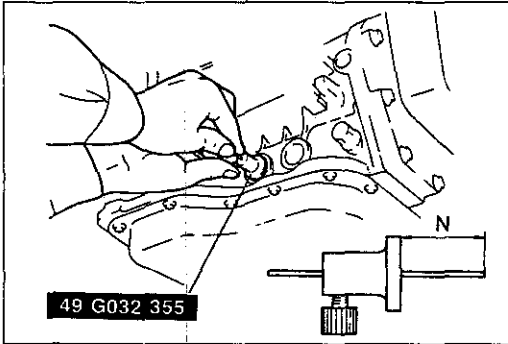
**On-vehicle Installation**

1. Apply ATF to a new O-ring, and install it onto the vacuum diaphragm.
2. Apply ATF to the vacuum diaphragm rod and vacuum diaphragm, and install them into the transmission case.
3. Connect the vacuum hose.



0BU0K1-094

4. Add **approx. 1.0 liter (1.1 US qt, 0.9 Imp qt)** of ATF and check the oil level. (Refer to page K1-33.)
5. Warm up the ATF to normal operating temperature **(50—80°C, 122—176°F)**, then check for following:
  - (1) Fluid leakage
  - (2) Vacuum leakage



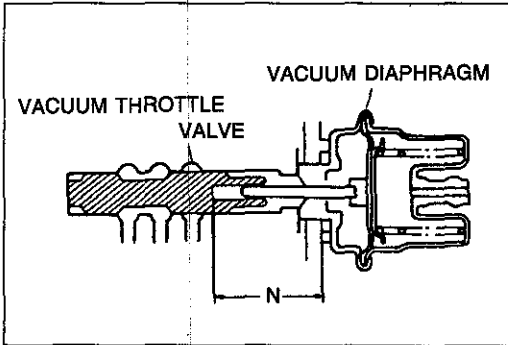
49 G032 355

1BU0K1-049

**On-vehicle Adjustment**

1. Remove the vacuum diaphragm, vacuum diaphragm rod, and O-ring from the transmission case. (Refer to On-vehicle Removal, page K1-108.)
2. Measure dimension N indicated in the figure with the **SST** and a scale.
3. Select the proper diaphragm rod from the table.

Dimension N	Applicable diaphragm rod
Below 25.65mm (1.0099 in)	29.0mm (1.14 in)
25.65—25.90mm (1.0099—1.0197 in)	29.5mm (1.16 in)
25.90—26.40mm (1.0197—1.0394 in)	29.75mm (1.17 in)
26.40—26.65mm (1.0394—1.0492 in)	30.0mm (1.18 in)
26.65—27.15mm (1.0492—1.0650 in)	30.5mm (1.20 in)
27.15mm (1.0689 in) or over	31.0mm (1.22 in)



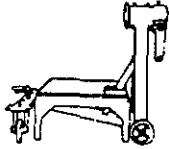
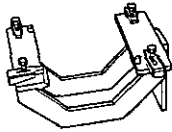
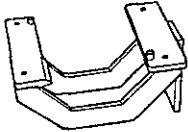
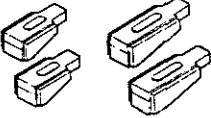
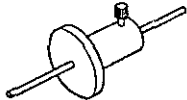
9BU0KX-068

4. Install the correct vacuum diaphragm rod, O-ring, and vacuum diaphragm. (Refer to On-vehicle Installation, page K1-108.)

### TRANSMISSION UNIT (ASSEMBLY)

#### Preparation

#### SST

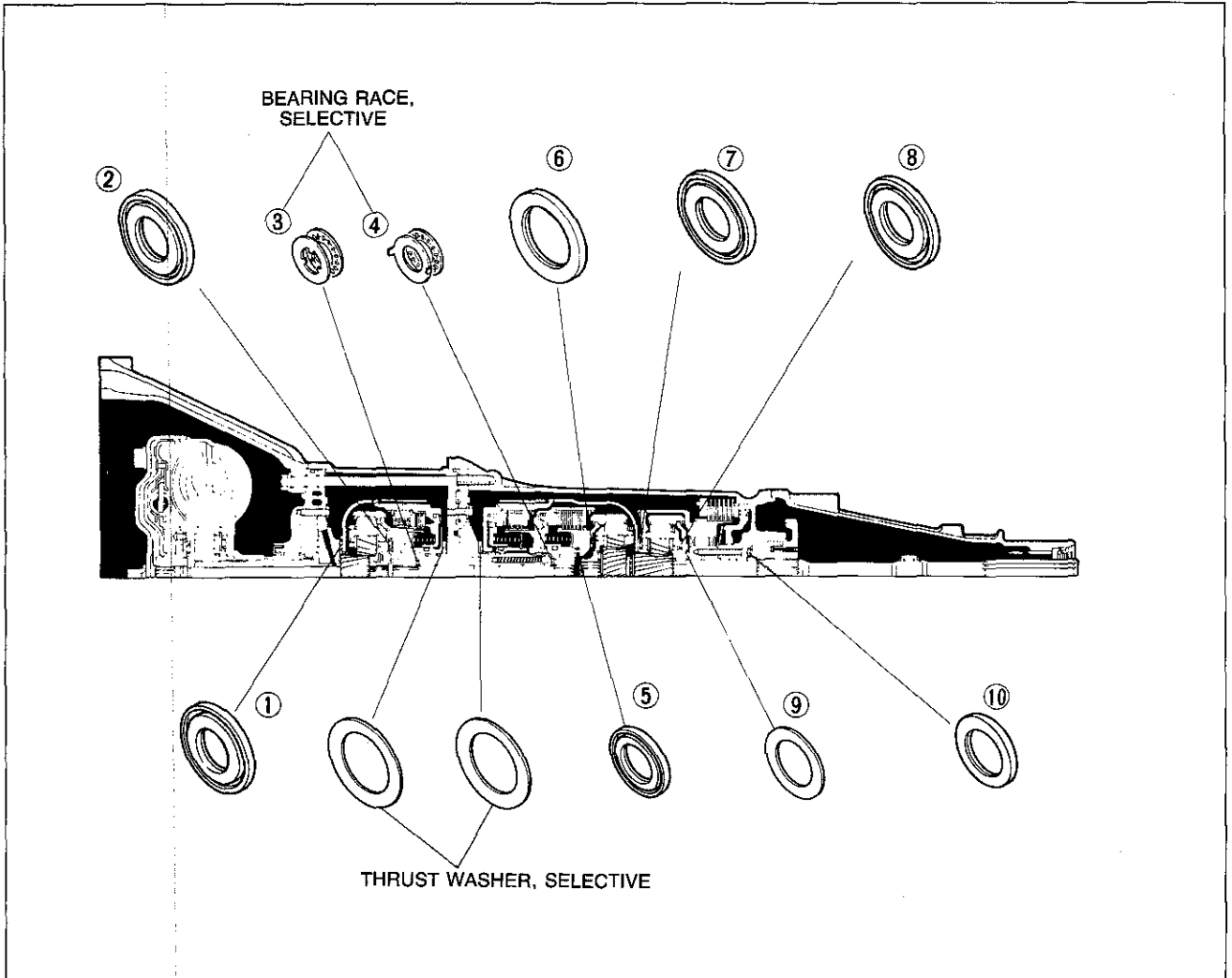
<p>49 0107 680 A</p> <p>Engine stand</p> 	<p>49 U019 0A0A</p> <p>Transmission hanger</p> 	<p>49 H075 495B</p> <p>Body (Part of 49 U019 0A0A)</p> 
<p>49 U019 003</p> <p>Holder (Part of 49 U019 0A0A)</p> 	<p>49 G032 355</p> <p>Adjustment gauge</p> 	<p>1BUOK1-050</p>

#### Precaution

1. If the drive plates or brake bands are replaced with new ones, soak the new ones in ATF for at least two hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings, and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with the new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

9MUOK2-356

Thrust Washer, Bearing, and Race Location



9MU0K2-357

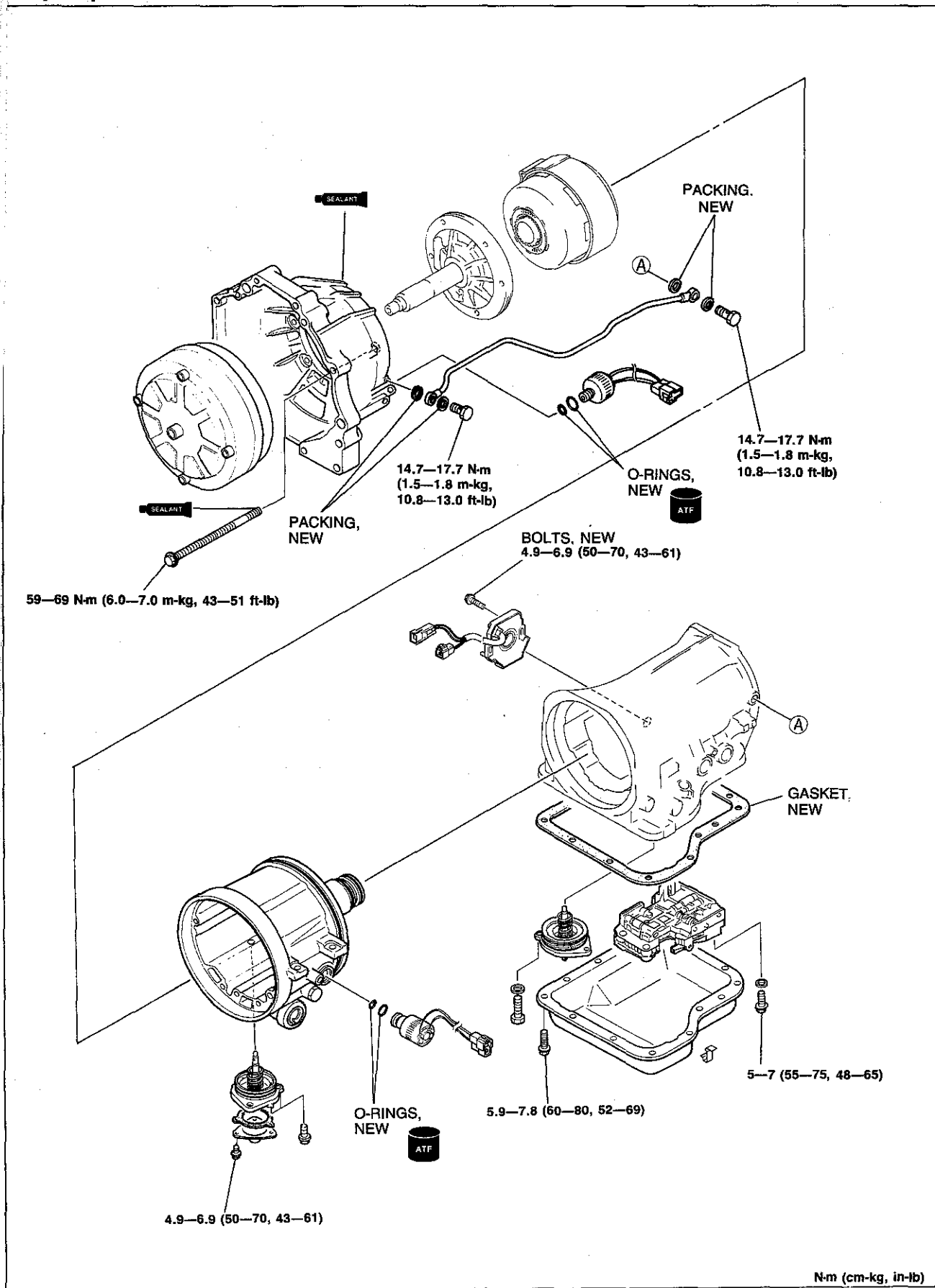
Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in)	70.0 (2.756)	70.0 (2.756)	35.0 (1.378)	35.0 (1.378)	53.0 (2.087)	70.0 (2.756)
Race	mm (in)	—	—	33.0 (1.299)	33.0 (1.299)	—	—

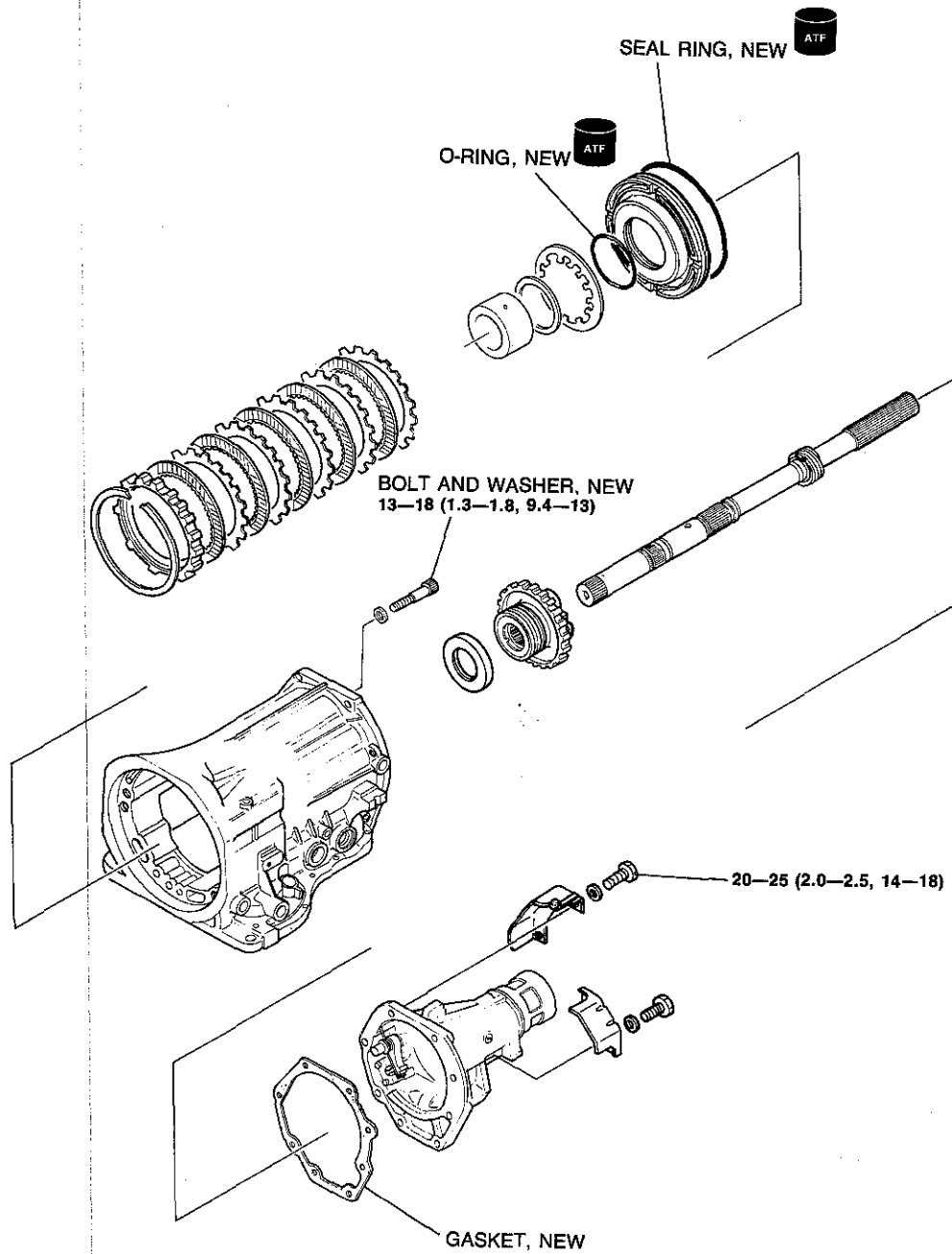
		7	8	9	10
Bearing	mm (in)	70.0 (2.756)	70.0 (2.756)	47.0 (1.850)	53.0 (2.087)
Race	mm (in)	—	—	—	—

0BU0K1-096

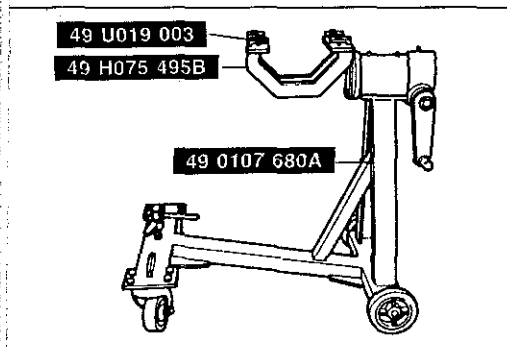
## Torque specifications



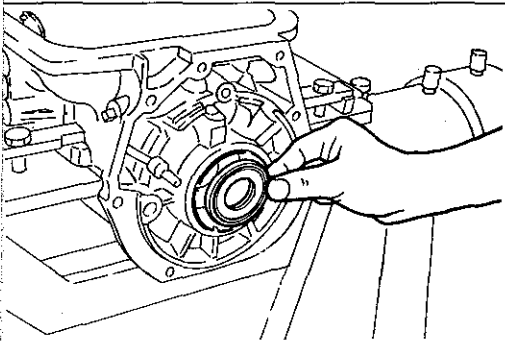
Torque specifications (cont'd)



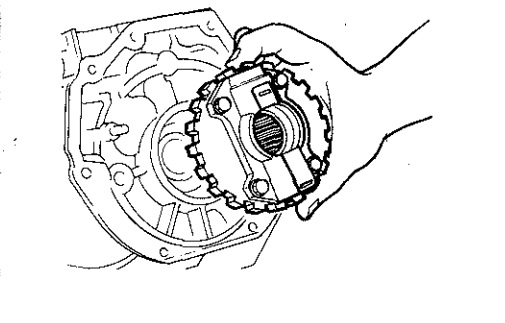
N-m (m-kg, ft-lb)



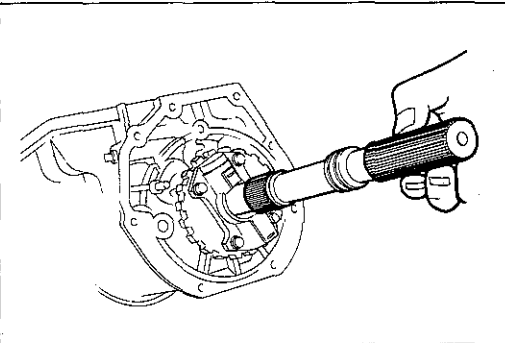
9MU0K2-360



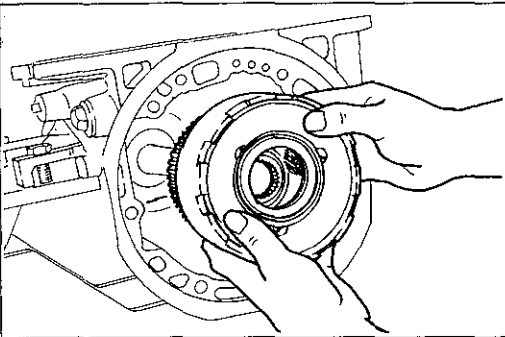
1BU0K1-051



0BU0K1-098



0BU0K1-099



0BU0K1-100

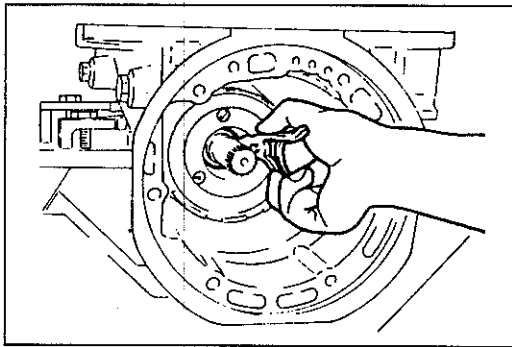
**Procedure**

1. Assemble the **SST** as shown.
2. Mount the transmission case onto the **SST**.
3. Apply petroleum jelly to the bearing, and install it into the rear of the transmission case shown in the figure.

**Bearing outer diameter: 53.0mm (2.087 in)**

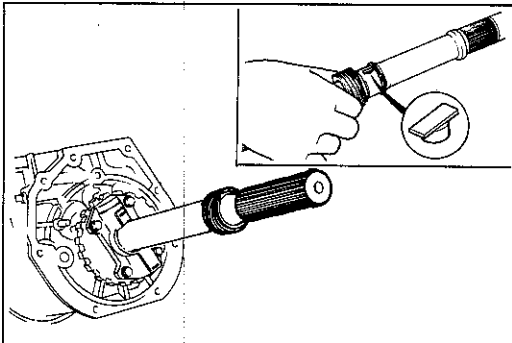
4. Install the oil distributor in the transmission case.
5. Insert the output shaft.
6. Install the rear planetary gear unit (connecting drum, rear planetary pinion carrier and one-way clutch) in the low and reverse brake side.





0BU0K1-101

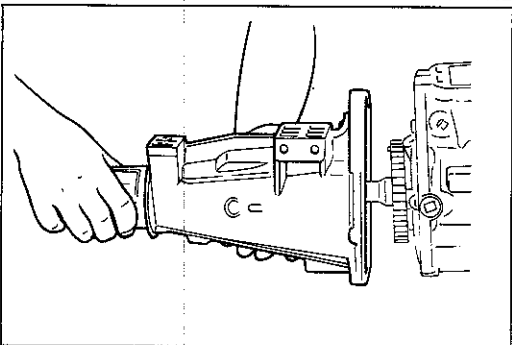
7. Install a new snap ring onto the front of the output shaft.



0BU0K1-102

8. Install the front snap ring, key, and speedometer drive gear onto the output shaft.

9. Secure the speedometer drive gear with the rear snap ring.



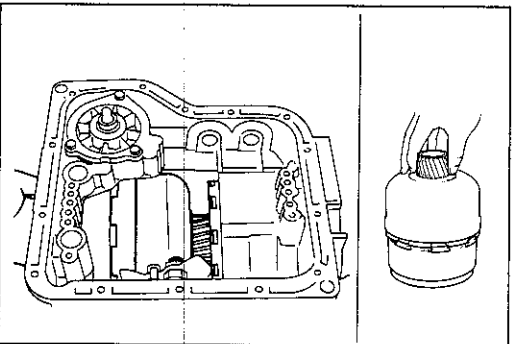
0BU0K1-103

10. Install the extension housing along with a new gasket.

**Tightening torque:**

**20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)**

11. Check that the output shaft is locked with the manual lever in P range.

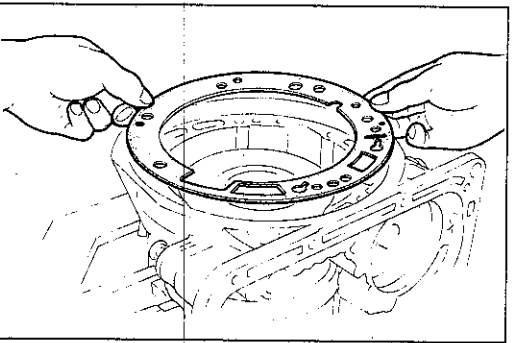


0BU0K1-104

**Caution**

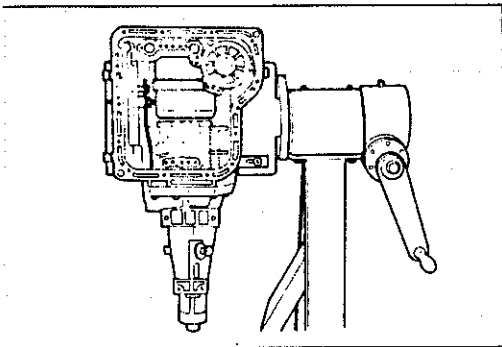
**Be very careful to avoid incorrect assembly of the many similar bearings and races.  
(Refer to page K1-116.)**

12. Install the front clutch, rear clutch, rear clutch hub, front planetary carrier, connecting shell, internal gear, sun gear, bearing, and bearing races as a unit into the transmission case.

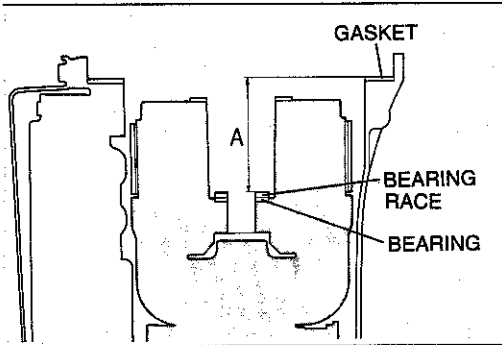


0BU0K1-105

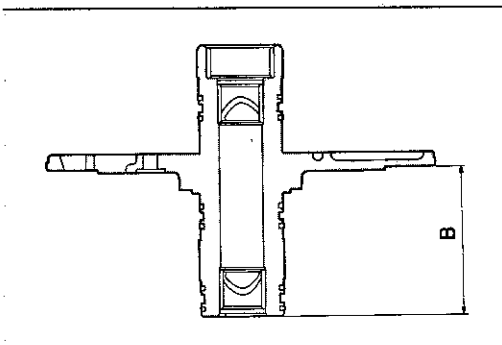
13. Set a new gasket into the front of the case.



0BU0K1-106



9BU0KX-086



14. Check and adjust the rear clutch total end play.
- (1) Position the front of the transmission case upward.
  - (2) Set the drum support bearing and race on the rear clutch.

- (3) Measure distances A and B with a straight edge and vernier calipers.
- (4) Calculate the total end play by using the formula below.

**Formula:  $T = A - B - 0.1\text{mm (0.004 in)}$**

- T : Total end play  
 A : The distance between the drum support mounting surface (including the drum support gasket) and the drum support bearing race surface on the rear clutch assembly.  
 B : The distance between the drum support bearing race contact surface and the drum support gasket contact surface.  
 0.1: The compression amount of a new gasket.

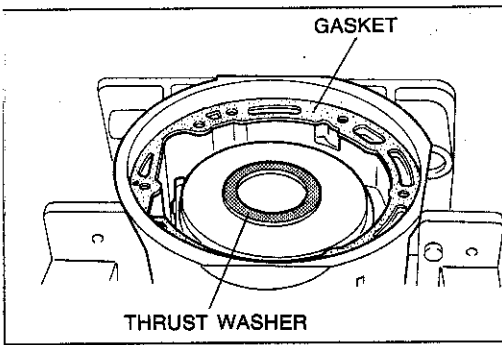
**Total end play:  $0.25 - 0.50\text{mm (0.0098 - 0.0197 in)}$**

- (5) Adjust the total end play by selecting the proper bearing race.

**Bearing race sizes**

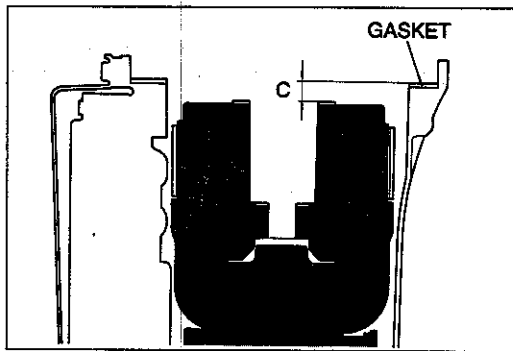
mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)

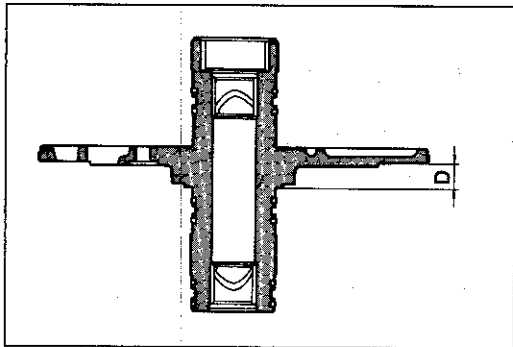


0BU0K1-107

15. Check and adjust the front clutch end play.
- (1) Set the bearing race and bearing in position.



0BU0K1-108



- (2) Measure distances C and D with a straight edge and vernier calipers.
- (3) Calculate the front clutch end play by using the formula below.

**Formula:  $T = C - D - 0.1\text{mm (0.004 in)}$**

- T : Front clutch end play  
 C : The distance between the drum support mounting surface (including the drum support gasket) of the transmission case and the bearing surface on the front clutch assembly.  
 D : The distance between the sliding surface of the bearing and the drum support gasket contact surface.  
 0.1: The compression amount of a new gasket.

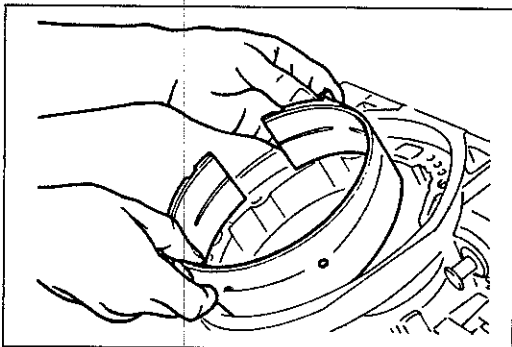
**Front clutch end play: 0.5—0.8mm (0.020—0.031 in)**

- (4) Adjust the front clutch end play by selecting the proper thrust washer.

**Thrust washer sizes**

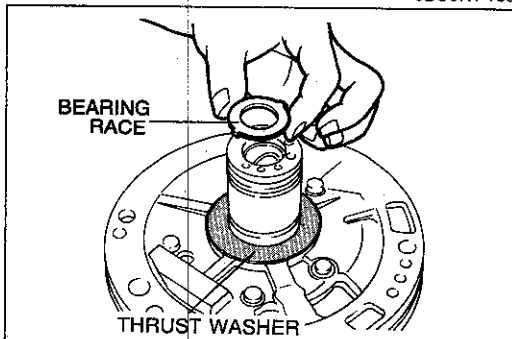
mm (in)

1.3 (0.051)	1.5 (0.059)	1.7 (0.067)
1.9 (0.075)	2.1 (0.083)	2.3 (0.091)
2.5 (0.098)	2.7 (0.106)	



0BU0K1-109

16. Set the 2nd brake band and strut in position.
17. Tighten the piston stem lightly.



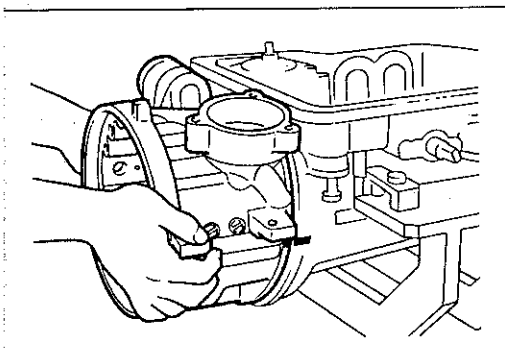
0BU0K1-110

18. Apply petroleum jelly to the bearing race and thrust washer, and install them as shown.

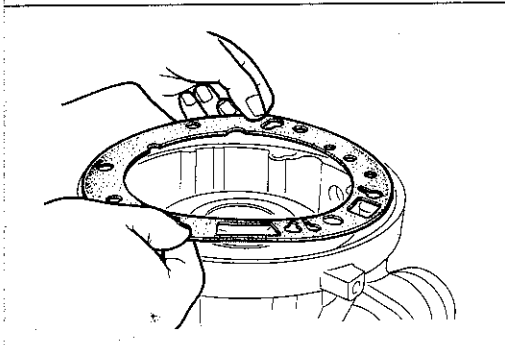
**Bearing race and thrust washer outer diameters**

**Bearing race: 33.0mm (1.299 in)**

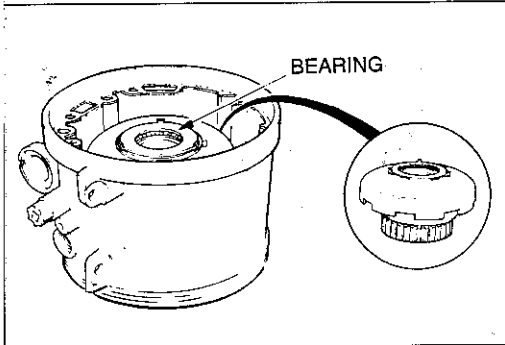
**Thrust washer: 66.0mm (2.598 in)**



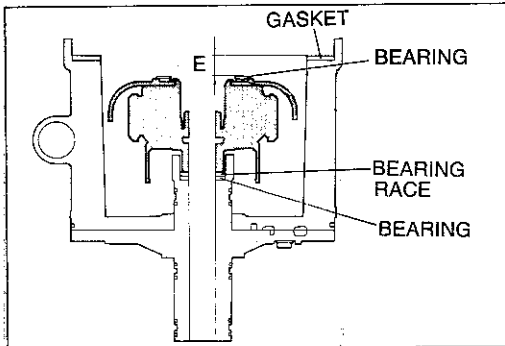
0BU0K1-111



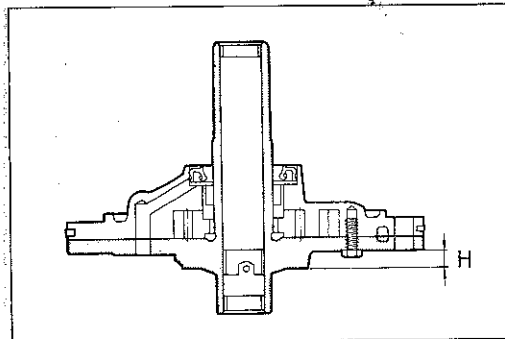
0BU0K1-112



1BU0K1-052



9BU0KX-088



### Note

a) Align the marks of the transmission case and OD case. Tap lightly with a plastic hammer to avoid damaging the seal rings when installing.

b) Install two bolts for alignment.

19. Check that the bearing race is atop the front clutch and that the bearing is on the bottom of the front clutch hole, then mount the OD case.

20. Set a new gasket in place.

### Note

**Do not install the direct clutch drum at this time.**

21. Check and adjust the OD planetary gear unit total end play.

(1) Position the OD case upright.

(2) Install the bearing on the OD case.

### Note

**Install the bearing with the black surface toward the oil pump cover side.**

(3) Install the planetary carrier, sun gear, connecting shell, and bearing as a unit in the OD case.

(4) Measure distances E and H with a straight edge and vernier calipers.

(5) Calculate the OD gear train total end play by using the formula below.

**Formula:  $T = E - H - 0.1\text{mm (0.004 in)}$**

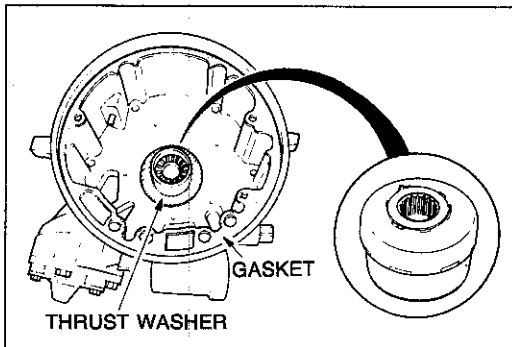
T : Total end play

E : The distance between the oil pump mounting surface (including the oil pump gasket) and the connecting shell bearing surface.

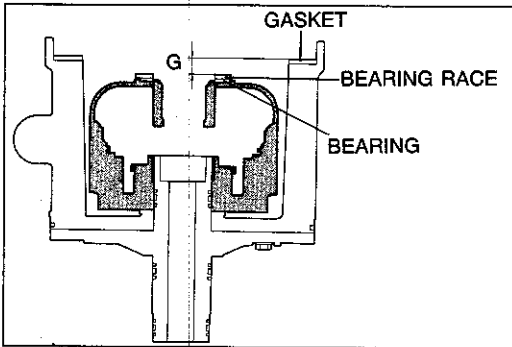
H : The distance between the oil pump side connecting shell bearing contact surface and the oil pump gasket contact surface.

0.1: The compression amount of a new gasket.

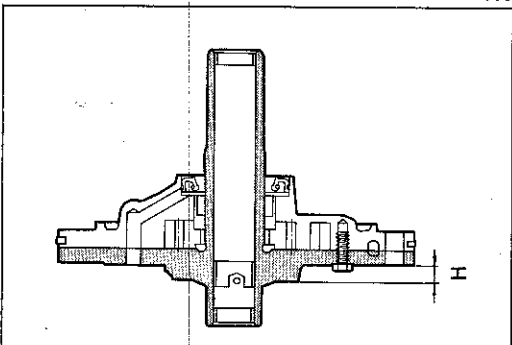
**Total end play: 0.25—0.50mm (0.0098—0.0197 in)**



9MU0K2-380



1BU0K1-053



0BU0K1-115

(6) Adjust the total end play by selecting the proper bearing race.

**Bearing race sizes**

mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)

**Note**

**Do not install the planetary pinion carrier at this time.**

22. Check and adjust the direct clutch end play.  
 (1) Install the bearing race in the OD case.

**Note**

**Install the bearing with the black surface toward the oil pump cover side.**

- (2) Install the direct clutch, sun gear, connecting shell, and bearings in the OD case.  
 (3) Measure distances G and H with a straight edge and vernier calipers.  
 (4) Calculate the direct clutch end play by using the formula below.

**Formula:  $T = G - H - 0.1\text{mm (0.004 in)}$**

T : Total end play

G : The distance between the oil pump mounting surface (including the oil pump gasket) and the connecting shell bearing surface.

H : The distance between the oil pump side connecting shell bearing contact surface and the oil pump gasket contact surface.

0.1: The compression amount of a new gasket.

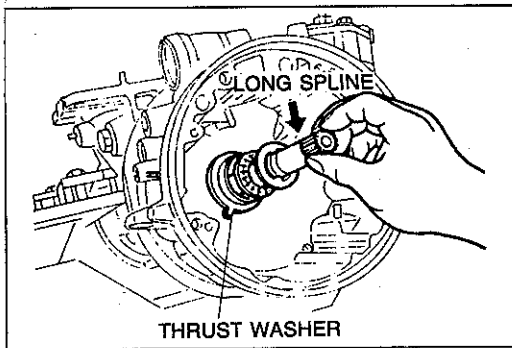
**Total end play: 0.5—0.8mm (0.020—0.031 in)**

- (5) Adjust the direct clutch end play by selecting the proper thrust washer.

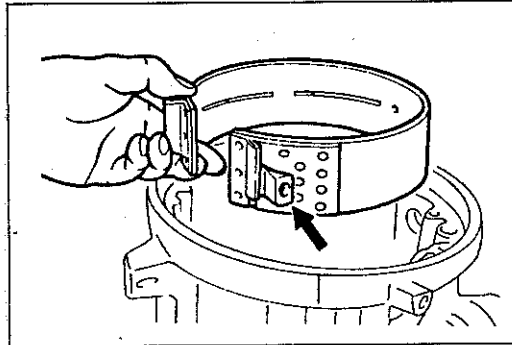
**Thrust washer sizes**

mm (in)

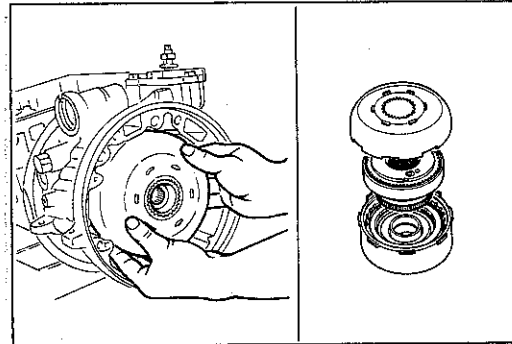
1.3 (0.051)	1.5 (0.059)	1.7 (0.067)
1.9 (0.075)	2.1 (0.083)	2.3 (0.091)
2.5 (0.098)	2.7 (0.106)	



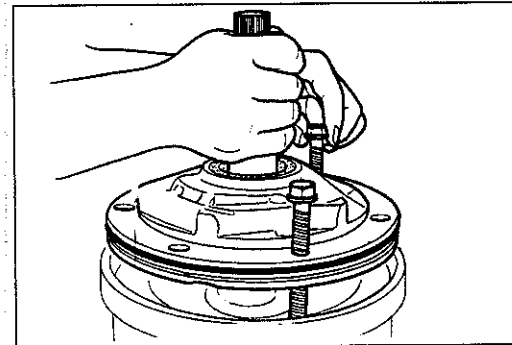
0BUOK1-116



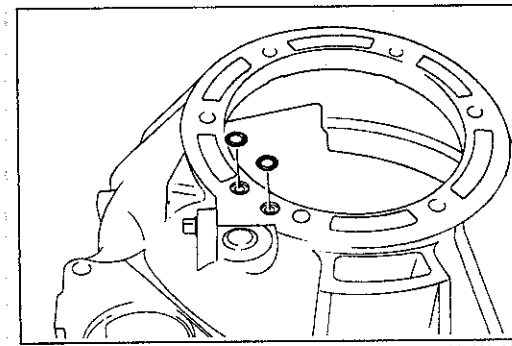
0BUOK1-117



1BUOK1-054



1BUOK1-055



1BUOK1-056

### Caution

The end with the long spline is the front.

Long spline: 23.0mm (0.906 in)

Short spline: 18.6mm (0.772 in)

23. Insert the intermediate shaft.
24. Apply petroleum jelly to the thrust washer and install it into the OD case.
25. Apply petroleum jelly to the small bearing and small bearing race, and install them as shown.

**Bearing outer diameter: 35.0mm (1.318 in)**

**Bearing race outer diameter: 33.0mm (1.299 in)**

26. Install the OD brake band and band strut.

27. Install the direct clutch assembly.
28. Apply petroleum jelly to the bearing and install it onto the OD connecting shell with the black surface facing upward.

**Bearing outer diameter: 70.0mm (2.756 in)**

### Caution

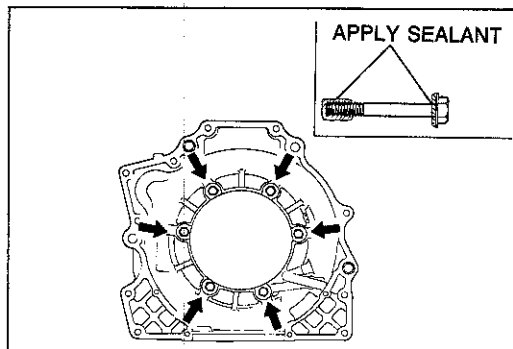
a) Do not damage the seal rings or O-ring.

b) Do not use a hammer, plastic or otherwise, to install the oil pump.

29. Install the oil pump assembly into the transmission case using two converter housing bolts as guide.

30. Coat the contact surfaces of the converter housing and transmission case with sealant.

31. Install new O-rings.

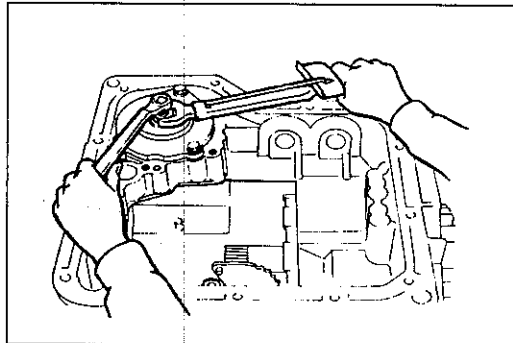


1BU0K1-057

32. Remove the converter housing bolts used as guide. Apply sealant to the bolts.
33. Install the converter housing onto the transmission case, and tighten bolts evenly in a crisscross pattern.

**Tightening torque:**

**59—69 N·m (6.0—7.0 m·kg, 43—51 ft·lb)**



1BU0K1-058

34. Apply ATF to the piston stem.
35. Adjust the 2nd brake band.
  - (1) Loosen the locknut and tighten the piston stem.

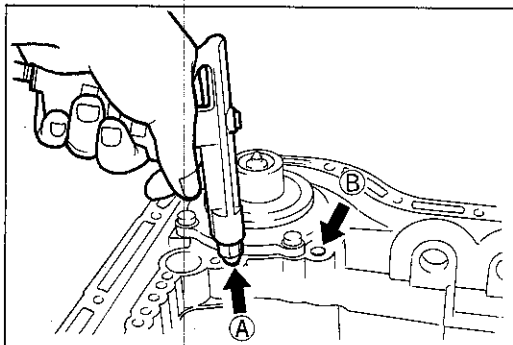
**Tightening torque:**

**11.8—14.7 N·m (1.2—1.5 m·kg, 8.7—10.8 ft·lb)**

- (2) Loosen the stem the number of turns shown below.

**Stem: 3 turns**

- (3) Hold the stem and tighten the locknut.



1BU0K1-059

**Tightening torque:**

**15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)**

**Caution**

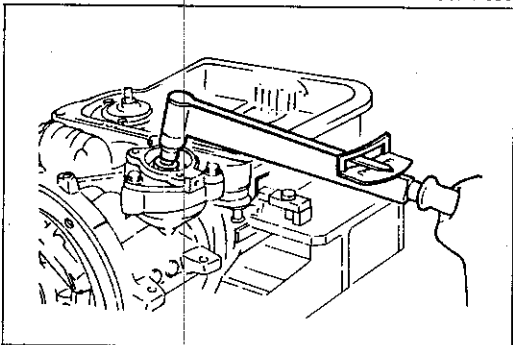
**Apply air for no more than three(3) seconds.**

36. Check the servo piston operation by applying compressed air through the oil passages of the 2nd band servo.

**(A) : Engage**

**(B) : Release**

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



1BU0K1-060

37. Apply ATF to the piston stem. Adjust the OD brake band.
  - (1) Loosen the locknut and tighten the piston stem.

**Tightening torque:**

**7—10 N·m (70—100 cm·kg, 61—87 in·lb)**

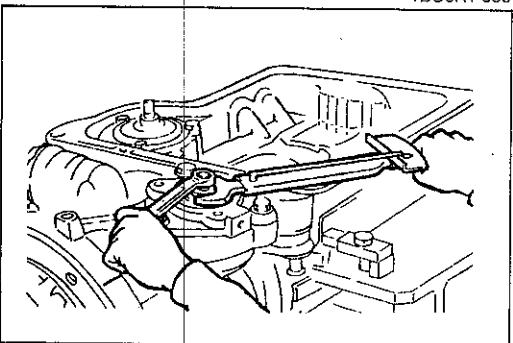
- (2) Loosen the stem the number of turns shown below.

**Stem: 2 turns**

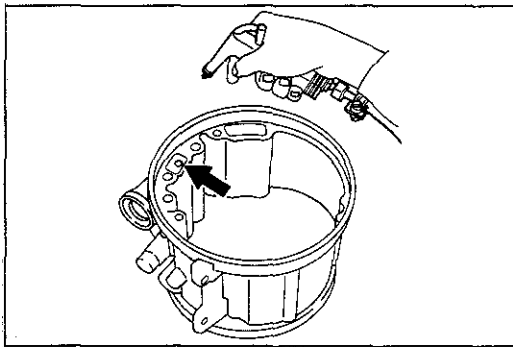
- (3) Hold the stem and tighten the locknut.

**Tightening torque:**

**15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)**



9MU0K2-392



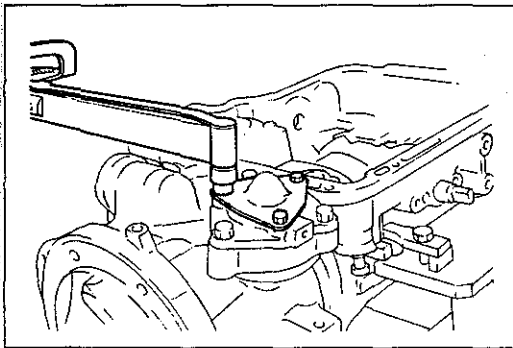
1BU0K1-061

### Caution

**Apply air for no more than three(3) seconds.**

38. Check the servo piston operation by applying compressed air through the oil passage of the OD band servo.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

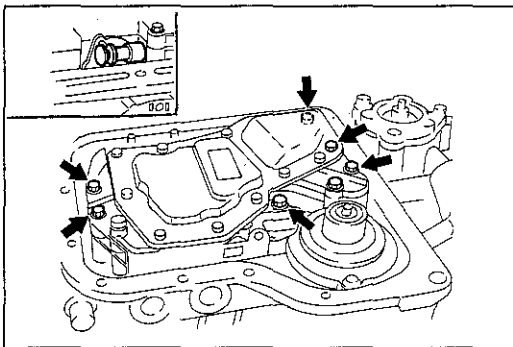


1BU0K1-062

39. Set a new gasket on the OD band servo.  
40. Install the OD band servo cover.

### Tightening torque:

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**



1BU0K1-063

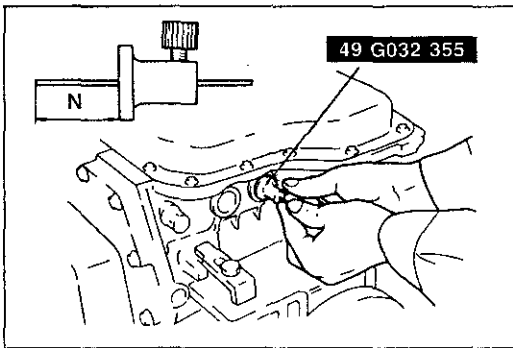
### Note

**Be careful to place the manual plate in the correct position of the manual valve.**

41. Set the valve body assembly in position.  
42. Install the bolts.

### Tightening torque:

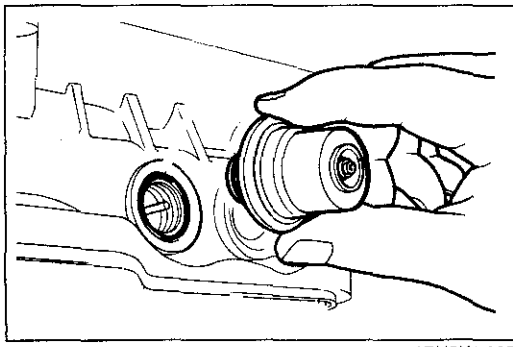
**5—7 N·m (55—75 cm·kg, 48—65 in·lb)**



1BU0K1-064

43. Apply ATF to a new O-ring and install it onto the vacuum diaphragm.  
44. Select the diaphragm rod.  
(1) Measure dimension N with the **SST** and a scale.  
(2) Select the proper diaphragm rod in accordance with the table below.

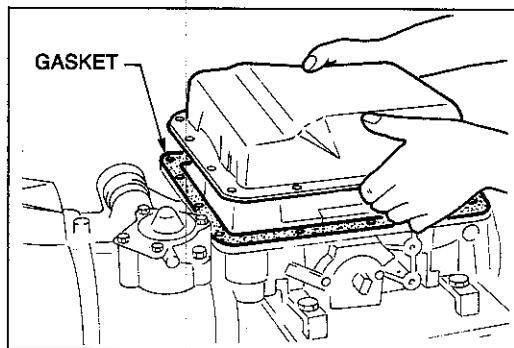
Dimension N	Applicable diaphragm rod
Below 25.65mm (1.0099 in)	29.0mm (1.14 in)
25.65—25.90mm (1.0099—1.0197 in)	29.5mm (1.16 in)
25.90—26.40mm (1.0197—1.0394 in)	29.75mm (1.17 in)
26.40—26.65mm (1.0394—1.0492 in)	30.0mm (1.18 in)
26.65—27.15mm (1.0492—1.0689 in)	30.5mm (1.20 in)
27.15mm (1.0689 in) or over	31.0mm (1.22 in)



1BU0K1-065

45. Apply ATF to the new O-rings, and install them to the vacuum diaphragm; then install the vacuum diaphragm to the transmission case.



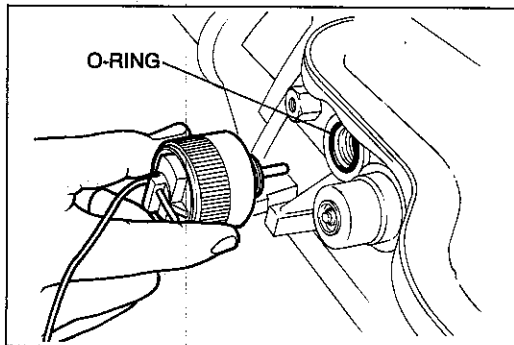


1BU0K1-066

46. Install the oil pan along with a new gasket.
47. Install the bracket and the pan mounting bolts.

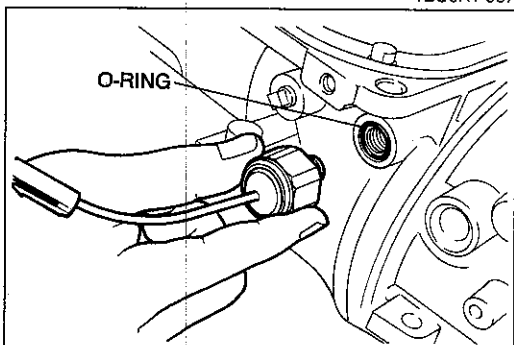
**Tightening torque:**

**5.9—7.8 Nm (60—80 cm-kg, 52—69 in-lb)**



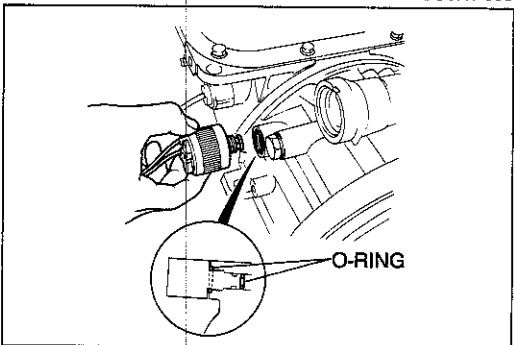
1BU0K1-067

48. Apply ATF to a new O-ring and install it to the transmission case.
49. Install the downshift solenoid.



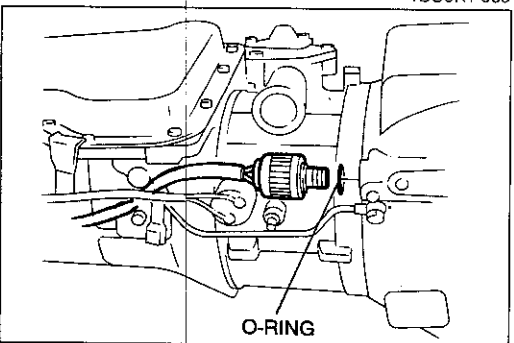
1BU0K1-068

50. Apply ATF to a new O-ring and install it into the transmission case.
51. Install the transmission oil pressure switch.



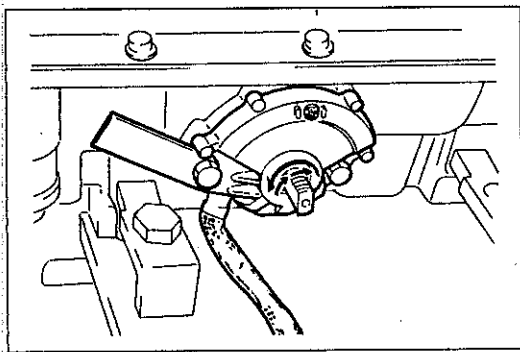
1BU0K1-069

52. Apply ATF to the new O-rings and install them into the transmission case.
53. Install the OD cancel solenoid.



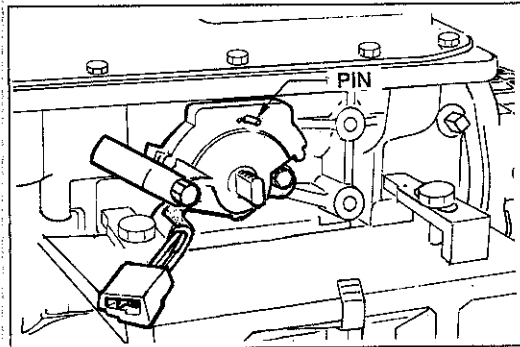
1BU0K1-070

54. Apply ATF to the new O-rings and install them into the transmission case.
55. Install the lockup solenoid (G6 engine).



2BU0K1-025

56. Rotate the manual shaft fully reward, then return it two (2) notches to the N position.



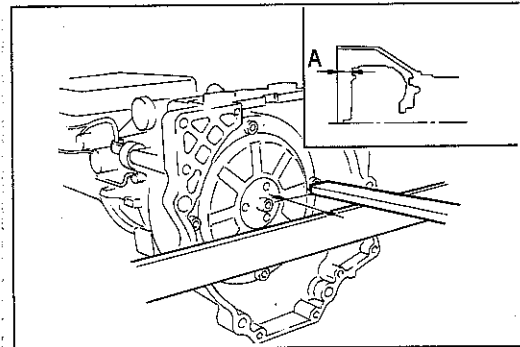
2BU0K1-026

57. Loosely tighten the new inhibitor switch bolts.  
 58. Remove the screw on the switch body and move the inhibitor switch so that the screw hole on the switch body is aligned with the small hole inside the switch. Check their alignment by inserting a **2.0mm (0.0079 in)** diameter pin into the holes.  
 59. Tighten the switch attaching bolts.

**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

60. Remove the pin, and tighten the screw into the hole.

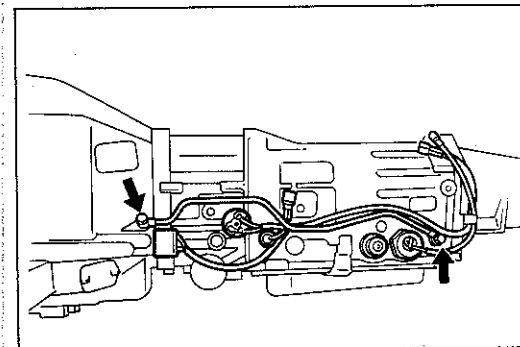


1BU0K1-072

61. Ensure that the torque converter is installed correctly by measuring the distance (A) between the end of the torque converter and the end of the converter housing.

**“A”: 54.2mm (2.13 in) min.**

62. Remove the transmission from the engine stand.



1BU0K1-073

63. Install the governor pressure pipe

**Tightening torque:**

**14.7—17.7 N·m (1.5—1.8 m·kg, 10.8—13.0 ft·lb)**

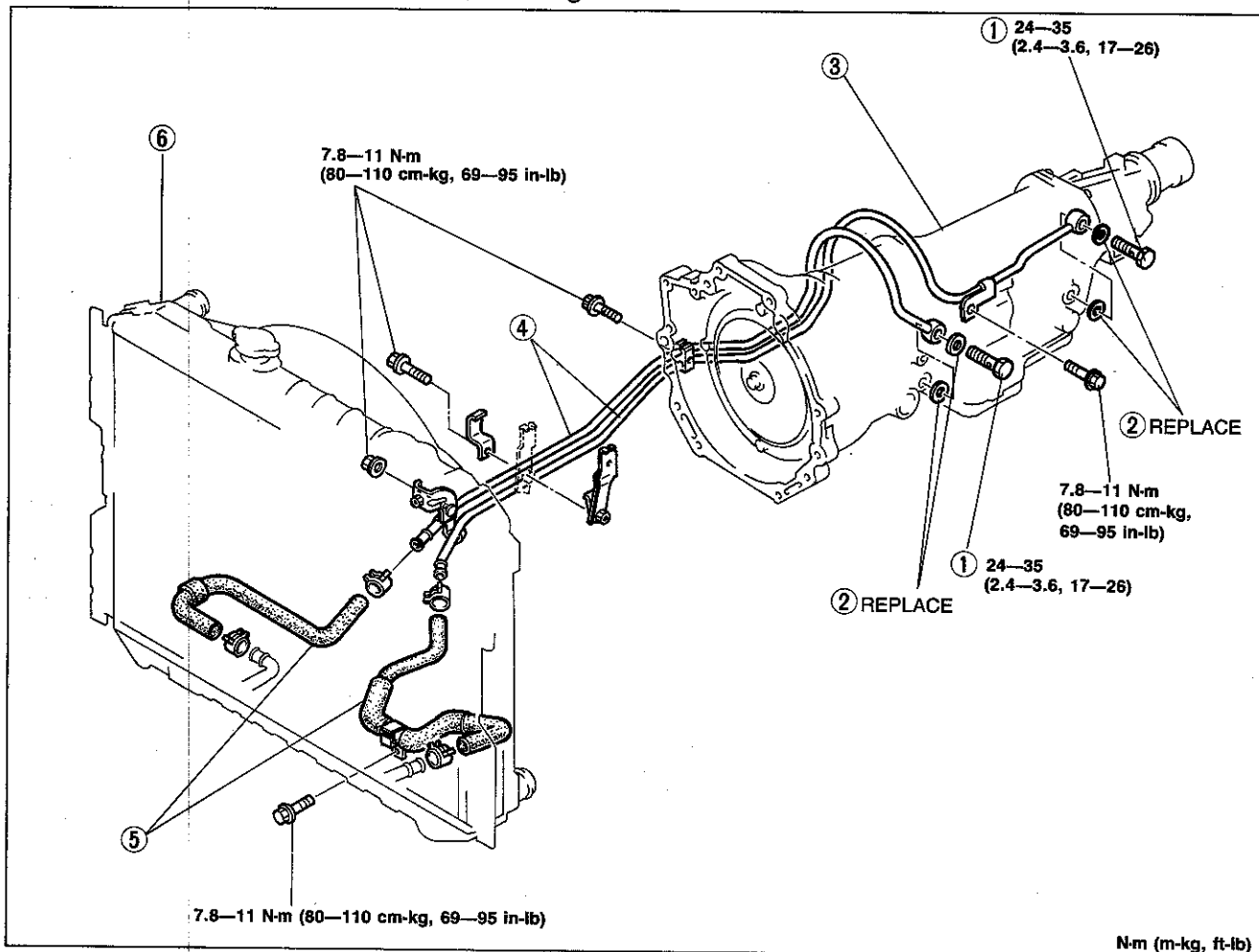
**OIL COOLER**

**Removal, Inspection, and Installation**

Remove in the order shown in the figure.

Inspect all parts and repair or replace as necessary.

Install in the reverse order of removal, referring to **Installation Note**.



N-m (m-kg, ft-lb)

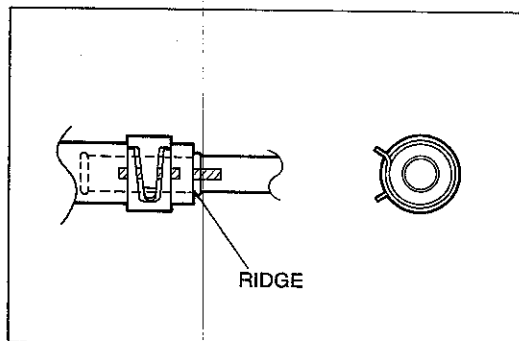
OBU0K1-138

- |   |   |
|---|---|
| <p>1. Connector bolts<br/>Inspect for clogging</p> <p>2. Packing</p> <p>3. Transmission<br/>Removal ..... page K1-36<br/>Installation..... page K1-36</p> | <p>4. Oil pipe<br/>Inspect for damage or cracks</p> <p>5. Oil hose<br/>Inspect for damage or cracks</p> <p>6. Radiator<br/>Refer to Section E</p> |
|---|---|

**Installation note**  
**Oil pipe**

**Caution**

- If reuse the hose clamp, position the hose clamp in the original location on the hose. Squeeze the clamp lightly with large pliers to ensure a good fit.



2BU0K1-027

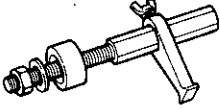



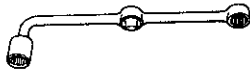
1. Align the marks, and slide the oil cooler hoses onto the oil cooler pipes until it contacts the ridge.
2. Install the hose clamps as shown and tighten them as specified.
3. Verify that the hose clamps do not interfere with other parts.

# K1

## DRIVE PLATE

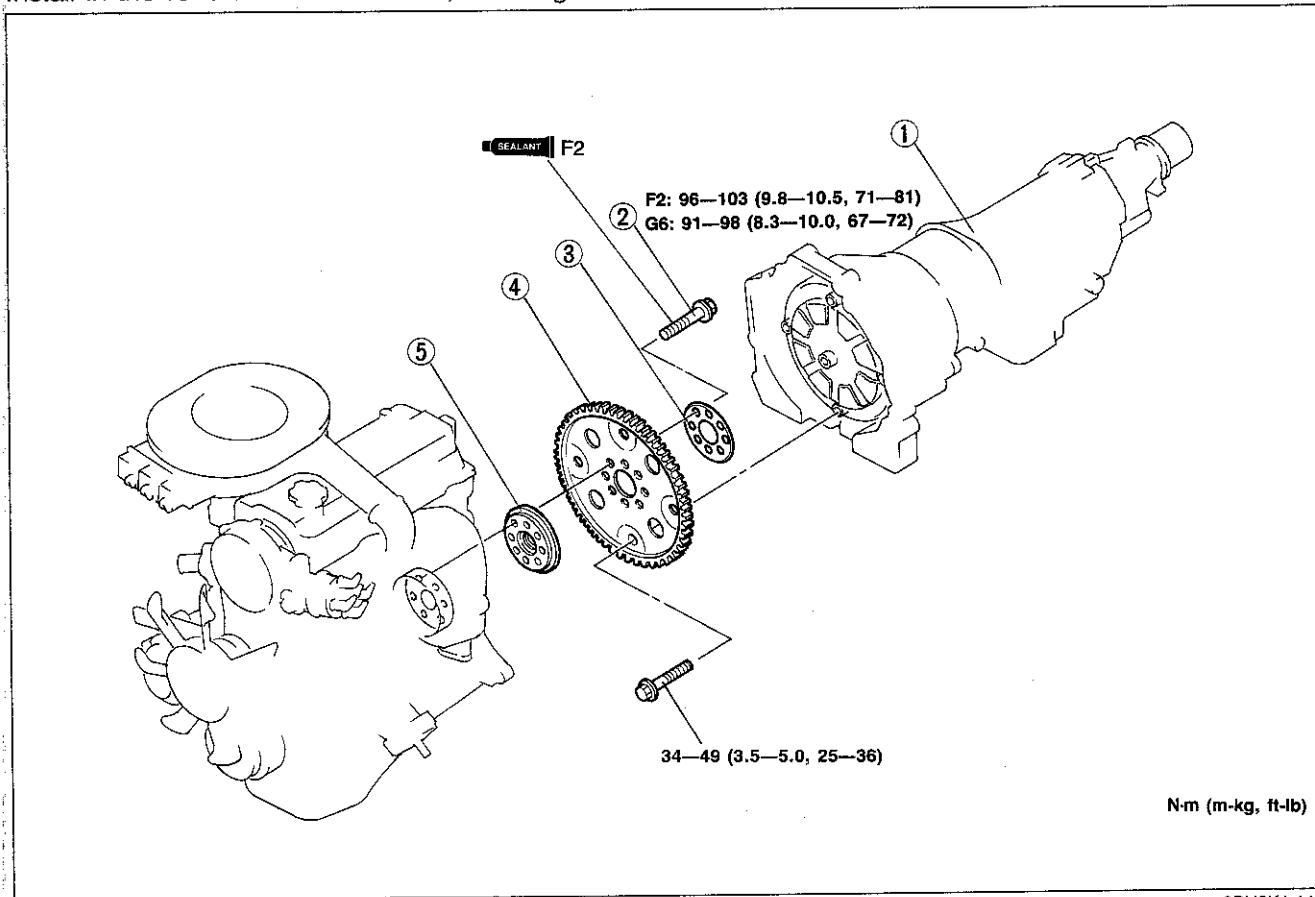
### DRIVE PLATE

#### Preparation SST

<p>49 E011 1A0 Brake set, ring gear</p> 	<p>49 E011 103 Shaft (Part of 49 E011 1A0)</p> 	<p>49 E011 104 Collar (Part of 49 E011 1A0)</p> 
<p>49 E011 105 Stopper (Part of 49 E011 1A0)</p> 	<p>49 0877 435 Special wrench</p> 	<p style="text-align: right;">2BU0K1-028</p>

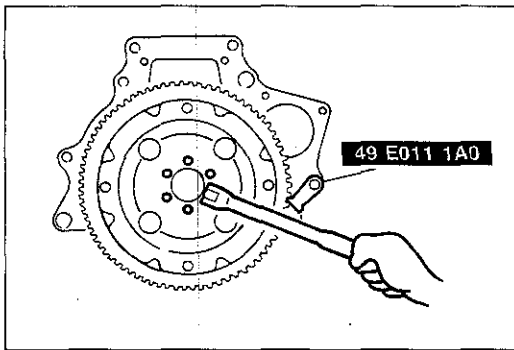
#### Removal, Inspection, and Installation

Remove in the order shown in the figure, referring to **Removal Note**.  
Inspect all parts, and repair or replace as necessary.  
Install in the reverse order removal, referring to **Installation Note**.

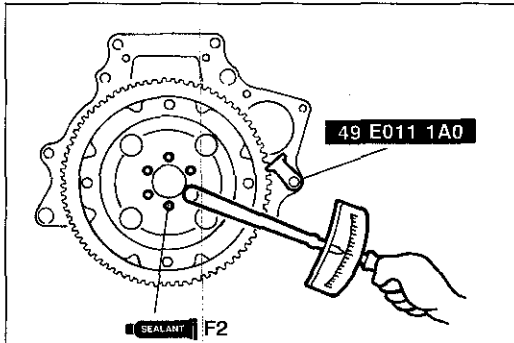


- 1. Transmission  
Removal ..... page K1-36  
Installation ..... page K1-36
- 2. Bolts
- 3. Backing plate

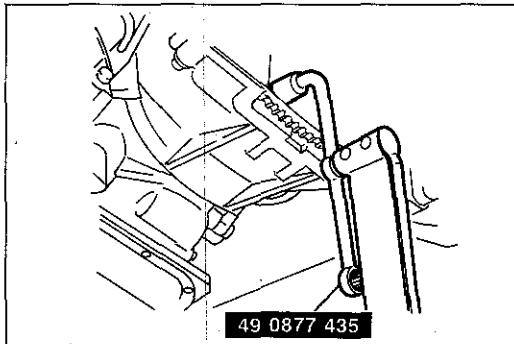
- 4. Drive plate  
Inspect for cracks and ring gear for wear or damage
- 5. Adapter



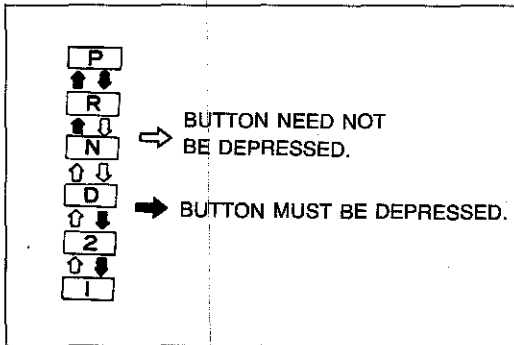
2BU0K1-029



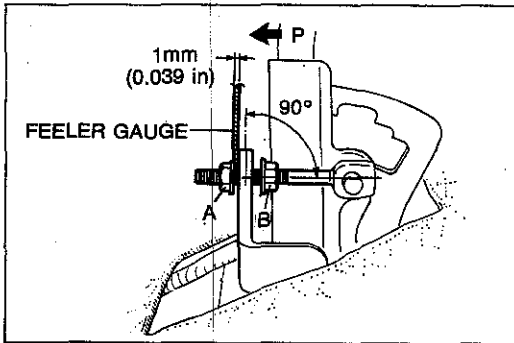
2BU0K1-030



9BU0KX-076



9BU0KX-075



9BU0KX-077

**Removal note**

**Drive plate**

Remove the drive plate with the **SST** or equivalent.

**Installation note**

**Drive plate**

1. Assemble the adapter, drive plate, and backing plate.
2. Install the **SST** or equivalent and tighten the bolts.

**Tightening torque**

**B2200: 96—103 N·m (9.8—10.5 m·kg, 71—81 ft·lb)**

**B2600: 91—98 N·m (8.3—10.0 m·kg, 67—72 ft·lb)**

3. Install the transmission. (Refer to page K1-36.)

4. Loosely and equally tighten the torque converter bolts, then further tighten them to the specified tightening torque.

**Tightening torque:**

**34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**

**Caution**

**When tightening the bolts with the SST, tighten them to the minimum specified tightening torque.**

**SHIFT MECHANISM**

**INSPECTION**

1. Verify that the gearshift lever can be shifted as shown in the figure.
2. Make sure of a click at each range when the lever is shifted from P—1 ranges.
3. Verify that the positions of the gearshift lever and the indicator are exact.
4. Verify that the knob returns smoothly when used to shift.
5. If not correct adjust or repair the selector lever.

**ADJUSTMENT**

**Lever Position**

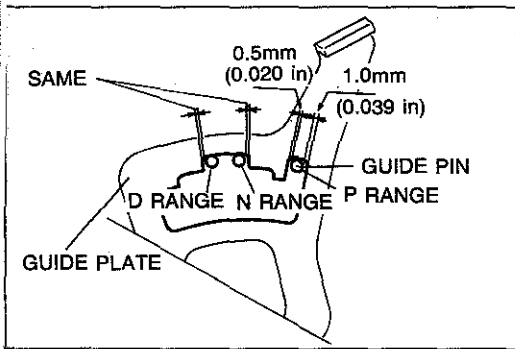
1. Shift the selector lever to P range.
2. Loosen locknuts A and B so that they are both at least 1mm (0.039 in) away from the adjustment lever.
3. Shift the transmission to P range by moving the manual shaft of the transmission.
4. With the link at 90° to the lever, adjust the clearance between the adjustment lever and locknut A.

**Clearance: 1mm (0.039 in)**

5. Remove the feeler gauge and tighten locknut B.

**Tightening torque:**

**8—11 N·m (80—110 cm·kg, 69—95 in·lb)**



0BU0K1-147

6. Measure the clearance between the guide plate and the guide pin in P range.

### Clearance

**Front: Approx. 1mm (0.039 in)**

**Rear : Approx. 0.5mm (0.020 in)**

7. Move the selector lever to N and D ranges and check that the clearance between the guide plate and guide pin is the same in both ranges.

8. If not equal, readjust locknuts A and B.
9. Check the selector lever operation.  
(Refer to Inspection.)

### Indicator

Adjust the body of the indicator to properly align with the selector.

0BU0K1-148

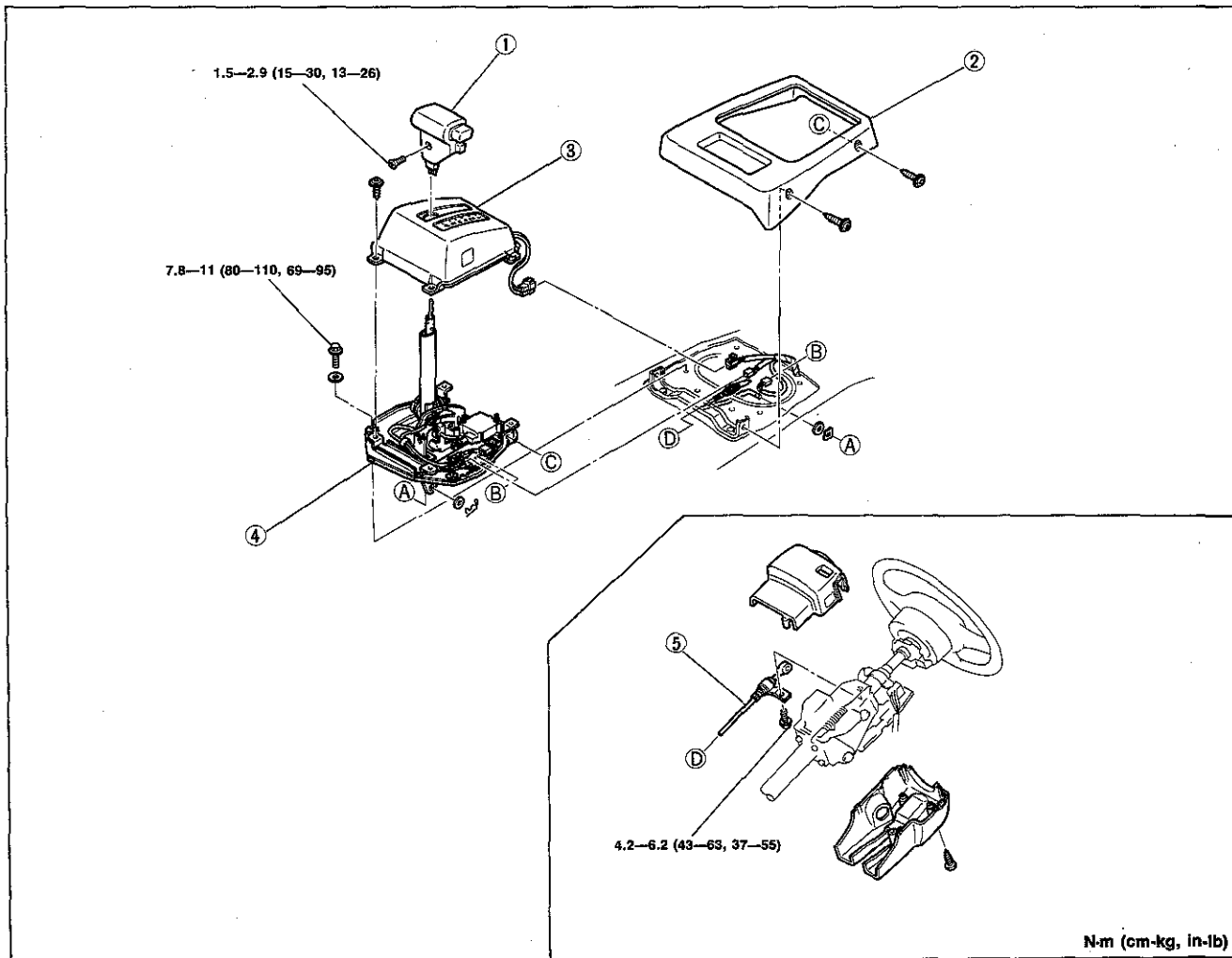
## REMOVAL AND INSTALLATION

Disconnect the negative battery cable.

Remove in the order shown in the figure, referring to **Removal Note**.

Inspect all parts, and repair or replace as necessary.

Install in the reverse order of removal, referring to **Installation Note**.



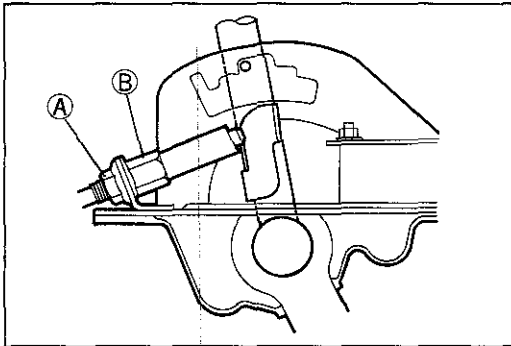
N-m (cm-kg, in-lb)

0BU0K1-142

- 1. Selector knob
- 2. Console
- 3. Indicator panel  
Installation..... page K1-130
- 4. Selector lever  
Removal..... page K1-129  
Installation..... page K1-130

- 5. Interlock cable  
Removal ..... page K1-129  
Installation..... page K1-129

OBUOK1-149



OBUOK1-143

### Removal Note Selector lever

- 1. Shift the selector lever to N range.

#### Caution

**Do not loosen locknut (B), it is factory preset for proper shift-lock system operation.**

- 2. Loosen the locknut (A).

#### Caution

**Do not kink the cable.**

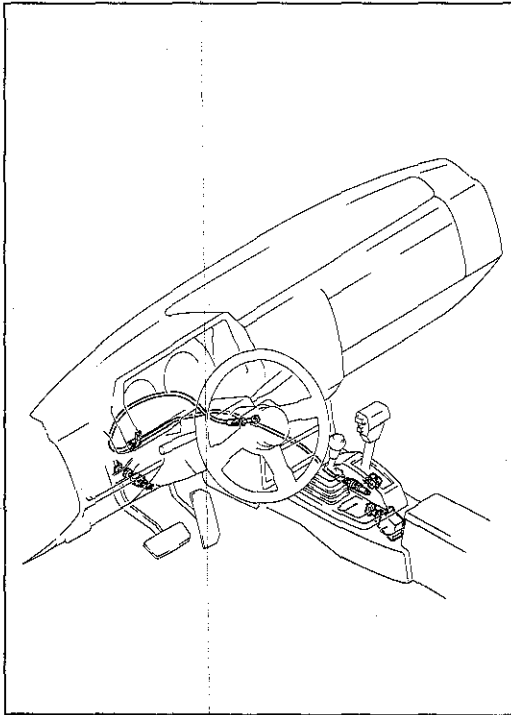
- 3. Separate the cable from the selector lever.

### Interlock cable

#### Note

**Do not remove the interlock cable if not necessary.**

- 1. Remove the instrument panel. (Refer to Section S.)
- 2. Remove the interlock cable.

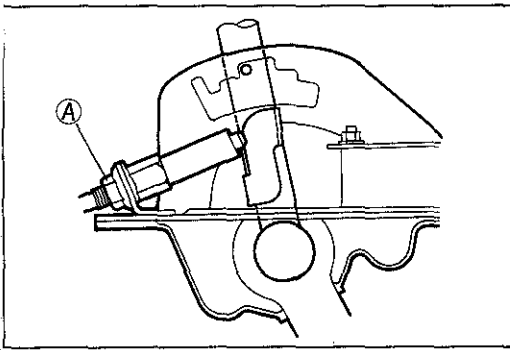


OBUOK1-150

### Installation Note

#### Interlock cable

- 1. Install the interlock cable.
- 2. Install the instrument panel. (Refer to Section S.)



97U0KX-322

### Selector lever

1. Shift the selector lever to N range.
2. Install the selector lever.

#### Tightening torque:

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

#### Caution

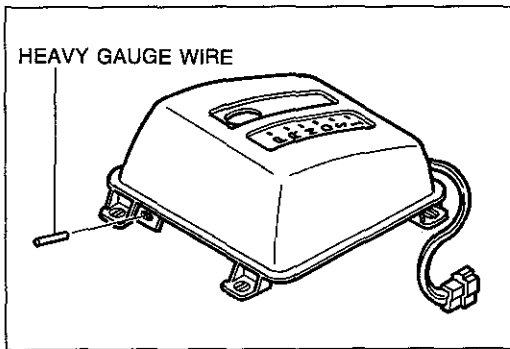
**Do not kink the cable.**

3. Install the cable and tighten locknut (A).

#### Tightening torque:

**9.8—15 N·m (1.0—1.5 m·kg, 7.2—11 ft·lb)**

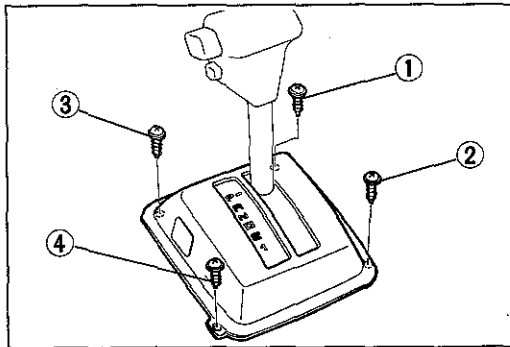
4. Check shift-lock system operation.  
(Refer to page K-159, Steps 5 to 8.)



0BU0K1-144

### Indicator panel

1. Temporarily install the indicator panel.
2. Align the alignment grooves in the slider with the holes in the indicator panel. Install suitable heavy-gauge wire to hold the slider.



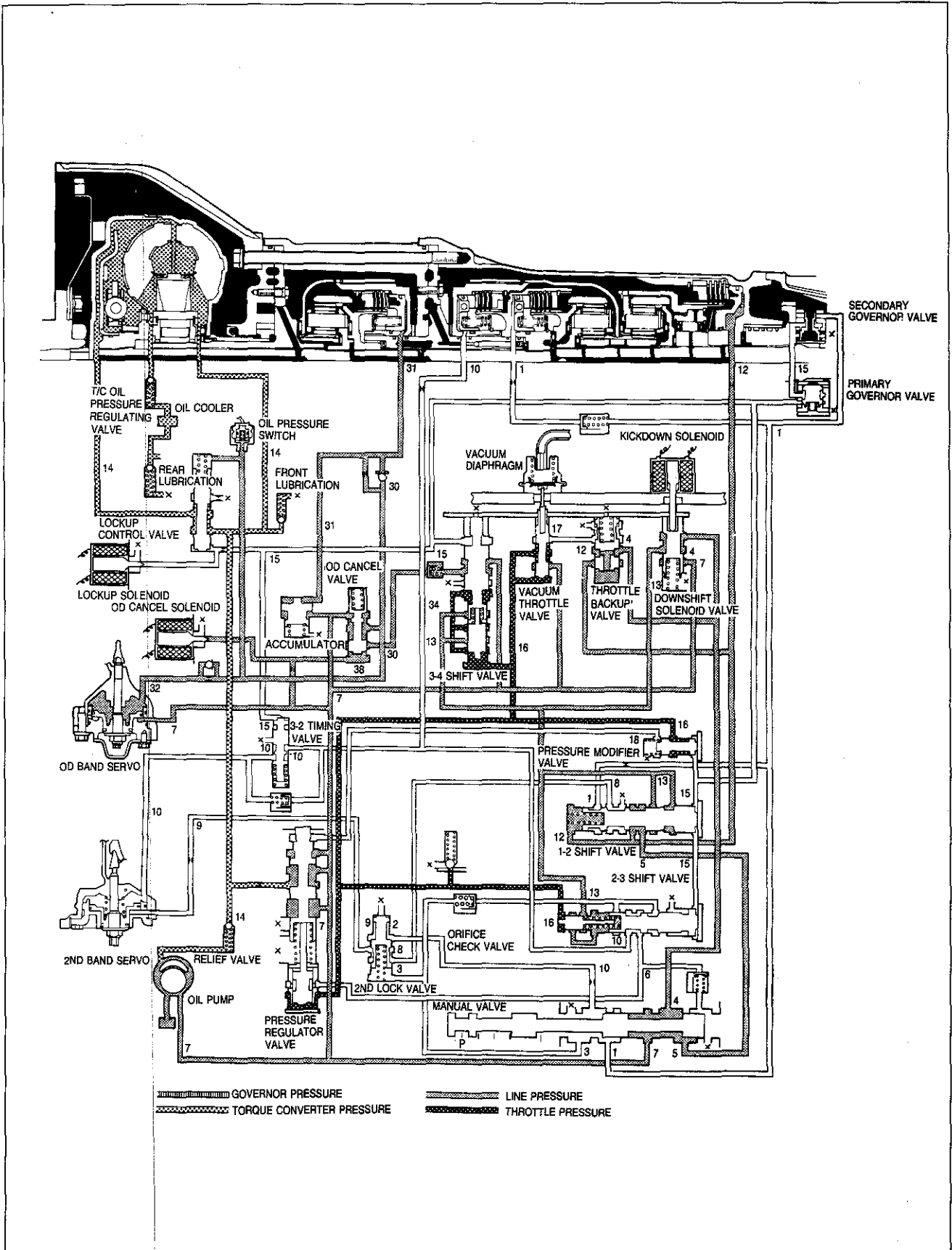
0BU0K1-145

3. Tighten the indicator screws in the order shown in the figure.



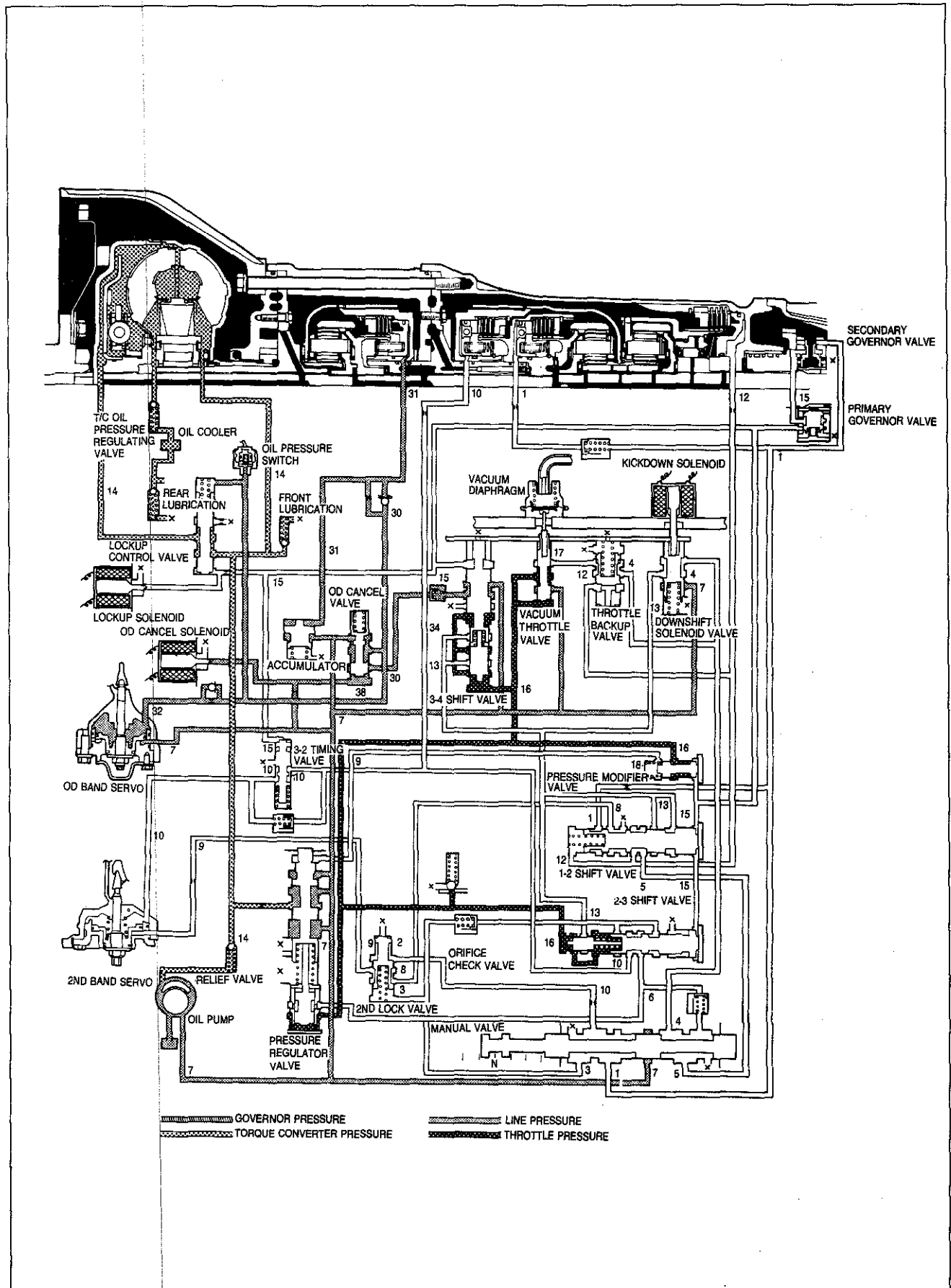
HYDRAULIC CIRCUIT

P RANGE





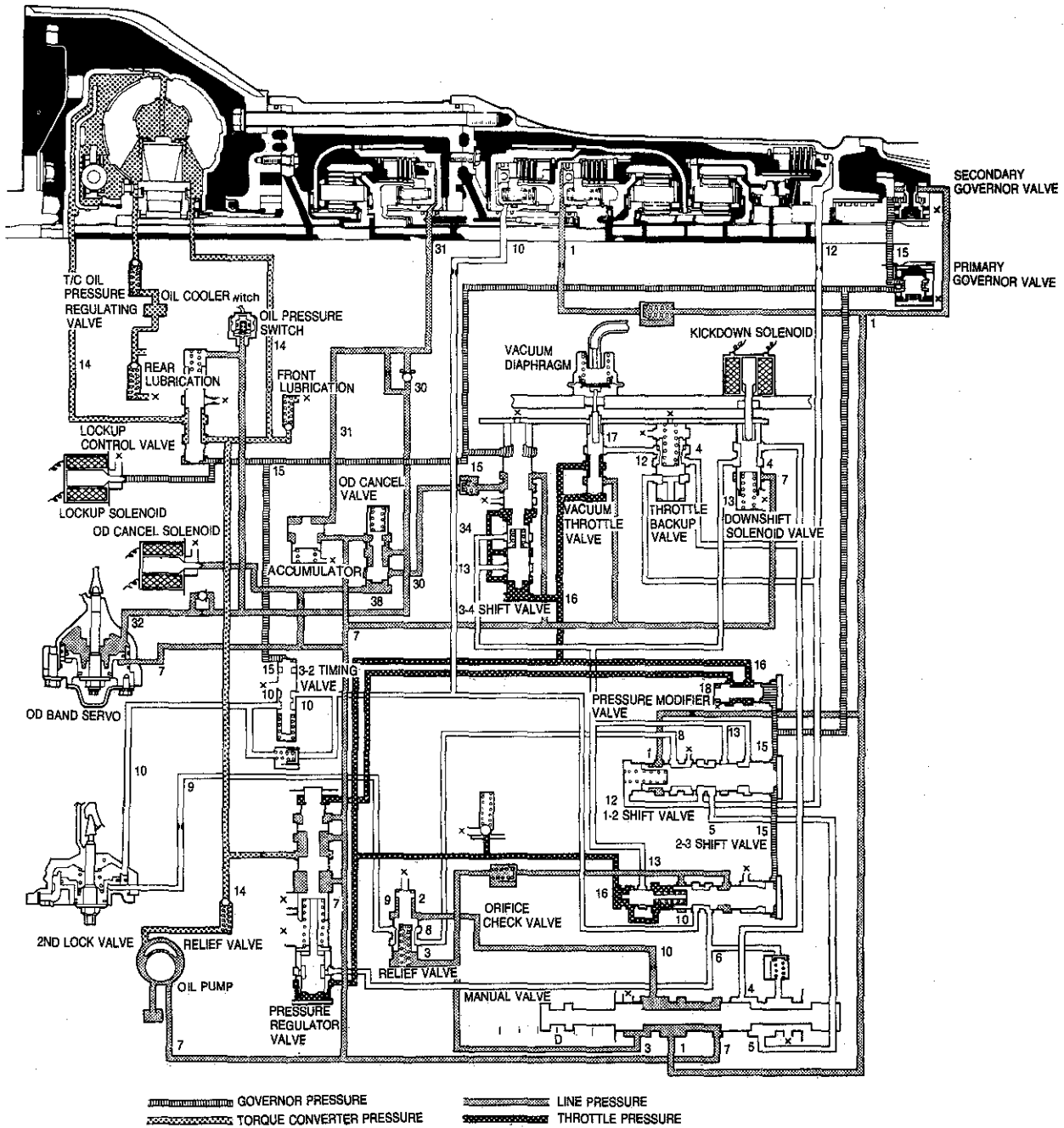
## N RANGE



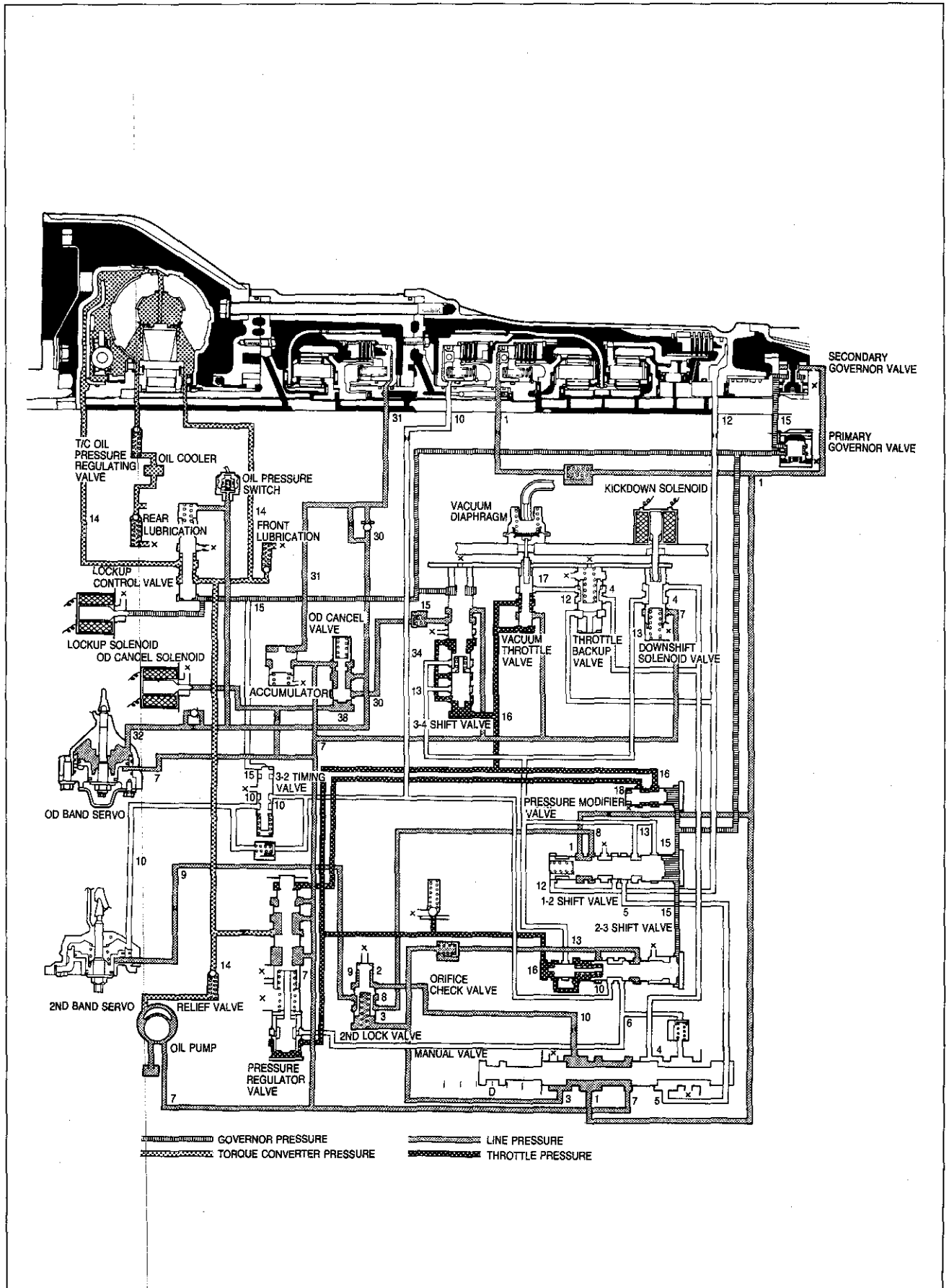
SECONDARY GOVERNOR VALVE

PRIMARY GOVERNOR VALVE

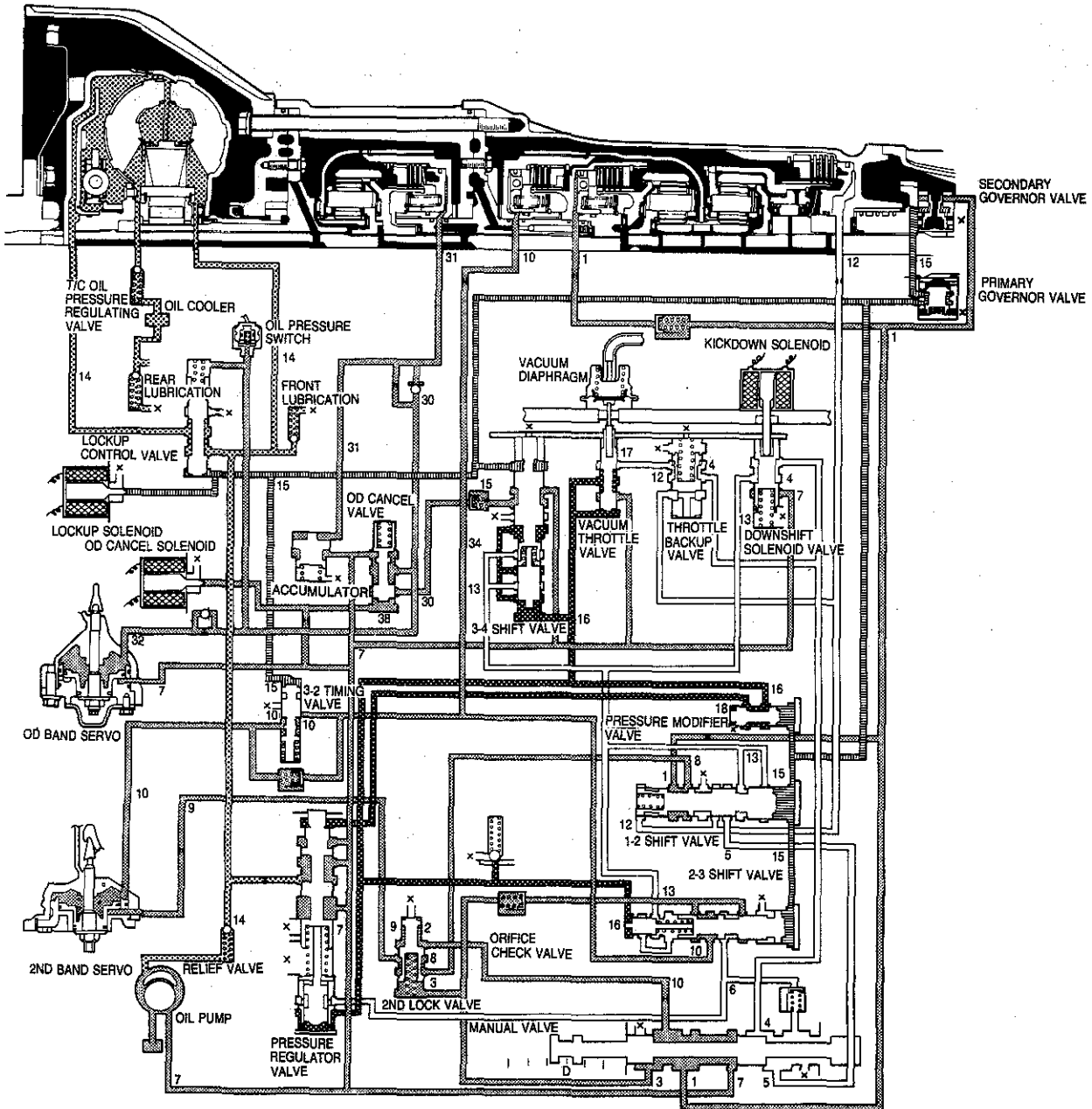
### D RANGE; 1ST GEAR



## D RANGE; 2ND GEAR



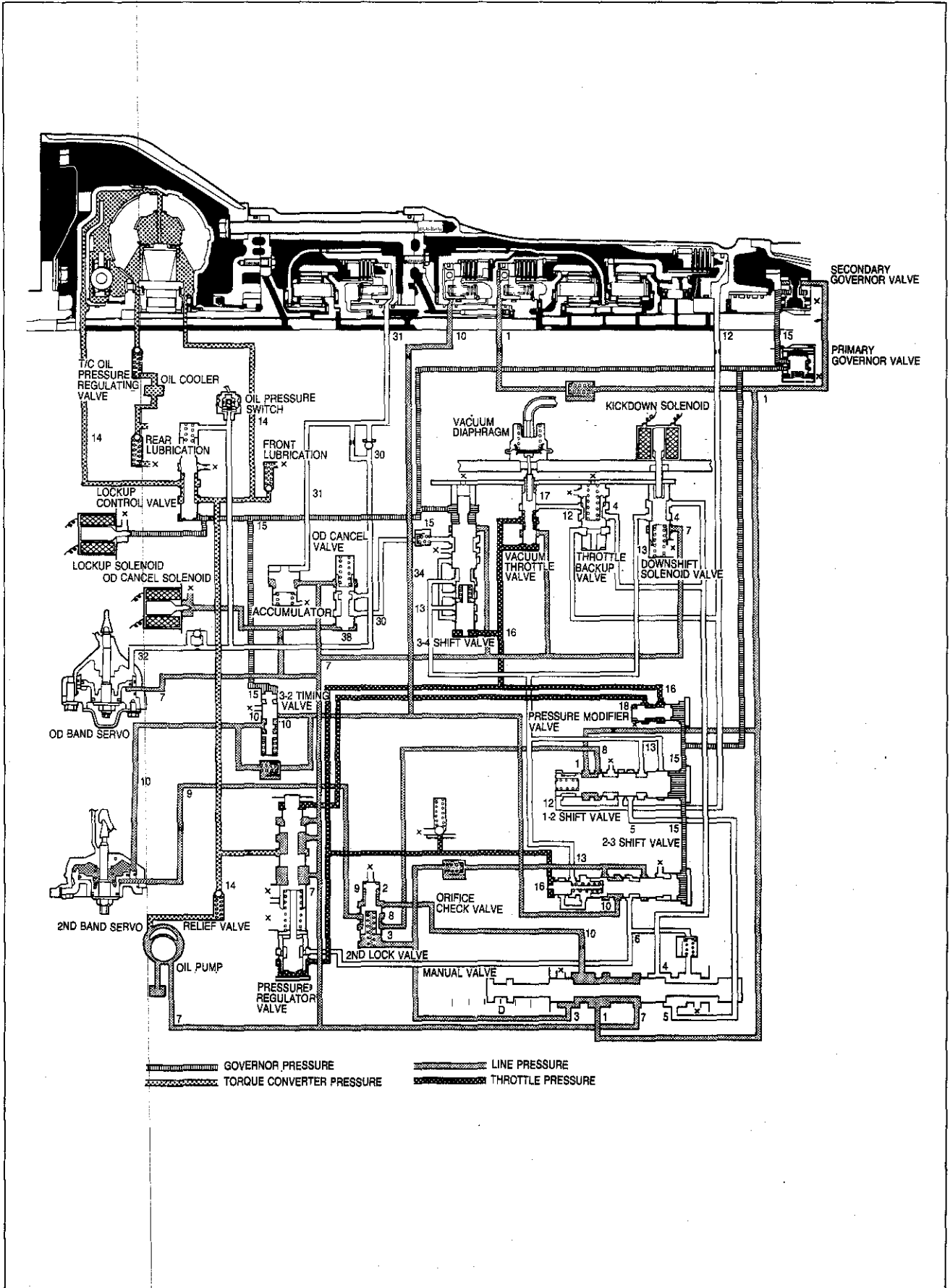
## D RANGE; 3RD GEAR



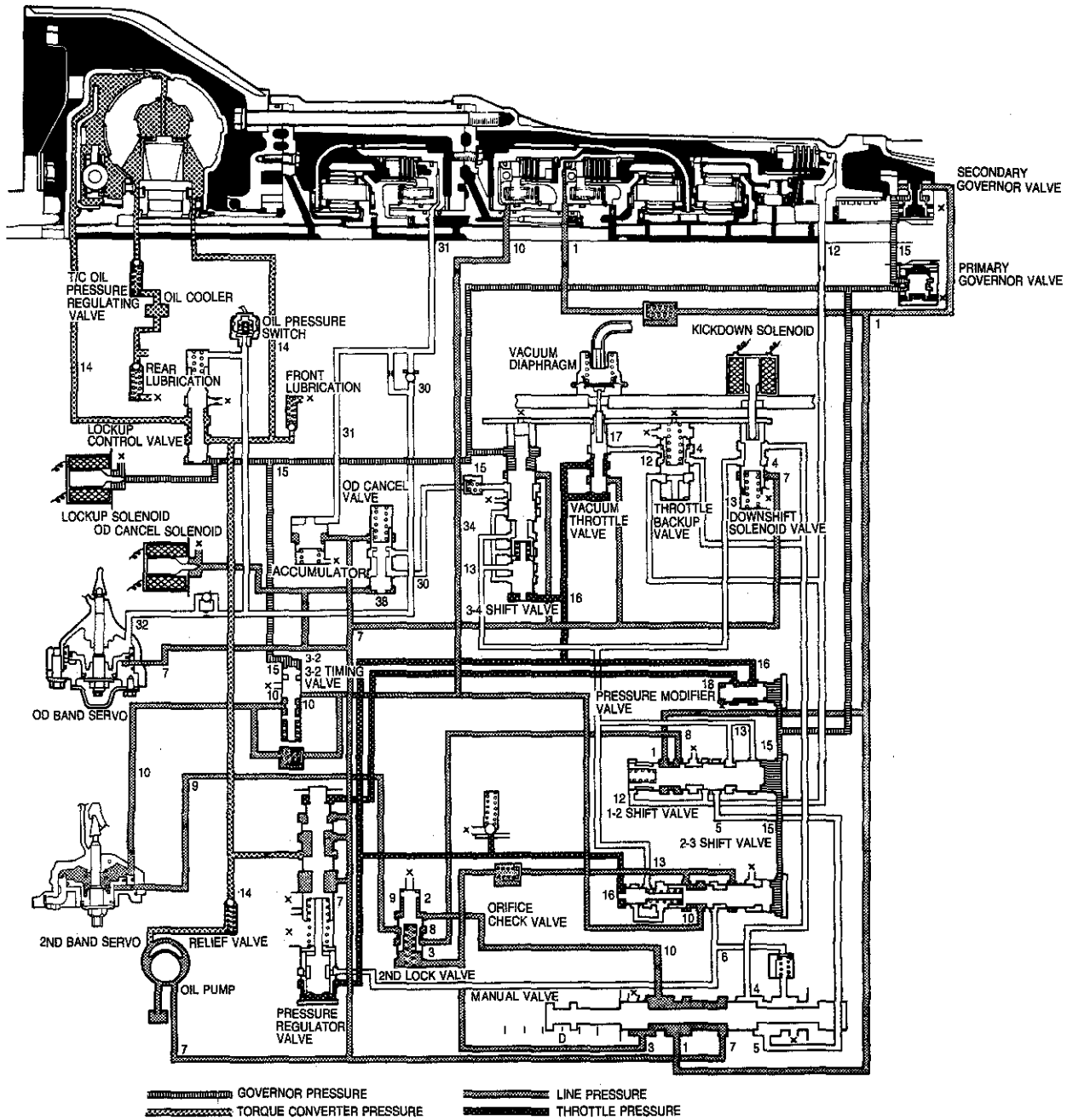
# HYDRAULIC CIRCUIT

# K1

D RANGE; OD

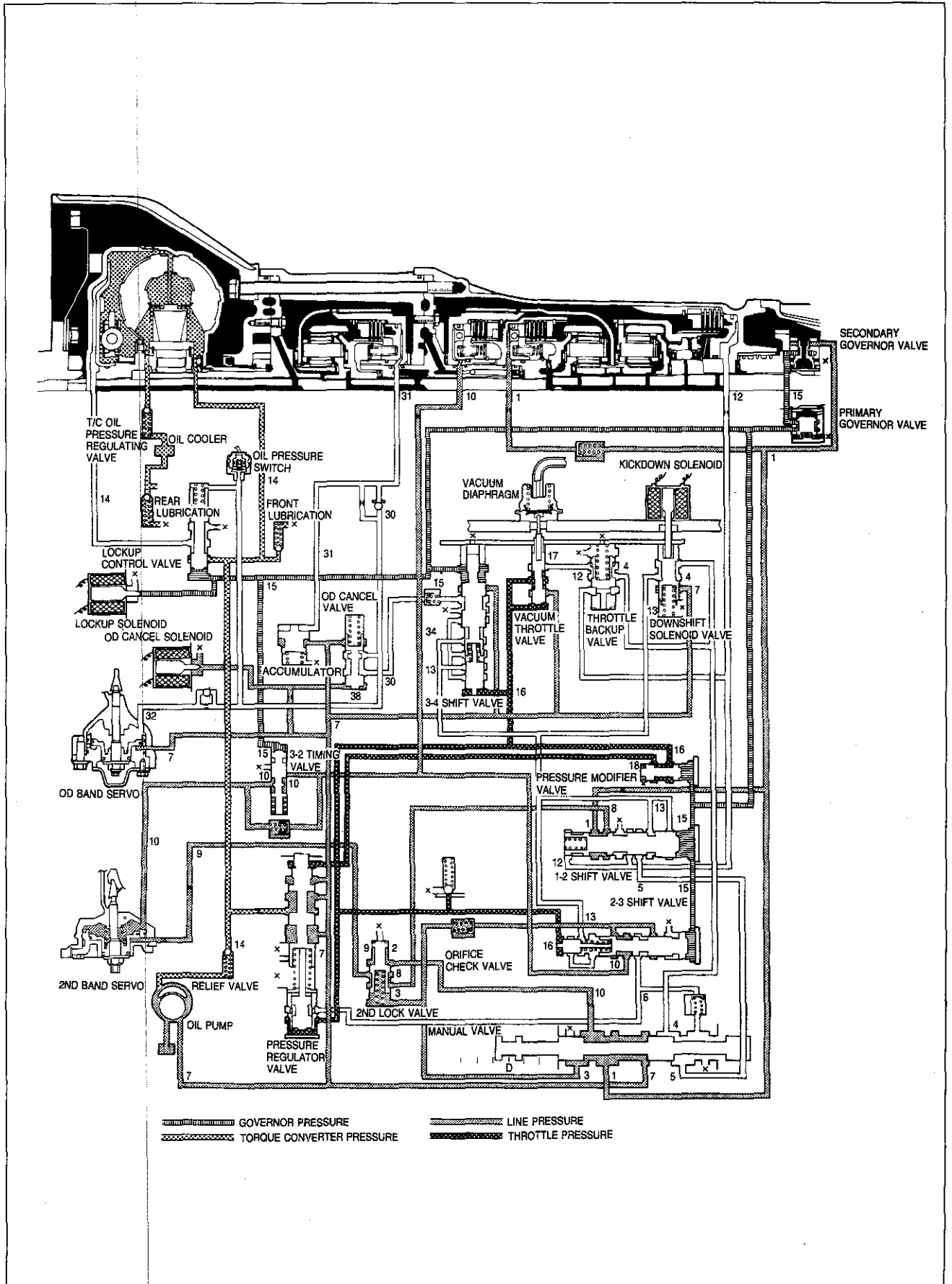


D RANGE; OD, LOCKUP OFF

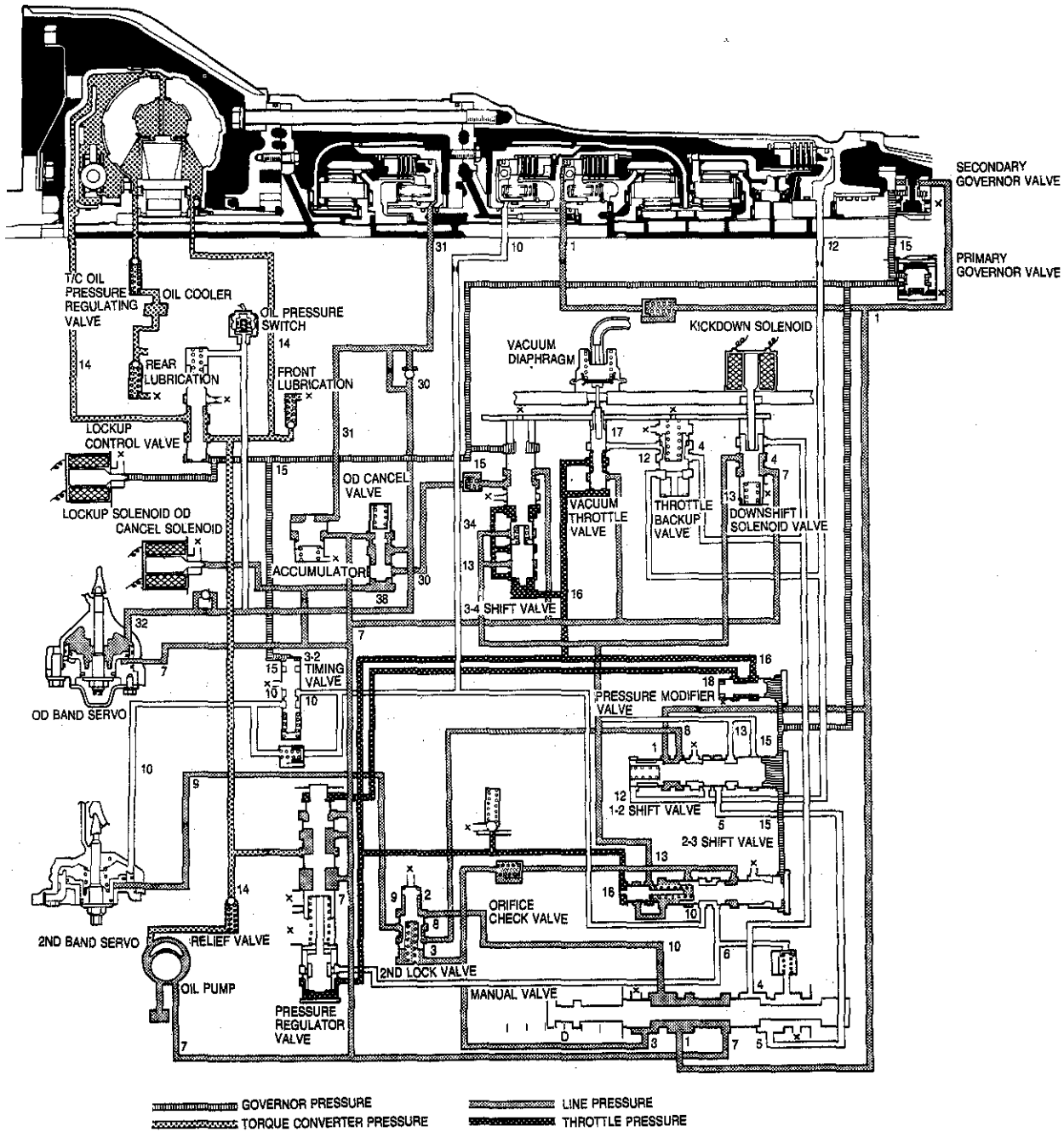




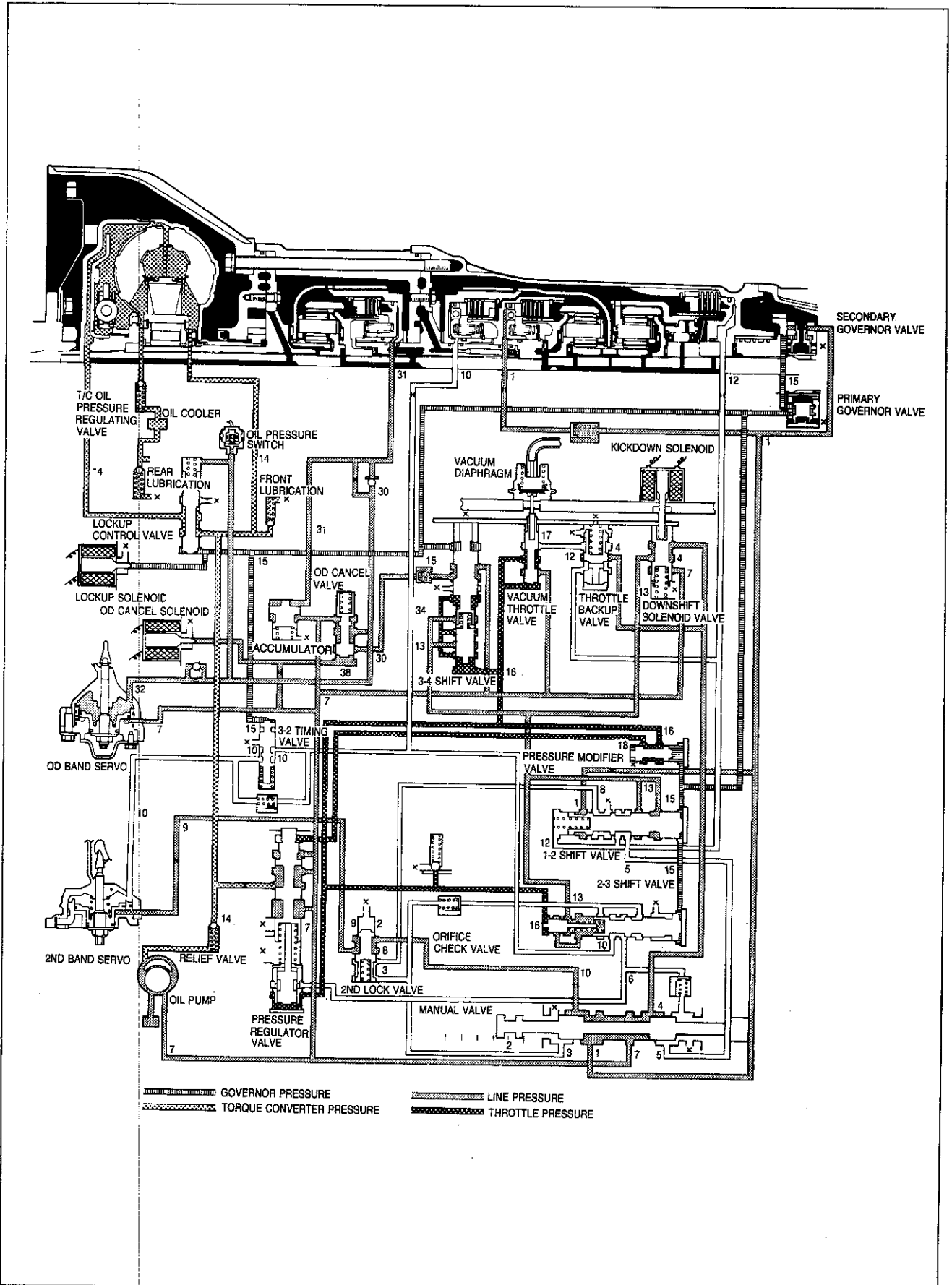
## D RANGE; OD, LOCKUP ON



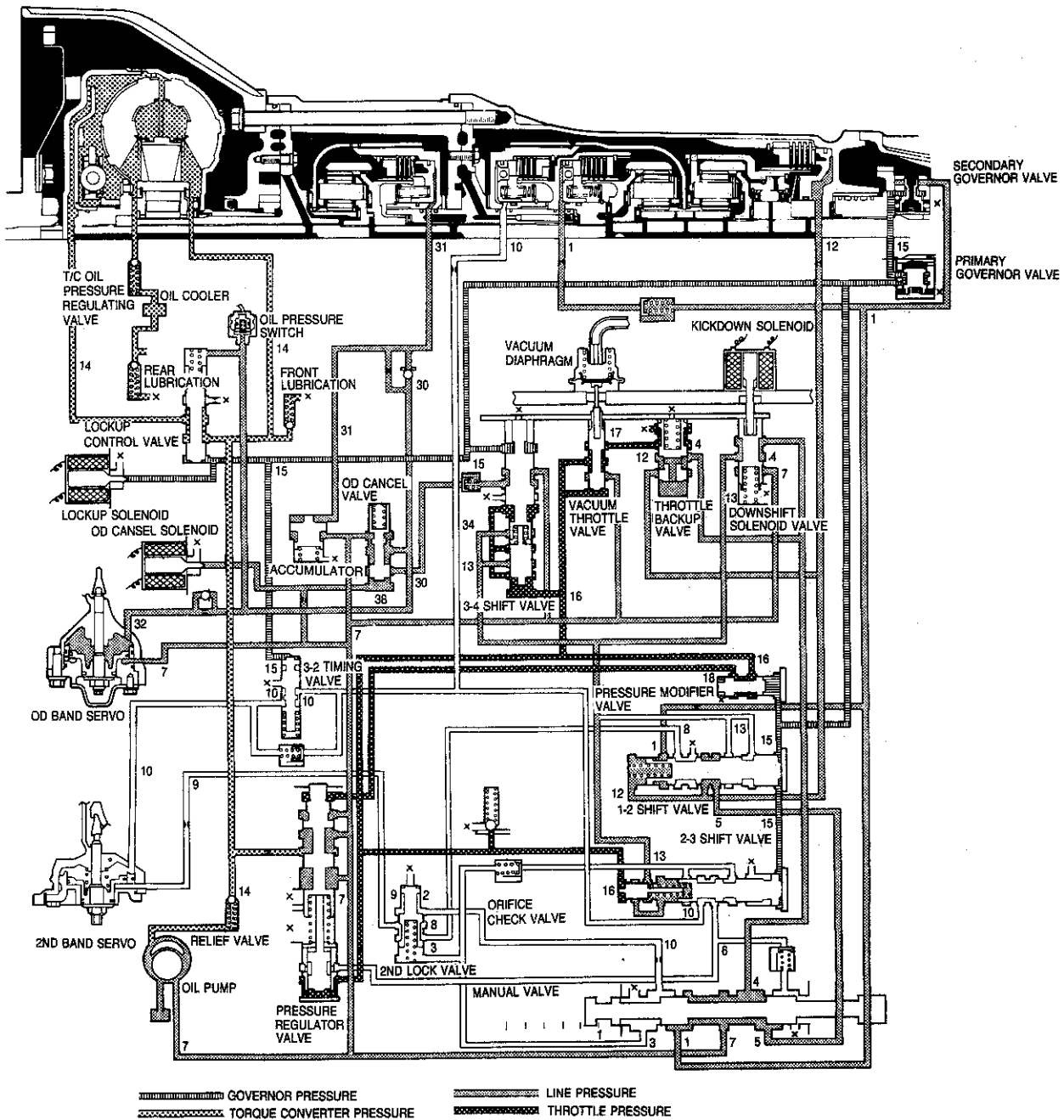
OD RANGE; KICKDOWN



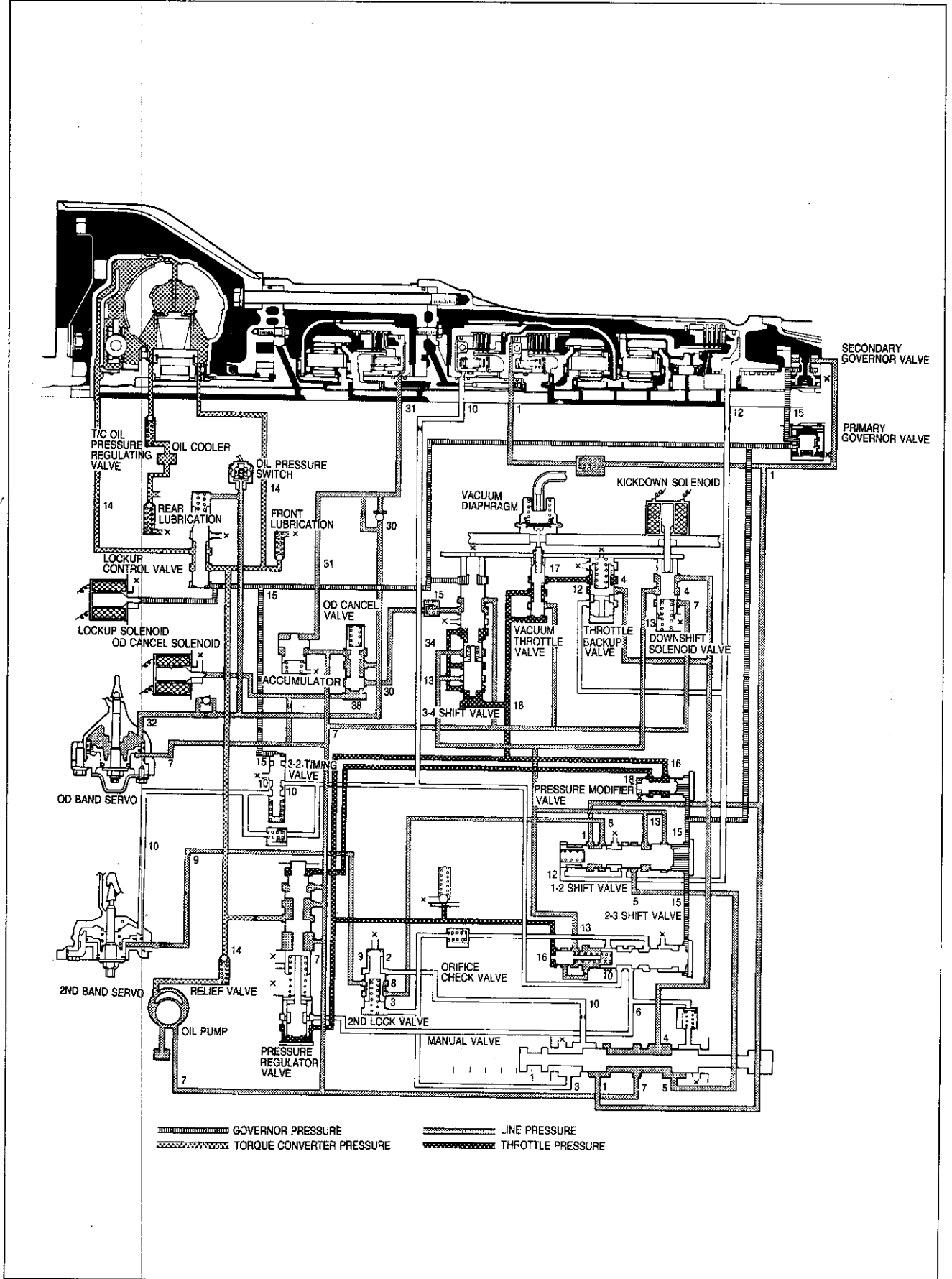
2 RANGE



### 1 RANGE; 1ST GEAR



## 1 RANGE; 2ND GEAR

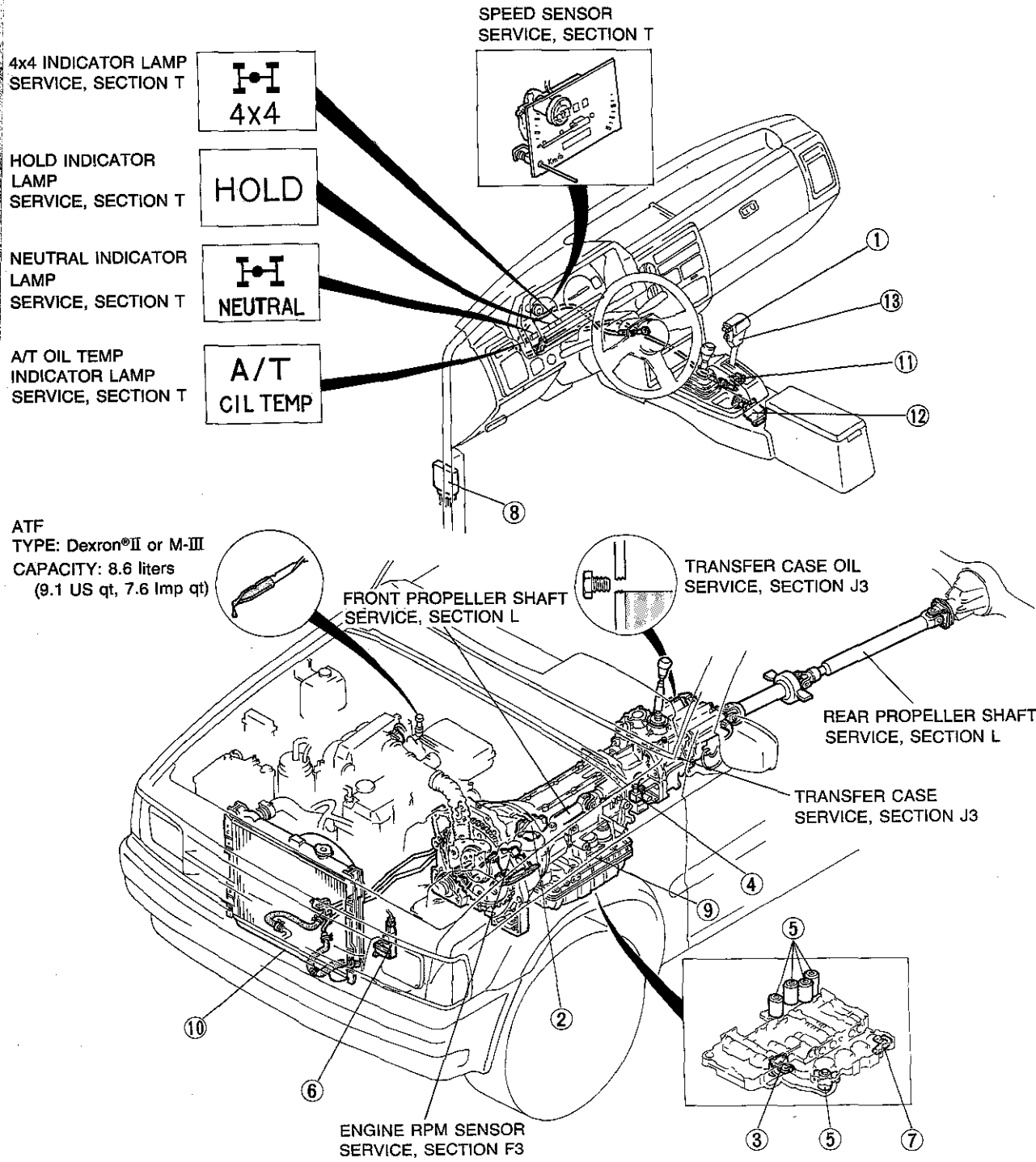


# AUTOMATIC TRANSMISSION (Electronically-Controlled)

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2BU0K2-002

**OUTLINE**

**SPECIFICATIONS**

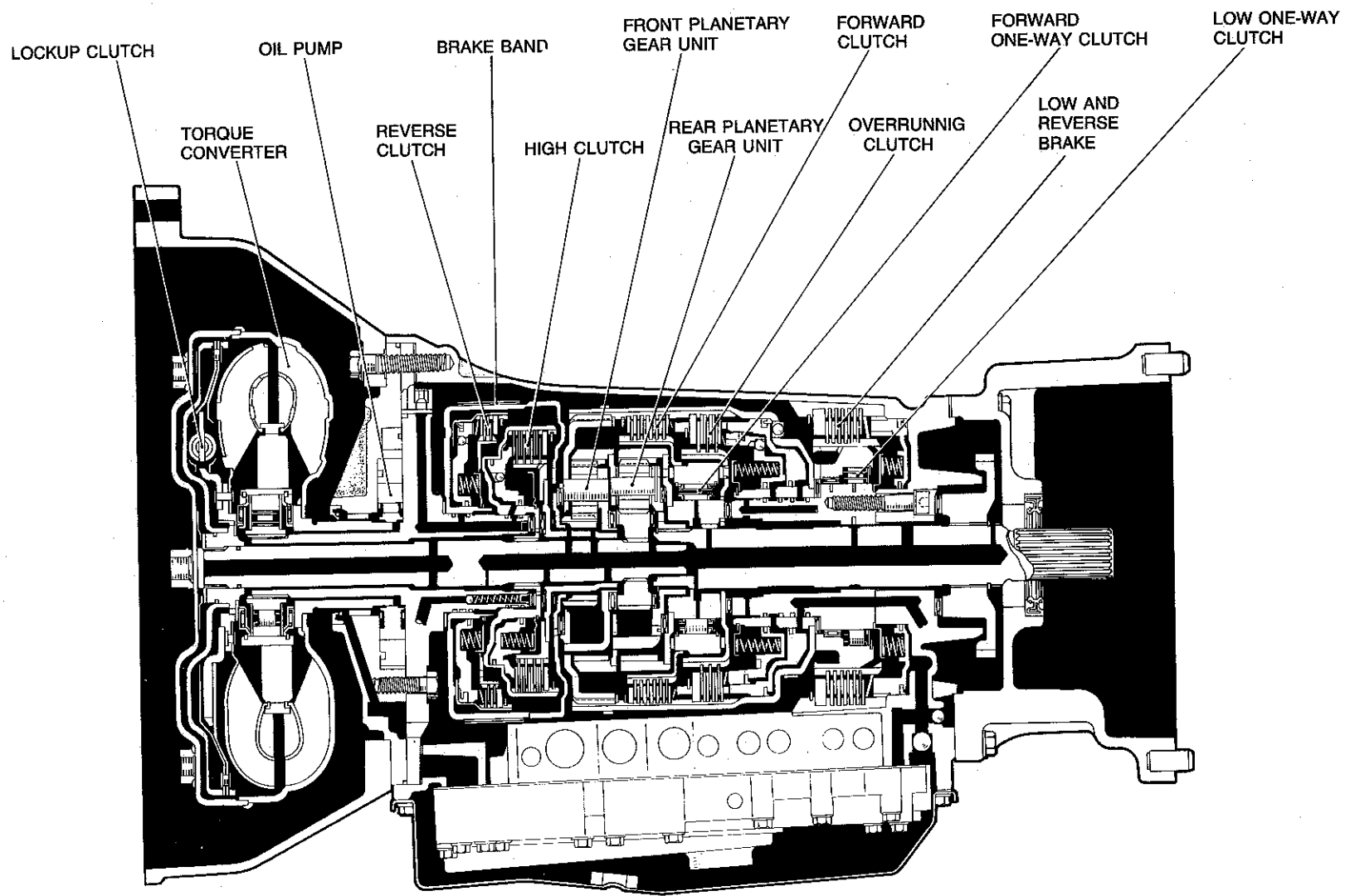
Item		Transmission	R4AX-EL
Torque converter stall torque ratio			2.000
Gear ratio	1st		2.786
	2nd		1.546
	3rd		1.000
	OD (4th)		0.694
	Reverse		2.273
Number of drive/ driven plates	Reverse clutch		2/2
	High clutch		4/7
	Forward clutch		6/6
	Overrunning clutch		3/5
	Low and reverse brake		6/6
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity liters (US qt, Imp qt)	Total	8.6 (9.1, 7.6)
		Oil pan	4.0 (4.2, 3.5)

2BU0K2-003

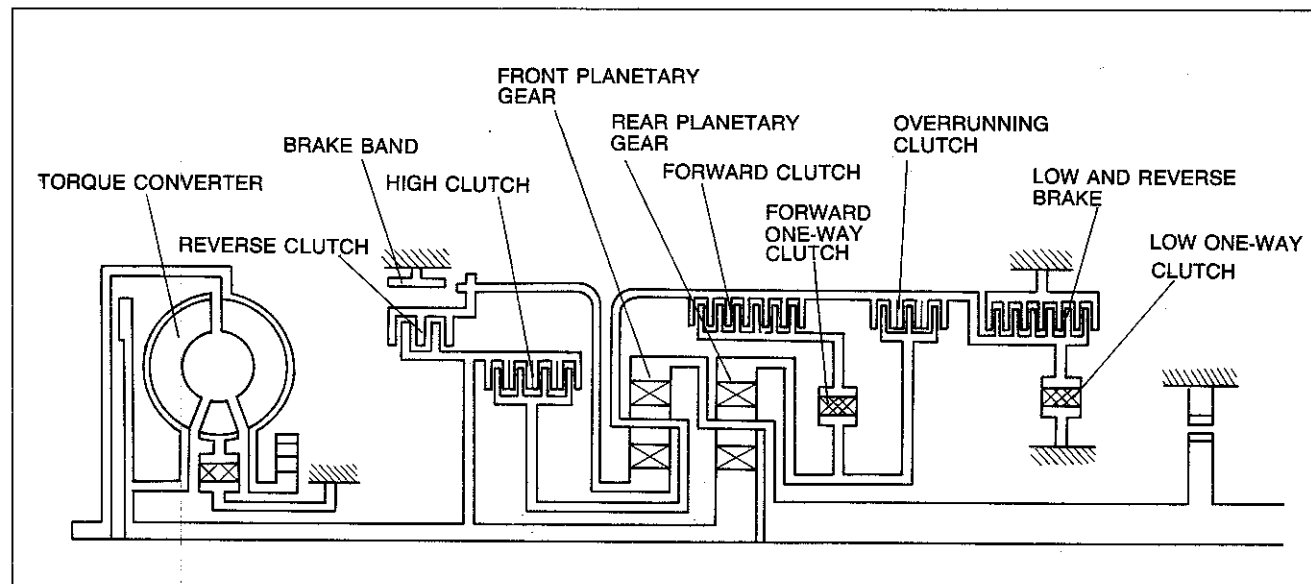
K2



CROSS-SECTIONAL VIEW



POWER FLOW DIAGRAM



9MU0K1-005

OPERATION OF COMPONENTS

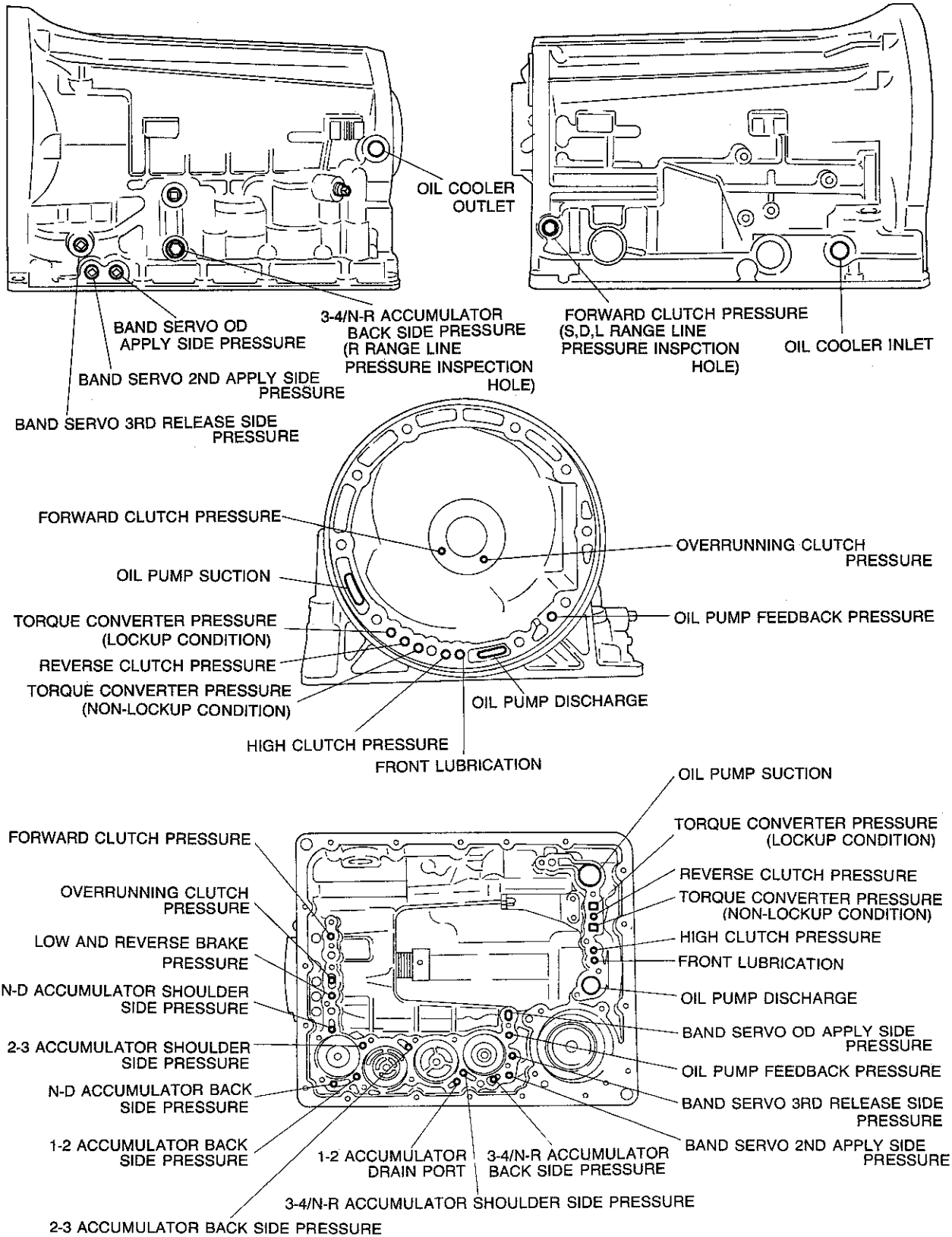
Mode	Range	Gear	Reverse clutch	High clutch	Forward clutch	Overrunning clutch	Brake band			Forward one-way clutch	Low one-way clutch	Low and reverse brake	
							2nd applied	3rd released	OD applied				
ECONOMY/POWER	P	—											
	R	Reverse	○									○	
	N	—											
	D	1st				○	■				●	●	
		2nd				○	□	○			●		
		3rd			○	○	□	⊗*1	⊗		●		
		OD		○		⊗		⊗*2	⊗	○			
	S	1st				○	★				●	●	
		2nd				○	⊙	○			●		
		3rd			○	○	⊙	⊗*1	⊗		●		
L	1st				○	○				●		○	
	2nd				○	○	○			●			
HOLD	D	2nd			○	⊙	○			●			
		3rd		○	○	⊙	⊗*1	⊗		●			
	S	2nd			○	⊙	○			●			
		L	1st			○	○			●		○	

9MU0K1-006

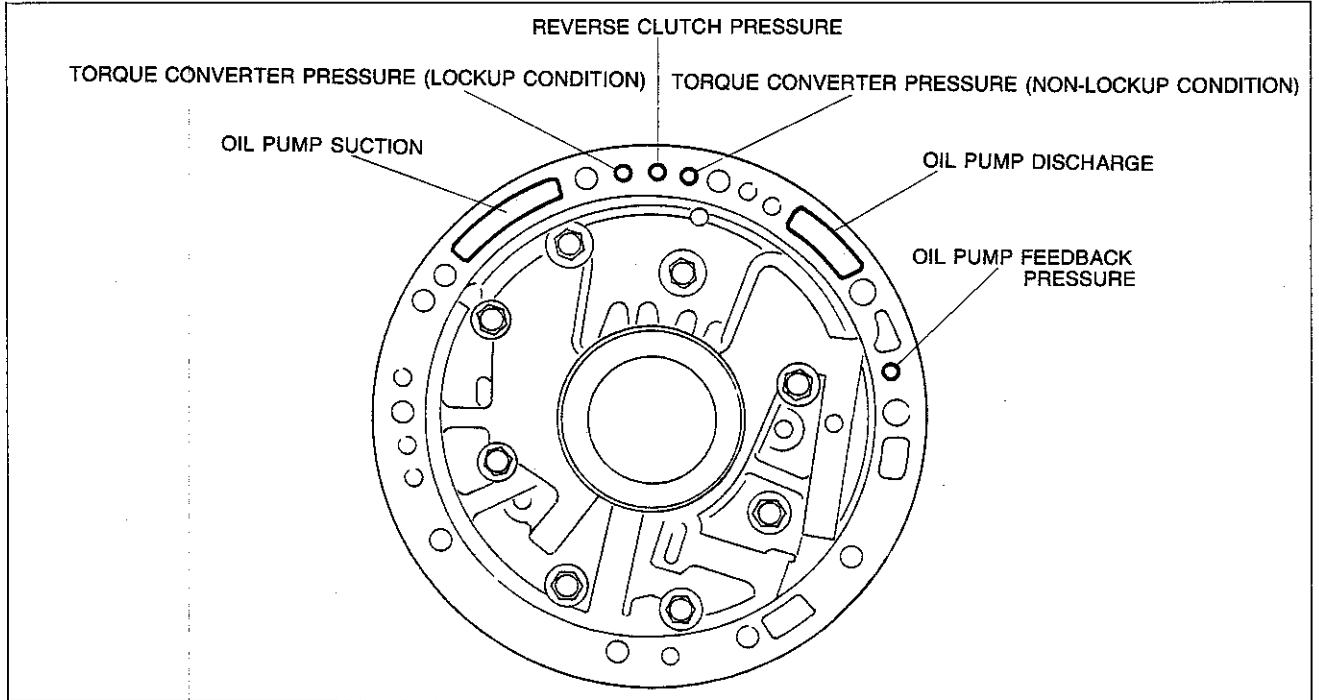
- \*1 : Hydraulic pressure is applied to both 2nd applied side and 3rd released side of band servo piston. However, because the area of the 3rd released side is larger than the 2nd applied side, the brake band does not operate.
- \*2 : Hydraulic pressure is applied to OD applied side, plus condition \*1 above. Brake band is applied.
- : Operates.
- ⊙ : Operates when throttle opening is less than 1/8. Engine braking effect available.
- ★ : Operates when throttle opening is less than 1/8. Engine braking effect not available.
- : Operates when the EC-AT control unit receive OD inhibit signal from the cruise control unit and throttle opening less than 1/8. Engine braking effect available.
- : Operates when the EC-AT control unit receive OD inhibit signal from the cruise control unit and throttle opening less than 1/8. Engine braking effect not available.
- ⊗ : Operates but does not transmit power.
- : Operates during acceleration and cruising.

K2

FLUID PASSAGE LOCATION  
Transmission Case

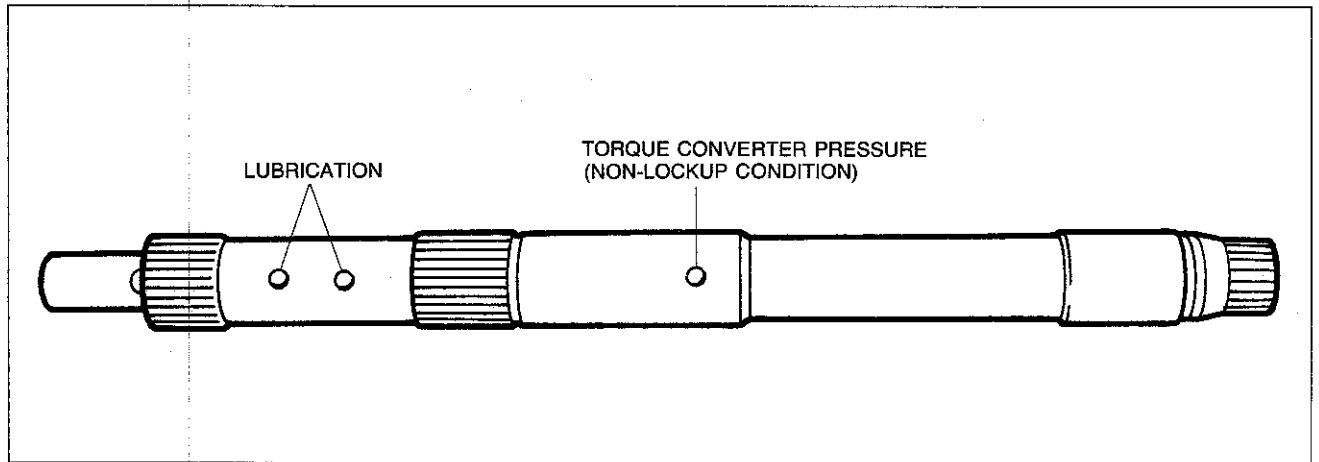


Oil Pump



9MU0K1-008

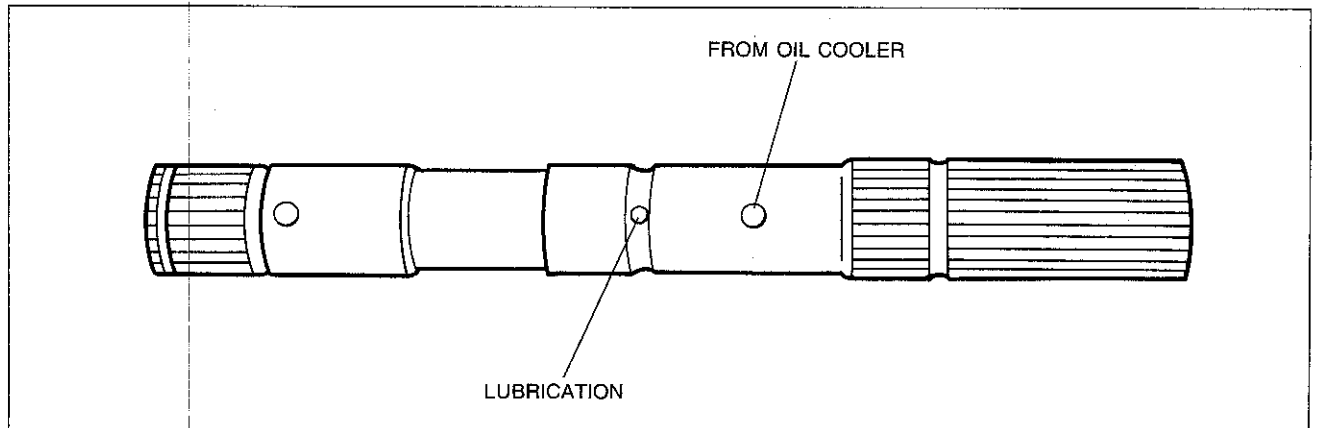
Input Shaft



K2

9MU0K1-009

Output Shaft



9MU0K1-010

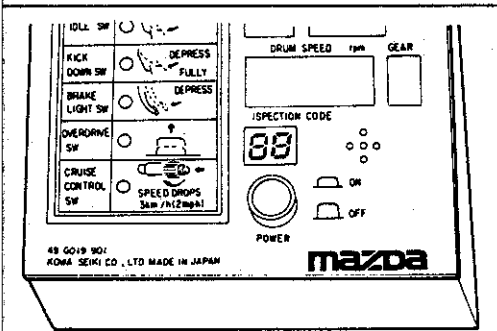
## TROUBLESHOOTING

### GENERAL NOTES

A problem with the EC-AT may be caused by the engine, the EC-AT powertrain, the hydraulic control system, or the electronic control system.

When troubleshooting, therefore, begin from these points, which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

9MU0K1-011



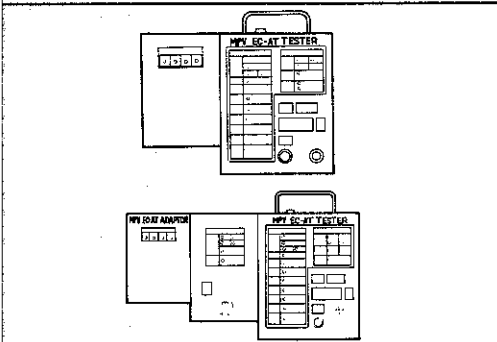
1BU0K2-079

### Step 1: Self-diagnostic System Inspection

Check for malfunction code(s) memorized in the EC-AT control unit with the **EC-AT Tester**. (Refer to page K2-13.)

#### Note

Malfunction code(s) can also be checked for by the flashing sequence of the HOLD indicator lamp. (Refer to page K2-13.)



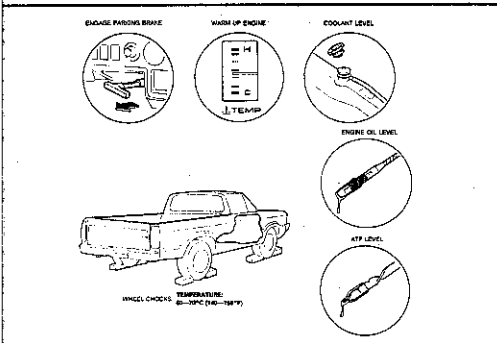
1BU0K2-080

### Step 2: Electric Signal Inspection

Check the signals to/from the EC-AT control unit with the **EC-AT Tester**. (Refer to page K2-21.)

#### Note

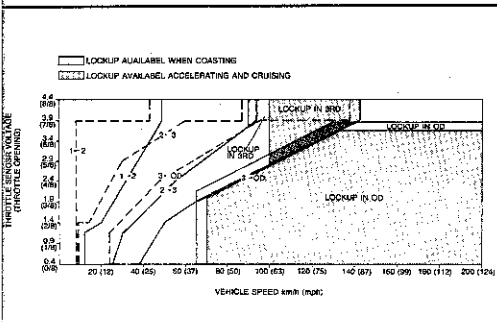
Signals can also be checked by checking the EC-AT control unit terminal voltages with a voltmeter. (Refer to page K2-39.)



1BU0K2-081

### Step 3: Mechanical System Test

Check the engine stall speed, time lag, and line pressure. (Refer to page K2-23.)



1BU0K2-082

### Step 4: Road Test

#### Note

For correct testing, vehicle speed, throttle opening (throttle sensor voltage), and gear position should be checked with the **EC-AT Tester**.

Check the shift point, shift schedule, and shift shock. (Refer to page K2-29.)



Inspection point and reference page		ON VEHICLE														OFF VEHICLE																						
		Preliminary		Electronic system										Hydraulic control system				Powertrain																				
		K2-42	K2-146	Section F2	Section G	K2-35	K2-35	Section T	Section F2	Section F2	Section F2	K2-37	K2-36	Section G	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-27	K2-103	K2-59	K2-59	K2-59	K2-59	K2-61	K2-58	K2-65	K2-71	K2-85	K2-82	K2-85	K2-85	K2-93	K2-78	K2-99	
ATF level and condition	Selector lever and control linkage	Idle speed and engine condition	Ignition switch and starter	Inhibitor switch	Hold switch	Cruise control switch	Atmospheric pressure sensor	Idle switch	Throttle sensor	Speed sensor 1	ATF thermostat	Engine rpm sensor	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Dropping resistor	Lockup solenoid	Overrunning clutch solenoid	Line pressure	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Oil pump	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band and band servo	Parking mechanism			
Engine starting	Engine does not start in N and/or P range	2	1	3																																		
	Engine starts in ranges other than N and P range	1		2																																		
Accelerating	Vehicle does not move in D range (moves in L, S, and R ranges)	1																																		②		
	Vehicle does not move in forward ranges (moves in R range) Extremely poor acceleration	1													3					2	4	5																
	Vehicle does not move in R range (moves in forward ranges) Extremely poor acceleration	1													3					2	4																	
	Vehicle does not move in any range	1	2												4					3						5	9		6							8	7	10
	Slippage felt when accelerating	1	2								3				5					4	6	7			8	12	13	10		9						11		
	Vehicle moves in N range	1																							4			3		2							5	
	Excessive creep		1																																			
	No creep	1																			2	3					5	6		4								
	Low maximum speed and poor acceleration	1			2										3	4						5					10	11	6	7							9	8
	Does not shift from 1st to 2nd	3		2	1						6			4								5																7
Does not shift from 2nd to 3rd	3		2	1						6			4								5								7								8	
Does not shift from 3rd to OD	4		3	1	2					6	7		5																									8
Lockup does not occur			4					1	2	3	6	5					8		7	9						10												
No shift	Does not shift from OD to 3rd	1								2			4	5				3			6												8		7			
	Does not shift from 3rd to 2nd, or from OD to 2nd	1								2			3	4							5								6								7	
	Does not shift from 2nd to 1st or from 3rd to 1st	1				3				2			4	5							6								8				7				9	
	Does not kickdown when accelerator is depressed in OD within kickdown range									1	2			3	4																							





Inspection point and reference page		ON VEHICLE														OFF VEHICLE																					
		Preliminary		Electronic system										Hydraulic control system				Powertrain																			
		K2-42	K2-146	Section F2	Section G	K2-35	K2-35	Section T	Section F2	Section F2	Section F2	K2-37	K2-36	Section G	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-27	K2-103	K2-59	K2-59	K2-59	K2-59	K2-61	K2-58	K2-65	K2-71	K2-85	K2-82	K2-85	K2-85	K2-93	K2-78	K2-99
ATF level and condition	Selector lever and control linkage	Idle speed and engine condition	Ignition switch and starter	Inhibitor switch	Hold switch	Cruise control switch	Atmospheric pressure sensor	Idle switch	Throttle sensor	Speed sensor 1	ATF thermostat	Engine rpm sensor	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Dropping resistor	Lockup solenoid	Overrunning clutch solenoid	Line pressure	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Oil pump	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band and band servo	Parking mechanism		
Slipping	Engine overruns or slips when shifting OD to 3rd	1							2					4					3	5								6	7								
	Engine overruns or slips when shifting OD to 2nd	1							2				5	4					3	6									8						7		
	Engine overruns or slips when shifting 3rd to 2nd	1							2					4			8		3	5			10					9	7							6	
	Engine overruns or slips when shifting OD to 3rd, or OD to 2nd	1							2					4					3	5									6	7			8				
	Lockup clutch (in torque converter) slips when locking	1							2						5	4			3	6							7										
Noise	Transmission noisy in P, and N ranges	1							3	4		5							2						6	7											
	Transmission noisy in D, S, L, and R ranges	1																									2										
Others	No engine braking in L range	2			1				3	4		5					7		6														8	9			
	Vehicle moves in P or parking gear not disengaged when P is disengaged	1																																			2
	Transmission overheats	1	2					3						5					4	6					7	14	8	9	11	12	13	10					
	White smoke discharged from exhaust while running	1																									2	3	5	6	7	4					
Abnormal odor from oil level gauge pipe	1																							3	2	4	5	7	8	9	6						
Engine stalls when shifting to D, S, L, or R ranges		1														2				3						4											

2BU0K2-004

SELF-DIAGNOSTIC SYSTEM INSPECTION

SELF-DIAGNOSTIC FUNCTION

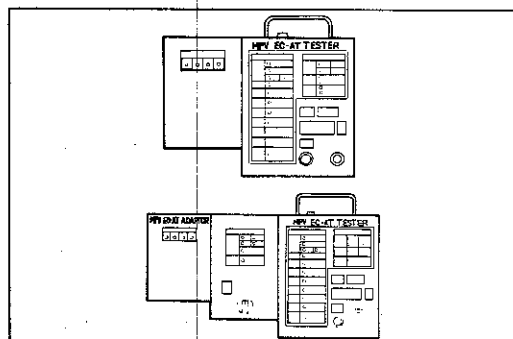
The self-diagnostic system, which is integrated in the EC-AT control unit, diagnoses malfunction of the main sensors (input) and solenoid valves (output) and the EC-AT control unit. Malfunctions or intermittent malfunctions are stored in the EC-AT control unit to later be output as malfunction codes.

The **EC-AT Tester and Adapter** are used to retrieve these malfunction codes. Each malfunction is indicated by a code number and the buzzer as shown in the table below.

Malfunction Code Number

CODE NO.	LOCATION OF MALFUNCTION	BUZZER	BUZZER (HOLD INDICATOR LAMP FLASH CYCLE)
		49 G019 901 TESTER BODY	49 G019 901A TESTER BODY
01	ENGINE RPM SENSOR	ON OFF	ON OFF
06	SPEED SENSOR 1		
07	SPEED SENSOR 2 (IN SPEEDOMETER)		
12	THROTTLE SENSOR		
56	ATF THERMOSENSOR		
60	SHIFT SOLENOID A		
61	SHIFT SOLENOID B		
62	OVERRUNNING CLUTCH SOLENOID		
63	LOCKUP SOLENOID	0.4sec. 2.0sec.	1.2sec. 0.4sec. 1.6sec. 0.4sec. 4.0sec.
64	LINE PRESSURE SOLENOID		

9MU0K1-018



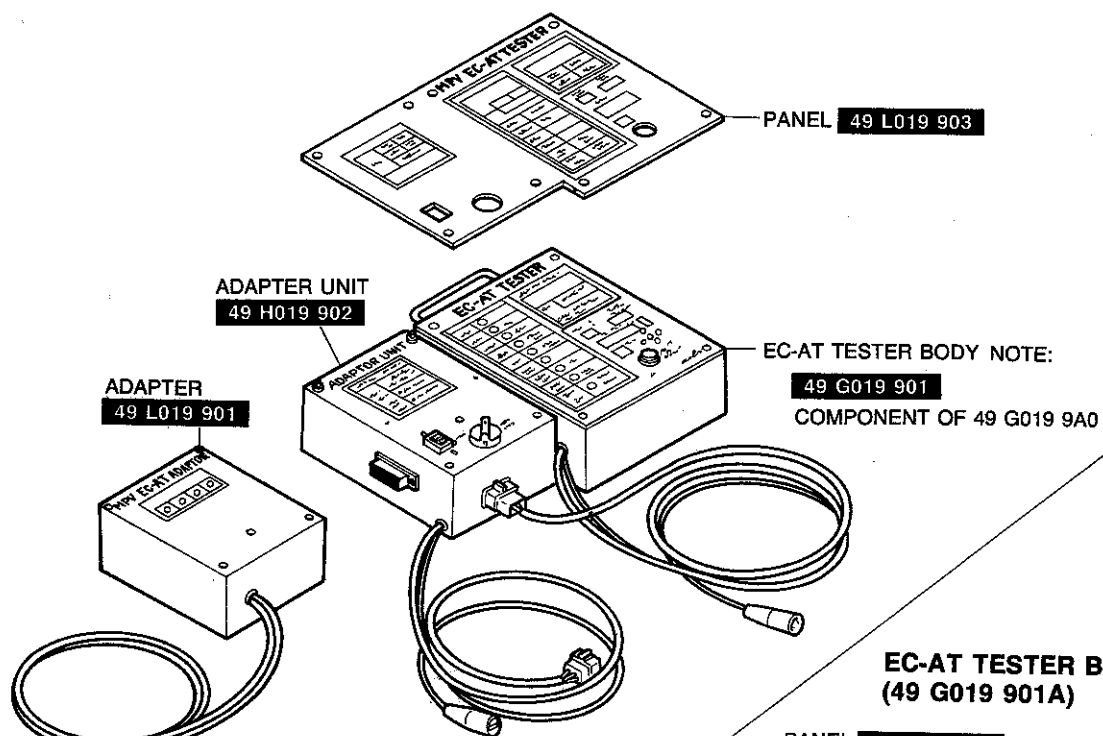
1BU0K2-005

EC-AT TESTER

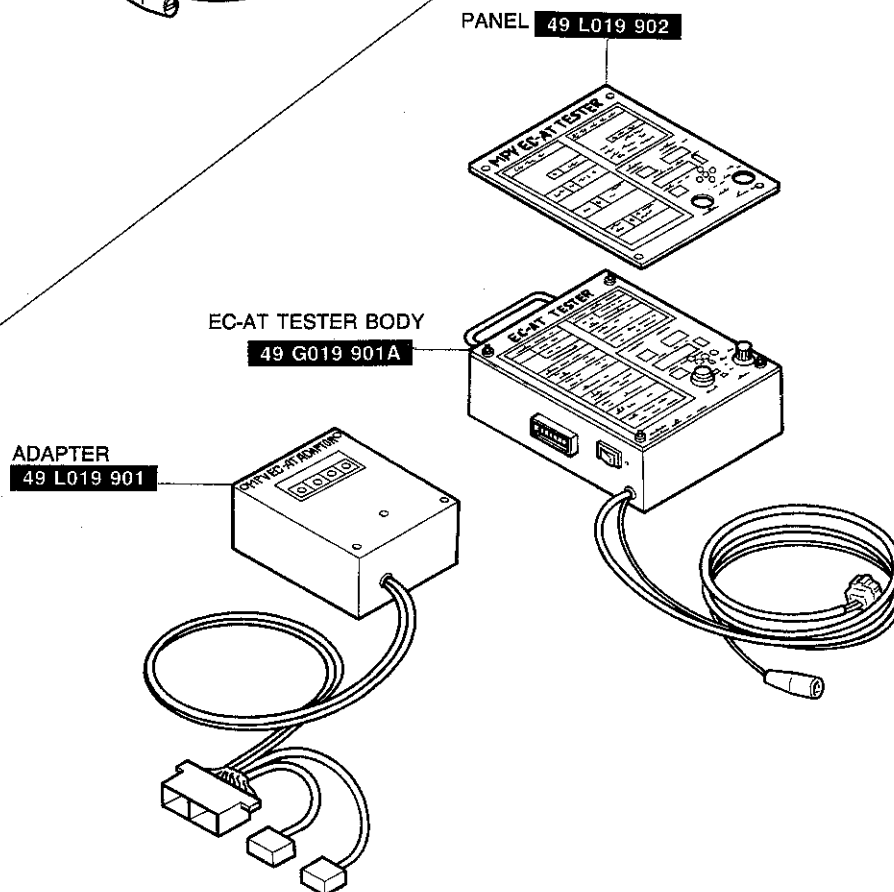
The previous **EC-AT Tester** can be used along with the **Adapter** (49 L019 901).

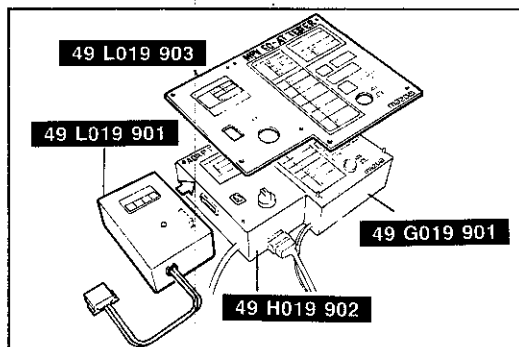
### Components

#### EC-AT TESTER BODY (49 G019 901) AND ADAPTER UNIT (49 H019 902)

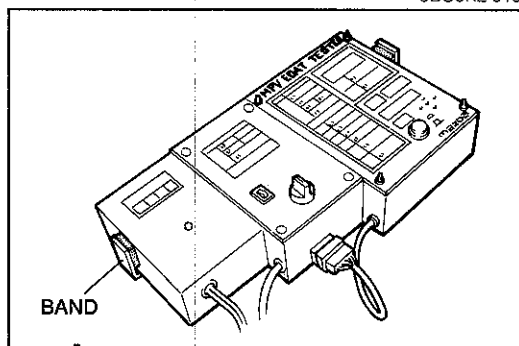


#### EC-AT TESTER BODY (49 G019 901A)

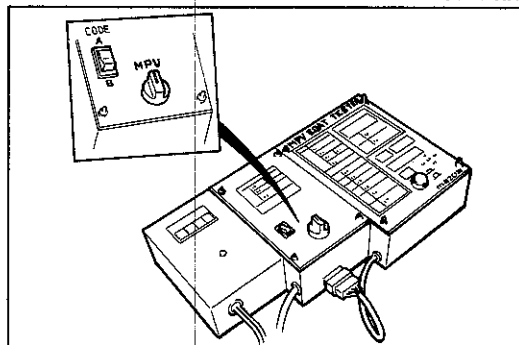




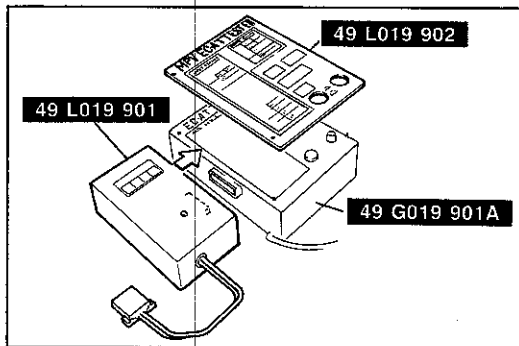
0BU0K2-015



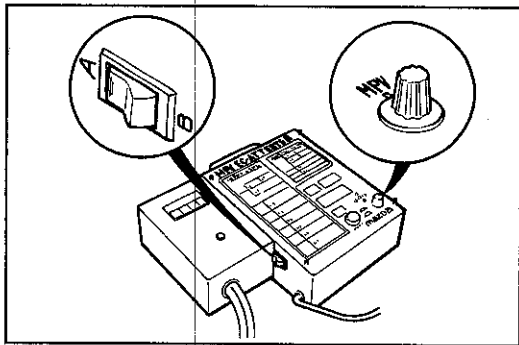
9MU0K1-021



9MU0K1-022



0BU0K2-016



9MU0K1-024

**Assembly of EC-AT Tester**

**For EC-AT tester body (49 G019 901) and adapter unit (49 H019 902)**

1. Install the **adapter** (49 L019 901) to the assembled **EC-AT tester body** (49 G019 901) and **adapter unit** (49 H019 902).
2. Set the **panel** (49 L019 903) onto the EC-AT tester.

3. Affix the EC-AT tester assembly with the band.

4. Set the code selector switch to position A.

**Note**

**Position B is used only for the 1987 626.**

5. Select the select switch to the MPV position.

**For EC-AT tester body (49 G019 901A)**

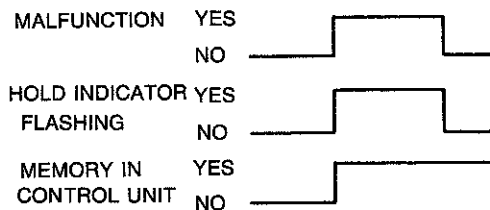
1. Install the **adapter** (49 L019 901) to the **EC-AT tester body** (49 G019 901A).
2. Set the **panel** (49 L019 902) onto the EC-AT tester body.

3. Perform steps 3 to 5 above.

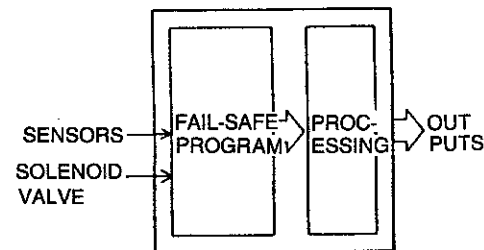
**06 → 4 SEC PERIOD →**  
**62 → 4 SEC PERIOD →**  
**64 → 4 SEC PERIOD →**  
**REPEATS ABOVE**

9MU0K1-025

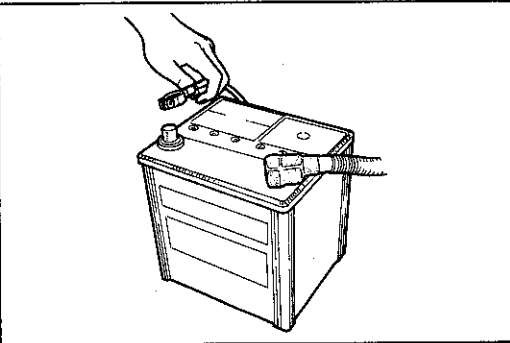
### CHECK CONNECTOR NOT GROUNDED



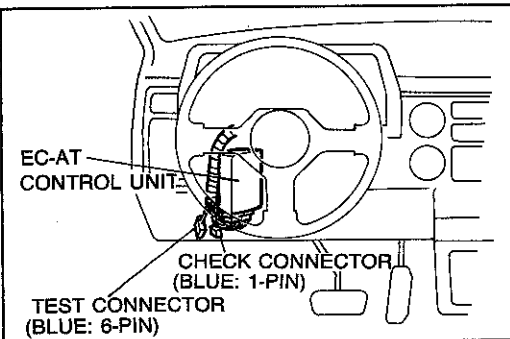
9MU0K1-026



9MU0K1-027



2BU0K2-005



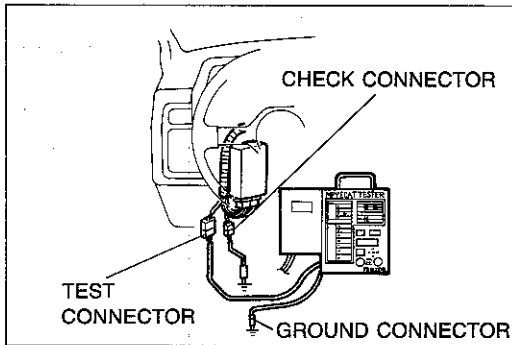
9MU0K1-029

### GENERAL NOTES

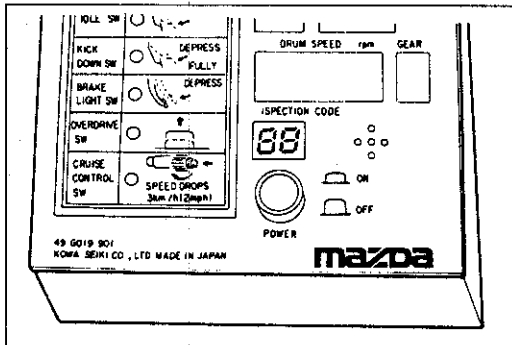
1. If there is more than one malfunction, the code numbers will be displayed on the tester one by one in numerical order. In the case of malfunctions 62, 06, and 64, the code numbers are displayed in order of 06, 62, then 64. The display is shown.
2. The HOLD indicator flashes to indicate the same pattern as the buzzer of the **EC-AT Tester** (49 G019 901A) when the check connector (blue, 1-pin) is grounded. When the check connector is not grounded, the indicator flashes at a constant frequency malfunction recovers. However, the malfunction code is memorized in the EC-AT control unit.
3. The EC-AT control unit has a built-in fail-safe function for the throttle sensor, the speed sensors, and all the solenoids. If a malfunction occurs, the EC-AT control unit will control operation of the remaining components according to a preset fail-safe program. The vehicle may still be driven, although driving performance will be slightly affected.
4. The memory of malfunction codes is canceled when the negative battery terminal is disconnected for approximately 20 seconds.

### RETRIEVAL PROCEDURES

1. Locate the check connector, and test connector.



0BU0K2-166



1BU0K2-006

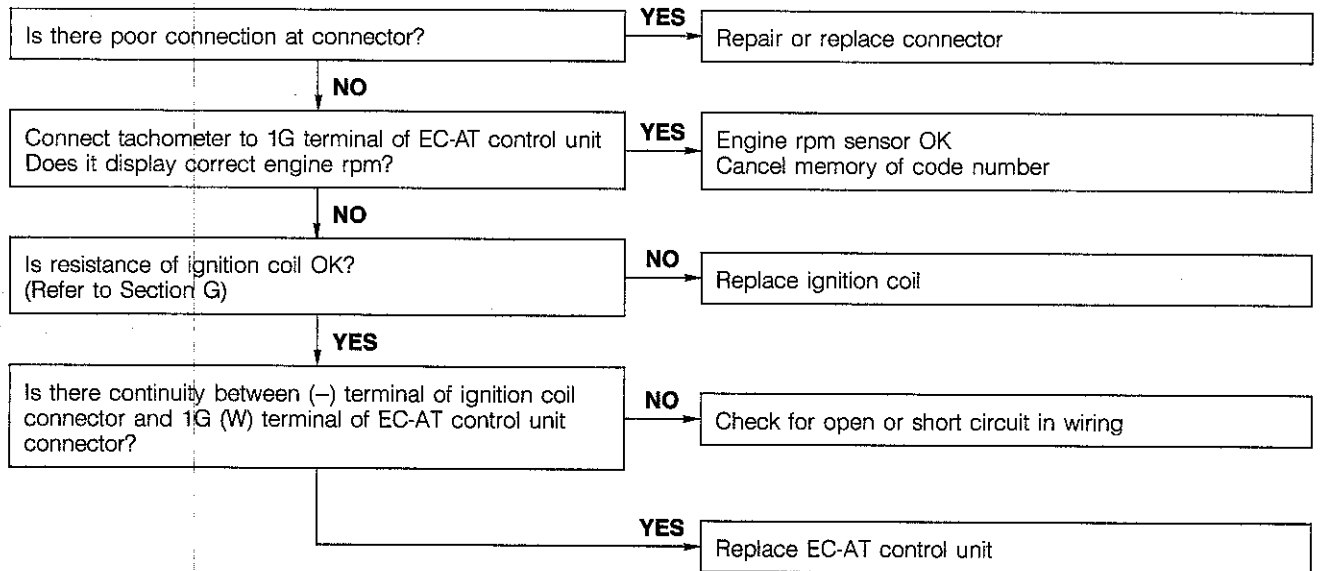
2. Connect the 6-pin connector of the **EC-AT Tester** to the test connector (Blue: 6-pin).
3. Ground the ground connector of the **EC-AT Tester**.
4. Ground the check connector (Blue: 1-pin).
5. Turn the ignition switch ON.
6. Check that **"88"** flashes on the digital display and that the buzzer sounds for three seconds.
7. If **"88"** does not flash, check the test connector wiring.
8. If **"88"** flashes and the buzzer sounds continuously for more than **20 seconds**, check the wiring to 2N terminal of the EC-AT control unit for a short-circuit. If necessary, replace the EC-AT control unit and repeat steps 2 to 5.
9. Note the code numbers and check for the causes by referring to the **INSPECTION PROCEDURES** shown on pages K2-17 to 20. Repair as necessary.

**Note**

After repairs are made, recheck for code numbers by performing the **"AFTER-REPAIR PROCEDURES"**. (Refer to page K2-20.)

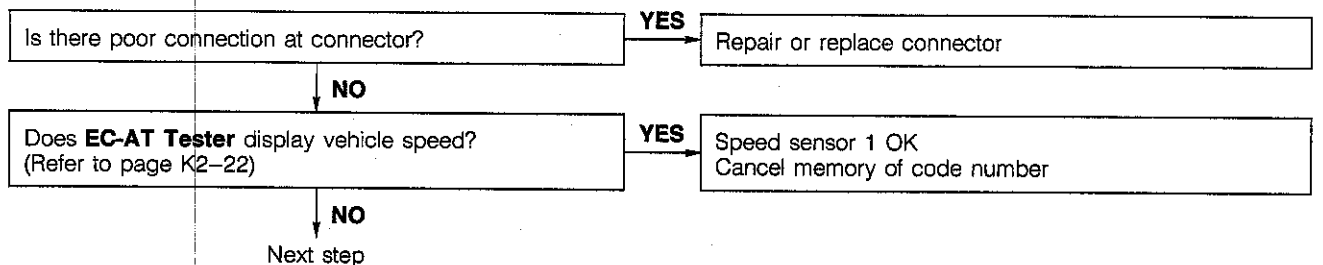
**INSPECTION PROCEDURES**

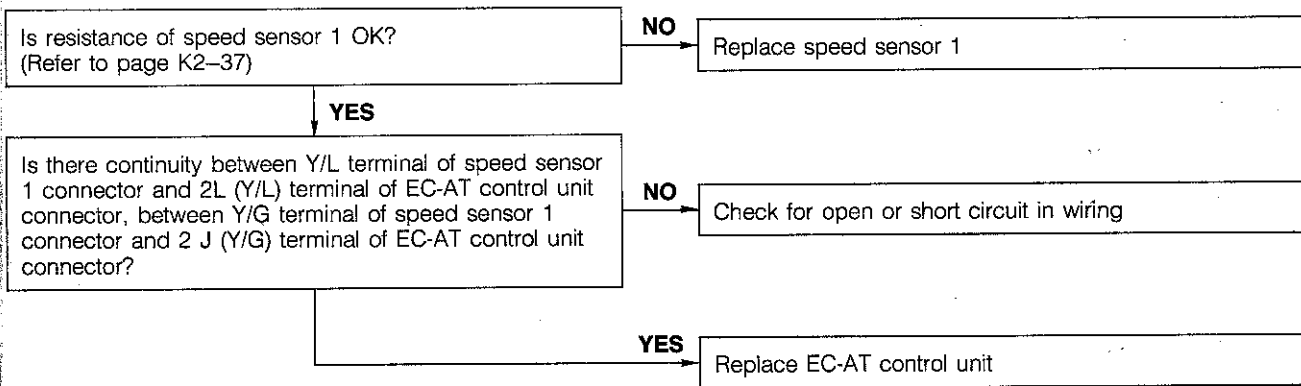
**No.01 Code Display (Engine RPM Sensor)**



0BU0K2-018

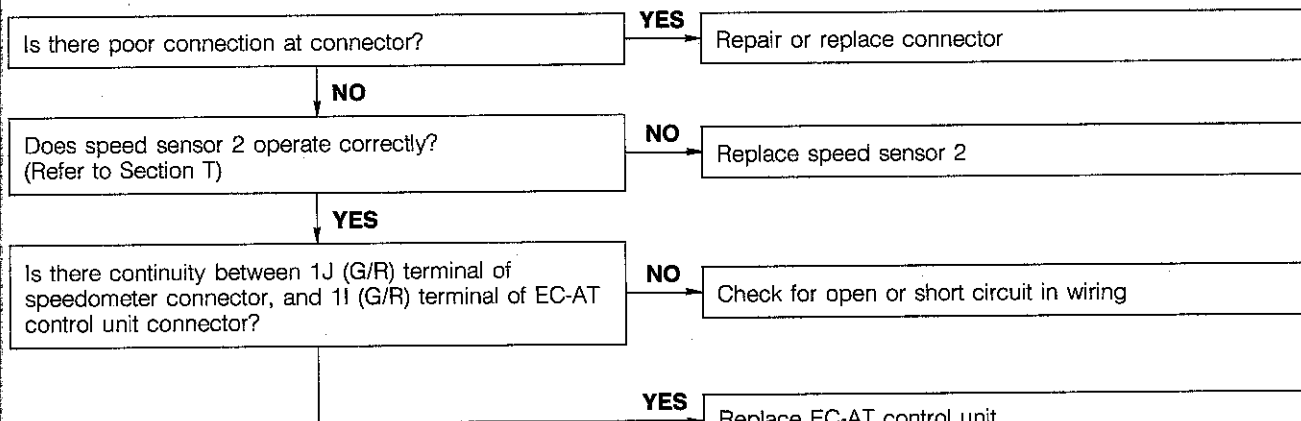
**No.06 Code Display (Speed Sensor 1)**





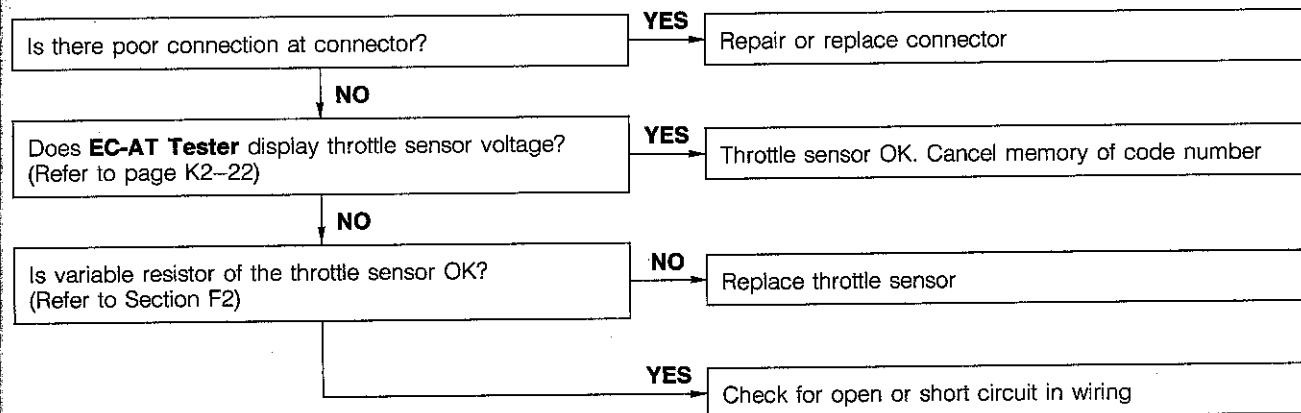
1BU0K2-007

### No.07 Code Display (Speed Sensor 2)



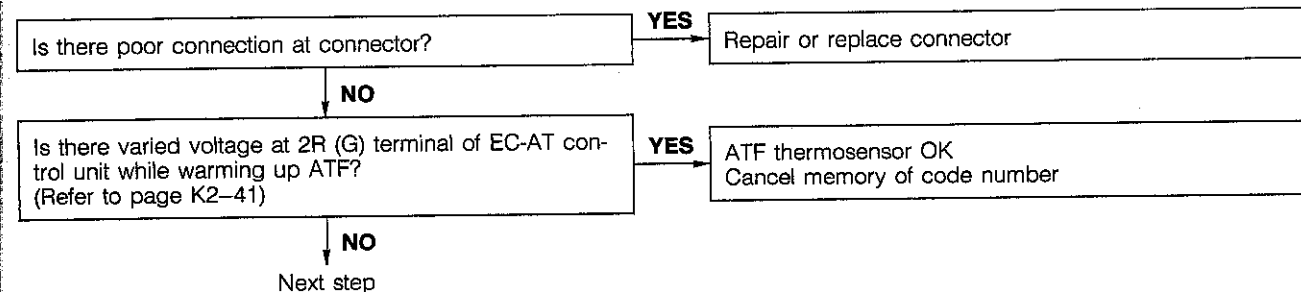
9MU0K1-034

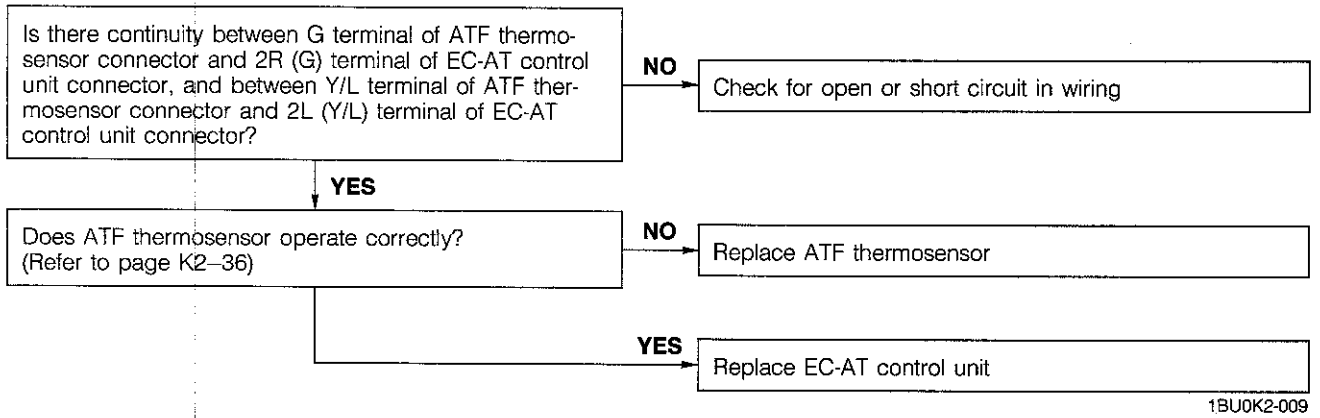
### No.12 Code Display (Throttle Sensor)



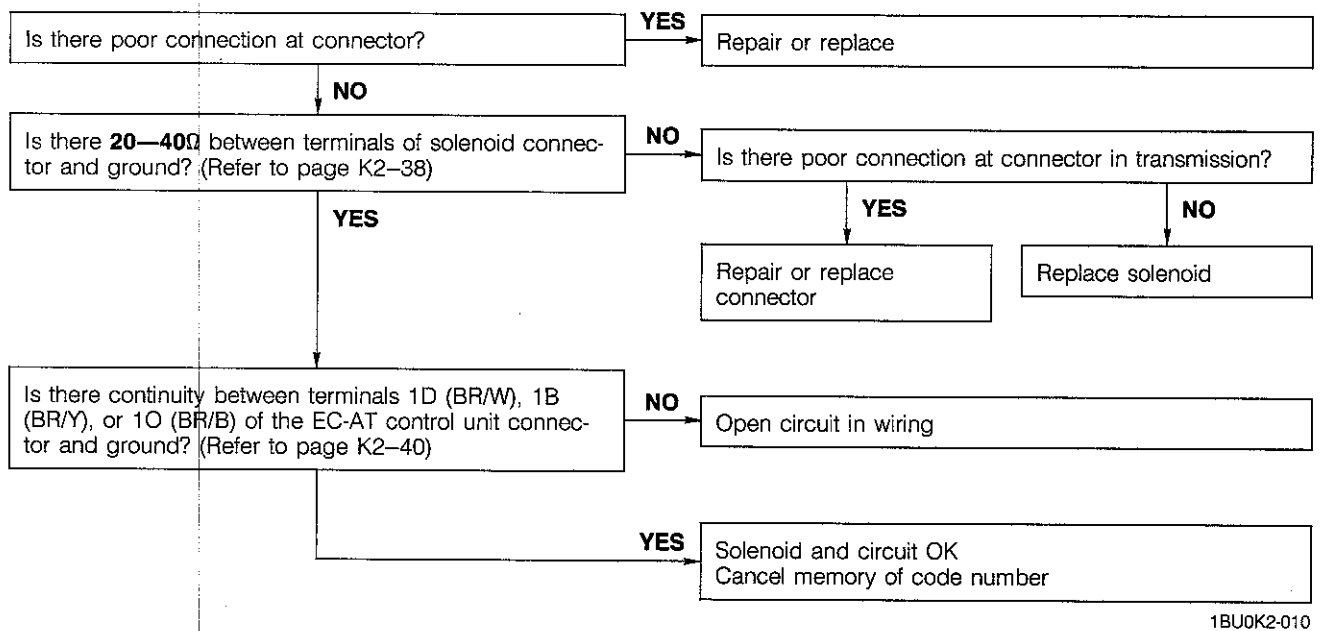
1BU0K2-008

### No.56 Code Display (ATF Thermosensor)

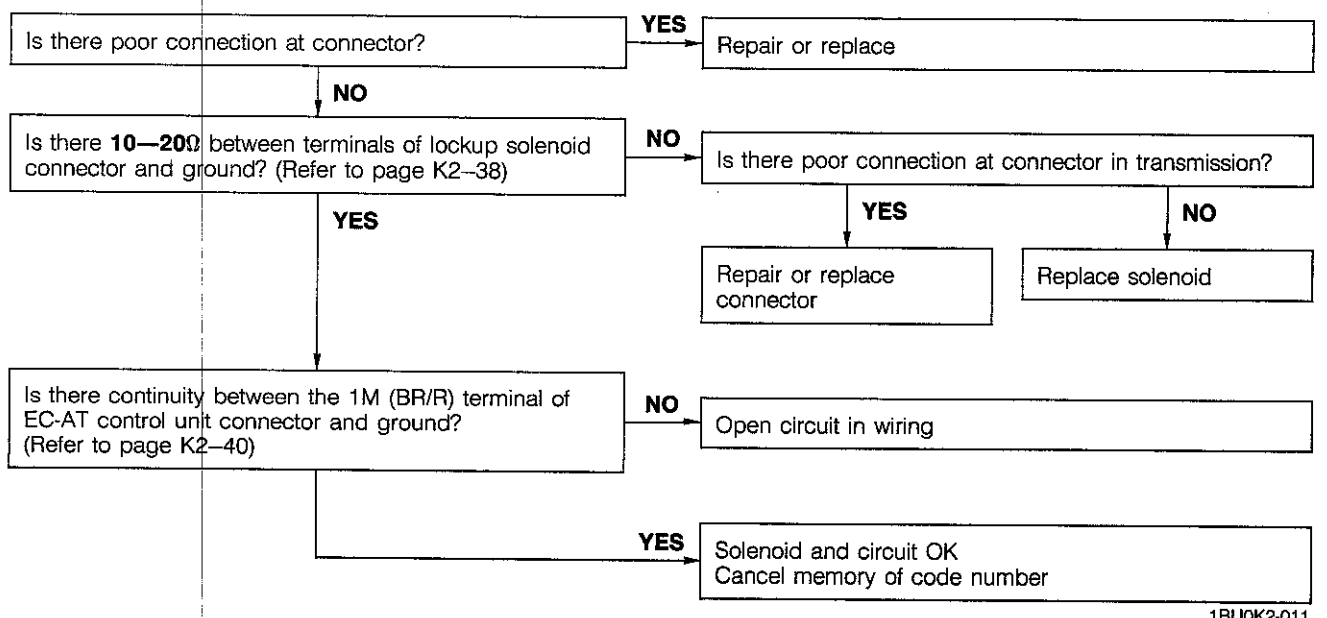




**No.60, 61, or 62 Code Display (Shift Solenoid A, Shift Solenoid B, or Overrunning Clutch Solenoid)**

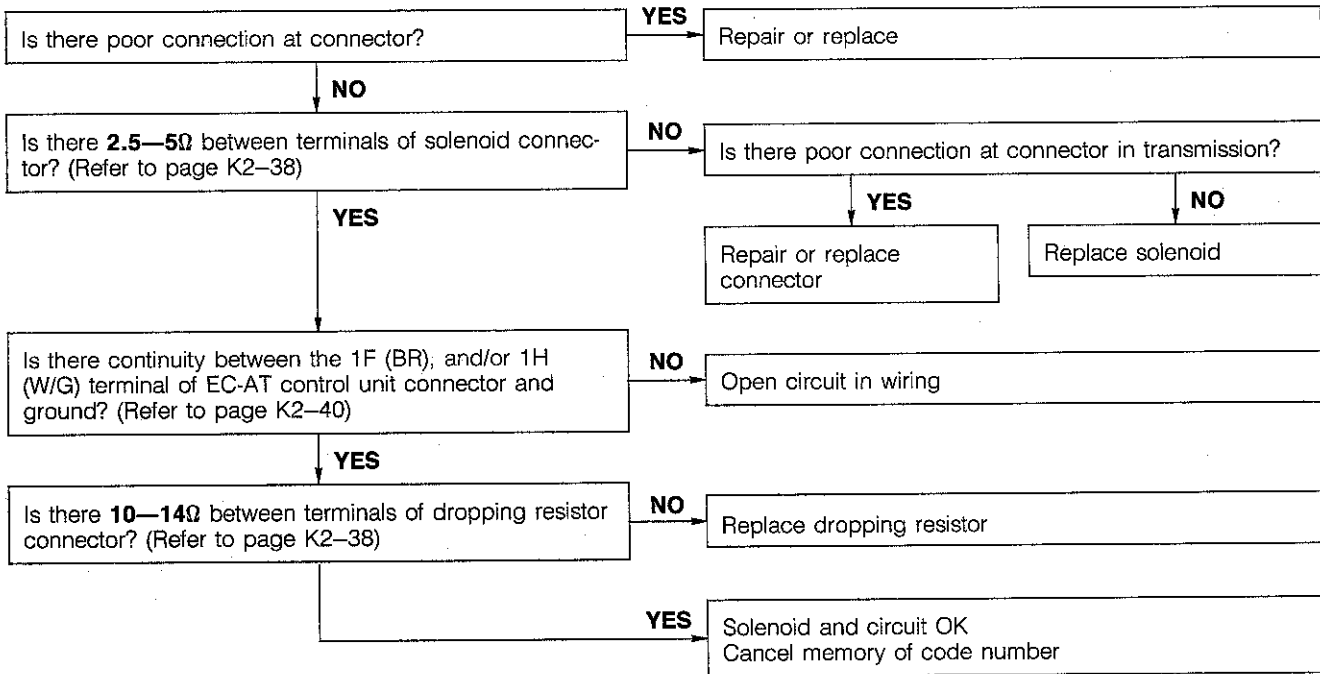


**No.63 Code Display (Lockup Solenoid)**

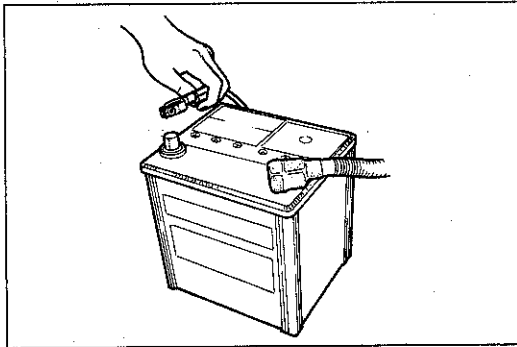




### No.64 Code Display (Line Pressure Solenoid)



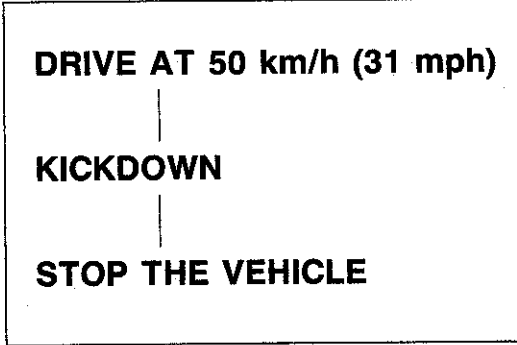
1BU0K2-012



2BU0K2-006

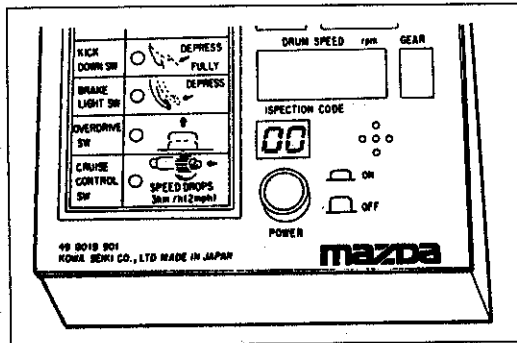
### AFTER-REPAIR PROCEDURES

1. Cancel the memory of malfunctions by disconnecting the negative battery terminal for approximately 20 seconds and reconnect it.
2. Remove the **EC-AT tester** if it is connected.



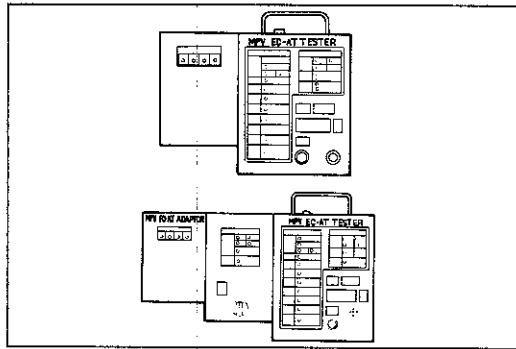
79G07C-069

3. Drive the vehicle at 50 km/h (31 mph), then depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.

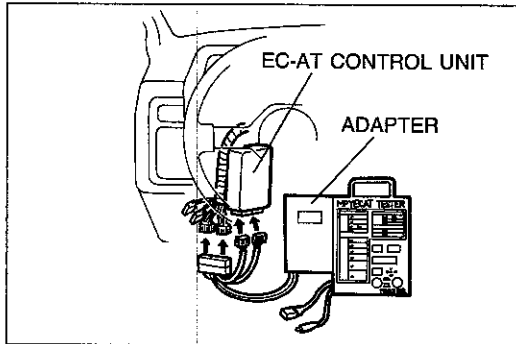


9MU0K1-484

4. Reconnect the **EC-AT Tester** to the test connector (Blue: 6-pin).
5. Ground the ground connector of the **EC-AT Tester**.
6. Ground the check connector (Blue: 1-pin).
7. Turn the ignition switch ON.
8. Check that no code numbers are displayed.



9MU0K1-041



1BU0K2-013

**ELECTRIC SIGNAL INSPECTION**

In this step, the input and output signals are checked with the **EC-AT Tester**.

The tester checks for proper operation of the various switches and sensors in the EC-AT system. It also checks the control unit for output of the various control signals.

**INSPECTION PROCEDURES**

1. Assemble the **EC-AT Tester**. (Refer to page K2-15.)
2. Disconnect the connectors from the EC-AT control unit.
3. Connect the **Adapter** between the control unit and the connectors.
4. Turn the ignition switch and main switch of the **EC-AT Tester** ON.
5. Check indication of the respective light or digital display in each condition, referring to the indication table below.

**Indication Table of Light and Digital Display**

Item	Indication	Condition	Possible cause	
<b>Input (Light)</b>				
INHIBITOR SW	P, N	ON	Other ranges	Inhibitor switch or wiring
		OFF	P or N range	
	D	ON	D range	
		OFF	Other ranges	
	S	ON	S range	
		OFF	Other ranges	
	L	ON	L range	
		OFF	Other ranges	
R	ON	R range		
	OFF	Other ranges		
MODE SW		Not used	—	
HOLD SW	ON	Hold switch depressed	Hold switch or wiring	
	OFF	Hold switch released		
*ATF THERMOSENSOR	ON	ATF temperature above 40°C (104°F)	ATF thermosensor or wiring	
	OFF	ATF temperature below 40°C (104°F)		
IDLE SW	ON	Throttle valve fully closed	Idle switch (in throttle sensor) or wiring	
	OFF	Throttle valve open		
ATMOSPHERIC PRESSURE SENSOR	ON	Atmospheric pressure below 679 mmHg (26.73 inHg) which is approximately at 1,500 m (4,921 ft)	Atmospheric pressure sensor (in engine control unit) or wiring	
	OFF	Atmospheric pressure above 679 mmHg (26.73 inHg)		

**Note**

\*: Items should be checked with engine running or while driving.

Item	Indication	Condition	Possible cause	
*CRUISE CONTROL SW	ON	SET or RESUME switch ON or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle, cruise control operation)	Cruise control unit, switch, or wiring	
	OFF	SET or RESUME switch OFF and vehicle speed kept at preset speed (driving vehicle, cruise control operation and not cruise control operation)		
<b>Input (Digital display)</b>				
THROTTLE SENSOR	EC-AT control unit terminal voltage	Constant	Throttle sensor or wiring	
*VEHICLE SPEED	Vehicle speed calculated from speed sensor 1 signal	Constant	Speed sensor 1 or wiring	
*ENGINE RPM		Not used	—	
<b>Output (Light)</b>				
*SOLENOID	SHIFT A	ON	1st and OD gear positions	Control unit, shift solenoid A, or wiring
		OFF	2nd and 3rd gear positions	
	SHIFT B	ON	1st and 2nd gear positions	Control unit, shift solenoid B, or wiring
		OFF	3rd and OD gear positions	
	OVER-RUNNING	ON	Other conditions	Control unit, overrunning clutch solenoid, or wiring
		OFF	When engine braking and 3-2 timing control	
	LOCKUP	Bright	Lockup	Control unit, lockup solenoid, or wiring
		Dim	Non-lockup	
	LINE PRESSURE	ON (Bright↔Dim)	While driving	Control unit, line pressure solenoid, or wiring
		OFF	Vehicle stopped	
HOLD INDICATOR	ON	Hold mode	Control unit, hold switch, or wiring	
	OFF	Other modes		
MODE INDICATOR	ON	Power mode	Control unit, mode switch, or wiring	
	OFF	Other modes		
*GEAR POSITION	1st	ON	1st gear position	—
		OFF	Other gear positions	
	2nd	ON	2nd gear position	
		OFF	Other gear positions	
	3rd	ON	3rd gear position	
		OFF	Other gear positions	
	OD	ON	OD gear position	
		OFF	Other gear positions	

1BU0K2-014

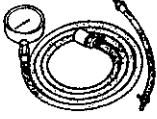

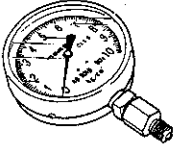
**Note**

\* : Items should be checked with engine running or while driving.

MECHANICAL SYSTEM TEST

PREPARATION

SST

<p>49 0378 400A Gauge set, oil pressure</p> 	<p>49 H019 002 Adapter</p> 	<p>49 B019 901 Gauge, oil pressure</p> 
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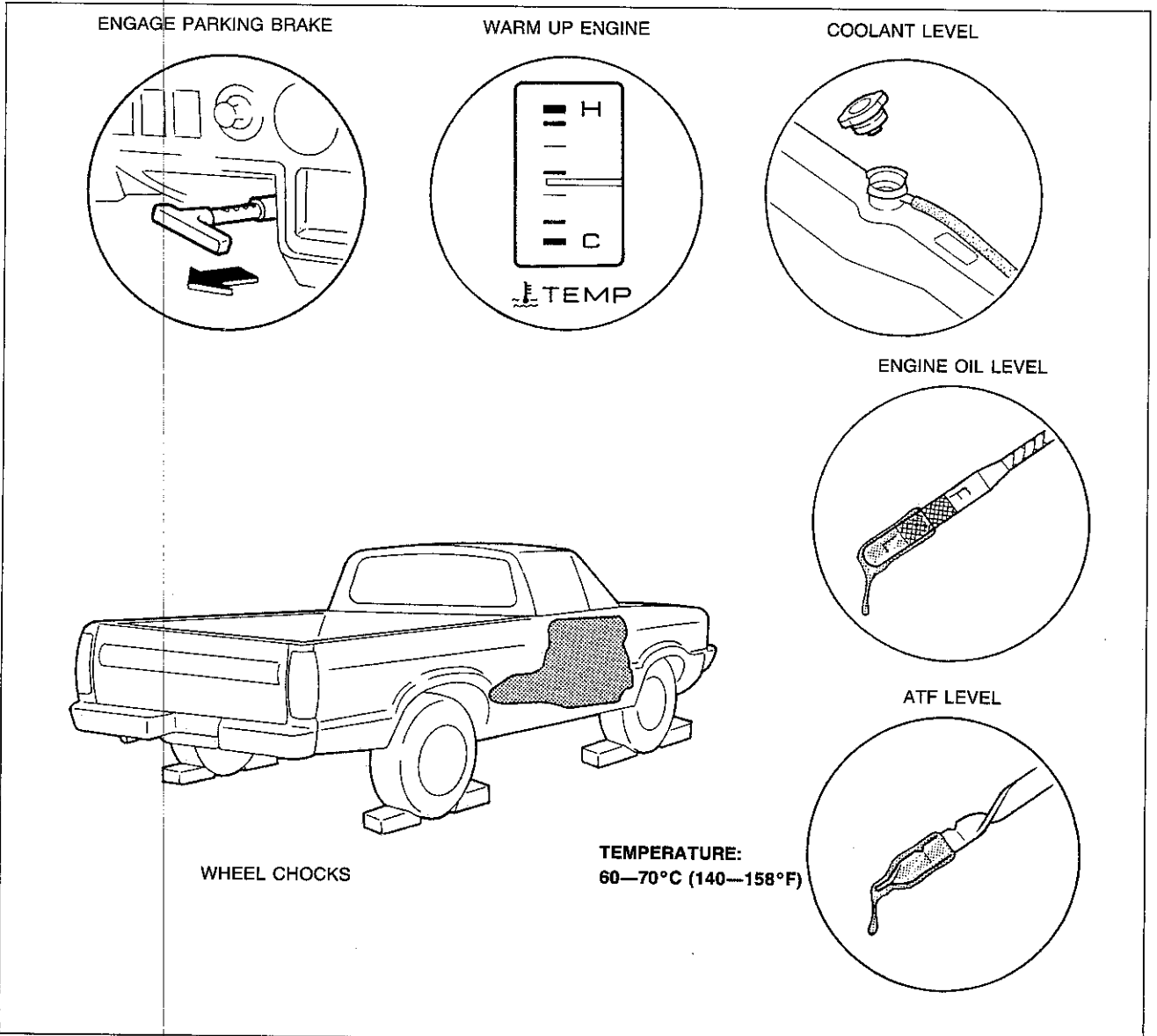
1BU0K2-015

STALL TEST

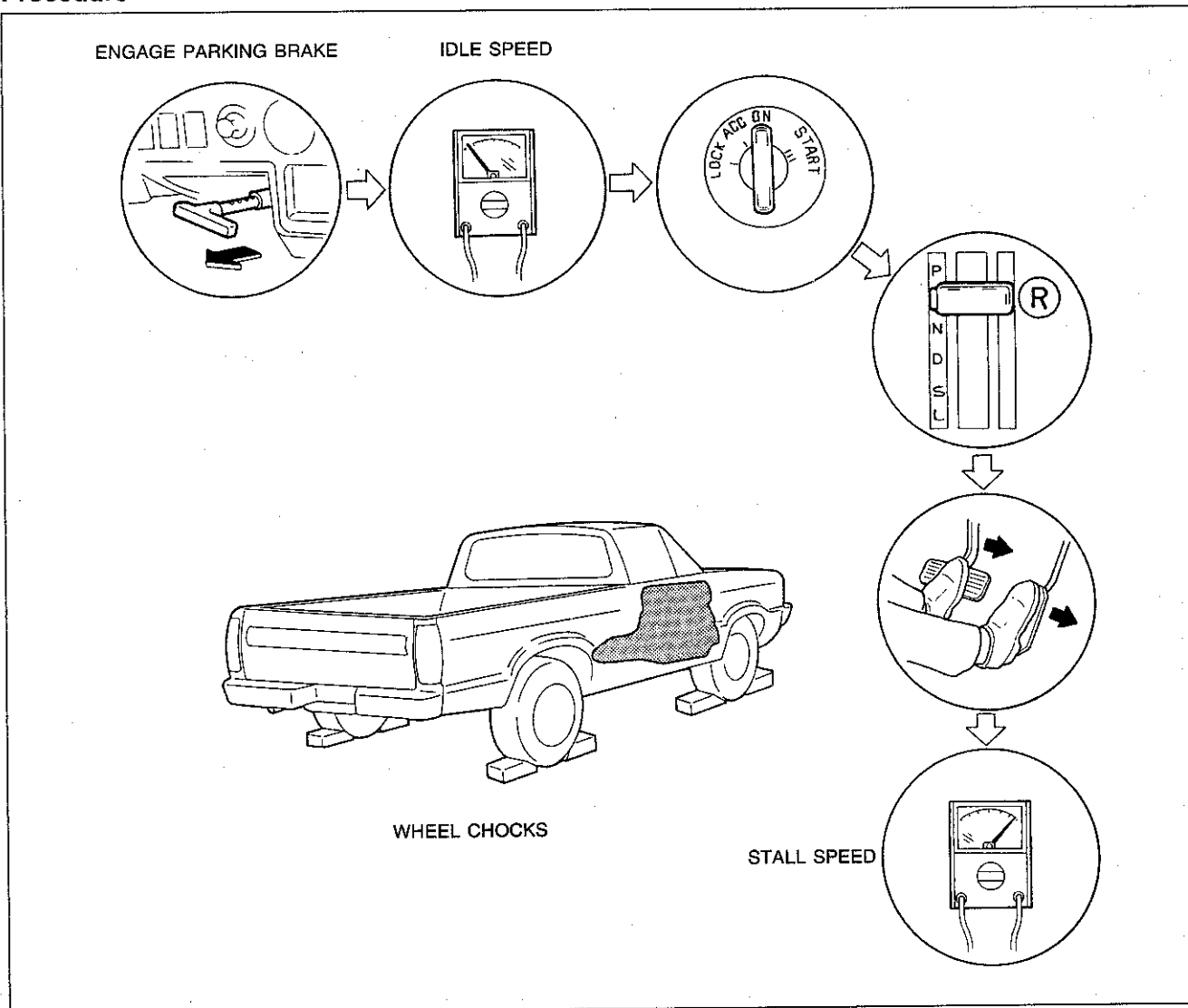
This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

Preparation

1. Check the engine coolant, engine oil, and ATF levels before testing.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (**60—70°C, 140—158°F**).
3. Engage the parking brake and use wheel chocks at the front and rear of the wheels.



## Procedure



1. Connect a tachometer to the engine.
2. Start the engine and check the idle speed in P range. (Refer to Section F2.)

**Idle speed: 750—790 rpm**

3. Shift the selector lever to R range.

**Caution**

**Step 4 must be performed within 5 seconds to prevent possible transmission damage.**

4. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right foot.

**Caution**

**Step 5 must be performed within 5 seconds to prevent possible transmission damage.**

5. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.

**Caution**

**Idling for at least one minute is to cool the ATF and to prevent deterioration of the fluid.**

6. Move the selector lever to N range and let the engine idle for at least one minute.

**Caution**

**Be sure to allow sufficient cooling time between each stall test.**

7. Perform the stall test for the following ranges in the same manner.  
 (1) D range  
 (2) S range  
 (3) L range

**Engine stall speed: 2,300—2,500 rpm**

9MU0K1-047

**Evaluation of Stall Test**

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transmission case
			Stuck pressure regulator valve
	In D and S ranges		Forward clutch slipping Forward one-way clutch slipping Low one-way clutch slipping
	In R range		Low and reverse brake slipping Reverse clutch slipping Perform road test to determine whether problem is low and reverse brake or reverse clutch a) Engine brake applied in L range 1st ...Reverse clutch b) Engine brake not applied in L range 1st ...Low and reverse brake
Within specification		All shift control elements within transmission are functioning normally	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

9MU0K1-048

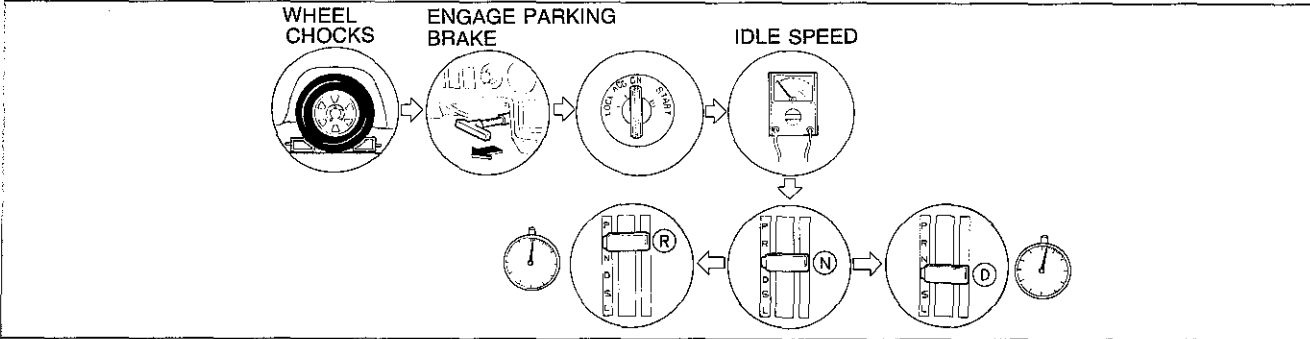
### TIME LAG TEST

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step measures this time lag for checking conditions of the N-D, 1-2, and 3-4/N-R accumulators; forward, reverse, and one-way clutches; brake band; and low and reverse brake.

#### Preparation

Perform the preparation procedure shown in the STALL TEST. (Refer to page K2-23.)

#### Procedure



2BU0K2-008

1. Start the engine and check the idle speed on P range. (Refer to Section F2.)

**Idle speed: 750—790 rpm**

2. Shift from N range to D range.
3. Use a stop watch to measure the time it takes from shifting until shock is felt.

#### Caution

**Idling for at least one minute is to cool the ATF and prevent deterioration of the fluid.**

4. Shift the selector to N range and run the engine at idle speed for at least one minute.

#### Note

**Make three measurements for each test and take the average value.**

5. Perform the test for the following shifts in the same manner.
  - (1) N→D range
  - (2) N→D range (Hold mode)
  - (3) N→R range

**Specified time lag:** N→D range ..... Less than 1.0 second  
 N→R range ..... Less than 1.2 second

### Evaluation of Time Lag Test

Condition		Possible Cause
Above specification	N→D and N→D (Hold) shift	Insufficient line pressure Forward clutch slipping Forward one-way clutch slipping
	N→D shift	Insufficient line pressure Low one-way clutch slipping N-D accumulator not operating properly
	N→D (Hold) shift	Insufficient line pressure Brake band slipping 1-2 accumulator not operating properly
	N→R shift	Insufficient line pressure Reverse clutch slipping Low and reverse brake slipping 3-4/N-R accumulator not operating properly

9MU0K1-050

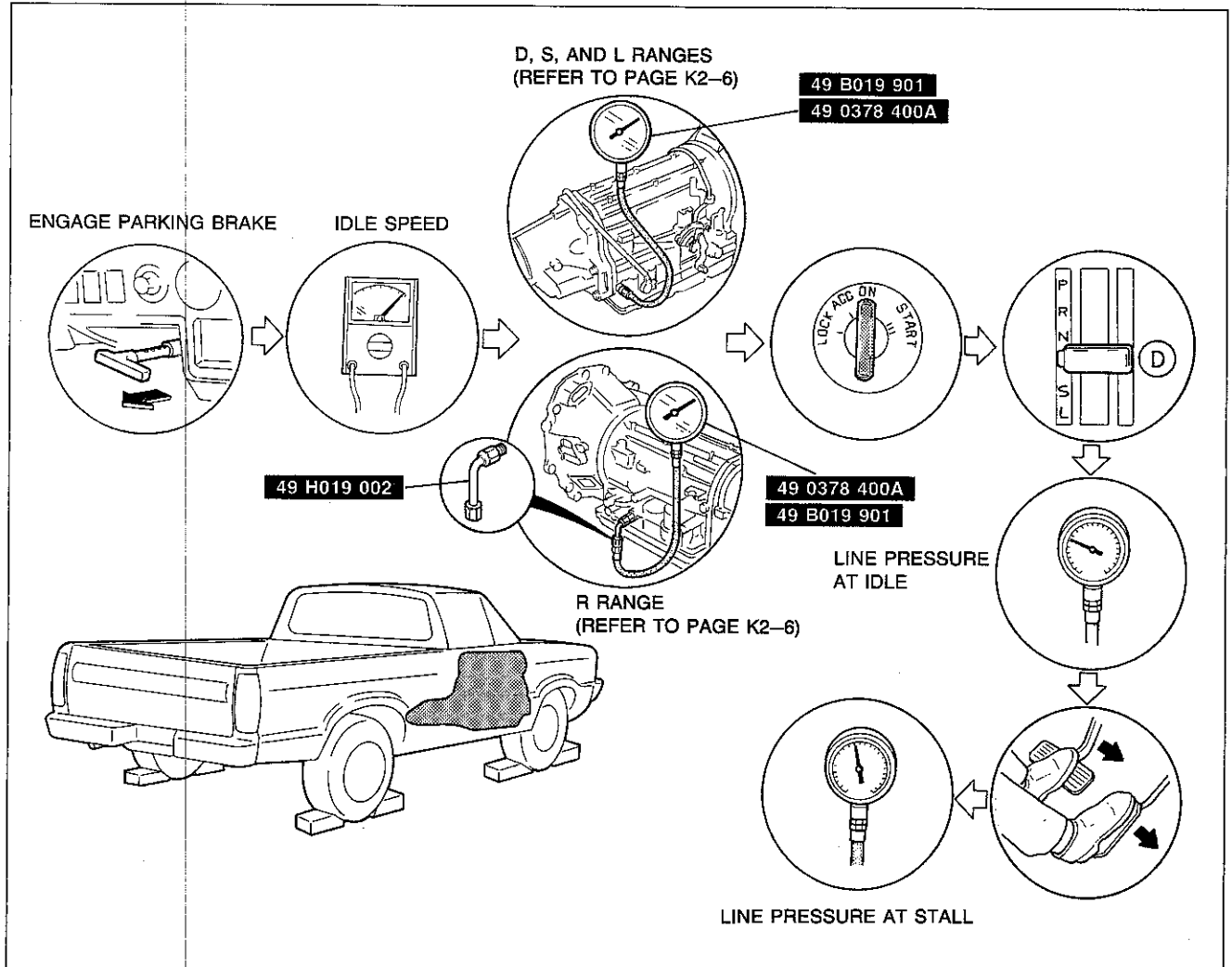
**LINE PRESSURE TEST**

This test measures line pressures for checking the hydraulic components and inspecting for oil leakage.

**Preparation**

1. Perform the preparation procedure shown in the STALL TEST. (Refer to page K2-23.)
2. Connect a tachometer to the engine.
3. Connect the **SST** to the line pressure inspection hole(s).

**Procedure**



2BU0K2-009

1. Start the engine and check the idle speed in P range. (Refer to Section F2.)

**Idle speed: 750—790 rpm**

2. Shift the selector lever to D range and read the line pressure at idle.

**Caution**

**Step 3 must be performed within 5 seconds to prevent possible transmission damage.**

3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.

**Caution**

**Step 4 must be performed within 5 seconds to prevent possible transmission damage.**

4. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.



### Caution

**Idling for at least one minute is to cool the ATF and to prevent deterioration of the fluid.**

5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

### Specified line pressure:

Range	Line pressure	
	Idle	Stall
D, S, L	432—471 (4.4—4.8, 63—68)	1,040—1,118 (10.6—11.4, 151—162)
R	598—638 (6.1—6.5, 87—92)	1,452—1,530 (14.8—15.6, 210—222)

0BU0K2-030

7. Install new plugs in the inspection ports.

**Tightening torque: 4.9—9.8 N·m (50—100 cm·kg, 43—87 in·lb)**

### Evaluation of Line Pressure Test

Condition		Possible cause
When idling	Low pressure in every range	Worn oil pump Damaged control piston (in oil pump) Pressure regulator valve or plug sticking Damaged pressure regulator valve spring Fluid leaking between oil strainer and pressure regulator valve
	Low pressure in forward ranges	Fluid leaking from hydraulic circuit of forward clutch
	Low pressure in D and S ranges (Hold mode only)	Fluid leaking from hydraulic circuit of band servo 2nd apply side
	Low pressure in R range only	Fluid leaking from hydraulic circuit of reverse clutch
	Low pressure in R and L ranges only	Fluid leaking from hydraulic circuit of low and reverse brake
	Higher than specification	Throttle sensor out of adjustment Damaged fluid thermosensor Line pressure solenoid sticking Short circuit of line pressure solenoid circuit Pressure modifier valve sticking Pressure regulator valve or plug sticking
At stall speed	Low pressure	Throttle sensor out of adjustment Damaged control piston (in oil pump) Line pressure solenoid sticking Short circuit of line pressure solenoid circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking

9MU0K1-053

## ROAD TEST

**Caution**

Perform the test at normal ATF operating temperature (60—70°C, 140—158°F).

This step is performed to inspect for problems in the various ranges. If these tests show any problems, refer to the electronic system component or mechanical sections to adjust or replace.

**D RANGE TEST****Shift Point, Shift Pattern, and Shift Shock**

- Shift the selector lever to D range.

**Note**

Throttle sensor voltage of the EC-AT Tester represents the throttle valve opening.

Driving mode (Economy or Power) is automatically changed corresponding to accelerator pedal depressing speed.

- Accelerate the vehicle with half- and full-throttle opening.
- Check that 1-2, 2-3, and 3-OD upshifts, downshifts, and lockup are obtained. The shift points must be as shown in the D range (Economy or Power) shift diagram.

**Note**

a) Vehicle speed of the EC-AT Tester and the speedometer and vehicle speed on a chassis roller may not meet the specified shift pattern because of incorrect tire size. Therefore, check the shift points with the VEHICLE SPEED of the EC-AT Tester.

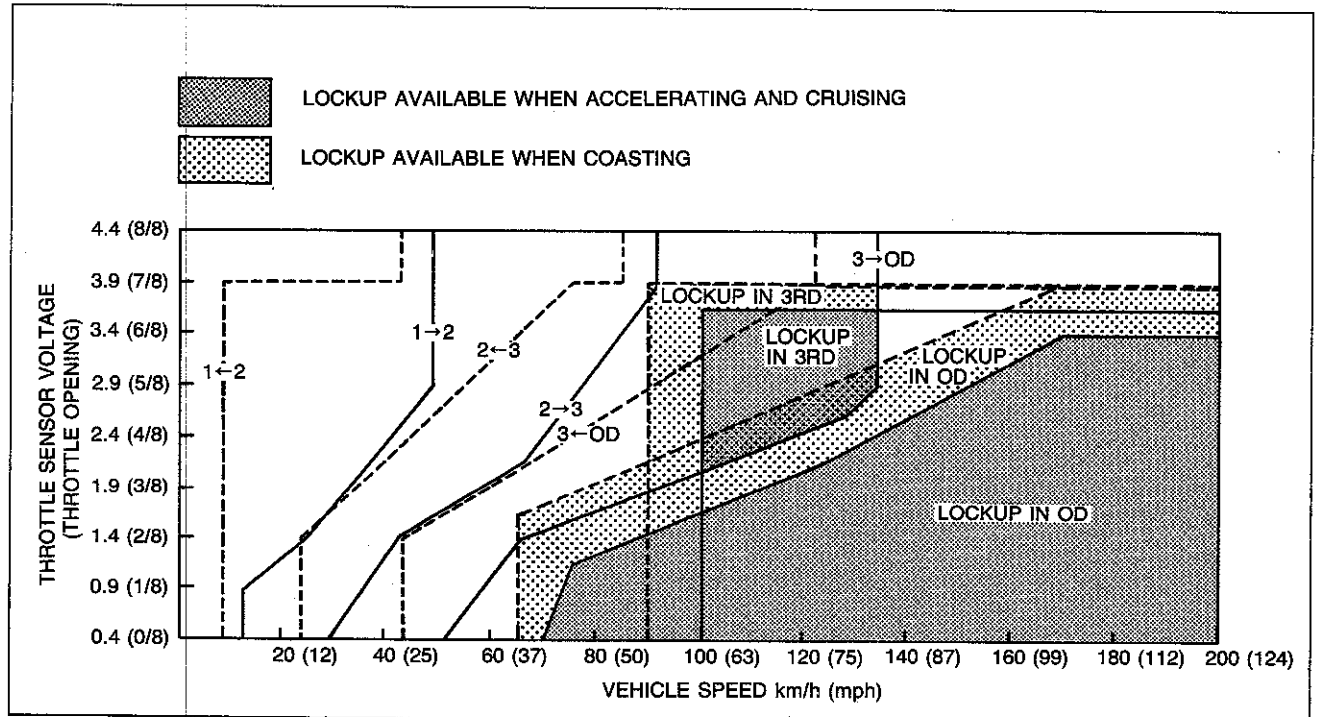
b) There is no overdrive when the ATF temperature is below 10°C (50°F).

c) There is no overdrive when the cruise control is operating and there is an 8 km/h (13 mph) difference between the preset cruise speed and vehicle speed, or SET or RESUME switch is ON.

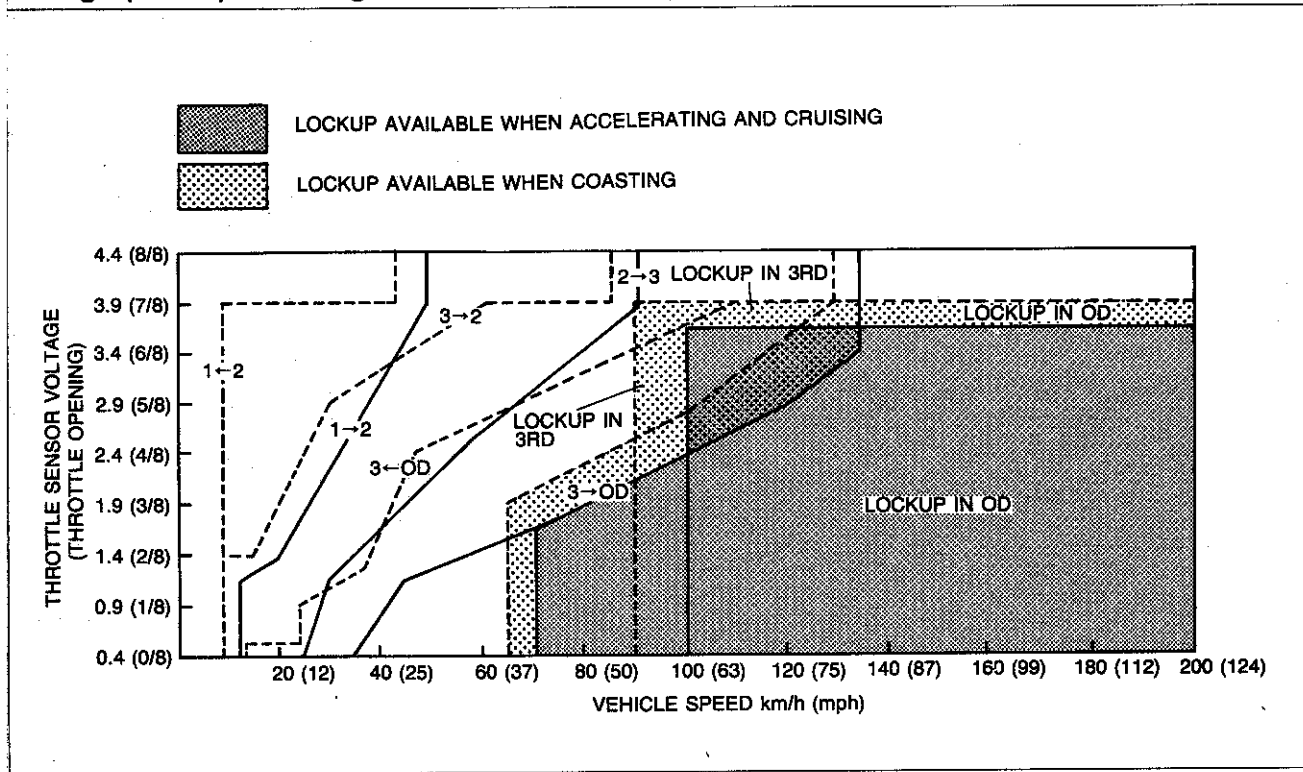
d) There is no overdrive when ATF temperature is below 40°C (104°F).

e) There is no lockup when the accelerator pedal is fully closed (idle switch ON) while driving the vehicle below 120 km/h (74 mph).

- Check the upshifts for shift shock or slippage in the same manner.
- While driving in OD, shift the selector lever to S range and check that OD-3 downshift immediately occurs.

**D range (Economy) shift diagram**

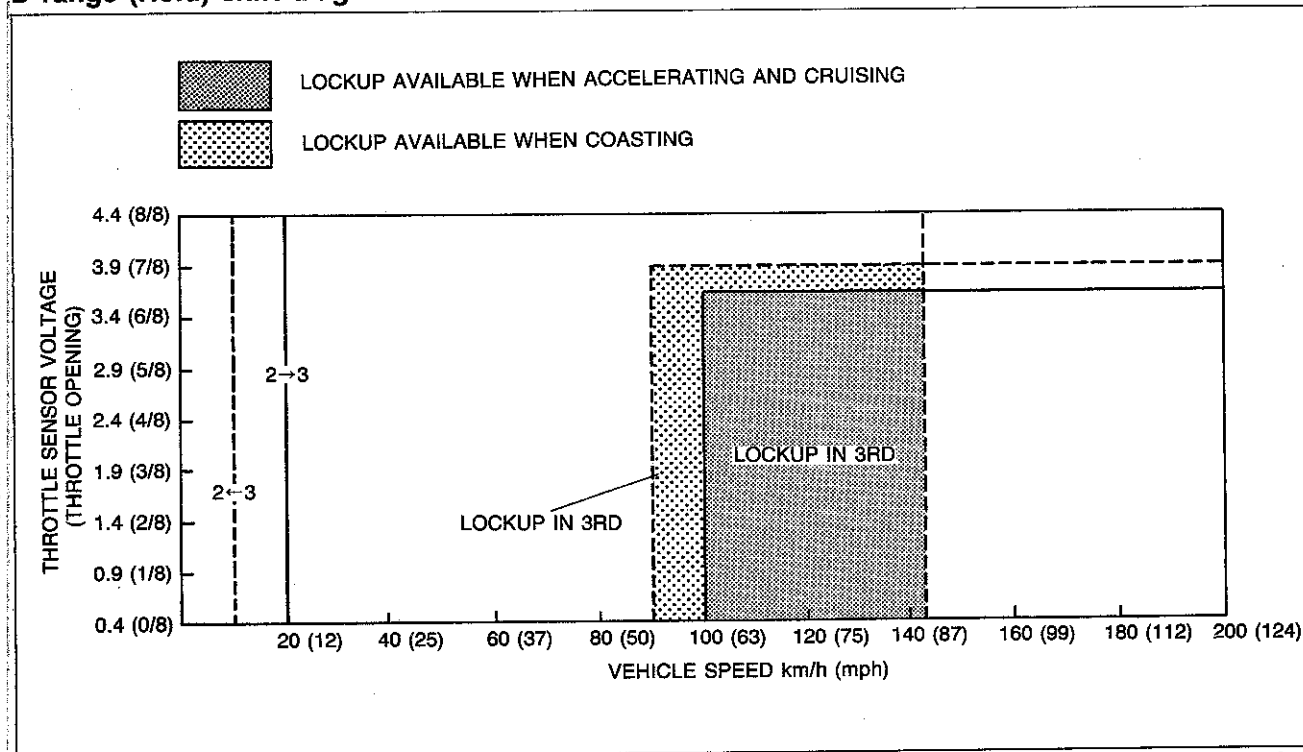
### D range (Power) shift diagram



OBU0K2-032

6. Select the Hold mode.
7. Accelerate the vehicle; check 2-3 up- and downshifts and lockup and that no 1st or OD is obtained. The 2-3 shift points are as shown in the D range (Hold) shift diagram.
8. Decelerate the vehicle and check that engine braking effect is felt in 3rd and 2nd gears when throttle opening less than 1/8.

### D range (Hold) shift diagram



79G07C-094

**Evaluation**

Condition		Possible Cause
Shifting	Starts in 2nd or shifts directly from 1st to OD	Stuck shift solenoid A Stuck shift valve A
	Starts in OD	Stuck shift solenoid B Stuck shift valve B
	No shift	Stuck shift solenoid A and/or B Stuck shift valve A and/or B
	Incorrect shift points	Throttle sensor out of adjustment Speed sensor 1 not operating properly
Shift shock felt or slipping	Stuck line pressure solenoid Accumulators not operating properly Throttle sensor out of adjustment Speed sensor 1 not operating properly ATF thermosensor not operating properly Worn clutches, one-way clutches, and/or brakes	
No engine braking	Stuck overrunning clutch solenoid Worn clutches, and/or brakes	
No lockup shift	Stuck lockup solenoid Stuck lockup control valve	

9MU0K1-056

**Noise and Vibration**

Drive the vehicle in OD (lockup), OD (no lockup), and 3rd (Hold) and check for abnormal noise or vibration.

**Note**

**Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause with extreme care.**

**Kickdown**

Drive the vehicle in OD, 3rd, and 2nd gears and check that kickdown occurs for OD→3, OD→2, OD→1, 3→2, 3→1, 2→1, and that the shift points are as shown in the shift diagram. (Refer to pages K2-29, 30.)

1BU0K2-018

**S RANGE TEST**

**Shift Pattern**

1. Shift the selector lever to S range.
2. Accelerate the vehicle; check that 1-2 and 2-3 up- and downshifts, and lockup are obtained and that no OD is obtained.
3. Decelerate the vehicle and check that engine braking effect is felt in only 3rd and 2nd gear when throttle opening less than 1/8.

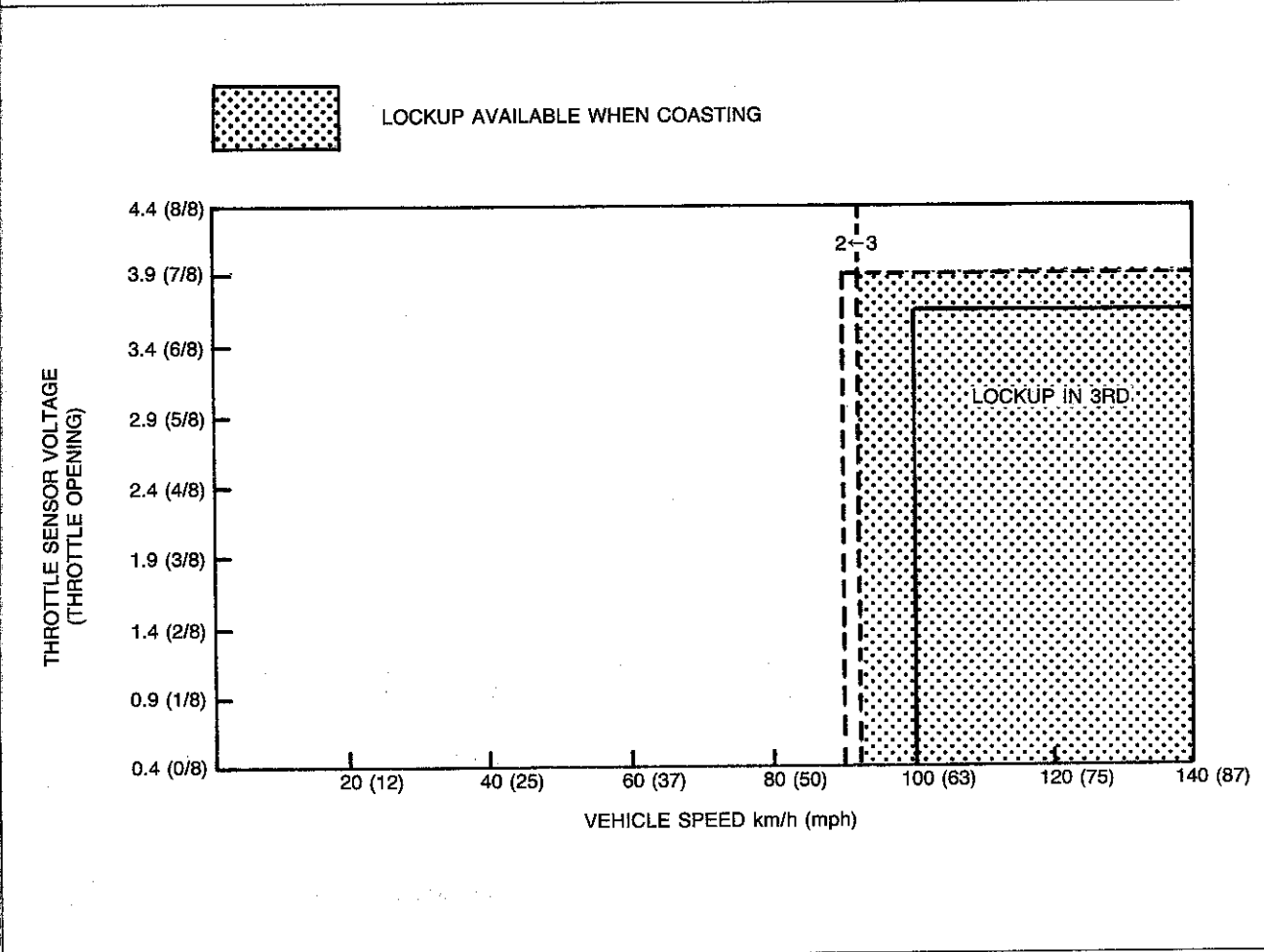
**Note**

- a) Inspections of shift shock and shift points are not necessary because these are the same as those of the D-range test.
- b) Shift points are the same as those of the D-range (Economy) shift diagram except 3↔OD.

4. While driving in S range (Economy mode) and 3rd gear, select the Hold mode and check that 3rd gear is held until the 3-2 downshift point is achieved as shown in the S range (Hold) shift diagram.
5. Accelerate the vehicle in S range (Hold mode) and check that 2nd gear is held.
6. Decelerate the vehicle and check that engine braking effect is felt when throttle opening less than 1/8.

**S range (Hold) shift diagram**

OBU0K2-034



79G07C-475

**Noise and Vibration**

Drive the vehicle in 2nd gear (Hold mode) and check for abnormal noise or vibration.

**Note**

Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause with extreme care.

**L RANGE TEST****Shift Pattern**

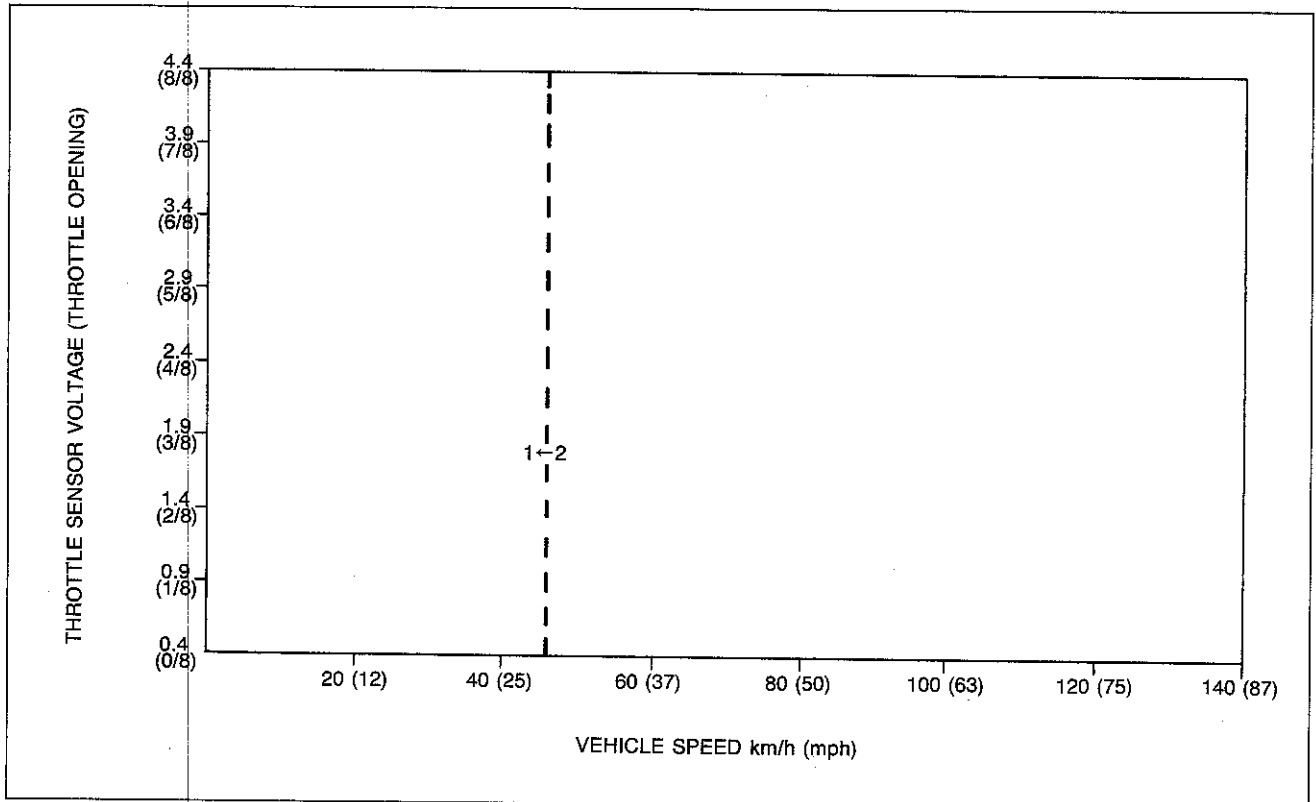
1. Shift the selector lever to L range.
2. Accelerate the vehicle and check that the 1-2 up- and downshifts are obtained and that no 3rd gear, overdrive, or lockup is obtained.

**Note**

a) Inspection of shift shock and shift points are not necessary because these are the same as those of the D-range test.

b) Shift points are the same as those of the D-range (Economy) shift diagram except 2↔3 and 3↔OD.

3. Decelerate the vehicle and check that engine braking effect is felt in 1st and 2nd gears.
4. While driving in D range (Hold mode) and 3rd gear, shift the selector lever to L range and check that 3rd gear is held until the 3-2 downshift point as shown in the L range (Hold) shift diagram is achieved, then that 2nd gear is held until 2-1 downshift point is achieved.
5. Accelerate the vehicle in L range (Hold mode) and check that 1st gear is held.
6. Decelerate the vehicle and check that engine braking effect is felt.

**L range (Hold) shift diagram**

0BU0K2-035

**Noise and Vibration**

Drive the vehicle in 1st gear (Hold mode) and check for abnormal noise or vibration.

**Note**

Abnormal noise and vibration can also be caused by the torque converter, propeller shaft or differential. Therefore, check for the cause with extreme care.

**P RANGE TEST**

1. Shift into P range on a gentle slope, release the brake, and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at **maximum of 4 km/h (2.5 mph)** on a level surface, and check that the vehicle stop.

9MU0K1-060

**K2-33**

Vehicle Speed at Shiftpoint Table

Mode	Range	Throttle condition (Throttle sensor voltage)	Shift	Vehicle speed km/h (mph)	
Normal (Power)	D	Fully opened (4.4 volt)	D1→D2	47-51 (29-32)	
			D2→D3	87-95 (54-59)	
			D3→OD	129-139 (80-86)	
		Half throttle (1.6-2.2 volt)	D1→D2	39-43 (24-27)	
			D2→D3	66-72 (41-45)	
			Lockup ON (D3)	96-104 (60-64)	
			D3→OD	111-119 (69-74)	
			Lockup ON (OD)	128-136 (79-84)	
			Lockup OFF (OD)	96-104 (60-64)	
			OD→D3	71-79 (44-49)	
		Kickdown	Lockup OFF (D3)	86-94 (53-58)	
			D3→D2	42-48 (26-30)	
	OD→D3		124-134 (77-83)		
	Normal (Economy)	D	Fully opened (4.4 volt)	OD→D2	81-89 (50-55)
				OD→D1	41-45 (25-28)
				D3→D2	81-89 (50-55)
			Half throttle (1.6-2.2 volt)	D3→D1	41-45 (25-28)
				D2→D1	41-45 (25-28)
D1→D2				47-51 (29-32)	
D2→D3		87-95 (54-59)			
D3→OD		129-139 (80-86)			
D1→D2		30-34 (19-21)			
Kickdown		D2→D3	52-58 (32-36)		
		D3→OD	96-104 (60-64)		
		Lockup ON (OD)	96-104 (60-64)		
	Lockup OFF (OD)	81-89 (50-55)			
	OD→D3	43-51 (27-32)			
	D3→D2	22-28 (14-17)			
Normal	S	Fully opened (4.4 volt)	OD→D3	124-134 (77-83)	
			OD→D2	81-89 (50-55)	
			OD→D1	41-45 (25-28)	
		Half throttle (1.6-2.2 volt)	D3→D2	81-89 (50-55)	
			D3→D1	41-45 (25-28)	
			D2→D1	41-45 (25-28)	
	L	Fully opened (4.4 volt)	S1→S2	47-51 (29-32)	
			S2→S3	87-95 (54-59)	
			S3→S2	82-88 (51-55)	
		Half throttle (1.6-2.2 volt)	S2→S1	41-45 (25-28)	
			S1→S2	39-43 (24-27)	
			S2→S3	66-72 (41-45)	
HOLD	D	-	S3→S2	41-47 (25-29)	
			L1→L2	47-51 (29-32)	
			L2→L1	41-45 (25-28)	
	S	Fully closed (0.4 volt)	L1→L2	39-43 (24-27)	
			D2→D3	18-22 (11-14)	
			D3→D2	7-13 (4-8)	
L	Fully closed (0.4 volt)	OD→D3	138-148 (86-92)		
		S3→S2	88-96 (55-60)		
			L2→L1	44-48 (27-30)	

**ELECTRONIC SYSTEM COMPONENTS**

**HOLD OFF SWITCH**

**Inspection**

**Terminal voltage**

1. Remove the selector lever knob.
2. Turn the ignition switch ON.
3. Check the voltage between terminal A and ground, and between terminal B and ground.

**V<sub>B</sub>: Battery voltage**

Terminal	Terminal voltage
A and ground	0V
B and ground	V <sub>B</sub>

4. If correct, check continuity between the terminals.
5. If not correct, check the wiring harness.

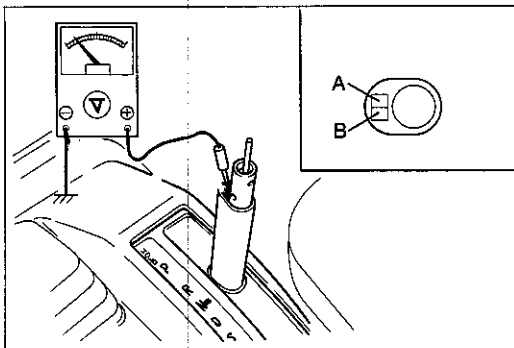
**Continuity**

1. Check continuity of the terminals.

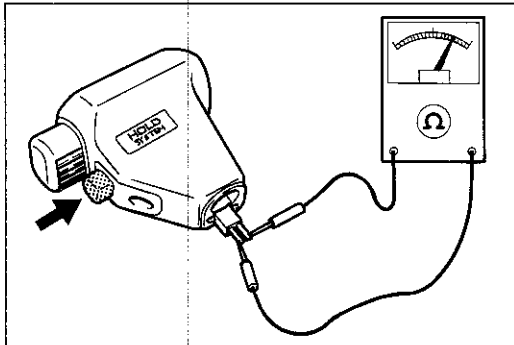
Continuity	Switch
Yes	Released
No	Depressed

2. If not correct, replace the selector lever knob.

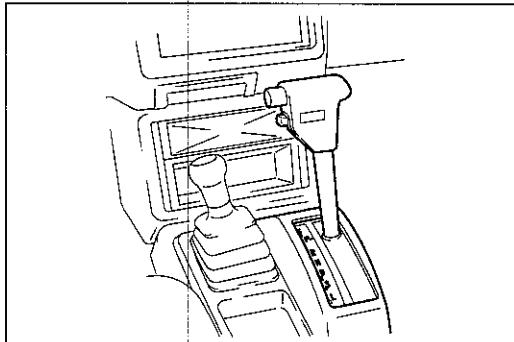
3. If not correct, replace the change knob as an assembly.



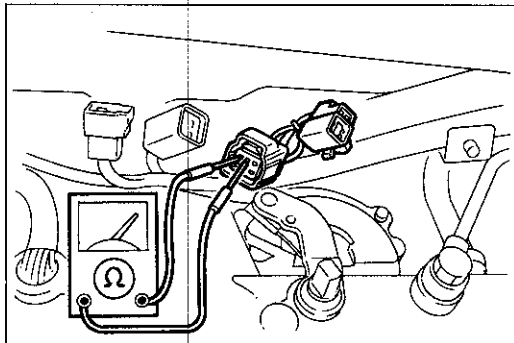
2BU0K2-010



9BU0KX-031



9MU0K1-066



9MU0K1-067

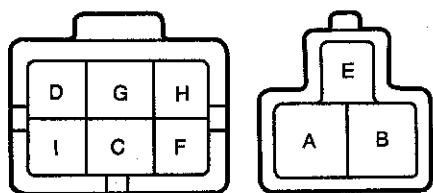
**INHIBITOR SWITCH**

**Inspection**

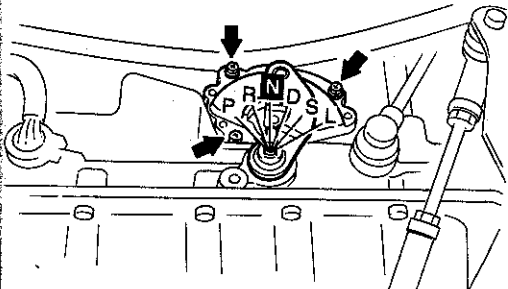
**Operation**

1. Check that the starter operates with the ignition switch at START position and the selector lever in P and N range only and that it does not operate in any other position.
2. Check that the back-up lights illuminate when shifted to the R range with the ignition switch in the ON position.
3. Check the inhibitor switch if it is not as specified.

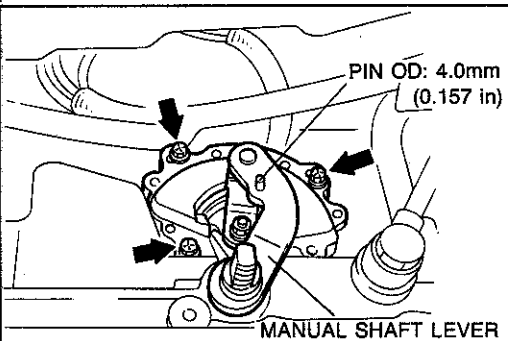




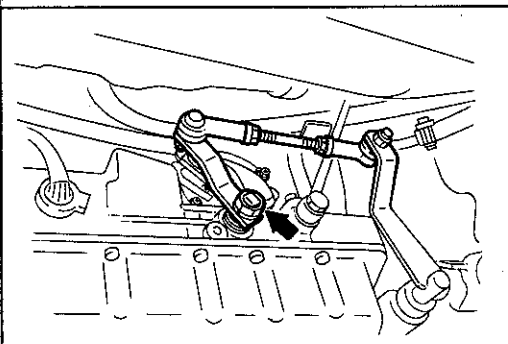
0BU0K2-167



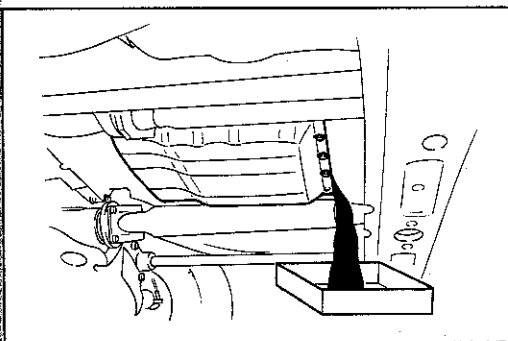
0BU0K2-038



2BU0K2-011



9MU0K1-071



9MU0K1-072

### Continuity

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the control linkage from the manual shaft.
3. Disconnect the inhibitor switch connector.
4. Check continuity of the terminals.

Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○—○		○—○						
R			○—○	○—○					
N	○—○		○—○			○—○			
D			○—○				○—○		
S			○—○					○—○	
L			○—○						○—○

○—○: Indicates continuity

5. If not correct, adjust the inhibitor switch.
6. If correct, check or adjust the selector lever.  
(Refer to page K2-149.)

### Adjustment

1. Move the manual shaft to N position.
2. Loosen the inhibitor switch mounting bolts.
3. Align the holes of the inhibitor switch and the manual shaft lever by inserting a an **approx. 4.0mm (0.157 in)** O.D. pin.
4. Tighten the mounting bolts.

### Tightening torque:

**2.5—3.9 N·m (25—40 cm·kg, 22—35 in·lb)**

5. Recheck the continuity of the inhibitor switch.
6. If not correct, replace the inhibitor switch.

7. Connect the control linkage.

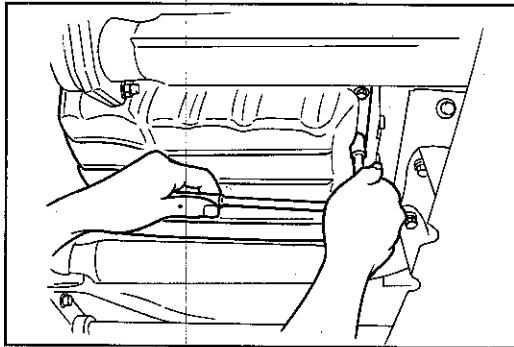
### Tightening torque:

**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

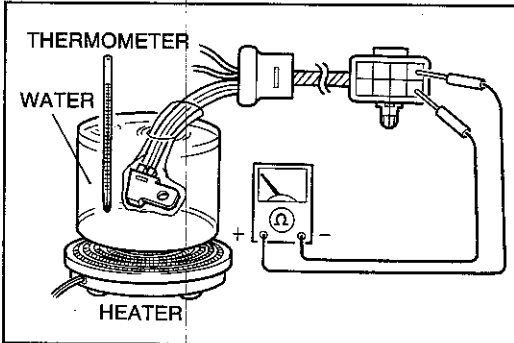
### ATF THERMOSENSOR

#### Inspection

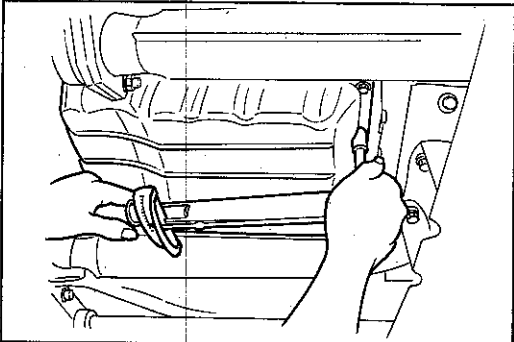
1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts, and drain the ATF into a suitable container.



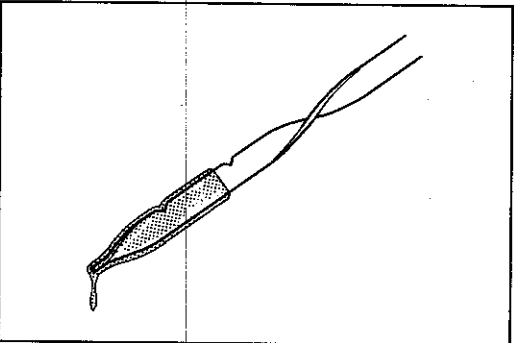
1BU0K2-021



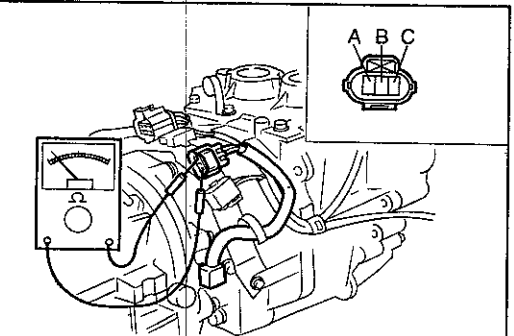
9MU0K1-074



1BU0K2-022



1BU0K2-023



9MU0K1-077

3. Remove the oil pan.
4. Remove the control valve body and solenoid connector. (Refer to page K2-124.)

5. Place the ATF thermosensor in water with a thermometer as shown and heat the water gradually.
6. Measure the resistance between the terminals. If necessary, replace the ATF thermosensor.

Water temperature	Resistance
20°C (68°F)	Approx. 2.5 kΩ
80°C (176°F)	Approx. 0.3 kΩ

7. Install the solenoid connector and control valve body. (Refer to page K2-126.)
8. Install the oil pan.

**Tightening torque:**

**4.9—7.8 N·m (50—80 cm·kg, 43—69 in·lb)**

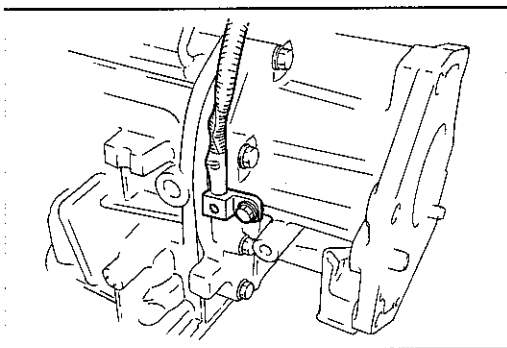
9. Pour in ATF, and with the engine idling, check the ATF level and check for leaks. (Refer to page K2-42.)

**SPEED SENSOR 1**

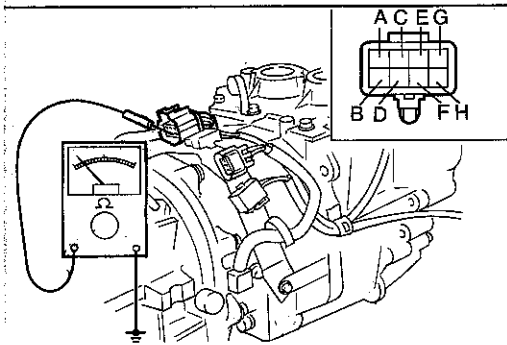
**Inspection**

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the connector.
3. Measure the resistance between the terminals.

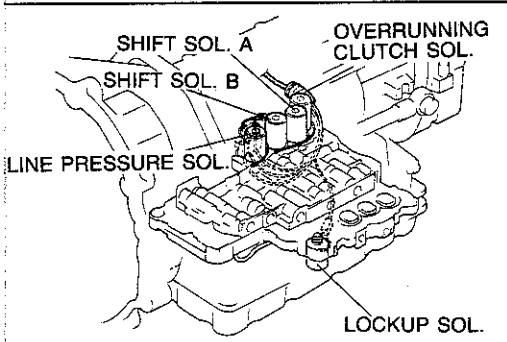
Terminal	Resistance
A and B	504—616Ω
B and C	∞
A and C	∞



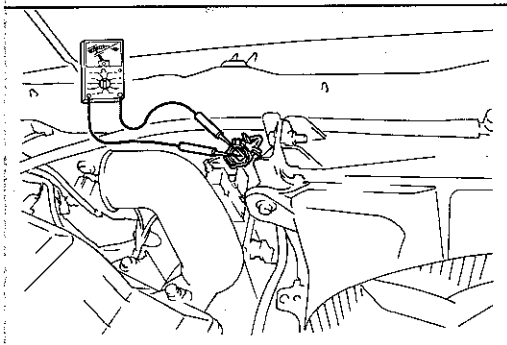
9MU0K1-078



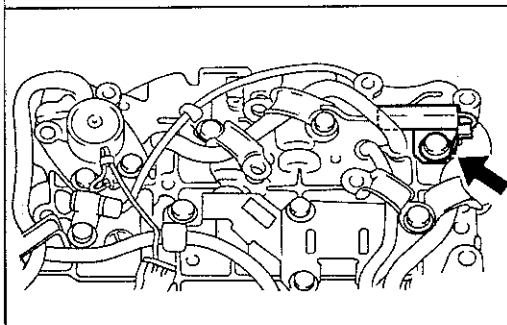
0BU0K2-042



9MU0K1-080



9MU0K1-081



1BU0K2-024

4. If not correct, replace the speed sensor 1.

### Tightening torque:

4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)

### SOLENOID VALVES

#### Inspection

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the connector.
3. Measure the resistance between the terminals.

#### Note

- a) Terminal A: ATF thermoswitch
- b) Terminal G, H: ATF thermosensor

Terminal	Connected to	Resistance
B	Shift solenoid A	20—40Ω
C	Shift solenoid B	20—40Ω
D	Overrunning clutch solenoid	20—40Ω
E	Line pressure solenoid	2.5—5Ω
F	Lockup solenoid	10—20Ω

4. If not correct, replace the solenoid or assembly.

#### Note

If shift solenoid A, shift solenoid B, overrunning clutch solenoid, or line pressure solenoid is not correct, replace as an assembly.

### DROPPING RESISTOR

#### Inspection

1. Disconnect the dropping resistor connector.
2. Measure the resistance of the terminals.

**Resistance: 10—14Ω**

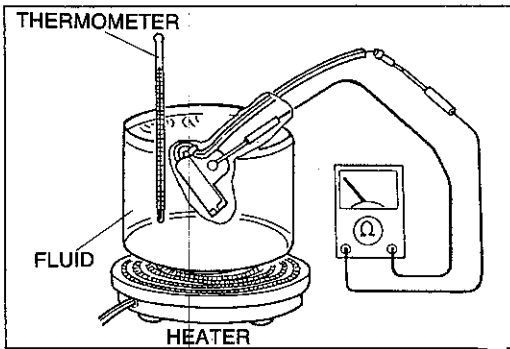
3. If not correct, replace the dropping resistor.

