

# 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 notification or advance notice.

All rights reserved. No part of this book may be reproduced or used in any form or by any means, electronic or mechanical, including photocopying and recording and the use of any kind of information storage and retrieval system—without permission in writing.

**Mazda Motor Corporation**  
**HIROSHIMA, JAPAN**

### APPLICATION:

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

## CONTENTS

Title		Section
General Information		GI
Pre-Delivery Inspection and Scheduled Maintenance Services		A
Engine	B2200	B1
	B2600i	B2
Lubrication System		D
Cooling System		E
Fuel and Emission Control Systems	Carburetor	F1
	EGI	F2
Engine Electrical System		G
Clutch		H
Manual Transmission	B2200	J1
	B2600i	J2
	Transfer Case	J3
Automatic Transmission	Hydraulically-Controlled	K1
	Electronically-Controlled	K2
	Transfer Case	K3
Propeller Shaft		L
Front and Rear Axles		M
Steering System		N
Braking System		P
Wheels and Tires		Q
Suspension		R
Body		S
Body Electrical System		T
Heater and Air Conditioner Systems		U
Technical Data		TD
Special Tools		ST
Parts Index		PI
Wiring Diagram (Part No. 5201-10-91G) (9999-95-020G-92)		Z

© 1991 Mazda Motor Corporation  
PRINTED IN USA, JUL. '91  
1269-10-91G  
(9999-95-022B-92)

## 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 ~  
JM2UF814\* NO 250001 ~  
JM2UF514\* NO 250001 ~  
JM2UF223\* NO 250001 ~

# GENERAL INFORMATION

<b>IMPORTANT INFORMATION</b> .....	<b>GI- 2</b>
BASIC ASSUMPTIONS.....	<b>GI- 2</b>
SAFETY RISK .....	<b>GI- 2</b>
POSSIBLE LOSS OF WARRANTY .....	<b>GI- 2</b>
WARNING ON LUBRICANTS AND GREASES.....	<b>GI- 2</b>
<b>HOW TO USE THIS MANUAL</b> .....	<b>GI- 3</b>
PREPARATION .....	<b>GI- 3</b>
REPAIR PROCEDURE.....	<b>GI- 3</b>
SYMBOLS.....	<b>GI- 4</b>
NOTES, CAUTIONS, AND WARNINGS.....	<b>GI- 4</b>
<b>FUNDAMENTAL PROCEDURES</b> .....	<b>GI- 4</b>
PROTECTION OF THE VEHICLE .....	<b>GI- 4</b>
A WORD ABOUT SAFETY .....	<b>GI- 5</b>
PREPARATION OF TOOLS AND MEASURING EQUIPMENT .....	<b>GI- 5</b>
SPECIAL TOOLS.....	<b>GI- 5</b>
REMOVAL OF PARTS.....	<b>GI- 5</b>
DISASSEMBLY .....	<b>GI- 5</b>
RE-ASSEMBLY .....	<b>GI- 6</b>
ADJUSTMENTS .....	<b>GI- 7</b>
RUBBER PARTS AND TUBING .....	<b>GI- 7</b>
<b>JACK AND SAFETY STAND (RIGID RACK)</b>	
POSITIONS.....	<b>GI- 8</b>
<b>VEHICLE LIFT (2-SUPPORT TYPE)</b>	
POSITIONS.....	<b>GI- 9</b>
<b>TOWING</b> .....	<b>GI-10</b>
WITH MANUAL TRANSMISSION.....	<b>GI-10</b>
WITH AUTOMATIC TRANSMISSION .....	<b>GI-10</b>
<b>CHASSIS NUMBER LOCATION</b> .....	<b>GI-11</b>
<b>ENGINE MODEL AND NUMBER</b>	
LOCATION .....	<b>GI-11</b>
UNITS .....	<b>GI-11</b>
<b>ABBREVIATIONS</b> .....	<b>GI-11</b>
<b>CAUTION</b> .....	<b>GI-12</b>
ELECTRICAL TROUBLESHOOTING TOOLS .....	<b>GI-12</b>
CAUTION WITH ELECTRICAL PARTS.....	<b>GI-12</b>

153 JG101 001

**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.

944UG13-002

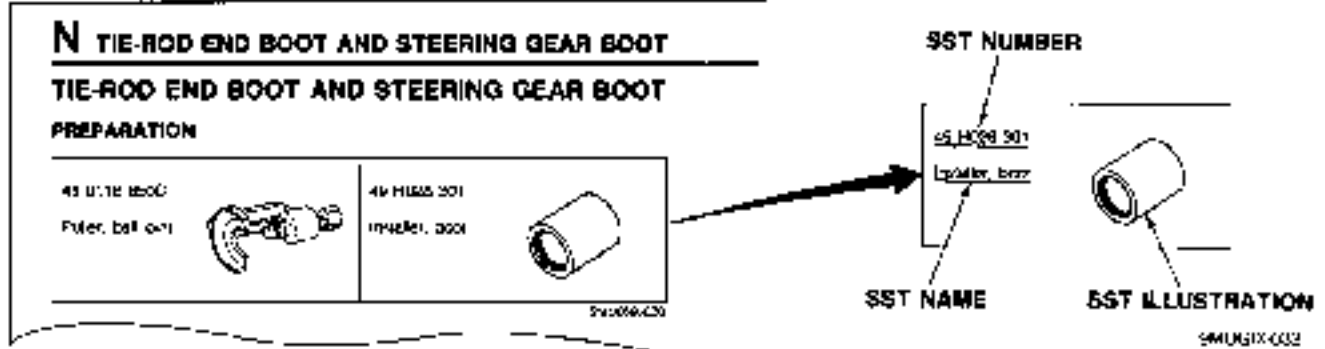


HOW TO USE THIS MANUAL

PREPARATION

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

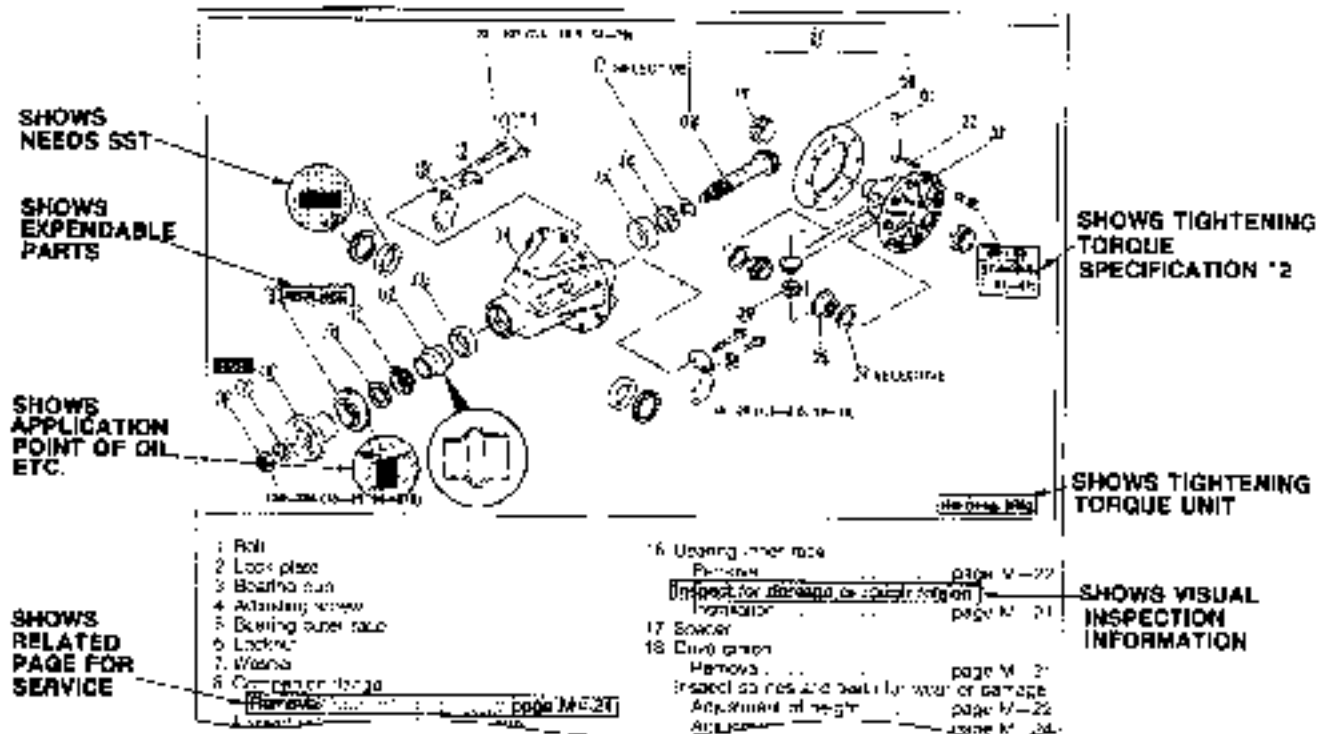
Example:



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:



**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

9MUBX-035

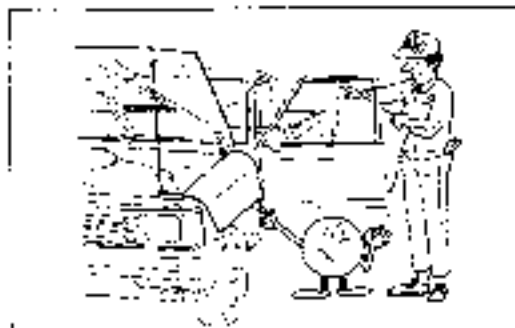
**Note**

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.

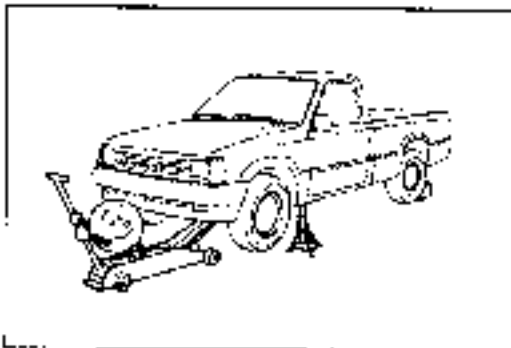
9MUGX-036



9MUGX-037

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

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



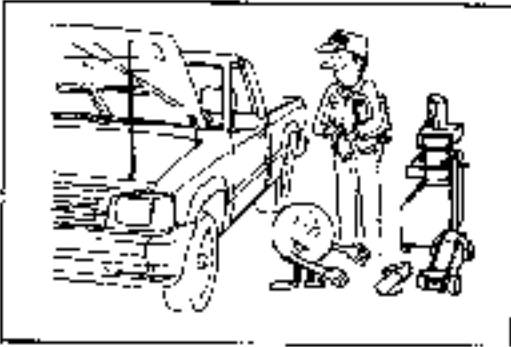
SMU3IX-306

**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.

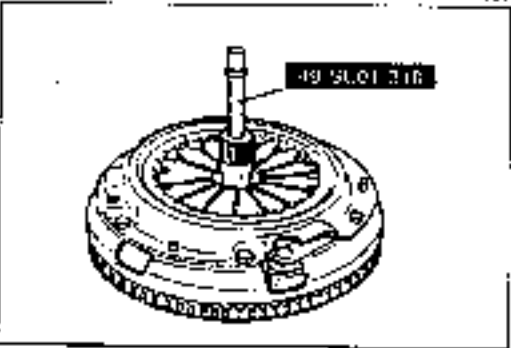
Start the engine only after making certain the engine compartment is clear of tools and people.



SMU3IX-438

**PREPARATION OF TOOLS AND MEASURING EQUIPMENT**

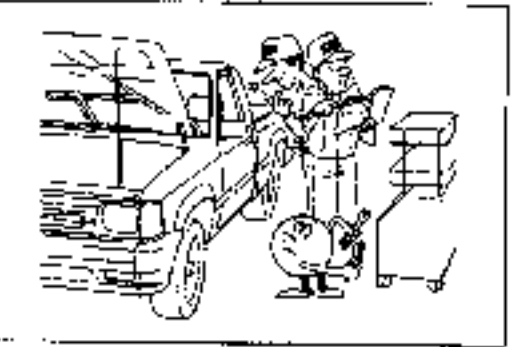
Be sure that all necessary tools and measuring equipment are available before starting any work.



47 106X-005

**SPECIAL TOOLS**

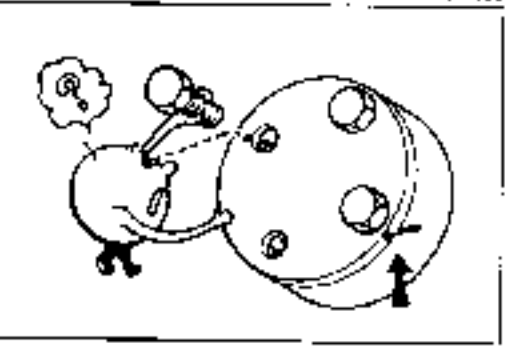
Use special tools when they are required.



47 106X-000

**REMOVAL OF PARTS**

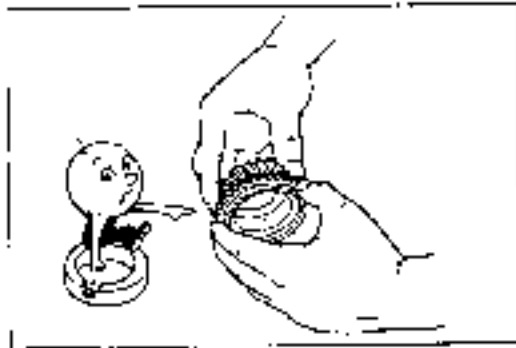
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



SMU3IX-029

**DISASSEMBLY**

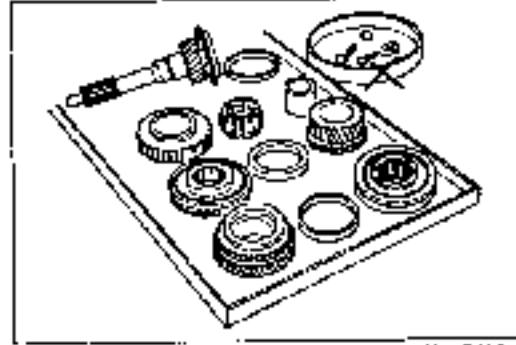
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



SMUGIX-040

### 1. Inspection of parts

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

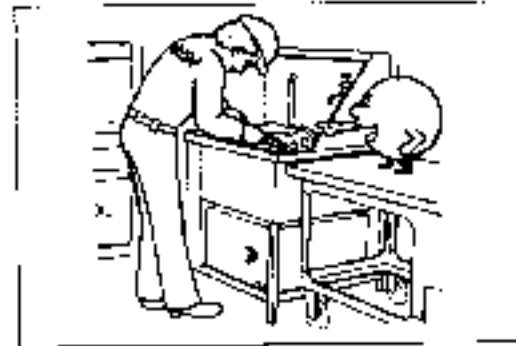


AMJG X-C41

### 2. Arrangement of parts

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

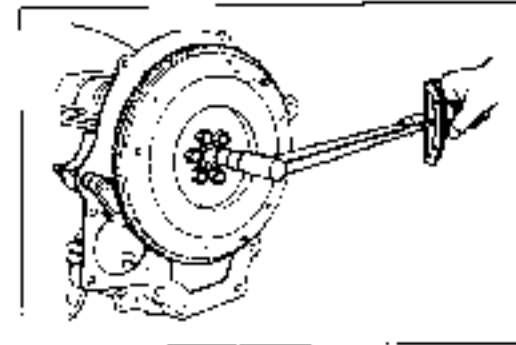
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



4700GK-010

### 3. Cleaning parts for reuse

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



SMUGIX-004

### REASSEMBLY

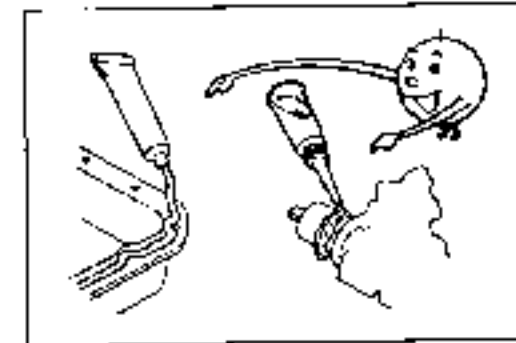
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts. Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in Section TD for tightening torques not mentioned in the main text.

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

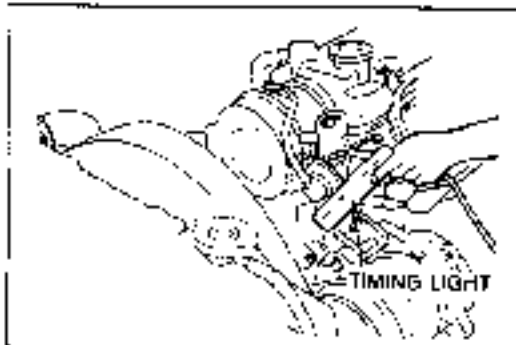
- |                |                 |
|----------------|-----------------|
| 1. Oil seals   | 2. Gaskets      |
| 3. O-rings     | 4. Lock washers |
| 5. Cotter pins | 6. Nylon nuts   |

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.



20XJELP6

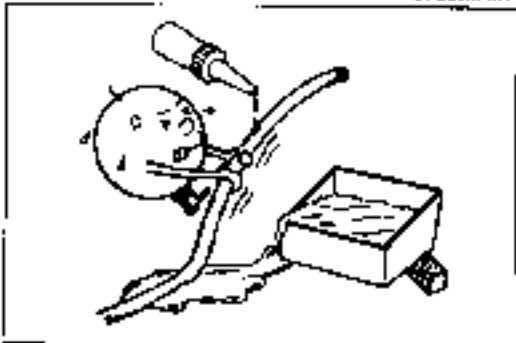


67UG57-007

**ADJUSTMENTS**

Use si. table gauges and/or testers when making adjustments.

GI



67UG14-006

**RUBBER PARTS AND TUBING**

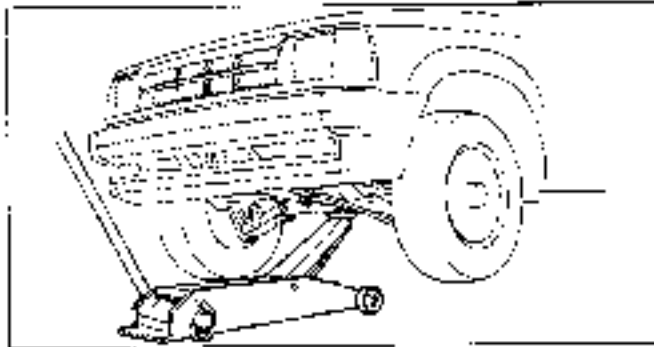
Prevent gasoline or oil from getting on rubber parts or tubing.

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

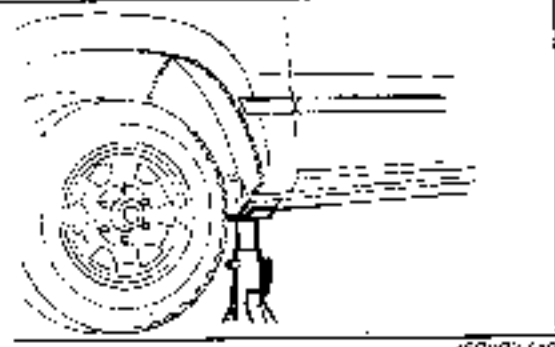
**FRONT**

**Jack position:**  
At the center of the crossmember

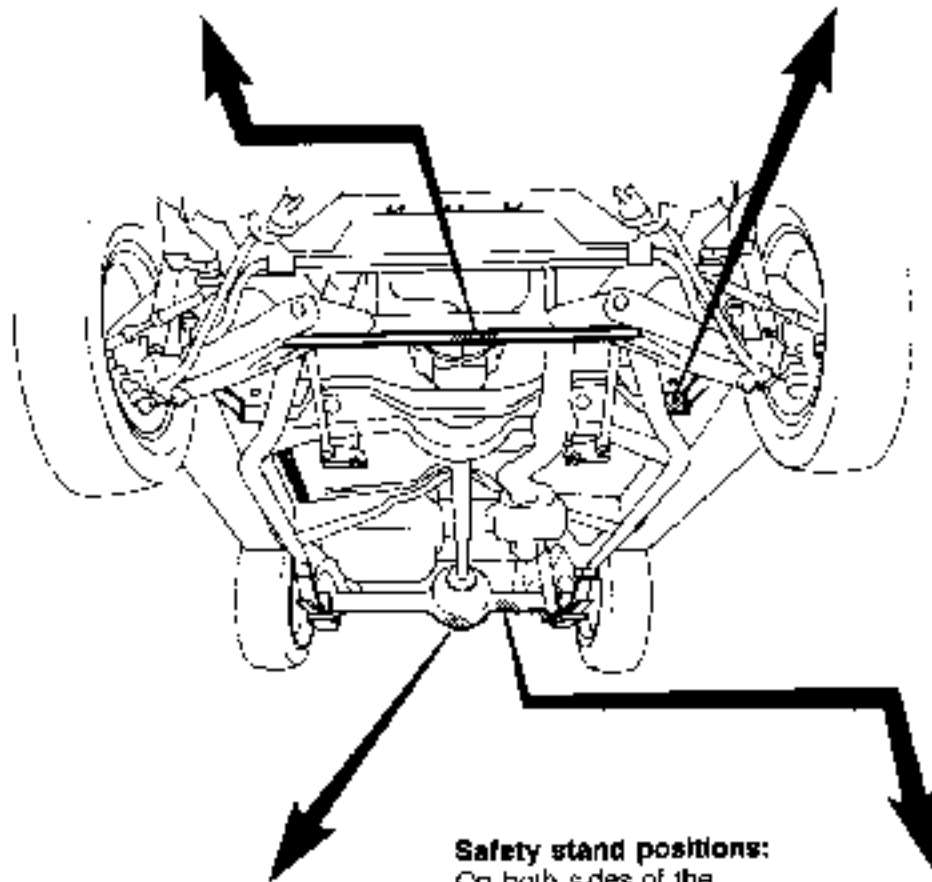
**Safety stand positions:**  
On both sides of the jack point



4EG0GK-013



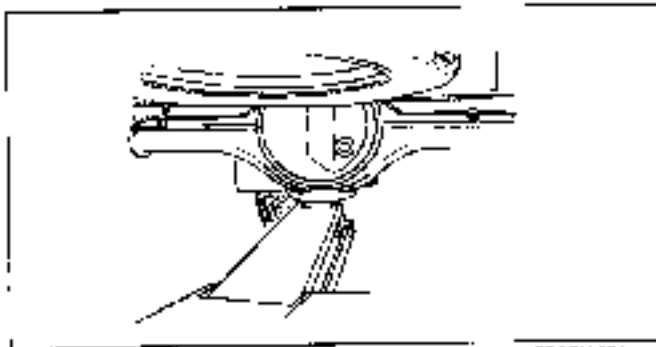
4EG0KX-4.19



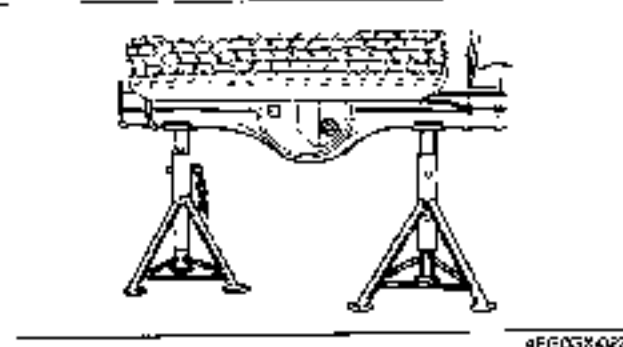
**REAR**

**Jack position:**  
At the center of the differential

**Safety stand positions:**  
On both sides of the differential



4EG0GK-021



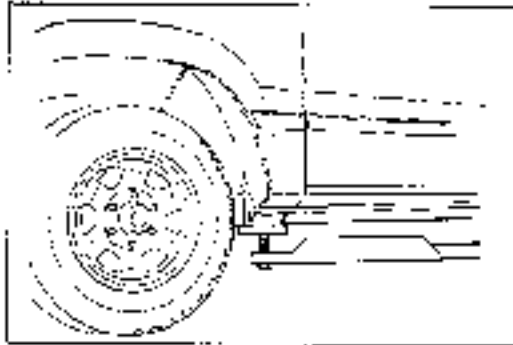
4FE0GM-022

VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

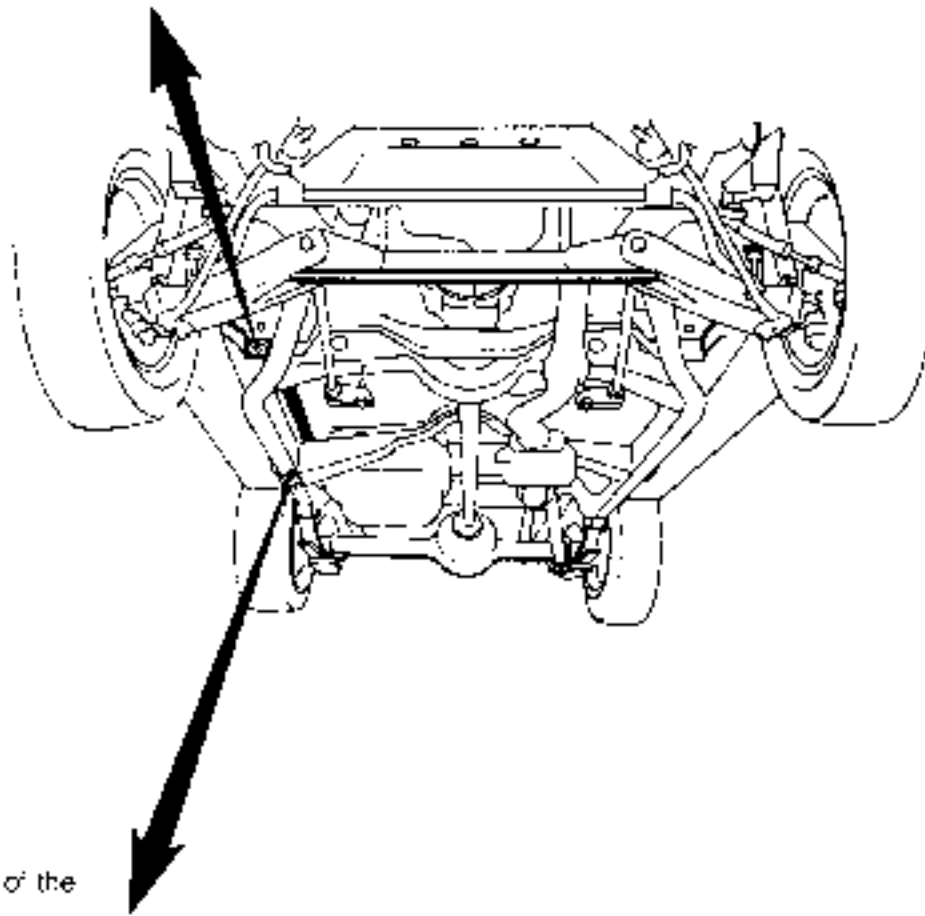
FRONT

**Jack point:**

On both sides of the jack point



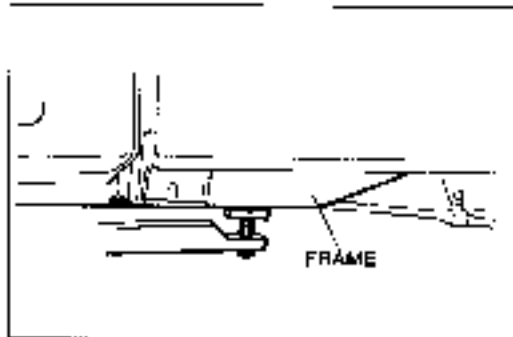
2E1U03X-019



REAR

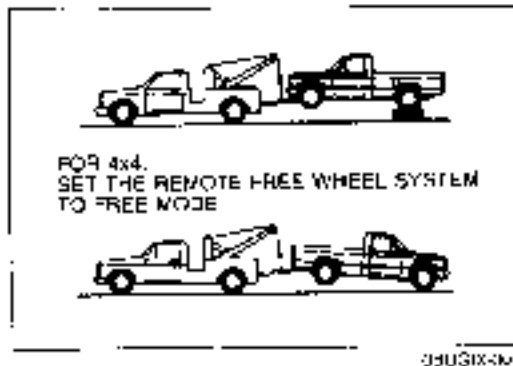
**Leaf-spring:**

On both sides of the leaf-spring



4EG06Y-027

GI



95U31X-07

## TOWING

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)	55 km/h (35 mph)
Towing distance	15 km (10 miles)	56 km (35 miles)

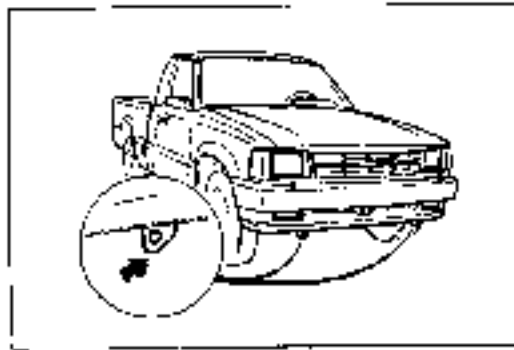
If towing speed and/or distance will exceed above-mentioned specifications, use one of three methods:

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

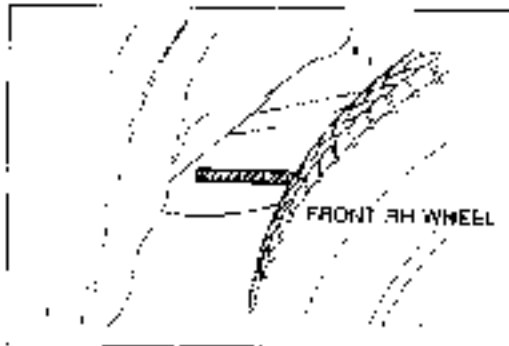
- a) The power assist for the brakes is inoperative while the engine is off.
- b) When either of the towing hooks is used, pull the cable or chain straight away from the hook and do not apply any sideways force to it. To further help prevent damage, do not take up slack too quickly in the cable or chain.
- 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).



4E5D6X-07



CHASSIS NUMBER LOCATION



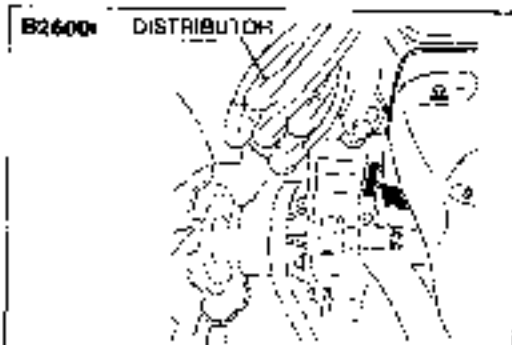
4B300X-106

UNITS

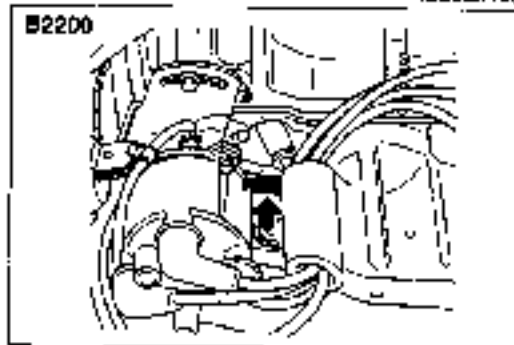
Nm (m-cg, ft-lb)	Torque
rpm	Revolutions per minute
A	Ampere(s)
V	Volt(s)
Ω	Ohm(s) (resistance)
kPa (kg/cm <sup>2</sup> , psi)	Pressure (usually positive)
mmHg (in Hg)	Pressure (usually negative)
W	Watt
mm (in)	Length

4B300X-016

ENGINE MODEL AND NUMBER LOCATION



4B300X-008

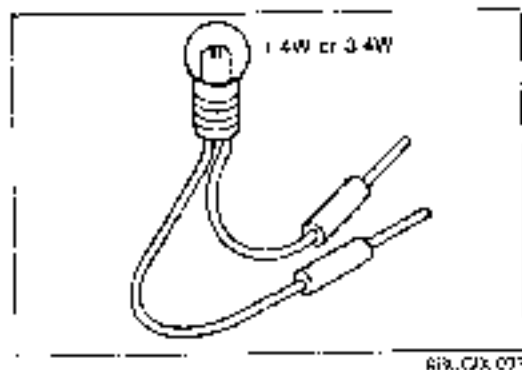


4B300X-007

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
AT	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
H/A	Hydraulic lash adjuster
IC	Integrated circuit
IG	Ignition
IN	Inlet
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	Preburning bypass valve
PCV	Positive crankcase ventilation
PS	Power steering
RFW	Remole free wheel hub
RH	Right hand
SW	Switch
TAS	Throttle adjust screw
TDC	Top dead center
VRS	Vibration reducing silencer

4B03X-001



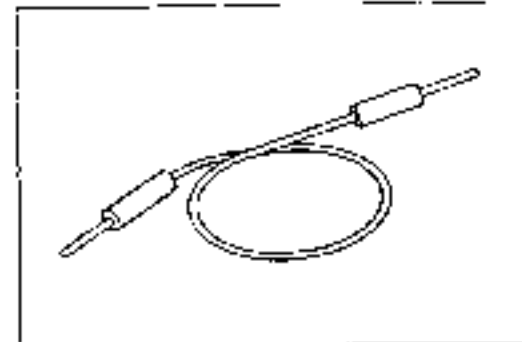
619,02X,073

**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.**



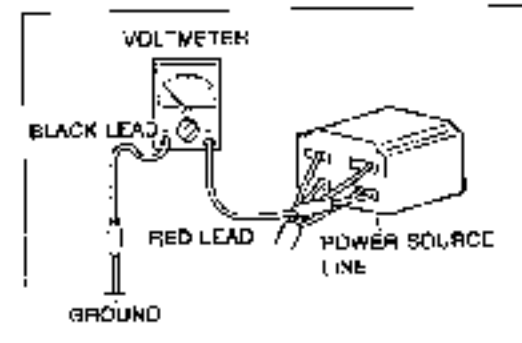
9M, J5, VC22

**Jumper Wire**

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

**Caution**

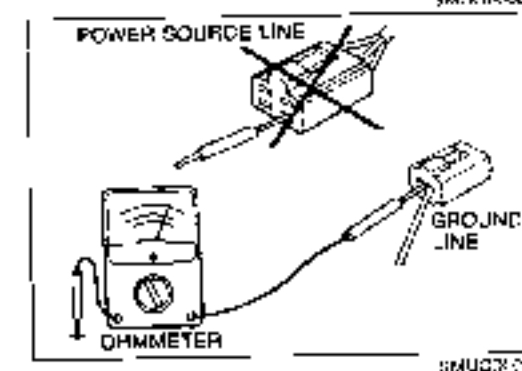
**Do not connect a jumper wire from the power source line to a body ground; this may cause burning or other damage to harnesses or electronic components.**



9M, J5, VC21

**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.



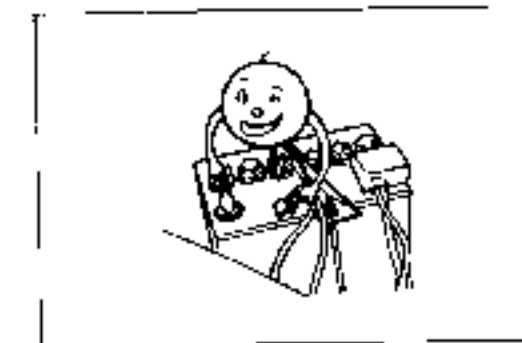
9M, J5, VC20

**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**

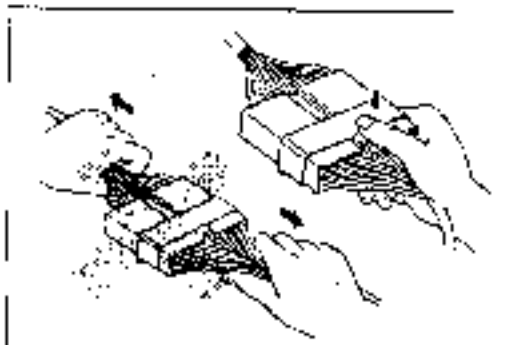
**Do not attempt to connect the ohmmeter to any circuit to which voltage is applied; this may burn or otherwise damage the ohmmeter.**



9M, J5, VC22

**CAUTION WITH ELECTRICAL PARTS****Battery Cable**

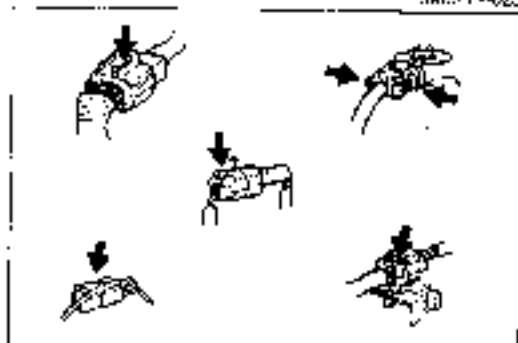
Before disconnecting connectors or replacing electrical parts, disconnect the negative battery cable.



8M1173-4-020

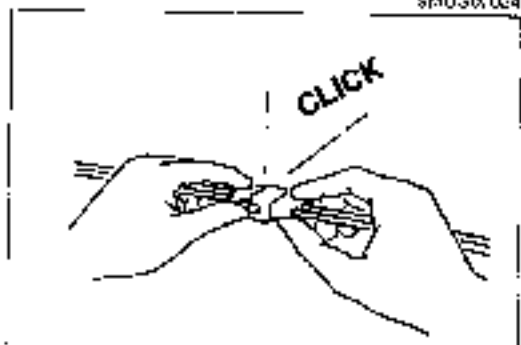
**Connectors****Removal of connector**

Never pull on the wiring harness when disconnecting connectors.



8M1173-024

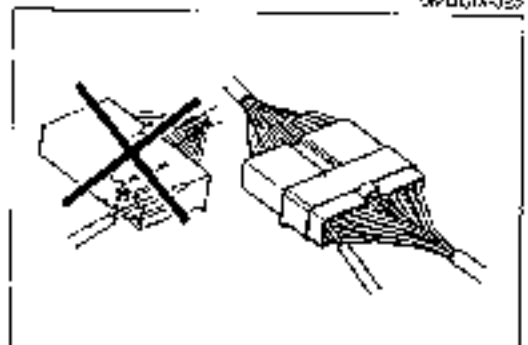
Connectors can be removed by pressing or pulling the lock lever as shown.



8M1173-025

**Locking of connector**

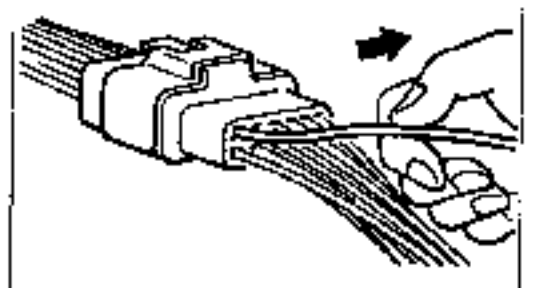
When locking connectors, make sure to listen for a click that will indicate they are securely locked.



8M1173-1126

**Inspection**

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



8M1173-1127

**Terminals****Inspection**

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

## CAUTION

### Replacement of terminals

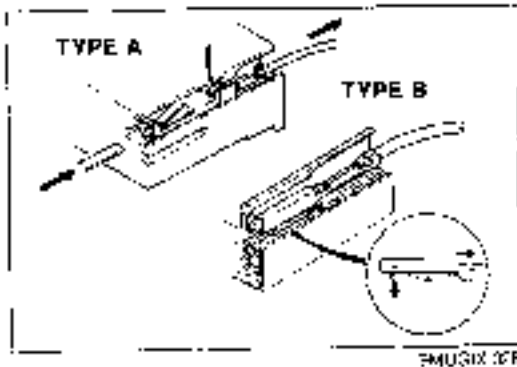
Use the appropriate tools to remove the terminal as shown. When installing the terminal, be sure to insert it until it locks securely.

#### <Female>

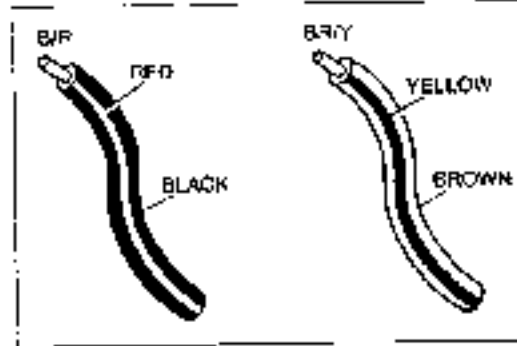
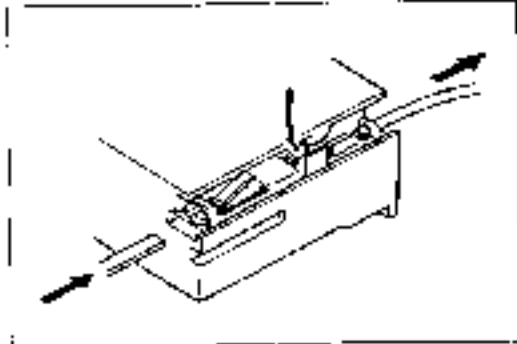
Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.

#### <Male>

Same as the female type.



BMJG13 20R



BMJG13 20B

### Wiring Harness

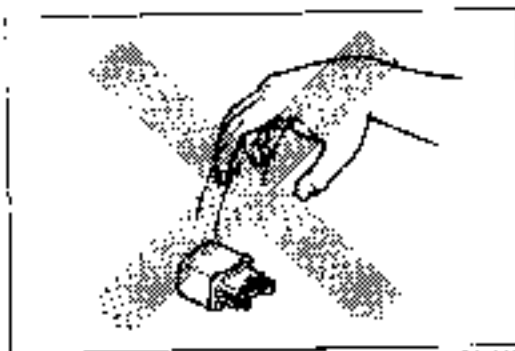
#### Wiring color codes

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.

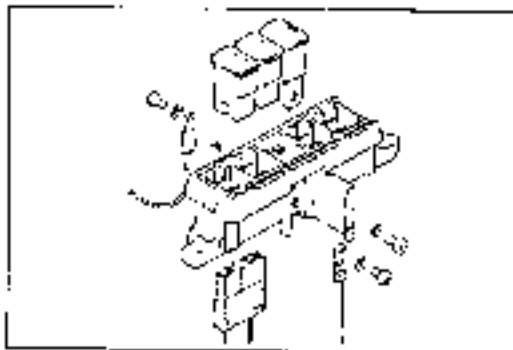
CODE	COLOR	CODE	COLOR
B	Black	O	Orange
BR	Brown	P	Pink
G	Green	R	Red
GY	Gray	V	Violet
L	Blue	W	White
LB	Light Blue	Y	Yellow
LG	Light Green	-	

### Sensors, Switches, and Relays

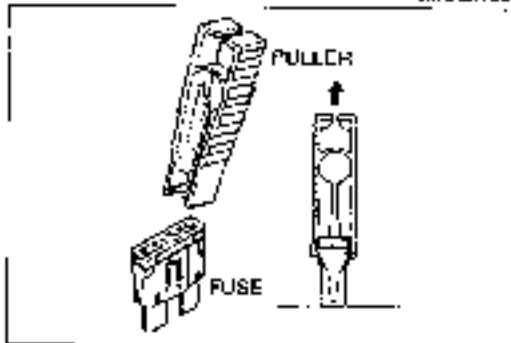
Handle sensors, switches, and relays carefully. Do not drop them or strike them against other parts.



BMJG13 200



SMUCIX 031



SMUCIX 709

### 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

<b>PRE-DELIVERY INSPECTION</b> .....	<b>A- 2</b>
PRE DELIVERY INSPECTION TABLE .....	<b>A- 2</b>
<b>SCHEDULED MAINTENANCE SERVICES</b>	
<b>(USA)</b> .....	<b>A- 3</b>
<b>SCHEDULE 1</b>	
(NORMAL DRIVING CONDITION) B260Di ..	<b>A- 3</b>
<b>SCHEDULE 1</b>	
(NORMAL DRIVING CONDITION) B220D ...	<b>A- 7</b>
<b>SCHEDULE 2</b>	
(UNIQUE DRIVING CONDITION) B2800i....	<b>A-10</b>
<b>SCHEDULE 2</b>	
(UNIQUE DRIVING CONDITION) B220D ....	<b>A-13</b>
<b>SCHEDULED MAINTENANCE SERVICES</b>	
<b>(CANADA)</b> .....	<b>A-16</b>

2B\_J0017 001

## 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 (light, metal and paint for damage)
  - Wheel lug nuts
    - Non-style:
      - RR—118 Nm (9.0—12.0 m·kg, 65—87 lbf)
      - Style: 112—147 Nm (12.0—16.0 m·kg, 07—105 lbf)
  - All weatherstrips for damage or detachment
  - Operation of hood release and lock
  - Operation of fuel filler (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, oxidant 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**

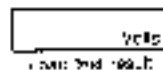
- **INSTALL** the following parts:
  - Rubber stopper for inside rearview mirror
- **CHECK** the operation of the following items:
  - Seat controls (sliding and reclining) and head rest
  - Door locks
  - Fold-Down rear seats (Cab: PUs only)
  - Seat belts and warning system
  - Ignition switch and steering lock
  - Starter interlock switch (MT only)
  - Shift-lock system and inhibitor switch (AT 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 lock (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

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 G)
- Clean outside of vehicle



Verify tire inflator

- **CHECK** and, if necessary, **ADJUST** the following items:
  - Pedal height (with control) and free play of brake and clutch pedals

		Pedal height mm (in)	Free play mm (in)
Clutch	B26ED	181—201 (7.12—7.91)	0.6—3.0 (0.02—0.12)
Brake pedal	B29ED	181—191 (7.13—7.52)	0.6—3.0 (0.02—0.12)
Brake pedal	B180—185	(7.09—7.28)	4.0—7.0 (0.16—0.28)

- Parking brake ..... 7—12 notches/ 98N (20 kg, 44 lb)

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

- **CHECK** the following items:
  - Throttle sensor (EGT)
  - Operation of idle-up system (if equipped)
    - Air conditioner and automatic transmission (Carburetor)
  - Automatic transmission fluid level
  - Operation of dash pot (Carburetor)
  - Carburetor float level
  - Initial ignition timing:  $6 \pm 1^\circ$  BTDC (B2200)
  - Idle speed: 800  $\pm 2$  rpm (MT; 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



## 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)

B2600

#### 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 vehicles.

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

B26001

Maintenance operation	Interval								Service data and inspection point	Page
	Months	7.5	15	22.5	30	37.5	45	52.5		
Engine operation	x 1,000 miles x 1,000 km									
Engine oil	R	R	R	R	R	R	R	R	Oil pan capacity: 4.5 liter (1.6 US qt.) (1 imp qt.)	D-7
Oil filter	R	R	R	R	R	R	R	R	Oil filter capacity: (2.2 liter) (23 US qt.) (9 imp qt.)	D-7
Drive belts									Check for damage	E2-5
Air cleaner element				R					Tension	F2-116
Oxygen sensor*										F2-132
PCV valve									Check operation	F2-163
Hoses and tubes (if applicable)										F2-7
<b>IGNITION SYSTEM</b>										
Spark plugs				A				R	Plug gap: 1.1 mm (0.043 in) Recommended spark plugs: NGK ZFR5F11* ZFR5E11 K16ECR11* KJ20CR11 Standard plug	G-22
Ignition timing									Ignition timing: 4-6° BTDC	G-24
<b>FUEL SYSTEM</b>										
Idle speed									Idle speed: 730-770 rpm (MM) 750-790 rpm in P range (A/I)	F2-118
Fuel filter								R		F2-149
Fuel lines									Fit %; connections and components for leaks	F2-143
<b>COOLING SYSTEM</b>										
Cooling system									Hoses for amount of wear Coolant level Coolant capacity with heater: 7.5 liter (7.9 US qt.) (6.6 imp qt.) Without heater: 6.0 liter (6.3 US qt.) (5.1 imp qt.)	E-5
Engine coolant								R		F-5

8BL5X004

**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B26001**

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	
Maintenance operation	x1,000 miles	7.5	15	22.5	30	37.5	45	52.5	60			
Maintenance operation	x1,000 km	12	24	36	48	60	72	84	96			
<b>CHASSIS AND BODY</b>												
Brake link hoses and connectors												
Brake fluid					H							P-5
Disc brakes (front)												P-2
Drum brakes (rear)												P-21
Drum brake linings												P-24
Drum inner diameter												P-24
Minimum steering gear oil												N-12
Steering shaft splines and gear teeth oil												N-12
Sleeve linkage												N-9
TC rod ends and arms												N-9
Suspension ball joints (front)												N-7
Upper arm shafts												N-7
Front wheel bearing												N-7
Manual transmission oil												L-18
Transfer case oil (4x4)												L-27
Leaf spring bushings (front)												L-27
Propeller shaft joints												L-27

- Frigid attachment and connections
- Brake fluid
- FMYSS 116 DOT3 or SAF J-003
- Caliper operation
- Thickness of disc rotor
- Minimum... 4x2 20mm (0.79 in); 4x2 18mm (0.71 in)
- Thickness of pad
- Minimum 3.0mm (0.118 in)
- Wheel cylinder operation and leakage
- Lining for wear or damage
- Thickness of lining
- Minimum 1.5mm (0.06 in)
- Drum inner diameter
- Maximum 261.5mm (10.30 in)
- Oil level (dimensions) 220mm (8.67 in)
- Gear oil API service GL-4 viscosity SAF 90
- Operation and looseness
- Fluid leakage or nozing
- Free play 5 20mm (0.79 in)
- Check for looseness and damage
- Check for excessive play
- Leakage, looseness and joint leakage
- Grease: NLGI No.2
- Clean and check for damage
- Repack or apply lithium grease (NLGI No.2)
- Oil capacity
- 4x2 2.9 liters (3.0 US qt, 2.5 imp qt)
- 4x4 3.7 liters (3.9 US qt, 3.2 imp qt)
- Oil capacity
- 2.0 liters (2.1 US qt, 1.8 imp qt)
- Cracking, corrosion, leakage and looseness
- Lubricate with grease



**SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)**  
**B26001**

Interval	Number of months or miles (Kilometers), whichever comes first						Service data and inspection point	Page					
	Months ≤ 1,000 miles × 1,000 km	7.5	15	22.5	30	37.5			45	52.5	60	68	
Maintenance operation		7.5	15	22.5	30	37.5	45	52.5	60	68			
<b>CHASSIS AND BODY</b>		12	24	36	48	60	72	84	96				
Automatic transmission fluid										11			K1-39 K2-43
Rear axle oil (4 x 2, 4 x 4) Front axle oil (4 x 4)										4			M-4
Bolts and nuts on chassis and body													
Shock system four wheel													
<b>AIR CONDITIONER SYSTEM</b>													
Rear panel													U-28
Compressor													U-31
All locks and hinges													

- Replacement fluid capacity  
Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)
- 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)
- Retighten all loose nuts and bolts
- Insulation clearance

- Check refrigerant charge
- Check compressor

Inspect the refrigerant amount annually  
Inspect the operation annually

**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:**

Alter 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 vehicles.

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		
Maintenance operation	> 1,000 miles	7.5	16	22.5	30	37.5	45	52.5	60				
Engine	x 1,000 km	12	24	36	48	60	72	84	96				
Engine oil		R	P	I	R	R	R	R	R	R	R	R	D-7
Oil filter													D-7
Choke system (California only)													F1-94
Idle switch <sup>1)</sup> (California only)													F1-105
Drive belts													H1-5
Air cleaner element													F1-00
Engine timing (F1-1)													B1-8
Oxygen sensor <sup>2)</sup>													F1-05
EGR control valve <sup>3)</sup> (California only)													F1-52
PCV valve <sup>4)</sup>													F1-79
L-caps and tubes for emission <sup>5)</sup>													F1-70
HAC air filter (California only)													F1-76

\* Oil filter capacity:  
3.9 liters (4.1 US qt, 3.4 imp qt)

\* Oil filter capacity:  
0.22 liter (0.23 US qt, 0.19 imp qt)

\* Spray cleaning agent

\* Check for damage

\* Perform

\* Check operation

Replace every 60,000 miles (96,000 km)

Replace every 90,000 miles (128,000 km)

Replace every 60,000 miles (96,000 km)



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

Interval	Number of months or miles (kilometers), whichever comes first						Page										
	Months	7.5	15	22.5	30	37.5		45	52.5	60							
Maintenance operation	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 plug				R					R	<ul style="list-style-type: none"> <li>Plug gap: 0.75-0.85mm (0.030-0.033 in)-Carburetor</li> <li>1.0-1.1mm (0.039-0.043 in)-EGI</li> <li>Recommended spark plugs:                     <table border="1" style="margin-left: 20px;"> <tr> <td>Carburetor</td> <td>NGK BFR6ES* BPR6CS</td> <td>NIHONKENSO W16EXR U* W20FXR-U</td> </tr> <tr> <td>EGI</td> <td>DP16ES-11* BPR6S-11</td> <td>W16EXR-UT** W20EXR-UT**</td> </tr> </table> </li> <li>*Standard plug</li> </ul>	Carburetor	NGK BFR6ES* BPR6CS	NIHONKENSO W16EXR U* W20FXR-U	EGI	DP16ES-11* BPR6S-11	W16EXR-UT** W20EXR-UT**	G 22
Carburetor	NGK BFR6ES* BPR6CS	NIHONKENSO W16EXR U* W20FXR-U															
EGI	DP16ES-11* BPR6S-11	W16EXR-UT** W20EXR-UT**															
Ignition timing										<ul style="list-style-type: none"> <li>Ignition timing: 5-7° BTDC</li> </ul>	G 24						
<b>FUEL SYSTEM</b>																	
Idle speed		1-4			4		1-4		1-4	<ul style="list-style-type: none"> <li>Idle speed: 800-850 (rpm) ± 10% A/T, in P range (Carburetor) 730-770 (rpm) (EGI A/T) 750-790 (rpm) in P range (EGI A/T)</li> <li>Fittings, connections and components for leaks</li> </ul>	F1 112 F2-118						
Fuel hoses											F1-4						
Fuel filter											F1 R3						
<b>COOLING SYSTEM</b>																	
Cooling system										<ul style="list-style-type: none"> <li>Losses (at cranes) or wear</li> <li>Coolant level</li> <li>Coolant capacity: With heater... 7.5 liters (7.9 US qt, 6.6 Imp qt); Without heater... 6.5 liters (7.0 US qt, 5.1 Imp qt)</li> </ul>	E 5 L 3						
Engine coolant																	
<b>CHASSIS AND BODY</b>																	
Brake line hoses and connections										<ul style="list-style-type: none"> <li>Proper discharge at connections</li> </ul>	P-5						
Brake fluid										<ul style="list-style-type: none"> <li>Brake fluid: FMVSS 16 DOT3 or SAE J1703</li> <li>Caliper operation</li> <li>Thickness of disc plate: Minimum... 18mm (0.71 in)</li> <li>Thickness of pad: Minimum... 3.0mm (0.12 in)</li> </ul>	P 2 P 2*						
Disc brakes (front)											P 2*						

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

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
Maintenance operation	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		
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</li> <li>• Minimum... 1.0mm (0.04 in)</li> <li>• Drum inner diameter</li> <li>• 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 SAE 90</li> </ul>	N 12
Sliding operations and gear housing									I	<ul style="list-style-type: none"> <li>• Operation and lubrication</li> <li>• Fluid leakage or oozing</li> <li>• Free play: 5-20mm (0.20-0.78 in)</li> </ul>	N-8
Steering linkage, tie rod ends and arms									I	<ul style="list-style-type: none"> <li>• Check for looseness and carriage</li> <li>• Check for excessive play</li> </ul>	N-7
Suspension ball joints (front)									I		
Upper and shafts									I	<ul style="list-style-type: none"> <li>• Drainage, looseness and grease leakage</li> </ul>	R-11
Front wheel bearing									I	<ul style="list-style-type: none"> <li>• Grease: NLGI No.2</li> </ul>	R-21
Manual transmission oil									L	<ul style="list-style-type: none"> <li>• Check and check for damage</li> <li>• Repack or apply lithium grease (NLGI No.2)</li> </ul>	M-35 M 35
Automatic transmission fluid									L	<ul style="list-style-type: none"> <li>• Oil capacity:</li> <li>• 5-speed 2.0 liter (2 US qt, 1.6 imp qt)</li> </ul>	J-7
Rear axle oil									I	<ul style="list-style-type: none"> <li>• Replacement: fluid capacity</li> <li>• Approx. 4.0 liters (4.2 US qt, 3.5 imp qt)</li> </ul>	K1-35
Bolts and nuts of chassis and body & exhaust system (see chart)									I	<ul style="list-style-type: none"> <li>• Lubricate with grease</li> <li>• Oil capacity:</li> <li>• 2 Hrs (1.2 US qt, 1.1 imp qt)</li> </ul>	I-15 M-4
<b>AIR CONDITIONER SYSTEM</b>									I	<ul style="list-style-type: none"> <li>• Retighten all loose nuts and bolts</li> <li>• Insulation clearance</li> </ul>	
Refrigerant									I	<ul style="list-style-type: none"> <li>• Inspect the refrigerant amount annually</li> </ul>	U 28
Compressor									I	<ul style="list-style-type: none"> <li>• Check compressor</li> </ul>	U-31
All locks and hinges									L		



**SCHEDULE 2 (UNIQUE DRIVING CONDITION)**

**B26001**

**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 vehicles.

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
Maintenance operation	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			
Oil filter	R	R	H	R	R	R	H	R	R	R	R	R			
Drive belts															
Air cleaner element															
Oxygen sensor <sup>*1</sup>															
PCV valve <sup>*2</sup>															
*test is required for emission <sup>*1</sup>															

- \* Oil pan capacity: 4.5 liters (4.8 US qt, 4.0 imp qt)
- \* Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 imp qt)
- \* Check for damage:
  - Termination
- \* Check operation

D-7  
D-7  
B2-5  
F2-116  
F2-1B2  
F2-1B3  
F2-7



SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)  
B26001

Interval	Number of months or miles (kilometers), whichever comes first											Service data and inspection point	Page								
	5	10	15	20	25	30	35	40	45	50	55			60							
Maintenance operation	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						H									F	Q-29					
<ul style="list-style-type: none"> <li>• Plug gap 1.0 mm (0.039–0.043 in)</li> <li>• Recommended spark plugs                             <table border="1" style="margin-left: 20px;"> <tr> <td>VEK</td> <td>ZFR5-11</td> </tr> <tr> <td></td> <td>ZFR5F-11</td> </tr> <tr> <td>NIPPONDENSO</td> <td>K-6CR-11*</td> </tr> <tr> <td></td> <td>K-20CR-11</td> </tr> </table> </li> <li>• Standard plug</li> <li>• Ignition timing, 4° BTDC</li> </ul>														VEK	ZFR5-11		ZFR5F-11	NIPPONDENSO	K-6CR-11*		K-20CR-11
VEK	ZFR5-11																				
	ZFR5F-11																				
NIPPONDENSO	K-6CR-11*																				
	K-20CR-11																				
<b>FUEL SYSTEM</b>																					
Idle speed																F2-118					
F-4 filter																F2-149					
F-6 filter																F2-149					
<b>COOLING SYSTEM</b>																					
Cooling system																E-5					
Engine coolant																E-5					
<b>CHASSIS AND BODY</b>																					
Brake line hoses and connections																P-5					
Brake fluid																P-2					
Disc brakes (front)																P-21					
Drum brakes (rear)																P-24					
Alignment (for Puro R10)																					

**SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)**  
**B26001**

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		
Maintenance x1,000 miles	5	10	15	20	25	30	35	40	45	50	55	60	60				
Operation x 1,000 km	8	16	24	32	40	48	56	64	72	80	88	96	96				
<b>CHASSIS AND BODY</b>																	
Steering operations and gear routing																<ul style="list-style-type: none"> <li>• Operation and looseness</li> <li>• Fluid leakage or coating</li> <li>• Frms play: 5-20mm (0.20-0.79 in)</li> </ul>	V-9
Steering linkage tie rod ends and arms																<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 (both)																<ul style="list-style-type: none"> <li>• Damage, looseness and grease leakage</li> </ul>	R-16
Upper arm shafts																<ul style="list-style-type: none"> <li>• Grease: NLGI No.2</li> </ul>	R-21
Front wheel bearing																<ul style="list-style-type: none"> <li>• Clean and check for damage</li> <li>• Repair or apply lithium grease (NLGI No.2)</li> </ul>	M-25 M-27
Manual steering gear oil																<ul style="list-style-type: none"> <li>• Oil level (4. dimensions): 22mm (0.87 in)</li> <li>• Gear oil: API service GL-4 viscosity: SAE 90</li> </ul>	N-12
Automatic transmission fluid																<ul style="list-style-type: none"> <li>• Replacement fluid capacity: Approx. 4.0 liters (4.2 US qt. 3.6 Imp qt)</li> <li>• Oil capacity: 4 x 2.2 liters (3.0 US qt. 2.5 Imp qt) 4 x 4 3.2 liters (3.4 US qt. 2.8 Imp qt)</li> </ul>	K1-35 K2-43
Manual transmission oil																<ul style="list-style-type: none"> <li>• Oil capacity: Rear: 1.7 liters (1.8 US qt. 1.5 Imp qt) Front: 5 liters (1.6 US qt. 1.3 Imp qt)</li> </ul>	M-4
Rear axle oil (4 x 2, 4 x 4) Front axle oil (4 x 4)																<ul style="list-style-type: none"> <li>• Tighten all cover nuts etc. using insulation cassette</li> </ul>	
Balls and nuts for chassis etc. only																<ul style="list-style-type: none"> <li>• Oil capacity: 2 C liters (2.1 US qt. 1.8 Imp qt)</li> </ul>	J2-7
Exhaust system heat shields																<ul style="list-style-type: none"> <li>• Cracking, damage, leakage and looseness</li> <li>• Lubricate with grease</li> </ul>	M-40
Transfer case oil (4 x 4)																	L-15
Diesel air dust filters (4 x 4)																	
Protektor wheel joints																	
<b>AIR CONDITIONER SYSTEM</b>																	
Refrigerant																<ul style="list-style-type: none"> <li>• Check refrigerant charge</li> </ul>	U-28
Compressor																<ul style="list-style-type: none"> <li>• Check compressor</li> </ul>	U-31
Air locks and hinges																	

**SCHEDULE 2 (UNIQUE DRIVING CONDITION)**

**B2200**

**Chart symbols:**

- I ... inspect, and if necessary correct, clean or replace (inspect, and if necessary replace ...An 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 the 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 vehicles.

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				
Maintenance operation	5	10	15	20	25	30	35	40	45	50	55	60	60	60	96				
operation	8	16	24	32	40	48	56	64	72	80	88	96	96	96					
<b>ENGINE</b>																			
Engine oil		I	I	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Oil pan capacity: 3.9 ltrs (4.1 US qt, 5.4 Imp qt)	D-7
Oil filter			R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Oil filter capacity: 0.22 liter (2.2 US oz, 0.19 Imp qt)	D-7
Choke system (Carburetor only)			C															Spray cleaning agent	F1-84
Idle switch (Carburetor only)			I																F1-105
Drive belts																		Check for damage: • Fan • Serpentine	B1-5
Air cleaner element																			F1-80
Engine timing belt																		Replace every 60,000 miles (96,000 km)	B1-6
Cylinder bandage																		Replace every 60,000 miles (96,000 km)	F1-56
SP (concealer valve) (Carburetor only)																		Replace every 60,000 miles (96,000 km)	F1-82
PCV valve																		Check operation	F1-79
Exhaust and tubes for emission*																			F1-10
F.A.C. filter (Carburetor only)																			F1-76

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

B2200

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

System	5	10	15	20	25	30	35	40	45	50	60
<b>IGNITION SYSTEM</b>											
Spark plugs				R							
Ignition timing											
<b>FUEL SYSTEM</b>											
Idle speed			**					**			
Fuel lines											
Fuel filter										R**	
<b>COOLING SYSTEM</b>											
Cooling system											
Engine coolant											
Engine oil (For Peterbilt)											
<b>CHASSIS AND BODY</b>											
Brake line hoses and connections											
Brake fluid											
Disc brakes (front)											

Service data and inspection points	Page												
<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) ECI</li> <li>• Recommended spark plugs:                             <table border="1" style="margin-left: 20px;"> <tr> <td>Carburetor</td> <td>NGK</td> <td>NIPPONDENSO</td> </tr> <tr> <td>BP16ES</td> <td>W16EXR-U*</td> <td>W16EXR-U*</td> </tr> <tr> <td>BP16ES-11*</td> <td>W16EXR-U*</td> <td>W16EXR-U*†</td> </tr> <tr> <td>BP16ES-11</td> <td>W16EXR-U*†</td> <td>W16EXR-U*†</td> </tr> </table> </li> <li>*Standard plug</li> <li>†Ignition timing 5-7° BTDC</li> </ul>	Carburetor	NGK	NIPPONDENSO	BP16ES	W16EXR-U*	W16EXR-U*	BP16ES-11*	W16EXR-U*	W16EXR-U*†	BP16ES-11	W16EXR-U*†	W16EXR-U*†	G-22
Carburetor	NGK	NIPPONDENSO											
BP16ES	W16EXR-U*	W16EXR-U*											
BP16ES-11*	W16EXR-U*	W16EXR-U*†											
BP16ES-11	W16EXR-U*†	W16EXR-U*†											
<ul style="list-style-type: none"> <li>• Idle speed: 800-850 (800-850 rpm A/T) in P range (Carburetor) 750-770 rpm (EGI A/T) 750-780 rpm in P range (EGI A/T)</li> <li>• Tighten connections and components for leaks</li> </ul>	F1-112 F2-118												
<ul style="list-style-type: none"> <li>• Hoses for cracks or wear</li> <li>• Coolant level</li> <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>	F-5												
<ul style="list-style-type: none"> <li>• Proper attachment and connections</li> <li>• Brake fluid: FMVSS 116 DOT3 or SAF J1703</li> <li>• Caliper operation</li> <li>• Thickness of disc plate: Minimum...18mm (0.71 in) Thickness of pad: Minimum...3.0mm (0.118 in)</li> </ul>	F-5 P-21												

2BU049-0-002

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

Interval	Number of months or miles (kilometers), whichever comes first												Service data and inspection points	Page														
	Months		5		10		15		20		25				30		35		40		45		50		55		60	
	x 1,000 miles		5		10		15		20		25				30		35		40		45		50		55		60	
x 1,000 km		8		16		24		32		40		48		56		64		72		80		88		96				
<b>CHASSIS AND BODY</b>																												
Drum brakes (rear)																												
Inspect steering gear oil																												
Steering operation is and gear assembly																												
Steering linkage, tie rod ends and joints																												
Suspension - oil joints (front)																												
Upper arm shafts																												
Front wheel bearing																												
Manual transmission oil																												
Automatic Transmission fluid																												
Rear axle oil																												
Dats and nuts on chassis and body																												
Exhaust system heat shields																												
<b>AIR CONDITIONER SYSTEM</b>																												
Refrigerant																												
Compressor																												
All locks and hinges																												
<ul style="list-style-type: none"> <li>Wheel cylinder operation and leakage</li> <li> lining for wear or damage</li> <li>Thickness of lining:                             <ul style="list-style-type: none"> <li>Minimum...1.0mm (0.04 in)</li> <li>Over inner diameter</li> <li>Maximum...25.5mm (1.00 in)</li> </ul> </li> <li>Oil level (l dimension): 22mm (0.87 in)</li> <li>Gear oil API service (GL 4 viscosity) SAE90</li> <li>Operation and looseness</li> <li>Fluid leakage or missing</li> <li>Free play: 5 - 20mm (0.20 - 0.79 in)</li> <li>Check for looseness and damage</li> <li>Check for excessive play</li> <li>Damage, corrosion and grease leakage</li> <li>Greaser VLG No 2</li> <li>Clean and dress for damage</li> <li>Repack or apply lithium grease (All CI No. 2)</li> <li>Oil capacity:                             <ul style="list-style-type: none"> <li>5-speed 2.0 liters (2.1 US qt, 1.8 Imp qt)</li> </ul> </li> <li>Replacement fluid capacity:                             <ul style="list-style-type: none"> <li>Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)</li> </ul> </li> <li>Lubricate with grease:</li> <li>Oil capacity: 1.2 liters (1.3 US qt, 1.1 Imp qt)</li> <li>Adjustment at cone nuts and bolts</li> <li>Insulation assistance</li> </ul>																											P 24	
<ul style="list-style-type: none"> <li>Inspect the refrigerant an unit annually</li> <li>Inspect the operation annually</li> </ul>																											N-12	
<ul style="list-style-type: none"> <li>Check refrigerant charge</li> <li>Check compressor</li> </ul>																											N-9	
<ul style="list-style-type: none"> <li>Check for excessive play</li> </ul>																											N-7	
<ul style="list-style-type: none"> <li>Damage, corrosion and grease leakage</li> </ul>																											R 11	
<ul style="list-style-type: none"> <li>Greaser VLG No 2</li> </ul>																											H 21	
<ul style="list-style-type: none"> <li>Clean and dress for damage</li> </ul>																											V-33	
<ul style="list-style-type: none"> <li>Repack or apply lithium grease (All CI No. 2)</li> </ul>																											V-35	
<ul style="list-style-type: none"> <li>Oil capacity:                             <ul style="list-style-type: none"> <li>5-speed 2.0 liters (2.1 US qt, 1.8 Imp qt)</li> </ul> </li> </ul>																											J1-7	
<ul style="list-style-type: none"> <li>Replacement fluid capacity:                             <ul style="list-style-type: none"> <li>Approx. 4.0 liters (4.2 US qt, 3.5 Imp qt)</li> </ul> </li> </ul>																											K1-35	
<ul style="list-style-type: none"> <li>Lubricate with grease:</li> </ul>																											J-15	
<ul style="list-style-type: none"> <li>Oil capacity: 1.2 liters (1.3 US qt, 1.1 Imp qt)</li> </ul>																											M 4	
<ul style="list-style-type: none"> <li>Adjustment at cone nuts and bolts</li> </ul>																												
<ul style="list-style-type: none"> <li>Insulation assistance</li> </ul>																												
<ul style="list-style-type: none"> <li>Inspect the refrigerant an unit annually</li> <li>Inspect the operation annually</li> </ul>																											U-28	
<ul style="list-style-type: none"> <li>Check refrigerant charge</li> <li>Check compressor</li> </ul>																											U-31	

# 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
	x 1,000 km (x 1,000 miles)	(5)	(10)	(15)	(20)	(25)	(30)	(35)	(40)	(45)	(50)	(55)	(60)

#### ENGINE

Engine oil	P	R	R	P	R	R	R	R	R	R	R	R	R
Oil filter	R	H	H	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts	I		I	I	I		I	I	I	I			I
Engine timing belts	FOR 2200 <sup>1</sup>												

#### AIR CLEANER

Air cleaner element							R						H
---------------------	--	--	--	--	--	--	---	--	--	--	--	--	---

#### IGNITION SYSTEM

Spark plugs							R						R
-------------	--	--	--	--	--	--	---	--	--	--	--	--	---

#### COOLING SYSTEM

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

#### FUEL SYSTEM

Idle speed							I						I
Fuel lines and hoses							I						I
Fuel filter							R						R
Choke system	FOR CARB		C				C			C			C
Idle switch	FOR CARB		I				I						I
PCV valve													I
HAC air filter	FOR CARB												R
Emission hoses and tubes													R
FCR valve	FOR CARB												R
Oxygen sensor							Replace every 125,000 kilometers						

#### CHASSIS & BODY

Automatic transmission fluid level			I	I	I	I	I	I	I	I	I	I	I
Transmission oil M/T and A/T							F						R
Oil level in final drive and transfer case (in model's so equipped)							I	I	I	I	I	I	I
Differential oil							R						R
Transfer case oil (FOR 4x4)							R						R
Propeller shaft (FOR 4x4)			L				I			L			L
Drive shaft dust boots (FOR 4x4)							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
Over brakes													
Rear drum brakes													
Front wheel bearings							L						L
Tire inflation pressure and tread 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
Steering gear housing for rattle and click													I
Suspension components front and rear													I

29U06A-014

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
	x 1,000 km (x 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						I			T
Exhaust system heat shield													
All locks and hinges			L		L		L	L	L	L		L	L
Washer fluid level	I	I	I	I	I	I	I	I	I	I	I	I	I
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.

MUC10X 015

# ENGINE (B2200)

<b>INDEX</b> .....	<b>B1- 2</b>
<b>OUTLINE</b> .....	<b>B1- 3</b>
SPECIFICATIONS .....	<b>B1- 3</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>B1- 3</b>
<b>ENGINE TUNE-UP PROCEDURE</b> .....	<b>B1- 5</b>
DRIVE BELT .....	<b>B1- 5</b>
HLA TROUBLESHOOTING GUIDE .....	<b>B1- 6</b>
<b>COMPRESSION</b> .....	<b>B1- 6</b>
COMPRESSION .....	<b>B1- 6</b>
<b>ON-VEHICLE MAINTENANCE</b> .....	<b>B1- 8</b>
TIMING BELT .....	<b>B1- 8</b>
CYLINDER HEAD GASKET I .....	<b>B1-13</b>
FRONT OIL SEAL .....	<b>B1-18</b>
REAR OIL SEAL .....	<b>B1-19</b>
<b>REMOVAL</b> .....	<b>B1-20</b>
PREPARATION .....	<b>B1-20</b>
<b>ENGINE STAND INSTALLATION</b> .....	<b>B1-22</b>
PREPARATION .....	<b>B1-22</b>
INSTALLATION .....	<b>B1-22</b>
<b>DISASSEMBLY</b> .....	<b>B1-24</b>
PREPARATION .....	<b>B1-24</b>
AUXILIARY PARTS .....	<b>B1-25</b>
TIMING BELT .....	<b>B1-26</b>
CYLINDER HEAD .....	<b>B1-28</b>
CYLINDER BLOCK I .....	<b>B1-30</b>
CYLINDER BLOCK II .....	<b>B1-31</b>
<b>INSPECTION AND REPAIR</b> .....	<b>B1-34</b>
PREPARATION .....	<b>B1-34</b>
<b>ASSEMBLY</b> .....	<b>B1-46</b>
PREPARATION .....	<b>B1-46</b>
CYLINDER BLOCK I .....	<b>B1-47</b>
CYLINDER BLOCK II .....	<b>B1-52</b>
CYLINDER HEAD .....	<b>B1-56</b>
TIMING BELT .....	<b>B1-60</b>
AUXILIARY PARTS .....	<b>B1-63</b>
<b>ENGINE STAND REMOVAL</b> .....	<b>B1-67</b>
REMOVAL .....	<b>B1-67</b>
<b>INSTALLATION</b> .....	<b>B1-69</b>
PREPARATION .....	<b>B1-69</b>

(B1) 911



### INDEX

HYDRAULIC LASH ADJUSTER (HLA)  
INSPECTION, PAGE B1-6

COMPRESSION  
INSPECTION, PAGE B1-6  
STANDARD: 1,197 kPa (12.2 kg/cm<sup>2</sup>, 17.3 psi) @ 300 rpm  
MINIMUM: 898 kPa (9.1 kg/cm<sup>2</sup>, 12.1 psi) @ 300 rpm

EXHAUST MANIFOLD  
TIGHTENING TORQUE  
22-25 N·m (2.2-2.6 m·kg, 16-21 ft·lb)

INTAKE MANIFOLD  
TIGHTENING TORQUE  
19-25 N·m (1.9-2.6 m·kg, 14-19 ft·lb)

ENGINE COOLANT INSPECTION,  
SERVICE, SECTION E

ENGINE OIL INSPECTION,  
SERVICE, SECTION D

DRIVE BELT ADJUSTING, PAGE B1-5

#### DEFLECTION

mm (in)

DRIVE BELT	NEW	USED
ALTERNATOR	7.0-8.0 (0.28-0.31)	8.0-9.0 (0.31-0.35)
P/S OIL PUMP	7.0-8.0 (0.28-0.31)	8.0-9.0 (0.31-0.35)
A/C COMPRESSOR	10.0-12.0 (0.39-0.47)	12.0-14.0 (0.47-0.55)

92005-077

#### 1. Engine

Removal .....	page B1-20
Disassembly .....	page B1-24
Inspection and Repair .....	page B1-34
Assembly .....	page B1-46
Installation .....	page B1-59

#### 2. Timing belt

Removal .....	page B1-8
Installation .....	page B1-10
Inspection .....	page B1-44

#### 3. Cylinder head gasket

Removal .....	page B1-13
Installation .....	page B1-15

OUTLINE

SPECIFICATIONS

Item	Engine		F2	
			Carburetor	EGI
Type			Gasoline, 4 cycle	
Cylinder arrangement and number			Inline, 4 cylinders	
Combustion chamber			Multispherical	
Valve system			OHV, belt drive	
Displacement	cc (cu in)		2,184 (133.22)	
Bore x stroke	mm (in)		86.0 x 94.0 (3.39 x 3.70)	
Compression ratio			9.6	
Compression pressure	kPa (kg/cm <sup>2</sup> , ps)-rpm		1,197 (12.2, 173)-300	
Valve timing	N	Open	BTDC	13°
		Close	ABDC	57°
	EX	Open	BBDC	58°
		Close	ATDC	12°
Valve clearance	IN	mm (in)	0; Maintenance free	
	EX	mm (in)	0; Maintenance free	
Idle speed	rpm	M/T (Neutral)	600 ± 5	750 ± 20
		A/T (P range)	600 ± 5	770 ± 20
Ignition timing (TEN terminal)	BTDC		6° ± 1° at idle	
Firing order			1-3-4-2	

25-3411-002

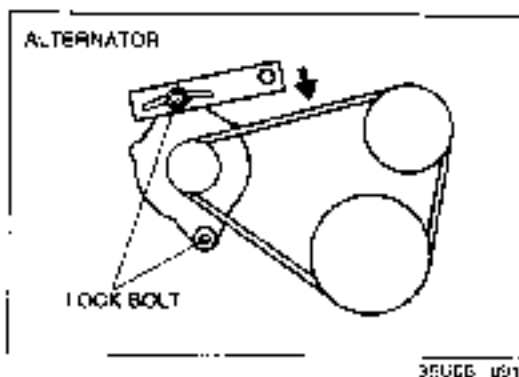
TRUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Difficult starting	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Leaked cylinder head gasket	Replace Replace or repair Replace	B1-35 B1-40, 42 B1-13
	<b>Malfunction of fuel system</b>	Refer to Section F	
	<b>Malfunction of electrical system</b>	Refer to Section G	
	Poor idling	<b>Malfunction of engine-related components</b> Malfunction of H <sub>2</sub> A Poor valve-to-valve seat contact Leaked cylinder head gasket	Replace Repair or replace Replace
<b>Malfunction of fuel system</b>		Refer to Section F	
<b>Malfunction of ignition system</b>		Refer to Section G	
Excessive oil consumption		<b>Oil working up</b> Worn piston ring groove or sticking piston ring Worn piston or cylinder	Replace Replace or repair
	<b>Oil working down</b> Worn valve seal Worn valve stem or guide	Replace Replace	B1-57 B1-35
	<b>Oil leakage</b>	Refer to Section D	

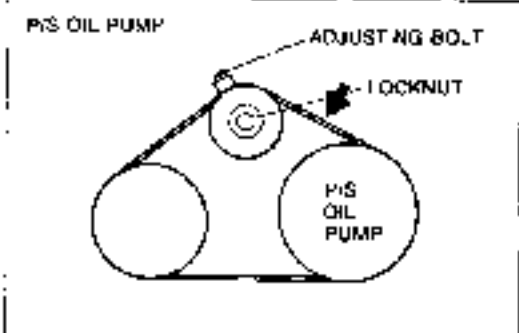
Problem	Possible Cause	Remedy	Page
Insufficient power	Insufficient compression		
	Malfunction of HLA	Replace	B1-40
	Compressor leakage from valve seal	Repair	B1-37
	Seized valve stem	Adjust	B1-35
	Weak or broken valve spring	Replace	B1-38
	Failed cylinder head gasket	Replace	B1-13
	Cracked or distorted cylinder head	Replace	B1-34
Sticking, damaged, or worn piston ring	Replace	B1-42	
	Cracked or worn piston	Replace	B1-42
	Malfunction of fuel system	Refer to Sections F1, F2	
	Malfunction of ignition system	Refer to Section G	
	Others		
	Slipping clutch	Refer to Section H	
	Dragging brakes	Refer to Section P	
Wrong size tires	Refer to Section Q		
Abnormal combustion	Malfunction of engine-related components		
	Malfunction of HLA	Replace	B1-40
	Sticking or burned valve	Repair	B1-35
	Weak or broken valve spring	Replace	B1-39
	Carbon accumulation in combustion chamber	Eliminate carbon	-
Malfunction of fuel system	Refer to Sections F1, F2		
Malfunction of ignition system	Refer to Section G		
Engine noise	Crankshaft or bearing related parts		
	Excessive main bearing oil clearance	Replace or repair	B1-49
	Main bearing seized or heat-damaged	Replace	B1-44
	Excessive crankshaft end play	Replace or repair	B1-50
	Excessive connecting rod bearing oil clearance	Replace or repair	B1-51
	Connecting rod bearing seized or heat-damaged	Replace	B1-46
	Piston-related parts		
	Worn cylinder	Replace or repair	B1-40
	Worn piston or piston pin	Replace	B1-45
	Seized piston	Replace	B1-42
	Damaged piston ring	Replace	B1-42
	Bent connecting rod	Replace	B1-43
	Valves or timing-related parts		
Malfunction of HLA*	Replace	B1-40	
Broken valve spring	Replace	B1-35	
Excessive valve guide clearance	Replace	B1-35	
Insufficient lubrication of rocker arm	Replace	B1-40	
Malfunction of cooling system	Refer to Section E		
Malfunction of fuel system	Refer to Sections F1, F2		
Others			
Malfunction of water pump bearing	Refer to Section E		
Improper drive-belt tension	Adjust	B1-5	
Malfunction of alternator bearing	Refer to Section G		
Exhaust gas leakage	Refer to Sections F1, F2		
Malfunction of timing belt tensioner	Replace	B1-8	

2BA,0B1-003

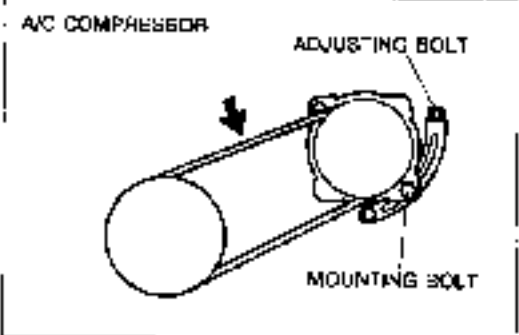
- \* Taproot noise may occur if the engine is not operated for an extended period. The noise should disappear after the engine has reached normal operating temperature.



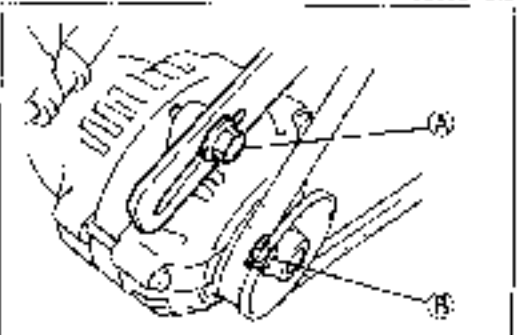
3EUCB-1671



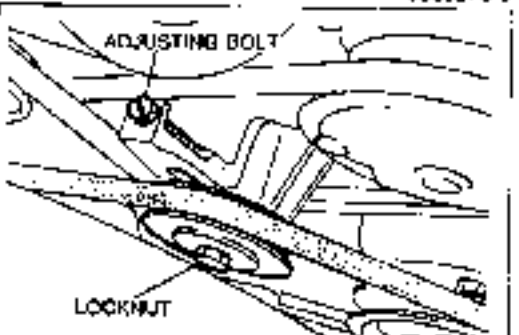
3RLCD-1432



03U3B-318



03U3B1-0-9



3WUCD2-089

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 shown in the figure. Adjust if necessary.

B1

Deflection

mm (in)

Drive belt	New	Used
Alternator	7.0-11.0 (0.28-0.31)	8.0-9.0 (0.31-0.35)
P/S oil pump	7.0-8.0 (0.28-0.31)	8.0-9.0 (0.31-0.35)
A/C compressor	10.0-12.0 (0.39-0.47)	12.0-14.0 (0.47-0.55)

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

Note

Belt tension can be measured among any pulleys.

Tension

N (kg, lb)

Drive belt	New	Used
Alternator	49-54C (50-55, 110-121)	302-491 (40-50, 96-110)
P/S oil pump	215-254 (25-30, 53-56)	136-245 (20-25, 41-55)
A/C compressor	411-540 (45-55, 86-121)	340-441 (35-45, 77-99)

Adjustment

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

Tightening torque

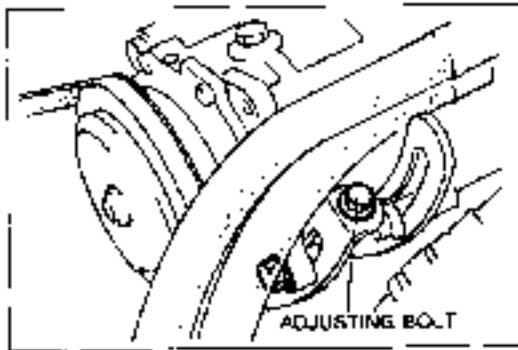
- Bolt A: 31-46 Nm (3.2-4.7 m-kg, 23-34 ft-lb)
- Bolt B: 37-52 Nm (3.8-5.3 m-kg, 27-38 ft-lb)

- (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 Nm (3.8-5.3 m-kg, 27-38 ft-lb)



8FUCB-009

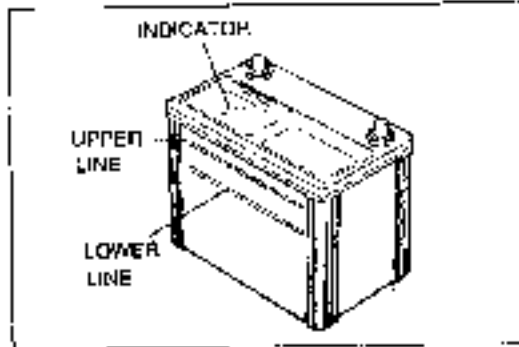
- (3) A/C compressor belt  
If necessary, loosen the mounting bolts and adjust the belt deflection by turning the adjusting bolt.

**Tightening torque:**  
37—52 Nm (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. Increase strips after 2 seconds—10 minutes*. HLA is normal. If not, replace HLA.
2. Noise when engine is started after sitting approx. one day.		* Time required for engine oil to circulate with engine includes tolerance for engine oil condition and ambient temperature.
3. Noise when engine is started after cranking for 3 seconds or more.	Oil leakage in HLA	
4. Noise when engine is started after new HLA is installed.		
5. Noise continues more than 10 minutes.	Insufficient oil pressure Faulty HLA	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> (Refer to page B2-69) Press down rocker arm by hand. If it moves, replace HLA. If it does not move, HLA normal. Measure valve clearance. If more than 0mm (0 in.) replace HLA.
6. Noise occurs during idle after high-speed running.	Incorrect oil amount Deteriorated oil	Check oil level. Crank or add oil as necessary. Check oil quality. If deteriorated, replace with specified type and amount of oil.

22UCB-000



22UBB-007

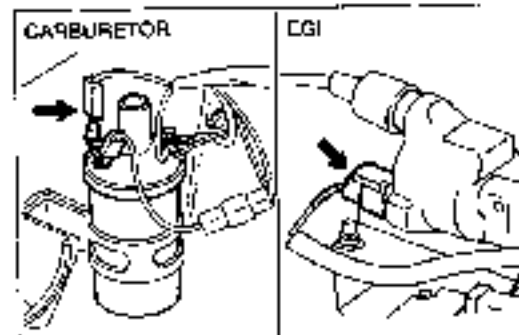
### COMPRESSION

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

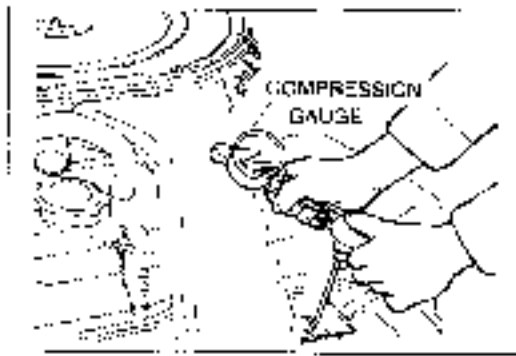
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Sections F1, F2.)

### COMPRESSION

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



86L01X-020



1B1.041-001

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:**

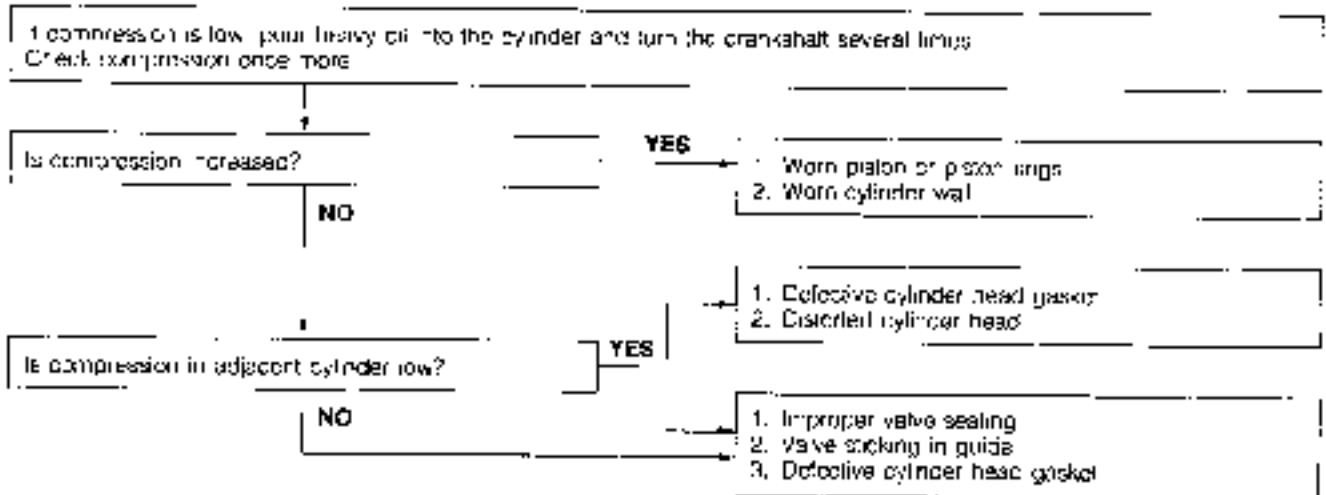
1,197 kPa (12.2 kg/cm<sup>2</sup>, 173 psi)-300 rpm

**Minimum:**

834 kPa (8.5 kg/cm<sup>2</sup>, 121 psi)-300 rpm

B1

**Possible Cause**



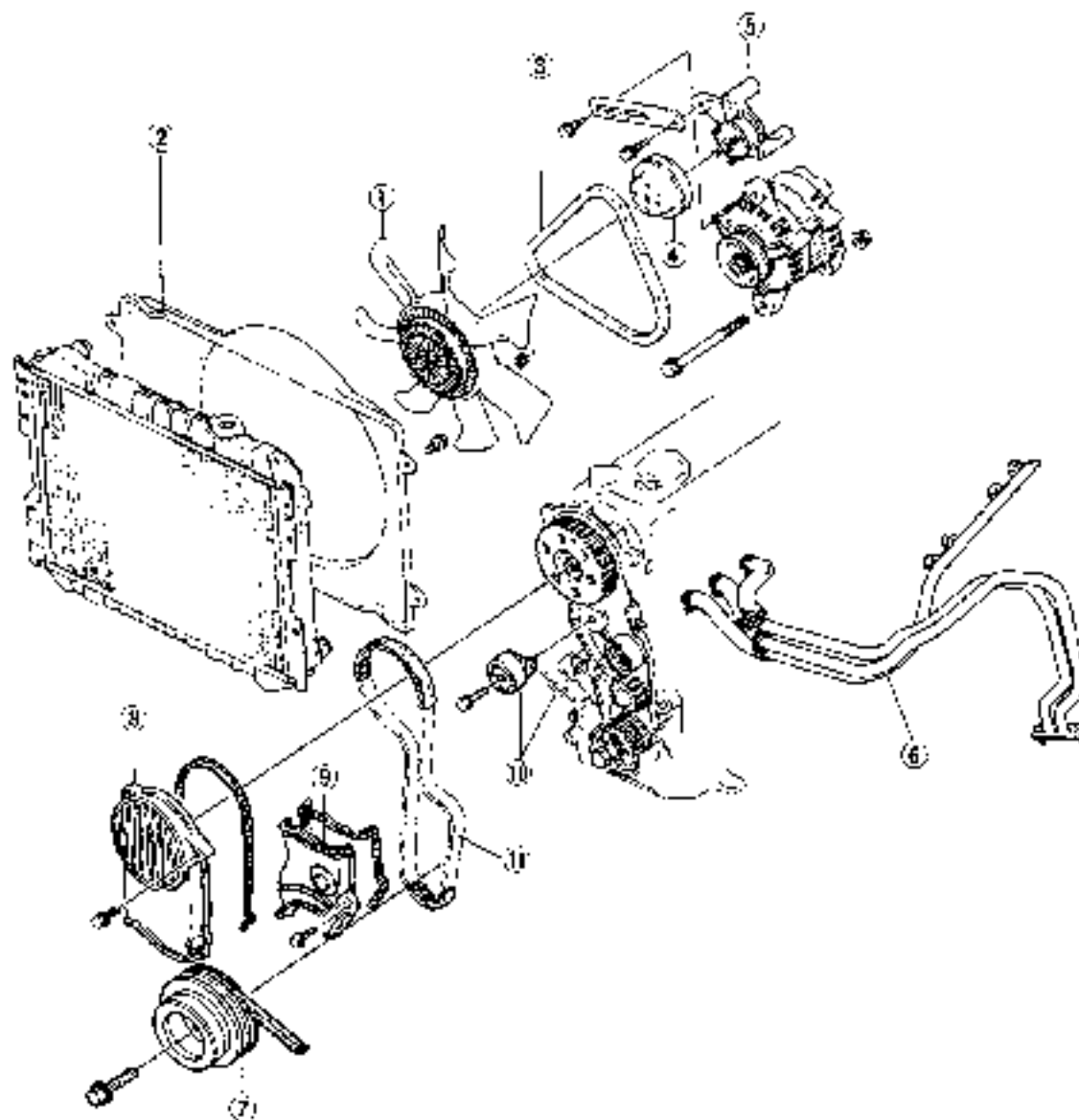
86.11X-022

## ON-VEHICLE MAINTENANCE

## TIMING BELT

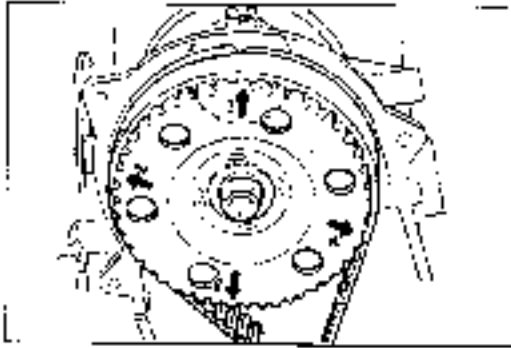
## Removal

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**.



15LGB1-KM2

- |   |                                      |
|---|--------------------------------------|
| 1. Cooling fan                              | 7. Crankshaft pulley                 |
| 2. Radiator cowl                            | 8. Timing belt cover upper           |
| 3. Alternator drive belt                    | 9. Timing belt cover lower           |
| 4. Cooling fan pulley                       | 10. Timing belt tensioner and spring |
| 5. Cooling fan bracket                      | 11. Timing belt                      |
| 6. Secondary air pipe assembly (Carburetor) |                                      |

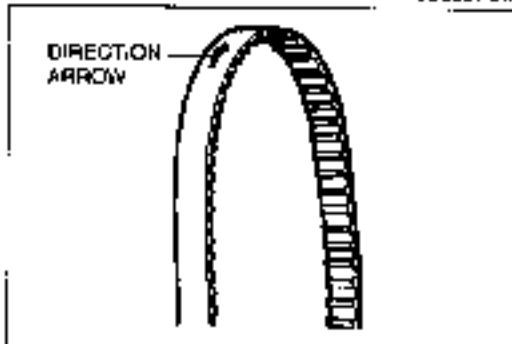


99U028-013

**Removal note****Timing belt tensioner**

1. Turn the crankshaft to align the ↑1 mark of the camshaft pulley with the front housing matching mark.
2. Remove the tensioner and spring.

B1



99U017-024

**Timing belt**

Mark the timing belt rotation for proper reinstallation if it is reused.

**Caution**

Be careful not to allow oil, grease, or water on the belt.

**Inspection**

Inspection of timing belt related parts  
(Refer to page B1-44.)

99U028-014



# B1

## ON-VEHICLE MAINTENANCE (TIMING BELT)

### Installation

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

### Caution

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

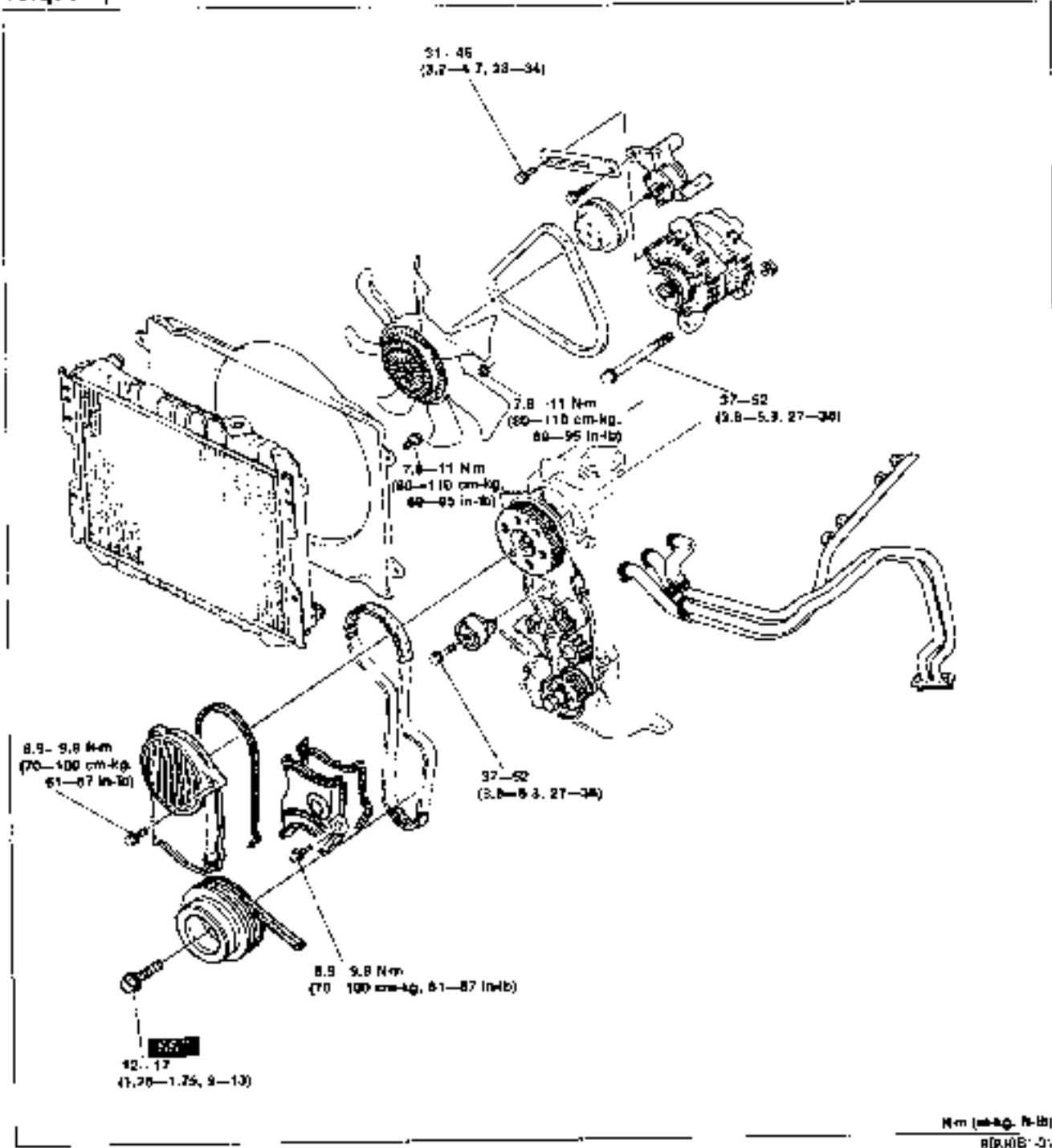
If the fan touches the cowling, adjust the radiator cowling mounting position.

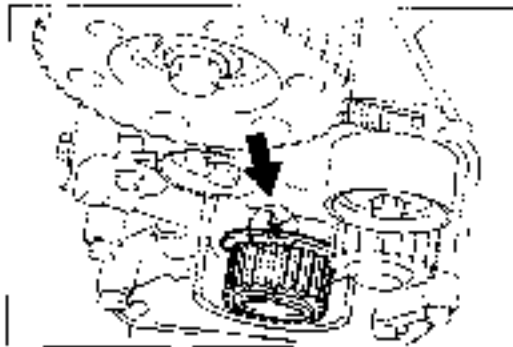
### Note

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

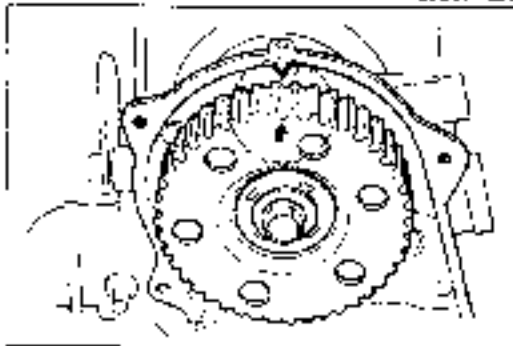
b) Squeeze the clamp lightly with large pliers to ensure a good fit.

### Torque Specifications

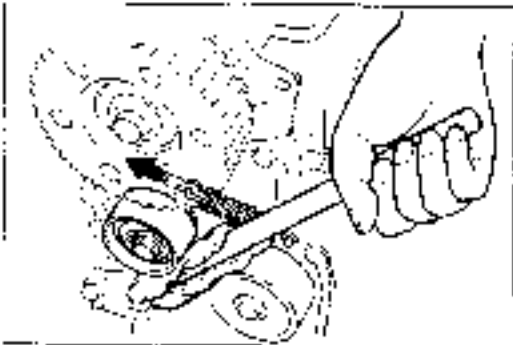




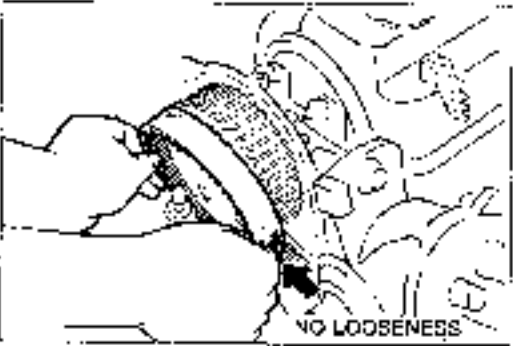
96L01X 226



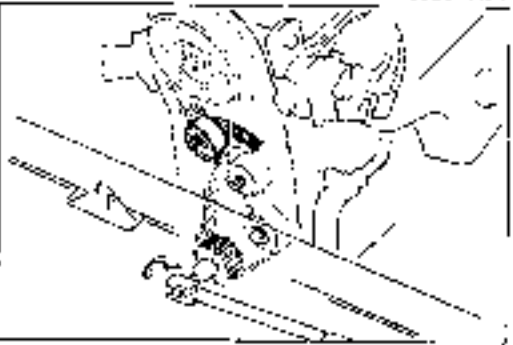
96L01X 314



96G01A 033



96L01X 027



96L01X 027

**Installation note****Timing belt**

1. Check that the mark on the timing belt pulley is aligned with the matching mark.
2. Check that the  $\uparrow$  mark of the camshaft pulley is aligned with the matching mark. If it is not aligned, turn the camshaft to align.
3. Install the timing belt tensioner and spring. Temporarily secure it with the spring fully extended.
4. Install the timing belt so that there is no looseness at the water pump pulley and idler pulley side.

**Caution**

- a) If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- b) Check that there is no oil, grease, or dirt on the timing belt.

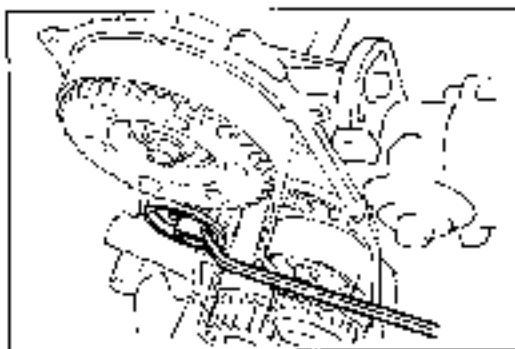
**Note**

**Remove all spark plugs for easier rotation.**

5. Turn the crankshaft twice clockwise in the direction of rotation.
6. Check that the matching marks are correctly aligned. If not, repeat the above-mentioned procedure.
7. Loosen the tensioner lock bolt and apply tension to the belt.

# B1

## ON-VEHICLE MAINTENANCE (TIMING BELT)

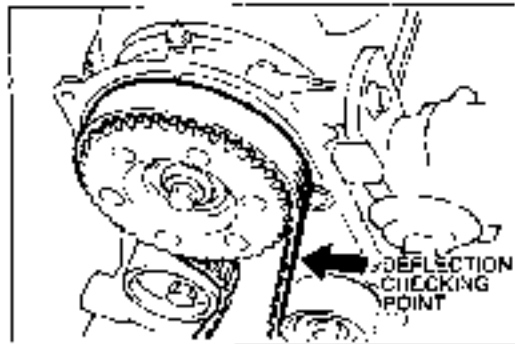


69C01E-02E

8. Tighten the timing belt tensioner lock bolt.

### Tightening torque:

37–52 N·m (3.8–5.3 m·kg, 27–38 ft·lb)



35J01X-01C

9. Turn the crankshaft twice in the direction of rotation and align the matching marks.

10. Check the timing belt deflection. If the deflection is not correct, repeat the adjustment from step 5 above.

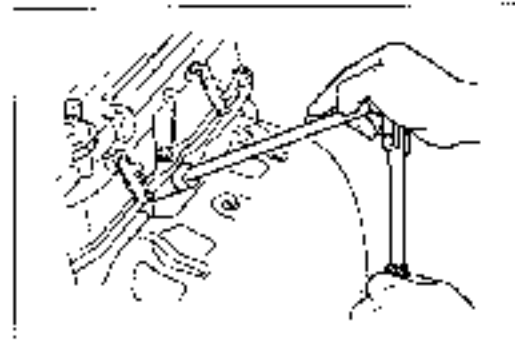
### Timing belt deflection/98 N (10 kg, 22 lb)

New : 8.0–9.0mm (0.31–0.35 in)

Used: 9.0–10.0mm (0.35–0.39 in)

### Caution

Be sure not to apply tension other than that of the tensioner spring.



2BJ081-01D

### Spark plug

1. Install the spark plugs.

### Tightening torque:

15–23 N·m (1.5–2.3 m·kg, 11–17 ft·lb)

### Steps After Installation

1. Adjust the drive belt tension. (Refer to page B1–5.)
2. Add engine coolant to the specified levels.
3. Connect the negative battery cable.
4. 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.

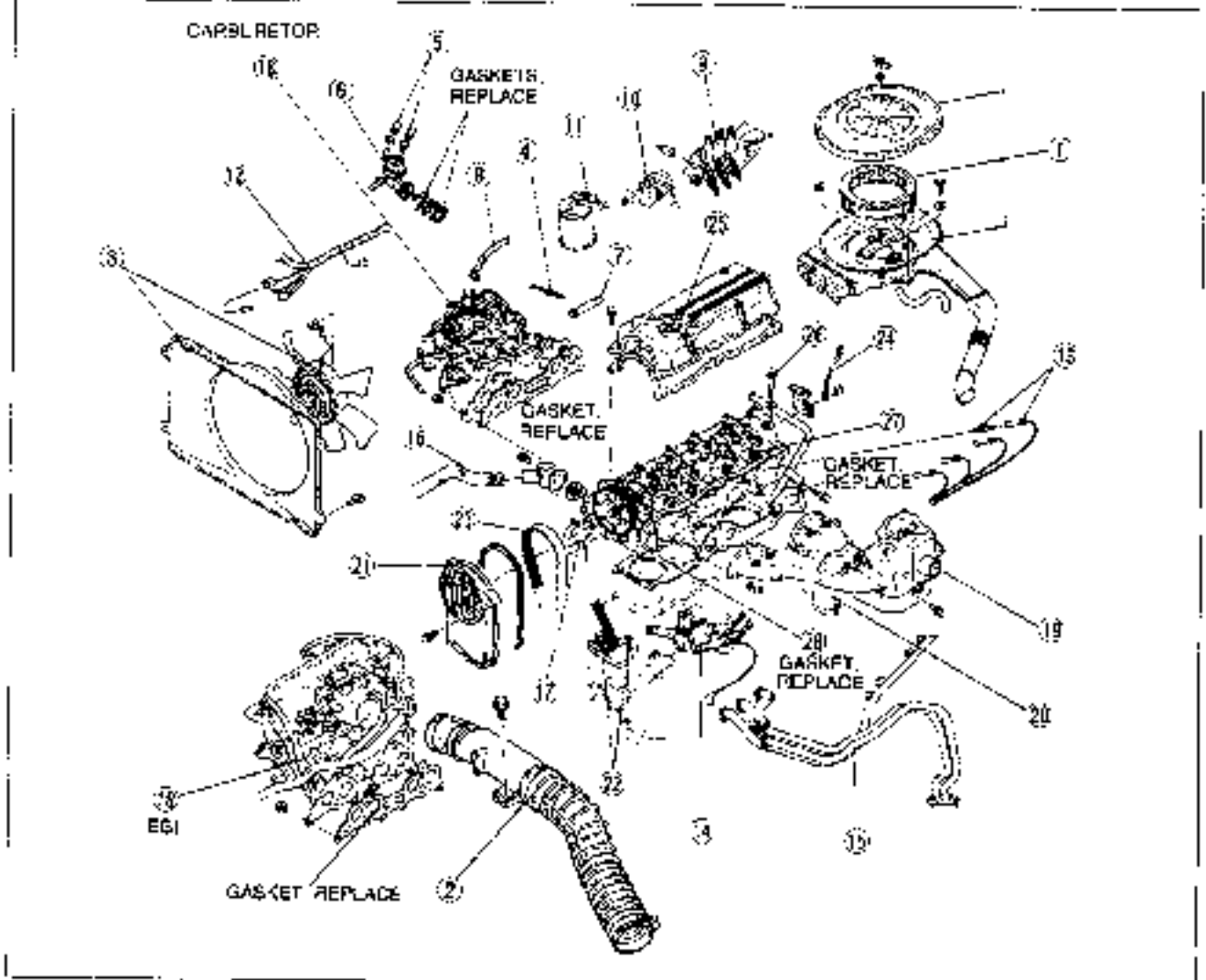
9R-CB1-01G

## CYLINDER HEAD GASKET

## Removal

**Warning: Release the fuel pressure. (Refer to Sections F1, F2.)**

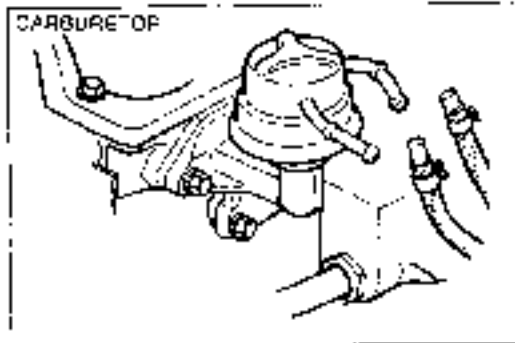
1. Disconnect the negative battery cable
2. Remove the engine undercover.
3. Drain the engine coolant
4. Remove in the order shown in the figure referring to the **Removal note**



- |  |  |
|--|--|
| 1. Air cleaner assembly (Carburetor)   | 15. Secondary air pipe assembly (Carburetor) |
| 2. Air intake hose (EGI)               | 16. Radiator hose, upper                     |
| 3. Cooling fan and radiator cowl       | 17. Water by-pass hose                       |
| 4. Accelerator cable                   | 18. Intake manifold assembly                 |
| 5. Fuel hoses                          | 19. Exhaust manifold insulator               |
| 6. Fuel pump (Carburetor M/T)          | 20. Exhaust manifold                         |
| 7. Heater hoses                        | 21. Timing belt cover, upper                 |
| 8. Brake vacuum hose                   | 22. Timing belt tensioner and spring         |
| 9. Three-way solenoid valve assembly   | 23. Timing belt                              |
| 10. Duty solenoid valve assembly       | 24. Engine ground                            |
| 11. Canister hoses                     | 25. Cylinder head cover                      |
| 12. Engine harness                     | 26. Cylinder head bolt                       |
| 13. High-tension leads and spark plugs | 27. Cylinder head                            |
| 14. Distributor                        | 28. Cylinder head gasket                     |

# B1

## ON-VEHICLE MAINTENANCE (CYLINDER HEAD GASKET)

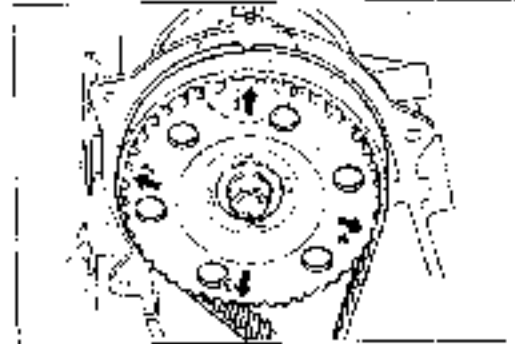
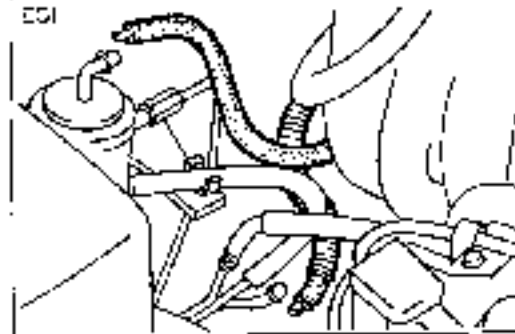


### Removal note Fuel hose

#### Note

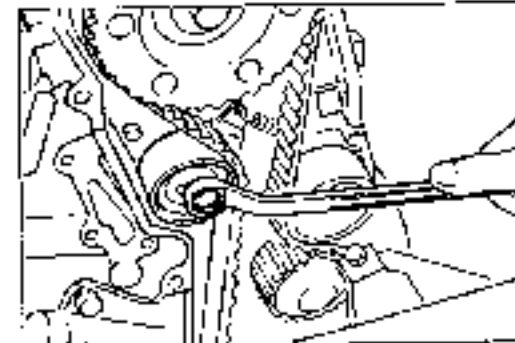
- Cover the hose with a rag because fuel will spray out when disconnecting.
- Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage

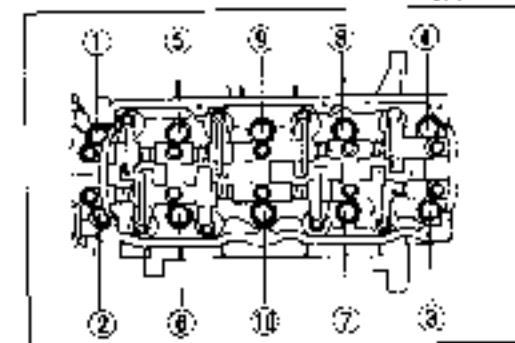


### Timing belt

- Before removing the timing belt, turn the crankshaft to align the ↑1 mark of the camshaft pulley with the front housing matching mark.

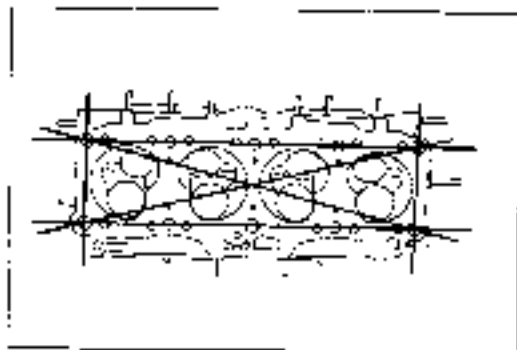


- Loosen the timing belt tensioner lock bolt.
- Shift the tensioner outward as far as possible, then temporarily tighten it.
- Remove the timing belt and secure it out of the way to prevent damage during removal and installation of the cylinder head.



### Cylinder head bolt

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



RBJ001 (2)

**Disassembly of Cylinder Head**

Refer to page B1-28

**Inspection of Cylinder Head**

Refer to page B1-34.

**Assembly of Cylinder Head**

Refer to page B1-56.

**Installation**

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

**Caution**

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

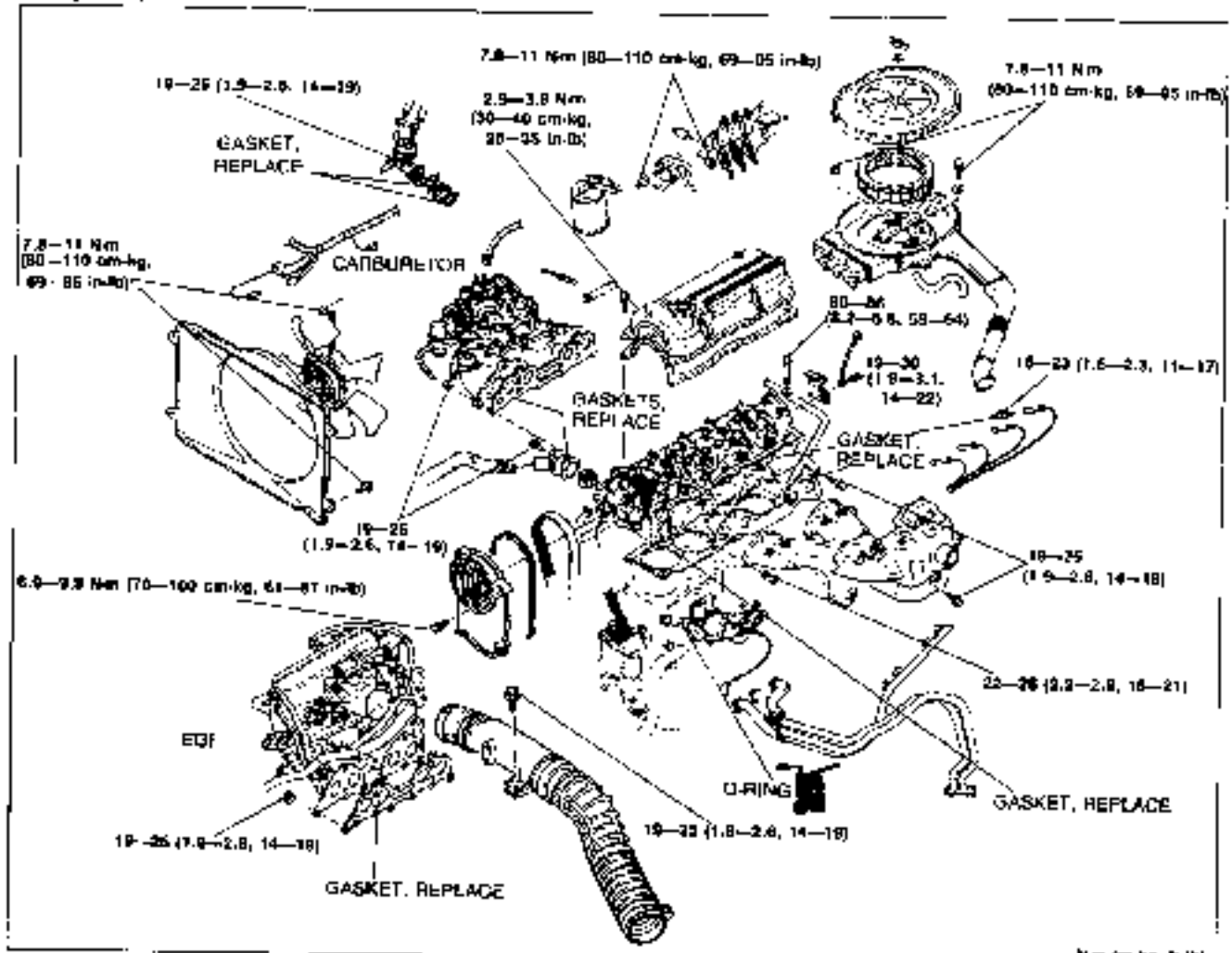
If the fan touches the cowling, adjust the radiator cowling mounting position.

**Note**

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**

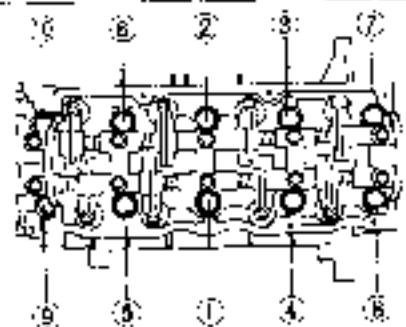


Nm (cm-kg, in-lb)

RBJ001 (2)

**Installation note****Cylinder head**

1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Place a new cylinder head gasket in position.



3. Set the cylinder head in place.
4. Apply engine oil to the bolt threads and seat faces.
5. 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)

**Cylinder head cover**

1. Apply engine oil to the valves and rocker arms.
2. Apply silicone sealant to the shaded areas shown in the figure.
3. Install the cylinder head cover.

**Tightening torque:**

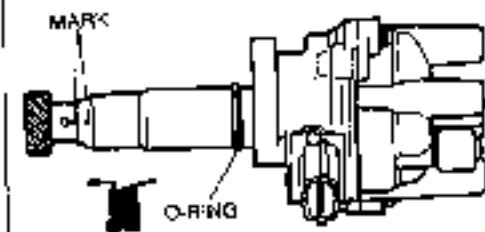
2.9—3.9 N·m (30—40 cm·kg, 26—35 in·lb)

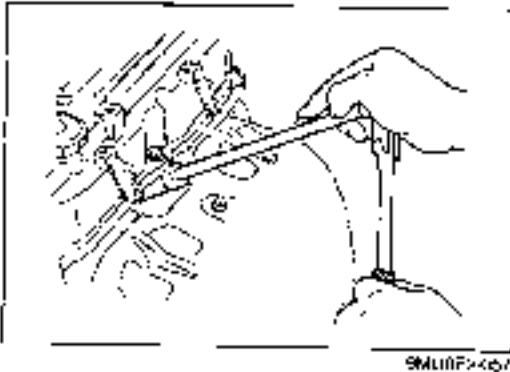
**Timing belt**

1. Align the ↑1 mark of the camshaft pulley with the front housing matching mark.
2. Install the timing belt. (Refer to page B1-10.)

**Distributor**

1. Apply engine oil to the new O-ring, and position it on the distributor.
2. Apply engine oil to the distributor driven gear.
3. Align the distributor housing and driven gear marks.
4. Install the distributor into the front housing.
5. Loosely tighten the distributor mounting bolt.





9M.U10F2407

**Spark plug**

1. Apply anti seize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

**Tightening torque:****15—23 Nm (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.

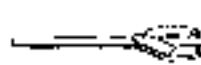

9M.U10F-056

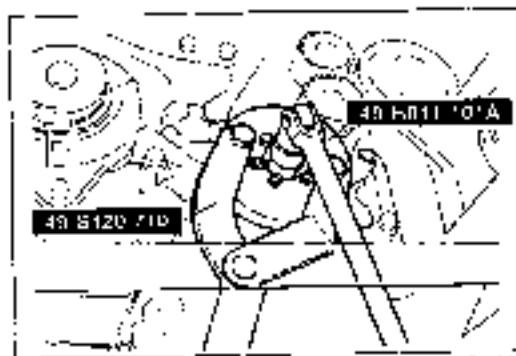


## FRONT OIL SEAL

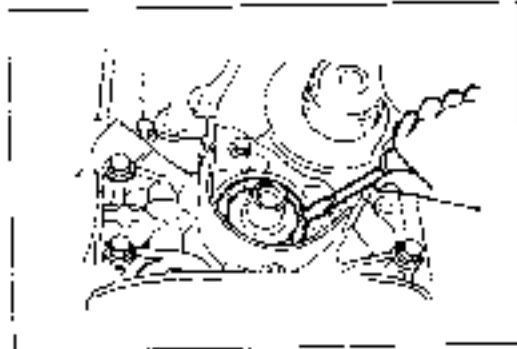
## Preparation

## SST

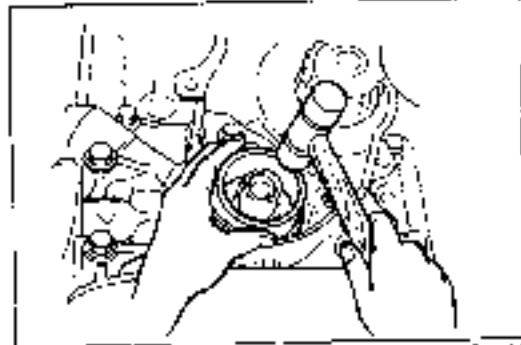
<p>49 5120 710</p> <p>Holder, cot pin; barge</p> 	<p>49 H011 101A</p> <p>Crankshaft lock tool</p> 
--	---



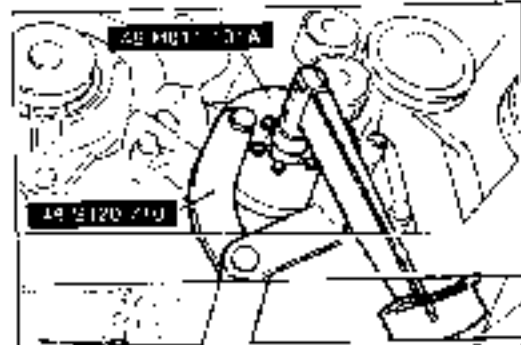
92U021-114



92U021-025



92U021-112



92U021-115

## Removal

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the timing belt. (Refer to page 31-8.)
4. Remove the timing belt pulley with the SST.

5. Remove the oil seal with a screwdriver and a rag.

## Installation

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

## Installation note

## Front oil seal

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

**Oil seal outer diameter: 46mm (1.89 in)**

## Caution

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

## Timing belt pulley

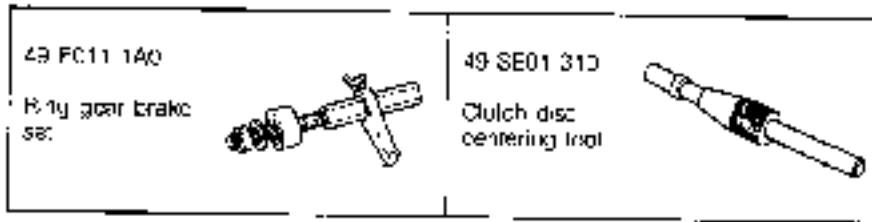
Install the timing belt pulley with the SST.

## Tightening torque:

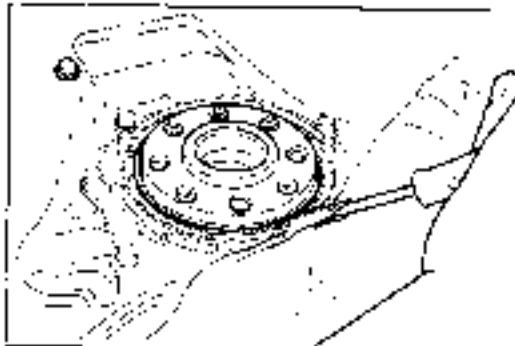
157—167 Nm (16.0—17.0 m·kg, 116—123 ft·lb)

## Steps After Installation

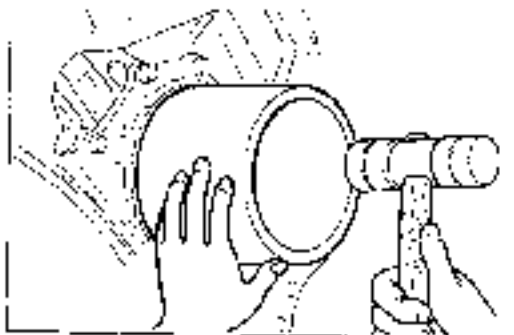
1. Add engine oil to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following.
  - (1) Check for leakage of engine oil.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil levels.

**REAR OIL SEAL****Preparation****SST**

28.001-017



28.001-017



28.001-017

**Removal**

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the manual transmission.  
(Refer to Sections J1, J2, J3.)  
Remove the automatic transmission  
(Refer to Sections K1, K2, K3.)
4. Remove the clutch cover, clutch disc, and flywheel with the **SST**. (Refer to Section H.)  
Remove the plate, drive plate, and adapter with the **SST**.  
(Refer to Sections K1, K2, K3.)
5. Remove the oil seal with a screwdriver 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**

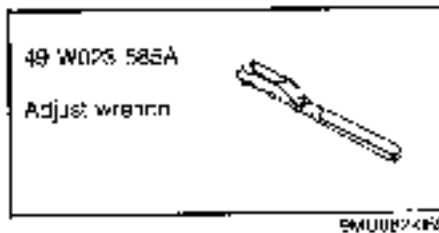
**The oil seal must be tapped in until it is flush with the edge of the rear cover.**

**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.

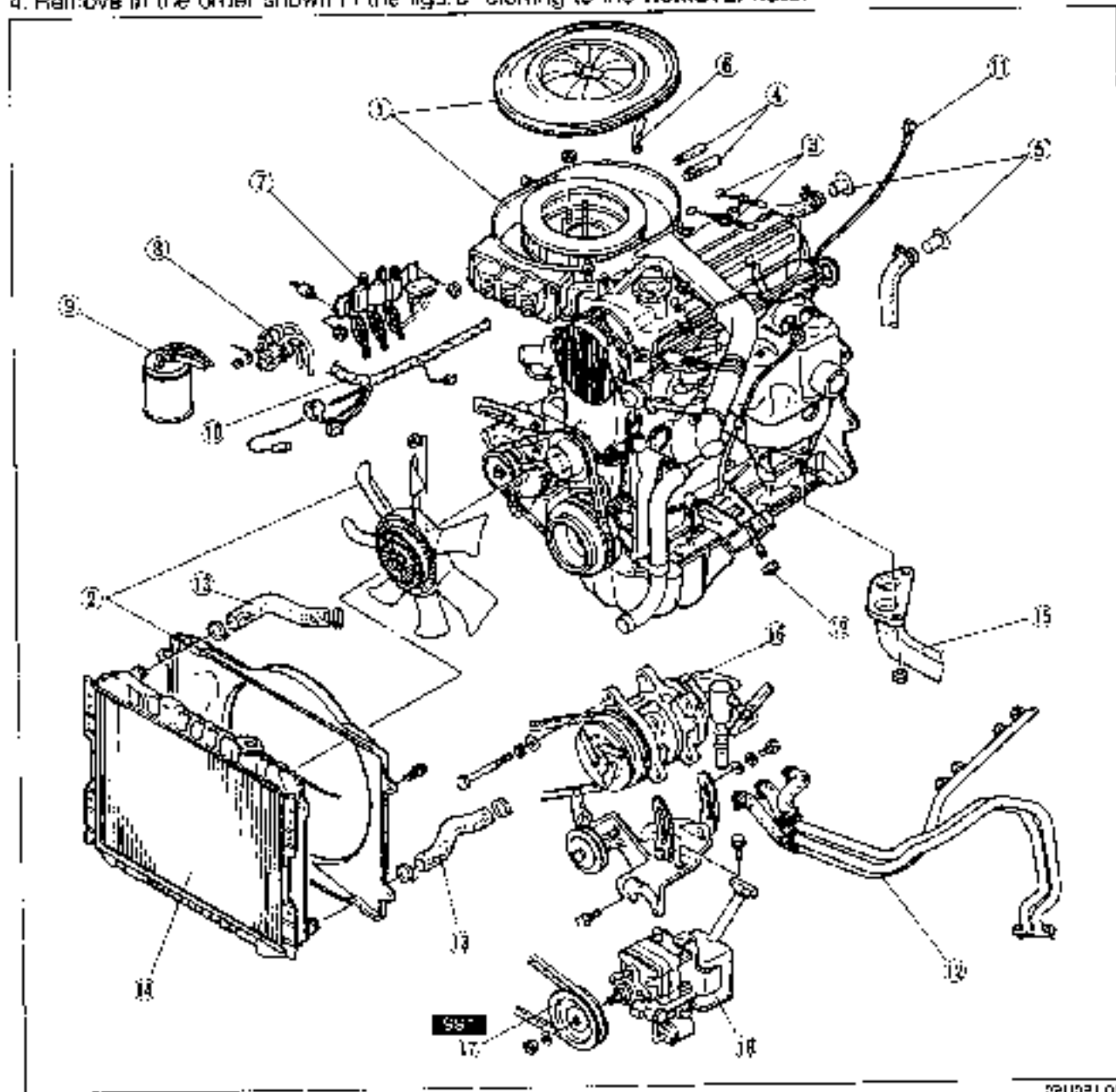
28.001-017

## REMOVAL

PREPARATION  
SST

**Warning: Release the fuel pressure. (Refer to Sections F1, F2.)**

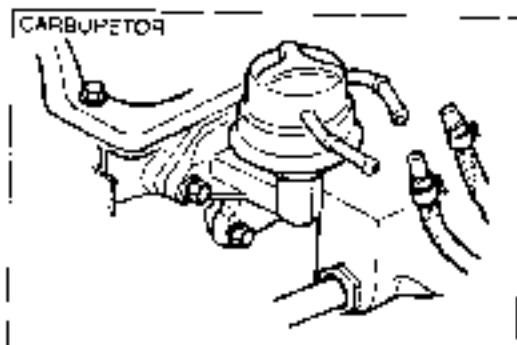
1. Disconnect the negative battery cable.
2. Remove the starter (Refer to Section G) and transmission. (Refer to Sections J1, J2, J3 and K1, K2, K3.)
3. Drain the engine oil and coolant.
4. Remove in the order shown in the figure referring to the **Removal note**.



32U021 014

1. Air cleaner assembly
2. Cooling fan and radiator cowling
3. Accelerator cable
4. Fuel hoses
5. Heater hoses
6. Brake vacuum hose
7. Three-way solenoid valve assembly
8. Vacuum solenoid valve assembly
9. Canister hoses
10. Engine harness
11. Engine ground
12. Secondary air pipe assembly (Carburetor)
13. Radiator hoses
14. Radiator
15. Exhaust pipe
16. A/C compressor
17. P/S oil pump pulley
18. P/S oil pump
19. Engine mount nuts

ISUZU 1-629



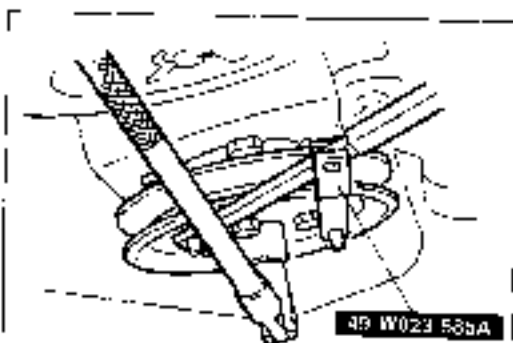
ISUZU 1-629

#### 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.

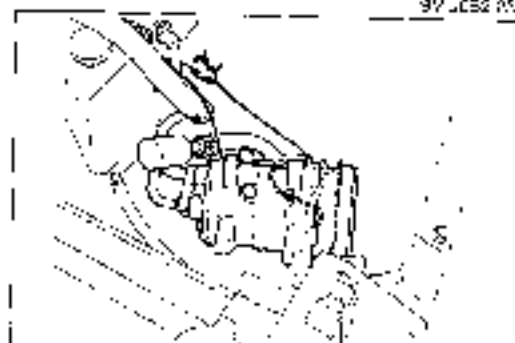
Plug the disconnected hoses to avoid fuel leakage



ISUZU 1-629

#### P/S oil pump pulley

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



ISUZU 1-629

#### 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.

# B1

## ENGINE STAND INSTALLATION

### ENGINE STAND INSTALLATION

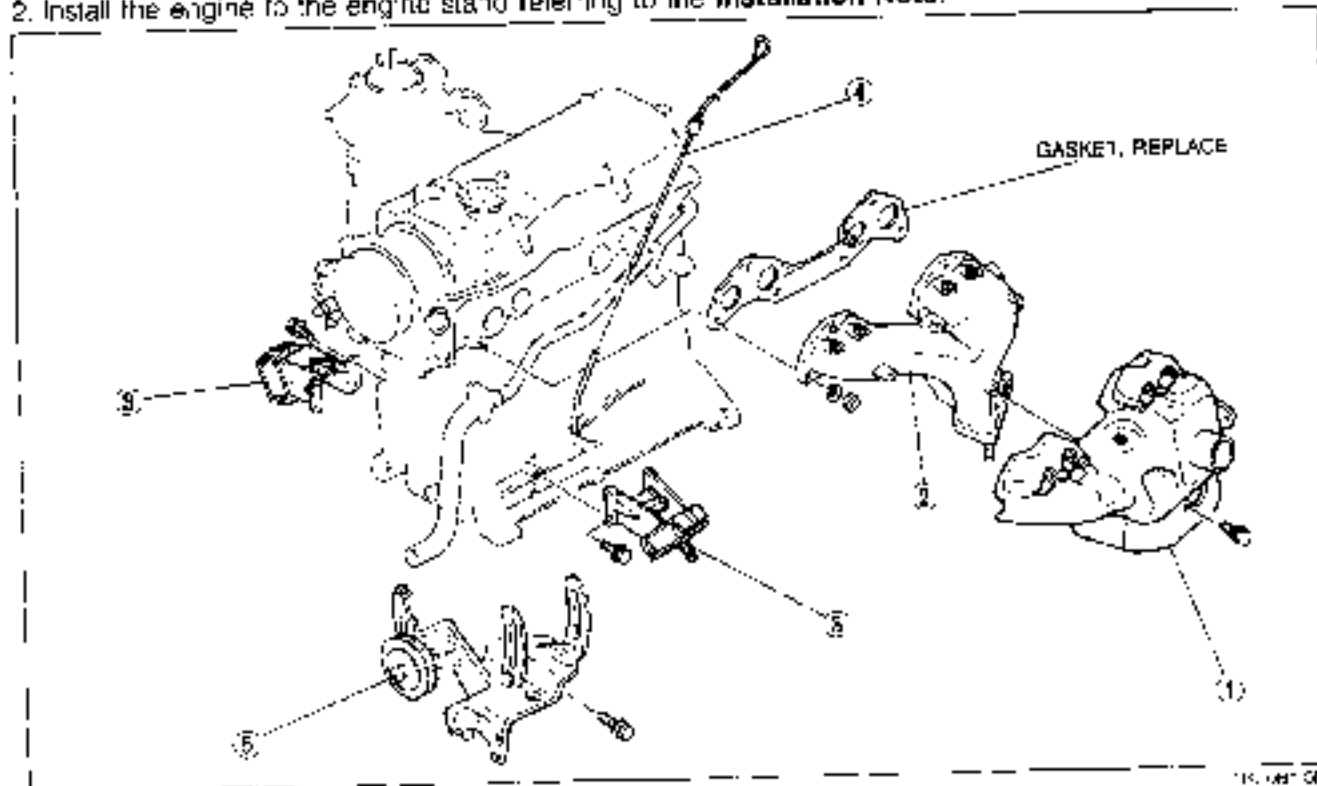
#### PREPARATION SST

49 D107 683A Engine stand 	49 L010 1A0 Hanger, engine stand 	49 L010 101 Plate (Part of 49 L010 1A0) 
49 L010 1C2 Arms (Part of 49 L010 1A0) 	49 L010 103 Hooks (Part of 49 L010 1A0) 	49 L010 104 Nuts (Part of 49 L010 1A0) 
49 L010 105 Balls (Part of 49 L010 1A0) 	49 L010 106 Balls (Part of 49 L010 1A0) 	

SMUK129-013

#### INSTALLATION

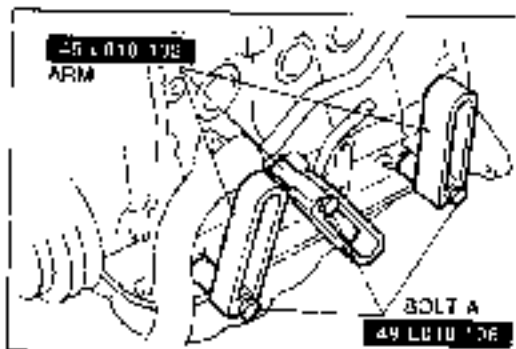
1. Remove the parts in the order shown in the figure.
2. Install the engine to the engine stand referring to the **Installation Note**.



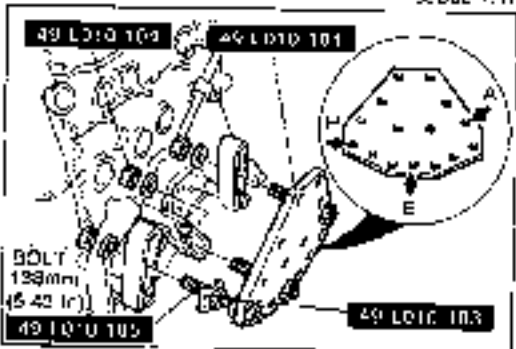
15. 001 005

1. Exhaust manifold insulator
2. Exhaust manifold
3. Engine mounts

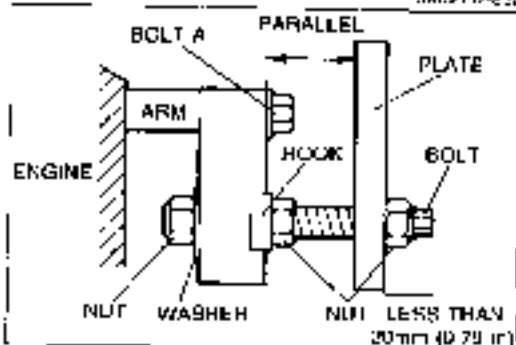
4. Oil level gauge
5. A/C compressor and P/S oil pump bracket



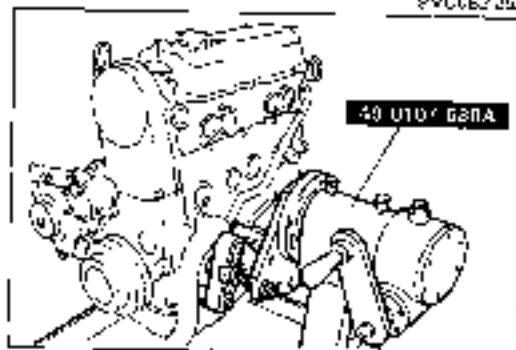
9EUD0E1117



9M07R0202



9VUC0E2055



9M07R0202

**Installation note**

**Engine Hanger**

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


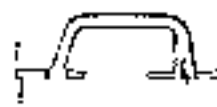





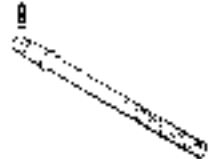




5. Install the engine on the **SST**.

# B1

## DISASSEMBLY

### DISASSEMBLY

#### PREPARATION SST

<p>49 E011 1A0</p> <p>Ring gear brake set</p> 	<p>49 D636 100A</p> <p>Arm, valve spring filter</p> 	<p>49 G030 2F2</p> <p>Pivot, valve spring lifter</p> 
<p>49 1285 071</p> <p>Pulver. bearing</p> 	<p>49 L011 0A0</p> <p>Piston pin setting tool set</p> 	<p>49 L011 0C1</p> <p>Support block body (Part of 49 L011 0A0)</p> 
<p>49 L011 0C2</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 006</p> <p>Pulver &amp; installer (Part of 49 L011 0A0)</p> 
<p>49 L011 008</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> 

29900-0.2

1. Code all vertical 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.

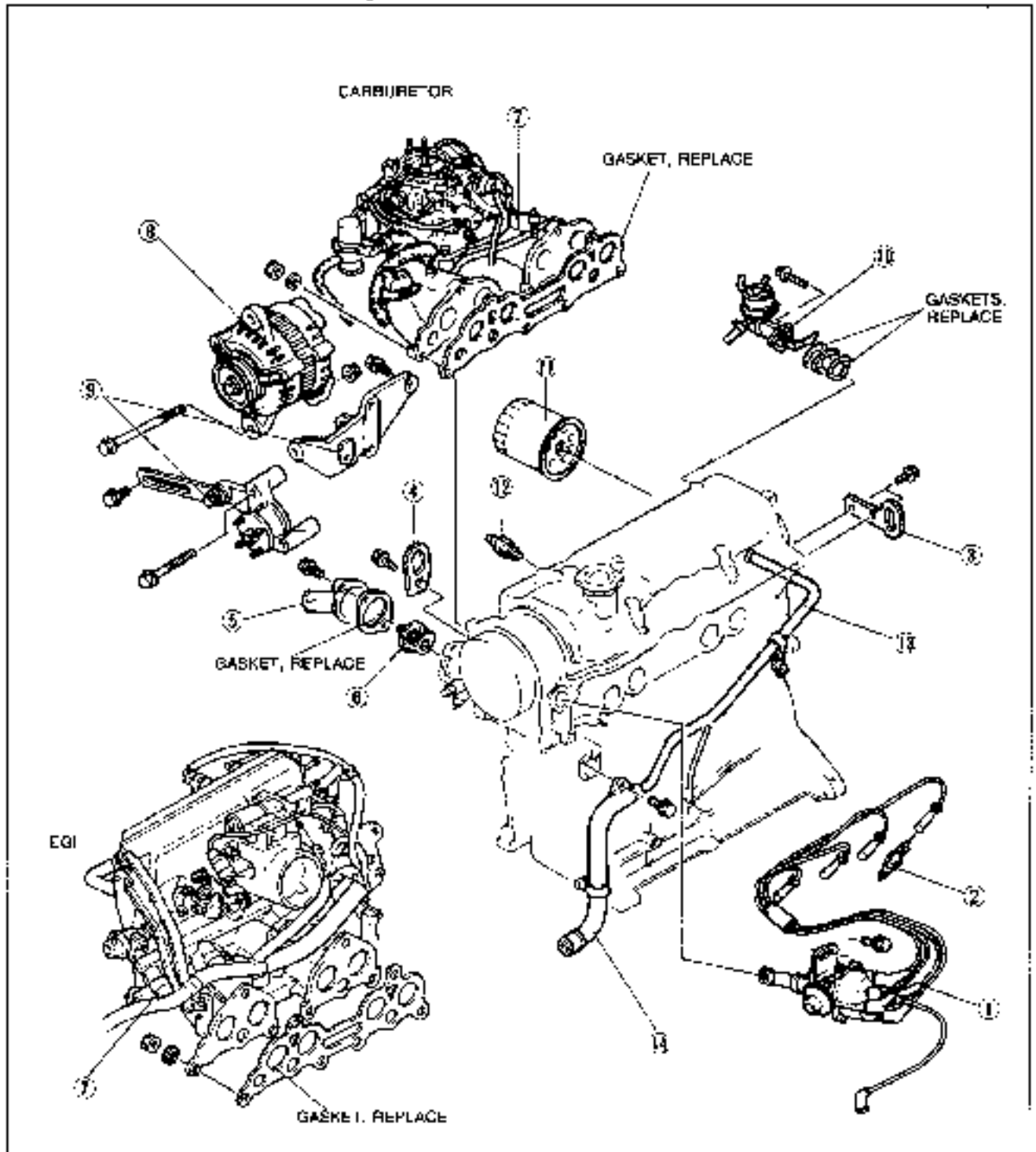
#### Note

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

3VU050-077

**AUXILIARY PARTS**

Remove in the order shown in the figure



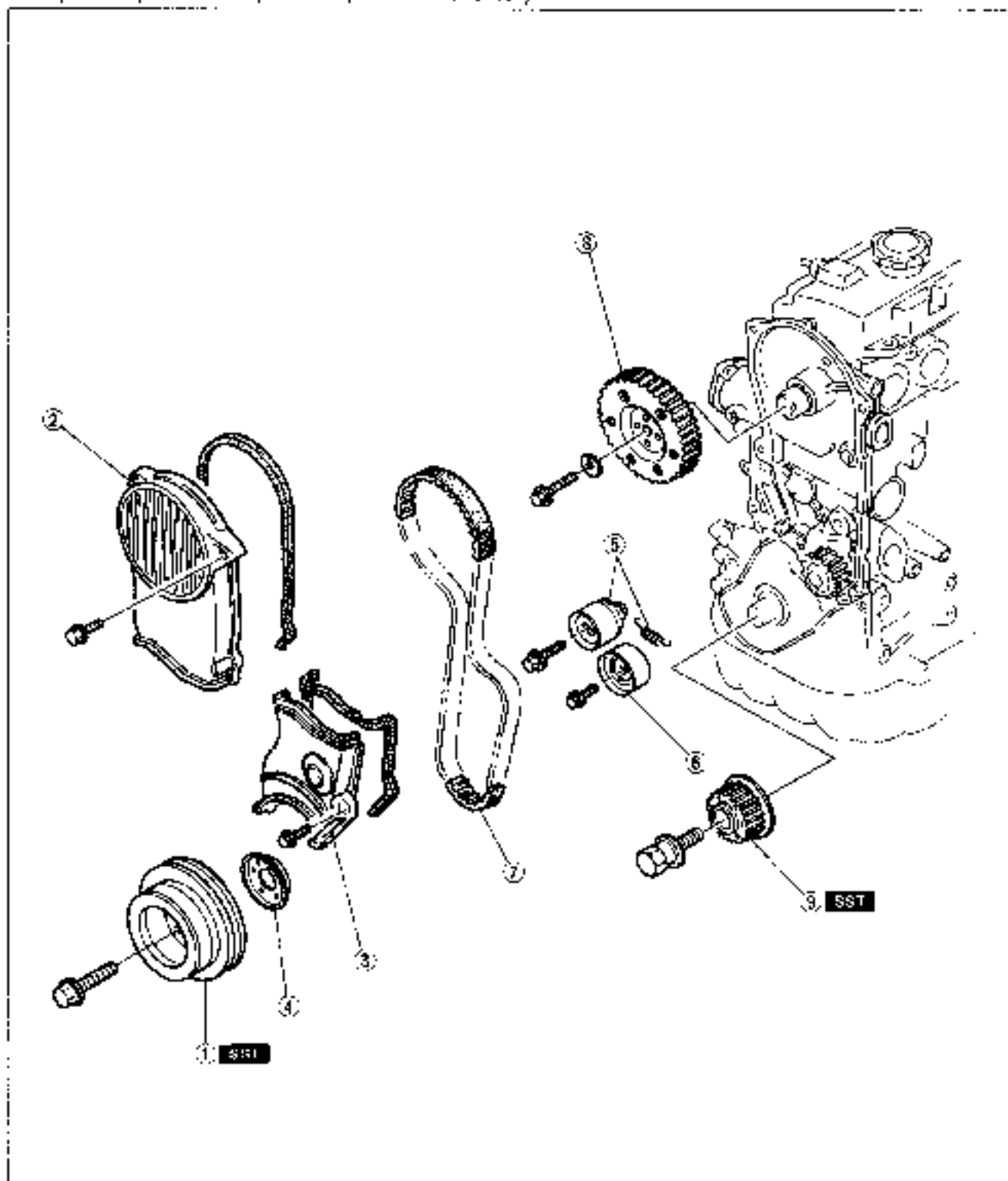
ELXB1-007

- |                                      |  |
|--------------------------------------|--|
| 1 Distributor and high-tension leads | 8. Alternator                                |
| 2 Spark plugs                        | 9 Alternator bracket and cooling fan bracket |
| 3 Rear engine hanger                 | 10. Fuel pump (Carburetor M/T)               |
| 4 Front engine hanger                | 11. Oil filler                               |
| 5 Thermostat cover                   | 12. Oil pressure switch                      |
| 6. Thermostat                        | 13. Coolant bypass pipe                      |
| Service ... .. Section E             | 14. Coolant inlet pipe                       |
| 7. Intake manifold assembly          |  |

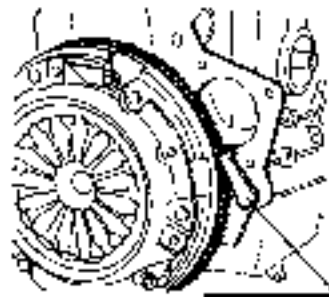


### TIMING BELT

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



- |                                     |                             |
|-------------------------------------|-----------------------------|
| 1. Crankshaft pulley                | 6. Timing belt idler pulley |
| 2. Upper timing belt cover          | 7. Timing belt              |
| 3. Lower timing belt cover          | 8. Camshaft pulley          |
| 4. Baffle plate                     | 9. Timing belt pulley       |
| 5. Timing belt tensioner and spring |                             |



JIS E011 1A0

79337 A-1E1

**Disassembly note****Crankshaft pulley**

1. Set the **SST** against the flywheel.
2. Remove the crankshaft pulley.

DIRECTION  
ARROW

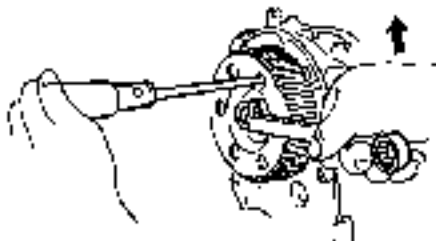
76321A 123

**Timing belt**

1. Loosen the tensioner lock bolt, and remove the tensioner spring.
2. Mark the timing belt rotation for proper reinstallation if it is reused.
3. Remove the timing belt.

**Caution**

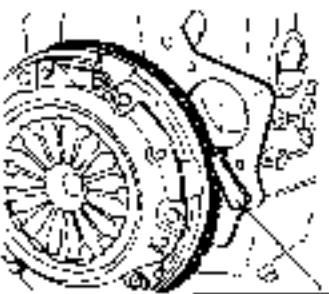
Be careful not to allow oil or grease on the belt.



76211A 126

**Camshaft pulley**

Remove the pulley lock bolt using a screw driver to prevent the camshaft from turning.



JIS E011 1A0

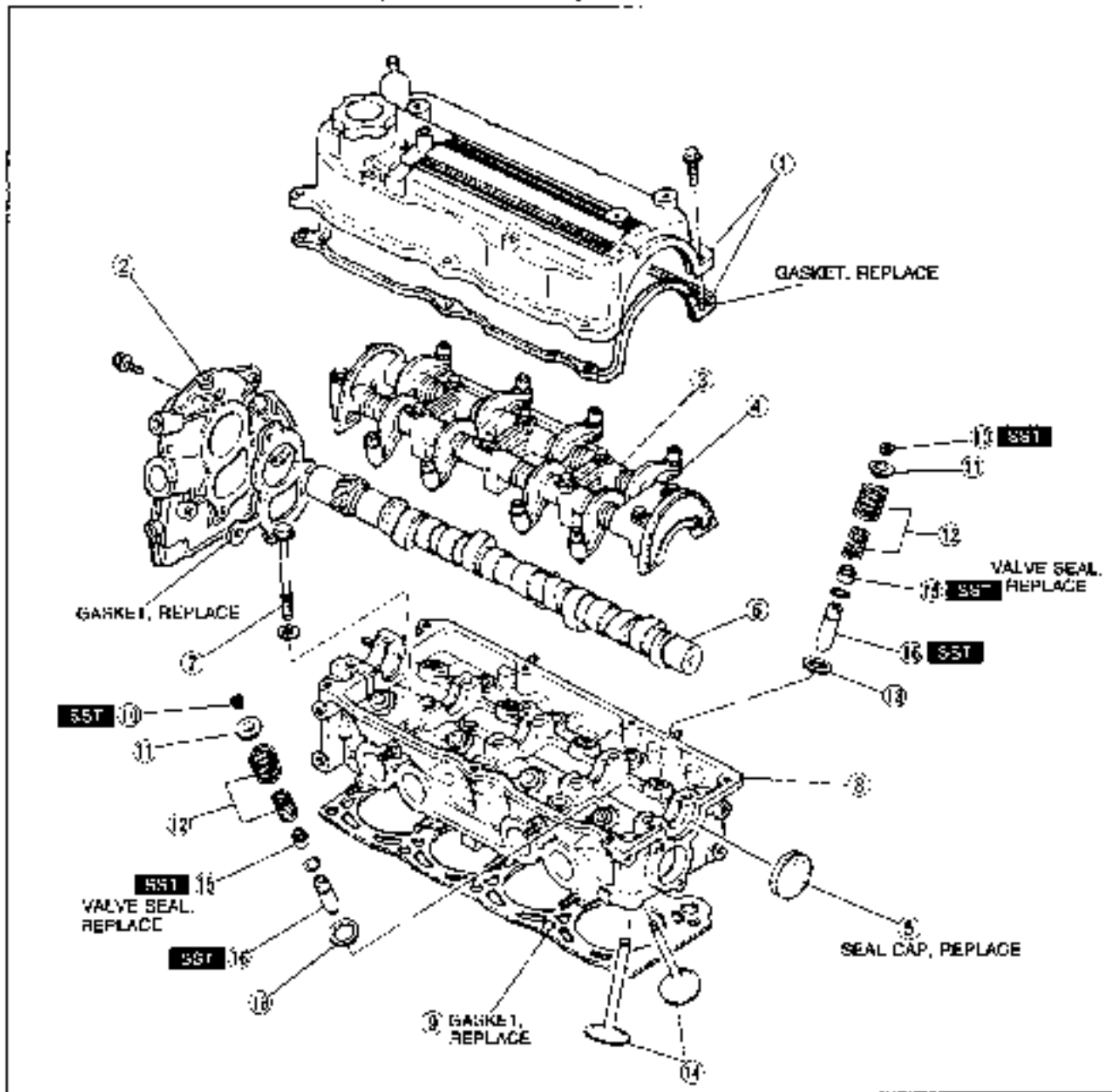
95...057-125

**Timing belt pulley**

Remove the timing belt pulley with the **SST**.