### ATF THERMOSWITCH

#### Inspection

1. Drain the ATF. (Refer to ATF thermosensor inspection; page K2-36, Steps 1—3.)
2. Disconnect the connector, and remove the ATF thermoswitch.
3. Place the ATF thermoswitch in fluid with a thermometer shown and heat the fluid gradually.
4. Measure the continuity between terminal and bracket.

Fluid temperature	Continuity
Above 150°C (302°F)	Yes
Below 145°C (293°F)	No



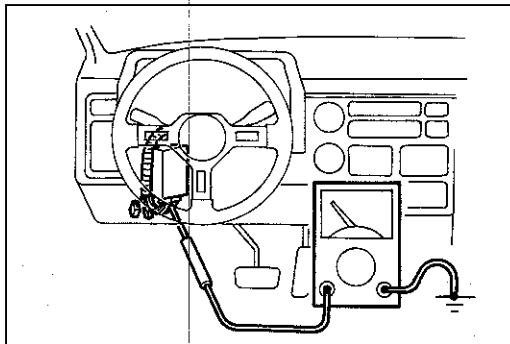
1BU0K2-025

5. If not correct, replace the ATF thermoswitch.
6. Install the ATF thermoswitch and connect the connector.

**Tightening torque:**

**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**

7. Add ATF to the correct level. (Refer to ATF thermosensor inspection; page K2-36, Steps 8, 9.)



9MU0K1-082

**EC-AT CONTROL UNIT**

**Inspection**

1. Turn the ignition switch ON, and check the EC-AT control unit terminal voltage, referring to the Terminal Voltage Chart.
2. If not correct, check or replace the component(s), wiring, and/or EC-AT control unit.

**Terminal Voltage Chart**

2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1O	1M	1K	1I	1G	1E	1C	1A
2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1P	1N	1L	1J	1H	1F	1D	1B

9MU0K1-083

V<sub>B</sub>: Battery voltage

Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	- terminal		
1A (Memory power)	Battery	1A	Ground	V <sub>B</sub>	Constant
1B (Output)	Shift solenoid B	1B		V <sub>B</sub>	Solenoid ON in following condition: • 1st and 2nd gear positions
				0V	Solenoid OFF in following condition: • 3rd and OD gear positions
1C	—	—	—	—	—
1D (Output)	Shift solenoid A	1D	Ground	V <sub>B</sub>	Solenoid ON in following condition: • 1st and OD gear positions
				0V	Solenoid OFF in following condition: • 2nd and 3rd gear positions
1E (Input)	Inhibitor switch (R range)	1E		V <sub>B</sub>	R range
				0V	Other ranges
1F (Output)	Line pressure solenoid	1F		1.7—4.5V	Accelerator pedal depressed (After ATF warm, engine stopped)
				Below 1.5V	Accelerator pedal fully released (After ATF warm, engine stopped)
1G (Input)	Engine rpm sensor*	1G		Above 1V (AC)	Engine running
				Below 0.5V (AC)	Engine stopped
1H (Output)	Dropping resistor	1H		V <sub>B</sub>	Accelerator pedal fully released (After ATF warm, engine stopped)
				Below 1.5V	Accelerator pedal depressed (After ATF warm, engine stopped)
1I (Input)	Speed sensor 2	1I		Approx. 2—3V	While driving
				0V or 4.5—5.5V	Vehicle stopped
1J (Ground)	—	1J		0V	Constant
1K (Output)	Hold indicator	1K		V <sub>B</sub>	Power or Economy mode
				0V	Hold mode
1L (Ground)	—	1L		0V	Constant
1M (Output)	Lockup solenoid	1M		V <sub>B</sub>	Solenoid ON, Lockup
				Below 1.5V	Solenoid OFF, Non-lockup
1N (Battery power)	Battery	1N		V <sub>B</sub>	Ignition switch ON
				0V	Ignition switch OFF
1O (Output)	Overrunning clutch solenoid	1O	V <sub>B</sub>	Solenoid ON in following condition: • D range (Engine stopped)	
			0V	Solenoid OFF in following condition: • Except D range (Engine stopped)	
1P (Battery power)	Battery	1P	V <sub>B</sub>	Ignition switch ON	
			0V	Ignition switch OFF	
2A (Input)	Throttle sensor	2A	2L	4.5—5.5V	Ignition switch ON
				0V	Ignition switch OFF
2B (Input)	Inhibitor switch (D range)	2B	Ground	V <sub>B</sub>	D range
				0V	Other ranges
2C	—	—	—	—	—
2D (Input)	Inhibitor switch (N and P ranges)	2D	Ground	V <sub>B</sub>	Except P or N ranges
				0V	P or N range
				Below 7V	P or N range and engine crank

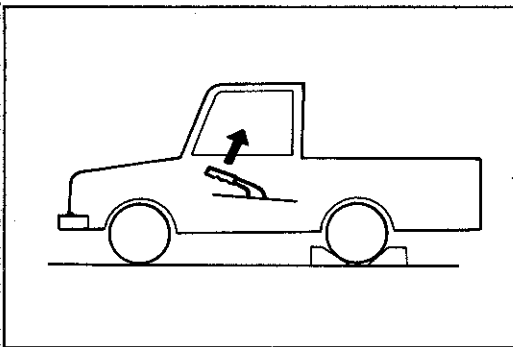
\* Checked with AC range

Vb: Battery voltage

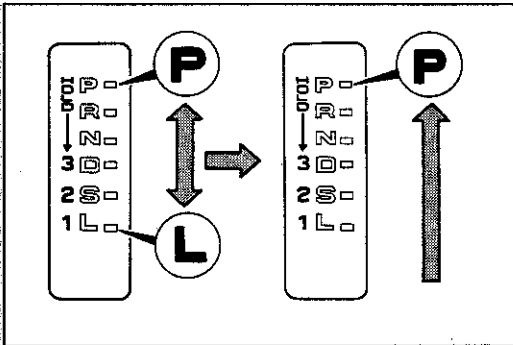
Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	- terminal		
2E (Input)	Cruise control unit	2E	Ground	Above 6V	Normal conditions
				Below 1.5V	Set or Resume switch ON or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle cruise control operation)
2F	—	—	—	—	—
2G	Engine control unit	2G	Ground	Above 6V	Normal condition
				Below 1.5V	Atmospheric pressure below 679 mmHg (26.73 inHg) which is approximately at 1,500 m (4,921 ft)
2H	—	—	—	—	—
2I (Input)	Hold switch	2I	Ground	Above 6V	Switch released
				0V	Switch depressed
2J (Input)	Speed sensor 1*	2J		Above 1V (AC)	Vehicle speed above 25 km/h (16 mph)
				Approx. 0V (AC)	Vehicle stopped
2K (Input)	EC-AT check connector	2K		Above 6V	Normal
				0V	Check connector grounded
2L (Ground)	Ground (For sensors)	2L		0V	Constant
2M (Input)	Idle switch	2M		Vb	Idle switch OFF (Throttle valve open)
				0V	Idle switch ON (Throttle valve fully closed)
2N (Output)	EC-AT Tester (Malfunction code)	2N		Vb	Normal (With EC-AT tester)
			0V	If malfunction present (With EC-AT tester)	
			Code signal	EC-AT check connector grounded (With EC-AT tester)	
2O	—	—	—	—	
2P	—	—	—	—	
2Q (Input)	Inhibitor switch (L range)	2Q	Ground	Vb	L range
				0V	Other ranges
2R (Input)	ATF thermosensor	2R	2L	Approx. 2.4—0.4V	While warming up ATF Note Approx. 1.8V: ATF temp. 10°C (50°F) Approx. 1.1V: ATF temp. 40°C (104°F)
2S (Input)	Inhibitor switch (S range)	2S	Ground	Vb	S range
				0V	Other ranges
2T (Input)	Throttle sensor	2T	2L	Approx. 0.5—4.3V	Throttle valve fully closed to fully open

\* Checked with AC range

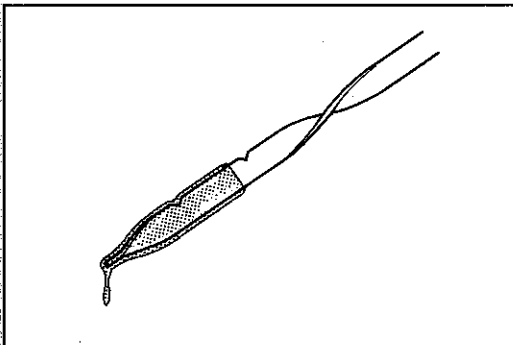
2BU0K2-012



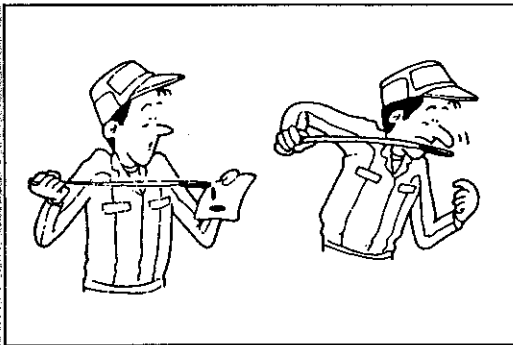
1BU0K1-027



79G07C-126



2BU0K2-013



79G07C-128

## AUTOMATIC TRANSMISSION FLUID (ATF)

### INSPECTION

#### Level

#### Caution

Place the vehicle on a flat, level surface.

1. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
2. Warm-up the engine until the ATF reaches **60—70°C (140—158°F)**.
3. While the engine is idling, shift the selector lever from P to L and back again.
4. Let the engine idle.
5. Shift the selector lever to P.

6. Ensure that the ATF level is between the notches on the transmission level gauge. Add ATF to specification if necessary.

**ATF type: Dexron® II or M-III**

#### Condition

1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

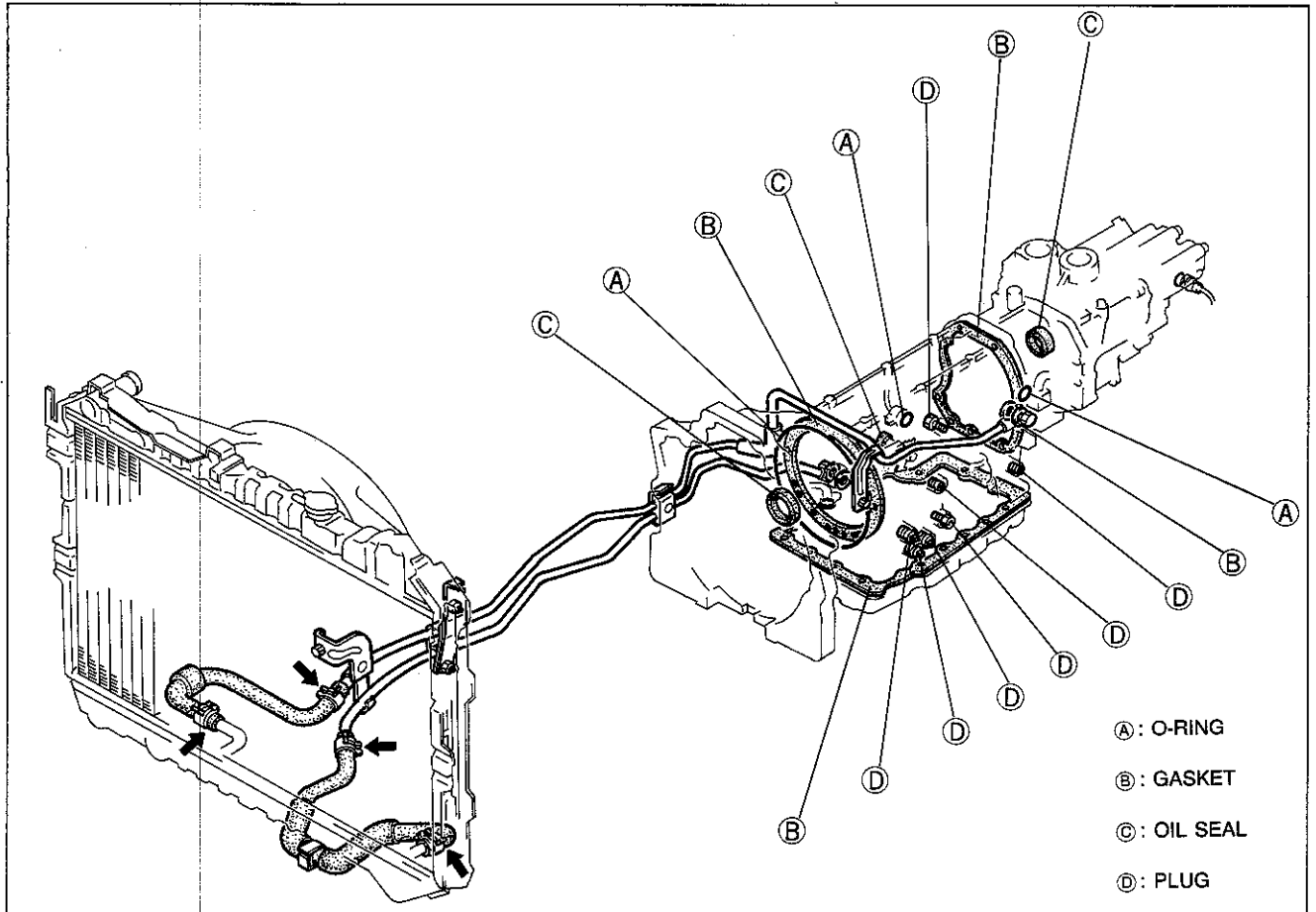
#### Note

- a) Determine whether or not the automatic transmission should be disassembled by observing the condition of the ATF carefully.
- b) If the ATF is muddy and varnished, it indicates burned drive plates.

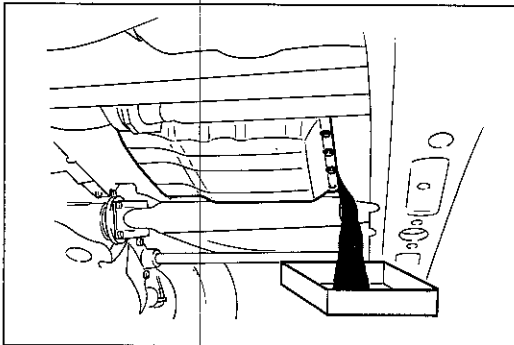
## Fluid leaks

Check for fluid leaks of the transmission as shown below, repair or replace if necessary.

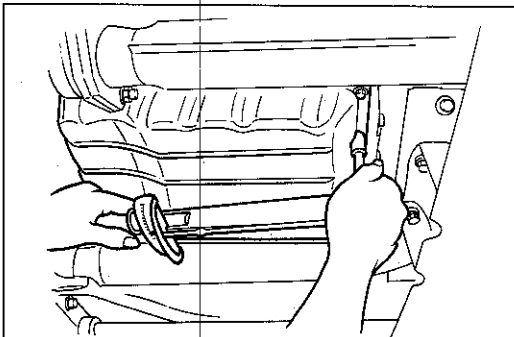
1. Gaskets, O-rings, and plugs
2. Oil hoses and oil pipes, and connections
3. Oil cooler(s)



9MU0K1-087



2BU0K2-014



2BU0K2-015

## REPLACEMENT

1. Jack up the vehicle and support it with safety stands.

### Warning

**Be careful when draining; the ATF is hot.**

2. Loosen the oil pan mounting bolts, and drain the ATF into a container.
3. Remove the oil pan and gasket.
4. Clean the oil pan and the magnet.
5. Install the oil pan along with a new gasket.

### Tightening torque:

**4.9—7.8 N·m (50—80 cm·kg, 43—69 in·lb)**

6. Jack down the vehicle and add **approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)** ATF.

**Specified ATF: Dexron®II or M-III**

7. Check the ATF level. (Refer to page K2-42.)



### TRANSMISSION

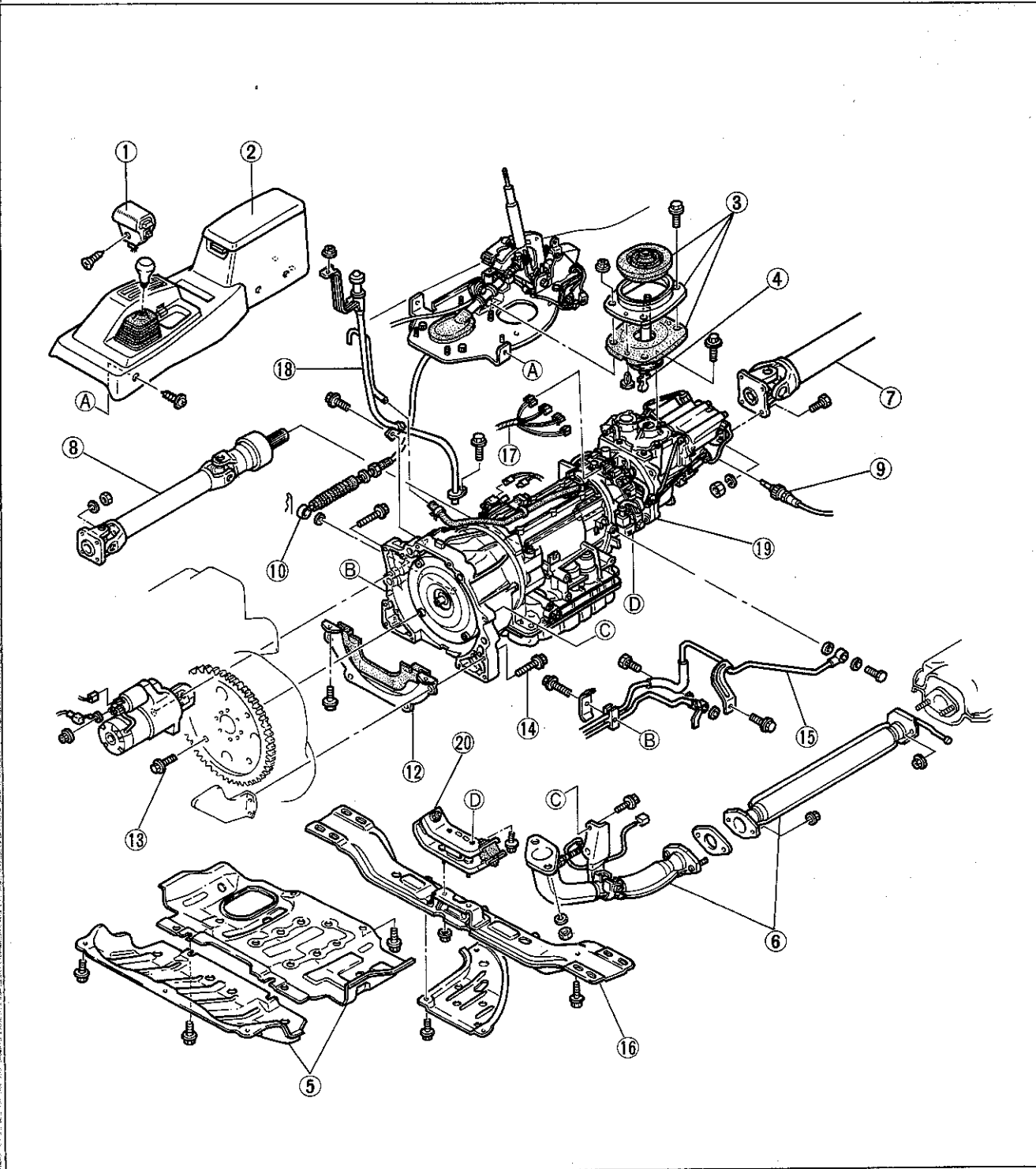
#### TRANSMISSION UNIT (REMOVAL)

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Remove in the order shown in the figure, referring to **Removal Note**.

#### Caution

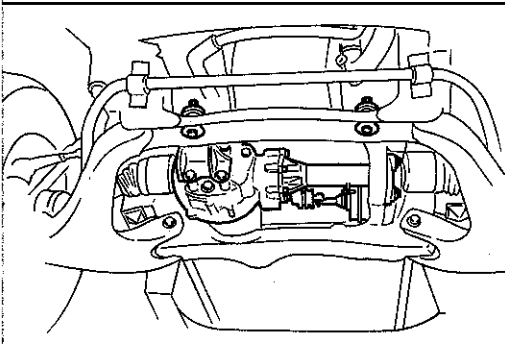
Do not turn the transmission over before removing the oil pan.

4. After removal, remove the oil pan to check condition of the transmission.

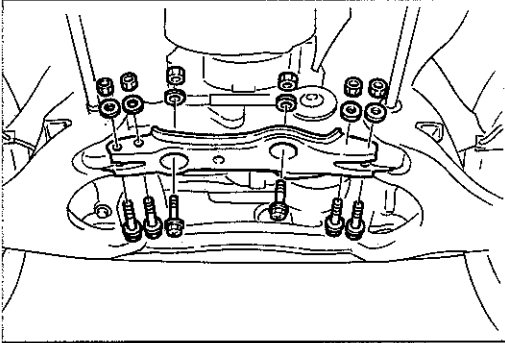


- 1. Selector knob
- 2. Console box
- 3. Insulator plate and boot
- 4. 4x4 shift lever
- 5. Under cover
- 6. Exhaust pipe
- 7. Rear propeller shaft  
Service..... Section L
- 8. Front propeller shaft  
Service..... Section L
- 9. Speedometer cable
- 10. Selector cable
- 11. No.2 cross member  
Removal Note..... page K2-46
- 12. Under cover
- 13. Torque converter installation bolt  
Removal Note..... page K2-46
- 14. Transmission installation bolt
- 15. Oil pipe connector and bracket
- 16. Cross member  
Removal Note..... page K2-46
- 17. Connectors
- 18. Oil level gauge and pipe
- 19. Automatic transmission
- 20. Transmission mount

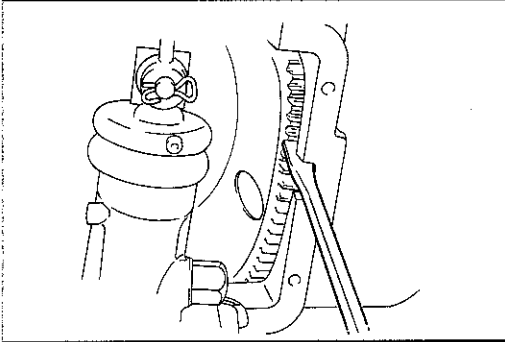
2BU0K2-017



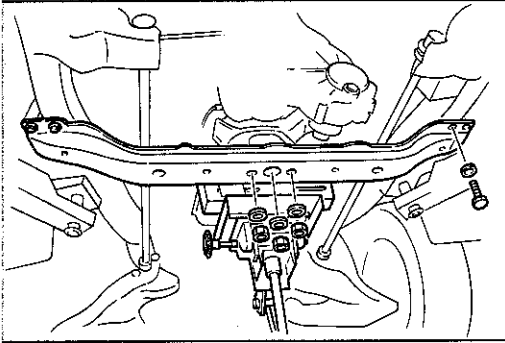
0BU0K2-050



0BU0K2-051



0BU0K2-052



0BU0K2-054

### Removal note No.2 cross member

1. Loosen the differential mounting bolts.
2. Remove the cross member.

### Torque converter installation bolts

1. Hold the drive plate with the screwdriver.
2. Remove the torque converter installation bolts.

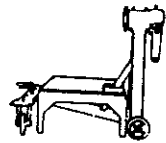
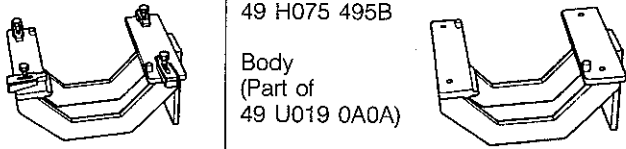
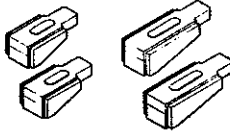
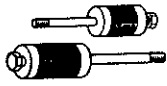
### Cross member

1. Support the transmission with the transmission jack.
2. Remove the cross member.

**TRANSMISSION UNIT (DISASSEMBLY)**

**Preparation**

**SST**

<p>49 0107 680A Engine stand</p>		<p>49 U019 0A0A Transmission hanger</p>	<p>49 H075 495B Body (Part of 49 U019 0A0A)</p> 
<p>49 U019 003 Holder (Part of 49 U019 0A0A)</p>		<p>49 0378 390 Puller, oil pump</p> 	<p>2BU0K2-018</p>

### Precaution

#### General Notes:

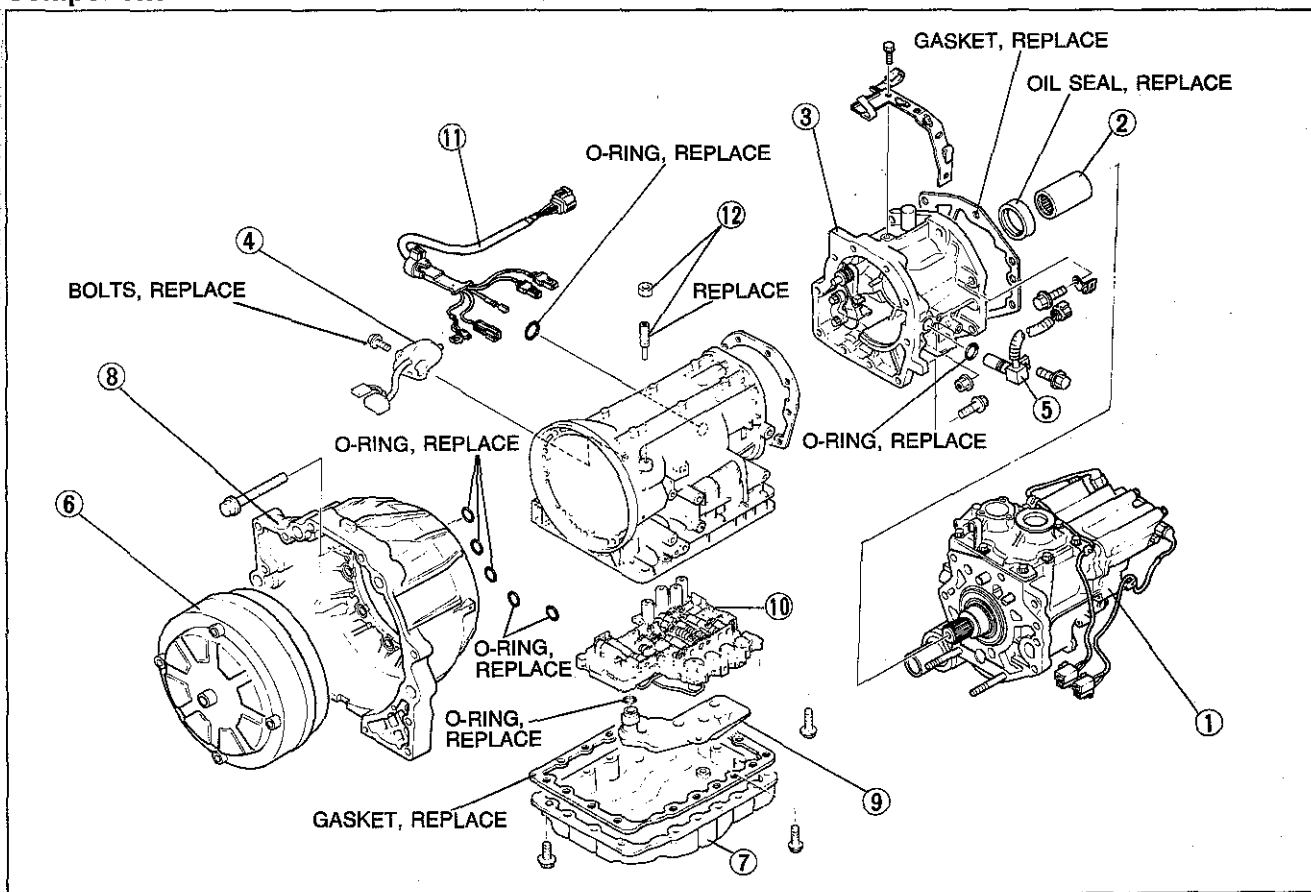
1. Disassemble the transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light alloy case joints.
4. Never use rags during disassembly; they may leave particles that can clog fluid passages.
5. Several parts resemble one another; organize them so that they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when the clutch or brake band has burned or when the ATF has degenerated.

#### Cleaning Notes:

1. Clean the transmission exterior thoroughly with steam or cleaning solvents, or both, before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

2BU0K2-019

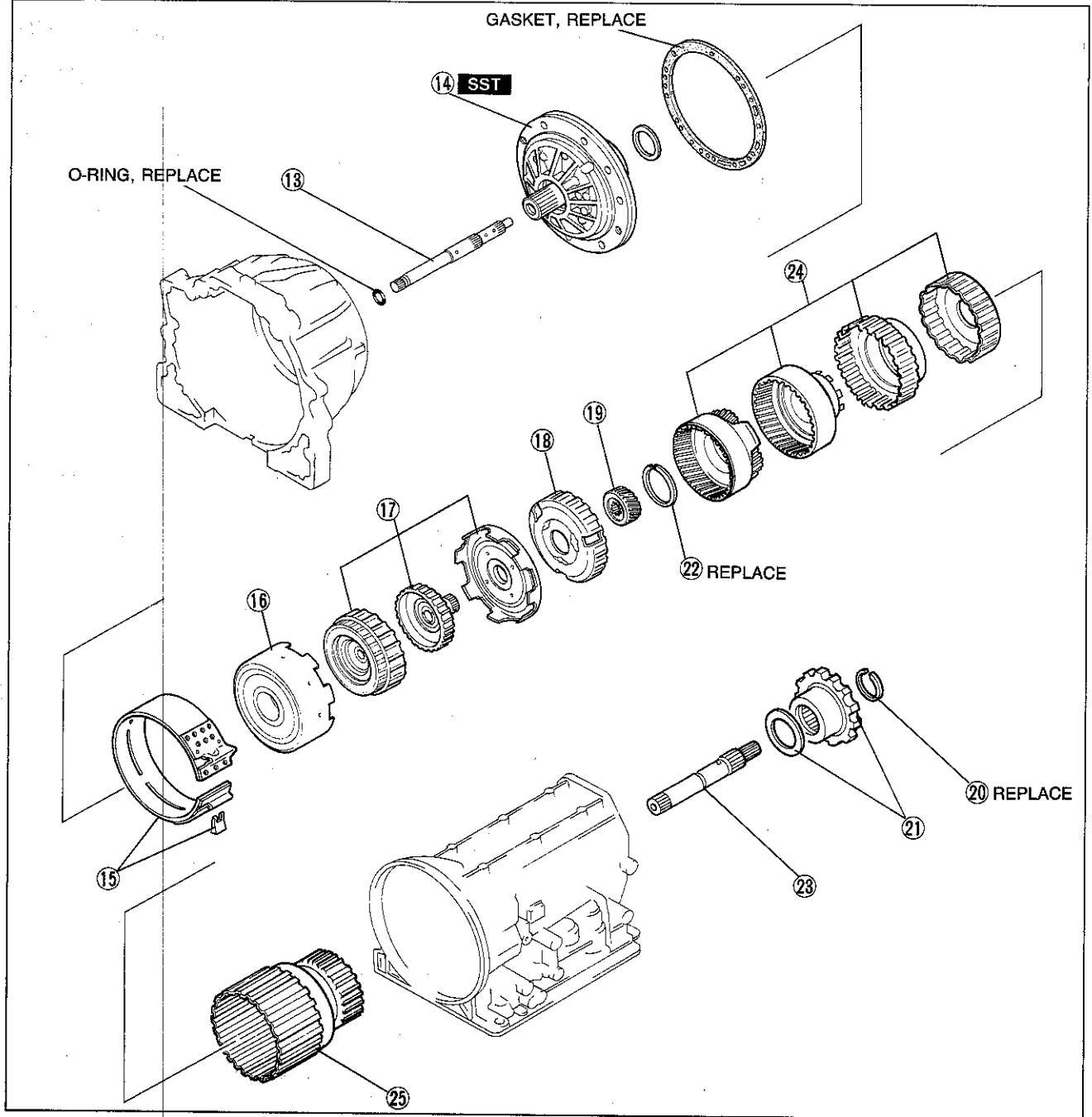
### Component



1BU0K2-031

- |  |  |   |
|--|--|---|
| <p>1. Transfer case</p> <p>2. Input sleeve</p> <p>3. Adapter case<br/>Disassembly and Inspection ..... page K2- 99<br/>Assembly ..... page K2-100</p> <p>4. Inhibitor switch<br/>Inspection .... page K2- 36<br/>Adjustment... page K2- 36</p> | <p>5. Speed sensor 1<br/>Inspection ..... page K2-38</p> <p>6. Torque converter<br/>Inspection ..... page K2-58</p> <p>7. Oil pan</p> <p>8. Converter housing</p> <p>9. Oil strainer</p> | <p>10. Control valve body<br/>Disassembly and Inspection ..... page K2-105<br/>Assembly ..... page K2-123</p> <p>11. Solenoid valve connectors</p> <p>12. Anchor end bolt and nut</p> |
|--|--|---|

## Components (cont'd)

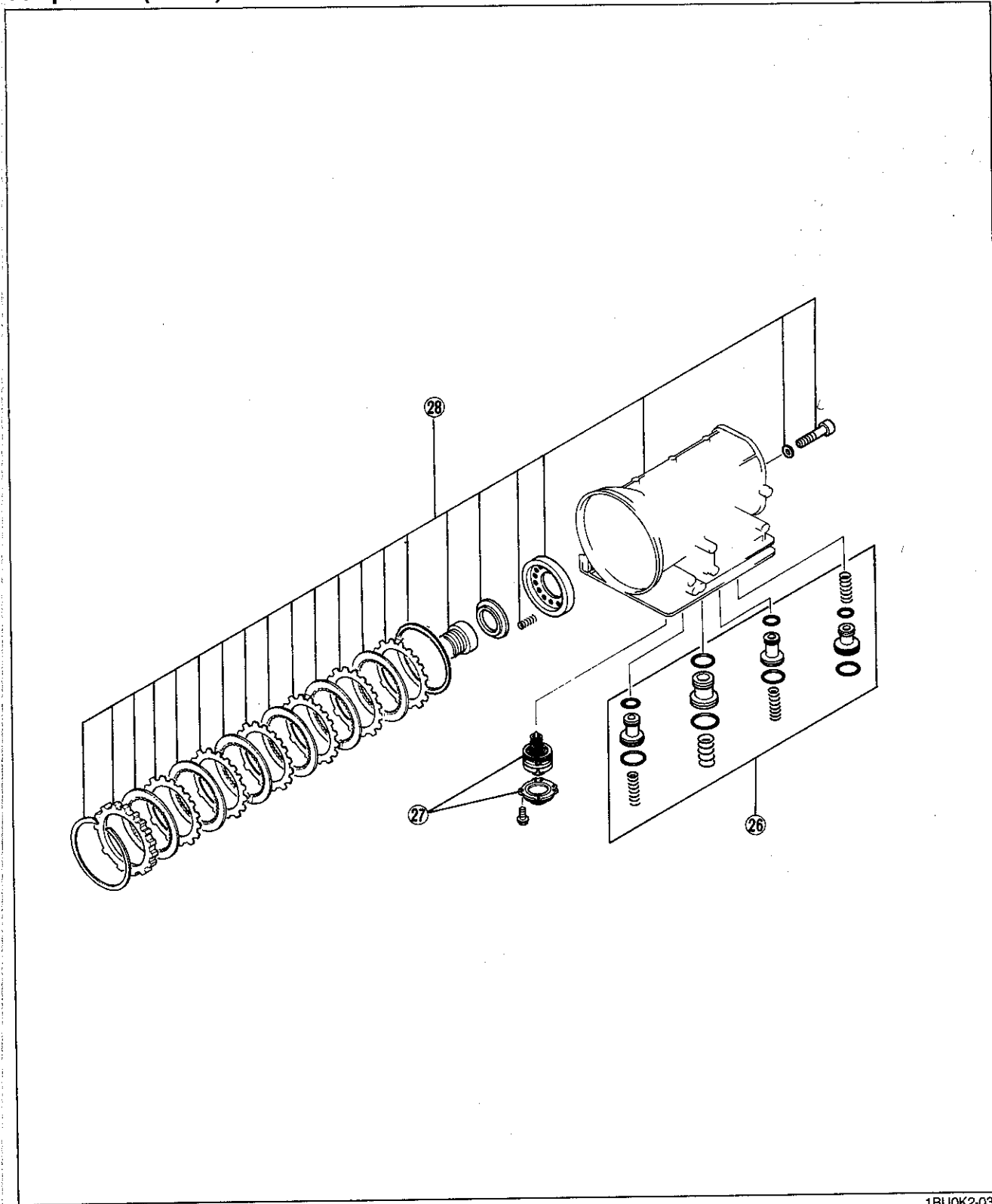


1BU0K2-032

- 13. Input shaft
- 14. Oil pump
  - Disassembly and Inspection .... page K2-61
  - Assembly ..... page K2-63
- 15. Brake band and strut
- 16. Reverse clutch
  - Disassembly and Inspection .... page K2-66
  - Assembly ..... page K2-68
- 17. High clutch and front sun gear
  - Disassembly and Inspection .... page K2-72
  - Assembly ..... page K2-74
- 18. Front planetary carrier
- 19. Rear sun gear

- 20. Snap ring
- 21. Parking gear and bearing
- 22. Snap ring
- 23. Output shaft
- 24. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
  - Disassembly and Inspection .... page K2-82
  - Assembly ..... page K2-83
- 25. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)
  - Disassembly and Inspection .... page K2-86
  - Assembly ..... page K2-88

### Components (cont'd)

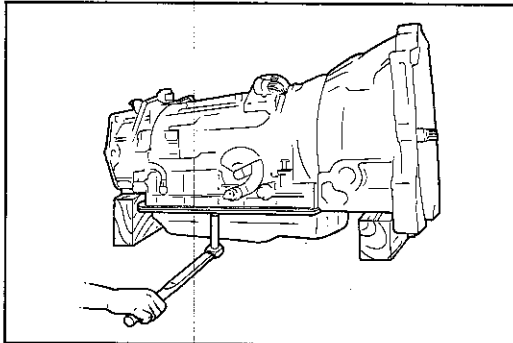


1BU0K2-033

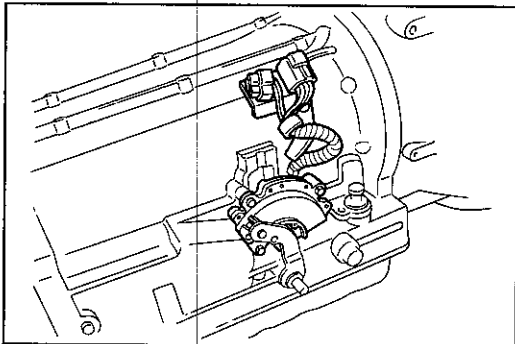
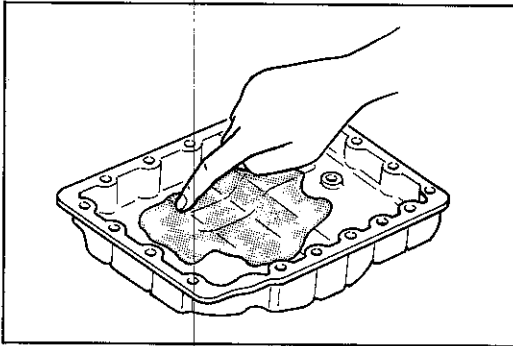
26. Accumulator spring and piston  
Disassembly and Inspection  
..... page K2-59  
Assembly ..... page K2-60

27. Band servo  
Disassembly and Inspection  
..... page K2-78  
Assembly ..... page K2-79

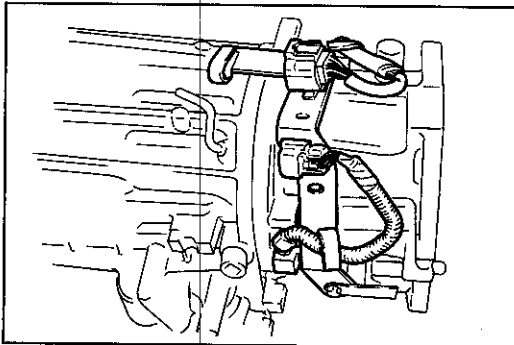
28. Low and reverse brake  
piston and spring  
Disassembly and Inspection  
..... page K2-95  
Assembly ..... page K2-96



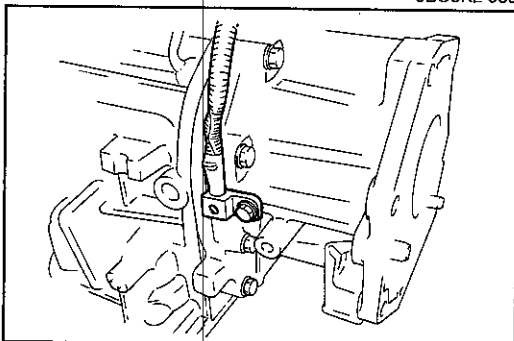
1BU0K2-085



0BU0K2-059



0BU0K2-060



0BU0K2-061

**Procedure**

**Caution**

**Keep the transmission oil-pan down so that any foreign material will remain in the pan.**

1. Remove the transfer case. (Refer to Section J3.)
2. Place the transmission on wooden blocks under the converter housing and the extension housing.
3. Remove the oil pan and gasket.  
Examine any material found in the pan or on the magnet to determine the condition of the transmission.  
Clutch facing material..... Drive plate and brake band wear  
Steel (magnet)..... Bearing, gear, and driven plate wear  
Aluminum (nonmagnetic).... Bushings or cast aluminum parts wear  
If large amounts of material are found, replace the torque converter and carefully check the transmission for the cause.
4. Install the oil pan with a few bolts to protect the valve body.

5. Remove the connector bracket from the transmission case.
6. Remove the inhibitor switch.

7. Remove the connector bracket from the extension housing.
8. Disconnect the harness from the harness bracket.

**Caution**

**Do not damage the speed sensor.**

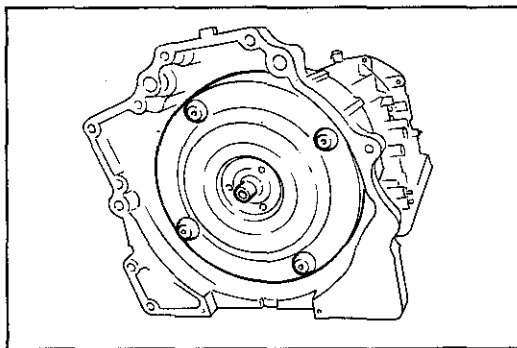
9. Remove the speed sensor 1.
10. Remove the O-ring from the speed sensor 1.



**Note**

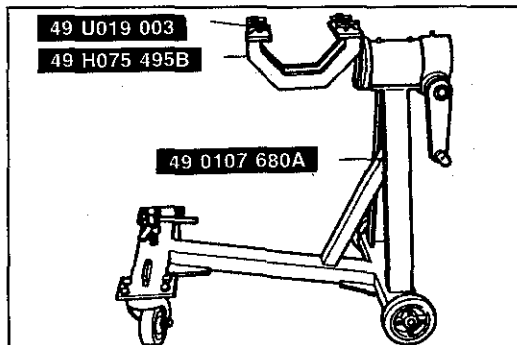
Be careful not to spill the ATF when removing the torque converter.

11. Remove the torque converter.



0BU0K2-062

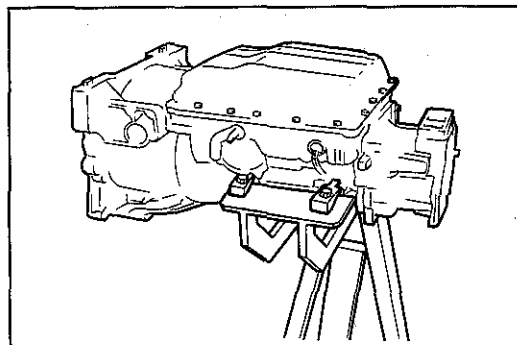
12. Assemble the **SST** as shown.



0BU0K2-063

13. Mount the transmission to the **SST**.

14. Remove the oil pan.

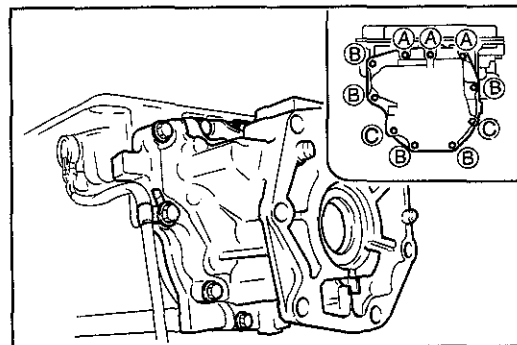


0BU0K2-064

15. Remove the adapter case and gasket.

**Bolt length (Measured from below the head)**

- Ⓐ: 30mm (1.181 in)
- Ⓑ: 45mm (1.772 in)
- Ⓒ: 50mm (1.969 in)



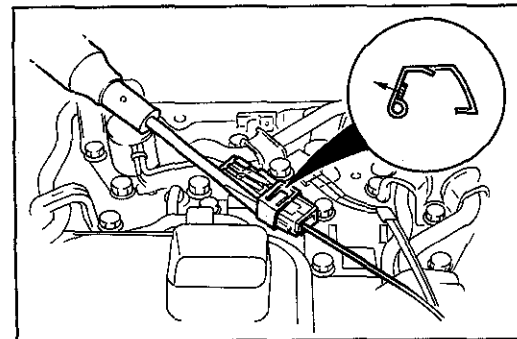
2BU0K2-020

**Caution**

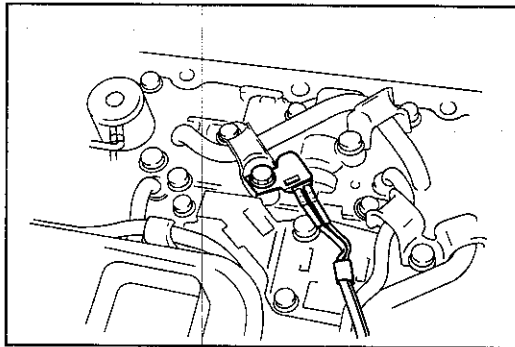
Do not damage the harness or connector.

16. Remove the clip.

17. Disconnect the lockup solenoid connector.



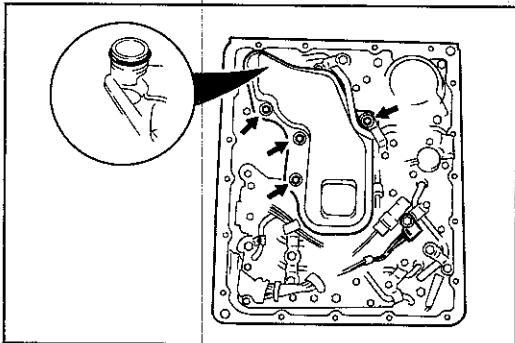
0BU0K2-066



2BU0K2-021

18. Disconnect the ATF thermosensor.

**Bolt length (Measured from below the head):**  
**45mm (1.772 in)**

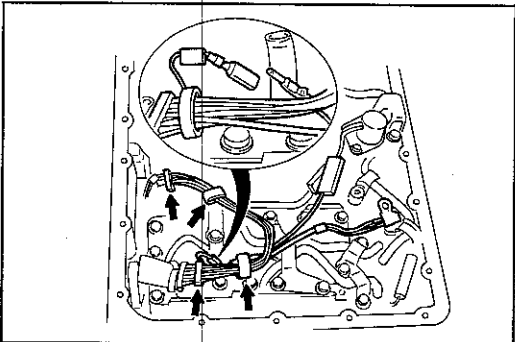


0BU0K2-068

19. Remove the oil strainer.

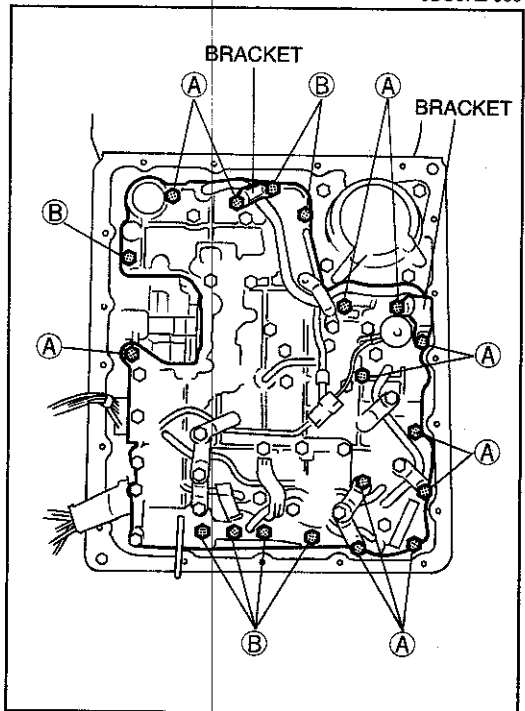
**Bolt length (Measured from below the head):**  
**50mm (1.969 in)**

20. Remove the O-ring from the oil strainer.



0BU0K2-069

21. Separate the solenoid harness from the harness clip.



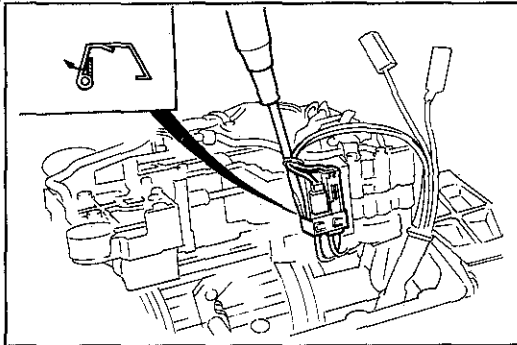
1BU0K2-035

22. Remove the bolts (A) and (B), and brackets shown in the figure.

**Bolt length (Measured from below the head)**

**(A): 33mm (1.299 in)**

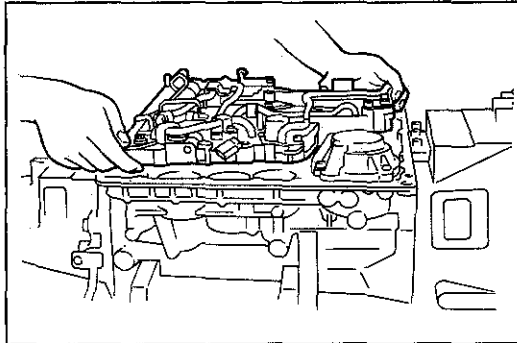
**(B): 45mm (1.772 in)**



OBU0K2-071

**Caution**  
Do not damage the harness or connector.

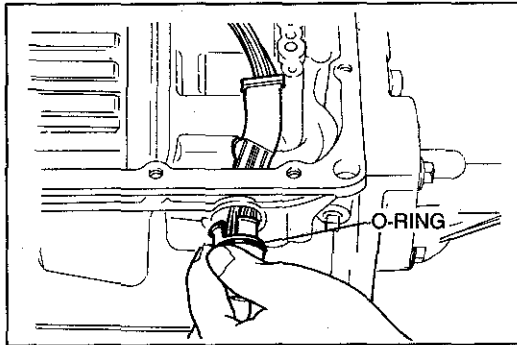
- 23. Remove the clip.
- 24. Disconnect the solenoid connectors.



OBU0K2-072

**Caution**  
Do not remove the control valve body unless you also remove the oil pipes.

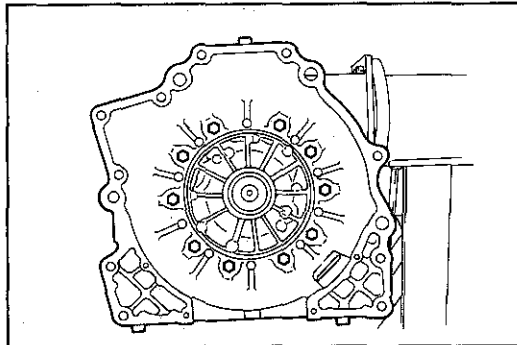
- 25. Remove the control valve body.



OBU0K2-073

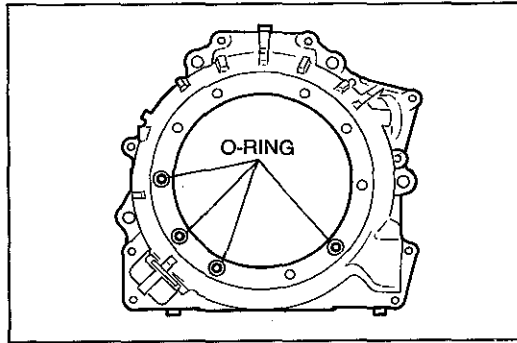
**Caution**  
Do not damage the solenoid connector.

- 26. Remove the solenoid connector from the transmission case.
- 27. Remove the O-ring from the solenoid connector.



OBU0K2-074

- 28. Remove the converter housing from the transmission case.

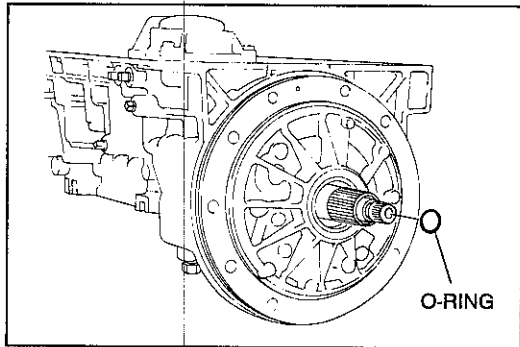


OBU0K2-075

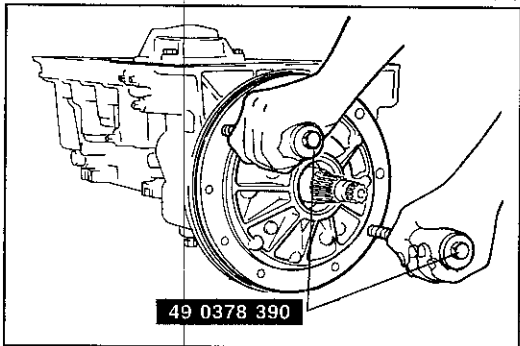
- 29. Remove the O-rings from the converter housing.

**Caution**  
Do not damage the converter housing.

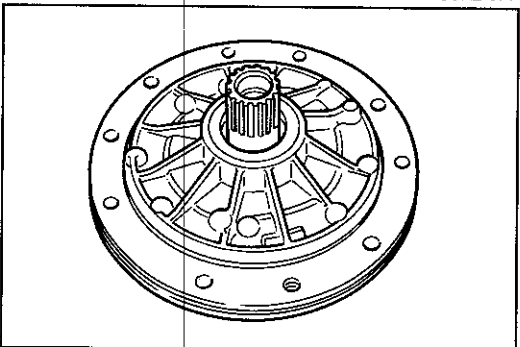
- 30. Clean the sealing compound from the converter housing.



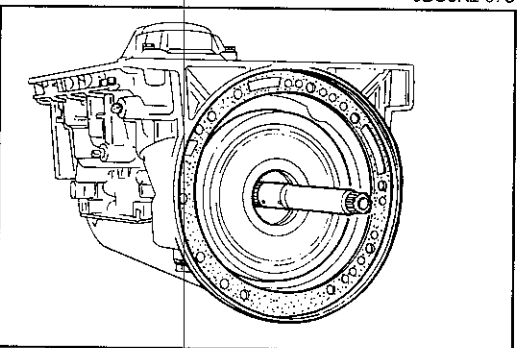
0BU0K2-076



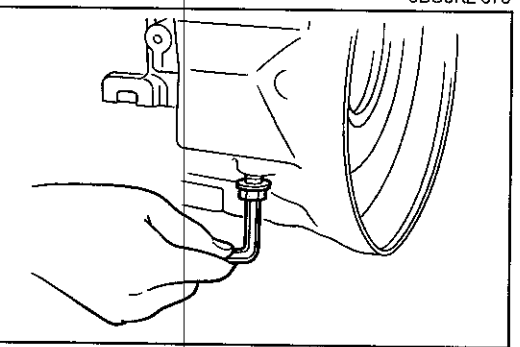
0BU0K2-077



0BU0K2-078



0BU0K2-079



0BU0K2-080

**Procedure**

**Caution**

**Keep the transmission oil-pan down so that any foreign material will remain in the pan.**

1. Remove the transfer case. (Refer to Section J2.)
2. Place the transmission on wooden blocks under the converter housing and the extension housing.
3. Remove the oil pan and gasket.
  - Examine any material found in the pan or on the magnet to determine the condition of the transmission.
  - Clutch facing material..... Drive plate and brake band wear
  - Steel (magnet)..... Bearing, gear, and driven plate wear
  - Aluminum (nonmagnetic).... Bushings or cast aluminum parts wear
4. Install the oil pan with a few bolts to protect the valve body.

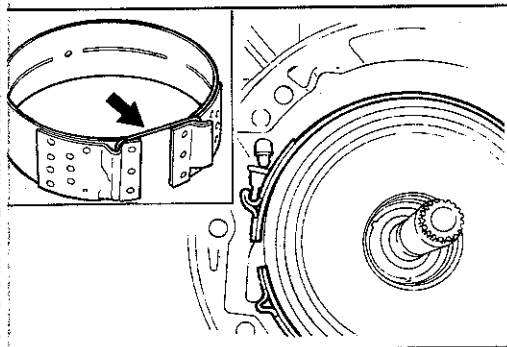
5. Remove the connector bracket from the transmission case.
6. Remove the inhibitor switch.

7. Remove the connector bracket from the extension housing.
8. Disconnect the harness from the harness bracket.

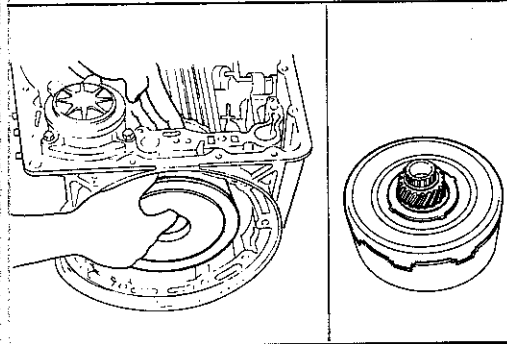
**Caution**

**Do not damage the speed sensor.**

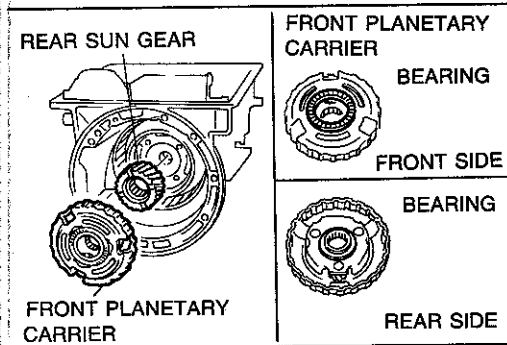
9. Remove the speed sensor 1.
10. Remove the O-ring from the speed sensor 1.



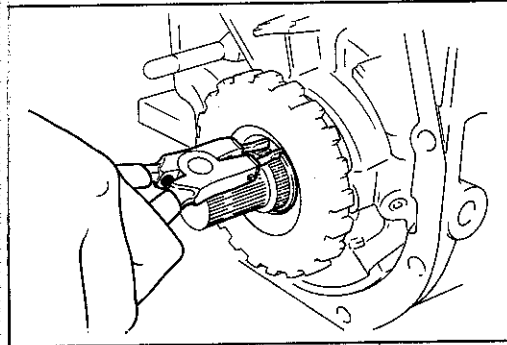
0BU0K2-081



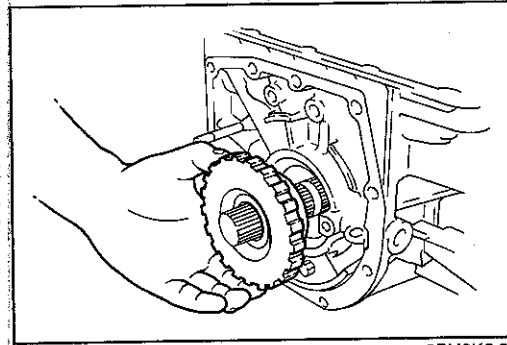
0BU0K2-082



0BU0K2-083



0BU0K2-084

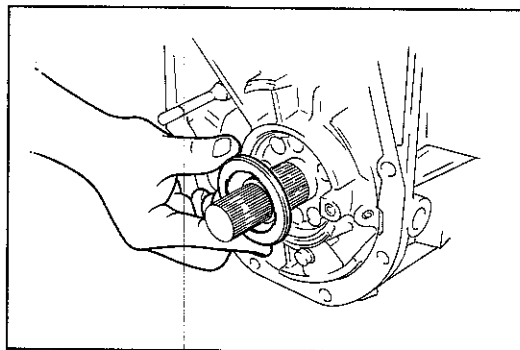


0BU0K2-085

### Caution

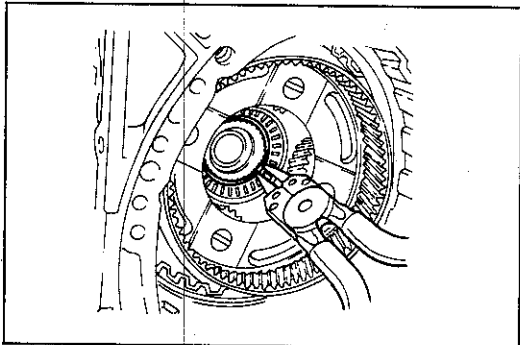
To prevent the brake facing from cracking or peeling, do not stretch the brake band. Secure it with a wire clip.

40. Remove the brake band and the band strut.
41. Remove the reverse clutch, high clutch, and the front sun gear from the transmission case as an assembly.
42. Remove the front planetary carrier, bearings, and the rear sun gear. Inspect the following parts, and repair or replace as necessary.
  - 1) Front planetary carrier  
Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears
  - 2) Rear sun gear  
Inspect individual gear teeth for damage, wear, or cracks
  - 3) Bearing  
Inspect for damage or rough rotation
43. Remove the snap ring (rear) from the output shaft.
44. Remove the parking gear.



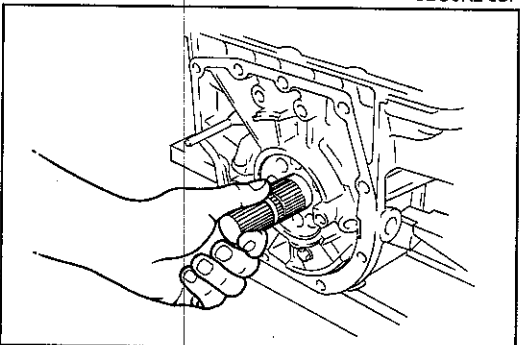
0BU0K2-086

45. Remove the bearing behind the transmission case.



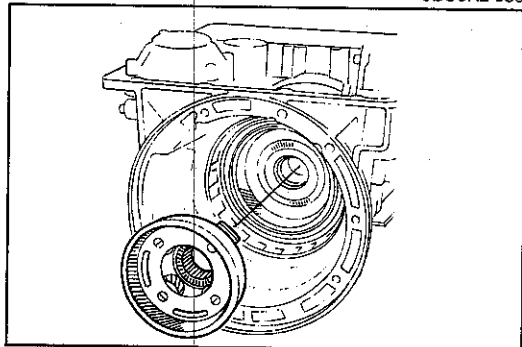
0BU0K2-087

46. While pushing the output shaft forward in slightly, and remove the snap ring (front) from the output shaft.



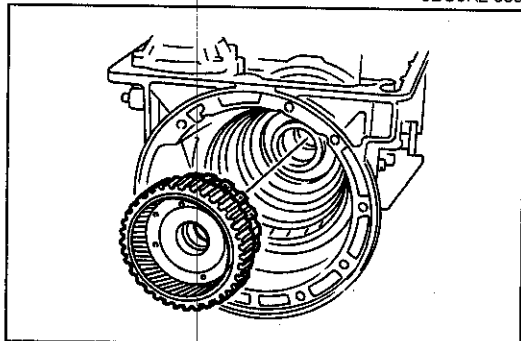
0BU0K2-088

47. Pull out the output shaft.



0BU0K2-089

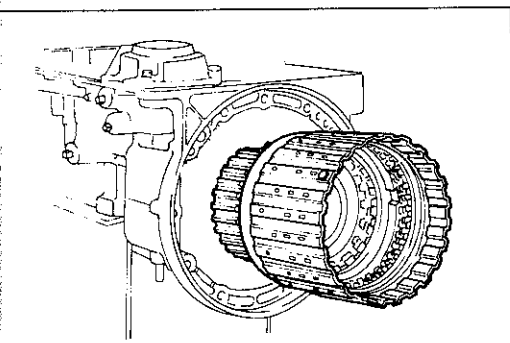
48. Remove the front internal gear (with rear planetary carrier).



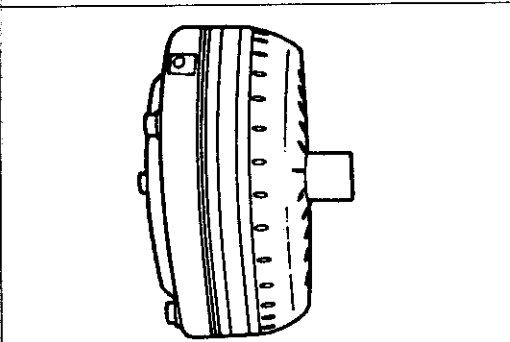
0BU0K2-090

49. Remove the rear internal gear, forward clutch hub, and over-running clutch hub as an assembly.

50. Remove the forward clutch drum (forward clutch, overrunning clutch, low one-way clutch) from the transmission case.



0BU0K2-091

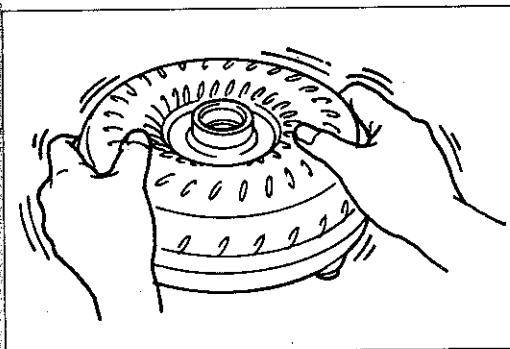


9MU0K1-133

### TORQUE CONVERTER

#### Inspection

1. Check the outside of the converter for damage and cracks, and replace the torque converter if there is any problem.
2. Check for rust on the pilot hub on the boss, and remove it completely if there is any.



15U0KX-113

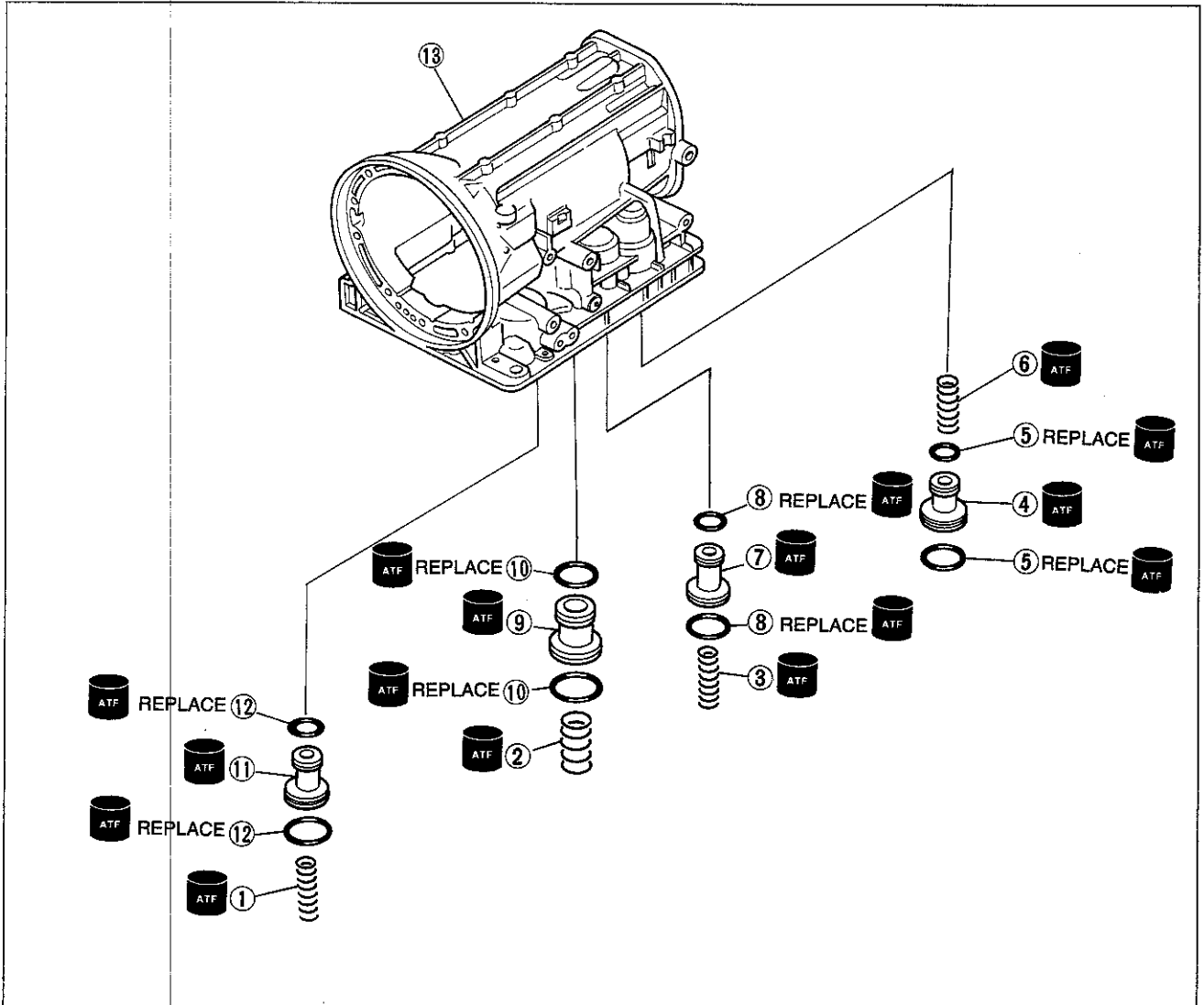
#### Washing inside the converter

1. Drain any ATF remaining in the converter.
2. Pour in solvent (**0.5 liter, 0.5 US qt, 0.4 Imp qt**).
3. Shake the converter to clean the inside. Pour out the solvent.
4. Pour in ATF.
5. Shake the converter to clean the inside. Pour out the ATF.

**ACCUMULATORS**

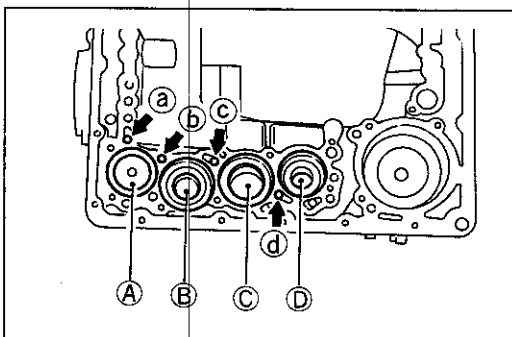
**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace if necessary.



1BU0K2-036

- |  |  |                                |
|--|--|--------------------------------|
| 1. 3-4/N-R accumulator spring<br>Inspection ..... page K2-60 | 4. N-D accumulator piston                                | 9. 1-2 accumulator piston      |
| 2. 1-2 accumulator spring<br>Inspection ..... page K2-60     | 5. O-rings   | 10. O-rings                    |
| 3. 2-3 accumulator spring<br>Inspection ..... page K2-60     | 6. N-D accumulator spring<br>Inspection ..... page K2-60 | 11. 3-4/N-R accumulator piston |
|  | 7. 2-3 accumulator piston                                | 12. O-rings                    |
|  | 8. O-rings   | 13. Transmission case          |



9MU0K1-136

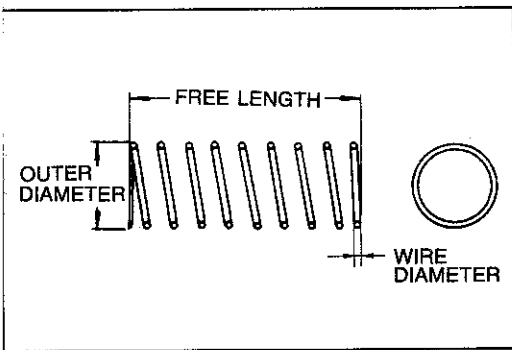
**Disassembly note**

**Accumulator piston**

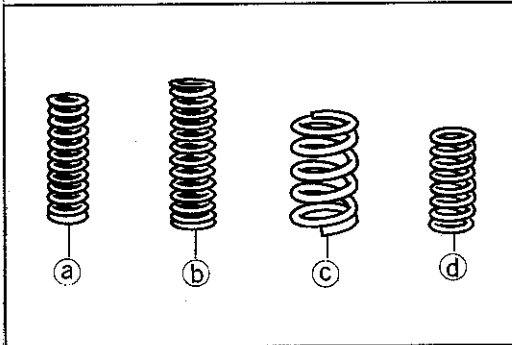
Remove the accumulator pistons, and springs from transmission case by applying compressed air through the oil passage as shown in the figure.

Accumulator	Item	Location	Oil passage
N-D accumulator		A	a
2-3 accumulator		B	b
1-2 accumulator		C	c
3-4/N-R accumulators		D	d

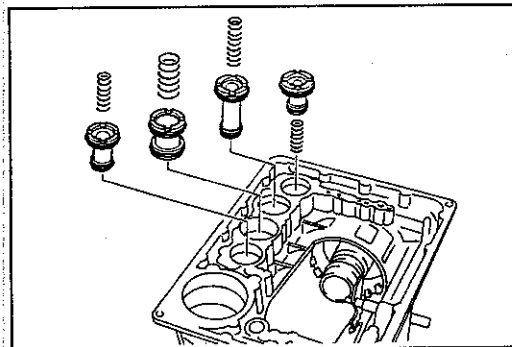
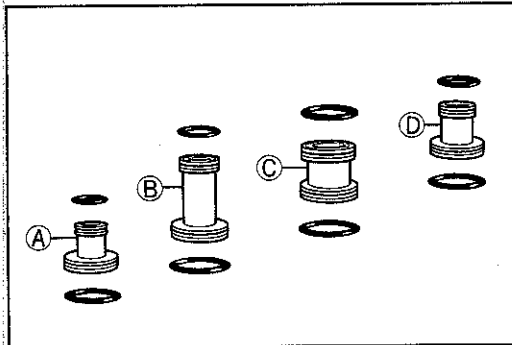




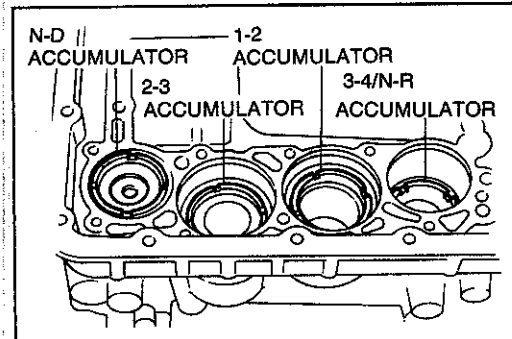
1BU0K2-037



1BU0K2-038



9MU0K1-139



9MU0K1-140

### Inspection Accumulator, spring

Measure the spring free length.

	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
N-D accumulator piston	18.0 (0.709)	43.0 (1.693)	12.3	2.3 (0.091)
1-2 accumulator piston	29.3 (1.154)	45.0 (1.772)	3.6	4.0 (0.157)
2-3 accumulator piston	20.0 (0.787)	66.0 (2.598)	11.4	3.5 (0.138)
3-4/N-R accumulators piston	17.3 (0.681)	58.4 (2.299)	12.3	2.3 (0.091)

If not within specification, replace the spring.

### Assembly

#### Note

#### Installation order

**N-D accumulator: Spring — Piston**

**2-3 accumulator: Piston — Spring**

**1-2 accumulator: Piston — Spring**

**3-4/N-R accumulators: Piston — Spring**

**Outer diameter of spring**

Spring	Outer dia. mm (in)
a N-D accumulator	18.0 (0.709)
b 2-3 accumulator	20.0 (0.787)
c 1-2 accumulator	29.3 (1.154)
d 3-4/N-R accumulators	17.3 (0.681)

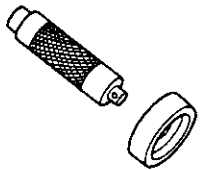

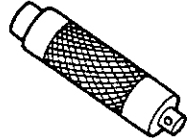
**Apply even pressure to the perimeter of the accumulator pistons to avoid damaging the O-rings when installing.**

1. Apply ATF to the new O-rings and install them on to the accumulator pistons.

Piston	O-ring	Large mm (in)	Small mm (in)
		A N-D accumulator	45.0 (1.772)
B 2-3 accumulator		50.0 (1.969)	32.0 (1.260)
C 1-2 accumulator		50.0 (1.969)	45.0 (1.772)
D 3-4/N-R accumulators		45.0 (1.772)	29.0 (1.142)

2. Install the accumulator pistons and springs.

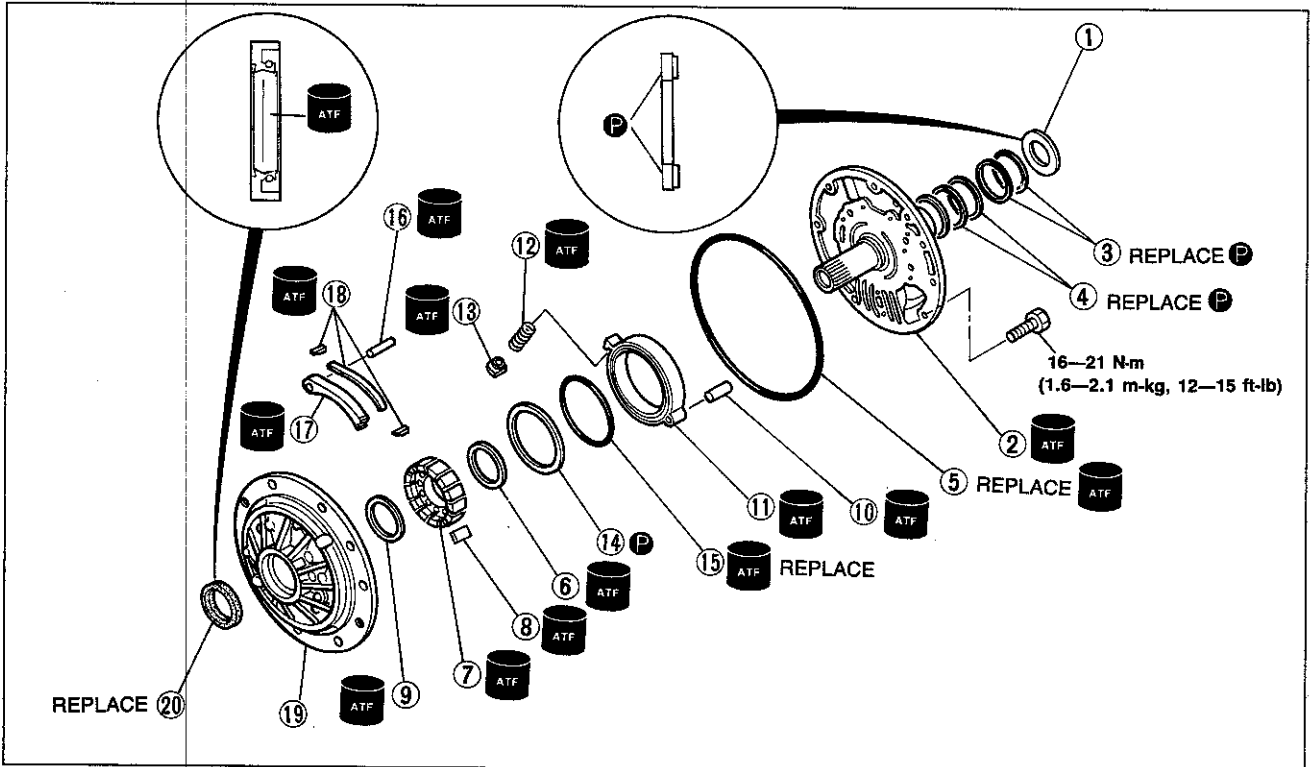
**OIL PUMP  
Preparation  
SST**

<p>49 G030 795</p> <p>Installer, oil seal</p> 	<p>49 G030 796</p> <p>Body (Parts of 49 G030 795)</p> 	<p>49 G030 797</p> <p>Handle (Parts of 49 G030 795)</p> 
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9MU0K1-486

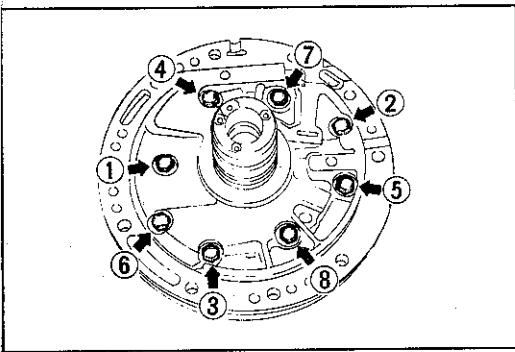
**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.



1BU0K2-039

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Bearing<br/>Inspect for damage or rough rotation</li> <li>2. Oil pump cover<br/>Disassembly Note ..... page K2-62<br/>Inspection ..... page K2-62</li> <li>3. Seal ring (small diameter)</li> <li>4. Seal ring (large diameter)</li> <li>5. Seal ring</li> <li>6. Vane ring</li> <li>7. Rotor<br/>Disassembly Note ..... page K2-62<br/>Inspection ..... page K2-63</li> <li>8. Vane<br/>Inspection ..... page K2-63</li> <li>9. Vane ring</li> <li>10. Pivot pin<br/>Disassembly Note ..... page K2-62</li> </ul> | <ul style="list-style-type: none"> <li>11. Cam ring<br/>Disassembly Note ..... page K2-62<br/>Inspection ..... page K2-63</li> <li>12. Spring<br/>Inspection ..... page K2-63</li> <li>13. Spring seat</li> <li>14. Friction ring</li> <li>15. O-Ring</li> <li>16. Pivot pin</li> <li>17. Control piston<br/>Inspection ..... page K2-63</li> <li>18. Side seal</li> <li>19. Oil pump housing<br/>Inspection ..... page K2-63</li> <li>20. Oil seal</li> </ul> |
|--|--|

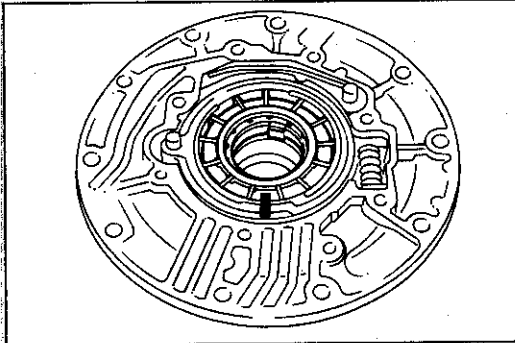


9MUOK1-142

### Disassembly note

#### Oil pump cover

Loosen the mounting bolts evenly in the pattern shown and remove the oil pump cover from the oil pump housing.



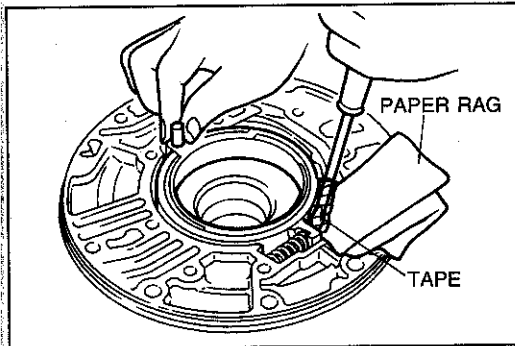
9MUOK1-143

### Rotor

#### Caution

**Do not use a punch to mark the rotor.**

Mark the rotor and cam ring; then separate the rotor and vanes from the cam ring.



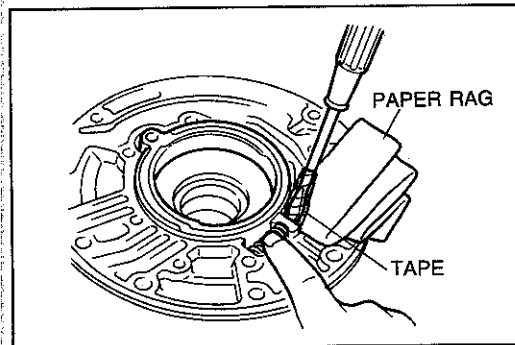
9MUOK1-144

### Pivot pin

#### Caution

**Do not scratch the oil pump housing.**

1. Wrap a screwdriver with tape.
2. While pushing on the cam ring, remove the pivot pin.



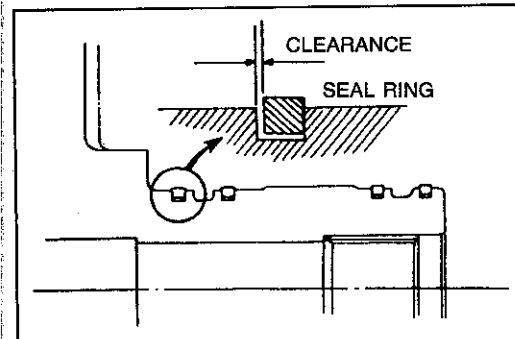
9MUOK1-145

### Cam ring

#### Caution

- a) Do not to scratch the oil pump housing.
- b) Hold the cam ring spring to prevent it from popping out.

Remove the cam ring and cam ring spring.



9MUOK1-147

### Inspection

#### Oil pump cover

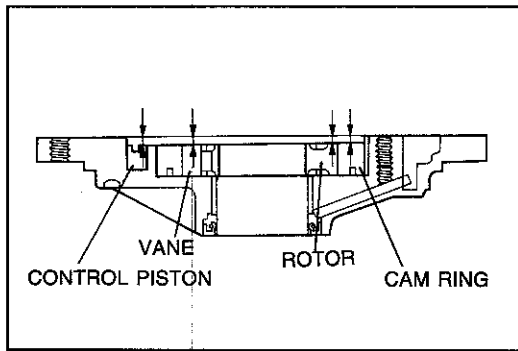
1. Apply petroleum jelly to new seal ring.
2. Measure the clearance between the seal ring and the ring groove.

#### Standard clearance:

0.10—0.25mm (0.0039—0.0098 in)

**Maximum clearance: 0.25mm (0.0098 in)**

3. If not within specification, replace the oil pump as an assembly.



9MU0K1-146

**Oil pump housing, cam ring, rotor, vane, and control piston**

**Note**

**Do not install the friction ring, O-ring, control piston side seals, or cam ring spring.**

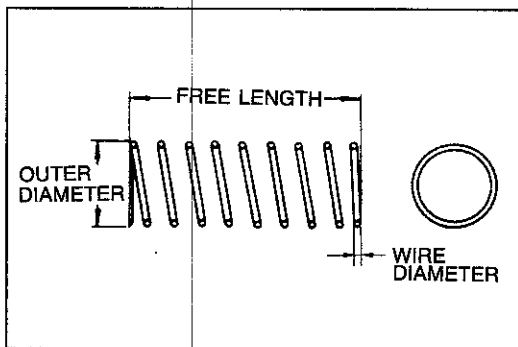
1. Install the cam ring vanes, rotor and control piston.
2. Measure the clearance between the end of the oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences.

**Clearance**

mm (in)

Port	Clearance	Standard	Maximum
Cam ring		0.010—0.024 (0.0004—0.009)	0.030 (0.0012)
Rotor, vane, control piston		0.030—0.044 (0.0012—0.0017)	0.050 (0.0020)

3. If not within specification, replace the oil pump as an assembly.



9MU0K1-487

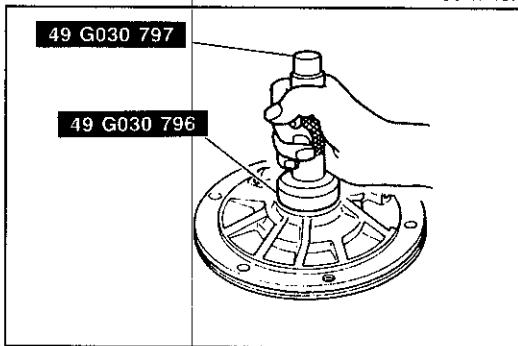
**Cam ring spring**

1. Measure the spring specification.

**Specification**

Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
13.7 (0.539)	39.8 (1.567)	7.8	2.3 (0.091)

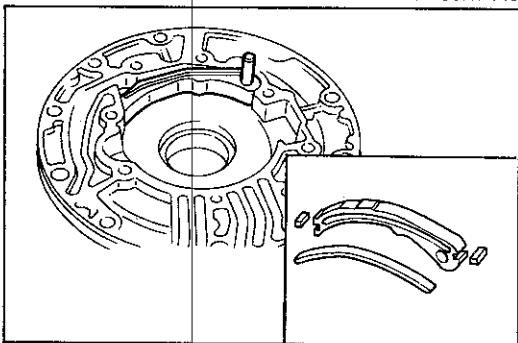
2. If not correct, replace the cam ring spring.



9MU0K1-148

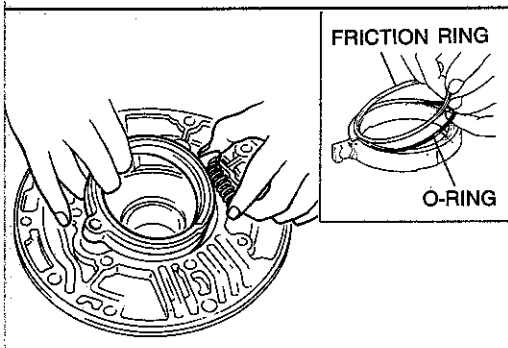
**Assembly**

1. Apply ATF to the new oil seal. Install the oil seal with the **SST**.

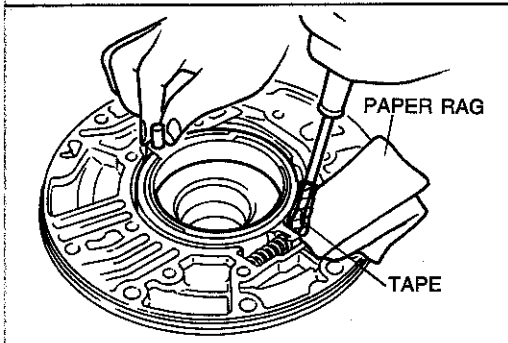


9MU0K1-149

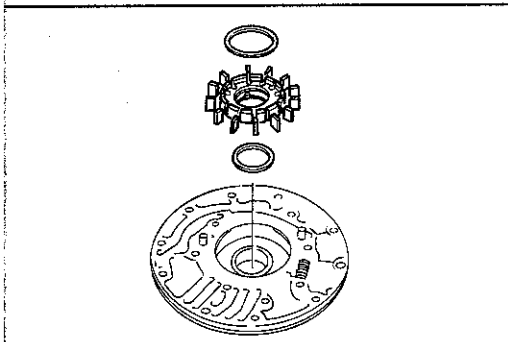
2. Apply ATF to side seal, and install them on the control piston with the black surface facing toward the control piston.
3. Install the control piston and pivot pin.



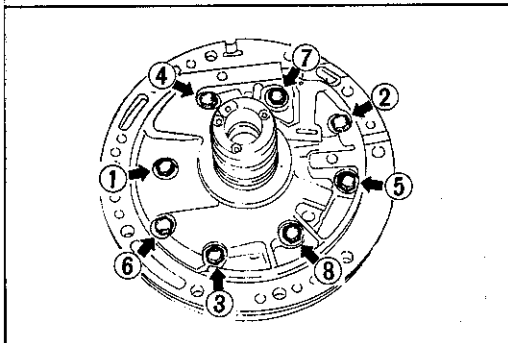
9MUOK1-151



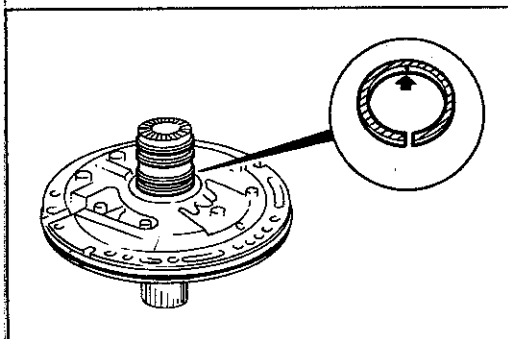
9MUOK1-152



9MUOK1-153



9MUOK1-154



9MUOK1-499

4. Apply petroleum jelly to the cam ring groove and install a new O-ring and friction ring into the cam ring.
5. Install the cam ring and spring while compressing the spring against the oil pump housing.

### Caution

**Do not scratch the oil pump housing.**

6. Wrap a screwdriver with tape.
7. While pushing on the cam ring, install the pivot pin.

8. Confirm the marks and install the rotor, vanes, and vane rings.

### Caution

**Do not damage the oil seal with the splines of the oil pump cover.**

9. Install the oil pump cover onto the oil pump housing.
10. Tighten the bolts evenly and gradually in the order shown.

### Tightening torque:

**16—21 Nm (1.6—2.1 m-kg, 12—15 ft-lb)**

### Caution

**Do not overexpand the seal rings when installing.**

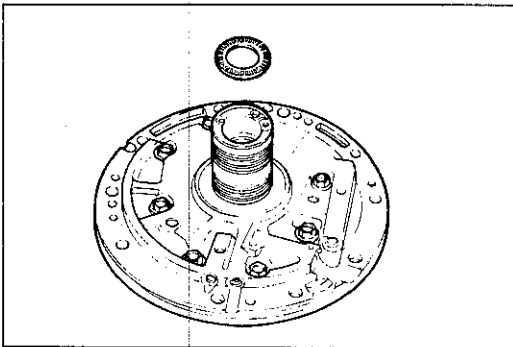
### Note

- a) Press the seal rings down into the petroleum jelly to hold them.
- b) Seal rings come in two different diameters.

**Small dia seal ring: No mark**

**Large dia seal ring: Yellow mark in area shown by arrow**

11. Put petroleum jelly into the ring grooves, and install the new seal rings.
12. Apply ATF to a new O-ring, and install it on the oil pump.



9MU0K1-157

13. Apply petroleum jelly to the bearing, and set it on the oil pump.

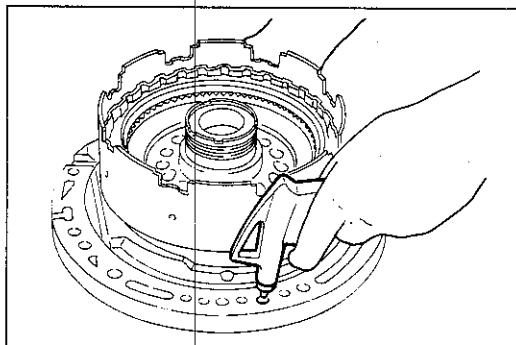
**Bearing outer diameter: 47.0mm (1.850 in)**

**REVERSE CLUTCH**

**Preparation**

**SST**

<p>49 G019 0A7A Compressor set, return spring</p>		<p>49 G019 025 Body B (Part of 49 G019 0A7A)</p>	<p>49 G019 026 Plate (Part of 49 G019 0A7A)</p>
<p>49 G019 027 Attachment A (Part of 49 G019 0A7A)</p>		<p>49 G019 029 Nut (Part of 49 G019 0A7A)</p>	<p>2BU0K2-022</p>



9MU0K1-159

**Preinspection**

**Reverse clutch operation**

1. Install the reverse clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

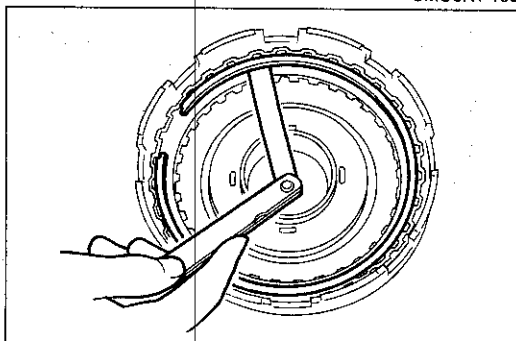
2. Verify that the retaining plate moves to the snap ring. If not, the D-ring or the oil seal may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.

**Clearance between retaining plate and snap ring**

Measure the clearance between the retaining plate and the snap ring.

**Standard clearance: 0.50—1.20mm (0.020—0.047 in)**

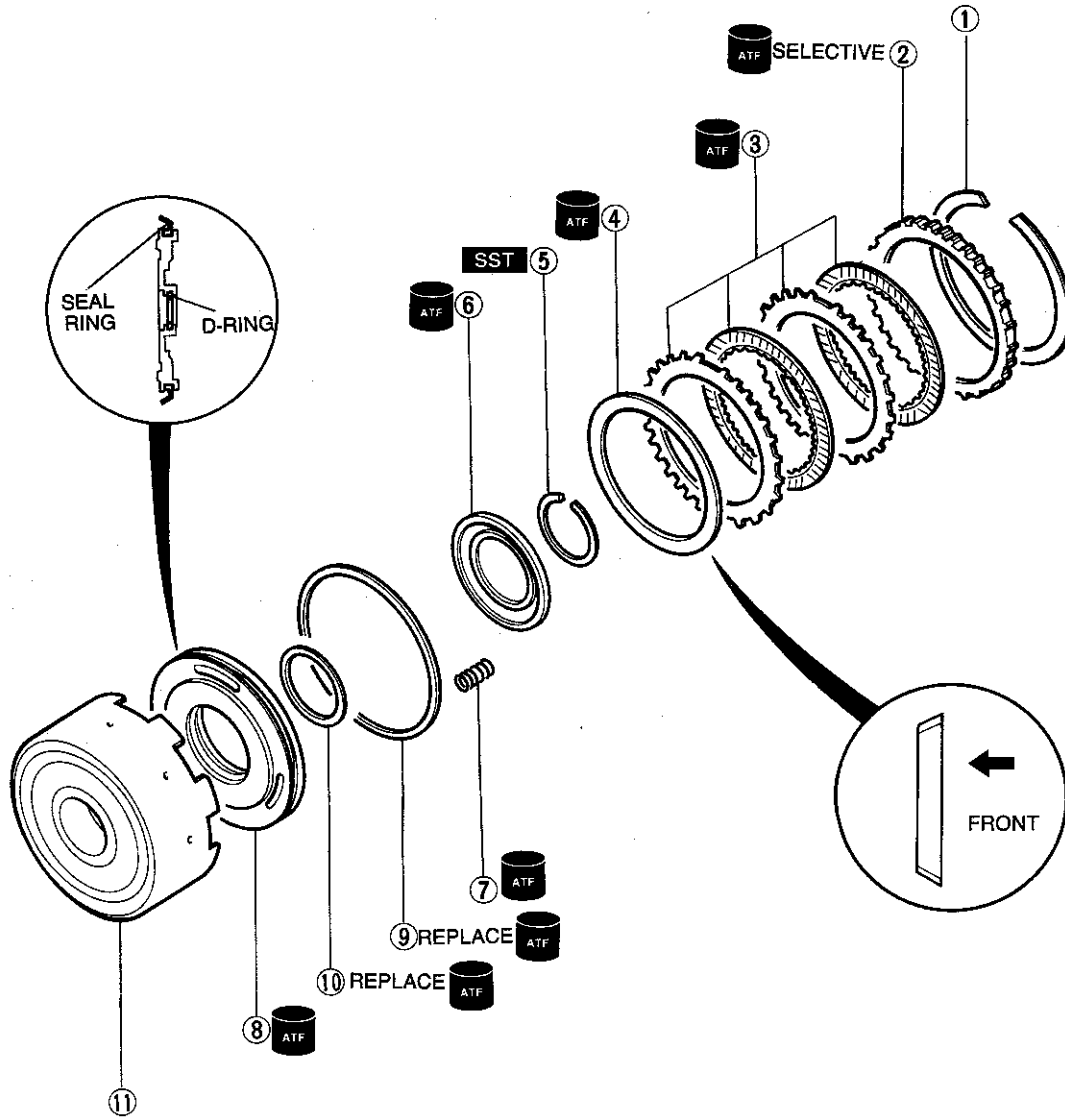
Select the correct retaining plate when assembling.



9MU0K1-160

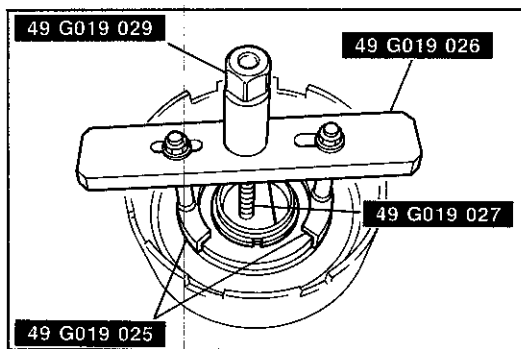
### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
 Inspect all parts and repair or replace as necessary.

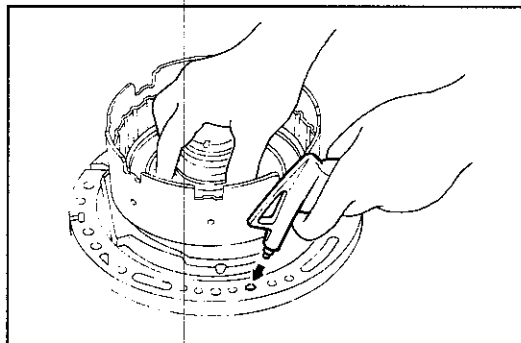


2BU0K2-023

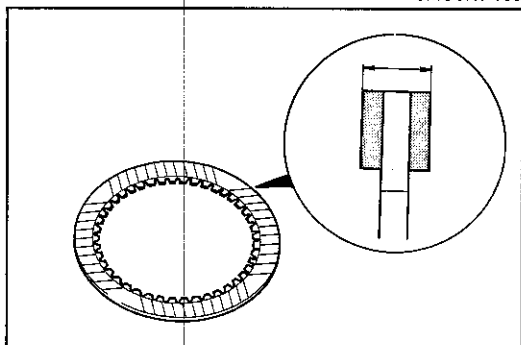
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Snap ring</li> <li>2. Retaining plate</li> <li>3. Drive plates and driven plates<br/>Inspect for wear or burning<br/>Inspection ..... page K2-67</li> <li>4. Dished plate</li> <li>5. Snap ring<br/>Disassembly Note ..... page K2-67</li> <li>6. Spring retainer</li> </ul> | <ul style="list-style-type: none"> <li>7. Return spring<br/>Inspection ..... page K2-67</li> <li>8. Clutch piston<br/>Inspect balls for sticking by shaking piston<br/>Disassembly Note ..... page K2-67<br/>Inspection ..... page K2-67</li> <li>9. Seal ring</li> <li>10. D-ring</li> <li>11. Reverse clutch drum</li> </ul> |
|--|--|



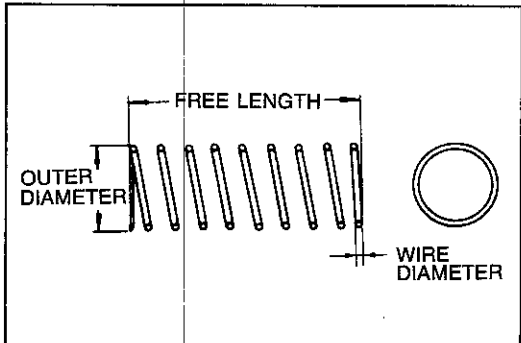
9MU0K1-162



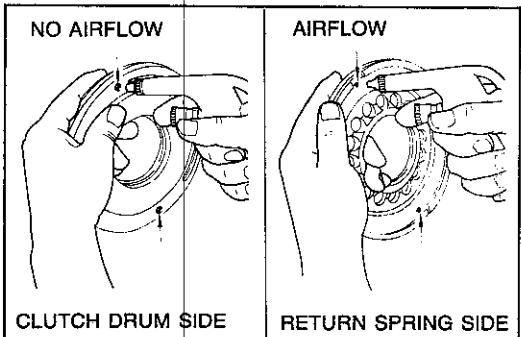
9MU0K1-163



9MU0K1-164



9MU0K1-165



9MU0K1-166

**Disassembly note**  
**Snap ring**

**Caution**

- a) Depress the spring retainer only enough to remove the snap ring.
- b) Do not damage the snap ring.

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

**Piston**

1. Install the reverse clutch onto the oil pump along with the seal rings.
2. Remove the piston by applying compressed air to the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Inspection**

**Drive plates**

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 2.0mm (0.079 in)**  
**Minimum thickness: 1.8mm(0.071 in)**

2. If not within specification, replace the drive plates.

**Return spring**

1. Measure the spring specifications.

**Specification**

Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
11.6 (0.457)	19.69 (0.775)	4.0	1.3 (0.051)

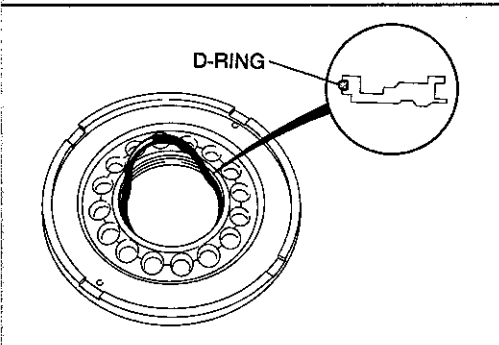
2. If not within specification, replace the return spring.

**Clutch piston**

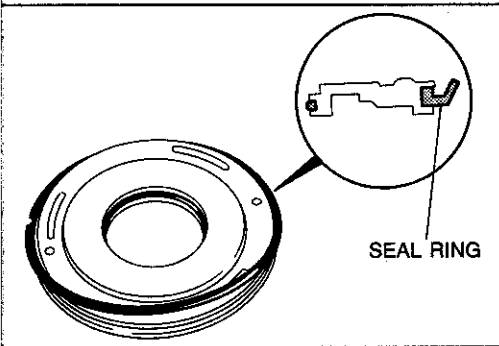
1. Verify that there is no air leakage when applying Compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

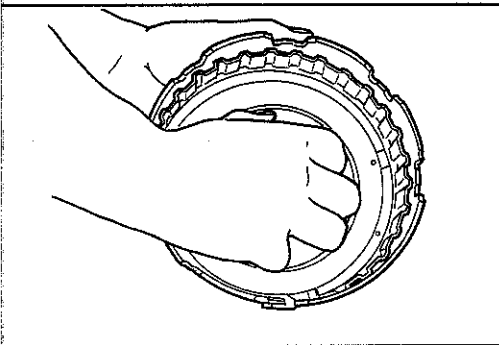




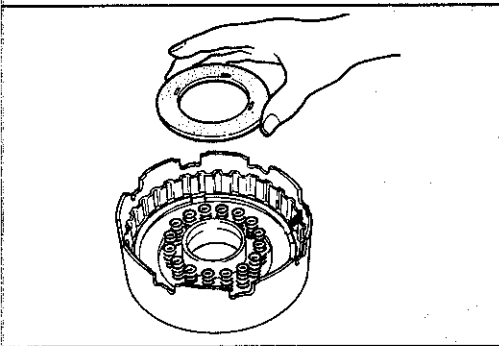
9MU0K1-167



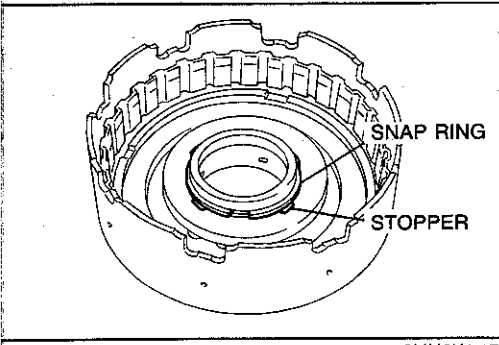
9MU0K1-168



9MU0K1-169



9MU0K1-170



9MU0K1-171

**Assembly**

1. Apply ATF to the new D-ring and install it into the clutch piston.

2. Apply ATF to the new seal ring and install it into the clutch piston.

3. Apply ATF to the inner surface of the reverse clutch drum.

**Caution**

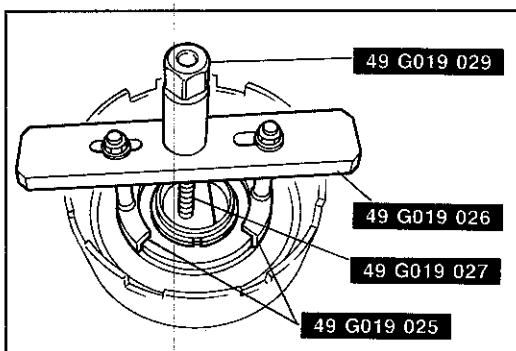
**Apply even pressure to the perimeter of the clutch piston to avoid damaging the seal ring and D-ring when installing.**

4. Install the clutch piston in the reverse clutch drum by turning it evenly and gradually.

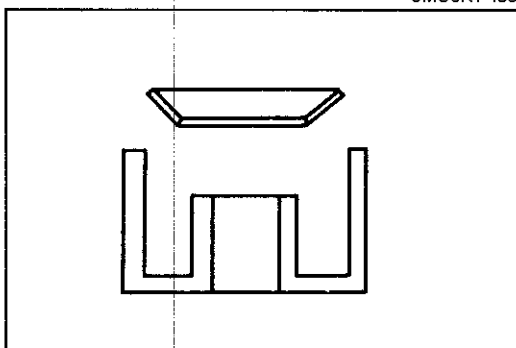
5. Install the return springs and spring retainer.

**Caution**

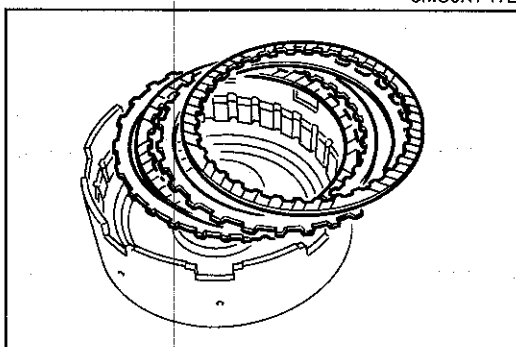
- a) **Depress the spring retainer only enough to install the snap ring.**
- b) **Do not overexpand the snap ring when installing.**
- c) **Do not align the snap ring end-gap with the spring retainer.**



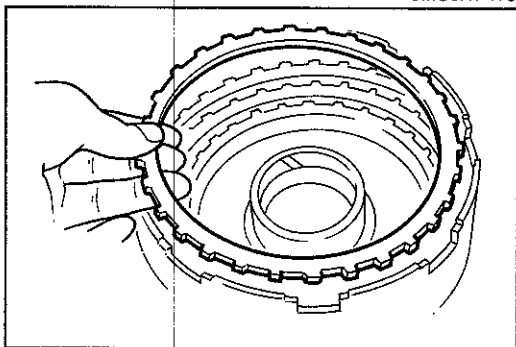
9MU0K1-488



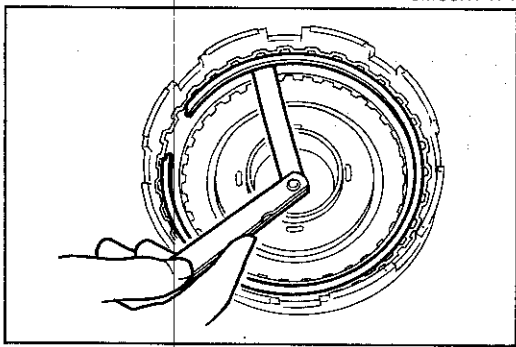
9MU0K1-172



9MU0K1-173



9MU0K1-174



9MU0K1-175

6. Install the snap ring while compressing the springs with the **SST**.

7. Install the dished plate as shown in the figure.

**Note**  
**Installation order: Driven-Drive-Driven-Drive**

8. Apply ATF to the drive plates and driven plates, and install them into the reverse clutch drum.

9. Install the retaining plate.

**Caution**  
**Do not deform the snap ring.**

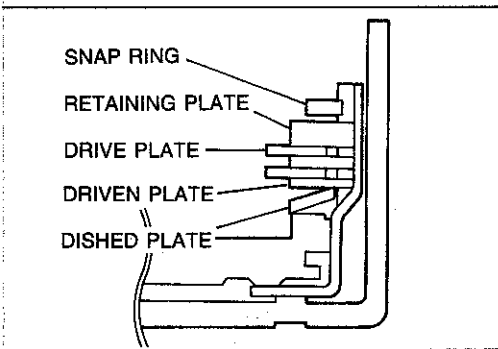
10. Install the snap ring.  
 11. Measure the clearance between the retaining plate and snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Standard clearance:**  
**0.50—1.20mm (0.020—0.047 in)**

**Retaining plate sizes**

mm (in)

4.6 (0.181)	4.8 (0.189)	5.0 (0.197)	5.2 (0.205)
5.4 (0.213)	5.6 (0.220)	5.8 (0.228)	



9MU0K1-176

12. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

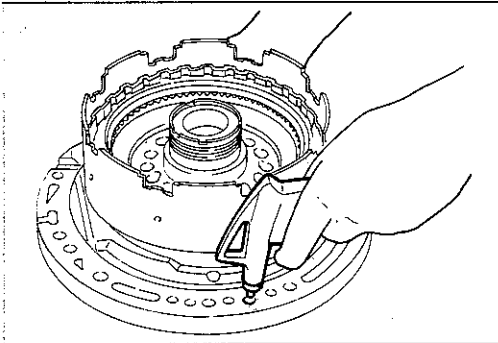
**Standard Clearance: 0.50—0.80mm (0.020—0.031 in)**

**Retaining plate sizes**

			mm (in)
4.6 (0.185)	4.8 (0.189)	5.0 (0.197)	5.2 (0.205)
5.4 (0.213)	5.6 (0.220)	5.8 (0.228)	

**Caution**

**Apply air for no more than 3 seconds.**



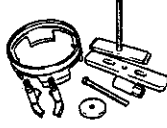
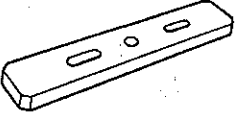

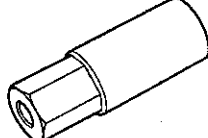
9MU0K1-177

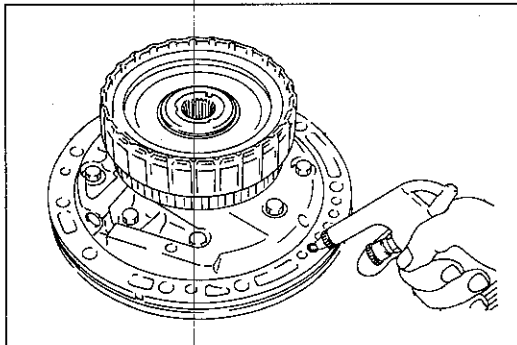
13. Install the reverse clutch on to the oil pump along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**HIGH CLUTCH AND FRONT SUN GEAR**

**Preparation  
SST**

<p>49 G019 0A7A Compressor set, return spring</p>		<p>49 G019 025 Body B (Part of 49 G019 0A7A)</p>	<p>49 G019 026 Plate (Part of 49 G019 0A7A)</p> 
<p>49 G019 027 Attachment A (Part of 49 G019 0A7A)</p>		<p>49 G019 029 Nut (Part of 49 G019 0A7A)</p> 	<p>2BU0K2-024</p>



9MU0K1-179

**Preinspection**

**High clutch operation**

1. Install the high clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

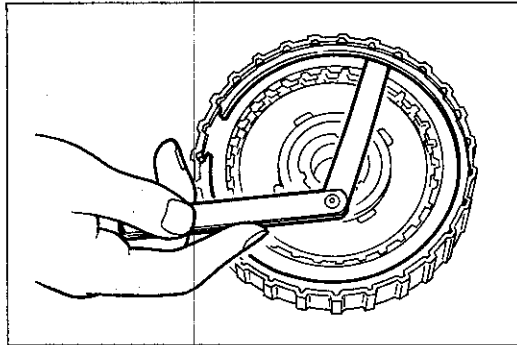
2. Verify that the retaining plate moves toward the snap ring. If not, the D-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.

**Clearance between retaining plate and snap ring**

Measure the clearance between the retaining plate and the snap ring.

**Standard clearance: 1.8—3.0mm (0.071—0.118 in)**

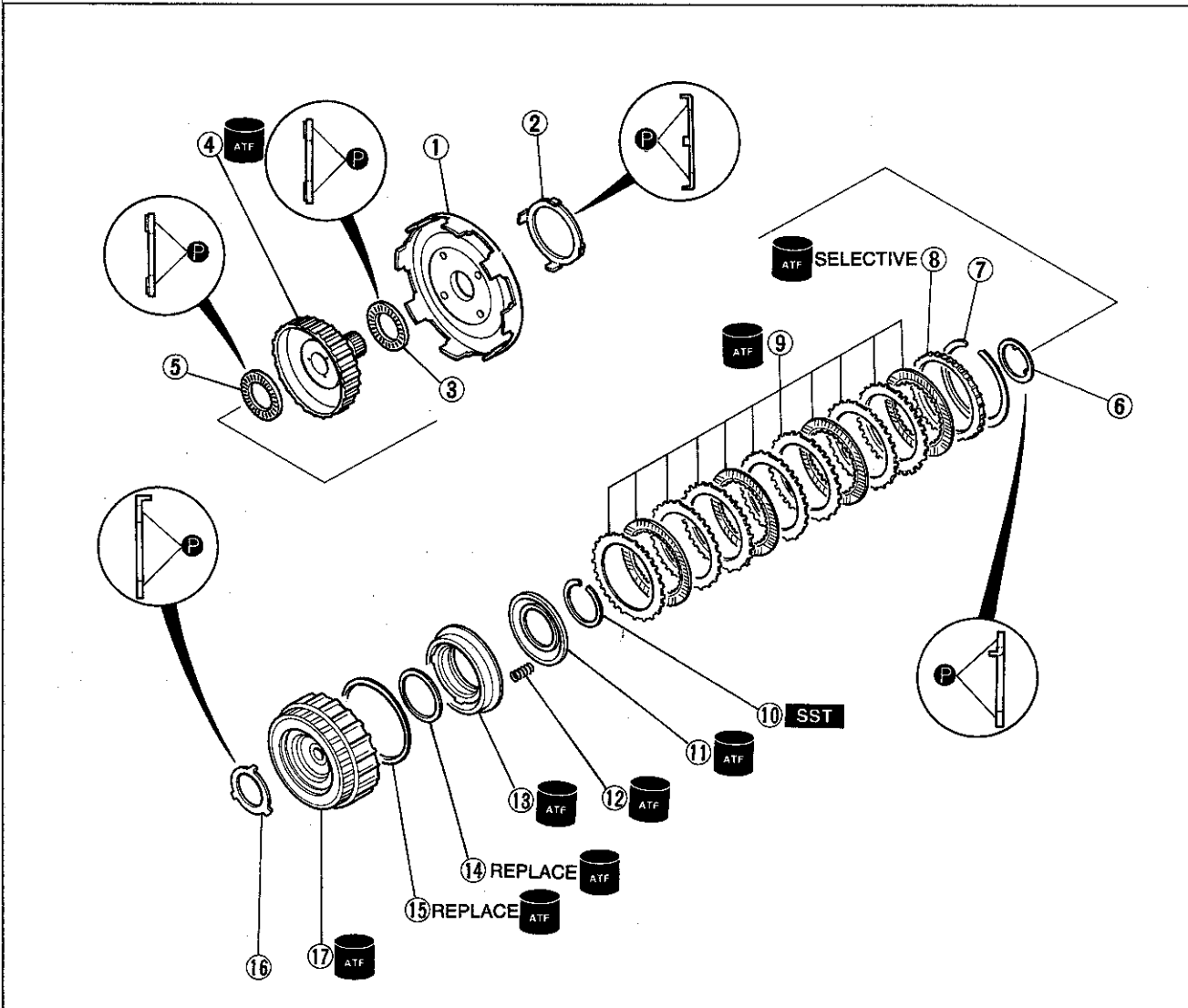
Select and install the correct retaining plate when assembling.



9MU0K1-180

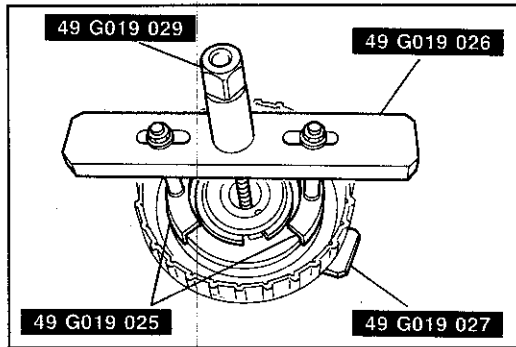
### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

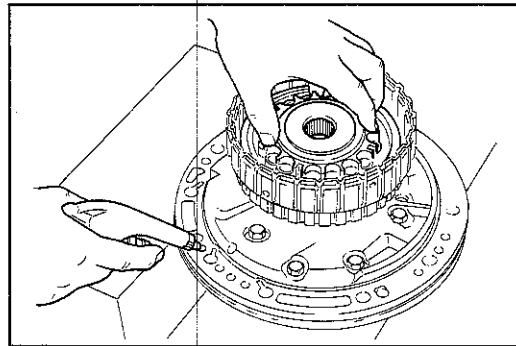


1BU0K2-041

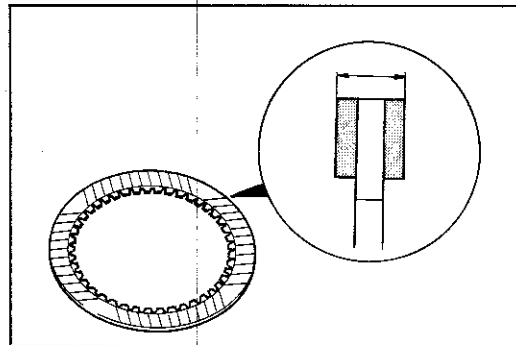
- |   |  |
|---|--|
| <p>1. Front sun gear<br/>Inspect individual gear teeth for damage, wear, or cracks</p> <p>2. Bearing race<br/>Inspect bearing surface for scoring or scratches</p> <p>3. Bearing<br/>Inspect for damage or rough rotation</p> <p>4. High clutch hub</p> <p>5. Bearing<br/>Inspect for damage or rough rotation</p> <p>6. Bearing race<br/>Inspect bearing surface for scoring or scratches</p> <p>7. Snap ring</p> <p>8. Retaining plate</p> <p>9. Drive plates and driven plates<br/>Inspect for wear or burning<br/>Inspection ..... page K2-73</p> | <p>10. Snap ring<br/>Inspect for fracture or wear<br/>Disassembly Note ..... page K2-73</p> <p>11. Spring retainer<br/>Inspect for deformation or wear</p> <p>12. Return spring<br/>Inspection ..... page K2-73</p> <p>13. Clutch piston<br/>Inspect balls for sticking by shaking the piston<br/>Disassembly Note ..... page K2-73<br/>Inspection ..... page K2-73</p> <p>14. D-ring</p> <p>15. D-ring</p> <p>16. Bearing race<br/>Inspect bearing surface for scoring or scratches</p> <p>17. High clutch drum</p> |
|---|--|



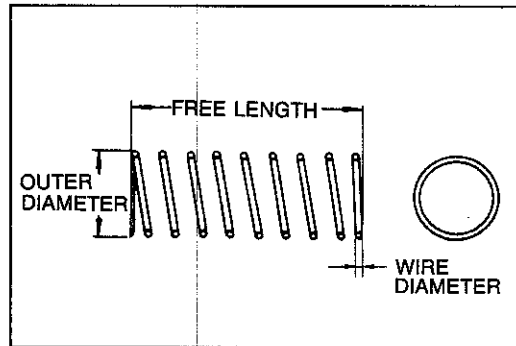
9MU0K1-182



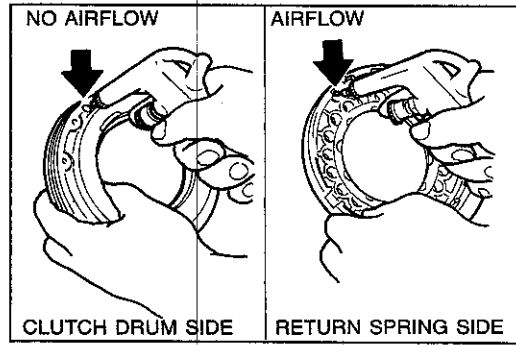
9MU0K1-183



9MU0K1-184



1BU0K2-042



9MU0K1-186

**Disassembly note**  
**Snap ring**

**Caution**

- a) **Depress the spring retainer only enough to remove the snap ring.**
- b) **Do not damage the snap ring.**

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

**Piston**

1. Install the high clutch onto the oil pump along with the seal rings.
2. Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

**Inspection**

**Drive plates**

1. Measure the facing thickness in three places, and determine the average of the three reading.

**Standard thickness: 1.6mm (0.063 in)**  
**Minimum thickness: 1.4mm (0.055 in)**

2. If not within specification, replace the drive plates.

**Return spring**

1. Check the spring specifications.

**Specifications**

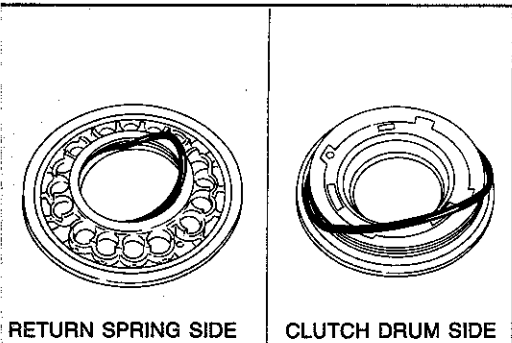
Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
11.6 (0.457)	22.1 (0.870)	6.0	1.3 (0.051)

2. If not within specification, replace the return spring.

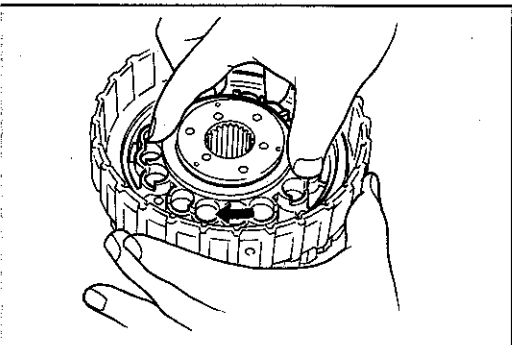
**Clutch piston**

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

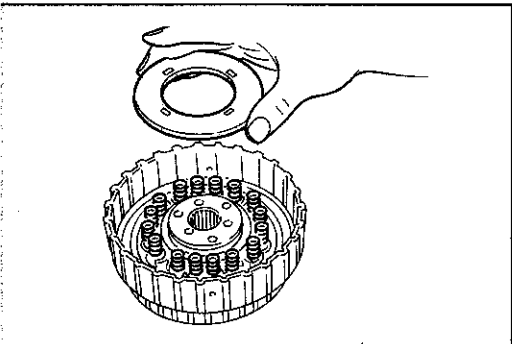
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



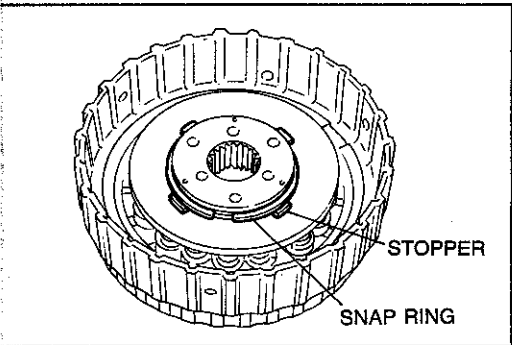
9MU0K1-187



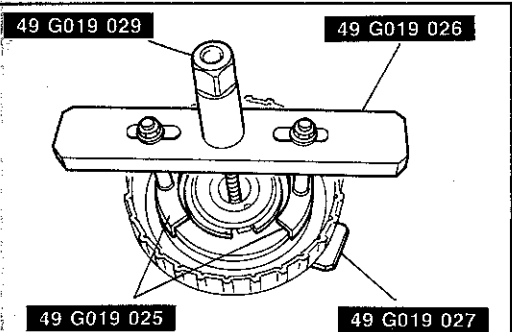
9MU0K1-188



9MU0K1-189



9MU0K1-190



9MU0K1-489

### Assembly High clutch

1. Apply ATF to the new D-rings and install them into the clutch piston.

2. Apply ATF to the inner surface of the high clutch drum.

#### Caution

**Apply even pressure to the perimeter of the clutch piston to avoid damaging the D-rings when installing.**

3. Install the clutch piston in the high clutch drum by turning it evenly and gradually.

4. Install the return springs and spring retainer.

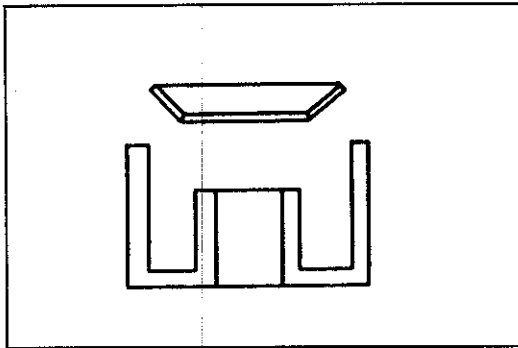
#### Caution

**a) Depress the spring retainer only enough to install the snap ring.**

**b) Do not over expand the snap ring when installing.**

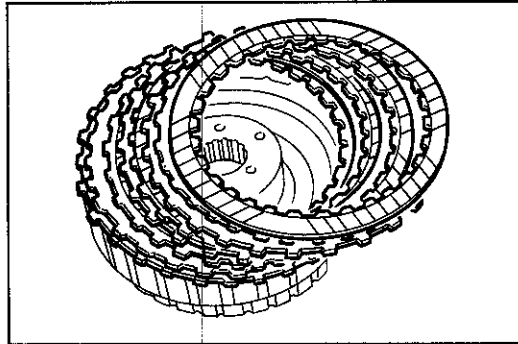
**c) Do not align the snap ring end-gap with the spring retainer stop.**

5. Install the snap ring while compressing the springs with the **SST**.



9MU0K1-191

6. Install the dished plate as shown in the figure.



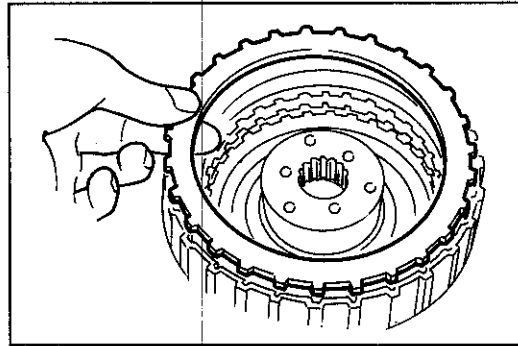
9MU0K1-192

**Note**

**Installation order:**

**Driven-Drive-Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive**

7. Apply ATF to the drive plates and driven plates, and install them into the high clutch drum.



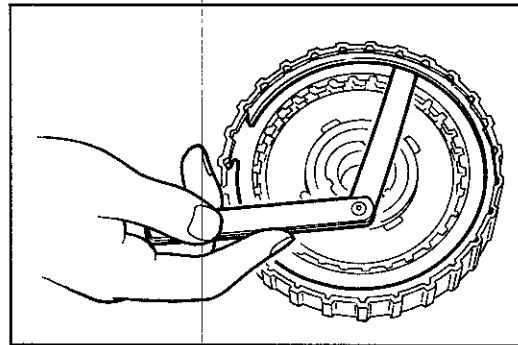
9MU0K1-193

8. Install the retaining plate.

**Caution**

**Do not deform the snap ring.**

9. Install the snap ring.



9MU0K1-194

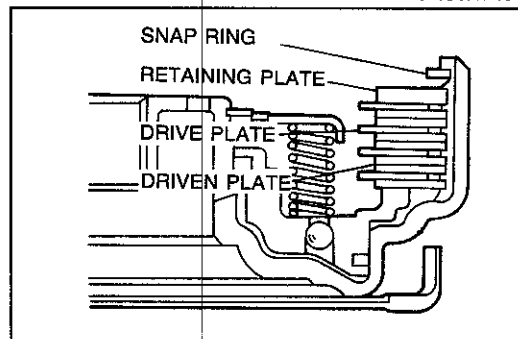
10. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification adjust the clearance by installing the correct retaining plate.

**Standard clearance: 1.8—3.0mm (0.071—0.118 in)**

**Retaining plate sizes**

mm (in)

3.0 (0.118)	3.2 (0.126)	3.4 (0.134)	3.6 (0.142)
3.8 (0.150)	4.0 (0.157)	4.2 (0.165)	4.4 (0.173)



9MU0K1-195

11. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

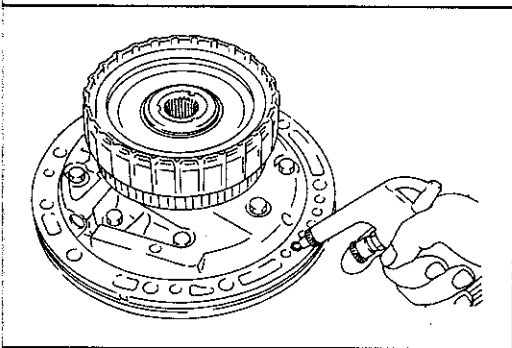
**Standard clearance: 1.8—2.2mm (0.071—0.087 in)**

**Retaining plate sizes**

mm (in)

3.0 (0.118)	3.2 (0.126)	3.4 (0.134)	3.6 (0.142)
3.8 (0.150)	4.0 (0.157)	4.2 (0.165)	4.4 (0.173)





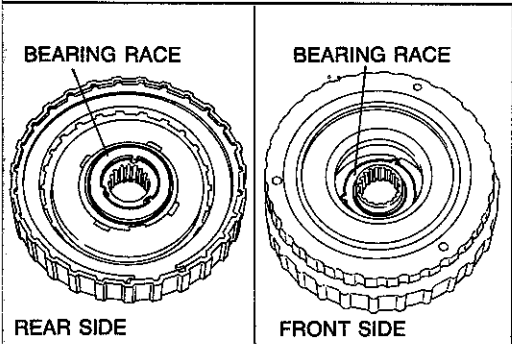
9MU0K1-196

**Caution**

**Apply air for no more than 3 seconds.**

12. Install the high clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



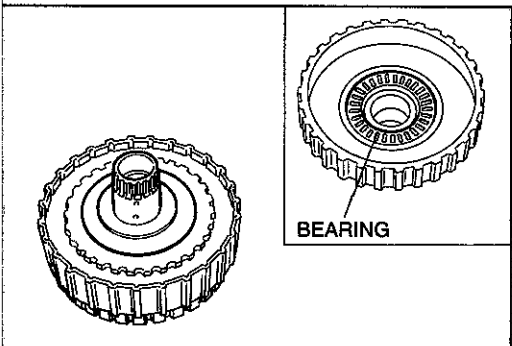
9MU0K1-197

13. Apply petroleum jelly to the bearing races and install them in the high clutch as shown.

**Bearing race outer diameter**

**Front side: 43.5mm (1.713 in)**

**Rear side : 51.5mm (2.028 in)**

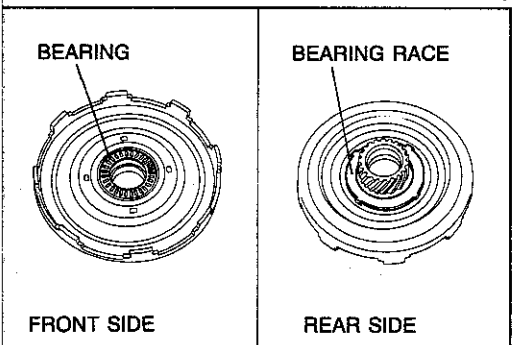


9MU0K1-198

14. Apply petroleum jelly to the bearing and install it in the high clutch hub.

**Bearing outer diameter: 53.0mm (2.087 in)**

15. Apply ATF to the high clutch hub, and install it in the high clutch by turning it evenly and gradually.



9MU0K1-199

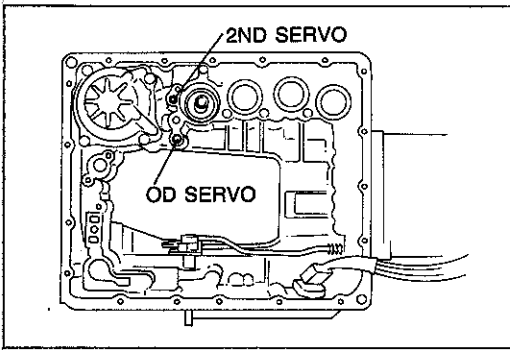
**Front sun gear**

Apply petroleum jelly to the bearing and bearing race, and install them to the front sun gear.

**Bearing outer diameter : 53.0mm (2.087 in)**

**Bearing race outer diameter: 75.0mm (2.953 in)**

MEMO



9MU0K1-490

### BAND SERVO Preinspection Band servo

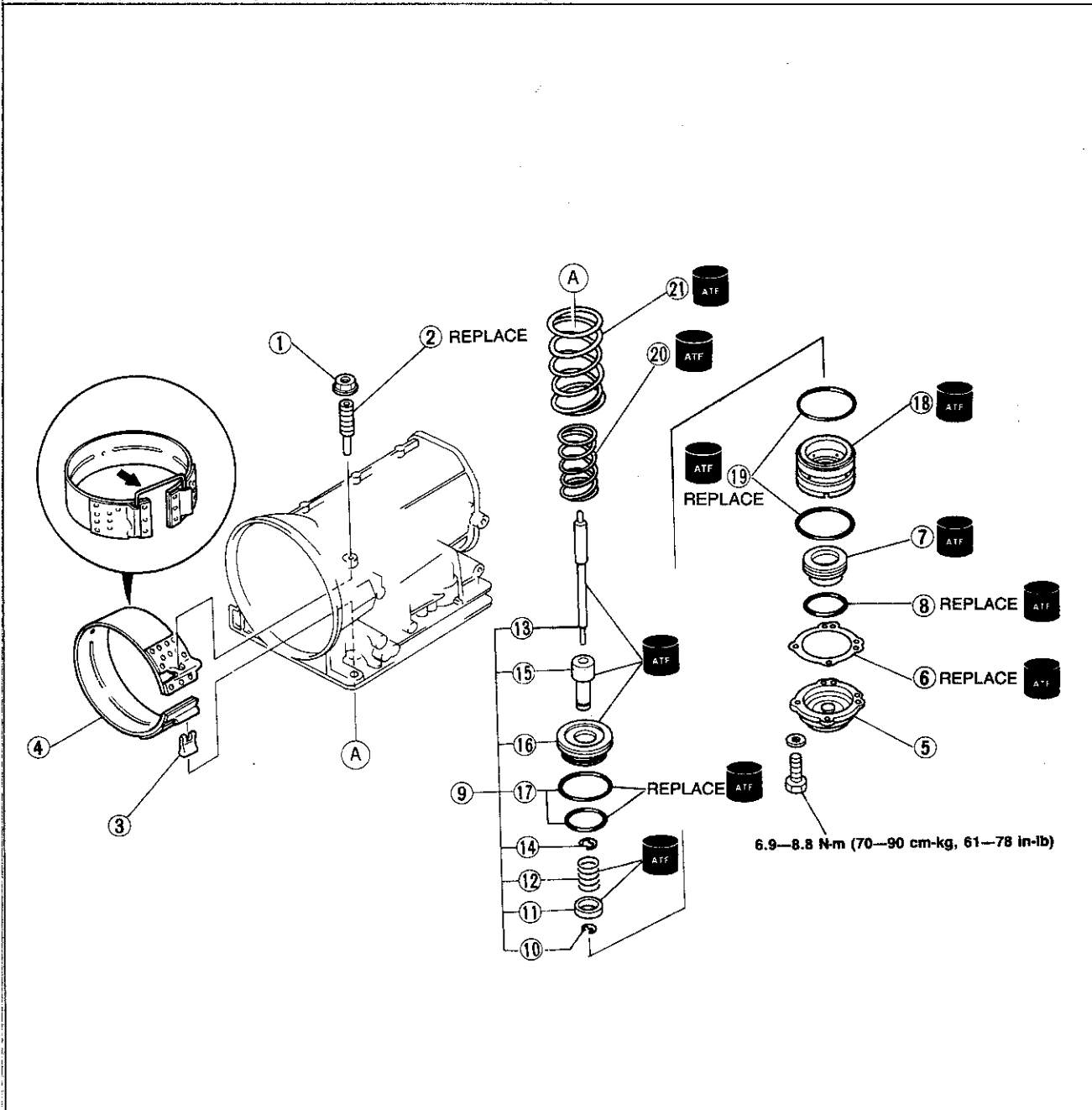
1. Apply compressed air to the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the piston stem moves to the brake band.  
If not the D-ring or the oil seal may be damaged or fluid may be sticking at the piston assembly.  
Inspect them, and replace when assembling.

### Disassembly and Inspection

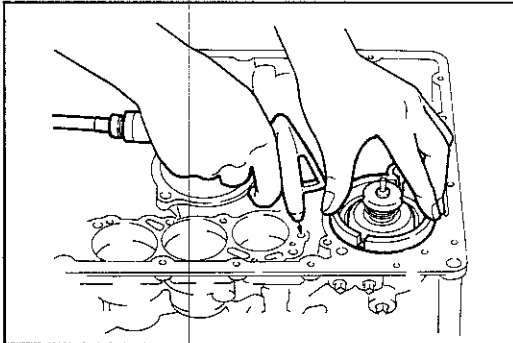
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.



9MU0K1-491

- |   |  |   |
|---|--|---|
| <ol style="list-style-type: none"> <li>1. Locknut</li> <li>2. Anchor end bolt</li> <li>3. Band strut</li> <li>4. Brake band</li> <li>5. Band servo retainer</li> <li>6. Gasket</li> <li>7. OD band servo piston<br/>Disassembly Note<br/>..... page K2-79</li> <li>8. D-ring</li> </ol> | <ol style="list-style-type: none"> <li>9. Piston assembly and servo<br/>piston retainer</li> <li>10. Retaining ring (small)</li> <li>11. Spring retainer</li> <li>12. Return spring C<br/>Inspection ..... page K2-79</li> <li>13. Piston stem</li> <li>14. Retaining ring (large)</li> <li>15. Servo cushion retainer</li> <li>16. Band servo piston</li> </ol> | <ol style="list-style-type: none"> <li>17. D-ring</li> <li>18. Servo piston retainer<br/>Disassembly Note<br/>..... page K2-79</li> <li>19. O-ring</li> <li>20. Return spring B<br/>Inspection ..... page K2-79</li> <li>21. Return spring A<br/>Inspection ..... page K2-79</li> </ol> |
|---|--|---|

1BU0K2-043



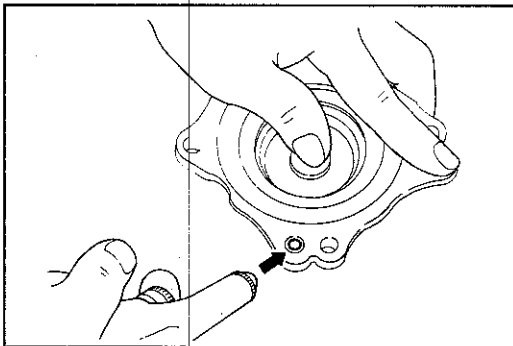
9MU0K1-201

### Disassembly note

#### Piston assembly and servo piston retainer

Apply compressed air to the oil hole in the transmission case to remove the piston assembly and servo piston retainer from the transmission case.

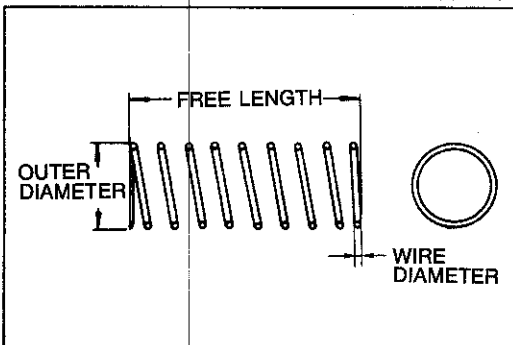
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MU0K1-202

### OD band servo piston

1. Block one oil hole OD servo piston retainer and the center hole in the OD band servo piston.
2. Apply compressed air to the other oil hole in the OD servo piston retainer to remove OD band servo piston from.
3. Remove the D-ring from the OD band servo piston.



1BU0K2-044

### Inspection

#### Return spring

1. Measure the spring specifications.

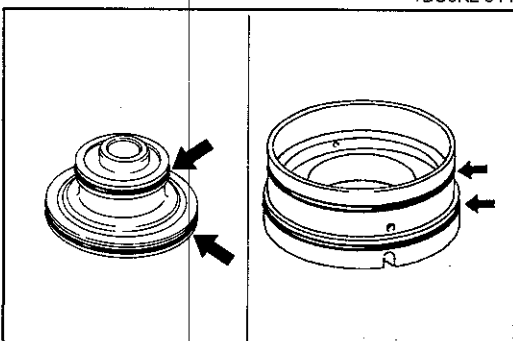
#### Specifications

	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
Return A	40.3 (1.587)	53.8 (2.118)	3.0	2.3 (0.091)
Return B	34.3 (1.350)	45.6 (1.795)	3.0	2.3 (0.091)
Return C	27.6 (1.087)	29.7 (1.169)	3.2	2.6 (0.102)

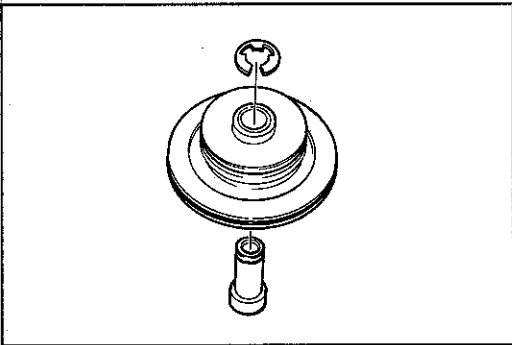
2. If not within specification, replace the return spring.

### Assembly

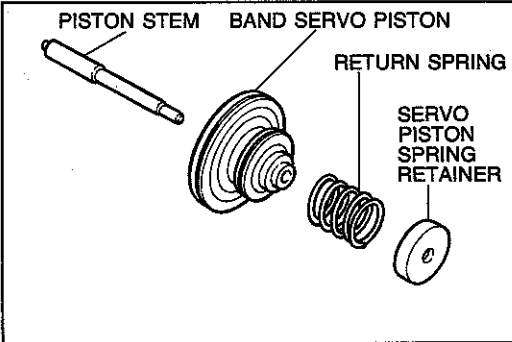
1. Apply ATF to the new O-rings and install them onto the servo piston retainer.
2. Apply ATF to the new D-rings and install them onto the band servo piston.



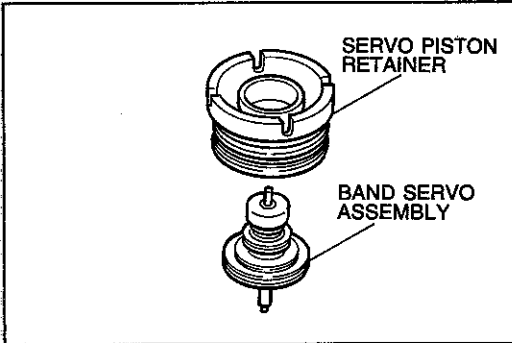
9MU0K1-204



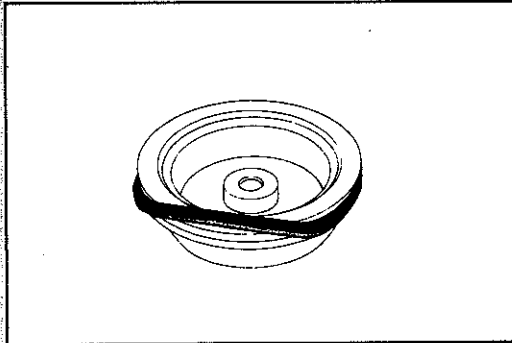
9MU0K1-205



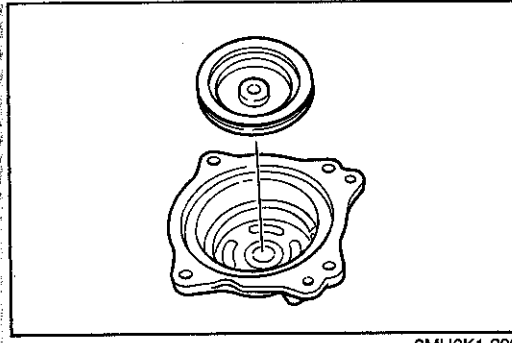
1BU0K2-045



1BU0K2-046



9MU0K1-208



9MU0K1-209

### Caution

**Do not deform the retaining ring.**

3. Apply ATF to the servo cushion spring retainer, and retaining ring, and assemble them in the band servo piston.

4. Apply ATF to the piston stem return spring, and spring retainer, and assemble them in the band servo piston.

### Caution

**Do not deform the retaining ring.**

5. Install the retaining ring.

### Caution

**Apply even pressure to the perimeter of the piston to avoid damaging the O-rings and D-rings when installing.**

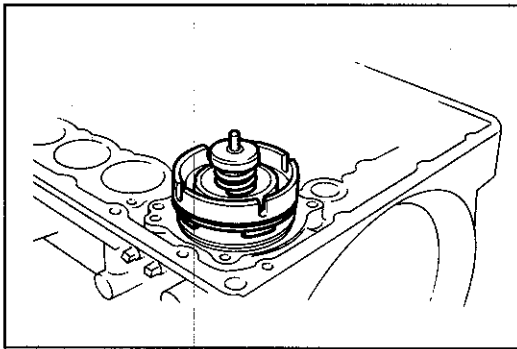
6. Apply ATF to the band servo piston, and install it onto the servo piston retainer.

7. Apply ATF to the new D-ring, and install it onto the OD band servo piston.

### Caution

**Apply even pressure to the perimeter of the piston to avoid damaging the D-ring when installing.**

8. Apply ATF to the OD band servo piston, and install it into the band servo retainer.



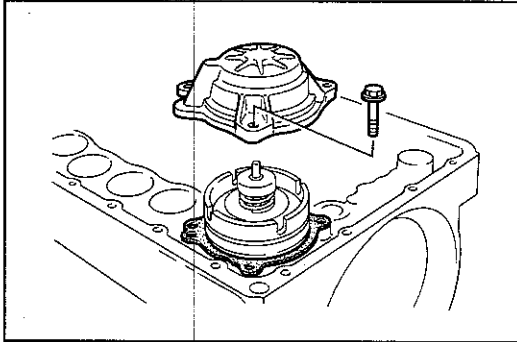
9MU0K1-210

9. Install return springs A and B.

**Caution**

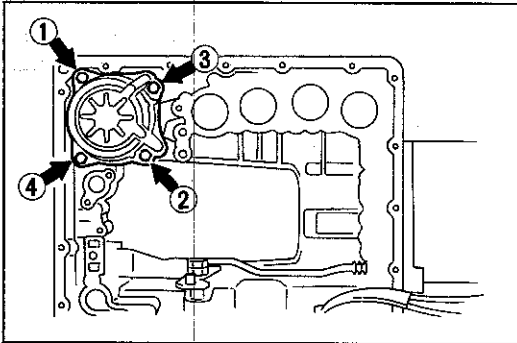
**Apply even pressure to the perimeter of the body to avoid damaging the O-rings when installing.**

10. Apply ATF to the piston assembly, and install it into the transmission case.



9MU0K1-211

11. Apply ATF to the band servo retainer and a new gasket, and install them on the transmission case.

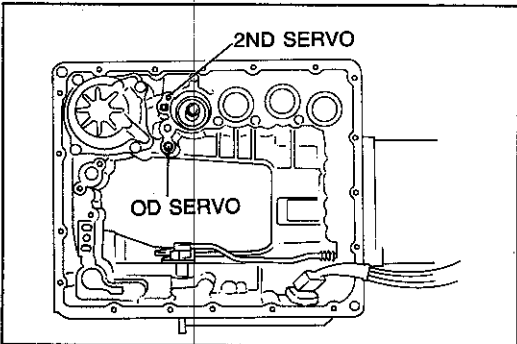


9MU0K1-212

12. Tighten the bolts evenly and gradually in the order shown.

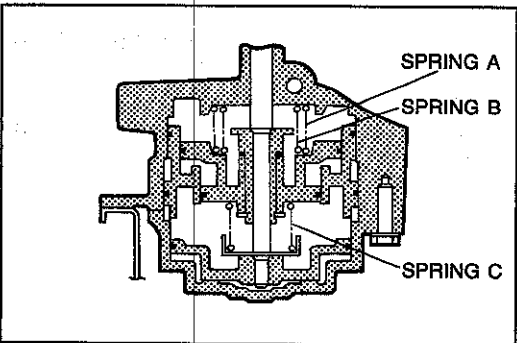
**Tightening torque:**

**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



9MU0K1-213

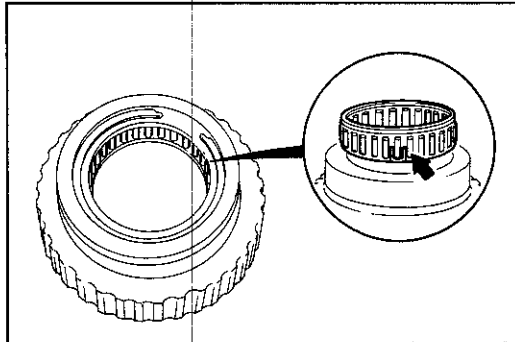
13. Check the servo piston operation by applying compressed air through the oil holes.



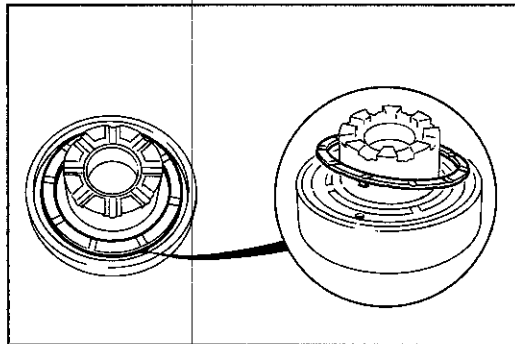


- |   |   |  |
|---|---|--|
| <p>1. Front internal gear (with rear planetary carrier)<br/>Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears</p> <p>2. Bearing race<br/>Inspect for bearing surface scoring or scratches</p> | <p>3. Bearing<br/>Inspect for damage or rough rotation</p> <p>4. Rear internal gear<br/>Inspect individual gear teeth for damage, wear, or cracks</p> <p>5. Thrust washer</p> | <p>6. Bearing<br/>Inspect for damage or rough rotation</p> <p>7. Overrunning clutch hub</p> <p>8. Thrust washer</p> <p>9. Snap ring</p> <p>10. Forward one-way clutch<br/>Inspection ..... page K2-82</p> <p>11. Snap ring</p> <p>12. Forward clutch hub</p> |
|---|---|--|

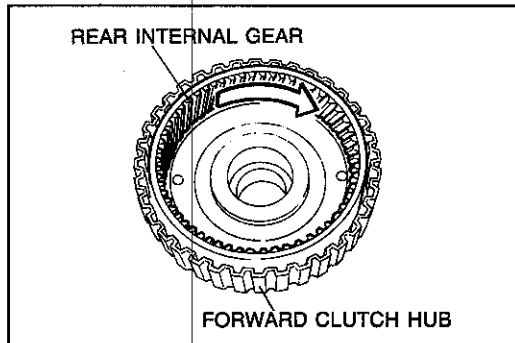
1BU0K2-047



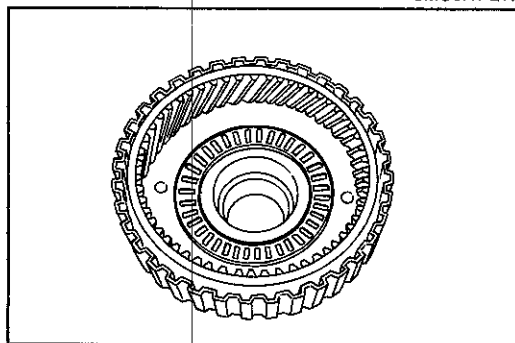
9MU0K1-215



9MU0K1-216



9MU0K1-217



9MU0K1-218

**Assembly**

**Caution**

- a) Do not deform the snap ring.
- b) Install the side indicated by an arrow in the figure toward the front when inserting the one-way clutch into the one-way clutch outer race.

1. Install the snap ring into the forward clutch hub.
2. Apply ATF to the forward one-way clutch. Install it in the forward clutch hub and the snap ring.

**Note**

**Be sure the locating tabs of the thrust washer are set into the holes in the rear internal gear.**

3. Apply petroleum jelly to the thrust washer and set it on the rear internal gear.

4. Apply ATF to the rear internal gear, and install it in the forward clutch hub by turning it evenly and gradually.

**Note**

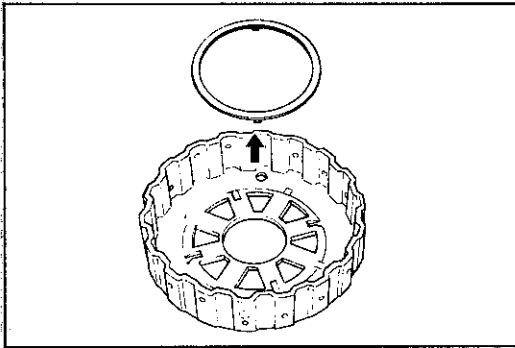
**If it turns counterclockwise, the one-way clutch is installed upside down.**

5. While holding the forward clutch hub, check the forward one-way clutch operation by turning right and left. It should turn clockwise only and locked counterclockwise.

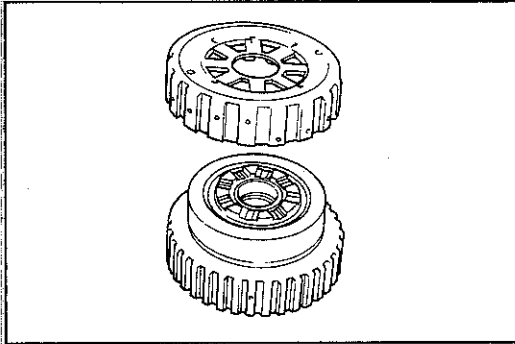
6. Apply petroleum jelly to the bearing, and install it on the rear internal gear.

**Bearing outer diameter: 78.0mm (3.071 in)**

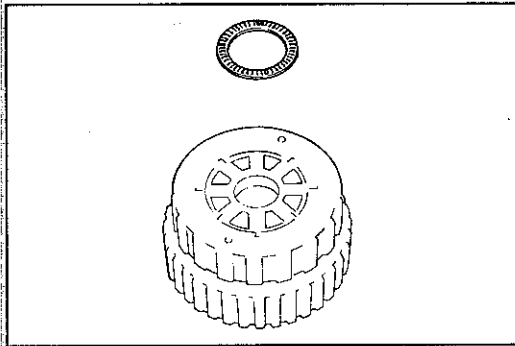




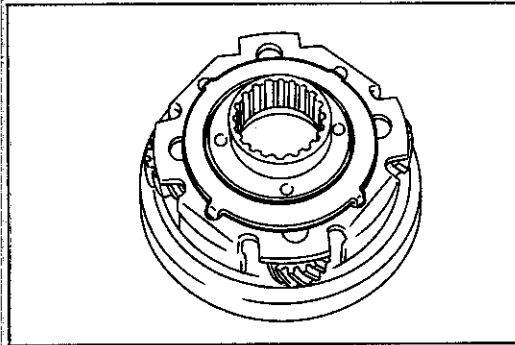
9MU0K1-219



9MU0K1-220



9MU0K1-221



9MU0K1-222

### Note

**Be sure the locating tabs of the thrust washer are set into the holes in the overrunning clutch hub.**

7. Apply petroleum jelly to the thrust washer, and set it in the overrunning clutch hub.

8. Set the overrunning clutch hub on the rear internal gear.

9. Apply petroleum jelly to the bearing, and set it on the overrunning clutch hub.

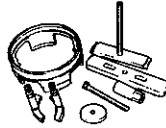
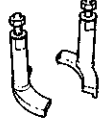
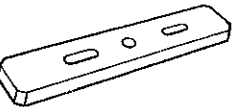

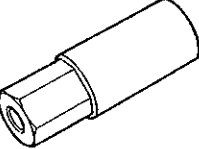
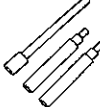
**Bearing outer diameter: 59.0mm (2.322 in)**

10. Apply petroleum jelly to the bearing race, and set it on the front internal gear.

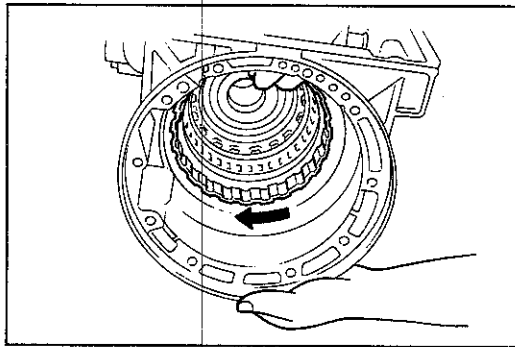
**Bearing race outer diameter: 75.0mm (2.953 in)**

**FORWARD CLUTCH DRUM  
(FORWARD CLUTCH, OVERRUNNING CLUTCH, LOW ONE-WAY CLUTCH)**

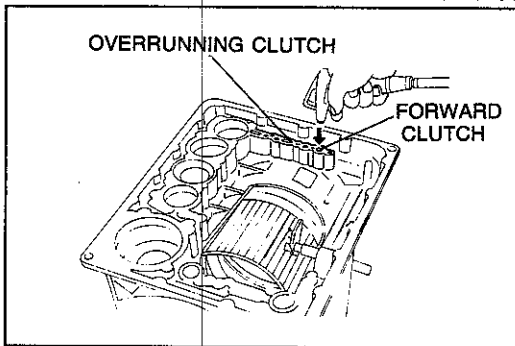
**Preparation  
SST**

<p>49 G019 0A7A Compressor set, return spring</p> 	<p>49 G019 025 Body B (Part of 49 G019 0A7A)</p> 	<p>49 G019 026 Plate (Part of 49 G019 0A7A)</p> 
<p>49 G019 027 Attachment A (Part of 49 G019 0A7A)</p> 	<p>49 G019 029 Nut (Part of 49 G019 0A7A)</p> 	<p>49 L019 001 Bolts</p> 

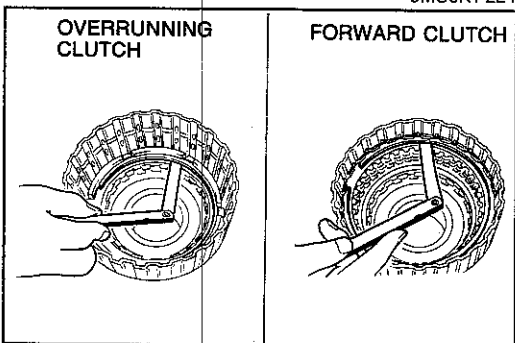
2BU0K2-025



9MU0K1-494



9MU0K1-224



0BU0K2-168

**Preinspection**

**Low one-way clutch operation**

Install the forward clutch drum into the transmission case, check that the forward clutch drum rotate smoothly when turned clockwise and lock when turned counterclockwise. If not, replace the one-way clutch.

**Forward clutch and overrunning clutch operation**

1. Install the forward clutch drum and low one-way clutch inner race into the transmission case. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the retaining plates move toward the snap ring. If not, the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect the parts, and replace if necessary when assembling.

**Clearance between retaining plate and snap ring**

Measure the clearance between the retaining plate and the snap ring of the forward clutch and the overrunning clutch.

**Standard clearance**

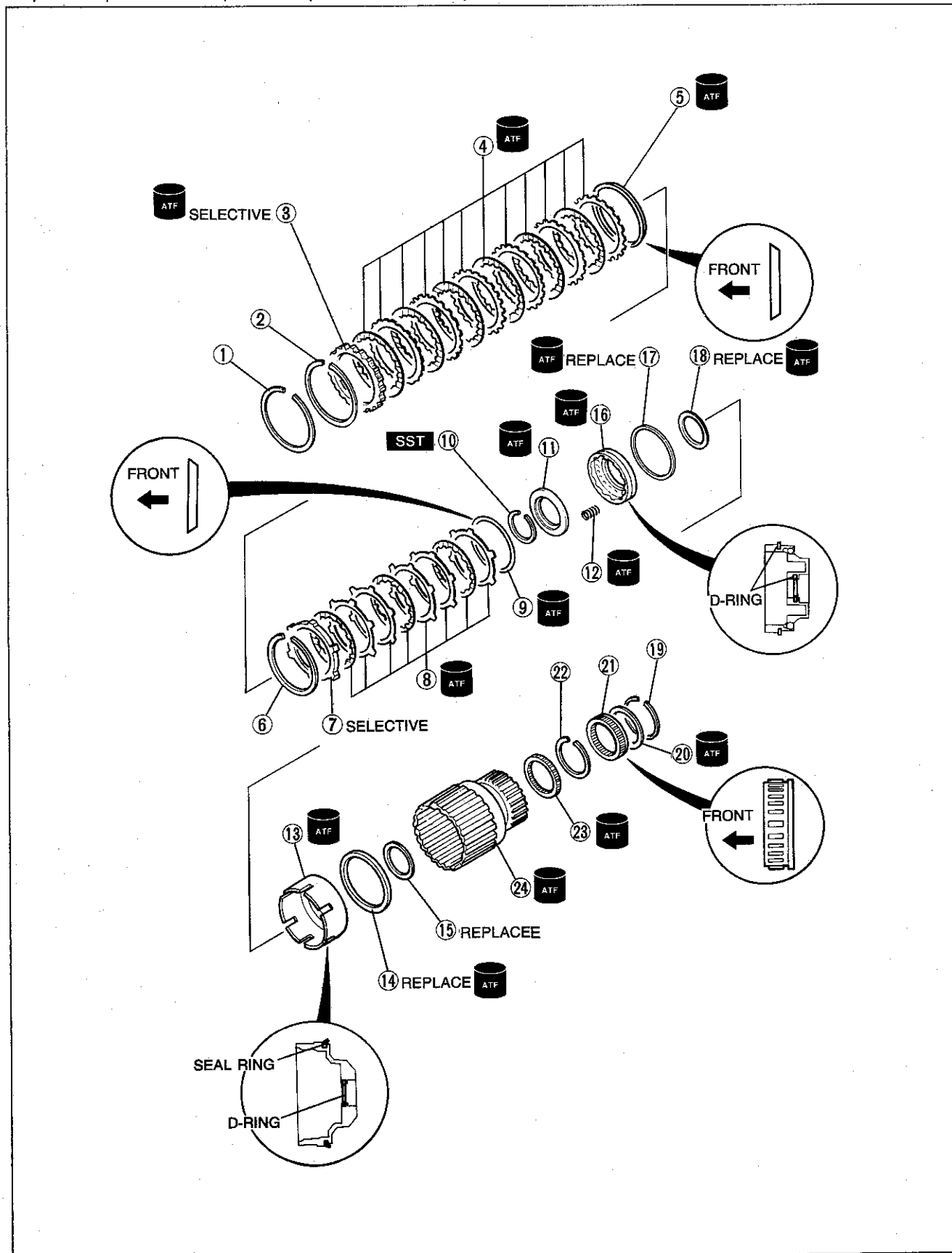
**Forward clutch : 0.45—2.05mm (0.18—0.081 in)**  
**Overrunning clutch: 1.0—2.0mm (0.039—0.079 in)**

Select the correct retaining plate when assembling if not within specification.

### Disassembly and Inspection

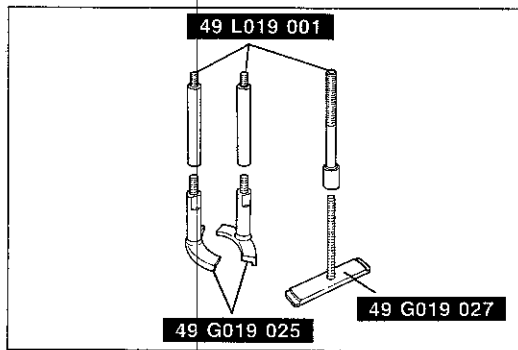
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace if necessary.

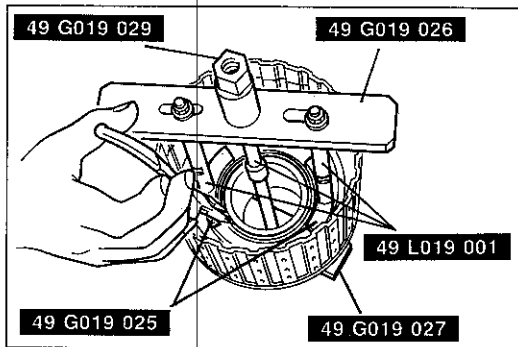


- 1. Snap ring
- 2. Snap ring
- 3. Retaining plate
- 4. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... page K2-88
- 5. Dished plate
- 6. Snap ring
- 7. Retaining plate
- 8. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... page K2-88
- 9. Dished plate
- 10. Snap ring  
Disassembly Note ..... page K2-87
- 11. Spring retainer
- 12. Return spring  
Inspection ..... page K2-88
- 13. Forward clutch piston  
Disassembly Note ..... page K2-87
- 14. Seal ring
- 15. D-ring
- 16. Overrunning clutch piston  
Inspect balls for sticking by shaking piston  
Disassembly Note ..... page K2-87  
Inspection ..... page K2-88
- 17. Seal ring
- 18. D-ring
- 19. Snap ring
- 20. Side plate
- 21. Low one-way clutch  
Inspection ..... page K2-85
- 22. Snap ring
- 23. Bearing (radial bearing)  
Inspect for damage or rough rotation
- 24. Forward clutch drum  
Inspection ..... page K2-88

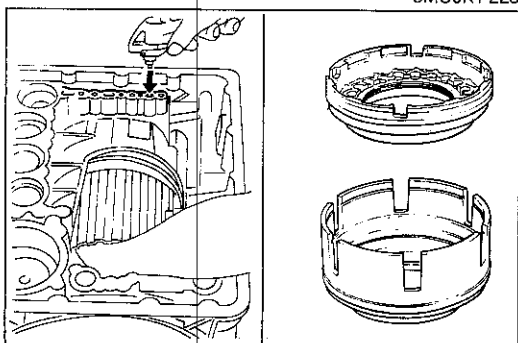
2BU0K2-026



9MU0K1-227



9MU0K1-228



9MU0K1-229

**Disassembly note**

**Snap ring**

- 1. Assemble the **SST**.

**Caution**

- a) **Depress the spring retainer only enough to remove the snap ring.**
- b) **Do not damage the snap ring.**

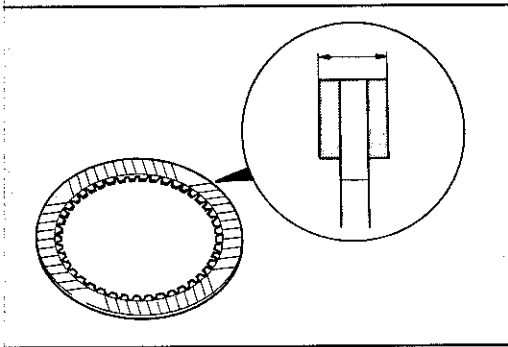
- 2. Compress the springs with the **SST**, then remove the snap ring with snap ring pliers.
- 3. Remove the spring retainer and springs.

**Piston**

- 1. Set the forward clutch drum in the transmission case.
- 2. Remove the piston by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

- 3. Remove the overrunning clutch piston from the forward clutch piston.



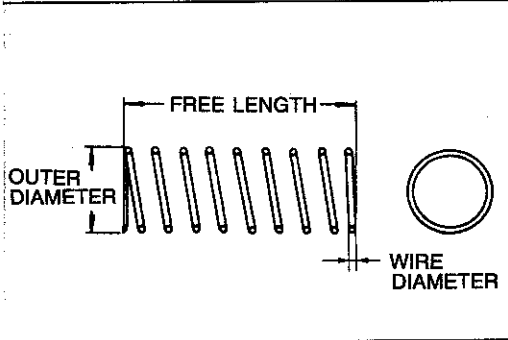
9MU0K1-230

### Inspection Drive plates

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 2.0mm (0.079 in)**  
**Minimum thickness: 1.8mm (0.071 in)**

2. If not within specification, replace the drive plates.



9MU0K1-231

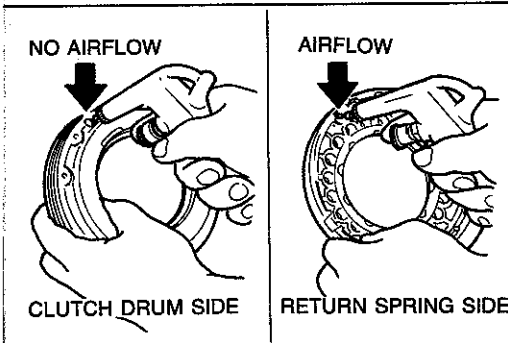
### Return spring

1. Measure the spring specifications.

### Specifications

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
9.7 (0.382)	35.8 (1.409)	10.3	1.3 (0.051)

2. If not within specification, replace the spring.

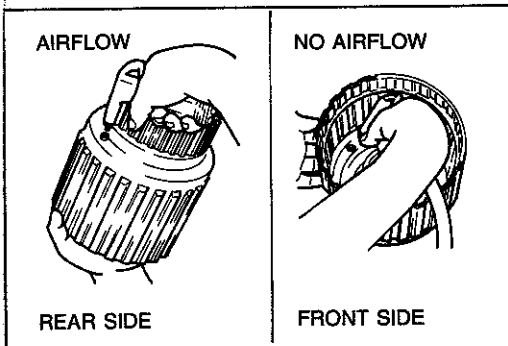


9MU0K1-232

### Clutch piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

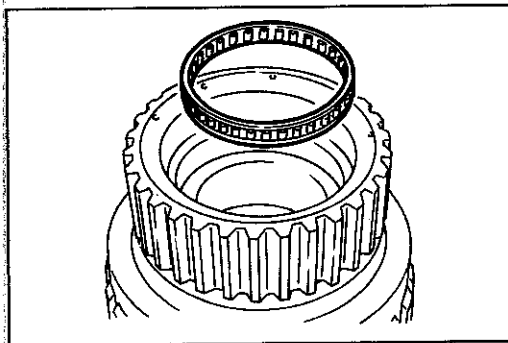


9MU0K1-233

### Forward clutch drum

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the low and reverse brake.
2. Verify that there is air flow when applying compressed air through the oil hole on the low and reverse brake side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MU0K1-234

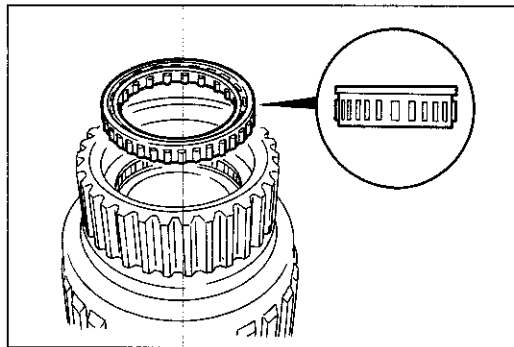
### Assembly

1. Apply ATF to the bearing, and install it into the forward clutch drum.

### Caution

- a) Do not scratch the forward clutch inner surface when fixing the low one-way clutch.
- b) Do not deform the snap ring.

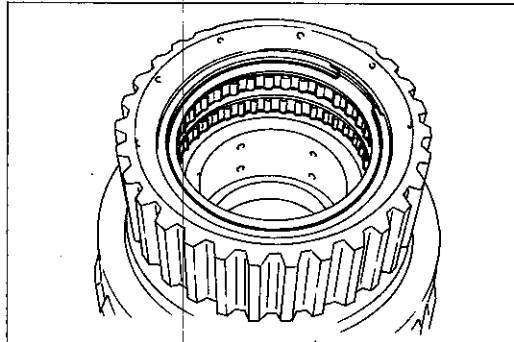
2. Install the snap ring.



9MU0K1-235

**Caution**  
Install the low one-way clutch with the flange facing outward.

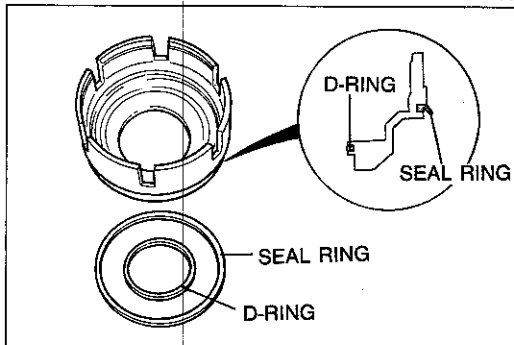
3. Apply ATF to the low one-way clutch, and install it in the forward clutch drum.



9MU0K1-236

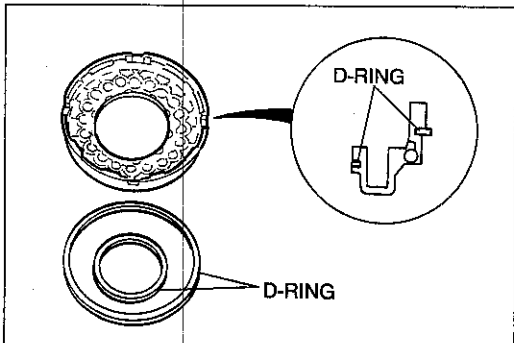
**Caution**  
Do not deform the snap ring.

4. Apply ATF to the side plate and snap ring, and install them into the forward clutch drum.



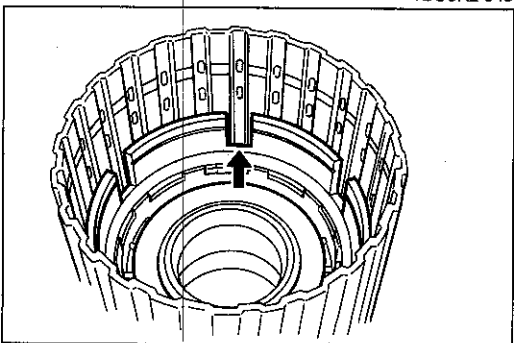
9MU0K1-237

5. Apply ATF to the new D-ring and seal ring, and install them into the forward clutch as shown.



1BU0K2-049

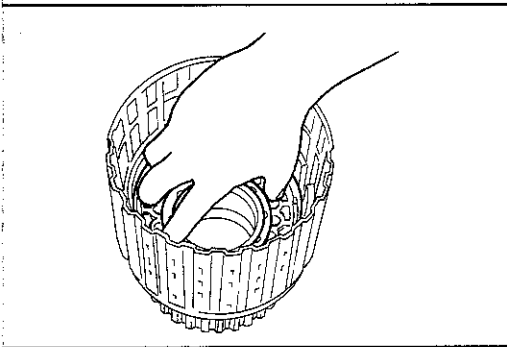
6. Apply ATF to the new D-ring and install them into the overrunning clutch piston as shown.



9MU0K1-239

**Caution**  
Apply even pressure to the perimeter of the piston to avoid damaging the seal ring, and D-ring when installing.

7. Apply ATF to the inner surface of the forward clutch drum and overrunning clutch piston.
8. Install the overrunning clutch piston in the forward clutch drum by turning it evenly and gradually. Align the notches in forward clutch piston with the grooves in forward clutch drum.

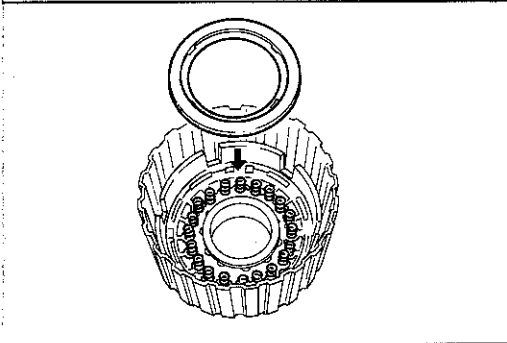


9MU0K1-240

**Caution**

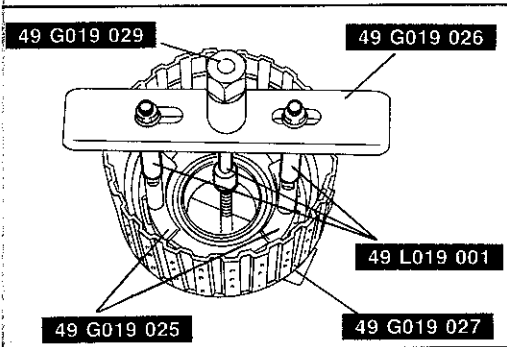
Apply even pressure to the perimeter of the piston to avoid damaging the D-ring and the seal ring when installing.

9. Apply ATF to the inner surface of the forward clutch piston and overrunning clutch piston.
10. Install the overrunning clutch piston in the forward clutch piston by turning it evenly and gradually.



9MU0K1-241

11. Install the springs and spring retainer.

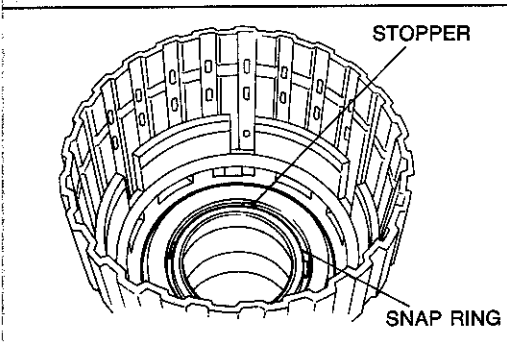


9MU0K1-242

**Caution**

- a) Depress the spring retainer only enough to install the snap ring.
- b) Do not over expand the snap ring.
- c) Do not align the snap ring end-gap with the spring retainer stop.

12. Install the snap ring while compressing the springs with the SST.

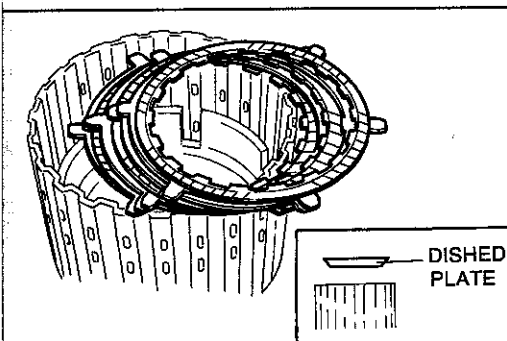


13. Install the dished plate as shown.

**Note**

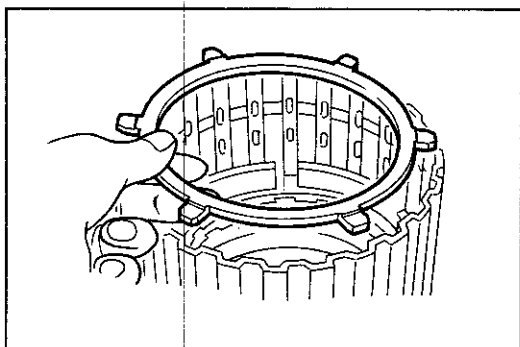
**Installation order:**

**Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive**

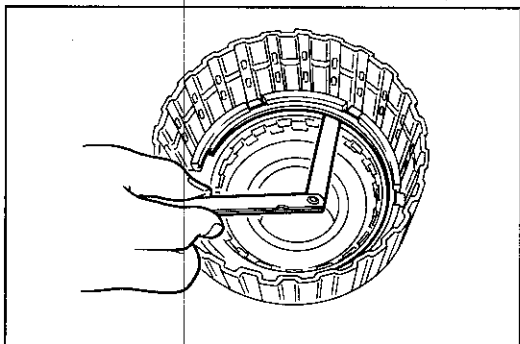


9MU0K1-243

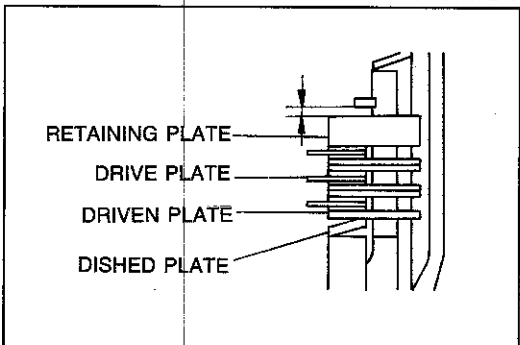
14. Apply ATF to the drive plates and driven plates and install them into the forward clutch piston.



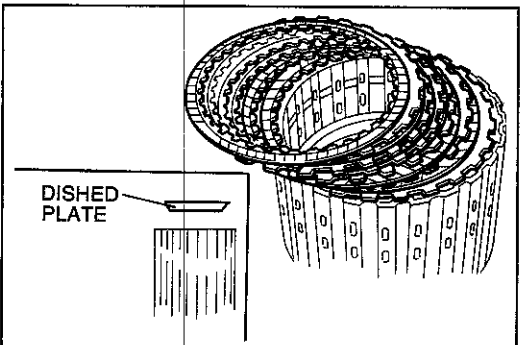
9MU0K1-244



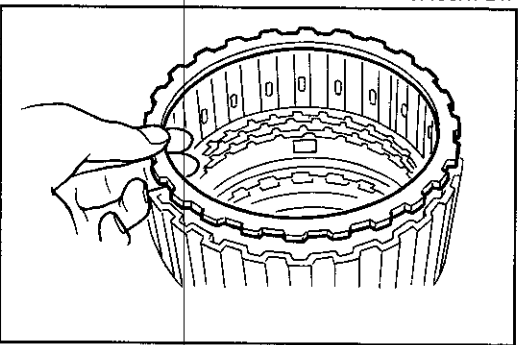
9MU0K1-245



9MU0K1-246



9MU0K1-247



9MU0K1-248

15. Install the retaining plate.

**Caution**  
Do not deform the snap ring.

16. Install the snap ring.

17. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Standard clearance: 1.0—2.0mm (0.039—0.079 in)**

**Retaining plate sizes**

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	

18. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

**Standard clearance: 1.0—1.4mm (0.039—0.055 in)**

**Retaining plate sizes**

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	

19. Install the dished plate as shown.

**Note**  
**Installation order:**  
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

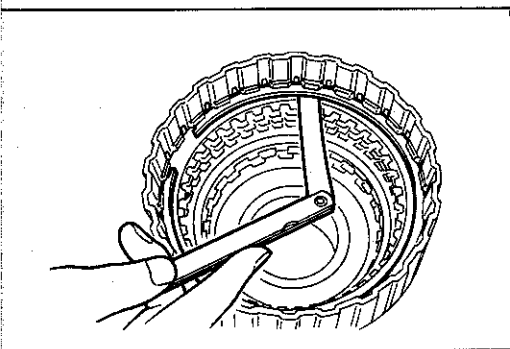
20. Apply ATF to the drive plates and driven plates, and install them into the forward clutch drum.

21. Install the retaining plate.

**Caution**  
Do not deform the snap ring.

22. Install the snap ring.





9MU0K1-249

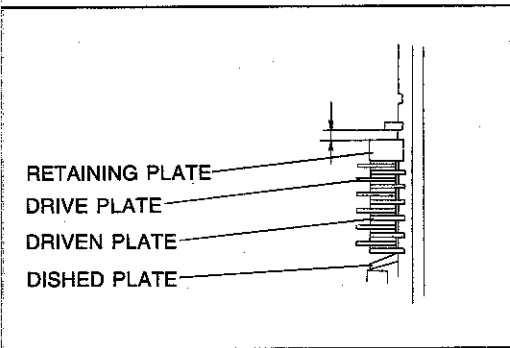
23. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Standard clearance: 0.45—2.05mm (0.018—0.081 in)**

**Retaining plate sizes**

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	



9MU0K1-250

24. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates.

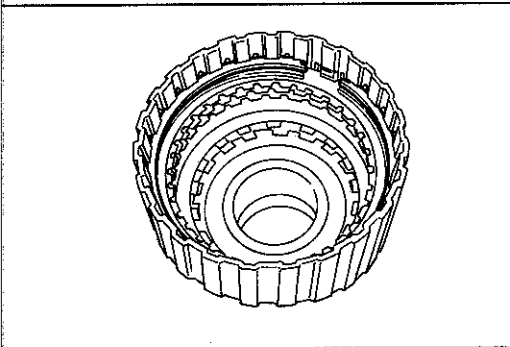
Adjust the clearance by installing the correct retaining ring.

**Standard clearance: 0.45—0.85mm (0.018—0.033 in)**

**Retaining plate sizes**

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	



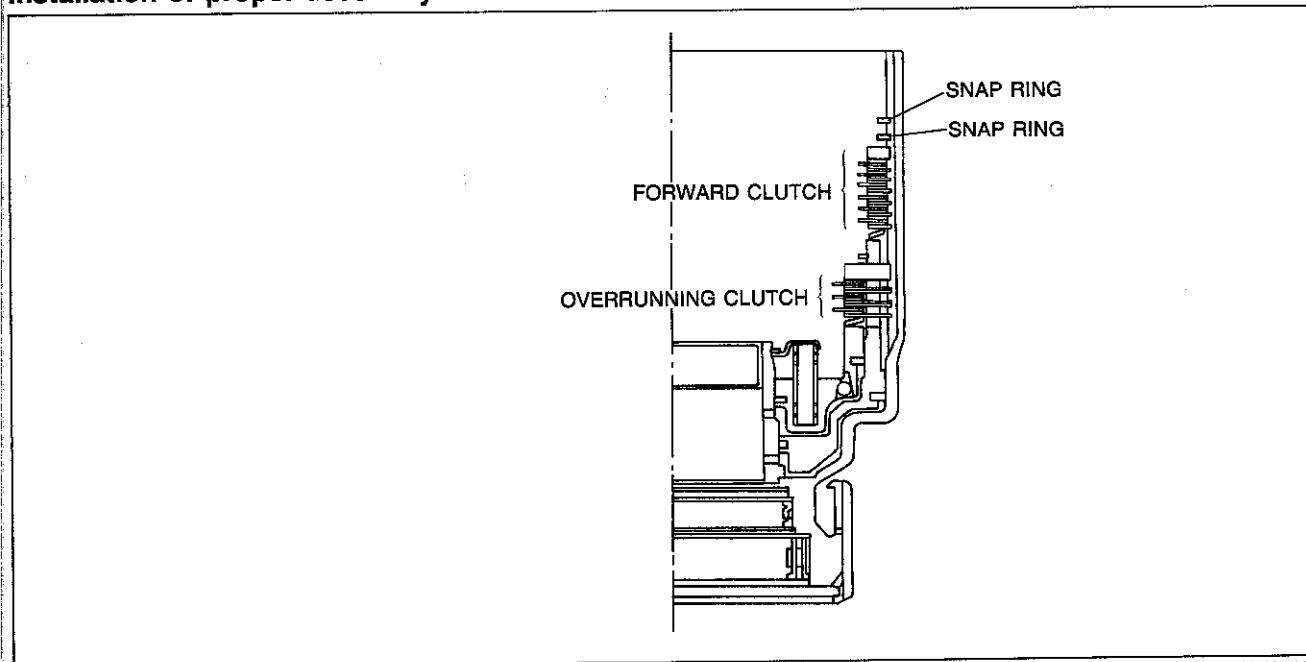
9MU0K1-251

**Caution**

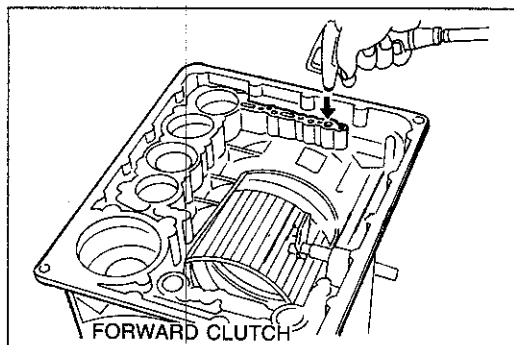
**Do not deform the snap rings.**

25. Install the snap ring.

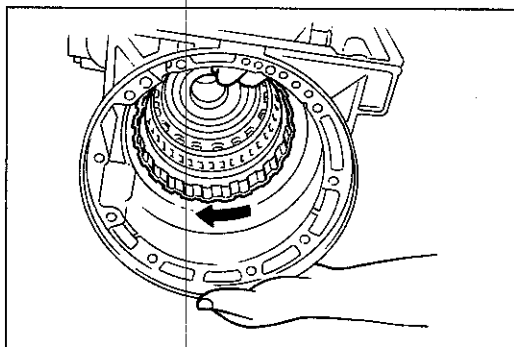
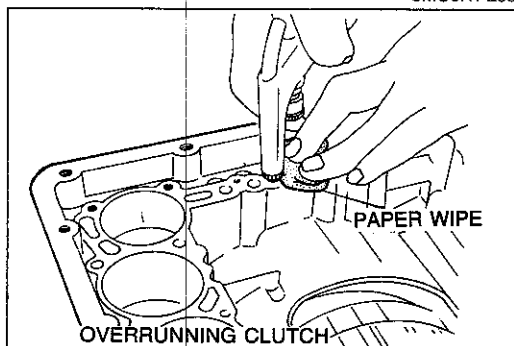
**Installation of proper assembly**



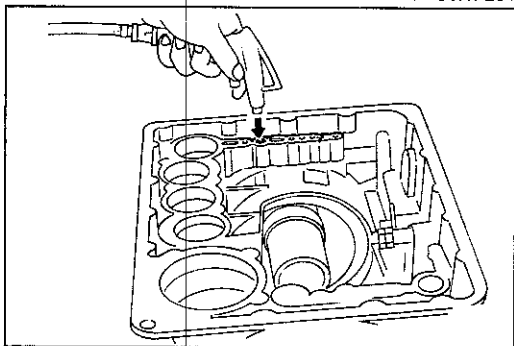
9MU0K1-252



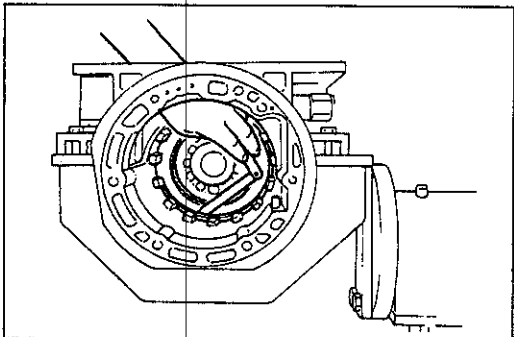
9MU0K1-253



9MU0K1-254



9MU0K1-255



1BU0K2-050

**Caution****Apply air for no more than 3 seconds.**

26. Set the forward clutch drum in the transmission. Apply compressed air through the oil passage, and check the forward clutch and overrunning clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.****Note****If it turns counterclockwise, the one-way clutch is installed upside down.**

27. Check the low one-way clutch operation by turning right and left. It should turn clockwise only, and locked counterclockwise.

**LOW AND REVERSE BRAKE****Preinspection****Low and reverse brake operation**

1. Apply compressed air through the oil passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

2. Verify that the retaining plates move forward the snap ring. If not the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace when assembling if necessary.

**Clearance between retaining plate and snap ring**

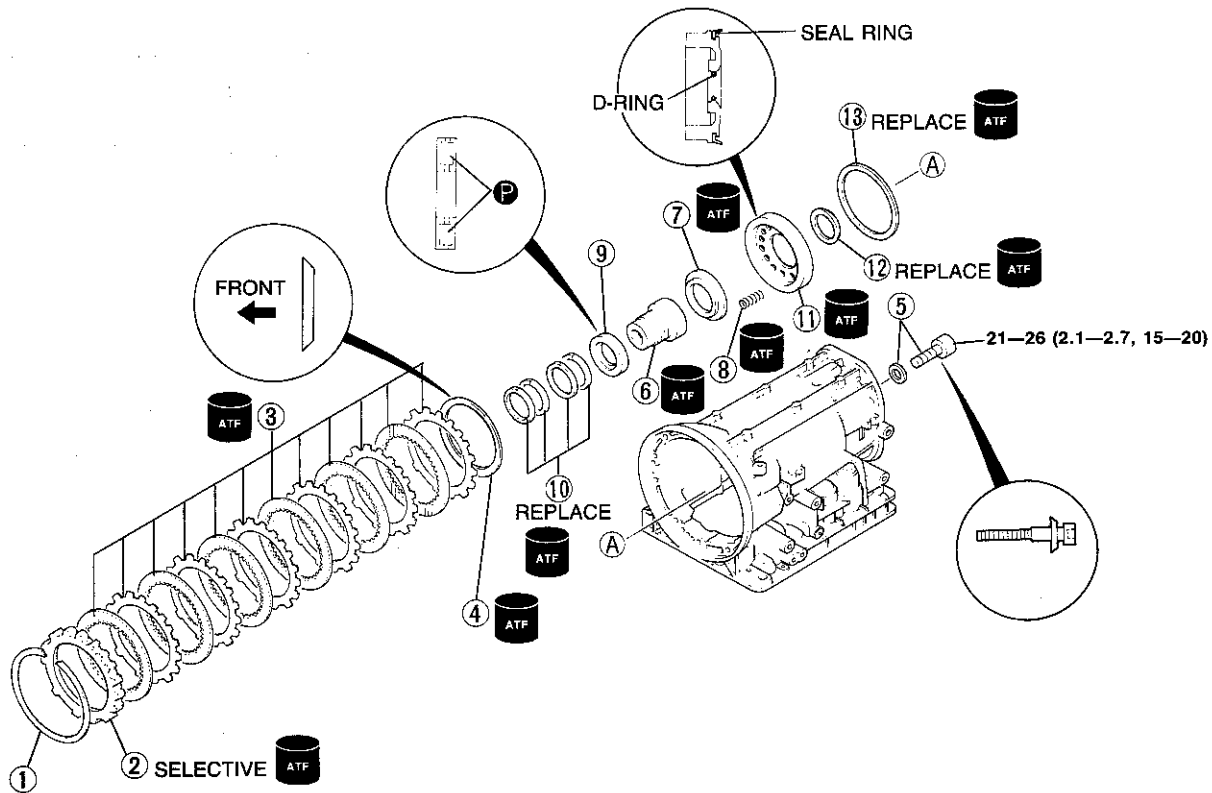
Measure the clearance between the retaining plate and the snap ring to the forward clutch and the overrunning clutch.

**Standard clearance: 0.7—2.3mm (0.028—0.091 in)**

Select the correct retaining plate when assembling if not within specification.

### Disassembly and Inspection

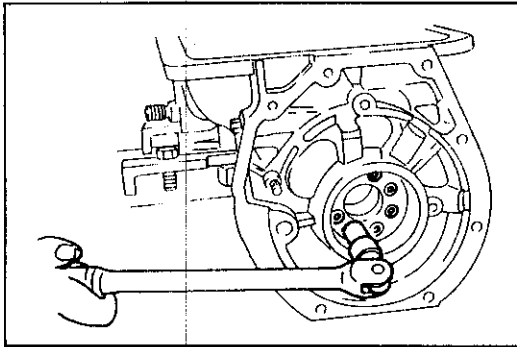
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace if necessary.



N·m (m·kg, ft·lb)

1BUOK2-051

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Snap ring</li> <li>2. Retaining plate</li> <li>3. Drive plates and driven plates<br/>Inspect for damage or burning<br/>Inspection ..... page K2-95</li> <li>4. Allen head bolts and washers</li> <li>5. Low one-way clutch inner race<br/>Disassembly Note ..... page K2-95<br/>Inspection ..... page K2-96</li> <li>6. Spring retainer</li> </ul> | <ul style="list-style-type: none"> <li>7. Return spring<br/>Inspection ..... page K2-95</li> <li>8. Bearing<br/>Inspect for damage or rough rotation</li> <li>9. Seal rings</li> <li>10. Low and reverse brake piston<br/>Inspect balls for sticking by shaking piston<br/>Disassembly Note ..... page K2-95<br/>Inspection ..... page K2-95</li> <li>11. D-ring</li> <li>12. Seal ring</li> </ul> |
|--|--|

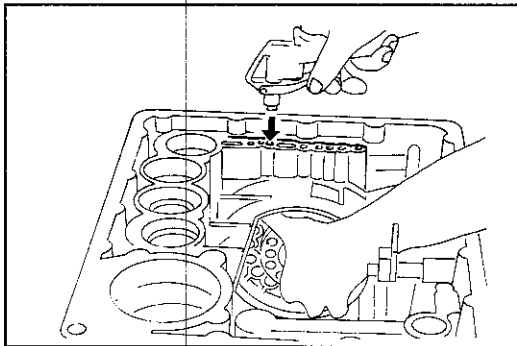


9MU0K1-258

**Disassembly note**  
**Low one-way clutch inner race**

**Caution**  
**Do not lose the springs.**

1. Remove the Allen head bolts holding the low one-way clutch inner race and spring retainer.
2. Remove the low one-way clutch inner race, spring retainer, and return springs.

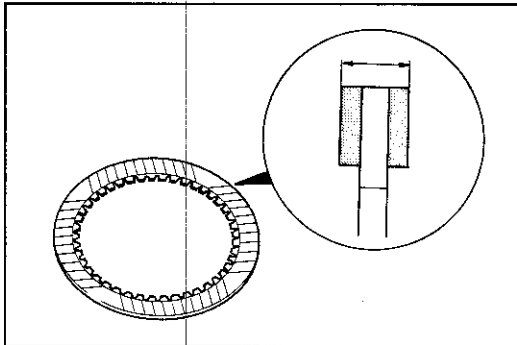


9MU0K1-259

**Low and reverse brake piston**

Remove the low and reverse brake piston apply compressed air through the oil passage as shown in the figure.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



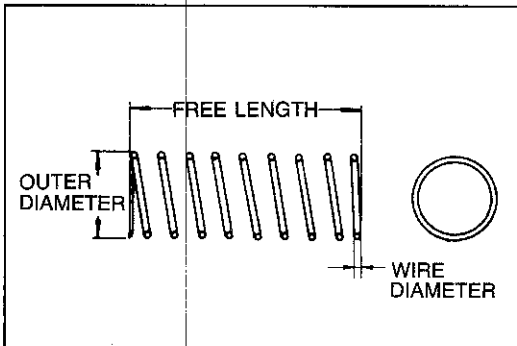
9MU0K1-260

**Inspection**  
**Drive plates**

1. Measure the facing thickness in three places, and determine the average of the three reading.

**Standard thickness: 2.0mm (0.079 in)**  
**Minimum thickness: 1.8mm (0.071 in)**

2. If not within specification, replace the drive plates.



9MU0K1-261

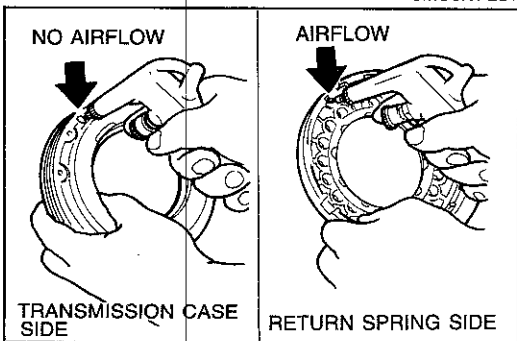
**Return spring**

1. Measure the spring specifications.

**Specifications**

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
11.6 (0.457)	23.7 (0.933)	5.0	1.1 (0.043)

2. If not within specification, replace the spring.

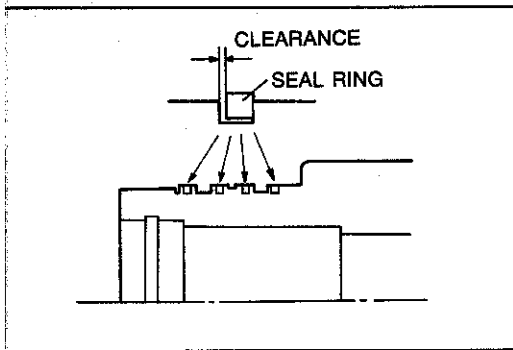


9MU0K1-262

**Low and reverse brake piston**

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9MUOK1-263

### Low one-way clutch inner race

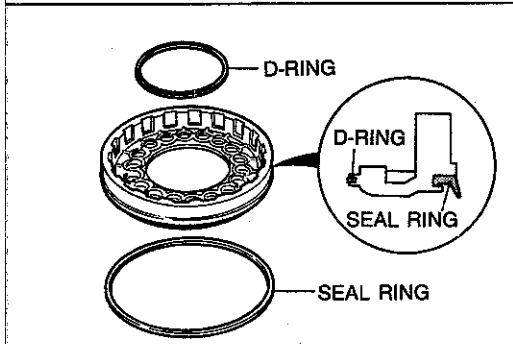
1. Apply petroleum jelly to a new seal ring and install the seal ring.
2. Measure the clearance between the seal ring and the ring groove.

#### Standard clearance:

0.10—0.25mm (0.0039—0.0098 in)

Maximum clearance: 0.25mm (0.0098 in)

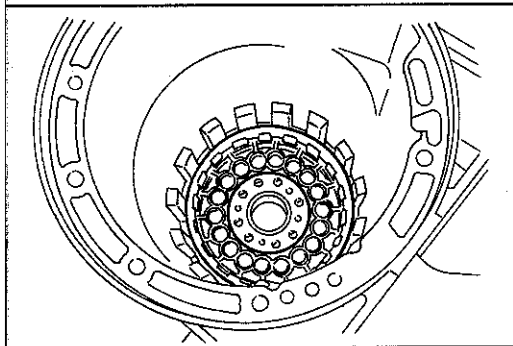
3. If not within specification, replace the low one-way clutch inner race.



9MUOK1-264

### Assembly

1. Apply ATF to the new D-ring and seal ring and install them to the low and reverse brake piston.

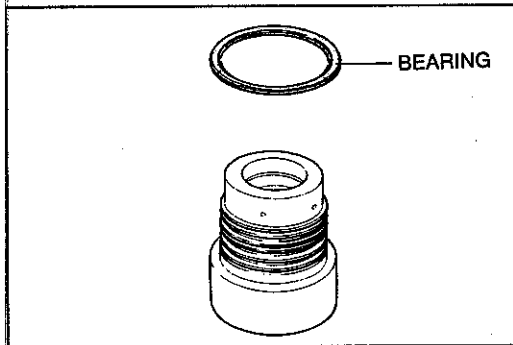


9MUOK1-265

### Caution

Apply even pressure to the perimeter of the brake piston to avoid damaging the D-ring and seal ring when installing.

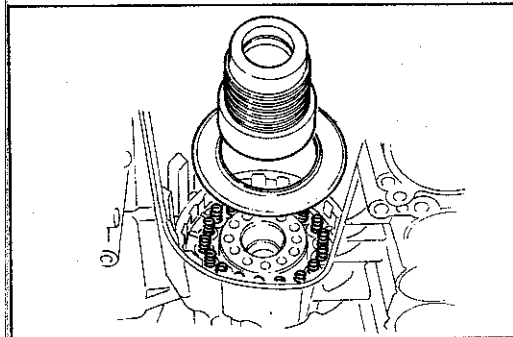
2. Apply ATF to the inner surface of the transmission case.
3. Install the low and reverse brake piston in the transmission case by turning it evenly and gradually.



9MUOK1-266

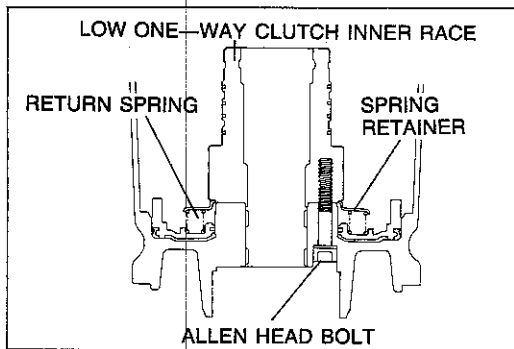
4. Apply petroleum jelly to the bearing, and install it on the low one-way clutch inner race.

**Bearing outer diameter: 78.0mm (3.071 in)**

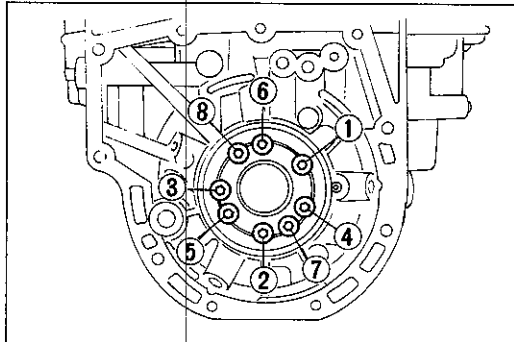


9MUOK1-267

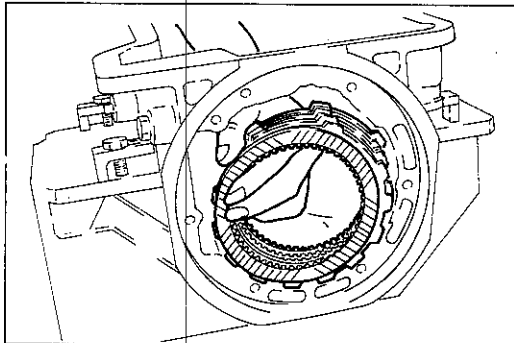
5. Assemble the return spring, spring retainer and low one-way clutch inner race to the low and reverse brake piston.



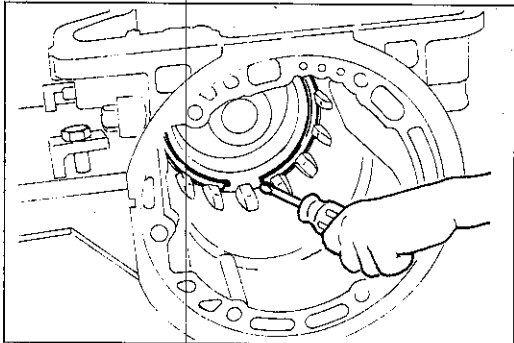
9MU0K1-268



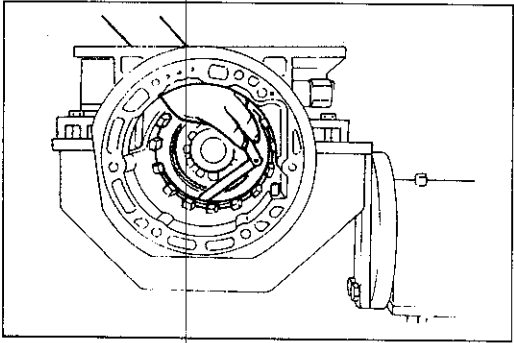
9MU0K1-269



9MU0K1-270



9MU0K1-271



1BU0K2-052

6. Check that the return spring, spring retainer, and low one-way clutch inner race are properly positioned before securing them with the Allen head bolts.

7. Tighten the Allen head bolts evenly and gradually in the order shown.

**Tightening torque:**

**21—26 N·m (2.1—2.7 m·kg, 15—20 ft·lb)**

**Note**

**Installation order**

**Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive**

8. Apply ATF to the drive plates and driven plates, and install them into the transmission case.

9. Install the retaining plate.

**Caution**

**Do not deform the snap ring.**

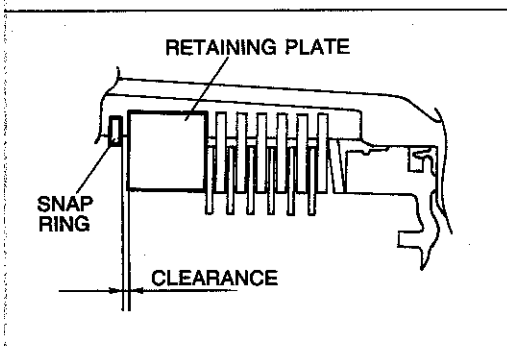
10. Install the snap ring.

11. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

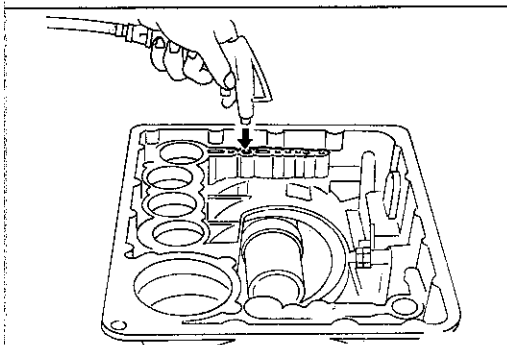
**Standard clearance: 0.7—2.3mm (0.028—0.091 in)**

**Retaining plate sizes**

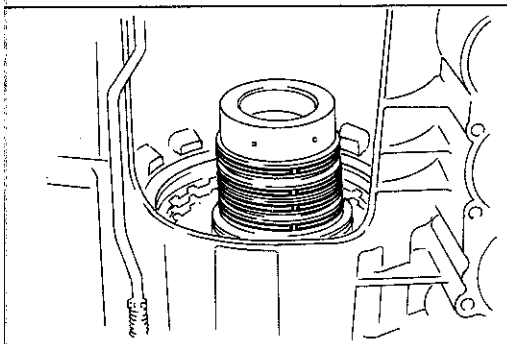
			mm (in)
9.0 (0.354)	9.2 (0.362)	9.4 (0.370)	
9.6 (0.378)	9.8 (0.386)	10.0 (0.394)	



1BU0K2-053



9MU0K1-274



9MU0K1-275

12. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

**Standard clearance: 0.7—1.1mm (0.028—0.043 in)**

### Retaining plate sizes

mm (in)

9.0 (0.354)	9.2 (0.362)	9.4 (0.370)
9.6 (0.378)	9.8 (0.386)	10.0 (0.394)

### Caution

**Apply air for no more than 3 seconds.**

13. Check operation of the piston by applying compressed air through the oil passage of the low and reverse brake.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

### Caution

**Make sure the seal rings are pressed firmly into place and held by petroleum jelly.**

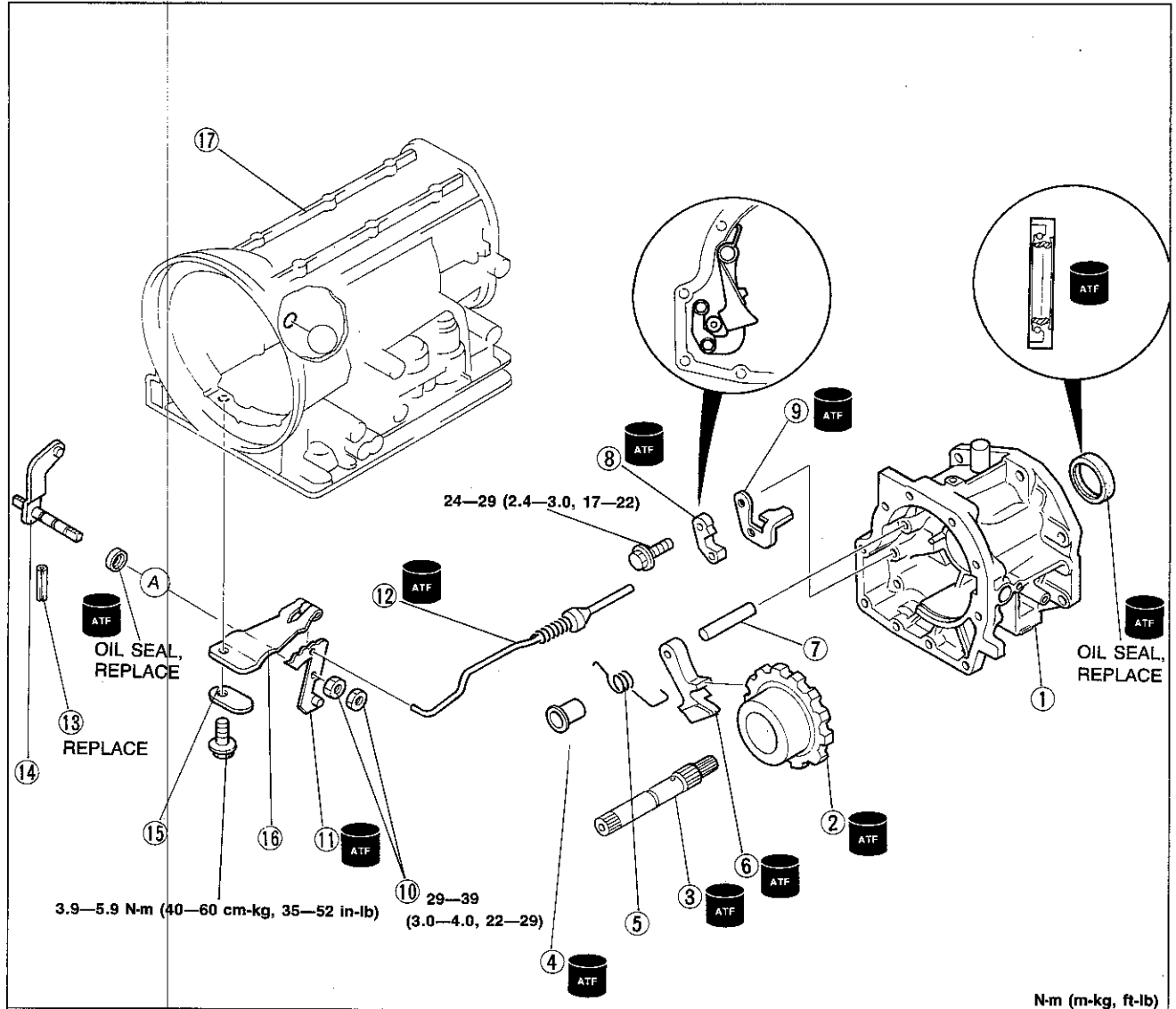
14. Apply petroleum jelly to the seal rings and install them onto the low one-way clutch inner race.

## ADAPTER CASE AND PARKING MECHANISM Disassembly and Inspection

### Caution

Do not remove the oil seals if not necessary to do so for repairs.

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace if necessary.

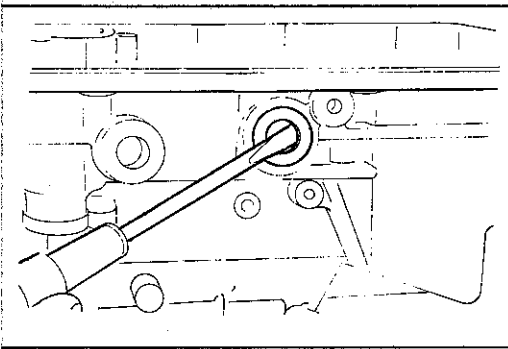


N-m (m-kg, ft-lb)

1BU0K2-054

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Adapter case</li> <li>2. Parking gear<br/>Inspect individual gear teeth for damage or wear and rough rotation of bearing</li> <li>3. Output shaft<br/>Inspect splines for damage or wear</li> <li>4. Parking pawl spacer</li> <li>5. Return spring</li> <li>6. Parking pawl</li> <li>7. Parking pawl shaft</li> <li>8. Parking actuator</li> <li>9. Parking rod guide</li> <li>10. Locknuts</li> </ol> | <ol style="list-style-type: none"> <li>11. Manual plate</li> <li>12. Parking rod</li> <li>13. Roll pin</li> <li>14. Manual shaft</li> <li>15. Spacer</li> <li>16. Detent spring<br/>Inspect for fracture or wear</li> <li>17. Transmission case<br/>Inspection             <ol style="list-style-type: none"> <li>a) Damage or wear of oil seal<br/>Disassembly ..... page K2-100</li> <li>b) Damage or rough rotation of inner bearing</li> </ol> </li> </ol> |
|--|--|



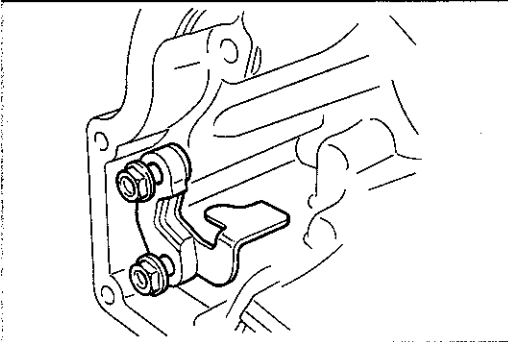


9MU0K1-277

**Disassembly note**  
**Oil seal (Transmission side)**

**Caution**  
**Do not remove the seal unless necessary.**

Remove the oil seal with a screwdriver.

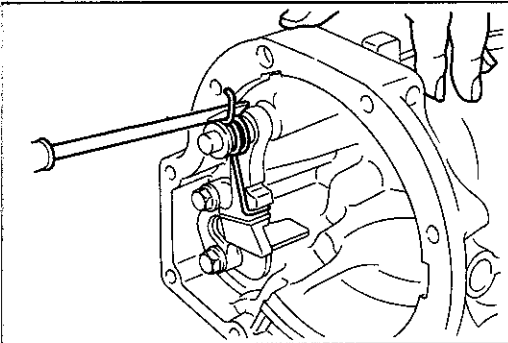


9MU0K1-278

**Assembly**  
**Extension housing**

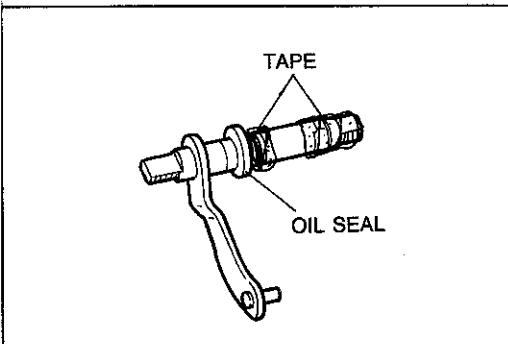
1. Apply ATF to the parking rod guide and parking actuator, and install them in the extension housing.

**Tightening torque:**  
**24—29 N·m (2.4—3.0 m·kg, 17—22 ft·lb)**



9MU0K1-279

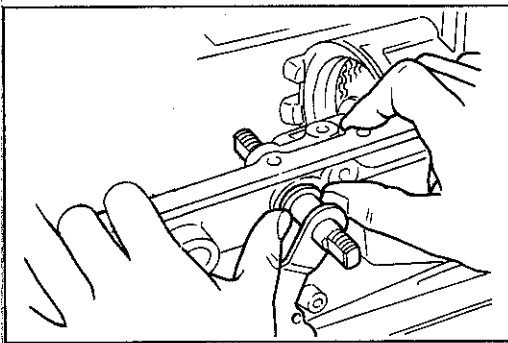
2. Apply ATF to the parking pawl shaft and install it in the extension housing
3. Apply ATF to the parking pawl, return spring and spacer, and install them in the extension housing.



9MU0K1-280

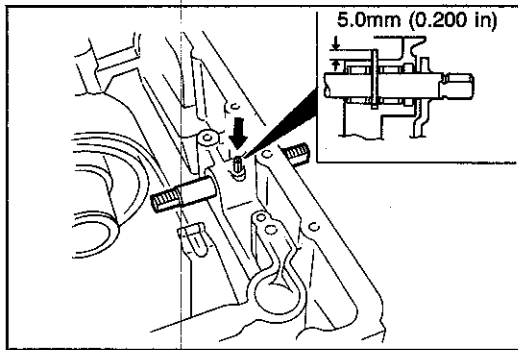
**Manual shaft**

1. Apply ATF to the lip surface of a new oil seal and install it onto the manual shaft.
2. Wrap the threads of the manual shaft with tape.



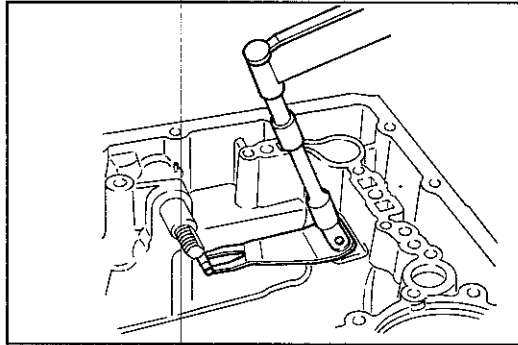
9MU0K1-281

3. Apply ATF to the bearing in the transmission case.
4. Install the manual shaft into the transmission case.
5. Push the oil seal squarely into the transmission case.
6. Remove the tape.



9MU0K1-282

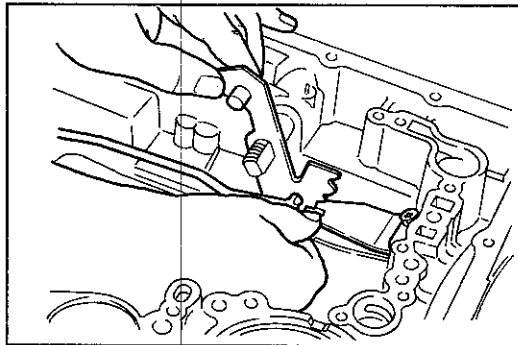
7. Align the groove in manual shaft with the roll pin hole, then tap the roll pin into the case as shown in the figure.



9MU0K1-283

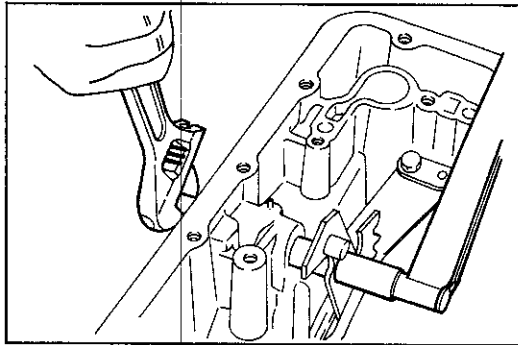
8. Install the detent spring and spacer.

**Tightening torque:**  
**3.9—5.9 N·m (40—60 cm·kg, 35—52 in·lb)**



9MU0K1-284

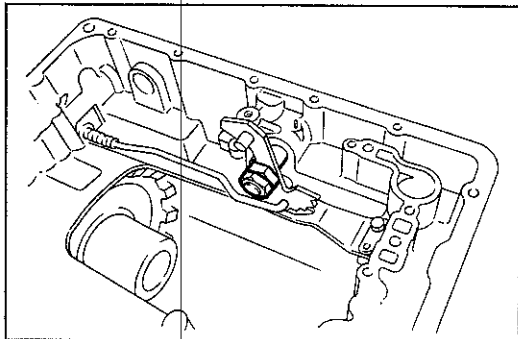
9. Install the manual plate and parking rod.



9MU0K1-285

10. Tighten the locknuts.

**Tightening torque:**  
**29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)**

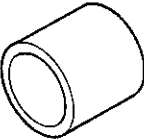




9MU0K1-286

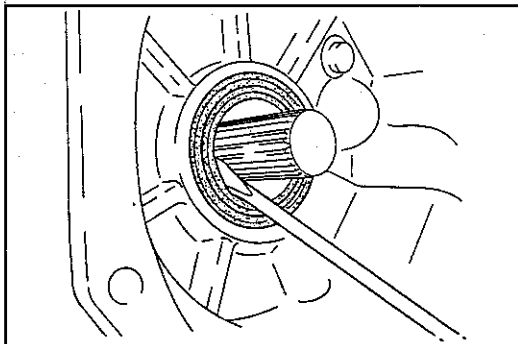
11. Check the parking mechanism operation.

### OIL SEAL Preparation SST

Following **SSTs** used for 4WD model.

49 U027 003 Installer, oil seal		49 G030 795 Installer, oil seal		49 G030 797 Handle (Part of 49 G030 795)	
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0MU0K1-050



### Inspection

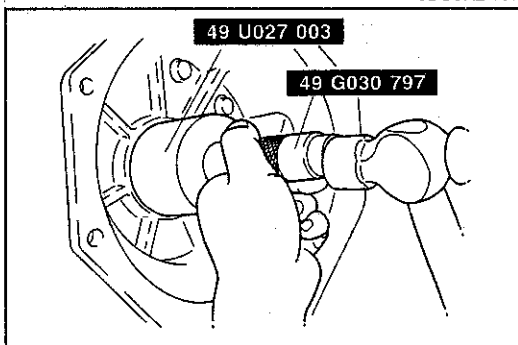
Check for damage, wear, or oil leaking of oil seal. Replace if necessary.

### On-vehicle Replacement

#### Caution

**Do not damage the mainshaft splines.**

1. Remove the transfer case.
2. Remove the oil seal from the adapter case.
3. Apply ATF to outer periphery and lip surface.
4. Install the new oil seal with the **SST**.
5. Install the transfer case.



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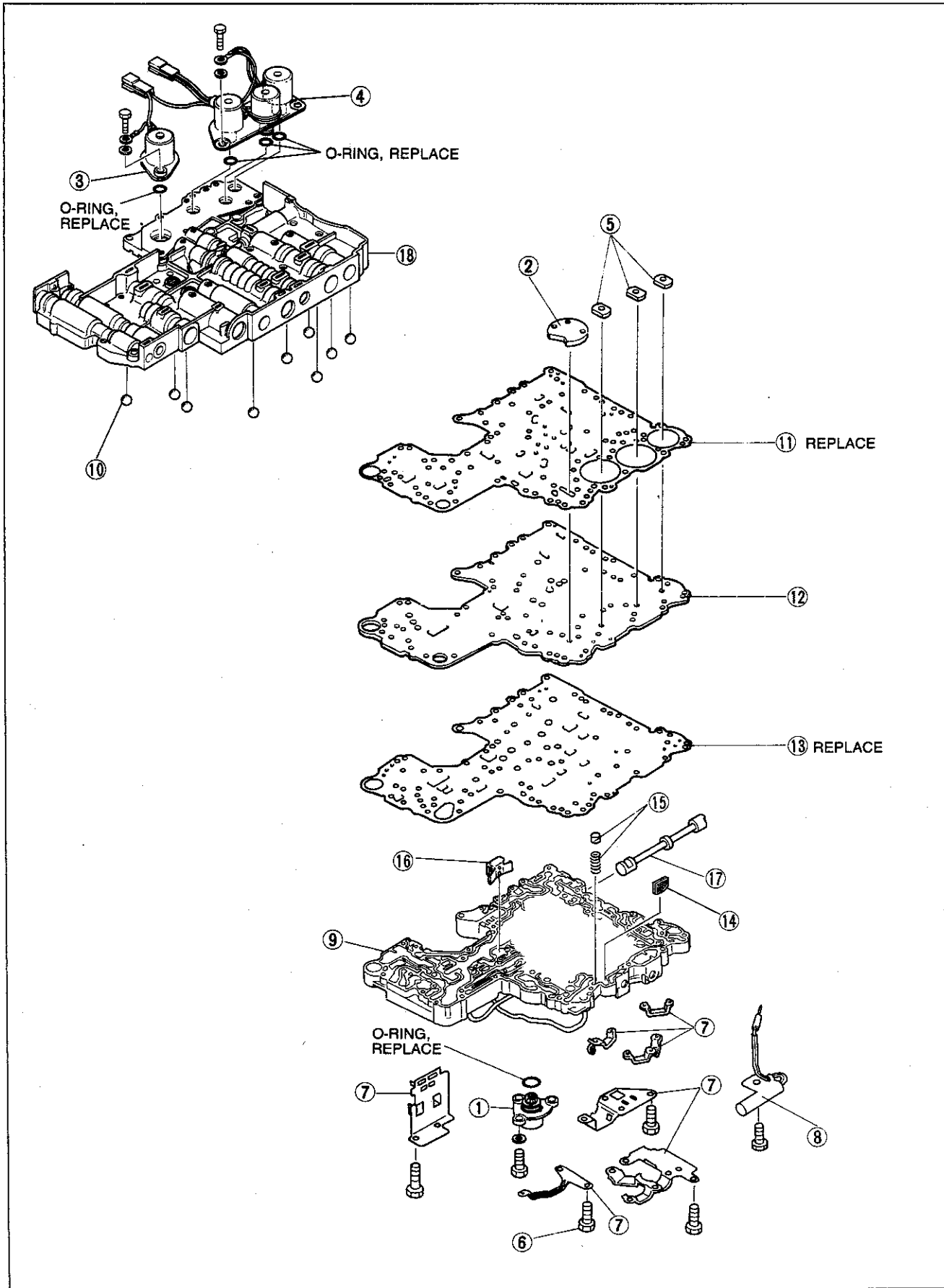
**CONTROL VALVE BODY (DISASSEMBLY AND INSPECTION)**  
**Disassembly and Inspection****Caution**

- a) Be especially careful when handling the control valve because it consists of the most precise and delicate parts of the transmission.
- b) Neatly arrange the removed parts to avoid confusing them with similar parts.
- c) Clean the removed parts with cleaning solvent, and dry them with compressed air. Clean out all holes and passages with compressed air.

Disassemble in the order shown in the figure.  
Inspect all parts, and repair or replace as necessary.

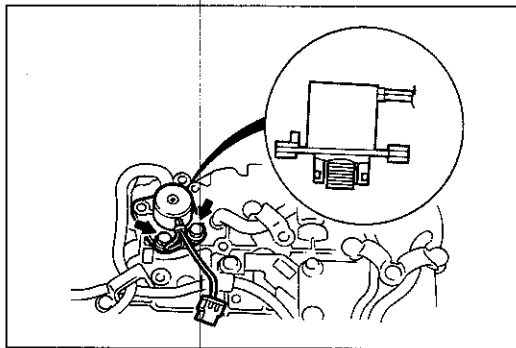
0BU0K2-169

## Components

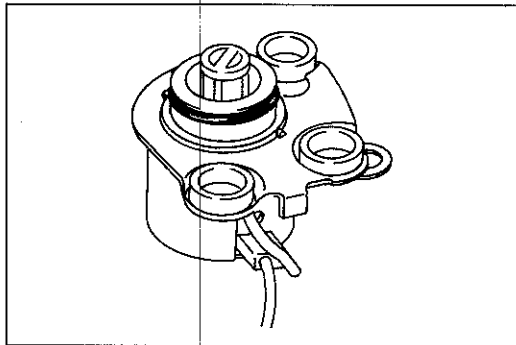


- 1. Lockup solenoid  
Inspect filter for clogging or damage  
Inspection ..... page K2- 38
- 2. Side plate
- 3. Line pressure solenoid  
Inspect filter for clogging or damage  
Inspection ..... page K2- 38
- 4. Overrunning clutch solenoid, shift solenoid A,  
and shift solenoid B  
Inspect filter for clogging or damage  
Inspection ..... page K2- 38
- 5. Support plate
- 6. Retaining bolts and nuts  
Installation position ..... page K2-120
- 7. Brackets  
Installation position ..... page K2-119
- 8. ATF thermostitch  
Inspection ..... page K2- 38
- 9. Lower valve body  
Disassembly and Inspection .. page K2-116  
Installation..... page K2-117
- 10. Steel ball  
Installation position ..... page K2-119
- 11. Upper gasket
- 12. Separate plate  
Inspect fluid passages for clogging or  
damage
- 13. Lower gasket
- 14. Accumulator filter  
Inspect for clogging or damage
- 15. Orifice check valve and spring
- 16. Pilot filter  
Inspect for clogging or damage
- 17. Manual valve  
Inspect for sticking, scoring, or scratches
- 18. Upper valve body  
Disassembly and Inspection .. page K2-108  
Assembly ..... page K2-111

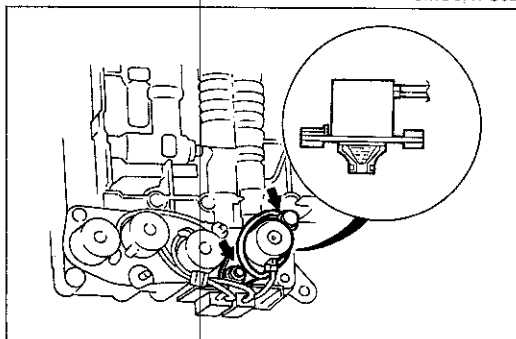
2BU0K2-027



9MU0K1-301



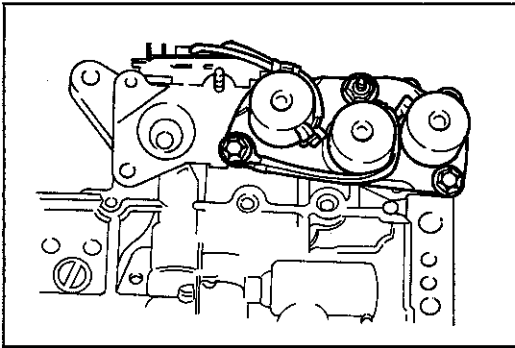
9MU0K1-302



9MU0K1-303

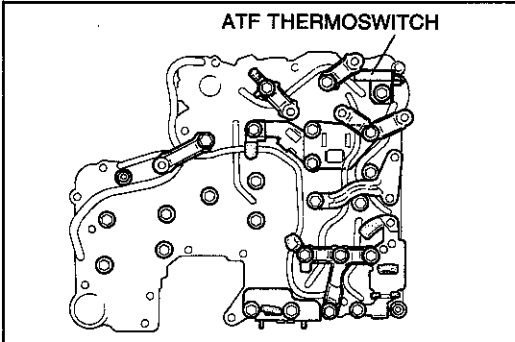
**Procedure**

- 1. Remove the lockup solenoid and side plate.
- 2. Remove the O-ring from the lockup solenoid.
- 3. Remove the line pressure solenoid.
- 4. Remove the O-ring from the line pressure solenoid.



9MU0K1-304

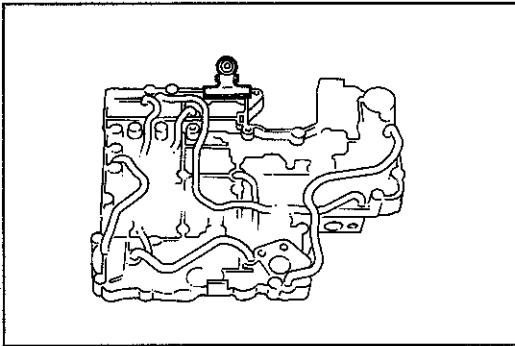
5. Remove the solenoids.
6. Remove the O-rings from the solenoids.



ATF THERMOSWITCH

0BU0K2-110

7. Remove the support plate.
8. Remove the bolts, nuts, brackets, and ATF thermoswitch.

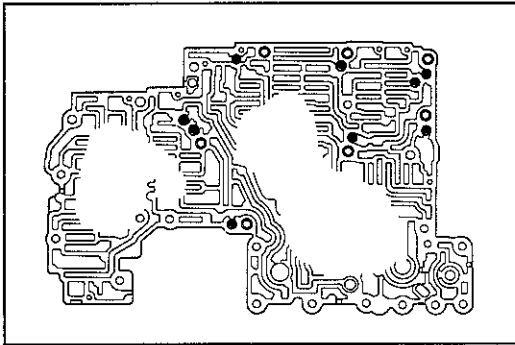


9MU0K1-306

**Caution**

- a) Do not scratch the lower valve body.
- b) Be careful not to drop the pilot filter, orifice check valve or spring.

9. Hold the lower valve body, lower and upper gaskets and separate plate with a large clip.
10. Separate the lower valve body from the upper valve body.

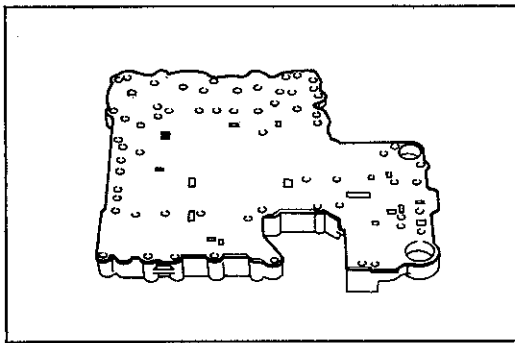


9MU0K1-307

**Caution**

**Do not drop or lose the steel balls.**

11. Remove the steel balls from the upper valve body.



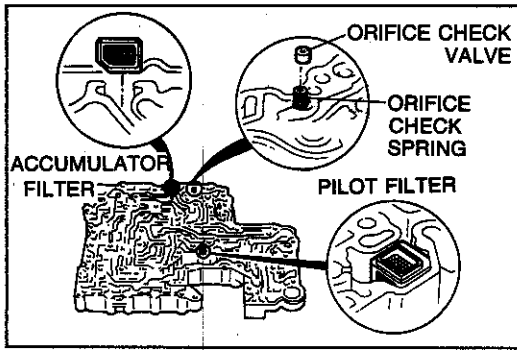
9MU0K1-308

12. Face the lower valve body downward, and remove the holding clip.

**Caution**

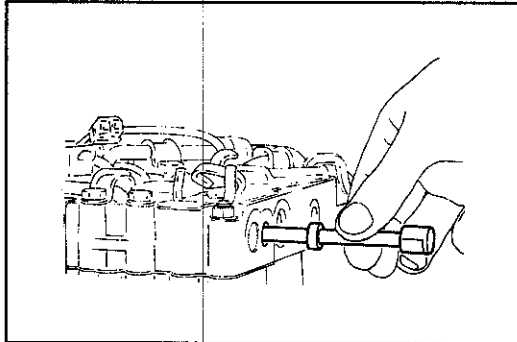
**Do not lose the pilot filter, orifice check valve or spring.**

13. Remove the separate plate and gaskets.



9MU0K1-309

14. Remove the orifice check valve, spring, accumulator filter, and pilot filter.



9MU0K1-310

15. Remove the manual valve from the upper valve body.



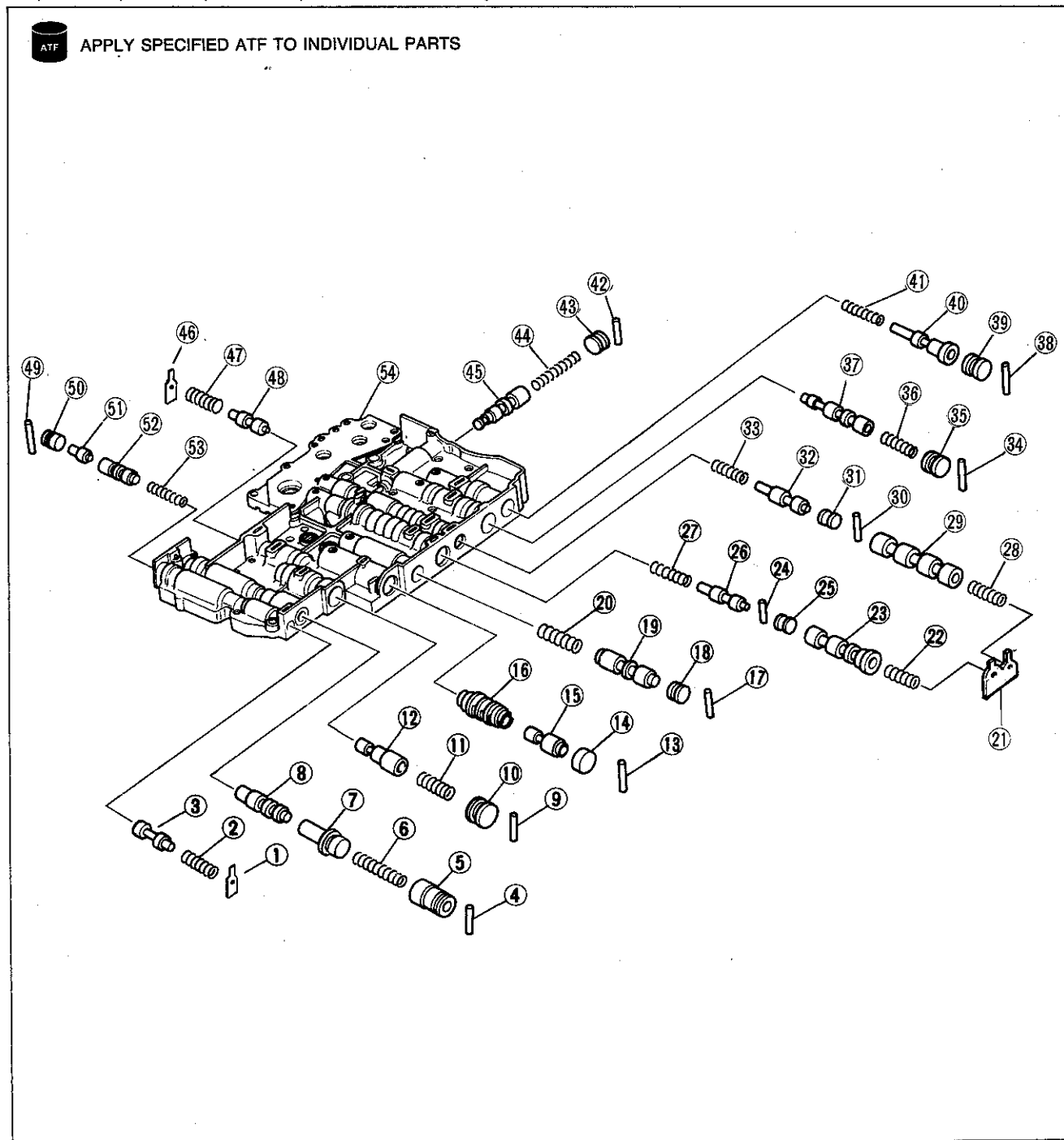
### UPPER VALVE BODY

#### Disassembly and Inspection

##### Caution

- a) Each valve should slide out by its own weight.
- b) When a valve will not slide out by its own weight, depending on the valve, push it out with a wire or place the valve body open-side down and lightly tap it with a soft hammer. Never scratch or otherwise damage the valve surface or bore.
- c) Do not drop or lose the valves or internal parts.

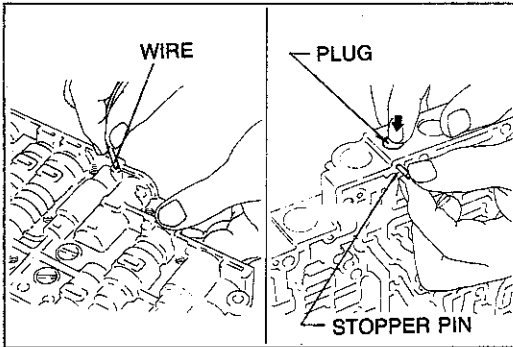
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, repair or replace as necessary.



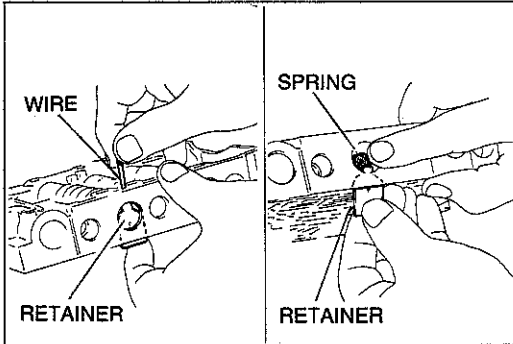
OBUCK2-170

- |  |   |
|--|---|
| 1. Retainer<br>Disassembly Note ..... page K2-110                              | 28. Shift valve A spring<br>Inspection ..... page K2-111                            |
| 2. Torque converter relief spring<br>Inspection ..... page K2-110              | 29. Shift valve A<br>Inspect for sticking, scoring or scratches                     |
| 3. Torque converter relief valve<br>Inspect for sticking, scoring or scratches | 30. Stopper pin<br>Disassembly Note ..... page K2-110                               |
| 4. Stopper pin<br>Disassembly Note ..... page K2-110                           | 31. 4-2 relay plug  |
| 5. Pressure regulator sleeve<br>Inspect for sticking, scoring or scratches     | 32. 4-2 relay valve<br>Inspect for sticking, scoring or scratches                   |
| 6. Pressure regulator spring<br>Inspection ..... page K2-110                   | 33. 4-2 relay spring<br>Inspection ..... page K2-111                                |
| 7. Pressure regulator plug<br>Inspect for sticking, scoring or scratches       | 34. Stopper pin<br>Disassembly Note ..... page K2-110                               |
| 8. Pressure regulator valve<br>Inspect for sticking, scoring or scratches      | 35. Overrunning clutch control plug   |
| 9. Stopper pin<br>Disassembly Note ..... page K2-110                           | 36. Overrunning clutch control spring<br>Inspection ..... page K2-111               |
| 10. Pressure modifier plug   | 37. Overrunning clutch control valve<br>Inspect for sticking, scoring or scratches  |
| 11. Pressure modifier spring<br>Inspection ..... page K2-110                   | 38. Stopper pin<br>Disassembly Note ..... page K2-110                               |
| 12. Pressure modifier valve<br>Inspect for sticking, scoring or scratches      | 39. Overrunning clutch reducing plug  |
| 13. Stopper pin<br>Disassembly Note ..... page K2-110                          | 40. Overrunning clutch reducing valve<br>Inspect for sticking, scoring or scratches |
| 14. Accumulator control plug   | 41. Overrunning clutch reducing spring<br>Inspection ..... page K2-111              |
| 15. Accumulator control valve<br>Inspect for sticking, scoring or scratches    | 42. Stopper pin<br>Disassembly Note ..... page K2-110                               |
| 16. Accumulator control sleeve<br>Inspect for sticking, scoring or scratches   | 43. Shuttle shift valve S plug  |
| 17. Stopper pin<br>Disassembly Note ..... page K2-110                          | 44. Shuttle shift valve S spring<br>Inspection ..... page K2-111                    |
| 18. Shuttle shift valve D plug   | 45. Shuttle shift valve S<br>Inspect for sticking, scoring or scratches             |
| 19. Shuttle shift valve D<br>Inspect for sticking, scoring or scratches        | 46. Retainer<br>Disassembly Note ..... page K2-110                                  |
| 20. Shuttle shift valve D spring<br>Inspection ..... page K2-110               | 47. Pilot spring<br>Inspection ..... page K2-111                                    |
| 21. Retainer<br>Disassembly Note ..... page K2-110                             | 48. Pilot valve<br>Inspect for sticking, scoring or scratches                       |
| 22. Shift valve B spring<br>Inspection ..... page K2-111                       | 49. Stopper pin<br>Disassembly Note ..... page K2-110                               |
| 23. Shift valve B<br>Inspect for sticking, scoring or scratches                | 50. Lockup control sleeve   |
| 24. Stopper pin<br>Disassembly Note ..... page K2-110                          | 51. Lockup control plug<br>Inspect for sticking, scoring or scratches               |
| 25. 4-2 sequence plug  | 52. Lockup control valve<br>Inspect for sticking, scoring or scratches              |
| 26. 4-2 sequence valve<br>Inspect for sticking, scoring or scratches           | 53. Lockup control spring<br>Inspection ..... page K2-111                           |
| 27. 4-2 sequence spring<br>Inspection ..... page K2-110                        | 54. Upper valve body<br>Inspect for damage or scoring                               |

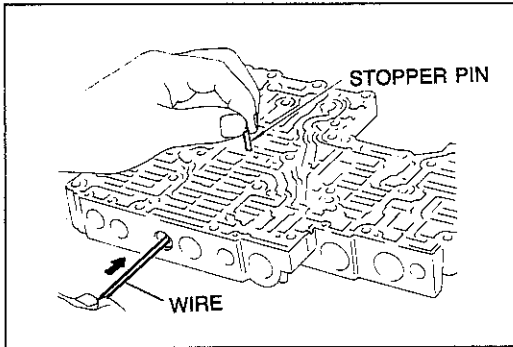
2BU0K2-029



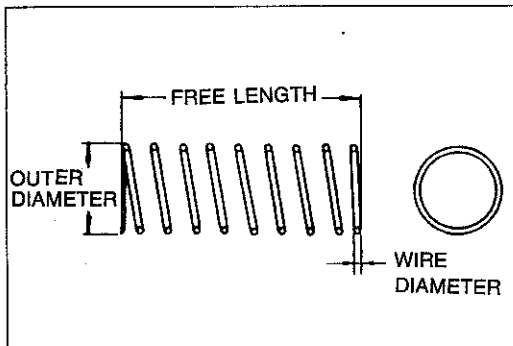
9MU0K1-312



9MU0K1-313



9MU0K1-314



9MU0K1-315

### Disassembly note Stopper pin

#### Caution

**Do not use a magnet to hold the pin.**

1. Push the stopper pin part way out with a wire.
2. Depress and hold the plug or sleeve with a finger to prevent the valve from jumping out.
3. Remove the stopper pin, and remove the valve and internal parts.

### Retainer

#### Caution

**Do not use a magnet to hold the retainer.**

1. Push the retainer part way out with a wire.
2. Hold the inside parts with a finger to prevent the valve from popping out.
3. Remove the retainer, the valve, and the internal parts.

### 4-2 sequence valve and 4-2 relay valve

#### Caution

**a) Removal may be difficult.**

**b) Do not use a magnet to hold the stopper pin.**

1. Push the stopper pin part way out with a wire.
2. Depress the plug with a vinyl tape wrapped **1.5mm (0.060 in)** thick around the diameter rod to prevent the valve from popping out.
3. Remove the stopper pin, the valve, and the internal parts.

### Inspection

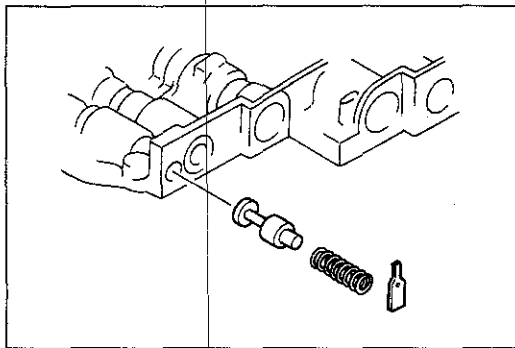
1. Measure the spring specifications.
2. If not within specification, replace the spring(s).

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Torque converter relief valve		9.0 (0.354)	38.0 (1.496)	12.7	1.4 (0.055)
Pressure regulator valve		14.0 (0.551)	44.0 (1.732)	7.9	1.4 (0.055)
Pressure modifier valve*	A	6.8 (0.268)	31.95 (1.258)	15.5	0.8 (0.031)
	B	6.9 (0.272)	32.60 (1.283)	22.2	0.9 (0.035)
	C	6.9 (0.272)	32.80 (1.291)	15.6	0.9 (0.035)
Shuttle shift valve D		6.0 (0.236)	26.5 (1.043)	12.0	0.7 (0.028)

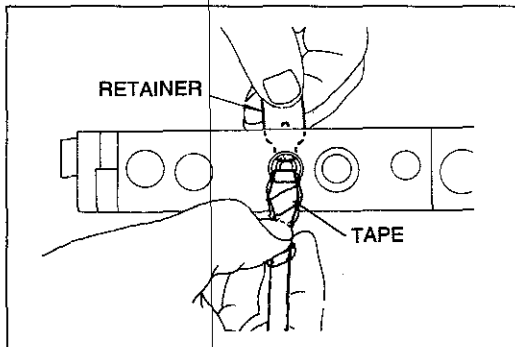
\*: Either A, B or C type spring is installed at shipment. Only A type spring is available for replacement.

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
4-2 sequence valve		6.95 (0.274)	29.1 (1.146)	11.0	0.55 (0.022)
Shift valve B		7.0 (0.276)	25.0 (0.984)	9.5	0.65 (0.026)
4-2 relay valve		6.95 (0.274)	29.1 (1.146)	11.0	0.55 (0.022)
Shift valve A		7.0 (0.276)	25.0 (0.984)	9.5	0.65 (0.026)
Overrunning clutch control valve		7.0 (0.276)	23.6 (0.929)	7.9	0.6 (0.024)
Overrunning clutch reducing valve		7.0 (0.276)	32.5 (0.984)	12.6	0.85 (0.033)
Shuttle shift valve S		5.5 (0.217)	43.0 (1.693)	22.2	0.85 (0.033)
Pilot valve		9.1 (0.358)	25.7 (1.012)	8.3	1.1 (0.043)
Lockup control valve		13.0 (0.512)	18.5 (0.728)	3.5	0.75 (0.030)

2BU0K2-030



0BU0K2-113



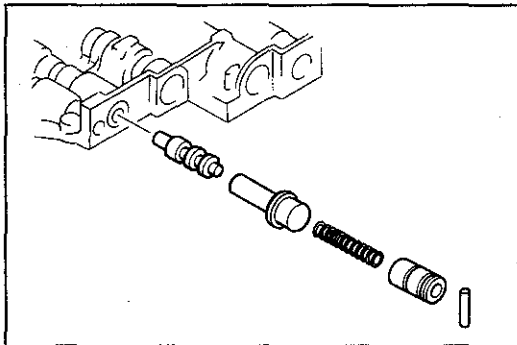
0BU0K2-114

### Assembly Procedure

#### Caution

- a) Before assembly, make sure all parts are thoroughly clean.
- b) Apply ATF to all parts and bores.
- c) Note the proper direction of the valve and internal parts.
- d) Do not reuse any parts that have been dropped.
- e) Do not scratch the valve or valve body.
- f) Wrap a screwdriver or rod with tape before using it to insert a valve.

1. Insert the torque converter relief valve and spring.
2. Install the retainer while compressing the spring.

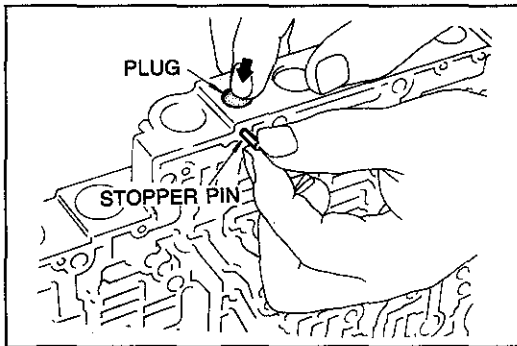


9MU0K1-320

3. Insert the pressure regulator valve, plug, spring, and sleeve.

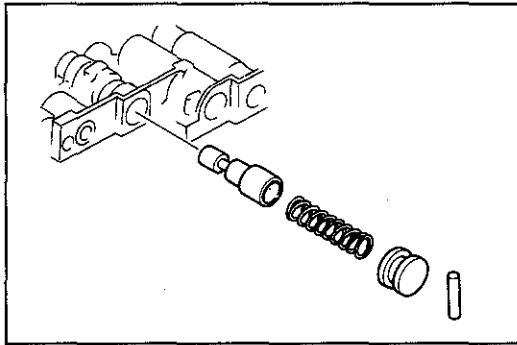
**Note**

- a) If the plug is not centered properly, the sleeve cannot be inserted into the bore in the upper body.
- b) Center the plug with a vinyl tape wrapped screwdriver until the sleeve can be inserted.
- c) Turn the sleeve slightly while installing.



9MU0K1-321

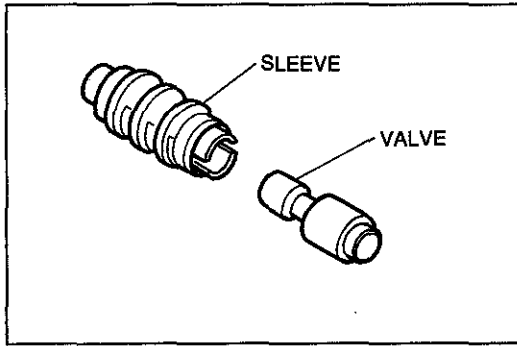
4. Insert the stopper pin while pushing the sleeve.



9MU0K1-322

5. Insert the pressure modifier valve, spring, and plug.

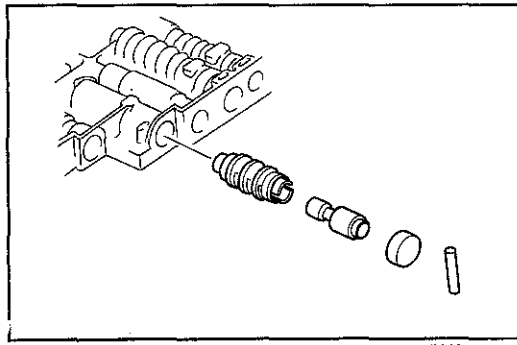
6. Insert the stopper pin while pushing the sleeve.



9MU0K1-323

**Note**

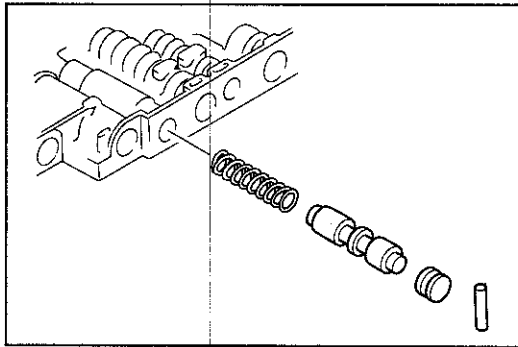
Align the notch of the sleeve with the plug and insert the stopper pin while pushing the plug.



0BU0K2-115

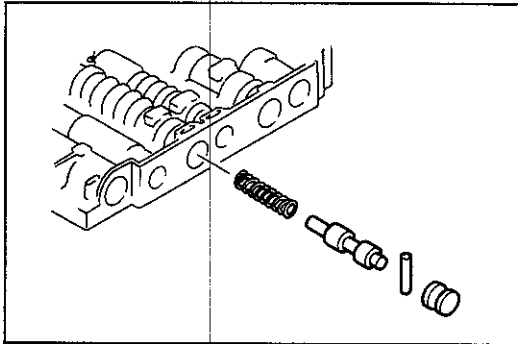
7. Insert the accumulator control valve, sleeve, and plug.

8. Insert the stopper pin while pushing the plug.



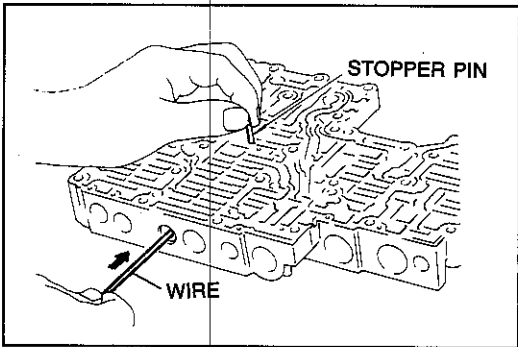
9MU0K1-325

- 9. Insert the shuttle valve D, spring, and plug.
- 10. Insert the stopper pin while pushing the plug.



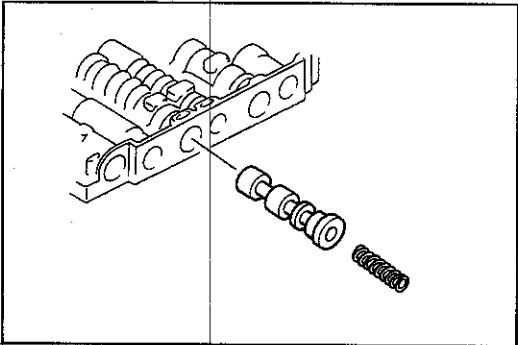
9MU0K1-326

- 11. Insert the 4-2 sequence valve, spring, and plug.



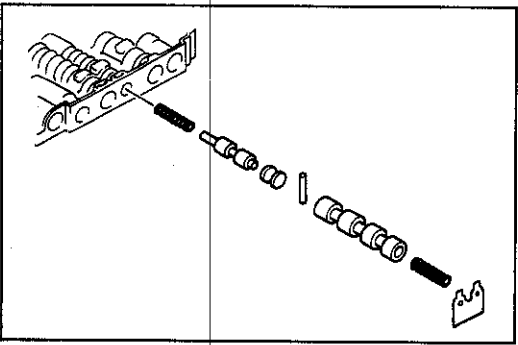
9MU0K1-327

- 12. Push in the plug with a vinyl tape wrapped **1.5mm (0.060 in)** diameter rod.
- 13. Insert the stopper pin.



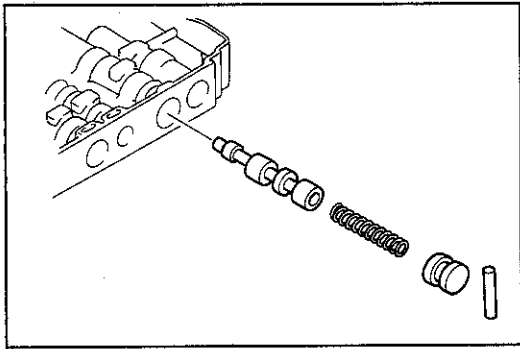
9MU0K1-328

- 14. Insert the shift valve B.
- 15. Insert the spring.