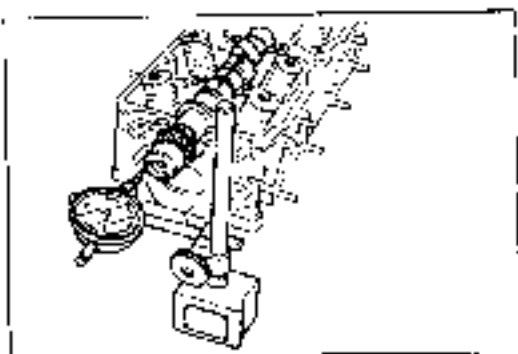
### CYLINDER HEAD

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



16-5561-009

- |   |  |
|---|--|
| 1. Cylinder head cover and gasket                               | 9. Cylinder head gasket  |
| 2. Front housing  | 10. Valve keepers  |
| 3. Rocker arm and shaft assembly<br>Inspection ..... page B1-40 | 11. Upper spring seat  |
| 4. Hydraulic lash adjuster (HLA)<br>Inspection ..... page B1-40 | 12. Valve spring, outer and inner<br>Inspection ..... page B1-36               |
| 5. Seal cap   | 13. Lower spring seat  |
| 6. Camshaft<br>Inspection ..... page B1-39                      | 14. Valve<br>Inspection ..... page B1-35                                       |
| 7. Cylinder head bolt   | 15. Valve seal<br>Inspect for wear or damage                                   |
| 8. Cylinder head<br>Inspection ..... page B1-34                 | 16. Valve guide<br>Inspection ..... page B1-35<br>Replacement ..... page B1-36 |

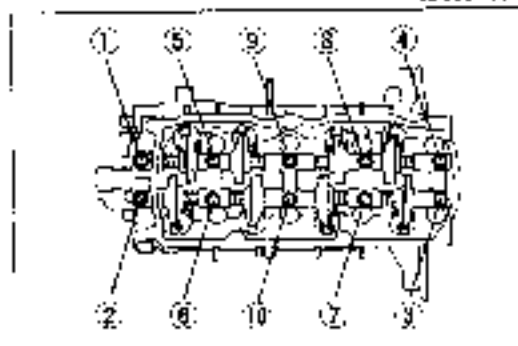


SB J261-004

**Disassembly note**

During disassembly, inspect the following:

1. Camshaft end play (Refer to page B1-40.)
2. Camshaft journal oil clearance (Refer to page B1-39.)



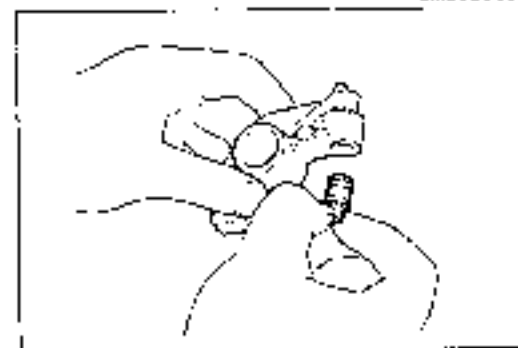
DM J042-C91

**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.



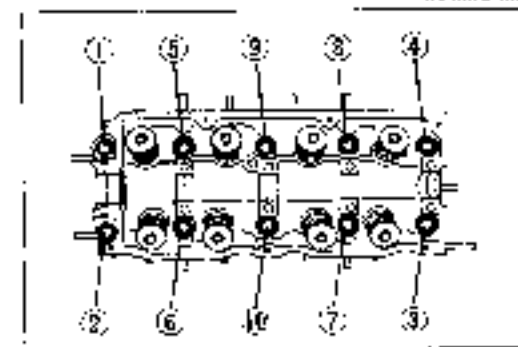
4VUJRP-C82

**Hydraulic lash adjuster (HLA)**

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

**Caution**

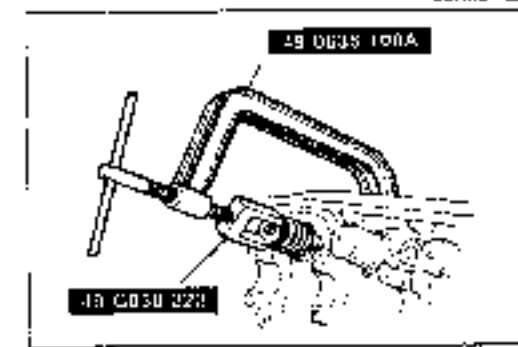
Do not remove the HLA unless necessary because oil leakage will occur if the O-ring is damaged.



4B J087-333

**Cylinder head bolt**

Loosen the cylinder head bolts in two or three steps in the order shown in the figure.



4B C030-024

**Valve**

Remove the valves from the cylinder head with the SST.

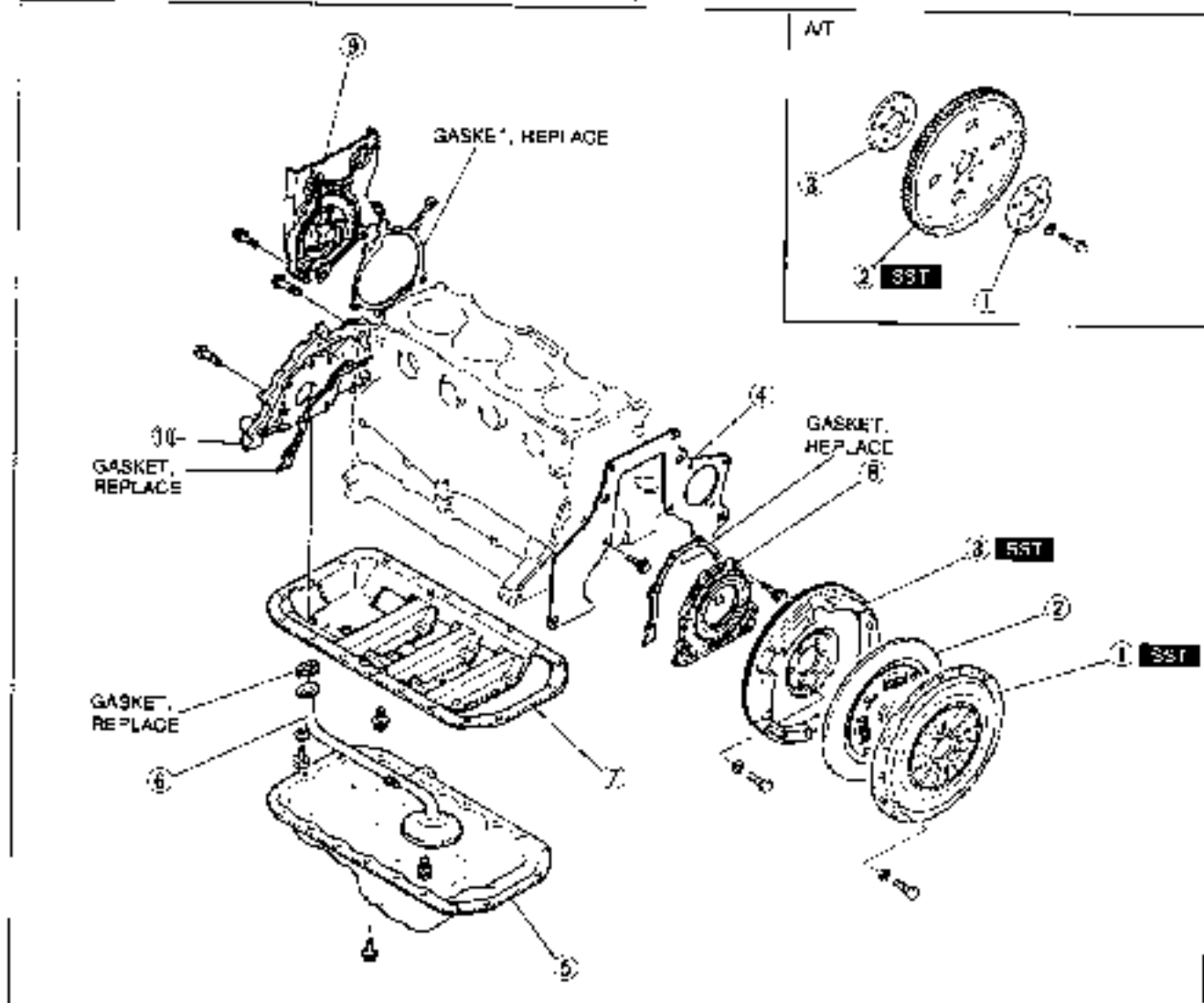
4B J252-003

# B1

## DISASSEMBLY (CYLINDER BLOCK)

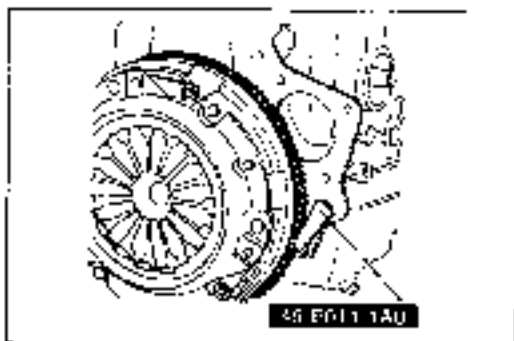
### CYLINDER BLOCK 1

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



- 1 Clutch cover (M/T), Backing plate (A/T)
- 2 Clutch disc (M/T), Drive plate (A/T)
- 3 Flywheel (M/T), Adapter (A/T)
- 4 End plate
- 5 Oil pan  
Inspect for damage

- 6 Oil strainer
- 7 Stiffener
- 8 Rear cover
- 9 Water pump assembly  
Service ..... Section F
- 10 Oil pump assembly  
Service ..... Section D



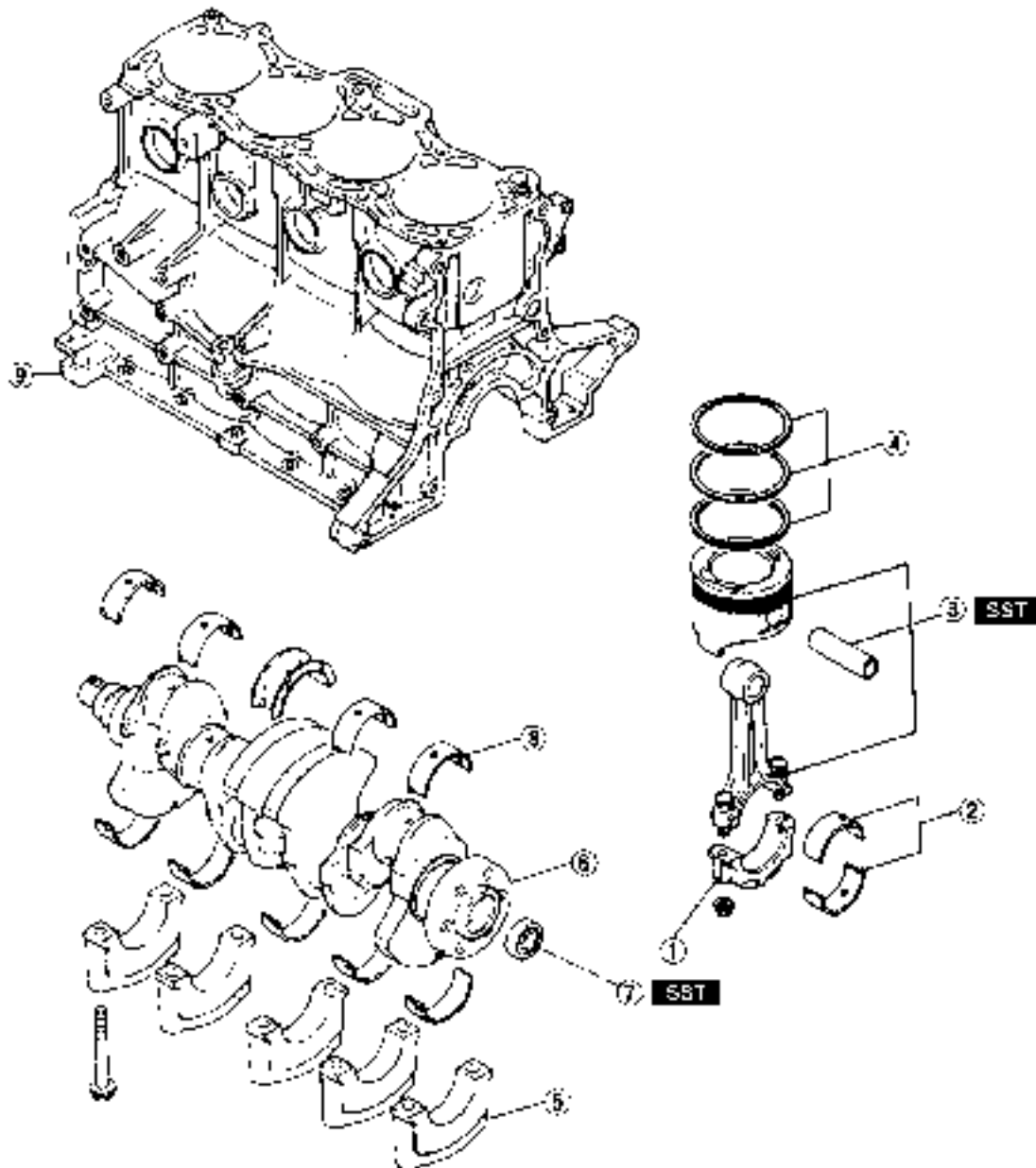
#### Disassembly note

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

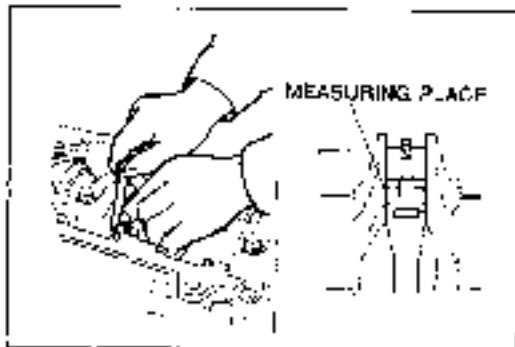
Remove the clutch cover and flywheel (M/T), or drive plate (A/T) with the SST

**CYLINDER BLOCK II**

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



- |   |  |
|---|--|
| 1. Connecting rod cap   | 5. Main bearing cap  |
| 2. Connecting rod bearing<br>Inspect for peeling, scoring, or damage        | 6. Crankshaft<br>Inspection..... page B1-43                |
| 3. Connecting rod, piston and piston pin<br>Inspection..... pages B1-42, 43 | 7. Pilot bearing (M/T)                                     |
| 4. Piston ring<br>Inspection..... page B1-42                                | 8. Main bearing<br>Inspect for peeling, scoring, or damage |
|   | 9. Cylinder block<br>Inspection..... page B1-40            |



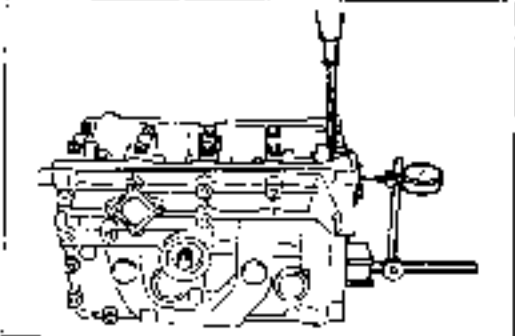
901177 029

### Disassembly note

#### 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 B1-51.)
2. Crankpin oil clearance (Refer to page B1-51.)

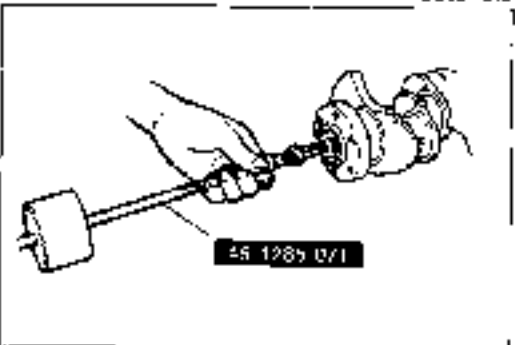


18U05 013

### 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 B1-50.)
2. Main journal oil clearance (Refer to page B1-49.)



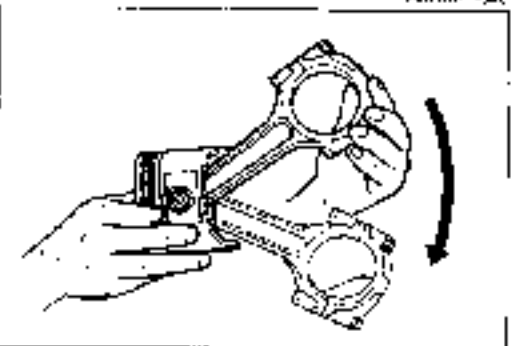
1461011 041

### Pilot bearing (M/T)

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

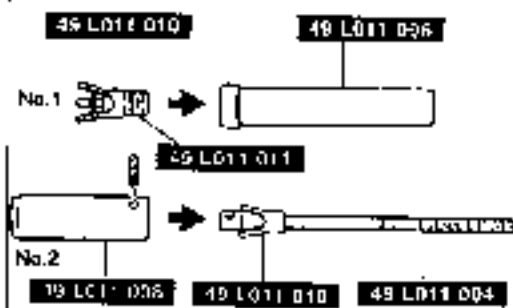
When replacing and/or cleaning the crankshaft, remove the pilot bearing.



9V-2029 067

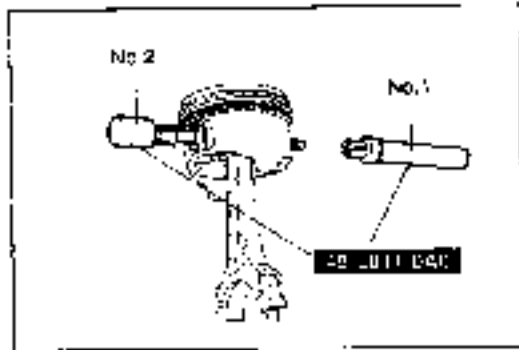
### Piston and connecting rod

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.



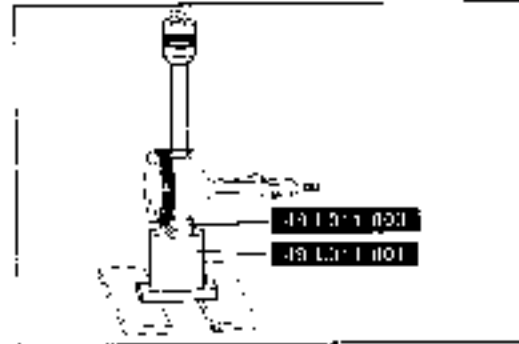
2443002 026

2. Assemble the SST as shown.



GMUB2-756

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



3MJOB2 '00

4. Mount the piston and connecting rod in the **SST** as shown.  
5. Press out the piston pin.

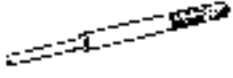




While removing the piston pin, check the pressure. If it is lower than **4,905 N (500 kg, 1,100 lb)**, replace the piston pin or connecting rod



### INSPECTION AND REPAIR

#### PREPARATION

#### SST

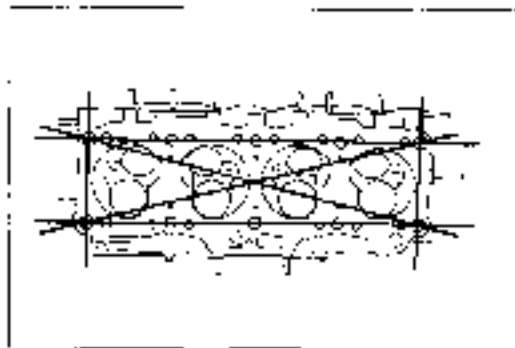
<p>49 022 251A</p> <p>Remover &amp; installer, valve guide</p> 	<p>49 L012 0A0</p> <p>Insulator sol. valve seat &amp; valve guide</p> 	<p>49 L012 002</p> <p>Body (Part of 49 L012 0A0)</p> 
<p>49 L012 003</p> <p>retailer (Part of 49 L012 0A0)</p> 	<p>49 L012 004</p> <p>Nut (Part of 49 L012 0A0)</p> 	<p>9A1J002 *02</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).

9A1J012 \*02



9A1J012 \*03

#### 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.**

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

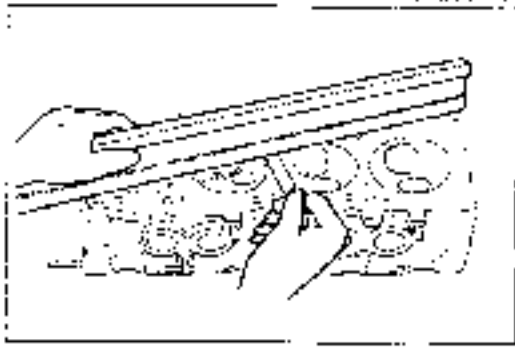
**Height: 91.95—92.05mm (3.620—3.624 in)**

**Grinding: 0.20mm (0.008 in) max.**

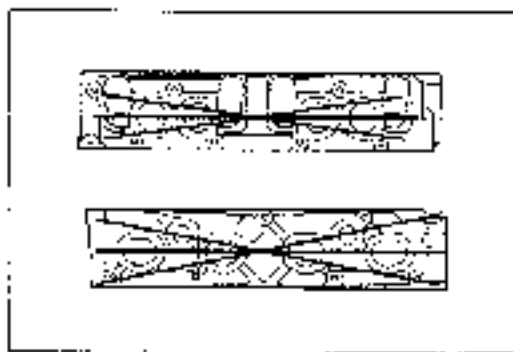
#### Note

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

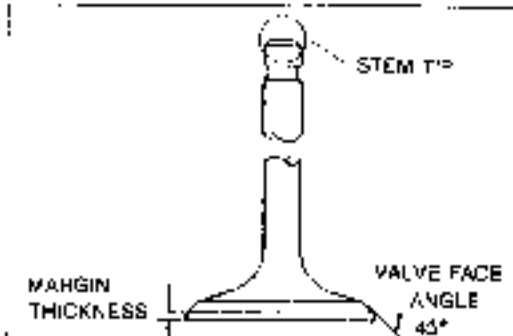
- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play



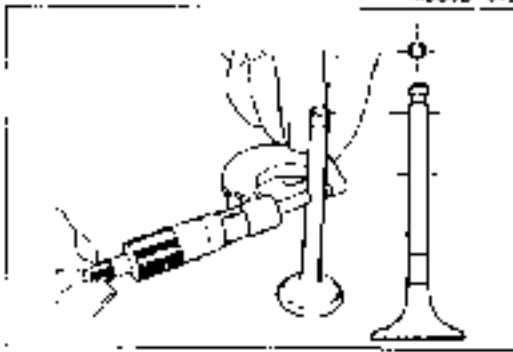
9A1J012 \*04



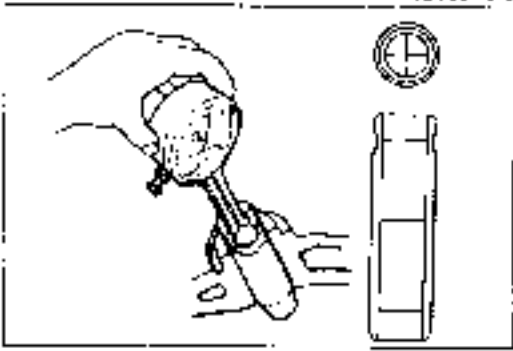
JML332 129



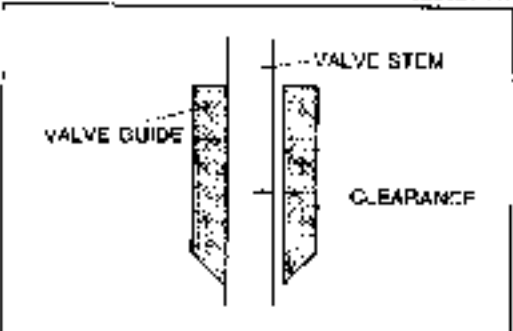
ADU001-343



93.001 043



EBL001-244



2EUD1X 001

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

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

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

### Valve and Valve Guide

1. 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
2. Check the valve head margin thickness. Replace if necessary.

#### Margin thickness

**IN : 0.5mm (0.020 in) min.**

**EX : 1.0mm (0.039 in) min.**

3. Measure the valve length.

#### Length

**Standard IN : 111.89mm (4.4051 in)**

**EX : 111.69mm (4.3972 in)**

**Minimum IN : 111.49mm (4.3894 in)**

**EX : 111.29mm (4.3815 in)**

4. Measure the valve stem diameter.

#### Diameter

**IN : 8.030—8.045mm (0.3161—0.3167 in)**

**EX : 8.025—8.040mm (0.3159—0.3165 in)**

5. Measure the valve guide inner diameter.

#### Inner diameter

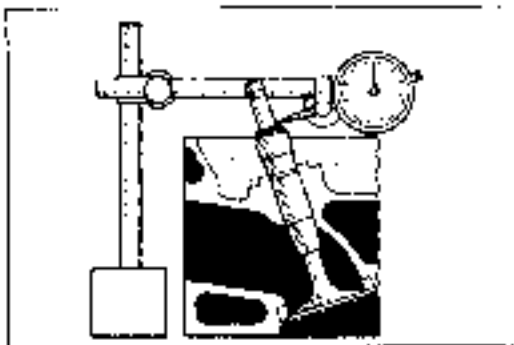
**IN : 8.07—8.09mm (0.3177—0.3185 in)**

**EX : 8.07—8.09mm (0.3177—0.3185 in)**

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

#### (\*) Method No. 1

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



RM1062-09

(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 seal.

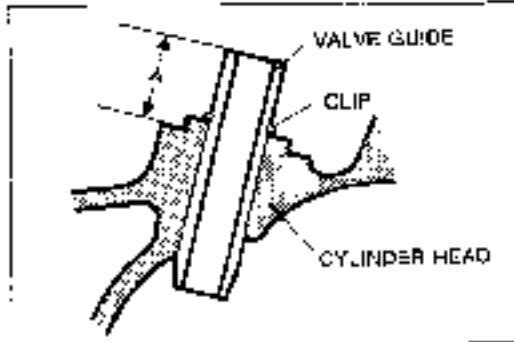
**Clearance**

IN : 0.025—0.060mm (0.0010—0.0024 in)

EX: 0.030—0.085mm (0.0012—0.0026 in)

**Maximum: 0.20mm (0.008 in)**

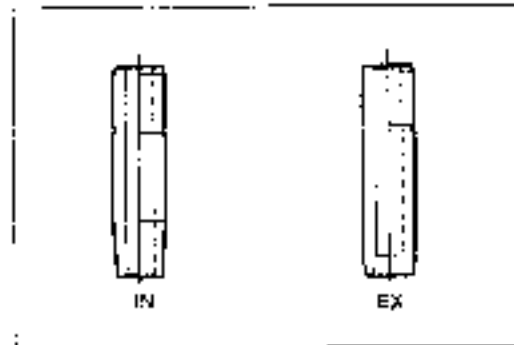
7. If the clearance exceeds the maximum, replace the valve and/or valve guide.



RM1031-045

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

**Height: 19.1—19.6mm (0.752—0.772 in)**

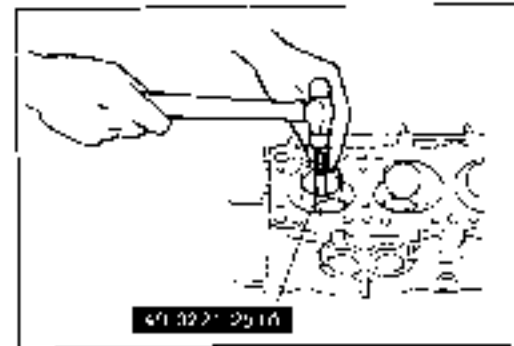


SMU032-11

### Replacement of valve guide

**Note**

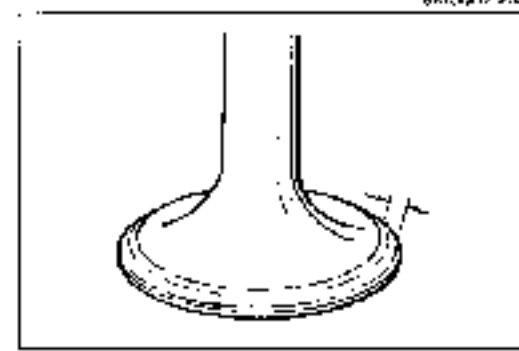
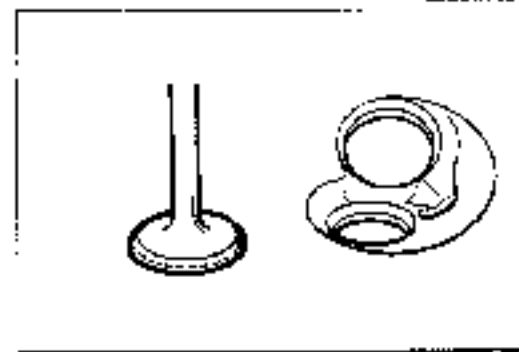
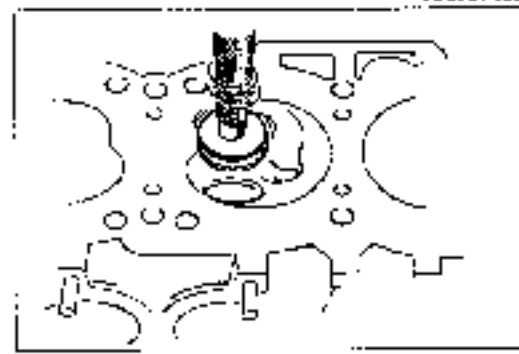
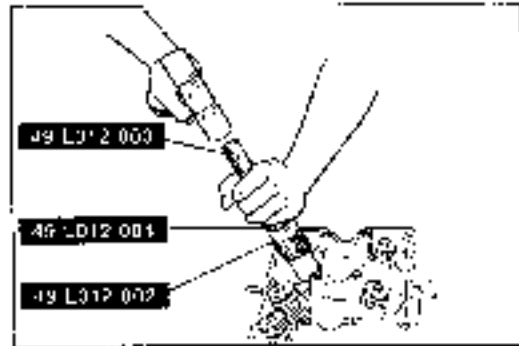
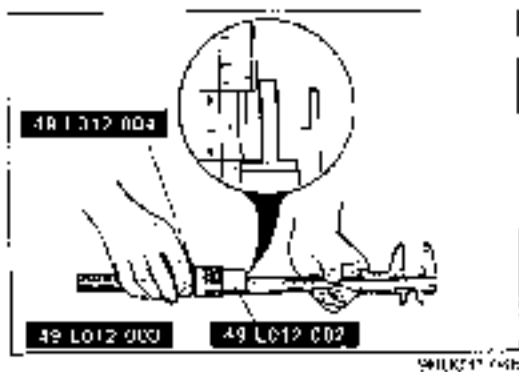
Although the shapes of the intake and exhaust valve guides are different, use the exhaust valve guide on both sides as a replacement.



SMU106A-12

### 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: 19.1—19.6mm (0.752—0.772 in)**

2. Tighten the locknut

3. Tap a 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

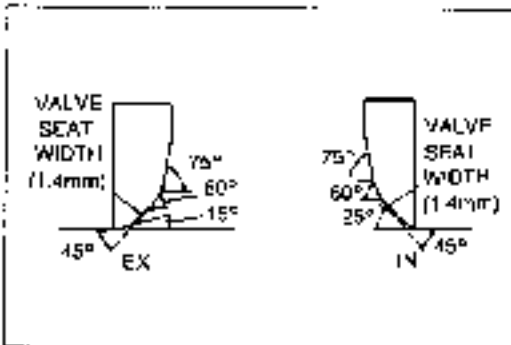
**Valve Seat**

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.

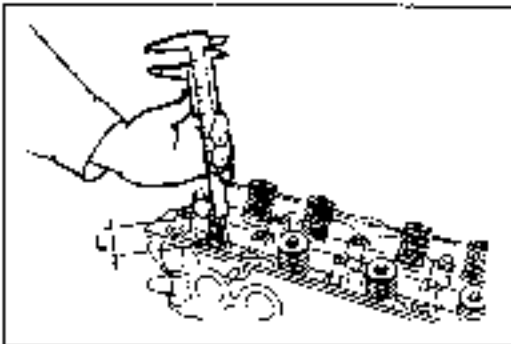
3. Apply a thin coat of Prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
  - (1) If blue does not appear **360°** around the valve face, replace the valve.
  - (2) if blue does not appear **360°** around the valve seat, resurface the seat.

5. Check the seat contact width.

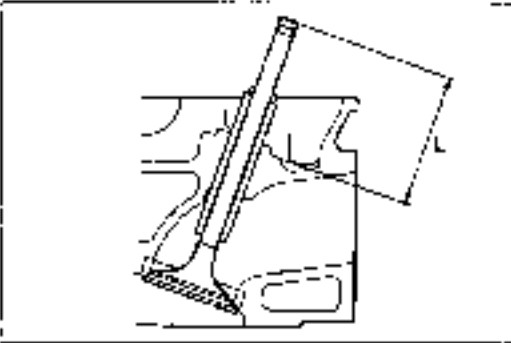
**Width: 1.2—1.6mm (0.047—0.063 in)**



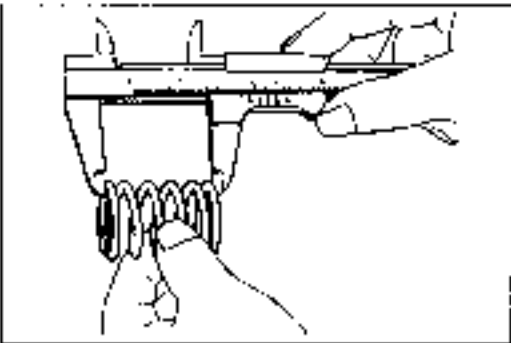
9BLJ.R1-047



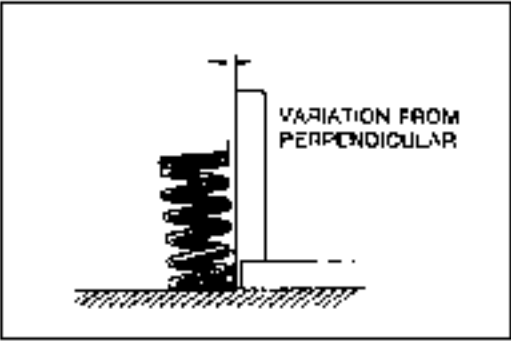
9SU0E1-043



9PLJ.R1-149



9BLJ0E1-030



9BLJ0E1-051

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 25° (IN) or 15° (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 : 46.5mm (1.831 in)  
EX : 46.5mm (1.831 in)

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

IN : 46.5—47.0mm (1.831—1.850 in)  
EX : 46.5—47.0mm (1.831—1.850 in)

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

IN : 47.0—48.0mm (1.850—1.890 in)  
EX : 47.0—48.0mm (1.850—1.890 in)

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

IN : 48.0mm (1.890 in)  
EX : 48.0mm (1.890 in)

### Valve Spring

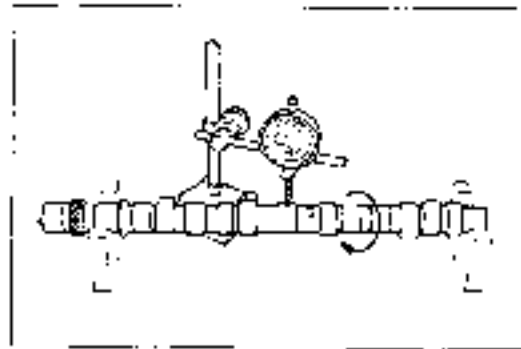
1. Inspect each valve spring for cracks or damage.
2. Check the free length and out of square. Replace if necessary.

### Free length

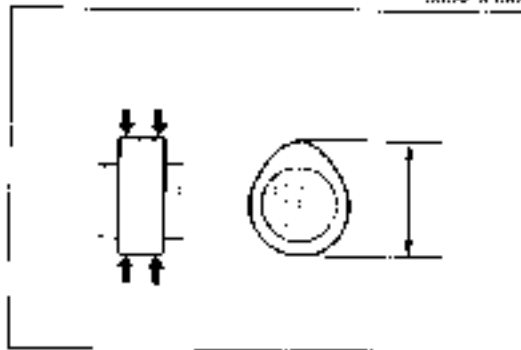
Standard Outer: 52.0mm (2.047 in)  
Inner: 44.0mm (1.732 in)  
Minimum Outer: 50.4mm (1.984 in)  
Inner: 42.7mm (1.681 in)

### Out of square

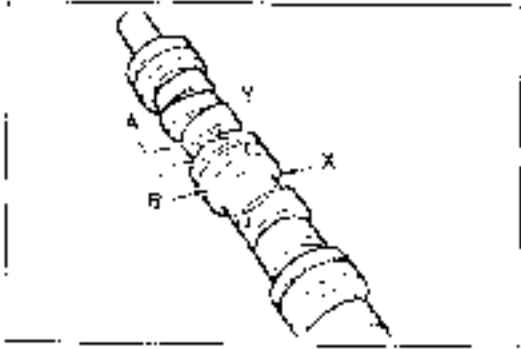
Outer: 1.8mm (0.07 in) max.  
Inner: 1.5mm (0.06 in) max.



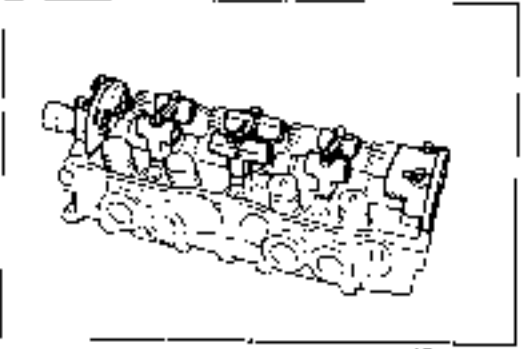
88.0014.032



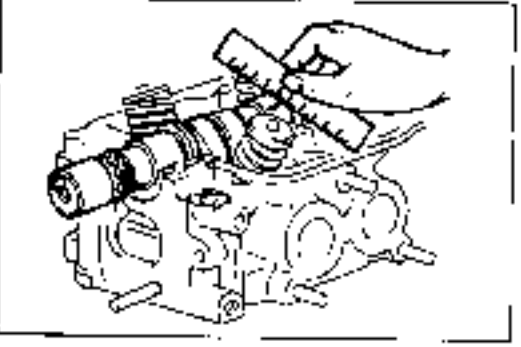
89.0000.052



29.0021.017



00.0015.024



00.0002.121

**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 : 38.059mm (1.4984 in)**

**EX: 38.059mm (1.4984 in)**

**Minimum**

**IN : 37.859mm (1.4905 in)**

**EX: 37.859mm (1.4905 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:**

**31.940—31.965mm (1.2575—1.2584 in)**

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

**31.910—31.935mm (1.2563—1.2573 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:**

**18—26 Nm (1.8—2.7 m-kg, 13—20 ft-lb)**

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

**Oil clearance**

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

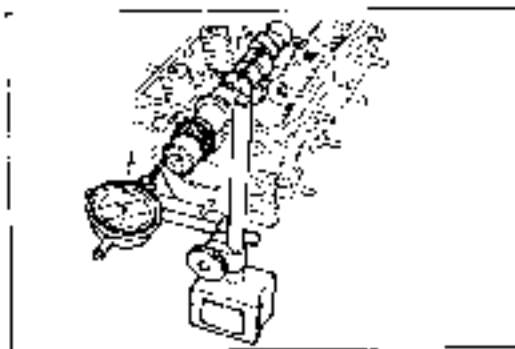
**0.035—0.085mm (0.0014—0.0033 in)**

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

**0.065—0.115mm (0.0026—0.0045 in)**

**Maximum: 0.15mm (0.008 in)**

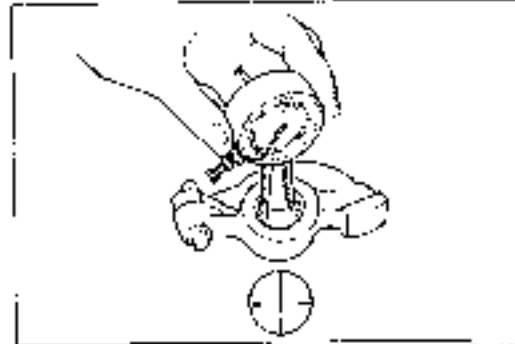
- (6) If the oil clearance exceeds the maximum, replace the cylinder head.



9PL06-054

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

**End play: 0.08—0.16mm (0.0031—0.0063 in)**  
**Maximum: 0.20mm (0.008 in)**



9BL00-055

#### 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. Replane if necessary.
2. Check the oil clearance between the rocker arm and shaft. Replace if necessary.
  - (1) Measure the rocker arm inner diameter.

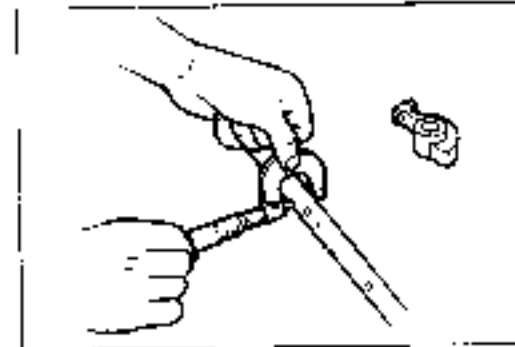
**Diameter: 15.000—15.027mm (0.5900—0.5910 in)**

- (2) Measure the rocker arm shaft diameter.

**Diameter: 15.966—15.984mm (0.6286—0.6293 in)**

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

**Oil clearance: 0.018—0.051mm (0.0006—0.0024 in)**  
**Maximum: 0.10mm (0.004 in)**



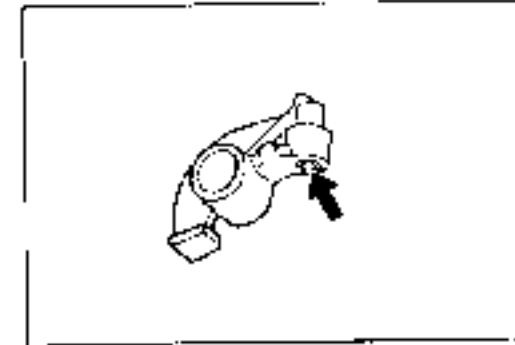
9PL061-056

#### 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.

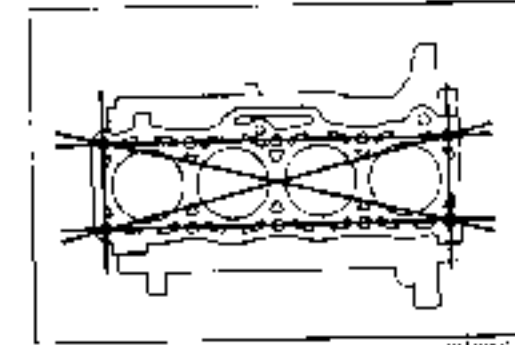


9ATJ092-059

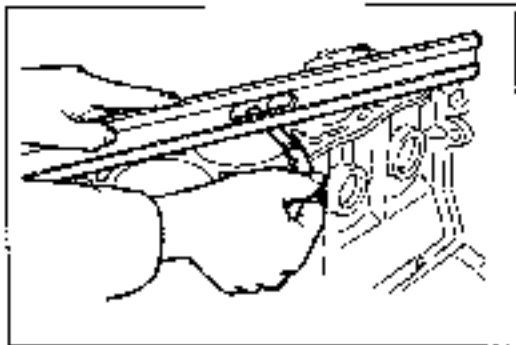
#### Cylinder Block

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.**



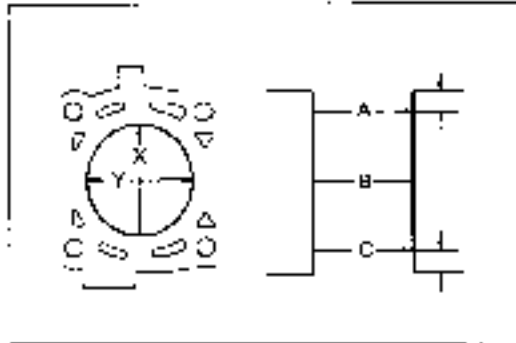
96X012-100



96UJ01-785

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

**Height: 301.5mm (11.87 in)**  
**Grinding: 0.20mm (0.008 in) max.**



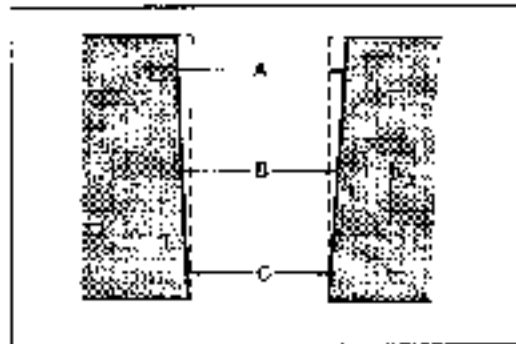
95J001-08\*

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)

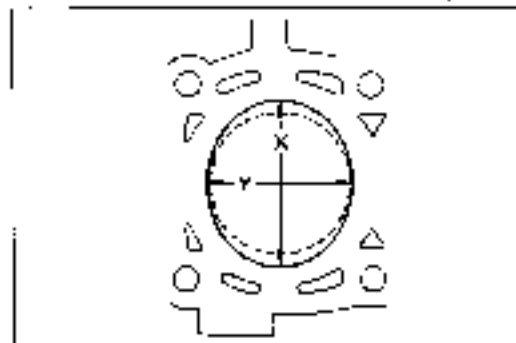
Size	Range	Diameter
Standard		95.000—95.019 (3.7389—3.7385)
0.25 (0.010) oversize		95.250—95.269 (3.7461—3.7457)
0.50 (0.020) oversize		95.500—95.519 (3.7559—3.7555)



94UJ01B-245

- (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 (0.0004 in) max.**



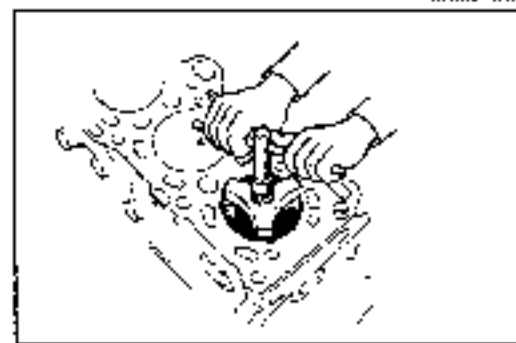
29UJ03-116

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

**Out-of-round: 0.010mm (0.0004 in) max.**

**Caution**

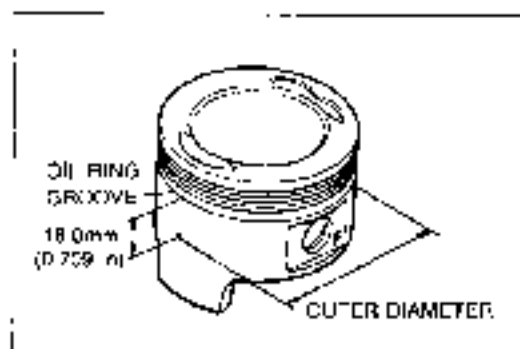
The boring size should be based on the size of an oversize piston and be the same for all cylinders.



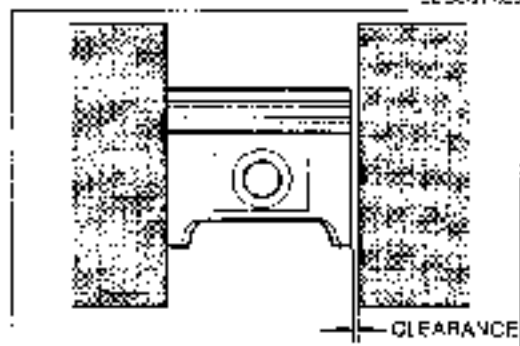
96L01-102

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

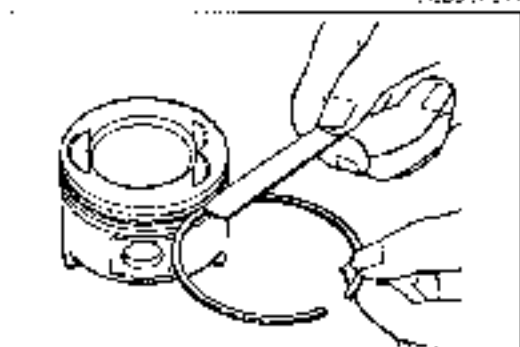




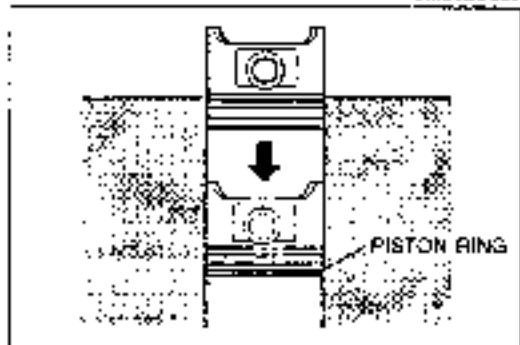
9BUCB1 028



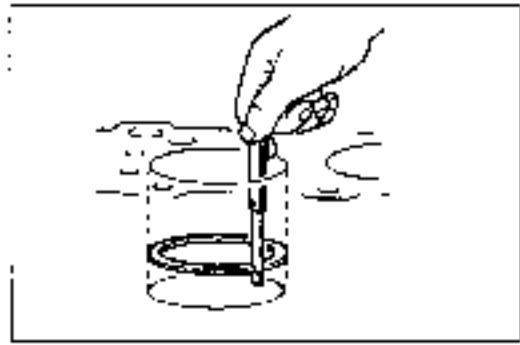
9BUCB1 019



9BUCB2 262



9BUCB2 253



9BUCB1 060

### 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 18.0mm (0.709 in) below the oil ring land lower edge.

### Piston diameter

Size	Piston	Diameter	
		mm	(in)
Standard		85.941 - 85.964	(3.3836 - 3.3844)
0.25 (0.010) oversize		85.191 - 85.214	(3.3935 - 3.3942)
0.50 (0.020) oversize		85.444 - 85.464	(3.4033 - 3.4041)

3. Check the piston-to-cylinder clearance.

**Clearance: 0.043—0.062mm (0.0017—0.0024 in)**  
**Maximum: 0.15mm (0.006 in)**

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

### Note

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

### Piston and Piston Rings

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

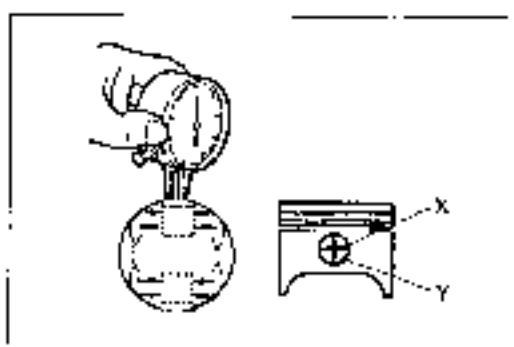
**Clearance (Top and Second):**  
**0.03—0.07mm (0.0012—0.0028 in)**  
**Maximum: 0.15mm (0.006 in)**

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.

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: 0.15—0.30mm (0.006—0.012 in)**  
**Oil rail : 0.20—0.70mm (0.008—0.028 in)**  
**Maximum: 1.0mm (0.039 in)**

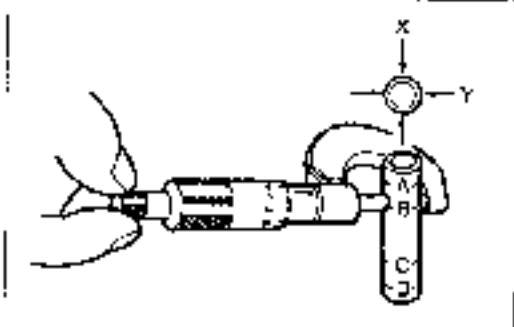


9EUE57 067

**Piston and Piston Pin**

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

**Diameter: 21.988—21.999mm (0.8657—0.8661 in)**



9H0781 066

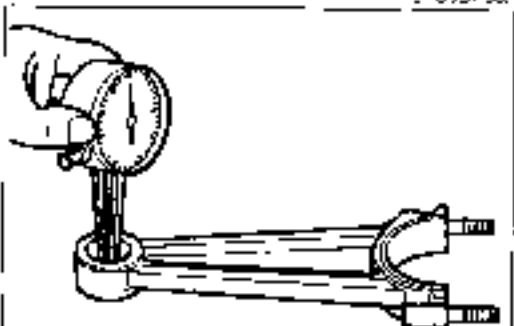
2. Measure the piston pin diameter in X and Y directions at four points.

**Diameter: 21.974—21.980mm (0.8651—0.8654 in)**

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

**Clearance: 0.008—0.024mm (0.0003—0.0009 in)**

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



9DU381 063

**Connecting Rod**

1. Measure the connecting rod small end bore.

**Diameter: 21.943—21.961mm (0.8640—0.8646 in)**

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

**Interference: 0.015—0.037mm (0.0005—0.0015 in)**



1DLCE1 612

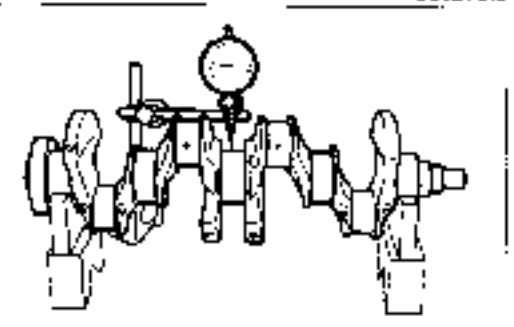
3. Check each connecting rod for bend. Repair or replace if necessary.

**Bend: 0.24mm (0.0094 in) max.**

**Length (Center to Center):**

**158.45—158.55mm (6.2382—6.2421 in)**

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

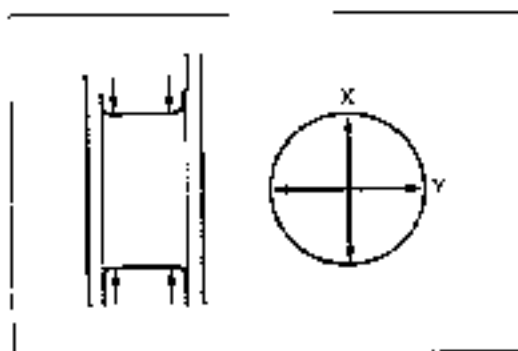


9M11052 131

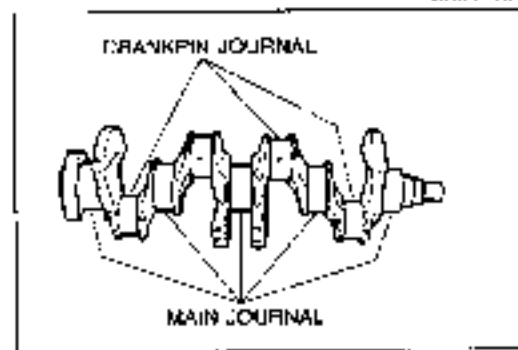
**Crankshaft**

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.

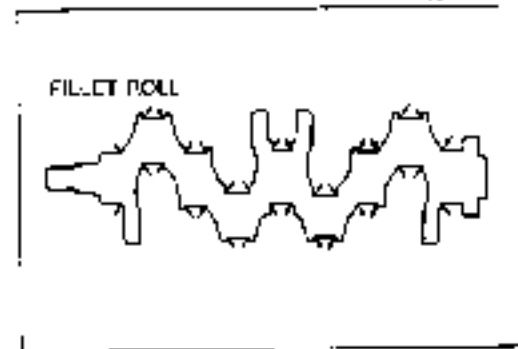
**Runout: 0.03mm (0.0012 in) max.**



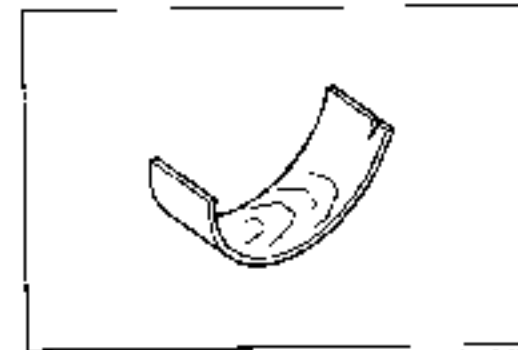
98K107-067



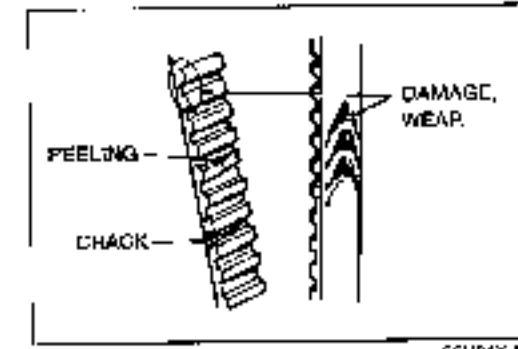
98K107-064



98U321-485



98U321-077



6E051X 113

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

### Crankpin journal

**Diameter:** 50.940—50.955mm (2.0066—2.0061 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),  
 0.50 mm (0.020 in), 0.75mm (0.030 in)

### Main journal diameter undersize

mm (in)

Bearing size		Journal diameter
0.25 (0.010) undersize	No. 1, 2, 4, 5	59.693—59.711 (2.3501—2.3508)
	No. 3	59.697—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)

### Crankpin journal diameter undersize

mm (in)

Bearing size		Journal diameter
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 (1.9780—1.9786)

### Caution

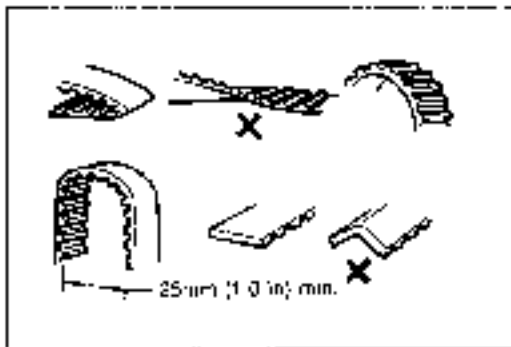
**Do not grind the fillet roll.**

### Main Bearing and Connecting Rod Bearing

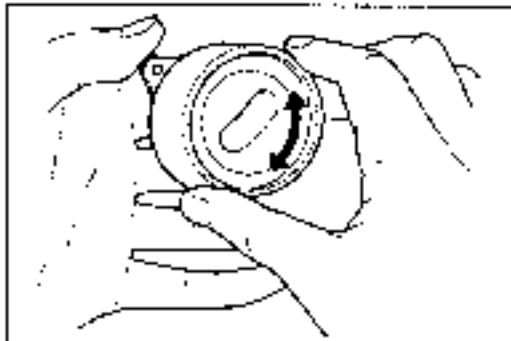
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.

### Timing Belt

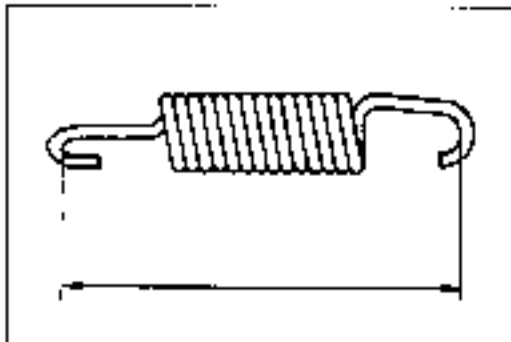
1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.



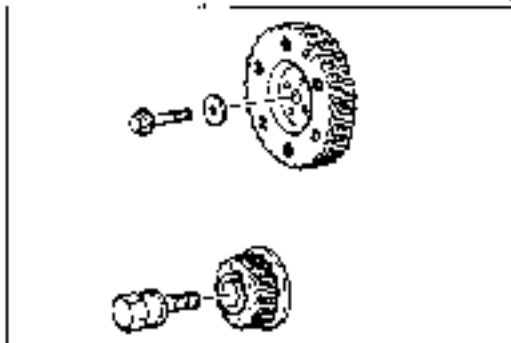
96L078174



96L078175



96L078401



96U01X 117

**Caution**

- a) Never forcefully twist turn inside out, or bend the timing belt.
- b) Be careful not to allow oil or grease on the belt.

**Timing Belt Tensioner and Idler Pulley**

Check the timing belt tensioner and idler pulley for smooth rotation and abnormal noise. Replace if necessary.

**Caution**

Do not clean the tensioner with cleaning fluids. If necessary, use a soft rag to wipe it clean, and avoid scratching it.

**Timing Belt Tensioner Spring**

Check the free length of the tensioner spring. Replace if necessary.

**Free length: 63.0mm (2.480 in)**

**Timing Belt Pulley and Camshaft Pulley**

Inspect the pulley teeth for wear, deformation, or other damage. Replace if necessary.

**Caution**




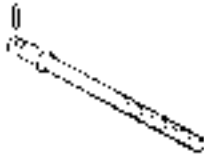







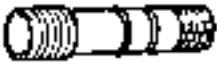





Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.

**Timing Belt Cover (lower and upper)**

Inspect the timing belt covers for damage or cracks. Replace if necessary.

### ASSEMBLY

#### PREPARATION SST

<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 005</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>Slipper 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 008</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 F011 1A0</p> <p>Ring gear brake set</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 DE36 100A</p> <p>Arm valve spring lifter</p> 
<p>49 G030 222</p> <p>Pivot valve spring clip</p> 	<p>49 SE01 310</p> <p>Centering tool, clutch disc</p> 	<p>76 J001 016</p>

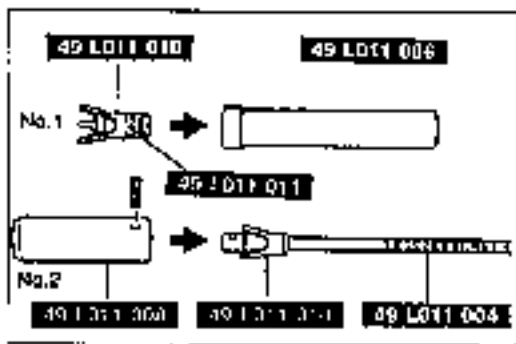
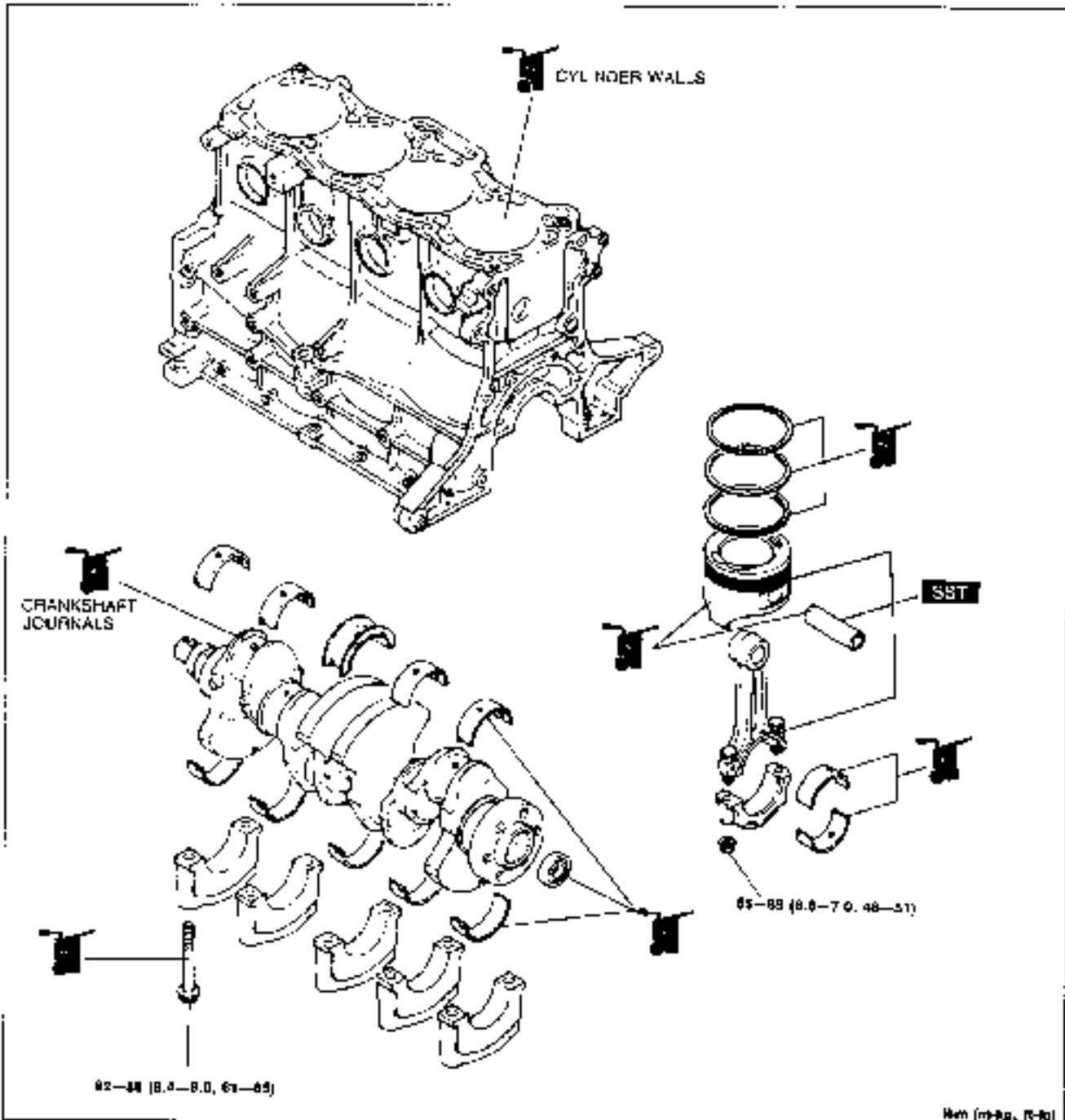
1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace chain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

#### Caution

Do not reuse gaskets or oil seals.

3970082-11

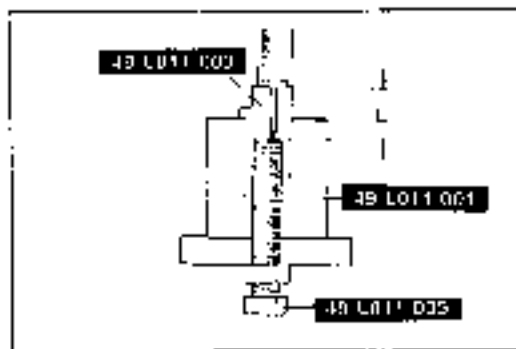
**CYLINDER BLOCK I**  
Torque Specifications



**Connecting Rod**

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

9M(U)P2-141

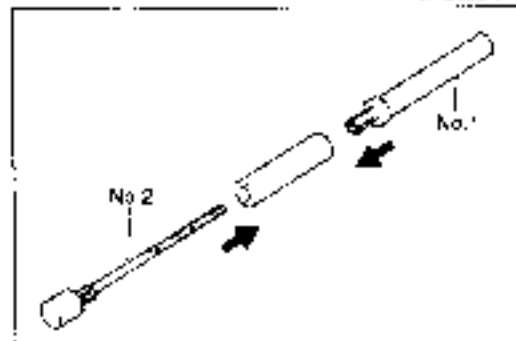


99V022 134

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

**Depth L: 59.5—59.7mm (2.342—2.450 in)**

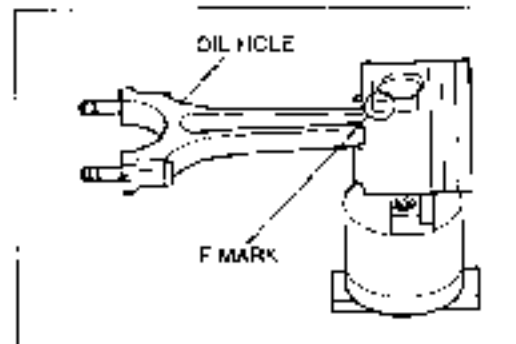
3. Tighten the locknut.



99V022 145

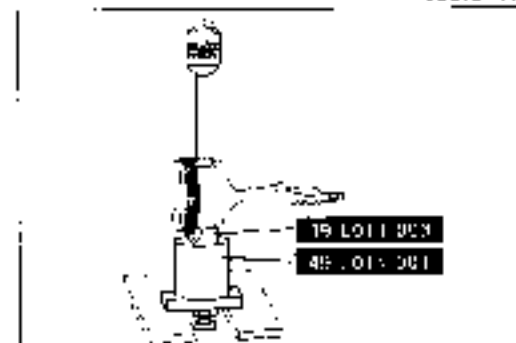
4. Insert the **SST No. 2** into the piston pin as shown and fully screw in the **SST No. 1**.

5. Apply engine oil to the piston pin.



99V022 156

6. Set the piston on the **SST** with the **F** mark facing upward.  
7. Align the oil hole of the large end of connecting rod and **F** mark on the piston as shown in the figure.



99V022 167

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 N (500—1,500 kg, 1,100—3,300 lb)**

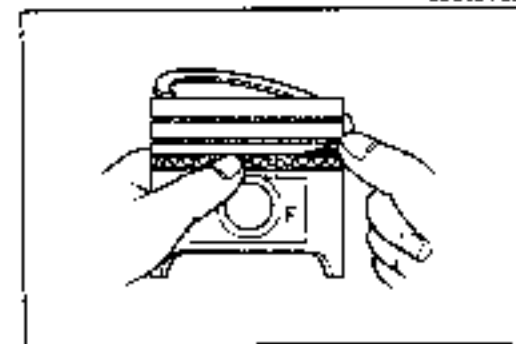
10. Check the oscillation torque of the connecting rod.  
(Refer to page B1-32.)

### Piston Ring

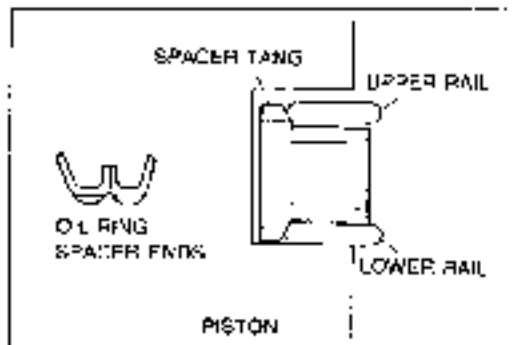
1. Install the three-piece oil rings on the pistons.
  - (1) Apply engine oil to the oil ring spacer and rails.
  - (2) Install the oil ring spacer so that the opening faces upward.
  - (3) Install the upper rail and lower rail.

### Note

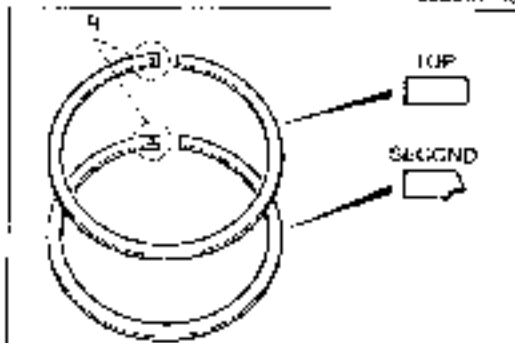
- a) The upper rail and lower rail are the same.
- b) Each rail can be installed with either face upward.



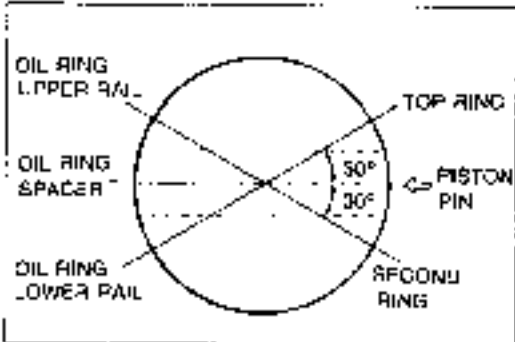
89G01 21 46



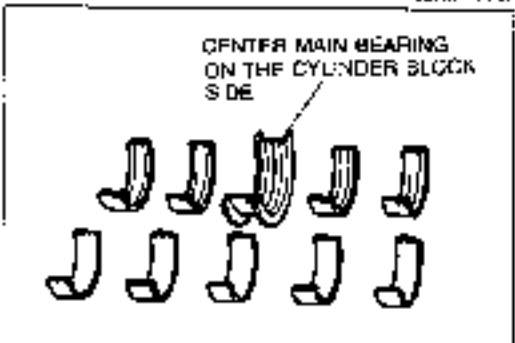
60331A-145



0911052-145



66874-147



7500B-353



0911052-200

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

**Crankshaft**

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

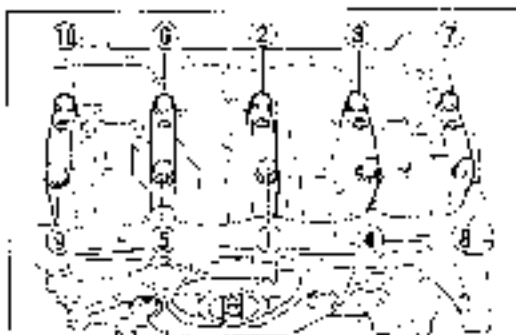
**Note**

The center main bearing on the cylinder block side has thrust shoulders.

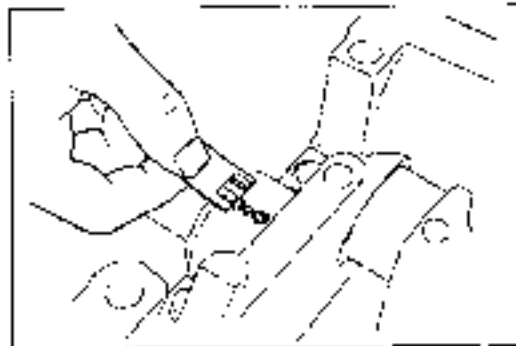
**Oil clearance inspection**

- (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.

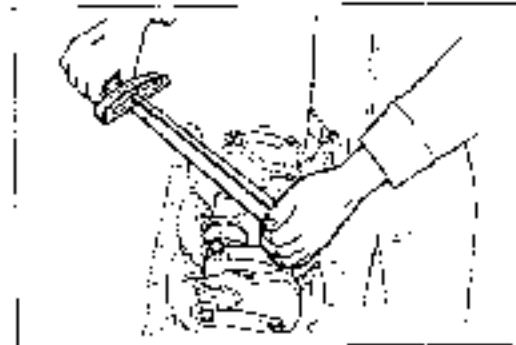




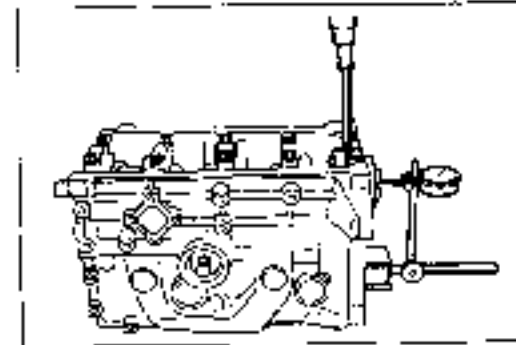
8610071-23



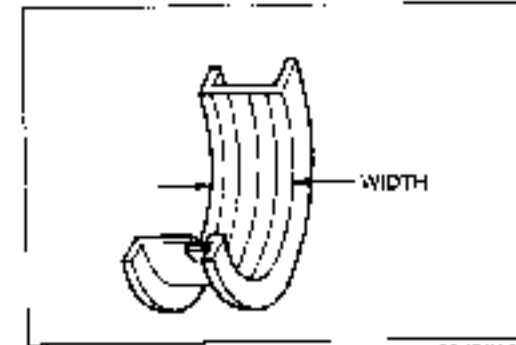
961061-055



94L0B3-274



5M1K12-267



861017-216

- (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 Plastigage 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 B1-44.)

**Oil clearance**

**No.1,2,4,5: 0.025—0.043mm (0.0010—0.0017 in)**

**No.3: 0.031—0.049mm (0.0012—0.0019 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 numbers and ← mark.
4. Verify that the crankshaft rotates smoothly by hand.

5. Inspect the crankshaft end play.

**End play: 0.08—0.16mm (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.

**Center main bearing width**

**Standard: 27.94—27.99mm (1.1000—1.1020 in)**

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

**28.04—28.09mm (1.1040—1.1059 in)**

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

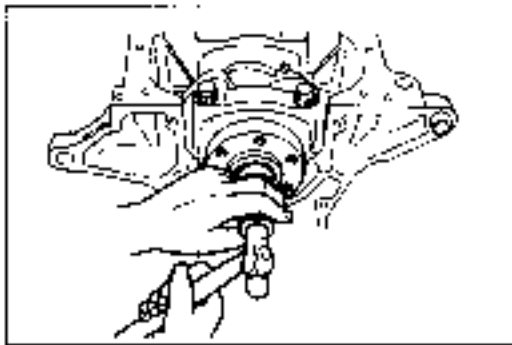
**28.12—28.17mm (1.1071—1.1091 in)**

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

**28.20—28.25mm (1.1102—1.1122 in)**

**Note**

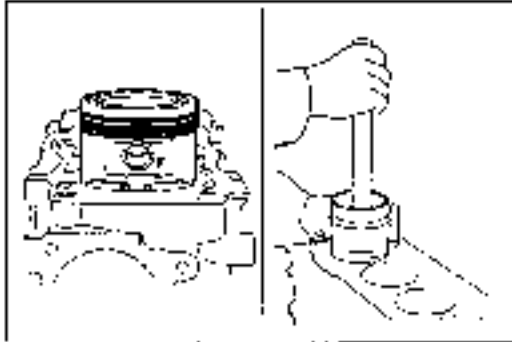
**Wider thrust width is available only in undersize center main bearing.**



78A018-01/2

**Pilot Bearing**

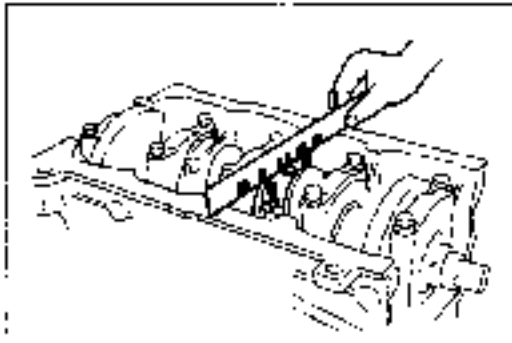
1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30–34mm, 1.18–1.34 in) against the outer race of the bearing. Then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



9F4J0B3-20/2

**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).



8MUD29-15/2

**Connecting Rod Cap**

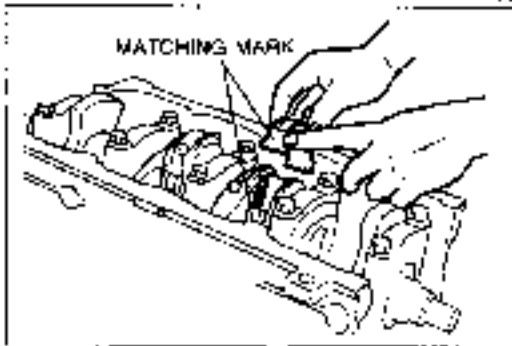
1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

**Connecting rod cap tightening torque:**

65–69 Nm (5.6–7.0 m·kg, 48–51 ft·lb)

Oil clearance: 0.027–0.067mm (0.0011–0.0028 in)

Maximum: 0.10mm (0.004 in)



9F4J0B3-20/2

**Caution**

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

2. If the oil clearance exceeds specification, grind the crankshaft and use undersize bearings. (Refer to page B1–44.)



9F4J0B3-20/2

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

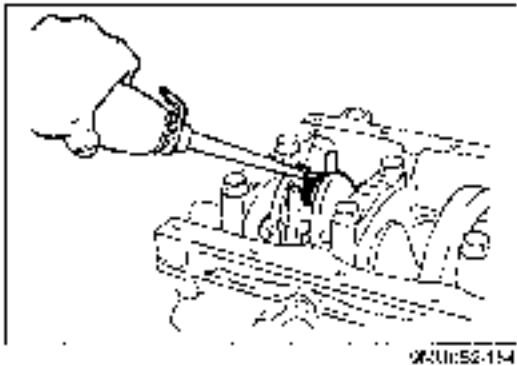
**Side clearance: 0.110–0.262mm (0.0043–0.0103 in)**

**Maximum: 0.30mm (0.012 in)**

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

# B1

## ASSEMBLY (CYLINDER BLOCK)



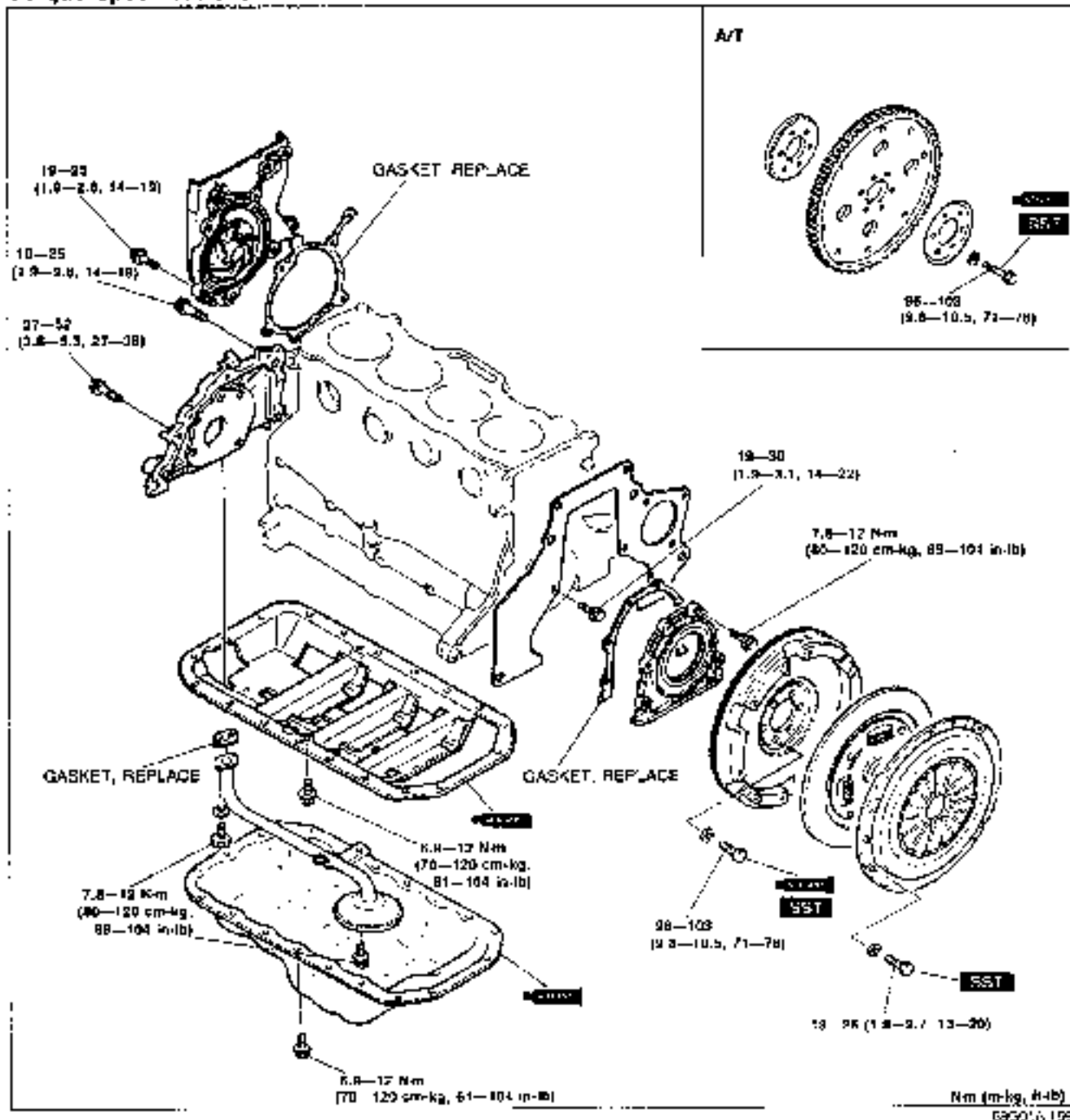
4. Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
5. Install the connecting rod cap with the alignment marks aligned.

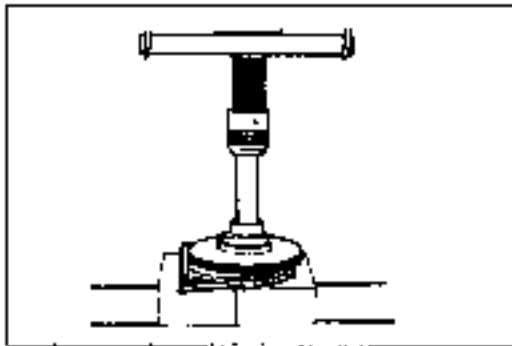
### Tightening torque:

**65–69 Nm (6.5–7.0 m·kg, 48–51 ft·lb)**

6. Verify that the crankshaft rotates smoothly by hand.

### CYLINDER BLOCK II Torque Specifications





8PL-001-039

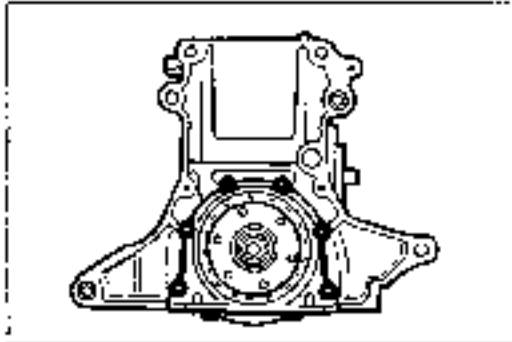
**Rear Cover**

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

**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.

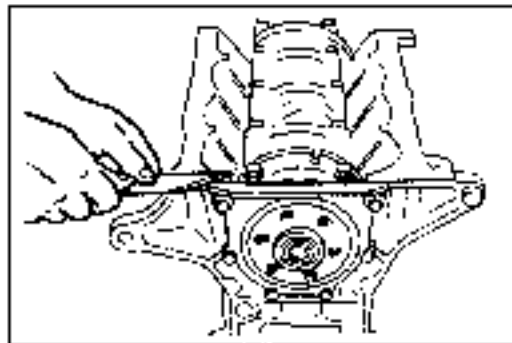


8PL-001-100

4. Install the rear cover and a new gasket.

**Tightening torque:**

**7.8—12 Nm (80—120 cm-kg, 69—104 in-lb)**

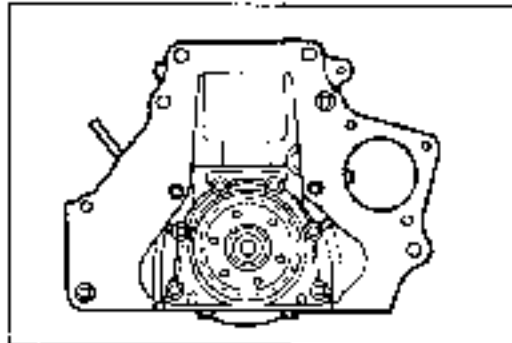


861-010-117

5. Cut away the portion of the gasket that projects out from the rear cover assembly toward the oil pan side.

**Caution**

Do not scratch the rear cover assembly.



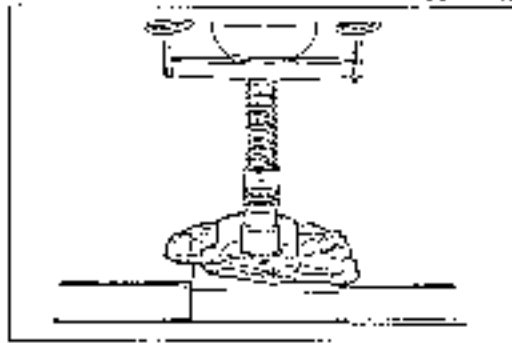
4PC-014-100

**End Plate**

Install the end plate.

**Tightening torque:**

**19—30 Nm (1.9—3.1 m-kg, 14—22 ft-lb)**



8PL-001-101

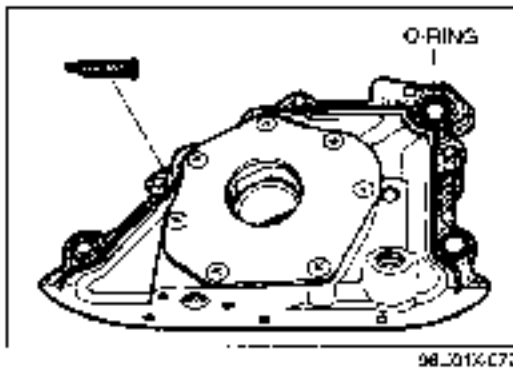
**Oil Pump**

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

**Oil seal outer diameter: 48mm (1.89 in)**

**Caution**

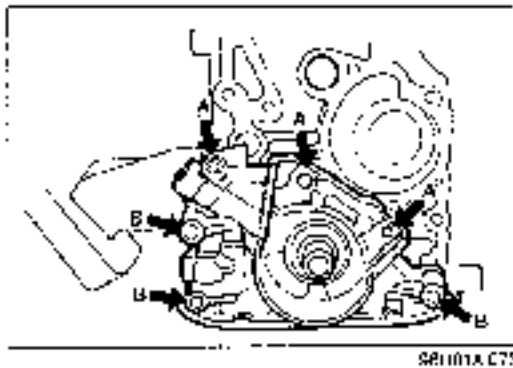
The oil seal must be pressed in until it is flush with the edge of the oil pump body.



4. Apply engine oil to the oil seal lip.
5. Remove any dirt or other material from the contact surfaces.
6. Apply a continuous bead of silicone sealant to the contact surface of the oil pump.
7. Install a new O-ring into the pump body.

**Caution**

Do not allow any sealant to get into the oil hole.

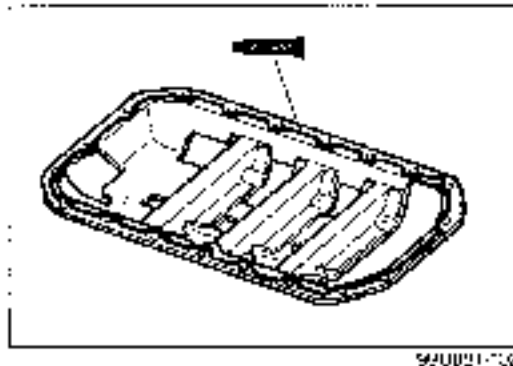


8. Install the oil pump.

**Tightening torque**

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

9. Remove any sealant which has been squeezed out.

**Stiffener**

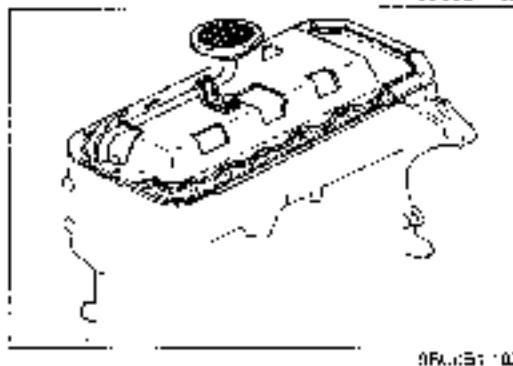
1. Remove any dirt or other material from the contact surface.
2. Apply a continuous bead of silicone sealant to the stiffener along the inside of the bolt holes and overlap the ends.
3. Install the stiffener.

**Tightening torque:**

6.9–12 N·m (70–120 cm·kg, 61–104 in·lb)

**Caution**

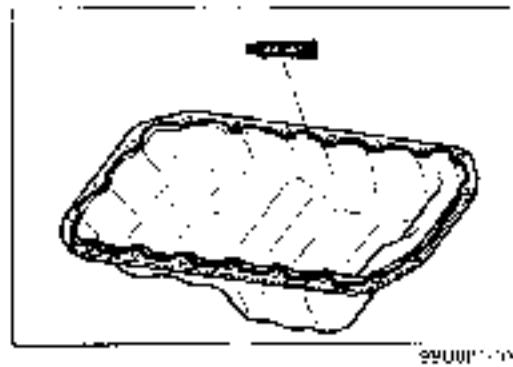
After the sealant is applied, the oil pan must be secured within 30 minutes.

**Oil Strainer**

Install the oil strainer and a new gasket.

**Tightening torque:**

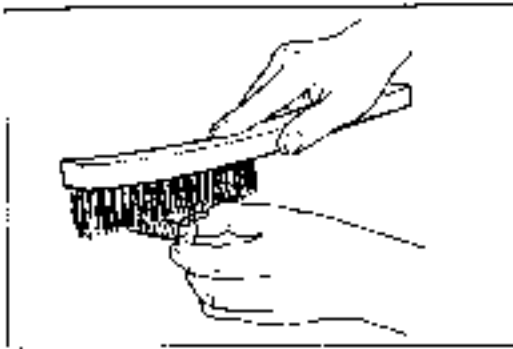
7.8–12 N·m (80–120 cm·kg, 69–104 in·lb)

**Oil Pan**

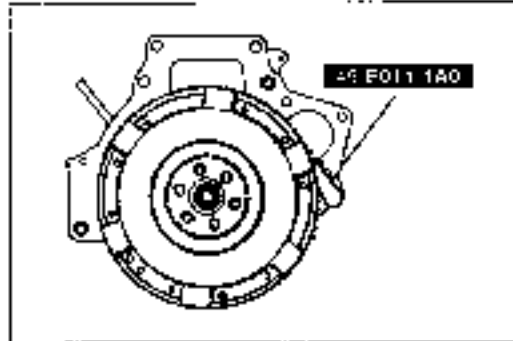
1. Apply a continuous bead of silicone sealant to the oil pan around the inside of the bolt holes and overlap the ends.
2. Install the oil pan.

**Tightening torque:**

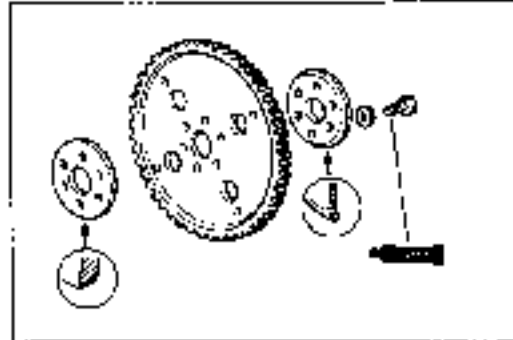
6.9–12 N·m (70–120 cm·kg, 61–104 in·lb)



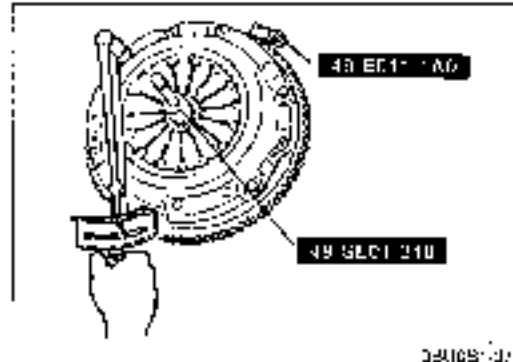
950217-139



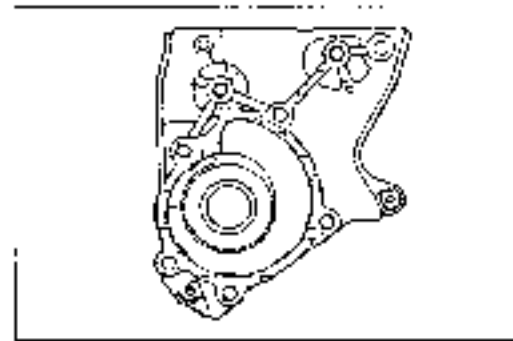
950217-136



75PC-D-040



091087-01



06021X-053

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

1. Remove any old sealant from the bolts and bolt holes. If old sealant cannot be removed from the bolt, replace it.
2. Apply sealant to the bolt threads.

(M/T)

3. Install, and tighten the flywheel with the **SST**.

**Tightening torque:**

96—103 N·m (9.9—10.5 m·kg, 71—76 ft·lb)

(A/T)

4. Install, and tighten the drive plate adapter, drive plate, and backing plate with the **SST**.

**Tightening torque:**

96—103 N·m (9.9—10.5 m·kg, 71—76 ft·lb)

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

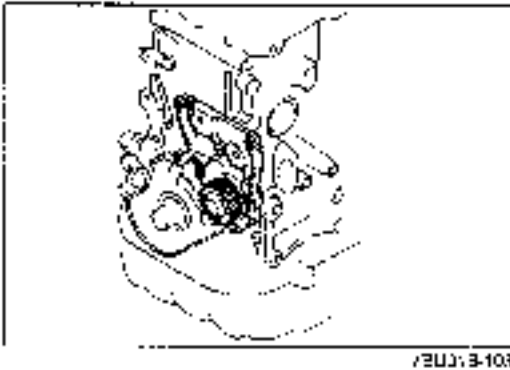
Install the clutch disc and clutch cover using the **SST** (Refer to Section H.)

**Tightening torque:**

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

**Water Pump**

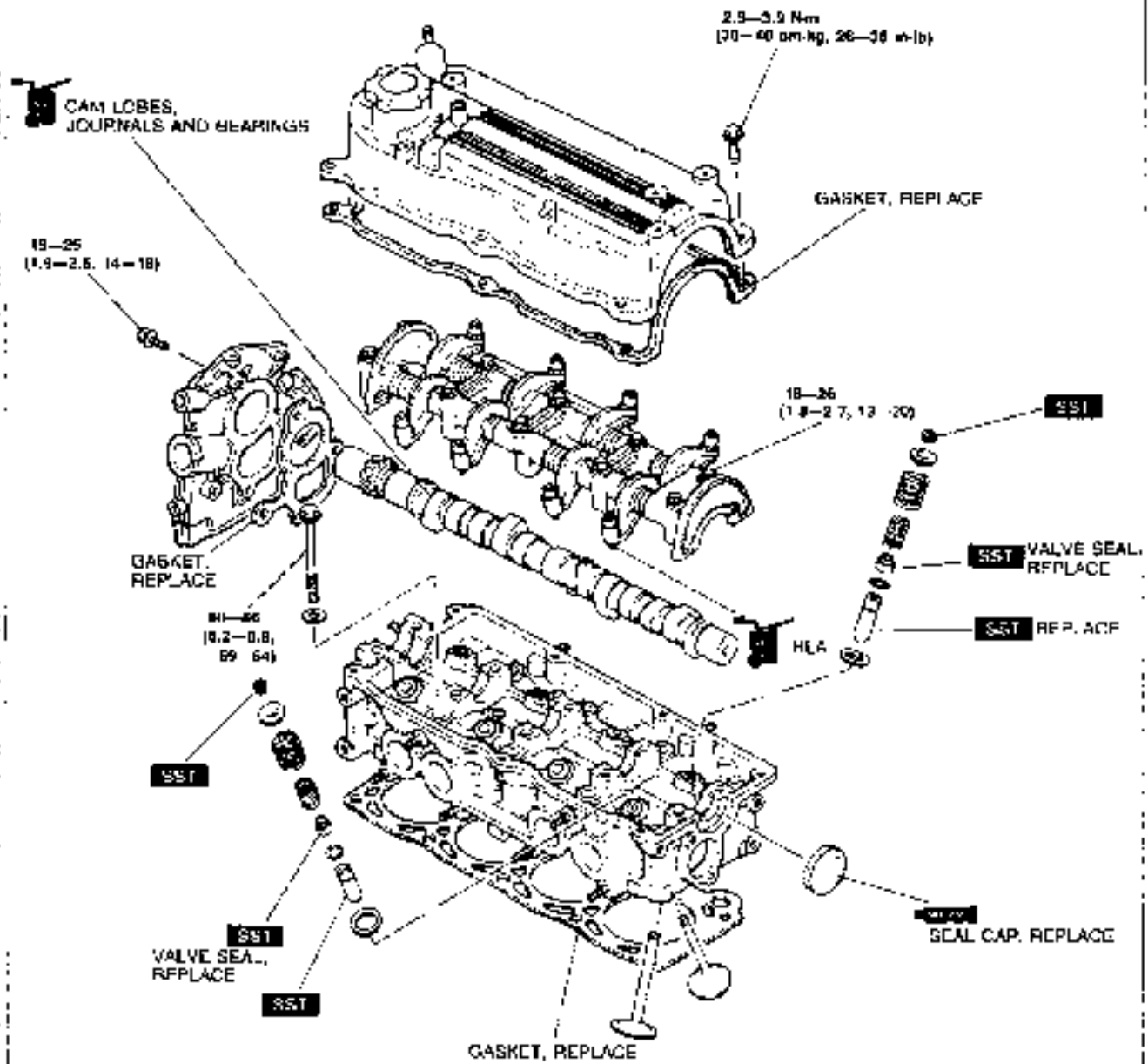
1. Remove all dirt, grease, and other material from the water pump mounting surface.
2. Place a new gasket in position.



3. Install the water pump.

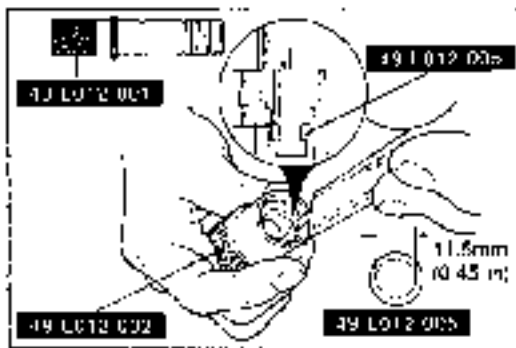
**Tightening torque:**  
19—25 Nm (1.9—2.5 m·kg, 14—19 ft·lb)

### CYLINDER HEAD Torque Specifications

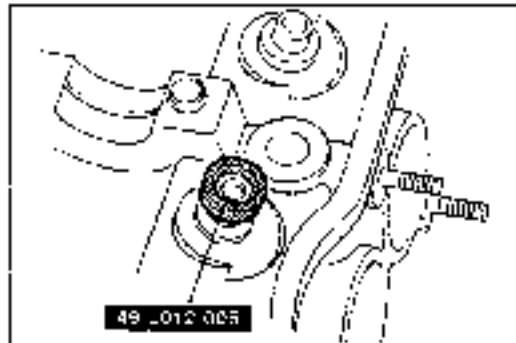


Nm (m·kg, ft·lb)

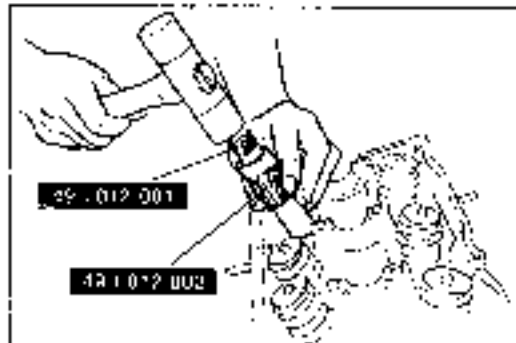
89910 152



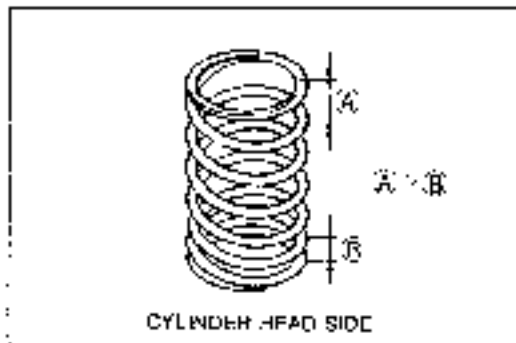
96U097-072



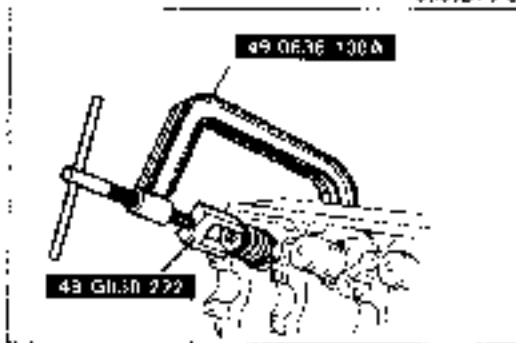
06LKB-072



06LKB-071



95U015-0



06LKB-074

**Valve Seal**

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

**Depth L: 21.8—22.0mm (0.850—0.866 in)**

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

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

**Valve and Valve Spring**

1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs (outer and inner) and the upper spring seat.

**Note**

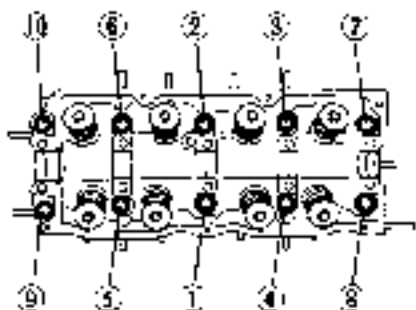
**Install the outer valve spring with the closer pitch toward the cylinder head.**

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 fully seated.





U8UD7X-140



26UD7X-47

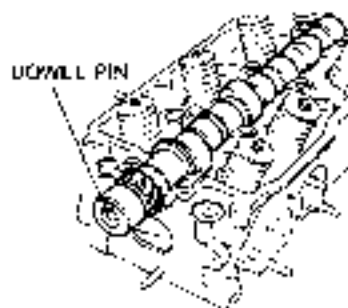
**Cylinder Head**

1. Thoroughly remove all dirt, oil, or other material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.

3. Install the cylinder head.
4. Apply engine oil to the bolt threads and seat faces.
5. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

**Tightening torque:**

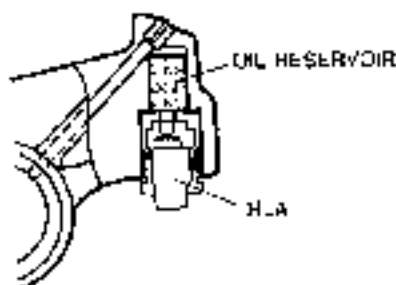
80—86 Nm (8.2—8.8 m·kg, 59—64 ft·lb)



50LC1X-142

**Camshaft**

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



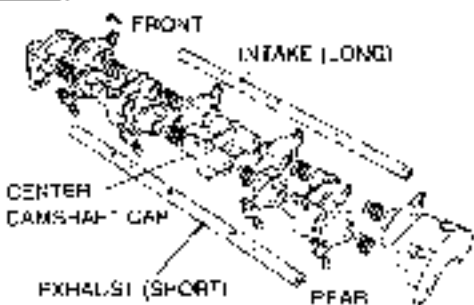
26UD7X-49

**Hydraulic Lash Adjuster (HLA)**

1. Pour engine oil into the oil reservoir in the rocker arm.
2. Apply engine oil to the new HLA.
3. Carefully install the HLA into the rocker arm.

**Caution**

Be careful not to damage the O-ring when installing the HLA.



26UD7X-52

**Camshaft Cap, Rocker Arm and Shaft Assembly**

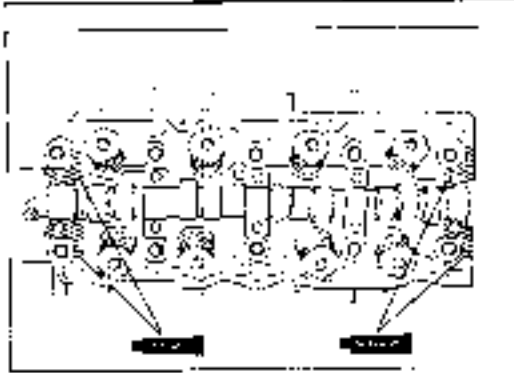
1. Assemble the rocker arm and shaft assembly as shown in the figure.

**Caution**

Be sure that rocker arm shaft oil holes (in the center camshaft cap) face each other.

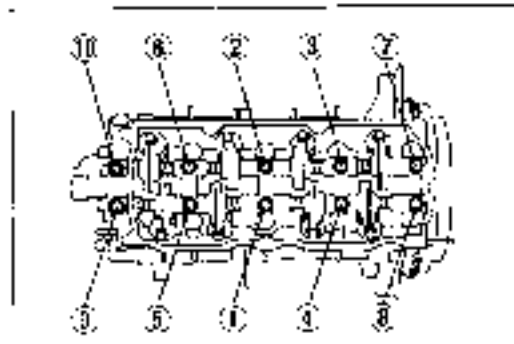
**Note**

Use the installation bolts for alignment.



39U081-075

2. Apply silicone sealant to the shaded areas shown in the figure.
3. Apply liberal amount of clear engine oil to the cam lobes and journals.

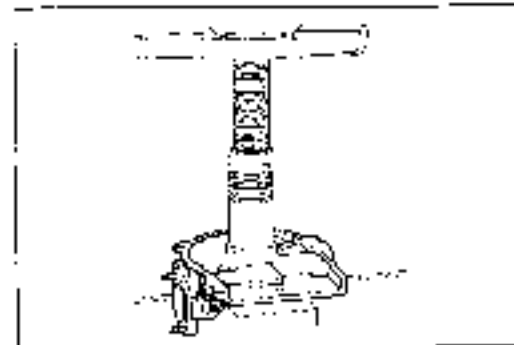


33L0B1-076

4. Install the rocker arm and shaft assemblies. Tighten the bolts in two or three steps in the order shown in the figure.

### Tightening torque:

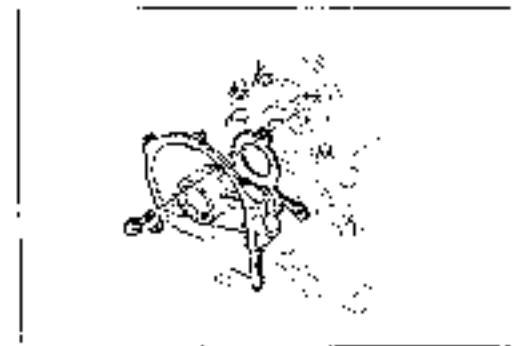
18—26 Nm (1.8—2.7 m-kg, 13—20 ft-lb)



36U21X-153

### Front Housing

1. Apply engine oil to the front housing and a new oil seal.
2. Press the oil seal into the front housing.

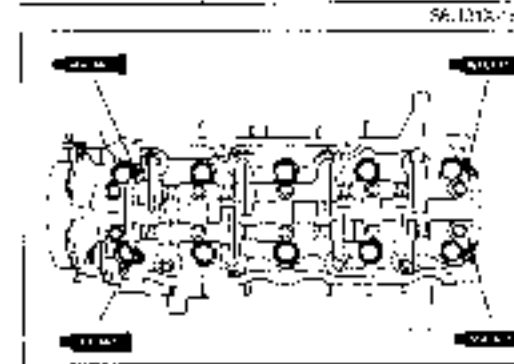


36.1213-154

3. Apply engine oil to the oil seal lip.
4. Install the front housing and a new gasket.

### Tightening torque:

19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)



39.1091-105

### Cylinder Head Cover

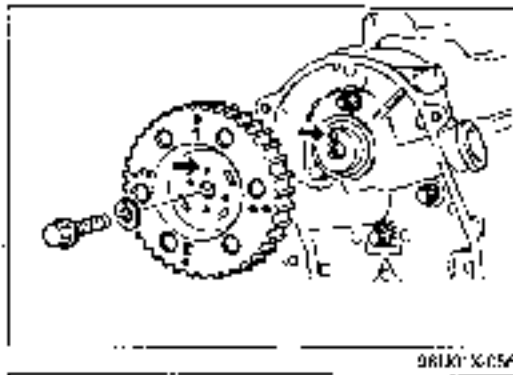
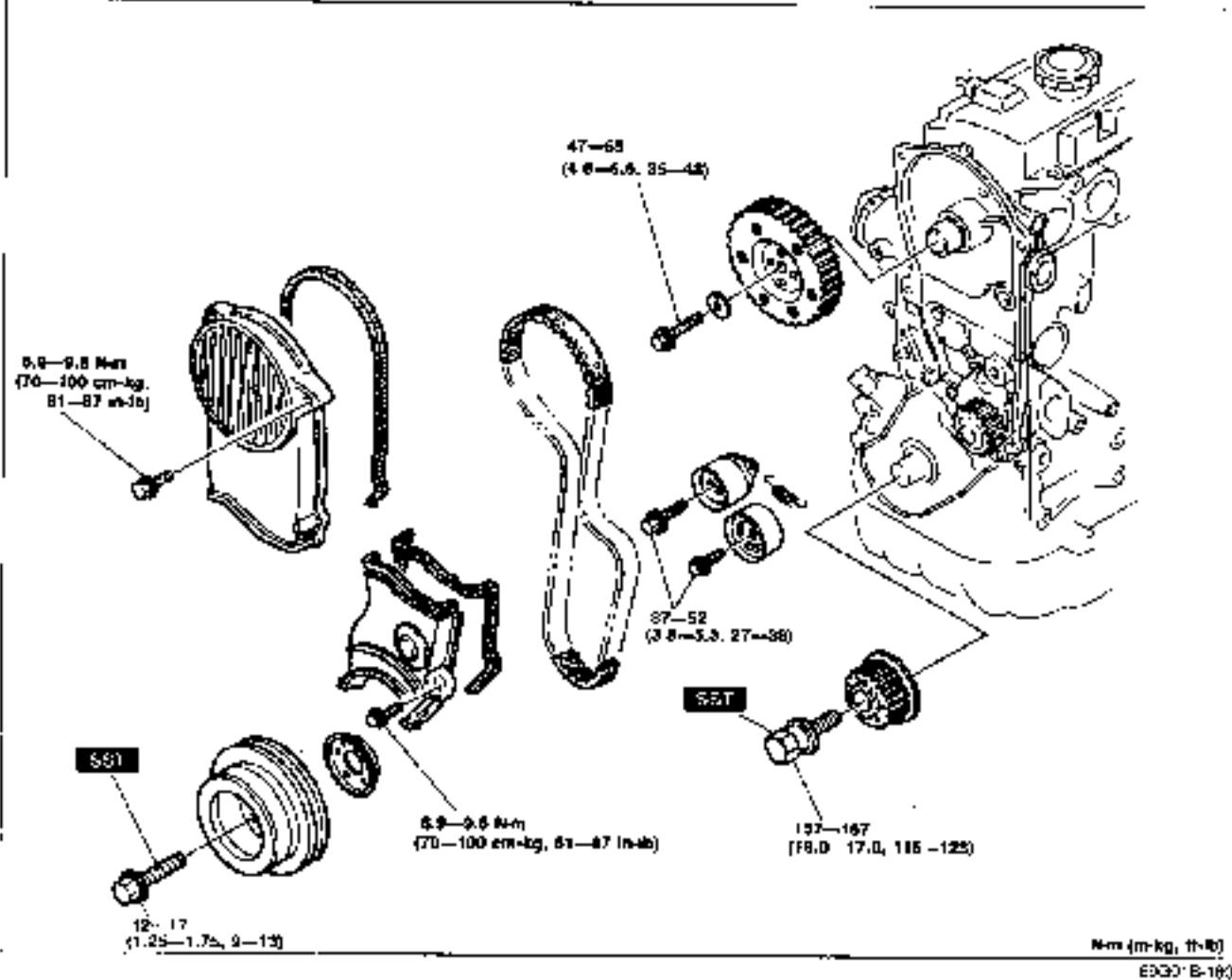
1. Apply silicon sealant to the shaded areas shown in the figure.
2. Install the cylinder head cover.

### Tightening torque:

2.9—3.9 Nm (30—40 cm-kg, 26—35 in-lb)

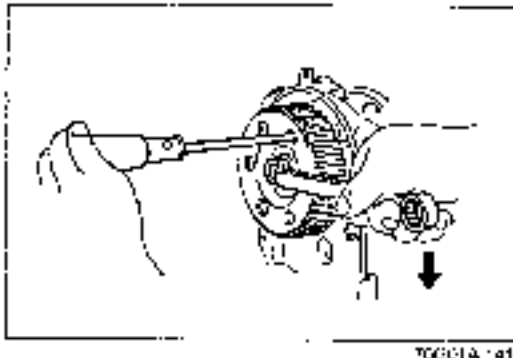
### TIMING BELT

#### Torque Specifications



#### Camshaft Pulley

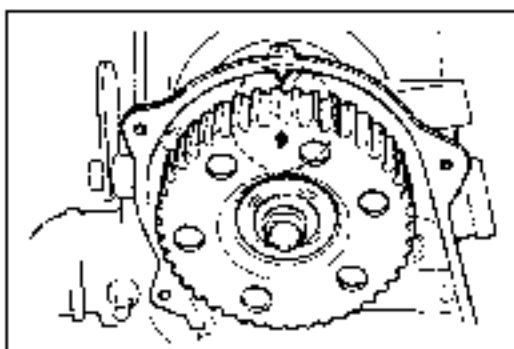
1. Install the camshaft pulley on the camshaft with the dowel pin fit into the hole at the **↑1** mark.



2. Tighten the camshaft pulley lock bolt.

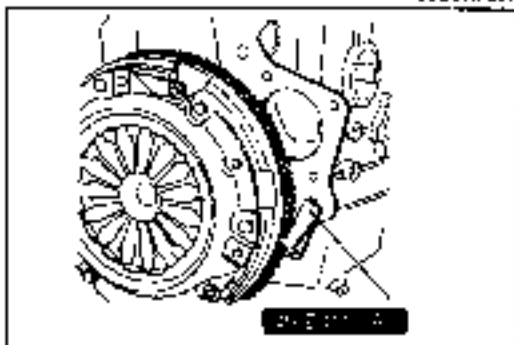
#### Tightening torque:

**47-65 Nm (4.8-6.6 m-k, 35-46 ft-lb)**



96J01X-037

- Align the **1** mark on the pulley with the matching mark on the front housing.



09U03B1-016

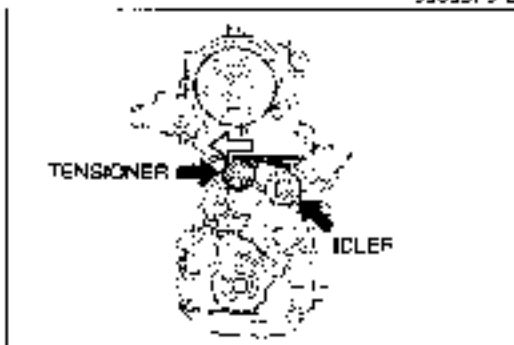
**Timing Belt Pulley**

- Reverse the direction of the **SST** (Refer to page B1-55)
- Install the crankshaft key.
- Install the timing belt pulley on the crankshaft.

**Tightening torque:**

**157—167 N·m (16.0—17.0 m·kg, 118—123 ft·lb)**

- Release the ring gear brake
- Align the timing belt pulley and the oil pump body matching marks



0300010-165

**Timing Belt Idler Pulley**

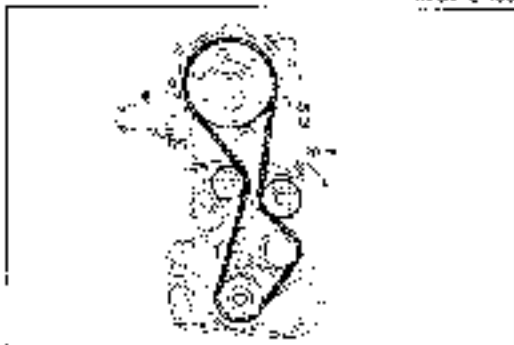
Install the timing belt idler pulley

**Tightening torque:**

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

**Timing Belt Tensioner**

- Install the timing belt tensioner and tensioner spring.
- Tentatively secure the tensioner with the spring fully extended.



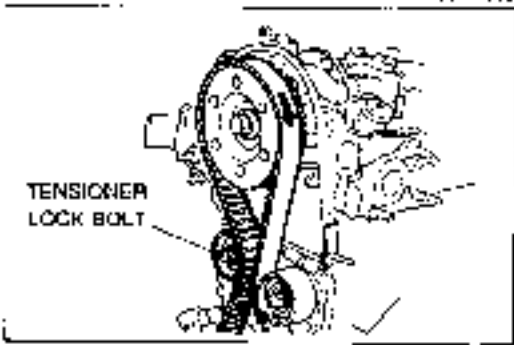
702010-095

**Timing Belt**

- Install the timing belt. (keep the tension side of belt as tight as possible)

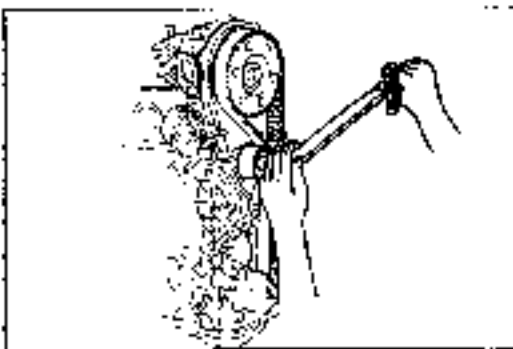
**Caution**

- If the timing belt is being reused, it must be reinstalled to rotate in the original direction.
- Check that there is no oil, grease, or dirt on the timing belt.



96J01X-038

- Turn the crankshaft twice in the direction of rotation.
- Check that the matching marks are correctly aligned. If not aligned, remove the timing belt and tensioner, and repeat the above-mentioned procedure.
- Loosen the tensioner lock bolt and apply tension to the belt



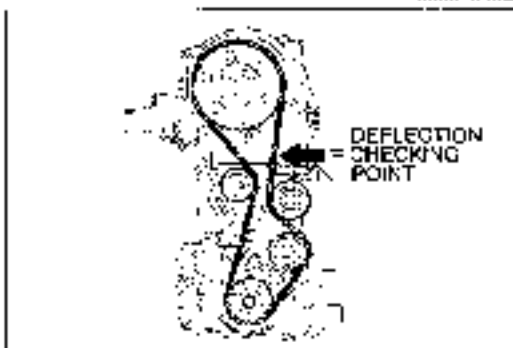
98LJ12060

5. Tighten the timing belt tensioner lock bolt.

**Tightening torque:**

**37—62 Nm (3.8—5.3 m-kg, 27—38 ft-lb)**

6. Turn the crankshaft twice in the direction of rotation and align the matching marks.



98LJ12061

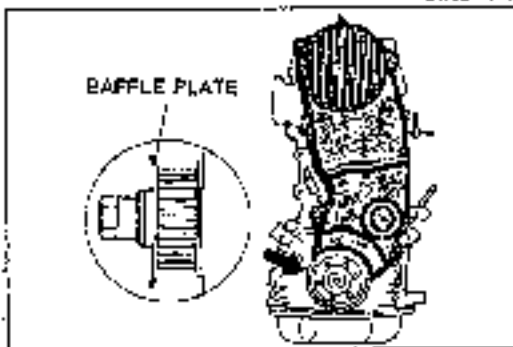
7. Check the timing belt deflection.

If the deflection is not correct, loosen the tensioner lock bolt and repeat steps 3—5 above. Replace the tensioner spring if necessary.

**Belt deflection/98 N (10 kg, 22 lb)**

**New : 8.0—9.0mm (0.31—0.35 in)**

**Used: 9.0—10.0mm (0.35—0.39 in)**



98LJ25107

**Baffle Plate**

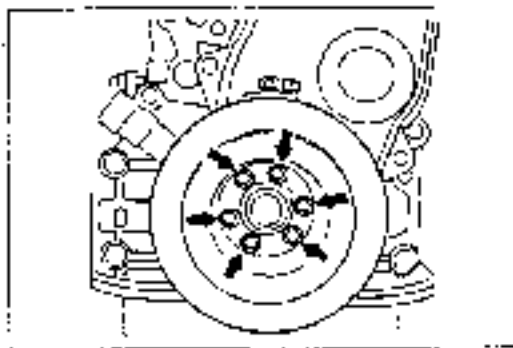
Position the baffle plate on the timing belt pulley.

**Timing Belt Cover**

Install the lower timing belt cover, upper timing belt cover, and new gaskets.

**Tightening torque:**

**6.9—9.8 Nm (70—100 cm-kg, 61—87 in-lb)**



98LJ25108

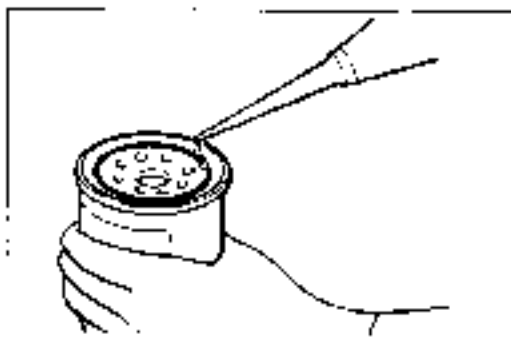
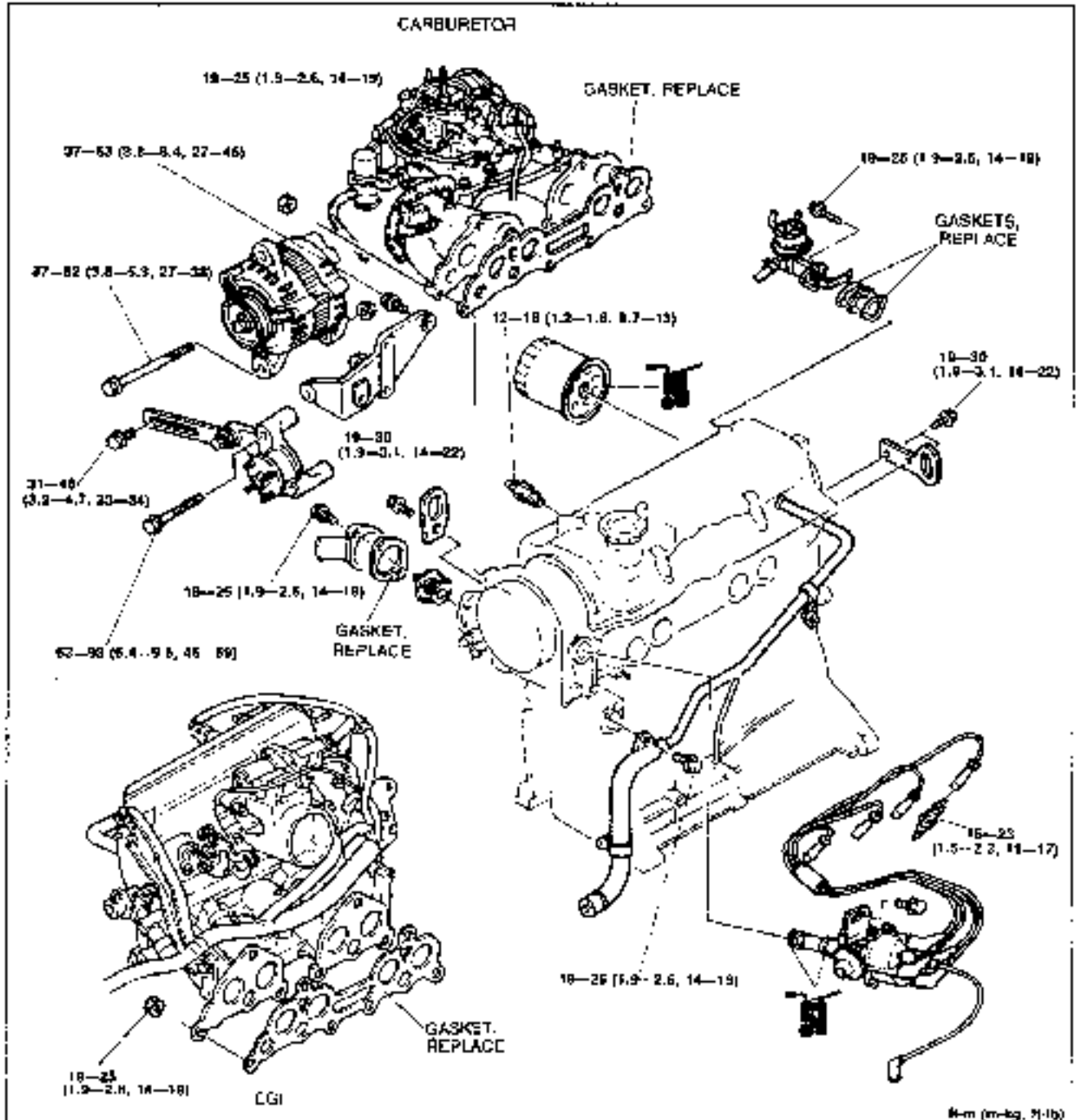
**Crankshaft Pulley**

Install the crankshaft pulley.

**Tightening torque:**

**12—17 Nm (1.25—1.75 m-kg, 9—13 ft-lb)**

## AUXILIARY PARTS Torque Specification



5BLCB1-2/8

### Oil Pressure Switch

Install the oil pressure switch.

### Tightening Torque:

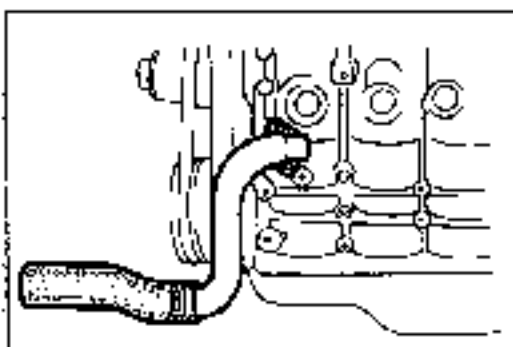
12-18 Nm (1.2-1.8 m·kg, 8.7-13 ft·lb)

### 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 1-1/8 turn with a wrench.

# B1

## ASSEMBLY (AUXILIARY PARTS)

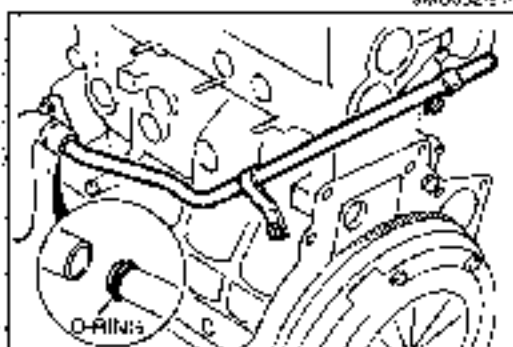


### Coolant Inlet Pipe and Bypass Pipe

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

#### Tightening torque:

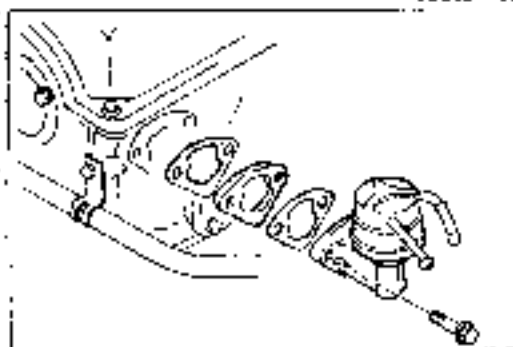
19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)



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

#### Tightening torque:

19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)

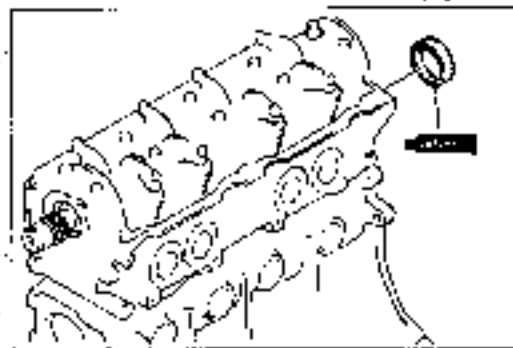


### Fuel Pump (Carburetor M/T)

1. Apply engine oil to the fuel cam contact surface.
2. Install the fuel pump with the insulator and new gaskets.

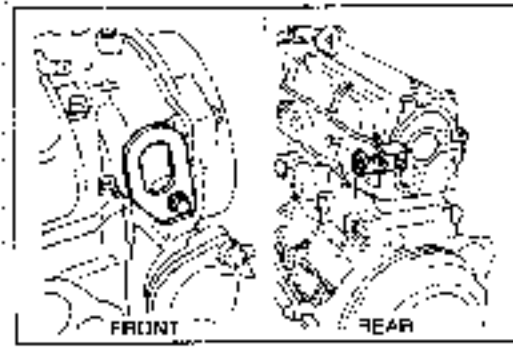
#### Tightening torque:

19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)



### Seal Cap

1. Apply silicone sealant to the new seal cap.
2. Install the seal cap into the cylinder head.

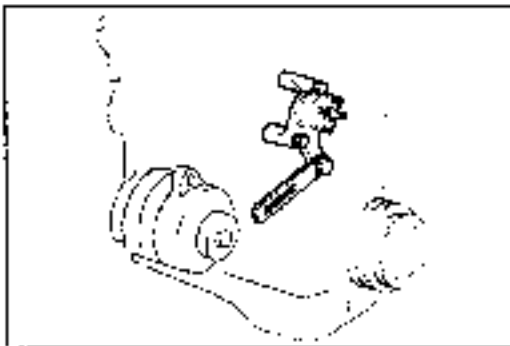


### Engine Hanger

- Install the front and rear engine hangers.

#### Tightening torque:

19–30 N·m (1.9–3.1 m·kg, 14–22 ft·lb)



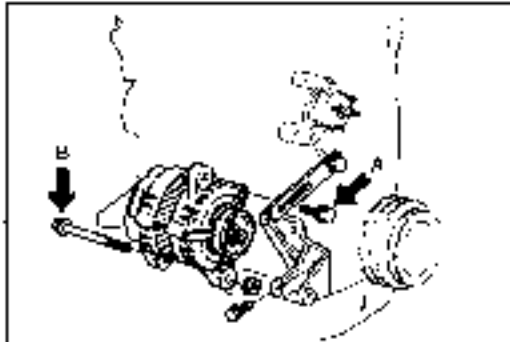
95LXB1-087

**Cooling Fan Bracket**

Install the cooling fan bracket.

**Tightening torque:**

**63—93 Nm (6.4—9.5 m-k<sub>g</sub>, 46—69 ft-lb)**



95LXB1-086

**Alternator and Alternator Bracket**

1. Install the alternator bracket.

**Tightening torque:**

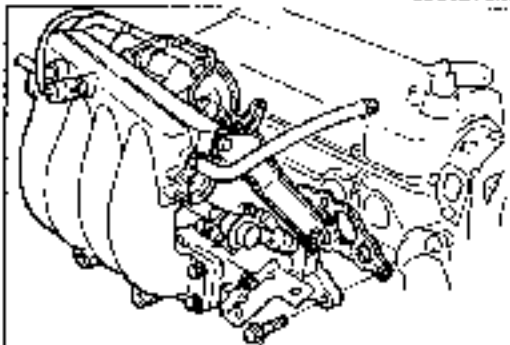
**37—63 Nm (3.8—6.4 m-k<sub>g</sub>, 27—46 ft-lb)**

2. Install the alternator

**Tightening torque**

**Bolt A: 31—46 Nm (3.2—4.7 m-k<sub>g</sub>, 23—34 ft-lb)**

**Bolt B: 37—52 Nm (3.8—5.3 m-k<sub>g</sub>, 27—38 ft-lb)**



95LXB1-077

**Intake Manifold Assembly**

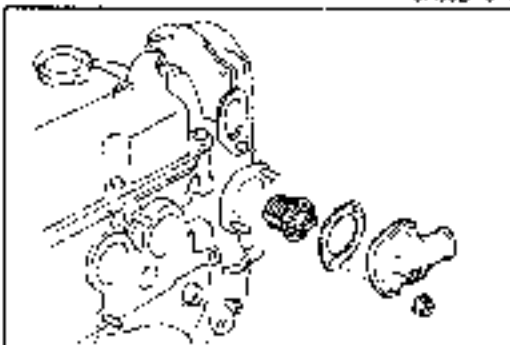
1. Place the new gasket in position.

2. Install the intake manifold assembly.

3. Tighten the bolts and nuts in two or three steps.

**Tightening torque:**

**19—26 Nm (1.9—2.6 m-k<sub>g</sub>, 14—19 ft-lb)**



95LXB1-077

**Thermostat and Thermostat Cover**

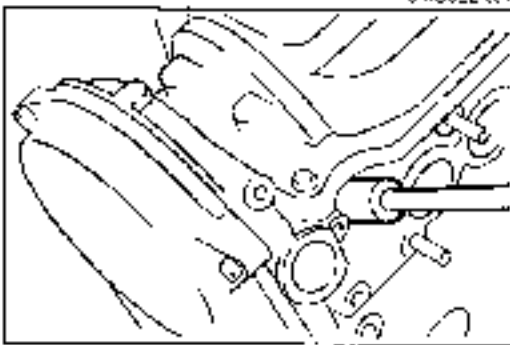
1. Install the thermostat into the water outlet with the rattle pin at the top.

2. Position a new gasket with the printed side facing the water outlet.

3. Install the thermostat cover.

**Tightening torque:**

**19—25 Nm (1.9—2.6 m-k<sub>g</sub>, 14—19 ft-lb)**



95LXB1-079

**Spark Plug**

1. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.

2. Install the spark plugs.

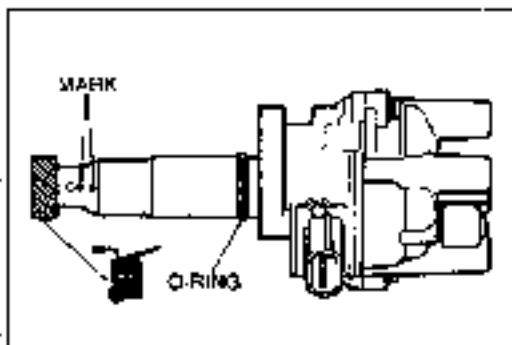
**Tightening torque:**

**15—23 Nm (1.5—2.3 m-k<sub>g</sub>, 11—17 ft-lb)**



# B1

## ASSEMBLY (AUXILIARY PARTS)



DEUCE 111

### Distributor

1. Verify that the crankshaft pulley timing mark (yellow) is aligned with the matching mark on the timing belt cover.
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

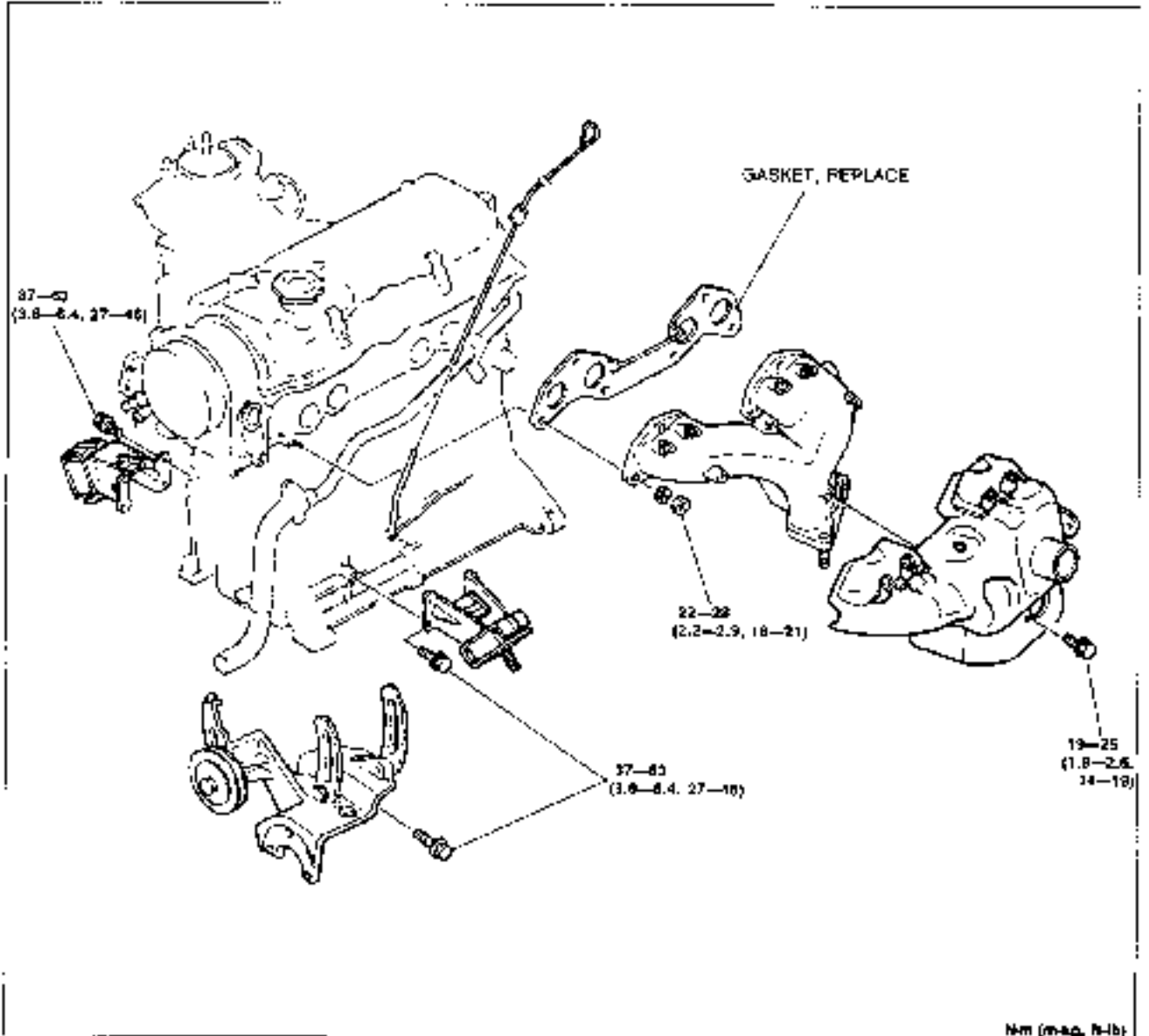
Install the high-tension leads.

## 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



Nm (m·kg, ft·lb)  
34U302 2'3



33U067 324

**A/C Compressor and P/S Oil Pump Bracket**  
Install the A/C compressor and P/S oil pump bracket.

**Tightening torque:**  
37-63 Nm (3.8-6.4 m·kg, 27-46 ft·lb)



90U03B1-036

**Engine Mount**

Install the right and left engine mounts.

**Tightening torque:**

**37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)**



90U03B1-036

**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·kg, 16—21 ft·lb)**

**Exhaust Manifold Insulator**

Install the exhaust manifold insulator.

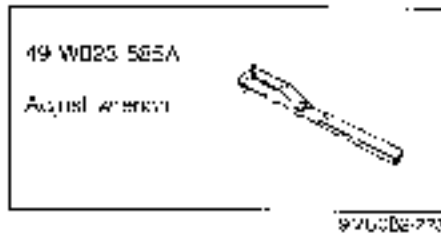
**Tightening torque:**

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

INSTALLATION

PREPARATION

SST



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

1. Install in the reverse order of removal, referring to the **Installation note**.
2. Tighten all bolts and nuts to the specified torque.

**Caution**

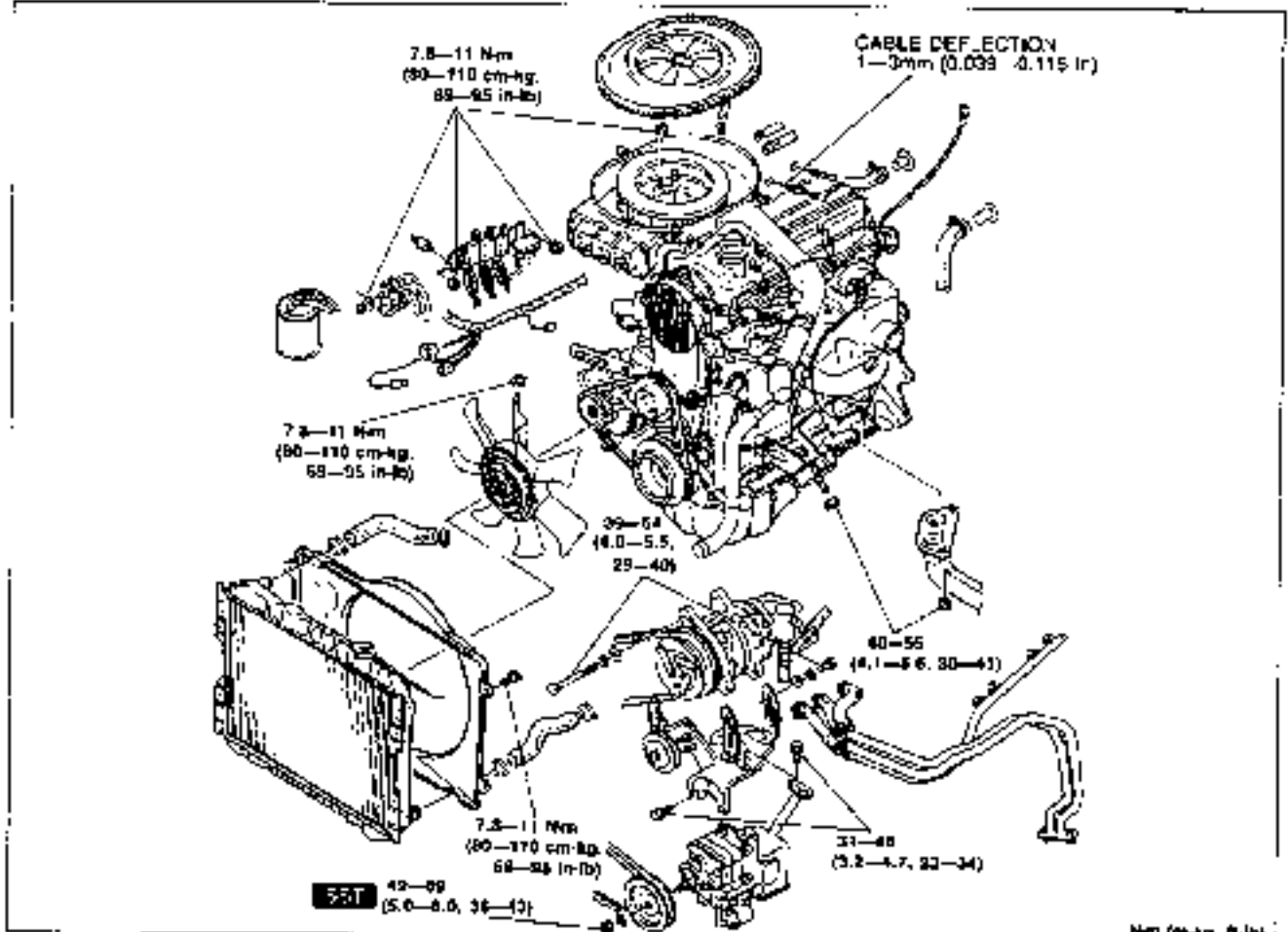
After radiator cowl installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowl.

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

**Note**

- 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



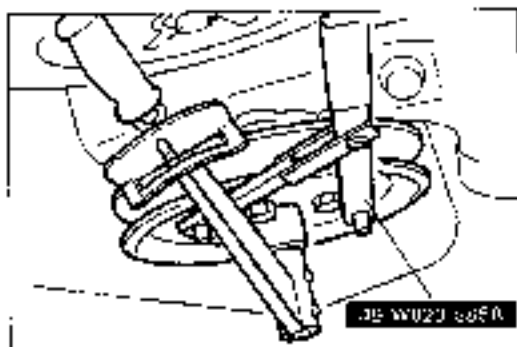
N·m (kg-cm, ft-lb)

30U001 0E7

B1-69

# B1

## INSTALLATION



3B WU23 2050

### Installation note

#### 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.

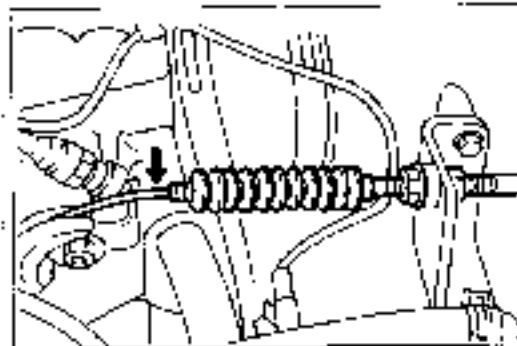
#### Tightening torque:

49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)

### Accelerator Cable

Install the accelerator cable.

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



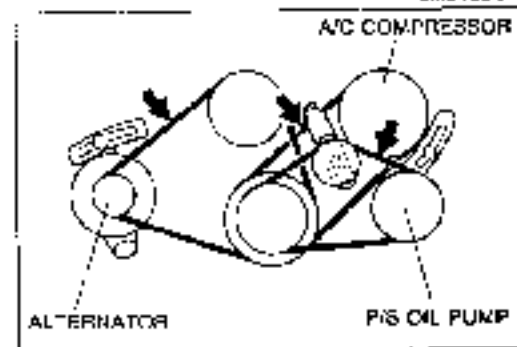
EMU002 240

### Drive Belt

Install and adjust the drive belt deflection (Refer to page B1-5.)

#### Note

Alternator drive belt can be adjusted after cooling fan installation.



3B WU23 2050

### 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 J.)  
Install the automatic transmission. (Refer to Section K.)

### Starter

Install the starter. (Refer to Section G.)

### Check Engine Condition

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

3B WU23 2050

# ENGINE (B2600i)

<b>INDEX</b> .....	B2- 2
<b>OUTLINE</b> .....	B2- 3
<b>SPECIFICATIONS</b> .....	B2- 3
<b>TROUBLESHOOTING GUIDE</b> .....	B2- 3
<b>ENGINE TUNE-UP PROCEDURE</b> .....	B2- 6
<b>DRIVE BELT</b> .....	B2- 5
<b>PMA TROUBLESHOOTING GUIDE</b> .....	B2- 6
<b>COMPRESSION</b> .....	B2- 6
<b>INSPECTION</b> .....	B2- 6
<b>ON-VEHICLE MAINTENANCE</b> .....	B2- 8
<b>TIMING CHAIN</b> .....	B2- 8
<b>CYLINDER HEAD GASKET</b> .....	B2-14
<b>FRONT OIL SEAL</b> .....	B2-21
<b>REAR OIL SEAL</b> .....	B2-23
<b>REMOVAL</b> .....	B2-24
<b>PREPARATION</b> .....	B2-24
<b>ENGINE STAND INSTALLATION</b> .....	B2-27
<b>PREPARATION</b> .....	B2-27
<b>INSTALLATION</b> .....	B2-27
<b>DISASSEMBLY</b> .....	B2-29
<b>PREPARATION</b> .....	B2-29
<b>AUXILIARY PARTS</b> .....	B2-30
<b>CYLINDER HEAD</b> .....	B2-31
<b>CHAIN CASE AND OIL PAN</b> .....	B2-33
<b>BALANCER CHAIN AND TIMING CHAIN</b> ..	B2-34
<b>CYLINDER BLOCK</b> .....	B2-36
<b>INSPECTION AND REPAIR</b> .....	B2-39
<b>PREPARATION</b> .....	B2-39
<b>ASSEMBLY</b> .....	B2-52
<b>PREPARATION</b> .....	B2-52
<b>CYLINDER BLOCK</b> .....	B2-53
<b>BALANCER CHAIN AND TIMING CHAIN</b> ..	B2-60
<b>CHAIN CASE AND OIL PAN</b> .....	B2-65
<b>CYLINDER HEAD</b> .....	B2-67
<b>AUXILIARY PARTS</b> .....	B2-72
<b>ENGINE STAND REMOVAL</b> .....	B2-76
<b>REMOVAL</b> .....	B2-76
<b>INSTALLATION</b> .....	B2-79
<b>PREPARATION</b> .....	B2-79

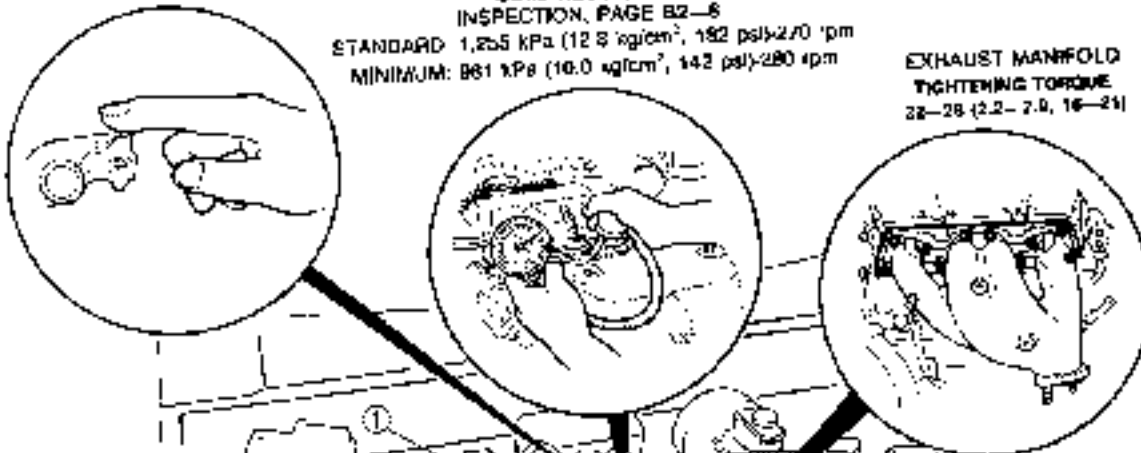
950339-1

INDEX

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

COMPRESSION  
INSPECTION, PAGE B2-6  
STANDARD: 1,265 kPa (12.8 kg/cm<sup>2</sup>, 182 psi) ± 2.0 %pm  
MINIMUM: 861 kPa (10.0 kg/cm<sup>2</sup>, 142 psi) ± 2.0 %pm

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

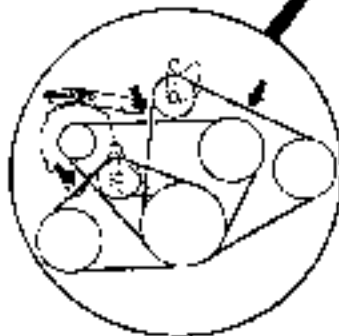


INTAKE MANIFOLD  
TIGHTENING TORQUE  
13-23 (1.5-2.4, 16-19)



ENGINE CV. INSPECTION,  
SERVICE, SECTION D

ENGINE COOLANT INSPECTION,  
SERVICE, SECTION E



DRIVE BELT ADJUSTING, PAGE B2-5

DEFLECTION

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

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/W OIL PUMP	8.6-7.2 (0.28-0.28)	7.2-8.0 (0.28-0.31)	10 (0.39)
A/C compressor	8.6-10.0 (0.33-0.39)	10.0-11.5 (0.39-0.45)	15 (0.59)

(BU097615)

- 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				Gasol.no. 4-cycle
Cylinder arrangement and number				in-line, 4 cylinders
Combustion chamber				Femuror
Valve system				O-C, ohm-over
Displacement		cc (cu. in.)		2,606 (158.97)
Bore and stroke		mm (in.)		92.0 × 98.0 (3.62 × 3.90)
Compression ratio				8.4
Compression pressure		kPa (kg/cm <sup>2</sup> , ps)-rpm		1,255 (12.8 (82)-270)
Valve timing	IN	Open	ATDC	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		750 ± 20 (Neutral)
		MIT		770 ± 20 (P range)
		AVT		
Ignition timing (TEN terminal grounded)		BTDC		6° ± 1° at idle
Firing order				1-3-4-2

79U982-002

TROUBLESHOOTING GUIDE

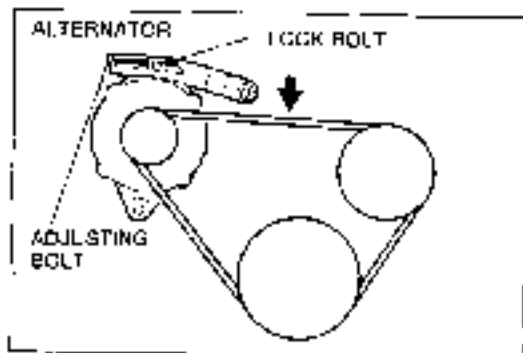
Problem	Possible Cause	Remedy	Page
Difficult starting	<b>Malfunction of engine-related components</b> Burned valve Worn piston, piston ring, or cylinder Failed cylinder head gasket	Replace Replace or repair Repair	B2-40 B2-45, 47 B2-14
	<b>Malfunction of fuel system</b>	Refer to Section F2	
	<b>Malfunction of electrical system</b>	Refer to Section G	
Poor idling	<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	
Excessive oil consumption	<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	



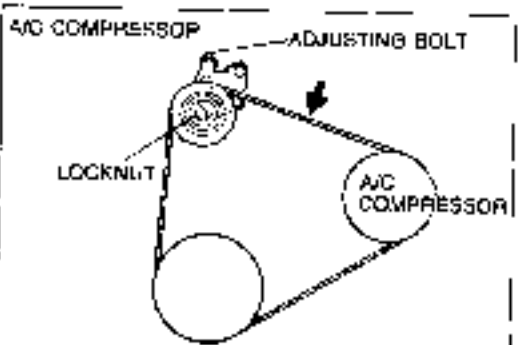
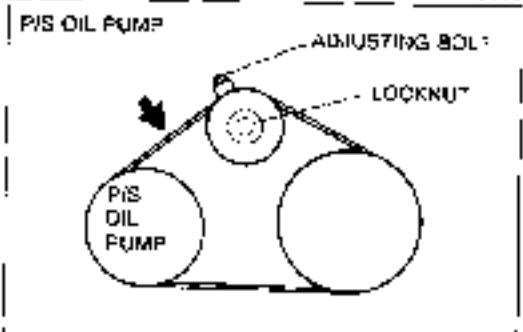
Problem	Possible Cause	Remedy	Page
Insufficient power	<b>Insufficient compression</b>	Replace	B2-45
	Malfunction of HVA	Repair	B2-42
	Compression leakage from valve seat	Replace	B2-40
	Seized valve stem	Repair	B2-43
	Weak or broken valve spring	Replace	B2-14
Abnormal combustion	Leak cylinder head gasket	Replace	B2-39
	Cracked or distorted cylinder head	Replace	B2-47
	Smoking, 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	
Engine noise	<b>Others</b>	Refer to Section V	
	Sticking clutch	Refer to Section P	
	Dragging brakes	Refer to Section Q	
	Wrong size tires		
	<b>Malfunction of engine-related components</b>		
Insufficient power	Malfunction of HVA	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	
Abnormal combustion	<b>Malfunction of engine-related components</b>		
	Malfunction of HVA	Replace or repair	B2-45
	Sticking or burned valve	Replace	B2-40
	Weak or broken valve spring	Replace or repair	B2-43
	Carbon accumulation in combustion chamber	Eliminate carbon	
Engine noise	<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	B2-56
	Excessive crankshaft end play	Replace or repair	B2-57
Abnormal combustion	Excessive connecting rod bearing oil clearance	Replace or repair	B2-48
	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
Engine noise	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	B2-49
	Seized piston	Replace	B2-47
Abnormal combustion	Damaged piston ring	Replace	B2-47
	Bent connecting rod	Replace	B2-48
	<b>Valves or timing-related parts</b>		
	Malfunction of HVA*	Replace	B2-45
	Broken valve spring	Replace	B2-40
Engine noise	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>		
Abnormal combustion	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	

091022018

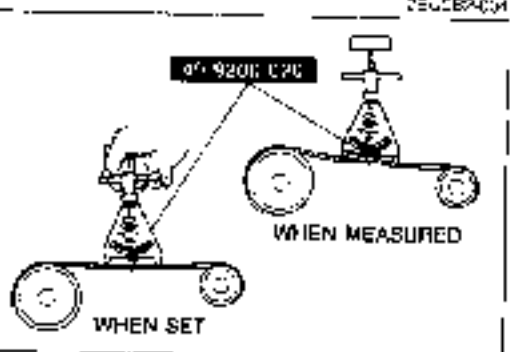
\* Tappet noise may occur if the engine is not operated for an extended period. The noise should disappear after the engine has reached normal operating temperature.



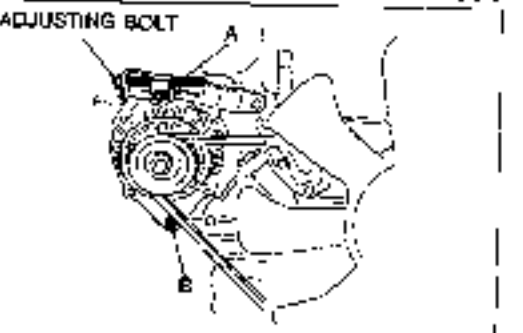
2E11012403



2E11012404



2E11012405



3D01330 001

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

Drive belt	New	Used	Limit
Alternator	13.0-13.0 (0.39-0.47)	17.0-13.0 (0.43-0.57)	16 (0.53)
P/S oil pump	6.5-7.2 (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)	12 (0.59)

mm. (in)

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

Drive belt	New	Used	Limit
Alternator	549-636 (30-65, 123.4-143.0)	461-549 (47-56, 103.6-123.4)	275 (29.61.6)
P/S oil pump	212-471 (47-48, 92.4-105.6)	353-402 (35-41, 79.2-100.2)	106 (20.14.0)
A/C compressor	559-636 (57-65, 123.7-143.0)	471-549 (48-56, 100.5-121.4)	282 (29.63.8)

N (kg, lb)

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.

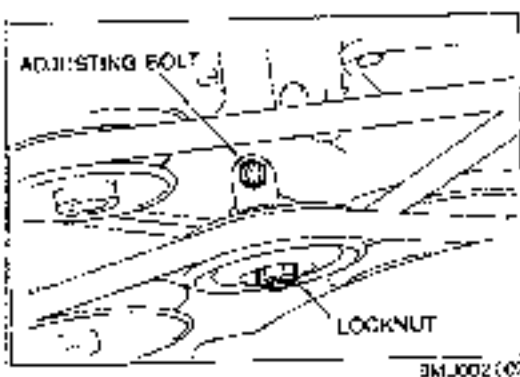
(1) Alternator belt

If necessary, loosen the alternator bolts and adjust the belt deflection by turning the adjusting bolt.