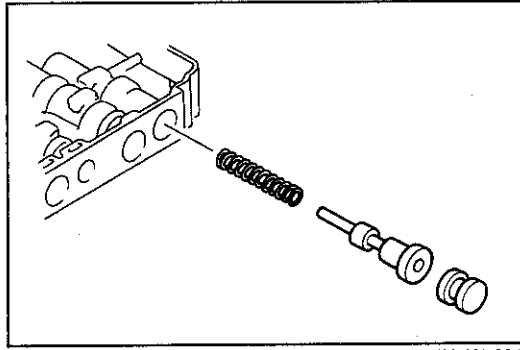


9MU0K1-329

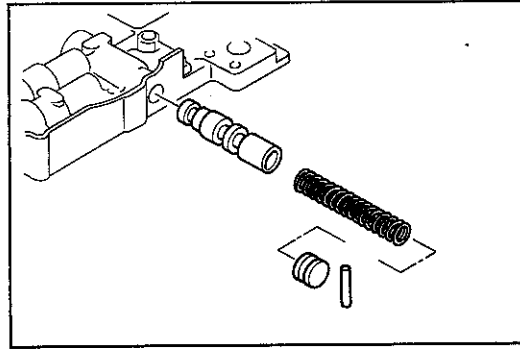
- 16. Insert the 4-2 relay valve and spring.
- 17. Insert the stopper pin while pushing the plug.
- 18. Insert the shift valve A and spring.
- 19. Insert the retainer while compressing the spring.



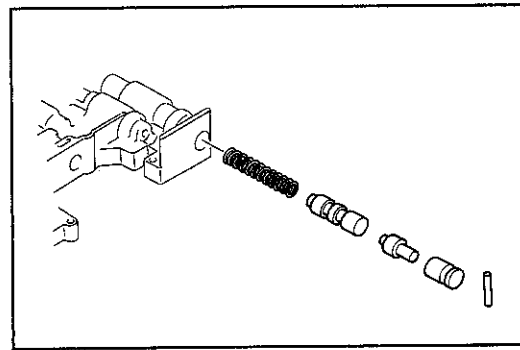
20. Insert the overrunning clutch control valve, spring, and plug.
21. Insert the stopper pin while pushing the plug.



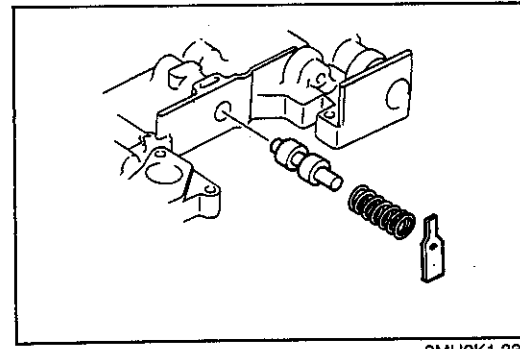
22. Insert the overrunning clutch reducing valve, spring, and plug.
23. Insert the stopper pin while pushing the plug.



24. Insert the shuttle shift valve S, spring, and plug.
25. Insert the stopper pin while pushing the plug.



26. Insert the lockup control valve, spring, plug, and sleeve.
27. Insert the stopper pin while pushing the sleeve.



28. Insert the pilot valve and spring.
29. Insert the retainer while pushing the spring.

MEMO

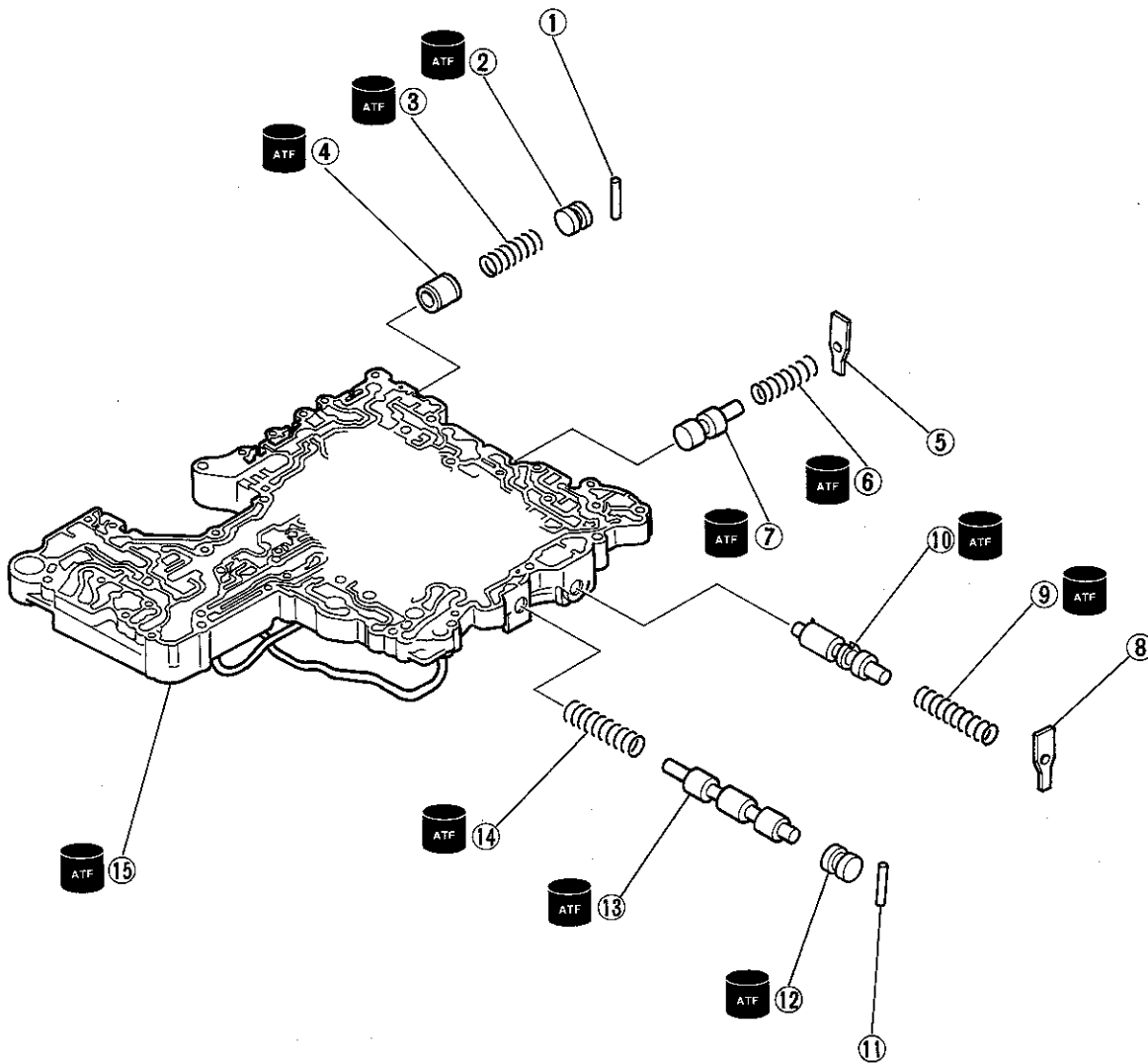


### LOWER VALVE BODY Disassembly and Inspection

#### Caution

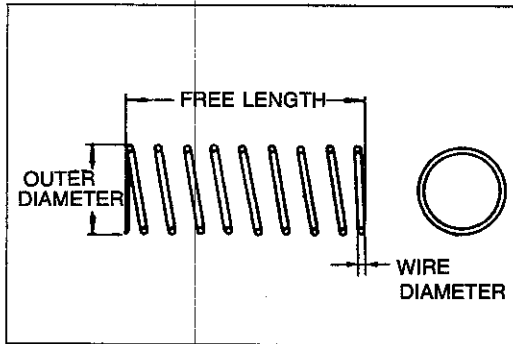
- a) Each valve should slide out by its own weight.
- b) When a valve will not slide out by its own weight, depending on the valve, push it out with a wire or place the valve body open-side down and lightly tap it with a soft hammer. Never scratch or otherwise damage the valve surface or bore.
- c) Do not drop or lose the valves or internal parts.

Disassemble in the order shown in the figure.  
Inspect all parts, repair or replace as necessary.



- 1. Stopper pin  
Disassembly Note ..... page K2-110
- 2. Modifier accumulator plug
- 3. Modifier accumulator spring  
Inspection ..... page K2-117
- 4. Modifier accumulator valve  
Inspect for sticking, scoring or scratches
- 5. Retainer
- 6. 1st reducing spring  
Inspection ..... page K2-117
- 7. 1st reducing valve  
Inspect for sticking, scoring or scratches
- 8. Retainer  
Disassembly Note ..... page K2-110
- 9. 3-2 timing spring  
Inspection ..... page K2-117
- 10. 3-2 timing valve  
Inspect for sticking, scoring or scratches
- 11. Stopper pin  
Disassembly Note ..... page K2-110
- 12. Servo charger plug
- 13. Servo charger valve  
Inspect for sticking, scoring or scratches
- 14. Servo charger spring  
Inspection ..... page K2-110
- 15. Lower valve body  
Inspect for damage or scoring

1BU0K2-058



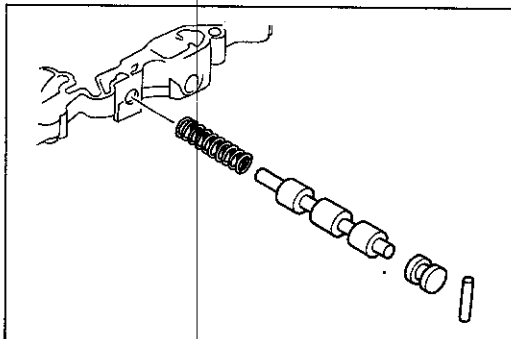
9MU0K1-338

**Inspection**

1. Measure the spring specifications.
2. If not within specification, replace the spring(s).

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Modifier accumulator piston		9.8 (0.386)	30.5 (1.201)	8.75	1.3 (0.051)
1st reducing valve		6.75 (0.266)	25.4 (1.0)	12.5	0.75 (0.030)
Servo charger valve		6.5 (0.256)	33.2 (1.307)	12.0	0.5 (0.020)
3-2 timing valve		6.75 (0.266)	20.55 (0.809)	7.5	0.75 (0.030)

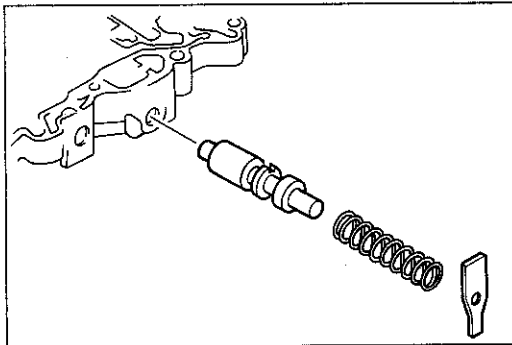
1BU0K2-059



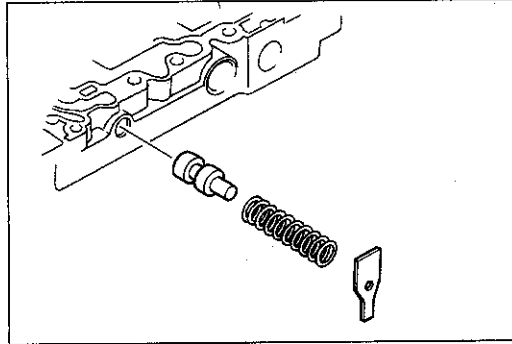
9MU0K1-340

**Installation**

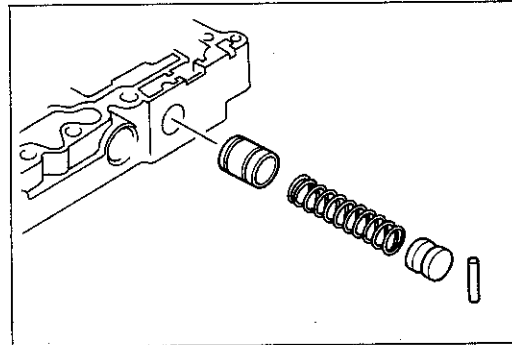
1. Insert the servo charger valve, spring, and plug.
2. Insert the stopper pin while pushing the plug.



3. Insert the 3-2 timing valve and spring.
4. Insert the retainer while compressing the spring.

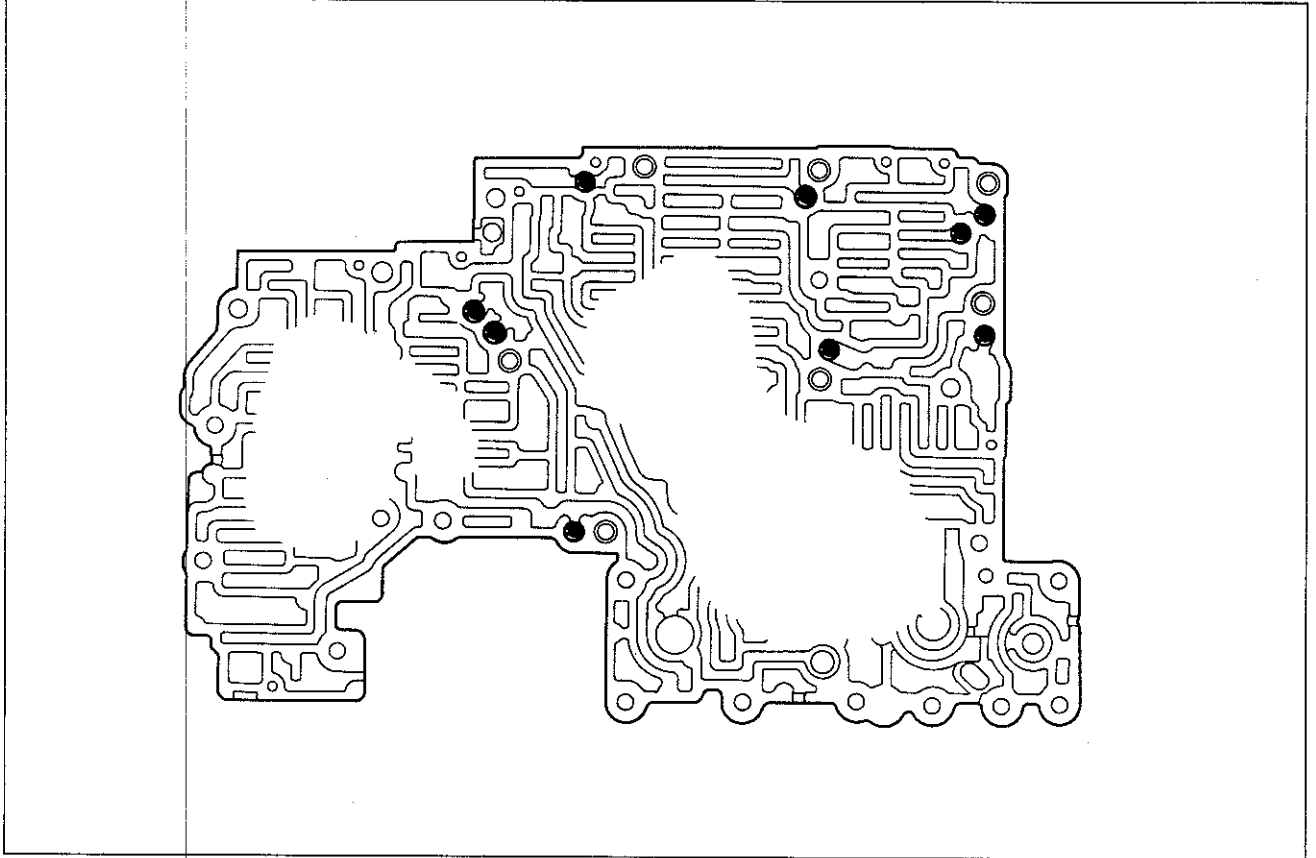


5. Insert the 1st reducing valve and spring.
6. Insert the retainer while compressing the spring.



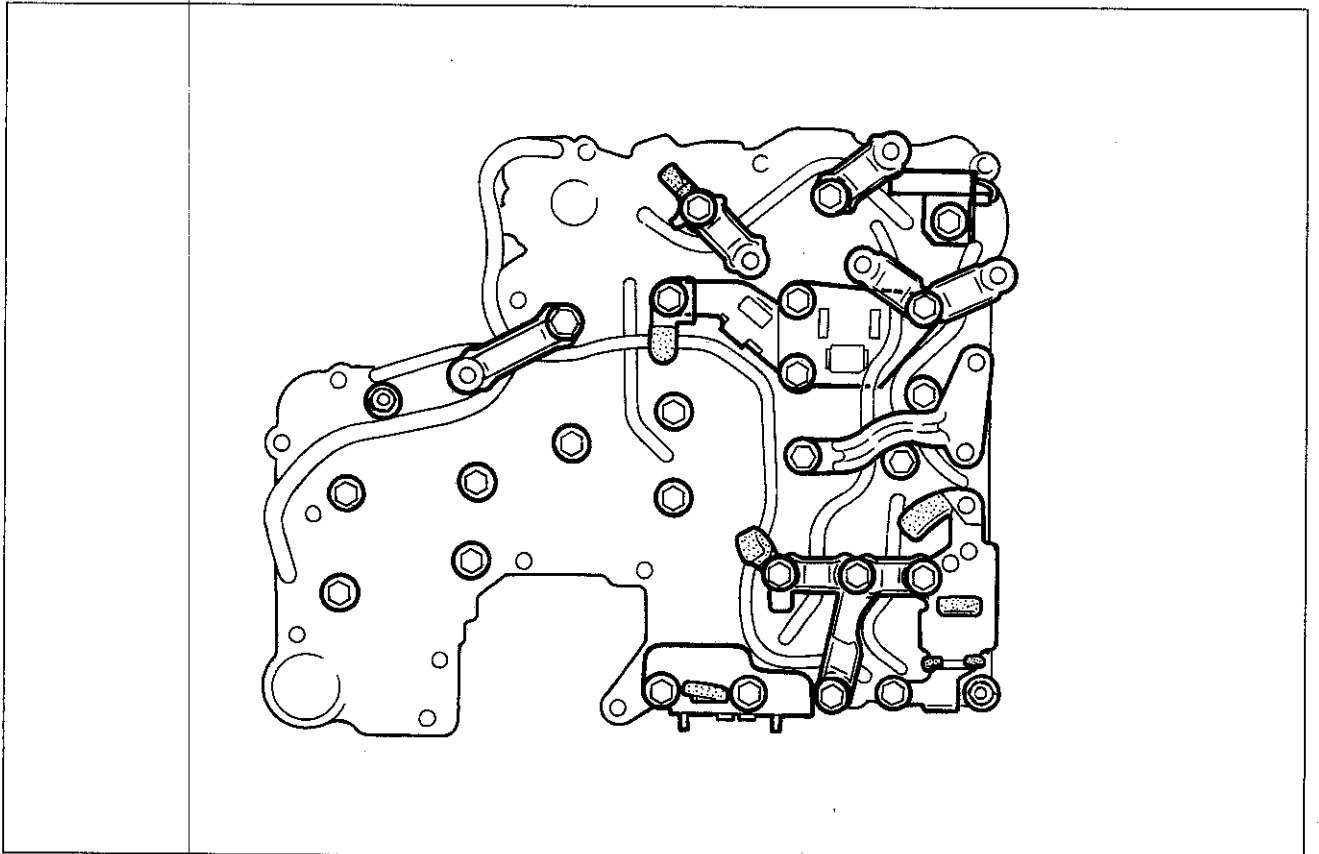
7. Insert the modifier accumulator valve, spring, and plug.
8. Insert the stopper pin while pushing the plug.

Steel ball installation positions



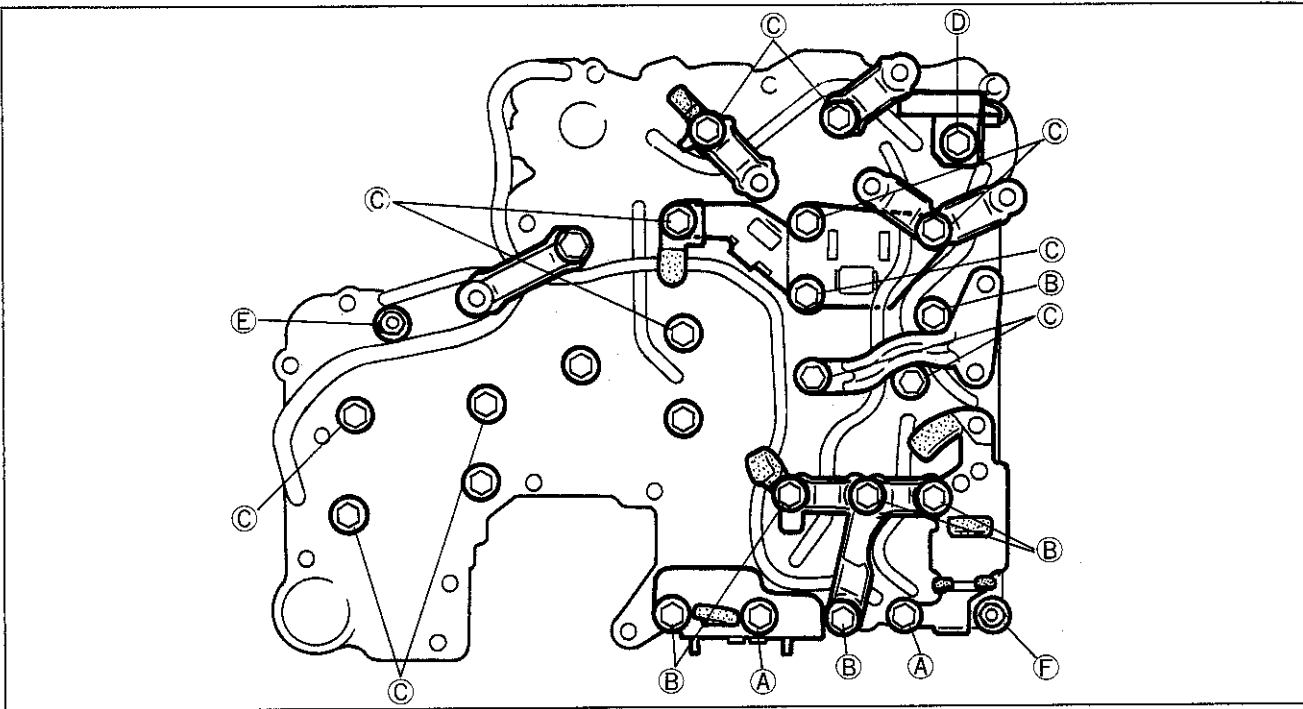
9MU0K1-344

Bracket installation positions


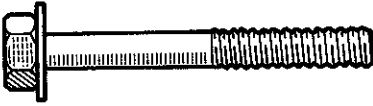



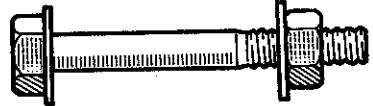



9MU0K1-345  
K2-119

### Bolts and nuts installation positions



9MU0K1-346

Identification letter	Bolts and nuts	Length mm (in)	Torque specification N-m (cm-kg, in-lb)
A		65 (2.559)	6.9—8.8 (70—90, 61—78)
B		50 (1.969)	
C		33 (1.299)	
D		27 (1.063)	
E		55 (2.165)	
F		40 (2.559)	
G		40 (2.559)	

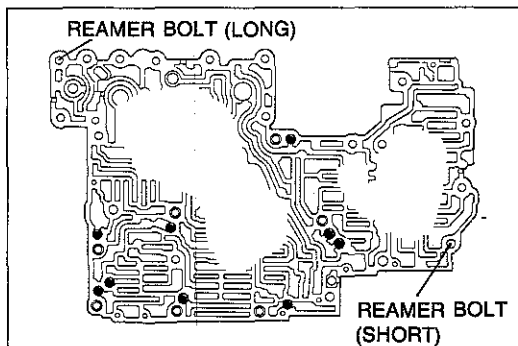
0BU0K2-120

## CONTROL VALVE BODY (ASSEMBLY)

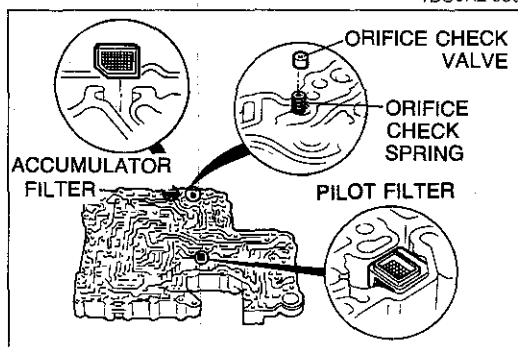
**Caution**

- a) Before assembly, make sure all parts are perfectly clean.
- b) Apply ATF to all parts.  
Do not reuse the gasket or O-ring.

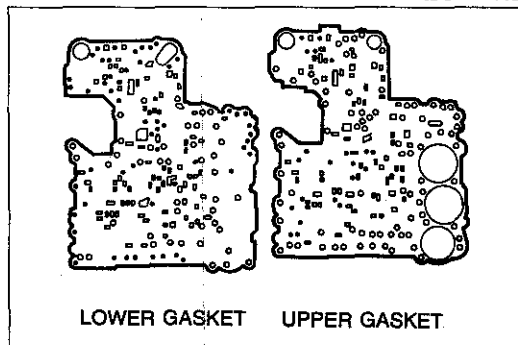
9MU0K1-348



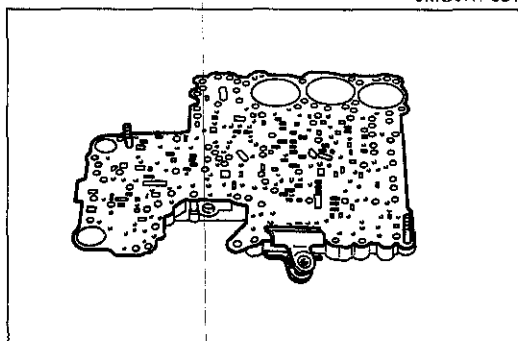
1BU0K2-060



2BU0K2-032



9MU0K1-351

**Procedure**

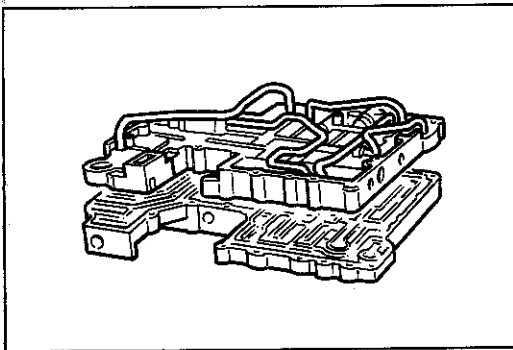
1. Install the steel balls and reamer bolts into their proper positions of the upper valve body.  
(Refer to page K2-121 for installation positions.)

2. Install the pilot filter, accumulator filter, and orifice check valve and spring into their proper positions in the lower valve body.

**Caution**

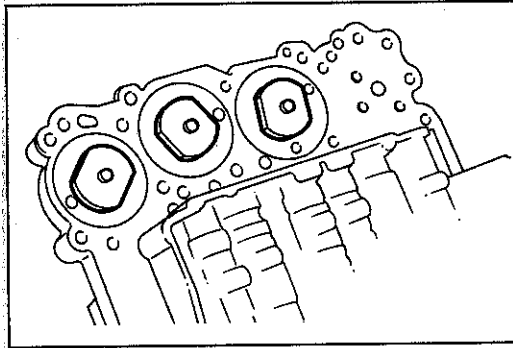
- a) Do not mixup the upper and lower gaskets.
- b) Do not scratch the lower valve body.

3. Install a new gasket and the separate plate onto the lower valve body and hold both them with a large clip.



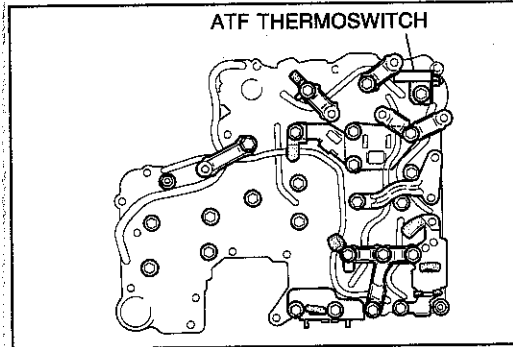
4. Set the lower valve body onto the upper valve body.
5. Remove a holding clip.

9MU0K1-352



6. The support plate locations are as shown.

9MU0K1-353

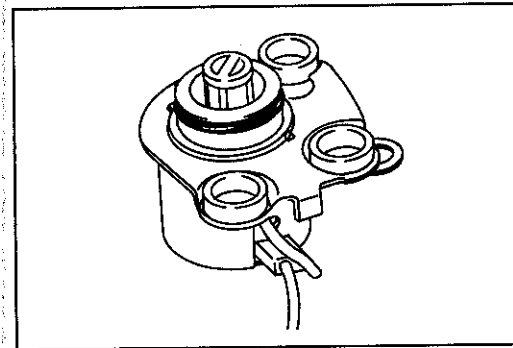


7. Install the bolts, nuts, support plates, ATF thermoswitch, and brackets in their proper positions. (Refer to page K2-122 for installation positions.) Tighten the fasteners evenly and gradually.

**Tightening torque:**

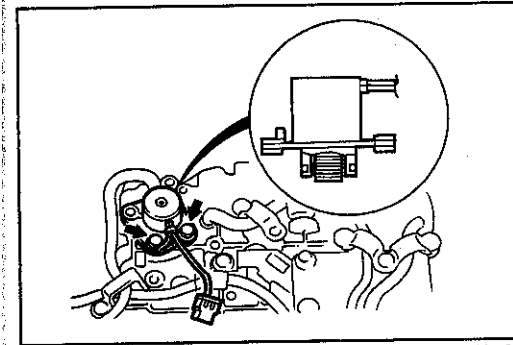
**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**

1BU0K2-061



8. Install a new O-ring onto the lockup solenoid.

9MU0K1-355

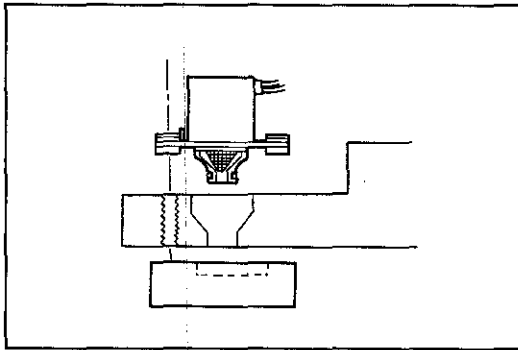


9. Install the lockup solenoid and side plate to the control valve body assembly.

**Tightening torque:**

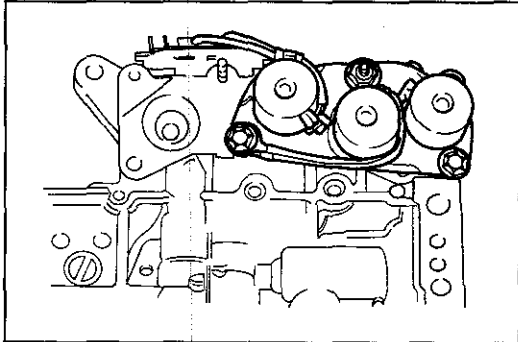
**9.8—13 N·m (1.0—1.3 m·kg, 87—113 in·lb)**

9MU0K1-356



9MU0K1-357

10. The side plate installation are as shown.

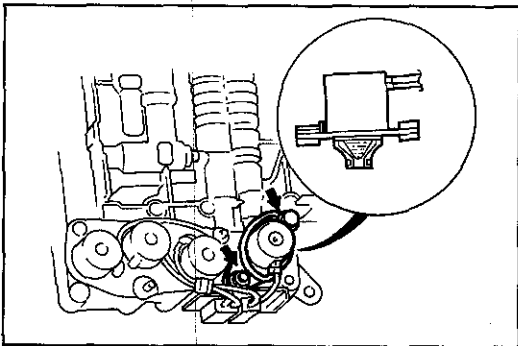


9MU0K1-358

- 11. Install the new O-rings onto the solenoids.
- 12. Install the solenoids into the control valve body assembly.

**Tightening torque:**

**6.9—9.8 N·m (70—100 cm·kg, 61—87 in·lb)**

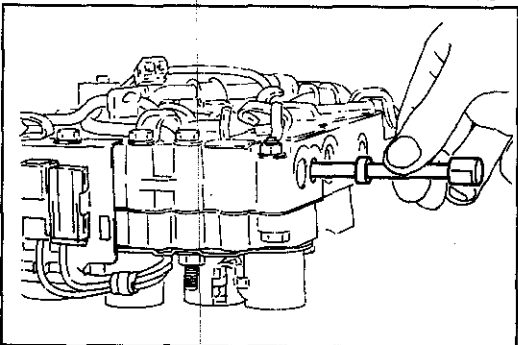


9MU0K1-359

- 13. Install a new O-ring onto the line pressure solenoid.
- 14. Install the line pressure solenoid into the control valve body assembly.

**Tightening torque:**

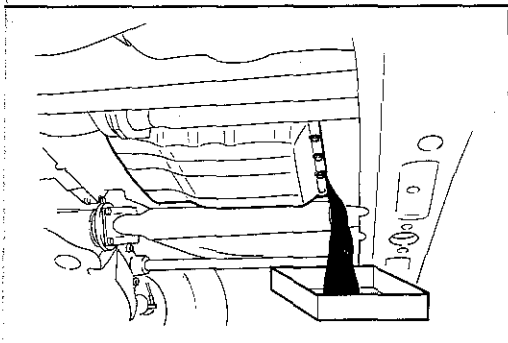
**6.9—9.8 N·m (70—100 cm·kg, 61—87 in·lb)**



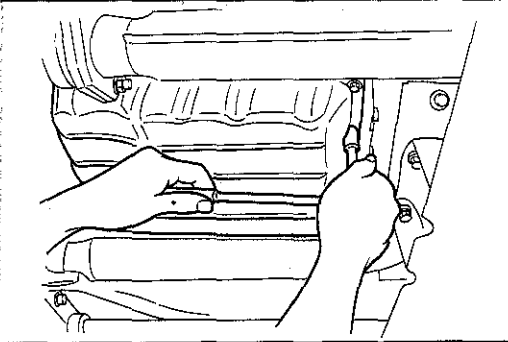
9MU0K1-360

15. Insert the manual valve.

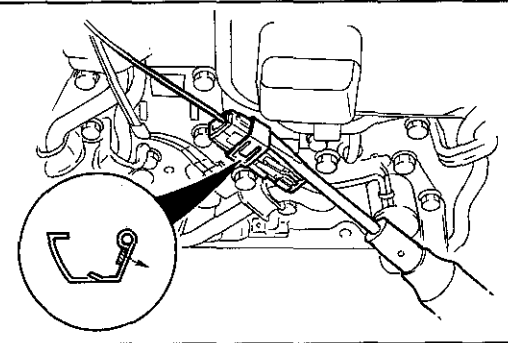




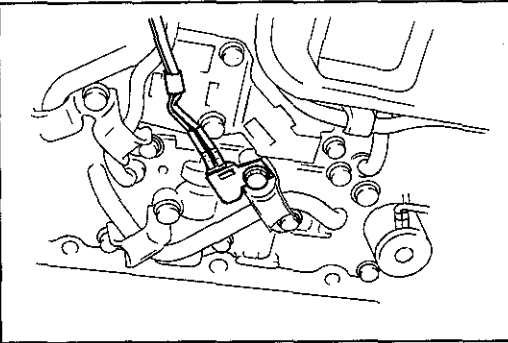
9MU0K1-361



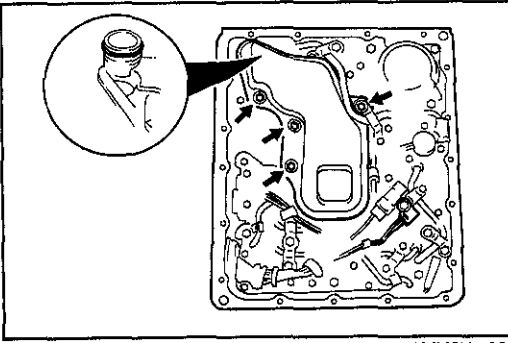
9MU0K1-362



0BU0K2-172



0BU0K2-173



9MU0K1-365

### ON-VEHICLE REMOVAL

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with a safety stand.
3. Loosen the oil pan installation bolts, and drain the ATF into a container.

4. Remove the oil pan and gasket.
5. Remove the magnet from the oil pan.

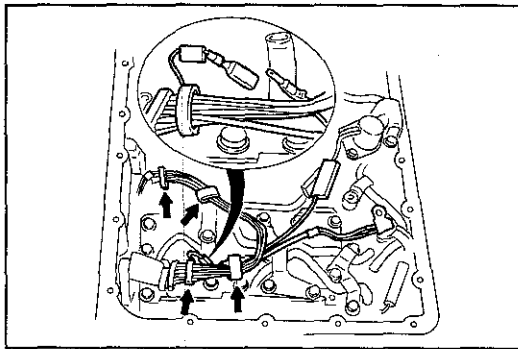
6. Remove the clip.

**Caution**  
Do not damage the harness.

7. Disconnect the lockup solenoid connector.

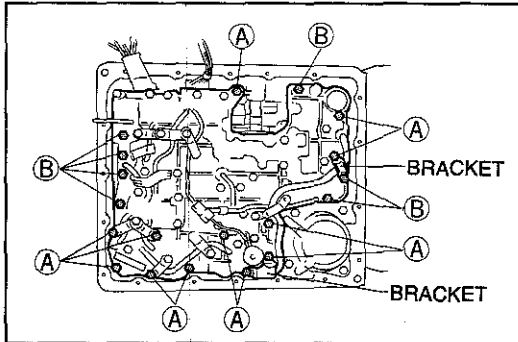
8. Disconnect the ATF thermosensor.

9. Remove the oil strainer.
10. Remove the O-ring from the oil strainer.



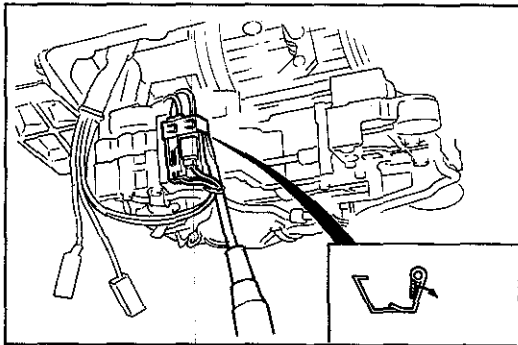
9MU0K1-366

11. Separate the harness of the solenoid connectors from the harness clip.



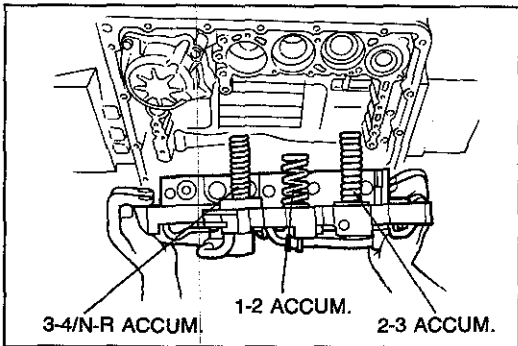
9MU0K1-367

12. Remove the (A) and (B) bolts and bracket shown in the figure.



9MU0K1-368

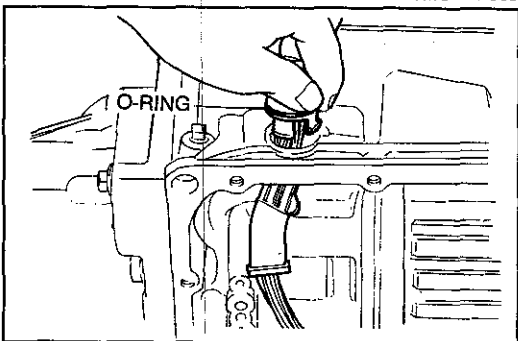
13. Remove the clip.  
14. Separate the solenoid connectors.



9MU0K1-369

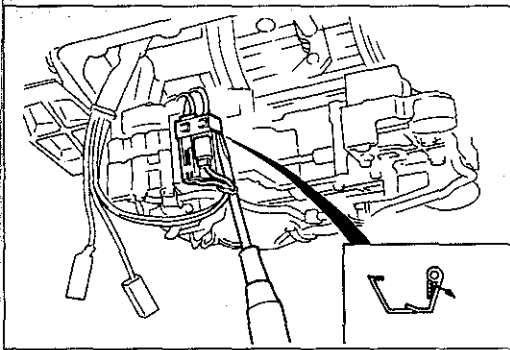
**Caution**  
a) Do not damage the oil pipes.  
b) Do not drop the springs.

15. Remove the control valve body assembly and accumulator springs.

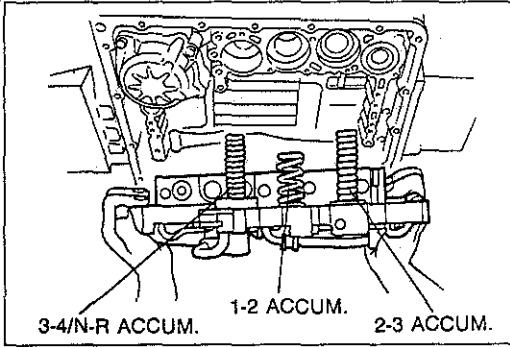


9MU0K1-370

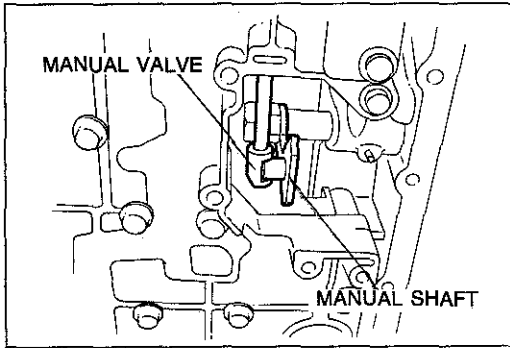
16. If necessary, remove the solenoid connector from the transmission case.



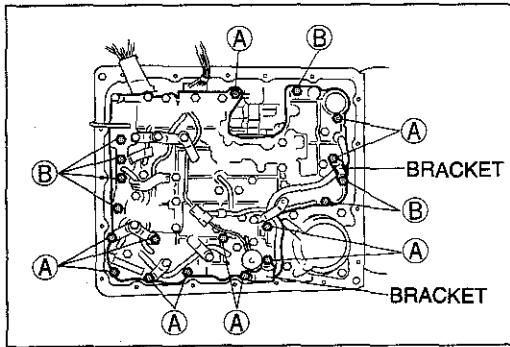
9MU0K1-371



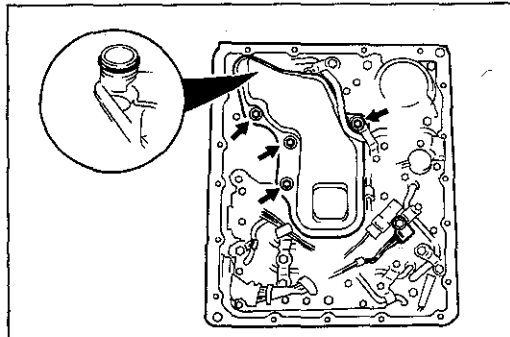
9MU0K1-372



9MU0K1-373



1BU0K2-062



9MU0K1-375

### ON-VEHICLE INSTALLATION

1. Install the solenoid connector into the transmission case if removed.
2. Connect the solenoid connector to the solenoids.
3. Install the clip.

4. Set the accumulator springs into the control valve body as shown.

### Spring specifications

mm (in)

Spring	Item	Outer dia	Free length	No. of coil	Wire dia.
3-4/N-R accumulator piston		17.3 (0.681)	58.4 (2.299)	12.3	2.3 (0.091)
1-2 accumulator piston		29.3 (1.154)	45.0 (1.772)	3.6	4.0 (0.157)
2-3 accumulator piston		20.0 (0.787)	66.0 (2.598)	11.4	3.5 (0.138)

### Note

- a) Verify that the manual valve and manual shaft are assembled correctly.
- b) Verify that the accumulator springs are installed correctly.

5. Set the control valve into the transmission case and secure it.

6. Install the control valve mounting bolts and brackets as shown.

### Bolt length (Measured from below the head)

- A: 33mm (1.299 in)
- B: 45mm (1.772 in)

7. Tighten the bolts in sequence.

### Tightening torque:

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)

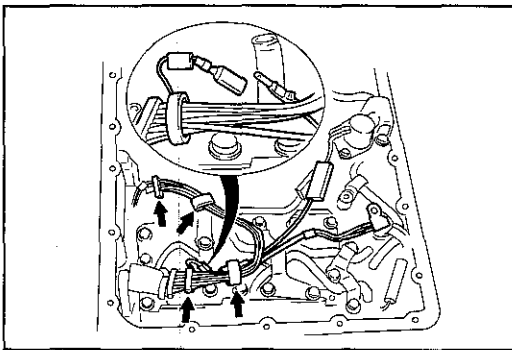
8. Apply ATF to a new O-ring and install it onto the oil strainer.
9. Install the oil strainer.

### Bolt length (Measured from below the head):

50mm (1.969 in)

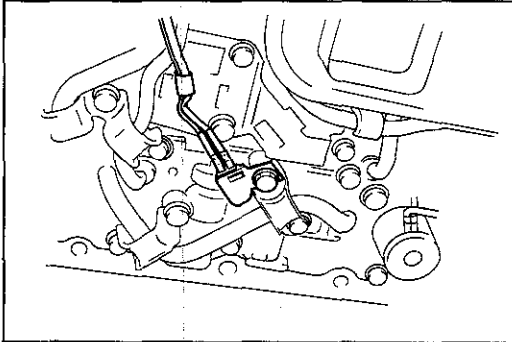
### Tightening torque:

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



9MU0K1-376

10. Mount the harness of the solenoid connectors with the harness clip.



1BU0K2-063

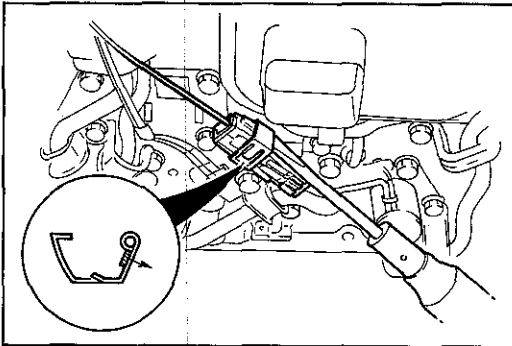
11. Install the ATF thermosensor.

**Tightening torque:**

**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**

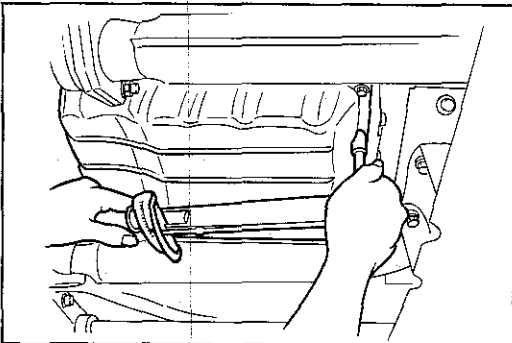
**Bolt length (Measured from below the head):**

**33mm (1.299 in)**



0BU0K2-175

12. Connect the lockup solenoid connector.  
13. Install the clip.

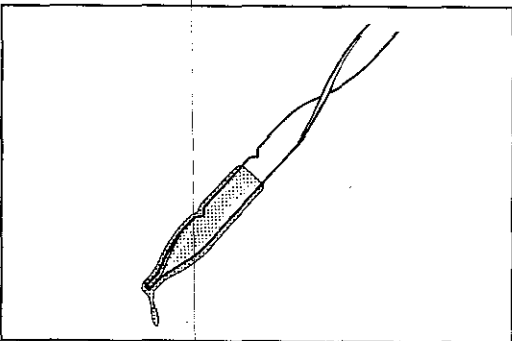


9MU0K1-379

14. Set the magnet into the oil pan.  
15. Install the oil pan along with a new gasket.

**Tightening torque:**

**4.9—7.8 N·m (50—80 cm·kg, 43—69 in·lb)**

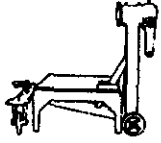
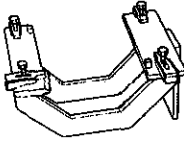
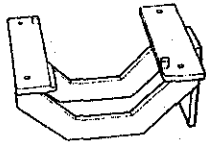
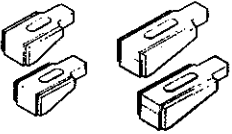


1BU0K2-064

16. Add **approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)** ATF, and check the ATF level. (Refer to page K2-42.)

### TRANSMISSION UNIT (ASSEMBLY)

#### Preparation SST

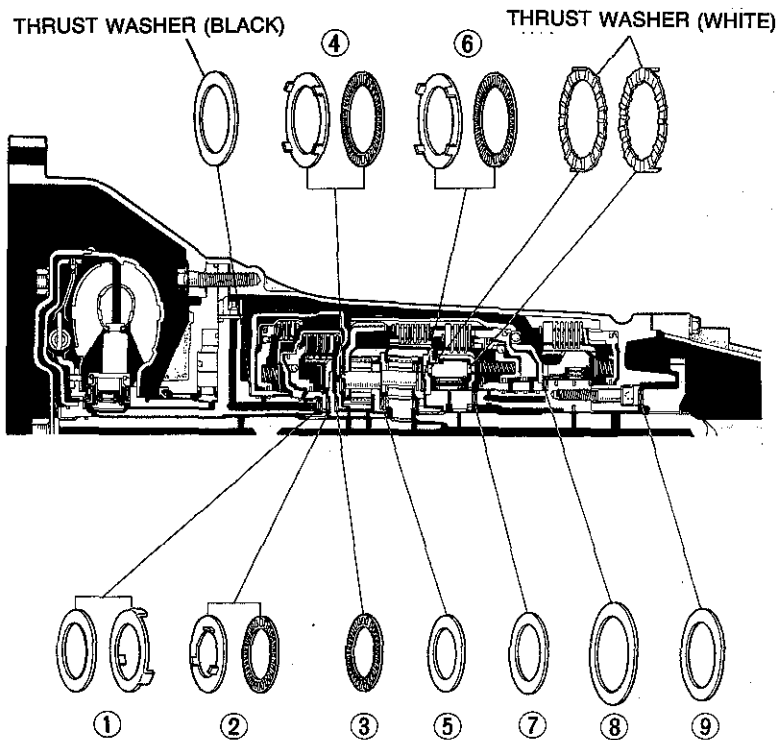
<p>49 0107 680A</p> <p>Engine stand</p> 	<p>49 U019 0A0A</p> <p>Transmission hanger</p> 	<p>49 H075 495B</p> <p>Body (Part of 49 U019 0A0A)</p> 
<p>49 U019 003</p> <p>Holder (Part of 49 U019 0A0A)</p> 		

2BU0K2-033

#### Precaution

1. If the drive plates or brake band is replaced with new ones, soak in ATF for at least 2 hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

#### Thrust washer, bearing, and race locations



9MU0K1-382

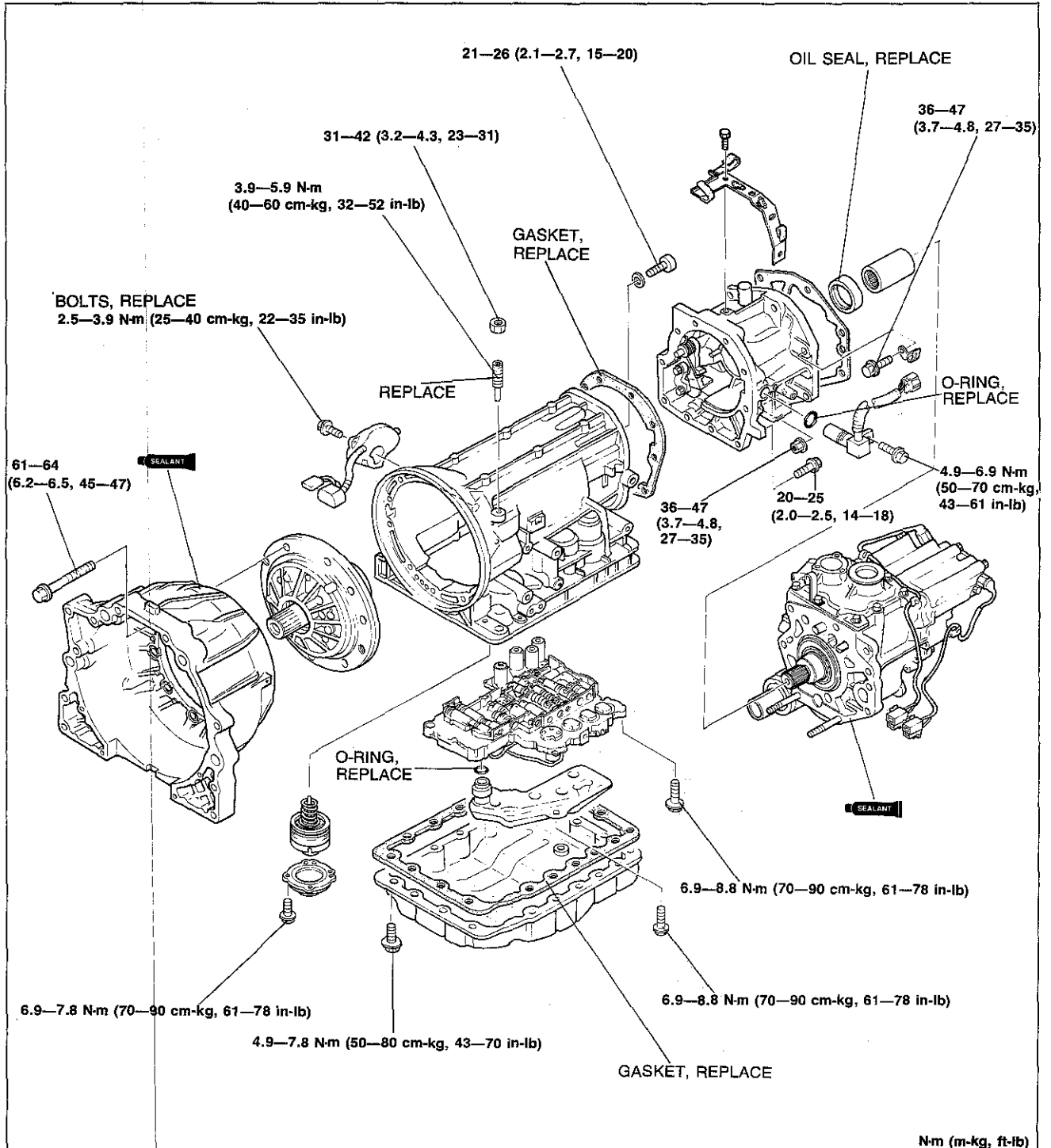
## Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in)	47.0 (1.850)	53.0 (2.087)	53.0 (2.087)	78.0 (3.071)	53.0 (2.087)	78.0 (3.071)
Race	mm (in)	43.5 (1.713)	51.5 (2.028)	—	75.0 (2.953)	—	75.0 (2.953)

		7	8	9
Bearing	mm (in)	59.0 (2.323)	78.1 (3.075)	64.0 (2.520)
Race	mm (in)	—	—	—

9MU0K1-383

## Torque specifications



N-m (m-kg, ft-lb)

9MU0K1-384

Procedure

Caution

Do not damage the seal ring on the low one-way clutch inner race.

1. Install the forward clutch drum while slowly turning it clockwise until its hub passes fully over the clutch inner race.

2. Verify that the forward clutch assembly will turn only clockwise.

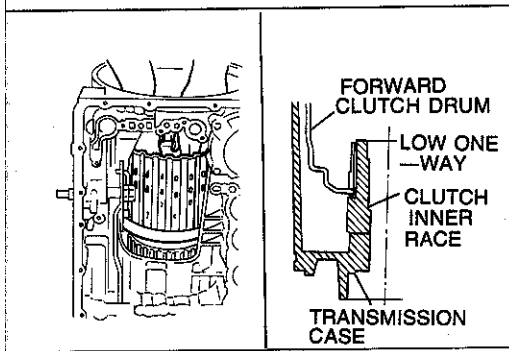
3. Install the rear internal gear, forward clutch hub, and over-running clutch hub in the forward clutch assembly.

4. Measure the height difference between forward clutch retaining plate and top of the forward clutch drum.

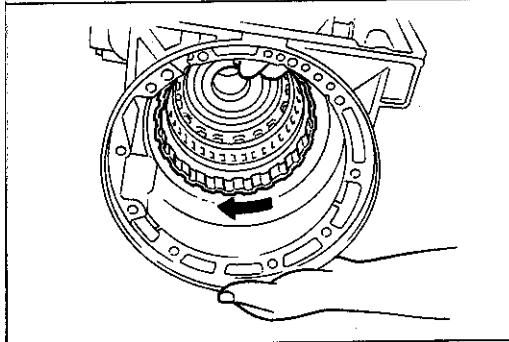
**Height: Approx. 2.0—3.0mm (0.079—0.118 in)**

5. Install the front internal gear and rear planetary carrier into the forward clutch assembly.

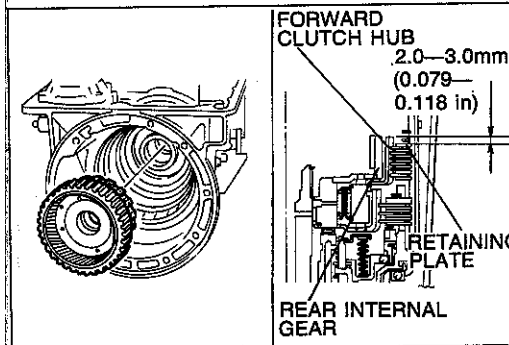
6. Insert the output shaft.



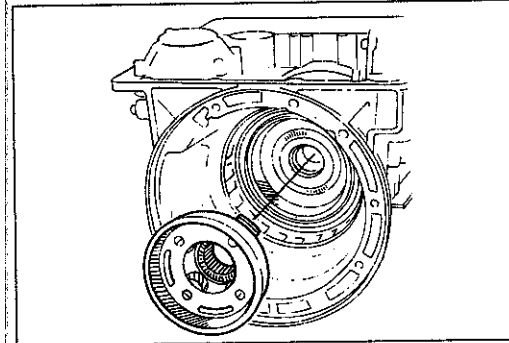
9MU0K1-385



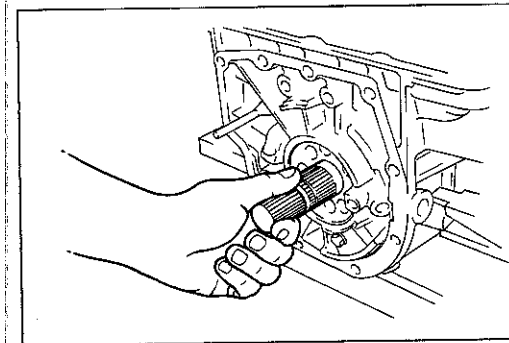
9MU0K1-386



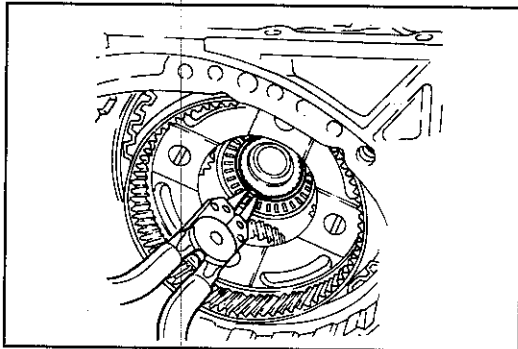
9MU0K1-387



9MU0K1-388

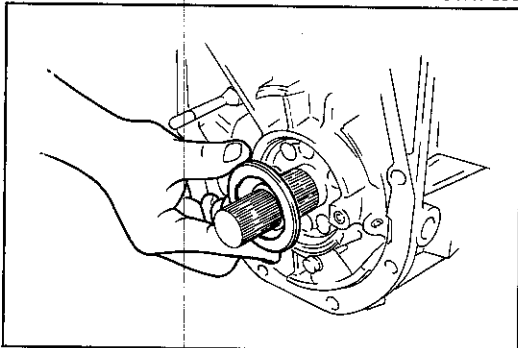


9MU0K1-389



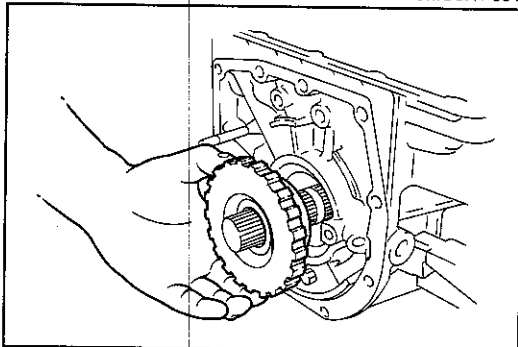
9MU0K1-390

7. Push the output shaft forward slightly, and install a new snap ring on it. Verify that the output shaft will not be removed from the rear.



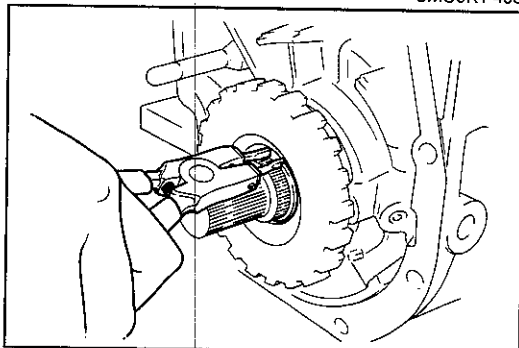
9MU0K1-391

8. Apply petroleum jelly to the bearing and install it to the transmission case with the black surface facing toward the rear.



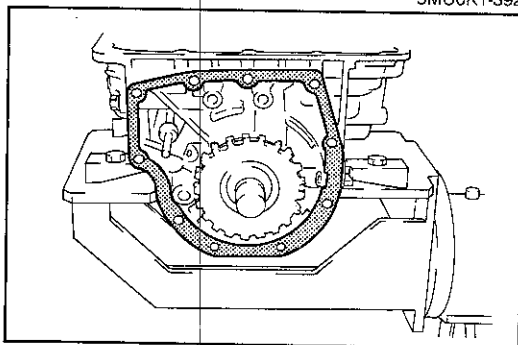
9MU0K1-495

9. Install the parking gear.



9MU0K1-392

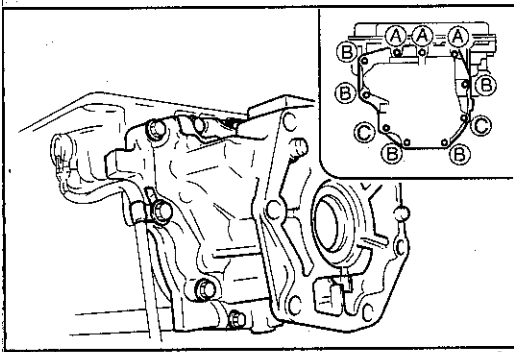
10. Pull the output shaft back slightly, and install a new snap ring on it. Verify that the output shaft will not move forward.



0BU0K2-124

11. Install the new gasket.





2BU0K2-034

12. Install the extension housing.

**Bolt length (Measured from below the head)**

- Ⓐ: 30mm (1.181 in)
- Ⓑ: 45mm (1.772 in)
- Ⓒ: 50mm (1.969 in)

**Tightening torque:**

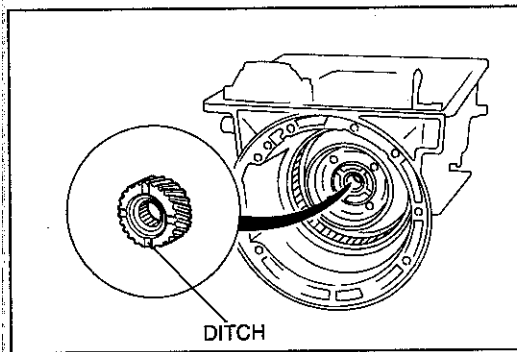
20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

13. Install the O-ring onto the speedometer driven gear.

14. Install the speedometer driven gear into the extension housing.

**Tightening torque:**

4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)

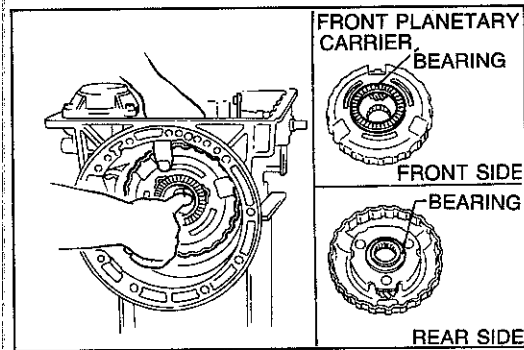


0BU0K2-126

**Caution**

**Be sure the oil grooves of the rear sun gear face forward as shown.**

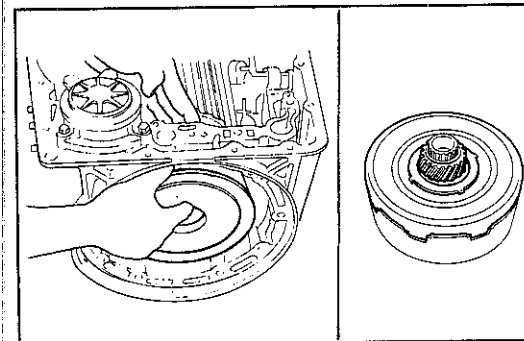
15. Install the rear sun gear into the front internal gear.



0BU0K2-127

16. Check that the bearing, and bearing race are installed correctly.

17. While rotating the forward clutch drum clockwise, install the front planetary carrier into the forward clutch assembly.



0BU0K2-128

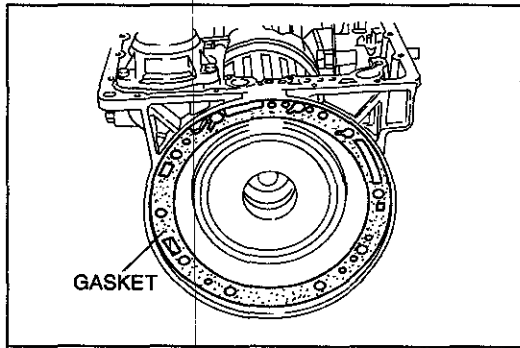
18. The reverse clutch, high clutch, and front sun gear. Install into the transmission case as an assembly.

**Caution**

**When any parts listed in the following table is replaced, total end play or reverse clutch end play must be adjusted.**

Part name	Item	Total end play	Reverse end play
Transmission case		○	○
Low one-way clutch inner race		○	○
Overrunning 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		—	○

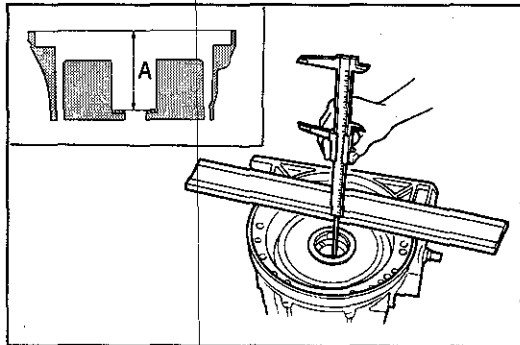
9MU0K1-399



0BU0K2-129

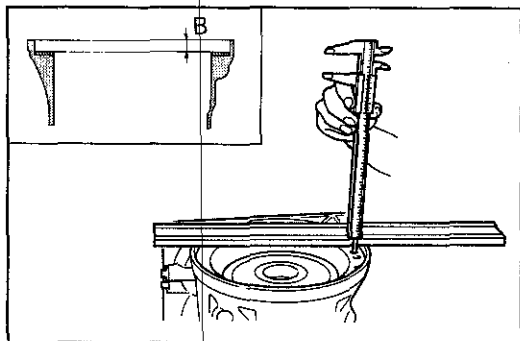
19. Adjust total end play.

(1) Install the oil pump gasket.



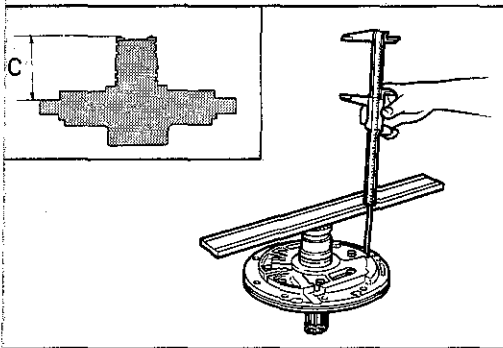
9MU0K1-401

(2) Measure height A with vernier calipers and a straight edge.

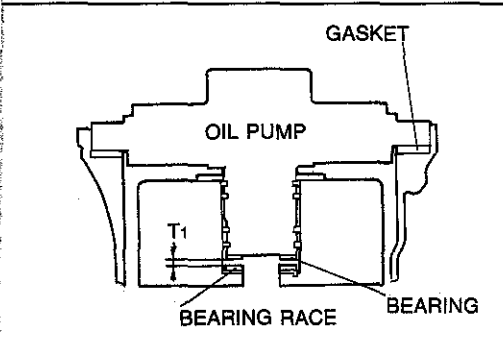


9MU0K1-402

(3) Measure height B with vernier calipers.



9MU0K1-403



9MU0K1-404

- (4) Install the needle bearing on the oil pump.
- (5) Measure height C with vernier calipers and a straight edge.
- (6) Calculate the total end play by using the formula below.

**Formula:  $T1 = A - B - C - 0.1\text{mm (0.0039 in)}$**

- T1 : Oil pump end play  
 A : Distance between bearing race of front side of transmission case and reverse clutch  
 B : Distance between front side of transmission case and oil pump gasket  
 C : Distance between upper surface of needle bearing of oil pump and oil pump gasket contact surface  
 0.1: Amount of compression of new oil pump gasket

**Oil pump end play specification:  
 0.25—0.55mm (0.010—0.022 in)**

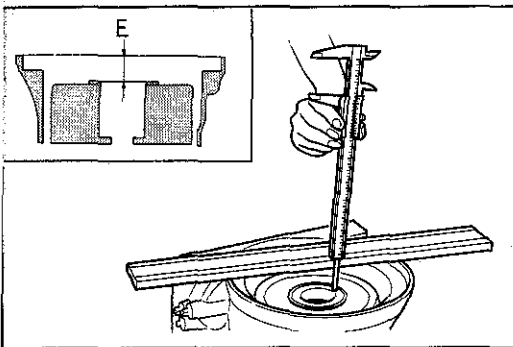
- (7) If the total end play is not within specification, adjust it by selecting and installing the proper bearing race.

### Bearing race size

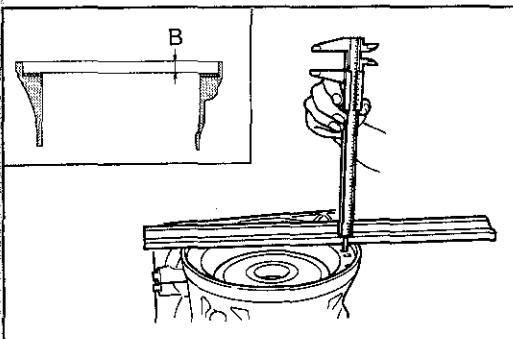
mm (in)

0.8 (0.031)	1.0 (0.039)	1.2 (0.047)	1.4 (0.055)
1.6 (0.063)	1.8 (0.071)	2.0 (0.079)	

9MU0K1-405



9MU0K1-406

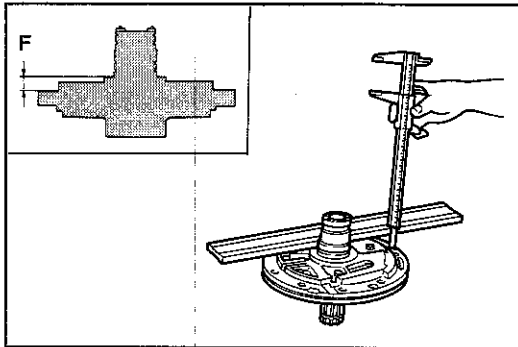


9MU0K1-407

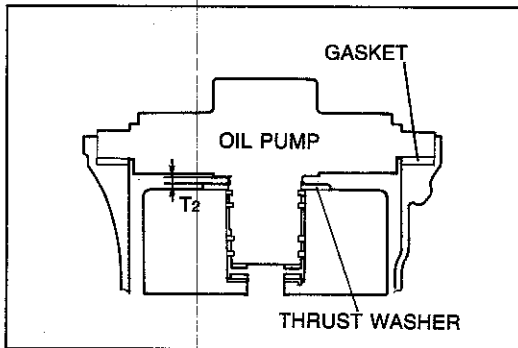
### 20. Adjust reverse clutch end play.

- (1) Install the thrust washer on the reverse clutch.
- (2) Measure height E with vernier calipers and a straight edge.

- (3) Measure height B with vernier calipers and a straight edge.



9MU0K1-408



9MU0K1-409

- (4) Measure height F with vernier calipers and a straight edge.
- (5) Calculate the reverse clutch end play by using the formula below.

**Formula:  $T2 = E - B - F - 0.1\text{mm (0.0039 in)}$**

- T2 : Reverse clutch end play
- B : Distance between front side of transmission case and oil pump gasket
- E : Distance between thrust washers of front side of transmission case and reverse clutch
- F : Distance between reverse clutch thrust washer contact surface of oil pump and oil pump gasket contact surface
- 0.1: Amount of compression of new oil pump gasket

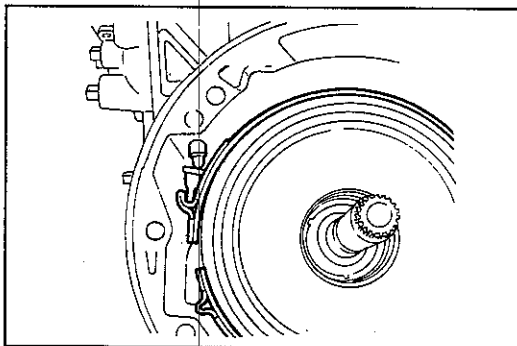
**Reverse clutch end play specification:  
0.55—0.90mm (0.022—0.035 in)**

- (6) If the reverse clutch end play is not within specification, adjust it by selecting and installing the proper reverse clutch thrust washer.

**Thrust washer size**

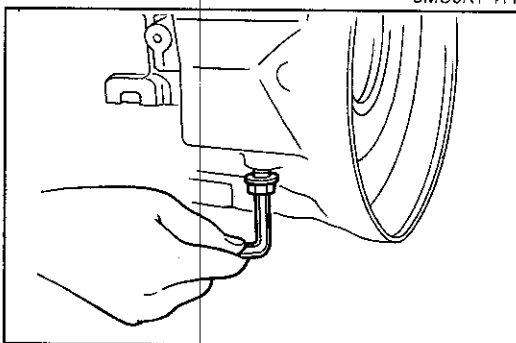
				mm (in)
0.7 (0.028)	0.9 (0.035)	1.1 (0.043)	1.3 (0.051)	
1.5 (0.059)	1.7 (0.067)	1.9 (0.075)		

9MU0K1-410



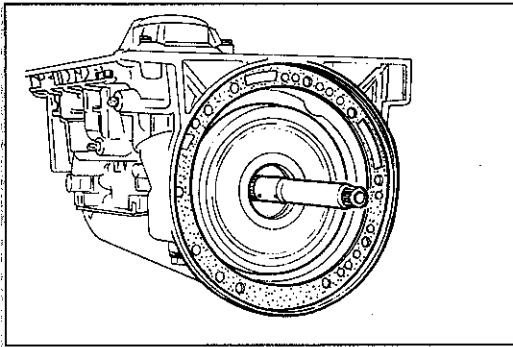
9MU0K1-411

21. Apply ATF to the brake band and band strut, and install them into the transmission.



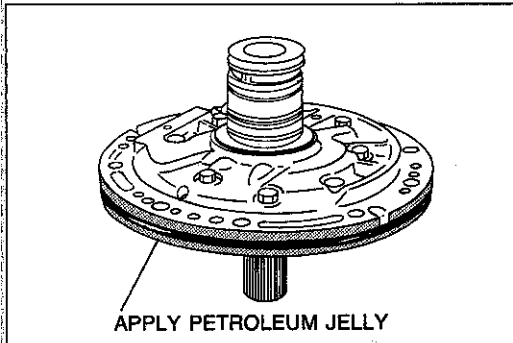
9MU0K1-412

22. Install a new anchor end bolt.



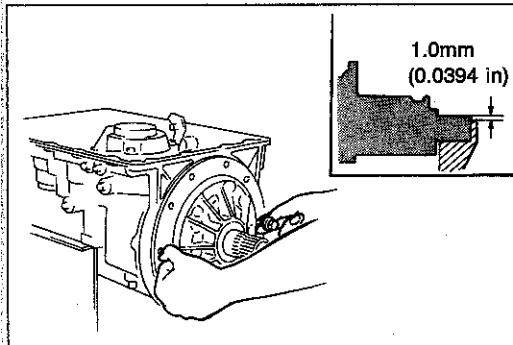
9MU0K1-413

23. Apply ATF to the input shaft, and install it into the transmission case.



9MU0K1-414

24. Apply petroleum jelly to the oil pump assembly as shown.

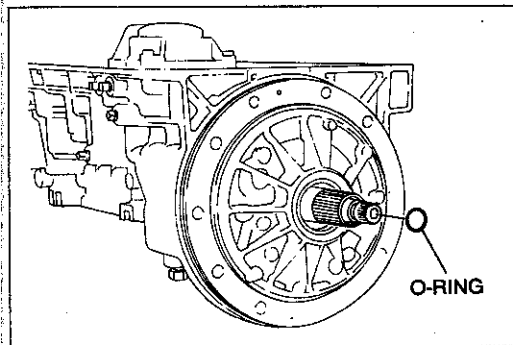


9MU0K1-415

**Caution**  
a) Do not damage the seal rings or O-ring.  
b) Do not use a hammer, plastic or any other kind to install the oil pump.

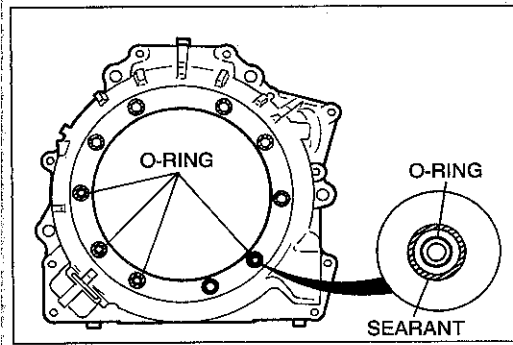
25. Turn the transmission as shown. Install the oil pump assembly into the transmission case by using two converter housing bolts as a guide. Measure the height difference between top of the transmission case and oil pump as shown.

**Height: Approx. 1.0mm (0.039 in)**



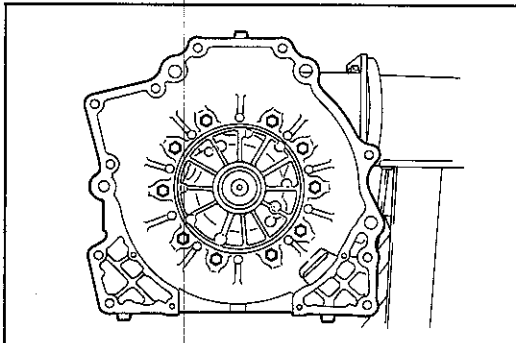
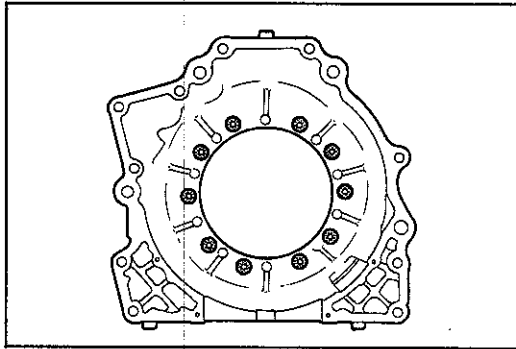
9MU0K1-416

26. Apply ATF to a new O-ring, and install it onto the input shaft.



9MU0K1-417

27. Apply ATF to the new O-rings, and install them into the converter housing, as shown.  
28. Apply sealant lightly, as shown.

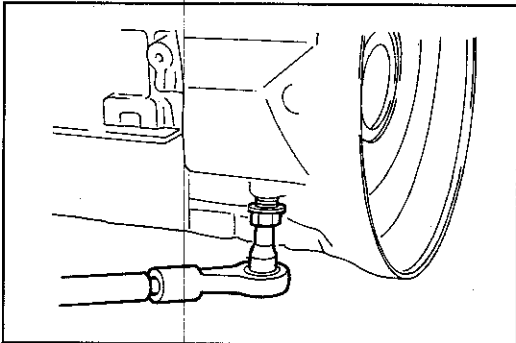


9MU0K1-418

29. Remove the converter housing bolts used as guide.  
 30. Install the converter housing onto the transmission case, and tighten the bolts evenly in a crisscross pattern.

**Tightening torque:**

**61—64 N·m (6.2—6.5 m·kg, 45—47 ft·lb)**



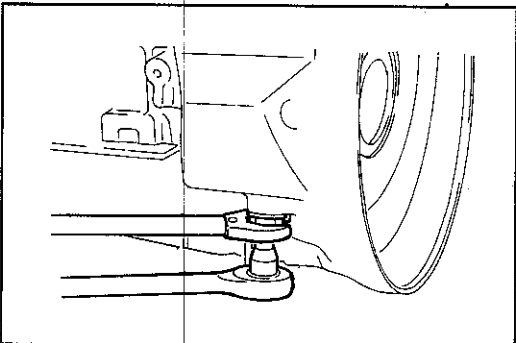
9MU0K1-419

31. Adjust the brake band.

(1) Tighten the anchor end bolt with the hex wrench.

**Tightening torque:**

**3.9—5.9 N·m (40—60 cm·kg, 35—52 in·lb)**



9MU0K1-420

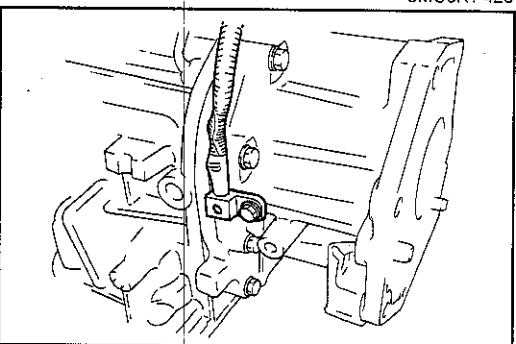
(2) Loosen the anchor end bolt **2.5** turns.

(3) Install the locknut.

(4) Hold the anchor end bolt with the hex wrench and tighten the locknut.

**Tightening torque:**

**31—42 N·m (3.2—4.3 m·kg, 23—31 ft·lb)**



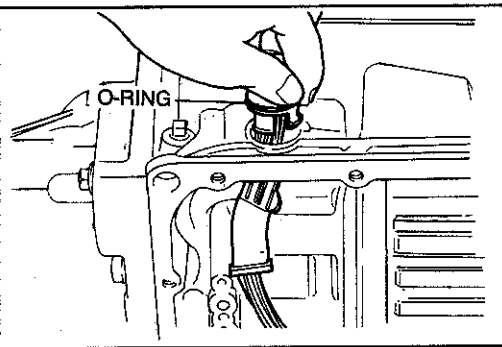
9MU0K1-421

32. Apply ATF to a new O-ring, and install it onto the speed sensor 1.

33. Mount the speed sensor 1 into the extension housing.

**Tightening torque:**

**4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**



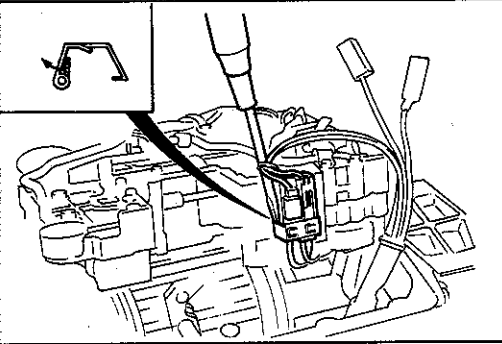
9MU0K1-422

34. Apply ATF to a new O-ring, and install it onto the solenoid connector.

**Caution**

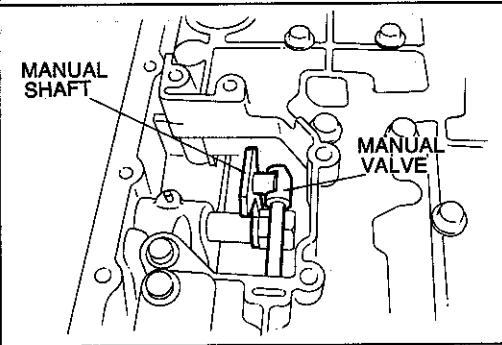
**Do not damage the solenoid connector.**

35. Install the solenoid connector into the transmission case.



9MU0K1-423

36. Connect the solenoid connector to the solenoids.  
37. Install the clip.



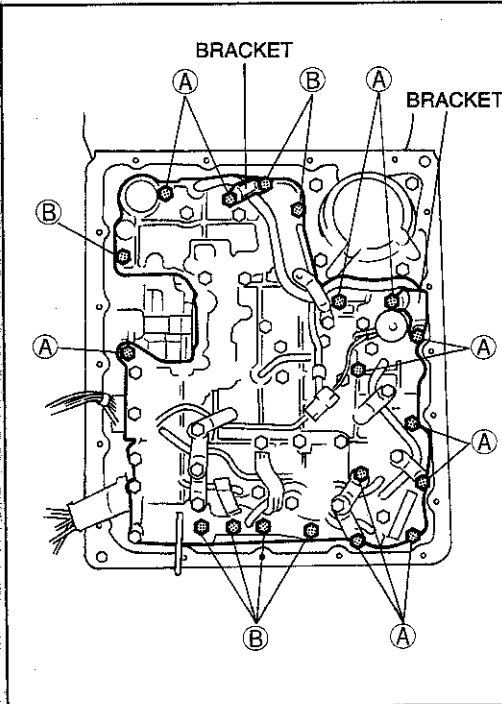
0BU0K2-176

**Note**

a) Verify that the manual valve and manual shaft are assembled correctly.

b) Verify that the accumulator springs are installed correctly.

38. Install the valve body assembly, and tighten bolts (A) and (B) evenly.



1BU0K2-067

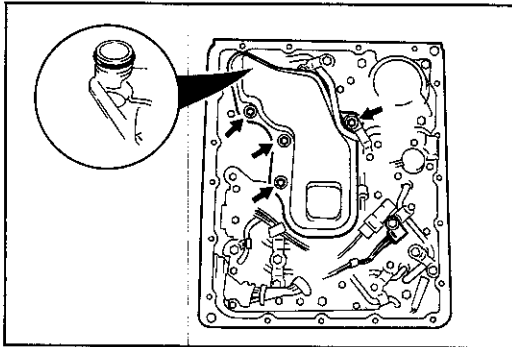
**Bolt length (Measured from below the head)**

(A): 33mm (1.299 in)

(B): 45mm (1.772 in)

**Tightening torque:**

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)

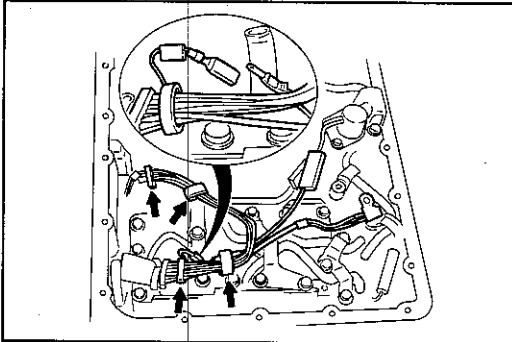


0BU0K2-177

- 39. Apply ATF to a new O-ring, and install it onto the oil strainer.
- 40. Install the oil strainer.

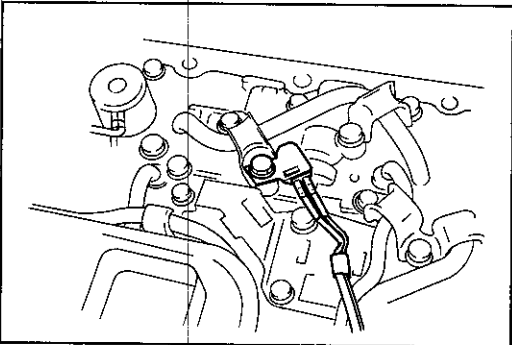
**Bolt length (Measured from below the head):**  
**50mm (1.969 in)**

**Tightening torque:**  
**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



9MU0K1-426

- 41. Mount the solenoid harness with the clips.

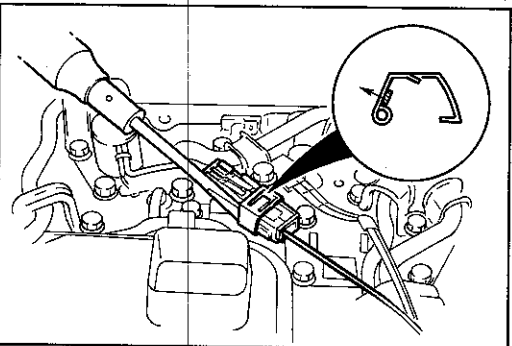


1BU0K2-068

- 42. Install the ATF thermosensor as shown in the figure.

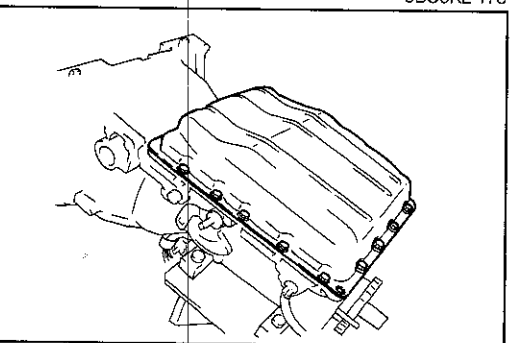
**Bolt length (Measured from below the head):**  
**45mm (1.772 in)**

**Tightening torque:**  
**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



0BU0K2-178

- 43. Connect the lockup solenoid connector.
- 44. Install the clip.

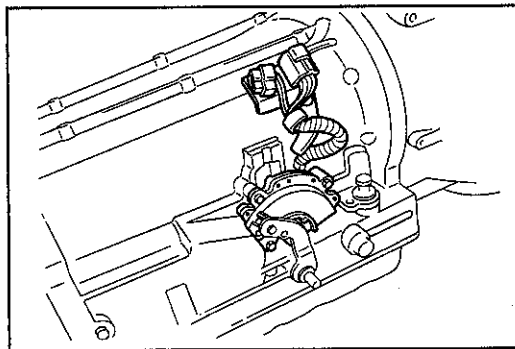


9MU0K1-429

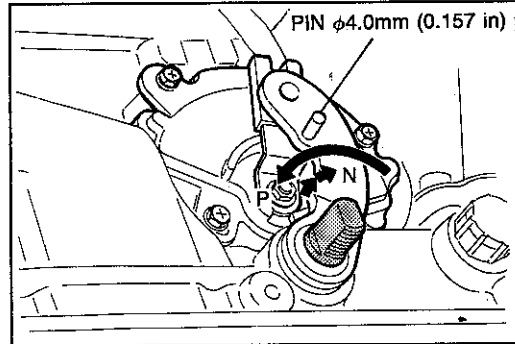
- 45. Set the magnet into the oil pan.
- 46. Install the oil pan along with the new gasket.

**Tightening torque:**  
**4.9—7.8 N·m (50—80 cm·kg, 43—70 in·lb)**

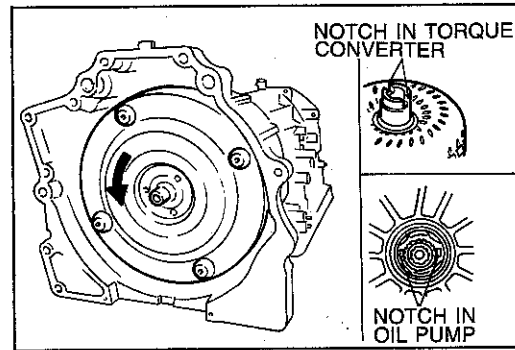




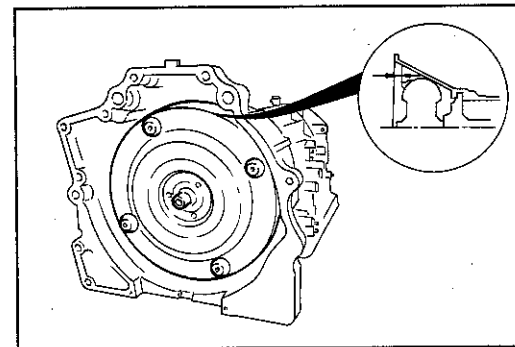
9MU0K1-430



2BU0K2-035



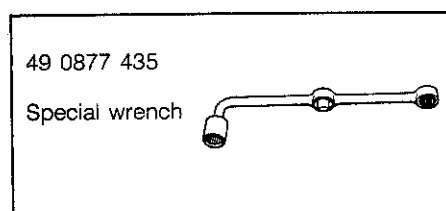
9MU0K1-432



1BU0K2-070

### TRANSMISSION UNIT (INSTALLATION)

#### Preparation SST



2BU0K2-036

47. Install the inhibitor switch.  
(1) Install the bracket.

#### Tightening torque:

**7.8—12 N·m (80—120 cm·kg, 69—104 in·lb)**

- (2) Verify that the manual shaft is positioned at the L position (fully forward).  
(3) Install the inhibitor switch over the manual shaft.

- (4) Turn the manual shaft fully rearward, then return it two (2) notches (N range position).  
(5) Insert a **4.0mm (0.157 in)** pin through the holes of the inhibitor switch and the manual shaft lever.  
(6) Tighten the new inhibitor switch retaining bolts.

#### Tightening torque:

**2.5—3.9 N·m (25—40 cm·kg, 22—35 in·lb)**

- (7) Remove the pin.

48. Stand the torque converter upright, and fill it with ATF.

#### Note

- a) Approximately 2 liters (2.1 US qt, 1.8 Imp qt) of ATF are required for a new torque converter.  
b) When reusing previous torque converter, add the same amount of ATF as was drained.

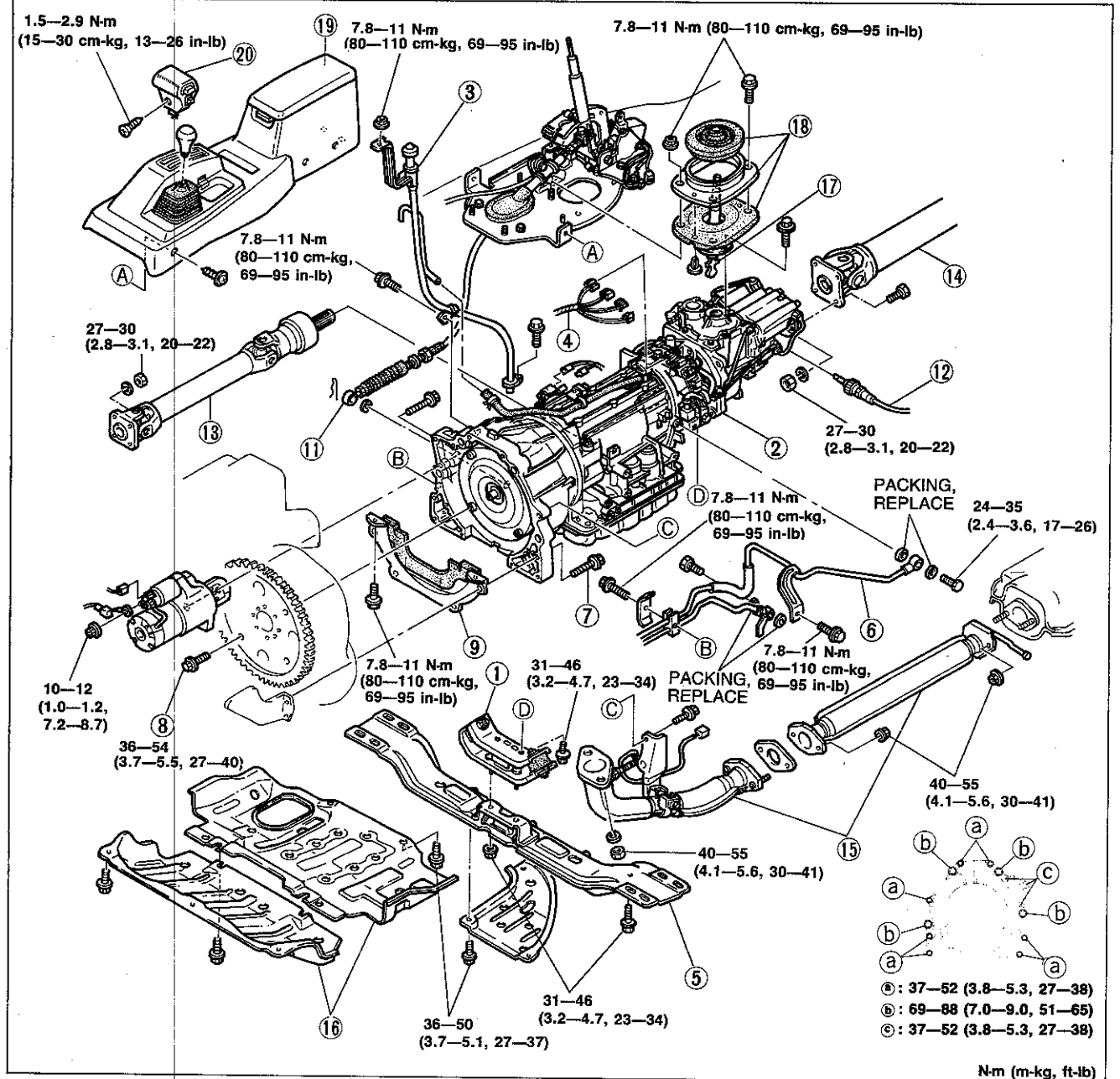
49. Install the torque converter into the transmission.

50. Measure the installation depth of the torque converter with vernier calipers and a straight edge.

**Specification: 36.0mm (1.417 in)**

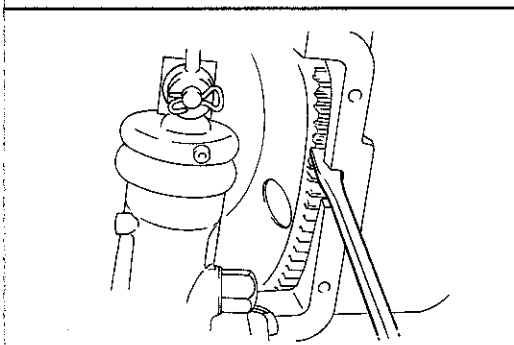
51. Install the transfer case. (Refer to Section J3.)

1. Raise the vehicle and support it with safety stands.
2. Install in the order shown in the figure, referring to **Installation Note**.
3. Fill the transmission with the specified amount of the ATF after installation.
4. Warm up the engine and transmission, and inspect for oil leakage and transmission operation.

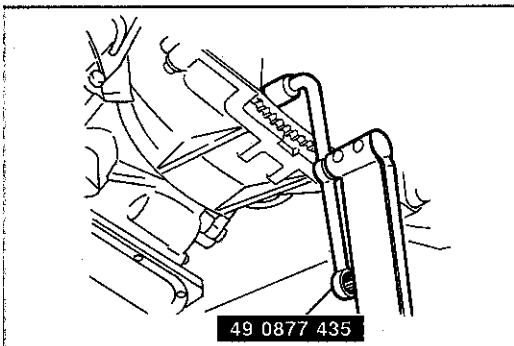


2BU0K2-037

- |                                       |                              |
|---------------------------------------|------------------------------|
| 1. Transmission mount                 | 12. Speedometer cable        |
| 2. Automatic transmission             | 13. Front propeller shaft    |
| 3. Oil level gauge and pipe           | Service..... Section L       |
| 4. Connectors                         | 14. Rear propeller shaft     |
| 5. Cross member                       | Service..... Section L       |
| 6. Oil pipe connector and bracket     | 15. Exhaust pipe             |
| 7. Transmission installation bolt     | 16. Under cover              |
| 8. Torque converter installation bolt | 17. 4x4 shift lever          |
| Installation Note..... page K2-144    | 18. Insulator plate and boot |
| 9. Under cover                        | 19. Console box              |
| 10. No.2 cross member                 | 20. Selector knob            |
| 11. Selector cable                    |                              |



0BU0K2-133



0BU0K2-134

### Installation Note

#### Torque converter installation bolts

1. Hold the drive plate with the screwdriver.

2. Loosely and evenly tighten the torque converter installation bolts, then further tighten them to the specified torque with the **SST**.

#### Tightening torque:

**34—49 N·m (3.5—5.0 m·kg, 25—36 ft·lb)**

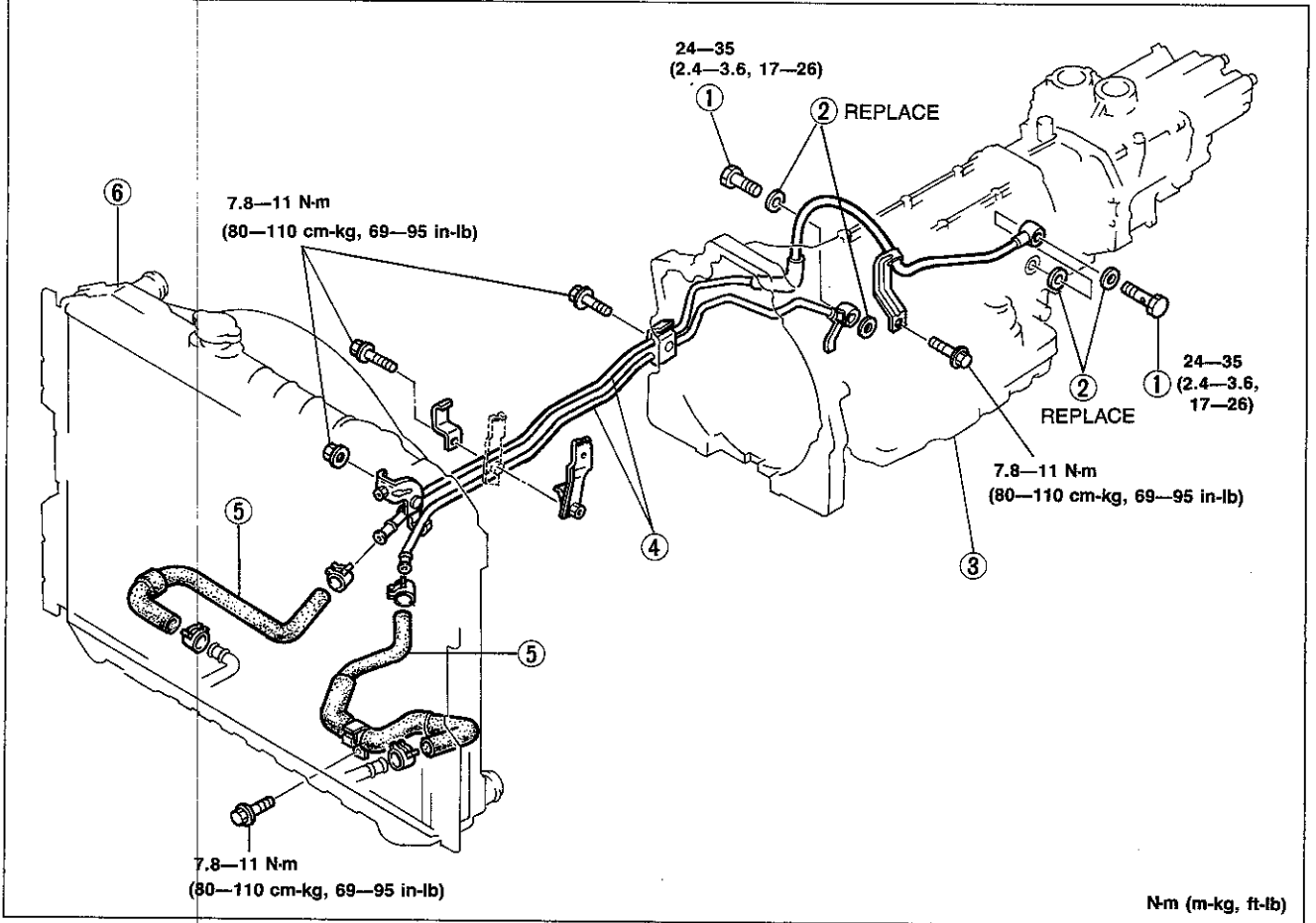
**OIL COOLER**

**Removal, Inspection, and Installation**

Remove in the order shown in the figure.

Inspect all parts and repair or replace as necessary.

Install in the reverse order of removal, referring to **Installation Note**.



1BU0K2-072

- |   |   |
|---|---|
| <p>1. Connector bolts<br/>Inspect for clogging</p> <p>2. Packing</p> <p>3. Transmission<br/>Removal ..... page K2- 45<br/>Installation..... page K2-141</p> | <p>4. Oil pipe<br/>Inspect for damage or cracks<br/>Installation Note..... page K2-143</p> <p>5. Oil hose<br/>Inspect for damage or cracks</p> <p>6. Radiator<br/>Service ..... Section E</p> |
|---|---|

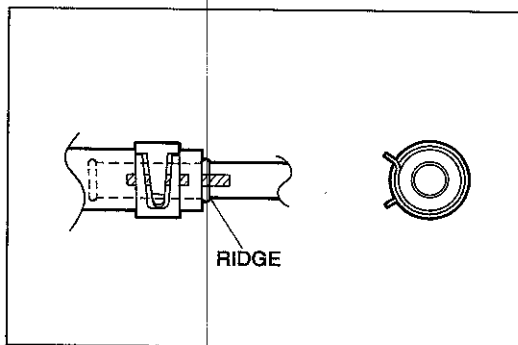
**Installation Note**

**Oil pipe**

**Caution**

**If reuse the hose clamp, position the hose clamp in the original location on the hose. Squeeze the clamp lightly with large pliers to ensure a good fit.**

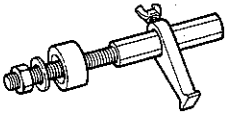
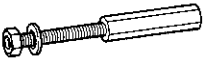


1. Align the marks, and slide the oil cooler hoses onto the oil cooler pipes until it contacts the ridge.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.



2BU0K2-038

### DRIVE PLATE

#### Preparation SST

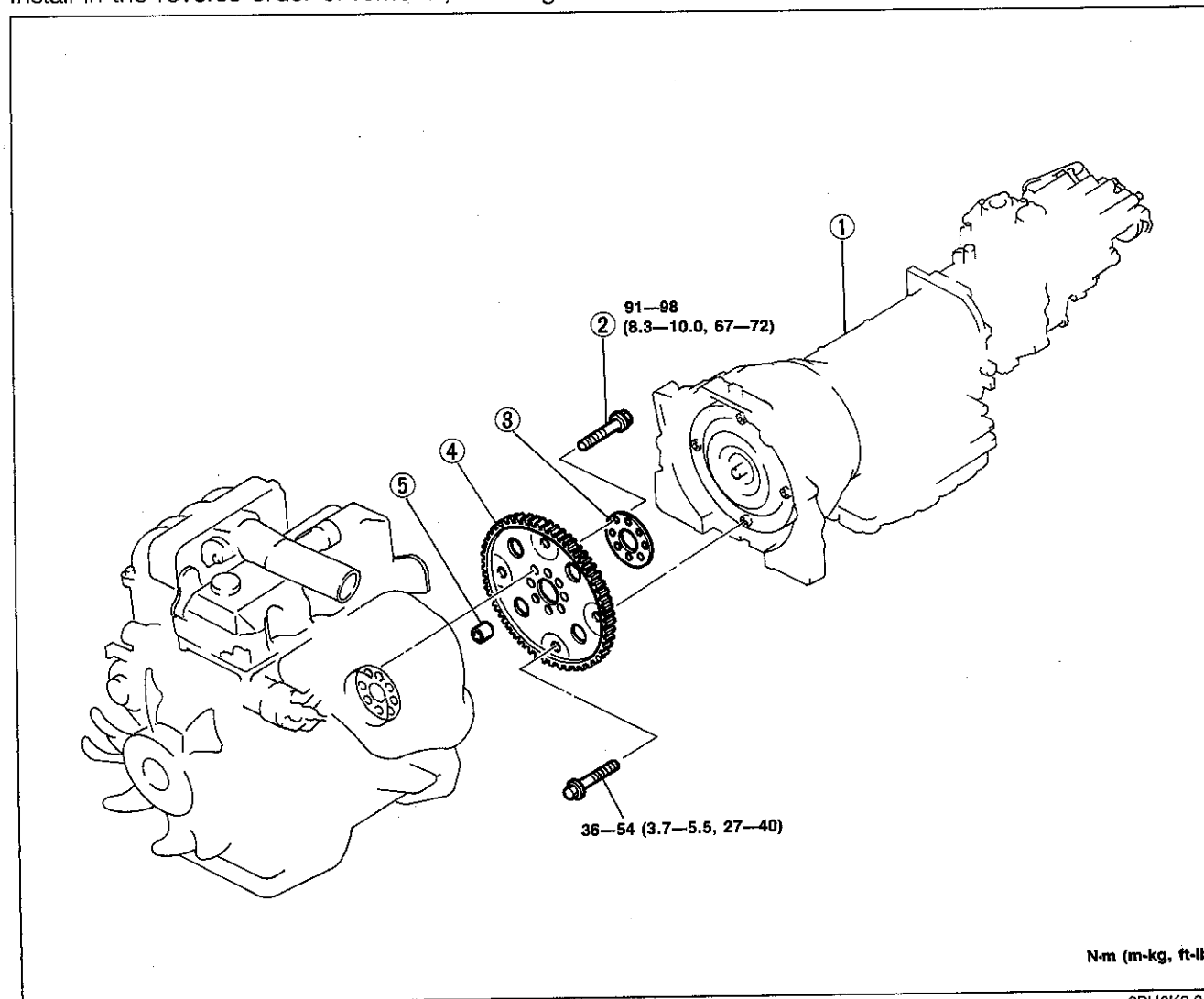
<p>49 E011 1A0</p> <p>Brake set, ring gear</p> 	<p>49 E011 103</p> <p>Shaft (Part of 49 E011 1A0)</p> 	<p>49 E011 104</p> <p>Collar (Part of 49 E011 1A0)</p> 
<p>49 E011 105</p> <p>Stopper (Part of 49 E011 1A0)</p> 	<p>2BU0K2-039</p>	

#### Removal and Inspection and Installation

Remove in the order shown in the figure, referring to **Removal Note**.

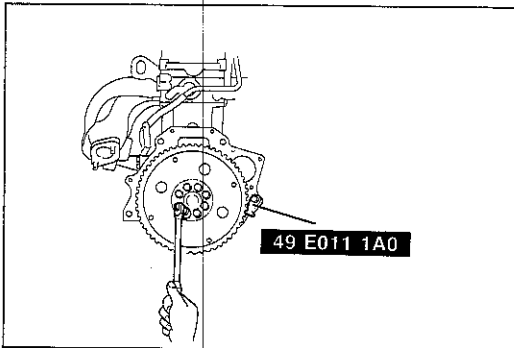
Inspect all parts, and repair or replace as necessary.

Install in the reverse order of removal, referring to **Installation Note**.

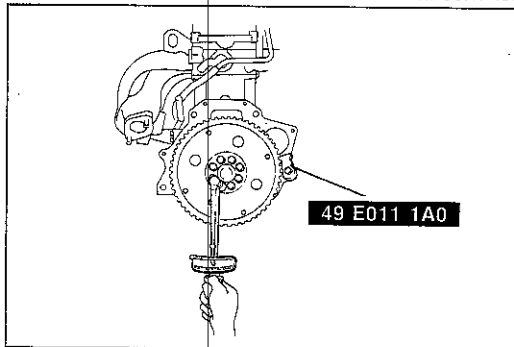


- 1. Transmission
  - Removal ..... page K2- 45
  - Installation ..... page K2-141
- 2. Bolts
  - Removal Note ..... below
  - Installation Note ..... below
- 3. Backing plate
- 4. Drive plate
  - Inspect for cracks and ring gear for wear or damage
- 5. Adapter

2BU0K2-041



9MU0K1-457



1BU0K2-074

### Removal Note Bolts

1. Remove the drive plate using the **SST** or equivalent.

### Installation Note Bolts

1. Assemble the adapter, drive plate and backing plate.
2. Install the **SST** or equivalent and tighten the bolts diagonally and evenly.

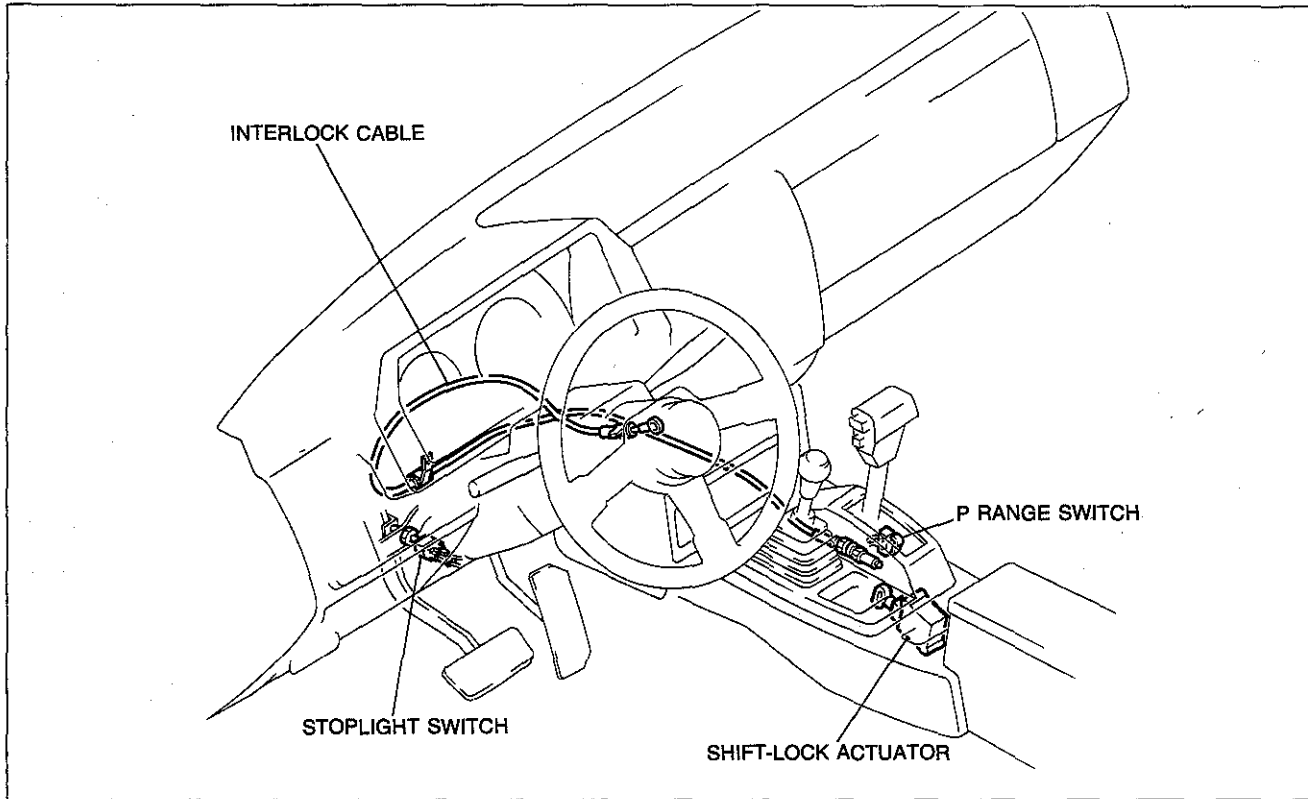
### Tightening torque:

**91—98 N·m (8.3—10.0 m·kg, 67—72 ft·lb)**

3. Install the transmission. (Refer to page K2-141.)

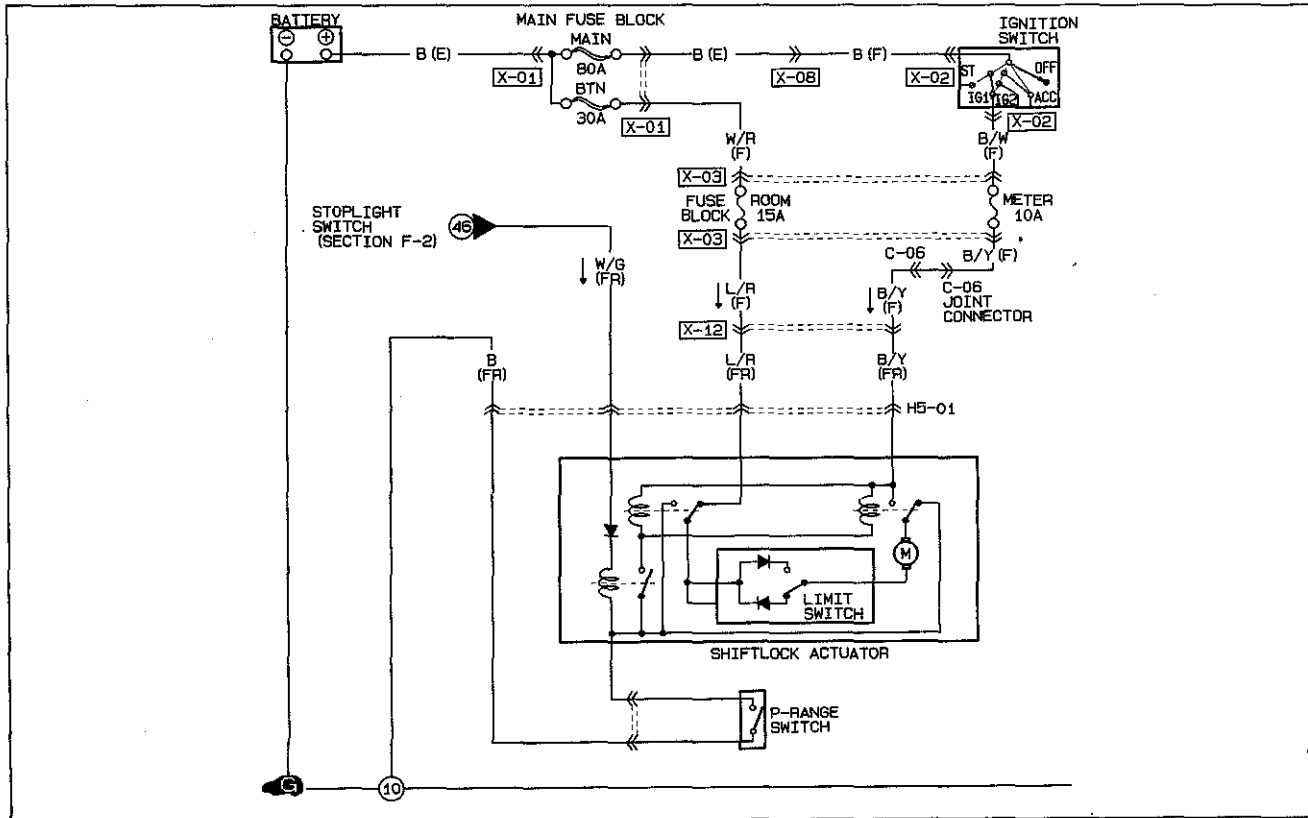
### SHIFT MECHANISM

#### SHIFT-LOCK SYSTEM COMPONENTS



OBUOK2-140

#### TROUBLESHOOTING Circuit Diagram



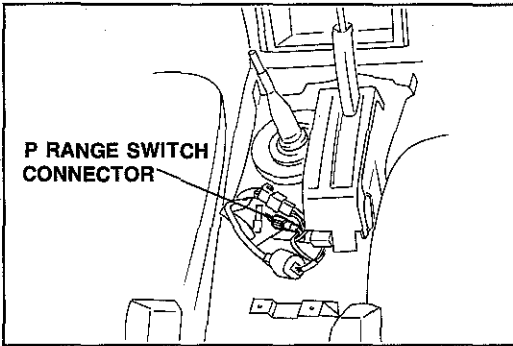
OBUOK2-141

## Diagnosis chart

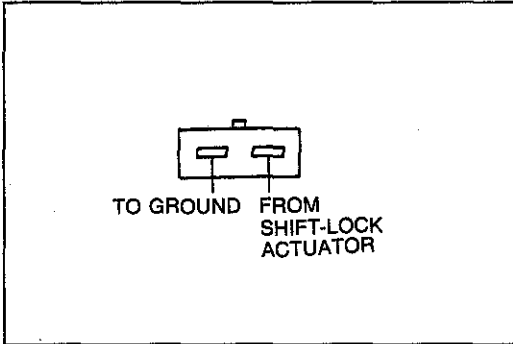
Problem	Possible Cause	Action	Page
<b>Selector lever cannot be moved from P range with brake pedal depressed and ignition switch ON</b>	ROOM 15A fuse not installed or burned	Install or replace	K2-146
	IG <sub>1</sub> system malfunction <ul style="list-style-type: none"> <li>• Wire harness broken</li> <li>• Poor connection</li> <li>• METER 10A fuse burned</li> </ul>	Repair or replace Connect firmly Replace	K2-146 K2-146 K2-146
	Ignition switch malfunction	Inspect and replace	Section T
	Stoplight switch remains OFF	Inspect and replace	Section T
	Stoplight system malfunction <ul style="list-style-type: none"> <li>• Wire harness broken</li> <li>• Poor connection</li> <li>• STOP 15A fuse burned</li> </ul>	Repair or replace Connect firmly Replace	K2-146 K2-146 K2-146
	P range switch remains OFF	Inspect and replace	K2-148
	P range switch system malfunction <ul style="list-style-type: none"> <li>• Wire harness broken (Poor ground)</li> <li>• Poor connection</li> </ul>	Repair or replace Connect firmly	K2-146 K2-146
	Shift-lock actuator malfunction <ul style="list-style-type: none"> <li>• Wire harness broken</li> <li>• Poor connection</li> </ul>	Inspect and replace Repair wiring harness Connect firmly	K2-148 K2-146 K2-146
	Misadjustment of selector lever or improper assembly of shift-lock actuator	Adjust or repair	K2-148
<b>Selector lever can be moved from P range with ignition switch ON, but without brake pedal depressed</b>	ROOM 15A fuse burned	Replace	K2-146
	Stoplight switch remains ON	Inspect and replace	Section T
	Shift-lock actuator malfunction	Inspect and replace	K2-148
	Misadjustment of selector lever or improper assembly of shift-lock actuator	Adjust or repair	K2-148
<b>Selector lever can be moved from P range with ignition switch OFF and brake pedal depressed</b>	ROOM 15A fuse burned	Replace	K2-146
	Ignition switch malfunction	Inspect and repair	Section T
	Shift-lock actuator malfunction	Inspect and replace	K2-148
	Misadjustment of selector lever or improper assembly of shift-lock actuator	Adjust and repair	K2-148
<b>Shift-lock actuator operation heard when brake pedal depressed with ignition switch ON in other than P range</b>	P range switch remains ON	Inspect and replace	K2-148
<b>Selector remains locked with emergency override button operated</b>	Emergency override button not slide fully back	Slide fully back and hold emergency override button, move selector lever	—
	Broken emergency override link	Replace	K2-152
	Misadjustment of indicator panel	Adjust	K2-151
<b>Ignition key can be turned to LOCK position with selector lever in ranges other than P range</b>	Interlock cable <ul style="list-style-type: none"> <li>• Disconnected</li> <li>• Kinked</li> <li>• Stuck</li> <li>• Spring damaged</li> </ul>	Inspect and replace	K2-151,152
	Key cylinder malfunction	Replace	Section N
<b>Ignition key cannot be turned to LOCK position with selector lever in P range</b>	Interlock cable <ul style="list-style-type: none"> <li>• Disconnected</li> <li>• Kinked</li> <li>• Stuck</li> <li>• Spring damaged</li> </ul>	Inspect and replace	K2-151,152
	Key cylinder malfunction	Replace	Section N

2BU0K2-042

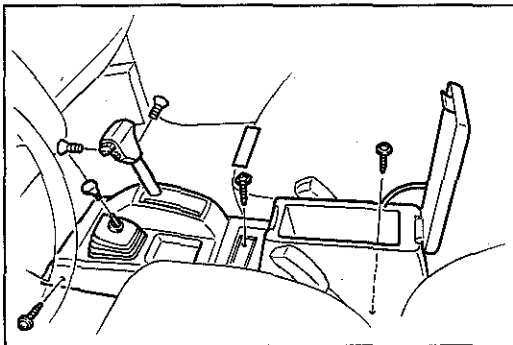




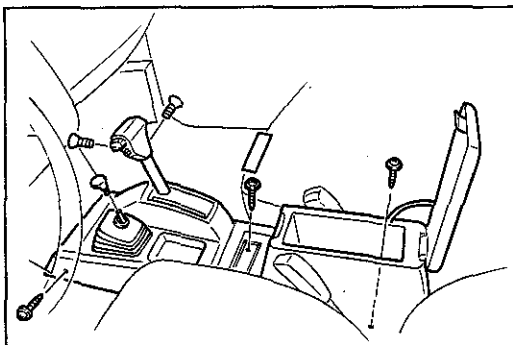
OBU0K2-143



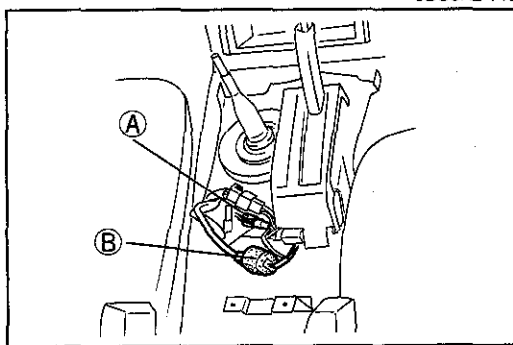
1BU0K2-076



OBU0K2-145



OBU0K2-146



OBU0K2-147

### P RANGE SWITCH

#### Inspection

#### Continuity

1. Disconnect the negative battery cable.
2. Remove the selector knob, and then remove the console.
3. Disconnect the P range switch connector.

4. Check continuity of the terminals.

Range	Selector lever release button	Continuity
P	Released	Yes
	Depressed	No
R, N, D, S, L	—	No

5. If not as specified, replace the P range switch.  
(Refer to page K2-152.)

6. Install the console.
7. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

#### Tightening torque:

**1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)**

8. Connect the negative battery cable.
9. Check for correct operation of the shift-lock system.

### SHIFT-LOCK ACTUATOR

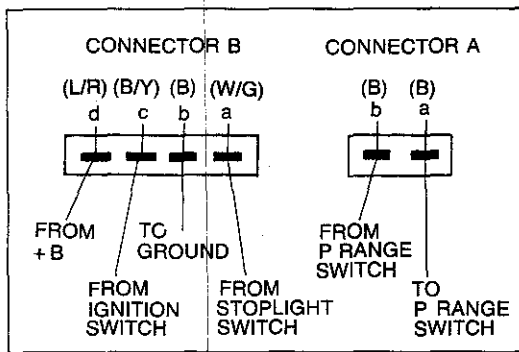
#### Inspection

#### Terminal voltage and continuity

1. Remove the selector knob, and then remove the console.

#### Caution

**Disconnect connector B to check continuity between terminal b (harness side) and a ground.**



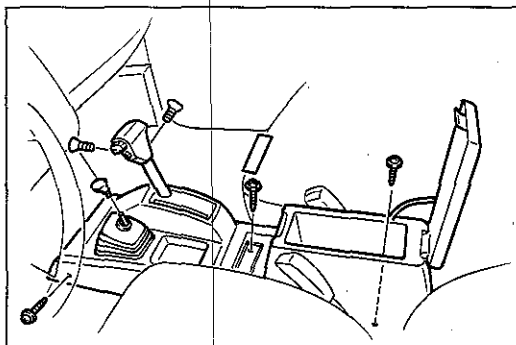
0BU0K2-148

2. Turn the ignition switch ON, and check terminal voltages and continuity, referring to the chart below.
3. If not as specified, repair the wire harness and/or shift-lock actuator.

**V<sub>B</sub>: Battery voltage**

Connector	Terminal	⊖ terminal connected to	Condition	Measurement valve
A	a	B—b	P range, selector lever release button not depressed	0Ω
A	b	B—b	Constant	0Ω
B	a	B—b	Brake pedal released → depressed	0V → V <sub>B</sub>
B	b (harness side)	Body	Constant	0Ω
B	c	B—b	Ignition switch ON	V <sub>B</sub>
B	d	B—b	Ignition switch OFF	V <sub>B</sub>

2BU0K2-043



0BU0K2-149

4. Install the console.
5. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

**Tightening torque:**

**1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)**

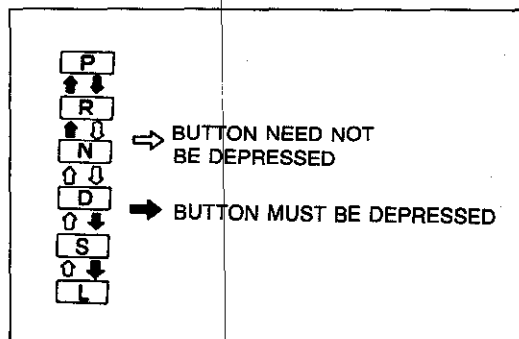
6. Check for correct operation of the shift-lock system.

**SELECTOR LEVER**

**Inspection**

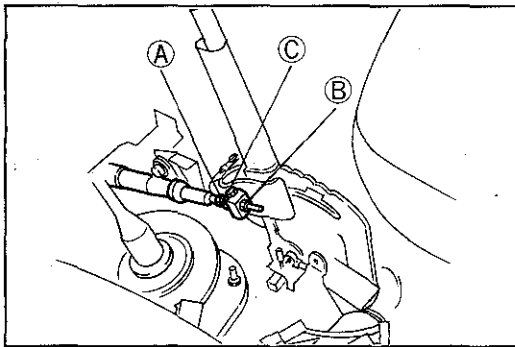
**Caution**

**Shift the selector lever from P range to other ranges with ignition switch ON and brake pedal depressed.**

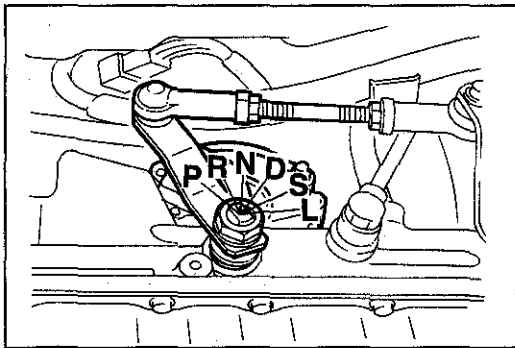


97U0KX-308

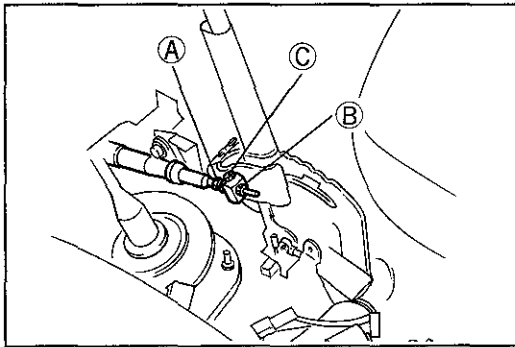
1. Check that the selector lever can only be shifted as shown in the figure.
2. Make sure there is a click at each range when shifted from P → L range.
3. Check that the positions of the selector lever and the indicator are aligned.
4. Check that the button returns smoothly when pushed to shift.



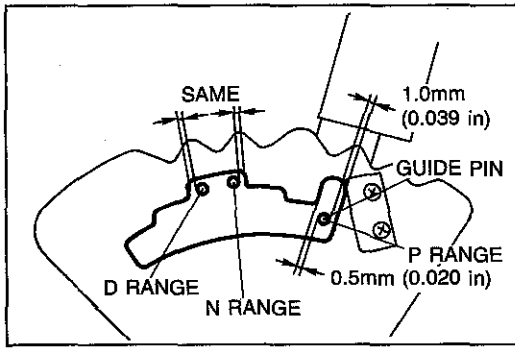
0BU0K2-150



0BU0K2-151



0BU0K2-152



0BU0K2-153

### Adjustment Lever position

1. Disconnect the negative battery cable to deactivate the shift-lock.
2. Remove the selector knob and console.
3. Loosen the locknut (A), (B), and lock bolt (C).

4. Shift the manual shaft to P range position.

5. Push and hold the selector lever forward by using a force of **39—98 N (4—10 kg, 8.8—22 lb)**, tighten the lock bolt (C) to the specified torque.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 67—95 in·lb)**

6. Turn locknut (A) by hand until it just touches the spacer.
7. Tighten the locknut (B) to the specified torque.

#### Tightening torque:

**8—11 N·m (80—110 cm·kg, 67—95 in·lb)**

8. Check the lever so that the clearance between the guide plate and the guide pin in P range with the push rod lightly depressed is as shown.

9. Move the selector lever to N and D ranges and verify that there is the same clearance between the guide plate and guide pin.

10. If not as specified, readjust the lever.

11. Install the console.

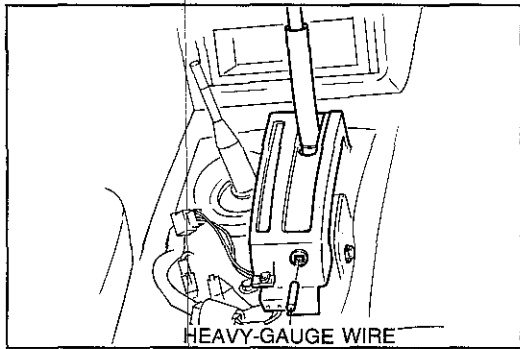
12. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

#### Tightening torque:

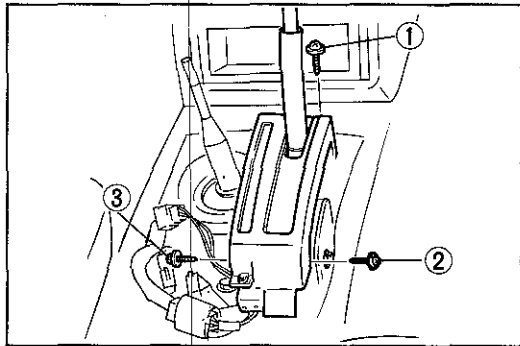
**1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)**

13. Check for correct operation of the shift-lock system.

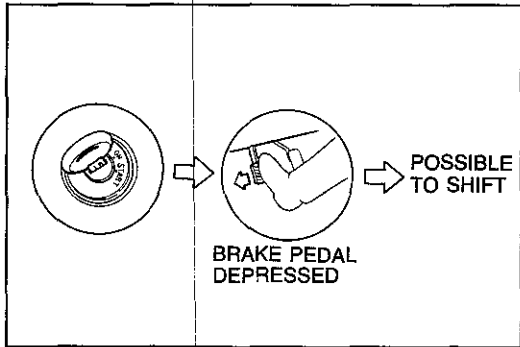
0BU0K2-154



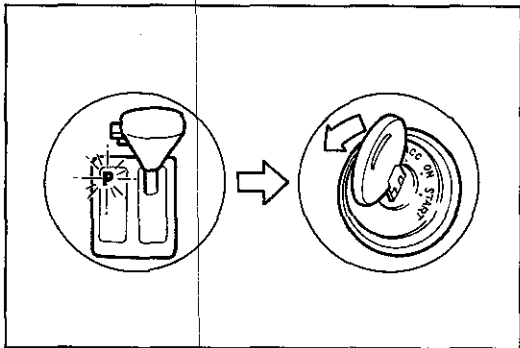
0BU0K2-155



0BU0K2-156



97U0KX-313



97U0KX-314

**Indicator panel**

1. Remove the selector knob and console.
2. Shift the selector lever to P range.
3. Loosen the indicator screws.
4. Align the alignment grooves in the slider with the holes in the indicator panel. Install suitable heavy-gauge wire to hold the slider.
5. Tighten the indicator screws in the order shown in the figure.
6. Remove the wire.
7. Verify that the selector lever properly aligns with the indicator in each range.
8. Install the console.
9. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

**Tightening torque:**

**1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)**

**Shift-lock System Operation Inspection**

**Caution**

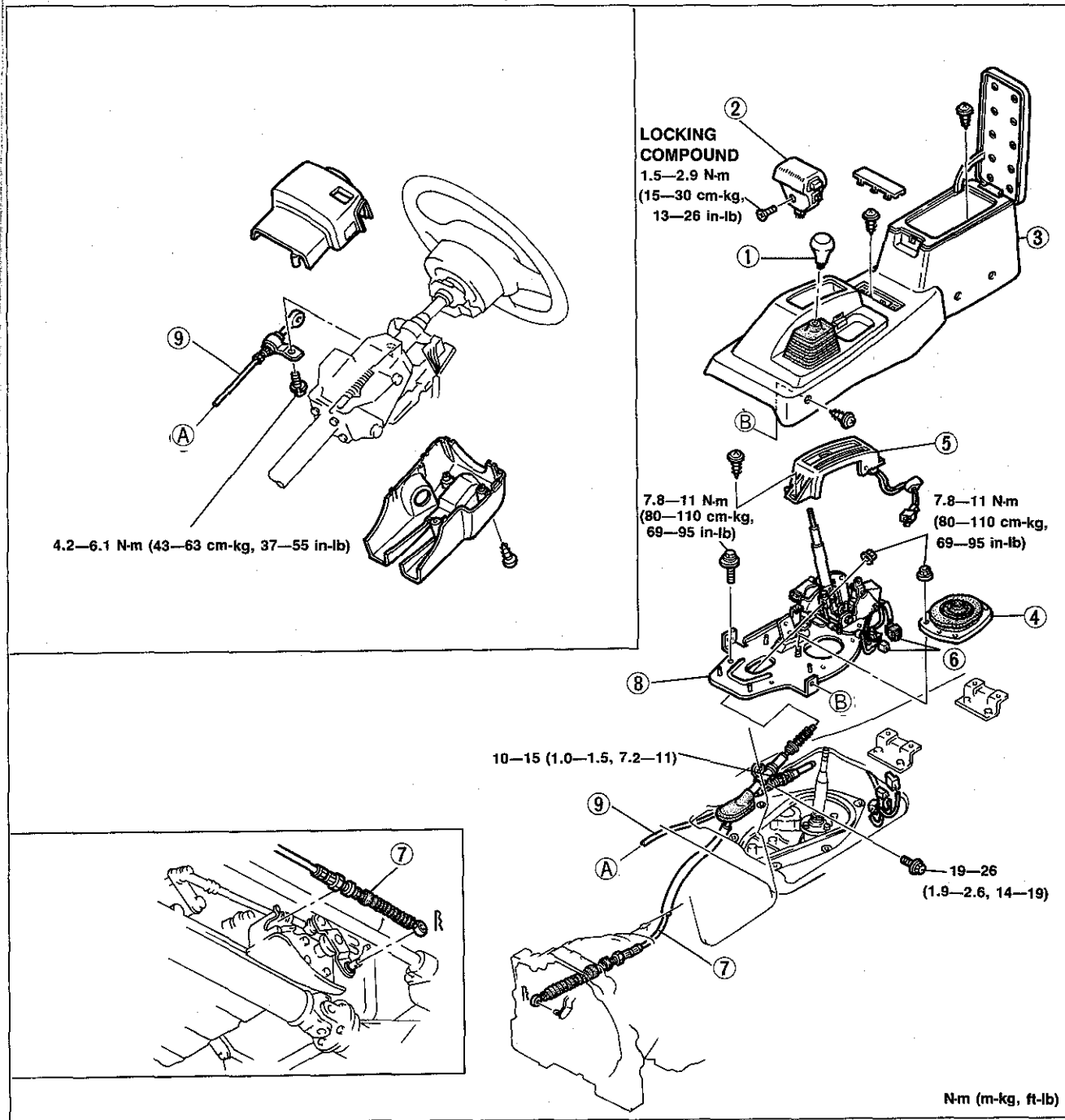
**Service with engine OFF.**

**Shift-lock system**

1. Turn the ignition switch ON.
2. Verify that the selector lever is in P range.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P range.
4. Depress the brake pedal. Verify that the selector lever can be shifted from P range.
5. Shift the selector lever to R range.
6. Verify that the ignition key cannot be turned to LOCK position.
7. Shift the selector lever to P range.
8. Verify that the ignition key can be turned to LOCK position.
9. If not as specified, inspect and repair as necessary, referring to Troubleshooting.

### REMOVAL, INSPECTION, AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Inspect all parts, and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.

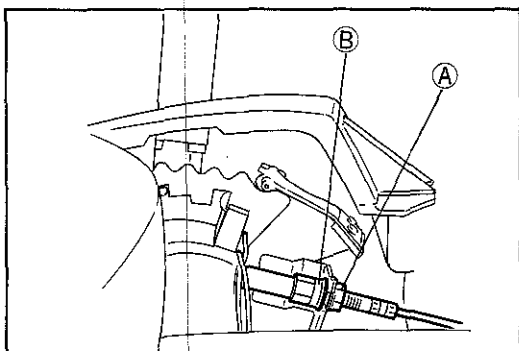


N-m (m-kg, ft-lb)

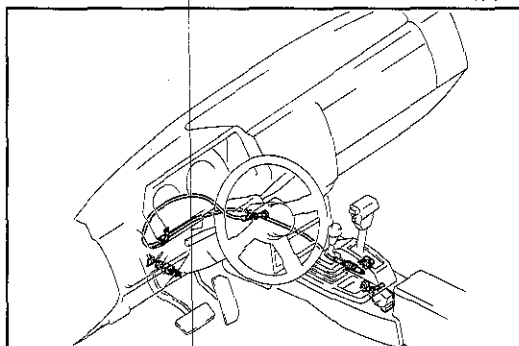
1BU0K2-077

1. 4x4 shift lever knob
2. Selector knob
3. Console
4. Insulator plate and boot  
Installation Note..... page K2-154
5. Indicator panel  
Installation Note..... page K2-154
6. Connectors

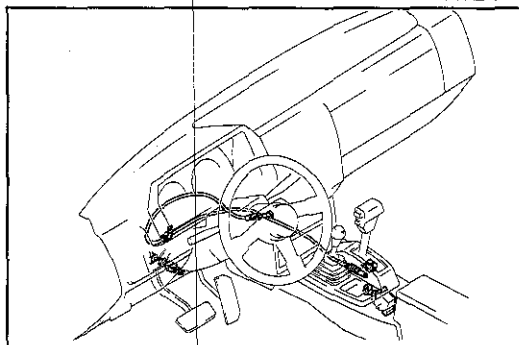
7. Selector cable  
Installation Note..... page K2-154
8. Selector lever  
Removal Note..... page K2-153  
Installation Note..... page K2-153
9. Interlock cable  
Removal Note..... page K2-153  
Installation Note..... page K2-153



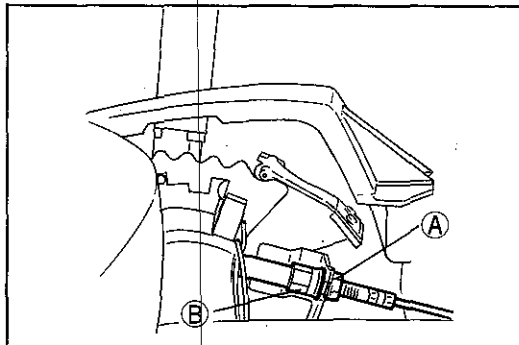
OBU0K2-158



OBU0K2-159



OBU0K2-160



OBU0K2-161

## Removal Note Selector lever

**Caution**  
Do not loosen locknut (B), it is factory preset for proper shift-lock system operation.

1. Loosen the locknut (A).

**Caution**  
Do not kink the cable.

2. Separate the cable from the selector lever.

## Interlock cable

**Note**  
Do not remove the interlock cable if not necessary.

1. Remove the instrument panel. (Refer to Section S.)
2. Remove the interlock cable.

## Installation Note Interlock cable

1. Install the interlock cable.
2. Install the instrument panel. (Refer to Section S.)

## Selector lever

1. Shift the selector lever to N range.
2. Install the selector lever.

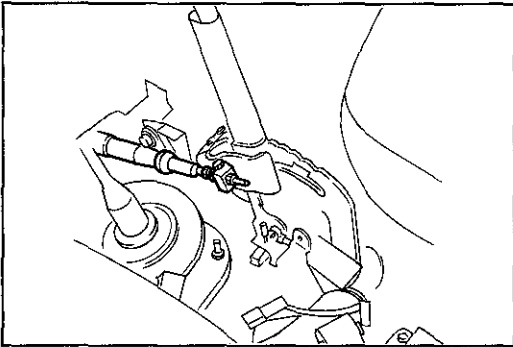
**Tightening torque:**  
7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

**Caution**  
Do not kink the cable.

3. Install the cable and tighten locknut (A).

**Tightening torque:**  
9.8—15 N·m (1.0—1.5 m·kg, 7.2—11 ft·lb)

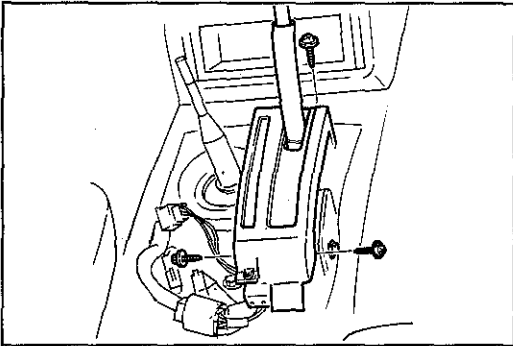
4. Check shift-lock system operation.



0BU0K2-163

### Selector cable

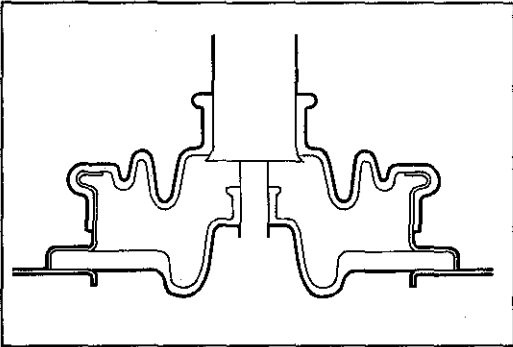
1. Install the selector cable as shown in the figure.
2. Adjust the lever position. (Refer to page K2-154.)



1BU0K2-078

### Indicator panel

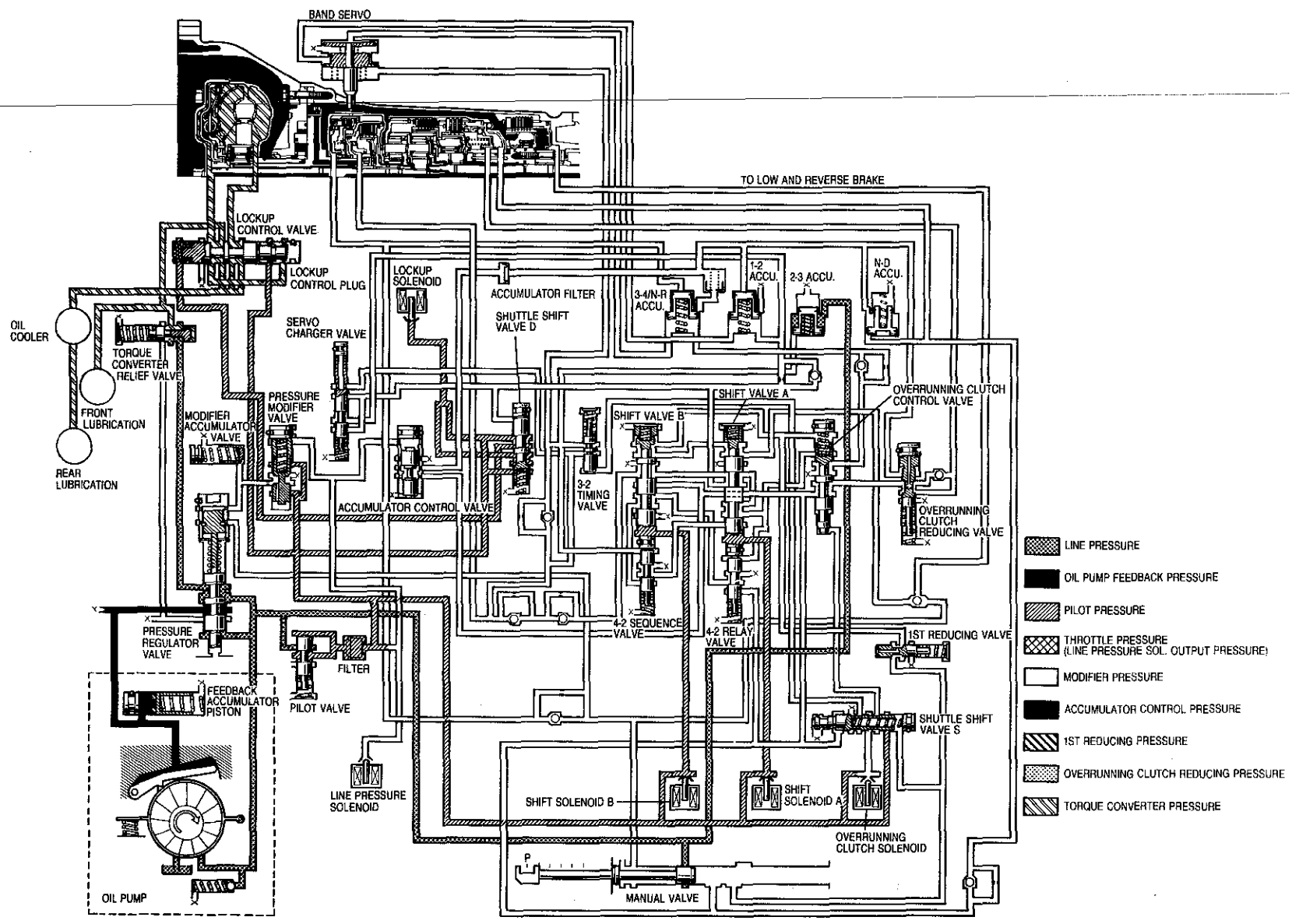
1. Install the indicator panel.
2. Adjust the indicator panel. (Refer to page K2-151.)



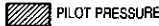


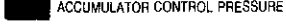
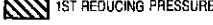
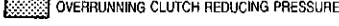



0BU0K2-165

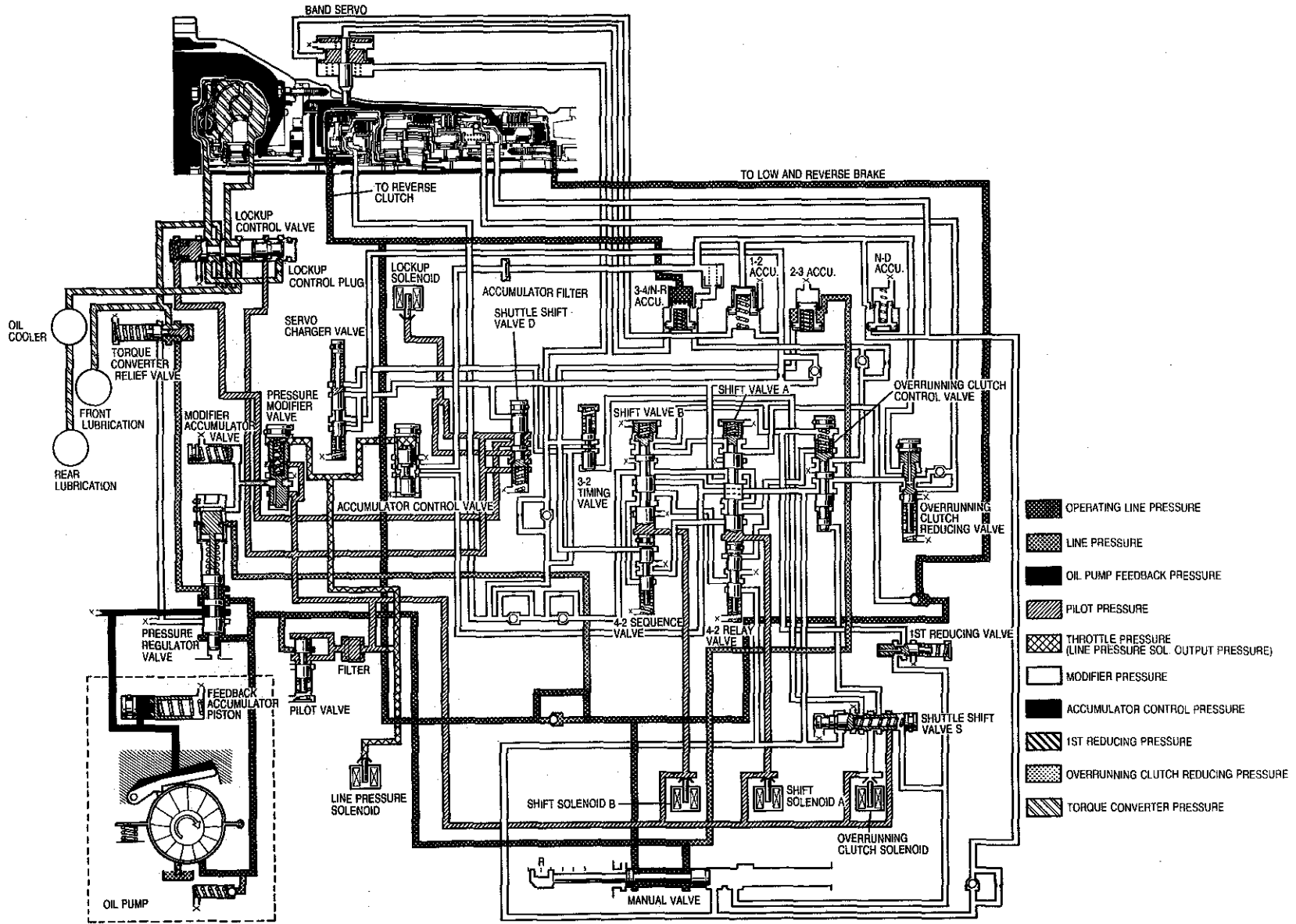
### Insulator panel and boot











1. Install the insulator panel and boot as shown in the figure.

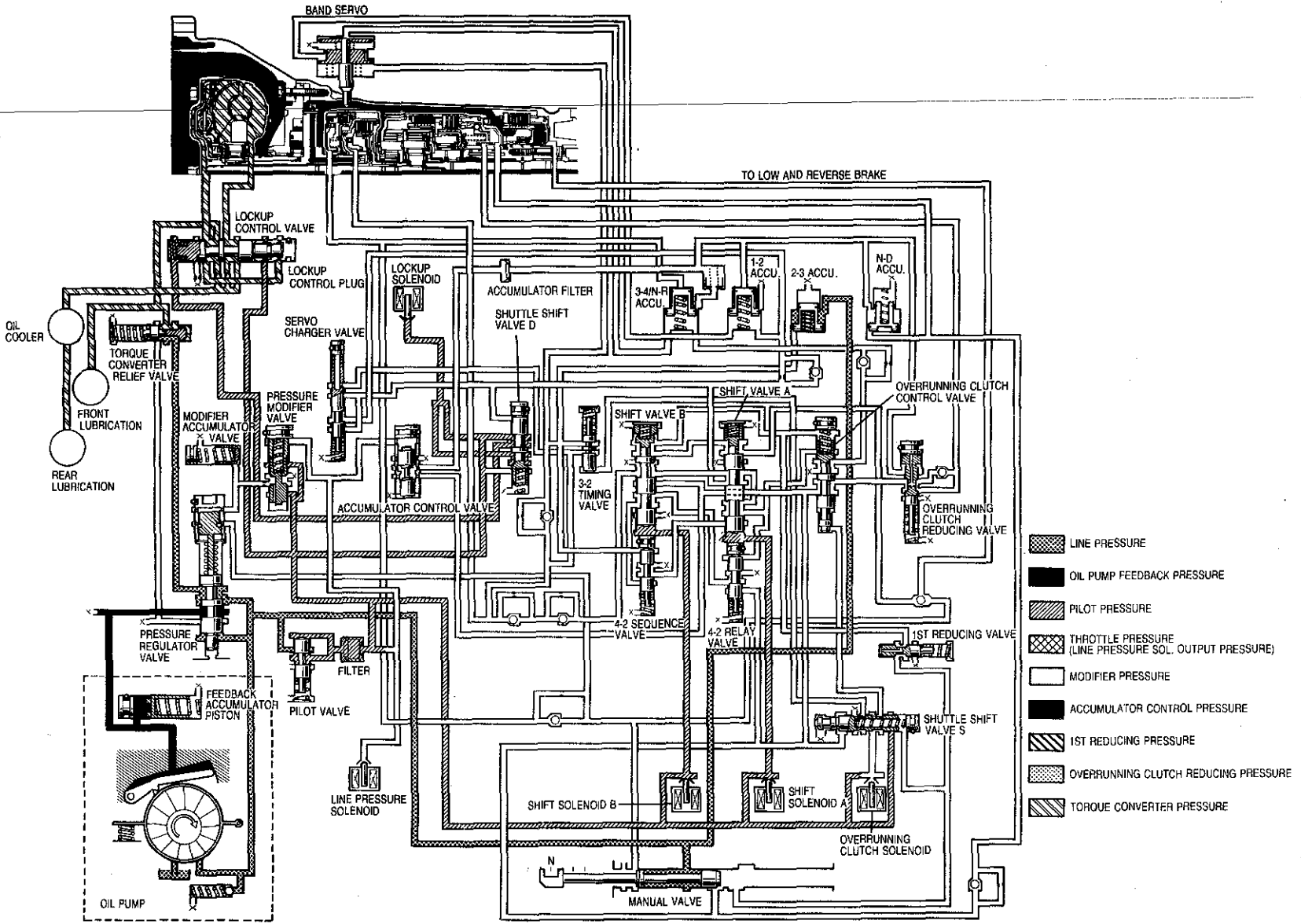


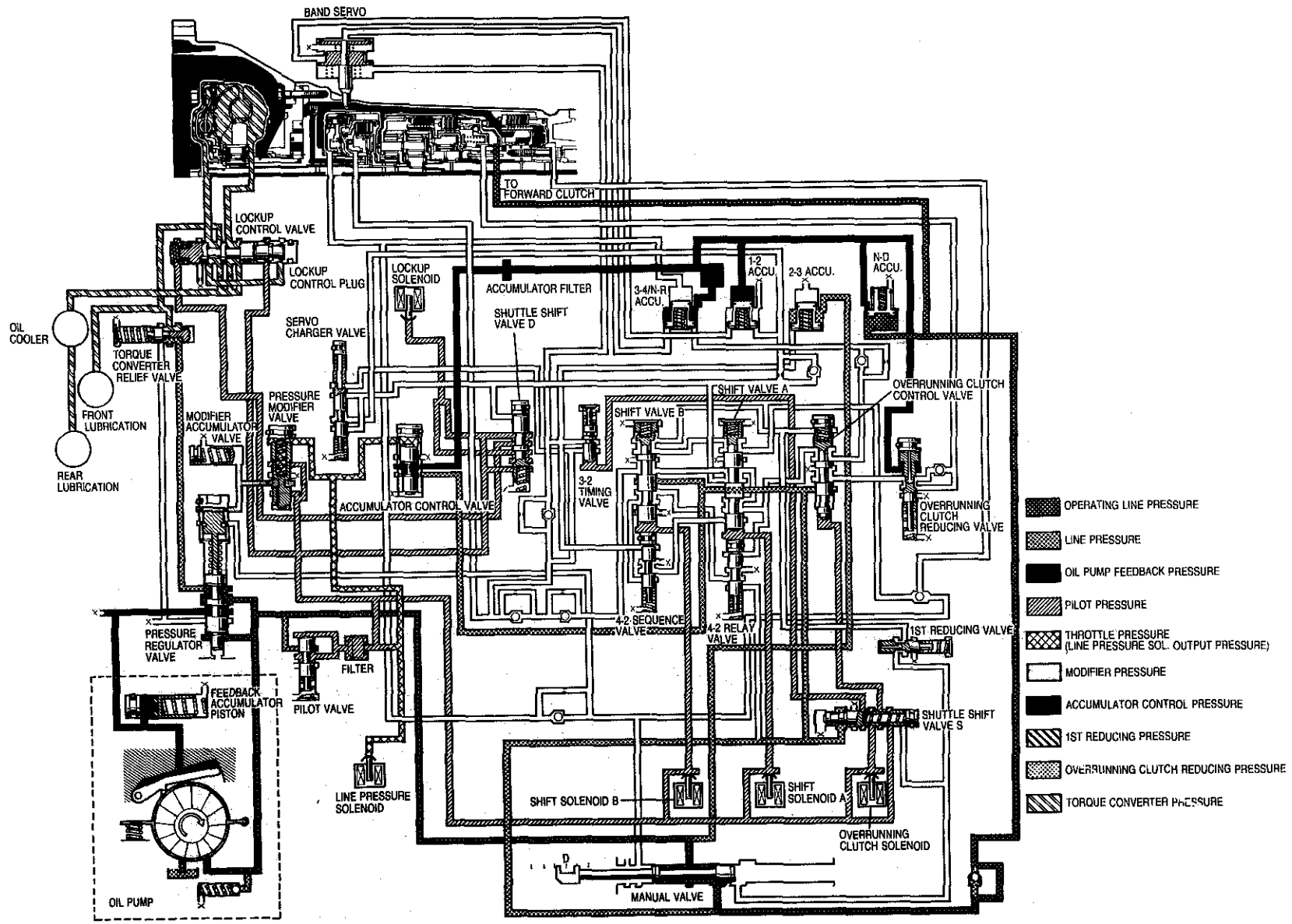
-  LINE PRESSURE
-  OIL PUMP FEEDBACK PRESSURE
-  PILOT PRESSURE
-  THROTTLE PRESSURE (LINE PRESSURE SOL. OUTPUT PRESSURE)
-  MODIFIER PRESSURE
-  ACCUMULATOR CONTROL PRESSURE
-  1ST REDUCING PRESSURE
-  OVERRUNNING CLUTCH REDUCING PRESSURE
-  TORQUE CONVERTER PRESSURE

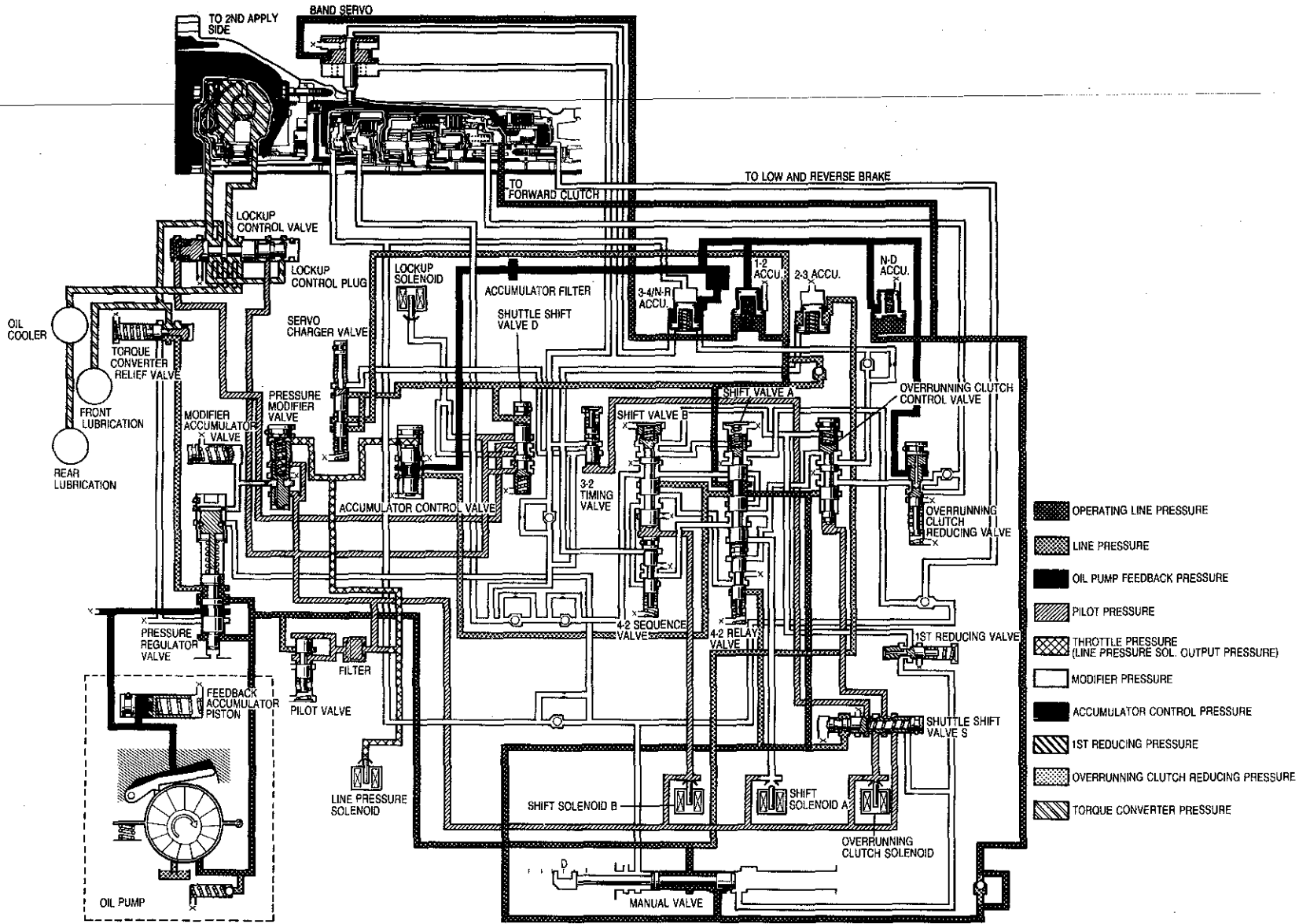


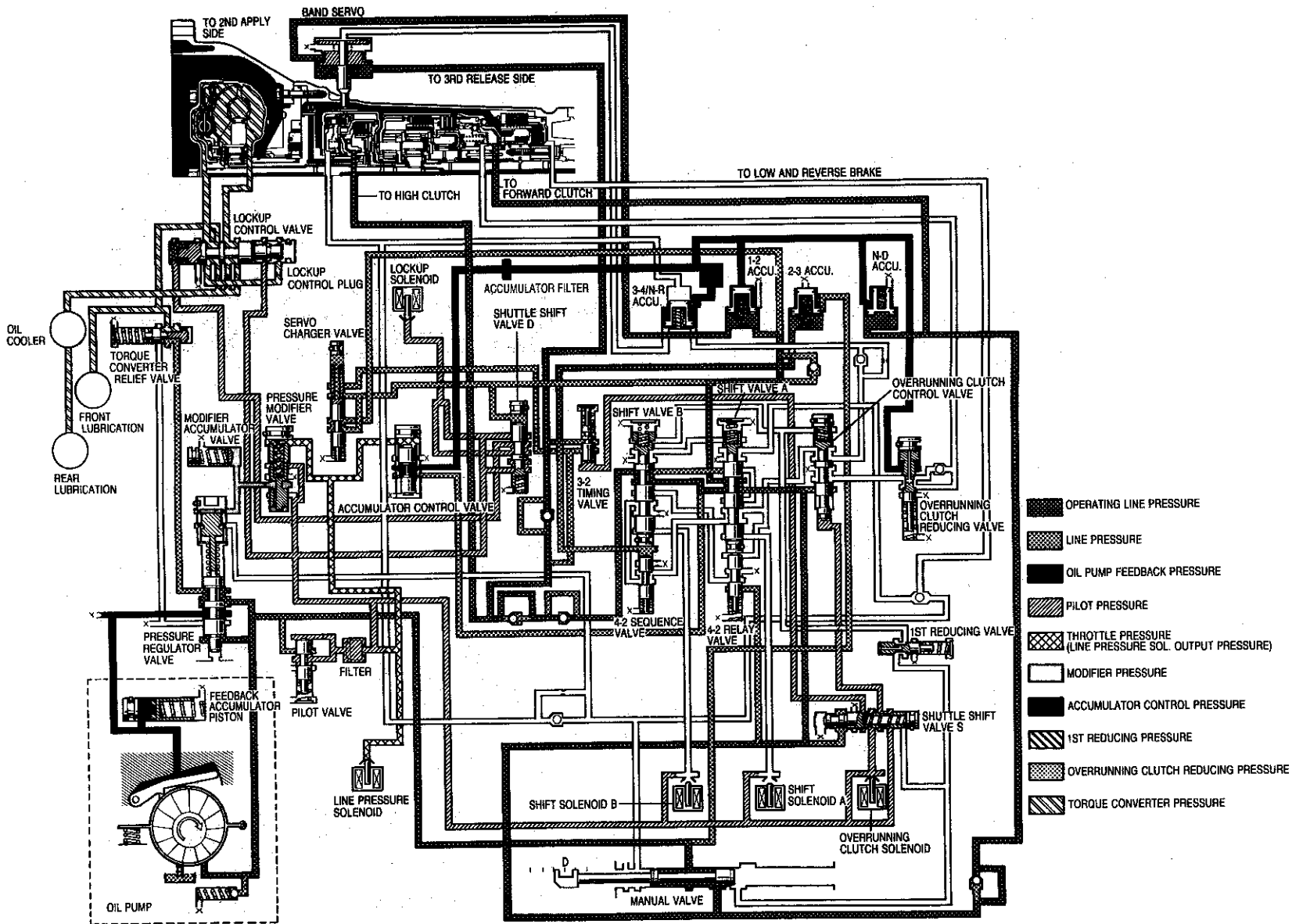


-  OPERATING LINE PRESSURE
-  LINE PRESSURE
-  OIL PUMP FEEDBACK PRESSURE
-  PILOT PRESSURE
-  THROTTLE PRESSURE (LINE PRESSURE SOL. OUTPUT PRESSURE)
-  MODIFIER PRESSURE
-  ACCUMULATOR CONTROL PRESSURE
-  1ST REDUCING PRESSURE
-  OVERRUNNING CLUTCH REDUCING PRESSURE
-  TORQUE CONVERTER PRESSURE





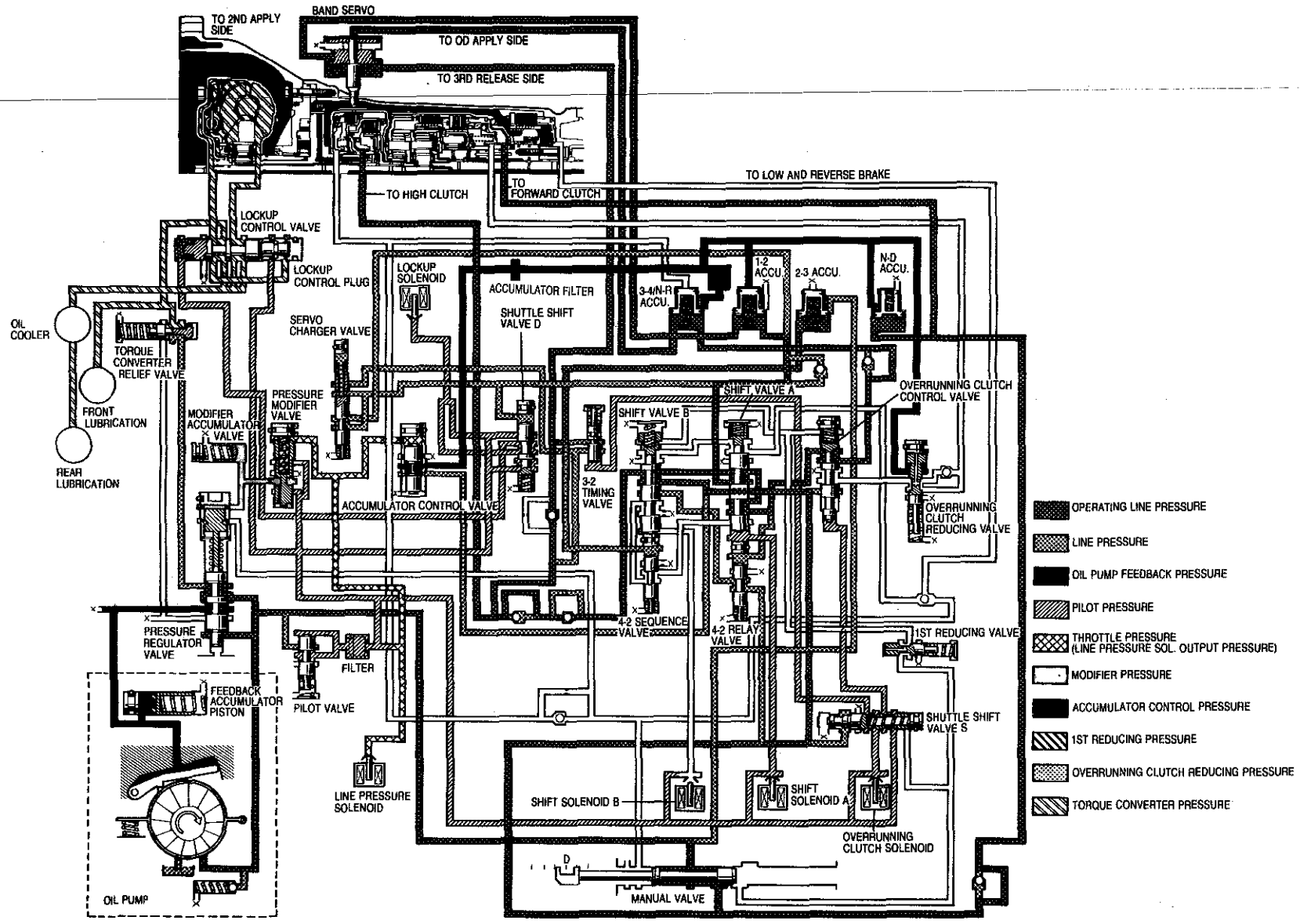




D RANGE; OD, LOCKUP OFF

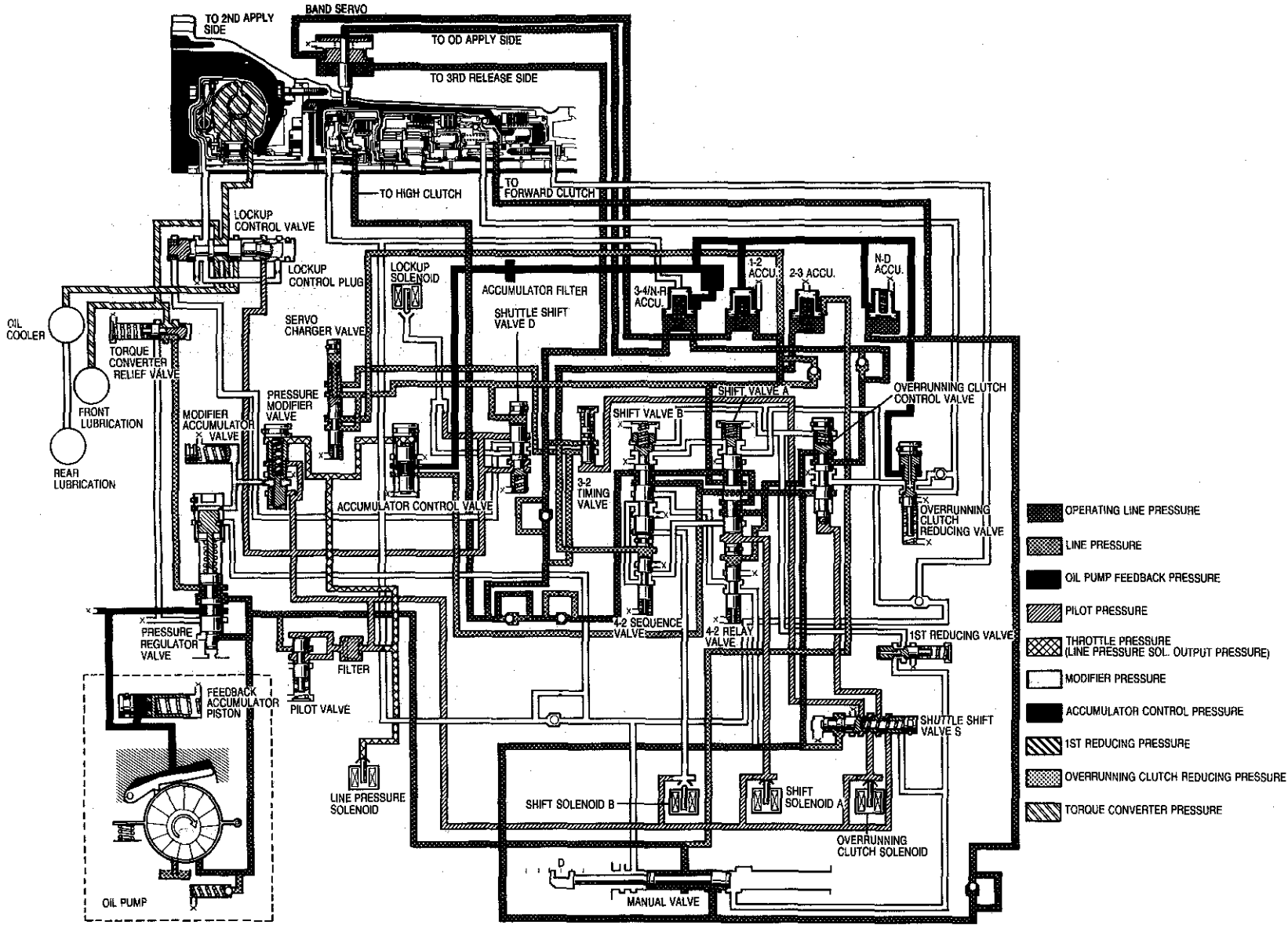
HYDRAULIC CIRCUIT

K2

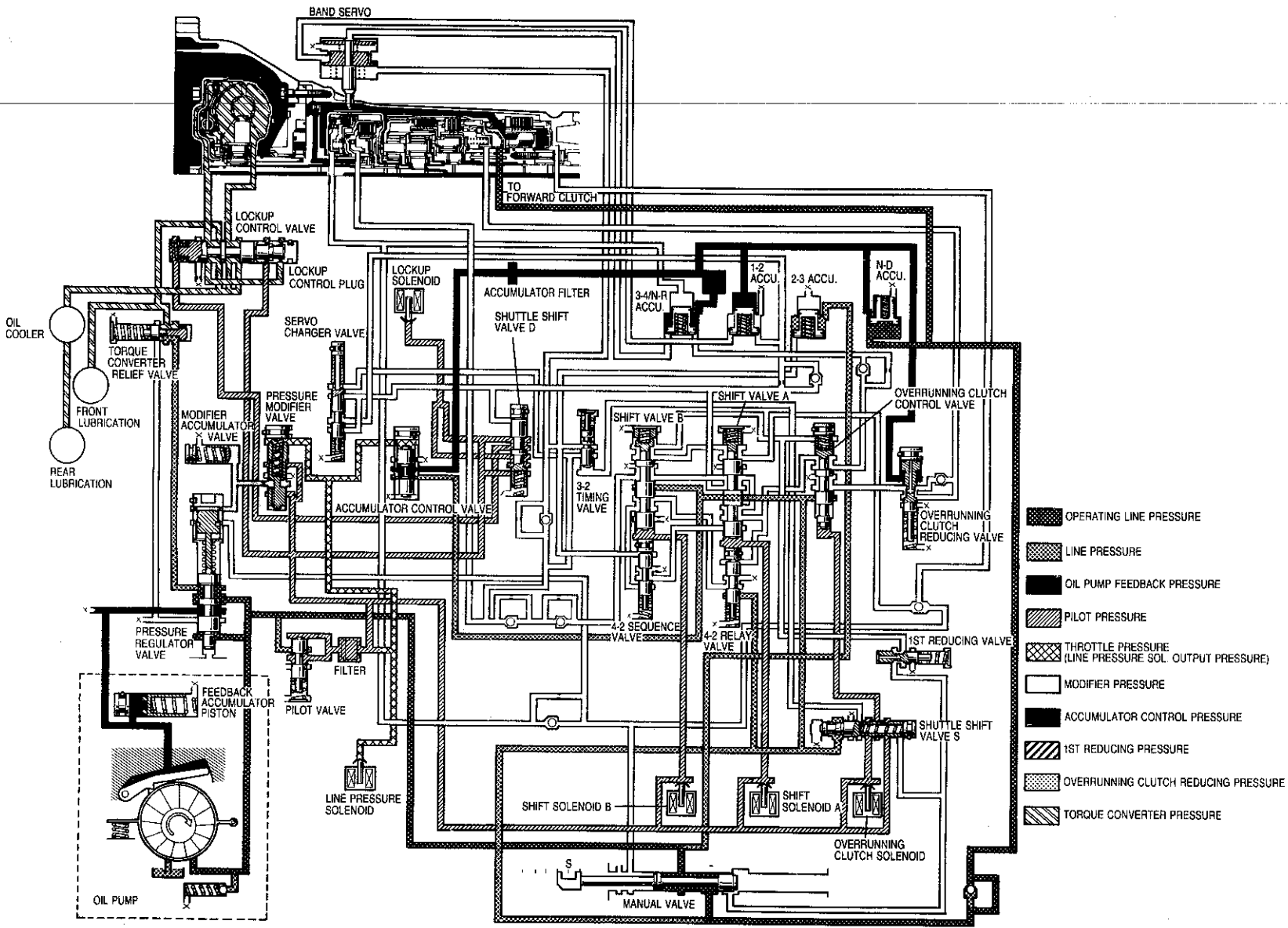


- OPERATING LINE PRESSURE
- LINE PRESSURE
- OIL PUMP FEEDBACK PRESSURE
- PILOT PRESSURE
- THROTTLE PRESSURE (LINE PRESSURE SOL. OUTPUT PRESSURE)
- MODIFIER PRESSURE
- ACCUMULATOR CONTROL PRESSURE
- 1ST REDUCING PRESSURE
- OVERRUNNING CLUTCH REDUCING PRESSURE
- TORQUE CONVERTER PRESSURE

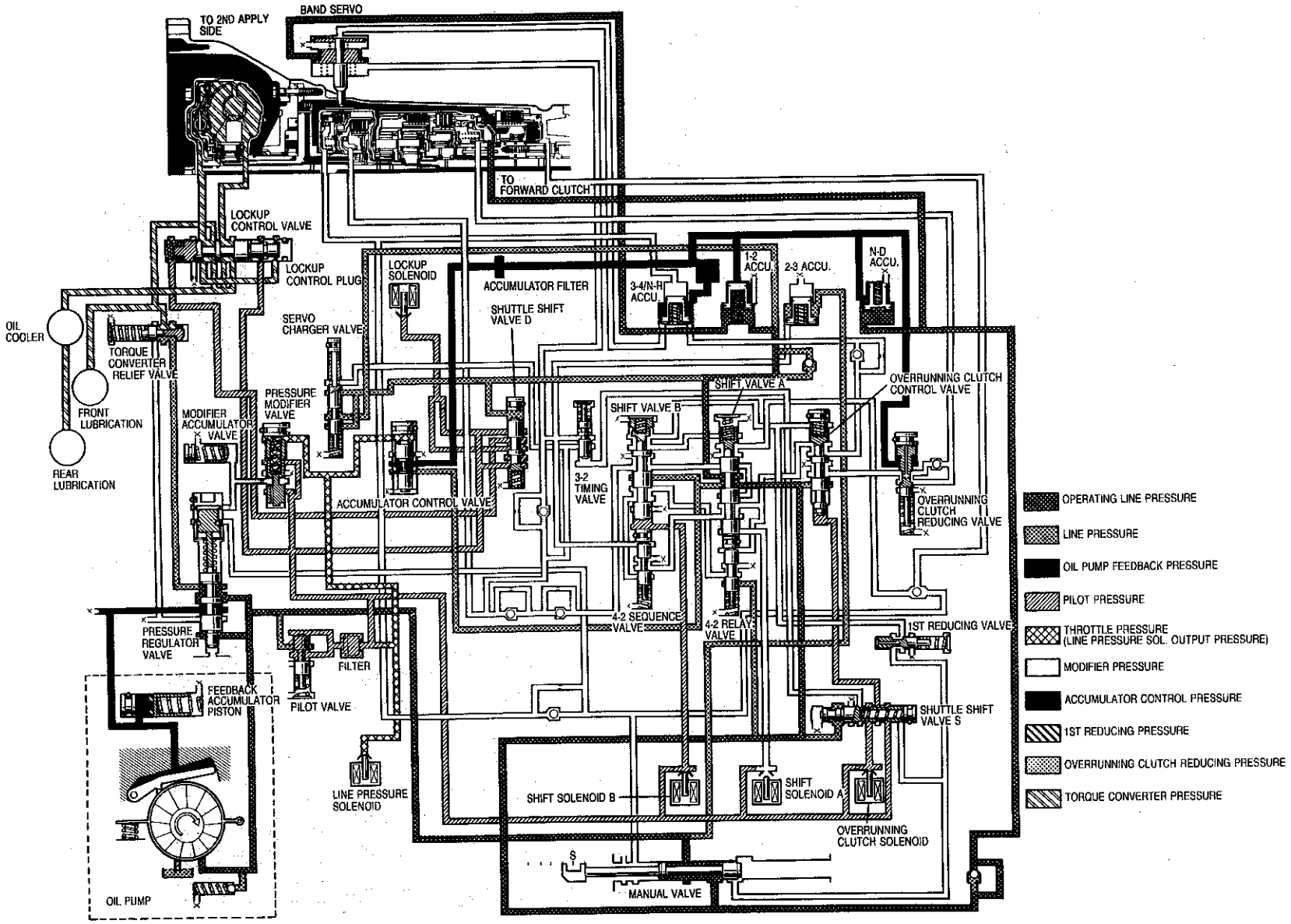
9MUDK1-477  
K2-161

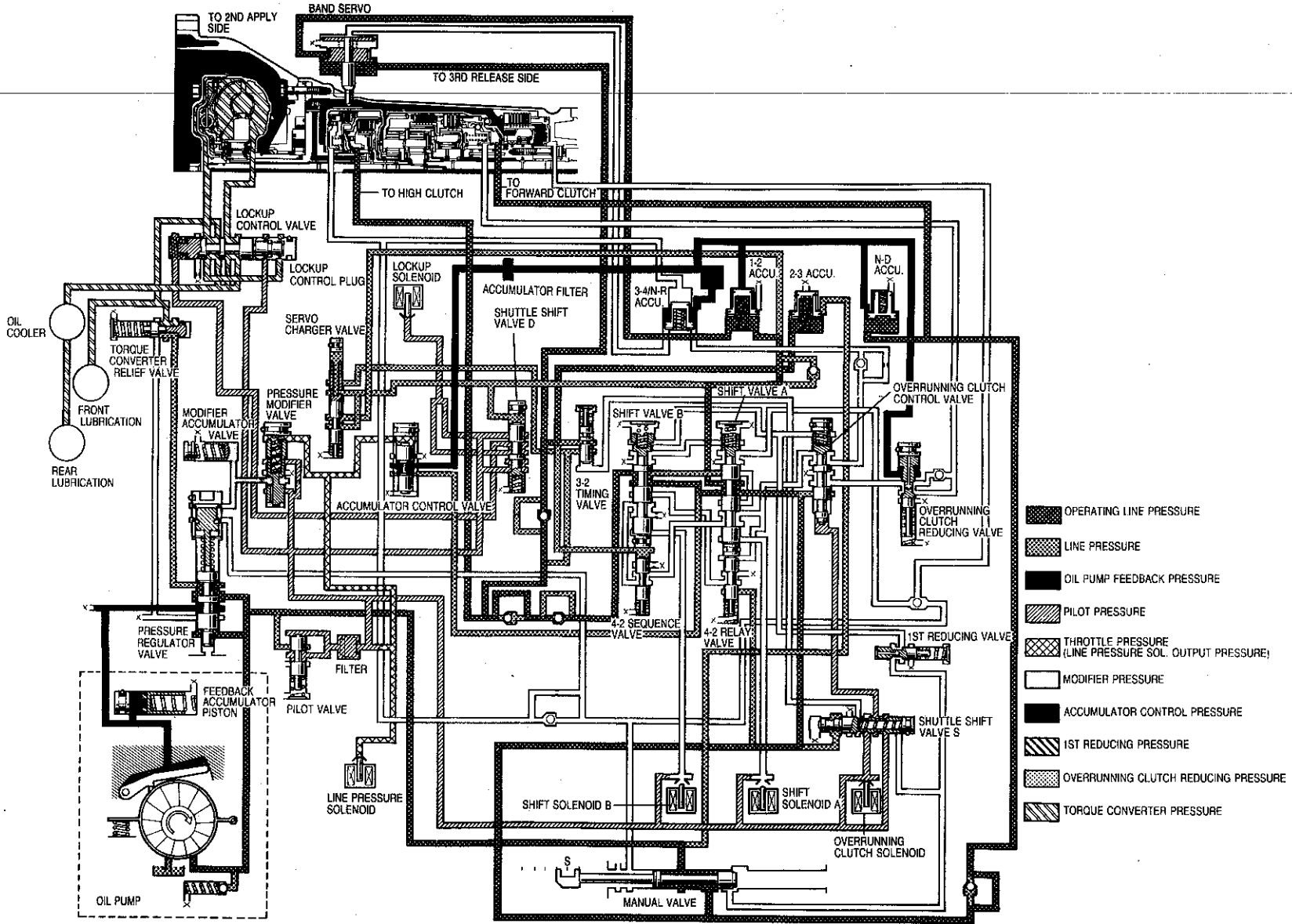


- OPERATING LINE PRESSURE
- LINE PRESSURE
- OIL PUMP FEEDBACK PRESSURE
- PILOT PRESSURE
- THROTTLE PRESSURE (LINE PRESSURE SOL. OUTPUT PRESSURE)
- MODIFIER PRESSURE
- ACCUMULATOR CONTROL PRESSURE
- 1ST REDUCING PRESSURE
- OVERRUNNING CLUTCH REDUCING PRESSURE
- TORQUE CONVERTER PRESSURE

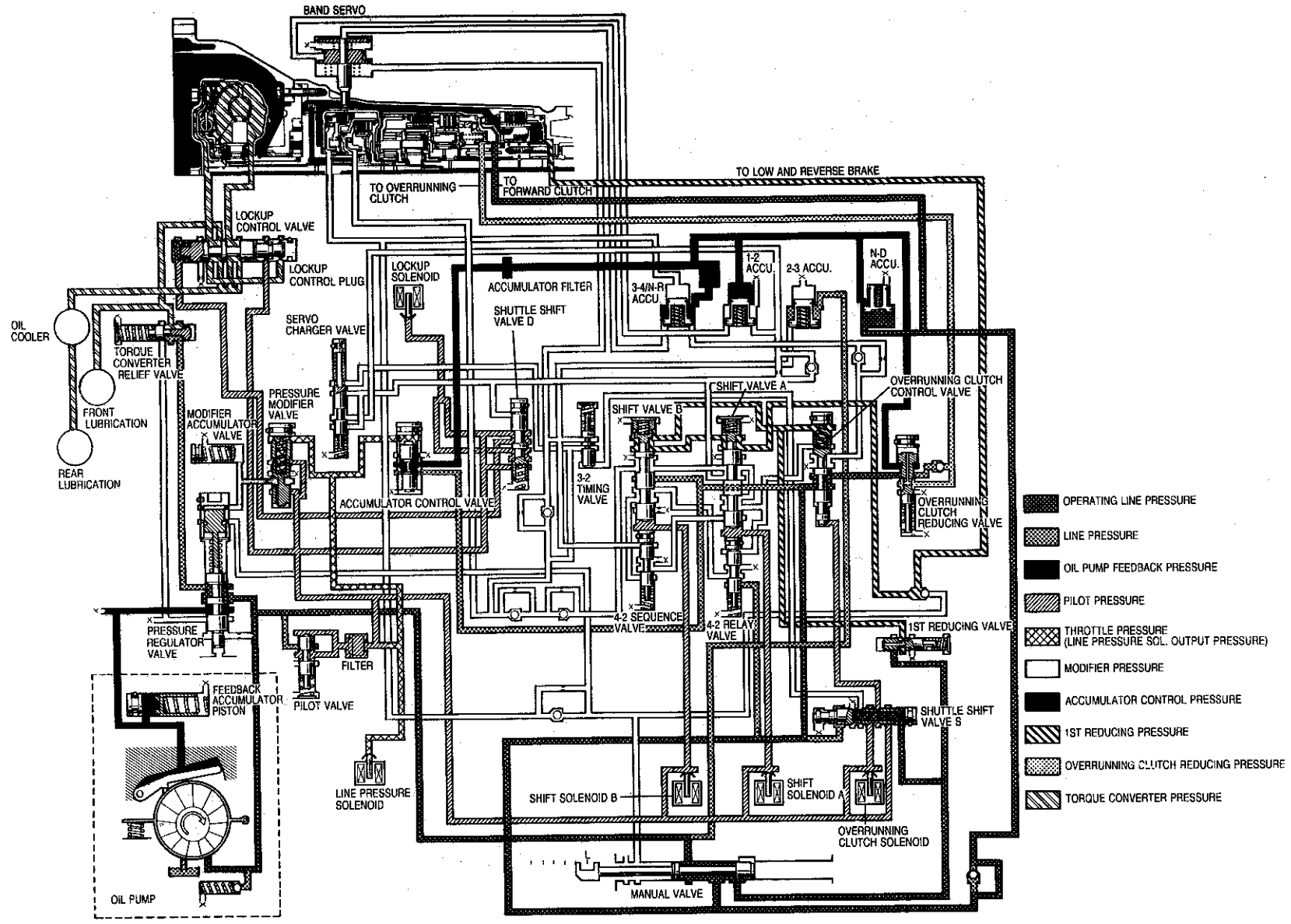








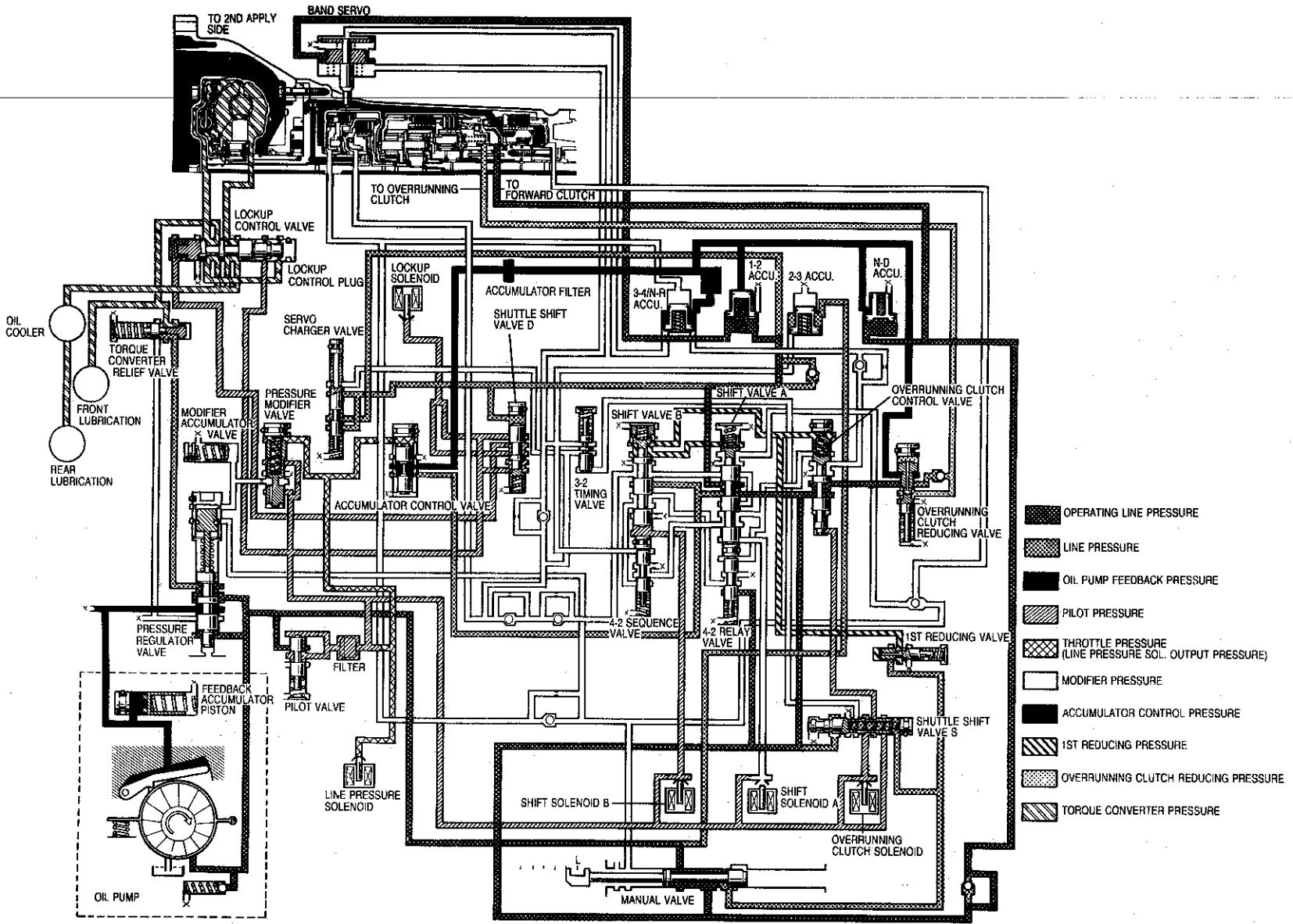
- OPERATING LINE PRESSURE
- LINE PRESSURE
- OIL PUMP FEEDBACK PRESSURE
- PILOT PRESSURE
- THROTTLE PRESSURE (LINE PRESSURE SOL. OUTPUT PRESSURE)
- MODIFIER PRESSURE
- ACCUMULATOR CONTROL PRESSURE
- 1ST REDUCING PRESSURE
- OVERRUNNING CLUTCH REDUCING PRESSURE
- TORQUE CONVERTER PRESSURE



L RANGE: 2ND GEAR

HYDRAULIC CIRCUIT

K2



9M UOK1-483  
K2-167

# **AUTOMATIC TRANSMISSION (TRANSFER CASE)**

**INDEX** ..... **K3- 2**  
**OUTLINE** ..... **K3- 3**  
**SPECIFICATION** ..... **K3- 3**

0BU0K3-001

## INDEX

4x4  
INDICATOR  
LAMP  
SERVICE,  
SECTION T



HOLD  
INDICATOR  
LAMP  
SERVICE,  
SECTION T

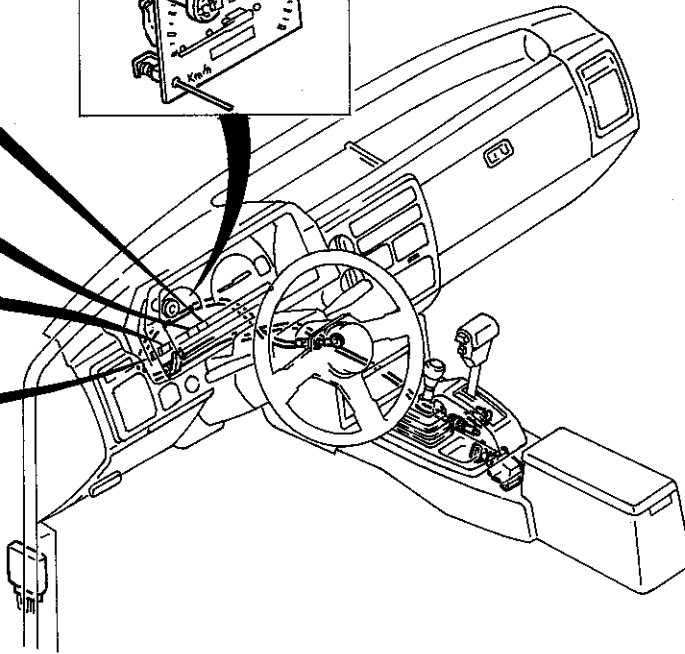
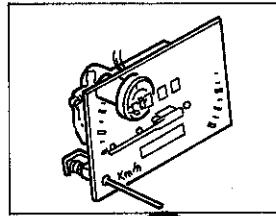
HOLD

NEUTRAL  
INDICATOR  
LAMP  
SERVICE,  
SECTION T

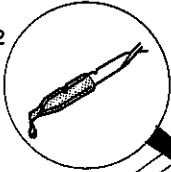


A/T OIL  
TEMP  
INDICATOR  
LAMP  
SERVICE,  
SECTION T

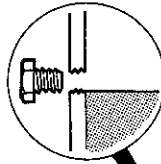
A/T  
OIL TEMP



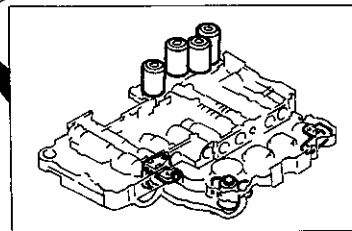
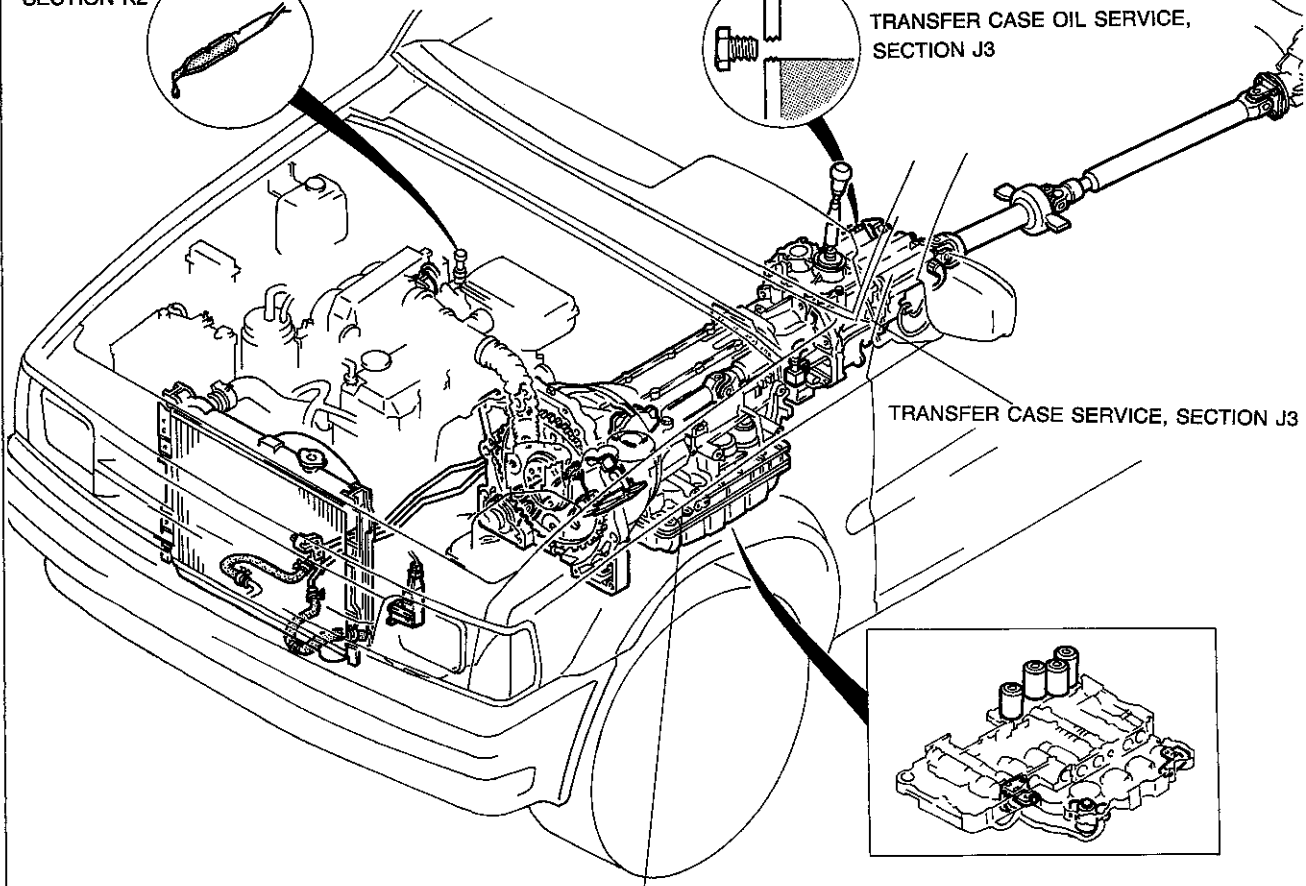
AUTOMATIC TRANSMISSION FLUID  
SERVICE,  
SECTION K2



TRANSFER CASE OIL SERVICE,  
SECTION J3



TRANSFER CASE SERVICE, SECTION J3



AUTOMATIC TRANSMISSION SERVICE, SECTION K2

OUTLINE

SPECIFICATIONS

Item	Engine/Transmission		B2600i
			R4AX-EL
			4x4
Synchromesh system			Constant-mesh
Shift type			
Gear ratio	Low		2.210
	High		1.000
Oil	Grade		API Service GL-4 or GL-5
	Viscosity	Above 10°C (50°F)	SAE 80W-90
		All season type	SAE 75W-90
	Capacity	liters (US qt, Imp qt)	2.0 (2.1, 1.8)

1BU0K3-001

# PROPELLER SHAFT

**OUTLINE** ..... L- 2  
    SPECIFICATIONS (4x2)..... L- 2  
    SPECIFICATIONS (4x4)..... L- 3  
**TROUBLESHOOTING GUIDE** ..... L- 4  
**PROPELLER SHAFT** ..... L- 4  
    PREPARATION ..... L- 4  
    REMOVAL AND INSTALLATION ..... L- 5  
    OVERHAUL..... L- 8  
    LUBRICATION ..... L-15

OBUOLX-001



OUTLINE

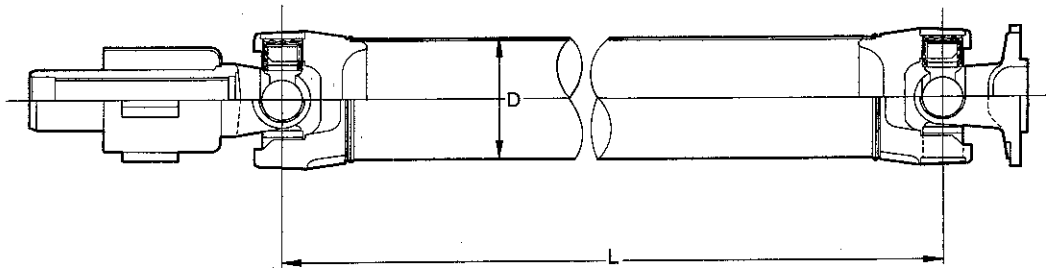
SPECIFICATIONS (4x2)

Model/Transmission		B2200				
		Short bed		Long bed		
		M/T	A/T	M/T	A/T	
Length	mm (in)	L	671.5 (26.44)	1,365 (53.74)	671.5 (26.44)	623.5 (24.55)
		L1	745 (29.33)	—	969 (38.15)	969 (38.15)
Outer diameter	mm (in)	D	57 (2.24)	75 (2.95)	57 (2.24)	65 (2.56)
		D1	65 (2.56)	—	65 (2.56)	65 (2.56)

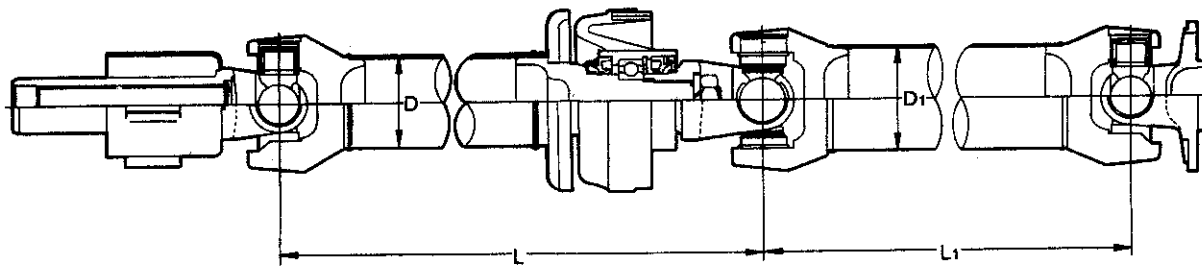
Model/Transmission		B2600i				
		Short bed		Long bed		
		M/T	A/T	M/T	A/T	
Length	mm (in)	L	669.5 (26.36)	1,370 (53.94)	669.5 (26.36)	623.5 (24.55)
		L1	745 (29.33)	—	969 (38.15)	969 (38.15)
Outer diameter	mm (in)	D	65 (2.56)	75 (2.95)	65 (2.56)	65 (2.56)
		D1	65 (2.56)	—	65 (2.56)	65 (2.56)

OBU0LX-002

SHORT BED A/T



EXCEPT SHORT BED A/T

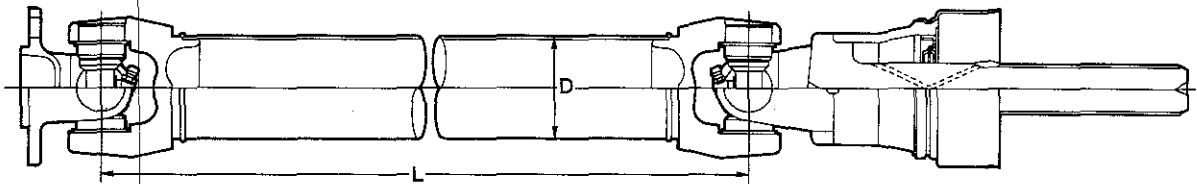


SPECIFICATIONS (4x4)

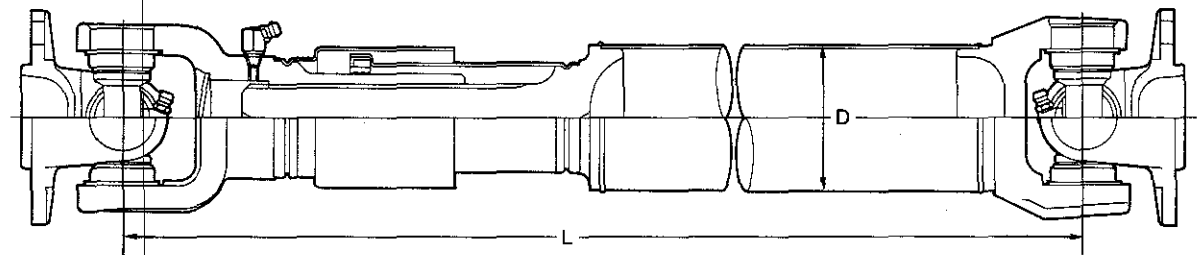
Model/Transmission			B2600i							
			Short bed				Long bed			
			Front propeller shaft		Rear propeller shaft		Front propeller shaft		Rear propeller shaft	
			M/T	A/T	M/T	A/T	M/T	A/T	M/T	A/T
Length	mm (in)	L	470 (18.50)		1,313 (51.69)		470 (18.50)		549 (21.61)	
		L1	—		—		—		990 (38.98)	
Outer diameter	mm (in)	D	57 (2.24)		75 (2.95)		57 (2.24)		75 (2.95)	

0BU0LX-003

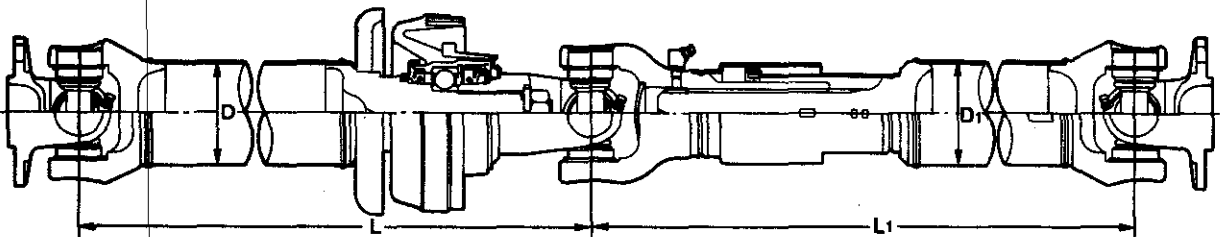
FRONT PROPELLER SHAFT (SHORT AND LONG BED)



REAR PROPELLER SHAFT (SHORT BED)



REAR PROPELLER SHAFT (LONG BED)



L


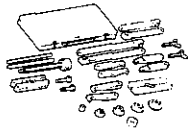
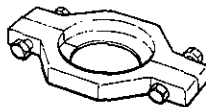
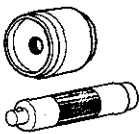
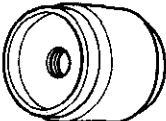
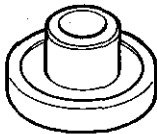
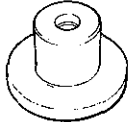

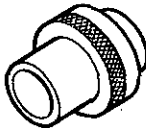
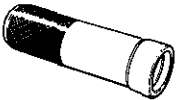

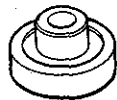

**TROUBLESHOOTING GUIDE**

Problem	Possible Cause	Remedy	Page
<b>Deflection</b>	Faulty assembly of universal joint	Repair	L-8, 9
	Bent propeller shaft	Replace	L-8, 9
	Worn center support and bearing	Replace	L-8
	Loose center support and bearing mounting bolts	Tighten	L-6
	Loose yoke mounting nut	Tighten	L-8
	Worn splines of sliding joint	Replace	—
<b>Abnormal noise</b>	Faulty assembly of yoke of center bearing	Repair	L-8
	Worn or damaged universal joint bearing	Replace	L-8, 9
	Worn or damaged center support and bearing	Replace	L-8
	Loose yoke mounting nut	Tighten	L-8
	Worn splines of sliding joint	Replace	—

2BU0LX-001

**PROPELLER SHAFT**

**PREPARATION  
SST**

49 0259 440 Holder, main shaft 	49 0839 425C Puller set, bearing 	49 0636 145 Puller, fan pulley boss 
49 B025 0A0 Installer, dust seal 	49 B025 001 Body (Part of 49 B025 0A0) 	49 H025 001 Installer, bearing 
49 F026 102 Installer, bearing 	49 H025 002 Installer, dust seal 	49 H025 004 Installer, bearing 
49 F401 331 Body 	49 H025 003 Installer, bearing 	49 H033 101 Remover, bearing 
49 S120 440 Holder, mainshaft 		

0BU0LX-010

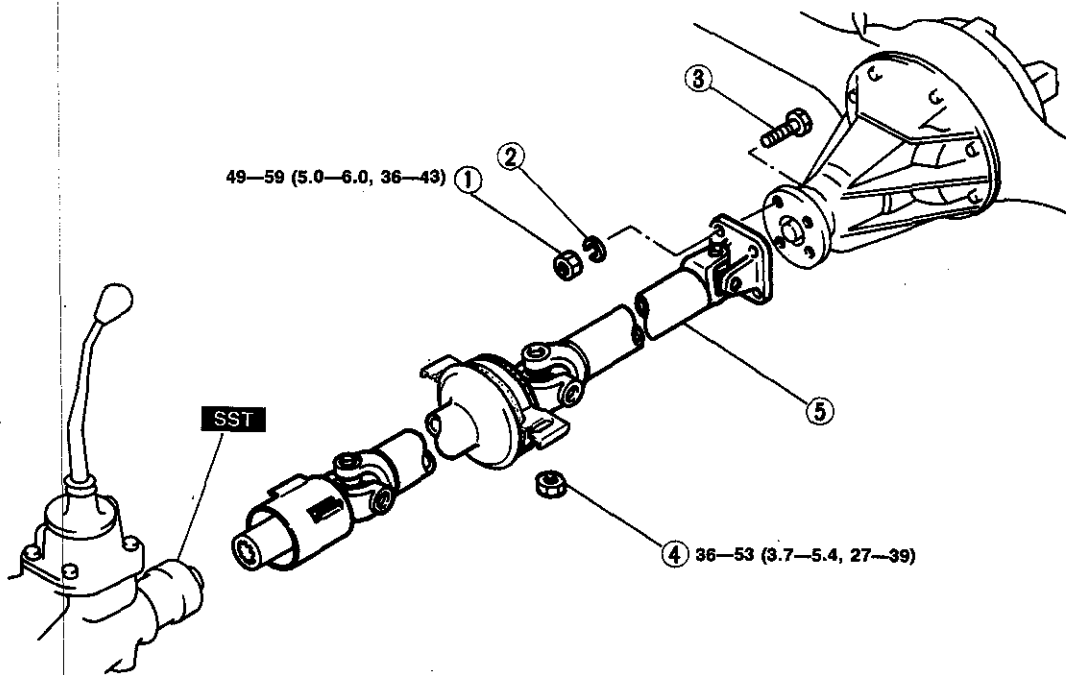
# PROPELLER SHAFT

L

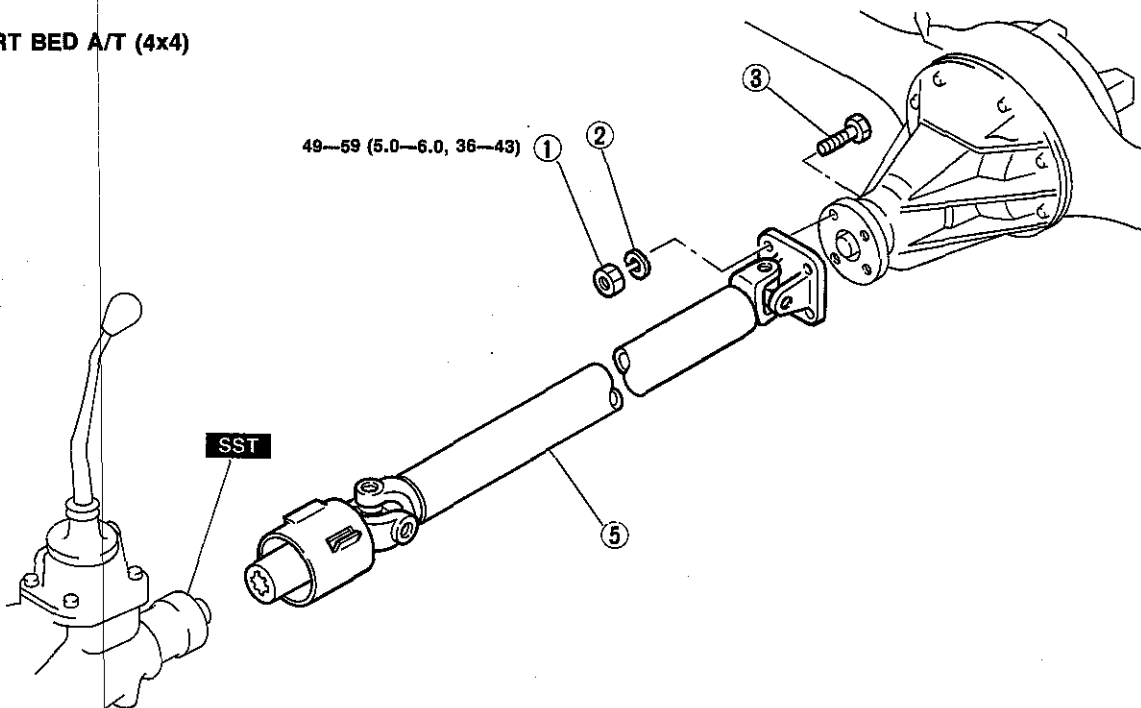
## REMOVAL AND INSTALLATION

Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

EXCEPT SHORT BED A/T (4x2)



SHORT BED A/T (4x4)



N-m (m-kg, ft-lb)

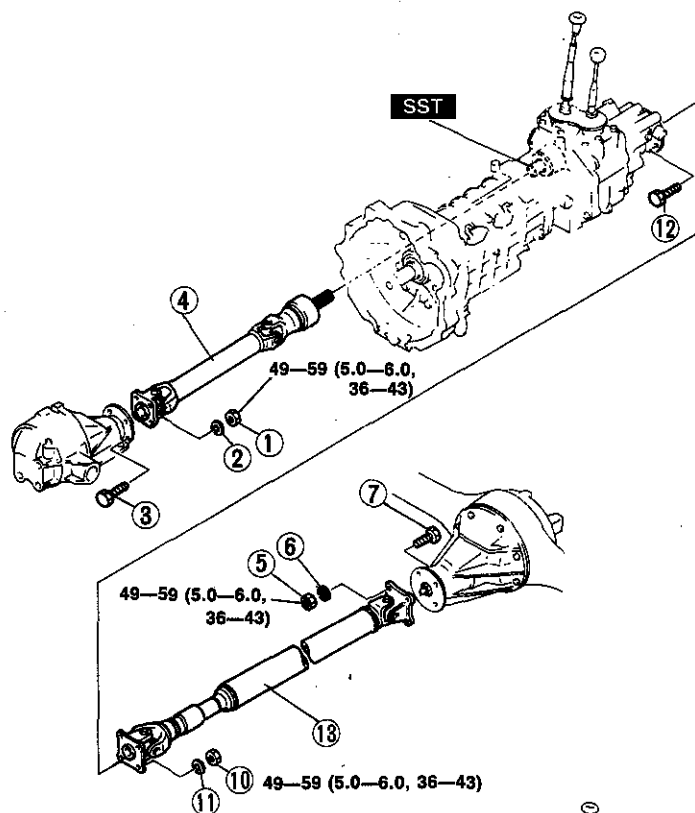
1BU0LX-001

- 1. Nut
- 2. Lock washer
- 3. Bolt
- 4. Nut

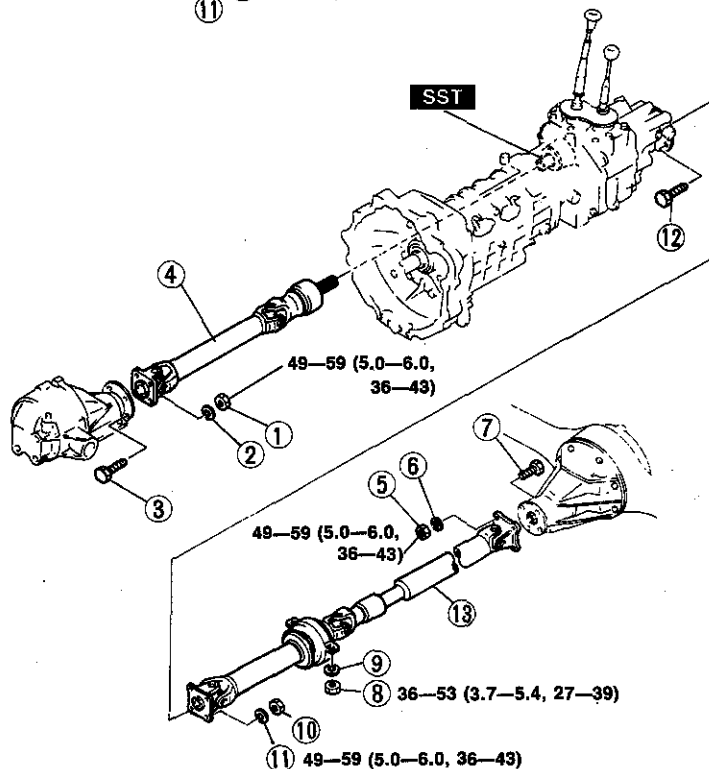
- 5. Propeller shaft
  - Removal..... page L-7
  - Installation..... page L-7

# PROPELLER SHAFT

## SHORT BED (4x4)



## LONG BED (4x4)



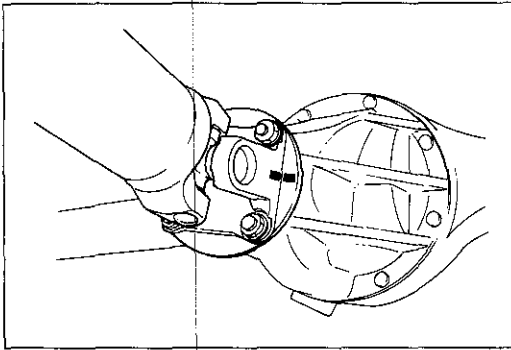
N·m (m·kg, ft·lb)

1BUJLX-002

- 1. Nut
  - 2. Lock washer
  - 3. Bolt
  - 4. Front propeller shaft
- Removal ..... page L-7  
Installation ..... page L-7

- 5. Nut
- 6. Lock washer
- 7. Bolt
- 8. Nut
- 9. Washer

- 10. Nut
  - 11. Lock washer
  - 12. Bolt
  - 13. Rear propeller shaft
- Removal ..... page L-7  
Installation ..... page L-7



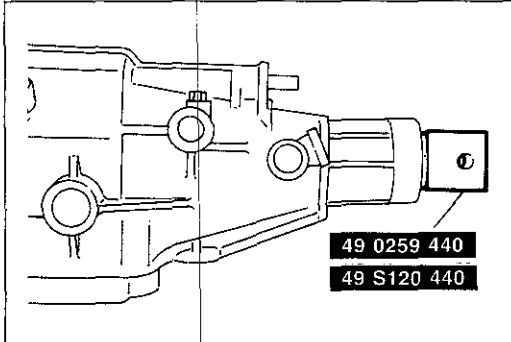
9BU0LX-008

**Removal note**  
**Propeller shaft (4x2)**

Before removing the propeller shaft, mark the flanges for correct installation.

**Propeller shaft (4x4)**

Before removing the propeller shaft mark on the front, and rear side flanges for correct installation.

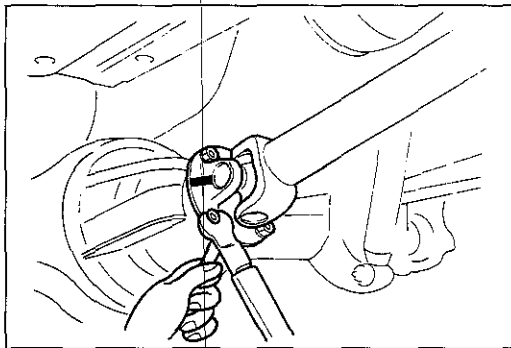


0BU0LX-011

**(4x2 Model)**

When the propeller shaft is removed from the extension housing, immediately install the **SST** into the extension housing to prevent oil leakage.

**B2200 : 49 0259 440**  
**B2600i: 49 S120 440**

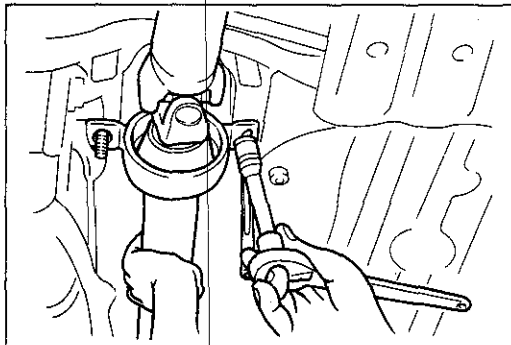


2BU0LX-002

**Installation note**  
**Propeller shaft**

1. Align the marks, and install the rear propeller shaft.

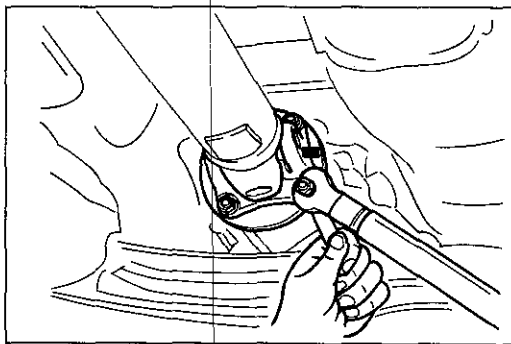
**Tightening torque:**  
**49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)**



9BU0LX-022

2. Install the center bearing support assembly.

**Tightening torque:**  
**36—53 N·m (3.7—5.4 m·kg, 27—39 ft·lb)**



2BU0LX-003

3. Align the marks, and install the front propeller shaft.

**Tightening torque:**  
**49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)**

4. Check that there is no abnormal noise or vibration when driving the vehicle.



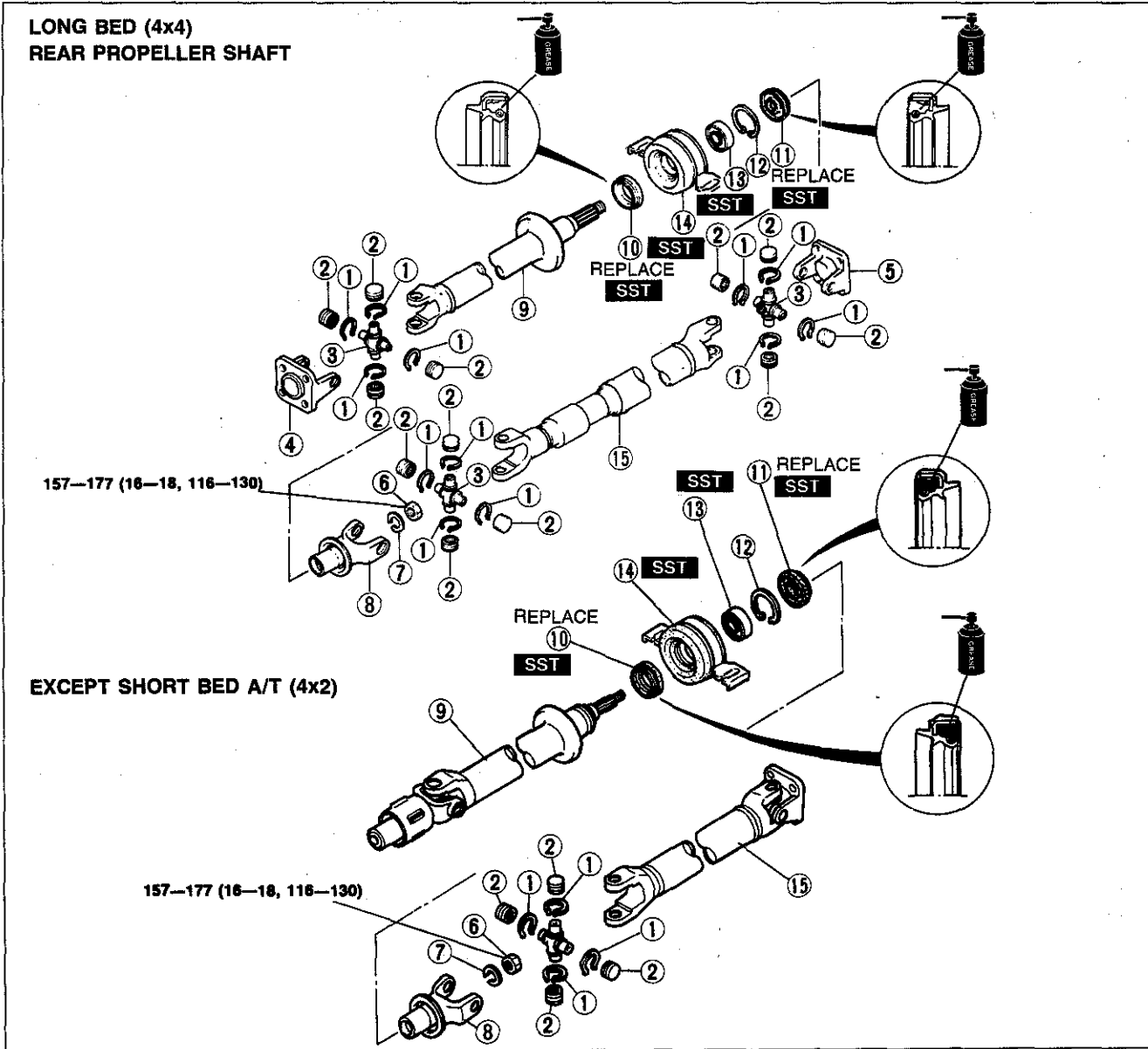
# PROPELLER SHAFT

## OVERHAUL

Disassemble in the order shown in the figure, referring to **Disassembly note**.  
 Inspect all parts and repair or replace as necessary.  
 Assemble in the reverse order of disassembly, referring to **Assembly note**.

### Caution

**Before assembly, make sure all parts are completely clean.**

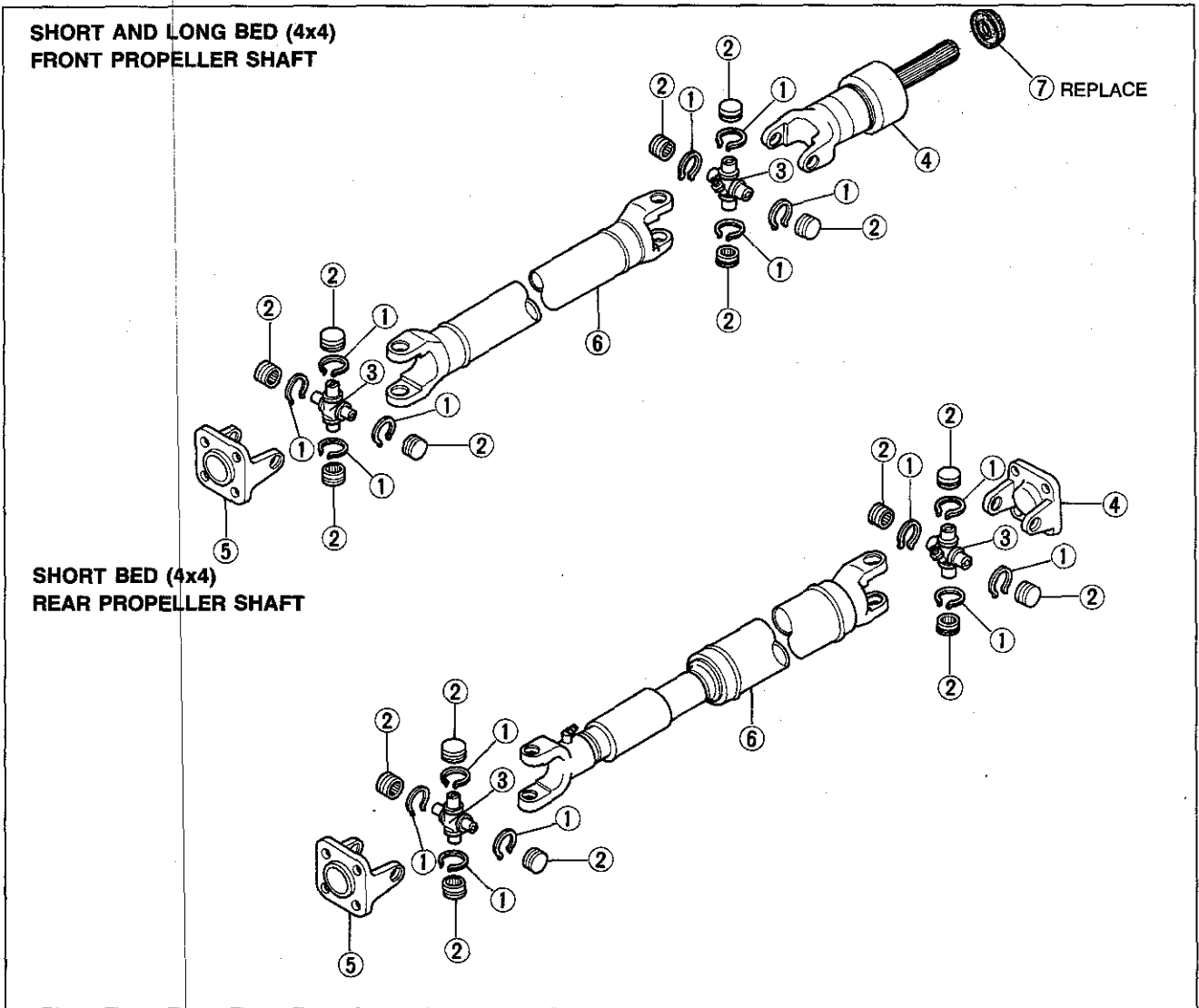


2BU0LX-004

- |  |  |  |
|--|--|--|
| 1. Snap ring   | 7. Lock washer   | 12. Snap ring  |
| 2. Bearing cup<br>Inspect for damage or<br>rough rotation                | 8. Center yoke<br>Removal ..... page L- 9<br>Installation ..... page L-14      | 13. Bearing<br>Removal ..... page L-11<br>Inspection ..... page L-12<br>Installation ..... page L-12 |
| 3. Spider<br>Removal ..... page L- 9<br>Installation ..... page L-14     | 9. Front propeller shaft<br>Inspection ..... page L-11                         | 14. Center bearing support<br>assembly<br>Removal ..... page L-11<br>Installation ..... page L-13    |
| 4. Front yoke<br>Removal ..... page L- 9<br>Installation ..... page L-14 | 10. Front dust seal<br>Removal ..... page L-11<br>Installation ..... page L-13 | 15. Rear propeller shaft<br>Inspection ..... page L-11   |
| 5. Rear yoke   | 11. Rear dust seal<br>Removal ..... page L-11<br>Installation ..... page L-12  |  |
| 6. Locknut   |  |  |

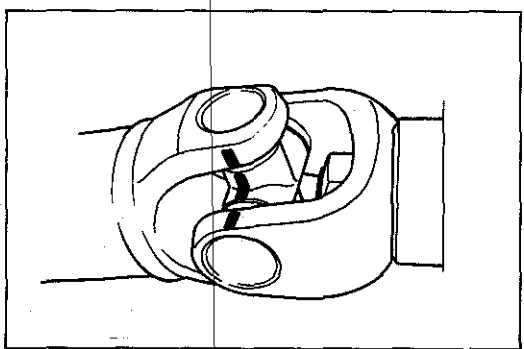
# PROPELLER SHAFT

L



2BU0LX-005

- |   |   |
|---|---|
| <p>1. Snap ring</p> <p>2. Bearing cup<br/>Inspect for damage or rough rotation</p> <p>3. Spider<br/>Removal..... page L- 9<br/>Installation..... page L-14</p> <p>4. Front yoke<br/>Removal..... page L- 9<br/>Inspect splines for damage, wear or cracks<br/>Installation..... page L-14</p> | <p>5. Rear yoke<br/>Removal..... page L- 9<br/>Installation..... page L-14</p> <p>6. Propeller shaft<br/>Inspection..... page L-11</p> <p>7. Oil seal<br/>Installation..... page L-14</p> |
|---|---|



2BU0LX-006

**Disassembly note**

**Snap ring, spider, front yoke, rear yoke, center yoke**

**Note**  
Use pads in the vice to prevent damage to the propeller shaft.

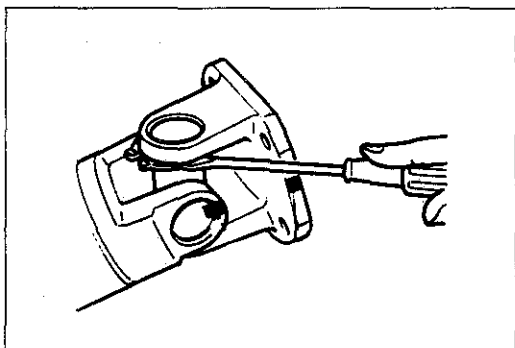
1. Place the propeller shaft in a vice.

**Note**  
If the propeller shaft, spider, and yoke are not correctly combined when assembled, vibration may result.

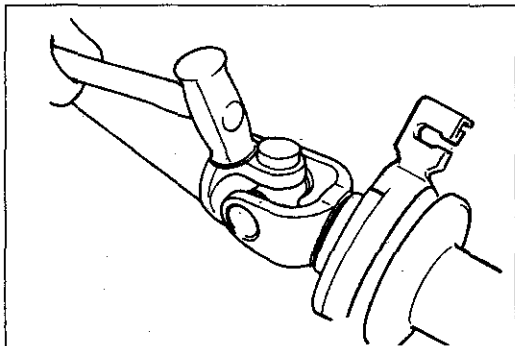
2. Align the marks on the propeller shaft, spider, and yoke.



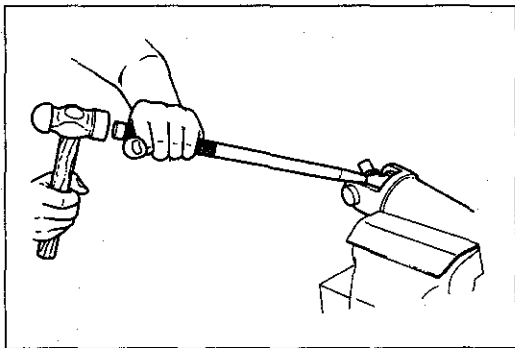
## PROPELLER SHAFT



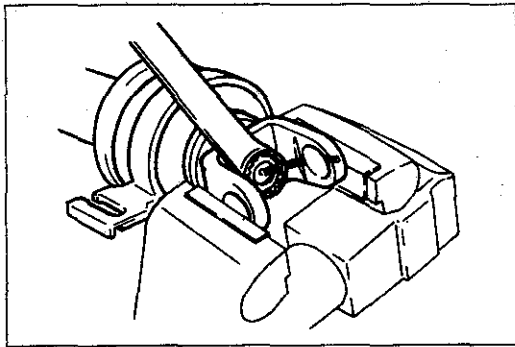
9BU0LX-014



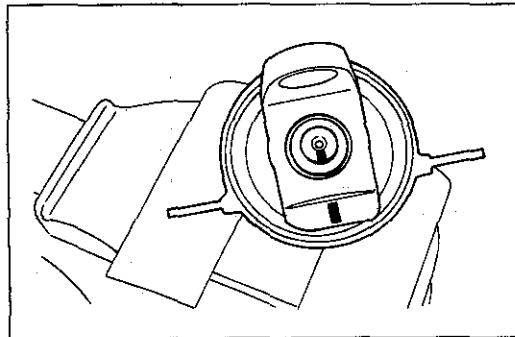
7BU08X-015



2BU0LX-007



1BU0LX-006



9BU0LX-026

### Note

The snap rings cannot be reused.

3. Remove all snap-rings with a flat-tip flattipped screwdriver.

4. Remove the bearings on the propeller shaft side by lightly tapping with a hammer.

5. Remove the bearings and spider by lightly tapping the spider.

6. Remove the bearings as shown.

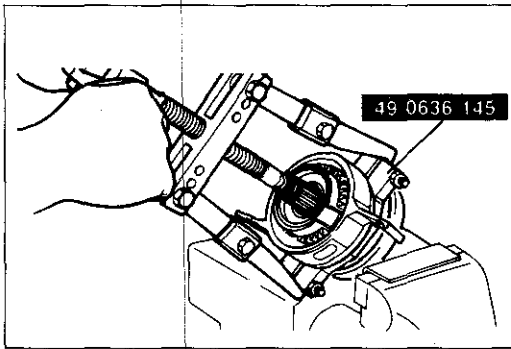
7. Remove the spider.

### Locknut

1. Align the marks on the yoke and shaft.

2. Remove the locknut.

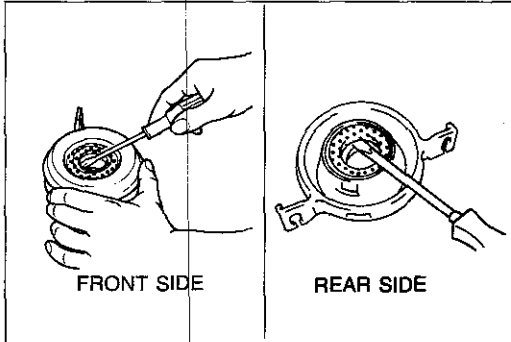
3. Align the marks on the yoke and propeller shaft.



9MU0LX-020

### Center bearing support assembly

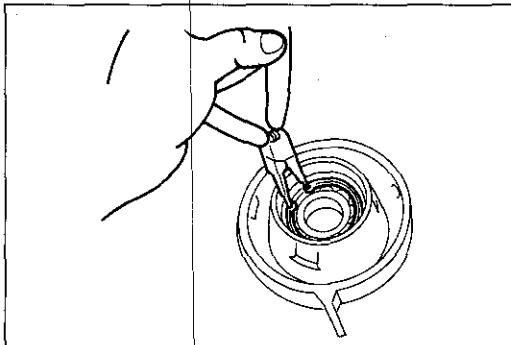
Remove the center bearing support assembly with the **SST**.



63G08X-318

### Dust seal

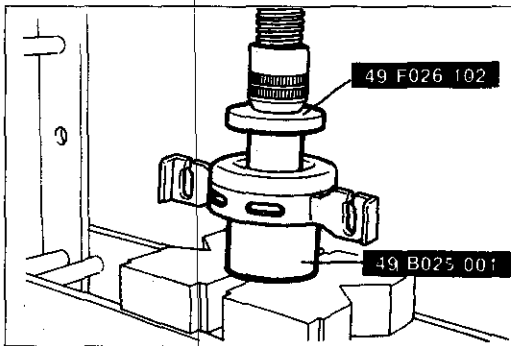
Remove the dust seals as shown.



8BU08X-007

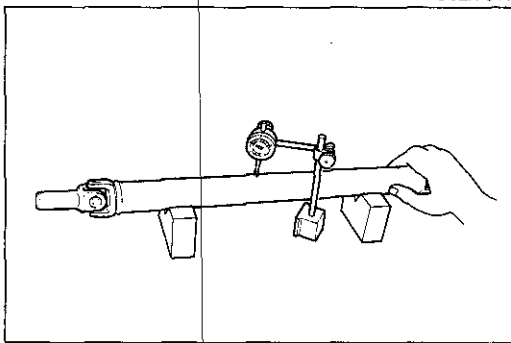
### Bearing

1. Remove the snap-ring with snap-ring pliers.



9BU0LX-015

2. Press the bearing from the support assembly toward front side with the **SST**.



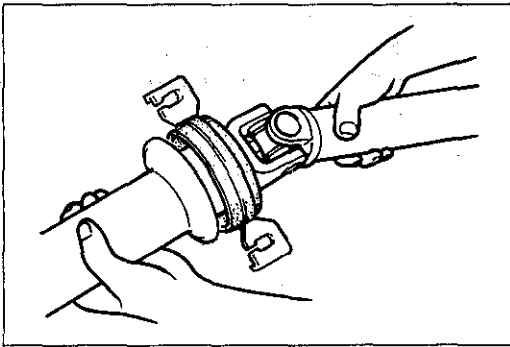
9BU0LX-016

### Inspection Propeller shaft

1. Measure the front and rear propeller shaft runout with a dial indicator.  
Replace the front and rear propeller shaft assembly if runout is excessive.

**Maximum runout: 0.4mm (0.016 in)**

## PROPELLER SHAFT

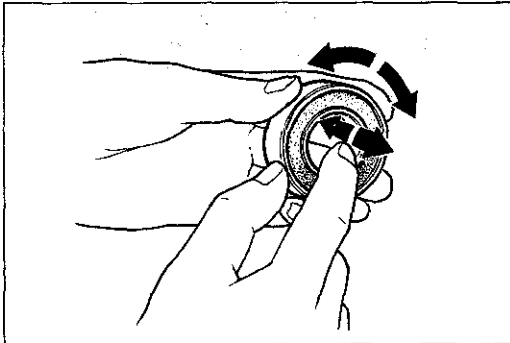


63G08X-322

2. Axial and perpendicular backlash of the universal joint

**Backlash limit: 0.05mm (0.0020 in)**

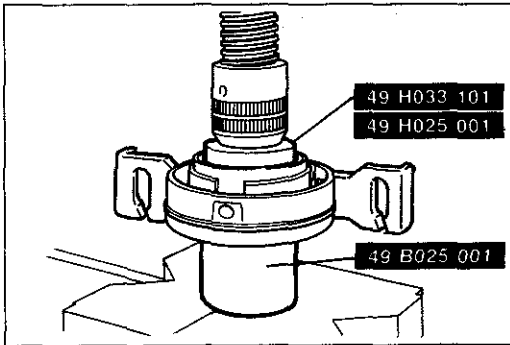
3. Condition of universal joint operation



9MU0LX-025

### Bearing

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.



9BU0LX-017

### Assembly note

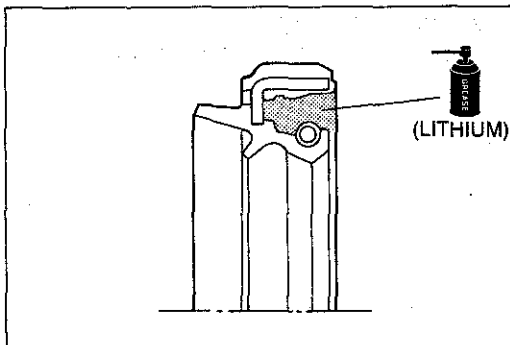
#### Bearing

1. Install the bearing into the bearing support assembly from the rear side with the **SST**.

**B2200 : 49 H033 101**

**B2600i: 49 H025 001**

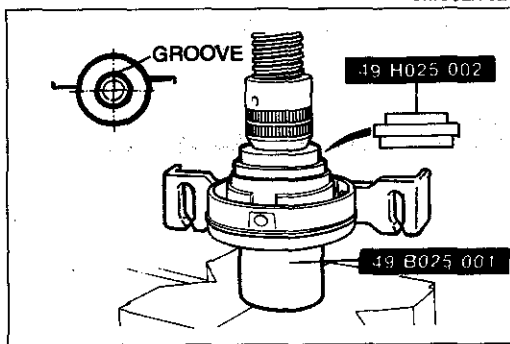
2. Install the snap-ring with the snap-ring pliers.



9MU0LX-027

### Rear dust seal

1. Before installing a new rear dust seal into the bearing support assembly, apply lithium based grease to the shaded area.

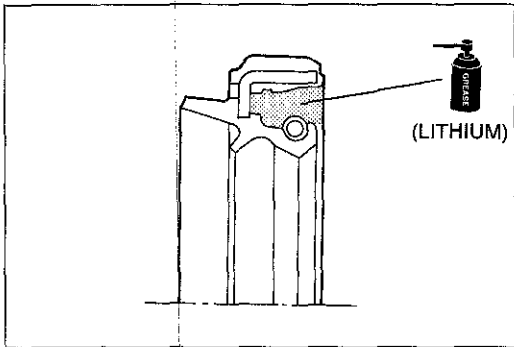


9MU0LX-028

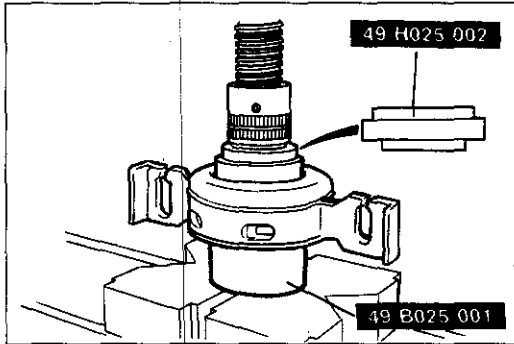
### Note

**The air bleed groove of the rear dust seal must be installed as shown.**

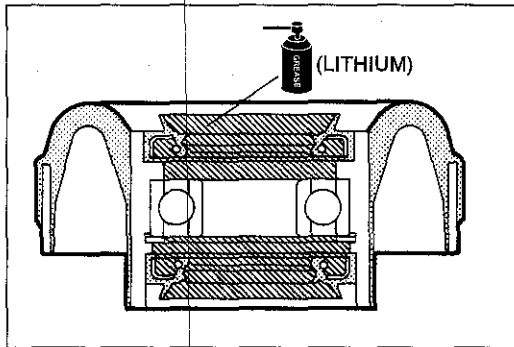
2. Install the rear dust seal into the support assembly from the rear side with the **SST** as shown in the figure.



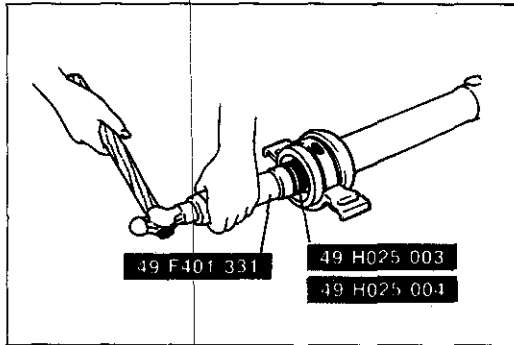
9MU0LX-029



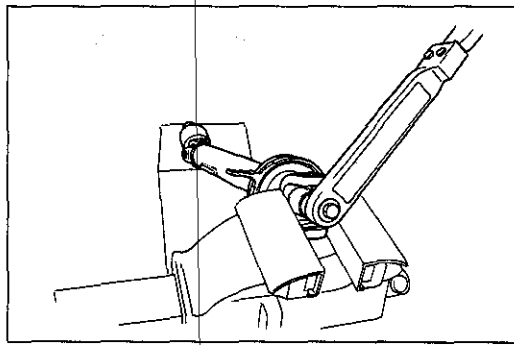
9MU0LX-030



9BU0LX-027



1BU0LX-007



1BU0LX-008

**Front dust seal**

1. Before installing a new front dust seal into the bearing support assembly, apply lithium based grease to the shaded area.

2. Install the front dust seal into the support assembly from the front side with the **SST** as shown in the figure.

3. Apply lithium based grease to the area indicated by the oblique lines.

**Center bearing support assembly**

1. Install the center bearing support assembly with the **SST**.

**B2200 : 49 H025 003**

**B2600i: 49 H025 004**

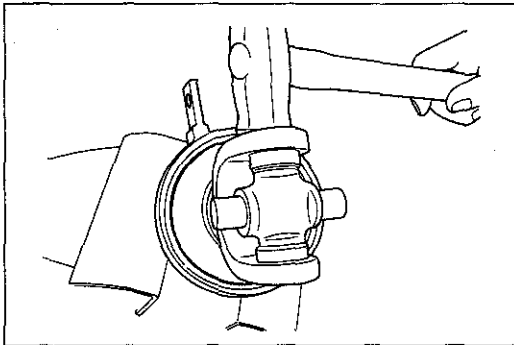
2. Align the matching marks on the yoke and shaft.

3. Install the center yoke.

**Tightening torque:**

**157—177 N·m (16—18 m·kg, 116—130 ft·lb)**

# PROPELLER SHAFT



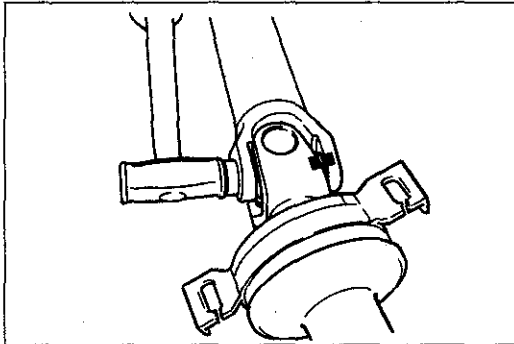
2BU0LX-008

## Front yoke, rear yoke, center yoke, spider

1. Before assembly, coat the inside of the bearing cup and roller and the grease hole of the spider with lithium based grease.

### Note

**Align the propeller shaft and spider matching marks.**



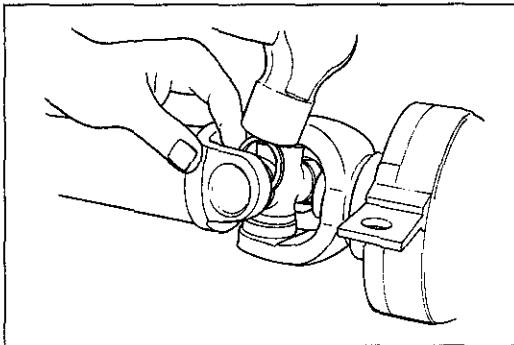
2BU0LX-009

### Note

**Align the spider and yoke matching marks.**

2. While in a vise, set 2 bearings in the propeller shaft, and tap them in by using a plastic hammer.

3. Place the yoke on the propeller shaft, and tap the bearing into the center yoke with a plastic hammer.



1BU0LX-011

## Snap rings

### Note

- a) The snap rings cannot be reused.
- b) All 4 snap rings must be the same thickness.
- c) Make sure that each snap ring fits correctly into the groove.
- d) Select the snap rings so that the universal joint starting torque will be as specified.

1. Install new snap rings.

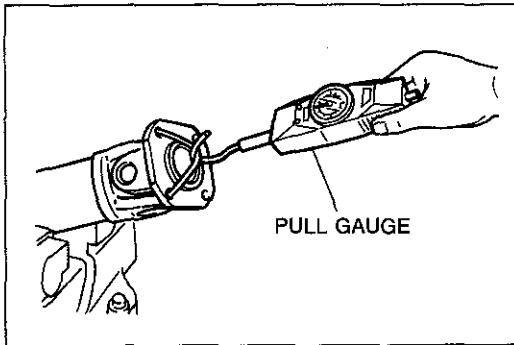
### Starting torque:

**0.294—0.784 N·m (3—8 cm·kg, 2.6—6.9 in·lb)**

### Snap-ring thicknesses:

mm (in)

1.45 (0.0571)	1.48 (0.0583)	1.51 (0.0594)	1.54 (0.0606)
1.57 (0.0618)	1.60 (0.0630)	1.63 (0.0642)	

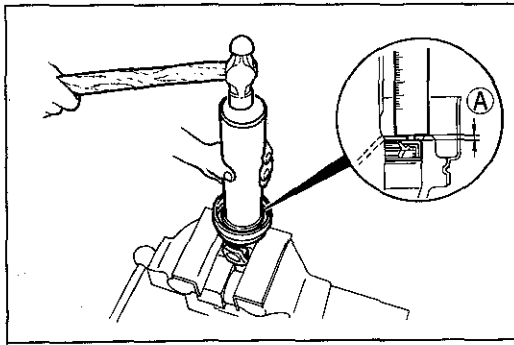


7BU08X-023

### Oil seal

Tap the new oil seal with a suitable pipe until depth **A** (between oil seal and front yoke) reaches as specified.

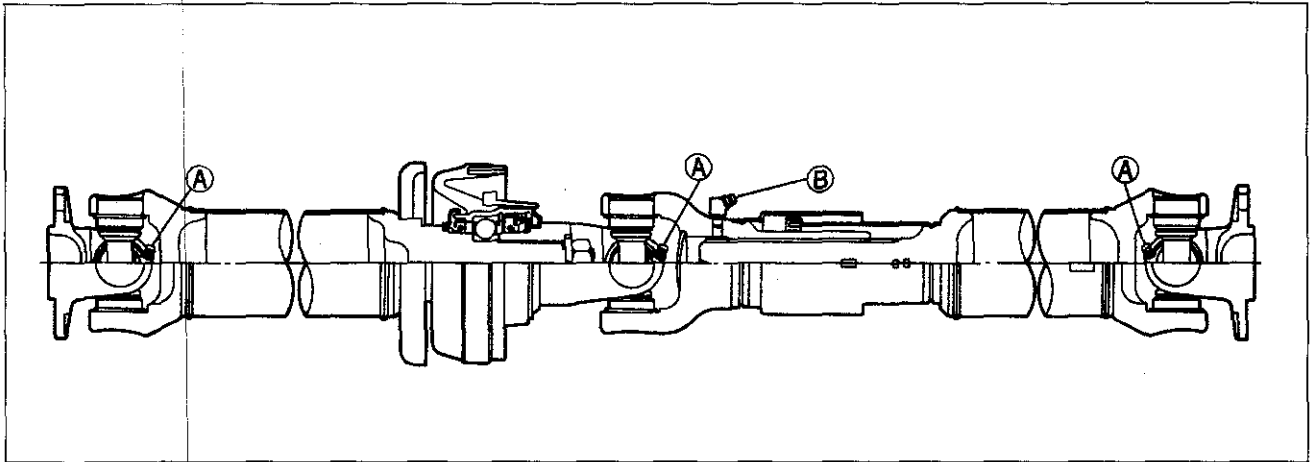
**Depth **A**: 1.7—2.3mm (0.067—0.091 in)**



9BU0LX-028

**LUBRICATION**

The fittings are installed so that regular lubrication is possible. The type of grease used for the universal joints and slip yoke is different.



9BU0LX-029

**Lubricant**

- For fitting **A** ..... Lithium based grease
- For fitting **B** ..... Disulphide molybdenum grease

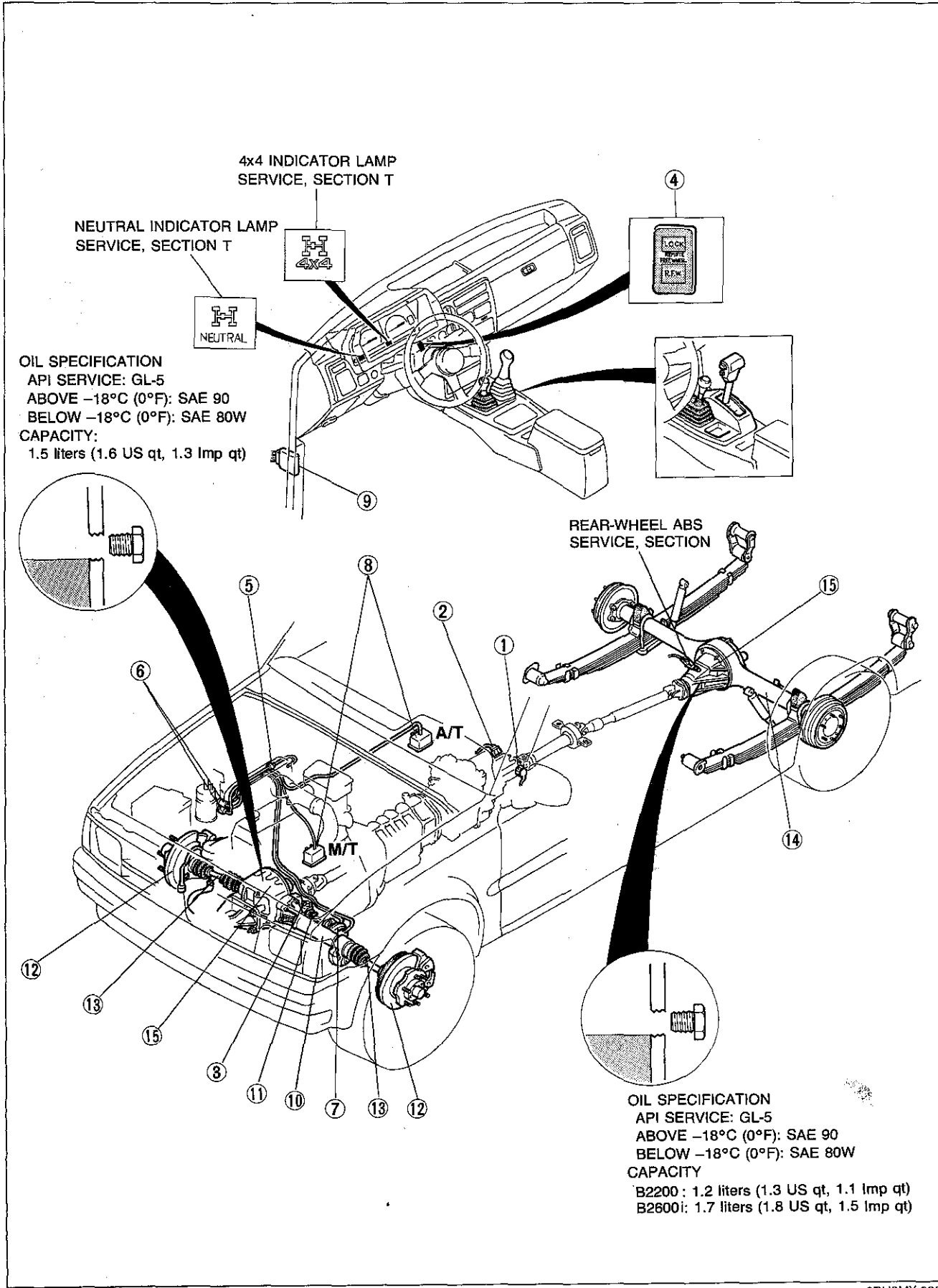
**Scheduled lubrication of propeller shaft**

Number of months or km (miles), whichever comes first
Every 15 months, or 24,000 km (15,000 miles)

# FRONT AND REAR AXLES

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2BU0MX-001

**OUTLINE**

**SPECIFICATIONS  
(4x4)**

Item		Model	B2600i	
			M/T	A/T
<b>Front axle</b>				
Bearing play axial direction		mm (in)	0 (0)	
Bearing preload (without oil seal load)	Pull scale reading	N (kg, lb)	6—12 (0.6—1.2, 1.3—2.6)	
<b>Front differential</b>				
Reduction gear		Hypoid gear		
Differential gear		Straight bevel gear		
Reduction ratio		4.300	4.444	
Number of teeth	Ring gear	43	40	
	Drive pinion gear	10	9	
Oil	Grade		API Service GL-5	
	Viscosity	Above -18°C (0°F)	SAE 90	
		Below -18°C (0°F)	SAE 80W	
	Capacity	liters (US qt, Imp qt)	1.5 (1.6, 1.3)	
<b>Rear axle</b>				
Axle casing		Banjo type		
Axle shaft support		Semifloating type		
Bearing play axial direction	When both shafts are installed	mm (in)	0.05—0.25 (0.002—0.010)	
	When one side shaft is installed	mm (in)	0.65—0.95 (0.026—0.037)	
<b>Rear differential</b>				
Reduction gear		Hypoid gear		
Differential gear		Straight bevel gear		
Reduction ratio		4.300	4.444	
Number of teeth	Ring gear	43	40	
	Drive pinion gear	10	9	
Oil	Grade		API Service GL-5	
	Viscosity	Above -18°C (0°F)	SAE 90	
		Below -18°C (0°F)	SAE 80W	
	Capacity	liters (US qt, Imp qt)	1.7 (1.8, 1.5)	

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**(4x2)**

Item		Model	B2200		B2600i	
			M/T	A/T	M/T	A/T
<b>Front axle</b>						
Bearing play axial direction		mm (in)	0 (0)			
Bearing preload (without oil seal load)	Pull scale reading	N (kg, lb)	6—11 (0.6—1.1, 1.3—2.4)			
<b>Rear axle</b>						
Axle casing		Banjo type				
Axle shaft support		Semifloating type				
Bearing play axial direction	When both shafts are installed	mm (in)	0.05—0.25 (0.002—0.010)			
	When one side shaft is installed	mm (in)	0.65—0.95 (0.026—0.037)			
<b>Differential</b>						
Reduction gear		Hypoid gear				
Differential gear		Straight bevel gear				
Reduction ratio		3.909	3.727			
Number of teeth	Ring gear	43	41			
	Drive pinion gear	11	11			
Rear axle oil	Grade		API Service GL-5			
	Viscosity	Above -18°C (0°F)	SAE 90			
		Below -18°C (0°F)	SAE 80W			
	Capacity	liters (US qt, Imp qt)	1.2 (1.3, 1.1)	1.7 (1.8, 1.5)		

OBU0MX-005

**TROUBLESHOOTING GUIDE**

**REMOTE FREE WHEEL (RFW) UNIT**

Problem		Possible Cause	Remedy	Page
No RFW operation	Free to Lock	Failed transfer case switch Failed control unit Failed lock solenoid Failed actuator Air leak at vacuum reservoir or system Failed one-way check valve	Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace	M- 7 M-10 M- 8 M- 9, 18 M-10 M- 8
	Lock to Free	Failed RFW main switch Failed transfer case switch Failed control unit Failed lock solenoid Failed actuator Air leak at vacuum reservoir or system Failed one-way check valve	Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace Inspect and/or Replace	M- 8, 18 M- 7 M-10 M- 8 M- 9, 18 M-10 M- 8
Abnormal noise		Insufficient front differential oil Incorrect front differential oil Worn or damaged bearing Worn spline of RFW hub Worn joint shaft Improperly adjusted shim Improperly adjusted spacer Worn spline of output shaft	Add oil Replace Replace Replace Replace Adjust Adjust Replace	M-51 M-51 M-14 M-14 M-14 M-16 M-17 M-13
Heat buildup		Insufficient front differential oil Improperly adjusted shim and spacer Excessive front differential oil	Add oil Adjust Drain oil	M-51 M-16, 17 M-51
Oil leakage		Excessive front differential oil Poorly tightened RFW unit Worn or damaged oil seal	Drain oil Tighten or repair Replace	M-51 M-13 M-14

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**FRONT AXLE**

Problem		Possible Cause	Remedy	Page
Steering wheel vibration		Improperly adjusted wheel bearing play	Adjust	M-22, 31
		Worn or damaged wheel bearing	Replace	M-25
Steering wheel pulls or one-sided braking		Improperly adjusted wheel bearing play	Adjust	M-29, 31
		Worn or damaged wheel bearing	Replace	M-25
Excessive steering wheel play		Improperly adjusted wheel bearing play	Adjust	M-29, 31
Abnormal noise		Bent axle casing	Replace	—
		Bent output shaft	Replace	M-13
		Worn or damaged wheel bearing	Replace	M-23
		Worn output shaft spline	Replace	M-13
		Insufficient grease in joint or spline of drive shaft	Replenish or replace	M-37
		Excessive backlash on spline of drive shaft worn joint of drive shaft	Replace	M-37
Grease leakage from boot		Damaged or broken boot	Replace	M-38
		Faulty boot band	Replace	M-38
		Excessive grease	Repair	M-37
Oil leakage		Cracked axle casing	Replace	—

2BUOMX-003

# M

## TROUBLESHOOTING GUIDE

### FRONT DIFFERENTIAL

Problem	Possible Cause	Remedy	Page
<b>Abnormal noise</b>	Insufficient front differential oil	Add oil	M-51
	Incorrect front differential oil	Replace	M-51
	Improperly adjusted backlash of final gear	Adjust	M-65
	Poor contact of teeth of final gear	Adjust	M-66
	Worn or damaged side bearing	Replace	M-60
	Worn or damaged final gear	Replace	M-58
	Worn or damaged drive pinion bearing	Replace	M-58
	Worn or damaged pinion and side gear	Replace	M-58, 60
	Seizure of side gear and case	Replace	M-60
	Worn spline of side gear	Replace	M-60
	Worn pinion shaft	Replace	M-60
	Loose companion flange nut	Tighten	M-64
	Worn side gear thrust washer	Replace	M-60
	Improperly adjusted side bearing preload	Adjust	M-61
Improperly adjusted drive pinion bearing preload	Adjust	M-64	
Worn spline of output shaft	Replace	M-13	
<b>Heat buildup</b>	Insufficient front differential oil	Add oil	M-51
	Insufficient backlash of gears	Adjust	M-65
	Excessive bearing preload	Adjust	M-64
<b>Oil leakage</b>	Excessive front differential oil	Drain oil	M-51
	Clogged air breather	Repair	—
	Poorly tightened differential carrier	Tighten or repair	M-57
	Worn or damaged oil seal	Replace	M-51

2BU0MX-004

### REAR AXLE

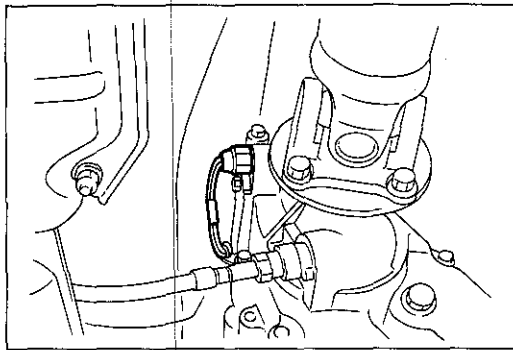
Problem	Possible Cause	Remedy	Page
<b>Abnormal noise</b>	Bent axle casing	Replace	—
	Bent axle shaft	Replace	M-46
	Worn or damaged wheel bearing	Replace	M-46
	Loose bearing locknut	Tighten	M-48
	Worn axle shaft spline	Replace	M-46
<b>Oil leakage</b>	Worn or damaged oil seal	Replace	M-46
	Cracked axle casing	Replace	—

0BU0MX-009

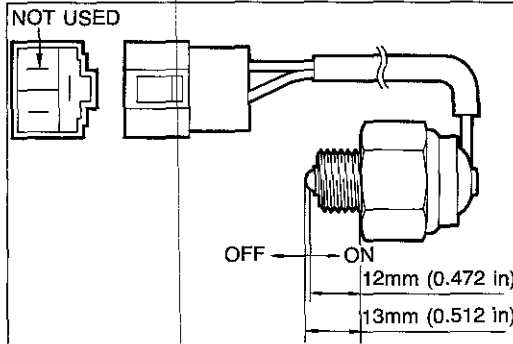
### REAR DIFFERENTIAL

Problem	Possible Cause	Remedy	Page
<b>Abnormal noise</b>	Insufficient rear differential oil	Add oil	M-51
	Incorrect rear differential oil	Replace	M-51
	Improperly adjusted backlash of final gear	Adjust	M-65
	Poor contact of teeth of final gear	Adjust	M-66
	Worn or damaged side bearing	Replace	M-60
	Worn or damaged final gear	Replace	M-58
	Worn or damaged drive pinion bearing	Replace	M-58
	Worn or damaged pinion and side gear	Replace	M-58, 60
	Seizure of side gear and case	Replace	M-60
	Worn spline of side gear	Replace	M-60
	Worn pinion shaft	Replace	M-60
	Loose companion flange nut	Tighten	M-64
	Worn side gear thrust washer	Replace	M-60
	Improperly adjusted side bearing preload	Adjust	M-61
Improperly adjusted drive pinion bearing preload	Adjust	M-64	
Worn spline of rear axle shaft	Replace	—	
<b>Heat buildup</b>	Insufficient rear differential oil	Add oil	M-51
	Insufficient backlash of gears	Adjust	M-65
	Excessive bearing preload	Adjust	M-64
<b>Oil leakage</b>	Excessive rear differential oil	Drain oil	M-51
	Clogged air breather	Repair	—
	Poorly tightened differential carrier	Tighten or repair	M-57
	Worn or damaged oil seal	Replace	M-51

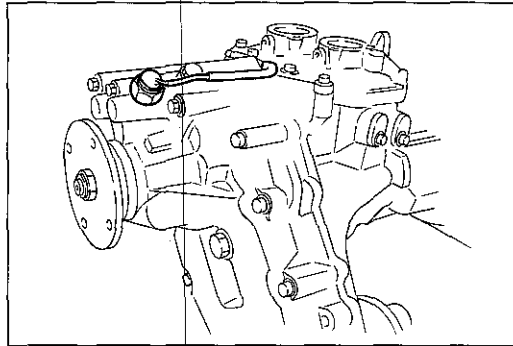
2BU0MX-005



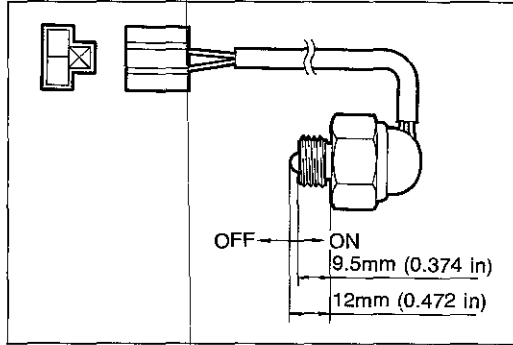
0BU0MX-011



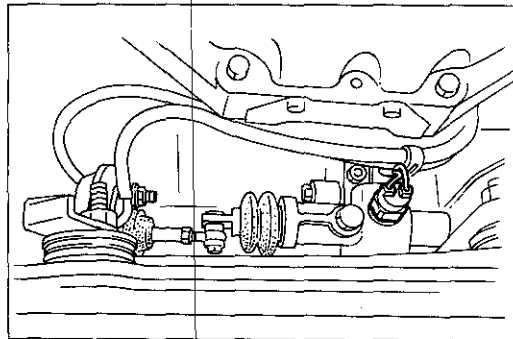
0BU0MX-012



0BU0MX-013



0BU0MX-014



9BU0MX-026

**REMOTE FREE WHEEL (RFW) MECHANISM**

**TRANSFER CASE SWITCH (4x4 INDICATOR SWITCH)  
Inspection**

1. Disconnect the negative battery terminal.
2. Jack up the vehicle and support it with safety stands.
3. Remove the transfer case switch (4x4 indicator switch).

4. Check for continuity between the terminals as shown with an ohmmeter.

Continuity	Switch
Yes	Depressed
No	Released

5. If not correct, replace the switch.

**TRANSFER CASE SWITCH (NEUTRAL SWITCH)  
Inspection**

1. Disconnect the negative battery terminal.
2. Jack up the vehicle and support it with safety stands.
3. Remove the transfer case switch (neutral switch).

4. Check continuity of switch with an ohmmeter.

Continuity	Switch
Yes	Depressed
No	Released

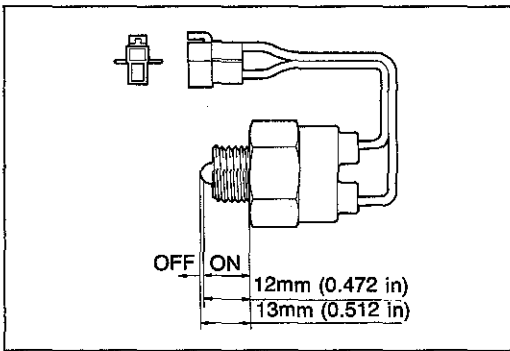
5. If not correct, replace the switch.

**RFW SWITCH  
Inspection**

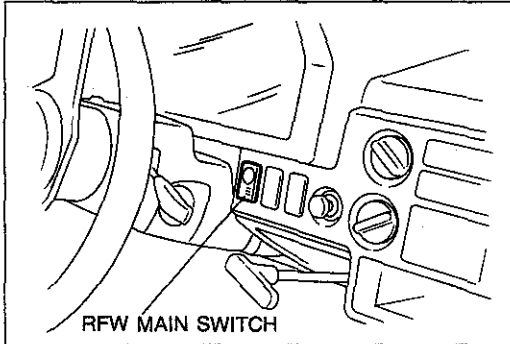
1. Disconnect the negative battery terminal.
2. Jack up the vehicle and support it with safety stands.
3. Disconnect the RFW switch connector and remove the switch.

# M

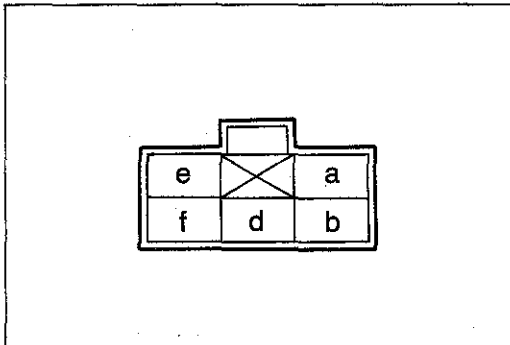
## REMOTE FREE WHEEL (RFW) MECHANISM



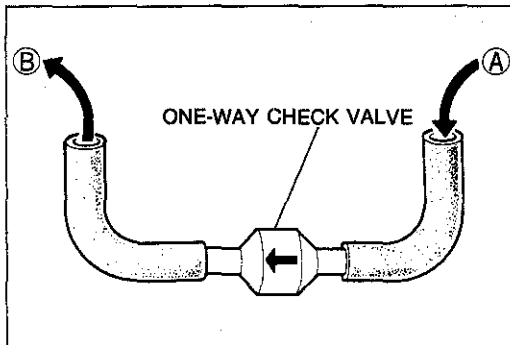
9BU0MX-027



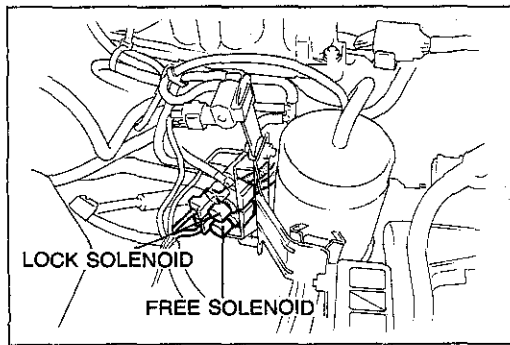
1BU0MX-004



9BU0MX-029



1BU0MX-005



9BU0MX-031

4. Check continuity of the switch with an ohmmeter.

Continuity	Switch
Yes	Depressed
No	Released

5. If not correct, replace the switch.

### RFW MAIN SWITCH AND LOCK INDICATOR LAMP Inspection

1. Remove the RFW main switch and LOCK indicator lamp. (Refer to Section S.)

2. Check for continuity between the terminals as shown with as ohmmeter.

Switch	Terminal				
	a	b	d	e	f
Depressed	○		○	○	○
Released	○	○		○	○

○—○ : Indicates continuity

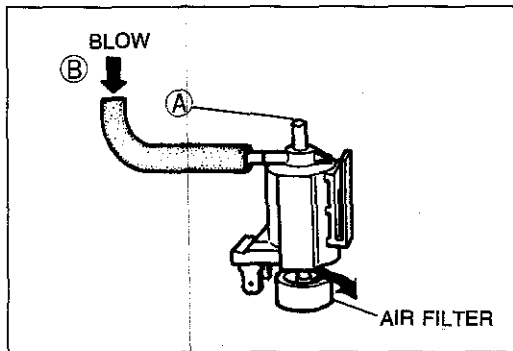
3. If not correct, replace the RFW main switch and LOCK indicator lamp.

### ONE-WAY CHECK VALVE Inspection

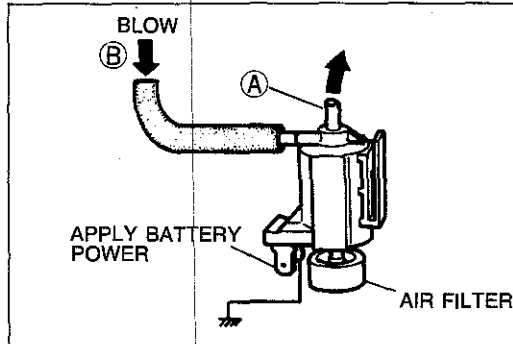
1. Remove the one-way check valve.
2. Blow through (A) and check that air flows from (B).
3. Blow through (B) and check that air does not flow from (A).
4. If not correct, replace the one-way check valve.

### LOCK AND FREE SOLENOID VALVES Inspection

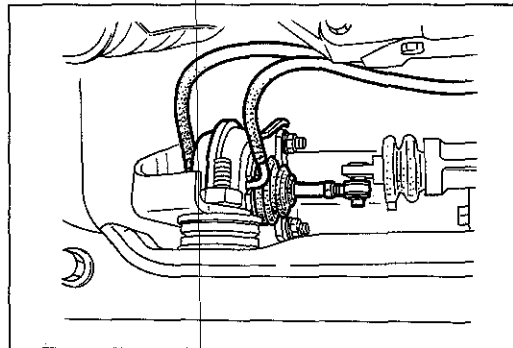
1. Disconnect the vacuum hoses and the connector from each solenoid valve.



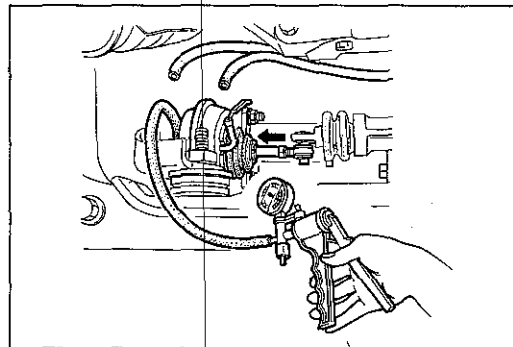
9BU0MX-032



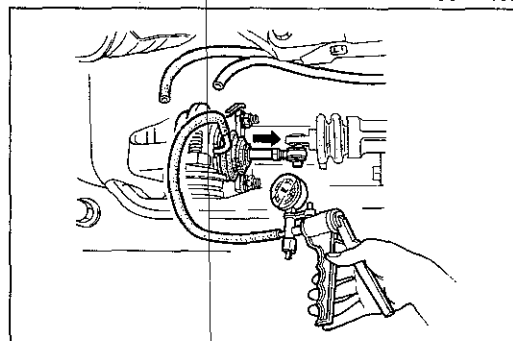
9BU0MX-033



9BU0MX-034



9BU0MX-035



9BU0MX-036

2. Blow through each valve from port (B).
3. Check that air flows from the air filter.

4. Connect 12V and a ground to the terminals of each valve.
5. Blow through each valve from port (B).
6. Check that air flows from port (A).
7. If not correct, replace the solenoid valve(s).

### ACTUATOR Inspection

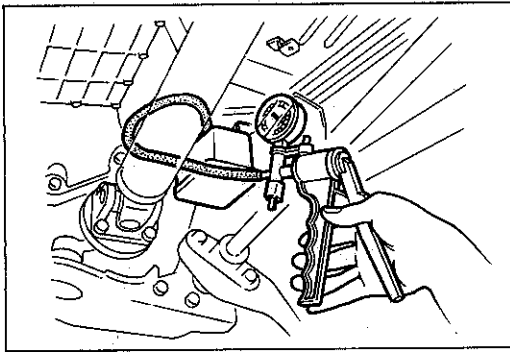
1. Jack up the vehicle and support it with safety stands.
2. Disconnect the vacuum hoses from the actuator.

3. Connect a vacuum pump tester to the actuator (free side) as shown.
4. Apply 200 mmHg (7.87 inHg) vacuum, and verify that the rod moves toward the left (driver side).
5. Disconnect the vacuum pump.

6. Connect the vacuum pump to the actuator (lock side) as shown.
7. Apply 200 mmHg (7.87 inHg) vacuum, and check that the rod moves toward the right (passenger side).
8. If not correct, replace the actuator.

### Tightening torque:

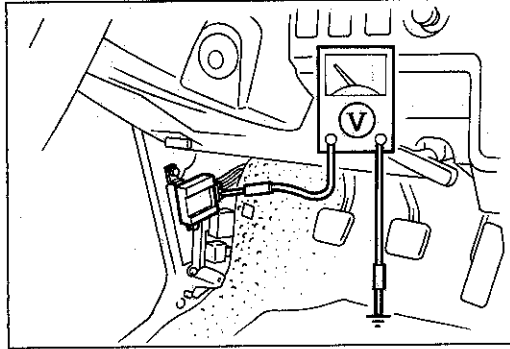
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



9BU0MX-037

**VACUUM RESERVOIR****Inspection**

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the vacuum hose and connect a vacuum pump tester.
3. Apply 700 mmHg (27.56 inHg) vacuum, and verify that the vacuum is held.
4. If not correct, replace the vacuum reservoir.



1BU0MX-006

**RFW CONTROL UNIT****Inspection**

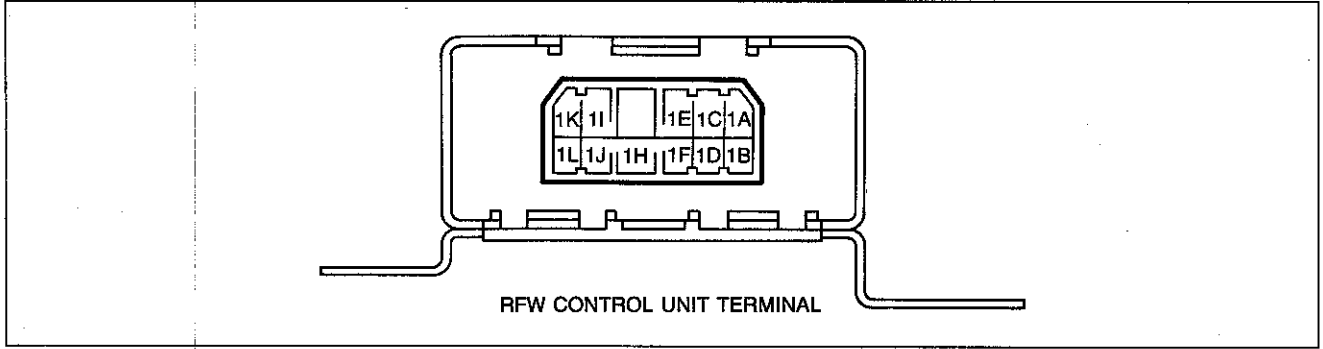
1. Turn the ignition switch ON and check the RFW control unit terminal voltages, referring to the Terminal Voltage Chart.
2. If not correct, check or replace the component(s), wiring, and/or RFW control unit.



# REMOTE FREE WHEEL (RFW) MECHANISM

M

## Terminal Voltage Chart



**V<sub>B</sub>: Battery voltage**

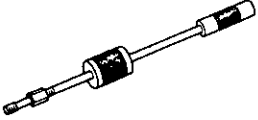
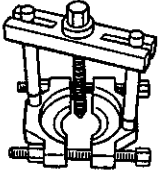
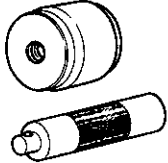
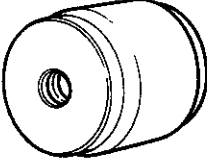
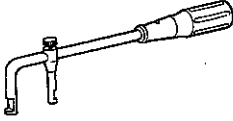

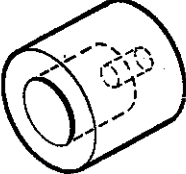
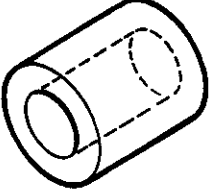
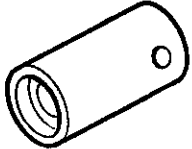
Terminal	Connected to	Voltage	Condition
1A (Output)	Lock solenoid	V <sub>B</sub>	Solenoid OFF • RFW unit "Free"
		Below 0.5V	Solenoid ON • RFW unit "Lock"
1B (Ground)	Body	Below 0.5V	—
1C (Output)	Free solenoid	V <sub>B</sub>	Solenoid OFF • RFW unit "Lock"
		Below 0.5V	Solenoid ON • RFW unit "Free"
1D	—	—	—
1E (Output)	4x4 indicator lamp	V <sub>B</sub>	4x4 indicator lamp OFF • Transfer case lever 2H or N
		Below 0.5V	4x4 indicator lamp ON • Transfer case lever 4H or 4L
1F (Output)	LOCK indicator lamp	V <sub>B</sub>	LOCK indicator lamp OFF • RFW switch OFF • RFW unit "Free"
		Below 0.5V	LOCK indicator lamp ON • RFW switch ON • RFW unit "Lock"
1H (Battery power)	Battery	V <sub>B</sub>	Ignition switch ON
		Below 0.5V	Ignition switch OFF
1I (Input)	RFW main switch	V <sub>B</sub>	RFW main switch released (OFF)
		Below 1.5V	RFW main switch depressed (ON)
1J (Input)	RFW switch	V <sub>B</sub>	RFW switch OFF • RFW unit "Free"
		Below 0.5V	RFW switch ON • RFW unit "Lock"
1K (Input)	4x4 indicator switch	V <sub>B</sub>	4x4 indicator switch OFF • Transfer case lever 4H, 4L, or N
		Below 0.5V	4x4 indicator switch ON • Transfer case lever 2H
1L (Input)	Neutral switch and neutral indicator lamp (A/T)	V <sub>B</sub>	Neutral switch OFF • Transfer case lever 2H, 4H, or 4L
		Below 0.5V	Neutral switch ON • Transfer case lever N

2BU0MX-006

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

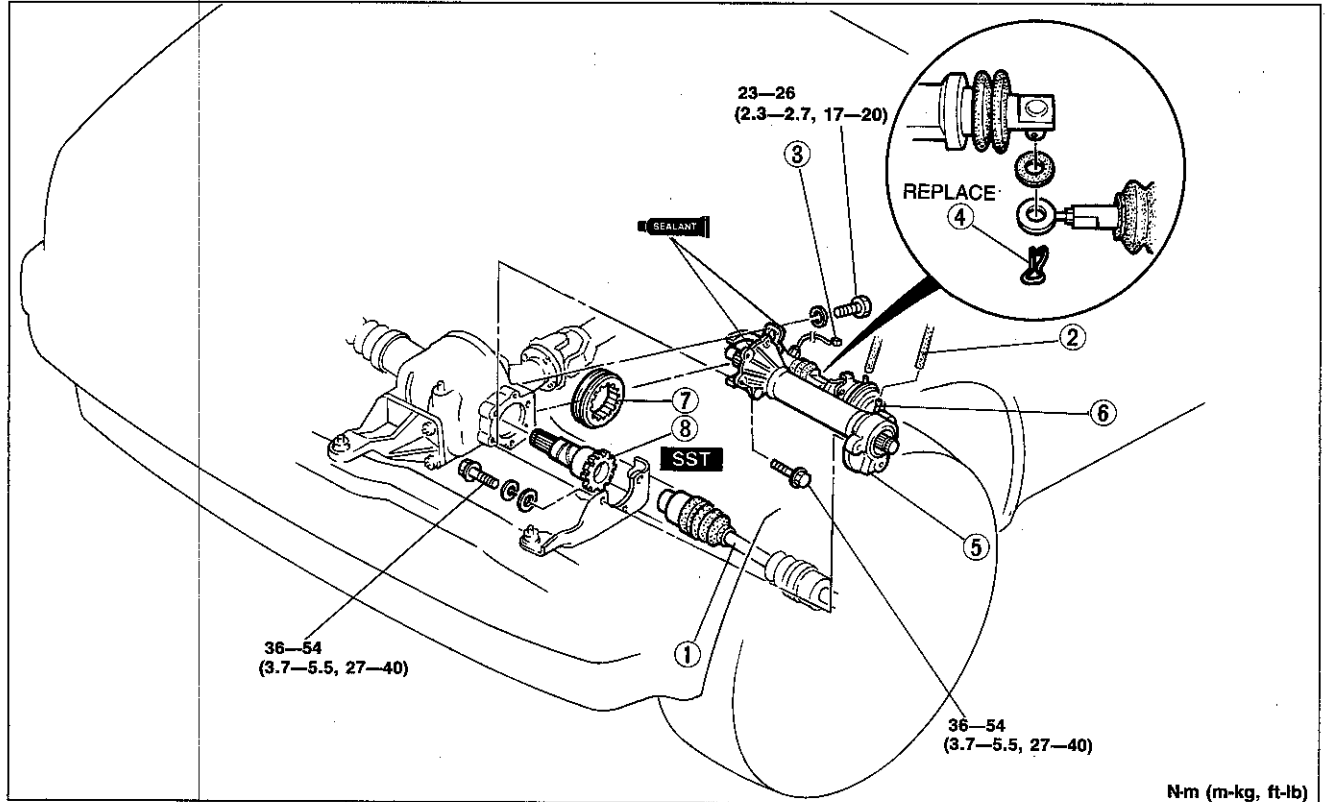
### RFW UNIT Preparation SST

<p>49 0813 215A</p> <p>Puller, tubular dowel</p> 	<p>49 0710 520</p> <p>Puller, bearing</p> 	<p>49 W027 0A0</p> <p>Installer set, oil seal</p> 
<p>49 W027 001</p> <p>Body (Part of 49 W027 0A0)</p> 	<p>49 U027 004</p> <p>Remover, oil seal</p> 	<p>49 M005 795</p> <p>Body</p> 
<p>49 U027 005</p> <p>Installer, bearing</p> 	<p>49 U027 006</p> <p>Installer, bearing</p> 	<p>49 U027 007</p> <p>Installer, oil seal</p> 

1BU0MX-007

## Joint Shaft Assembly Removal and installation

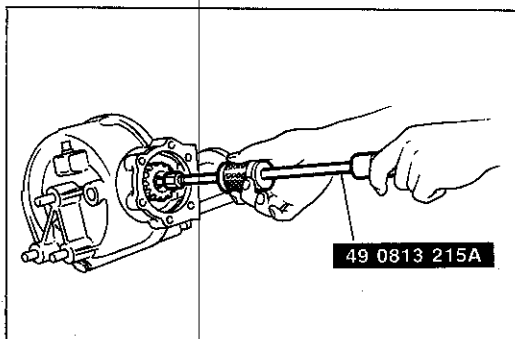
1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the front differential oil.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Add the specified oil to the specified level. (Refer to page M-51.)
7. Connect the negative battery cable.



N·m (m·kg, ft·lb)

2BU0MX-007

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Front axle drive shaft                     <ul style="list-style-type: none"> <li>Removal..... page M-37</li> <li>Disassembly..... page M-38</li> <li>Inspection..... page M-40</li> <li>Assembly..... page M-40</li> <li>Installation..... page M-43</li> </ul> </li> <li>2. Vacuum hose</li> <li>3. RFW switch connector</li> <li>4. Snap pin</li> </ol> | <ol style="list-style-type: none"> <li>5. Joint shaft assembly                     <ul style="list-style-type: none"> <li>Disassembly and inspection..... page M-14</li> <li>Inspection..... page M-16</li> <li>Assembly..... page M-16</li> </ul> </li> <li>6. Control box assembly                     <ul style="list-style-type: none"> <li>Removal and installation..... page M-18</li> <li>Disassembly and assembly..... page M-19</li> </ul> </li> <li>7. Gear sleeve                     <ul style="list-style-type: none"> <li>Inspection..... page M-20</li> </ul> </li> <li>8. Output shaft                     <ul style="list-style-type: none"> <li>Removal Note..... below</li> </ul> </li> </ol> |
|--|--|



9BU0MX-042

### Removal note

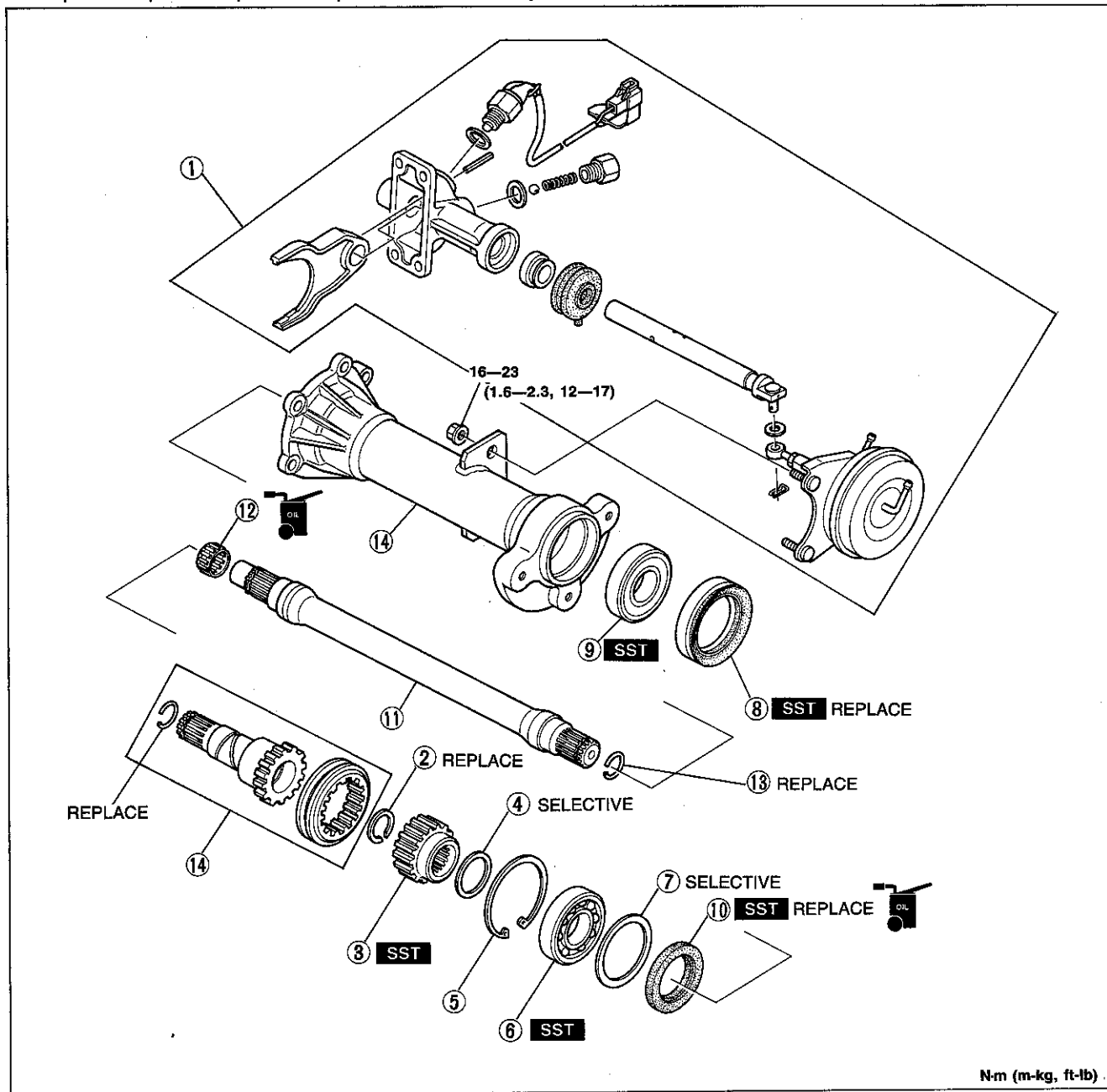
Remove the output shaft with the **SST**.

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

### Disassembly and inspection

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts, repair or replace as necessary.



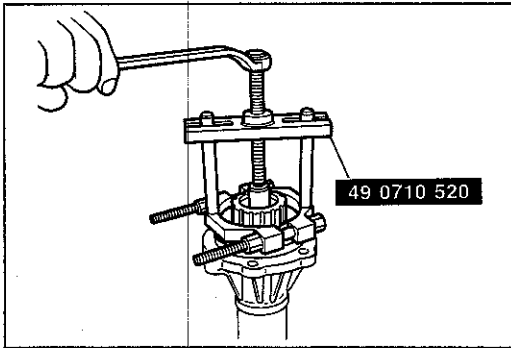
N-m (m-kg, ft-lb)

2BU0MX-008

1. Control box assembly  
Removal and installation..... page M-18  
Disassembly and assembly..... page M-19
2. Clip
3. Remote free wheel hub  
Disassembly  
Note ..... page M-15  
Inspect for cracks or damage
4. Spacer
5. Retaining ring

6. Ball bearing  
Disassembly  
Note ..... page M-15  
Inspect for damage or rough rotation
7. Adjustment shim(s)
8. Dust seal  
Inspect for damage
9. Bearing  
Disassembly  
Note ..... page M-15  
Inspect for damage or rough rotation

10. Oil seal  
Disassembly  
Note ..... page M-16
11. Joint shaft  
Inspection..... page M-16
12. Needle bearing  
Inspect for damage or rough rotation
13. Clip
14. Output shaft and gear sleeve  
Removal and installation..... page M-13

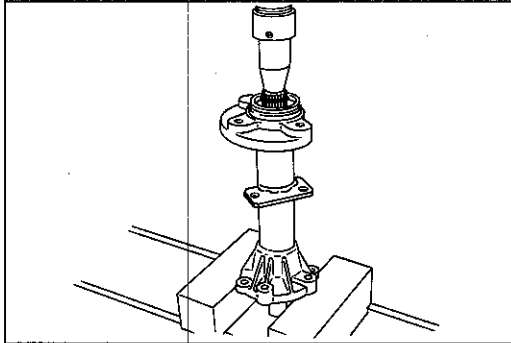


9BU0MX-044

**Disassembly note**

**Remote free wheel hub**

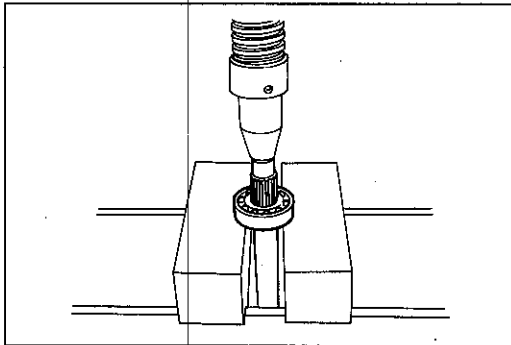
Remove the remote free wheel hub with the **SST**.



9BU0MX-045

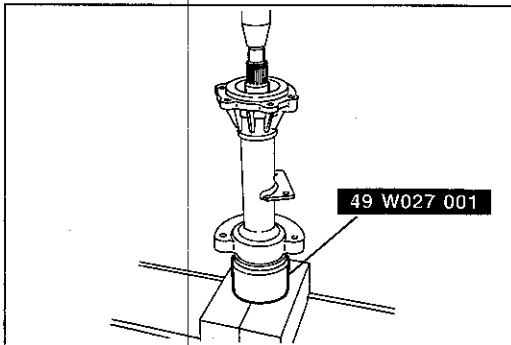
**Ball bearing**

1. Remove the ball bearing and the joint shaft with a press.



9BU0MX-046

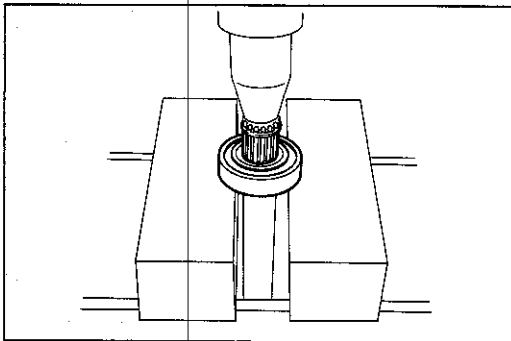
2. Remove the ball bearing with a press.



9BU0MX-048

**Bearing**

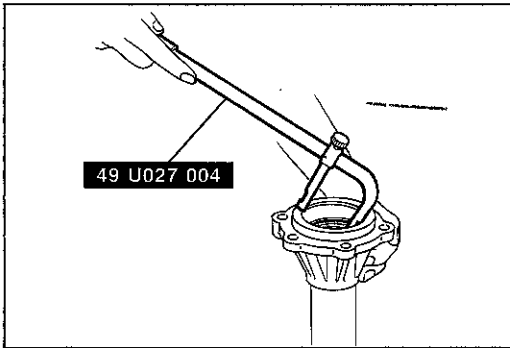
1. Remove the dust seal and bearing with the **SST**.



9BU0MX-049

2. Remove the bearing with a press.

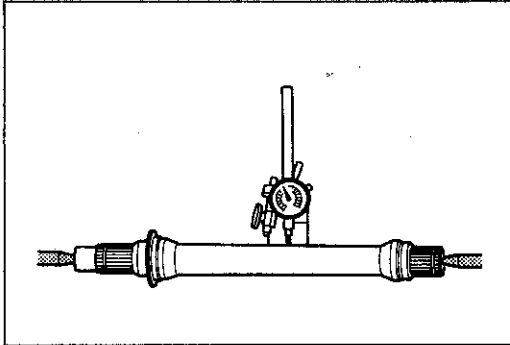
**REMOTE FREE WHEEL (RFW) MECHANISM**



9BU0MX-047

**Oil seal**

Remove the oil seal with the **SST**.

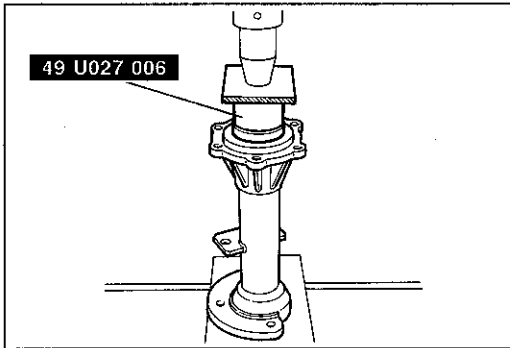


9BU0MX-050

**Inspection**

Measure the joint shaft runout.

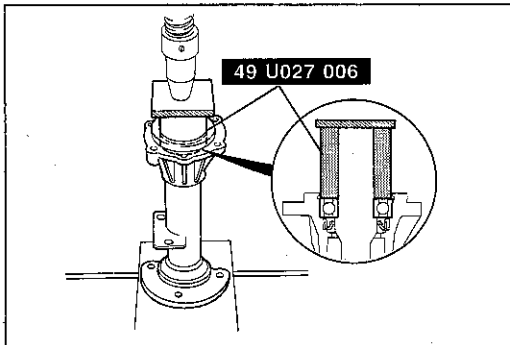
**Maximum runout: 0.03mm (0.0012 in)**



9BU0MX-051

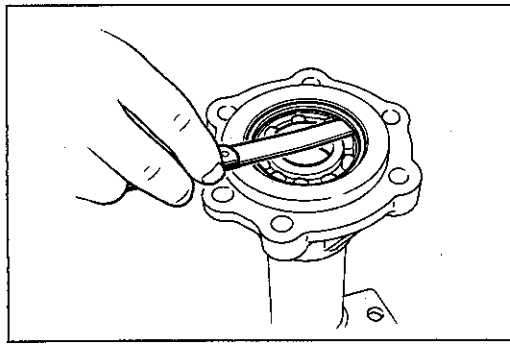
**Assembly**

1. Apply front differential oil to a new oil seal.
2. Install a new oil seal with the **SST**.



9BU0MX-052

3. Install the removal shim(s), the ball bearing with the **SST**.
4. Install the retaining ring.



9BU0MX-149

**Note**

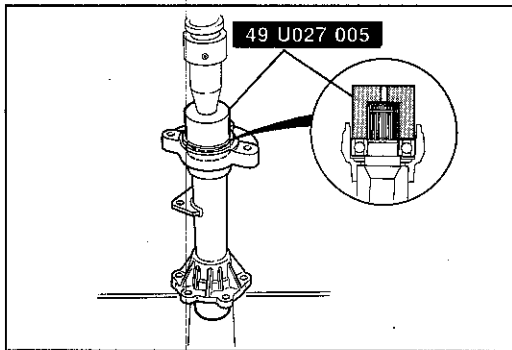
**The number of shims must not exceed two.**

5. Measure the clearance between the ball bearing and the retaining ring.  
If clearance is not as specified, adjust by adding or removing shims.

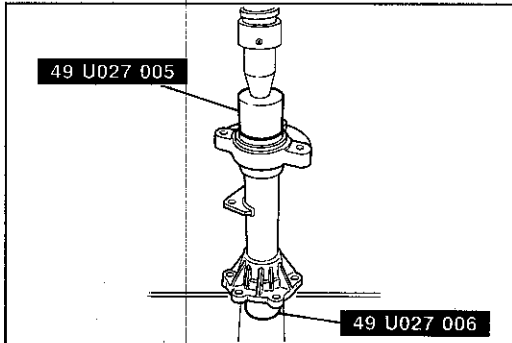
**Maximum clearance: 0.15mm (0.0059 in)**

**Available shim thickness:**

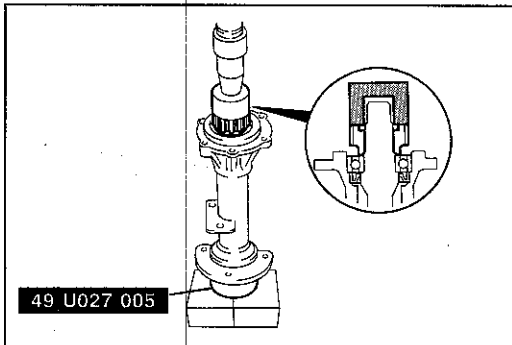
- 0.15mm (0.0059 in), 0.30mm (0.0118 in),
- 0.35mm (0.0138 in), 0.40mm (0.0157 in),
- 0.50mm (0.0197 in)



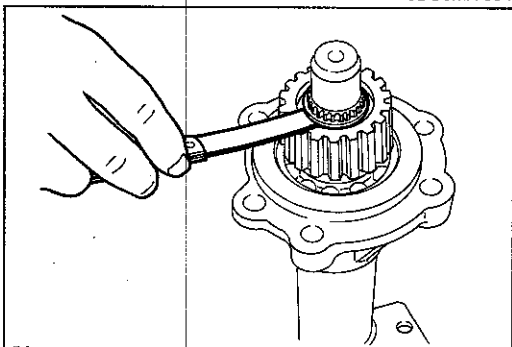
9BU0MX-150



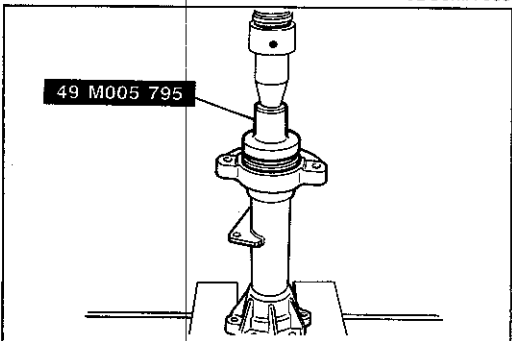
2BU0MX-009



9BU0MX-054



9BU0MX-055



9BU0MX-056

6. Install the bearing with the **SST**.

7. Remove the retaining ring.

8. Install the joint shaft and bearing with the **SST**.

**Caution**

**Install the bearing with the side of seal upward.**

9. Install the retaining ring.

10. Install the removed spacer and the remote free wheel hub with a suitable pipe and the **SST**.

11. Install a new clip.

**Note**

**The number of spacers must not exceed two.**

12. Measure the clearance between the remote free wheel hub and the clip.

If clearance is not as specified, adjust by adding or removing spacers.

**Maximum clearance: 0.15mm (0.0059 in)**

**Available spacer thickness:**

- 0.15mm (0.0059 in), 0.30mm (0.0118 in),**
- 0.35mm (0.0138 in), 0.40mm (0.0157 in),**
- 0.50mm (0.0197 in)**

13. Install the new dust seal with the **SST**.

14. Apply front differential oil to needle bearing and install it.

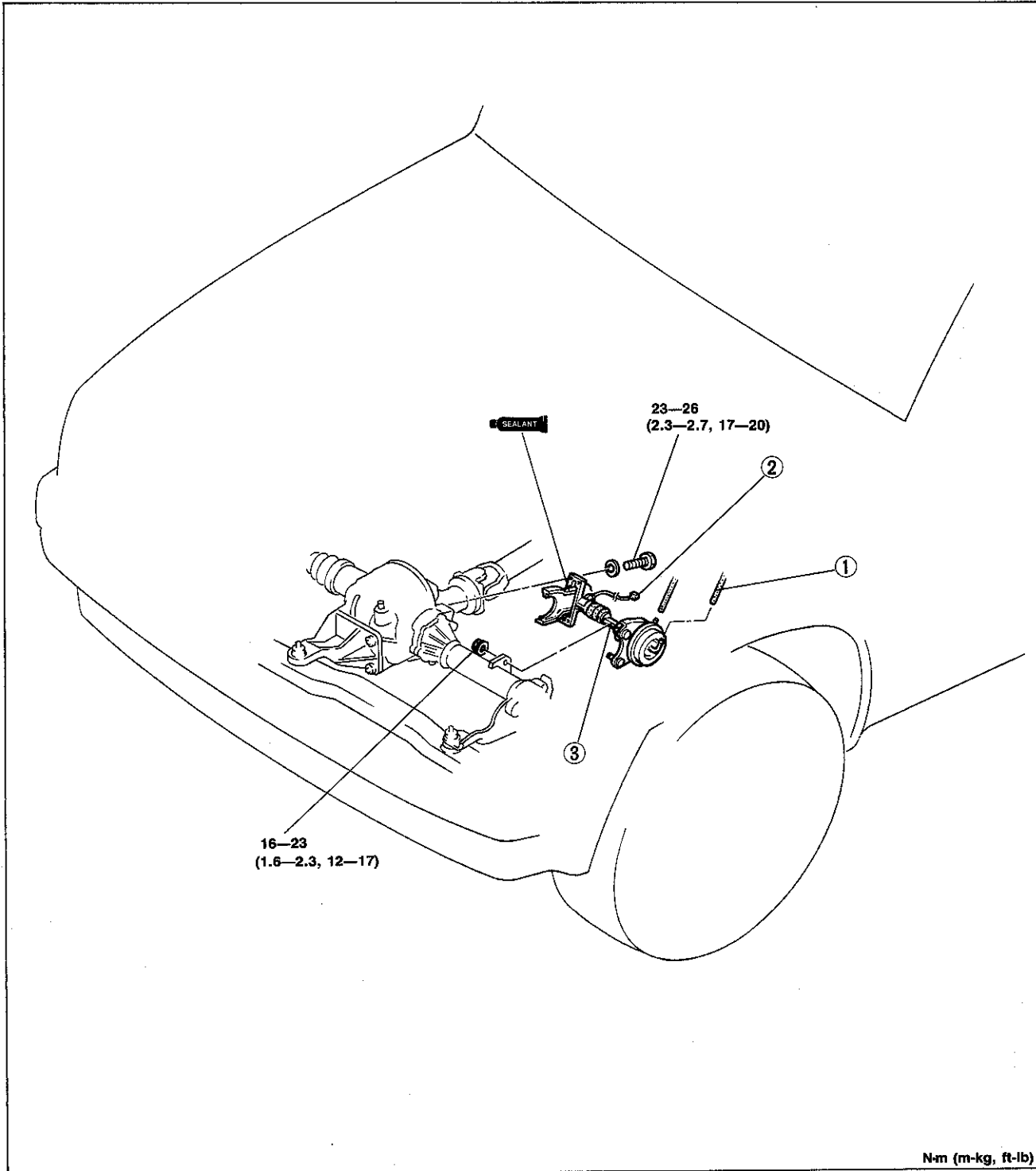
15. Install a new clip to the joint shaft.

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

### Control Box Assembly Removal and installation

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the front differential oil.
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal.
6. Add the specified oil to the specified level. (Refer to page M-51.)



N·m (m·kg, ft·lb)

2BU0MX-010

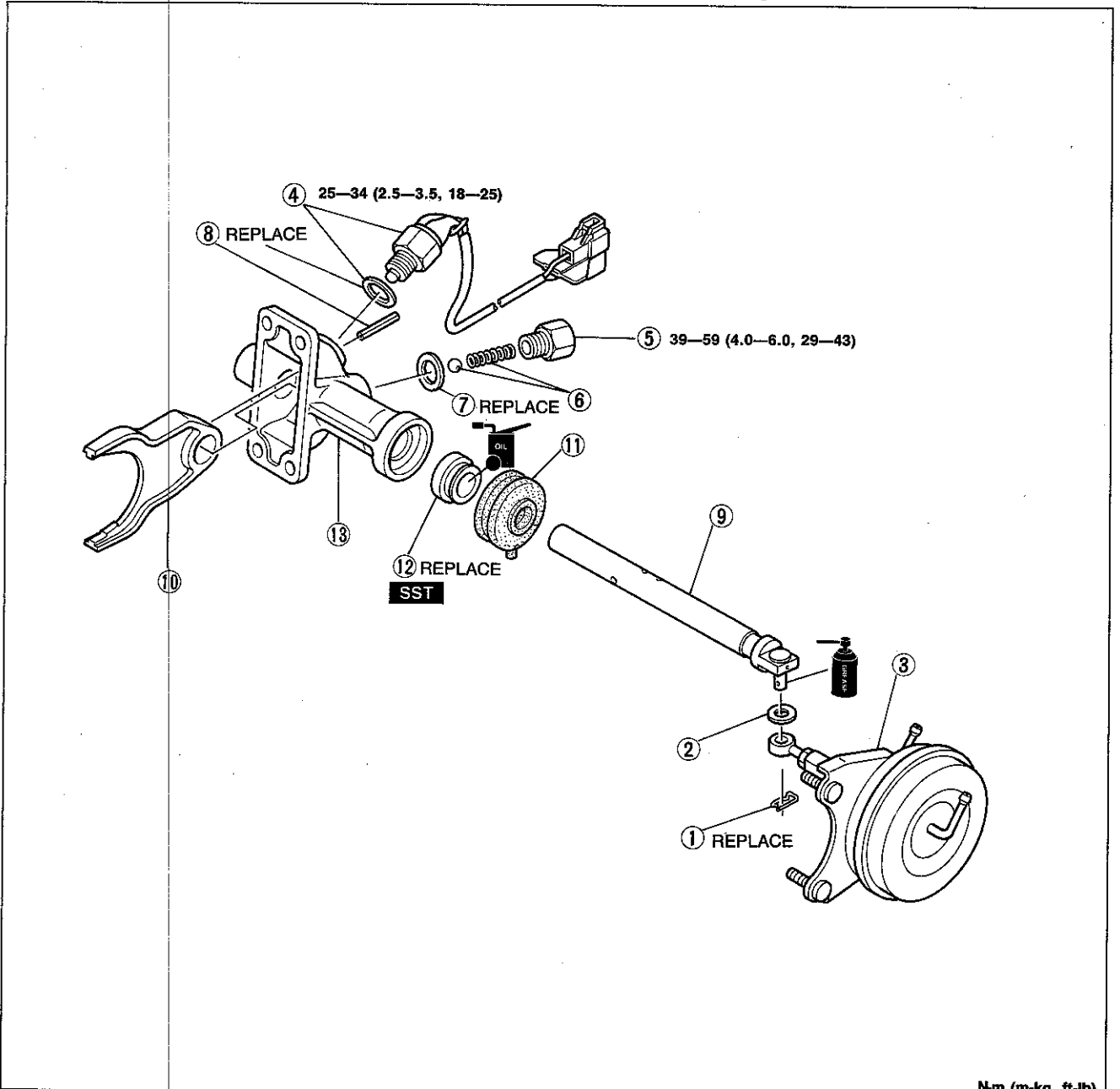
1. Vacuum hose
2. RFW switch connector

3. Control box assembly  
Disassembly and assembly ..... page M-19



## Disassembly and assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all part, repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



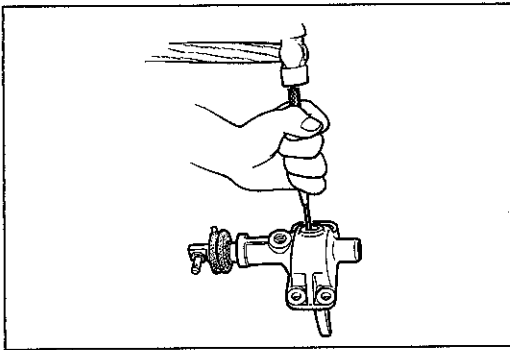
N-m (m-kg, ft-lb)  
2BU0MX-011

- |                          |           |
|--------------------------|-----------|
| 1. Snap pin              |           |
| 2. Washer                |           |
| 3. Actuator              |           |
| Inspection .....         | page M- 9 |
| 4. RFW switch and washer |           |
| Inspection .....         | page M- 8 |
| 5. Spring cap            |           |
| 6. Spring and ball       |           |
| 7. Washer                |           |
| 8. Roll pin              |           |
| Disassembly Note .....   | page M-20 |
| Assembly Note .....      | page M-20 |

- |                     |           |
|---------------------|-----------|
| 9. Change rod       |           |
| 10. Shift fork      |           |
| 11. Boot            |           |
| Inspect for damage  |           |
| Assembly Note ..... | page M-20 |
| 12. Oil seal        |           |
| Assembly Note ..... | page M-20 |
| 13. Control box     |           |
| Inspect for damage  |           |

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

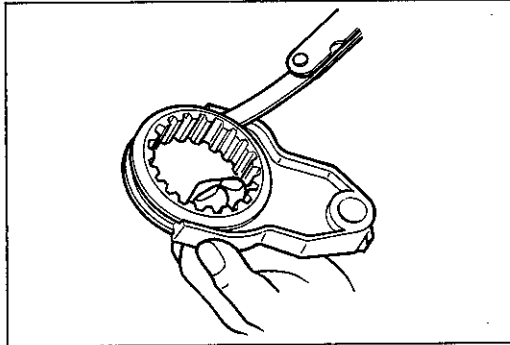


9BU0MX-059

### Disassembly note

#### Roll pin

Remove the roll pin as shown in the figure.



2BU0MX-012

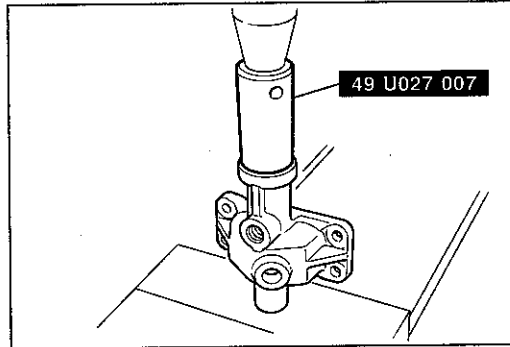
### Inspection

Measure the clearance between gear sleeve and shift fork.

#### Standard clearance:

0.1—0.40mm (0.0039—0.0161 in)

Maximum clearance: 0.50mm (0.0197 in)

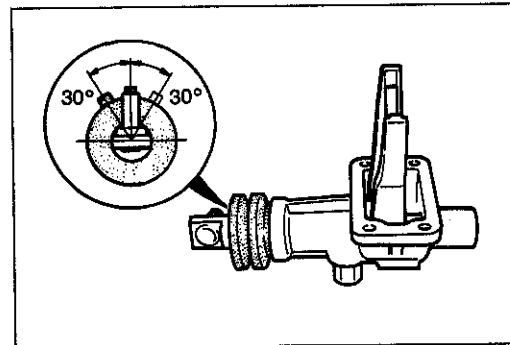


9BU0MX-061

### Assembly note

#### Oil seal

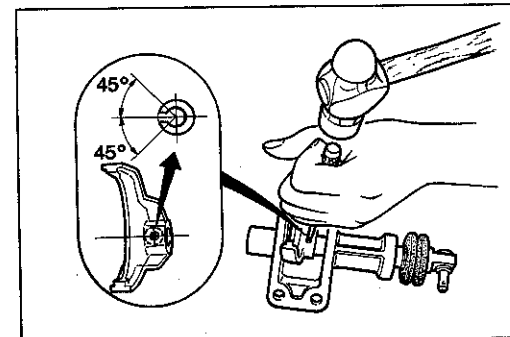
Install a new oil seal with the SST.



9BU0MX-063

### Boot

Install the boot as shown in the figure.



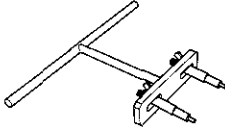
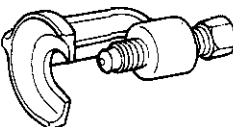
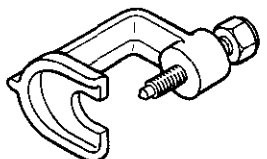
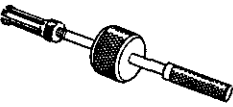
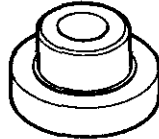
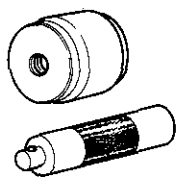
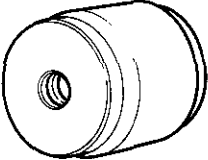
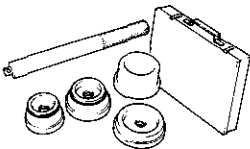
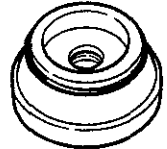
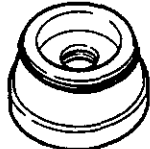
9BU0MX-062

### Roll pin

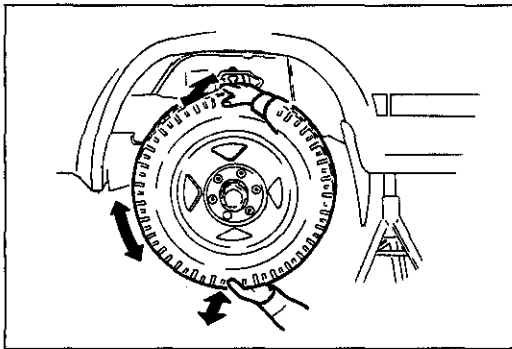
Install a new roll pin as shown in the figure.

FRONT AXLE (4x4)

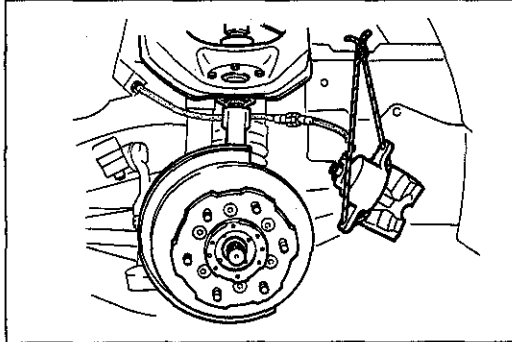
PREPARATION  
SST

<p>49 S231 635</p> <p>Wrench, front hub locknut</p>		<p>49 0118 850C</p> <p>Puller, ball joint</p>		<p>49 0727 575</p> <p>Puller, ball joint</p>	
<p>49 S231 660</p> <p>Puller, needle bearing</p>		<p>49 U033 101</p> <p>Installer, bearing</p>		<p>49 W027 0A0</p> <p>Installer set, oil seal</p>	
<p>49 W027 001</p> <p>Body (part of 49 W027 0A0)</p>		<p>49 F027 0A1</p> <p>Installer set, bearing</p>		<p>49 F027 007</p> <p>Attachment 72 (Part of 49 F027 0A1)</p>	
<p>49 F027 005</p> <p>Attachment 62 (Part of 49 F027 0A1)</p>					

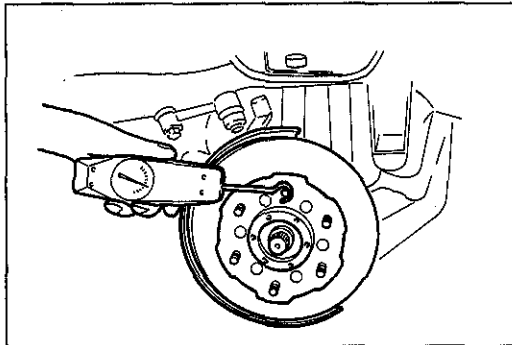
9BU0MX-064



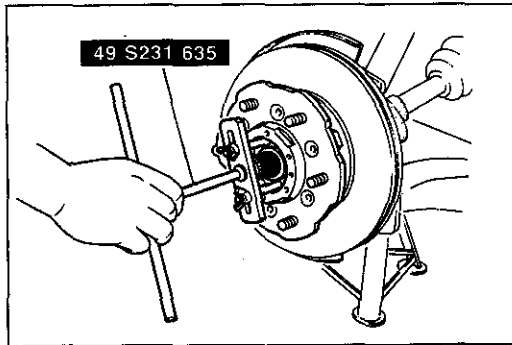
9BU0MX-065



2BU0MX-013



2BU0MX-014



9BU0MX-066

**WHEEL BEARING PLAY****Inspection**

1. Jack up the vehicle, and support it with safety stands. Inspect for noticeable bearing play with the hands held at the top and bottom of the tire.

**Wheel bearing play: 0mm (0 in)**

2. Inspect the tire for smooth rotation. Note any rough feeling or abnormal noise from the bearing.
3. Replace the wheel bearing or adjust the wheel bearing preload if necessary.

**Adjustment**

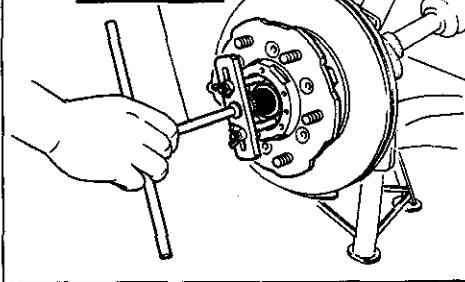
1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.
3. Remove the disc brake caliper assembly, and use a rope to suspend it.
4. Remove the drive flange.
5. Remove the snap ring and spacer.
6. Remove the set bolts and bearing set plate.
7. Tighten the locknut, and turn the hub 2 or 3 times to seat the bearing.
8. Loosen the locknut so they can be turned by hand.
9. Attach a pull scale to a wheel lug bolt, and measure the frictional force.

**Preload****Frictional force plus:**

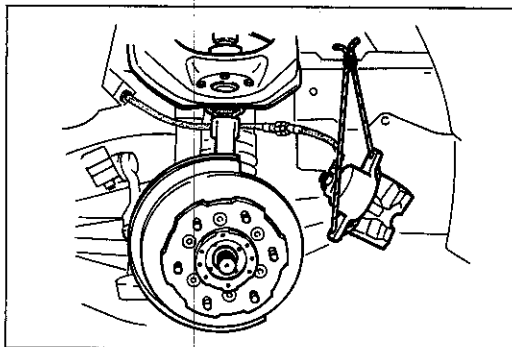
**6—12 N (0.6—1.2 kg, 1.3—2.6 lb)**

10. Tighten the locknut until the preload reaches the specified preload with the **SST**.

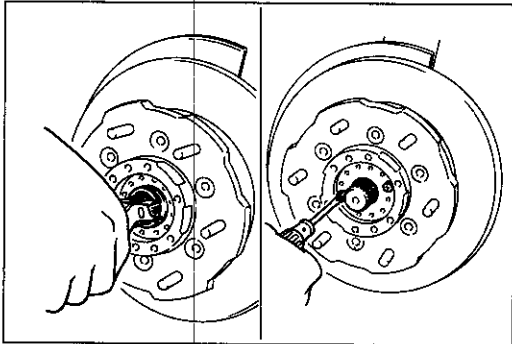
49 S231 635



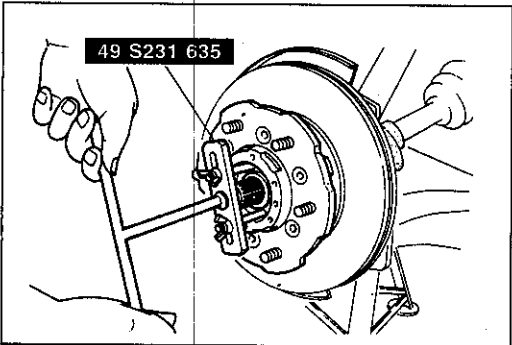
9BU0MX-066



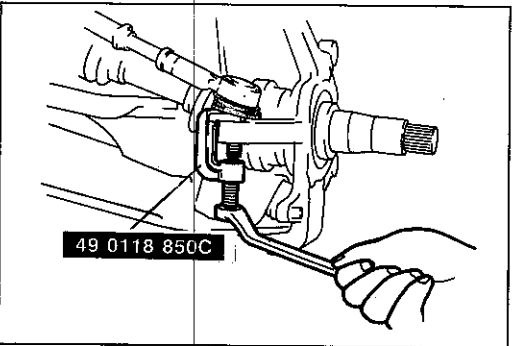
9BU0MX-067



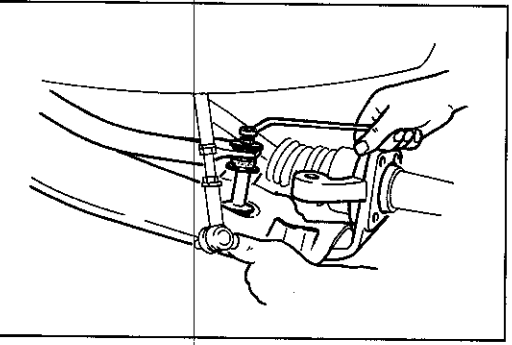
6EG09X-020



9BU0MX-068



2BU0MX-058



7BU09X-018

## REMOVAL

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.
3. Remove the drive flange.
4. Remove the caliper assembly, and use a rope to suspend it.

5. Remove the snap ring and spacer.
6. Remove the set bolts and bearing set plate.

7. Remove the bearing locknut with the **SST**.
8. Remove the hub and plate so that the washer and bearing do not fall.
9. Remove the dust cover.

10. After removing the tie rod end nut, with the **SST** to separate the tie-rod end from the knuckle.

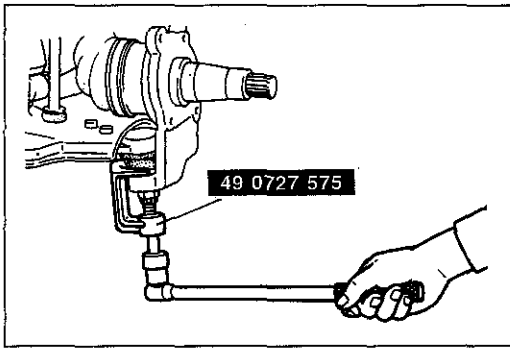
### Note

If removal is difficult, lightly tap the ball joint coupling of the knuckle with a hammer.

11. Disconnect the stabilizer and lower side of the shock absorber mounting.

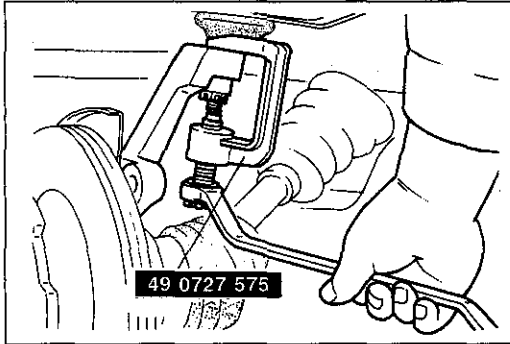
# M

## FRONT AXLE (4x4)



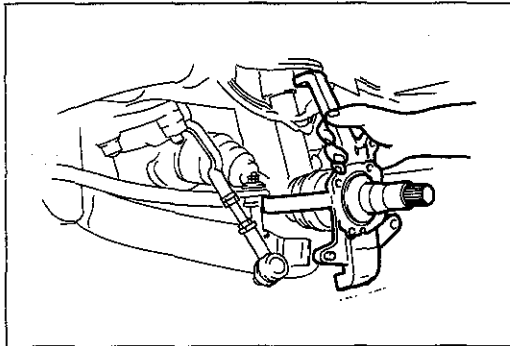
9BU0MX-070

12. Support the lower arm with a jack.
13. After removing the lower arm ball joint nut, separate the knuckle from the lower arm with the **SST**.



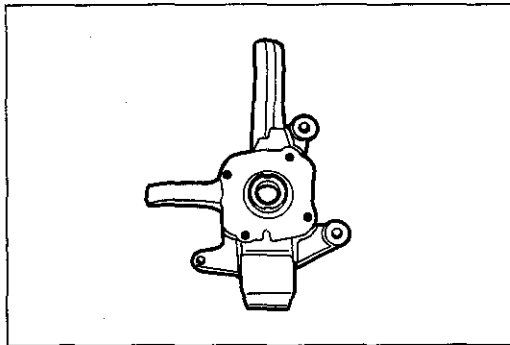
9BU0MX-071

14. After removing the upper arm ball joint nut, separate the knuckle from the upper arm with the **SST**.



7BU09X-021

15. Lower the lower arm, and remove the knuckle.

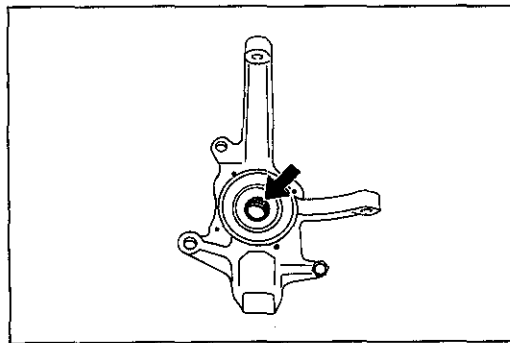


7BU09X-022

### INSPECTION

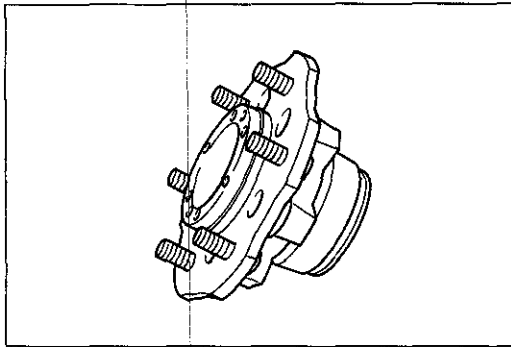
Inspect for the following problems, and replace any faulty parts.

1. Cracks and damage to knuckle.
2. Wear and rust of oil seal friction surface.



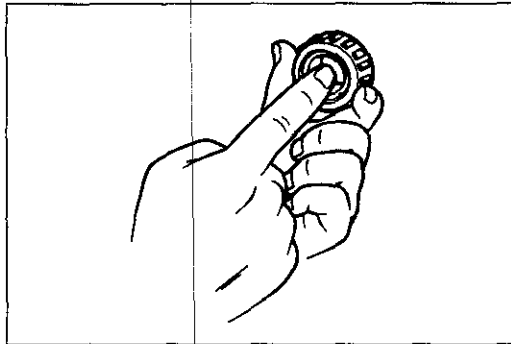
7BU09X-023

3. Wear and damage of needle bearing.



7BU09X-024

4. Cracks and damage to hub.

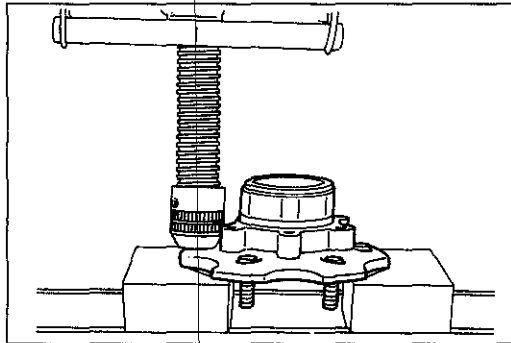


9BU0MX-151

**Caution**

**If replacement is necessary, replace the bearing inner and outer races as a set.**

5. Wear and seizure of bearings.



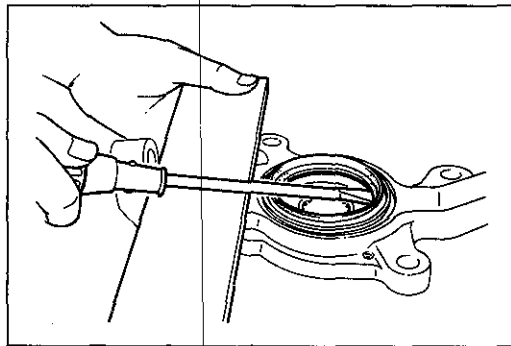
9BU0MX-152

**Caution**

**Do not reuse the wheel lug bolts once they have been removed.**

6. Wheel lug bolts for wear or damage.

Replace the wheel lug bolts, if necessary, by using a press.

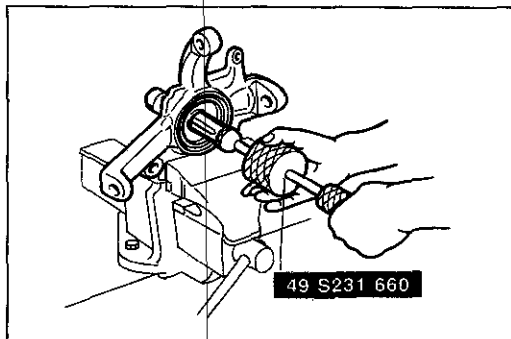


7BU09X-027

**DISASSEMBLY**

**Knuckle**

1. Remove the oil seal, and take out the bearing inner race.
2. Using a suitable bar, remove the bearing outer race by lightly tapping with a hammer.



49 S231 660

9BU0MX-072

3. Remove the needle bearing from the knuckle with the **SST**.

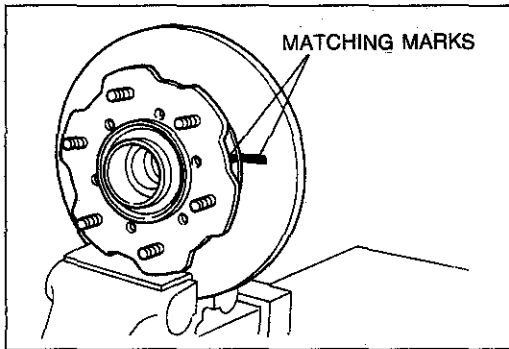
### Disc Plate and Wheel Hub

#### Caution

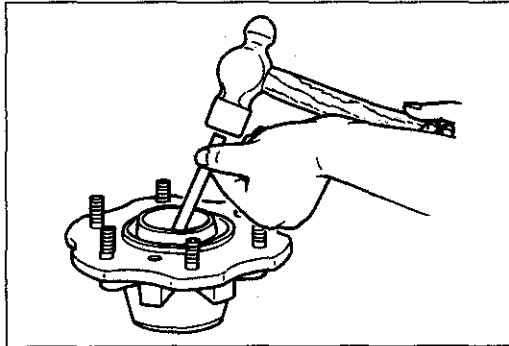
Secure the disc plate in a copper-lined vise.

1. After making matching marks on the disc plate and wheel hub, remove the bolts and disassemble the plate and hub.

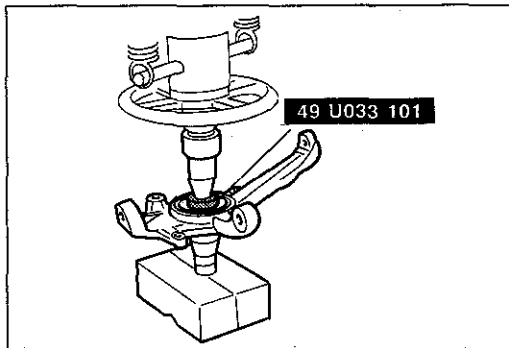
2. Remove the oil seal, and take out the bearing inner race.  
3. Using a suitable bar, remove the bearing outer race by lightly tapping with a hammer.



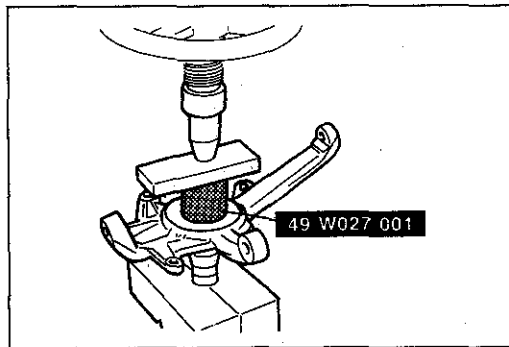
9BU0MX-153



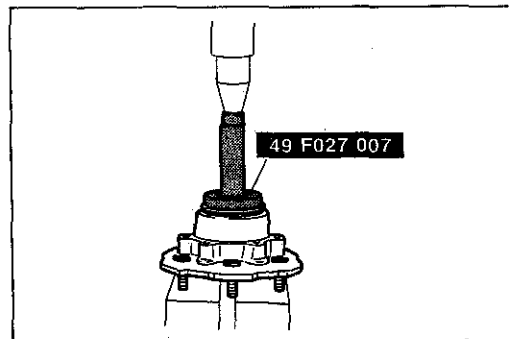
4BG09X-101



2BU0MX-015



0BU0MX-030



9BU0MX-075

### ASSEMBLY

#### Knuckle

1. Install a new needle bearing with the **SST**.

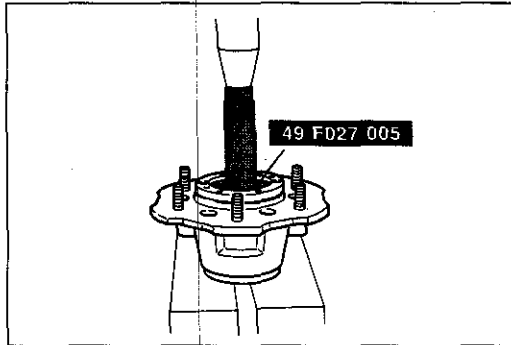
2. After installing the inner bearing into the hub, press in the new oil seal with the **SST**.

3. Apply lithium based grease to the oil seal lip.

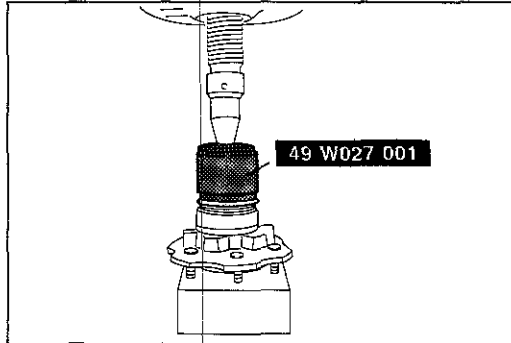
### Disc Plate and Wheel Hub

1. Press fit the outer side bearing outer race with the **SST**.

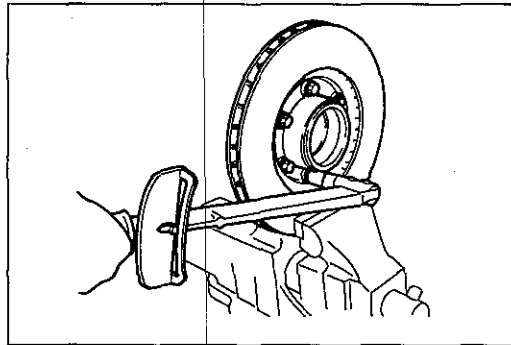




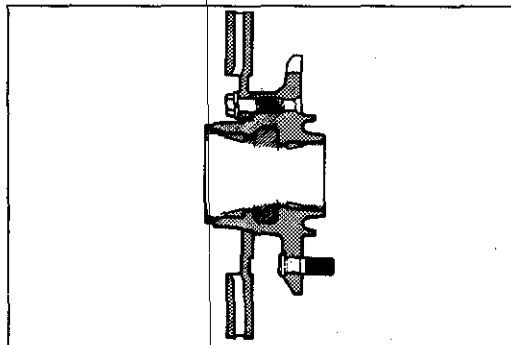
9BU0MX-076



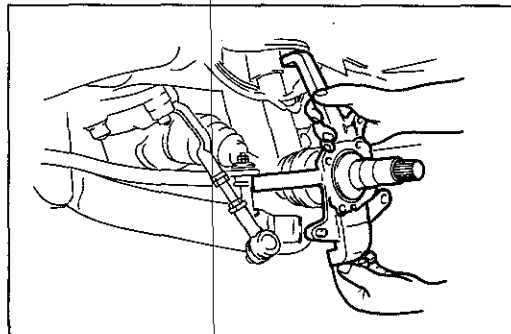
9BU0MX-077



7BU09X-034



7BU09X-035



2BU0MX-059

2. Press fit the inner side bearing outer race with the **SST**.

**Caution**

**Press in the oil seal until it is flush with the hub end surface.**

3. Press fit the new oil seal with the **SST**.

4. Apply lithium based grease to the oil seal lip.

5. Align the matching marks of the wheel hub and the disc plate, and tighten the mounting bolts.

**Tightening torque:**

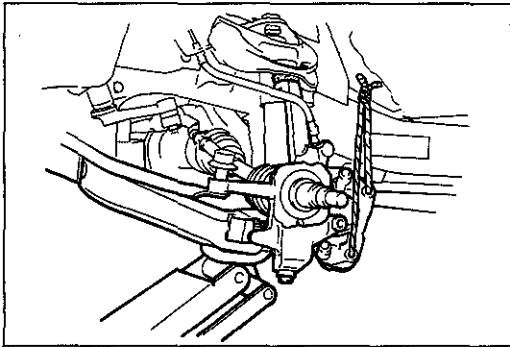
**54—69 N·m (5.5—7.0 m·kg, 40—51 ft·lb)**

6. Apply grease (lithium base, NLGI No.2) to the area indicated by oblique lines.

7. Install the outer bearing race and washer in the hub.

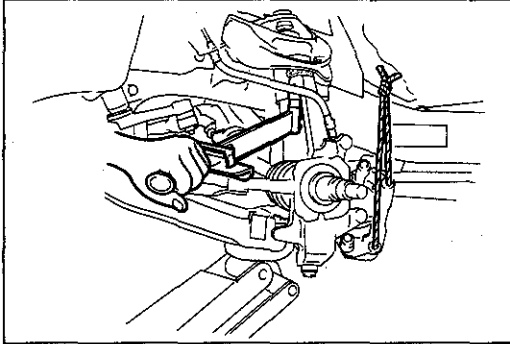
**INSTALLATION**

1. Insert the front axle drive shaft into the knuckle, and install the nut for the lower arm ball joint; tighten it by hand.



7BU09X-037

2. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



1BU0MX-011

3. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

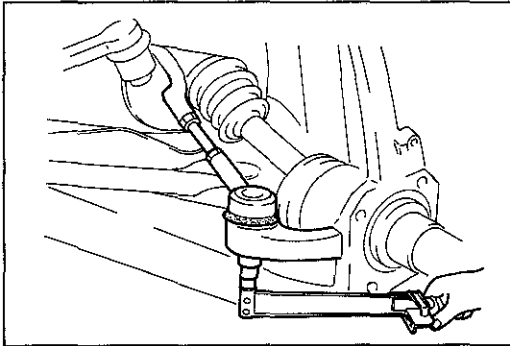
**Tightening torque**

**Upper arm ball joint nut:**

29—51 N·m (3.0—5.2 m·kg, 22—38 ft·lb)

**Lower arm ball joint nut:**

118—157 N·m (12—16 m·kg, 87—116 ft·lb)

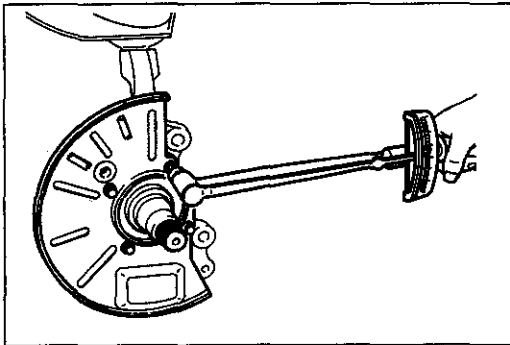


2BU0MX-060

4. Tighten the tie rod end and knuckle arm, and secure with a new cotter pin.

**Tightening torque:**

44—59 N·m (4.5—6.0 m·kg, 23—43 ft·lb)

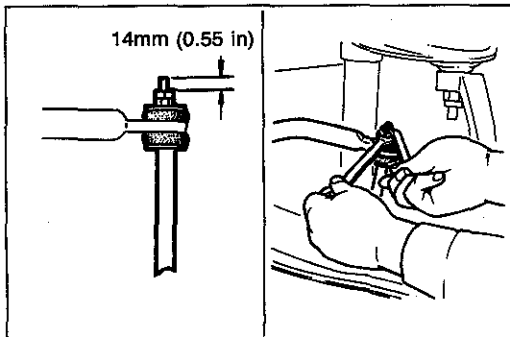


2BU0MX-016

5. Install the dust cover to the knuckle.

**Tightening torque:**

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



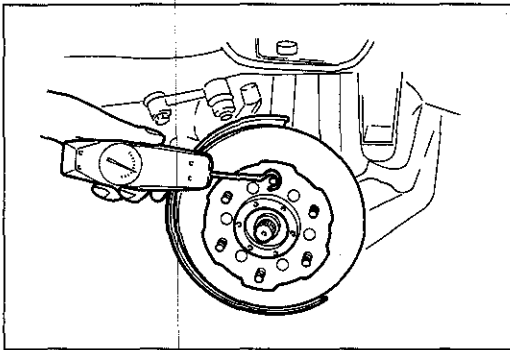
2BU0MX-017

6. After loosely installing the lower mount of the shock absorber, install the stabilizer.

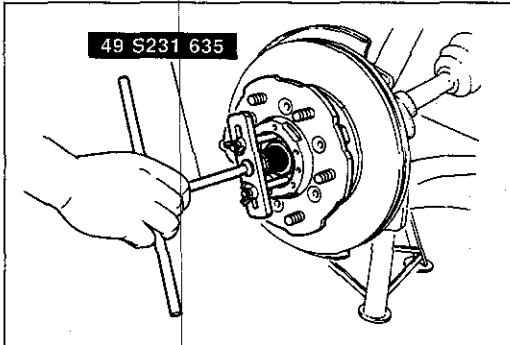
**Tightening torque**

**Stabilizer:**

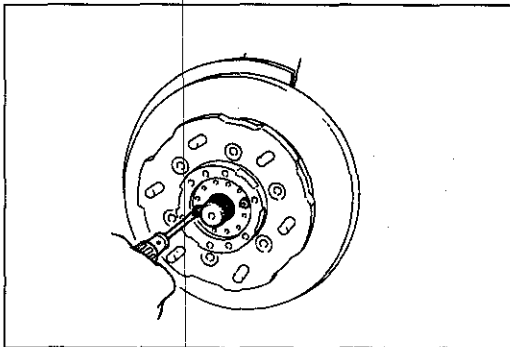
31—46 N·m (3.2—4.7 m·kg, 33—34 ft·lb)



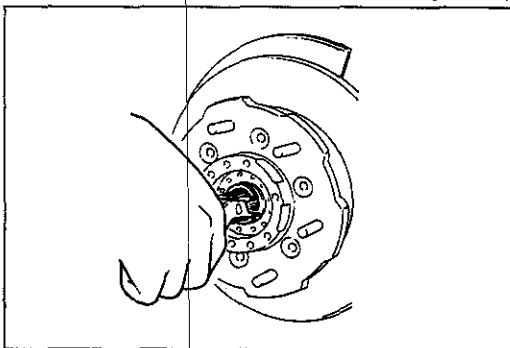
2BU0MX-018



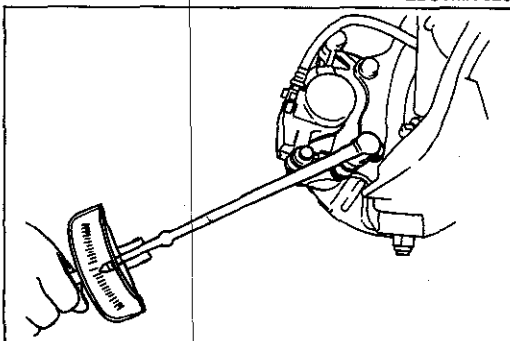
9BU0MX-079



2BU0MX-019



2BU0MX-020



2BU0MX-021

7. After installing the hub and disc plate, adjust the bearing preload.

- (1) Tighten the lock nut; then turn the hub and plate 2 or 3 times to seat the bearing.
- (2) Loosen the lock nut so that they can be turned by hand.
- (3) Attach a pull scale to a wheel lug bolt, and measure the frictional force.

### Preload

**Frictional force plus:**

**6—12 N (0.6—1.2 kg, 1.3—2.6 lb)**

- (4) Tighten the locknut until the preload reaches the specified preload with the **SST**.

- (5) Install the bearing set plate using two bolts.

### Tightening torque:

**5—7 N·m (50—70 cm·kg, 43—61 in·lb)**

- (6) Coat the spacer with grease (lithium base, NLGI No.2), and install it.

- (7) Install a new snap ring.

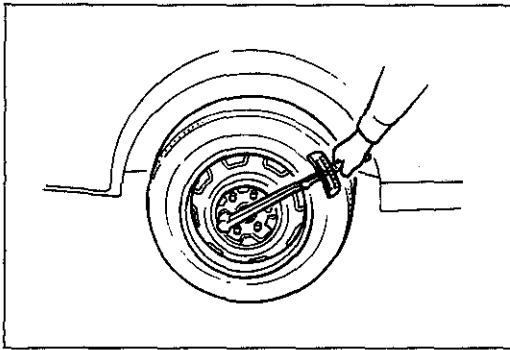
8. Reinstall the caliper assembly.

### Tightening torque:

**88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

# M

## FRONT AXLE (4x4), FRONT AXLE (4x2)



2BU0MX-022

9. Install the wheel and drive flange.

### Tightening torque

**Styled wheel lug nut:**

**118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)**

**Standard wheel lug nut:**

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**

**Drive flange:**

**29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)**

10. Lower the vehicle.

11. Tighten the lower mount of the shock absorber to the specified torque with the vehicle unladen.

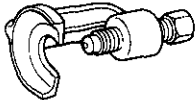
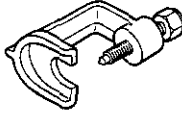
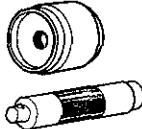
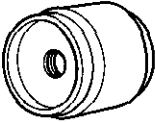

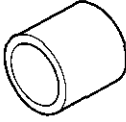
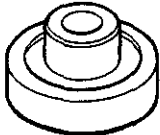
### Tightening torque:

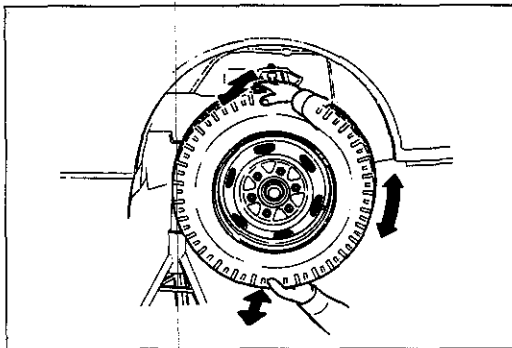
**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**

12. Check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)

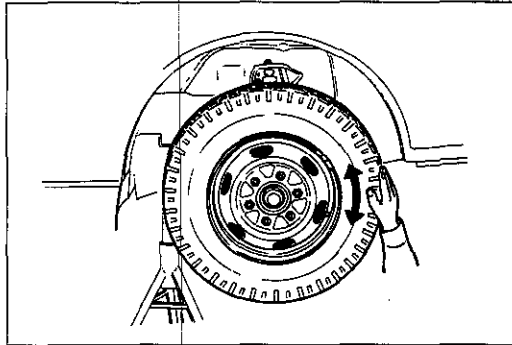
## FRONT AXLE (4x2)

### PREPARATION SST

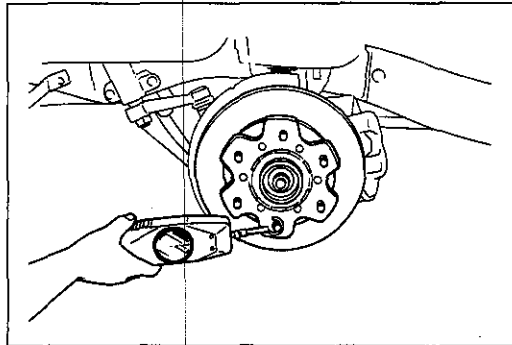
49 0118 850C Puller, ball joint 	49 0727 575 Puller, ball joint 	49 B025 0A0 Installer, dust seal 
49 B025 001 Body (Part of 49 B025 0A0) 	49 G030 797 Handle (Part of 49 B025 0A0) 	49 U027 003 Installer, oil seal 
49 H033 101 Bearing remover 	1BU0MX-036	



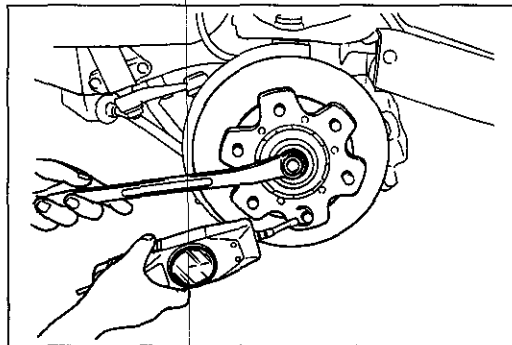
9BU0MX-082



4EG12X-012



9BU0MX-156



2BU0MX-023

**WHEEL BEARING PLAY**

**Inspection**

1. Jack up the vehicle, and support it with safety stands. Inspect for noticeable bearing play with the hands held at the top and bottom of the tire.

**Wheel bearing play: 0mm (0 in)**

2. Inspect the tire for smooth rotation. Note any rough feeling or abnormal noise from the bearing.

**Adjustment**

1. Remove the wheel and tire.
2. Remove the disc brake caliper assembly, and use a rope to suspend it.
3. Remove the hub cap and cotter pin.
4. Tighten the locknut, and turn the hub and plate 2 or 3 times to seat the bearing.

**Tightening torque:**

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**

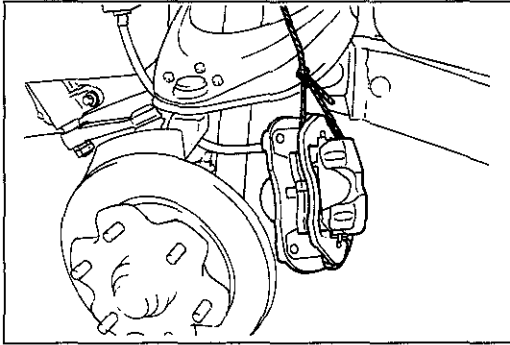
5. Loosen the locknuts so that they can be turned by hand.
6. Attach a pull scale to a wheel lug bolt, and measure the frictional force.
7. Tighten the locknut until the reading (initial turning torque) reaches the specified preload. Insert the set cover, and secure with a new cotter pin.

**Preload**

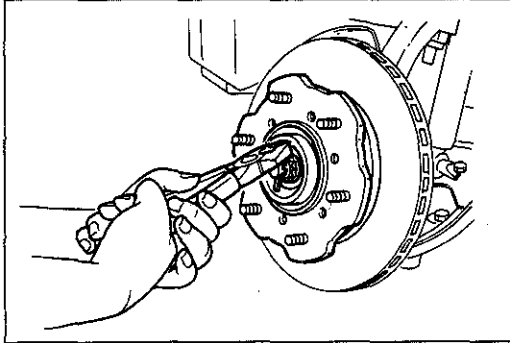
**Frictional force plus:**

**6—11 N (0.6—1.1 kg, 1.3—2.4 lb)**

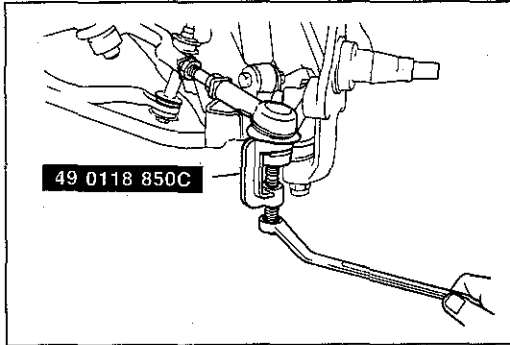
## FRONT AXLE (4x2)



9BU0MX-158

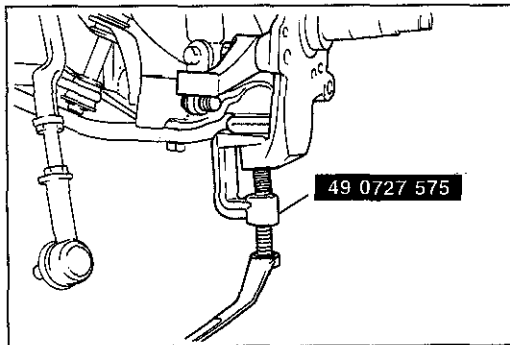


5BU09X-011



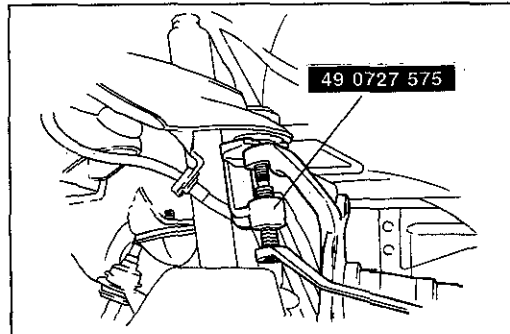
49 0118 850C

2BU0MX-061



49 0727 575

9BU0MX-084



49 0727 575

9BU0MX-085

**REMOVAL**

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.

**Caution**

**After removing the caliper assembly, use a rope to suspend it.**

3. Remove the caliper assembly.
4. Remove the hub cap, pull out the cotter pin, and remove the set cover and nut.
5. While using your fingers to hold the washer and bearing to prevent them from falling, remove the hub and plate.
6. Remove the dust cover.

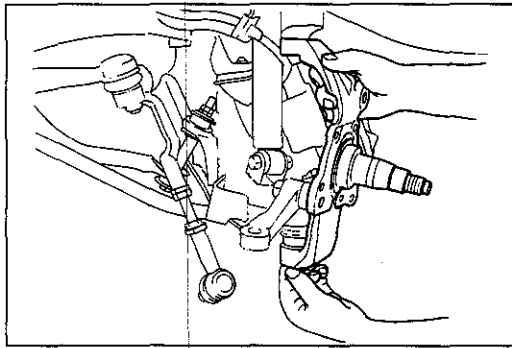
7. After removing the tie rod end nut, with the **SST** to separate the tie rod end from the knuckle.

**Note**

**If removal is difficult, lightly tap the ball joint coupling of the knuckle with a hammer.**

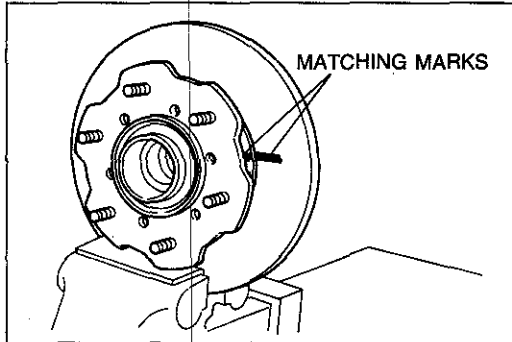
8. After removing the nut of the lower arm ball joint, with the **SST** to separate the knuckle from the lower arm.
9. Reinstall the lower arm ball joint nut, and tighten it by hand.

10. Support the lower arm with a jack so that the torsion bar spring does not turn.
11. After removing the nut of the upper arm ball joint, with the **SST** to separate the knuckle from the upper arm.



7BU09X-120

12. After removing the nut of the lower arm ball joint, remove the knuckle.



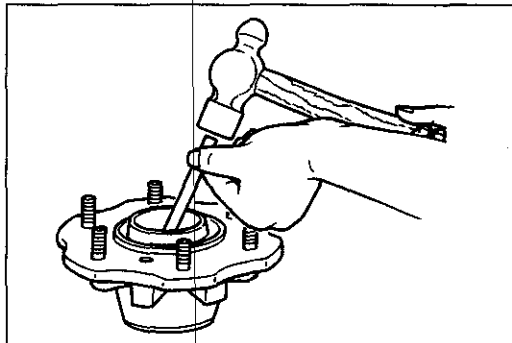
9BU0MX-159

## DISASSEMBLY

### Caution

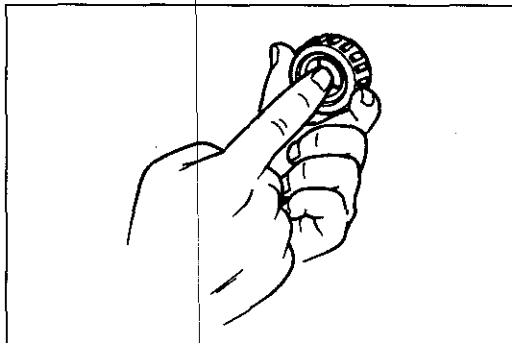
- a) Secure the disc plate in a copper-lined vise.
- b) If necessary, use a press to remove the wheel lug bolts.

1. Make matching marks on the disc plate and the wheel hub; then remove the bolts and disassemble the plate and hub.



4EG12X-024

2. Remove the oil seal and take out the bearing inner race.
3. Use a suitable round bar, and lightly tap it with a hammer to remove the bearing outer race.



9BU0MX-086

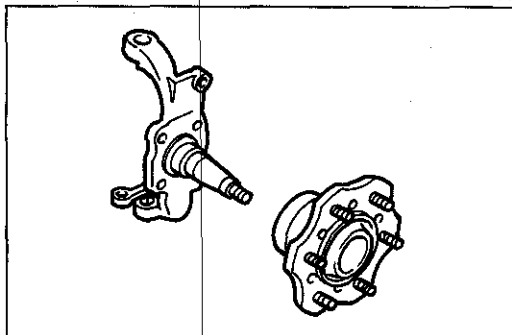
## INSPECTION

Inspect for the following problems, and replace any faulty parts.

### Caution

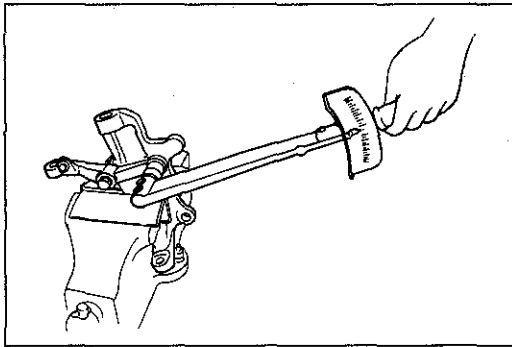
**If replacement is necessary, replace the bearing inner and outer races as a set.**

1. Wear, damage, or seizure of bearing
2. Crack and damage to hub
3. Crack and damage to knuckle spindle and wear and rust on the oil seal friction surface
4. Damage to knuckle and knuckle arm
5. Deformation of dust cover
6. Deformation of hub cap
7. Wear and damage to wheel lug bolts



2BU0MX-062

## FRONT AXLE (4x2)



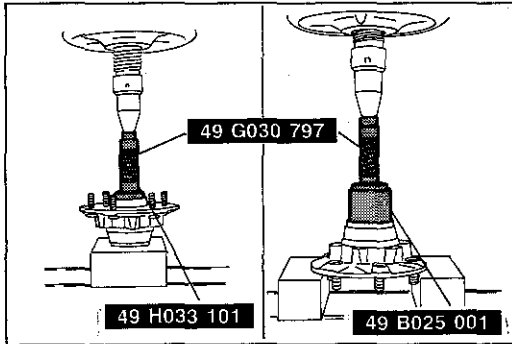
5BU09X-016P

**ASSEMBLY**

1. Secure the knuckle in a vise, and install the knuckle arm.

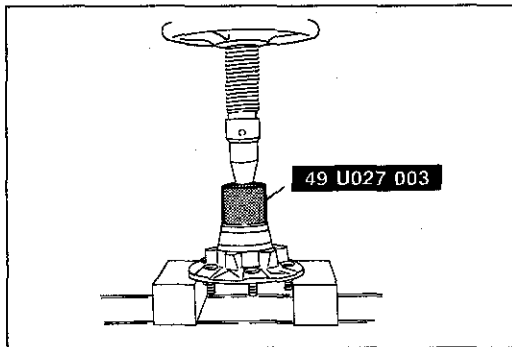
**Knuckle arm****Tightening torque:**

79—100 N·m (8.1—10.2 m·kg, 59—74 ft·lb)



9BU0MX-088

2. Press fit the inner bearing inner race onto the hub with the **SST**.
3. Press fit the outer bearing inner race onto the hub with the **SST**.

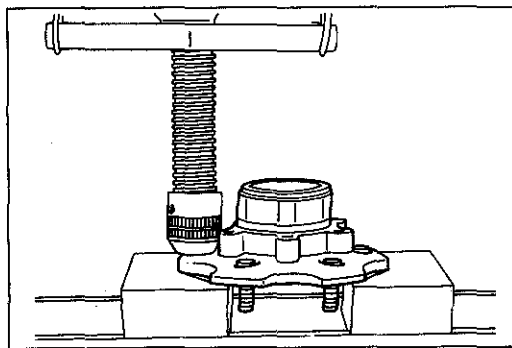


0BU0MX-032

**Caution**

**Press in the oil seal until it is flush with the hub end surface.**

4. Press fit the new oil seal onto the hub with the **SST**.
5. Apply lithium based grease to the lip.

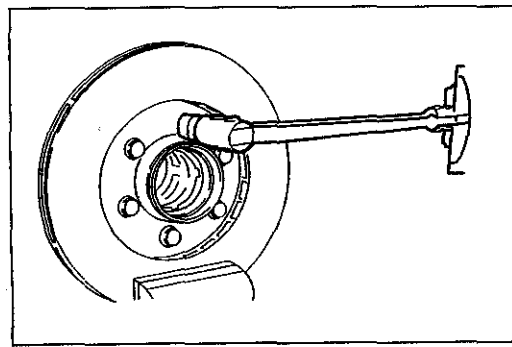


9BU0MX-160

**Caution**

**Do not reuse wheel lug bolts once they have been removed.**

6. Use a press to press new wheel lug bolts into the wheel hub.



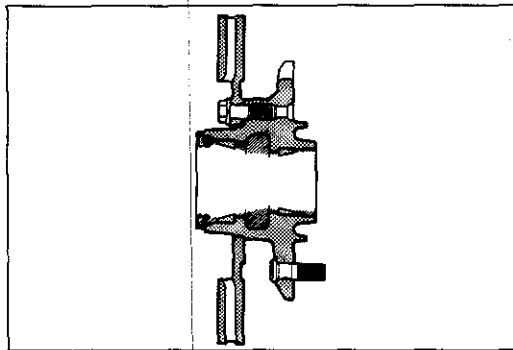
7BU09X-051

7. Align the matching marks of the wheel hub and disc plate, assemble them, and tighten the mounting bolts.

**Tightening torque:**

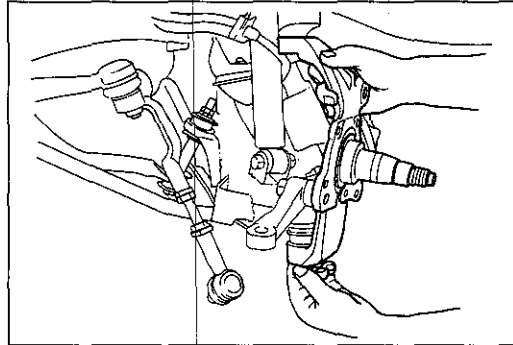
54—69 N·m (5.5—7.0 m·kg, 40—51 ft·lb)





9BU0MX-161

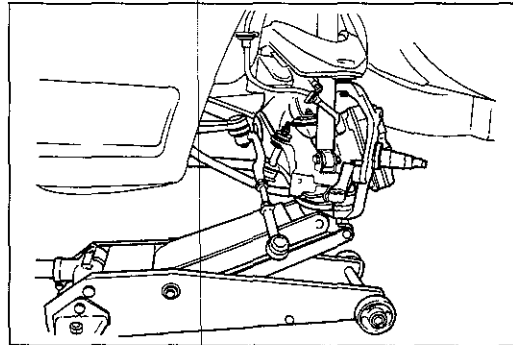
8. Apply lithium based grease to the areas indicated by shaded lines.
9. Install the outer bearing and washer in the hub.



5BU09X-021

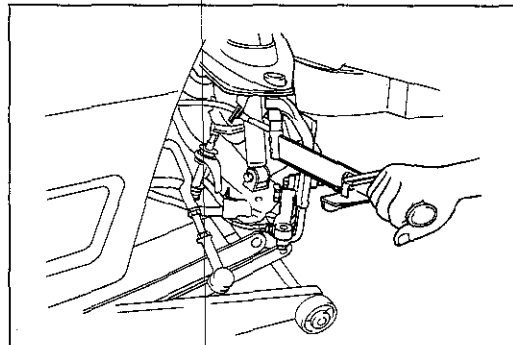
**INSTALLATION**

1. Install the knuckle to the lower arm.
2. Install the nut for the lower arm ball joint, and tighten it by hand.



5BU09X-022

3. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



1BU0MX-015

4. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

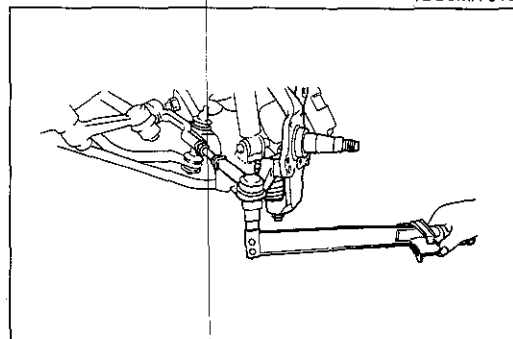
**Tightening torque**

**Upper arm ball joint nut:**

**29—51 N·m (3.0—5.2 m·kg, 22—38 ft·lb)**

**Lower arm ball joint nut:**

**118—157 N·m (12—16 m·kg, 87—116 ft·lb)**



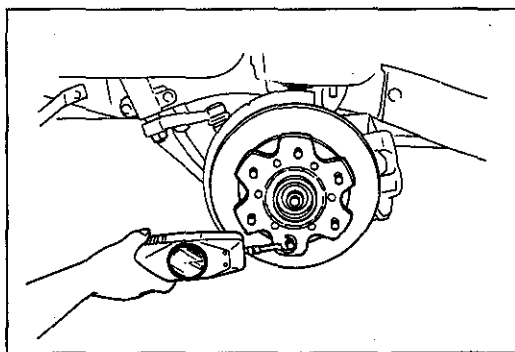
2BU0MX-024

5. Tighten the tie rod end and knuckle arm, and secure with a new cotter pin.

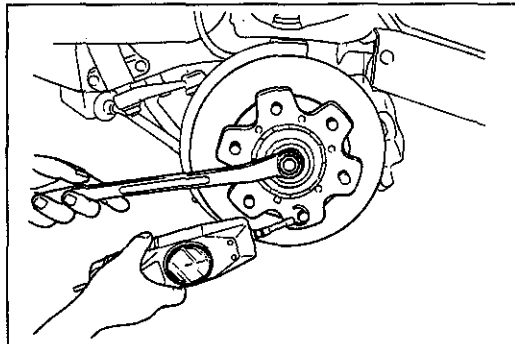
**Tightening torque:**

**44—59 N·m (4.5—6.0 m·kg, 33—43 ft·lb)**

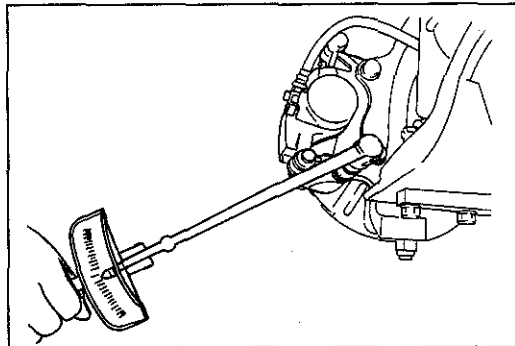
## FRONT AXLE (4x2)



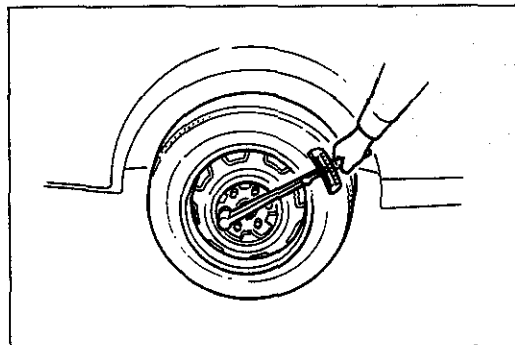
2BU0MX-025



2BU0MX-063



7BU09X-053



1BU0MX-016

6. After installing the dust cover, install the hub and plate and adjust the bearing preload.

- (1) Tighten the locknut; then turn the hub and plate 2 or 3 times to seat the bearing.

**Tightening torque:**

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**

- (2) Loosen the locknut so they can be turned by hand.
- (3) Attach a pull scale to a wheel lug bolt, and measure the frictional force.
- (4) Tighten the locknut until the reading (initial turning torque) reaches the specified preload. Then insert the set cover, and secure it with a new cotter pin.

**Preload****Frictional force plus:**

**6—11 N (0.6—1.1 kg, 1.3—2.4 lb)**

7. Reinstall the caliper assembly.

**Tightening torque:**

**88—108 N·m (9.0—11.0 m·kg, 65—80 ft·lb)**

8. Mount the wheel and tire.

**Tightening torque****Standard wheel lug nut:**

**88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)**

**Styled wheel lug nut:**

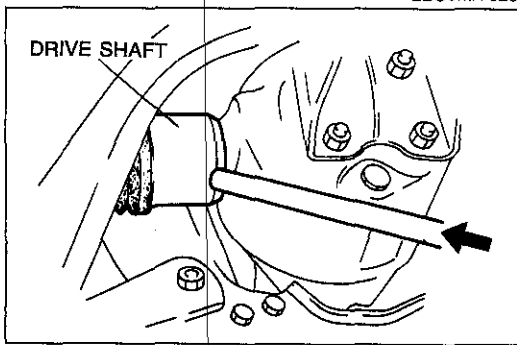
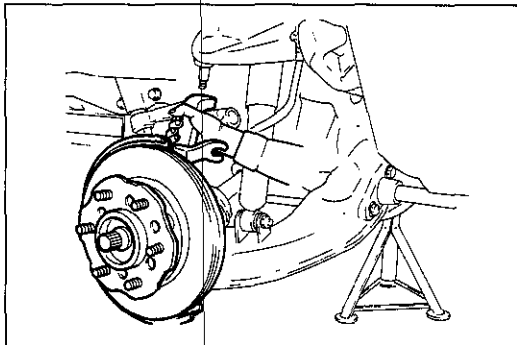
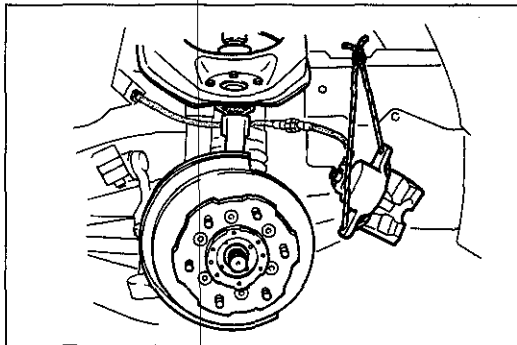
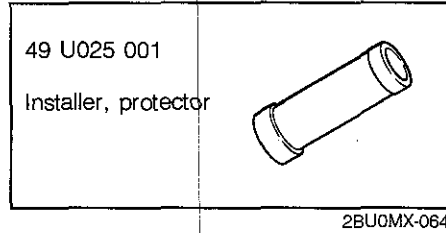
**118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)**

9. Lower the vehicle.

10. Check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)

FRONT AXLE DRIVE SHAFT (4x4)

PREPARATION  
SST



**REMOVAL**

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.
3. Remove the drive flange hub.
4. Remove the caliper, mounting support, and knuckle arm, and use a rope to suspend the caliper.
5. Disconnect the stabilizer.
6. Remove the tie rod end.
7. Remove the lower mount of the shock absorber.
8. Remove the snap ring and spacer.
9. Support the lower arm with a jack.
10. Disconnect the upper and lower ball joints and knuckle.
11. Lower the lower arm and remove the knuckle assembly.
12. Remove the engine undercover.

**Caution**

**Do not damage the dust cover or oil seal.**

13. Remove the front-axle drive shaft.

# M

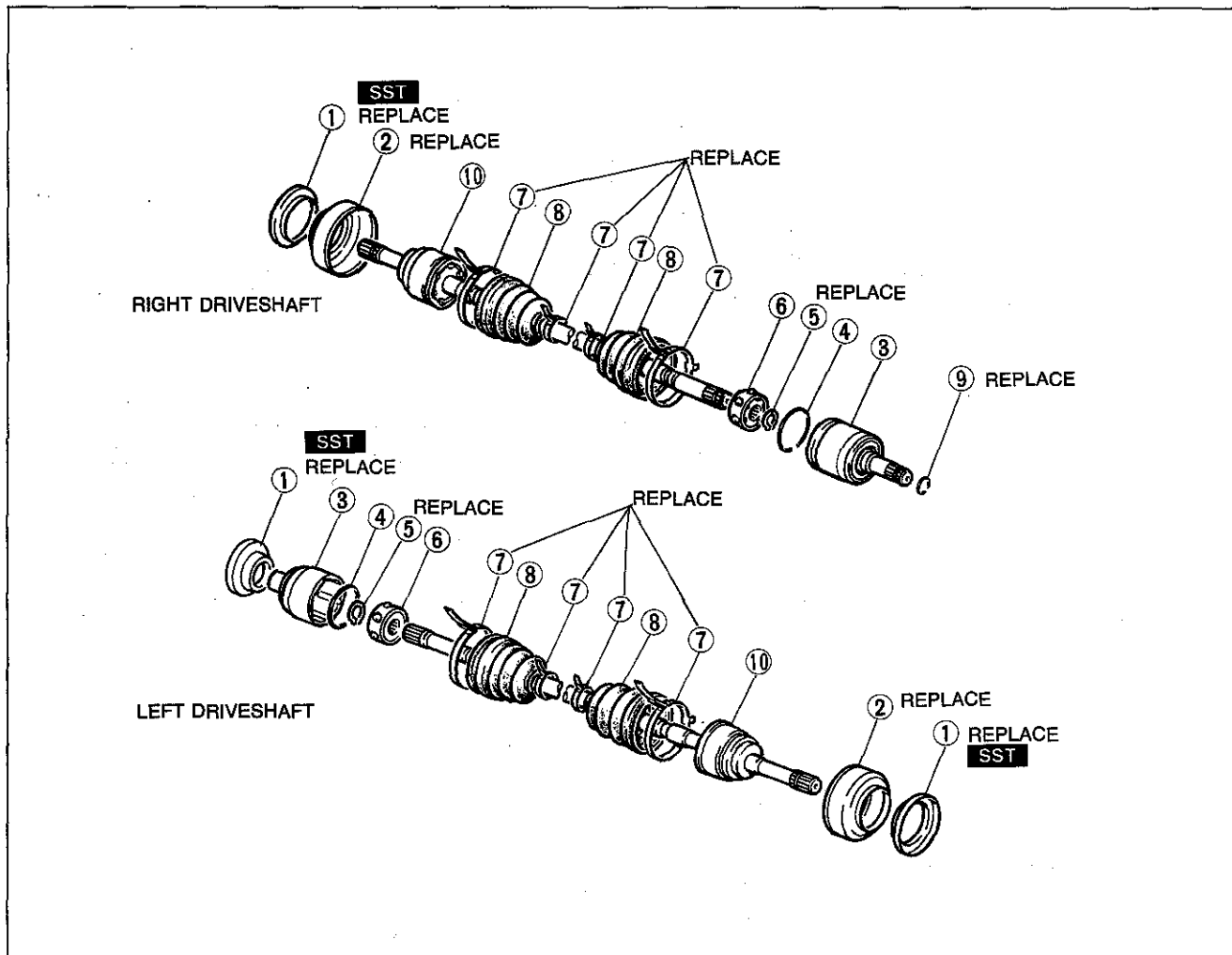
## FRONT AXLE DRIVE SHAFT (4x4)

### DISASSEMBLY

#### Caution

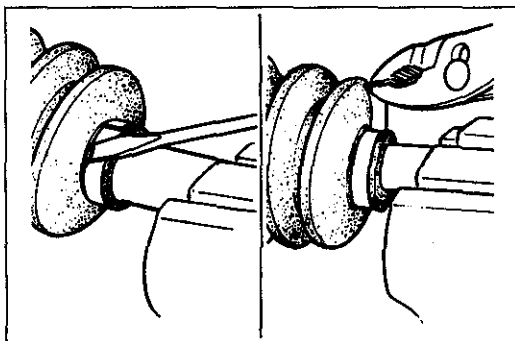
- Secure the joint in a vise with protective material (such as copper plates) on the vise jaws.
- Be careful that dust or other foreign material does not enter the joint while the work is being performed.
- Do not disassemble the wheel side ball joint.
- Do not wash the joint unless it is being disassembled.

7BU09X-093



9BU0MX-166

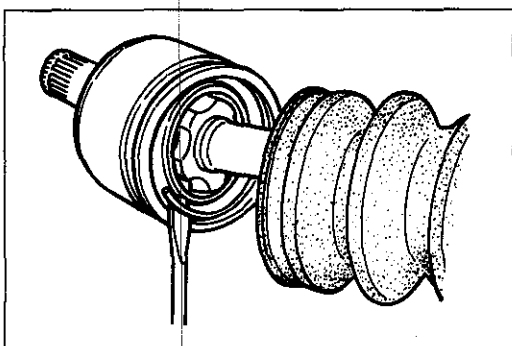
- |                   |                               |                                   |
|-------------------|-------------------------------|-----------------------------------|
| 1. Dust cover     | 5. Snap ring                  | 9. Clip                           |
| 2. Boot protector | 6. Balls, inner ring and cage | 10. Shaft and ball joint assembly |
| 3. Outer ring     | 7. Boot band                  |                                   |
| 4. Clip           | 8. Boot                       |                                   |



7BU09X-094

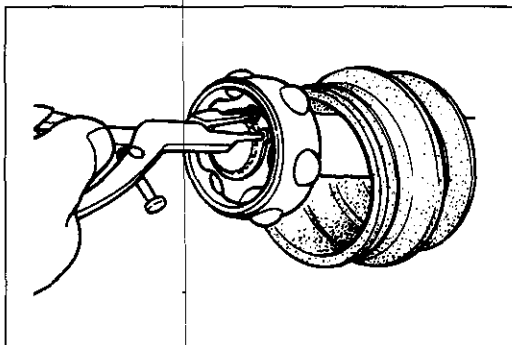
#### Removal of Differential Side Boot

- Pry up the locking clip with a screwdriver, and remove the band with pliers.
- Slide the boot along the shaft to expose the joint.



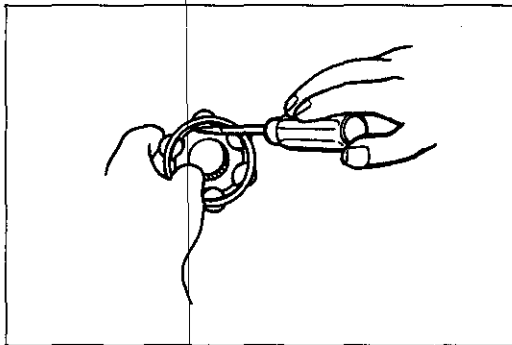
7BU09X-095

3. Remove the clip with a screwdriver.



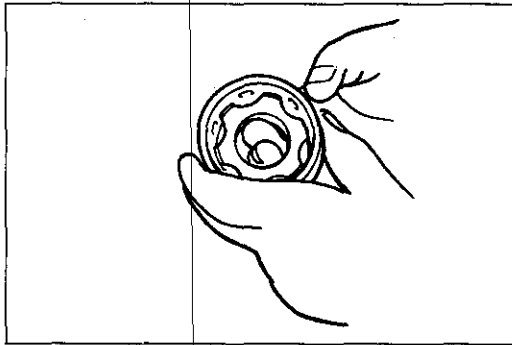
7BU09X-096

4. Remove the snap ring with snap ring pliers.



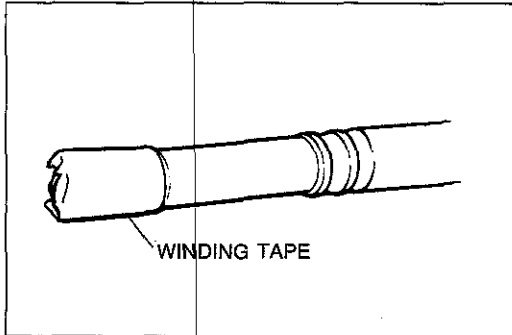
7BU09X-097

- 5. Remove the balls, inner ring, and cage from the shaft as a complete assembly.
- 6. Insert a screwdriver between the inner ring and the cage to remove the balls.



7BU09X-098

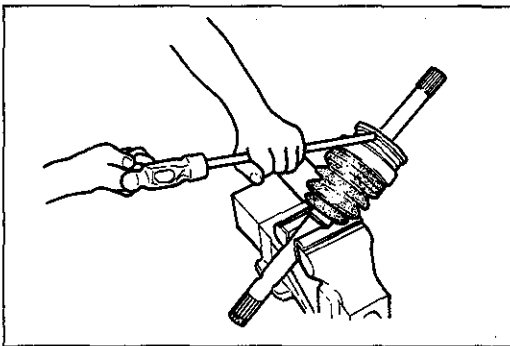
7. Turn the cage about 30 degrees, and separate it from the inner ring.



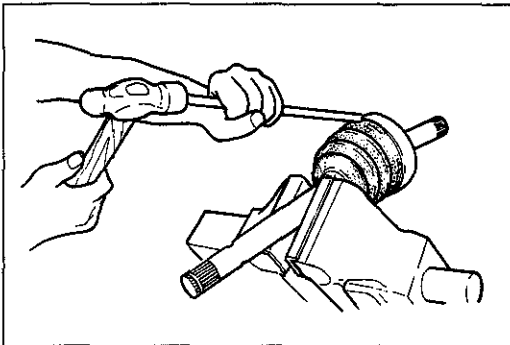
WINDING TAPE

7BU09X-099

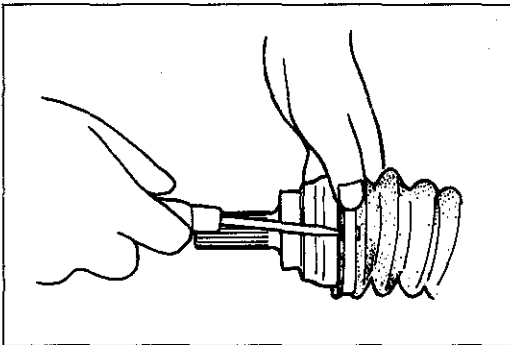
8. Wrap the spline of the shaft with tape to prevent damaging the boot, and remove the boot.



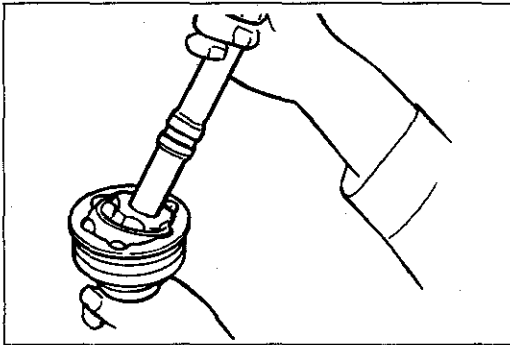
7BU09X-102



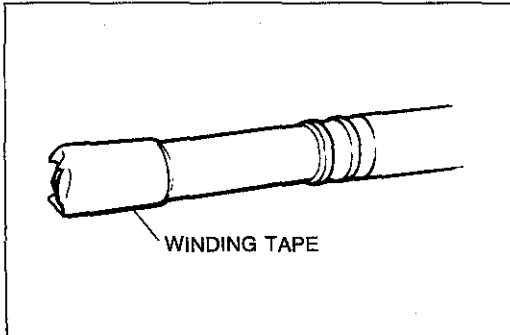
7BU09X-103



7BU09X-104



67U09X-059



7BU09X-105

**Removal of Wheel Side Boot**

1. Remove the dust cover by using a suitable round bar and hammer.
2. Remove the boot protector by using a suitable round bar and hammer.
3. Pry up the locking clip with a screwdriver, and remove the band with pliers.

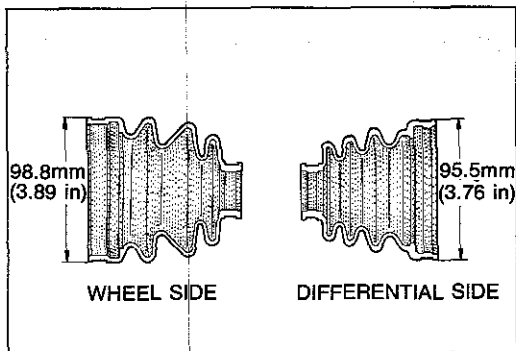
**INSPECTION**

Inspect for the following problems, and replace any faulty parts.

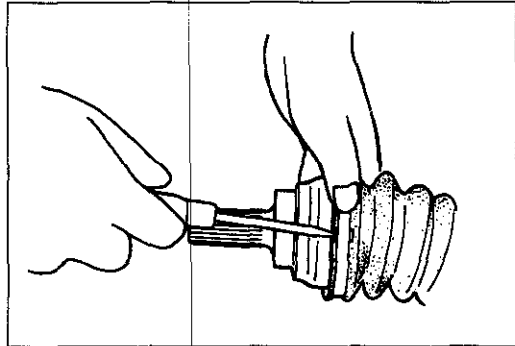
1. Bending, twisting and damage of the shaft
2. Wear on the shaft splines
3. Wear, excessive play, corrosion and damage to the joint on the differential side
4. Excessive play, wear, corrosion, and damage to the joint on the wheel side

**ASSEMBLY****Installation of Differential Side Boot**

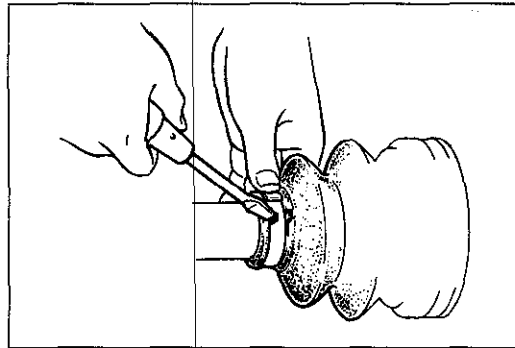
1. Wrap the splines or the wheel side of the shaft, and install the boot and a new boot band.



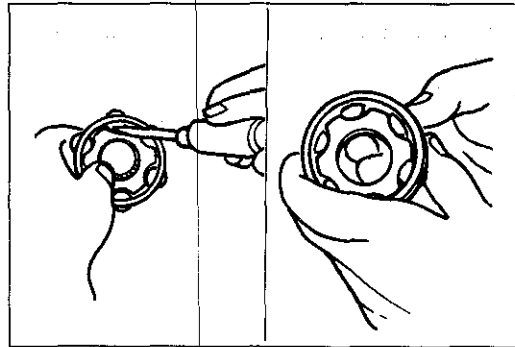
67U09X-061



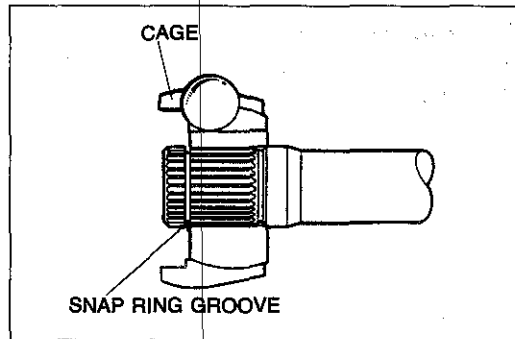
67U09X-062



2BU0MX-028



7BU09X-106



2BU0MX-029

### Caution

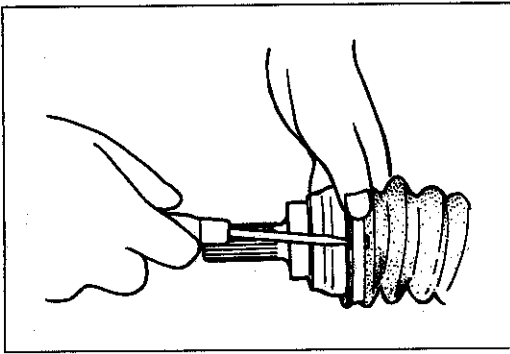
The wheel side and differential side boots are different, as shown.

2. Fold the band back over itself while pulling on the end of the clip with pliers.  
Lock the end of the band by bending the locking clip.
3. Install the differential side boot with a new boot band (the part with the smaller diameter).
4. Attach a new clip to the clip groove in the shaft.
5. Assemble the cage, inner race, and balls in the following order.
  - a) Insert the inner race into the cage, and turn the cage approximately 30° with respect to the inner race.
  - b) Fit the balls through the cage into the ball groove of the inner race.
  - c) Fill the inside of the ball joint assembly with the specified grease included in the repair kit.
6. Install the cage, inner ring, and ball assembly to the driveshaft in the direction shown in the figure.

### Caution

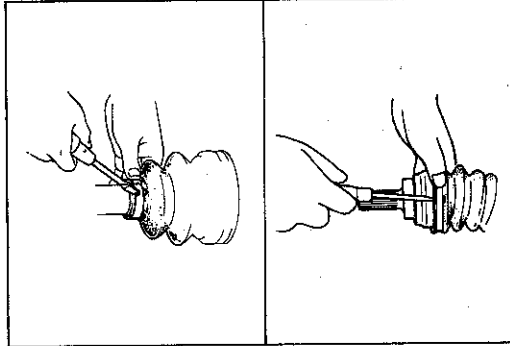
Install the cage with the big end facing the snap ring groove. If reversely installed, the drive shaft may become disengaged.

**FRONT AXLE DRIVE SHAFT (4x4)**



67U09X-066

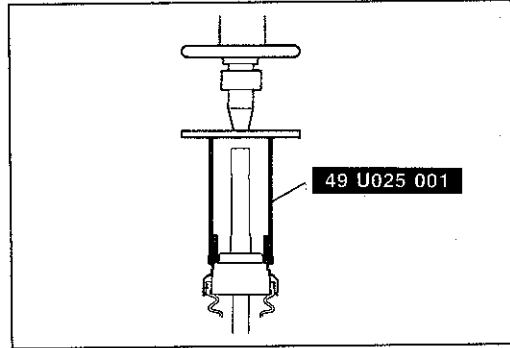
8. Fit the differential side boot onto the outer race and the boot groove of the shaft.
9. Secure the boot with a new boot band.



7BU09X-108

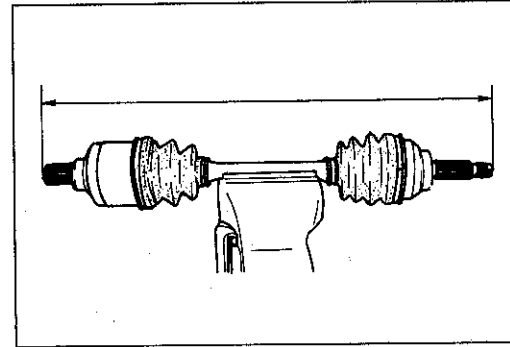
**Installation of Wheel Side Boot**

1. Fit the wheel side boot onto the ball joint assembly and the boot groove of the shaft.
2. Secure the boot with a new boot band.



0BU0MX-034

3. Press fit the new dust cover in a press with the **SST**.

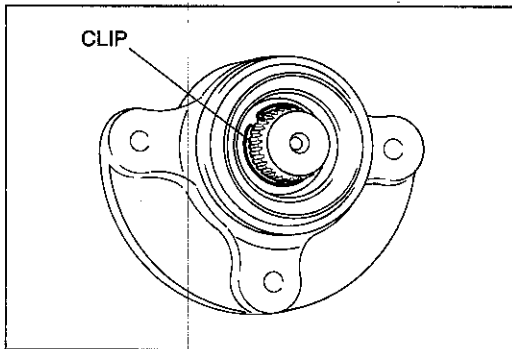


2BU0MX-030

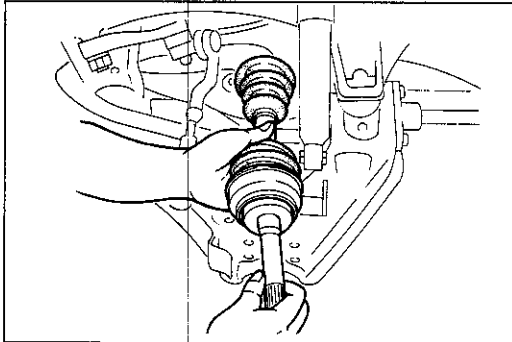
**Standard length**

- Right side: 622mm (24.49 in)
- Left side : 554mm (21.81 in)

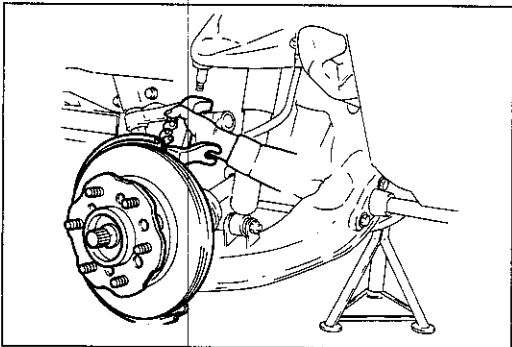




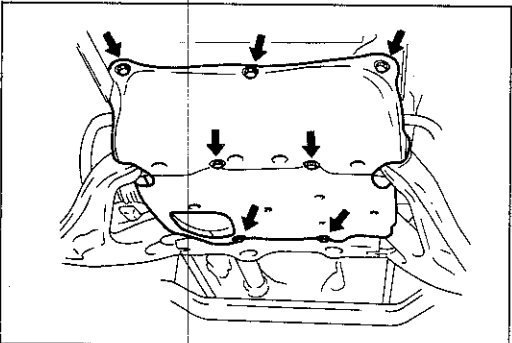
6EG09X-047



6EG09X-048



2BU0MX-031



1BU0MX-019

## INSTALLATION

1. Replace the clip of the output shaft and the front axle drive shaft with a new one.
2. Coat the oil seal of the differential with transmission oil.

3. Install the front axle drive shaft.

### Caution

- a) Do not damage the oil seal of the differential.
- b) After installation, pull the front axle drive shaft outward to make sure it does not come out.

4. Install the knuckle and hub to the front axle drive shaft and ball joints. (Refer to pages M-28, 29.)
5. Install the spacer and a new snap ring.
6. Install the lower mount of the shock absorber and loosely tighten the bolt.
7. Install the stabilizer. (Refer to page M-28.)
8. Install the tie rod end. (Refer to pages M-28, 29.)
9. Install the caliper assembly, knuckle arm, wheel and drive flange. (Refer to page M-29.)

10. Apply sealant to the drive flange and install it.
11. Install the engine undercover.

### Tightening torque:

**31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)**

12. Lower the vehicle.
13. Tighten the lower mount of the shock absorber to the specified torque with the vehicle unladed.

### Tightening torque:

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**

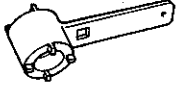
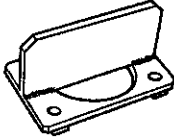

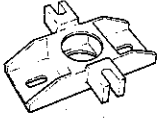
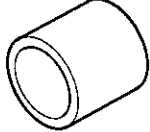
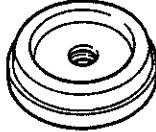
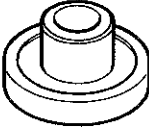
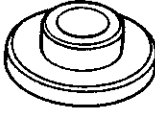


14. Check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)

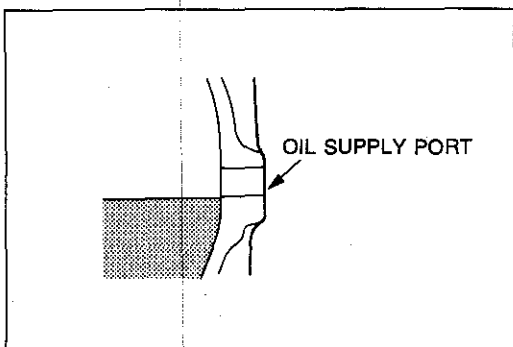
# M

## REAR AXLE (4x4 AND 4x2)

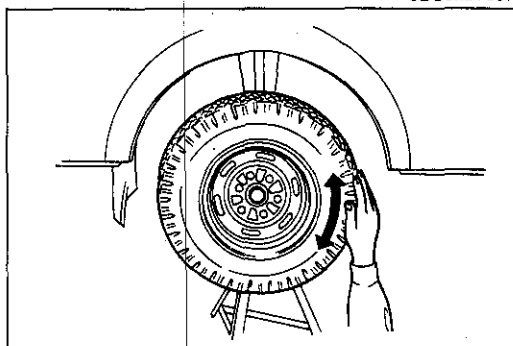
### REAR AXLE (4x4 AND 4x2)

#### PREPARATION SST

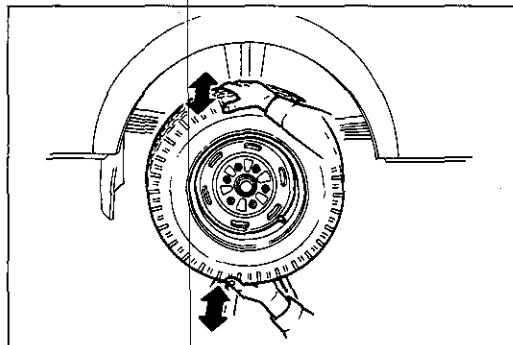
<p>49 0603 635A</p> <p>Wrench, rear shaft bearing</p> 	<p>49 S120 645A</p> <p>Holder, rear shaft</p> 	<p>49 S120 520A</p> <p>Puller, rear axle shaft bearing</p> 
<p>49 S120 523A</p> <p>Attachment (Part of 49 S120 520A)</p> 	<p>49 U027 003</p> <p>Installer, oil seal</p> 	<p>49 F027 004</p> <p>Attachment for bearing <math>\phi 62</math></p> 
<p>49 H025 001</p> <p>Bearing installer</p> 	<p>49 S120 748</p> <p>Attachment</p> 	<p>49 G030 797</p> <p>Handle</p> 
<p>49 0259 770B</p> <p>Wrench, flare nut</p> 	<p>2BU0MX-032</p>	



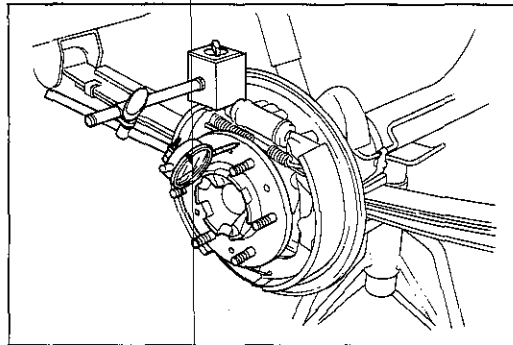
9BU0MX-097



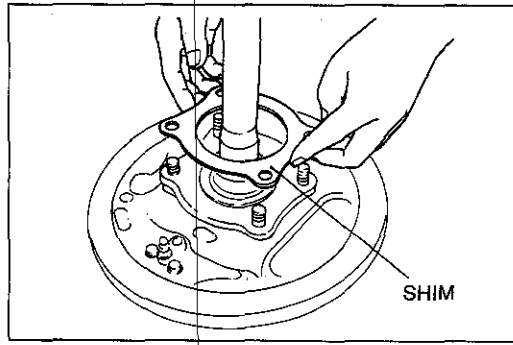
9BU0MX-098



5BU09X-030



5BU09X-031



0BU0MX-020

**ON-VEHICLE MAINTENANCE**

**Rear Axle Oil**

**Inspection**

Remove the oil supply port plug, and make sure the oil level is near the port.

If the level is below the necessary amount, add oil of the specified type.

**Plug tightening torque:**

**39—54 N-m (4.0—5.5 m-kg, 29—40 ft-lb)**

**Wheel Bearing Play**

**Inspection**

1. Jack up the rear of the vehicle, and support it with safety stands.
2. Make sure there is no abnormal noise and that the tire rotates smoothly by hand.

3. Make sure that the bearing play in the axial direction is within specifications.

**Standard bearing play:**

**0.05—0.25mm (0.002—0.010 in)**

**Adjustment**

1. Refer to the axle removal section, and remove one axle shaft.
2. Refer to the removal section, and remove the other wheel and brake drum.
3. (1) Use a dial gauge to verify that bearing play is within specifications.

**Standard bearing play (one axle installed):**

**0.65—0.95mm (0.026—0.037 in)**

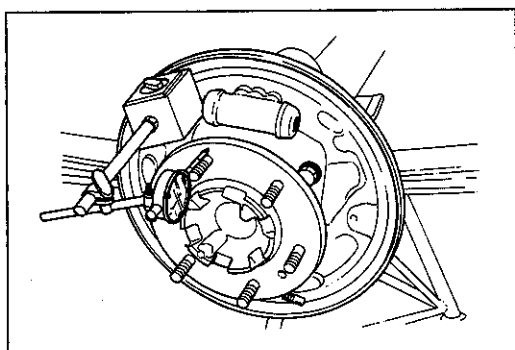
- (2) If bearing play is not within specifications, remove the axle and adjust by using selectable shims.

**Shim**

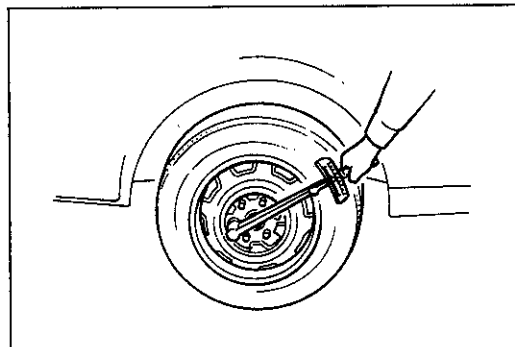
Part No.	Thickness mm (in)
S083 26 165	0.10 (0.004)
S083 26 166	0.15 (0.006)
S083 26 167	0.50 (0.020)
S083 26 168	0.75 (0.030)

- (3) After making the adjustment, reinstall the brake drum and tire. (Refer to page M-49.)

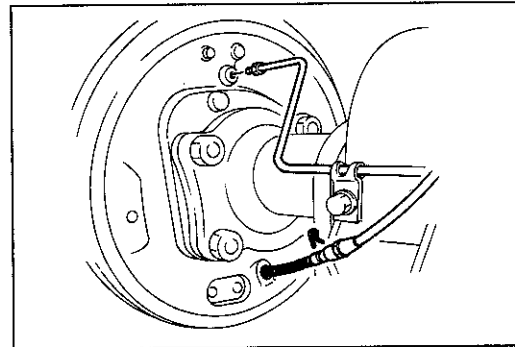
## REAR AXLE (4x4 AND 4x2)



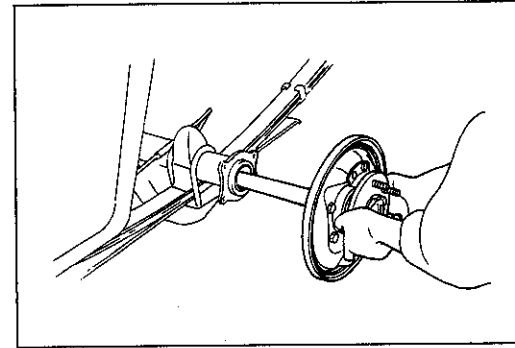
5BU09X-033



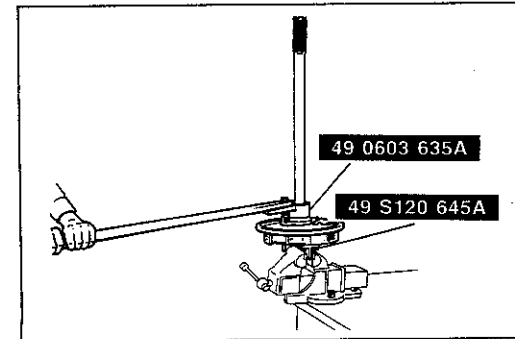
5BU09X-034



9BU0MX-100



2BU0MX-033



2BU0MX-034

4. Refer to Installation section, and reinstall the axle shaft.
5. (1) Use a dial gauge and check wheel bearing play on the opposite side.

**Standard bearing play (both axles installed):**  
**0.05—0.25mm (0.002—0.010 in)**

- (2) If wheel bearing play is not within specifications, follow the above procedures.

6. Reinstall the brake drum and tire.

### REMOVAL

1. Remove the wheel and brake drum. (Refer to Section P.)
2. Remove the parking brake cable attaching pin and brake pipe.

3. Remove the back plate mounting nuts, and separate the back plate from the axle casing.
4. Remove the axle shaft and back plate from the axle casing.
5. Remove the O-ring from the axle casing. (4x4)

### Caution

**Don't damage the oil seal with the axle shaft during removal.**

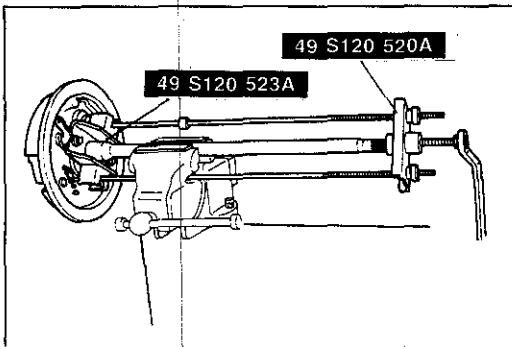
6. If the oil seal in the axle casing is cracked or damaged, replace it.

### DISASSEMBLY

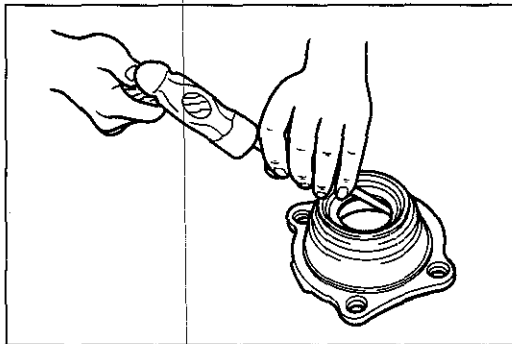
1. Remove the lockwasher.
2. Attach the **SST** as shown, and remove the bearing locknut from the rear axle shaft.

### Caution

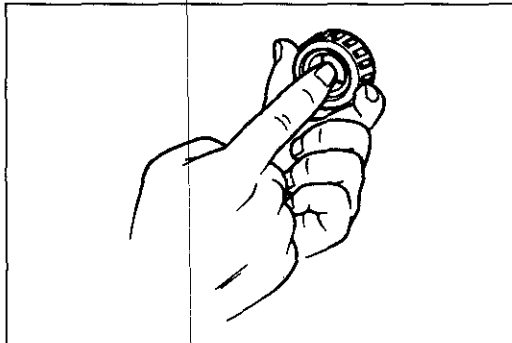
**Be careful when removing or installing the bearing locknuts for the left wheels because they are left threaded (tightened by turning counterclockwise).**



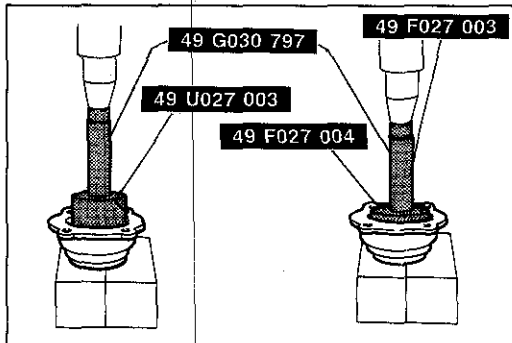
9BU0MX-102



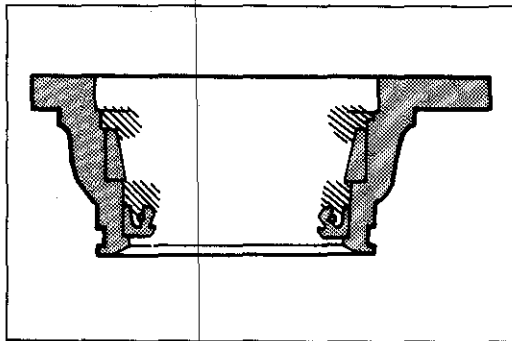
7BU09X-072



9BU0MX-103



9BU0MX-104



9BU0MX-169

2. Remove the bearing and bearing housing assembly with the **SST**.

**Caution**

**Secure the rear axle shaft in a vise in which copper plates are used.**

3. After removing the bearing and oil seal from the rear wheel hub, tap lightly with a suitable round bar to force out the outer race.

**INSPECTION**

Inspect for the following problems, and replace any faulty parts.

1. Wear, damage, and seizure of bearing

**Caution**

**a) If the bearing is replaced, be sure to adjust the bearing play in the axial direction.**

**b) Replace the bearing inner and outer races as a set.**

2. Cracks and damage on wheel hub

3. Bends and cracks on axle shaft

**ASSEMBLY**

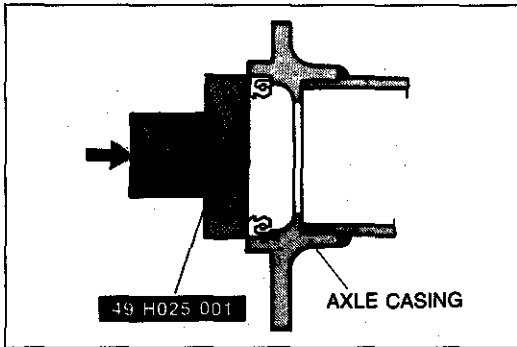
1. Press fit the new oil seal with the **SST**.

2. Press fit the bearing inner race with the **SST**.

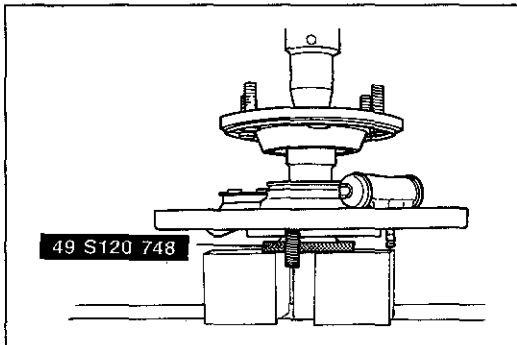
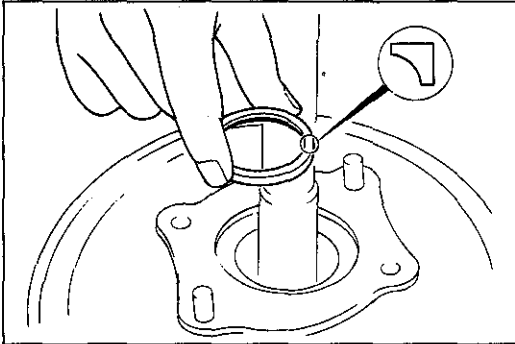
3. Liberally coat with lithium based grease the places indicated by oblique lines in the figure.

# M

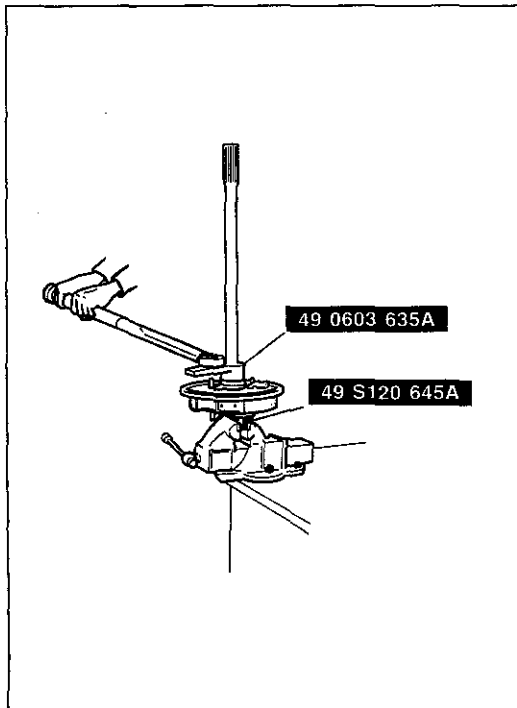
## REAR AXLE (4x4 AND 4x2)



0BU0MX-035



9BU0MX-106



2BU0MX-035

- Using the **SST**, tap the new oil seal in until it is flush with the end of the axle casing.
- Coat the oil seal lip with lithium based grease.

- Install the spacer on the axle shaft.

- Using the **SST** and a press, press the wheel bearing onto the axle shaft.

### Standard press-fit force:

4,200—6,100 kg (30,379—44,121 lb)

### Caution

If the press-fit force is too high or too low, replace the bearing collar or shaft.

- Remove the bearing installer, and attach the bearing locknut to the axle shaft.
- Using the **SST** to tighten the bearing locknut, and press in the bearing.
- Remove the rear shaft bearing nut wrench, and install a new lock washer so that its tab fits into the groove of the rear axle shaft.
- Tighten the bearing locknut to the specified torque.

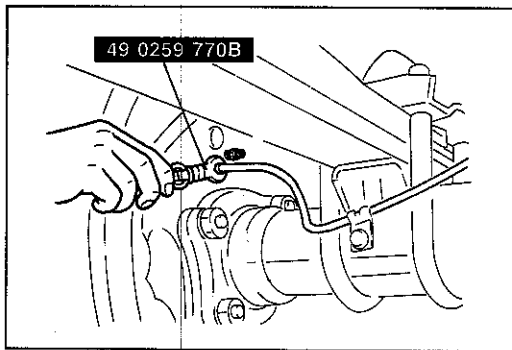
### Tightening torque:

196—294 N·m (20—30 m·kg, 145—217 ft·lb)

### Caution

The torque wrench must be attached perpendicular to the rear shaft bearing nut wrench (49 0603 635A).

- Align the lock washer craws to the locknut notches and crimp the lock washer.



**INSTALLATION**

1. Install a new O-ring to the axle casing.
2. Install the axle shaft assembly, and adjust the bearing play in the axial direction. (Refer to page M-45.)
3. Tighten the back plate mounting nuts.

**Tightening torque:**

**98—118 N·m (10—12 m·kg, 72—87 ft·lb)**

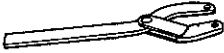
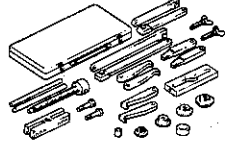
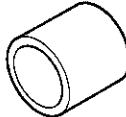
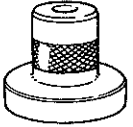
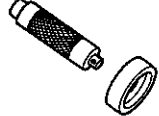

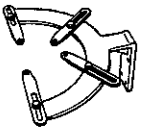
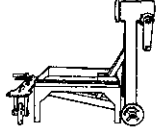
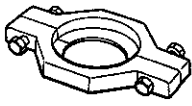
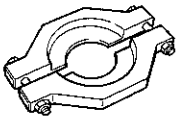
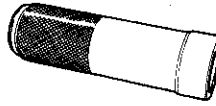

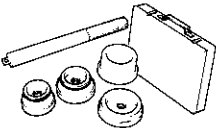
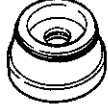
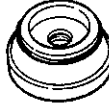
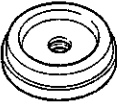
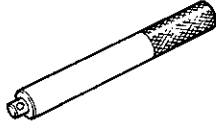
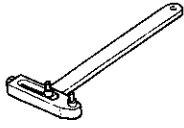
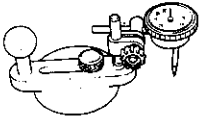
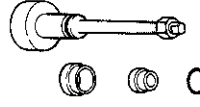
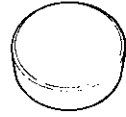
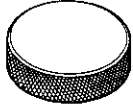
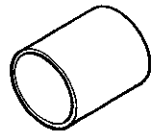
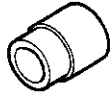
4. Install the parking brake cable, attaching pin, and brake pipe. (Refer to Section P.)
5. Install the brake assembly. (Refer to Section P.)
6. Bleed the air from the brake system (Refer to Section P.)
7. Install the wheel and tire.
8. After installation, adjust the parking brake lever stroke. (Refer to Section P.)

# M

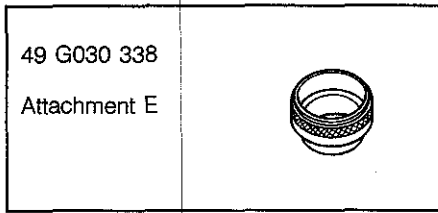
## DIFFERENTIAL (FRONT AND REAR)

### DIFFERENTIAL (FRONT AND REAR)

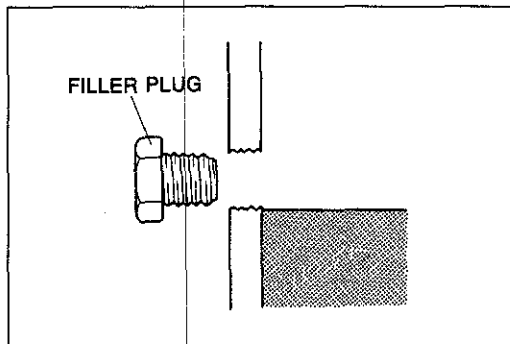
#### PREPARATION SST

<p>49 S120 710</p> <p>Holder, Coupling flange</p> 	<p>49 0839 425C</p> <p>Puller set, bearing</p> 	<p>49 U027 003</p> <p>Installer, oil seal</p> 
<p>49 V001 795</p> <p>Installer, oil seal</p> 	<p>49 G030 795</p> <p>Installer, oil seal</p> 	<p>49 G030 796</p> <p>Body (Part of 49 G030 795)</p> 
<p>49 M005 561</p> <p>Hanger, Diff. carrier</p> 	<p>49 0107 680A</p> <p>Engine stand</p> 	<p>49 0636 145</p> <p>Puller, fan pulley boss</p> 
<p>49 H027 002</p> <p>Remover, bearing</p> 	<p>49 F401 331</p> <p>Body</p> 	<p>49 UB71 525</p> <p>Installer, bearing</p> 
<p>49 F027 0A1</p> <p>Installer set, bearing</p> 	<p>49 F027 005</p> <p>Attachment <math>\phi 62</math> (Part of 49 F027 0A1)</p> 	<p>49 F027 007</p> <p>Attachment <math>\phi 72</math> (Part of 49 F027 0A1)</p> 
<p>49 F027 004</p> <p>Attachment <math>\phi 80</math> (Part of 49 F027 0A1)</p> 	<p>49 F027 003</p> <p>Handle (Part of 49 F027 0A1)</p> 	<p>49 0259 720</p> <p>Wrench, diff. side bearing adjust nut</p> 
<p>49 0720 570</p> <p>Gauge body, pinion height</p> 	<p>49 8531 565</p> <p>Pinion model</p> 	<p>49 0660 555</p> <p>Gauge block</p> 
<p>49 0305 555</p> <p>Gauge block</p> 	<p>49 H027 001</p> <p>Collar</p> 	<p>49 U027 001</p> <p>Collar</p> 

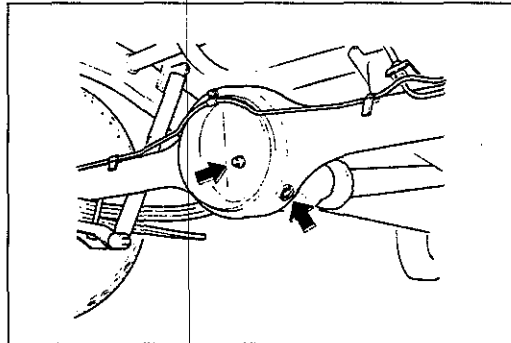




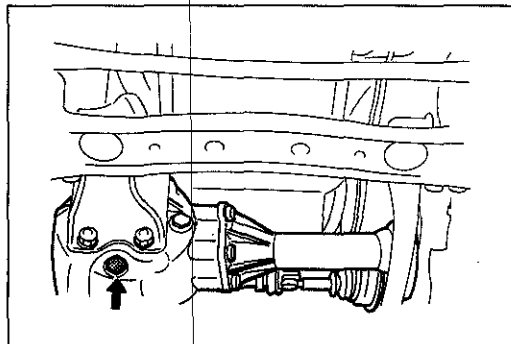
2BU0MX-037



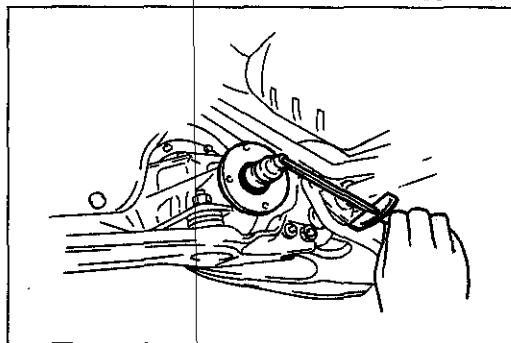
2BU0MX-038



2BU0MX-039



2BU0MX-040



1BU0MX-021

## ON-VEHICLE MAINTENANCE

### Differential Oil

#### Inspection

1. Remove the filler plug.
2. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
3. Install the filler plug.

#### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

#### Replacement

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install the drain plug and a new washer.

#### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

5. Add the specified oil from the filler plug until the level reaches the bottom of the plug hole. (Refer to page M-4.)
6. Install the filler plug and a new washer.

#### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

### Oil Seals

#### Replacement

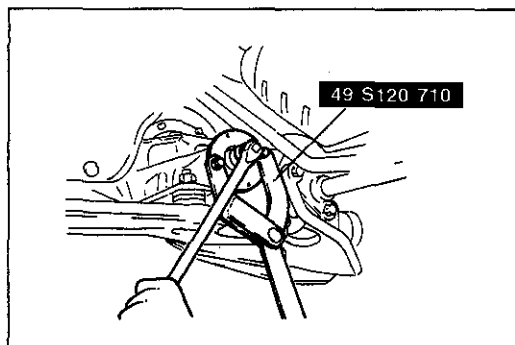
#### (Companion flange and differential right side oil seal)

1. Jack up the vehicle, and support it with safety stands.
2. Drain the differential gear oil.
3. Remove the propeller shaft. (Refer to Section L.)
4. Before loosening the locknut, measure the rotation starting torque of the drive pinion (within the range of the drive pinion and ring gear backlash).

#### Note

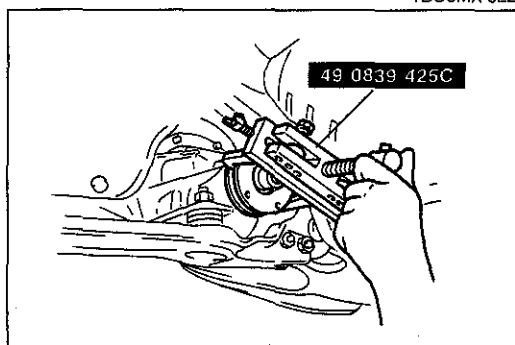
**Make a notation of this torque, and tighten the locknut to set this value during installation.**

## DIFFERENTIAL (FRONT AND REAR)



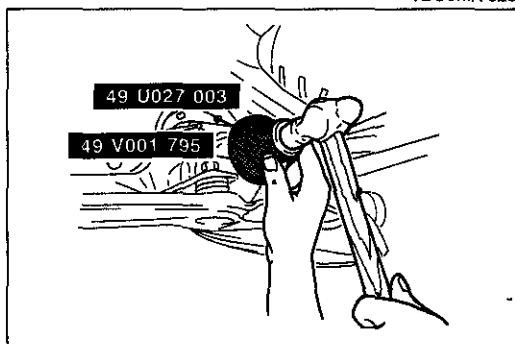
1BU0MX-022

5. Hold the companion flange with the **SST**, and remove the locknut.



1BU0MX-023

6. Remove the companion flange with the **SST**.
7. Remove the oil seal.



1BU0MX-024

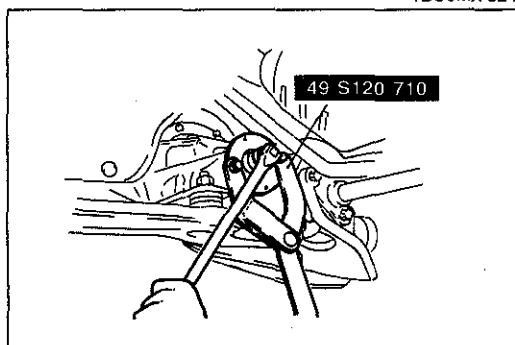
8. Install a new oil seal with the **SST**.

**M-size differential: 49 U027 003**

**P-size differential: 49 V001 795**

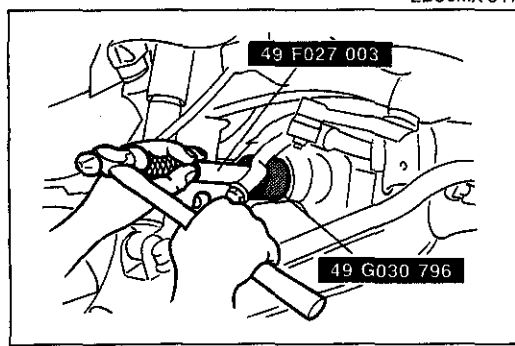
**Note**

**Apply a thin coat of lithium based grease to the oil seal lip.**



2BU0MX-041

9. Install and tighten the locknut using the **SST** to get the specified starting torque recorded in Step 4.
10. Install the propeller shaft.
11. Pour the differential oil until the specified level.  
(Refer to page M-51.)



2BU0MX-042

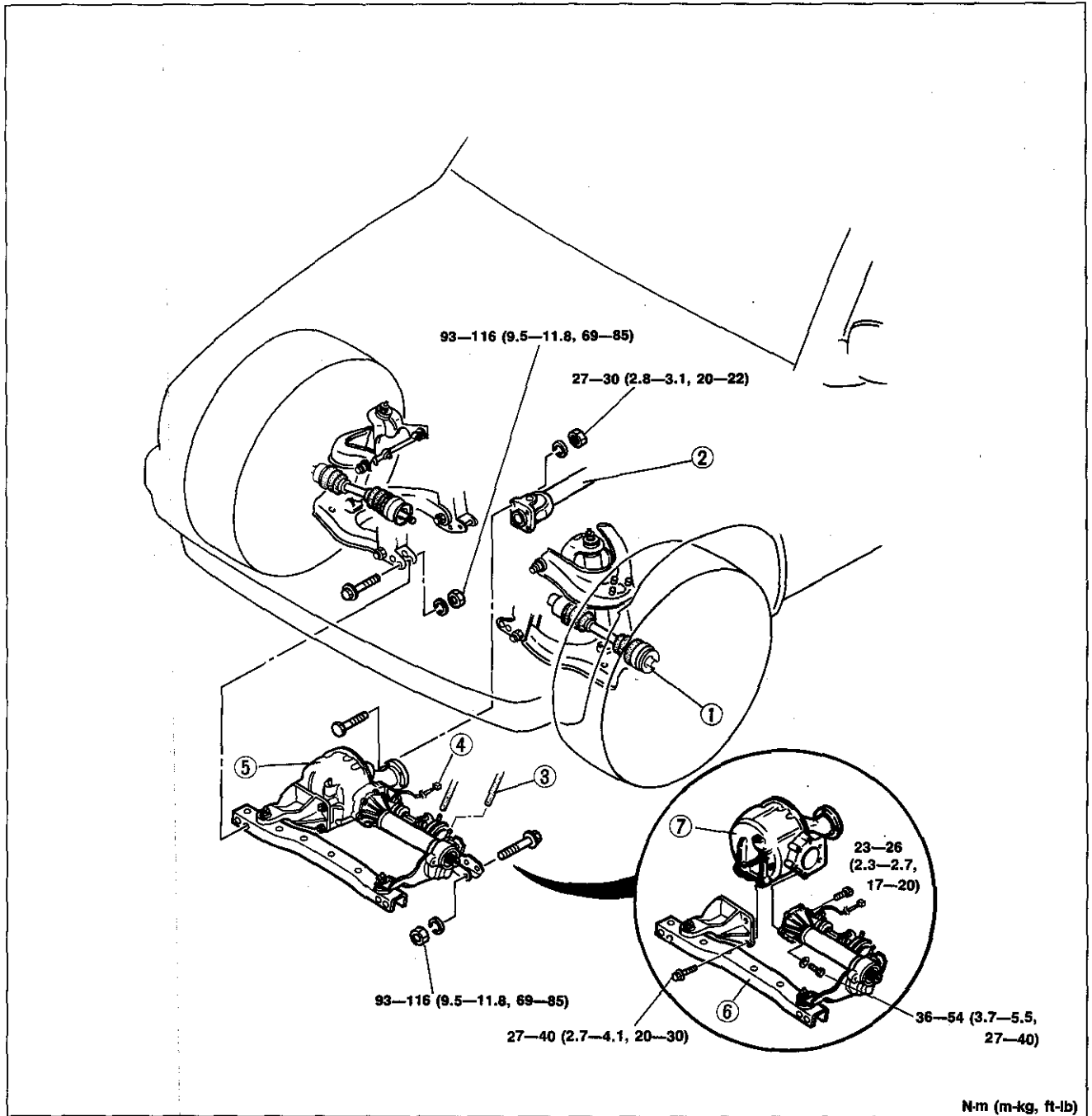
**Front Differential Right Side Oil Seal (4x4)**

1. Drain the differential gear oil.
2. Remove the front axle drive shaft. (Refer to page M-37.)
3. Remove the oil seal from the differential.
4. Tap the new oil seal to the differential with the **SST**.
5. Install the front axle drive shaft.
6. Pour the differential oil until the specified level.  
(Refer to page M-51.)

## REMOVAL AND INSTALLATION (FRONT)

### Front Differential (4x4)

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.

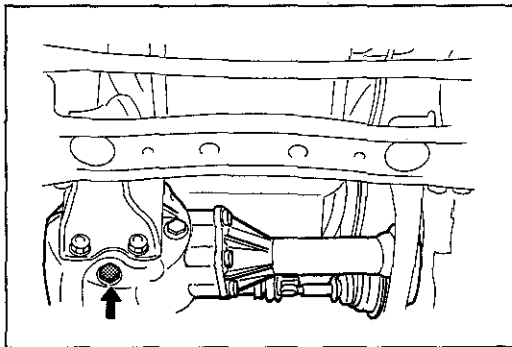


- |                           |           |
|---------------------------|-----------|
| 1. Front axle drive shaft |           |
| Removal.....              | page M-37 |
| Disassembly.....          | page M-38 |
| Inspection.....           | page M-40 |
| Assembly.....             | page M-40 |
| Installation.....         | page M-43 |
| 2. Propeller shaft        |           |
| Service.....              | Section L |
| 3. Vacuum hose            |           |
| 4. RFW switch connector   |           |

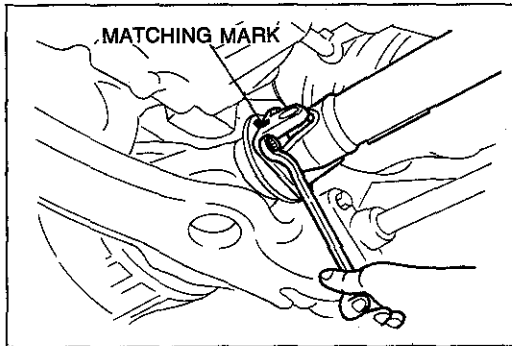
- |  |           |
|--|-----------|
| 5. Front differential and joint shaft assembly |           |
| Removal Note.....                              | page M-54 |
| Inspection.....                                | page M-61 |
| Installation Note.....                         | page M-54 |
| 6. Joint shaft assembly and cross member       |           |
| 7. Front differential                          |           |
| Disassembly.....                               | page M-57 |
| Inspection.....                                | page M-61 |
| Assembly.....                                  | page M-61 |

# M

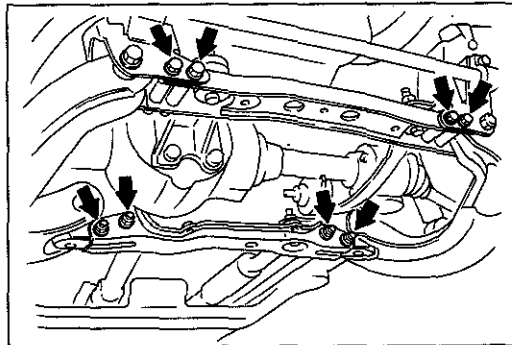
## DIFFERENTIAL (FRONT AND REAR)



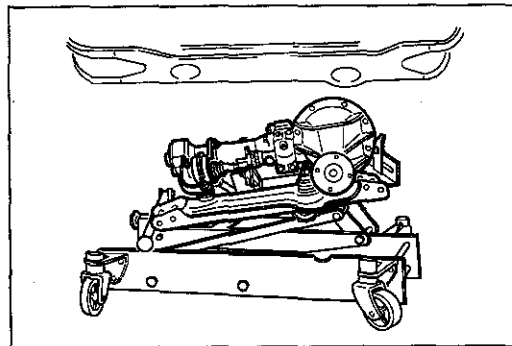
0BU0MX-024



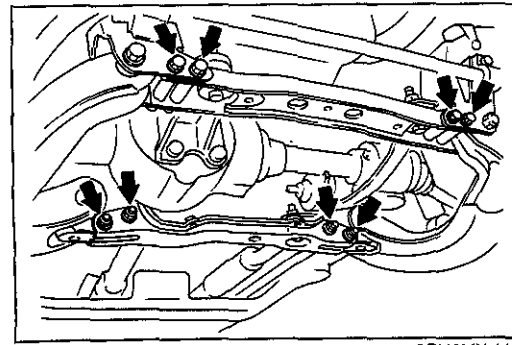
7BU09X-087



7BU09X-088



2BU0MX-044



9BU0MX-118

### Removal note

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the engine undercover.
3. Drain the differential gear oil.
4. Remove the front axle driveshaft. (Refer to page M-37.)
5. Put matching marks on the flanges of the front differential.
6. Remove the front propeller shaft.

7. Set the transmission jack on the differential.
8. Remove the bolts and nuts indicated by arrows.

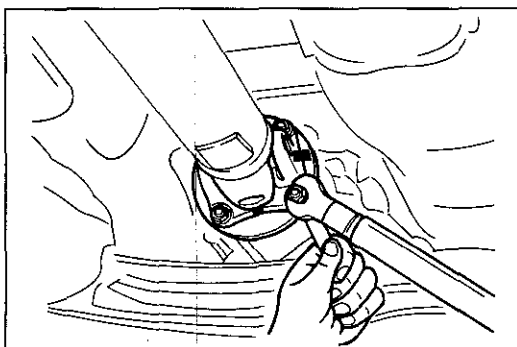
9. Remove the front differential and joint shaft assembly from the vehicle by using the transmission jack.

### Installation note

1. Set the differential on the transmission jack.
2. Install the front differential and RFW assembly.

### Tightening torque:

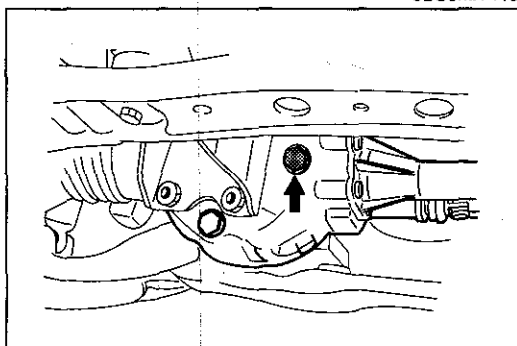
93—116 N·m (9.5—11.8 m·kg, 69—85 ft·lb)



9BU0MX-119

3. Install the propeller shaft. (Refer to Section L.)

**Tightening torque:**  
**27—30 N·m (2.8—3.1 m·kg, 20—22 ft·lb)**



2BU0MX-067

4. Pour the differential gear oil to the specified level.
5. Install the front axle drive shaft. (Refer to page M-43.)
6. Install the engine undercover. (Refer to page M-43.)
7. Lower the vehicle.

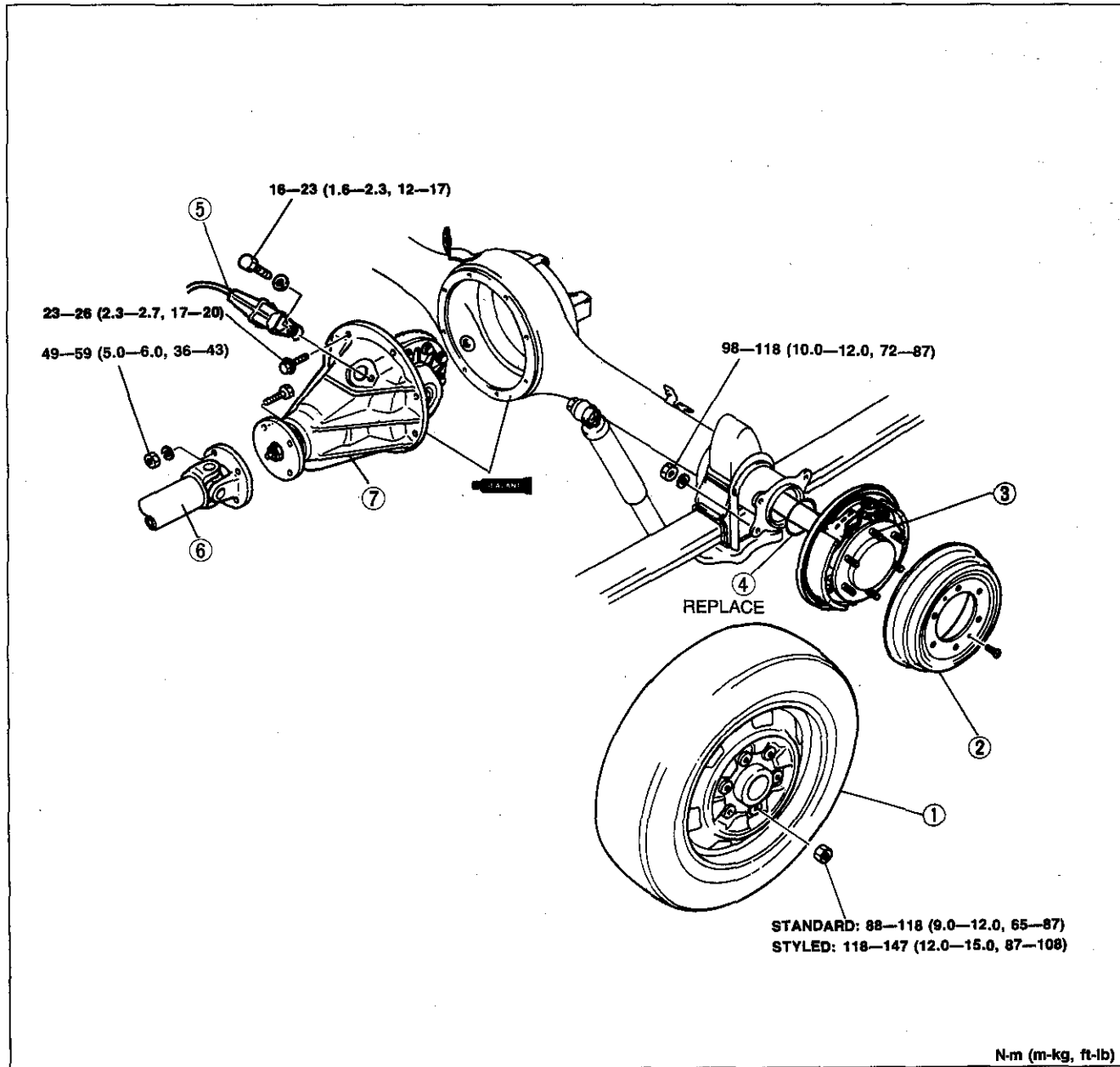
### REMOVAL AND INSTALLATION (REAR)

1. Jack up the rear of the vehicle, and support it with safety stands.
2. Drain the rear axle oil.
3. Remove each part in the numbered sequence shown.
4. Pour the rear axle oil until the specified level. (Refer to page M-51.)
5. Install in the reverse order of removal.

### Rear Differential (4x4 and 4x2)

The B2600 rear differential is P-size.  
The B2200 rear differential is M-size.

Because the construction of these two parts is the same, their disassemblies, inspection, and reassemblies will be explained together.



N-m (m-kg, ft-lb)  
2BU0MX-045

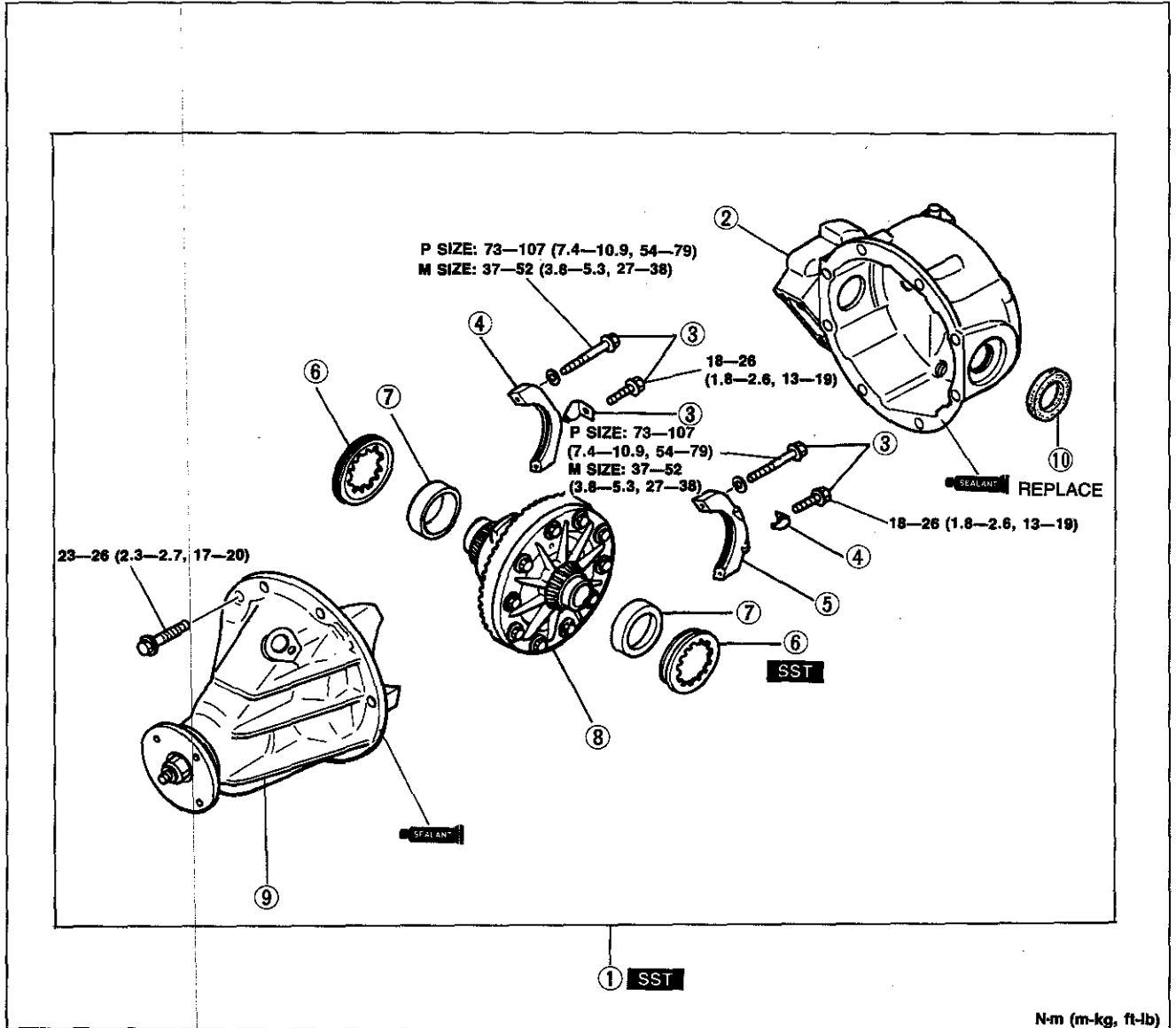
1. Wheel and tire (left and right)
2. Brake drum (left and right; Refer to Section P)
3. Rear axle shaft assembly (left and right)
4. O-ring
5. Rear-wheel ABS sensor

6. Propeller shaft (Refer to Section L)
7. Differential

Disassembly..... page M-57  
Inspection..... page M-61  
Assembly..... page M-61

## DISASSEMBLY (4x4 AND 4x2)

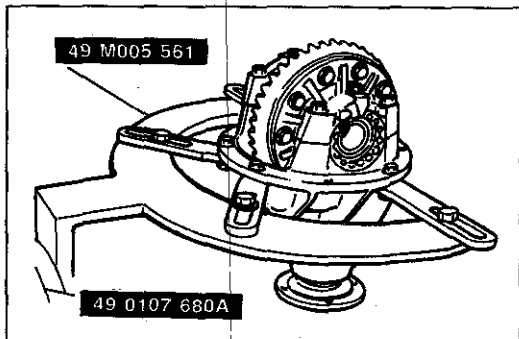
Disassemble each part in the numbered sequence shown in the figure, referring to **Disassembly Note**.



N-m (m-kg, ft-lb)

2BU0MX-046

- |   |   |  |
|---|---|--|
| <p>1. Differential<br/>Disassembly<br/>Note..... below</p> <p>2. Differential casing<br/>(Front differential)</p> | <p>3. Bolts</p> <p>4. Lock plates</p> <p>5. Bearing caps<br/>Disassembly<br/>Note ..... page M-58</p> | <p>6. Adjustment screws</p> <p>7. Bearing outer races</p> <p>8. Differential gear assembly</p> <p>9. Differential casing and drive<br/>pinion assembly</p> <p>10. Oil seal</p> |
|---|---|--|



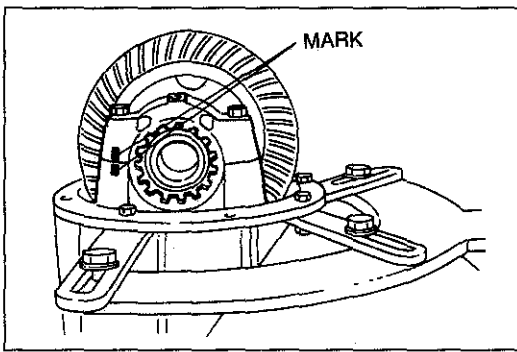
### Disassembly note Differential

Mount the differential gear assembly on the **SST**.

2BU0MX-047

# M

## DIFFERENTIAL (FRONT AND REAR)



4EG09X-036

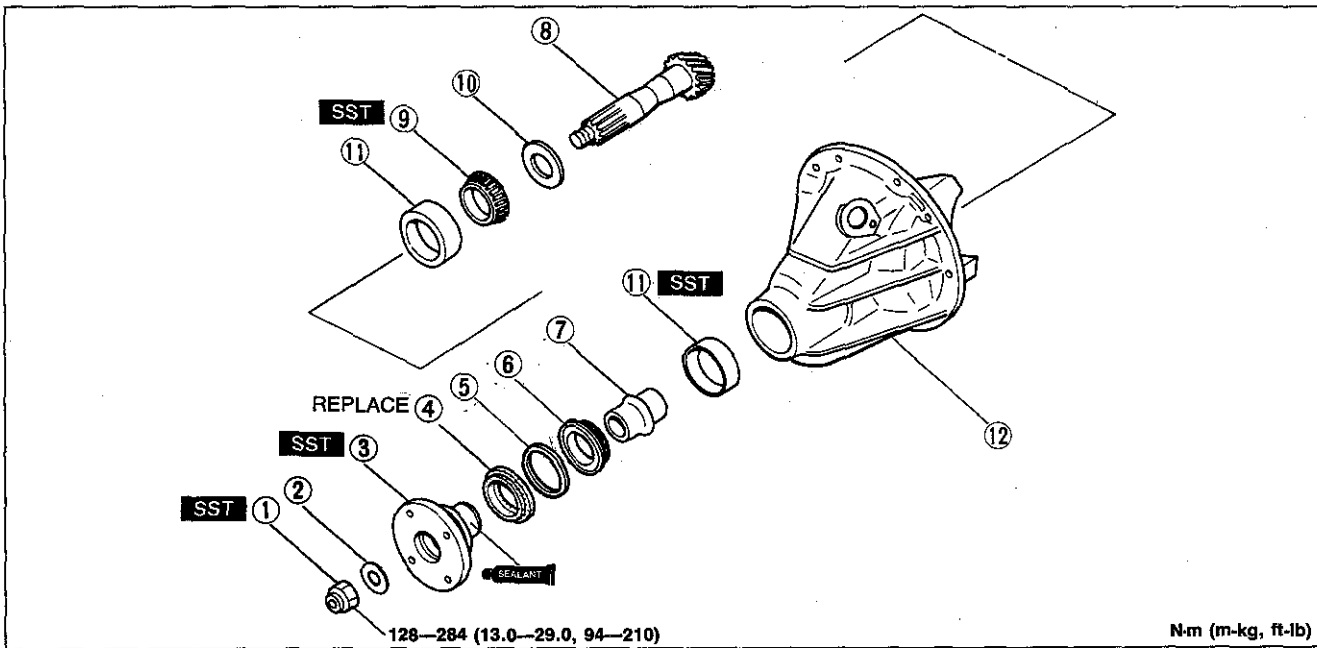
### Bearing Caps

Place a mark on one of the bearing caps so that the left and right bearing caps will not get mixed. Use the mark for matching at the time of assembly.

### DISASSEMBLY

#### Differential casing and drive pinion assembly

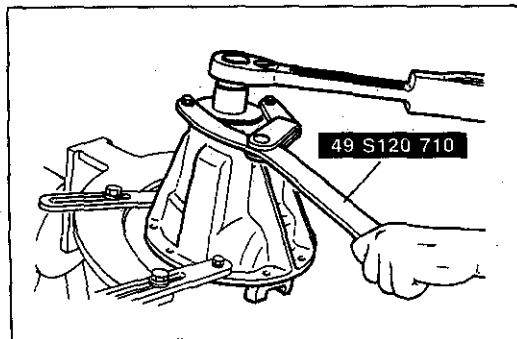
Disassembly in the order shown in the figure, referring to **Disassembly note**.



N-m (m-kp, ft-lb)

2BU0MX-048

- |   |   |
|---|---|
| 1. Locknut<br>Disassembly note..... below               | 7. Collapsible spacer                                       |
| 2. Washer   | 8. Drive pinion   |
| 3. Companion flange<br>Disassembly note ..... page M-59 | 9. Rear bearing<br>Disassembly note ..... page M-59         |
| 4. Oil seal   | 10. Spacer  |
| 5. Spacer   | 11. Bearing outer races<br>Disassembly note ..... page M-59 |
| 6. Front bearing<br>Disassembly note ..... page M-59    | 12. Differential casing                                     |



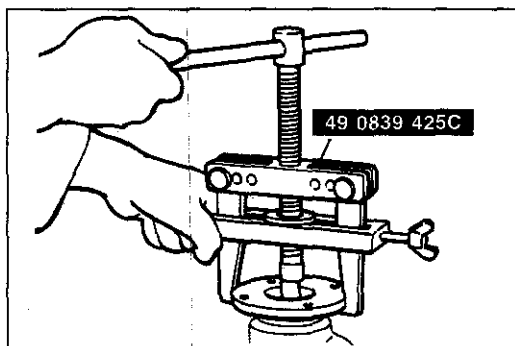
1BU0MX-031

### Disassembly note

#### Locknut

Hold the companion flange with the **SST**, and remove the locknut.

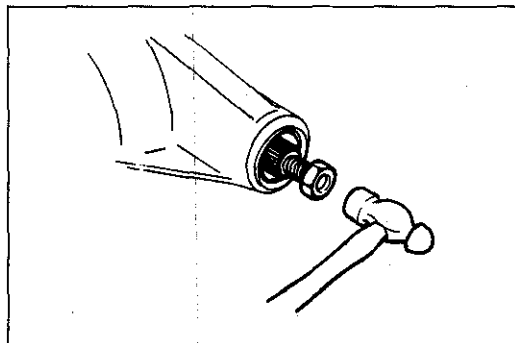




9BU0MX-126

### Companion flange

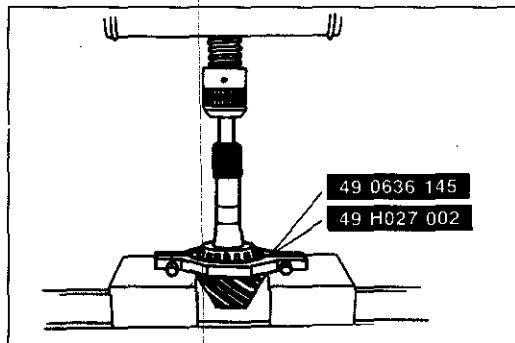
Pull the companion flange off with the **SST**.



5BU09X-064

### Front bearing

The front bearing can be pushed out by attaching a miscellaneous (unnecessary) locknut to the drive pinion, then gently tapping it with a copper hammer.



9BU0MX-127

### Rear bearing

The rear bearing can be pulled off with the **SST**.

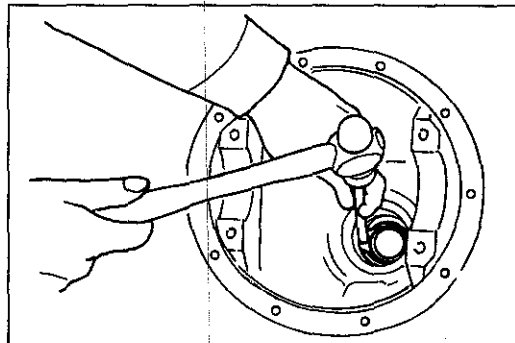
**M-size front differential**

**P-size rear differential: 49 0636 145**

**M-size rear differential: 49 H027 002**

### Note

**Support the drive pinion by hand so that it won't fall.**



5BU09X-066

### Bearing outer races

Remove the bearing outer races by using the two grooves in the carrier and tapping the outer races alternately.

### Note

**Mark or otherwise distinguish between the front and rear outer races so that they are not mixed at the time of reassembly.**

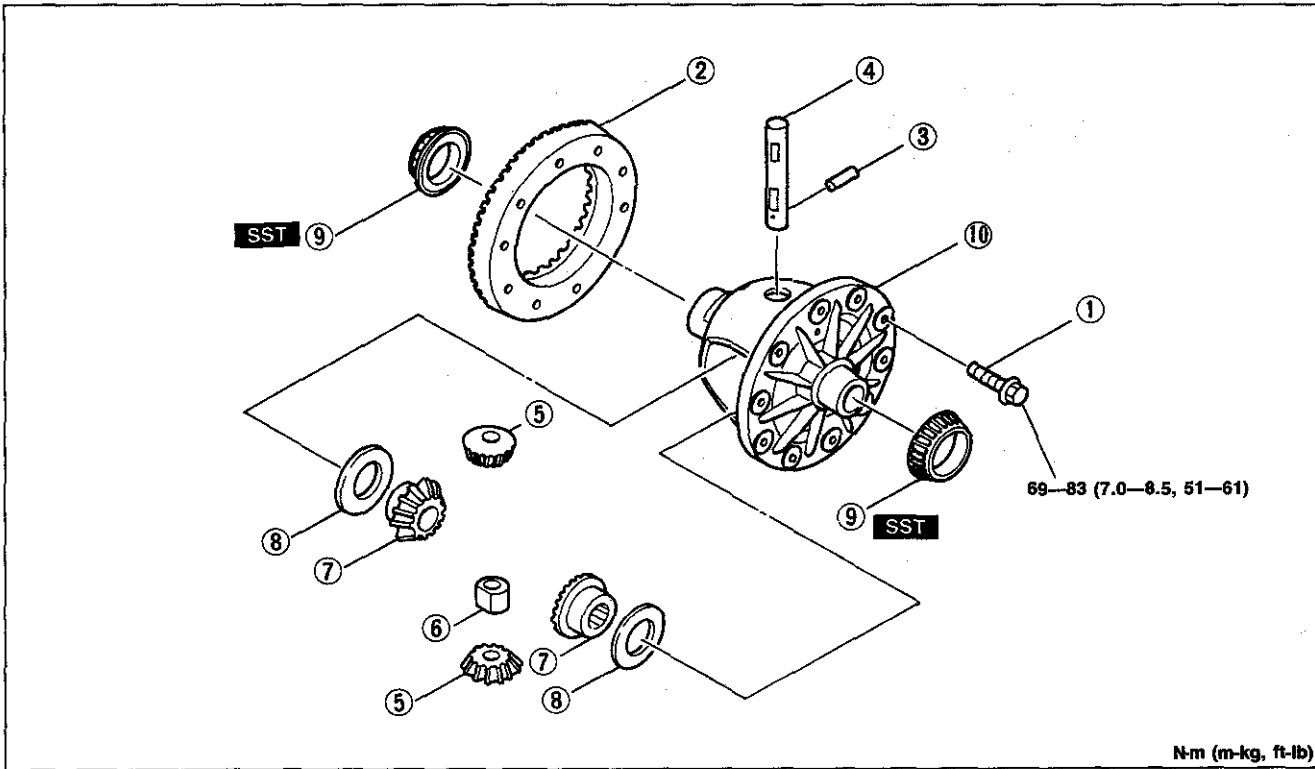
# M

## DIFFERENTIAL (FRONT AND REAR)

### DISASSEMBLY

#### Differential Gear Assembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



N-m (m-kg, ft-lb)

2BU0MX-049

- |                              |                                     |
|------------------------------|-------------------------------------|
| 1. Bolt                      | 6. Thrust block (rear differential) |
| 2. Ring gear                 | 7. Side gears                       |
| 3. Knock pin                 | 8. Thrust washers                   |
| Disassembly Note ..... below | 9. Side bearings                    |
| 4. Pinion shaft              | Disassembly Note ..... below        |
| 5. Pinion gears              | 10. Gear case                       |

#### Disassembly note

##### Knock pin

Secure the gear case in a vise, and remove the knock pin by using a bar with a diameter of 4mm (0.16 in).

##### Caution

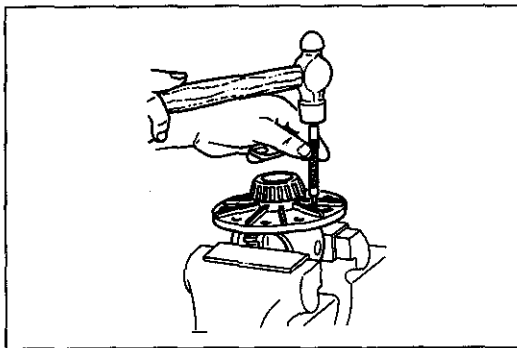
Insert the bar from the knock pin hole opposite the side in which the ring gear is installed.

##### Side bearings

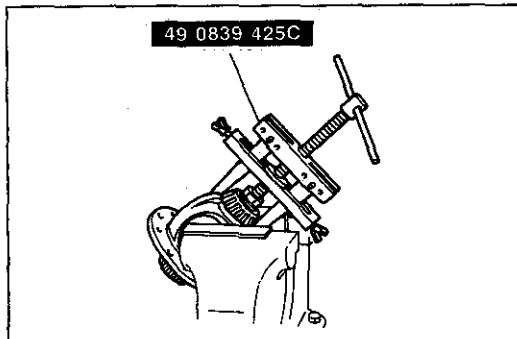
Using parts in the **SST**, remove the side bearings from the gear case.

##### Caution

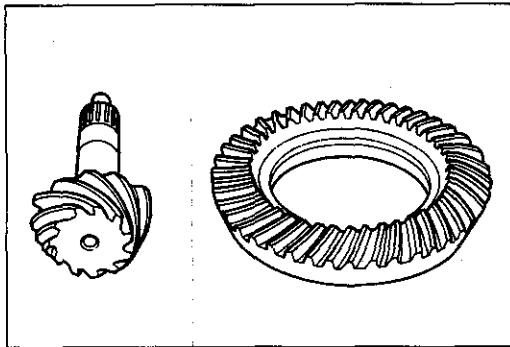
Identify the left bearing so that it can later be reinstalled in the same position.



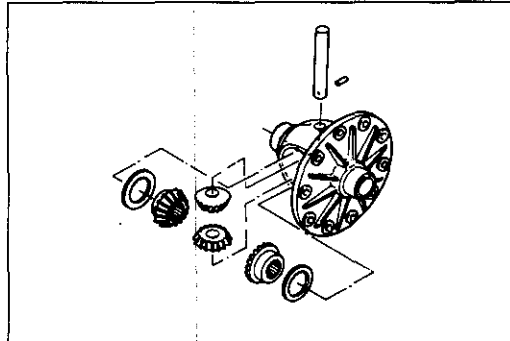
1BU0MX-033



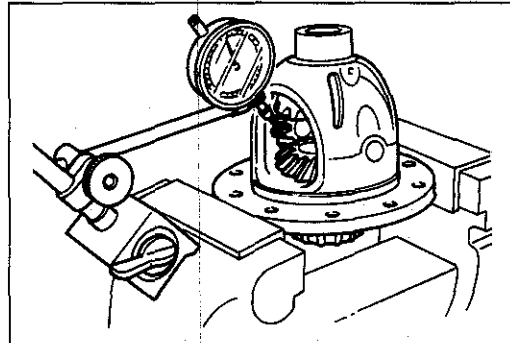
9BU0MX-129



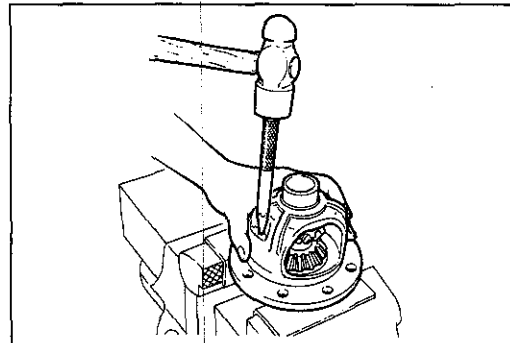
9BU0MX-130



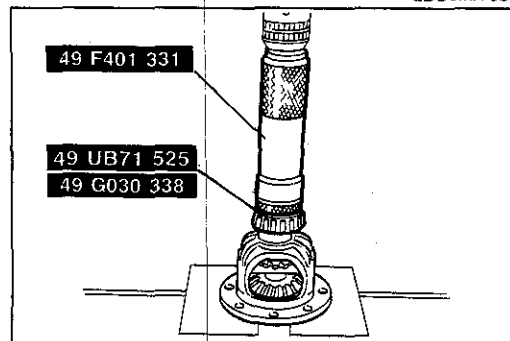
4EG09X-047



2BU0MX-050



2BU0MX-051



2BU0MX-052

### INSPECTION (4x4 AND 4x2)

Inspect for the following problems, and replace any faulty parts.

1. Poor meshing, wear, and damage of the ring gear or drive pinion

#### Note

**If a problem is found, replace the ring gear and the drive pinion as a set.**

2. Seizure, wear, rough rotation, and abnormal noise of bearing
3. Wear and damage of side gear, pinion gear, pinion shaft, and thrust washer
4. Cracked or worn differential carrier; wear at contact point of bearing
5. Cracked gear case; worn sliding parts
6. Damaged or worn contact surface of companion flange oil seal

### ASSEMBLY (4x4 AND 4x2)

1. Adjust the backlash of the side gears and pinion gear as follows.
  - (1) Set a dial gauge against the pinion gear as shown.
  - (2) Secure one of the side gears.
  - (3) Move the pinion gear, and measure the backlash at the end of it.

**Standard backlash: 0—0.1mm (0—0.004 in)**

- (4) If the backlash exceeds the standard, use the selectable thrust washers for adjustment.

Identification mark	Washer thickness mm (in)
0	2.00 (0.0787)
05	2.05 (0.0807)
1	2.10 (0.0827)
15	2.15 (0.0846)
2	2.20 (0.0866)

2. Assemble the side gears, thrust washer, thrust block, pinion gears, pinion shaft, and a new knock pin. After installing a new knock pin, make a crimp so that it cannot come out of the gear case.
3. Press the side bearings onto the gear case with the **SST**.

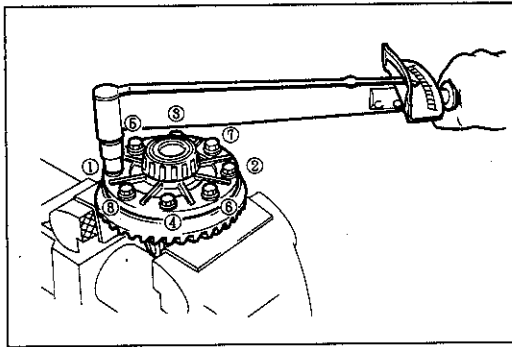
**M-size differential: 49 G030 338 and 49 F401 331**  
**P-size differential: 49 UB71 525**

#### Caution

**Bearings must be reassembled to the original positions if bearing reused.**

# M

## DIFFERENTIAL (FRONT AND REAR)

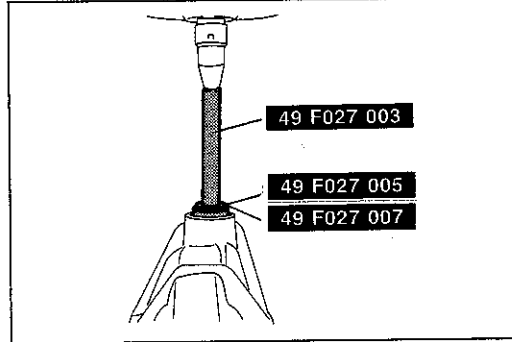


7BU09X-101

4. Install the ring gear and tighten the bolts.

### Tightening torque:

69—83 Nm (7.0—8.5 m·kg, 51—61 ft·lb)



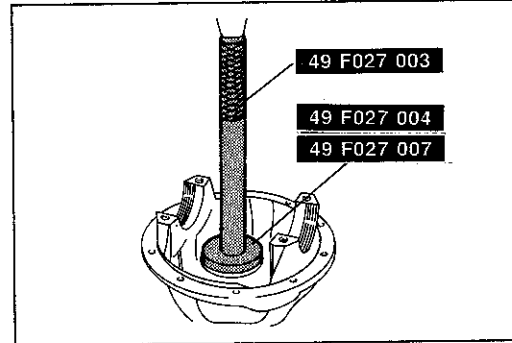
9BU0MX-133

5. Press fit the companion flange side bearing outer races with the **SST**.

4x4 M-size front differential: 49 F027 005

4x4 P-size rear differential: 49 F027 007

4x2 M-size differential: 49 F027 005



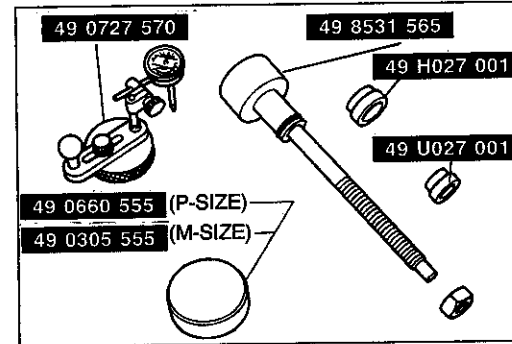
9BU0MX-134

6. Press fit the ring gear side bearing outer races with the **SST**.

4x4 M-size front differential: 49 F027 007

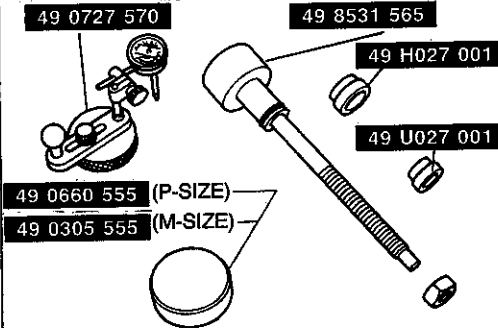
4x4 P-size rear differential: 49 F027 004

4x2 M-size differential: 49 F027 004



9BU0MX-135

7. Adjust the pinion as follows with the **SST**.



49 0727 570

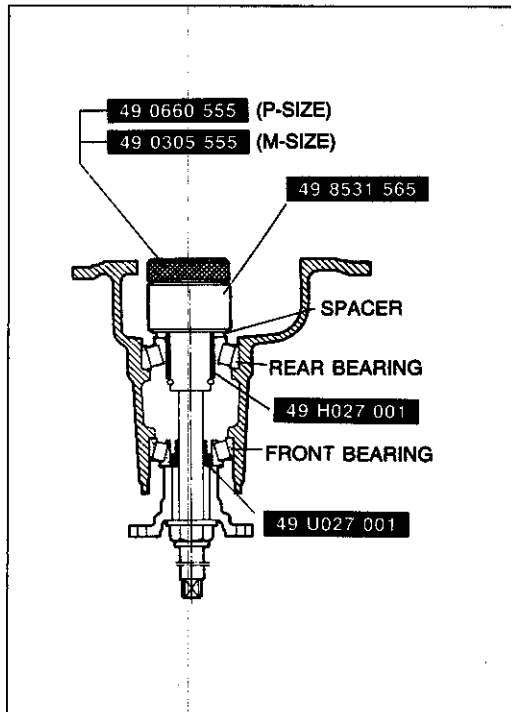
49 8531 565

49 H027 001

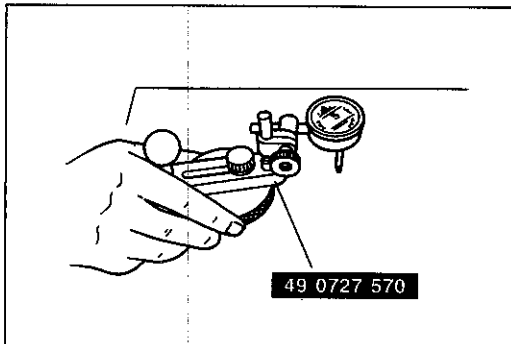
49 U027 001

49 0660 555 (P-SIZE)

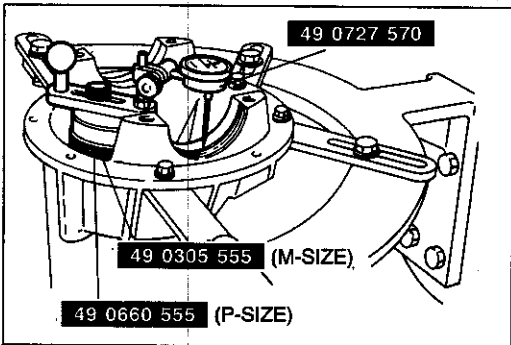
49 0305 555 (M-SIZE)



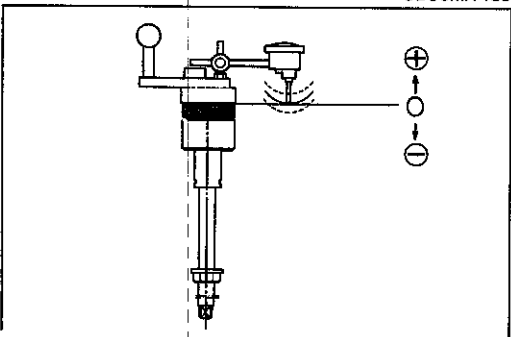
2BU0MX-053



9BU0MX-137



9BU0MX-138



9BU0MX-139

8. Fit the spacer, rear bearing, and **SST**.  
Secure the collar with the O-ring. Then install this to the carrier.
9. Attach the front bearing, **SST**, companion flange, washer, and nut to the drive pinion model.

**Note**

- a) Use the same spacer and nut that were removed at disassembly.
- b) Install the spacer selected for the pinion height adjustment, being careful that the installation direction is correct.
- c) Be sure to install collars in the correct positions and facing in the correct directions.

10. Tighten the nut so that the drive pinion model can be turned by hand.

11. Place the **SST** on the surface plate, and set the dial indicator to zero.

12. Place the **SST**.
13. Place the feeler of the dial indicator so that it contacts where the side bearing is installed in the carrier. Measure the lowest position on both the left and right sides.

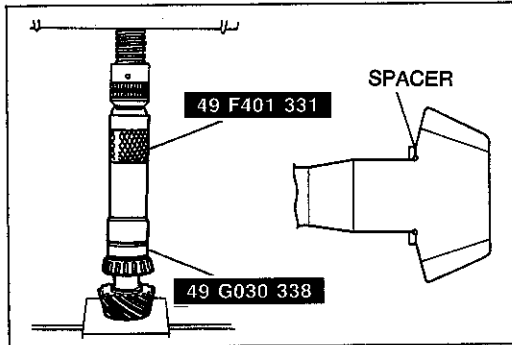
14. Add the two (left and right) values obtained by the measurements taken in step 8, and divide the total by 2.

**Standard: 0mm (0 in)**

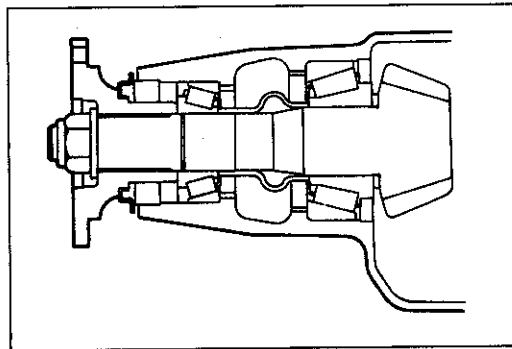
## DIFFERENTIAL (FRONT AND REAR)

Mark	Thickness	Mark	Thickness
08	3.08mm (0.1213 in) 3.11mm (0.1224 in)	29	3.29mm (0.1295 in)
11	3.14mm (0.1236 in)	32	3.32mm (0.1307 in)
14	3.17mm (0.1248 in)	35	3.35mm (0.1319 in)
17	3.20mm (0.1260 in)	38	3.38mm (0.1331 in)
20	3.23mm (0.1271 in)	41	3.41mm (0.1343 in)
23	3.26mm (0.1283 in)	44	3.44mm (0.1354 in)
26		47	3.47mm (0.1366 in)

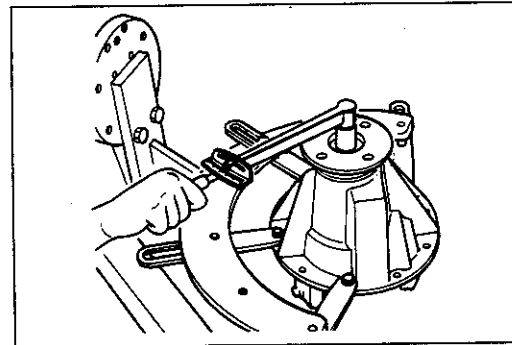
9BU0MX-140



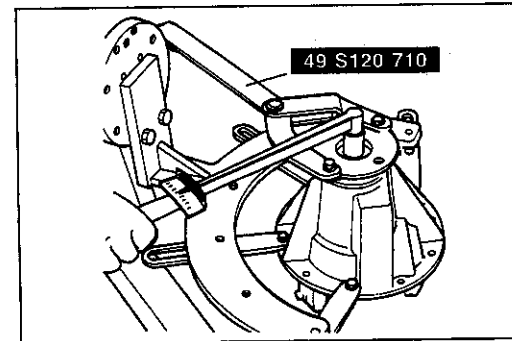
9BU0MX-141



9BU0MX-142



2BU0MX-054



1BU0MX-035

15. If the pinion height is not within specifications, adjust it by selecting a spacer.

### Note

The spacer thicknesses are available in 0.03mm. Select the one closest the thickness required.

16. Press on the rear bearing with the SST.

### Caution

- Press on until the force required suddenly increases.
- Install the spacer selected for the pinion height adjustment, being careful that the installation direction is correct.

17. Install the drive pinion, spacer, front bearing, collapsible spacer, and companion flange to the carrier, and temporarily tighten the locknut.

### Caution

Do not install the oil seal.

18. Adjust the preload of the drive pinion bearing as follows.
- Turn the companion flange by hand to seat the bearing.
  - Use a torque wrench to tighten the locknut, and check to be sure that the specified preload can be obtained within the specified tightening torque range. Remember the torque applied at this time because it will be used after the oil seal is installed.

### Drive pinion preload

#### M-size:

0.9—1.4 N·m (9—14 cm·kg, 7.8—12.2 in·lb)

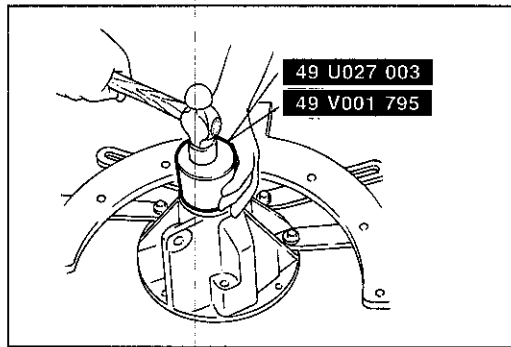
#### P-size:

1.3—1.8 N·m (13—18 cm·kg, 11.3—15.6 in·lb)

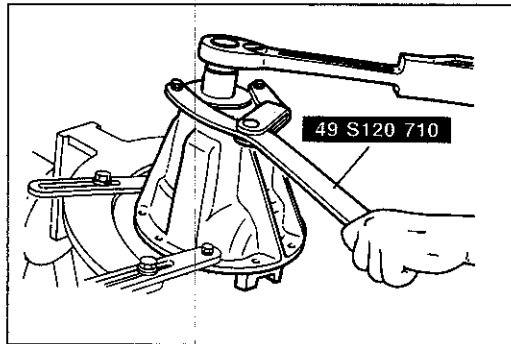
### Locknut tightening torque:

128—284 N·m (13.0—29.0 m·kg, 94—210 ft·lb)

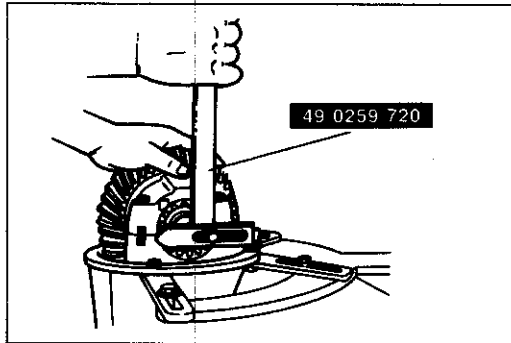
- If the specified preload cannot be obtained within the specified tightening torque range, replace the collapsible spacer with a new one, and check it again.
- Remove the locknut, washer, and companion flange.



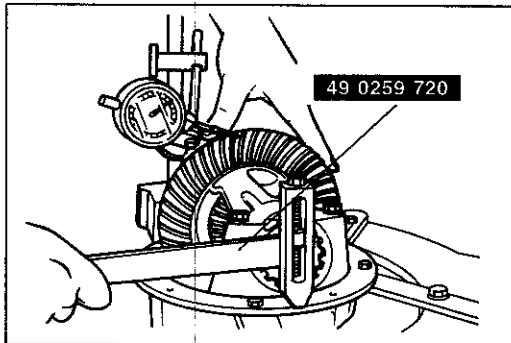
9BU0MX-144



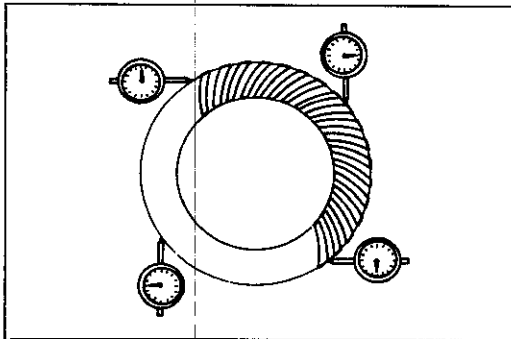
9BU0MX-145



2BU0MX-055



9BU0MX-147



4EG09X-064

(5) Tap the new oil seal into the carrier with the **SST**.

**M-size differential: 49 U027 003**

**P-size differential: 49 V001 795**

**Caution**

**a) Coat the oil seal lip with differential oil.**

**b) Press the oil seal in until it reaches the end of the differential carrier.**

(6) Install the companion flange and washer; then with the **SST** to hold the flange, and tighten the locknut to the torque used in step (2).

**Caution**

**a) Use a new locknut.**

**b) Coat the end of the companion flange with molybdenum disulphide grease.**

19. Install the differential gear assembly in the carrier, and, after loosely tightening the bearing cap mounting bolts, completely tighten the adjustment screws by hand. Then, while turning the ring gear, alternately tighten the left and right adjustment screws with the **SST**.

**Caution**

**Align the matching marks of the bearing cap and the carrier.**

20. Adjust the drive pinion and ring gear backlash and the side bearing preload as follows.

(1) Mark the ring gear at four points at approximately 90° intervals on the ring gear, and mount a dial indicator to the carrier so that the feeler comes in contact at a 90° angle with one of the ring gear teeth.

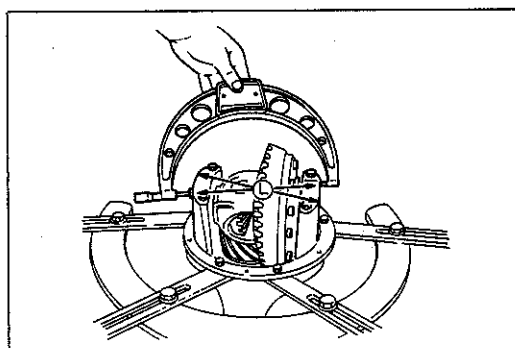
(2) Turn both bearing adjusters equally until the backlash is within specifications with the **SST**.

**Standard backlash:**

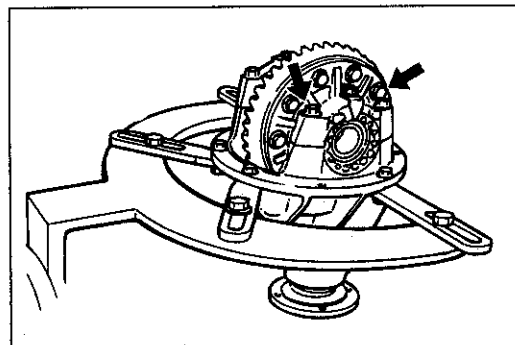
**0.09—0.11mm (0.0035—0.0043 in)**

(3) Check the backlash at the three other marked points, and make sure the minimum backlash is more than **0.05mm (0.002 in)** and the difference in the value of the maximum and minimum backlashes is less than **0.07mm (0.0028 in)**.

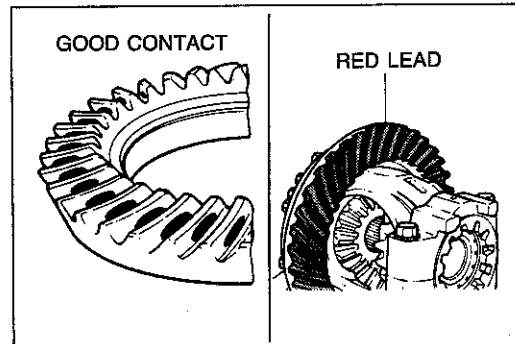
## DIFFERENTIAL (FRONT AND REAR)



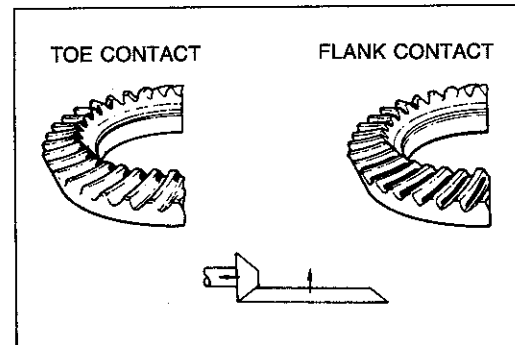
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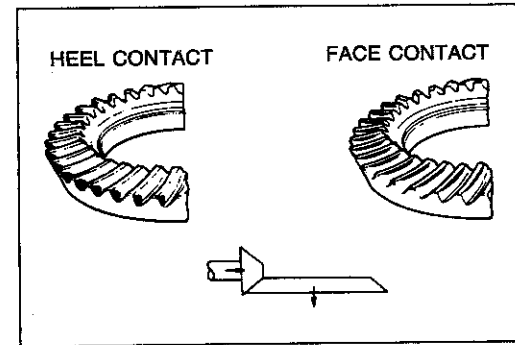
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9BU0MX-148



4EG09X-067



5BU09X-071

- (4) After adjusting the backlash, tighten the adjustment screws equally until the distance between both pilot sections on the bearing caps becomes the standard distance (L).

### Standard distance

#### M-size differential:

185.43—185.50mm (7.3004—7.3031 in)

#### P-size differential:

204.43—204.50mm (8.0484—8.0512 in)

### Note

When adjusting the differential bearing preload, be careful not to affect the backlash of the drive pinion gear and ring gear.

- (5) Tighten the bearing cap bolts to the specified torque.

### Tightening torque

#### M-size differential:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

#### P-size differential:

73—107 N·m (7.4—10.9 m·kg, 54—79 ft·lb)

21. The inspection and adjustment procedure is as follows:

- (1) Coat both surfaces of 6—8 teeth of the ring gear uniformly with a thin coat of red lead.
- (2) While moving the ring gear back and forth by hand, rotate the drive pinion several times and check the tooth contact.
- (3) If the tooth contact is correct, wipe off the coating of red lead.
- (4) If it is not correct, adjust the pinion height and then the backlash.

- (a) Toe-and-flank contact

Replace the spacer with a thinner one, and move the drive pinion outward.

- (b) Heel-and-face contact

Replace the spacer with a thicker one, and bring the drive pinion in closer.



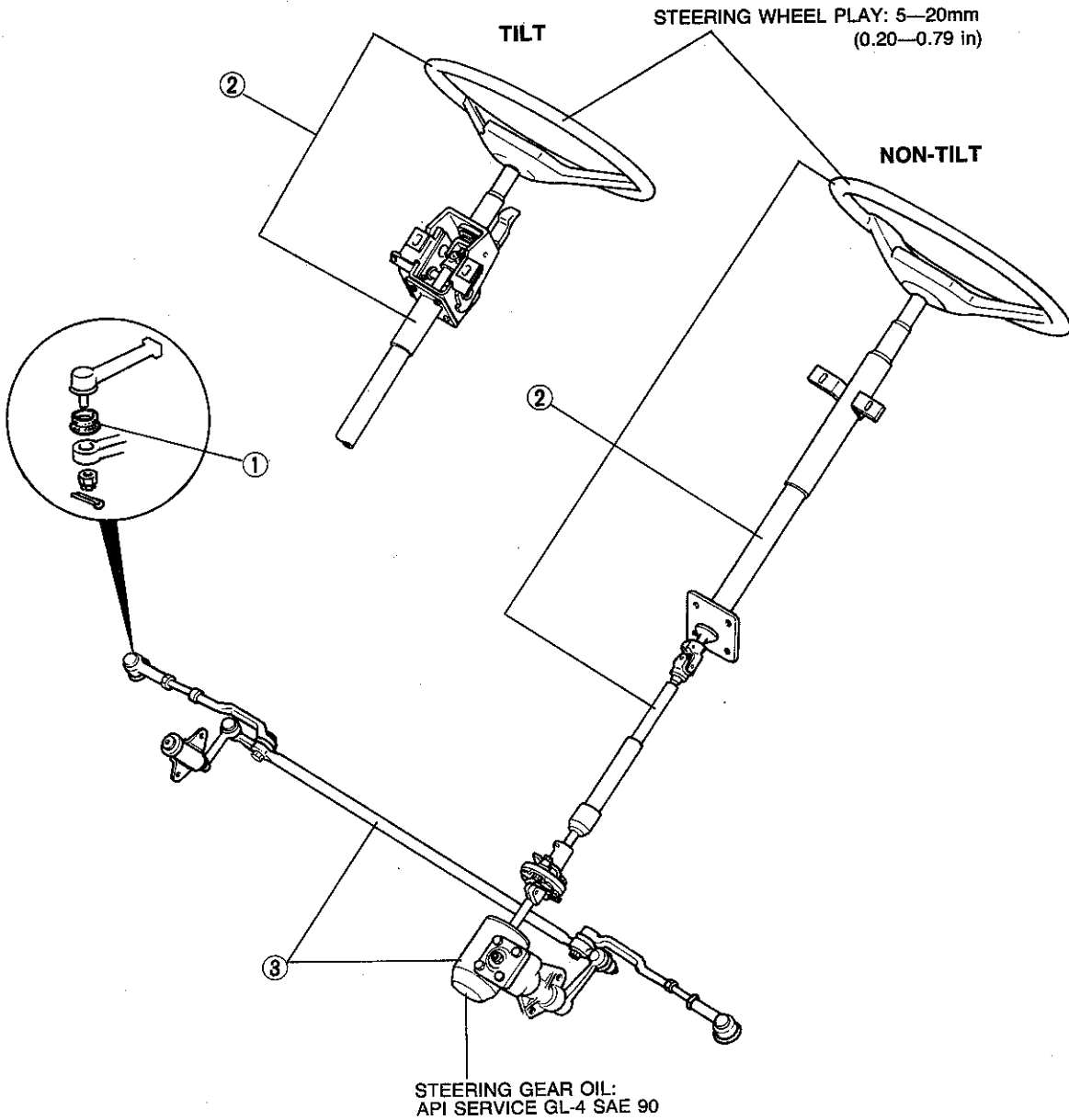
# STEERING SYSTEM

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B2200 MANUAL STEERING



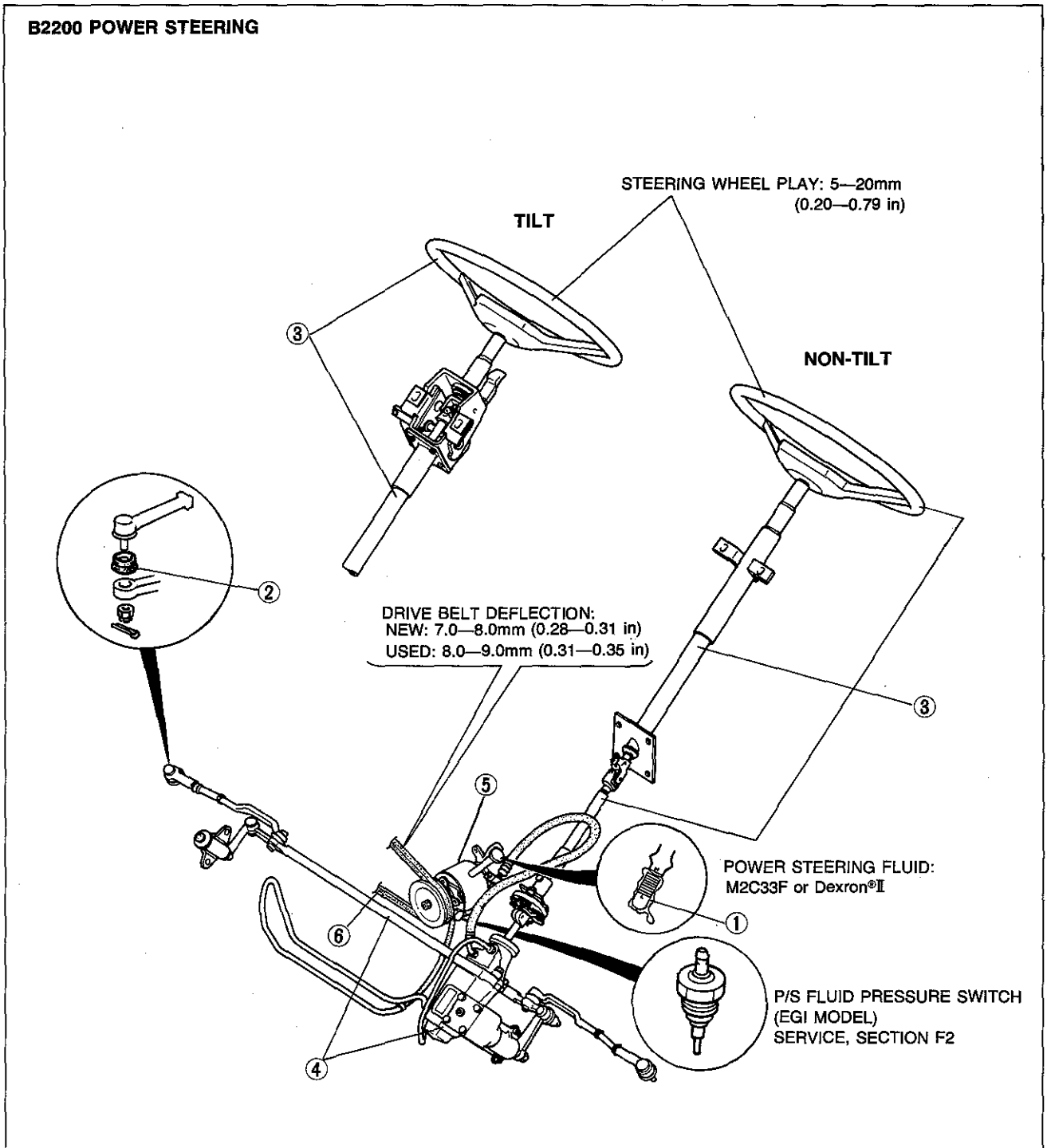
0BUONX-002

1. Boot  
Replacement ..... page N- 7

2. Steering wheel and column  
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3. Steering gear and linkage  
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Assembly ..... page N-14

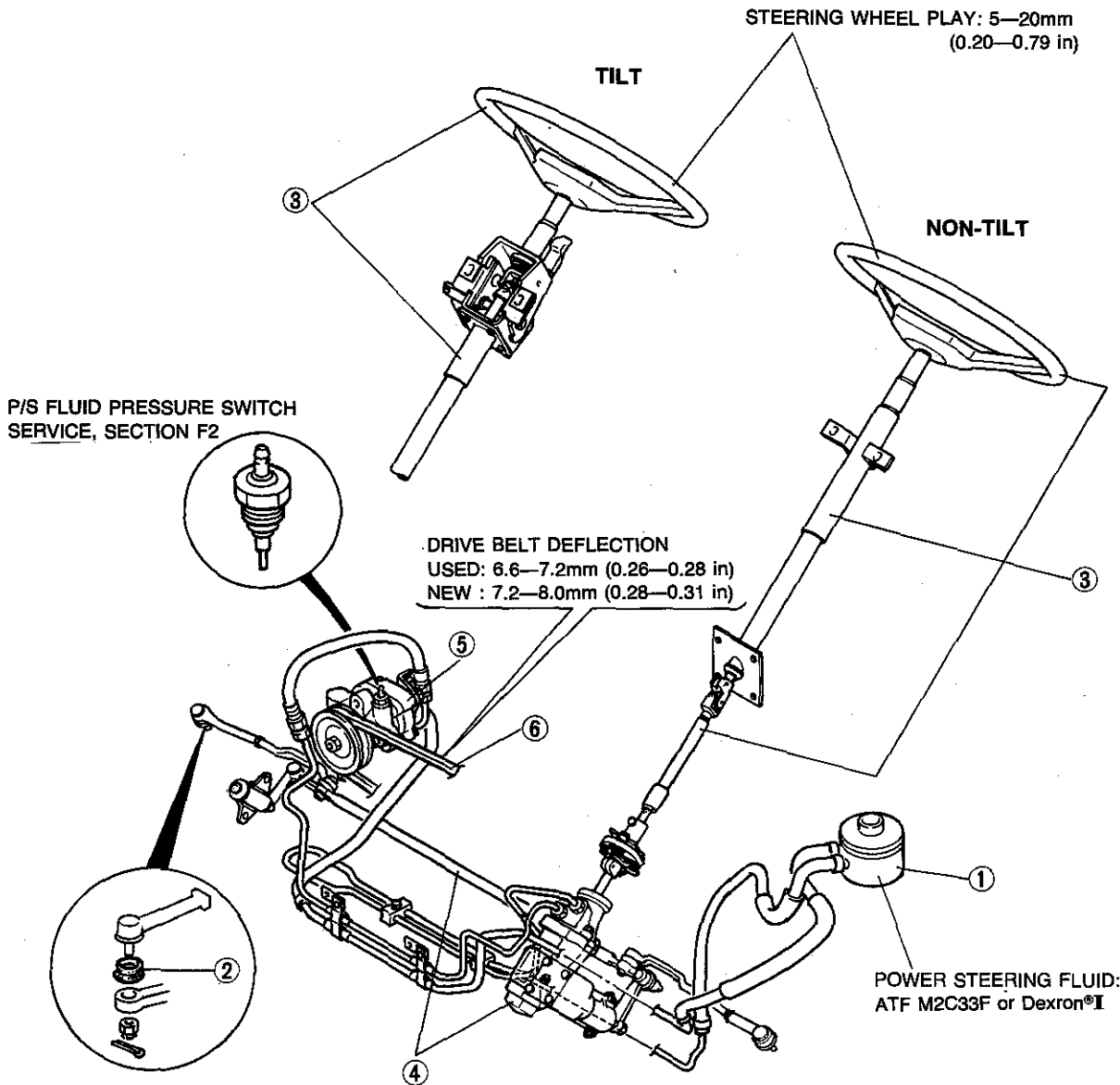
**B2200 POWER STEERING**



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- |  |   |
|--|---|
| <p>1. Power steering fluid<br/>On-vehicle inspection..... page N-21</p> <p>2. Boot<br/>Replacement..... page N- 7</p> <p>3. Steering wheel and column<br/>On-vehicle inspection..... page N-24<br/>Removal and Installation..... page N-10<br/>Inspection..... page N-11</p> | <p>4. Steering gear and linkage<br/>Removal, Inspection, and<br/>Installation ..... page N-24<br/>Disassembly, Inspection, and<br/>Assembly..... page N-26</p> <p>5. Oil pump<br/>Removal and Installation..... page N-28<br/>Disassembly, Inspection, and<br/>Assembly..... page N-32</p> <p>6. Drive belt<br/>Inspection and Adjustment ..... page N-35</p> |
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**B2600i POWER STEERING**



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- |  |  |
|--|--|
| <p>1. Power steering fluid<br/>On-vehicle inspection..... page N-21</p> <p>2. Boot<br/>Replacement..... page N- 7</p> <p>3. Steering wheel and column<br/>On-vehicle inspection..... page N-24<br/>Removal and Installation..... page N-10<br/>Inspection..... page N-11</p> | <p>4. Steering gear and linkage<br/>Removal, Inspection, and<br/>Installation ..... page N-24<br/>Disassembly, Inspection, and<br/>Assembly..... page N-26</p> <p>5. Oil pump<br/>Removal and Installation ..... page N-28<br/>Disassembly, Inspection, and<br/>Assembly..... page N-34</p> <p>6. Drive belt<br/>Inspection and Adjustment ..... page N-35</p> |
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OUTLINE

SPECIFICATIONS

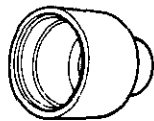
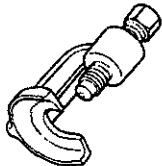
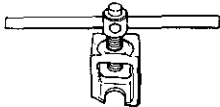
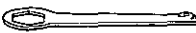
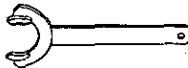
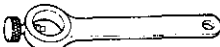
Item	Model	B2200		B2600i
		Manual	Power	Power
Steering wheel	Outer diameter	mm (in)	380 (14.96)	
	Lock-to-lock	turns	4.6	3.5
Steering shaft and joint	Shaft type	Collapsible, non-tilt or tilt		
	Joint type	Cross-joint and rubber coupling		
	Tilt stroke	mm (in)	68 (2.68)	
Steering gear	Type	Ball nut		
	Gear ratio	21–25 : 1	17.8 : 1	
Oil	Type	API service GL-4 SAE 90	ATF M2C33F or Dexron®II	
	Capacity*	liters (US qt, Imp qt)	0.34 (0.36, 0.30)	0.80 (0.85, 0.70)   1.20 (1.27, 1.06)
Power steering	Assist type	—	Engine speed sensing	

\* Power steering: complete system

2BU0NX-001

MANUAL STEERING

PREPARATION

49 1243 785 Installer, dust boot		49 0118 850C Puller, ball joint		49 0223 695E Puller, pitman arm	
49 1391 580 Wrench, locknut		49 UB39 585A Adjust wrench		49 0180 510B Attachment, steering worm bearing preload measurement	

2BU0NX-029

N

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Steering "heavy"</b>	Poor lubrication of or foreign material in steering ball joints	Lubricate or replace	N- 7
	Poor lubrication of or foreign material in upper or lower arm ball joints	Lubricate or replace	Section R
	Stuck or damaged steering ball joints	Replace	N- 7
	Stuck or damaged upper or lower arm ball joints	Replace	Section R
	Improperly adjusted steering worm shaft preload	Adjust	N-16
	Damaged steering gear	Replace	N-12
	Malfunctioning steering shaft joint	Replace	N-10
	Improperly adjusted wheel alignment	Adjust	Section R
	Malfunctioning steering gear	Repair or replace	N-12
<b>Steering wheel effort uneven</b>	Incorrect tire pressures	Adjust	Section Q
	Insufficient oil in steering gear box	Lubricate	N-12
	Malfunctioning steering gear	Repair or replace	N-12
	Steering shaft contacting something	Repair or replace	N-10
	Steering linkage not operating smoothly	Repair or replace	N-12

## TROUBLESHOOTING GUIDE (Cont'd)

Problem	Possible Cause	Remedy	Page
<b>Excessive steering wheel play</b>	Improperly adjusted front wheel bearing preload Worn steering gear Worn or damaged steering shaft joints Loose gear box mounting bolts Improperly adjusted steering gear backlash	Adjust Replace Replace Tighten Adjust	Section M N-12 N-10 N-12 N-17
<b>Steering wheel pulls to one side</b>	Deformed steering linkage Incorrect tire pressures Unevenly worn tires Weakened front spring Worn or damaged stabilizer Dragging brake Deformed knuckle arm Improperly adjusted wheel alignment Improperly adjusted front wheel bearing preload	Replace Adjust Replace Replace Replace Repair Replace Adjust Adjust	N-12 Section Q — Section R Section R — Section M Section R Section M
<b>Poor steering wheel return</b>	Incorrect tire pressures Stuck or damaged steering ball joints Stuck or damaged upper or lower arm ball joints Improperly adjusted front wheel alignment Improperly adjusted steering worm shaft preload Steering shaft contacting something	Adjust Replace Replace Adjust Adjust Repair or replace	Section Q N-7 Section R Section R N-16 N-10
<b>General instability while driving</b>	Deformed steering linkage Incorrect tire pressures Damaged or unbalanced wheel Worn or damaged steering shaft joints Improperly adjusted steering worm shaft preload Weakened front spring Worn or damaged stabilizer Malfunctioning shock absorber Improperly adjusted wheel alignment Improperly adjusted wheel bearing preload	Replace Adjust Adjust or replace Replace Adjust Replace Replace Replace Adjust Adjust	N-12 Section Q Section Q N-10 N-16 Section R Section R Section R Section R Section M
<b>"Shimmy" occurs (Steering wheel vibrates left/right)</b>	Deformed steering linkage Loose gear box mounting bolts Stuck or damaged steering ball joints Stuck or damaged upper or lower arm ball joints Excessive tire and wheel runout Loose lug nuts Unbalanced wheel Incorrect tire pressures Unevenly worn tires Malfunctioning shock absorber Loose shock absorber mounting bolts Cracked or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Replace Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten Replace Replace Replace Adjust	N-12 N-12 N-7 Section R — Section Q Section Q Section Q — Section R Section R Section R Section R Section M Section R
<b>Abnormal noise from steering system</b>	Improperly adjusted steering gear box backlash Loose steering gear box Malfunction inside steering gear Obstruction near steering column Loose steering linkage Worn steering shaft joints	Adjust Tighten Replace Repair or replace Tighten or replace Replace	N-17 N-12 N-12 — N-12 N-10

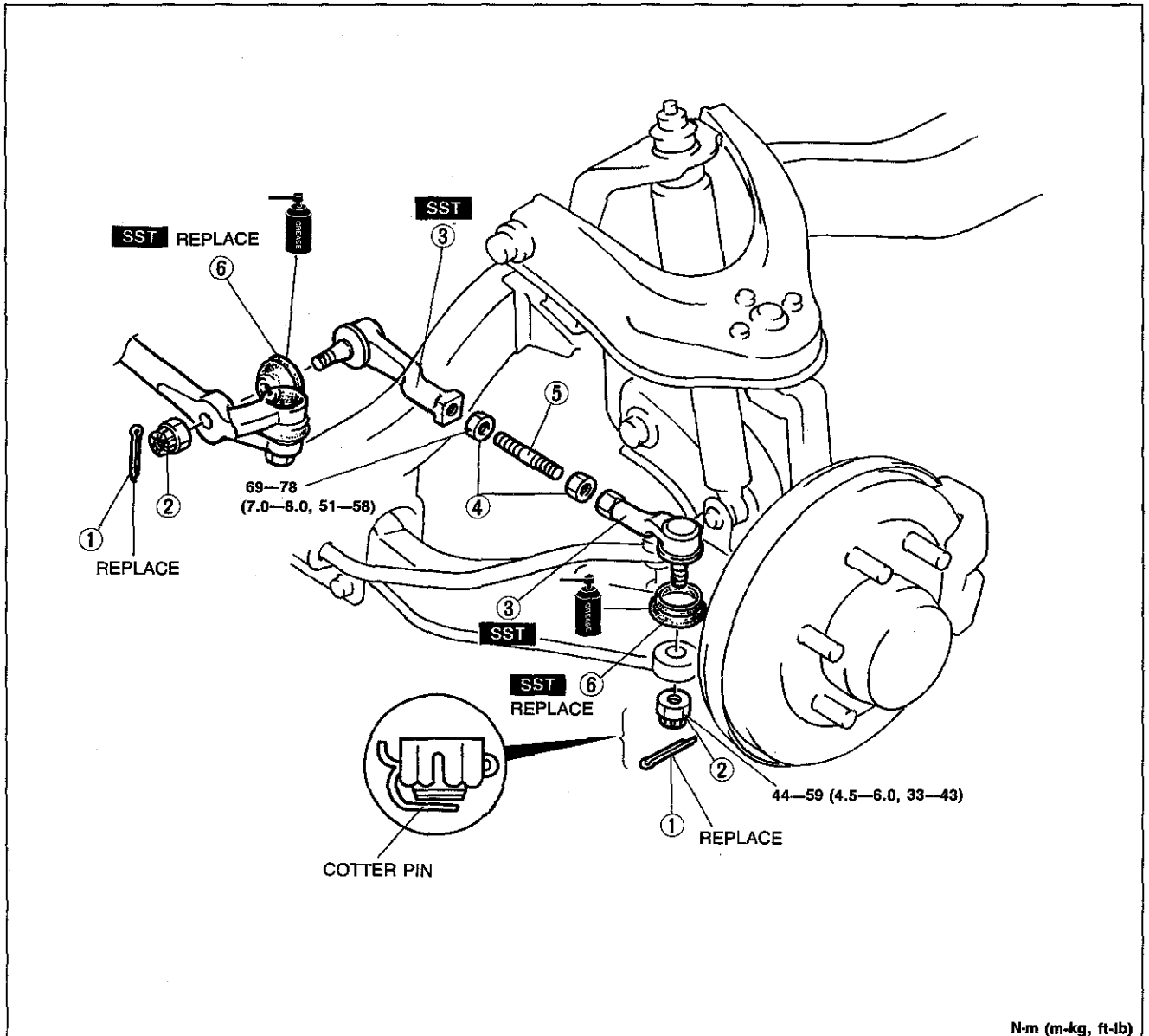
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**BOOT Replacement**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove the ball joint boot in the order shown in the figure, referring to **Removal Note**.
5. Install a new boot in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel.

**Tighten torque: Non-styled wheel 88—118 N-m (9—12 m-kg, 65—87 ft-lb)**  
**Styled wheel 118—147 N-m (12—15 m-kg, 87—108 ft-lb)**

**Note**  
**After replacement, check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)**

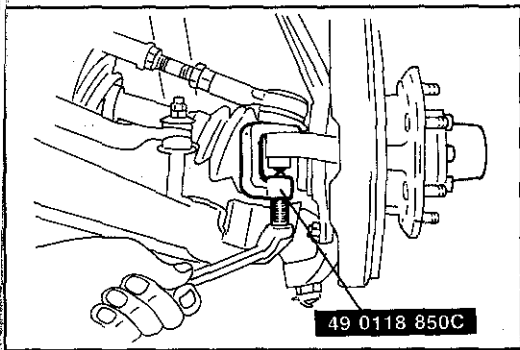


N-m (m-kg, ft-lb)

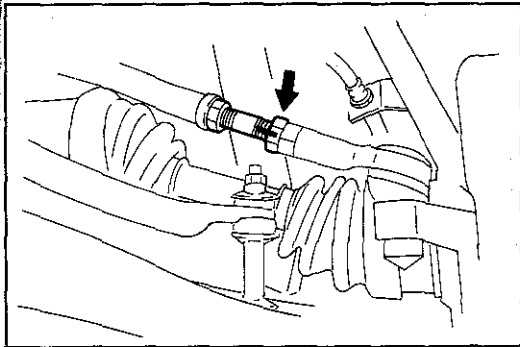
2BUONX-002

1. Cotter pin
2. Nut
3. Ball joint (Inner or outer)  
Removal Note ..... page N-8
4. Locknut

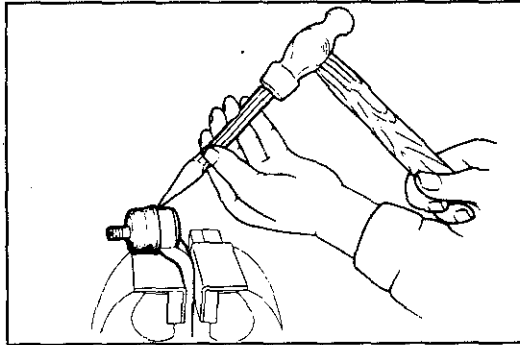
5. Tie rod
6. Ball joint boot (Inner or outer)  
Removal Note ..... page N-8  
Installation Note..... page N-8



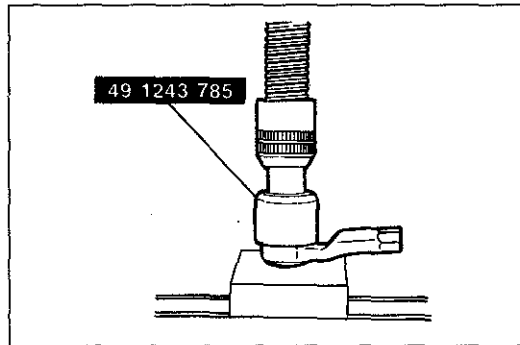
9BU0NX-010



2BU0NX-030



9BU0NX-012



2BU0NX-003

**Removal note****Ball joint (Inner or outer)**

1. With the nut protecting the ball joint stud, separate the ball joint from the steering knuckle or from the center link with the **SST**.

2. Mark the locknut and the tie-rod for reference during installation.
3. Loosen the locknut and remove the ball joint from the tie rod.

**Ball joint boot (Inner or outer)**

Secure the ball joint in a vise. Place a chisel against the boot and hold it at the angle shown. Remove the boot by tapping with a hammer.

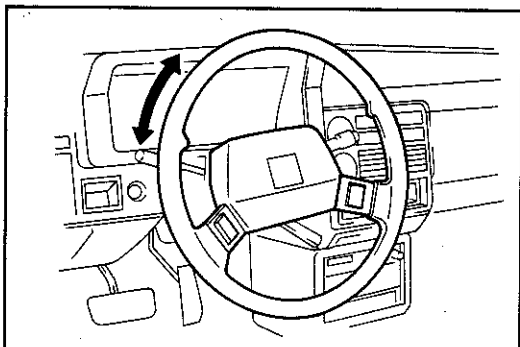
**Caution**

**Be careful not to scar the area where the boot attaches to the ball joint.**

**Installation note****Ball joint boot (Inner or outer)**

1. Wipe away the grease on ball stud.
2. Put a small amount of grease (lithium base, NLGI No.2) into the new boot and set it onto the ball joint. Press the boot onto the ball joint with the **SST**.
3. Wipe away any grease that has been expelled from the boot.





9BU0NX-030

## STEERING WHEEL AND COLUMN

### On-vehicle Inspection

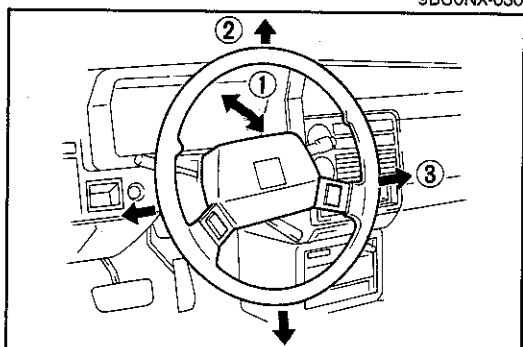
#### Steering wheel play

With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right to determine if play is within specification.

**Play: 5—20mm (0.20—0.79 in)**

#### Note

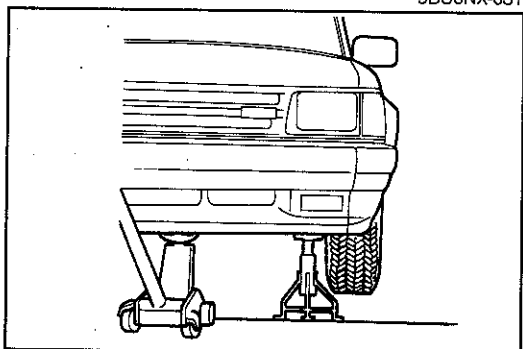
**If play exceeds specification, either the steering joints are worn or the backlash of the steering gear is excessive.**



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### Looseness or play of steering wheel

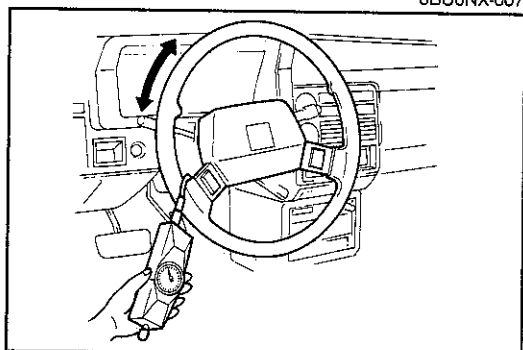
Move the steering wheel in directions ①, ②, and ③ to check for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.



0BU0NX-007

### Steering wheel effort

1. Jack up the vehicle and support vehicle with safety stands. Move the steering wheel to put the wheels in the straight-ahead position.