Tightening torque

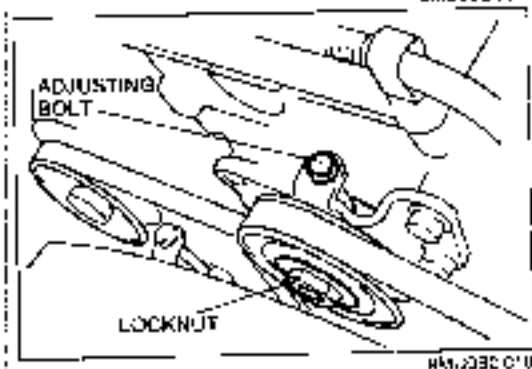
Bolt A: 19-25 Nm (1.9-2.6 m·kg, 14-19 ft·lb)

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



- (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)



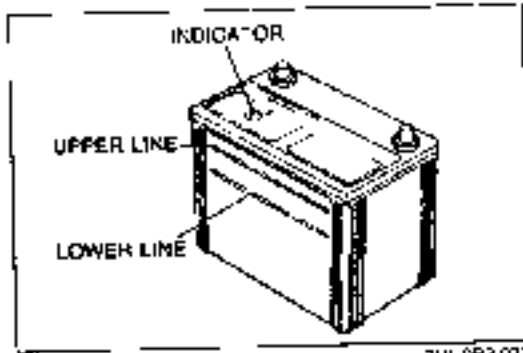
- (3) A/C Compressor belt:  
If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

**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 or oil passage	Run engine at 2000—3000 rpm. If noise stops after 2 second—10 minutes*, P/A is normal. If not, replace HLA.
2. Noise when engine is started after sitting approx. one day.		* Time required for engine oil to circulate within engine, includes tolerance for engine oil condition and ambient temperature.
3. Noise when engine is started after cranking for 3 seconds or more.	Oil leakage in HLA	
4. Noise when engine is started after new HLA is installed.		
5. Noise continues more than 10 minutes.	Insufficient oil pressure Faulty HLA	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> (Refer to page R2-69) 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 0.081 (0.01), replace HLA.
6. Noise occurs during die after high-speed running.	Improper oil amount Deteriorated oil	Check oil level. Drain or add oil as necessary. Check oil quality. If deteriorated, replace with specified type and amount of oil.

26UC93007



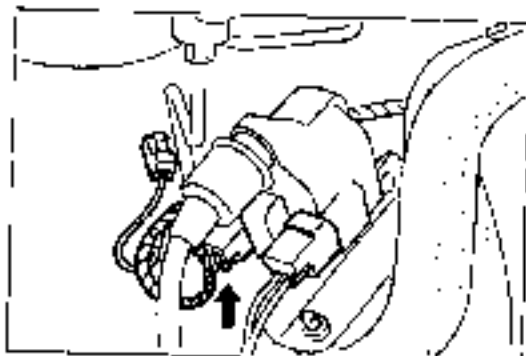
### COMPRESSION

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

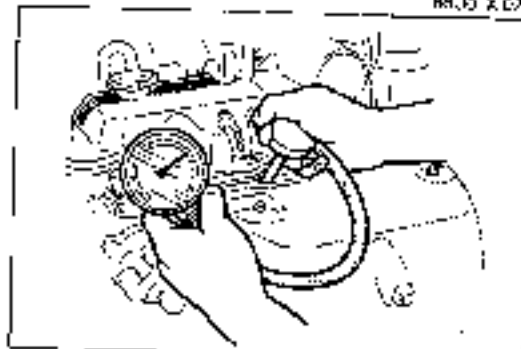
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Section F2)

### INSPECTION

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



RM-10-2-CA\*



15-0032-01-R

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.

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:**

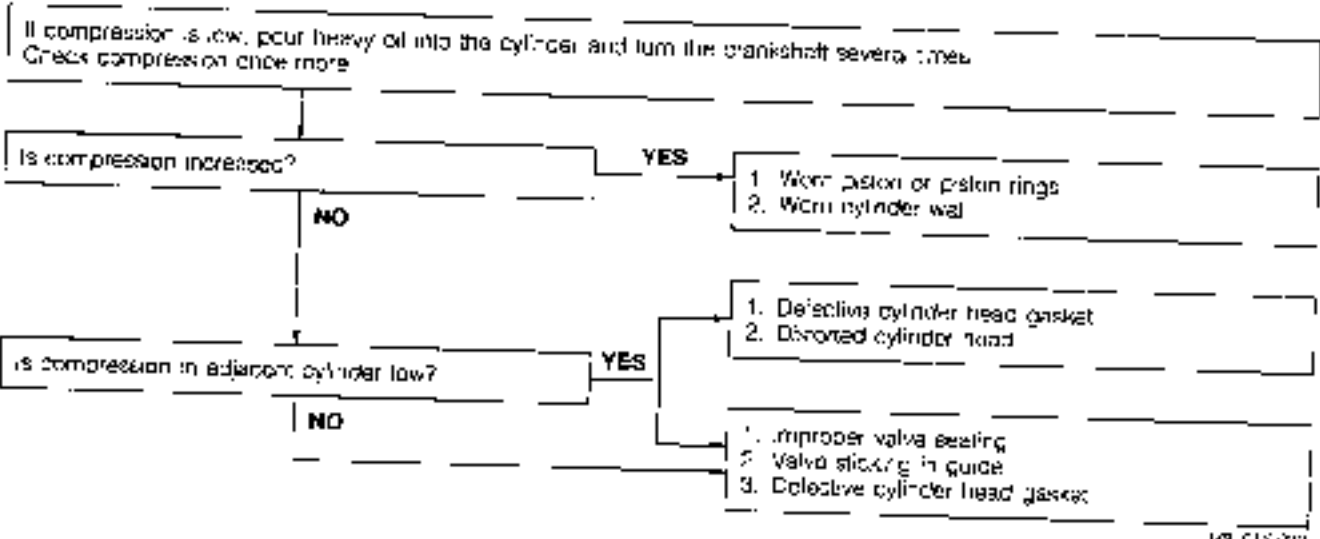
1,255 kPa (12.8 kg/cm<sup>2</sup>, 182 psi)-270 rpm

**Minimum:**

981 kPa (10.0 kg/cm<sup>2</sup>, 142 psi)-280 rpm

62

**Possible Cause**



50L618-012

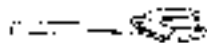
## ON-VEHICLE MAINTENANCE

## TIMING CHAIN

## Preparation

## SST

49-5120-710

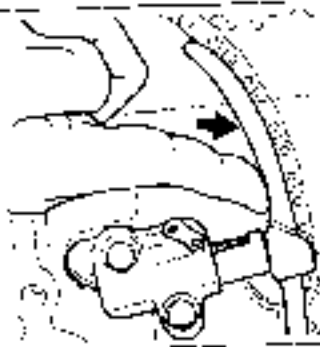
Halter coupling  
flange

SMUC004-15

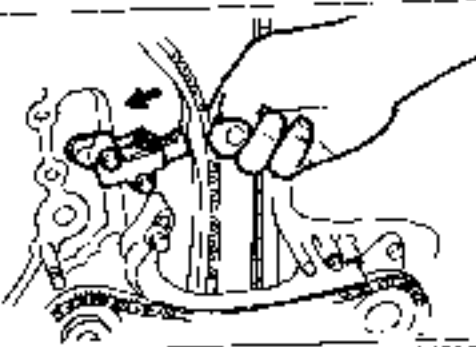


13 NOTCHES

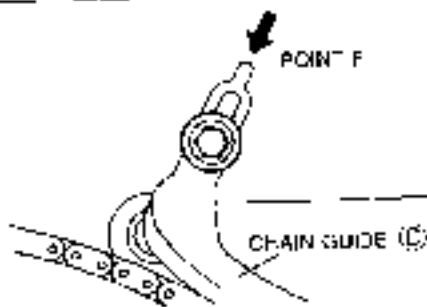
SMUC02-17E



SMUC02-17



SMUC02-18



POINT F

CHAIN GUIDE (C)

SMUC04-19

## 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 culley 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 (C) bottoms at point F when adjusting.

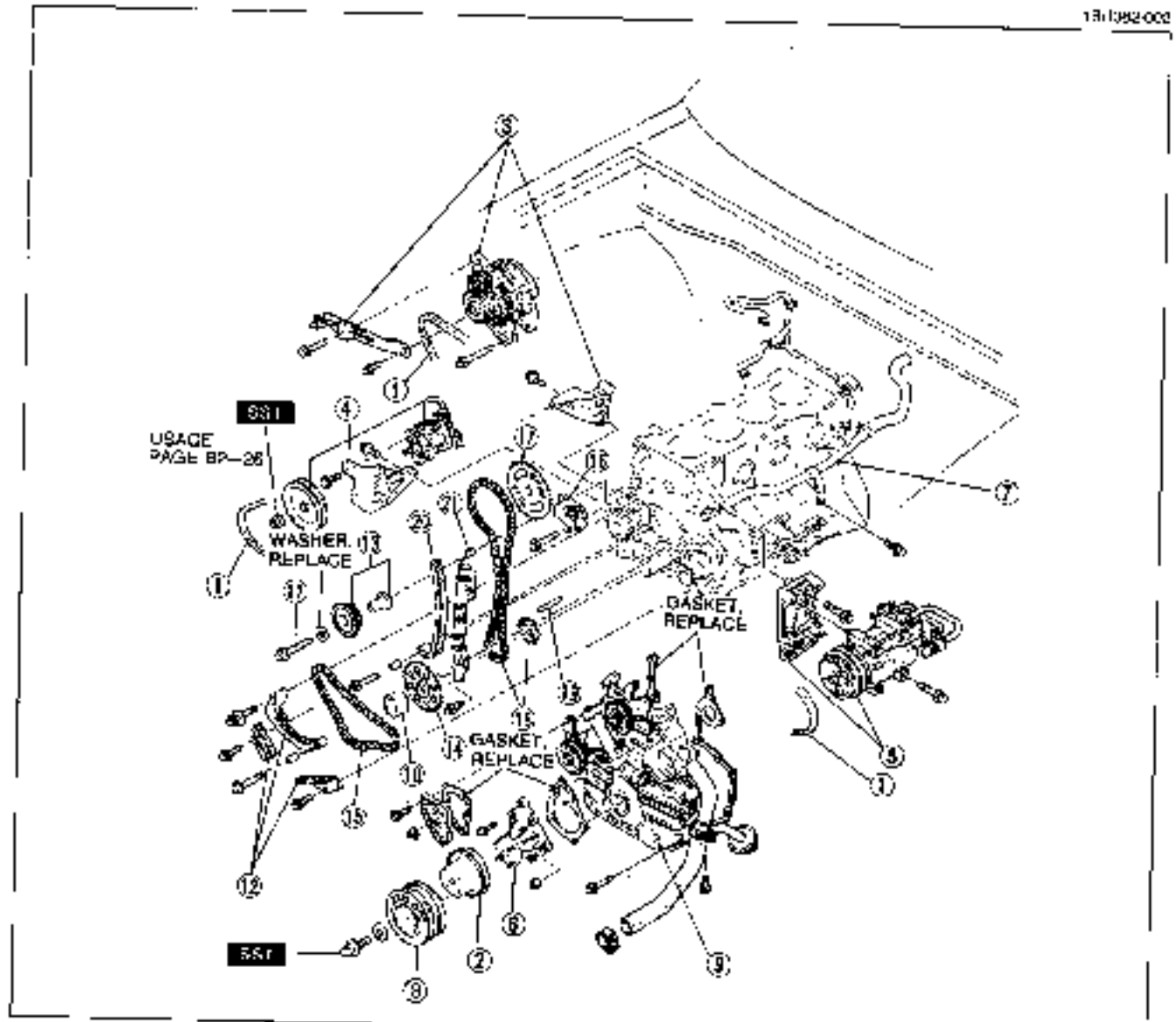
**Removal**

**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 coving and cooling fan. (Refer to Section F.)
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**.

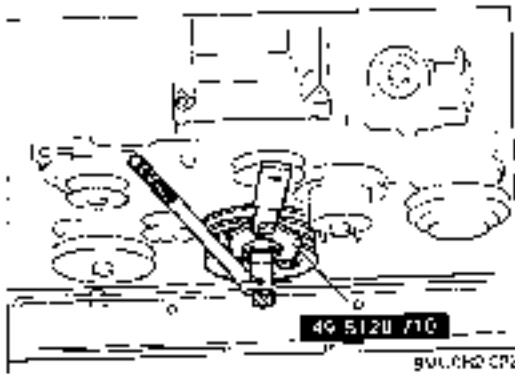
1311382-003

B2



94LCB2-0P1

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Drive belts</li> <li>2. Water pump pulley</li> <li>3. Alternator and bracket</li> <li>4. P/S oil pump and bracket</li> <li>5. A/C compressor end bracket</li> <li>6. Water pump</li> <li>7. Coolant bypass pipe</li> <li>8. Crankshaft pulley</li> <li>9. Chain cover</li> <li>10. Spacer</li> <li>11. Idler sprocket assembly lock bolt</li> </ol> | <ol style="list-style-type: none"> <li>12. Chain guides</li> <li>13. Idler sprocket assembly</li> <li>14. Crankshaft sprocket</li> <li>15. Balancer chain</li> <li>16. Chain adjuster</li> <li>17. Camshaft pulley</li> <li>18. Timing chain and timing gear</li> <li>19. Key</li> <li>20. Chain lever</li> <li>21. Chain guide</li> </ol> |
|---|--|



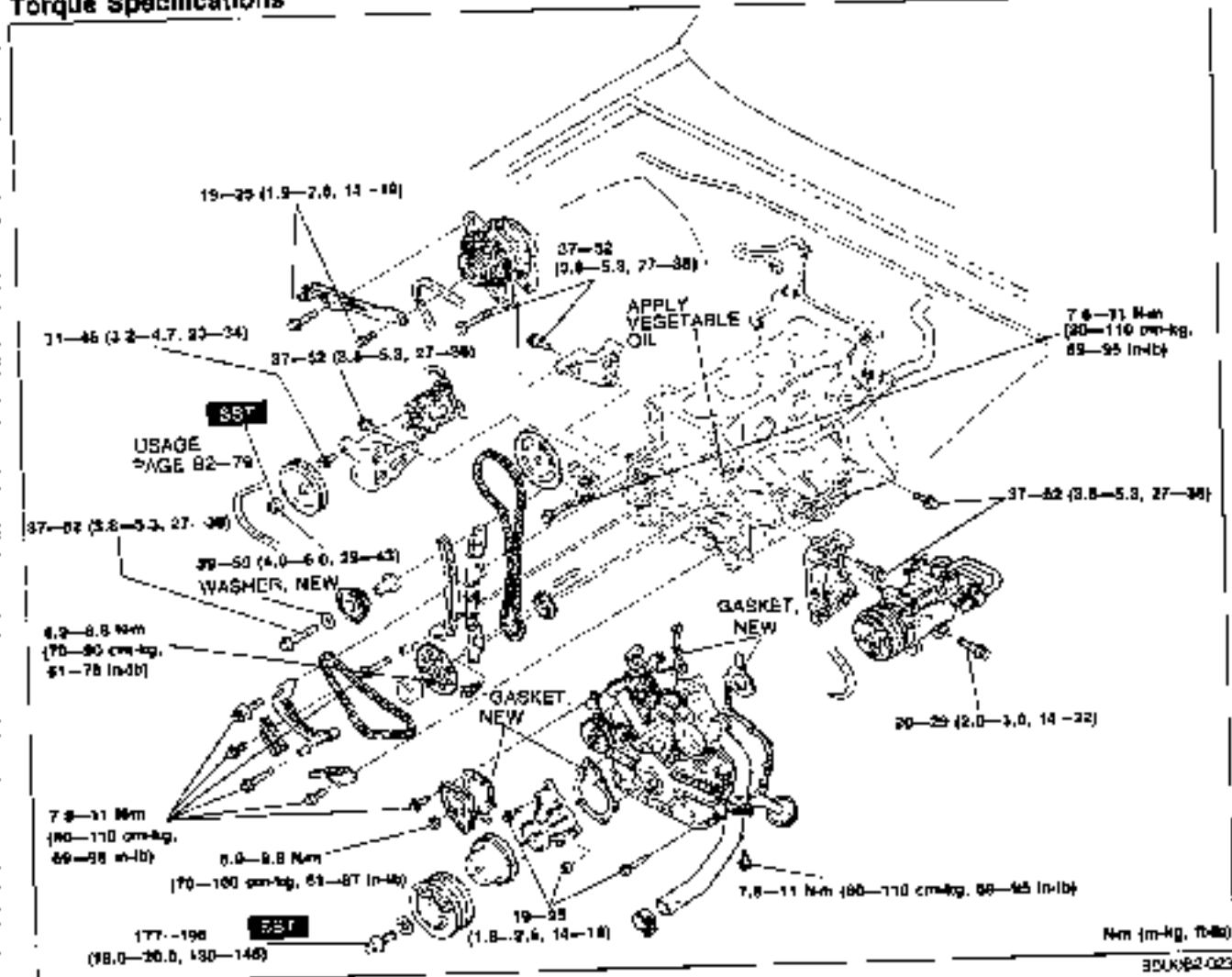
**Removal note**  
**Crankshaft pulley**  
 Remove the crankshaft pulley with the SST

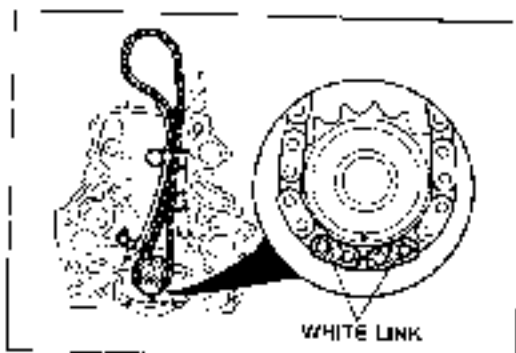
**Inspection**  
 Inspection of timing chain related parts. (Refer to page B2-51.)  
 Inspection of balancer chain related parts. (Refer to page B2-51.)

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

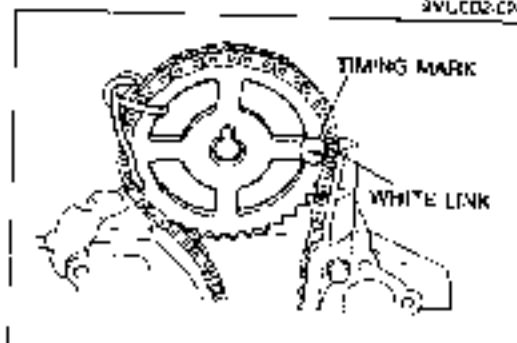
**Note**  
 a) Position the hose clamp in the original location on the hose.  
 b) Squeeze the clamp lightly with large pliers to ensure a good fit.

**Torque Specifications**

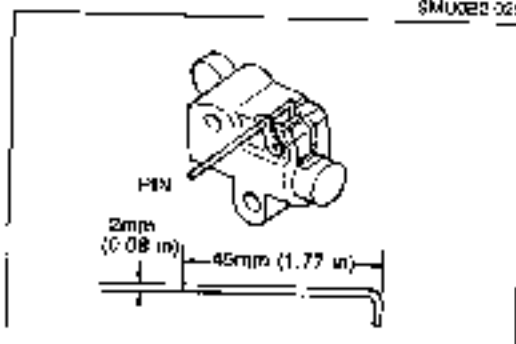




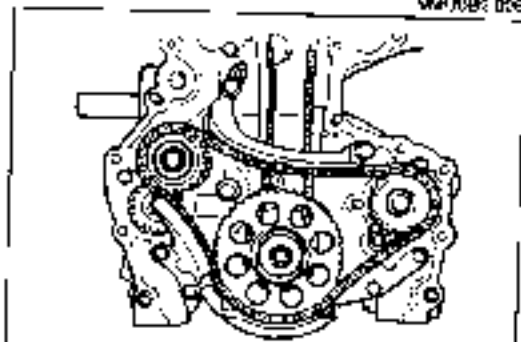
9VUC02-CP4



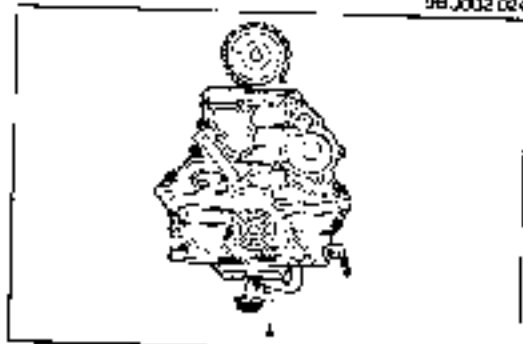
9MUC02-025



9MUC02-026



9B-J002-024



9MUC02-029

**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 sleeves.
2. Install it onto the cylinder block.

**Tightening torque:**

7.8—11 Nm (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 Nm (1.9—2.6 m-kg, 14—19 ft-lb)

2. Tighten the oil strainer stay bolt.

**Tightening torque:**

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)





9WU082 039

**Water pump**

Install the water pump with a new gasket.

**Tightening torque:**

19—25 Nm (1.9—2.6 m·kg, 14—19 ft·lb)



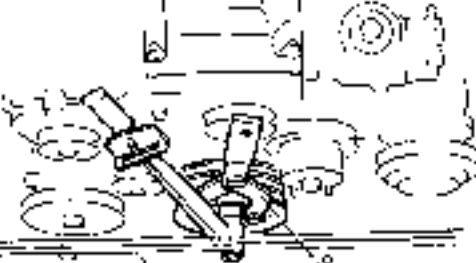
9WU082 039

**Coolant bypass pipe**

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

**Tightening torque:**

37—52 Nm (3.8—5.3 m·kg, 27—38 ft·lb)



49 5120 710

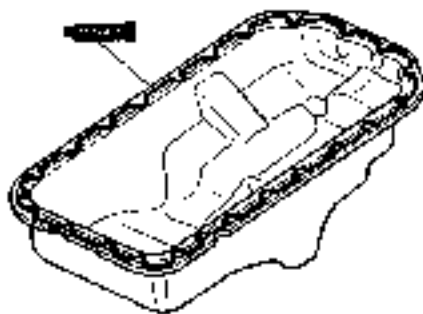
9WU082 041

**Crankshaft pulley**

Install the crankshaft pulley with the SST.

**Tightening torque:**

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



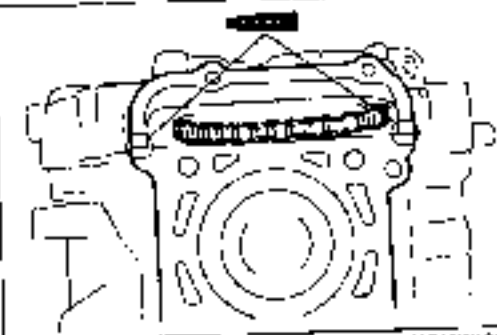
9WU082 042

**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:**

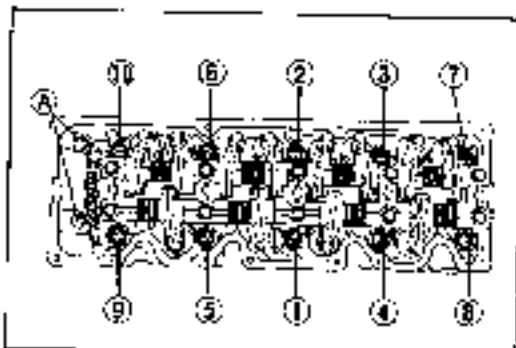
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)



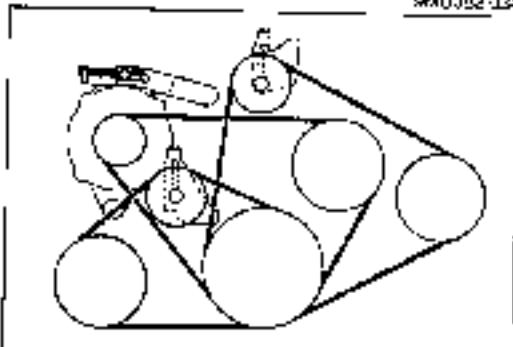
9WU082 043

**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.



9AUJ352-134



9EUP62-026

**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)

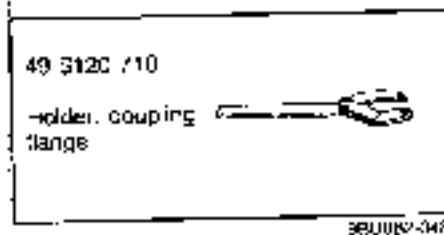
4. Tighten the remaining small cylinder head bolts: ②.

**Tightening torque:**

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

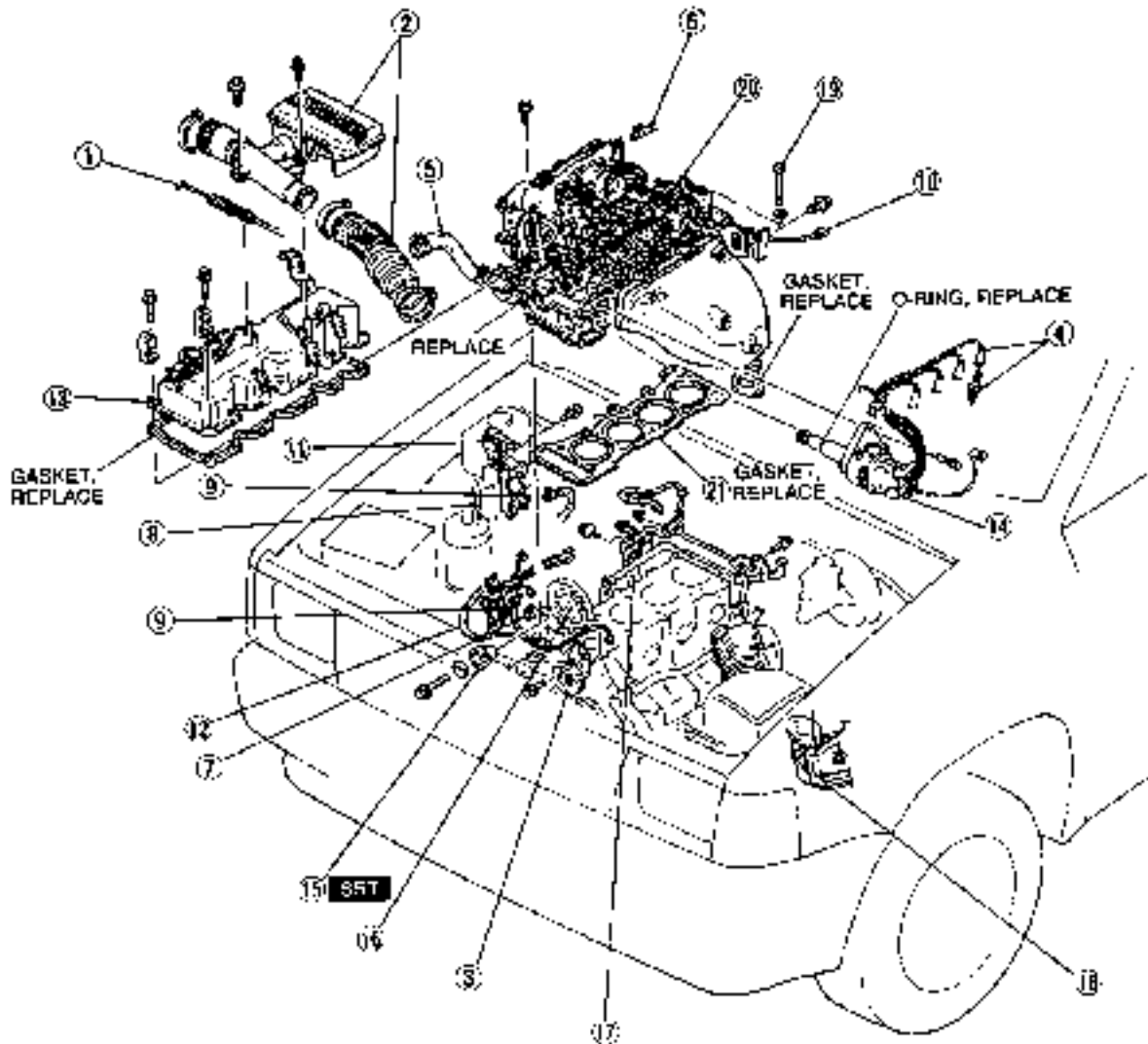
**Steps After Installation**

1. Install the radiator cowling 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****Removal**

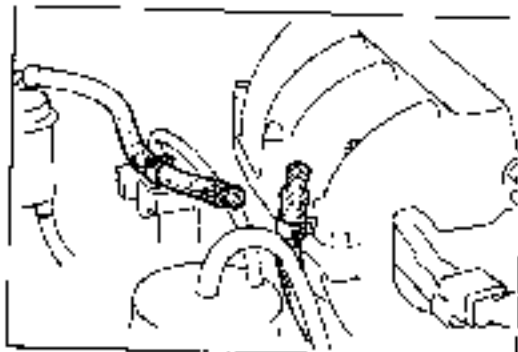
**Warning: Release the fuel pressure. (Refer to Section F2.)**

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**.



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

9M-AU02-032

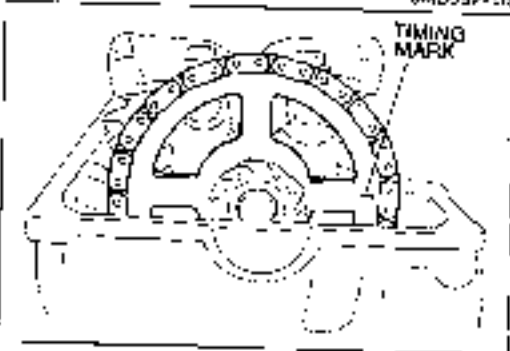


### Removal note Fuel hose

#### 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.

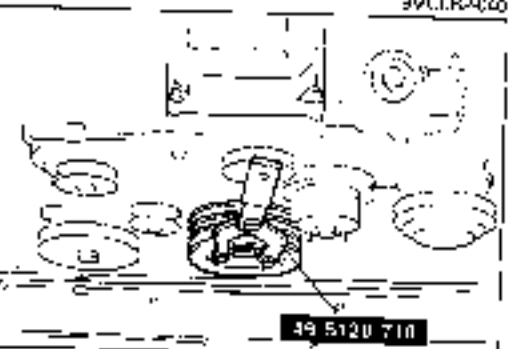


### Distributor

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.

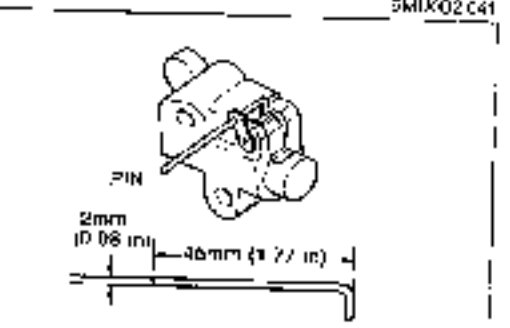
#### Caution

Do not turn the crankshaft during removal and installation.



### Distributor drive gear

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



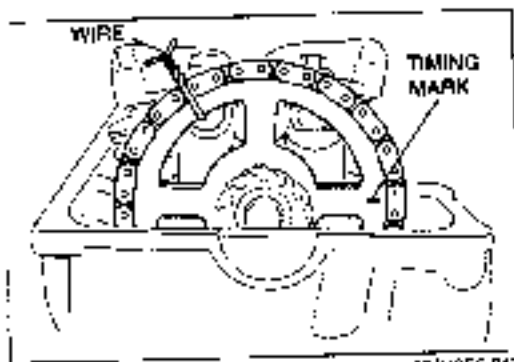
### Camshaft pulley

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

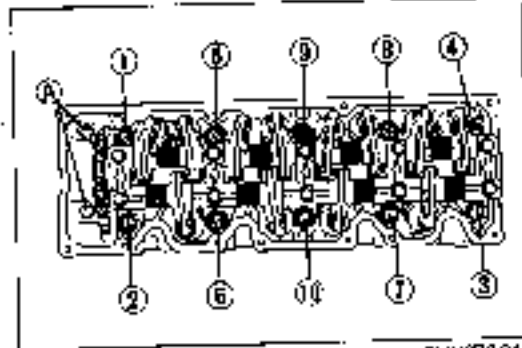
Be especially careful that the pin does not fall.

9M-AU02-045



SM110E2-043

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



EMU092-044

#### 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.

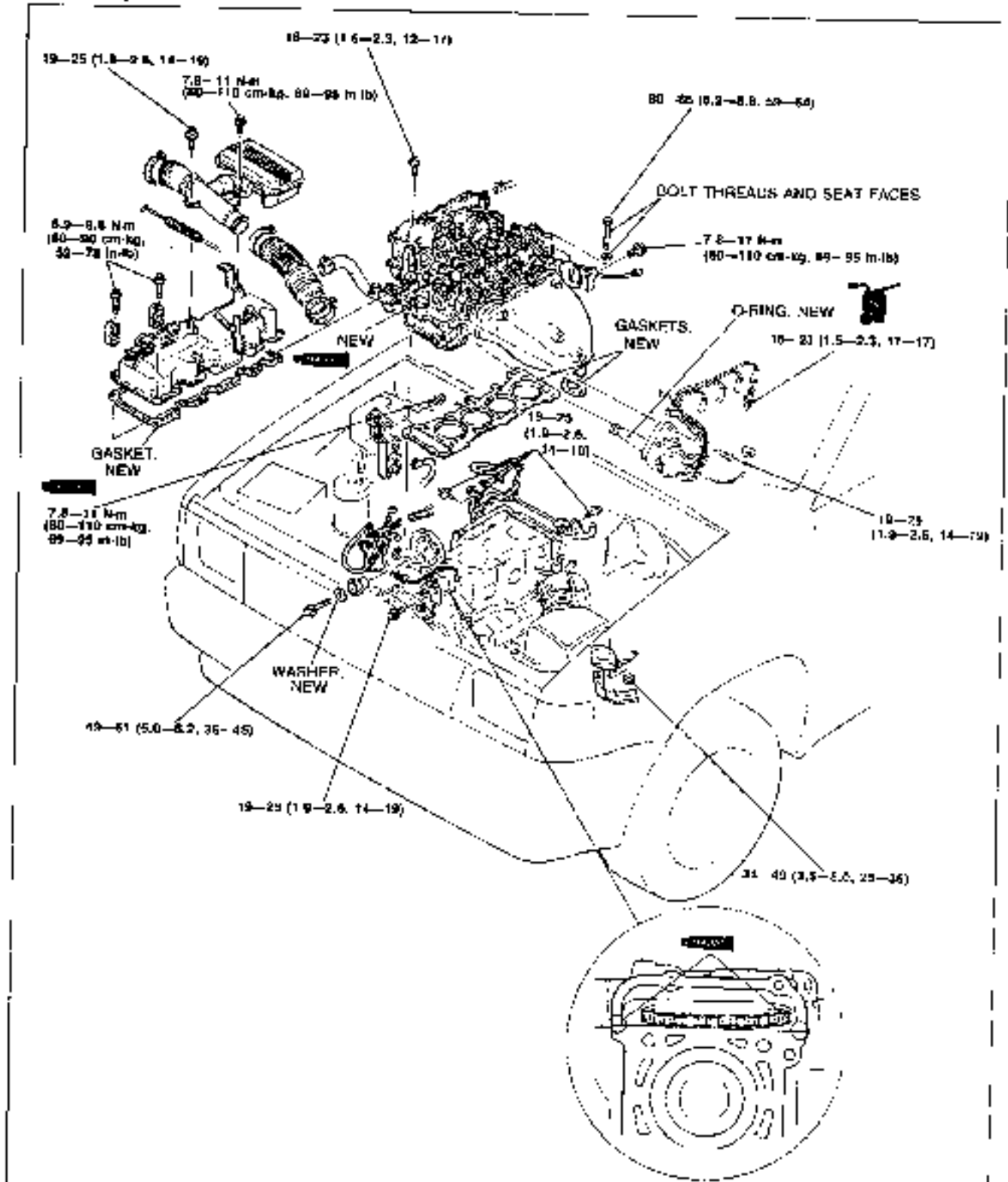
## Installation

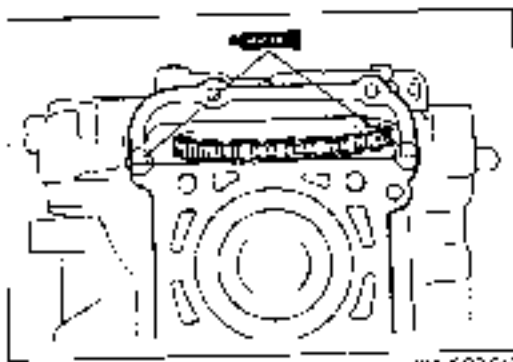
Install in the reverse order of removal referring to the **Installation note**.

## Note

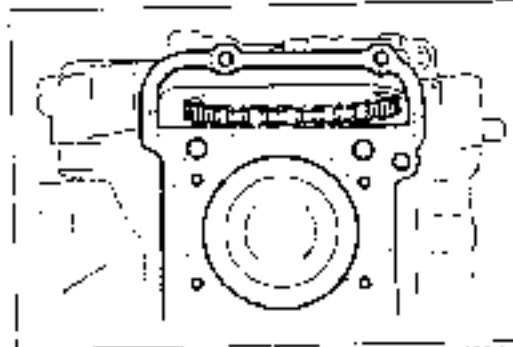
Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.

## Torque Specifications

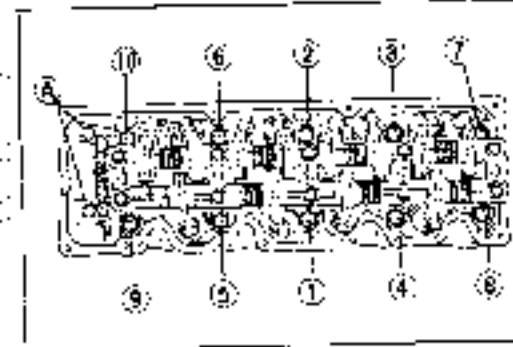




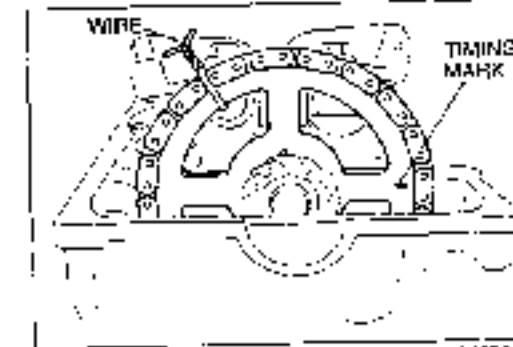
9M1K62 C47



9M1K09 C47



9M1J22 C48



9M1J05 C48



9M1K80 C49

**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 Nm (8.2—8.8 m·kg, 59—64 ft·lb)

4. Tighten the remaining small cylinder head bolts 

**Tightening torque:**

16—23 Nm (1.6—2.3 m·kg, 12—17 ft·lb)

**Camshaft pulley**

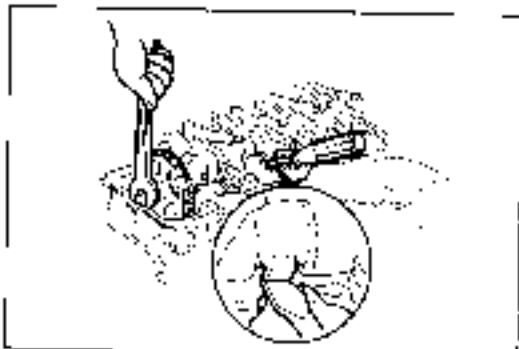
1. Install the camshaft pulley onto the camshaft dowel pin.
2. Remove the wire securing the camshaft pulley and the chain.

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

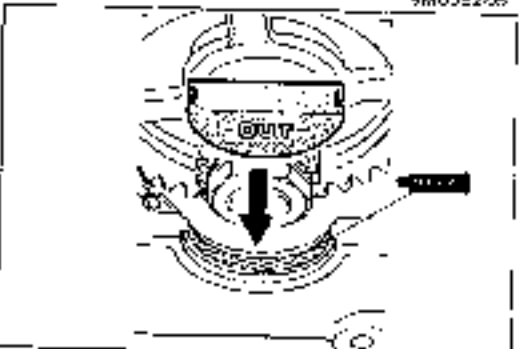
**Tightening torque**

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

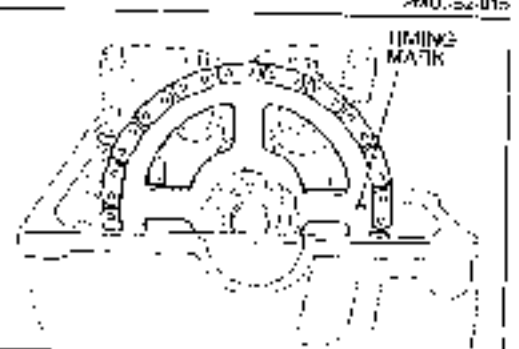
Nut: 6.9—8.8 Nm (70—100 cm·kg, 61—87 in·lb)



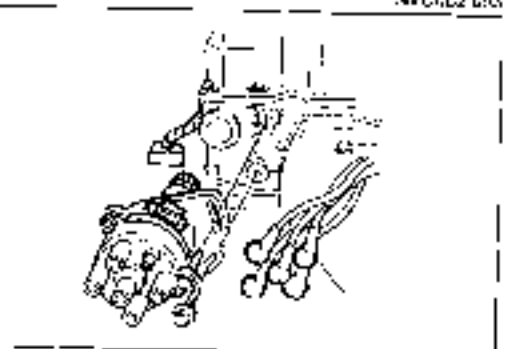
9MU02J05



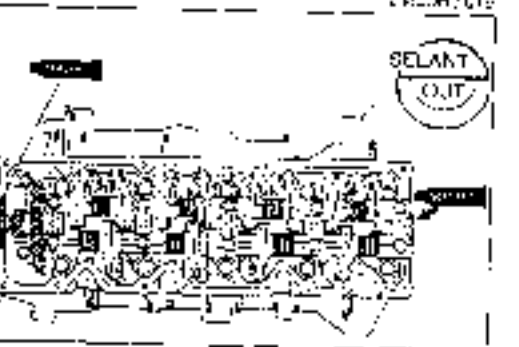
9MU02D15



14WU02D03



0VLD00G15



25WU02D17

**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 Nm (5.0—6.2 m·kg, 36—45 ft·lb)

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

**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.

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.

**Cylinder head cover**

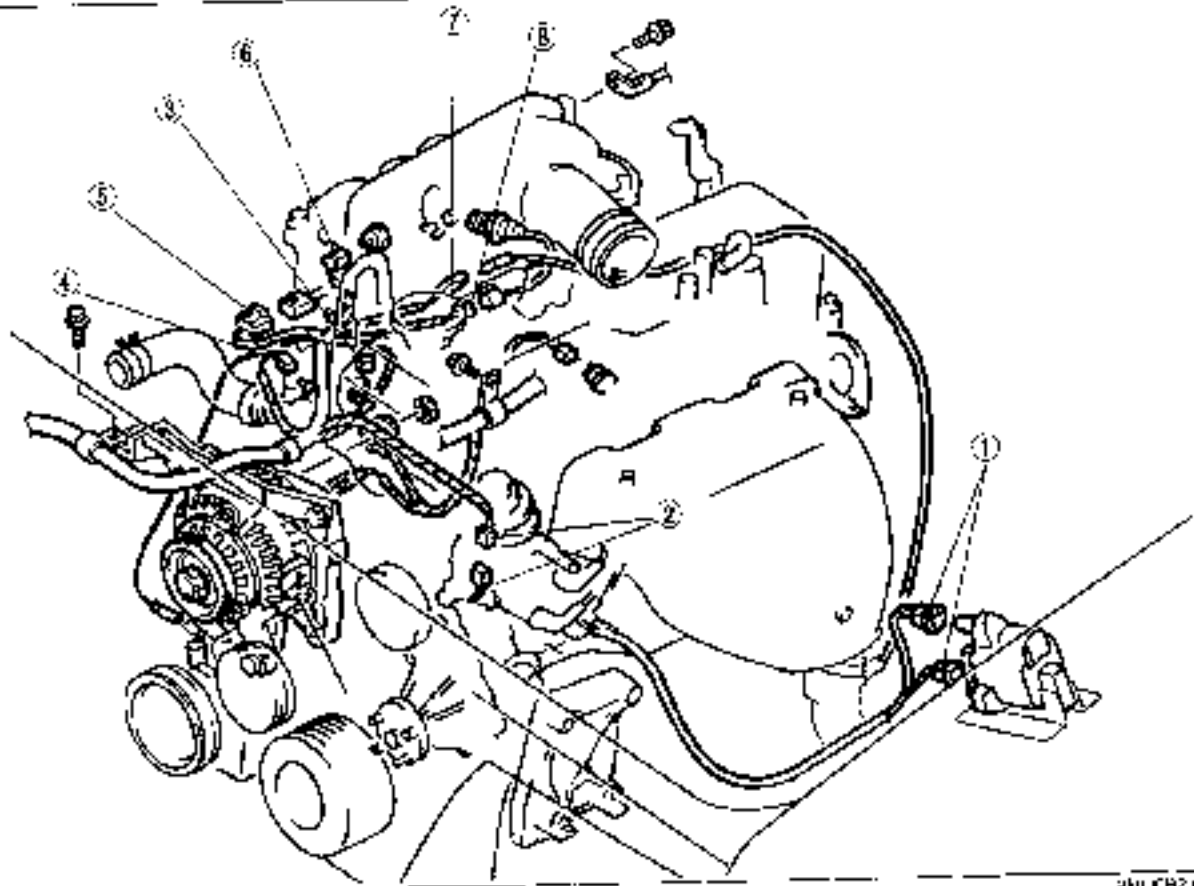
1. Apply engine oil to the valves, rocker arms and timing chain.
2. Remove all old silicone sealant from the cylinder head and cover.
3. Coat a new gasket with silicone sealant, and install onto the cylinder head cover.
4. Apply silicone sealant to the shaded areas shown in the figure.
5. Install the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

**Tightening torque:**

5.9—8.8 Nm (60—90 cm·kg, 52—78 in·lb)



## Emission harness connectors



9M.U.F.B2 CGG

1. IG coil
2. Distributor
3. Water thermostat
4. Heat gauge unit

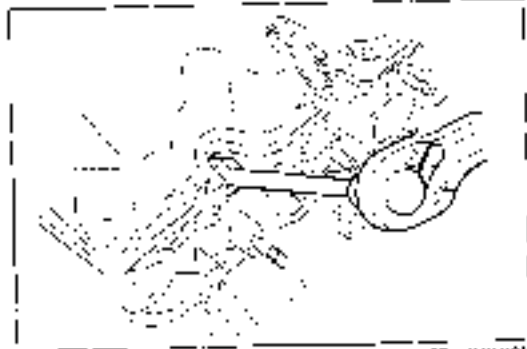
5. Injector harness
6. Intake air thermostat
7. Oxygen sensor
8. Idle switch

**Spark plug**

Install the spark plugs

**Tightening torque:**

15—23 Nm (1.5—2.3 m·kg, 11—17 ft·lb)



75.U.F.B2 CGG

**Steps After Installation**

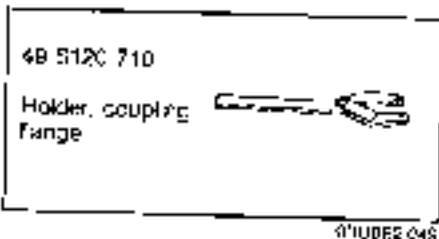
1. Add engine coolant to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
  - (1) Check for leakage of engine coolant.
  - (2) Perform engine adjustments if necessary.
  - (3) Recheck the oil and coolant levels.

2A.U.F.B2 CGG

**FRONT OIL SEAL**

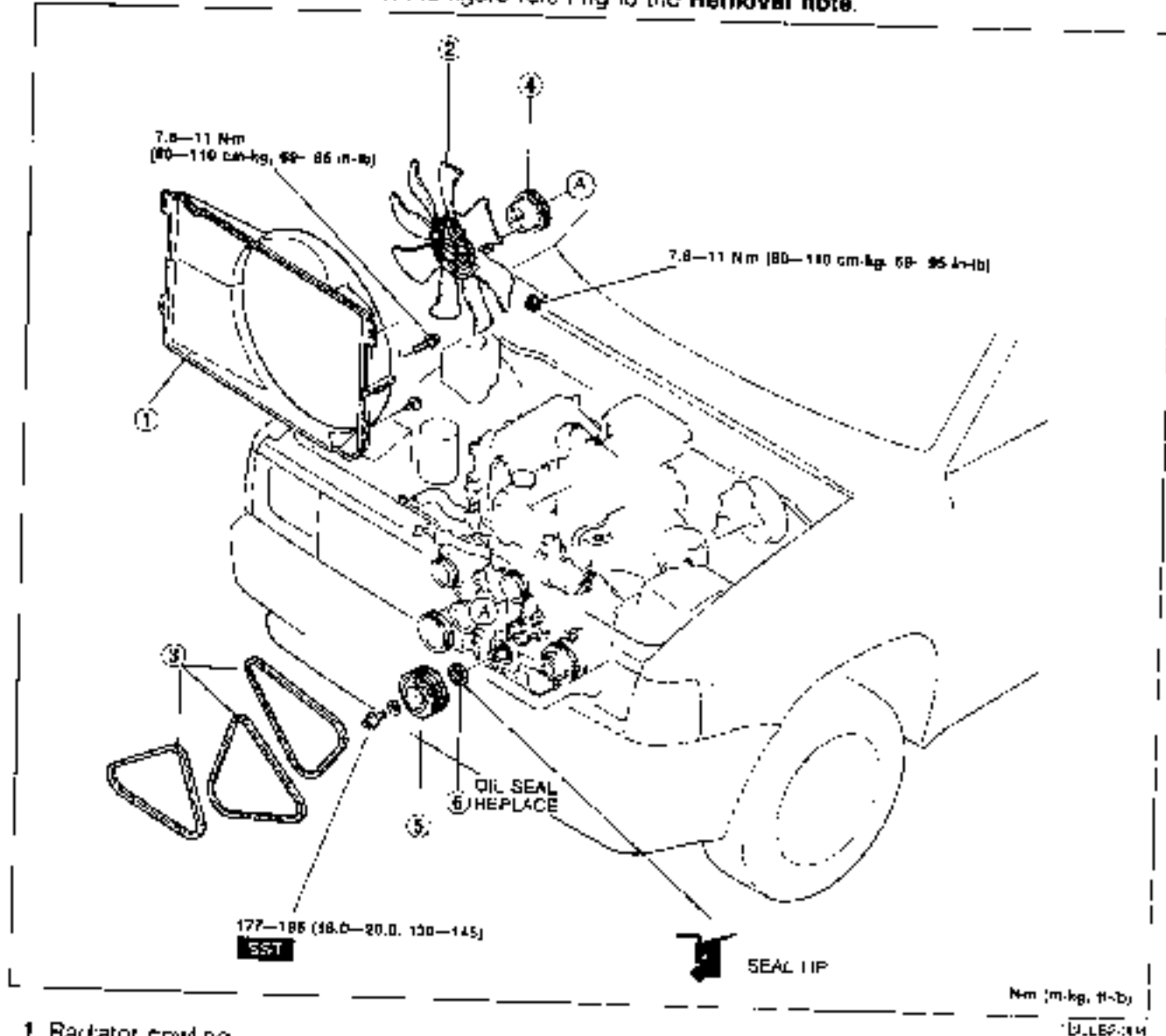
**Preparation**

**SST**



**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**.

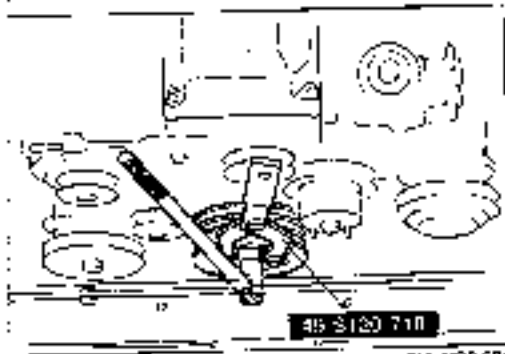


1. Radiator cowling
2. Cooling fan
3. Drive belts

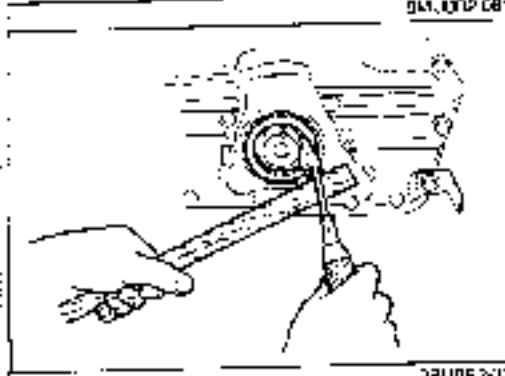
Adjustment..... page B2-5

4. Water pump pulley
5. Crankshaft pulley
6. Front oil seal

Nm (m-kg, ft-lb)  
DLEB:114

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

Remove the crankshaft pulley with the SST.

**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 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.

**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: 80mm (2.36 in)**

**Caution**

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

**Crankshaft pulley**

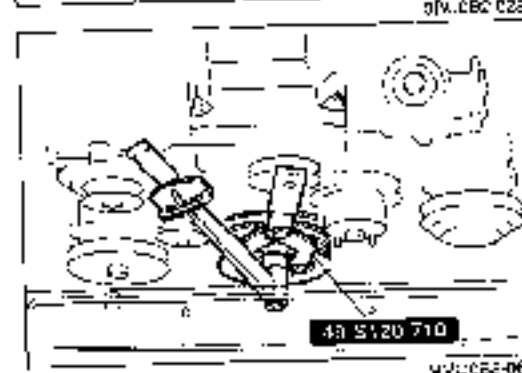
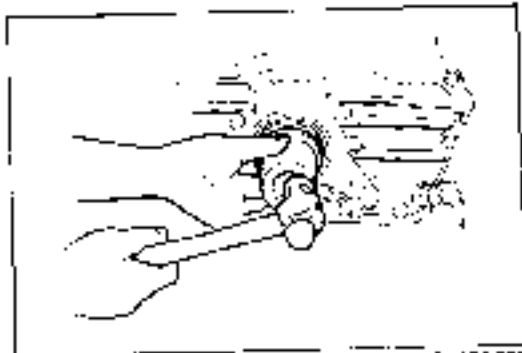
Install the crankshaft pulley with the SST.

**Tightening torque:**



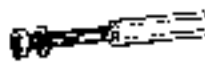


177—196 Nm (18.0—20.0 m·kg, 130—145 ft·lb)

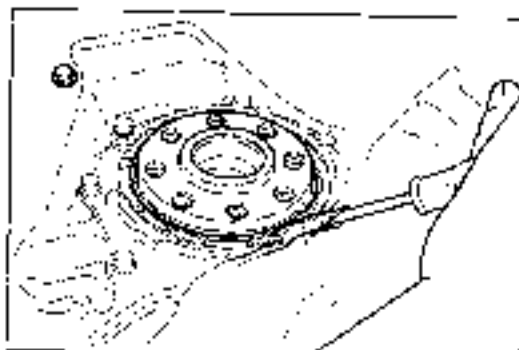
**Steps After Installation**

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.

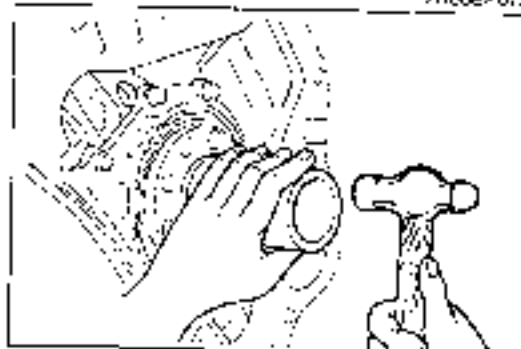


**REAR OIL SEAL****Preparation****SST**

<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 SE01 310A Clutch disc centering tool</p> 	<p>26.0312-010</p>



26.0312-010



26.0312-030

**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  
STEP

19 WC23 585A

Adjust wrench

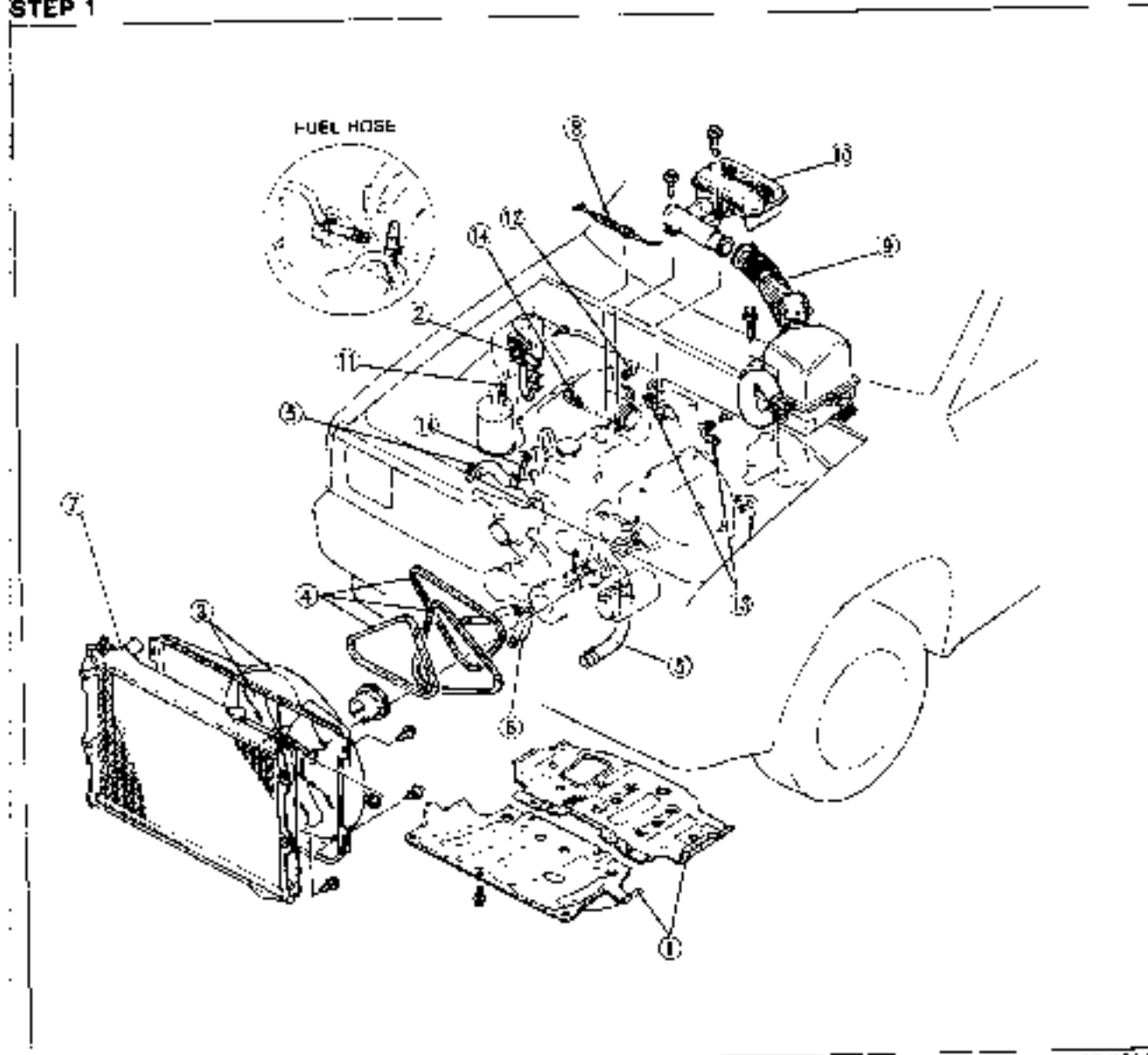


18J0122-003

**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

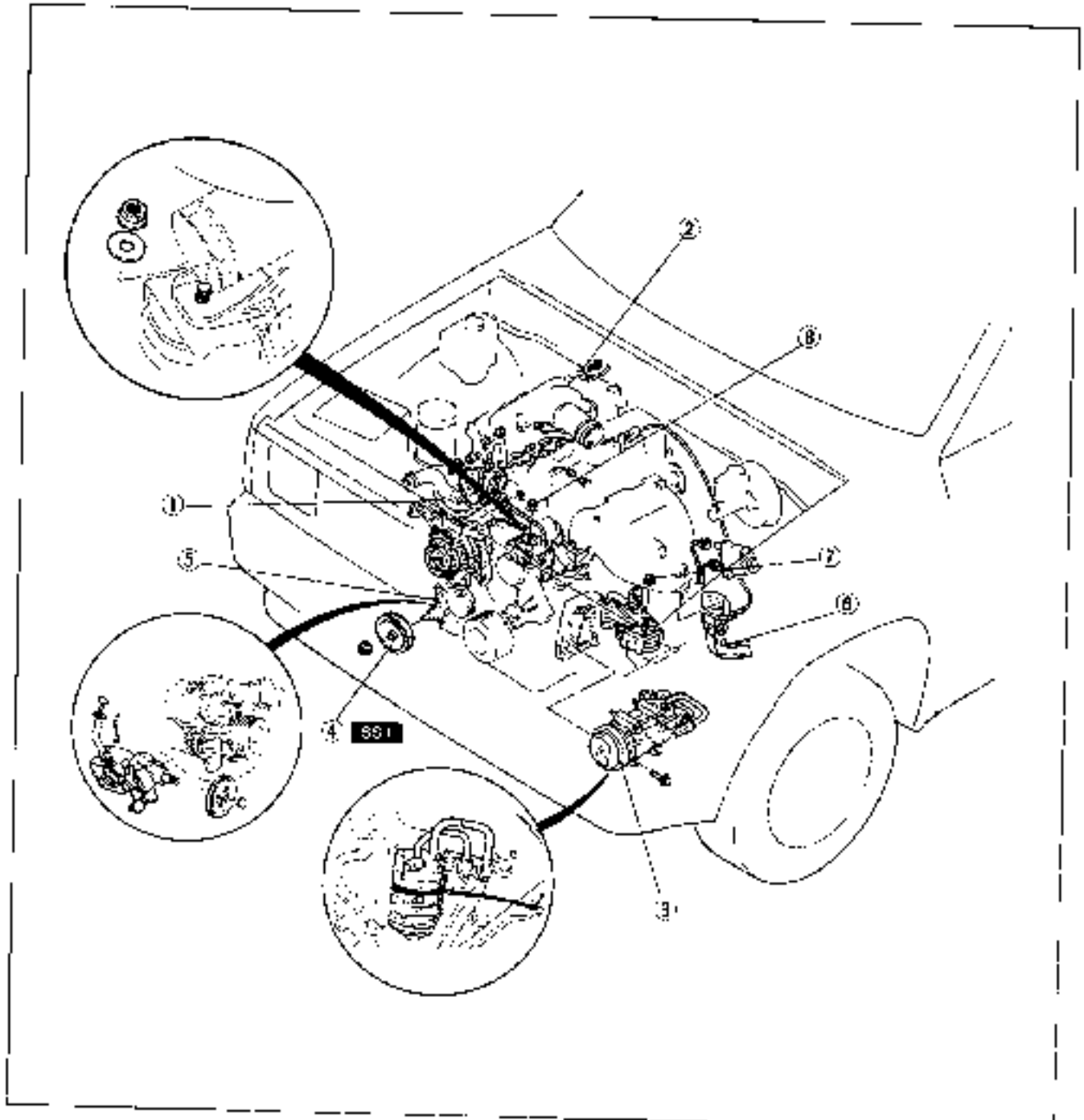


18J0122-003

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

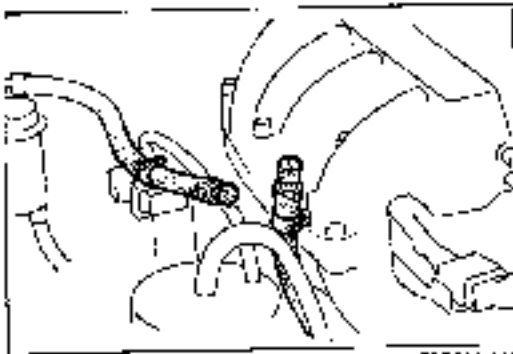
STEP 2

06J002 003



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

06J002 032



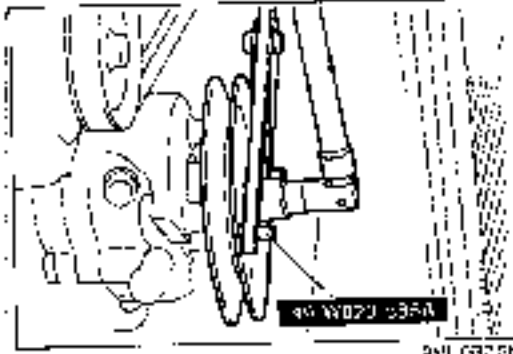
76G012-118

**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.

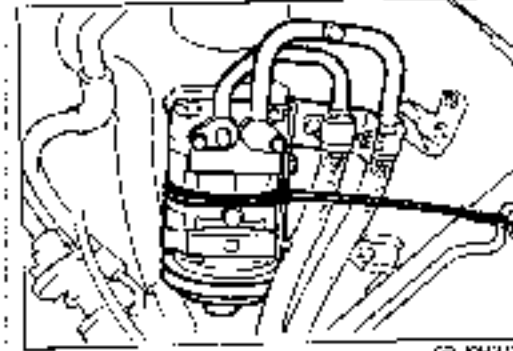
Plug the disconnected hoses to avoid fuel leakage.



9N1CB7582

**P/S oil pump pulley**

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




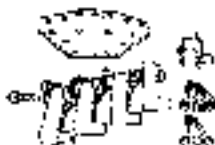

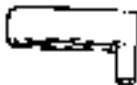




6B1JH2011

**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.

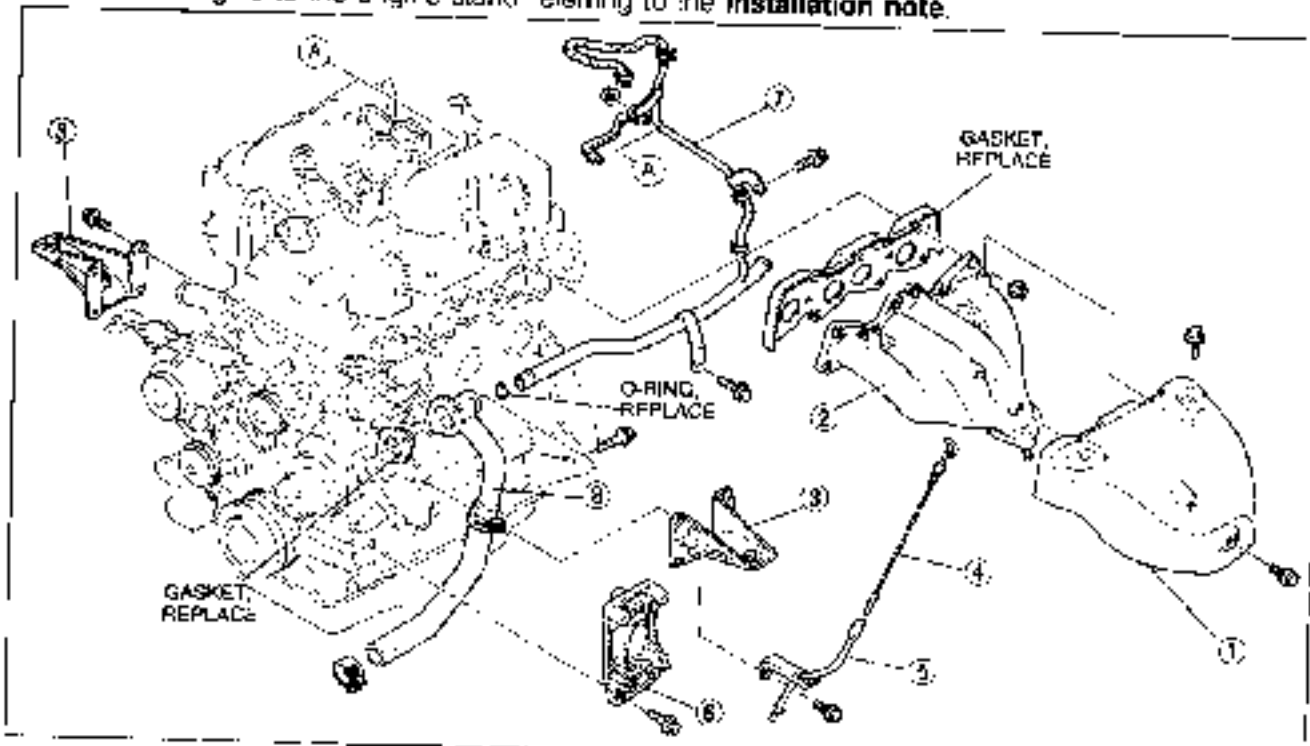
ENGINE STAND INSTALLATION

PREPARATION  
SST

<p>49 0107 090A 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>344.000-075</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**.

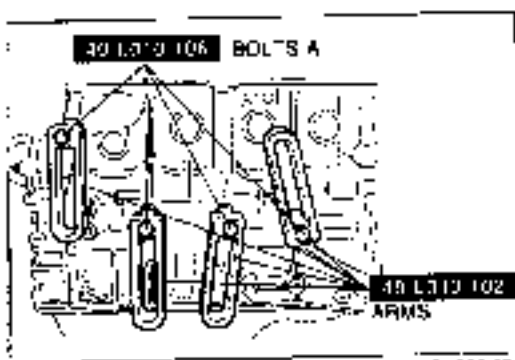


1. Exhaust manifold insulator
2. Exhaust manifold
3. Engine mount
4. Oil level gauge

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

TR-1412-056

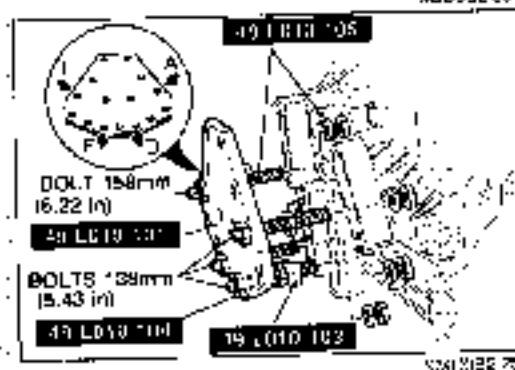




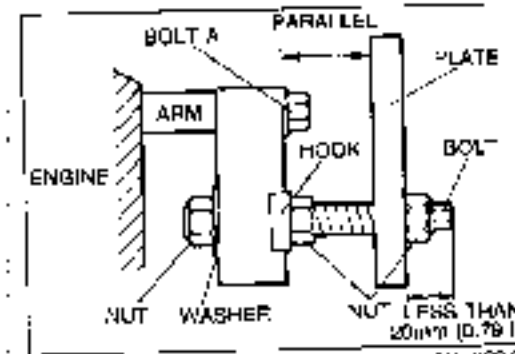
**Installation note**

**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**.



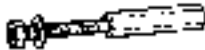

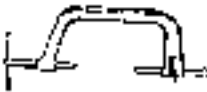
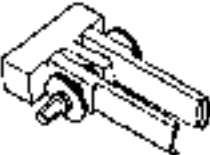
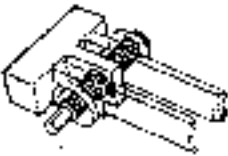
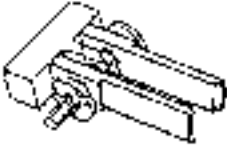












5. Install the engine on the **SST**

## DISASSEMBLY

## PREPARATION

## SST

49 EC11 1A0 Ring gear brake set 	49 E01* 1CE Stopper (Part of 49 EC11 1A0) 	49 F011 1D3 Shaft (Part of 49 E011 1A0) 
49 EC11 1B4 Culter (Part of 49 E011 1A0) 	49 G036 100A Ann. valve spring lifter 	49 B012 0A2 Pivot valve spring lifter 
49 B012 012 Body (Part of 49 R012 0A2) 	49 B012 013 Foot (Part of 49 R012 0A2) 	49 B012 014 Lock nut (Part of 49 R012 0A2) 
49 1285 07* Puller bearing 	49 LC11 0A0 Piston pin setting tool set 	49 LD11 0C1 Support block body (Part of 49 LD11 0A0) 
49 LD11 0C2 Support block head (Part of 49 LD11 0A0) 	49 LD11 004 Screw (Part of 49 LD11 0A0) 	49 LD11 008 Puller & installer (Part of 49 LD11 0A0) 
49 LD11 009 Guide (Part of 49 LD11 0A0) 	49 LD11 010 Centering tool (Part of 49 LD11 0A0) 	49 LD11 011 Holder (Part of 49 LC11 0A0) 

JELCB0-011

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.

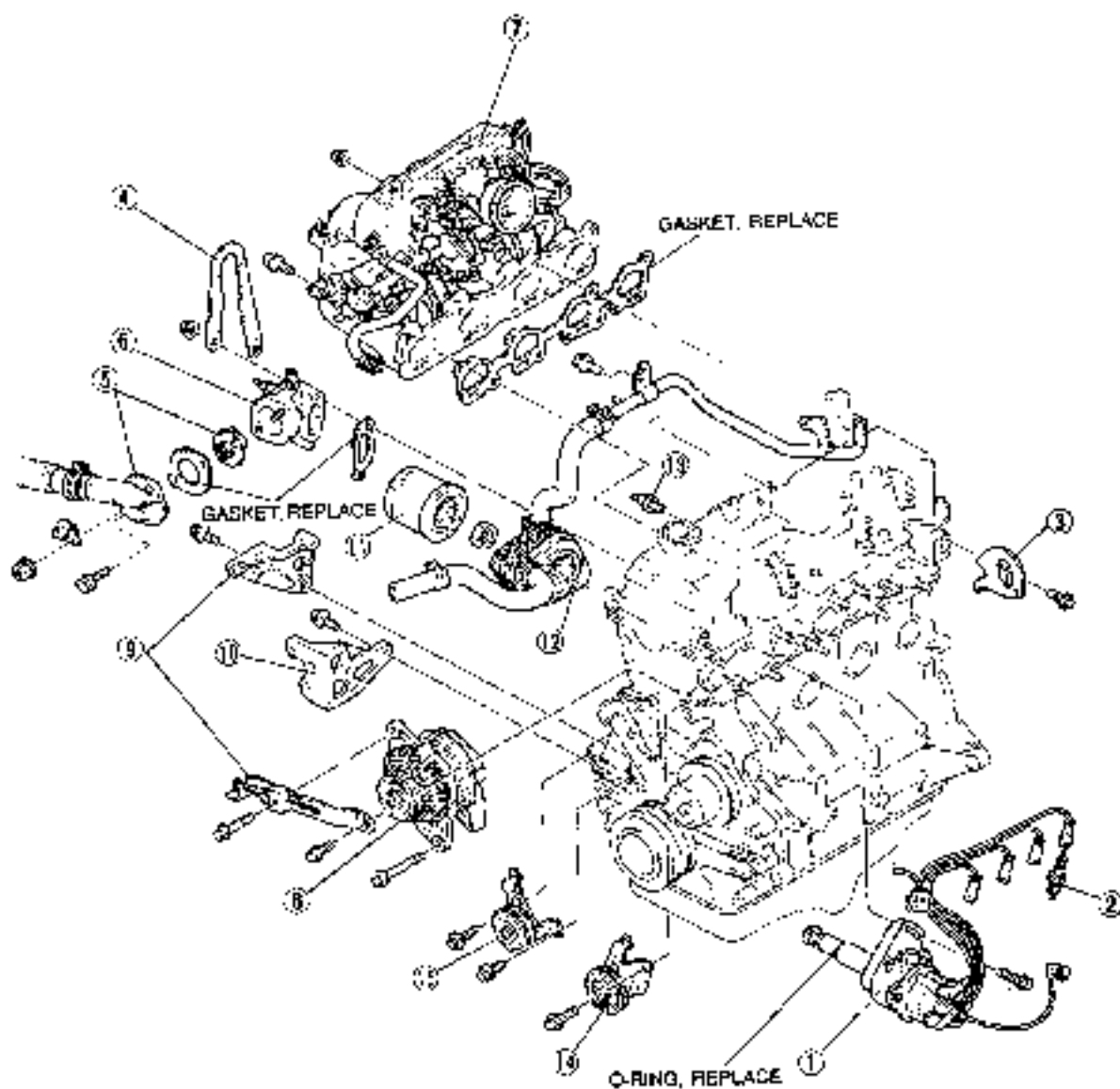
**Note**

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

JELCB0-012

### AUXILIARY PARTS

Remove in the order shown in the figure.



18002-407

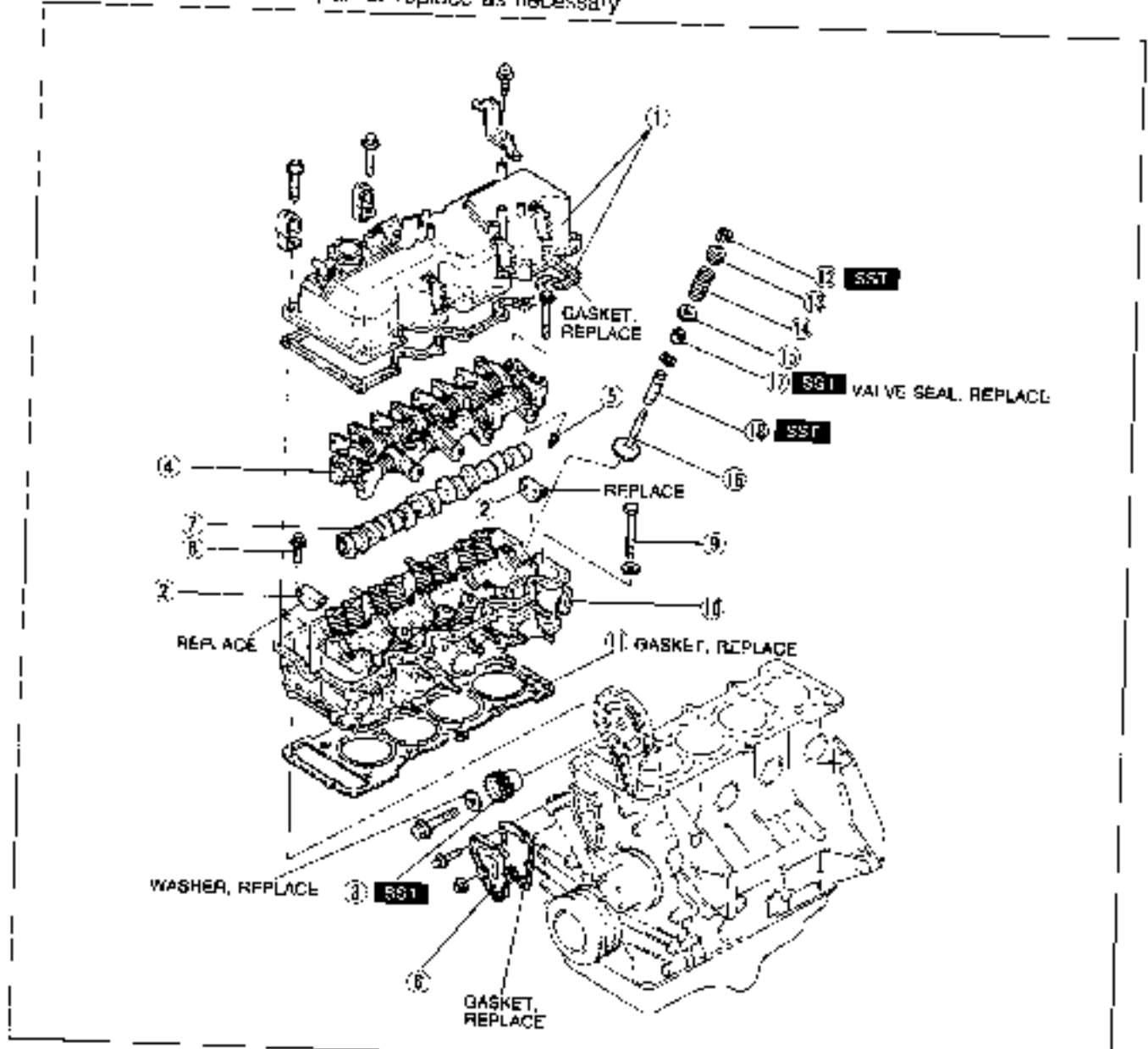
1. Distributor and high-tension lead
2. Spark plug
3. Rear engine hanger
4. Front engine hanger
5. Thermostat and thermostat cover
6. Water outlet
7. Intake manifold assembly

Section E

8. Alternator
9. Alternator bracket and strap
10. P/S oil pump bracket
11. O' filter
12. Oil cooler
13. Oil pressure switch
14. A/C idler bracket
15. P/S idler bracket

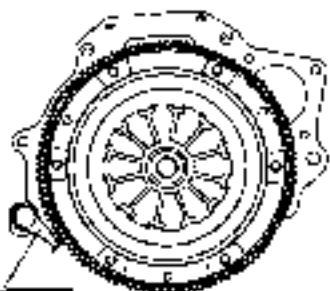
## CYLINDER HEAD

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



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

19085002



24L09202

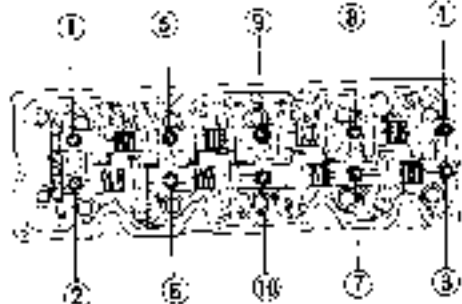
**Disassembly note**

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.



24L09201

**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.



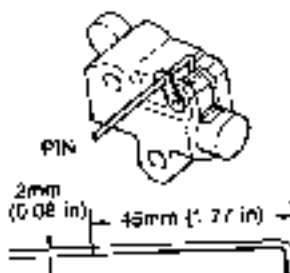
24L09202

**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.



24L09203

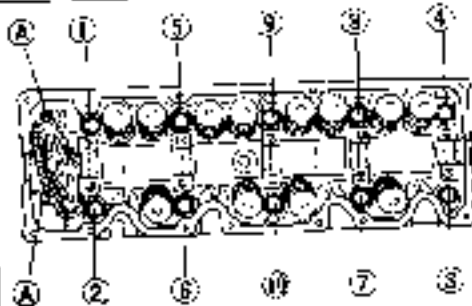
**Camshaft**

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.

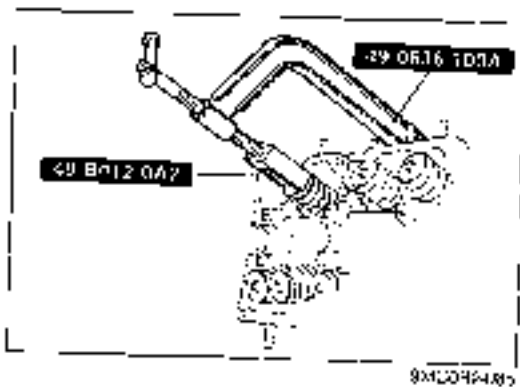
3. Remove the camshaft.



24L09204

**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.

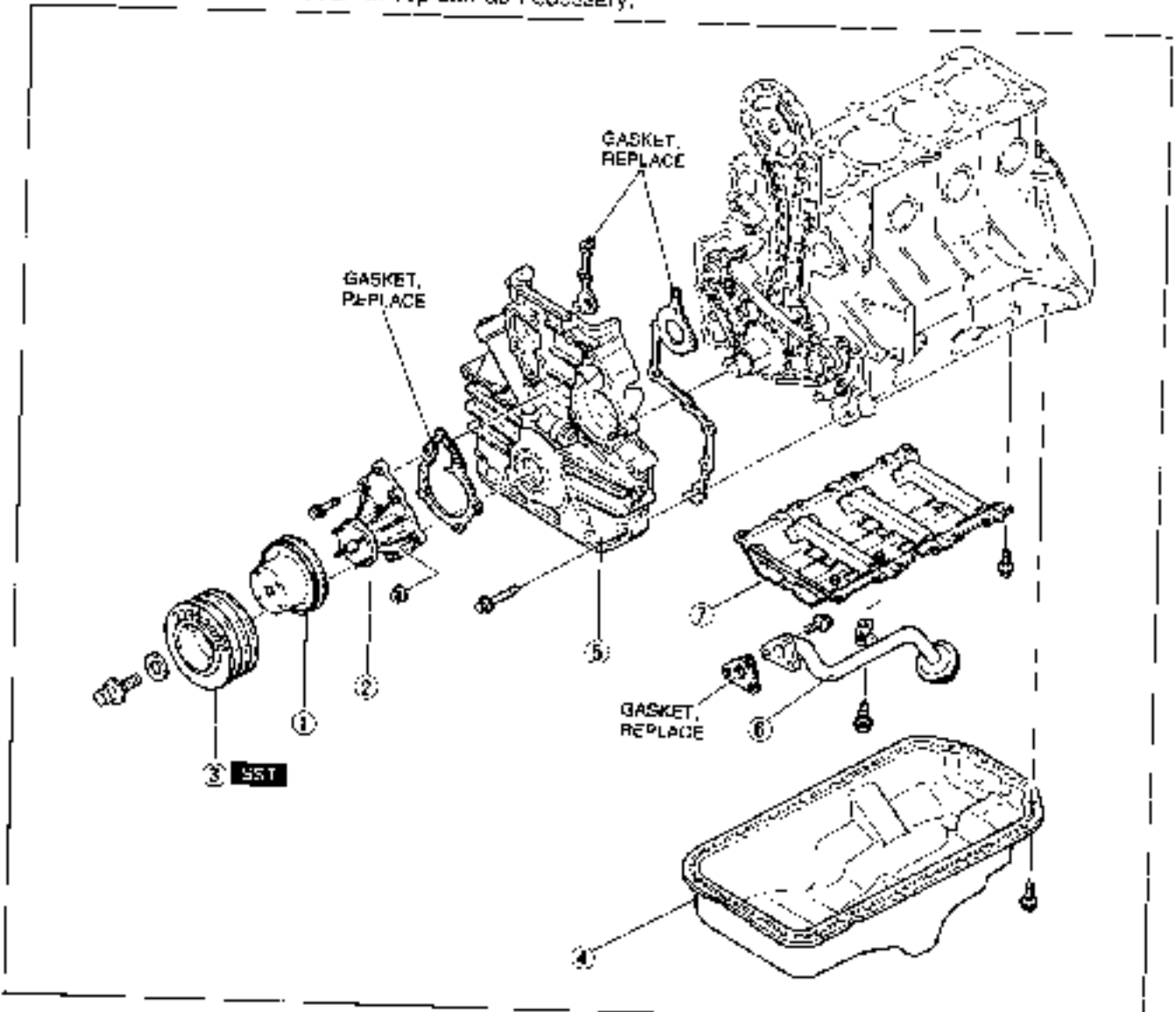


**Valve**

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

**CHAIN CASE AND OIL PAN**

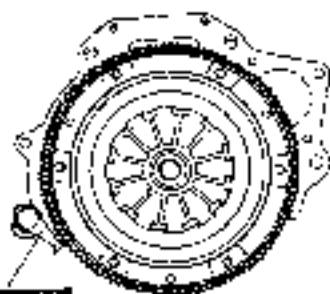
1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



1. Water pump pulley
2. Water pump  
Service . . . . . Section F
3. Crankshaft pulley

4. Oil pan  
Inspect for damage
5. Chain cover
6. Oil strainer
7. Vibration reducing strainer (VRS)

16UCB2-005



49 E011 1AC

29.042074

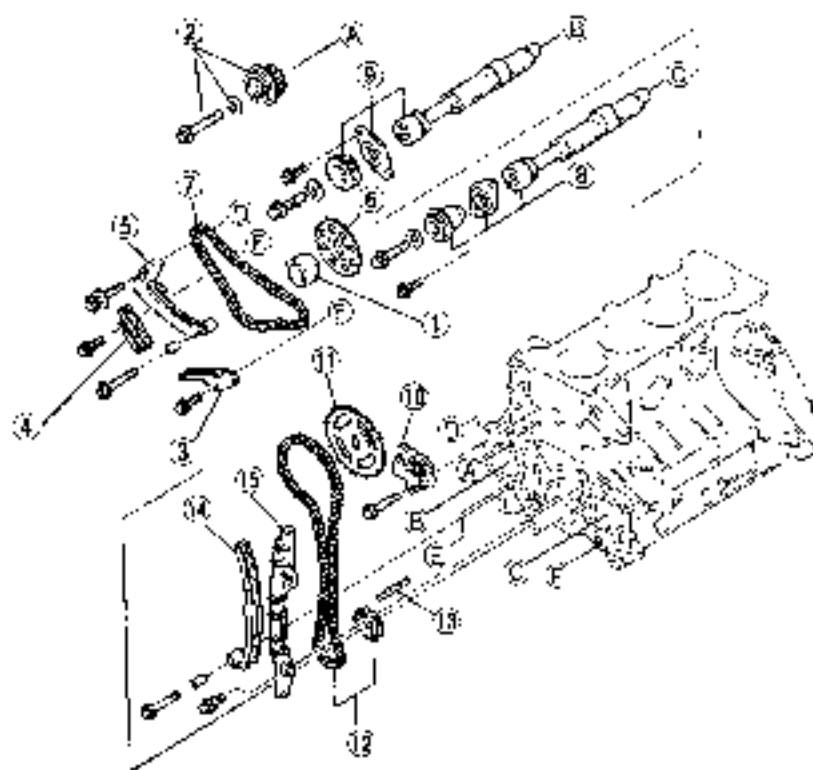
**Disassembly note**

**Crankshaft pulley**

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

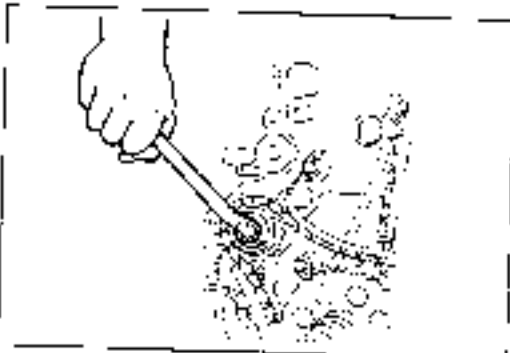
**BALANCER CHAIN AND TIMING CHAIN**

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



29A.CB2031

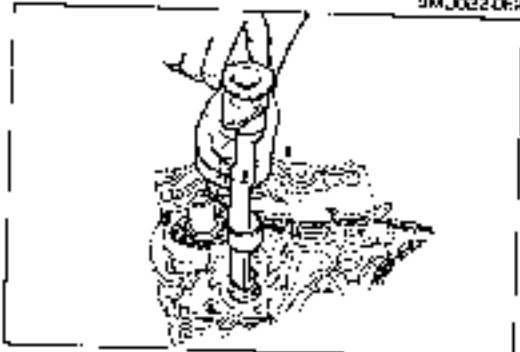
- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Spacer</li> <li>2. Idler sprocket assembly lock bolt</li> <li>3. Chain guide A<br/>Inspect for wear or damage</li> <li>4. Chain guide B<br/>Inspect for wear or damage</li> <li>5. Chain guide C<br/>inspect for wear or damage</li> <li>6. Crankshaft sprocket<br/>Inspect for wear or damage</li> <li>7. Balancer chain<br/>Inspect for wear or damage</li> <li>8. Left balance shaft assembly<br/>Inspection ..... page B2-50</li> </ol> | <ol style="list-style-type: none"> <li>9. Right balance shaft assembly<br/>Inspection ..... page B2-50</li> <li>10. Chain adjuster<br/>Inspection ..... page B2- 8</li> <li>11. Camshaft pulley<br/>Inspect for wear or damage</li> <li>12. Timing chain and timing gear<br/>Inspection ..... page B2-51</li> <li>13. Key</li> <li>14. Chain lever<br/>Inspect for wear or damage</li> <li>15. Chain guide<br/>Inspect for wear or damage</li> </ol> |
|---|--|



9MUC22-064

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

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



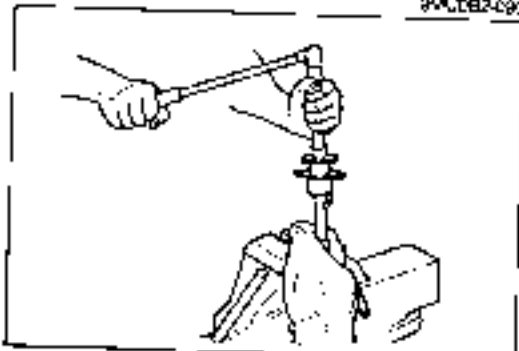
9MUC22-090

**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.



9MUC22-091

3. Disassemble the balance shaft assembly.

**Caution**

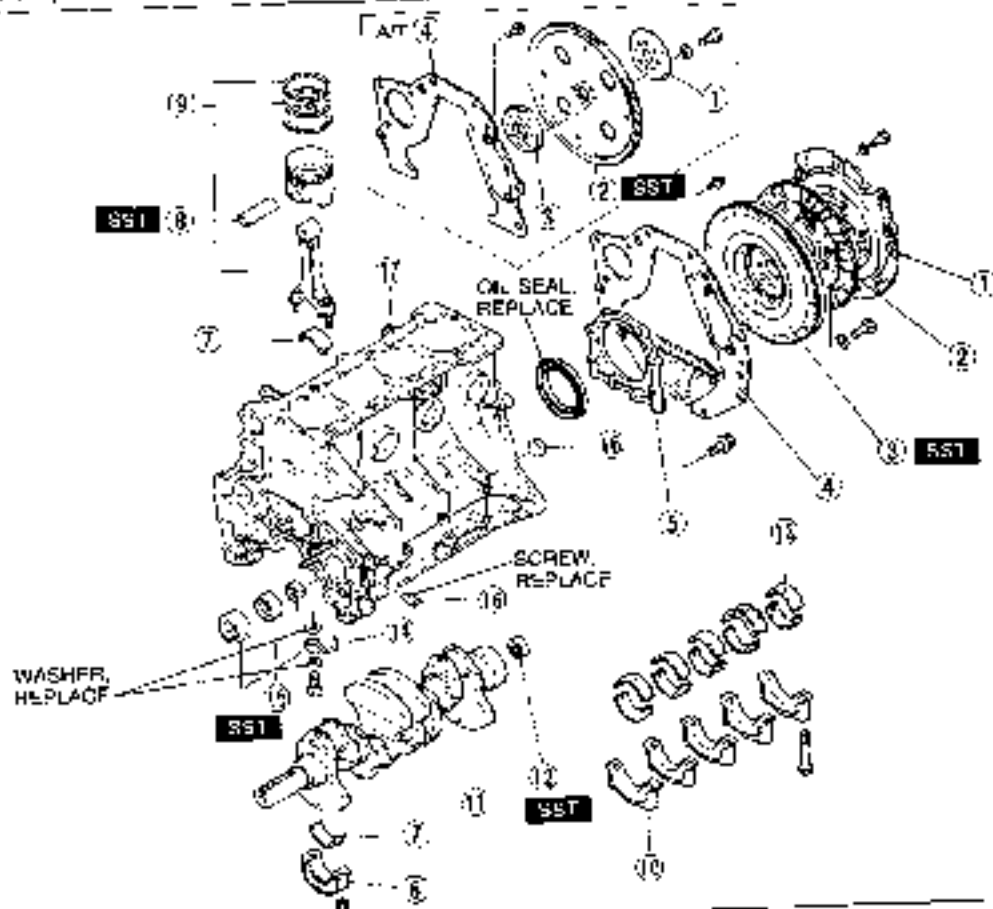
Do not use a vise on the journals during disassembly.

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.

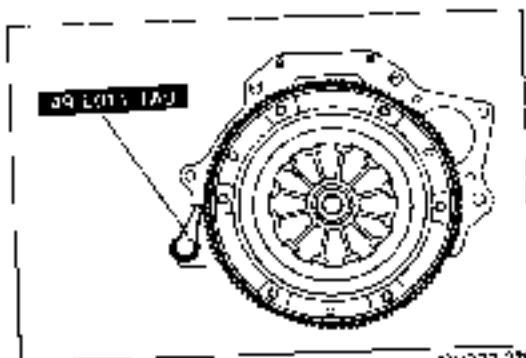


ZBU02 018

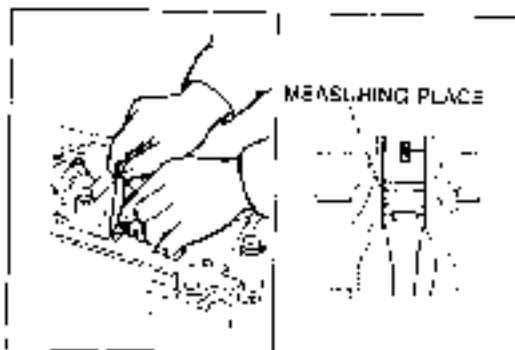
- |   |   |
|---|---|
| 1 Clutch cover (M/T). Plate (A/T)       | 10 Main bearing cap                     |
| 2 Clutch disc (M/T). Drive plate (A/T)  | 11 Crankshaft                           |
| 3 Flywheel (M/T). Adapter (A/T)         | Inspection ..... page B2-49             |
| 4 End plate                             | 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.



ZBU02 025

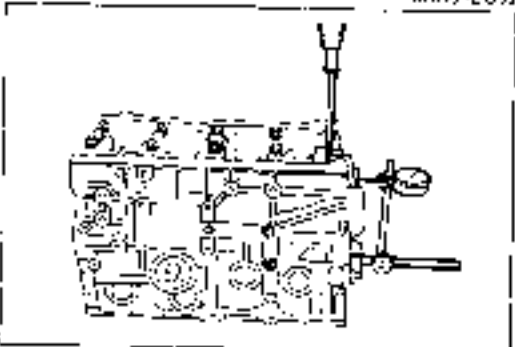


98 J12 013

**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.)

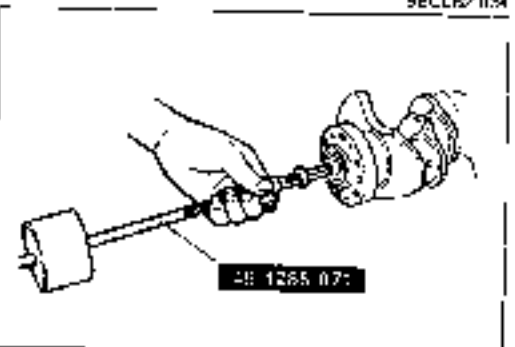


98 L12 024

**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.)



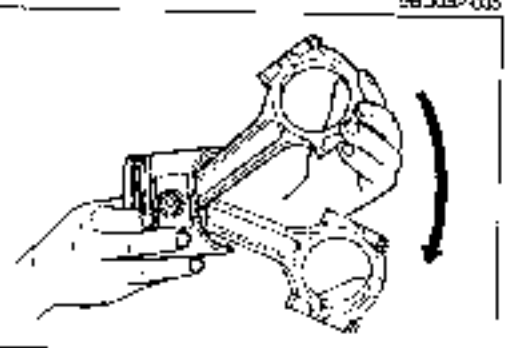
98 J13 035

**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**

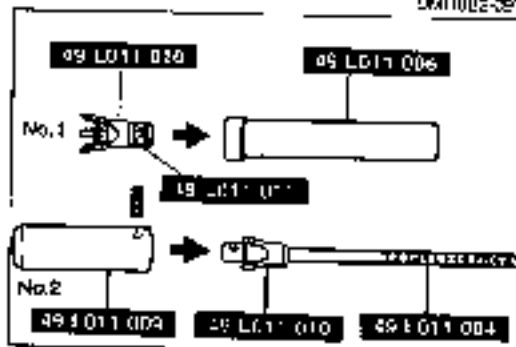
When replacing and/or cleaning the crankshaft, remove the pilot bearing.



08110E-027

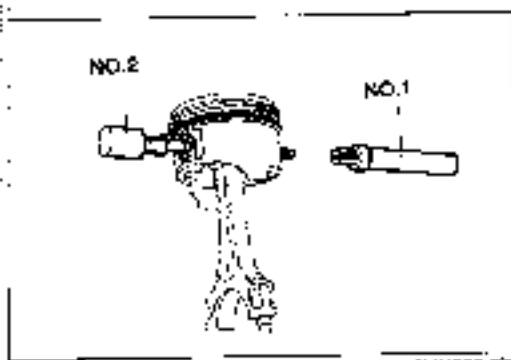
**Piston and connecting rod**

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.

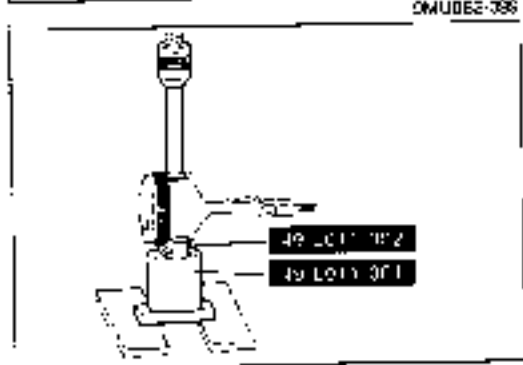


98J0B2-05E

2. Assemble the SST as shown.



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

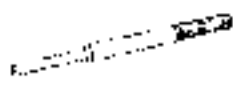
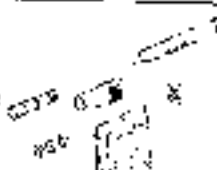










4. Mount the piston and connecting rod in the **SST** as shown.  
 5. Press out the piston pin. While removing the piston pin, check the pressure. If it is lower than **4,905 N (500 kg, 1,100 lb)**, replace the piston pin or connecting rod.

## INSPECTION AND REPAIR

## PREPARATION

## SST

<p>49 L040 01CA</p> <p>Turnover &amp; installer, valve guide</p> 	<p>49 L012 0A0</p> <p>Installer set, valve seal &amp; valve guide</p> 	<p>49 L012 007</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> 		

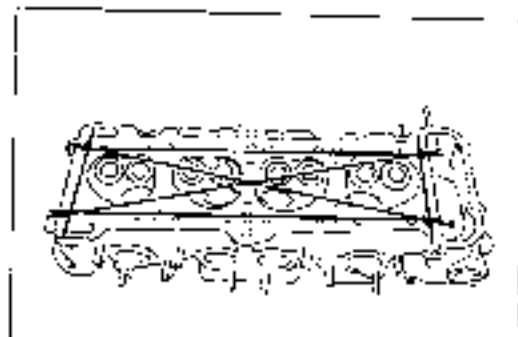
9MUG2117

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).**

9MUG2117

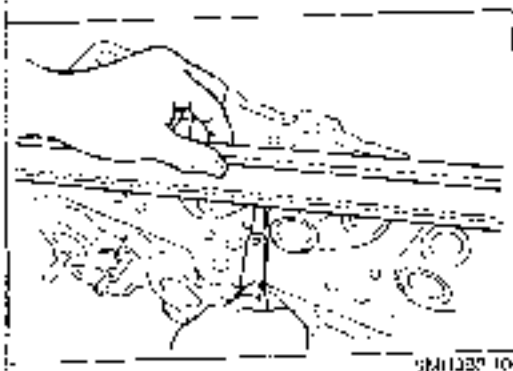


9MUG2117

**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.**



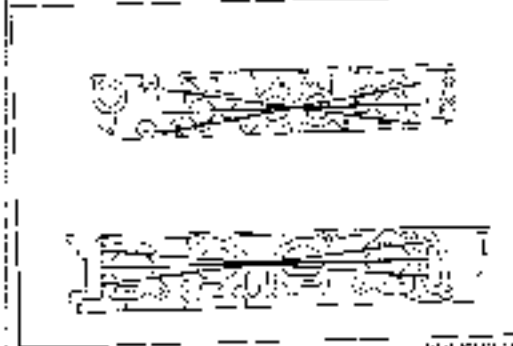
3. If the cylinder head distortion exceeds specification, grind the cylinder head surface.  
If the cylinder head height is not within specification, replace it.

**Height:** 89.95—90.05mm (3.541—3.546 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



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

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

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

#### Valve and Valve Guide

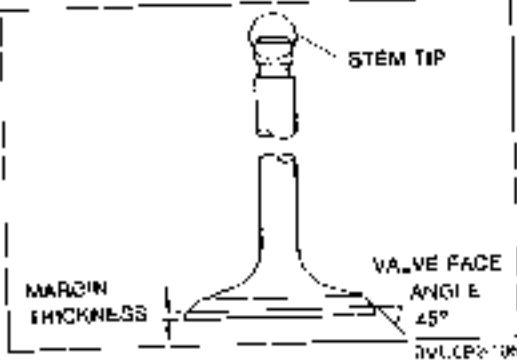
1. Inspect each valve for the following. Replace or resurface if necessary.

- (1) Damaged or bent stem
- (2) Roughness or damage to face
- (3) Damage or uneven wear of stem tip

2. Check the valve head margin thickness. Replace if necessary.

#### Margin thickness

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



3. 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)

4. Measure the valve stem diameter.

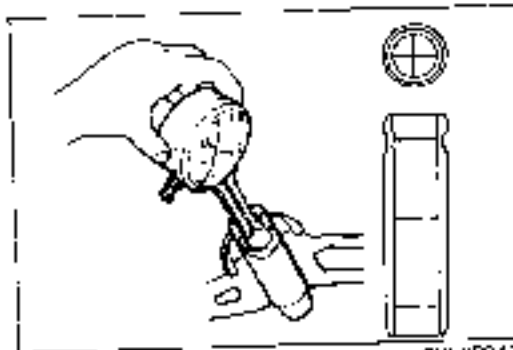
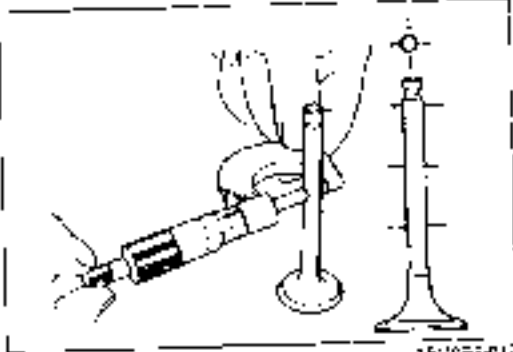
#### Diameter

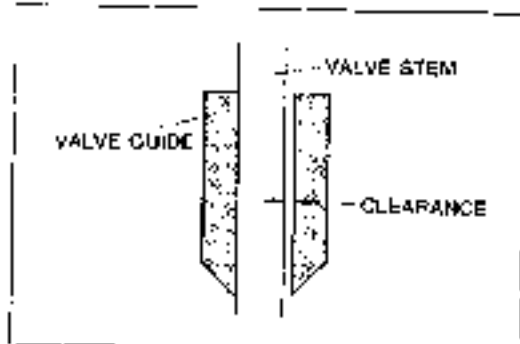
**IN :** 6.970—6.985mm (0.2744—0.2750 in)  
**EX :** 6.985—6.980mm (0.2742—0.2748 in)

5. Measure the valve guide inner diameter.

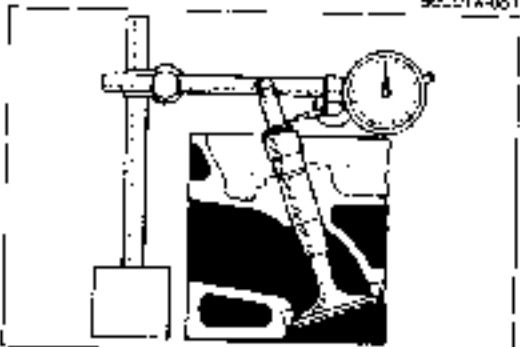
#### Inner diameter

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

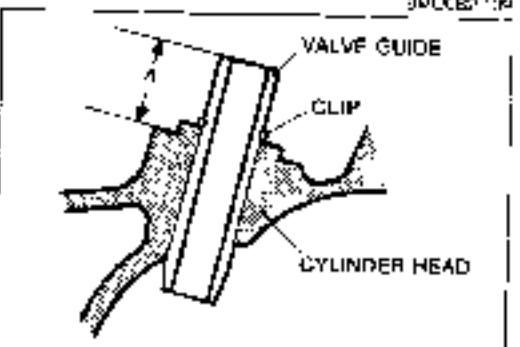




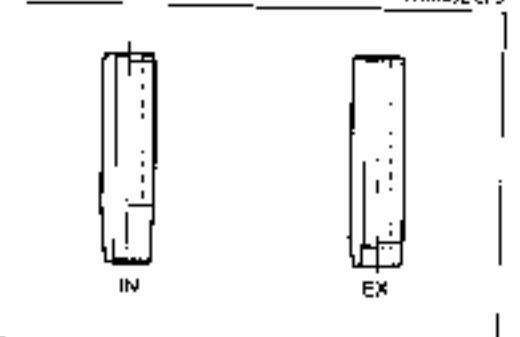
92L014-081



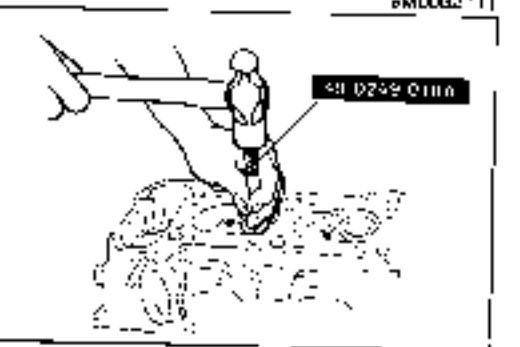
9MUCB2-109



1R-4392-079



9MUCB2-111



9MUCB2-112

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

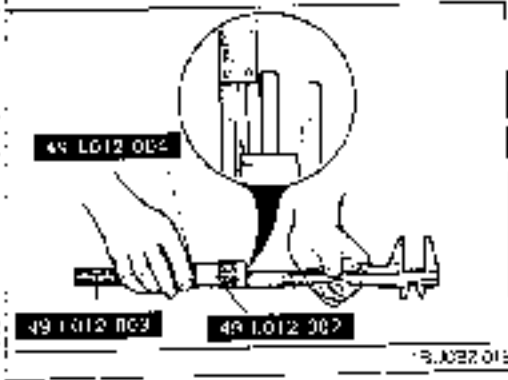
**Note**

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)**

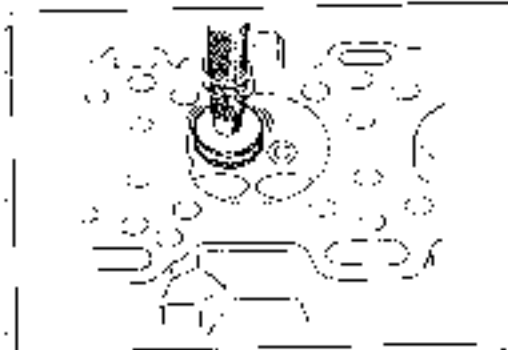
2. Tighten the locknut.



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

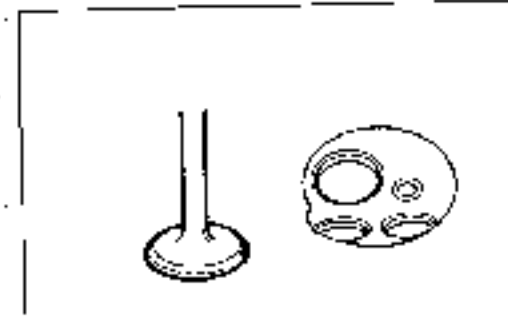


**Valve Seat**

1. Inspect the contact surface of the valve seat and valve face for the following:

- (1) Roughness
- (2) Damage

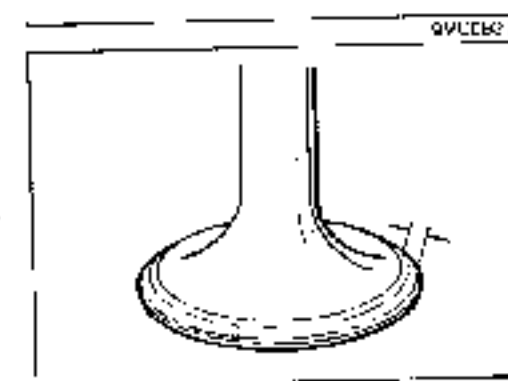
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.



3. Apply a thin coat of Prussian blue to the valve face

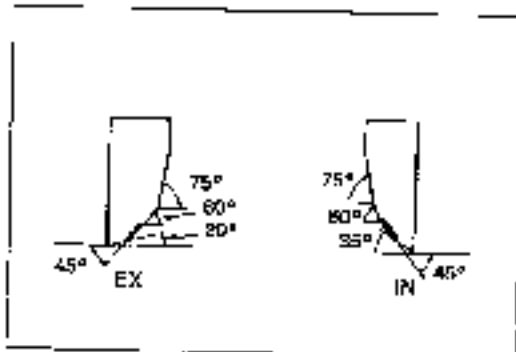
4. Check the valve seating by pressing the valve against the seat.

- (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.

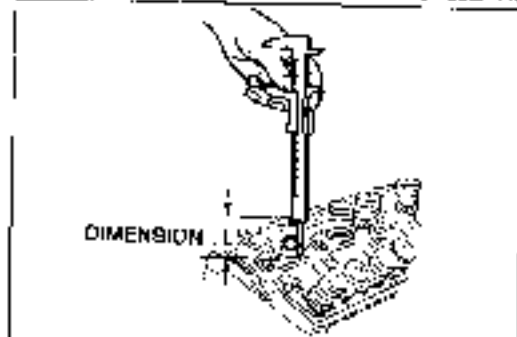


5. Check the seat contact width

**Width: 1.2—1.6mm (0.047—0.063 in)**



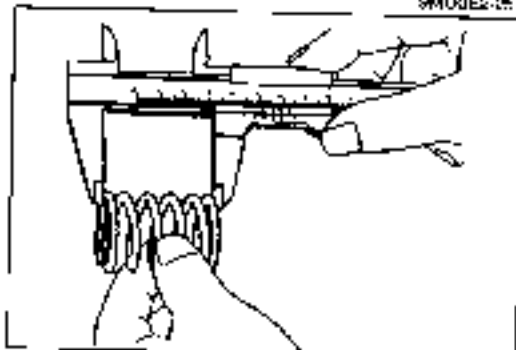
3MUCB2-115



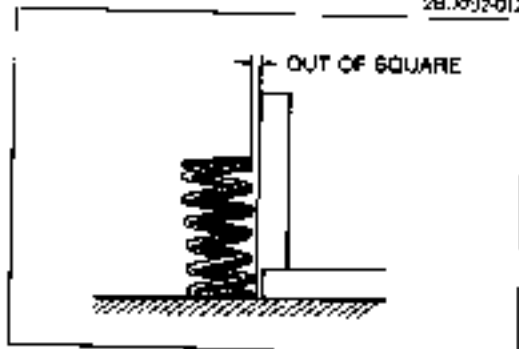
3MUCB2-256



3MUCB2-257



2B.1012-012



3MUCB2-117

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 ginking 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 Nm (19.9—22.6 m·kg, 144—163 ft·lb)****Out of square: 1.75mm (0.069 in) max.**





22U01X 022

**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.**



15L0B7713

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

**Height**

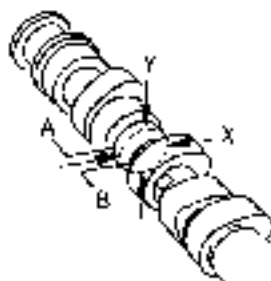
**IN: 41.714mm (1.6423 in)**

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

**Minimum**

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

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



10U1B2016

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

**Diameter**

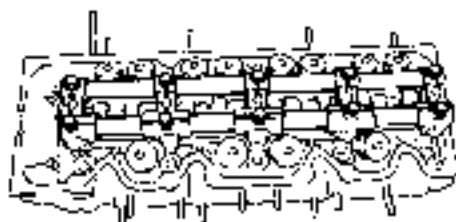
**No.1 and No.5:**

**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.**



3M00K170

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 Nm (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**

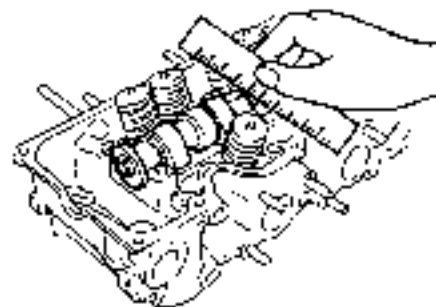
**No.1 and No.5: 0.035—0.065mm (0.0014—0.0033 in)**

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

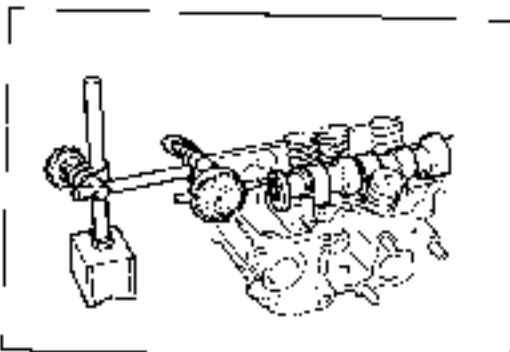
**0.065—0.115mm (0.0026—0.0045 in)**

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

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



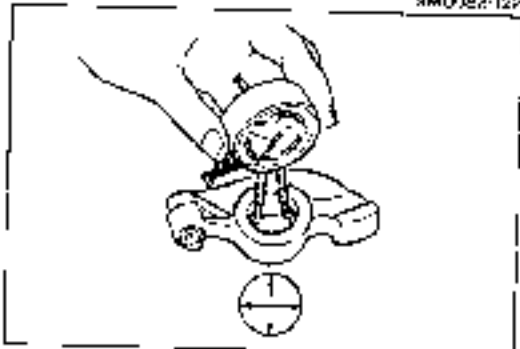
024111R-121



9M0182-12F

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)**

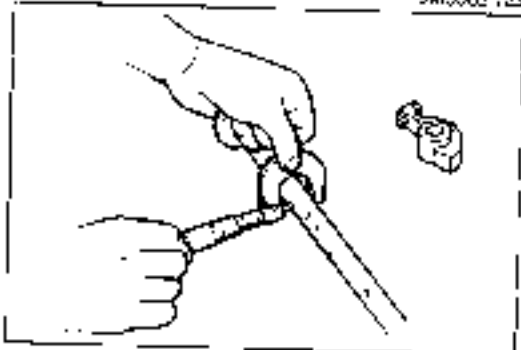


9M1002-123

#### 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)**



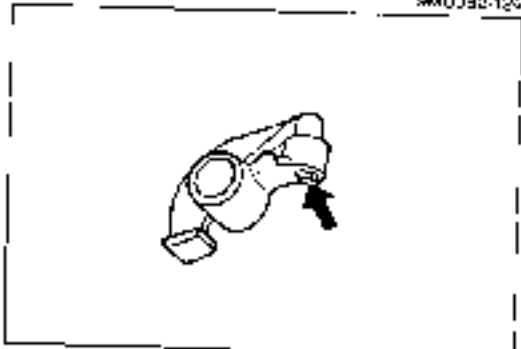
9M0733-126

- (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)**



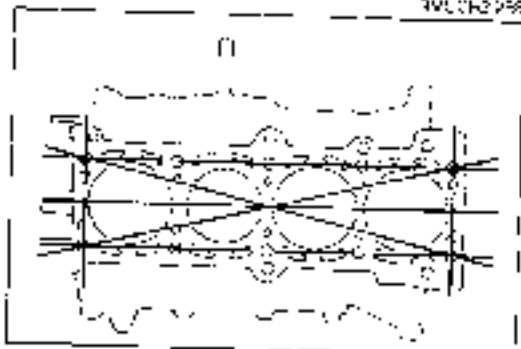
9M1232-96

#### 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.**

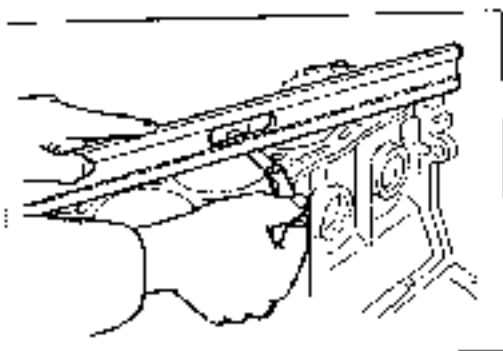


9M1214-10

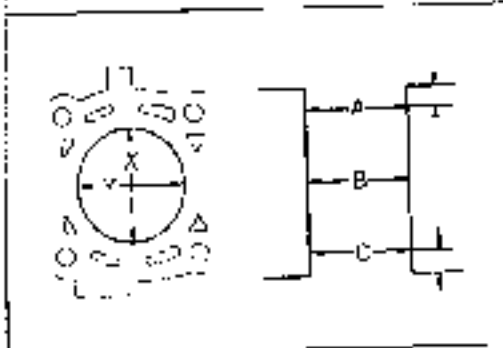
#### Cylinder Block

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.

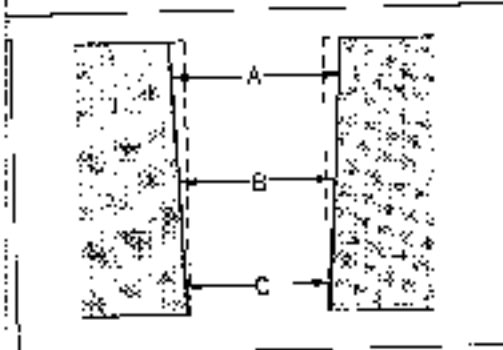
**Distortion: 0.15mm (0.006 in) max.**



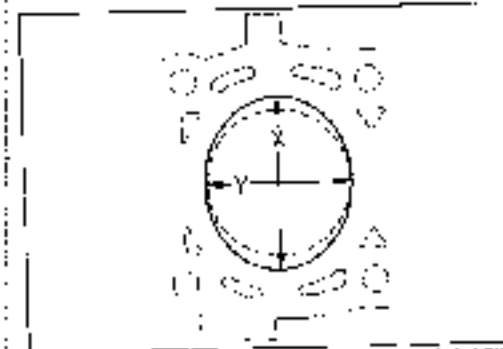
9M1JY92 125



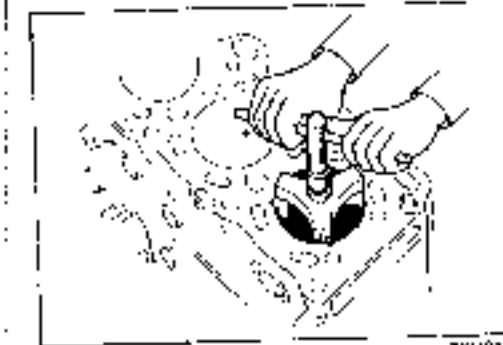
9M11022 126



9M10022 22E



9M10022 22E



9M1011X 1C2

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.**

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	
		mm	(in)
Standard		92.000	92.002 (3.6220 - 3.6230)
0.25 (0.010) oversize		92.250	92.272 (3.6330 - 3.6330)
0.50 (0.020) oversize		92.500	92.522 (3.6423 - 3.6430)

- (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.**

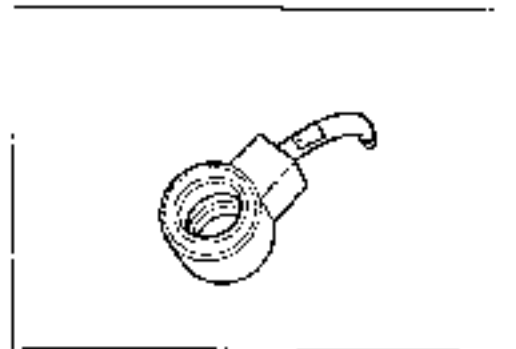
- (3) If the difference between the measurements X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

**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.

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



9M. 1022-281

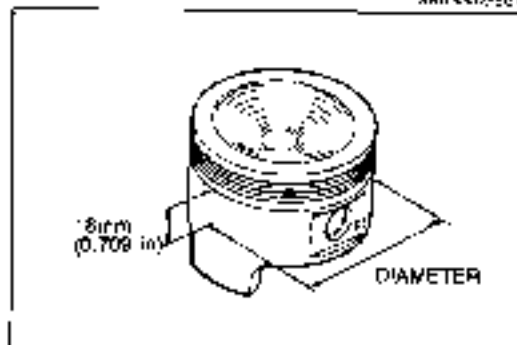
**Oil Jet**

1. Check the oil jet for clogging.

**Note**

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

2. Make sure the ball moves smoothly.



9VU.023-127

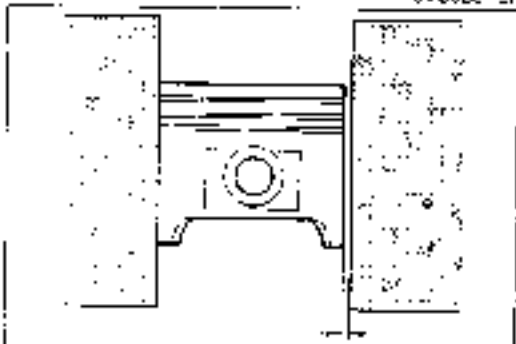
**Piston**

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—91.965 (3.6104—3.6202)
0.25 (0.010) oversize		92.185—92.205 (3.6293—3.6301)
0.50 (0.020) oversize		92.435—92.455 (3.639—3.6400)



9M.022-129

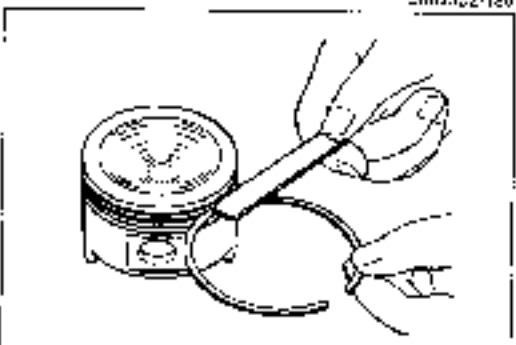
3. Check the piston-to-cylinder clearance.

**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 rebore the cylinders to fit oversize pistons.

**Note**

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



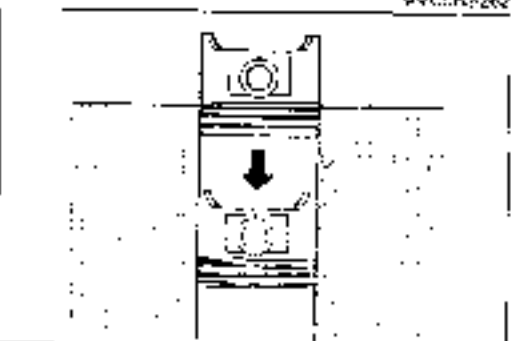
9VU.023-282

**Piston and Piston Rings**

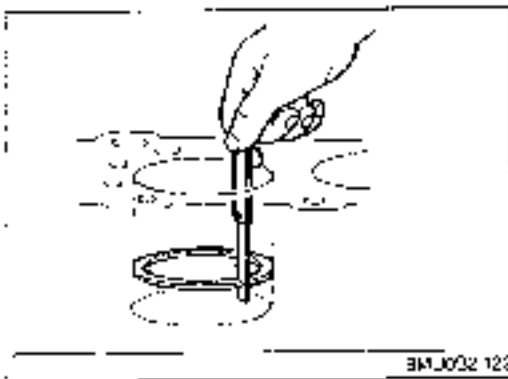
1. Measure the piston ring to ring and clearance around the entire circumference by using a new piston ring.

**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.



9M. 1022-263

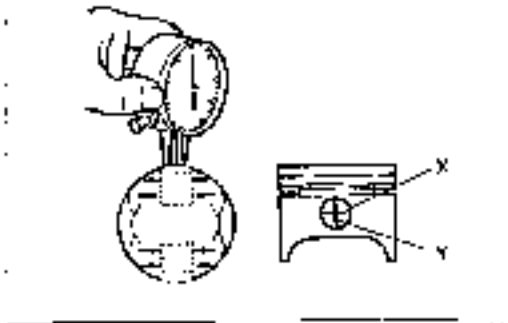


9M, J032 123

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)

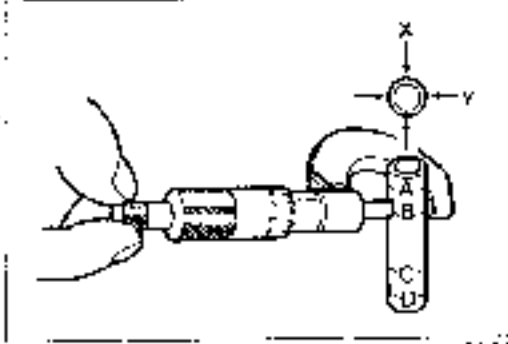


99, C1 X-005

#### 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)**



9M, J032 294

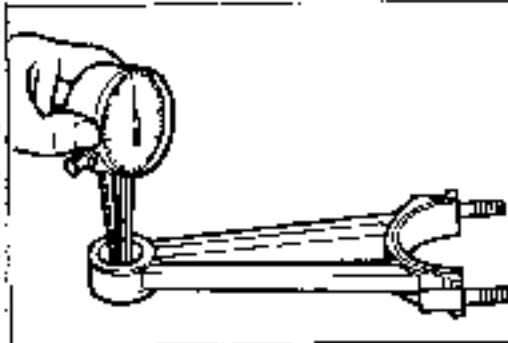
2. Measure the piston pin diameter in X and Y directions at four points.

**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.



99, E1 X-047

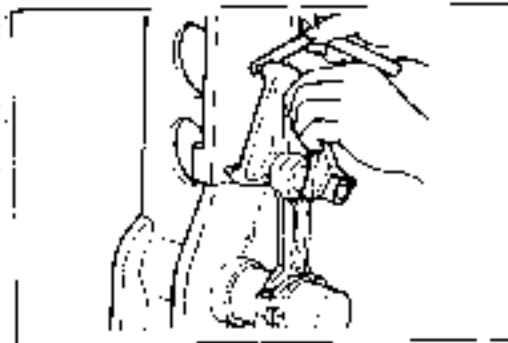
#### Connecting Rod

1. Measure the connecting rod small end bore.

**Diameter: 22.943—22.951mm (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)**



9M, J032 294

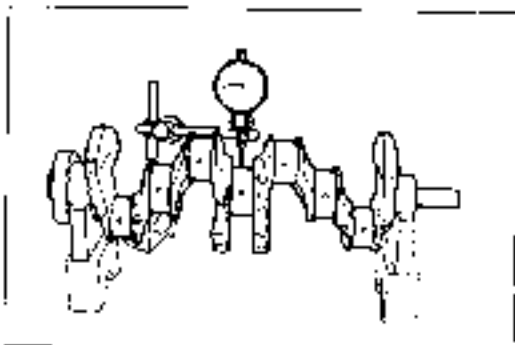
3. Check each connecting rod for bend. Repair or replace if necessary.

**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.

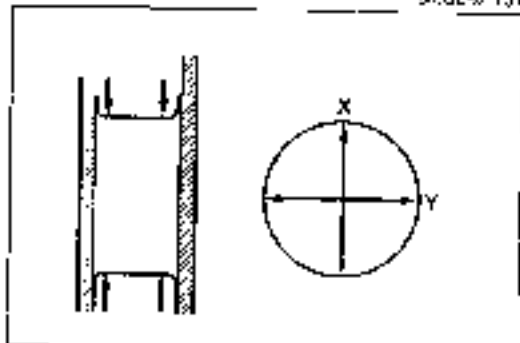


9AUC057 131

**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.**



6DQ718-119

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**

Bearing size	Journal diameter	mm (in)
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**

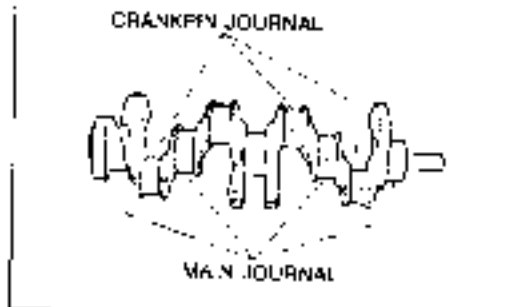
Bearing size	Journal diameter	mm (in)
0.25 undersize	50.690—50.705 (1.9957—1.9963)	
0.50 undersize	50.440—50.455 (1.9858—1.9864)	
0.75 undersize	50.190—50.205 (1.9760—1.9766)	

**Caution**

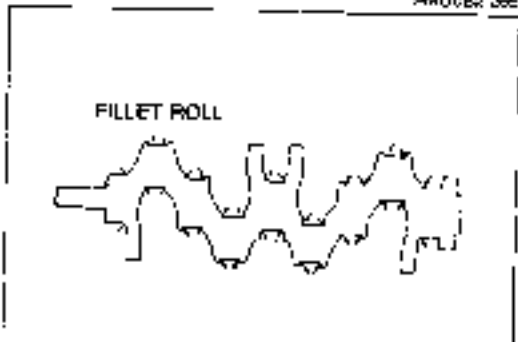
**Do not grind the fillet roll.**

**Main Bearing and Connecting Rod Bearing**

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



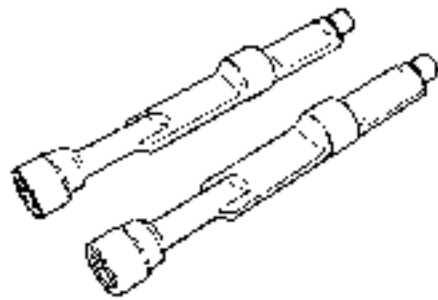
4MUC08 366



6X001E 183



7XU01C 077



### 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)

RMUCB2 '32

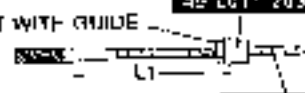
### REMOVAL



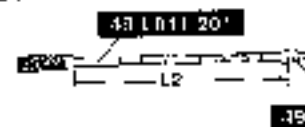
### FRONT BUSHING



### CENTER BUSHING

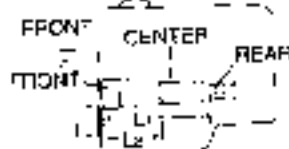


### REAR BUSHING



9MJ088 '33

### INSTALLATION



### REAR BUSHING



### CENTER BUSHING



### FRONT BUSHING



2MLCB2 '31

### 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)

### 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)

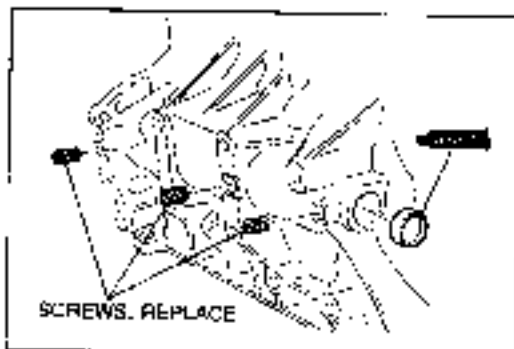
L2: 202—203mm (7.95—7.99 in)

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

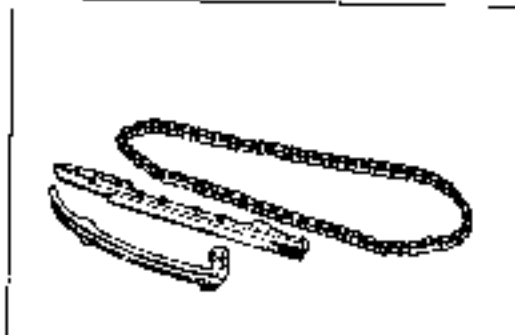
Do not use a iron hammer, use a plastic hammer on the **SST** when installing the front bushing.

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



9MJC02-135

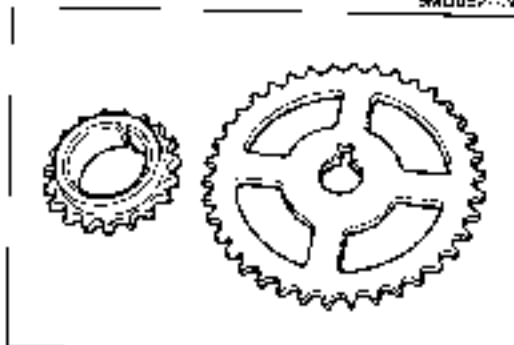
5. Install new blind screws.
6. Apply sealant to the blind plug and install it in the cylinder block.



9MJC02-136

#### Timing Chain, Chain Lever, and Chain Guide

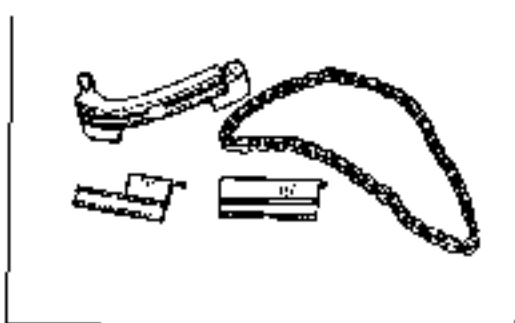
1. Check the timing chain for wear, damage, and cracks. Replace if necessary.
2. Check the rubber of the chain lever for wear, damage, peeling, and cracks. Replace if necessary.



9MJC02-137

#### Timing Gear and Camshaft Pulley

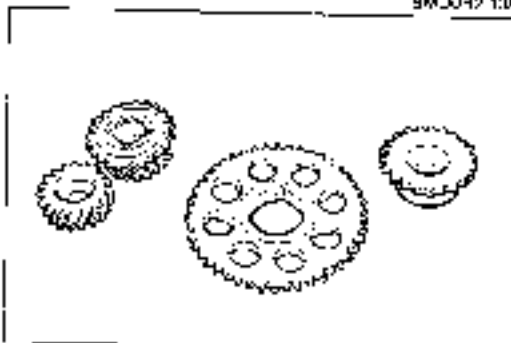
Check the timing gear and camshaft pulley for wear, damage, and cracks. Replace if necessary.



9MJC02-138

#### 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.



9MJC02-139

#### Crankshaft Sprocket and Balance Shaft Sprocket

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












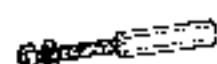





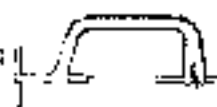





#### Caution

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



## ASSEMBLY

### PREPARATION 5ST

<p>49 L011 0A0</p> <p>Piston pin sniting 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 006</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 limit (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 1C5</p> <p>Stopper (Part of 49 E011 1A0)</p> 	<p>49 E011 103</p> <p>Shaft (Part of 49 E011 1A0)</p> 
<p>49 L011 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 U036 10CA</p> <p>Arm valve spring filter</p> 
<p>49 B012 0A2</p> <p>Foot, valve spring filter</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> 	

29-312-013

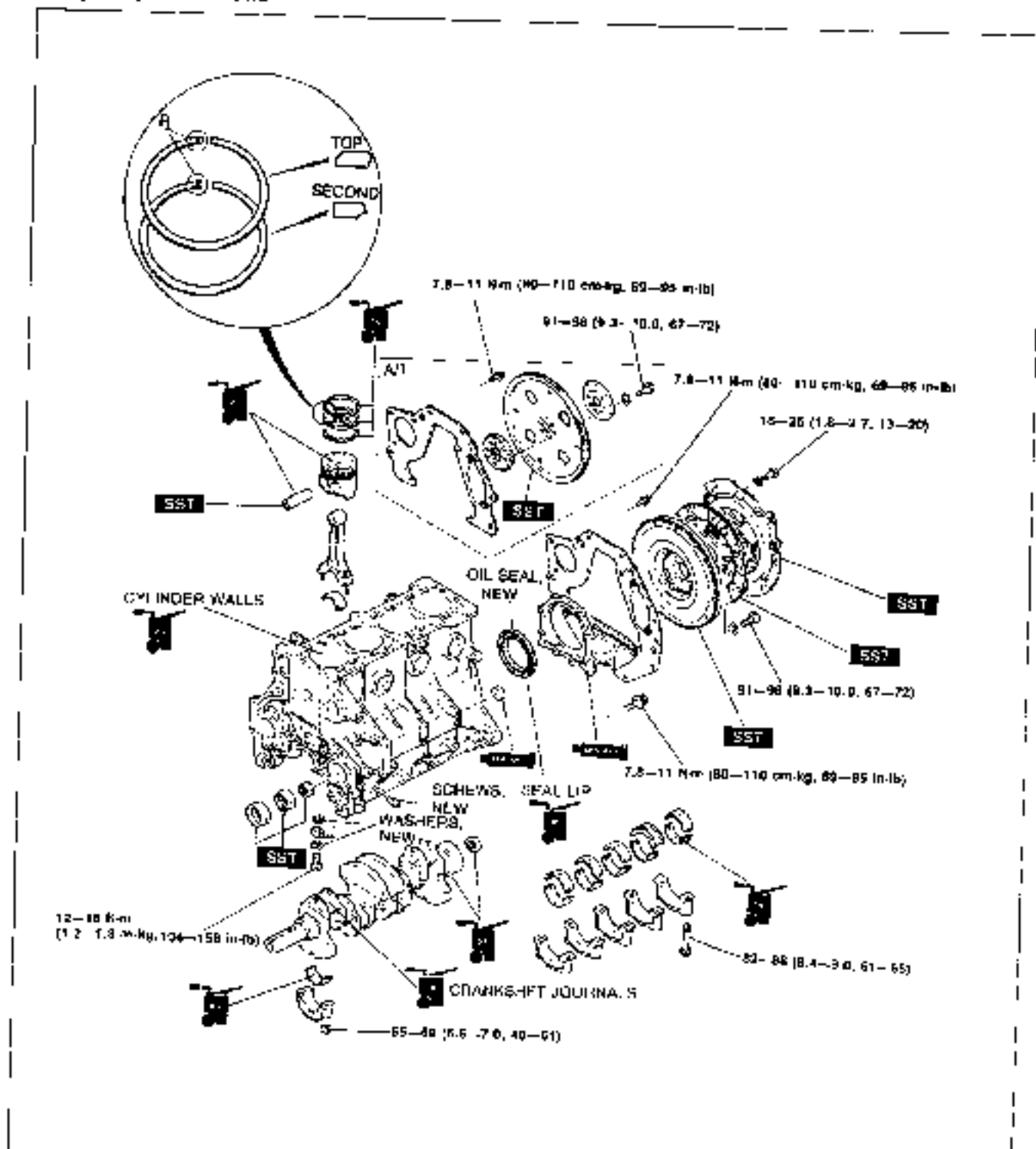
1. Clear all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace worn bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

### Caution

Do not reuse gaskets or oil seals.

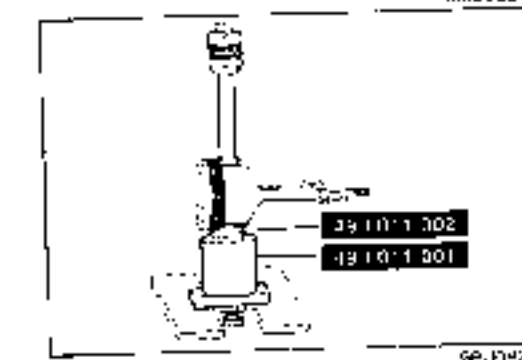
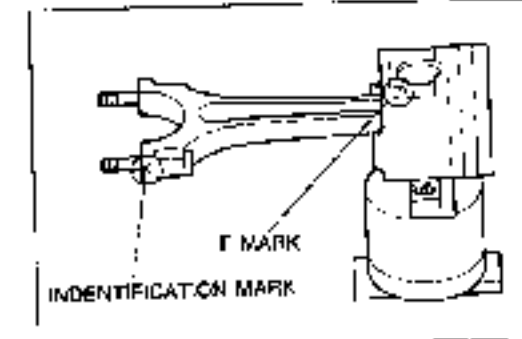
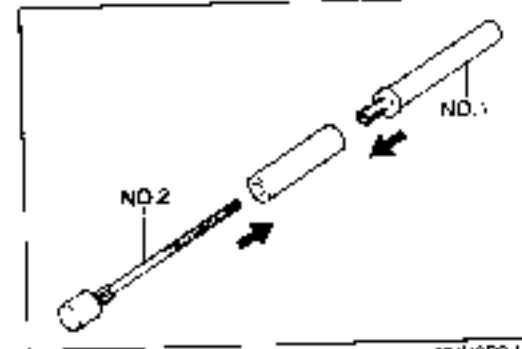
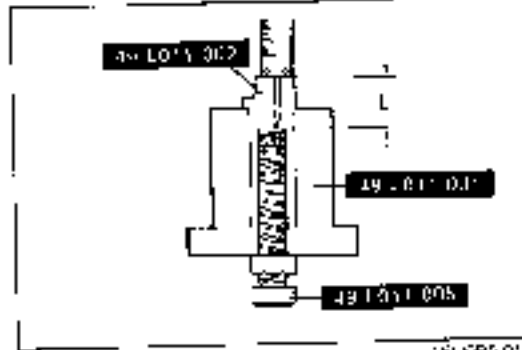
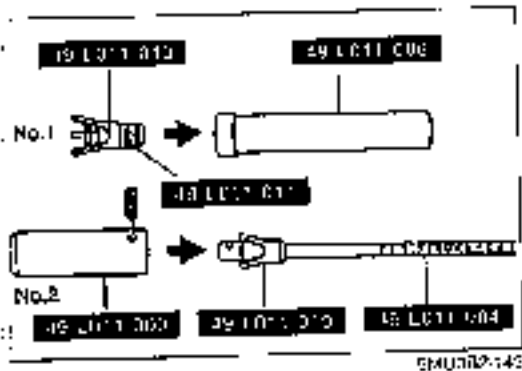
### CYLINDER BLOCK Torque Specifications

GM1092-11



Nm (M-kg, Ft-lb)

GM1092-11  
B2-53



**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

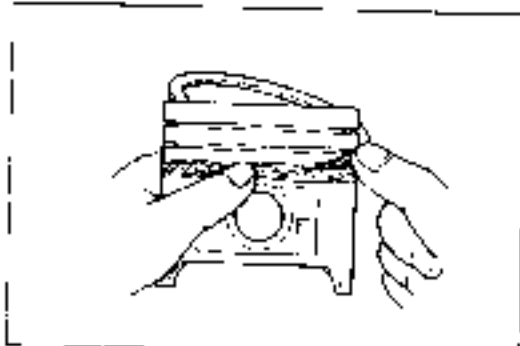
6. Set the piston on the **SST** with the **F** mark facing upward  
 7. Align the identification mark to the cap of the large end of connecting rod and **F** mark on the piston as shown in the figure.

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.

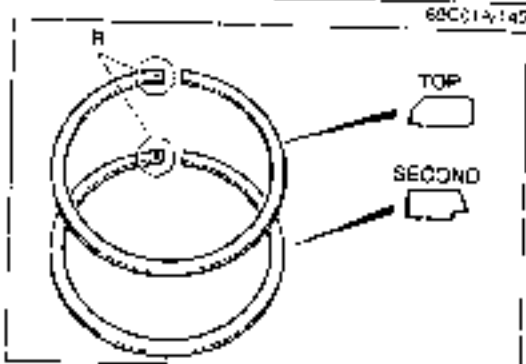
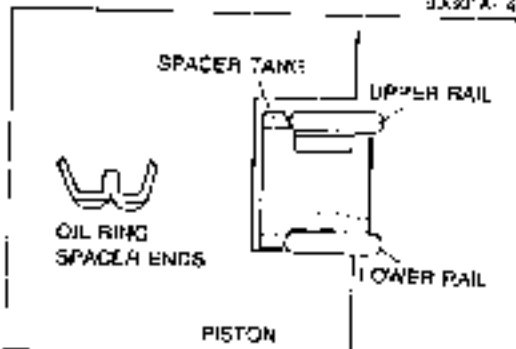
**Pressure force:**

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

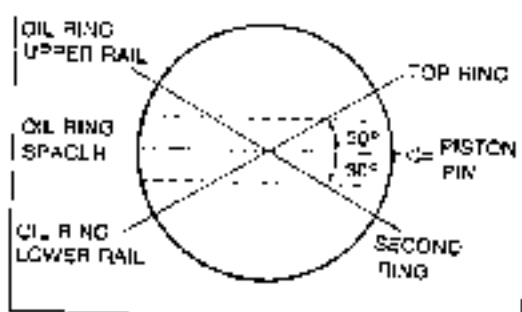
10. Check the oscillation torque of the connecting rod.  
 (Refer to page B2-37.)



60001A-44



60002A-14B



60003A-14



60052-01

**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 Nm (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.



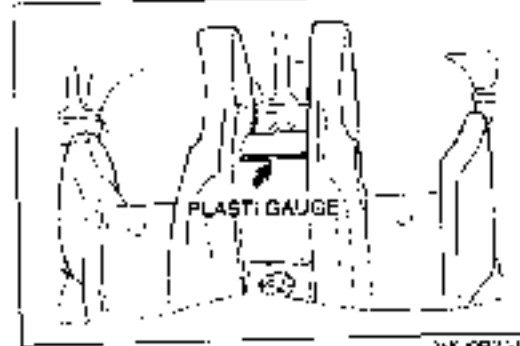
0MUGEP 100

**Crankshaft**

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

**Note**

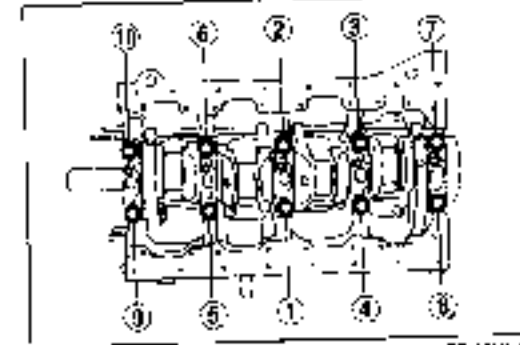
The No. 4 bearing has thrust shoulders in the cylinder block.



2MUGB2 00H

**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.



B5J07 X-123

- (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**

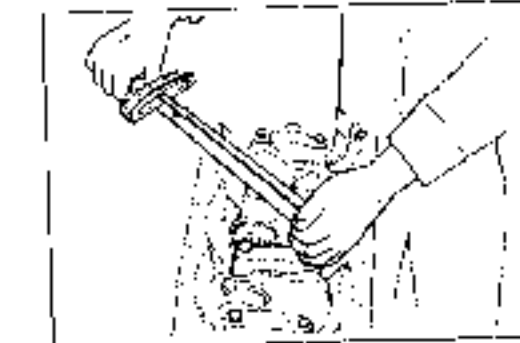
Do not rotate the crankshaft when measuring the oil clearances.

- (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)**

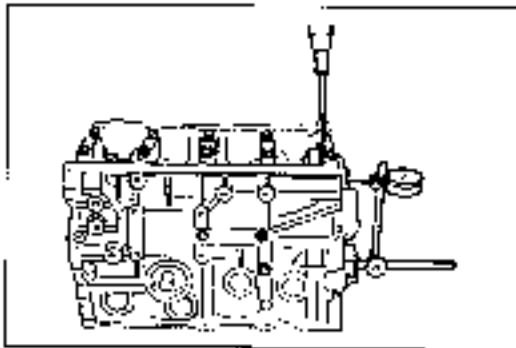


B3U0B2 040



6MUGB2 274

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.

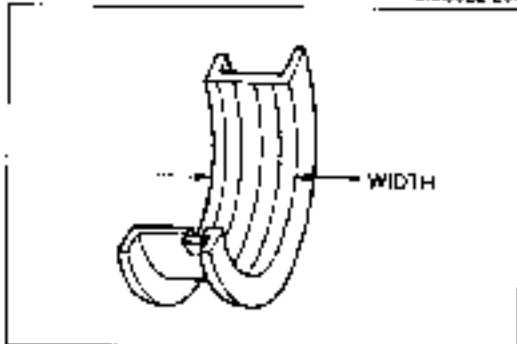


9WJ0052-267

5. Inspect the crankshaft end play

**End play: 0.08—0.18mm (0.0031—0.0071 in)**  
**Maximum: 0.20mm (0.0118 in)**

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



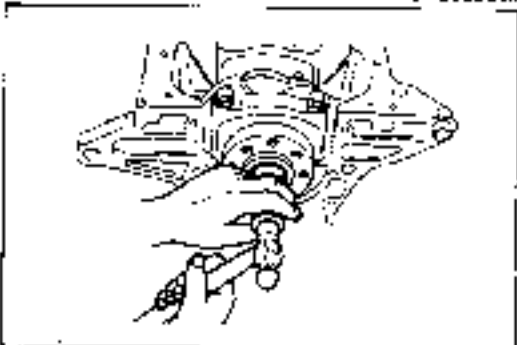
9WJ032-268

**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**

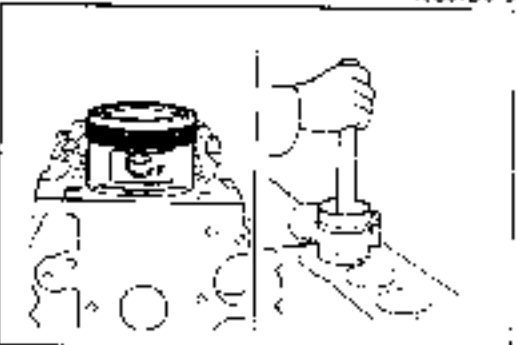
**Wider thrust width is available only in an undersize No.4 main bearing**



78G01E-075

**Pilot Bearing**

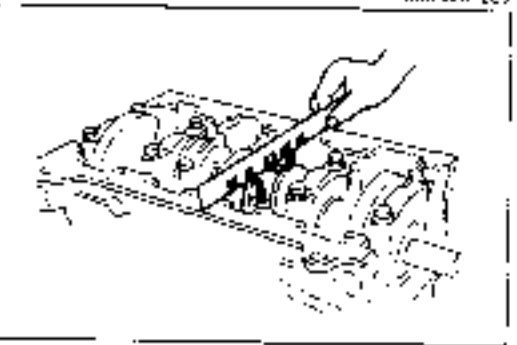
1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30—34mm, 1.18—1.34 in) against the outer race of the bearing; then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



9WJ019-269

**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).



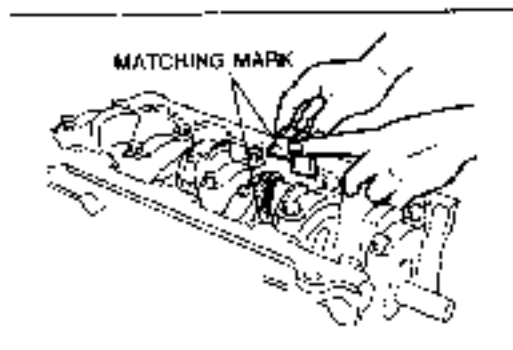
9WJ019-153

**Connecting Rod Cap**

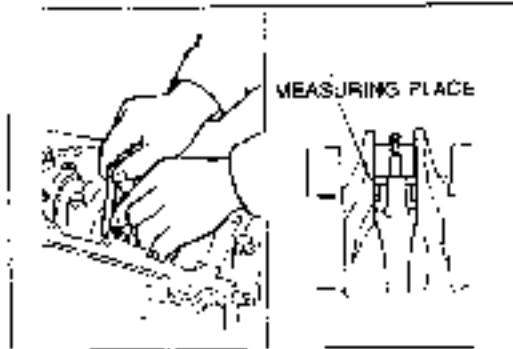
1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

**Connecting rod cap tightening torque:**

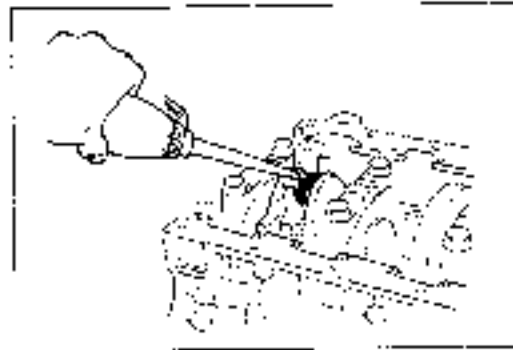
**65—69 Nm (6.6—7.0 m·kg, 48—51 ft·lb)**  
**Oil clearance: 0.027—0.067mm (0.0011—0.0026 in)**  
**Maximum: 0.10mm (0.0039 in)**



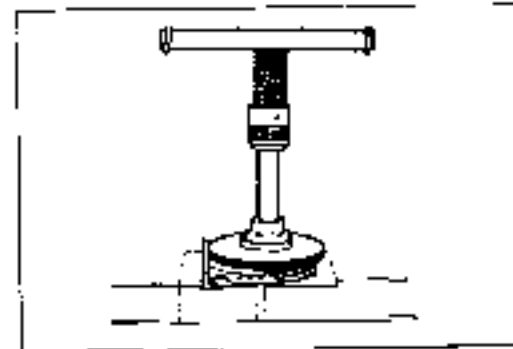
8DJ002 34



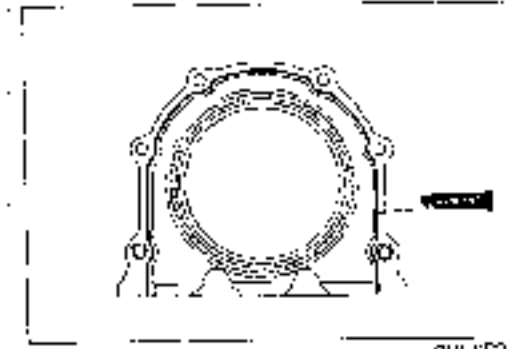
8WLC02 670



09MLCB2 154



4B11B2 047



94V1103 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)**

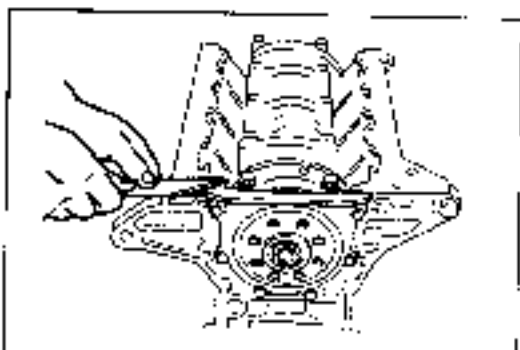
### Caution

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—96 in·lb)**

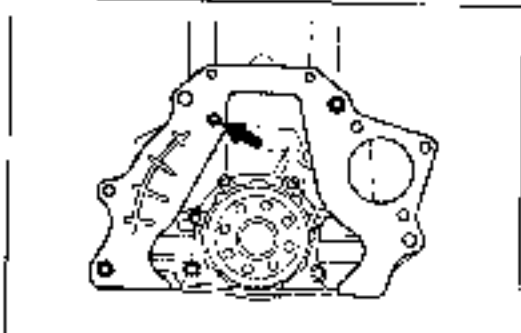


9MUCB2-156

6. Cut away the portion of the sealant that projects from the rear cover assembly toward the cylinder side.

**Caution**

Do not scratch the rear cover assembly.



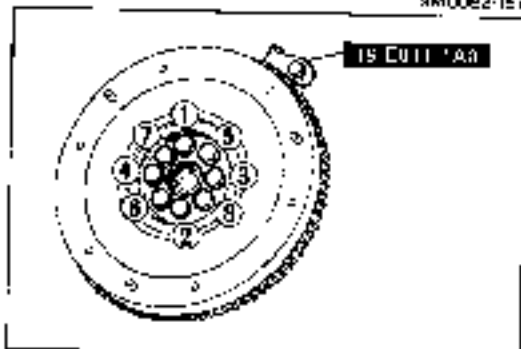
9MUCB2-157

**End Plate**

Install the end plate.