7BU10X-012

2. Measure the steering wheel effort by connecting a pull scale to the outer circumference of the steering wheel.

#### Steering wheel effort:

**5—20 N (0.5—2.0 kg, 1—5 lb)**

**[during one turn of the steering wheel]**

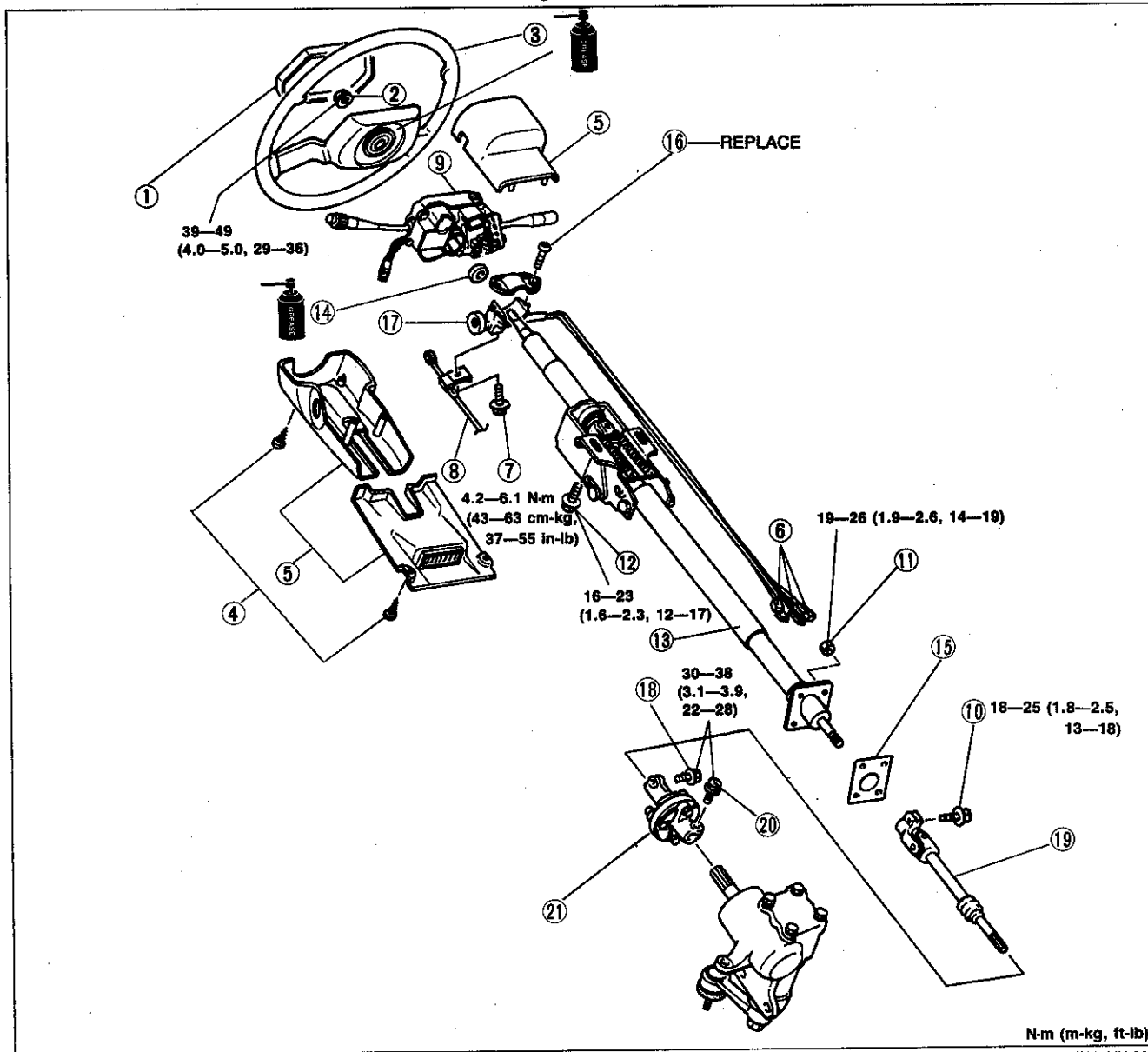
#### Note

**Measure after turning the steering wheel to the left and right 5 times or more.**

3. If the measured effort exceeds specification, check the following: rotation-starting torque of the pinion, rotation torque of each ball joint, and seizure of each joint.

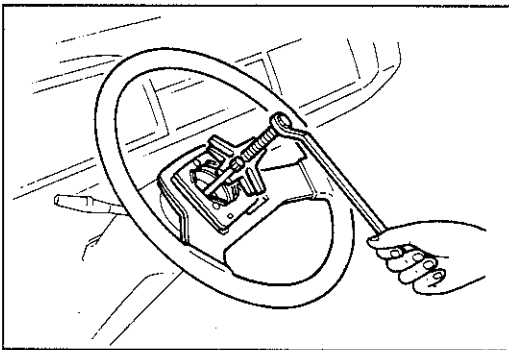
### Removal, Inspection, and Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Horn cover
2. Locknut
3. Steering wheel  
Removal Note ..... page N-11
4. Screws
5. Column cover
6. Combination switch connectors
7. Bolt (A/T)
8. Key-inter-lock cable (A/T)
9. Combination switch
10. Bolt
11. Nuts
12. Bolts
13. Steering shaft assembly  
Inspection..... page N-11

14. Bearing
15. Dust cover
16. Bolts
17. Steering lock assembly  
Removal Note ..... page N-11  
Inspection..... page N-11  
Installation Note..... page N-11
18. Bolt
19. Intermediate shaft  
Inspection..... page N-11
20. Bolt
21. Rubber coupling  
Inspection..... page N-11



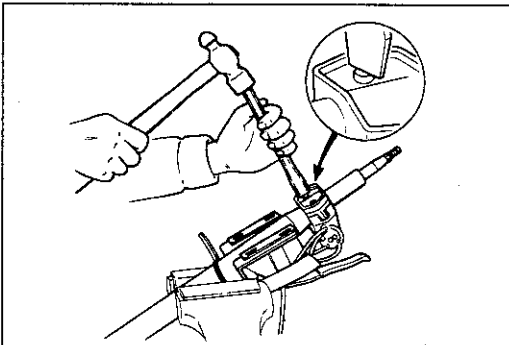
9BU0NX-034

**Removal note**  
**Steering wheel**

Remove the steering wheel with a suitable puller.

**Caution**

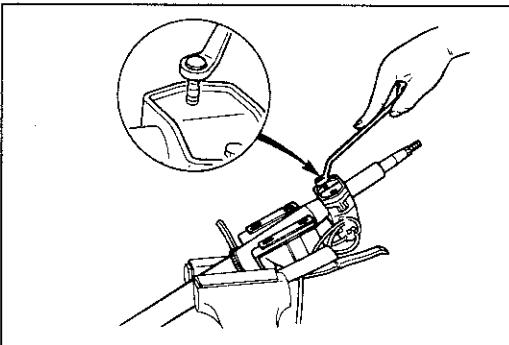
**Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**



2BU0NX-005

**Steering lock assembly**

Use a chisel to make a groove in the head of each steering lock installation bolts. Remove the bolts with a screwdriver; then remove the steering lock assembly.

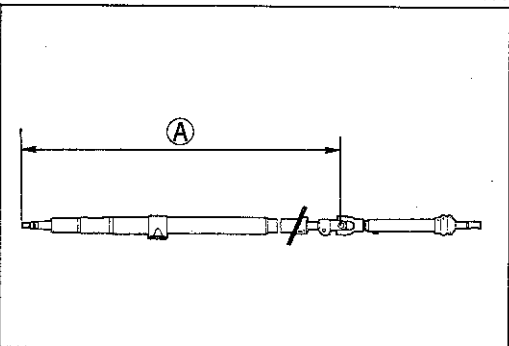


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**Installation note**

**Steering lock assembly**

Install the steering lock assembly on the jacket. Install steering lock installation new bolts, and tighten them until the heads break off.



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**Inspection**

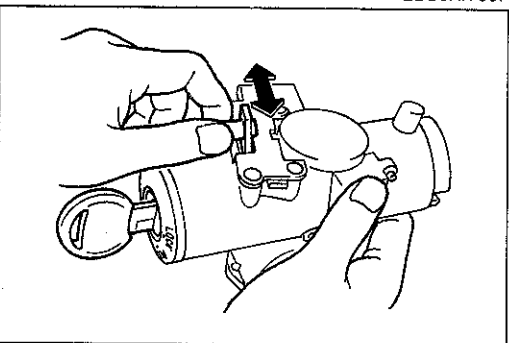
Check for the following and repair or replace as necessary.

1. Dimensions of steering shaft

**Standard dimensions (A):**

**833.8 ± 1.0mm (32.8 ± 0.04 in)**

2. Operation of intermediate shaft joint
3. Worn of rubber coupling,



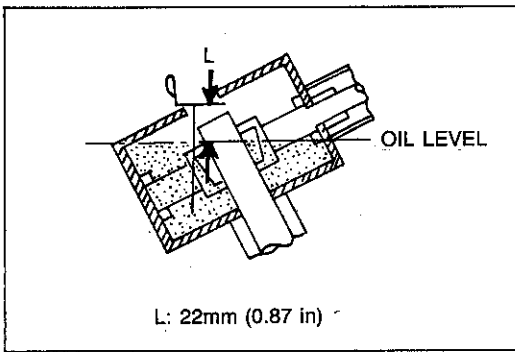
2BU0NX-008

4. Steering lock assembly (Automatic transmission only)

Verify that the cable connector does not move when the key is in the LOCK position and that it moves freely with the key in other positions.

**Steering wheel**

With the wheel into straight-ahead position.



2BU0NX-009

**STEERING GEAR AND LINKAGE**

**On-vehicle Inspection**

**Steering gear oil level**

1. Remove the oil filler port plug.
2. Prepare a simple wire dipstick.
3. Insert the dipstick through the oil filler port.
4. Pull out the dipstick and measure the L dimension.  
Add the specified gear oil if necessary.

**Standard L dimension: 22mm (0.87 in)**

**Specified gear oil: API service GL-4 SAE 90**

5. Install the oil filler port plug.

**Removal, Inspection, and Installation**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Install the wheel.

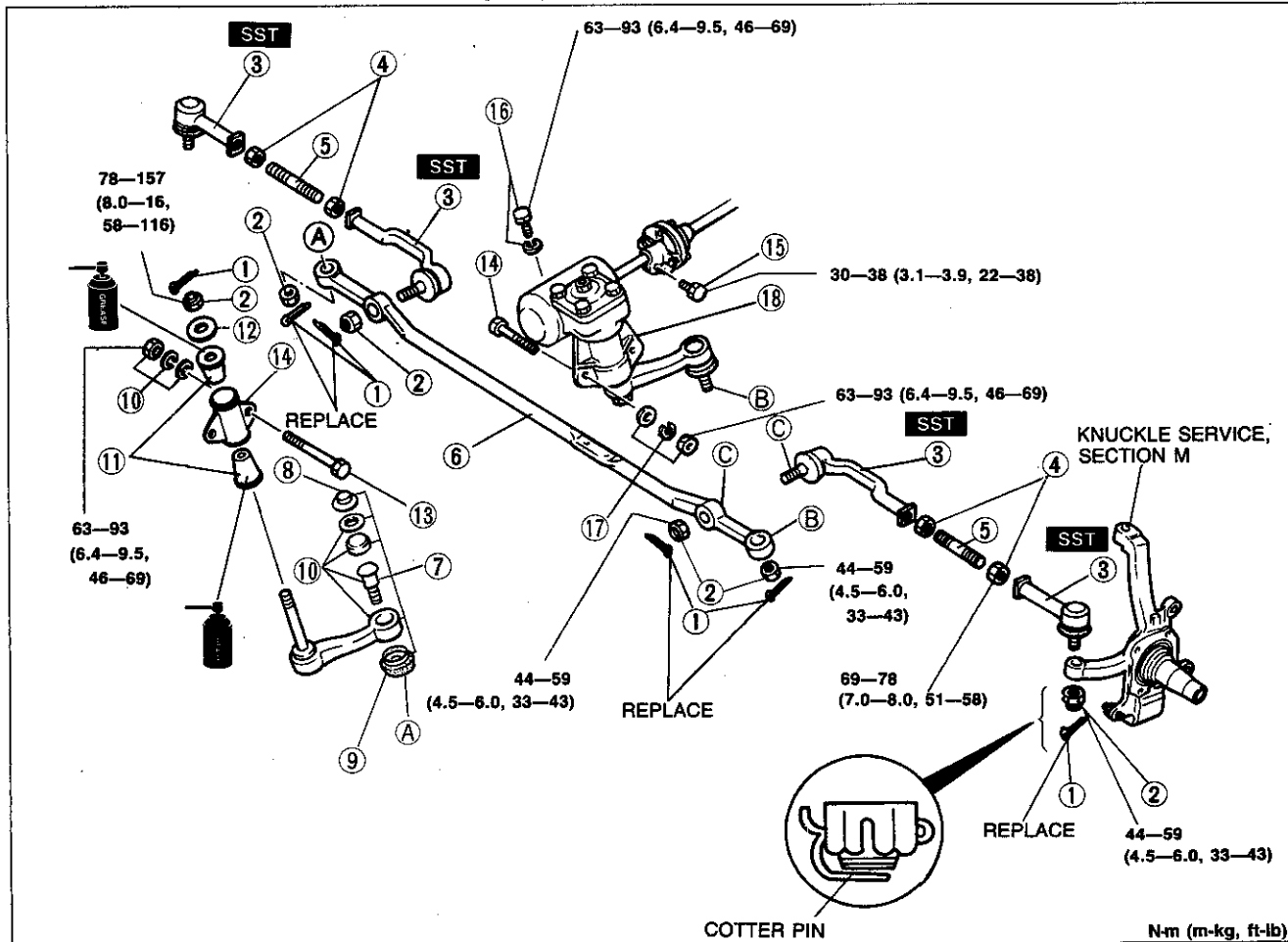
**Tightening torque: Non-styled wheel 88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

**Styled wheel 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

7. Inspect all parts and repair or replace as necessary.

**Note**

**After installation, check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)**



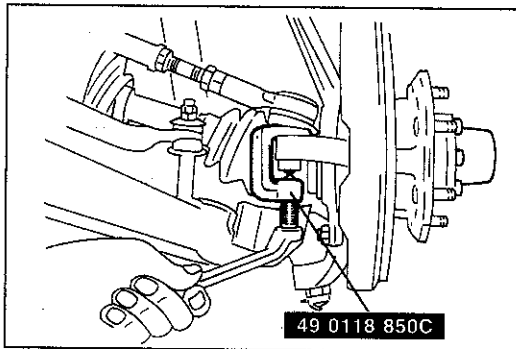
COTTER PIN

N·m (m·kg, ft·lb)

2BU0NX-010

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Cotter pin</li> <li>2. Nut</li> <li>3. Ball joint                             <ul style="list-style-type: none"> <li>Removal Note..... page N-8, 13</li> <li>Check for damage or poor operation</li> </ul> </li> <li>4. Locknut</li> <li>5. Tie rod</li> <li>6. Center link                             <ul style="list-style-type: none"> <li>Check for damage or cracks</li> </ul> </li> <li>7. Idler arm assembly                             <ul style="list-style-type: none"> <li>Check for damage or poor operation</li> </ul> </li> <li>8. Idler cap</li> <li>9. Ball joint dust seal</li> </ul> | <ul style="list-style-type: none"> <li>10. Idler arm</li> <li>11. Washer</li> <li>12. Rubber bushing                             <ul style="list-style-type: none"> <li>Check for wear or damage</li> </ul> </li> <li>13. Bolts, nuts, and washers</li> <li>14. Idler arm bracket</li> <li>15. Bolt</li> <li>16. Bolt and washer</li> <li>17. Bolts, nuts, and washers</li> <li>18. Steering gear assembly                             <ul style="list-style-type: none"> <li>Disassembly, Inspection, and Assembly..... page N-14</li> </ul> </li> </ul> |
|--|---|

2BU0NX-011



9BU0NX-017

**Removal note**

**Ball joint, pitman arm, and idler arm**

With the **SST**, separate the ball joint from the knuckle and from the center link (C—C), the pitman arm from the center link (B—B), and the idler arm from the center link (A—A).

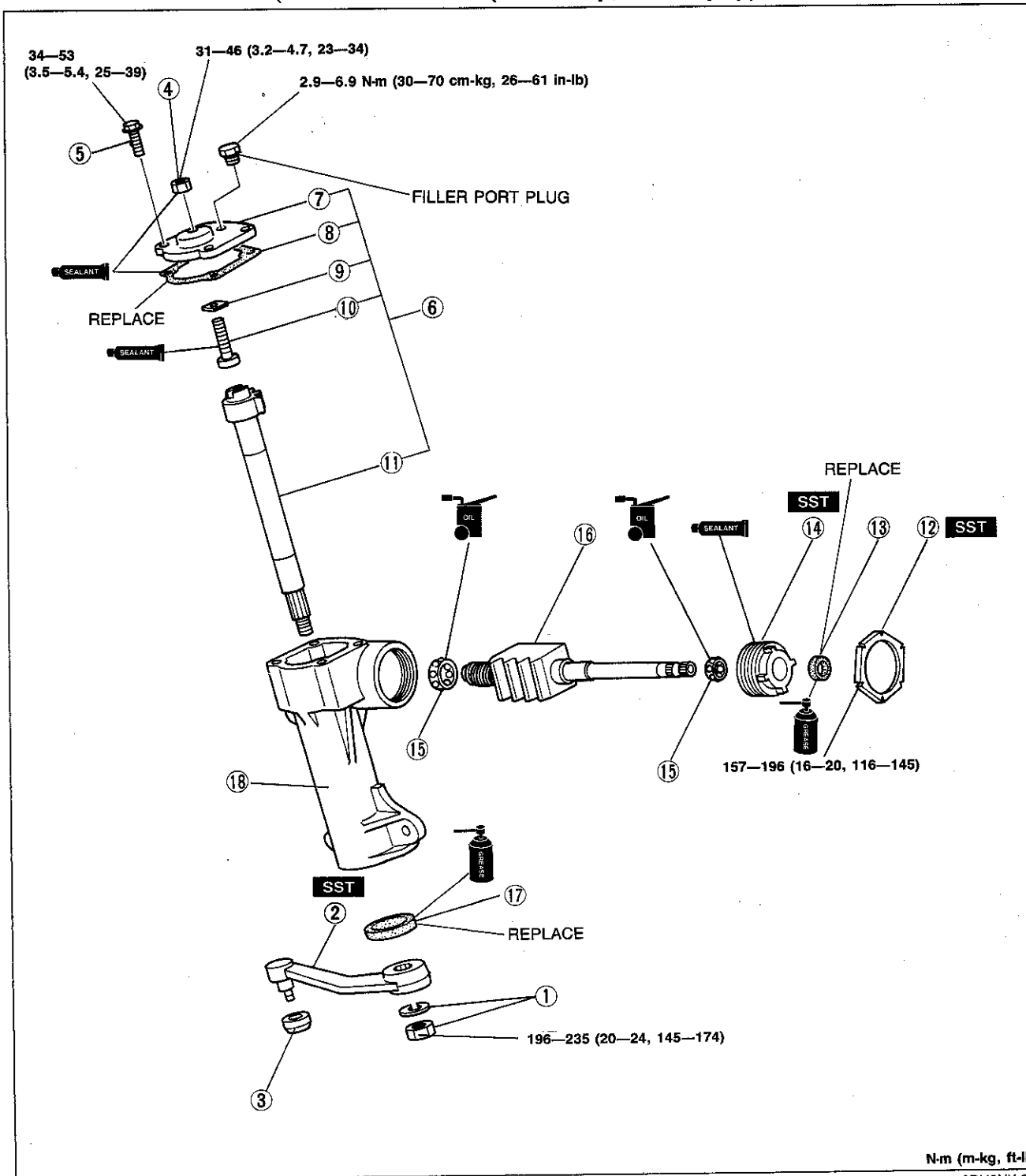
### Disassembly, Inspection, and Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
3. Inspect all parts and repair or replace as necessary.

#### Note

- a) Before disassembling, clean thoroughly and drain the gear oil through the filler port.
- b) After assembly, fill the gear box with gear oil.

**Gear oil specification: API Service GL-4, SAE 90**  
**{ Amount: 0.34 liter (0.36 US qt, 0.30 Imp qt) }**

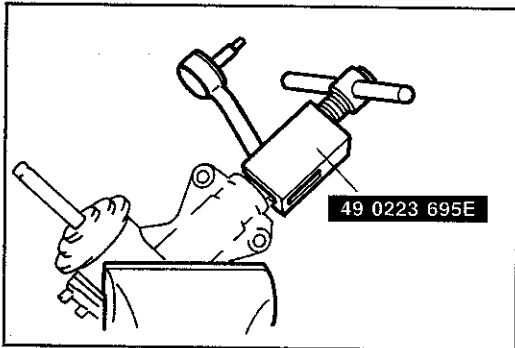


N-m (m-kg, ft-lb)

OBUONX-012

- |                                 |   |
|---------------------------------|---|
| 1. Nut and washer               | 12. Locknut   |
| 2. Pitman arm                   | Disassembly Note ..... below                          |
| Disassembly Note ..... below    | 13. Oil seal  |
| Check for damage or cracks      | 14. Adjusting nut                                     |
| 3. Dust boot                    | Disassembly Note ..... page N-16                      |
| Check for wear or damage        | 15. Bearing   |
| 4. Locknut                      | Check for sticking, abnormal noise, or poor operation |
| 5. Bolts                        | 16. Worm ball nut assembly                            |
| 6. Sector shaft assembly        | Check for poor rotation or play in axial direction    |
| Disassembly Note ..... below    | 17. Oil seal  |
| Assembly Note ..... page N-16   | 18. Gear housing                                      |
| 7. Side cover                   | Check for damage or deformation                       |
| 8. Gasket                       |   |
| 9. Adjustment shim              |   |
| 10. Adjusting screw             |   |
| 11. Sector shaft                |   |
| Check for damage or deformation |   |

2BU0NX-012

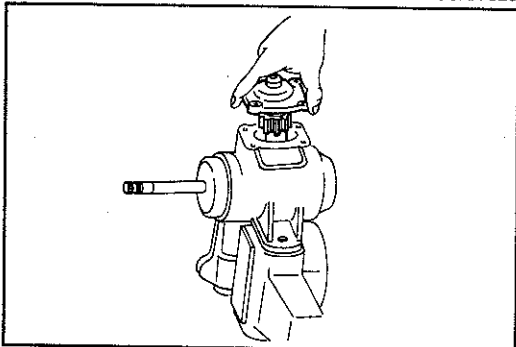


9BU0NX-020

### Disassembly note

#### Pitman arm

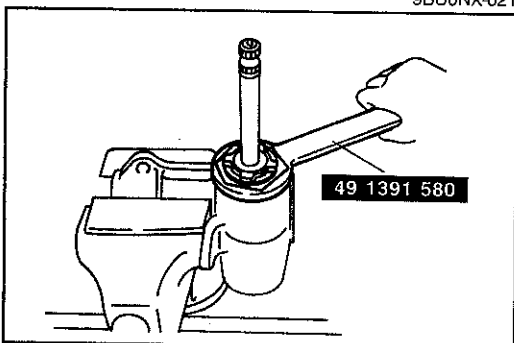
Separate the pitman arm from the gear box with the **SST**.



9BU0NX-021

### Sector shaft assembly

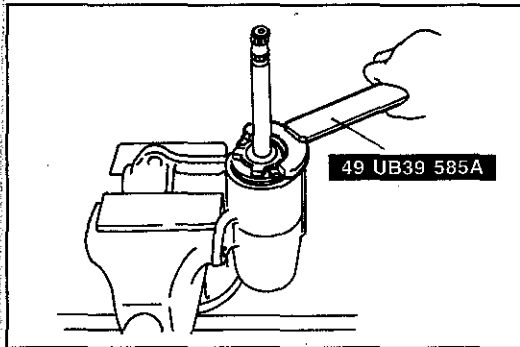
1. Set the sector shaft in the center position.
2. Tap the lower portion of the sector shaft with a plastic hammer to loosen the shaft.
3. Lift the sector shaft assembly out of the gear housing.



9BU0NX-022

### Locknut

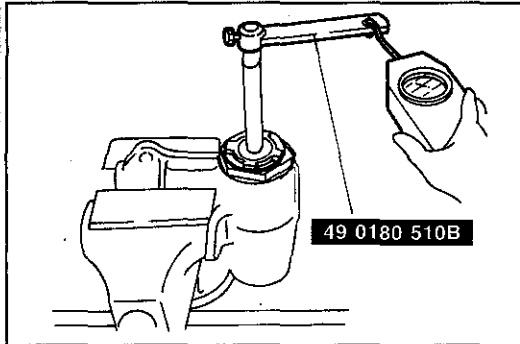
Remove the locknut with the **SST**.



9BU0NX-023

**Adjusting nut**

Remove the adjusting nut with the **SST**.



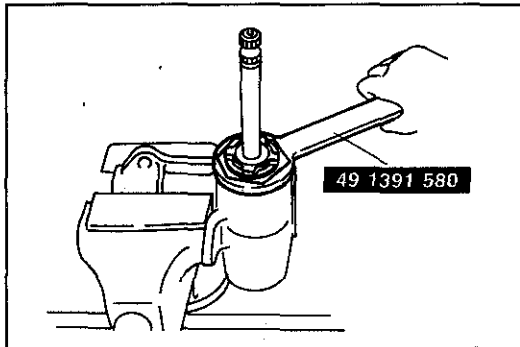
9BU0NX-024

**Assembly note**  
**Worm shaft preload**  
**Inspection**

Measure the worm shaft preload with the **SST** and a pull scale before the sector shaft is installed.

**Worm shaft preload (without sector shaft)**

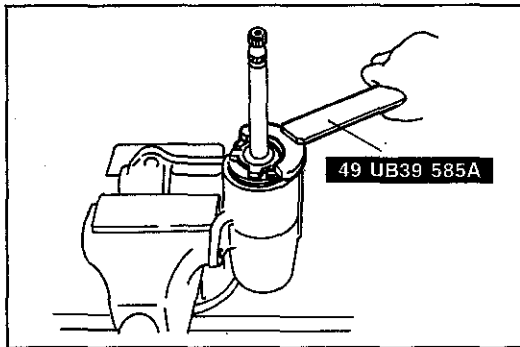
**Pull scale reading: 3—6 N (0.3—0.6 kg, 0.7—1.3 lb)**



9BU0NX-025

**Adjustment**

1. Loosen the locknut with the **SST**.



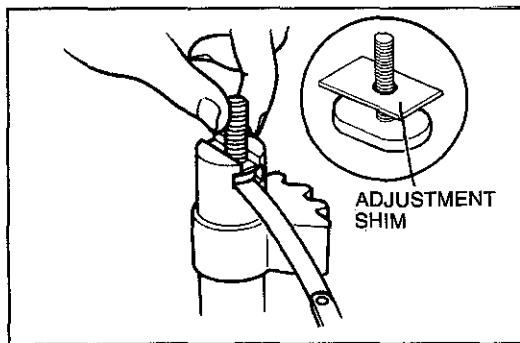
2BU0NX-013

2. Turn the adjusting nut with the **SST**.

3. Tighten the locknut to the specified torque with the **SST** used in Step 1.

**Locknut tightening torque:**

**157—196 N·m (16—20 m·kg, 116—145 ft·lb)**



9BU0NX-027

**Sector shaft assembly**

1. Set the adjusting screw and the adjustment shim in the T groove.

2. Measure the clearance in the axial direction.

3. If the clearance exceeds specification, adjust it with available adjustment shims supplied in the adjustment shim kit.

**Clearance in axial direction:**

**0—0.1mm (0—0.004 in)**

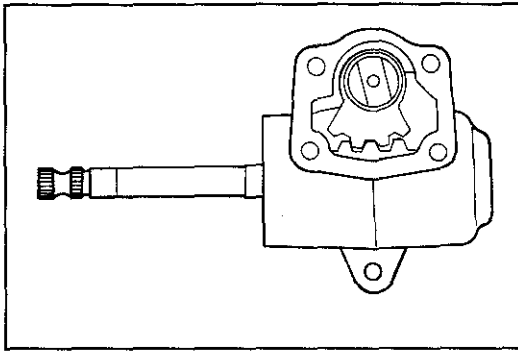
**Available adjustment shims:**

**1.97mm (0.077 in), 2.00mm (0.079 in),**

**2.03mm (0.079 in), 2.06mm (0.081 in),**

**2.09mm (0.082 in)**

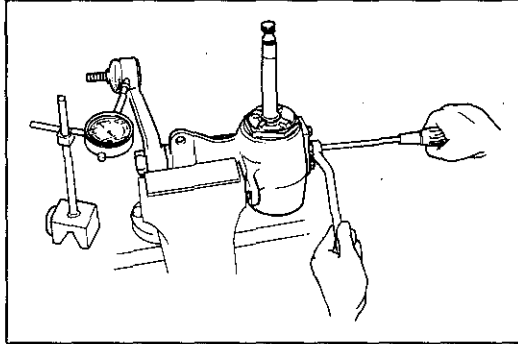




9BU0NX-028

4. After making the clearance adjustment, install the sector shaft assembly so that the sector shaft and the ball nut are centered.
5. Check the worm shaft preload.

**Worm shaft preload (after sector shaft installed)**  
**Pull scale reading: 6—11 N (0.6—1.1 kg, 1.3—2.4 lb)**



9BU0NX-029

### Steering gear backlash

Turn the adjusting screw to adjust the steering gear backlash.

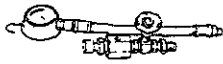


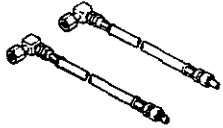

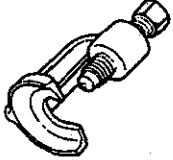
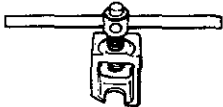
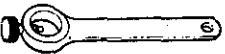
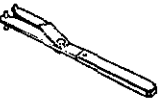
#### Note

**Adjust the backlash with the steering gear in the center position. Otherwise, the backlash becomes excessively small, and gears may be damaged.**

**Backlash: 0mm**

### ENGINE SPEED SENSING POWER STEERING

#### PREPARATION SST

49 1232 670A Gauge set, power steering 	49 1232 672 Gauge (Part of 49 1232 670A) 	49 1232 673 Valve body (Part of 49 1232 670A) 
49 H002 671 Adapter, power steering gauge 	49 B032 302 Adapter, power steering gauge 	49 0118 850C Puller, ball joint 
49 0223 695E Puller, pitman arm 	49 0180 510B Attachment steering worm bearing preload measuring 	49 W023 585A Adjust wrench 

1BU0NX-011

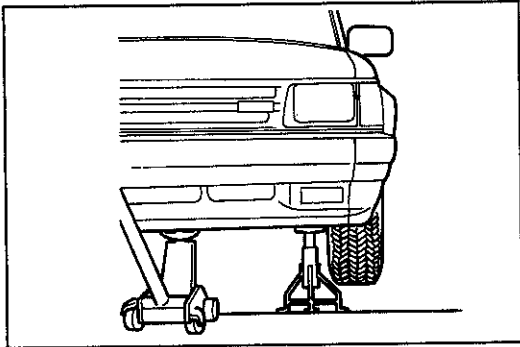
#### TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Steering "heavy"</b>	Poor lubrication of or foreign material of steering ball joints	Lubricate or replace	N- 7
	Poor lubrication of or foreign material of upper or lower arm ball joints	Lubricate or replace	Section R
	Stuck or damaged steering ball joints	Replace	N- 7
	Stuck or damaged upper or lower arm ball joints	Replace	Section R
	Improperly adjusted steering gear preload	Adjust	N-28
	Damaged steering gear	Replace	N-24
	Malfunctioning steering shaft joint	Replace	N-10
	Improperly adjusted wheel alignment	Adjust	Section R
	Malfunctioning steering gear	Repair or replace	N-24
	Incorrect tire pressure	Adjust	Section Q
	Loose or damaged drive belt	Adjust or replace	N-31
	Low fluid level or air in fluid	Add fluid or bleed air	N-21
	Leakage of fluid	Repair or replace	N-20
Insufficient oil pump pressure	Repair or replace	N-30, 31	
Clogged pipe or hose	Replace	—	
<b>Steering wheel effort is uneven</b>	Malfunctioning steering gear	Replace	N-24
	Steering shaft contacting something	Repair or replace	N-10
	Steering linkage does not operate smoothly	Repair or replace	N-24
	Loose belt	Adjust	N-29
<b>Excessive steering wheel play</b>	Improperly adjusted front wheel bearing preload	Adjust	Section M
	Worn steering gear	Replace	N-24
	Worn or damaged steering shaft joints	Replace	N-10
	Loose steering gear box mounting bolts	Tighten	N-24

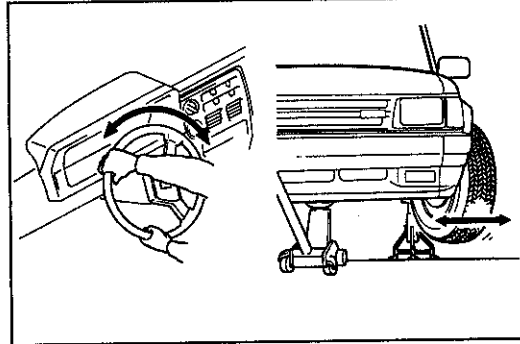
**TROUBLESHOOTING GUIDE (Cont'd)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Remedy</b>	<b>Page</b>
<b>Steering wheel pulls to one side</b>	Deformed steering linkage Incorrect tire pressures Unevenly worn tires Weakened front spring Worn or damaged stabilizer Dragging brake Deformed knuckle arm Improperly adjusted wheel alignment Improperly adjusted wheel bearing preload	Replace Adjust Replace Replace Replace Repair Replace Adjust Adjust	N-24 Section Q — Section R Section R — Section M Section R Section M
<b>Poor steering wheel return</b>	Incorrect tire pressures Stuck or damaged steering ball joints Stuck or damaged upper or lower arm ball joints Improperly adjusted front wheel alignment Improperly adjusted steering gear preload Steering shaft contacting something	Adjust Replace Replace Adjust Adjust Repair or replace	Section Q N- 7 Section R Section R N-28 N-10
<b>General instability while driving</b>	Deformed steering linkage Incorrect tire pressures Damaged or unbalanced wheel Worn or damaged steering shaft joints Improperly adjusted steering gear preload Weakened front spring Worn or damaged stabilizer Malfunctioning shock absorber Improperly adjusted wheel alignment Improperly adjusted wheel bearing preload	Replace Adjust Adjust or replace Replace Adjust Replace Replace Replace Adjust Adjust	N-24 Section Q Section Q N-10 N-28 Section R Section R Section R Section R Section M
<b>“Shimmy” occurs (Steering wheel vibrates left/right)</b>	Deformed steering linkage Loose steering gear box mounting bolts Stuck or damaged steering ball joint Stuck or damaged upper or lower arm ball joint Excessive tire and wheel runout Loose lug nuts Unbalanced wheel Incorrect tire pressures Unevenly worn tires Malfunctioning shock absorber Loose shock absorber mounting bolts Cracked or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Replace Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten Replace Replace Adjust	N-24 N-24 N- 7 Section R — Section Q Section Q Section Q — Section R Section R Section R Section R Section M
<b>Abnormal noise from steering system</b>	Loose oil pump Loose steering gear box Loose oil pump bracket Loose oil pump pulley nut Belt loose/tight Air intake Malfunction inside steering gear Malfunctioning oil pump Obstruction near steering column Loose steering linkage Worn steering shaft joints	Tighten Tighten Tighten Tighten Adjust Bleed air Replace Replace Repair or replace Tighten or replace Replace	N-29, 30 N-24 — N-29, 30 N-31 N-20 N-24 N-29, 30 — N-24 N-10
<b>Fluid leakage</b>	Problem at hose coupling Damaged or clogged hose Damaged reserve tank Overflow  Malfunctioning oil pump Malfunctioning steering gear box	Repair or replace Replace Replace Bleed air or adjust fluid level Replace Replace	— — — N-20 Section R N-24

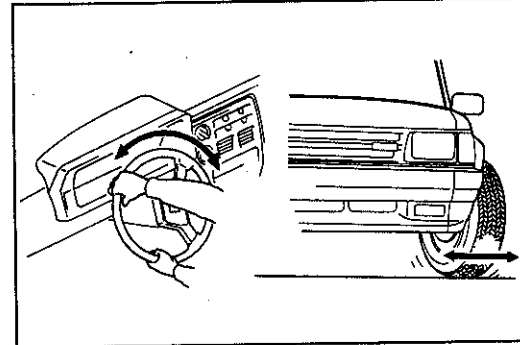
2BUONX-014



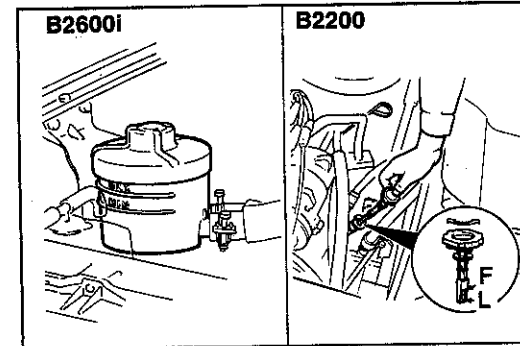
0BU0NX-016



63U10X-015



9BU0NX-067



9BU0NX-068

**AIR BLEEDING**

1. Jack up the front of the vehicle and support it with safety stands.

2. Check the fluid and add some if necessary. Turn the steering wheel fully left and right several times.

3. Recheck the fluid and add as required. Let the vehicle down.

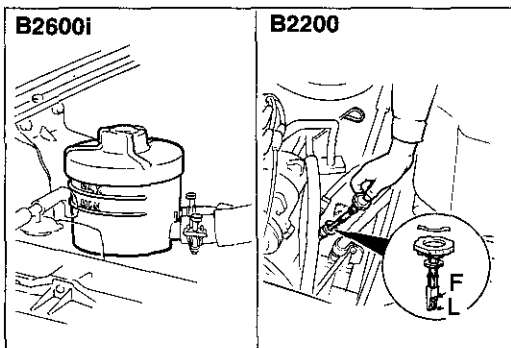
4. Start the engine and run it at idle speed. Turn the steering wheel again fully left and right several times. If a noise is heard in the oil line, air is still present.

5. Put the wheels in the straight-ahead position, and turn off the engine. The fluid level in the pump should not increase; if it does, air is present. Repeat Step 4 if necessary.

6. Recheck the fluid level, and inspect for leaks.

**Caution**

If the air bleeding is incomplete, raise the oil temperature to about 50—80°C (122—176°F) (the oil temperature will rise when the steering wheel is turned right and left), stop the engine, and perform Step 4 for five to ten minutes. Air can be completely bled by repeating this operation.



2BUJONX-015

## POWER STEERING FLUID

### On-vehicle Inspection

#### Inspection of power steering fluid level

Check the power steering fluid level, and add fluid to the specified level if necessary.

#### Caution

Use only specified power steering fluid.

#### Fluid specification:

ATF M2C33F of Dexron® II

### Inspection of fluid leakage

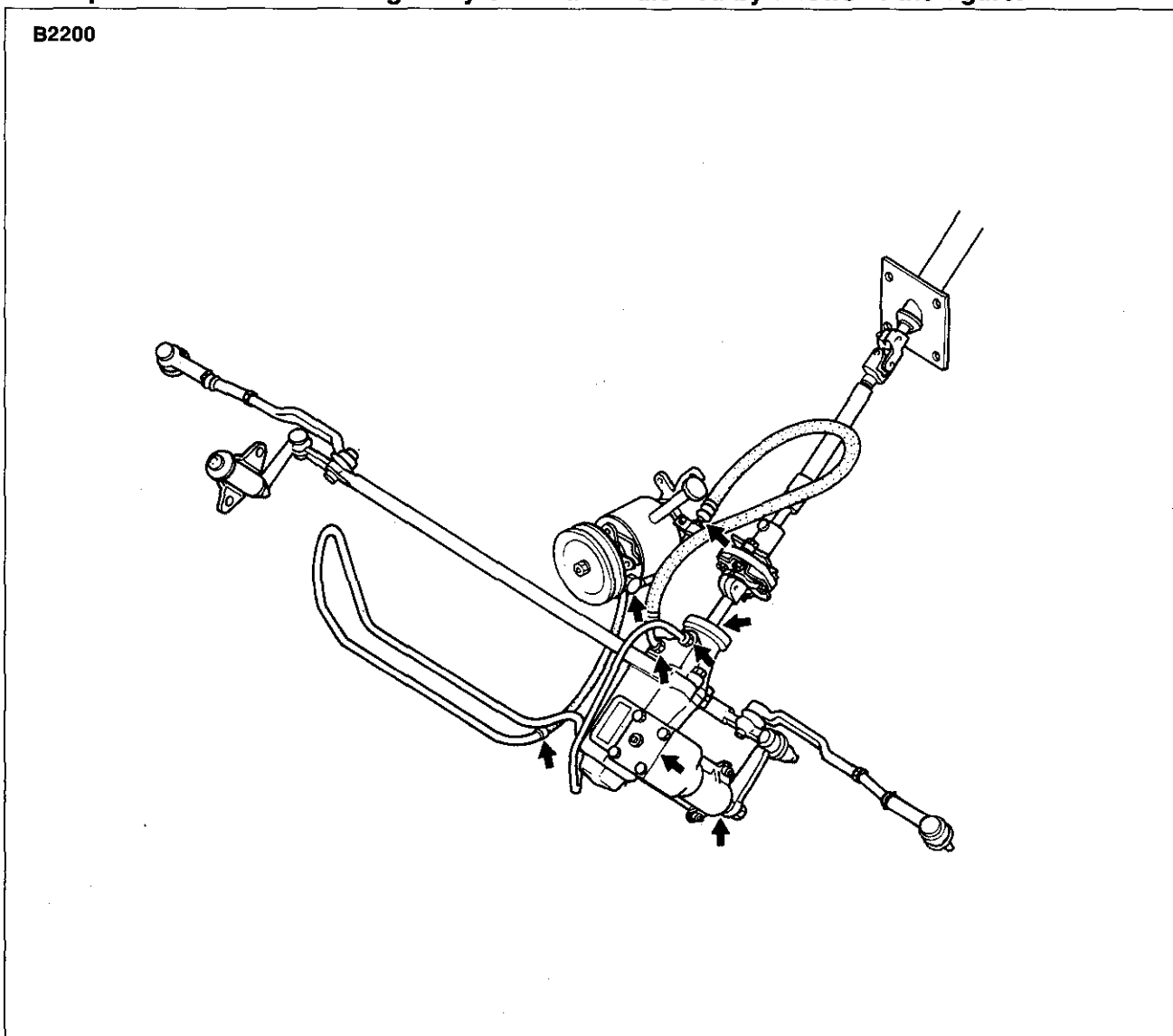
Start the engine. Turn the steering wheel fully left and right to apply fluid pressure; then check for fluid leakage.

#### Caution

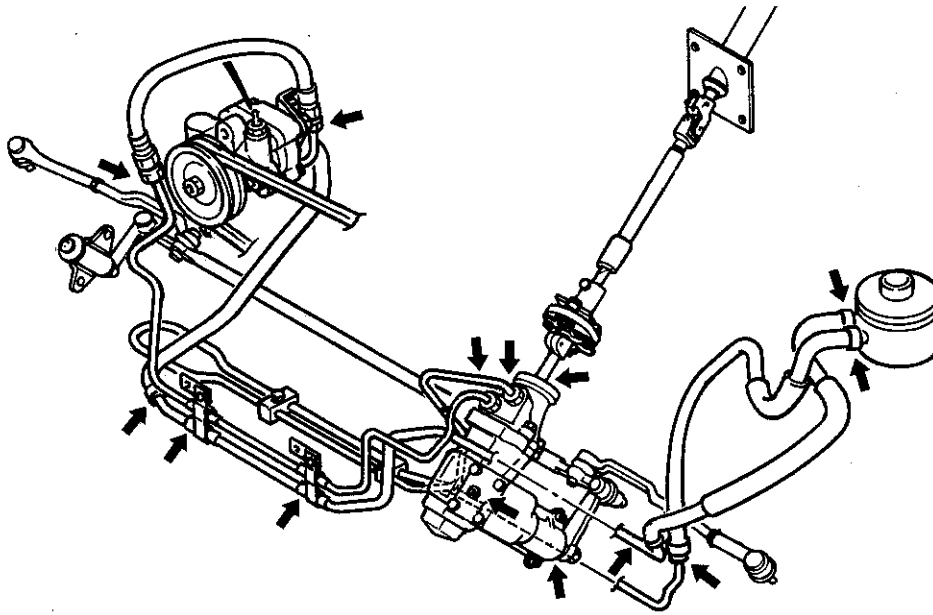
To prevent damage to the steering system, do not keep the steering wheel in the fully turned position for more than 15 seconds.

#### Note

The points where fluid leakage may occur are indicated by arrows in the figure.



B2600i

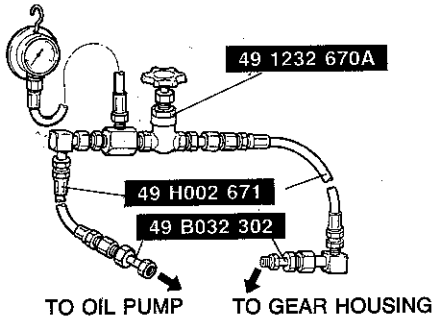


**Inspection of fluid pressure**

1. Assemble the **SST** as shown in the figure.

**Tightening torque:**

**39—49 N·m (4.0—5.0 m·kg, 29—36 ft·lb)**



9BU0NX-044

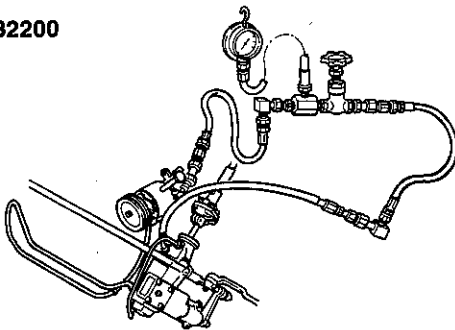
2. Disconnect the high-pressure hose of the oil pump side, and attach the **SST**.

**Note**

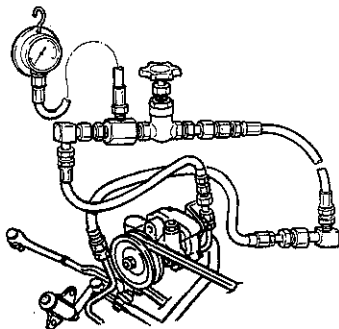
**Before disconnecting the hose, mark the connections for proper reinstallation.**

3. Bleed the air from the system. (Refer to page N-20.)
4. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50—60°C (122—140°F)**.

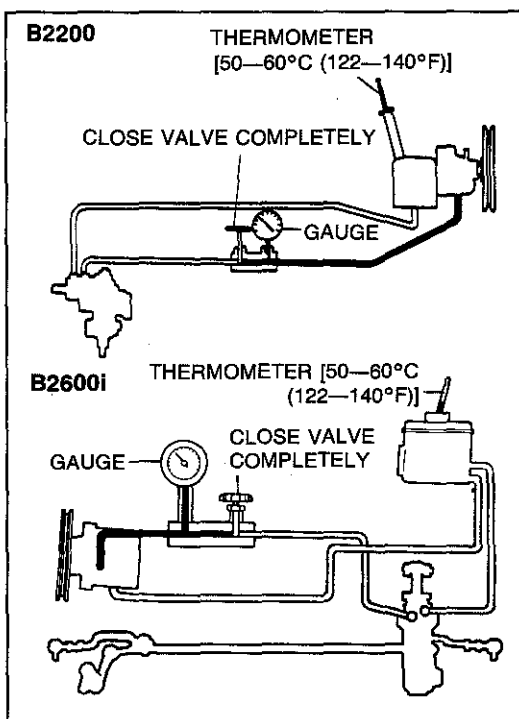
B2200



B2600i



OBU0NX-018



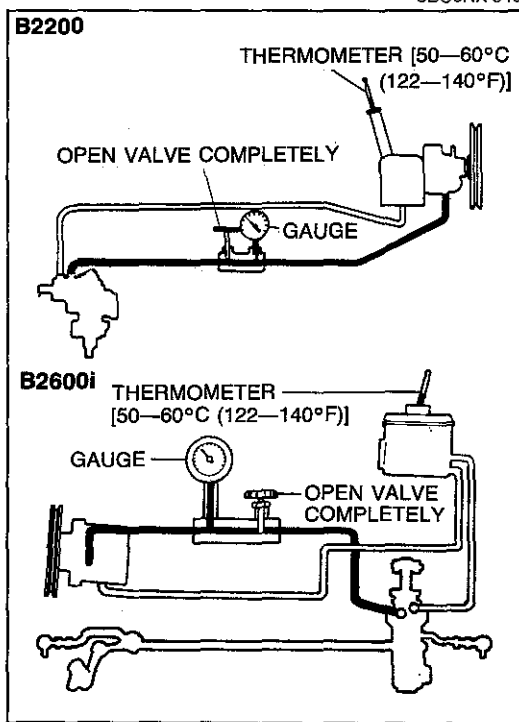
5. Close the gauge valve completely. Increase the engine speed to **1,000—1,500 rpm** and measure the fluid pressure generated by the oil pump. If the pressure is below specification, replace the oil pump assembly.

**Oil pump fluid pressure:**

- (B2200) 8,584—9,320 kPa  
(87.5—95 kg/cm<sup>2</sup>, 1,244—1,351 psi)
- (B2600i) 9,320—9,810 kPa  
(95—100 kg/cm<sup>2</sup>, 1,351—1,422 psi)

**Warning**

If the valve is left closed for more than 15 seconds, the fluid temperature will increase excessively and adversely affect the oil pump.



6. Open the gauge valve fully again and increase the engine speed to **1,000—1,500 rpm**.

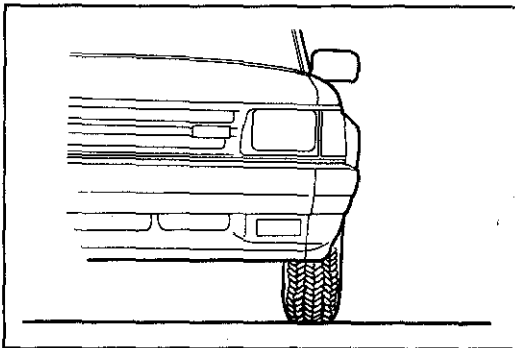
7. Turn the steering wheel fully to the left and right and measure the fluid pressure generated by the gear housing. If the pressure is below specification, replace the gear housing assembly.

**Gear housing fluid pressure:**

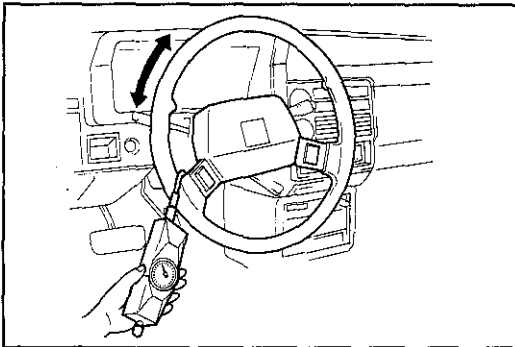
- (B2200) 8,584—9,320 kPa  
(87.5—95 kg/cm<sup>2</sup>, 1,244—1,351 psi)
- (B2600i) 9,320—9,810 kPa  
(95—100 kg/cm<sup>2</sup>, 1,351—1,422 psi)

**Warning**

If the steering wheel is kept in the fully turned position for more than 15 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.



0BU0NX-019



2BU0NX-016

## STEERING WHEEL AND COLUMN

### On-vehicle Inspection

#### Steering wheel effort

1. With the vehicle on a hard level surface, move the steering wheel to put the wheels in the straight-ahead position.
2. Start the engine and warm the power steering fluid to **50—60°C (122—140°F)**.

3. Attach a pull scale to the outer circumference of the steering wheel. Then, starting with the wheels in the straight-ahead position, check the steering effort required to turn the steering wheel to the left and right.

**Steering wheel effort: 40 N (4.1 kg, 9 lb) or less  
[during one turn of the steering wheel]**

4. If the measured value exceeds specification, check the following: fluid level, air in system, fluid leakage at hose or connections, function of oil pump and steering gear box, and tire pressures.

## STEERING GEAR AND LINKAGE

### Removal, Inspection, and Installation

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Install the wheel.

**Tightening torque: Non-styled wheel 88—118 N·m (9—12 m·kg, 65—87 ft·lb)  
Styled wheel 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

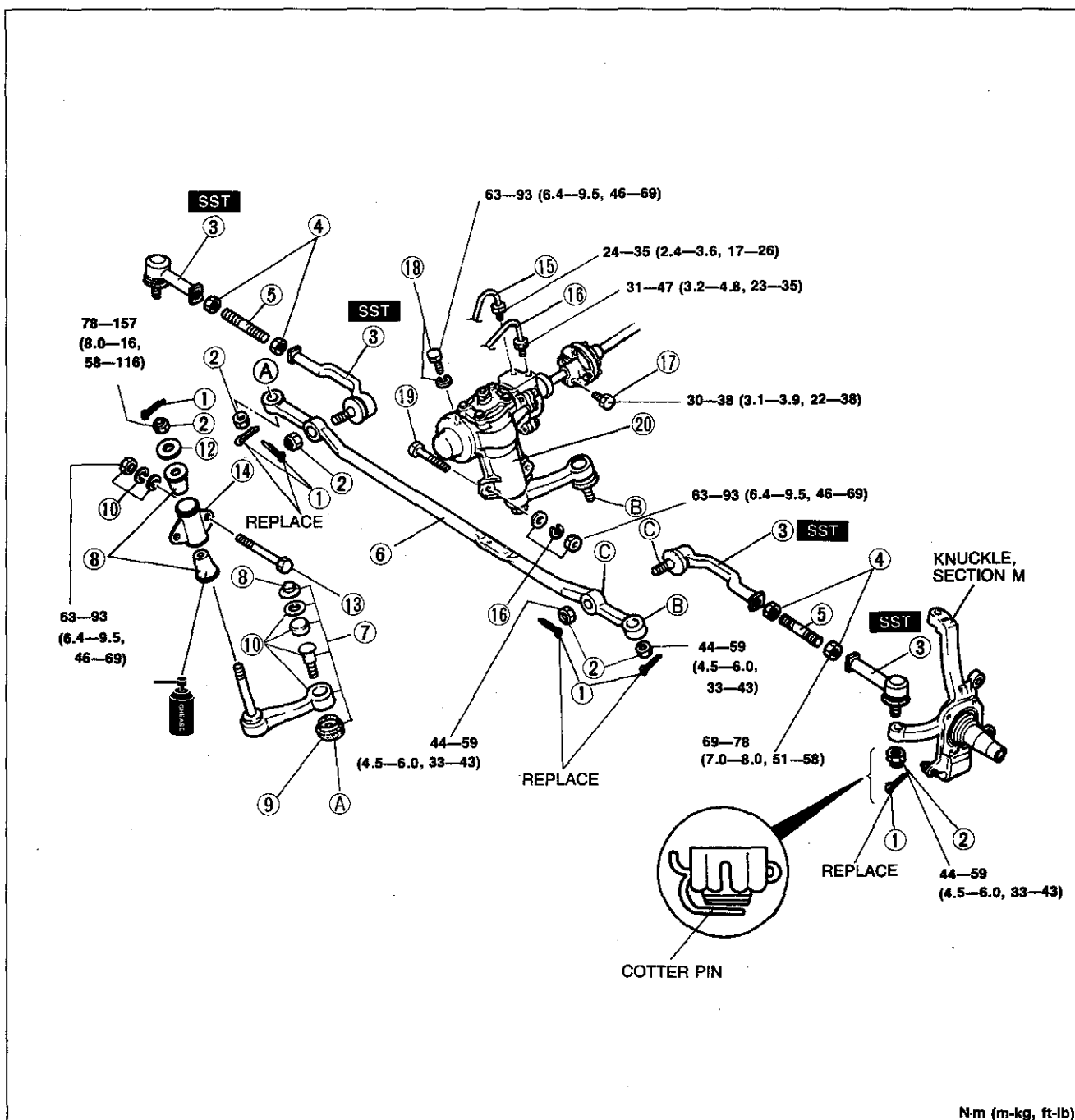
7. Inspect all parts and repair or replace as necessary.

#### Note

- a) The power steering fluid will leak out when the return pipe and/or the pressure pipe is disconnected. Prepare a suitable container for it to drain into.
- b) After installation: (1) Bleed air from the power steering system (2) Check the power steering fluid level and add fluid if necessary. (3) Check the system for fluid leakage. (4) Check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)

2BU0NX-017

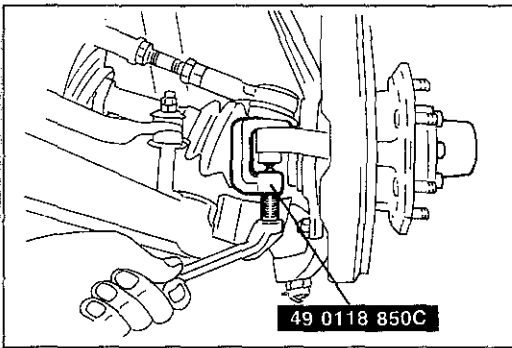




N-m (m-kG, ft-lb)

2BU0NX-018

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Cotter pin</li> <li>2. Nut</li> <li>3. Ball joint<br/>Removal Note ..... page N-26<br/>Check for damage or poor operation</li> <li>4. Locknut</li> <li>5. Tie rod</li> <li>6. Center link<br/>Check for damage or cracks</li> <li>7. Idler arm assembly<br/>Check for damage or poor operation</li> <li>8. Idler cap</li> <li>9. Ball joint dust seal</li> <li>10. Idler arm</li> </ul> | <ul style="list-style-type: none"> <li>11. Washer</li> <li>12. Rubber bushing<br/>Check for wear or damage</li> <li>13. Bolts, nuts, and washers</li> <li>14. Idler arm bracket</li> <li>15. Pressure pipe</li> <li>16. Return pipe</li> <li>17. Bolt</li> <li>18. Bolt and washer</li> <li>19. Bolts, washers, and nuts</li> <li>20. Steering gear assembly<br/>Disassembly, Inspection, and<br/>Assembly..... page N-26</li> </ul> |
|---|--|



9BU0NX-017

**Removal note**

**Ball joint, pitman arm and idler arm**

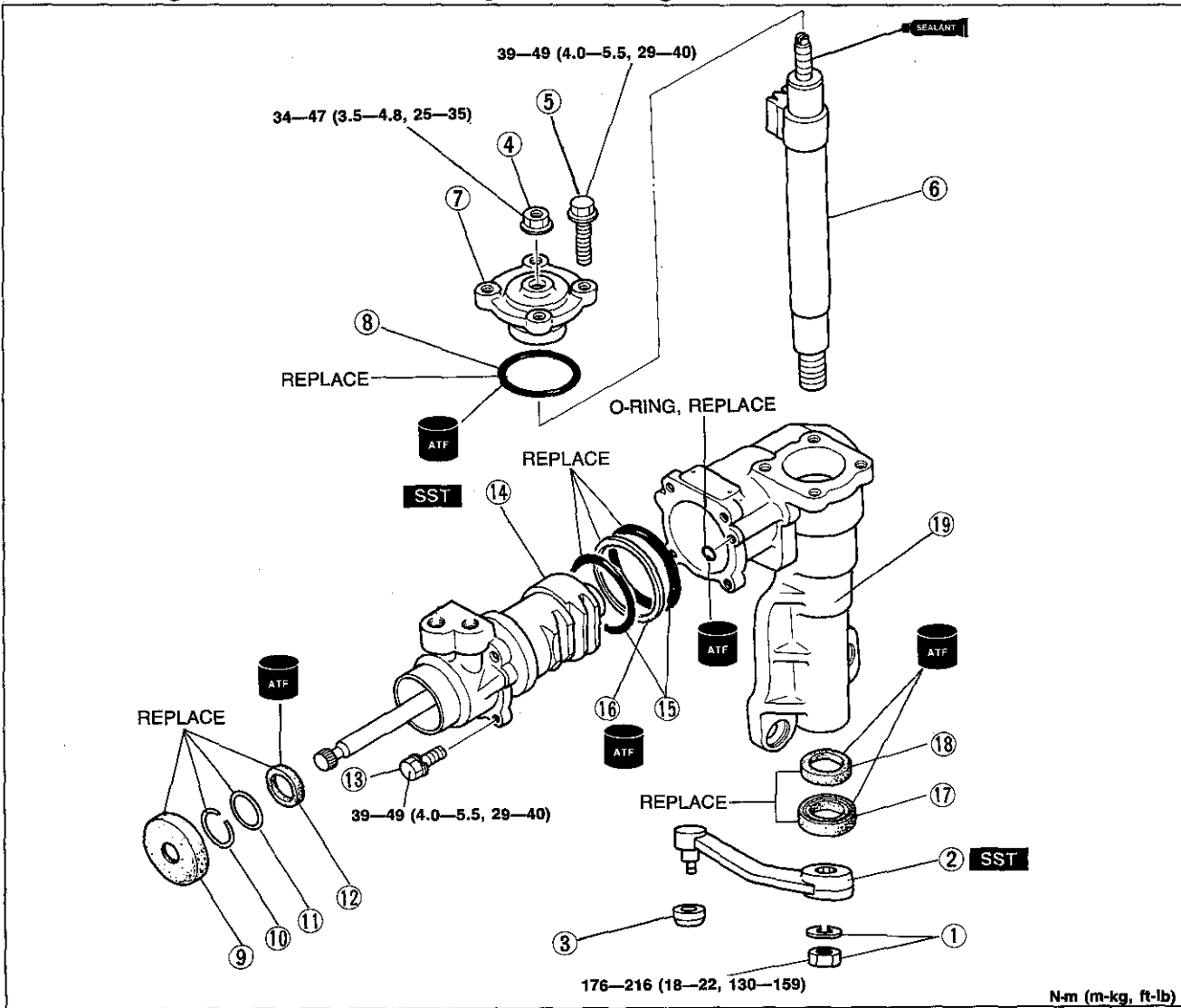
With the **SST**, separate the ball joint from the knuckle and from the center link (C—C), the pitman arm from the center link (B—B), and the idler arm from the center link (A—A).

**Disassembly, Inspection, and Assembly**

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
3. Inspect all parts and repair or replace as necessary.

**Caution**

- a) In order to prevent the entrance of dirt, all disassembly and assembly should be done in a clean area.
- b) Before disassembly, plug the openings of all pipe installation fittings, and then remove all external grease and dirt from the gear and linkage.

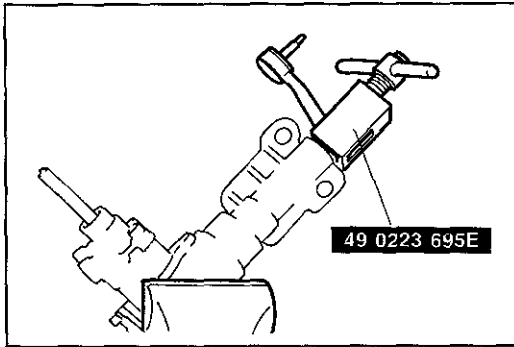


N-m (m-kg, ft-lb)

0BU0NX-022

- |  |   |
|--|---|
| 1. Nut and washer  | 10. Snap ring   |
| 2. Pitman arm<br>Disassembly Note ..... below<br>Check for damage or cracks        | 11. Washer  |
| 3. Dust boot<br>Check for wear or damage   | 12. Oil seal  |
| 4. Locknut<br>Loosen; remove after removing sector shaft                           | 13. Bolts   |
| 5. Bolts   | 14. Valve and piston assembly<br>Assembly Note ..... below<br>Check for cracks or deformation |
| 6. Sector shaft<br>Disassembly Note ..... below<br>Check for damage or deformation | 15. O-ring  |
| 7. Side cover  | 16. Piston seal ring  |
| 8. O-ring  | 17. Dust cover  |
| 9. Dust cover  | 18. Oil seal  |
|  | 19. Gear housing<br>Check for cracks or deformation   |

2BU0NX-019

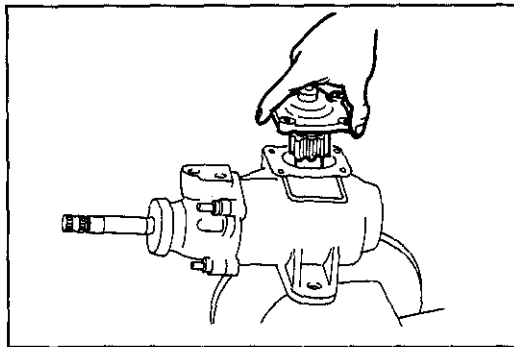


9BU0NX-053

### Disassembly note

#### Pitman arm

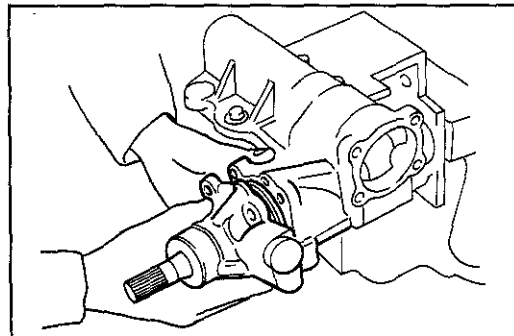
Separate the pitman arm from the gear housing with the **SST**.



9BU0NX-054

### Sector shaft

1. Loosen the locknut.
2. Remove the side cover attaching bolts.
3. Set the sector shaft in the center position.
4. Tap the lower portion of the sector shaft with a plastic hammer to loosen the shaft.
5. Lift the sector shaft out of the gear housing.



9BU0NX-055

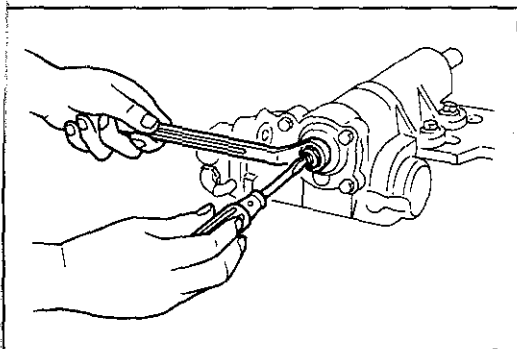
### Assembly note

#### Valve and piston assembly

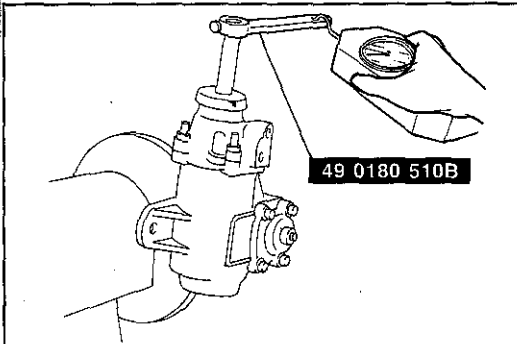
Insert the valve and piston assembly into the gear housing.

#### Caution

- a) Do not scratch the piston seal ring and new O-ring against the housing.
- b) Insert the piston while slightly turning it to the left and right to prevent damage of the new O-ring and the new seal ring.



0BU0NX-024



2BU0NX-020

**Preload adjustment**

1. Position the worm shaft in the center position.
2. Set the sector shaft adjusting screw so that the preload at that position is **5.9—8.8 N (0.6—0.9 kg, 1.3—2.0 lb)**.

**Note**

a) Use the SST when measuring the preload.

b) The preload at the center position must be **2.0—3.9 N (0.2—0.4 kg, 0.4—0.9 lb)** higher than the preload when the worm shaft is turned 360° to the left and right.

3. If the specified preload is not obtained, once again disassemble the steering gearbox; check the gears for dirt and foreign material, and check the installation of the oil seal. After checking, reassemble the gearbox, and once again adjust the preload.
4. After making the setting, tighten the sector shaft adjusting screw locknut to the specified torque.

**Tightening torque:**

**34—47 N·m (3.5—4.8 m·kg, 25—35 ft·lb)**

**OIL PUMP****Removal and Installation**

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Inspect all parts and repair or replace as necessary.

**Note**

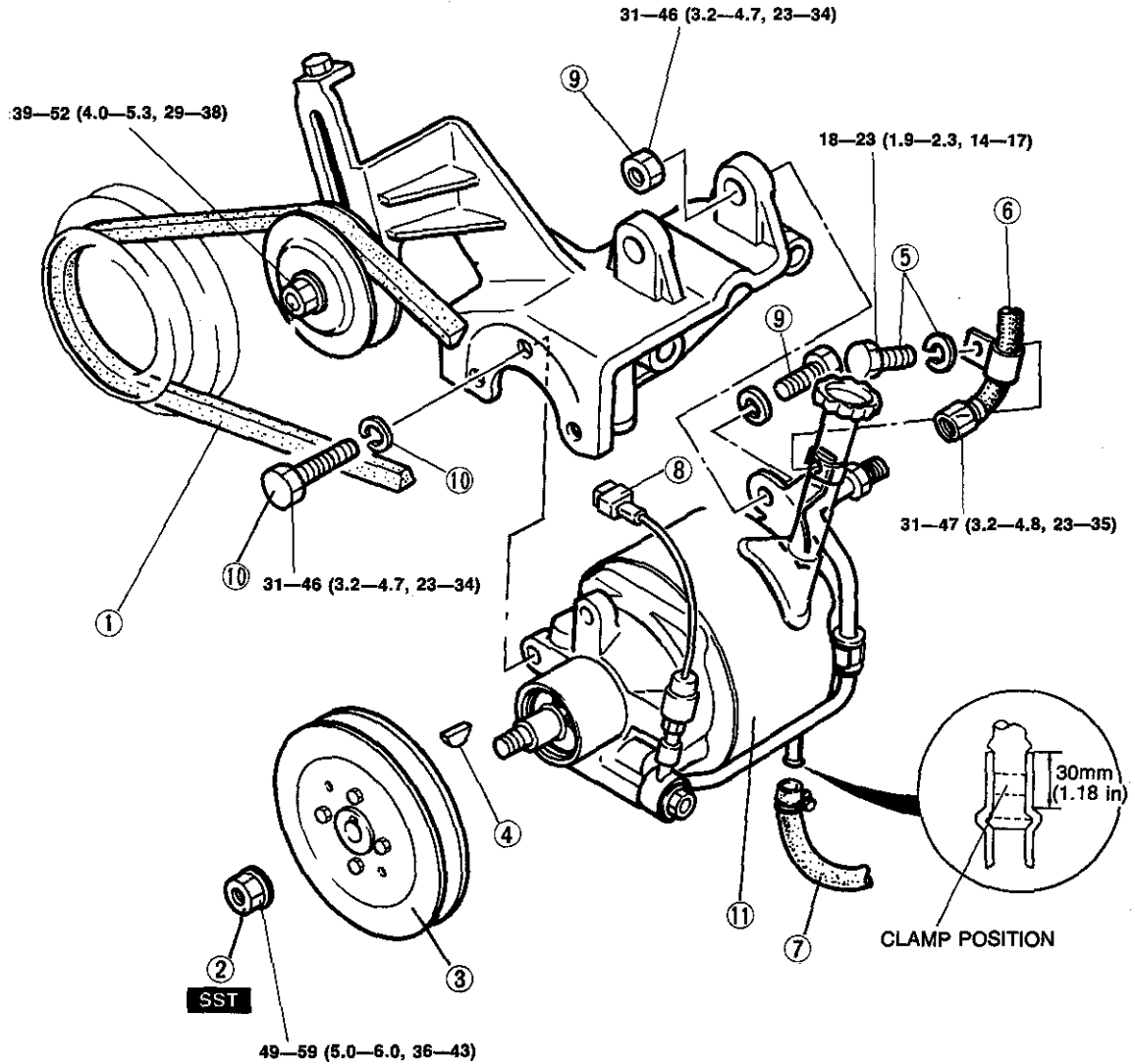
a) The power steering fluid will leak out when the return hose and/or the pressure hose is disconnected. Prepare a suitable container for it to drain into.

**b) After installation:**

- (1) Check the oil pump drive belt (tension) and adjust it if necessary. (Refer to page N-29.)
- (2) Bleed air from the power steering system.
- (3) Check for fluid leakage.

2BU0NX-021

B2200

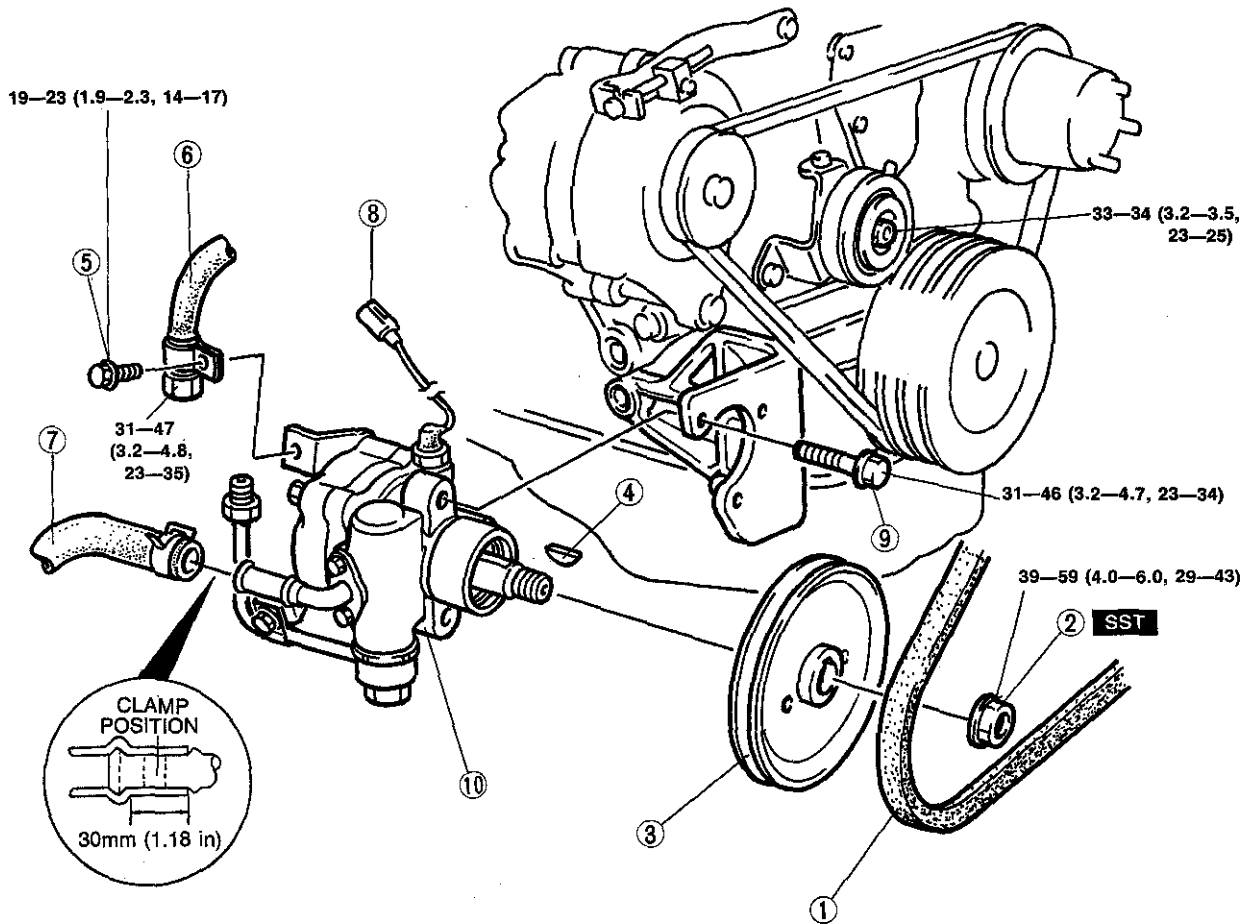


N·m (m·kg, ft·lb)

2BU0NX-022

- |  |   |
|--|---|
| <p>1. Drive belt<br/>Removal Note ..... page N-31<br/>Inspection and adjustment..... page N-35<br/>Check for damage or wear</p> <p>2. Locknut<br/>Removal Note ..... page N-31</p> <p>3. Oil pump pulley</p> <p>4. Key</p> <p>5. Bolt and washer</p> | <p>6. Pressure hose</p> <p>7. Return hose</p> <p>8. Fluid pressure switch coupler (EGI model)</p> <p>9. Bolt, washer, and nut</p> <p>10. Bolts and washers</p> <p>11. Oil pump assembly<br/>Check for damage or deformation<br/>Disassembly, Inspection,<br/>and Assembly ..... page N-32</p> |
|--|---|

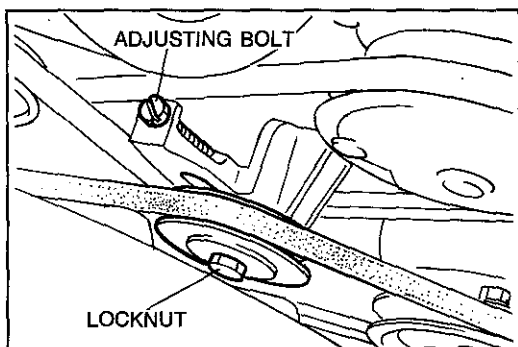
**B2600i**



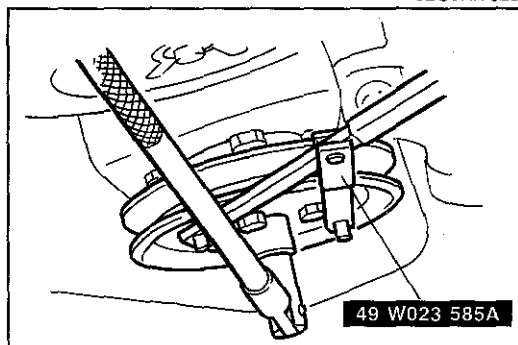
**N-m (m-kg, ft-lb)**

2BU0NX-023

- |  |  |
|--|--|
| <p>1. Drive belt<br/>Removal Note ..... page N-31<br/>Inspection and adjustment ..... page N-35<br/>Check for damage or wear</p> <p>2. Locknut<br/>Removal Note ..... page N-31</p> <p>3. Oil pump pulley</p> <p>4. Key</p> <p>5. Bolt</p> | <p>6. Pressure hose</p> <p>7. Return hose</p> <p>8. Fluid pressure switch coupler</p> <p>9. Bolts and washers</p> <p>10. Oil pump assembly<br/>Check for damage or deformation<br/>Disassembly, Inspection,<br/>and Assembly ..... page N-34</p> |
|--|--|



0BU0NX-028



0BU0NX-029

## Removal note

### Drive belt

Loosen the idler pulley locknut and turn the adjusting bolt to loosen the oil pump drive belt.

### Locknut

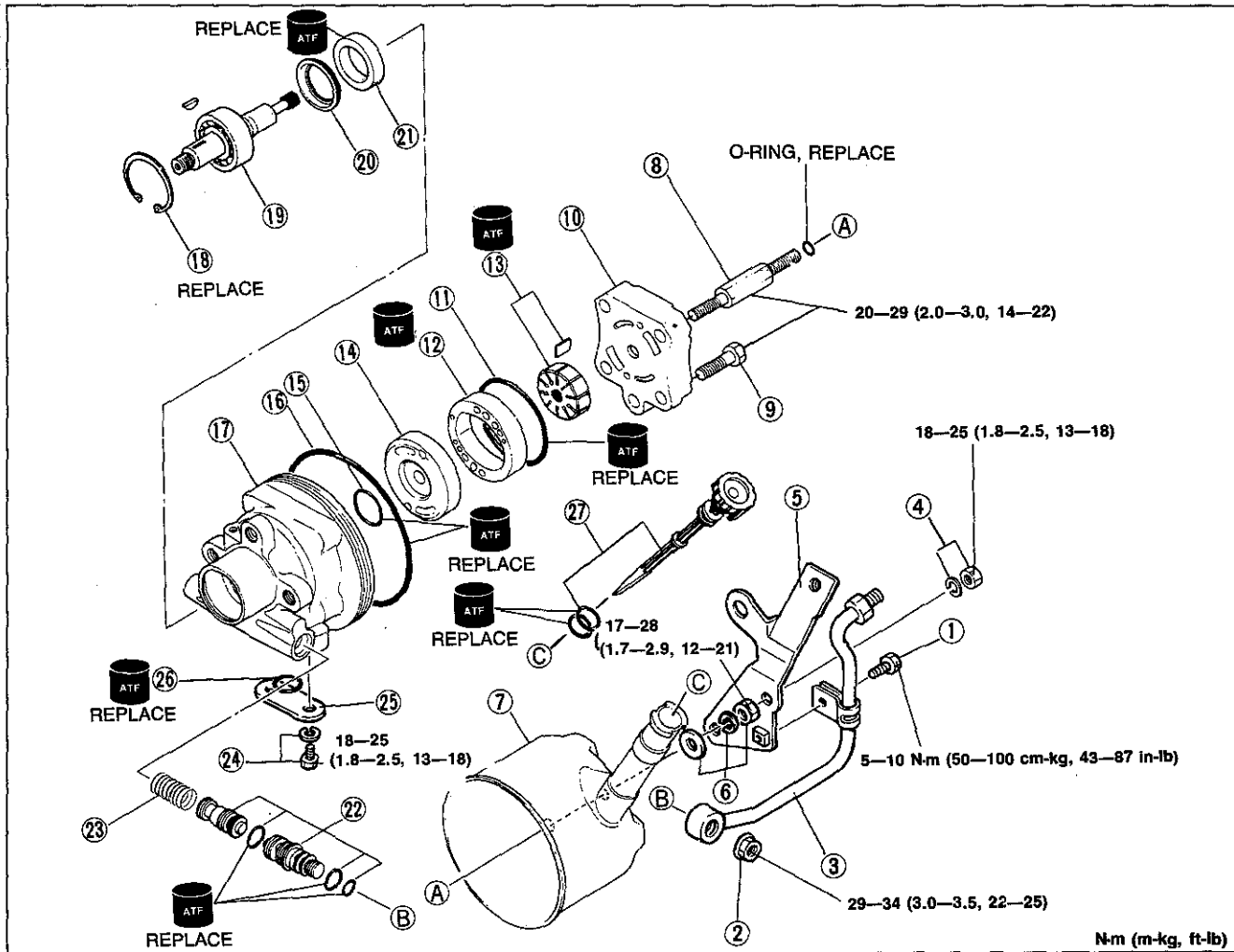
Remove the oil pump pulley locknut while holding the pulley with the **SST**.

### Disassembly, Inspection, and Assembly (B2200)

1. The following procedure is for replacement of O-ring and oil seal and bearing. Replace the pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

#### Note

- To prevent the entry of dirt, disassemble and assemble in a clean area.
- Before disassembly, plug the pipe installation hole; then remove all oil and dirt from the outside surfaces of the oil pump.

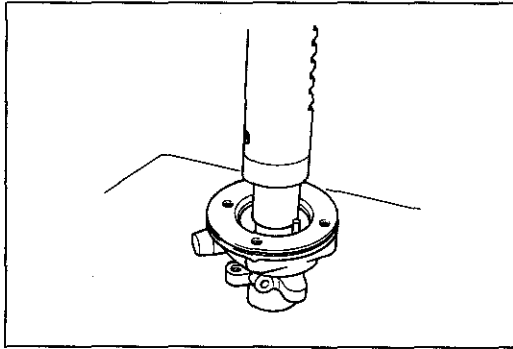


N-m (m-kg, ft-lb)

2BUONX-024

- |                                     |  |  |
|-------------------------------------|--|--|
| 1. Bolt                             | 13. Rotor and vanes<br>Inspect friction surface for wear or damage<br>Assembly Note<br>..... page N-33 | 20. Retaining ring<br>21. Oil seal<br>Assembly Note<br>..... page N-33 |
| 2. Nut                              | 14. Pressure plate   | 22. Control valve and O-ring<br>Inspect for damage                     |
| 3. Hose connector assembly          | 15. O-ring   | 23. Spring   |
| 4. Nut and washer                   | 16. O-ring   | 24. Bolts and washers  |
| 5. Bracket                          | 17. Front body<br>Inspect for damage   | 25. Connector  |
| 6. Nut and washer                   | 18. Snap ring  | 26. O-ring   |
| 7. Oil tank                         | 19. Bearing and drive shaft<br>Inspect friction surface for wear                                       | 27. Level gauge and O-ring   |
| 8. Bolt                             |  |  |
| 9. Bolts                            |  |  |
| 10. Rear body<br>Inspect for damage |  |  |
| 11. O-ring                          |  |  |
| 12. Cam ring                        |  |  |



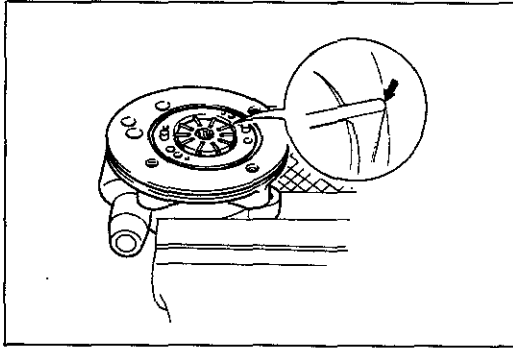


2BU0NX-025

### Assembly note

#### Oil seal

Use a press and piece of pipe [outer diameter 28mm (1.102 in), inner diameter 18mm (0.709 in)] to press in a new oil seal.



2BU0NX-026

#### Vanes

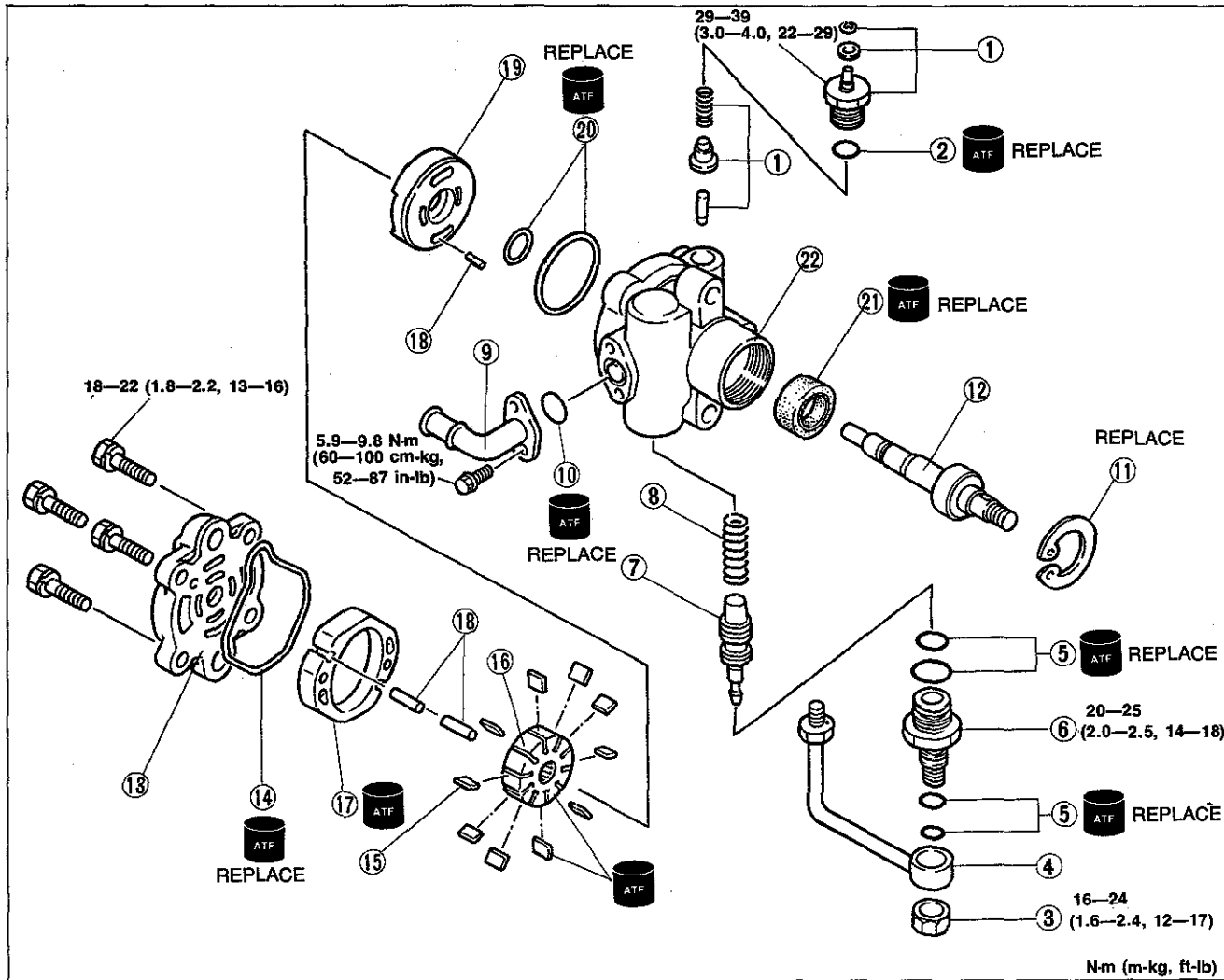
As shown, attach the vanes to the rotor so that the rounded end contacts the cam.

### Disassembly, Inspection, and Assembly (B2600i)

1. The following procedure is for replacement of O-ring and oil seal and bearing. Replace the pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Assemble in the reverse order of disassembly.

#### Note

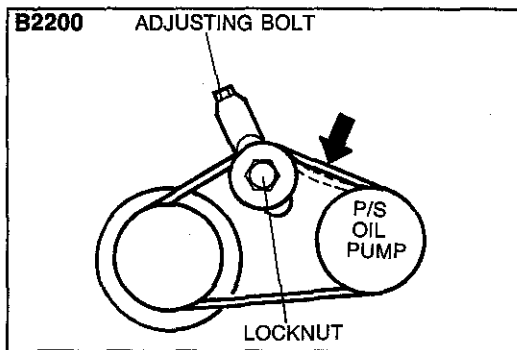
- a) In order to prevent the entry of dirt, disassemble and assemble in a clean area.
- b) Before disassembly, plug the pipe installation hole, and then remove all oil and dirt from the outside surfaces of the oil pump.



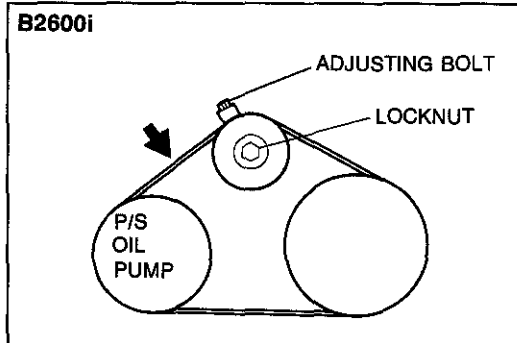
N-m (m-kg, ft-lb)

2BU0NX-027

- |   |  |  |
|---|--|--|
| 1. Pressure switch                              | 12. Bearing and shaft assembly<br>Inspect for wear or damage | 17. Cam ring<br>Inspect for wear or damage |
| 2. O-ring                                       | 13. Rear body<br>Inspect for damage                          | 18. Pin                                    |
| 3. Nut  | 14. Oil seal   | 19. Front side plate                       |
| 4. Connector                                    | 15. Vanes<br>Inspect for wear or damage                      | 20. O-ring                                 |
| 5. O-ring                                       | 16. Rotor<br>Inspect for wear or damage                      | 21. Oil seal                               |
| 6. Connector bolt                               |  | 22. Front body<br>Inspect for damage       |
| 7. Control valve assembly<br>Inspect for damage |  |  |
| 8. Spring<br>Inspect for deterioration          |  |  |
| 9. Suction pipe                                 |  |  |
| 10. O-ring                                      |  |  |
| 11. Snap ring                                   |  |  |



0BUONX-030



9BUONX-058

**DRIVE BELT**  
**Inspection and Adjustment**  
**Inspection**

Check that the drive belt deflection (tension) is within specification.

**Deflection**  
**(Depressed with 98N [10 kg, 22 lb] force)**

mm (in)

	New	Used
B2200	7.0—8.0 (0.28—0.31)	8.0—9.0 (0.31—0.35)
B2600i	6.6—7.2 (0.26—0.28)	7.2—8.0 (0.28—0.31)

**Tension**

N (kg, lb)

	New	Used
B2200	245—294 (25—30, 55—66)	196—245 (20—25, 44—55)
B2600i	412—471 (42—48, 92.4—105.6)	353—402 (36—41, 79.2—90.2)

**Note**

**Belt tension can be measured among any pulleys.**

**Adjustment**

1. Loosen the idler pulley locknut.
2. Adjust the deflection (tension) by turning the adjusting bolt.
3. Tighten the locknut to the specified torque.

**Tightening torque**

- B2200 : 39—52 N·m (4.0—5.3 m·kg, 29—38 ft·lb)**
- B2600i: 33—34 N·m (3.2—3.5 m·kg, 23—25 ft·lb)**

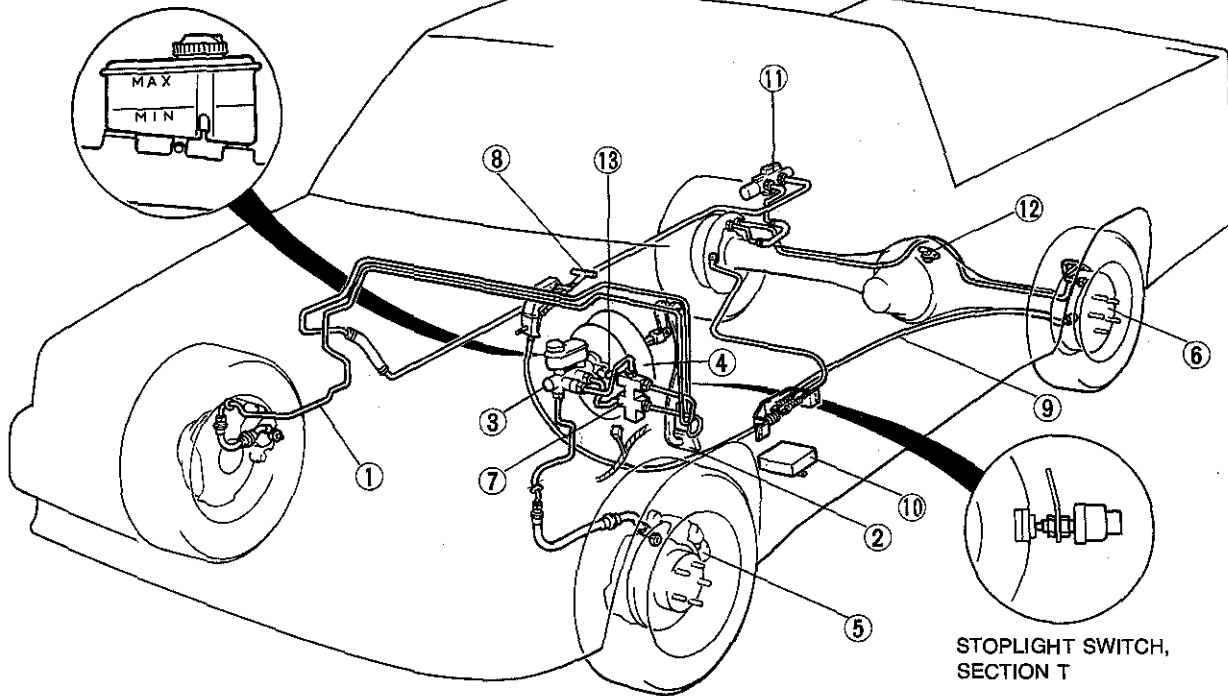
2BUONX-028

# BRAKING SYSTEM

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FLUID SPECIFICATION  
FMVSS 116 DOT-3 or SAE J1703



2BU0PX-022

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		On-vehicle inspection .....	page P-55

OUTLINE

SPECIFICATIONS

Item		Model	4×4	4×2	
Brake pedal	Type		Suspended		
	Pedal lever ratio		3.75	4.5	
	Max. stroke	mm (in)	112.5 (4.43)	135 (5.31)	
Master cylinder	Type		Tandem (with level sensor)		
	Cylinder inner diameter	mm (in)	22.22 (0.875)		
Front disc brake	Type		Ventilated disc		
	Cylinder inner diameter	mm (in)	53.98 (2.125)		
	Pad dimensions (area×thickness)	mm <sup>2</sup> ×mm (in <sup>2</sup> ×in)	4,800×10.0 (7.44×0.39)		
	Disc plate dimensions	mm (in) (outer diameter×thickness)	272×22 (10.7×0.87)	256×20 (10.1×0.79)	
Rear drum brake	Type		Duo-servo	Leading-trailing	
	Wheel cylinder inner diameter	mm (in)	17.46 (0.688)	19.05 (0.750)	
	Lining dimensions	mm (in) (width×length×thickness)	Ⓟ 50×248×5 (1.97×9.76×0.20) Ⓢ 50×260×5 (1.97×10.24×0.20)	45×261×6.3 (1.77×10.28×0.25)	
	Drum inner diameter	mm (in)	260 (10.24)		
	Shoe clearance adjustment		Increment type automatic adjuster		
Power brake unit	Type		Tandem	Single	
	Size	mm (in)	187 + 213 (7.36 + 8.39)	238 (9.37)	
Braking force control device	Type		Rear-wheel Anti-lock Brake System		
Brake fluid			FMVSS 116 DOT-3 or SAE J1703		
Parking brake	Type		Mechanical, 2 rear brakes		
	Operation system		Stick type		

2BU0PX-001


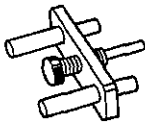
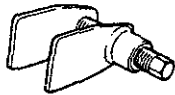
Ⓟ Primary  
Ⓢ Secondary

P

## CONVENTIONAL BRAKE SYSTEM

### CONVENTIONAL BRAKE SYSTEM

#### PREPARATION

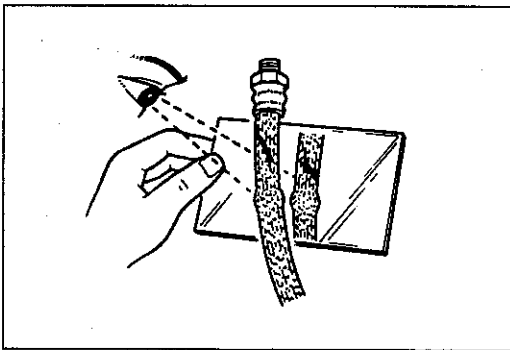
49 0259 770B Wrench, flare nut 	49 F043 001 Adjust gauge 	49 0221 600C Expand tool, disc brake 
---	---	---

2BU0PX-002

#### TROUBLESHOOTING GUIDE

Problem	Possible cause	Remedy	Page
<b>Poor braking</b>	Leakage of brake fluid	Repair	—
	Air in system	Bleed air	P-5
	Worn pad or lining	Replace	P-19,23,27
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	P-19,23,27
	Hardening of pad or lining surface or poor contact	Grind or replace	P-19,23,27
	Malfunction of disc brake piston	Replace	P-21
	Malfunction of master cylinder or wheel cylinder	Repair or replace	P-9
	Malfunction of power brake unit	Repair or replace	P-15
	Malfunction of check valve (vacuum hose)	Repair or replace	P-15
	Damaged vacuum hose	Replace	P-15
Deterioration of flexible hose	Replace	—	
Malfunction of PBV	Replace	P-30	
<b>Brakes pull to one side</b>	Worn pad or lining	Replace	P-19,23,27
	Brake fluid, grease, oil, or water on pad or lining	Clean or replace	P-19,23,27
	Hardening of pad or lining surface or poor contact	Grind or replace	P-19,23,27
	Abnormal wear or distortion of disc, drum, pad, or lining	Repair or replace	P-19,23,27
	Malfunction of automatic adjuster	Repair or replace	—
	Looseness of backing plate mounting bolts	Tighten	P-23,27
	Malfunction of wheel cylinder	Repair or replace	P-23,27
	Improperly adjusted wheel alignment	Adjust	Section R
Unequal tire air pressures	Repair or replace	Section Q	
<b>Brakes do not release</b>	No brake pedal play	Adjust	P-7
	Improperly adjusted push rod clearance	Adjust	P-10
	Clogged master cylinder return port	Clean	—
	Weak shoe return spring	Replace	P-23,27
	Wheel cylinder not returning properly	Clean or replace	P-23,27
	Malfunction of piston seal of disc brake	Replace	P-21
Excessive runout of disc plate	Replace	Section M	
<b>Pedal goes too far (too much pedal stroke)</b>	Air in system	Bleed air	P-5
	Improperly adjusted pedal play	Adjust	P-7
	Worn pad or lining	Replace	P-19,23,27
<b>Abnormal noise or vibration during braking</b>	Worn pad or lining	Replace	P-19,23,27
	Deteriorated pad or lining	Grind or replace	P-19,23,27
	Brakes do not release	Repair	—
	Foreign material or scratches on disc plate or drum contact surface	Clean	—
	Looseness of backing plate or caliper mounting bolts	Tighten	P-23,27
	Poor contact of pad or lining	Repair or replace	P-19,23,27
	Insufficient grease on sliding parts	Apply grease	—

1BU0PX-004



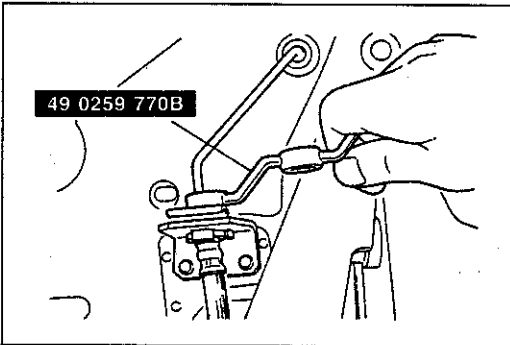
9MU0PX-007

**BRAKE HYDRAULIC LINE**

**On-vehicle Inspection**

Check for the following and replace parts as necessary.

1. Cracking, damage, or corrosion of brake hose
2. Damage to brake hose threads
3. Scars, cracks, or swelling of flexible hose
4. All lines for fluid leakage



9MU0PX-008

**Removal and Installation**

1. Loosen or tighten the flare nut with the **SST**.

**Flare nut tightening torque:**

**13—22 N·m (1.3—2.2 m·kg, 9.4—16 ft·lb)**

2. When connecting the flexible hose, do not overtighten or twist it.
3. After installation:
  - (1) Check that the hose does not contact other parts when the vehicle bounces or when the steering wheel is turned fully right or left.
  - (2) Bleed the air from the brake system.

**Air-Bleeding**

Air-bleeding locations are as follows:

Removed part			Air-bleeding locations		
			Front		Rear
			Right	Left	Left
Master cylinder			*	*	*
Wheel cylinder or caliper	Front	Right	*	*	—
		Left	*	*	—
	Rear	Right	—	—	*
		Left	—	—	*
Hydraulic unit			—	—	*
Proportioning bypass valve (PBV)			*	*	*

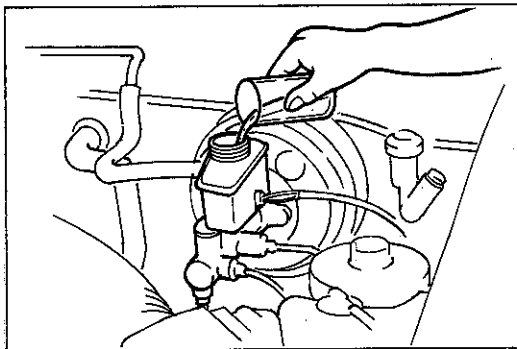
\*: Indicates locations where air bleeding is necessary.

OMU0PX-076

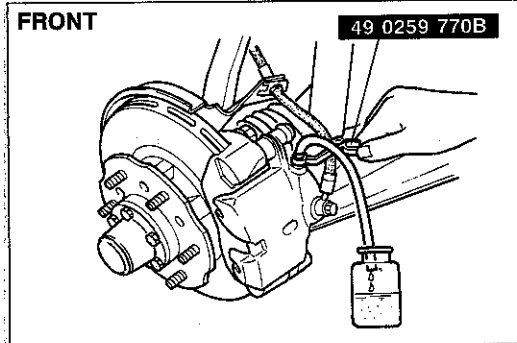
**Note**

- a) Air bleeding must be done from the bleeder screw farthest from the removed parts to the nearest.
- b) It is not necessary to energize the solenoid valves electrically to bleed the rear brakes.

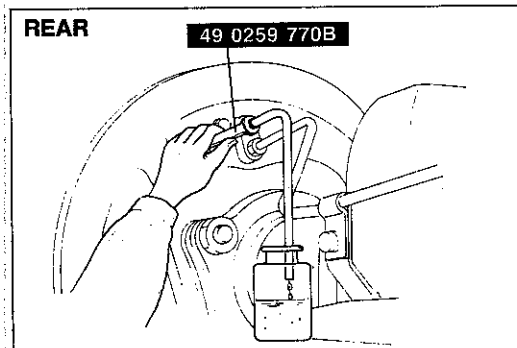




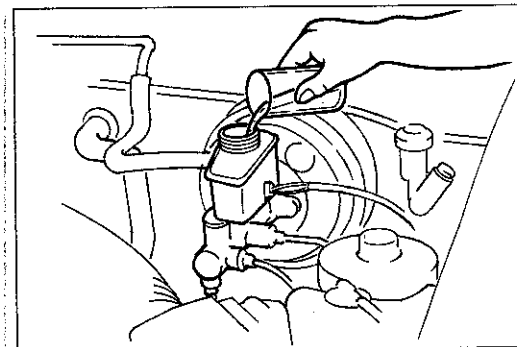
9MU0PX-010



2BU0PX-031



9MU0PX-012



2BU0PX-023

**Bleed air as described below.**

1. Jack up the vehicle and support it with safety stands.
2. Fill the reserve tank with brake fluid. Be sure that the reserve tank is at least half full at all times during the air bleeding process.

**Caution**

- a) Be careful not to spill brake fluid onto a painted surface.
- b) Use only the specified brake fluid. Do not mix it with any other type.

3. After removing the bleeder cap, connect one end of a transparent vinyl tube to the bleeder screw with the **SST** and place the other end in a receptacle.
4. One person should depress the brake pedal a few times, and then hold it in the depressed position.
5. A second person should loosen the bleeder screw, drain out the fluid, and retighten the screw.

**Caution**

- a) The two people should stay in voice contact with each other.
- b) Be sure the pedal remains depressed until the air bleed screw is tightened.

6. Repeat steps 4 and 5 until no air bubbles are seen.

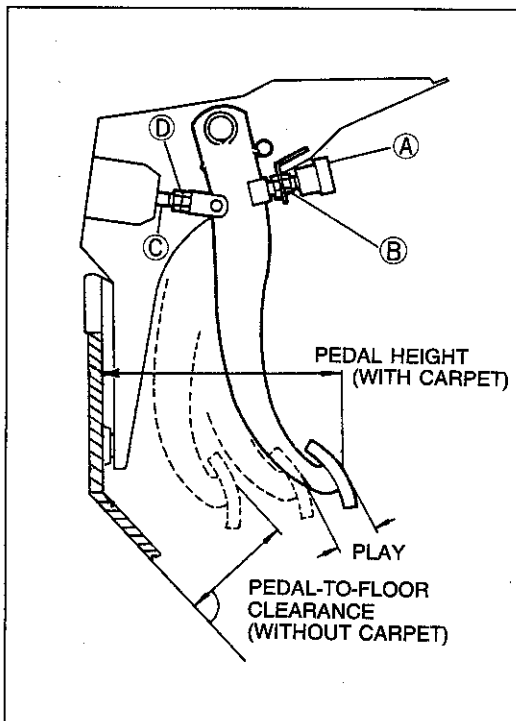
**Caution**

- a) After tightening the bleeder screw, check to be sure that there is no fluid leakage.
- b) Be sure to clean away any spilled fluid with rags.

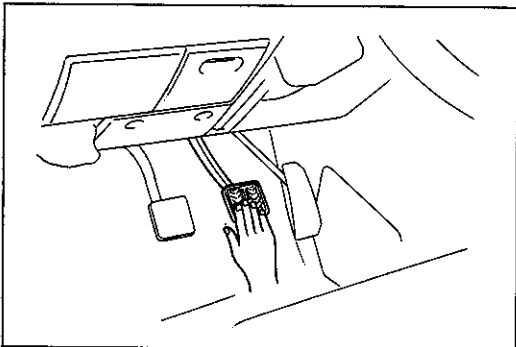
7. After bleeding the air, add brake fluid to the reserve tank up to the specified level.

**Bleeder screw tightening torque**

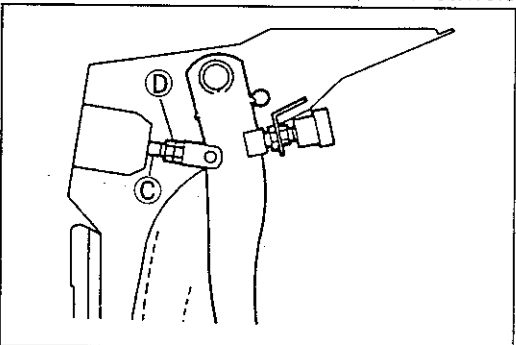
Front: 6—9 N·m (60—90 cm·kg, 52—78 in·lb)  
Rear : 6—7 N·m (60—70 cm·kg, 52—61 in·lb)



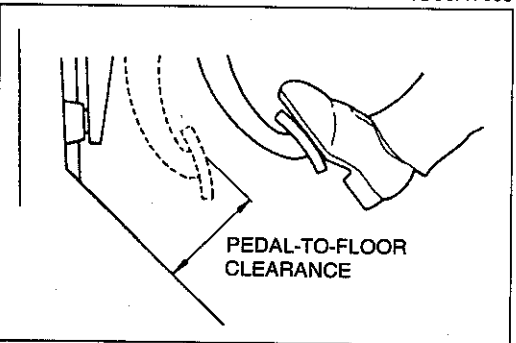
2BU0PX-003



9MU0PX-015



9BU0PX-008



1BU0PX-007

## BRAKE PEDAL

### On-vehicle Inspection

#### Pedal height

#### Inspection

Check that the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

**Pedal height: 180—185mm (7.09—7.28 in)  
(With carpet)**

#### Adjustment

1. Disconnect the stoplight switch connector.
2. Loosen locknut (B) and turn switch (A) until it does not contact the pedal.
3. Loosen locknut (D) and turn rod (C) to adjust the height.
4. Adjust the pedal free play and tighten locknut (D).
5. Turn the stoplight switch until it contacts the pedal; then turn an additional 1/2 turn. Tighten locknut (B).

#### Locknut (B) tightening torque:

**14—18 N·m (1.4—1.8 m·kg, 10—13 ft·lb)**

#### Locknut (D) tightening torque:

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**

6. Connect the stoplight switch connector.

### Pedal play

#### Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Gently depress the pedal again by hand and check the free play (until the valve plunger contacts the stopper plate = until the power piston begins to move).

**Pedal play: 4.0—7.0mm (0.16—0.28 in)**

#### Adjustment

Loosen locknut (D) of operating rod (C); then turn the rod to adjust the free play.

#### Locknut (D) tightening torque:

**20—29 N·m (2.0—3.0 m·kg, 14—21 ft·lb)**

### Pedal-to-floor clearance

#### Inspection

Check that the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of **589 N (60 kg, 132 lb)**.

**Pedal-to-floor clearance: 105mm (4.1 in) min.  
(Without carpet)**

If the distance is less than specified, check for the following problems:

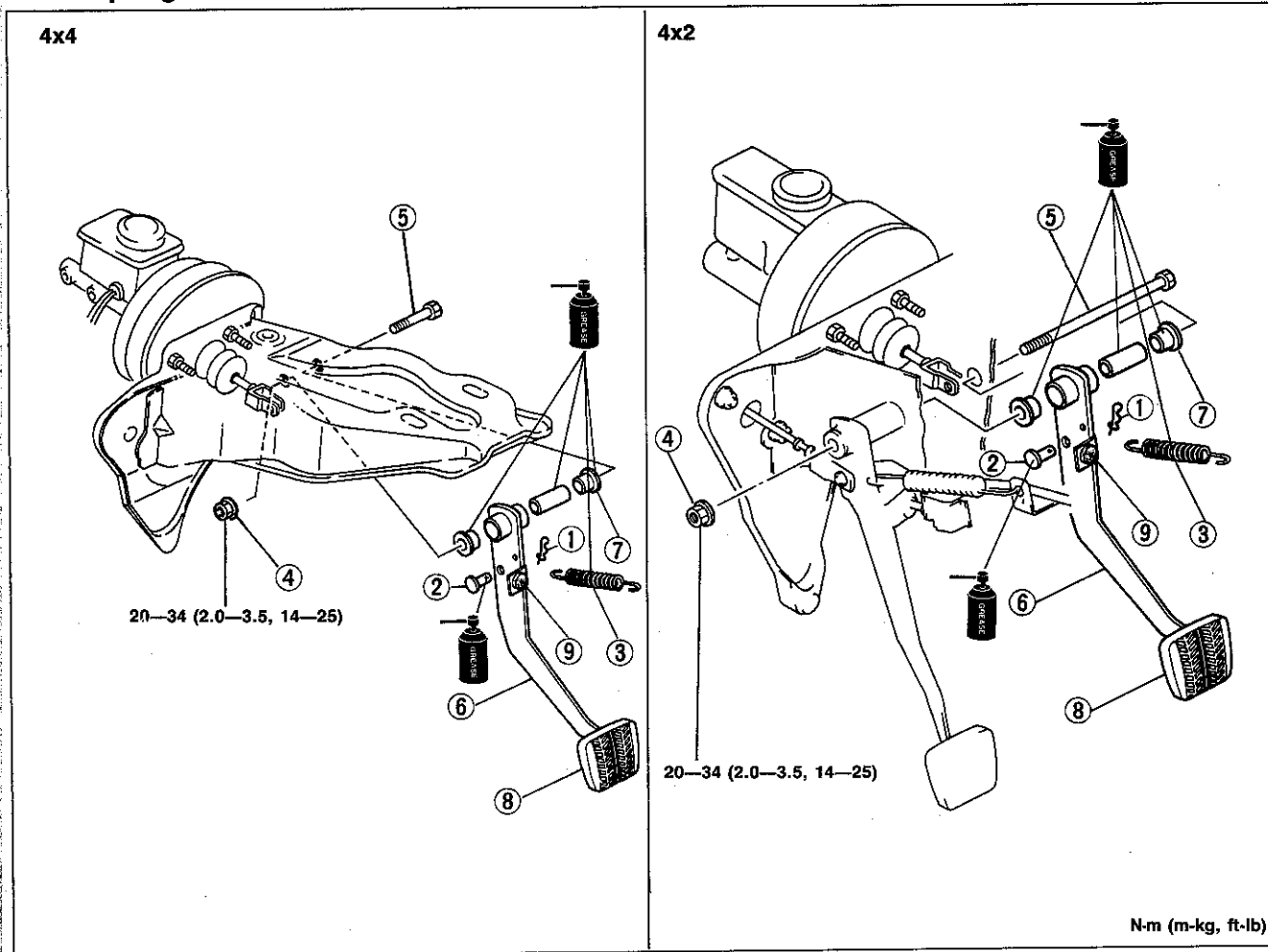
1. Air in brake system
2. Malfunction of automatic adjuster (rear drum brakes)
3. Worn shoes or pads

**Removal, Installation, and Inspection**

1. Remove in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Install in the reverse order of removal.
4. After installation, check and adjust the pedal height and free play if necessary.

**Caution**

**Apply grease to the inner surface of the bushing and to the contact surfaces of the clevis pin and spring.**



1. Cotter pin
2. Clevis pin
3. Return spring  
Inspect for weakness or damage
4. Nut
5. Bolt  
Inspect for bending

6. Brake pedal  
Inspect for bending
7. Bushing  
Inspect for wear
8. Pedal pad  
Inspect for wear or damage
9. Rubber stopper  
Inspect for wear or damage

2BU0PX-024

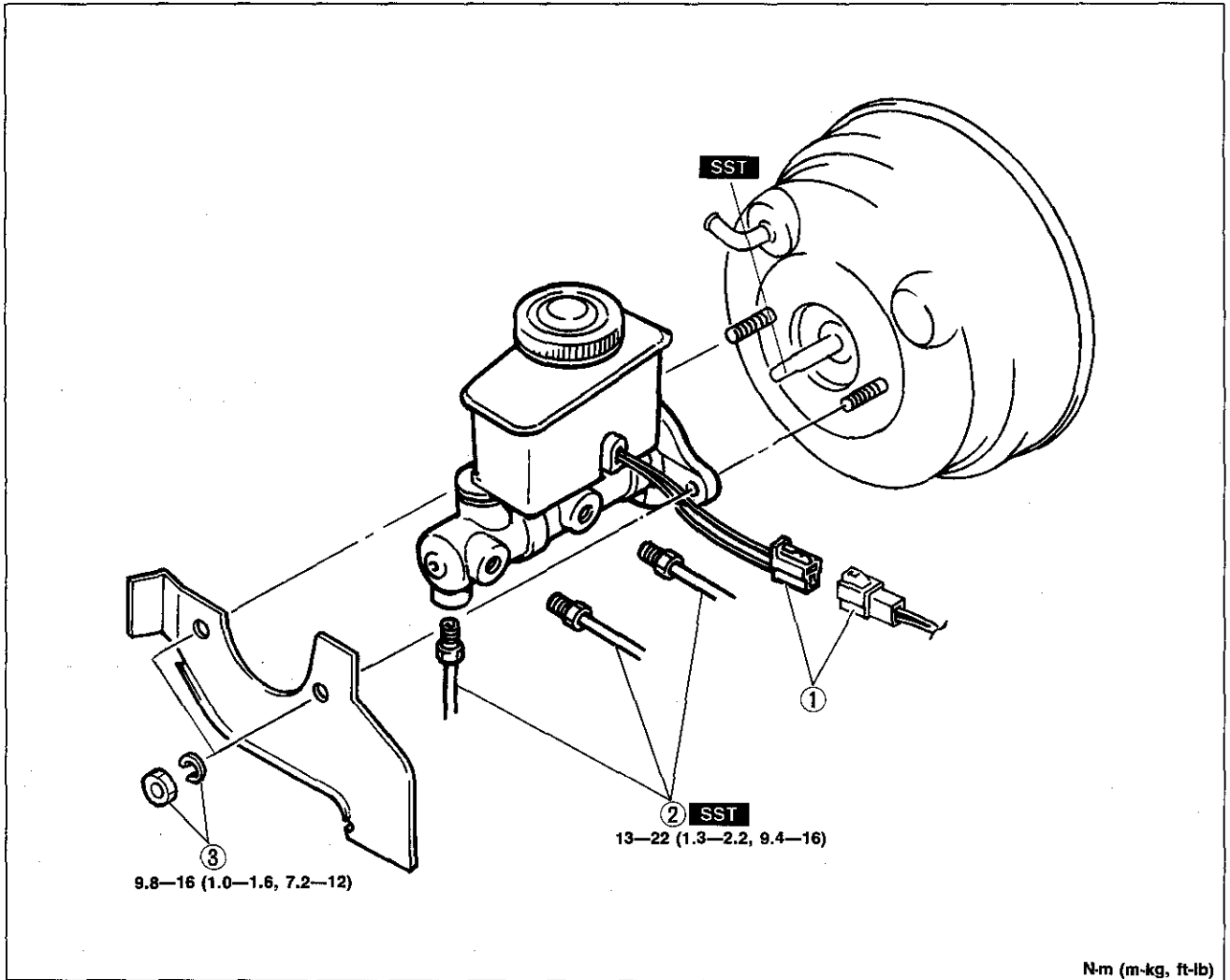
**MASTER CYLINDER**

**Removal and Installation**

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal.
3. After installation, add brake fluid, bleed air, and check for fluid leakage.

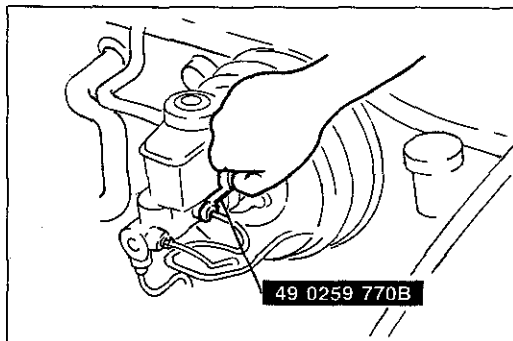
**Caution**

**Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**



N-m (m-kg, ft-lb)  
2BU0PX-004

- |                               |                                       |
|-------------------------------|---------------------------------------|
| 1. Fluid level sensor coupler | 4. Reserve tank and master cylinder   |
| 2. Brake pipe                 | Installation Note..... page P-10      |
| Removal Note ..... below      | 5. Proportioning bypass valve bracket |
| 3. Nuts and washers           |                                       |

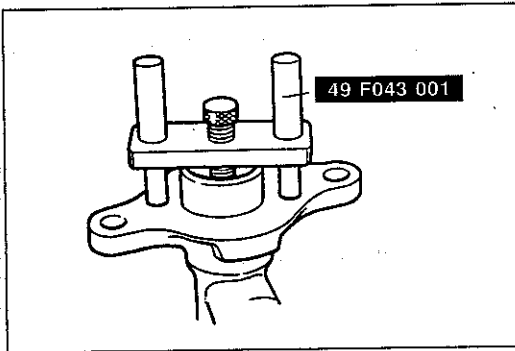


9MU0PX-020

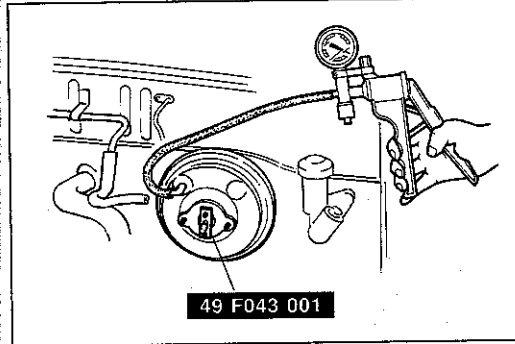
**Removal note**

**Brake pipe**

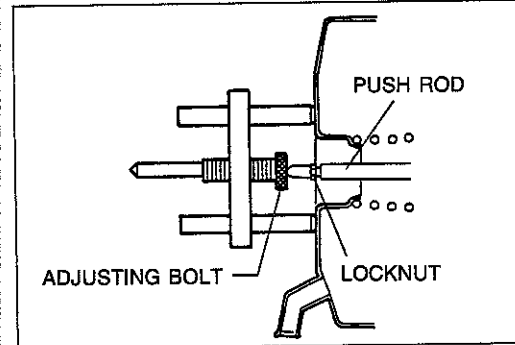
Disconnect/connect the brake pipe from/to the master cylinder with the **SST**.



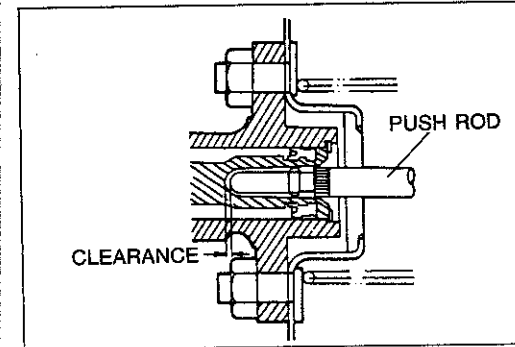
2BU0PX-005



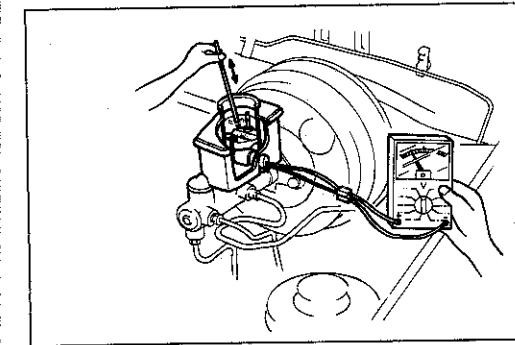
9MU0PX-022



2BU0PX-006



1BU0PX-009



2BU0PX-007

**Installation note**  
**Reserve tank and master cylinder**  
**Push rod clearance**

Check the clearance between the push rod of the power brake unit and the piston of the master cylinder.

1. Place the **SST** a top the master cylinder. Turn the adjusting bolt until it bottoms in the push rod hole in the piston.

2. Apply **500 mmHg (19.7 inHg)** vacuum to the power brake unit with a vacuum pump.

3. Invert the adjustment gauge used in Step 1, and place it on the power brake unit.

4. Check the clearance between the end of the adjusting bolt and the push rod of the power brake unit.

If it is not **0mm (0 in)**, loosen the push rod locknut and turn the push rod to make the adjustment.

**Reference**

By making the above adjustment, the clearance between the push rod and piston (after installation of the brake master cylinder and the power brake unit) will be as shown in the table below.

	Push rod-to-piston clearance
When vacuum applied to unit is approx. 500 mmHg (19.7 inHg)	0.1—0.4mm (0.004—0.016 in)

**Inspection of fluid level sensor**

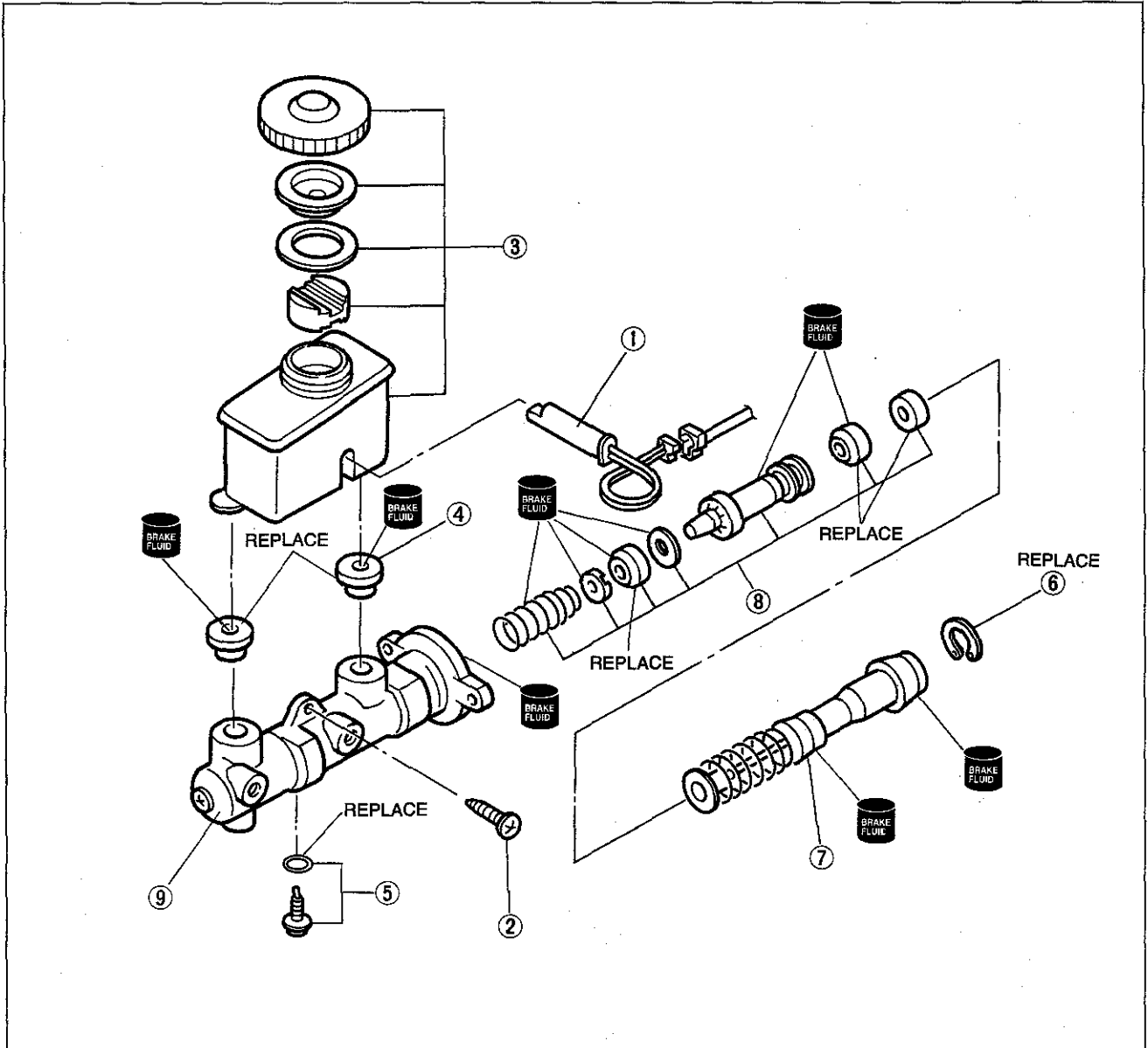
1. Disconnect the fluid level sensor connector.
2. Fill the reservoir with brake fluid up to the specified level.
3. Connect a circuit tester to the connector.
4. Check for continuity when the float is moved up and down.
5. The sensor is good if there is continuity when the float is below the "MIN" mark, and there is no continuity when the float is above it.
6. Replace the sensor if necessary.

### Disassembly, Assembly, and Inspection

1. After removing the brake fluid, disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all components and parts.
3. Assemble in the reverse order of removal, referring to **Assembly Note**.

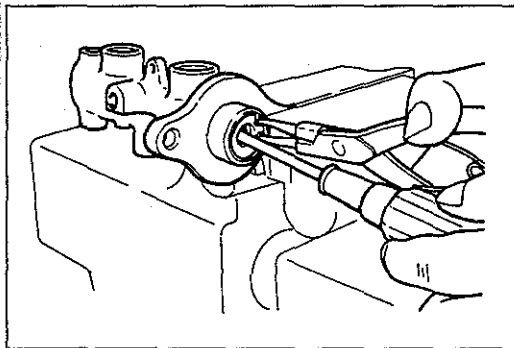
#### Caution

- a) Secure the master cylinder flange in a vise when necessary.
- b) Replace the piston assembly, if necessary.
- c) Do not let foreign material enter the cylinder, and do not scratch the inside of the cylinder or the outer surface of the piston.



2BU0PX-008

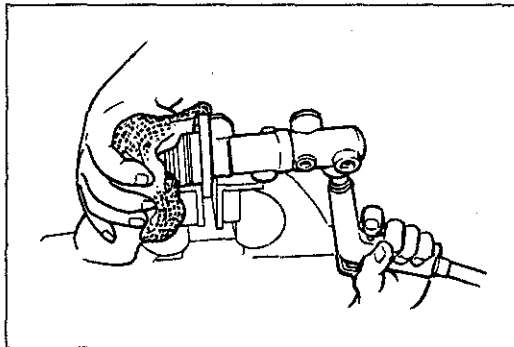
- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Fluid level sensor</li> <li>2. Screw</li> <li>3. Reserve tank assembly<br/>Inspect for damage or deformation</li> <li>4. Bushings</li> <li>5. Stopper screw and O-ring<br/>Assembly Note ..... page P-12</li> <li>6. Snap ring<br/>Disassembly Note ..... page P-12</li> </ol> | <ol style="list-style-type: none"> <li>7. Primary piston assembly<br/>Inspect for abnormal wear, rust, or damage</li> <li>8. Secondary piston assembly<br/>Disassembly Note ..... page P-12<br/>Inspect for abnormal wear, rust, or damage</li> <li>9. Cylinder<br/>Inspect for abnormal wear, rust, or damage</li> </ol> |
|--|---|



9MU0PX-027

**Disassembly note****Snap ring**

Push the piston in to remove or install the snap ring with snap-ring pliers.



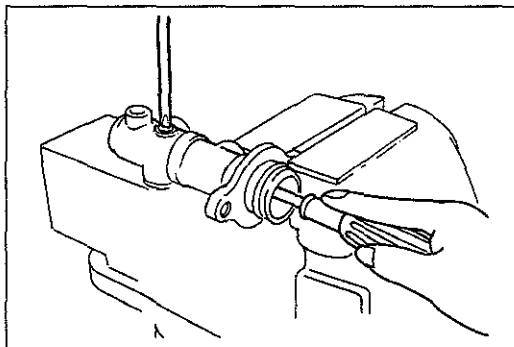
9MU0PX-028

**Secondary piston assembly**

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

**Caution**

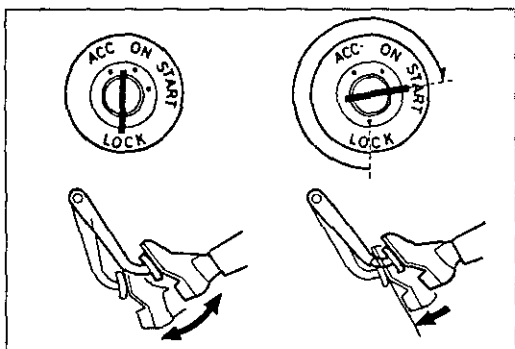
Use a rag to catch the secondary piston assembly.



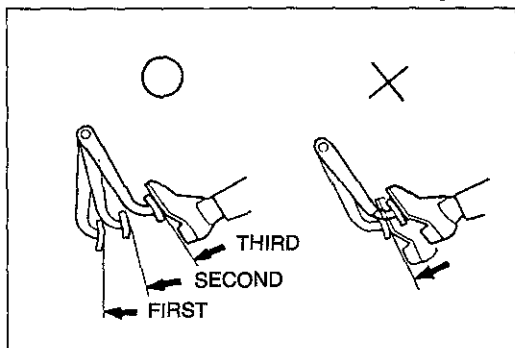
2BU0PX-009

**Assembly note****Stopper screw and O-ring**

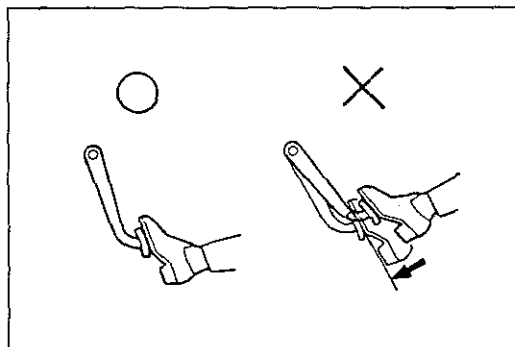
1. Push the primary piston assembly in fully.
2. Install and tighten the stopper screw and new O-ring.
3. Push and release the piston to verify that it is held by the stopper screw.



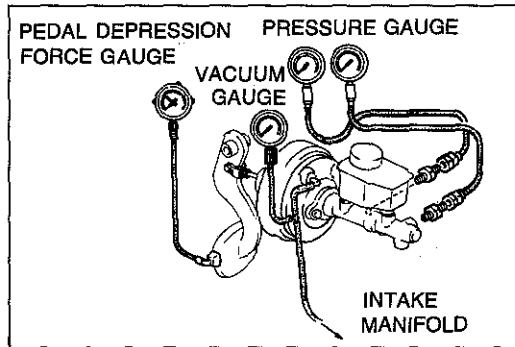
9MU0PX-030



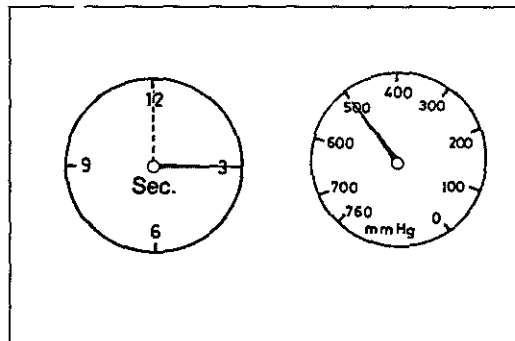
9MU0PX-031



9MU0PX-032



9MU0PX-033



9MU0PX-034

**POWER BRAKE UNIT**

**On-vehicle Inspection**

**Power brake unit function check**

**(Simple method)**

**Step 1**

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine.
3. If immediately after the engine starts the pedal moves down slightly, the unit is operating.

**Step 2**

1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage of the check valve or vacuum hose, and examine the installation. Repair if necessary, and inspect it once again.

**Step 3**

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal held depressed.
4. Hold the pedal down for **about 30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, check for damage to the check valve or vacuum hose, and check the connection. Repair if necessary, and check once again.

If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed check described in "Method-using tester," below.

**(Method-using tester)**

Connect a pressure gauge, vacuum gauge, and pedal depression force gauge as shown in the figure. After bleeding the air from the pressure gauge, conduct the test as described in the 3 steps below.

**Note**

**Use commercially available gauges and pedal depression force gauge.**

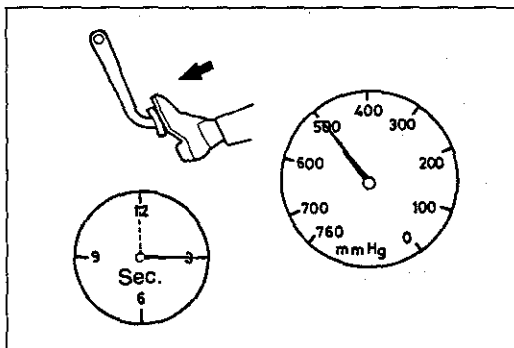
**a) Checking for vacuum loss**

**Unloaded condition**

1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.



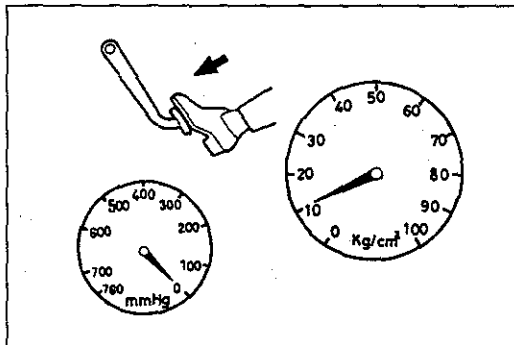
## CONVENTIONAL BRAKE SYSTEM



9MU0PX-035

### Loaded condition

1. Start the engine.
2. Depress the brake pedal with a force of **196 N (20 kg, 44 lb)**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **500 mmHg (19.7 inHg)**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **475—500 mmHg (18.7—19.7 inHg)**, the unit is operating.

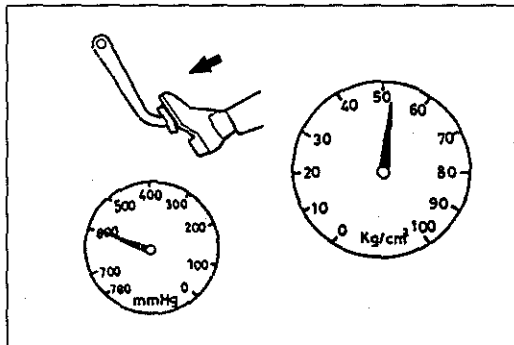


9BU0PX-013

### b) Checking for hydraulic pressure

1. If with the engine stopped (vacuum **0 mmHg**) the fluid pressure is within specification, the unit is operating.

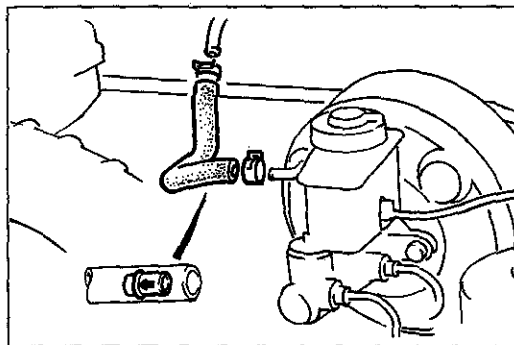
Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	1,962 kPa (20.0 kg/cm <sup>2</sup> , 284 psi) min...Tandem 1,078 kPa (11.0 kg/cm <sup>2</sup> , 156 psi) min...Single



9BU0PX-014

2. Start the engine. Depress the brake pedal when the vacuum reaches **500 mmHg (19.7 inHg)**. If the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	5,886 kPa (60.0 kg/cm <sup>2</sup> , 853 psi) min...Tandem 5,390 kPa (55.0 kg/cm <sup>2</sup> , 782 psi) min...Single



9MU0PX-038

### Inspection of check valve

#### Note

The check valve is pressed into the vacuum hose. There is an arrow on the hose to indicate direction of hose installation.

#### Inspection

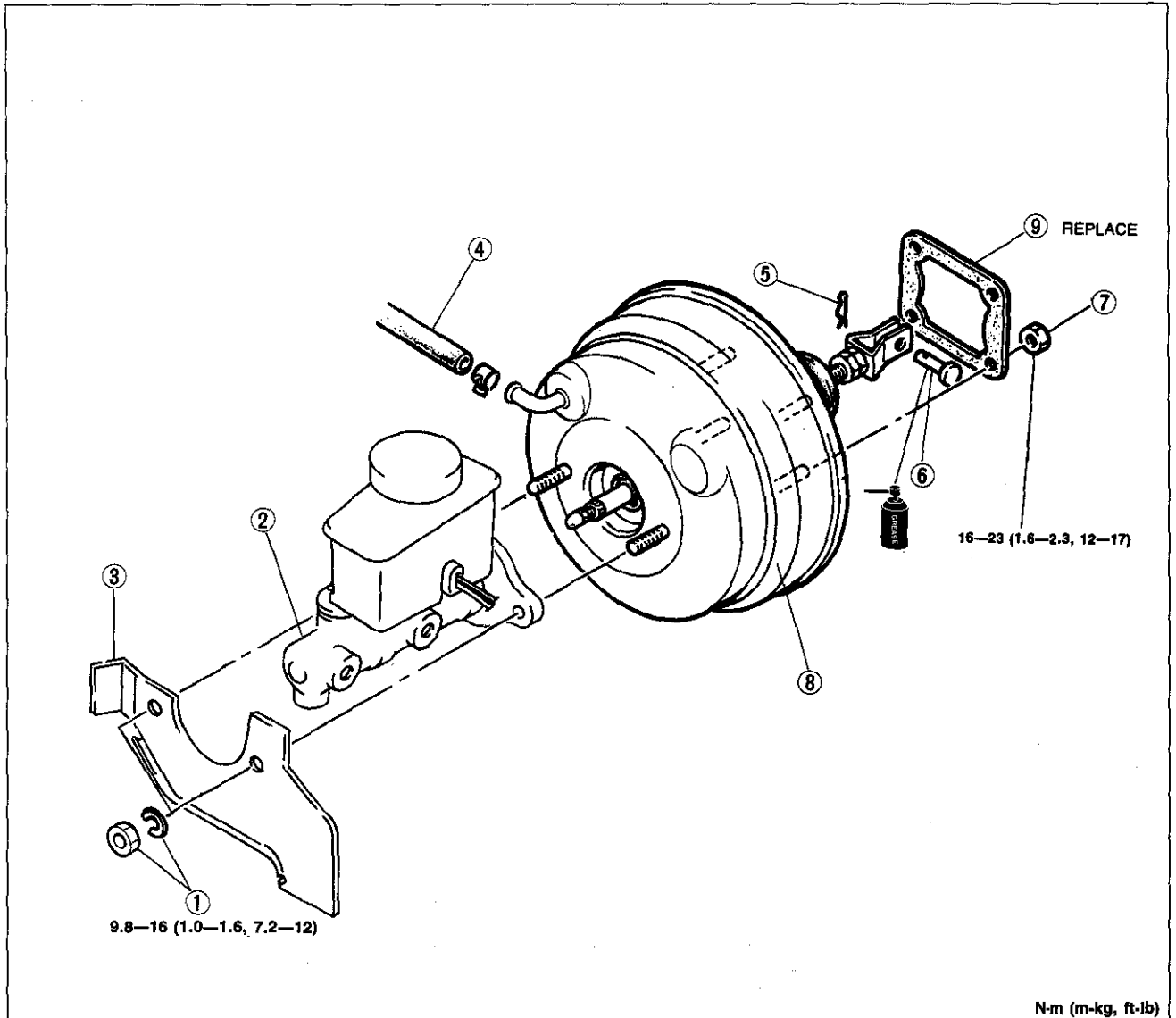
1. Disconnect the vacuum hose from the engine.
2. Apply suction and pressure to the hose from the engine side. Check that air flows only toward the engine. If the air passes in both directions or not at all, replace the check valve (along with the hose).

### Removal and Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.
3. Take the following steps after installation:
  - (1) Check and adjust the push rod and piston clearance. (Refer to page P-10.)
  - (2) Add fluid and bleed the air. (Refer to page P-5.)
  - (3) Check all parts for fluid leakage.
  - (4) Make an on-vehicle check of the unit. (Refer to page P-13.)
  - (5) Check that the vacuum hose does not contact other parts.

### Caution

**Apply sealant to the gasket contact surface.**



N-m (m-kg, ft-lb)

2BU0PX-010

1. Nuts and washers
2. Master cylinder  
Removal and Installation ..... page P-9
3. Proportioning bypass valve bracket
4. Vacuum hose
5. Cotter pin
6. Clevis pin
7. Nuts

8. Power brake unit  
Disassembly and Inspection  
(Single diaphragm, 4x2) ..... page P-16  
Assembly ..... page P-17
9. Gasket

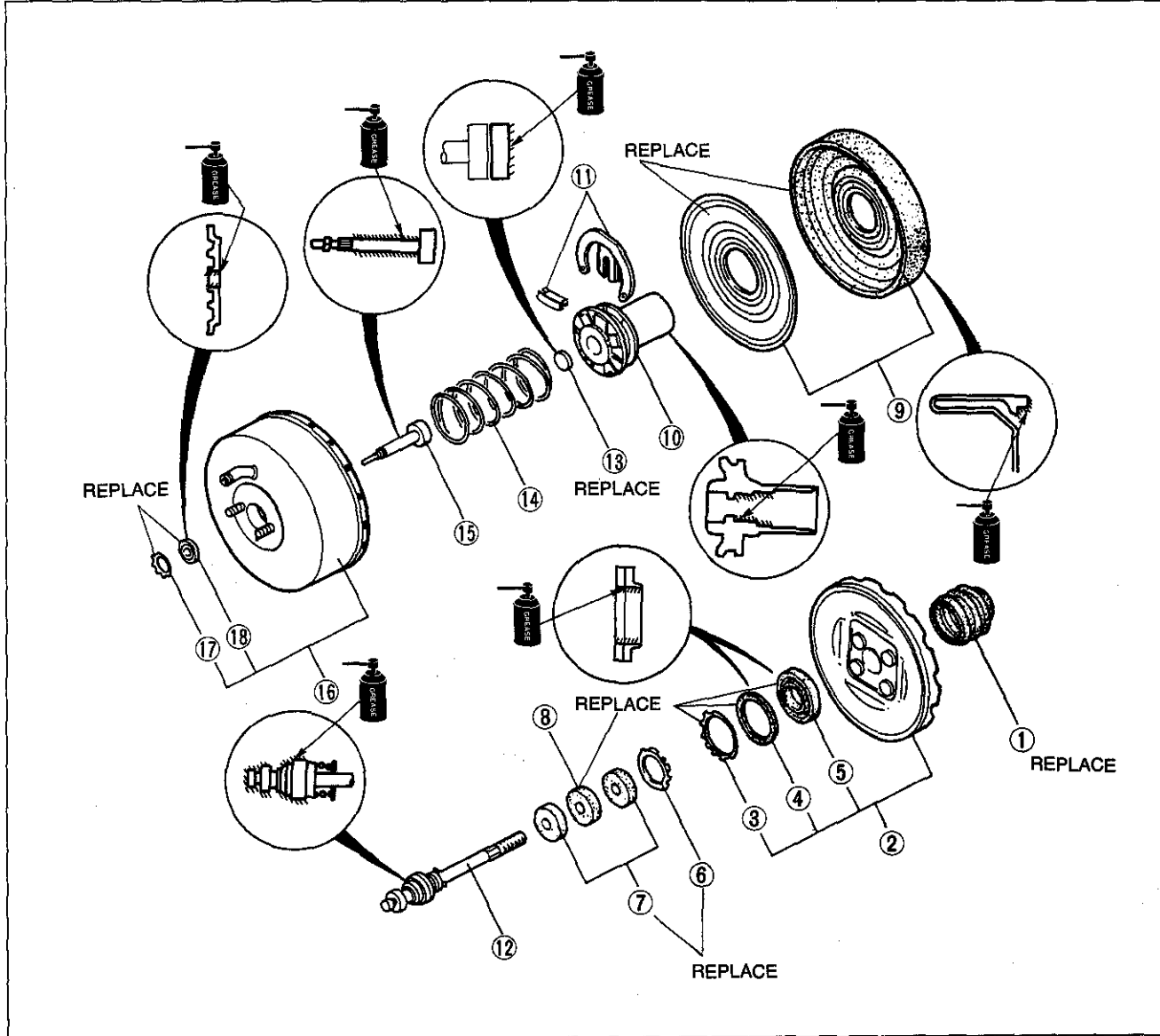
### Note

**Do not disassemble the tandem diaphragm power brake unit (4x4).**

CONVENTIONAL BRAKE SYSTEM

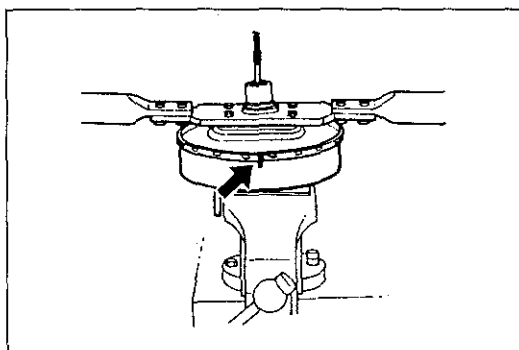
Disassembly and Inspection (Single diaphragm, 4x2)

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Wipe free of fluid and carefully inspect all rubber parts for cuts, nicks, or other damage.
3. Inspect all components and parts. Replace parts if necessary.
4. Make sure the seats of the valve rod and plunger are smooth and free of nicks and scars. Replace if defective.



2BU0PX-011

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Dust boot</li> <li>2. Rear shell assembly<br/>Disassembly Note..... page P-17<br/>Inspect for scratches, scores, pits, dents,<br/>or other damage</li> <li>3. Retainer</li> <li>4. Bearing</li> <li>5. Dust seal</li> <li>6. Retainer</li> <li>7. Air filter</li> <li>8. Air silencer</li> <li>9. Diaphragm and plate<br/>Inspect for cuts or other damage</li> </ol> | <ol style="list-style-type: none"> <li>10. Power piston assembly<br/>Inspect for cracks, distortion, chipping,<br/>or damaged seats</li> <li>11. Retainer key<br/>Disassembly Note..... page P-17</li> <li>12. Valve rod and plunger assembly</li> <li>13. Reaction disc<br/>Inspect for deterioration</li> <li>14. Spring</li> <li>15. Push rod</li> <li>16. Front shell assembly<br/>Inspect for scratches, scores, pits, dents,<br/>or other damage</li> <li>17. Retainer</li> <li>18. Seal</li> </ol> |
|---|---|

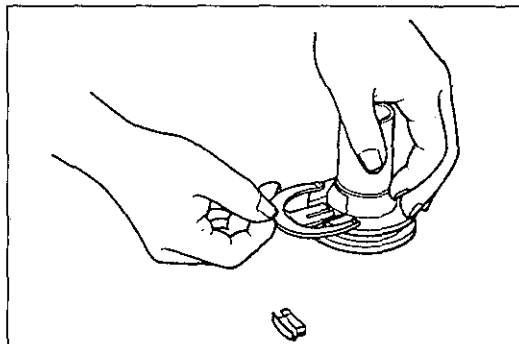


2BU0PX-025

**Disassembly note**  
**Rear shell assembly**

1. Before separating the front and rear shells, make mating marks to be used in reassembly.
2. Fit a locally obtained spanner onto the studs of the rear shell, and rotate the rear shell counterclockwise to unlock it.

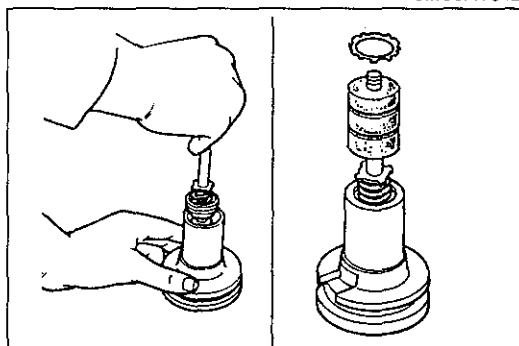
**Caution**  
**The rear shell is spring loaded; loosen it carefully.**



9MU0PX-042

**Retainer key**  
 Press the valve rod in to remove the valve retainer key. Remove the valve rod and plunger assembly.

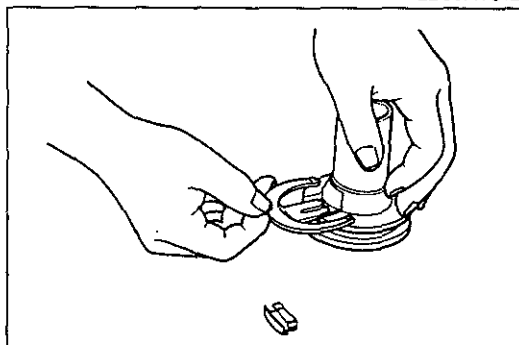
**Caution**  
**The valve rod and plunger must be serviced as an assembly.**



2BU0PX-012

**Assembly (4x2)**

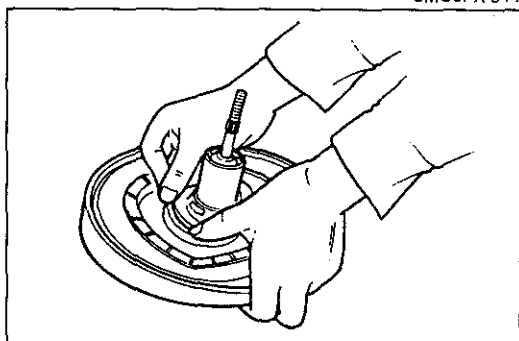
1. Install the valve rod and plunger assembly.
2. Install the new air filter and silencer.
3. Install a new retainer.



9MU0PX-044

4. Install the retainer key.

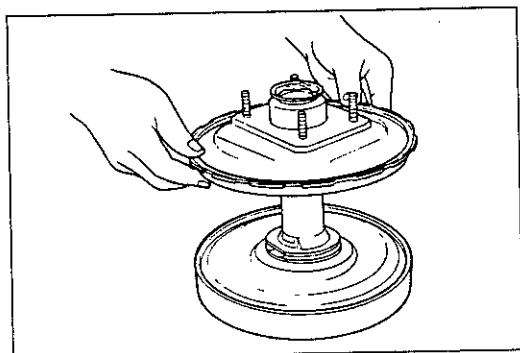
**Caution**  
**Push down the valve rod, align the groove in the valve plunger with the slot of the power piston, and insert the valve retainer key.**



0BU0PX-060

5. Connect the new diaphragm to the power piston and new plate.

**Caution**  
**Make certain the diaphragm is well seated in the groove.**

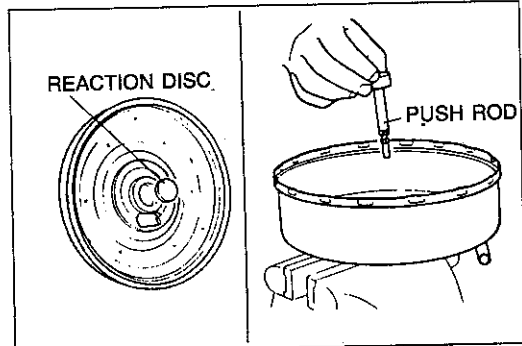


9MU0PX-046

6. Assemble the rear shell assembly.

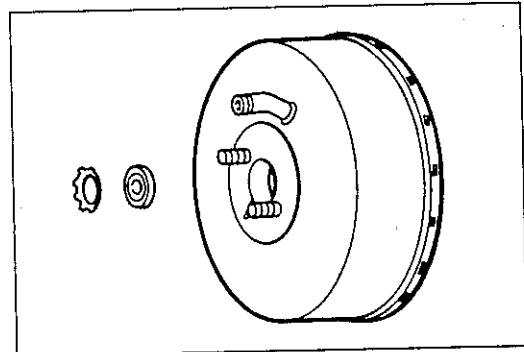
**Caution**

Carefully guide the tube end of the power piston through the seal in the rear shell.



9MU0PX-047

7. Push the reaction disc into the power piston with the push rod.

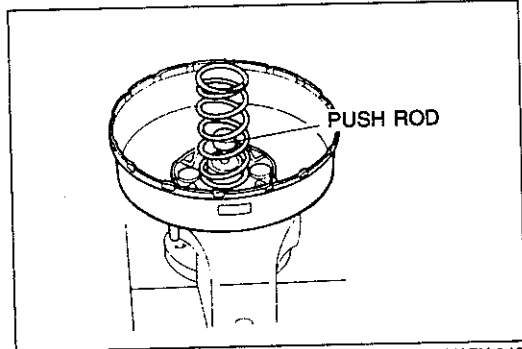


0BU0PX-061

8. Put the new dust seal and new retainer into the front shell.

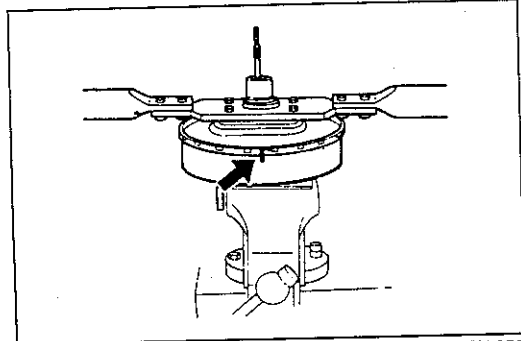
**Caution**

Place the front shell assembly in a vise to complete the following operations.



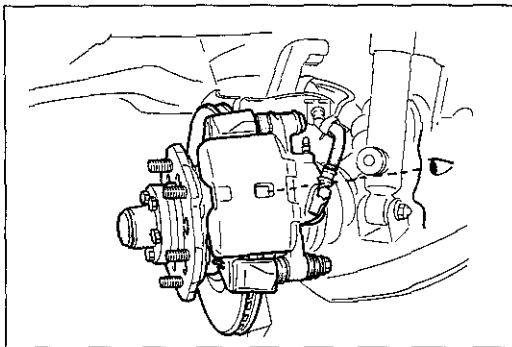
9MU0PX-049

9. Install the push rod.  
10. Install the return spring.

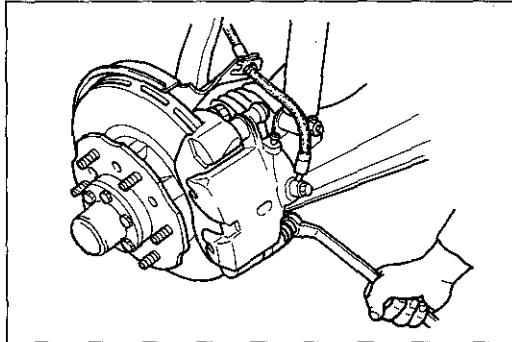


9MU0PX-050

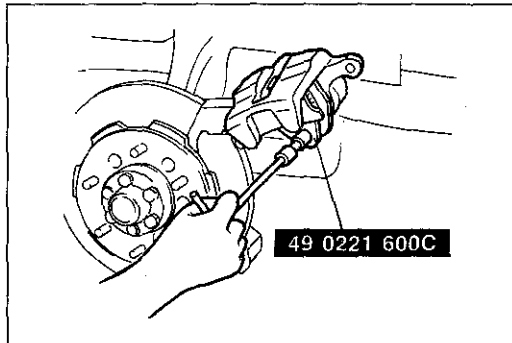
11. Press the rear shell down and rotate it clockwise until the matching marks are aligned.  
12. Set the dust boot onto the rear shell.



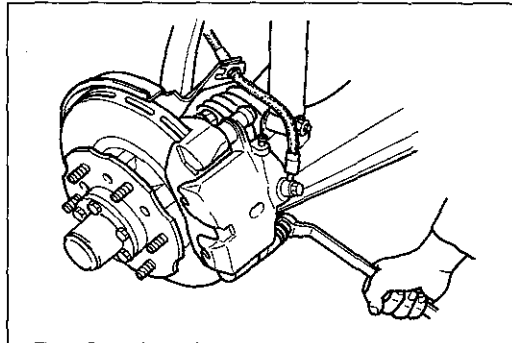
9BU0PX-017



9MU0PX-066



9BU0PX-018



9BU0PX-019

## FRONT BRAKE (DISC)

### On-vehicle Inspection

#### Disc pad

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Sight through the caliper inspection hole and see if the remaining thickness of the pad is at least **3.0mm (0.118 in)**.

### Replacement

#### Disc pad

#### Caution

**Replace the left and right pads as a set.**

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Remove the lower lock-pin bolt; then lift the caliper and support it.
4. Remove the pads.
5. Push the piston inward with the **SST**.
6. Install the new pads in the mounting support.

7. Lower the caliper assembly onto the mounting support.
8. Tighten the lock bolt to the specified torque.

#### Tightening torque:

**31—41 N·m (3.2—4.2 m·kg, 23—30 ft·lb)**

9. Mount the wheels.

#### Caution

**Apply the brakes 2—3 times. Rotate the wheels and check to see if the brakes drag.**

10. Lower the vehicle.

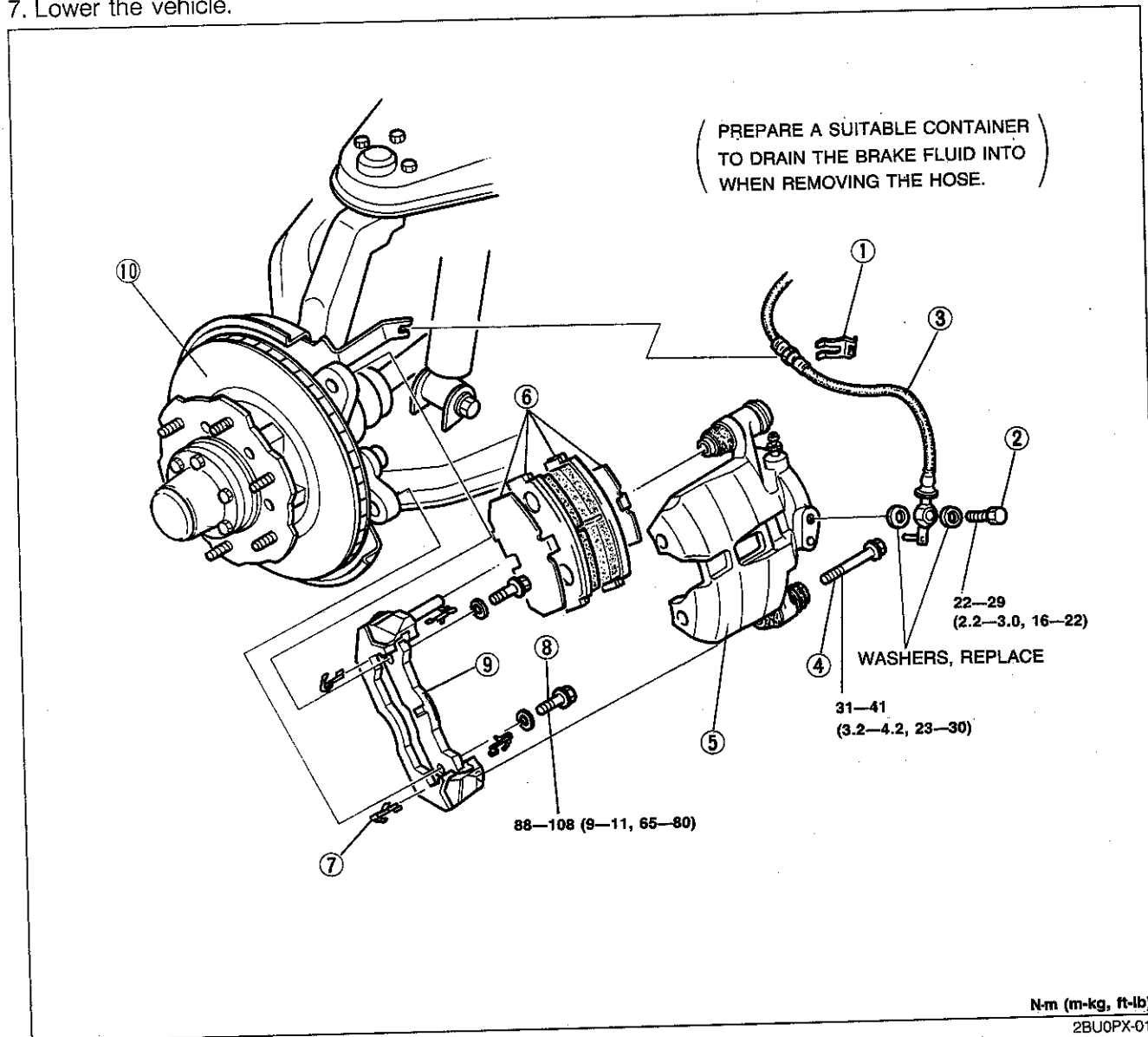
**CONVENTIONAL BRAKE SYSTEM**

**Removal and Installation**

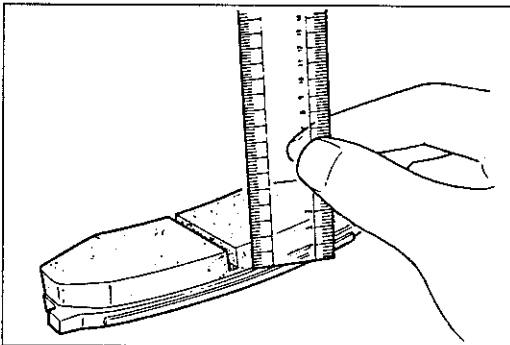
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels; then remove components in the order shown in the figure.
3. Install in the reverse order of removal.
4. Tighten all nuts and bolts to the specified torque, referring to the figure.
5. After installation, add brake fluid, bleed air, and check for fluid leakage.
6. Install the wheels.

**Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m·kg, 65—87 ft·lb)**  
**Styled wheel ..... 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

7. Lower the vehicle.



- |                             |  |
|-----------------------------|--|
| 1. Clip                     | 6. Disc pad                              |
| 2. Bolt                     | Inspection ..... page P-21               |
| 3. Brake hose               | 7. Shims                                 |
| 4. Lock bolts               | 8. Bolts                                 |
| 5. Brake caliper assembly   | 9. Mounting support                      |
| Disassembly ..... page P-21 | 10. Disc plate                           |
| Assembly ..... page P-22    | Removal and Installation ..... Section M |
|                             | Inspection ..... page P-21               |



0BU0PX-062

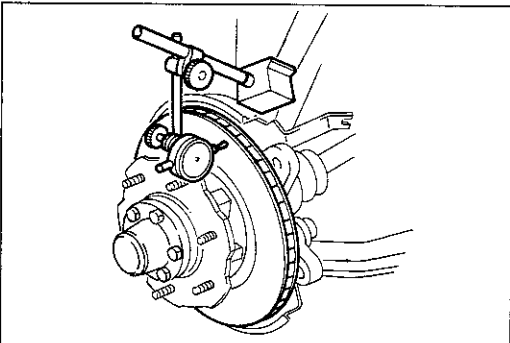
### Inspection

Check the following and replace parts as necessary.

### Disc pad

1. Oil or grease on facing
2. Abnormal wear or cracks
3. Deterioration or damage by heat
4. Remaining lining thickness

**Thickness: 3.0mm (0.118 in) min.**



9BU0PX-022

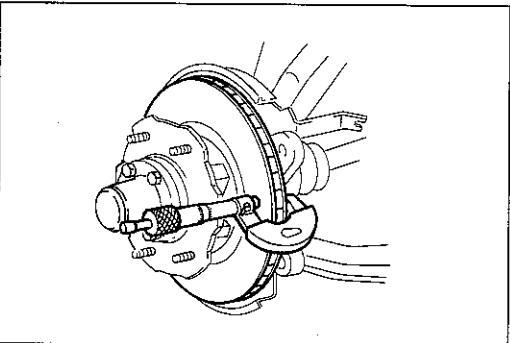
### Disc plate

1. Runout.

**Runout: 0.15mm (0.006 in) max.**

### Caution

- a) There must be no wheel bearing looseness.
- b) The measurement location is the outer edge of the disc plate surface.



9BU0PX-023

2. Wear or damage.

### Thickness

#### 4x4 model

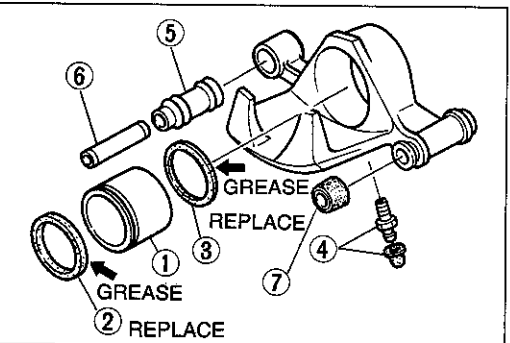
**Standard value: 22mm (0.87 in)**

**Minimum: 20mm (0.79 in)**

#### 4x2 model

**Standard value: 20mm (0.79 in)**

**Minimum: 18mm (0.71 in)**



9BU0PX-024

### Disassembly (Caliper)

Disassemble in the order shown in the figure, referring to **Disassembly note**.

1. Piston
2. Dust seal
3. Piston seal
4. Bleeder screw and cap
5. Pin boot
6. Pin
7. Bushing

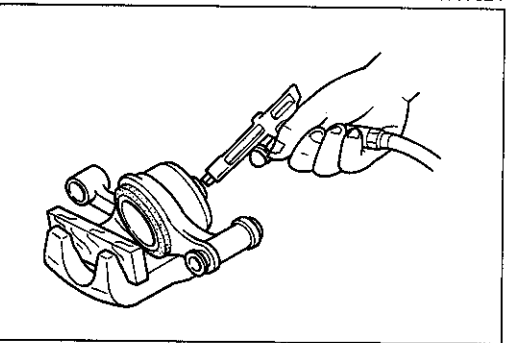
### Disassembly note

#### Piston

Place a piece of wood in the caliper; then blow compressed air through the hole to force the piston out of the caliper.

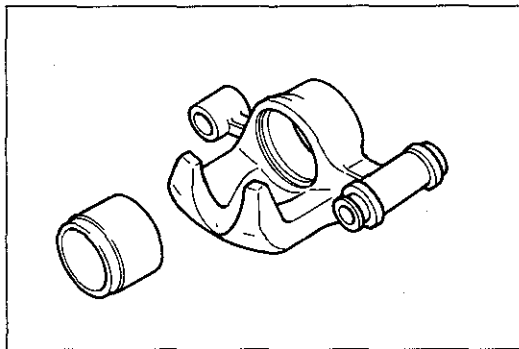
#### Caution

**Blow the compressed air slowly to prevent the piston from popping out.**



9MU0PX-075



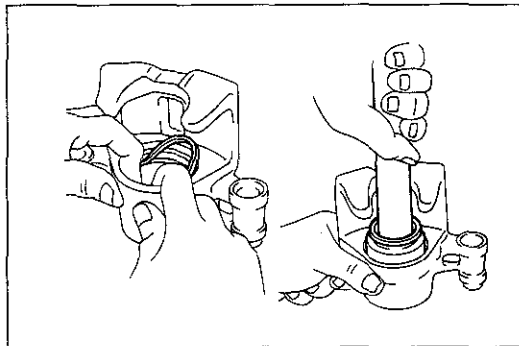


9MU0PX-076

**Inspection (Caliper)**

Inspect each part; if necessary replace parts.

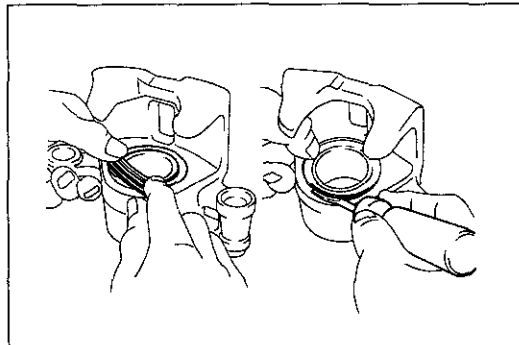
1. Cylinder and piston for wear or rust
2. Caliper body for damage or cracks
3. Boot for damage or poor sealing



2BU0PX-026

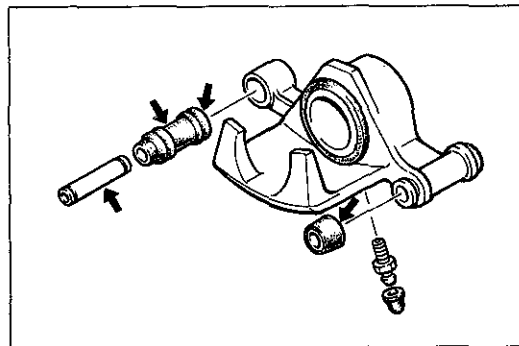
**Assembly (Caliper)**

1. Coat a new piston seal with the grease supplied in the seal kit; then install it in the caliper.



2BU0PX-027

2. Coat the piston and the cylinder with brake fluid and insert the piston squarely into the cylinder.
3. Coat a new dust seal with the grease supplied in the seal kit; then install it in the caliper.



2BU0PX-028

4. Coat the following parts with pink grease.

- (1) Pin (outside)
- (2) Pin boot (inside and outside)
- (3) Bushing (inside)
- (4) Bleeder screw cap (inside)

**Tightening torque:**

**6—9 N·m (60—90 cm·kg, 52—78 in·lb)**

5. Install the bleeder screw and cap.
6. Fit the pin boot and pin to the caliper, and fit the bushing to the lock pin.

## REAR BRAKE (DRUM, 4x4)

### Removal, Installation, and Inspection

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels and remove the brakes in the order shown in the figure, referring to **Removal Note**.
3. Inspect all components and parts. Replace parts if necessary.
4. Install in the reverse order of removal.
5. After installation, add brake fluid, bleed the air, and check for fluid leakage.
6. Install the wheels.

**Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m·kg, 65—87 ft·lb)**  
**Styled wheel ..... 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

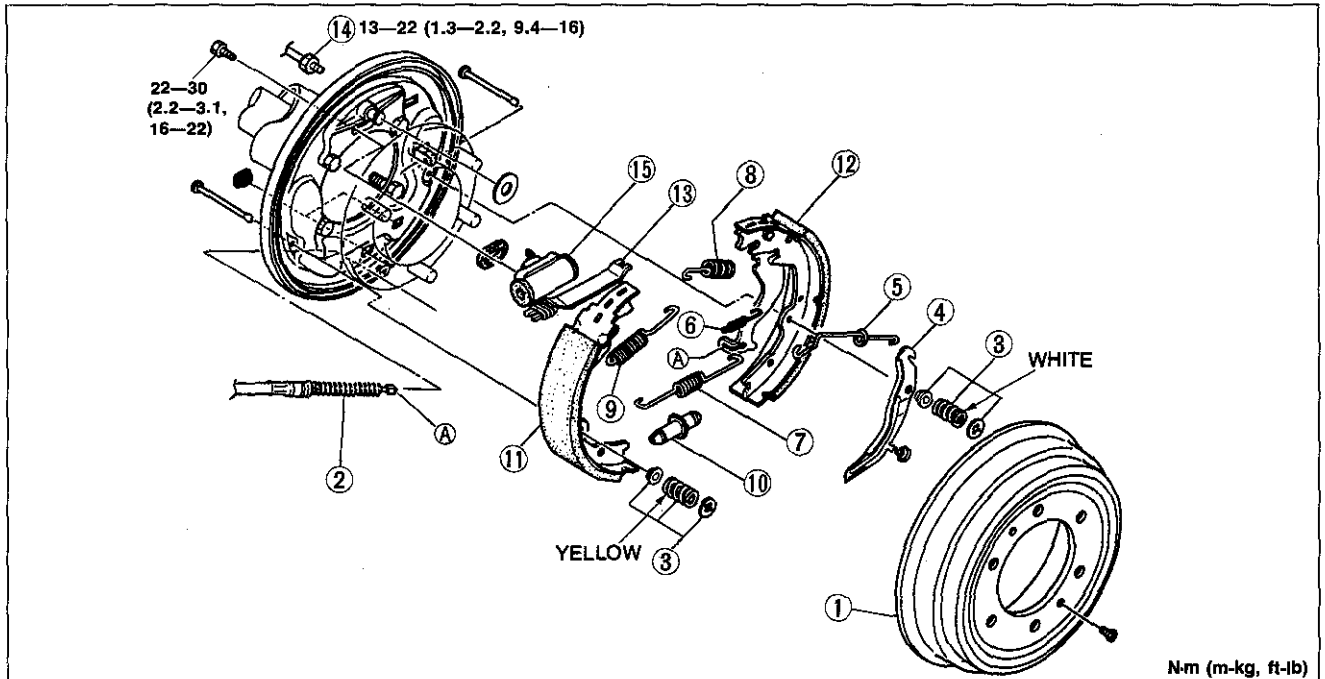
7. Lower the vehicle.
8. Adjust the parking lever stroke. (Refer to page P-31.)

### Note

**Before removal, release the parking brake.**

### Caution

**There are identification marks in the hold springs because they are different between the primary side and secondary side. Use correct hold springs for each side, otherwise, it may cause the malfunction of automatic adjuster.**



N·m (m·kg, ft·lb)

2BU0PX-014

1. Brake drum  
Inspection ..... page P-24
2. Parking brake cable
3. Hold spring and sleeve, pin

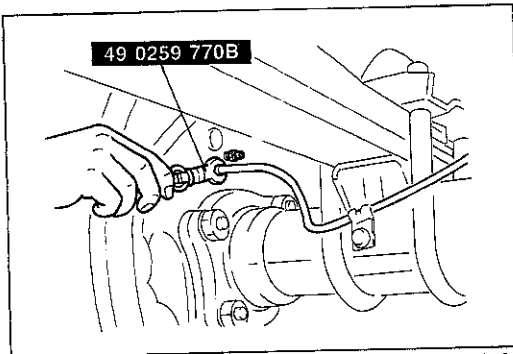
### Caution

**Primary side ..... Yellow**  
**Secondary side ..... White**

4. Adjust lever
5. Link
6. Pull-off spring
7. Shoe spring
8. Return spring

9. Return spring
10. Adjuster
11. Primary brake shoe  
Inspection ..... page P-24  
Adjustment of brake shoes ..... page P-25
12. Secondary brake shoe  
Inspection ..... page P-24  
Adjustment of brake shoes ..... page P-25
13. Strut
14. Brake pipe  
Removal Note ..... page P-24
15. Wheel cylinder assembly  
Disassembly, Assembly and  
Inspection ..... page P-26

# CONVENTIONAL BRAKE SYSTEM



9MU0PX-081

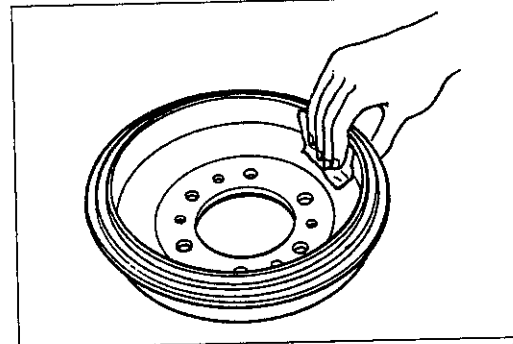
**Removal note**

**Brake pipe**

Disconnect or connect the brake pipe from/to the wheel cylinder with the **SST**.

**Tightening torque:**

**13–22 N·m (1.3–2.2 m·kg, 9.4–16 ft·lb)**



9MU0PX-082

**Inspection**

Check for the following and repair or replace parts as necessary.

**Brake drum**

1. Scratches, uneven or abnormal wear inside drum

**Note**

**Repair if the problem is minor.**

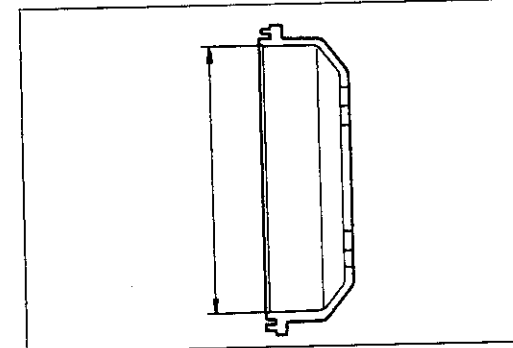
2. Drum inner diameter

**Standard diameter: 260mm (10.24 in)**

**Diameter limit: 261.5mm (10.30 in)**

**Caution**

**When repairing or replacing the drum, check the contact with the shoe.**



9MU0PX-083

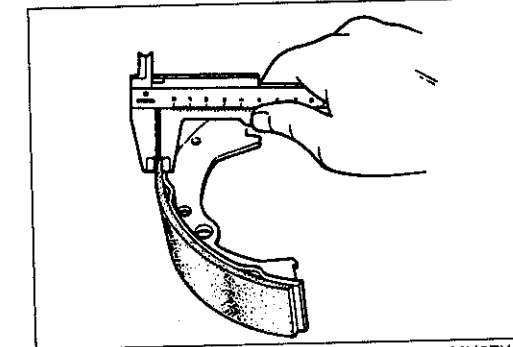
**Brake shoe**

1. Peeling, cracking, or extremely uneven wear of lining
2. Lining wear

**Thickness: 1.0mm (0.04 in) min.**

**Caution**

**When replacing the shoe assembly, replace as a set and with shoes of the same quality.**

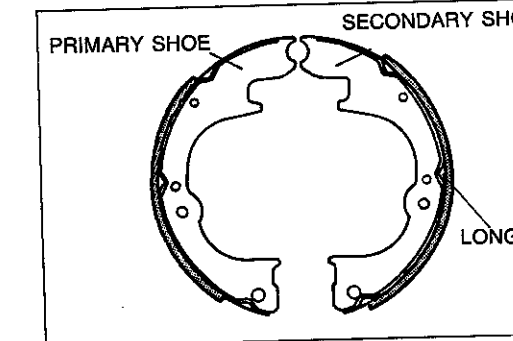


9MU0PX-084

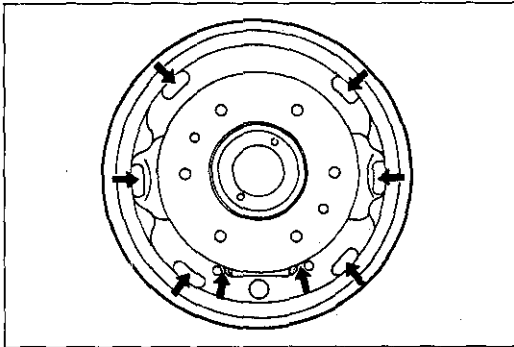
**Installation note**

**Brake shoe**

When installing the brake shoes, be careful not to confuse the primary and secondary shoes.



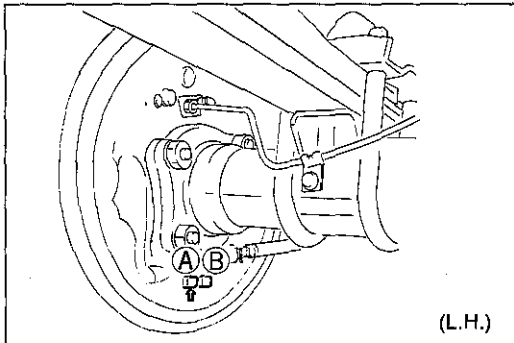
9MU0PX-085



9MU0PX-086

### Grease points

- (1) Piston of wheel cylinder
- (2) Anchor sliding parts
- (3) Projection of backing plate
- (4) Adjusting screw
- (5) Adjusting sleeve contact surfaces



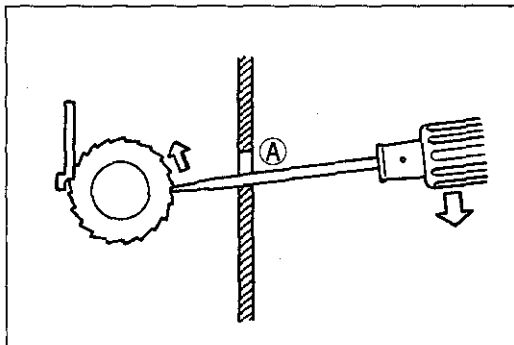
9MU0PX-087

### Adjustment of brake shoes

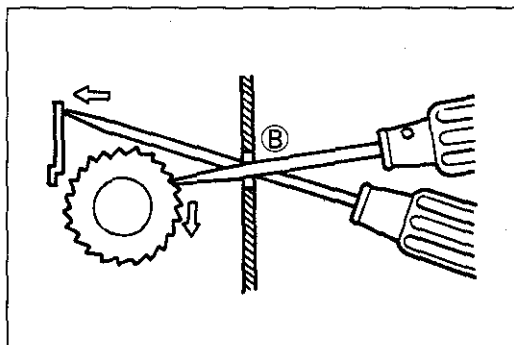
The rear brakes are self-adjusting and require a manual adjustment only after the brake shoes have been replaced or when the operating lever has been moved during some other service operation.

To adjust the rear brake shoes, proceed as follows:

1. Jack up the rear of the vehicle until the wheels are free to turn. Then support it with safety stands.
2. Make sure the parking brake is fully released.
3. Remove the two hole plugs from the backing plate.
4. Place a screwdriver against the adjuster through hole (A) and turn the adjuster in the direction of the arrow marked on the backing plate until the wheel is locked.
5. Using hole (B), push the pawl lever of the self-adjuster and back off the star wheel about **8—10 notches** so that the drum rotates freely without drag.
6. Repeat the above adjustment on the other rear wheel. The adjustment must be the same on both rear wheels.
7. Adjust the parking lever stroke. (Refer to page P-31.)
8. Install the hole plugs into the backing plate.



9MU0PX-088



2BU0PX-029

## CONVENTIONAL BRAKE SYSTEM

### Disassembly, Assembly, and Inspection (Wheel cylinder)

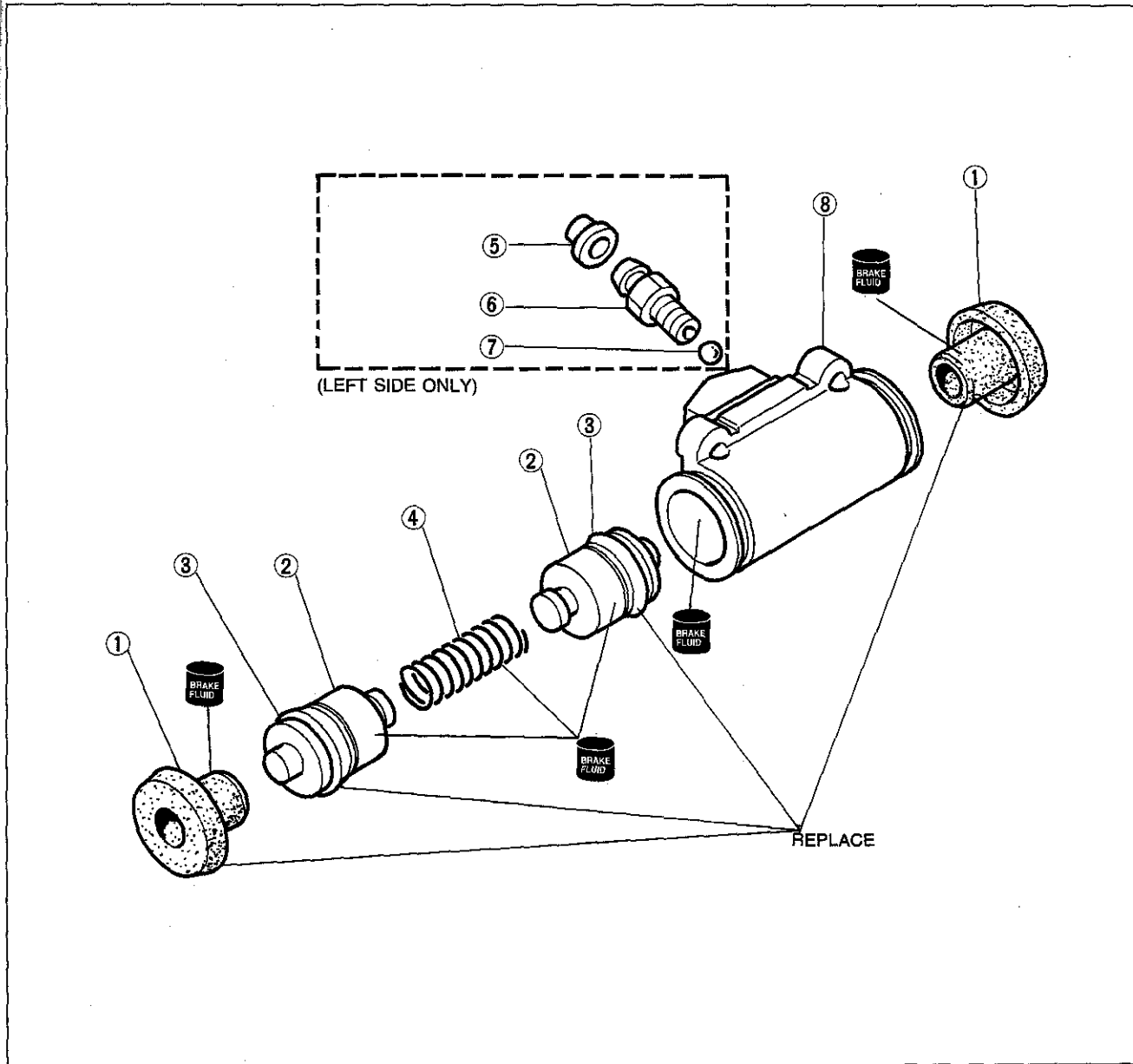
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

**Note**

- a) Use a new boot set.
- b) Apply brake fluid to the points shown in the figure.

**Caution**

Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.



1BU0PX-016

1. Dust boot
2. Piston  
Inspect for wear of contact surface
3. Piston rubber cup
4. Spring  
Inspect for wear or breaks

5. Rubber cap
6. Bleeder screw
7. Steel ball
8. Wheel cylinder  
Inspect for wear, rust, or damage

**REAR BRAKE (DRUM, 4x2)**

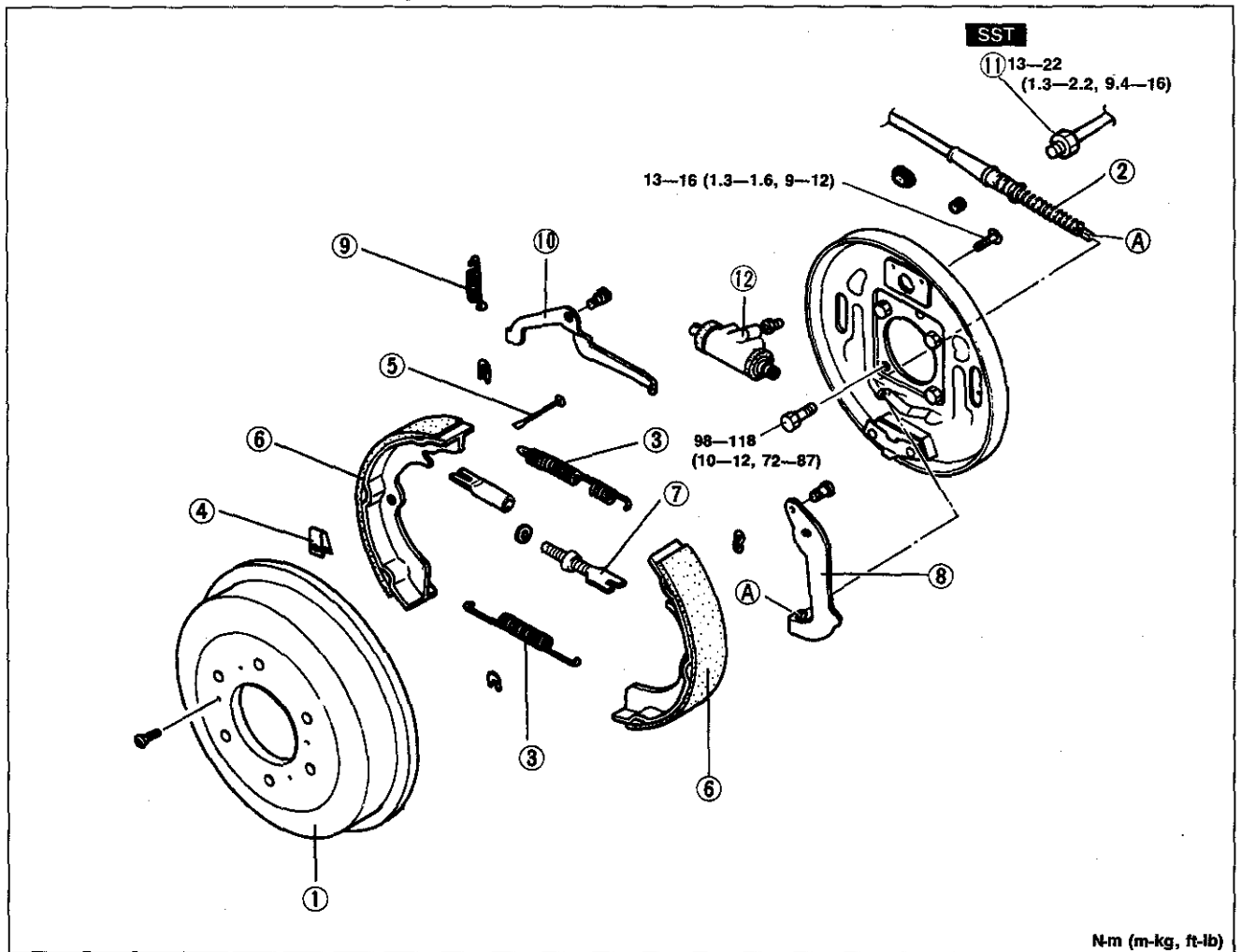
**Removal, Installation, and Inspection**

1. Jack up the rear of the vehicle, and support it with safety stands.
2. Remove the wheels, then the rear drum brakes in the sequence shown in the figure.
3. Inspect all components and parts. Replace parts if necessary.
4. Install in the reverse order of removal.
5. After installation, add brake fluid and bleed the air; then check for fluid leakage.
6. Install the wheels.

**Tightening torque: Non-styled wheel .... 88—118 N·m (9—12 m·kg, 65—87 ft·lb)**  
**Styled wheel ..... 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

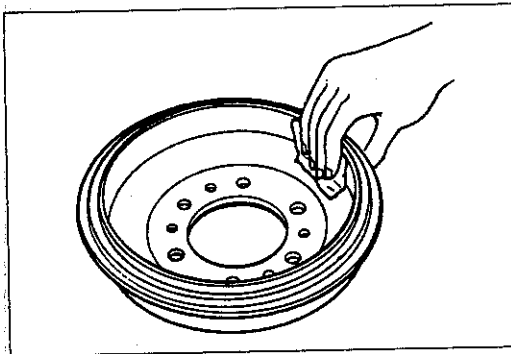
7. Lower the vehicle.
8. Adjust the parking brake lever stroke. (Refer to page P-31.)

**Note**  
**Before removal, release the parking brake.**



- |  |  |   |
|--|--|---|
| 1. Brake drum<br>Inspection..... page P-28 | 6. Brake shoe<br>Inspection..... page P-28 | 9. Pawl lever return spring   |
| 2. Parking brake cable                     | 7. Adjust screw                            | 10. Pawl lever  |
| 3. Return spring                           | 8. Operating lever                         | 11. Brake pipe<br>Removal Note.. page P-24  |
| 4. Brake shoe spring                       |  | 12. Wheel cylinder assembly<br>Disassembly, Assembly<br>and Inspection<br>..... page P-29 |
| 5. Brake shoe pin                          |  |   |

## CONVENTIONAL BRAKE SYSTEM



9BU0PX-028

### Inspection

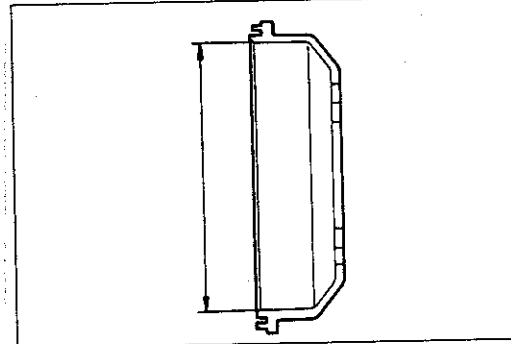
Inspect for the following problems, and repair or replace any faulty parts.

### Brake drum

1. Scratches and uneven or abnormal wear inside the drum.

### Note

Repair if the problem is minor.



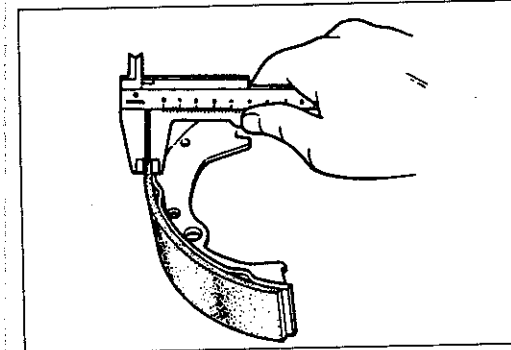
4BG11X-666

2. Drum inner diameter

**Standard diameter: 260mm (10.24 in)**  
**Diameter limit : 261.5mm (10.30 in)**

### Caution

When repairing or replacing the drum, examine the contact with the shoe.



9BU0PX-029

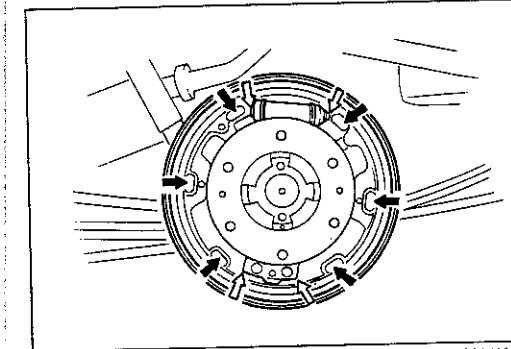
### Brake shoe

1. Peeling, cracks, and extremely uneven wear of the lining.
2. Wear of the lining.

**Thickness limit: 1.0mm (0.04 in)**

### Caution

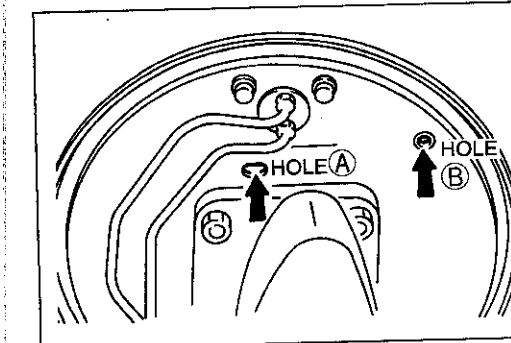
When replacing the shoe assembly, replace it as a set and with an assembly of the same quality.



8BU11X-027

### Grease points

Before installation, apply grease to the wheel cylinder and anchor sliding parts (⇔), the projections of the backing plate (→).

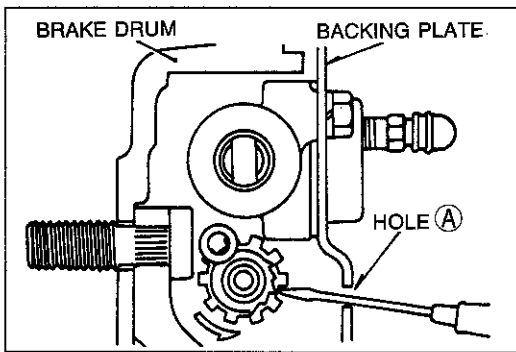


7BU11X-070

### Brake Shoe Adjustment

To adjust the rear brake shoes, proceed as follows:

1. Jack up the rear of the vehicle until the wheels are free to turn. Then support it with stands.
2. Make sure the parking brake is fully released.
3. Remove the two shoe-adjusting hole plugs from the back of the backing plate.



4. Place a screwdriver against the star wheel of the adjust screw through hole (A), and turn the star wheel toward the arrow direction (←) marked on the backing plate until the wheel is locked.
5. Through hole (B), push the pawl lever of the self-adjuster with a suitable drift, and back off the star wheel about **6—7 notches** so that the drum rotates freely without drag.
6. Repeat this adjustment on the other rear wheel. The adjustment must be the same on both rear wheels.
7. Adjust the parking lever stroke. (Refer to page P-31.)
8. Install the adjusting hole plugs into the backing plate.

### Disassembly, Assembly, and Inspection (Wheel cylinder)

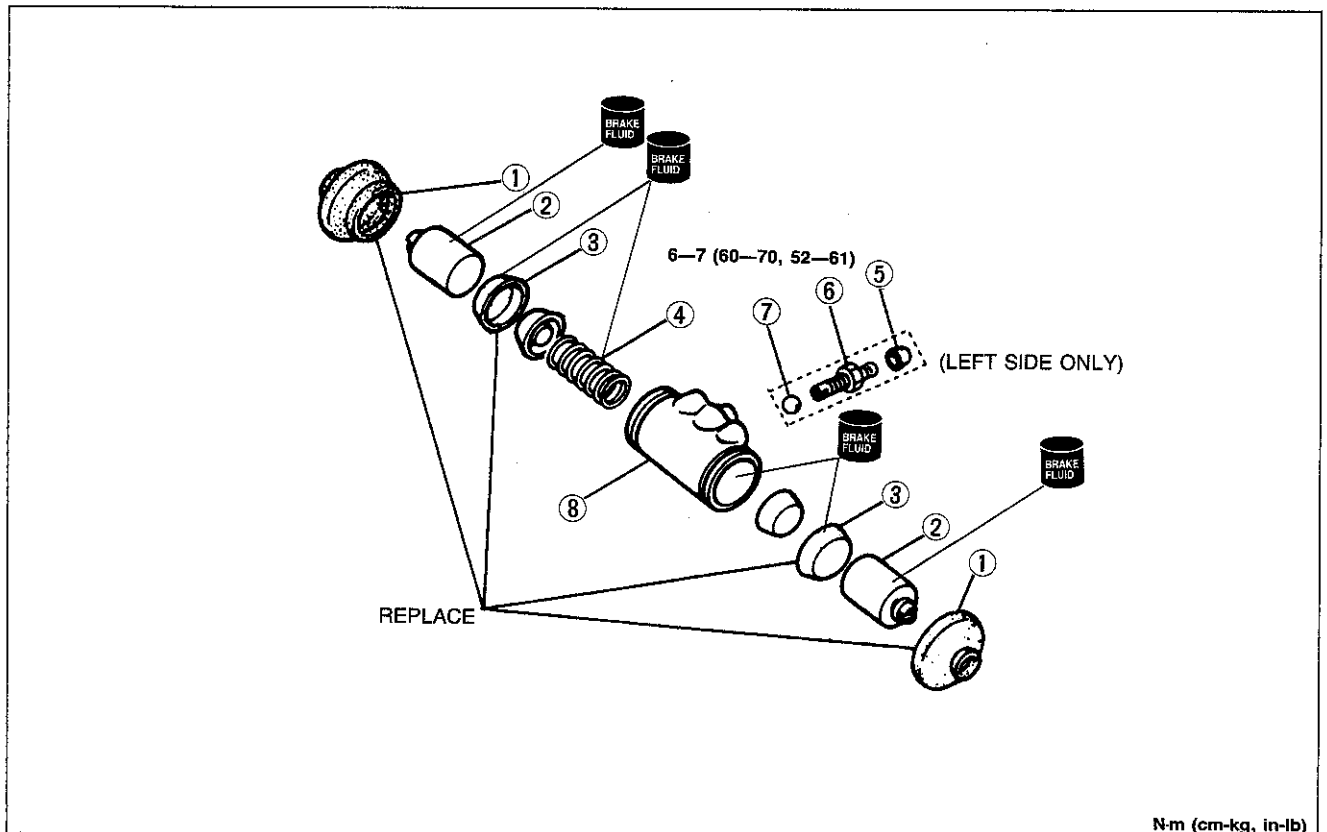
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

#### Note

- a) Use a new boot set.
- b) Apply brake fluid to the points shown in the figure.

#### Caution

Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.



1. Dust boot
2. Piston  
Inspect for wear of contact surface
3. Piston rubber cup
4. Spring  
Inspect for wear or breaks

5. Rubber cap
6. Bleeder screw
7. Steel ball
8. Wheel cylinder  
Inspect for wear, rust, or damage

1BU0PX-019

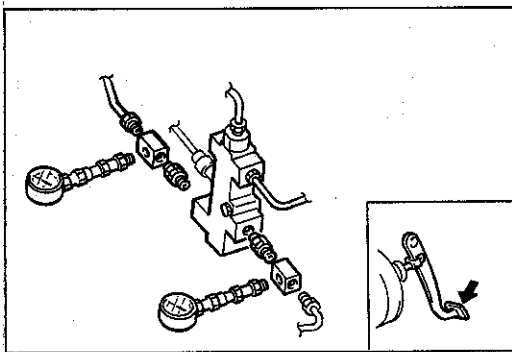


CONVENTIONAL BRAKE SYSTEM

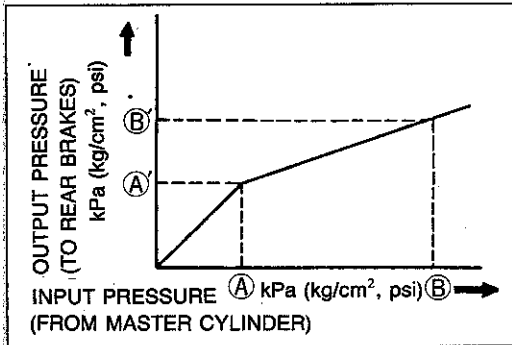
PROPORTIONING BYPASS VALVE (PBV)

Function Check

As shown in the figure, connect two pressure gauges (9,810 kPa [100 kg/cm<sup>2</sup>, 1,422 psi] ), depress the brake pedal, and measure the fluid pressure of the master cylinder and the fluid pressure to the rear brakes.



0BU0PX-022



0BU0PX-023

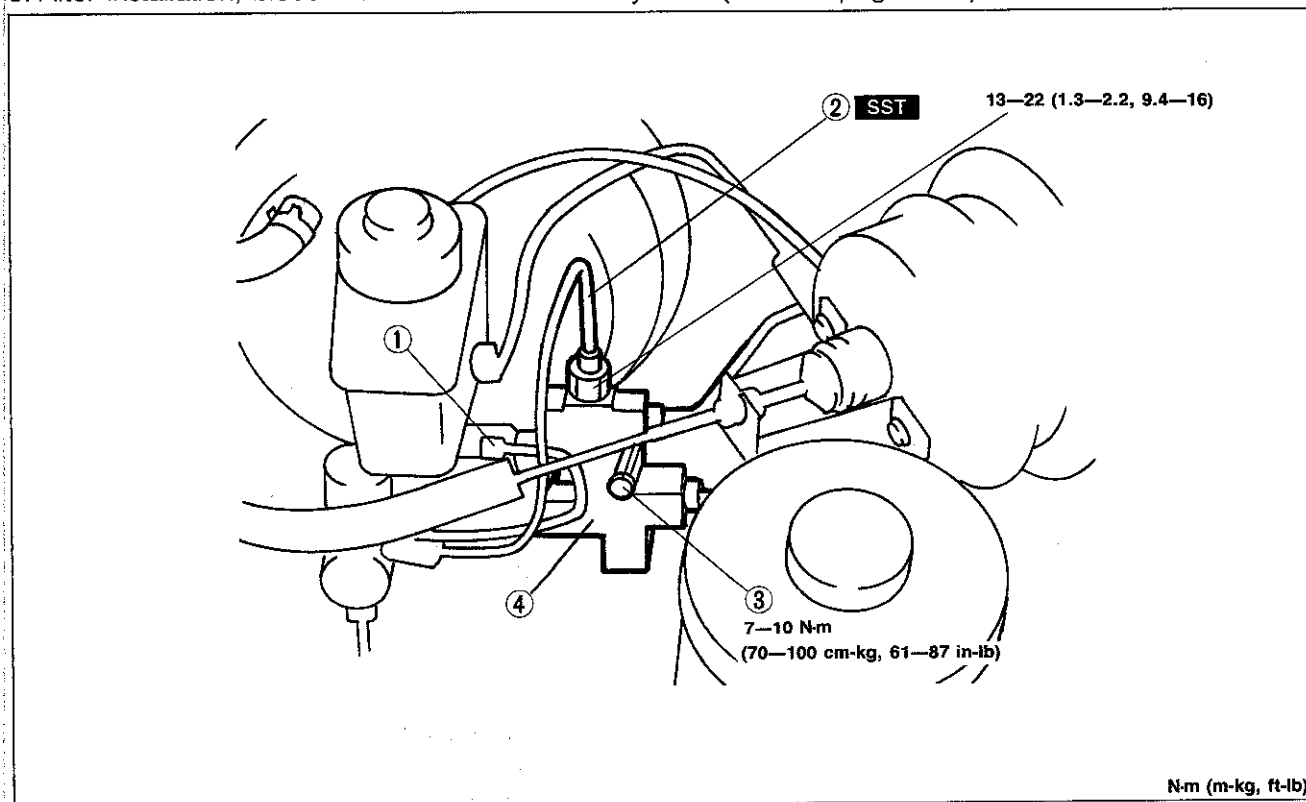
Fluid pressure kPa (kg/cm <sup>2</sup> , psi)			
A	A'	B	B'
3,826 (39,555)	3,826 ± 294 (39 ± 3.0, 555 ± 43)	7,848 (80, 1,138)	6,180 ± 294 (63 ± 3.0, 896 ± 43)

Caution

If there is a malfunction of the valve, replace it as an assembly.

Removal and Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal.
3. After installation, bleed the air from the brake system. (Refer to page P-5.)



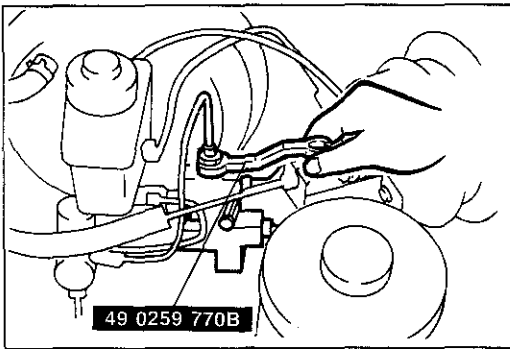
N-m (m-kg, ft-lb)

2BU0PX-016

1. Pressure differential switch coupler
2. Brake pipes

3. Bolt
4. Propotioning bypass valve

Removal Note..... page P-31



1BU0PX-021

**Removal note**

**Brake pipes**

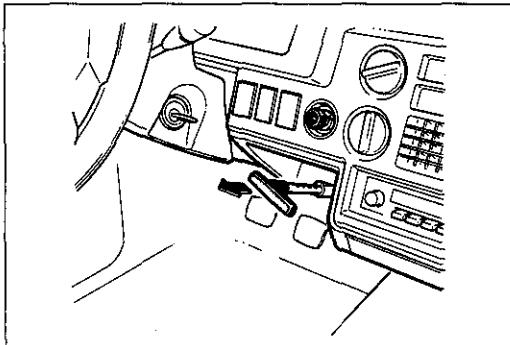
Disconnect or connect the brake pipes from/to the proportioning bypass valve with the **SST**.

**PARKING BRAKE SYSTEM**

**TROUBLESHOOTING GUIDE**

Problem	Possible cause	Action	Page
<b>Brakes do not release</b>	Improper return of parking brake cable or improper adjustment	Repair or adjust	P-31
<b>Parking brake does not hold well</b>	Excessive lever stroke Brake cable stuck or damaged Brake fluid or oil on lining Hardening of lining surface or poor contact	Adjust Repair or replace Clean or replace Grind or replace	P-31 P-33,34 P-23,27 P-23,27

1BU0PX-022



0BU0PX-026

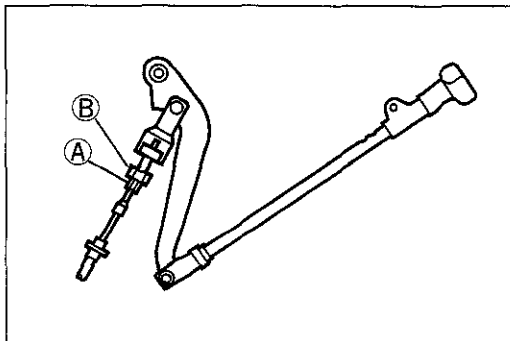
**PARKING BRAKE LEVER**

**On-vehicle Inspection**

**Inspection**

Check that the stroke is within specification when the parking brake lever is pulled with a force of **196 N (20 kg, 44 lb)**.

**Stroke: 7—12 notches**



7BU11X-012

**Adjustment**

1. Before adjustment, depress the brake pedal several times while the vehicle is moving in reverse.
2. Loosen locknut (A) and turn the adjusting nut (B) so that the stroke is within the above range.
3. After adjustment, tighten locknut (A).

**Tightening torque:**

**7—10 N·m (0.7—1.0 m·kg, 5—7 ft·lb)**

4. Make sure that the parking brake warning light illuminates when the brake lever is pulled one notch.

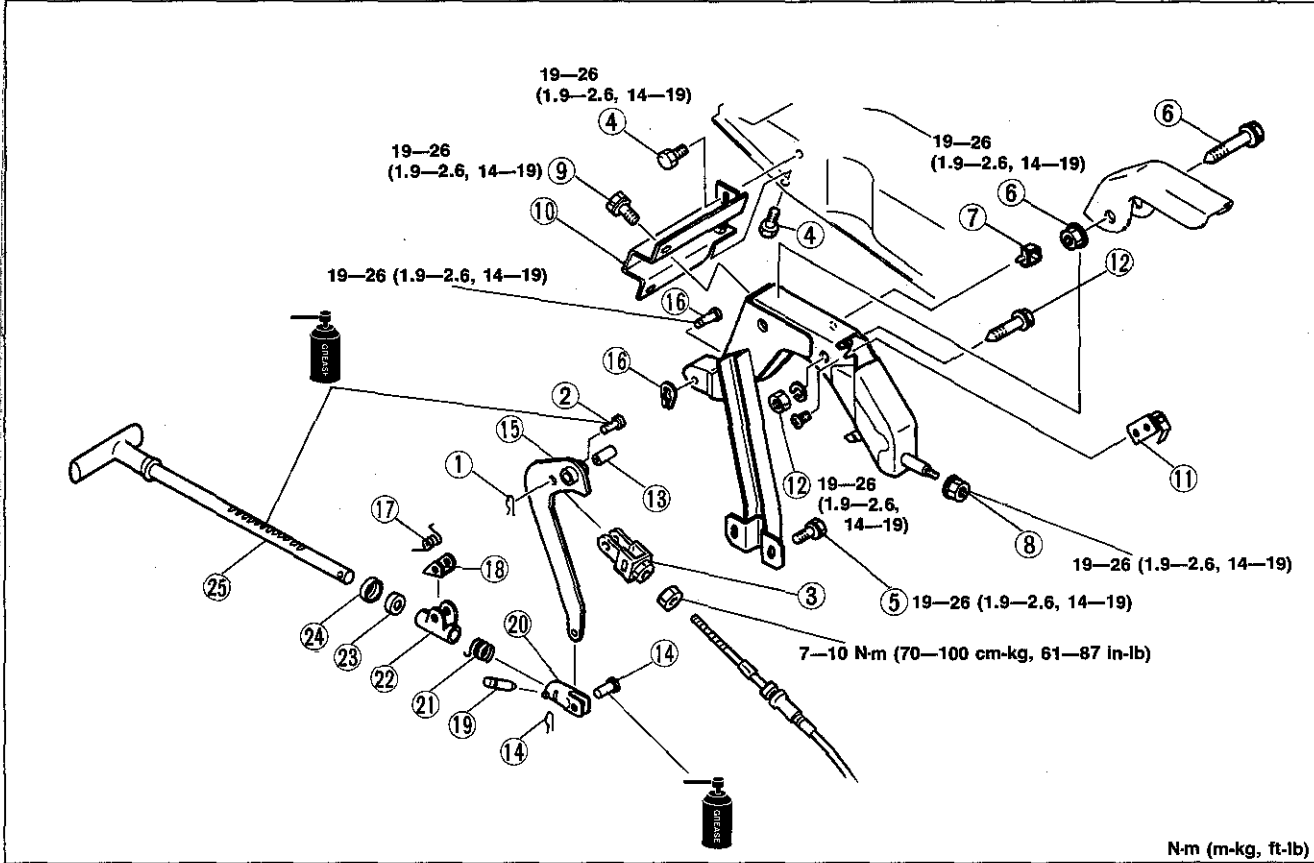
**Caution**

**Be sure that the brakes are not dragging.**

# PARKING BRAKE SYSTEM

## Removal, Installation, and Inspection

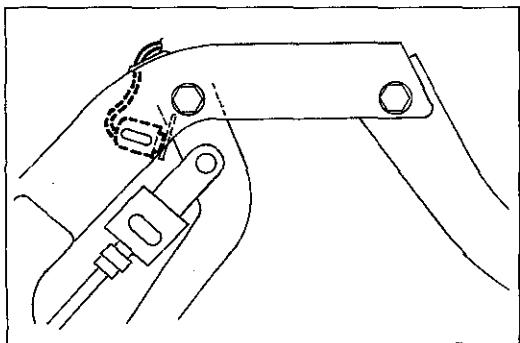
1. Block the wheels firmly.
2. Release the parking brake.
3. Remove in the order shown in the figure.
4. Inspect all components and parts. Replace parts if necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. After installation:  
Adjust the parking lever stroke. (Refer to page P-31.)



N-m (m-kg, ft-lb)

2BU0PX-017

- |                            |                             |  |
|----------------------------|-----------------------------|--|
| 1. Clip                    | 11. Parking-brake switch    | 20. Fork joint                                     |
| 2. Joint pin               | Installation Note.....below | 21. Spring   |
| 3. Parking cable connector | 12. Bolt and nut            | Inspect for weakness or breakage                   |
| 4. Bolt                    | 13. Pin                     | 22. Guide  |
| 5. Bolt                    | 14. Clip and joint pin      | 23. Stopper  |
| 6. Bolt and nut            | 15. Lever                   | 24. Stopper seat                                   |
| 7. Harness band connector  | 16. Pin and clip            | 25. Rod  |
| 8. Nut                     | 17. Spring                  | Inspect sector and ratchet pawl for wear or damage |
| 9. Bolt                    | 18. Ratchet pawl            |  |
| 10. Bracket                | 19. Stopper                 |  |



9MU0PX-110

### Installation note

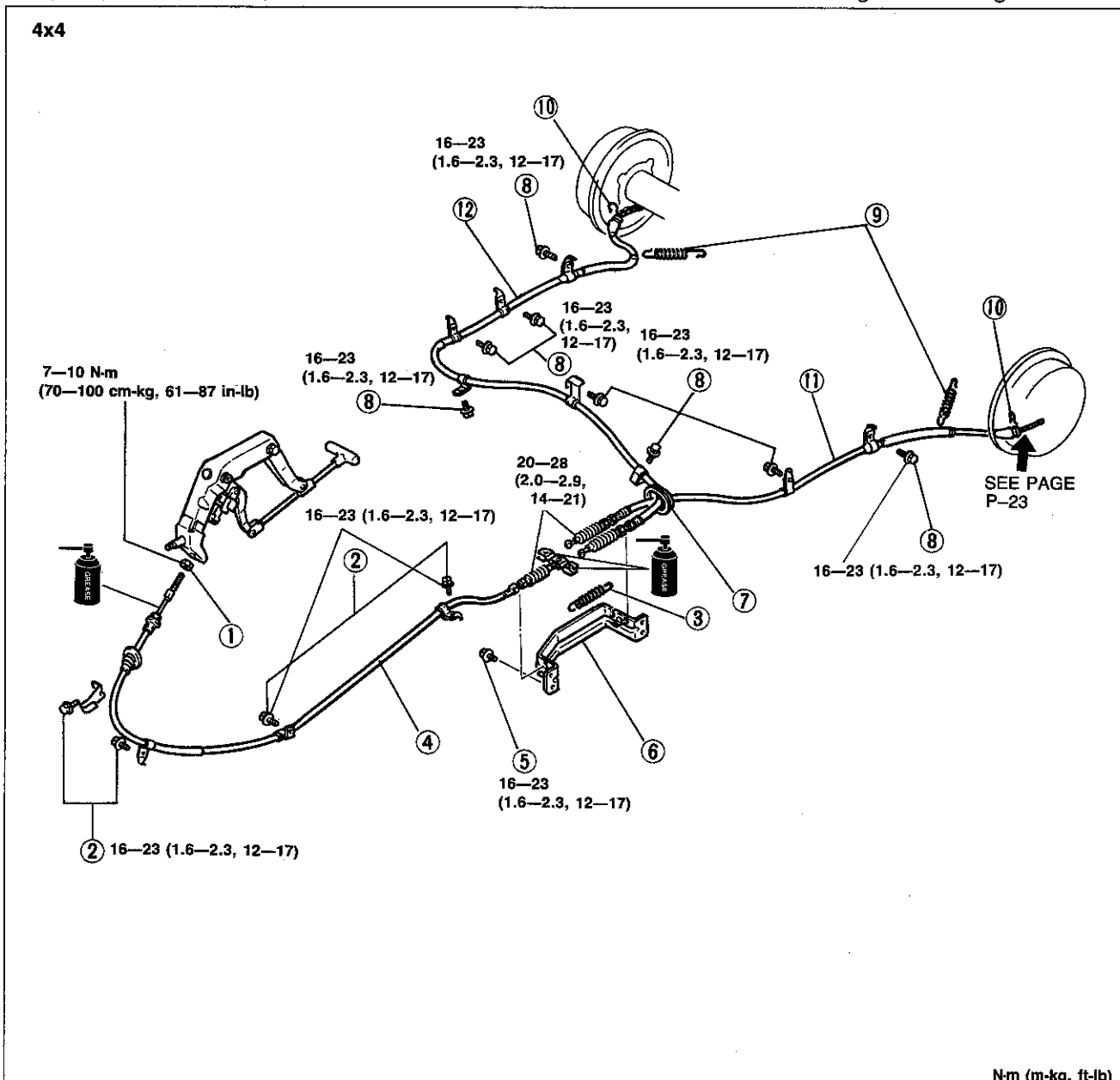
#### Parking brake switch

1. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever pulled one notch.

**PARKING BRAKE CABLE**

**Removal and Installation**

1. Block the wheels firmly.
2. Release the parking brake and remove the parking brake lever adjusting nut. (Refer to page P-31.)
3. Remove rear seat No.1, front floormat, and cover. (Refer to Section S.)
4. Jack up the vehicle and support it with safety stands.
5. Remove the parking brake cable in the order shown in the figure.
6. Install in the reverse order of removal.
7. After installation:
  - (1) Adjust the parking brake lever stroke. (Refer to page P-31.)
  - (2) Depress the brake pedal a few times and check that the rear brakes do not drag while rotating the wheels.



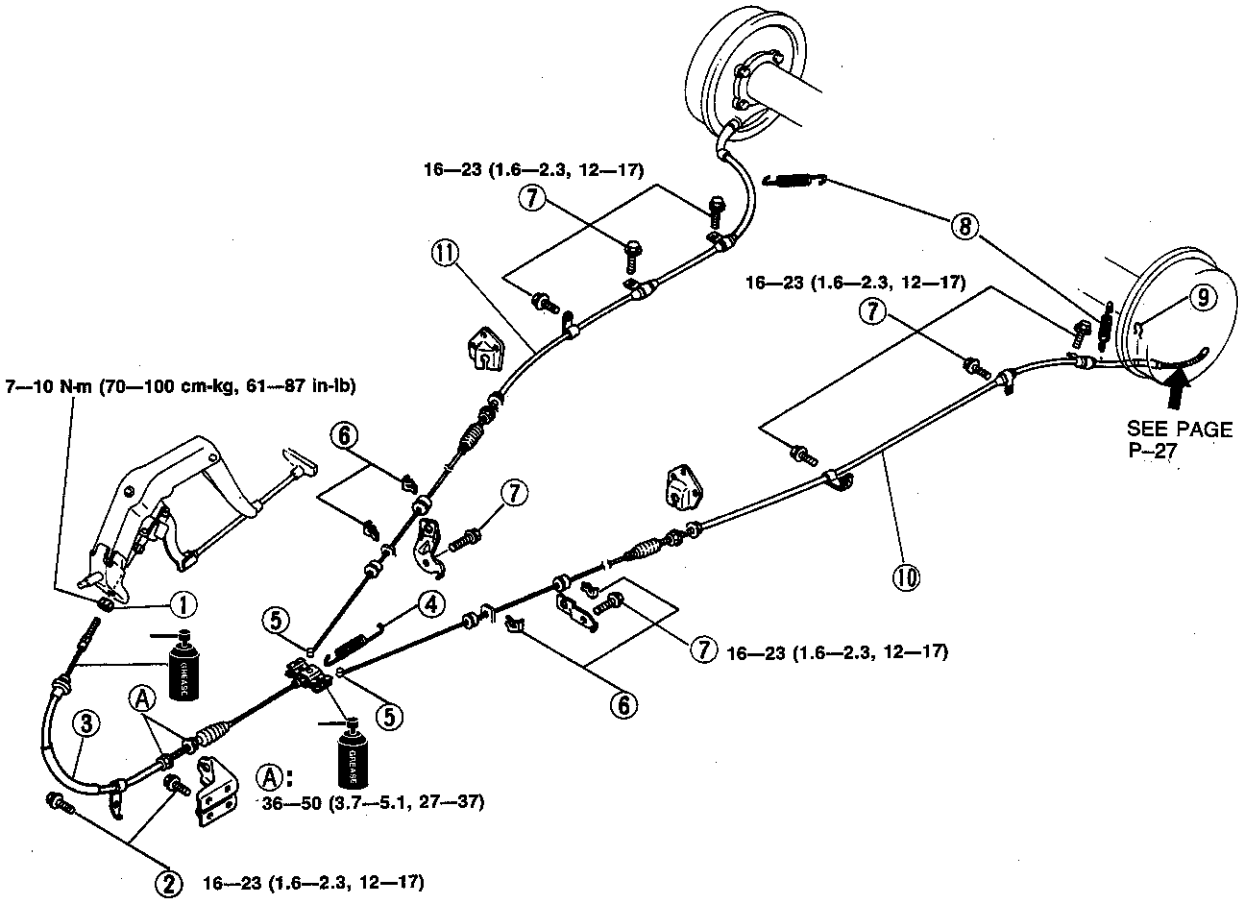
N-m (m-kg, ft-lb)

1BUOPX-024

- |                      |                         |
|----------------------|-------------------------|
| 1. Nut               | 7. Grommet              |
| 2. Bolt              | 8. Bolt                 |
| 3. Spring            | 9. Spring               |
| 4. Front brake cable | 10. Clip                |
| 5. Bolt              | 11. Rear cable, (left)  |
| 6. Bracket           | 12. Rear cable, (right) |

PARKING BRAKE SYSTEM

4x2



N-m (m-kg, ft-lb)

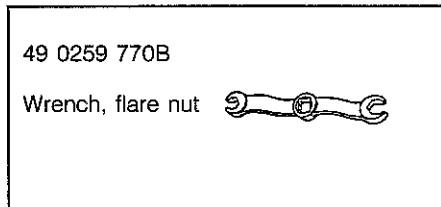
1BU0PX-025

- |                          |                        |
|--------------------------|------------------------|
| 1. Nut                   | 7. Bolts               |
| 2. Bolt                  | 8. Spring              |
| 3. Front brake cable     | 9. Clip                |
| 4. Spring                | 10. Rear cable (left)  |
| 5. Brake cable connector | 11. Rear cable (right) |
| 6. Clip                  |                        |

REAR-WHEEL ANTI-LOCK BRAKE SYSTEM (REAR-WHEEL ABS)

PREPARATION

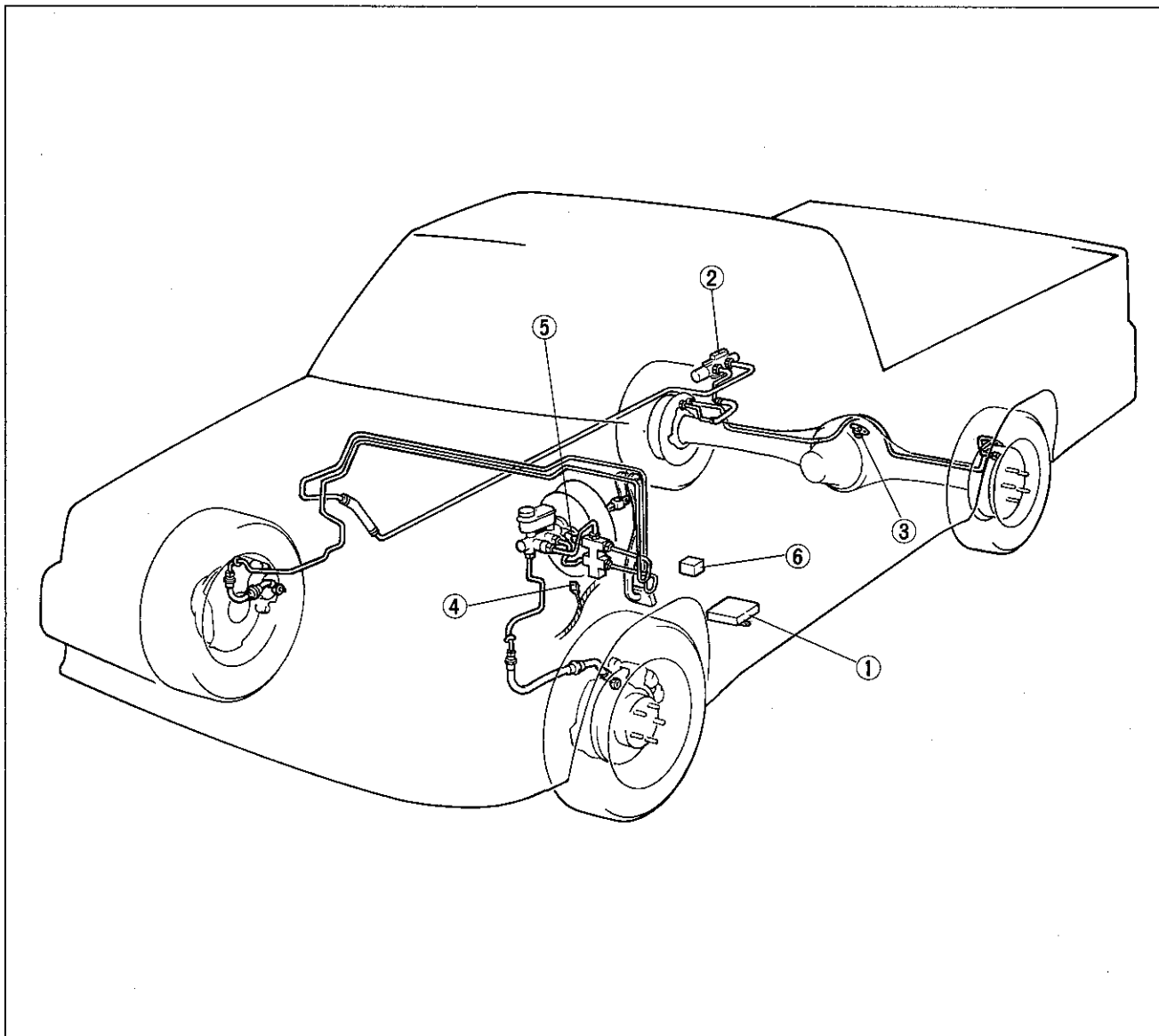
SST



0MU0PX-021

DESCRIPTION

The Rear-wheel Anti-lock Brake System (Rear-wheel ABS) is equipped on all B2200 and B2600i. The ABS control unit senses the drop in rear wheel speed and modulates hydraulic pressure to the rear brakes, inhibiting lockup.



1BU0PX-026

- |                                     |                                 |
|-------------------------------------|---------------------------------|
| 1. Control unit                     | 4. ABS check connector          |
| 2. Hydraulic unit (Solenoid valves) | 5. Pressure differential switch |
| 3. Speed sensor                     | 6. ABS fuse                     |

**TROUBLESHOOTING GUIDE**

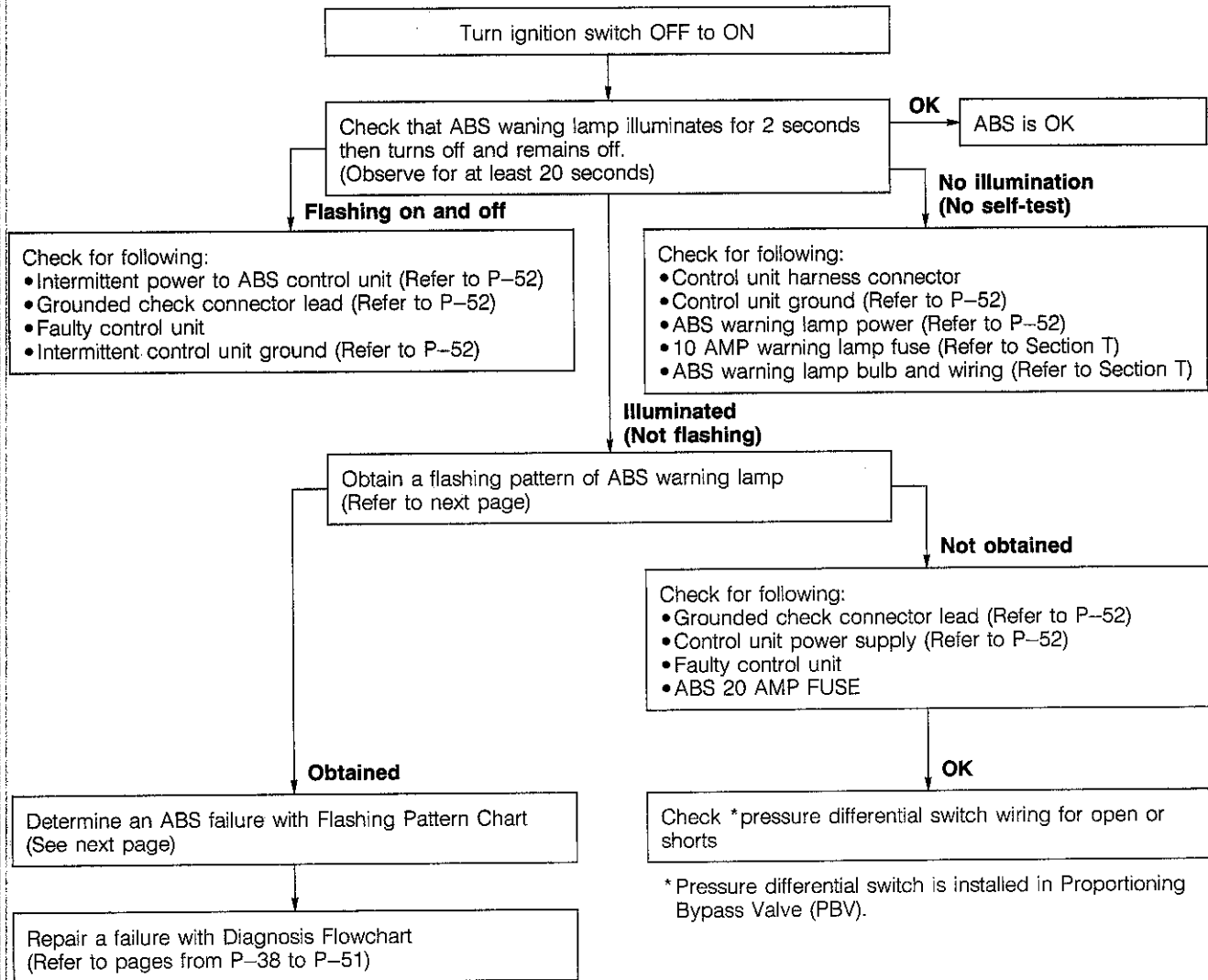
**Outline**

The Rear-wheel ABS is composed of electrical components, mechanical components (hydraulic unit), and the components of the standard brake system.

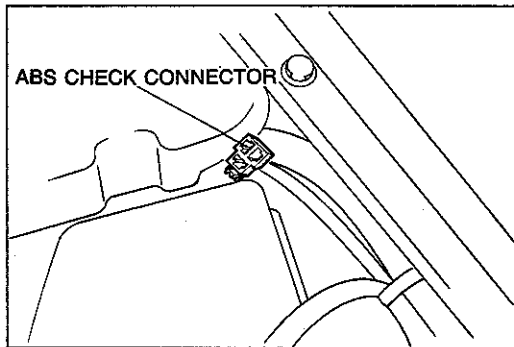
Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the self-diagnosis function within the ABS control unit. And malfunctions are indicated by the warning lamp in the instrument panel. The location of a malfunction is indicated by the technician obtaining a flashing pattern of the ABS warning lamp. The self-diagnosis and indication functions must be used when diagnosing malfunctions of the ABS.

1BU0PX-027

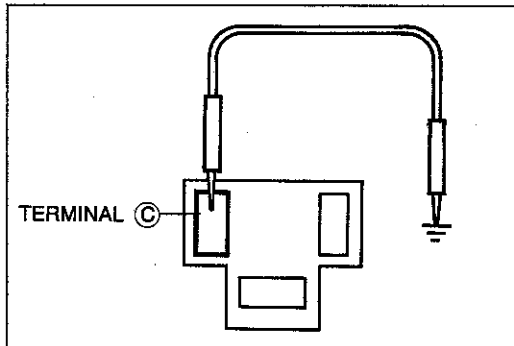
**Troubleshooting Main Flowchart**



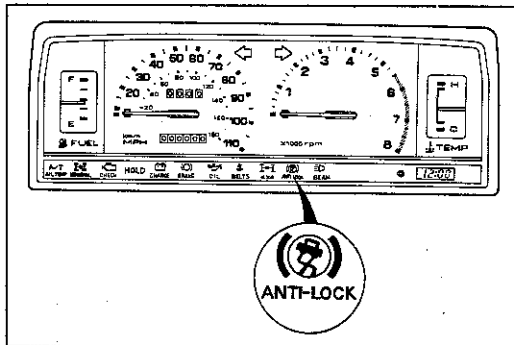
1BU0PX-028



0MU0PX-025



1BU0PX-038



1BU0PX-029

## Obtaining A Flashing Pattern

1. Locate the ABS check connector.

### Note

The check connector (Blue: 3-pins), is located in the left in the engine compartment.

2. Attach a jumper wire to the terminal © (yellow wire) and ground it to the chassis for one second and release it. When the ground is made and broken the ABS warning lamp will begin to flash.

3. Count a flashing number of the ABS warning lamp.

### Note

- a) A flashing pattern consists of a number of short flashes and ends with a long flash. Count the short flashes and include the long flash in the count.
- b) A same flashing pattern repeats until ignition switch is turned off. After the ignition switch is turned off, then when the ignition switch is turned on again, a same flashing pattern appears.
- c) If there is more than one system fault only the first recognized flashing pattern will be obtained.
- d) Verify the flashing pattern by reading it several times.



## REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

### Flashing Pattern Chart

Number of flashing	Failure location	Failure condition	Flowchart number
1	—	(1 flash should not occur)	ABS-1
2	Hydraulic unit	Open in isolation solenoid circuit	ABS-2
3		Open in dump solenoid circuit	ABS-3
4		Solenoid valve switch closed	ABS-4
5	—	System dumps too many times in 4x2 (4x2 and 4x4 vehicles) (condition occurs while making normal or hard stops. Rear brake may lock.)	ABS-5
6	Speed sensor	(Speed sensor signal rapidly cuts in and out) condition only occurs while driving	ABS-6
7	Hydraulic unit	Shorted ground circuit (Isolation solenoid)	ABS-7
8		Shorted ground circuit (Dump solenoid)	ABS-8
9	Speed sensor	High speed sensor resistance	ABS-9
10		Low speed sensor resistance	ABS-10
11	Stoplight switch	Stoplight switch circuit defective. (Condition indicated only when driving above 56 km/h [35 mph])	ABS-11
12	—	(12 flashes should not occur)	ABS-12
13	Control unit	Control unit speed circuit phase lock loop failure detected during self-test	ABS-13
14		Control unit program check sum failure detected during self-test	ABS-14
15		Control unit RAM failure detected during self-test	ABS-15
16	—	(16 or more flashes should not occur)	ABS-16

1BU0PX-030

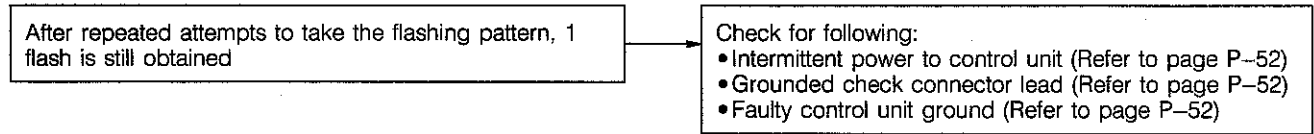
## Diagnosis Flowchart

### Caution

**When checking resistance at the control unit terminals, always disconnect the battery cable. Improper resistance may occur with the vehicle battery connected.**

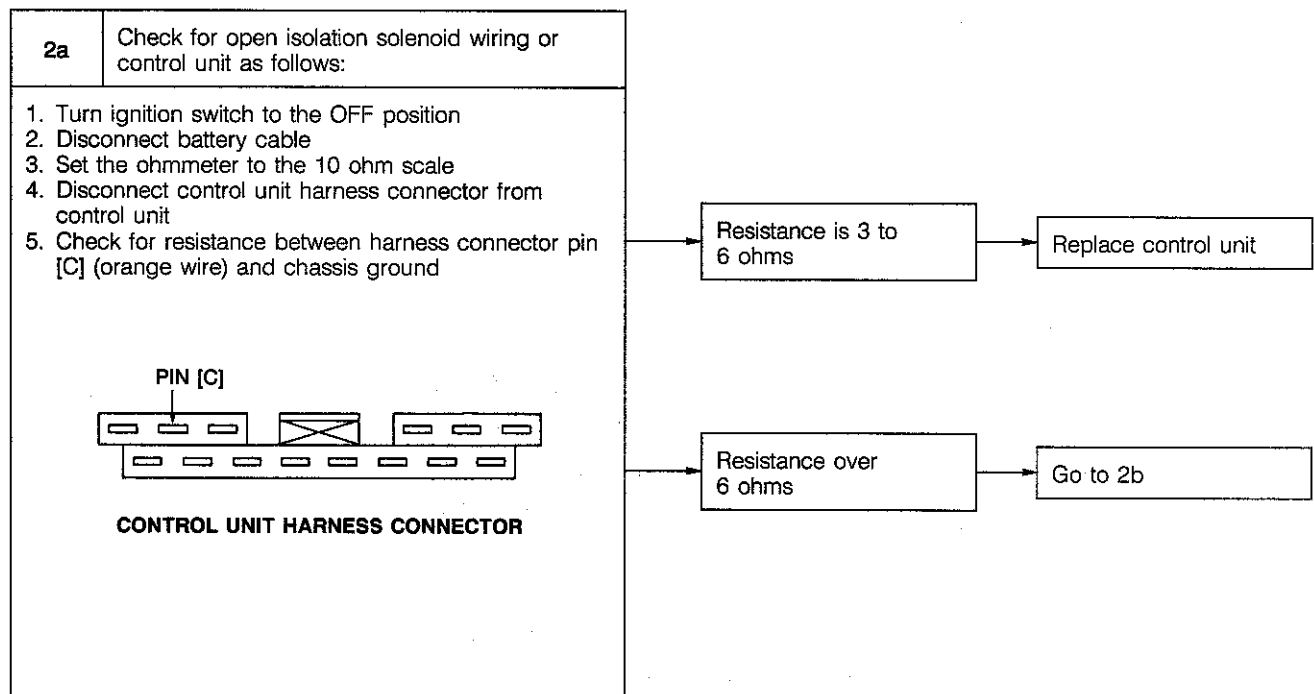
**When using a test lead for testing at the control unit terminals, use a fine needle to prevent damage to the terminal.**

<b>ABS-1</b>	(1 flash should not occur)
--------------	----------------------------



1BU0PX-031

<b>ABS-2</b>	Open isolation solenoid circuit
--------------	---------------------------------



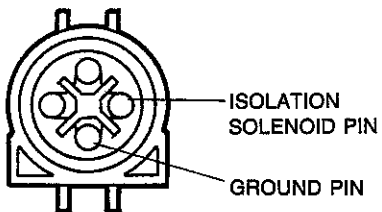
0BU0PX-035

# REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

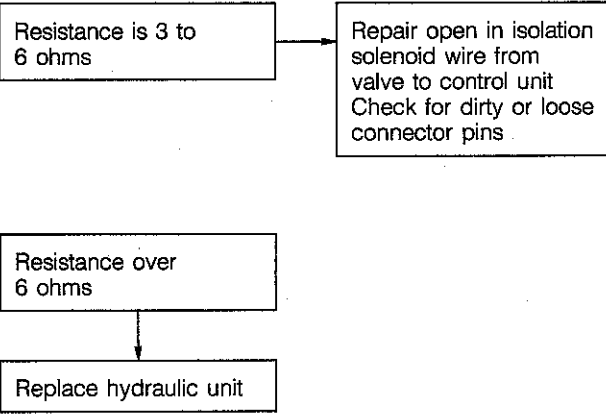
2b

Check for open isolation solenoid or wiring as follows:

1. Disconnect battery cable
2. Set ohmmeter to 10 ohm scale
3. Check resistance between valve connector isolation solenoid pin (orange/white wire) and connector ground pin (black wire)



**SOLENOID VALVE CONNECTOR**



1MU0PX-026

<b>ABS-3</b>	Open dump solenoid circuit
--------------	----------------------------

<b>3a</b>	Check for open dump solenoid wiring or control unit as follows:
<ol style="list-style-type: none"> <li>1. Turn ignition switch to the off position</li> <li>2. Disconnect battery cable</li> <li>3. Disconnect control unit harness connector from control unit</li> <li>4. Place the ohmmeter on the 10 ohm scale</li> <li>5. Check resistance between pin [B] (orange/blue wire) or pin [A] (orange/blue wire) and chassis ground</li> </ol>	
<p style="margin: 0;"><b>CONTROL UNIT HARNESS CONNECTOR</b></p>	

Resistance is 1 to 3 ohms

Replace control unit

Resistance greater than 3 ohms

Go to Test 3b

OBU0PX-037

<b>3b</b>	Check for open dump solenoid or wiring as follows:
<ol style="list-style-type: none"> <li>1. Turn the ignition switch to the off position</li> <li>2. Disconnect battery cable</li> <li>3. Disconnect solenoid valve harness connector from valve connector</li> <li>4. Check resistance between valve connector dump solenoid pin (orange/blue wire) and ground pin (black wire)</li> </ol>	
<p style="margin: 0;"><b>SOLENOID VALVE CONNECTOR</b></p>	

Resistance is 1 to 3 ohms

Repair open dump solenoid wire, from valve to control unit  
Check for loose or dirty connector pins

Resistance greater than 3 ohms

Replace hydraulic unit

OBU0PX-038

# REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

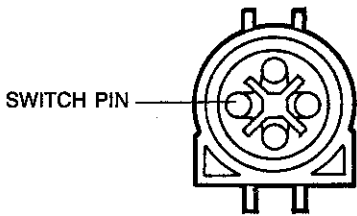
**ABS-4**

Solenoid valve switch closed

4a

Check for closed solenoid valve switch as follows:

1. Disconnect solenoid valve harness connector from valve connector
2. Place ohmmeter on the 20k ohm scale
3. Check resistance between valve connector switch pin (orange wire) and valve body



**SOLENOID VALVE CONNECTOR**

Resistance greater than 10k ohms

Go to Test 4b

Resistance less than 10k ohms

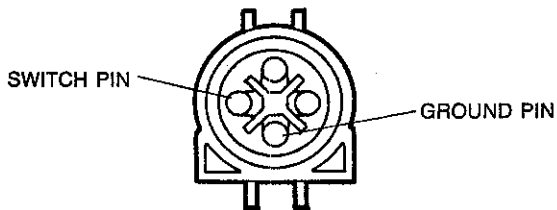
Replace hydraulic unit

1MU0PX-027

4b

Check for short between solenoid valve switch and valve ground lead as follows:

1. Set the ohmmeter on the 20k ohm scale
2. Check resistance between valve connector switch pin (orange wire) and valve solenoid ground pin (black wire)



**SOLENOID VALVE CONNECTOR**

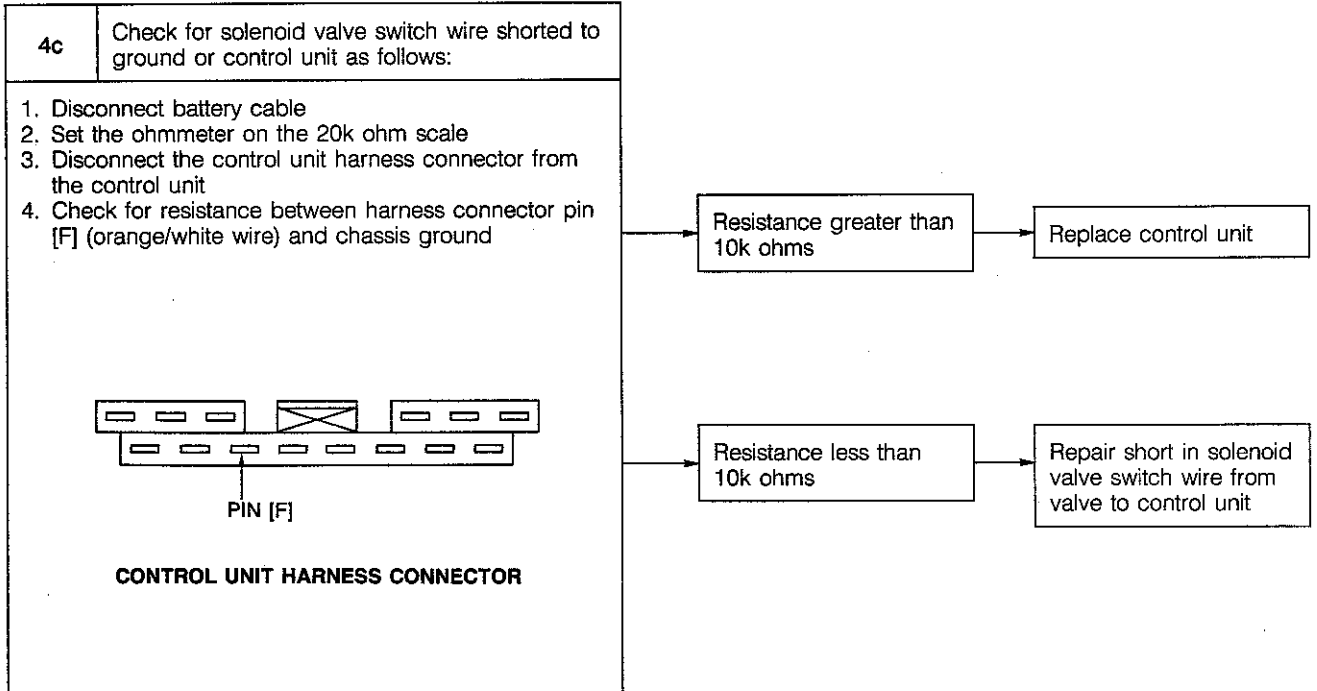
Resistance greater than 10k ohms

Go to Test 4c

Resistance less than 10k ohms

Replace hydraulic unit

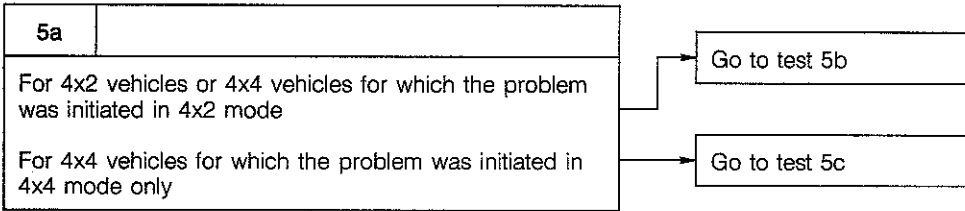
1MU0PX-028



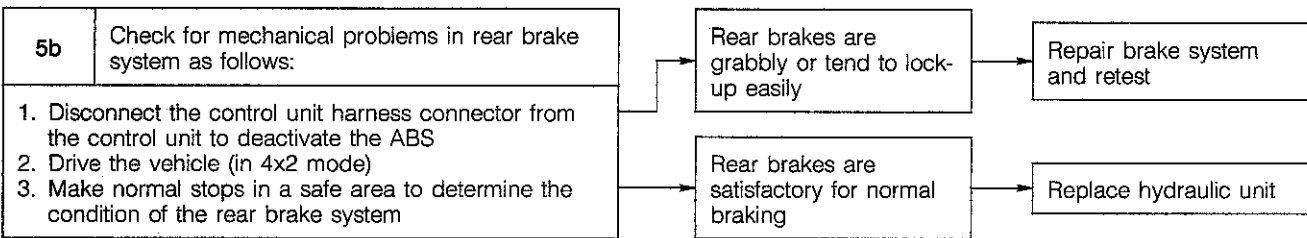
0BU0PX-040

**REAR-WHEEL ANTI-LOCK BRAKE SYSTEM**

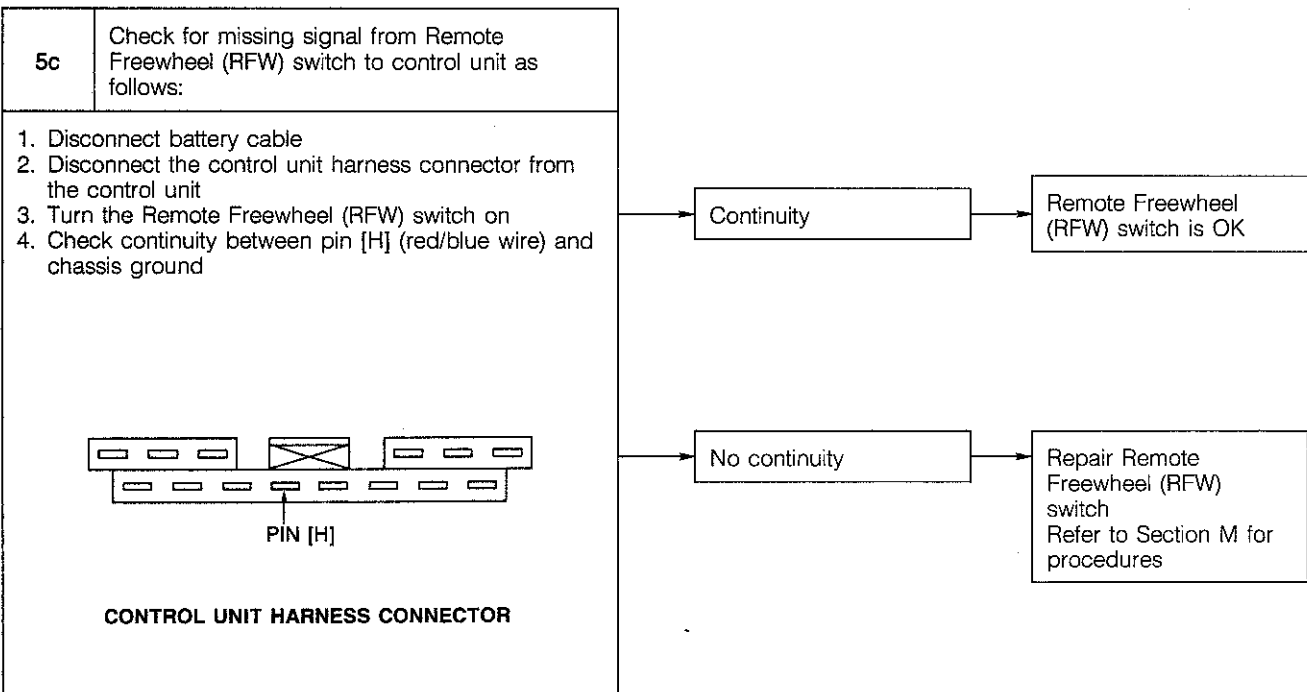
<b>ABS-5</b>	System dumps too many times in 4x2 (4x2 and 4x4 vehicles) (condition occurs while making normal or hard stops. Rear brake may lock)
--------------	---



1BU0PX-039



1BU0PX-040



1BU0PX-032

**ABS-6** (Speed sensor Signal rapidly cuts in and out) condition only occurs while driving

<b>6a</b>	Check for erratic speed sensor signal and loose wire connections as follows:				
<ol style="list-style-type: none"> <li>1. Turn ignition off</li> <li>2. Disconnect battery cable</li> <li>3. Set ohmmeter on the 2,000 ohm scale</li> <li>4. Check resistance between pin [O] (blue wire) and pin [L] (green wire) of the harness connector while shaking the harness from sensor to control unit</li> </ol>					
<p style="text-align: center;"><b>CONTROL UNIT HARNESS CONNECTOR</b></p>					
<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 50%;">Constant reading of 1,000 to 2,000 ohms</td> <td style="border: 1px solid black; padding: 5px; width: 50%;">Go to Test 6b</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Reading is erratic</td> <td style="border: 1px solid black; padding: 5px;">Repair loose connection in speed sensor leads. Check for dirty or loose pins, frayed or shorted connectors</td> </tr> </table>		Constant reading of 1,000 to 2,000 ohms	Go to Test 6b	Reading is erratic	Repair loose connection in speed sensor leads. Check for dirty or loose pins, frayed or shorted connectors
Constant reading of 1,000 to 2,000 ohms	Go to Test 6b				
Reading is erratic	Repair loose connection in speed sensor leads. Check for dirty or loose pins, frayed or shorted connectors				

1BU0PX-041

<b>6b</b>	Check for metal chips on speed sensor magnet pole piece as follows:				
Remove the sensor from the differential and inspect for a build-up of metal chips on sensor magnetic pole					
<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 50%;">No metal chips are present</td> <td style="border: 1px solid black; padding: 5px; width: 50%;">Go to Test 6c</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Metal chips are present</td> <td style="border: 1px solid black; padding: 5px;">Drain and clean differential. Check the sensor rotor for broken or chipped teeth</td> </tr> </table>		No metal chips are present	Go to Test 6c	Metal chips are present	Drain and clean differential. Check the sensor rotor for broken or chipped teeth
No metal chips are present	Go to Test 6c				
Metal chips are present	Drain and clean differential. Check the sensor rotor for broken or chipped teeth				

0MU0PX-042

<b>6c</b>	Check for erratic or low speed sensor output on control unit				
<ol style="list-style-type: none"> <li>1. Locate the ABS check connector (blue: 3-pins)</li> </ol> <p><b>Note</b> The ABS check connector is located in the left in the engine compartment (Refer to page P-37)</p> <ol style="list-style-type: none"> <li>2. Position vehicle on a hoist and raise the rear wheels to clear the floor</li> <li>3. Start the engine and turn the wheels at 8 km/h (5 mph)</li> <li>4. Place voltmeter on the 2000 mV AC scale</li> <li>5. Measure voltage at the two pins (blue and green wires) of the check connector</li> </ol>					
<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 50%;">Voltage greater than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) and steady</td> <td style="border: 1px solid black; padding: 5px; width: 50%;">Replace control unit</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Voltage less than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) or erratic</td> <td style="border: 1px solid black; padding: 5px;">Go to Test 6d</td> </tr> </table>		Voltage greater than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) and steady	Replace control unit	Voltage less than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) or erratic	Go to Test 6d
Voltage greater than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) and steady	Replace control unit				
Voltage less than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) or erratic	Go to Test 6d				

1BU0PX-033

<b>6d</b>	Check for sensor rotor damage as follows:				
<ol style="list-style-type: none"> <li>1. Remove sensor from carrier</li> <li>2. Rotate sensor rotor and check for damage to teeth</li> </ol>					
<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 50%;">Teeth are intact and no visible lateral runout is observed</td> <td style="border: 1px solid black; padding: 5px; width: 50%;">Replace speed sensor and recheck output</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Teeth are damaged or lateral runout of sensor rotor is visible</td> <td style="border: 1px solid black; padding: 5px;">Replace the sensor rotor (Refer to page P-55)</td> </tr> </table>		Teeth are intact and no visible lateral runout is observed	Replace speed sensor and recheck output	Teeth are damaged or lateral runout of sensor rotor is visible	Replace the sensor rotor (Refer to page P-55)
Teeth are intact and no visible lateral runout is observed	Replace speed sensor and recheck output				
Teeth are damaged or lateral runout of sensor rotor is visible	Replace the sensor rotor (Refer to page P-55)				

1BU0PX-034



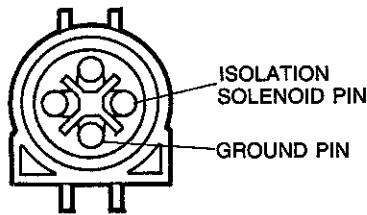
ABS-7

Shorted ground circuit (Isolation solenoid)

7a

Check for isolation solenoid or wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect the solenoid valve harness connector from the solenoid valve connector
3. Set the ohmmeter on the 10 ohm scale
4. Measure the resistance between the isolation solenoid pin (orange/white wire) and the solenoid ground pin (black wire) in the solenoid valve connector



SOLENOID VALVE CONNECTOR

Resistance is 3 to 6 ohms

Go to Test 7b

Resistance is less than 3 ohms

Replace hydraulic unit

2BU0PX-018

7b

Check for control unit and wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect the solenoid valve harness connector from the solenoid valve
4. Disconnect the control unit harness connector from the control unit
5. Place the ohmmeter on the 20k ohm scale
6. Measure the resistance between control unit harness connector pin [C] (orange wire) and chassis ground



CONTROL UNIT HARNESS CONNECTOR

Resistance greater than 20k ohms

Replace control unit

Resistance less than 20k ohms

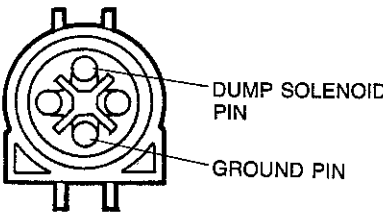
Repair short between solenoid valve and control unit. Reconnect control unit and solenoid valve

0BU0PX-048

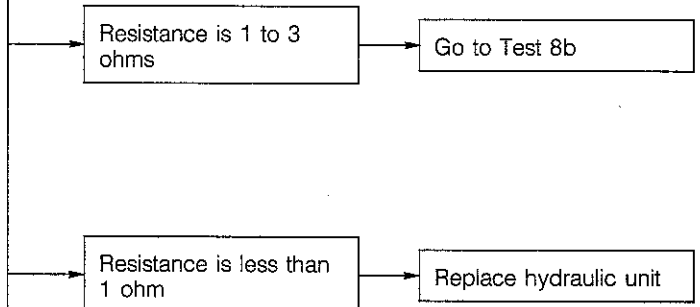
**ABS-8** Shorted ground circuit (Dump solenoid)

**8a** Check for dump solenoid or wiring shorted to ground as follows:

1. Turn ignition switch off
2. Disconnect solenoid valve harness connector from valve connector
3. Set the ohmmeter on the 10 ohm scale
4. Measure the resistance between the dump solenoid pin (orange/blue wire) and the solenoid valve ground pin (black wire) in the solenoid valve connector



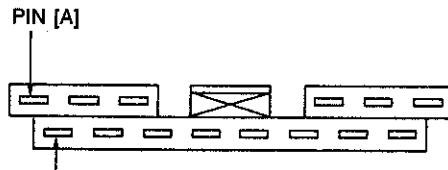
**SOLENOID VALVE CONNECTOR**



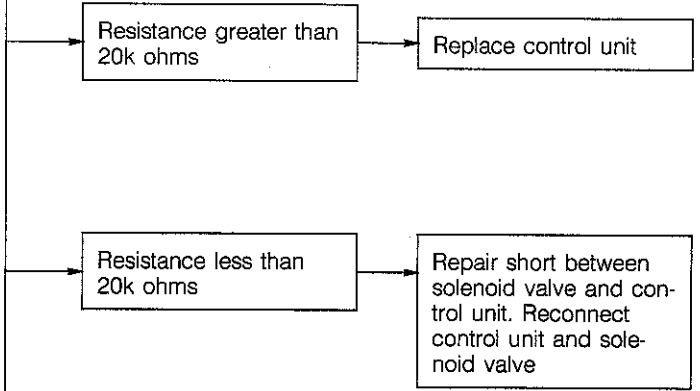
2BU0PX-019

**8b** Check for control unit and wiring shorted to ground as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect solenoid valve harness connector from solenoid valve connector
4. Disconnect the control unit harness connector from the control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance between control unit harness connector pin [B] (orange/blue wire) or pin [A] (orange/blue wire) and chassis ground



**CONTROL UNIT HARNESS CONNECTOR**



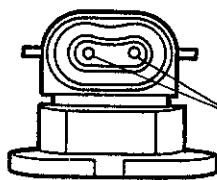
0BU0PX-050

# REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

<b>ABS-9</b>	High speed sensor resistance
--------------	------------------------------

**9a** Check for open speed sensor or sensor wiring as follows:

1. Turn key off
2. Disconnect speed sensor harness connector from the speed sensor on the differential
3. Set the ohmmeter on the 20k ohm scale
4. Measure the resistance at the two sensor pins



SENSOR PINS

SPEED SENSOR CONNECTOR

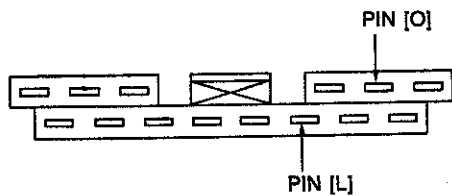
Resistance is 1,000 to 2,500 ohms → Go to Test 9b

Resistance greater than 2,500 ohms → Replace speed sensor

OBU0PX-051

**9b** Check for open speed sensor harness wiring as follows:

1. Turn key off
2. Disconnect battery cable
3. Reconnect speed sensor harness connector to speed sensor
4. Disconnect control unit harness connector from control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance between harness connector pins [L] (green wire) and [O] (blue wire)



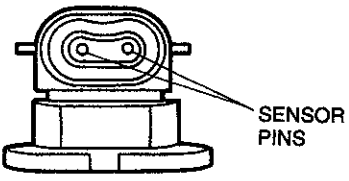
CONTROL UNIT HARNESS CONNECTOR

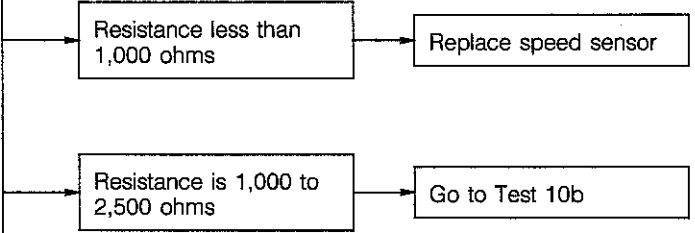
Resistance is 1,000 to 2,500 ohms → Replace control unit

Resistance greater than 2,500 ohms → Repair open in speed sensor wires between the speed sensor and control unit. Check for loose or dirty pin connectors

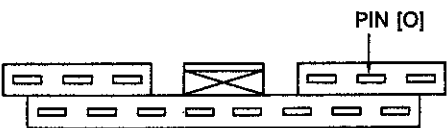
1BU0PX-042

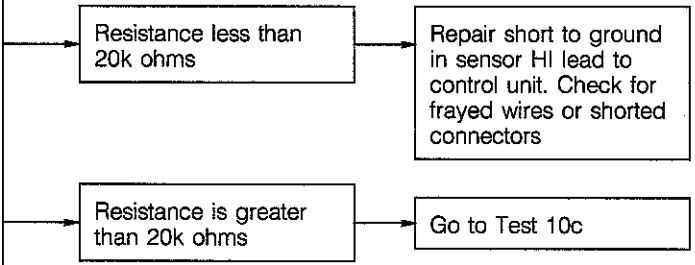
<b>ABS-10</b>	Low speed sensor resistance
---------------	-----------------------------

<b>10a</b>	Check for shorted speed sensor as follows:
<ol style="list-style-type: none"> <li>1. Turn ignition off</li> <li>2. Disconnect the speed sensor harness from the speed sensor</li> <li>3. Place the ohmmeter on the 20k ohms scale</li> <li>4. Measure the resistance at the two sensor pins</li> </ol>	
 <p><b>SPEED SENSOR CONNECTOR</b></p>	

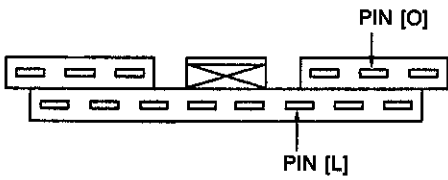


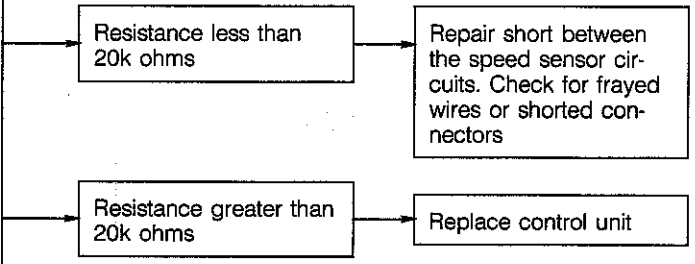
OBU0PX-053

<b>10b</b>	Check for grounded speed sensor wiring as follows:
<ol style="list-style-type: none"> <li>1. Turn ignition off</li> <li>2. Disconnect battery cable</li> <li>3. Disconnect the speed sensor harness connector from the speed sensor</li> <li>4. Disconnect the control unit harness connector from the control unit</li> <li>5. Set the ohmmeter on the 20k ohm scale</li> <li>6. Measure the resistance from pin [O] (blue wire) of the harness connector to chassis ground</li> </ol>	
 <p><b>CONTROL UNIT HARNESS CONNECTOR</b></p>	



1BU0PX-043

<b>10c</b>	Check for shorted speed sensor wiring as follows:
<ol style="list-style-type: none"> <li>1. Turn ignition off</li> <li>2. Disconnect speed sensor harness connector from the speed sensor</li> <li>3. Disconnect the control unit harness connector from the control unit</li> <li>4. Place the ohmmeter on the 20k ohms scale</li> <li>5. Measure the resistance from pin [L] (green wire) to pin [O] (blue wire) of the harness connector</li> </ol>	
 <p><b>CONTROL UNIT HARNESS CONNECTOR</b></p>	



# REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

**ABS-11** Stoplight switch always closed or stoplight switch circuit defective. (Condition indicated only when driving above 56 km/h [35 mph])

**11a** Check for vehicle stoplights as follows:  
Apply the service brakes and observe the rear brake lights

Lights illuminate

Go to Test 11b

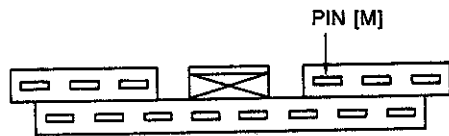
Lights do not illuminate

Repair or replace vehicle stoplight switch  
Check for blown stoplight switch fuse  
Investigate reason for blown fuse  
Check for open stoplight switch wiring or blown stoplights. Repair as needed

OMU0PX-054

**11b** Check for open between the stoplight switch and the control unit as follows:

1. Turn the ignition off
2. Set the voltmeter on the 20 VDC scale
3. Remove the control unit harness connector
4. Measure the voltage between pin [M] (white/green wire) and chassis ground while stepping on the brake pedal



**CONTROL UNIT HARNESS CONNECTOR**

Voltage is less than 9V

Repair the open between stoplight switch and control unit circuit

Voltage is 9V or more

Check 4 way flasher and directional wiring  
This condition could create feedback through the stoplight circuit

OMU0PX-055

# REAR-WHEEL ANTI-LOCK BRAKE SYSTEM

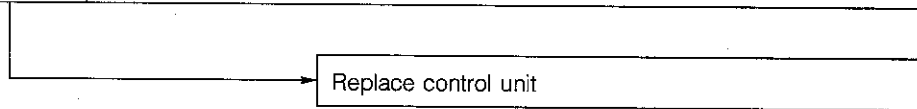
P

<b>ABS-12</b>	(12 flashes should not occur)
---------------	-------------------------------



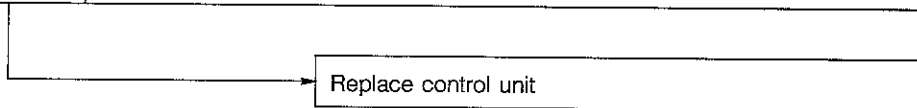
0MU0PX-056

<b>ABS-13</b>	Control unit speed circuit phase lock loop failure detected during control unit self-test
---------------	---



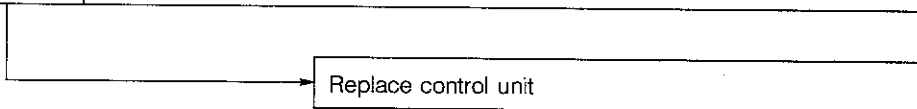
0MU0PX-057

<b>ABS-14</b>	Control unit program check sum failure detected during self-test
---------------	--



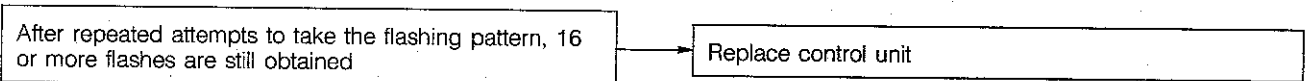
0MU0PX-058

<b>ABS-15</b>	Control unit RAM failure detected during self-test
---------------	--



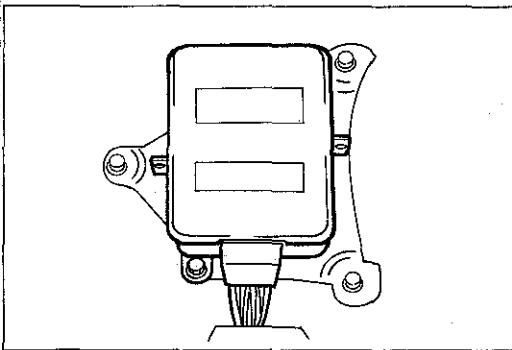
0MU0PX-059

<b>ABS-16</b>	(16 or more flashes should not occur)
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0MU0PX-060

## REAR-WHEEL ANTI-LOCK BRAKE SYSTEM



1BU0PX-035

### CONTROL UNIT

#### Inspection

#### Inspection of control unit circuit

1. Remove the driver's seat.
2. Disconnect the harness connector from the control unit.
3. Check the control unit harness connector terminals for voltage or resistance referring to the table below.

V<sub>B</sub>: Battery voltage

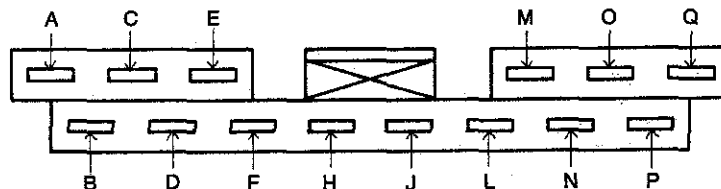
Tester connection ( ) indicates wire color	Measured item	Remark	Resistance (Battery cable off)	Voltage (IG switch ON)
L (G) - 0 (L)	Speed sensor	—	Approx. 1.4 kΩ	—
P (L/W) - Ground	Battery	—	∞	V <sub>B</sub>
N (R) - Ground	Pressure differential switch (PBV)	Parking sw. ON	1Ω	V <sub>B</sub>
		Parking sw. OFF	540Ω	
L (G) - Ground	Speed sensor	—	∞	—
H (R/L) - Ground	R/W control unit (4x4 only)	4x2 mode	∞	—
		4x4 mode	0Ω	
F (O/W) - Ground	Pressure switch (Hydraulic unit)	—	∞	—
D (LG) - Ground	Warning lamp	—	Approx. 23Ω	V <sub>B</sub>
B (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
Q (L/W) - Ground	Battery	—	∞	V <sub>B</sub>
O (L) - Ground	Speed sensor	—	∞	—
M (W/G) - Ground	Stoplight switch	Switch ON	Approx. 1.0Ω	V <sub>B</sub>
		Switch OFF		0V
E (Y) - Ground	Check connector	—	∞	0V
C (O) - Ground	Isolation solenoid	—	3-6Ω	0V
A (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
J (B) - Ground	Ground	—	Continuity	—

2BU0PX-020

#### Caution

- a) When checking resistance at the control unit terminals, always disconnect the battery cable. Improper resistance may occur with the vehicle battery connected.
- b) When using a test lead for testing, use a fine needle to prevent damage to the terminal.

#### CONTROL UNIT HARNESS CONNECTOR



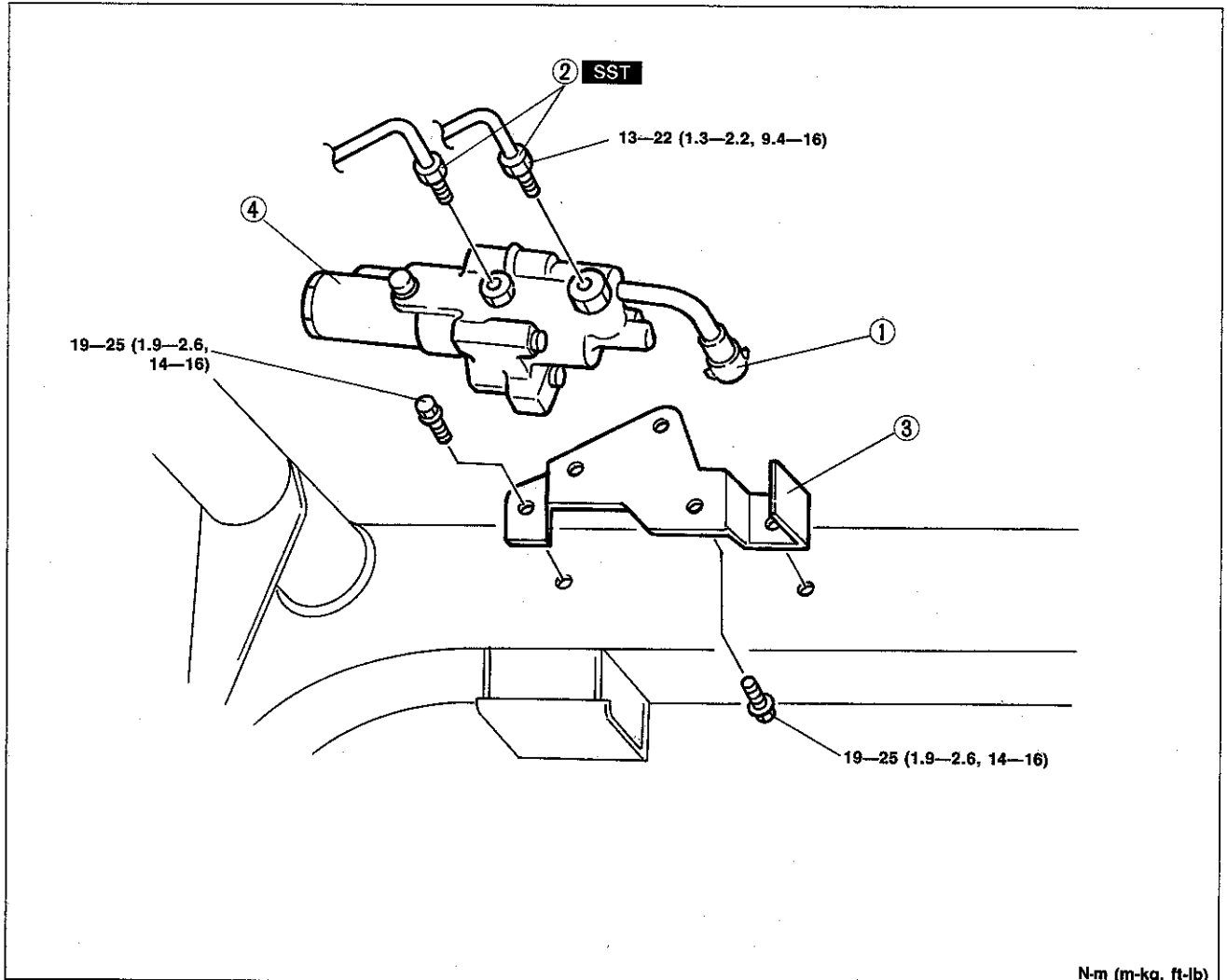
**HYDRAULIC UNIT**

**Removal and Installation**

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal.
4. After installation, bleed air from the system. (Refer to page P-5.)

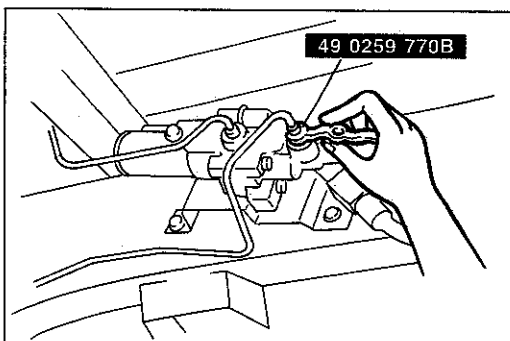
**Note**

It is not necessary to energize the solenoid valves electrically to bleed the rear brakes.



N-m (m-kg, ft-lb)  
2BU0PX-021

- |                          |                           |
|--------------------------|---------------------------|
| 1. Harness coupler       | 3. Hydraulic unit bracket |
| 2. Brake pipe            | 4. Hydraulic unit         |
| Removal Note ..... below |                           |

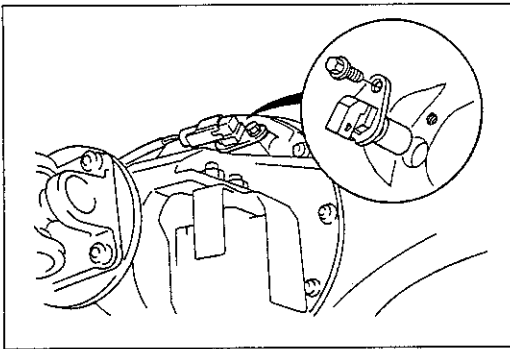


OMU0PX-064

**Removal Note**  
**Brake pipe**

1. Remove the brake pipes with the **SST**.

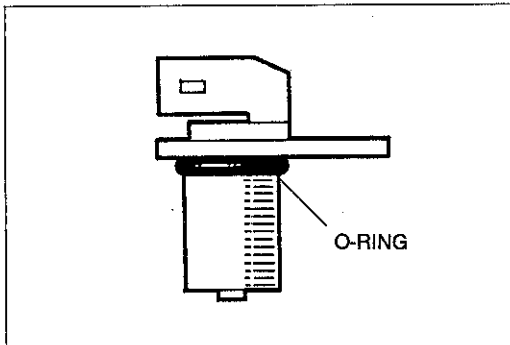




OMU0PX-065

**SPEED SENSOR****Removal**

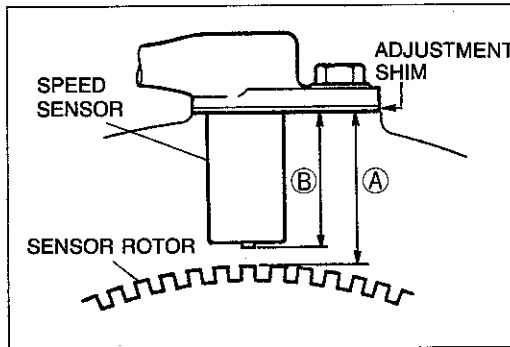
1. Remove the harness connector.
2. Remove the sensor fixing bolt and remove the speed sensor from the axle casing.



OMU0PX-066

**Inspection****Sensor O-ring**

1. Check the sensor O-ring for damage and replace if necessary.



0BU0PX-057

**Clearance between sensor and sensor rotor**

1. Measure the clearance between the sensor metal tip and the sensor rotor teeth as follows:
  - (1) Measure the (A) between the sensor rotor teeth and the sensor attaching surface.
  - (2) Measure the (B) between the sensor attaching surface and the sensor metal tip.
  - (3) Obtain (A) - (B).

**Specified clearance**

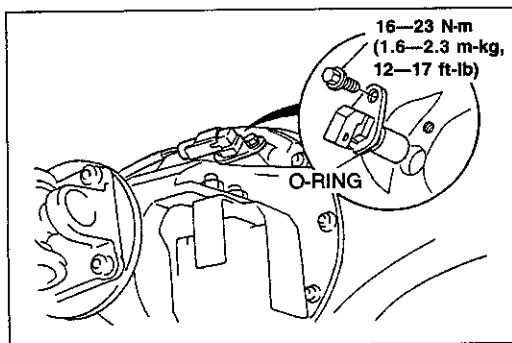
**B2600i: 0.5—1.2mm (0.020—0.047 in)**

**B2200 : 0.5—1.0mm (0.020—0.039 in)**

**Note**

If the clearance is less than specification, adjust it using the adjustment shim (P049 27 155) during sensor installation. If the clearance is more than specification, replace the speed sensor with new one.

1BU0PX-037



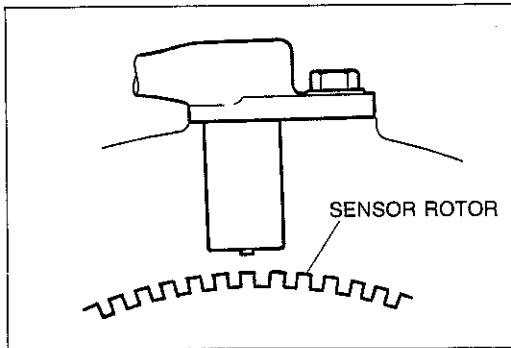
OMU0PX-069

**Installation**

1. Clean the axle mounting surface.
2. Lubricate the sensor O-ring with motor oil.
3. Install the speed sensor.

**Tightening torque:**

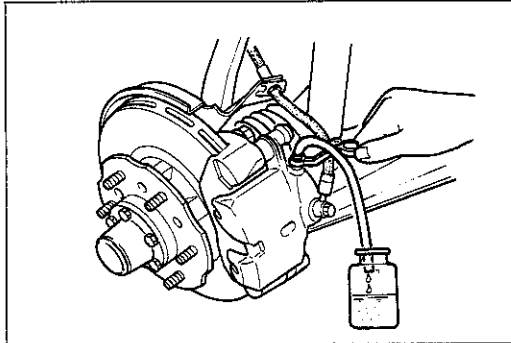
**16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)**



OMU0PX-070

## SENSOR ROTOR Removal and Installation

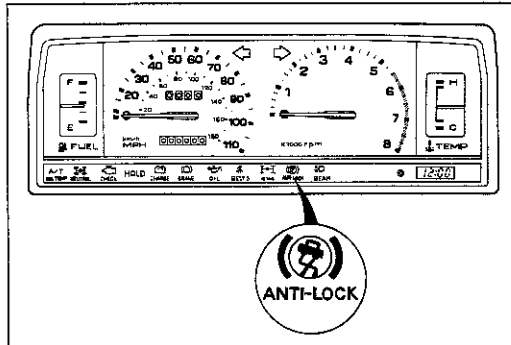
The sensor rotor is not serviceable. If there is a problem (rotor teeth damage etc.) in the sensor rotor, replace the gear case. (Refer to Section M for service.)



OMU0PX-073

## PRESSURE DIFFERENTIAL SWITCH On-vehicle Inspection

1. Connect one end of a vinyl tube to the front brake bleeder screw and place the other end in a receptacle.
2. Loosen the bleeder screw.



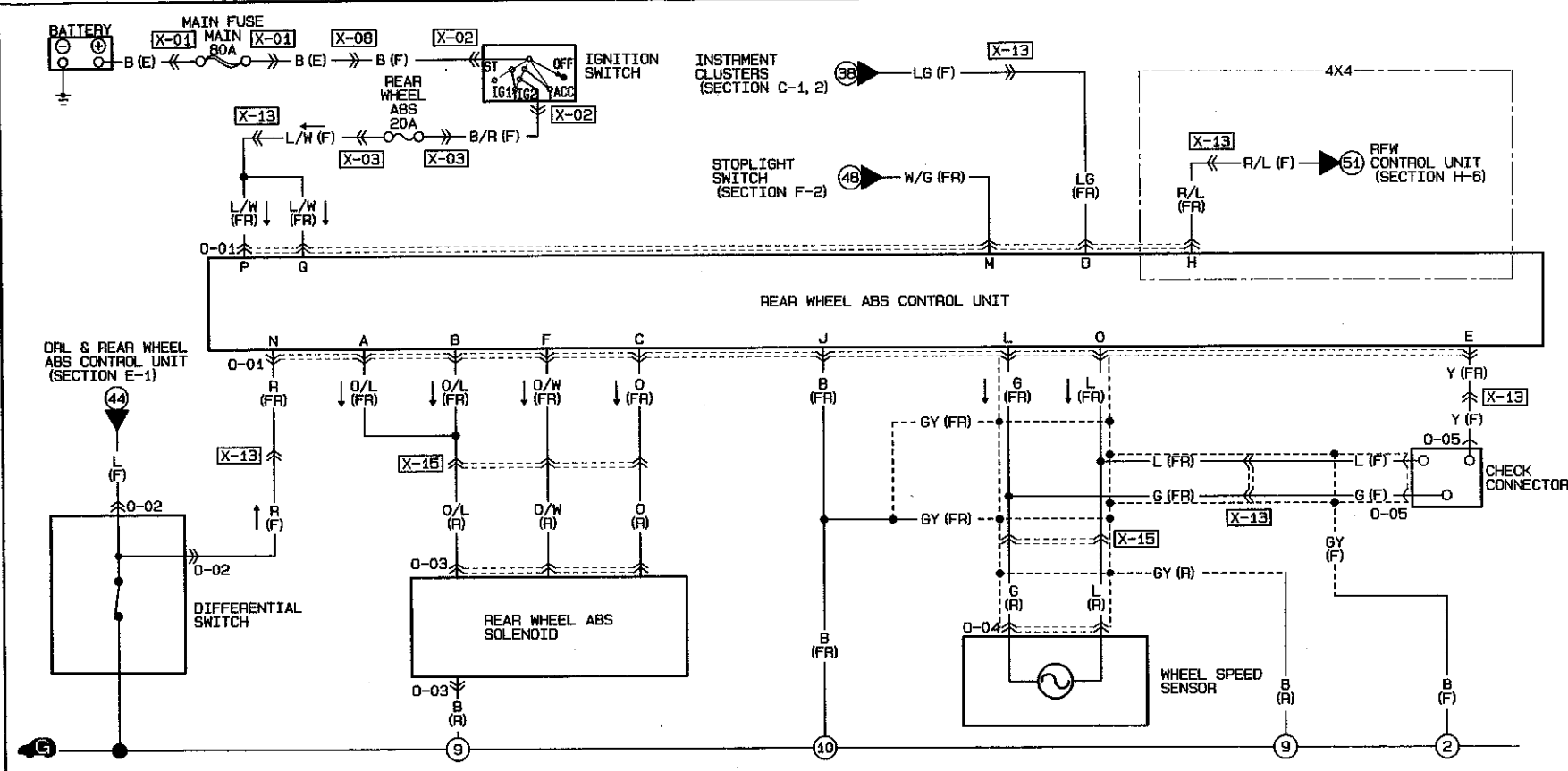
OMU0PX-074

3. Turn the ignition switch ON and make sure that the ABS warning lamp flashes and goes off.
4. Depress the brake pedal several times and check that the ABS warning lamp is illuminated because the pressure differential switch is ON.

### Note

- a) One person should hold the vinyl tube to prevent the tube from being disconnected when the brake pedal is depressed.
- b) The brake warning lamp (red) is also illuminated when the pressure differential switch is ON.

REAR WHEEL ANTI-LOCK BRAKE SYSTEM



<p>0-01 REAR WHEEL ABS CONTROL UNIT (FR)</p> <table border="1"> <tr> <td>D</td><td>O</td><td>M</td><td>E</td><td>C</td><td>A</td> </tr> <tr> <td>L/W</td><td>L</td><td>W/G</td><td>Y</td><td>O</td><td>O/L</td> </tr> <tr> <td>L/W</td><td>R</td><td>G</td><td>B</td><td>R/L</td><td>O/W</td> </tr> <tr> <td>P</td><td>N</td><td>L</td><td>J</td><td>H</td><td>F</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td>D</td> </tr> </table>	D	O	M	E	C	A	L/W	L	W/G	Y	O	O/L	L/W	R	G	B	R/L	O/W	P	N	L	J	H	F						D	<p>0-02 DIFFERENTIAL SWITCH (F)</p>	<p>0-03 REAR WHEEL ABS SOLENOID (R)</p>	<p>0-04 WHEEL SPEED SENSOR (R)</p>	<p>0-05 CHECK CONNECTOR (F)</p>
D	O	M	E	C	A																													
L/W	L	W/G	Y	O	O/L																													
L/W	R	G	B	R/L	O/W																													
P	N	L	J	H	F																													
					D																													

# WHEELS AND TIRES

**OUTLINE**..... Q- 2  
    SPECIFICATIONS..... Q- 2  
**TROUBLESHOOTING GUIDE**..... Q- 2  
**WHEELS AND TIRES**..... Q- 3  
    SPECIAL NOTES ABOUT WHEELS  
        AND TIRES ..... Q- 3  
    NOTES REGARDING TIRE REPLACEMENT. Q- 3  
    INSPECTION AND ADJUSTMENT..... Q- 3  
    REMOVAL AND INSTALLATION..... Q- 4  
    TIRE ROTATION ..... Q- 5  
    WHEEL BALANCE ADJUSTMENT ..... Q- 5

9MU0QX-001



# Q

## OUTLINE, TROUBLESHOOTING GUIDE

### OUTLINE

#### SPECIFICATIONS

Item	Model	4x4		4x2		
		Standard	Temporary spare	Standard	Temporary spare	
Wheels	Size	15 x 6 JJ	16 x 4T	14 x 5 1/2 JJ	16 x 4T	
	Offset mm (in)	30 (1.18)	48 (1.89)	40 (1.57)	48 (1.89)	
	Diameter of pitch circle mm (in)	139.7 (5.50)				
	Type	Styled or Non-styled				
Tires	Size	P215/75R15 P235/75R15	T155/90D16	P205/75R14	T145/80D16	
	Air pressure kPa (kgf/cm <sup>2</sup> , psi)	Front	196 (2.0, 28)	415 (4.2, 60)	180 (1.8, 26)	415 (4.2, 60)
		Rear	216 (2.2, 31)		240 (2.5, 35)	

2BU0QX-001

### TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Excessive or irregular tire wear</b>	Refer to page Q- 4 for details.		
<b>Premature tire wear</b>	Incorrect tire pressure	Adjust	Q- 2
<b>Tire squeal</b>	Incorrect tire pressure Tire deterioration	Adjust Replace	Q- 2 —
<b>Road noise or body vibration</b>	Insufficient tire pressure	Adjust	Q- 2
	Unbalanced wheel(s)	Adjust	Q- 5
	Deformed wheel(s) or tire(s)	Repair or replace	—
	Irregular tire wear	Replace	—
<b>“Shake” occurs (Steering wheel vibrates up/down)</b>	Excessive tire and wheel runout	Replace	—
	Loose lug nuts	Tighten	Q- 4
	Unbalanced wheel(s)	Adjust or replace	Q- 5
	Cracked or worn engine mount rubber	Replace	Sections B1,B2
	Cracked or worn transmission mount rubber	Replace	Sections J1,J2,K1,K2
<b>“Shimmy” occurs (Steering wheel vibrates left/right)</b>	Cracked or worn steering gear mount rubber	Replace	Section N
	Loose steering gear mounting bolts	Tighten	Section N
	Stuck or damaged steering ball joint	Replace	Section N
	Excessive tire and wheel runout	Replace	—
	Loose lug nuts	Tighten	Q- 4
	Unbalanced wheel(s)	Adjust or replace	Q- 5
	Insufficient tire pressure	Adjust	Q- 2
	Unevenly worn tires	Replace	—
	Malfunction of shock absorber	Replace	Section R
	Loose shock absorber mounting bolts	Tighten	Section R
	Struck or damaged lower arm ball joint	Replace	Section R
	Cracked or worn suspension bushings	Replace	Section R
	Damaged or worn front wheel bearing	Replace	Section M
Improperly adjusted front wheel alignment	Adjust	Section R	
<b>Uneven (one-sided) braking</b>	Unequal tire pressures	Adjust	Q- 2
<b>Steering wheel doesn't return properly or pulls to either left or right</b>	Incorrect tire pressure	Adjust	Q- 2
	Irregular tire wear (left/right)	Replace	—
	Unequal tire pressures	Adjust	Q- 2
	Different types or brands of tires mixed (left/right)	Replace	—
	Loose lug nuts	Tighten	Q- 4
<b>General driving instability</b>	Unequal tire pressures	Adjust	Q- 2
	Damaged or unbalanced wheel(s)	Replace or adjust	Q- 5
	Loose lug nuts	Tighten	Q- 4
<b>Excessive steering wheel play</b>	Loose lug nuts	Tighten	Q- 4

1BU0QX-001

WHEELS AND TIRES

**SPECIAL NOTES ABOUT WHEELS AND TIRES**

Do not use wheels or tires other than the specified types.

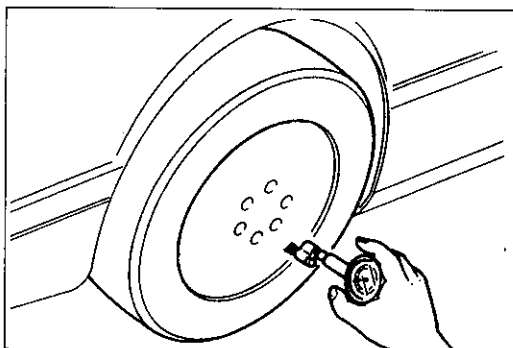
9BU0QX-003

**NOTES REGARDING TIRE REPLACEMENT**

Note the following points when tires are to be removed from or mounted onto the wheels.

1. Be careful not to damage the tire bead, the rim bead, or the edge of the rim.
2. Apply a soapy solution to the tire bead and the edge of the rim.
3. Use a wire brush, sandpaper, or cloth to clean and remove all rust and dirt from the rim edge and the rim bead.
4. Remove any pebbles, glass, nails, and other foreign items embedded in the tire tread.
5. Be sure the air valve is installed correctly.
6. After mounting a tire onto a wheel, inflate the tire to 250—300 kPa (2.55—3.06 kg/cm<sup>2</sup>, 35.55—42.66 psi). Check to be sure that the bead is seated correctly onto the rim and that there are no air leaks. Then reduce the pressure to the specified level.

9BU0QX-004



9MU0QX-006

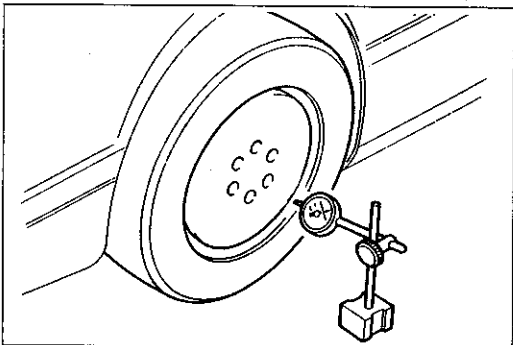
**INSPECTION AND ADJUSTMENT**

Check for the following and adjust or replace as necessary.

1. Air pressure  
Check the air pressure of all tires, including the spare tire, with an air pressure gauge.  
(Refer to page Q-2.)

**Caution**

**The air pressure must be measured when the tire is cold.**

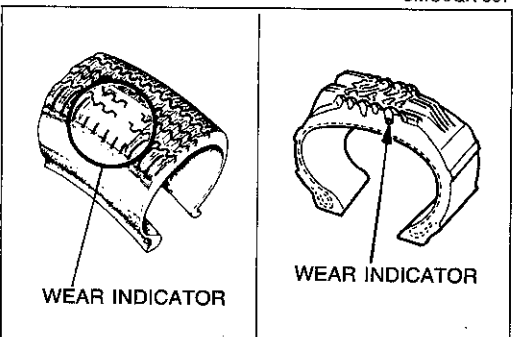


9MU0QX-007

2. Wheel runout  
Set the probe of a dial indicator against the wheel, and turn the wheel one full revolution.

**Wheel runout limit**

**Horizontal: 2.0mm (0.079 in)**  
**Vertical : 1.5mm (0.059 in)**



9MU0QX-008

3. Tire wear

**Specifications**

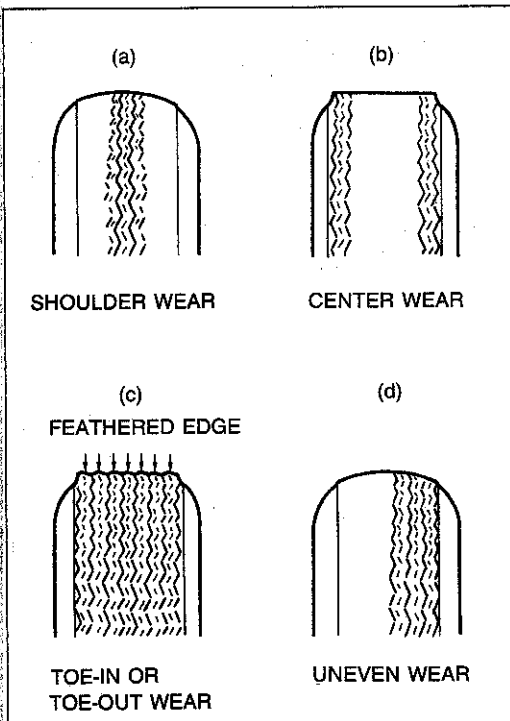
**Remaining tread**

**Ordinary tires: 1.6mm (0.063 in) min.**  
(Tire should be replaced if wear indicators are exposed.)

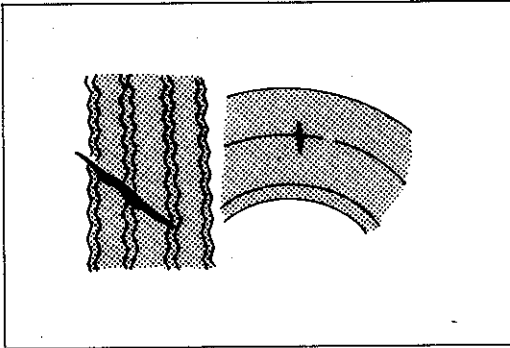
**Snow tires: 50% of tread**  
(Tire should be replaced if wear indicators are exposed.)

# Q

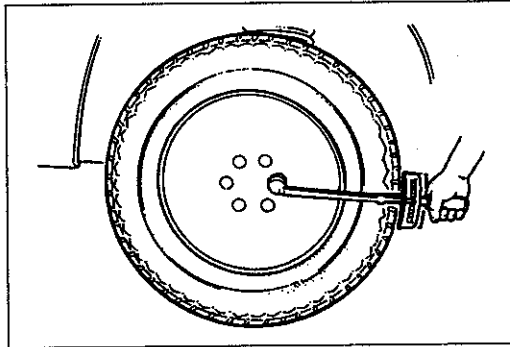
## WHEELS AND TIRES



9MU0QX-009



96U12X-004



2BU0QX-002

### Troubleshooting guide

Abnormal tire wear patterns shown in the illustration can occur. Refer to the chart for the possible causes and remedies.

	Possible cause	Remedy
(a)	<ul style="list-style-type: none"> <li>• Underinflation (both sides worn)</li> <li>• Incorrect camber (one side worn)</li> <li>• Hard cornering</li> <li>• Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>• Measure and adjust pressure</li> <li>• Repair or replace axle and suspension parts</li> <li>• Reduce speed</li> <li>• Rotate tires</li> </ul>
(b)	<ul style="list-style-type: none"> <li>• Overinflation</li> <li>• Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>• Measure and adjust pressure</li> <li>• Rotate tires</li> </ul>
(c)	<ul style="list-style-type: none"> <li>• Incorrect toe-in</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust toe-in</li> </ul>
(d)	<ul style="list-style-type: none"> <li>• Incorrect camber or caster</li> <li>• Malfunctioning suspension</li> <li>• Unbalanced wheel</li> <li>• Out-of-round brake drum or disc</li> <li>• Other mechanical conditions</li> <li>• Lack of rotation</li> </ul>	<ul style="list-style-type: none"> <li>• Repair or replace axle and suspension parts</li> <li>• Repair or replace</li> <li>• Balance or replace</li> <li>• Correct or replace</li> <li>• Rotate tires</li> </ul>

4. Cracks, damage, or foreign matter (such as metal pieces, nails, and stones) in the tire and cracks, deformation, and damage to the wheel
5. Loose wheel lug nut(s)
6. Air leaking from valve stem

### REMOVAL AND INSTALLATION

Tighten the lug nuts to the specified torque in a crisscross fashion.

#### Tightening torque

##### Non-styled wheel:

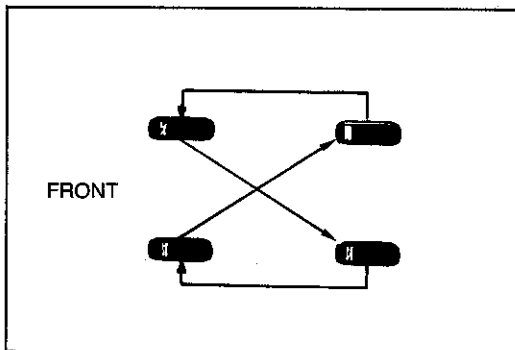
88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)

##### Styled wheel:

118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)

#### Caution

- a) The wheel-to-hub contact surfaces must be clean.
- b) Never apply oil to the nuts, bolts, or wheels; doing so might cause looseness or seizure of the lug nuts.



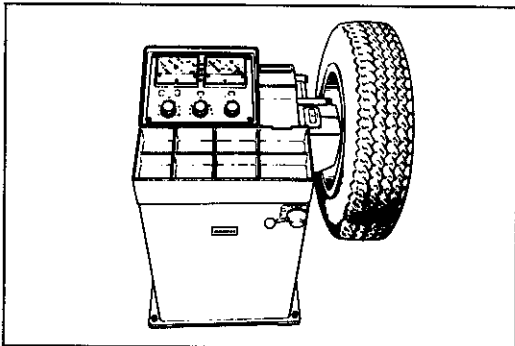
1BU0QX-002

## TIRE ROTATION

To prolong tire life and assure uniform tire wear, rotate the tires every 6000 km (3750 miles), sooner if irregular wear develops.

### Caution

- a) Do not include "TEMPORARY USE ONLY" spare tire in rotation.
- b) After rotating the tires, adjust each tire to the specified air pressure. (Refer to page Q-2.)

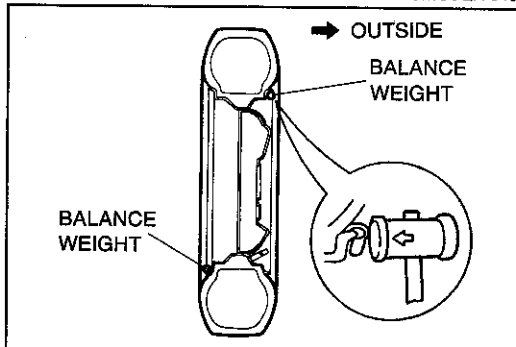


9MU0QX-012

## WHEEL BALANCE ADJUSTMENT

If a wheel becomes unbalanced or if a tire is replaced or repaired, the wheel must be rebalanced to within specification.

**Maximum unbalance (at rim edge): 10 g (0.35 oz)**



9BU0QX-006

### Caution

- a) Do not use more than two balance weights on the inner or outer side of the wheel. If the total weight exceeds 100 g (3.5 oz), rebalance after moving the tire around on the rim.
- b) Attach the balance weights tightly so that they do not protrude more than 3mm (0.12 in) beyond the wheel edge.
- c) Do not use an on-car balancer on automatic transmission models; it may cause transmission damage.



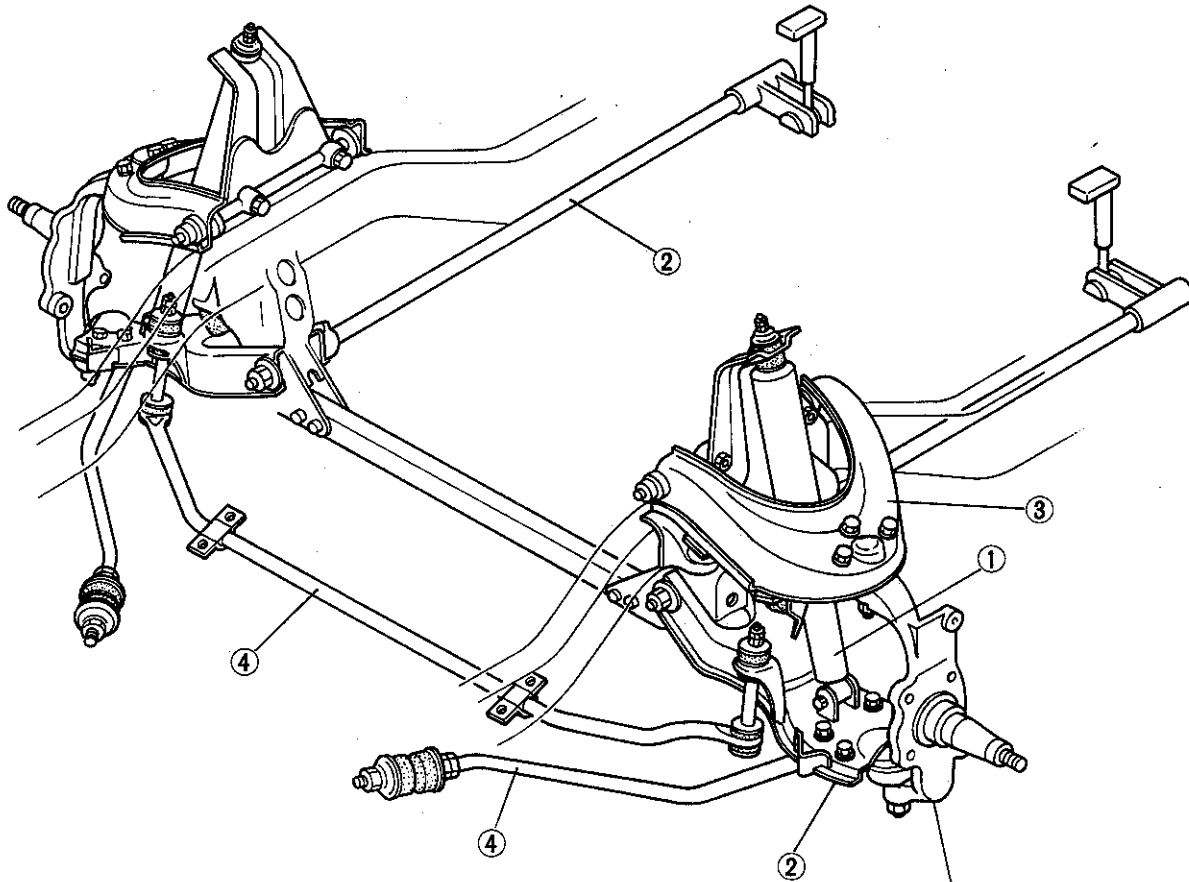
# SUSPENSION

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### INDEX

#### FRONT SUSPENSION (4x2)



#### FRONT WHEEL ALIGNMENT

TOTAL TOE-IN:  $3 \pm 3\text{mm}$  ( $0.12 \pm 0.12\text{ in}$ ,  $18' \pm 18'$ )

MAXIMUM STEERING ANGLE:  $35^{\circ}00' \pm 2^{\circ}$  (INNER)  
 $33^{\circ}00' \pm 2^{\circ}$  (OUTER)

CAMBER ANGLE:  $0^{\circ}45' \pm 30'$   
 $-20'$

CASTER ANGLE M/S:  $0^{\circ}50' \pm 45'$

P/S:  $1^{\circ}50' \pm 45'$

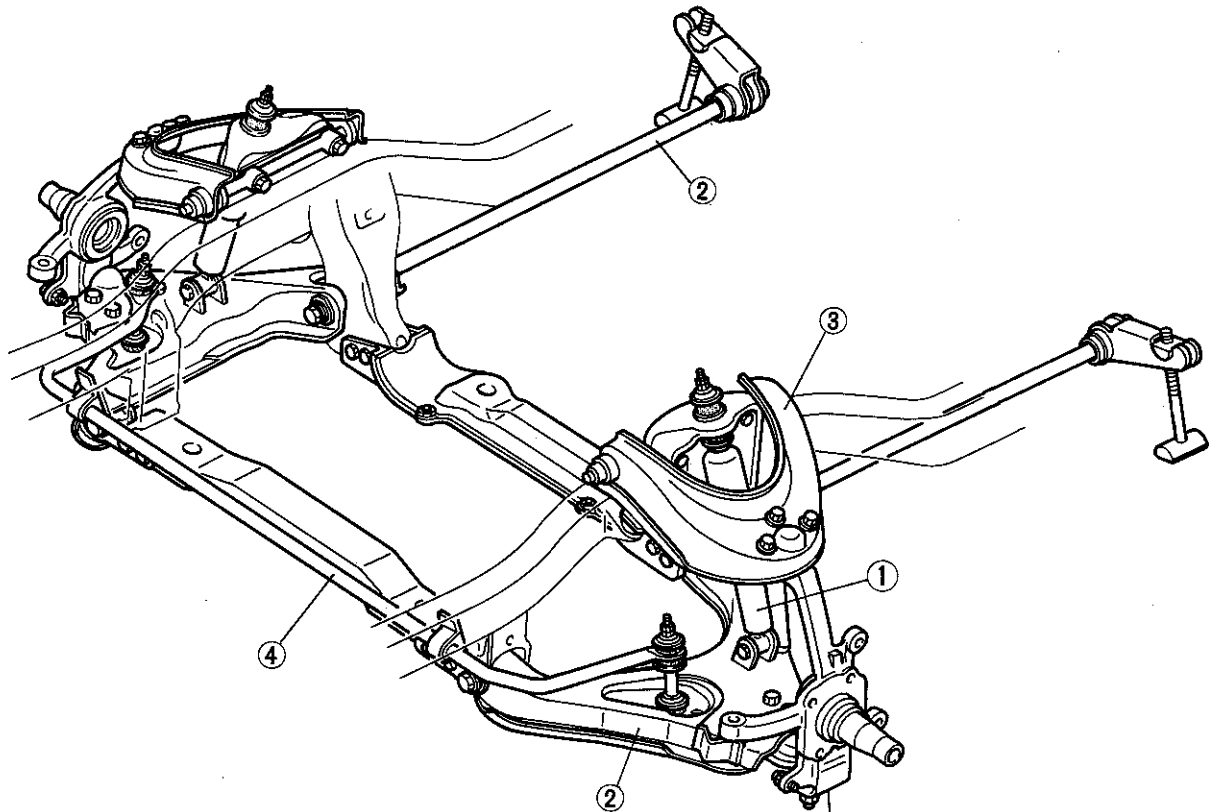
KINGPIN ANGLE:  $8^{\circ}15'$

KNUCKLE ASSEMBLY SERVICE,  
SECTION M

2BU0RX-002

- |   |  |
|---|--|
| <p>1. Shock absorber<br/>Removal, Inspection, and<br/>Installation..... page R-10</p> <p>2. Torsion bar spring and lower arm<br/>Removal..... page R-11<br/>Inspection..... page R-13<br/>Installation..... page R-13</p> | <p>3. Upper arm<br/>Removal and Installation..... page R-21<br/>Inspection..... page R-23</p> <p>4. Stabilizer and tension rod<br/>Removal and Inspection..... page R-24<br/>Installation..... page R-25</p> |
|---|--|

**FRONT SUSPENSION (4x4)**



**FRONT WHEEL ALIGNMENT**

TOTAL TOE-IN:  $3 \pm 3\text{mm}$  ( $0.12 \pm 0.12\text{ in}$ ,  $18' \pm 18'$ )  
 MAXIMUM STEERING ANGLE:  $33^{\circ}30' \pm 2^{\circ}$  (INNER)  
 $30^{\circ}00' \pm 2^{\circ}$  (OUTER)

CAMBER ANGLE:  $1^{\circ}00' \begin{smallmatrix} +30' \\ -20' \end{smallmatrix}$   
 CASTER ANGLE:  $2^{\circ}00' \pm 45'$   
 KINGPIN ANGLE:  $10^{\circ}20'$

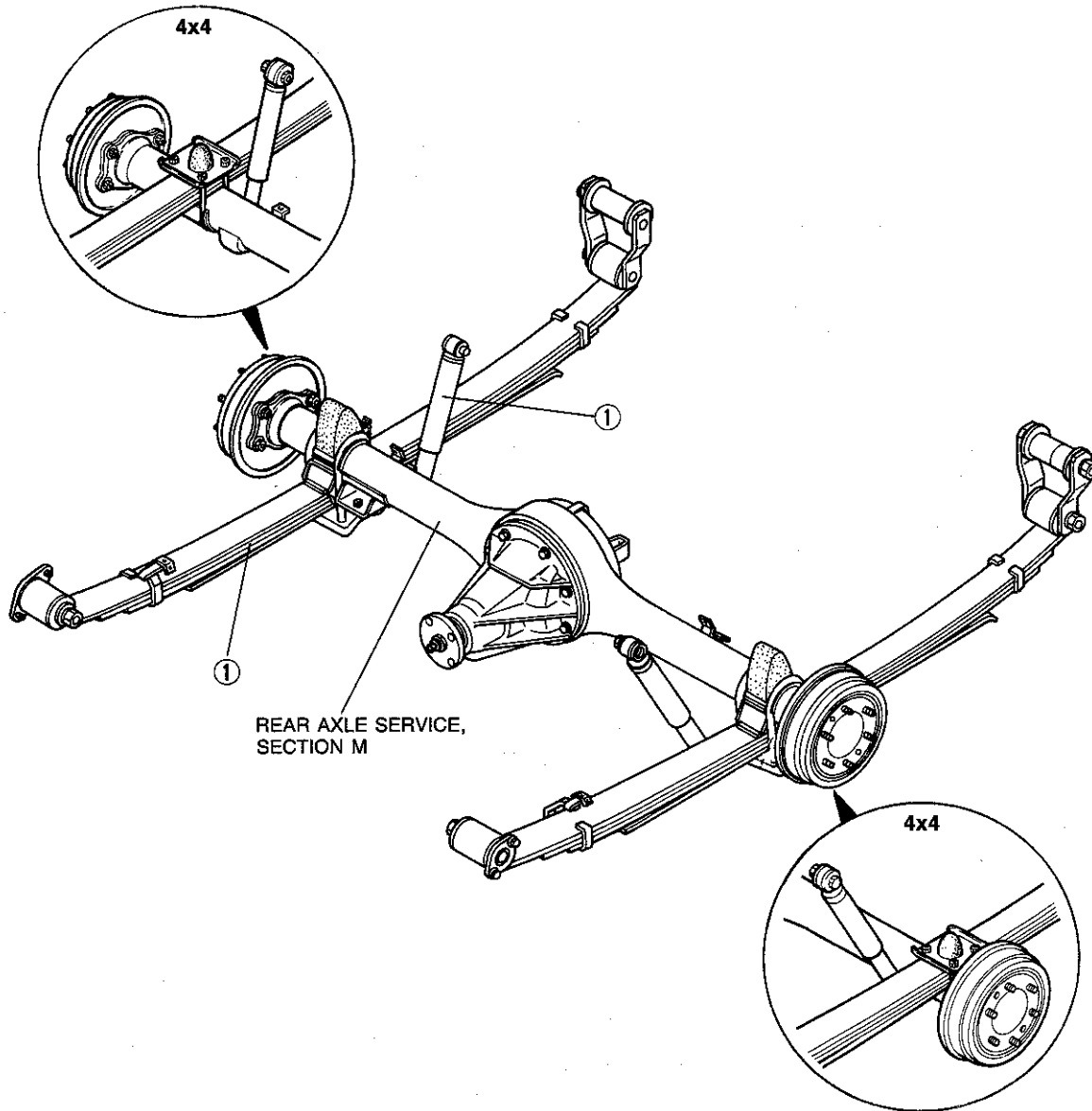
KNUCKLE ASSEMBLY SERVICE,  
SECTION M

R

2BU0RX-003

- |   |  |
|---|--|
| <p>1. Shock absorber<br/>                 Removal, Inspection and<br/>                 Installation..... page R-10</p> <p>2. Torsion bar spring and lower arm<br/>                 Removal..... page R-16<br/>                 Inspection..... page R-18<br/>                 Installation..... page R-18</p> | <p>3. Upper arm<br/>                 Removal and Installation..... page R-21<br/>                 Inspection..... page R-23</p> <p>4. Stabilizer<br/>                 Removal and Inspection..... page R-26<br/>                 Installation..... page R-27</p> |
|---|--|

### REAR SUSPENSION (4x2 and 4x4)



2BU0RX-004

- 1. Shock absorber and leaf springs
  - Removal and Inspection ..... page R-28
  - Installation ..... page R-30

OUTLINE

SPECIFICATIONS

Item		Model	4x2	4x4
<b>Front Suspension</b>				
Suspension type			Double wishbone	
Springs	Type		Torsion bar spring	
	Dimensions (bar diameter x length)	mm (in)	21.9 x 901 (0.86 x 35.47)	23.8 x 924 (0.94 x 36.38)
Stabilizer	Type		Torsion bar	
	Diameter	mm (in)	22 (0.87)	24 (0.94)
Shock absorbers	Type		Cylindrical, double-acting	
	Damping force N (kg, lb) at 0.3 m/s	Extended	785 ± 118 (80 ± 12, 176 ± 26)	1,825 ± 255 (186 ± 26, 409 ± 57)
		Compressed	245 ± 59 (25 ± 6, 55 ± 13)	530 ± 98 (54 ± 10, 119 ± 22)
Front wheel alignment (*Unladen condition)	Turning angle	Inner	35°00' ± 2°	33°30' ± 2°
		Outer	33°00' ± 2°	30°00' ± 2°
	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)	
		degree	18' ± 18'	
	Camber angle		0°45' <sup>+30'</sup> <sub>-20'</sub>	1°00' <sup>+30'</sup> <sub>-20'</sub>
	Caster angle		M/S: 0°50' ± 45' P/S: 1°50' ± 45'	2°00' ± 45'
	Kingpin angle		8°15'	10°20'
Caster trail	mm (in)	4.4 (0.17)	12 (0.47)	
<b>Rear Suspension</b>				
Suspension type			Leaf spring	
Springs	Type		Semielliptic leaf spring	
	Dimensions (length x width x thickness)	mm (in)	1,566 x 60 x 7 (61.65 x 2.36 x 0.28)	1,422 x 60 x 9 (55.98 x 2.36 x 0.35)
			1,132 x 60 x 6 (44.57 x 2.36 x 0.24)	979 x 60 x 6 (38.54 x 2.36 x 0.24)
			966 x 60 x 6 (38.03 x 2.36 x 0.24)	844 x 60 x 6 (33.23 x 2.36 x 0.24)
			790 x 60 x 14 (31.10 x 2.36 x 0.55)	639 x 60 x 12 (25.16 x 2.36 x 0.47)
Shock absorbers	Type		Cylindrical, double-acting	
	Damping force N (kg, lb) at 0.3 m/s	Extended	687 ± 108 (70 ± 11, 154 ± 24)	1,079 ± 167 (110 ± 17, 242 ± 37)
Compressed		471 ± 98 (48 ± 10, 106 ± 22)	441 ± 98 (45 ± 10, 99 ± 22)	

M/S: Manual steering P/S: Power steering

1BU0RX-001

\* Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack, and tools in designated position.



## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Body rolls</b>	Weak stabilizer Worn or deteriorated stabilizer or tension rod bushing Malfunctioning shock absorber	Replace Replace Replace	R-24, 26 R-24, 26 R-10, 28
<b>Poor riding comfort</b>	Weak torsion bar or leaf spring Malfunctioning shock absorber Excessive tire pressure	Replace Replace Adjust	R-11,16,28 R-10, 28 Section Q
<b>Body leans</b>	Weak torsion bar or leaf spring Weak stabilizer bushing	Replace Replace	R-11,16,28 R-24, 26
<b>Abnormal noise from suspension system</b>	Poor lubrication or wear of upper or lower arm ball joint Looseness of peripheral connections Malfunctioning shock absorber Worn or deteriorated stabilizer or tension rod bushing	Lubricate or replace Tighten Replace Replace	R-11,16,21 — R-10, 28 R-24, 26
<b>Steering "heavy"</b>	Poor lubrication of or foreign material in upper or lower arm ball joint Stuck or damaged upper or lower arm ball joint Improperly adjusted front wheel alignment Problem related to steering system	Lubricate or replace  Replace Adjust —	R-11,16,21  R-11,16,21 R-7 Section N
<b>Steering wheel pulls to one side</b>	Weak torsion bar spring Worn or damaged stabilizer Improperly adjusted front wheel alignment Problem related to steering system Problem related to braking system Problem related to wheels and tires	Replace Replace Adjust — — —	R-11, 16 R-24, 26 R-7 Section N Section P Section Q
<b>Poor steering wheel return</b>	Stuck or damaged upper or lower arm ball joints Improperly adjusted front wheel alignment Problem related to steering system Problem related to wheels and tires	Replace Adjust — —	R-11,16,21 R-7 Section N Section Q
<b>General instability while driving</b>	Weak torsion bar spring Worn or damaged stabilizer Malfunctioning shock absorber Improperly adjust front wheel alignment Problem related to steering system Problem related to wheels and tires	Replace Replace Replace Adjust — —	R-11, 16 R-24, 26 R-10, 28 R-7 Section N Section Q
<b>"Shimmy" occurs (Steering wheel vibrates left/right)</b>	Stuck or damage upper or lower arm ball joints Malfunctioning shock absorber Loose shock absorber mounting bolts Cracked or worn suspension bushing Improperly adjusted front wheel alignment Problem related to steering system Problem related to wheels and tires	Replace Replace Tighten Replace Adjust — —	R-11,16,21 R-10, 28 R-10, 28 R-11,16,21,28 R-7 Section N Section Q

2BU0RX-005

WHEEL ALIGNMENT

PRE-INSPECTION

1. Check the tire inflations and set to the recommended pressure if necessary.
2. Inspect the front wheel bearing play and correct if necessary.
3. Inspect the wheel and tire runout.
4. Inspect the ball joints and steering linkage for any excessive looseness.
5. The vehicle must be on level ground and have no luggage or passenger load.
6. The difference in height between the left and right sides from the center of the wheel to the fender brim must not exceed **10mm (0.39 in)**.

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FRONT WHEEL ALIGNMENT

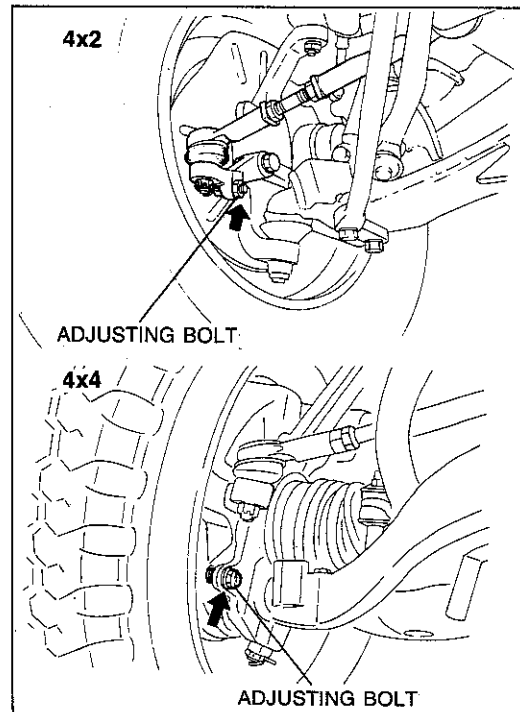
Specifications

Item			Specifications	
			4x2	4x4
Front wheel alignment (*1Unladen)	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)	
		degree	18' ± 18'	
	Maximum steering angle	Inner	35°00' ± 2°	33°30' ± 2°
		Outer	33°00' ± 2°	30°00' ± 2°
	Camber angle		0°45' $\pm$ $\begin{matrix} +30' \\ -20' \end{matrix}$	1°00' $\pm$ $\begin{matrix} +30' \\ -20' \end{matrix}$
	Caster angle		M/S: 0°50' ± 45' P/S: 1°50' ± 45'	2°00' ± 45'
Kingpin angle		8°15'	10°20'	

M/S: Manual steering P/S: Power steering

2BU0RX-006

\*1 Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack, and tools in designated position.



1BU0RX-002

Adjustment

Maximum steering angle

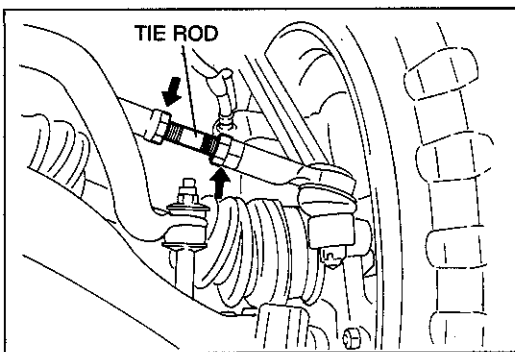
Adjust the turning angle as follows:

1. Loosen the adjusting bolt locknut.
2. Turn the adjusting bolt to provide the correct turning angle.
3. After adjustment, tighten the locknut to the specified torque.

R

Tightening torque:

39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)



2BU0RX-051

**Total toe-in**

To adjust the toe-in, loosen the left and right tie rod locknuts, and turn each tie rod an equal amount.

**Locknut tightening torque:**

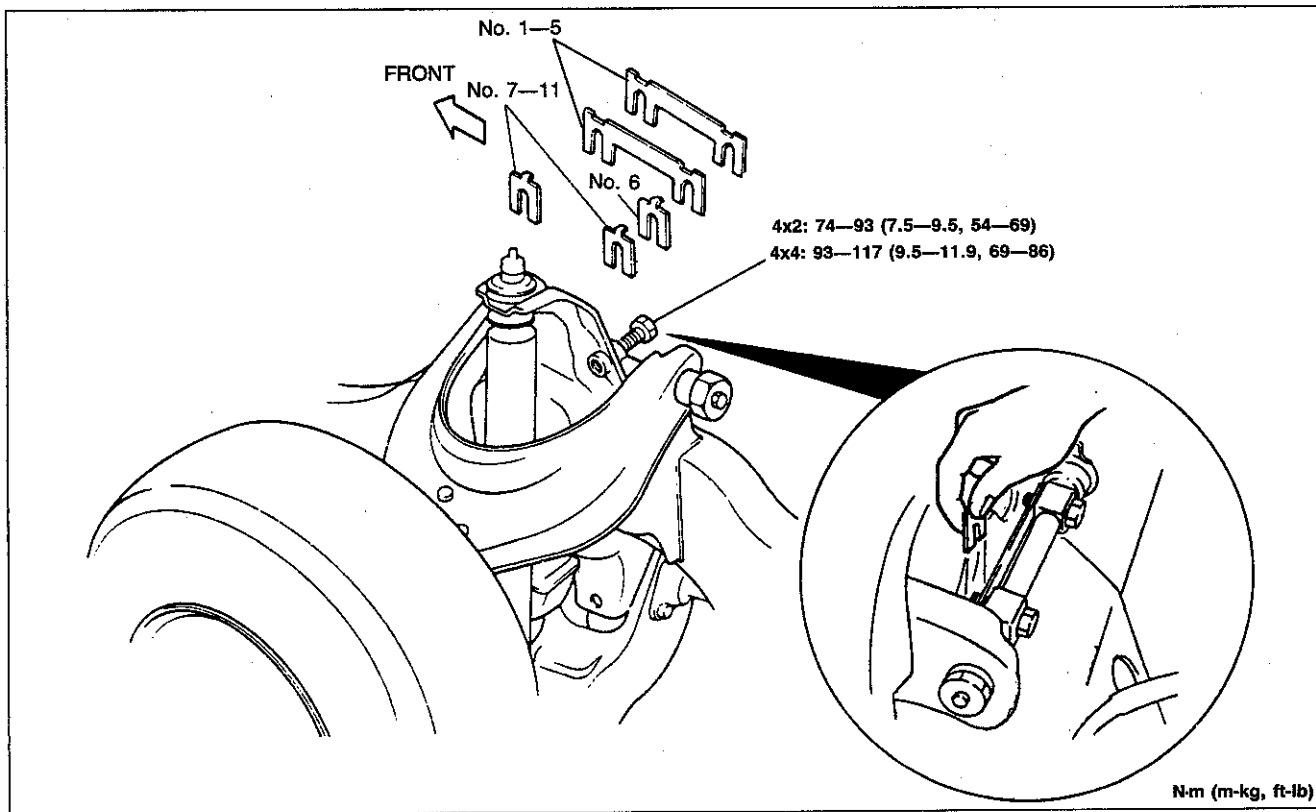
69—78 N·m (7.0—8.0 m·kg, 51—58 ft·lb)

**Note**

- a) The left and right tie rods are both right threaded. To increase the toe-in, turn the right tie rod toward the front of the vehicle, and turn the left tie rod by the same amount toward the rear.
- b) One turn of the tie rod (both sides) changes the toe-in by about 30mm (1.18 in).

**Camber and caster**

To adjust the camber and caster angles, loosen the bolts of the upper arm shaft and insert or remove adjustment shims.



N·m (m·kg, ft·lb)

1BU0RX-017

No.	Thickness mm (in)	No.	Thickness mm (in)
1	1.0 (0.004)	7	1.0 (0.004)
2	1.6 (0.063)	8	1.6 (0.063)
3	2.0 (0.079)	9	2.0 (0.079)
4	3.2 (0.126)	10	3.2 (0.126)
5	4.0 (0.157)	11	4.0 (0.157)
6	2.0 (0.079)		

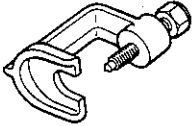
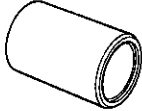
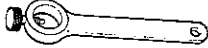




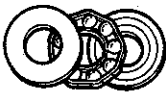
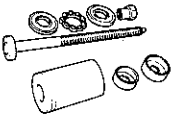

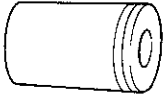

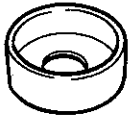
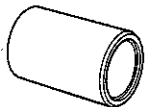
**Note**

1. Shims No.1—5 are used at the left and right sides (2/side).
2. Shims No.7—11 are used at the front and rear of the left and right sides (2/side).
3. Shim No.6 is for models equipped with power steering and is used at the rear only of the left and right sides (1/side).
4. **Camber:** A change of shim thickness (at front and rear) of 1mm (0.004 in) results in a change of about 15'.
5. **Caster:** A change of shim thickness (at front or rear only) of 1mm (0.004 in) results in a change of about 30'.



FRONT SUSPENSION (DOUBLE WISHBONE)

PREPARATION

<p>49 0727 575</p> <p>Puller, ball joint</p> 	<p>49 S120 785</p> <p>Installer, dust boot</p> 	<p>49 0180 510B</p> <p>Attachment, preload measurement</p> 
<p>49 U034 2A0</p> <p>Lower arm bushing puller &amp; installer</p> 	<p>49 U034 201</p> <p>Shaft (Part of 49 U034 2A0)</p> 	<p>49 U034 202</p> <p>Support block (Part of 49 U034 2A0)</p> 
<p>49 U034 203</p> <p>Installer (Part of 49 U034 2A0)</p> 	<p>49 W034 305</p> <p>Bearing (Part of 49 U034 2A0)</p> 	<p>49 UB39 615</p> <p>Bushing puller and installer set</p> 
<p>49 UB39 616</p> <p>Shaft set (Part of 49 UB39 615)</p> 	<p>49 UB39 617</p> <p>Support block (Part of 49 UB39 615)</p> 	<p>49 UB39 618</p> <p>Attachment A (Part of 49 UB39 615)</p> 
<p>49 UB39 619</p> <p>Attachment B (Part of 49 UB39 615)</p> 	<p>49 U034 204</p> <p>Installer, dust boot</p> 	<p>9BU0RX-017</p>

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## FRONT SUSPENSION (DOUBLE WISHBONE)

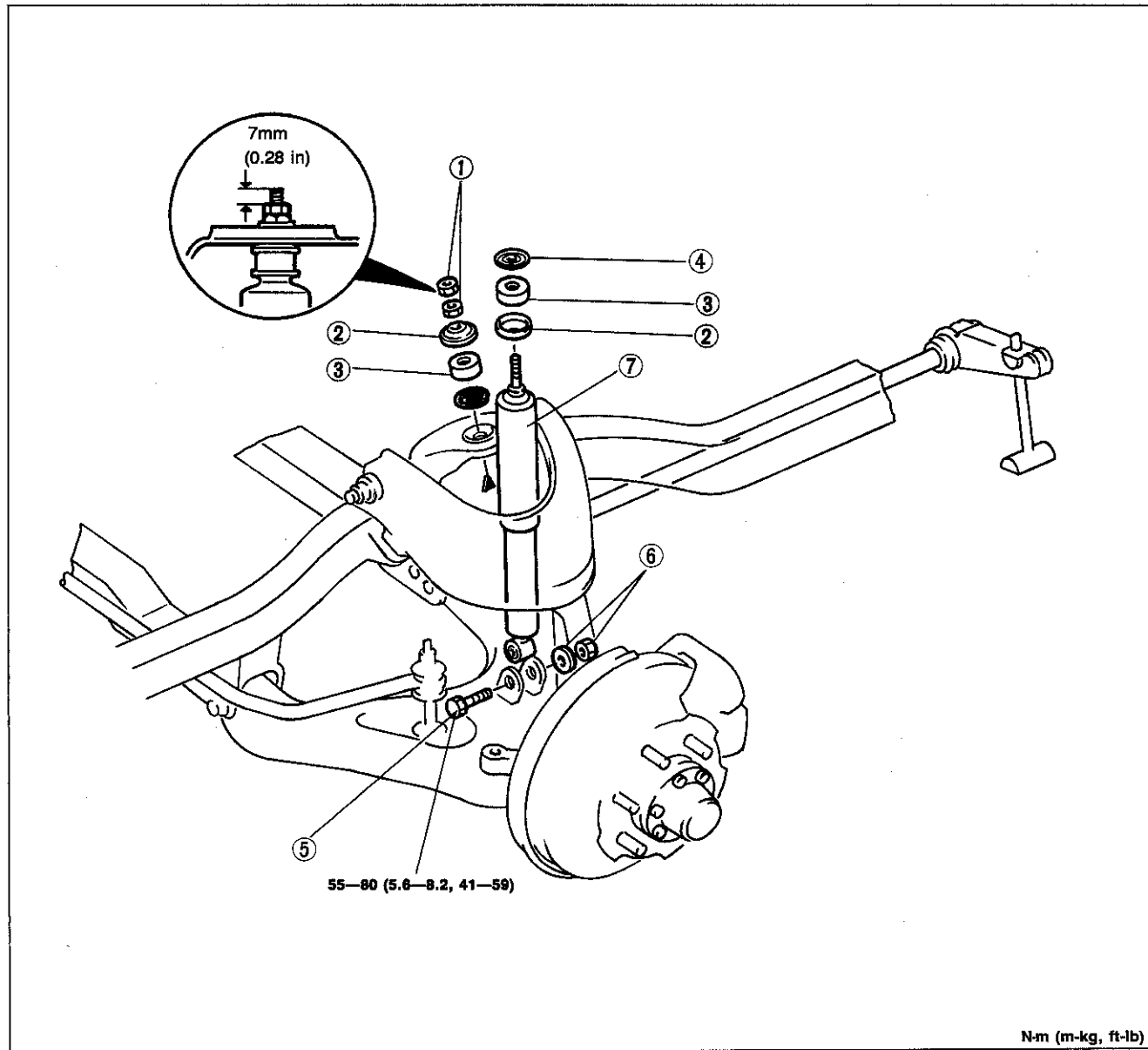
### SHOCK ABSORBER (4x2 AND 4x4) Removal, Inspection and Installation

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle, and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure.
5. Inspect the shock absorber components and repair or replace as necessary.
6. Install in the reverse order of removal.

#### Caution

**Loosely tighten the shock absorber to the lower arm when installing. Lower the vehicle and tighten all nuts and bolts to the specified torques with the vehicle unladen.**

7. Inspect front wheel alignment and adjust it as necessary.



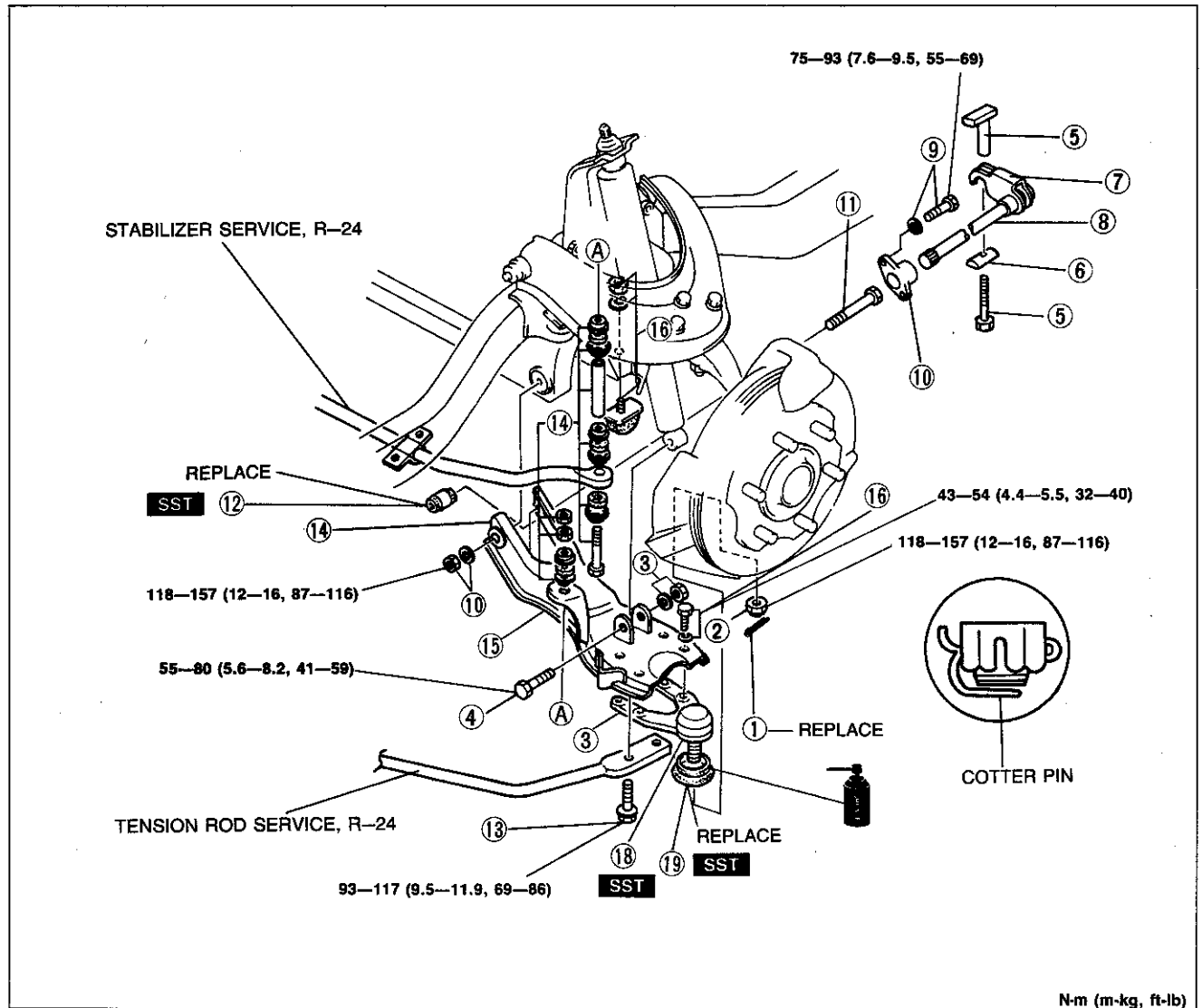
1. Nuts
2. Retainers
3. Bushings  
Check for damage or deterioration
4. Retainer

5. Bolt
6. Washer and nut  
Check for oil leakage, poor operation, damage, or deterioration

## TORSION BAR SPRING AND LOWER ARM (4x2)

### Removal

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.



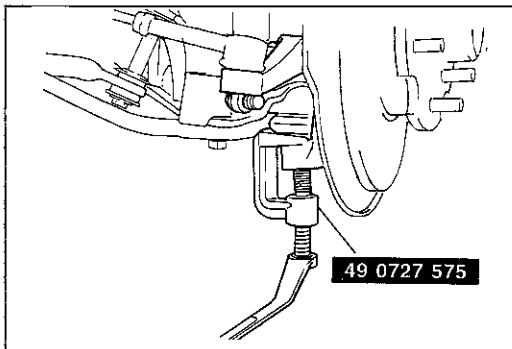
N-m (m-kg, ft-lb)

2BUORX-007

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Cotter pin</li> <li>2. Nut</li> <li>3. Lower arm ball joint, Knuckle arm<br/>Removal Note..... page R-12</li> <li>4. Bolt, washer, and nut (shock absorber)</li> <li>5. Anchor bolt<br/>Removal Note..... page R-12</li> <li>6. Anchor swivel</li> <li>7. Anchor arm<br/>Inspection..... page R-13</li> <li>8. Torsion bar spring<br/>Removal Note..... page R-12<br/>Inspection..... page R-13</li> <li>9. Bolts and washers</li> <li>10. Torque plate<br/>Inspection..... page R-13</li> </ol> | <ol style="list-style-type: none"> <li>11. Lower arm spindle, washer, and nut</li> <li>12. Rubber bushing<br/>Removal and installation ..... page R-12</li> <li>13. Tension rod bolt</li> <li>14. Bolts, bushings, retainers, spacer, and nuts (stabilizer)</li> <li>15. Lower arm<br/>Inspection..... page R-13</li> <li>16. Bound bumper, washer, and nut</li> <li>17. Bolts and washer (ball joint)</li> <li>18. Lower arm ball joint<br/>Inspection..... page R-13</li> <li>19. Lower arm ball joint boot<br/>Removal Note..... page R-12</li> </ol> |
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# R

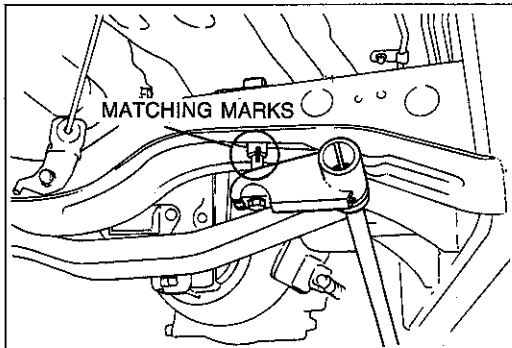
## FRONT SUSPENSION (DOUBLE WISHBONE)



### Removal note

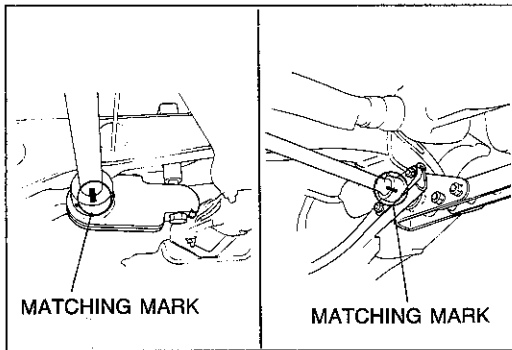
#### Lower arm ball joint/Knuckle arm

Separate the ball joint from the knuckle arm with the **SST**.



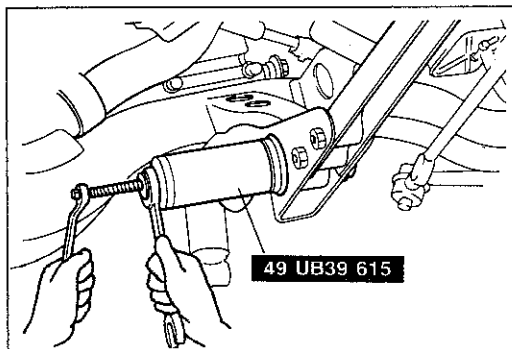
### Anchor bolt

Mark the anchor bolt and swivel for reference during reassembly.



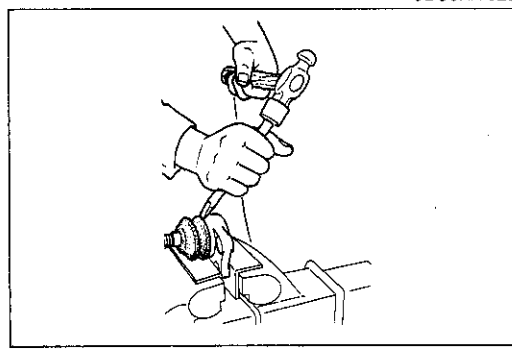
### Torsion bar spring

Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



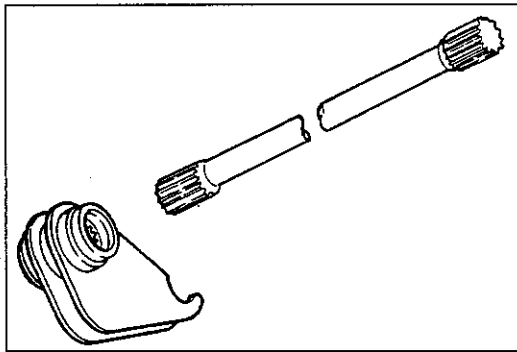
### Rubber bushing

Remove the rubber bushing from the body with the **SST**. Install the new bushing into the body with the same **SST**.

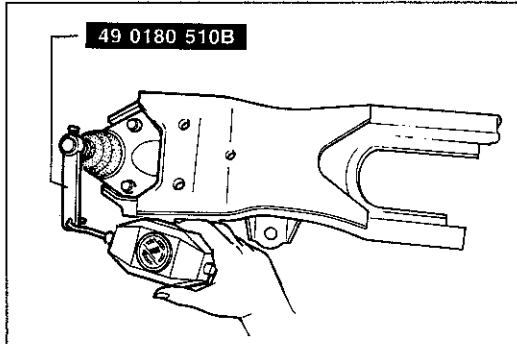


### Lower arm ball joint boot

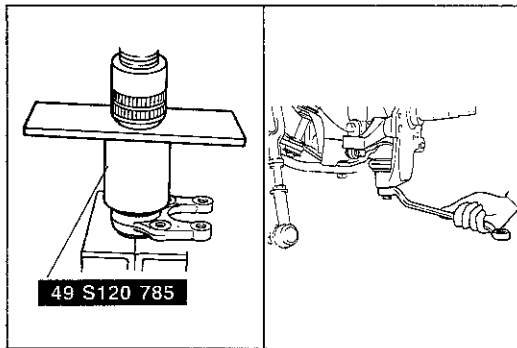
1. Secure the lower arm in a vise protected with brass pads.
2. Use a chisel to remove the boot.



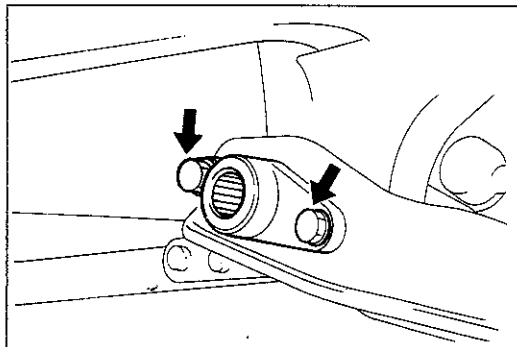
2BU0RX-009



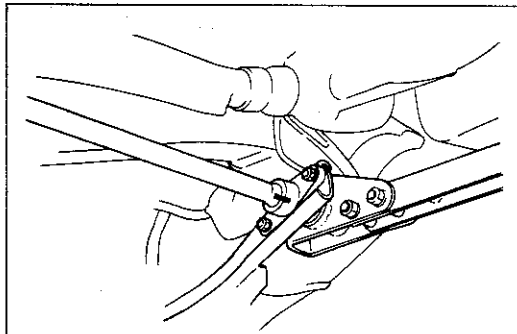
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2BU0RX-011



2BU0RX-012



2BU0RX-013

## Inspection

Check for the following and repair or replace parts as necessary.

1. Bending or damage of torsion bar spring.
2. Looseness between serrations of torsion bar spring and anchor arm or the torque plate.
3. Damage or poor operation of ball joint.
4. Damage of lower arm.

5. Lower arm ball joint preload.

Attach the **SST** to the ball stud, and measure the preload with a pull scale.

## Caution

**Measure the preload after first shaking the stud of the ball joint 3 or 4 times.**

## Pull scale reading:

**20—34 N (2.0—3.5 kg, 4.4—7.7 lb)**  
**(While ball stud is rotating)**

## Installation

Install as follows:

1. Liberally coat a new lower arm ball joint boot with grease.
2. Wipe away any grease that has been expelled from the lower arm ball joint boot.
3. Press a new lower arm ball joint boot with the **SST**.
4. Install the lower arm ball joint to the lower arm.
5. Install the lower arm spindle to the lower arm, and temporarily tighten the nut.
6. Install the lower arm ball joint to the knuckle arm.  
Tighten the ball joint nut to the specified torque and install a new cotter pin.

## Tightening torque:

**118—157 N·m (12—16 m·kg, 87—116 ft·lb)**

7. Install the torque plate and tighten it to the specified torque.

## Tightening torque:

**75—93 N·m (7.6—9.5 m·kg, 55—69 ft·lb)**

8. Align the marks made during removal, and connect the torsion bar spring to the torque plate.

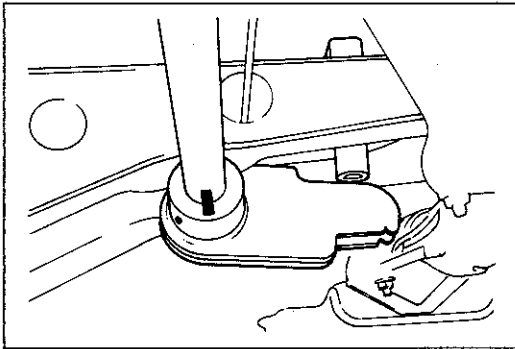
## Caution

- a) Coat the serrations of the torsion bar with grease.
- b) Before installation, check the identification color on the end of the torsion bar spring.

**Yellow: Left bar, White: Right bar**

# R

## FRONT SUSPENSION (DOUBLE WISHBONE)

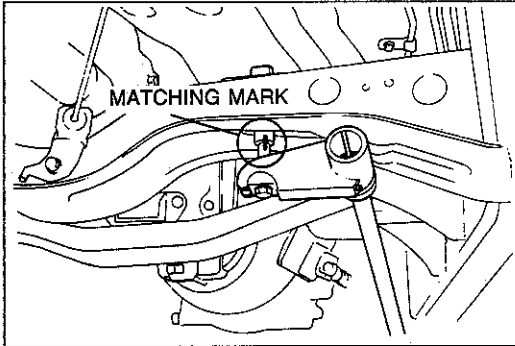


2BU0RX-014

9. Align the marks made during removal, and install the anchor arm onto the torsion bar spring.

### Caution

Coat the serrations of the torsion bar with grease.



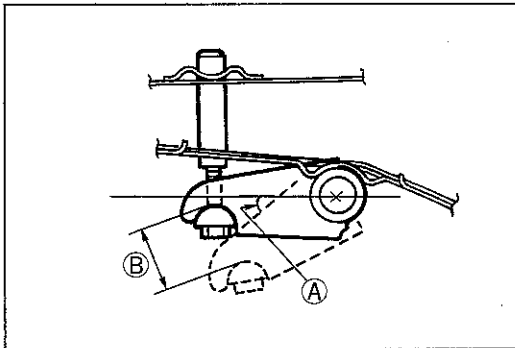
2BU0RX-015

10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.

### Note

If the anchor bolt was not marked during removal, install it as follows:

1. Lower the front suspension until the upper arm contacts the rebound stopper.
2. Install the anchor arm so that the angle  $\textcircled{A}$  is  $33^{\circ}30'$ .
3. Install the anchor bolt and tighten it by the amount  $\textcircled{B}$ .

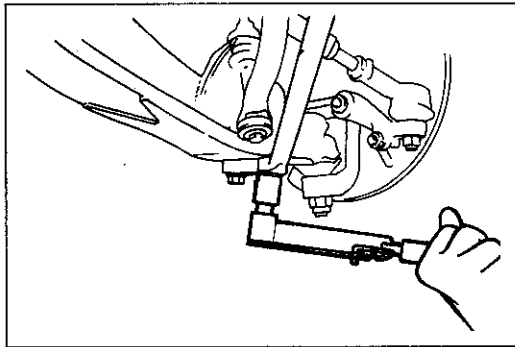


OBU0RX-008

### Amount $\textcircled{B}$ :

B2200		B2600i
M/T	A/T	M/T and A/T
$45 \pm 1\text{mm}$ ( $1.77 \pm 0.04\text{ in}$ )	$50 \pm 1\text{mm}$ ( $1.97 \pm 0.04\text{ in}$ )	$54.5 \pm 1\text{mm}$ ( $2.15 \pm 0.04\text{ in}$ )

M/T: Manual transmission  
A/T: Automatic transmission

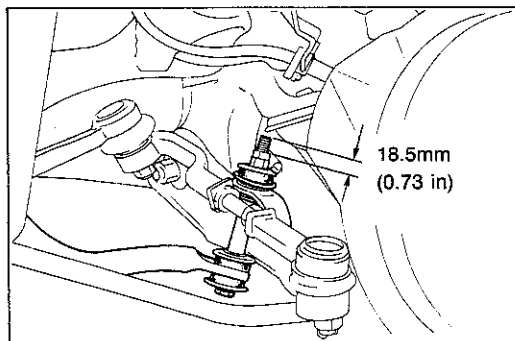


2BU0RX-016

11. Install the tension rod bolt.

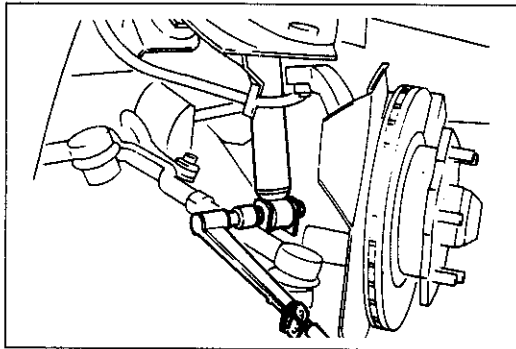
### Tightening torque:

**93—117 N·m (9.5—11.9 m·kg, 69—86 ft·lb)**



2BU0RX-017

12. Install the stabilizer bolt.  
Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.



2BU0RX-018

13. Install the shock absorber to the lower arm, and temporarily tighten the bolt and nut.
14. Install the wheels.
15. Lower the vehicle from the safety stands.
16. Tighten the lower arm spindle nut temporarily tightened in Step 5.

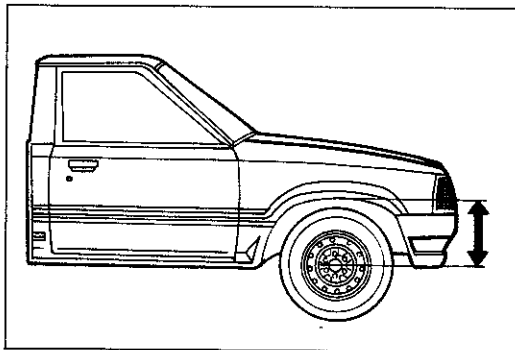
**Tightening torque:**

**118—157 N·m (12—16 m·kg, 87—116 ft·lb)**

17. Tighten the shock absorber bolt and nut temporarily tightened in Step 13.

**Tightening torque:**

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**



2BU0RX-019

18. Adjust the vehicle height by turning the torsion bar spring anchor bolt.
  - (1) With the vehicle on level ground, check the front and rear tire pressures.
  - (2) Measure the distance from the center of each front wheel to the fender brim.

mm (in)

Stretch	430 (16.9)
Short	436 (17.2)
Long	431 (17.0)

- (3) If the difference between the left and right is not within the specification, adjust the necessary anchor bolt.

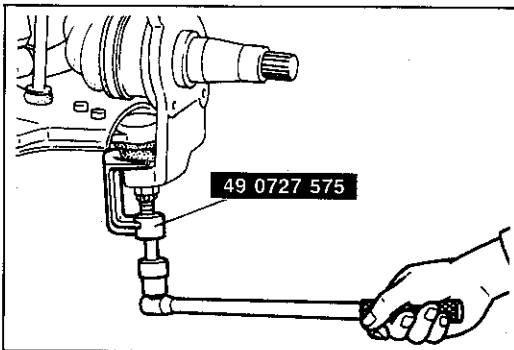
**Vehicle height left/right difference:**

**10mm (0.39 in) max.**

19. Inspect front wheel alignment and adjust it as necessary.





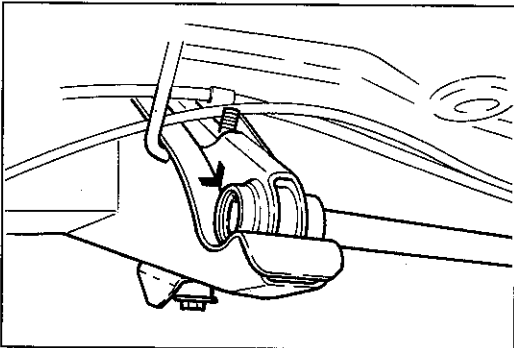


9BU0RX-038

**Removal note**

**Lower arm ball joint/Knuckle arm**

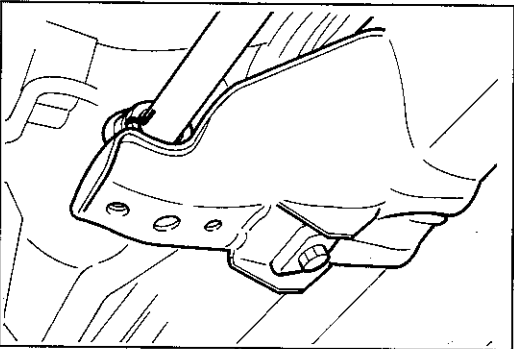
Separate the ball joint from the knuckle arm with the **SST**.



9BU0RX-039

**Anchor arm**

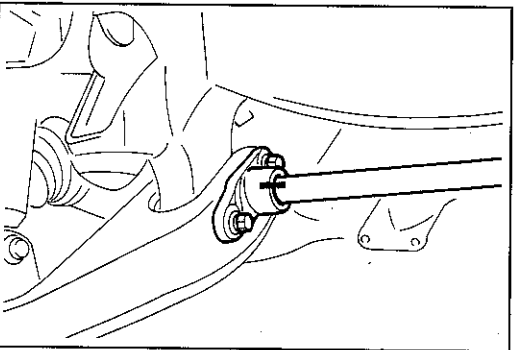
Mark the anchor arm and body for reference during reassembly.



9BU0RX-040

**Torsion bar spring**

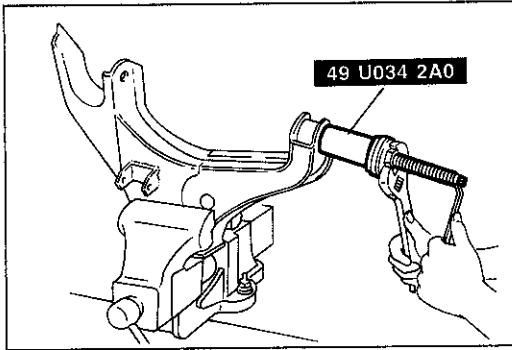
Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



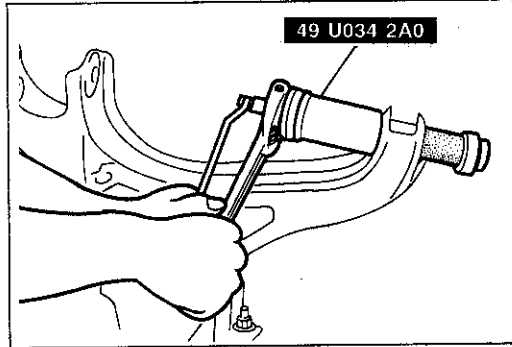
2BU0RX-021

**Lower arm ball joint boot**

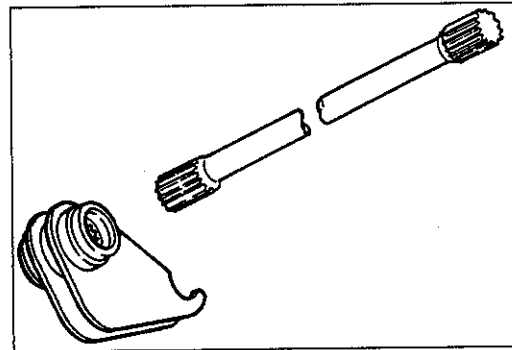
1. Secure the lower arm in a vise protected with brass pads.
2. Use a chisel to remove the boot.



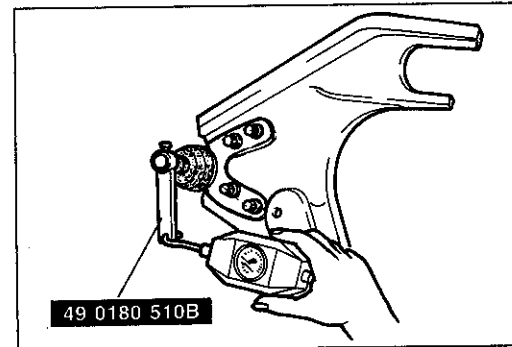
9BU0RX-042



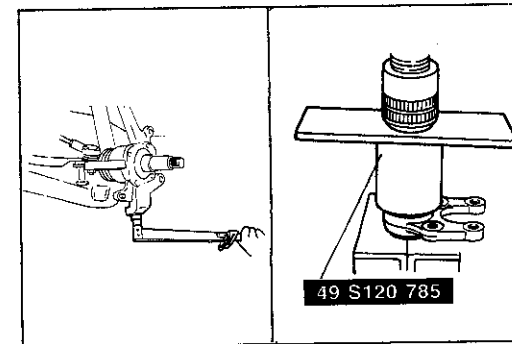
9BU0RX-043



2BU0RX-022



2BU0RX-023



2BU0RX-024

**Lower arm bushing**

Removal:

Remove the bushing from the lower arm with the **SST**.

Installation:

Install a new bushing into the lower arm with the **SST** as illustrated.**Note****Before installing the bushing, apply soapy water to the bushing surface.****Inspection**

Check for the following and repair or replace parts as necessary.

1. Bending or damage of the torsion bar spring.
2. Looseness between serrations of the torsion bar and the anchor arm or the torque plate.
3. Damage or poor operation of ball joint.
4. Damage of lower arm.

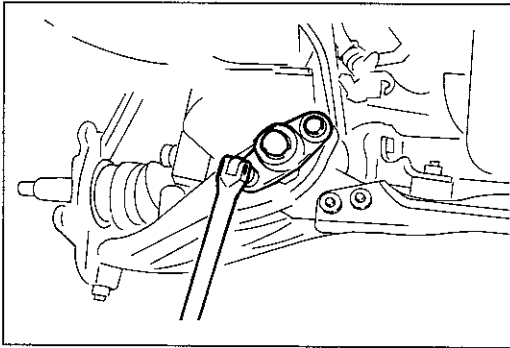
5. Lower arm ball joint preload.

Attach the **SST** to the ball stud, and measure the preload with a pull scale.**Caution****Measure the preload after first shaking the joint stud 3 or 4 times.****Pull scale reading: 20—35 N (2.0—3.5 kg, 4.4—7.7 lb)  
(while ball stud is rotating)****Installation**

Install as follows:

1. Liberally coat a new lower arm ball joint boot with grease.
2. Wipe away any grease that has been expelled from the lower arm ball joint boot.
3. Press a new lower arm ball joint boot with the **SST**.
4. Install the lower arm ball joint to the lower arm.
5. Install the lower arm spindle to the lower arm, and temporarily tighten the nut.
6. Install the lower arm ball joint into the knuckle arm.  
Tighten the ball joint nut to the specified torque and install a new cotter pin.

**Tightening torque:****118—157 N·m (12.0—16.0 m·kg, 87—116 ft·lb)**

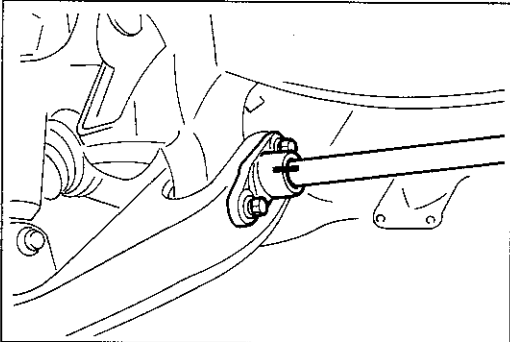


2BU0RX-025

7. Install the torque plate and tighten it to the specified torque.

**Tightening torque:**

**75—93 N·m (7.6—9.5 m·kg, 55—69 ft·lb)**



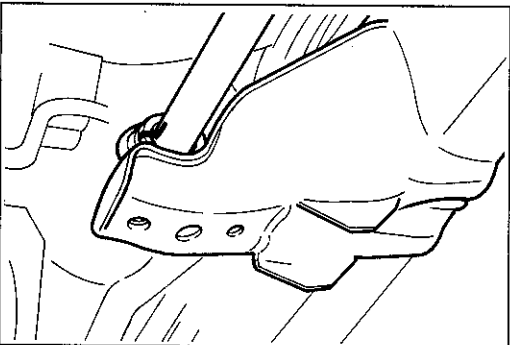
2BU0RX-026

8. Align the marks made during removal, and connect the torsion bar spring into the torque plate.

**Caution**

- a) Coat the serrations of the torsion bar with grease.
- b) Before installation, check the identification color on the end of torsion bar spring.

**Yellow: Left bar, White: Right bar**

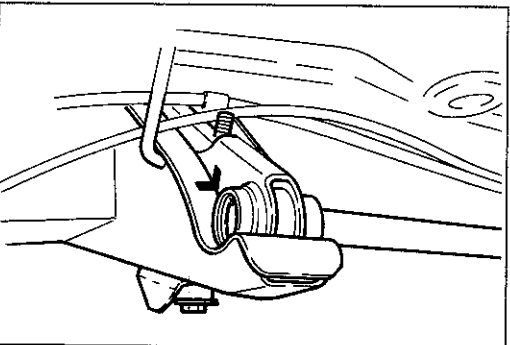


2BU0RX-027

9. Align the marks made during removal, and install the anchor arm onto the torsion bar spring.

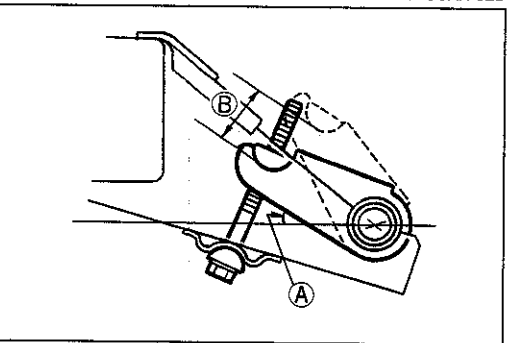
**Caution**

**Coat the serrations of the torsion bar with grease.**



2BU0RX-028

10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.



9BU0RX-049

**Note**

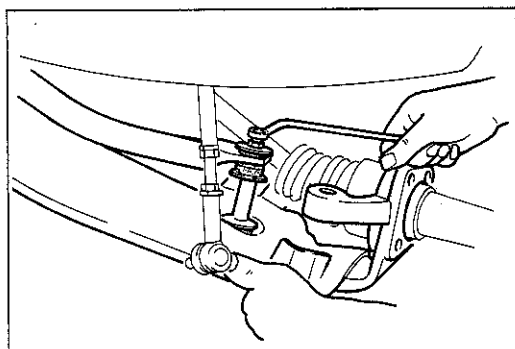
If the anchor bolt was not marked during removal, install it as follows:

1. Lower the front suspension until the upper arm contacts the rebound stopper.
2. Install the anchor arm so that the angle **(A)** is 47°.
3. Install the anchor bolt and tighten it by the amount **(B)**.

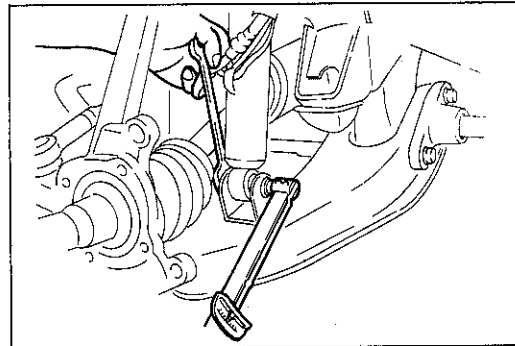
**Amount (B): 40mm (1.57 in)**

# R

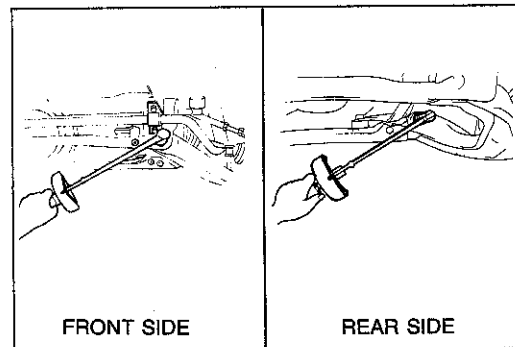
## FRONT SUSPENSION (DOUBLE WISHBONE)



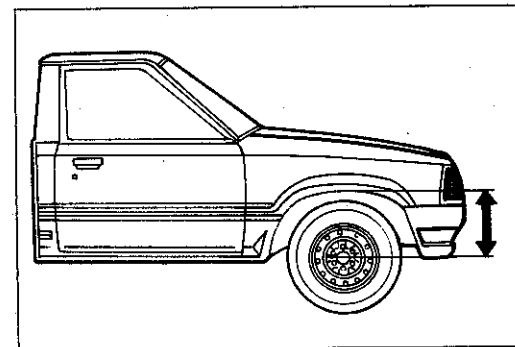
2BU0RX-029



2BU0RX-030



2BU0RX-031



2BU0RX-032

11. Install the stabilizer bolt.  
Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.
12. Install the shock absorber to the lower arm, and temporarily tighten the bolt and nut.
13. Install the wheels.
14. Lower the vehicle from the safety stands.

15. Tighten the shock absorber bolt and nut temporarily tightened in Step 12.

### Tightening torque:

**55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)**

16. Tighten the lower arm spindle nuts temporarily tightened in Step 5.

### Tightening torque

#### Front lower arm spindle nut:

**118—157 N·m (12—16 m·kg, 87—116 ft·lb)**

#### Rear lower arm spindle nut:

**157—196 N·m (16—20 m·kg, 116—145 ft·lb)**

17. Adjust the vehicle height by turning the torsion bar spring anchor bolt.
  - (1) With the vehicle on level ground, check the front and rear tire pressures.
  - (2) Measure the distance from the center of each front wheel to the fender brim.

**Distance: 502mm (19.8 in)**

- (3) If the difference between the left and right is within the specification, adjust the necessary anchor bolt.

### Vehicle height left/right difference:

**10mm (0.39 in) max.**

18. Inspect front wheel alignment and adjust it as necessary.

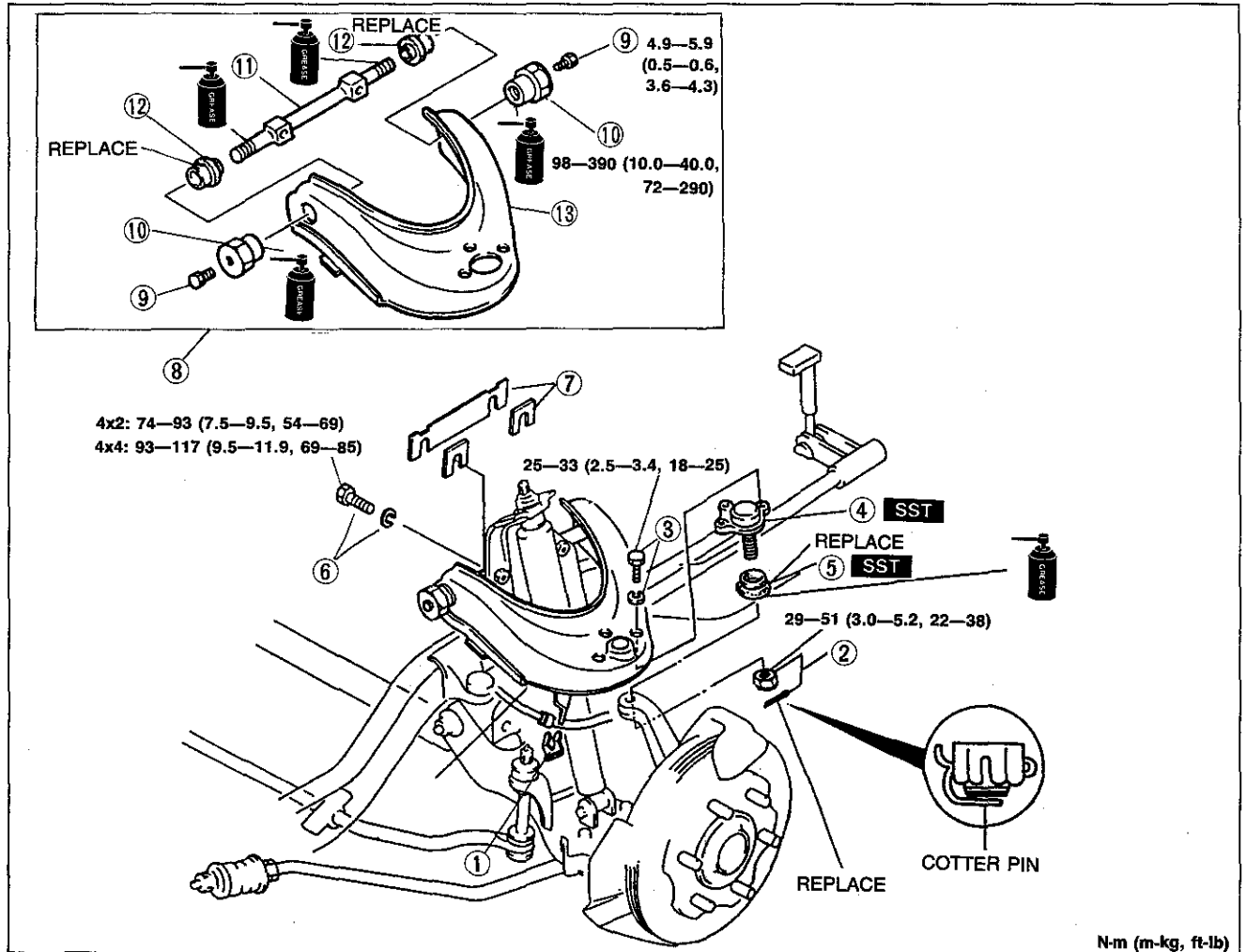
**UPPER ARM (4x2 AND 4x4)**

**Removal and Installation**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal, referring to **Installation Note**.

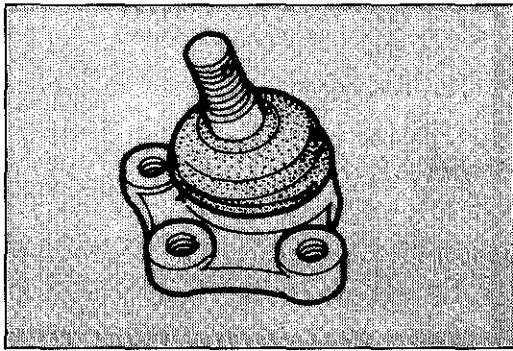
**Note**

- a) During removal, note the number, amount and position of the adjustment shims so that they are reinstalled in the correct positions.
- b) After installation, check the wheel alignment and adjust it if necessary.  
(Refer to page R-7.)

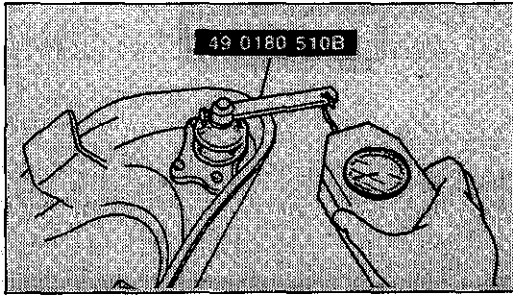


- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 1. Clip                              | 8. Adjustment shims              |
| 2. Cotter pin and nut                | 9. Upper arm assembly            |
| 3. Upper arm ball joint, Knuckle arm | 10. Plug                         |
| Removal Note..... page R-22          | 11. Threaded bushing             |
| 4. Bolts and washers                 | Removal Note..... page R-22      |
| 5. Upper arm ball joint              | Installation Note..... page R-22 |
| Removal Note..... page R-22          | 12. Upper arm shaft              |
| Inspection..... page R-23            | Installation Note..... page R-22 |
| 6. Upper arm ball joint boot         | Inspection..... page R-23        |
| Removal Note..... page R-22          | 13. Dust seal                    |
| Installation Note..... page R-23     | 14. Upper arm                    |
| 7. Bolts and washers                 | Inspection..... page R-23        |

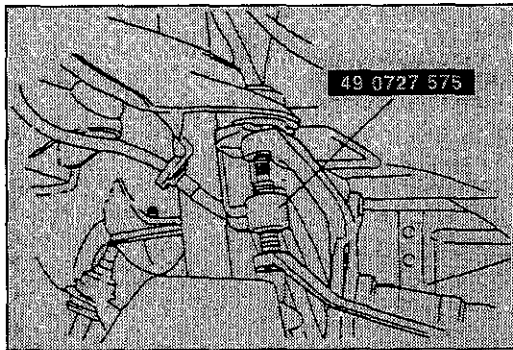
# R FRONT SUSPENSION (DOUBLE WISHBONE)



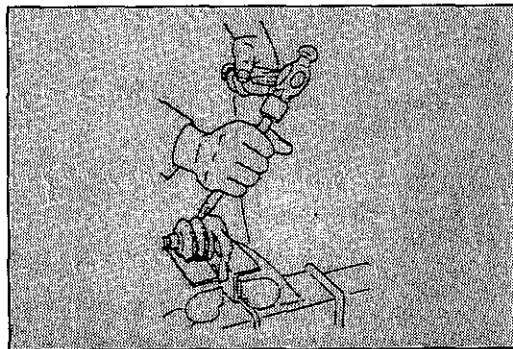
1BU0RX-026



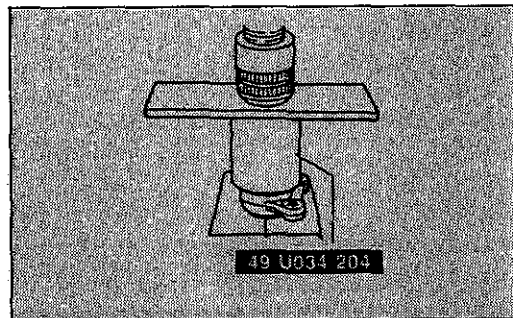
1BU0RX-027



1BU0RX-019



1BU0RX-020



1BU0RX-025

## Inspection

Check for the following and repair or replace parts as necessary.

1. Cracking, damage, and bending of upper arm and upper arm shaft.
2. Damage and poor operation of upper arm ball joint.

3. Upper arm ball joint preload.

Attach the **SST** to the ball stud, and measure the preload with a pull scale.

## Caution

Measure the preload after first rocking the ball joint stud 3 or 4 times.

**Pull scale reading: 20—34 N (2.0—3.5 kg, 4.4—7.7 lb)**  
(While ball stud is rotating)

## Removal note

### Upper arm ball joint/Knuckle arm

Using the **SST**, separate the upper arm ball joint from the knuckle arm.

## Upper arm ball joint boot

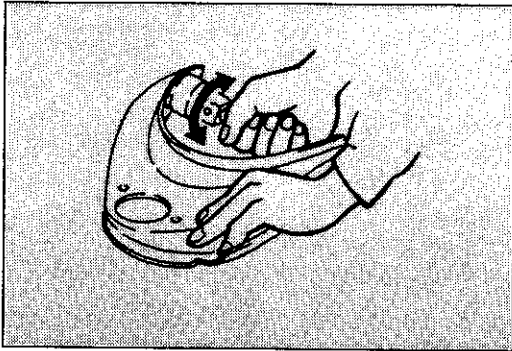
1. Secure the upper arm in a vise.
2. Use a chisel as shown to remove the upper arm ball joint boot.

## Note

Use protective plates in the jaws of the vise to prevent damage to the part secured.

## Upper arm ball joint boot

1. Liberally coat the new boot with grease, and use the **SST** to press it on.



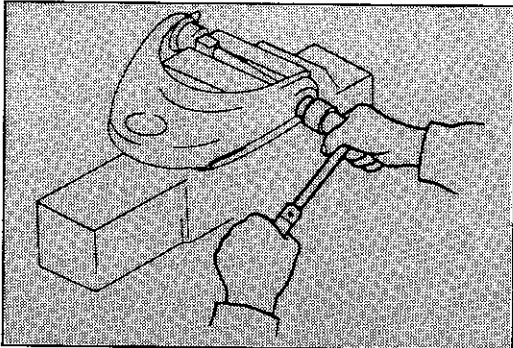
1BU0RX-024

## Inspection

Verify that the upper arm shaft turns smoothly.

## Caution

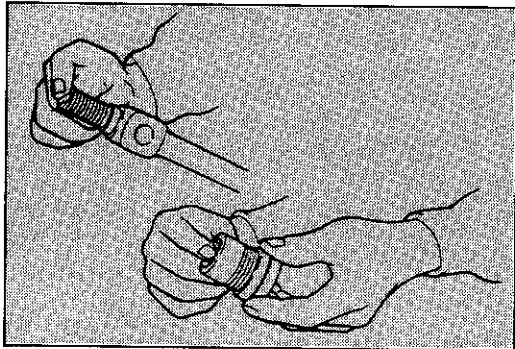
**If the upper arm shaft cannot be turned smoothly, replace the upper arm and/or threaded bushings.**



1BU0RX-021

## Threaded bushing

1. Secure the upper arm shaft in a vise.
2. Alternately loosen the threaded bushings in steps.
3. Remove the threaded bushings.

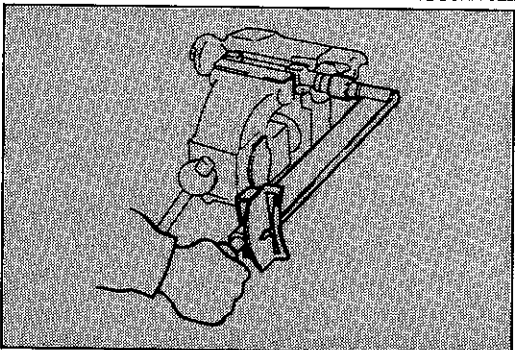


1BU0RX-022

## Installation note

### Upper arm shaft/Threaded bushing

1. Apply the specified grease to the upper arm shaft and threaded bushings.



1BU0RX-027

2. Secure the upper arm shaft in a vise.
3. Install the dust seals and upper arm shaft to the upper arm.
4. Alternately tighten the threaded bushings in steps.

## Tightening torque:

**98—390 N·m (10—40 m·kg, 72—290 ft·lb)**

## Caution

**If the specified tightening torque cannot be obtained, replace the upper arm and/or threaded bushings.**

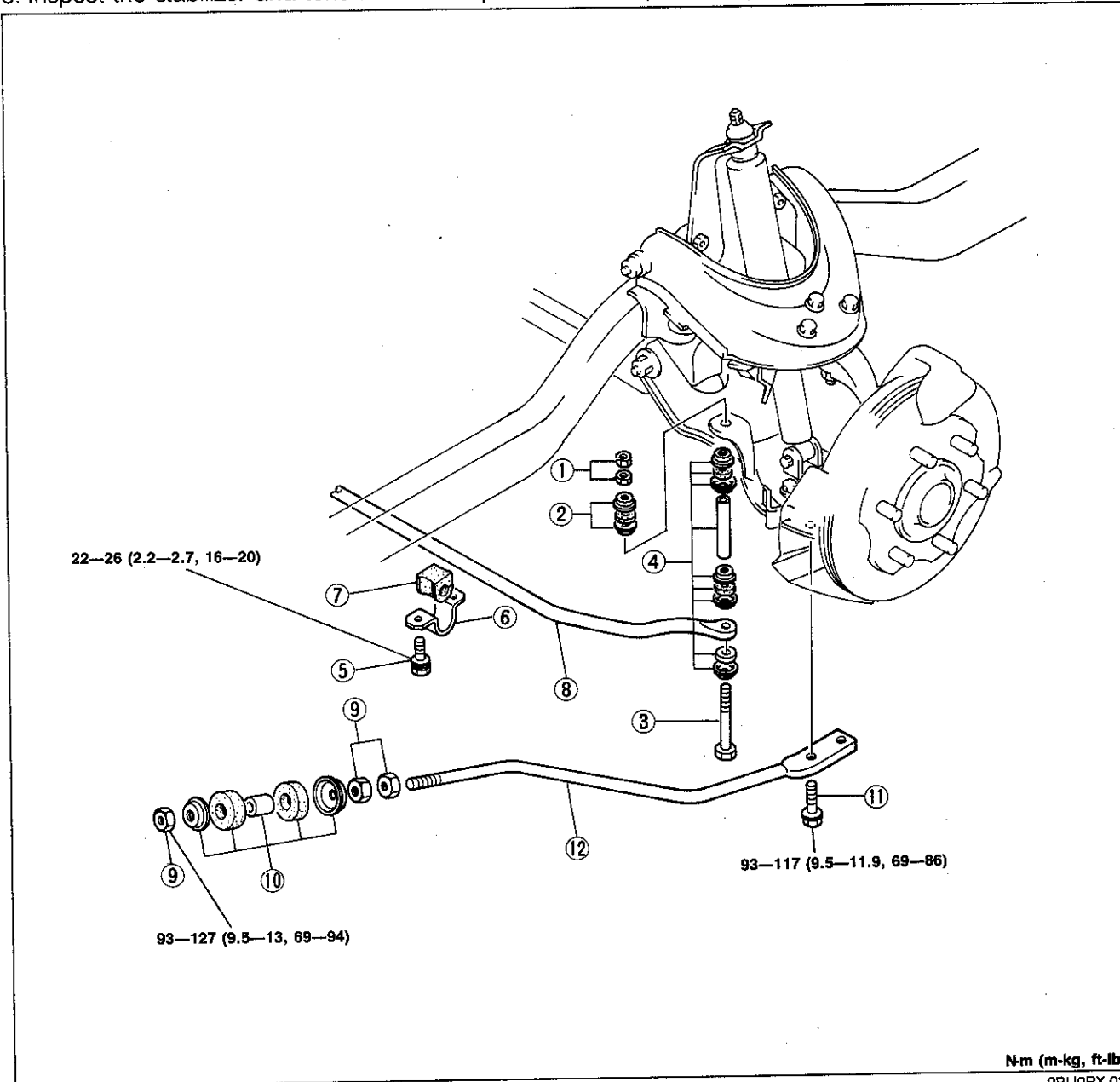
# R

## FRONT SUSPENSION (DOUBLE WISHBONE)

### STABILIZER AND TENSION ROD (4x2)

#### Removal and Inspection

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure.
5. Inspect the stabilizer and tension rod components and repair or replace as necessary.

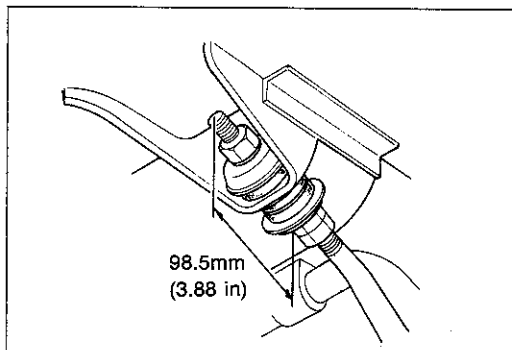


N-m (m-kg, ft-lb)

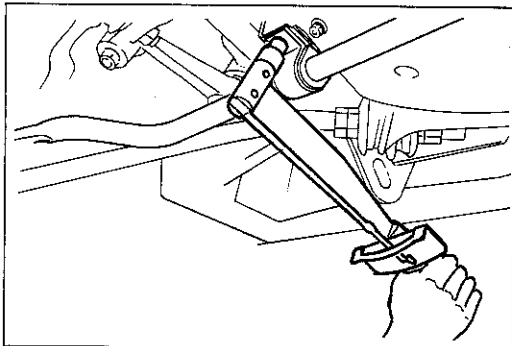
2BU0RX-038

- |  |  |
|--|--|
| 1. Nuts                                      | 8. Stabilizer bar                                    |
| 2. Retainers                                 | Check for bending, cracking, deterioration or damage |
| 3. Bolt                                      |  |
| 4. Bushings, retainers and spacer            | 9. Nuts  |
| Check the bushings for wear or deterioration | 10. Bushings and retainers                           |
|  | Check bushings for wear or deterioration             |
| 5. Bolts                                     | 11. Bolt   |
| 6. Stabilizer bracket                        | 12. Tension rod                                      |
| 7. Bushing                                   | Check for bending, cracking, deterioration or damage |
| Check for wear or deterioration              |  |

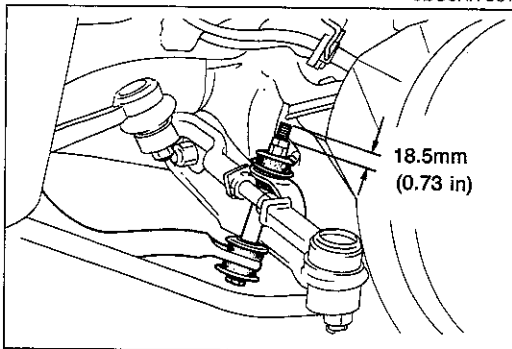




9BU0RX-060



9BU0RX-061



2BU0RX-039

## Installation

Install as follows:

1. Install the tension rod.

## Tightening torque

### Bushing (front):

93—127 N·m (9.5—13.0 m·kg, 69—94 ft·lb)

### Lower arm:

93—117 N·m (9.5—11.9 m·kg, 69—86 ft·lb)

2. Install the stabilizer bushing and bracket. Tighten the bolts to the specified torque.

## Tightening torque:

22—26 N·m (2.2—2.7 m·kg, 16—20 ft·lb)

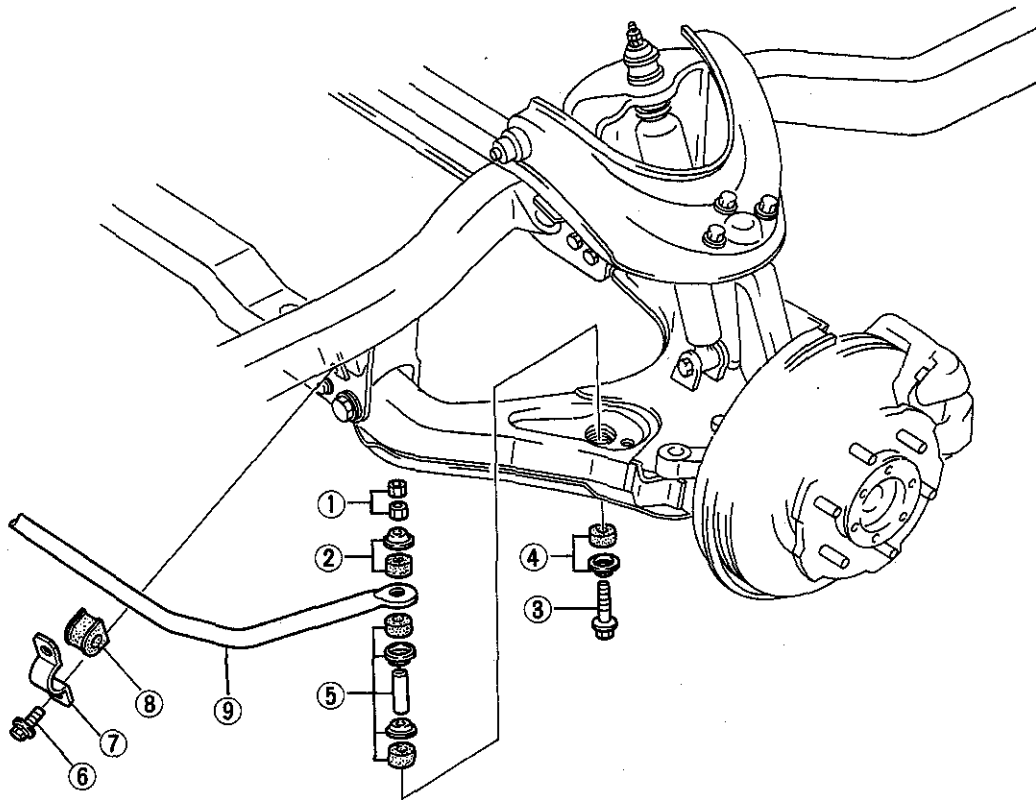
## Caution

- a) Install so that the bushing seam faces forward.
- b) Lower the vehicle, and then tighten once again to the specified torque with the vehicle in the unladen condition.

3. Install the stabilizer bolt. Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.
4. After installation, check the caster angle. (Refer to page R-7.)

**STABILIZER (4x4)****Removal and Inspection**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure.
5. Inspect the stabilizer components and repair or replace as necessary.

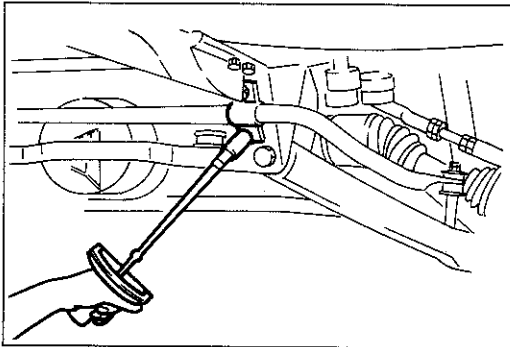


22-26 (2.2-2.7, 16-20)

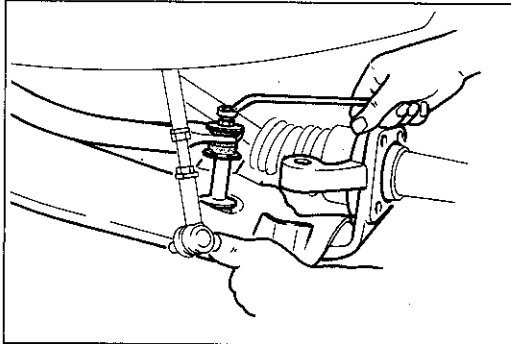
N-m (m-kg, ft-lb)

2BU0RX-040

- |   |  |
|---|--|
| 1. Nuts                                 | 5. Retainers, bushings, and spacer         |
| 2. Retainer and bushing                 | Check bushings for wear or deterioration   |
| Check bushing for wear or deterioration | 6. Bolts                                   |
| 3. Bolt                                 | 7. Stabilizer bracket                      |
| 4. Retainer and bushing                 | 8. Bushing                                 |
| Check bushing for wear or deterioration | Check for wear or deterioration            |
|   | 9. Stabilizer bar                          |
|   | Check for cracking, bending, deterioration |
|   | or damage                                  |



9BU0RX-064



2BU0RX-041

### Installation

1. Install the stabilizer bushing and bracket, and tighten the bolts to the specified torque.

### Tightening torque:

**22–26 N·m (2.2–2.7 m·kg, 16–20 ft·lb)**

### Caution

- a) Install so that the bushing seam faces forward.
- b) Lower the vehicle, and then tighten once again to the specified torque with the vehicle in the unladen condition.

2. Install the stabilizer bolt.  
Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.
3. After installation, check the caster angle.  
(Refer to page R-7.)

# R

## REAR SUSPENSION (LEAF SPRING)

### REAR SUSPENSION (LEAF SPRING)

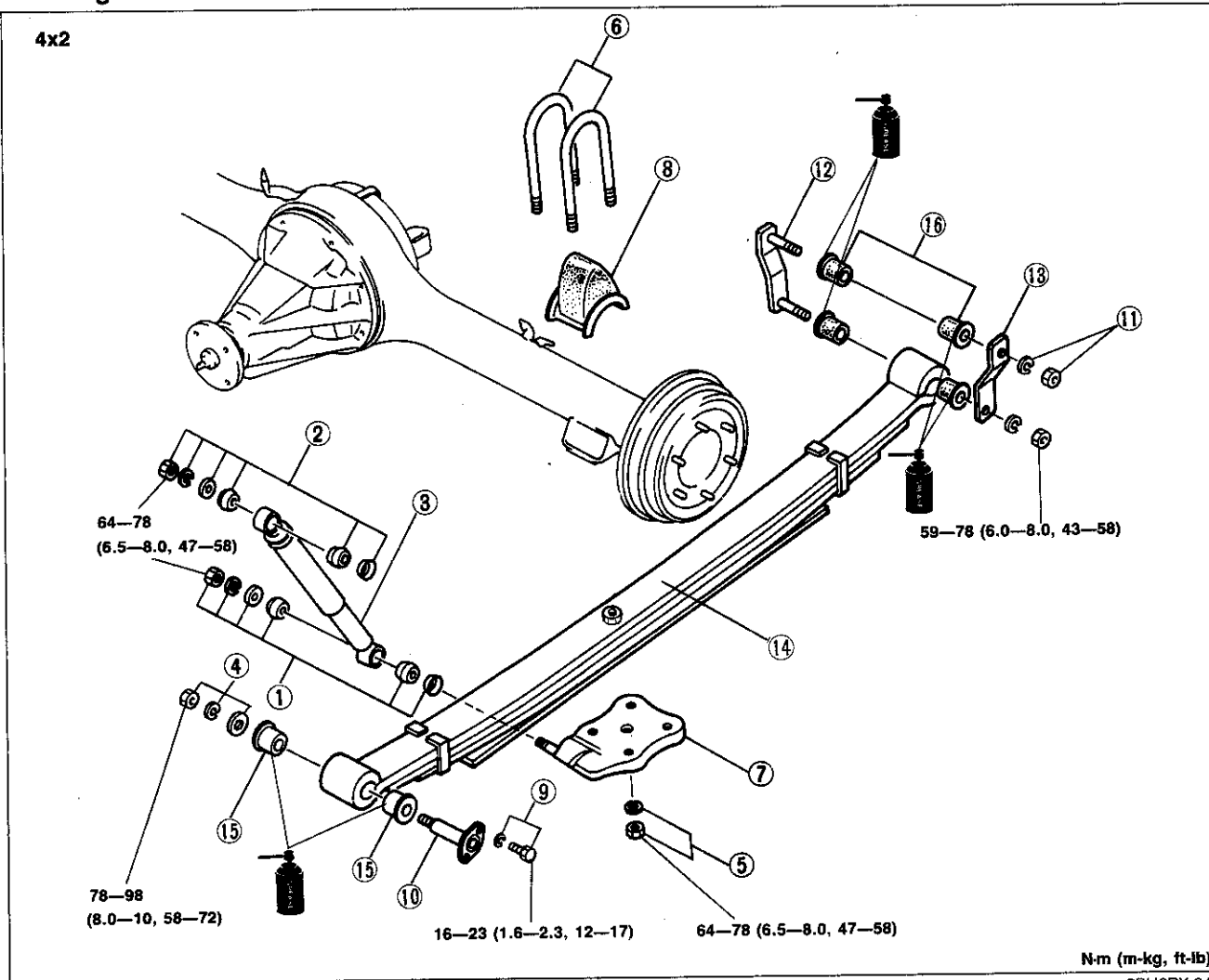
#### SHOCK ABSORBER AND LEAF SPRINGS (4x2 AND 4x4)

##### Removal and Inspection

1. Loosen the wheel lug nuts.
2. Jack up the rear of the vehicle and support it with safety stands.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect the shock absorber and leaf spring components and repair or replace as necessary.

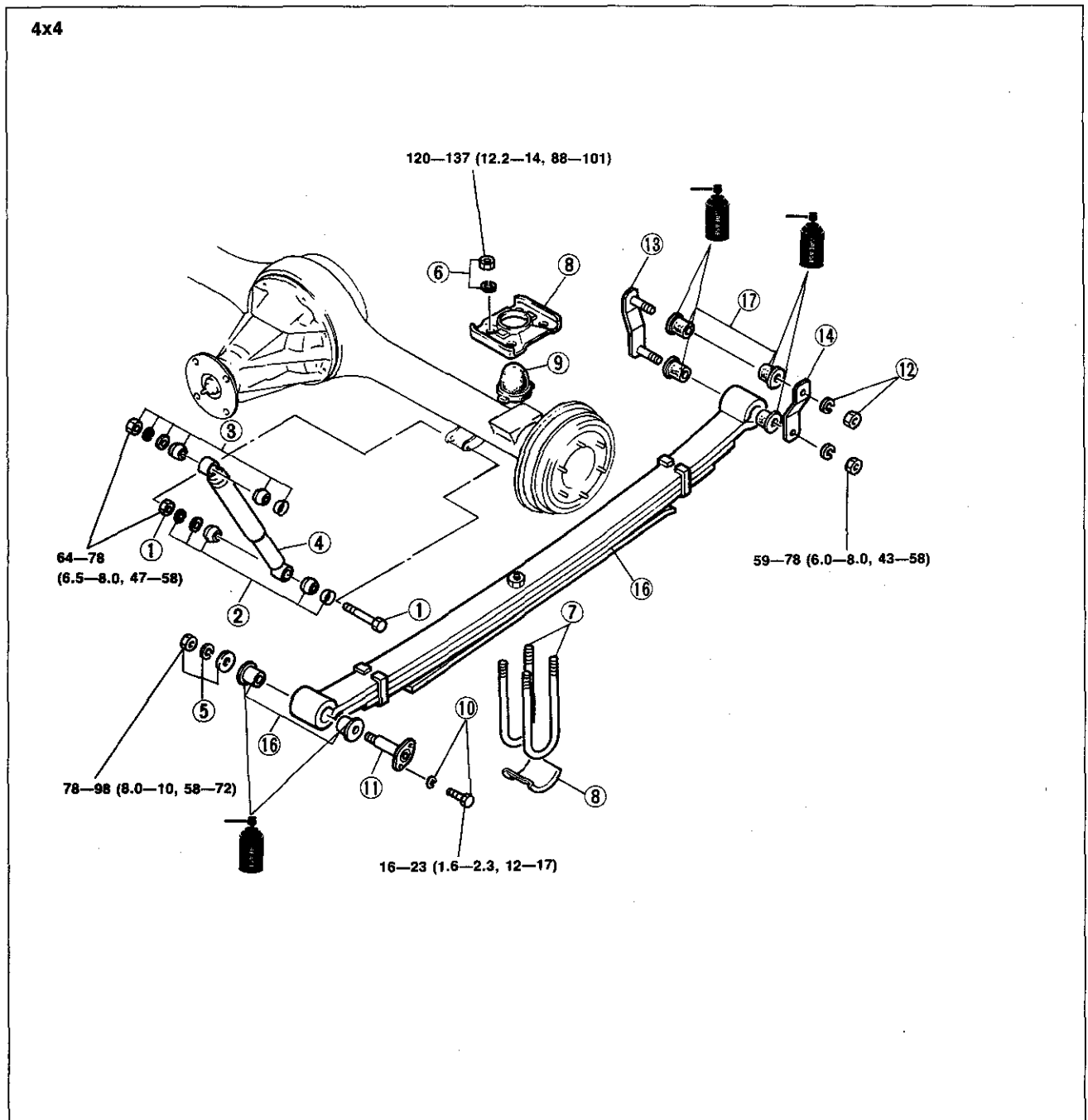
##### Warning

**Do not place the safety stands under the rear axle casing. Use a jack to raise or lower the axle casing**



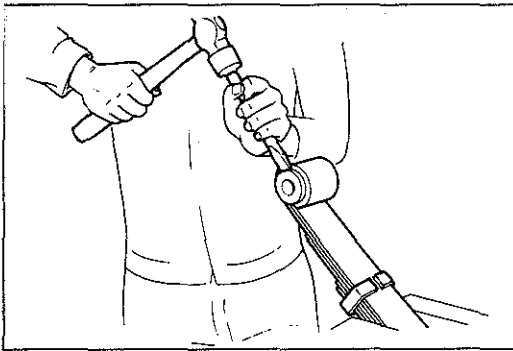
1. Nut, washers, retainer, and bushings  
Check bushings for wear or deterioration
2. Nut, washers, retainer, and bushings  
Check bushings for wear or deterioration
3. Shock absorber  
Check for oil leakage or poor operation
4. Nut and washers
5. Nuts and washers
6. U-bolts
7. Spring clamp
8. Stopper rubber  
Check for damage or deterioration

9. Bolts and washers
10. Spring pin
11. Nuts and washers
12. Shackle pin
13. Shackle plate
14. Leaf spring assembly  
Disassembly ..... page R-31  
Assembly ..... page R-31  
Check for weakness or damage
15. Leaf spring bushings  
Removal Note..... page R-30  
Check for wear or deterioration



2BU0RX-043

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Bolt and nut</li> <li>2. Washers, retainer, and bushings<br/>Check bushings for wear or deterioration</li> <li>3. Nut, washers, retainer, and bushings<br/>Check the bushing for wear or deterioration</li> <li>4. Shock absorber<br/>Check for oil leakage or poor operating</li> <li>5. Nut and washers</li> <li>6. Nut and washer</li> <li>7. U-bolts</li> <li>8. Set plates</li> <li>9. Spring clamp</li> <li>10. Stopper rubber<br/>Check for wear or deterioration</li> </ul> | <ul style="list-style-type: none"> <li>11. Bolt and washer</li> <li>12. Spring pin</li> <li>13. Nut and washer</li> <li>14. Shackle pin</li> <li>15. Shackle plate</li> <li>16. Leaf spring assembly<br/>Disassembly ..... page R-31<br/>Assembly ..... page R-31<br/>Check for weakness or damage</li> <li>17. Leaf spring bushing<br/>Removal Note..... page R-30<br/>Check for wear or deterioration</li> </ul> |
|---|--|



9BU0RX-069

### Removal note

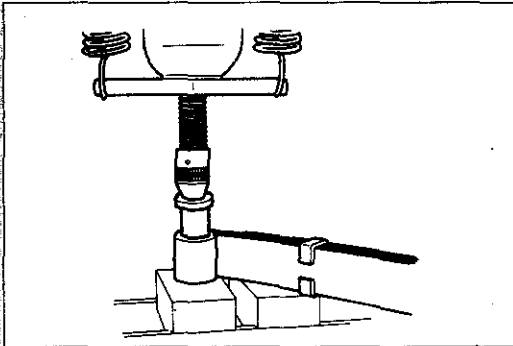
#### Leaf spring bushings

#### Removal:

Secure the leaf spring assembly in a vise and use a chisel to remove the bushings.

#### Caution

**Use protective pads in the vise.**



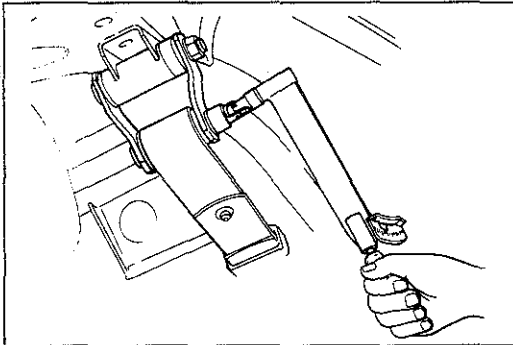
2BU0RX-044

#### Installation:

Apply rubber grease to the bushing outer surface and press the new bushings in with a suitable round bar.

#### Installation

1. Lift the leaf spring assembly into place.
2. Wipe away the grease on the shackle pin and shackle plate.
3. Install the shackle pin and shackle plate, and loosely tighten the shackle mounting nut.
4. Lift the front of the spring assembly.
5. Wipe away grease on the spring pin.
6. Install the spring pin and tighten the mounting nuts of shackle pin and spring pin to the specified torques.



2BU0RX-045

#### Tightening torque

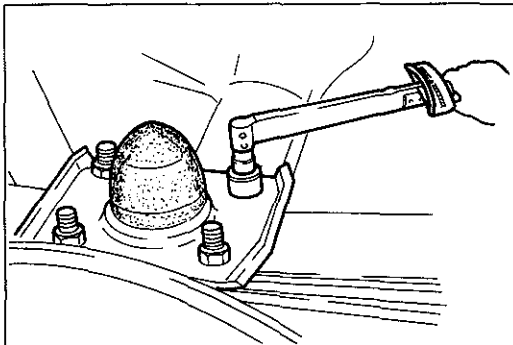
##### Shackle pin:

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

##### Spring pin:

**78—98 N·m (8.0—10.0 m·kg, 58—72 ft·lb)**

7. Wipe away any grease that has been expelled from the shackle pin, shackle plate and spring pin.



2BU0RX-046

8. Install the U-bolts, set plates and stopper rubber. Tighten the U-bolt mounting nuts to the specified torque.

#### Tightening torque

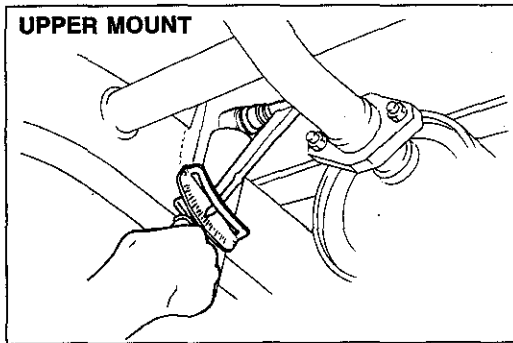
**4x2: 64—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)**

##### 4x4:

**120—137 N·m (12.2—14.0 m·kg, 88—101 ft·lb)**

#### Caution

**Retighten the nuts to the specified torque after lowering the vehicle (unladen condition).**



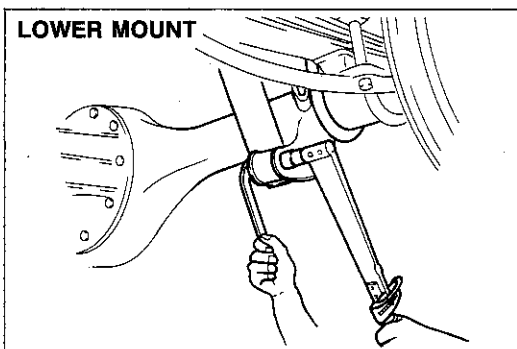
1BU0RX-015

9. Tighten the shock absorber mounting nuts to the specified torque.

#### (4x2 and 4x4 Upper mount)

#### Tightening torque:

**64—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)**

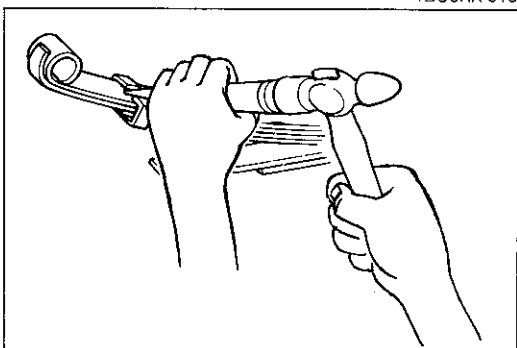


1BU0RX-016

(4x2 and 4x4 Lower mount)

**Tightening torque:**

**64—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)**



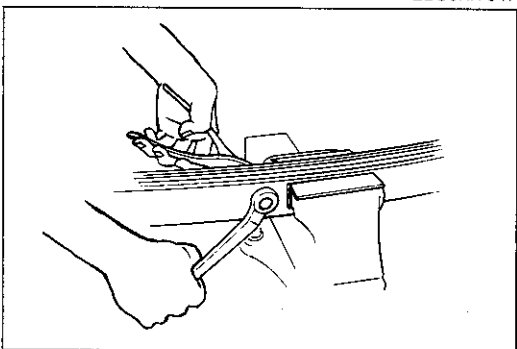
2BU0RX-047

### Leaf spring assembly Disassembly

1. Secure the leaf spring assembly in a vise.

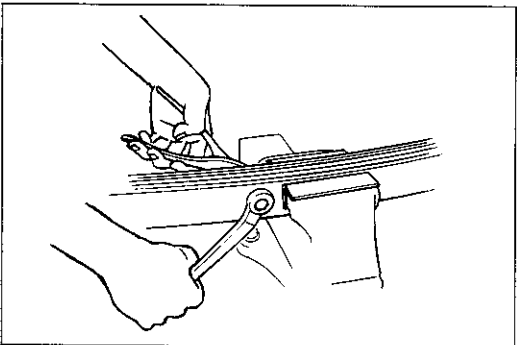
#### Note

**Use protective plates in the jaws of the vise to prevent damage to the port secured.**



2BU0RX-048

2. Uncrimp the clip.
3. Remove the center bolt.



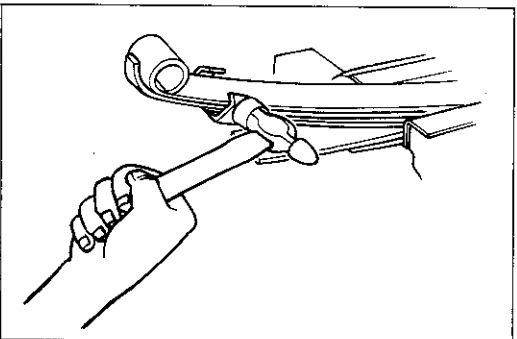
2BU0RX-049

### Assembly

1. Secure the leaf springs in a vise.
2. Install the center bolt from the upper side.

**Tightening torque:**

**98—137 N·m (10.0—14.0 m·kg, 72—101 ft·lb)**



2BU0RX-050

3. Crimp the clip.

#### Caution

**Do not allow any gap between the clip and the springs.**

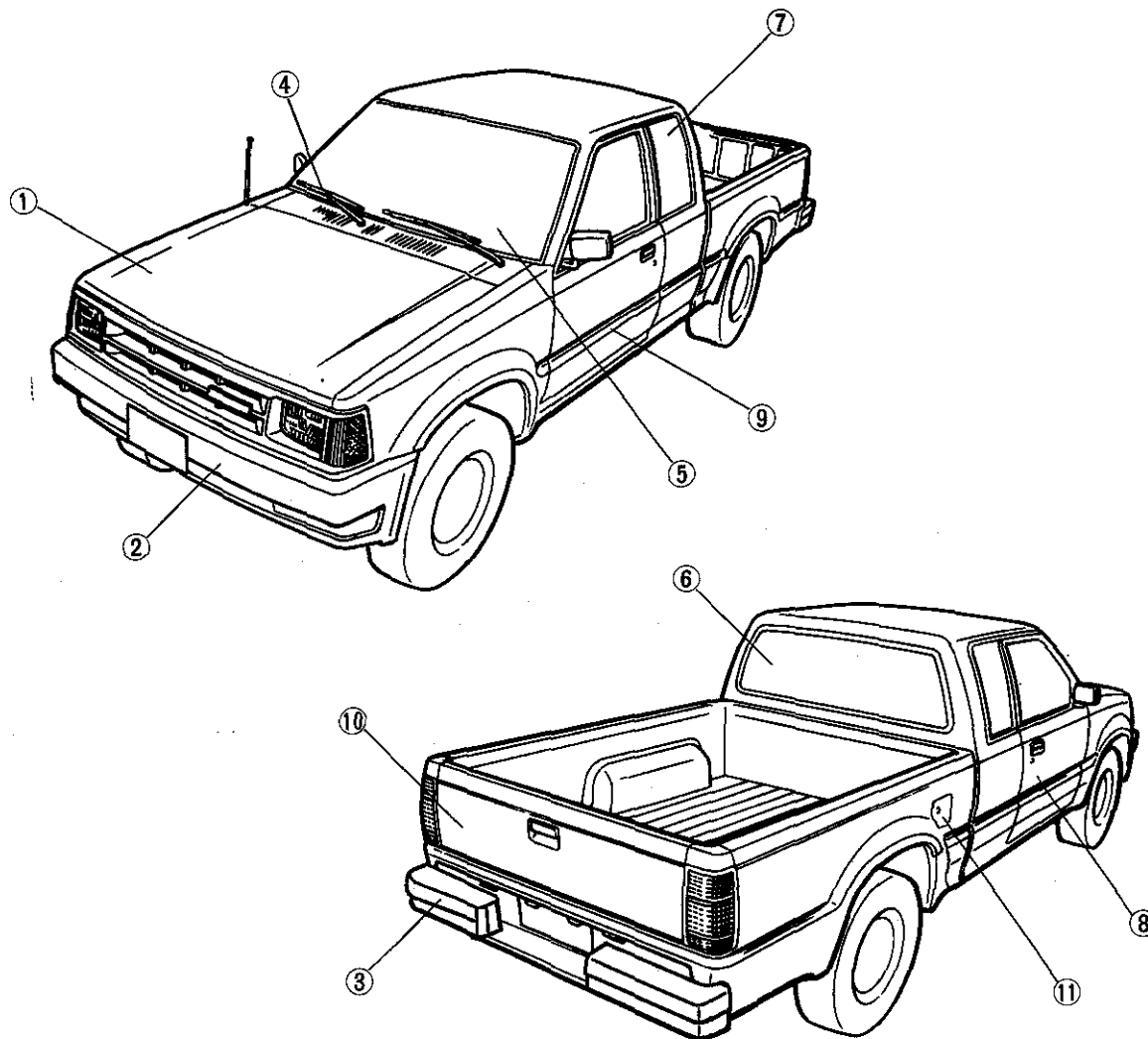
## BODY

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2BU0SX-001

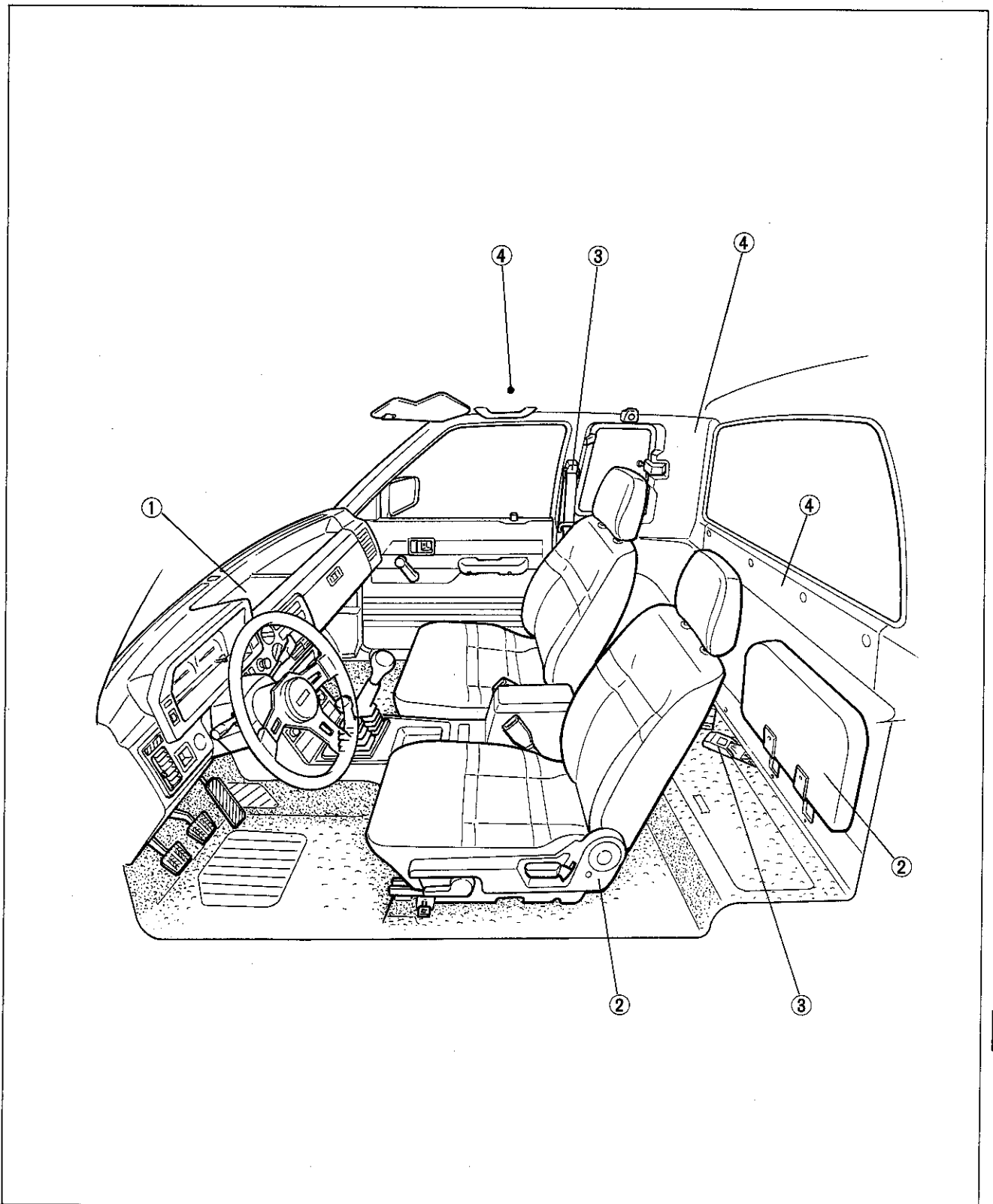


## INDEX



2BU0SX-002

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| 4. Windshield wiper and washer<br>Troubleshooting guide<br>..... page S- 7<br>Inspection ..... page S-10<br>Removal and installation<br>..... page S-12<br>Adjustment ..... page S-13 | 8. Door<br>Adjustment ..... page S-16<br>Removal and installation<br>..... page S-16 |   |
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2BU05X-003

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## HOOD

## REMOVAL AND INSTALLATION

1. Remove in the order shown in the figure.
2. Mark the hood hinge locations on the engine hood for proper reinstallation.
3. Install the hood in the reverse order of removal, and adjust it if necessary.

## Tightening torque:

**7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

## ADJUSTMENT

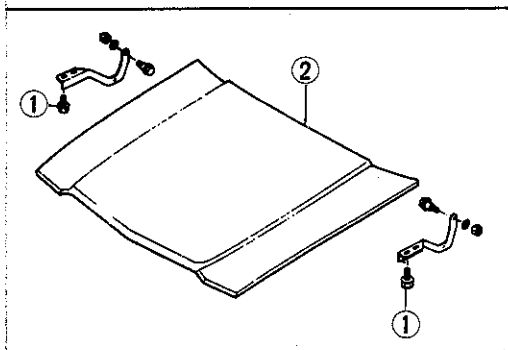
1. Adjust the hood front and rear and side to side by loosening the nuts attaching it to the hinges to allow repositioning.

2. Adjust the hood lock after the hood has been aligned. The lock can be moved up and down and side to side. Align it with the striker on the hood by loosening the attaching bolts and nut.

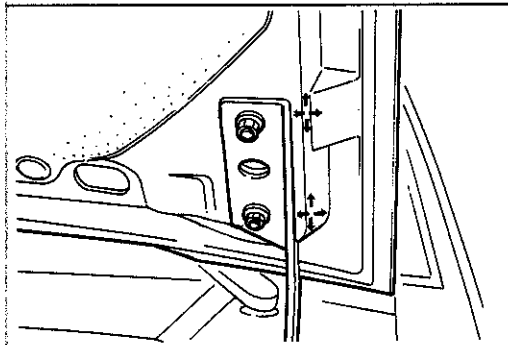
## Tightening torque:

**Bolt ... 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)**

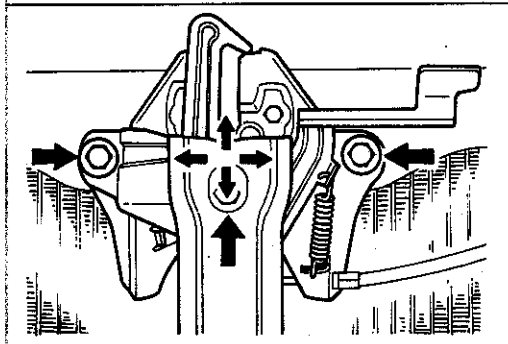
**Nut .... 8.8—13 N·m (0.9—1.3 m·kg, 6.5—9.4 ft·lb)**



1BU0SX-002



7BU14X-003

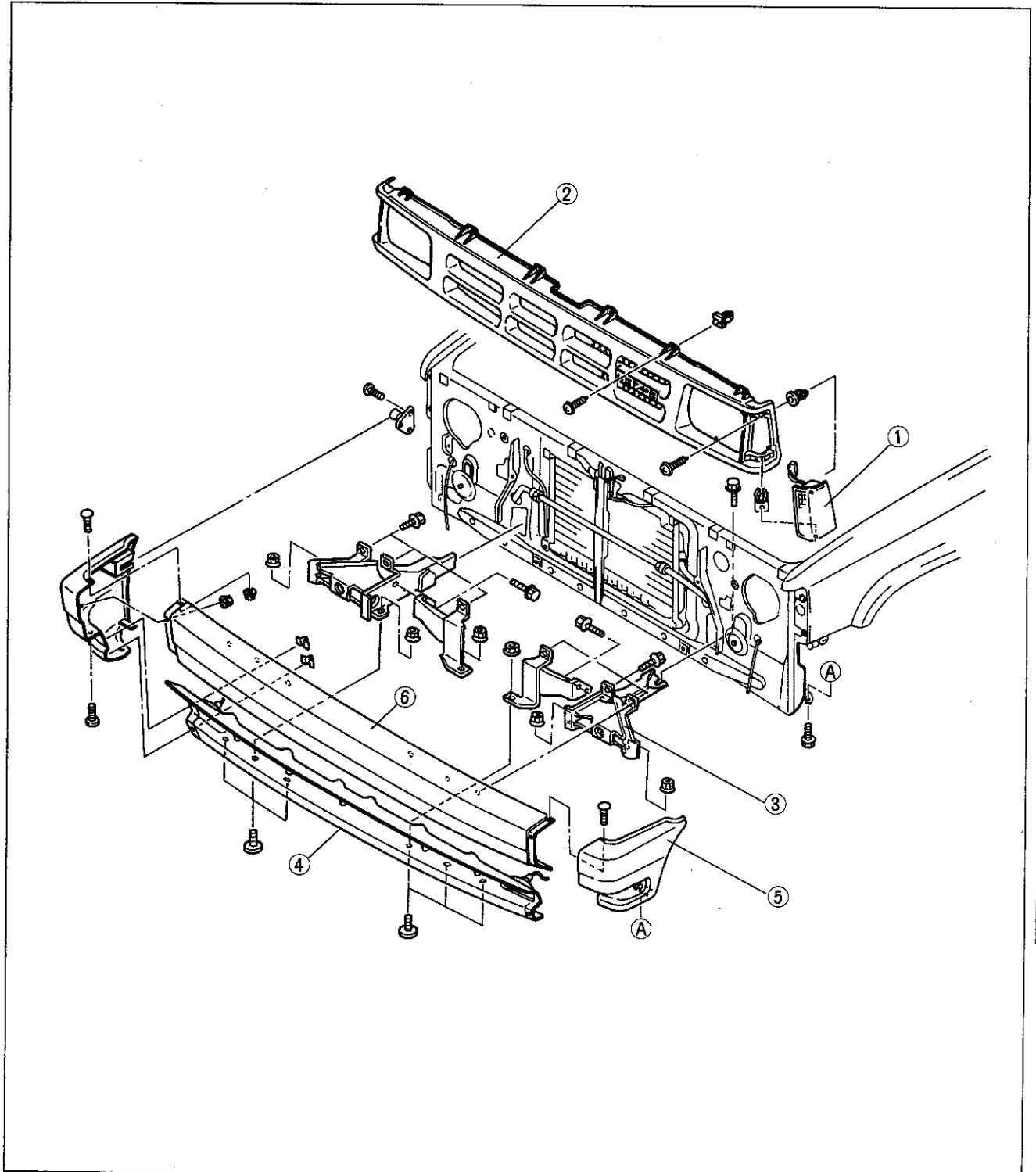


9BU0SX-005

## FRONT BUMPER

## REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Combination light
2. Radiator grille
3. Bumper stay

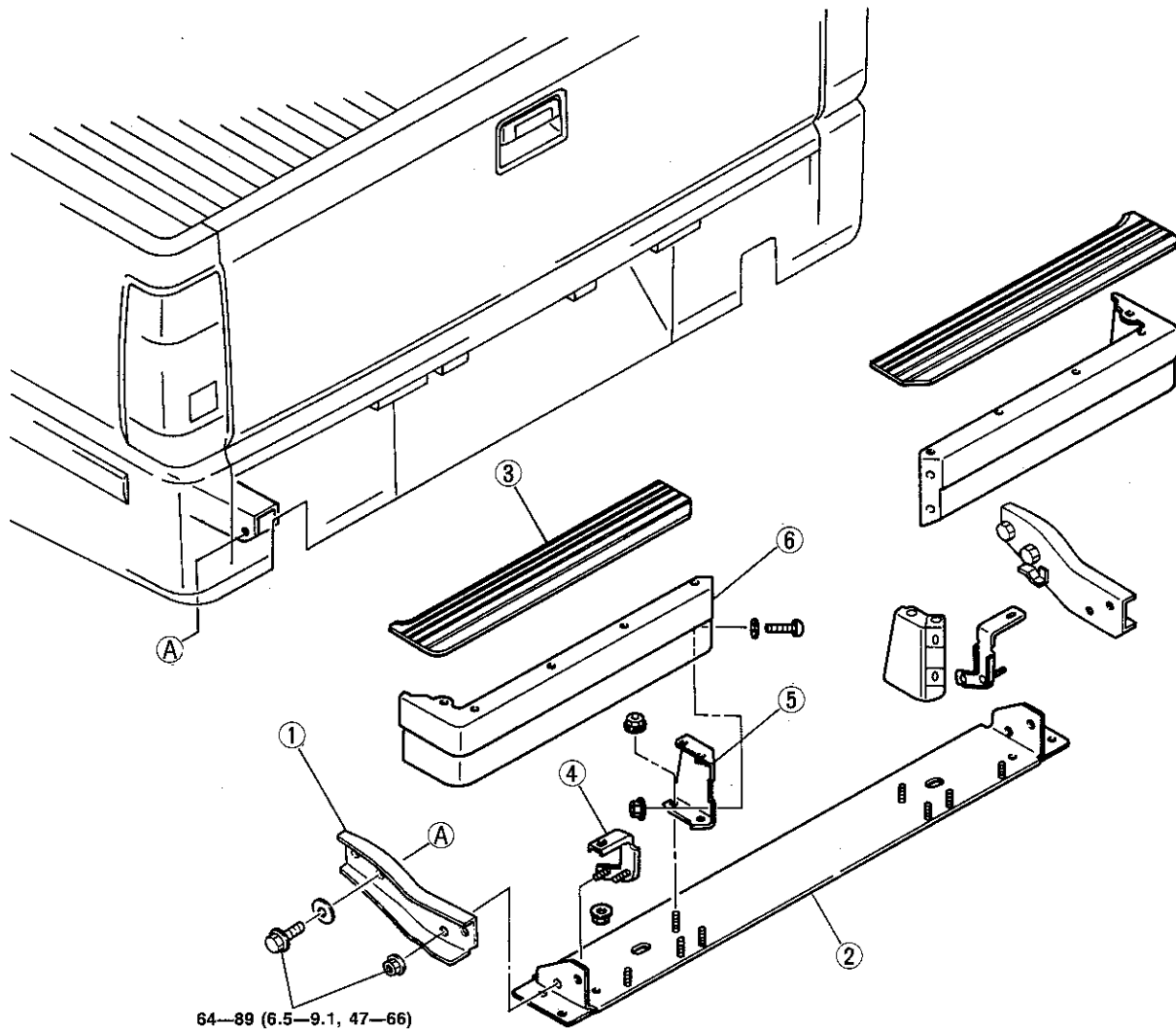
4. Bumper skirt
5. Bumper sides
6. Bumper face

1BU0SX-003

## REAR BUMPER

## REMOVAL AND INSTALLATION

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



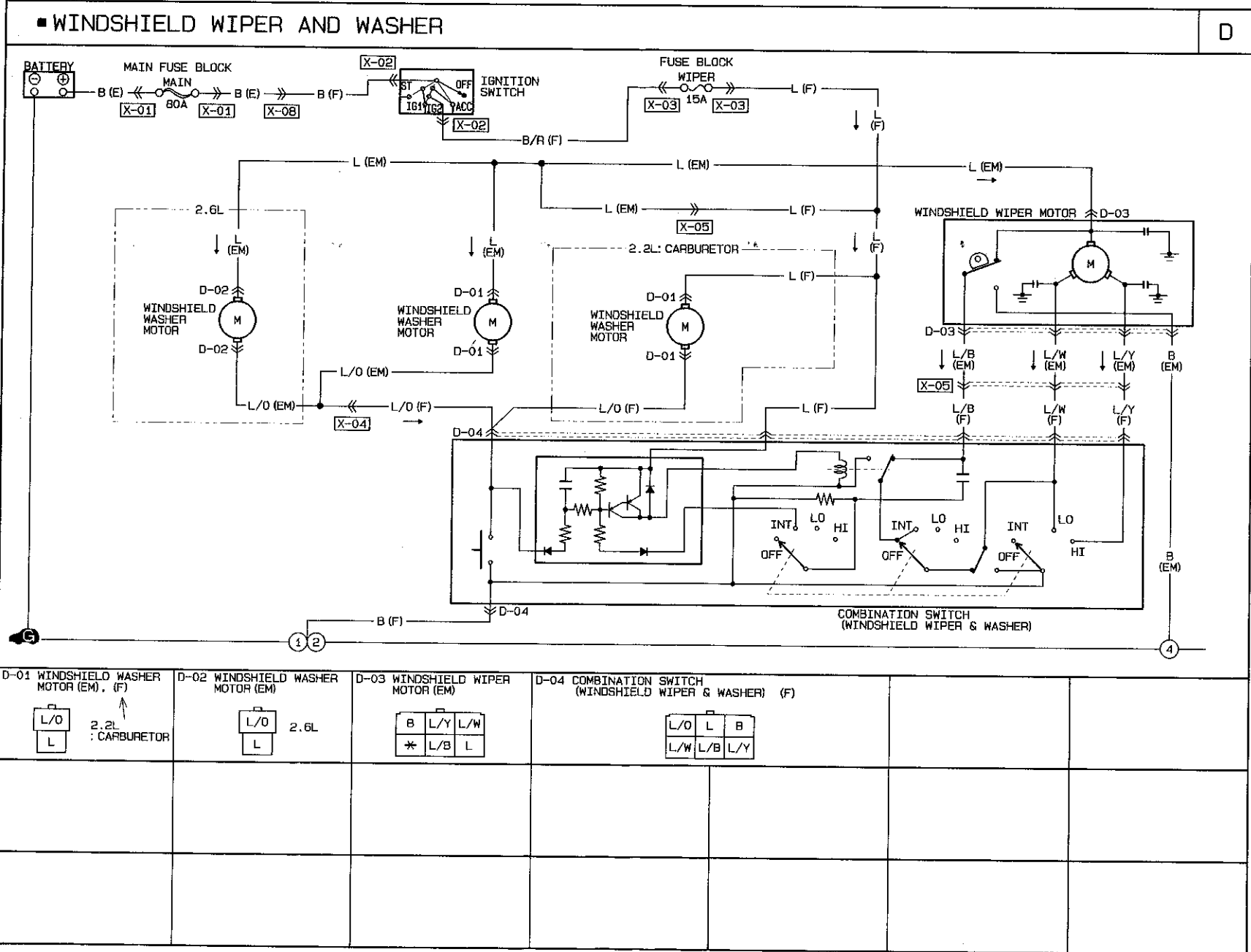
N-m (m-kg, ft-lb)

1BU0SX-004

1. Bumper stay
2. Set plate assembly
3. Step bracket

4. Bumper bracket
5. Inner face
6. Bumper face

WINDSHIELD WIPER AND WASHER TROUBLESHOOTING GUIDE



# S

## WINDSHIELD WIPER AND WASHER

Flow No.1	Symptom	Either Lo or Hi operation of wiper is not possible
-----------	---------	--

### Possible cause

- Damaged wiper switch
- Damaged wiper motor
- No continuity of wiring harness
- Loose or corroded connector

### Remedy

- Check wiper switch (Refer to page S-10)
- Check wiper motor (Refer to page S-10)
- Repair wiring harness

2BU0SX-005

Flow No.2	Symptom	Auto stop operation of wiper is not possible (Wiper stops at position where wiper switch is turned OFF)
-----------	---------	--

### Possible cause

- Damaged wiper motor
- No continuity of wiring harness
- Loose or corroded connector

### Remedy

- Check wiper motor (Refer to page S-10)
- Repair wiring harness

2BU0SX-006

Flow No.3	Symptom	Intermittent operation of wiper is not possible (Lo/Hi operation is possible)
-----------	---------	---

### Possible cause

- Damaged wiper switch
- Damaged intermittent wiper relay

### Remedy

- Check wiper switch (Refer to page S-10)

2BU0SX-007

Flow No.4	Symptom	One touch operation of wiper is not possible
-----------	---------	--

### Possible cause

- Damaged wiper switch

### Remedy

- Check wiper switch (Refer to page S-10)

2BU0SX-008

Flow No.5	Symptom	Wiper continues Lo/Hi operation after wiper switch is turned OFF
-----------	---------	--

### Possible cause

- Damaged wiper switch

### Remedy

- Check wiper switch (Refer to page S-10)

2BU0SX-009

Flow No.6	Symptom	Washer does not operate (Wiper operates)
-----------	---------	--

**Possible cause**

- Damaged washer switch
- Damaged washer motor
- No continuity of wiring harness
- Loose or corroded connector

**Remedy**

- Check washer switch (Refer to page S-10)
- Check washer motor (Refer to page S-11)
- Repair wiring harness

2BU0SX-010

Flow No.7	Symptom	Washer operates with washer switch turned OFF
-----------	---------	---

**Possible cause**

- Damaged washer switch

**Remedy**

- Check washer switch (Refer to page S-10)

2BU0SX-011

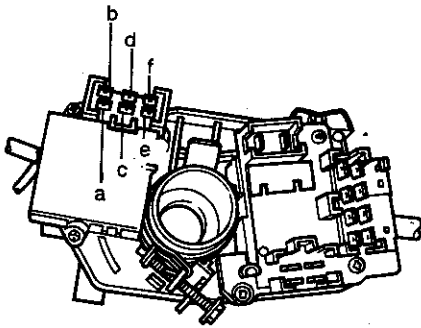


# WINDSHIELD WIPER AND WASHER

## WIPER AND WASHER SWITCH

### Inspection

1. Check for continuity between terminals by using an ohmmeter.



2BU0SX-012

Position	Terminal		a	b	c	d	e	f
	One touch							
Wiper switch	OFF	ON	○					○
		OFF				○		○
	INT		○					○
	I (Low)		○					○
	II (High)		○	○				
Washer switch ON			○				○	

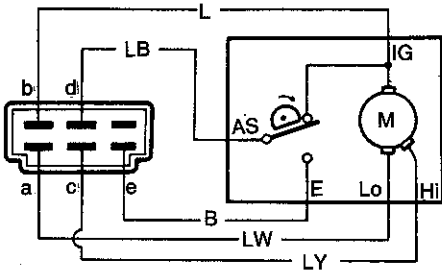
○—○: Indicates continuity

2. If not as specified replace the combination switch.

## WIPER MOTOR

### Inspection

1. Check for continuity between terminals by using an ohmmeter.



2BU0SX-013

Terminals	Continuity	Note
b—a	Conductive	—
b—c	Conductive	—
b—d	Conductive	Normal resting position
e—d	Conductive	Except for normal resting position

2. Check the operation by applying an electrical source to the motor.

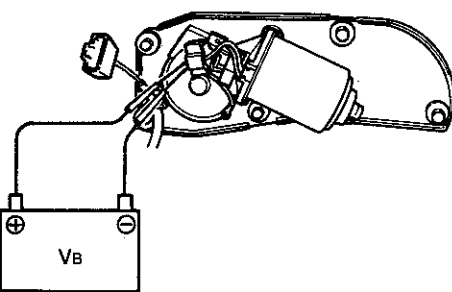
**V<sub>B</sub>: Battery voltage**

Terminal		Operation speed
V <sub>B</sub>	Ground	
b	a	Low
	c	High

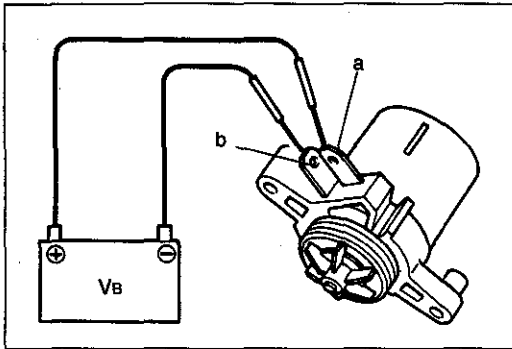
3. Check for continuity between the b and d terminals and between the d and e terminals while operating the motor in low speed.

Terminals	Continuity
b—d	Nonconductive most of the time, and becomes conductive once per turn
d—e	Continuity most of the time, and becomes nonconductive once per turn

4. If not as specified, replace the wiper motor.



2BU0SX-014



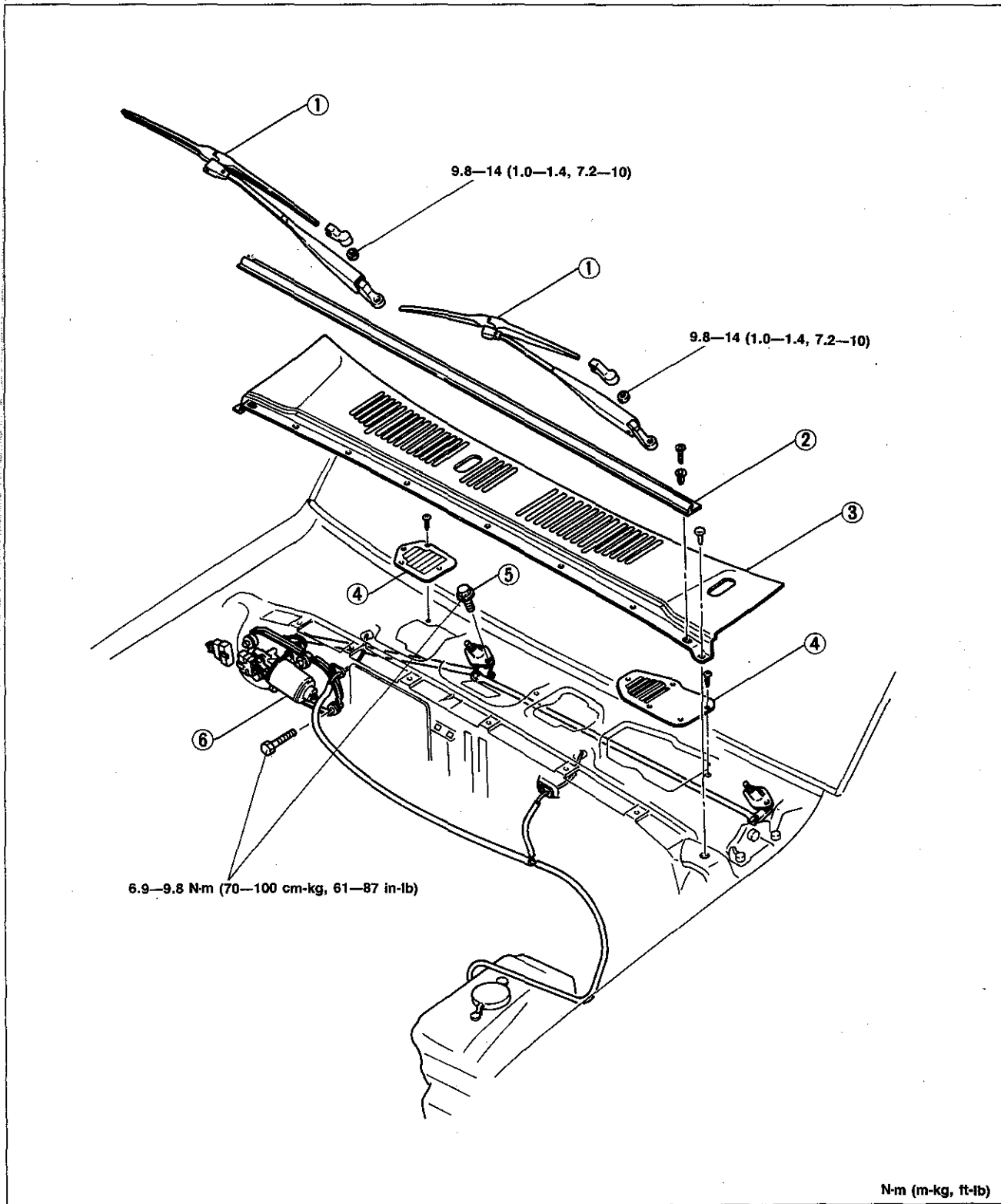
2BU0SX-015

**WASHER MOTOR****Inspection**

1. Connect battery voltage to the a terminal and the ground to the b terminal, and make sure the washer motor operates.
2. If not as specified, replace the washer motor.

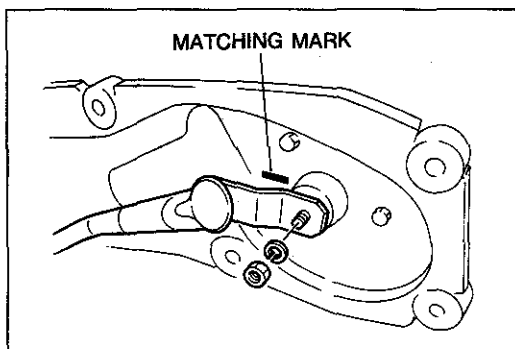
**REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.

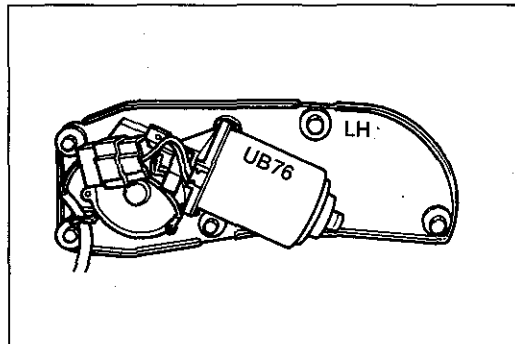


1. Wiper arms and wiper blades
2. Seal rubber
3. Cowl grille

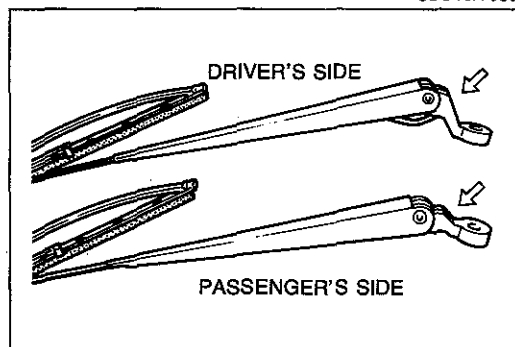
4. Seal covers
5. Bolt
6. Wiper motor and link assembly



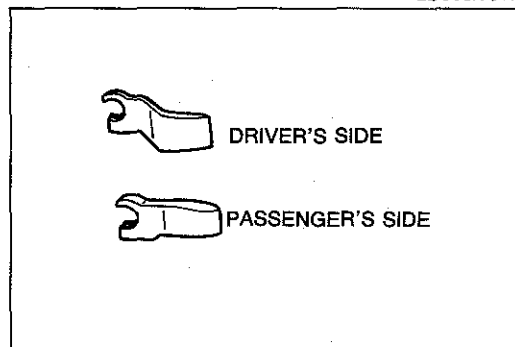
9BU0TX-035



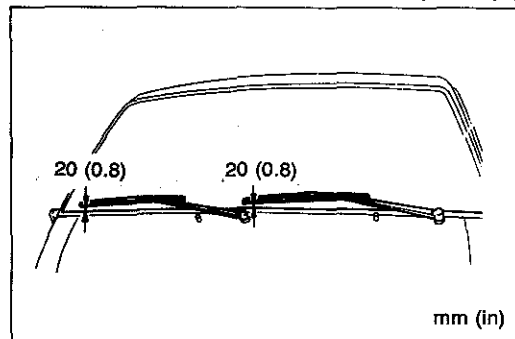
5BU15X-039



2BU0SX-017



5BU15X-041



9BU0TX-036

### Removal and Installation Note

- a) Make matching marks on the wiper motor when removing the wiper link assembly from it.
- b) Align the wiper link with the mark on the wiper motor when installing the wiper link assembly to the motor. The automatic-stop angle is approximately 20.5°.

- c) The wiper motor used is per specifications. When replacing the wiper motor, note the identification numbers.

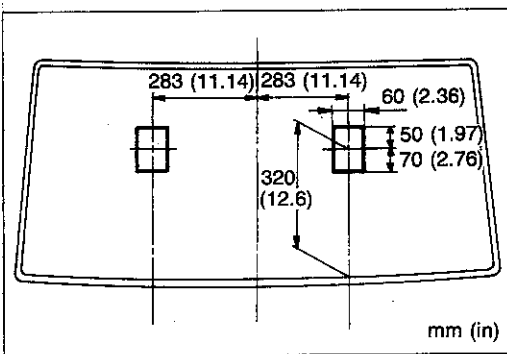
Identification number	Specification
LH (on the bracket)	Without cold-area version
LH + UB76 (on the bracket) + (on the motor)	Cold-area version

- d) The shape of the wiper arm and cap on the driver's side is different from ones on the passenger's side. When reinstalling the wiper arms, install them in the correct positions.

### ADJUSTMENT Arm Height

Adjust the arm height as shown in the figure, and tighten the arm to the specified torque.

**Tightening torque:**  
9.8—14 N·m (1.0—1.4 m·kg, 7.2—10 ft·lb)



5BU15X-043

**Washer Spray**

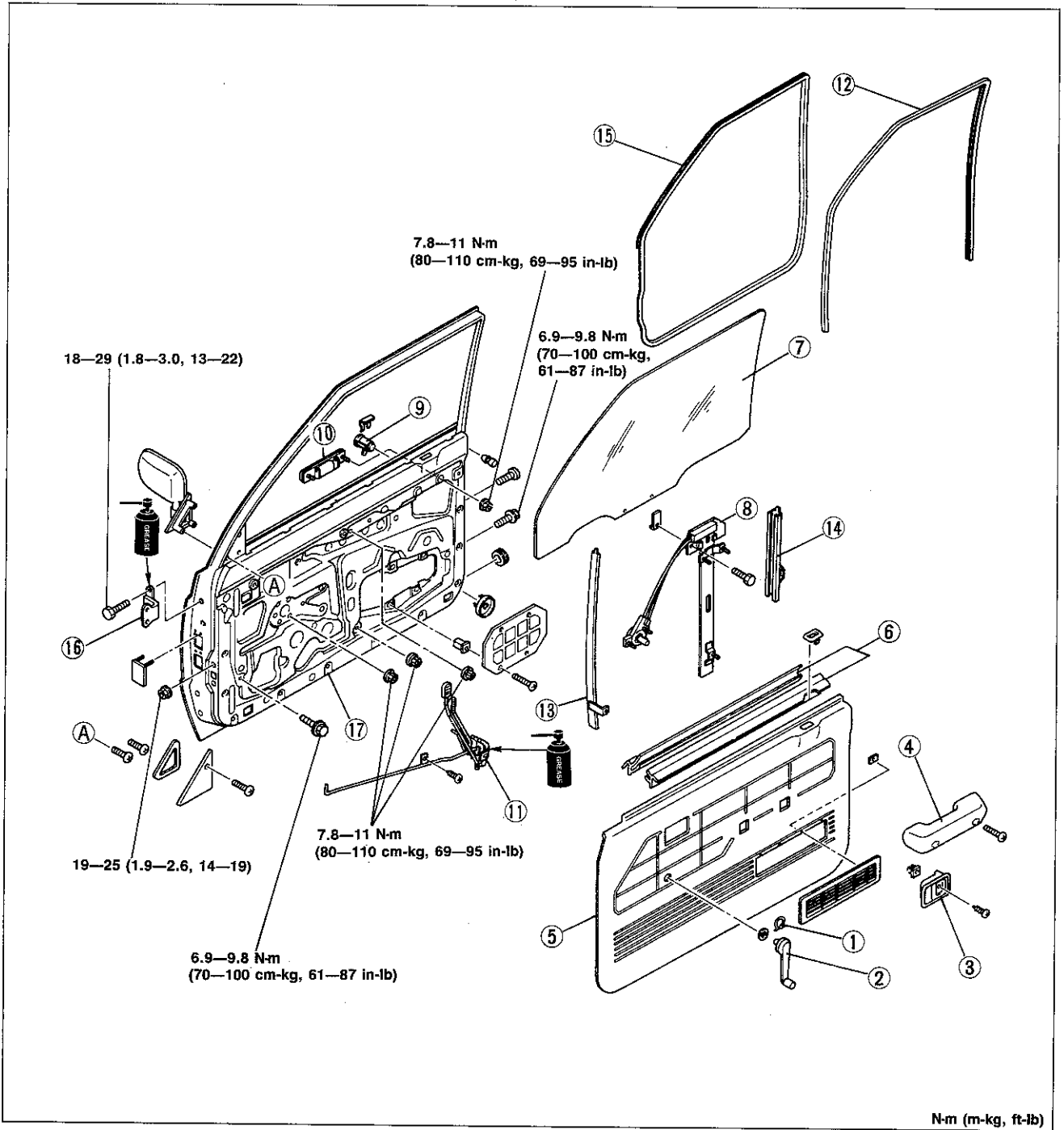
Adjust the aim of the washer spray nozzle by inserting a needle or similar object into the hole of the nozzle and bending it to adjust.

DOOR

STRUCTURAL VIEW

Note

Refer to page S-16 for door lock striker adjustment.

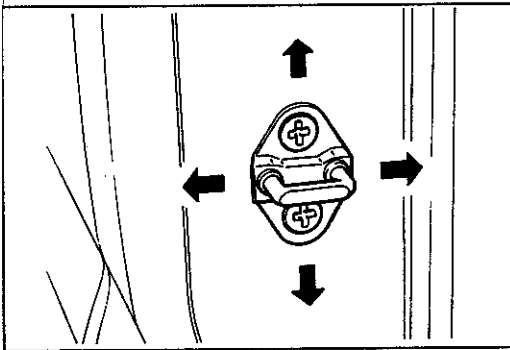


- 1. Snap ring
- 2. Regulator handle
- 3. Inner handle
- 4. Armrest
- 5. Door trim
- 6. Weatherstrip (inner and outer)

- 7. Door glass
- 8. Regulator assembly
- 9. Key cylinder
- 10. Outer handle
- 11. Door lock
- 12. Glass run channel

- 13. Glass guide A
  - 14. Glass guide B
  - 15. Weatherstrip
  - 16. Door hinge
  - 17. Door
- Adjustment ..... page S-16

2BU0SX-018



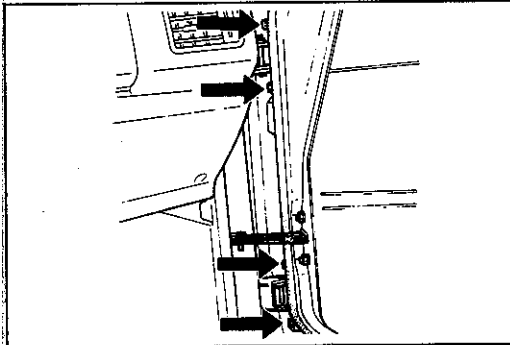
1BU0SX-009

**ADJUSTMENT****Door Lock Striker**

1. Make sure the door can be closed easily, and inspect for looseness. If a problem is found, adjust by loosening the striker mounting screw and moving the door lock striker up, down, or laterally.
2. Make sure the door and rear body are aligned. If not, adjust by moving the door lock striker laterally.

**Tightening torque:**

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



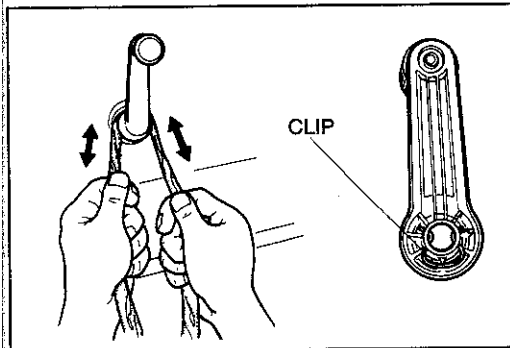
4EG14X-023

**Door Hinge**

1. If looseness is found when the door is opened, tighten the door hinge mounting bolts (arrows).
2. Align the door and body by loosening the door hinge mounting bolts.

**Note**

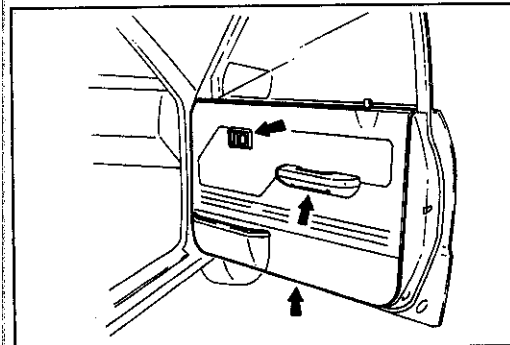
If noise is heard from the checker when the door is opened, apply grease to the checker cam.



1BU0SX-010

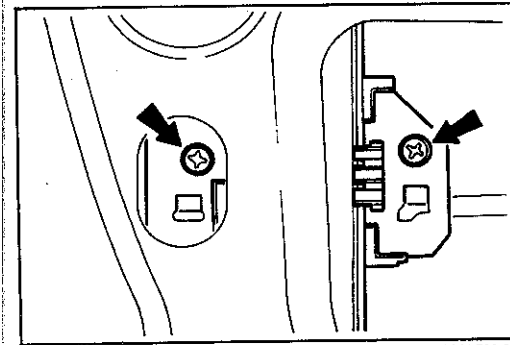
**REMOVAL AND INSTALLATION****Window Regulator**

1. Remove the regulator handle installation clip with a rag as shown in the figure.



9BU0SX-017

2. Remove inner handle, armrest, and door trim.



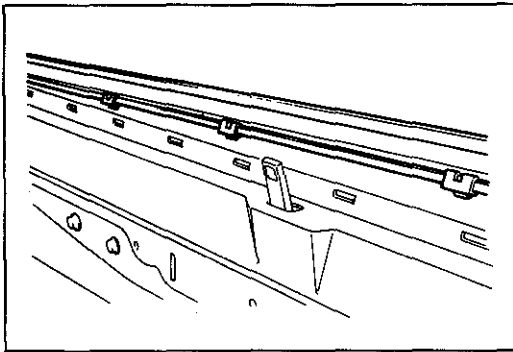
9BU0SX-018

3. Remove door screen.

**Note**

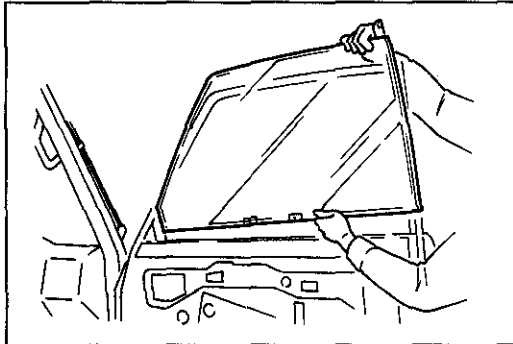
Remove the door screen carefully so that it may be reused.

4. Position the door glass mounting screw so that it can be removed from the access hole.
5. Remove the door glass mounting screws.



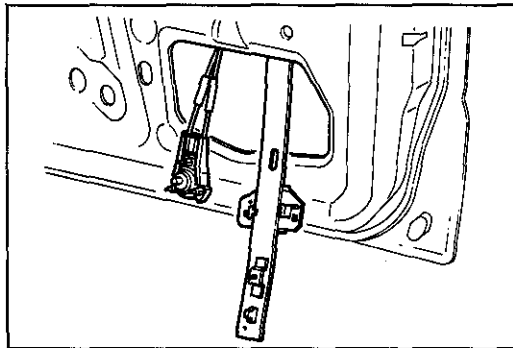
9BU0SX-019

6. Remove the weatherstrips (inner and outer).
7. Remove the glass guide mounting bolt.



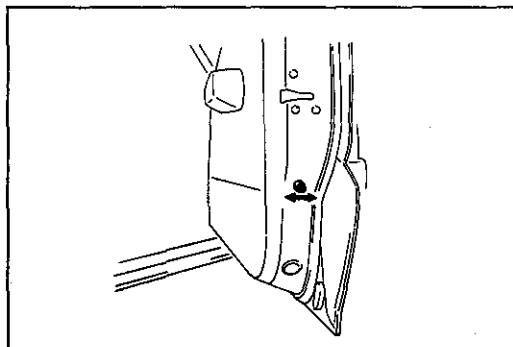
9BU0SX-020

8. Remove the door glass upward.



9BU0SX-021

9. Remove the mounting bolts, and remove the window regulator from the access hole.

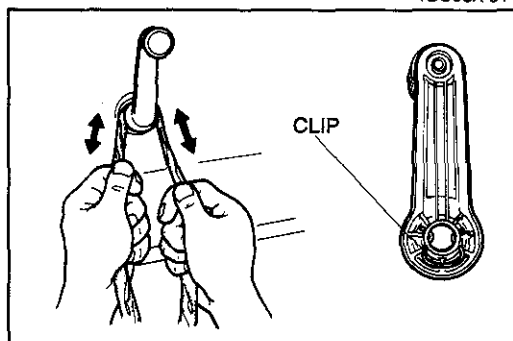


1BU0SX-011

Install in the reverse order of removal, referring to the installation note.

#### Note

**After installing the window regulator, adjust it so that the door glass moves up and down smoothly.**



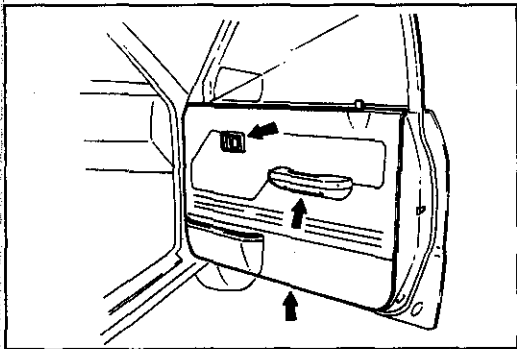
1BU0SX-012

#### Door Lock

1. Raise the door glass all the way.
2. Remove the regulator handle installation clip with a rag as shown in the figure.



## DOOR

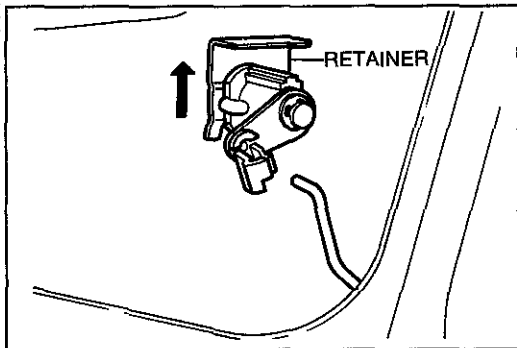


9BU0SX-024

3. Remove inner handle, armrest, and door trim.
4. Remove the door screen.

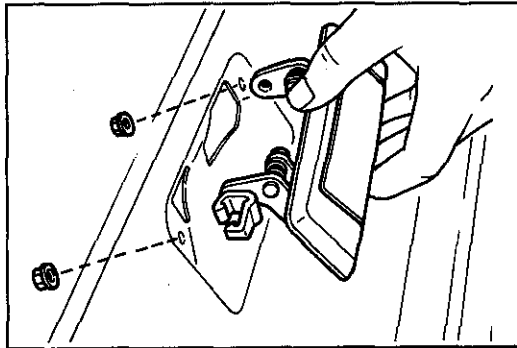
**Note**

Remove the door screen carefully so that it may be reused.



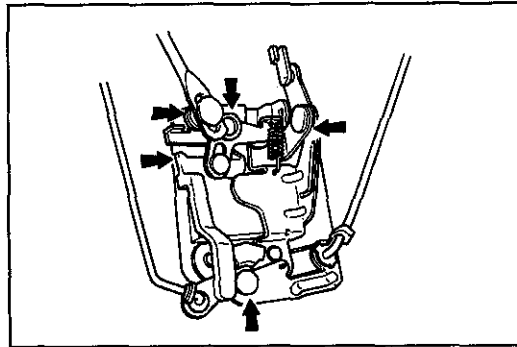
9BU0SX-025

5. Remove the rod clip and retainer and the key cylinder.
6. Remove the mounting screws and door lock.



9BU0SX-026

7. Remove the mounting nuts, then remove the outer handle.



1BU0SX-013

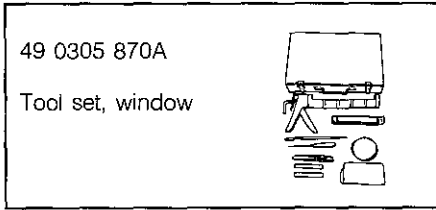
Install in the reverse order of removal, referring to the installation note.

**Note**

- a) Before installing the door lock, apply grease to the areas shown in the figure.
- b) After installation, make sure the door opens smoothly and that it may be locked and unlocked with the key and the door lock knob.

WINDSHIELD

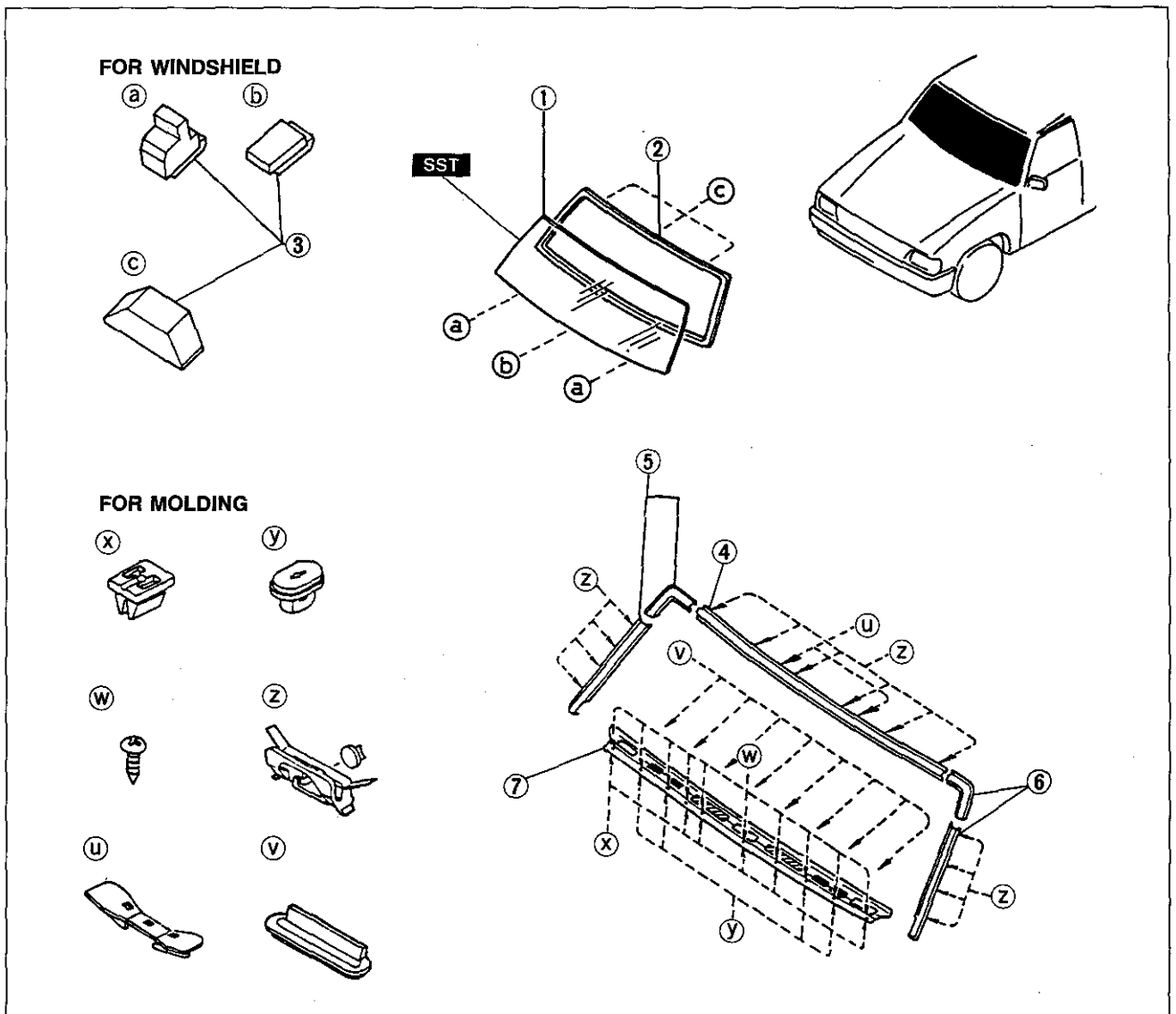
PREPARATION  
SST



9MU0SX-095

**Note**  
Use SST (49 0305 870A) to remove and install the windshield.

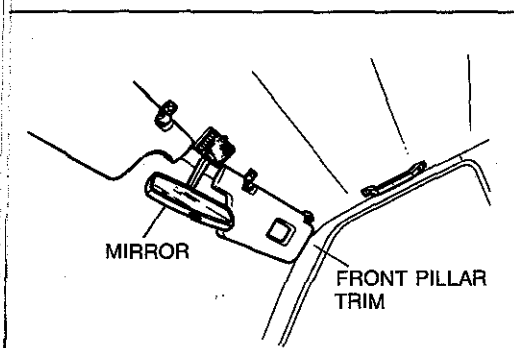
Structural View



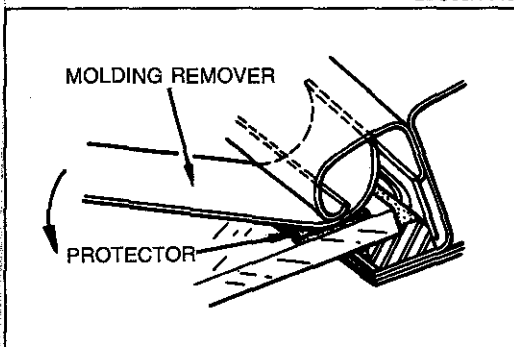
1BU0SX-014

- 1. Windshield
- 2. Dam
- 3. Spacers
- 4. Molding (upper)

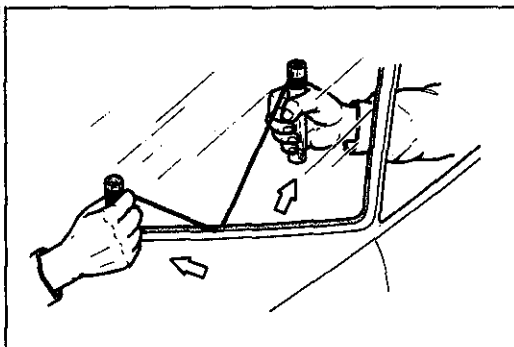
- 5. Molding (right side)
- 6. Molding (left side)
- 7. Molding (lower)



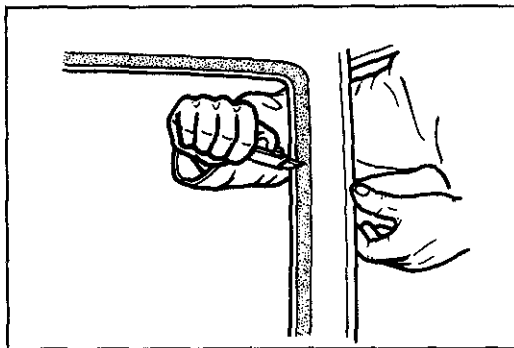
2BU0SX-019



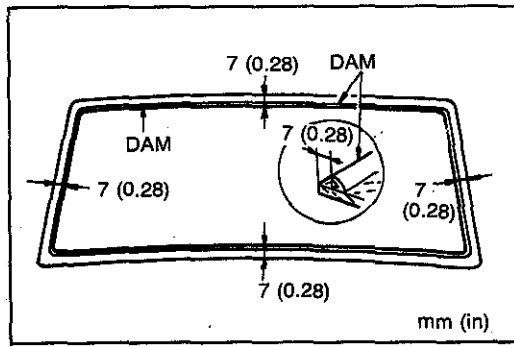
9BU0SX-030



7BU14X-021



1BU0SX-016



9BU0SX-032

**REMOVAL**

1. Remove the wiper arms and blades. (Refer to page S-12.)
2. Remove the interior mirror and front pillar trims.

3. Insert a suitable protector, and remove the molding by using the molding remover as shown.

**Caution**

**Before removing the molding, apply adhesive tape to the body to protect it from damage.**

4. Drill a small hole through the sealant.
5. Pass a piano wire through the hole.
6. Wind each end of the wire around a bar.
7. Pull the wire to and from, and saw through the sealant around the edge of the glass. Then remove the glass.

**Caution**

- a) Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking.
- b) Be careful that the wire does not rub on the vehicle paint.

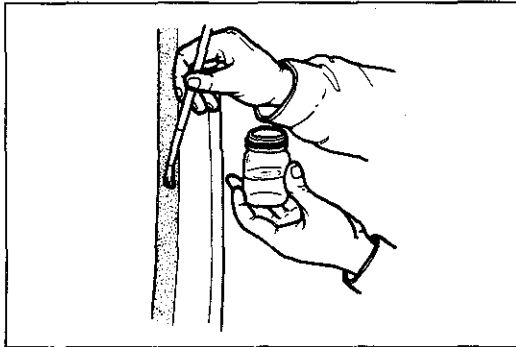
**INSTALLATION**

1. Cut away the old sealant with a sharp knife so that **1 to 2mm (0.04 to 0.08 in)** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it 30 minutes to dry. Then put on new sealant **to build up to a 2mm (0.08 in) layer.**

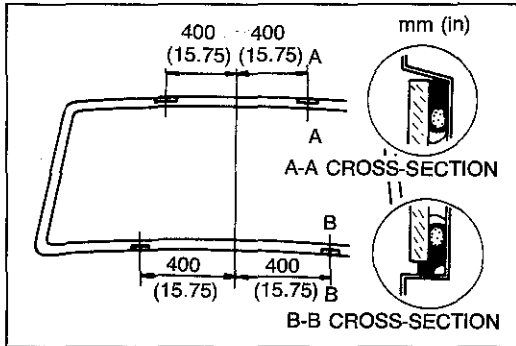
2. Bond the new dam to the glass with a bonding agent. Position it with its outer edge **7mm (0.28 in)** from the glass edge and the lip facing outward.

**Caution**

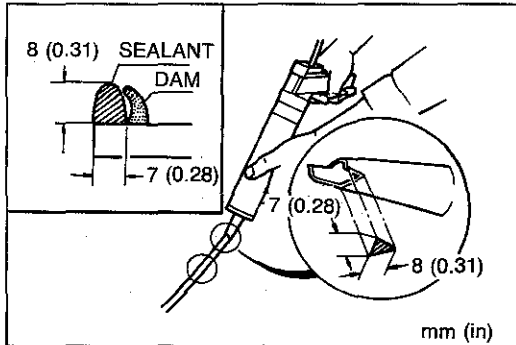
**Securely bond the dam so that it is straight and firmly in place.**



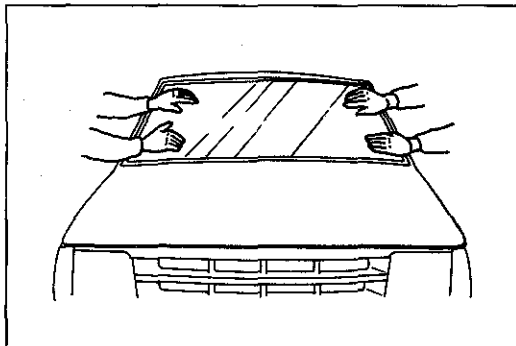
7BU14X-024



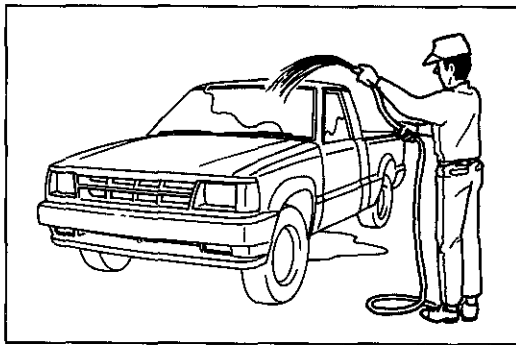
47U14X-064



7BU14X-025



7BU14X-026



9BU05X-053

3. Apply a thin coat of primer to the bonding area of the body and glass, and **allow 30 minutes** for it to dry. Keep the area free of dirt. Do not touch the surface. If primer gets on the hands, remove it immediately.

4. Bond the spacers to the body as shown.

**Caution**  
Use the proper spacers for the upper and lower sections.

5. Insert the molding clips on their points. Replace any defective clips with new ones.

6. Prepare the nozzle of the sealant gun so that it has a flange that can run along the edge of the glass, and a V from which the sealant can flow. Once the primer is dry, apply the sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a ridge of sealant **8mm (0.31 in)** high.

Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.

7. Lift the glass into place. Push it in lightly toward the vehicle to compress the sealant.

**Caution**  
Open the windows to prevent the glass from being pushed out by air pressure if a door is closed.

8. Use a spatula to smooth away any sealant that oozes out. Add more sealant to any points of poor contact.

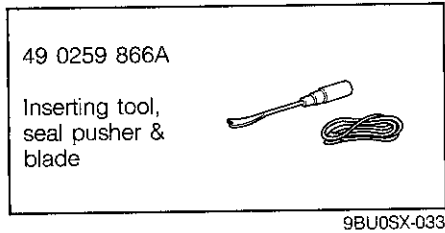
9. Allow the sealant to harden without disturbing it. This will require **5 hours at 20°C (68°F)** and **another 24 hours at 5°C (41°F)**.

10. After installing the front window glass, make a water leak test.

11. Clip in the molding. Refit the interior mirror and pillar trim.

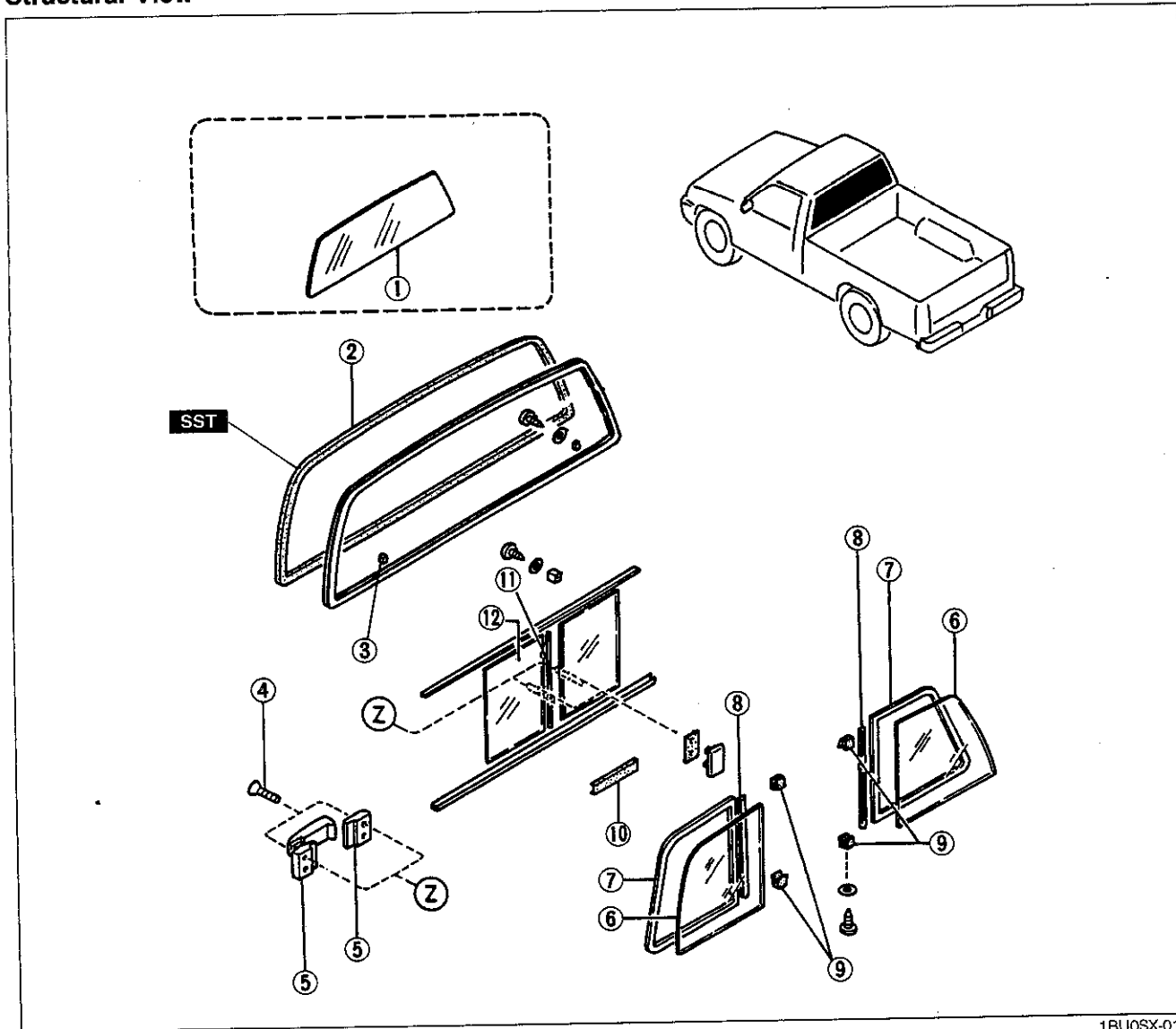
BACK WINDOW GLASS

PREPARATION  
SST



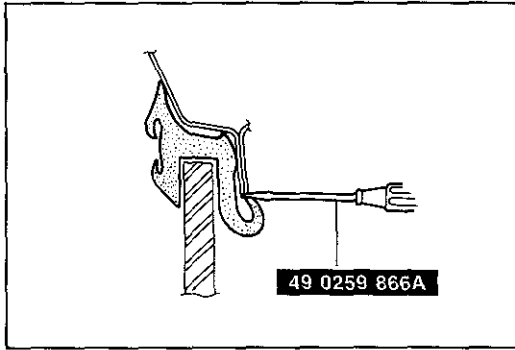
**Note**  
Use SST (49 0259 866A) to remove and install the back window glass.

Structural View

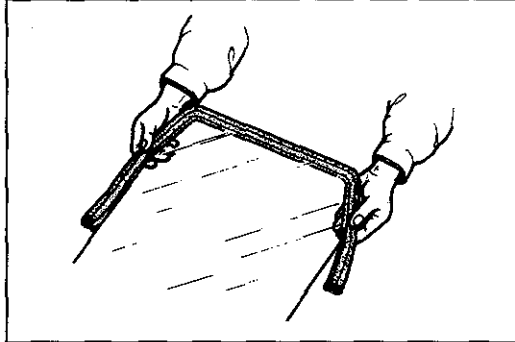


1BU0SX-017

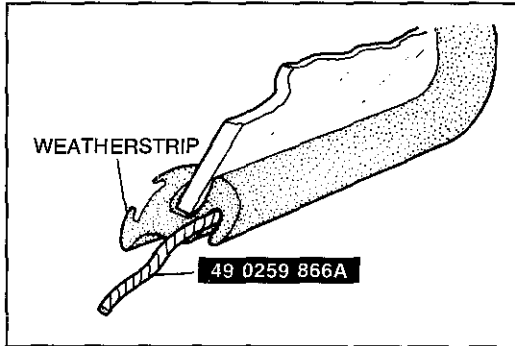
- |                      |                             |                                |
|----------------------|-----------------------------|--------------------------------|
| 1. Back window glass | 5. Spacers                  | 9. Rubber seals                |
| 2. Weatherstrip      | 6. Back window glass (side) | 10. Drain valve                |
| 3. Spacer            | 7. Weatherstrip             | 11. Weatherstrip (slide glass) |
| 4. Screw             | 8. Weatherstrip             | 12. Slide glass                |



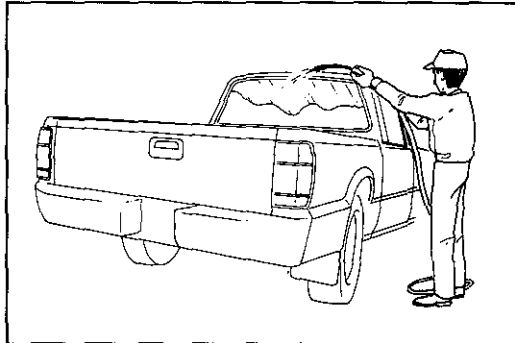
1BU0SX-018



1BU0SX-019



9BU0SX-037



9BU0SX-038

## REMOVAL

1. Use the **SST** to push out the inner lip of the weatherstrip along the edge of the back window from inside the vehicle while pushing the window outward.
2. Remove the window together with the weatherstrip.
3. Remove the weatherstrip from the window.
4. Thoroughly clean off the old adhesive cement from the window and the body.

## INSTALLATION

Before installing the back window glass, thoroughly remove any old bonding agent from the glass and the body.

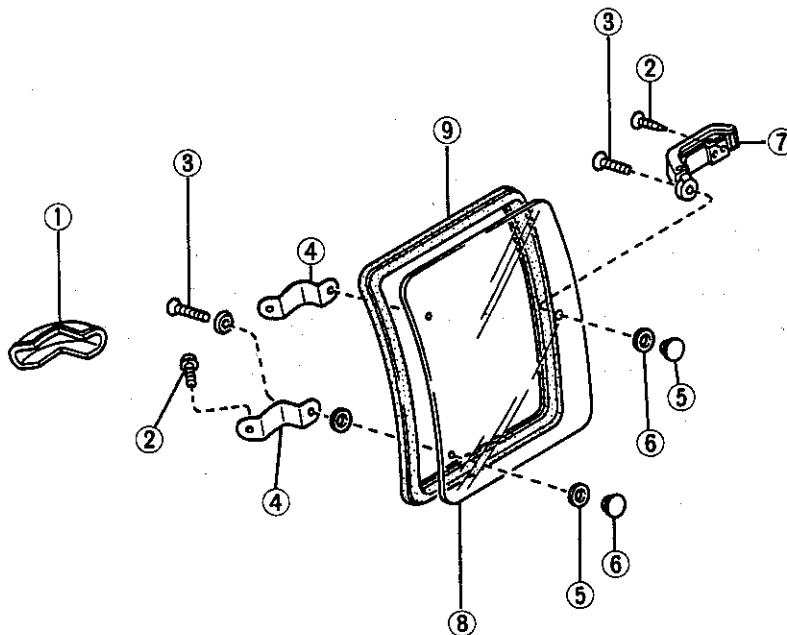
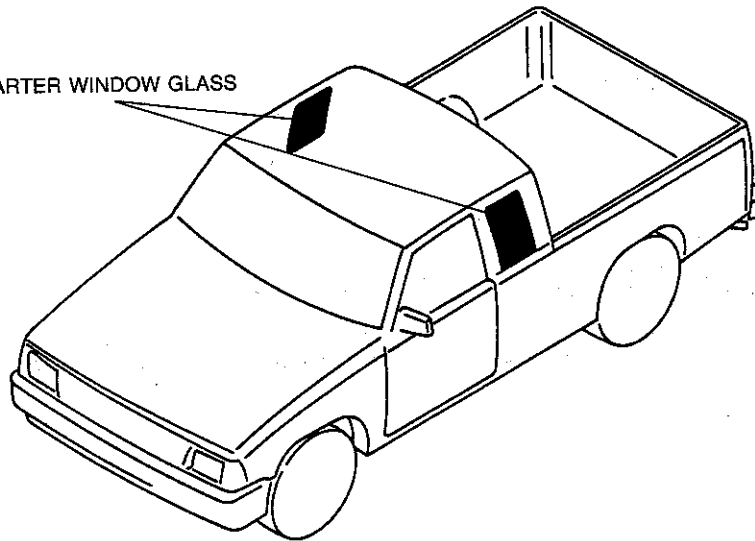
1. Install the weatherstrip along the circumference of the glass as shown.
2. Apply liquid soap to the groove of the weatherstrip.
3. Fit a string **4mm (0.16 in)** in diameter to the groove of the weatherstrip as shown.
4. Place the back window glass and weatherstrip assembly into position on the body flange.
5. Pull the **SST** to place the inner lip over the flange.
6. After installing the back window glass, be sure to make a water leak test.
7. If a water leak is found, seal the weatherstrip to the back window glass or the body flange where necessary by carefully applying a thin coat of rubber sealer.

## QUARTER WINDOW GLASS (CAB PLUS)

## REMOVAL AND INSTALLATION

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

QUARTER WINDOW GLASS



1BU0SX-020

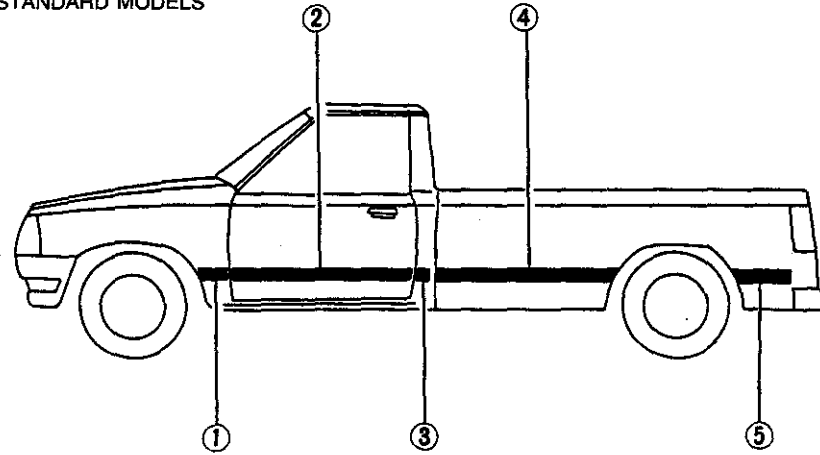
1. Hinge cover
2. Screws
3. Bolts
4. Hinges (lower and upper)

5. Glass clamp nuts
6. Washers
7. Quarter window lock
8. Quarter window glass
9. Weatherstrip

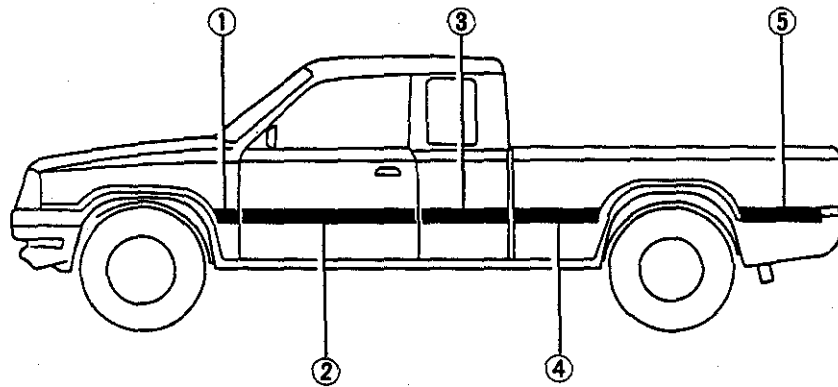
SIDE PROTECTOR

STRUCTURAL VIEW

STANDARD MODELS



CAB PLUS MODELS



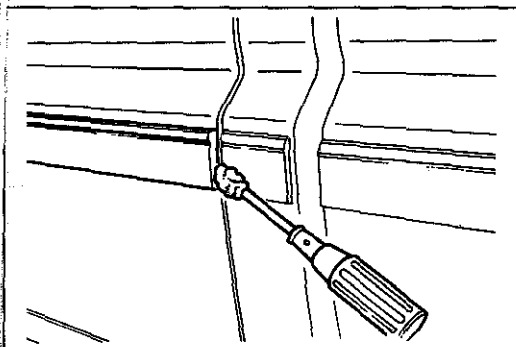
- 1. Side protector A
- 2. Side protector B
- 3. Side protector C

- 4. Side protector D
- 5. Side protector E

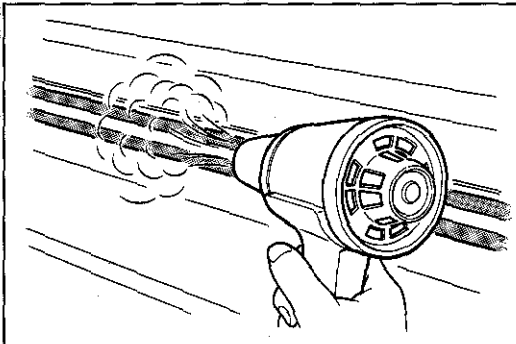
9BU0SX-040



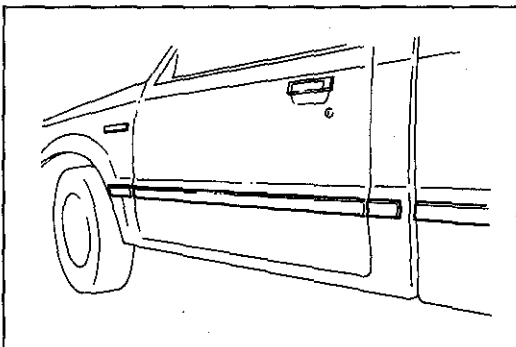
## SIDE PROTECTOR



9BU0SX-041



7BU14X-035



9BU0SX-042

**REMOVAL**

1. Using a screwdriver or knife, twist the protector end, being careful not to damage the painted surface, and separate the adhesive for **20—30mm (0.79—1.18 in)**.
2. Pull the separated portion to remove it.
3. Use a knife to remove any adhesive remaining on the body.

**Note**

**Remove as much adhesive as possible without damaging the painted surface.**

4. If the adhesive is difficult to remove, soften it with a hot air blower.

**INSTALLATION**

1. Remove any grease or dirt from the protector adhesion surface of the body.
2. Mark the installation position on the body with masking tape.
3. Align the protector on the body, and attach it securely.

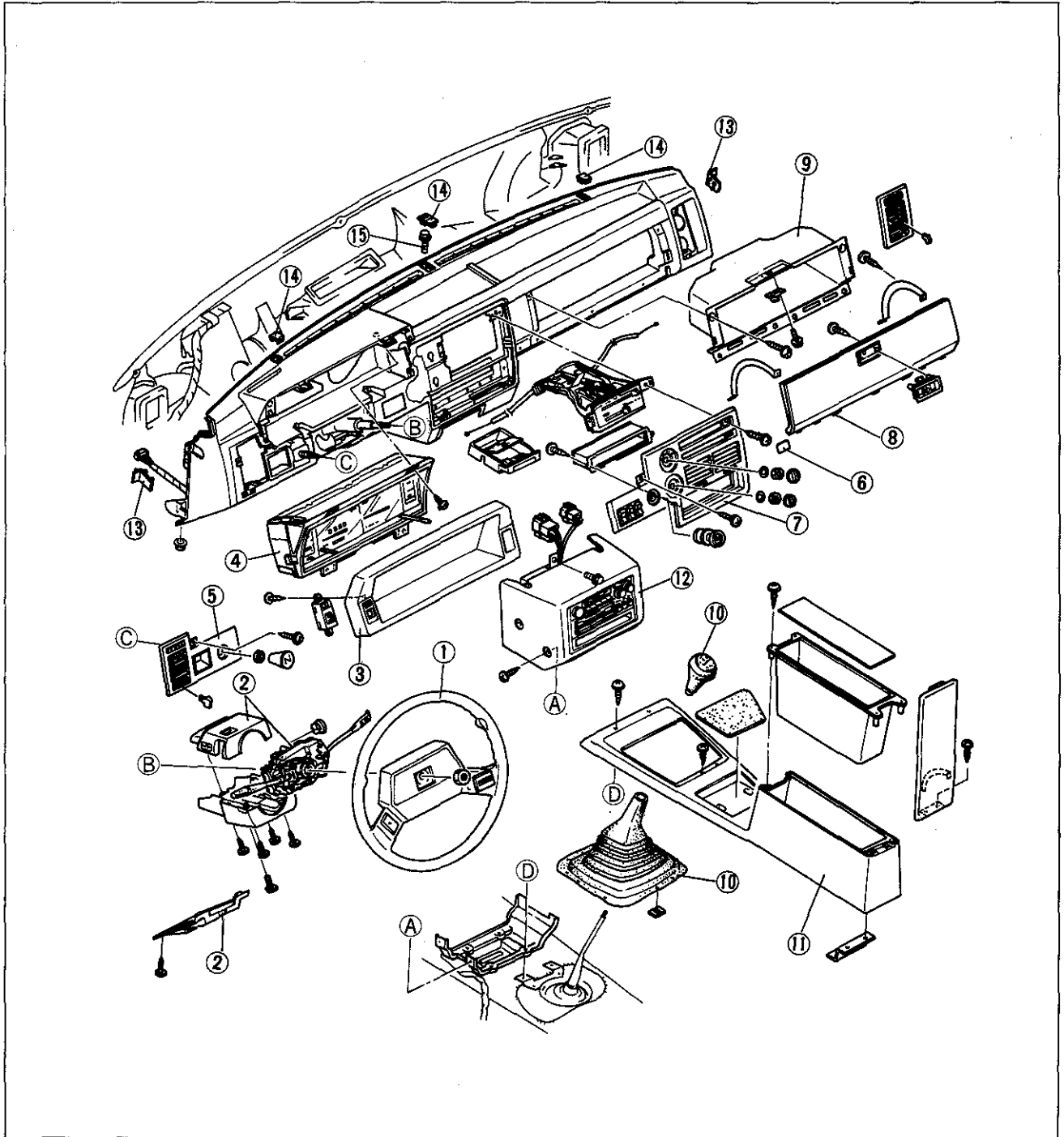
**Note**

**Adhesion conditions deteriorate if air temperature is 20°C (68°F) or less; heating of the body is thus recommended.**

INSTRUMENT PANEL

REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

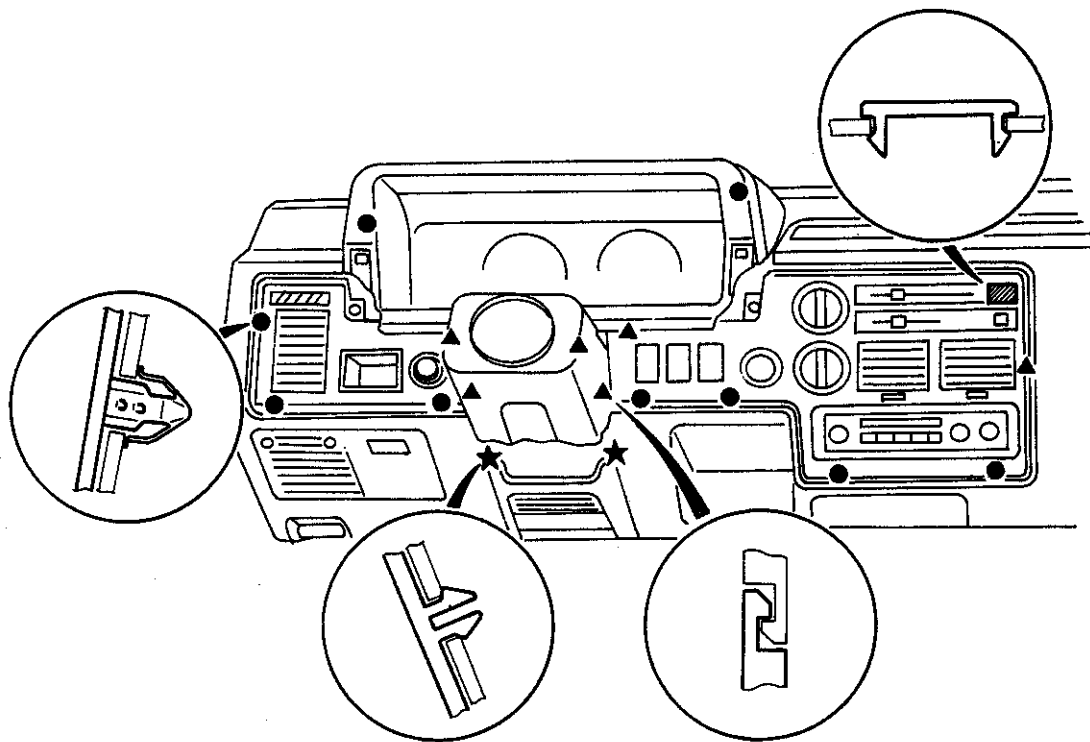


1BU0SX-021

- |  |                          |                                       |
|--|--------------------------|---------------------------------------|
| 1. Steering wheel  | 6. Hole cover            | 12. Radio assembly                    |
| 2. Column cover (upper and lower) and combination switch | 7. Center panel          | 13. Side hole covers (right and left) |
| 3. Meter hood  | 8. Glove compartment lid | 14. Hole covers (upper)               |
| 4. Meter   | 9. Glove compartment     | 15. Bolt                              |
| 5. Side panel  | 10. Shift knob and boot  |                                       |
|  | 11. Console box          |                                       |

# INSTRUMENT PANEL

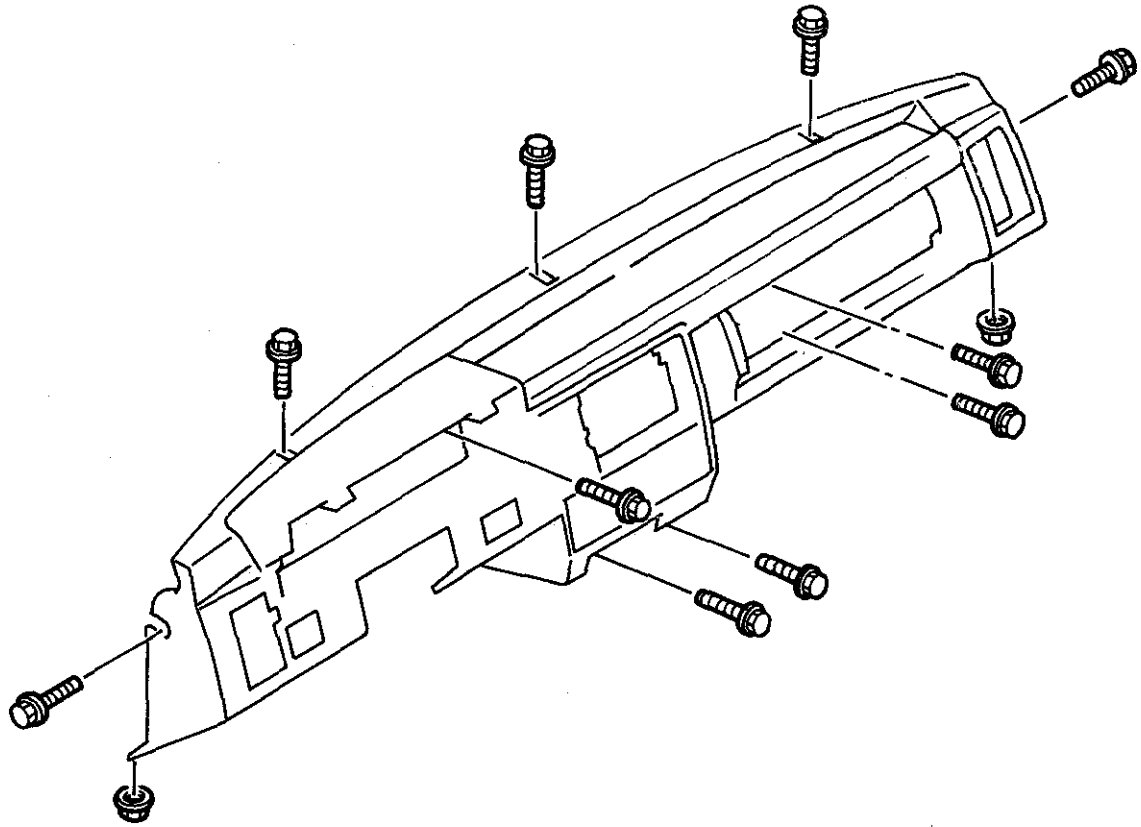
## INTERLOCK OF INSTRUMENT PANEL



5BU14X-035

The panels are interlocked as noted.

MOUNTING OF INSTRUMENT PANEL



TIGHTENING TORQUE:  
7.8—12 N·m (80—120 cm·kg, 69—104 in·lb)

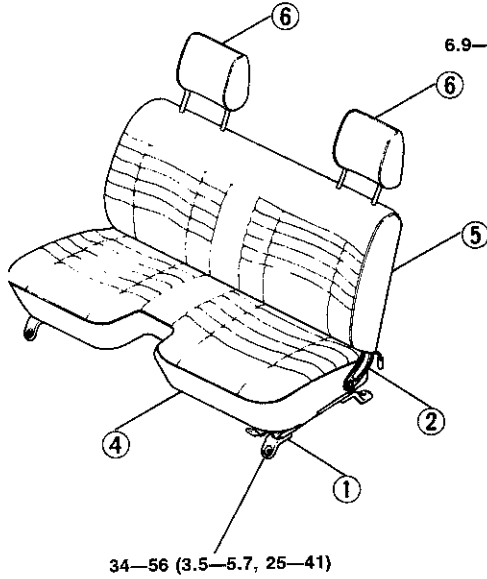
5BU14X-036

As shown, the instrument panel is mounted by 10 bolts and 2 nuts.

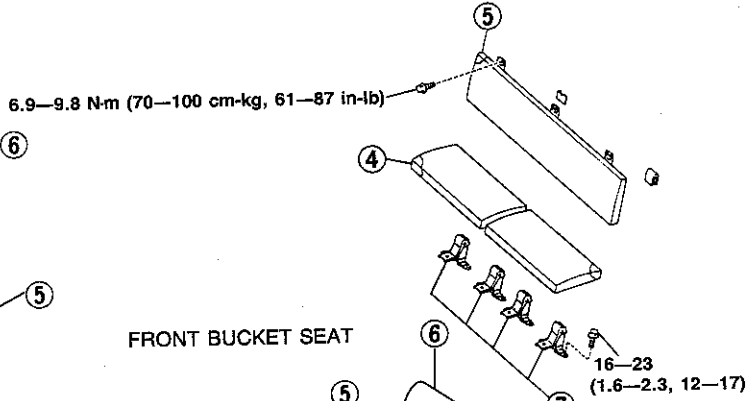
SEATS

STRUCTURAL VIEW

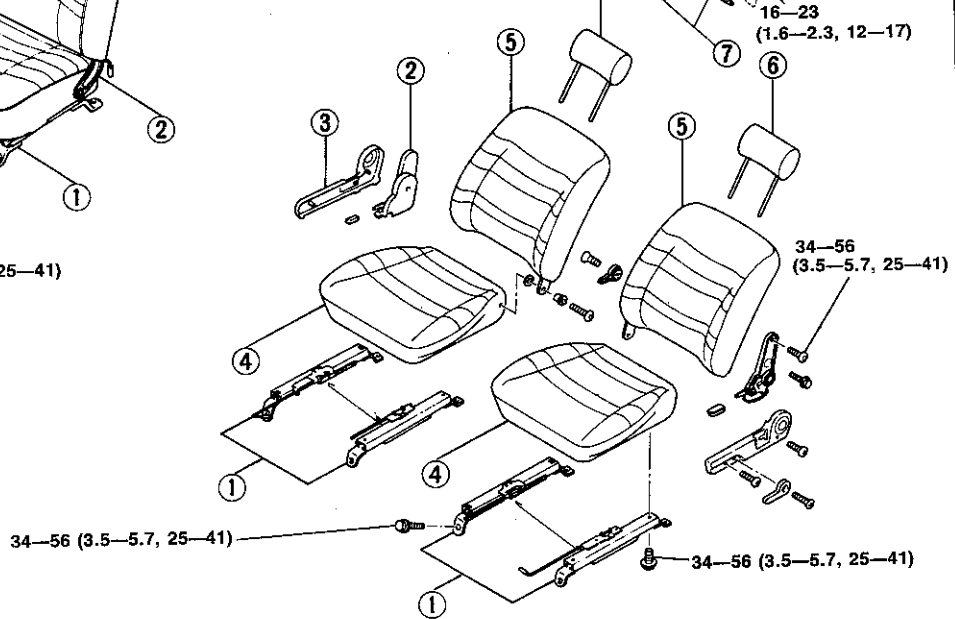
FRONT BENCH SEAT



REAR SEAT (CAB PLUS)



FRONT BUCKET SEAT



N-m (m-kg, ft-lb)

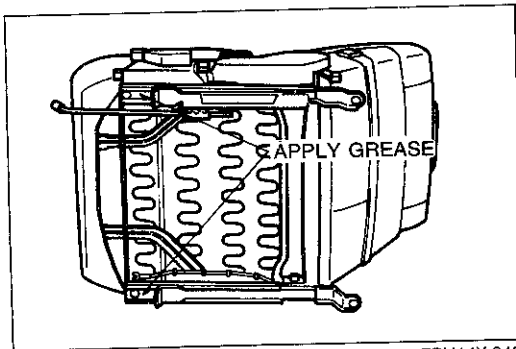
1BU0SX-022

- 1. Adjuster(s)  
Inspection ..... Described below
- 2. Reclining knuckle
- 3. Knuckle cover

- 4. Seat cushion(s)
- 5. Seat back(s)
- 6. Headrests
- 7. Seat cushion hinges

**INSPECTION**

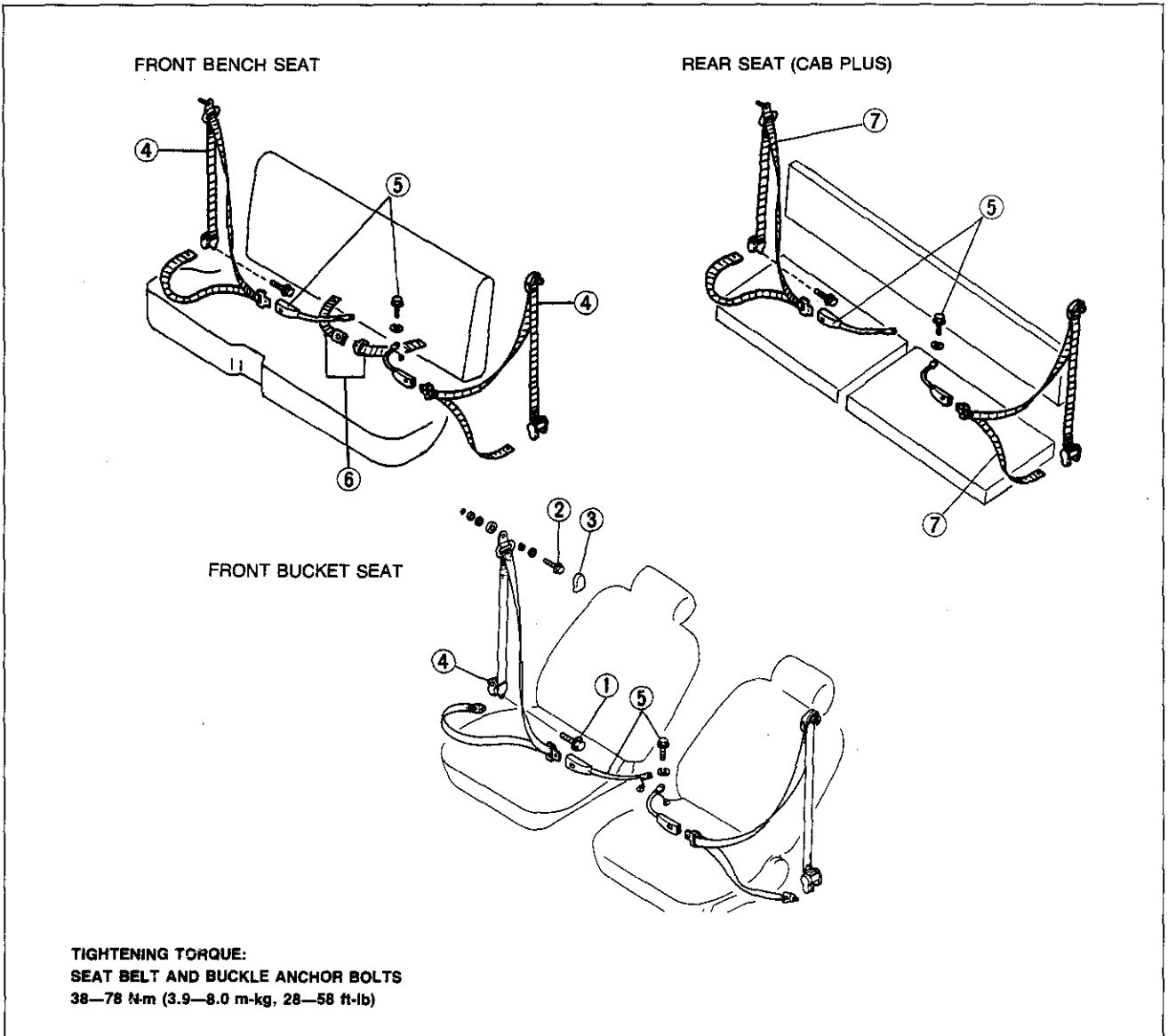
1. Make sure the seat adjuster lever and reclining knuckle move smoothly. Apply grease to the moving parts.
2. Check the adjuster lever for wear.
3. Check the front seat mounting bolts for looseness.



7BU14X-040

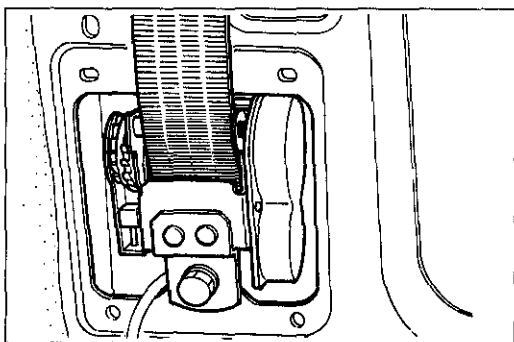
SEAT BELTS

STRUCTURAL VIEW



9BU0SX-044

- |                                      |                           |
|--------------------------------------|---------------------------|
| 1. Anchor bolt (lower)               | 5. Anchor bolt and buckle |
| 2. Anchor bolt (upper)               | 6. Front seat belts       |
| 3. Cover                             | 7. Rear seat belts        |
| 4. Retractors and seat belts (outer) |                           |
- Inspection ..... Described below



9BU0SX-045

**INSPECTION**

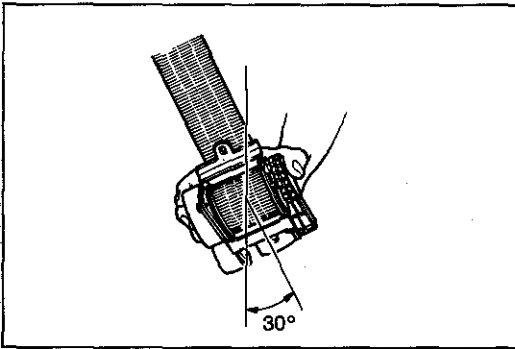
**Caution**

**Do not disassemble the buckle and retractor assembly.**

**Emergency Locking Retractor (ELR)**

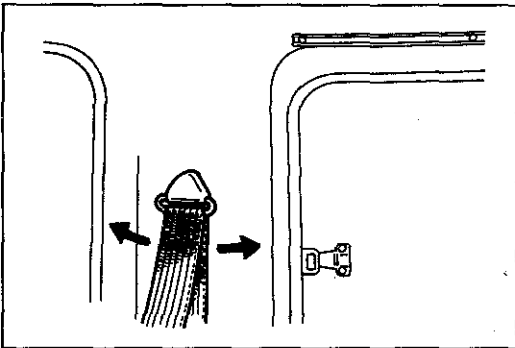
1. Verify that the belt can be pulled out smoothly and that it moves smoothly when worn.
2. Verify that the retractor locks when quickly pulling the belt.

## SEAT BELTS



9BU0SX-046

3. Remove the retractor.
4. Hold the retractor as it is installed.
5. Slowly incline the retractor while pulling out the belt.
6. Verify that the retractor locks at **approx. 30 degrees** inclination.



9BU0SX-047

**Shoulder Anchor**

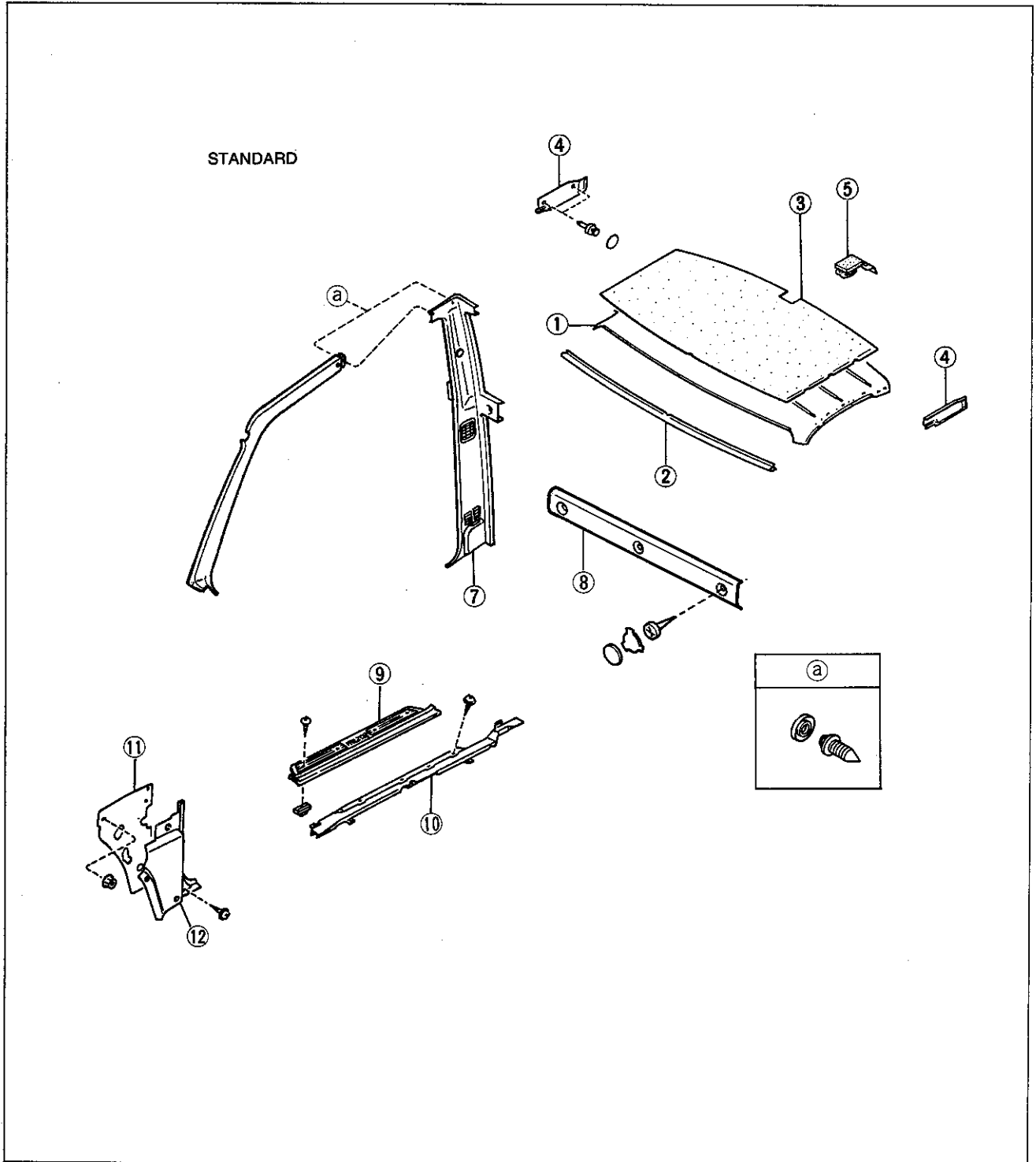
Make sure the anchor works in the circumferential direction with the shoulder anchor bolt tightened.

**Webbing**

Inspect the webbing for scars, tears, and wear and for deformation of the fittings.

HEADLINER AND TRIM

STRUCTURAL VIEW



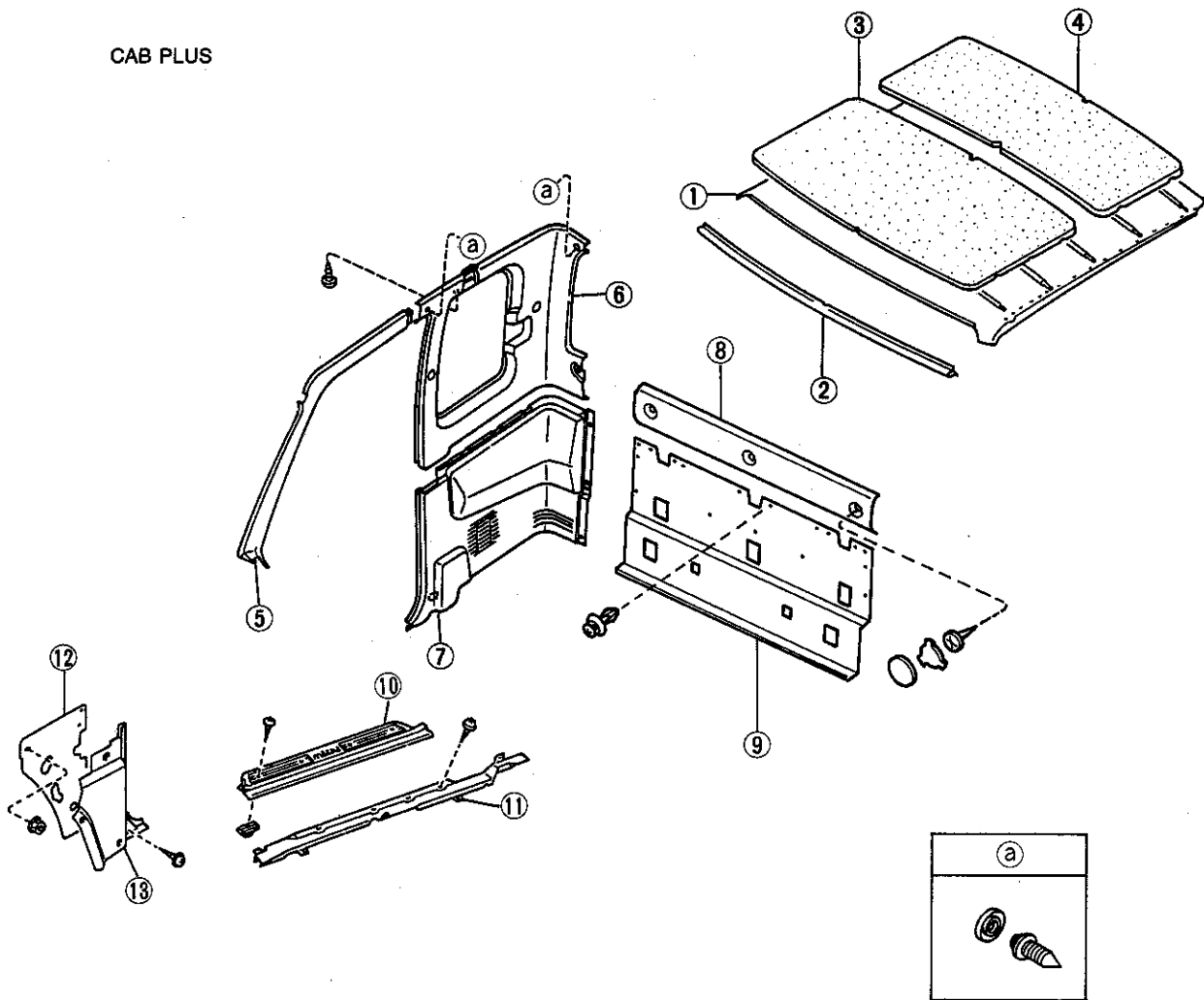
2BU0SX-020

- |                         |           |                       |
|-------------------------|-----------|-----------------------|
| 1. Headliner            |           | 6. Front pillar trim  |
| Removal.....            | page S-35 | 7. B pillar trim      |
| Installation.....       | page S-35 | 8. Back upper garnish |
| 2. Fixing plate         |           | 9. Front scuff plate  |
| 3. Front roof insulator |           | 10. Wiring cover      |
| 4. Top side garnish     |           | 11. Cowl insulator    |
| 5. Headliner bracket    |           | 12. Front side trim   |



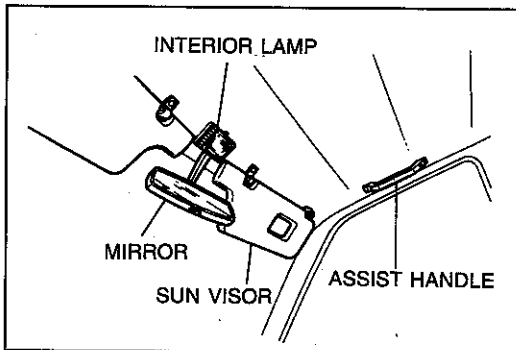
# HEADLINER AND TRIM

CAB PLUS

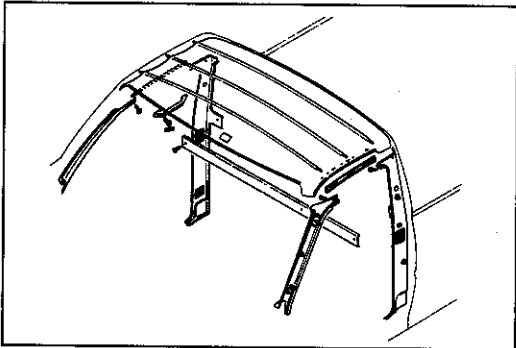


2BU0SX-021

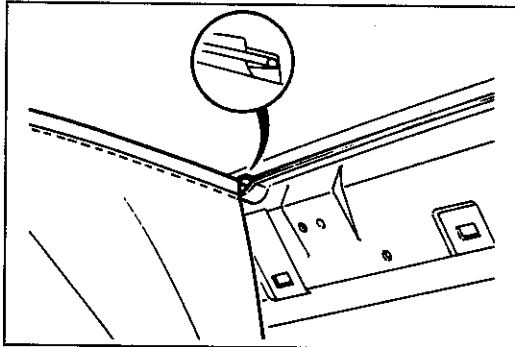
- |                             |                          |
|-----------------------------|--------------------------|
| 1. Headliner                | 7. B pillar trim (lower) |
| Removal..... page S-35      | 8. Back upper trim       |
| Installation..... page S-35 | 9. Backpanel trim        |
| 2. Fixing plate             | 10. Front scuff plate    |
| 3. Front roof insulator     | 11. Wiring cover         |
| 4. Rear roof insulator      | 12. Cowl insulator       |
| 5. Front pillar trim        | 13. Front side trim      |
| 6. B pillar trim (upper)    |                          |



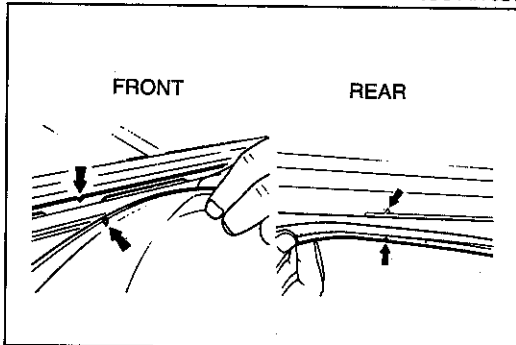
9BU0SX-054



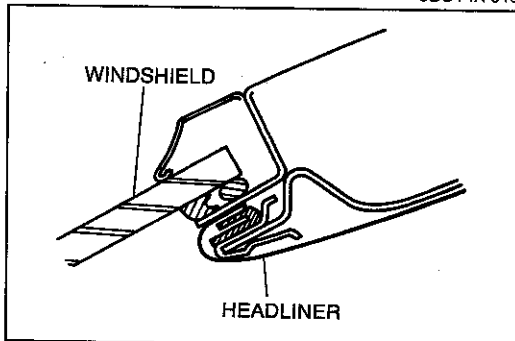
9BU0SX-050



8BU14X-021



8BU14X-015



8BU14X-016

## REMOVAL

Remove these items in order.