**Tightening torque:**

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



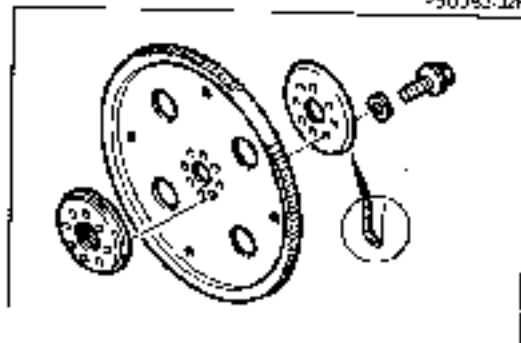
9J0383-326

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

1. 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)



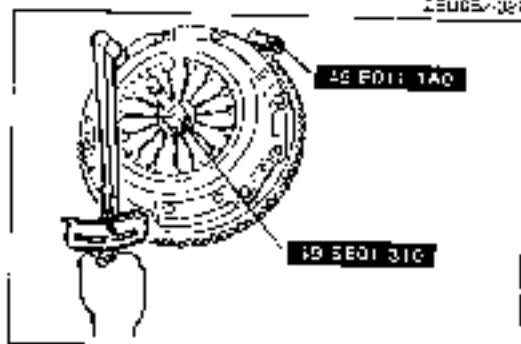
2E065-087

**(A/T)**

2. 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)



9MUCB2-158

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

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

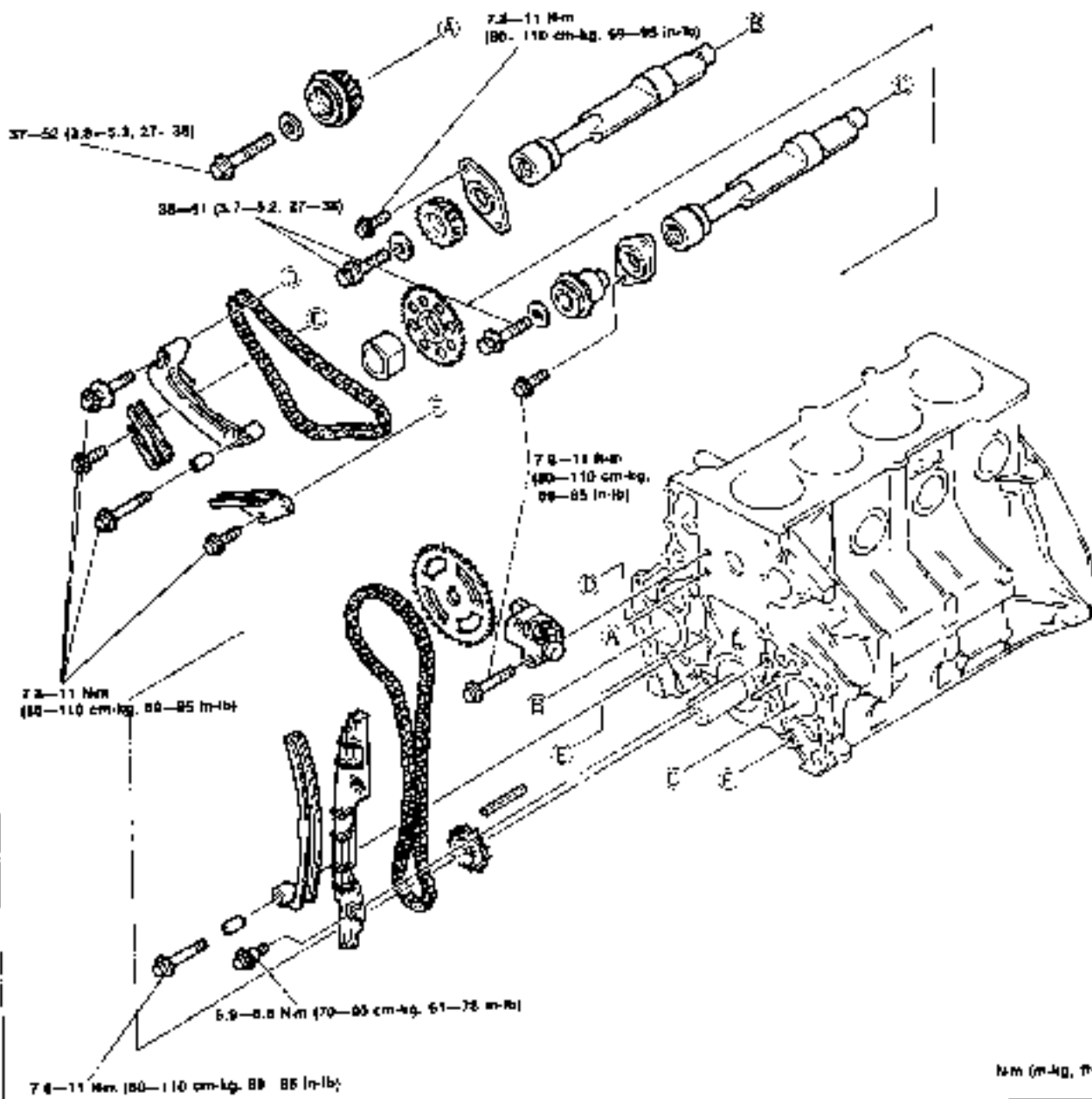
(Refer to Section H.)

**Tightening torque:**

18–25 N·m (1.8–2.7 m·kg, 13–20 ft·lb)

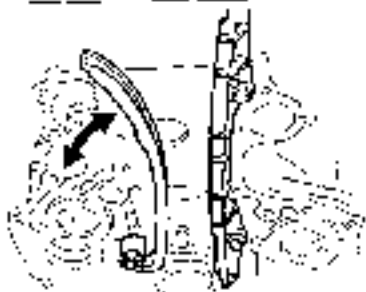


### BALANCER CHAIN AND TIMING CHAIN Torque Specification



Nm (m-kp, ft-lb)

BMJ2627-02



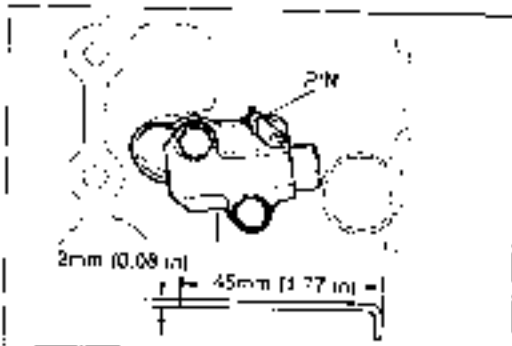
#### Chain Guide and Chain Lever

1. Install the chain guide

**Tightening torque:**  
6.9-8.8 Nm (70-90 cm-kp, 61-78 in-lb)

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

**Tightening torque:**  
7.8-11 Nm (80-110 cm-kp, 69-95 in-lb)



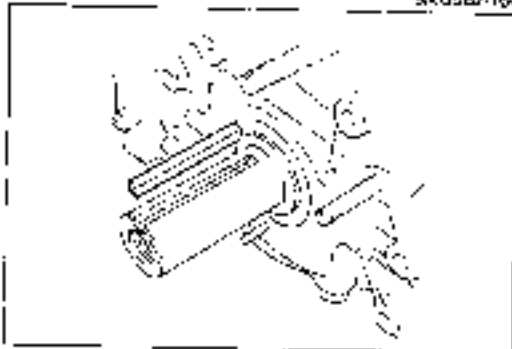
SKU262-164

### 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:

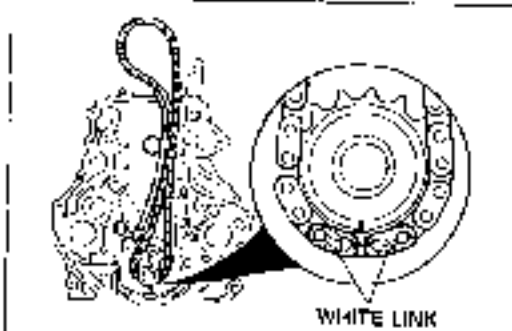
7.0—11 N·m (60—110 cm·kg, 69—95 in·lb)



9MJOB2-165

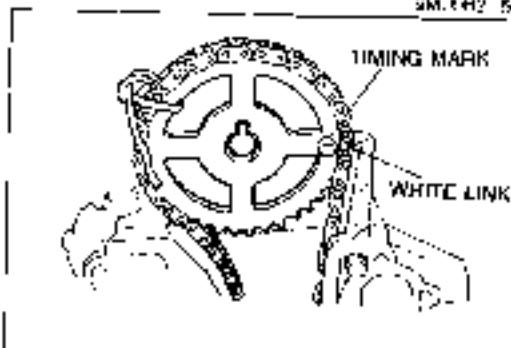
### Timing Chain and Timing Gear

1. Install the key onto the crankshaft.



9MJOB2-166

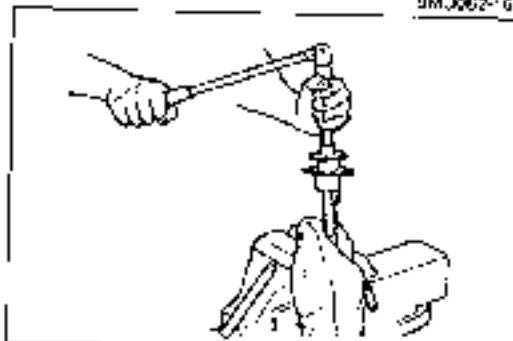
2. Install the timing chain and timing gear as shown.



9MJOB2-167

### 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.



9MJOB2-168

### 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)



9VU.CB2.179

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

**Caution**

Do not damage the balancer shaft bushings and journals during installation.

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

5. Tighten the thrust plate lock bolts.

**Tightening torque:**

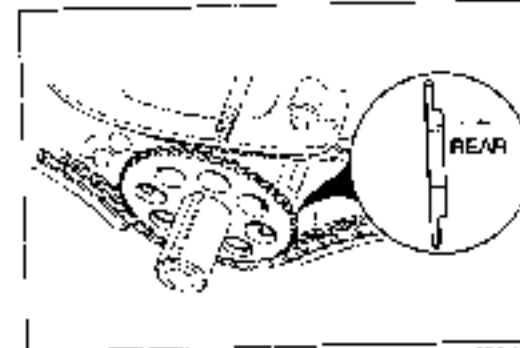
7.8—11 N·m (80—110 cm·kg, 59—95 in·lb)



9VU.CB2.170

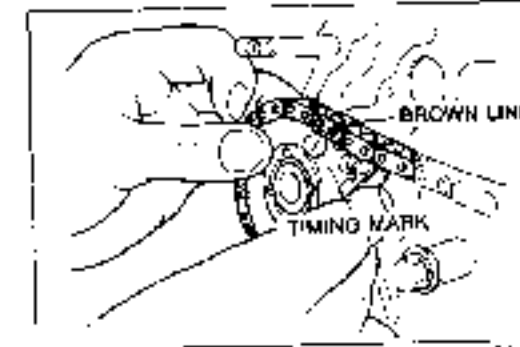
**Balancer Chain**

1. Install the crankshaft sprocket.



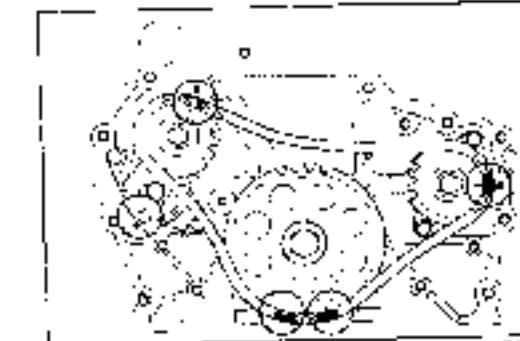
9VU.CB2.171

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.

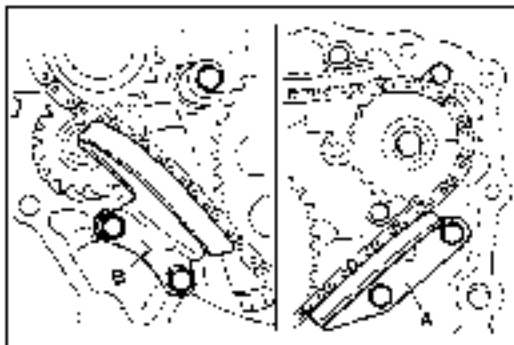


2B.U02.037

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.



2DA.CB2.C33

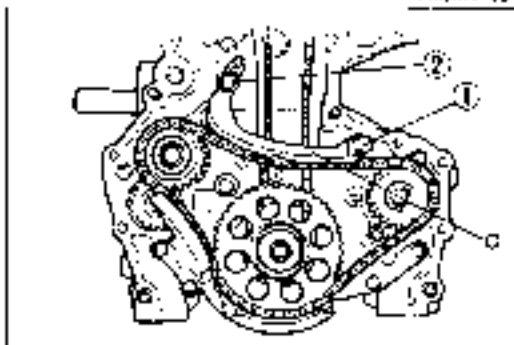


2E1000034

5. Install the chain guide A and B.

**Tightening torque:**

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



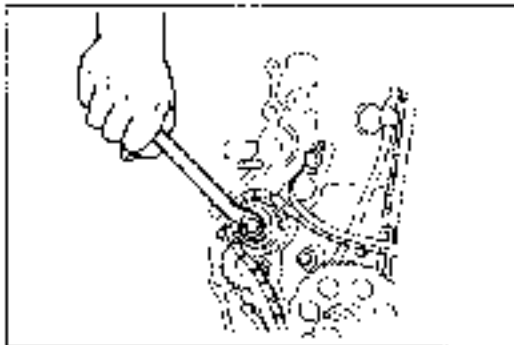
7U022-035

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

**Tightening torque:**

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

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



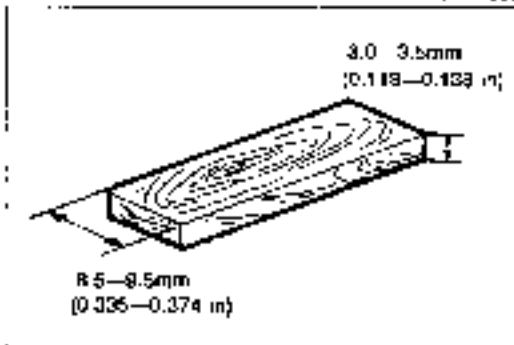
2H1012-036

7. Tighten the idler sprocket assembly lock bolt.

**Tightening torque:**

**37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)**

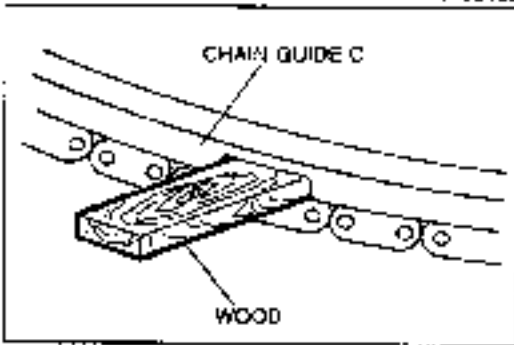
8. Install the spacer.



2B1062-029

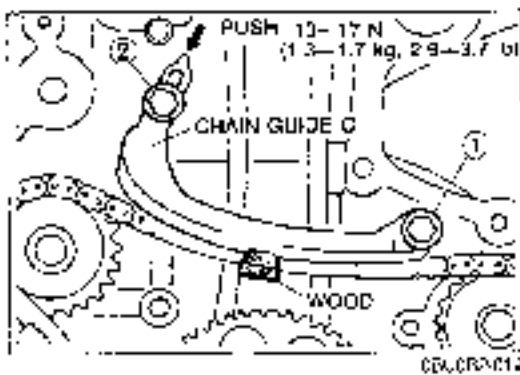
**Adjustment of balancer chain tension**

1. Fabricate a piece of hard wood as shown.



2B1062-030

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 Nm (60—110 cm-kg, 69—95 in-lb)**

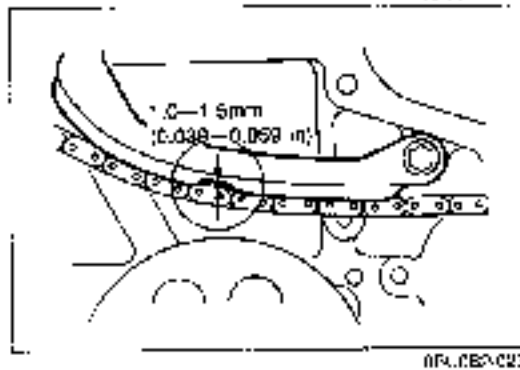
4. Remove the wood from between the chain and chain guide C.

**Caution**

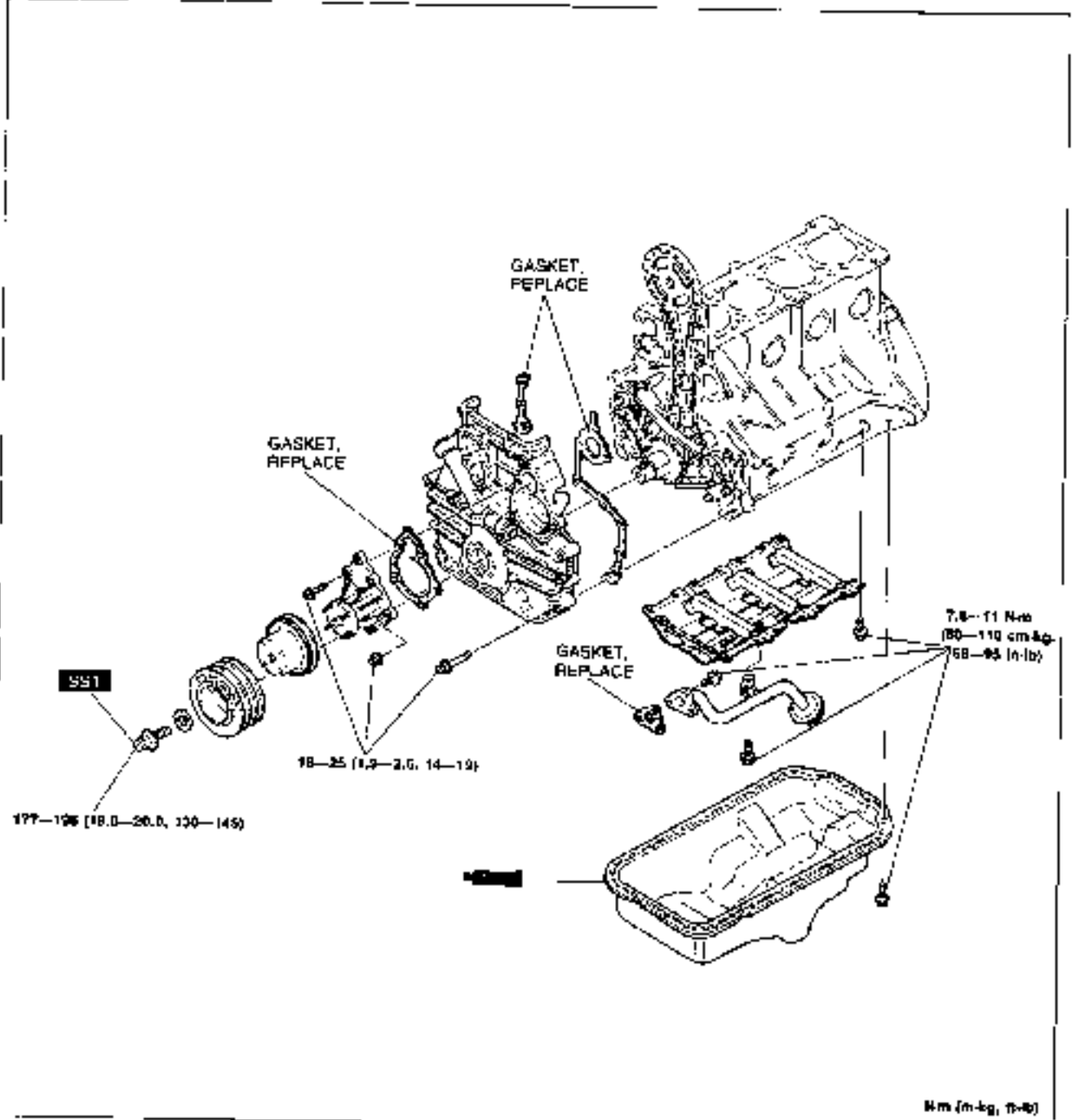
**Do not leave any wood shavings around the chain and chain guide.**

5. Measure the chain slack.

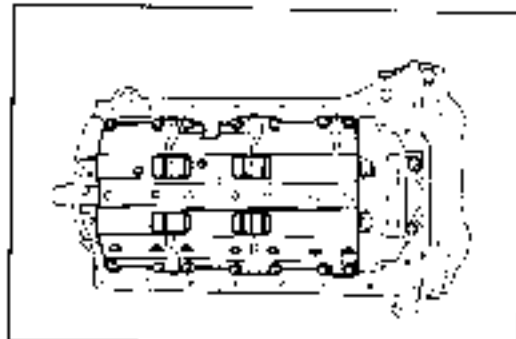
**Specification: 1.0—1.5mm (0.039—0.059 in)**



CHAIN CASE AND OIL PAN  
Torque Specifications



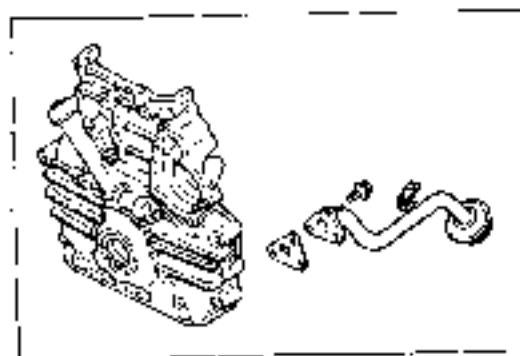
9M-J0E2-160



9M-J0E2-18\*

**Vibration Reducing Stiffener (VRS)**  
Install the vibration reducing stiffener.

**Tightening torque:**  
**7.8-11 N-m (80-110 cm-kp, 68-95 in-lb)**



99M10E2-185

**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.

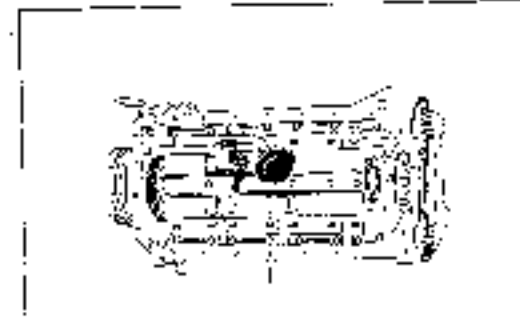
**Tightening torque:**

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)



99M10E2-183

**Oil Pan**

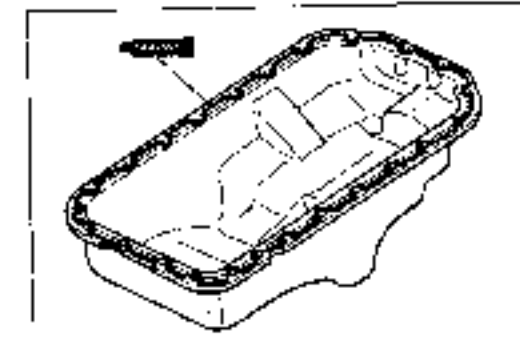
1. Remove any old sealant from the bolts and bolt holes. If the old sealant cannot be removed, replace the bolt as necessary.
2. Apply a continuous bead of silicon sealant to the oil pan along the inside of the bolt holes, and overlap the ends.
3. Apply locking agent to the bolt threads.

**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.



99M10E2-017

4. Install the oil pan.

**Tightening torque:**

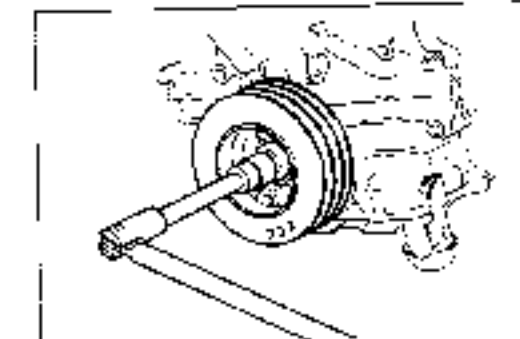
7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

**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)



99M10E2-186

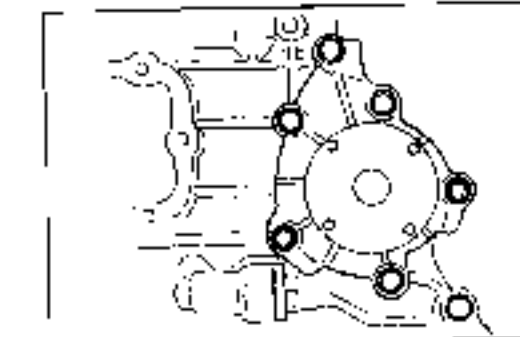
**Water Pump**

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:**

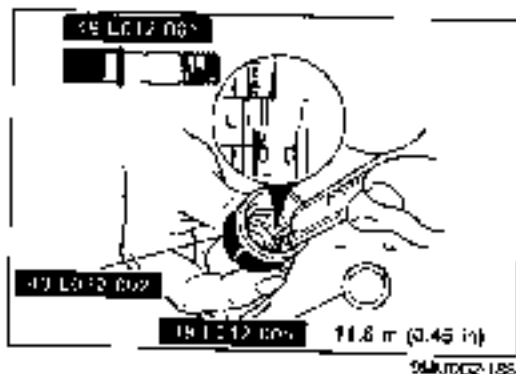
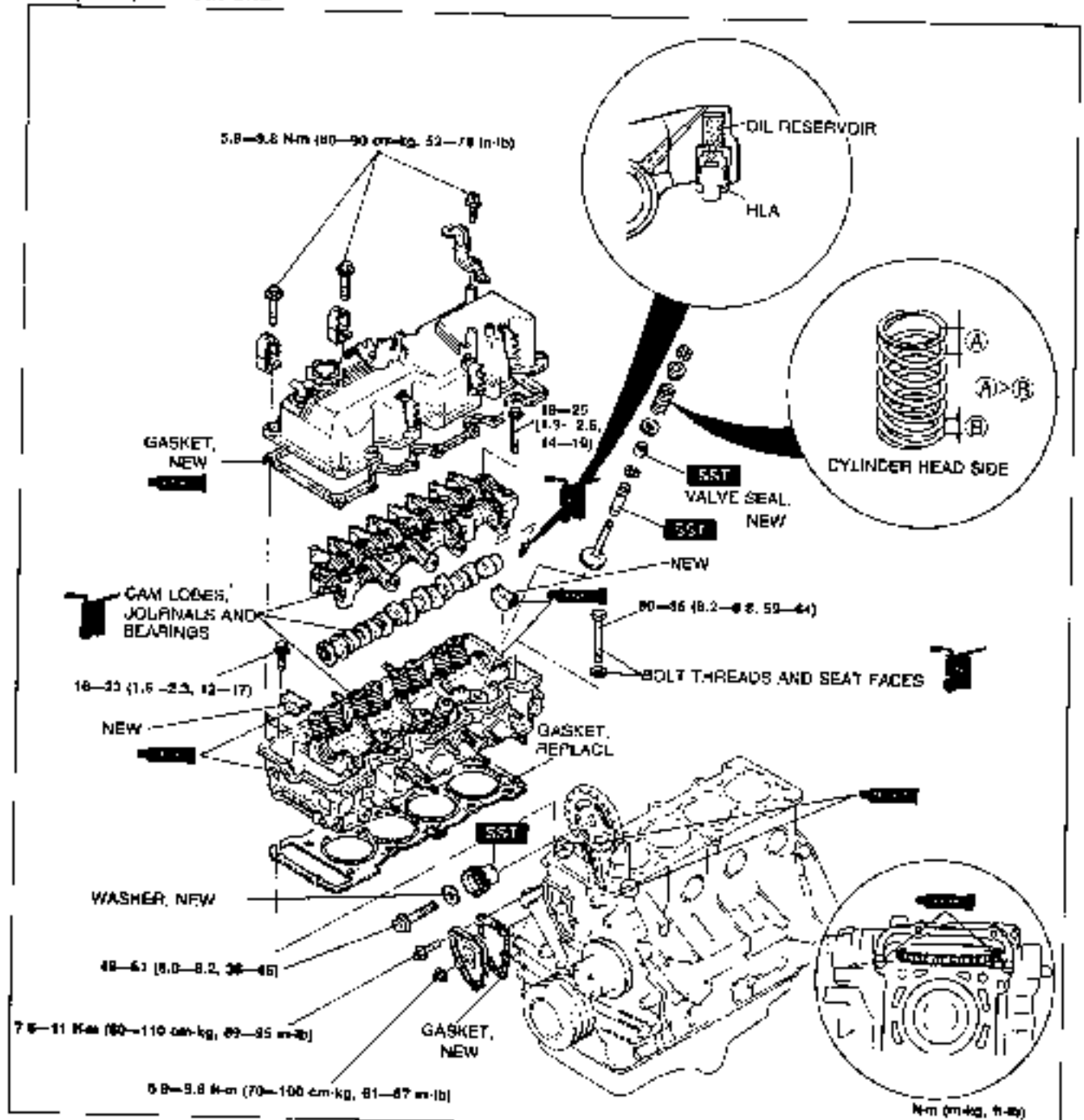
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

3. Temporarily install the water pump pulley.



99M10E2-106

CYLINDER HEAD  
Torque Specifications

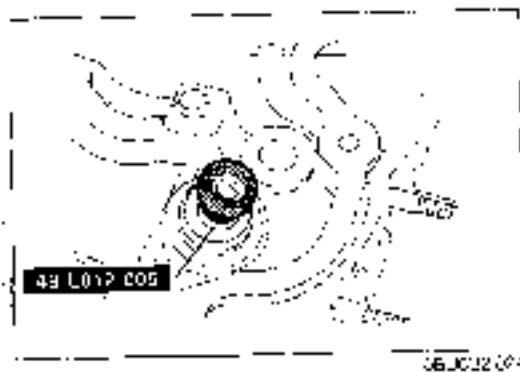


**Valve Seal**

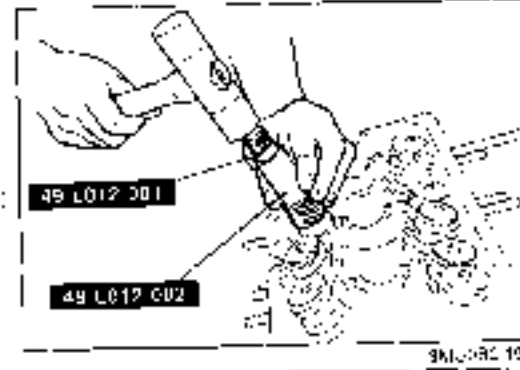
1. Assemble the SST as shown, so that the depth L is as specified.

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

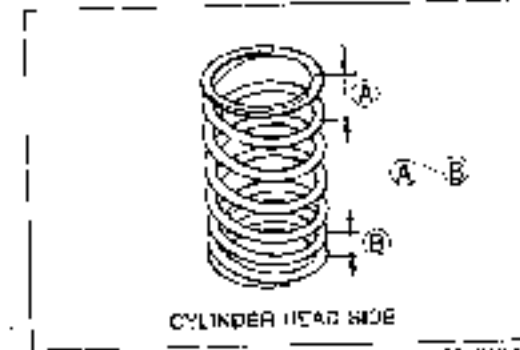




2. Install the new valve seal onto the valve guide.
3. Install the **SST** onto the valve seal.



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

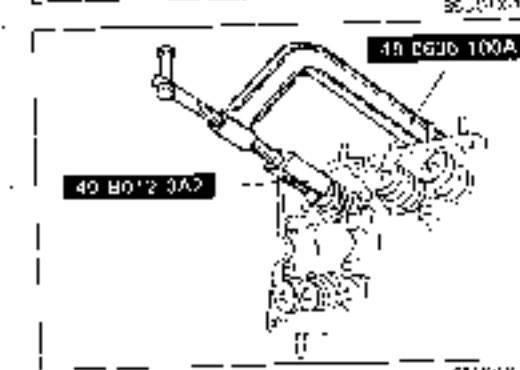


### Valve and Valve Spring

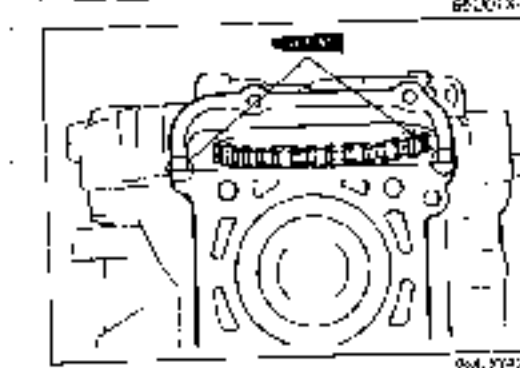
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

### Note

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

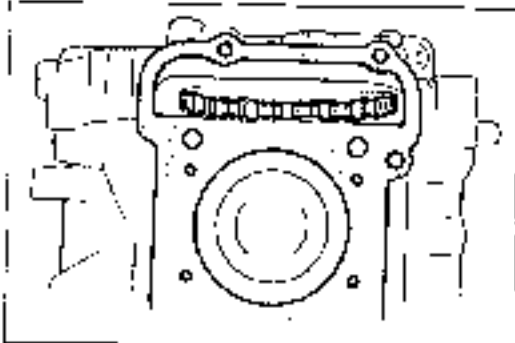


4. Compress the valve spring with the **SST**, then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.

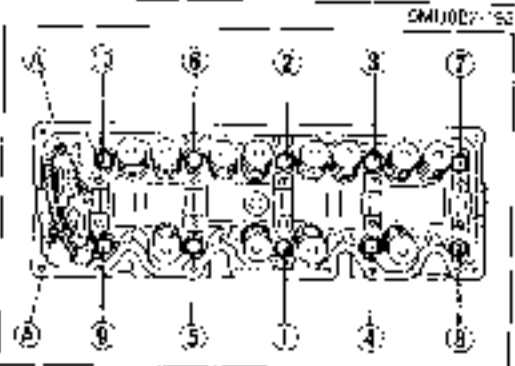


### Cylinder Head Gasket

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.



- Place a new cylinder head gasket in position



**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.

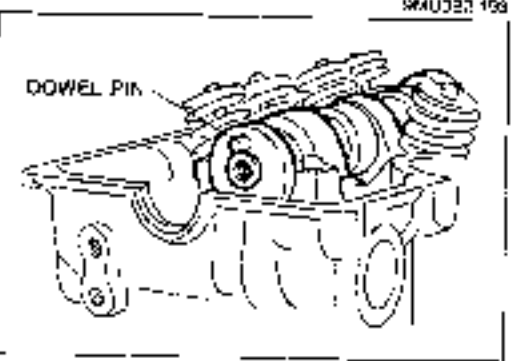
**Tightening torque:**

80—86 Nm (8.2—8.8 m·kg, 59—64 ft·lb)

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

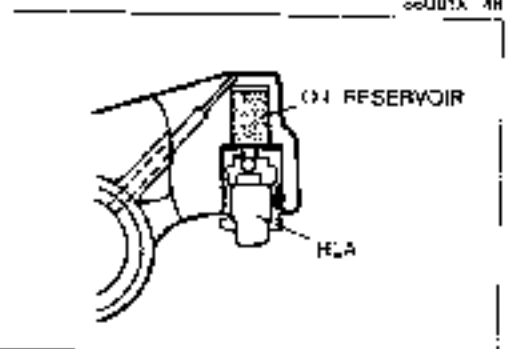
**Tightening torque:**

16—23 Nm (1.8—2.3 m·kg, 12—17 ft·lb)



**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.

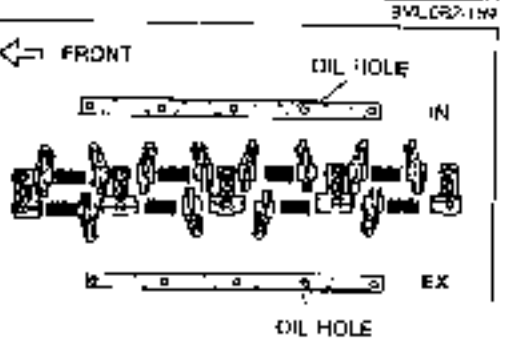


**Hydraulic Lash Adjuster (HLA)**

- 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.

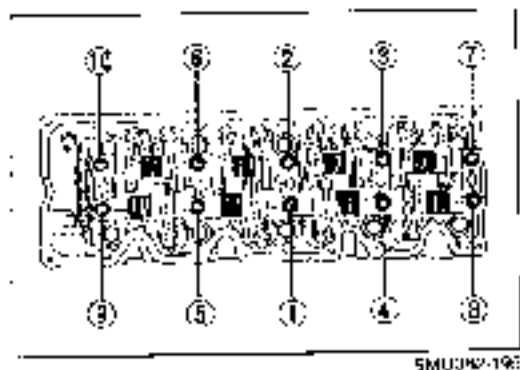


**Camshaft Cap, Rocker Arm and Shaft Assembly**

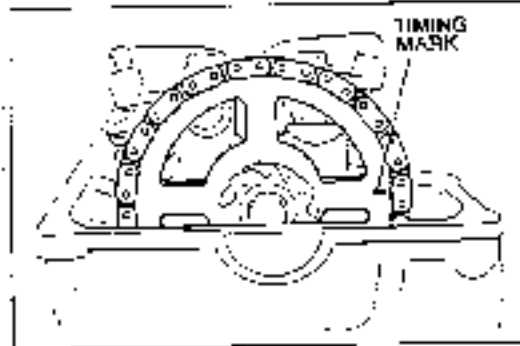
- Assemble the rocker arm and shaft assembly as shown in the figure according to the cap number and ← mark.

**Note**

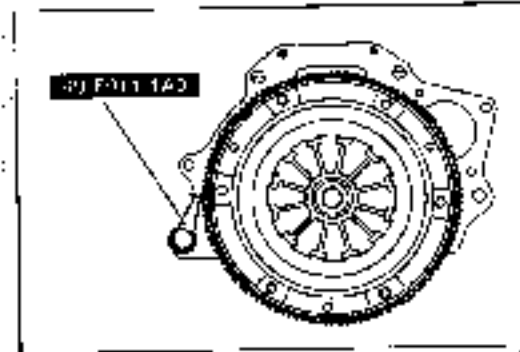
- The intake side shaft has twice as many oil holes as the exhaust side shaft.
- The No.4 camshaft cap has an oil hole from the cylinder head; be certain it is installed correctly.



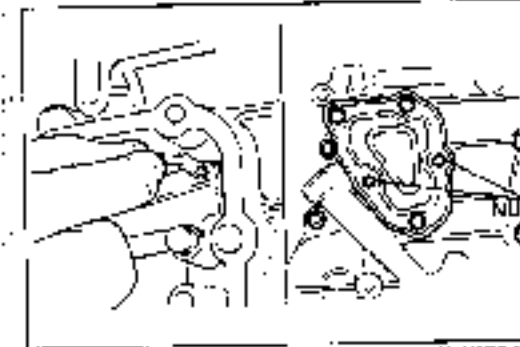
5M03K2-19E



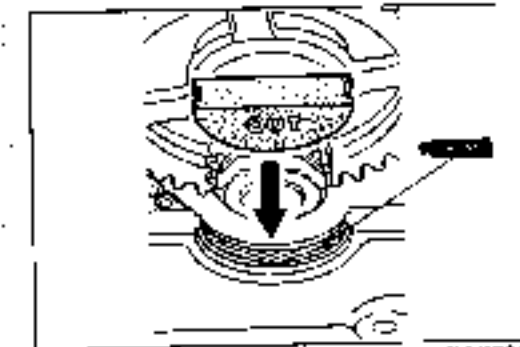
3VLCB2-18E



2BUDBC2-39E



CM10E2-32E



3M10D2-02E

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.

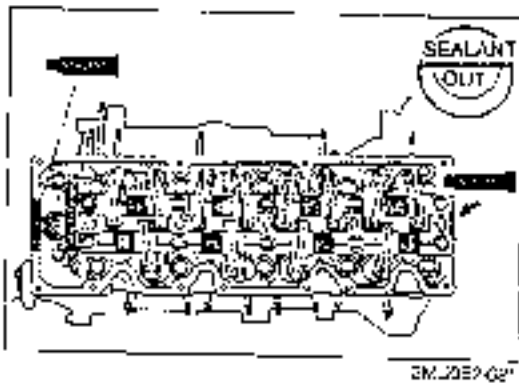
**Tightening torque**

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.

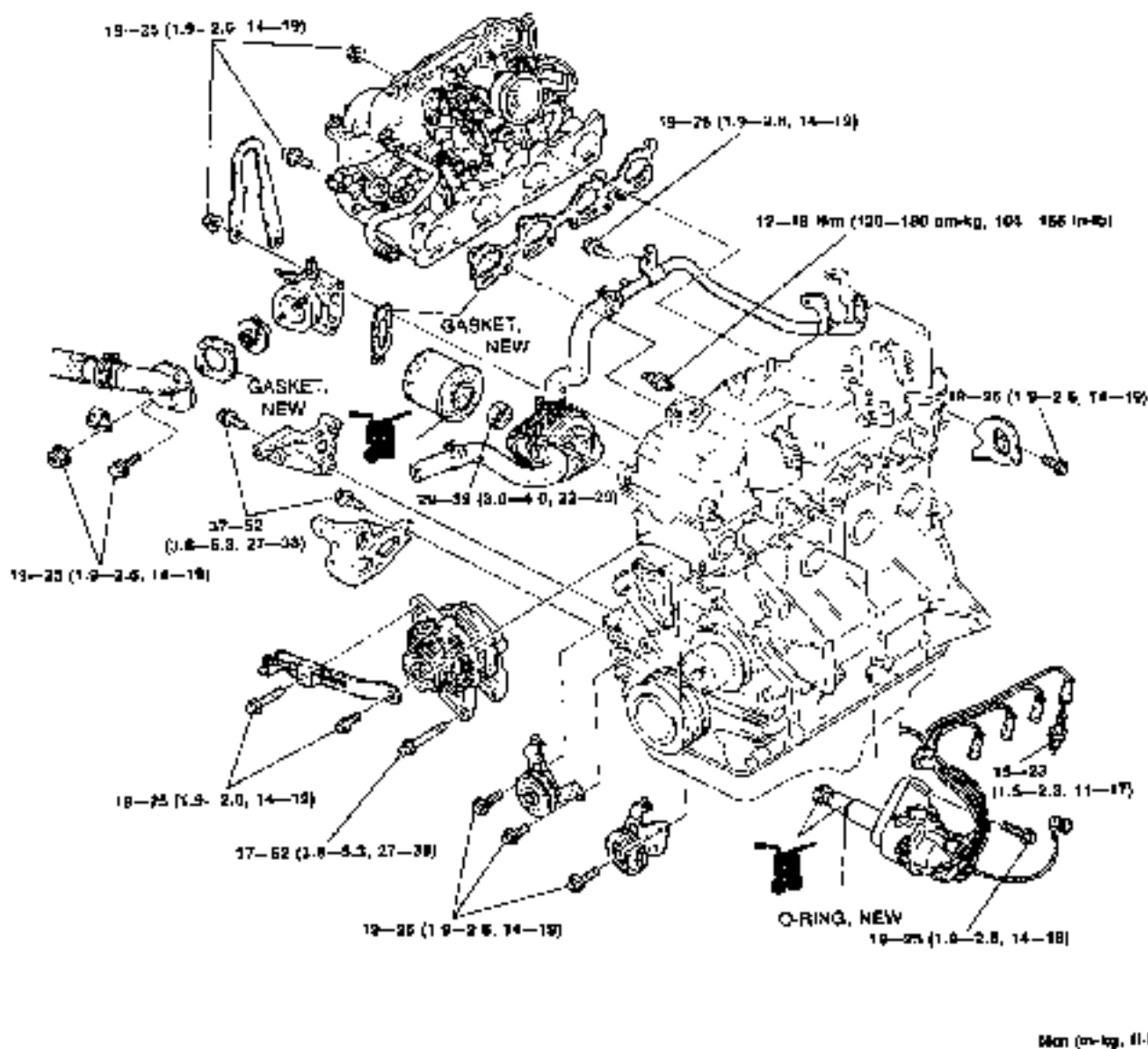
**Cylinder Head Cover**

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:**

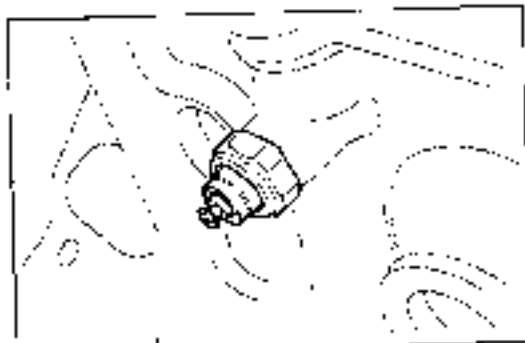
**5.9—8.8 N·m (60—90 cm·kg, 52—78 in·lb)**

AUXILIARY PARTS  
Torque Specification



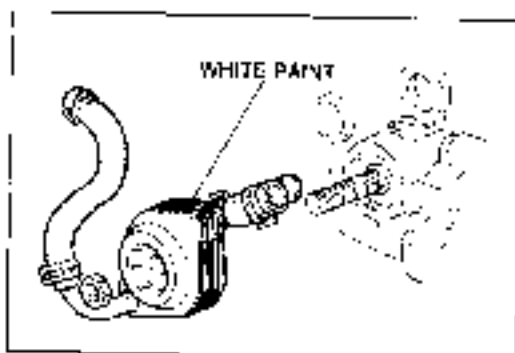
Nm (cm-kg, ft-lb)

9M1042-011



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

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



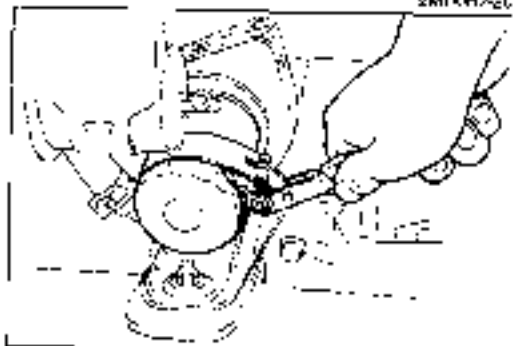
9M1092-203

**Oil Cooler**

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

**Tightening torque:**

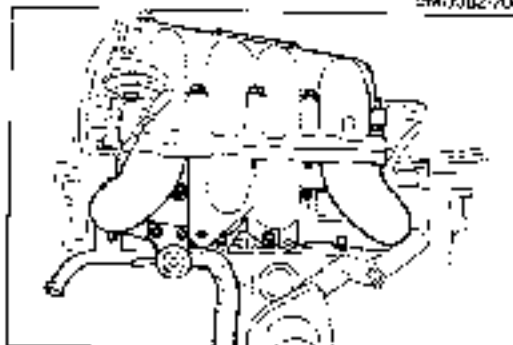
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



9M1092-704

**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.



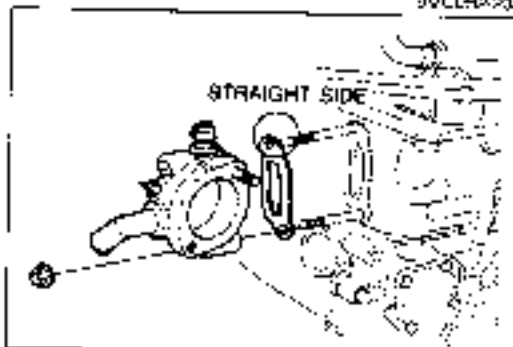
9VLCRA200

**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)



9FX1092-026

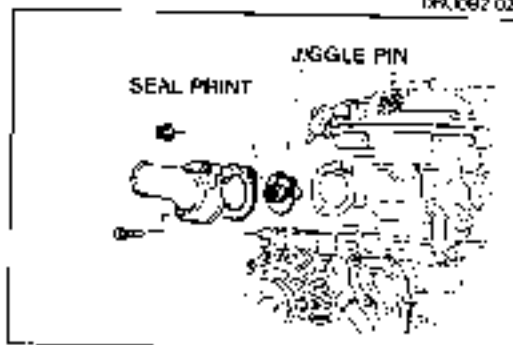
**Water Outlet**

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



9M1092-007

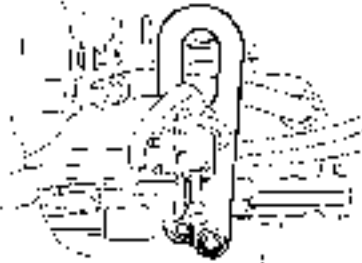
**Thermostat and Thermostat Cover**

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:**

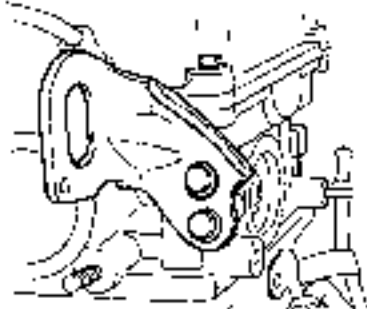
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

FRONT



SMU002-205

REAR



SMU002-206

**Engine Hanger**

Install the front and rear engine hangers.

**Tightening torque:**

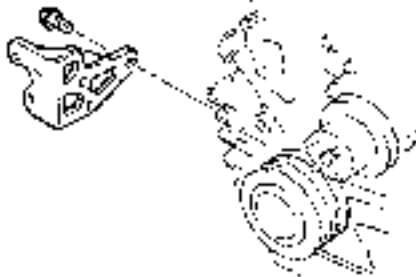
19–25 Nm (1.9–2.6 m·kg, 14–19 ft·lb)

**P/S Oil Pump Bracket**

Install the P/S oil pump bracket.

**Tightening torque:**

37–52 Nm (3.8–5.3 m·kg, 27–38 ft·lb)



SMU009-273

**Alternator**

1. Install the alternator strap and bracket.

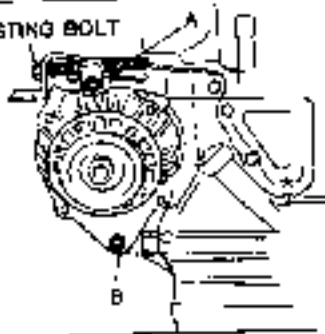
**Tightening torque****Bracket:** 37–52 Nm (3.8–5.3 m·kg, 27–38 ft·lb)**Strap :** 19–25 Nm (1.9–2.6 m·kg, 14–19 ft·lb)

SMU002-209

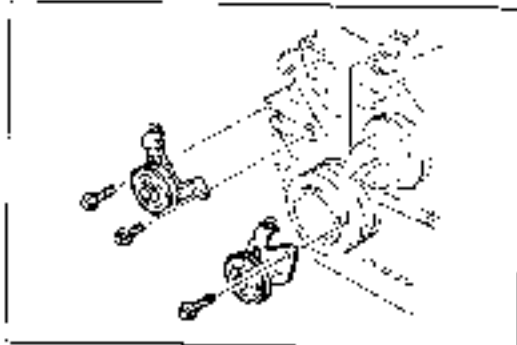
2. Install the alternator.

**Tightening torque****Bolt A:** 19–25 Nm (1.9–2.6 m·kg, 14–19 ft·lb)**Bolt B:** 37–52 Nm (3.8–5.3 m·kg, 27–38 ft·lb)

ADJUSTING BOLT



SMU002-210



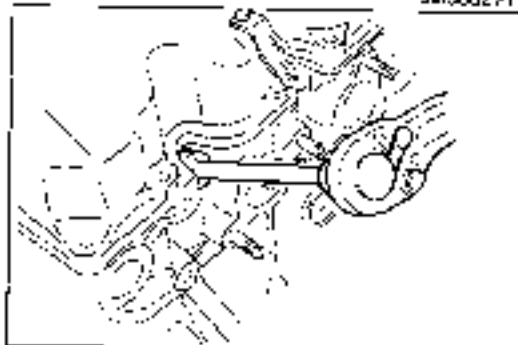
3M.A002.P11

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

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

**Tightening torque:**

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



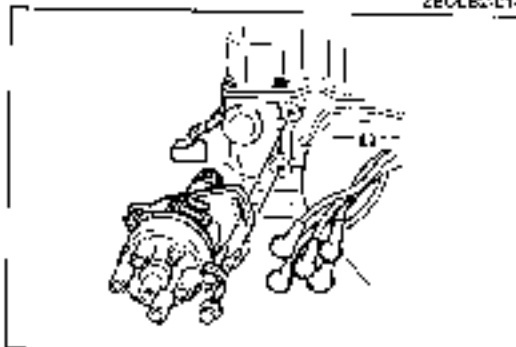
ZEL-CE0-C14

**Spark Plug**

Install the spark plugs.

**Tightening torque:**

**15—23 Nm (1.5—2.3 m·kg, 11—17 ft·lb)**



5M110R2-2\*2

**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.

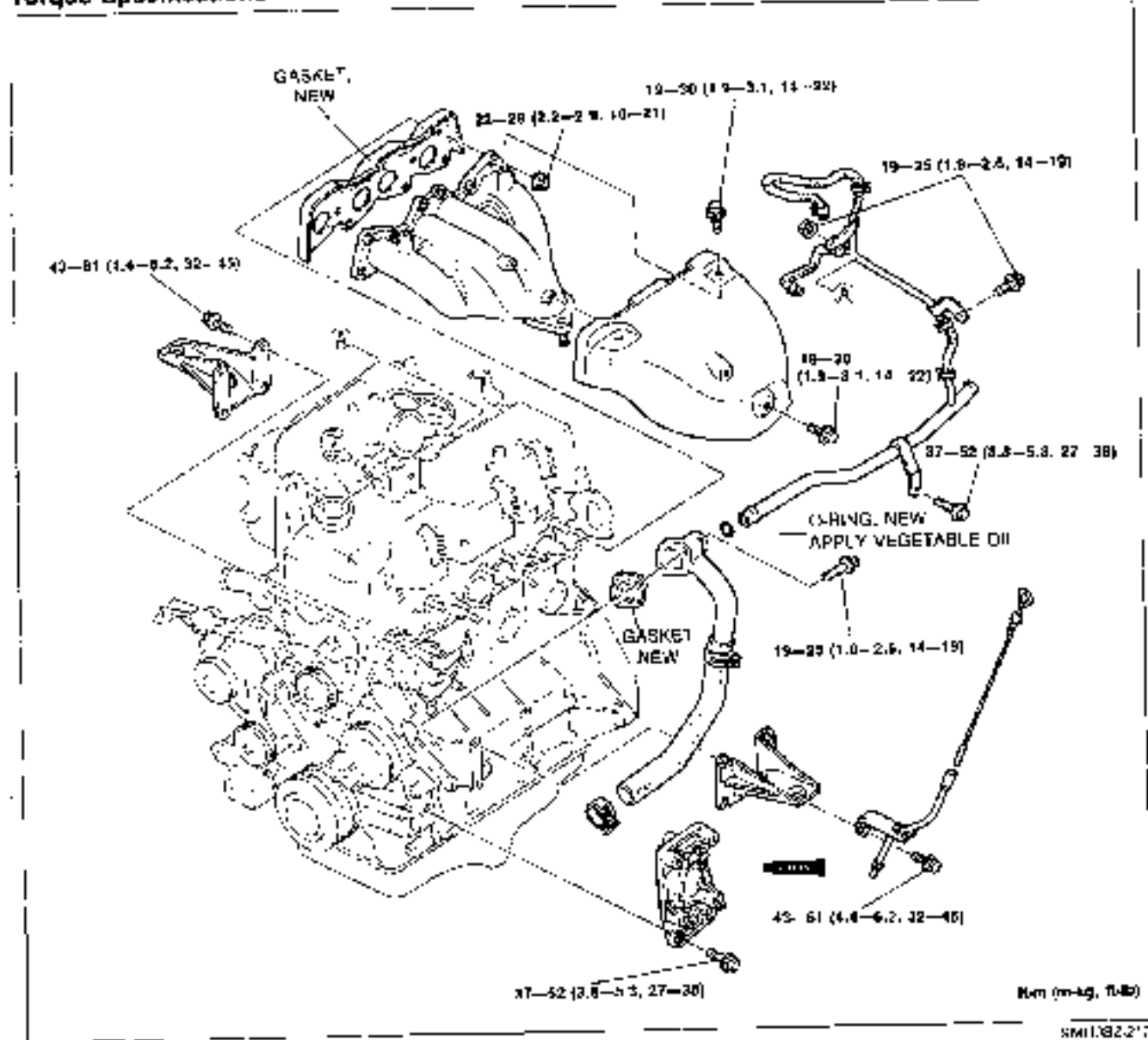


### ENGINE STAND REMOVAL

#### REMOVAL

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

#### Torque Specifications

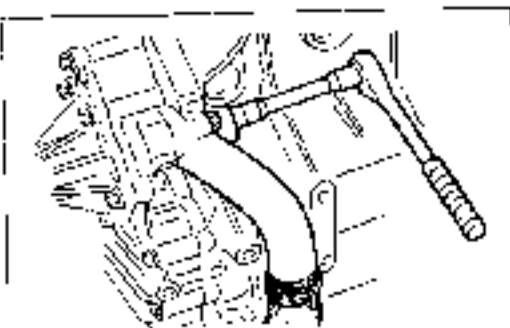


#### Coolant Inlet Pipe and Bypass Pipe

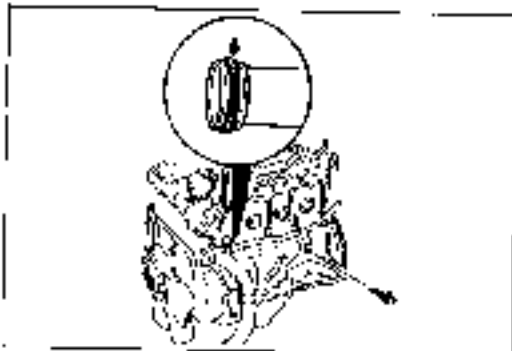
1. Install the coolant inlet pipe with a new gasket

#### Tightening torque:

19-25 Nm (1.8-2.6 m-kgs, 14-19 ft-lb)



3M J2713-4

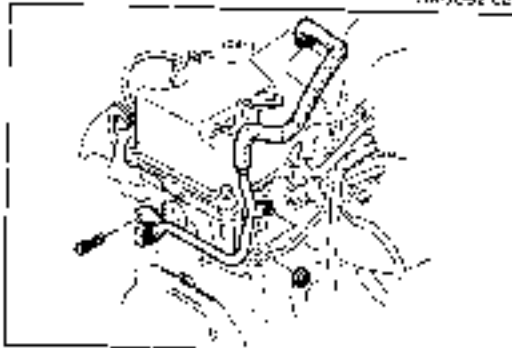


391.052 023

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

**Tightening torque:**

37–52 Nm (3.8–5.3 m·kg, 27–38 ft·lb)



391.052 016

4. Tighten the intake manifold nut.

**Tightening torque:**

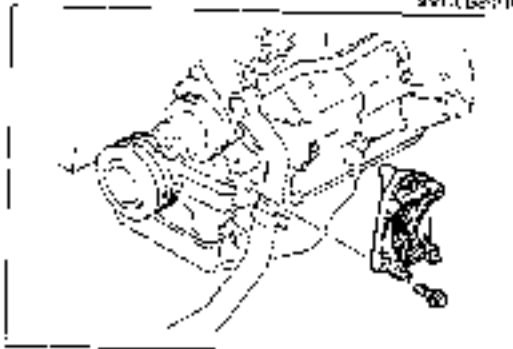
19–25 Nm (1.9–2.6 m·kg, 14–19 ft·lb)

5. Tighten the bolt.

**Tightening torque:**

19–25 Nm (1.9–2.6 m·kg, 14–19 ft·lb)

6. Connect the water hose to the BAC valve.



391.052 017

**A/C Compressor Bracket**

Install the A/C compressor bracket.

**Tightening torque:**

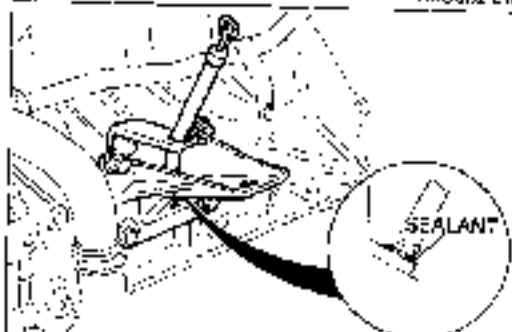
37–52 Nm (3.8–5.3 m·kg, 27–38 ft·lb)



391.052 012

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

1. Tap in the oil level gauge pipe



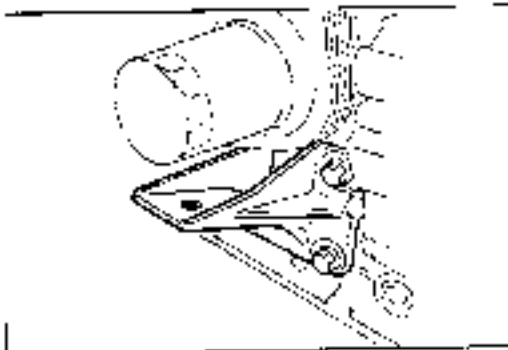
391.052 015

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 Nm (4.4–6.2 m·kg, 32–45 ft·lb)

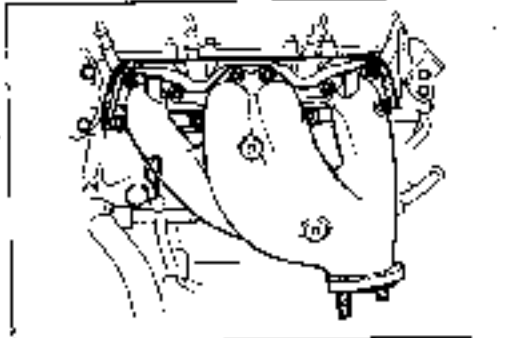
5. Install the oil level gauge.



8MU092-220

**Right Engine Mount**

Install the right engine mount.

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

8MU002-221

**Exhaust Manifold**

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

**Tightening torque:****22—28 Nm (2.2—2.9 m·kg, 16—21 ft·lb)**

8MU005-222

**Exhaust Manifold Insulator**

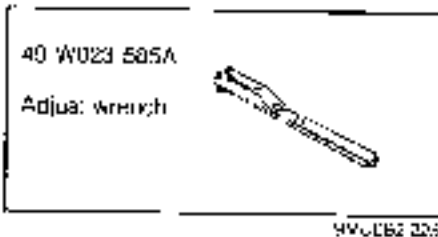
Install the exhaust manifold insulator.

**Tightening torque:****19—30 Nm (1.9—3.1 m·kg, 14—22 ft·lb)**

INSTALLATION

PREPARATION

SST

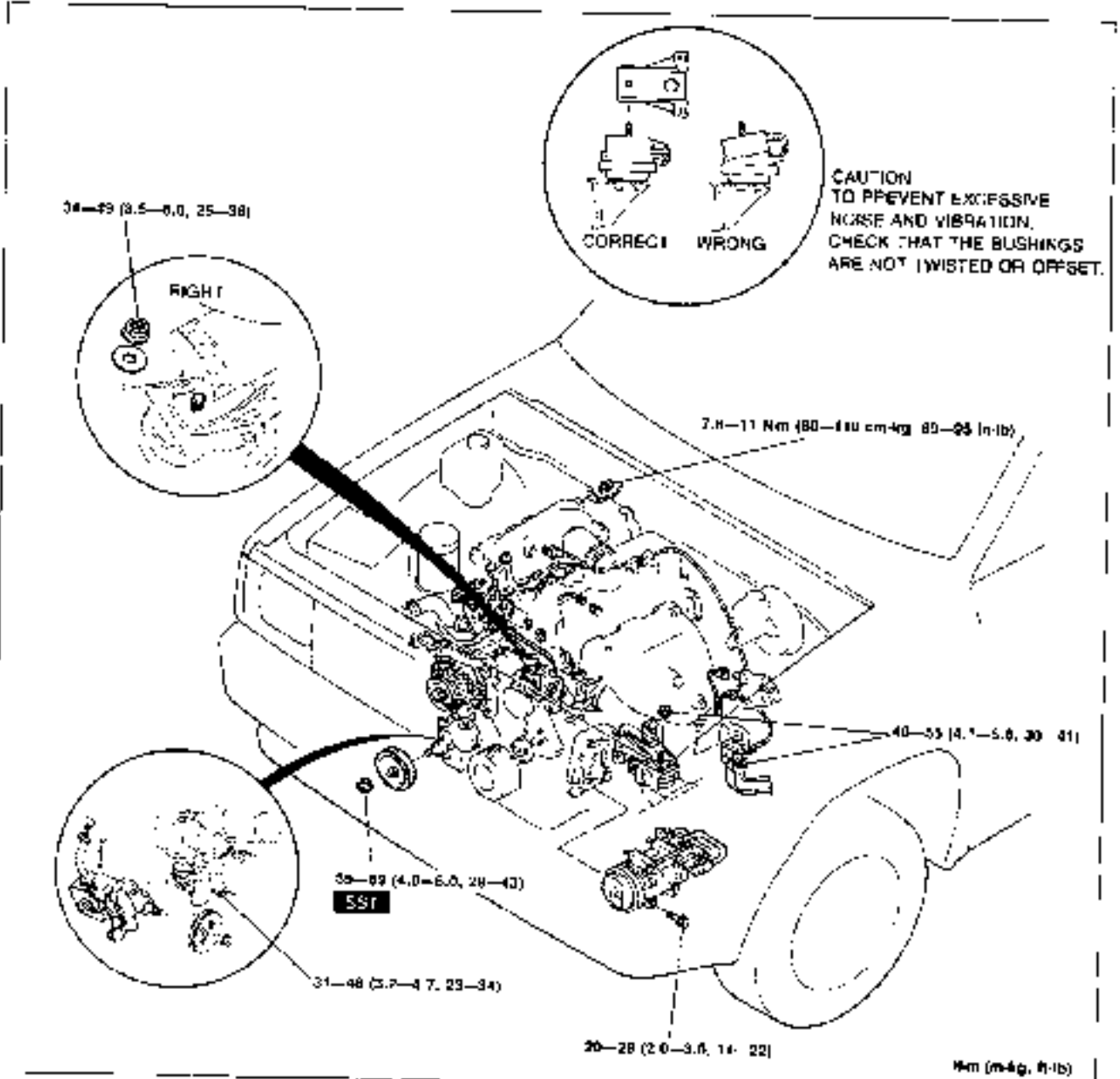


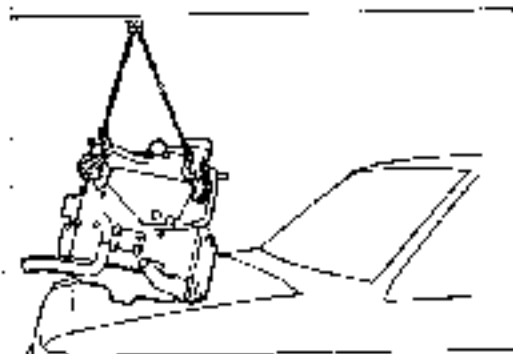
Tighten all bolts and nuts to the specified torques

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

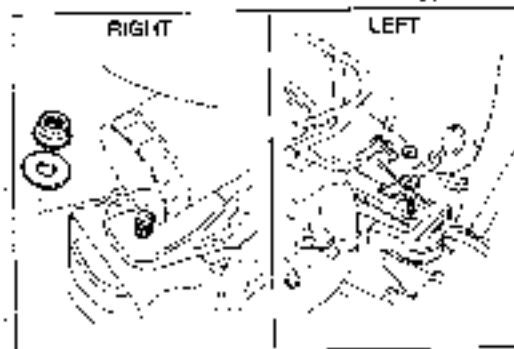
STEP 1

Torque Specifications

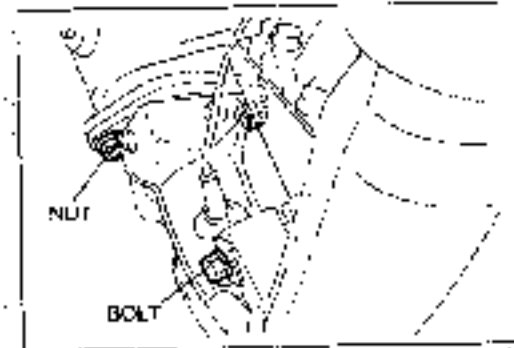




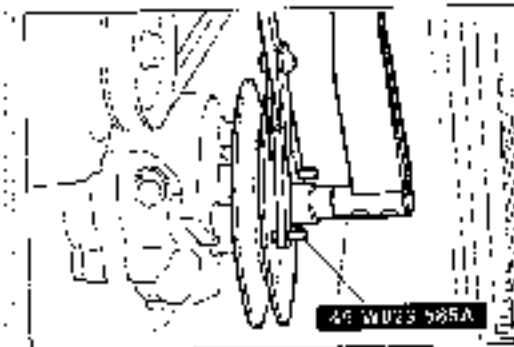
8910B2 246



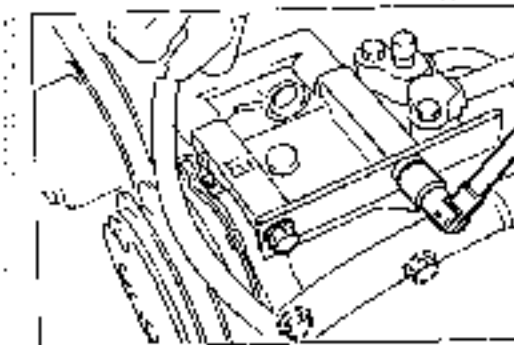
6D,082 C11



94U082-21



511K22 623



63,002 077

**Engine**

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

3. Tighten the engine mount nuts

**Tightening torque:**

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

**Exhaust Pipe and Bracket**

1. Install the exhaust pipe.

**Tightening torque**

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

2. Tighten the bracket bolt.

**Tightening torque**

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

**P/S Oil Pump**

1. Install the P/S oil pump

**Tightening torque:**

**31—46 Nm (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 Nm (4.0—6.0 m·kg, 29—43 ft·lb)**

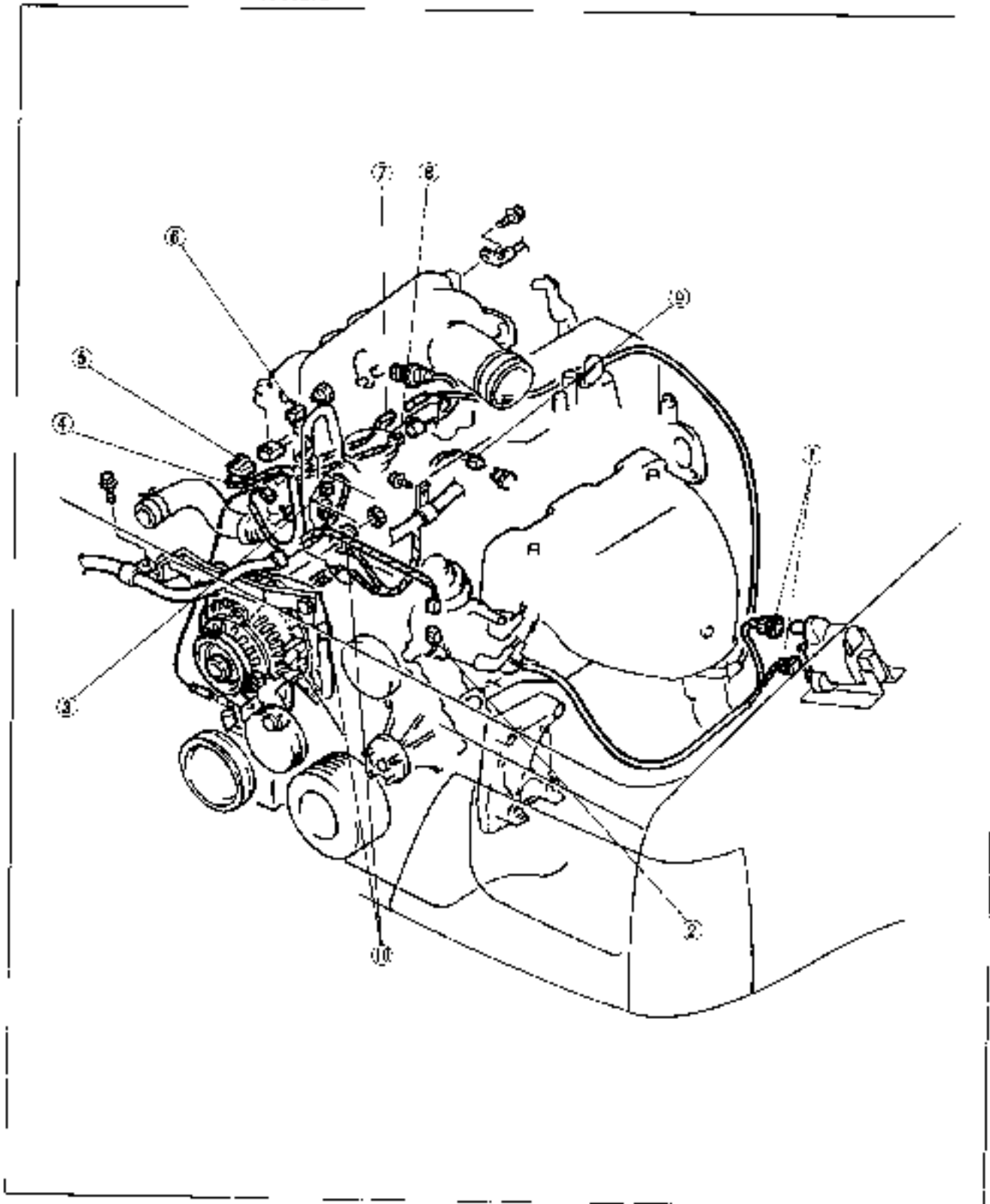
**A/C Compressor**

1. Install the A/C compressor.

**Tightening torque:**

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

Emission Harness Connectors

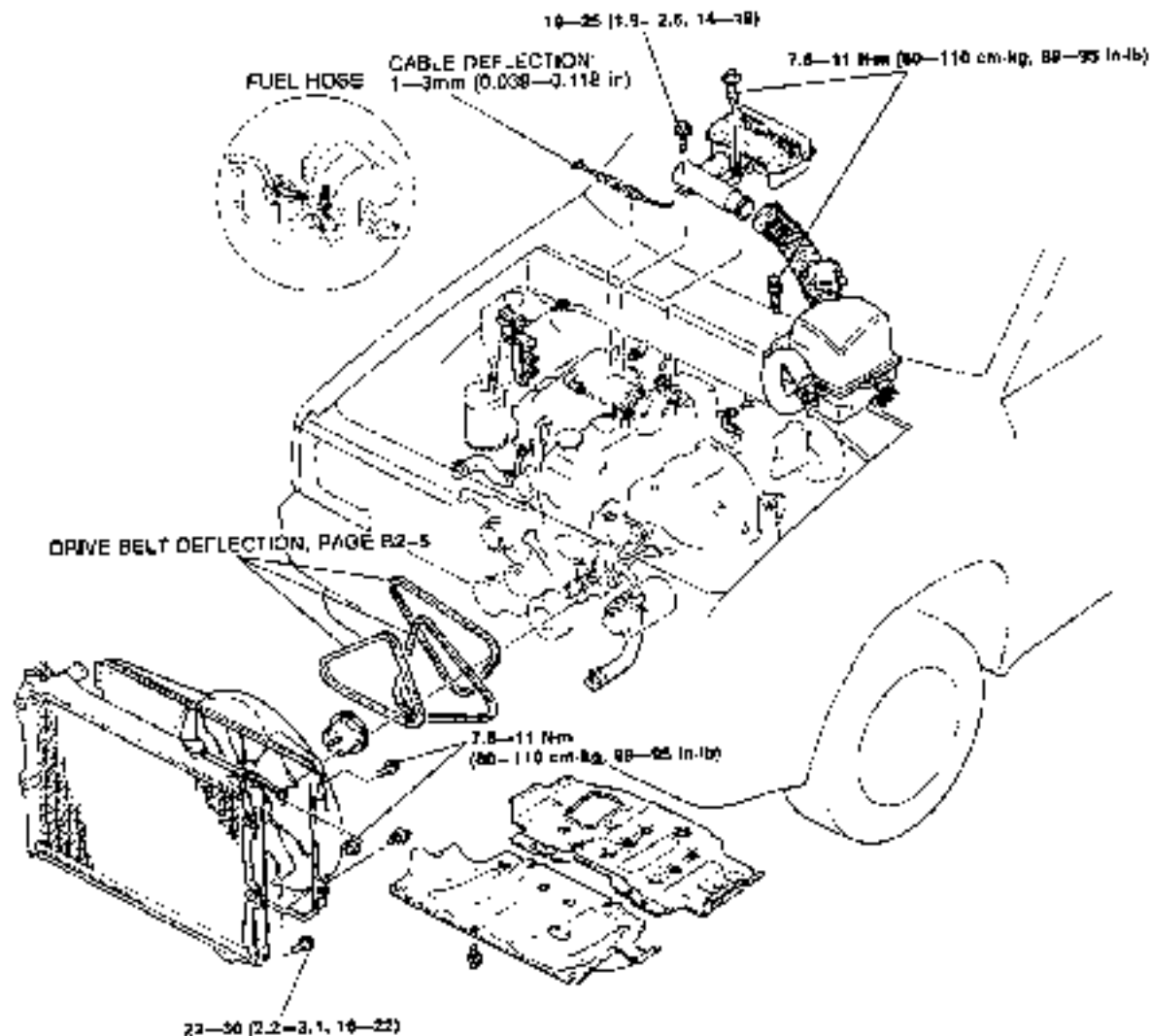


- 1. IG coil
- 2. Distributor
- 3. Water thermostat
- 4. Fuel gauge unit
- 5. Injector harness

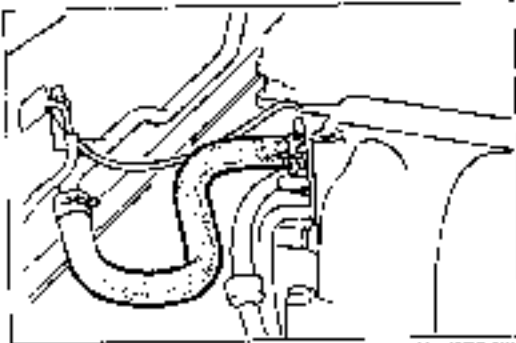
- 6. Intake air thermostat
- 7. Oxygen sensor
- 8. Idle switch
- 9. Oil pressure switch
- 10. Alternator

9FAU062 237

**STEP 3**  
**Torque Specifications**

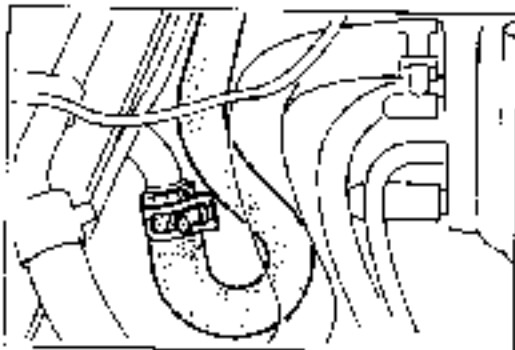


Nm (m-kg, ft-lb)  
 931.177-255



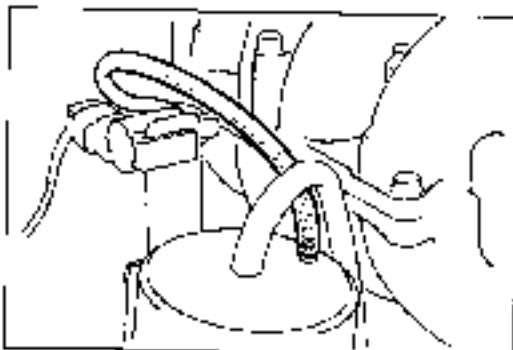
**Brake Vacuum Hose**  
 Connect the brake vacuum hose.

9M-J092 E3H



9M.003-240

**Heater Hose**  
Connect the heater hoses.



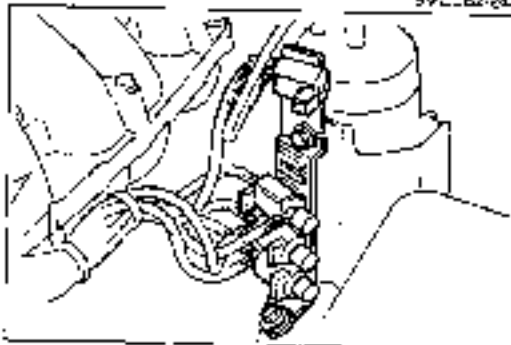
9M.039-241

**Canister Hose**  
Connect the canister hose.



9M.062-242

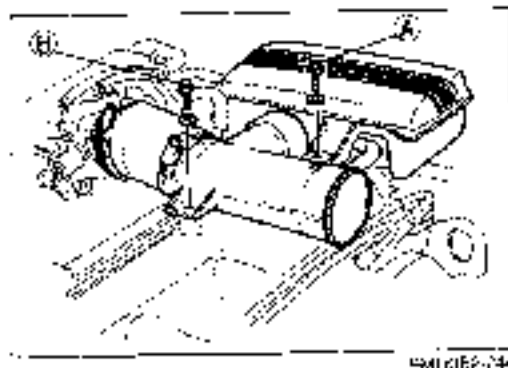
**Fuel Hoses**  
Connect the fuel hoses.



9M.067-243

**Solenoid Valve**  
1. Install the solenoid valve.  
**Tightening torque:**  
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)  
2. Connect the emission harness connector.

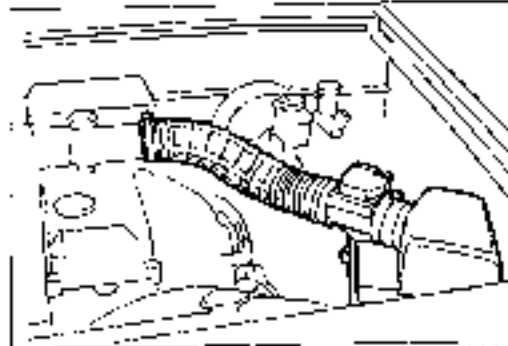




SWU01E2-044

**Resonance Chamber Assembly**

Install the resonance chamber assembly.

**Tightening torque****Bolt A:** 7.8–11 Nm (80–110 cm-kg, 69–95 in-lb)**Bolt B:** 19–25 Nm (1.9–2.6 m-kg, 14–19 ft-lb)

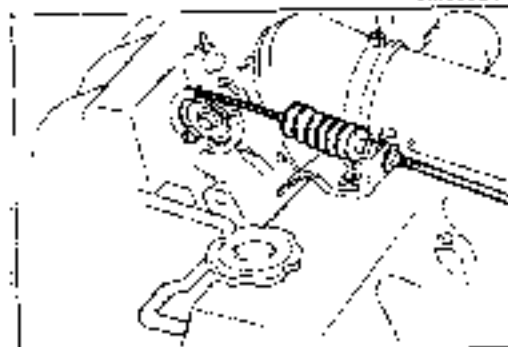
DNTJ0022-45

**Air Cleaner**

1. Install the air cleaner.

**Tightening torque:****7.8–11 Nm (80–110 cm-kg, 69–95 in-lb)**

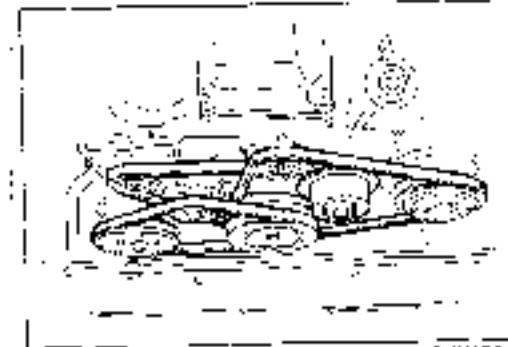
2. Connect the airflow meter connector.



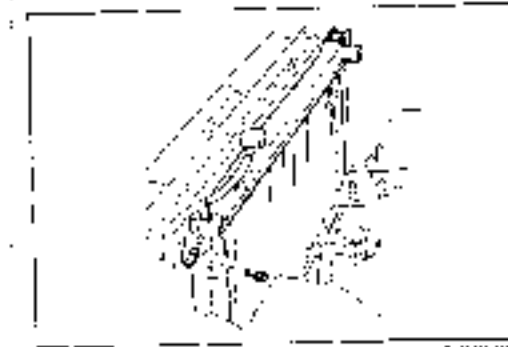
SWU01E2-046

**Accelerator Cable**

Install the accelerator cable.

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

SWU01E2-047

**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.**

SWU01E2-048

**Radiator**

1. Install the radiator.

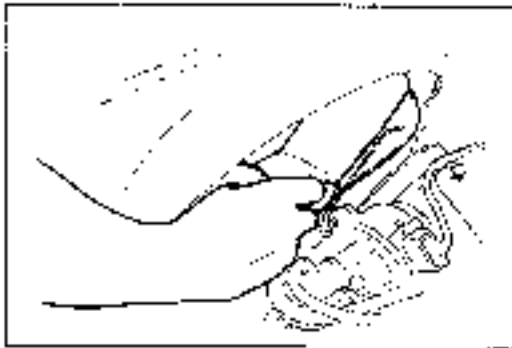
**Tightening torque:****22–30 Nm (2.2–3.1 m-kg, 16–22 ft-lb)**2. Connect the radiator harness, and coolant reservoir hose.  
3. Connect the oil cooler hoses. (AT)

- 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.

90A0162-240



90A022-647

**Cooling Fan and Radiator Cowling**

Install the cooling fan and radiator cowling.

**Tightening torque:**

7.8—11 N·m (80—110 cm·kg, 88—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.

90A022-014



# LUBRICATION SYSTEM

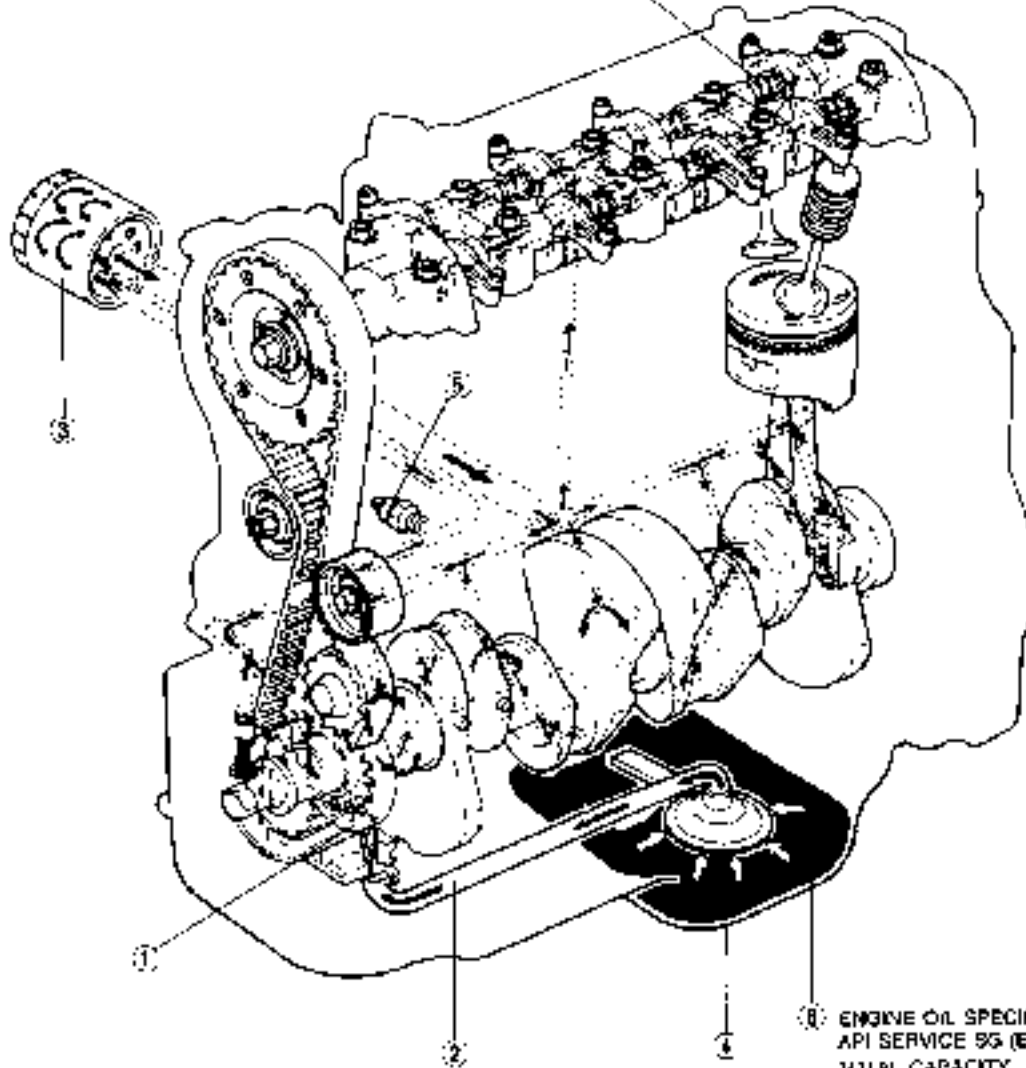
<b>INDEX</b> .....	<b>D- 2</b>
<b>OUTLINE</b> .....	<b>D- 4</b>
SPECIFICATIONS.....	<b>D- 4</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>D- 5</b>
<b>ON-VEHICLE INSPECTION</b> .....	<b>D- 5</b>
PREPARATION.....	<b>D- 5</b>
ENGINE OIL.....	<b>D- 5</b>
OIL PRESSURE.....	<b>D- 6</b>
<b>ON-VEHICLE MAINTENANCE</b> .....	<b>D- 7</b>
ENGINE OIL.....	<b>D- 7</b>
OIL FILTER.....	<b>D- 7</b>
OIL COOLER (G6 ENGINE).....	<b>D- 7</b>
OIL PAN.....	<b>D- 8</b>
OIL PUMP.....	<b>D-11</b>

CD: G6X 301

INDEX

B2200 (F2 ENGINE)

HYDRAULIC LASH ADJUSTER (H.L.A.)  
SERVICE SECTION B1

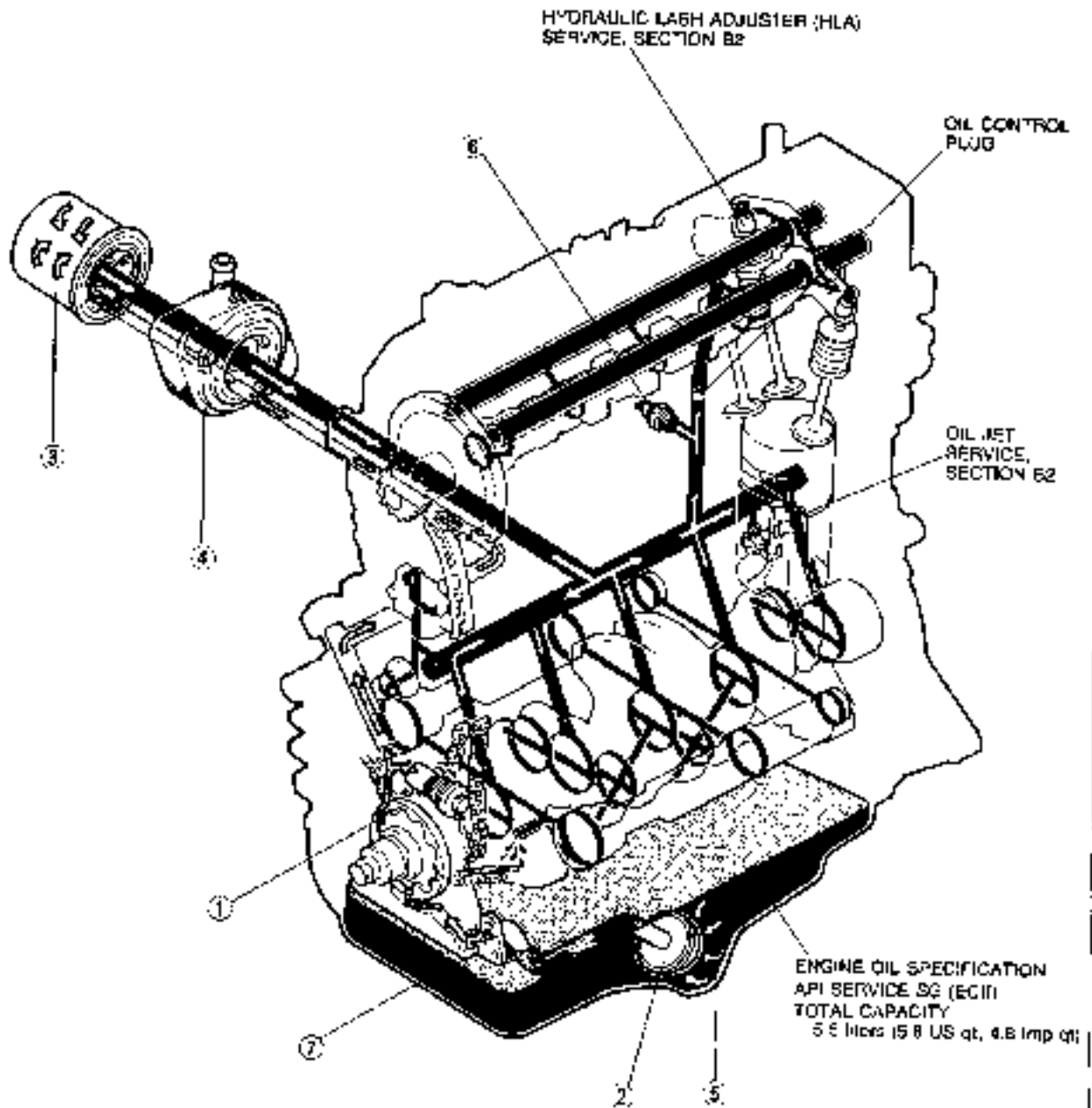


ENGINE OIL SPECIFICATION  
API SERVICE 95 (ECM)  
TOTAL CAPACITY  
4.6 liters (14.9 US qt., 4.0 Imp. qt.)

3M J00X-770

1. Oil pump		4. Oil pan	
Removal .....	page D-11	Removal .....	page D- 8
Installation .....	page D-15	Installation .....	page D-10
Disassembly .....	page D-12	5 Oil pressure	
Assembly.....	page D-14	Inspection .....	page D- 6
Inspection.....	page D-14	6 Engine oil	
2 Oil strainer		Inspection .....	page D- 5
Removal and Installation.....	page D-11	Replacement .....	page D- 7
3. Oil filter			
Replacement .....	page D- 7		

B2600 (G8 ENGINE)



- 1. Oil pump
  - Removal ..... page D-12
  - Installation ..... page D-15
  - Disassembly ..... page D-13
  - Assembly ..... page D-14
  - Inspection ..... page D-14
- 2. Oil strainer
- 3. Oil filter
  - Replacement ..... page D-7

- 4. Oil cooler
  - Removal and Installation, ... page D-7
- 5. Oil pan
  - Removal ..... pages D-8-9
  - Installation ..... page D-10
- 6. Oil pressure
  - Inspection ..... page D-6
- 7. Engine oil
  - Inspection ..... page D-5
  - Replacement, ..... page D-7

2-00000-013

## 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)

10J004-001

## 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)	75—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, 4.5)
	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)

10J004-002

## 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	5W-30									
	10W-30									

10J004-003

**TRUBLESHOOTING GUIDE**

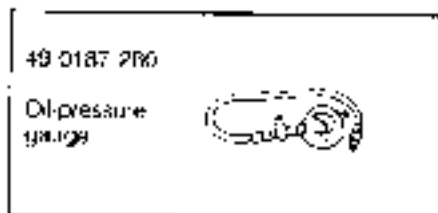
Problem	Possible Cause	Remedy	Page
Engine hard starting	Improper engine oil Insufficient engine oil	Replace Add oil	D-7 D-7
Excessive oil consumption	Oil working up or down Oil leakage	Refer to Section B1 (F2 engine) or B2 (G6 engine) Repair	-
Oil pressure drop	Insufficient oil Oil leakage Worn and/or damaged oil pump gear Worn plunger (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
Warning lamp illuminates while engine is running	Oil pressure drop Malfunction of oil pressure switch Malfunction of electrical system	As described above Refer to Section T Refer to Section T	-

97L C0X 007

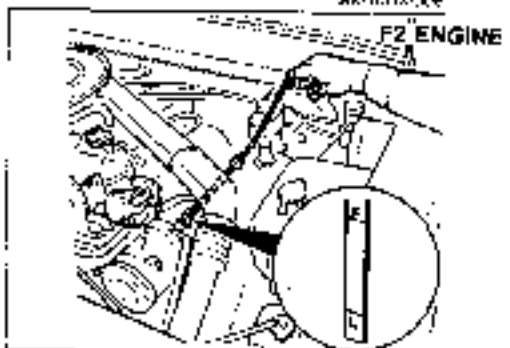
**ON-VEHICLE INSPECTION**

**PREPARATION**

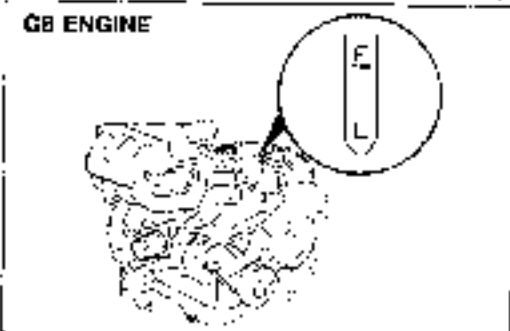
**SST**



97L C0X 007



97L C0X 007



97L C0X 007

**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.

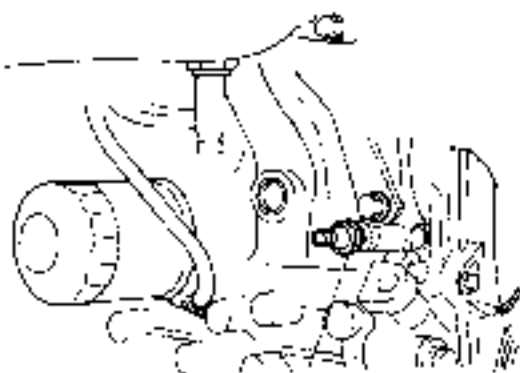
#### Oil pressure

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

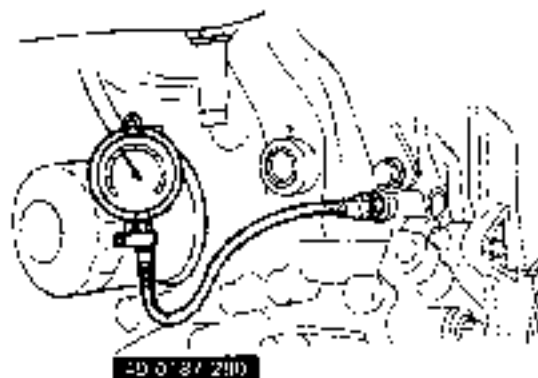
Engine	F2	G6
1,000 rpm	147-245 (1.6-2.6, 24-36)	108-206 (1.1-2.1, 16-30)
3,000 rpm	284-392 (3.0-4.0, 43-57)	304-402 (3.1-4.1, 44-58)

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

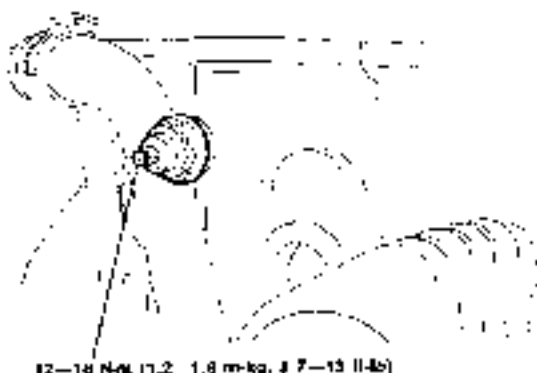
#### F2 ENGINE



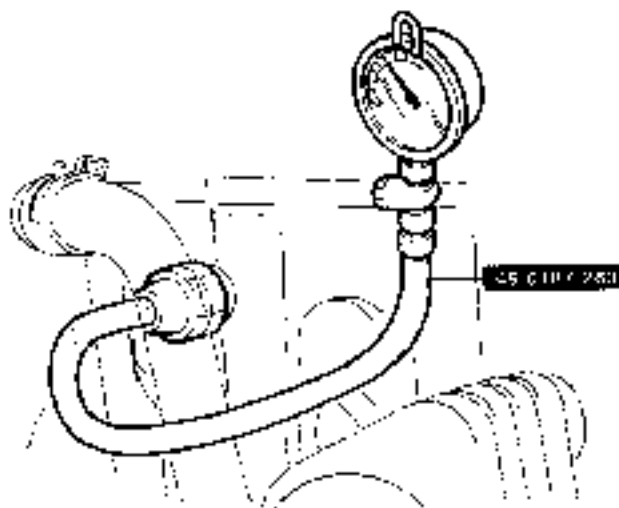
12-18 Nm (1.2-1.8 m·kg, 8.7-13 ft·lb)



#### G6 ENGINE



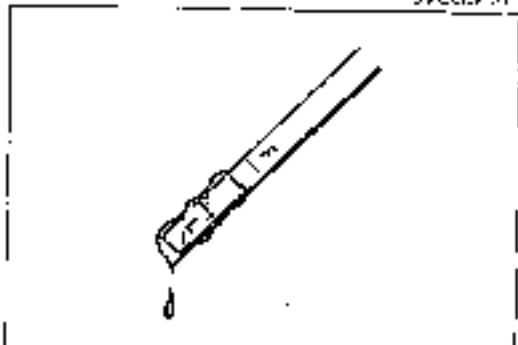
12-18 Nm (1.2-1.8 m·kg, 8.7-13 ft·lb)



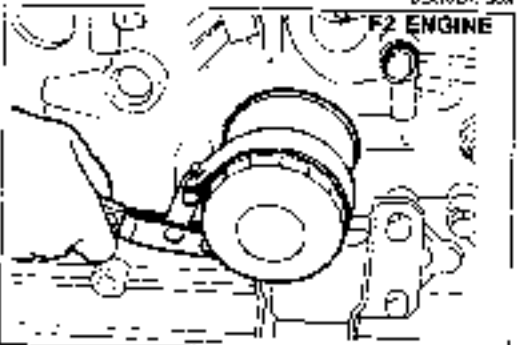
ELX170X03



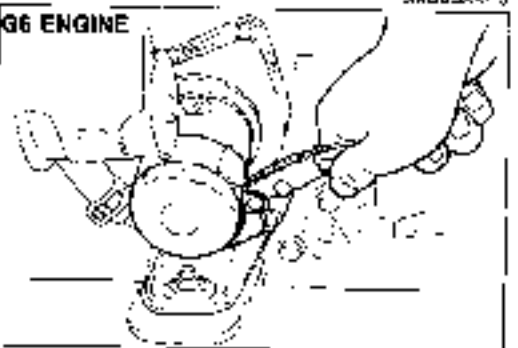
39LCC7 011



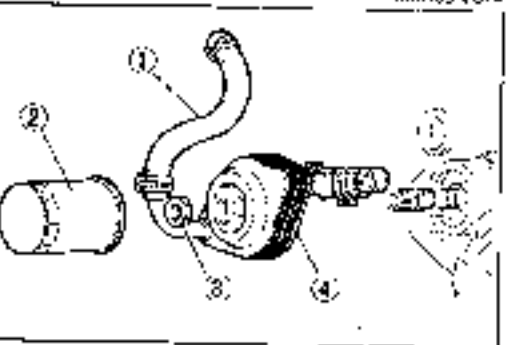
39LDDX 009



39AUG2X 610



39MDDX 014



39LDDX 004

## ON-VEHICLE MAINTENANCE

### ENGINE OIL Replacement

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the oil filter 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 Nm (3.0—4.2 m·kg, 22—30 ft·lb)**

5. Refill the engine with the specified type and amount of engine oil.
6. Refill the oil filter 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 Nm (3.0—4.0 m·kg, 22—29 ft·lb)**

# D

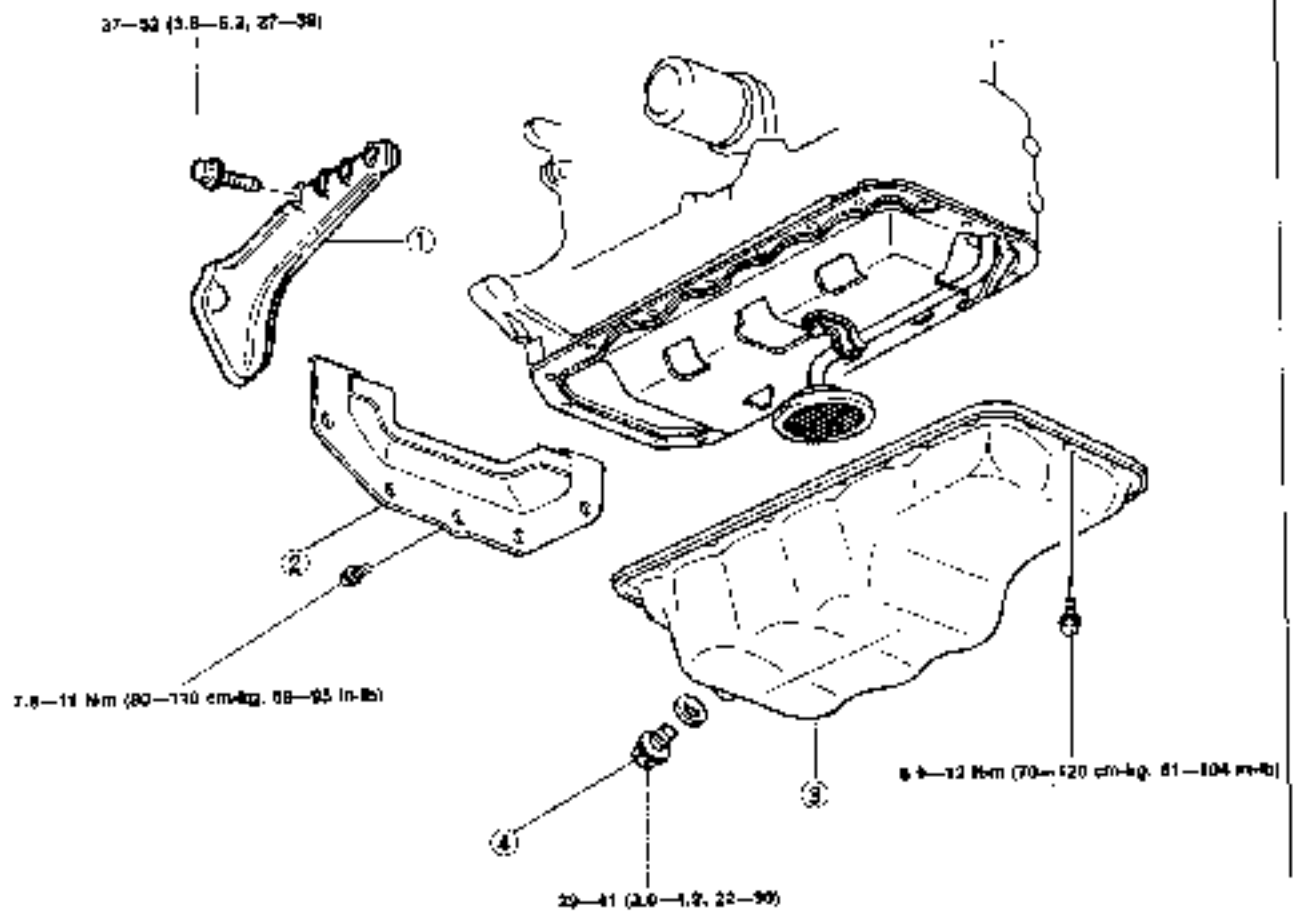
## ON-VEHICLE MAINTENANCE (OIL PAN)

### 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.

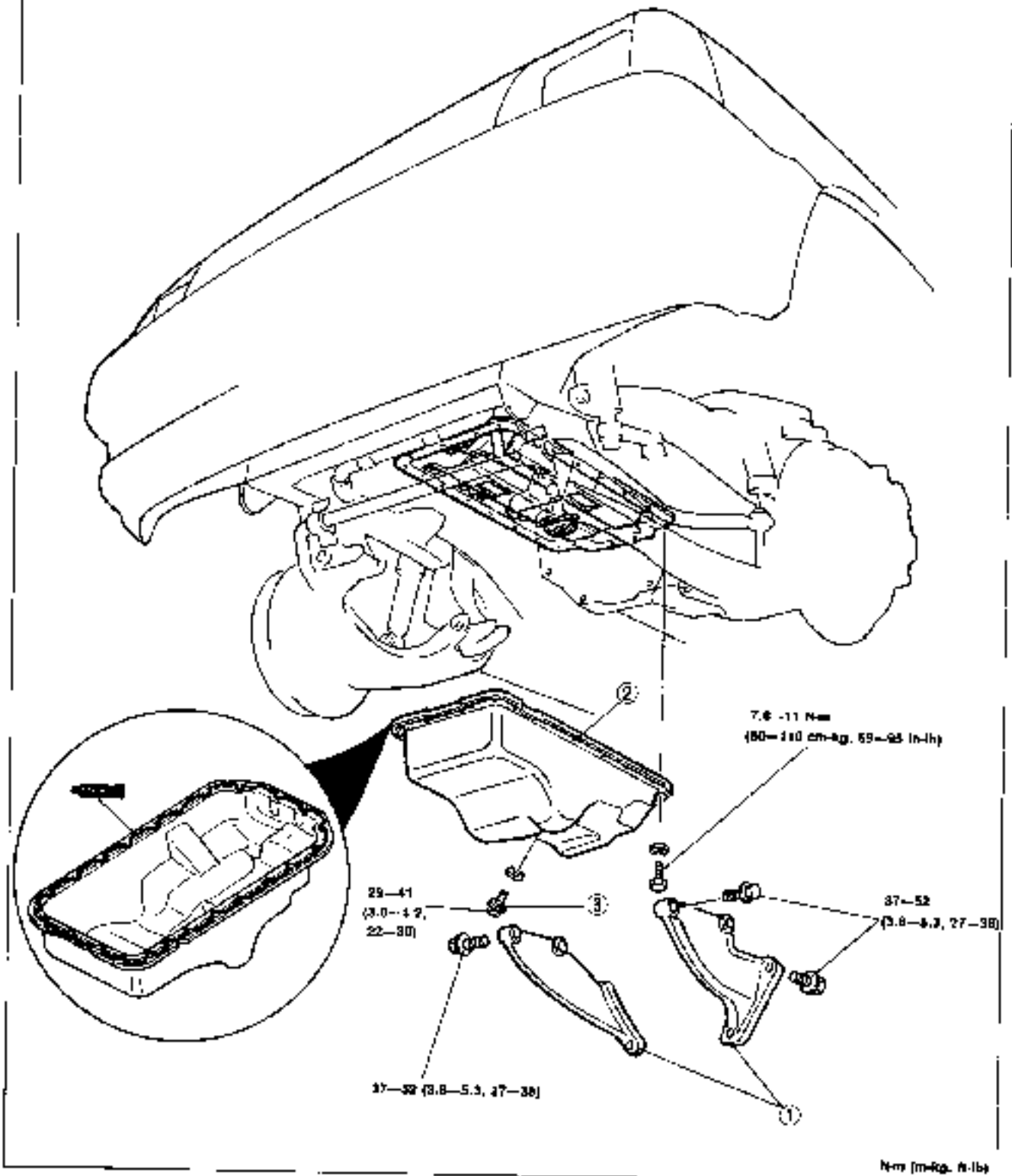
#### F2 ENGINE



1. Gusset plate
2. Clutch undercover
3. Oil pan  
Inspect for cracks, deformation, or damage

4. Drain plug  
Inspect for damage to threads

6B ENGINE



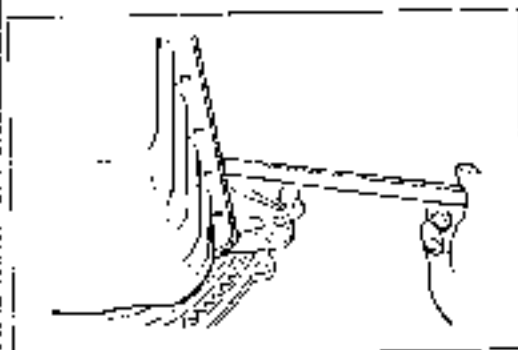
- 1 Gasket plate
- 2 Oil pan  
Inspect for cracks, deformation, or damage

- 3 Drain plug  
Inspect for damage to threads

N-m (m-kg, ft-lb)  
5B.27X-006

# D

## ON-VEHICLE MAINTENANCE (OIL PAN)



9MUD1000R

### 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**

#### G6 ENGINE



9B100X-01\*

### 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.

#### F2 ENGINE



#### G6 ENGINE



8D100X-01\*

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:

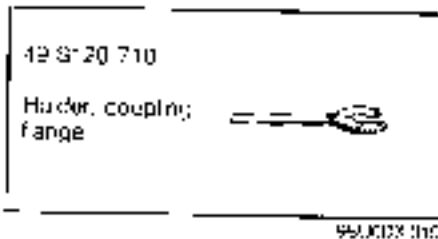
- |  |           |
|--|-----------|
| 6.9—12 N·m<br>(70—120 cm·kg, 51—104 in·lb) ..... | F2 Engine |
| 7.8—11 N·m<br>(80—110 cm·kg, 69—95 in·lb) .....  | G6 Engine |

### 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.

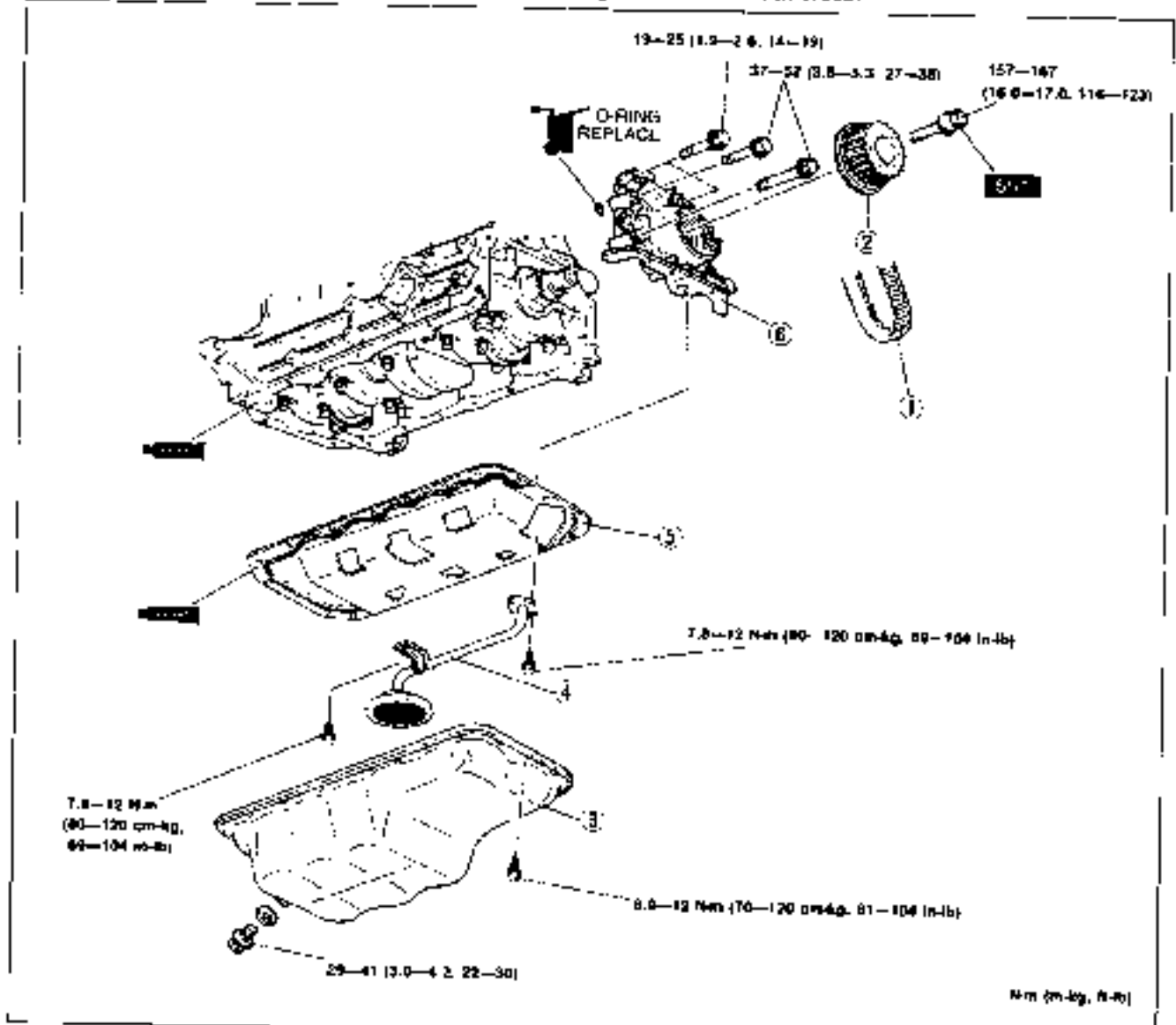
9MUD00X-000

**OIL PUMP**  
Preparation  
SST



**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**.

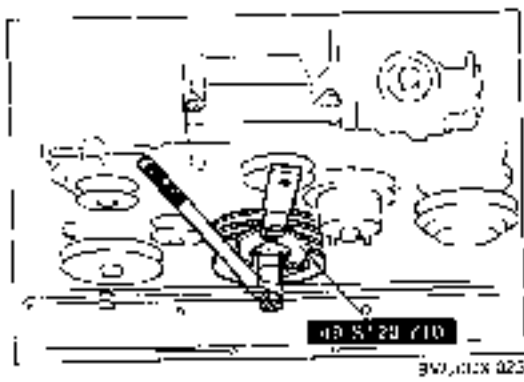


- |                                      |                 |
|--------------------------------------|-----------------|
| 1. Timing belt (Refer to Section B1) | 4. Oil strainer |
| 2. Timing belt pulley                | 5. Stiffener    |
| 3. Oil pan                           | 6. Oil pump     |

99JULX 001

# 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

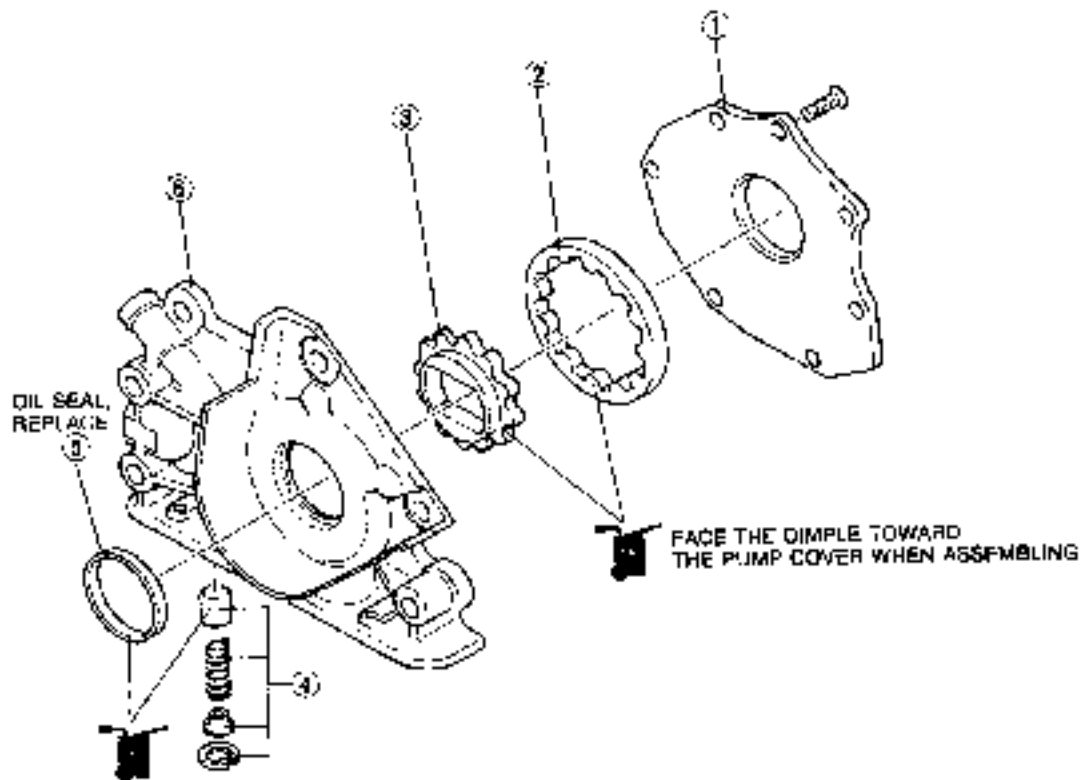
#### G6 Engine

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.

#### F2 ENGINE

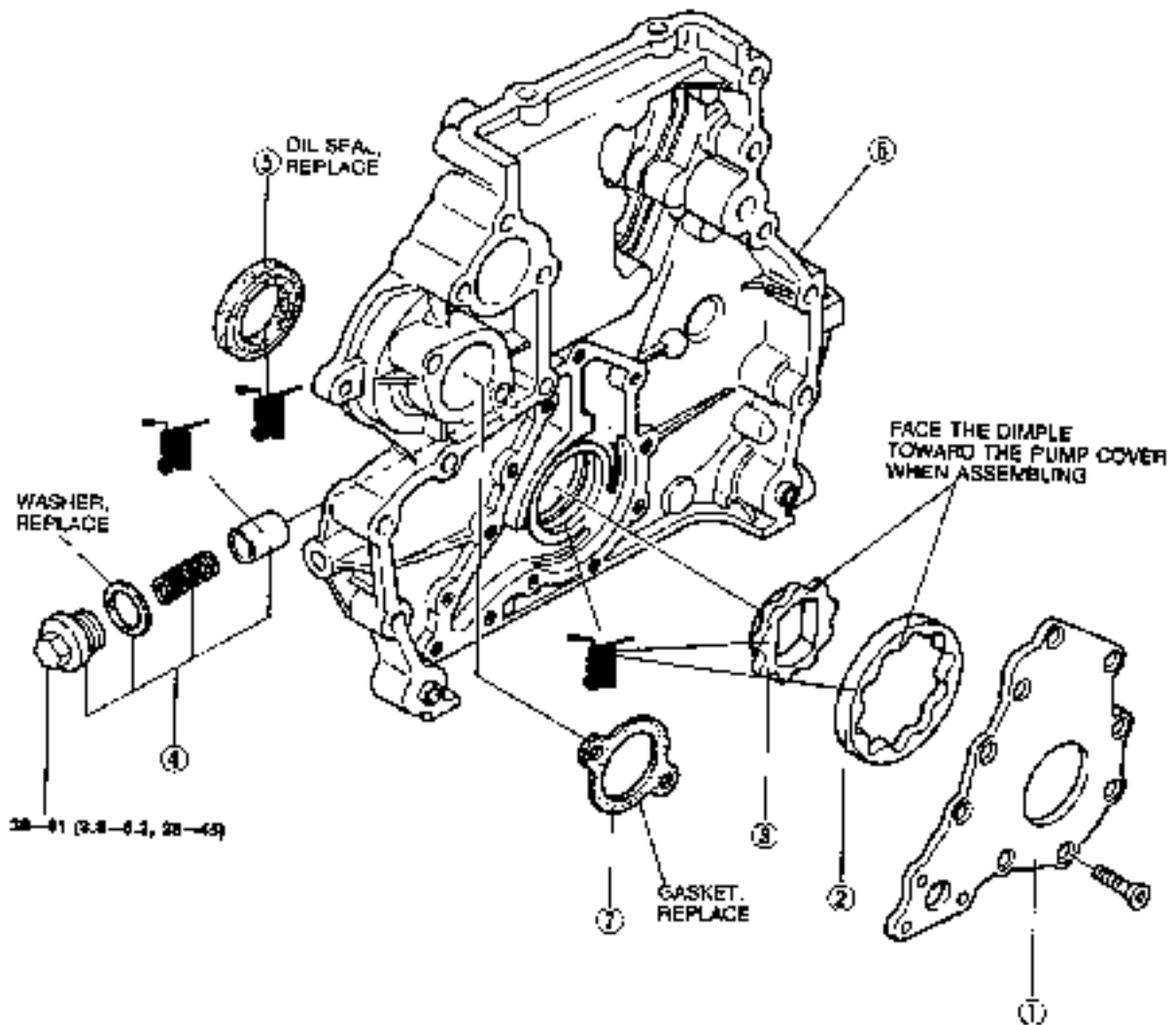


391,00X-002

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

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

G6 ENGINE

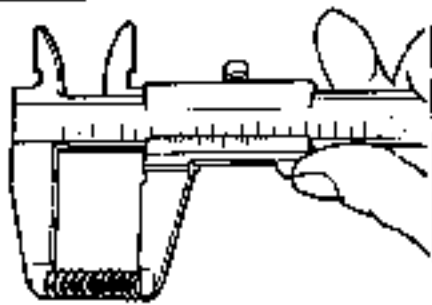


- 1. Pump cover
- 2. Outer rotor
- 3. Inner rotor

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

Hyd (28-41, 28-43)  
SAFARI 025



**D****ON-VEHICLE MAINTENANCE (OIL PUMP)**

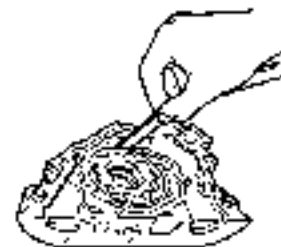
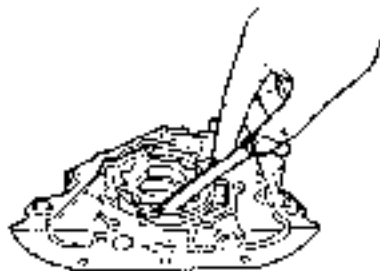
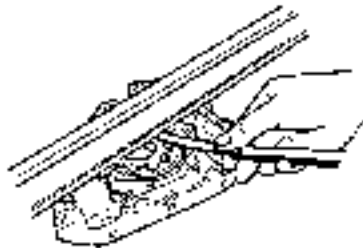
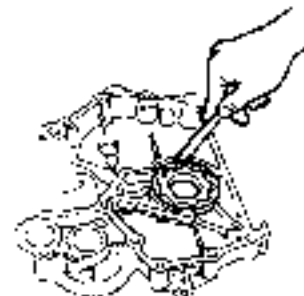
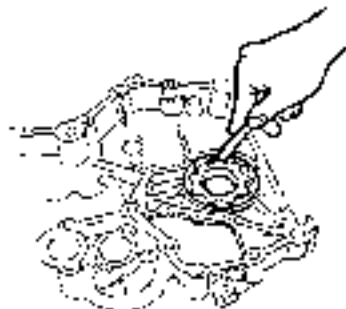
SMU30X-048

**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**

HB1024-0-2

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

**Tooth tip clearance:**  
0.15mm (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**.

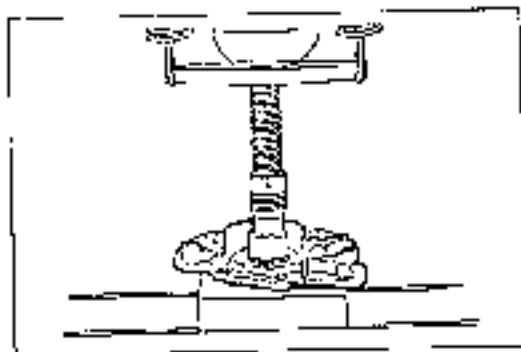
**Assembly note****Oil seal**

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

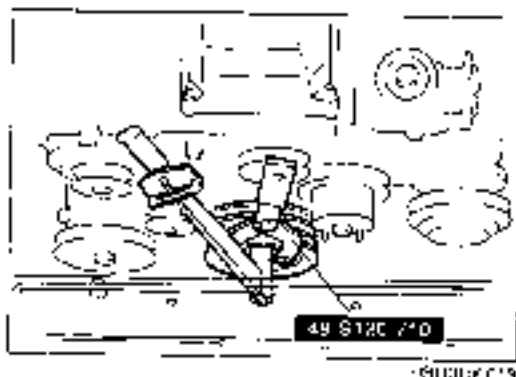
**Oil seal outer diameter: 48mm (1.89 in)... F2 Engine**  
**60mm (2.36 in)... G6 Engine**

**Caution**

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



SMU30X-048

**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.



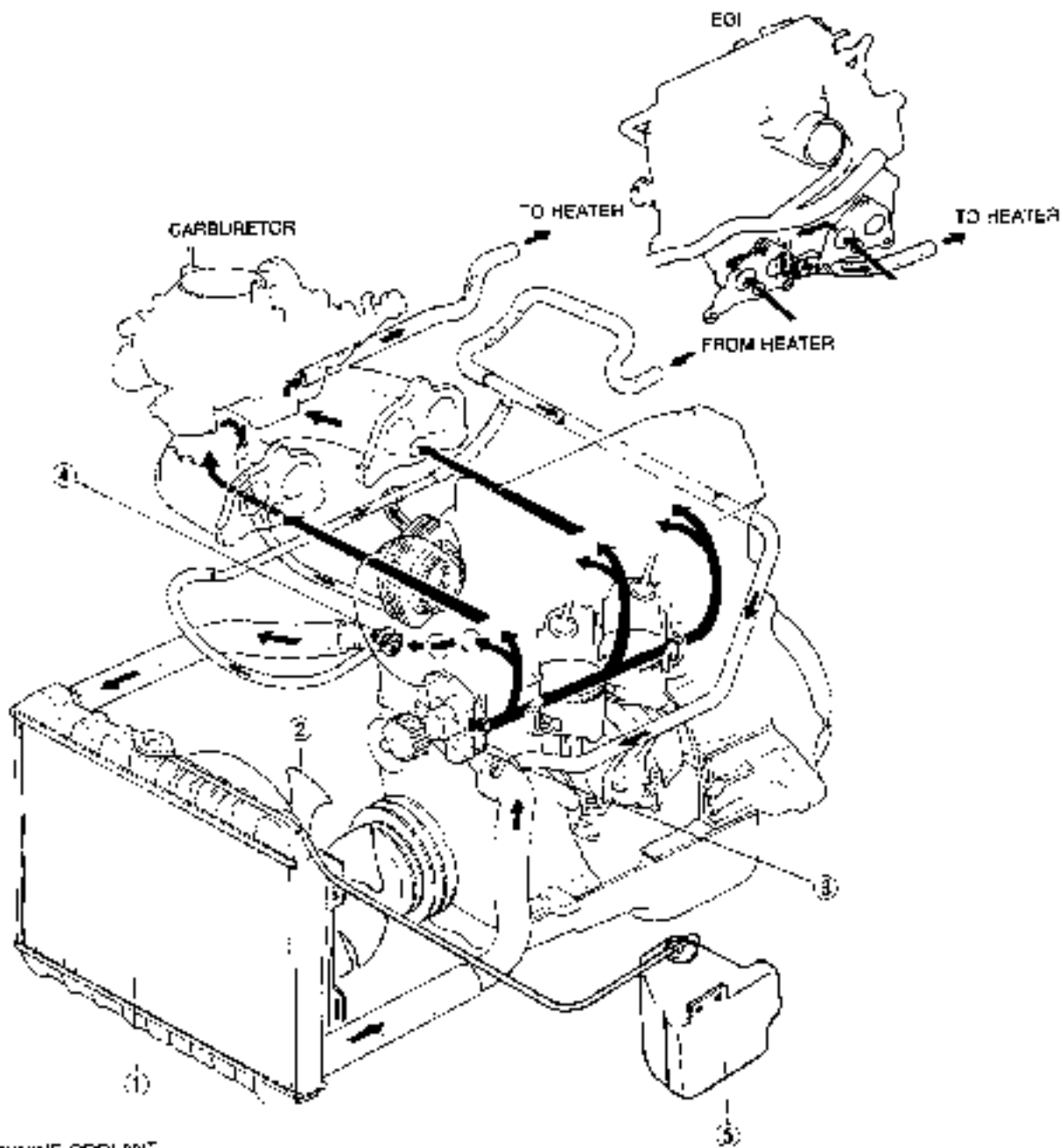
# COOLING SYSTEM

<b>INDEX</b> .....	<b>E- 2</b>
<b>OUTLINE</b> .....	<b>E- 4</b>
SPECIFICATIONS .....	<b>E- 4</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>E- 4</b>
<b>ON-VEHICLE INSPECTION</b> .....	<b>E- 5</b>
PREPARATION .....	<b>E- 5</b>
ENGINE COOLANT .....	<b>E- 5</b>
REPLACEMENT .....	<b>E- 6</b>
AIR BLEEDING AND REFILLING SYSTEM .....	<b>E- 6</b>
RADIATOR CAP .....	<b>E- 7</b>
COOLING FAN .....	<b>E- 7</b>
<b>ON-VEHICLE MAINTENANCE</b> .....	<b>E- 8</b>
RADIATOR .....	<b>E- 8</b>
WATER PUMP .....	<b>E- 9</b>
THERMOSTAT .....	<b>E-11</b>

28L02X401

INDEX

62200 (F2 ENGINE)



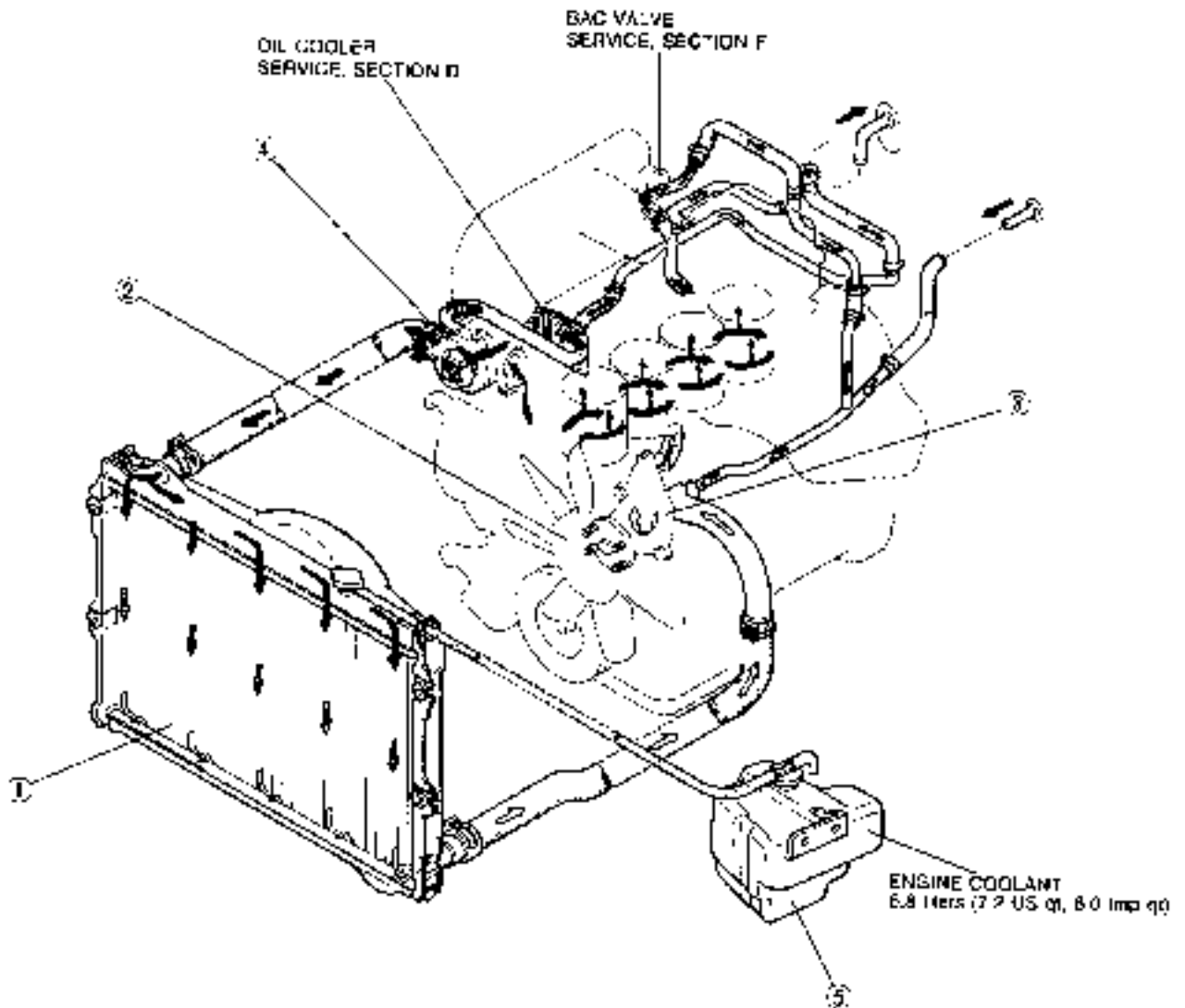
ENGINE COOLANT  
 WITH HEATER: 7.5 liters (7.9 US qt, 6.61 imp qt)  
 WITHOUT HEATER: 7.0 liters (7.4 US qt, 6.2 imp qt)

92A06EX-022

1 Radiator	
Removal, inspection, and	
Installation.....	page E- 7
2 Cooling fan	
Removal and installation.....	page E- 7
Inspection.....	page E 6

3 Water pump	
Removal, inspection, and	
Installation.....	page E 8
4. Thermostat	
Removal.....	page E-10
Inspection.....	page E 11
Installation.....	page E-11
5. Coolant reservoir	

B2600i (G6 ENGINE)



279LCEX 003

- 1. Radiator  
Removal, Inspection, and  
Installation ..... page E- 7
- 2. Cooling fan  
Removal and Installation ..... page E- 7  
Inspection ..... page E- 8

- 3. Water pump  
Removal, Inspection, and  
Installation ..... pages E- 8, 9
- 4. Thermostat  
Removal ..... page E-10  
Inspection ..... page E-11  
Installation ..... page E-11
- 5. Coolant reservoir

# E

## OUTLINE, TROUBLESHOOTING GUIDE

### 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, 5.6)	7.5 (7.9, 5.6)	
		Without heater	6.0 (7.3, 5.1)	6.0 (7.3, 5.1)	
Water pump	Type		Centrifugal		
	Water seal		Unleak mechanical seal		
Thermocets:	Type		Wax	Wax, two-stage	
	Opening temperature	°C (°F)	66.5 (89.5) (189—193)	Main: 95.5—89.5 (188—193) Sub: 83.5—80.5 (182—188)	
	Full-open temperature	°C (°F)	103 (212)	100 (212)	
	Full-open lift	mm (in)	6.5 (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	58—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	320 (15.0)	410 (16.1)
		A/T	410 (16.1)	—	

1903EX-00




### TROUBLESHOOTING GUIDE

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

9M03EX-002

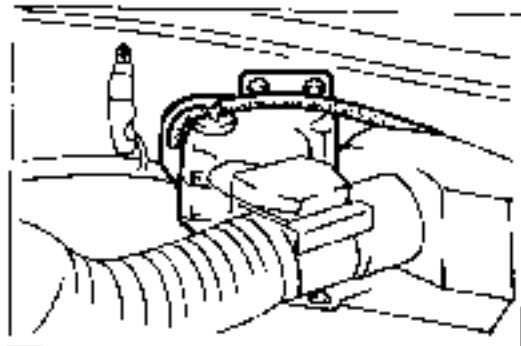
ON-VEHICLE INSPECTION

PREPARATION  
SST

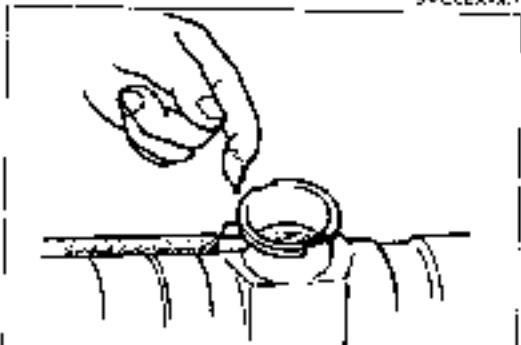
<p>49 9200 145</p> <p>Radiator cap tester adapter set:</p> 	<p>49 9200 146</p> <p>Adapter A (Part of 49 9200 145):</p> 	<p>49 9200 147</p> <p>Adapter B (Part of 49 9200 145):</p> 
--	---	--

3ML0EX 006

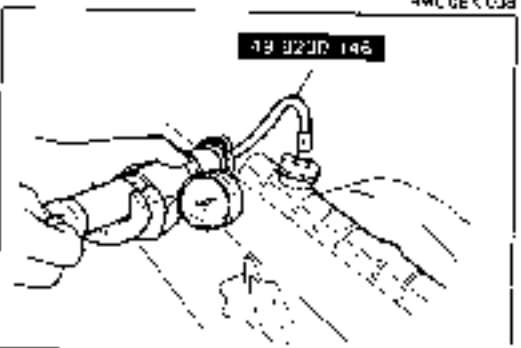
E



3ML0EX 007



4ML0EX 033



5ML0EX 005

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.

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.

Coolant Leakage

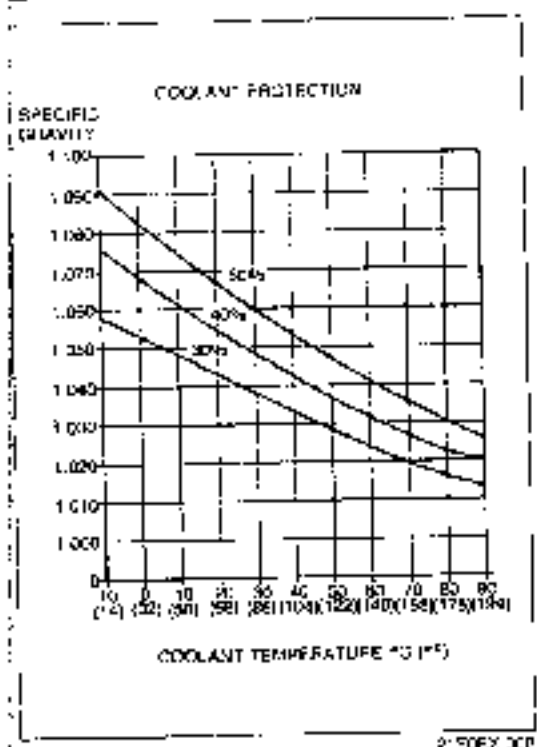
1. Connect a tester and SST to the radiator inlet port.
2. Apply 103 kPa (1.05 kg/cm<sup>2</sup>, 15 psi) pressure to the system.
3. Check that the pressure is held.  
If not, check for coolant leakage.

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.



# E REPLACEMENT, AIR BLEEDING AND REFILLING SYSTEM



## Coolant Protection

### Caution

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

- Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.
- 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 -18°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

CSJLX-110

## REPLACEMENT

### Warning

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

### Caution

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

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

## AIR BLEEDING AND REFILLING SYSTEM

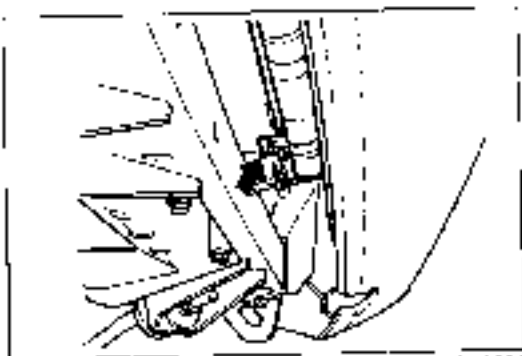
When the coolant is drained, bleed the cooling system after refilling it.

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

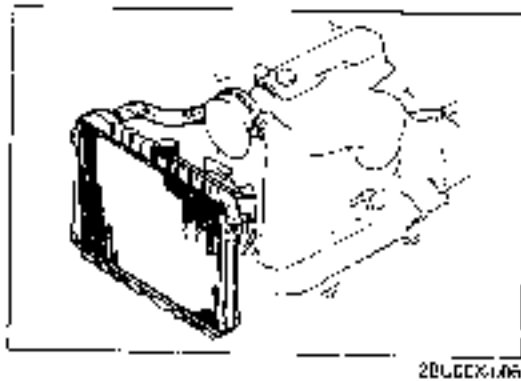
**Filling pace: 2 l (2.1 US qt, 1.8 Imp qt)/min. max.**

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

2SLC1X-110



2SLC1X-110



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

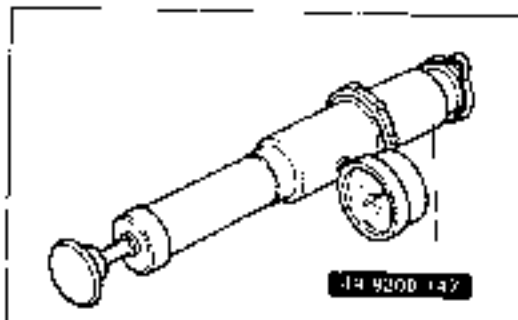
**Caution**

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.

5. Run the engine above idle several times as specified:

**Speed: 2,200—2,800 rpm x 5 sec.**

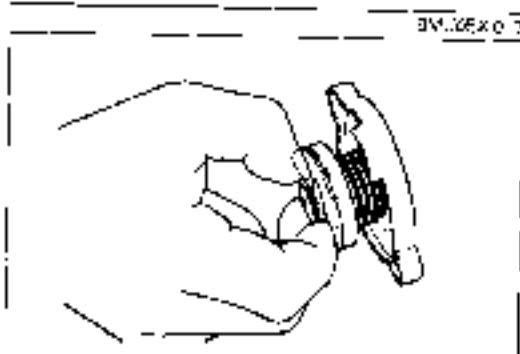
6. Stop the engine and wait till the system is cooled down. Remove the radiator cap and check the coolant level. If the coolant level has dropped, repeat the operation from Step 1.



**RADIATOR CAP**

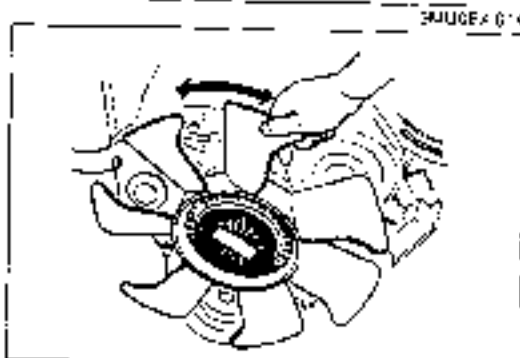
**Radiator Cap Valve**

1. Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. 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).
3. Wait about 10 seconds; then check that the pressure has not decreased.



**Negative Pressure Valve**

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



**COOLING FAN**

**Inspection**

1. Inspect the following items. Replace if necessary.
  - (1) Fluid leakage from the fan-drive clutch
  - (2) Deformation of the bimetal
  - (3) Excessive play of the cooling fan bearing
  - (4) Grease leakage from the cooling fan bearing
2. 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

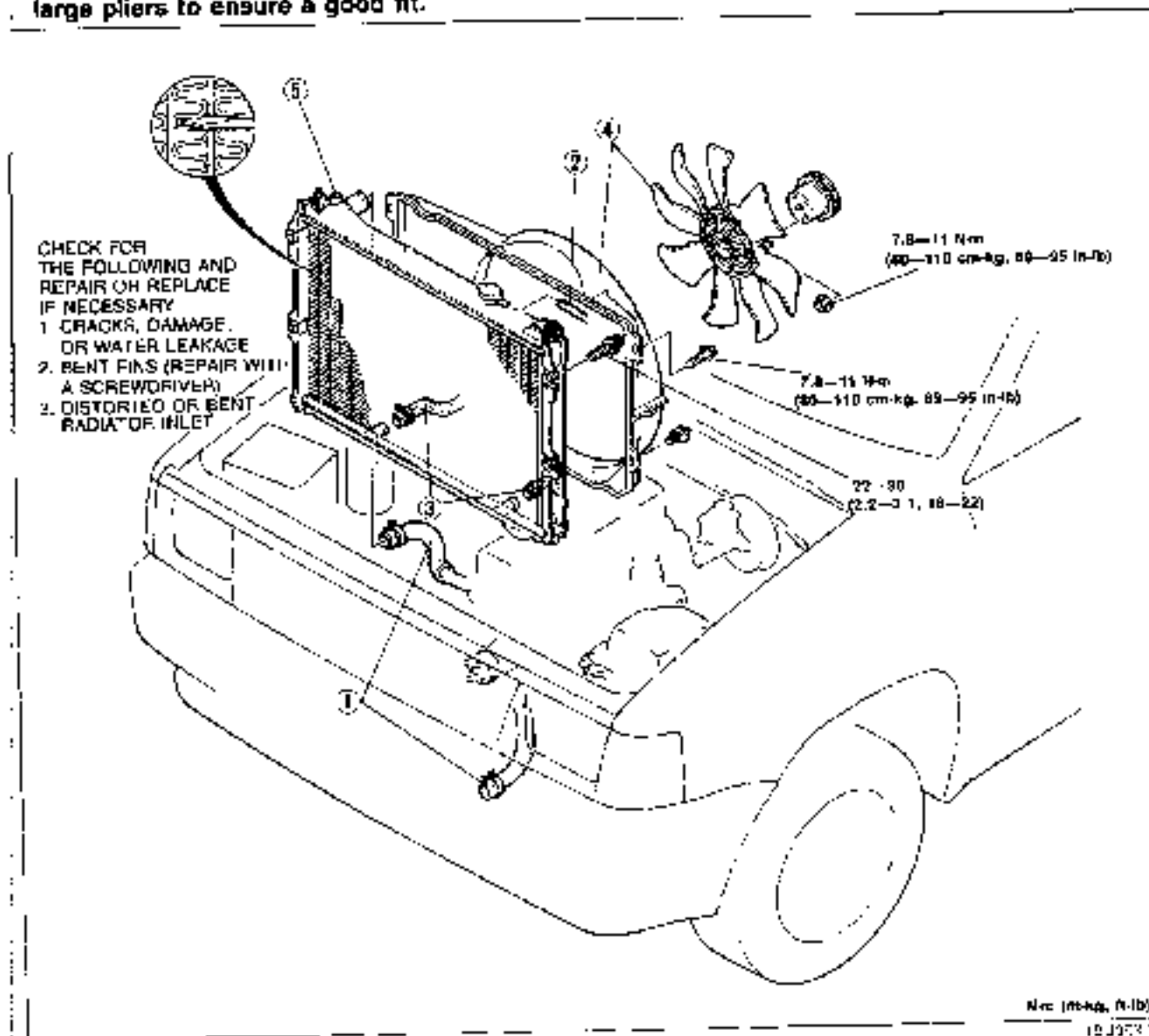
1. Drain the engine coolant.
2. Remove in the order shown in the figure.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal.

#### 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 (AT)

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.

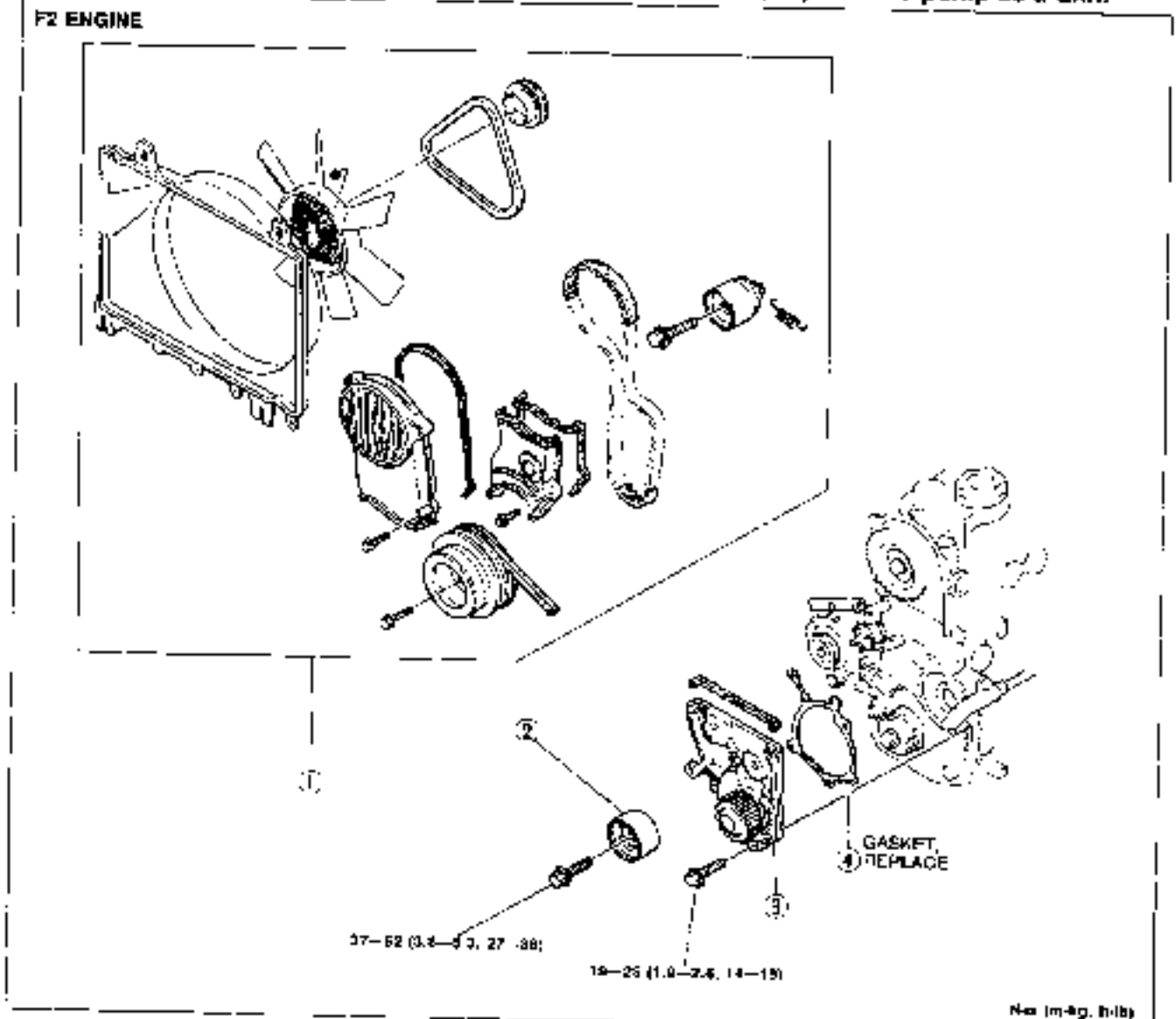
**Caution**

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**

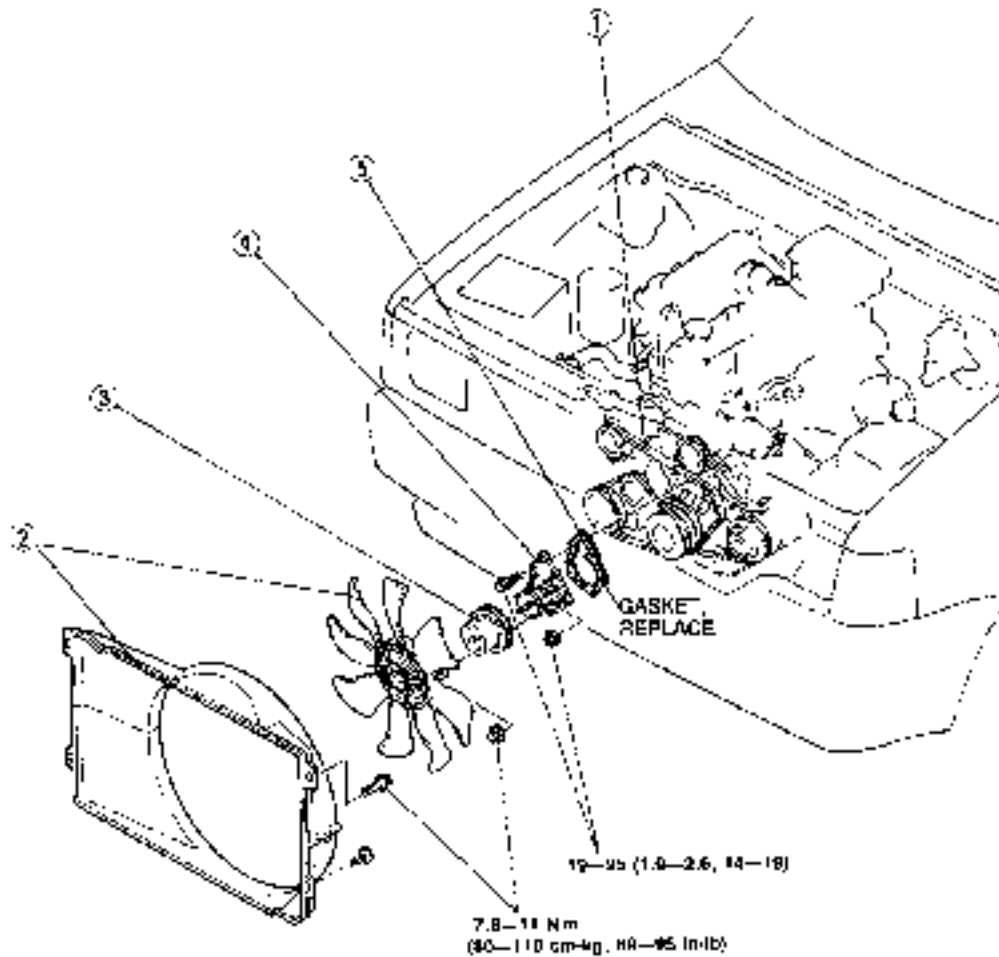
Do not disassemble the water pump. If a problem is found, replace the pump as a unit.



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

## G6 ENGINE



88MJ0-0079

- 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.

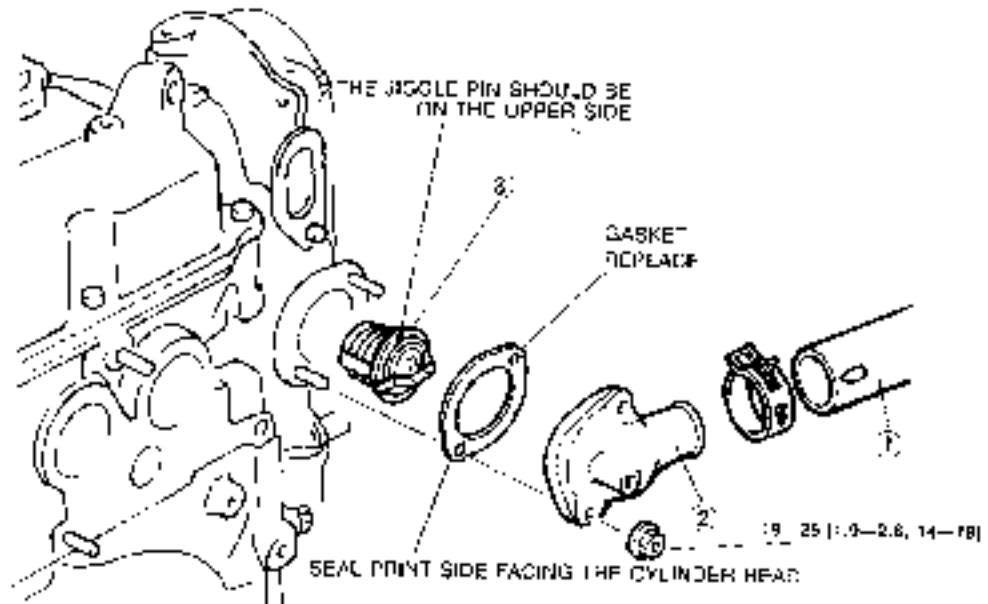
88JURLX 001

**THERMOSTAT**

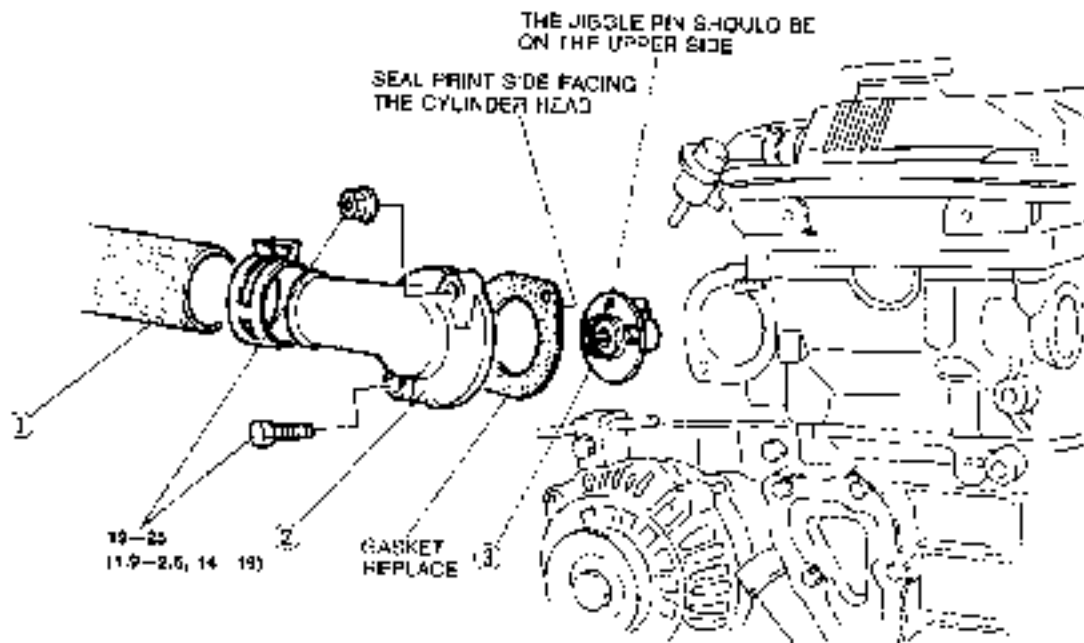
**Removal**

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

**F2 ENGINE**



**G8 ENGINE**



Nm (ft-lb) 11-1b  
SAFARI

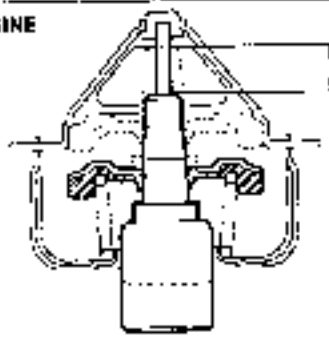
1. Upper radiator hose
2. Thermostat cover

3. Thermostat inspection ..... page E-12

# E

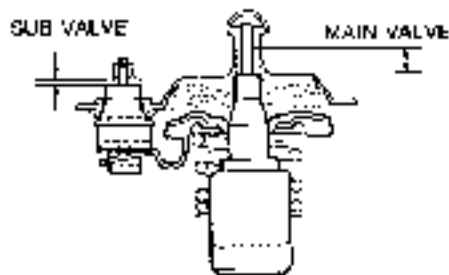
## ON-VEHICLE MAINTENANCE (THERMOSTAT)

### F2 ENGINE



JALCO 4025

### G6 ENGINE



ORION EX 075

### 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)		66.5—89.5 (188—193)	Main: 66.5—88.5 (188—193)
			Sub: 83.5—95.5 (182—198)
Full-open temperature °C (°F)		100 (212)	100 (212)
Full-open lift: mm (in)		3.5 (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.