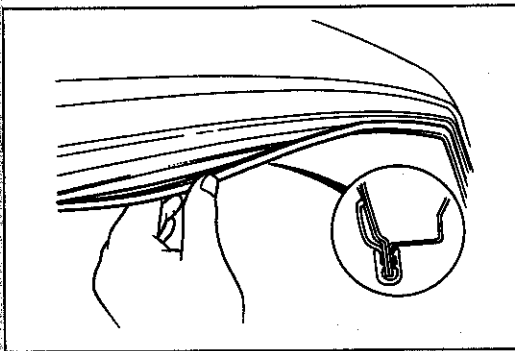
1. Back window
2. Rearview mirror, sun visor and assist handle
3. Interior lamp attaching screws; disconnect connector and remove interior lamp
4. Seat belt anchor bolts
5. Upper part of seaming welt
6. Front pillar trims, top side garnishes, and B pillar trims
7. Listing wires and headliner

## INSTALLATION

Install in the reverse order of removal, noting the following points.

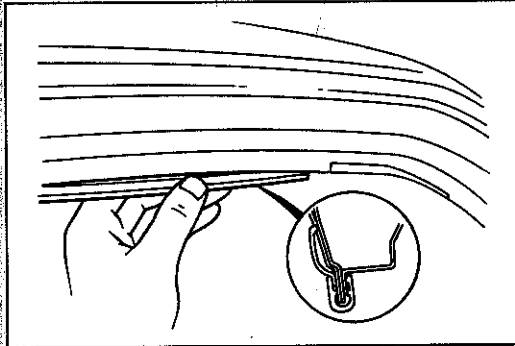
1. Heat the headliner to a temperature of **30°C to 50°C (86°F to 122°F)**.
2. Insert both ends of the listing wires to their respective positions in successive order, beginning from the front.
3. Align the centering mark on the headliner to the body mark.

4. Insert the front of the headliner to the inserting point of the body.

**HEADLINER AND TRIM**

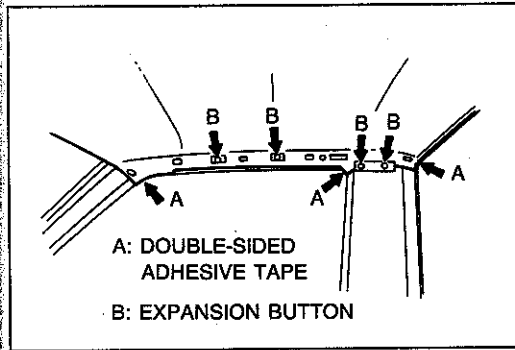
8BU14X-017

5. Insert the rear of the headliner to the body flange.



8BU14X-018

6. Pull the headliner from both sides to remove any looseness, and insert both sides of the headliner to the body flange.



8BU14X-019

7. Apply double-sided adhesive tape between the headliner and the body flange.

8. Push in the expansion buttons.

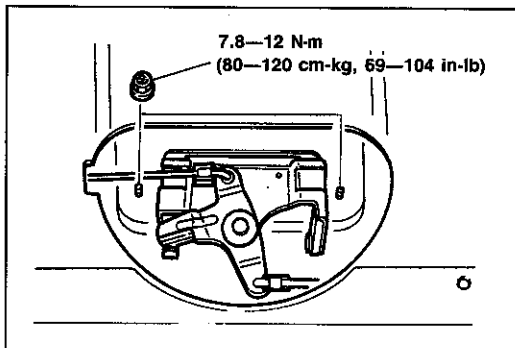
## TAILGATE

## TAILGATE

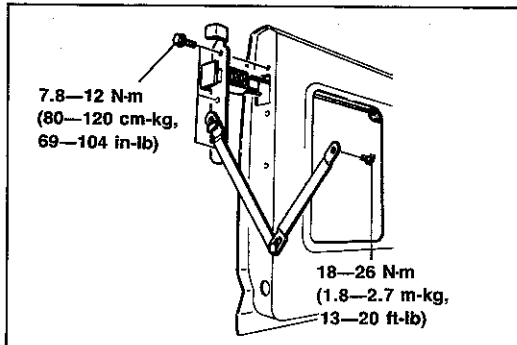
**DISASSEMBLY**

Remove these items in order.

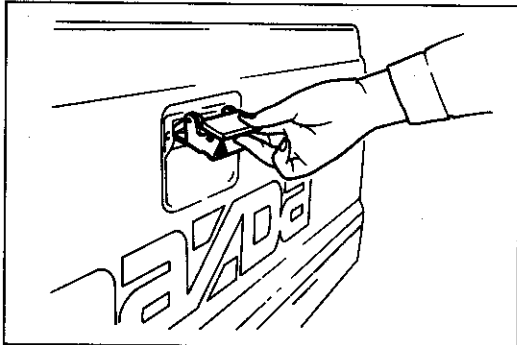
1. Cover
2. Nuts attaching the tailgate lock
3. Disconnect rods from tailgate lock and remove lock.



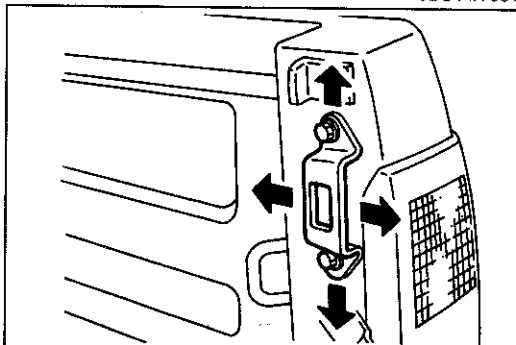
5BU14X-049



5BU14X-050



5BU14X-051



9BU05X-051

4. Bolts and latch guide, latch, and rod

5. Handle

**ASSEMBLY**

Assemble the tailgate in the reverse order of disassembly.

**ADJUSTMENT**

1. Loosen the two bolts.
2. Move the striker forward or backward to adjust.
3. After adjustment is made, tighten the bolts.

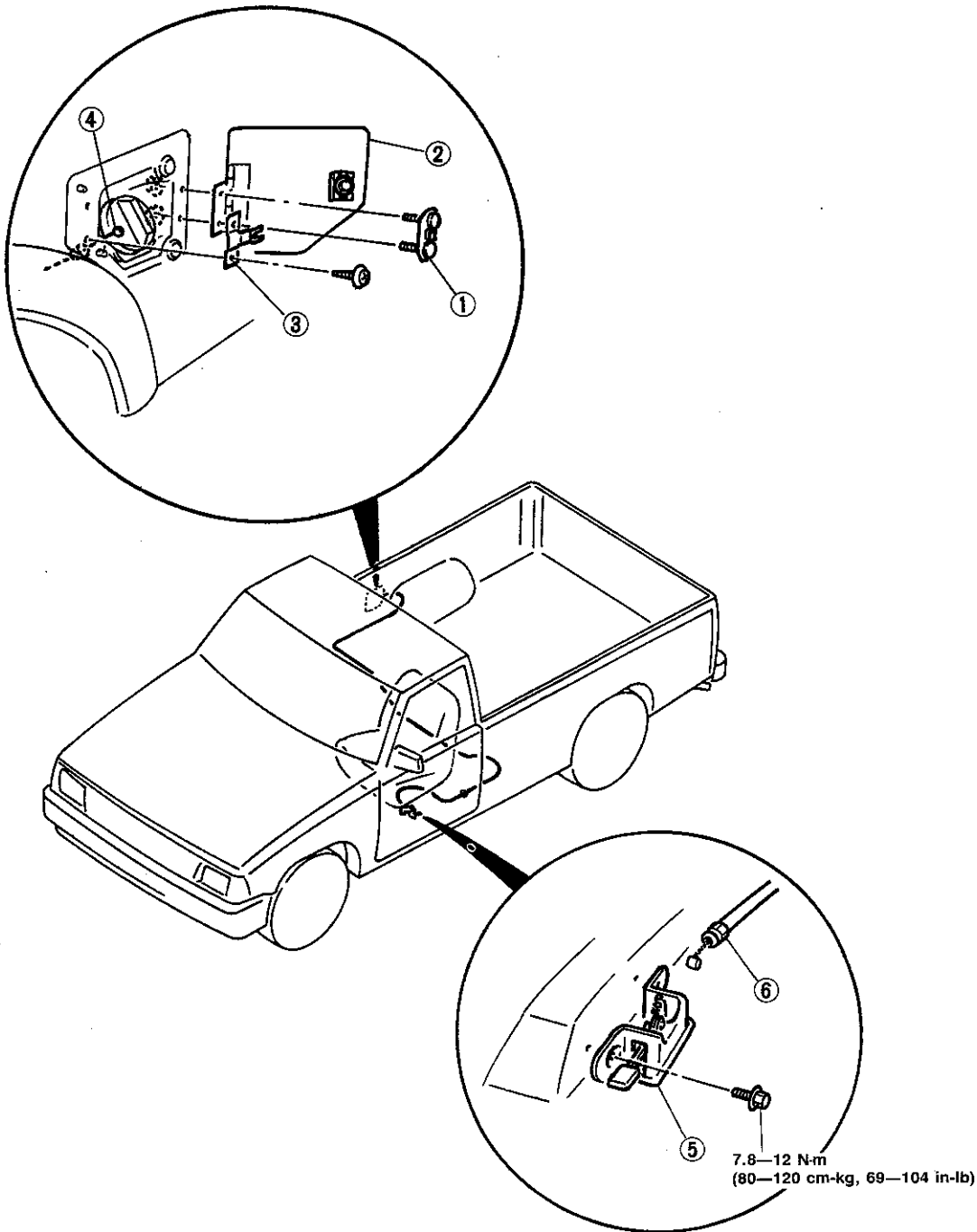
**Tightening torque:**

7.8—12 N-m (80—120 cm-kg, 69—104 in-lb)

## FUEL LID REMOTE RELEASE

## REMOVAL AND INSTALLATION

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



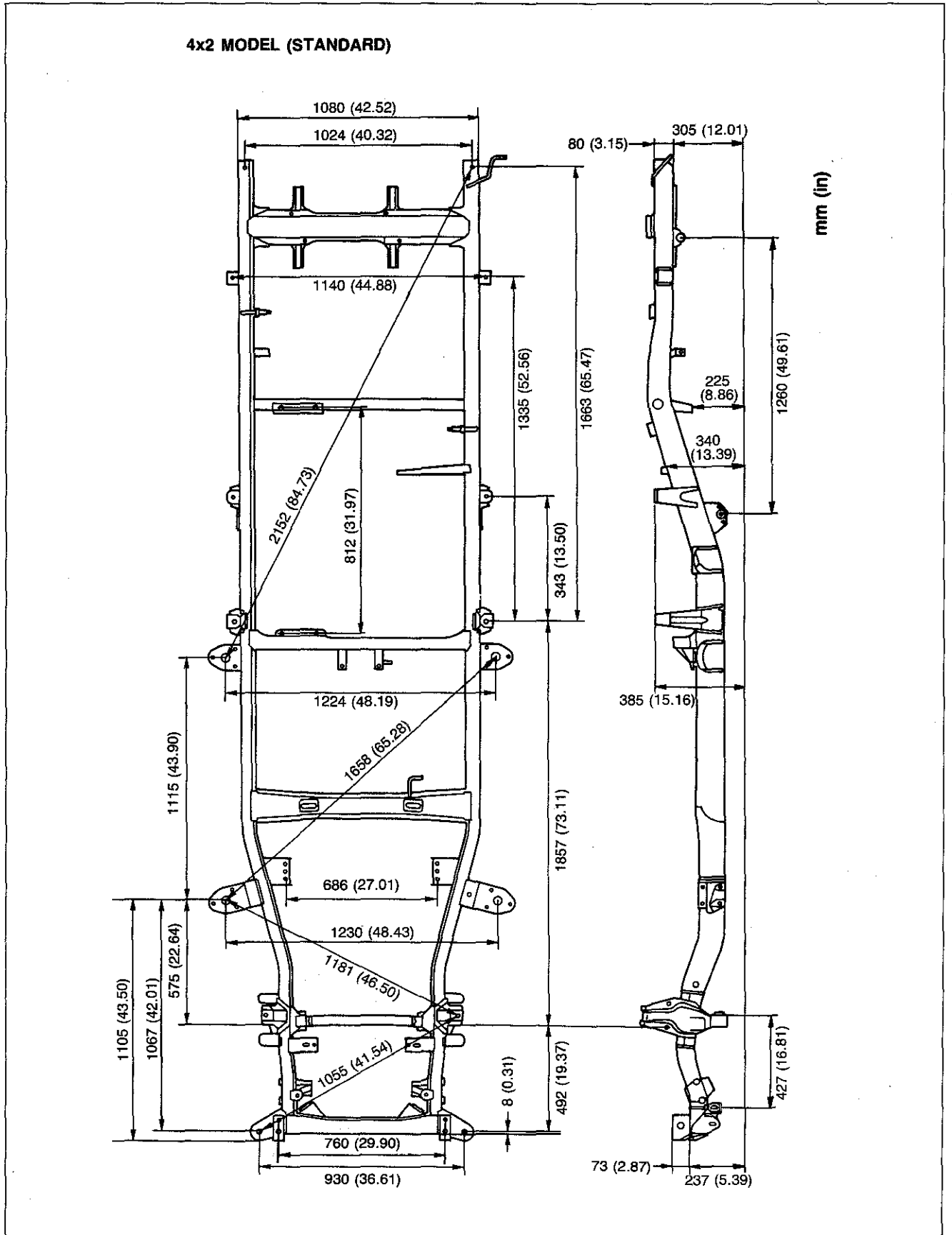
1BU0SX-025

1. Lift spring
2. Fuel lid
3. Lock plate

4. Release wire (Fuel lid side)
5. Fuel lid opener
6. Release wire (Opener side)

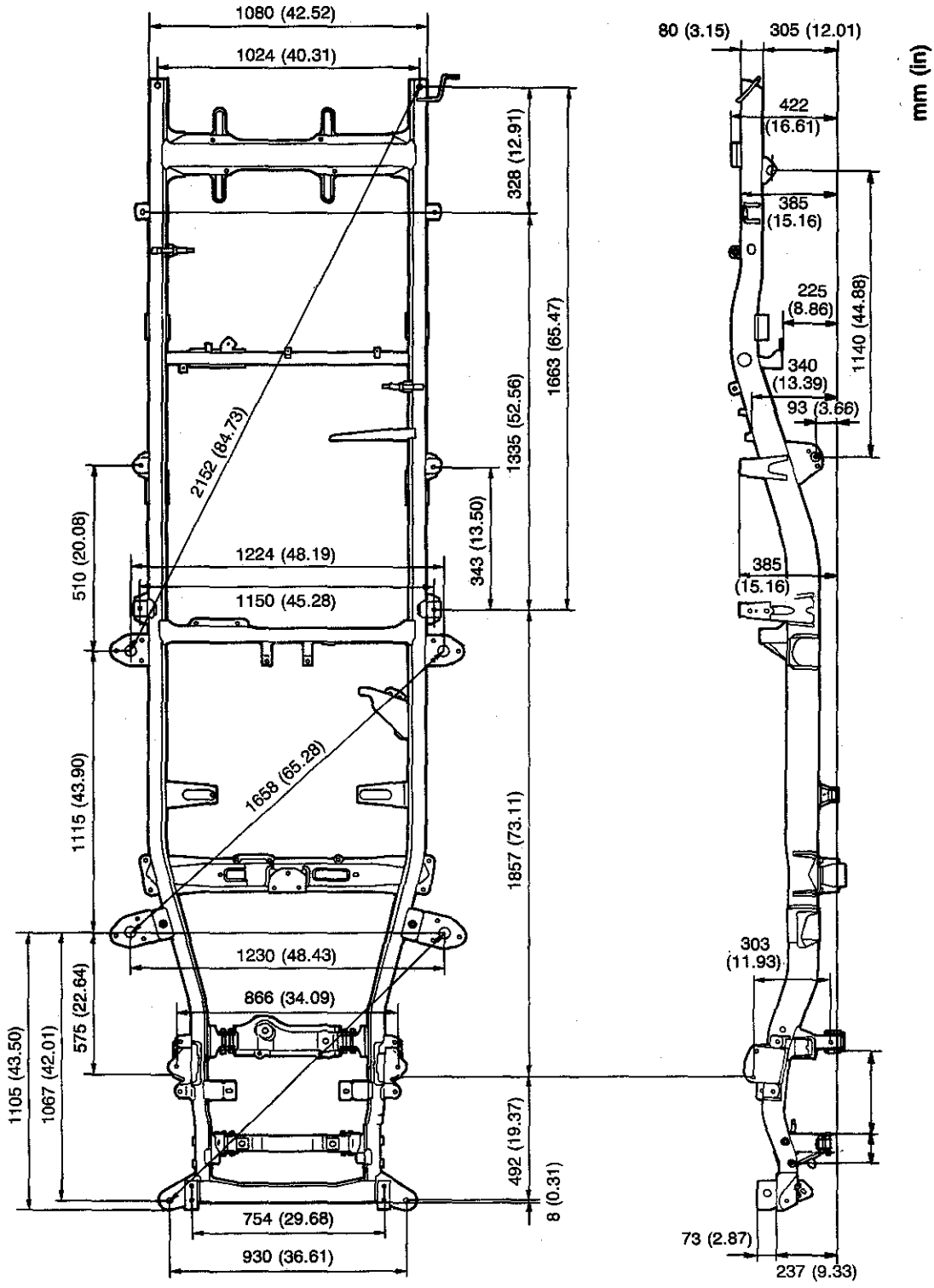
BODY DIMENSIONS

(Short Bed)



(Short Bed)

4x4 MODEL (STANDARD)

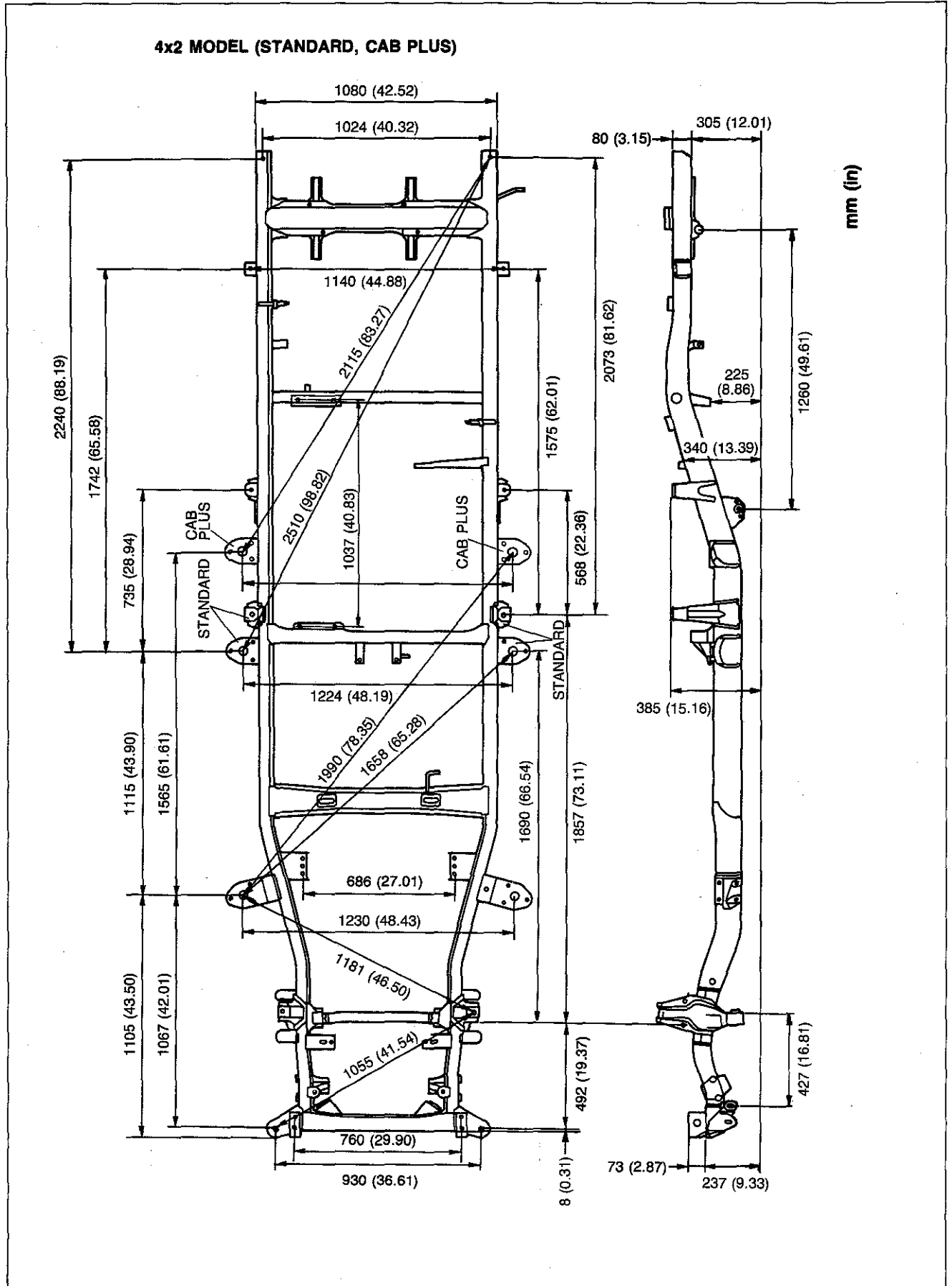


mm (in)

# BODY DIMENSIONS

S

(Long Bed)





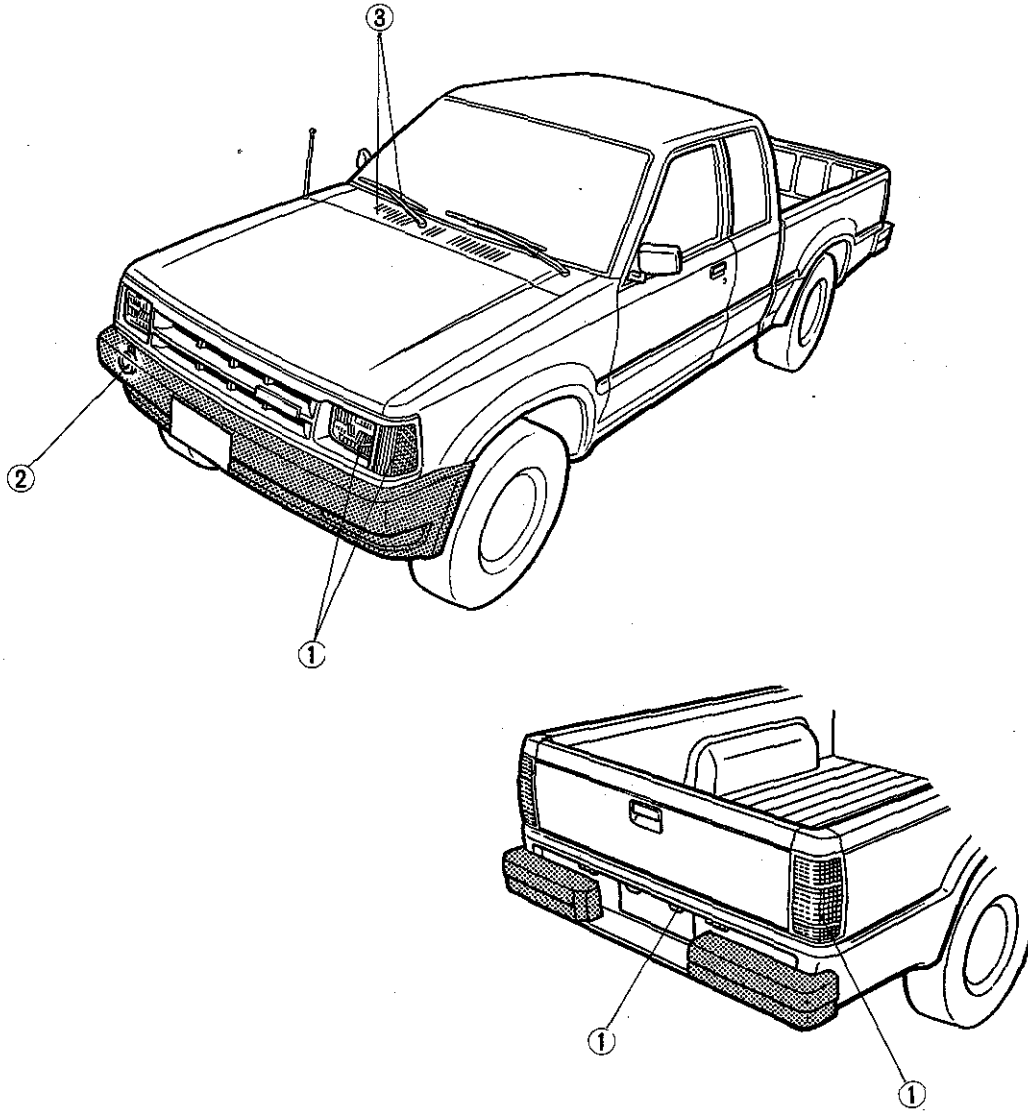


Before beginning any service procedure, refer to Section T of this manual for airbag system warnings and cautions.

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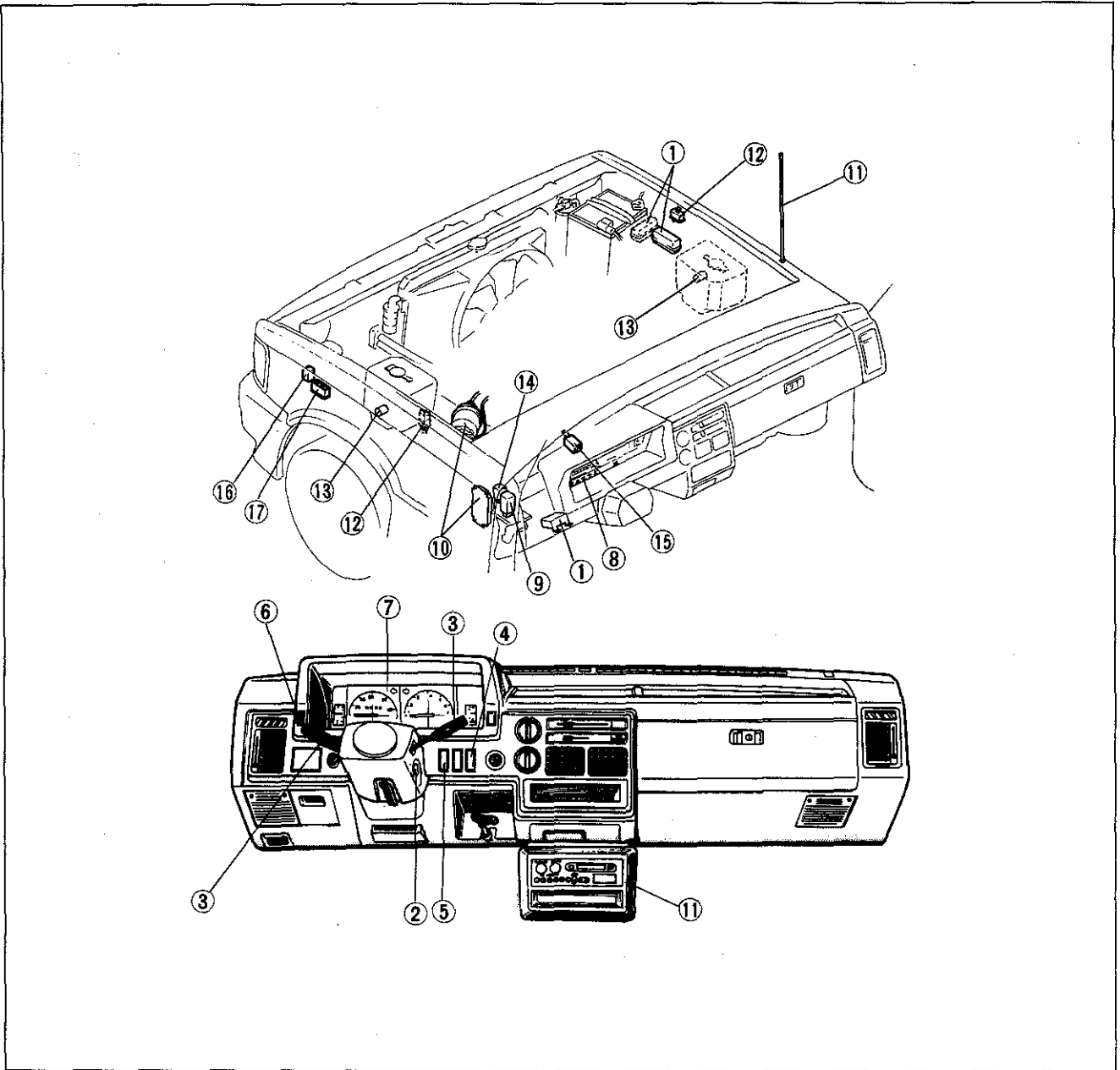
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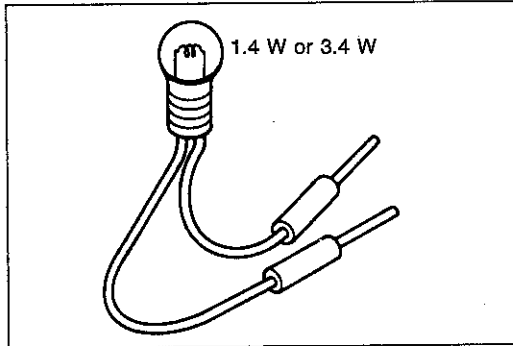
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## INTRODUCTION

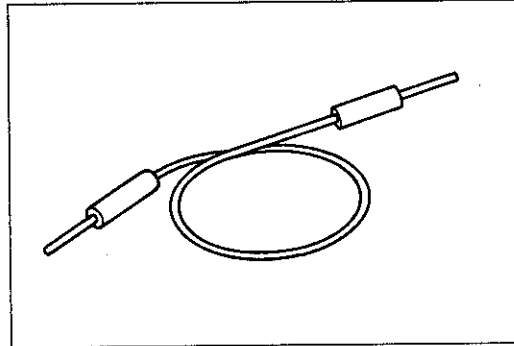
## HOW TO USE THIS SECTION

Information regarding removal and installation of electrical equipment is given in **SECTION S**. Understanding this section will be easier if it is used in conjunction with the **WIRING DIAGRAMS**. Precautions and electrical symbols are given on pages T-5 to T-7, and information regarding the main fuse and fuse box can be found on page T-8. Read the appropriate pages carefully before any inspection or other work is attempted.

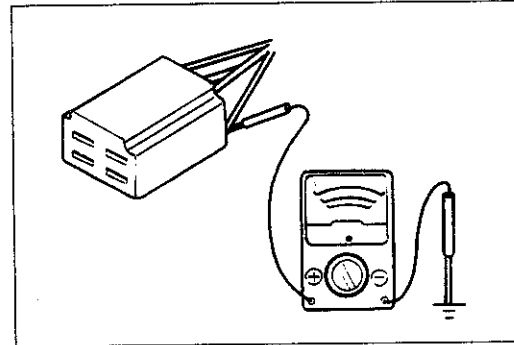
9BU0TX-004



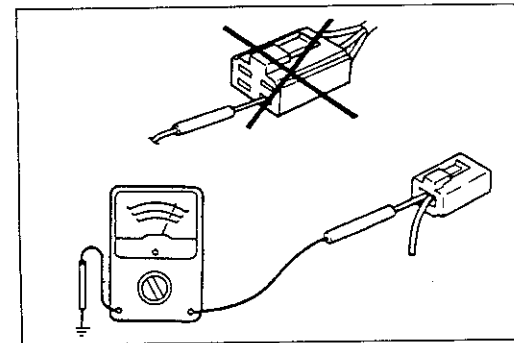
5BU15X-080



9BU0TX-005



47U15X-006



47U15X-007

## ELECTRICAL TROUBLESHOOTING TOOLS

## Test Light

The test light, as shown in the figure, uses a 12V bulb. The two lead wires should be connected to probes. The test light is used for simple voltage checks and for checks for short circuits.

**Caution**

**When checking the control unit, never use a bulb of more than 3.4W.**

## Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and verifying the condition of ground connections.

**Caution**

**Do not connect the jumper wire between the power source line and the body ground because this may cause burning or other damage to the harnesses.**

## Voltmeter

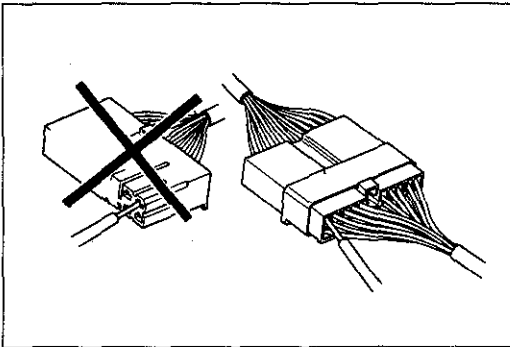
A DC voltmeter with a range of 15V or more is used to measure circuit voltage. Connect the positive (+) probe (red lead wire) to the point where voltage is to be measured, and connect the negative (-) probe (black lead wire) to the body ground.

## Ohmmeter

The ohmmeter is used to measure the resistance between two points in a circuit and to check for continuity and diagnosis of short circuits.

**Caution**

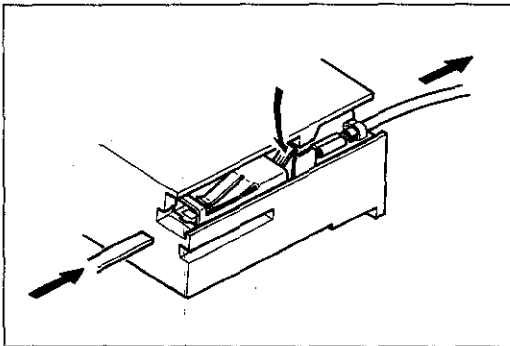
**Do not attempt to connect the ohmmeter to any circuit to which voltage is applied because this may burn or otherwise damage the ohmmeter.**



4EG15X-088

**Inspection note**

When checking the continuity or voltage with a circuit tester, insertion of the test probe into the receptacle connector may open the fitting to the connector and result in poor contact. Therefore, make sure the test probe is inserted from the wire harness side.



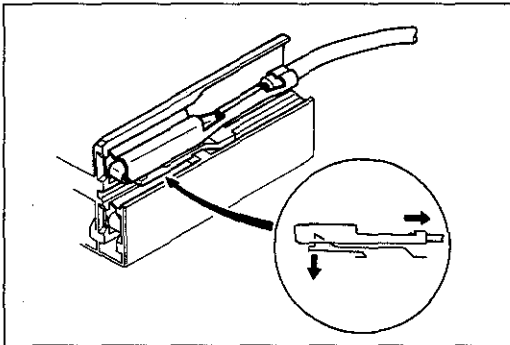
5BU15X-003

**Replacement of Terminal**

Use the appropriate tools to remove the terminal, as shown. When installing a terminal, be sure to press it in until it locks securely.

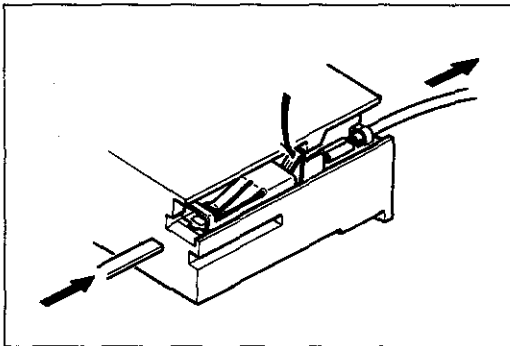
**< Female Type No.1 >**

Insert a push tool or thin piece of metal from the terminal side of the connector. Then, with the locking tabs of the terminal pressed down, pull the terminal out from the rear side.



5BU15X-004

**< Female Type No.2 >**



47U15X-012

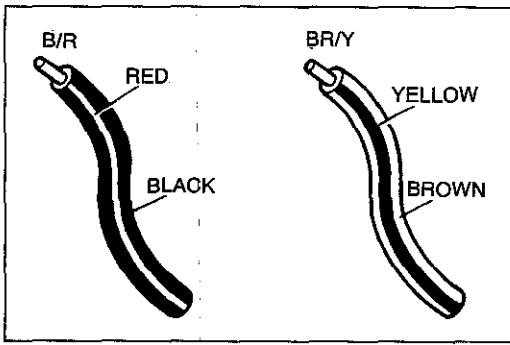
**< Male Type >**

Same as the female type.

**PRECAUTIONS**

**Wiring Color Code**

Two-color wires are indicated by a 2-letter symbol. The first letter indicates the base color of the wire, and the second indicates the color of the stripe.



47U15X-008

CODE	COLOR
B	BLACK
BR	BROWN
G	GREEN
L	BLUE
LB	LIGHT BLUE
LG	LIGHT GREEN
O	ORANGE
R	RED
Y	YELLOW
W	WHITE

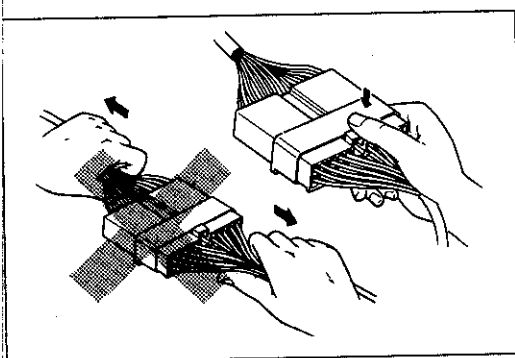
# T

## INTRODUCTION

### Handling of Bulkhead-type Connectors

#### Removal of the connector

The connector can be removed by pressing the lock lever. Do not pull the wire when removing the connector; be sure to hold the connector itself when disconnecting it.



2BU0TX-004

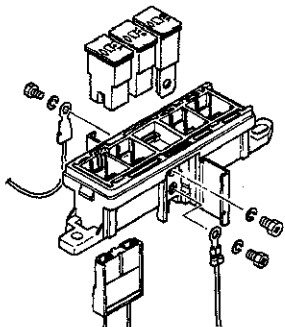
### Replacement of Fuses

When replacing a fuse, be sure to replace it with one of the specified capacity.

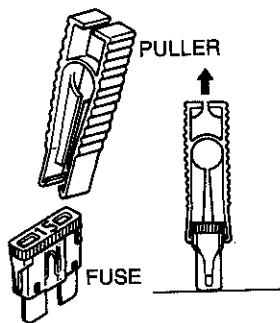
If a fuse fails again after it has been replaced, there is probably a short circuit, and the wiring should be checked.

#### Caution

- a) Be sure the battery (-) terminal is disconnected before replacing a fuse.
- b) When replacing a fuse, use the supplied fuse puller.



2BU0TX-005



**ELECTRICAL SYMBOLS**

**Switches and Relays**

There is an NC (normally closed) and NO (normally open) indication for switches and relays; this indicates the condition when there has been no change of operating conditions.

	Relay		Switch	
	NO type relay	NC type relay	NO switch	NC switch
Not in operation (no power supply)				
In operation (power supply)				

**Other Electrical Symbols**

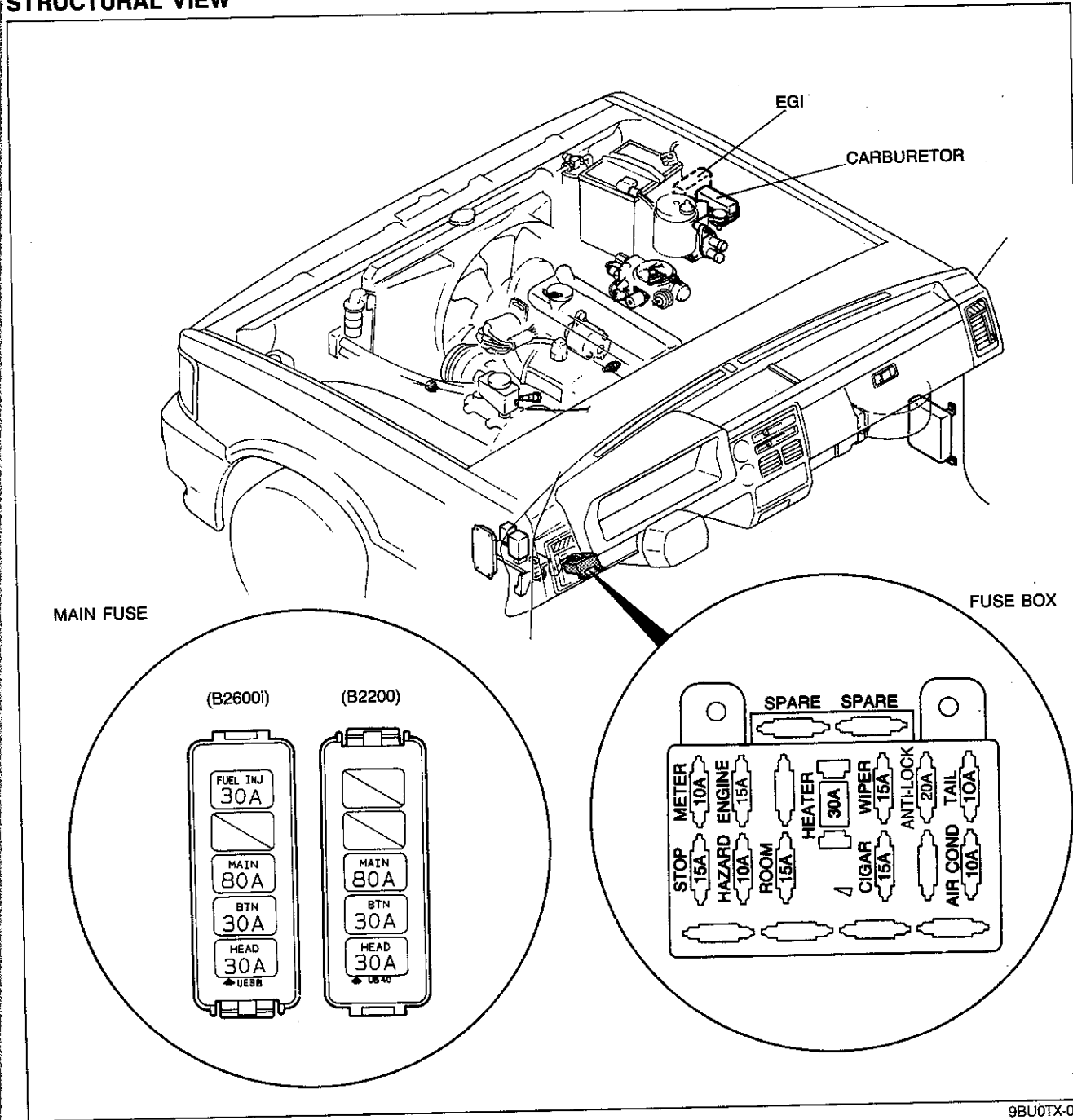
BATTERY	BODY GROUND	FUSE	FUSIBLE LINK
MOTOR	COIL, SOLENOID	RESISTOR	VARIABLE RESISTOR
THERMISTER	DIODE	CONDENSER	LIGHT
TRANSISTOR	SPEAKER	CIGARETTE LIGHTER	HEATER

47U15X-013

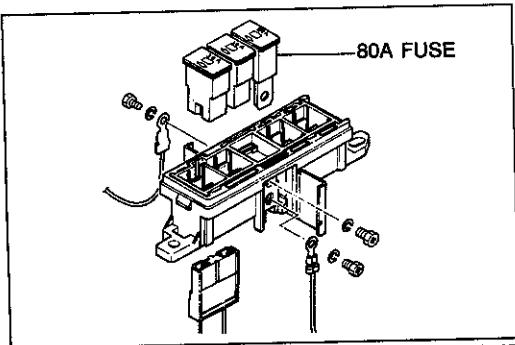


MAIN FUSE AND FUSE BOX

STRUCTURAL VIEW



9BU0TX-006



9BU0TX-007

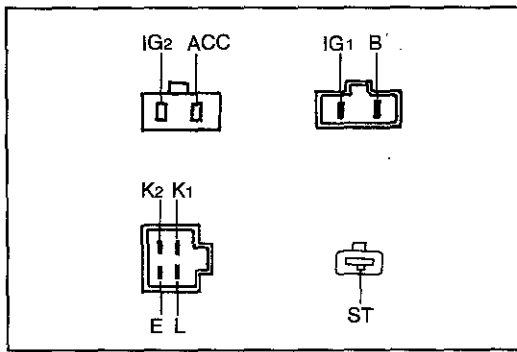
**REPLACEMENT OF MAIN FUSE**

Disconnect the negative battery cable

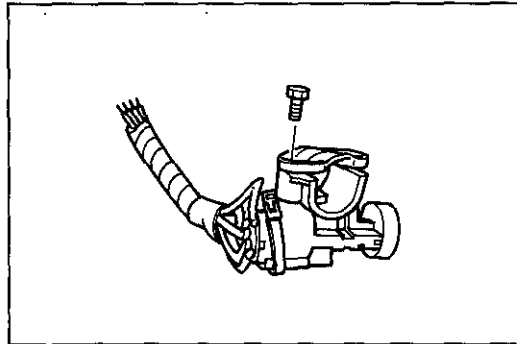
30A fuse: Pull out and push in a new one.

80A fuse:

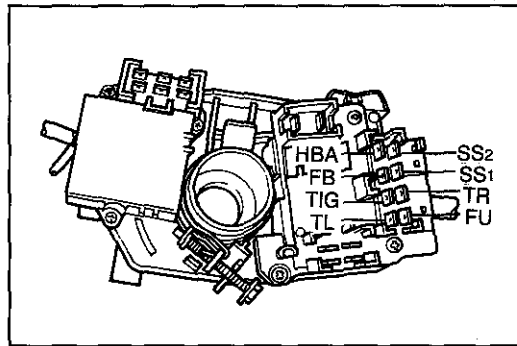
1. Remove the main fuse box.
2. Open the cover.
3. Remove the terminal.
4. Pull out the old fuse and push in a new one.



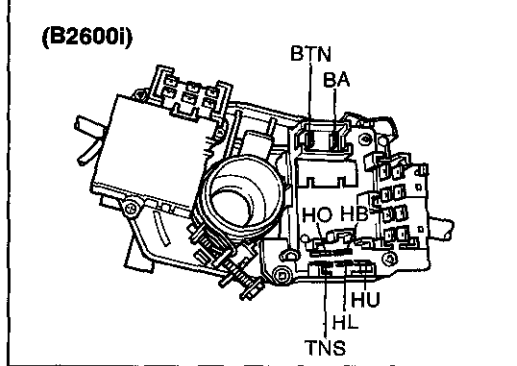
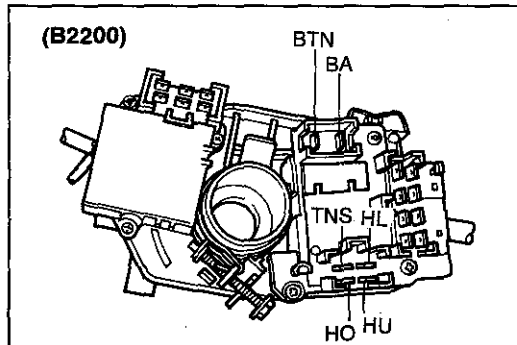
9BU0TX-008



9BU0TX-061



9BU0TX-009



9BU0TX-010

SWITCHES

IGNITION KEY SWITCH

Inspection

Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Terminal Position	B	ACC	IG1	IG2	ST	L	E	K1	K2
	LOCK								○—○
ACC	○—○							○—○	○—○
ON	○—○	○—○	○—○	○—○				○—○	○—○
START	○—○		○—○		○—○	○—○	○—○	○—○	○—○

○—○: Indicates continuity

Replacement

1. Disconnect the negative battery cable.
2. Remove the column covers.
3. Disconnect the connectors from the wiring harness.
4. Loosen the attaching screw.
5. Install in the reverse order of removal.

COMBINATION SWITCH

Inspection

Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Turn signal and hazard switch

Terminal Hazard/ Turn	FU	TL	TR	TIG	HBA	FB	SS1	SS2
	Left	○—○			○—○	○—○	○—○	
OFF				○—○	○—○	○—○		
Right	○—○	○—○	○—○	○—○	○—○	○—○		
ON	○—○	○—○	○—○		○—○	○—○	○—○	○—○

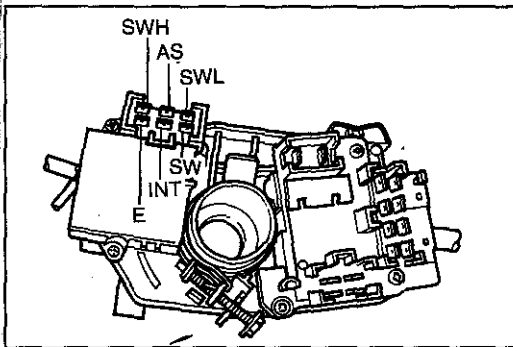
○—○: Indicates continuity

Light, dimmer, and passing switch

Terminal Position	BTN	TNS	BA	HL	HU	HB
	Tail, parking	○—○				
Head-light	Low beam	○—○	○—○	○—○	○—○	○—○
	High beam	○—○	○—○	○—○	○—○	○—○
Passing	Tail, parking			○—○	○—○	

○—○: Indicates continuity

**SWITCHES**

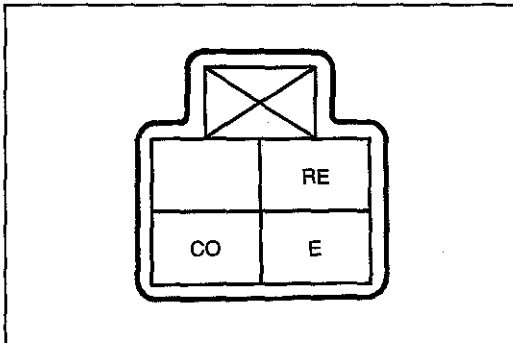


9BU0TX-011

**Windshield wiper and washer switch**

Position	Terminal						
	One touch	AS	SWL	SWH	INT	E	SW
Wiper switch	OFF	ON	○			○	
		OFF	○	○			
	INT		○			○	
	II (High)		○			○	
Washer switch ON						○	○

○—○: Indicates continuity

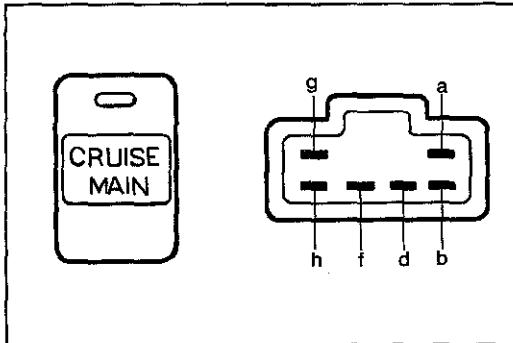


0BU0TX-004

**Cruise control switch**

Switch	Terminal		
	CO	RE	E
SET/COAST	○		○
RESUME/ACCEL		○	○

○—○: Indicates continuity



0BU0TX-005

**CRUISE CONTROL MAIN SWITCH**

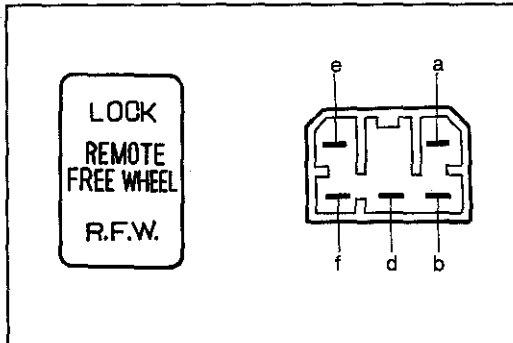
**Inspection**

Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Position	Terminal					
	a	b	d	f	g	h
Neutral			○	○	○	○
OFF					○	○
ON	○		○	○	○	○

○—○: Indicates continuity



9BU0TX-014

**REMOTE FREE WHEEL (RFW) MAIN SWITCH**

**Inspection**

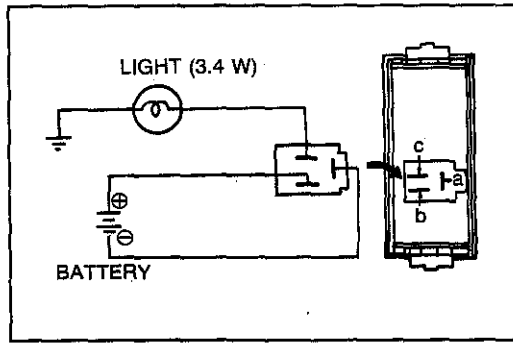
Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Position	Terminal				
	a	b	d	e	f
OFF	○			○	
ON	○		○	○	○

○—○: Indicates continuity

○—○: Illumination lamp



2BU0TX-007

**PANEL LAMP CONTROL SWITCH**

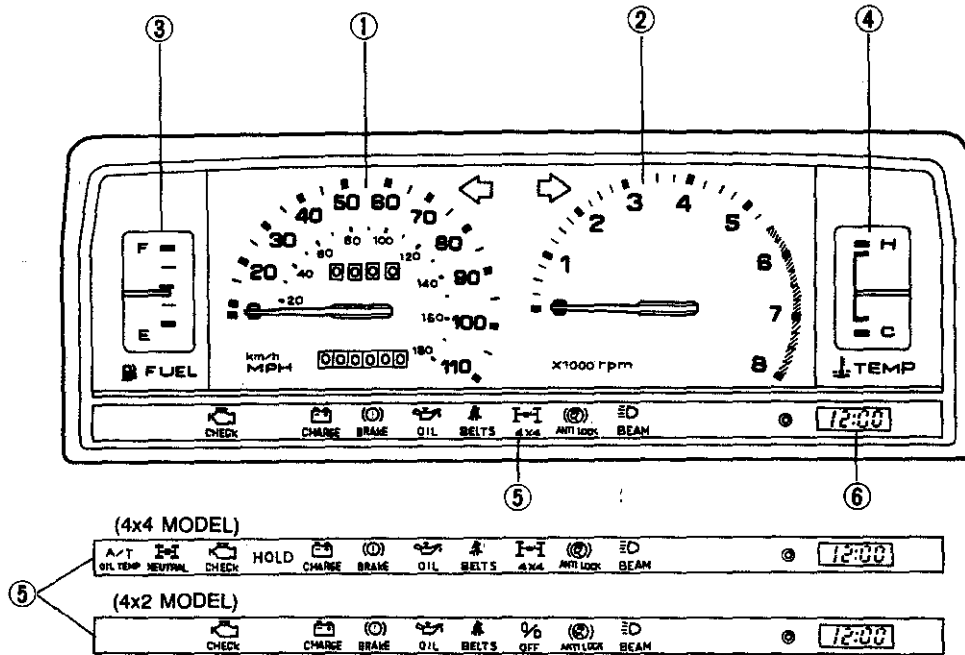
**Inspection**

1. Connect battery voltage to terminal (b) and ground terminal (a).
2. Connect a 3.4W bulb to terminal (c).
3. Verify that the brightness of the bulb changes when the control is turned.

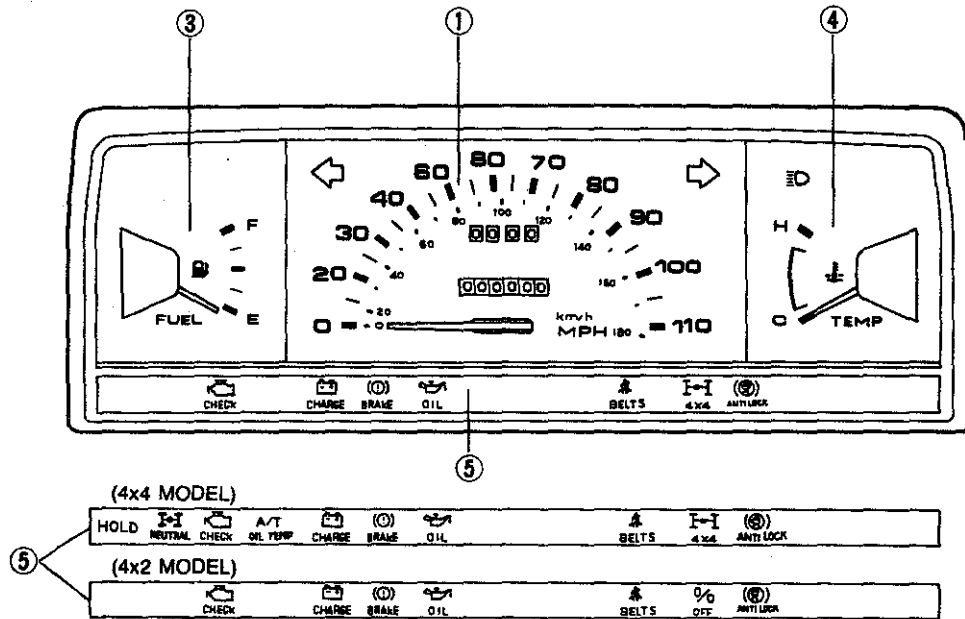
METER

STRUCTURAL VIEW

TYPE A



TYPE B



- 1. Speedometer
- 2. Tachometer
- 3. Fuel gauge

- 4. Water temperature gauge
- 5. Warning and indicator lights
- 6. Digital clock

OBU0TX-007

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
<b>Speedometer does not work</b>	Faulty speedometer cable	Replace	—
	Faulty speedometer	Replace	T-12
<b>Speedometer fluctuation</b>	Faulty speedometer cable	Replace	—
	Faulty speedometer	Replace	T-12
<b>Tachometer does not work</b>	METER fuse blown	Replace fuse and check for short	—
	Faulty tachometer	Check or replace tachometer	T-12
	Faulty wiring	Repair as necessary	—
<b>Fuel gauge does not work</b>	METER fuse blown	Replace fuse and check for short	—
	Faulty fuel gauge	Check fuel gauge	T-13
	Faulty fuel tank unit	Check fuel tank unit	T-13
	Faulty ground or wiring	Repair as necessary	—
<b>Water temperature gauge does not work</b>	METER fuse blown	Replace fuse and check for short	—
	Faulty water temperature gauge	Check water temperature gauge	T-14
	Faulty water temperature gauge unit	Check water temperature gauge unit	T-14
	Faulty wiring	Repair as necessary	—

9BU0TX-017

Standard indication (km/h)	Allowable range (km/h)
20	20—22.5
40	40—43
80	80—84.2
120	120—126

## ON-VEHICLE INSPECTION

**Speedometer**

- Using a speedometer tester, test the speedometer for allowable indication error, and inspect the operation of the odometer.
- Check the speedometer for fluctuation and abnormal noise.

**Caution**

- If significant fluctuation occurs or the speedometer does not move, remove the speedometer cable. If the cable is normal, replace the speedometer assembly.
- Tire wear and improper inflation will increase speedometer error.

Standard indication (mph)	Allowable range (mph)
10	10—11.4
30	30—32
60	60—63
90	90—94.5

9BU0TX-018

Standard indication (rpm)	Allowable range (rpm)
1,000	910—1,090
2,000	1,910—2,090
3,000	2,910—3,090
4,000	3,880—4,120
5,000	4,850—5,150
6,000	5,820—6,180

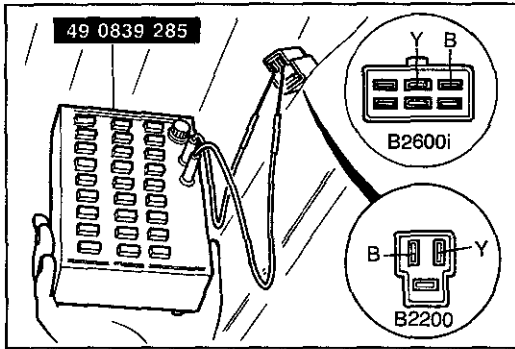
2BU0TX-008

**Tachometer**

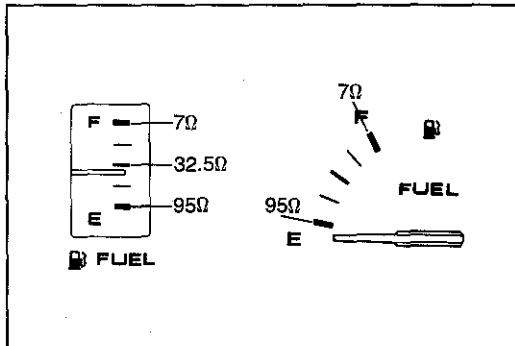
Compare the tester and tachometer indications. If significant error is noted, replace the tachometer.

**Caution**

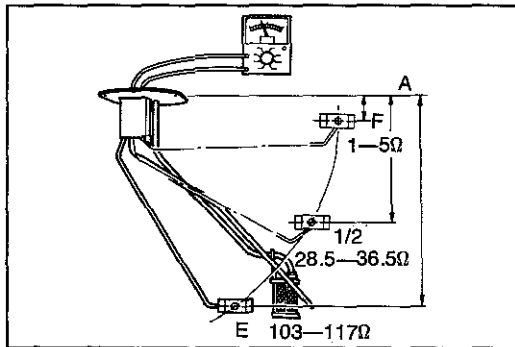
When removing or installing the tachometer, be careful not to drop it or subject it to sharp impact.



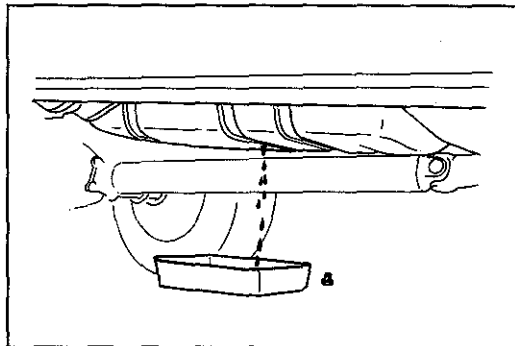
8BU15X-002



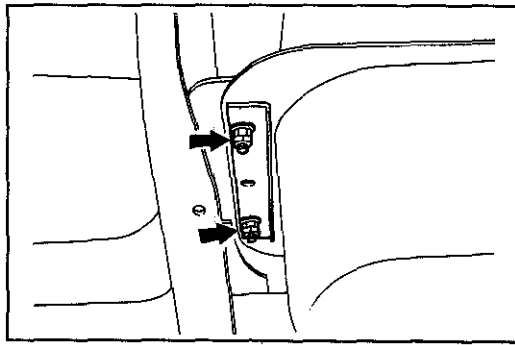
9BU0TX-062



9BU0TX-020



1BU0TX-005



4EG15X-015

**Fuel Gauge**

1. Disconnect the connector from the fuel tank unit.
2. Connect the red lead wire of the **SST** to the Y wire of the fuel tank unit connector; connect the black lead wire to the B wire of the connector.

3. Set the checker to the resistance values shown in the figure.
4. Turn on the ignition switch, and make sure the needle indicator displays the correct values.  
If it does, the trouble is in the fuel tank unit; if it does not, the trouble is in the meter.

**Caution**

- a) Continue the above inspections for at least two minutes each to correctly judge the condition.
- b) The allowable indication error is twice the width of the needle.

**Fuel Tank Unit**

1. Connect an ohmmeter to the tank unit.
2. Move the unit arm slowly from point (E) to point (F) and read the resistance value. If this value is outside the standard range, replace the unit.

Height		A—F	A—1/2	A—E
Standard	Short	44 ± 2.5mm (1.73 ± 0.1 in)	158mm (6.22 in)	263.5 ± 2.5mm (10.37 ± 0.1 in)
	Long	54 ± 2.5mm (2.13 ± 0.1 in)	163mm (6.42 in)	260 ± 2.5mm (10.24 ± 0.1 in)
Cab Plus		91 ± 2.5mm (3.58 ± 0.1 in)	181mm (7.13 in)	263.5 ± 2.5mm (10.37 ± 0.1 in)

**Note**

To inspect the fuel tank unit, remove the fuel tank.

**Removal**

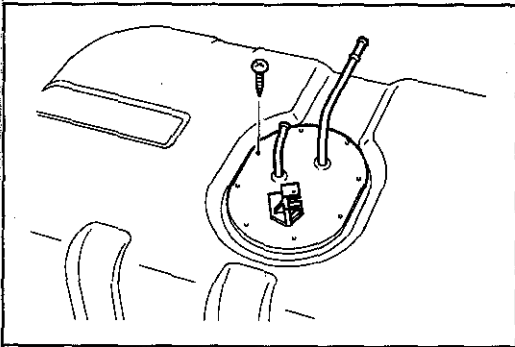
1. Jack up the vehicle, and support it with safety stands (rigid racks).
2. Open the filler cap.
3. Drain the fuel.

**Warning**

When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.

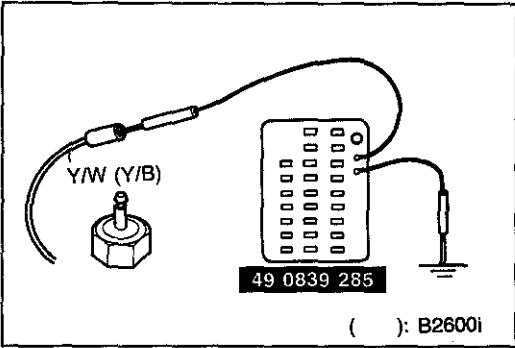
4. Disconnect the main fuel hose, fuel return hose, and evaporation hoses from the fuel tank.
5. Remove the fixing bolts (arrows) and fuel tank.

METER



5BU15X-083

6. Remove the fuel tank unit.
7. Install in the reverse order of removal.

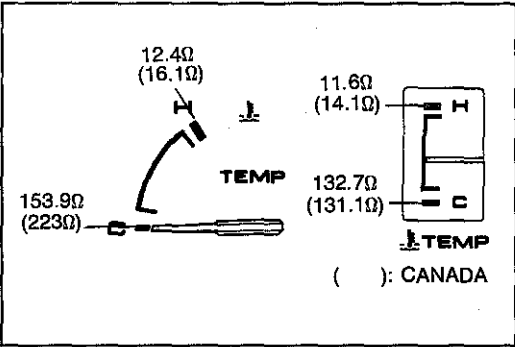


( ): B2600i

1BU0TX-016

**Water Temperature Gauge**

1. Remove the connector from the gauge unit.
2. Connect the red lead wire of the **SST** to the Y/W (Y/B · B2600i) wire of the gauge unit connector; connect the black lead wire to body ground.



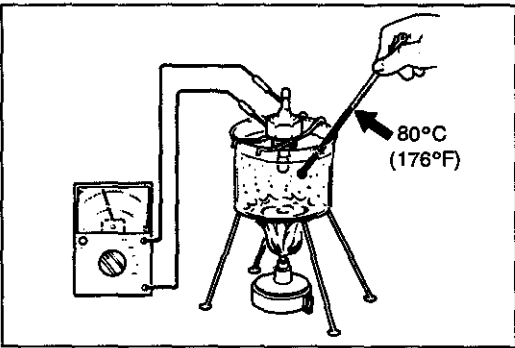
( ): CANADA

5BU15X-022

3. Set the checker to the resistance values shown in the figure.
4. Turn ON the ignition switch, and make sure the needle indicator displays the correct values. If it does, the trouble is in the gauge unit; if it does not, the trouble is in the meter.

**Note**

- a) Continue the above inspections for at least two minutes each to correctly judge the condition.
- b) The allowable indication error is twice the width of the needle.



7BU15X-050

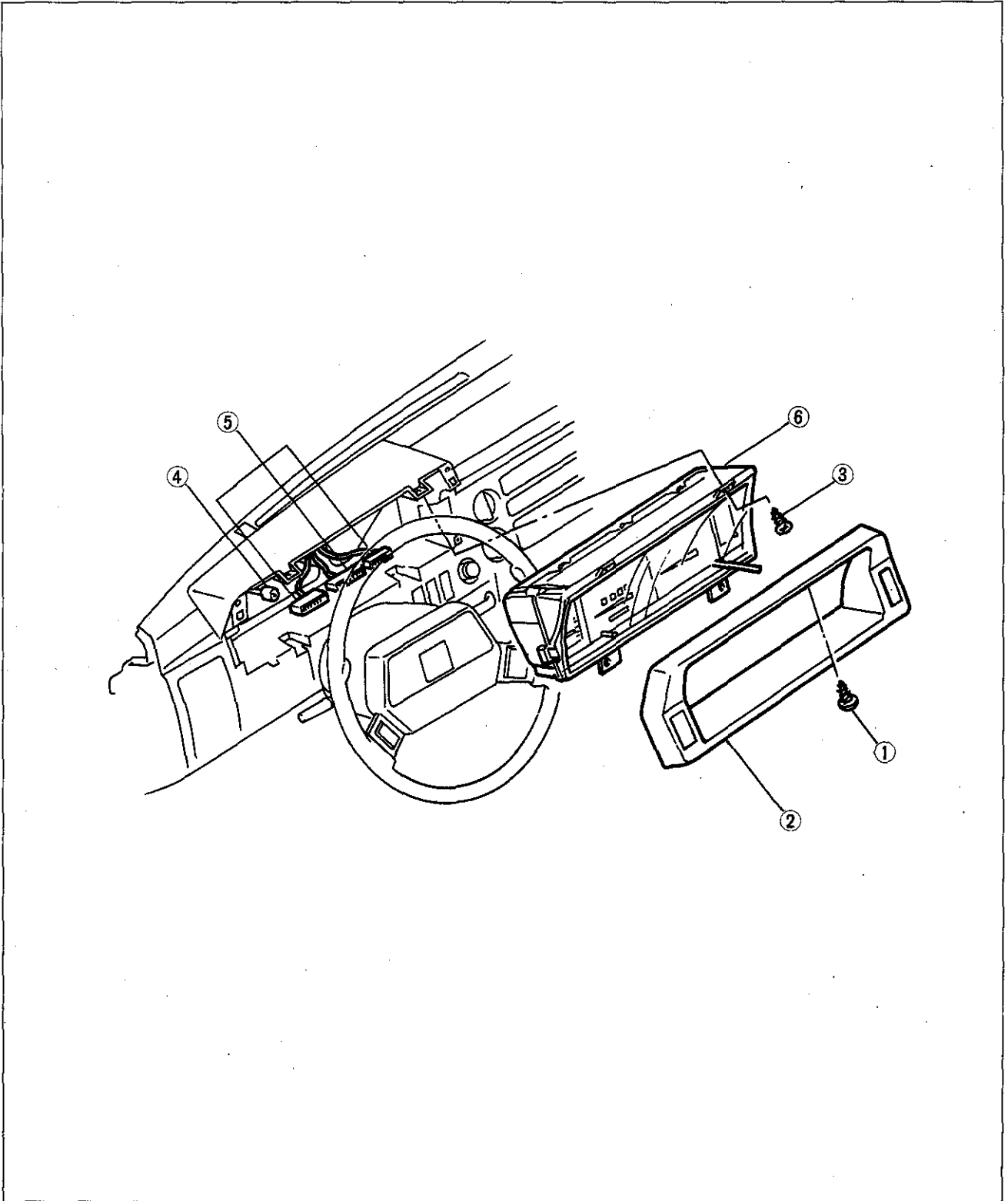
**Water Temperature Gauge Unit**

1. Remove the gauge unit.
2. Place it in a container of water, and heat the water to 80°C (176°F).
3. Use an ohmmeter to measure the resistance.

Water temperature	Resistance (Ω)
80°C (176°F)	53.5 ± 4.2

**REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown.
3. Install in the reverse order of removal.



1. Screw
2. Meter hood
3. Screw

4. Speedometer cable
5. Combination meter connectors
6. Combination meter assembly

9BU0TX-022

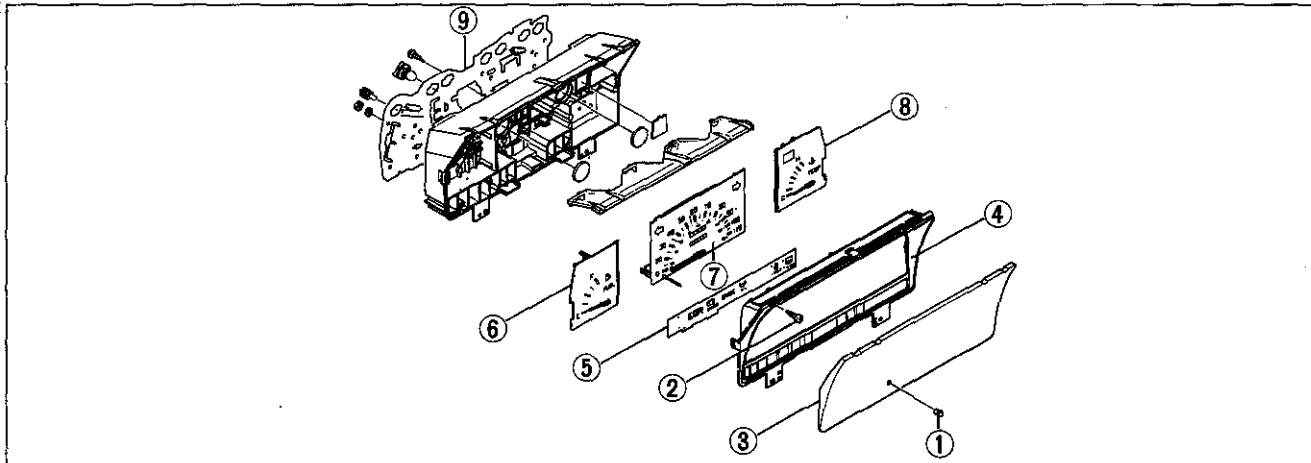


### DISASSEMBLY AND ASSEMBLY

#### Caution

When replacing the speedometer, for correct operation of the malfunction indicator light (CHECK) the odometer of the new unit must be set to the reading of the removed unit.

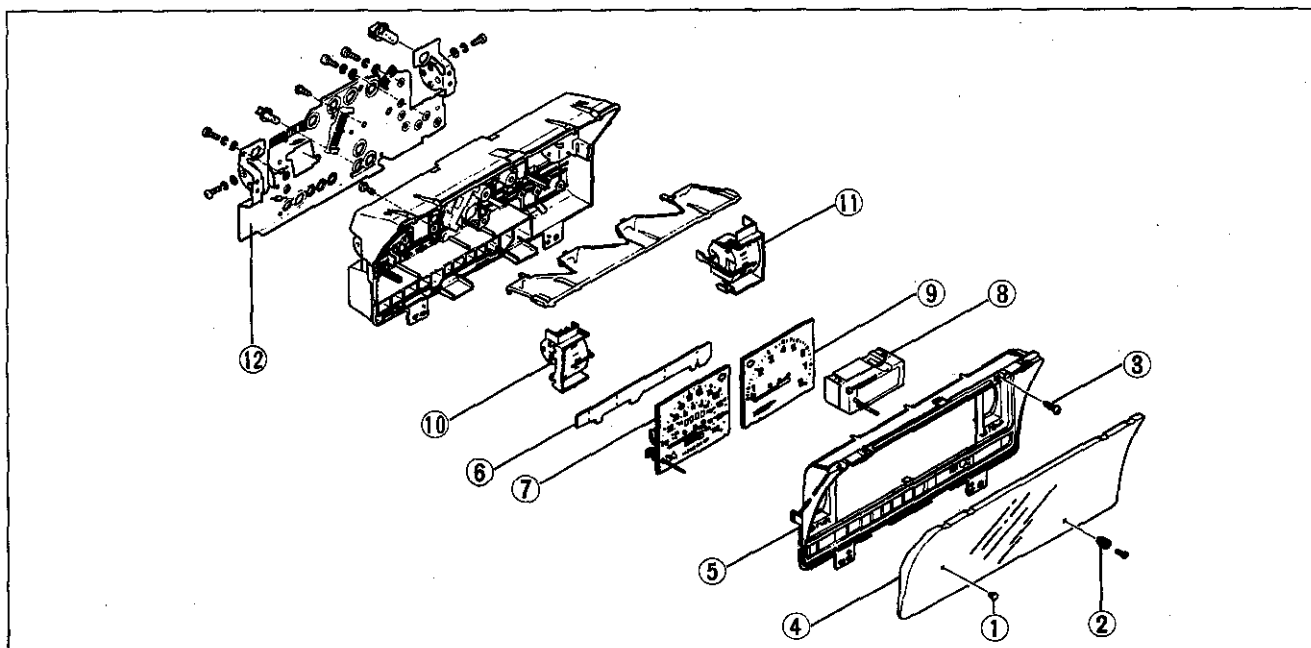
1. Disassemble in the order shown.
2. Assemble in the reverse order of disassembly.



2BU0TX-009

1. Trip meter knob
2. Screw
3. Front lens
4. Window plate
5. Warning plate

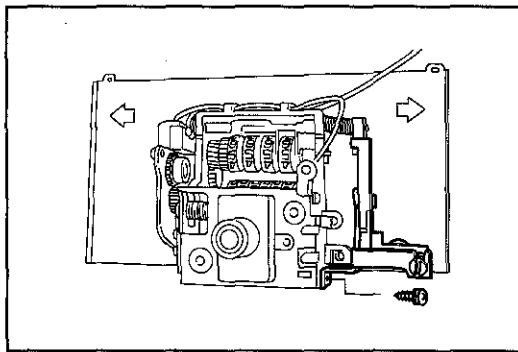
6. Fuel gauge
7. Speedometer
- Disassembly / Assembly ..... page T-17
8. Water temperature gauge
9. Printed circuit board



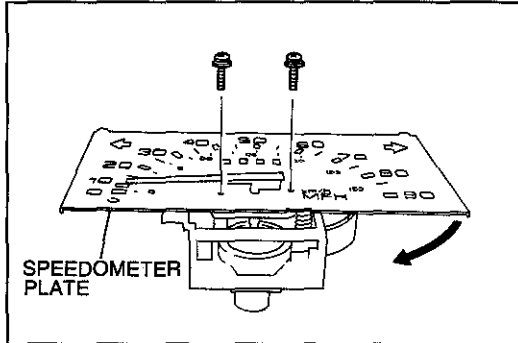
2BU0TX-010

1. Trip meter knob
2. Clock adjusting knob
3. Screw
4. Front lens
5. Window plate
6. Warning plate

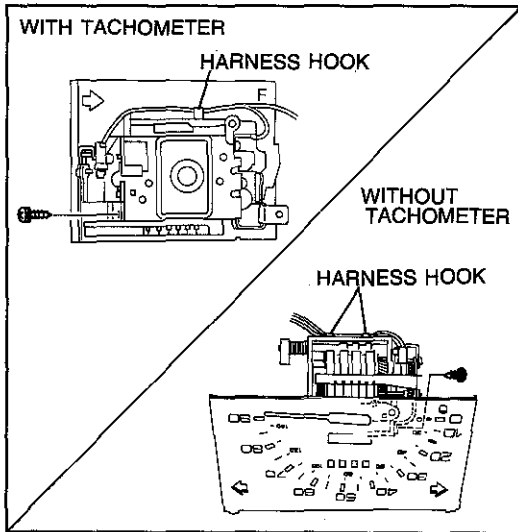
7. Speedometer
- Disassembly / Assembly ..... page T-17
8. Digital clock
9. Tachometer
10. Fuel gauge
11. Water temperature gauge
12. Printed circuit board



OBU0TX-048



9BU0TX-026



OBU0TX-049

**Disassembly and Assembly  
Odometer (In Speedometer)**

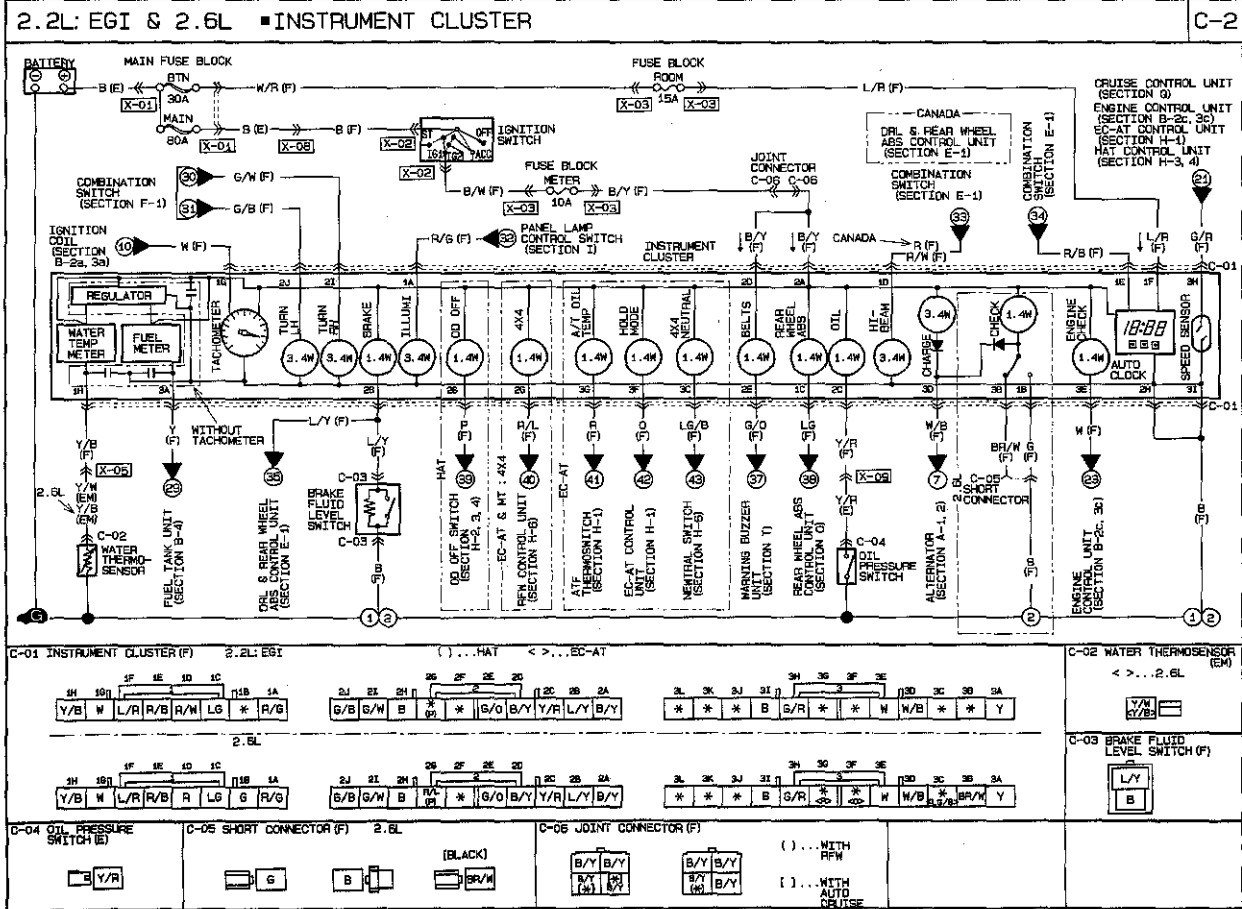
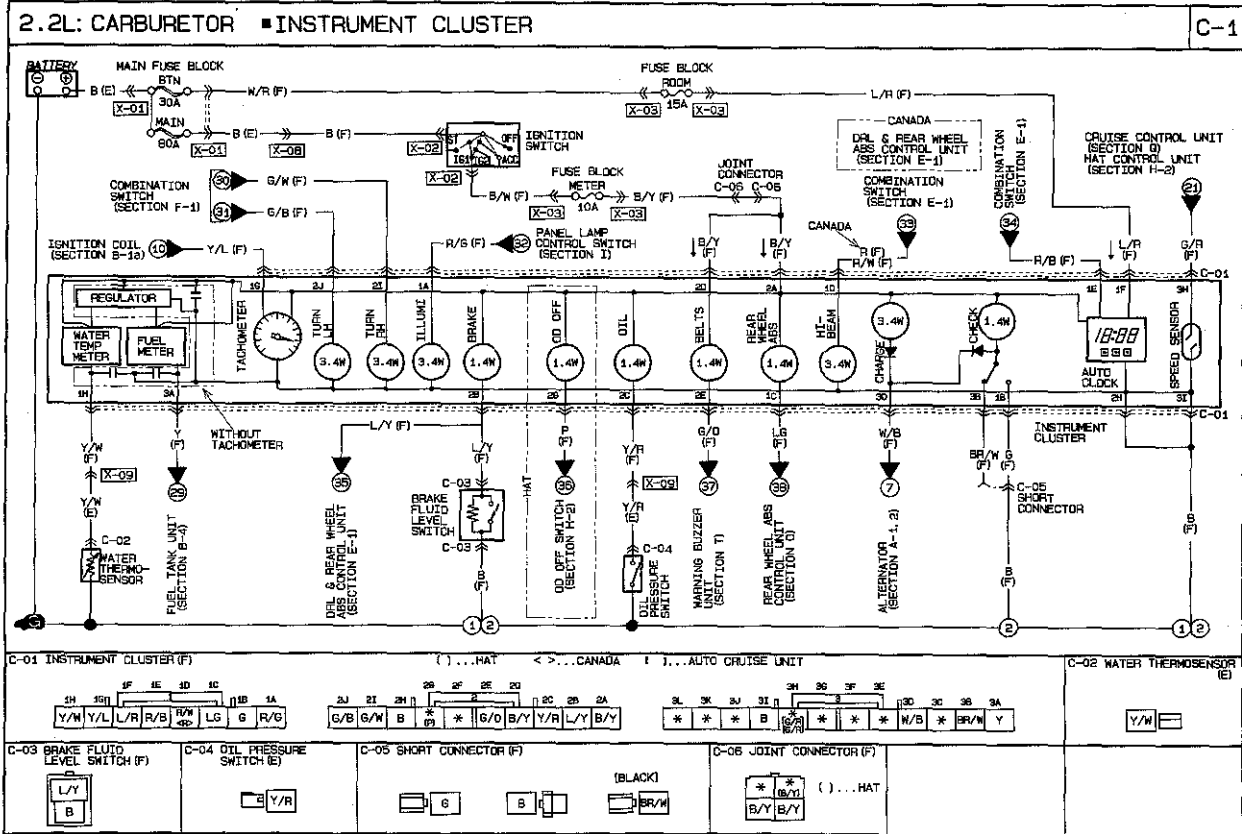
1. Remove the screw and remove the trip meter reset knob assembly. (Without tachometer)
2. Remove the screws and turn the speedometer plate approx. 180 degrees. (Without tachometer)
3. Remove the screw and remove the odometer assembly from the speedometer.
4. Assemble in the reverse order of disassembly.

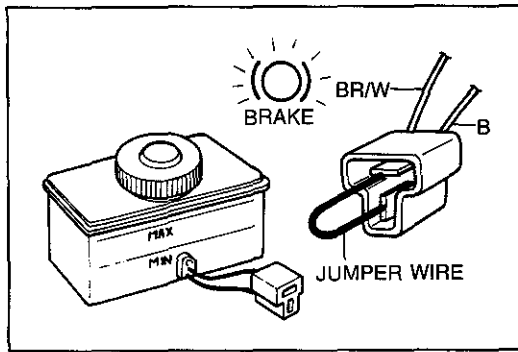
**Caution**

**When replacing the speedometer within 60,000 mile, continue to use the previous odometer by transferring it to the new speedometer.**

# T METER

## METER PRINTED CIRCUIT BOARD INSPECTION





7BU15X-018

**WARNING LIGHTS AND SENDER UNITS**

**INSPECTION OF CIRCUIT AND PARTS**

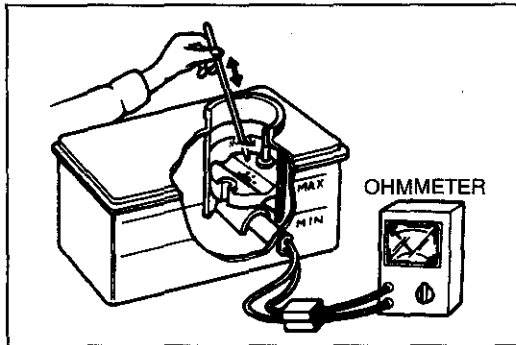
**Brake System Warning Light**

1. Disconnect the connector from the brake fluid level sensor.
2. Connect a jumper wire between BR/W and B terminals (body ground).
3. Start the engine and make sure the BRAKE warning light illuminates.

**Caution**

**Be sure the parking brake is fully released before checking.**

4. If there is no illumination, inspect the fuse, bulb, and wiring harness.



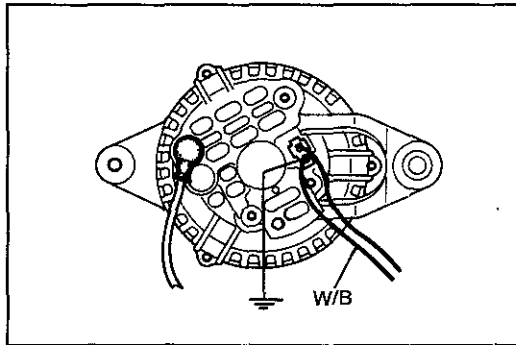
5BU15X-028

**Brake Fluid Level Sensor**

Connect an ohmmeter to the terminals of the brake fluid level sensor connector.

Check for continuity when the float is moved up and down. The sensor is good if there is continuity when the float is below the MIN mark and if there is none when the float is above the MAX mark.

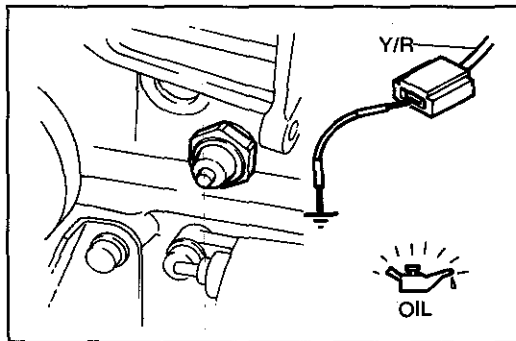
If the sensor does not pass this test, replace it.



9BU0TX-029

**Alternator Warning Light**

1. Start the engine, use a jumper wire, and connect the connector terminal W/B to a body ground.
2. Make sure the alternator warning light illuminates.

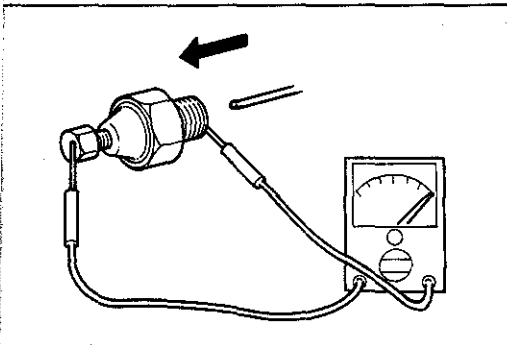


2BU0TX-011

**Engine Oil Pressure Warning Light**

1. Disconnect the connector from the oil pressure switch.
2. Start the engine and connect the connector terminal Y/R to a body ground with a jumper wire.
3. Make sure the oil pressure warning light illuminates.

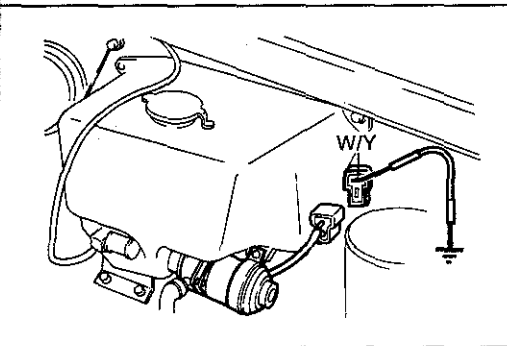
**WARNING LIGHTS AND SENDER UNITS**



4EG15X-026

**Engine Oil Pressure Switch**

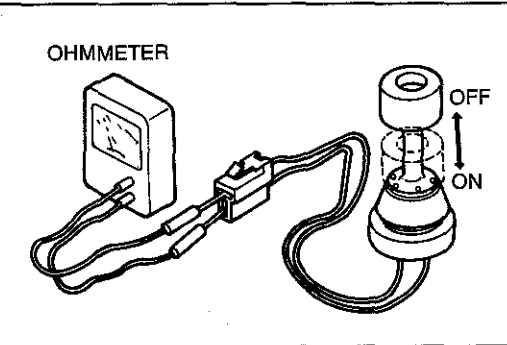
1. Remove the engine oil pressure switch.
2. With an ohmmeter attached as shown in the figure, use a wire to press the engine oil pressure switch inward.  
The switch is normal if there is no continuity when it is pressed in and if there is continuity when it is returned.
3. If the switch is not normal, replace it.



7BU15X-052

**Washer Fluid Warning Light**

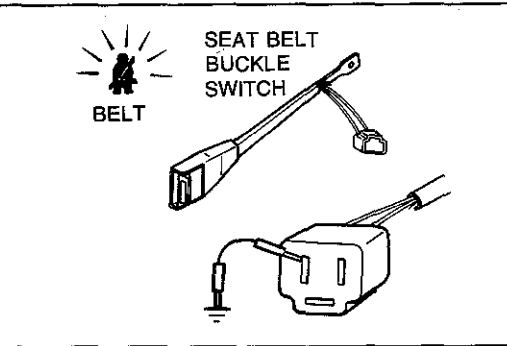
1. Disconnect the connector from the washer fluid level sensor.
2. Start the engine and with a jumper wire connect the connector terminal W/Y to a body ground.
3. Make sure the washer fluid warning light illuminates.



7BU15X-032

**Washer Fluid Level Sensor**

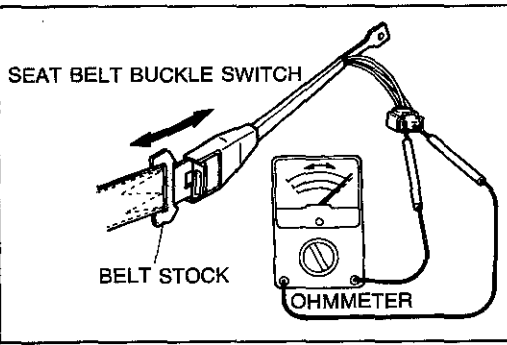
1. Connect the sensor connector to an ohmmeter.
2. Move the sensor float up and down.
3. Make sure there is continuity when the float is at the lowest point.



7BU15X-020

**Seat Belt Warning Light**

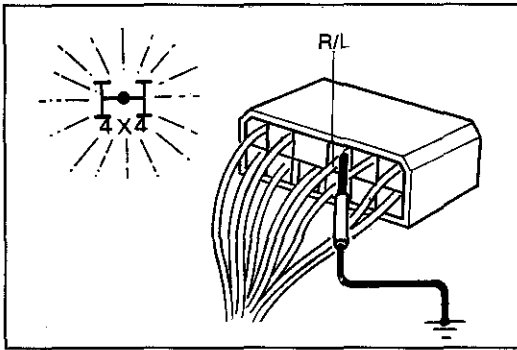
1. Disconnect the connector from the seat belt buckle switch (driver's side).
2. Connect the connector terminal B/R to a body ground.
3. Start the engine and check to be sure that the BELT warning light illuminates for about 6 seconds.
4. If there is no illumination, check the fuse, warning readout, and wiring harness.



4BG15X-022

**Buckle Switch (driver's belt)**

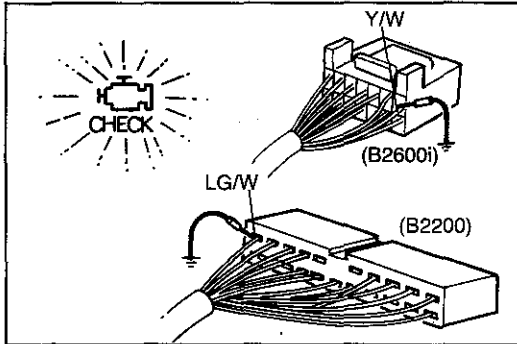
- Insert the seat belt stock into the buckle, and use an ohmmeter to check for continuity of the switch.
- Belt inserted...no continuity  
Belt not inserted...continuity



9BU0TX-031

**4x4 Indicator Light (4x4 model)**

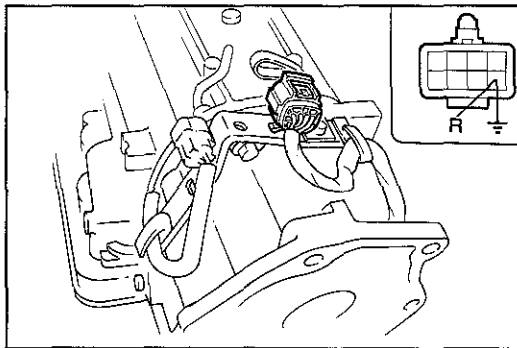
1. Disconnect the RFW control unit connector.
2. Connect the R/L wire terminal to a body ground.
3. Turn the IG switch to ON, and verify that the indicator light illuminates.
4. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and RFW control unit.



9BU0TX-032

**Malfunction Indicator Light (for California and Federal)**

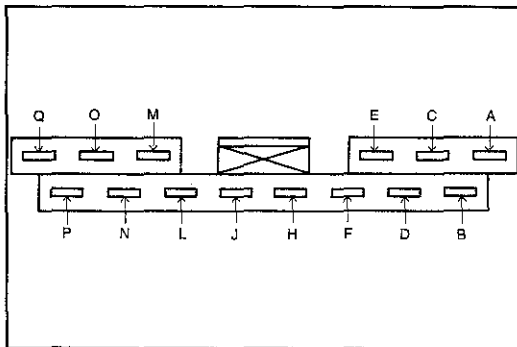
1. Connect the LG/W wire terminal of the FB control unit (B2200) or Y/W wire terminal of the EGI control unit (B2600i) to a body ground.
2. Start the engine and check that the warning light illuminates.
3. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and F/B control unit (B2200) or EGI control unit (B2600i).



0BU0TX-009

**A/T Oil Temperature Warning Light**

1. Disconnect the connector from the ATF thermoswitch.
2. Connect the connector terminal R to a body ground.
3. Start the engine and check that the warning light illuminates.
4. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and ATF thermoswitch.

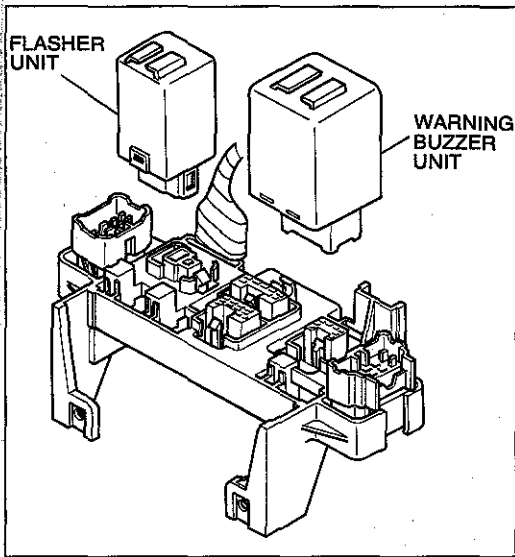


0BU0TX-010

**ABS Warning Light**

1. Disconnect the connector from the ABS control unit.
2. Connect the connector terminal LG to a body ground.
3. Start the engine and check that the warning light illuminates.
4. If there is no illumination, check that the meter fuse, bulb, and wiring harness between the meter and ABS control unit.

# WARNING BUZZER



1BU0TX-017

## WARNING BUZZER

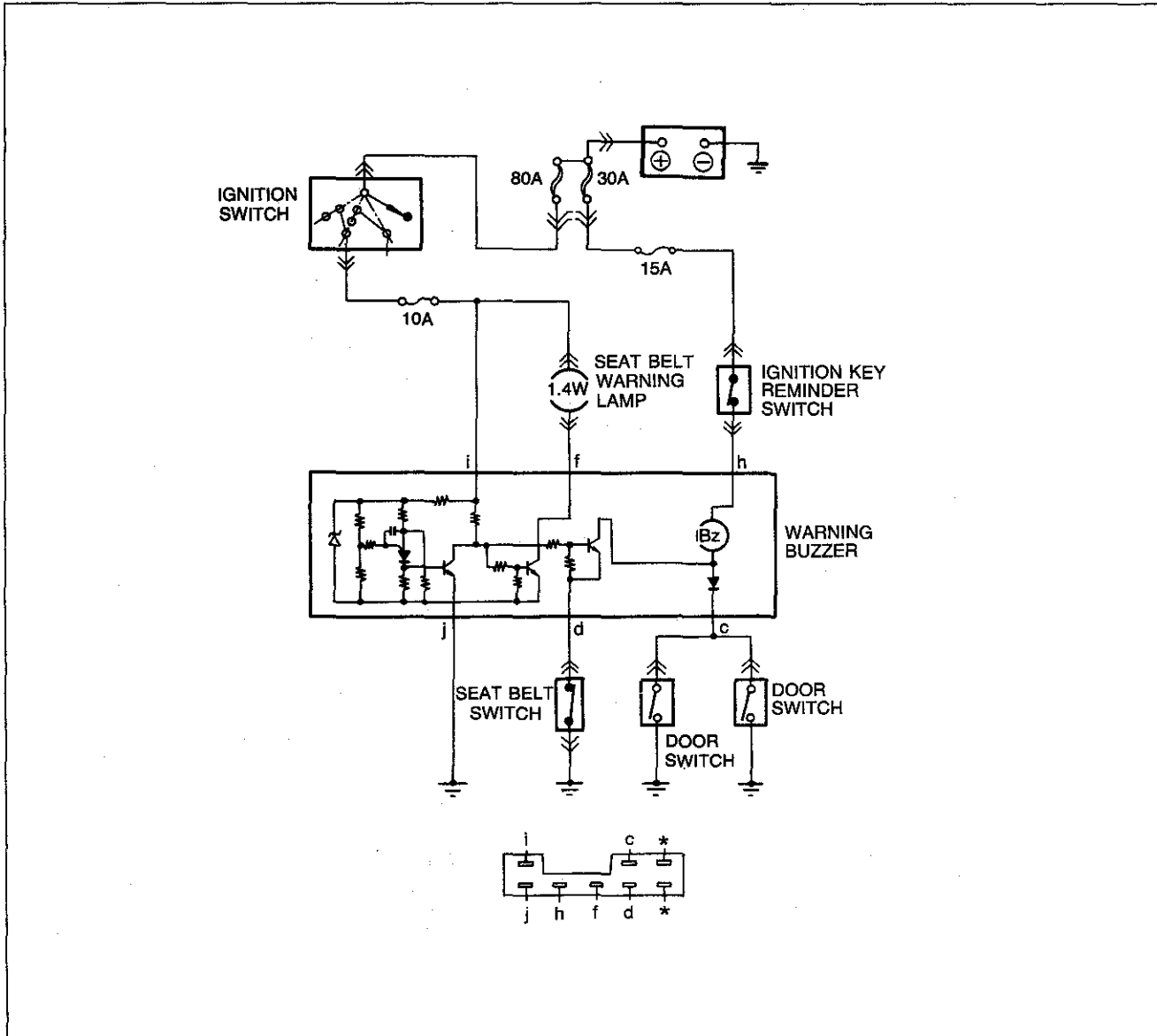
### ON-VEHICLE INSPECTION

The warning buzzer system detects certain conditions and warns the driver about them.

The warnings are described below.

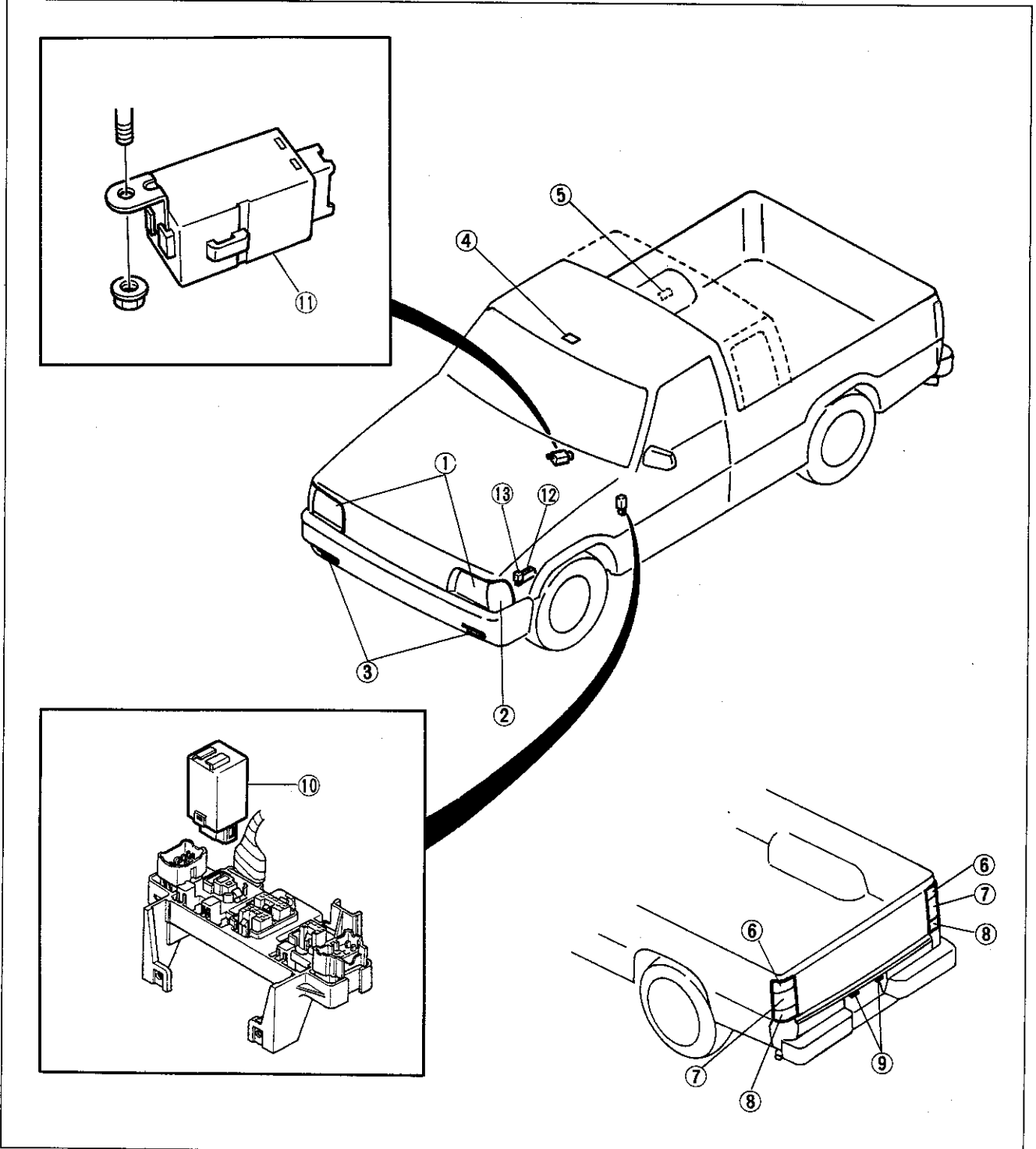
Item	Activation Conditions
Seat belt not fastened	(1) Ignition key at ON (2) Seat belt timer functioning (seat belt not fastened after ignition key set to ON)
Ignition key left in ignition	(1) Ignition key at LOCK Ignition key reminder switch ON (ignition key not removed) (2) Door open (door switch ON)

### CIRCUIT DIAGRAM



LIGHT AND LAMP

STRUCTURAL VIEW



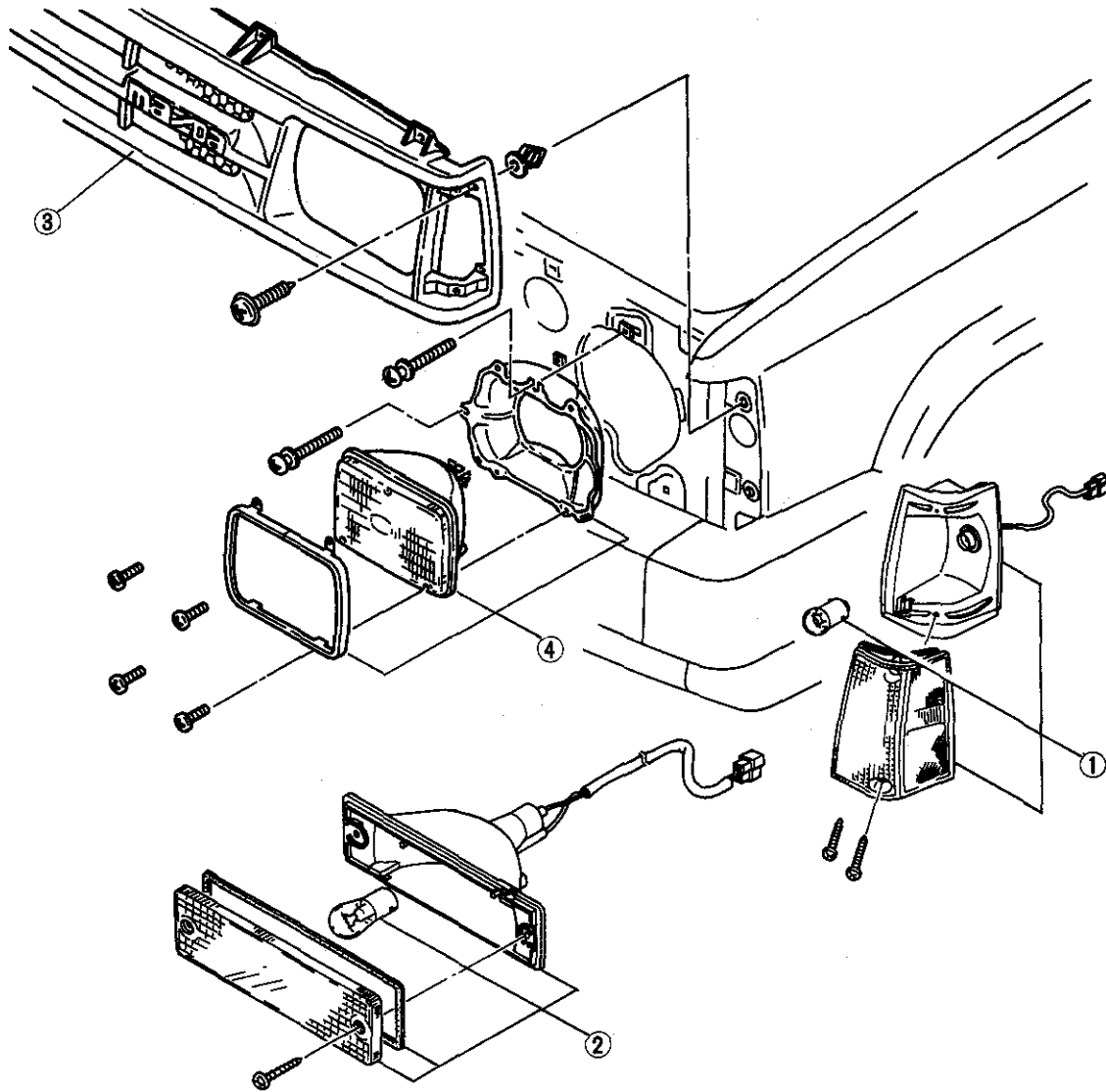
2BU0TX-012

- |   |                            |
|---|----------------------------|
| 1. Headlights                                 | 8. Back-up lights          |
| 2. Front parking and side marker lights       | 9. License plate lights    |
| 3. Turn and hazard signal lights              | 10. Flasher unit           |
| 4. Interior lamp                              | 11. DRL & ABS control unit |
| 5. Interior lamp (for Cab Plus)               | 12. DRL resistor           |
| 6. Turn and hazard signal lights              | 13. DRL relay              |
| 7. Tail and stoplights and side marker lights |                            |



**HEADLIGHTS, FRONT PARKING AND SIDE MARKER LIGHTS  
REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



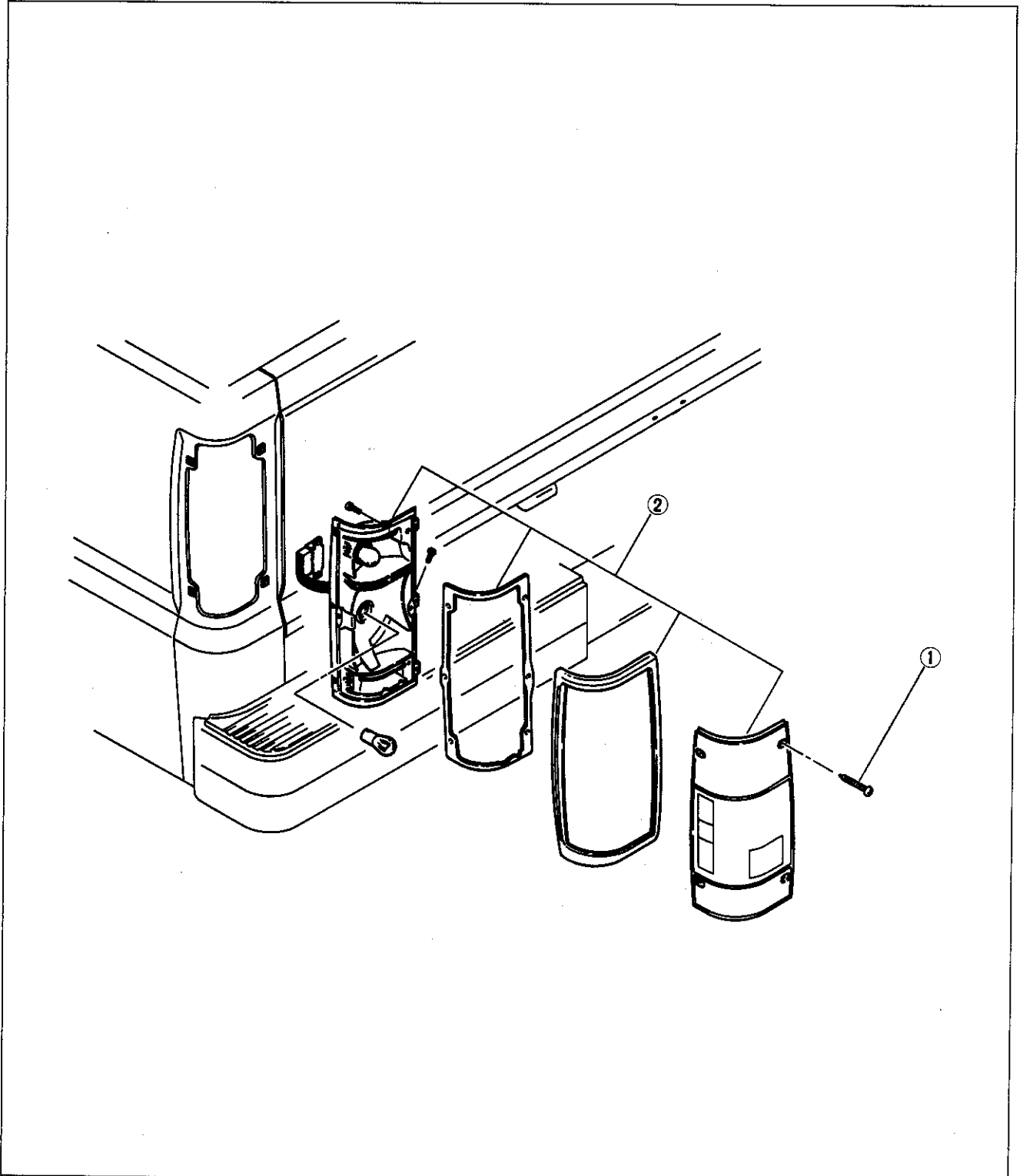
1. Front combination light  
2. Turn and hazard light

3. Radiator grille  
4. Headlight

2BU0TX-013

**REAR COMBINATION LIGHTS (TURN AND HAZARD WARNING LIGHTS, TAIL AND STOPLIGHTS AND SIDE MARKER LIGHTS)  
REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



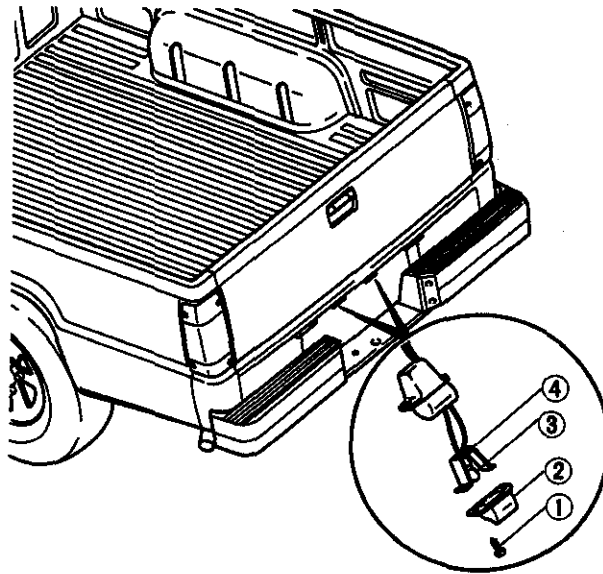
1. Screw
2. Rear combination light assembly

2BU0TX-014

**LIGHT AND LAMP**

**LICENSE PLATE LIGHT  
REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

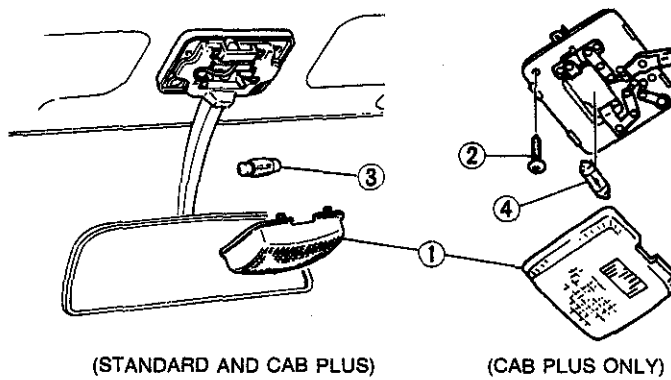


2BU0TX-015

- |          |              |
|----------|--------------|
| 1. Screw | 3. Bulb (6W) |
| 2. Lens  | 4. Bulb body |

**INTERIOR LAMP  
REMOVAL AND INSTALLATION**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



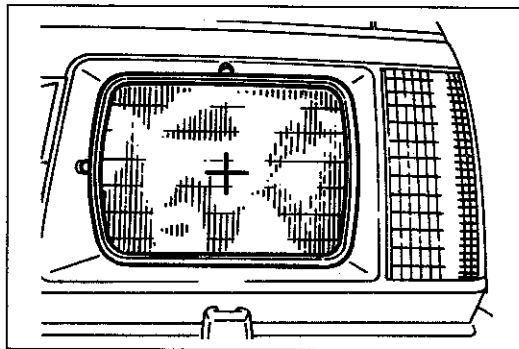
2BU0TX-016

- |          |               |
|----------|---------------|
| 1. Lens  | 3. Bulb (10W) |
| 2. Screw | 4. Bulb (10W) |

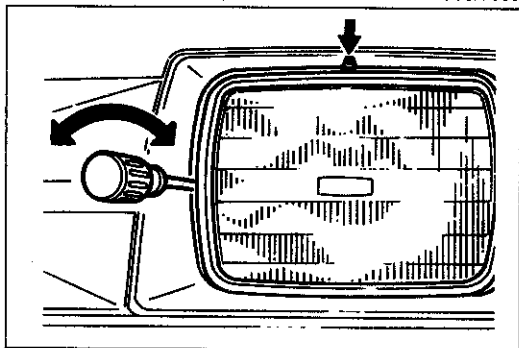
**Specifications**

Light bulb	Wattage (w)	SAE trade number
Headlight	65/55	6052
	65/35	H6054
Front parking and side marker lights	8	67
Turn and hazard signal lights	27	1156
Rear turn signal lights	27	1156
Stop and taillight	27/8	1157
Back-up light	27	1156
License plate lights	6	—
Interior lamp	10	—

2BU0TX-017



9BU0SX-009



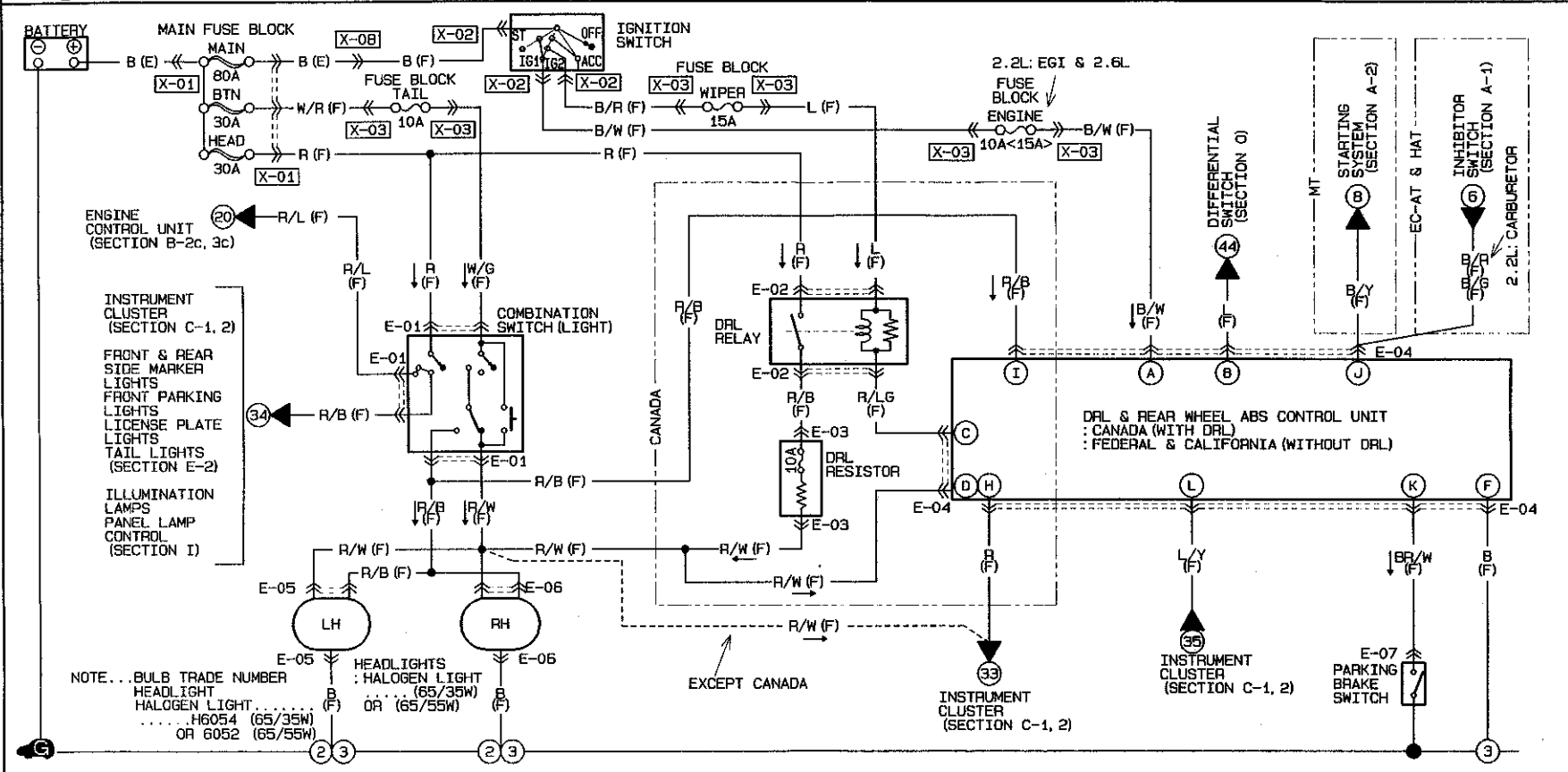
9BU0SX-010

**ADJUSTMENT**

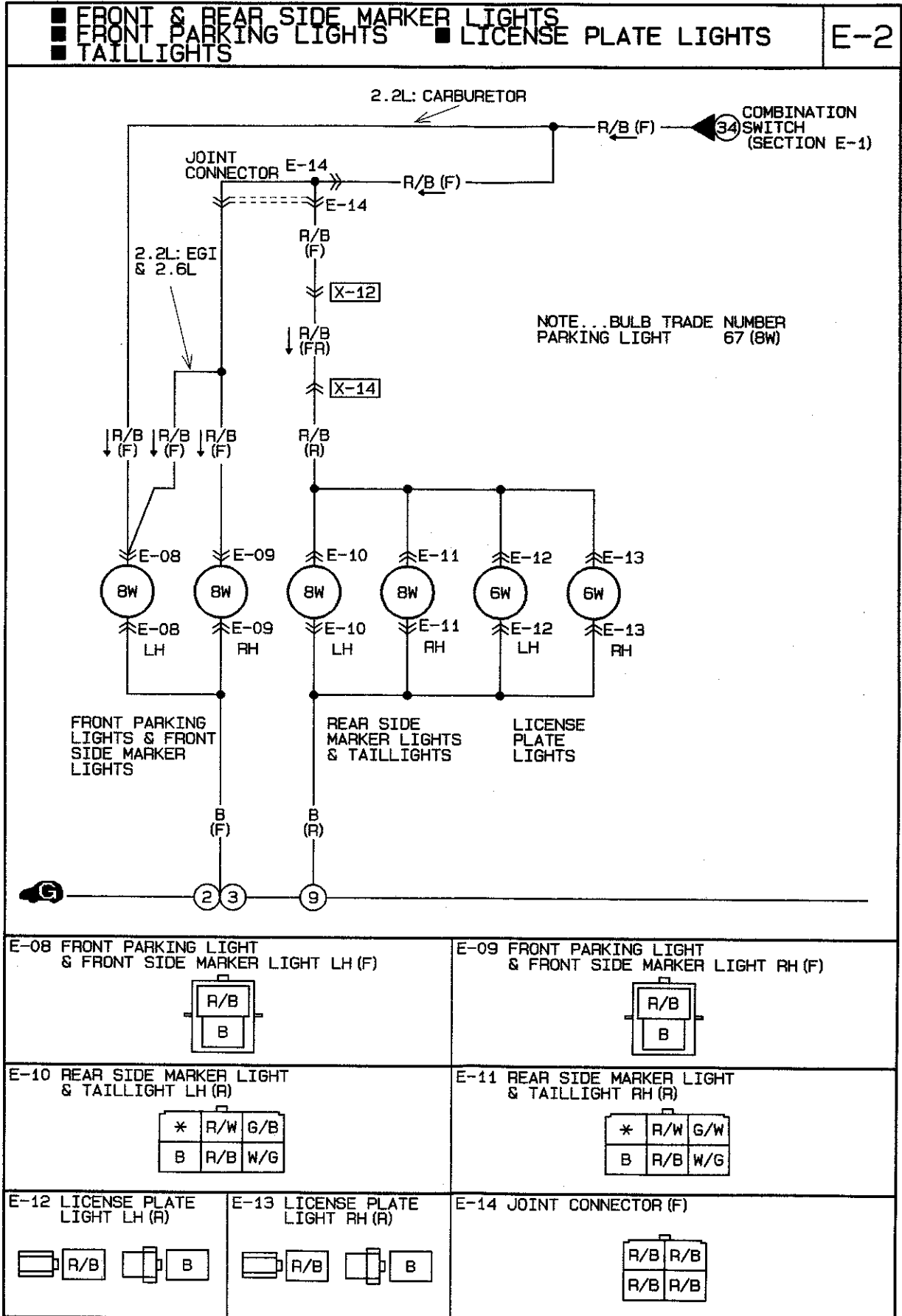
**Headlight Aiming**

1. Inflate the tires to the standard pressures.
2. Position the vehicle on a flat level surface (unloaded condition).
3. One person should sit in the driver's seat.
4. Adjust the headlights to meet state regulations.  
To adjust, turn the two adjusting screws until the headlight is properly aimed.

HEADLIGHTS  
DAYTIME RUNNING LIGHT CONTROL SYSTEM : CANADA

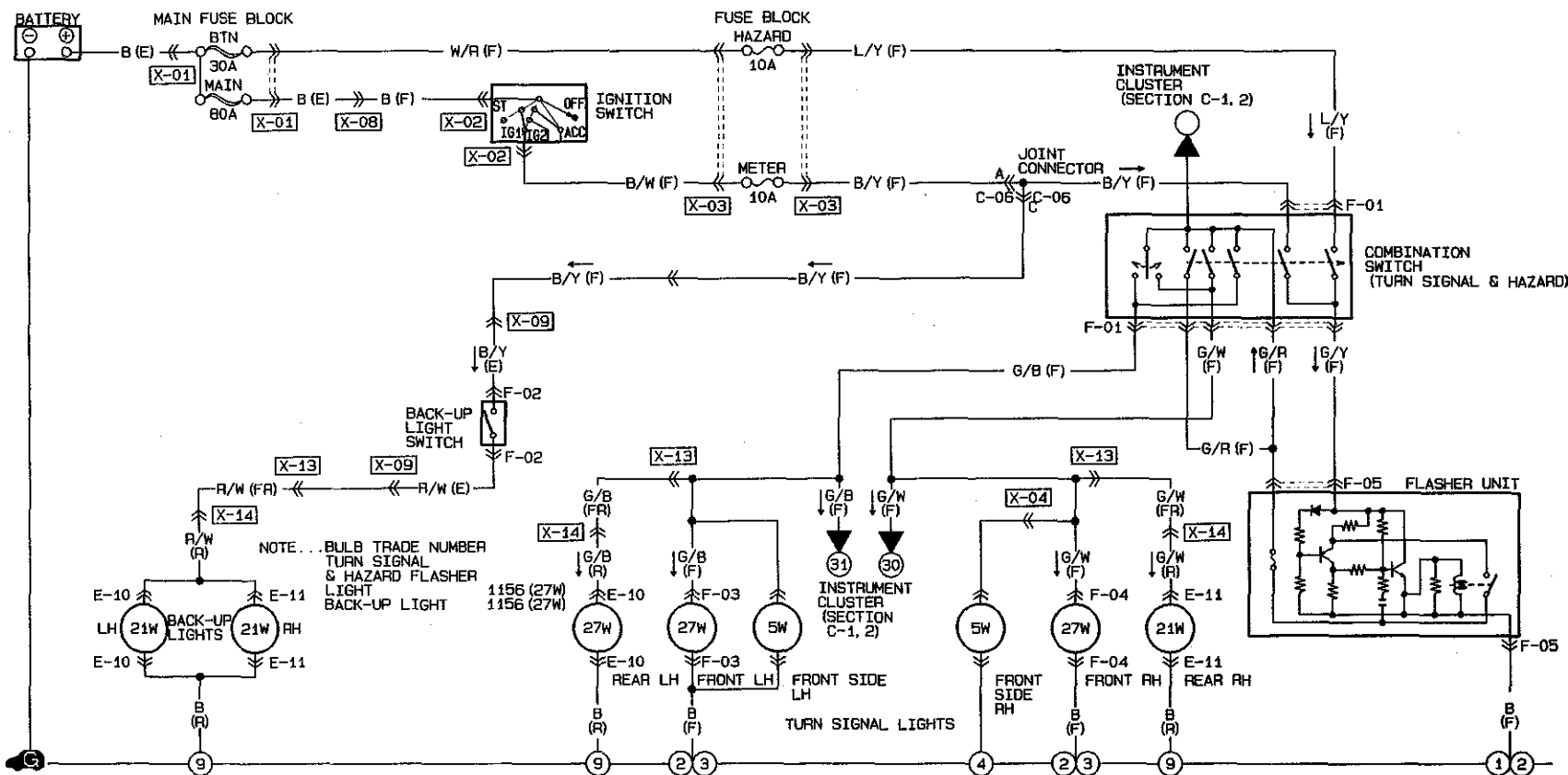


<p>E-01 COMBINATION SWITCH (LIGHT) (F) ( ) ... 2.2L: CARBURETOR</p> <table border="1"> <tr> <td>G/Y</td> <td>R/L #0</td> <td>*</td> </tr> <tr> <td>R/B</td> <td>R/B</td> <td>R/W</td> </tr> </table> <p>W/G R</p>	G/Y	R/L #0	*	R/B	R/B	R/W	<p>E-02 DRL RELAY (F) CANADA</p> <table border="1"> <tr> <td>R</td> <td>L</td> </tr> <tr> <td>R/B</td> <td>R/LG</td> </tr> </table>	R	L	R/B	R/LG	<p>E-03 DRL RESISTOR (F) CANADA</p> <table border="1"> <tr> <td>R/B</td> </tr> <tr> <td>* R/W</td> </tr> </table>	R/B	* R/W	<p>E-04 DRL &amp; REAR WHEEL ABS CONTROL UNIT (F)</p> <table border="1"> <tr> <td colspan="2">CANADA (WITH DRL)</td> <td colspan="2">CANADA</td> </tr> <tr> <td>K</td><td>I</td><td>C</td><td>A</td> </tr> <tr> <td>BR/W</td><td>R/B</td><td>R/LG</td><td>B/W</td> </tr> <tr> <td>L/Y</td><td>R/B</td><td>R</td><td>B</td> </tr> <tr> <td>L</td><td>J</td><td>H</td><td>F</td> </tr> <tr> <td></td><td></td><td>D</td><td>B</td> </tr> </table> <p>FEDERAL &amp; CALIFORNIA (WITHOUT DRL)</p> <table border="1"> <tr> <td>K</td><td>I</td><td>C</td><td>A</td> </tr> <tr> <td>BR/W</td><td>*</td><td>* B/W</td><td></td> </tr> <tr> <td>L/Y</td><td>*</td><td>* B</td><td>* L</td> </tr> <tr> <td>L</td><td>J</td><td>H</td><td>F</td> </tr> <tr> <td></td><td></td><td>D</td><td>B</td> </tr> </table> <p>( ) ... HAT 2.2L: CARBURETOR &lt; &gt; ... MT</p>	CANADA (WITH DRL)		CANADA		K	I	C	A	BR/W	R/B	R/LG	B/W	L/Y	R/B	R	B	L	J	H	F			D	B	K	I	C	A	BR/W	*	* B/W		L/Y	*	* B	* L	L	J	H	F			D	B
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<p>E-05 HEADLIGHT LH (F)</p> <table border="1"> <tr> <td>R/B</td> </tr> <tr> <td>B</td> </tr> <tr> <td>R/W</td> </tr> </table>	R/B	B	R/W	<p>E-06 HEADLIGHT RH (F)</p> <table border="1"> <tr> <td>R/B</td> </tr> <tr> <td>B</td> </tr> <tr> <td>R/W</td> </tr> </table>	R/B	B	R/W	<p>E-07 PARKING BRAKE SWITCH (F)</p> <table border="1"> <tr> <td>BR/W</td> </tr> <tr> <td>*</td> </tr> </table>	BR/W	*																																																	
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BACK-UP LIGHTS ■ TURN SIGNAL & HAZARD FLASHER LIGHTS

F-1

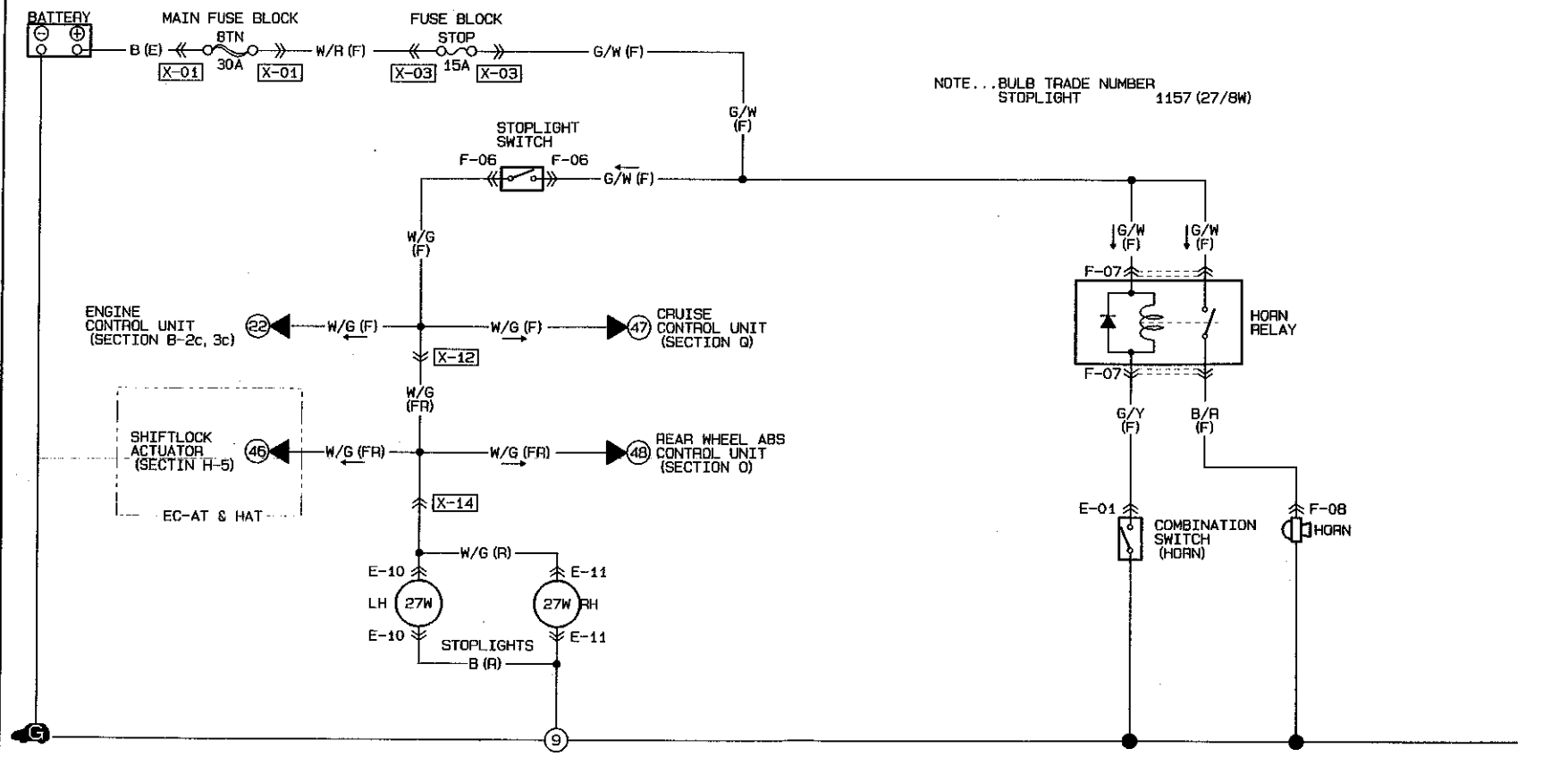


NOTE... BULB TRADE NUMBER  
TURN SIGNAL  
& HAZARD FLASHER  
LIGHT  
BACK-UP LIGHT

<p>F-01 COMBINATION SWITCH (TURN SIGNAL &amp; HAZARD) (F)</p> <table border="1"> <tr> <td>G/B</td> <td>B/Y</td> <td>G/Y</td> <td>L/Y</td> </tr> <tr> <td>G/R</td> <td>G/W</td> <td>G/L</td> <td>G/R</td> </tr> </table>	G/B	B/Y	G/Y	L/Y	G/R	G/W	G/L	G/R	<p>F-02 BACK-UP LIGHT SWITCH (E) MT</p> <table border="1"> <tr> <td>B/Y</td> <td>R/W</td> </tr> </table> <p>2.2L</p>	B/Y	R/W	<p>F-03 FRONT TURN SIGNAL LIGHT LH (F)</p> <table border="1"> <tr> <td>B/Y</td> </tr> <tr> <td>R/W</td> </tr> </table> <p>2.6L</p>	B/Y	R/W	<p>E-10 REAR COMBINATION LIGHT LH (R)</p> <table border="1"> <tr> <td>* R/W</td> <td>G/B</td> </tr> <tr> <td>B</td> <td>R/B</td> </tr> </table>	* R/W	G/B	B	R/B	<p>E-11 REAR COMBINATION LIGHT RH (R)</p> <table border="1"> <tr> <td>* R/W</td> <td>G/W</td> </tr> <tr> <td>B</td> <td>R/B</td> </tr> </table>	* R/W	G/W	B	R/B	<p>F-04 FRONT TURN SIGNAL LIGHT RH (F)</p> <table border="1"> <tr> <td>G/W</td> </tr> <tr> <td>B</td> </tr> </table>	G/W	B
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B/Y																											
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<p>F-05 FLASHER UNIT (F)</p> <table border="1"> <tr> <td>G/R</td> </tr> <tr> <td>G/Y</td> </tr> <tr> <td>B</td> </tr> </table>	G/R	G/Y	B	<p>C-06 JOINT CONNECTOR (F)</p> <table border="1"> <tr> <td>B/Y</td> <td>B/Y</td> </tr> <tr> <td>*</td> <td>*</td> </tr> <tr> <td>(B/Y)</td> <td></td> </tr> </table> <p>( )...2.6L</p>	B/Y	B/Y	*	*	(B/Y)		<p>F-10 FRONT SIDE TURN SIGNAL LIGHT LH (F)</p> <table border="1"> <tr> <td>G/B</td> </tr> <tr> <td>B</td> </tr> </table>	G/B	B	<p>F-11 FRONT SIDE TURN SIGNAL LIGHT (EM)</p> <table border="1"> <tr> <td>G/W</td> </tr> <tr> <td>B</td> </tr> </table>	G/W	B											
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■ HORN ■ STOPLIGHTS

F-2



<p>F-06 STOPLIGHT SWITCH (F)</p>	<p>E-10 STOPLIGHT LH (R)</p> <table border="1"> <tr> <td>*</td> <td>R/W</td> <td>G/B</td> </tr> <tr> <td>B</td> <td>R/B</td> <td>W/G</td> </tr> </table>	*	R/W	G/B	B	R/B	W/G	<p>E-11 STOPLIGHT RH (R)</p> <table border="1"> <tr> <td>*</td> <td>R/W</td> <td>G/W</td> </tr> <tr> <td>B</td> <td>R/B</td> <td>W/G</td> </tr> </table>	*	R/W	G/W	B	R/B	W/G	<p>F-07 HORN RELAY (F)</p>	<p>F-08 HORN (F)</p>	<p>E-01 COMBINATION SWITCH (HORN) (F) ( ) ... 2.2L</p> <table border="1"> <tr> <td>G/Y</td> <td>R/L</td> <td>*</td> </tr> <tr> <td>R/B</td> <td>R/B</td> <td>R/W</td> </tr> </table>	G/Y	R/L	*	R/B	R/B	R/W
*	R/W	G/B																					
B	R/B	W/G																					
*	R/W	G/W																					
B	R/B	W/G																					
G/Y	R/L	*																					
R/B	R/B	R/W																					



**LIGHT AND LAMP**

Flow No.1	Symptom	All headlights do not illuminate.
-----------	---------	-----------------------------------

Possible cause

- Burned out HEAD 30A main fuse block.
- Damaged combination switch.
- Burnt bulb.
- No continuity of wiring harness.
- Loose or corroded connector.

Remedy

- Replace HEAD 30A main fuse block.
- Check combination switch.
- Replace bulb.
- Repair wiring harness.

2BU0TX-018

Flow No.2	Symptom	All turn signal and hazard warning lights do not illuminate.
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Possible cause

- Burned out HAZARD 10A fuse block.
- Damaged flasher unit.
- Burnt bulb.
- No continuity of wiring harness.
- Loose or corroded connector.

Remedy

- Replace HAZARD 10A fuse block.
- Check flasher unit.
- Replace bulb.
- Repair wiring harness.

2BU0TX-019

Flow No.3	Symptom	All stoplights do not illuminate.
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Possible cause

- Burned out STOP 15A fuse block.
- Damaged stoplight switch.
- Damaged stoplight check unit.
- Burnt bulb.
- No continuity of wiring harness.
- Loose or corroded connector.

Remedy

- Replace STOP 15A fuse block.
- Check stoplight switch.
- Check stoplight check unit.
- Replace bulb.
- Repair wiring harness.

2BU0TX-020

Flow No.4	Symptom	All TNS (taillights, license plate lights, parking lights, side marker lights, back-up lights) do not illuminate.
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Possible cause

- Burned out TAIL fuse block.
- Damaged combination switch.
- Burnt bulb.
- No continuity of wiring harness.
- Loose or corroded connector.

Remedy

- Replace TAIL 10A fuse block.
- Check combination switch.
- Replace bulb.
- Repair wiring harness.

2BU0TX-021

Flow No.5	Symptom	All interior lamp do not illuminate.
-----------	---------	--------------------------------------

Possible cause

- Burned out ROOM 15A fuse block.
- Damaged interior lamp switch.
- Damaged door switch.
- Burnt bulb.
- No continuity of wiring switch.
- Loose or corroded connector.

Remedy

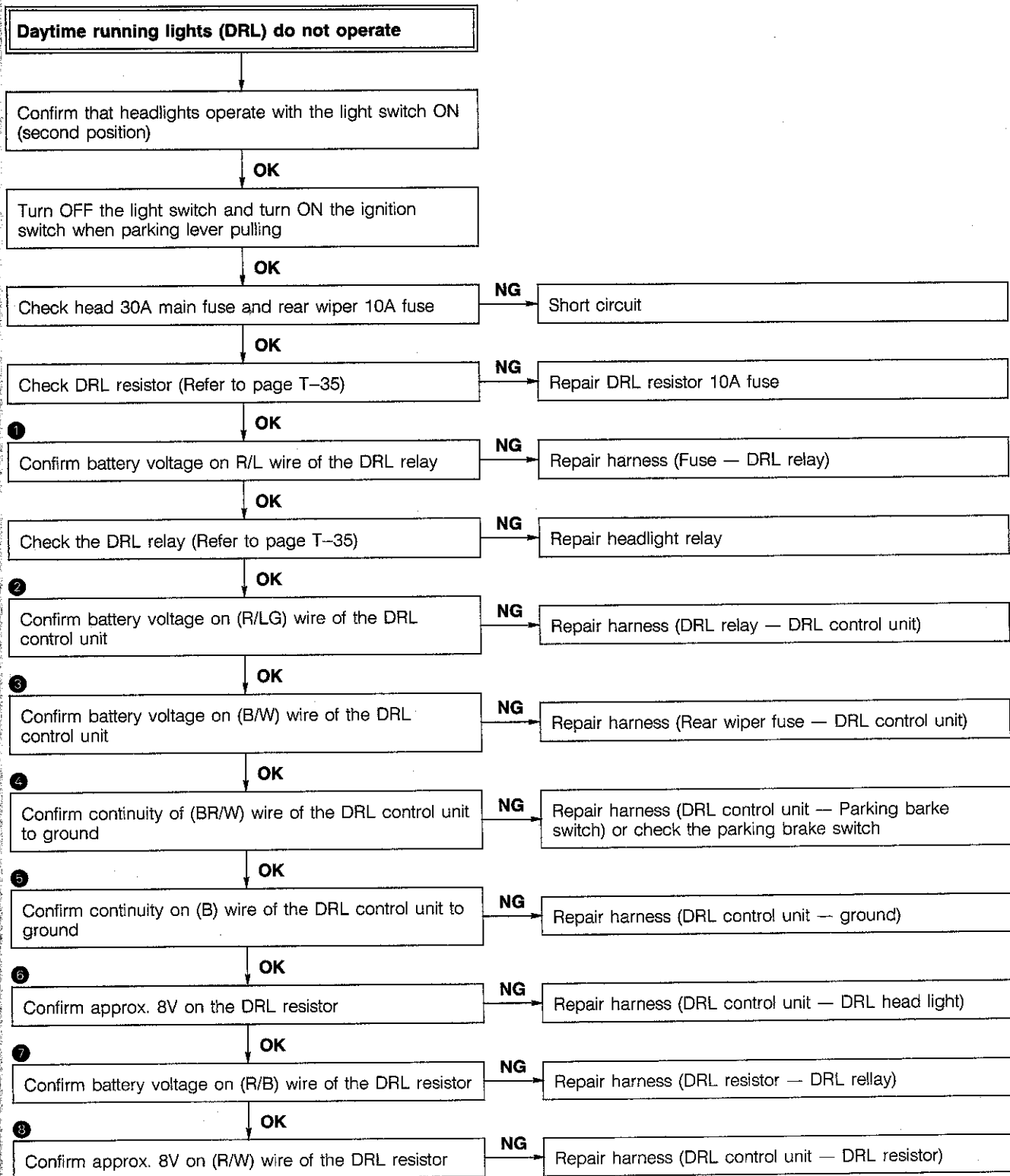
- Replace ROOM 15A fuse block.
- Check interior lamp switch.
- Check door switch.
- Replace bulb.
- Repair wiring harness.

2BU0TX-022

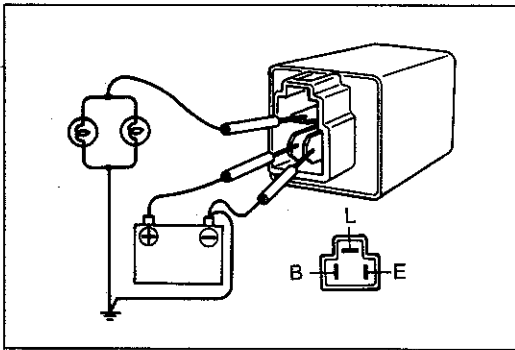
# T

## LIGHT AND LAMP

(Canada)



2BU0TX-023



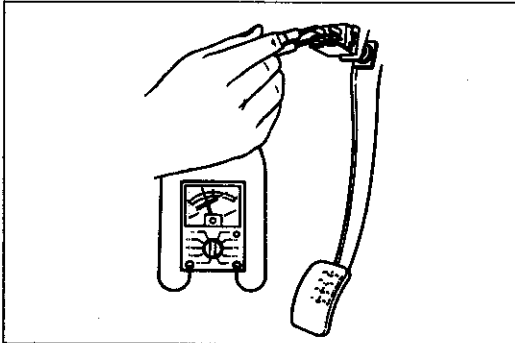
2BU0TX-024

**INSPECTION**  
**Flasher Unit**

1. Apply battery voltage to the B terminal of the unit, and connect the E terminal to the ground.
2. Confirm that the two paralleled lights come on when connected between the L terminal and the ground.

**Caution**

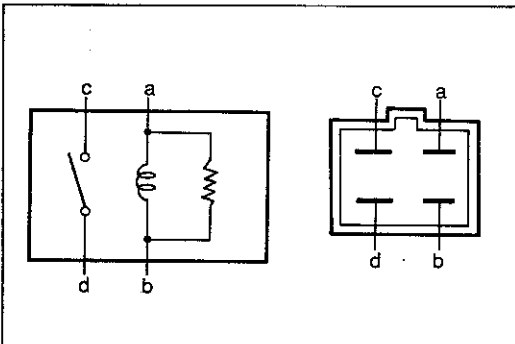
**Do not reverse the polarity of the electrical source to the terminal.**



2BU0TX-041

**Stoplight Switch**

1. Disconnect the 2-pin connector from the switch.
2. Confirm the conductivity between the two terminals of the stoplight switch.



2BU0TX-025

**DRL Relay (Canada)**

1. Disconnect the DRL relay connector and remove the relay.
2. Check for continuity between terminals of the relay.

**V<sub>B</sub>: Battery voltage**

Connecting to		a	b	c	d
V <sub>B</sub>	Ground	○	○		
	a			○	○

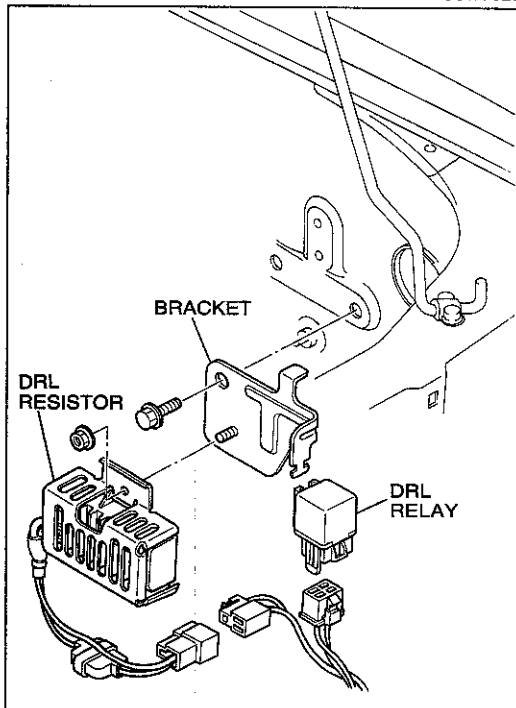
○—○: Indicates continuity

**DRL Resistor (Canada)**

Confirm that 10A fuse is not burnt out.

**Removal and Installation**

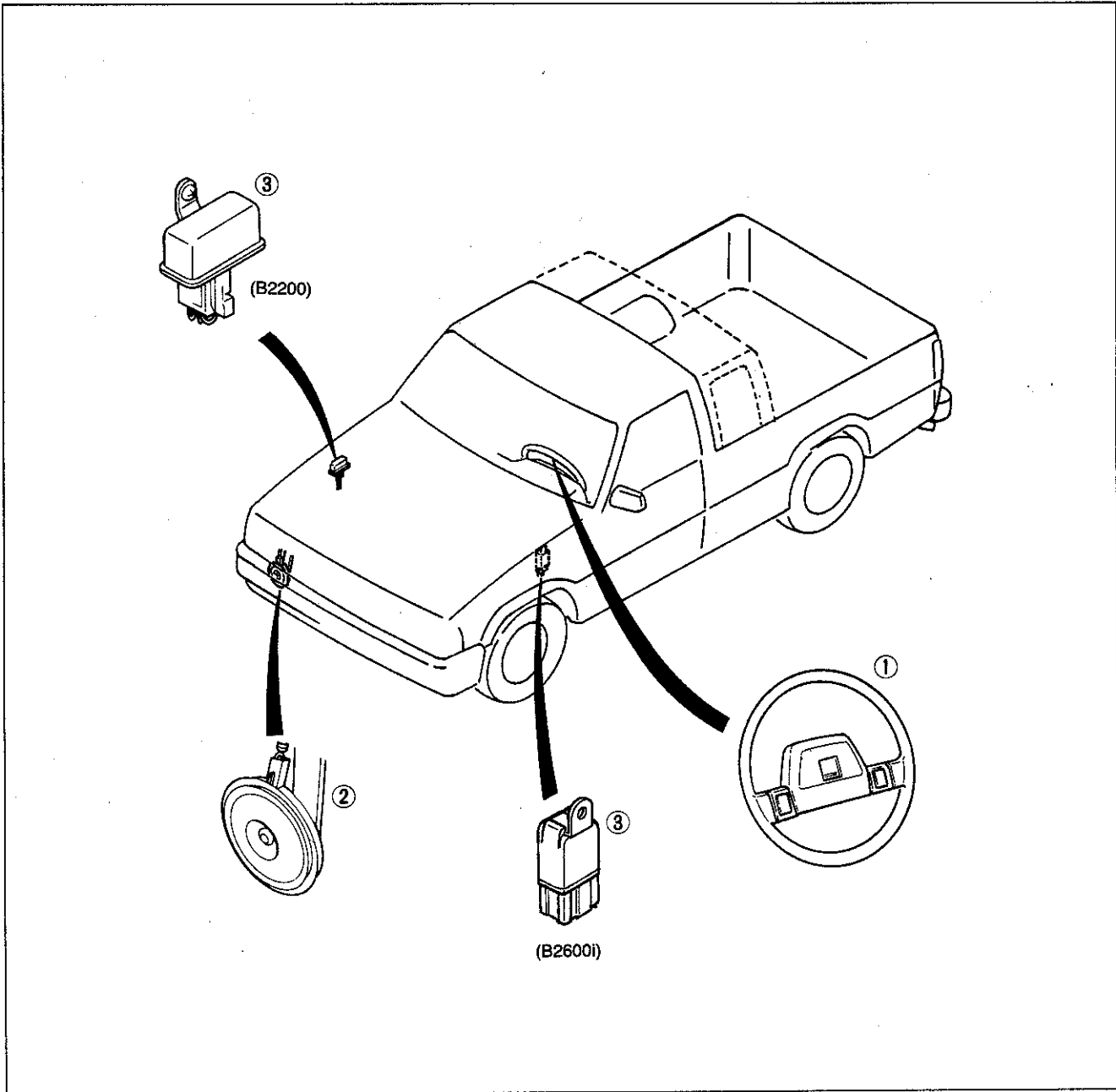
1. Remove the air cleaner. (Refer to Section F2.)
2. Remove the bolt, nut and the bracket.
3. Disconnect the DRL resistor connector and the DRL relay connector.



2BU0TX-042

HORN

STRUCTURAL VIEW

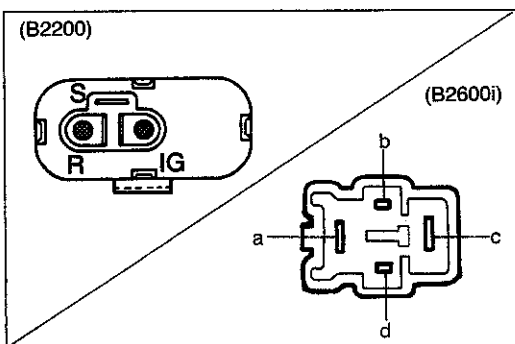


7BU15X-028

1. Horn switch

2. Horn

3. Horn relay



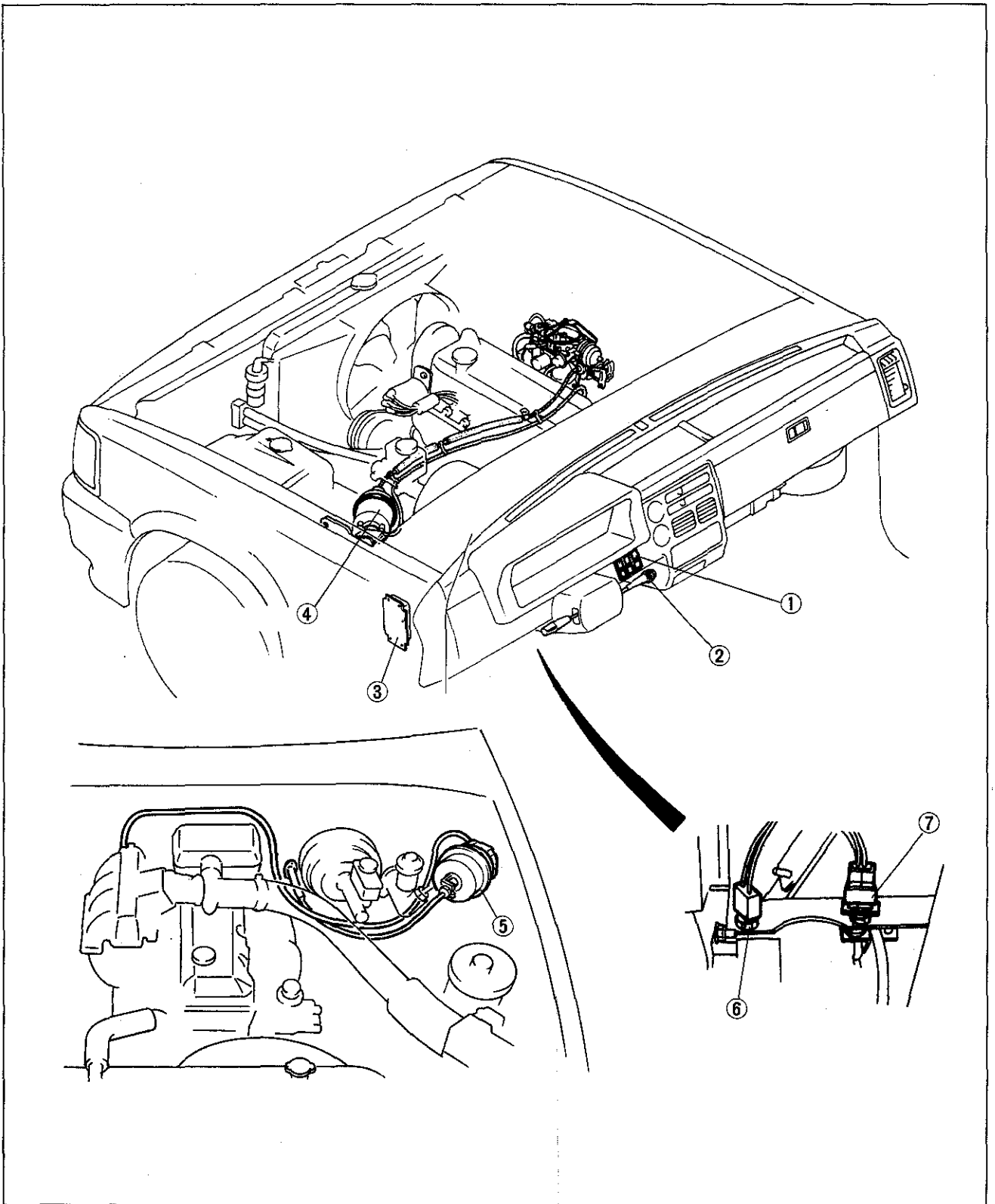
2BU0TX-026

**HORN RELAY Inspection**

1. Confirm the continuity between the IG (b) and S (d) terminals.
2. Connect battery voltage to the IG (b and c) terminal and the ground to the S (d) terminal; then confirm battery voltage of R (a) terminal.

CRUISE CONTROL SYSTEM

STRUCTURAL VIEW

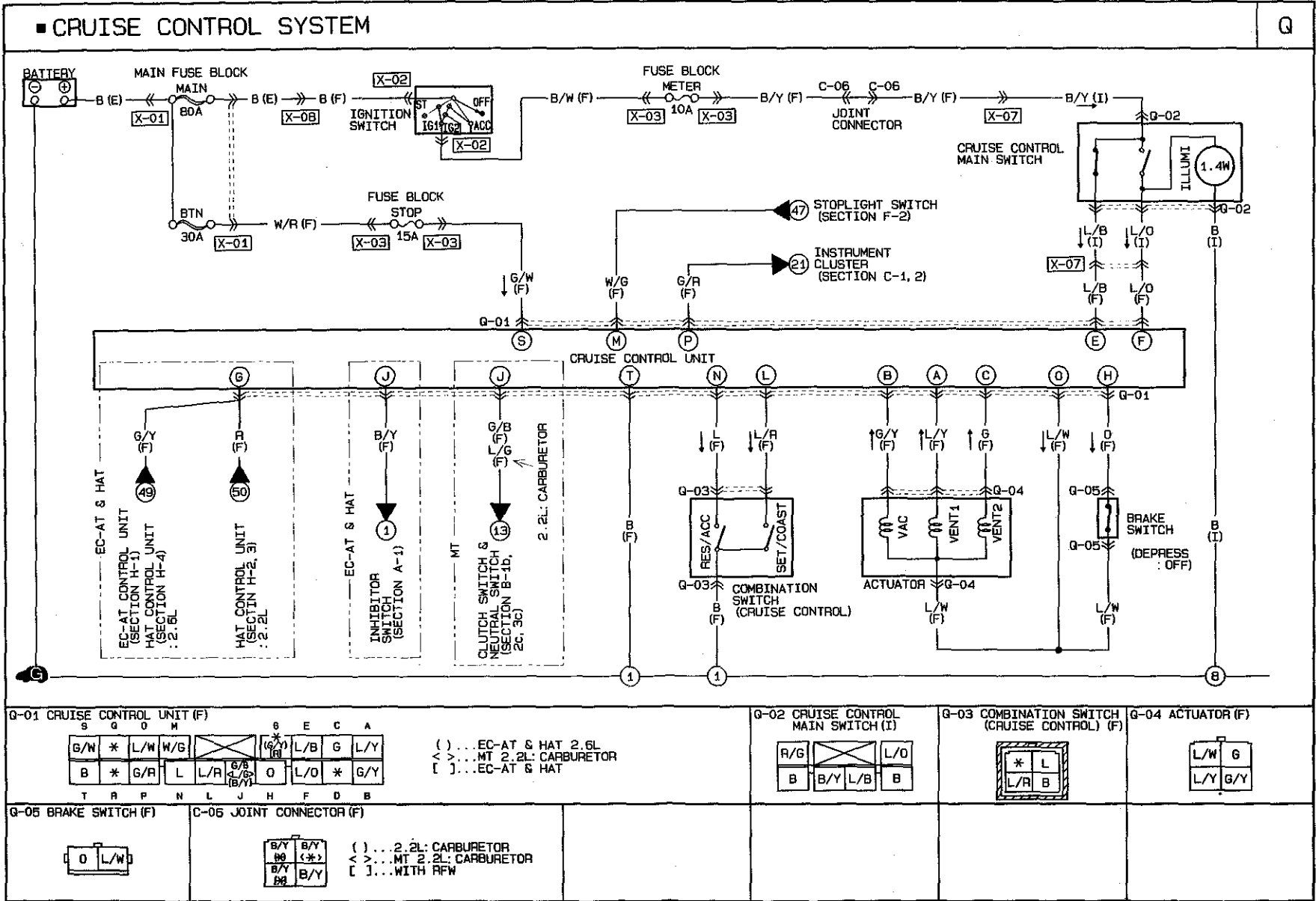


1BU0TX-013

- 1. Main switch
- 2. Control switch
- 3. Control unit

- 4. Actuator (B2200)
- 5. Actuator (B2600i)
- 6. Clutch switch

- 7. Stoplight switch



7BU15X-034

## TROUBLESHOOTING

**Symptom: Vehicle speed cannot be set. (Cruise control unit will not hold vehicle speed.)**

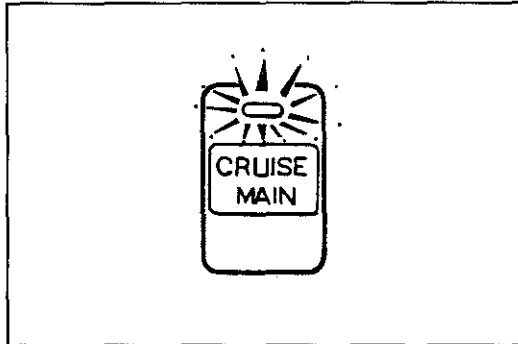
**Note**

- Before troubleshooting of the system, verify the following items:

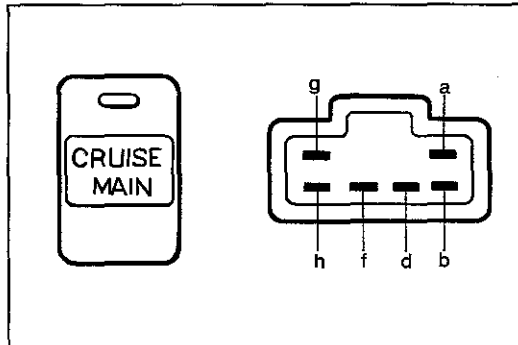
1. Is system being correctly used by customer?
2. Is fuse OK?

**Check the fuse. If the fuse is burned, replace it. Check the wire harness for a short circuit.**

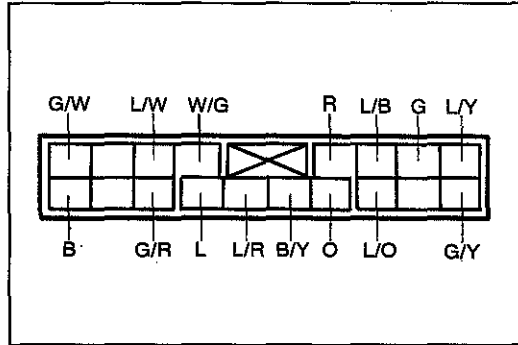
05U0TX-330



05U0TX-211



0BU0TX-016



0BU0TX-046

**Step 1**

1. Turn the ignition switch ON.
2. Turn the cruise control main switch ON.
3. Check that the main switch indicator lamp comes ON.
4. If the lamp does not come ON, go to Step 2.
5. If the lamp comes ON, go to Step 3.

**Step 2**

1. Check continuity between terminals of the cruise control main switch.

Position	Terminals					
	a	b	d	f	g	h
Neutral			○—○		○—○	○—○
Off					○—○	○—○
On	○—○	○—○	○—○	○—○	○—○	○—○

○—○: Indicates continuity

2. If not as specified, replace the switch.
3. If the switch is OK, repair the wire harness.  
(METER 10A fuse — Cruise control main switch — Ground)

**Step 3**

1. Measure the voltage at the following terminal-wires of the cruise control unit connector.
2. If all terminal voltage are OK, replace the cruise control unit.

**Note**

**When checking j terminal, disconnect the EGI control unit connector.**

**V<sub>B</sub>: Battery voltage**

Terminal	Wire color	Connected to	Test condition	Specification	Action
a	(L/Y)	Actuator	Main switch off	0V	Go to Step 8
			Main switch on	9V	
b	(G/Y)	Actuator	Main switch off	0V	
			Main switch on	9V	
c	(G)	Actuator	Main switch off	0V	
			Main switch on	9V	
e	(L/B)	Main switch	Main switch off	V <sub>B</sub>	Repair wire (L/B)
			Main switch off	0V	(Main switch—Cruise control unit)
f	(L/O)	Main switch	Main switch off	0V	Repair wire (L/O)
			Main switch on	V <sub>B</sub>	(Main switch—Cruise control unit)

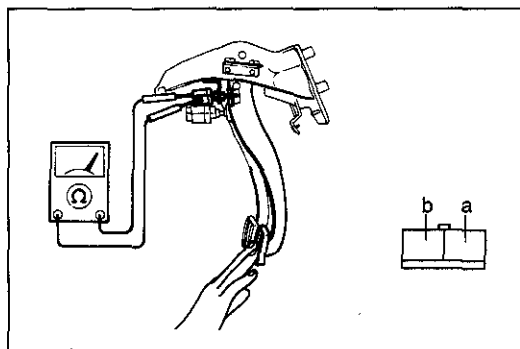


## CRUISE CONTROL SYSTEM

V<sub>B</sub>: Battery voltage

Terminal	Wire color	Connected to	Test condition	Specification	Action
g	(R)	ECAT control unit	Ignition switch OFF	0V	Check ECAT control unit (Refer to section F)
			Ignition switch ON	V <sub>B</sub>	
h	(O)	Stoplight switch (For cruise)	Brake pedal depressed	0V	Check stoplight switch (Refer to page T-40)
			Brake pedal released	9V	
j	(B/Y)	Clutch switch	Clutch pedal depressed	0V	Check clutch switch (Refer to page T-40)
			Clutch pedal released	5V	
		Inhibitor switch	Shift to "N" or "P" range	0V	Check inhibitor switch (Refer to page K1-25)
			Shift to other range	5V	
i	(L/R)	Cruise control switch (Set/Coast switch)	Main switch ON	V <sub>B</sub>	Check cruise control switch (Refer to page T-47)
			While turning set switch Main switch ON	0V	
m	(W/G)	Stoplight switch	Brake pedal depressed	V <sub>B</sub>	Check stoplight switch (Refer to page T-41)
			Brake pedal released	0V	
n	(L)	Cruise control switch (Resume/Accel switch)	Main switch ON	V <sub>B</sub>	Check cruise control switch (Refer to page T-47)
			While turning resume switch Main switch ON	0V	
o	(L/W)	Actuator	Main switch OFF	0V	Check actuator (Refer to page T-47)
			Main switch ON	9V	
p	(G/R)	Speed sensor	While rotating rear tires	Cycles 0-5V	Check speed sensor (Refer to page T-48)
s	(G/W)	Battery	Constant	V <sub>B</sub>	Repair wire
t	(B)	Ground	Constant	0V	Repair wire

2BU0TX-027



0BU0TX-018

### Step 4 — Inspection of stoplight switch (For cruise)

1. Disconnect the stoplight switch connector.
2. Check continuity between terminals of the switch.

Pedal position	Terminal	
	a	b
Pedal released		
Pedal depressed	○—○	○—○

○—○: Indicates continuity

3. If not as specified, replace the stoplight switch.
4. If the switch is OK, repair the wire harness. (Fuse — stoplight switch — Control unit)

### Step 5 — Inspection of inhibitor switch (Refer to Section K1.)

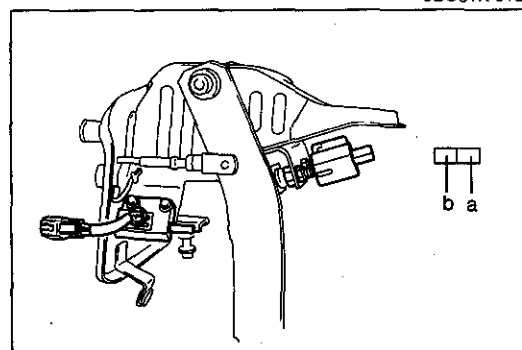
#### — Inspection of clutch switch

1. Disconnect the clutch switch connector.
2. Check continuity between terminals of the switch.

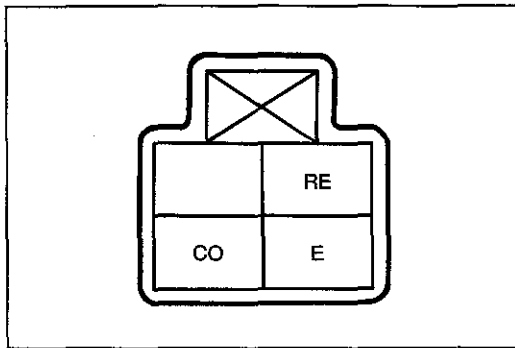
Pedal position	Terminal	
	a	b
Pedal released		
Pedal depressed	○—○	○—○

○—○: Indicates continuity

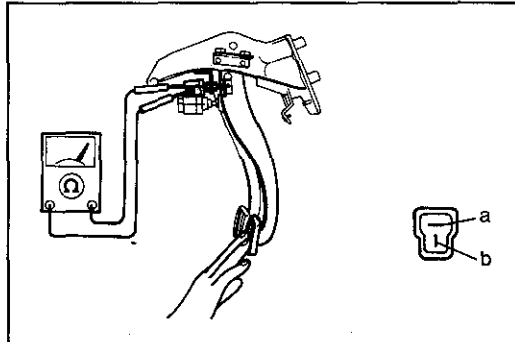
3. If not as specified, replace the clutch switch.
4. If the switch is OK, repair the wire harness (Fuse — Clutch switch — Control unit).



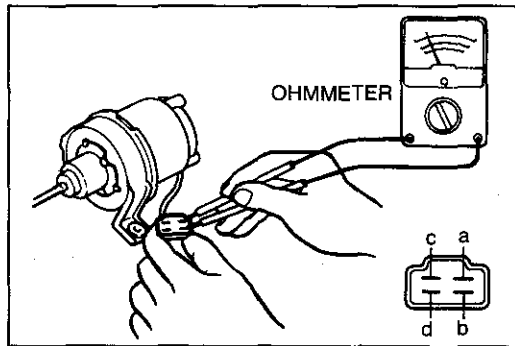
1BU0TX-018



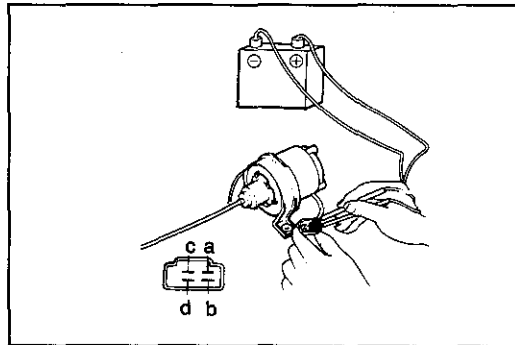
OBU0TX-020



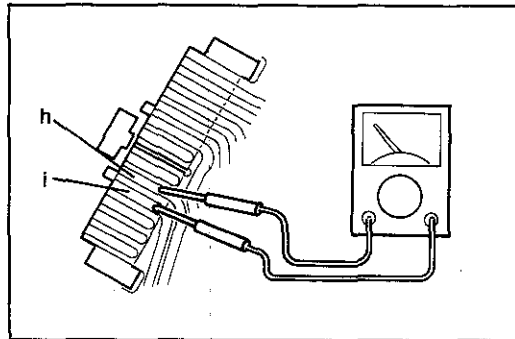
OBU0TX-021



1BU0TX-014



2BU0TX-028



OBU0TX-023

**Step 6 — Inspection of cruise control switch**

1. Disconnect the combination switch connector.
2. Check continuity between terminals of the combination switch connector.

Switch	Terminal		
	CO	RE	E
SET/COAST	○	—	○
RESUME/ACCEL	—	○	○

○—○: Indicates continuity

3. If not as specified, replace the cruise control switch.
4. If the switch is OK, repair the wire harness. (Cruise control switch — Control unit)

**Step 7 — Inspection of stoplight switch**

1. Disconnect the stoplight switch.
2. Check continuity between terminals of the switch.

Pedal position	Terminal	
	a	b
Pedal released	○	○
Pedal depressed	—	—

○—○: Indicates continuity

3. If not as specified, replace the stoplight switch.
4. If the switch is OK, repair the wire harness. (Cruise control unit — Stoplight switch)

**Step 8 — Inspection of actuator**

1. Measure the actuator solenoid resistance using an ohmmeter.

Check terminals	Resistance (Ω)	
	B2200	B2600i
c—a	60	55
c—b	23	23
c—d	60	30

2. If not as specified, replace the actuator.
3. If continuity is OK, go to Step 8—4.
4. Disconnect the actuator cable from the accelerator pedal.
5. Run the engine at idle speed.
6. Apply battery voltage to the following terminals, and check actuator operation.

Order	Terminal condition				Operation of control cable
	a	b	c	d	
1	Ground	Ground	Power	Ground	Pull
2	Ground	—	Power	Ground	Hold
3	Ground	—	Power	—	Extend
4	—	—	—	—	Release

7. If not as specified, replace the actuator.

**Step 9 — Inspection of speed sensor**

1. Remove the meter. (Refer to page T-15.)
2. Connect an ohmmeter between h and i terminals of the 12-pin connector.
3. Confirm intermittent continuity between terminals while rotating the speedometer cable shaft.
4. If not 4 times per rotation, replace the speedometer.

### SELF-DIAGNOSTIC INSPECTION

#### Self-diagnostic Function

The self-diagnostic function integrated within the cruise control unit diagnoses the condition of the cruise control system.

Condition/operation codes are indicated by flashing of the test light connected to the control unit. (Refer to condition code numbers on page T-43, 44.) This operation continues until canceled.

2BU0TX-029

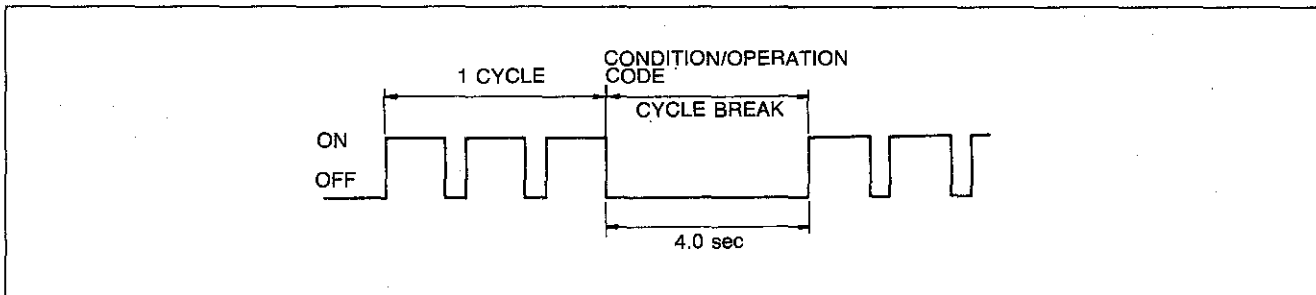
#### Principle of Code Cycle

Condition and operation codes are determined by flashing of the test light connected to the control unit as shown below.

03U0TX-140

#### 1. Code cycle break

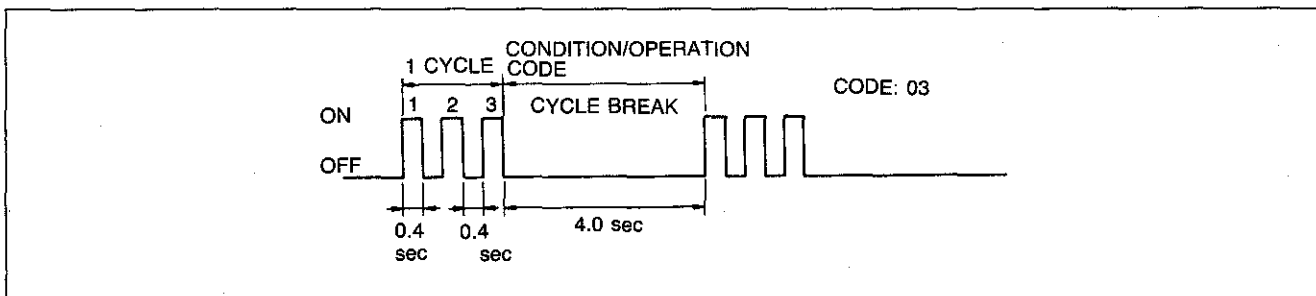
The time between condition/operation code cycles is 4.0 seconds (the time the lamp is off).



97U0TX-188

#### 2. Second digit of condition/operation code (ones position)

The digit in the ones position of the condition/operation code represents the number of times the lamp is on 0.4 second during one cycle.

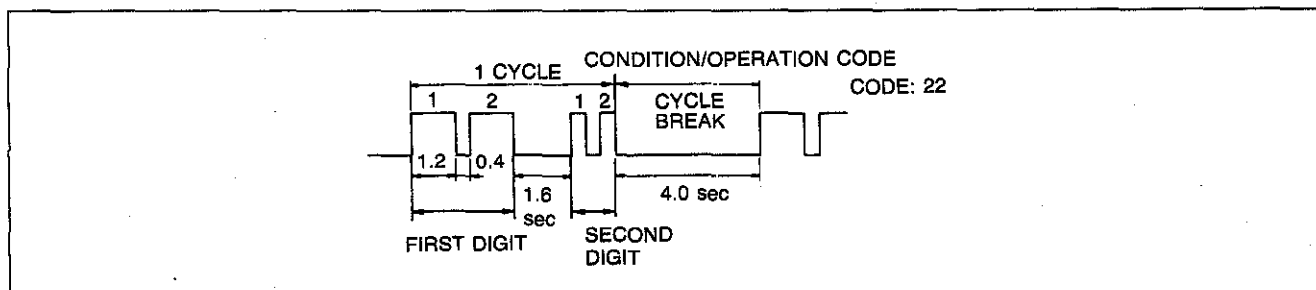


97U0TX-189

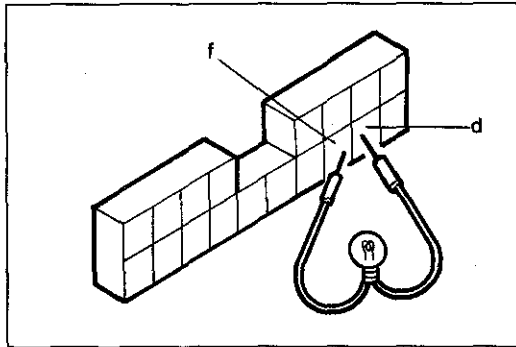
#### 3. First digit of condition/operation code (tens position)

The digit in the tens position of the condition/operation code represents the number of times the lamp is on 1.2 seconds during one cycle.

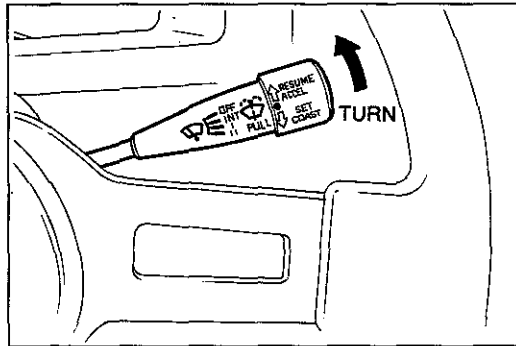
The lamp remains off for 1.6 seconds between the long and short flashes.



97U0TX-190



2BU0TX-030



2BU0TX-031

**Inspection Procedure**  
**Self-diagnosis of malfunction**

1. Locate the cruise control connector.
2. Connect a 1.4W test light between terminals d and f, with connector attached to control unit.

**Note**

**There is no wire in terminal d of the connector. Push the test light through the connector and touch the corresponding pin on the control unit.**

3. Turn the ignition switch to ON.
4. Turn the cruise control on by pressing the MAIN switch. (The MAIN indicator lamp will come ON.)
5. Turn and hold the RESUME/ACCEL switch for more than three seconds.
6. The test light will illuminate for 3 seconds and go out for 2 seconds.
7. The self-diagnostic system is activated and the test light will flash if a problem is present.
8. Make note of the condition code number(s). (Refer to the chart at the bottom of the page.)
9. After retrieving the code(s), drive the vehicle at more than 16 km/h (10 mph), or press the MAIN switch to deactivate self-diagnosis. (The MAIN indicator lamp will go OFF.)

**Note**

**The cruise control system will not operate when in the self-diagnosis mode.**

**Condition Code Numbers**  
**Self-diagnosis of malfunction**

The test light will flash if a malfunction is present.

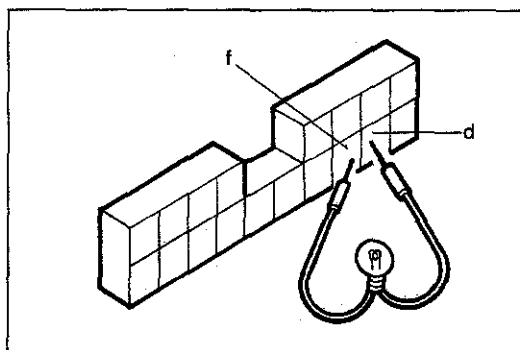
Pattern of output signal (Test light)	Code No.	Possible Cause	Action
ON                      OFF	01	Defective wiring (Actuator—Cruise control unit, Stoplight switch—Cruise control unit) Defective actuator  Defective stoplight switch (For cruise)	Repair harness  Inspect actuator (Refer to page T-41) Inspect stoplight switch (Refer to page T-34)
ON                      OFF	05	STOP fuse blown Defective wiring (Fuse — Cruise control unit)	Replace fuse Repair harness
ON                      OFF	07	Both stoplight switches (for vehicle and cruise) are ON simultaneously	Inspect stoplight switches (Refer to pages T-34 and T-35)
ON                      OFF	11	Defective SET/COAST, or RESUME/ACCEL switch	Inspect cruise control switch (Refer to page T-41)
ON                      OFF	15	Defective cruise control unit	Go to troubleshooting (Refer to page T-33)

2BU0TX-032

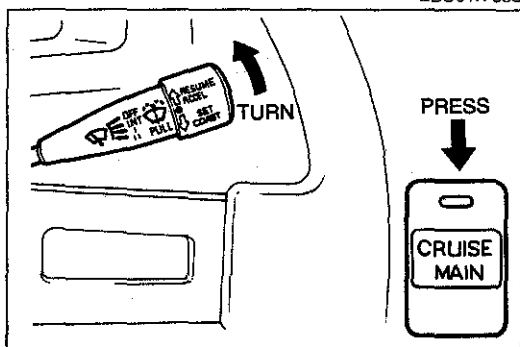
**Note**

**If there is more than one malfunction, the code numbers will be indicated in numerical order.**

## CRUISE CONTROL SYSTEM



2BU0TX-033



2BU0TX-034

### Inspection Procedure

#### Quick inspection of cruise control system

1. Locate the cruise control connector.
2. Connect a 1.4W test light between terminals d and f, with connector attached to control unit.

#### Note

There is no wire in terminal d of the connector. Push the test light through the connector and touch the corresponding pin on the control unit.

3. Turn the ignition switch to ON.
4. Verify that the MAIN switch is OFF. (The MAIN indicator lamp is OFF.)
5. Turn the RESUME/ACCEL switch and the MAIN switch simultaneously to activate the system inspection. (The MAIN indicator lamp will come ON.)
6. Operate each switch as described below and verify the operation codes.
7. Press the MAIN switch to deactivate the system inspection. (The MAIN indicator lamp will go OFF.)

#### Note

The cruise control system will not operate when in the self-diagnosis mode.


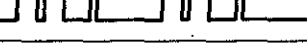

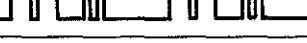

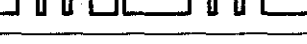




### Operation Code Numbers

#### Inspection of cruise control system

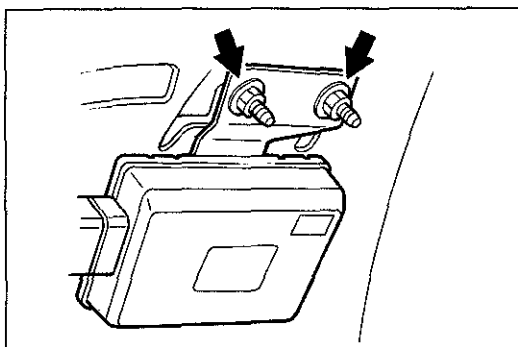
The test light will flash if the system is operating correctly. If the light fails to flash, inspect the system as shown.

#### Note

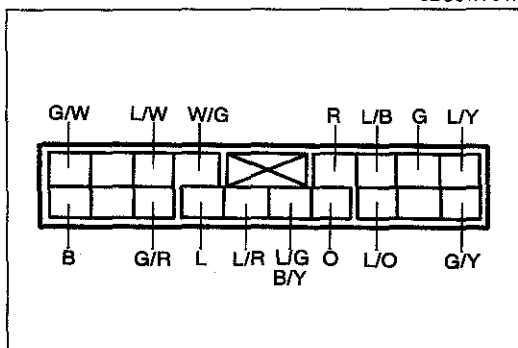
Shift the selector lever to D or R range before performing the inspection. (For ATX)

Procedure	Pattern of output signal (Test light)	Code No.	Action to inspect
Press SET/COAST switch	ON  OFF 	21	Inspect cruise control switch (Refer to page T-41)
Press RESUME/ACCEL switch	ON  OFF 	22	Inspect cruise control switch (Refer to page T-41)
Depress brake pedal	ON  OFF 	31	Inspect stoplight switches (Refer to page T-34 and T-35)
Turn ignition switch to ON and shift the selector lever to P or N range (For ATX) Depress clutch pedal (For MTX)	ON  OFF 	35	Inspect inhibitor switch (Refer to Section K) or clutch switch (Refer to Section F)
Drive vehicle above 40 km/h (25 mph)	ON  OFF 	37	Inspect speed sensor or wire harness

2BU0TX-035



OBU0TX-047



OBU0TX-029

## CRUISE CONTROL UNIT

### Removal

1. Remove the front side trim.
2. Remove the nut and the control unit.

### Installation

Install in the reverse order of removal.

### Inspection

1. Check the terminal voltages of the control unit.
2. If the terminal voltages are correct, replace the control unit.

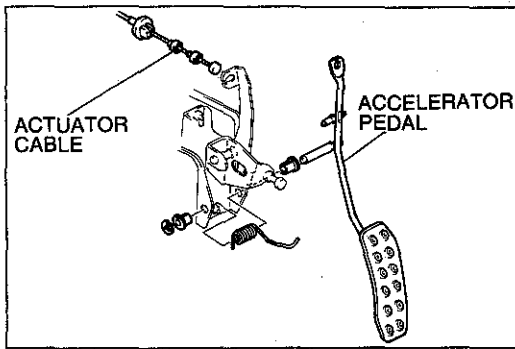
### Note

When checking j terminal, disconnect the EGI control unit connector.

V<sub>B</sub>: Battery voltage

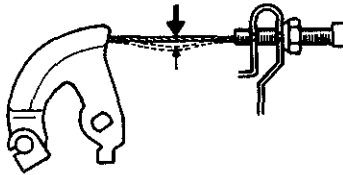
Terminal	Wire color	Connected to	Test condition	Specification	Action
a	(L/Y)	Actuator	Main switch OFF	0V	Check actuator (Refer to page T-47)
			Main switch ON	9V	
b	(G/Y)	Actuator	Main switch OFF	0V	
			Main switch ON	9V	
c	(G)	Actuator	Main switch OFF	0V	
			Main switch ON	9V	
e	(L/B)	Main switch	Main switch OFF	V <sub>B</sub>	Check main switch (Refer to page T-47)
			Main switch ON	0V	
f	(L/O)	Main switch	Main switch OFF	0V	
			Main switch ON	V <sub>B</sub>	
g	(R)	ECAT control unit or HAT control unit	Ignition switch OFF	0V	Check ECAT control unit (Refer to section F)
			Ignition switch ON	V <sub>B</sub>	
h	(O)	Stoplight switch (For cruise)	Brake pedal depressed	0V	Check stoplight switch (Refer to page T-40)
			Brake pedal released	9V	
j	(L/G)	Clutch switch	Clutch pedal depressed	0V	Check clutch switch (Refer to page T-40)
			Clutch pedal released	5V	
	(B/Y)	Inhibitor switch	Shift to "N" or "P" range	0V	Check inhibitor switch (Refer to Section K1)
			Shift to other range	5V	
i	(L/R)	Cruise control switch (Set/Coast switch)	Main switch ON	V <sub>B</sub>	Check cruise control switch (Refer to page T-47)
			While turning set switch Main switch ON	0V	
m	(W/G)	Stoplight switch	Brake pedal depressed	V <sub>B</sub>	Check stoplight switch (Refer to page T-41)
			Brake pedal released	0V	
n	(L)	Cruise control switch (Resume/Accel switch)	Main switch ON	V <sub>B</sub>	Check cruise control switch (Refer to page T-47)
			While turning resume switch Main switch ON	0V	
o	(L/W)	Actuator	Main switch OFF	0V	Check actuator (Refer to page T-47)
			Main switch ON	9V	
p	(G/R)	Speed sensor	While rotating rear tires	Cycles 0-5V	Check speed sensor (Refer to page T-48)
s	(G/W)	Battery	Constant	V <sub>B</sub>	Repair wire
t	(B)	Ground	Constant	0V	Repair wire

OBU0TX-036

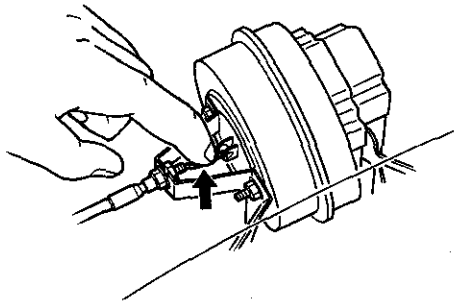


9MU0TX-263

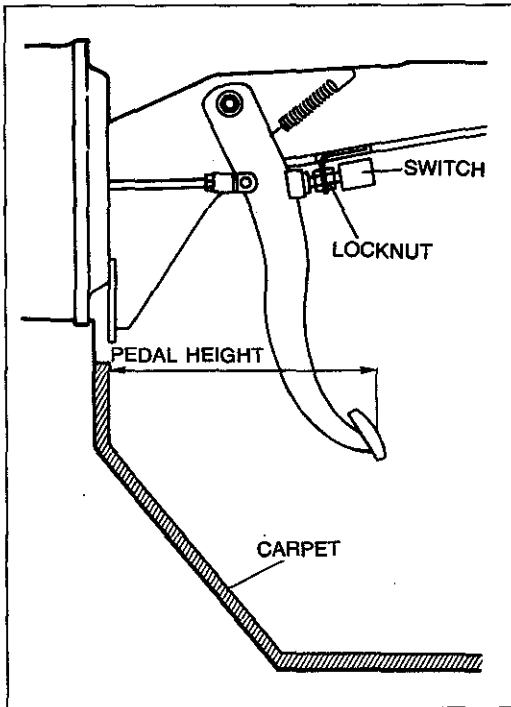
(B2200)



(B2600i)



0BU0TX-031



0BU0TX-032

**ACTUATOR CABLE**

**Removal**

1. Disconnect the actuator cable from the accelerator pedal.
2. Remove the clamp at the inside of the firewall.

3. Disconnect the actuator cable from the actuator.
4. Remove the clamps and the actuator cable.

**Installation**

Install in the reverse order of removal.

**Adjustment**

Remove the clamp and adjust the nut so that actuator cable free play is as shown when the cable is pressed lightly.

**Cable play: 1—3mm (0.04—0.12 in)**

**CLUTCH SWITCH, STOPLIGHT SWITCH**

When replacing these switches, adjust them so that the corresponding pedal height agrees with the standard value.

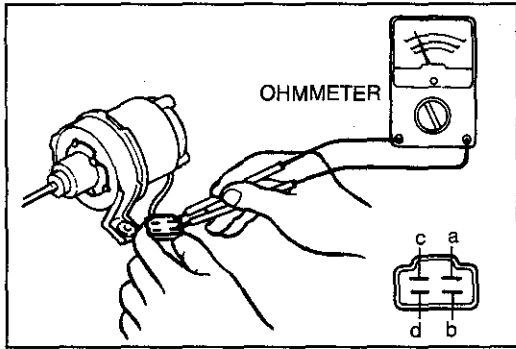
**Clutch pedal height**

**B2200 : 181—191mm (7.13—7.52 in)**

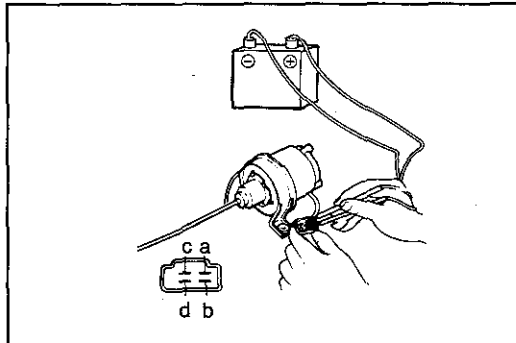
**B2600i: 191—201mm (7.52—7.91 in)**

**Brake pedal height:**

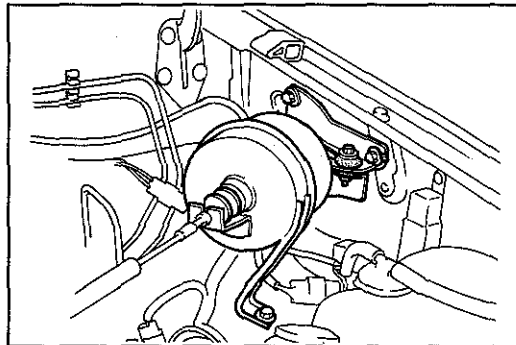
**180—185mm (7.09—7.28 in)**



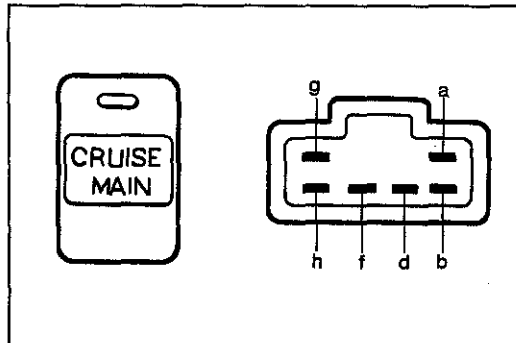
1BU0TX-015



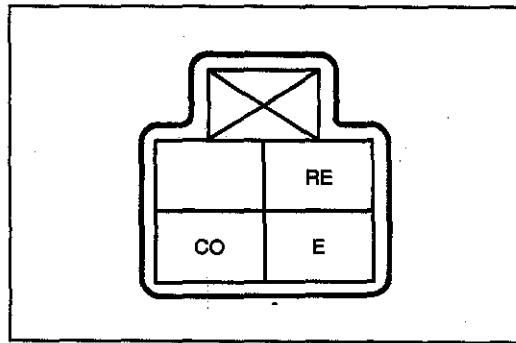
05U0TX-459



9MU0TX-262



0BU0TX-034



0BU0TX-035

**ACTUATOR**

**Inspection**

1. Measure the actuator solenoid resistance using an ohmmeter.

Check terminals	Resistance (Approx.Ω)	
	B2200	B2600i
c-a	60	55
c-b	23	23
c-d	60	30

2. If not as specified, replace the actuator.
3. Disconnect the actuator cable from the accelerator pedal.
4. Run the engine at idle speed.
5. Apply battery voltage to the following terminals, and check the actuator operation.

Order	Terminal condition				Operation of control cable
	a	b	c	d	
1	Ground	Ground	Power	Ground	Pull
2	Ground	—	Power	Ground	Hold
3	Ground	—	Power	—	Extend
4	—	—	—	—	Release

6. If not as specified, replace the actuator.

**Removal**

1. Disconnect the accelerator cable and vacuum hose from the actuator.
2. Remove the bolt and nuts and the actuator.

**Installation**

Install in the reverse order of removal.

**CRUISE CONTROL MAIN SWITCH**

**Inspection**

1. Check continuity between terminals of the cruise control main switch.

Position	Terminal					
	a	b	d	f	g	h
Neutral			○—○		○—○	○—○
Off					○—○	○—○
On	○—○		○—○	○—○	○—○	○—○

○—○: Indicates continuity

2. If not as specified, replace the cruise control main switch.

**CRUISE CONTROL SWITCH**

**Inspection**

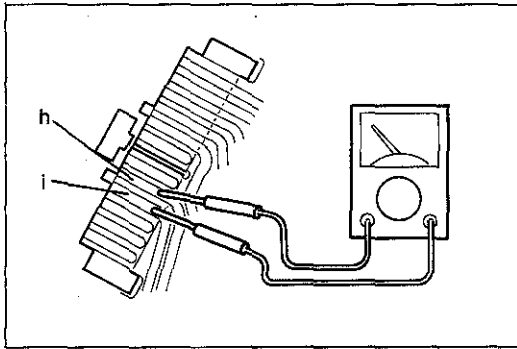
1. Disconnect the combination switch connector.
2. Check continuity between terminals of the combination switch connector.

Switch	Terminal		
	CO	RE	E
SET/COAST	○—○		○—○
RESUME/ACCEL		○—○	○—○

○—○: Indicates continuity

3. If not as specified, replace the cruise control switch.





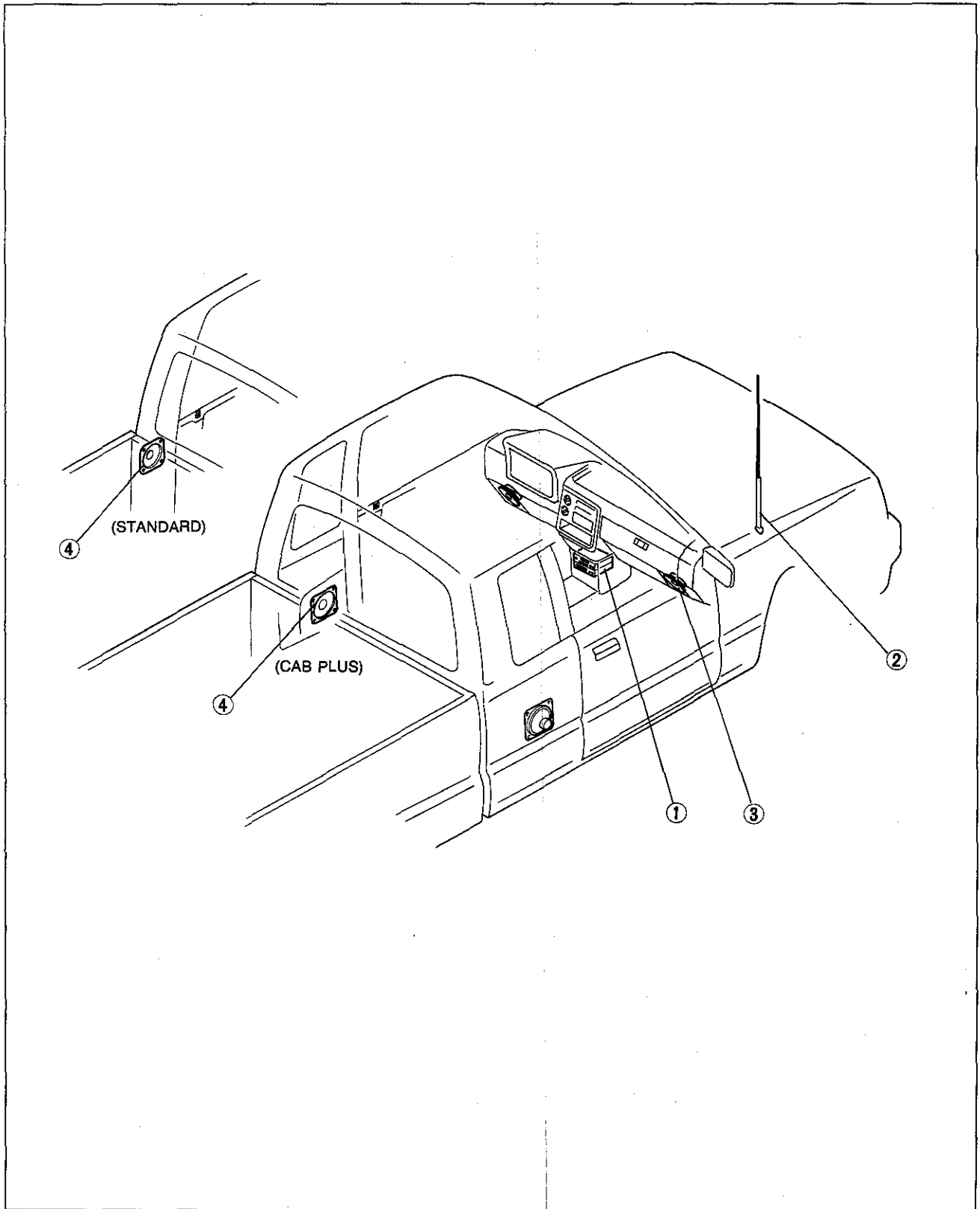
2BU0TX-037

**SPEED SENSOR****Inspection**

1. Remove the meter. (Refer to page T-15.)
2. Connect an ohmmeter between h and i terminals of the 12-pin connector.
3. Confirm intermittent continuity between terminals while rotating the speedometer cable shaft.
4. If not 4 times per rotation, replace the speedometer.

AUDIO SYSTEM

STRUCTURAL VIEW



0BU0TX-036

1. Audio unit  
2. Antenna

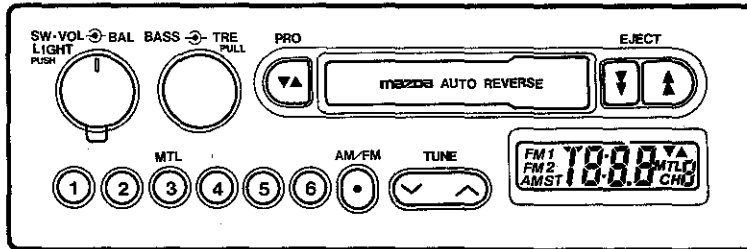
3. Front speaker  
4. Rear speaker

# AUDIO SYSTEM

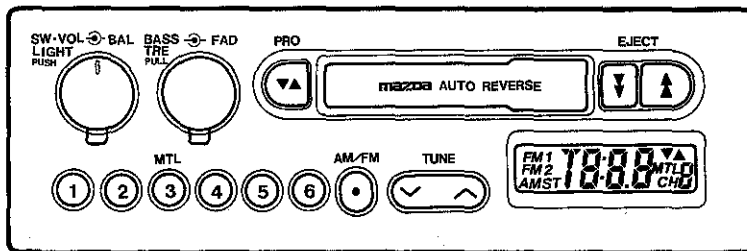
## OUTLINE OF AUDIO

Front view

AM-FM RADIO, CASSETTE TAPE PLAYER

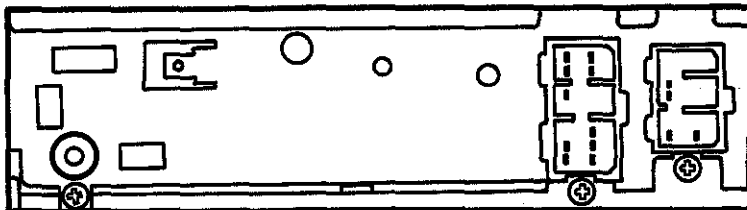


AM-FM RADIO, CASSETTE TAPE PLAYER



OBU0TX-037

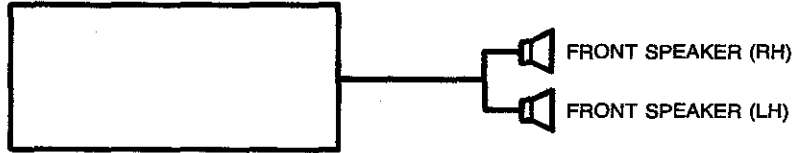
Rear view



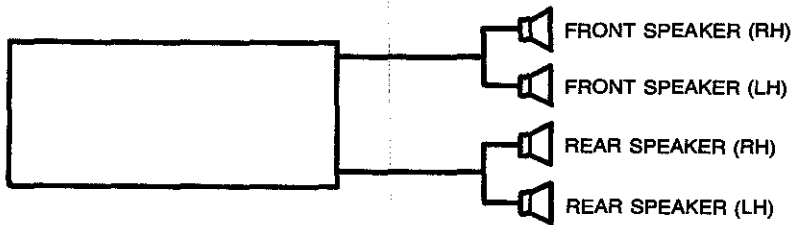
OBU0TX-038

SYSTEM

AM-FM RADIO, CASSETTE TAPE PLAYER



AM-FM RADIO, CASSETTE TAPE PLAYER



0BU0TX-039

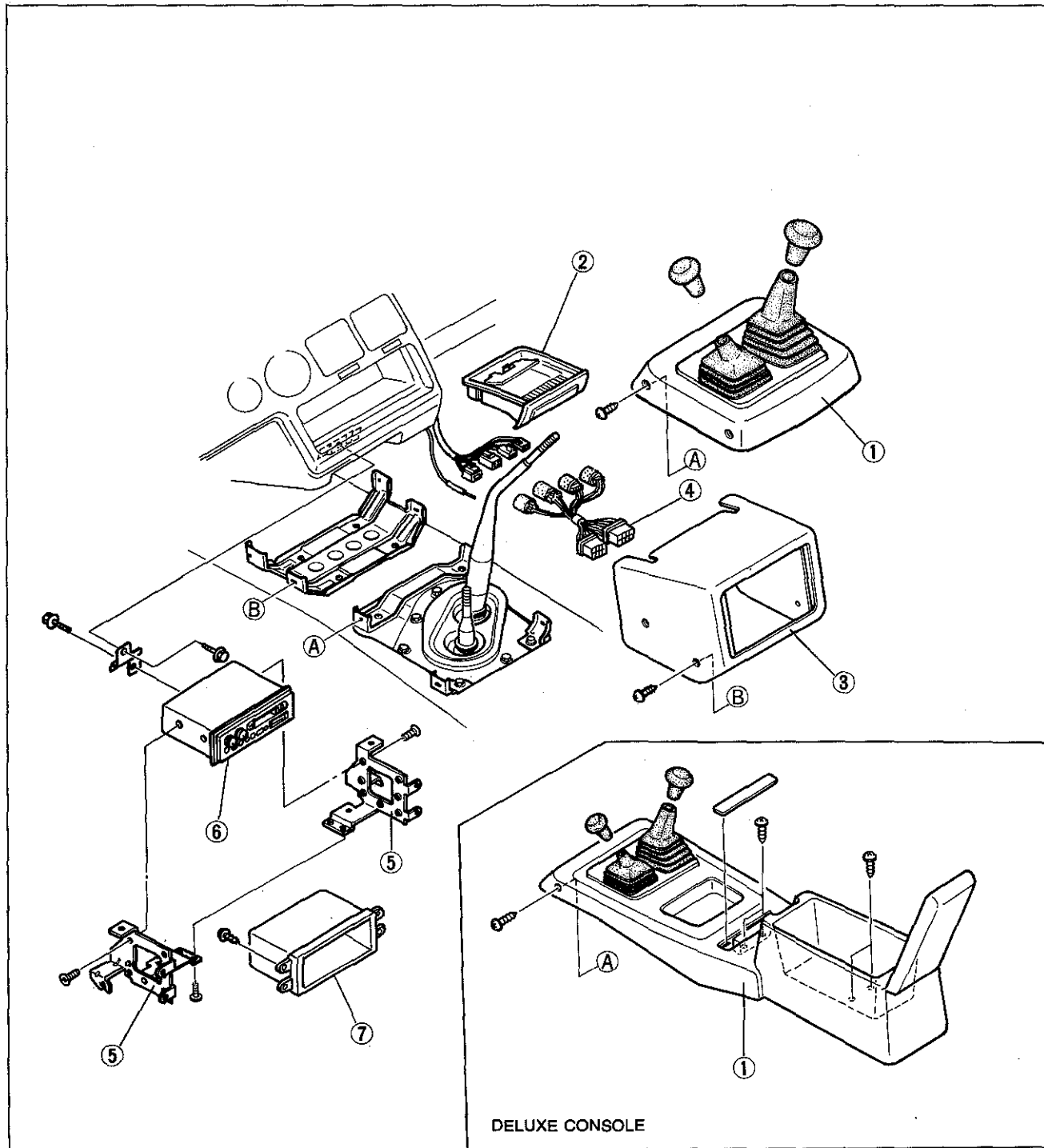
### REMOVAL AND INSTALLATION

**Caution**

Disconnect the negative battery cable before removing or installing the audio unit.

**Audio Unit**

1. Remove in the order shown in the figure
2. Install in the reverse order of removal.



0BU0TX-040

1. Front console
2. Ashtray
3. Audio box

4. Stereo cord
5. Bracket
6. Audio unit

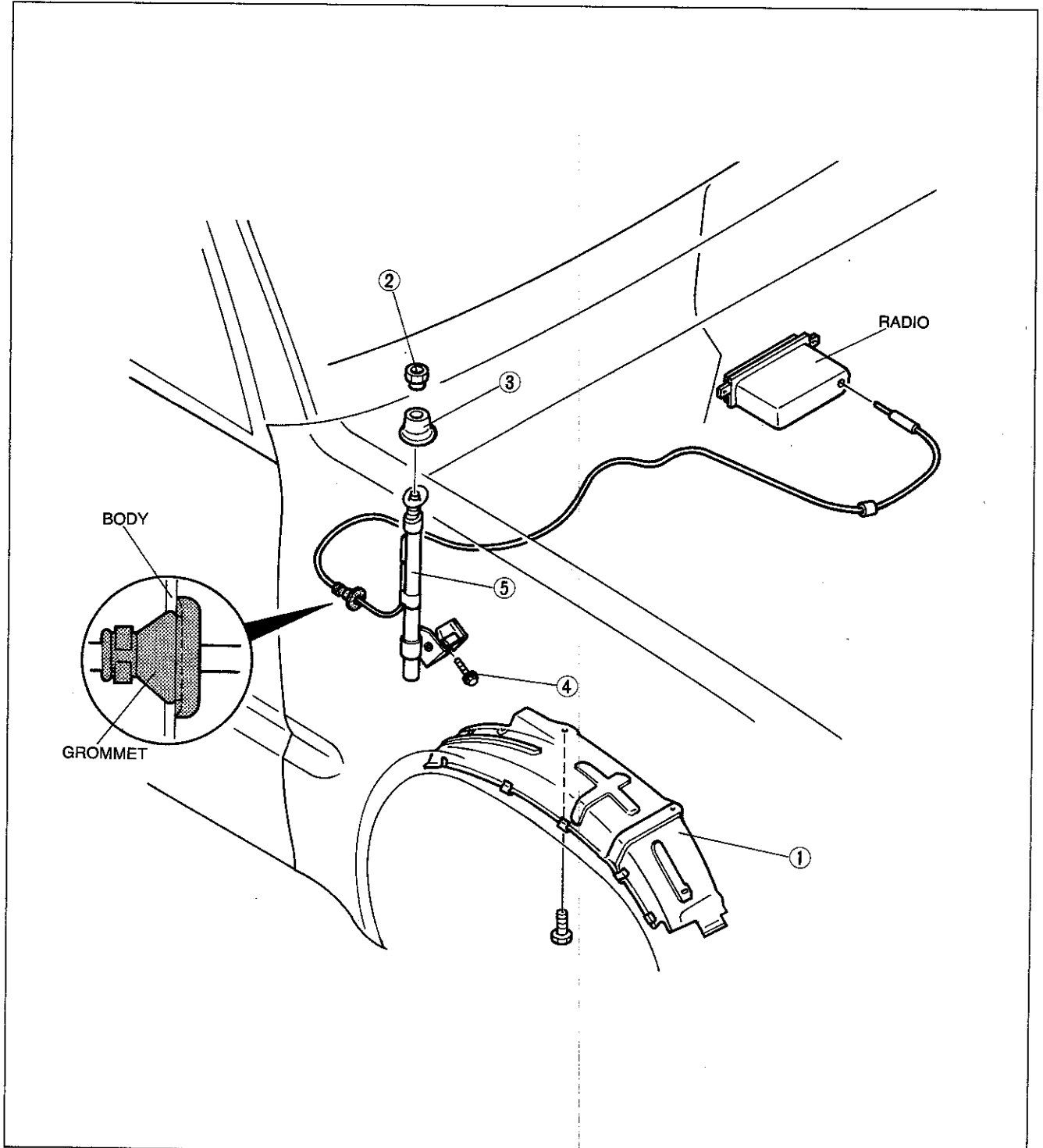
7. Stereo ornament

Antenna

Note

Remove the glove compartment or instrument panel (if necessary) when removing and installing the antenna assembly. (Refer to page S-27.)

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

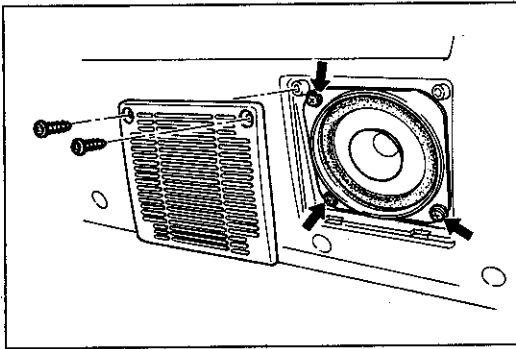


1. Mud guard  
2. Mounting nut

3. Mounting insulator  
4. Mounting bolt

5. Antenna assembly

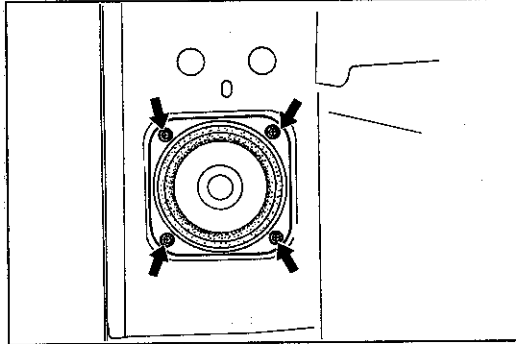
2BU0TX-038



9BU0TX-049

**Front Speaker**

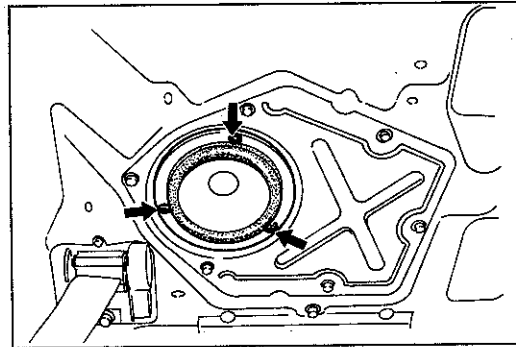
1. Remove the screws and the speaker grille.
2. Remove the screws and disconnect the connector; then remove the speaker.
3. Install in the reverse order of removal.



2BU0TX-039

**Rear Speaker  
Standard cab**

1. Remove the seat belt upper anchor bolt.  
(Refer to page S-31.)
2. Remove the back upper garnish and B pillar trim.  
(Refer to page S-33.)
3. Remove the screws and disconnect the connector; then remove the speaker.
4. Install in the reverse order of removal.

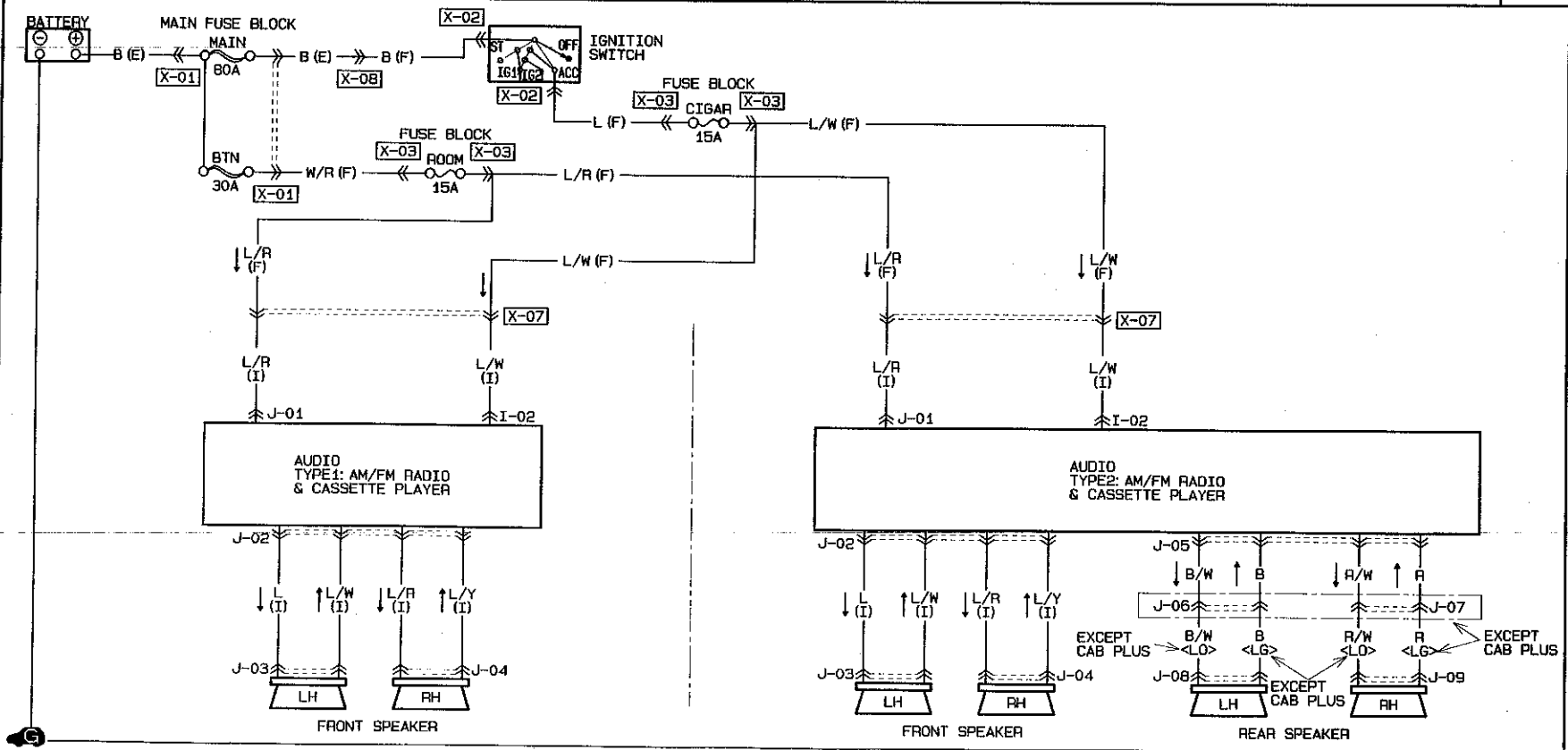


2BU0TX-040

**Cab plus**

1. Remove the seat belt upper anchor bolt.  
(Refer to page S-31.)
2. Remove the quarter window glass. (Refer to page S-24.)
3. Remove the back upper garnish, B pillar upper trim, and B pillar lower trim. (Refer to page S-34.)
4. Remove the screws and disconnect the connector; then remove the speaker.
5. Install in the reverse order of removal.

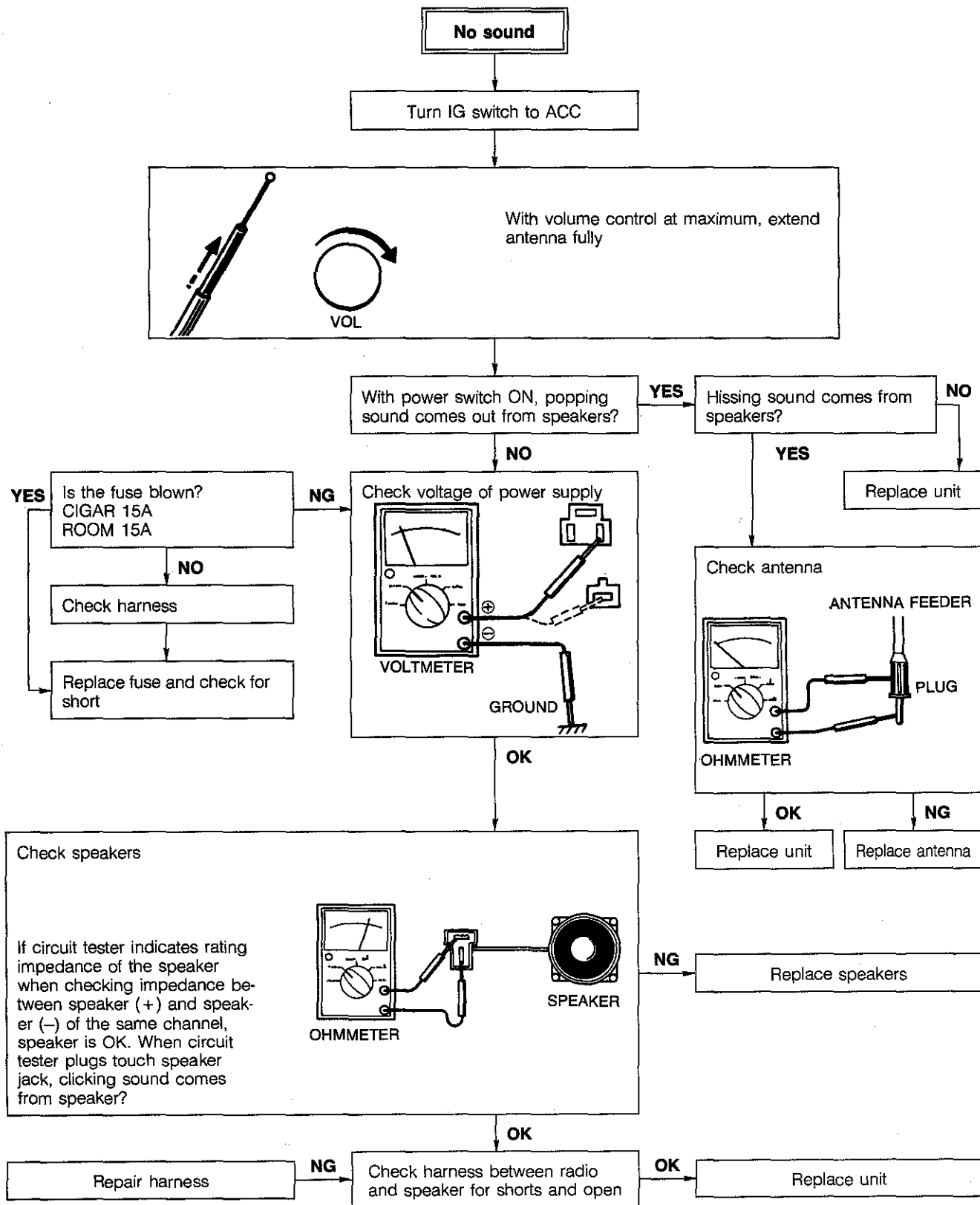
■ AUDIO (TYPE 1, 2)



J-01 AUDIO (I)	J-02 AUDIO (I)	J-03 FRONT SPEAKER LH (I)	J-04 FRONT SPEAKER RH (I)	J-05 AUDIO	J-06 CONNECTOR BETWEEN AUDIO & REAR SPEAKER LH EXCEPT CAB PLUS
L/R	L/R L L/Y L/W	L/W L	L/Y L/R	R/W B/W R B	AUDIO B B/W REAR SPEAKER LH LG LO
J-07 CONNECTOR BETWEEN AUDIO & REAR SPEAKER RH EXCEPT CAB PLUS	J-08 REAR SPEAKER LH	J-09 REAR SPEAKER RH	I-02 AUDIO (I)		
AUDIO R R/W REAR SPEAKER RH LG LO	B (L.G) B/W (L.O)	R (L.G) R/W (L.O)	* L/W R/B		

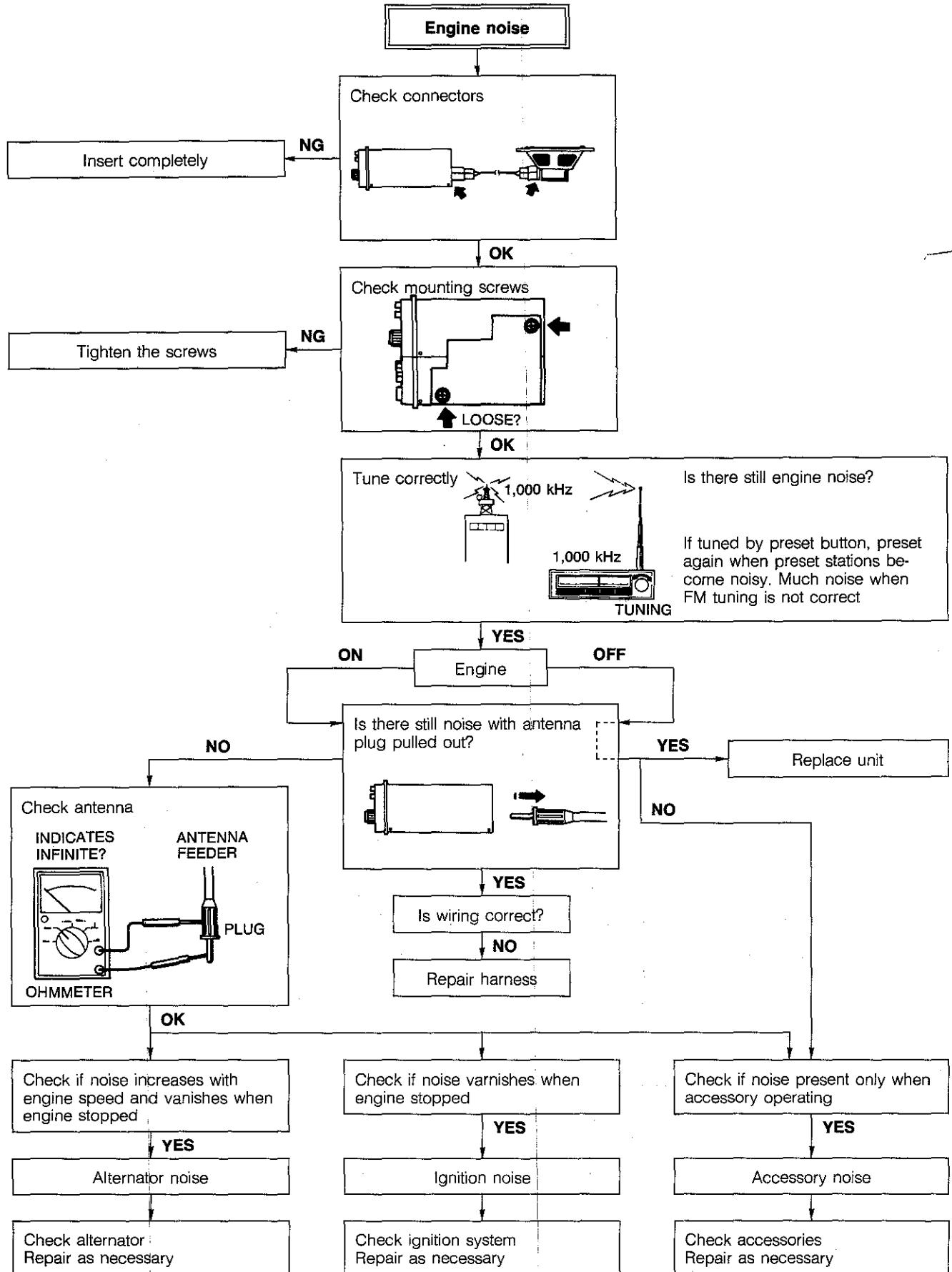


RADIO

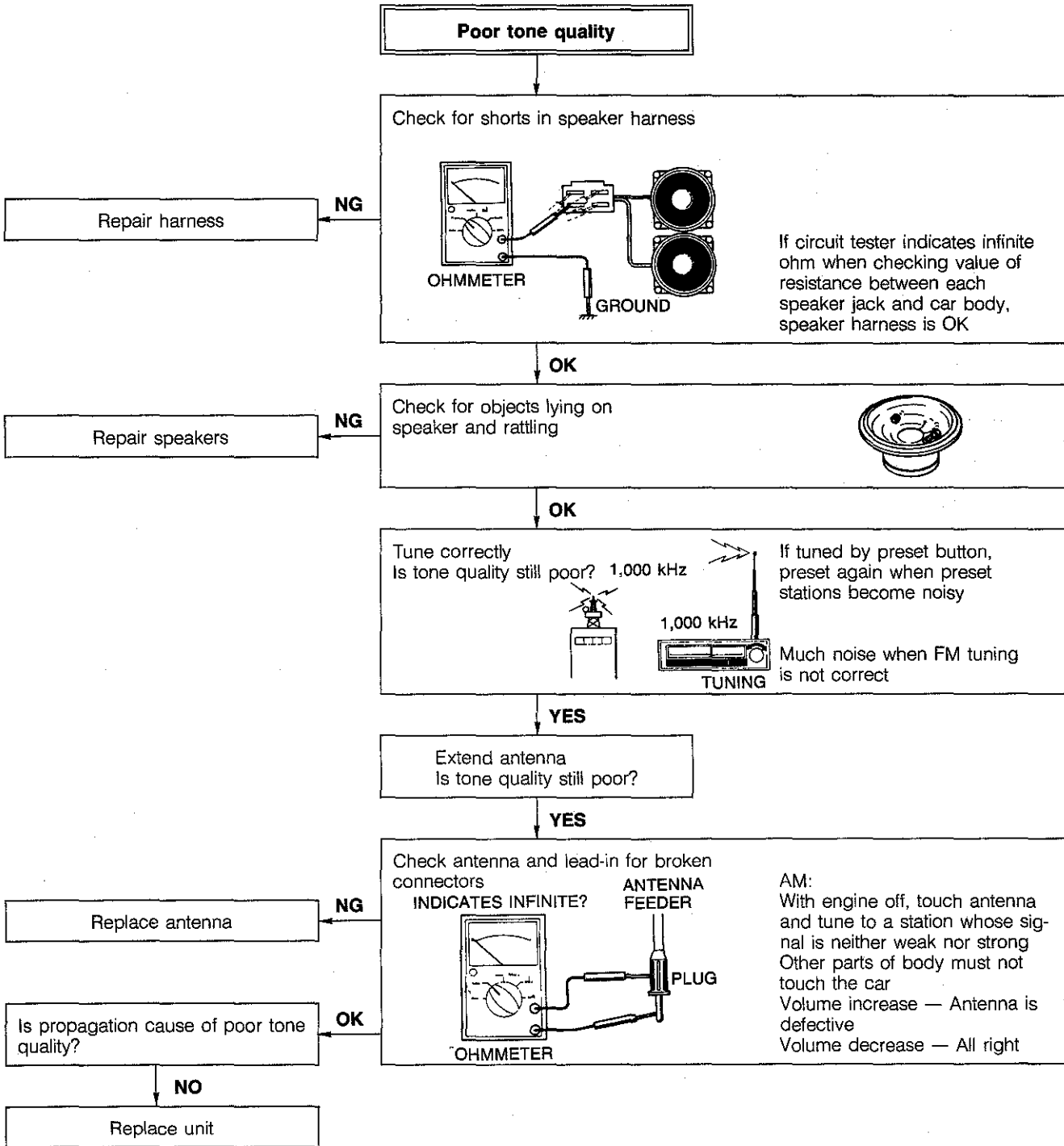


OBU0TX-042

## RADIO

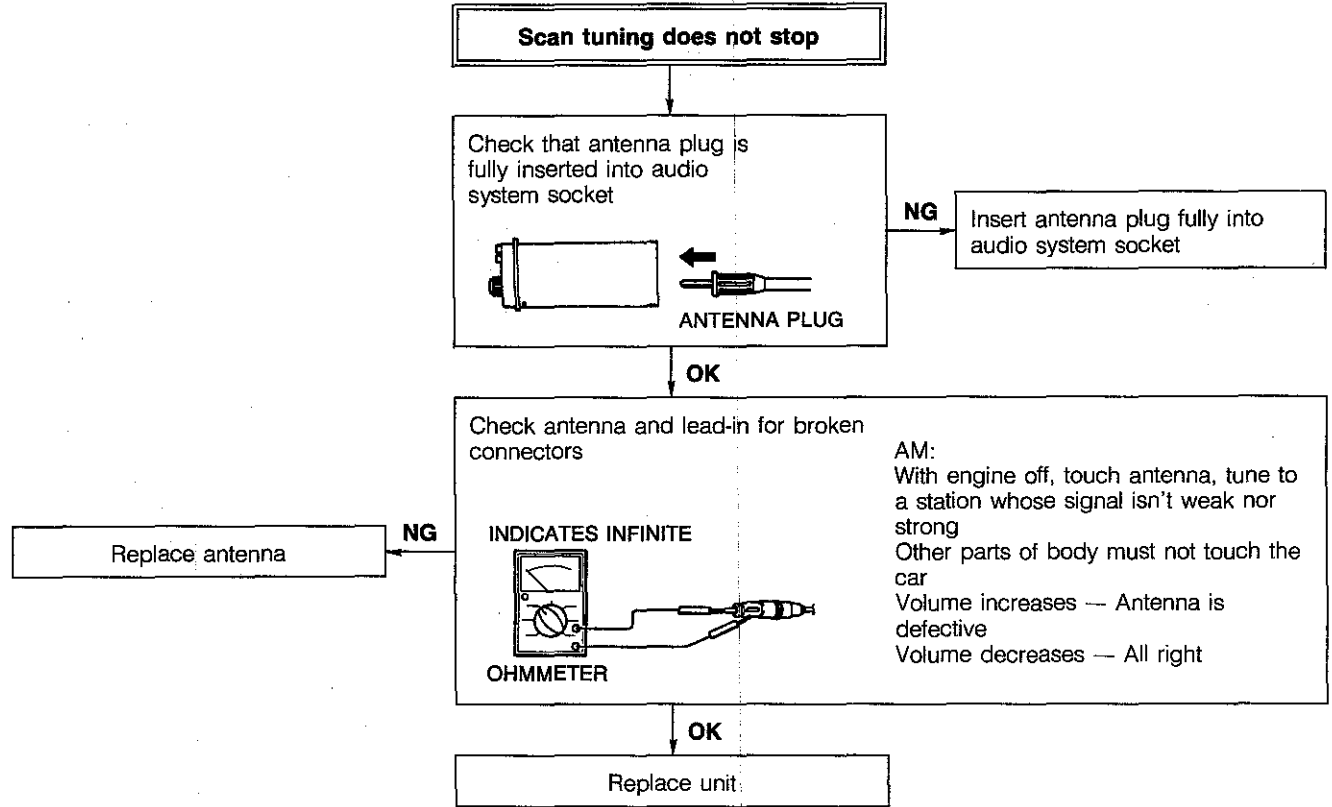


### RADIO

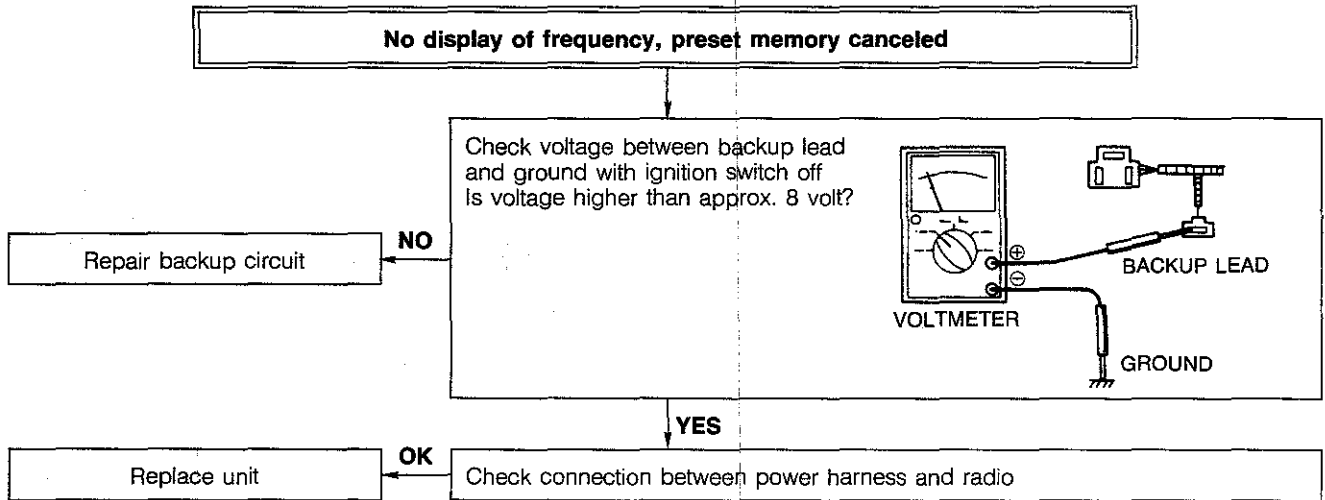


0BU0TX-043

## RADIO



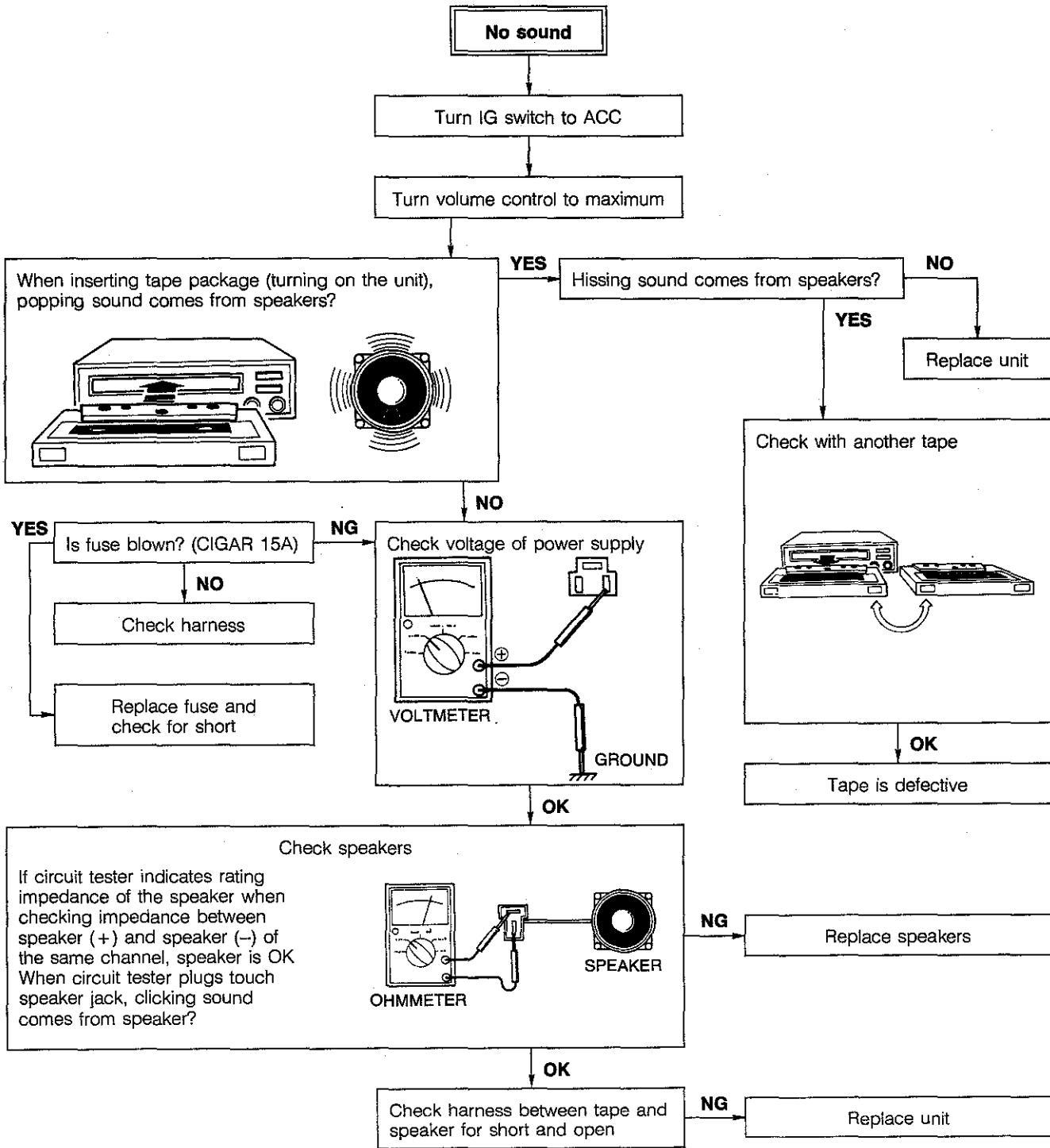
0BU0TX-044



**Note**  
When battery is discharged or radio is disconnected from battery for or during repair, all memory is canceled. Preset stations must be reset.

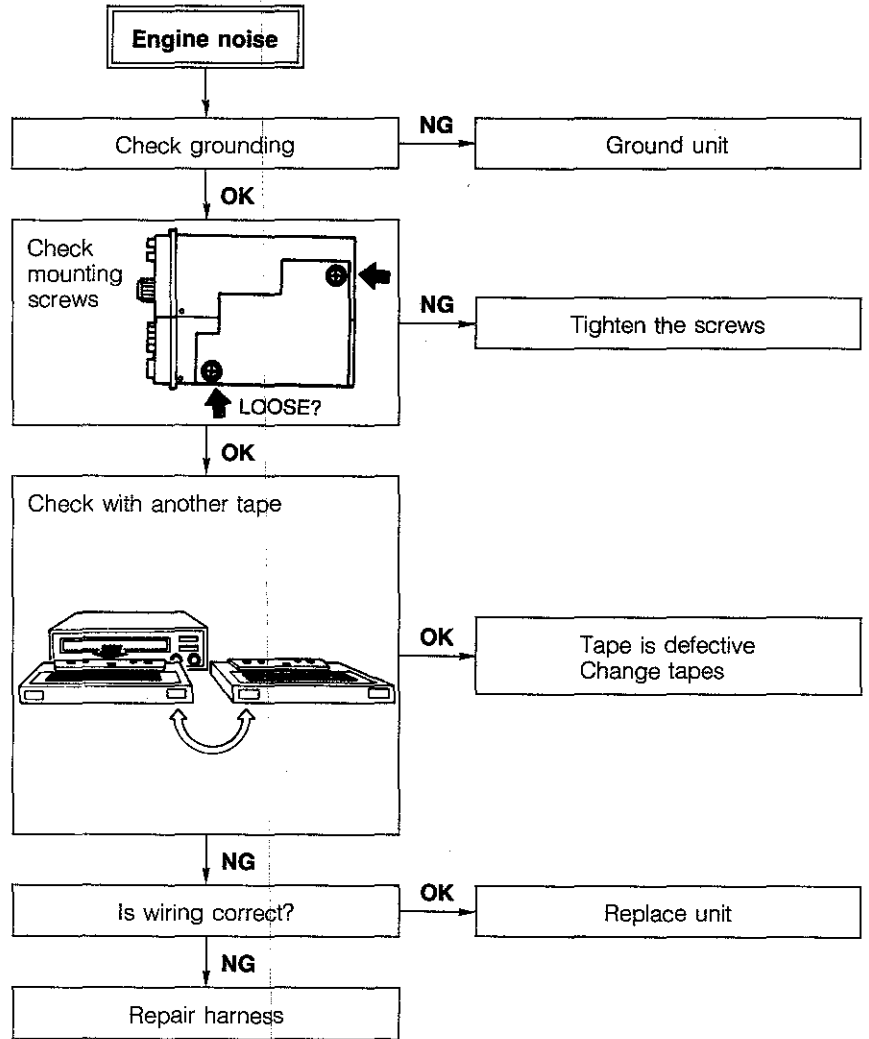
96U15X-174

CASSETTE DECK



7BU15X-057

CASSETTE DECK



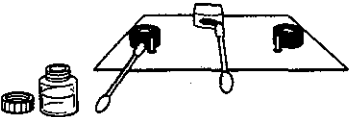
9BU0TX-058

CASSETTE DECK

Poor tone quality

Check head, capstan, and pinch roller for oxide and dirt buildup

Clean head, capstan, and pinch roller

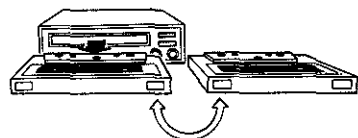


Use Allsop Head cleaner or equivalent

NG

OK

Check with another tape

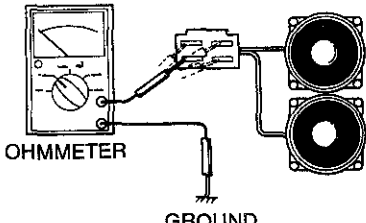


Tape is defective  
Change tapes

OK

NG

Check for shorts in speaker harness



OHHMMETER

GROUND

If circuit tester indicates infinite ohm when checking value of resistance between each speaker jack and car body, speaker harness is OK

Repair harness

NG

OK

Check for objects lying on speaker and rattling



Repair speakers

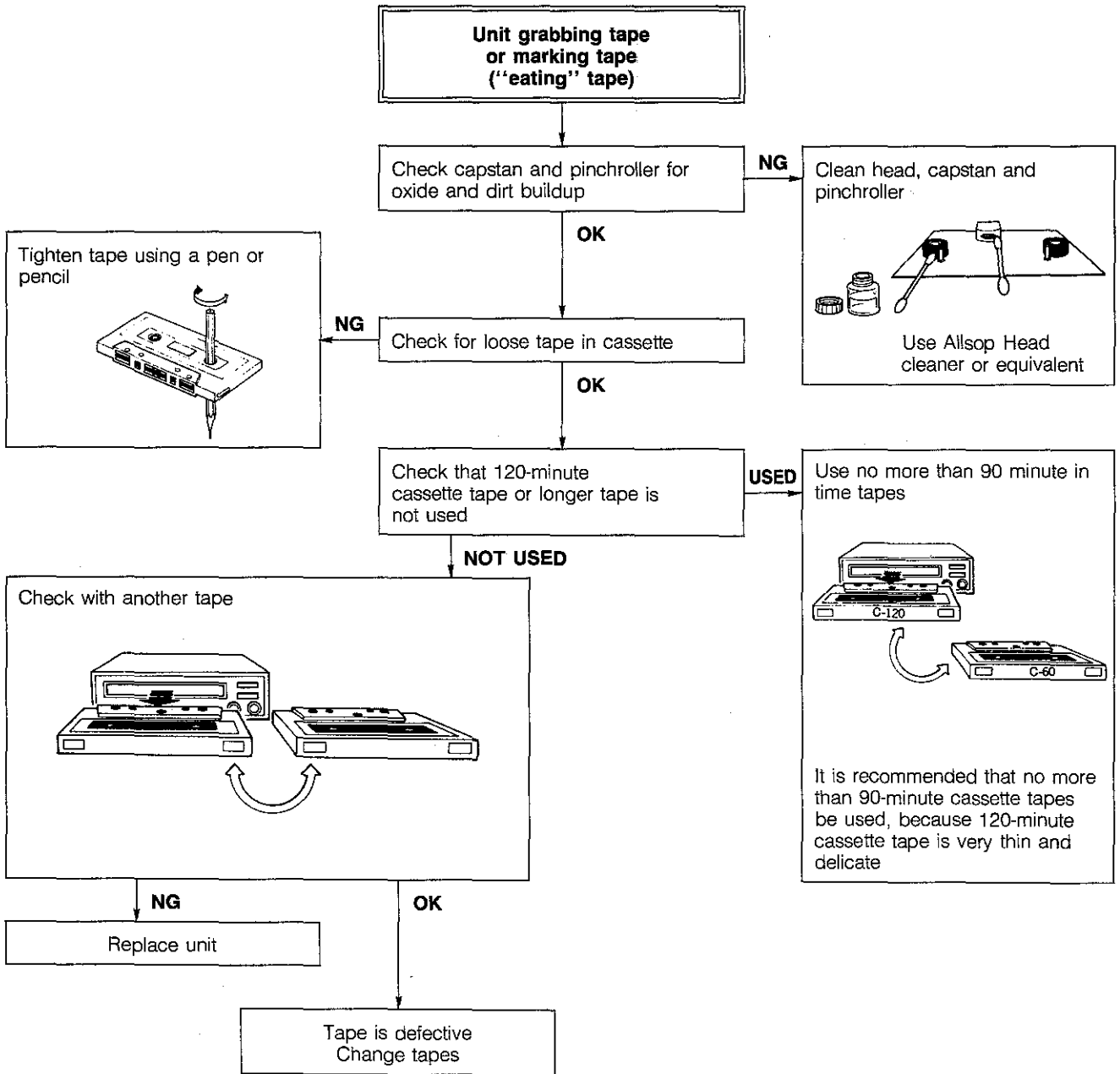
NG

OK

Replace unit

9BU0TX-059

## CASSETTE DECK



9BU0TX-060

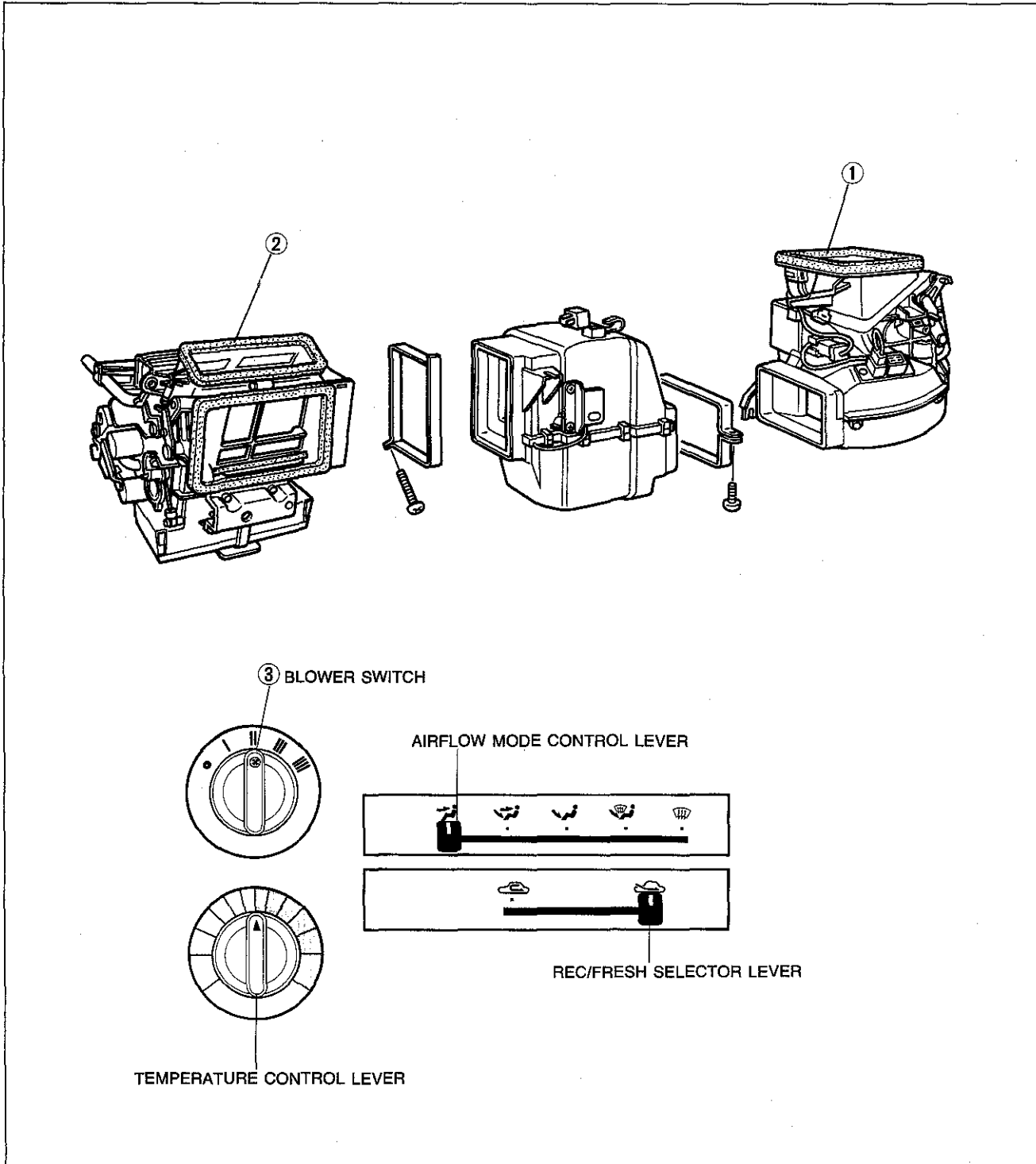


# HEATER AND AIR CONDITIONER SYSTEMS

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### HEATER AND SWITCHES

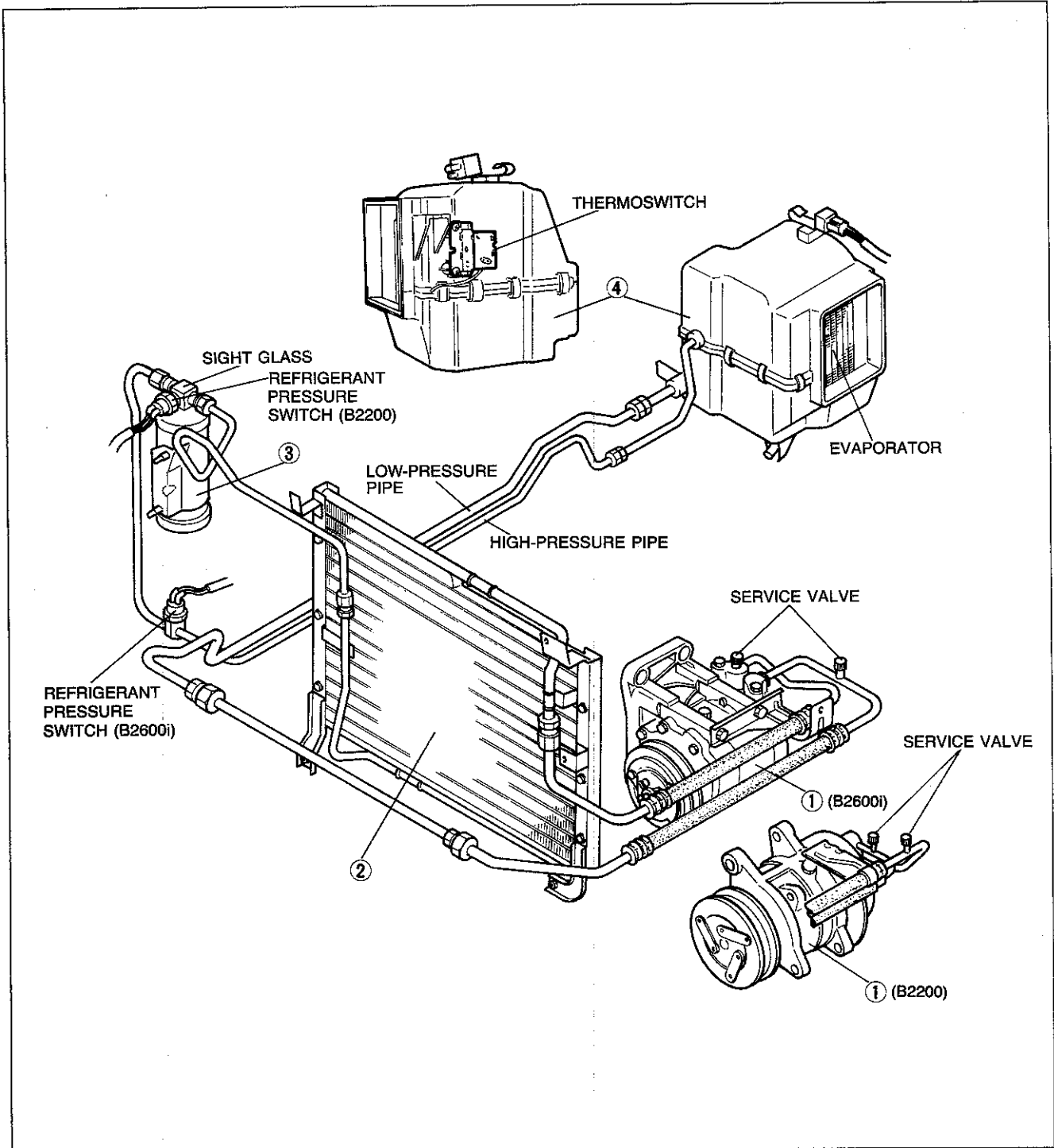


1BU0UX-002

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AIR CONDITIONER



2BU0UX-002

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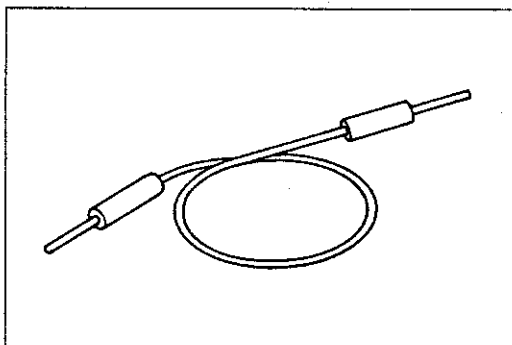
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### TROUBLESHOOTING

#### TROUBLESHOOTING GUIDE

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Insufficient cooling No cooling Intermittent cooling	U- 5
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9BU0UX-004



9MU0UX-008

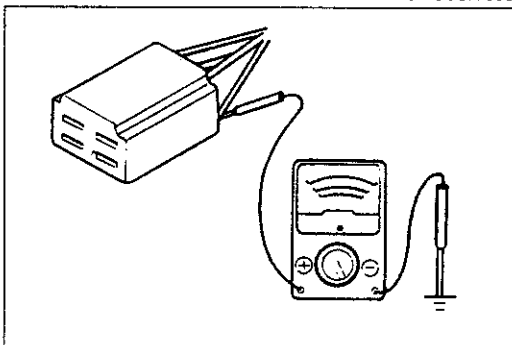
#### ELECTRICAL TROUBLESHOOTING TOOLS

##### Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and to verify the condition of ground connections.