JALCO 4025

### 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.

ORION EX 025

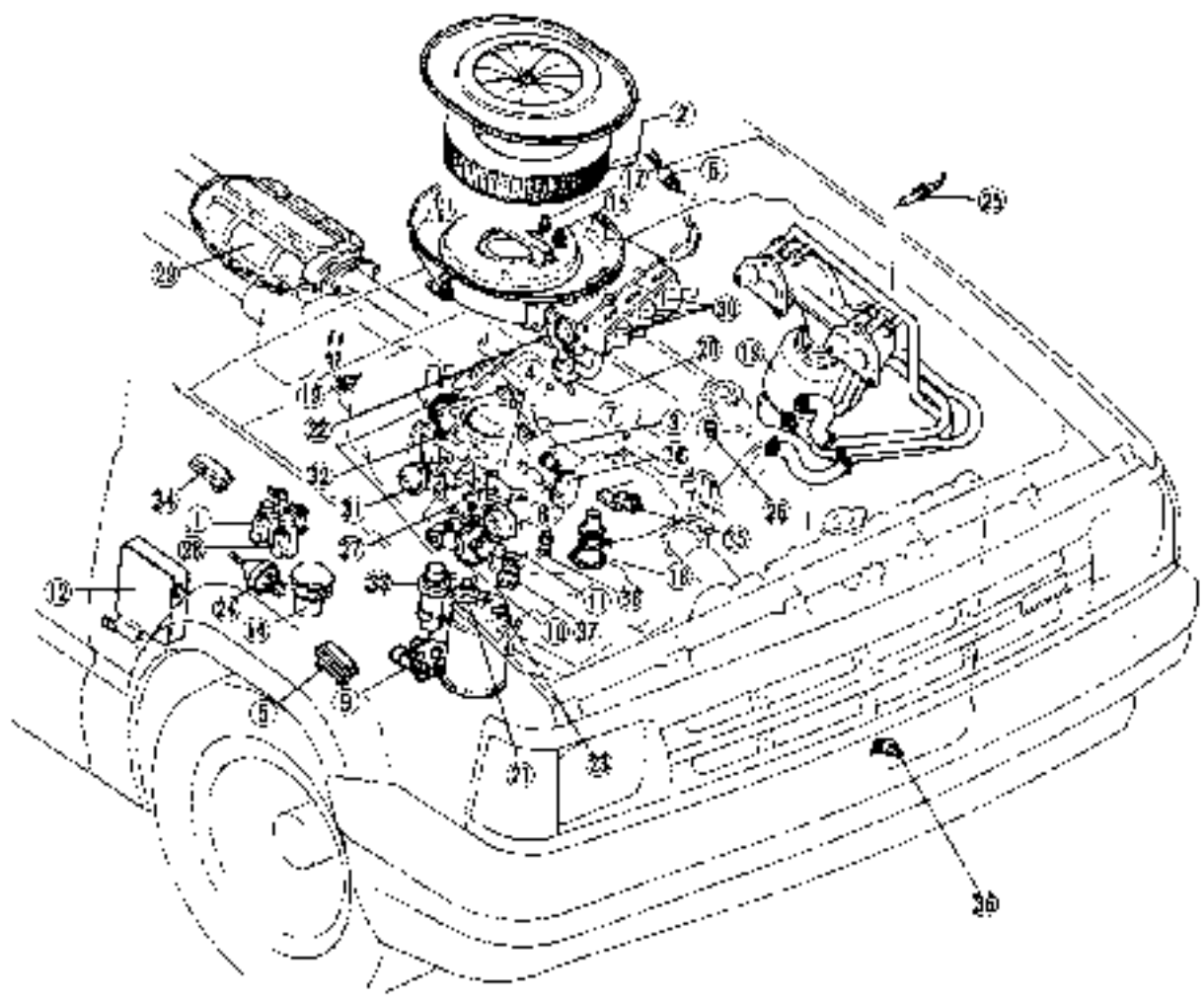
# FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR)

INDEX.....	F1- 2	ALTITUDE COMPENSATION SYSTEM..	F1- 76
OUTLINE.....	F1- 6	HIGH-ALTITUDE COMPENSATOR... ..	F1- 76
SYSTEM DIAGRAM.....	F1- 6	<b>AIR INTAKE TEMPERATURE CONTROL</b>	
COMPONENT DESCRIPTIONS.....	F1- 7	<b>SYSTEM</b> .....	F1- 77
VACUUM HOSE ROUTING DIAGRAM.....	F1- 10	CONTROL VALVE.....	F1- 77
SPECIFICATIONS.....	F1- 12	<b>HOT-IDLE COMPENSATION SYSTEM...</b>	F1- 78
<b>TROUBLESHOOTING GUIDE</b> .....	F1- 13	IDLE COMPENSATOR.....	F1- 78
HOW TO USE THIS SECTION.....	F1- 13	<b>ACCELERATOR CABLE</b> .....	F1- 78
DIAGNOSTIC INDEX.....	F1- 15	<b>POSITIVE CRANKCASE VENTILATION</b>	
SYMPTOM TROUBLESHOOTING.....	F1- 18	<b>(PCV) SYSTEM</b> .....	F1- 79
<b>FEEDBACK SYSTEM</b> .....	F1- 52	PCV VALVE.....	F1- 79
PREPARATION.....	F1- 52	<b>VACUUM CONTROL VALVE (VCV)</b>	
SYSTEM INSPECTION.....	F1- 53	<b>SYSTEM</b> .....	F1- 80
AIR/FUEL (A/F) SOLENOID VALVE.....	F1- 54	VACUUM CONTROL VALVE.....	F1- 80
OXYGEN SENSOR.....	F1- 55	<b>AIR CLEANER</b> .....	F1- 80
IDLE CLUTCH, NEUTRAL, AND		AIR CLEANED ELEMENT.....	F1- 80
AIR-CONDITIONER SIGNALS.....	F1- 56	<b>FUEL SYSTEM</b> .....	F1- 81
<b>AIR INJECTION SYSTEM</b> .....	F1- 58	FUEL PUMP (ELECTRICAL TYPE).....	F1- 82
SYSTEM INSPECTION.....	F1- 59	FUEL PUMP (MECHANICAL TYPE).....	F1- 83
No.1 AIR CONTROL VALVE.....	F1- 59	FUEL PUMP CONTROL UNIT.....	F1- 83
No.2 AIR CONTROL VALVE.....	F1- 60	FUEL FILTER.....	F1- 83
REFD VALVE.....	F1- 60	FUEL TANK.....	F1- 84
ACV SOLENOID VALVE.....	F1- 60	FUEL CHECK VALVE.....	F1- 84
<b>EXHAUST GAS RECIRCULATION</b>		FUEL CUT VALVE.....	F1- 84
<b>(EGR) SYSTEM</b> .....	F1- 61	CARBURETOR.....	F1- 85
SYSTEM INSPECTION.....	F1- 62	<b>CONTROL SYSTEM</b> .....	F1- 95
EGR CONTROL VALVE.....	F1- 62	PREPARATION.....	F1- 95
EGR POSITION SENSOR.....	F1- 63	TROUBLESHOOTING WITH	
DUTY SOLENOID VALVE.....	F1- 63	S.F.F-DIAGNOSIS CHECKER.....	F1- 97
<b>DECELERATION CONTROL SYSTEM</b> ...	F1- 65	WATER TEMPERATURE SWITCH.....	F1-105
SYSTEM INSPECTION.....	F1- 66	IDLE SWITCH.....	F1-105
SLOW FUEL CUT SOLENOID VALVE..	F1- 67	CLUTCH SWITCH.....	F1-105
COASTING RICHEN SOLENOID VALVE	F1- 67	NEUTRAL SWITCH.....	F1-105
VACUUM SOLENOID VALVE.....	F1- 67	INHIBITOR SWITCH.....	F1-108
MIXTURE CONTROL VALVE.....	F1- 68	ATMOSPHERIC PRESSURE SENSOR..	F1-106
DASHPOT (FOR M/T).....	F1- 68	WATER THERMOSENSOR.....	F1-106
<b>EVAPORATIVE EMISSION CONTROL</b>		VACUUM SENSOR.....	F1-107
<b>(EEC) SYSTEM</b> .....	F1- 69	INTAKE AIR THERMOSENSOR.....	F1-107
SYSTEM INSPECTION.....	F1- 70	EGR POSITION SENSOR.....	F1-107
No.1 PURGE CONTROL VALVE.....	F1- 70	OXYGEN SENSOR.....	F1-107
No.2 PURGE CONTROL VALVE.....	F1- 71	ENGINE CONTROL UNIT.....	F1-108
No.3 PURGE CONTROL VALVE.....	F1- 71	<b>IDLE ADJUSTMENT</b> .....	F1-112
WATER THERMOVALVE.....	F1- 71	IDLE SPEED.....	F1-112
CHECK-AND-CUT VALVE.....	F1- 71	IDLE MIXTURE.....	F1-112
AIR VENT SOLENOID VALVE.....	F1- 72	<b>IDLE-UP SYSTEM</b> .....	F1-114
PURGE SOLENOID VALVE.....	F1- 72	IDLE-UP FOR A/T OR A/C.....	F1-114
<b>CATALYTIC CONVERTER</b> .....	F1- 74	IDLE UP FOR A/T WITH A/C	
INSPECTION.....	F1- 74	(DUAL SERVO DIAPHRAGM).....	F1-115
<b>PTC HEATER SYSTEM</b> .....	F1- 75	IDLE-UP SOLENOID VALVE.....	F1-116
PTC HEATER.....	F1- 75	<b>MalFUNCTION INDICATOR</b>	
PTC HEATER RELAY.....	F1- 75	<b>LIGHT (MIL)</b> .....	F1-117



INDEX

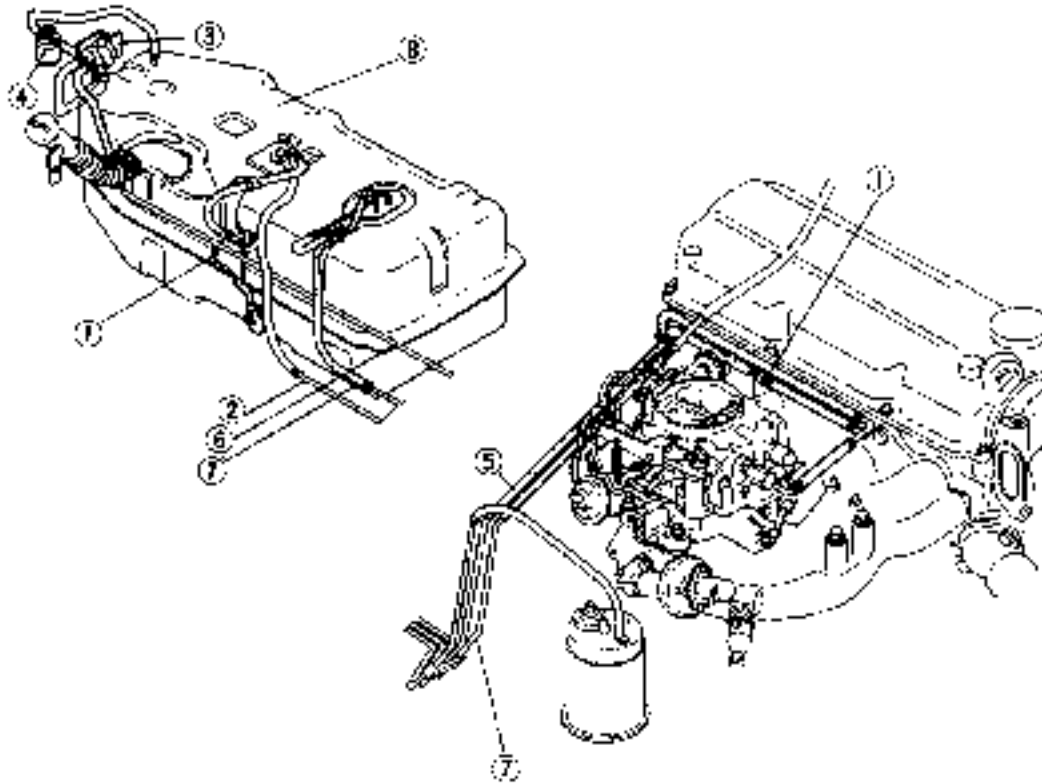
INHIBITOR SWITCH  
SERVICE, SECTION K1



- |   |             |  |              |
|---|-------------|--|--------------|
| 1. ACV solenoid valve<br>Inspection . . . . .             | page F1- 60 | 20. No.1 Air control valve<br>Inspection . . . . .   | page F1- 59  |
| 2. Air cleaner element<br>Inspection . . . . .            | page F1- 80 | 21. No.1 purge control valve<br>Inspection . . . . . | page F1- 70  |
| 3. Air vent solenoid valve<br>Inspection . . . . .        | page F1- 72 | 22. No.2 Air control valve<br>Inspection . . . . .   | page F1- 60  |
| 4. Air/fuel (A:F) solenoid valve<br>Inspection . . . . .  | page F1- 54 | 23. No.2 purge control valve<br>Inspection . . . . . | page F1- 71  |
| 5. Atmospheric pressure sensor<br>Inspection . . . . .    | page F1-106 | 24. No.3 purge control valve<br>Inspection . . . . . | page F1- 71  |
| 6. Clutch switch<br>Inspection . . . . .                  | page F1-105 | 25. Oxygen sensor<br>Inspection . . . . .            | page F1- 56  |
| 7. Coasting incher solenoid valve<br>Inspection . . . . . | page F1- 67 | 26. PCV valve<br>Inspection . . . . .                | page F1- 79  |
| 8. Dashboard (for M/T)<br>Inspection . . . . .            | page F1- 68 | 27. PTC heater<br>Inspection . . . . .               | page F1- 75  |
| 9. Duty solenoid valve<br>Inspection . . . . .            | page F1- 63 | 28. Purge solenoid valve<br>Inspection . . . . .     | page F1- 72  |
| 10. EGR control valve<br>Inspection . . . . .             | page F1- 62 | 29. Rear catalytic converter<br>Inspection . . . . . | page F1- 74  |
| 11. EGR position sensor<br>Inspection . . . . .           | page F1- 63 | 30. Reed valve<br>Replacement . . . . .              | page F1- 60  |
| 12. Engine control unit<br>Precaution . . . . .           | page F1-109 | 31. Servo diaphragm<br>Adjustment . . . . .          | page F1- 114 |
| Inspection . . . . .                                      | page F1-109 | 32. Slow fuel cut solenoid<br>Inspection . . . . .   | page F1- 67  |
| 13. Front catalytic converter<br>Inspection . . . . .     | page F1- 74 | 33. Vacuum control valve<br>Inspection . . . . .     | page F1- 80  |
| 14. High altitude compensator<br>Inspection . . . . .     | page F1- 76 | 34. Vacuum sensor<br>Inspection . . . . .            | page F1-107  |
| 15. Idle compensator<br>Inspection . . . . .              | page F1- 78 | 35. Vacuum solenoid valve<br>Inspection . . . . .    | page F1- 67  |
| 16. Idle switch<br>Inspection . . . . .                   | page F1-105 | 36. Water temperature switch<br>Inspection . . . . . | page F1-105  |
| 17. Intake air thermosensor<br>Inspection . . . . .       | page F1-107 | 37. Water thermosensor<br>Inspection . . . . .       | page F1-106  |
| 18. Mixture control valve<br>Inspection . . . . .         | page F1- 68 | 38. Water thermo valve<br>Inspection . . . . .       | page F1- 71  |
| 19. Neutral switch<br>Inspection . . . . .                | page F1-105 |  |              |

F1-101

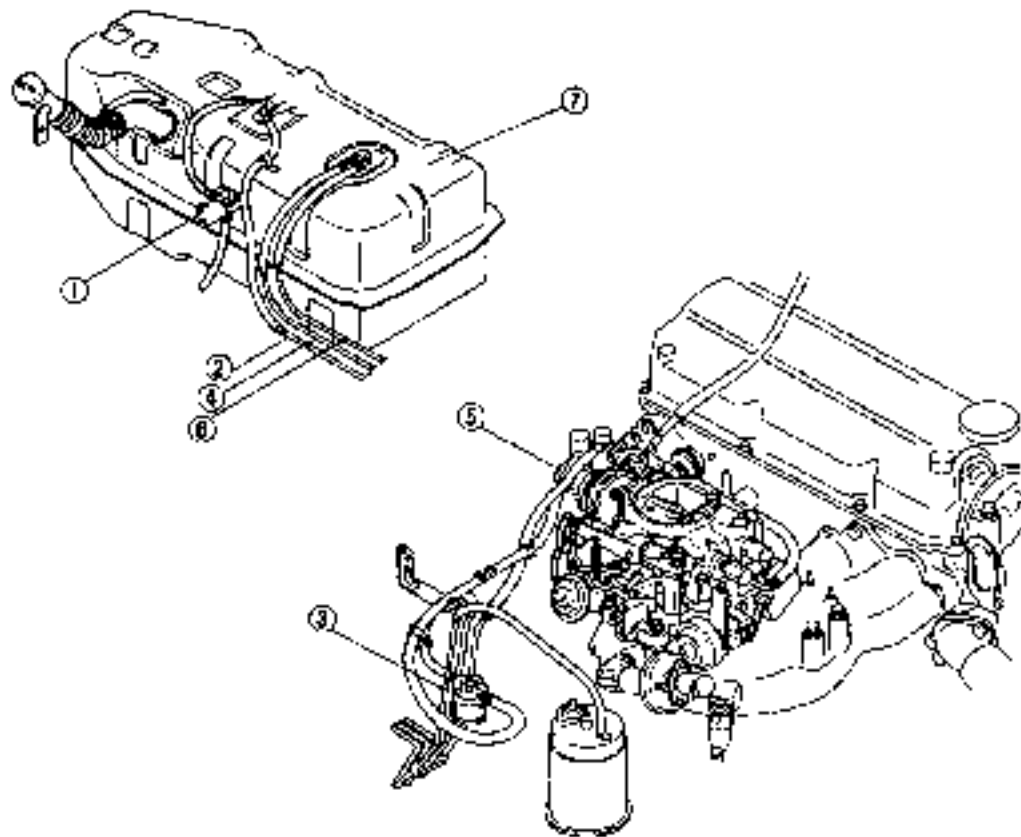
### VEHICLE WITH A/T



JBL-CH1-026

- |                        |       |            |  |
|------------------------|-------|------------|--|
| 1. Check and cut valve |       |            |  |
| Inspection .....       | ..... | page F1-71 |  |
| 2. Evaporation pipe    |       |            |  |
| Removal .....          | ..... | page F1-84 |  |
| Installation .....     | ..... | page F1-84 |  |
| 3. Fuel cut valve      |       |            |  |
| Inspection .....       | ..... | page F1-84 |  |
| 4. Fuel filter         |       |            |  |
| Replacement .....      | ..... | page F1-83 |  |
| 5. Fuel main hose      |       |            |  |
| Inspection .....       | ..... | page F1-84 |  |
| 6. Fuel main pipe      |       |            |  |
| Removal .....          | ..... | page F1-84 |  |
| Installation .....     | ..... | page F1-84 |  |
| 7. Fuel return pipe    |       |            |  |
| Removal .....          | ..... | page F1-84 |  |
| Installation .....     | ..... | page F1-84 |  |
| 8. Fuel tank           |       |            |  |
| Removal .....          | ..... | page F1-84 |  |
| Installation .....     | ..... | page F1-84 |  |

VEHICLE WITH M/T

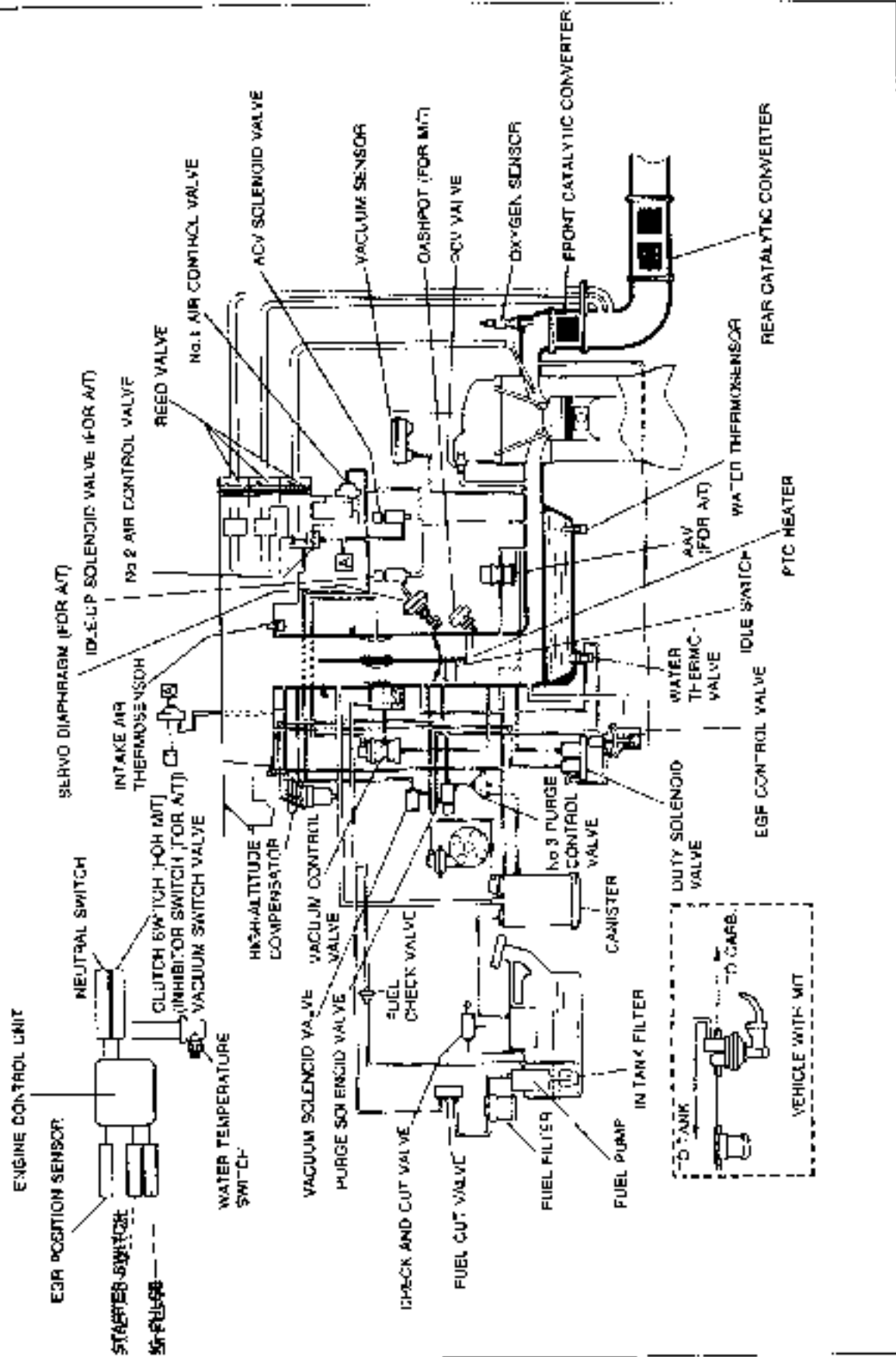


28LCH1 027

1. Check and cut valve		5. Fuel pump	
Inspection . . . . .	page F1-71	Fuel pressure . . . . .	page F1-83
2. Evaporation pipe		Flow Rate (Volume) . . . . .	page F1-83
Removal . . . . .	page F1-84	Replacement . . . . .	page F1-83
Installation . . . . .	page F1-84	6. Fuel return pipe	
3. Fuel filter		Removal . . . . .	page F1-84
Replacement . . . . .	page F1-83	Installation . . . . .	page F1-84
4. Fuel main pipe		7. Fuel tank	
Removal . . . . .	page F1-84	Removal . . . . .	page F1-84
Installation . . . . .	page F1-84	Installation . . . . .	page F1-84

OUTLINE

SYSTEM DIAGRAM



FRKMB JC2

COMPONENT DESCRIPTIONS

Component	Function	Remarks
ACV solenoid valve	Applies vacuum to No 2 air control valve according to signal from engine control unit	
Air/fuel solenoid valve (in carburetor)	Controls air/fuel mixture according to signal from engine control unit	
Air cleaner	Filters air into carburetor	
Air vent solenoid valve	Vents first chamber to the canister when engine stopped	
Atmospheric pressure sensor	Detects atmospheric pressure (altitude) and sends signal to engine control unit	Decreases amount of EGR at high altitude (higher than 1,000 m, 3,280 ft)
Canister	Stores gas tank and carburetor fumes while engine stopped. When engine started, fumes drawn into intake manifold	
Check-and-cut valve	Vents fuel tank to atmosphere if vent line from check valve to No 2 purge control valve is clogged	
Coasting richer solenoid valve	Opens carburetor secondary stage fuel circuit during deceleration	
Dashpot	Gradually allows throttle closing during acceleration	
Duty solenoid valve	Controls vacuum to activate EGR control valve	
1) Vent valve 2) Vacuum valve	1) Opens vent according to signal from engine control unit. 2) Opens vacuum line according to signal from engine control unit	
EGR position sensor	Detects EGR control valve lift and sends signal to control unit	
EGR control valve (with EGR position sensor)	Introduces exhaust gas to intake manifold	Operates during acceleration and constant speed driving
Engine control unit	Detects the following: Engine speed Engine coolant temperature Intake manifold vacuum Atmospheric pressure Radiator coolant temperature Intake air temperature Oxygen concentration EGR valve lift Throttle opening In-gear condition Air conditioner ON/OFF	Ignition coil negative (-) terminal Water thermostat Vacuum sensor Atmospheric pressure sensor Water temperature switch Intake air thermostat sensor Oxygen sensor EGR position sensor Idle switch Neutral and clutch switch or inhibitor switch Air condenser

F1

Component	Function	Remarks
Engine control unit	Controls operation of the following: Air/fuel (A/F) solenoid valve Idle-up solenoid valves Slow fuel cut solenoid valve Coasting richer solenoid valve Vacuum solenoid valve ACV solenoid valve Purge solenoid valve Duty solenoid valve	
Front catalytic converter	Reduces HC & CO by oxidation Reduces NOx	Converts into CO <sub>2</sub> and H <sub>2</sub> O Honeycomb construction
Fuel check valve	Prevents leakage through fuel return line if vehicle turns over	
Fuel cut valve	Prevents leakage from main fuel line if the vehicle turns over	
Fuel filter	Filters fuel entering fuel pump and carburetor	
Fuel pump	Pumps fuel from fuel tank to carburetor	
Fuel pump cut relay	Operates fuel pump according to ignition pulse or alternator operation	
High-altitude compensator	Maintains air/fuel mixture when atmospheric pressure drops because of elevation	Adds air to air needs in carburetor and intake manifold Operates at altitude of 500 m (1,640 ft) or higher
Idle compensator	Keeps idle constant with temperature change	
Idle switch	Detects throttle opening	OFF at idle ON at 1,000 - 1,200 rpm
Idle-up solenoid valve 1) air conditioner 2) automatic transmission	Applies vacuum to servo diaphragm according to signal from engine control unit	
Inhibitor switch	Detects select lever position sends signal to engine control unit	Senses transmission operating range
Intake air thermosensor	Detects intake air temperature; sends signal to engine control unit	Fixes duty of a fuel solenoid valve at high air temperature (higher than 67°C (153°F))
Mixture control valve	Supplies fresh air into intake manifold at first period of sudden acceleration	
Neutral and clutch switches	Detects in-gear operation and clutch engagement; sends signal to engine control unit	

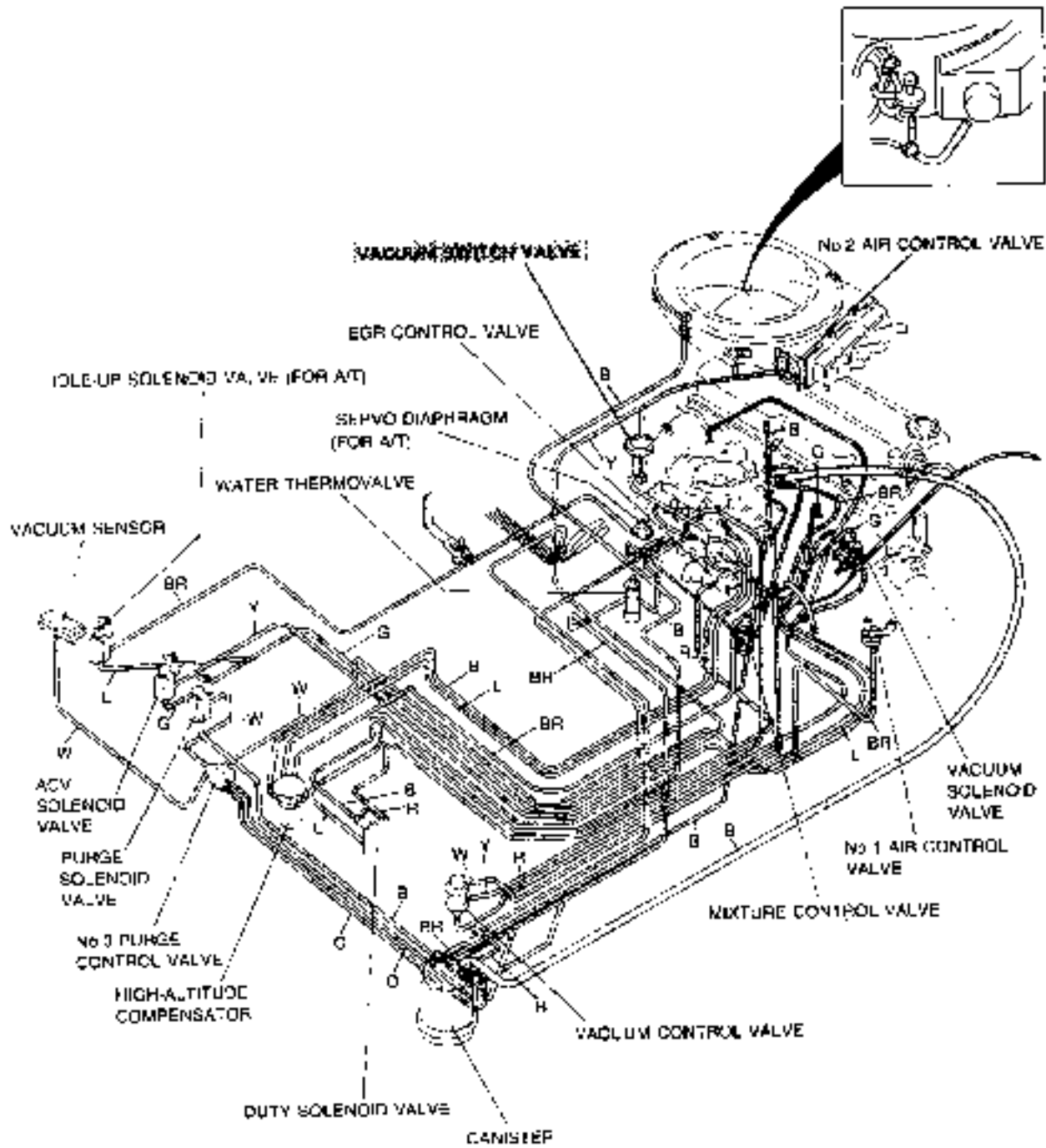
Component	Function	Remarks
No.1 air control valve	Supplies secondary air to reed valve A according to intake manifold vacuum	
No.1 purge control valve	Purges fuel vapor (stored in canister) into intake manifold during idling	
No.2 air control valve	Supplies secondary air to reed valve A when ACM solenoid valve is ON	
No.2 purge control valve	Pressure and vacuum valves operate in accordance with fuel tank pressure	
No.3 purge control valve	Purges fuel vapor (stored in canister) into intake manifold when purge solenoid valve is ON	
Oxygen sensor	Detects exhaust oxygen concentration; sends signal to control unit	
PTC heater	Heats throttle body of carburetor and prevents icing	
Purge solenoid valve	Applies vacuum to No.3 purge control valve according to signal from engine control unit	
Rear catalytic converter (except for Canada)	Reduces HC & CO by oxidation	Converts into CO <sub>2</sub> and H <sub>2</sub> O Honeycomb construction
Reed valves Reed valve A Reed valves B and C	Supplies secondary air to exhaust manifold (valve A) Supplies secondary air to exhaust pipe just behind from catalytic converter (valves B and C)	One-way valve for air passage
Servo diaphragm	Opens throttle valve by vacuum from idle-up solenoid valve (for A/C and A/T)	
Slow fuel cut solenoid valve	Cuts off primary slow fuel during deceleration or when ignition switch is OFF	Improves fuel consumption and prevents run-on
Vacuum control valve	Vents fuel chamber to intake manifold during heavy-load idling	
Vacuum sensor	Detects intake manifold vacuum; sends signal to engine control unit	
Vacuum solenoid valve	Applies intake manifold vacuum to vacuum control unit; advances ignition timing during deceleration	
Water temperature switch	Detects radiator coolant temperature; sends signal to engine control unit	ON at 15—19°C (59—66.2°F) or lower
Water thermosensor	Detects intake manifold coolant temperature; sends signal to engine control unit	*Thermistor
Water thermovalve	Opens and closes depending on engine coolant temperature	Opens at 46—54°C (114.8—129.2°F) or higher

10E10F1-0735

F1



VACUUM HOSE ROUTING DIAGRAM



- HOSE COLOR:  
 B. BLACK  
 G. GREEN  
 BR BROWN  
 L BLUE  
 O. ORANGE  
 W WHITE  
 Y YELLOW  
 R. RED

53U043-504

Revised 11/92

Hose Color Code

Component	Color	Connected to:
ACV solenoid valve	Yellow Green	No.2 air control valve Intake manifold
Carburetor	Green Black Brown Black	No.3 purge control valve Intake manifold Water thermosyphon Evaporative pipe
Distributor	Black	Intake manifold
Duty solenoid valve	Red Blue Black	DGR control valve Intake manifold Air cleaner
High-altitude compensator	Blue Black Purple	Carburetor (Primary main) Carburetor (Intake manifold) Carburetor (Secondary main)
Idle compensator	Black	Intake manifold
No.1 air control valve	Brown to green	Intake manifold
No.3 purge control valve	White Orange to black Green	Purge selection valve Intake manifold Carburetor
Purge solenoid valve	White Black to brown	No.3 purge control valve Intake manifold
Vacuum control valve	Red White Yellow	Intake manifold Secondary venturi (in carburetor) Float chamber (in carburetor)
Vacuum sensor	White	Intake manifold
Vacuum solenoid valve	Green Black	Intake manifold Distributor

F8U048 J44

### SPECIFICATIONS

Item	Transmission		Manual	Automatic
	Short sec	Liter (U.S. gal., Imp. gal.)		56 (14.8, 12.3)
Fuel tank capacity	Long sec	Liter (U.S. gal., Imp. gal.)		66 (17.4, 14.5)
	Type		Filter paper with magnet	
Fuel pump	Type		Mechanical	Electrical
	Fuel pressure	kPa (kg/cm <sup>2</sup> , psi)	28-32 (0.25-0.32, 3.7-4.7)	20-25 (0.20-0.25, 2.8-3.6)
Carburetor	Flow rate		0.83 (52.3)	1.50 (70.2)
	Type		Down draft, 2-barrel, 2-stage, auto-choke	
Throat diameter	Pr.	mm (in.)	30 (1.181)	
	Sec.	mm (in.)	31 (1.220)	
Venturi diameter	Pr.	mm (in.)	24.5 x 1.5 x 8 (0.965 x 0.059 x 0.315)	
	Sec.	mm (in.)	31 x 10 (1.220 x 0.394)	
Main jet	Pr.	mm (in.)	1.04 (0.0409)	
	Sec.	mm (in.)	1.50 (0.0591)	
Main air bleed	Pr.	mm (in.)	0.50 (0.0197)	
	Sec.	mm (in.)	0.52 (0.0205)	
Slow jet	Pr.	mm (in.)	0.86 (0.0335)	
	Sec.	mm (in.)	0.80 (0.0315)	
Slow air bleed	Pr. No.1	mm (in.)	1.10 (0.0433)	
	Pr. No.2	mm (in.)	0.60 (0.0236)	
	Sec. No.1	mm (in.)	0.50 (0.0197)	
	Sec. No.2	mm (in.)	0.42 (0.0165)	
Coasting richer jet			1.60 (0.0630)	
	No.1	mm (in.)	2.60 (0.1024)	
Coasting richer air bleed			1.80 (0.0709)	
	No.2	mm (in.)	1.00 (0.0394)	
High-speed richer jet			0.85 (0.0335)	
			1.50 (0.0591)	
High-speed richer air bleed			11.5-12.6 (0.457-0.496)	
			10.7-11.7 (0.42-0.461)	
Solenoid controlled fuel jet	High	mm (in.)	46.0 (1.811)	
	Low	mm (in.)	47.0 (1.850)	
Solenoid controlled air bleed			0.84-1.04 (0.033-0.041)	
			0.60-1.14 (0.024-0.045)	
Fast idle adjustment	Throttle valve clearance		mm (in.)	
	Choke valve clearance		mm (in.)	
Secondary throttle valve adjustment	Throttle valve clearance		mm (in.)	
	Choke valve clearance		mm (in.)	
Unloader system adjustment	Throttle valve clearance		mm (in.)	
	Choke valve clearance		mm (in.)	
Choke diaphragm adjustment	Throttle valve clearance		mm (in.)	
	Choke valve clearance		mm (in.)	
Air cleaner	Fresh-air		General, automatic	
	Element type		Wet	
Accelerator cable	Deflection		mm (in.)	
	rpm (in neutral or P range)		800-850 (800-100)	

25107-1-602

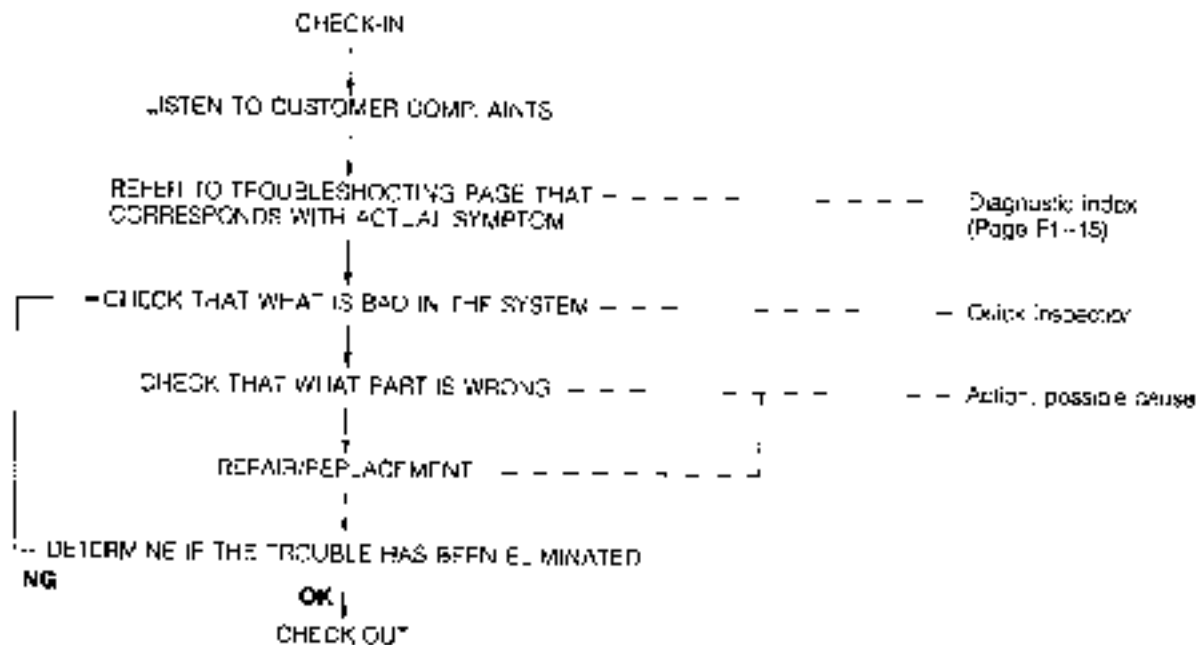
**TROUBLESHOOTING GUIDE**

**HOW TO USE THIS SECTION**

**Introduction**

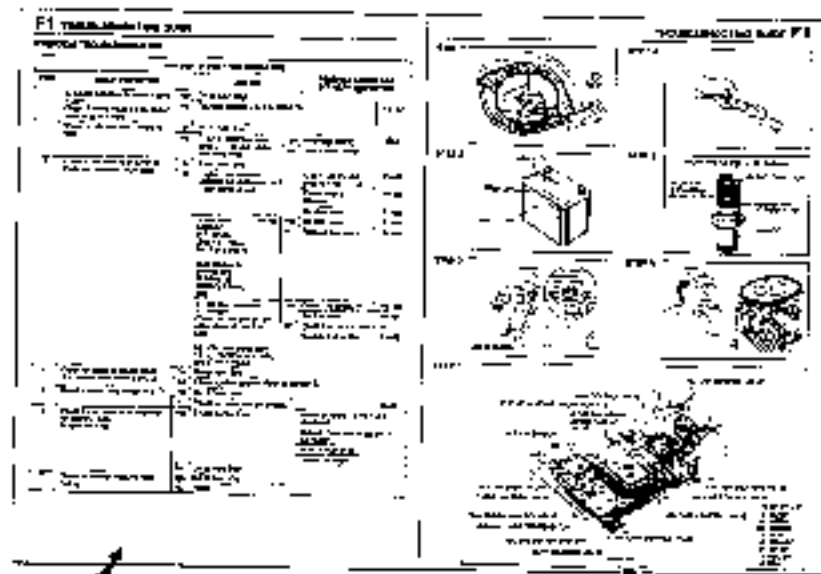
Most of the fuel and emission control system is electronically controlled. Thus, it is sometimes difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a drivability complaint. 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**



REL10P-001

**How to read the troubleshooting chart**



Left page shows the troubleshooting procedure  
 • QUICK INSPECTION  
 • ACTION  
 • POSSIBLE CAUSE AND DETAILED INSPECTION

Right page illustrates how to perform QUICK INSPECTION

		Ibad start or won't start (Check OK)			
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Is enough cranking time being used? Check engine valve is fully closed when engine is cold	Yes	Go to Next Step		
		No		Exhaust system or intake assembly	P1-69 P1-110
2	Check if fuel pump and battery are low	Yes	Go to Next Step		
		No	Check if electrical line to battery is clean, loose and tight	Recharge battery and add electrolyte	G-8
		No	Go to Next Step		
3	Check if fuel and air is supplied from air carburetor sight glass	Yes	Go to Next Step		
		No	Regulate fuel supply Adjust air pressure and check points of air	Check needle and seat for wear or rust Check type for leakage	P1-63 P1-64
				See leaflets	P1-67
				Set time and	P1-67
				Recheck fuel pump	P1-70
			Lower than 1000 RPM vehicle 1.1 liter 1000 RPM End the procedure		

### 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.

GMJ-2 312

## DIAGNOSTIC INDEX

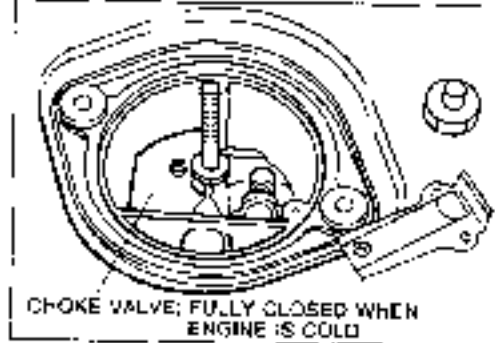
No.	TROUBLESHOOTING ITEM	REMARK	PAGE
1	Hard start or won't start	Engine cranks at normal speed but shows no sign of "firing" or will not continue to run after ignition switch is moved from START position or requires excessive cranking time before starting	F1-18
2	Engine stalls during warm up	Engine stops running only when engine is cold	F1-20
3	Hard restarting when hot	Engine starts normally when engine is cold but hard to start after running at high speed or after heat soak	F1-24
4	High idle speed after warm up	Engine idle is excessive for operating mode	F1-26
5	Engine idles roughly or stalls	Engine vibrates excessively or stops running during idle	F1-30
6	Hesitation on acceleration	Lag between time accelerator is depressed and acceleration begins	F1-34
7	Lack of power	Performance is inadequate under load	F1-38
8	Afterburn or deceleration	Abnormal combustion in exhaust system producing backfire	F1-42
9	High fuel consumption	Fuel economy is unsatisfactory	F1-48
10	No crank or crank slowly		Section G

98LSP-006

### SYMPTOM TROUBLESHOOTING

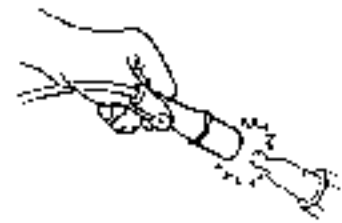
Hard start or won't start (Crank OK)							
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION				
1	If trouble occurs only when engine is cold) Check if choke valve is fully closed when engine is cold	Yes	Go to Next Step				
		No	Replace automatic choke assembly F1-87				
2	Check if indicator above battery is blue	Yes	Go to Next Step				
		No	Check if electrolyte level of battery is between upper and lower lines <table border="1" style="margin-left: 20px;"> <tr> <td>Yes</td> <td>Recharge battery</td> <td rowspan="2">Section G</td> </tr> <tr> <td>No</td> <td>Add distilled water</td> </tr> </table>	Yes	Recharge battery	Section G	No
Yes	Recharge battery	Section G					
No	Add distilled water						
3	Check if fuel level is at specified mark on carburetor sight glass	Yes	Go to Next Step				
		No (Higher than specified) Disassemble carburetor and check points shown	Check needle and seat for wear or rust	F1-90			
			Check float for damage	F1-90			
			Set float level	F1-91			
		(Lower than specified) M/T vehicle. Check for specified fuel pressure	F1-83	Yes	Set float level	F1-91	
			No	Replace fuel pump	F1-83		
Fuel pressure: 25—32 kPa (0.26—0.33 kg/cm <sup>2</sup> , 3.7—4.7 psi)							
(Lower than specified) A/T vehicle. Check for fuel pump operation sound at fuel filler port  (Ign ON, fuel pump control unit terminal wire (B/R) and (B/W) jumped)	Yes	Check fuel pressure	F1-83				
		Set float level	F1-91				
	No	Check fuel pump control unit Replace fuel pump	F1-82				
4	Check for spark at disconnected high tension lead while cranking	Yes	Go to Next Step				
		No	Check ignition system (Refer to Section G)				
5	Check if spark plug condition is OK	Yes	Go to Next Step				
		No	Repair or replace spark plug(s) Section G				
6	Check for air leakage by listening for sucking noise (Engine running)	Yes	Check points shown <table border="1" style="margin-left: 20px;"> <tr> <td>Intake air system component damaged</td> </tr> <tr> <td>Vacuum hose disconnected or damaged</td> </tr> <tr> <td>Bolts or nuts loose</td> </tr> <tr> <td>Gasket damaged</td> </tr> </table>	Intake air system component damaged	Vacuum hose disconnected or damaged	Bolts or nuts loose	Gasket damaged
		Intake air system component damaged					
Vacuum hose disconnected or damaged							
Bolts or nuts loose							
Gasket damaged							
No	Go to Next Step						
7	Check for correct vacuum hose routing	Yes	Go to Next Step				
		No	Repair				

STEP 1

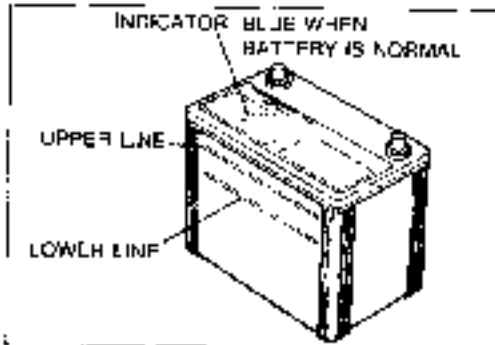


STEP 4

CHECK FOR SPARK WHILE CRANKING



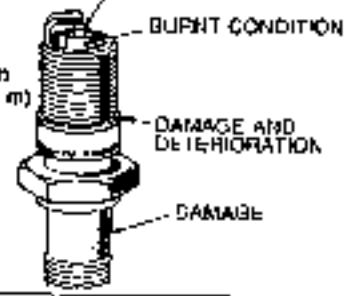
STEP 2



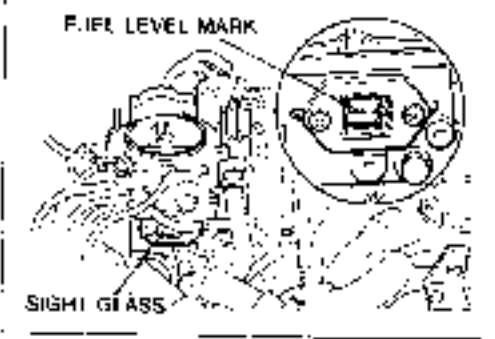
STEP 5

WEAR AND ADHESION OR CARBON

PLUG GAP  
0.76-0.85mm  
(0.029-0.033 in)

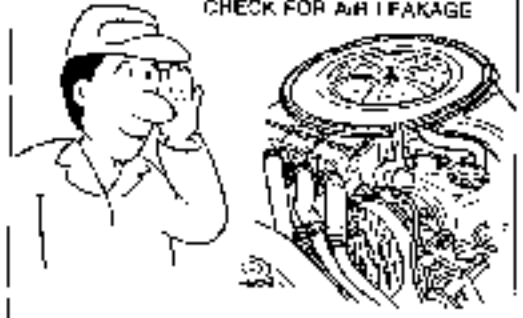


STEP 3

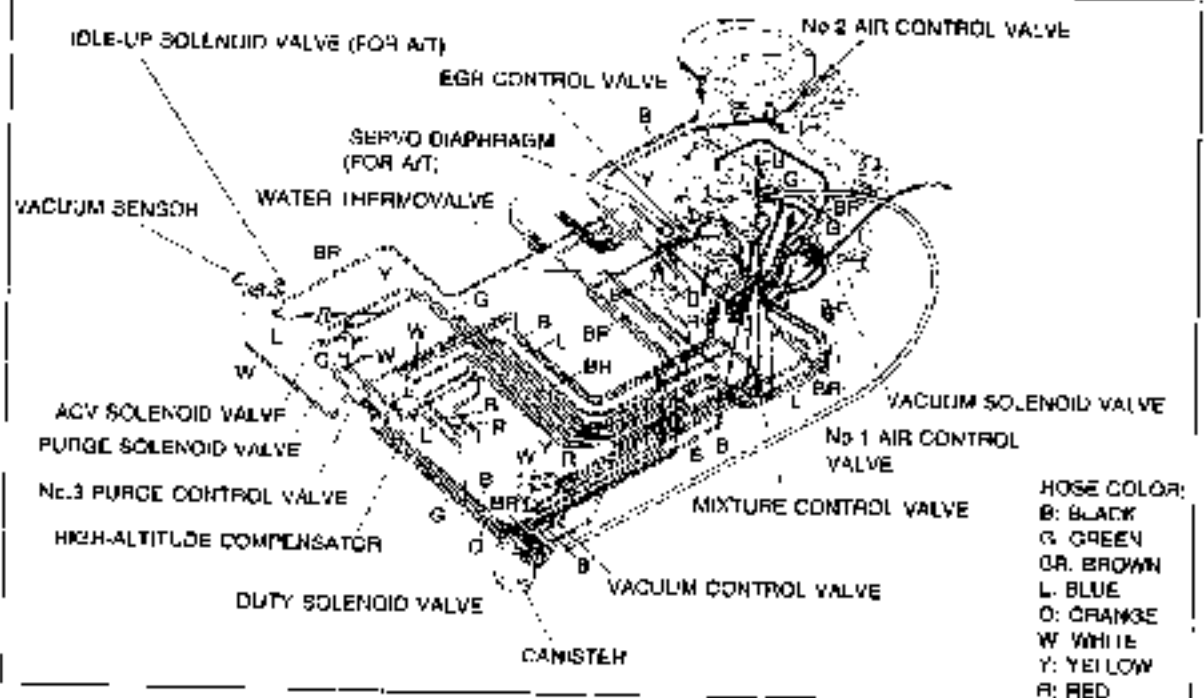


STEP 6

CHECK FOR AIR LEAKAGE



STEP 7

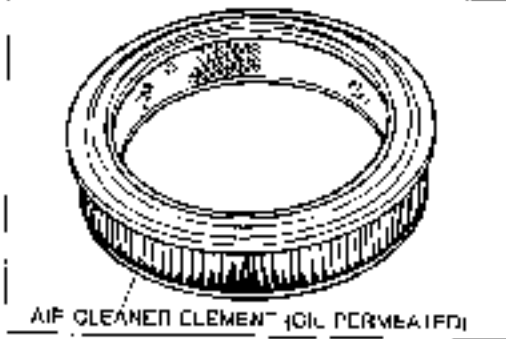




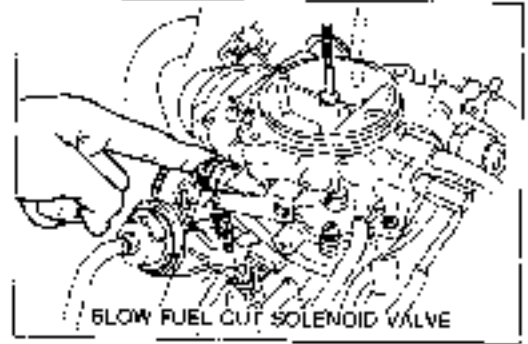
Hard start or won't start (Crank OK) (Cont'd)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
8	Check if air cleaner element is clean	Yes	Go to Next Step				
		No	Replace				
9	Pinch PCV hose and check if condition improves	Yes	Replace PCV valve				
		No	Go to Next Step				
10	Start engine	Yes	Replace mixture control valve				
	Block intake port of mixture control valve and check if engine speed drops	No	Increase engine speed and quickly decelerate	Yes	Go to Next Step		
			Check that air is pulled into intake port for 1-2 sec after accelerator is released	No	Replace mixture control valve		
11	Check for malfunction code with SST	Yes	Check for cause by referring to specified check sequence	F1-101			
	[Ign ON, test connector (Green 1-pin) grounded]	No	Go to Next Step				
12	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (2K), (2L) terminal voltage with SST	F1-111	Yes	Check duty solenoid valve	F1-63
			<b>Voltage:</b> 2K—battery voltage 2L—battery voltage (While cranking)		No	Check ECU (1G), (1C) and (2A) terminal volt. age with SST	F1-110
		No	Check EGR control valve for operation	F1-62	Yes	Go to Next Step	
					No	Replace EGR control valve	
13	(Only for "won't start" problem) Check if "clicking" is heard from slow fuel cut solenoid valve when ignition switch is turned OFF → ON	Yes	Go to Next Step				
		No	Check ECU (2L) terminal voltage with SST	F1-110	Yes	Check slow fuel cut solenoid valve	F1-90
			<b>Voltage:</b> Less than 1.5V (Ign ON)		No	Check ECU (2D) terminal voltage with SST	F1-110
14	Check carburetor	Check points shown		Check jets for clogging		F1-90	
				Check nozzle for clogging		F1-90	
15	Check engine condition	Check points shown		Demand lifting		Section B	
				Compression		Section B	

2F1J0F1-003

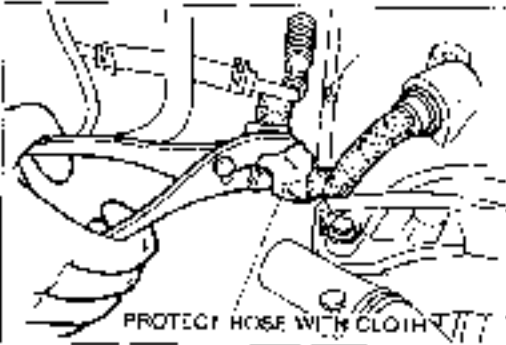
STEP 8



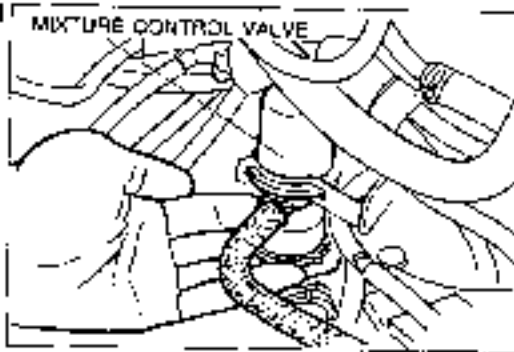
STEP 13



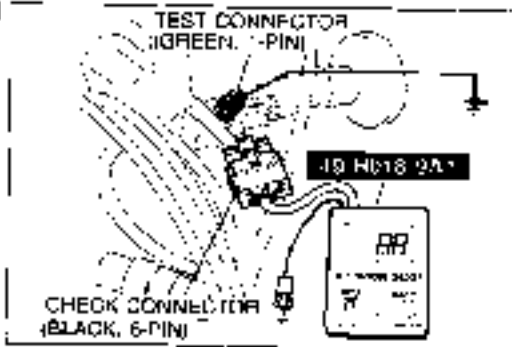
STEP 9



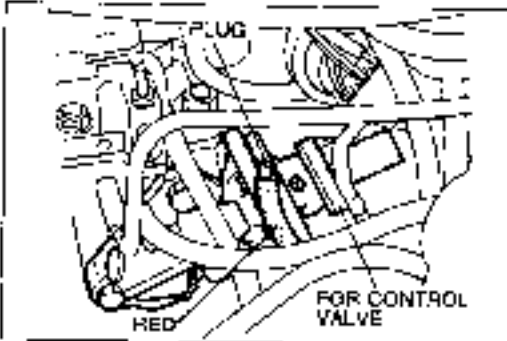
STEP 10



STEP 11

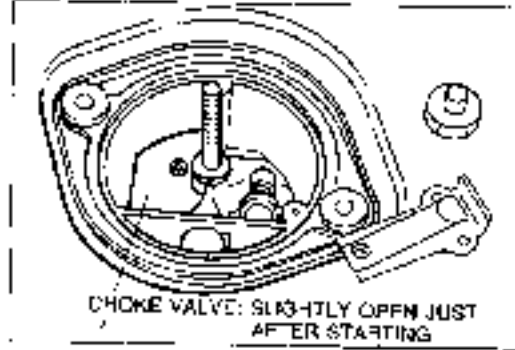


STEP 12



Engine stalls during warm up					
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check if choke valve is slightly open just after starting	Yes	Check for correct choke diaphragm adjustment	F1-92	Yes: Go to Next Step No: Adjust
		No	Check points shown		Check choke diaphragm for damage F1-92 Check choke diaphragm vacuum hose for disconnection or damage F1-86
2	Check if choke valve opens as engine warms up	Yes	Go to Next Step		
		No	Check voltage at choke heater (YL) wire	Voltage: 8-8V (At idle)	Yes: Replace automatic choke assembly F1-87 No: Repair or replace wiring harness
3	Check if engine stalls when throttle valve is opened slightly	Yes	Go to Next Step		
		No	Check points shown		Mixture adjustment screw adjustment F1-112 Slow jet clogged F1-90
4	Check for air leakage by listening for sucking noise	Yes	Check points shown		Intake air system components damaged Vacuum hose disconnected or damaged Bolts or nuts loose Gasket damaged
		No	Go to Next Step		
5	Check for correct vacuum hose routing	Yes	Go to Next Step		
		No	Repair		
6	Pinch PCV hose and check if condition improves	Yes	Replace PCV valve		
		No	Go to Next Step		
7	Disconnect air hoses (B), (L), and (RR) from carburetor  Check high-altitude compensator by blowing through each hose:  500 m (1,640 ft) or higher: Air flows Less than 500 m (1,640 ft): Air does not flow	Yes	Go to Next Step		
		No	Replace high-altitude compensator		

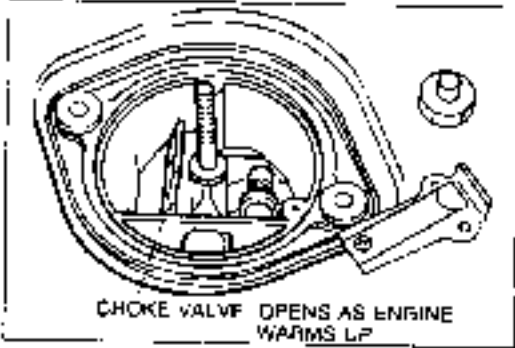
STEP 1



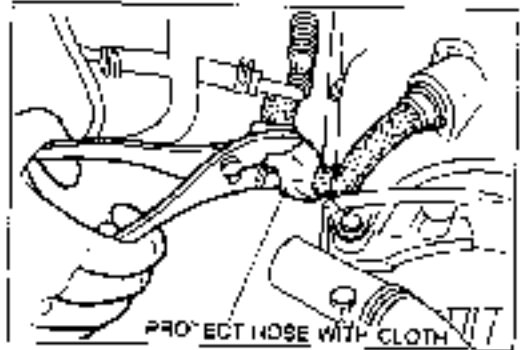
STEP 4



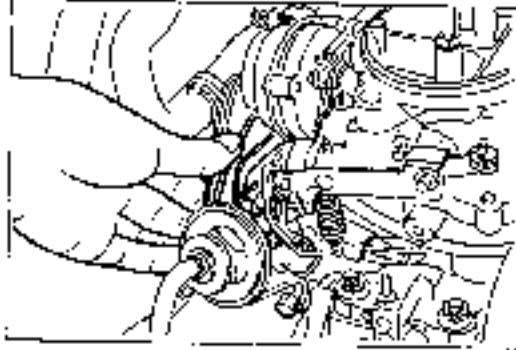
STEP 2



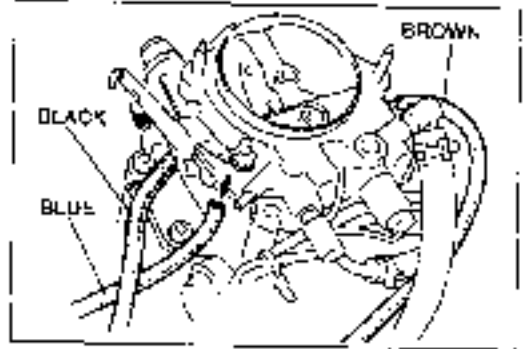
STEP 6



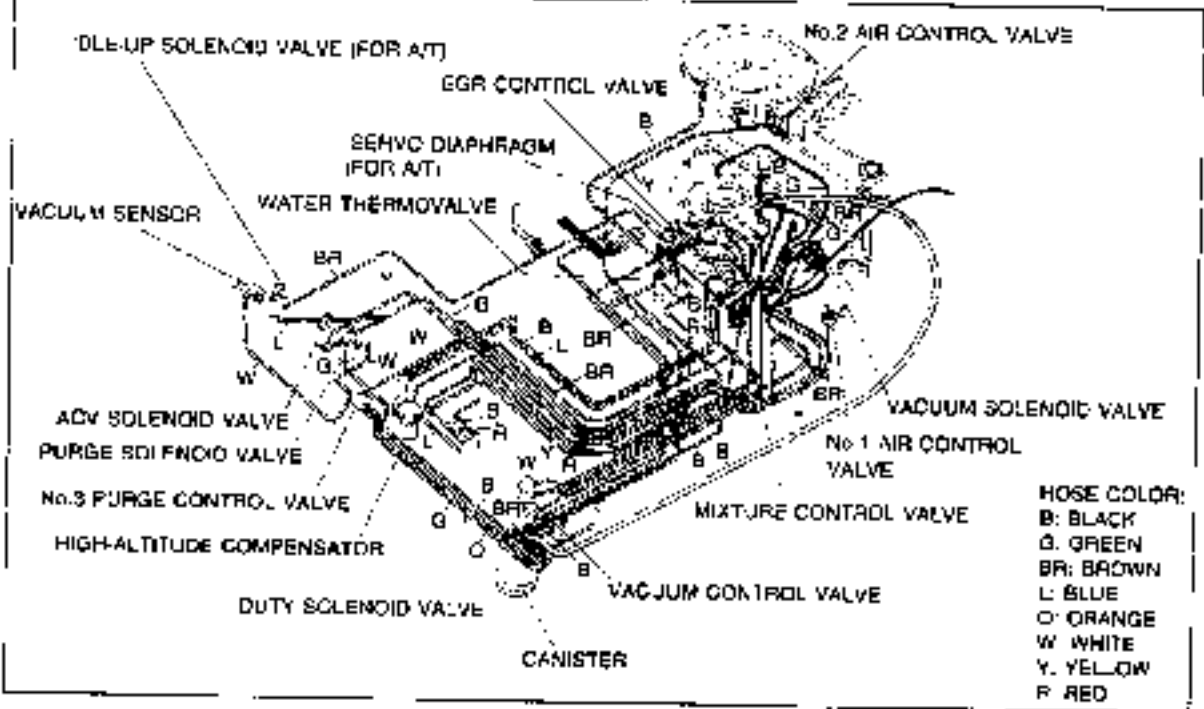
STEP 3



STEP 7

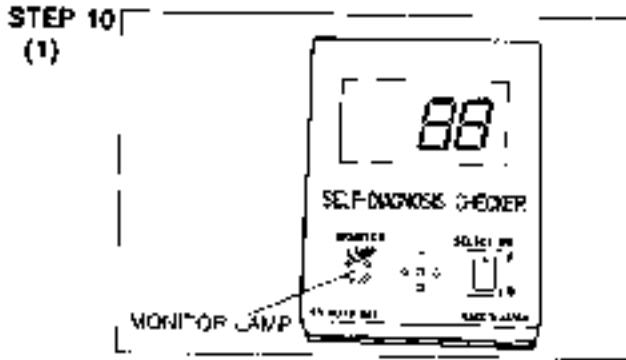
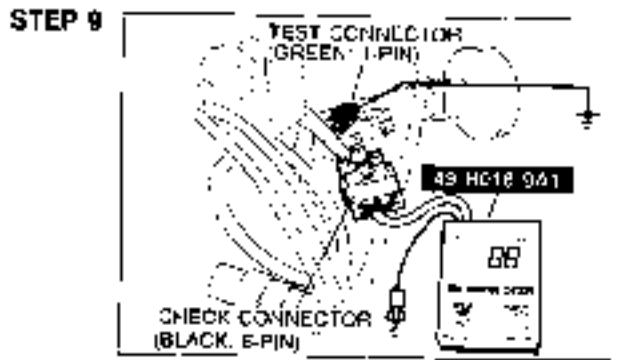
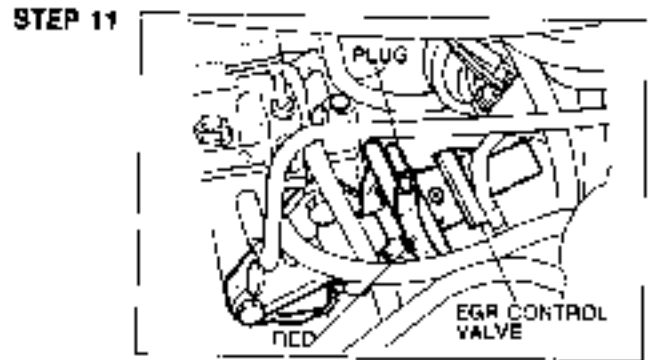
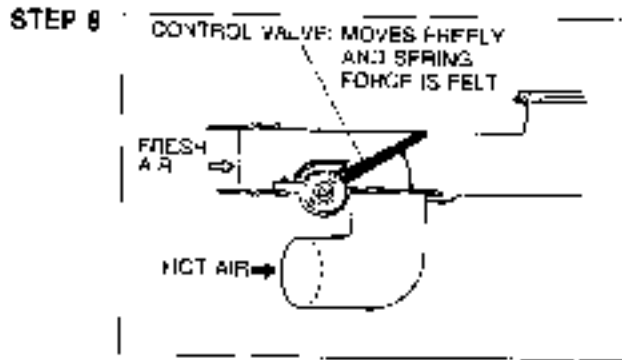


STEP 5



Engine stalls during warm up (Cont'd)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
8	Move control valve (for air intake temperature control system) inside air cleaner  Verify that it moves freely and that spring force is full	Yes	Go to Next Step				
		No	Replace air cleaner				
9	Check for malfunction code with SST  (Ign ON, test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to specified check sequence	F1-101			
		No	Go to Next Step				
10	Check switches for correct operation with SST monitor arm  (Ign ON, test connector (Green 1-pin) grounded)	Yes	Go to Next Step				
		No	Check for cause by referring to specified check sequence	F1-56			
11	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (2K) and (2L) terminal voltage with SST  Voltage: 2K—battery voltage 2L—battery voltage (During warm up)	F1-111	Yes	Check duty solenoid valve	F1-88
					No	Check ECU (1C), (1C), and (2A) terminal voltage with SST	F1-110
		No	Check EGR control valve for operation	F1-82	Yes	Go to Next Step	
					No	Replace EGR control valve	
12	Check carburetor	Check points shown			Check main jet for clogging	F1-90	
					Check main nozzle for clogging	F1-90	

23001-1-004



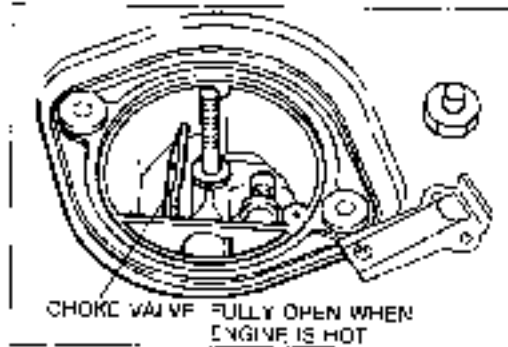
**STEP 10 (2)**

SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RE-RELEASE <sup>1)</sup>	OFF
	ACCELERATOR DEPRESSED <sup>1)</sup>	ON
CLUTCH SWITCH	CLUTCH PEDAL RE-RELEASE <sup>2)</sup>	ON
	CLUTCH PEDAL DEPRESSED <sup>2)</sup>	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
PARK/LOW SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

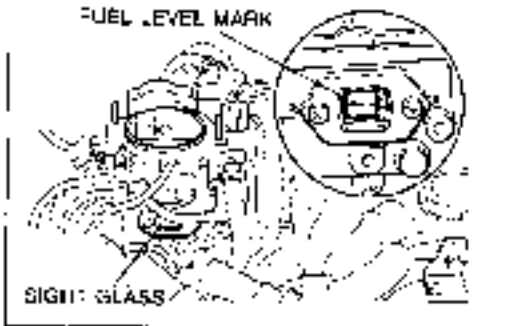
<sup>1)</sup> Transmission in neutral  
<sup>2)</sup> Transmission in gear

Hard restarting when hot																				
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION																	
1	Check if choke valve is fully open when engine is hot	Yes	Go to Next Step																	
		No	<table border="1"> <tr> <td>Check voltage at choke heater (Y/L) and</td> <td>Yes</td> <td>Replace automatic choke assembly</td> <td>F1-97</td> </tr> <tr> <td><b>Voltage: 5-8V (At Idle)</b></td> <td>No</td> <td>Repair or replace wiring harness</td> <td></td> </tr> </table>	Check voltage at choke heater (Y/L) and	Yes	Replace automatic choke assembly	F1-97	<b>Voltage: 5-8V (At Idle)</b>	No	Repair or replace wiring harness										
Check voltage at choke heater (Y/L) and	Yes	Replace automatic choke assembly	F1-97																	
<b>Voltage: 5-8V (At Idle)</b>	No	Repair or replace wiring harness																		
2	Check if fuel level is at specified mark on carburetor sight glass	Yes	Go to Next Step																	
		No	<table border="1"> <tr> <td>(Higher than specified) Disassemble carburetor and check points shown</td> <td></td> <td>Check needle and seat for wear or rust</td> <td>F1-90</td> </tr> <tr> <td></td> <td>Check float for damage</td> <td>F1-90</td> </tr> <tr> <td></td> <td>Set fuel level</td> <td>F1-91</td> </tr> </table>	(Higher than specified) Disassemble carburetor and check points shown		Check needle and seat for wear or rust	F1-90		Check float for damage	F1-90		Set fuel level	F1-91							
			(Higher than specified) Disassemble carburetor and check points shown		Check needle and seat for wear or rust	F1-90														
				Check float for damage	F1-90															
			Set fuel level	F1-91																
		<table border="1"> <tr> <td>(Lower than specified) M/T vehicle: Check for specified fuel pressure</td> <td>F1-83</td> <td>Yes</td> <td>Set fuel level</td> <td>F1-91</td> </tr> <tr> <td></td> <td></td> <td>No</td> <td>Replace fuel pump</td> <td>F1-83</td> </tr> </table>	(Lower than specified) M/T vehicle: Check for specified fuel pressure	F1-83	Yes	Set fuel level	F1-91			No	Replace fuel pump	F1-83								
(Lower than specified) M/T vehicle: Check for specified fuel pressure	F1-83	Yes	Set fuel level	F1-91																
		No	Replace fuel pump	F1-83																
<table border="1"> <tr> <td>(Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filter port</td> <td></td> <td>Yes</td> <td>Check fuel pressure</td> <td>F1-82</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Set fuel level</td> <td>F1-91</td> </tr> <tr> <td></td> <td></td> <td>No</td> <td>Check fuel pump control unit</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Replace fuel pump</td> <td>F1-82</td> </tr> </table>	(Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filter port		Yes	Check fuel pressure	F1-82				Set fuel level	F1-91			No	Check fuel pump control unit					Replace fuel pump	F1-82
(Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filter port		Yes	Check fuel pressure	F1-82																
			Set fuel level	F1-91																
		No	Check fuel pump control unit																	
			Replace fuel pump	F1-82																
[Ign ON, fuel pump control unit terminal-wire (D/R) and (B/W) jumped]																				
3	Prick PCV hose and check if condition improves	Yes	Replace PCV valve																	
		No	Go to Next Step																	
4	Check for malfunction code with SST  [Ign ON, test connector (Green 1-pin) grounded]	Yes	Check for cause by referring to specified check sequence	F1-101																
		No	Go to Next Step																	
5	Check switches for correct operation with SST monitor lamp  [Ign ON, test connector (Green 1-pin) grounded]	Yes	Go to Next Step																	
		No	Check for cause by referring to specified check sequence	F1-88																

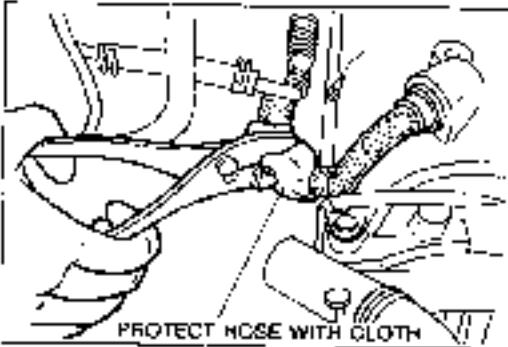
STEP 1



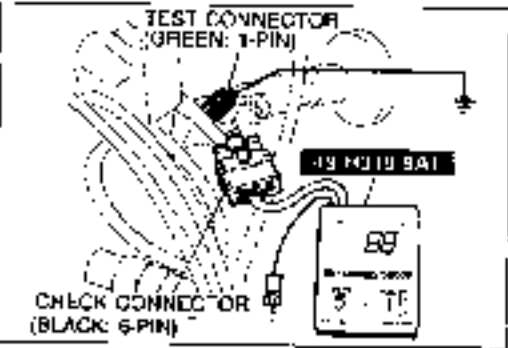
STEP 2



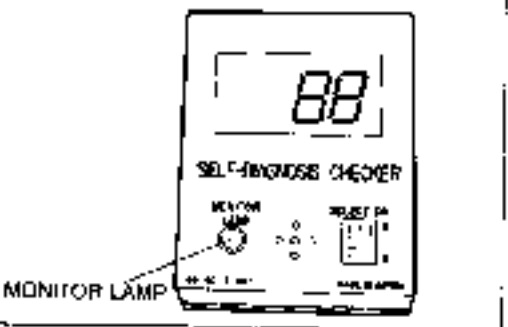
STEP 3



STEP 4



STEP 5  
(1)



STEP 5  
(2)

SWITCH	CONDITION	MONITOR LAMP
CLUTCH SWITCH	ACCEL. SWITCH RELEASED**	OFF
	ACCELERATOR DEPRESSED**	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED**	ON
	CLUTCH PEDAL DEPRESSED**	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
NEUTRAL SWITCH	IN FOUR RANGE	OFF
	IN OTHER RANGES	ON
AC ON/OFF SWITCH	OFF	OFF
	ON	ON

\*\* Transmission in gear  
\*\* Transmission in gear

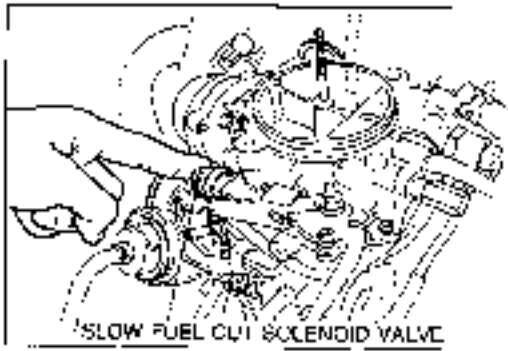


Hard restarting when hot (Cont'd)							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
6	Check if "clicking" is heard from glow fuel cut solenoid valve when ignition switch is turned OFF → ON	Yes	Go to Next Step				
		No	Check ECU (2D) terminal voltage with SST	F1-110	Yes	Check glow fuel cut solenoid valve	F1-90
					No	Check ECU (2B) terminal voltage with SST	F1-110
7	Check if "clicking" is heard from air vent solenoid valve when ignition switch is turned OFF → ON	Yes	Go to Next Step				
		No	Check for solenoid valve operation	F1-90	Yes	Check wiring harness	
					No	Replace solenoid valve	F1-95
8	Check if idle compensator is in closed position when bimetal temperature is less than specified	Yes	Go to Next Step				
		No	Replace idle compensator				
	<b>Opening temperature:</b> 63°—71°C (145°—160°F)						
9	Disconnect and plug vacuum hose (B) from charcoal canister and check if condition improves	Yes	Check vacuum hose routing			F1-10	
		No	Go to Next Step				
10	Warm up engine and run it at idle  Connect dwellmeter to check connector (White, 1-07) and check if reading is within 20°—70°	Yes	Go to Next Step				
		No	<b>(Fixed at 0°)</b>			ECU (2A) terminal voltage	F1-110
			Check points shown			ECU (1'E) terminal voltage	F1-110
						ECU (10) terminal voltage	F1-110
			<b>(Fixed at 27°)</b>			ECU (1J) terminal voltage	F1-110
			Check points shown			Vacuum hose routing	F1-10
						ECU (1A) terminal voltage	F1-110
						Oxygen sensor sensitivity	F1-55
			<b>(Fixed at 35°)</b>			ECU (1C) terminal voltage	F1-110
			Check points shown			Vacuum hose routing	F1-10
			<b>(Fluctuating out of 20°—70° range)</b>			ECU (1A) terminal voltage	F1-110
			Check points shown			Oxygen sensor sensitivity	F1-55
				ECU (2F) terminal voltage	F1-111		
				Air/fuel solenoid valve operation	F1-54		
				Clogged jets and air blends in carburetor	F1-90		
				Idle mixture adjustment	F1-112		
11	Check carburetor	Check part shown			Excess petrol	F1-95	

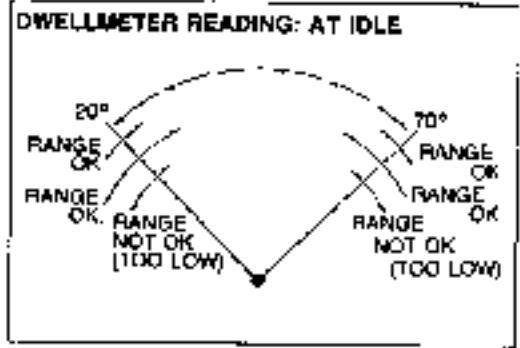
32010-10-2

Note: High RVP (winter) fuel can cause vapor lock in warm weather if used.

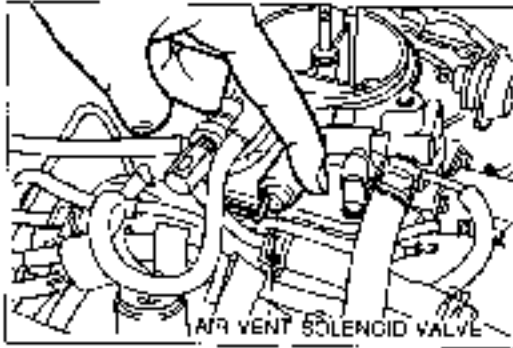
STEP 6



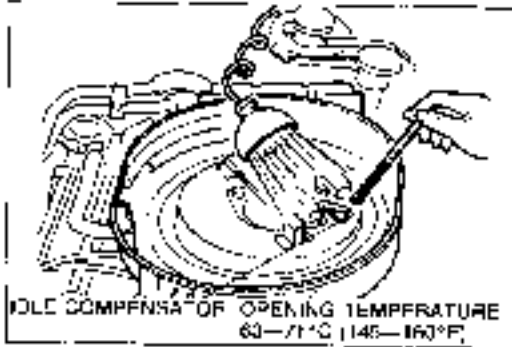
STEP 10  
(2)



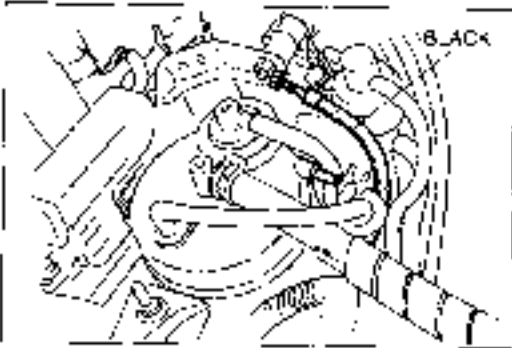
STEP 7



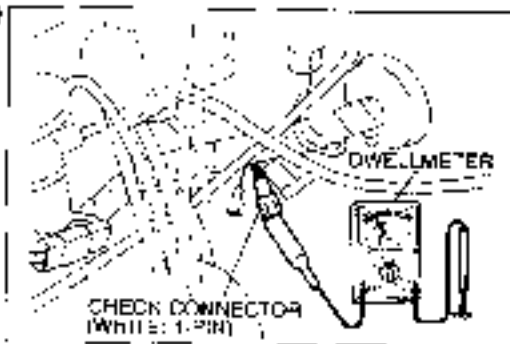
STEP 8



STEP 9



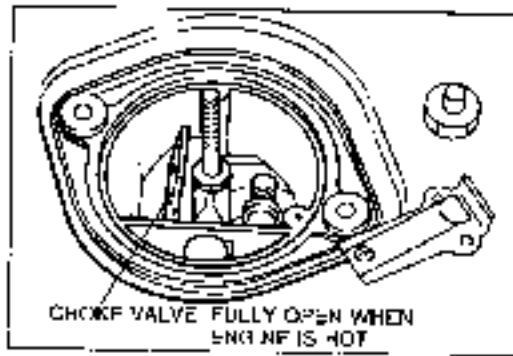
STEP 10  
(1)



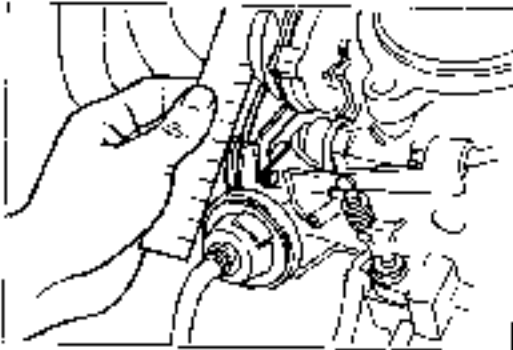
High idle speed after warm up							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if choke valve is fully open when engine is hot	Yes	Go to Next Step				
		No	Check voltage at choke heater (YL) wire <b>Voltage: 8—9V (At Idle)</b>	Yes	Replace automatic choke assembly	F1-87	
			No	Repair or replace wiring harness			
2	Check for correct accelerator cable free play <b>Free play: 1—3mm (0.039—0.188 in)</b>	Yes	Go to Next Step				
		No	Adjust		F1-78		
3	Check if idle speed can be adjusted by turning TAS	Yes	Adjust idle speed		F1-112		
		No	Go to Next Step				
4	Check for correct ignition timing (Vacuum hose disconnected)	Yes	Go to Next Step				
		No	Adjust ignition timing		Section G		
5	Check for malfunction code with SST  (Ign. ON, test connector (Green 1 pin) grounded)	Yes	Check for cause by referring to specified check sequence		F1-97		
		No	Go to Next Step				
6	Disconnect vacuum hose(s) from servo diaphragm and check if condition improves	Yes	Check ECU terminal voltage (1T, 2M) with SST <b>Voltage: 1T—Less than 1.5V (At less than 1,000 rpm in R, D, 2 or 1 range) battery voltage (in N or P range or more than 1,100 rpm without A/C switch, ON)  2M—Less than 1.5V (At idle (A/C ON) battery voltage (At 1,400 rpm or below (A/C ON))</b>	F1-110	Yes	Check idle up solenoid valve	F1-116
				F1-111	No	Check ECU terminal voltage (1N) and (2G) with SST	F1-110
		No	Go to Next Step				
7	Check if throttle lever separates from dashpot rod at approx. 2,700—2,900 rpm	Yes	Go to Next Step				
		No	Adjust		F1-88		
8	Check carburetor	Check pump, Ehorn		Carburetor linkage	F1-92		

3B0961005

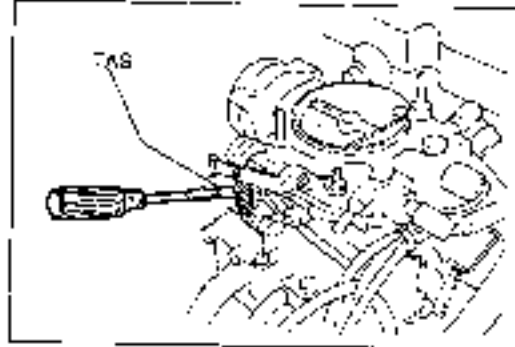
STEP 1



STEP 2



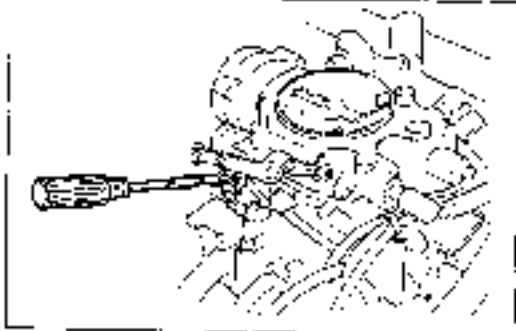
STEP 3



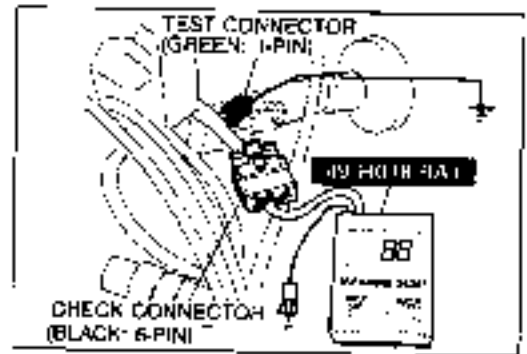
STEP 4  
(1)



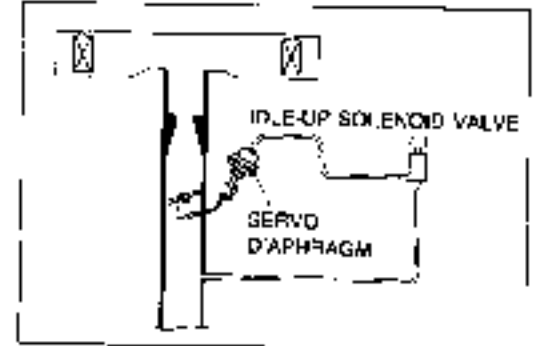
STEP 4  
(2)



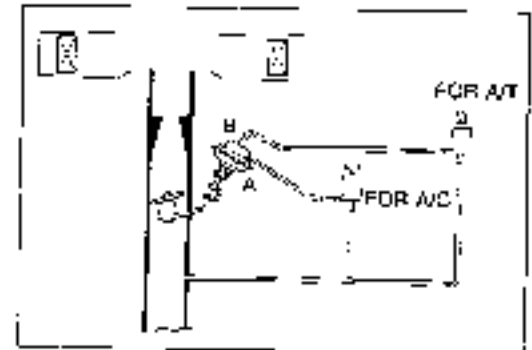
STEP 5



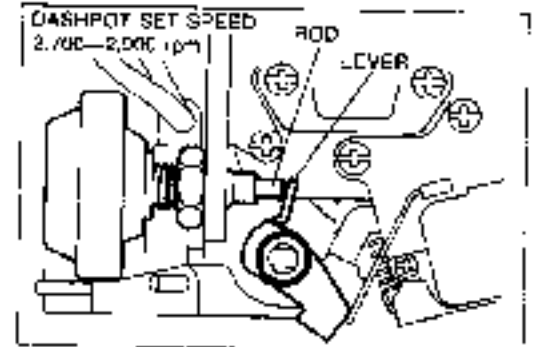
STEP 6  
(1)



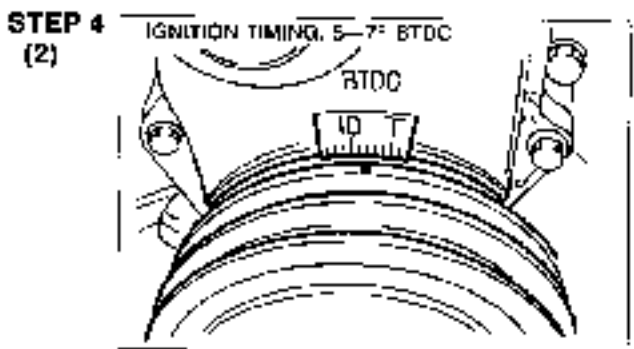
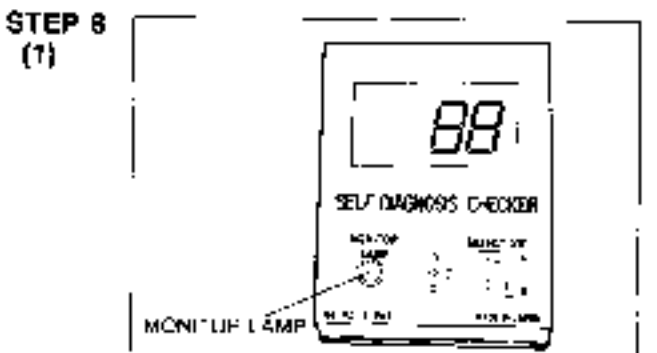
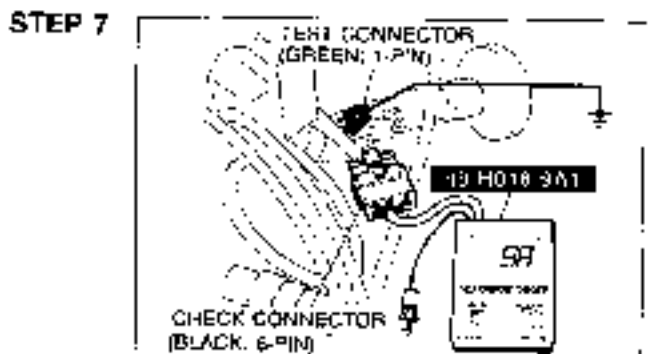
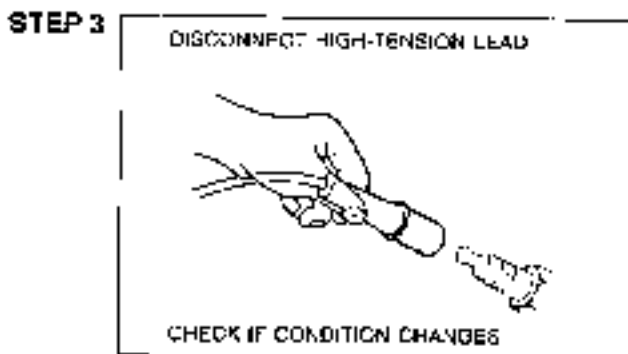
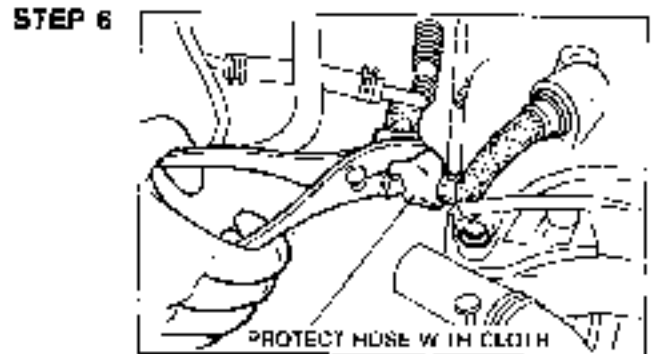
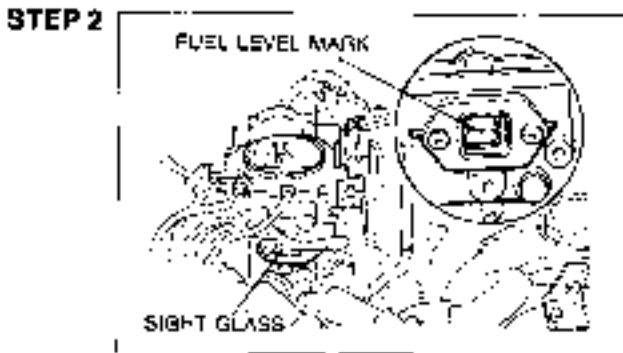
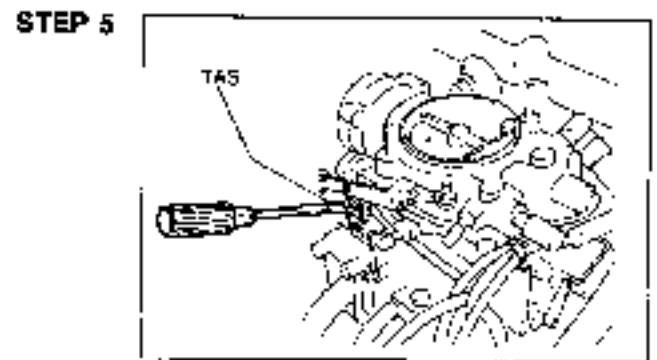
STEP 6  
(2)



STEP 7



Engine idles roughly or stalls			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for air leakage by listening for sucking noise	Yes: Check points shown No: Go to Next Step	Intake air system component damaged Vacuum hose disconnected or damaged Bolts or nuts loose Gasket damaged
2	Check if fuel level is at specified mark on carburetor sight glass	Yes: Go to Next Step	
		No: (Higher than specified) Disassemble carburetor and check points shown	Check needle and seat for wear or rust: F1-90 Check float for damage: F1-90 Set float level: F1-91
		(Lower than specified) M/T vehicle: Check for specified fuel pressure  Fuel pressure: 26-32 kPa (0.26-0.33 kg/cm <sup>2</sup> 3.7-4.7 psi)	F1-83 Yes: Set float level: F1-81 No: Replace fuel pump: F1-83
		(Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filter port  (Ign ON, fuel pump control terminal wire (B/H) and (B/W) unplug)	Yes: Check fuel pressure: F1-82 Set float level: F1-91 No: Check fuel pump control unit: Replace fuel pump: F1-82
3	Disconnect high-tension lead from individual cylinders and check if condition improves	Yes: Go to Next Step No: Check ignition system	Spark plug: Section G High-tension lead: Section G Distributor cap, rotor: Section G
4	Check for correct ignition timing  Ignition timing: 5-7° BTDC	Yes: Go to Next Step No: Adjust ignition timing	Section G
5	Turn throttle adjustment screw counterclockwise and check if condition improves	Yes: Adjust idle speed No: Go to Next Step	F1-112
6	Pinch PCV hose and check if condition improves	Yes: Replace PCV valve No: Go to Next Step	
7	Check for malfunction code with SST  (Ign ON, test connector (Green 1-pin) grounded)	Yes: Check for cause by referring to specified check sequence No: Go to Next Step	F1-101
8	Check switches for correct operation with SST monitor lamp  (Ign ON, test connector (Green 1-pin) grounded)	Yes: Go to Next Step No: Check for cause by referring to specified check sequence	F1-86



**STEP 8 (2)**

SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATION FULLY DEPRESSED	OFF
CLUTCH SWITCH	ACCELERATION FULLY DEPRESSED	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED	ON
CLUTCH SWITCH	CLUTCH PEDAL DEPRESSION	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
NEUTRAL SWITCH	TRANSMISSION IN NEUTRAL	OFF
R-REVERSE SWITCH	R-REVERSE RANGE	OFF
R-REVERSE SWITCH	OTHER RANGES	ON
AV SWITCH	ON	OFF
AV SWITCH	OFF	ON

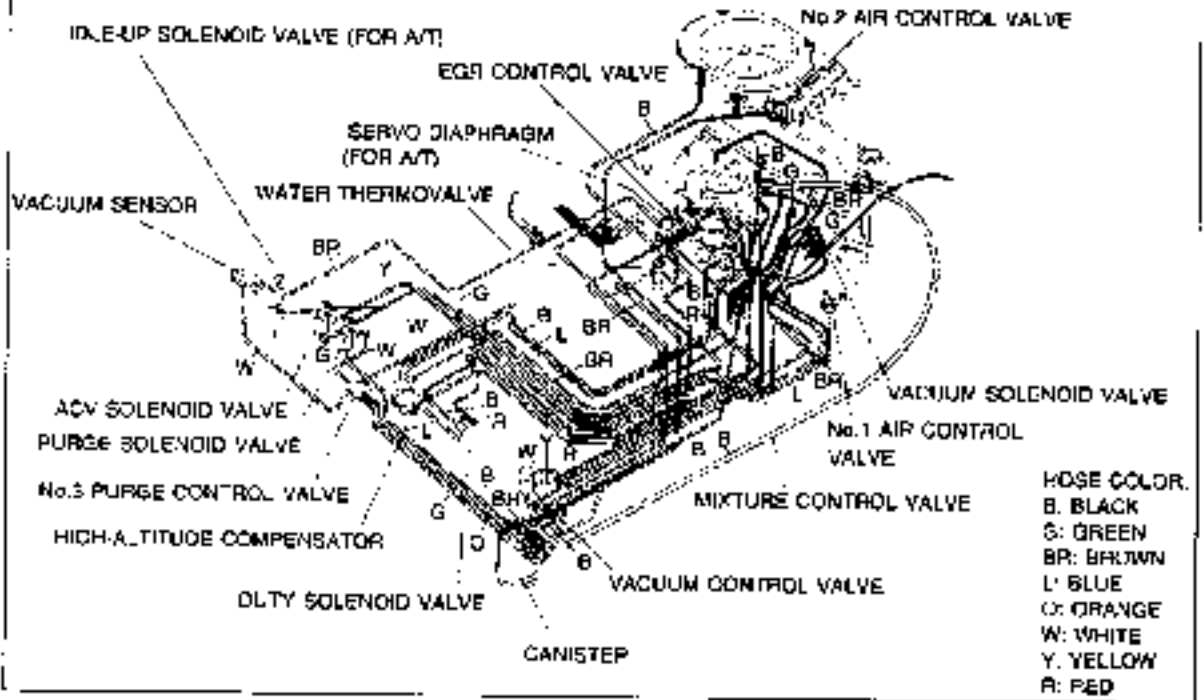
\* Transmission in gear    \*\* Transmission in gear

### Engine idles roughly or stalls (Cont'd)

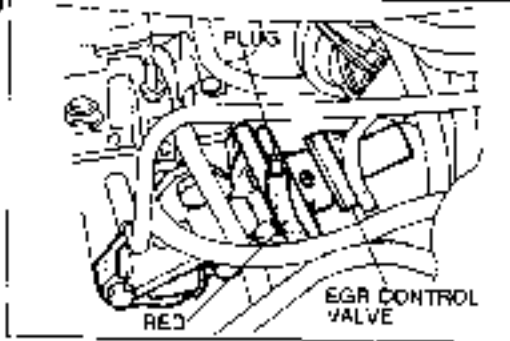
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
9	Check for correct EOP system vacuum hose routing	Yes	Go to Next Step				
		No	Repair or replace vacuum hose	F1-10			
10	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (2K) and (2L) terminal voltage with SST	F1-110	Yes	Check duty solenoid valve	F1-83
				No	Check ECU (1C), (1D), and (2A) terminal voltage with SST	F1-110	
		No	Check EGR control valve for operation	F1-62	Yes	Go to Next Step	
				No	Replace EGR control valve		
11	Check if "ricking" is heard from slow fuel cut solenoid valve when ignition switch is turned OFF → ON	Yes	Go to Next Step				
		No	Check ECU (2D) terminal voltage with SST	F1-110	Yes	Check slow fuel cut solenoid valve	F1-80
			Voltage: Less than 1.5V (Ign ON)	No	Check ECU (2B) terminal voltage with SST	F1-110	
12	Check if die compensator is closed when ambient temperature is below 63–71°C (145–150°F)	Yes	Go to Next Step				
		No	Replace die compensator				
13	Disconnect air hoses (B), (L) and (BR) from carburetor  Check high-altitude compensator by blowing through each hose  500 m (1,640 ft) or higher: Airflows Less than 500 m (1,640 ft): Air does not flow	Yes	Go to Next Step				
		No	Replace high-altitude compensator				
14	Check vacuum control valve			F1-80			
15	Check carburetor	Check parts shown		Check jet(s) for clogging	F1-88		
				Check carburetor fuel line for clogging	F1-86		
16	Check engine condition	Check point shown		Compression	Section B1		

3R-04-1-008

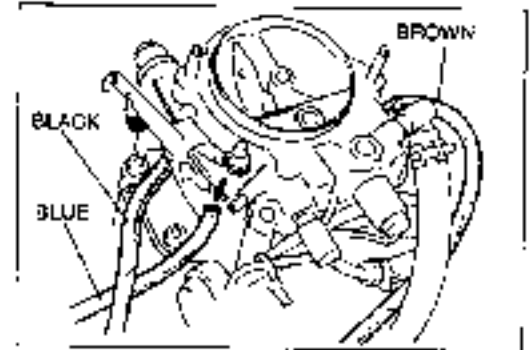
STEP 9



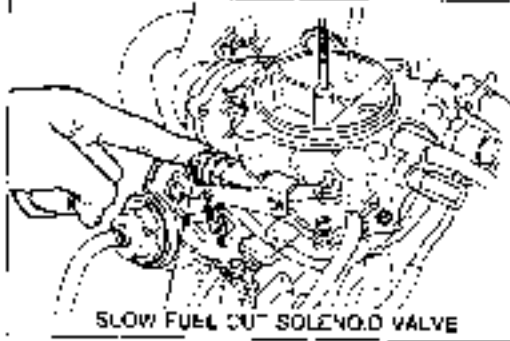
STEP 10



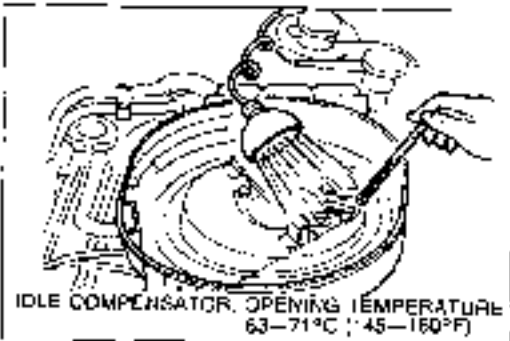
STEP 13



STEP 11



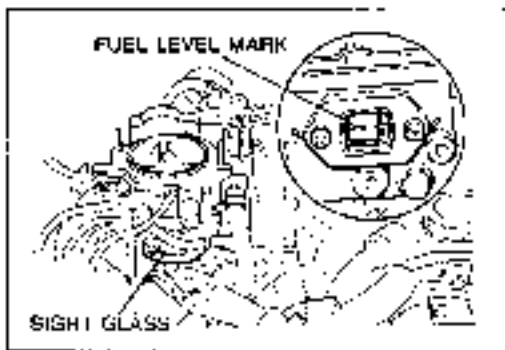
STEP 12



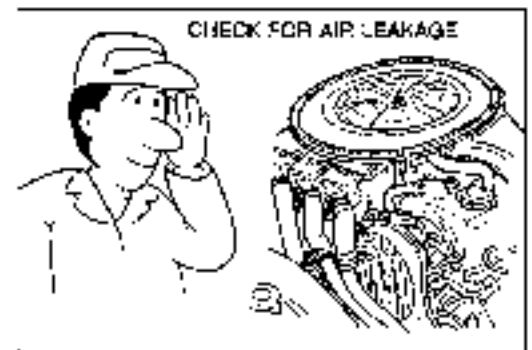


Hesitation on acceleration or start-up							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if fuel level is at specified mark on sight glass	Yes	Go to Next Step				
		No (Higher than specified) Disassemble carburetor and check points shown		Check needle and seat for wear or rust	F1-80		
				Check float for damage	F1-90		
				Set float level	F1-91		
		(Lower than specified) M/T vehicle: Check for specific fuel pressure  <b>Fuel pressure:</b> 25—32 kPa (0.26—0.33 kg/cm <sup>2</sup> , 3.7—4.7 psi)  (Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filler port  [Ign ON, fuel pump control unit terminal-wire (B/F) and (B/W) jump]]	F1-83	Yes	Set float level	F1-91	
				No	Replace fuel pump	F1-83	
			Yes	Check fuel pressure	F1-82		
	Set float level		F1-91				
No	Check fuel pump control unit						
Replace fuel pump	F1-82						
2	Check if fuel is discharged from accelerator pump nozzle when opening throttle valve	Yes	Go to Next Step				
No	Check if accelerator pump is damaged	F1-86	Yes	Replace accelerator pump	F1-86		
			No	Clean carburetor fuel passages	F1-86		
3	Check for correct ignition timing  <b>Ignition timing</b> 5—7° BTDC	Yes	Go to Next Step				
No	Adjust ignition timing				Section G		
4	Check for correct idle speed  <b>Idle speed</b> 800—850 (800 ±%) rpm (A/T: P range)	Yes	Go to Next Step				
No	Adjust idle speed				F1-112		
5	Check for air leakage with throttle valve opened	Yes	Repair				
No	Go to Next Step						
6	Check for misfire on code with SST  [Ign ON, test connector (Green, 1 pin) grounded]	Yes	Check for cause by referring to specified check sequence		F1-101		
No	Go to Next Step						
7	Check switches for correct operation with SST monitor lamp  [Ign ON, test connector (Green, 1 pin) grounded]	Yes	Go to Next Step				
No	Check for cause by referring to specified check sequence				F1-56		

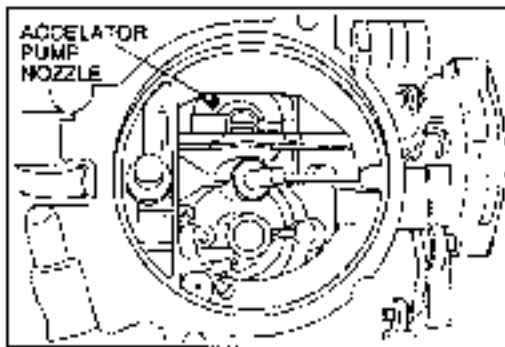
STEP 1



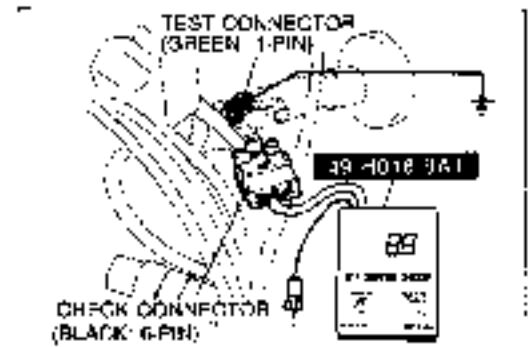
STEP 5



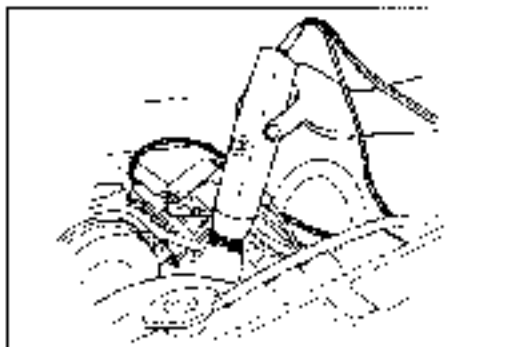
STEP 2



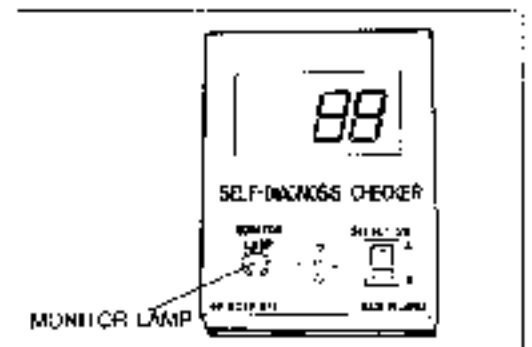
STEP 6



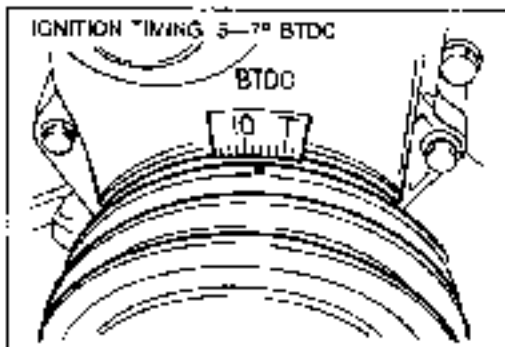
STEP 3 (1)



STEP 7 (1)



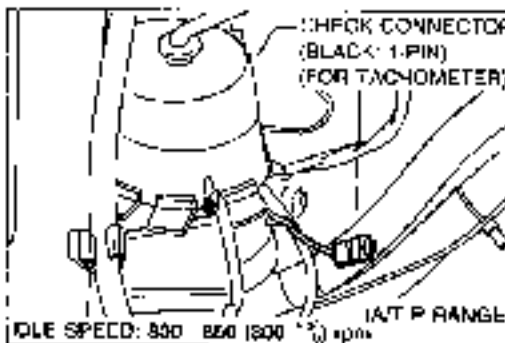
STEP 3 (2)



STEP 7 (2)

SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RELEASED <sup>1)</sup>	OFF
CLUTCH SWITCH	ACCELERATOR RELEASED <sup>2)</sup>	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED <sup>1)</sup>	ON
CLUTCH SWITCH	CLUTCH PEDAL DEPRESS <sup>2)</sup>	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
NEUTRAL SWITCH	TRANSMISSION IN NEUTRAL	OFF
IGNITION SWITCH	IN PULL RANGE	OFF
IGNITION SWITCH	IN OTHER RANGE	ON
AC SWITCH	OFF	OFF
AC SWITCH	ON	ON

STEP 4



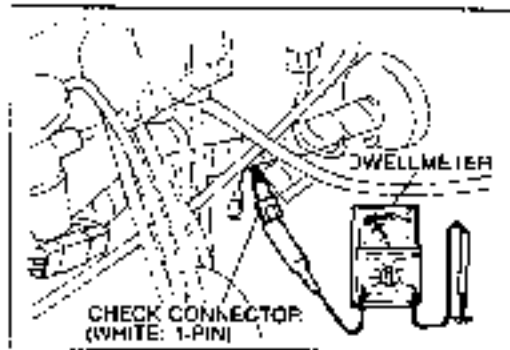
<sup>1)</sup> Ignition switch in "LOCK"  
<sup>2)</sup> Ignition switch in "ON"

## Hesitation on acceleration or start-up (Cont'd)

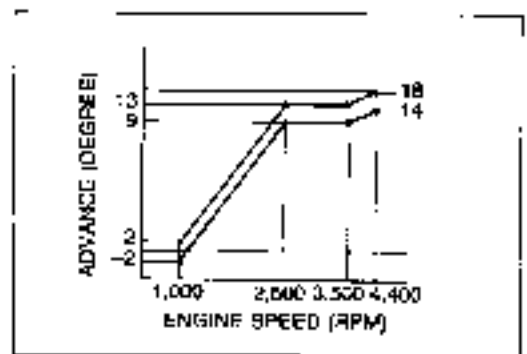
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
8	Warm up engine and run it at idle. Connect dwellmeter to check connector (White 1-pin) and check if dwellmeter reading is within 20°—70°	Yes	Go to Next Step				
		No	(Fixed at 0°)	ECU (2A) terminal voltage	F1-110		
			Check points shown	ECU (1E) terminal voltage	F1-110		
				ECU (10i) terminal voltage	F1-110		
		(Fixed at 27°)	Check points shown	ECU (11j) terminal voltage	F1-110		
				Vacuum hose routing	F1-10		
				ECU (11A) terminal voltage	F1-110		
(Fixed at 35°)	Check points shown	ECU (10) terminal voltage	F1-110				
(Fluctuating out of 20°—70° range)	Check points shown	Vacuum hose routing	F1-10				
		ECU (1A) terminal voltage	F1-110				
		Oxygen sensor sensitivity	F1-55				
		ECU (2F) terminal voltage	F1-111				
		Air/fuel solenoid valve operation	F1-54				
		Clogged jets and air bleeds in carburetor	F1-86				
Idle mixture adjustment	F1-112						
9	Increase engine speed to 4,600 rpm and check if dwellmeter indicates a fixed 0°	Yes	Go to Next Step				
		No	Replace engine control unit				
10	Check for correct ignition timing advance	Yes	Go to Next Step				
		No	Insufficient centrifugal advance	Distributor malfunction	Section G		
11	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (2K) and (2I) terminal voltage with 55"	F1-111	Yes	Check duty solenoid valve	F1-83
				No	Check ECU (10i), (10j), and (2A) terminal voltage with 55"	F1-110	
		No	Check EGR control valve	F1-82	Yes	Go to Next Step	
				No	Replace EGR control valve		
12	Check carburetor	Check points shown		Clogged primary jet or nozzle	F1-86		

©1994 Ford

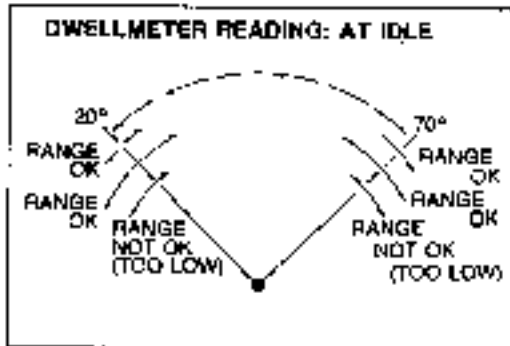
STEP 8  
(1)



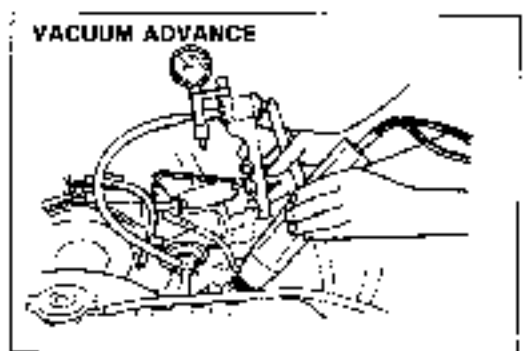
STEP 10  
(2)



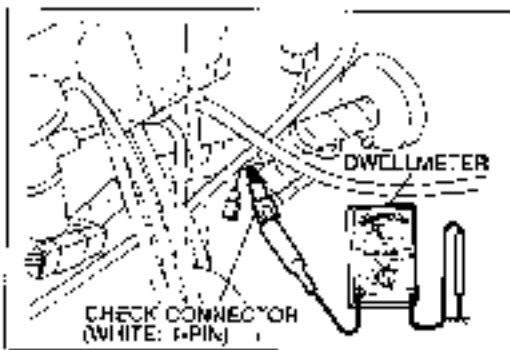
STEP 8  
(2)



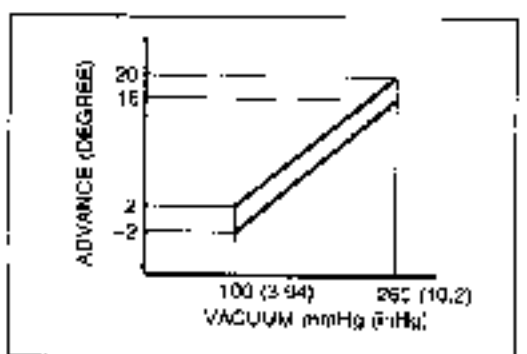
STEP 10  
(3)



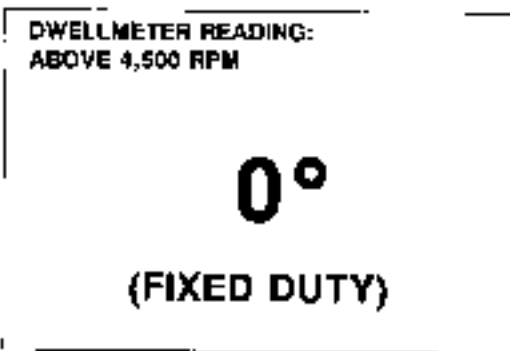
STEP 9  
(1)



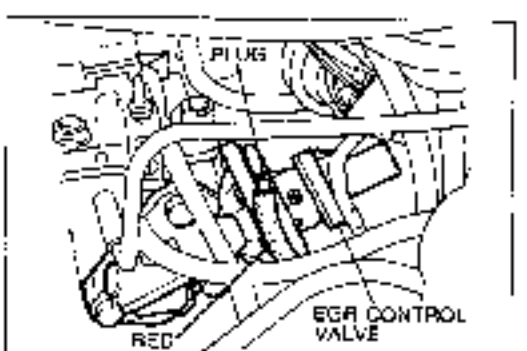
STEP 10  
(4)



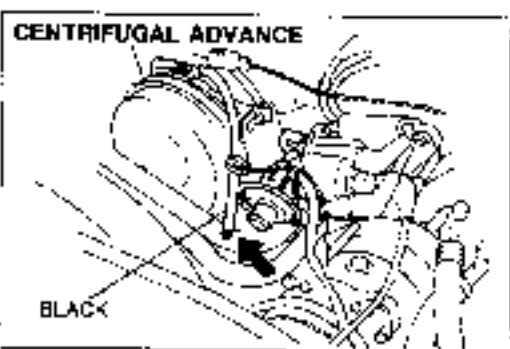
STEP 9  
(2)



STEP 11

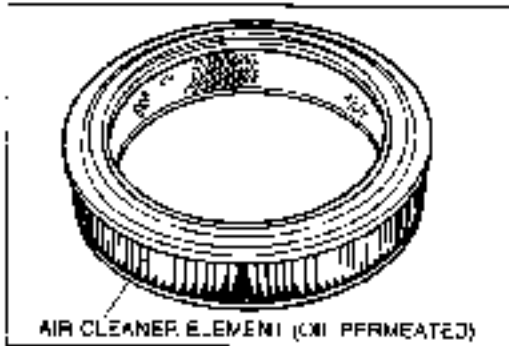


STEP 10  
(1)

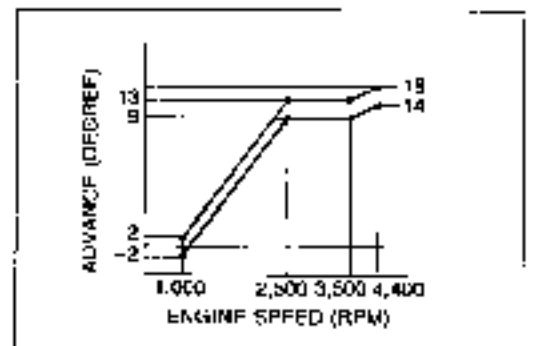


Lack of power						
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if air cleaner element is clean	Yes	Go to Next Step			
		No	Replace air cleaner element			
2	Check if fuel level is at specified mark on carburetor sight glass	Yes	Go to Next Step			
		No (Higher than specified) Disassemble carburetor and check points shown	Check needle and seat for wear or rust	F1-90		
			Check float for damage	F1-90		
			Set float level	F1-91		
		(Lower than specified) M/T vehicles: Check for specified fuel pressure  <b>Fuel pressure:</b> 28—32 kPa (0.26—0.33 kg/cm <sup>2</sup> , 3.7—4.7 psi)	F1-83	Yes	Set float level	F1-91
				No	Replace fuel pump	F1-83
(Lower than specified) A/T vehicle: Check for sound of fuel pump operation fuel filter port  [Ign ON, fuel pump control unit terminal wire (R/R) and (R/W), unplug]	Yes		Check fuel pressure	F1-82		
No	Set float level	F1-91				
No	Check fuel pump control unit Hepisco fuel pump	F1-82				
3	Check ignition timing  <b>Ignition timing: 5—7° BTDC</b>	Yes	Go to Next Step			
		No	Adjust ignition timing	Section G		
4	Check for correct ignition timing advance	Yes	Go to Next Step			
		No	Insufficient centrifugal advance: Distributor malfunction	Section G		
			Insufficient vacuum advance Check for correct vacuum hose routing	F1-10 Yes: Distributor malfunction No: Repair vacuum hose	Section G F1-10	
5	Check if spark plug condition is OK	Yes	Go to Next Step			
		No	Repair or replace spark plug(s)	Section G		
6	Check for malfunction code with SST  [Ign ON, test connector (Green 1-pin) grounded]	Yes	Check for cause by referring to specified check sequence	F1-101		
		No	Go to Next Step			

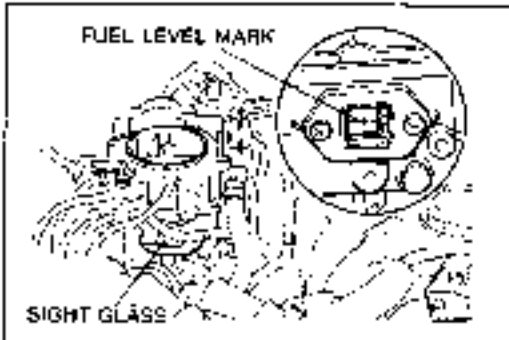
STEP 1



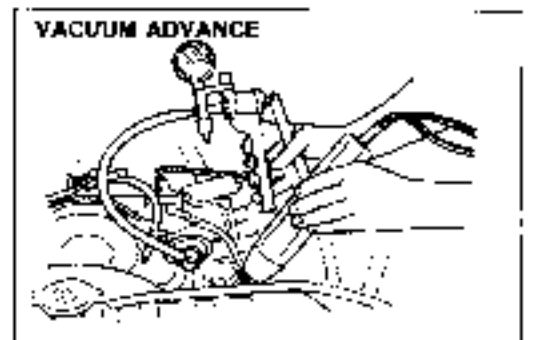
STEP 4  
(2)



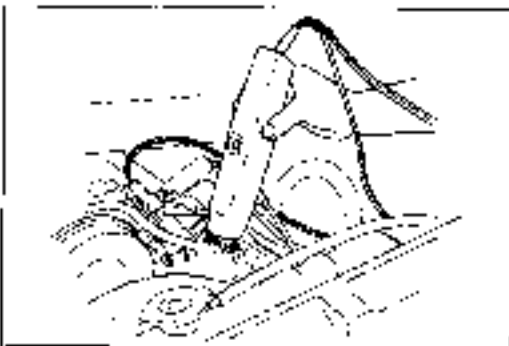
STEP 2



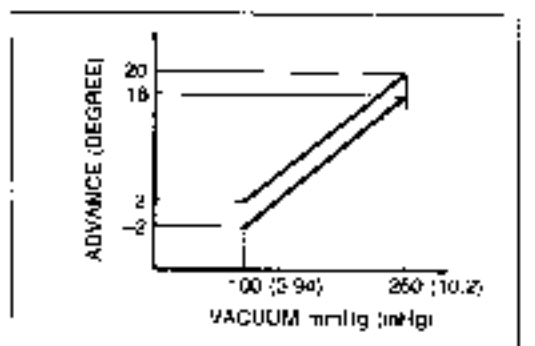
STEP 4  
(3)



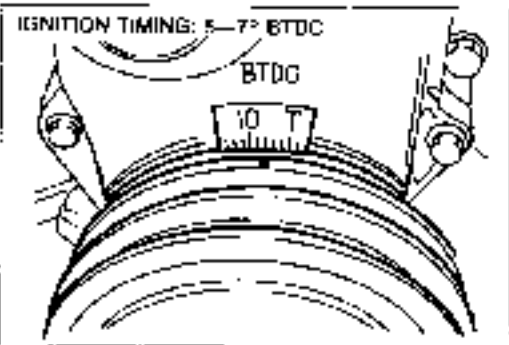
STEP 3  
(1)



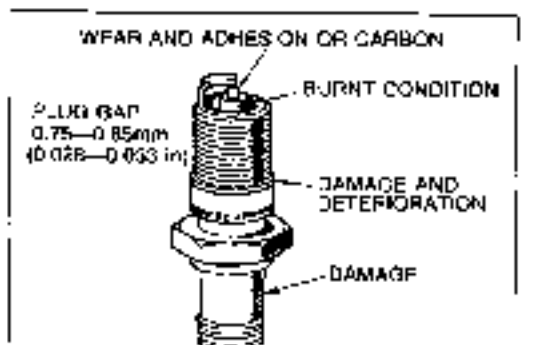
STEP 4  
(4)



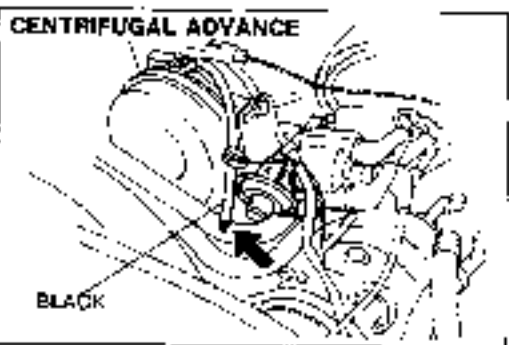
STEP 3  
(2)



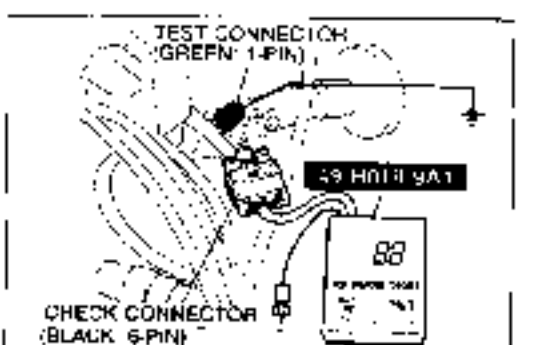
STEP 5



STEP 4  
(1)

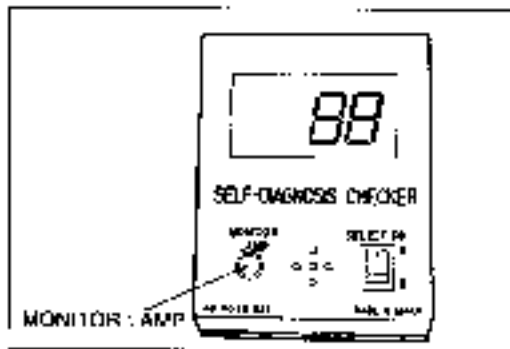


STEP 6



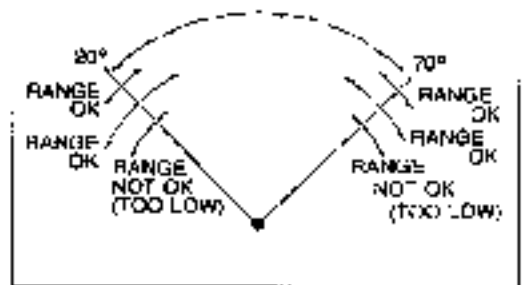
Lack of power (Cont'd)						
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION			
6	Check switches for correct operation with SST monitor lamp  [Ign ON, SST connector (Green 1-pin) grounded]	Yes	Go to Next Step			
		No	Check for cause by referring to specified check sequence			
7	Disconnect and plug vacuum hose to LGR control valve and check if condition improves	Yes	Check ECU (2C) and (2A) terminal voltage with SST  <b>Voltage: Drops from battery voltage and green and red lights flash (While acceleration)</b>	F1-111 Yes	Check duty to avoid valve	F1-63
			No		No	Check LCU (1C), (1Q), and (2A) terminal voltage with SST
		No	Check LGR control valve for operation	Yes	Go to Next Step	
				No	Replace LGR control valve	
8	Warm up engine and run it at idle  Connect dwellmeter to check connector (White 1 pin) and check if readings within 20°—70°	Yes	Go to Next Step			
		No	<b>(Fixed at 0°)</b>  Check points shown	ECU (2A) terminal voltage	F1-110	
				ECU (1E) terminal voltage	F1-110	
				ECU (1C) terminal voltage	F1-110	
		<b>(Fixed at 27°)</b>  Check points shown	ECU (1J) terminal voltage	F1-110		
			Vacuum hose routing	F1-10		
			ECL (1A) terminal voltage	F1-110		
		<b>(Fixed at 25°)</b>  Check points shown	Oxygen sensor sensitivity	F1-55		
			ECU (1C) terminal voltage	F1-110		
			Vacuum hose routing	F1-10		
		<b>(Fluctuating out of 20°—70° range)</b>  Check points shown	ECU (1A) terminal voltage	F1-110		
			Oxygen sensor sensitivity	F1-55		
ECU (2F) terminal voltage	F1-111					
Air/fuel screw/valve operation	F1-54					
Clogged jets and air filters in carburetor	F1-86					
Idle mixture adjustment	F1-112					
9	Check engine condition	Check compression	Section B1			
10	Check carburetor	Check float shown	<ul style="list-style-type: none"> <li>• Clogged primary main jet or nozzle</li> <li>• Clogged secondary main jet or nozzle</li> <li>• Secondary throttle valve opening</li> </ul>	F1-112		
11	Check exhaust system for clogging					

STEP 6  
(1)



STEP 6  
(2)

DWELL METER READING: AT IDLE

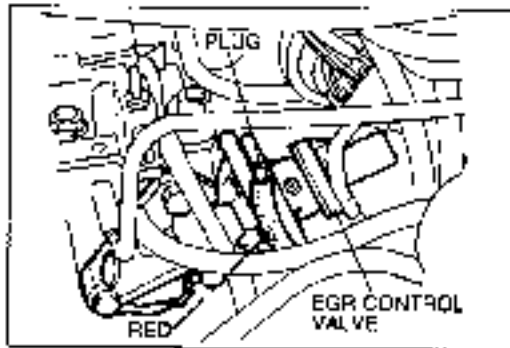


STEP 6  
(2)

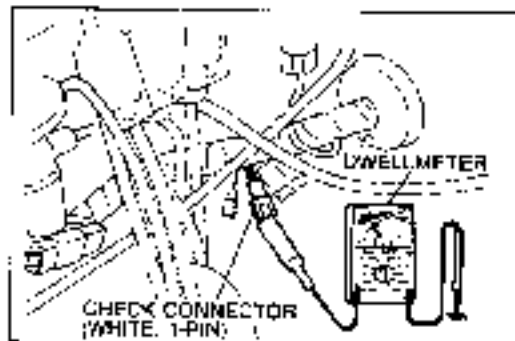
SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RE-FASTEN <sup>1)</sup>	ON
	ACCELERATOR DE-PRESSED <sup>2)</sup>	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED <sup>1)</sup>	ON
	CLUTCH PEDAL DE-PRESSED <sup>2)</sup>	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
IN-REAR SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

<sup>1)</sup> Transmission in neutral  
<sup>2)</sup> Transmission in gear

STEP 7



STEP 8  
(1)



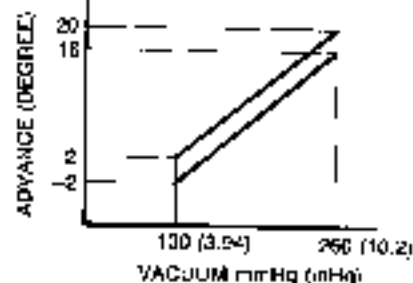


Afterburn on deceleration					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for correct ignition timing <b>Ignition timing: 5-7° BTDC</b>	Yes	Go to Next Step		
		No	Adjust ignition timing	Section G	
2	Check for correct ignition timing advance	Yes	Go to Next Step		
		No	Insufficient centrifugal advance: Distributor malfunction		Section G
			Insufficient Vacuum advance: Check for vacuum routing	F1-10	Yes: Distributor malfunction No: Repair vacuum hose
3	Check if air cleaner element is clean	Yes	Go to Next Step		
		No	Replace		
4	Check for malfunction code with SST  (Ign ON, test connector (Green-1 pin) grounded)	Yes	Check for cause by referring to specified check sequence F1-101		
		No	Go to Next Step		
5	Check switches for correct operation with SST monitor lamp  (IGN ON, Test connector (Green-1-pin) grounded)	Yes	Go to Next Step		
		No	Check for cause by referring to specified check sequence		F1-55

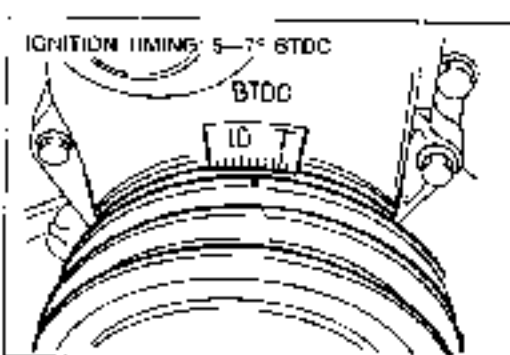
STEP 1  
(1)



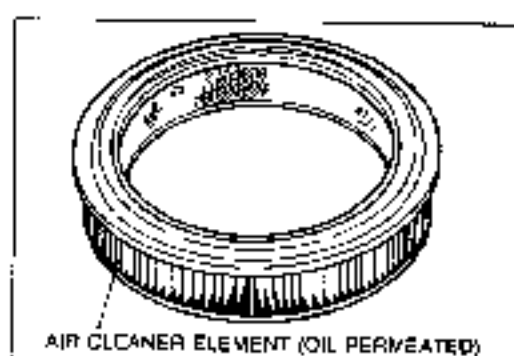
STEP 2  
(4)



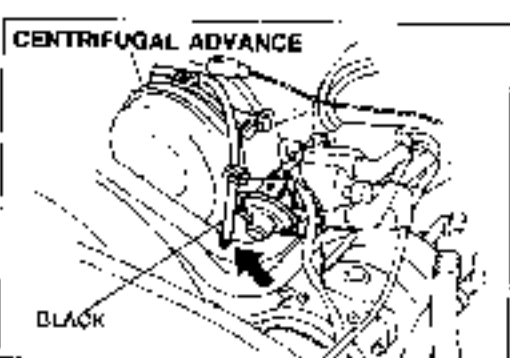
STEP 1  
(2)



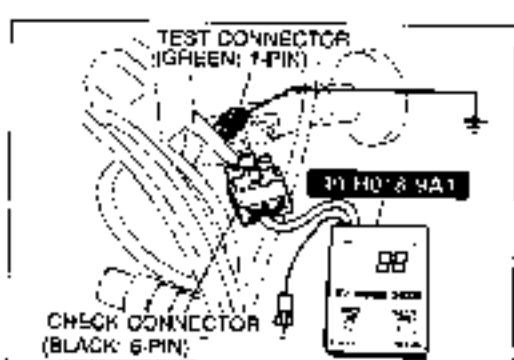
STEP 3



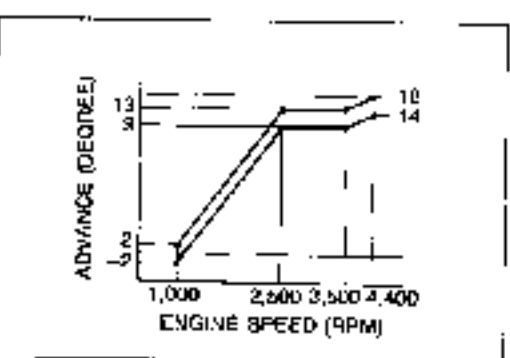
STEP 2  
(1)



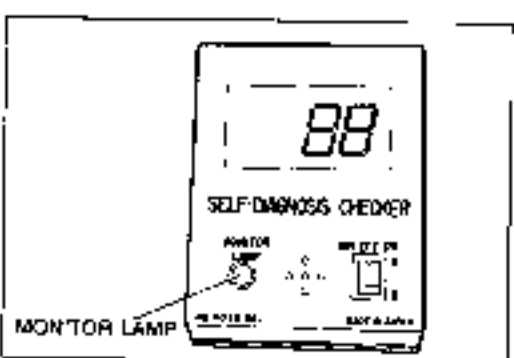
STEP 4



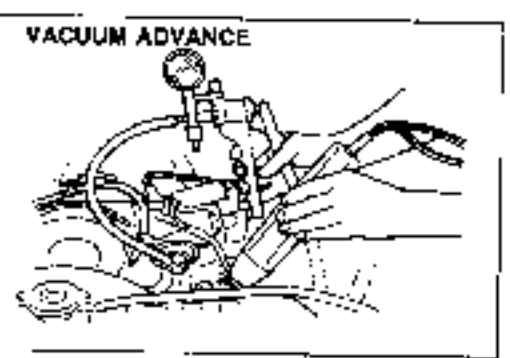
STEP 2  
(2)



STEP 5  
(1)



STEP 2  
(3)



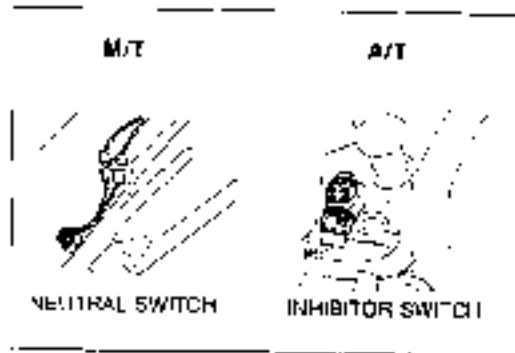
STEP 5  
(2)

SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RELEASED <sup>1)</sup>	ON
	ACCELERATOR DEPRESSED <sup>1)</sup>	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED <sup>1)</sup>	ON
	CLUTCH PEDAL DEPRESSED <sup>2)</sup>	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
INHIBITOR SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
AVC SWITCH	OFF	OFF
	ON	ON

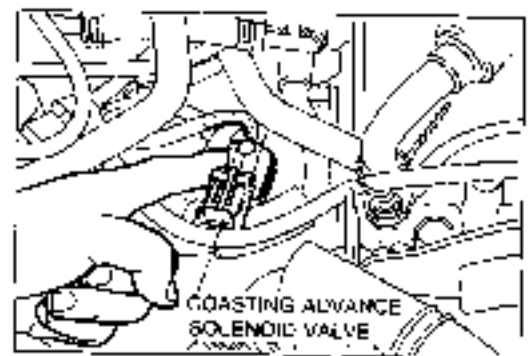
<sup>1)</sup> Transmission in neutral. <sup>2)</sup> Transmission in gear.

Afterburn on deceleration (Cont'd)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
6	Disconnect neutral switch (N/T) or inhibitor switch (A/I) connector  Decelerate engine from <b>3,000 rpm</b> and check if "clicking" sound is heard from slow fuel cut solenoid valve.	Yes	Go to Next Step			
		No	Check ECU (2D) terminal voltage with SST  <b>At idle:</b> Less than 1.5V <b>Above 2,500 rpm during deceleration:</b> battery voltage	F1-110	Yes	Check slow fuel cut solenoid valve  F1-80
7	Disconnect neutral switch (N/T) or inhibitor switch (A/I) connector  Decelerate engine from <b>3,000 rpm</b> and check if "clicking" sound is heard from coasting richer solenoid valve.	Yes	Go to Next Step			
		No	Check ECU (2H) terminal voltage with SST  <b>At idle:</b> battery voltage <b>At 2,500—1,400 rpm during deceleration:</b> Less than 1.5V	F1-111	Yes	Check coasting richer solenoid valve  F1-67
8	Disconnect neutral switch (N/T) or inhibitor switch (A/I) connector  Decelerate engine from <b>3,000 rpm</b> and check if "clicking" is heard from coasting advance solenoid valve.	Yes	Go to Next Step			
		No	Check ECU (1S) terminal voltage with SST  <b>At idle:</b> battery voltage <b>At 2,500—1,700 rpm during deceleration:</b> Below 1.5V	F1-110	Yes	Check coasting advance solenoid valve  F1-87
9	Start engine  Block intake port of mixture control valve and check if engine speed drops.	Yes	Replace mixture control valve			
		No	Increase engine speed and quickly decelerate  Verify that air is pulled into intake port for 1—2 sec after accelerator is released.		Yes	Go to Next Step
10	Check if throttle lever separates from dashpot rod <b>at 2,700—2,900 rpm</b>	Yes	Go to Next Step			
		No	Adjust dashpot			F1-88

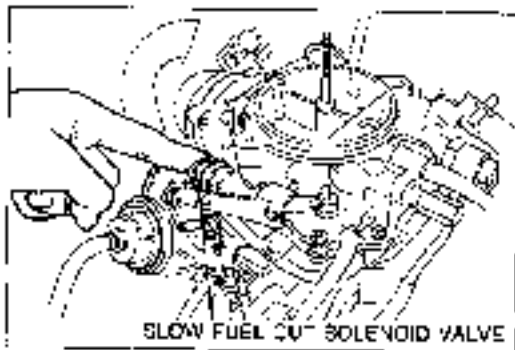
STEP 6  
(1)



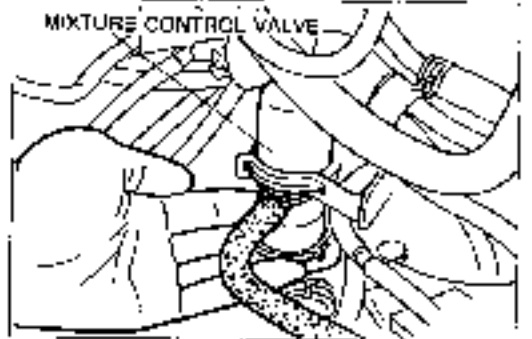
STEP 8  
(2)



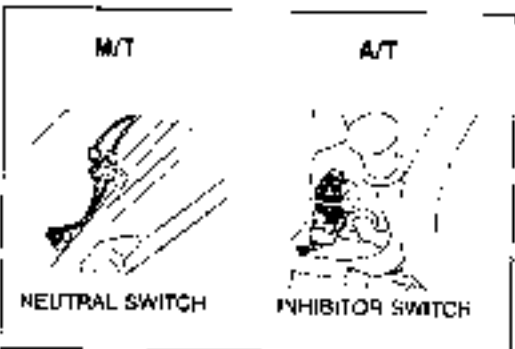
STEP 6  
(2)



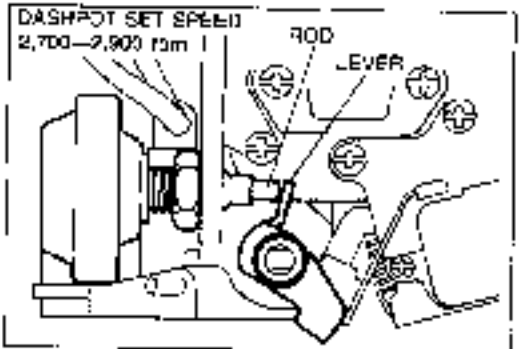
STEP 9



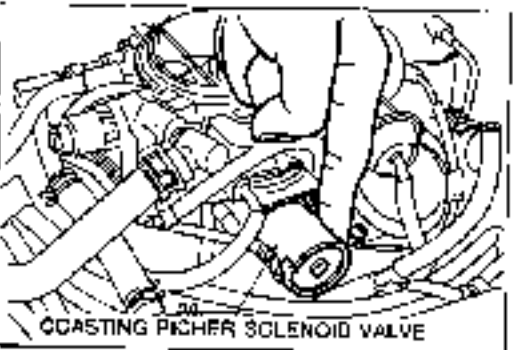
STEP 7  
(1)



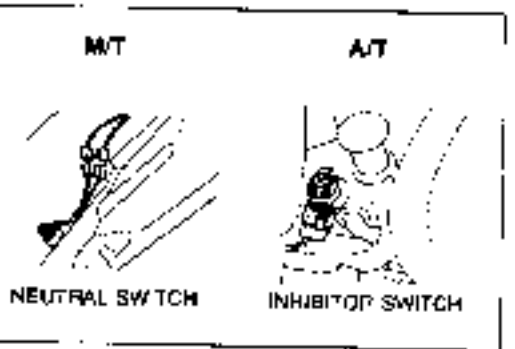
STEP 10



STEP 7  
(2)



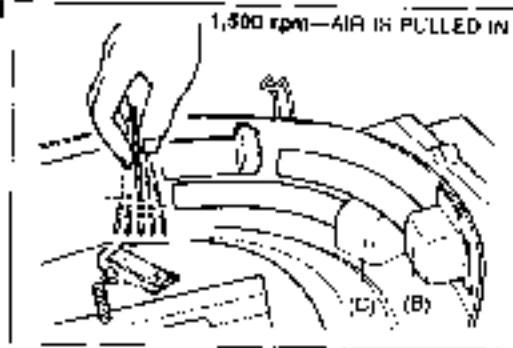
STEP 8  
(1)



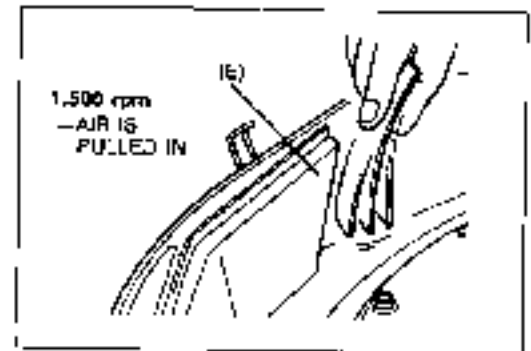
Afterburn on deceleration (Cont'd)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
11	Place a thin paper over inlet port of reed valves (B) and (C)  Increase engine speed to 1,500 rpm and check if air is pulled in	Yes	Increase engine speed to 3,000 rpm and check if exhaust gas leaks from air inlet port	Yes	Replace reed valve(s)	F1-60
		No		No	Go to Next Step	
12	Disconnect and plug vacuum hose (M) to No.2 air control valve  Place a thin paper over inlet port of reed valve (D) and increase engine speed to 1,500 rpm and check if air is pulled in	Yes	Go to Next Step		Replace reed valve(s)	F1-60
		No	Check No.1 air control valve for operation	F1-59	Yes No	Replace reed valve Replace No.1 air control valve
13	Disconnect and plug vacuum hose to No.1 air control valve  Apply 80 mmHg (3.54 inHg) of vacuum to No.2 air control valve  Place a thin paper over inlet port (E) of reed valve and increase engine speed to 1,500 rpm and check if air is pulled in	Yes	Go to Next Step			
		No	Check No.2 air control valve for operation	F1-60	Yes No	Check reed valve Replace No.2 air control valve
14	Disconnect water temperature switch connector and check that no vacuum exists at No.2 air control valve vacuum hose (N)	Yes	Increase engine speed to 1,500 rpm and check if vacuum is left at vacuum hose	Yes No	Go to Next Step Check ACV solenoid valve	F1-60
		No	Check ACV solenoid valve			F1-60
15	Check engine condition	Check points shown		Check compression Check valve timing	Section B1 Section B1	

2910F1-020

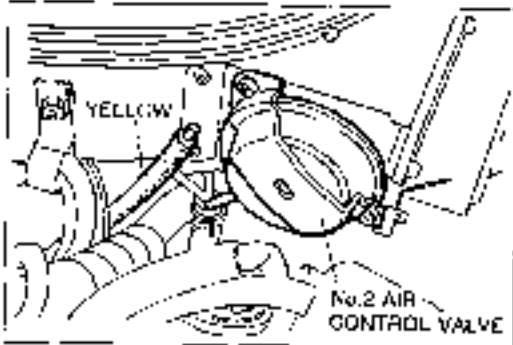
STEP 11  
(1)



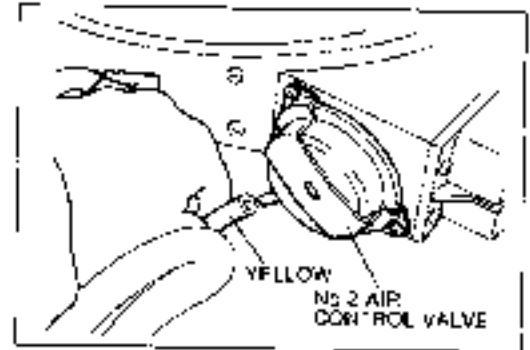
STEP 13  
(3)



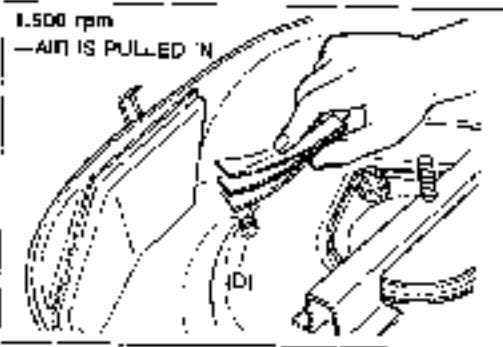
STEP 11  
(2)



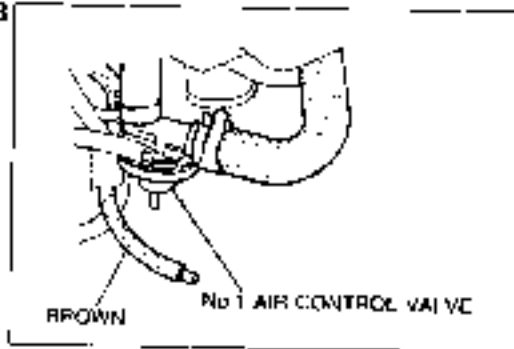
STEP 14



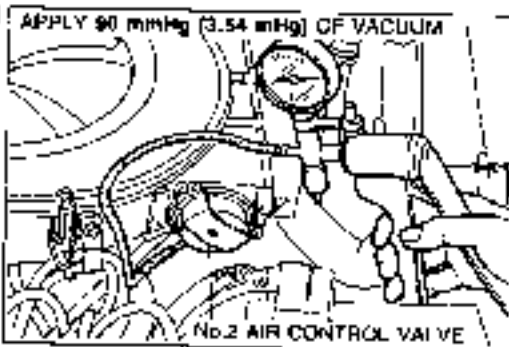
STEP 12



STEP 13  
(1)

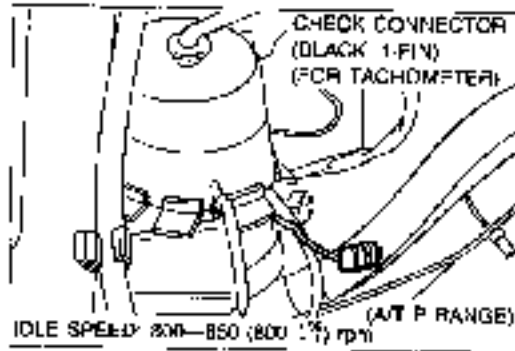


STEP 13  
(2)

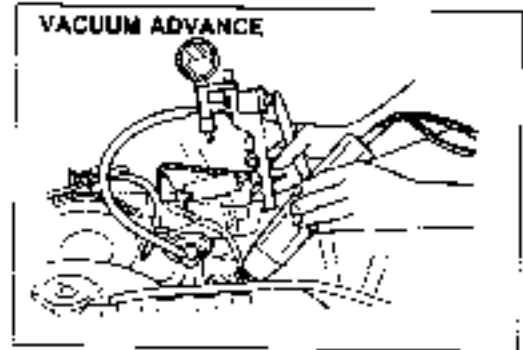


High fuel consumption											
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION								
1	Check other systems for proper operation • Brake • Clutch • A/T	Yes	Go to Next Step								
		No	<table border="1"> <tr> <td>Brake dragging</td> <td>Section P</td> </tr> <tr> <td>Clutch slipping</td> <td>Section H</td> </tr> <tr> <td>A/T shifting</td> <td>Section K1</td> </tr> </table>	Brake dragging	Section P	Clutch slipping	Section H	A/T shifting	Section K1		
Brake dragging	Section P										
Clutch slipping	Section H										
A/T shifting	Section K1										
2	Check for correct idle speed  Idle speed: 800—850 (800 ± 5%) rpm (A/T: P range)	Yes	Go to next Step								
		No	Adjust <span style="float: right;">F1-112</span>								
3	Check for correct ignition timing  Ignition timing: 6—7° BTDC	Yes	Go to Next Step								
		No	Adjust <span style="float: right;">Section G</span>								
4	Check for correct ignition timing advance	Yes	Go to Next Step								
		No	Insufficient centrifugal advance: Distributor malfunction <span style="float: right;">Section G</span>								
		Insufficient vacuum advance. Check vacuum hose routing	<table border="1"> <tr> <td>F1-10</td> <td>Yes</td> <td>Distributor malfunction</td> <td>Section G</td> </tr> <tr> <td></td> <td>No</td> <td>Repair or replace vacuum hose</td> <td>F1-10</td> </tr> </table>	F1-10	Yes	Distributor malfunction	Section G		No	Repair or replace vacuum hose	F1-10
		F1-10	Yes	Distributor malfunction	Section G						
	No	Repair or replace vacuum hose	F1-10								
5	Check if air cleaner element is clean	Yes	Go to Next Step								
		No	Replace								
6	Check if fuel level is at specified mark on carburetor sight glass	Yes	Go to Next Step								
		No	Adjust float level setting <span style="float: right;">F1-91</span>								
7	Check if choke valve fully opens after warm up	Yes	Go to Next Step								
		No	Replace automatic choke assembly <span style="float: right;">F1-86</span>								

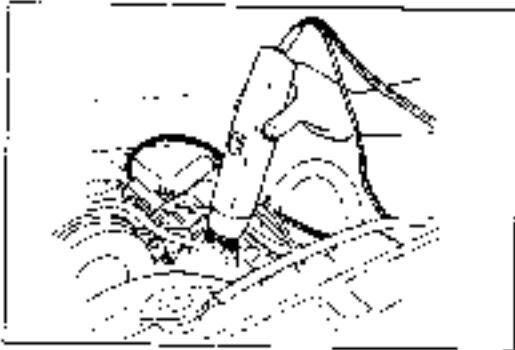
STEP 2



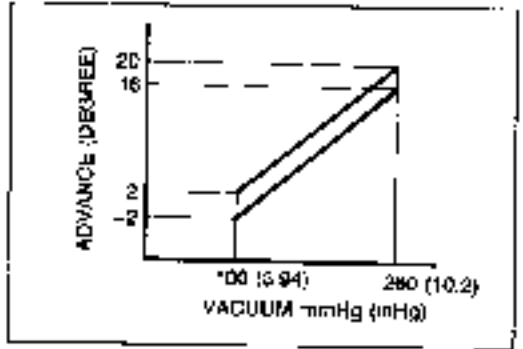
STEP 4 (3)



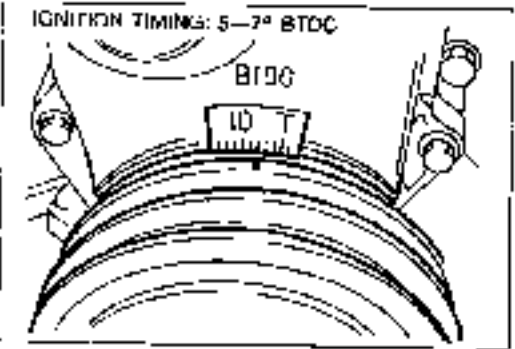
STEP 3 (1)



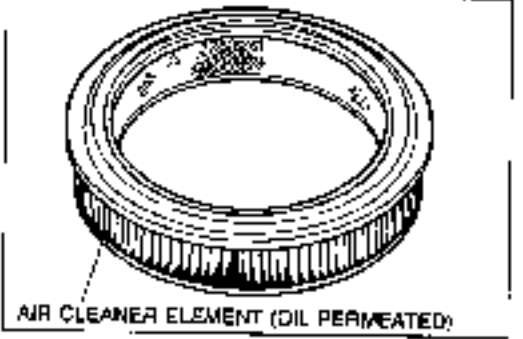
STEP 4 (4)



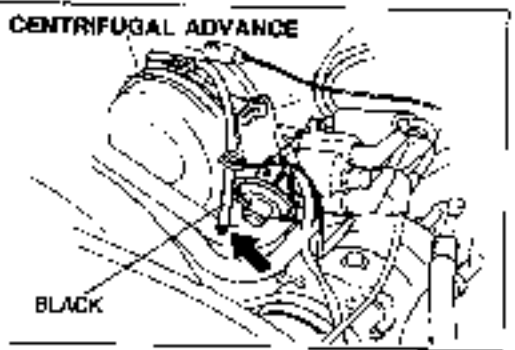
STEP 3 (2)



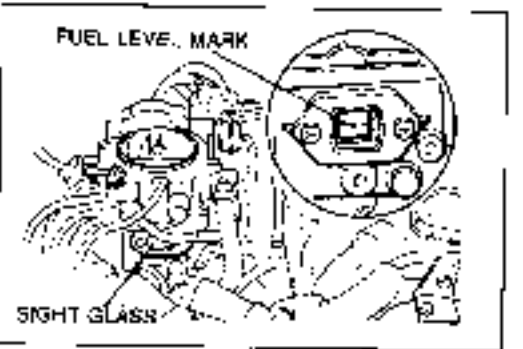
STEP 6



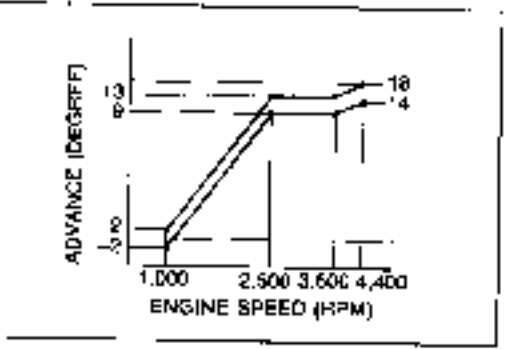
STEP 4 (1)



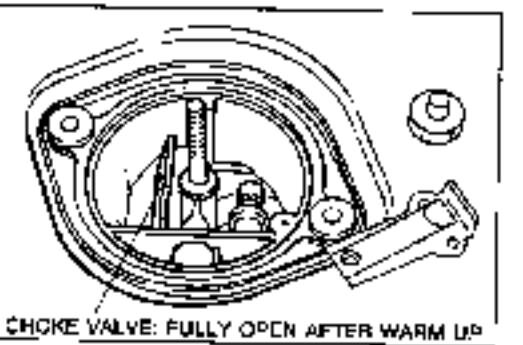
STEP 6



STEP 4 (2)



STEP 7



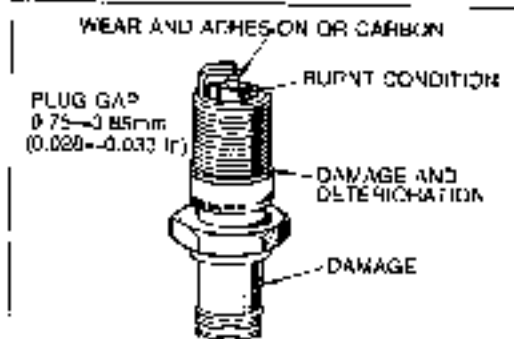


High fuel consumption (Cont'd)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
8	Check if spark plug condition is OK	Yes	Go to Next Step
		No	Repair or replace <b>Section G</b>
9	Check for malfunction coil with SST  (Ign ON, test connector (Green: 1 pin) grounded)	Yes	Check for cause by referring to specified check sequence <b>F1-101</b>
		No	Go to Next Step
10	Check switches for correct operation with SST monitor lamp  (IGN ON, test connector (Green: 1-pin) grounded)	Yes	Go to Next Step
		No	Check for cause by referring to specified check sequence <b>F1-58</b>
11	Warm up engine and run it at idle  Connect dwellmeter to check connector (White: 1 pin) and check if reading is within 20°—70°	Yes	Go to Next Step
		No <b>(Fixed at 0°)</b>  Check points shown	ECU (2A) terminal voltage <b>F1-110</b>
			ECU (1F) terminal voltage <b>F1-110</b>
			ECU (1G) terminal voltage <b>F1-110</b>
		<b>(Fixed at 27°)</b>  Check points shown	ECU (7J) terminal voltage <b>F1-110</b>
			ECU (1A) terminal voltage <b>F1-110</b>
			Oxygen sensor sensitivity <b>F1-55</b>
		<b>(Fixed at 35°)</b>  Check points shown	Vacuum hose routing <b>F1-10</b>
			ECU (1C) terminal voltage <b>F1-110</b>
			<b>(Fluctuating out of 20°—70° range)</b>  Check points shown
		ECU (2F) terminal voltage <b>F1-110</b>	
		Oxygen sensor sensitivity <b>F1-55</b>	
12	Check carburetor	Check part shown	Air/fuel solenoid valve operation <b>F1-54</b>
			Vacuum hose routing <b>F1-10</b>
			Idle mixture adjustment <b>F1-112</b>
			Clogged oil(s) and air bleed(s) in carburetor <b>F1-86</b>
			Clogged or loose jet(s) and air bleed(s) <b>F1-86</b>

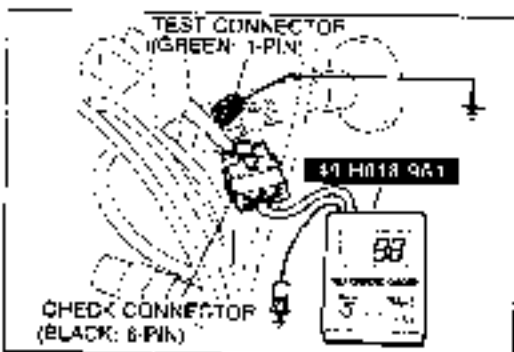
2002-1-010

Note: Some loss of fuel economy is expected with alcohol blended fuels.

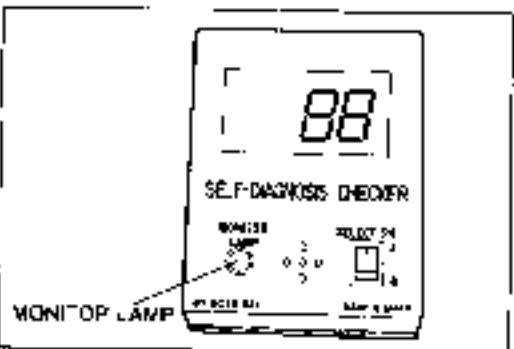
STEP 8



STEP 9



STEP 10 (1)

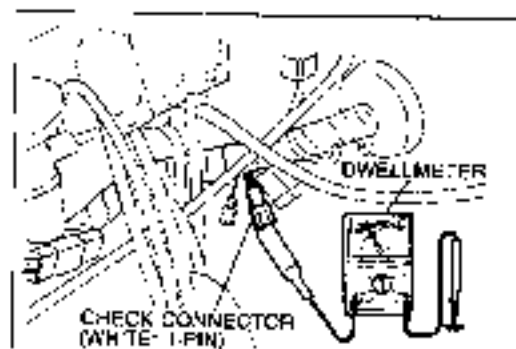


STEP 10 (2)

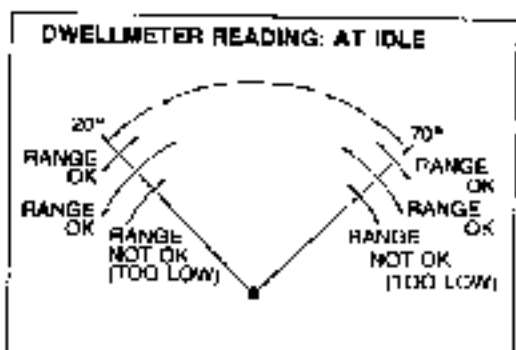
SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RELEASED <sup>1)</sup>	ON
	ACCELERATOR DEPRESSED <sup>1)</sup>	OFF
CLUTCH SWITCH	CLUTCH PEDAL RELEASED <sup>2)</sup>	ON
	CLUTCH PEDAL DEPRESSED <sup>2)</sup>	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
INHIBITOR SWITCH	IN P O D M RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

<sup>1)</sup> Transmission in neutral  
<sup>2)</sup> Transmission in gear

STEP 11 (1)



STEP 11 (2)



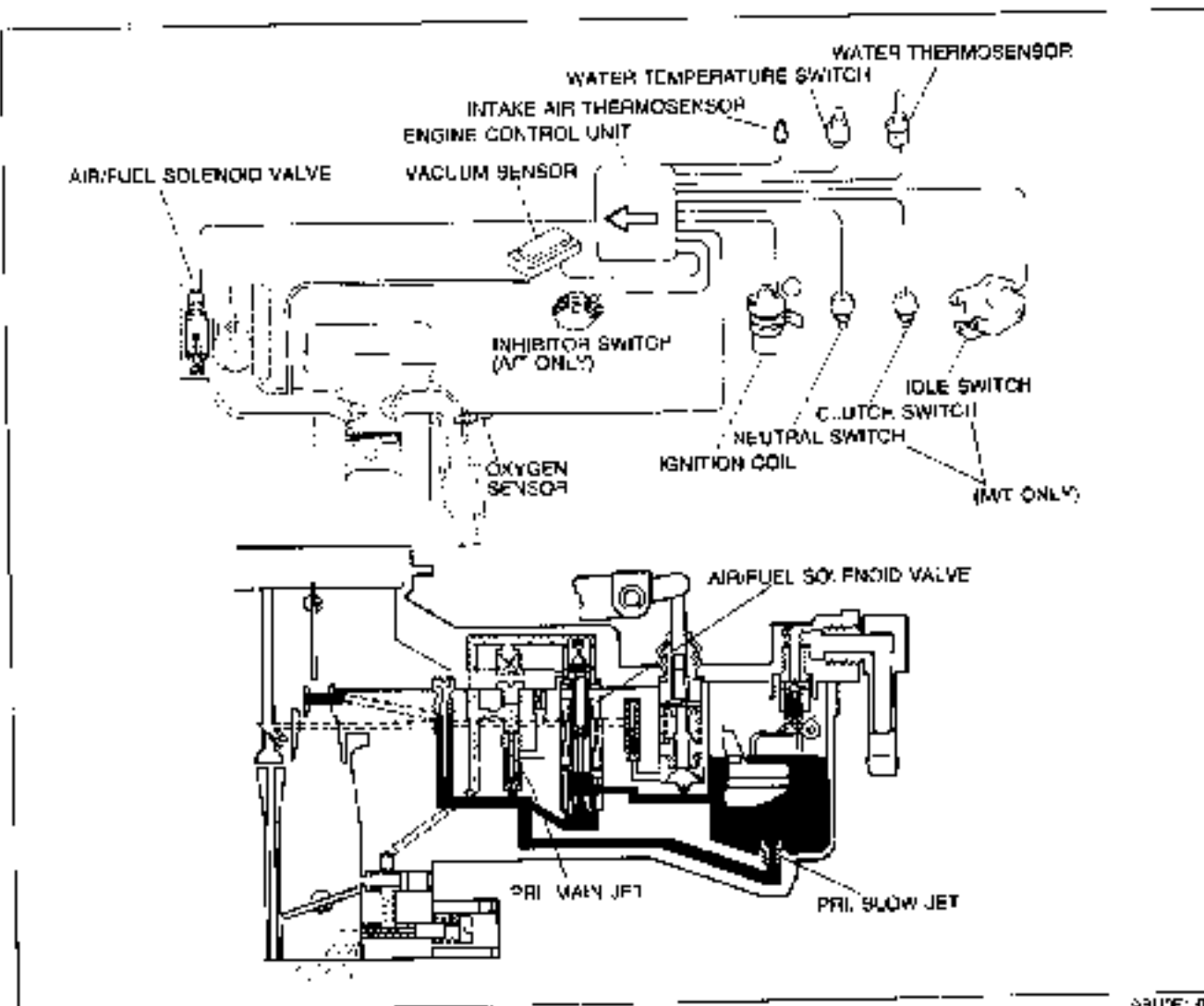
## FEEDBACK SYSTEM

PREPARATION  
SST

49 1018 9A1

Self-diagnosis  
checker

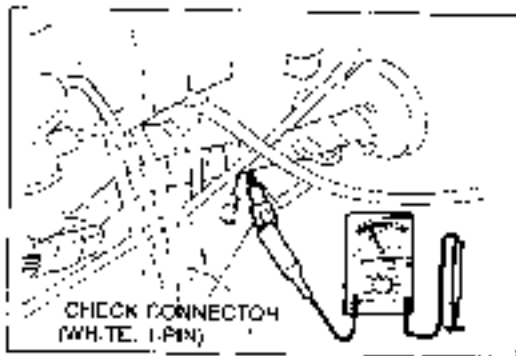
03U0P-C13



03U0P-027

This system controls air-fuel mixture to about the stoichiometric ratio (14.7 : 1), reduces CO, HC, and NOx emissions, and minimizes fuel consumption.

The system is composed of the ignition coil, neutral switch, clutch switch, idle switch, water thermosensor, water temperature switch, intake air thermosensor, oxygen sensor, vacuum sensor, A/C switch as a sensor (input), air/fuel solenoid valve as an actuator (output), and the engine control unit as a processor. The engine control unit controls the opening duration of the air/fuel solenoid valve to maintain the air/fuel mixture to the stoichiometric air-fuel ratio (14.7:1) and be suitable for current driving conditions. The air/fuel solenoid valve controls the amount of fuel added to the primary main circuit through the solenoid-controlled fuel jet. It also controls the air added to the primary slow circuit through the solenoid-controlled air bleed.



**DWELLMETER READING**

**0°**

**(FIXED DUTY)**

**DWELLMETER READING**

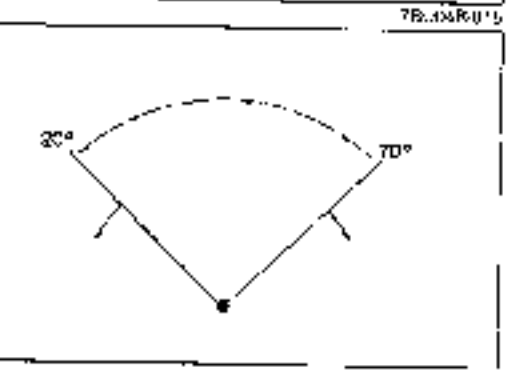
**27°**

**(FIXED DUTY)**

**DWELLMETER READING**

**36°**

**(FIXED DUTY)**



**SYSTEM INSPECTION**

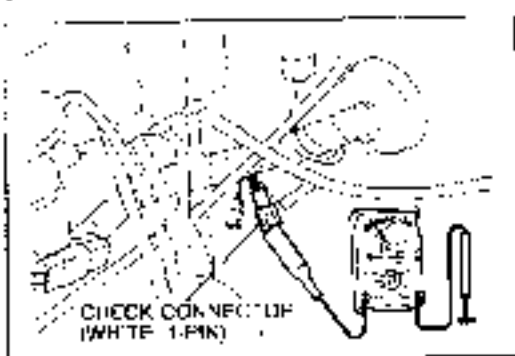
**Note**

**Troubleshoot with the Self-Diagnosis Checker before performing the following steps.**

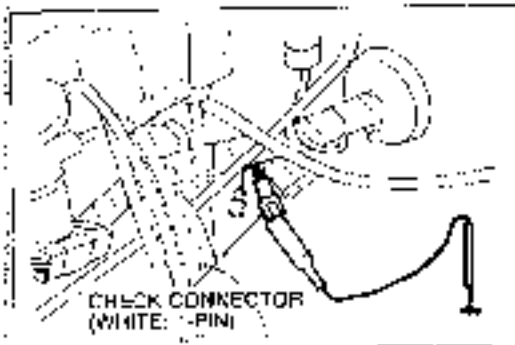
1. Warm up the engine and run it at idle.
2. Connect a dwellmeter to the check connector (White 1-pin), and note the dwellmeter reading.
3. If the dwellmeter reading is fixed at **0°**, check the following.
  - 1) Ignition pulse signal for the engine control unit.
  - 2) Characteristics of the vacuum sensor.
  - 3) Characteristics of the water thermosensor.
4. If the dwellmeter reading is fixed at **27°**, check the following.
  - 1) Characteristics of the intake air thermosensor.
  - 2) Vacuum hose routing.
  - 3) Oxygen sensor.
5. If the dwellmeter reading is fixed at **36°**, check the following.
  - 1) Characteristics of the water thermosensor.
6. If the dwellmeter reading is fluctuating out of the **20°—70°** range, check the following.
  - 1) Vacuum hose routing.
  - 2) Oxygen sensor.
  - 3) A/F solenoid valve and wiring harness.
  - 4) Clogged jets and air bleeds in the carburetor.

**Note**

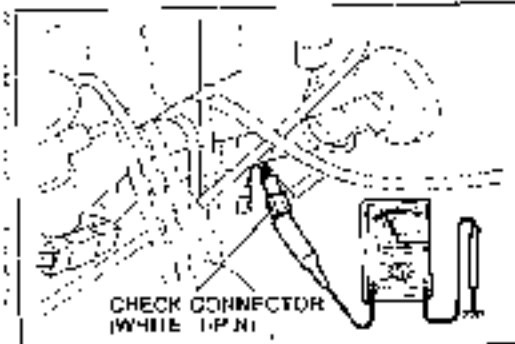
**If all these items are in good working condition, adjust the idle mixture (duty) with the mixture adjust screw.**



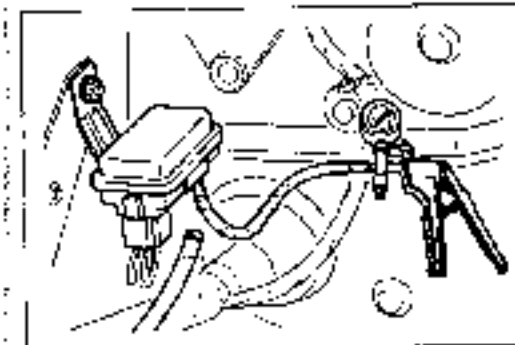
4R, JCF-026



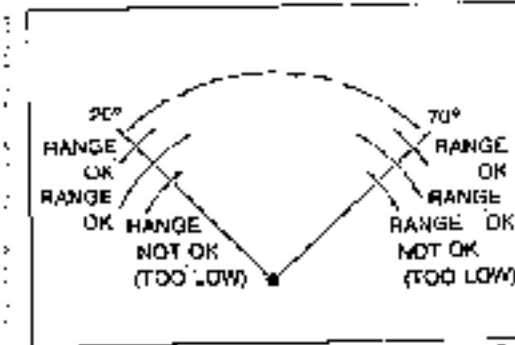
5B, JCF-026



5D, JCF-027



7B, G4D-020



7B, G4F-021

**AIR/FUEL (A/F) SOLENOID VALVE****Inspection of Valve**

1. Warm up the engine and run it at idle.
2. Connect a dwellmeter to the check connector (White 1-pin) and check to see that the dwellmeter indicates within  $20^{\circ}$ — $70^{\circ}$ .

3. Using a jumper wire, ground the check connector (White 1-pin) and check to see that the engine speed drops.
4. If it does not, clean the air/fuel solenoid valve or carburetor, or replace the air horn assembly.

**Note**

Clean with carburetor cleaner spray and blow out with compressed air, but do not submerge in cleaner. The air/fuel solenoid must be replaced along with a new air horn. The air/fuel solenoid is not available separately.

**Inspection of Signal**

1. Warm up the engine and run it at idle.
2. Connect a dwellmeter to the check connector (White 1-pin)

3. Disconnect the vacuum hose from the vacuum sensor and plug it.
4. Connect a vacuum pump to the vacuum sensor.

5. Apply **500 mmHg (19.7 inHg)** vacuum and check to see the dwellmeter indicates within  $20^{\circ}$ — $70^{\circ}$ .

DWELLMETER READING

0°

(FIXED DUTY)

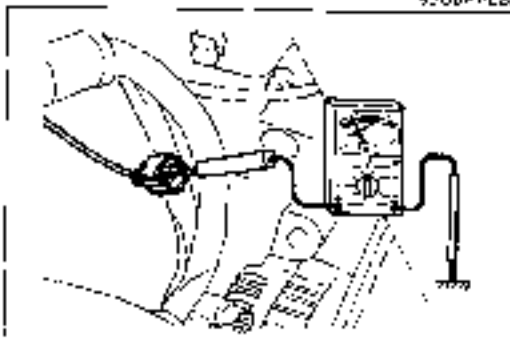
7A10H1-026

DWELLMETER READING

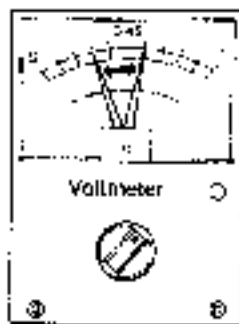
0°

(FIXED DUTY)

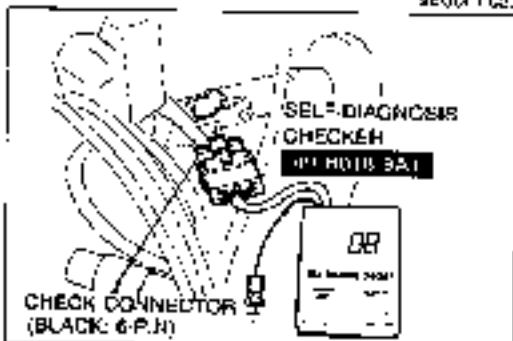
9J00H1-028



33L0F1-029



9EUCF1-027



7B J0M0-025

6. Release the vacuum, and check to see the dwellmeter indicates a fixed 0°.
7. If not correct, check the IE terminal voltage of the emission control unit and the vacuum sensor.
8. Remove the vacuum pump and reconnect the vacuum hose.

9. Increase the engine speed to **4,500 rpm** and check to see the dwellmeter indicates a fixed 0°.
10. If the reading is **72°**, check the idle switch and neutral switch.
11. If the reading is other than **0° or 72°**, replace the engine control unit.

OXYGEN SENSOR

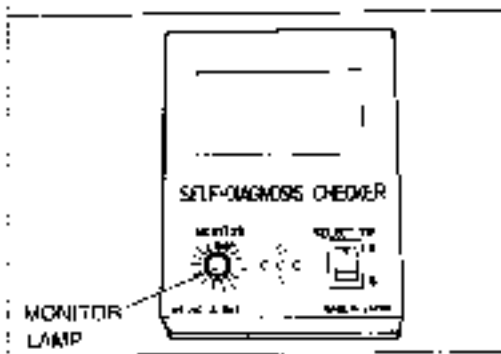
Inspection of Output Voltage

1. Warm up the engine and stop it.
2. Disconnect the Oxygen sensor connector.
3. Connect a voltmeter between the Oxygen sensor connector (sensor side) and ground.
4. Run the engine at **4,000 rpm** until the voltmeter indicates approximately **0.7V**.

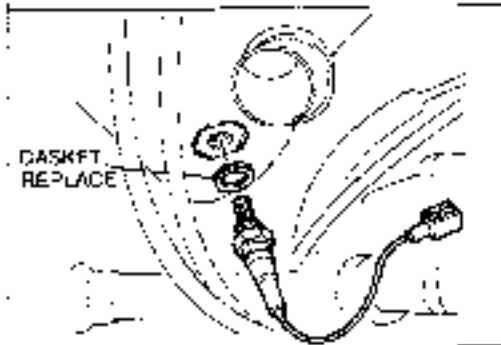
5. Increase and decrease the engine speed suddenly several times. Check to see that when the speed is increased the meter reads between **0.5V—1.0V**, and when the speed is decreased it reads between **0V—0.4V**.
6. If the voltmeter doesn't indicate as specified, replace the Oxygen sensor.

Inspection of sensitivity

1. Warm up the engine and run it at idle.
2. Connect the **Self-Diagnosis Checker** (49 H015 9A1) to the check connector.



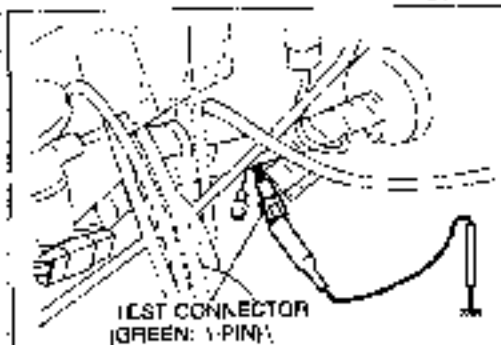
7F1K4B 097



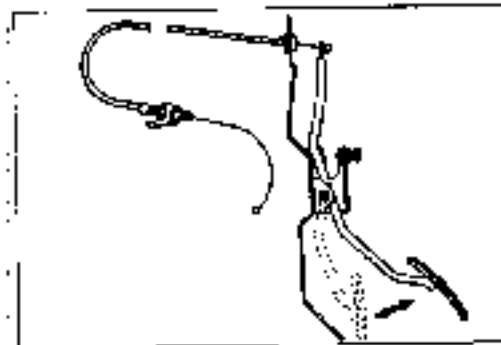
9BUCF1 C31



7B1E46 C99



9BUCF1 C32



9H111F1 C33

- Increase the engine speed to between **2,000 and 3,000 rpm** and check to see if the monitor lamp flashes for 10 seconds.

**Monitor lamp: Flashes ON and OFF more than 8 times/10 sec**

#### Replacement

- Disconnect the connector.
- Remove the oxygen sensor and gasket.
- Install the oxygen sensor and gasket as shown.

#### IDLE, CLUTCH, NEUTRAL, AND AIR-CONDITIONER SIGNALS

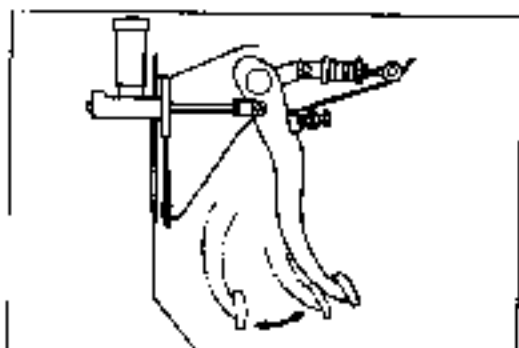
##### Inspection

- With the engine OFF, connect the **Self-Diagnosis Checker** (49 HC18 9A1) to the check connector.
- Ground the test connector (Green: 1-pin).
- Turn the ignition switch ON and the air-conditioner switch OFF.

- With the shift lever in neutral, check the monitor lamp on the **Self-Diagnosis Checker** while depressing the accelerator pedal.

Condition	Lamp
Accelerator pedal released	OFF
Accelerator pedal depressed	ON

If it malfunctions, check the 10 terminal of the engine control unit and the idle switch.

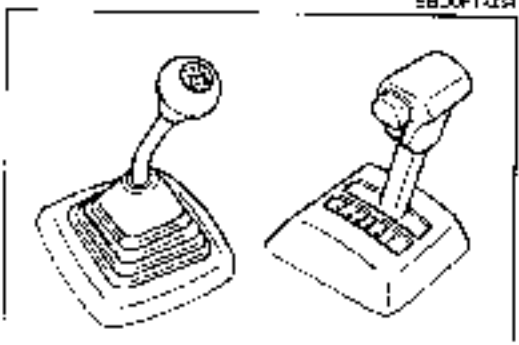


98L0F1-029

5. With the transmission in gear, check the monitor lamp while depressing the clutch pedal.

Condition	Lamp
Clutch pedal released	ON
Clutch pedal depressed	OFF

If it malfunctions, check the 1N terminal of the engine control unit and the clutch switch.

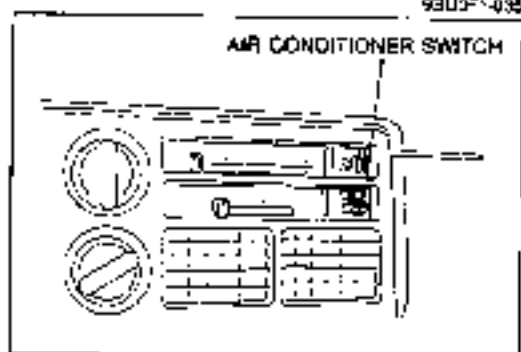


98L0F1-030

6. Check the monitor lamp while moving the shift lever.

Condition		Lamp
A/T	M/T	
In P or N	In neutral	OFF
In other	In gear	ON

If not correct, check the 1N terminal of the engine control unit and the neutral or inhibitor switch.



98L0F1-036

7. With the transmission in neutral and blower motor ON, check the monitor lamp while operating the air conditioner switch.

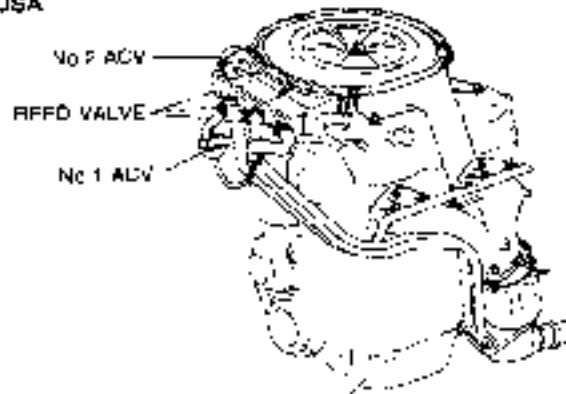
Condition	Lamp
Air conditioner OFF	OFF
Air conditioner ON	ON

If not correct, check the 2C terminal of the engine control unit.

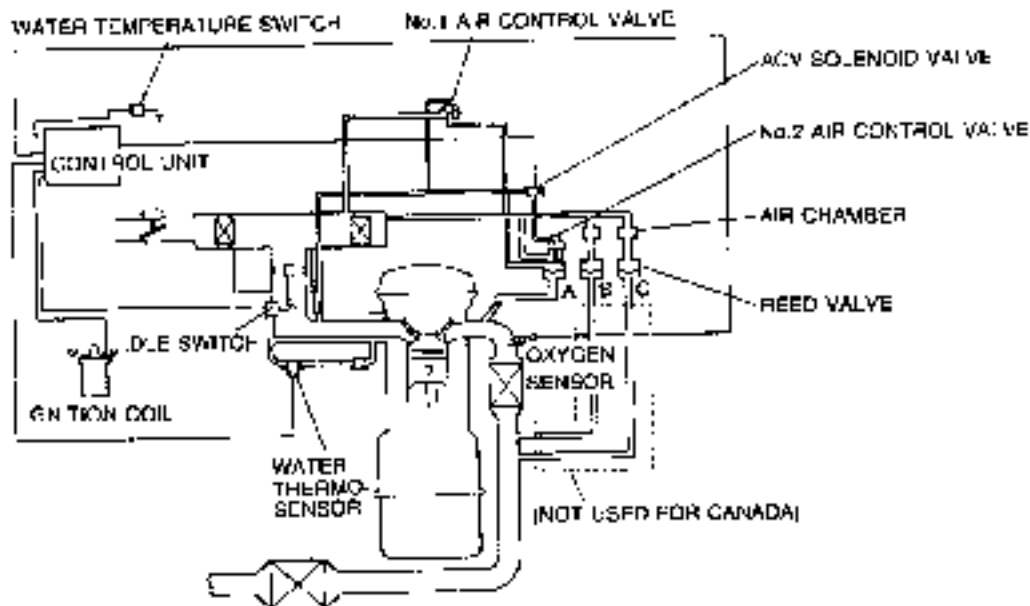
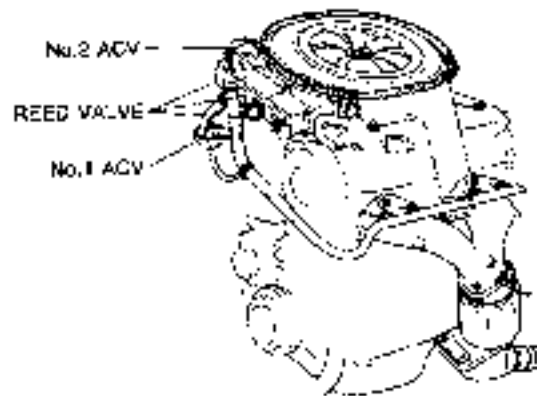


## AIR INJECTION SYSTEM

USA



CANADA



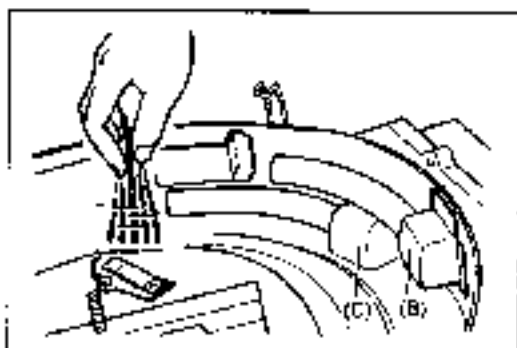
80J0F1-057

This system supplies secondary air into the exhaust system to burn (oxidize) CO and HC in the exhaust gas and to control the oxygen signal for the engine control unit.

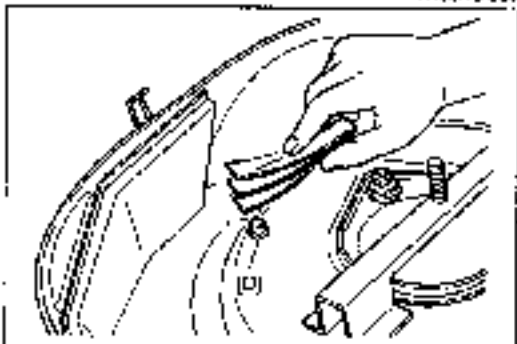
The system comprises the reed valves, air control valves, and ACV solenoid valve controlled by the engine control unit.

Reed valve A supplies secondary air into the exhaust manifold when the No. 1 or No. 2 air control valve air passage opens, and when both open.

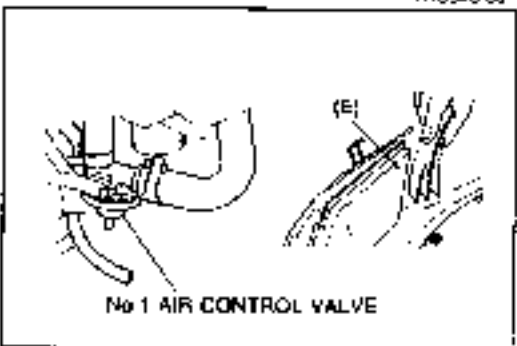
Reed valves B and C supply secondary air into the exhaust pipe just behind the Iron catalytic converter through exhaust gas pulsation.



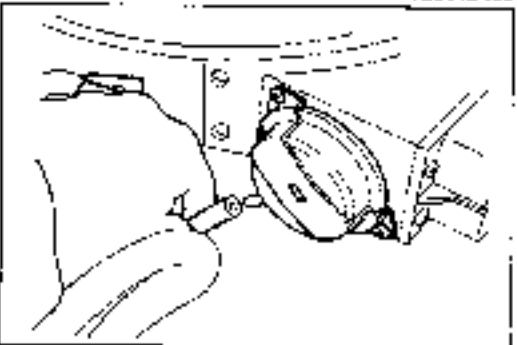
7R.0119-03H



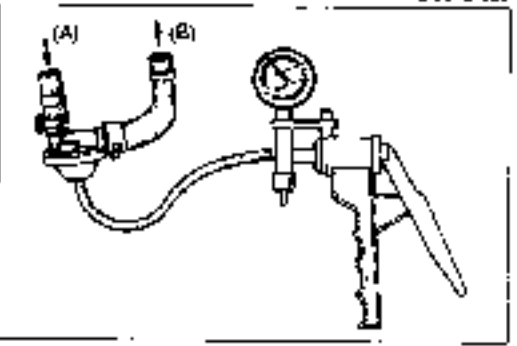
7R.0246-03F



7B.0246-03B



7R.0110-02B



7R.0246-040

SYSTEM INSPECTION

Note

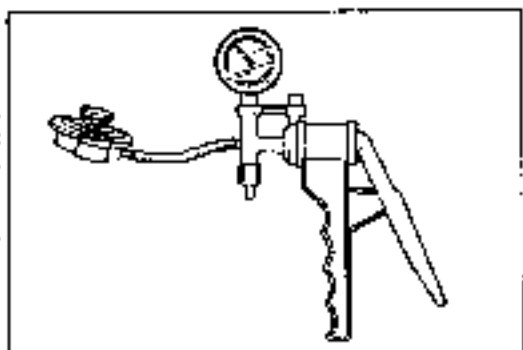
Troubleshoot with the Self-Diagnosis Checker before performing the following steps.

- 1 Warm up the engine
- 2 Place a thin paper over the inlet port of reed valves B and C.
- 3 Increase the engine speed to **1,500 rpm**, and check to see that air is being pulled in.
- 4 Increase the engine speed to **3,000 rpm**, and check to see that there is no exhaust gas leaking from the air inlet port.
- 5 If a malfunction is found, replace the reed valve.
- 6 Disconnect the vacuum hose from the No. 2 air control valve and plug it.
- 7 Place a thin paper over inlet port (D) of reed valve A.
- 8 Increase the engine speed to **1,500 rpm**, and check to see that air is being pulled in.
- 9 If it is not, check the No. 1 air control valve, and then check the reed valve.
- 10 Disconnect the vacuum hose from the No. 1 air control valve and plug it.
- 11 Apply **90 mmHg (3.54 inHg)** vacuum to the No. 2 air control valve, with a vacuum pump.
- 12 Place a thin paper over inlet port (E) of reed valve A.
- 13 Increase the engine speed to **1,500 rpm**, and check to see that air is being pulled in.
- 14 If it is not, check the No. 2 air control valve, and then check the reed valve.
- 15 Stop the engine and disconnect the water temperature switch connector.
- 16 Run the engine at idle and check to see that no vacuum is evident at the No. 2 air control valve vacuum hose.
- 17 Increase the engine speed to **1,500 rpm** and check to see that vacuum is present at the vacuum hose.
- 18 If a malfunction is found, check the ACV solenoid valve.
- 19 Reconnect the vacuum hoses to the No. 1 and No. 2 air control valves.
- 20 Reconnect the water temperature switch connector.

No. 1 AIR CONTROL VALVE

Inspection

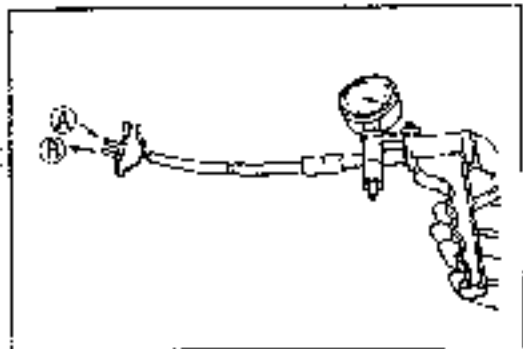
- 1 Remove No. 1 ACV.
- 2 Connect a vacuum pump to :
- 3 Blow air into (A) and verify that air does not come out of (B).
- 4 Apply **400 mmHg (15.7 inHg)** vacuum.
- 5 Blow air into (A) and verify that air comes out of (B).



78J04B-185

**No.2 AIR CONTROL VALVE****Inspection**

1. Remove No.2 air control valve.
2. Connect a vacuum pump to it.
3. Apply vacuum gradually, and verify that the stem starts to move at **50 mmHg (1.97 inHg)** vacuum and stops at **90 mmHg (3.54 inHg)**.



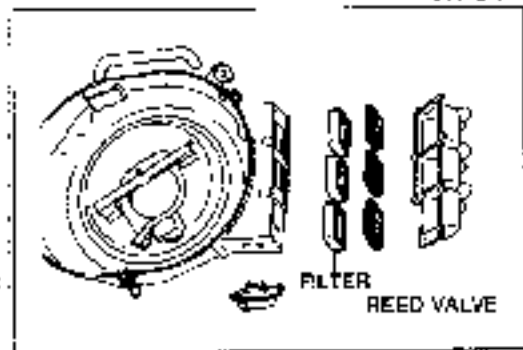
78J04B-231

**VACUUM SWITCH VALVE**

1. Remove the No.3 purge control valve.
2. Connect a vacuum pump to the valve as shown.
3. Blow through the valve from port (A), and verify that air comes out of port (B) when vacuum is applied.

**Specified vacuum: 66-108 mmHg (2.60-4.17 in Hg)**

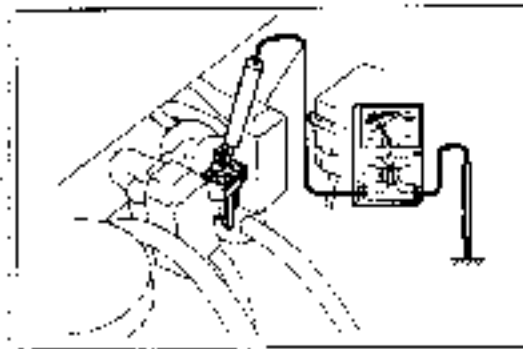
4. If it does not, replace the No.3 purge control valve.



78J04B-012

**REED VALVE****Replacement**

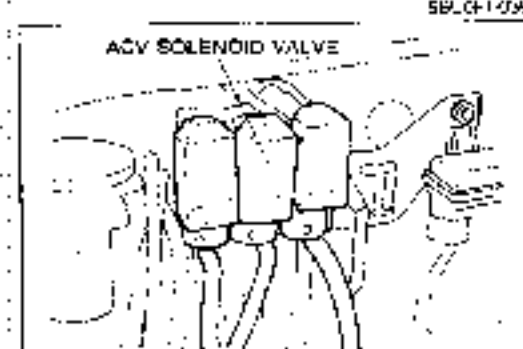
Replace the reed valve as shown, if necessary.



58L-CF-1-038

**ACV SOLENOID VALVE****Inspection of Signal**

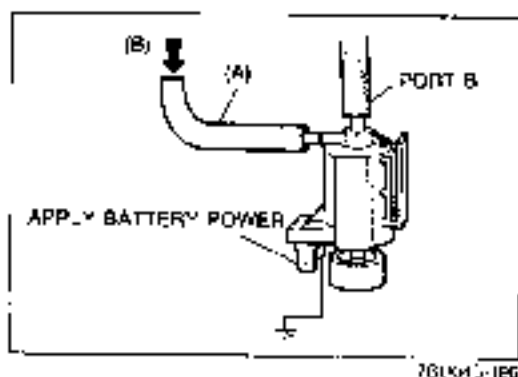
1. Warm up the engine and stop it.
2. Connect the connectors of the water temperature switch with a jumper wire.
3. Connect a voltmeter between (Y) terminal of the ACV solenoid valve and ground.
4. Verify that the voltmeter indicates **0V** at approximately **1,500 rpm** or higher.
5. If it does not, check the 2J terminal of the engine control unit.



78L-CB-044

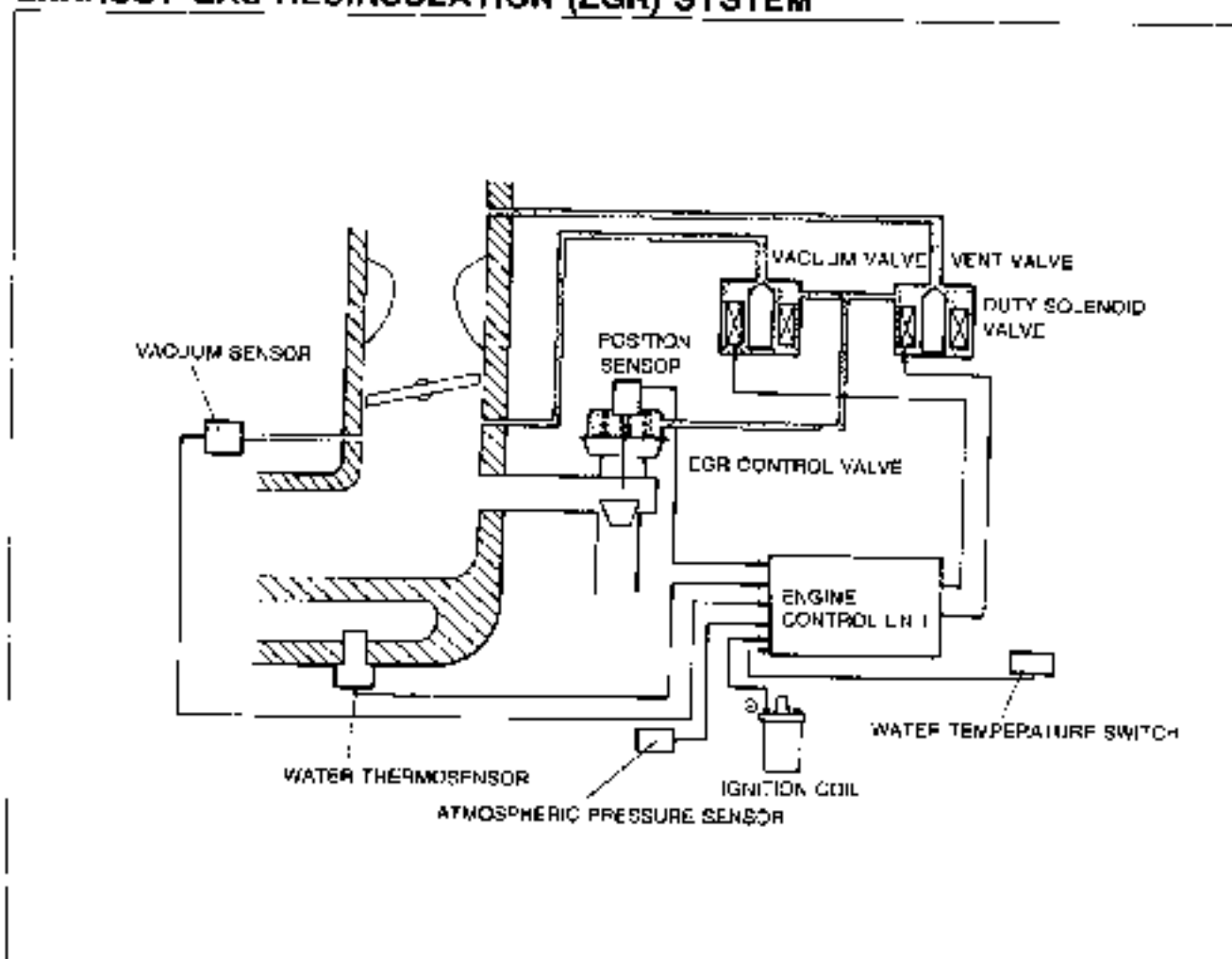
**Inspection of valve**

1. Remove the ACV solenoid valve



2. Connect hoses to the valve as shown in the figure.
3. Blow air through hose (A), and check to see that air comes out of the valve air filter.
4. Apply battery power, and ground the valve with jumper wires.
5. Blow air through hose (A), and check to see that air comes out of port (B).
6. If the ACV solenoid valve does not operate properly, replace it.

## EXHAUST GAS RECIRCULATION (EGR) SYSTEM



80JDF-246

This system introduces exhaust gas into the intake manifold to reduce NOx emissions. The system comprises the EGR control valve, EGR position sensor, and duty solenoid valve controlled by the engine control unit. The EGR control valve controls the amount of exhaust gas flowing into the intake manifold according to vacuum regulated by the duty solenoid valve.

The duty solenoid valve consists of a vacuum valve and a vent valve. The vacuum valve opens the vacuum passage to the EGR control valve, and the vent valve vents the vacuum from the vacuum valve to control vacuum according to signals from the engine control unit.

The engine control unit senses the amount of EGR gas recirculated by the EGR position sensor on the EGR valve and controls the opening duration of the vacuum and vent valves. The amount of exhaust gas recirculated is determined by the ignition coil signal, water thermosensor, water temperature sensor, vacuum sensor, and atmospheric pressure sensor.

## SYSTEM INSPECTION

**Note**

**Troubleshoot with the Self-Diagnosis Checker before performing the following steps.**

1. Check the vacuum hose routing.
2. If incorrect connection, clogging, or leakage is found, repair or replace the hose.
3. Warm up the engine and run it at idle.
4. Disconnect vacuum hose (A) from the EGR control valve and plug it.
5. Verify that the engine runs smoothly.
6. If it does not, check the EGR control valve.
7. Connect a vacuum gauge to hose (A).
8. Verify that the gauge shows no vacuum.
9. Accelerate the engine, and verify that the gauge shows vacuum.
10. Decelerate the engine, and verify that the gauge again shows no vacuum.
11. If a problem is found, check the duty solenoid valve and the 2L and 2K terminals of the engine control unit.
12. Connect a vacuum gauge between the duty solenoid valve and the EGR control valve, as shown.
13. Accelerate the engine, and note the amount of vacuum.
14. Disconnect vacuum hose (A) and plug it.
15. Accelerate and verify that the gauge shows higher vacuum than in step 13.
16. If it does not, check the EGR position sensor, the 1F terminal of the engine control unit, and the duty solenoid valve.
17. Disconnect the connectors from the water temperature switch, and connect them with a jumper wire.
18. With vacuum hose (A) plugged, verify that the gauge shows no vacuum when the engine is accelerated.
19. If it shows vacuum, check the duty solenoid valve and the 1Q terminal of the engine control unit.

## EGR CONTROL VALVE

**Inspection**

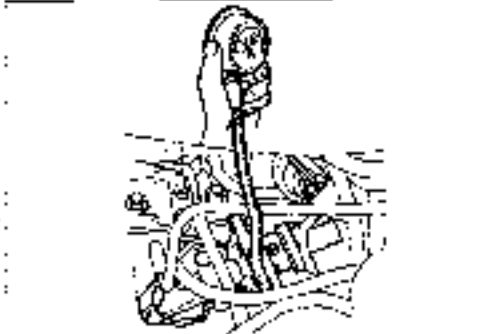
1. Warm up the engine and run it at idle.
2. Disconnect the vacuum hose from the EGR control valve and plug the hose.
3. Verify that the engine runs smoothly.
4. If it does not, clean the exhaust gas passage in the valve or replace the valve.

**Note**

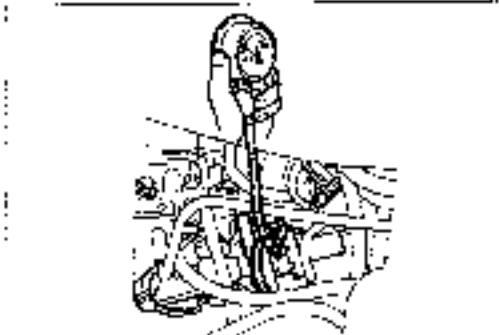
**Before replacing the EGR control valve, check the intake air and control systems.**



720049-04K



48106F1-041



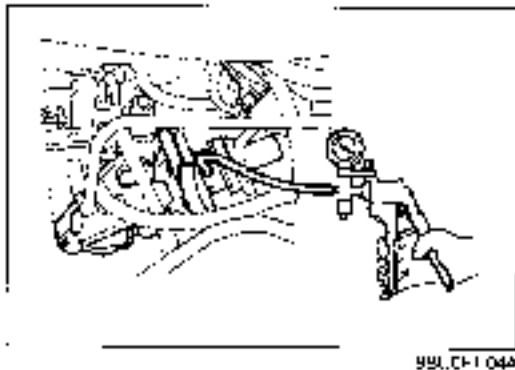
58107F1-042



08L1CF1-043



700048-04



99L.C1-1.044

5. Connect a vacuum pump to the valve, and apply vacuum.
6. Verify that the engine runs roughly or stops at more than the specified vacuum.

**Specification: 40—60 mmHg (1.57—2.36 inHg)**

7. If it does not, replace the EGR control valve.

**Tightening torque:**  
**8—11 Nm (0.8—1.2 m·kg, 8—9 ft·lb)**



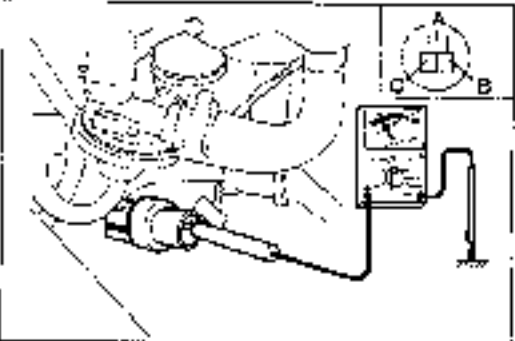
7E.9.16-19

**EGR POSITION SENSOR**

**Inspection of Terminal Voltage**

1. Remove the rubber boot from the connector.
2. Disconnect the vacuum hose from the EGR control valve, and connect a vacuum pump.
3. Turn the ignition switch ON.
4. USING A VOLTMETER, check the voltage of each terminal in the condition shown in the table.

Terminal	No vacuum	150 mmHg (5.9 inHg)
A (B/L)	Approx. 0.7V	Approx. 4.7V
B (B/G)	Less than 1.5V	
C (B/Y)	4.5—5.5V	



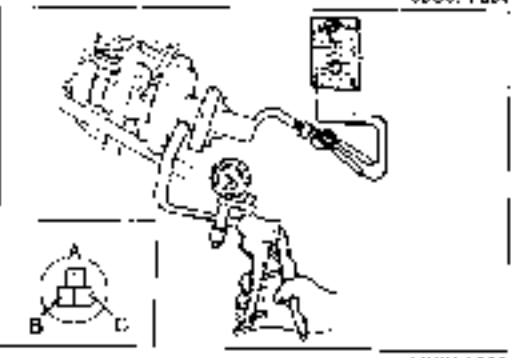
30J371.024

5. If the voltage is incorrect at B and C terminals, check the wiring harness and the engine control unit terminals (1D, 1F, 1G).
6. If not correct at the A terminal, check resistance of the sensor, then the wiring harness and engine control unit.
7. Reinstall the rubber boot.

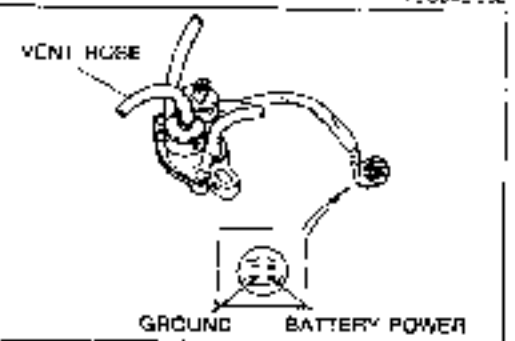
**Inspection of Resistance**

1. Disconnect the sensor connector.
2. Remove the rubber boot from the connector.
3. Check resistance between the terminals while applying **0—150 mmHg (0—5.9 inHg)** vacuum to the EGR control valve, using a vacuum pump.

Terminals	Resistance
B—C	5 kΩ
A—C	5.5—9 kΩ
A—B	0.7—6.0 kΩ



750042.052

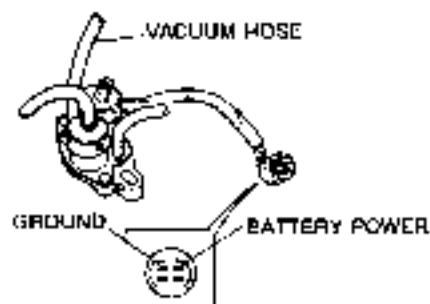


711.1K3.055

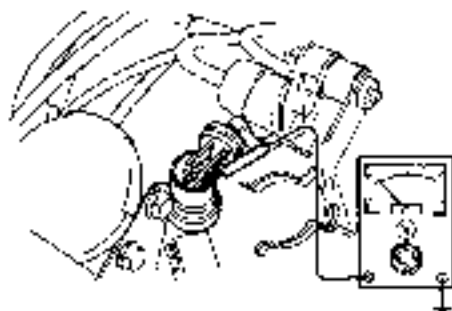
**DUTY SOLENOID VALVE**

**Inspection of Vent Valve**

1. Disconnect the vacuum hoses.
2. Blow through the vent hose and verify that air passes.
3. Disconnect the duty solenoid valve connector.
4. Apply battery power and ground the solenoid valve as shown.
5. Blow through the vent hose and verify that air does not flow.
6. If a problem is found, replace the duty solenoid valve.



720042-024



101-K0F2

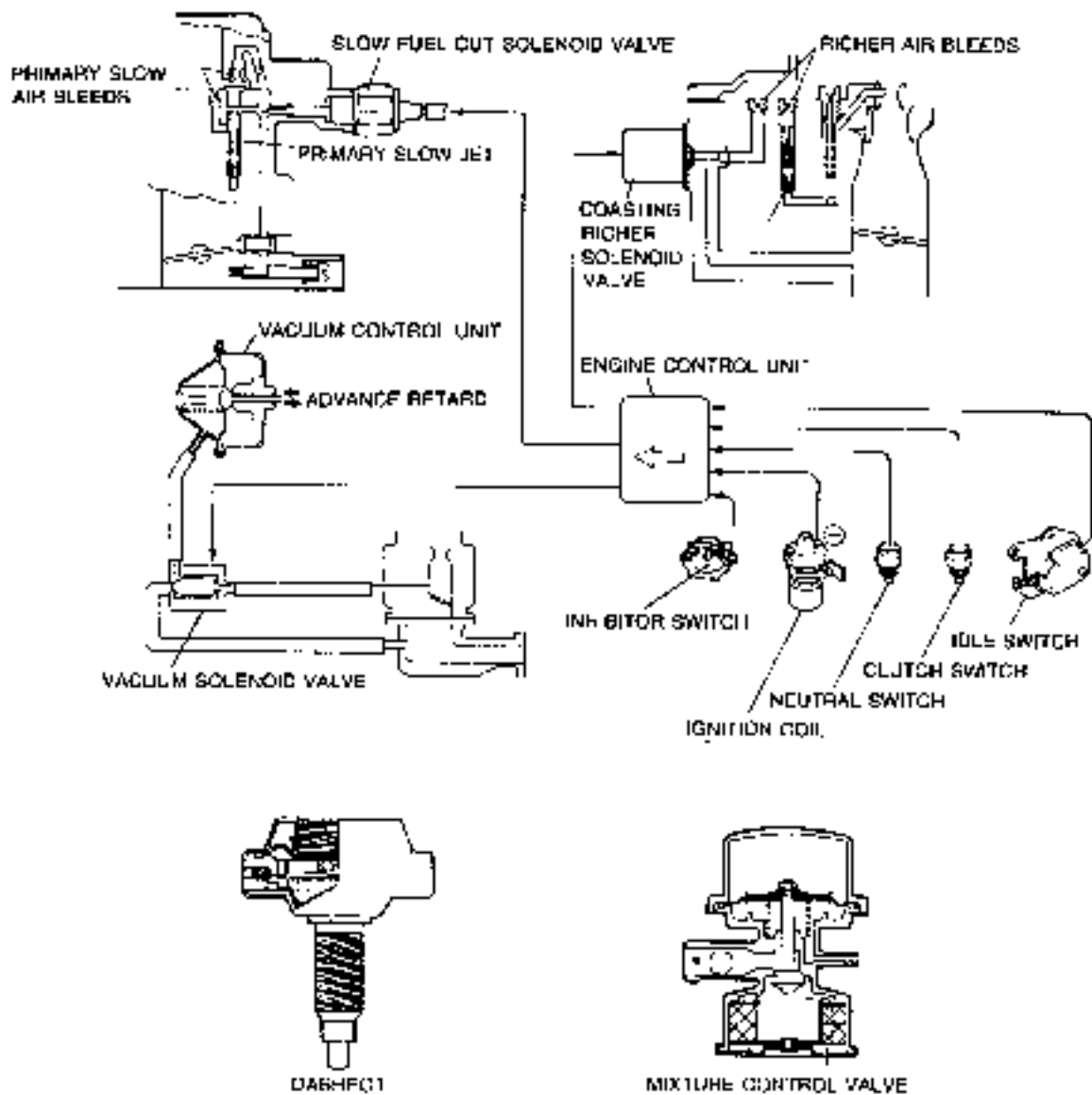
### Inspection of Vacuum Valve

1. Disconnect the vacuum hoses.
2. Blow through the vacuum hose and verify that air does not flow.
3. Disconnect the duty solenoid valve connector.
4. Apply battery power and ground the solenoid valve as shown.
5. Blow through the vacuum hose and verify that air passes.
6. If a problem is found, replace the duty solenoid valve.

### Inspection of Voltage

1. Remove the rubber boot from the connector.
2. Turn the ignition switch ON.
3. USING A VOLTMETER, verify that voltage at each terminal is battery voltage.
4. If on any terminal it is not, check the duty solenoid valve, the wiring of the valve, and the 2K and 2L terminals of the engine control unit.

DECELERATION CONTROL SYSTEM



92U07-1447

This system controls the air/fuel mixture and advances ignition timing to reduce CO and HC engines to reduce fuel consumption, and to prevent the front catalytic converter from overheating.

The system comprises the slow fuel cut solenoid valve, coasting richer solenoid valve, vacuum solenoid valve, dash pot, and mixture control valve.

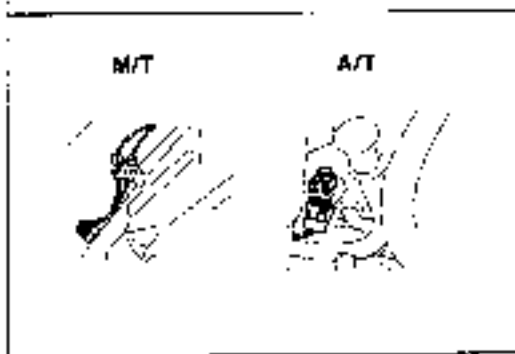
The slow fuel cut solenoid valve closes the primary slow fuel passage on command from the engine control unit. The coasting richer solenoid valve supplies extra air/fuel mixture to add to the primary slow fuel on command from the engine control unit.

The vacuum solenoid valve applies intake manifold vacuum to the vacuum control unit of the distributor on command from the engine control unit.

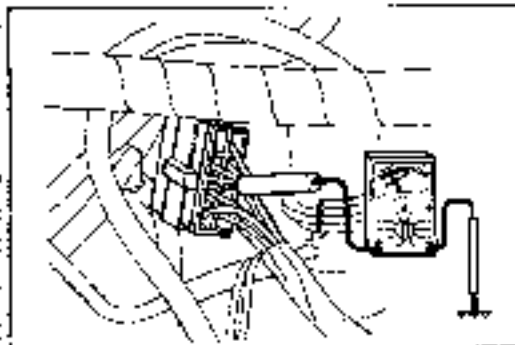
The mixture control valve supplies air into the intake manifold during the 1st period of deceleration.

The dashpot commands the throttle valve to close gradually.

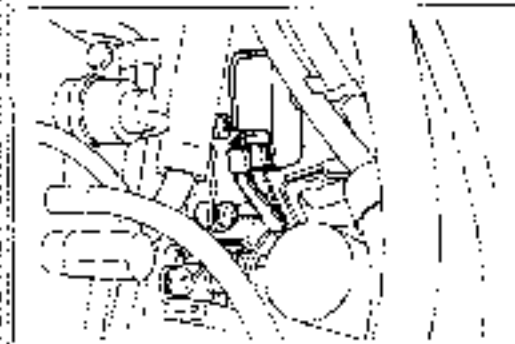




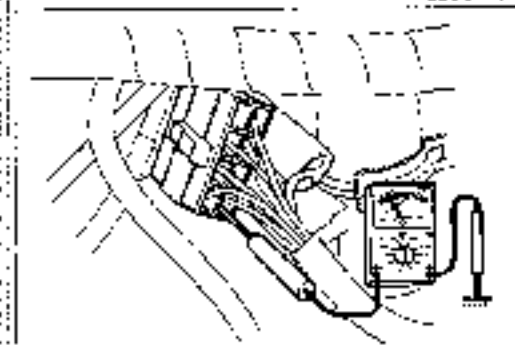
7B,JKR-67



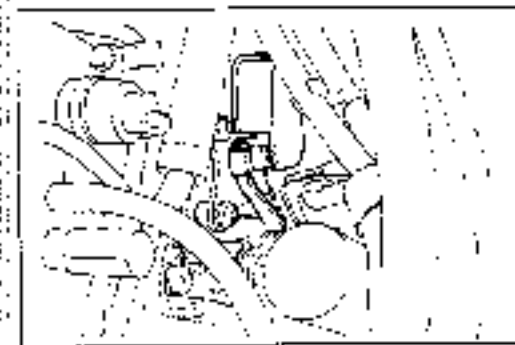
7B,JKH-28



2B,LCF-17



8P,UK-04



7B,JK-3-2

## SYSTEM INSPECTION

**Note**

**Troubleshoot with the Self-Diagnosis Checker before performing the following steps.**

1. Warm up the engine and run it at idle.
2. Disconnect the neutral switch connectors or the inhibitor switch connector.
3. Remove the air cleaner case assembly.

**Slow fuel cut system**

4. Connect a voltmeter to the F terminal (LG) of the carburetor connector.

5. Increase the engine speed to **3,000 rpm**.
6. Lift the idle switch arm as shown.
7. Verify that the voltmeter indicates as shown in the following table.

Engine speed	Voltage
More than 2,500 rpm	battery voltage
Less than 2,500 rpm	Less than 1.5V

8. If it does not, check the 2D terminal of the engine control unit and the slow fuel cut solenoid valve.

**Coasting richer system**

9. Connect a voltmeter to the H terminal (BR/B) of the carburetor connector.
10. Increase the engine speed to **3,000 rpm**, and lift the idle switch arm.

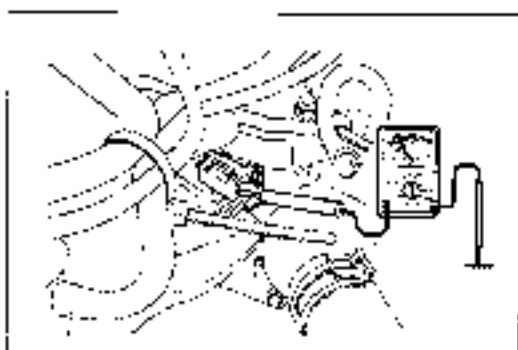
11. Verify that the voltmeter indicates as shown in the following table.

Engine speed	Voltmeter
More than 2,500 rpm	battery voltage
2,500 - 1,400 rpm	Less than 1.5V
Less than 1,400 rpm	battery voltage

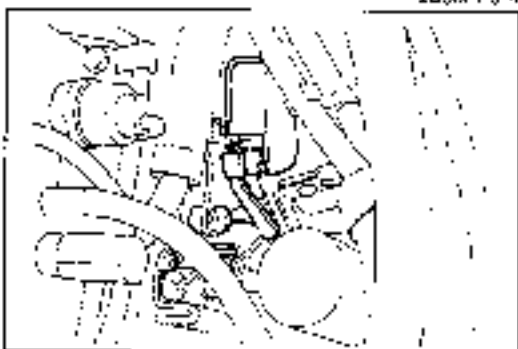
**Note**

**Less than 1.5V is shown 1 sec after the condition is met.**

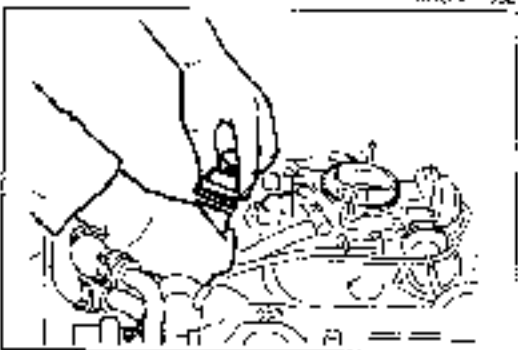
12. If any of these voltages are not indicated, check the 2H terminal of the engine control unit and the coasting richer solenoid valve.



2B,00F1 014



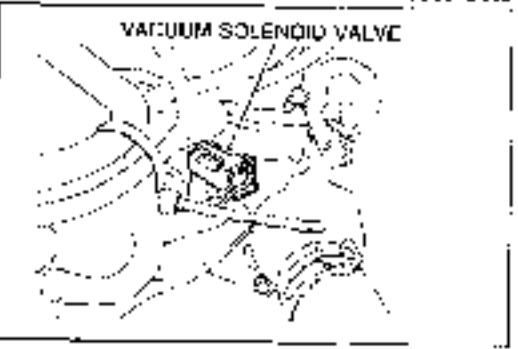
60,001-052



7E,0012 064



7U,0012 062



7S,001A 066

**Coasting advance system**

- 13 Connect a voltmeter to terminal (W/G) of the coasting advance solenoid valve.
- 14 Increase the engine speed to **3,000 rpm**, and lift the idle switch arm.
- 15 Verify that the voltmeter indicates as shown in the following table.

Engine speed	Voltmeter
More than 2,500 rpm	Battery voltage
2,500—1,700 rpm	Less than 1.5V
Less than 1,700 rpm	Battery voltage

16. If any of these voltages are not indicated, check the 15 terminal of the engine control unit and the vacuum solenoid valve.

**SLOW FUEL CUT SOLENOID VALVE**

**Inspection**

- 1 Run the engine at idle.
- 2 Disconnect the carburetor connector.
- 3 Verify that the engine stops.

**COASTING RICHER SOLENOID VALVE**

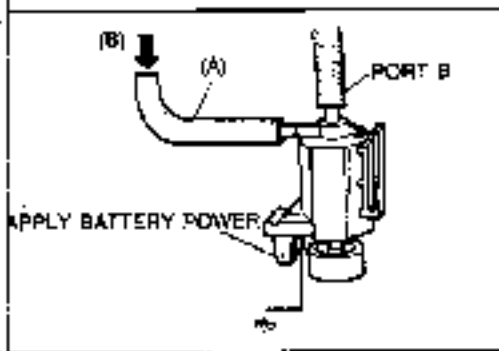
**Inspection**

- 1 Run the engine at idle.
- 2 Ground H terminal (B/B) of the carburetor connector.
3. Verify that the engine speed increases.

**VACUUM SOLENOID VALVE**

**Inspection**

- 1 Remove the vacuum solenoid valve.



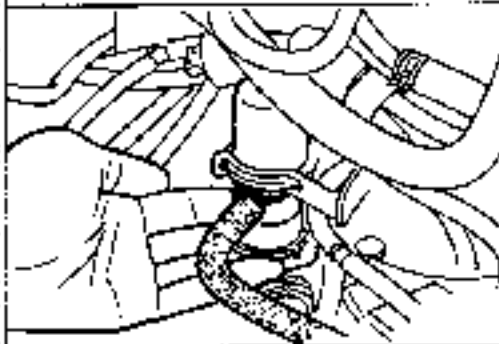
7B1-C4B '85

2. Connect vacuum hoses to the valve as shown in the figure.
3. Blow air through the valve from hose (A), and verify that air comes out of the valve air filter.
4. Apply battery power and ground the solenoid valve with jumper wires.
5. Blow air through the valve from hose (A), and verify that air comes out of port (B).
6. If the vacuum solenoid valve does not operate properly, replace it with a new one.

### MIXTURE CONTROL VALVE

#### Inspection

1. Start the engine.
2. Block the intake port of the mixture control valve, and verify that the engine speed does not decrease.
3. Increase the engine speed and quickly decelerate.
4. Verify that air is pulled into the intake port for approx. 1–2 sec after the accelerator is released.

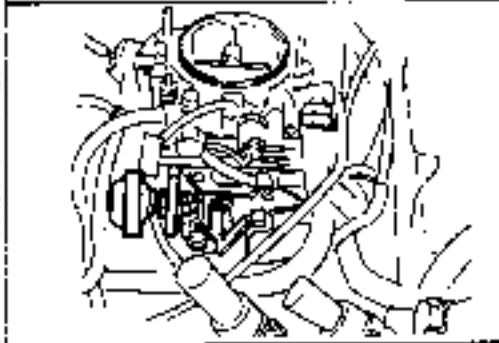


3E6C4A-020

### DASHPOT (FOR M/T)

#### Inspection

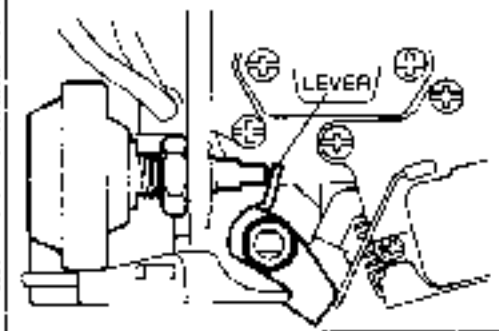
1. Quickly move the throttle lever, and verify that the dashpot rod also comes out quickly to its full stroke, accompanying the movement of the throttle lever.
2. Release the throttle lever, and verify that it returns slowly to the idle position after it has contacted the dashpot rod.



DBL-CP-006

#### Adjustment

1. Warm up the engine and run it at idle.
2. Connect a tachometer to it.
3. Slowly increase the engine speed, and verify that the lever separates from the dashpot rod at 2,700–2,900 rpm.
4. If it does not, loosen the locknut and adjust by turning the dashpot.

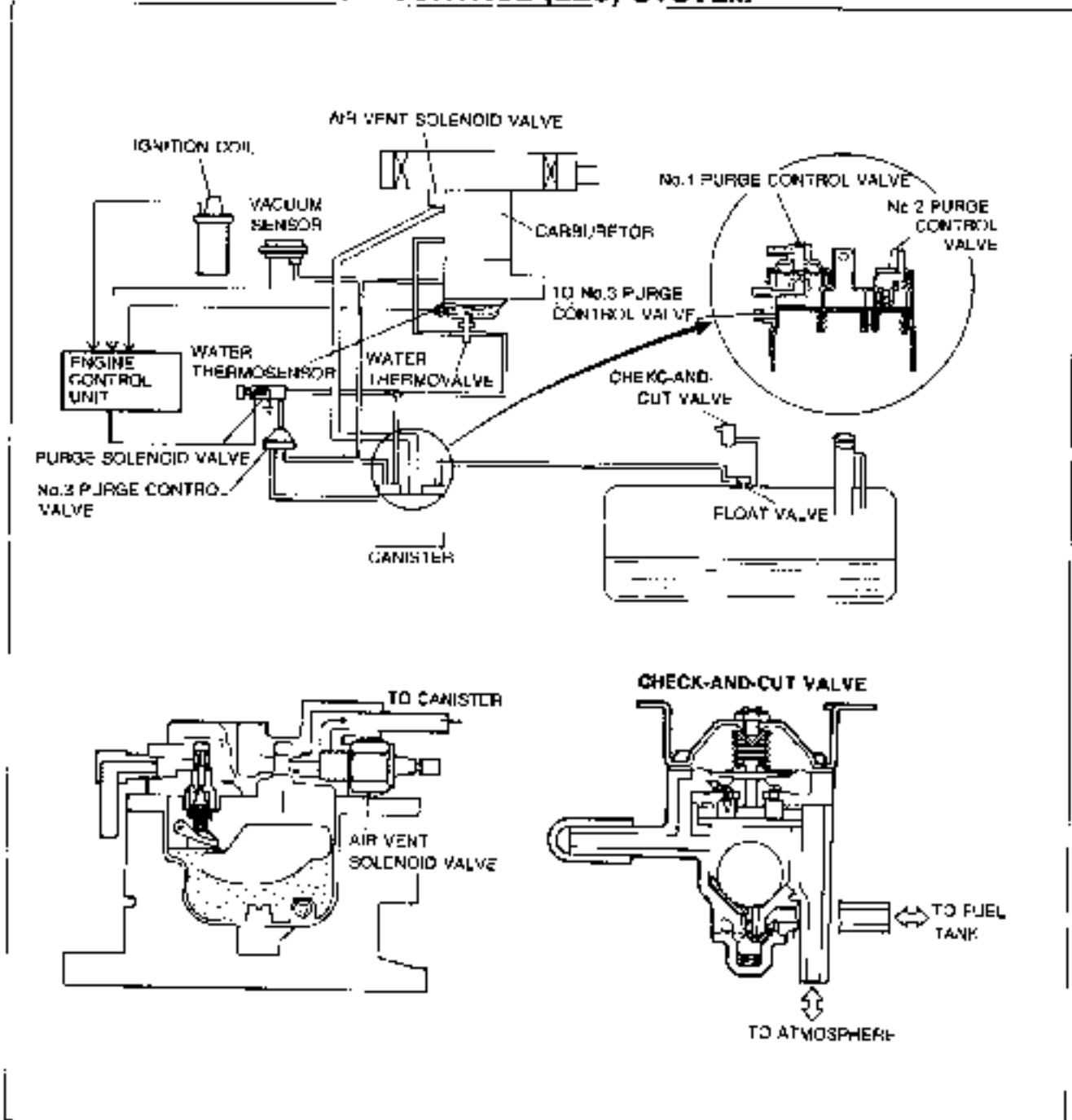


EPL-3-1-027

#### Tightening torque:

20–29 N·m (2.0–3.0 m·kg, 14–22 ft·lb)

## EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM



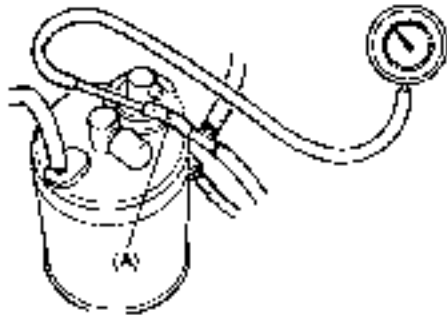
F0548-364

This system stores fuel vapor generated within the fuel tank in the canister and draws the fuel vapor into the intake manifold, burning it there when the engine is started. The system consists of the canister, No. 3 purge control valve, water thermovalve, check-and-cut valve, purge solenoid valve, and air vent solenoid valve. The water thermovalve opens the vacuum passage to the No. 1 and No. 3 purge control valves. The canister incorporates the No. 2 purge control valve, which is a two-way check valve, and the No. 1 purge control valve, which opens the fuel vapor passage between the canister and the intake manifold. The No. 3 purge control valve opens the fuel vapor passage between the canister and the intake manifold when the purge solenoid valve is ON. Port vacuum is applied to the No. 1 purge control valve while the engine is running and to the No. 3 purge control valve during running or heavy-load driving. The check-and-cut valve vents the vapors to the atmosphere if the evaporative hoses become clogged. It also prevents fuel leakage if the vehicle overturns.

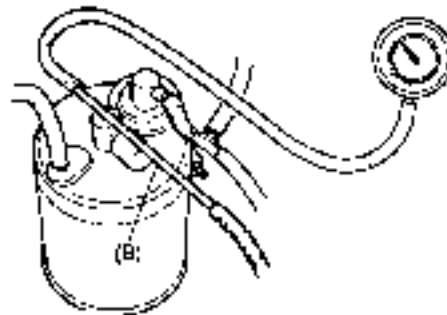
## SYSTEM INSPECTION

**Note**

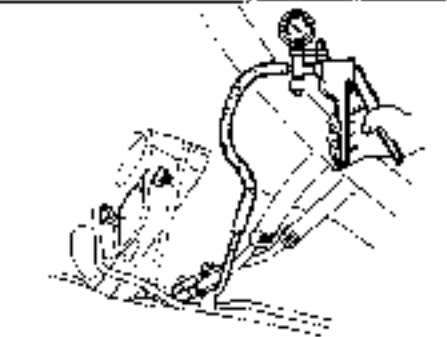
Troubleshoot with the Self-Diagnosis Checker before performing the following steps.



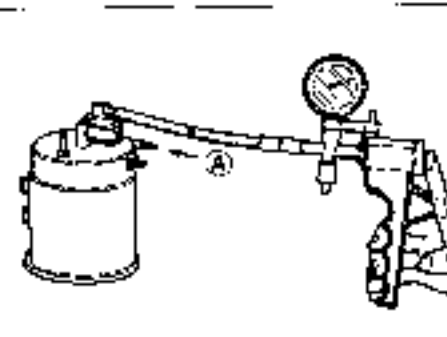
70U04B-672



88U07-004



71L045-196



56X204-449

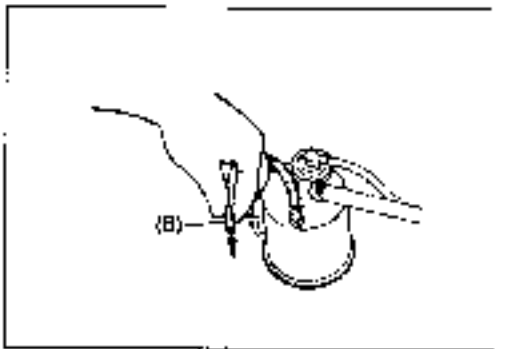
1. Check the vacuum hose routing.
2. If a poor connection, clog, or leak is found, repair or replace the necessary part.
3. Warm up the engine and run it at idle.
4. Disconnect vacuum hose (A) from the No. 1 purge control valve, and connect a vacuum gauge to the disconnected hose.
5. Increase the engine speed to **2,500 rpm** and verify that the gauge shows more than **150 mmHg (5.9 inHg)** vacuum.
6. If it does not, check the water thermostatic valve.
7. Reconnect hose (A) to the No. 1 purge control valve.

8. Disconnect vacuum hose (B) from the canister, and connect a vacuum gauge to the disconnected hose.
9. Verify that there is vacuum when the engine speed exceeds **1,400 rpm**.
10. If no vacuum is evident, check the purge solenoid valve, No. 3 purge control valve, and the 1V terminal of the engine control unit.
11. Reconnect hose (B) to the canister.

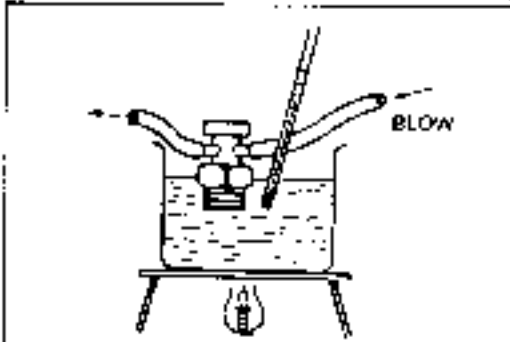
12. Disconnect the evaporation hose from the evaporation pipe.
13. Connect a vacuum pump to the evaporation pipe.
14. Operate the vacuum pump and verify that no vacuum is held.
15. If it is, check the check-and-cut valve and evaporation pipe for clogging.

**No. 1 PURGE CONTROL VALVE****Inspection**

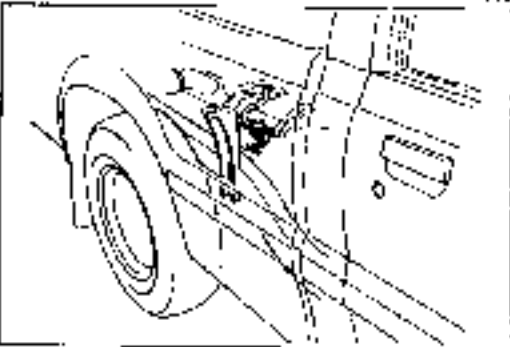
1. Blow through the purge control valve from port (A) and verify that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum.
4. Blow through port (A) and verify that air flows.



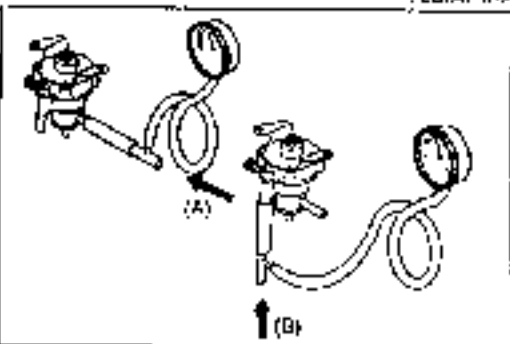
78J047 200



78J048 1000



78J049 1000



78J048 200

**No.2 PURGE CONTROL VALVE****Inspection**

1. Disconnect vacuum hose (B) from the evaporation pipe.
2. Blow into the hose and verify that air flows freely.

**WATER THERMOVALVE**

1. Remove the water thermovalve.
2. Immerse it in a water-filled container.
3. Heat the water gradually, and observe the temperature.
4. Blow through the valve from one vacuum port, and verify that air comes out of the other port at a temperature of **54°C (129.2°F) or higher**.
5. Install the water thermovalve.

**Tightening torque:**

**25—53 Nm (2.5—5.5 m·kg, 19—39 ft·lb)**

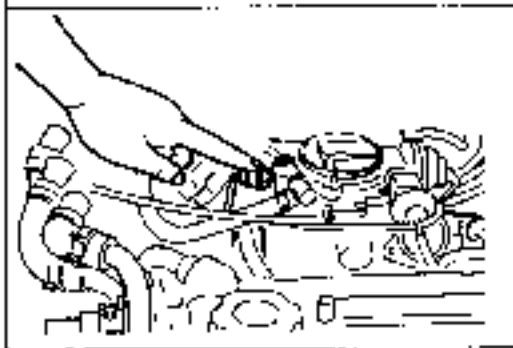
**CHECK-AND-CUT VALVE****Inspection**

1. Remove the check-and-cut valve.

2. Connect a pressure gauge to the passage that normally is connected to the fuel tank.
3. Blow through the valve from port (A), and verify that the valve opens at pressure of **5.39—6.87 kPa (0.065—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). Verify that the valve opens at a pressure of **0.98—4.91 kPa (0.01—0.05 kg/cm<sup>2</sup>, 0.14—0.71 psi)**.

**Note**

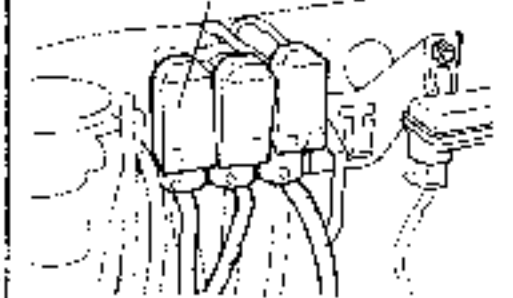
The test should be performed with the valve positioned horizontally. Otherwise, the ball in the valve will move out of position and close the passage.



78U048-075

**AIR VENT SOLENOID VALVE****Inspection**

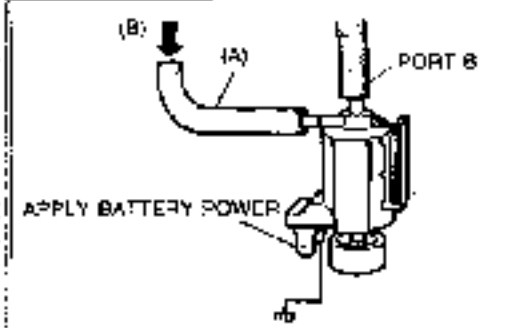
1. Remove the air cleaner.
2. Touch the air vent solenoid valve on the carburetor.
3. Turn the ignition switch ON and OFF, and verify that a clicking is felt and heard.

**PURGE SOLENOID VALVE**

78U048-076

**PURGE SOLENOID VALVE****Inspection of Valve**

1. Remove the purge solenoid valve.

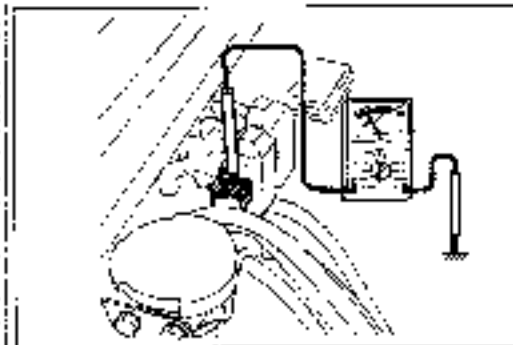


78U048-077

2. Connect hoses to the valve as shown in the figure.
3. Blow air through the valve from hose (A), and verify that air comes out of the valve air filter.
4. Apply battery power, and ground the valve with jumper wires.
5. Blow air through the valve from hose (A), and verify that air comes out of port (B).
6. If the purge solenoid valve does not operate properly, replace it with a new one.

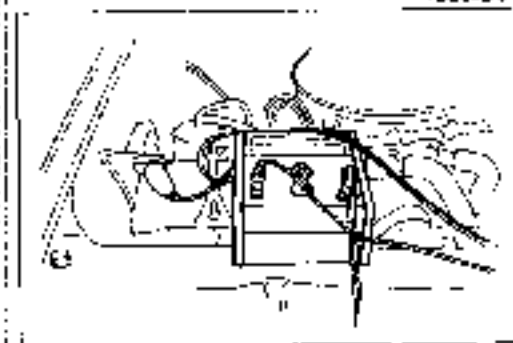
**Inspection of Signal**

1. Warm up the engine and run it at idle.
2. Connect a voltmeter between terminal (YR) of the purge solenoid valve and ground.

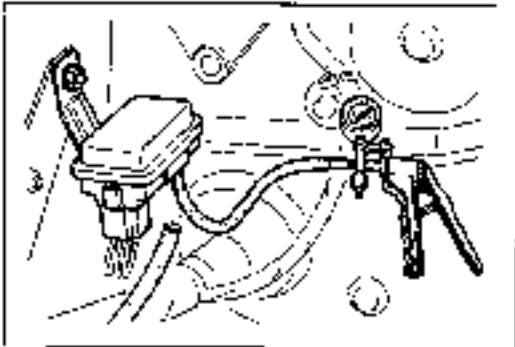


78U048-078

3. Connect a tachometer to the engine.
4. Increase the engine speed, and verify that the voltmeter indicates **0V** at more than **1,400 rpm**.
5. If it does not, check the 1C terminal of the engine control unit and the water thermostat; then replace the engine control unit, if necessary.



78U048-079

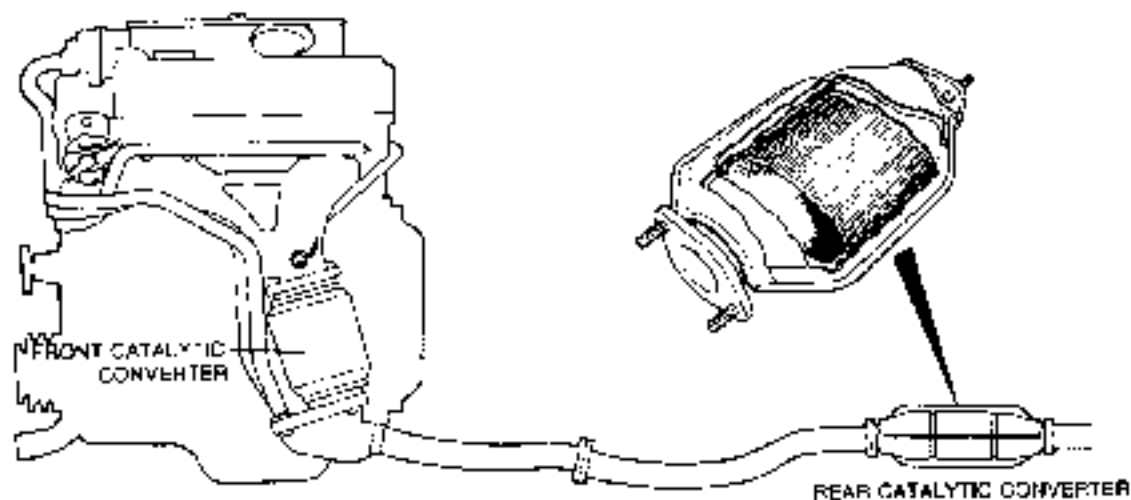


2B110F-40-5

6. Disconnect the vacuum hose from the vacuum sensor, and connect a vacuum pump to the sensor.
7. Apply vacuum to the sensor, and verify that the voltmeter indicates battery voltage at more than **200 mmHg (7.9 inHg)** vacuum.
8. If it does not, verify the following and replace the engine control unit, if necessary.
  - (1) 1C terminal of the engine control unit and the water thermostat sensor.
  - (2) 1E terminal of the engine control unit and the vacuum sensor.



## CATALYTIC CONVERTER



88A/C418-107

The catalytic converters are used to reduce CO, HC, and NOx. The specifications are as follows.

Front			Rear		
Type	Material of catalyst	Volume of container	Type	Material of catalyst	Volume of container
2-way	Palladium and Platinum	1,100 cc (87.1 cu in)	Oxidizing	Palladium	1,500 cc (97.6 cu in)

**INSPECTION**

1. Check the catalytic converter for deterioration or restriction.
2. Check the insulation covers welded to the catalytic converter for damage or looseness.

**Caution**

If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.

PTC HEATER SYSTEM

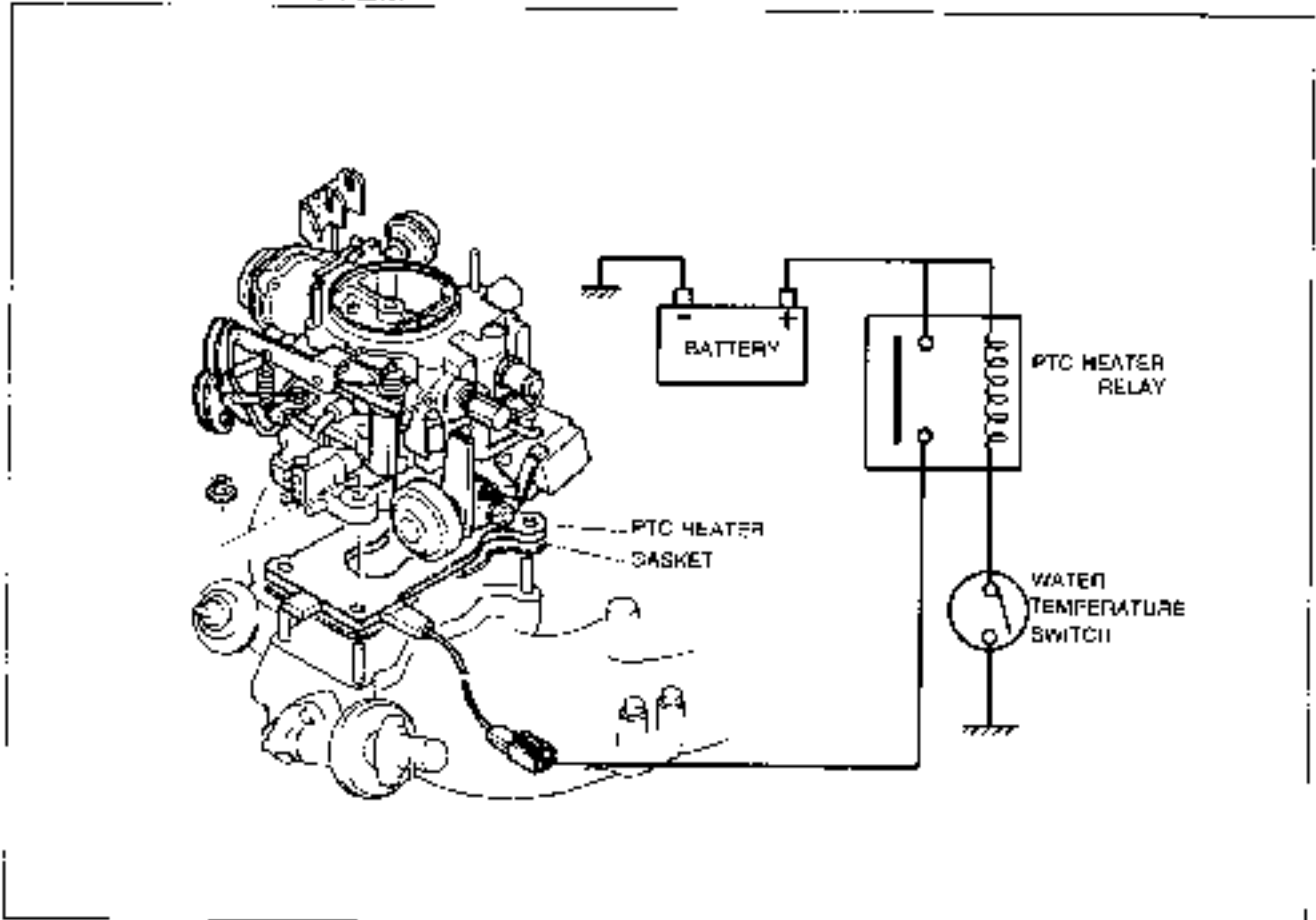


Figure 376

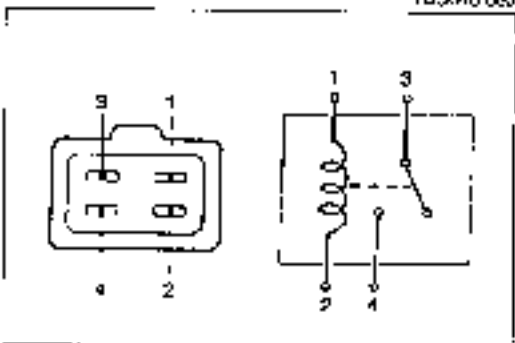
This system warms up the throttle body of the carburetor to prevent the carburetor from icing. The system consists of the PTC heater, PTC heater relay, and water temperature switch. It operates when the radiator coolant temperature is less than **17°C (63°F)**.



7B, X40 007

**PTC HEATER Inspection**

1. Disconnect the PTC heater connector.
2. Connect an ohmmeter between the connector and the intake manifold, and verify continuity.



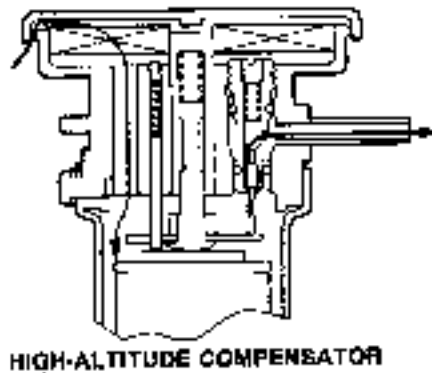
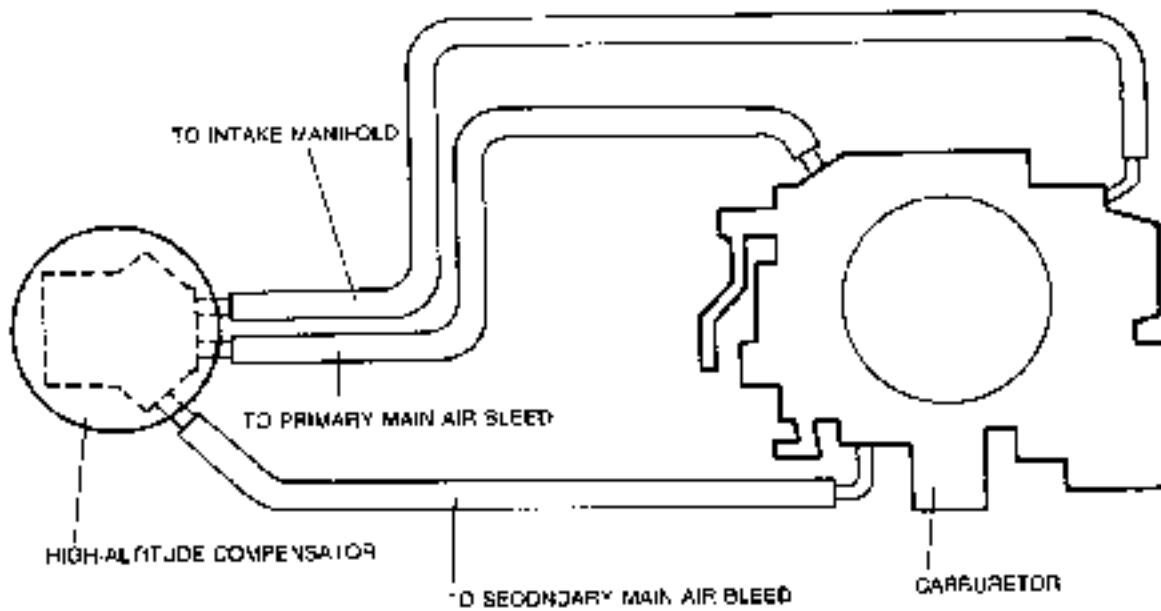
7B, 1049-18

**PTC HEATER RELAY Inspection**

1. Apply battery power (positive to No. 1 terminal and ground No. 2 terminal), and verify continuity at terminals 3 and 4, using an ohmmeter.

Operation	Power not applied	Power applied
Terminals 3-4	No continuity	Continuity

## ALTITUDE COMPENSATION SYSTEM



780046-02

This system increases the amount of air to the carburetor to prevent overrich air/fuel ratio at high altitudes. The system consists of the high-altitude compensator and carburetor. The high-altitude compensator provides additional air bleeds for the primary main and secondary main fuel circuits and supplies additional air into the intake manifold.



78J01B 083

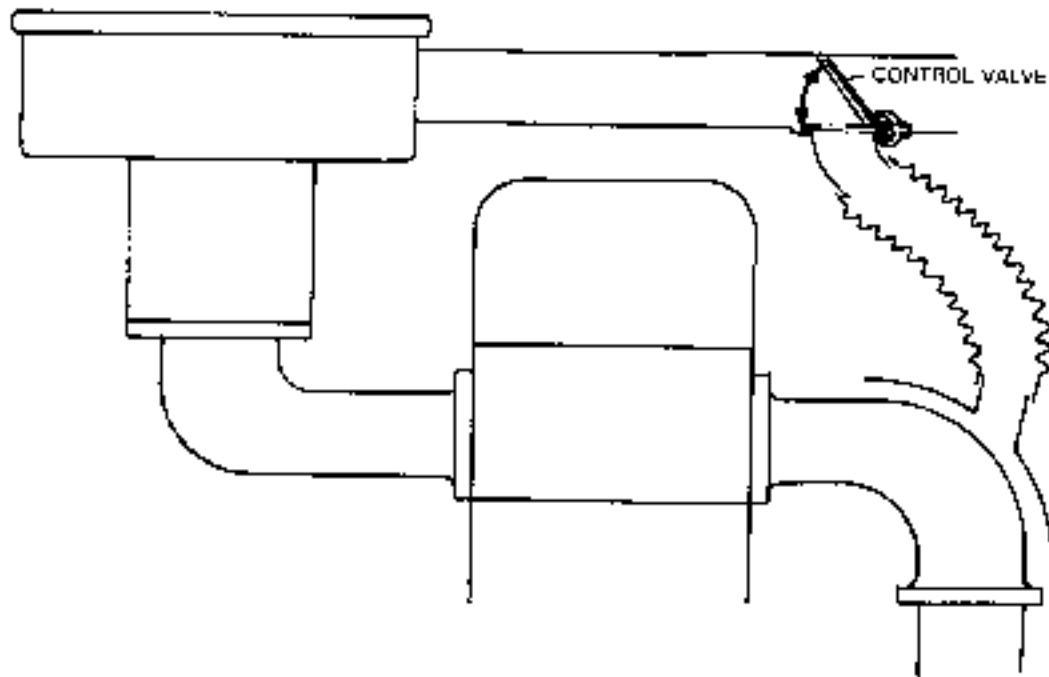
**HIGH-ALTITUDE COMPENSATOR****Inspection**

1. Disconnect each air hose from the carburetor.
2. Check the high-altitude compensator by blowing through each hose.

**500 m (1,640 ft) or higher**  
**(High altitude): Air passes.**

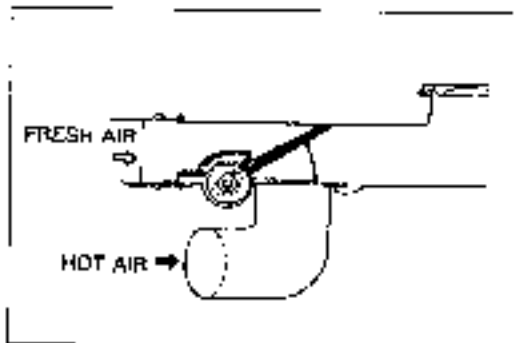
**Less than 500 m (1,640 ft)**  
**(Low altitude): Air does not pass.**

AIR INTAKE TEMPERATURE CONTROL SYSTEM



731C43-004

This system controls air intake temperature to prevent icing and operates depending on air temperature around the control valve.



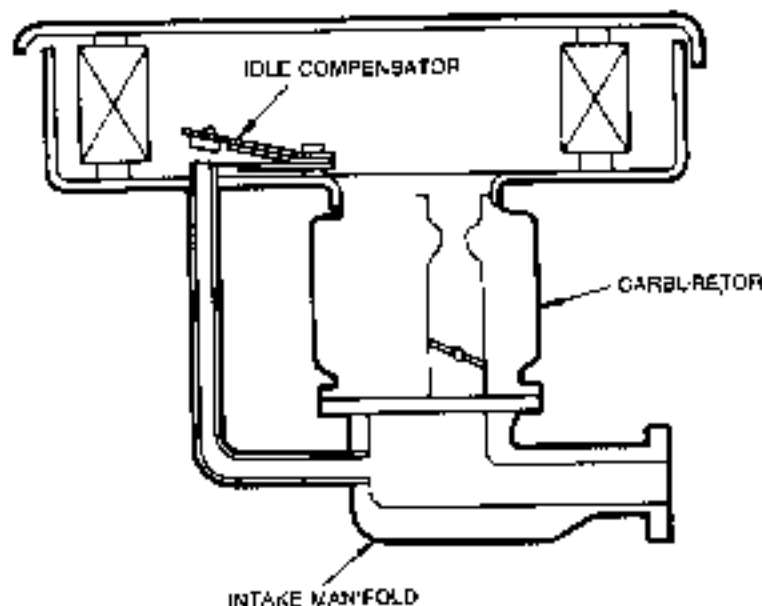
731C43-005

**CONTROL VALVE**

**Inspection**

Move the control valve inside the air cleaner, and verify that it does not stick, and that spring force of the bimetal is felt.

## HOT-IDLE COMPENSATION SYSTEM



7BU043-085

This system supplies secondary air into the intake manifold to stabilize idle speed when air intake temperature is more than  $67^{\circ}\text{C}$  ( $153^{\circ}\text{F}$ )

**IDLE COMPENSATOR****Inspection**

1. Verify that the valve is in closed position when the bimetal temperature is less than specified.

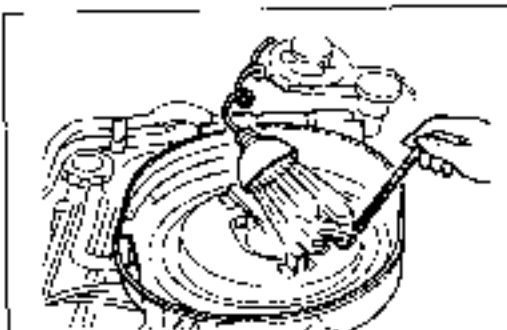
**Opening temperature:  $63\text{--}71^{\circ}\text{C}$  ( $145\text{--}160^{\circ}\text{F}$ )**

2. With the valve closed, suck air through the hose. If excessive air leakage is found, replace the idle compensator as an assembly.
3. When the bimetal temperature is higher than approximately  $71^{\circ}\text{C}$  ( $160^{\circ}\text{F}$ ), verify that the valve is open. If it is not, replace the idle compensator as an assembly.

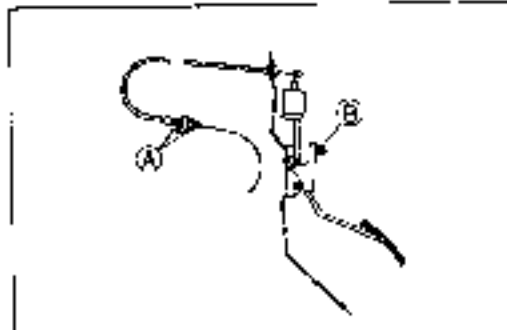
**ACCELERATOR CABLE****Inspection****Note**

**Verify that the choke valve is fully open and that the throttle valve is set to the correct idle opening.**

1. Inspect the cable deflection at the carburetor. If it is not within  $1\text{--}3\text{mm}$  ( $0.04\text{--}0.12\text{ in.}$ ), adjust by turning nut (A).
2. Depress the accelerator pedal to the floor and verify that the throttle valve is fully open. Adjust by using bolt (B), if necessary.

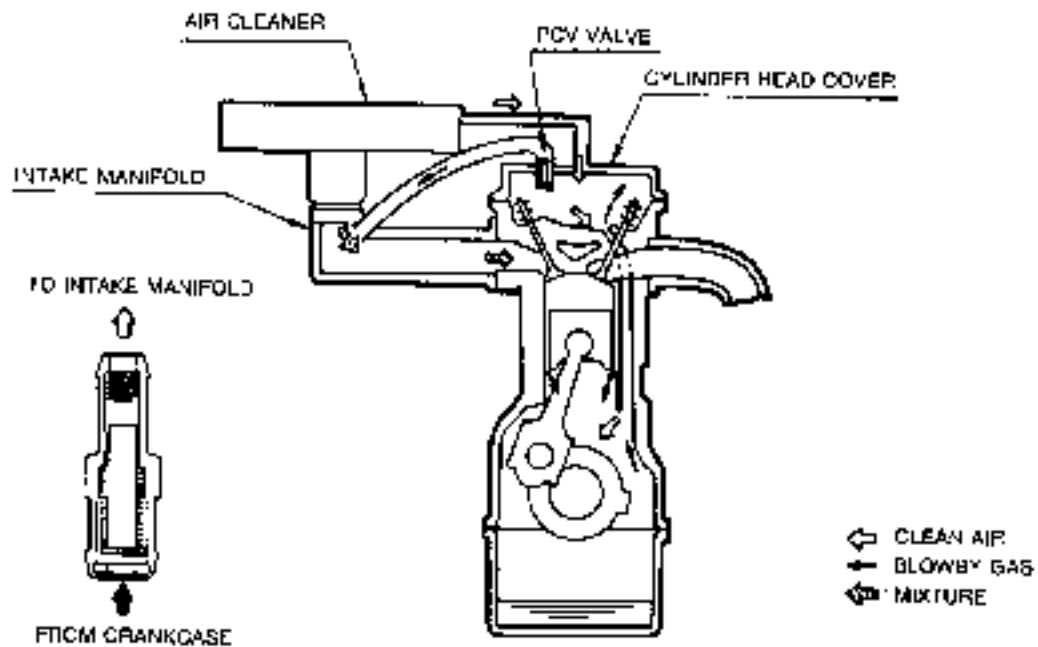


7DU043-057



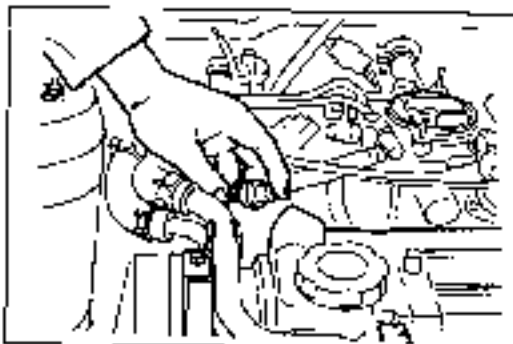
7BU043-025

## POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



78UC4E-C190

This system returns the combustion blowby gases. The system consists of the PCV valve, which operates while the engine is running to control the flow of blowby gases according to intake manifold vacuum.



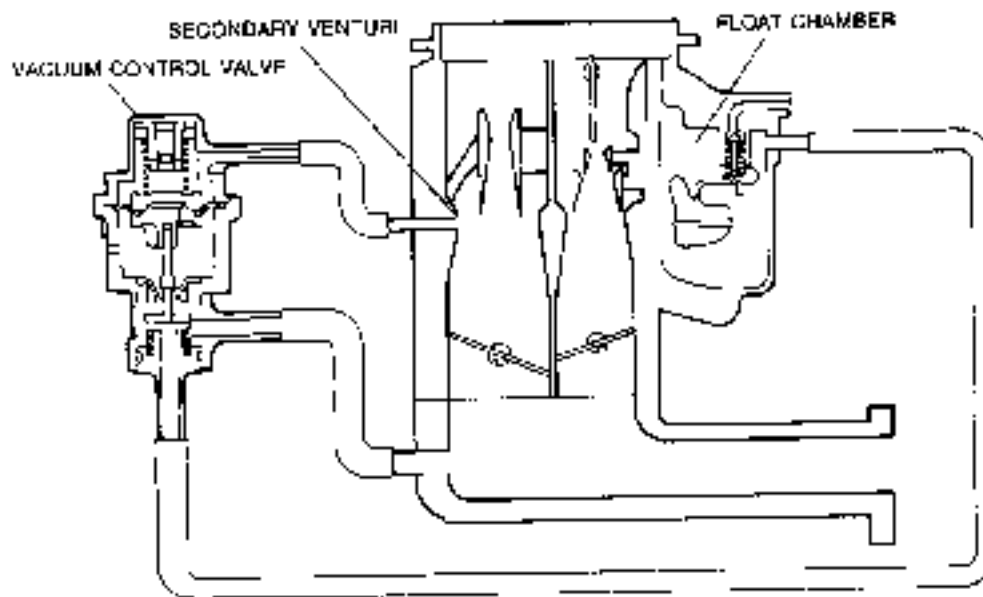
78UC4E-C190

### PCV VALVE

#### Inspection

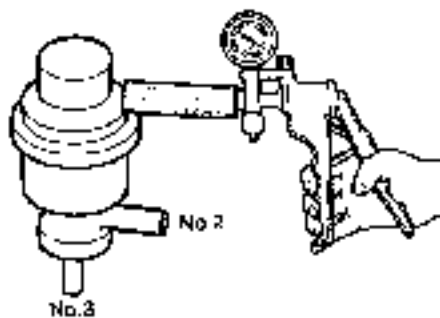
1. Warm up the engine and run it at idle.
2. Disconnect the PCV valve together with the ventilation hose from the cylinder head cover.
3. Block the PCV valve opening with a finger, and verify that the engine speed drops.

## VACUUM CONTROL VALVE (VCV) SYSTEM



7B-1045-101

This system prevents fuel from overflowing into the carburetor from the float chamber. While the engine is being driven at full throttle, the float chamber temperature becomes high and may cause fuel in the chamber to bubble and force its way out through the air vent tube and into the carburetor air stream. The VCV system controls float chamber pressure to prevent this bubbling. The vacuum control valve opens the passage from the float chamber to the intake manifold according to secondary venturi vacuum.



7B-1005-101

## VACUUM CONTROL VALVE

## Inspection

1. Remove all the hoses from the vacuum control valve.
2. Connect a vacuum pump to No.1 port.
3. Operate the vacuum pump and verify that the passage between the No.2 and No.3 ports opens as specified.

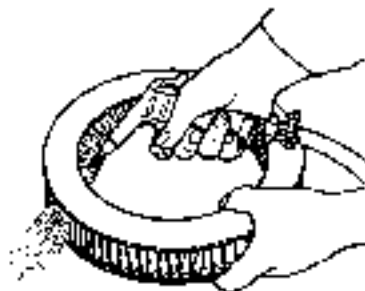
**Specification: 40 mmHg (1.57 inHg) or more**

## AIR CLEANER

## AIR CLEANER ELEMENT

## Inspection

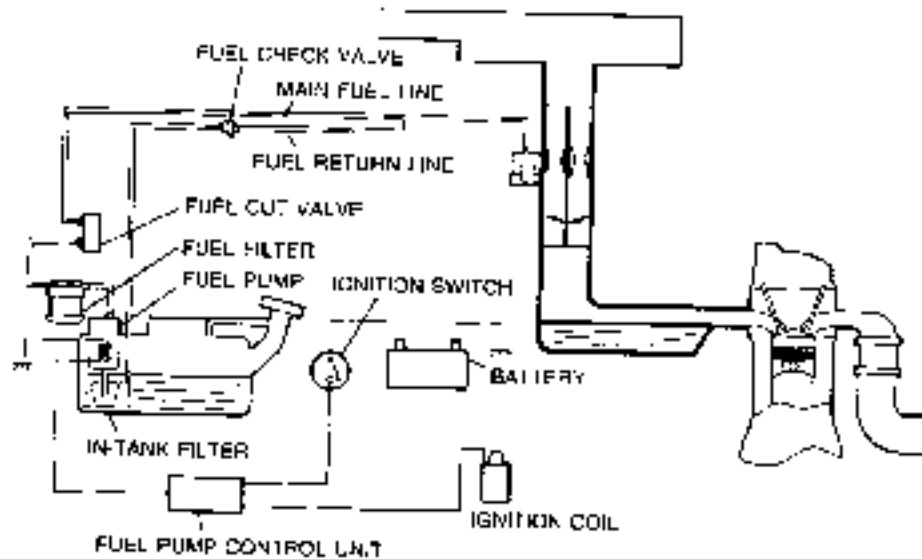
1. Remove the air cleaner element.
2. Blow out the dust with compressed air.
3. Install the air cleaner element.



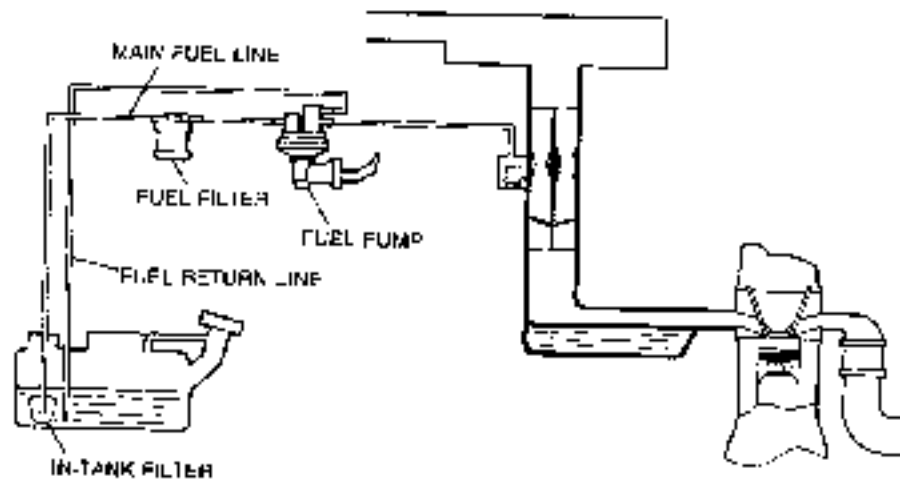
8J-0F1-008

FUEL SYSTEM

VEHICLE WITH A/T



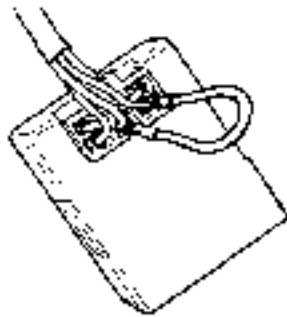
VEHICLE WITH M/T



700313 033

This system supplies fuel to the carburetor, which provides the air/fuel mixture for engine operation. The system consists of the fuel tank, mechanical fuel pump (M/T), electrical fuel pump (A/T), fuel pump control unit (A/T), carburetor, fuel filter, fuel cut valve, and fuel check valve.





EBJ071 006

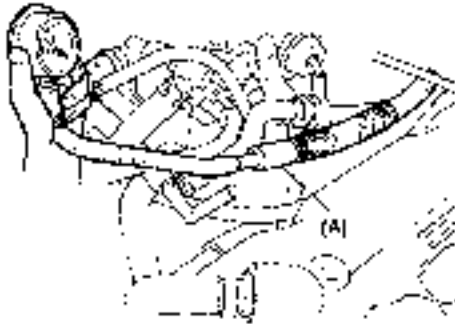
**FUEL PUMP (ELECTRICAL TYPE)****Precheck**

1. Turn the ignition switch ON.
2. Connect the (B) and (D) terminals of the fuel pump control unit with a jumper wire.
3. Verify that the fuel pump can be heard operating.

**Note**

The fuel pump is in the fuel tank.

4. If the fuel pump is not operating, check it.
5. If it is, check the fuel pump control unit. (Refer to page F1-83.)



7BL045 006

**Fuel Pressure**

1. Turn the ignition switch OFF.
2. Disconnect the main fuel hose (A), and connect a fuel pressure gauge to it.
3. Connect the (B) and (D) terminals of the fuel pump control unit with a jumper wire.
4. Turn the ignition switch ON, and verify that fuel pressure is as specified.

**Specification:**

20—25 kPa (0.20—0.25 kg/cm<sup>2</sup>, 2.8—3.8 psi)

5. If it is not, replace the fuel pump.

**Flow Rate (volume)**

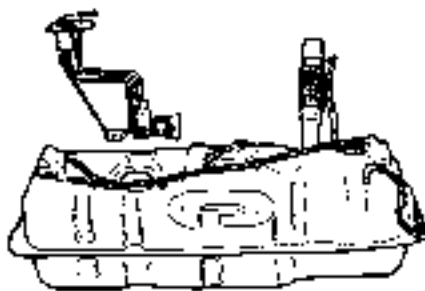
1. Turn the ignition switch OFF.
2. Disconnect the main fuel hose (A), and insert the end into a measuring beaker.
3. Connect the (B) and (D) terminals of the fuel pump control unit with a jumper wire.
4. Turn the ignition switch ON, and measure the amount of fuel pumped.

**Volume: More than 1,150 cc (70.2 cu in)/min.**

5. If this amount of fuel is not correct, replace the fuel pump.

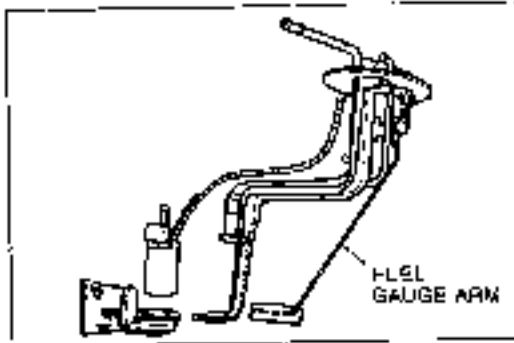
**Replacement**

1. Remove the fuel tank.
2. Remove the fuel gauge and fuel pump assembly from the tank.



7BU043 100

3. Remove the wires.
4. Remove the fuel pump from the bracket.
5. Disconnect the fuel hose.
6. Replace the fuel pump.
7. Install in the reverse order of removal.
8. Check that the fuel gauge arm moves smoothly.



3BU0F1 009



4U043-094

**FUEL PUMP (MECHANICAL TYPE)**

**Fuel Pressure**

1. Disconnect the hose from the carburetor and connect a fuel pressure gauge to the hose.
2. Disconnect the fuel return hose from the fuel pump, and plug the fuel pump return outlet.
3. Check the fuel pressure while the engine is idling. Replace the pump, if necessary.

**Specification:**

26—32 kPa (0.26—0.33 kg/cm<sup>2</sup>, 3.7—4.7 psi)

**Flow Rate (Volume)**

1. Disconnect the hose from the carburetor, and insert the end into a measuring beaker.
2. Disconnect the fuel return hose from the fuel pump, and plug the fuel pump return outlet.
3. Measure the amount of fuel pumped while running the engine for one minute.

**Volume: More than 860 cc (52.5 cu in)/min at 800 rpm**



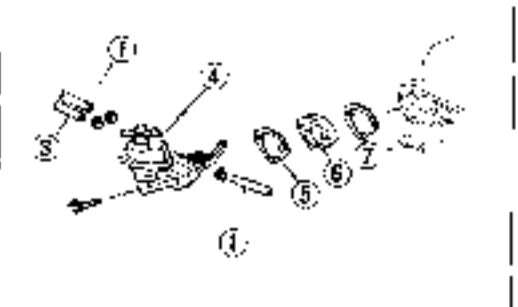
4B094E-006

**Replacement**

**Removal**

Remove in the sequence shown in the figure

1. Outlet hose
2. Inlet hose
3. Return hose
4. Fuel pump
5. Gasket
6. Insulator
7. Gasket



8EJ0F-056

**Installation**

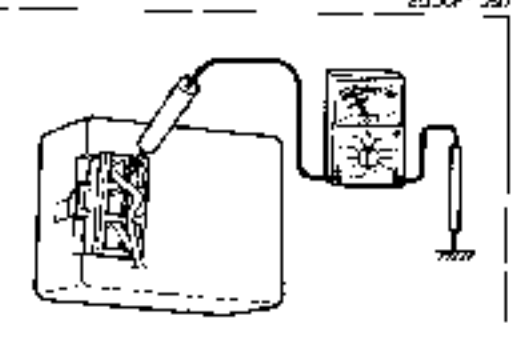
Install in the reverse order of removal.

**Tightening torque:**

19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)

**Caution**

Replace the gasket whenever the fuel pump is removed.



6EJ0F-010

**FUEL PUMP CONTROL UNIT**

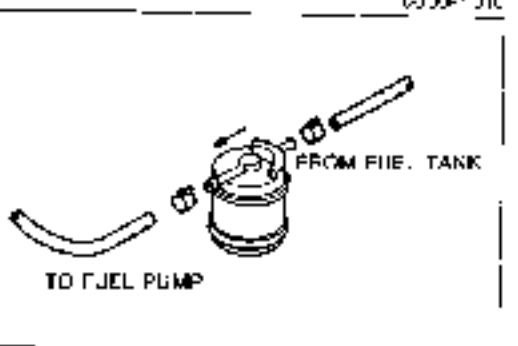
**Inspection**

Use a voltmeter to check terminal voltages in the following conditions.

V<sub>B</sub>: Battery voltage

	A	B	D	E
IG switch: ON	V <sub>B</sub>	0V	V <sub>B</sub>	0V
All idle	V <sub>B</sub>	V <sub>B</sub>	V <sub>B</sub>	0V

2. If only the (B) terminal is not correct, replace the fuel pump control unit.
3. If others are not correct, check the wiring and related parts.

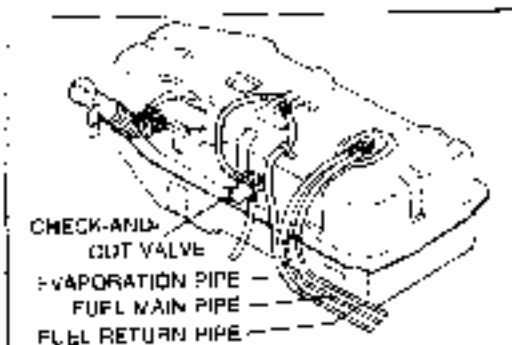


6EJ0F-016

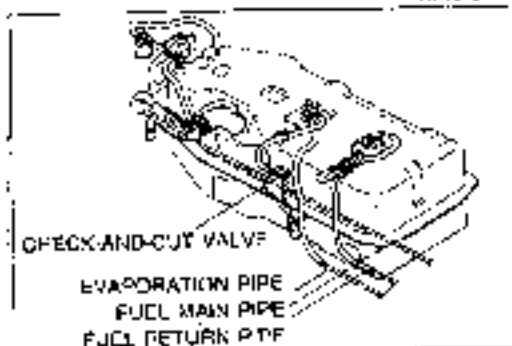
**FUEL FILTER**

**Replacement**

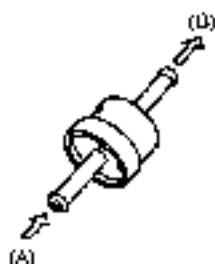
Be sure to install in the correct direction



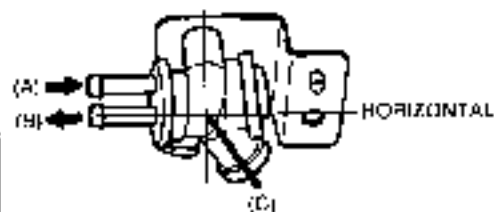
71A.C4B-164



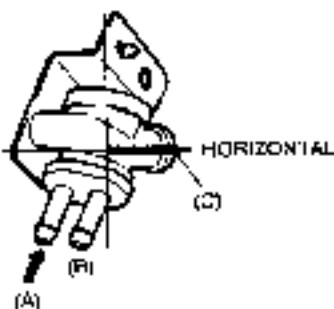
7B0743-109



78LX7P-106



101-84CNE7



7B034B-108

**FUEL TANK****Removal**

1. Disconnect the fuel tank gauge unit connector.
2. Raise the vehicle on a jack, and support it with safety stands.
3. Remove the drain plug and drain the fuel.

**Warning**

- a) When repairing the fuel tank, clean the fuel tank thoroughly with steam to remove all explosive gas.
- b) Use of fire is strictly prohibited while working on the fuel tank.

4. Remove the following parts.

- (1) All hoses
- (2) Fuel tank

**Installation**

Install in reverse order of removal, and note the following.

1. Make sure all hoses are connected in the correct positions.
2. Check for leaks.

**FUEL CHECK VALVE****Inspection**

1. Remove the fuel check valve.
2. Verify that air flows through the valve from port (A) to port (B) and not in the reverse direction.
3. If not correct, replace the fuel check valve.

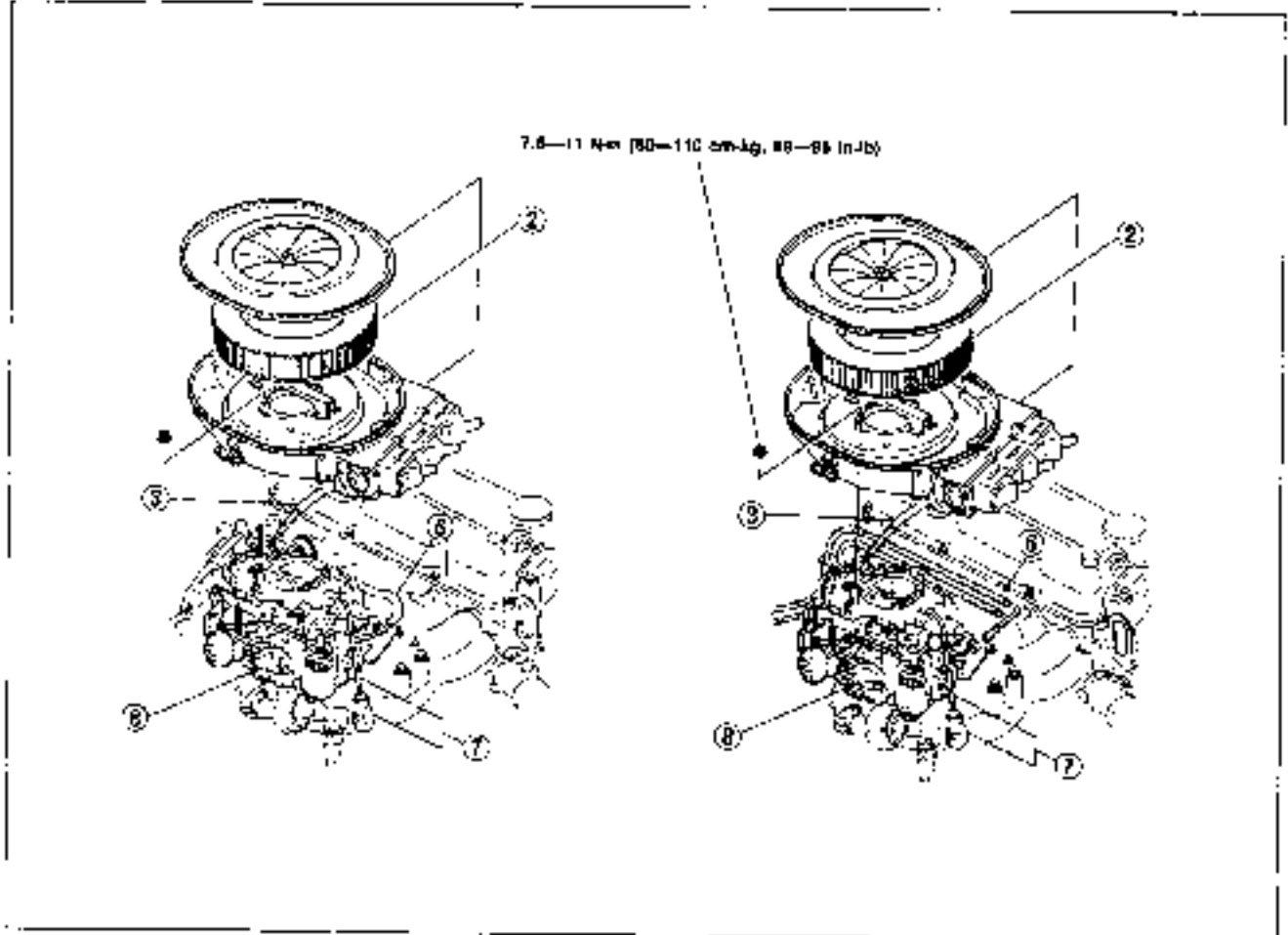
**FUEL CUT VALVE****Inspection**

1. Remove the fuel cut valve.
2. Place the valve in a horizontal position as shown in the figure.
3. Check that air flows through the valve from port (A) to port (B).

4. Place the valve so that line (C) is as shown to allow the check ball to block the outlet.
5. Verify that air does not flow through the valve from port (A) to port (B).
6. If it does, replace the fuel cut valve.

## CARBURETOR

## Removal



9EJCF-090

Remove or disconnect each part in the sequence shown in the figure.

**Warning**

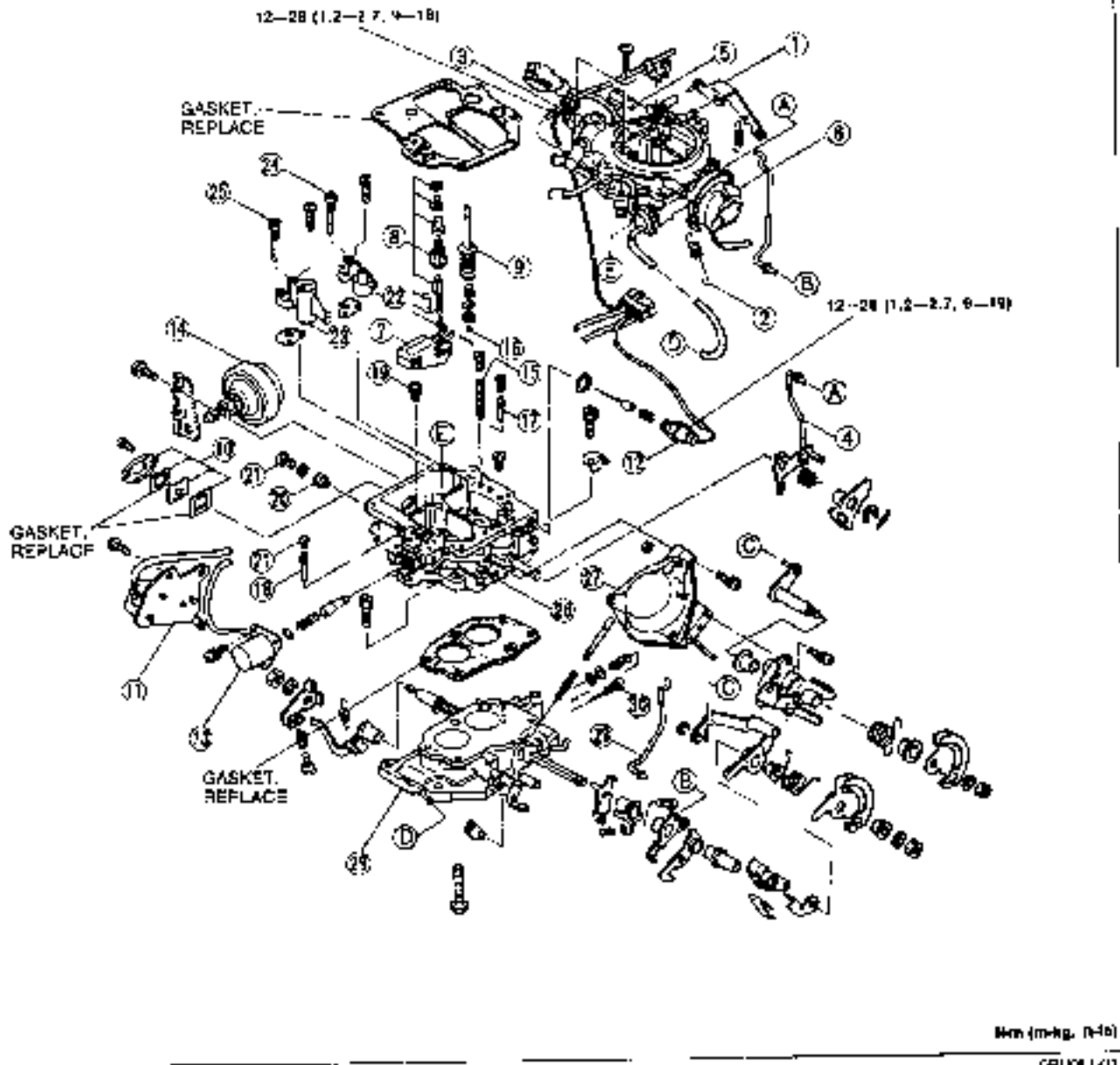
**Be extremely careful when working with fuel; always work away from sparks or open flames.**

- |                                       |  |
|---------------------------------------|--|
| 1. Negative battery cable             | 5. Vacuum hoses                        |
| 2. Air cleaner assembly               | 6. Fuel hoses                          |
| 3. Accelerator cable                  | 7. Wiring coupler and bullet connector |
| 4. Cruise control cable (if equipped) | 8. Carburetor                          |

**Caution**

**After removing the carburetor, cover the intake manifold port with a clean cloth to prevent dust or dirt from entering.**

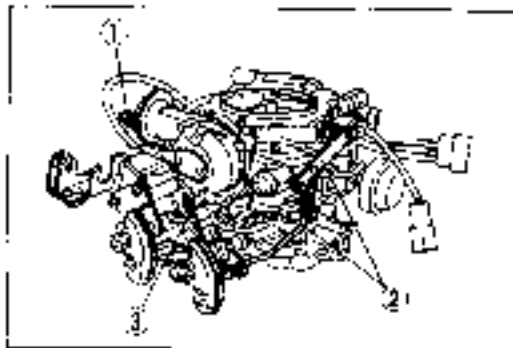
## Structural View



Mm (mkg, 1-16)

CEUOF 1-011

- |   |                                       |
|---|---------------------------------------|
| 1. Accelerator pump connecting rod                | 15. Accelerator pump inlet check ball |
| 2. Connect spring                                 | 17. Primary slow jet                  |
| 3. Air vent solenoid valve                        | 18. Secondary slow jet                |
| 4. Choke rod                                      | 19. Primary main jet                  |
| 5. Air horn                                       | 20. Secondary main jet                |
| 6. Automatic choke assembly                       | 21. Plug                              |
| 7. Float  | 22. Primary venturi and nozzle        |
| 8. Needle valve assembly                          | 23. Secondary venturi and nozzle      |
| 9. Accelerator pump plunger                       | 24. Primary main air bleed            |
| 10. Fuel bowl sight glass                         | 25. Secondary main air bleed          |
| 11. Idle switch                                   | 26. Main body                         |
| 12. Slow fuel cut solenoid valve                  | 27. Vacuum diaphragm                  |
| 13. Coasting richer solenoid valve                | 28. Throttle link                     |
| 14. Dashpot (For M7)                              | 29. Throttle body                     |
| 15. Accelerator pump outlet check ball and spring | 30. Mixture adjust screw              |



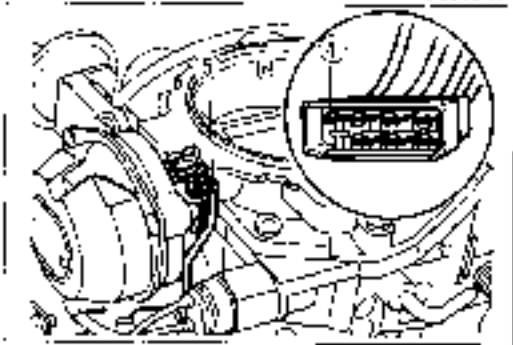
7D,0310 117

**Disassembly**

Disassemble in the sequence shown

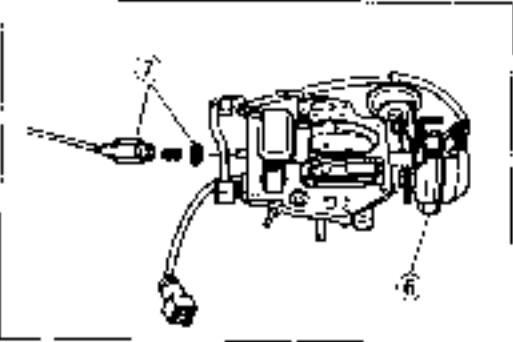
**Air horn and automatic choke**

1. Vacuum hose
2. Accelerator pump connecting rod, spring, and lever
3. Connect spring



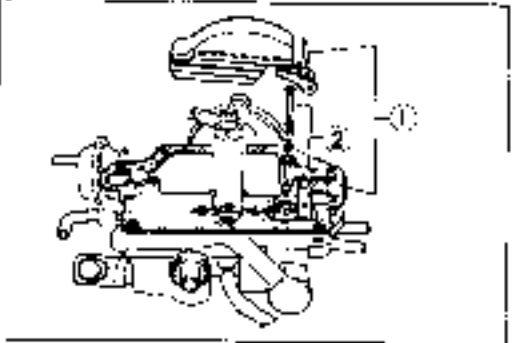
7B,0345-206

4. Air vent solenoid valve lead (separate from the connector)
5. Choke rod (disconnect)



7B,0341-207

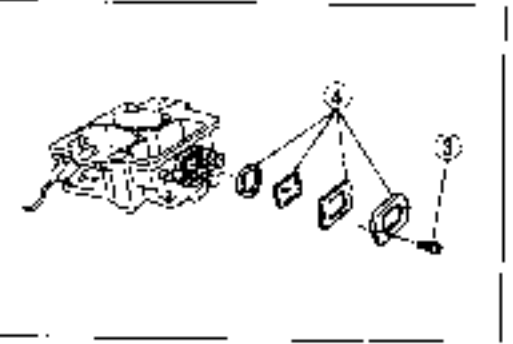
6. Air horn and automatic choke assembly (separate from main body)
7. Air vent solenoid valve, spring, and gasket, if necessary



7D,048 112

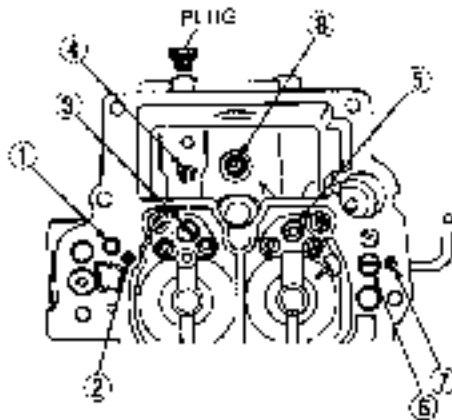
**Needle valve and float**

1. Float, pin, and gasket
2. Needle valve assembly



7B,144B-208

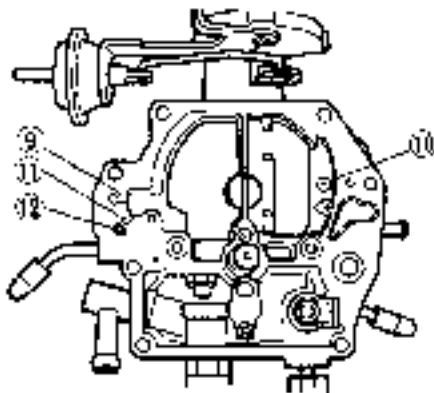
3. Fuel bowl sight glass mounting screws
4. Cover, gasket, glass, and rubber gasket



### Air Bleeds and Jets

- 1. Secondary slow jet
- 2. Secondary slow air bleed (No.1)
- 3. Secondary main air bleed
- 4. Secondary main jet
- 5. Primary main air bleed
- 6. Slow jet and plug
- 7. Primary slow air bleed (No.1)
- 8. Primary main jet

7B,04B-13

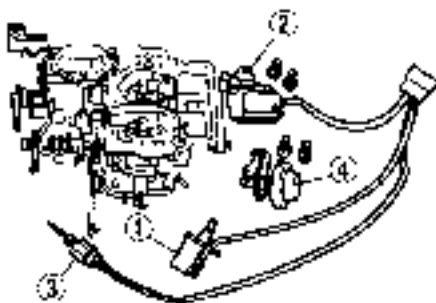


- 9. Richer air bleed (No.2)
- 10. Primary slow air bleed (No.2)
- 11. Coasting richer air bleed (No.1)
- 12. Coasting richer jet

### Caution

Note the size of all jets and air bleeds so that they will be reassembled in the correct position

7B,001B-14



### Main body

- 1. Coasting richer solenoid valve and O-ring
- 2. Idle switch and spring

### Caution

After installing the idle switch, be sure to adjust it.

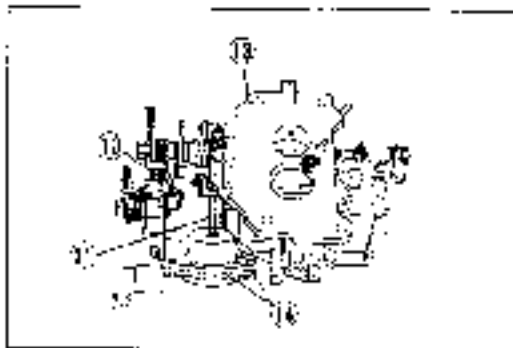
- 3. Slow fuel out solenoid valve, needle valve, spring, and gasket.
- 4. Dashpot bracket and dashpot. (For M/T)

0E1JDF1C-2



- 5. Accelerator pump plunger assembly and spring
- 6. Retaining clip
- 7. Strainer and accelerator pump inlet check ball
- 8. Check valve plug
- 9. Accelerator pump outlet check ball and spring

7B,04A-18



- 10. Throttle link (disconnect)
- 11. Vacuum diaphragm connecting rod (disconnect)
- 12. Throttle return spring (disconnect)
- 13. Throttle body (separate from main body)

**Note**

One bolt is inside the throttle body

**Tightening torque:**

4—11 Nm (0.4—1.2 m-kg, 3—8 ft-lb)



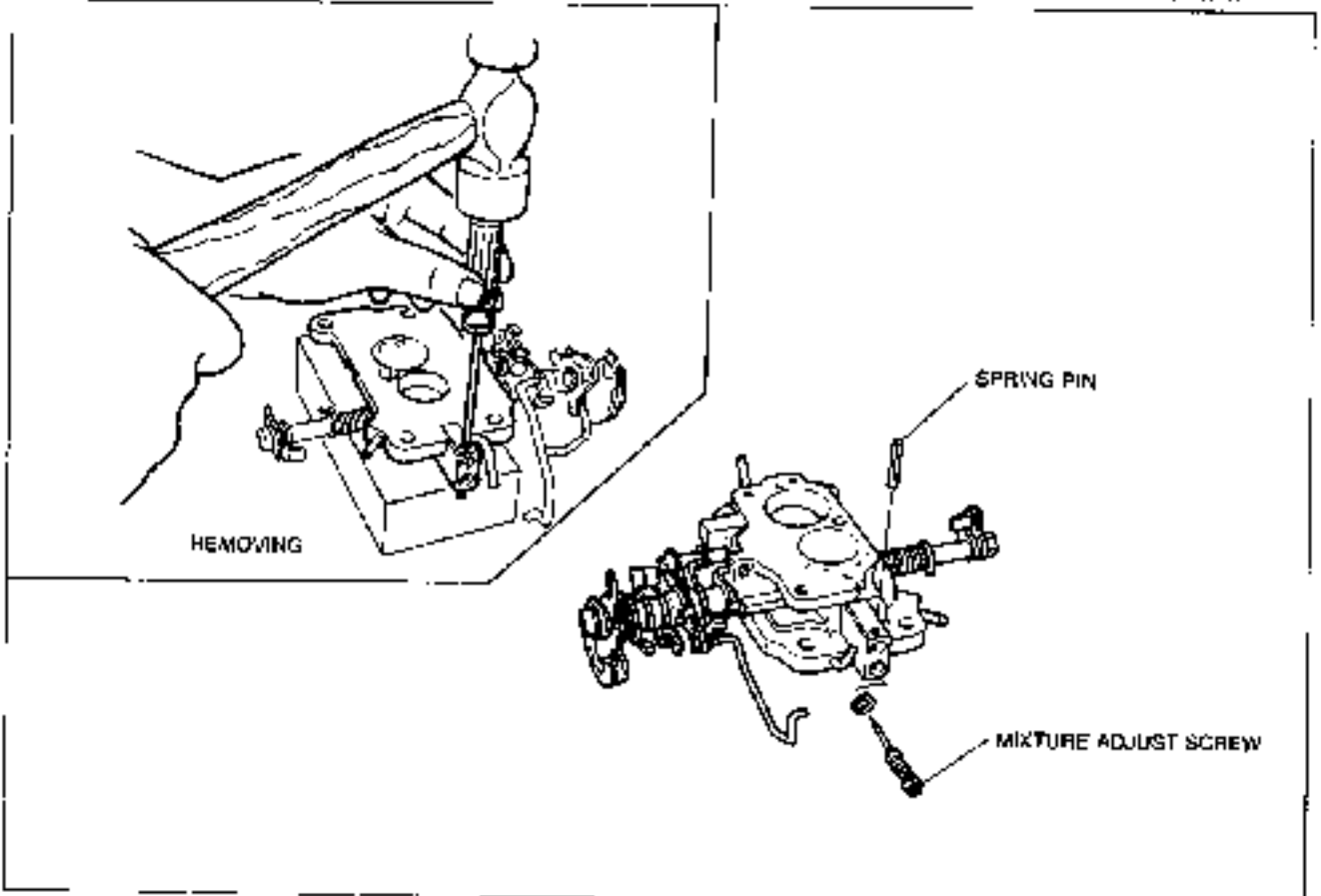
- 14. Vacuum diaphragm assembly and gasket
- 15. Diaphragm cover screws and cover
- 16. Spring and diaphragm
- 17. Throttle lever hanger screws

**Throttle Body**

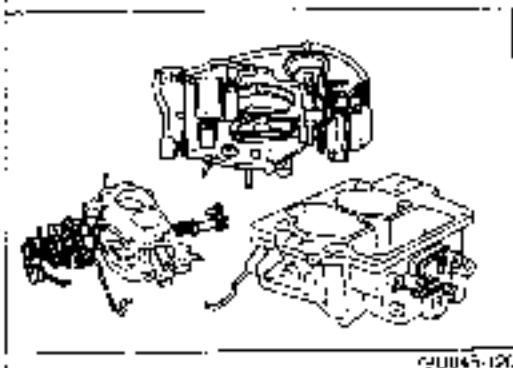
When removing the mixture adjust screw, tap out the spring pin as shown in the figure.

**Caution**

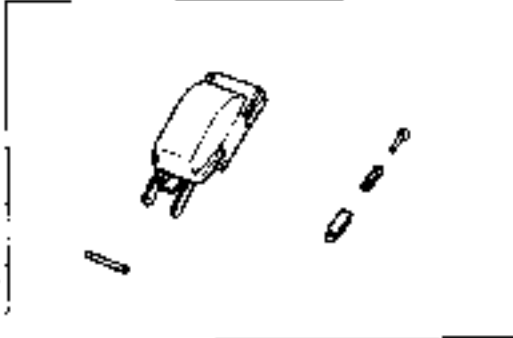
Do not remove the throttle valve and shaft, the venturies, or the choke valve and shaft.



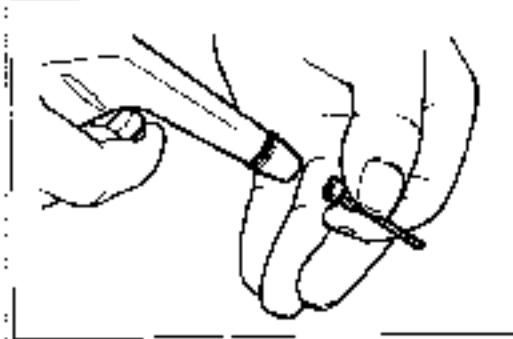




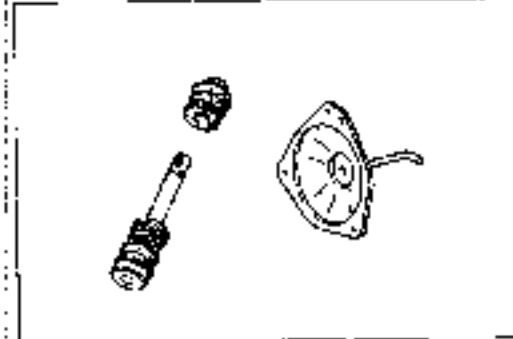
290045-126



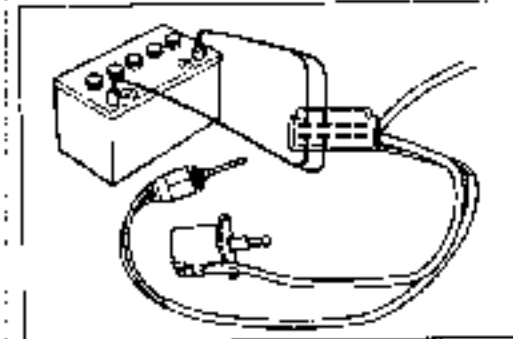
590043-076



78L046710



590012-076



78L043-217

### Inspection

#### Caution

Before inspection, wash all parts in carburetor cleaner and blow compressed air into the fuel passages to remove any dirt. Never use wire to clean the jets.

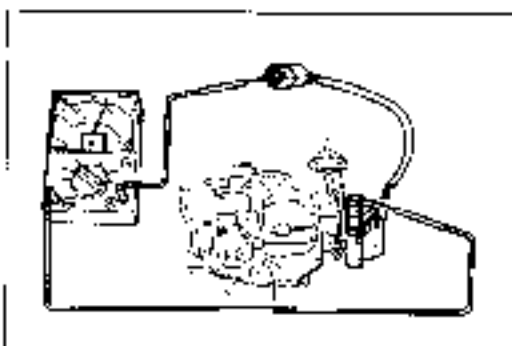
1. Inspect the air horn, main body, and throttle body for cracks or breakage.
2. Inspect the choke shaft and throttle shaft for wear. A worn throttle shaft will allow extra air to mix with the air/fuel mixture and cause lean ratios at low driving speeds.
3. Check the needle and seat for wear or rust.
4. Check the float for damage.

5. Examine all jets and air bleeds for clogging: clean in carburetor cleaner and blow with compressed air. Never use a wire; this might enlarge the hole or passage, and change the calibration of the carburetor.

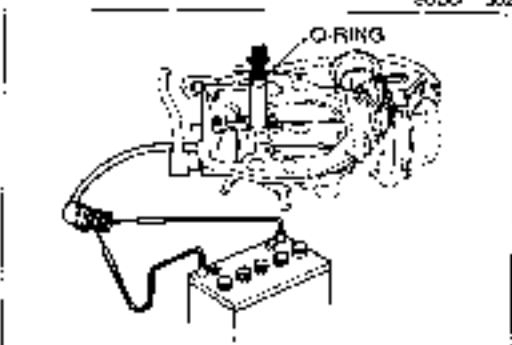
6. Inspect the accelerator pump plunger cup. Replace the plunger if it's worn or damaged.
7. Check the diaphragm for damage.
8. Inspect the mixture adjust screw for burrs or ridges.

9. Check the operation of the solenoids.

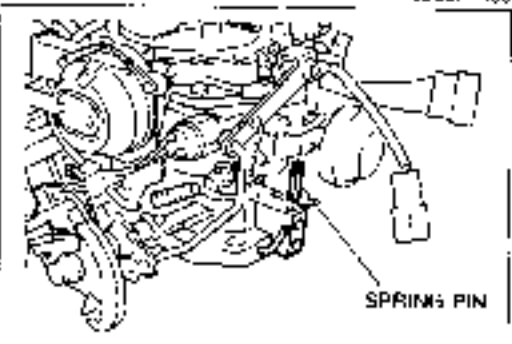
Connect the solenoid to the positive terminal of the battery and ground the body. When current is applied to the solenoid, the valve stem should be drawn into the valve body. If the valve does not operate properly, replace the solenoid.



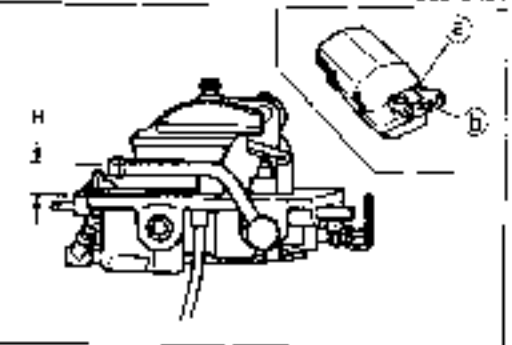
80J01-1002



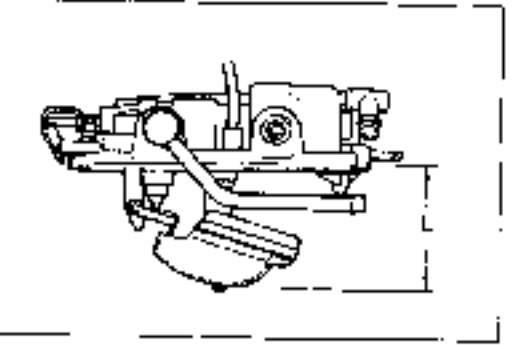
78J01F-1003



7EJ04E-121



78J01B-122



78J01B-123

10. Use an ohmmeter to check for continuity between the coupler and the choke heater ground. If there is no continuity, replace the choke heater.
11. To check the air/fuel solenoid valve, connect one terminal of the solenoid valve to the positive terminal of the battery, and ground the other terminal. Verify that air flows through the valve in the direction shown by the arrow.

Current applied	Air does not pass
Current not applied	Air passes

**Caution**

- a) When assembling, replace the O-ring and coat it with gasoline.
- b) The air/fuel solenoid cannot be replaced separately. If it must be replaced, the air horn assembly must also be replaced.

**Assembly**

Assemble the carburetor in the reverse order of disassembly.

**Caution**

- a) Discard the old gaskets and use new ones.
- b) Make sure that all parts are in good condition and clean.
- c) Both the primary and secondary venturuses have independent functions. Therefore, be careful not to interchange the parts during reassembly.
- d) Do not secure the spring pin to lock the mixture adjust screw until the idle adjustment has been completed.

**Float level adjustment**

Before installing the air horn assembly, adjust the float level as follows.

**Caution**

This adjustment is made without the gasket on the air horn.

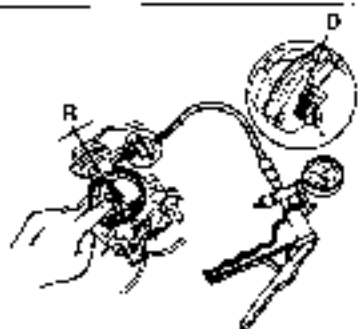
1. Turn the air horn upside down and allow the float to lower by its own weight.
2. Measure clearance (H) between the float and the air horn. If the clearance is not correct, bend the float stopper (A) to adjust.

**Clearance (H):**

- 11.6—12.6mm (0.457—0.496 in)....M/T
- 10.7—11.7mm (0.421—0.461 in)....A/T

3. Turn the air horn to normal position and allow the float to lower by its own weight.
4. Measure clearance (L) between the bottom of the float and the air horn. If 1 is not correct, bend the float stopper (B) to adjust.

**Clearance (L): 46.0—47.0mm (1.811—1.850 in)**



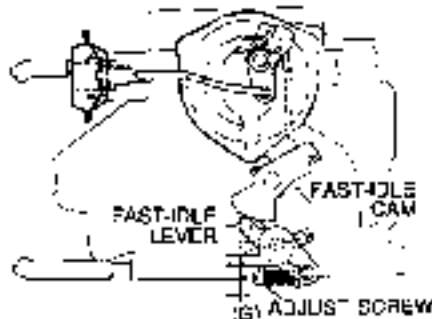
781043-123

### Adjustment Choke diaphragm

1. Use a vacuum pump to apply approximately **400 mmHg (15.7 inHg)** vacuum to the choke diaphragm.
2. Push the choke valve lightly to close it, and check the clearance (R).

**Clearance (R): 1.70—2.16mm (0.067—0.085 in)**

3. If the clearance is not as specified, adjust by bending the choke lever (D).



78U043-124

### Fast-idle cam

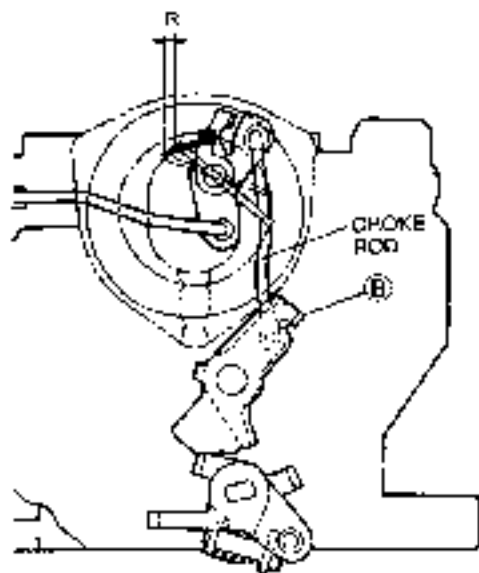
1. Set the fast-idle cam to the second highest position.
2. Adjust the throttle valve clearance (G) by turning the adjust screw.  
(The clearance becomes larger as the screw is turned clockwise.)

**Throttle valve clearance (G):  
0.84—1.04mm (0.033—0.041 in)**

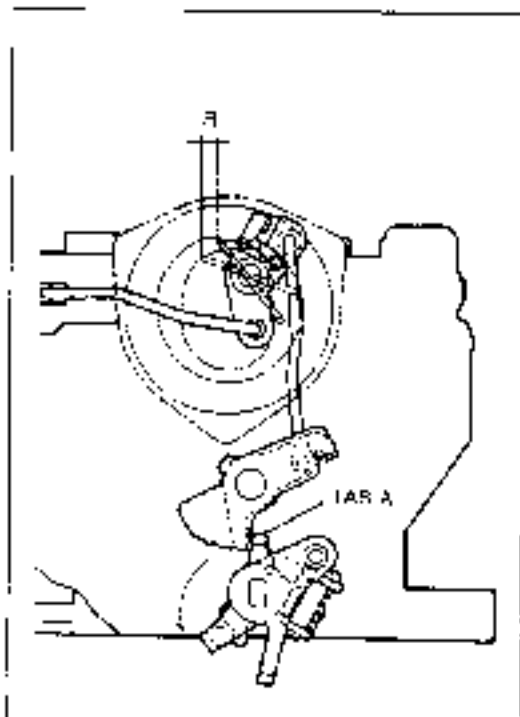
3. Set the fast-idle cam at the second highest position.
4. Check the choke valve clearance (R).

**Choke valve clearance (R):  
0.60—1.14mm (0.024—0.045 in)**

If necessary, adjust the choke valve clearance (R) by bending the starting arm (B). If large adjustments are required, the choke rod should be bent.