##### Caution

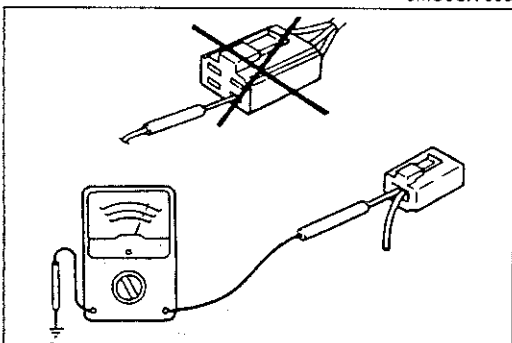
**Do not connect the jumper wire between a power source and a body ground. This may cause burning or other damage to harnesses and electronic components.**



9MU0UX-009

##### Voltmeter

The DC voltmeter is used for measurement of circuit voltage. A voltmeter with a range of 15V or more must be used. It is used by connecting the positive (+) probe (red lead) to the point where voltage is to be measured and connecting the negative (-) probe (black lead) to a body ground.



9MU0UX-010

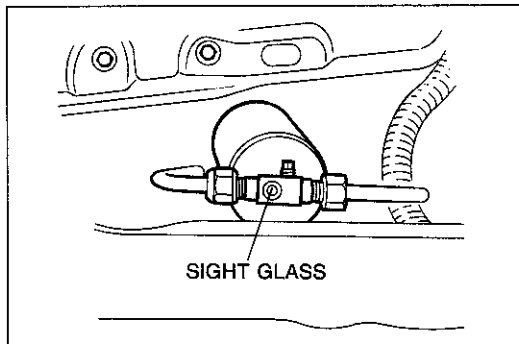
##### Ohmmeter

The ohmmeter is used to measure the resistance between two points in a circuit, to check for continuity, and to diagnose short circuits.

##### Caution

**Never connect the ohmmeter to any circuit to which voltage is applied. Doing so may burn or otherwise damage the ohmmeter.**

Symptom: Insufficient cooling  
No cooling  
Intermittent cooling



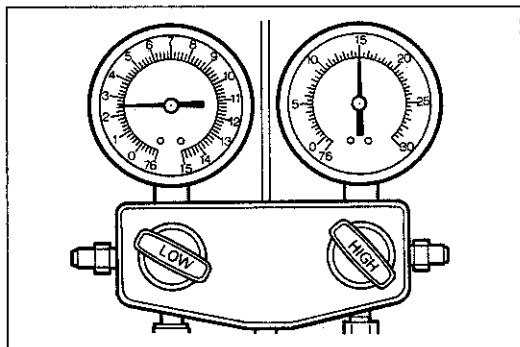
9MU0UX-072

### Step 1 Checking refrigerant charge

1. Run the engine at a fast idle.
2. Operate the air conditioner at maximum cooling for a few minutes.
3. Determine the amount of refrigerant as shown below by observing the sight glass.

Item	Symptom	Amount of refrigerant	Action
1	Bubbles present in sight glass	Insufficient refrigerant	Check refrigerant pressure, go to Step 2
2	No bubbles present in sight glass	Too much or proper amount of refrigerant	Turn air conditioner OFF, and watch bubbles (Refer to Items 3 and 4)
3	Immediately after air conditioner turned off, refrigerant in sight glass stays clear	Too much refrigerant	Check refrigerant pressure, go to Step 2
4	When air conditioner turned OFF, refrigerant foams and then sight glass becomes clear	Proper amount of refrigerant	Refrigerant amount normal

9MU0UX-073



2BU0UX-003

### Step 2 Checking refrigerant pressure

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Operate the engine at 1,500 rpm and set the air conditioner to maximum cooling.
3. Measure the low and high pressures. (Refer to page U-30.)

#### Specified pressure at 25°C (77°F)

**Low pressure:**

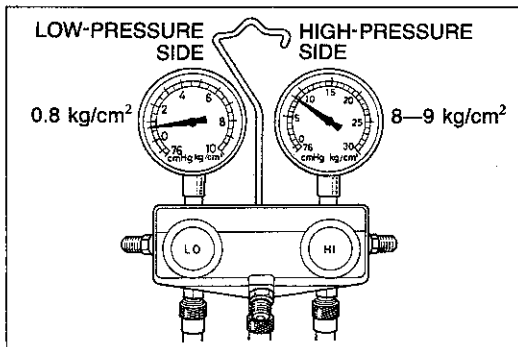
**98—167 kPa (1.0—1.7 kg/cm<sup>2</sup>, 14—24 psi)**

**High pressure:**

**1,030—1,275 kPa (10.5—13.0 kg/cm<sup>2</sup>, 149—185 psi)**

# U

4. If the pressure is not as specified, refer to the following items and check the system.

**Case 1****Measured pressure****Low pressure:**

Below 78 kPa (0.8 kg/cm<sup>2</sup>, 11 psi)

**High pressure:**

785—883 kPa (8—9 kg/cm<sup>2</sup>, 114—128 psi)

**Possible cause****Insufficient refrigerant****Condition**

- Outlet air from vents not cold
- Bubbles seen in sight glass

**Step 1**

1. Check for oil stains on the pipes, hoses and other parts.
2. If oil staining is found at the connection of pipes or hoses, replace the O-ring; then, evacuate, charge, and test the system.
3. If oil staining is not found, go to Step 2.

**Step 2**

1. Check for leakage from connections with a gas leak tester.

- Inlet and outlet of condenser
- Inlet and outlet of receiver/drier
- Inlet and outlet of compressor
- Sight glass
- Inlet and outlet of cooling unit

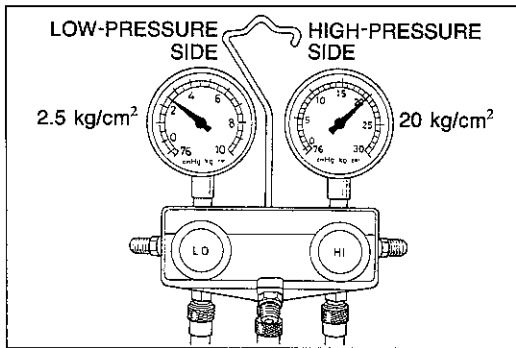
2. If leakage is evident, go to Step 3.

3. If leakage cannot be found, charge the system until it is filled with specified amount of refrigerant by checking the sight glass. (System OK, but refrigerant leaked gradually over time.)

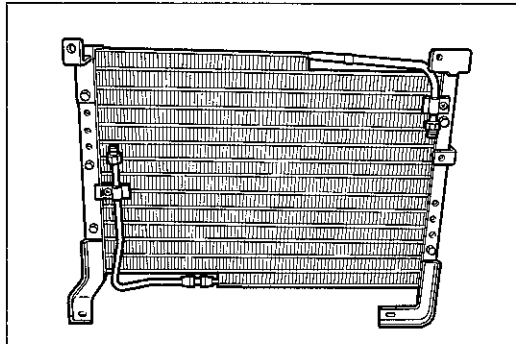
**Step 3**

1. Check tightening torque of the connection where leak was detected.
2. If the connection is loose, tighten the connection; then, evacuate, charge, and test the system.
3. If the connection is properly tightened, replace the O-ring; then, evacuate, charge, and test the system.

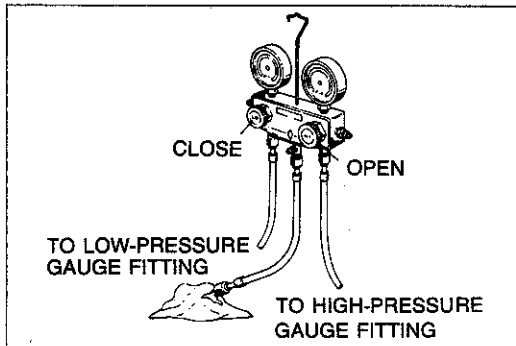
2BU0UX-004



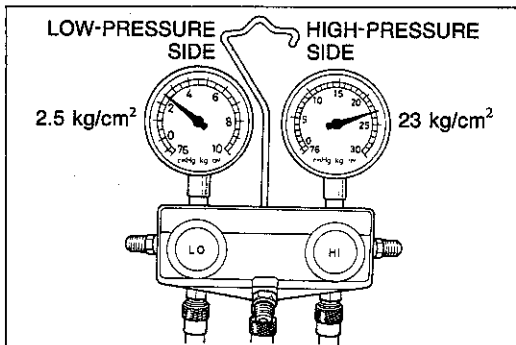
9BU0UX-008



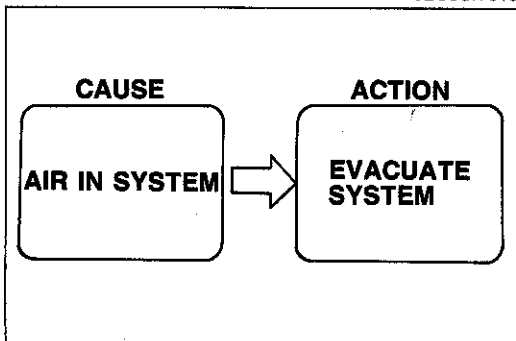
9MU0UX-084



2BU0UX-005



9BU0UX-010



2BU0UX-006

**Case 2**

**Measured pressure**

**Low pressure:**

Above 245 kPa (2.5 kg/cm<sup>2</sup>, 36 psi)

**High pressure:**

Above 1,962 kPa (20 kg/cm<sup>2</sup>, 284 psi)

**Possible cause**

Excessive refrigerant or insufficient condenser cooling

**Condition**

Insufficient cooling

**Step 1**

1. Check the condenser for bent fins or damage. Repair or replace if necessary.
2. If the condenser is OK, go to Step 2.

**Step 2**

1. Recover the excessive refrigerant from the system using a recommended CFC recovery device or equivalent. (Refer to page U-25.)

**Warning**

**Always wear gloves and eye protection when handling the refrigerant.**

2. Verify that the refrigerant pressure is normal.

**Case 3**

**Measured pressure**

**Low pressure:**

Above 245 kPa (2.5 kg/cm<sup>2</sup>, 36 psi)

**High pressure:**

Above 2,256 kPa (23 kg/cm<sup>2</sup>, 327 psi)

**Possible cause**

Air in system

**Condition**

Insufficient cooling

**Step 1**

Recover the refrigerant from the system using a recommended CFC recovery device or equivalent. (Refer to page U-25.)

**Step 2**

Evacuate the system to remove all air from the system. (Refer to page U-25.)

**Step 3**

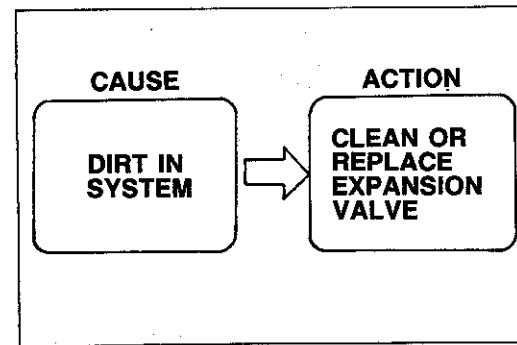
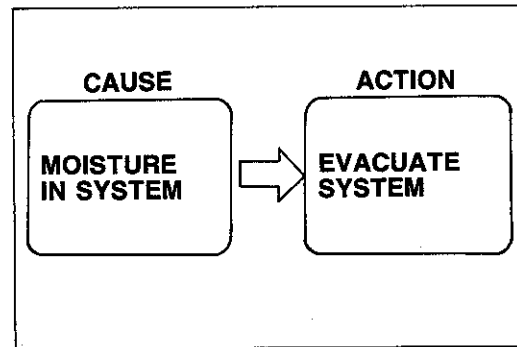
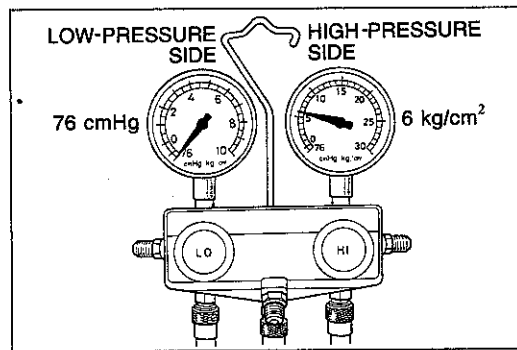
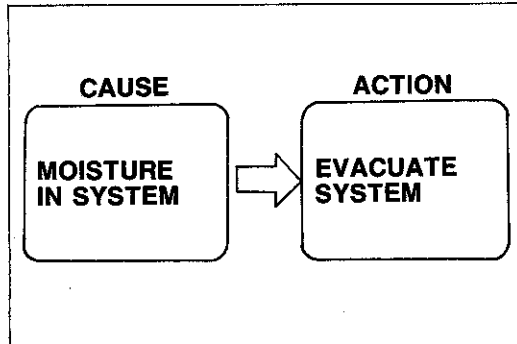
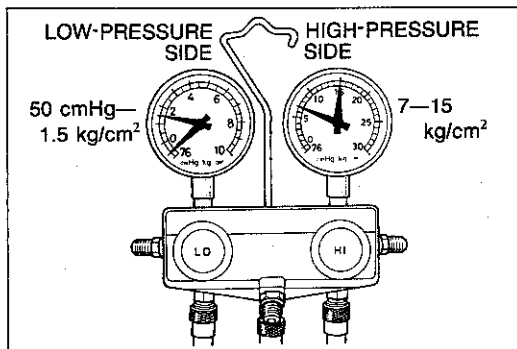
Charge the system with refrigerant. (Refer to page U-26.)

**Step 4**

After charging, check the refrigerant pressure. (Refer to page U-30.)

**Step 5**

If low and high pressures are still too high, replace the receiver/drier.



### Case 4

#### Measured pressure

Low pressure: 50 cmHg (2.0 inHg) of Vacuum  
—147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)

High pressure:  
687—1,472 kPa (7—15 kg/cm<sup>2</sup>, 100—213 psi)

#### Possible cause

Moisture in system

#### Condition

Intermittent cooling

(Moisture in refrigeration system freezes in expansion valve and causes temporary blocking. After time, ice melts and condition returns to normal.)

#### Step 1

Discharge the refrigeration system. (Refer to page U-25.)

#### Step 2

Evacuate the system to remove all air and moisture from the system. (Refer to page U-26.)

#### Step 3

Charge the system with refrigerant. (Refer to page U-26.)

#### Step 4

After charging, check the refrigerant pressure. (Refer to page U-30.)

#### Step 5

If low and high pressures are not normal, replace the receiver/drier. (Normal pressure: Refer to page U-5)

### Case 5

#### Measured pressure

Low pressure:  
76 cmHg (3.0 inHg) Vacuum

High pressure:  
Below 589 kPa (6 kg/cm<sup>2</sup>, 85 psi)

#### Possible cause

No refrigerant circulation

#### Condition

Refrigerant flow obstructed by moisture or dirt, causing freezing or blockage of expansion valve

#### Step 1

Turn the air conditioner OFF for about 10 minutes. Turn the air conditioner ON to determine whether the blockage is due to moisture or dirt.

a) If caused by moisture

System will operate normally after being OFF for 10 minutes. (Ice melts and relieves blockage).

If cause is moisture, refer to "Moisture in system."

b) If caused by dirt

System remains abnormal after being OFF 10 minutes.

If caused by dirt, go to Step 2.

#### Step 2

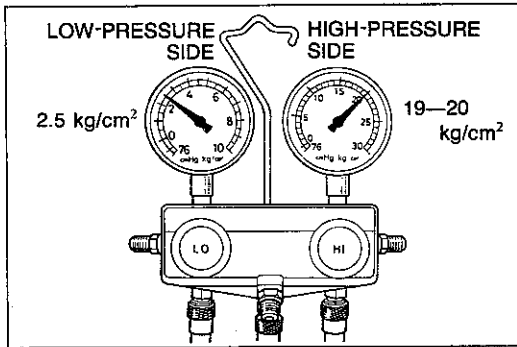
1. Remove the expansion valve. (Refer to page U-31.)

2. Blow out the dirt with compressed air.

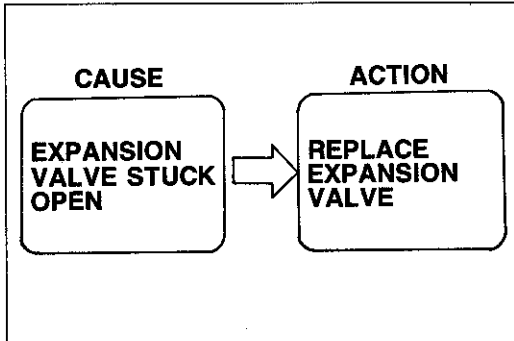
3. If unable to remove the dirt, replace the expansion valve.

4. Evacuate, charge, and test the system.

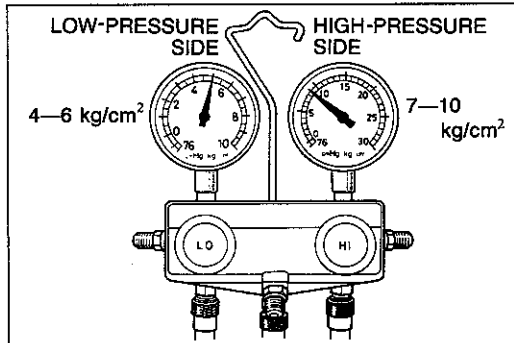




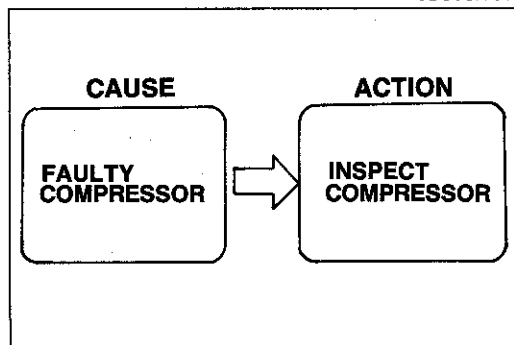
9BU0UX-016



2BU0UX-010



9BU0UX-018



2BU0UX-011

**Case 6**

**Measured pressure**

**Low pressure:**

Above 245 kPa (2.5 kg/cm<sup>2</sup>, 36 psi)

**High pressure:**

1,864—1,962 kPa (19—20 kg/cm<sup>2</sup>, 270—284 psi)

**Possible cause**

Expansion valve stuck open

**Condition**

Insufficient cooling

1. Check whether there is frost or heavy dew on the suction pipe (between cooling unit and compressor).
2. If neither is found, refer to "Excessive refrigerant or insufficient condenser cooling," page U-7.
3. If either is found, replace the expansion valve. (Refer to page U-31.)

**Case 7**

**Measured pressure**

**Low pressure:**

392—589 kPa (4—6 kg/cm<sup>2</sup>, 57—85 psi)

**High pressure:**

687—981 kPa (7—10 kg/cm<sup>2</sup>, 100—142 psi)

**Possible cause**

Faulty compressor

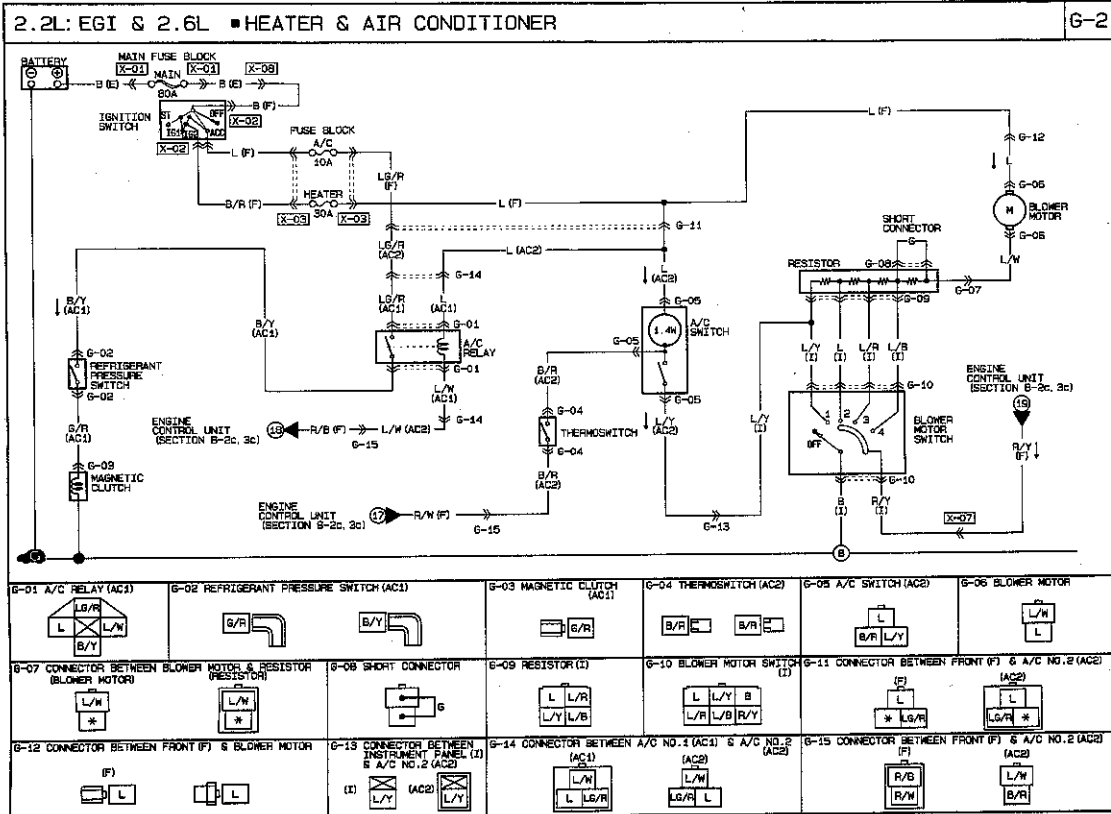
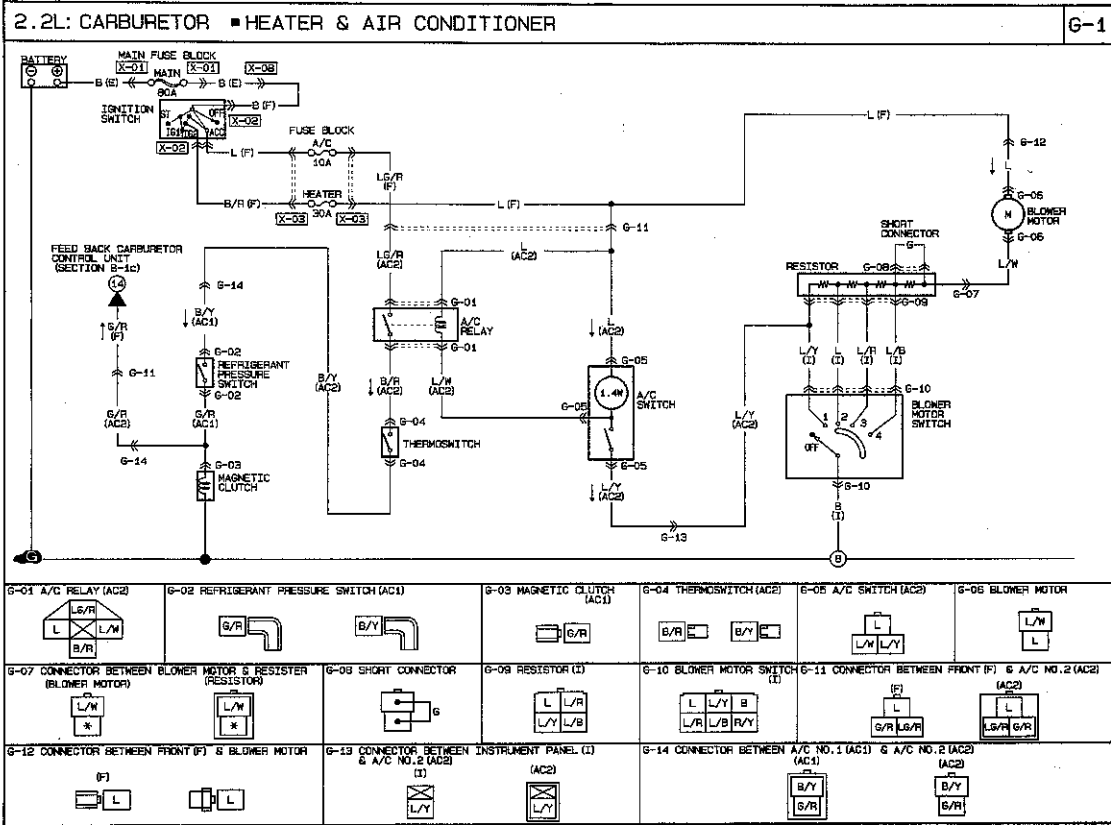
**Condition**

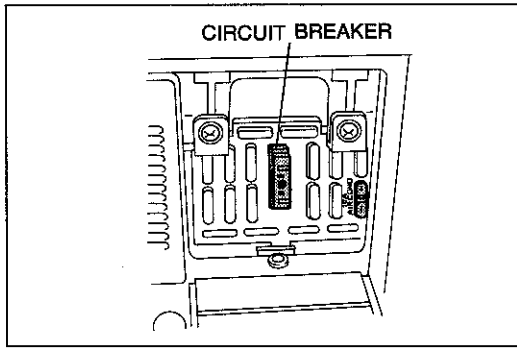
No cooling

1. Run the engine at a first idle.
2. Check that the magnetic clutch is ON when the A/C switch and blower switch are ON.
3. If the magnetic clutch remains OFF, refer to "Magnetic clutch does not operate," page U-13.
4. If the magnetic clutch is ON, inspect the compressor. (Refer to page U-33.)

Symptom: Blower motor does not operate

Circuit diagram

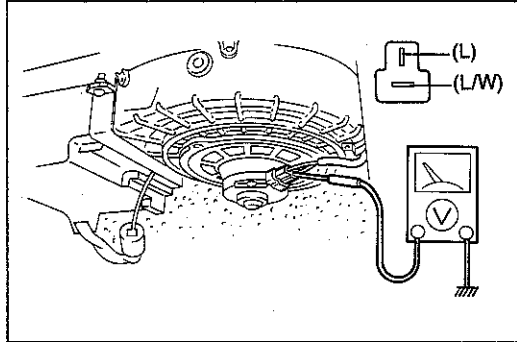




2BU0UX-012

**Step 1**

1. Check the circuit breaker.
2. If the red button has not popped out, go to Step 2.
3. If the red button is out, check for a short circuit in the circuit. Repair as necessary; then depress the red button to reset the circuit breaker.



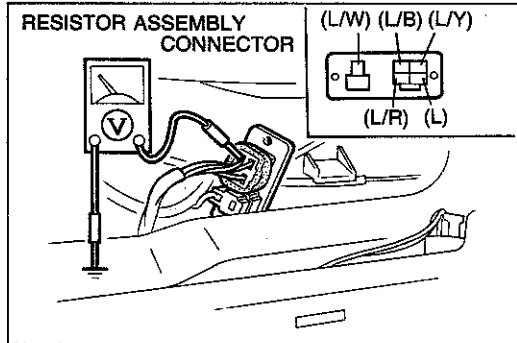
2BU0UX-013

**Step 2**

1. Turn the ignition switch ON.
2. Turn the blower switch to the fourth position.
3. Measure the voltage at terminal-wires of the blower motor connector.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(L)	V <sub>B</sub>	Next, check wire (L/W)
	0V	Repair wiring harness (Circuit breaker—Blower motor)
(L/W)	V <sub>B</sub>	Go to Step 3
	0V	Replace blower motor



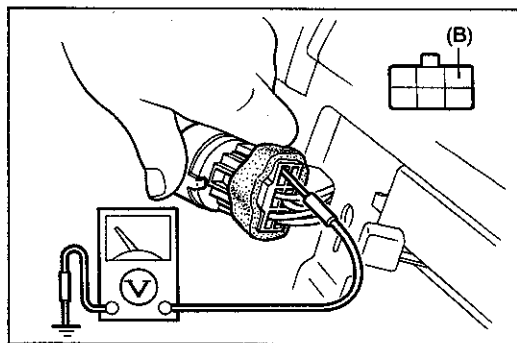
2BU0UX-014

**Step 3**

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch OFF.
3. Measure the voltage at the terminal-wires of the resistor assembly connector.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(L/W)	V <sub>B</sub>	Next, check wire (L/B)
	0V	Repair wiring harness (Blower motor—Resistor assembly)
(L/B)	V <sub>B</sub>	Next, check wire (L/R)
	0V	Replace resistor assembly
(L/R)	V <sub>B</sub>	Next, check wire (L)
	0V	Replace resistor assembly
(L)	V <sub>B</sub>	Next, check wire (L/Y)
	0V	Replace resistor assembly
(L/Y)	V <sub>B</sub>	Go to Step 4
	0V	Replace resistor assembly



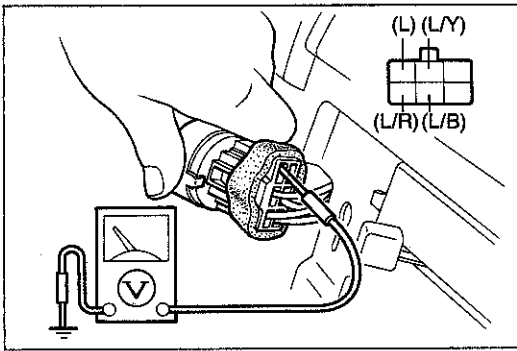
2BU0UX-015

**Step 4**

1. Turn the ignition switch ON.
2. Turn the blower switch to the fourth position.
3. Measure the voltage at terminal-wire (B) of the blower switch connector.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(B)	0V	Go to Step 5
	V <sub>B</sub>	Repair wiring harness (Blower switch—Body ground)



2BU0UX-016

### Step 5

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch OFF.
3. Measure the voltage at the terminal-wires of the blower switch connector.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(L/B)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V <sub>B</sub>	Next, check wire (L/R)
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V <sub>B</sub>	Next, check wire (L)
(L)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V <sub>B</sub>	Next, check wire (L/Y)
(L/Y)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V <sub>B</sub>	Replace blower switch

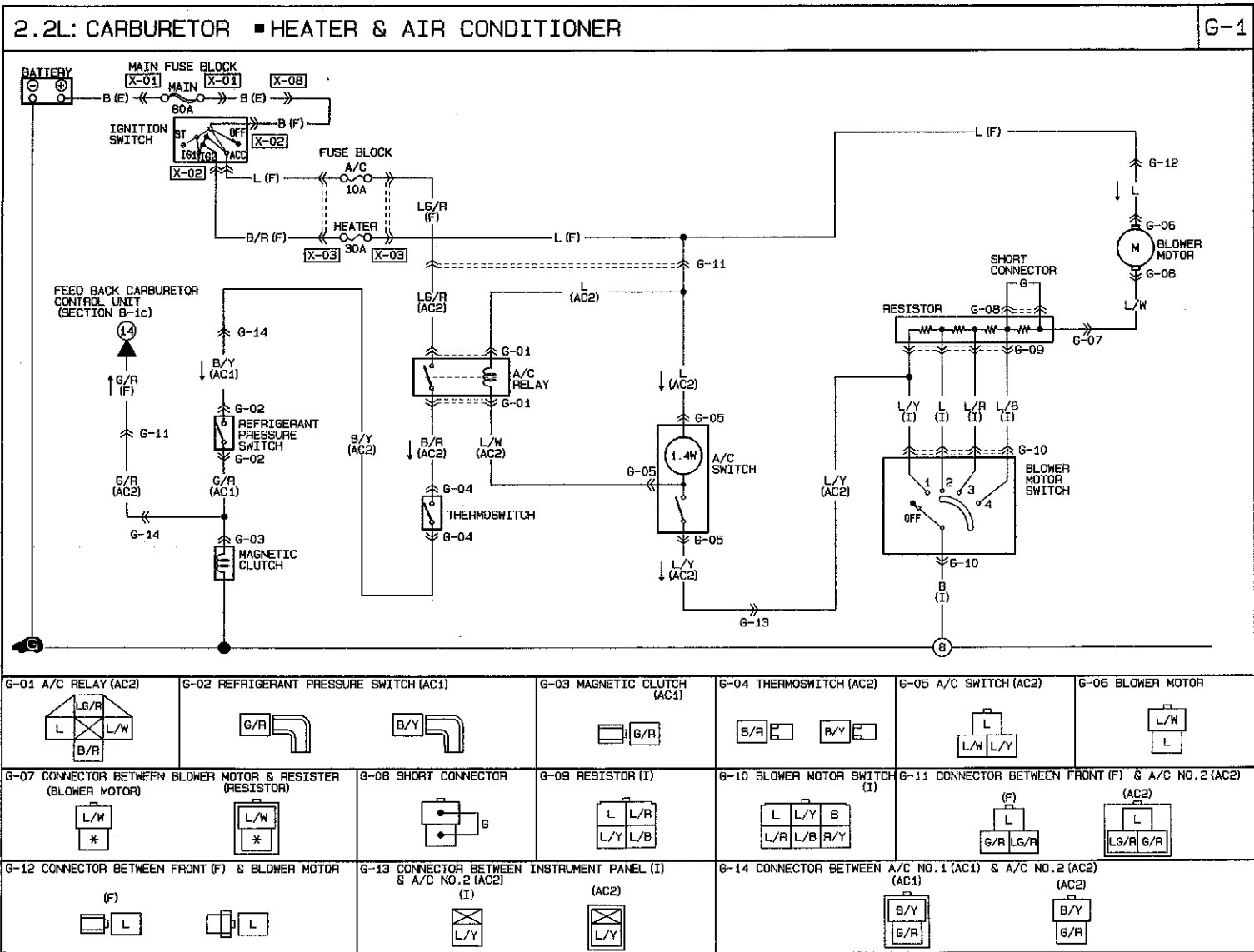
# TROUBLESHOOTING

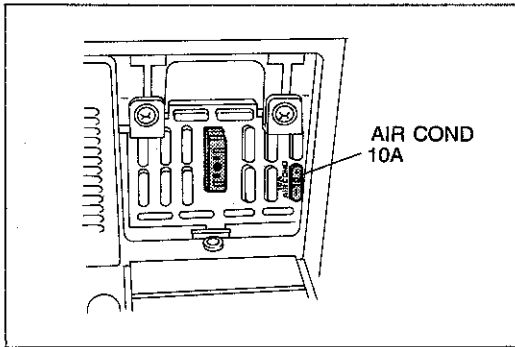


Symptom: Magnetic clutch does not operate

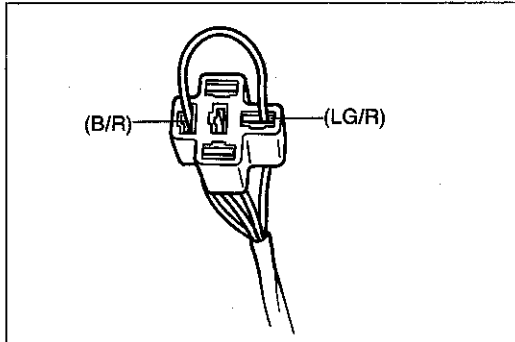
Note  
If the blower motor also does not operate, see "Blower motor does not operate", page U-10.

(B2200 Carb.)  
Circuit diagram

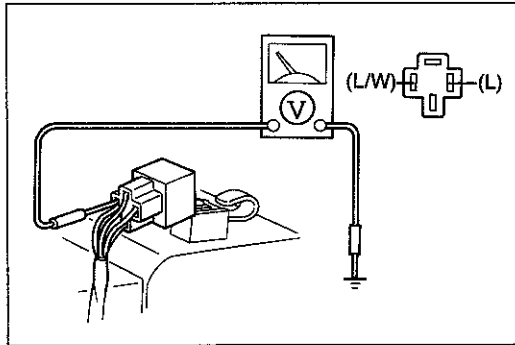




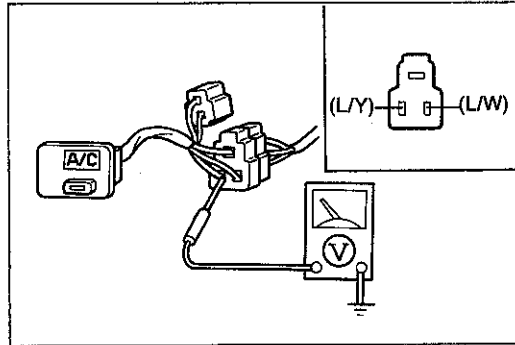
9BU0UX-026



9BU0UX-027



2BU0UX-017



2BU0UX-018

### Step 1

1. Check the fuse.

Fuse	Amperage	Location
AIR COND.	10A	Fuse box

2. If the fuse is OK, go to Step 2.
3. If the fuse is burned, check for a short circuit in the harness and repair as necessary before replacing the fuse.

### Step 2

1. Disconnect the negative battery cable.
2. Disconnect the A/C relay connector.
3. Connect a jumper wire between terminal-wires (LG/R) and (B/R) of the relay connector.
4. Reconnect the negative battery cable, and check whether the magnetic clutch operates.
5. If the magnetic clutch operates, disconnect the jumper wire and go to Step 3.
6. If the magnetic clutch does not operate, leave the jumper wire connected and go to Step 5.

### Step 3

1. Turn the ignition switch ON.
2. Turn the blower switch to the first position and A/C switch ON.
3. Measure the voltage at the terminal-wires of the A/C relay connector.

**V<sub>B</sub>: Battery voltage**

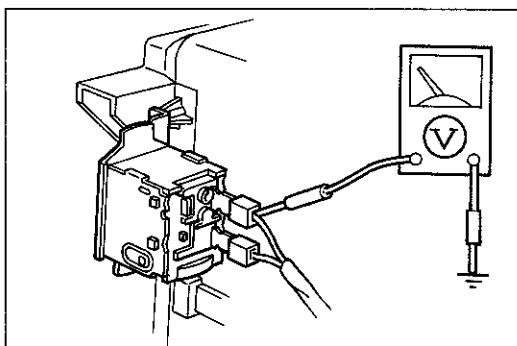
Wire	Voltage	Action
(L)	V <sub>B</sub>	Next, check wire (L/W)
	0V	Repair wiring harness (Circuit breaker—A/C relay)
(L/W)	V <sub>B</sub>	Go to Step 4
	0V	Replace A/C relay

### Step 4

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage at the terminal-wires of the A/C switch.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(L/W)	V <sub>B</sub>	Next, check wire (L/Y)
	0V	Repair wiring harness (A/C relay—A/C switch)
(L/Y)	V <sub>B</sub>	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch



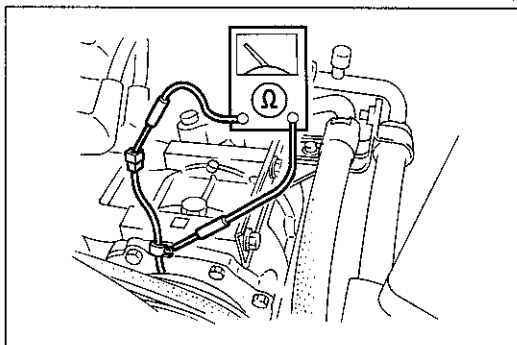
2BU0UX-019

### Step 5

1. Turn the ignition switch ON.
2. Measure the voltage at the terminal-wires of the thermostatic switch connector.

**Vb: Battery voltage**

Wire	Voltage	Action
(B/R)	Vb	Next, check wire (B/Y)
	0V	Repair wiring harness (A/C fuse—A/C relay—Thermostatic switch)
(B/Y)	Vb	Disconnect jumper wire and go to Step 6
	0V	Replace thermostatic switch



9BU0UX-031

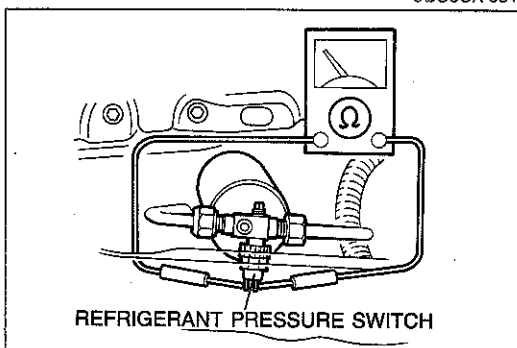
### Step 6

1. Disconnect the magnetic clutch connector.
2. Check for continuity between the terminal-wire of the magnetic clutch connector and a ground.

Continuity	Action
Yes	Reconnect connector and go to Step 7
No	Replace magnetic clutch

### Note

**Set the ohmmeter to the x1000 range.**

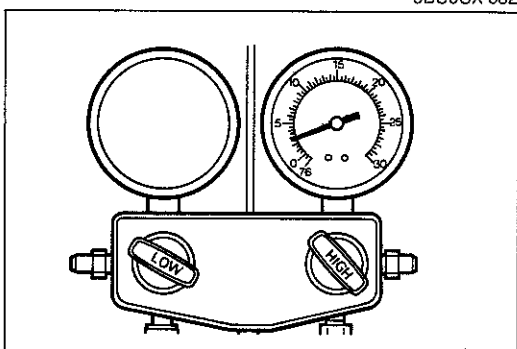


9BU0UX-032

### Step 7

Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Repair wiring harness (Thermostatic switch—Refrigerant pressure switch—Magnetic clutch)
No	Reconnect connector and go to step 8



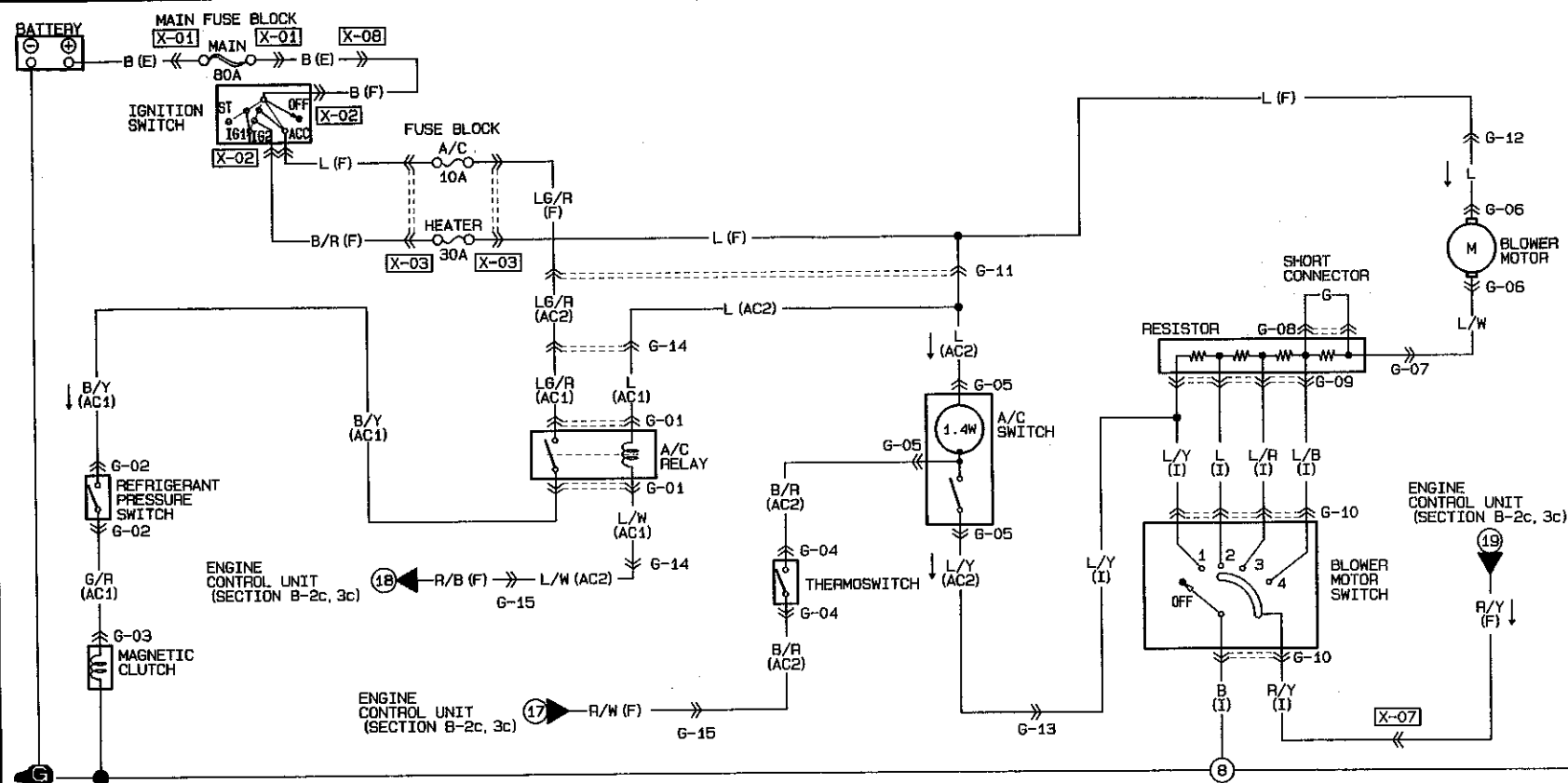
9BU0UX-033

### Step 8

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

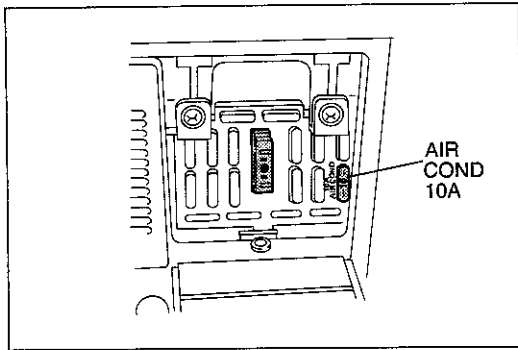
Pressure	Action
More than 2.8 kg/cm <sup>2</sup>	Replace refrigerant pressure switch
Less than 2.8 kg/cm <sup>2</sup>	Check the refrigerant system (Refer to page U-5.)

2.2L: EGI & 2.6L ■ HEATER & AIR CONDITIONER

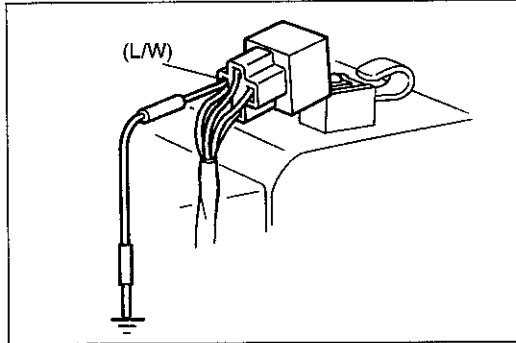


<p>G-01 A/C RELAY (AC1)</p>	<p>G-02 REFRIGERANT PRESSURE SWITCH (AC1)</p>	<p>G-03 MAGNETIC CLUTCH (AC1)</p>	<p>G-04 THERMOSWITCH (AC2)</p>	<p>G-05 A/C SWITCH (AC2)</p>	<p>G-06 BLOWER MOTOR</p>
<p>G-07 CONNECTOR BETWEEN BLOWER MOTOR &amp; RESISTOR (BLOWER MOTOR)</p>	<p>G-08 SHORT CONNECTOR</p>	<p>G-09 RESISTOR (I)</p>	<p>G-10 BLOWER MOTOR SWITCH (I)</p>	<p>G-11 CONNECTOR BETWEEN FRONT (F) &amp; A/C NO.2 (AC2)</p>	
<p>G-12 CONNECTOR BETWEEN FRONT (F) &amp; BLOWER MOTOR</p>		<p>G-13 CONNECTOR BETWEEN INSTRUMENT PANEL (I) &amp; A/C NO.2 (AC2)</p>	<p>G-14 CONNECTOR BETWEEN A/C NO.1 (AC1) &amp; A/C NO.2 (AC2)</p>	<p>G-15 CONNECTOR BETWEEN FRONT (F) &amp; A/C NO.2 (AC2)</p>	

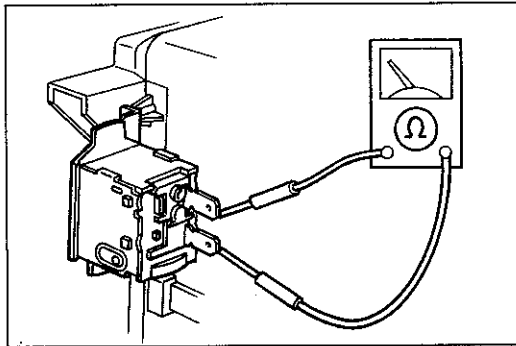




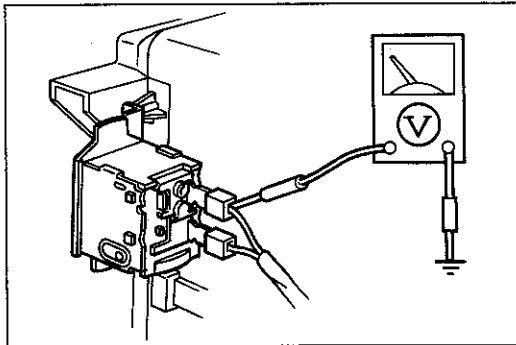
9BU0UX-026



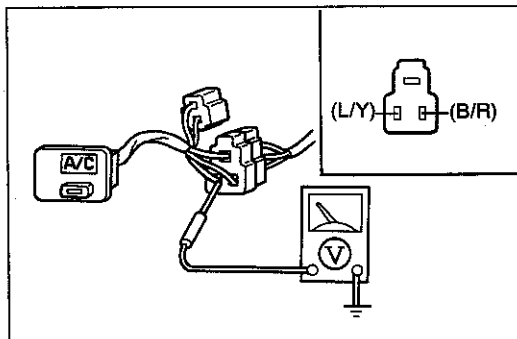
9BU0UX-035



9BU0UX-036



2BU0UX-020



2BU0UX-021

### Step 1

1. Check the fuse.

Fuse	Amperage	Location
AIR COND	10A	Fuse box

2. If the fuse is OK, go to Step 2.
3. If the fuse is burned, check for a short circuit in the harness and repair as necessary before replacing the fuse.

### Step 2

1. Run the engine at idle.
2. Turn the blower switch and the A/C switch ON.
3. Check if the magnetic clutch operates when grounding the A/C relay terminal-wire (L/W).

Operation	Action
Yes	Go to Step 3
No	Go to Step 6

### Step 3

1. Remove the thermoswitch connector.
2. Check for continuity between terminals of the thermoswitch.

Continuity	Action
Yes	Go to Step 4
No	Replace thermoswitch

### Step 4

1. Turn the ignition switch OFF.
2. Turn the blower switch ON.
3. Turn the A/C switch ON.
4. Measure the voltage at terminal-wire (B/R) of the thermoswitch.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(B/R)	V <sub>B</sub>	Go to Step 5
	0V	Engine control unit trouble (Refer to Section F2)

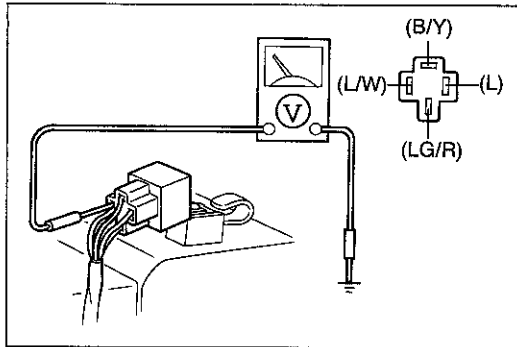
### Step 5

1. Turn the ignition switch OFF.
2. Turn the blower switch ON.
3. Turn the A/C switch ON.
4. Measure the voltage at the terminal-wires of the A/C switch.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(B/R)	V <sub>B</sub>	Next, check wire (L/Y)
	0V	Repair wiring harness (Thermoswitch—A/C switch)
(L/Y)	V <sub>B</sub>	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch

## TROUBLESHOOTING



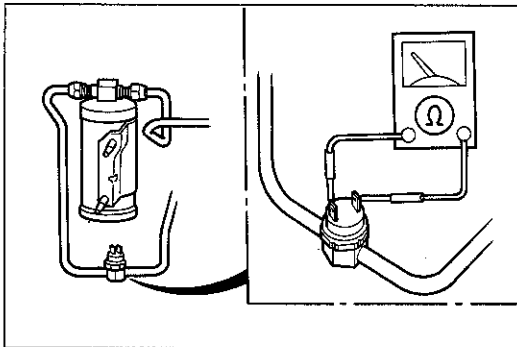
2BU0UX-022

### Step 6

1. Run the engine at idle.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage of terminal-wires of the A/C relay connector.

**Vb: Battery voltage**

Wire	Voltage	Action
(L/W)	Vb	Go to Step 3
	0V	Next, check wire (L)
(L)	Vb	Next, check wire (LG/R)
	0V	Repair wiring harness (Circuit breaker—A/C relay)
(LG/R)	Vb	Next, check wire (B/Y)
	0V	Repair wiring harness (A/C fuse—A/C relay)
(B/Y)	Vb	Go to Step 7
	0V	Replace A/C relay

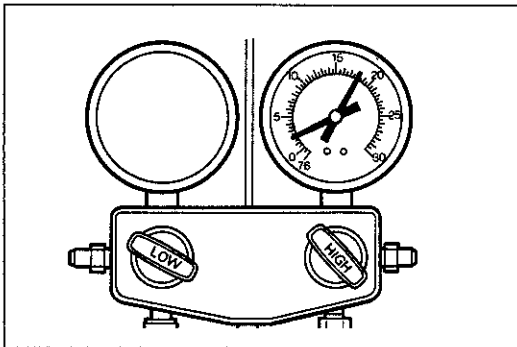


9BU0UX-041

### Step 7

Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Go to Step 9
No	Go to Step 8

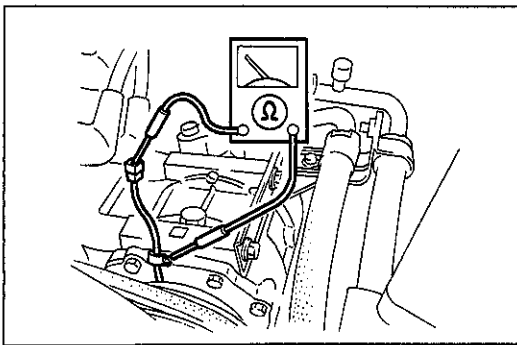


9BU0UX-042

### Step 8

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

Pressure	Action
More than 2.1 kg/cm <sup>2</sup> and less than 18 kg/cm <sup>2</sup>	Replace refrigerant pressure switch
More than 18 kg/cm <sup>2</sup> or less than 2.1 kg/cm <sup>2</sup>	Check refrigerant system (Refer to page U-5.)



9BU0UX-043

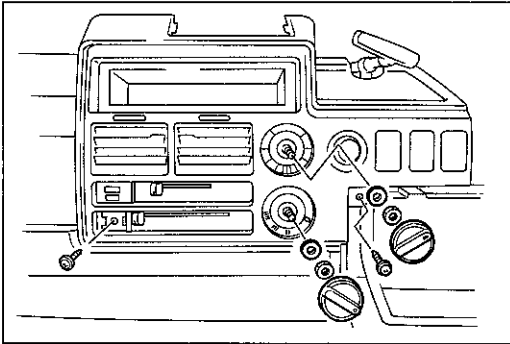
### Step 9

1. Disconnect the magnetic clutch connector.
2. Check for continuity between the terminal-wire of the magnetic clutch and a ground.

Continuity	Action
Yes	Repair wiring harness (A/C relay—Refrigerant pressure switch—Magnetic clutch)
No	Replace magnetic clutch

### Note

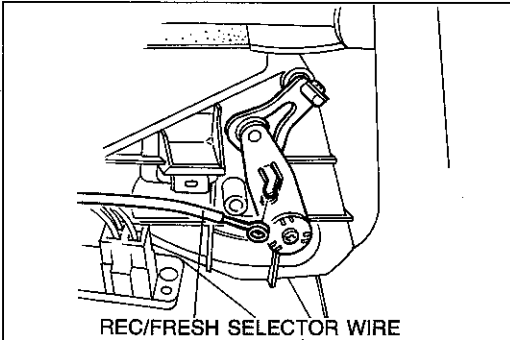
Set the ohmmeter to the x1000 range.



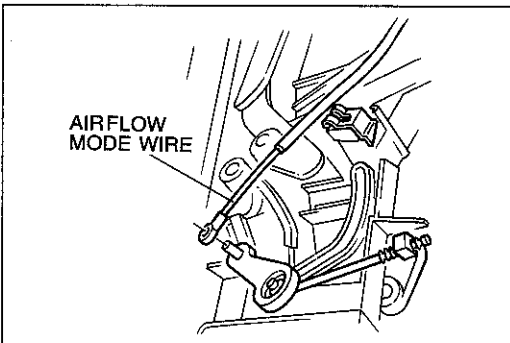
## CONTROL SWITCH PANEL

### REMOVAL AND INSTALLATION

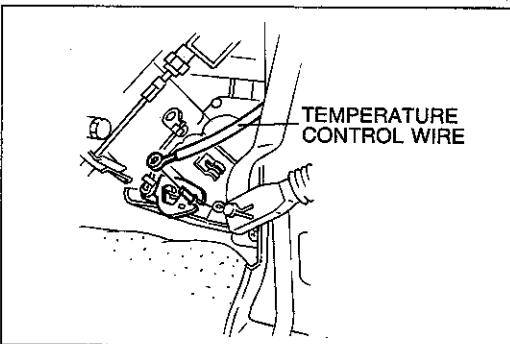
1. Remove the meter hood. (Refer to page S-23.)
2. Remove the screws, knobs, and nuts.
3. Disconnect the cigarette lighter connector and A/C switch connector.
4. Remove the center panel.



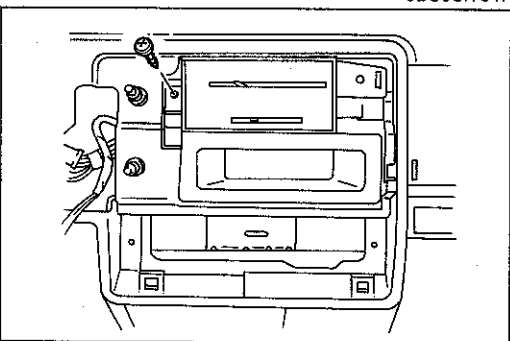
5. Remove the glove compartment. (Refer to page S-23.)
6. Disconnect the REC/FRESH selector wire.



7. Disconnect the airflow mode wire.

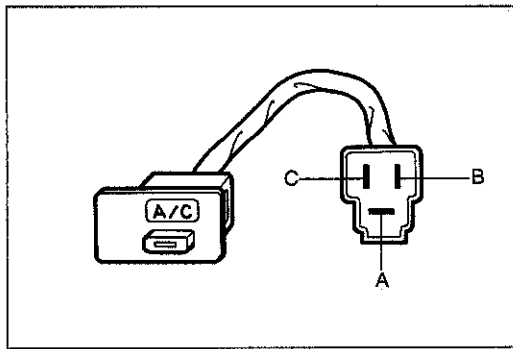


8. Disconnect the temperature control wire.



9. Remove the screw and disconnect the connectors; then remove the control switch panel.
10. Install in the reverse order of removal.

## CONTROL SWITCH PANEL



9BU0UX-049

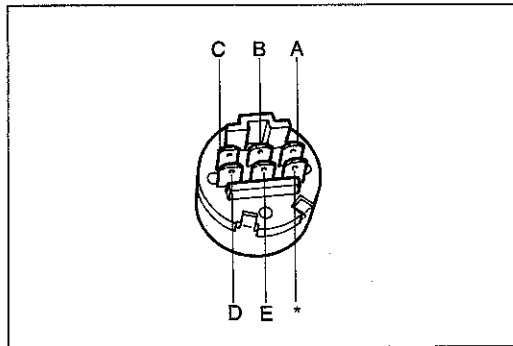
### INSPECTION

#### A/C Switch

Check for continuity between terminals of the switch with an ohmmeter.

Switch position \ Terminal	A	B	C
A/C switch ON	○—○	○—○	○—○
A/C switch OFF	○—○	○—○	

○—○: Indicates continuity



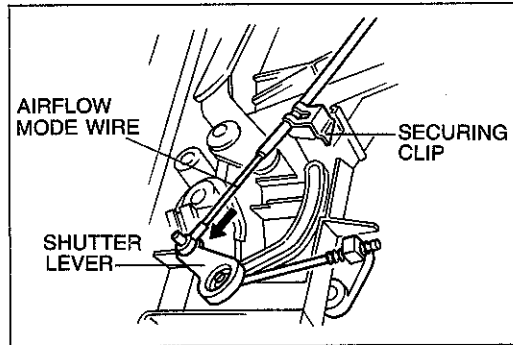
9BU0UX-050

#### Blower Switch

Check for continuity between terminals of the switch with an ohmmeter.

Switch position \ Terminal	A	B	C	D	E
1	○—○	○—○			
2	○—○		○—○		
3	○—○			○—○	
4	○—○				○—○


○—○: Indicates continuity

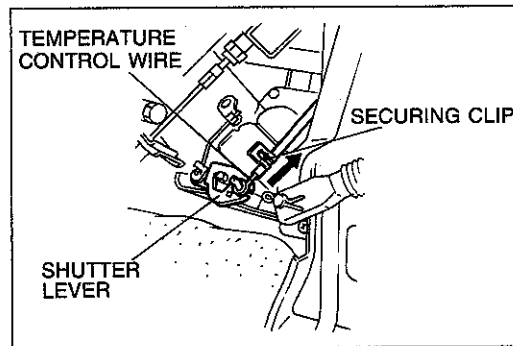


1BU0UX-006

### ADJUSTMENT

#### Airflow Mode Wire

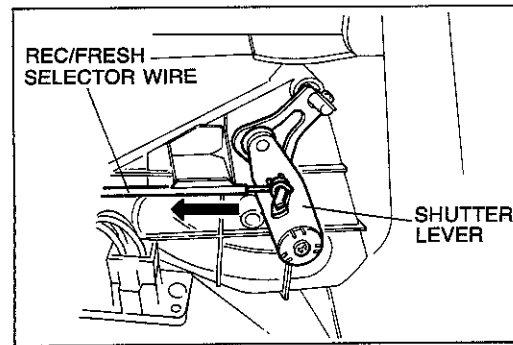
1. Set the airflow mode control lever to DEFROST (  ).
2. With the shutter lever on the heater unit pushed fully downward (direction of arrow), install the airflow mode wire.
3. Attach the securing clip.
4. Turn the blower switch to 4, and make sure no air leaks from the center and floor-area outlets.



9BU0UX-052

#### Temperature Control Wire

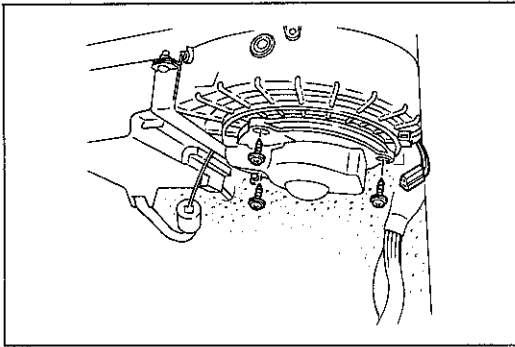
1. Set the temperature control lever to COLD.
2. With the shutter lever on the heater unit pushed fully upward (direction of arrow), install the temperature control wire.
3. Attach the securing clip.
4. Make sure the temperature control lever moves fully from COLD to HOT.



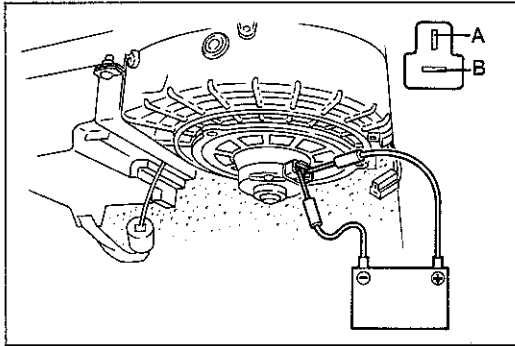
1BU0UX-007

#### REC/FRESH Selector Wire

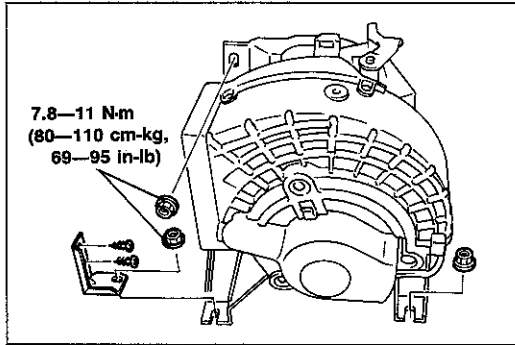
1. Set the REC/FRESH selector lever to RECIRC.
2. With the shutter lever on the blower unit pushed fully forward (direction of arrow), install the REC/FRESH selector wire.
3. Make sure the REC/FRESH selector lever moves fully from RECIRC to FRESH.



1BU0UX-008



2BU0UX-023



9BU0UX-056

## BLOWER UNIT

### BLOWER MOTOR

#### Removal

1. Remove the ECU. (Refer to Section F2.)
2. Remove the screws and disconnect the blower motor connector.
3. Remove the motor cover.
4. Remove the blower motor.

#### Installation

Install in the reverse order of removal.

#### Inspection

1. Remove the ECU. (Refer to Section F2.)
2. Remove the screws and disconnect the blower motor connector.
3. Remove the motor cover.
4. Check that the blower motor runs when connecting battery voltage to terminal B and grounding terminal A.
5. If the blower motor does not run, replace it.

## BLOWER UNIT

### Removal

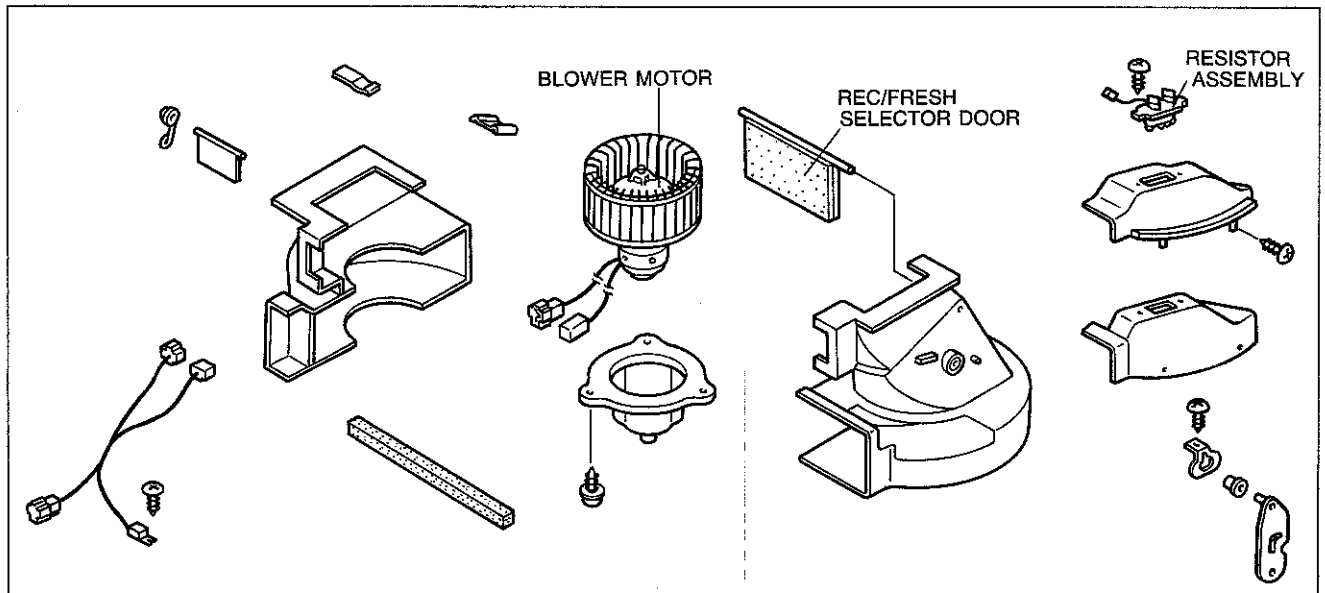
1. Remove the blower motor. (Refer to above.)
2. Remove the seal plate and nuts.
3. Remove the blower unit.

#### Installation

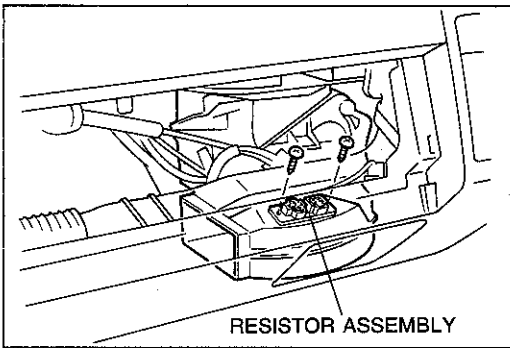
Install in the reverse order of removal.

### Disassembly and Assembly

Disassemble and assemble as shown.



9BU0UX-057

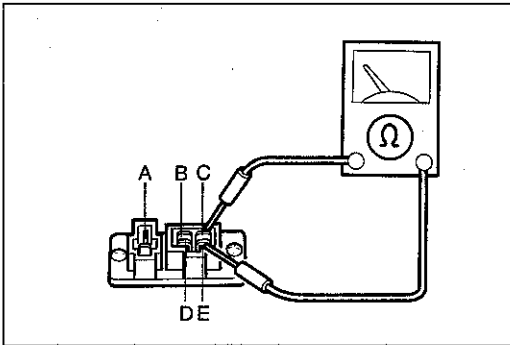


9BU0UX-058

### RESISTOR ASSEMBLY

#### Removal

1. Remove the glove compartment. (Refer to page S-23.)
2. Disconnect the resistor assembly connectors.
3. Remove the screws and the resistor assembly.



9BU0UX-059

#### Inspection

Check for continuity between terminals of the resistor assembly.

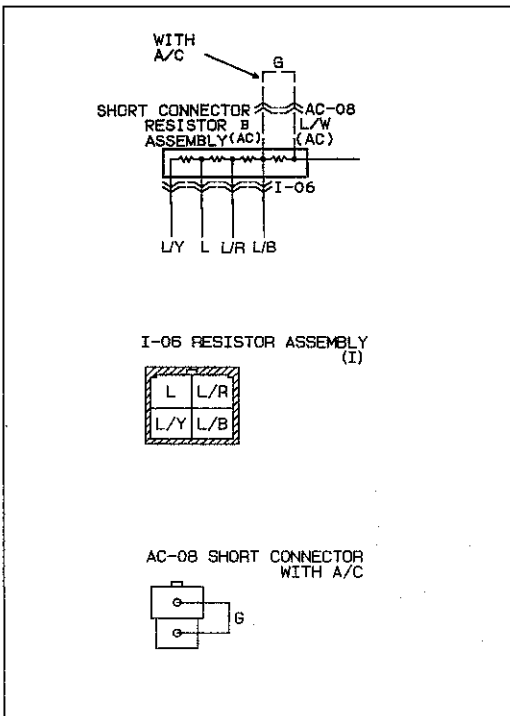
Terminal	A	B	C	D	E
Continuity	○	○	○	○	○

○—○: Indicates continuity

#### Note

**Set the ohmmeter to the x1000 range.**

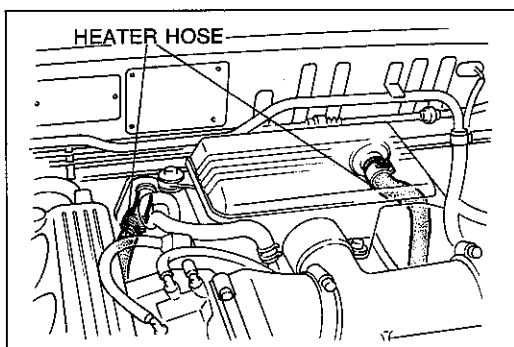
If not as specified, replace the resistor assembly.



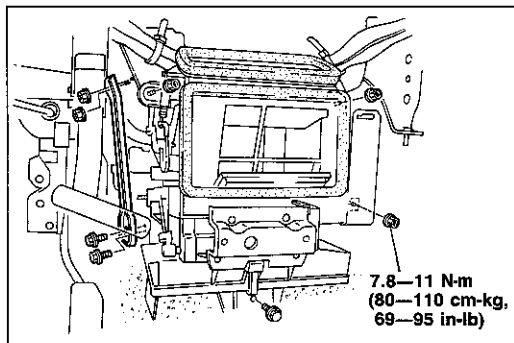
9BU0UX-060

#### Installation

Install in the reverse order of removal.



1BU0UX-020



9BU0UX-062

## HEATER UNIT

### HEATER UNIT

#### Removal

1. Drain the engine coolant. (Refer to Section E.)
2. Disconnect the heater hoses from the heater unit and remove the grommet.

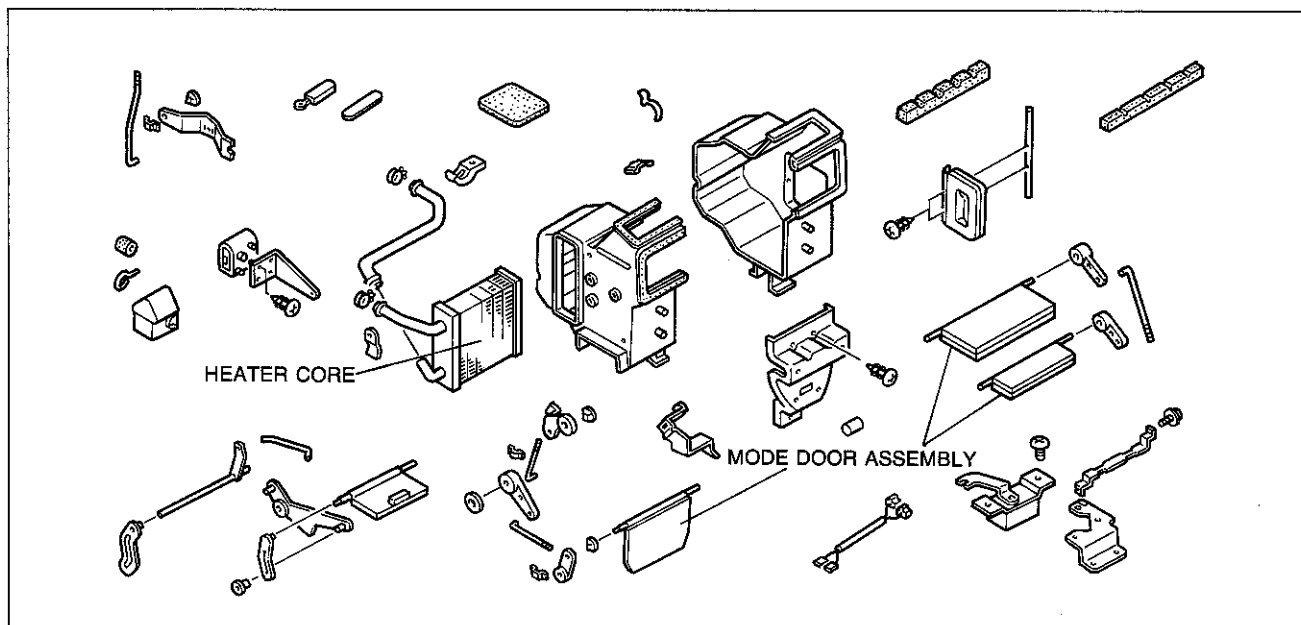
3. Remove the instrument panel. (Refer to page S-23.)
4. Remove the nuts and bolts; then remove the heater unit.

#### Installation

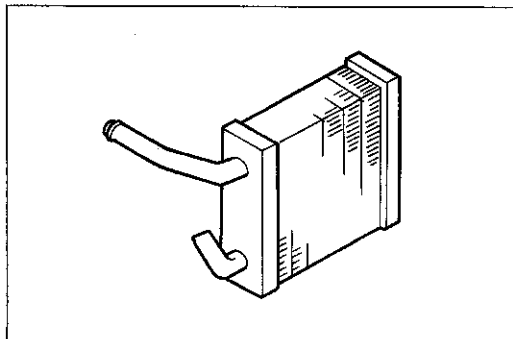
Install in the reverse order of removal.

### Disassembly and Assembly

Disassemble and assemble as shown.



9BU0UX-063



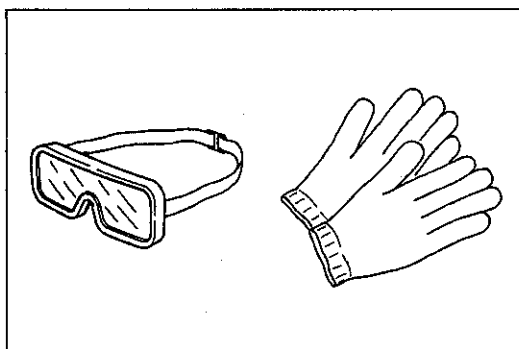
9BU0UX-064

### HEATER CORE

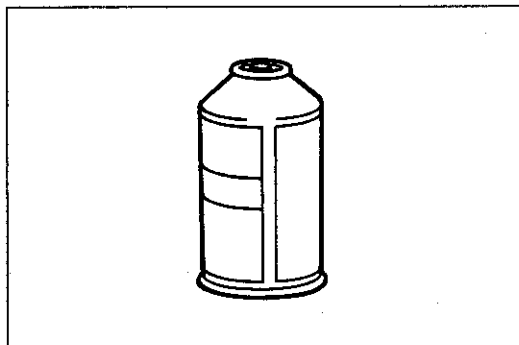
#### Inspection

Check for the following and repair or replace parts as necessary.

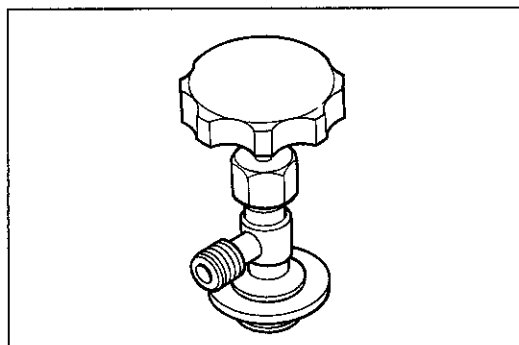
1. Cracks, damage, or water leakage.
2. Bent fins.
3. Distorted or bent inlet or outlet.



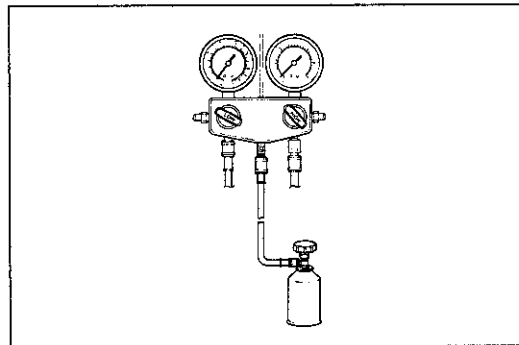
9BU0UX-065



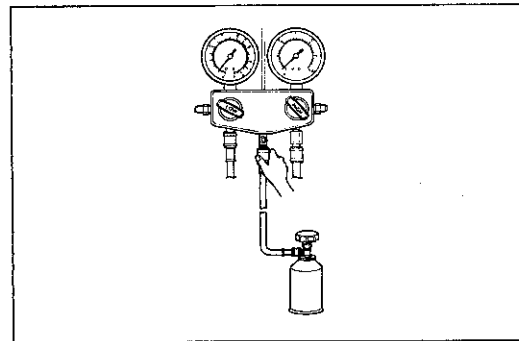
2BU0UX-024



9BU0UX-066



9MU0UX-128



2BU0UX-025

## REFRIGERANT SYSTEM

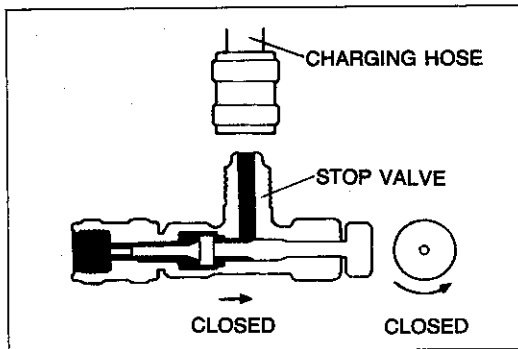
### SAFETY PRECAUTION

1. R-12 liquid refrigerant is highly volatile. A drop of it on the skin could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. If the refrigerant splashes into the eyes, wash them with clean water immediately. Always wear goggles or glasses to protect the eyes.
3. The R-12 container is a highly pressurized vessel. Never subject it to high temperature, and be sure that the temperature where it is stored is below **52°C (125.6°F)**.
4. A halide leak detector is often used to check the system for refrigerant leakage. Remember that R-12, upon coming into contact with the flame, produces phosgene, a toxic gas. Always provide adequate ventilation.

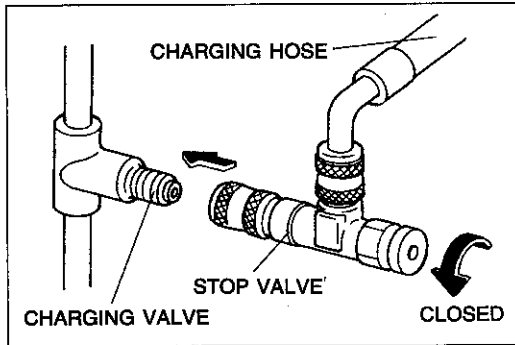
### REFRIGERANT CONTAINER SERVICE VALVE

1. Turn the handle fully counterclockwise before connecting the valve to the refrigerant container.
2. Turn the outlet valve counterclockwise until it reaches its highest position.
3. Turn the outlet valve fully clockwise by hand. Connect the center hose to the valve fitting.
4. Turn the handle clockwise to puncture the sealed can.
5. Turn the handle fully counterclockwise to fill the center hose. Do not open the high- or low-pressure manual valves.
6. Loosen the hose nut connected to the center fitting of the manifold gauge. Allow air to escape, then retighten the nut.





2BU0UX-026



2BU0UX-027

## REFRIGERANT SYSTEM OPERATION PROCEDURE

### Manifold gauge set/stop valve installation

#### Caution

- a) Connect all charging hoses via stop valves to avoid venting the refrigerant remaining in the hoses into the atmosphere.
- b) Do not disconnect the stop valve from the charging hose when there is refrigerant remaining in the hose.

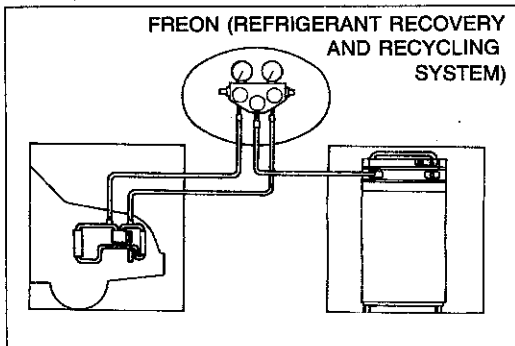
1. Turn the knob counterclockwise to close the stop valve.
2. Install the stop valve to the end of the charging hose of the manifold gauge set.

#### Caution

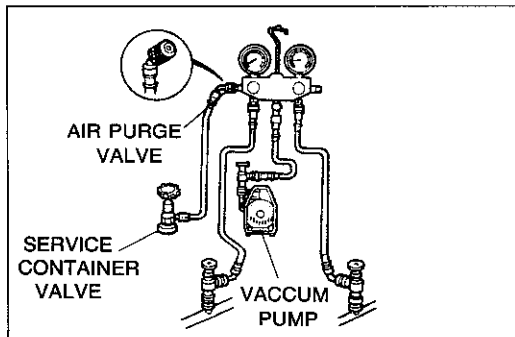
Verify that high- and low-pressure side valves of the manifold gauge set are fully closed before connecting the charging hose and stop valve to the refrigerant system service valve.

3. Connect high- and low-pressure side charging hoses and stop valves to the refrigerant system service valves.

2BU0UX-028



2BU0UX-029



2BU0UX-030

### Refrigerant recovery operation

Remove the refrigerant from the refrigerant system by using a freon (refrigerant) recovery and recycling system.

#### Caution

- a) Never vent the refrigerant into the atmosphere.
- b) When using a freon recovery and recycling system, follow the operation instructions provided by the equipment manufacturer.

### Evacuation/airtightness test

1. Connect the manifold gauge set and stop valves to the refrigerant system service valves.
2. Connect the center hose of the manifold gauge set to the vacuum pump inlet.
3. Prepare as follows according to the charging method.

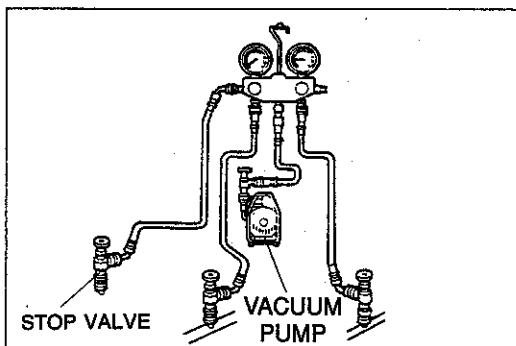
### Charging from service container

Connect the charging hose and service container valve to the manifold gauge set air purge valve.

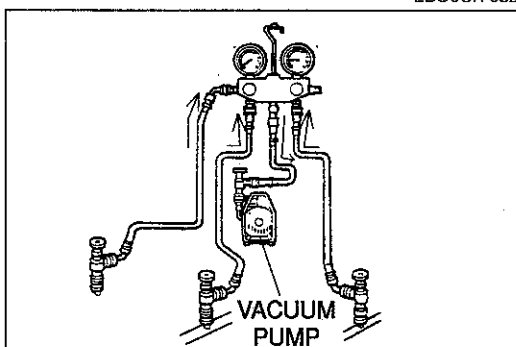
**Caution**

- a) Connect the charging hose to the air purge valve via its tap pin side.
- b) Do not disconnect the charging hose or the service container valve until the charging operation is completed.
- c) Do not open the service container valve when not used.

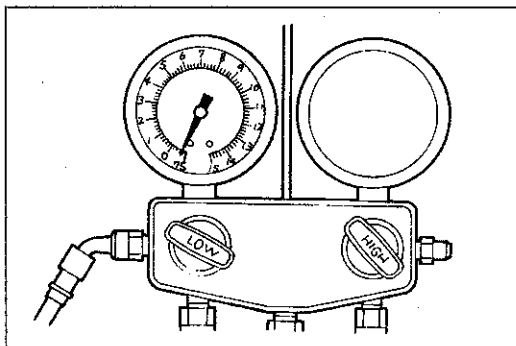
2BU0UX-031



2BU0UX-032



2BU0UX-033



2BU0UX-053

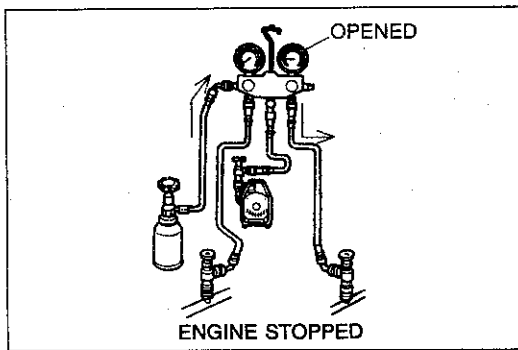
**Charging from freon recovery and recycling system**

Connect the charging hose and stop valve to the manifold gauge set air purge valve.

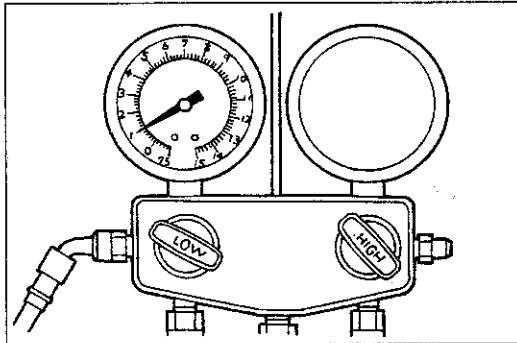
**Caution**

- a) Connect the charging hose to the air purge valve via its tap pin side.
- b) Do not disconnect the charging hose or stop valve until the charging operation is completed.
- c) Do not open the stop valve when hot used.

4. Start the vacuum pump and open the high- and low-pressure side valves of the manifold gauge set.
5. Start the pump and let it operate for 15 minutes.
6. Check high- and low-pressure side gauge readings. When both of them are at 750 mmHg or more, close the manifold gauge set valves.
7. Stop the vacuum pump and wait for about 5 minutes.
8. Verify that the low-pressure side gauge reading does not change.
9. If the reading changes, retighten the piping connections and repeat the evacuation operation.
10. If not changed, check for leaks (Refer to page U-27.) and charge the system.



2BU0UX-034



2BU0UX-035

### Leak test

1. Carry out the system evacuation and airtightness test as described before.
2. Prepare as follows according to charging method.

### Charging from service container

Connect the refrigerant service container to the service container valve (which is connected to the manifold gauge set air purge valve) and open the service container.

### Charging from freon recovery and recycling system

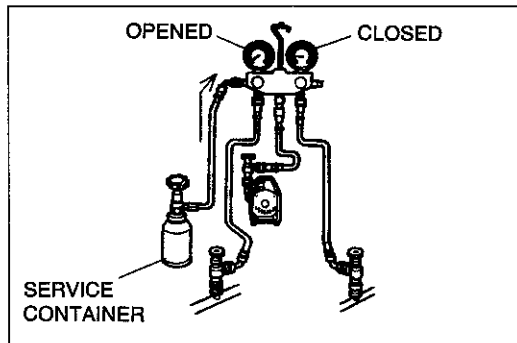
- Connect the charging valve of the system to the stop valve (which is connected to the manifold gauge set air purge valve).
3. Open the high-pressure side valve of the manifold gauge set. Charge the system until the low-pressure side gauge indicates 98.1 kPa (1 kg/cm<sup>2</sup>, 14.22 psi).
  4. Close the high-pressure side valve.
  5. Check for leaks at the system piping joints by using a gas leak tester.

6. If leaks are found, check the O-rings and tightening torques at the joints. Replace or retighten as necessary. (Refer to page U-41.)
7. If no leaks are found, fully charge the system.

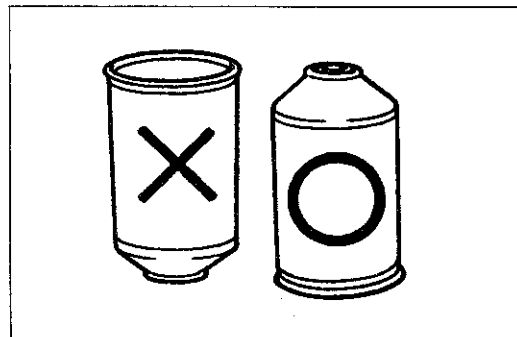
### Caution

**Carry out the leak test in a well-ventilated but still air area because it is affected by moving air.**

2BU0UX-036



2BU0UX-037



2BU0UX-038

### Initial charging from service container

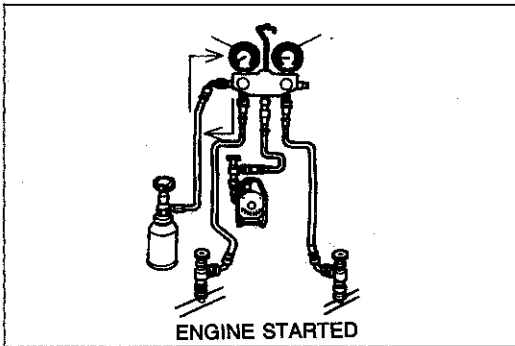
1. Carry out the system evacuation, airtightness test, and leak test.
2. Start the engine and actuate the A/C compressor.

### Caution

- a) Do not turn the service container upside down while charging when the engine is running.
- b) Do not open the high-pressure side valve while the engine is running.

3. Open the low-pressure side valve of the manifold gauge set and charge the system to specification.

**Specified total refrigerant amount: 800 g (28.24 oz)**

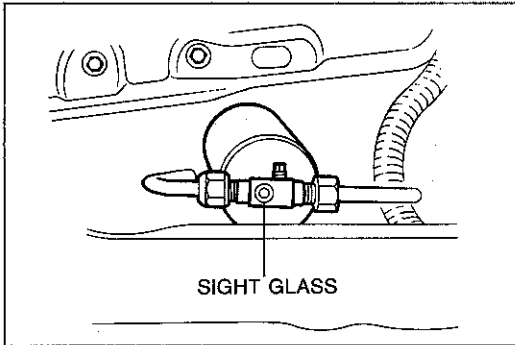


2BU0UX-039

4. Close the low-pressure side valve.
5. Stop the engine.
6. Close the stop valves and the service container valve.

**Caution**

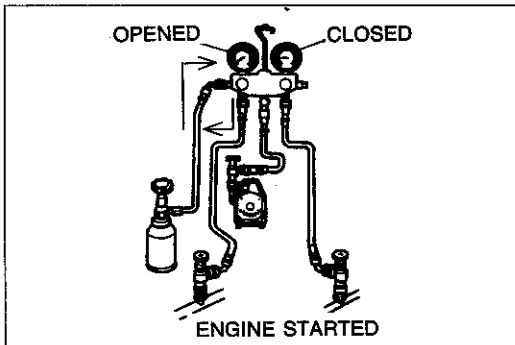
**Do not disconnect the stop valves or the service container valve from the charging hoses when there is refrigerant remaining in the hoses.**



2BU0UX-040

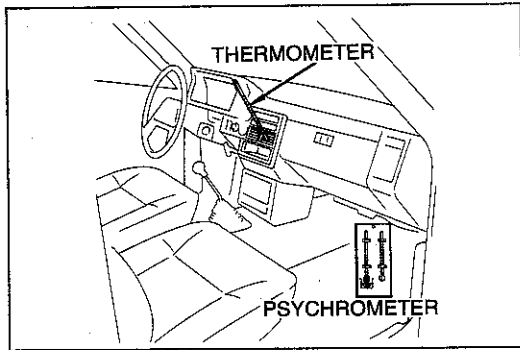
**Refilling****Caution**

- a) Do not overcharge the system.
- b) Note the sight glass during refilling the refrigerant. Stop charging when no bubbles are observed in the glass. (Refer to page U-30.)
- c) Care must be taken when the ambient temperature is low. The bubbles may not be present even if the refrigerant amount is insufficient.

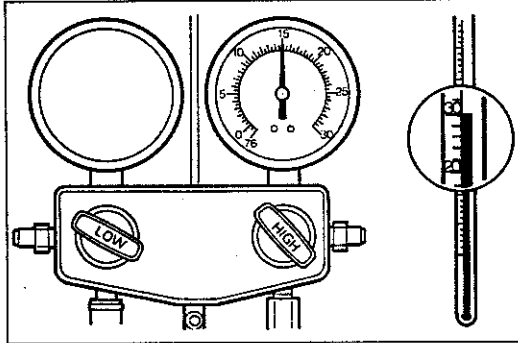


2BU0UX-041

1. Connect the manifold gauge set to the refrigerant system charging valve. (Refer to page U-25.)
2. Start the engine.
3. Open the low-pressure side valve of the manifold gauge set and charge the system as necessary.
4. Note the sight glass, and when no bubbles can be seen, close the low-pressure side valve.
5. Stop the engine.
6. Close the stop valves and service container valve. Disconnect the stop valves quickly.



9BU0UX-075



9BU0UX-076

## PERFORMANCE TEST

After finishing repairs, conduct a performance test of the air conditioning system as follows.

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Start the engine and keep the engine speed at **1,500 rpm**.
3. Operate the air conditioner at maximum cooling.
4. Open all windows and doors.
5. Place a dry-bulb thermometer in the center ventilator outlet.
6. Place a dry and wet thermometer close to the blower inlet.

7. Wait until the air conditioner outlet temperature stabilizes.

### Stabilized condition

**Blower inlet temperature: 25—35°C (77—95°F)**

**High pressure:**

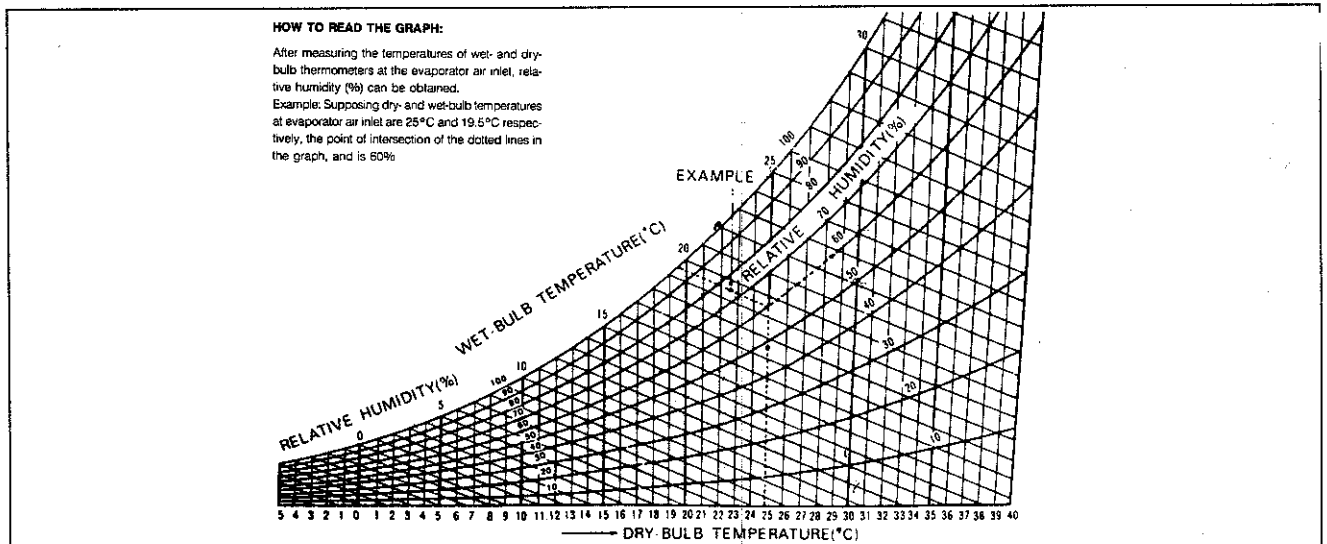
**1,373—1,521 kPa (14.0—15.5 kg/cm<sup>2</sup>, 199—220 psi)**

### Note

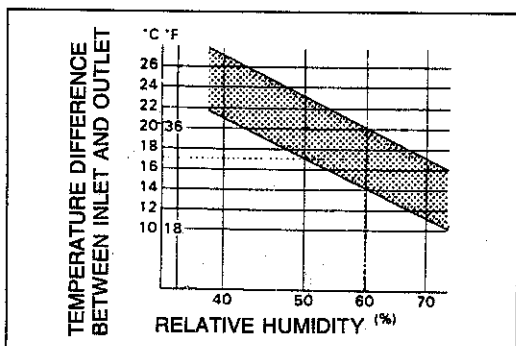
**If the high pressure becomes too high, pour cool water on the condenser. If the high pressure is too low, cover the front of the condenser.**

8. After the air conditioner stabilizes, read the dry and wet thermometer at the air inlet.
9. Calculate the relative humidity from the below chart by comparing the wet and dry bulb readings.

96U16X-102

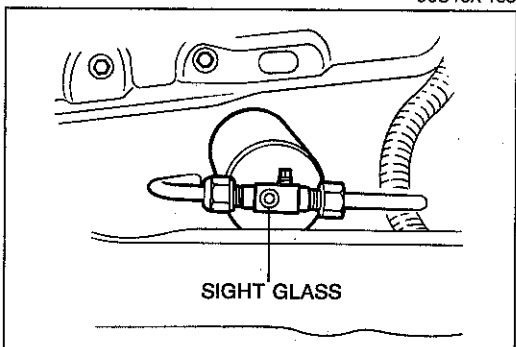


## REFRIGERANT SYSTEM



96U16X-103

10. Read the dry thermometer at the air outlet, and calculate the difference between the inlet dry bulb and outlet dry bulb temperatures.
11. Verify that the intersection of the relative humidity and temperature difference is in the shaded zone.



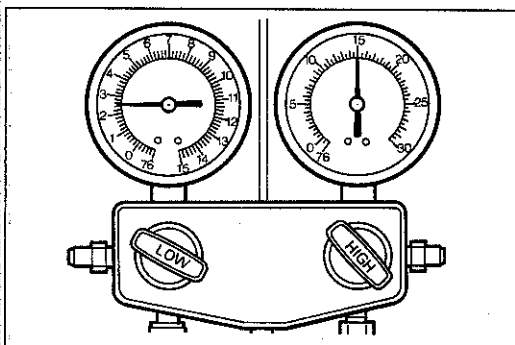
9BU0UX-077

### CHECKING REFRIGERANT CHARGE

1. Run the engine at a fast idle.
2. Operate the air conditioner at maximum cooling for a few minutes.
3. Determine the amount of refrigerant as shown below by observing the sight glass.

Item	Symptom	Amount of refrigerant	Action
1	Bubbles present in sight glass	Insufficient refrigerant	Check refrigerant pressure
2	No bubbles present in sight glass	Too much or proper amount of refrigerant	Turn air conditioner off, and watch bubbles (Refer to Items 3 and 4)
3	Immediately after air conditioner turned off, refrigerant in sight glass stays clear	Too much refrigerant	Check refrigerant pressure
4	When air conditioner turned OFF, refrigerant foams and then sight glass becomes clear	Proper amount of refrigerant	Refrigerant amount normal

9MU0UX-140



9BU0UX-078

### CHECKING REFRIGERANT PRESSURE

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Operate the engine at 1,500 rpm and set the air conditioner to maximum cooling.
3. Measure the low and high pressures.

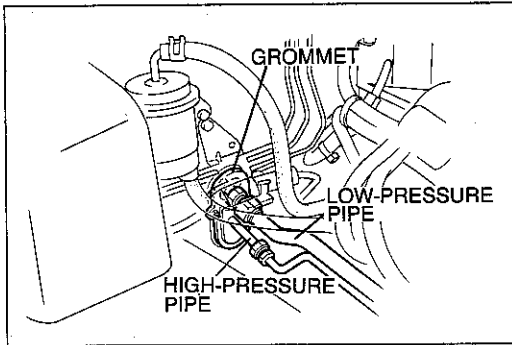
#### Specified pressure at 25°C (77°F)

##### Low pressure:

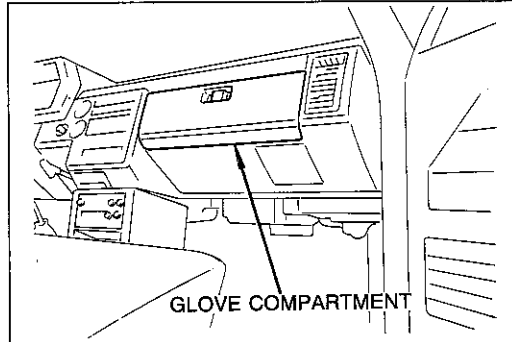
98—167 kPa (1.0—1.7 kg/cm<sup>2</sup>, 14—24 psi)

##### High pressure:

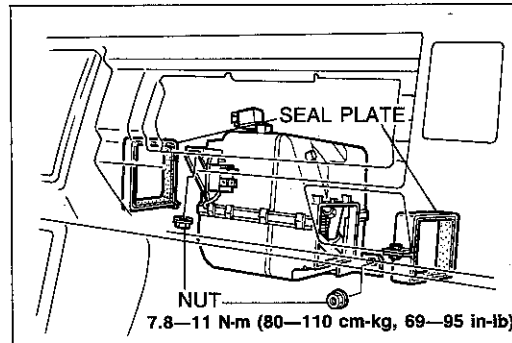
1,030—1,275 kPa (10.5—13.0 kg/cm<sup>2</sup>, 149—185 psi)



9BU0UX-079



9BU0UX-080



9BU0UX-081

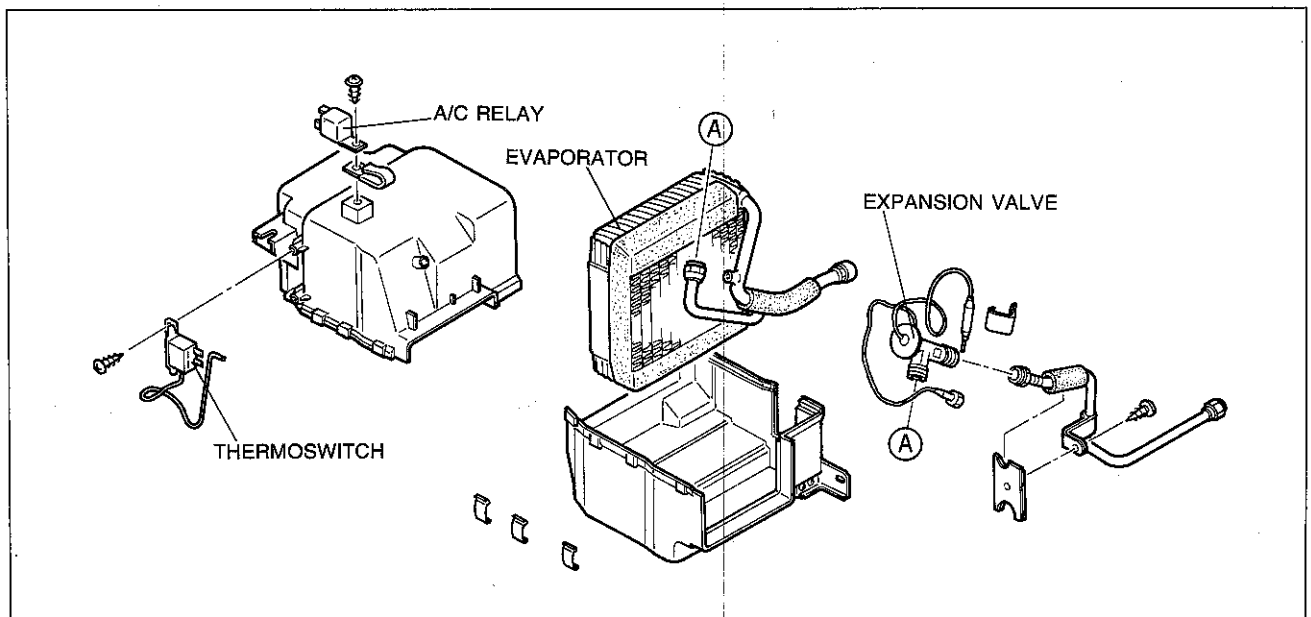
## COOLING UNIT

### Removal

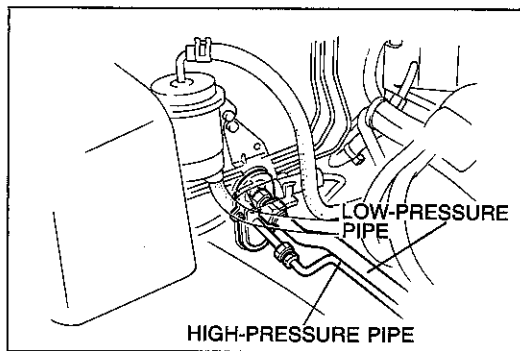
1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the refrigerant system. (Refer to page U-25.)
3. Disconnect the low-pressure pipe from the cooling unit outlet fitting.
4. Disconnect the high-pressure pipe from the cooling unit inlet fitting.
5. Remove the grommet.
6. Remove the glove compartment. (Refer to page S-23.)
7. Disconnect the A/C wire harness.
8. Remove the seal plates.
9. Remove the nuts and disconnect the drain hose; then remove the cooling unit.

### Disassembly and Assembly

Disassemble and assemble as shown.



9BU0UX-082



9BU0UX-083

**Installation**

Install in the reverse order of the removal, noting the following.

**Note**

- a) Adjust and position the cooling unit so that its connections match those of the heater unit and the blower unit.
- b) If the evaporator is replaced, add compressor oil to the compressor.

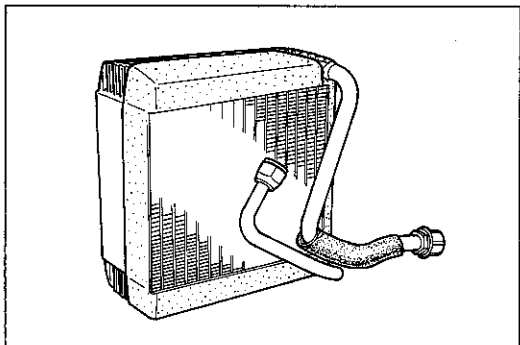
**Compressor oil: 50 cc (3.05 cu in)**

**Tightening torque****Low-pressure pipe:**

29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)

**High-pressure pipe:**

25—29 N·m (2.5—3.0 m·kg, 18—22 ft·lb)



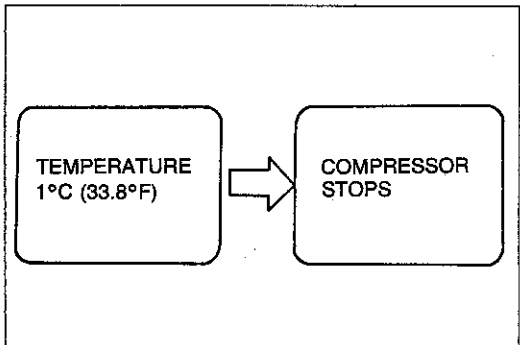
9BU0UX-084

**EVAPORATOR****Inspection**

1. Check the evaporator fins for blockage. If the fins are clogged, clean them by compressed air.
2. Check the fittings for cracks or other damage.
3. Replace the evaporator if necessary.

**Caution**

**Never use water to clean the evaporator.**



9BU0UX-085

**THERMOSWITCH****Inspection**

1. Remove the glove compartment. (Refer to page S-23.)
2. Run the engine at idle speed and set the air conditioning to maximum cooling.
3. Block the air inlet of the blower unit with a thick piece of paper to hasten evaporator cooling.
4. After a few minutes, check that the compressor stops.

**Note**

**The compressor stops when the temperature at the evaporator becomes 1°C (33.8°F).**

**Removal**

1. Remove the cooling unit. (Refer to page U-31.)
2. Disassemble the cooling unit and remove the thermoswitch. (Refer to page U-31.)

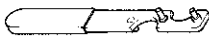
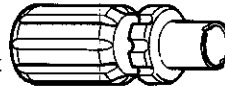


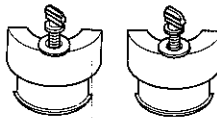

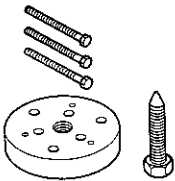
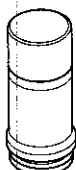
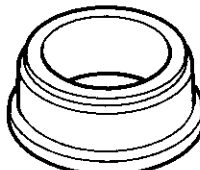


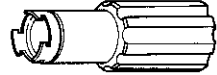

**Installation**

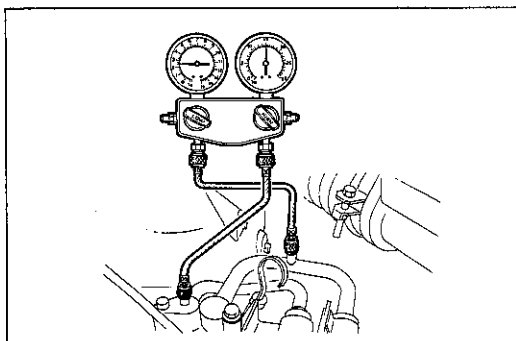
Install in the reverse order of removal.

2BU0UX-042



## PREPARATION SST

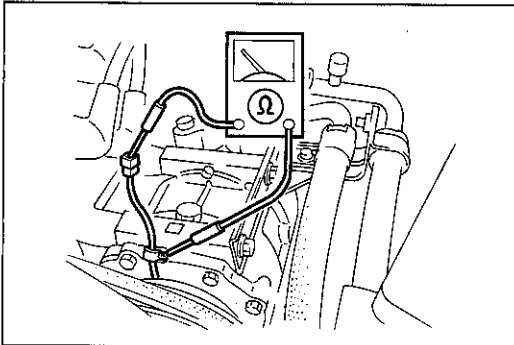
<p>0000-41-0809-01 Holder, clutch</p> 	<p>0000-41-0810-73 Remover &amp; installer, seal seat</p> 	<p>0000-41-0804-57 Universal Puller Body</p> 
<p>0000-41-0804-51 Universal Puller Arbor</p> 	<p>0000-41-0810-76 Removal set, pulley &amp; clutch</p> 	<p>0000-41-0810-77 Clutch Pilot</p> 
<p>0000-41-0809-02 Puller, clutch plate</p> 	<p>0000-41-0804-43 Installer, clutch rotor bearing</p> 	<p>0000-41-0810-59 Clutch Rotor Driver</p> 
<p>0000-41-0809-10 Shaft Protector Pilot</p> 	<p>0000-41-0804-12 Remover, O-ring</p> 	<p>0000-41-0812-11 Remover &amp; installer, seal</p> 
<p>0000-41-0812-13 Protector, seal sleeve</p> 	<p>1BU0UX-011</p>	



2BU0UX-043

## COMPRESSOR On-vehicle Inspection

1. Install the manifold gauge set. (Refer to page U-25.)
2. Run the engine at fast idle.
3. Check the compressor for the following:
  - (1) High and low pressure abnormal.  
Normal pressure: Refer to page U-30.
  - (2) Metallic sound from compressor.
  - (3) Leakage from shaft seal.
 Repair or replace the compressor if any of the above is noted.

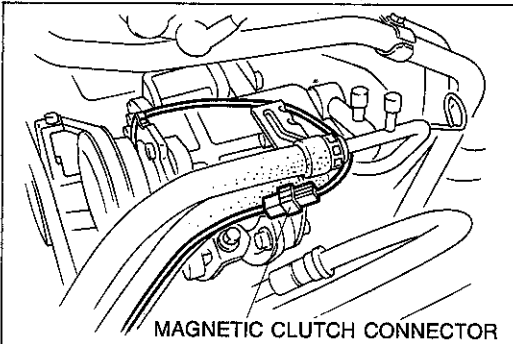


2BU0UX-044

4. Check the magnetic clutch for the following:
  - (1) Pressure plate and rotor for trace of oil.
  - (2) Clutch bearings for noise and grease leakage.
5. Check the resistance of the starter coil between the clutch connector and a ground with an ohmmeter.

**Resistance: 3.05—3.35Ω at 20°C (68°F)**

If any of the above is not satisfactory, replace the magnetic clutch.

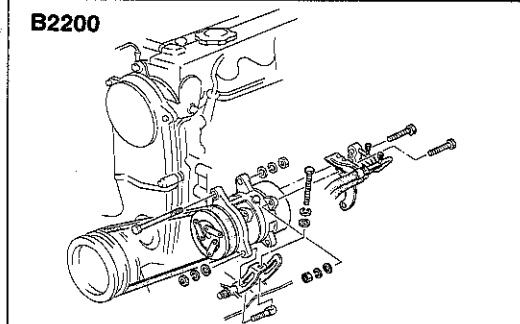


MAGNETIC CLUTCH CONNECTOR

9BU0UX-090

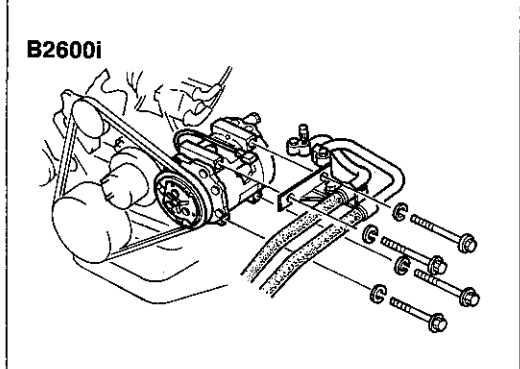
### Removal

1. Disconnect the negative battery cable.
2. Disconnect the magnetic clutch connector.



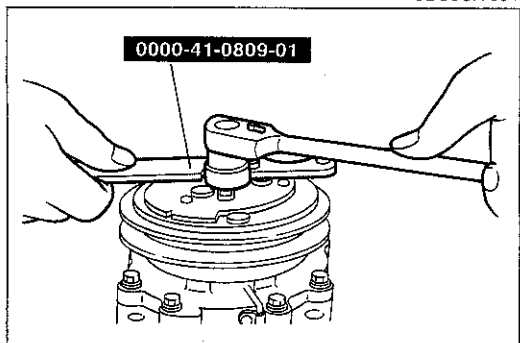
B2200

3. Discharge the refrigeration system. (Refer to page U-25.)
4. Disconnect the low- and high-pressure pipes from the compressor.
5. Remove the compressor mounting bolts.
6. Remove the compressor drive belt; then remove the compressor.



B2600i

9BU0UX-091



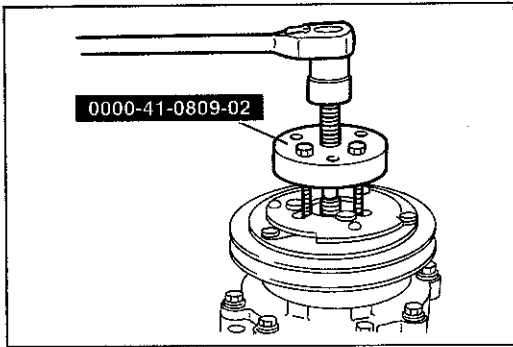
0000-41-0809-01

### Disassembly and Assembly

#### Magnetic Clutch removal

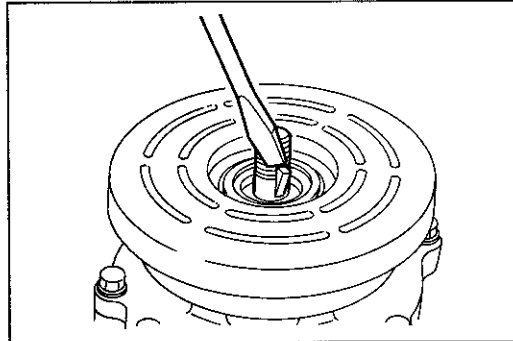
1. Insert the two pins of the **SST** into any two threaded holes of the clutch front plate. Hold the clutch plate stationary, and remove the nut.

9BU0UX-092



9BU0UX-093

2. Remove the clutch front plate with the **SST**. Align the puller center bolt to compressor shaft. Hand tighten the three puller bolts into the threaded holes. Turn the center bolt clockwise until the front plate is loosened.

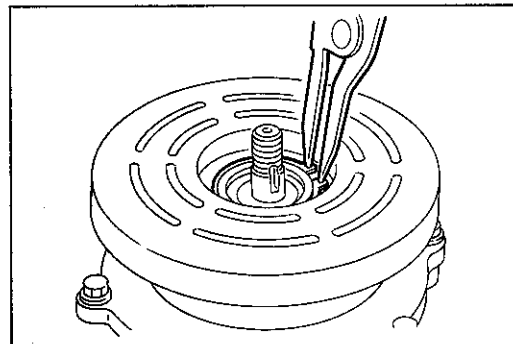


9BU0UX-094

3. Remove the shaft key by lightly tapping it loose with a screwdriver and hammer.

**Note**

**Steps 1 thru 3 must be performed before servicing either the shaft seal or clutch assembly.**

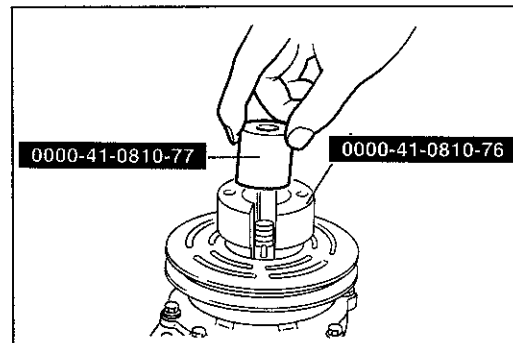


9BU0UX-095

4. Remove the external front housing snap ring with snap-ring pliers.

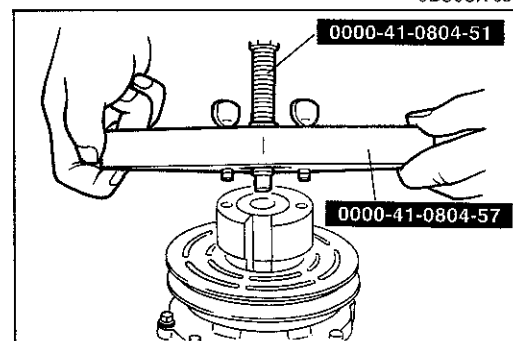
**Note**

**Some compressors may have two snap rings in front, one on front housing and the other securing the clutch bearing. Remove both snap rings.**



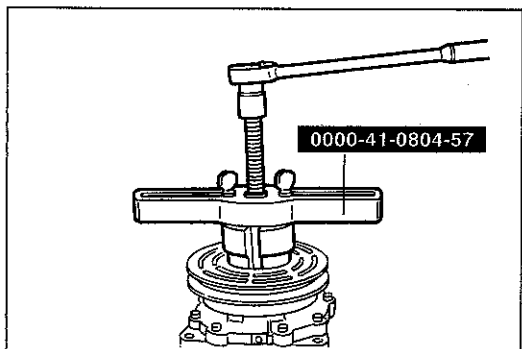
9BU0UX-096

5. Remove the rotor pulley assembly.
  - (1) Insert the lip of the **SST** puller jaws into the snap ring groove.
  - (2) Place the **SST** over the shaft.



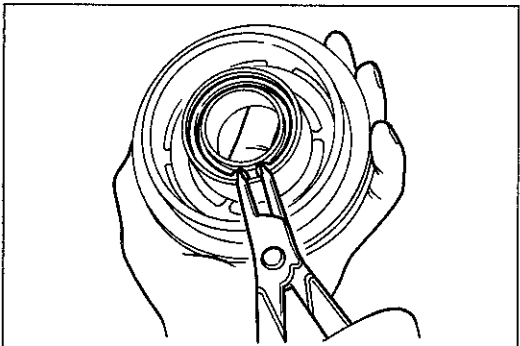
9BU0UX-097

- (3) Place the **SST** handle onto the puller jaws.
  - (4) Finger tighten the securing bolts into the puller jaws.



9BU0UX-098

- (5) Hold the **SST** handle stationary and turn the puller center bolt clockwise until the rotor pulley is free.



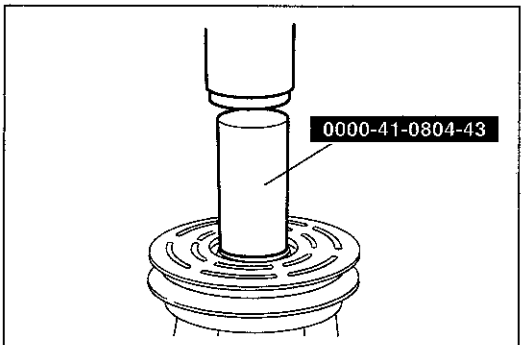
2BU0UX-045

### Clutch Bearing Removal

1. Remove the magnetic clutch. (Refer to page U-34.)
2. Remove the bearing retaining snap ring with snap-ring pliers.

#### Note

**Some rotors have the snap-ring in the front; this ring should have been removed in Step 4.**



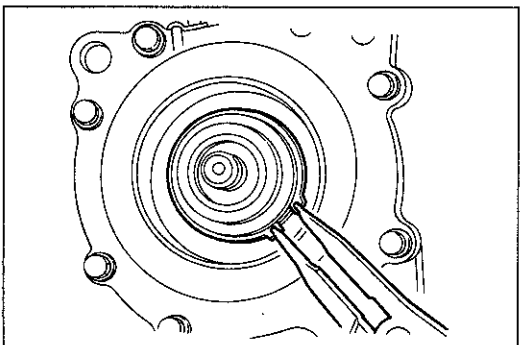
2BU0UX-046

3. Using the **SST**, press the bearing out from the rotor.

#### Note

**Press the bearing out toward the snap-ring side.**

4. Install the new bearing in the reverse order of removal.



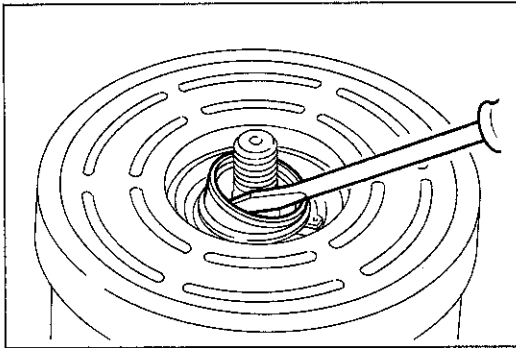
2BU0UX-047

### Field Coil Removal

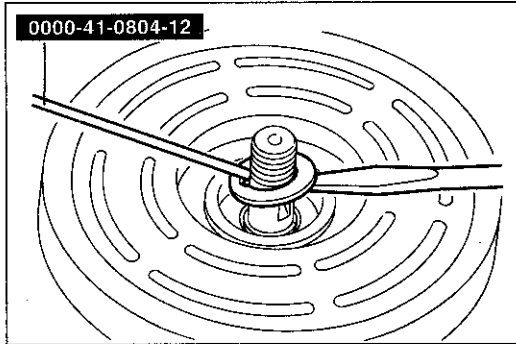
1. Remove the magnetic clutch. (Refer to page U-34.)
2. Remove the field coil.
  - (1) Remove the coil lead wire from the clip atop the compressor front housing.
  - (2) Remove the snap ring and field coil using snap-ring pliers.
3. Install the new field coil in the reverse order of removal.

#### Note

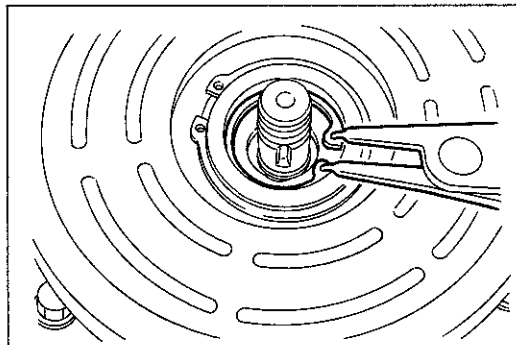
**The coil flange protrusion must match the hole in the front housing to prevent coil movement and to correctly locate the lead wire.**



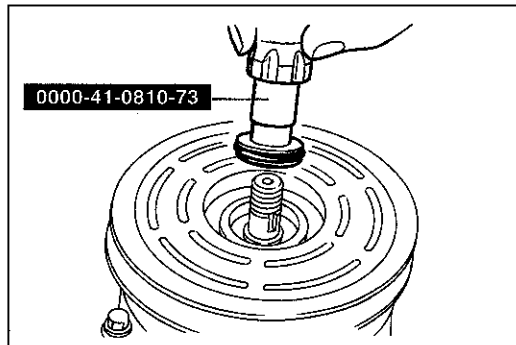
2BU0UX-048



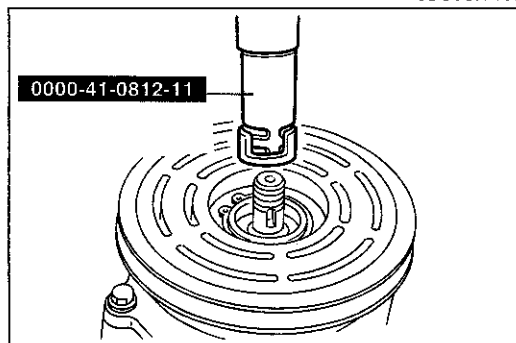
9BU0UX-103



9BU0UX-104



9BU0UX-105



9BU0UX-106

**Shaft seal**

1. Follow Steps 1 thru 3 of the magnetic clutch disassembly. (Refer to pages U-34 and U-35.)

**Note**

**Shaft seal replacement should be done on the bench. Never use any old parts of the shaft seal assembly. Replace the complete seal assembly.**

2. Pry out the felt ring with a screwdriver, being careful not to damage the shaft housing.

3. Remove the clutch shims. Use the **SST** and a small screwdriver as shown to prevent the shim from binding on shaft.

4. Remove the shaft seal seat retaining snap ring with snap-ring pliers.

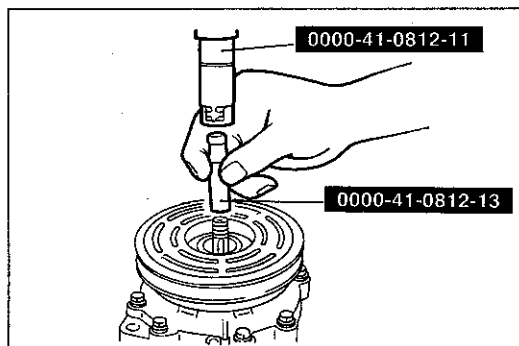
5. Remove the shaft seal seat with the **SST**.

6. Insert the **SST** against the seal assembly. Press down against the seal spring and twist the tool until feeling it engage in the slots of the seal cage. Lift out the seal assembly.

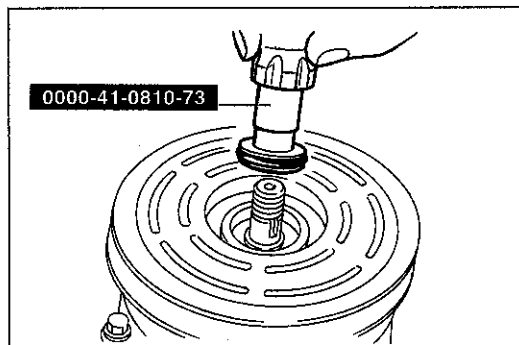
**Shaft Seal Replacement**

1. Clean the seal cavity thoroughly.
  - (1) Clean thoroughly with a "lint-free" or synthetic cloth and clean refrigerant oil. Then blow out with dry compressed air.
  - (2) Make sure all foreign substances are thoroughly removed.

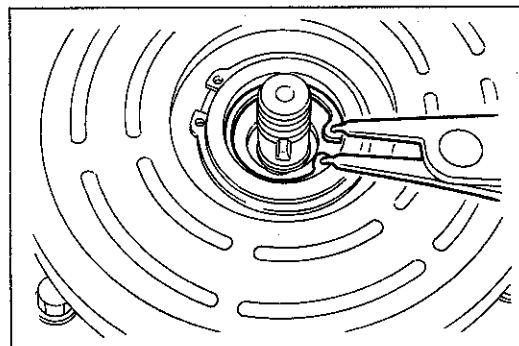
2BU0UX-049



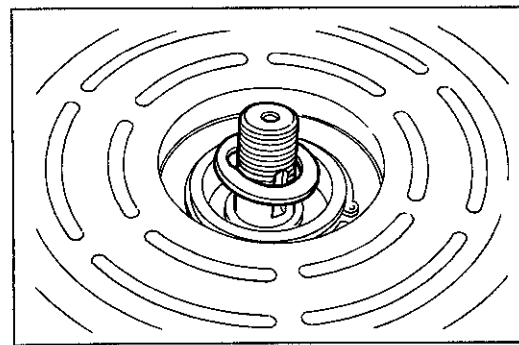
9BU0UX-108



9BU0UX-109



9BU0UX-110



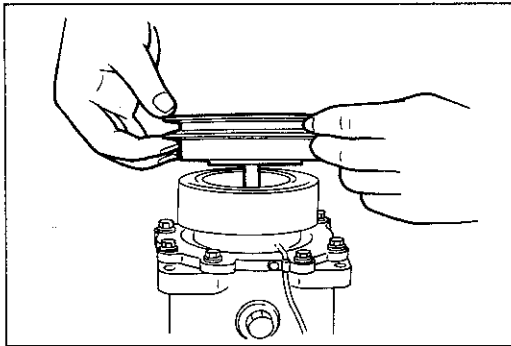
2BU0UX-050

2. Insert the **SST** over the compressor shaft.
3. Do not touch the new seal lip surfaces. Dip the mating surfaces in clean refrigerant oil before proceeding.
4. Engage the slots of the **SST** to the new seal cage; then insert the seal assembly firmly into place in the compressor seal cavity. Twist the tool in the opposite direction to disengage it from the seal cage. Remove the **SST**.

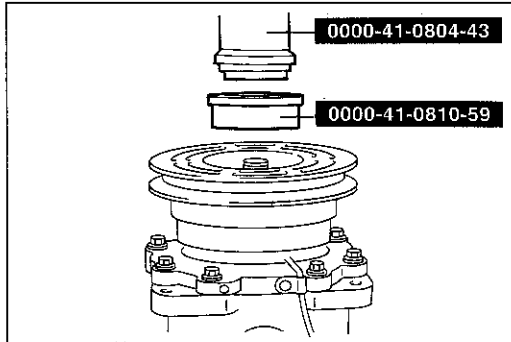
5. Place the new seal seat onto the **SST**. Coat the seat and O-ring with clean refrigerant oil and install them into the cavity. Press the seat lightly against the seal; then remove the **SST**.

6. Install the snap ring with the beveled edge facing outward (away) from the compressor. It may be necessary to lightly tap the snap ring to securely position it in its groove.

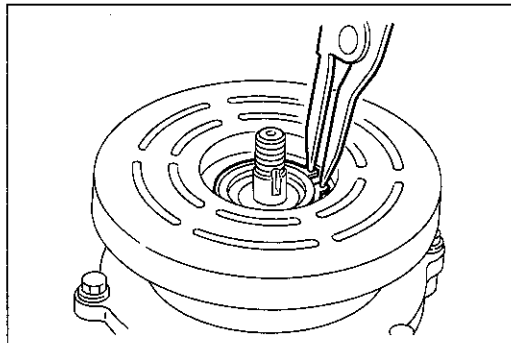
7. Install the clutch spacer shims that were removed.
8. Tap a new felt ring into place.
9. Install the clutch front plate as outlined in the magnetic clutch assembly. (Refer to page U-39.)



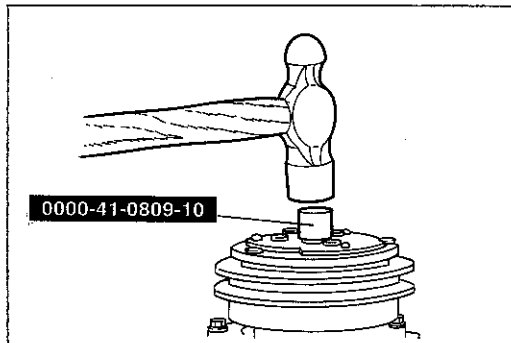
1BU0UX-017



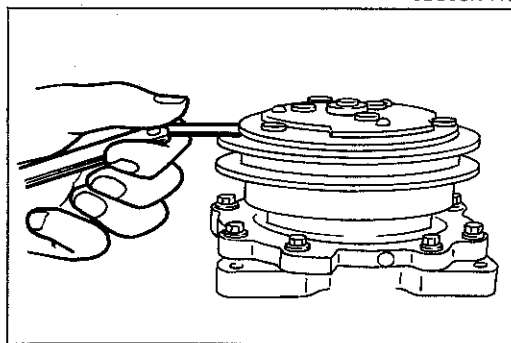
9BU0UX-113



9BU0UX-114



9BU0UX-115



9BU0UX-116

### Assembly Magnetic clutch

1. Install the rotor pulley.
  - (1) Support the compressor on the mounting ears at the rear of the compressor. If using a vise, clamp only on the mounting ears—NEVER ON THE COMPRESSOR BODY.
  - (2) Align the rotor assembly squarely on the front housing hub.
  - (3) Place the **SST** collar into the bearing cavity. Make certain the outer edge rests firmly on the rotor bearing outer race. Place the other **SST** into the first **SST** as shown.
  - (4) Tap the end of the **SST** with a hammer while holding the rotor to prevent binding. Tap until the rotor bottoms against the compressor front housing hub. Listen for a distinct change of sound during the tapping process.
2. Install the internal bearing snap ring (if used) with snap-ring pliers.
3. Install the external front housing snap ring with snap-ring pliers.
4. Install the front plate assembly.
  - (1) Check that the original clutch shims are in place on the compressor shaft.
  - (2) Install the compressor shaft key.
  - (3) Align the front plate keyway to the compressor shaft key.
  - (4) Tap the front plate onto the shaft with the **SST** until it has bottomed against the clutch shims. Note a distinct sound change.
5. Install the shaft hex nut.

#### Tightening torque:

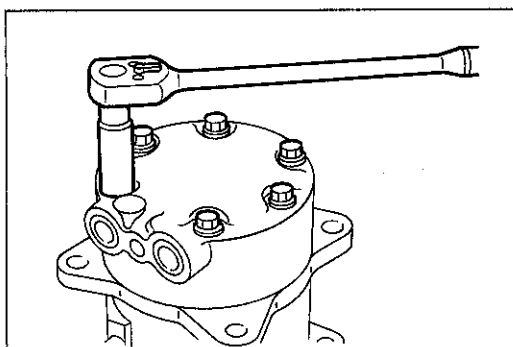
**34—44 N·m (3.5—4.5 m·kg, 25—33 ft·lb)**

6. Measure the air gap with a feeler gauge. If the air gap is not consistent around the circumference, lightly pry up at the minimum variations. Lightly tap down at points of maximum variation.

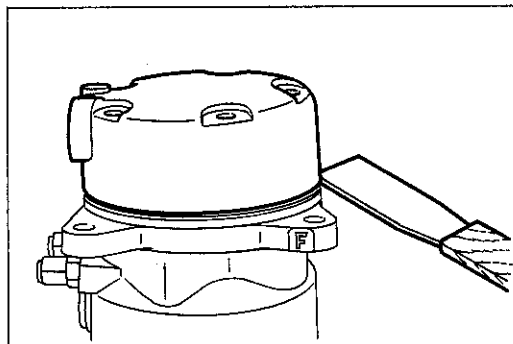
**Air gap: 0.4—0.8mm (0.016—0.031 in)**

#### Note

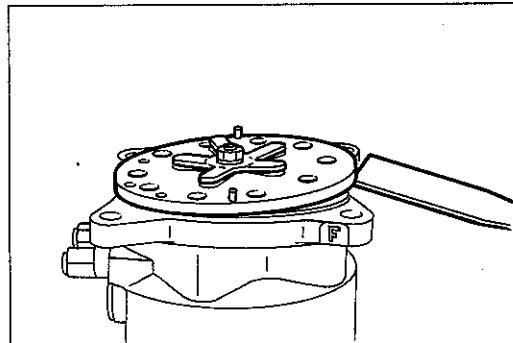
The air gap is determined by the spacer shims. When installing a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that previously did not have a clutch, use the .040, .020, and .005 shims from the clutch accessory kit. If the air gap does not meet the specification in Step 6, add or subtract shims by repeating Steps 4 and 5.



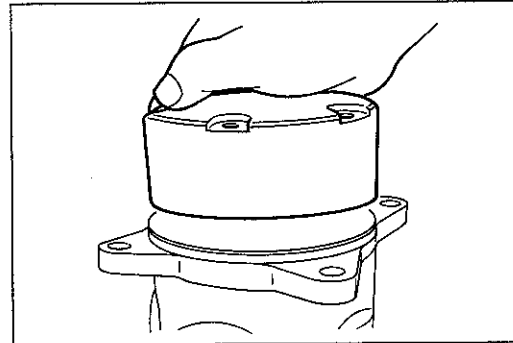
1BU0UX-018



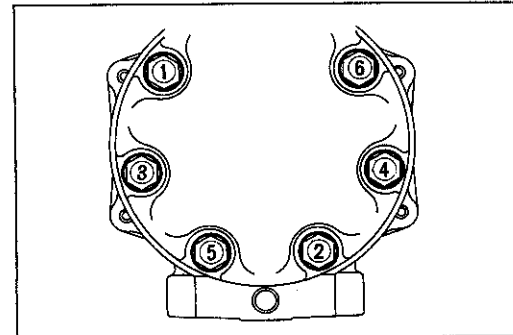
9BU0UX-118



9BU0UX-119



1BU0UX-019



9BU0UX-121

**Disassembly****Cylinder head and valve plate**

1. Remove the cylinder head bolts.
2. Use a small hammer and a gasket scraper to tap the outer edge of the cylinder head until it frees from the valve plate. Inspect the parts for damage.
3. Position the gasket scraper between the outside edge of the valve plate and the cylinder block and lightly tap the valve plate loose. Inspect the reed valves and discharge retainer. Discard assembly if any portion is damaged.

**Assembly****Installing cylinder head, valve plate & gaskets**

When installing the head or valve plate, use the new gaskets provided in the parts kit.

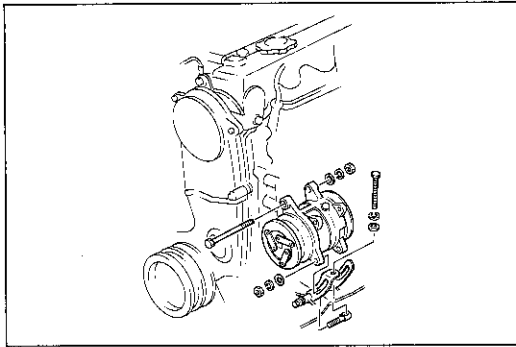
**Cylinder Head Only**

1. Inspect the valve plate for damage and remove all old gasket material.
  - (1) Coat the top of the valve plate with clean refrigerant oil. Position a new gasket over the valve plate locating pins. Align the gasket holes to the oil equalizer and orifice opening.
  - (2) The cylinder head fittings must be pointing upward or be in line with the oil filler plug.
  - (3) The valve plate locating pins must be securely in the locating holes in the cylinder head.
  - (4) Install the cylinder head bolts finger tight; then tighten in the sequence shown.

**Tightening torque:**

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)

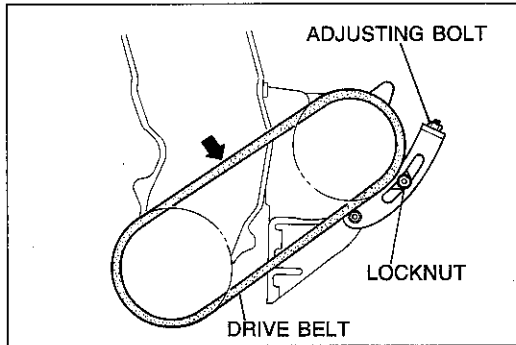




9BU0UX-122

## Installation (B2200)

1. Install the compressor and loosely tighten the bolts.



9BU0UX-123

2. Install the drive belt.

3. Adjust the drive belt deflection by applying moderate pressure **98 N (10 kg, 22 lb)** midway between the pulleys as shown.

### Drive belt deflection

**New belt : 10—12mm (0.39—0.47 in)**

**Used belt: 12—14mm (0.47—0.55 in)**

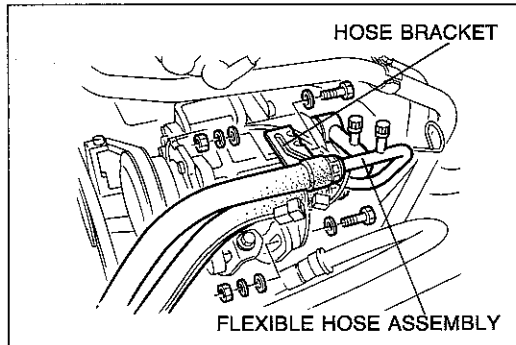
### Drive belt tension

**New belt : 441—540 N (45—55 kg, 99—121 lb)**

**Used belt: 343—441 N (35—45 kg, 77—99 lb)**

### Note

**Belt tension can be measured among any pulleys.**



9BU0UX-124

4. Tighten the compressor bracket nut.

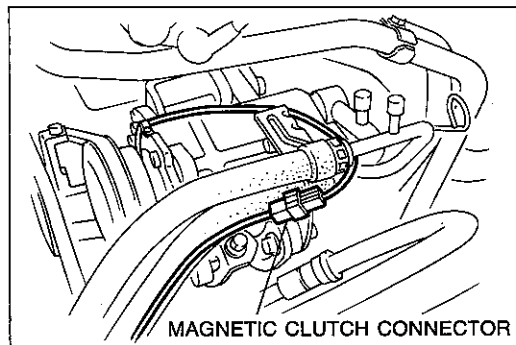
5. Tighten the bolts installed in Step 1.

### Tightening torque:

**39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)**

6. Install the hose bracket.

7. Connect the flexible hose assembly to the compressor.



2BU0UX-051

### Tightening torque:

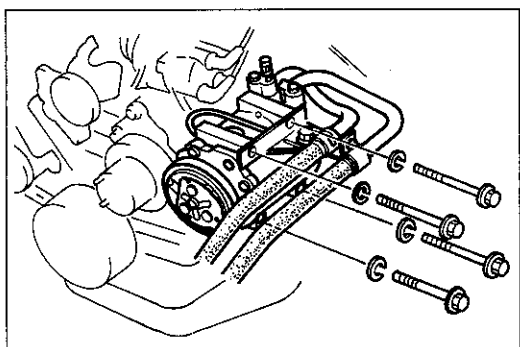
**39—44 N·m (4.0—4.5 m·kg, 29—33 ft·lb)**

8. Connect the magnetic clutch connector.

9. Connect the negative battery cable.

10. Evacuate, charge, and test the system.

(Refer to page U-25.)



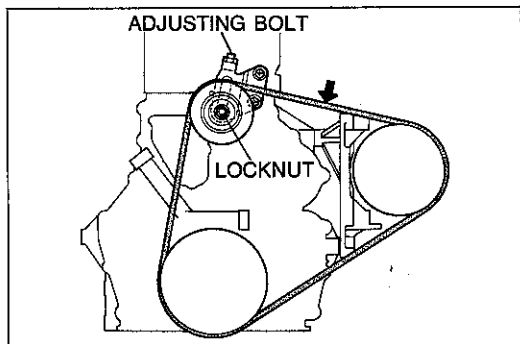
9BU0UX-126

**Installation (B2600i)**

1. Install the compressor and tighten the bolts.

**Tightening torque:**

**20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)**



9BU0UX-127

2. Install the drive belt.
3. Adjust the drive belt deflection by applying moderate pressure **98 N (10 kg, 22 lb)** midway between the pulleys as shown.

**Drive belt deflection**

**New belt : 8.5—10mm (0.33—0.39 in)**

**Used belt: 10—11.5mm (0.39—0.45 in)**

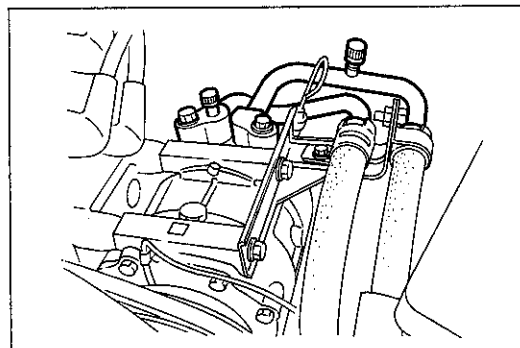
**Drive belt tension**

**New belt : 559—638 N (57—65 kg, 125.4—143.0 lb)**

**Used belt: 471—549 N (48—56 kg, 105.6—123.2 lb)**

**Note**

**Belt tension can be measured among any pulleys.**



9BU0UX-128

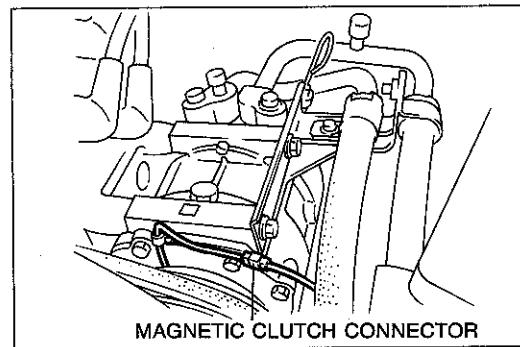
4. Connect the low- and high-pressure pipes to the compressor.

**Tightening torque****Low-pressure pipe:**

**29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)**

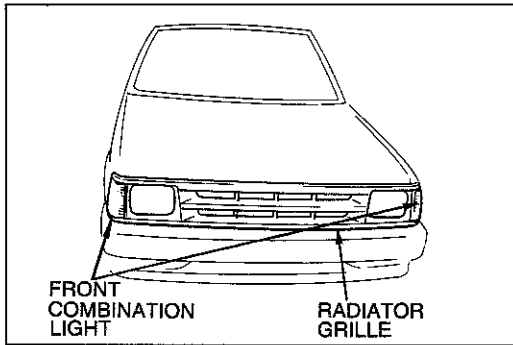
**High-pressure pipe:**

**20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)**

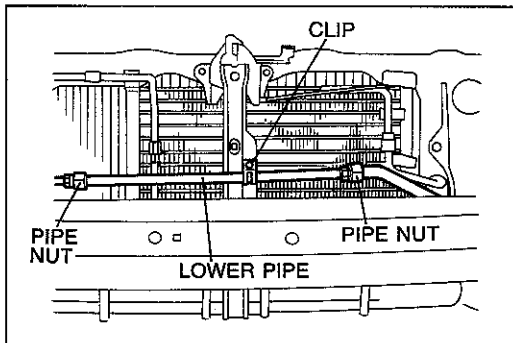


2BU0UX-054

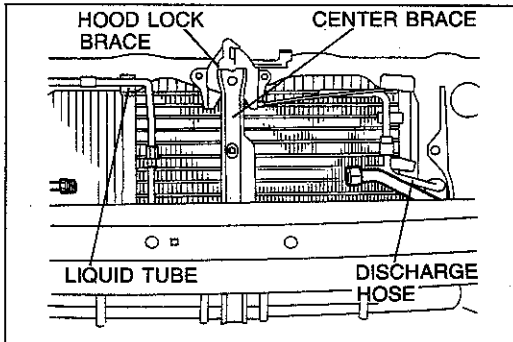
5. Connect the magnetic clutch connector.
6. Connect the negative battery cable.
7. Evacuate, charge, and test the system.  
(Refer to page U-25.)



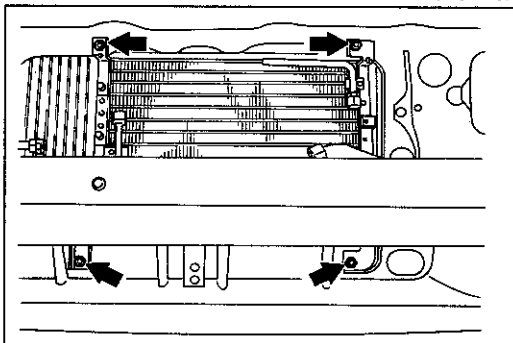
9BU0UX-130



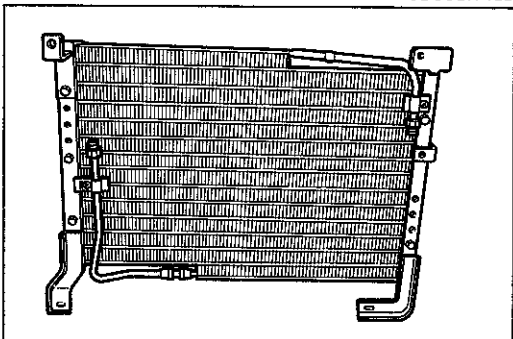
9BU0UX-131



9BU0UX-132



9BU0UX-133



9BU0UX-134

## CONDENSER

### Removal

1. Discharge the refrigeration system. (Refer to page U-25.)
2. Remove the radiator grille and the front combination lights. (Refer to pages S-5 and S-7.)

3. Remove the clip and disconnect the pipe nuts.
4. Remove the lower pipe.

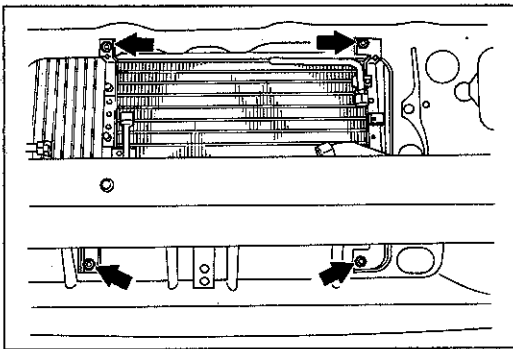
5. Remove the center brace and the hood lock brace.
6. Disconnect the discharge hose and the liquid tube.

7. Remove the nuts and remove the condenser.

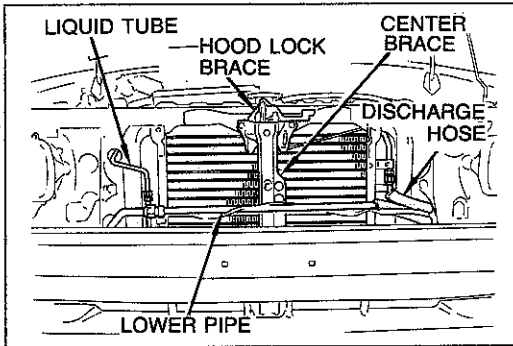
### Inspection

Check for the following and repair or replace parts as necessary.

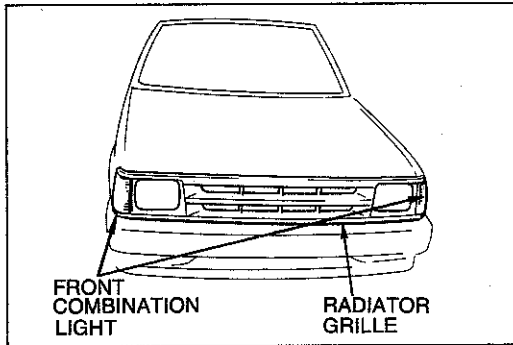
1. Cracks, damage, or refrigerant leakage.
2. Bent fins.
3. Distorted or damaged condenser inlet or outlet.



9BU0UX-135



9BU0UX-136



2BU0UX-052

### Installation

1. Install and mount the condenser.

2. Connect the lower pipe, discharge hose, and liquid tube.

### Tightening torque

**Suction tube:**

29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)

**Discharge hose:**

20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

**Liquid tube:**

12—15 N·m (1.2—1.5 m·kg, 8.7—11 ft·lb)

3. Install the clip, hood lock brace, and center brace.

### Installation note

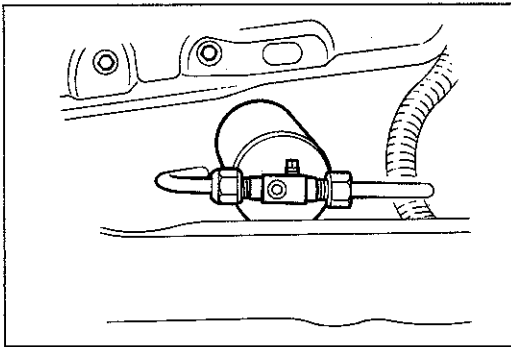
Add compressor oil to the compressor if the condenser was replaced.

**Add: 25—30 cc (1.5—1.8 cu in)**

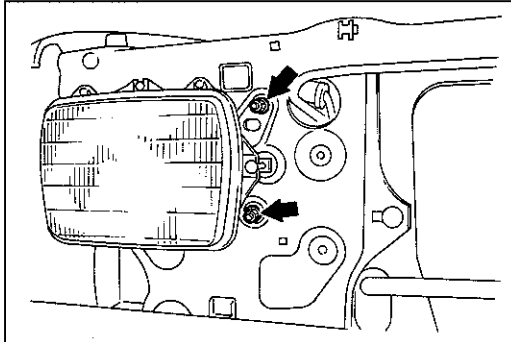
4. Install the radiator grille and the front combination lights.

5. Evacuate, charge, and test the system.

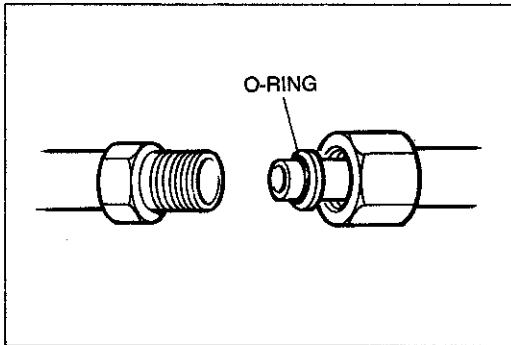
(Refer to page U-25.)



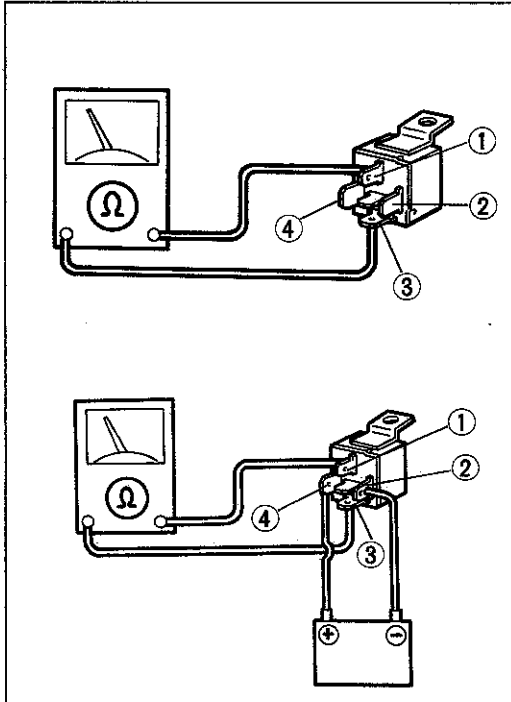
9BU0UX-138



9MU0UX-196



9BU0UX-140



9BU0UX-141

## RECEIVER/DRIER

### On-vehicle Inspection

Check for leakage at the pipe fittings with a gas leak tester. If leakage is found, check and replace the receiver/drier or piping.

### Removal

1. Discharge the refrigeration system. (Refer to page U-25.)
2. Remove the radiator grille. (Refer to page S-5.)
3. Remove the receiver/drier mounting nuts.
4. Disconnect the liquid hose and liquid pipe.

### Note

**Immediately plug the open fittings to keep moisture out of the system.**

5. Remove the receiver/drier.

### Installation

Install in the reverse order of removal, referring to the installation note.

### Installation note

- a) Apply new compressor oil to the O-rings before connecting the fittings.
- b) Do not apply compressor oil to the fittings.
- c) If the receiver/drier is replaced, add compressor oil.

**Compressor oil: 15—20 cc (0.9—1.2 cu in)**

### Tightening torque

**Liquid pipe and hose:**

**12—15 N·m (1.2—1.5 m·kg, 98—120 in·lb)**

## A/C RELAY

### Inspection

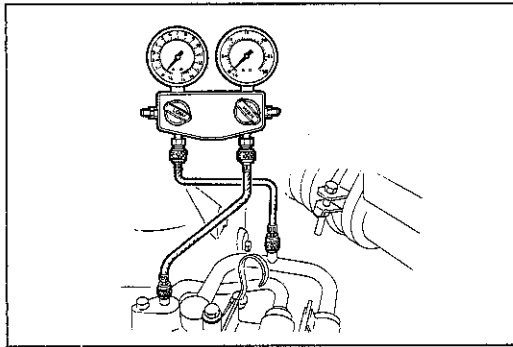
1. Disconnect the A/C relay from the cooling unit.
2. Check for continuity between terminals 1 and 3 of the relay with an ohmmeter.

Continuity	Action
No	Go to Step 3
Yes	Replace relay

3. Apply 12V to terminal 4 and ground terminal 2. Check for continuity between terminals 3 and 4 with an ohmmeter.

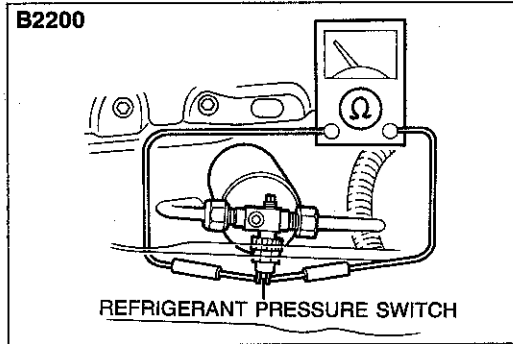
Continuity	Action
Yes	Relay OK
No	Replace relay

## REFRIGERANT SYSTEM



9BU0UX-142

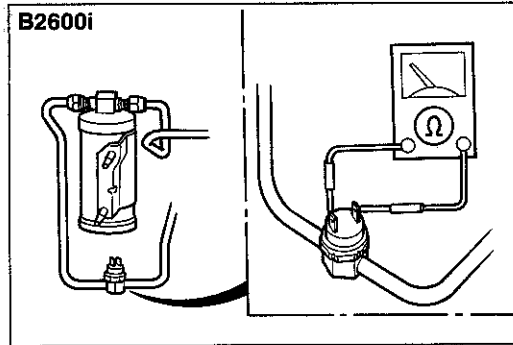
### B2200



REFRIGERANT PRESSURE SWITCH

9BU0UX-144

### B2600i



9BU0UX-145

### REFRIGERANT PRESSURE SWITCH

#### Inspection

1. Install the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

#### (B2200)

Pressure	Action
More than 2.8 kg/cm <sup>2</sup>	Go to Step 3
Less than 2.8 kg/cm <sup>2</sup>	Charge with refrigerant; then go to Step 3

#### (B2600i)

Pressure	Action
More than 18 kg/cm <sup>2</sup>	Discharge refrigerant system; then go to Step 3
More than 2.1 kg/cm <sup>2</sup> and less than 18 kg/cm <sup>2</sup>	Go to Step 3
Less than 2.1 kg/cm <sup>2</sup>	Charge with refrigerant; then go to Step 3

3. Check for continuity between the terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Refrigerant pressure switch OK
No	Replace refrigerant pressure switch

# TECHNICAL DATA

MEASUREMENTS.....	TD- 2
ENGINE (B2200).....	TD- 2
ENGINE (B2600i).....	TD- 5
LUBRICATION SYSTEM.....	TD- 8
COOLING SYSTEM.....	TD- 9
FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR).....	TD-10
FUEL AND EMISSION CONTROL SYSTEMS (EGI).....	TD-12
ENGINE ELECTRICAL SYSTEM .....	TD-13
CLUTCH.....	TD-14
MANUAL TRANSMISSION (B2200).....	TD-14
MANUAL TRANSMISSION (B2600i).....	TD-15
MANUAL TRANSMISSION (TRANSFER CASE).....	TD-15
AUTOMATIC TRANSMISSION (HYDRAULICALLY-CONTROLLED).....	TD-16
AUTOMATIC TRANSMISSION (ELECTRONICALLY-CONTROLLED) .....	TD-19
PROPELLER SHAFT.....	TD-22
FRONT AND REAR AXLES.....	TD-22
STEERING SYSTEM .....	TD-24
BRAKING SYSTEM.....	TD-25
WHEELS AND TIRES.....	TD-26
SUSPENSION .....	TD-26
BODY ELECTRICAL SYSTEM.....	TD-27
HEATER AND AIR CONDITIONING SYSTEM.....	TD-27
STANDARD BOLT AND NUT TIGHTENING TORQUE .....	TD-28

OBUTDX-001

### A. MEASUREMENTS

Item		Short bed	Long bed	Cab plus
Overall length	mm (in)	4,510 (177.6)	4,920 (193.7)	
		4,640 (182.7)*	5,050 (198.8)*	
Overall width	mm (in)	4x2	1,670 (65.7)	
		4x4	1,705 (67.1)	
Overall height	mm (in)	4x2	1,565 (61.6)	
		4x4	1,690 (66.5)	
Wheelbase	mm (in)	4x2	2,760 (108.7)	2,985 (117.5)
		4x4	2,775 (109.3)	3,000 (118.1)
Tread	mm (in)	4x2	Front: 1,400 (55.1), Rear: 1,410 (55.5)	
		4x4	Front: 1,440 (56.7), Rear: 1,430 (56.3)	

\* with rear step bumper

### B1. ENGINE (B2200)

Item		Engine	F2
Type			Gasoline, 4-cycle
Cylinder arrangement and number			In-line, 4-cylinders
Type of combustion chamber			Multispherical
Valve system			OHC, belt-driven
Bore x stroke		mm (in)	86.0 x 94.0 (3.39 x 3.70)
Total piston displacement		cc (cu in)	2,184 (133.2)
Compression ratio			8.6
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm	Standard		1,197 (12.2, 173)-300
	Minimum		838 (8.5, 121)-300
	Maximum difference between cylinders		196 (2.0, 28)
Valve timing	IN	Open BTDC	13°
		Close ABDC	57°
	EX	Open BBDC	58°
		Close ATDC	12°
Valve clearance	mm (in)	IN	0; Maintenance-free
		EX	0; Maintenance-free
<b>Cylinder head</b>			
Height		mm (in)	91.95—92.05 (3.620—3.624)
Distortion		mm (in)	0.15 (0.006) max.
Grinding		mm (in)	0.20 (0.008) max.
<b>Valve and valve guide</b>			
Valve head diameter	mm (in)	IN	43.9—44.1 (1.728—1.736)
		EX	35.9—36.1 (1.413—1.421)
Valve head margin thickness	mm (in)	IN	0.8—1.2 (0.031—0.047)
		EX	1.3—1.7 (0.051—0.067)
Valve face angle		IN	45°
		EX	45°
Valve length	IN	Standard	111.89 (4.4051)
		Minimum	111.49 (4.3894)
	EX	Standard	111.69 (4.3972)
		Minimum	111.29 (4.3815)
Valve stem diameter	mm (in)	IN	8.030—8.045 (0.3161—0.3167)
		EX	8.025—8.040 (0.3159—0.3165)
Guide inner diameter	mm (in)	IN	8.07—8.09 (0.3177—0.3185)
		EX	8.07—8.09 (0.3177—0.3185)
Valve stem-to-guide clearance	mm (in)	IN	0.025—0.060 (0.0010—0.0024)
		EX	0.030—0.065 (0.0012—0.0026)
		Maximum	0.20 (0.008)
Guide projection (Height "A")		mm (in)	19.1—19.6 (0.752—0.772)



Item		Engine	F2		
<b>Valve seat</b>					
Seat angle		IN	45°		
		EX	45°		
Seat contact width	mm (in)	IN	1.2—1.6 (0.047—0.063)		
		EX	1.2—1.6 (0.047—0.063)		
Seat sinking (measure valve protruding length)	mm (in)	IN	Standard	46.5 (1.831)	
			Maximum	48.0 (1.890)	
	EX	Standard	46.5 (1.831)		
		Maximum	48.0 (1.890)		
<b>Valve spring</b>					
Free length	mm (in)	IN	Outer	Standard	52.0 (2.047)
			Minimum	50.4 (1.984)	
		Inner	Standard	44.0 (1.732)	
			Minimum	42.7 (1.681)	
		EX	Outer	Standard	52.0 (2.047)
			Minimum	50.4 (1.984)	
Inner	Standard	44.0 (1.732)			
Minimum	42.7 (1.681)				
Out-of-square	mm (in)	IN	Outer	1.8 (0.07) max.	
			Inner	1.5 (0.06) max.	
		EX	Outer	1.8 (0.07) max.	
			Inner	1.5 (0.06) max.	
Setting load/height	N (kg, lb)/mm (in)	IN	Outer	421.8 (43.0, 94.6)/31.0 (1.22)	
			Inner	294.3 (30.0, 66.0)/26.5 (1.04)	
		EX	Outer	421.8 (43.0, 94.6)/31.0 (1.22)	
			Inner	294.3 (30.0, 66.0)/26.5 (1.04)	
<b>Camshaft</b>					
Camlobe height	mm (in)	IN	Standard	38.059 (1.4984)	
			Minimum	37.859 (1.4905)	
		EX	Standard	38.059 (1.4984)	
			Minimum	37.859 (1.4905)	
Journal diameter	mm (in)	Front and Rear (No.1,5)		31.940—31.965 (1.2575—1.2584)	
		Center (No.2,3,4)		31.910—31.935 (1.2563—1.2573)	
		Out-of-round max.		0.05 (0.0020)	
Camshaft bearing oil clearance	mm (in)	Front and Rear (No.1,5)		0.035—0.085 (0.0014—0.0033)	
		Center (No.2,3,4)		0.065—0.115 (0.0026—0.0045)	
		Maximum		0.15 (0.006)	
		Camshaft runout		mm (in)	0.03 (0.0012) max.
Camshaft end play	mm (in)	Standard	0.08—0.16 (0.0031—0.0063)		
		Maximum	0.20 (0.008)		
<b>Rocker arm and rocker arm shaft</b>					
Rocker arm inner diameter	mm (in)	16.000—16.027 (0.6300—0.6310)			
Rocker arm shaft diameter	mm (in)	15.966—15.984 (0.6286—0.6293)			
Rocker arm-to-shaft clearance	mm (in)	Standard	0.016—0.061 (0.0006—0.0024)		
		Maximum	0.10 (0.004)		
<b>Cylinder block</b>					
Height	mm (in)	301.5 (11.87)			
Distortion	mm (in)	0.15 (0.006) max.			
Grinding	mm (in)	0.20 (0.008) max.			
Cylinder bore diameter	mm (in)	Standard size		86.000—86.019 (3.3858—3.3866)	
		0.25 (0.010) oversize		86.250—86.269 (3.3957—3.3964)	
		0.50 (0.020) oversize		86.500—86.519 (3.4055—3.4063)	
Cylinder bore taper	mm (in)	0.019 (0.0007) max.			
Cylinder bore out-of-round	mm (in)	0.010 (0.0004) max.			

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Item		Engine	F2
<b>Piston</b>			
Piston diameter mm (in) (Measured at 90° to pin bore axis and 18.0mm (0.709 in) below oil ring groove)	Standard size		85.944—85.964 (3.3836—3.3844)
	0.25 (0.010) oversize		86.194—86.214 (3.3935—3.3942)
	0.50 (0.020) oversize		86.444—86.464 (3.4033—3.4041)
Piston-to-cylinder clearance mm (in)	Standard		0.043—0.062 (0.0017—0.0024)
	Maximum		0.15 (0.006)
<b>Piston ring</b>			
Thickness mm (in)			1.47—1.49 (0.058—0.059)
End gap measured in cylinder mm (in)	Top		0.20—0.35 (0.008—0.014)
	Second		0.15—0.30 (0.006—0.012)
	Oil (rail)		0.20—0.70 (0.008—0.028)
	Maximum		1.0 (0.039)
Ring groove width in piston mm (in)	Top		1.52—1.54 (0.0598—0.0606)
	Second		1.52—1.54 (0.0598—0.0606)
	Oil		4.02—4.04 (0.1583—0.1591)
Piston ring-to-ring land clearance mm (in)	Top		0.03—0.07 (0.0012—0.0028)
	Second		0.03—0.07 (0.0012—0.0028)
	Maximum		0.15 (0.006)
<b>Piston pin</b>			
Diameter mm (in)			21.974—21.980 (0.8651—0.8654)
Interference in connecting rod mm (in)			0.013—0.037 (0.0005—0.0015)
Piston-to-piston pin clearance mm (in)			0.008—0.024 (0.0003—0.0009)
Pressure force N (kg, lb)			4,905—14,715 (500—1,500, 1,100—3,300)
<b>Connecting rod</b>			
Length (Center to center) mm (in)			158.45—158.55 (6.2382—6.2421)
Bend mm (in)			0.24 (0.0094) max.
Small end bore mm (in)			21.943—21.961 (0.8640—0.8646)
Big end bore mm (in)			54.002—54.017 (2.1261—2.1266)
Big end width mm (in)			26.838—26.890 (1.0566—1.0587)
Connecting rod side clearance mm (in)	Standard		0.110—0.262 (0.0043—0.0103)
	Maximum		0.30 (0.012)
<b>Crankshaft</b>			
Crankshaft runout mm (in)			0.03 (0.0012) max.
Main journal diameter mm (in)	Standard		59.937—59.955 (2.3597—2.3604)
	0.25 (0.010) undersize	No.1,2,4,5	59.693—59.711 (2.3501—2.3508)
		No.3	59.687—59.705 (2.3499—2.3506)
	0.50 (0.020) undersize	No.1,2,4,5	59.443—59.461 (2.3403—2.3410)
		No.3	59.437—59.455 (2.3400—2.3407)
	0.75 (0.030) undersize	No.1,2,4,5	59.193—59.211 (2.3304—2.3311)
No.3		59.187—59.205 (2.3302—2.3309)	
Main journal taper mm (in)			0.05 (0.002) max.
Main journal out-of-round mm (in)			0.003 (0.00012)
Crankpin journal diameter mm (in)	Standard		50.940—50.955 (2.0055—2.0061)
	0.25 (0.010) undersize		50.690—50.705 (1.9957—1.9963)
	0.50 (0.020) undersize		50.440—50.455 (1.9858—1.9864)
	0.75 (0.030) undersize		50.190—50.205 (1.9760—1.9766)
Crankpin taper mm (in)			0.05 (0.0020) max.
Crankpin out-of-round mm (in)			0.003 (0.00012)
<b>Main bearing</b>			
Main journal bearing oil clearance mm (in)	Standard		0.025—0.043 (0.0010—0.0017)
	No.1,2,4,5		0.031—0.049 (0.0012—0.0019)
	No.3		0.031—0.049 (0.0012—0.0019)
Maximum		0.08 (0.0031)	
Available undersize bearing mm (in)			0.25 (0.010), 0.50 (0.020), 0.75 (0.030)
<b>Crankpin bearing</b>			
Crankpin bearing oil clearance mm (in)	Standard		0.027—0.067 (0.0011—0.0026)
	Maximum		0.10 (0.004)
Available undersize bearing mm (in)			0.25 (0.010), 0.50 (0.020), 0.75 (0.030)

Item		Engine	F2
<b>Thrust bearing</b>			
Crankshaft end play	mm (in)	Standard	0.08—0.18 (0.0031—0.0071)
		Maximum	0.30 (0.0118)
Bearing width	mm (in)	Standard	27.94—27.99 (1.100—1.102)
		0.25 (0.010) undersize	28.04—28.09 (1.104—1.106)
		0.50 (0.020) undersize	28.12—28.17 (1.107—1.109)
		0.75 (0.030) undersize	28.20—28.25 (1.110—1.112)
<b>Timing belt</b>			
Belt deflection	mm (in)/98 N (10 kg, 22 lb)	New	8.0—9.0 (0.31—0.35)
		Used	9.0—10.0 (0.35—0.39)

**B2. ENGINE (B2600i)**

Item		Engine	G6
Type		Gasoline, 4-cycle	
Cylinder arrangement and number		In-line, 4-cylinders	
Type of combustion chamber		Pentroof	
Valve system		OHC, chain-driven	
Bore x Stroke		mm (in)	92.0 x 98.0 (3.62 x 3.86)
Total piston displacement		cc (cu in)	2,606 (158.97)
Compression ratio		8.4	
Compression pressure kPa (kg/cm <sup>2</sup> , psi)-rpm	Standard		1,255 (12.8, 182)-270
	Minimum		981 (10.0, 142)-280
	Maximum difference between cylinders		196 (2.0, 28)
Valve timing	IN	Open BTDC	10°
		Close ABDC	50°
	EX	Open BBDC	55°
		Close ATDC	15°
Valve clearance	mm (in)	IN	0; Maintenance-free
		EX	0; Maintenance-free
<b>Cylinder head</b>			
Height		mm (in)	89.95—90.05 (3.541—3.545)
Distortion		mm (in)	0.15 (0.006) max.
Grinding		mm (in)	0.20 (0.008) max.
<b>Valve and valve guide</b>			
Valve head diameter	mm (in)	IN	33.2—33.4 (1.307—1.315)
		EX	35.9—36.1 (1.413—1.421)
Valve head margin thickness	mm (in)	IN	1.0 (0.039)
		EX	1.5 (0.059)
Valve face angle		IN	45°
		EX	45°
Valve length	IN	Standard	112.69 (4.4367)
		Minimum	112.29 (4.4209)
	EX	Standard	113.82 (4.4812)
		Minimum	113.42 (4.4654)
Valve stem diameter	mm (in)	IN	6.970—6.985 (0.2744—0.2750)
		EX	6.965—6.980 (0.2742—0.2748)
Guide inner diameter	mm (in)	IN	7.01—7.03 (0.2760—0.2768)
		EX	7.01—7.03 (0.2760—0.2768)
Valve stem-to-guide clearance	mm (in)	IN	0.025—0.060 (0.0010—0.0024)
		EX	0.030—0.065 (0.0012—0.0026)
		Maximum	0.20 (0.008)
Guide projection (Height "A")		mm (in)	23.5—24.2 (0.925—0.953)

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Item		Engine	G6	
<b>Valve seat</b>				
Seat angle		IN	45°	
		EX	45°	
Seat contact width		IN	1.2—1.6 (0.047—0.063)	
		EX	1.2—1.6 (0.047—0.063)	
Seat sinking (Measure valve protruding length) mm (in)		IN	Standard	49.0 (1.929)
			Maximum	49.5 (1.949)
		EX	Standard	49.0 (1.929)
			Maximum	49.5 (1.949)
<b>Valve spring</b>				
Free length		IN	Standard	50.05 (1.970)
			Minimum	49.85 (1.963)
		EX	Standard	50.05 (1.970)
			Minimum	49.85 (1.963)
Out-of-square		mm (in)	1.75 (0.069) max.	
Setting load/height		IN	195—222 (19.9—22.6, 43.8—49.7)/43 (1.693)	
		EX	195—222 (19.9—22.6, 43.8—49.7)/43 (1.693)	
<b>Camshaft</b>				
Camlobe height		IN	Standard	41.714 (1.6423)
			Minimum	41.514 (1.6344)
		EX	Standard	41.988 (1.6531)
			Minimum	41.788 (1.6452)
Journal diameter		Front and Rear (No.1,5)		29.940—29.965 (1.1788—1.1797)
		Center (No.2,3,4)		29.910—29.935 (1.1776—1.1786)
		Out-of-round	Maximum	0.05 (0.002)
Camshaft bearing oil clearance		Front and Rear (No.1,5)		0.035—0.085 (0.0014—0.0033)
		Center (No.2,3,4)		0.065—0.115 (0.0026—0.0045)
		Maximum		0.15 (0.006)
Camshaft runout		mm (in)	Maximum	0.03 (0.0012)
Camshaft end play		Standard	0.02—0.15 (0.0008—0.0059)	
		Maximum	0.20 (0.008)	
<b>Rocker arm and rocker arm shaft</b>				
Rocker arm inner diameter		mm (in)	21.000—21.033 (0.8268—0.8281)	
Rocker arm shaft diameter		mm (in)	20.959—20.980 (0.8252—0.8260)	
Rocker arm to shaft clearance		Standard	0.020—0.074 (0.0008—0.0029)	
		Maximum	0.10 (0.004)	
<b>Cylinder block</b>				
Height		mm (in)	316.5 (12.46)	
Distortion		mm (in)	0.15 (0.006) max.	
Grinding		mm (in)	0.20 (0.008) max.	
Cylinder bore diameter		Standard	92.000—92.022 (3.6220—3.6230)	
		0.25 (0.010) oversize	92.250—92.272 (3.6320—3.6330)	
		0.50 (0.020) oversize	92.500—92.522 (3.6420—3.6430)	
Cylinder bore taper and out-of-round		mm (in)	0.019 (0.0007) max.	
<b>Piston</b>				
Piston diameter measured at 90° to pin bore axis and 18.0mm (0.709 in) below oil ring groove		Standard	91.935—91.955 (3.6194—3.6202)	
		0.25 (0.010) oversize	92.185—92.205 (3.6293—3.6301)	
		0.50 (0.020) oversize	92.435—92.455 (3.6391—3.6400)	
Piston-to-cylinder clearance		Standard	0.058—0.074 (0.0023—0.0029)	
		Maximum	0.15 (0.006)	

Item		Engine	G6
<b>Piston ring</b>			
Thickness	mm (in)	Top	1.47—1.49 (0.058—0.059)
		Second	1.47—1.49 (0.058—0.059)
End gap measured in cylinder	mm (in)	Top	0.20—0.35 (0.008—0.014)
		Second	0.25—0.40 (0.010—0.016)
		Oil (rail)	0.20—0.70 (0.008—0.028)
		Maximum	1.0 (0.039)
Ring groove width in piston	mm (in)	Top	1.52—1.54 (0.0598—0.0606)
		Second	1.52—1.54 (0.0598—0.0606)
		Oil	4.02—4.04 (0.1583—0.1591)
Piston ring-to-ring land clearance	mm (in)	Top	0.03—0.07 (0.0012—0.0028)
		Second	0.03—0.07 (0.0012—0.0028)
		Maximum	0.15 (0.006)
<b>Piston pin</b>			
Diameter		mm (in)	22.974—22.980 (0.9045—0.9047)
Interference in connecting rod		mm (in)	0.013—0.037 (0.0005—0.0015)
Piston to piston pin clearance		mm (in)	0.008—0.026 (0.0003—0.0010)
Pressure force		N (kg, lb)	4,905—14,715 (500—1,500, 1,100—3,300)
<b>Connecting rod and connecting rod bearing</b>			
Length (Center to center)		mm (in)	166.45—166.55 (6.553—6.557)
Bend		mm (in)	0.249 (0.0098) max.
Small end bore		mm (in)	22.943—22.961 (0.9033—0.9040)
Big end bore		mm (in)	54.002—54.017 (2.1261—2.1266)
Big end width		mm (in)	25.638—25.690 (1.0094—1.0114)
Connecting rod side clearance	mm (in)	Standard	0.110—0.262 (0.0043—0.0103)
		Maximum	0.30 (0.012)
<b>Crankshaft</b>			
Crankshaft runout		mm (in)	0.03 (0.0012) max.
Main journal diameter	mm (in)	Standard size	59.937—59.955 (2.3597—2.3604)
		0.25 (0.010) undersize	59.687—59.705 (2.3499—2.3506)
		0.50 (0.020) undersize	59.437—59.455 (2.3400—2.3407)
		0.75 (0.030) undersize	59.187—59.205 (2.3302—2.3309)
Main journal taper and out-of-round		mm (in)	0.05 (0.0020) max.
Crankpin journal diameter	mm (in)	Standard	50.940—50.955 (2.0055—2.0061)
		0.25 (0.010) undersize	50.690—50.705 (1.9957—1.9963)
		0.50 (0.020) undersize	50.440—50.455 (1.9858—1.9864)
		0.75 (0.030) undersize	50.190—50.205 (1.9760—1.9766)
Crankpin taper and out-of-round		mm (in)	0.05 (0.0020) max.
<b>Main bearing</b>			
Main journal bearing oil clearance	mm (in)	Standard	0.025—0.044 (0.0010—0.0017)
		Maximum	0.08 (0.0031)
Available undersize bearing		mm (in)	0.25 (0.010), 0.50 (0.020), 0.75 (0.030)
<b>Crankpin bearing</b>			
Crankpin bearing oil clearance	mm (in)	Standard	0.027—0.067 (0.0011—0.0026)
		Maximum	0.10 (0.0039)
Available undersize bearing		mm (in)	0.25 (0.010), 0.50 (0.020), 0.75 (0.030)
<b>Thrust bearing (center main bearing)</b>			
Crankshaft end play	mm (in)	Standard	0.08—0.18 (0.0031—0.0071)
		Maximum	0.30 (0.0118)
Bearing width	mm (in)	Standard	25.94—25.99 (1.021—1.023)
		0.25 (0.010) oversize	26.04—26.09 (1.025—1.027)
		0.50 (0.020) oversize	26.12—26.17 (1.028—1.030)
		0.75 (0.030) oversize	26.20—26.25 (1.031—1.033)

Item		Engine	G6
<b>Balance shaft</b>			
Front journal diameter		mm (in)	41.945—41.960 (1.6514—1.6520)
Center journal diameter		mm (in)	39.945—39.960 (1.5727—1.5732)
Rear journal diameter		mm (in)	20.945—20.960 (0.8247—0.8251)
Oil clearance	Front	mm (in)	0.050—0.115 (0.0020—0.0045)
	Center	mm (in)	0.080—0.145 (0.0031—0.0057)
	Rear	mm (in)	0.080—0.145 (0.0031—0.0057)

**D. LUBRICATION SYSTEM**

Item		Engine	F2	G6
Lubrication method			Force-fed	
<b>Oil pump</b>				
Type			Trochoid gear	
Regulating pressure		kPa (kg/cm <sup>2</sup> , psi)	294—392 (3.0—4.0, 43—57)	392—491 (4.0—5.0, 57—71)
Oil pressure	kPa (kg/cm <sup>2</sup> , psi)	1,000 rpm	147—245 (1.5—2.5, 21—36)	108—206 (1.1—2.1, 16—30)
		3,000 rpm	294—392 (3.0—4.0, 43—57)	304—402 (3.1—4.1, 44—58)
Inner rotor tooth tip to outer rotor clearance	mm (in)	Standard	0.044—0.084 (0.0017—0.0033)	
		Maximum	0.18 (0.0071)	
Outer rotor to body clearance	mm (in)	Standard	0.090—0.176 (0.0035—0.0069)	0.122—0.178 (0.0048—0.0070)
		Maximum	0.20 (0.008)	
Side clearance	mm (in)	Standard	0.030—0.090 (0.0012—0.0035)	0.045—0.095 (0.0018—0.0037)
		Maximum	0.10 (0.004)	
<b>Oil filter</b>				
Type			Full-flow, paper element	
Relief pressure differential		kPa (kg/cm <sup>2</sup> , psi)	78—118 (0.8—1.2, 11—17)	
<b>Oil cooler</b>				
Type			—	Water cooled, 3 stage
<b>Oil pressure switch</b>				
Activation pressure		kPa (kg/cm <sup>2</sup> , psi)	2—25 (0.02—0.25, 0.28—3.60)	29 (0.3, 4.3)
<b>Engine oil</b>				
Capacity	liters (US qt, Imp qt)	Total (dry engine)	4.6 (4.9, 4.0)	5.5 (5.8, 4.8)
		Oil pan	3.9 (4.1, 3.4)	4.5 (4.8, 4.0)
		Oil filter	0.22 (0.23, 0.19)	
Grade			API Service SG Energy Conserving II (ECII)	
Viscosity number	Above -25°C (-13°F)		SAE 10W-30	
	Below 0°C (32°F)		SAE 5W-30	

E. COOLING SYSTEM

Item	Engine	F2	G6
Cooling method		Water-cooled, forced circulation	
<b>Water pump</b>			
Type		Centrifugal, timing belt driven	Centrifugal
Impeller diameter	mm (in)	70 (2.76)	62 (2.44)
Number of impeller blades		6	
Speed ratio		1 : 1.05	1 : 1.3
Water seal type		Unified mechanical seal	
<b>Thermostat</b>			
Type		Wax	Wax, Two-stage
Start to open	°C (°F)	86.5—89.5 (188—193)	Main: 86.5—89.5 (188—193) Sub : 83.5—86.5 (182—188)
Full open	°C (°F)	100 (212)	
Lift	mm (in)	8.5 (0.33) min.	Main: 8.0 (0.31) min. Sub : 1.5 (0.06) min.
<b>Radiator</b>			
Type		Corrugated fin	
Cap opening valve pressure	kPa (kg/cm <sup>2</sup> , psi)	74—103 (0.75—1.05, 11—15)	
Cooling circuit checking pressure	kPa (kg/cm <sup>2</sup> , psi)	103 (1.05, 15)	
<b>Cooling fan</b>			
Type		Thermo-modulated	
Switching temperature OFF → ON °C (°F)	M/T	55—65 (131—152)...linear	70—90 (158—194)...linear
	A/T	65—75 (152—167)...linear	—
Number of blades	M/T	7	8
	A/T	8	—
Outer diameter	mm (in)	M/T 380 (15.0)	410 (16.1)
		A/T 410 (16.1)	—
<b>Coolant</b>			
Capacity	liters (US qt, Imp qt)	With heater : 7.5 (7.9, 6.6) Without heater: 7.0 (7.4, 6.2)	6.8 (7.2, 6.0)

F1. FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR)

Item		Transmission	Manual	Automatic	
Fuel tank capacity		liters (US gal, Imp gal)	Short bed: 56 (14.8, 12.3), Long bed: 66 (17.4, 14.5)		
Fuel filter	Type		Filter paper; with magnet		
Fuel pump	Type		Mechanical	Electrical	
	Fuel pressure	kPa (kg/cm <sup>2</sup> , psi)	26—32 (0.26—0.33, 3.7—4.7)	20—25 (0.20—0.25, 2.8—3.6)	
	Feeding capacity	cc (cu in)/min	860 (52.5)	1,150 (70.2)	
Carburetor	Type		Down-draft (2-barrel, 2-stage, autochoke)		
	Throat diameter	Primary	mm (in)	30 (1.181)	
		Secondary	mm (in)	34 (1.339)	
	Venturi diameter	Primary	mm (in)	24.5 × 15 × 8 (0.965 × 0.591 × 0.315)	
		Secondary	mm (in)	31 × 10 (1.220 × 0.394)	
	Main jet	Primary	mm (in)	1.04 (0.0409)	
		Secondary	mm (in)	1.50 (0.0591)	
	Main air bleed	Primary	mm (in)	0.60 (0.0236)	
		Secondary	mm (in)	0.50 (0.0197)	
	Slow jet	Primary	mm (in)	0.52 (0.0205)	
		Secondary	mm (in)	0.85 (0.0335)	
	Slow air bleed	Primary No.1	mm (in)	0.80 (0.0315)	
		Primary No.2	mm (in)	1.10 (0.0433)	
		Secondary No.1	mm (in)	0.80 (0.0315)	
		Secondary No.2	mm (in)	0.50 (0.0197)	
	High-speed richer jet		mm (in)	1.80 (0.0709)	
	High-speed richer air bleed		mm (in)	1.00 (0.0394)	
	Solenoid-controlled fuel jet		mm (in)	0.85 (0.0335)	
	Solenoid-controlled air bleed		mm (in)	1.50 (0.0591)	
	Coasting richer jet		mm (in)	0.42 (0.0165)	
	Coasting richer air bleed	No.1	mm (in)	1.60 (0.0630)	
		No.2	mm (in)	2.60 (0.1024)	
	Float level	High	mm (in)	11.6—12.6 (0.457—0.496)	10.7—11.7 (0.421—0.461)
Low		mm (in)	46.0—47.0 (1.811—1.850)		
Fast idle adjustment	Throttle valve clearance	mm (in)	0.84—1.04 (0.033—0.041)		
	Choke valve clearance	mm (in)	0.60—1.14 (0.024—0.045)		
Secondary throttle valve adjustment	Throttle valve clearance	mm (in)	7.35—8.25 (0.289—0.325)		
Unloader system adjustment	Choke valve clearance	mm (in)	2.80—3.62 (0.110—0.143)		
Choke diaphragm adjustment	Choke valve clearance	mm (in)	1.70—2.16 (0.067—0.085)		
Air cleaner	Fresh-Hot		Bimetal, automatic		
	Element type		Wet		
Accelerator cable	Deflection	mm (in)	1—3 (0.04—0.12)		
Idle speed		rpm	800—850 (800 <sup>+50</sup> ) rpm in neutral or P range		
Idle mixture	Duty	Inspection	° (%)		
		Adjustment	° (%)		
Idle-up	Automatic transmission	Adjustment speed	rpm		
	Air conditioner	Adjustment speed	rpm		
Dashpot	Adjustment speed	rpm	1,900—2,100		
Idle switch	Adjustment speed	rpm	1,000—1,200		
Idle compensator	Operating temperature	°C (°F)	63—71 (145—160)		
High-altitude compensator	Starts to open (Altitude above sea level)	m (ft)	500 (1,640)		



# TECHNICAL DATA

# TD

Item		Transmission		Manual	Automatic
EGR control valve	1st	Starts to open	mmHg (inHg)	40—60 (1.57—2.36)	
		Fully open	mmHg (inHg)	110—130 (4.33—5.11)	
No.1 air control valve	Starts to open		mmHg (inHg)	300—400 (11.8—15.7)	
No.2 air control valve	Starts to open		mmHg (inHg)	50—90 (1.97—3.54)	
Water thermovalve	Opened		°C (°F)	More than 46—54 (114.8—129.2)	
Water thermostwitch	Opened	At radiator	°C (°F)	More than 15—19 (59—66.2)	
Water thermo-sensor	Resistance	-20°C ( -4°F)	kΩ	14.6—17.8	
		20°C ( 68°F)	kΩ	2.21—2.69	
		80°C (176°F)	kΩ	0.290—0.354	
EGR position sensor	Resistance	A—B	kΩ	0.7—6.0	
		A—C	kΩ	5.5—0	
		B—C	kΩ	5	
Vacuum control valve	Starts to open		mmHg (inHg)	40 (1.57) or more	
No.1 purge control valve	Starts to open		mmHg (inHg)	90—110 (3.54—4.33)	
No.3 purge control valve	Starts to open		mmHg (inHg)	66—106 (2.60—4.17)	
Intake air thermo-sensor	Resistance	-20°C ( -4°F)	kΩ	14.6—17.8	
		20°C ( 68°F)	kΩ	2.21—2.69	
		80°C (176°F)	kΩ	0.290—0.354	

### F2. FUEL AND EMISSION CONTROL SYSTEMS (EGI)

Item		Specification			
Idle speed* <sup>1</sup>	rpm	M/T: 730—770	A/T: 750—790		
Ignition timing* <sup>1</sup>	BTDC	G6: 4—6° F2: 5—7°			
<b>Throttle body</b>					
Type		Horizontal draft (2-barrel)			
Throat diameter	mm (in)	No.1	G6	F2	50 (2.0)
		No.2			
<b>Fuel pump</b>					
Type		Impeller (in-tank)			
Output pressure		kPa (kg/cm <sup>2</sup> , psi)			
		441—589 (4.5—6.0, 64—85)			
<b>Fuel filter</b>					
Type	Low-pressure side		Nylon element		
	High-pressure side		Paper element		
<b>Pressure regulator</b>					
Type		Diaphragm			
Regulating pressure		kPa (kg/cm <sup>2</sup> , psi)			
		265—314 (2.7—3.2, 38—46)			
<b>Injector</b>					
Type		High-ohmic			
Type of drive		Voltage			
Resistance		$\Omega$			
		12—16 (at 23°C, 73°F)			
<b>BAC valve (solenoid valve [idle speed control])</b>					
Solenoid resistance		$\Omega$			
		7.7—9.3 (at 23°C, 73°F)			
<b>BAC valve (air valve)</b>					
Opening temperature		°C (°F)			
		Below 50 (122)			
<b>Solenoid valve (Purge control)</b>					
Solenoid resistance		$\Omega$			
		30—34 (at 20°C, 68°F)			
<b>Water thermosensor</b>					
Resistance	k $\Omega$	-20°C (-4°F)	14.5—17.8		
		20°C (68°F)	2.2—2.7		
		80°C (176°F)	0.28—0.35		
<b>Intake air thermosensor</b>					
Resistance	k $\Omega$	25°C (77°F)	29.7—36.3		
		85°C (185°F)	3.3—3.7		
<b>Circuit opening relay</b>					
Resistance	$\Omega$	STA — E1	21—43		
		B — Fc	109—226		
		B — Fp	$\infty$		
<b>Fuel tank</b>					
Capacity		liters (US gal, Imp gal)			
		56 (14.8, 12.3)			
<b>Air cleaner</b>					
Element type		Dry			
<b>Accelerator cable</b>					
Free play		mm (in)			
		1—3 (0.039—0.118)			
<b>Fuel</b>					
Specification		Unleaded regular (RON 87 or higher)			

\*<sup>1</sup>...Test connector grounded

G. ENGINE ELECTRICAL SYSTEM

Item		Engine	F2 Carburetor	F2 EGI	G6	
Battery	Voltage	V	12, Negative ground			
	Type and capacity (20-hour rate)		50D20R 75D26R Maintenance-free	50D20R 75D26R Maintenance-free	50D20R 80D26R Maintenance-free	
Dark current*		mA	MAX. 20.0			
Alternator	Type		A.C.			
	Output	V-A	12-55		12-60	
	Regulator type		Transistorized (built-in IC regulator)			
	Regulated voltage	V	14.1—14.7			
	Brush length	mm (in)	Standard	21.5 (0.846)		
			Minimum	8.0 (0.315)		
	Drive belt deflection	mm (in)/98 N (10 kg, 22 lb)	New	7—8 (0.28—0.31)		10—12 (0.39—0.47)
Used			8—9 (0.31—0.35)		11—13 (0.43—0.51)	
Starter	Type		Non-reduction (M/T) Coaxial reduction (A/T)		Reduction	
	Output	V-kW	12-0.95 (M/T) 12-1.4 (A/T)		12-1.2 (M/T) 12-1.4 (A/T)	
	Brush length	mm (in)	Standard	17.0 (0.669) (M/T) 17.5 (0.689) (A/T)		16.0 (0.630) (M/T) 17.0 (0.669) (A/T)
			Minimum	11.5 (0.453) (M/T) 10.0 (0.394) (A/T)		9.0 (0.354) (M/T) 11.5 (0.453) (A/T)
Distributor	Type		Fully transistorized (HEI)		Electronic spark advance (Photo-diode type)	
	Centrifugal spark advance (Crank angle/Engine speed) degree/rpm		0/1,000 11.0/2,500 11.0/3,500 16.0/4,400			
	Vacuum spark advance (Crank angle/Vacuum) degree/mmHg (inHg)		0/100 (3.9) 18.0/260 (10.2)			
Ignition timing			5—7°	5—7° (Test connector grounded)	4—6° (Test connector grounded)	
Spark plug	Type	NGK	BPR5ES BPR6ES	BPR5ES-11 BPR6ES-11	ZFR5F-11 ZFR6F-11	
		NIPPONDENSO	W16EXR-U W20EXR-U	W16EXR-U11 W20EXR-U11	KJ16CR-11 KJ20CR-11	
	Plug gap	mm (in)	0.75—0.85 (0.028—0.033)	1.0—1.1 (0.039—0.043)		
	Firing order		1—3—4—2			

\* Dark current is the constant flow of current while the ignition switch is OFF. (i.e. Engine control unit, Audio, etc.)

**H. CLUTCH**

Item		Model	B2600i	B2200
Clutch control			Hydraulic	
<b>Clutch pedal</b>				
Type			Suspended	
Pedal ratio			6.0	
Full stroke		mm (in)	135 (5.32)	
Height (with carpet)		mm (in)	191—201 (7.52—7.91)	181—191 (7.13—7.52)
Free play		mm (in)	0.6—3.0 (0.02—0.12)	
Distance to carpet when clutch fully disengaged		mm (in) Minimum	71 (2.80)	66 (2.60)
<b>Flywheel</b>				
Runout limit		mm (in)	0.2 (0.008)	
<b>Clutch disc</b>				
Type			Single dry plate	
Runout limit		mm (in)	1.0 (0.039)	0.7 (0.028)
Wear limit		mm (in)	0.3 (0.012) from rivet head	
Outer diameter		mm (in)	250 (9.84)	225 (8.86)
Inner diameter		mm (in)	160 (6.30)	150 (5.91)
Facing thickness		mm (in)	3.5 (0.14)	
		Flywheel side		
		Pressure plate side	3.5 (0.14)	4.1 (0.16)
<b>Clutch cover</b>				
Type			Diaphragm spring	
Set load		N (kg, lb)	5,494 (560, 1,232)	4,807 (490, 1,078)

**J1. MANUAL TRANSMISSION (B2200)**

Item		Transmission	M5M-D
Gearshift lever position			Floor shift
Synchronmesh system			Forward: synchronmesh/Reverse: constant-mesh
Gear ratio	1st		3.622
	2nd		2.186
	3rd		1.419
	4th		1.000
	5th		0.858
	Reverse		3.493
Oil	Capacity	liters (US qt, Imp qt)	2.0 (2.1, 1.8)
	Grade		API Service GL-4 or GL-5
	Viscosity	Above 10°C (50°F)	
All seasons			SAE 75W-90
Mainshaft runout limit		mm (in)	0.03 (0.0012)
Clearance between synchronizer ring and flank surface of gear		Standard	1.5 (0.059)
		Limit	0.8 (0.032)
Clearance between hub sleeve and shift fork		Standard	0.2—0.3 (0.008—0.012)
		Limit	0.5 (0.020)
Mainshaft bearing end play		mm (in)	0 ± 0.05 (0 ± 0.002)
Mainshaft bearing adjustment shim			0.1 (0.004), 0.3 (0.012)
5th-gear end play		mm (in)	0.1—0.3 (0.004—0.012)
5th-gear end play adjustment washer		mm (in)	6.4 (0.252), 6.5 (0.256), 6.6 (0.260), 6.7 (0.264)
Mainshaft rear bearing end play		mm (in)	0.1 (0.004) or less
Rear bearing adjustment C washer		mm (in)	2.9 (0.114), 3.0 (0.118), 3.1 (0.122), 3.2 (0.126)
Mainshaft front bearing end play		mm (in)	0—0.1 (0—0.004)
Front bearing adjustment shim		mm (in)	0.15 (0.006), 0.30 (0.012)

**J2. MANUAL TRANSMISSION (B2600i)**

Item		Transmission	R5M-D	R5MX-D
Gear ratio	1st			3.730
	2nd			2.158
	3rd			1.396
	4th			1.000
	5th			0.816
	Reverse			3.521
Oil	Capacity	liters (US qt, Imp qt)	2.8 (3.0, 2.5)	3.2 (3.4, 2.8)
	Grade		API Service GL-4 or GL-5	
	Viscosity	Above 10°C (50°F)		SAE 80W-90
All seasons			SAE 75W-90	
Mainshaft runout limit		mm (in)	0.03 (0.0012)	
Reverse idle gear	Clearance between reverse idle gear bush and shaft	Wear limit mm (in)	0.15 (0.006)	
Shift fork and rod	Clearance between shift fork and clutch hub sleeve	Wear limit mm (in)	0.5 (0.020)	
	Clearance between shift rod gate and control lever	Wear limit mm (in)	0.8 (0.032)	
Synchronizer ring	Clearance between synchronizer ring and side of gear when fitted mm (in)	Standard	1.5 (0.059)	
		Wear limit	0.8 (0.032)	

**J3. MANUAL TRANSMISSION (TRANSFER CASE)**

Item		Specifications
Gear ratio	Low	2.210
	High	1.000
Oil	Capacity	liters (US qt, Imp qt) 2.0 (2.1, 1.8)
	Grade	API Service GL-4 or GL-5
	Viscosity	Above 10°C (50°F)
All seasons		SAE 75W-90
Input-shaft gear bearing end play		mm (in) 0—0.1 (0—0.004)
Input-shaft gear bearing adjust shim		mm (in) 0.7 (0.028), 0.8 (0.032), 0.9 (0.035), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047)
Output-shaft rear bearing end play		mm (in) 0—0.1 (0—0.004)
Output-shaft bearing adjusting shim		mm (in) 0.5 (0.020), 0.6 (0.024), 0.7 (0.028), 0.8 (0.032), 0.9 (0.035), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047), 1.3 (0.051), 1.4 (0.055), 1.5 (0.059), 1.6 (0.063), 1.7 (0.067)
Front-drive sprocket bearing end play		mm (in) 0—0.1 (0—0.004)
Front-drive sprocket rear bearing adjusting shim		mm (in) 0.5 (0.020), 0.6 (0.024), 0.7 (0.028), 0.8 (0.032), 0.9 (0.035), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047)

K1. AUTOMATIC TRANSMISSION (HYDRAULICALLY-CONTROLLED)

Item		Transmission/Engine		N4A-HL			
				F2 EGI	F2 Carb.	G6	
Torque converter stall torque ratio				1.900 : 1			
Gear ratio	1st			2.841			
	2nd			1.541			
	3rd			1.000			
	OD (4th)			0.720			
	Reverse			2.400			
Automatic transmission fluid (ATF)	Type			Dexron®II or M-III			
	Capacity liters (US qt, Imp qt)	Total			7.5 (7.9, 6.6)		
		Oil pan			4.0 (4.2, 3.5)		
Engine stall speed	rpm	D, 2, 1, and R ranges	1,850—2,250	1,800—2,200	2,100—2,500		
Time lag	sec.	N→D range	0.5—1.0				
		N→R range	0.5—1.0				
Line pressure kPa (kg/cm <sup>2</sup> , psi)	At idle	D and 1 ranges	294—392 (3.0—4.0, 43—57)				
		2 range	589—1,148 (6.0—11.7, 85—166)		1,010—1,570 (10.3—16.0, 146—228)		
		R range	520—657 (5.3—6.7, 75—95)		549—687 (5.6—7.0, 80—100)		
	At stall	D and 1 ranges	932—1,128 (9.5—11.5, 135—164)		1,118—1,315 (11.4—13.4, 162—191)		
		2 range	981—1,177 (10.0—12.0, 142—172)		1,403—1,599 (14.3—16.3, 203—232)		
		R range	1,736—1,923 (17.7—19.6, 252—279)		2,188—2,374 (22.3—24.2, 317—344)		
Governor pressure kPa (kg/cm <sup>2</sup> , psi)	Vehicle speed: 30 km/h (19 mph)		69—128 (0.7—1.3, 10—18)	88—147 (0.9—1.5, 13—21)	78—137 (0.8—1.4, 11—20)		
	Vehicle speed: 55 km/h (34 mph)		157—235 (1.6—2.4, 23—34)	196—275 (2.0—2.8, 28—40)	186—265 (1.9—2.7, 27—38)		
	Vehicle speed: 85 km/h (53 mph)		314—412 (3.2—4.2, 46—60)	412—510 (4.2—5.2, 60—74)	392—491 (4.0—5.0, 57—71)		
	Cutpack point	Atmospheric pressure	108—167 (1.1—1.7, 16—24)	137—196 (1.4—2.0, 20—28)	128—186 (1.3—1.9, 18—27)		
		200 mmHg (7.87 inHg)	59—118 (0.6—1.2, 9—17)	69—128 (0.7—1.3, 10—18)	78—137 (0.8—1.4, 11—20)		
Oil pump	Body clearance	mm (in)	Standard	0.02—0.04 (0.0008—0.0016)			
			Maximum	0.08 (0.0031)			
	Tip clearance	mm (in)	Standard	0.14—0.21 (0.0055—0.0083)			
			Maximum	0.25 (0.0098)			
	Side clearance	mm (in)	Standard	0.05—0.20 (0.0020—0.0079)			
			Maximum	0.25 (0.0098)			
Drum support	Seal ring and groove clearance	mm (in)	Standard	0.04—0.16 (0.0016—0.0063)			
			Maximum	0.40 (0.016)			
Direct clutch	Number of drive/driven plates		2/2				
	Drive plate thickness	mm (in)	Standard	1.6 (0.063)			
			Minimum	1.4 (0.055)			
	Clutch clearance	mm (in)	1.6—1.8 (0.063—0.071)				
	Retaining plate size	mm (in)	5.6 (0.220), 5.8 (0.228), 6.0 (0.236), 6.2 (0.244), 6.4 (0.263), 6.6 (0.260), 6.8 (0.268), 7.0 (0.276)				
	End play	mm (in)	0.5—0.8 (0.020—0.031)				
	Bearing race size	mm (in)	1.3 (0.051), 1.5 (0.059), 1.7 (0.067), 1.9 (0.075), 2.1 (0.083), 2.3 (0.091), 2.5 (0.098), 2.7 (0.106)				
OD planetary gear unit	Pinion clearance	mm (in)	Standard	0.2—0.7 (0.0079—0.028)			
			Maximum	0.8 (0.031)			
	Total end play	mm (in)	0.25—0.50 (0.010—0.020)				
Bearing race size	mm (in)	1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079), 2.2 (0.087)					

Item	Transmission/Engine		N4A-HL		
			F2 EGI	F2 Carb.	G6
Front clutch	Number of drive/driven plates		3/5		4/5
	Drive plate thickness mm (in)	Standard	1.6 (0.063)		
		Maximum	1.4 (0.055)		
	Clutch clearance mm (in)		1.6—1.8 (0.063—0.071)		0.9—1.1 (0.035—0.043)
	Retaining plate size mm (in)		5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228), 6.0 (0.236)		5.6 (0.220), 5.8 (0.228), 6.0 (0.236), 6.2 (0.244), 6.4 (0.252), 6.6 (0.260), 6.8 (0.268), 7.0 (0.276)
	End play mm (in)		0.5—0.8 (0.020—0.031)		
	Bearing race size mm (in)		1.3 (0.051), 1.5 (0.059), 1.7 (0.067), 1.9 (0.075), 2.1 (0.083), 2.3 (0.091), 2.5 (0.098), 2.7 (0.106)		
Rear clutch	Number of drive/driven plates		5/5		
	Drive plate thickness mm (in)	Standard	1.6 (0.063)		
		Maximum	1.4 (0.055)		
	Clutch clearance mm (in)		0.8—1.0 (0.031—0.039)		
	Retaining plate size mm (in)		9.4 (0.370), 9.6 (0.378), 9.8 (0.386), 10.0 (0.394), 10.2 (0.402), 10.4 (0.409), 10.6 (0.417)		
	Total end play mm (in)		0.25—0.50 (0.0098—0.0197)		
	Bearing race size mm (in)		1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079), 2.2 (0.087)		
Low and reverse brake	Number of drive/driven plates		5/5		
	Drive plate thickness mm (in)	Standard	2.0 (0.079)		
		Maximum	1.8 (0.071)		
	Clutch clearance mm (in)		0.8—1.05 (0.031—0.041)		
Retaining plate size mm (in)		7.8 (0.307), 8.0 (0.315), 8.2 (0.323), 8.4 (0.331), 8.6 (0.339), 8.8 (0.346)			
Front planetary gear	Pinion clearance mm (in)	Standard	0.2—0.7 (0.008—0.028)		
		Maximum	0.8 (0.031)		
Rear planetary gear	Pinion clearance mm (in)	Standard	0.2—0.7 (0.008—0.028)		
		Maximum	0.8 (0.031)		
Parking gear (oil distributor)	Seal ring and groove clearance mm (in)	Standard	0.04—0.16 (0.0016—0.0063)		
		Maximum	0.40 (0.0157)		

Spring specifications

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)	
Control valve	Second lock	5.55 (0.219)	33.5 (1.319)	18.0	0.55 (0.022)	
	Pressure regulator	11.7 (0.461)	43.0 (1.692)	15.0	1.2 (0.047)	
	Downshift	5.55 (0.219)	21.9 (0.862)	14.0	0.55 (0.022)	
	Throttle backup	F2	7.3 (0.287)	36.0 (1.417)	16.0	0.8 (0.031)
		G6	7.4 (0.291)	29.8 (1.173)	13.5	0.9 (0.035)
	3-4 shift	F2 EGI	7.2 (0.283)	28.1 (1.106)	12.0	0.8 (0.031)
		F2 Carb.	7.3 (0.287)	25.24 (0.994)	13.0	0.9 (0.035)
		G6	6.6 (0.260)	30.3 (1.193)	14.6	0.8 (0.031)
	2-3 shift	F2 EGI	6.9 (0.272)	41.0 (1.614)	20.0	0.7 (0.028)
		F2 Carb.	6.9 (0.272)	31.6 (1.244)	16.25	0.8 (0.031)
		G6	7.3 (0.287)	42.0 (1.654)	17.6	0.75 (0.030)
	1-2 shift		6.65 (0.262)	32.2 (1.268)	18.0	0.65 (0.026)
	Pressure modifier	F2 EGI, G6	8.6 (0.339)	15.5 (0.610)	7.5	0.6 (0.024)
		F2 Carb.	9.1 (0.358)	18.5 (0.728)	7.4	0.6 (0.024)
	Throttle relief		6.5 (0.256)	26.8 (1.055)	16.0	0.9 (0.035)
Orifice check		5.0 (0.197)	15.5 (0.610)	12.0	0.23 (0.009)	
3-2 shift	F2	7.5 (0.295)	23.2 (0.913)	11.0	0.8 (0.031)	
	G6	7.4 (0.291)	20.7 (0.815)	11.0	0.9 (0.035)	

Spring		Item	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
Governor valve	Primary		8.75 (0.344)	21.8 (0.858)	7.0	0.45 (0.018)
	Secondary	F2 Carb.	9.0 (0.354)	21.7 (0.854)	10.0	0.8 (0.031)
		F2 EGI	9.2 (0.362)	25.2 (0.992)	7.5	0.7 (0.028)
Oil pump	Lockup control	G6	9.0 (0.354)	21.7 (0.854)	10.0	0.8 (0.031)
		F2 EGI	5.5 (0.217)	25.0 (0.984)	15.0	0.7 (0.028)
		F2 Carb.	5.5 (0.217)	26.3 (1.035)	15.5	0.7 (0.028)
Drum support	G6		5.5 (0.217)	24.7 (0.972)	15.5	0.7 (0.028)
	OD accumulator		14.85 (0.585)	39.7 (1.563)	9.3	1.8 (0.071)
		OD cancel valve	4.95 (0.195)	23.0 (0.906)	14.8	0.65 (0.026)
Band servo	2ND	F2				
		G6				
Direct, front, and rear clutches			8.0 (0.315)	30.5 (1.20)	14.5	1.3 (0.051)
Low and reverse brake			—	5.9—6.2 (0.232—0.249)	—	—
Parking rod			7.2 (0.283)	32.0 (1.26)	14.0	0.7 (0.028)

### Vehicle speed at gearshift table

Range	Throttle condition (Manifold vacuum)	Shifting	Vehicle speed km/h (mph)		
			F2 EGI	F2 Carb.	G6
D	Fully opened	D <sub>1</sub> →D <sub>2</sub>	51—57 (32—35)	52—58 (32—36)	53—59 (33—37)
		D <sub>2</sub> →D <sub>3</sub>	93—99 (58—61)	88—94 (55—58)	97—103 (60—64)
		OD→D <sub>3</sub>	Above 84 (52)	Above 83 (51)	Above 91 (56)
		D <sub>3</sub> →D <sub>2</sub>	84—90 (52—56)	83—89 (51—55)	91—97 (56—60)
		D <sub>2</sub> →D <sub>1</sub>	37—43 (23—27)	38—44 (24—27)	37—43 (23—27)
	Half throttle 200 mmHg (7.87 inHg)	D <sub>1</sub> →D <sub>2</sub>	16—22 (10—14)	20—26 (12—16)	23—29 (14—18)
		D <sub>2</sub> →D <sub>3</sub>	29—35 (18—22)	24—30 (15—18)	40—46 (25—29)
		D <sub>3</sub> →OD	43—49 (27—30)	42—48 (26—30)	64—70 (40—43)
		Lockup ON (OD)	68—74 (42—46)	70—76 (43—47)	68—74 (42—46)
		Lockup OFF (OD)	63—69 (39—43)	66—72 (41—45)	63—69 (39—43)
		OD→D <sub>3</sub>	26—32 (16—20)	29—35 (18—22)	36—42 (22—26)
		D <sub>3</sub> →D <sub>2</sub>	12—18 (7—11)	12—18 (7—11)	25—31 (16—19)
	Fully closed	D <sub>2</sub> →D <sub>1</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
		D <sub>1</sub> →D <sub>2</sub>	12—18 (7—11)	16—22 (10—14)	13—19 (8—12)
		D <sub>2</sub> →D <sub>3</sub>	24—30 (15—19)	21—27 (13—17)	24—30 (15—19)
		D <sub>3</sub> →OD	41—47 (25—29)	40—46 (25—29)	40—46 (25—29)
		OD→D <sub>3</sub>	26—32 (16—20)	29—35 (18—22)	27—33 (17—20)
		D <sub>3</sub> →D <sub>2</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
1	—	D <sub>2</sub> →D <sub>1</sub>	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
1	—	1 <sub>2</sub> →1 <sub>1</sub>	38—44 (24—27)	38—44 (24—27)	41—47 (25—29)



**K2. AUTOMATIC TRANSMISSION (ELECTRONICALLY-CONTROLLED)**

Item		Transmission	R4AX-EL
Torque converter stall torque ratio			2.000 : 1
Gear ratio	1st		2.786
	2nd		1.546
	3rd		1.000
	OD (4th)		0.694
	Reverse		2.272
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity liters (US qt, Imp qt)	Total Oil pan	8.6 (9.1, 7.6) 4.0 (4.2, 3.5)
Engine stall speed	rpm	D, S, L and R ranges	2,300—2,500
Time lag	sec.	N → D range	Less than 1.0
		N → R range	Less than 1.2
Line pressure kPa (kg/cm <sup>2</sup> , psi)	At idle	D, S and L ranges	432—471 (4.4—4.8, 63—68)
		R range	598—638 (6.1—6.5, 87—92)
	At stall	D, S and L ranges	1,040—1,118 (10.6—11.4, 151—162)
		R range	1,452—1,530 (14.8—15.6, 210—222)
Oil pump	Cam ring clearance mm (in)	Standard	0.010—0.024 (0.0004—0.0009)
		Maximum	0.030 (0.0012)
	Rotor, vanes, and control piston clearance mm (in)	Standard	0.030—0.044 (0.0012—0.0017)
		Maximum	0.050 (0.0020)
	Seal ring clearance mm (in)	Standard	0.10—0.25 (0.0039—0.0098)
		Maximum	0.25 (0.0098)
Reverse clutch	Number of drive/driven plates		2/2
	Drive plate thickness mm (in)	Standard	2.0 (0.079)
		Minimum	1.8 (0.071)
	Clutch clearance mm (in)	With new drive/driven plates	0.5—0.8 (0.020—0.031)
		When reusing drive/driven plates	0.5—1.2 (0.020—0.047)
	Retaining plate size mm (in)		4.6 (0.181), 4.8 (0.189), 5.0 (0.197), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228)
High clutch	Number of drive/driven plates		4/7
	Drive plate thickness mm (in)	Standard	1.6 (0.063)
		Minimum	1.4 (0.055)
	Clutch clearance mm (in)	With new drive/driven plates	1.8—2.2 (0.071—0.087)
		When reusing drive/driven plates	1.8—3.0 (0.071—0.118)
	Retaining plate size mm (in)		3.0 (0.118), 3.2 (0.126), 3.4 (0.134), 3.6 (0.142), 3.8 (0.150), 4.0 (0.157), 4.2 (0.165), 4.4 (0.173)
Forward clutch	Number of drive/driven plates		6/6
	Drive plate thickness mm (in)	Standard	2.0 (0.079)
		Minimum	1.8 (0.071)
	Clutch clearance mm (in)	With new drive/driven plates	0.45—0.85 (0.018—0.033)
		When reusing drive/driven plates	0.45—2.05 (0.018—0.081)
	Retaining plate size mm (in)		4.0 (0.157), 4.2 (0.165), 4.4 (0.173), 4.6 (0.181), 4.8 (0.189), 5.0 (0.197), 5.2 (0.205)
Overrunning clutch	Number of drive/driven plates		3/5
	Drive plate thickness mm (in)	Standard	2.0 (0.079)
		Minimum	1.8 (0.071)
	Clutch clearance mm (in)	With new drive/driven plates	1.0—1.4 (0.039—0.055)
		When reusing drive/driven plates	1.0—2.0 (0.039—0.079)
	Retaining plate size mm (in)		4.0 (0.157), 4.2 (0.165), 4.4 (0.173), 4.6 (0.181), 4.8 (0.189), 5.0 (0.197), 5.2 (0.205)

Item		Transmission	R4AX-EL
Low and reverse brake	Number of drive/driven plates		6/6
	Drive plate thickness mm (in)	Standard	2.0 (0.079)
		Minimum	1.8 (0.071)
	Brake clearance mm (in)	With new drive/driven plates	0.7—1.1 (0.028—0.043)
		When reusing drive/driven plates	0.7—2.3 (0.028—0.091)
	Retaining plate size mm (in)		9.0 (0.354), 9.2 (0.362), 9.4 (0.370), 9.6 (0.378), 9.8 (0.386), 10.0 (0.394)
	Seal ring clearance mm (in)	Standard	0.10—0.25 (0.0039—0.0098)
Maximum		0.25 (0.0098)	
Total end play	Standard mm (in)	0.25—0.55 (0.010—0.022)	
	Bearing race size mm (in)	0.8 (0.031), 1.0 (0.039), 1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079)	
Reverse clutch drum end play	Standard	0.55—0.90 (0.022—0.035)	
	Thrust washer size mm (in)	0.7 (0.028), 0.9 (0.035), 1.1 (0.043), 1.3 (0.051), 1.5 (0.059), 1.7 (0.067), 1.9 (0.075)	

**Spring Specification**

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)	
Upper control valve body	Torque converter relief valve	9.0 (0.354)	38.0 (1.496)	12.7	1.4 (0.055)	
	Pressure regulator valve	14.0 (0.551)	44.0 (1.732)	7.9	1.4 (0.055)	
	Pressure modifier valve*	A	6.8 (0.268)	31.95 (1.258)	15.5	0.8 (0.031)
		B	6.9 (0.272)	32.60 (1.283)	22.2	0.9 (0.035)
		C	6.9 (0.272)	32.80 (1.291)	15.6	0.9 (0.035)
	Shuttle shift valve D	6.0 (0.236)	26.5 (1.043)	12.0	0.7 (0.028)	
	4-2 sequence valve	6.95 (0.274)	29.1 (1.146)	11.0	0.55 (0.022)	
	Shift valve B	7.0 (0.276)	25.0 (0.984)	9.5	0.65 (0.026)	
	4-2 relay valve	6.95 (0.274)	29.1 (1.146)	11.0	0.55 (0.022)	
	Shift valve A	7.0 (0.276)	25.0 (0.984)	9.5	0.65 (0.026)	
	Overrunning clutch control valve	7.0 (0.276)	23.6 (0.929)	7.9	0.6 (0.024)	
	Overrunning clutch reducing valve	7.0 (0.276)	32.5 (0.984)	12.6	0.85 (0.033)	
	Shuttle shift valve S	5.5 (0.217)	43.0 (1.693)	22.2	0.85 (0.033)	
	Pilot valve	9.1 (0.358)	25.7 (1.012)	8.3	1.1 (0.043)	
	Lockup control valve	13.0 (0.512)	18.5 (0.728)	3.5	0.75 (0.030)	
Lower control valve body	Modifier accumulator piston	9.8 (0.386)	30.5 (1.201)	8.75	1.3 (0.051)	
	1st reducing valve	6.75 (0.266)	25.4 (1.000)	12.5	0.75 (0.030)	
	Servo charger valve	6.5 (0.256)	33.2 (1.307)	12.0	0.5 (0.020)	
	3-2 timing valve	6.75 (0.266)	20.55 (0.809)	7.5	0.75 (0.030)	
Oil pump	Cam ring	13.7 (0.539)	39.8 (1.567)	7.8	2.3 (0.091)	
Accumulator	N-D accumulator piston	18.0 (0.709)	43.0 (1.693)	12.3	2.3 (0.091)	
	1-2 accumulator piston	29.3 (1.154)	45.0 (1.772)	3.6	4.0 (0.157)	
	2-3 accumulator piston	20.0 (0.787)	66.0 (2.598)	11.4	3.5 (0.138)	
	3-4/N-R accumulator piston	17.3 (0.681)	58.4 (2.299)	12.3	2.3 (0.091)	
Reverse clutch	Return	11.6 (0.457)	19.69 (0.775)	4.0	1.3 (0.051)	
High clutch	Return	11.6 (0.457)	22.10 (0.870)	6.0	1.3 (0.051)	
Forward & overrunning clutch	Return	9.7 (0.382)	35.8 (1.409)	10.3	1.3 (0.051)	
Low and reverse brake	Return	11.6 (0.457)	23.7 (0.933)	5.0	1.1 (0.043)	
Band servo	Return A	34.3 (1.350)	45.6 (1.795)	3.0	2.3 (0.091)	
	Return B	40.3 (1.587)	53.8 (2.118)	3.0	2.3 (0.091)	
	Return C	27.6 (1.087)	29.7 (1.169)	3.2	2.6 (0.102)	

\*: Either A, B or C type spring is installed at shipment. Only A type spring is available for replacement.

Vehicle Speed at Shiftpoint Table

Mode	Range	Throttle condition (Throttle sensor voltage)	Shift	Vehicle speed km/h (mph)	
Normal (Power)	D	Fully opened (4.4 volt)	D <sub>1</sub> →D <sub>2</sub>	47—51 (29—32)	
			D <sub>2</sub> →D <sub>3</sub>	87—95 (54—59)	
			D <sub>3</sub> →OD	129—139 (80—86)	
		Half throttle (1.6—2.2 volt)	D <sub>1</sub> →D <sub>2</sub>	39—43 (24—27)	
			D <sub>2</sub> →D <sub>3</sub>	66—72 (41—45)	
			Lockup ON (D <sub>3</sub> )	96—104 (60—64)	
			D <sub>3</sub> →OD	111—119 (69—74)	
			Lockup ON (OD)	128—136 (79—84)	
			Lockup OFF (OD)	96—104 (60—64)	
			OD→D <sub>3</sub>	71—79 (44—49)	
			Lockup OFF (D <sub>3</sub> )	86—94 (53—58)	
			D <sub>3</sub> →D <sub>2</sub>	42—48 (26—30)	
	Kickdown	OD→D <sub>3</sub>	124—134 (77—83)		
		OD→D <sub>2</sub>	81—89 (50—55)		
		OD→D <sub>1</sub>	41—45 (25—28)		
		D <sub>3</sub> →D <sub>2</sub>	81—89 (50—55)		
		D <sub>3</sub> →D <sub>1</sub>	41—45 (25—28)		
		D <sub>2</sub> →D <sub>1</sub>	41—45 (25—28)		
	Normal (Economy)	D	Fully opened (4.4 volt)	D <sub>1</sub> →D <sub>2</sub>	47—51 (29—32)
				D <sub>2</sub> →D <sub>3</sub>	87—95 (54—59)
				D <sub>3</sub> →OD	129—139 (80—86)
Half throttle (1.6—2.2 volt)			D <sub>1</sub> →D <sub>2</sub>	30—34 (19—21)	
			D <sub>2</sub> →D <sub>3</sub>	52—58 (32—36)	
			D <sub>3</sub> →OD	96—104 (60—64)	
			Lockup ON (OD)	96—104 (60—64)	
			Lockup OFF (OD)	81—89 (50—55)	
			OD→D <sub>3</sub>	43—51 (27—32)	
Kickdown		D <sub>3</sub> →D <sub>2</sub>	22—28 (14—17)		
		OD→D <sub>3</sub>	124—134 (77—83)		
		OD→D <sub>2</sub>	81—89 (50—55)		
S		Fully opened (4.4 volt)	S <sub>1</sub> →S <sub>2</sub>	47—51 (29—32)	
			S <sub>2</sub> →S <sub>3</sub>	87—95 (54—59)	
			S <sub>3</sub> →S <sub>2</sub>	82—88 (51—55)	
			S <sub>2</sub> →S <sub>1</sub>	41—45 (25—28)	
			Half throttle (1.6—2.2 volt)	S <sub>1</sub> →S <sub>2</sub>	39—43 (24—27)
				S <sub>2</sub> →S <sub>3</sub>	66—72 (41—45)
	S <sub>3</sub> →S <sub>2</sub>	41—47 (25—29)			
	L	Fully opened (4.4 volt)	L <sub>1</sub> →L <sub>2</sub>	47—51 (29—32)	
			L <sub>2</sub> →L <sub>1</sub>	41—45 (25—28)	
Half throttle (1.6—2.2 volt)		L <sub>1</sub> →L <sub>2</sub>	39—43 (24—27)		
HOLD	D		D <sub>2</sub> →D <sub>3</sub>	18—22 (11—14)	
			D <sub>3</sub> →D <sub>2</sub>	7—13 (4—8)	
			OD→D <sub>3</sub>	138—148 (86—92)	
	S	Fully closed (0.4 volt)	S <sub>3</sub> →S <sub>2</sub>	88—96 (55—60)	
	L		L <sub>2</sub> →L <sub>1</sub>	44—48 (27—30)	

### L. PROPELLER SHAFT

Item		Front propeller shaft	Rear propeller shaft
Starting torque adjustment snap ring	mm (in)	1.45 (0.0571), 1.48 (0.0583)	1.51 (0.0594), 1.54 (0.0606), 1.57 (0.0618), 1.60 (0.0630), 1.63 (0.0642)
Runout limit	mm (in)	0.4 (0.016)	
Starting torque of universal	N-m (cm-kg, in-lb)	0.294—0.784 (3.0—8.0, 2.6—6.9)	

### M. FRONT AND REAR AXLES (4x4)

Item		Engine/Transmission	B2600i	
			M/T	A/T
<b>Front axle</b>				
Bearing play axial direction		mm (in)	0 (0)	
Bearing preload (without oil seal load)	Pull scale reading	N (kg, lb)	6—12 (0.6—1.2, 1.3—2.6)	
<b>Front differential</b>				
Reduction gear			Hypoid gear	
Differential gear			Straight bevel gear	
Reduction ratio			4.300	4.444
Number of teeth	Ring gear		43	40
	Drive pinion gear		10	9
Oil	Grade		API Service GL-5	
	Viscosity	Above -18°C (0°F)	SAE 90	
		Below -18°C (0°F)	SAE 80W	
Amount	liters (US qt, Imp qt)	1.5 (1.6, 1.3)		
Drive pinion preload		N-m (cm-kg, in-lb)	0.9—1.4 (9—14, 7.8—12.2)	
Drive pinion and ring gear backlash	mm (in)	Standard	0.09—0.11 (0.0035—0.0043)	
		Minimum	More than 0.05 (0.0020)	
		Allowable variation	Less than 0.07 (0.0028)	
Pinion height adjustment spacer		mm (in)	14 sizes from 3.08 (0.1213) to 3.47 (0.1366) in increments of 0.03 (0.0012)	
L dimension between bearing caps		mm (in)	185.43—185.50 (7.3004—7.3031)	
Side gear and pinion gear backlash		mm (in)	0—0.1 (0—0.004)	
Backlash adjustment washer		mm (in)	2.00 (0.0787), 2.05 (0.0807), 2.10 (0.0827), 2.15 (0.0846), 2.20 (0.0866)	
<b>Rear axle</b>				
Axle casing			Banjo type	
Axle shaft support			Semifloating type	
Bearing play axial direction	When both shafts are installed	mm (in)	0.05—0.25 (0.002—0.010)	
	When one side shaft is installed	mm (in)	0.65—0.95 (0.026—0.037)	
<b>Rear differential</b>				
Reduction gear			Hypoid gear	
Differential gear			Straight bevel gear	
Reduction ratio			4.300	4.444
Number of teeth	Ring Gear		43	40
	Drive pinion gear		10	9
Oil	Grade		API Service GL-5	
	Viscosity	Above -18°C (0°F)	SAE 90	
		Below -18°C (0°F)	SAE 80W	
Amount	liters (US qt, Imp qt)	1.7 (1.8, 1.5)		

Engine/Transmission		B2600i	
		M/T	A/T
Drive pinion preload	N-m (cm-kg, in-lb)	1.3—1.8 (13—18, 11.3—15.6)	
Drive pinion and ring gear backlash	mm (in)	Standard	0.09—0.11 (0.0035—0.0043)
		Minimum	More than 0.05 (0.0020)
		Allowable variation	Less than 0.07 (0.0028)
Pinion height adjustment spacer	mm (in)	14 sizes from 3.08 (0.1213) to 3.47 (0.1366) in increments of 0.03 (0.0012)	
L dimension between bearing caps	mm (in)	204.43—204.50 (8.0484—8.0512)	
Side gear and pinion gear backlash	mm (in)	0—0.1 (0—0.004)	
Backlash adjustment washer	mm (in)	2.00 (0.0787), 2.05 (0.0807), 2.10 (0.0827), 2.15 (0.0846), 2.20 (0.0866)	

(4x2)

Engine/Transmission		B2200		B2600i	
		M/T	A/T	M/T	A/T
<b>Front axle</b>					
Bearing play axial direction	mm (in)	0 (0)			
Bearing preload (without oil seal load)	Pull-scale reading N (kg, lb)	6—11 (0.6—1.1, 1.3—2.4)			
<b>Rear axle</b>					
Axle casing		Banjo type			
Axle shaft support		Semifloating			
Bearing play axial direction	When both shafts are installed	mm (in)	0.05—0.25 (0.002—0.010)		
	When one side shaft is installed	mm (in)	0.65—0.95 (0.026—0.037)		
<b>Differential</b>					
Reduction gear		Hypoid gear			
Differential gear		Straight bevel gear			
Reduction ratio		3.909		3.727	
Number of teeth	Ring gear	43		41	
	Drive pinion gear	11		11	
Rear axle oil	Grade	API Service GL-5			
	Viscosity	Above -18°C (0°F)	SAE 90		
		Below -18°C (0°F)	SAE 80W		
Amount	liters (US qt, Imp qt)	1.2 (1.3, 1.1)		1.7 (1.8, 1.5)	
Drive pinion preload	N-m (cm-kg, in-lb)	0.9—1.4 (9—14, 7.8—12.2)			
Drive pinion and ring gear backlash	mm (in)	Standard	0.09—0.11 (0.0035—0.0043)		
		Minimum	More than 0.05 (0.0020)		
		Allowable variation	Less than 0.07 (0.0028)		
Pinion height adjustment spacer	mm (in)	14 sizes from 3.08 (0.1213) to 3.47 (0.1366) in increments of 0.03 (0.0012)			
L dimension between bearing caps	mm (in)	185.43—185.50 (7.3004—7.3031)		204.43—204.50 (8.0484—8.0512)	
Side gear and pinion gear backlash	mm (in)	0—0.1 (0—0.004)			
Backlash adjustment washer	mm (in)	2.00 (0.0787), 2.05 (0.0807), 2.10 (0.0827), 2.15 (0.0846), 2.20 (0.0866)			

### N. STEERING SYSTEM

Item		Engine/Type	B2200		B2600i
			Manual	Power	Power
Steering wheel	Outer diameter	mm (in)	380 (14.96)		
	Lock to lock		4.6	3.5	
	Play	mm (in)	5—20 (0.20—0.79)		
	Effort* <sup>1</sup>	N (kg, lb)	5—20 (0.5—2.0, 1—5)	40 (4.1, 9)	
Steering shaft and joint	Shaft type		Collapsible, non-tilt or tilt		
	Joint type		Cross-joint and rubber coupling		
	Tilt stroke	mm (in)	68 (2.68)		
Steering gear	Type		Ball nut		
	Gear ratio		21—25	17.8	
	Backlash	mm (in)	0 (0)		
	Worm shaft preload	N (kg, lb)	3—6 (0.3—0.6, 0.7—1.3)	5.9—8.8 (0.6—0.9, 1.3—2.0)	
Oil	Grade		API Service GL-4 SAE 90	ATF M2C33F or Dexron®II	
	Capacity* <sup>2</sup>	liters (US qt, Imp qt)	0.34 (0.36, 0.30)	0.80 (0.85, 0.70)	1.20 (1.27, 1.06)
Power steering	Assist type		—	Engine speed sensing	
	Fluid pressure	kPa (kg/cm <sup>2</sup> , psi)	—	8,584—9,320 (87.5—95, 1,244—1,351)	9,320—9,810 (95—100, 1,351—1,422)
Oil pump drive belt	Deflection mm (in)/98 N (10 kg, 22 lb)	New	—	7.0—8.0 (0.28—0.31)	6.6—7.2 (0.26—0.28)
		Used		8.0—9.0 (0.31—0.35)	7.2—8.0 (0.28—0.31)
	Tension	New		245—294 (25—30, 55—66)	412—471 (42—48, 92.4—105.6)
		Used		196—245 (20—25, 44—55)	353—402 (36—41, 79.2—90.2)

\*<sup>1</sup> Manual steering, measured with wheels off ground. Power steering, measured with wheels on ground.

\*<sup>2</sup> Power steering: complete system.

P. BRAKING SYSTEM

Item		Model	4x4	4x2
Brake type			Front.....disc, Rear.....drum	
Brake pedal	mm (in)	Height (with capet)	180—185 (7.09—7.28)	
		Free play	4.0—7.0 (0.16—0.28)	
		Reserve travel	More than 105 (4.1)	
		Clearance when pedal is depressed at 589 N (60 kg, 132 lb)		
<b>Master cylinder and reserve tank</b>				
Master cylinder	Type		Tandem (with level sensor)	
	Bore diameter mm (in)		22.22 (0.875)	
Clearance between piston and bore	mm (in)	Standard	0.04—0.125 (0.002—0.005)	
		Wear limit	0.15 (0.006)	
Fluid capacity of reserve tank		liter (US qt, Imp qt)	0.16 (0.17, 0.14)	
<b>Front brake (disc)</b>				
Thickness of pad	mm (in)	Standard	10 (0.39)	
		Wear limit	3.0 (0.118)	
Thickness of disc plate	mm (in)	Standard	22 (0.87)	20 (0.79)
		Wear limit	20 (0.79)	18 (0.71)
Runout of disc plate		mm (in)	0.15 (0.006)	
Cylinder inner diameter		mm (in)	53.98 (2.125)	
<b>Rear brake (drum)</b>				
Type			Duoservo	Leading-trailing
Shoe clearance adjustment			Self-adjusting	
Thickness of lining	mm (in)	Standard	5.0 (0.20)	6.3 (0.25)
		Wear limit	1.0 (0.04)	
Diameter of drum	mm (in)	Standard	260.0 (10.24)	
		Wear limit	261.5 (10.30)	
Wheel cylinder bore		mm (in)	17.46 (0.688)	19.05 (0.750)
Clearance between piston and bore	mm (in)	Standard	0.040—0.125 (0.002—0.005)	
		Wear limit	0.15 (0.006)	
<b>Parking brake</b>				
Type			Stick type	
Parking lever notches When lever is pulled at 196 N (20 kg, 44 lb)			7—12 notches	
<b>Power brake unit</b>				
Type			Tandem	Single
Diameter		mm (in)	187 + 213 (7.36 + 8.39)	238 (9.37)
Clearance between master cylinder and brake unit		mm (in)	0—0.5 (0—0.02)	
Fluid pressure per treading force		kPa (kg/cm <sup>2</sup> , psi)	More than 1,962 (20, 284) at 0 mmHg (0 inHg) More than 5,886 (60, 853) at 500 mmHg (19.7 inHg)	More than 1,078 (11, 156) at 0 mmHg (0 inHg) More than 5,390 (55, 782) at 500 mmHg (19.7 inHg)
<b>Rear wheel hydraulic control system</b>				
Type			Rear-wheel Anti-lock Brake System (Rear-wheel ABS)	
<b>Brake fluid</b>				
Grade			FMVSS 116 DOT-3 or SAE J1703	

### Q. WHEELS AND TIRES

Item	Model	4x4		4x2		
		Standard	Temporary	Standard	Temporary	
Wheels	Size	15 x 6JJ	16 x 4T	14 x 5 1/2JJ	16 x 4T	
	Offset	mm (in)	30 (1.18)	48 (1.89)	40 (1.57)	48 (1.89)
	Diameter of pitch circle	mm (in)	139.7 (5.50)			
	Type	Styled or design				
Tires	Size	P215/75R15 P235/75R15	T155/90D16	P205/75R14	T135/80D16	
	Air pressure kPa (kg/cm <sup>2</sup> , psi)	Front	196 (2.0, 28)	415 (4.2, 60)	180 (1.8, 26)	415 (4.2, 60)
		Rear	216 (2.2, 31)		235 (2.4, 35)	
Wheel and tire runout limit		mm (in)	Horizontal.....2.0 (0.079), Vertical.....1.5 (0.059)			
Wheel unbalance at rim edge (on one side)		g (oz)	10 (0.35)			

### R. SUSPENSION

Item	Model	4x2		4x4		
<b>Front Suspension</b>						
Suspension		Double wishbone				
Springs		Torsion bar spring				
Springs	Type					
	Dimensions (bar diameter x length)	mm (in)	21.9 x 901 (0.86 x 35.47)	23.8 x 924 (0.94 x 36.38)		
Stabilizer		Torsion bar				
Shock absorbers	Type	Cylindrical, double-acting				
	Damping force N (kg, lb) at 0.3 m/s	Extended	785 ± 118 (80 ± 12, 176 ± 26)	1,825 ± 255 (186 ± 26, 409 ± 57)		
		Compressed	245 ± 59 (25 ± 6, 55 ± 13)	530 ± 98 (54 ± 10, 119 ± 22)		
Front wheel alignment (*Unladen condition)	Turning angle	Inner	35°00' ± 2°	33°30' ± 2°		
		Outer	33°00' ± 2°	30°00' ± 2°		
	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)			
		degree	18' ± 18'			
	Camber angle		0°45' <sup>+30'</sup> <sub>-20'</sub>	1°00' <sup>+30'</sup> <sub>-20'</sub>		
	Caster angle		Manual steering: 0°50' ± 45' Power steering: 1°50' ± 45'	2°00' ± 45'		
	Kingpin angle		8°15'	10°20'		
Caster trail	mm (in)	4.4 (0.17)	12 (0.47)			
<b>Rear Suspension</b>						
Suspension		Rigid axle				
Springs		Semielliptic leaf spring				
Springs	Type					
	Dimensions (length x width x thickness)	mm (in)	1,566 x 60 x 7 (61.65 x 2.36 x 0.28)	1,422 x 60 x 9 (55.98 x 2.36 x 0.35)		
			1,132 x 60 x 6 (44.57 x 2.36 x 0.24)	979 x 60 x 6 (38.54 x 2.36 x 0.24)		
			966 x 60 x 6 (38.03 x 2.36 x 0.24)	844 x 60 x 6 (33.23 x 2.36 x 0.24)		
		790 x 60 x 14 (31.10 x 2.36 x 0.55)	639 x 60 x 12 (25.16 x 2.36 x 0.47)			
Shock absorbers	Type	Cylindrical, double-acting				
	Damping force N (kg, lb) at 0.3 m/s	Extended	687 ± 108 (70 ± 11, 154 ± 24)	1,079 ± 167 (110 ± 17, 242 ± 37)		
		Compressed	471 ± 98 (48 ± 10, 106 ± 22)	441 ± 98 (45 ± 10, 99 ± 22)		

\* Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack, and tools in designated position.



**T. BODY ELECTRICAL SYSTEM**

Item		Wattage (BULB TRADE NO.)
Headlight	Standard	65/55 (6052)
	Halogen	65/35 (H6054)
Parking and front side marker light		8 (67)
Turn signal light	Front	27 (1156)
	Rear	27 (1156)
Back-up light		27 (1156)
Stop/tail light and rear side marker light		27/8 (1157)
License plate light		6
Interior lamp		10 (10×2 Cab Plus)
<b>Indicator and warning lights</b>		
Alternator		1.4
Brake		1.4
Check (MIL)		1.4
Hazard		3.4
High beam		3.4
O/D OFF		1.4
Oil pressure		1.4
Seat belt		1.4
Turn signal		3.4
A/T oil temperature		1.4
Neutral		1.4
Hold		1.4
4x4		1.4
Anti-lock		1.4
<b>Illumination lights</b>		
A/C switch		1.4
Ashtray		3.4
Blower		3.4
A/T selector		3.4
Heater		3.4
Meter		3.4
Audio		1.4
RFW main switch		1.4
Cigarette lighter		0.7
Cruise control main switch		1.4

**U. HEATER AND AIR CONDITIONING SYSTEM**

Item		Specifications
Refrigerant amount	g (oz)	800 (28.2)
Compressor oil amount	cc (cc in)	135 (8.2)
Refrigerant normal pressure	kPa (kg/cm <sup>2</sup> , psi)	Low pressure: 98—167 (1.0—1.7, 14—24) High pressure: 1,030—1,275 (10.5—13.0, 149—185)

### STANDARD BOLT AND NUT TIGHTENING TORQUE

Diameter mm (in)	Pitch mm (in)	4T			6T			8T		
		N-m	m-kg	ft-lb	N-m	m-kg	ft-lb	N-m	m-kg	ft-lb
6 (0.236)	1 (0.039)	4.2—6.2	0.43—0.63	3.1—4.6	6.9—9.8	0.7—1.0	5.0—7.2	7.8—11.8	0.8—1.2	5.8—8.8
8 (0.315)	1.25 (0.049)	9.8—14.7	1.0—1.5	7.2—10.8	16—23	1.6—2.3	12—17	18—26	1.8—2.7	13—20
10 (0.394)	1.25 (0.049)	20—28	2.0—2.9	14—21	31—46	3.2—4.7	23—34	36—54	3.7—5.5	27—40
12 (0.472)	1.5 (0.059)	34—50	3.5—5.1	25—37	55—80	5.6—8.2	41—59	63—93	6.4—9.5	46—69
14 (0.551)	1.5 (0.059)	—	—	—	75—103	7.7—10.5	56—76	102—137	10—14	75—101
16 (0.630)	1.5 (0.059)	—	—	—	116—157	12—16	85—116	156—211	16—22	115—156
18 (0.709)	1.5 (0.059)	—	—	—	167—225	17—23	123—166	221—299	23—31	163—221
20 (0.787)	1.5 (0.059)	—	—	—	231—314	24—32	171—231	308—417	31—43	227—307
22 (0.866)	1.5 (0.059)	—	—	—	314—423	32—43	231—312	417—564	43—58	307—416
24 (0.945)	1.5 (0.059)	—	—	—	475—546	41—56	298—403	536—726	55—74	396—536

# **SPECIAL TOOLS**

<b>GENERAL INFORMATION .....</b>	<b>ST- 2</b>
<b>ENGINE.....</b>	<b>ST- 3</b>
<b>CLUTCH AND MANUAL TRANSMISSION ...</b>	<b>ST- 4</b>
<b>AUTOMATIC TRANSMISSION.....</b>	<b>ST- 5</b>
<b>DIFFERENTIAL .....</b>	<b>ST- 6</b>
<b>PROPELLER SHAFT .....</b>	<b>ST- 7</b>
<b>FRONT AND REAR AXLES.....</b>	<b>ST- 7</b>
<b>BRAKING SYSTEM.....</b>	<b>ST- 9</b>
<b>STEERING SYSTEM AND SUSPENSION ....</b>	<b>ST- 9</b>
<b>AIR CONDITIONER SYSTEM .....</b>	<b>ST-10</b>
<b>CHECKER AND OTHER EQUIPMENT.....</b>	<b>ST-11</b>

2BUSTX-001

**GENERAL INFORMATION**

The letters A and B in the priority column indicate the degree of importance of each tool.

**A.....Indispensable**

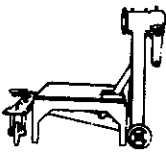
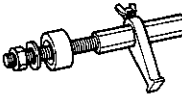
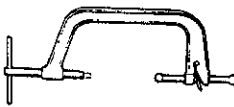


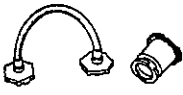
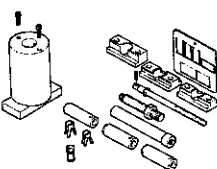
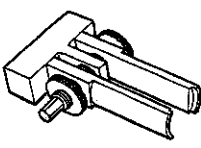
The tools ranked A in this list are indispensable for performing operations satisfactorily, easily, safely, and efficiently. It is, therefore advisable that all service shops have these tools.

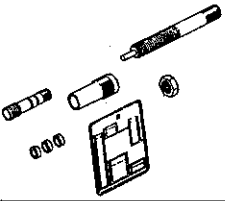
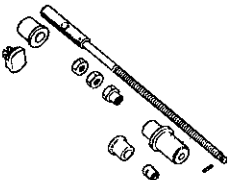
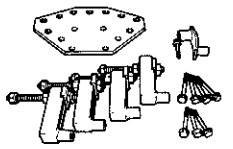
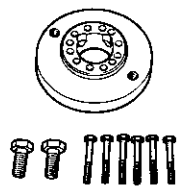

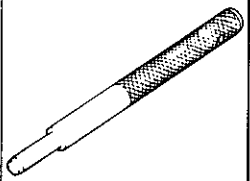
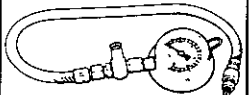
**B.....Selective**

The tools in this list are not as necessary as tools ranked A, but all service shops should have these tools to perform repairs more easily and more efficiently.

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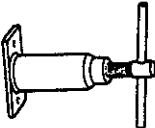
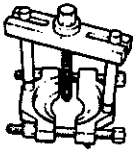
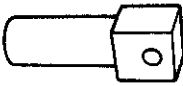

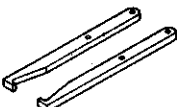

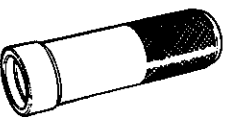

ENGINE

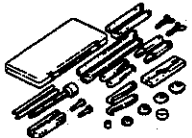
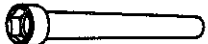
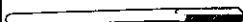


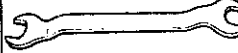
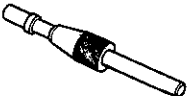

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 E011 1A0 Brake set, ring gear	A	
49 0636 100A Arm, valve spring lifter	A	
49 S120 710 Holder, coupling flange	A	
49 1285 071 Puller, bearing	A	
49 9200 145 Adapter set, radiator cap tester	A	
49 L011 0A0 Piston pin setting tool set	A	
49 B012 0A2 Pivot	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L012 0A0 Installer set, valve seal & valve guide	A	
49 L011 2A0 Replacer set, balance shaft bushing (G6)	A	
49 L010 1A0 Hanger set, engine stand	A	
49 H011 101A Lock tool, crankshaft	A	
49 0249 010A Remover & installer, valve guide (G6)	A	
49 0221 251A Remover & installer, valve guide (F2)	A	
49 0187 280 Gauge, oil pressure	A	
—	—	—

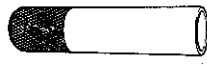
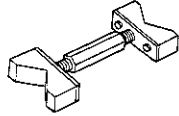

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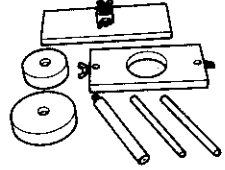
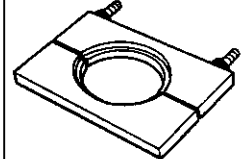
## CLUTCH AND MANUAL TRANSMISSION

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 430 Main drive shaft pusher	A	
49 0710 520 Puller, bearing	A	
49 0259 440 Holder, mainshaft	A	
49 0636 145 Puller, fan pulley boss	A	
49 H017 101 Hook	A	
49 0180 321A Installer, bearing	A	
49 F401 331 Body (4x4)	A	
49 F401 335A Attachment A (4x4)	A	

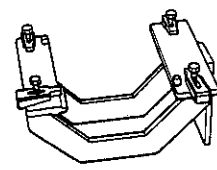
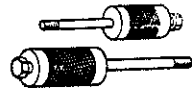
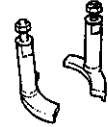
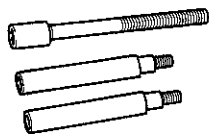
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0839 425C Puller set, bearing	A	
49 1243 465A Wrench, mainshaft locknut	A	
49 0187 451A Guide, interlock pin assembly	B	
49 0500 330 Installer, transmission bearing	A	
49 0862 350 Guide, shift fork	B	
49 0164 631A Spanner, locknut (F2 4-speed)	A	
49 SE01 310A Clutch disc centering tool	A	
49 F401 337A Attachment C (4x4)	A	

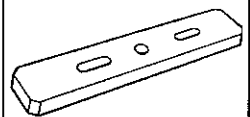

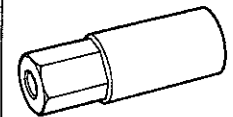
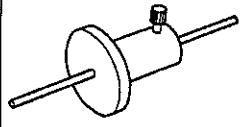
CLUTCH AND MANUAL TRANSMISSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0727 415 Installer, bearing (4x4)	A	
49 S231 395 Chain expansion tool (4x4)	A	
49 0259 770B Wrench, flare nut	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U017 3A0A Guide set, shim select (4x4)	A	
49 G030 370 Removing plate (4x4)	A	
—	—	—

AUTOMATIC TRANSMISSION

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U019 0A0A Transmission hanger	A	
49 0378 390 Puller, oil pump	A	
49 G019 025 Body B (EC-AT)	A	
49 L019 001 Bolts (EC-AT)	A	

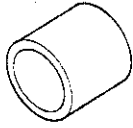
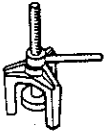
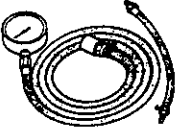

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G019 026 Plate (EC-AT)	A	
49 G019 027 Attachment A (EC-AT)	A	
49 G019 029 Nut (EC-AT)	A	
49 G032 355 Adjust gauge (except EC-AT)	B	

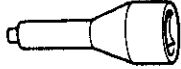
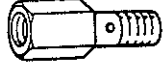

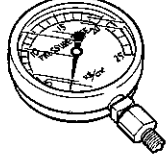
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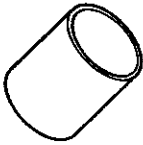

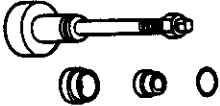
## SPECIAL TOOLS

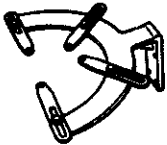
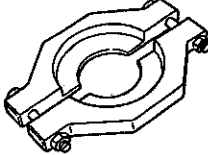
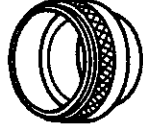
### AUTOMATIC TRANSMISSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 003 Installer, oil seal (EC-AT)	A	
49 0378 375 Compressor, clutch spring (except EC-AT)	A	
49 0378 400A Gauge set, oil pressure	A	
49 H019 002 Adapter	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0378 346 Hex-head wrench (except EC-AT)	A	
49 H075 406 Adapter (except EC-AT)	A	
49 S019 0A0 Set, centering tool (except EC-AT)	A	
49 B019 901 Gauge, oil pressure	A	


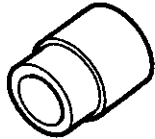
### DIFFERENTIAL

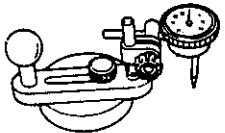
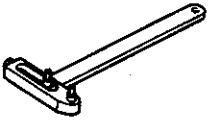
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H027 001 Collar	A	
49 G030 795 Installer, oil seal (4x4)	A	
49 8531 565 Pinion model	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 M005 561 Hanger, differential carrier	A	
49 H027 002 Remover, bearing	A	
49 G030 338 Attachment E	A	

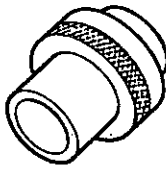
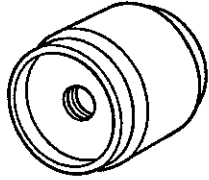
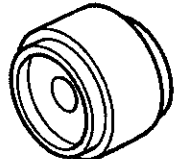


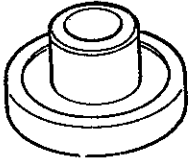
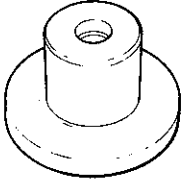
DIFFERENTIAL (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 555 Gauge block	A	
49 U027 001 Collar	A	

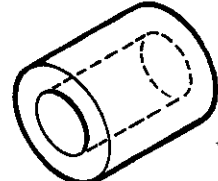
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0727 570 Gauge body, pinion height	A	
49 0259 720 Adjustment wrench, side bearing	B	

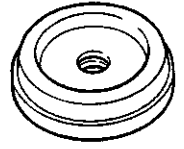
PROPELLER SHAFT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H025 003 Installer, bearing	A	
49 H025 002 Installer, dust seal	A	
49 B025 001 Body	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H033 101 Remover, bearing	A	
49 F026 102 Remover, bearing	A	
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FRONT AND REAR AXLES


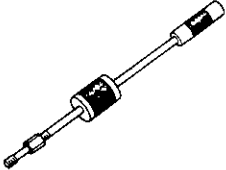
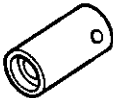
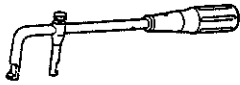
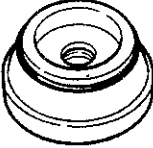
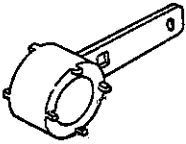

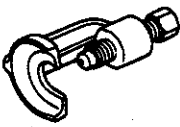
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 006 Installer, bearing (4x4)	A	

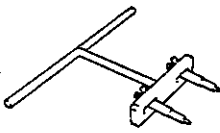
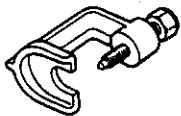
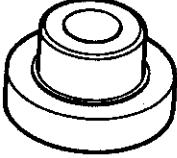
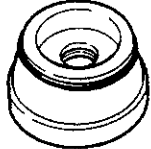
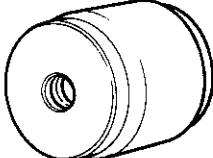


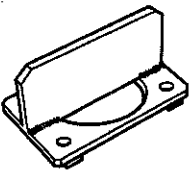
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 004 Attachment $\phi$ 80	A	

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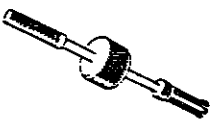
## SPECIAL TOOLS

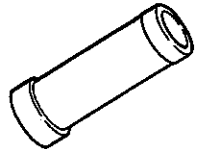
## FRONT AND REAR AXLES (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 005 Installer, bearing (4x4)	A	
49 0813 215A Puller, tubular dowel	A	
49 U027 007 Installer, oil seal (4x4)	A	
49 U027 004 Remover, oil seal (4x4)	A	
49 F027 007 Attachment $\phi 72$	A	
49 0603 635A Wrench, rear shaft bearing nut	A	
49 S120 520A Puller, rear axle shaft bearing	A	
49 0118 850C Puller, ball joint	A	

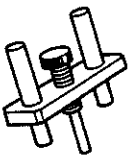
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 S231 635 Wrench, locknut (4x4)	A	
49 0727 575 Puller, ball joint	A	
49 U033 101 Installer, bearing (4x4)	A	
49 F027 005 Attachment $\phi 62$	A	
49 W027 001 Installer, oil seal	A	
49 S120 748 Attachment	A	
49 M005 795 Installer set, oil seal (4x4)	A	
49 S120 645A Holder, rear shaft	A	


FRONT AND REAR AXLES (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 S231 660 Puller, bearing (4x4)	A	

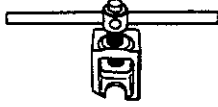

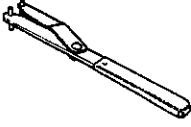

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U025 001 Installer, protector (4x4)	A	



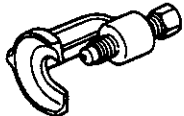
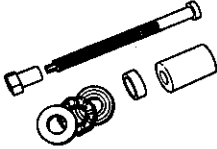
BRAKING SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F043 001 Adjust gauge	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0221 600C Disc brake expand tool	B	

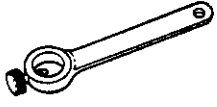
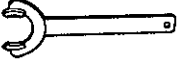
STEERING SYSTEM AND SUSPENSION

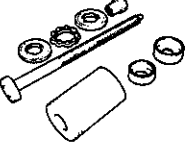
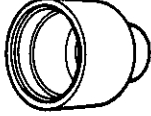
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0223 695E Puller, pitman arm	A	
49 1391 580 Wrench, locknut	A	
49 W023 585A Adjust wrench	A	
49 B032 302 Adapter	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1232 670A Gauge set, power steering	A	
49 H002 671 Adapter	A	
49 0118 850C Puller, ball joint	A	
49 U034 2A0 Lower arm bushing puller and installer	A	

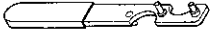
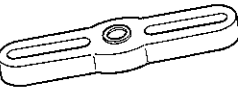

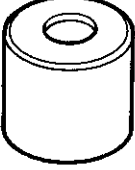
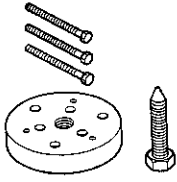
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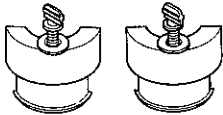
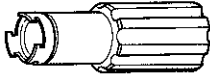
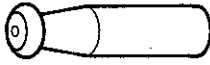

### STEERING SYSTEM AND SUSPENSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0180 510B Preload measuring attachment	B	
49 UB39 585 Adjust wrench	A	

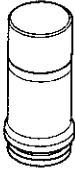
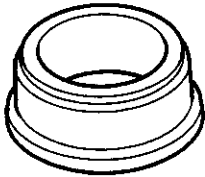
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 UB39 615 Bushing puller and installer set	A	
49 1243 785 Installer, dust boot (Upper arm & outer ball joint)	A	

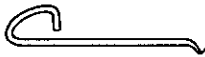
### AIR CONDITIONER SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0809-01 Holder, clutch	A	
0000-41-0804-57 Universal puller body	A	
0000-41-0804-51 Universal puller arbor	A	
0000-41-0810-77 Clutch pilot	A	
0000-41-0809-02 Puller, clutch plate	A	

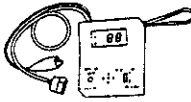
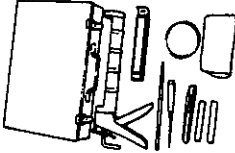
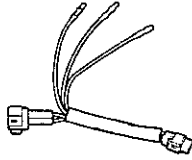
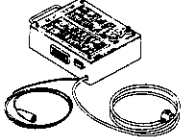
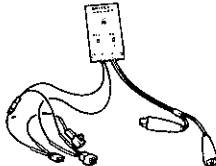
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0810-73 Remover & installer, seal seat	A	
0000-41-0810-76 Removal set, pulley & clutch	A	
0000-41-0812-11 Remover & installer, seal	A	
000-41-0812-13 Protector, seal sleeve	A	
0000-41-0809-10 Protector shaft pilot	A	



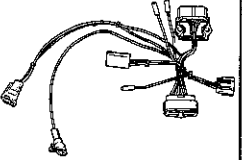
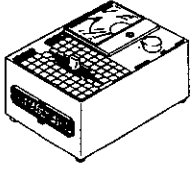
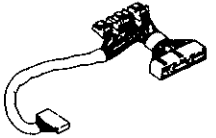
AIR CONDITIONER SYSTEM (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0804-43 Installer, clutch rotor bearing	A	
0000-41-0810-59 Driver clutch rotor	A	

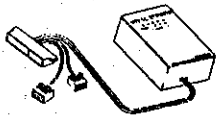
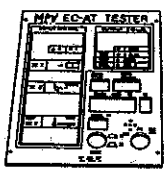
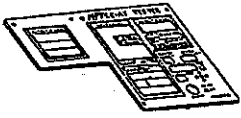
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0804-12 Remover, O-ring	A	
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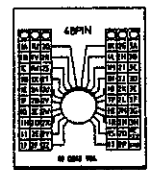
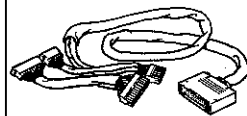
CHECKER AND OTHER EQUIPMENT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H018 9A1 Checker, Self-diagnosis	A	
49 0305 870A Tool set, window	A	
49 G018 901 Adapter harness (Throttle sensor)	A	
49 G019 901A EC-AT tester	A	
49 F018 002 Igniter checker	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 866A Inserting tool, seal pusher & blade	B	
49 G019 901 EC-AT tester 49 H019 902 Adapter unit	A	
49 N018 001 Adapter harness (Igniter checker)	A	
49 9200 162 Monitor, engine signal	A	
49 G018 903 Adapter harness (Engine signal monitor)	A	

### CHECKER AND OTHER EQUIPMENT (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L019 901 Adapter (EC-AT tester)	A	
49 L019 902 Panel (EC-AT tester)	A	
49 L019 903 Panel (EC-AT tester)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G018 904 Sheet (Engine signal monitor)	A	
49 U018 001 Adapter harness A	A	
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