78U043-125



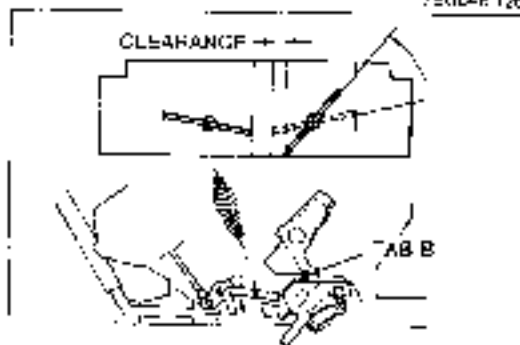
7E1104R 126

**Unloader system**

1. Open the primary throttle valve fully.
2. Measure the choke valve clearance (R).

**Clearance (R): 2.80—3.62mm (0.110—0.143 in)**

3. If the clearance is not as specified, adjust by bending tab (A).



2E11F10:7

**Secondary throttle valve**

1. The secondary throttle valve should start to open when the primary throttle valve opens  $50—54^\circ$  and should be completely open at the same time the primary throttle valve is fully open.
2. Check the clearance between the primary throttle valve and the throttle bore when the secondary throttle valve starts to open.
3. If the clearance is not as specified, bend tab (B) to adjust.

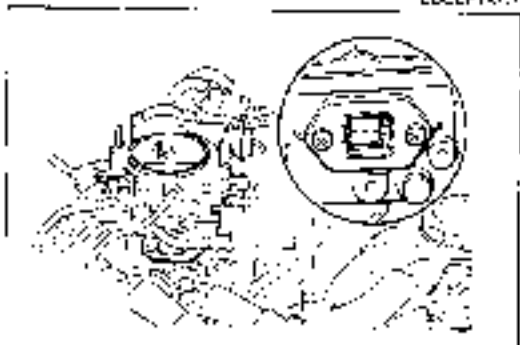
**Clearance: 7.35—8.25mm (0.289—0.325 in)**

**Installing**

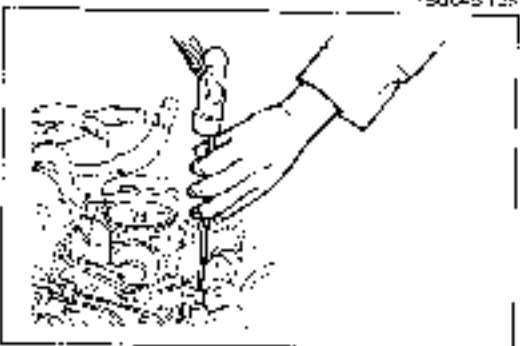
Install the carburetor in the reverse order of removal.

After installation, note the following:

- a) Start the engine and check for leaks.
- b) With the engine running, verify that the fuel level is at the specified mark on the sight glass.
- c) Make the idle adjustment.

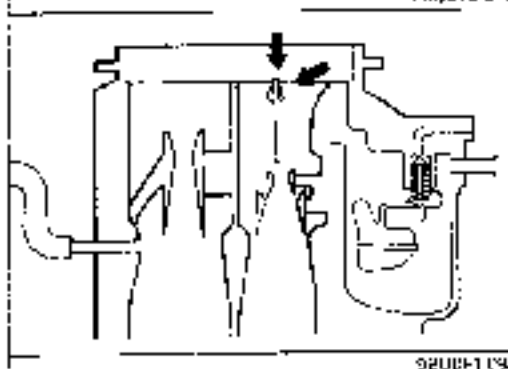
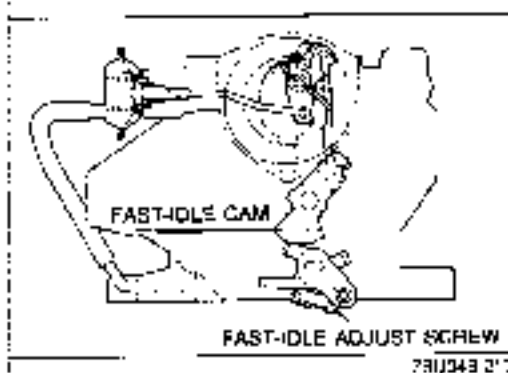


Y9UC45 125



7E1104R 126

- c) After the idle adjustment is completed, press in the spring pin.
- e) Adjust the dashpot.
- f) Adjust the idle switch.



After the idle adjustment has been completed, check the fast idle speed as follows:

1. Warm up the engine to normal operation temperature.
  2. Stop the engine.
  3. Plug the hoses of the idle compensator and reed valves.
  4. While holding the throttle valve slightly open, push the choke fully closed; then release the choke valve after releasing the throttle valve.
  5. Start the engine, but do not touch the accelerator pedal.
  6. Verify that the engine speed is **3,000—4,000 rpm**.
- If the engine speed is not as specified, turn the fast-idle adjust screw to adjust.

#### Cleaning of Carburetor

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the air cleaner.
3. Start the engine and run it at 1,500 rpm.
4. Spray the cleaning agent to the carburetor from two directions (3 sec. by 10 times; each direction) as shown in the figure.

#### Note




**Be sure to keep the engine speed to 1,500 rpm while spraying.**

5. Race the engine five or six times.
6. Run the engine at idle until the engine condition stabilizes.
7. Stop the engine and install the air cleaner.

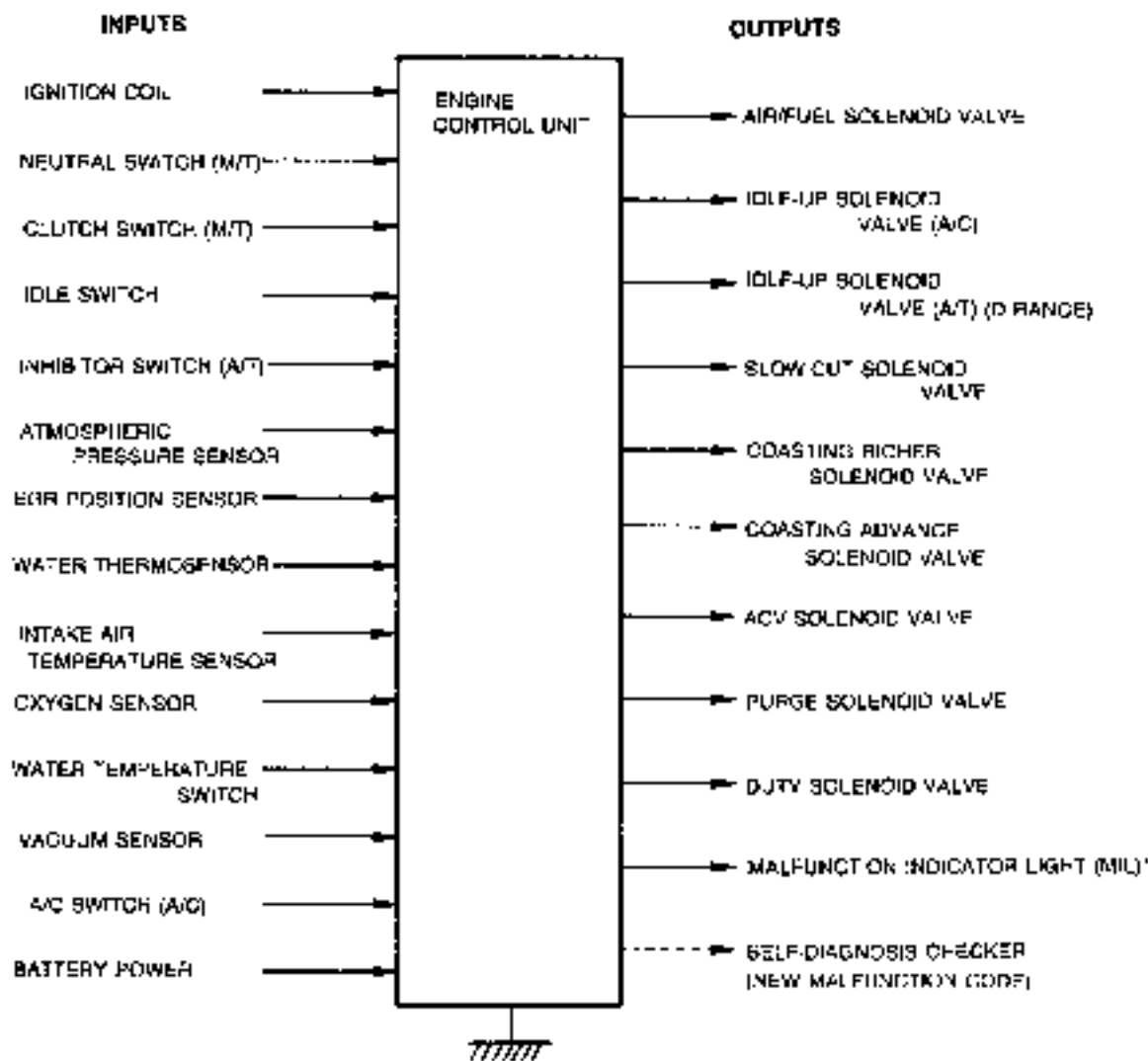
## CONTROL SYSTEM

## PREPARATION

## SST

<p>49 H018 9A1 Self-diagnosis checker</p> 	<p>49 U018 001 Adapter harness A</p> 	<p>49 9300 162 Engine signal monitor</p> 
---	---	--

90JCT-062



EXCEPT CANADA

4126-10-10

This system consists of sensors, solenoid valves, engine control unit, and malfunction indicator light. It controls solenoid valves in the feedback, idle-up, EEC, EGR air injection, and deceleration control systems. It incorporates the self-diagnosis system and the malfunction indicator light (MIL) for the driver. The self-diagnosis system diagnoses malfunctions (open or short circuits) of the main sensors (input), of all the solenoid valves (output), and of the engine control unit.

Malfunctions are memorized in the engine control unit as specific codes that can be retrieved by using the **Self-Diagnosis Checker**.

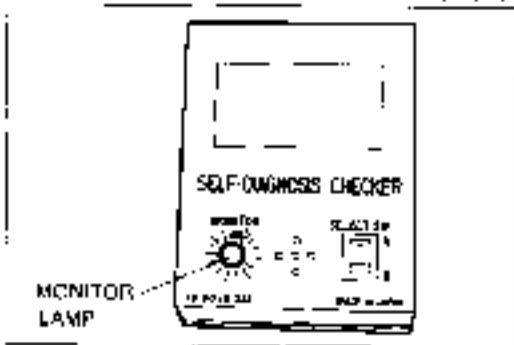
#### Note (Federal)

The MIL also comes ON at 60,000 miles and 80,000 miles to indicate that maintenance of the engine control system is required.

When the light comes ON, inspect, adjust and replace the emission system and parts.  
(Refer to Scheduled Maintenance)



7BL04B-101



93U7-066

**TROUBLESHOOTING WITH SELF-DIAGNOSIS CHECKER**

The **Self-Diagnosis Checker** (48 H010 9A1) is used to retrieve code numbers of malfunctions that have happened and were memorized or are continuing.

The malfunction is indicated by the code number and a buzz or, as shown in the table below.

**Monitor lamp**

This indicator (green light) indicates operation of the oxygen sensor.

**Note**

**This indicator shows lean air/fuel mixture when the light illuminates constantly and rich air/fuel mixture when it does not illuminate.**

**Normal air/fuel ratio is indicated by a flashing light.**

**Code Number**

Code No.	Location of malfunction	Buzzer	Control unit fail-safe function
01	buzzer circuit	ON: [Pulsing sound] OFF: [Silence]	—
09	Water-thermistor or circuit	ON: [Rapid pulsing sound] OFF: [Silence]	Maintains constant 80°C (176°F) signal
13	Vacuum sensor or circuit	ON: [Pulsing sound] OFF: [Silence]	Holds air/fuel solenoid valve to 0% duty and cuts off FGR
14	Air/fuel pressure sensor or circuit	ON: [Pulsing sound] OFF: [Silence]	Maintains constant signal of sea level pressure
15	Oxygen sensor or circuit	ON: [Pulsing sound] OFF: [Silence]	Holds air/fuel solenoid valve to 20% duty
15	FGR control system FGR position sensor or circuit	ON: [Pulsing sound] OFF: [Silence]	Cuts off FGR
17	Feedback system	ON: [Pulsing sound] OFF: [Silence]	Holds air/fuel solenoid valve to 30% duty
18	Air/fuel solenoid valve or circuit	ON: [Pulsing sound] OFF: [Silence]	—



Code No.	Location of malfunction	Buzzer	Control unit fail-safe function
22	Slow fuel solenoid valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [Low frequency pulse] [Low frequency pulse] [Low frequency pulse]	
23	Coasting richer solenoid valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
26	Purge solenoid valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
28	Duty solenoid vacuum valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
29	Duty solenoid vent valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
30	A/CV solenoid valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [Low frequency pulse] [Low frequency pulse] [Low frequency pulse]	
34	Idle-up solenoid valve (for A/C) or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
35	Idle-up solenoid valve (for A/T) or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	
45	Vacuum solenoid valve or circuit	ON: [Pulse] [Pulse] [Pulse] [Pulse] OFF: [High frequency pulse] [High frequency pulse] [High frequency pulse]	

95L021097

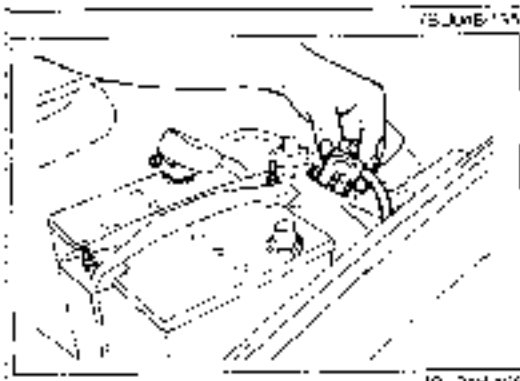
- 01 → 4-second period →
  - 09 → 4-second period →
  - 13 → 4-second period →
- Repeats above

### Note

a) If more than one malfunction occurs, the code numbers will be displayed on the Self-Diagnosis Checker one by one in numerical order.

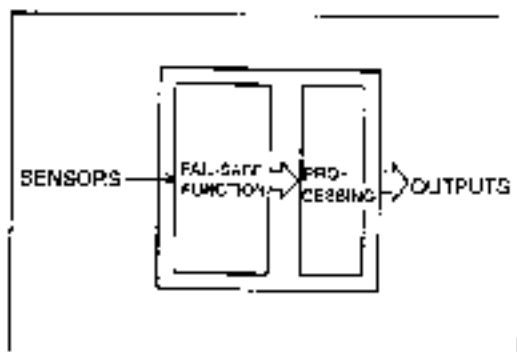
For example, for malfunctions 09, 13, and 01, the code numbers are displayed in the order 01, 09, then 13.

b) The memory of malfunctions is canceled when the negative battery cable is disconnected for approximately five seconds.

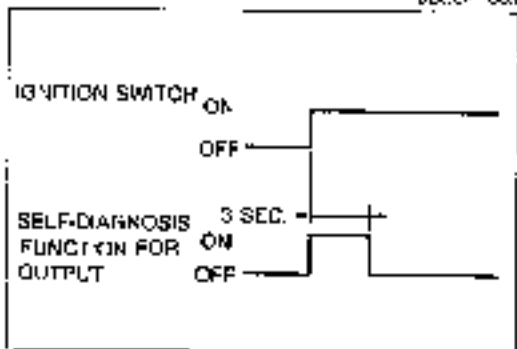


75JUN8135

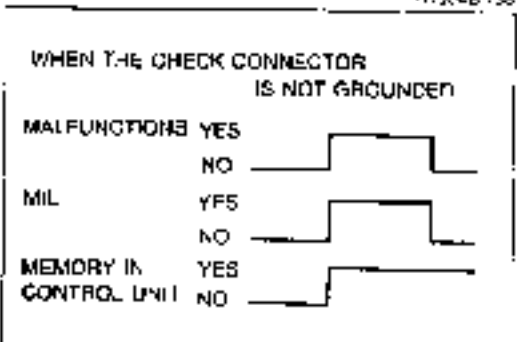
78L249136



DBLCH-058



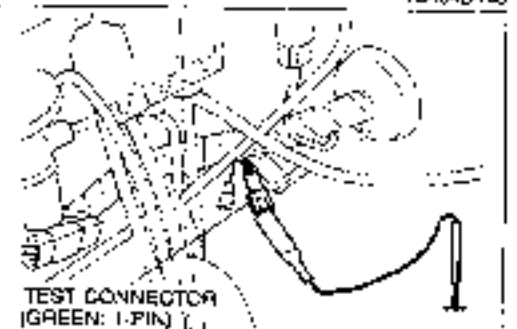
P/AMB-138



28LAF-405



78LAD-120



98LDT-140

c) The engine control unit has a built-in fail-safe mechanism for the main input sensors. If a malfunction occurs, the engine control unit will substitute values as shown in the above diagram. The driving performance will be slightly affected, but the vehicle may still be driven.

d) Self-diagnosis for the output solenoid valves functions within three seconds after turning the ignition switch ON. It stops when the engine starts, even if this is within three seconds.

e) The malfunction indicator light indicates a pattern the same as the buzzer of the Self-Diagnosis Checker when the self-diagnosis check connector is grounded.

When the self-diagnosis check connector is not grounded, the lamp illuminates steadily while malfunction of a main input sensor occurs and goes out if the malfunction recovers. However, the malfunction code is memorized in the engine control unit.

#### Inspection Procedure

1. Connect the **Self-Diagnosis Checker** (49 H018 9A1) to the check connector.
2. Set the select switch to the A position.

#### Note

The check connector is above the right side wheel housing.

3. Ground the test connector (Green 1-pin) with a jumper wire.



98U0F1 071

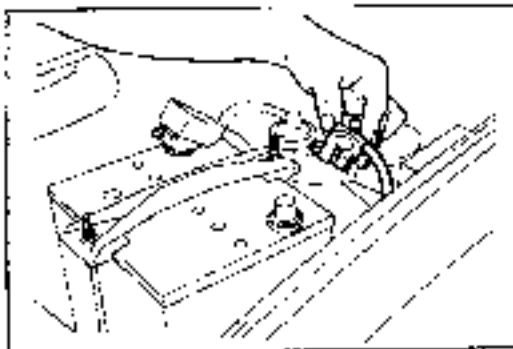
4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **three seconds** after turning the ignition switch ON.
6. If **88** does not flash, check the check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **20 seconds**, replace the engine control unit and perform steps 3 and 4 again.

8. Note the code numbers and check for the causes by referring to the checking order shown on pages F1-101 — F1-104, and repair as necessary.

**Note**

**Recheck for code numbers by performing the after-repair procedure after repairing.**

98U0F1 072



98U0F1 015

**After-repair Procedure**

1. Cancel the memory of malfunctions by disconnecting the negative battery cable for more than **20 seconds**, then reconnect it.

**IGNITION SWITCH: ON  
FOR SIX SECONDS**

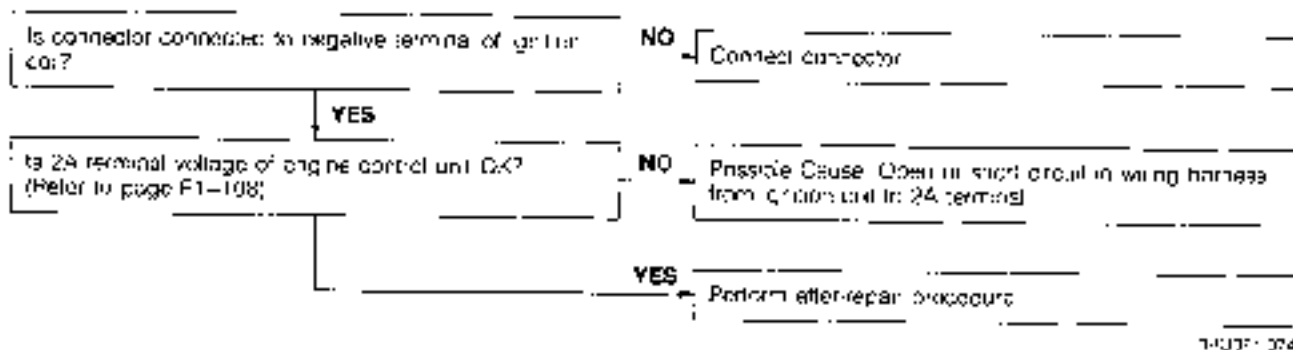
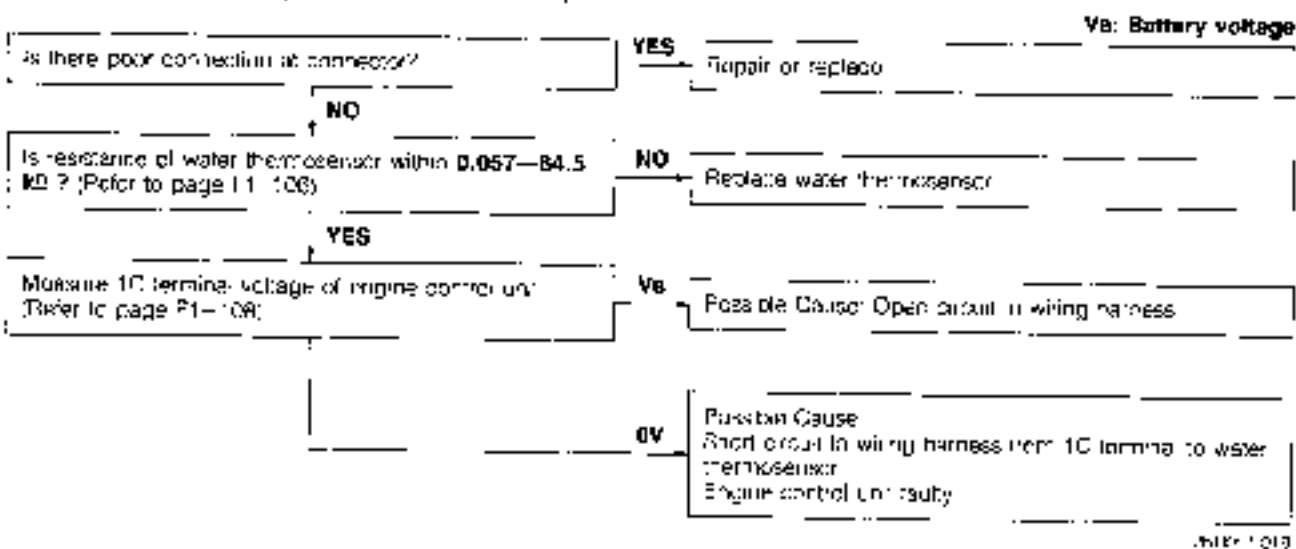
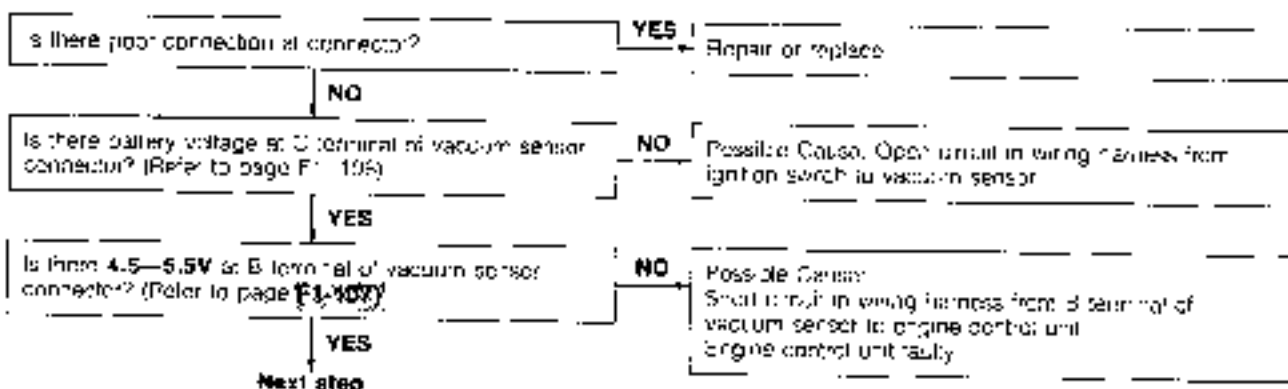
78LJ34E-149



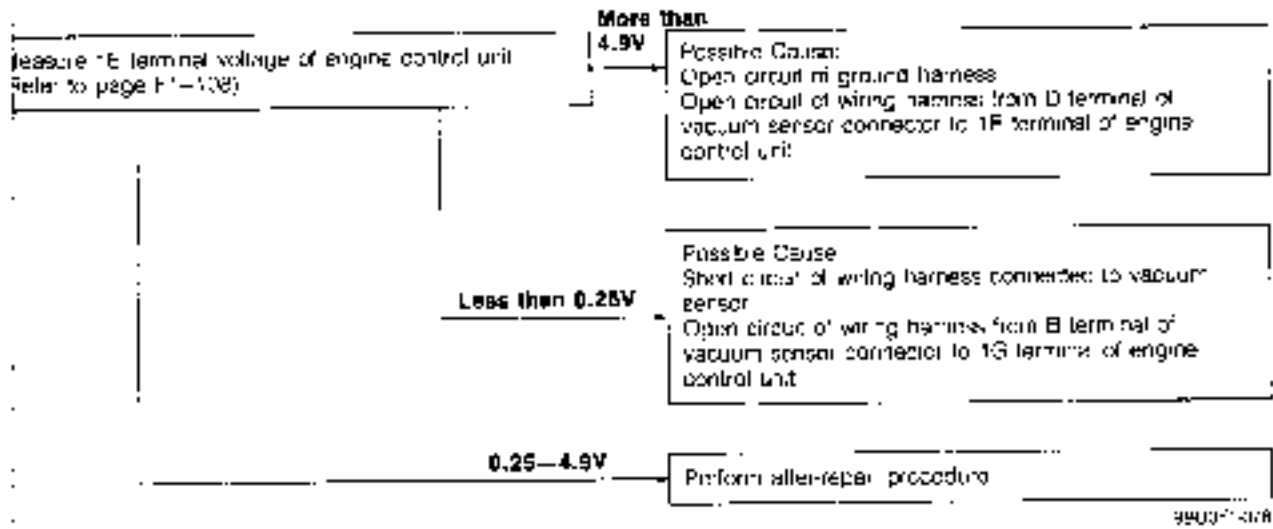
98U0F1 073

2. Turn the ignition switch ON, but do not start the engine for **8 seconds**.
3. Start and warm up the engine, then run it at **2,000 rpm for four minutes**.

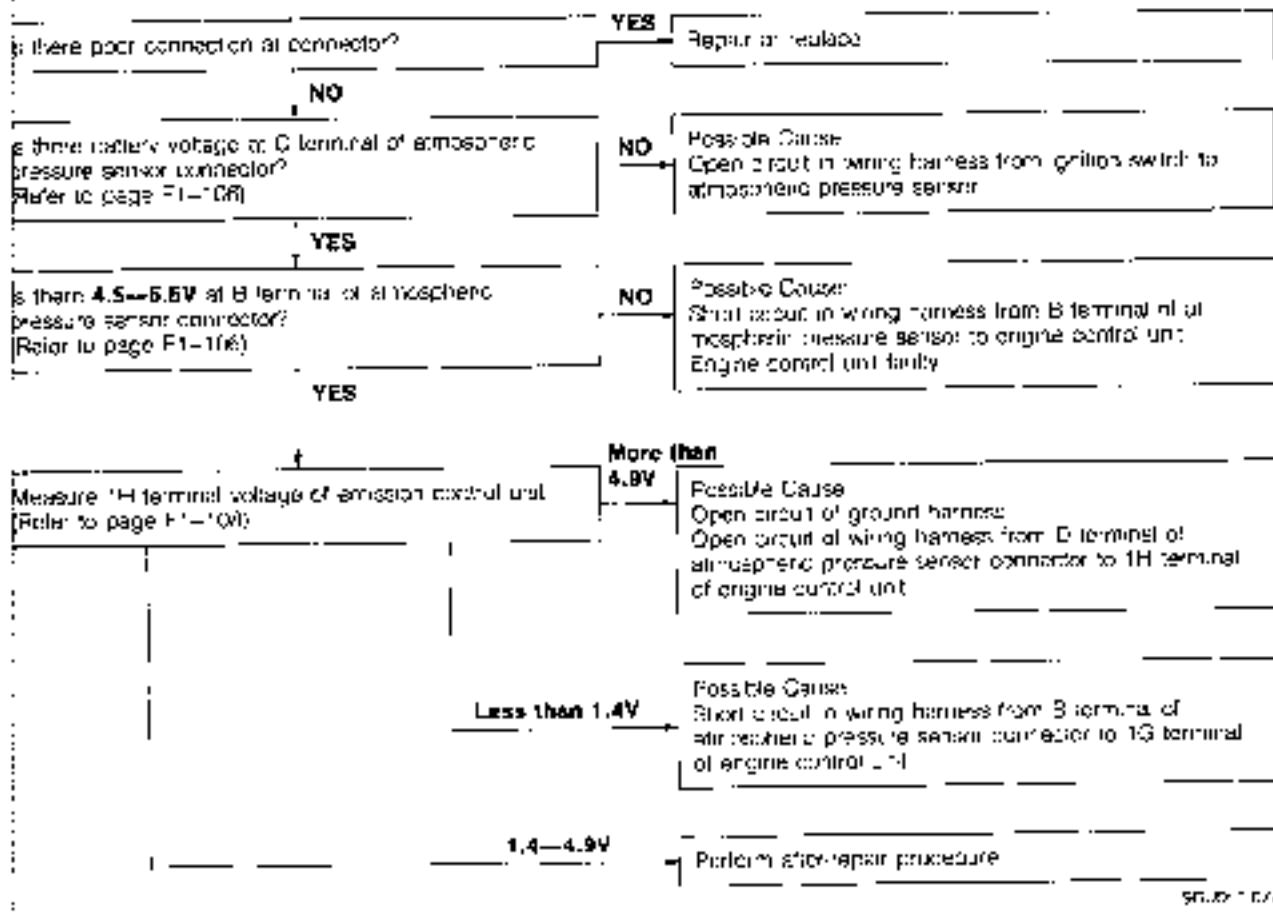
4. Connect the **Self-Diagnosis Checker** (49 H018 9A1) to the check connector.
5. Ground the test connector (Green: 1 pin) with a jumper wire.
6. Verify that no code numbers are displayed.

**No.01 code display (IG pulse)****No.09 code display (Water thermosensor)****No.13 code display (Vacuum sensor)**

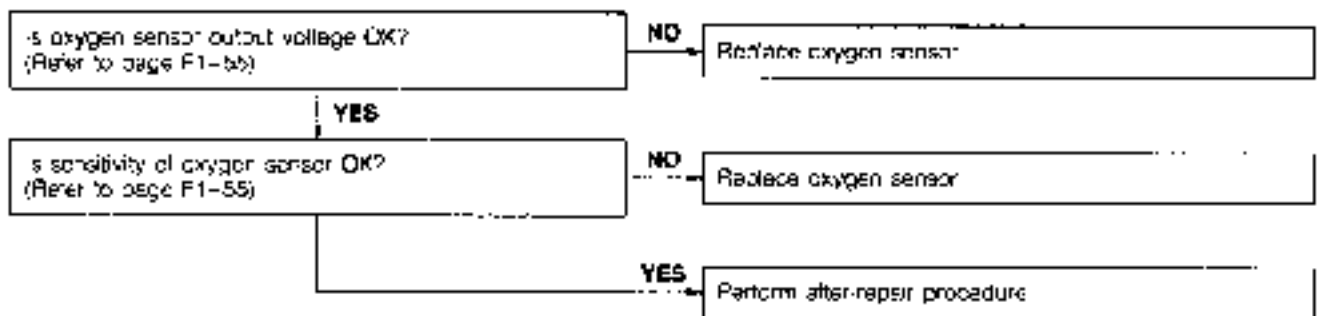
**CONTROL SYSTEM**



**b.14 code display (Atmospheric pressure sensor)**



## No.15 code display (Oxygen sensor)

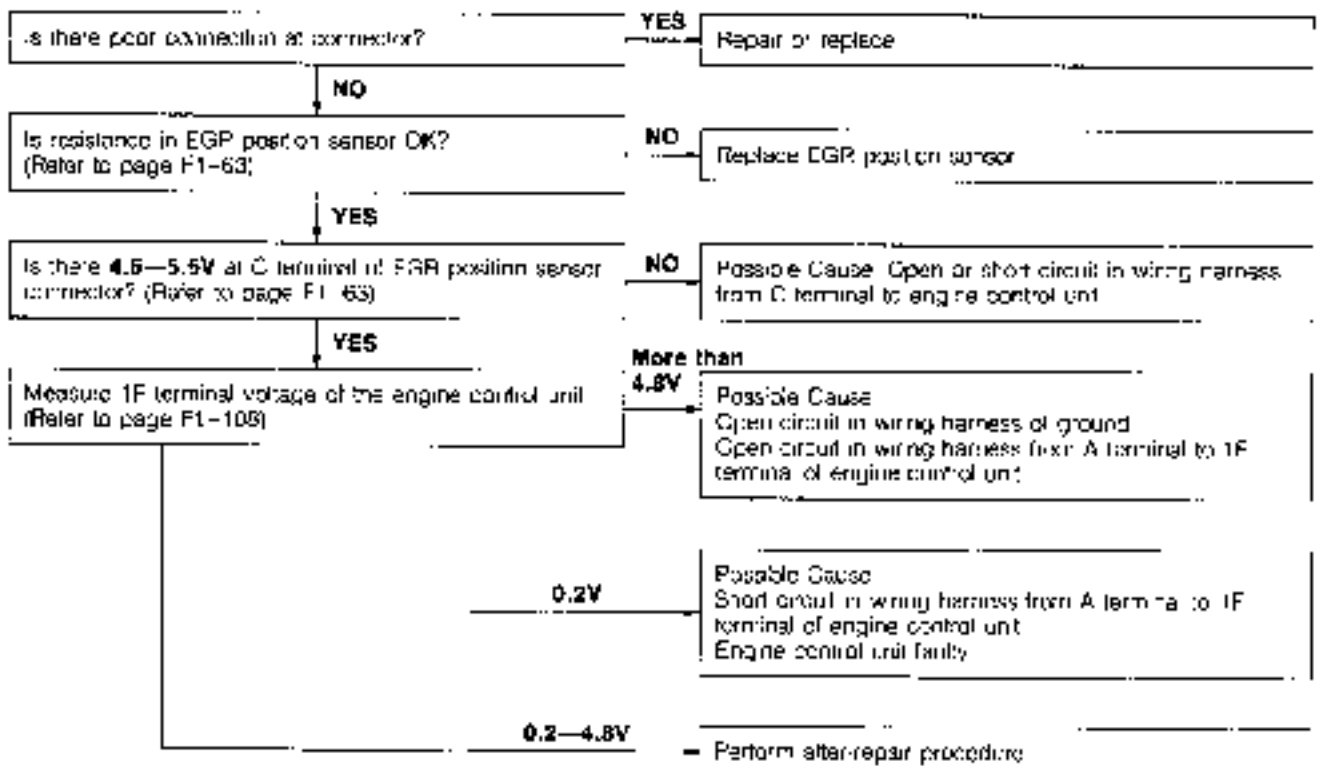


98-001-078

## No.16 code display (EGR position sensor)

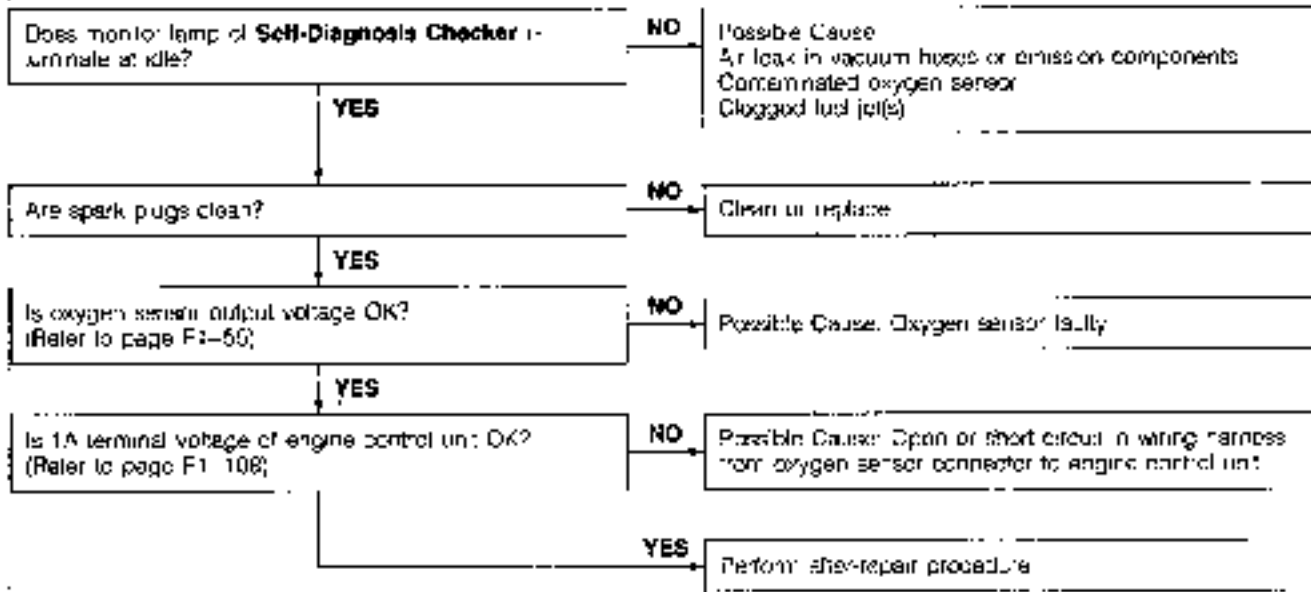
**Note**

Inspect the vacuum hose to the EGR control valve for air leakage, blockage and damage if the MIL illuminates only during cruising.



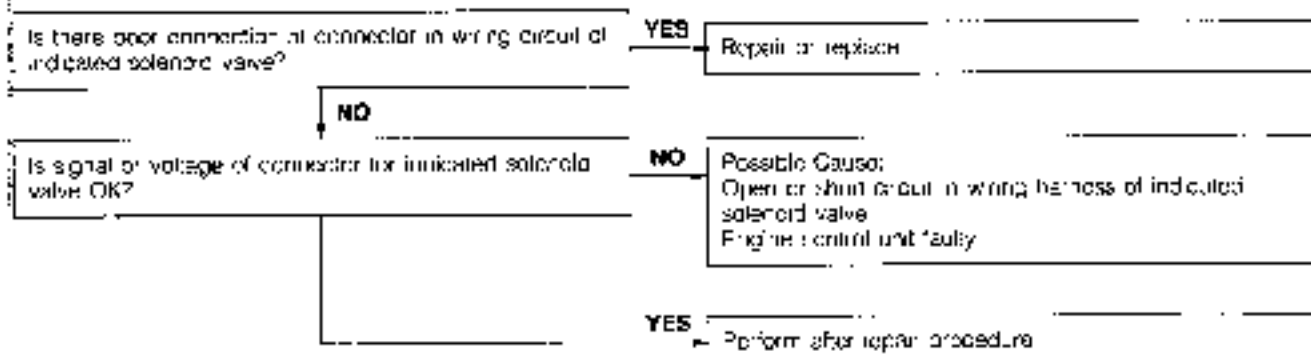
98-001-078

### No.17 code display (Feedback system)

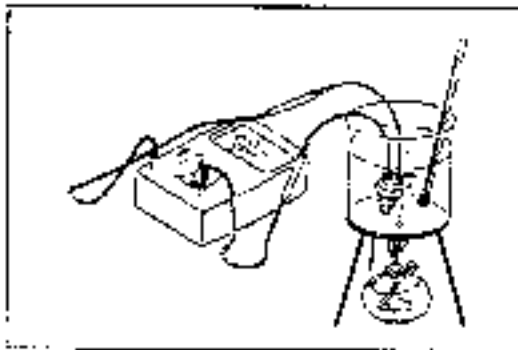


SEJ0F1-000

### No.18, 22, 23, 26, 28, 29, 30, 34, 35, and 45 code displays (Solenoid valves)



SEJ0F1-001



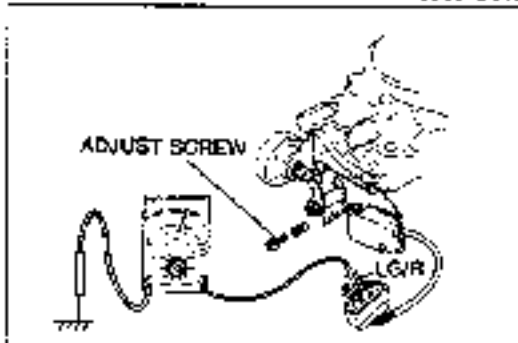
68U043-013

**WATER TEMPERATURE SWITCH****Inspection**

1. Remove the switch from the radiator.
2. Place the switch in water with a thermometer, and heat the water gradually.
3. Check for continuity between the terminals as specified.

**Specification: less than 15—19°C (59—66.2°F)**

4. If continuity is not evident, replace the water temperature switch.



78U043-155

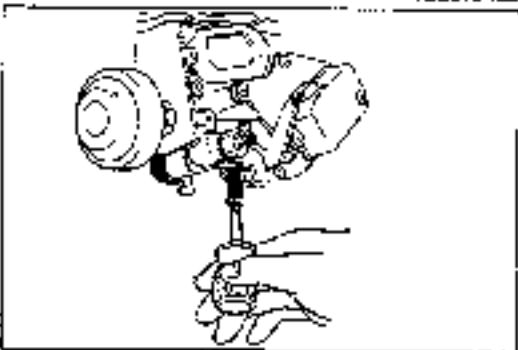
**IDLE SWITCH****Inspection**

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Connect a voltmeter to the idle switch terminal (LG/R) as shown.

4. Increase the engine speed to more than 2,000 rpm; decelerate gradually and verify that the voltmeter indicates as follows.

Engine speed	Voltage
At idle	Battery voltage
More than 1,000—1,200	Less than 1.5V

5. If not as specified, turn the adjust screw to adjust.



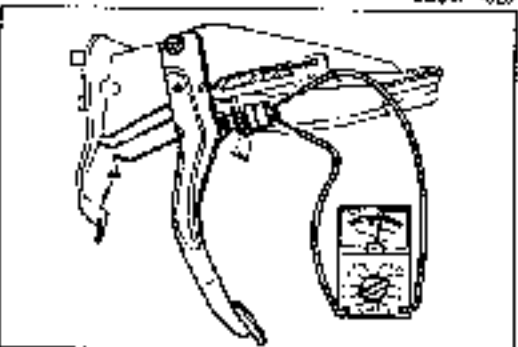
28,007-020

**CLUTCH SWITCH****Inspection**

1. Disconnect the switch connector.
2. Check continuity between the terminals.

Continuity	Condition
Yes	Pedal released
No	Pedal depressed

3. If not correct, turn the clutch switch to adjust.



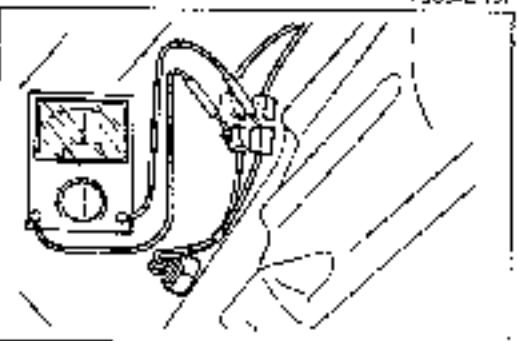
73U04E 157

**NEUTRAL SWITCH****Inspection**

1. Disconnect the switch connector.
2. Check continuity between the terminals.

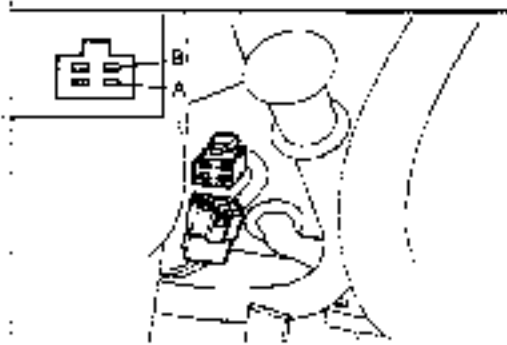
Continuity	Condition
No	In neutral position
Yes	In other positions

3. If not correct, replace the neutral switch.



78U04E 166

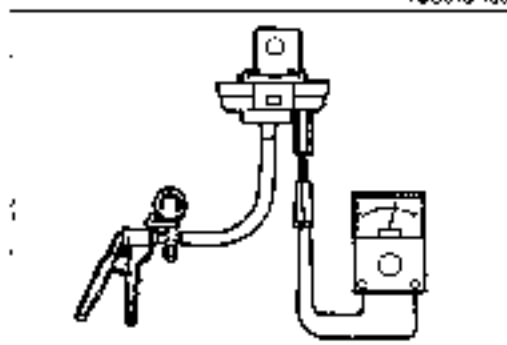


**INHIBITOR SWITCH****Inspection**

1. Disconnect the switch connector
2. Check continuity between A and B terminals.

Continuity	Condition
Yes	In N or P range
No	In other ranges

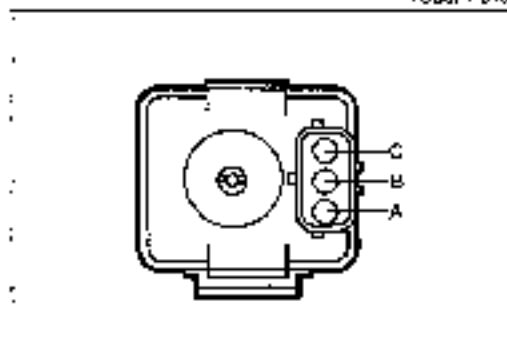
3. If not correct, replace the inhibitor switch.

**ATMOSPHERIC PRESSURE SENSOR****Inspection of Terminal Voltage**

1. Remove the right side kick panel.
2. Attach a vacuum pump to the sensor port.
3. Turn the ignition switch ON.
4. Check voltage between each terminal and ground while applying and releasing vacuum to the sensor.

**Vacuum: 0—760 mmHg (0—29.9 inHg)**

Terminal	Voltage
B/LG	Less than 1.5V
G/Y	1.4-4.8V
BW	4.5-5.5V



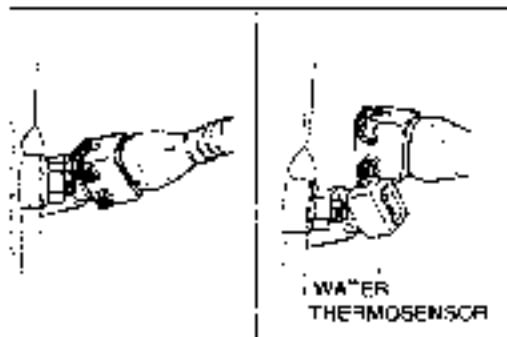
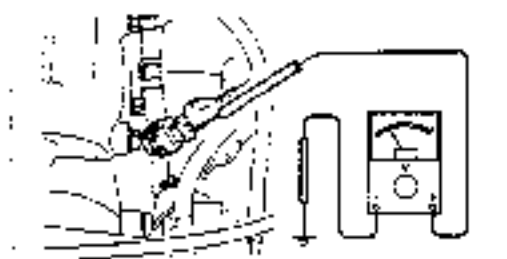
5. If the voltage at A or C terminal is not correct, check the wiring harness.
6. If the voltage at A and C terminals is correct but is not correct at B terminal, replace the atmospheric pressure sensor.

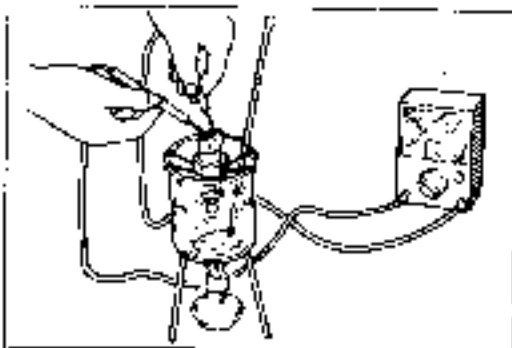
**WATER THERMOSENSOR****Inspection of Terminal Voltage**

1. Warm up the engine and run it at idle.
2. Remove the rubber boot from connector as shown.
3. Turn the ignition switch ON.
4. Verify that voltage between terminal (L/R) and the ground is as specified.

**Specification: approximately 0.5V**

5. If the voltage is not correct, check the resistance of the sensor, and check the wiring harness for an open or short circuit.





7UJ04B-01E

- Place the sensor in water with a thermometer, and heat the water gradually.
- Verify that resistance of the sensor is as specified.

Water Temperature:	Resistance
20°C (68°F)	14.6—17.0 kΩ
20°C (68°F)	2.21—2.69 kΩ
80°C (176°F)	0.290—0.354 kΩ

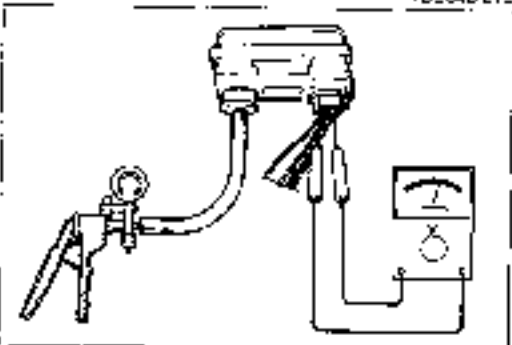
- If it is not, replace the water thermostat.

### VACUUM SENSOR

#### Inspection of Terminal Voltage

- Remove the vacuum nose, and attach a vacuum pump to the sensor.
- Turn the ignition switch ON.
- Check voltage between each terminal and ground while applying and releasing vacuum to the sensor.

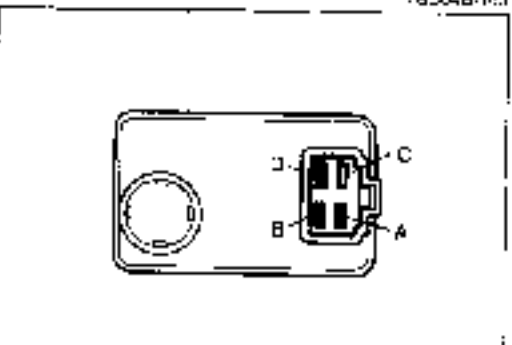
**Vacuum: 0—760 mmHg (0—29.9 inHg)**



7HJ04B-100

Terminal	Voltage
A	Less than 1.5V
B	4.5—5.5V
C	1.4—4.9V

- If the voltage at A or B terminal is not correct, check the wiring harness.
- If the voltages at A and B terminals are correct but the voltage is not at C terminal, replace the vacuum sensor.



7HJ04B-100

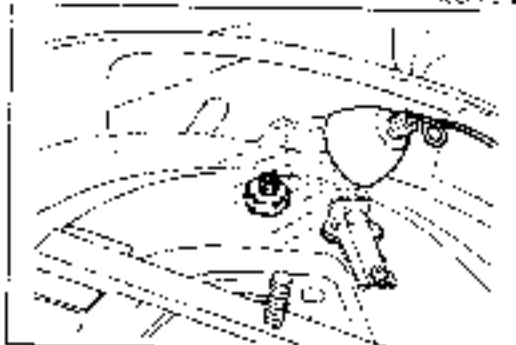
### INTAKE AIR THERMOSENSOR

#### Inspection of Resistance

- Remove the air cleaner cover.
- Remove the rubber boot from the connector.
- Heat the intake air thermostat, and observe the temperature.
- Use an ohmmeter to check resistance between the terminals of the intake air thermostat.

Intake Air Temperature	Resistance
-20°C (-4°F)	14.6—17.0 kΩ
20°C (68°F)	2.21—2.69 kΩ
80°C (176°F)	0.290—0.354 kΩ

- If the resistance is not as specified, replace the intake air thermostat.



5B11F1-002

### EGR POSITION SENSOR

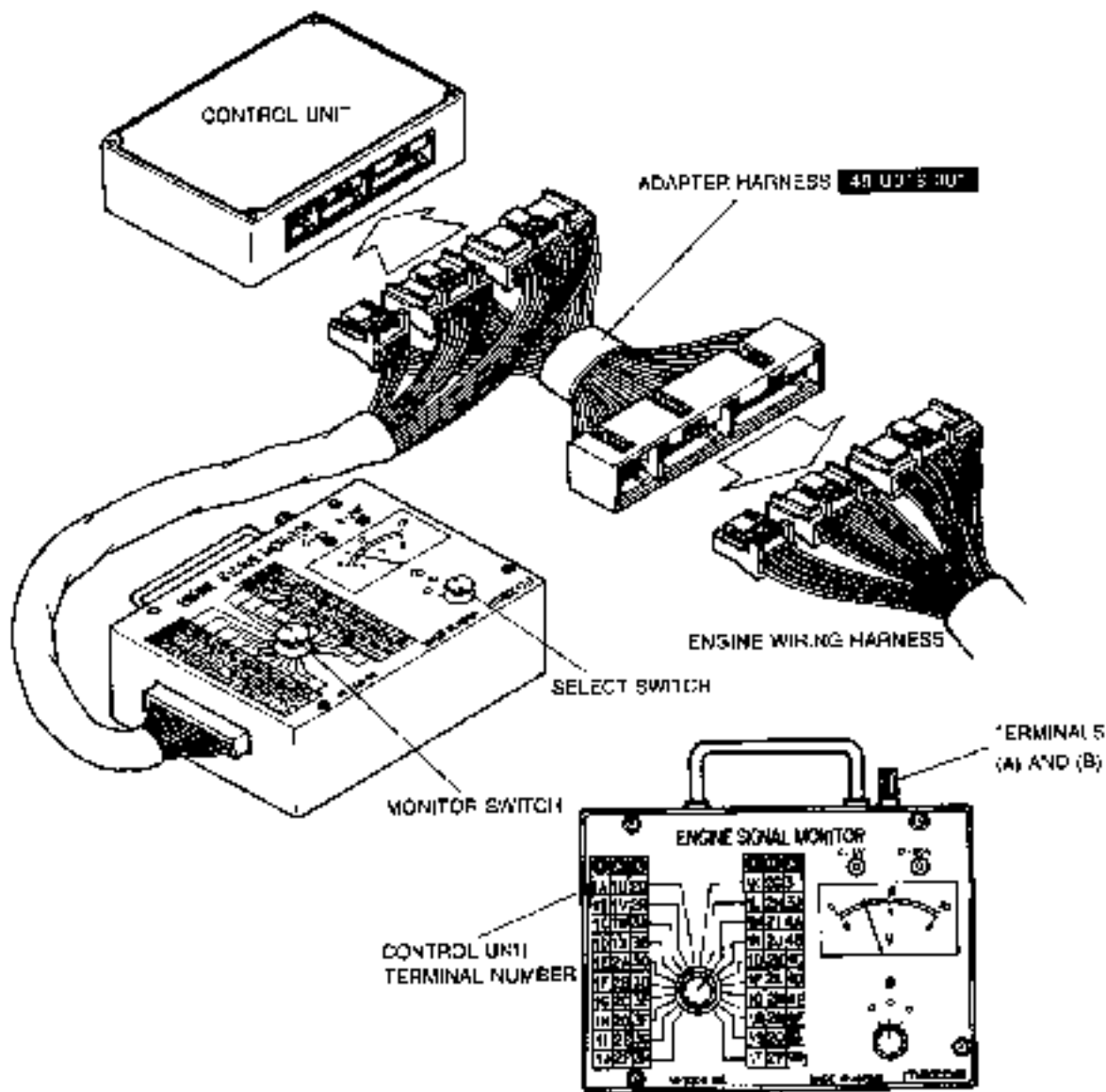
Refer to page F1-63.

### OXYGEN SENSOR

Refer to page F1-55.

## ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 UC18 001)



BDL/F1-063

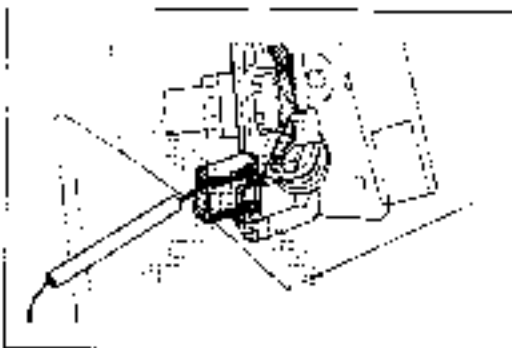
The **Engine Signal Monitor** (49 9200 162) was developed to check the control unit terminal voltages. This monitor easily inspects the individual terminal voltages through selection by the monitor switch.

**How to Use the Engine Signal Monitor**

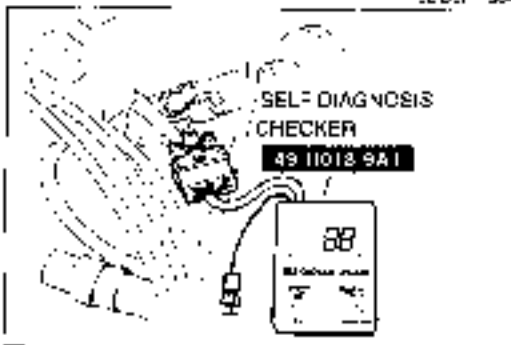
1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter** (49 UC18 001).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

**Caution**

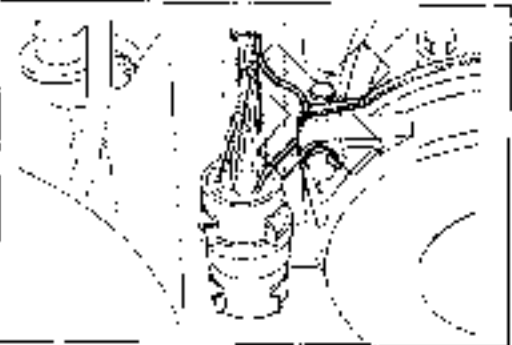
Never apply voltage to terminals (A) and (B).



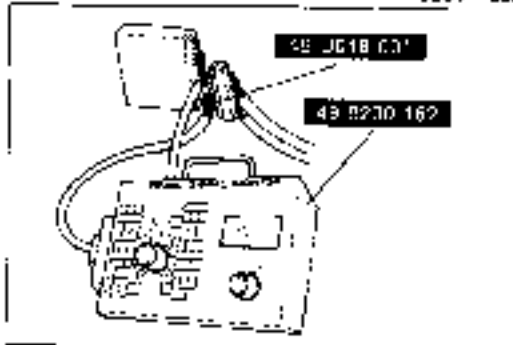
9EUCF-064



9ELCF1-005



9E074-086



9B07F1-007

**Precaution**

1. Never push the circuit tester test probe into the connectors from the engine control unit side.

2. Before checking the engine control unit, troubleshoot with the **Self-Diagnosis Checker**.

3. Before replacing the engine control unit, first check the parts, wiring harnesses, and terminal contacts if the terminal voltage is incorrect, and repair as necessary.

**Inspection of Terminal Voltage**

1. Warm up the engine and stop it.
2. Disconnect the connector from the engine control unit.
3. Connect the **adapter** (49 0018 001) between the engine control unit and the connector.
4. Connect the **Engine Signal Monitor** (49 9200 162) to the adapter.
5. Check voltage of each terminal.

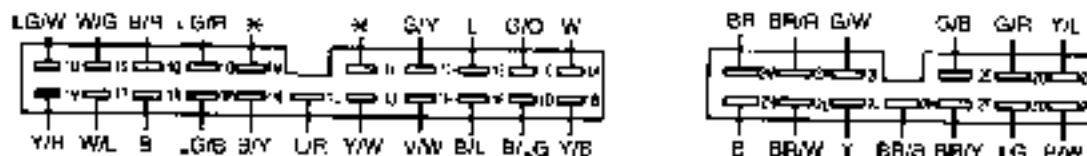
V<sub>B</sub>: Battery voltage

Terminal	Connected to	Voltage	Condition
1A (Output)	Oxygen sensor	0.3—0.7V	At idle
		More than 0.45V	During acceleration
		Less than 0.45V	During deceleration
1B (Input)	Self-diagnosis check connector	V <sub>B</sub>	Check connector; Not grounded
		0V	Check connector; Grounded
1C (Input)	Water temperature	Approx. 0.5V	Warm-up engine (Thermostat Open)
1D (Ground)	Water temperature, FGR position sensor, Vacuum sensor, Atmospheric pressure sensor, Intake air temperature	Less than 1.5V	—
		Approx. 1.3V	At idle
1E (Input)	Vacuum sensor	Approx. 4.0V	Engine stopped (Atmospheric pressure)
1F (Input)	EGR position sensor	Approx. 0.7V	At idle
		0.7—4.7V	During driving
1G (Power supply)	EGR position sensor, Vacuum sensor, Atmospheric pressure sensor	4.5—5.5V	—
1H (Input)	Atmospheric pressure sensor	Approx. 4V	Sea level
1J (Input)	Intake air temperature	Approx. 2.1V	At 20°C (68°F)
1L (Memory power)	Battery	V <sub>B</sub>	—
1N (Input)	Neutral and clutch switch	V <sub>B</sub>	In gear
		Less than 1.5V	In neutral or depress clutch pedal
		Less than 1.5V	In N or P range
1O (Input)	Inhibitor switch	0V	In other ranges
		V <sub>B</sub>	At idle
1P (Input)	Idle switch	Less than 1.5V	At more than 1,200 rpm with no load
1Q (Ground)	Idle switch	Less than 1.5V	—
		V <sub>B</sub>	Radiator coolant temp. above 17°C (63°F)
1Q (Input)	Water temperature switch	Less than 1.5V	Radiator coolant temp. below 17°C (63°F)
		Less than 1.5V	—
1R (Ground)	Engine ground	Less than 1.5V	—
1S (Output)	Coasting advance solenoid valve	V <sub>B</sub>	At idle
		Less than 1.5V	At 1,700—2,500 rpm during in gear deceleration
1T (Output)	Idle stop solenoid valve (A/E)	Less than 1.5V	At less than 1,000 rpm in R, D, 2, or 1 range
		V <sub>B</sub>	In N or P range or more than 1,100 rpm without A/C switch ON
1U (Output)	Malfunction indicator light	0V	light OFF
		Less than 1.5V	light ON
1V (Output)	Purge solenoid valve	V <sub>B</sub>	At idle
		Less than 1.5V	At 1,200 rpm with warmed-up engine
2A (Input)	Ignition coil negative terminal	0V	—
2B (Battery power)	Ignition switch (ON)	V <sub>B</sub>	Ignition switch ON
		0V	Ignition switch OFF
2C (Input)	Air conditioner magnetic clutch circuit	V <sub>B</sub>	Air conditioner ON
		0V	Air conditioner OFF
2D (Output)	Sew fuel cut solenoid valve	Less than 15V	Ignition switch ON
		Less than 1.5V	At idle
		V <sub>B</sub>	At 2,500 rpm or more during in gear deceleration

V<sub>B</sub>: Battery voltage

Terminal	Connected to	Voltage	Condition
2E (Output)	Self-Diagnosis Checker (Digital display)	V <sub>B</sub>	Buzzer: OFF
		Less than 1.5V	Buzzer: ON
		Code signal	When self-diagnosis check connector grounded
2F (Output)	Airfuel (A/F) ratio valve	Monitor reading: 1.5-3.8V (fluctuating) Actual voltage: 3.5- V <sub>B</sub> (fluctuating)	At idle
		0.1-1.4V (fluctuating or fixed)	During running
2H (Output)	Coasting clutch solenoid valve	V <sub>B</sub>	At idle
2I (Output)	Self-Diagnosis Checker (Monitor lamp)	Less than 1.5V	Monitor lamp: ON
		V <sub>B</sub>	Monitor lamp: OFF
2J (Output)	ACT solenoid valve	V <sub>B</sub>	At idle
		Less than 1.5V	At 7500 rpm or more, warmed up, no load
		V <sub>B</sub>	While cranking
		V <sub>B</sub>	During warm up
2K (Output)	Duty solenoid valve (Vent)	V <sub>B</sub>	At idle
		Voltage decreases (Green and red lights flash)	During acceleration
		V <sub>B</sub>	While cranking
2L (Output)	Duty solenoid valve (Vacuum)	V <sub>B</sub>	During warm up
		V <sub>B</sub>	At idle
		Voltage decreases (Green and red lights flash)	During acceleration
		V <sub>B</sub>	While cranking
2V (Output)	Idle-up solenoid valve (A/C)	Less than 1.5V	At idle (A/C ON)
2W (Ground)	Engine ground	V <sub>B</sub>	At 1,400 rpm or below (A/C ON)
		Less than 1.5V	

**Connectors**



29U3F-021

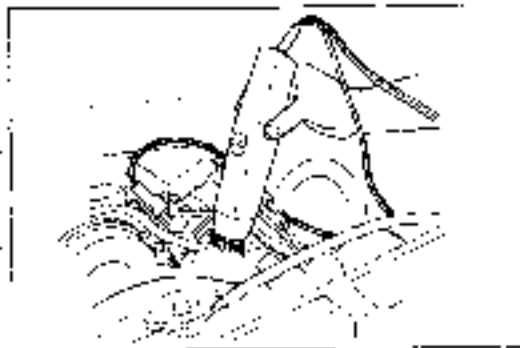
**Note**

**a) In-gear deceleration is as follows.**

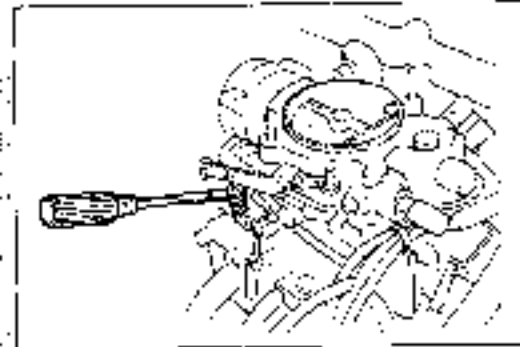
Vehicle with M/T ..... transmission in gear (not neutral), clutch pedal released, and throttle valve closed fully

Vehicle with A/T ..... transmission in gear (not P or N) and throttle valve closed fully

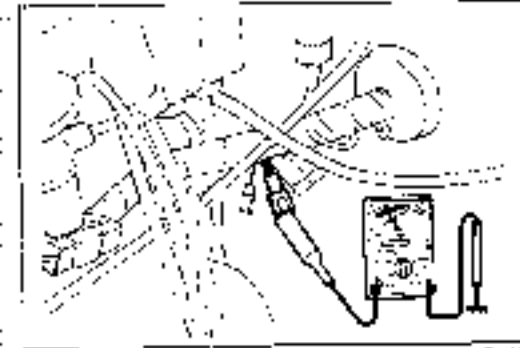
**b) When inspecting "2E" terminal voltage, connect the Self-Diagnosis checker.**



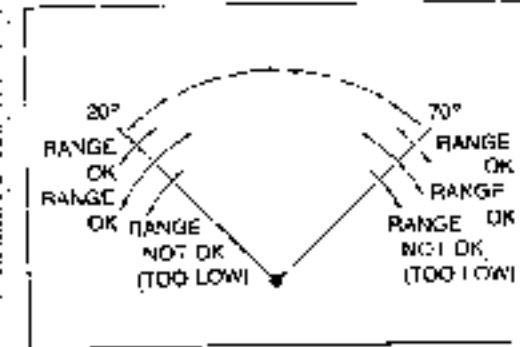
78UCAS-210



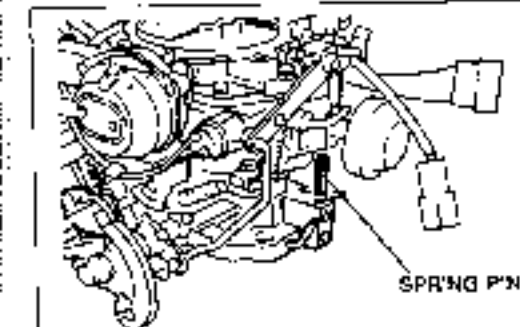
28J0-137



F3UKF-030



TB...019



78JMR-78

## IDLE ADJUSTMENT

### Caution

- Before adjusting the idle speed and idle mixture, verify that such things as ignition timing, spark plugs, and carburetor float level are all in normal operating condition.
- Turn off all lights and other unnecessary electrical loads.
- This adjustment must be done while the cooling fan motor is not operating.

### IDLE SPEED

- Connect a tachometer to the engine.
- Warm up the engine, and verify that the choke valve has fully opened.
- Check the idle speed. If necessary, turn throttle adjust screw and set the idle speed to specification.

### Idle speed:

800—850 (800  $\pm 5\%$ ) rpm in neutral or P range

### Caution

After adjusting the idle speed, check and adjust the dashpot.

### IDLE MIXTURE

#### Inspection

- Warm up the engine and run it at idle.
- Connect a dwellmeter (30 degree, 4 cylinder) to the air/fuel check connector (BR/Y).

- Check the idle mixture (duty) at the specified idle.

Idle mixture: 20°—70°

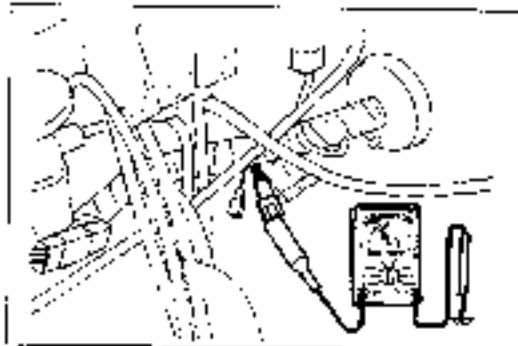
If the idle mixture is not as specified, check the feedback system.

### Adjustment

Adjustment of the idle mixture is normally unnecessary.

### Note

- To adjust the idle mixture, remove the carburetor and knock out the spring pin. Reinstall the carburetor.
- Install the air cleaner and verify that the idle compensator is closed.
- Verify that all vacuum hoses are correctly connected.



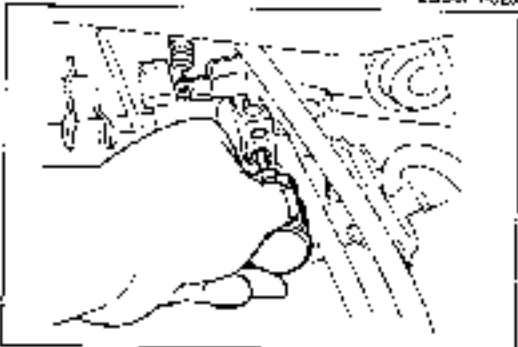
25JCF1-02E

- 1 Warm up the engine and run it at idle.

**Idle speed:**

**800—850 (800  $\pm$  5%) rpm in neutral or P range**

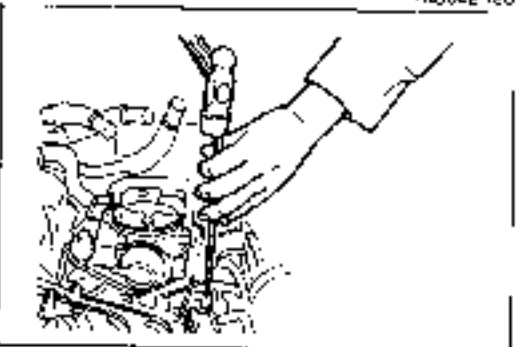
- 2 Connect a tachometer to the engine.
- 3 Connect a dwellmeter (90 degrees, 4 cylinders) to the air/fuel check connector **(BR/Y)**.



7RUC2E 180

- 4 Adjust the idle mixture (duty) to specification by turning the mixture adjust screw.

**Specification: 27°—45°**



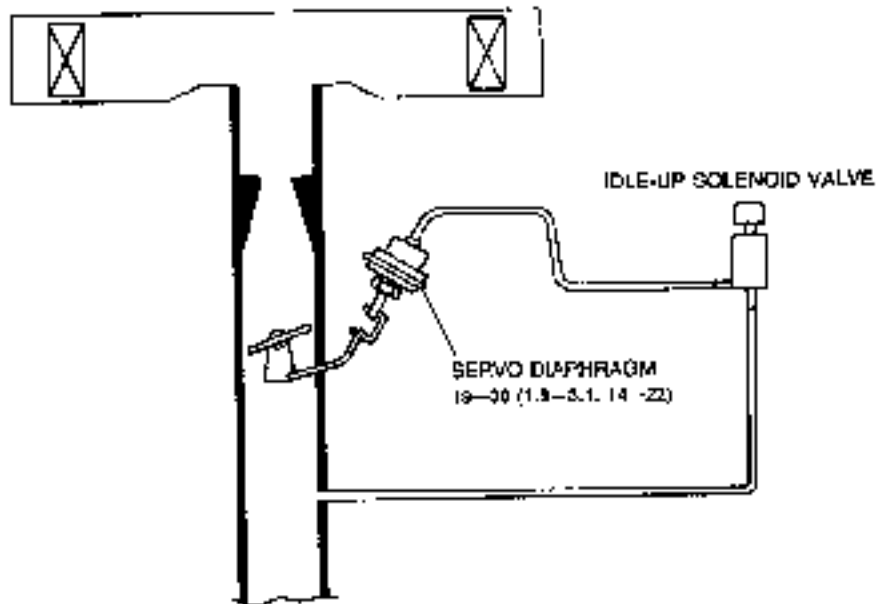
6BU04X 120

5. After adjustment, tap in the spring pin as shown.



## IDLE-UP SYSTEM

## IDLE-UP FOR AUTOMATIC TRANSMISSION (A/T) OR AIR CONDITIONER (A/C)



N- (m-lg, f-b)

73U14B-18

**Adjustment**

1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum hose from the servo diaphragm.
4. Connect the intake manifold vacuum directly to the servo diaphragm, and verify that the engine speed is as specified.

**Specification:**

920—970 rpm (A/T)

1,300—1,500 rpm (A/C)

**Caution**

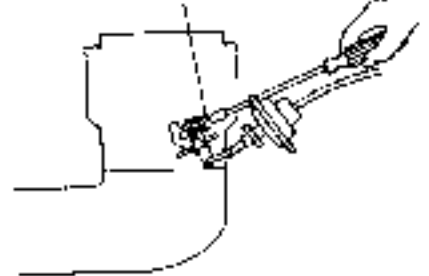
All accessories should be OFF.

5. If it is not, turn the adjust. screw to adjust.



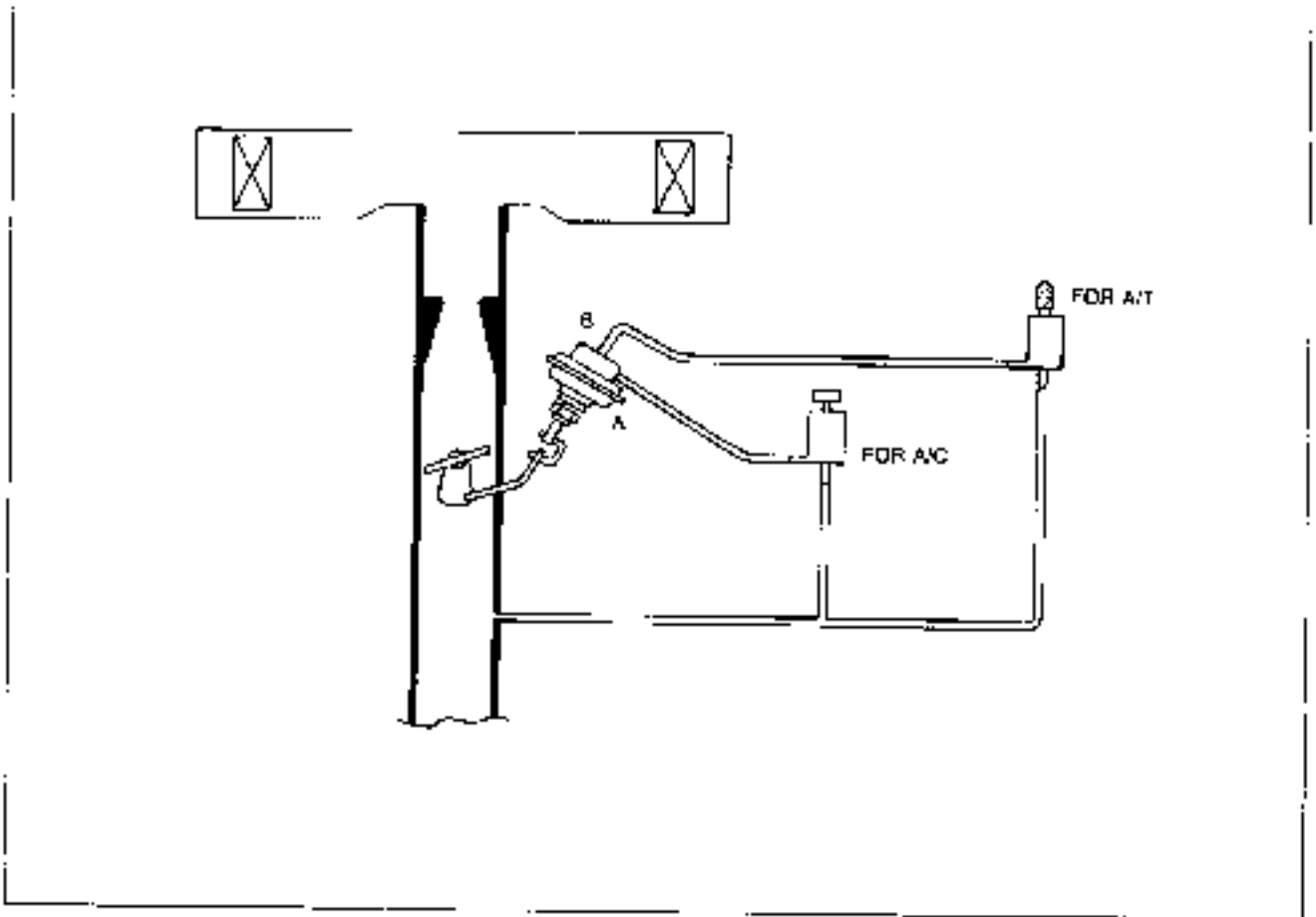
73U14B-18

ADJUST SCREW

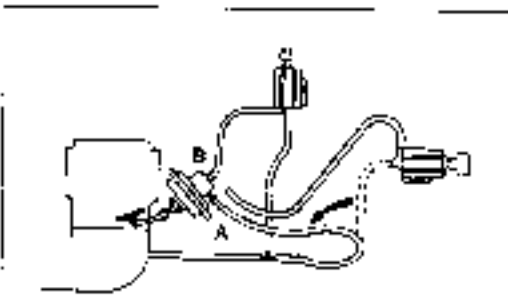


73U14B-18

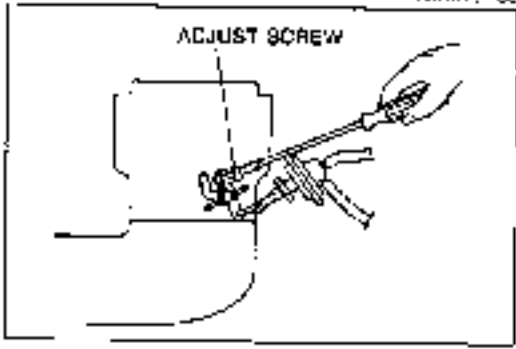
**IDLE-UP FOR AUTOMATIC TRANSMISSION (A/T) WITH AIR CONDITIONER (A/C)  
(DUAL SERVO DIAPHRAGM)**



730246-104



730246-105



730246-106

**Adjustment**

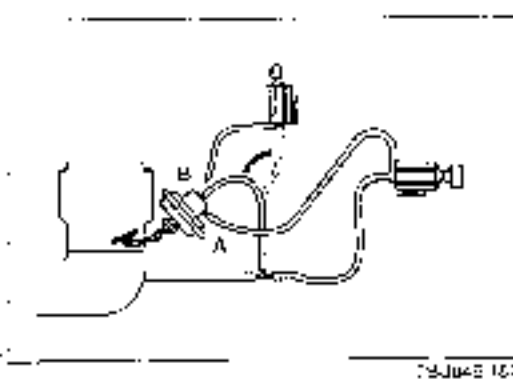
1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum hose from port (A).
4. Connect the intake manifold vacuum directly to port (A), and verify that the engine speed is as specified.

**Specification: 1,300—1,500 rpm**

**Caution**

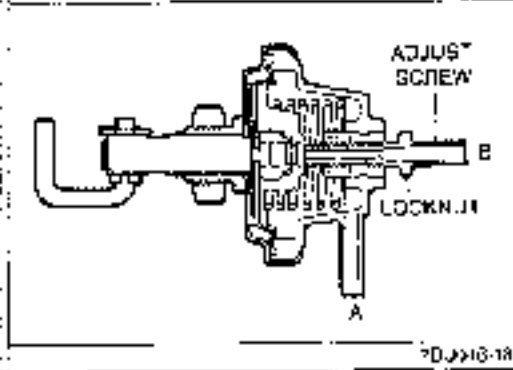
**All accessories should be OFF.**

5. If it is not, turn the adjust screw to adjust.



6. Reconnect the proper vacuum hose to port (A).
7. Disconnect the vacuum hose from port (B).
8. Connect the intake manifold vacuum directly to port (B).
9. Verify that the engine speed is as specified.

**Specification: 920—970 rpm**

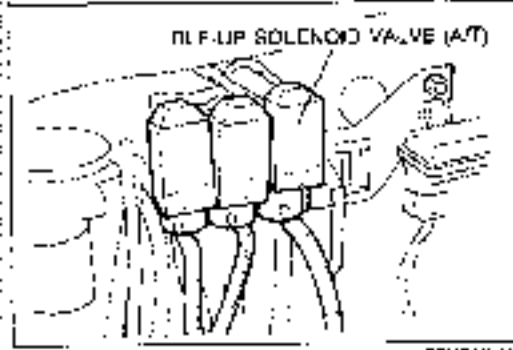


10. If it is not, disconnect the vacuum hose, and turn the adjust screw on the diaphragm head to adjust.

**Note**

Engine speed is increased when the adjust screw is turned counterclockwise and decreased when the adjust screw is turned clockwise.

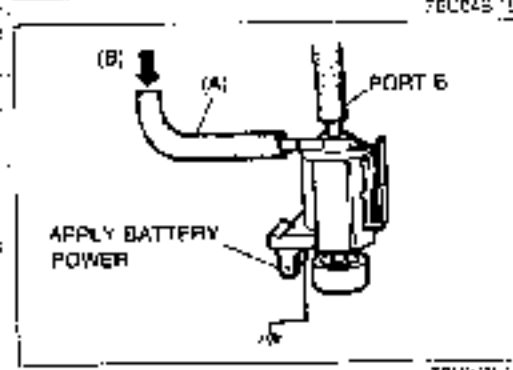
11. Reconnect the intake manifold vacuum to port (B), and recheck the engine speed.
12. When correct, reconnect the proper vacuum hose to port (B).



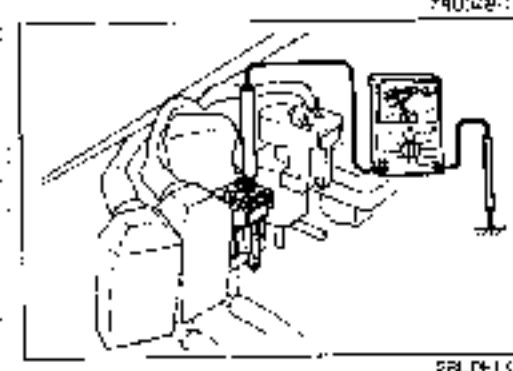
**IDLE-UP SOLENOID VALVE**

**Inspection**

1. Remove the idle-up solenoid valve.



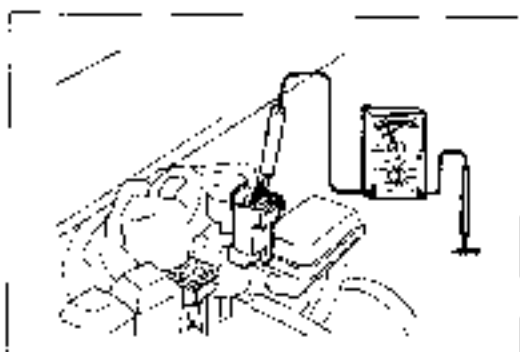
2. Connect hoses to the valve as shown in the figure.
3. Blow air through the valve from hose (A), and verify that air comes out of the valve air filter.
4. Apply battery power, and ground the valve with jumper wires.
5. Blow air through the valve from hose (A), and verify that air comes out of port (B).
6. If a problem is found, replace the solenoid valve with a new one.



**Inspection of Signal (for A/T)**

1. Run the engine at idle.
2. Connect a voltmeter to terminals (W/L) of the idle-up solenoid valve for A/T as shown.
3. Apply the parking brake and the service brake.
4. Check the voltage while moving the shift lever.

Voltage	Condition
Less than 1.5V	D range
Battery voltage	N range



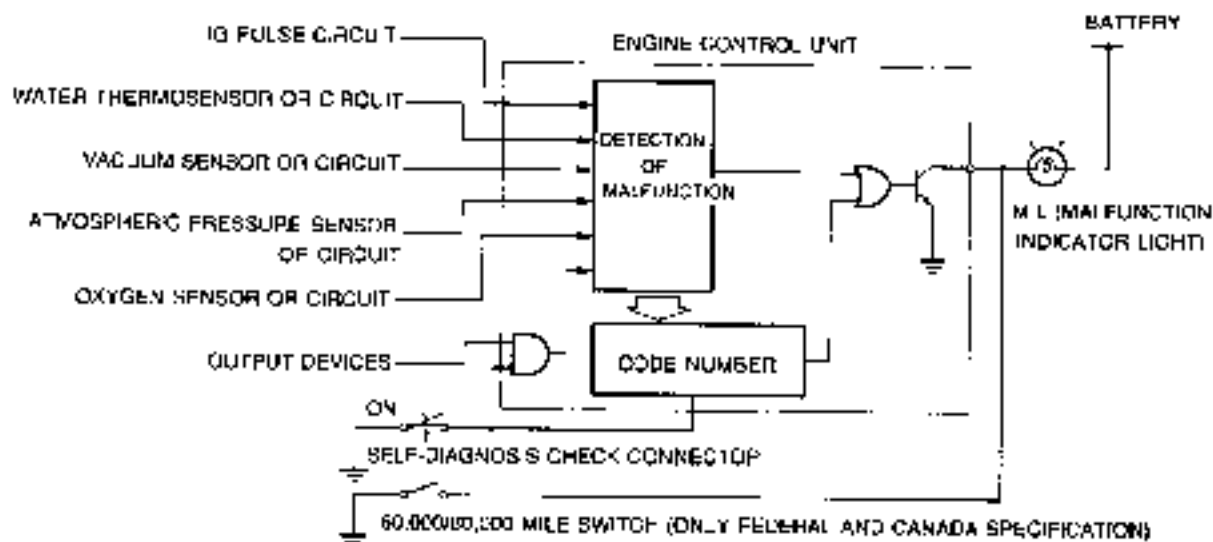
CP-251-026

**Inspection of Signal (for A/C)**

1. Run the engine at idle.
2. Connect a voltmeter to terminal (B/F) of the idle-up solenoid valve for A/C as shown.
3. Check voltage in the following conditions:

Voltage	Air conditioner
Less than 1.5V	ON
Battery voltage	OFF

**MALFUNCTION INDICATOR LIGHT (MIL)**



3BU0F-092

The MIL (Malfunction Indicator Light) is equipped on California and Federal specification vehicles, and is installed in the instrument panel.

If an input device malfunctions, the MIL stays ON (without Self-diagnosis check connector grounded), or it flashes to indicate a warning code number for input and output device malfunctions, (with Self-diagnosis check connector grounded).

On Federal specification vehicles, the MIL also comes ON and stays on 60,000 miles and 80,000 miles to indicate that maintenance of the engine control system is required. At this time, the MIL does not indicate warning code numbers even if the Self-diagnosis check connector is grounded.

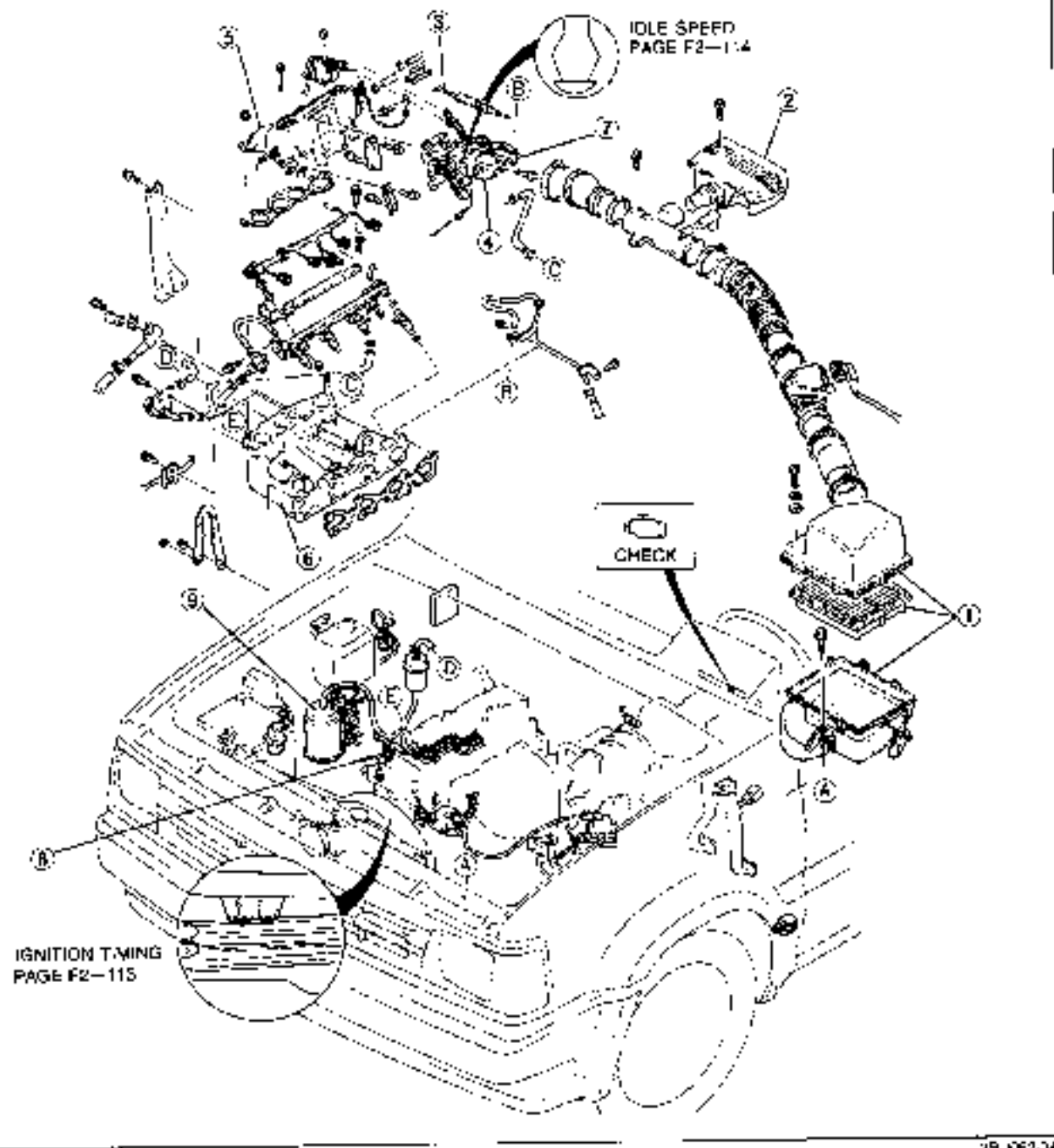
**Note**

- a) When the MIL comes ON, inspect, adjust, and replace the engine control system and parts. (Refer to Scheduled Maintenance)
- b) Refer to Section T for how to reset the MIL after 60,000 miles and 80,000 miles.



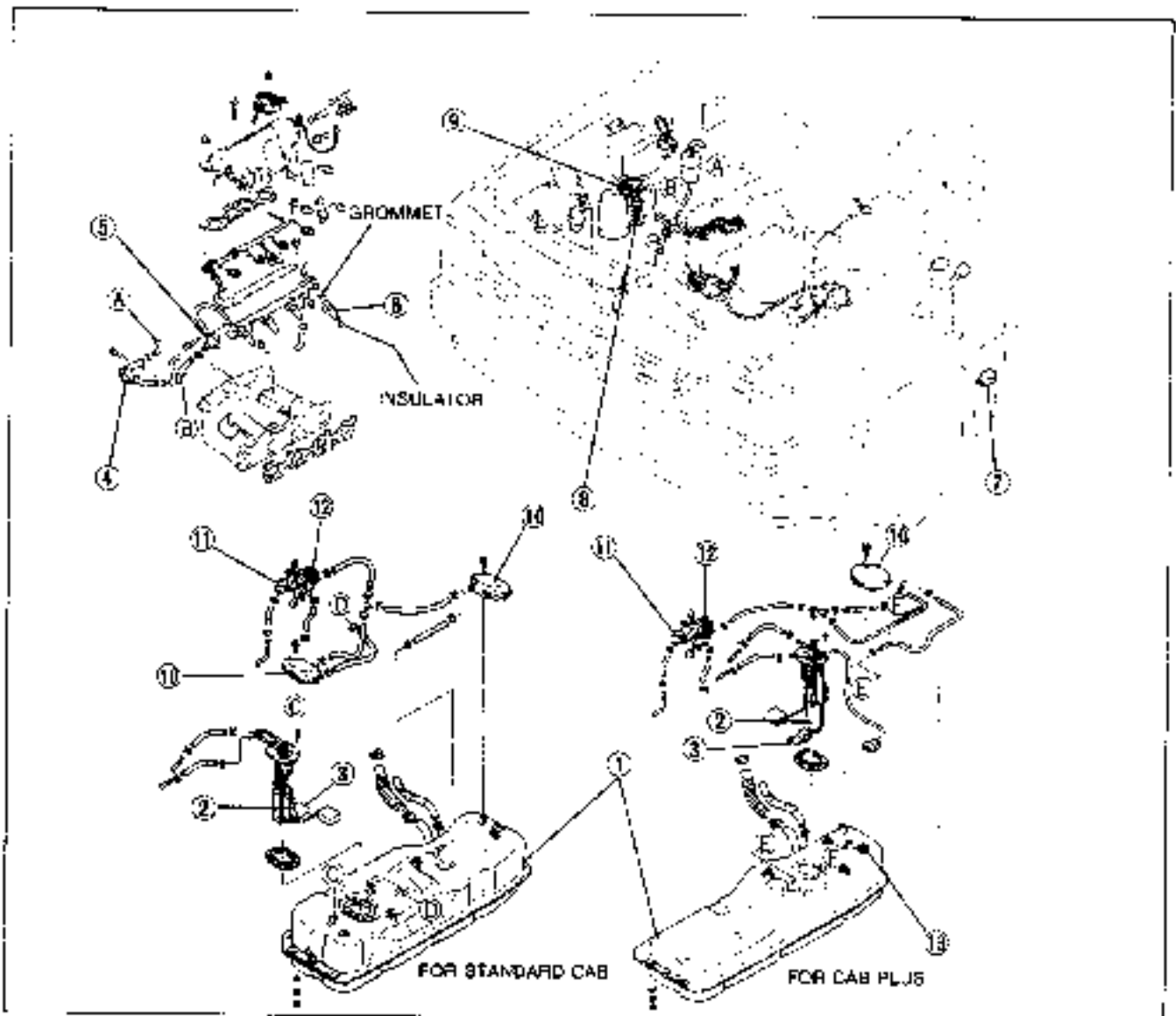
# FUEL AND EMISSION CONTROL SYSTEMS (EGI)

<b>INDEX</b> .....	F2- 2	<b>PRESSURE REGULATOR</b>	
<b>OUTLINE</b> .....	F2- 6	<b>CONTROL (PRC) SYSTEM</b> .....	F2-159
SYSTEM DIAGRAM .....	F2- 6	DESCRIPTION .....	F2-159
VACUUM HOSE ROUTING		SOLENOID VALVE (PRC) .....	F2-160
DIAGRAM .....	F2- 7	<b>EXHAUST SYSTEM</b> .....	F2-161
WIRING DIAGRAM .....	F2- 8	COMPONENTS .....	F2-161
SPECIFICATIONS .....	F2- 15	<b>OUTLINE OF EMISSION</b>	
COMPONENT DESCRIPTIONS .....	F2- 16	<b>CONTROL SYSTEM</b> .....	F2-162
<b>TROUBLESHOOTING GUIDE</b> .....	F2- 19	STRUCTURAL VIEW .....	F2-162
RELATIONSHIP CHART .....	F2- 19	<b>POSITIVE CRANKCASE</b>	
ENGINE CONTROL OPERATION		<b>VENTILATION (PCV) SYSTEM</b> .....	F2-163
CHART .....	F2- 20	DESCRIPTION .....	F2-163
HOW TO USE THIS SECTION .....	F2- 24	PCV VALVE .....	F2-163
DIAGNOSTIC INDEX.....	F2- 26	<b>EVAPORATIVE EMISSION</b>	
SYMPTOM TROUBLESHOOTING..	F2- 28	<b>CONTROL SYSTEM</b> .....	F2-164
<b>ENGINE TUNE-UP</b> .....	F2-116	DESCRIPTION .....	F2-164
BASIC INSPECTION .....	F2-116	SOLENOID VALVE	
ADJUSTMENT .....	F2-117	(PURGE CONTROL).....	F2-165
<b>TROUBLESHOOTING WITH SST</b> ....	F2-119	SEPARATOR .....	F2-165
PREPARATION .....	F2-119	TWO-WAY CHECK VALVE .....	F2-166
INSPECTION PROCEDURE.....	F2-120	CHECK AND-CUT VALVE .....	F2-166
AFTER-REPAIR PROCEDURE.....	F2-120	CHARCOAL CANISTER.....	F2-167
PRINCIPLE OF CODE CYCLE .....	F2-121	FUEL VAPOR VALVE.....	F2-167
CODE NUMBERS.....	F2-122	<b>CATALYTIC CONVERTER SYSTEM</b> F2-168	
<b>SWITCH MONITOR FUNCTION</b> .....	F2-133	DESCRIPTION .....	F2-168
PREPARATION .....	F2-133	CATALYTIC CONVERTER .....	F2-168
INSPECTION PROCEDURE.....	F2-134	<b>A/C CUT-OFF SYSTEM</b> .....	F2-169
<b>INTAKE AIR SYSTEM</b> .....	F2-137	DESCRIPTION .....	F2-169
STRUCTURAL VIEW .....	F2-137	INSPECTION .....	F2-170
THROTTLE BODY .....	F2-138	<b>BURN-OFF CONTROL SYSTEM</b> .....	F2-171
ACCELERATOR CABLE .....	F2-139	DESCRIPTION .....	F2-171
DYNAMIC CHAMBER .....	F2-139	INSPECTION .....	F2-172
INTAKE MANIFOLD.....	F2-140	<b>CONTROL SYSTEM</b> .....	F2-173
<b>IDLE SPEED CONTROL (ISC)</b>		PREPARATION .....	F2-173
<b>SYSTEM</b> .....	F2-141	STRUCTURAL VIEW .....	F2-174
DESCRIPTION .....	F2-141	ENGINE CONTROL UNIT .....	F2-175
BAC VALVE .....	F2-142	AIRFLOW SENSOR.....	F2-179
<b>FUEL SYSTEM</b> .....	F2-143	WATER THERMOSENSOR .....	F2-179
STRUCTURAL VIEW .....	F2-143	INTAKE AIR THERMOSENSOR.....	F2-180
PRECAUTION .....	F2-144	THROTTLE SENSOR.....	F2-181
SYSTEM INSPECTION.....	F2-145	OXYGEN SENSOR .....	F2-182
FUEL TANK .....	F2-147	IDLE SWITCH.....	F2-183
FUEL FILTER .....	F2-149	MAIN RELAY.....	F2-184
FUEL PUMP.....	F2-150	CLUTCH SWITCH .....	F2-184
CIRCUIT OPENING RELAY.....	F2-153	NEUTRAL SWITCH.....	F2-184
PRESSURE REGULATOR .....	F2-154	P/S PRESSURE SWITCH .....	F2-185
PULSATION DAMPER.....	F2-155	MALFUNCTION INDICATOR LAMP	
INJECTOR .....	F2-156	(MIL) .....	F2-186



- 1. Air cleaner  
Inspection and Replacement... page F2-137
- 2. Resonance chamber (GE)  
Inspection and Replacement... page F2-137
- 3. Accelerator cable  
Inspection and Replacement... page F2-139
- 4. Throttle body  
Removal and Inspection..... page F2-138  
Installation..... page F2-138
- 5. Dynamic chamber  
Inspection..... page F2-137  
Removal and Installation..... page F2-139

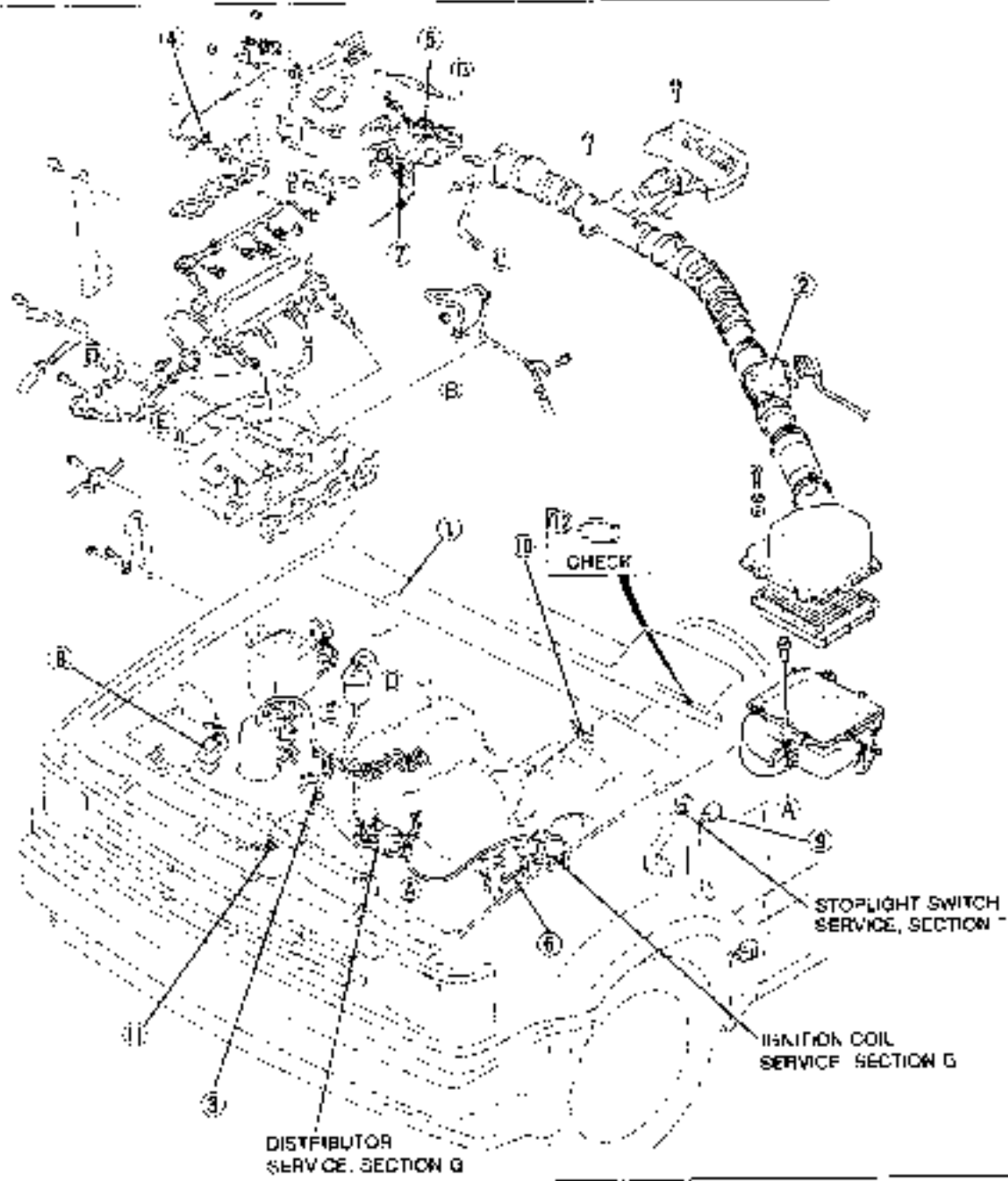
- 6. Intake manifold  
Inspection..... page F2-137  
Removal and Installation..... page F2-140
- 7. BAC valve  
Inspection, Removal,  
and Installation..... page F2-142
- 8. PCV valve  
Inspection..... page F2-163
- 9. Charcoal canister  
Inspection and Replacement... page F2-167



2B.JCF2-M7

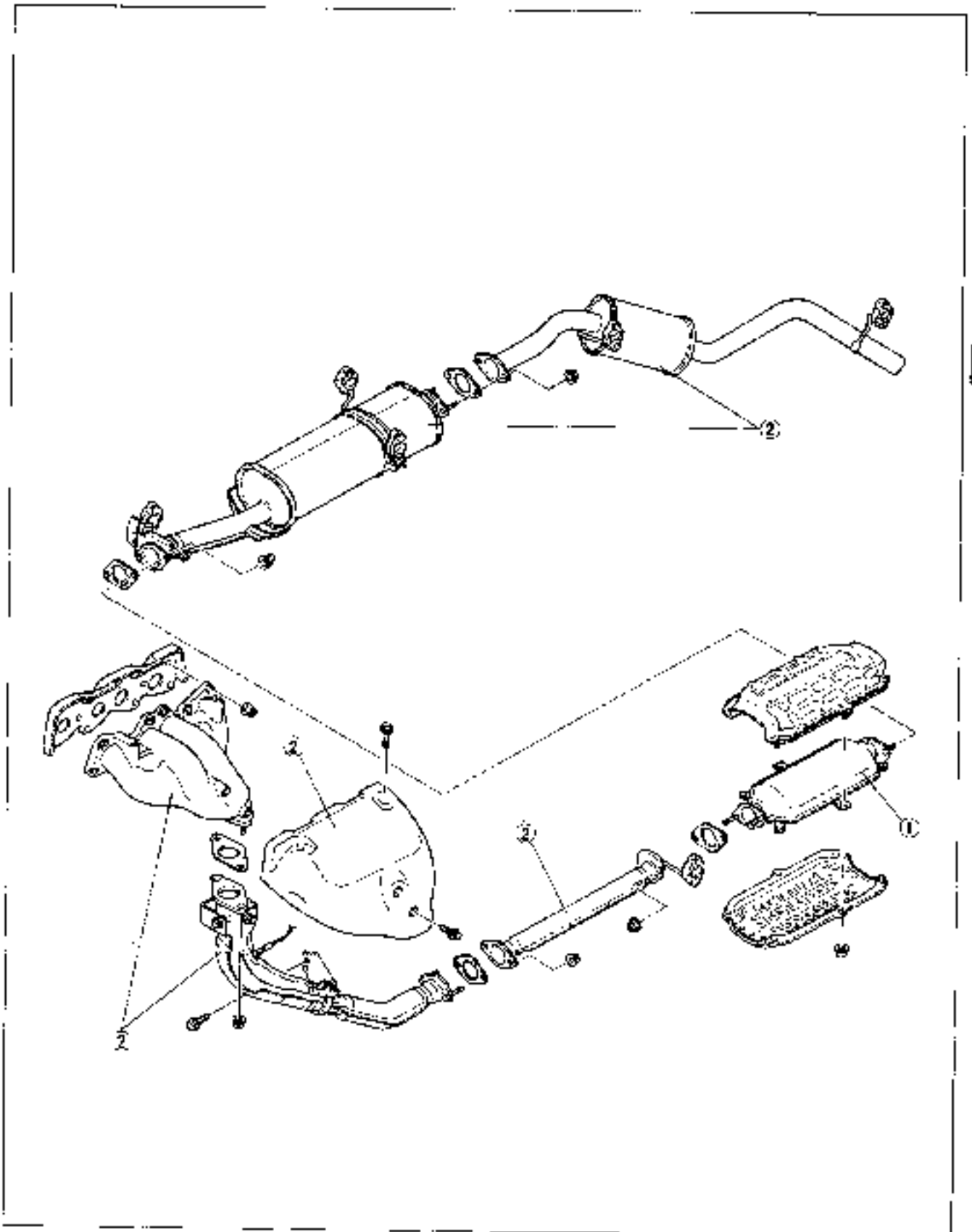
- |  |   |
|--|---|
| 1. Fuel tank<br>Inspection and Removal..... page F2-147<br>Installation . . . . . page F2-148                                  | 7. Circuit-opening relay<br>Inspection, Removal,<br>and Installation..... page F2-153 |
| 2. Fuel pump<br>Inspection..... page F2-150<br>Replacement..... page F2-152  | 8. Solenoid valve (PRC)<br>Inspection (on-vehicle)..... page F2-160                   |
| 3. Fuel filter<br>Replacement:<br>(high-pressure side)..... page F2-149<br>Replacement<br>(low pressure side)..... page F2-149 | 9. Solenoid valve (purge control)<br>Inspection (on-vehicle)..... page F2-165         |
| 4. Pulsator/damper<br>Inspection, Removal,<br>and Installation..... page F2-155  | 10. Separator<br>Inspection and Replacement.. page F2-165                             |
| 5. Pressure regulator<br>Inspection..... page F2-154<br>Replacement..... page F2-155   | 11. Two-way check valve<br>Inspection and Replacement.. page F2-166                   |
| 6. Injector<br>Removal..... page F2-156<br>Inspection..... page F2-157<br>Installation..... page F2-156                        | 12. Check-and-cut valve<br>Inspection and Replacement page F2-166                     |
|  | 13. Fuel vapor valve<br>Inspection and Replacement.. page F2-143                      |





2J002045

1. Engine control unit Inspection .....	page F2-175	7. Idle switch Inspection .....	page F2-183
2. Airflow sensor Inspection and Replacement .....	page F2-179	8. Main relay Inspection .....	page F2-184
3. Water thermosensor Removal and Inspection .....	page F2-179	9. Clutch switch Inspection .....	page F2-184
Installation .....	page F2-180	10. Neutral switch M/T Inspection and Replacement .....	page F2-184
4. Intake air thermosensor Inspection and Replacement .....	page F2-180	11. P/S Pressure switch Inspection and Replacement .....	page F2-185
5. Throttle sensor Inspection and Adjustment .....	page F2-181	12. Malfunction Indicator Lamp (MIL) How to reset MIL .....	page F2-187
6. Oxygen sensor Inspection .....	page F2-182		
Replacement .....	page F2-183		



F2

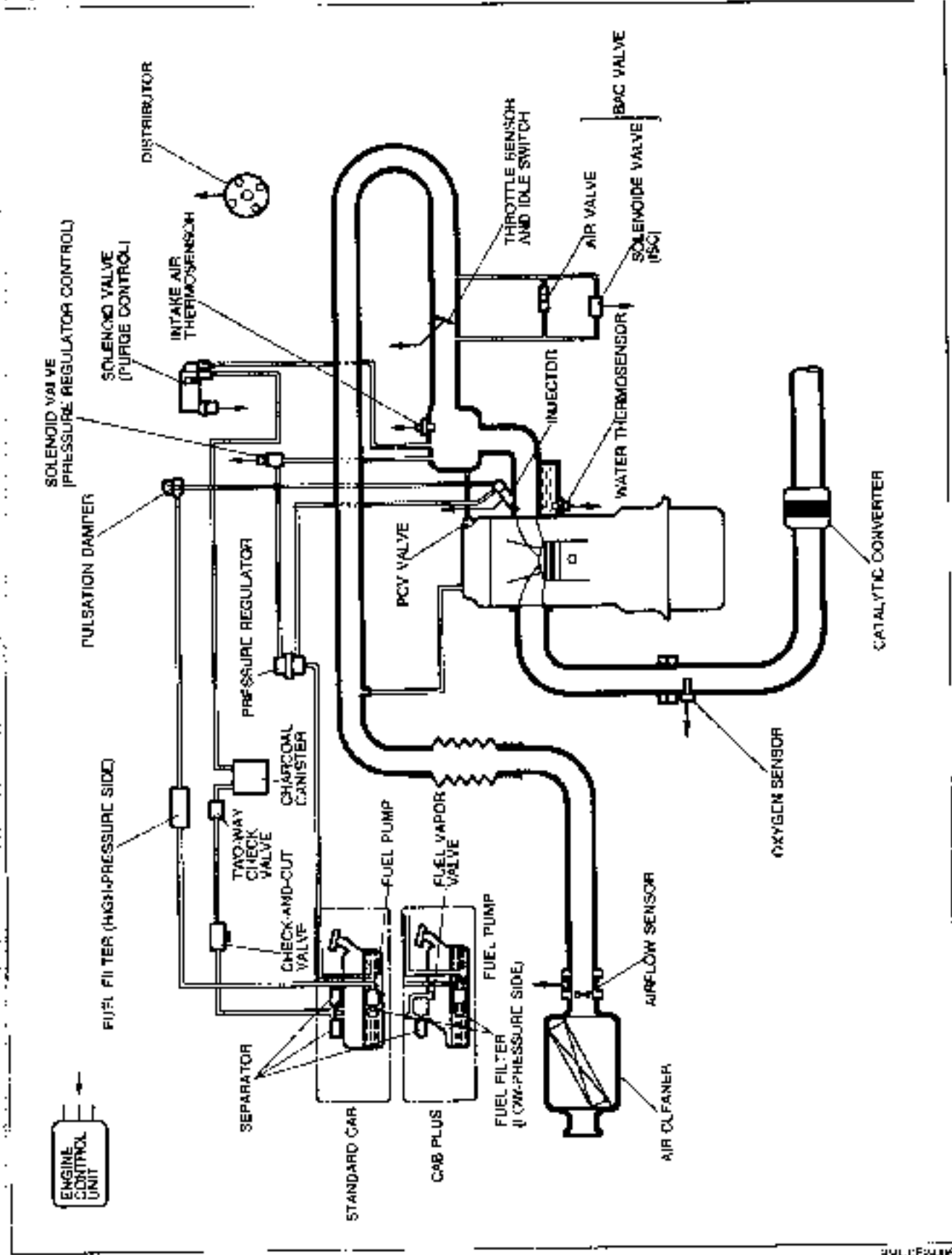
1. Catalytic converter  
 Inspection and Replacement . . . page F2-168

2. Exhaust components  
 Removal, Inspection, and  
 Installation . . . . . page F2-161

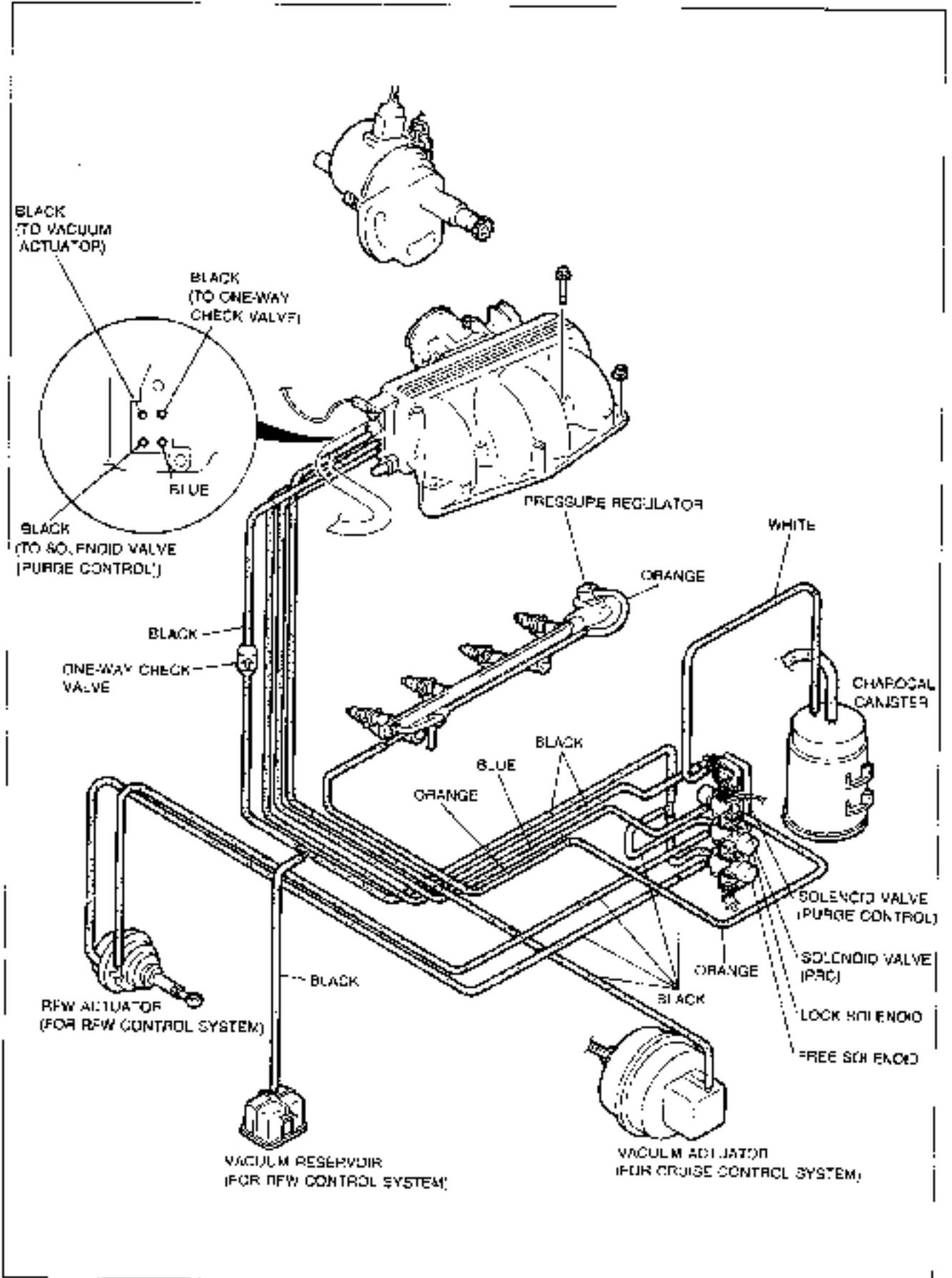
28.02 204c

OUTLINE

SYSTEM DIAGRAM



VACUUM HOSE ROUTING DIAGRAM

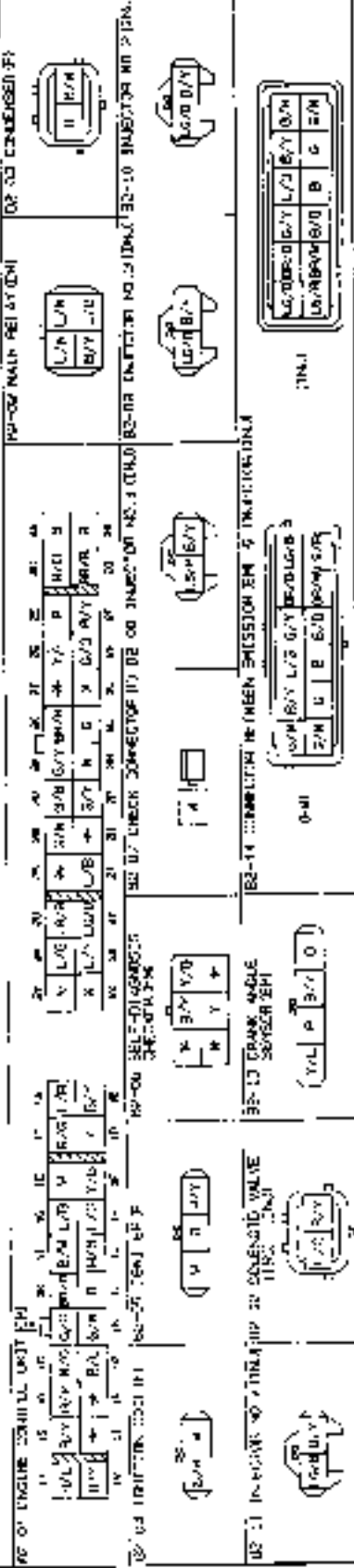
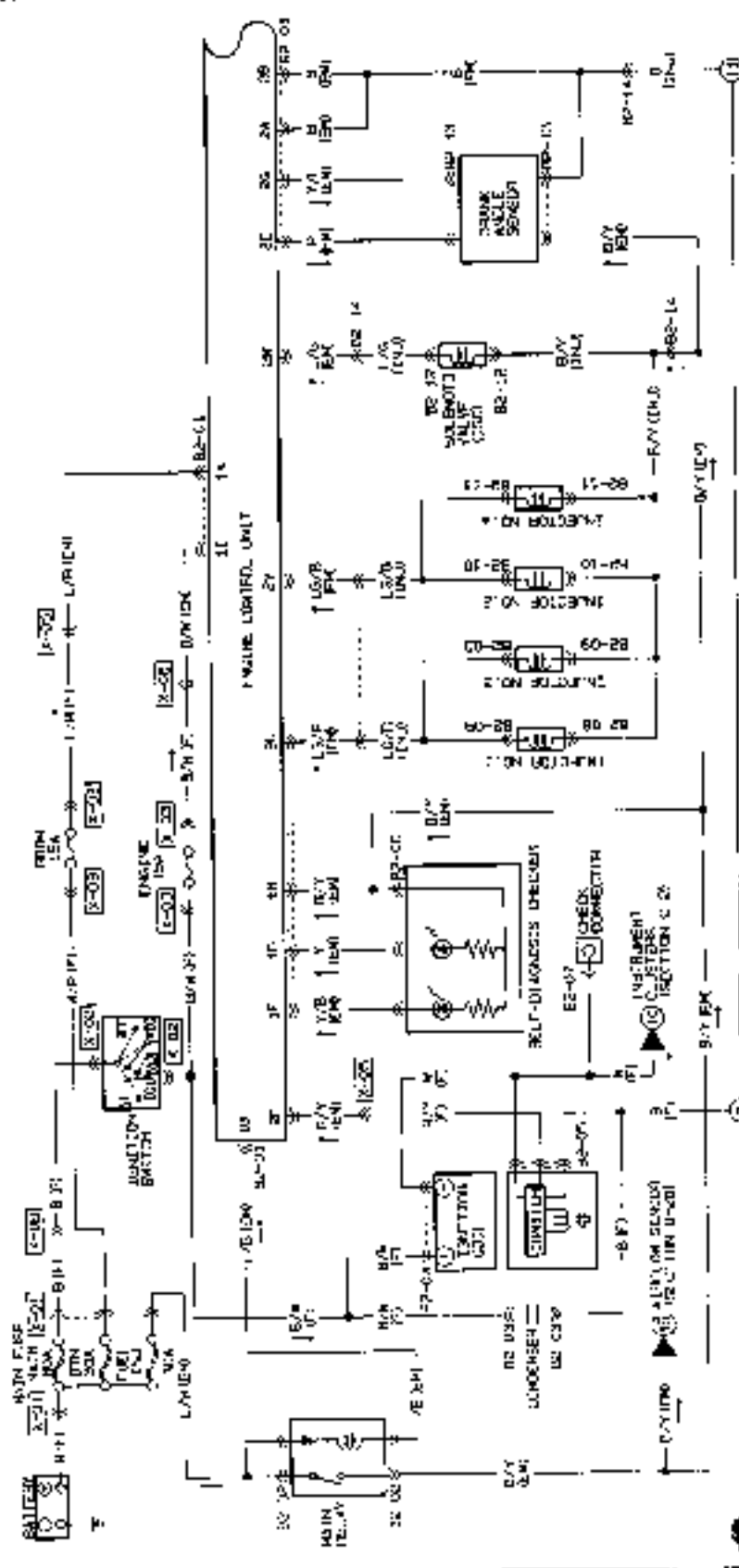


F2

WIRING DIAGRAM

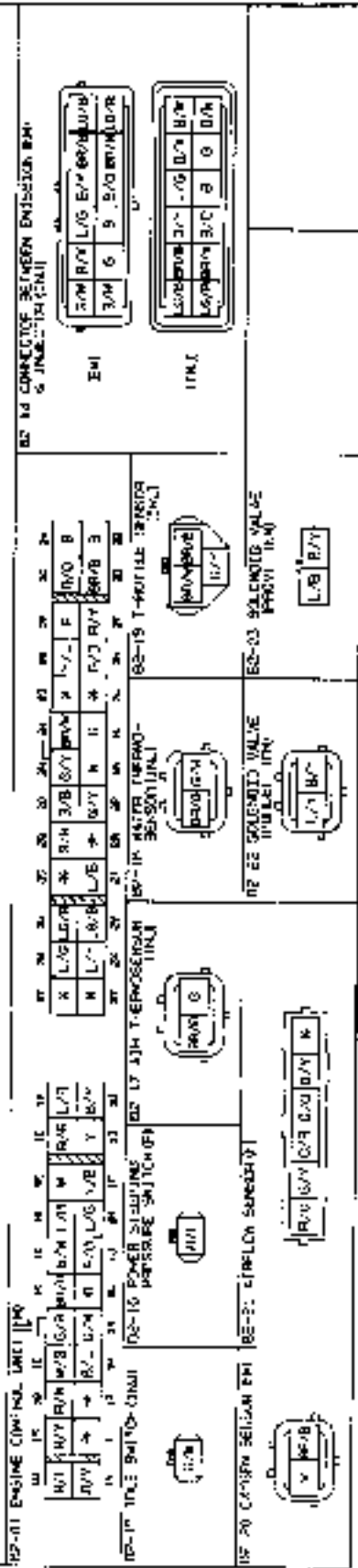
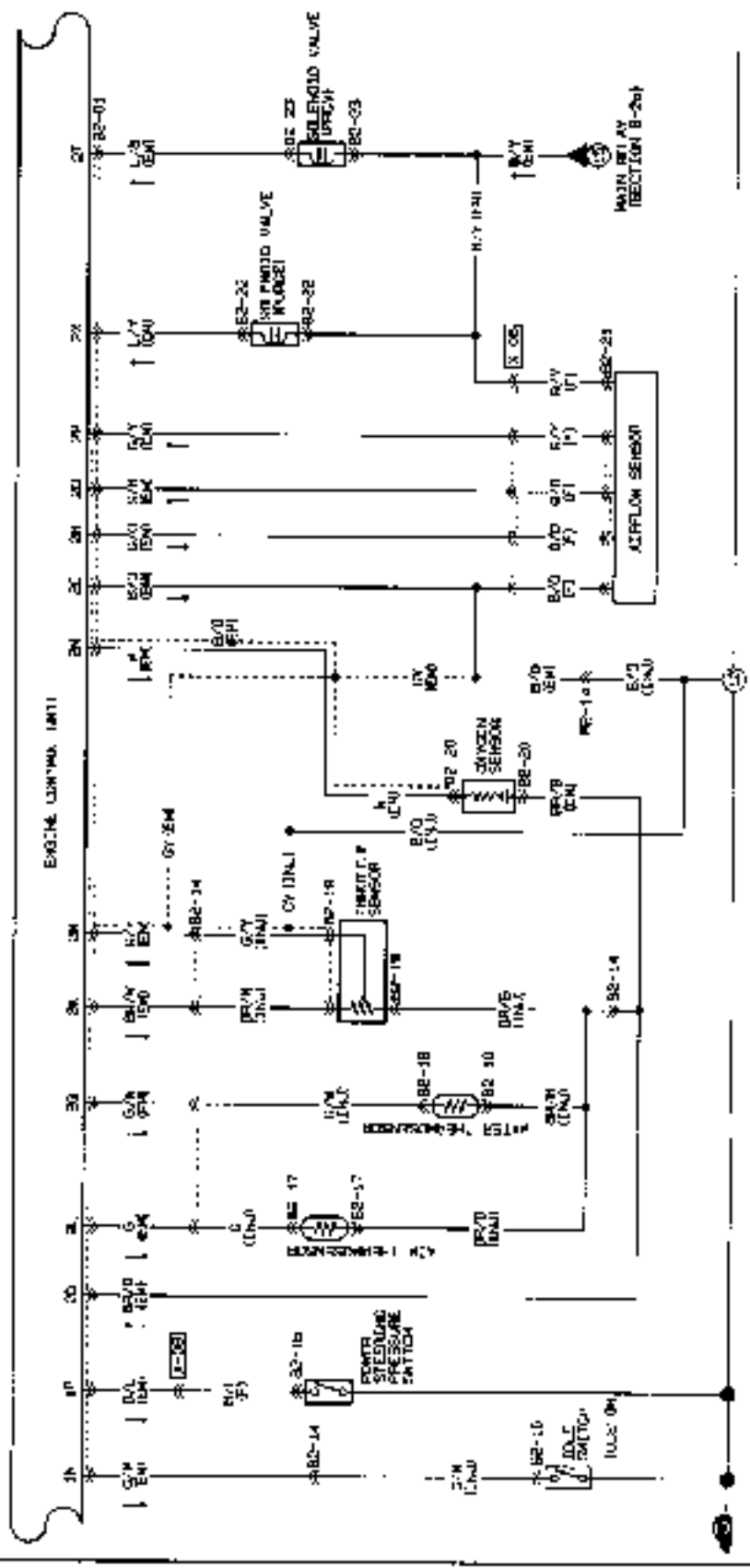
18-28

2 PLUGS ■ IGNITION SYSTEM ■ ENGINE CONTROL SYSTEM



2.21: F01 ■ ENGINE CONTROL SYSTEM

D-20

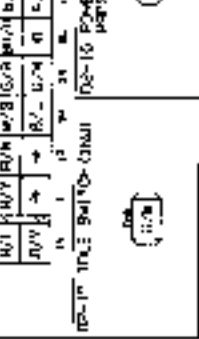
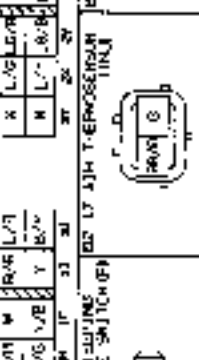
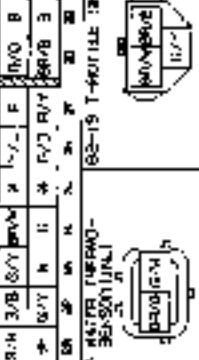
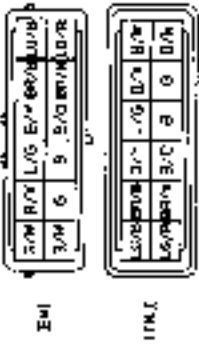


8B-19 WATER THERMOSTAT SENSOR UNIT

8B-22 SOLENOID VALVE UNIT

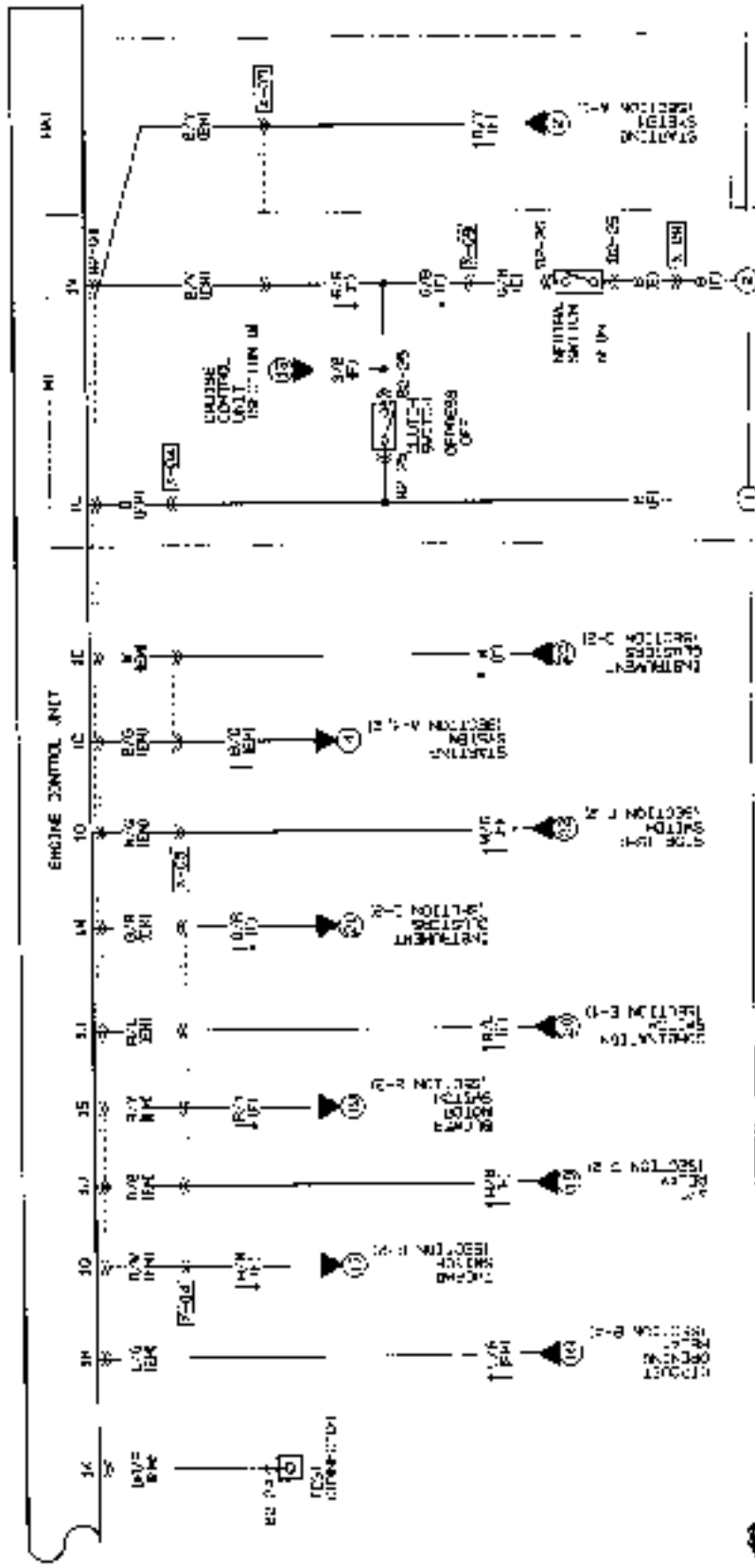
8B-23 SOLENOID VALVE UNIT

8B-01 ENGINE CONTROL UNIT



B-20

2. 2L: EGI • ENGINE CONTROL SYSTEM

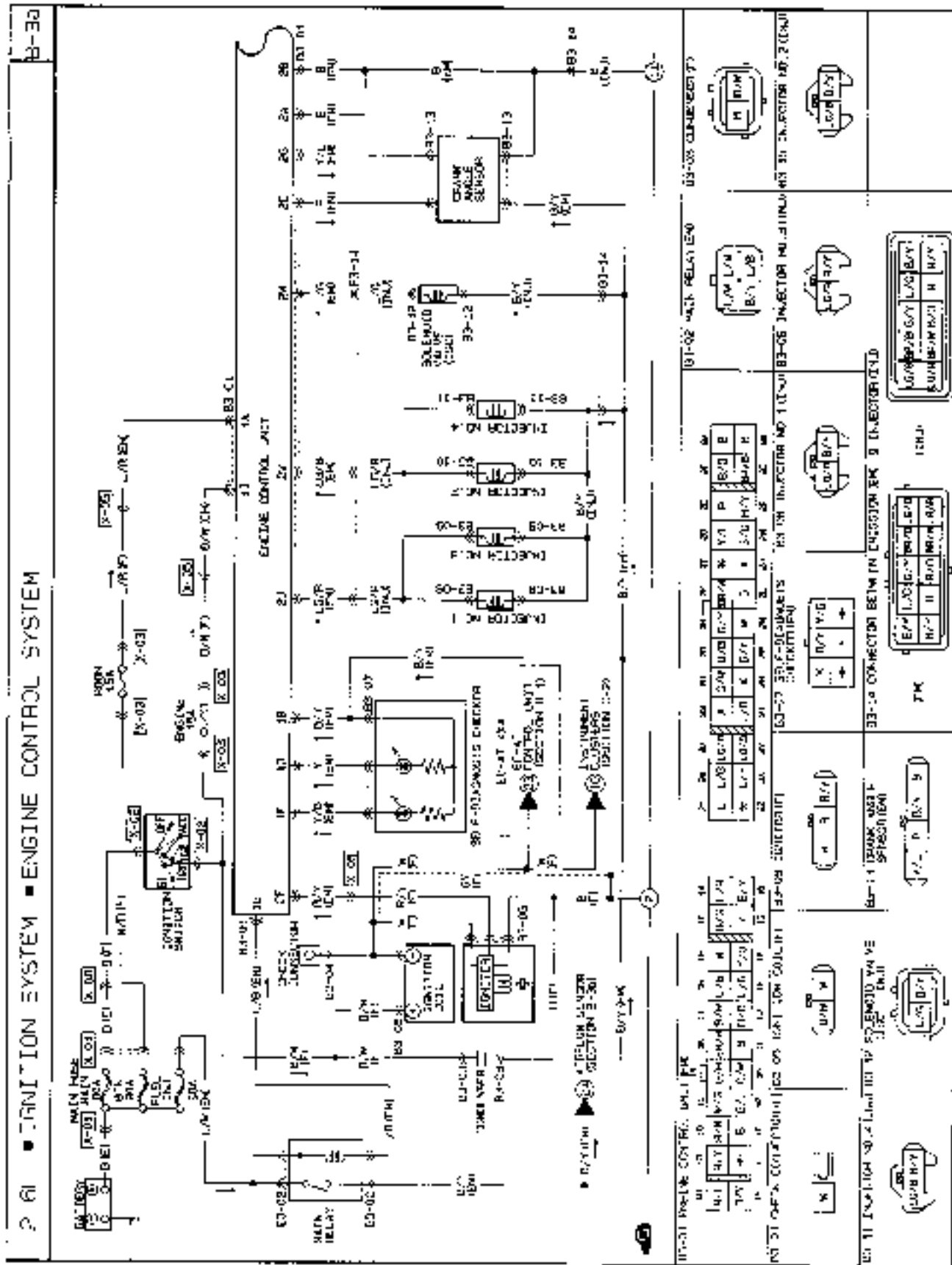


DO 24 TEST CONNECTIONS TO CLUTCH SWITC...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

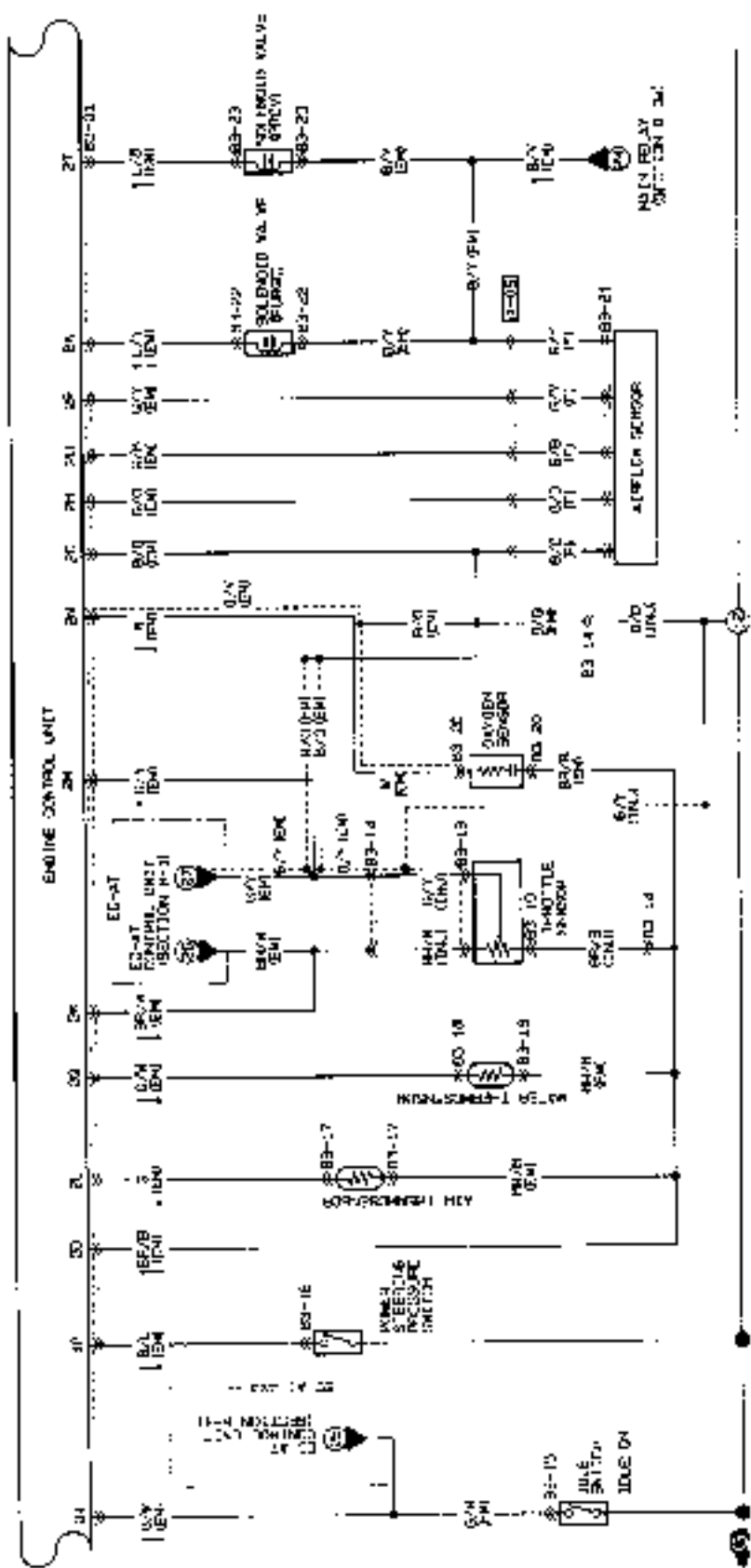
DO 24 TEST CONNECTIONS TO CLUTCH SWITC...





DE-F

2.5L ■ ENGINE CONTROL SYSTEM



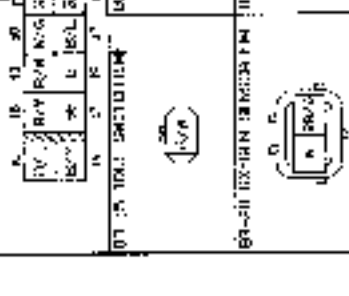
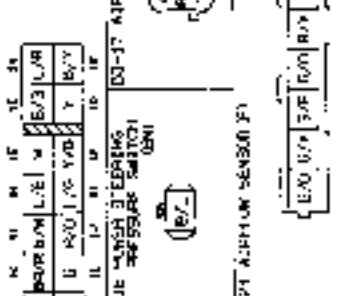
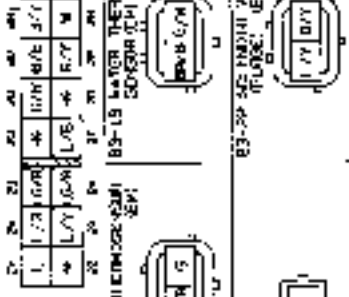
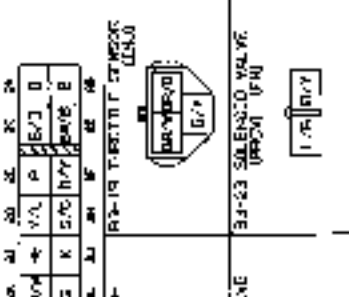
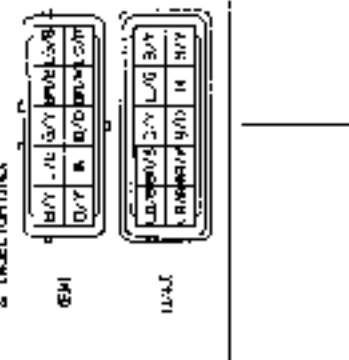
83-24 CONNECTOR BETWEEN SECTION 84 & UNCLE TOM'S

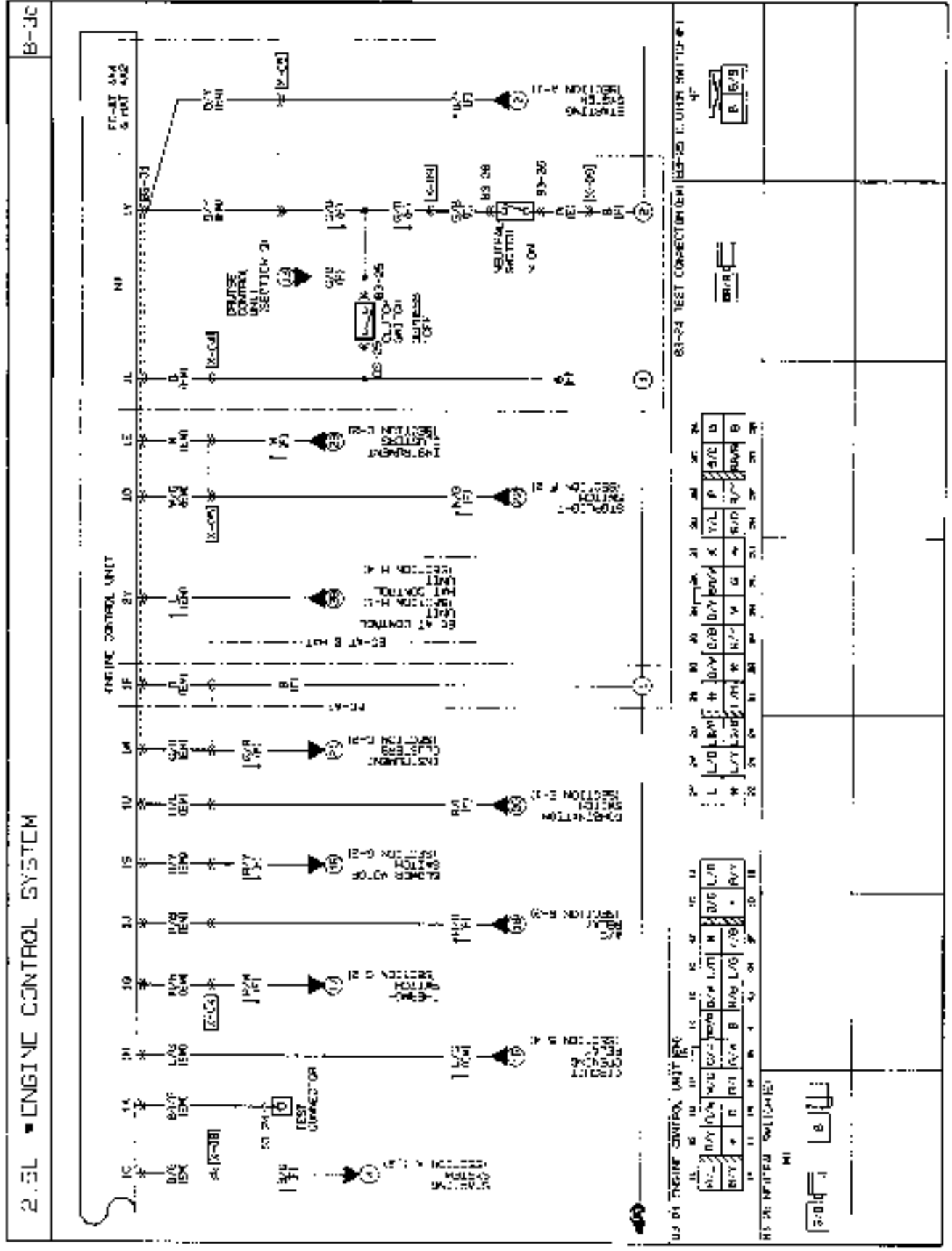
83-19 THROTTLE POSITION SENSOR

83-18 WATER TEMPERATURE SENSOR

83-17 AIR TEMPERATURE SENSOR

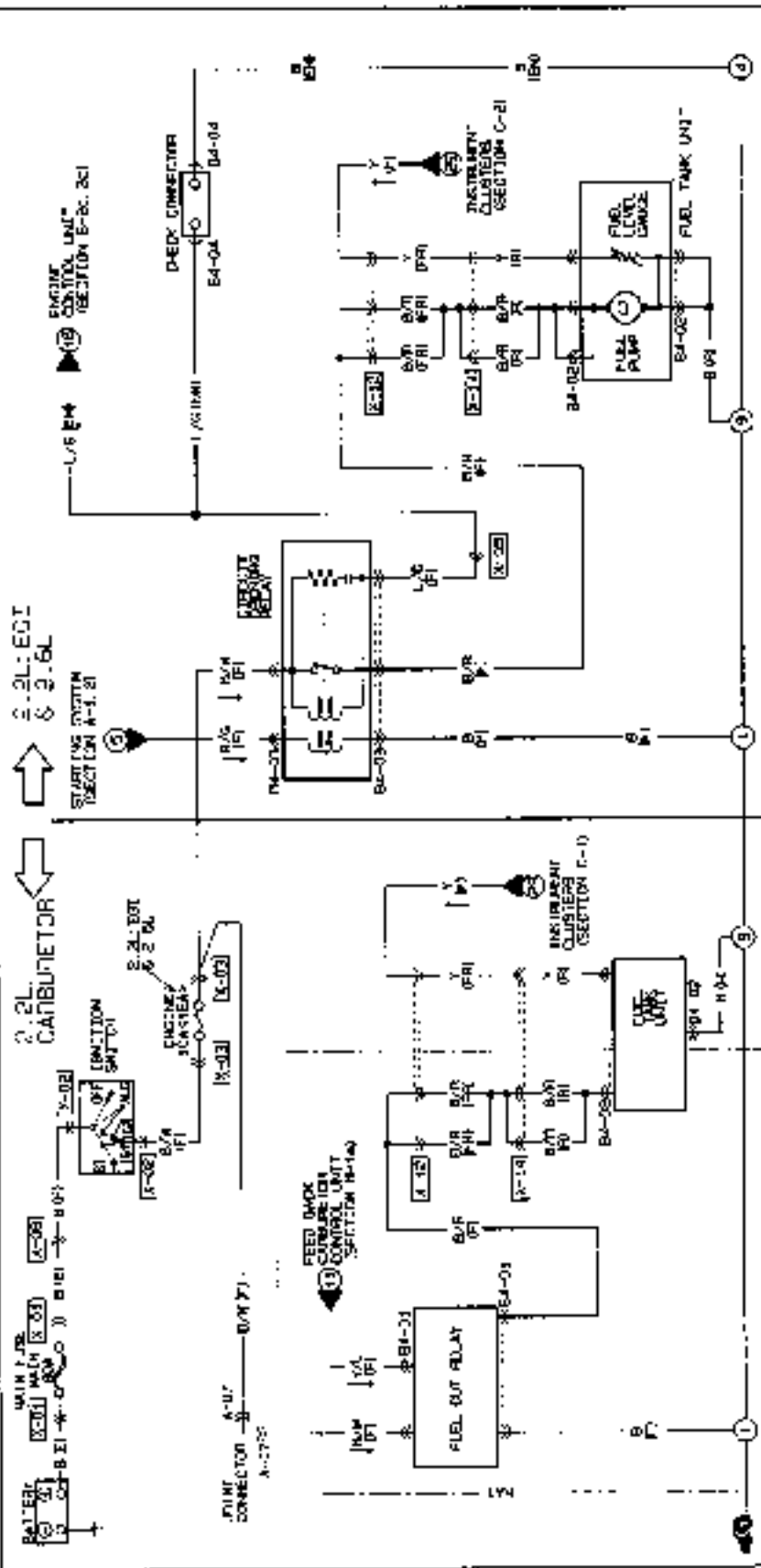
83-20 OXYGEN SENSOR





B-4

FUEL CONTROL SYSTEM



BA-01 FUEL OUT RELAY (F)	BA-02 FUEL TANK UNIT (R)	BA-03 CIRCUIT BREAKING RELAY (L)	BA-04 CHECK CONNECTION (EM)	BA-07 JUMP CONNECTION (F)																																																												
<table border="1"> <tr><td>B</td><td>W</td><td>R</td><td>Y</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> </table>	B	W	R	Y	+	+	+	+	+	+	+	+	<table border="1"> <tr><td>B</td><td>Y</td><td>R</td><td>W</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> </table>	B	Y	R	W	+	+	+	+	+	+	+	+	<table border="1"> <tr><td>B</td><td>W</td><td>B</td><td>Y</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> </table>	B	W	B	Y	+	+	+	+	+	+	+	+	<table border="1"> <tr><td>B</td><td>W</td><td>B</td><td>Y</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> </table>	B	W	B	Y	+	+	+	+	+	+	+	+	<table border="1"> <tr><td>B</td><td>W</td><td>R</td><td>Y</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> <tr><td>+</td><td>+</td><td>+</td><td>+</td></tr> </table>	B	W	R	Y	+	+	+	+	+	+	+	+
B	W	R	Y																																																													
+	+	+	+																																																													
+	+	+	+																																																													
B	Y	R	W																																																													
+	+	+	+																																																													
+	+	+	+																																																													
B	W	B	Y																																																													
+	+	+	+																																																													
+	+	+	+																																																													
B	W	B	Y																																																													
+	+	+	+																																																													
+	+	+	+																																																													
B	W	R	Y																																																													
+	+	+	+																																																													
+	+	+	+																																																													
MAF 2.2L CARBURETOR	MT 2.2L CARBURETOR	2.2L SOI & 2.6L	2.2L SOI & 2.6L	2.2L SOI & 2.6L																																																												

SPECIFICATIONS

Item		Specification	
Idle speed <sup>1)</sup>	rpm	M/T, 730—770; A/T, 750—790 (P target)	
Ignition timing <sup>1)</sup>	BTDC	G6: 4—6°, F2: 5—7°	
<b>Throttle body</b>			
Type		horizontal draft (1 barrel)	
Throat diameter	mm (in)	G6: 55 (2.2)      F2: 50 (2.0)	
<b>Fuel pump</b>			
Type		Impeller (in-tank)	
Output pressure	kPa (kg/cm <sup>2</sup> , psi)	44—589 (4.5—6.0, 64—85)	
<b>Fuel filter</b>			
Type	Low-pressure side	Nylon nonnet	
	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-orbit	
Type of cone		Voltage	
Resistance	Ω	12—16 (at 20°C, 65°F)	
Volume		G6: 74—88 cc (4.51—5.43 cu in)/15 sec. F2: 50—62 cc (3.05—3.78 cu in)/15 sec.	
<b>SAC 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 thermostat</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 thermostat</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	ST4—E1	21—42
		B—F2	1.05—2.76
		B—Fp	∞
<b>Fuel tank</b>			
Capacity	liters (US gal, imp gal)	55 (14.8, 12.3)	
<b>Air cleaner</b>			
Flament 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)	

PS-J01-000\*

<sup>1)</sup> Test connector grounded

## COMPONENT DESCRIPTIONS

Component	Function	Remarks
Air cleaner	Filters air entering throttle body	
Airflow sensor	Detects amount of intake air; sends signal to engine control unit	
Air valve	When closed, supplies bypass air into dynamic chamber	<ul style="list-style-type: none"> <li>• Engine speed increased to shorten warm-up period</li> <li>• Thermostatic type</li> <li>• Installed in BAC valve</li> </ul>
Atmospheric pressure sensor	Detects atmospheric pressure	In ECU
BAC valve	Supplies bypass air into dynamic chamber	Consists of air valve and ISC valve
Catalytic converter	Reduces HC, CO, and NOx by chemical reaction	Monolith type
Charcoal canister	Stores gas tank fumes when engine stopped	
Check connector	For Self-Diagnosis Checker	6 pin connector (Green)
Check-and-cut valve	Releases excessive pressure or vacuum in fuel tank to atmosphere	
Circuit opening relay	Voltage for fuel pump while engine running	
Clutch switch	Detects in-gear condition; sends signal to engine control unit	Switch ON when clutch pedal depressed
Crank angle sensor (in distributor)	<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
Dynamic chamber	Interconnects all cylinders	
Engine control unit	<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. F/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. Fuel-sage 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. No-Signal</li> <li>2. G-signal</li> <li>3. Airflow sensor</li> <li>4. Water thermostat</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 thermometer (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 power switches</li> <li>15. Ignition switch (START position)</li> <li>16. Test connector</li> <li>17. Stoplight switch</li> </ol> <ol style="list-style-type: none"> <li>1. Injector</li> <li>2. Solenoid valve (Idle speed control)</li> <li>3. Solenoid valve (Pressure regulator control)</li> <li>4. Solenoid valve (Purge control)</li> <li>5. Self-Diagnosis Checker and MI</li> <li>6. Monitor lamp (Self-Diagnosis Checker)</li> <li>7. Airflow sensor</li> <li>8. Igniter</li> <li>9. Circuit opening relay</li> <li>10. A/C relay</li> <li>11. Main relay</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-ohm injector</li> <li>Two port injector nozzle (G6)</li> </ul> Installed on dynamic chamber	
Intake air thermosensor	Detects intake air temperature, sends signal to engine control unit		
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 flashes 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 idling</li> </ul>
	Pressure regulator control	Controls vacuum to pressure regulator	Cuts vacuum passage when light
	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 Set-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	

2BAXF2-002

**TROUBLESHOOTING GUIDE**

**RELATIONSHIP CHART**

INPUT DEVICES	OUTPUT DEVICES											
	INJECTOR	FUEL INJECTION AMOUNT	FUEL INJECTION TIMING	AIR VALVE	BAC 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)
TEST CONNECTOR	X	X	X	X	O	X	X	X	X	X	X	O
IGNITION SWITCH (ON POSITION)	X	X	X	X	X	X	X	X	X	O	X	X
IGNITION SWITCH (START POSITION)	O	O	X	X	O	X	O	O	X	X	X	O
HEADLIGHT AND BLOWER SWITCH	X	X	X	X	O	X	X	X	X	X	X	X
P/S PRESSURE SWITCH	X	X	X	X	O	X	X	X	X	X	X	X
A/C SWITCH	X	X	X	X	O	X	X	O	X	X	X	X
NEUTRAL AND CLUTCH SWITCH	O	X	X	X	O	O	X	X	O	X	X	X
STOPLIGHT SWITCH	O	X	X	X	X	X	X	X	X	X	X	X
IDLE SWITCH	O	X	X	X	O	O	O	X	X	X	X	O
ATMOSPHERIC PRESSURE SENSOR	O	X	X	X	O P2 X G6	X	X	X	X	X	X	X
THROTTLE SENSOR	O	X	X	X	X	X	X	O	O	X	X	X
INTAKE AIR THERMOSENSOR	O	X	X	X	X	X	X	O	X	X	X	X
AIRFLOW SENSOR	O	X	X	X	O	O	X	X	O	X	X	O
OXYGEN SENSOR	O	X	X	X	X	O	X	X	X	X	X	X
WATER THERMOSENSOR	O	X	X	X	O	O	O	X	O	X	X	O
DISTRIBUTOR	(No-SIGNAL)	O	O	X	O	O	O	O	X	O	O	O
	(G-SIGNAL)	X	O	X	X	X	X	X	X	X	X	X



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

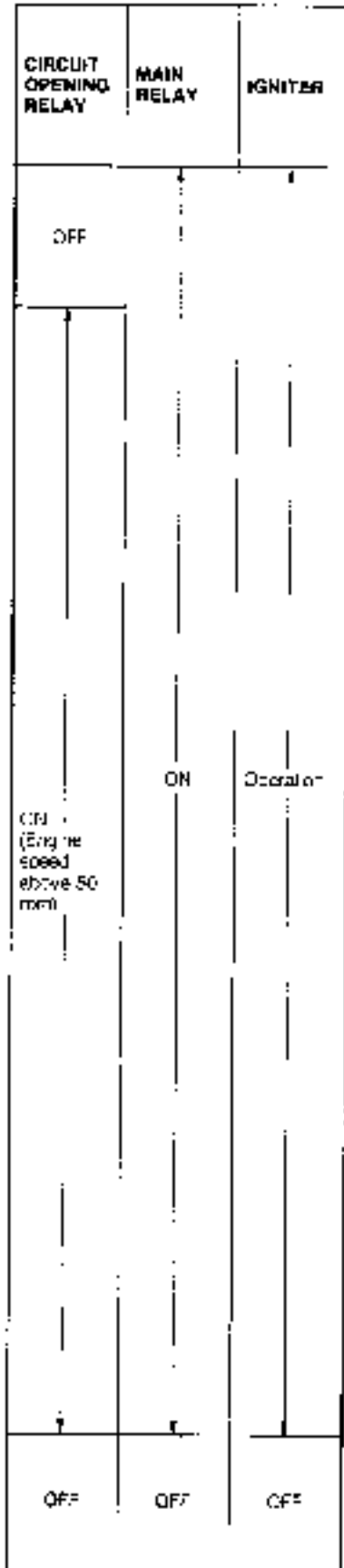
ENGINE CONDITIONS	APPROXIMATE TIME BASED ON 10-15°C or 50-60°F AMBIENT	DISTRIBUTOR		WATER THERMISTOR	SENSORS				ATMOSPHERIC PRESSURE SENSOR (ON ECU)
		(G-SIGNAL)	(M-SIGNAL)		OXYGEN SENSOR	AIRFLOW SENSOR	INTAKE AIR THERMISTOR	THROTTLE SENSOR	
CRANKING -COLD ENGINE -COLD AIR -COLD COOLANT	Zero				Signal 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 minute			Cool to warm; medium voltage (3.5V and dropping)	Sensor and low to high voltage (0-0.8V)	Low volume airflow to high voltage (2.1-3.5V)		Close 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 (0.8V)	Moderate volume airflow; low to medium voltage (3.2V)		Part throttle; medium voltage (1-3.5V)	
HOT CHUISE -WARM AIR -WARM COOLANT		Sense No. 1 cylinder TDC signal to ECU	Sense engine speed signal to ECU		Sensor hot; switching from high voltage (0.8V) to low voltage (0.1V)	Moderate to strong volume of airflow (3.8V)	Cool to warm; medium voltage (1.4-2.6V)		Sends voltage signal to ECU that varies with altitude (approx. 4V at sea level)
HOT ACCELERATION -50% THROTTLE									
HOT ACCELERATION -WIDE OPEN THROTTLE	More than four minutes			Hot; low voltage (Approx. 0.4V)	High voltage (0.9V)	Strong volume of airflow (4.2V)		Wide open throttle; high voltage (Approx. 4.0V)	
DECELERATION -CLOSED THROTTLE					Low voltage (0V)				
HOT C.R.P. BLE -EXTENDED					Strong; switching to low voltage (0.1V) after 0.75-0.250	Low volume of airflow (2.4V)		Close throttle; low voltage (0.3-0.7V)	
HOT ENGINE -SHUT DOWN		OFF	OFF	OFF	Sensor 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	Service 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)	If neutral low, will send signal to ECU (approx. 0V)							
High voltage signal to ECU (battery voltage)	No signal sent to ECU (below 1.5V)	Emergency in any gear, high voltage signal to ECU (battery voltage)	A/C switch ON, sends signal to ECU (battery voltage)	Steering wheel turned, low voltage signal to ECU (below 1.5V)	Headlight switch ON, low voltage signal to ECU (below 1.5V)	Blower switch ON, low voltage signal to ECU (below 1.5V)	No signal to ECU (below 1.5V)	Service 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)	A/C switch OFF, no signal to ECU (below 1.5V)	Steering wheel straight ahead, high voltage signal to ECU (battery voltage)	Headlight switch OFF, high voltage signal to ECU (battery voltage)	Blower switch OFF, high voltage signal to ECU (battery voltage)			Low voltage signal to ECU when connector grounded (below 1.5V)
OFF	ON	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF

2003F2 003

### Output Devices and Engine Conditions

ENGINE CONDITIONS	OUTPUT DEVICES APPROXIMATE TIME (BASED ON 10-14°C or 50-55°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 igniter pulse					OFF (A/C ON)	
COLD START - FAST IDLE - COLD AIR - COLD COOLANT	One minute	Rich		Open bypass temporarily below 50°C (122°F)	Large amount of bypass air	OFF (Purge cut)		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 cycles change large 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		Rich						ON (A/C CUT)	
HOT ACCELERATION - W/ WIDE OPEN THROTTLE	More than four minutes			Closed					
DECELERATION - CLOSED THROTTLE			Fuel cut		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 fire			OFF	OFF	OFF	ON (Burn-off)



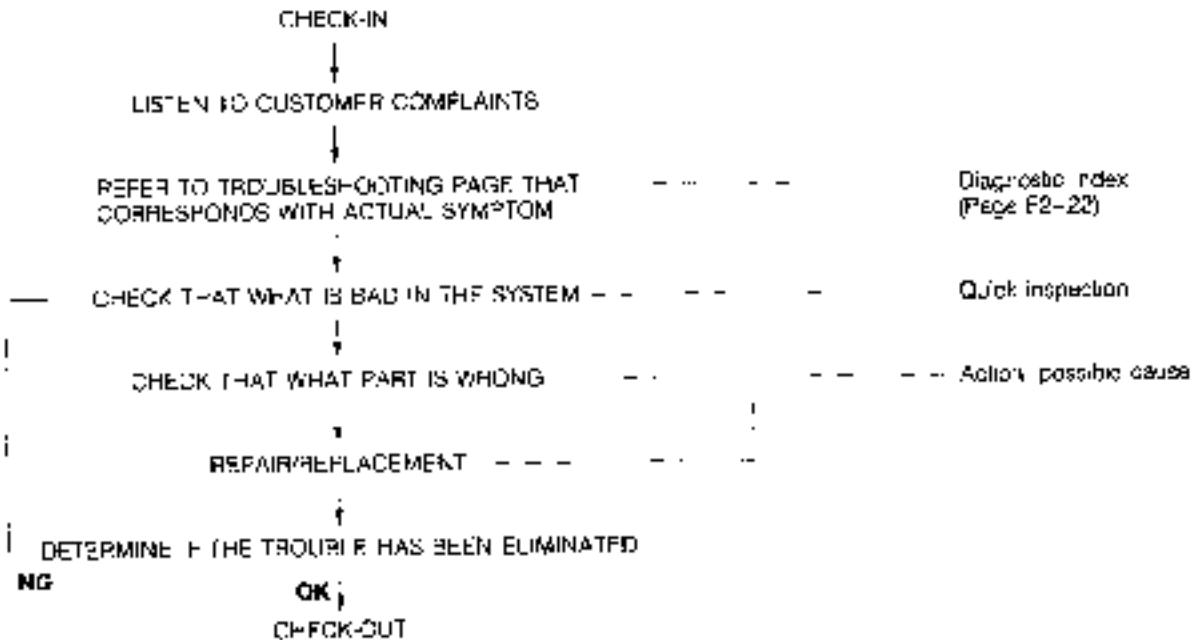
354.CF2 (UM)

### HOW TO USE THIS SECTION

#### Introduction

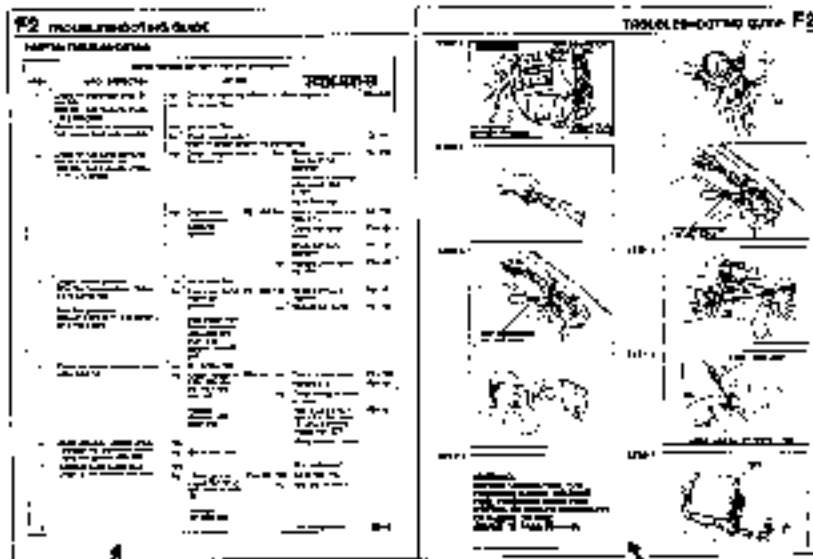
Most of the fuel and emission control system is electronically controlled. Thus, it is sometimes difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a drivability complaint. 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



SMKPF2-011

### How to read the troubleshooting chart



Left page shows the troubleshooting procedure

- QUICK INSPECTION
- ACTION
- POSSIBLE CAUSE AND DETAILED INSPECTION

Right page illustrates how to perform QUICK INSPECTION

Checks normally fail won't start (No combustion)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunctions (check with SST) (IGN ON, Test connection (Green, Yellow) grounded)	Yes: Check for cause by referring to check sequence. No: Go to Step 2	F2-127
2	Check for spark by observing high pressure lines while cranking	Yes: Go to Step 3 No: Check ignition system (refer to ground system troubleshooting)	Check
3	Check oil level (pump operating return from fuel filter) (IGN ON, Test connection (White, Pink) grounded)	Yes: Check if engine stops if oil's consumed No: Check oil level (oil pump operating only) (oil filter) operation	Check if oil's opening only (oil filter) operation Check if oil's opening only (oil filter) (IGN START) Go to Step 4
		Yes: Check if oil's opening only (oil filter) operation No: Check oil level (oil pump operating)	F2-159 F2-159 F2-167
		Yes: Check if oil's opening only (oil filter) operation No: Check if oil's opening only (oil filter) operation	F2-159 F2-167

**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.

BMW CF2 013

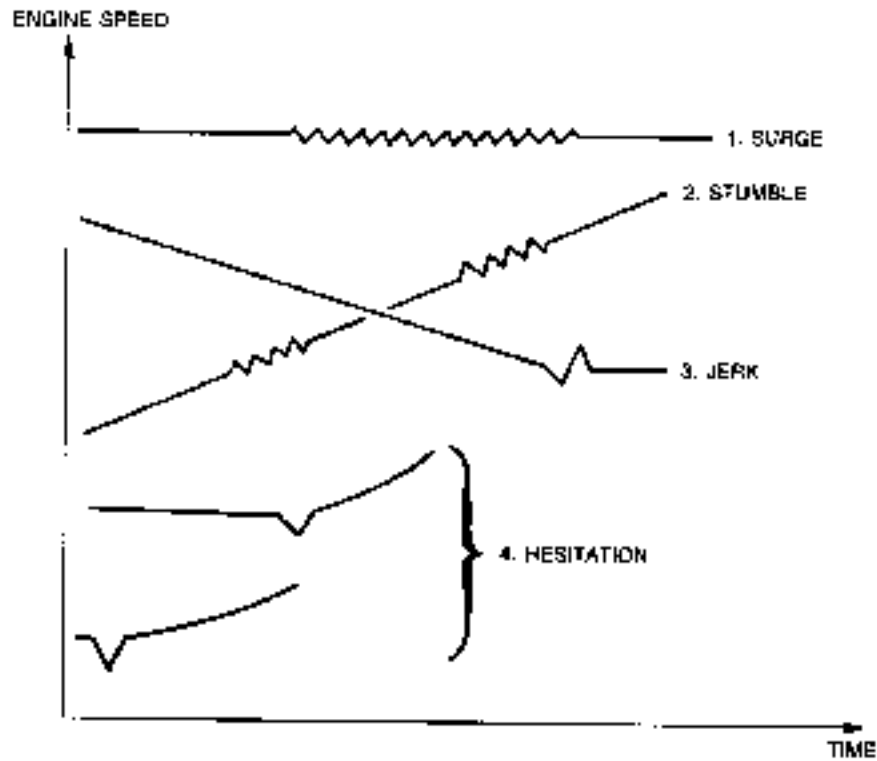
### DIAGNOSTIC INDEX

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, EIL 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 EIL 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- 76
23	Hesitates/Slurbs 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- 92
28	Lack of power		F2- 96
29	Bucking at high speed		F2- 98
30	Bucking on deceleration		F2- 100
31	Poor fuel economy		F2- 102
32	High oil consumption/White exhaust smoke		F2- 104
33	Aftersmoke on deceleration		F2- 108
34	Rotten egg smell		F2- 108
35	Gasoline fumes		F2- 110
36	MIL always ON	(Federal and Canada) Odometer does not indicate emission system parts replacement time, but MIL is ON (California) Engine operation is OK but MIL is ON	
37	MIL never ON	(Federal and Canada) Emission system parts replacement time has come, but MIL never ON (California) Self-diagnose checker indicates malfunction code No., but MIL never ON	F2- 112
SR	A/C does not work		F2- 114

3-0-97-005

**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.



SMUEP2 014

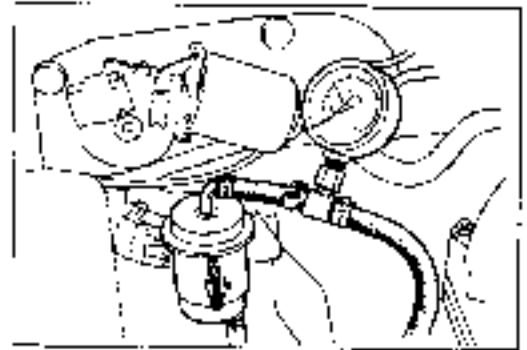
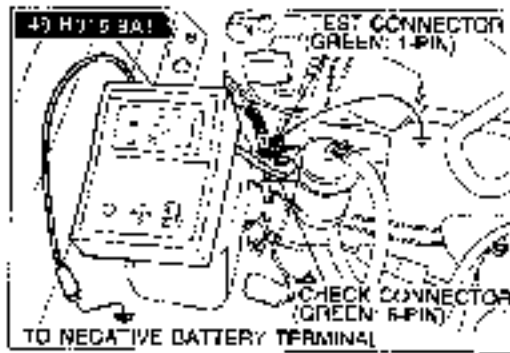


### SYMPTOM TROUBLESHOOTING

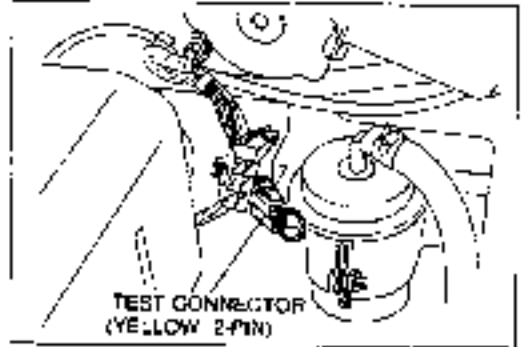
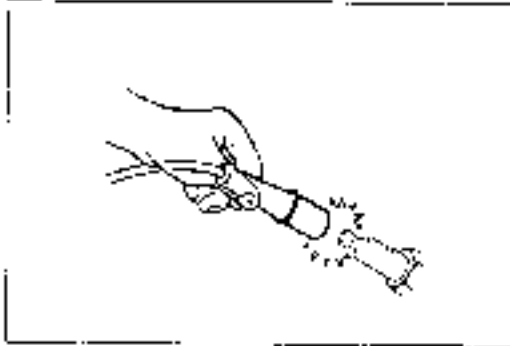
Crankes normally but won't start (No combustion)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code (D2) with SST (IGN ON. Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to check sequence		F2-123	
		No	Go to Next Step			
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 filter 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	Yes	Check circuit opening relay circuit	F2-153
				No	Check fuel pump operation	F2-151
				No	Replace circuit opening relay	F2-153
4	Check line line pressure (IGN ON. Test connector (Yellow 2-pin) connected)  Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—45 psi)	Yes	Go to Next Step			
		No	Check fuel pump maximum pressure	F2-150	Yes	Replace pressure regulator
				No	Repair fuel pump	F2-152
5	Check for injector operating sound while cranking	Yes	Go to Next Step			
		No	Check voltage at ECU (2C) and (2V) terminals with SST	F2-175	Yes	Check throttle sensor
					Replace FCI.	F2-175
				No	Check wiring for short or open	
					Fear 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	F2-175	Yes	Go to Next Step
				No	Fear ground circuit	
					Low compression	Section B2

1991F2-006

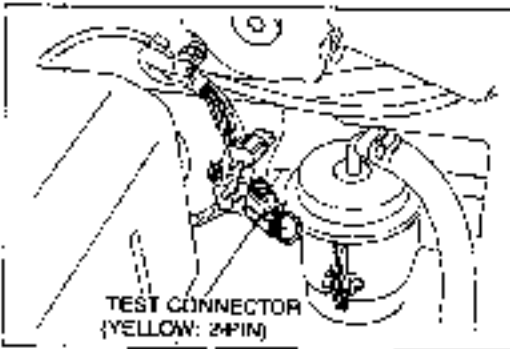
STEP 1



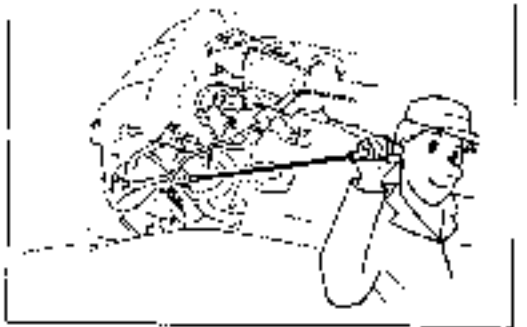
STEP 2



STEP 3



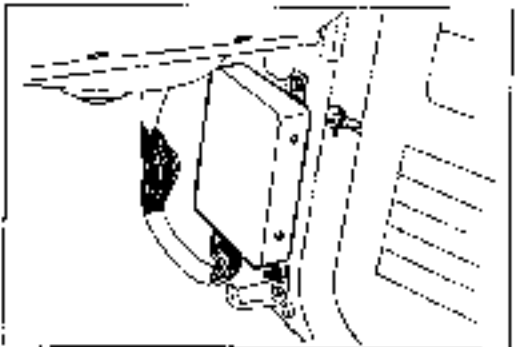
STEP 5



STEP 4



STEP 6

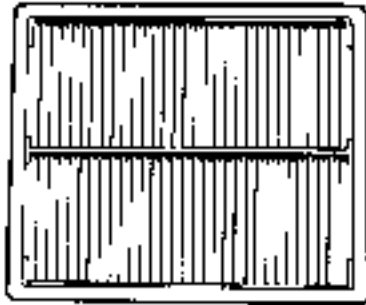


STEP 4

**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  Ignition timing: BTOC 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 (M-1e)]	Section G	Yes	Replace injector (If Step 3 OK)	F2-156
				No	Check spark plug	Section Q	
				Check high-tension lead	Section G		
Check distributor cap	Section Q						
5	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMJ-U-01)	F2-157	Yes	Check wiring short or open	
					No	Check injector resistance	F2-157
					Check wiring short or open		
Terminals Resistance	6—511						
6	Check fuel line pressure [IGN ON, Test connector (Yellow: 2-pin) connected]  Fuel line pressure: 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
Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm <sup>2</sup> , 64—85 psi)	No	Replace fuel pump	F2-152				

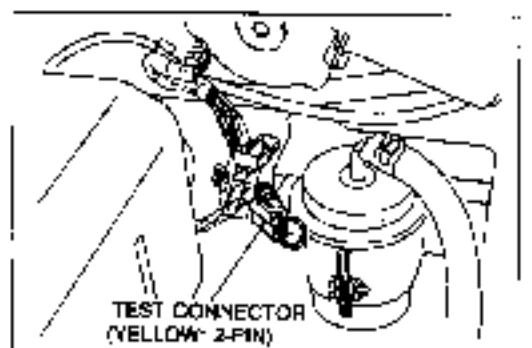
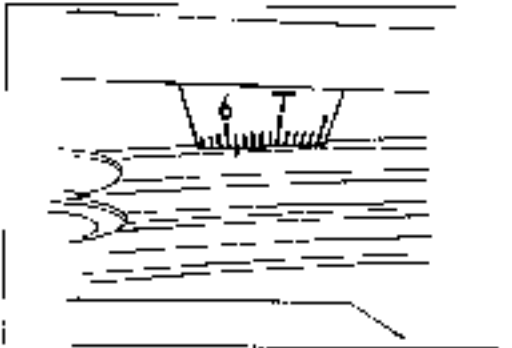
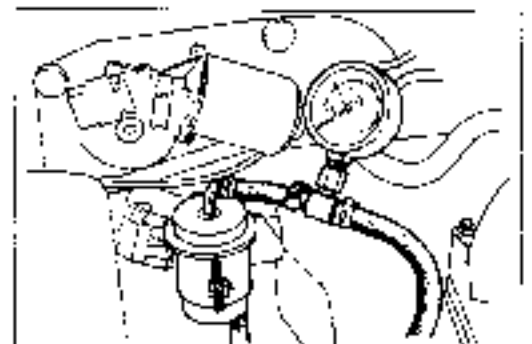
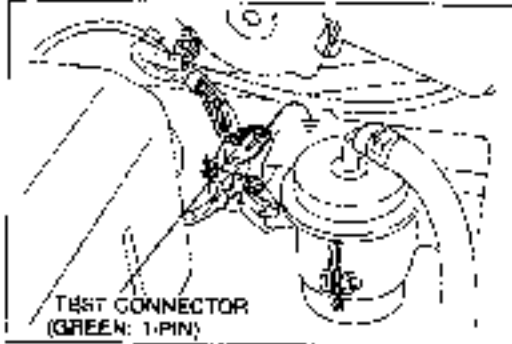
STEP 2



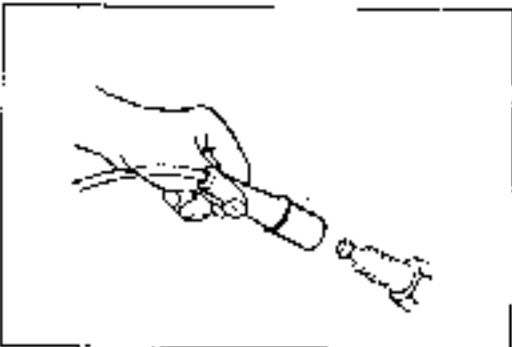
STEP 6

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**

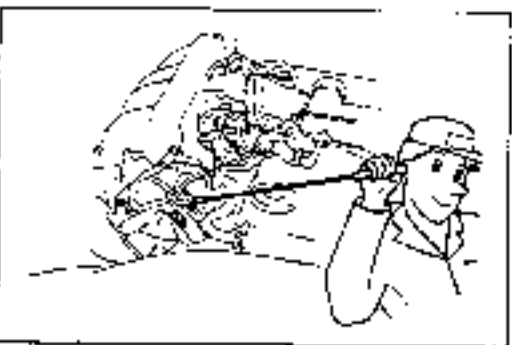
STEP 3



STEP 4



STEP 5



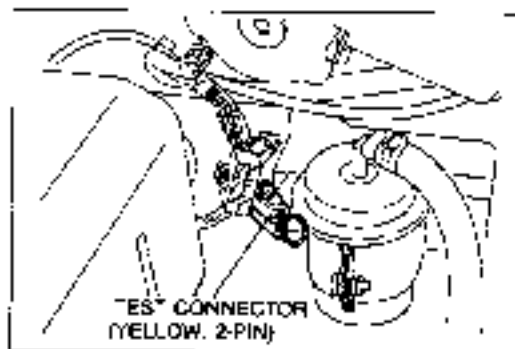
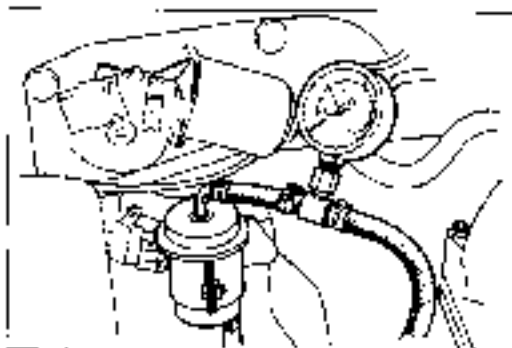
**Cranks normally but hard to start (Always) (Cont'd)**

STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Operate fuel pump (IGN ON. Test connector (Yellow, 2-pin) connector) Turn ignition switch OFF and observe fuel pressure for 5 minutes  Fuel pressure: More than 147 kPa (1.5 kg/cm <sup>2</sup> , 21 psi)	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	F2-157
					No	Replace pressure regulator	F2-155
8					Check compression	Section B2	

EDL0F2004

## 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)

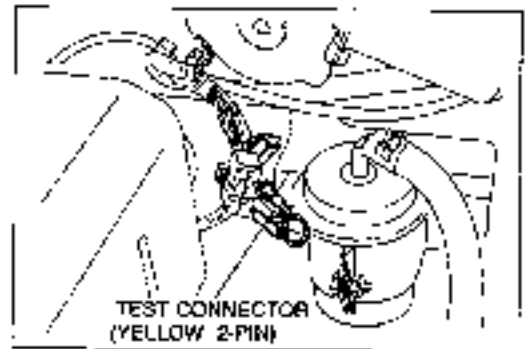
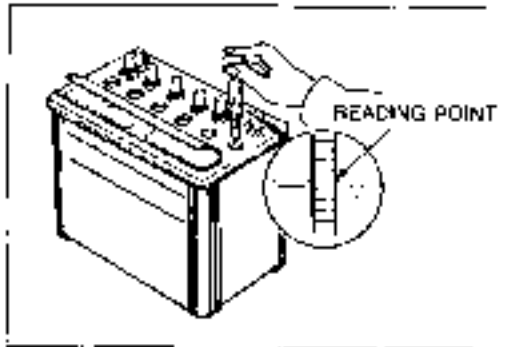


Crankes normally but hard to start (Only when engine is cold)

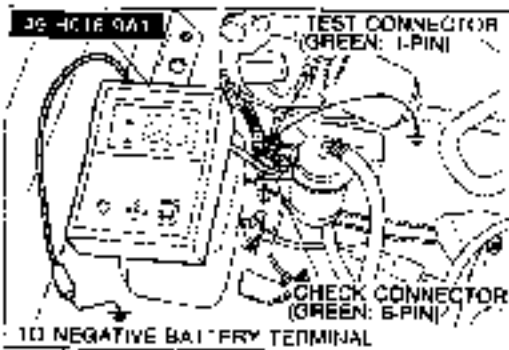
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
	Check specific gravity of battery using a hydrometer  <b>Specific gravity: Above 1.200</b>	Yes	Go to Next Step			
		No	Recharge battery		Section G	
2	Check for malfunction code (09) (26) with SST (IGN ON, Test connector (Green: 1-pin) grounded)	Yes	Check for cause by referring to check sequence		F2-122	
		No	Go to Next Step			
3	Disconnect high-tension lead of each cylinder at idle Check if engine malfunction changes	Yes	Go to Next Step			
			Check ignition system (Refer to ignition system troubleshooting (Misfire))	Section G	Check spark plug Check high-tension lead Check distributor cap	Section G Section G Section G
4	Check fuel line pressure (IGN ON, Test connector (Yellow: 2 pin) connected)  <b>Fuel line pressure: 285—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	
			Check fuel pump maximum pressure	No	Replace fuel filter	F2-149
		Yes	Replace pressure regulator	F2-155		
		No	Replace fuel pump	F2-152		
			<b>Fuel pump maximum pressure: 441—568 kPa (4.5—5.8 kg/cm<sup>2</sup>, 64—85 psi)</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	F2-142	
6	Check voltage at ECU (10) terminal with SST  <b>Voltage: Approx. 10V (while cranking)</b>	Yes	Go to Next Step			
		No	Check starter interlock switch	Section G	Yes: Check related wiring No: Replace switch	
7	Check voltage at ECU (20) 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 thermostat	F2-179	
8			Check compression	Section B2		

19UJF2-00A

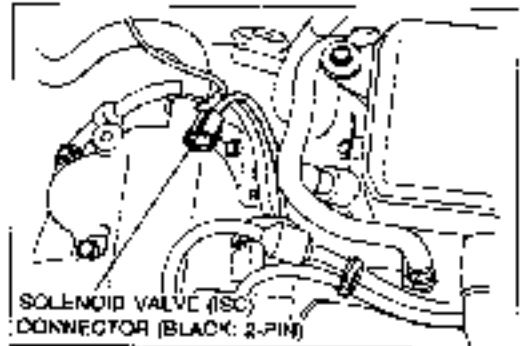
STEP 1



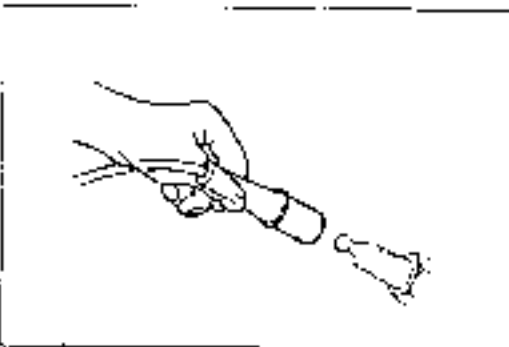
STEP 2



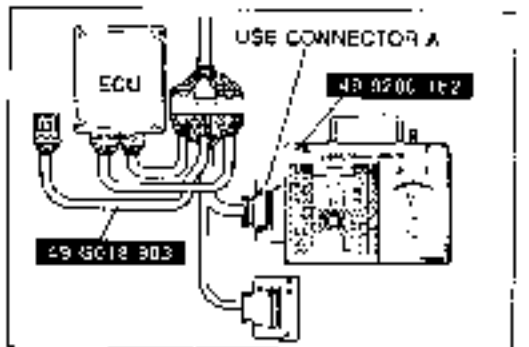
STEP 5



STEP 3

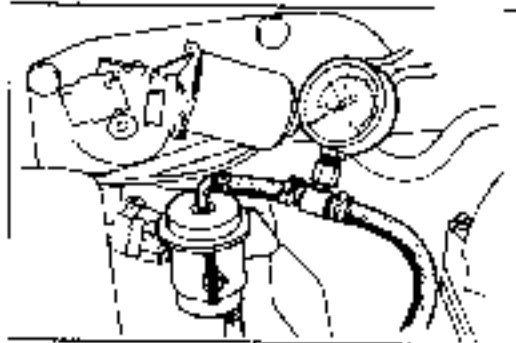
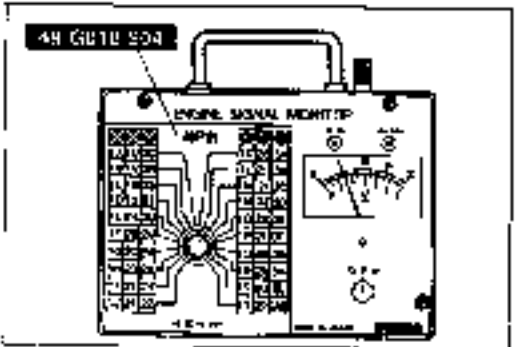


STEP 6



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)**



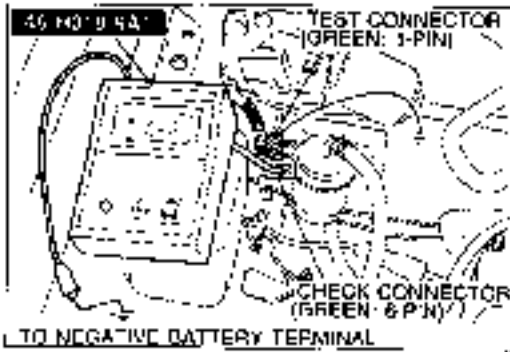


### Cranks normally but hard to start (Only when engine is warm)

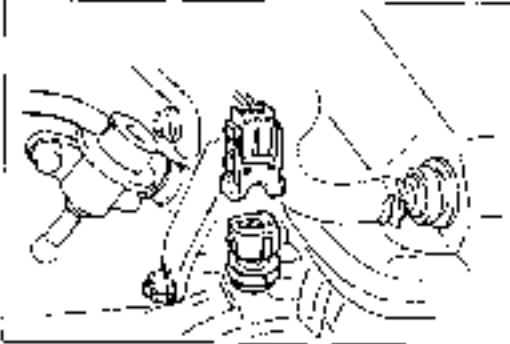
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SBI (IGN ON. Test connector (Green 1 pin) grounded)	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next Step				
2	Disconnect water temperature sensor connector Check if condition improves	Yes	Check water temperature sensor 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 temperature sensor	F2-179	
		No	Go to Next Step	No	Poor contact of water temperature sensor connector		
3	Operate fuel pump (IGN ON. Test connector (Yellow, 2-pin) grounded) Turn ignition switch OFF and observe fuel pressure for 5 minutes  <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	F2-150	No	Replace fuel pump	F2-152
			Check pressure regulator pressure drop	F2-154	Yes	Check injector fuel leakage	F2-157
					No	Replace pressure regulator	F2-155
4					ECU malfunction		

10-1063 008

STEP 1

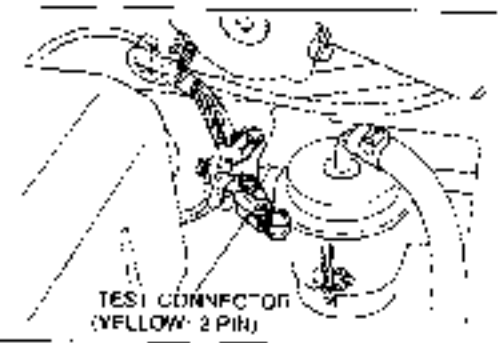
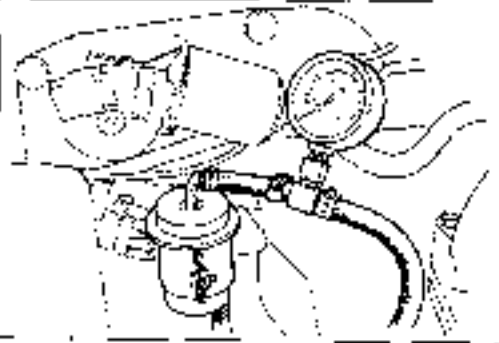


STEP 2



STEP 3

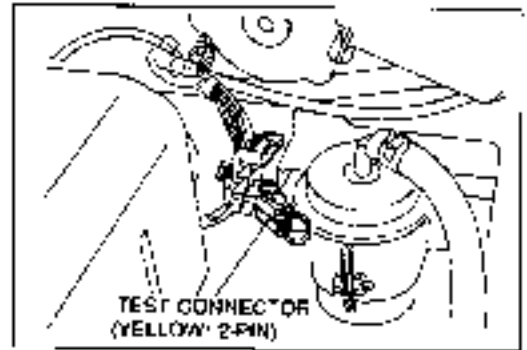
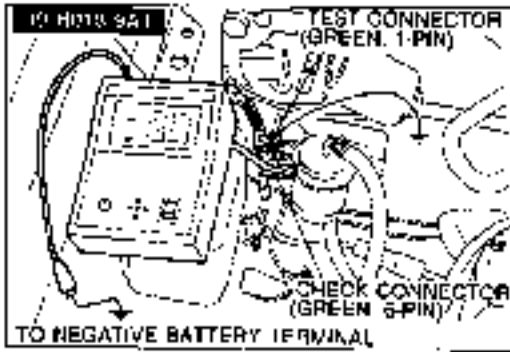
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



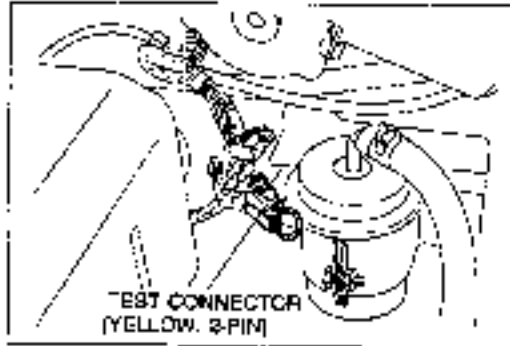
Cranked normally but hard to start (Only after heat soak)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [IGN ON, Test connector (Green, 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next Step				
2	Circulate fuel by operating fuel pump for 20 seconds [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 thermometer	F2-190		
				Check solenoid valve (P10)	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 for 5 minutes  Fuel pressure: More than 147 kPa (1.5 kg/cm <sup>2</sup> , 21 psi)	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					

5U6F2C-3

STEP 1



STEP 2

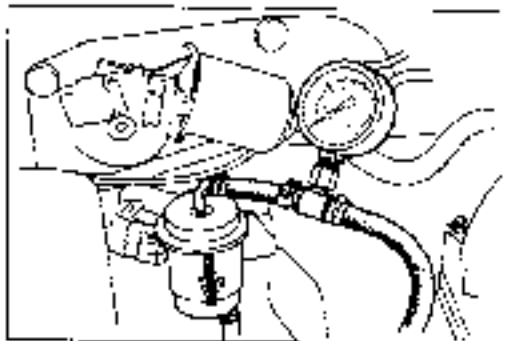


STEP 3



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)**

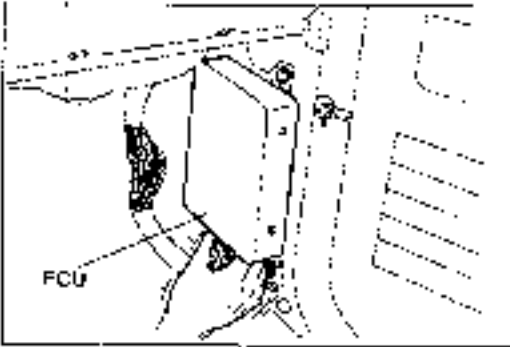
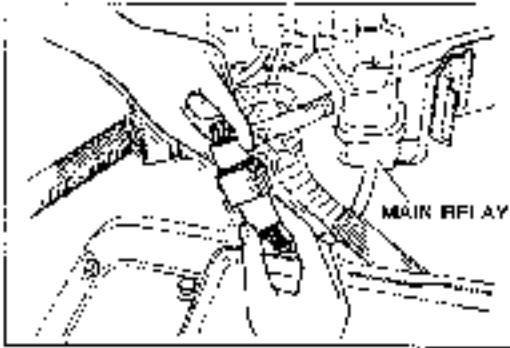
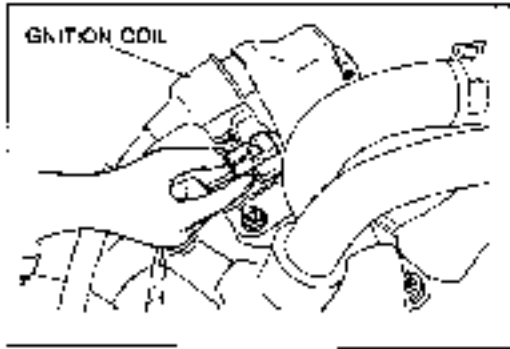


## Crankes normally but won't start (Intermittent)

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 "Crankes normally but hard to start (Always)".	F2-30

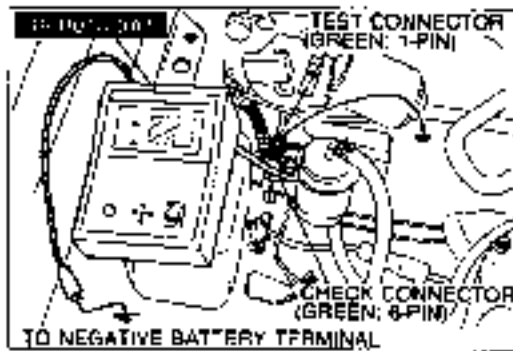
13UD32 096

STEP 1

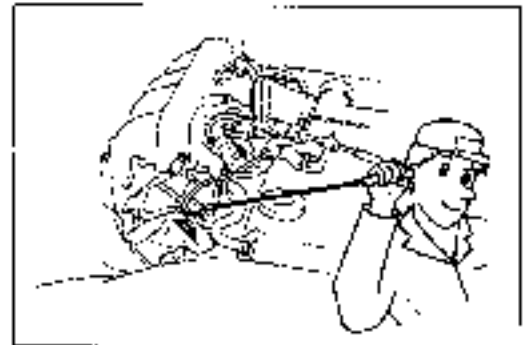


Rough Idle (Always)				
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IGN ON. Test connector (Green: 1 pin) grounded]	Yes	Check for cause by referring to the check sequence	F2-122
		No	"00" flashing F2-175 Check voltage at FCI (20) terminal with SST <b>Voltage: 0V (IG ON)</b> "00" Go to Next Step	Yes: Replace ECU No: Fix ground circuit F2-175
2	Check ignition at idle after warm up <b>Ignition timing:</b> BTOC 4-6° (G8) 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 Spec 3-DK) No: Check spark plug: Section G Check high-tension exp: 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 (E-MIN-01) <b>Terminals Resistance:</b> (BY)-(LQ8) 5-8Ω (BY)-(LGM)	Yes: Check wiring short or open No: Check injector resistance: F2-157 Check wiring short or open
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> , 38-45 psi)	Yes	Go to Next Step	
		No	Check for fuel leakage	
		Substitute a good fuel filter and reset	Yes: Replace fuel filter: F2-148	
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: F2-197	Yes: Intake air system components damaged: Vacuum and intake air hoses and/or connected parts or nuts loose Gaskets damaged No: Check throttle valve closing condition: F2-138

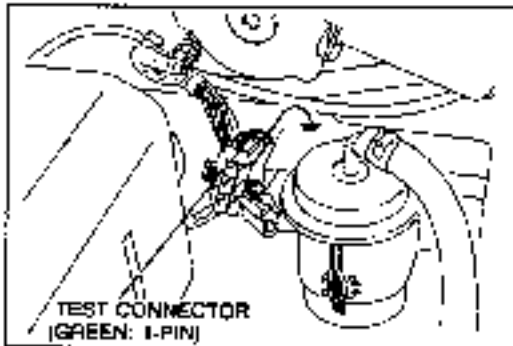
STEP 1



STEP 5

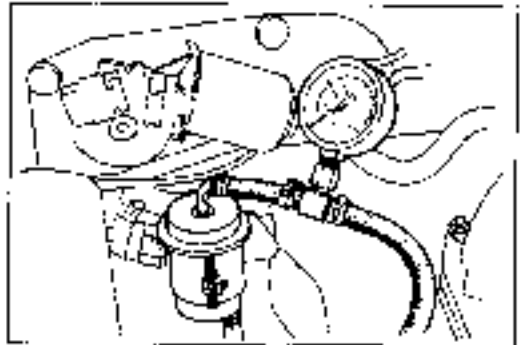
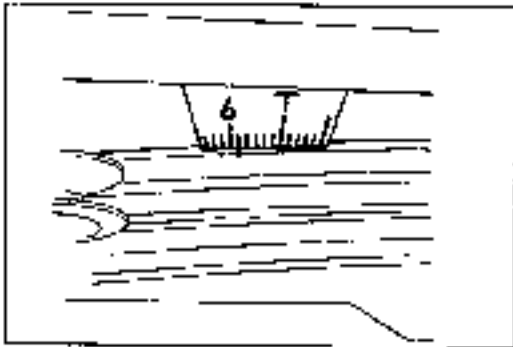


STEP 2

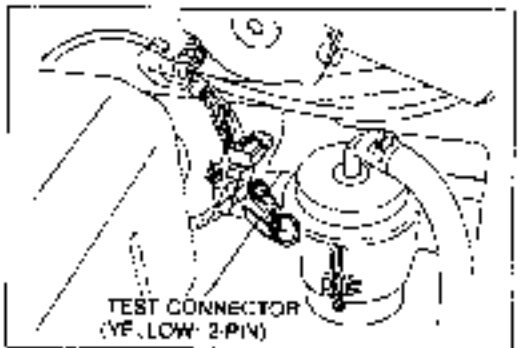
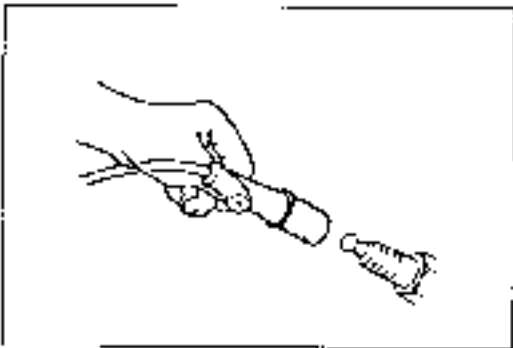


STEP 6

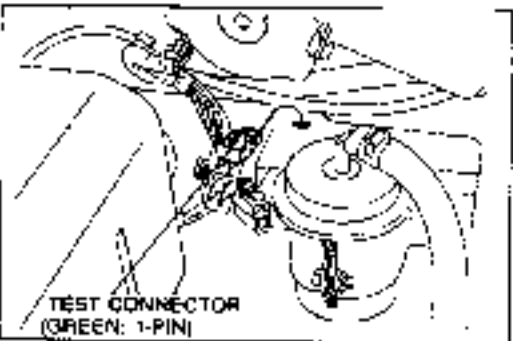
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



STEP 3



STEP 4



STEP 7

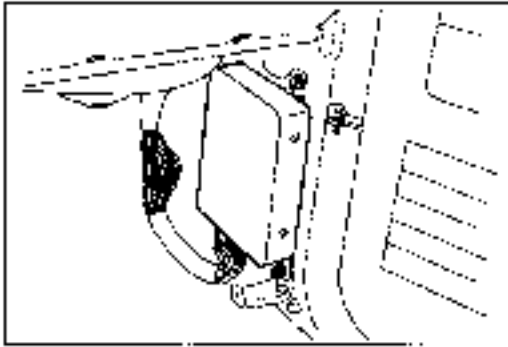




Rough Idle (Always) (Cont'd)					
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION
8	Substitute a well-known ECU. Check if condition improves	Yes			ECU malfunction
		No	Check voltage at ECU (2C) terminal with SST  Voltage: 0V (IGN ON)	F2-178	Yes No
9					Check compression <b>Section 82</b>

PLATE-003

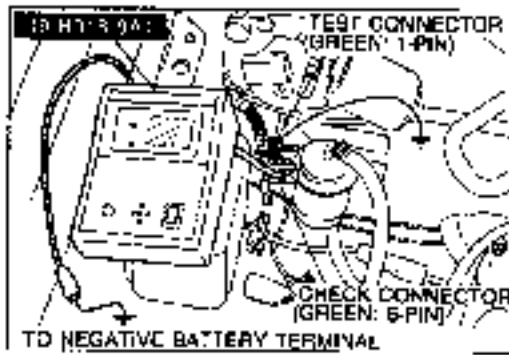
STEP 8



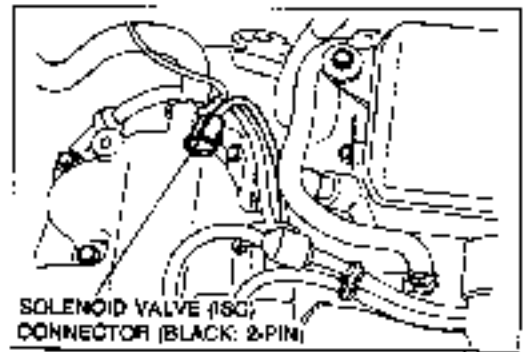
Rough Idle (Only when engine is cold)								
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION				
1	Check for malfunction codes with SST (IGN ON. Test connector (Green 1-pin) grounded).	Yes	Check for cause by referring to check sequence		F2-122			
		No	Go to Next Step					
2	Check ignition at idle after warm up  Ignition timing: BTDC 4—6° (G8) 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 (Malfunction)]	Section G	Yes	Replace injector (if step 4 OK)	F2-156	
				No	Check spark plug	Section G		
				Check high-tension lead	Section G			
Check distributor cap	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	F2-157	
				Terminals	Resistance	No		Injector malfunction (Check resistance)
				(BY)-(LGR)	6—8Ω			Wiring short or open
(BY)-(LGR)								
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	F2-142		
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 FCL. Check if condition improves	Yes			ECU malfunction			
		No			Check airflow sensor	F2-17B		

29LAP2 LHM

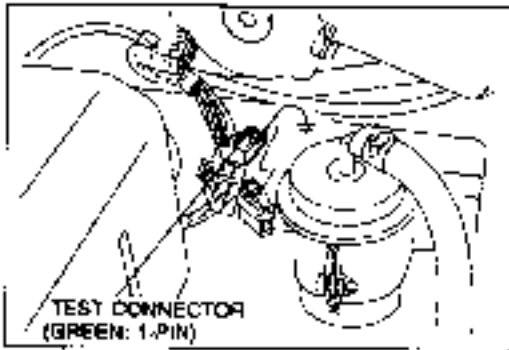
STEP 1



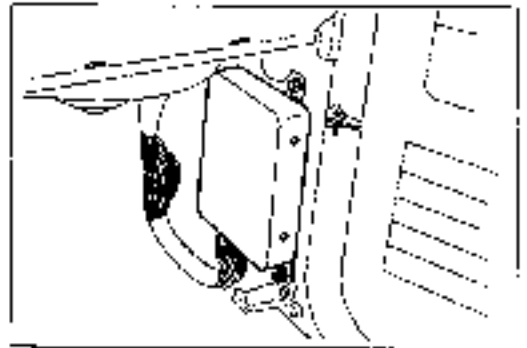
STEP 5



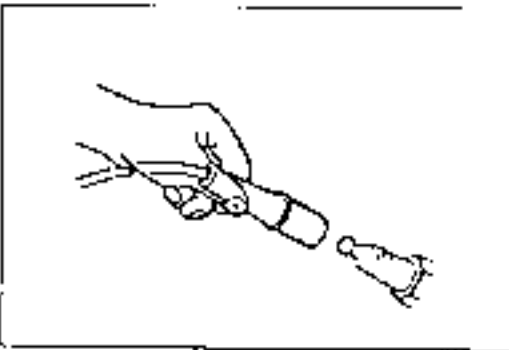
STEP 2



STEP 7



STEP 3



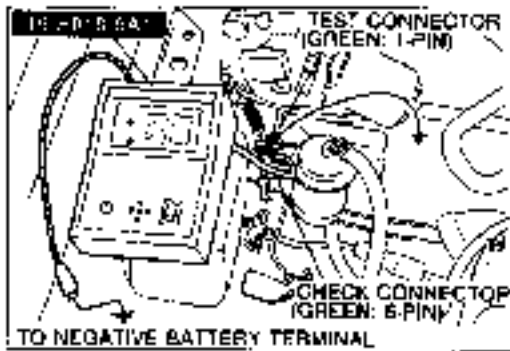
STEP 4



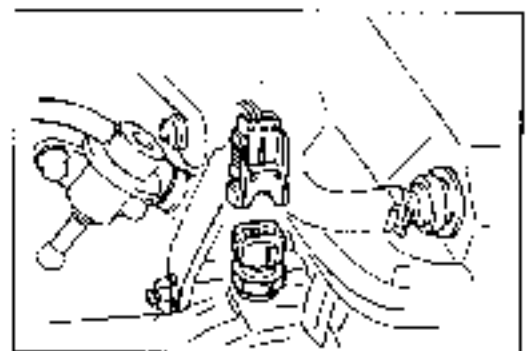
## Rough idle (Only when engine is warm)

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at 2,000 rpm for more than 20 seconds 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  idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)  [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  Monitor lamp: Flashes more than 6 times/10 seconds at 2,000—3,000 rpm  [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 SO 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	Polish 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 & wet injector may be leaking						

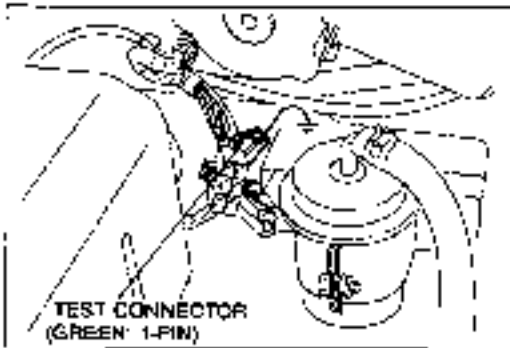
STEP 1



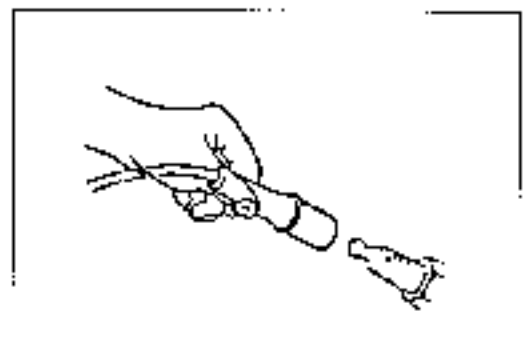
STEP 5



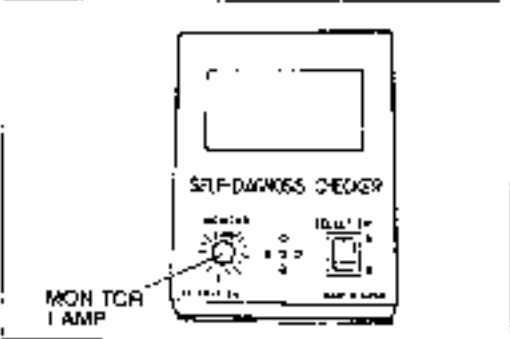
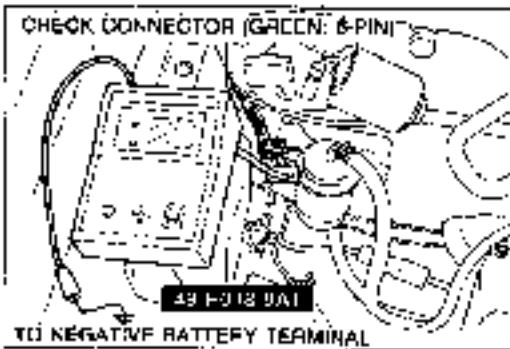
STEP 2



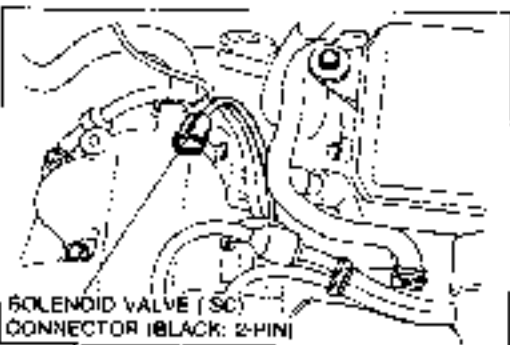
STEP 6



STEP 3



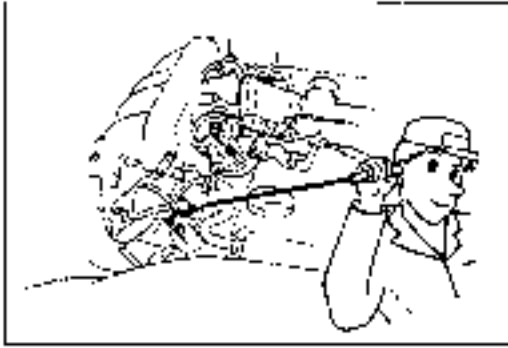
STEP 4



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	<table border="1"> <tr> <td rowspan="2">Check resistance at injector harness connector (EM-NJ-01)</td> <td rowspan="2">F2-157</td> <td>Yes</td> <td>Check wiring short or open</td> </tr> <tr> <td>No</td> <td> <table border="1"> <tr> <td>Check injector resistance</td> <td rowspan="2">F2-157</td> </tr> <tr> <td>Check wiring short or open</td> </tr> </table> </td> </tr> <tr> <td>Terminals</td> <td>Resistance</td> <td colspan="2"></td> </tr> <tr> <td>(BY)-AG(B)</td> <td>6-8Ω</td> <td colspan="2"></td> </tr> <tr> <td>(BY)-AG(B)</td> <td>6-8Ω</td> <td colspan="2"></td> </tr> </table>	Check resistance at injector harness connector (EM-NJ-01)	F2-157	Yes	Check wiring short or open	No	<table border="1"> <tr> <td>Check injector resistance</td> <td rowspan="2">F2-157</td> </tr> <tr> <td>Check wiring short or open</td> </tr> </table>	Check injector resistance	F2-157	Check wiring short or open	Terminals	Resistance			(BY)-AG(B)	6-8Ω			(BY)-AG(B)	6-8Ω
Check resistance at injector harness connector (EM-NJ-01)	F2-157	Yes	Check wiring short or open																			
		No	<table border="1"> <tr> <td>Check injector resistance</td> <td rowspan="2">F2-157</td> </tr> <tr> <td>Check wiring short or open</td> </tr> </table>	Check injector resistance	F2-157	Check wiring short or open																
Check injector resistance	F2-157																					
Check wiring short or open																						
Terminals	Resistance																					
(BY)-AG(B)	6-8Ω																					
(BY)-AG(B)	6-8Ω																					
8	Check for air leaks by listening for sucking noise	Yes	Go to Next Step																			
		No	<table border="1"> <tr> <td>Intake air system components damaged</td> <td rowspan="4">F2-187</td> </tr> <tr> <td>Vacuum and intake air hoses loose or damaged</td> </tr> <tr> <td>Boots or nuts loose</td> </tr> <tr> <td>Gaskets damaged</td> </tr> </table>	Intake air system components damaged	F2-187	Vacuum and intake air hoses loose or damaged	Boots or nuts loose	Gaskets damaged														
Intake air system components damaged	F2-187																					
Vacuum and intake air hoses loose or damaged																						
Boots or nuts loose																						
Gaskets damaged																						
9			<table border="1"> <tr> <td>Check compression</td> <td>Section 62</td> </tr> </table>	Check compression	Section 62																	
Check compression	Section 62																					

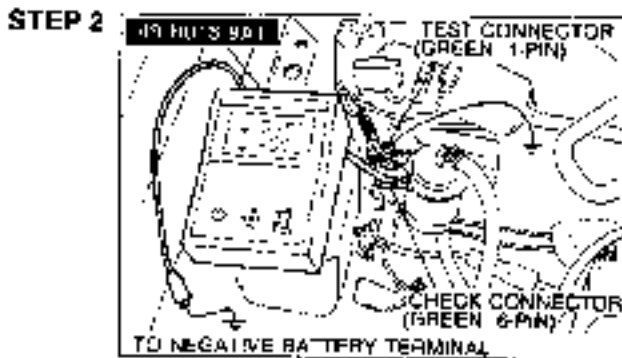
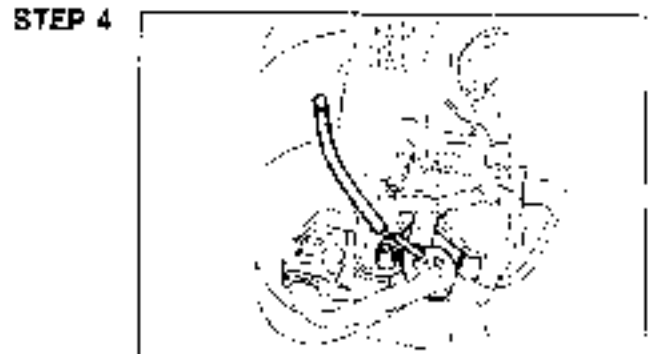
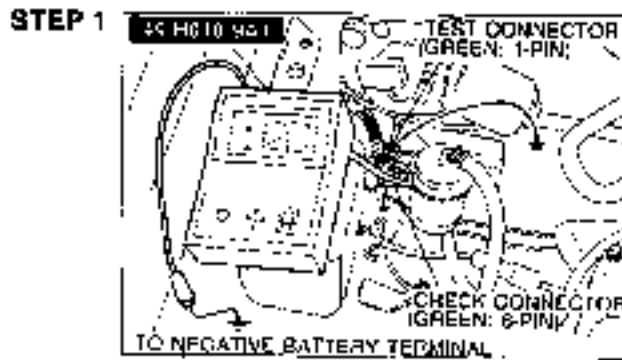
2H-UP-007

STEP 7



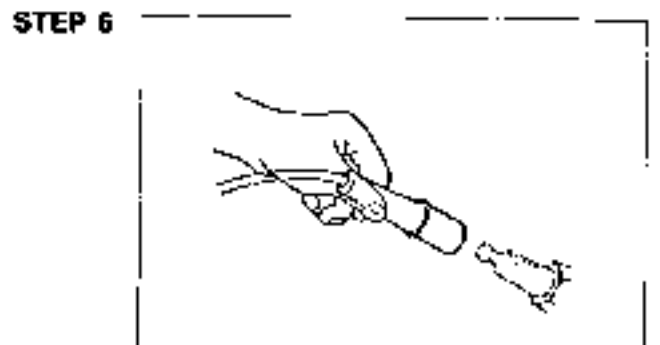
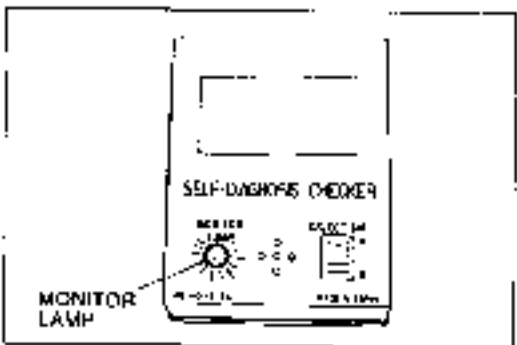
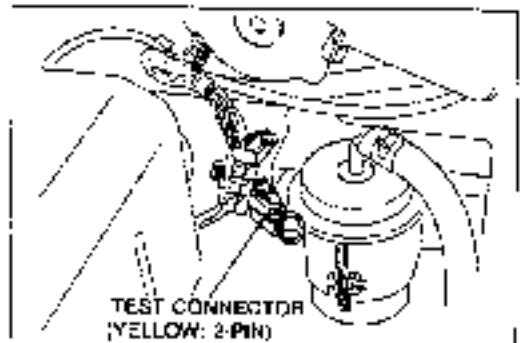
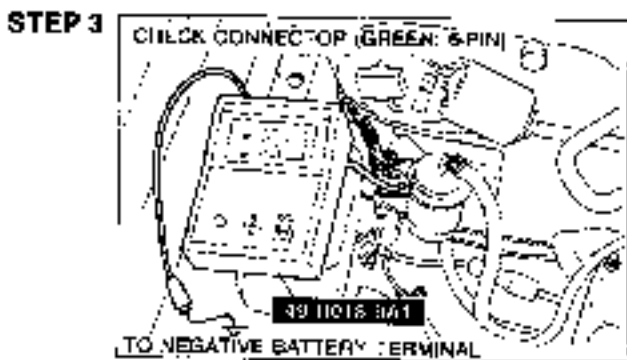
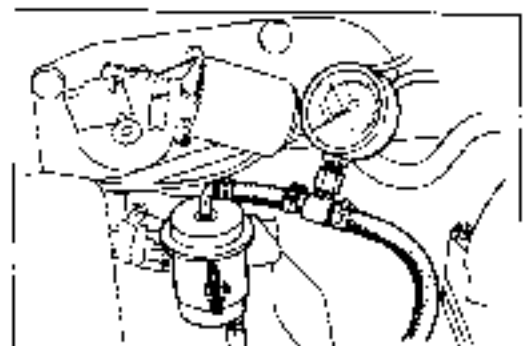
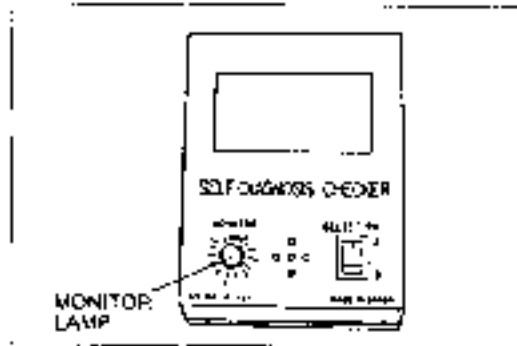


Rough Idle (Only after heat soak)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Run engine at <b>2,000 rpm</b> for more than <b>20 seconds</b> Check for malfunction code with SST (IGN ON Test connector (Green 1 pin) grounded)	Yes	Check for cause by referring to check sequence		F2-122		
		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		F2-134		
		No	Check for cause by referring to check sequence				
3	Check for flashing of SST monitor lamp after warm up  <b>Monitor lamp:</b> Flashes more than <b>8 times 10 seconds</b> at <b>2,000-3,000 rpm</b>  (Test connector (Green 1 pin) not grounded)	Yes	Go to Next Step		F2-183		
		No		Replace oxygen sensor			
4	Disconnect vacuum hose from pressure regulator Check if oxidation improve	Yes	Check components related to pressure regulator control system	Check water thermo sensor	F2-179		
				Check intake air thermosensor	F2-180		
				Check solenoid valve (PSC)	F2-180		
				ECU malfunction (Check (2T) terminal voltage)	F2-175		
		No	Go to Next Step				
5	Run engine at idle and stop 1 Observe fuel pressure for <b>5 minutes</b>  <b>Fuel pressure:</b> More than <b>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	Repair fuel pump malfunction	F2-152
				Check pressure regulator pressure drop	F2-150	Yes	Check injector fuel leakage
		No	Replace pressure regulator		F2-155		
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 (Vref))	Section G	Yes	Replace injector (if step 4 OK)	F2-156
					No	Check spark plug	Section G
					Check high-tension lead	Section G	
		Check distributor cap	Section G				



**STEP 5**

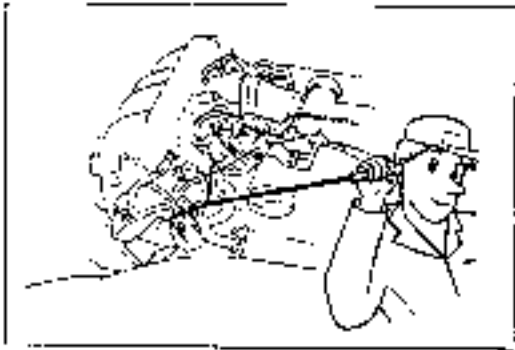
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



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 of injector harness connector (EMINJ-01)	F2-157	Yes
			Terminals Resistance	No	Check injector resistance
			(A7)-(LG#)		F2-157
			(B7)-(LG#) 8-80		
8	Change lube to specified grade	Yes		Poor fuel quality	
		No	Go to Next Step		
	Check if condition improves				
9				ECU malfunction	

13U0F3-14

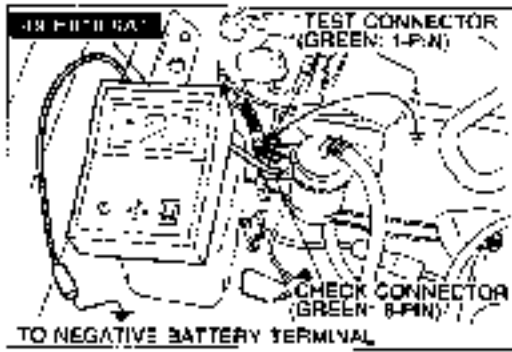
STEP 7



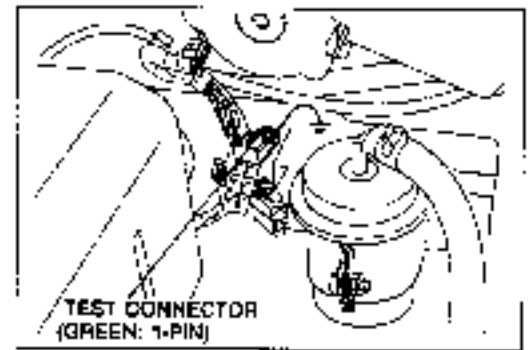
Rough idle just after starting							
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION				
1	Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence	F2-122			
		No	Go to Next Step				
2	Check idle switch with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step	F2-124			
		No	Check for cause by referring to check sequence				
3	Check ignition timing at idle after warm up  Ignition timing: BTDC 4-6° (G5) 5-7° (F2)  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step	F2-117			
		No	Adjust ignition timing				
4	Check idle speed after warm up  Idle speed: 730-770 rpm (M/T) 750-790 rpm (A/T, P range)  [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step	F2-118			
		No	Try to adjust idle speed		Yes	Idle speed (misadjustment)	
					No	Check accelerator cable free play	F2-138
					Check ISC valve (Stuck closed)	F2-142	
Check throttle body	F2-136						
5	Substitute a well-known ECU Check if condition improves	Yes		ECU malfunction			
		No	Check voltage at ECU (1C) terminal with SST  Voltage: Approx. 10V (While cranking)	F2-175	Yes	Go to Next Step	
				No	Check starter interlock switch	Section G	
				Check related wiring			
B				Poor quality engine oil			

ZBU0-E-006

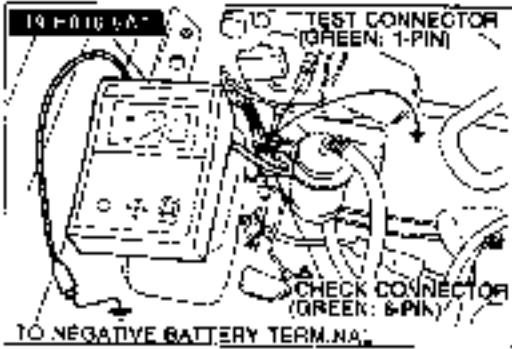
STEP 1



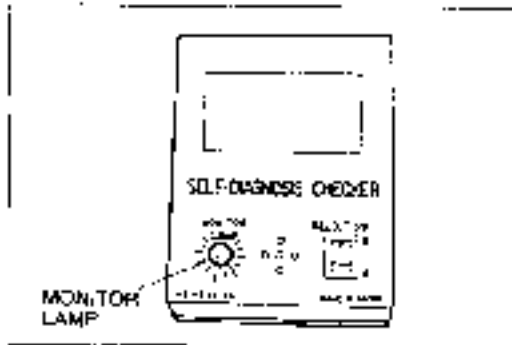
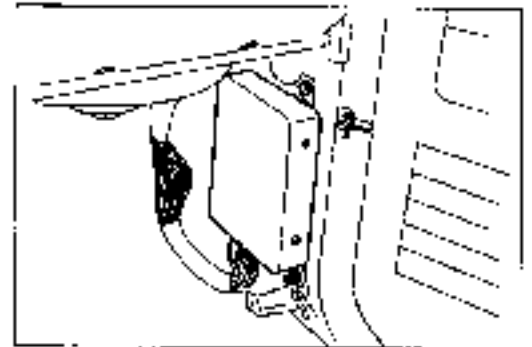
STEP 4



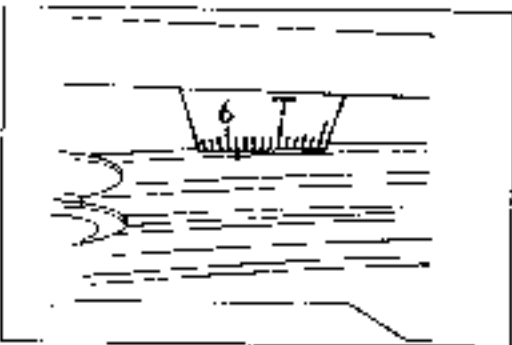
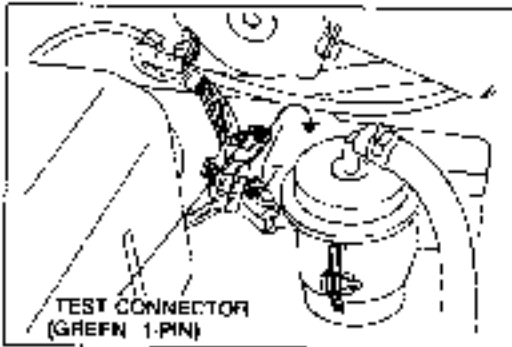
STEP 2



STEP 5



STEP 3



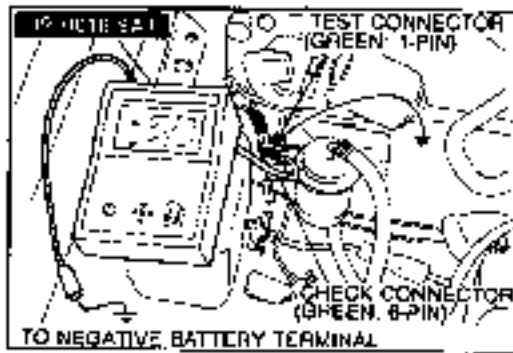
Low idle speed (When A/C, P/S, E/L is ON)				
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction with SST (IGN ON, test connector (Green: 1-pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122
		No	Go to Next Step	
2	Disconnect IBC valve connector at idle Check if the condition does not change	Yes	Go to Next Step	F2-116 F2-116
		No		
3	Check switches with SST Idle switch Neutral switch Clutch switch (IGN ON, Test connector (Green: 1-pin) grounded)	Yes	Go to Next Step	F2-134
		No	Check for cause by referring to check sequence	
4	Check continuity between test connector (Green: 1-pin) and ground		Wiring short to ground	

28U0F2-045

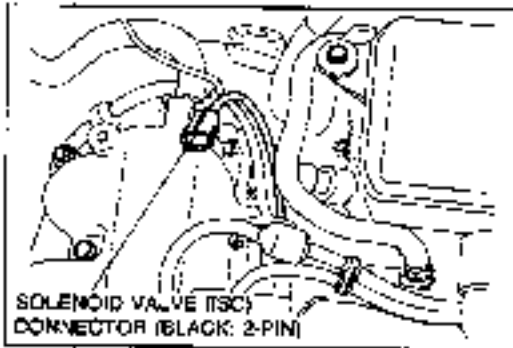
**Note:**

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.)

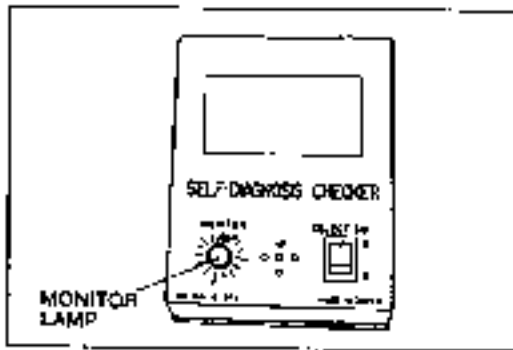
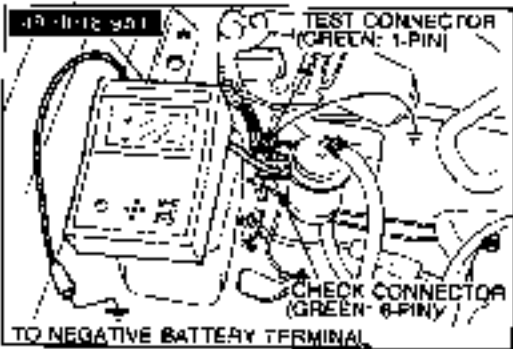
STEP 1



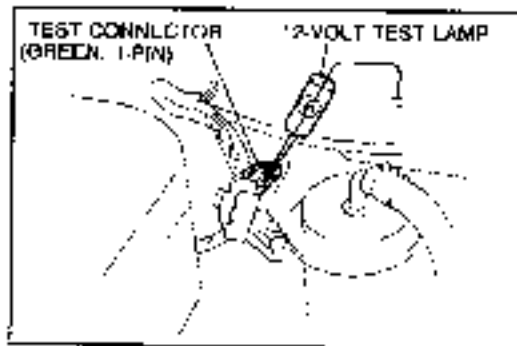
STEP 2



STEP 3



STEP 4





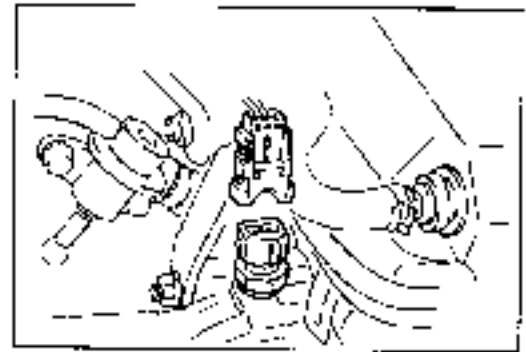
High idle speed after warm up			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST (IGN ON, Test connector (Green: 1 pin) grounded)	Yes	Check for cause by referring to check sequence <b>F2-122</b>
		No	Go to Next Step
2	Check gap on timing at idle after warm up.  Ignition timing: BTDC 4-5° (G6) 5-7° (F2)  (Test connector (Green: 1 pin) grounded)	Yes	Go to Next Step
		No	Adjust ignition timing <b>F2-117</b>
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 <b>F2-137</b>
4	Check idle speed after warm up  Idle speed: 730-770 rpm (M/T) Idle speed: 750-790 rpm (A/T, P range)  (Test connector (Green: 1-pin) grounded)	Yes	Check ISC valve <b>F2-142</b>
		No	Try to adjust idle speed <b>F2-118</b>  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 <b>F2-142</b>
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.
		No	Go to Next Step
7			EGR malfunction

28UZF2-000

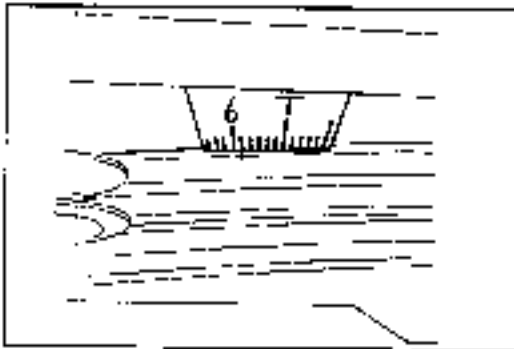
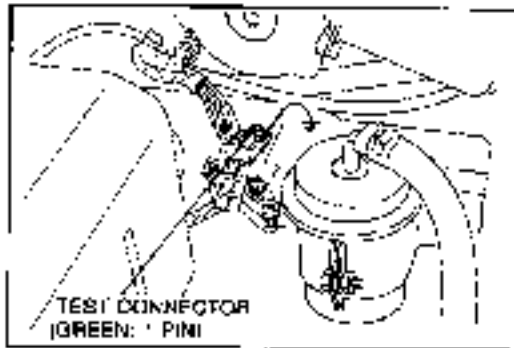
STEP 1



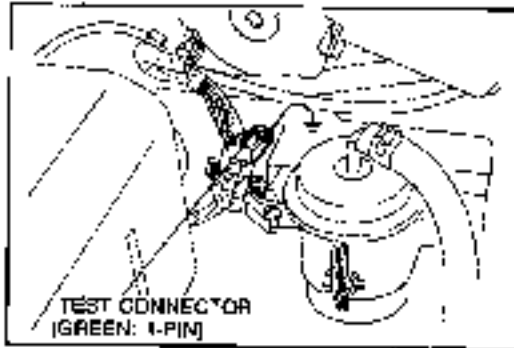
STEP 6



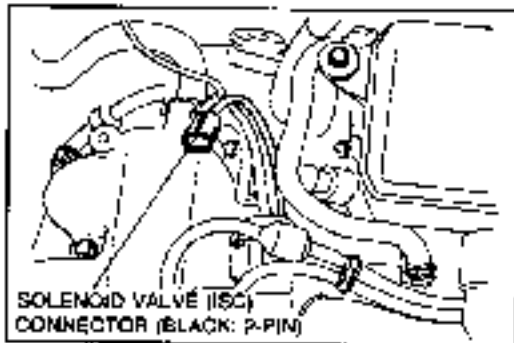
STEP 2



STEP 4



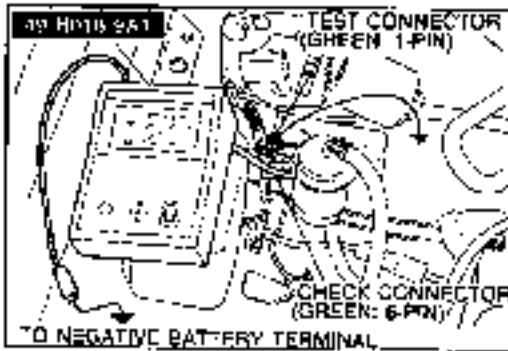
STEP 5



Idle hunting or surging					
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION		
1	(If trouble occurs only at warm condition) Run engine at 2,000 rpm for more than 20 seconds 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	(If trouble occurs only at warm condition) Check for flicking of SST monitor lamp after warm up  <b>Monitor lamp:</b> Flashes more than 8 times 10 seconds at 2,000—3,000 rpm  (Test connector (Green: 1-pin) not grounded)	Yes	Go to Next Step		
		No		Replace oxygen sensor F2-183	
3	Check intake manifold vacuum at idle  <b>Vacuum: G8 500—540 mmHg (19.7—21.3 inHg)</b> <b>F2 510—550 mmHg (20.1—21.7 inHg)</b>	Yes	Go to Next Step		
		No	Check for air leaks F2-137	Yes Intake air system components damaged Vacuum and air intake hoses loose or damaged Bulbs or nuts loose Gaskets damaged F2-137	
4	Check PCV hose Check if condition improves	Yes		Check throttle body F2-138	
		No	Go to Next Step	Check PCV valve F2-183	
5	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 for fuel leaks		
		Substitute a good fuel filter and retest	Yes	Replace fuel filter	F2-149
		Check fuel pump maximum pressure  <b>Fuel pump maximum pressure:</b> 441—568 kPa (4.5—6.0 kg/cm <sup>2</sup> , 64—85 psi)	Yes F2-144	Replace pressure regulator F2-155	No Replace fuel pump F2-152
6			ECU malfunction		

28J0-2-310

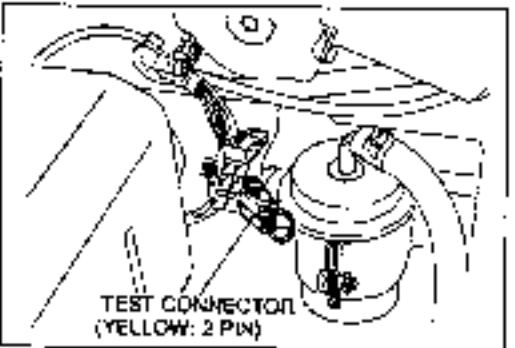
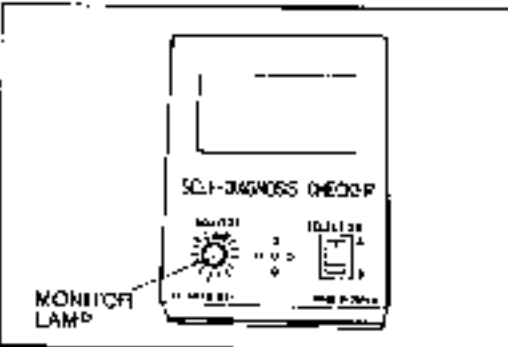
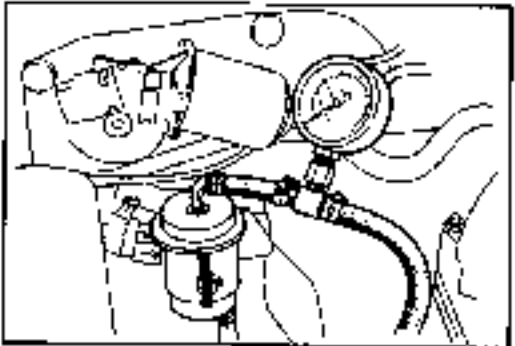
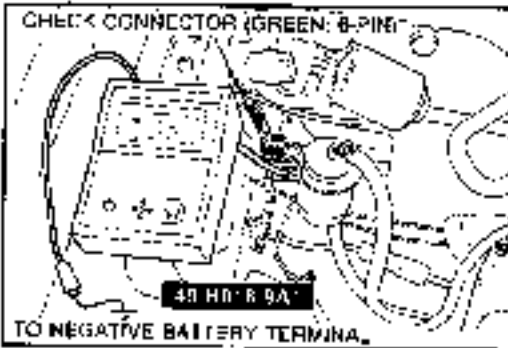
STEP 1



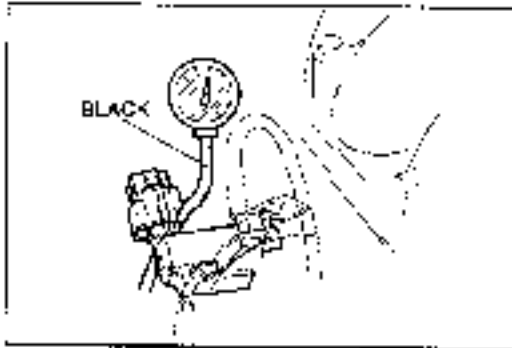
STEP 5

**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

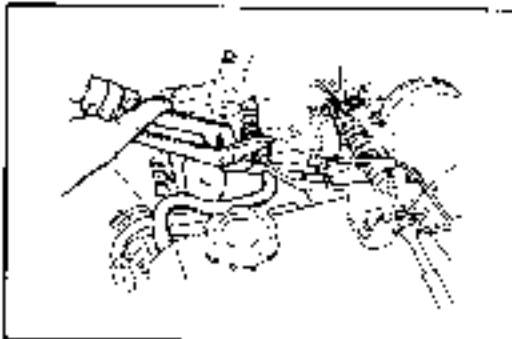
STEP 2



STEP 3

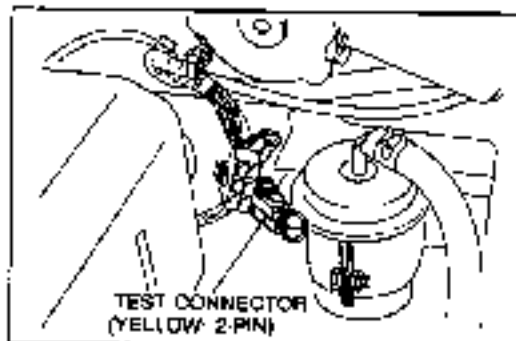
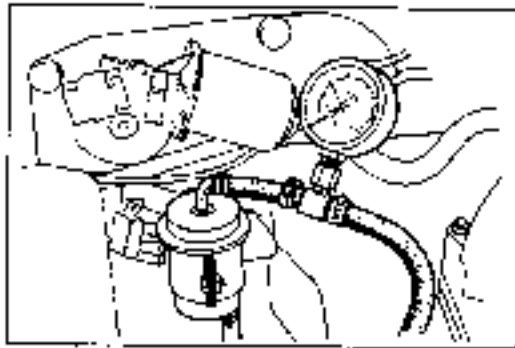
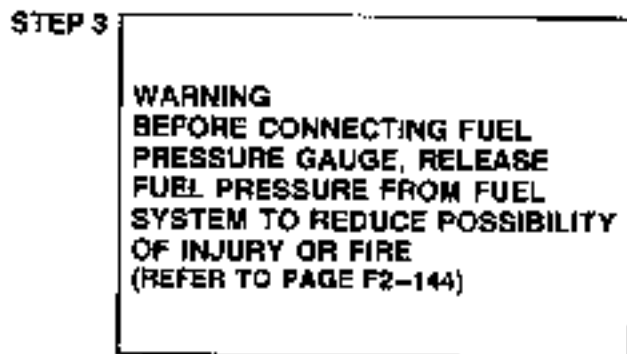
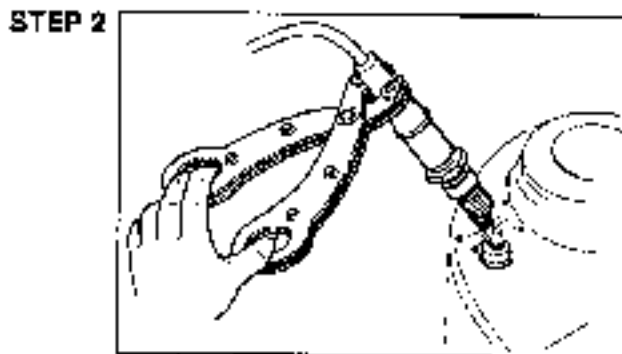
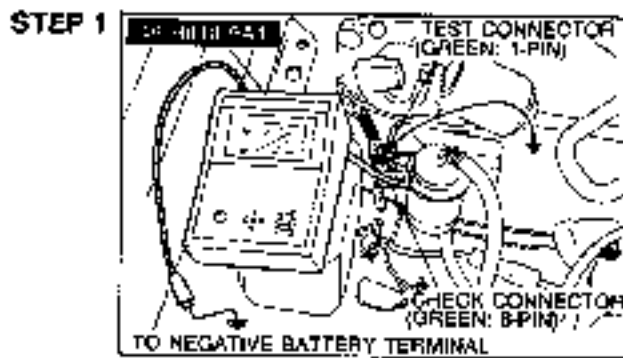


STEP 4



Engine start 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 Check high-tension lead Check distributor cap	Section G Section G Section G
3	Check fuel line pressure [IGN ON, Test connector (Yellow, 2-pin) connected]  Fuel line pressure: 285—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—46 psi)	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	F2-148
Check fuel pump maximum pressure	F2-144	Yes	Reduce pressure regulator	F2-155		
		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			

13UJ2-218

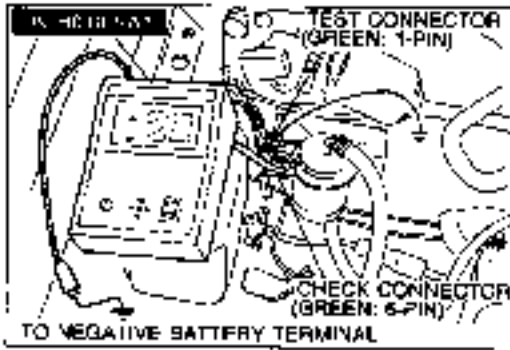


## Engine stall at idle (Only when engine is cold)

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
		Yes	No	
1	Check for malfunction code with SST [IGN ON. Test connector (Green: 1-5 n) grounds:)]	Yes	Check for cause by referring to check sequence	F2-122
		No	Go to Next Step	
2				Check RAD valve (air valve)
3				ECU malfunction

13UJF2-019

STEP 1

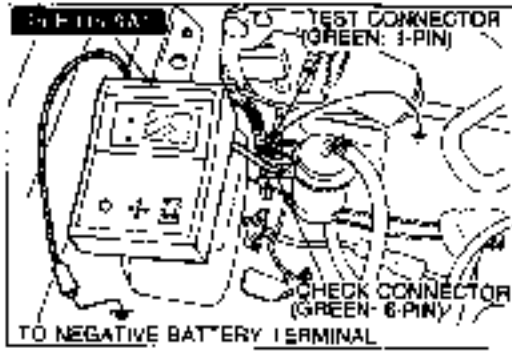




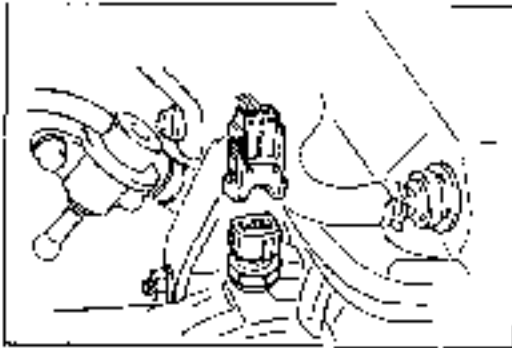
Engine stall at idle (Only when engine is warm)						
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SS* (IGN ON, Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122		
		No	Go to Next Step			
2	Disconnect 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 (turner or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes No	Check water thermosensor Poor contact of water thermosensor connector	F2-179
		No	Go to Next Step			
3				ECU malfunction		

18U0F2-030

STEP 1



STEP 2



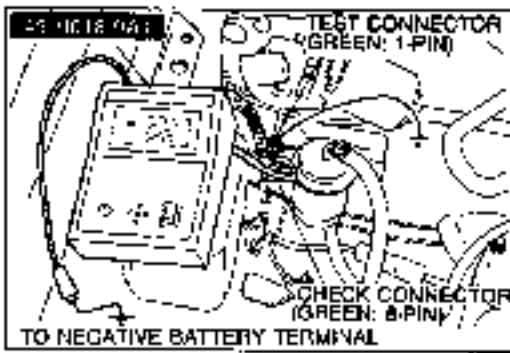
Engine stall at idle (When A/C, P/S, E/L is ON)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST (IGN ON, Test connector (Green, 1-pin) grounded)	Yes	Check for cause by referring to check sequence: <b>F2-122</b>
		No	Go to Next Step
2	Check 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	Check ISC valve: <b>F2-142</b> Check engine oil: <b>F2-116</b>
4	Check idle speed after warm up:  Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)  (Test connector (Green, 1-pin) grounded)	Yes	Go to Next Step
		No	Adjust idle speed: <b>F2-118</b>
5			ECU malfunction

2810P2-011

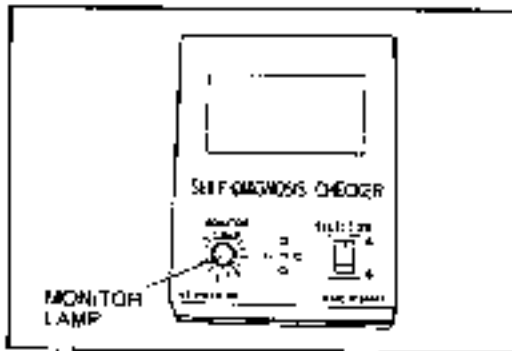
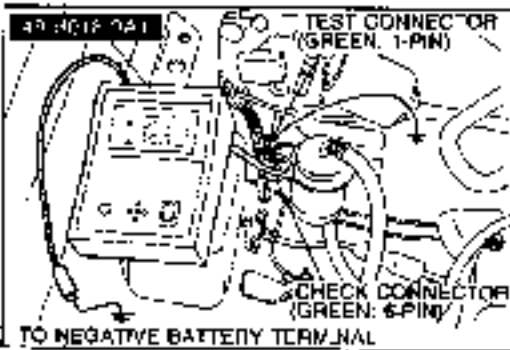
**Note:**

Engine stalls at idle with A/C ON, if the trouble cannot be fixed after checking above steps, it may be A/C compressor malfunction (See Section U).

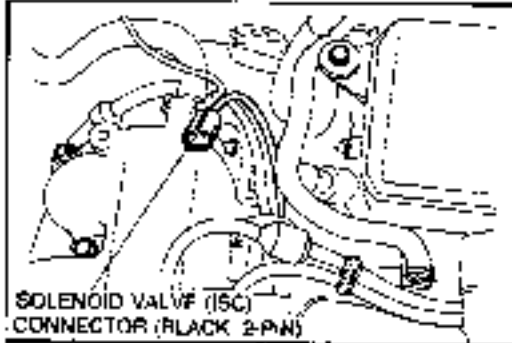
STEP 1



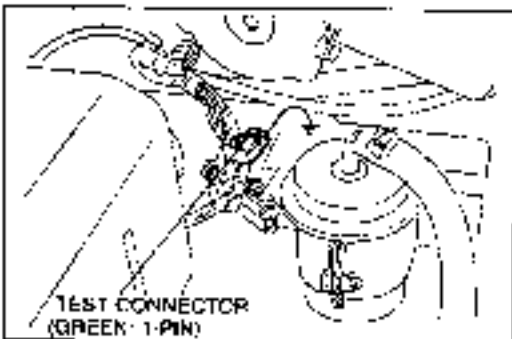
STEP 2



STEP 3



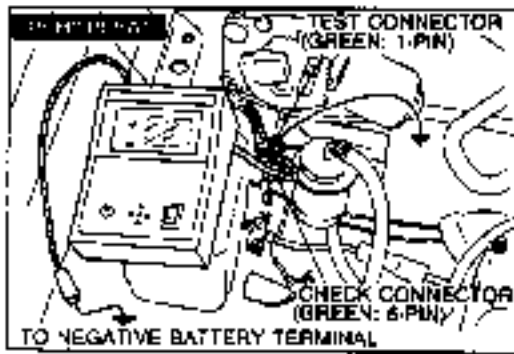
STEP 4



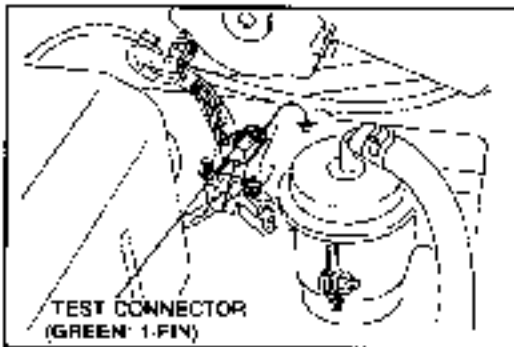
Engine stall during start up						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST (IGN ON, Test connector (Green: 1-pin) grounded)	Yes	Check for cause by referring to check sequence		F2-122	
		No	Go to Next Step			
2	Check idle speed after warm up  idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)  (Test connector (Green: 1-pin) grounded)	Yes	Go to Next Step			
		No	Adjust idle speed			F2-116
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 Check wiring
		Terminal Resistance				
	B <sup>+</sup> —(LGR) B <sup>-</sup> —(LGR)	B—BU				
4	Check ignition timing at idle after warm up  Ignition timing: BTDC 4—8° (G6) 5—7° (F2)  (Test connector (Green: 1-pin) grounded)	Yes	Go to Next Step			
		No	Adjust ignition timing			F2-117
5		ECU malfunction				

2000-010

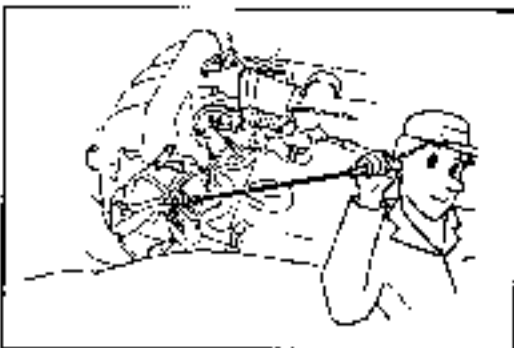
STEP 1



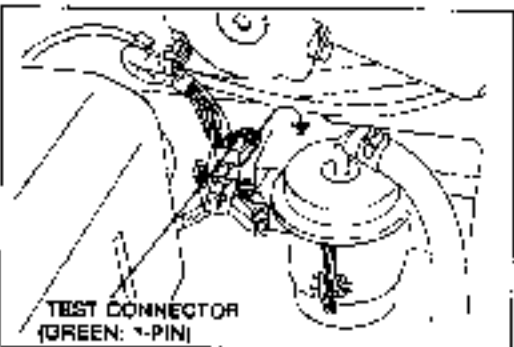
STEP 2



STEP 3



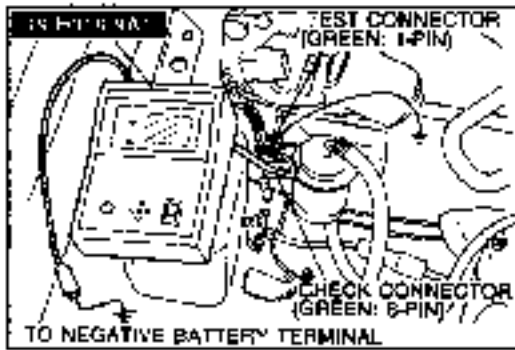
STEP 4



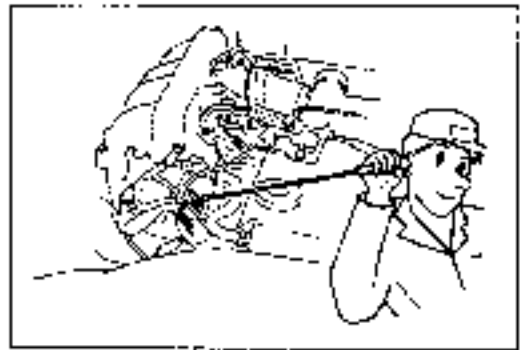
Engine stall on deceleration

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [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 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	F2-163		
4	Check for fuel cut operation during deceleration  <b>Fuel cut: after warm up</b> <b>Above 1,800 rpm (G6)</b> <b>Above 1,900 rpm (F2)</b>	Yes	Go to Next Step				
		No	Check water thermometer	F2-179	Yes	Replace ECU	F2-175
				No	Replace water thermometer	F2-179	

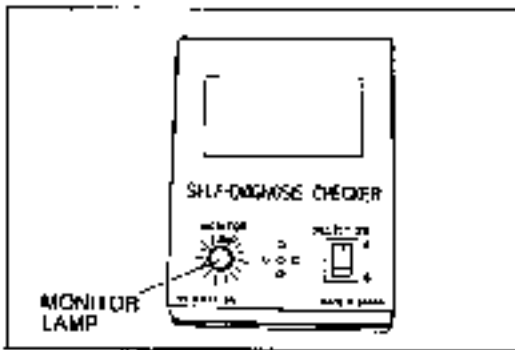
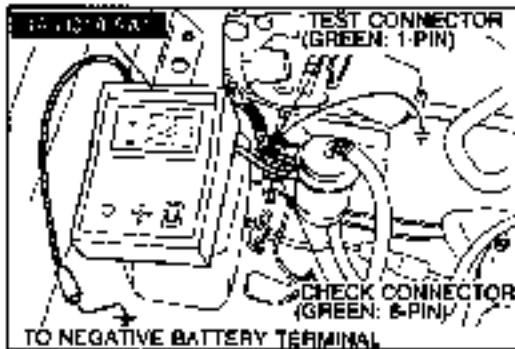
STEP 1



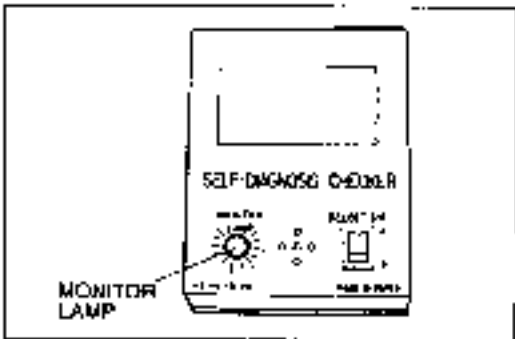
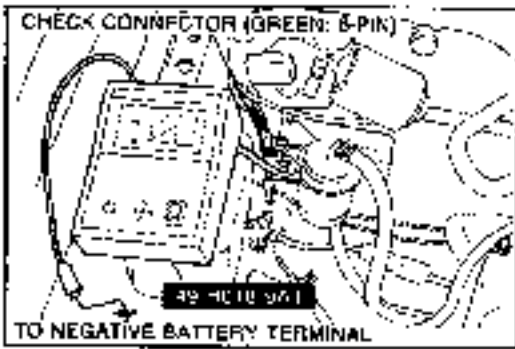
STEP 4



STEP 2



STEP 3



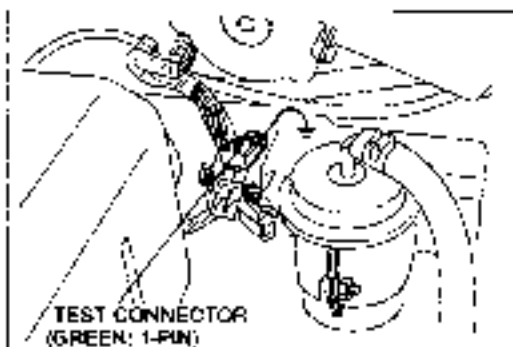


### Engine stall on deceleration (Cont'd)

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
5	Check idle speed after warm up  Idle speed: 730—770 rpm (M/T) 750—790 rpm (A/T, P range)  [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  Ignition timing: BTDC 4—8° (GB) 5—7° (F2)  [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step	F2-117
		No	Adjust ignition timing	
7			Check ISC valve	F2-142

2B-J0F2-313

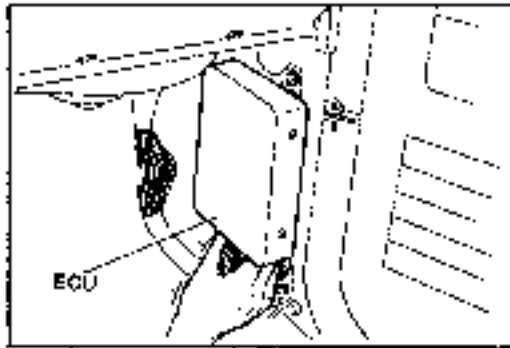
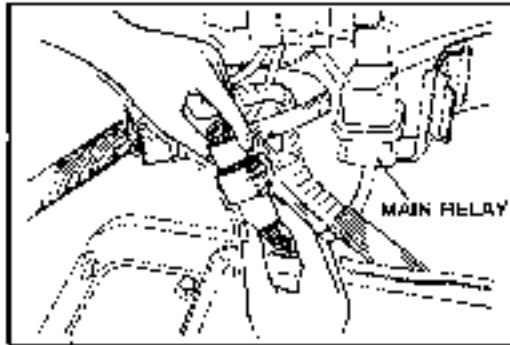
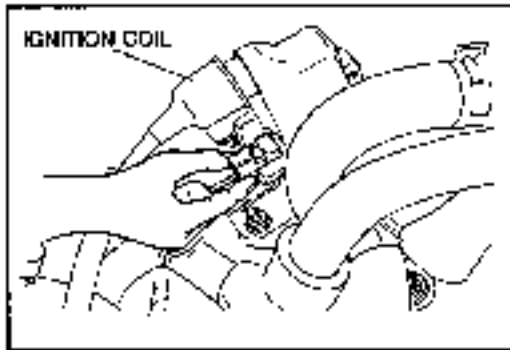
STEP 5  
6



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

15J0F2 028

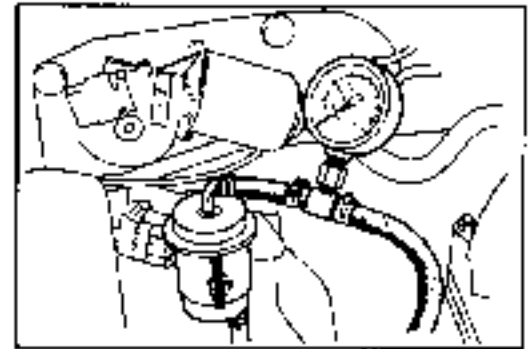
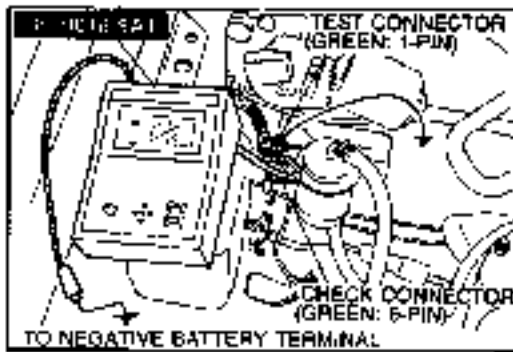
STEP 1



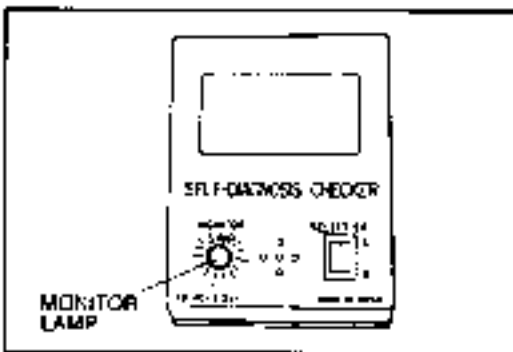
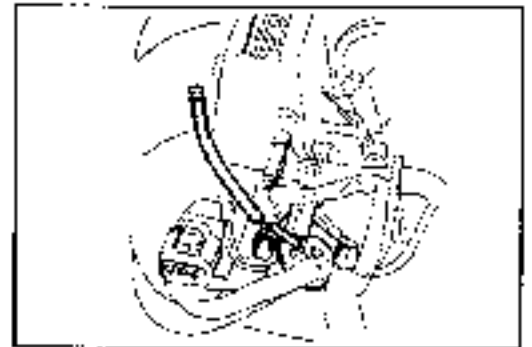
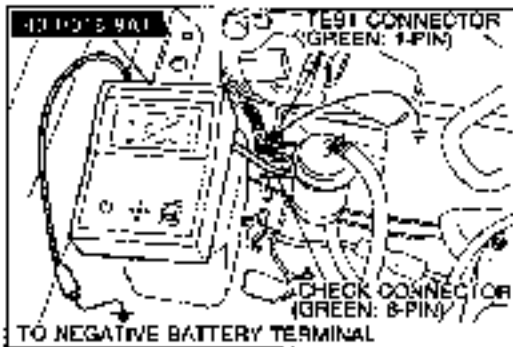
Hesitates/Stumbles on acceleration						
QUICK	INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction code with SST (IGN ON Test connector (Green: 1-p) grounded)	Yes	Check for cause by referring to check sequence		F2-122	
		No	Go to Next Step			
2	Check idle switch with SST (IGN ON Test connector (Green: 1-p) grounded)	Yes	Go to Next Step			
		No	Check for cause by referring to check sequence		F2-134	
3	Disconnect oxygen sensor connector. Check if condition improves	Yes		Check oxygen sensor	F2-182	
		No	Go to Next Step			
4	Check fuel line pressure while accelerating (Vacuum hose to pressure regulator disconnected)  Fuel line pressure: Keep 265—314 kPa 2.7—3.2 kg/cm <sup>2</sup> , 39—45 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	
Replace pressure regulator	F2-155					
5	Check for air leaks with throttle valve open by listening for sucking noise	Yes		Intake air system components damaged Vacuum and intake air hoses loose or damaged Bolt or nut loose Gaskets damaged	F2-197	
		No	Go to Next Step			
6	Substitute a well-known ECU. Check if condition improves	Yes		ECU malfunction		
		No		Check air flow sensor	F2-179	
				Check throttle body	F2-138	
		Check spark plug	Section G			
7	Check other systems			Check ECU	Section H	

20107409

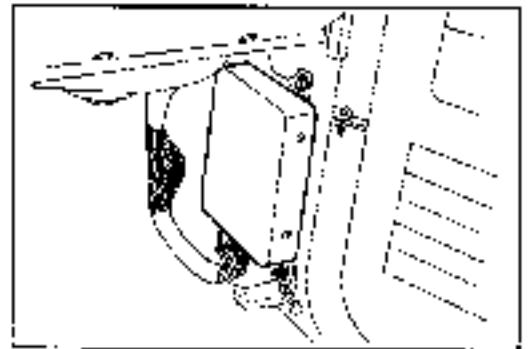
STEP 1



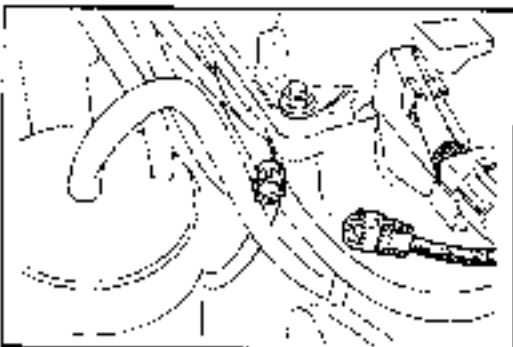
STEP 2



STEP 5



STEP 3



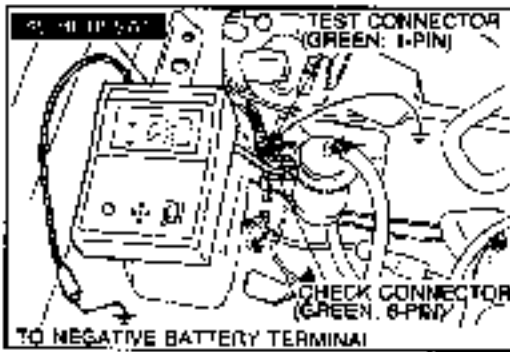
STEP 4

**WARNING**  
 BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

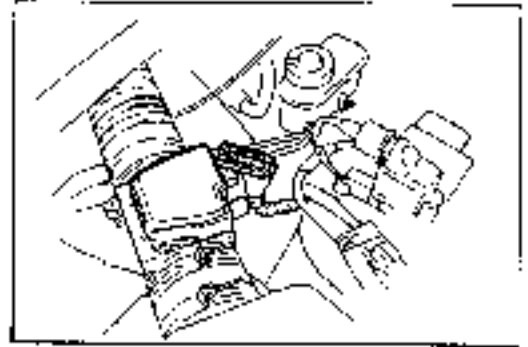
Hesitates at steady speed				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction code with SST (IGN ON. Test connector (Green: 1-5r) grounded).	Yes	Check for cause by referring to check sequence <b>F2-122</b>	
		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	
Gaskets 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	Yes	Check fuel line for clogging
			No	Replace fuel filter <b>F2-149</b>
		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>	
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		

201.0F2447

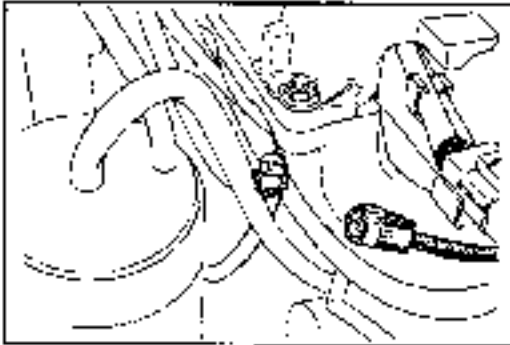
STEP 1



STEP 5

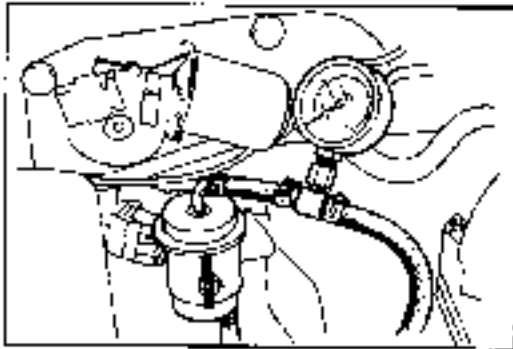


STEP 2



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)**

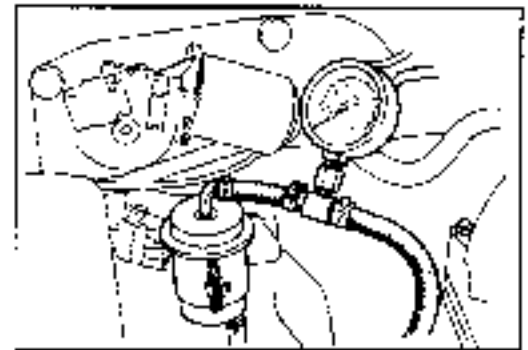
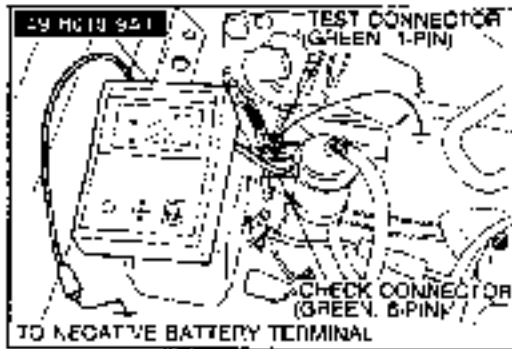




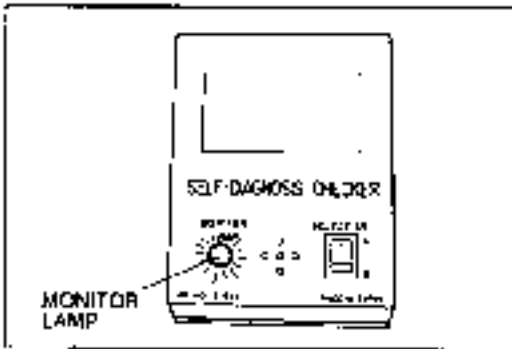
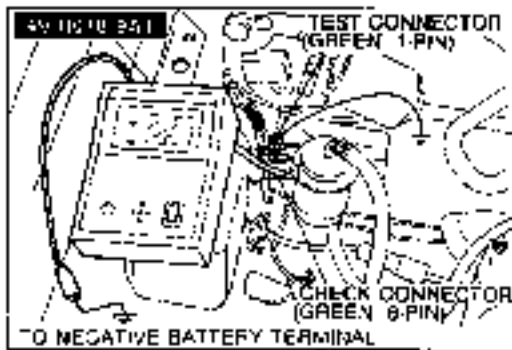
Jerking on acceleration											
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION								
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction cable with SST [IGN ON. Test connector (Green 1-pin) grounded].	Yes	Check for cause by referring to check sequence	F2-122							
		No	Go to Next Step								
2	Check idle 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	F2-194							
3	Disconnect oxygen sensor connector. Check if condition improves.	Yes		Check oxygen sensor F2-182							
		No	Go to Next Step								
4	Check fuel line pressure while accelerating (Vacuum hose to pressure regulator disconnected).  Fuel line pressure: Keeps 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	<table border="1"> <tr> <td>Yes</td> <td>Check fuel line for clogging</td> <td></td> </tr> <tr> <td>No</td> <td>Replace fuel filter</td> <td>F2-149</td> </tr> <tr> <td></td> <td>Replace pressure regulator</td> <td>F2-156</td> </tr> </table>	Yes	Check fuel line for clogging		No	Replace fuel filter	F2-149	
Yes	Check fuel line for clogging										
No	Replace fuel filter	F2-149									
	Replace pressure regulator	F2-156									
5	Check for air leaks with throttle valve open by listening for sucking noise	Yes		<table border="1"> <tr> <td>Intake air system components damaged</td> <td rowspan="4">F2-137</td> </tr> <tr> <td>Vacuum and intake air hoses loose or damaged</td> </tr> <tr> <td>Belts or pulleys loose</td> </tr> <tr> <td>Gaskets disassembled</td> </tr> </table>	Intake air system components damaged	F2-137	Vacuum and intake air hoses loose or damaged	Belts or pulleys loose	Gaskets disassembled		
		Intake air system components damaged	F2-137								
Vacuum and intake air hoses loose or damaged											
Belts or pulleys loose											
Gaskets disassembled											
No	Go to Next Step										
6	Substitute a well-known ECU. Check if condition improves	Yes		ECU malfunction							
		No		<table border="1"> <tr> <td>Check airflow sensor</td> <td>F2-179</td> </tr> <tr> <td>Check throttle body</td> <td>F2-138</td> </tr> <tr> <td>Check spark plug</td> <td>Section G</td> </tr> <tr> <td>Clutch slipping</td> <td>Section H</td> </tr> </table>	Check airflow sensor	F2-179	Check throttle body	F2-138	Check spark plug	Section G	Clutch slipping
Check airflow sensor	F2-179										
Check throttle body	F2-138										
Check spark plug	Section G										
Clutch slipping	Section H										
7	Check other systems										

2001 P&A

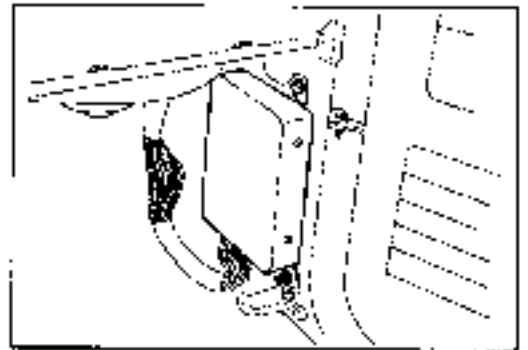
STEP 1



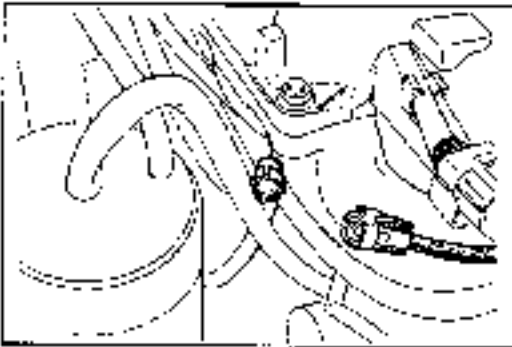
STEP 2



STEP 6



STEP 3



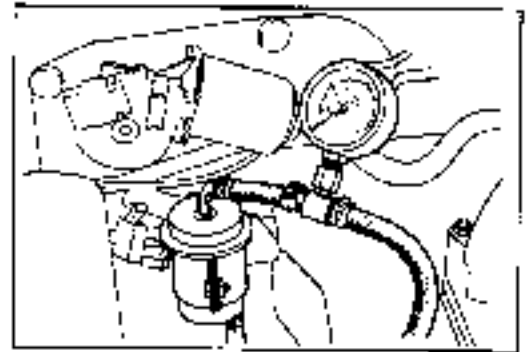
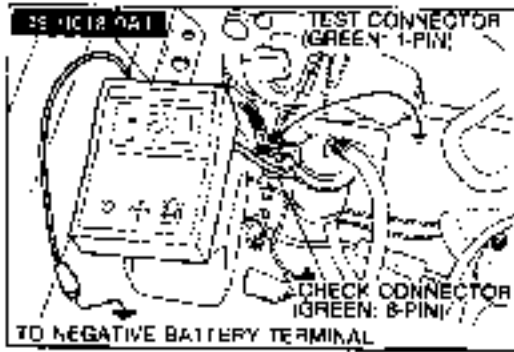
STEP 4

**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**

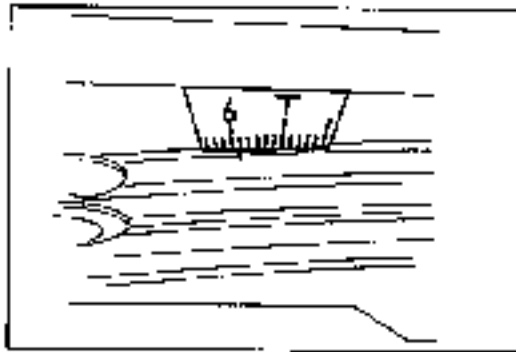
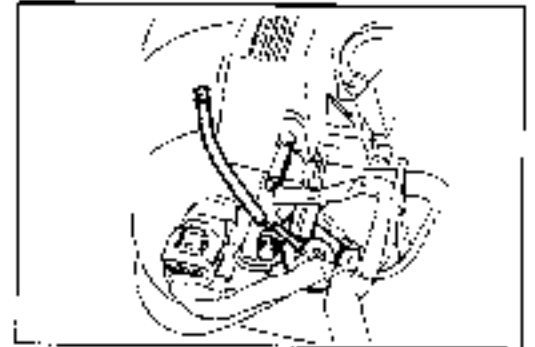
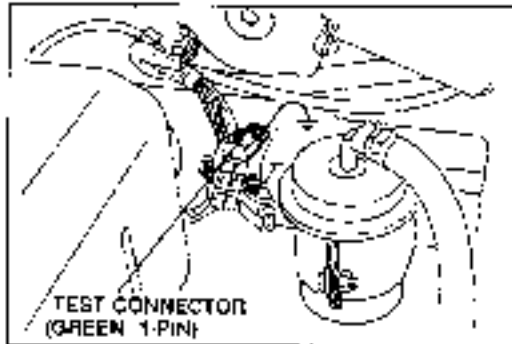
Knocking					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check malfunction code with SST (IGN ON, Test connector (Green: 1-pin) grounded)	Yes	Check for cause by referring to the check sequence	F2-122	
		No	Go to Step 2		
2	Check ignition timing at idle after warm up  Ignition timing: 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 thermometer connector Check if condition improves	Yes		Check water thermometer	F2-178
		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  Fuel line pressure: Keeps 255-314 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
					F2-149
					F2-152
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	

2R-JF2-0-1

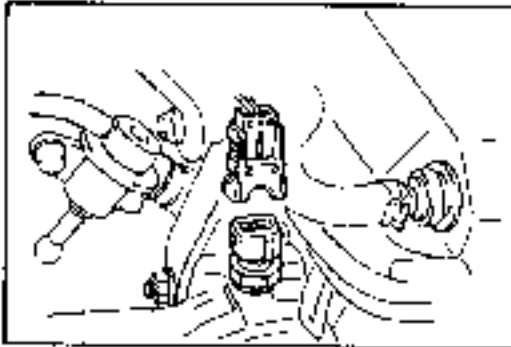
STEP 1



STEP 2



STEP 3

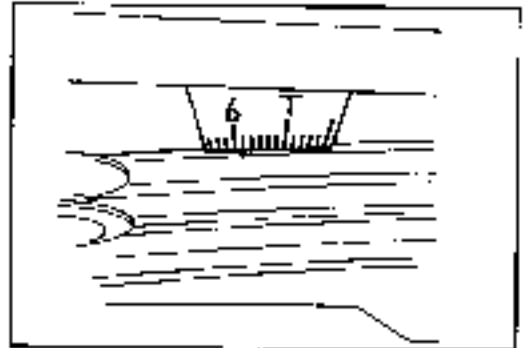


STEP 5

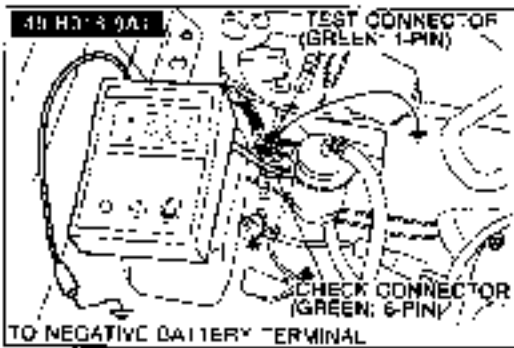
**WARNING**  
 BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

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		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 check sequence		F2-134		
3	Disconnect high-tension lead of each cylinder or idle. Check if engine condition changes [ISC valve connector disconnected]	Yes	Go to Next Step				
		No	Check ignition system (Refer to ignition system troubleshooting (M strc))	Section G	Yes	Replace injector	F2-158
				No	Check spark plug	Section G	
					Check high-tension	Section G	
Check distributor cap	Section G						
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		F2-117		
5	Check for air leaks by listening for sucking noises	Yes			Intake air system components damaged Vacuum and air intake hoses loose or damaged Nuts or bolts loose Gasket damaged	F2-137	
		No	Go to Next Step				
6	Observe fuel line pressure while accelerating from idle  <b>Fuel line pressure:</b> Keeps 285-314 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	F2-155	
Yes	Replace fuel filter			F2-149			

STEP 1

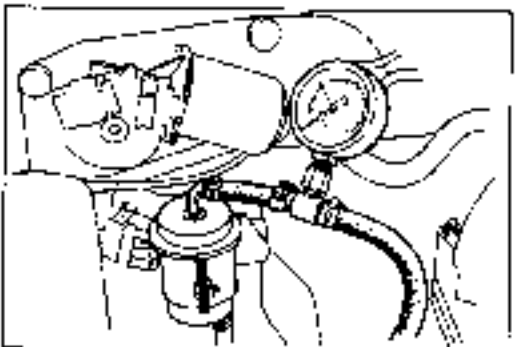
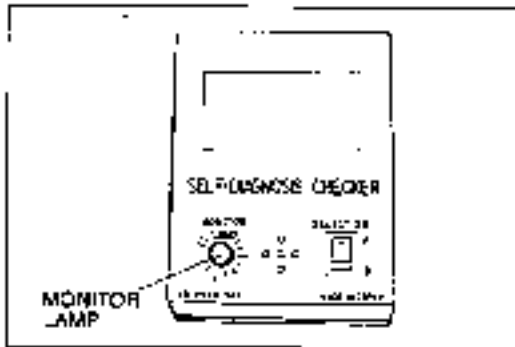


STEP 2

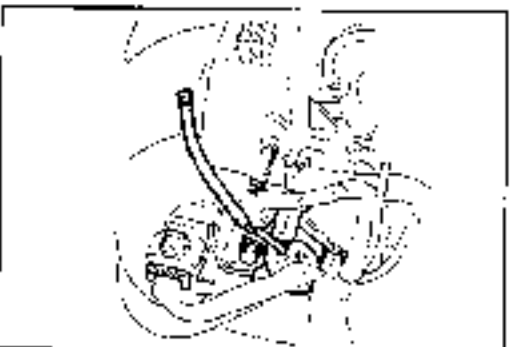
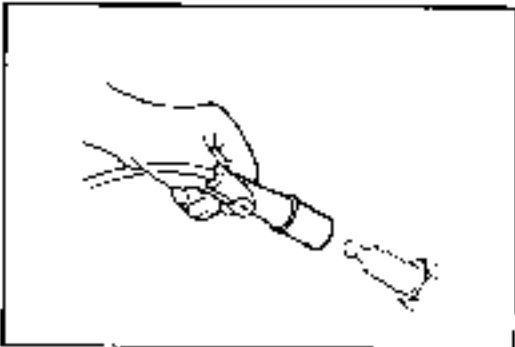


STEP 6

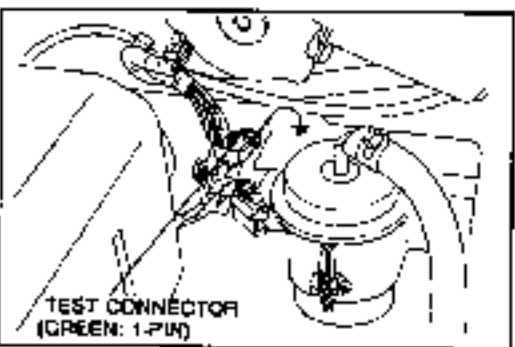
**WARNING**  
**BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)**



STEP 3



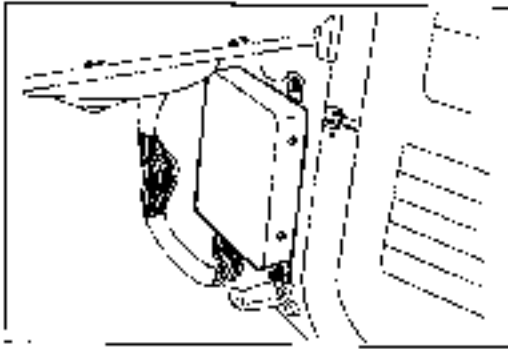
STEP 4



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 for cable free play	F2-138	Yes	Check airflow sensor	F2-179
					No	Adjust	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		

39078-015

STEP 9



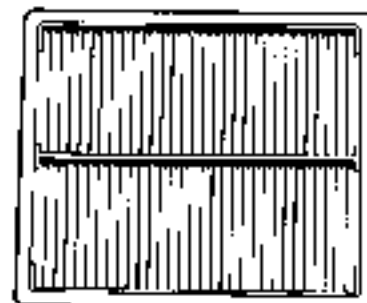


Lack of power													
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION										
1	Check for malfunction code and (only high-altitude) with SST (IGN ON). Test connector (Green 1-pin) grounded.	Yes: Check for cause by referring to check sequence. No: Go to Step 2 (High-altitude). Go to Step 3 (Others).	F2-122										
2	Check ignition timing at idle after warm-up.  Ignition Timing: 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)).	<table border="1"> <tr> <td>Yes: Replace injector (if step 4 OK).</td> <td>F2-156</td> </tr> <tr> <td>No: Check high-tension lead.</td> <td>Section G</td> </tr> <tr> <td>Check distributor cap.</td> <td>Section G</td> </tr> <tr> <td>Check spark plug.</td> <td>Section G</td> </tr> </table>	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		
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 (E-MINJ-C1). <b>Terminal Resistance</b> (BT)-(LGB) 8-8Ω (BT)-(LGR) 8-8Ω	<table border="1"> <tr> <td>Yes: Check wiring short or open.</td> <td></td> </tr> <tr> <td>No: Check injector resistance.</td> <td>F2-157</td> </tr> <tr> <td>Check wiring short or open.</td> <td></td> </tr> </table>	Yes: Check wiring short or open.		No: Check injector resistance.	F2-157	Check wiring short or open.					
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:	<table border="1"> <tr> <td>Intake air system</td> <td>F2-137</td> </tr> <tr> <td>Components damaged</td> <td></td> </tr> <tr> <td>Vacuum and air intake hoses loose or damaged</td> <td></td> </tr> <tr> <td>Nuts or links loose</td> <td></td> </tr> <tr> <td>Gasket damaged</td> <td></td> </tr> </table>	Intake air system	F2-137	Components damaged		Vacuum and air intake hoses loose or damaged		Nuts or links loose		Gasket damaged	
Intake air system	F2-137												
Components damaged													
Vacuum and air intake hoses loose or damaged													
Nuts or links loose													
Gasket damaged													

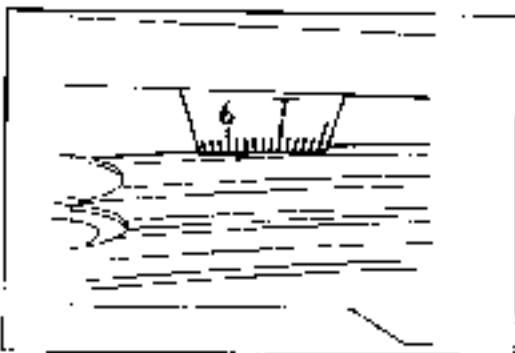
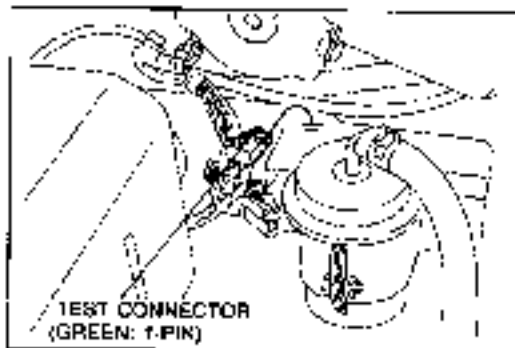
STEP 1



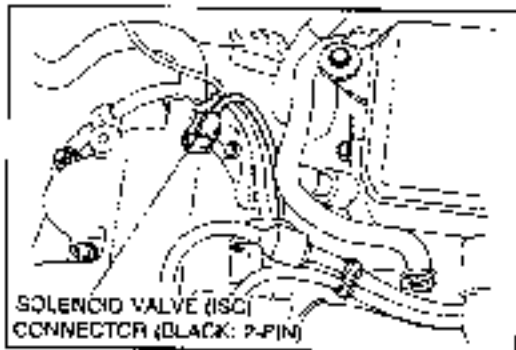
STEP 5



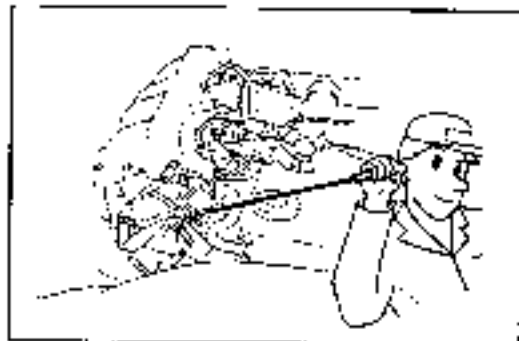
STEP 2



STEP 3



STEP 4

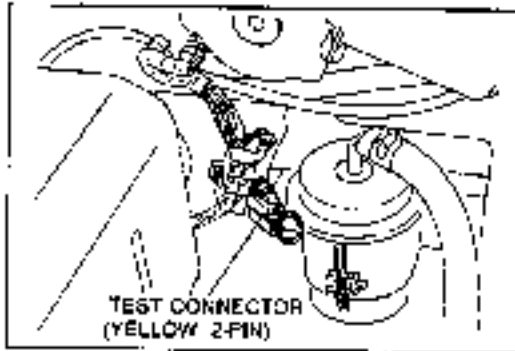
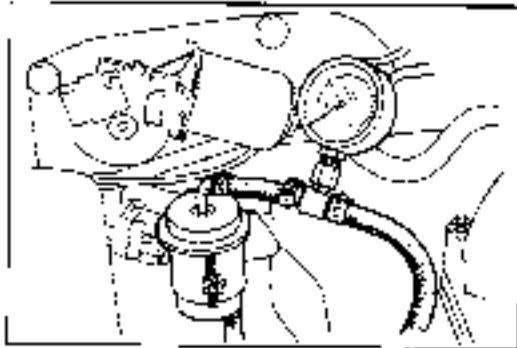


Lack of power (Cont'd)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Check fuel line pressure (IGN ON. Test connector (Yellow 2-pin) connected).  Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm <sup>2</sup> , 38—46 psi)	Yes	Go to Next Step			
		No	Check for fuel leakage			
			Substitute a good fuel filter and retest	Yes	Repair fuel filter	F2-149
			Check fuel pump maximum pressure	F2-150	Yes	Replace pressure regulator
		No	Replace fuel pump	F2-152		
		Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm <sup>2</sup> , 64—85 psi)				
8	Check fuel line pressure at idle  Fuel line pressure: 216—264 kPa (2.2—2.7 kg/cm <sup>2</sup> , 31—38 psi)	Yes	Go to Next Step			
		No			Replace pressure regulator	F2-155
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	
		No	Go to Next Step			
10	Check exhaust system for damage	Yes	Go to Next Step			
		No	Repair or replace		F2-161	
11	Check A/C, P/S and alternator belts tensions	Yes	Go to Next Step			
		No	Adjust belt tension		Sections B1, B2	
12	Check if accelerator cable is depressed fully	Yes	Go to Next Step			
		No	Check accelerator cable	Yes	Throttle body	F2-138
				No	Accelerator cable	F2-139
13	Substitute a well-known ECU Check if condition improves	Yes			ECU malfunction	
		No			Check airflow sensor	F2-179
					Check throttle sensor	F2-181
					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		

SBL07016

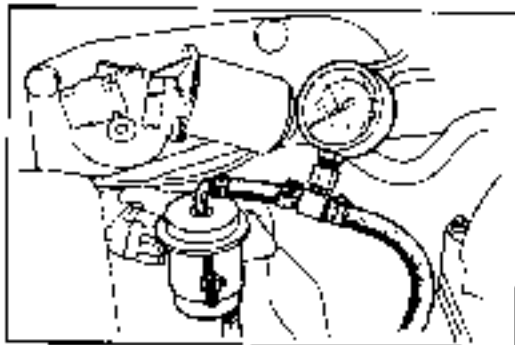
STEP 7

**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**

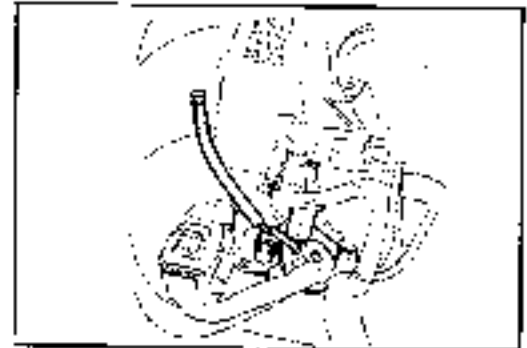


STEP 8

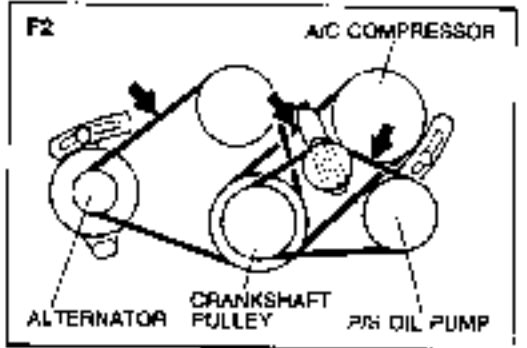
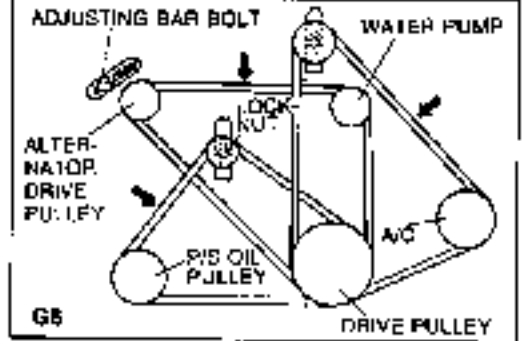
**WARNING**  
**BEFORE CONNECTING FUEL**  
**PRESSURE GAUGE, RELEASE**  
**FUEL PRESSURE FROM FUEL**  
**SYSTEM TO REDUCE POSSIBILITY**  
**OF INJURY OR FIRE**  
**(REFER TO PAGE F2-144)**



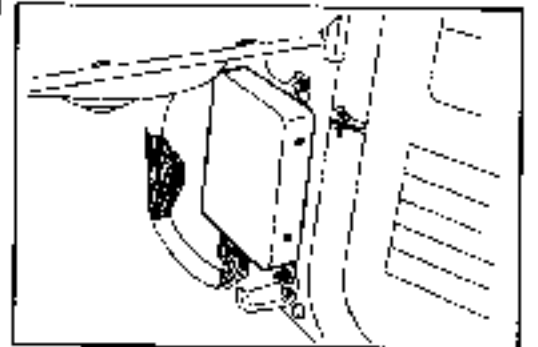
STEP 9



STEP 11



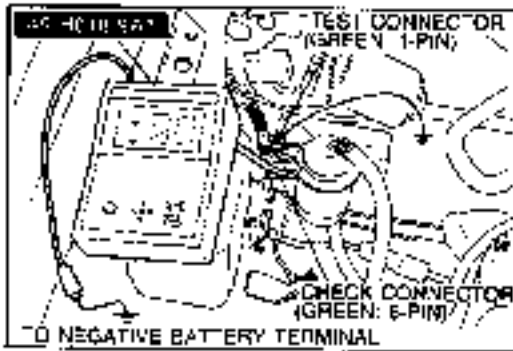
STEP 13



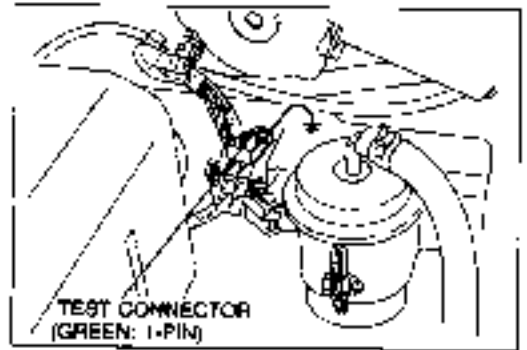
Backing at high speed						
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Run engine at 2,000 rpm for more than 20 seconds. Check for malfunction code with SS1. (IGN ON, Test connector (Green, 1-pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122		
		No	Go to Next Step			
2	Disconnect oxygen sensor connector. Check if condition improves	Yes	Check oxygen sensor	F2-182		
		No	Go to Next Step			
3	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> , 39—46 psi)  [Vacuum hose to pressure regulator disconnected]	Yes	Go to Next Step	F2-155		
		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	F2-137		
		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:</b> BTDC 4—6° (G8) 5—7° (F2)  [Test connector (Green, 1-pin) grounded]	Yes	Go to Next Step	F2-117		
		No	Adjust ignition timing			
6	Gradually open throttle valve from idle check if engine speed increases smoothly	Yes	Go to Next Step	F2-179		
		No			Check airflow sensor	
7			Check spark plug	Section G		
8			ECU malfunction			

X0002-017

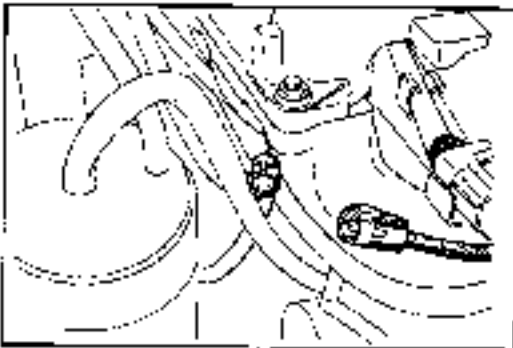
STEP 1



STEP 5

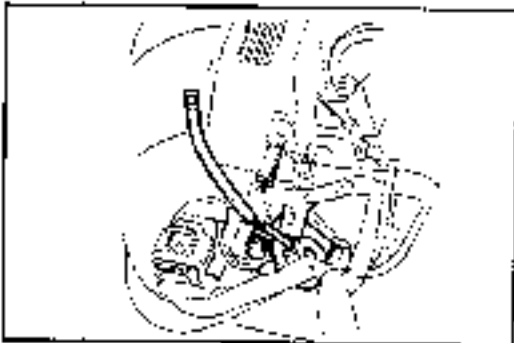
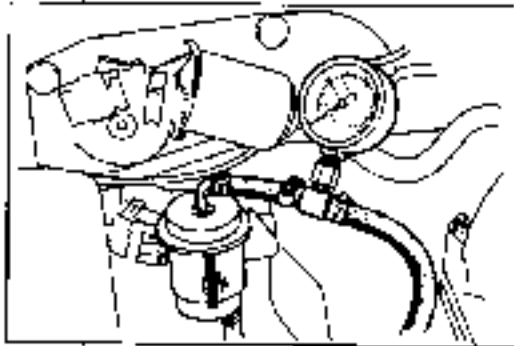


STEP 2



STEP 3

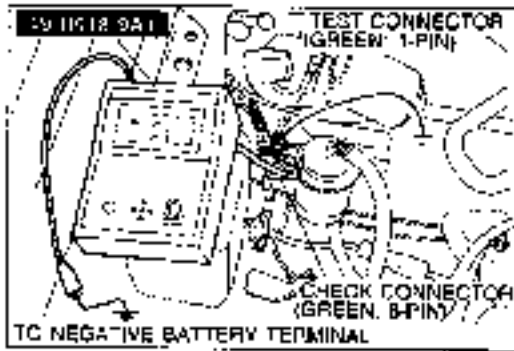
**WARNING**  
 BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



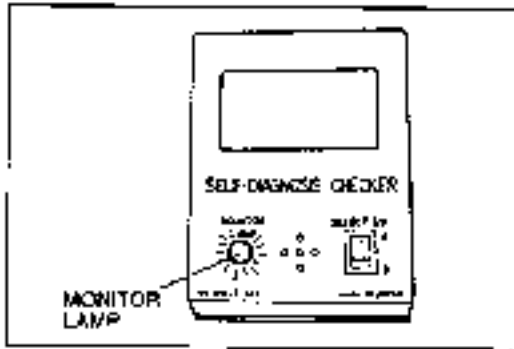
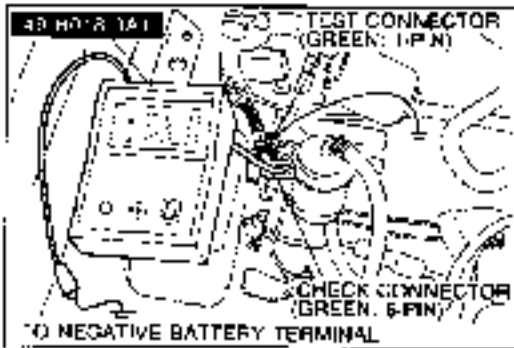
Backing on deceleration				
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IGN ON, Test connector (Green 1-pin) grounded]	Yes No	Check for cause by referring to the check sequence Go to Next Step	F2-122
2	Check switches with SST [IGN ON, Test connector (Green 1-pin) grounded] • Idle switch • Stoplight switch	Yes No	Go to Next Step Check for cause by referring to the check sequence	F2-134
3	Substitute a well-known ECU Check if condition improves	Yes No	ECU malfunction Check throttle sensor Go to Next Step	F2-181
4			Check spark plug	Section G
5			Check clutch slipping	
6			Check compression between cylinders	Section B2

16UHF2409

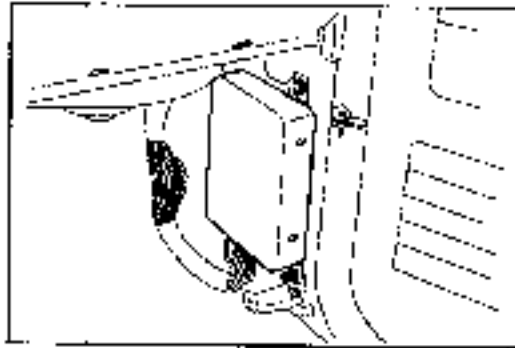
STEP 1



STEP 2



STEP 3

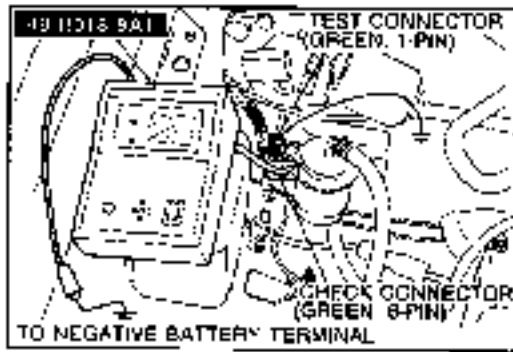




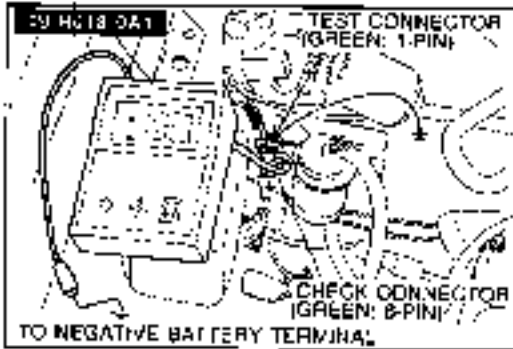
Poor fuel economy					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Run the engine at 2,000 rpm for more than 20 seconds after warm up and stop. Check for malfunction code with SST (IGN ON, Test connector (Green: 1-pin) grounded).	Yes	Check for cause by referring to check sequence F2-122		
		No	Go to Next Step		
2	Check the 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.  Monitor lamp: Flashes more than 8 times / 10 seconds at 2,000—3,000 rpm.  [Test connector (Green: 1-pin) not grounded].	Yes	Go to Next Step		
		No		Replace oxygen sensor F2-183	
4	Check fuel line pressure at idle.  Fuel line pressure: 196—255 kPa (2.0—2.6 kg/cm <sup>2</sup> , 28—37 psi)	Yes	Go to Next Step		
		No	Check vacuum line to pressure regulator for clogging or air leakage	Yes	Vacuum line clogging or damaged F2-7
				No	Check air end of valve (PRC) F2-160
				ECU malfunction? (Check (2T) terminal voltage) F2-175	
Replace pressure regulator F2-155					
5	Check for fuel cut operation during deceleration.  Fuel cut: after warm up Above 1,600 rpm (G6) Above 1,900 rpm (F2)	Yes	Go to Next Step		
		No	Check water thermometer F2-179	Yes	Replace ECU F2-175
6	Check ignition timing at idle after warm up.  Ignition timing: BTDC 4—5° (G6) 5—7° (F2)  [Test connector (Green: 1-pin) grounded].	Yes	Go to Next Step		
		No	Adjust ignition timing F2-117		
7	Check other systems			Clutch slipping Section H	
				Brake Section P	
				Tire air pressure Section Q	

30092318

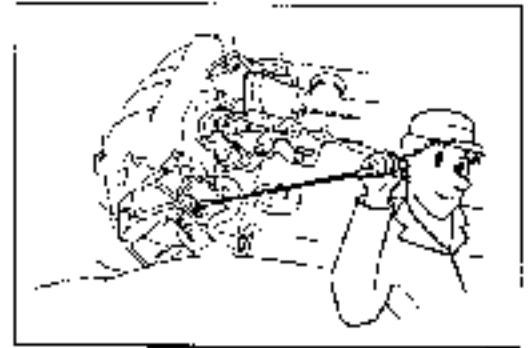
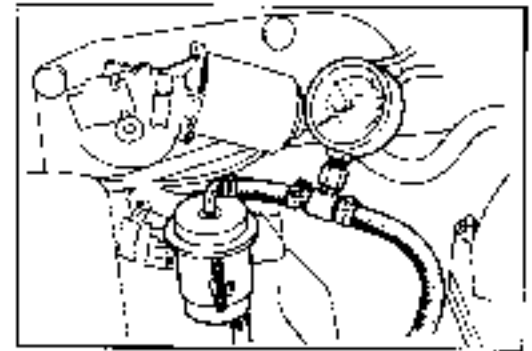
STEP 1



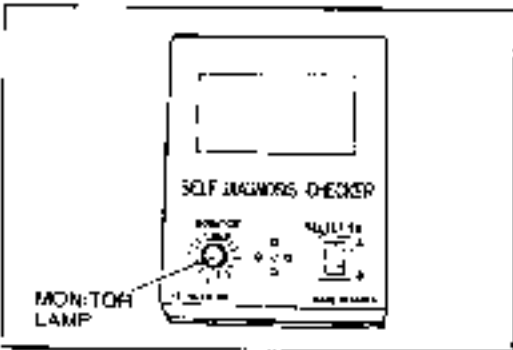
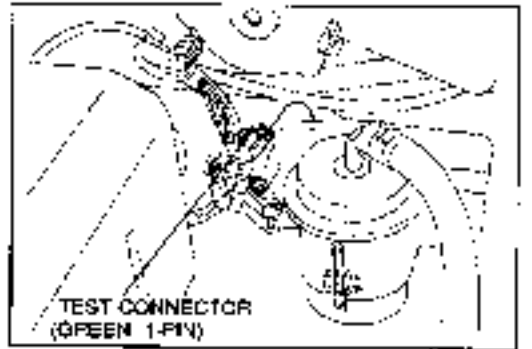
STEP 2



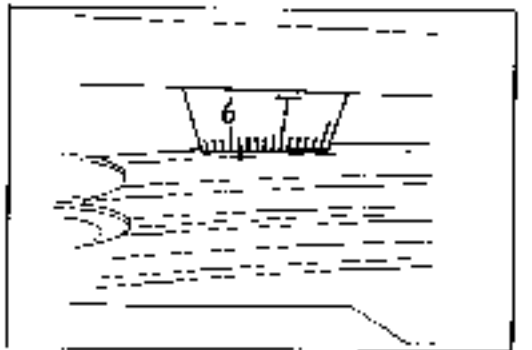
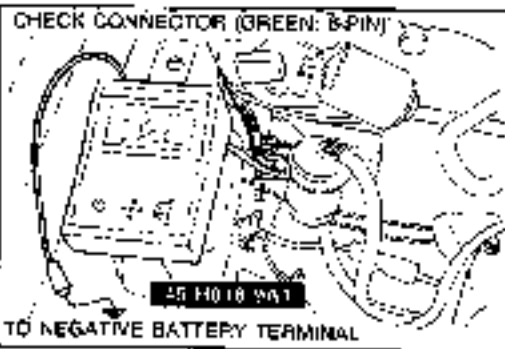
STEP 5



STEP 6



STEP 3



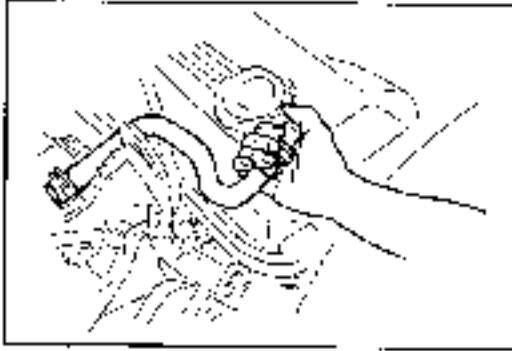
STEP 4

**WARNING**  
 BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

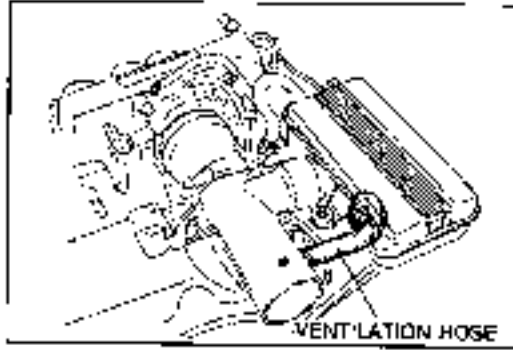
High oil consumption/White exhaust smoke				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for oil leak from engine	Yes	Repair or replace	
		No	Go to Next Step	
2	Disconnect PCV valve from engine Check if vacuum is full at idle	Yes	Go to Next Step	
		No	Check PCV valve <b>F2-163</b>	Yes PCV hose clogging 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			

19J072034

STEP 2



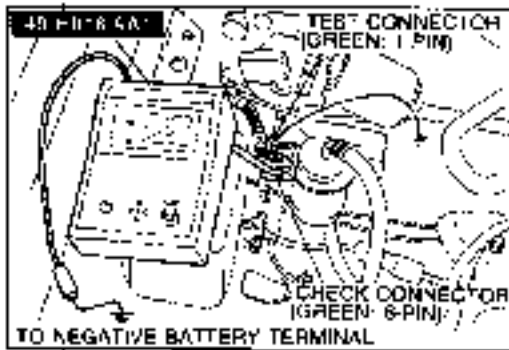
STEP 3



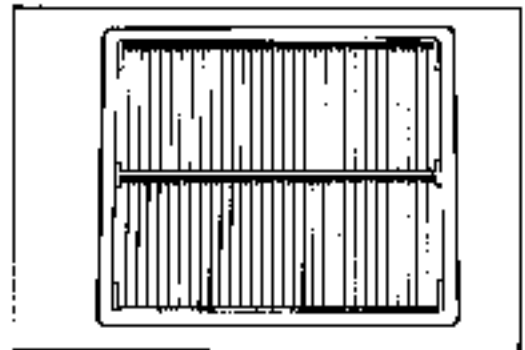
Afterburn on deceleration							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check malfunction code with SST (IGN CN, Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to the check sequence			F2-122	
		No	Go to Next Step				
2	Check idle switch with SST (IGN CN, 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  Ignition timing: BTDC 4—8° (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  Fuel cut: after warm up Above 1,600 rpm (G6) Above 1,800 rpm (F2)	Yes	Go to Next Step				
		No	Check water thermosensor	F2-179	Yes	ECU malfunction Check (20) terminal voltage	F2-176
				No	Replace water thermosensor	F2-179	
6	Run engine at idle and stop it (IG OFF) Observe fuel pressure for 5 minutes  Fuel pressure: 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
			Check pressure regulator for pressure drop	F2-154	Yes	Check injector fuel leakage	F2-157
				No	Replace pressure regulator	F2-155	
7		Check compression				Section B2	
		Check valve timing				Section B2	

PRL0122-010

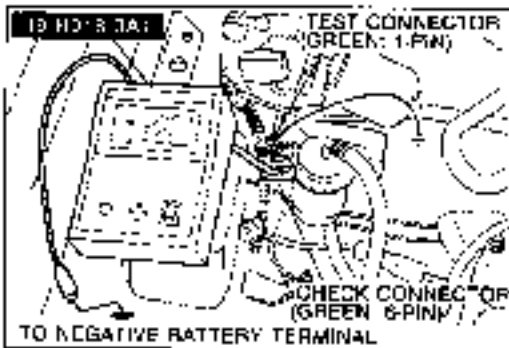
STEP 1



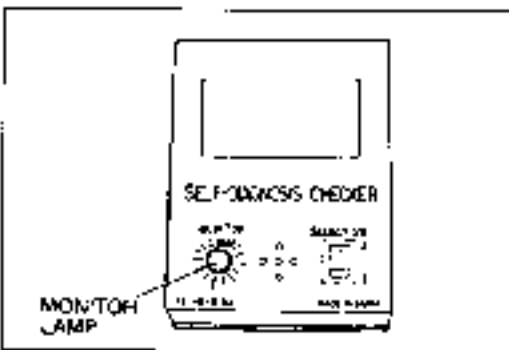
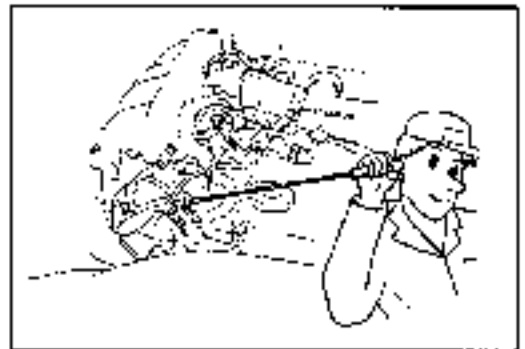
STEP 4



STEP 2



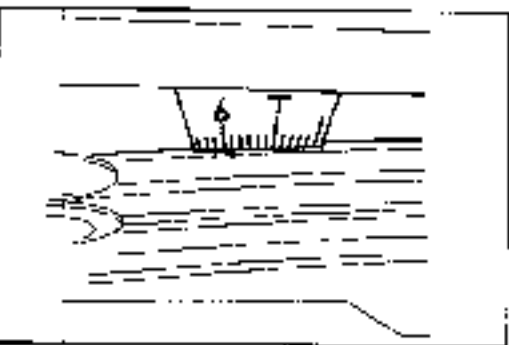
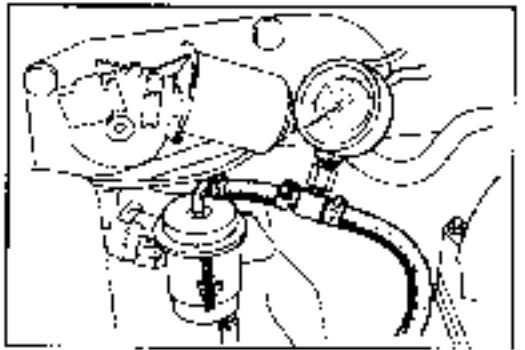
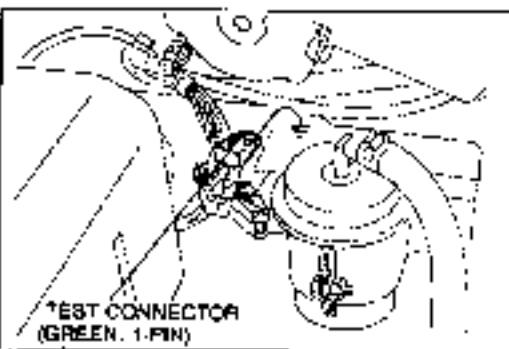
STEP 5



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



Rotten egg smell			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Change fuel to specified grade Check if condition improves		Poor fuel quality

9M, J0-2-0e-0

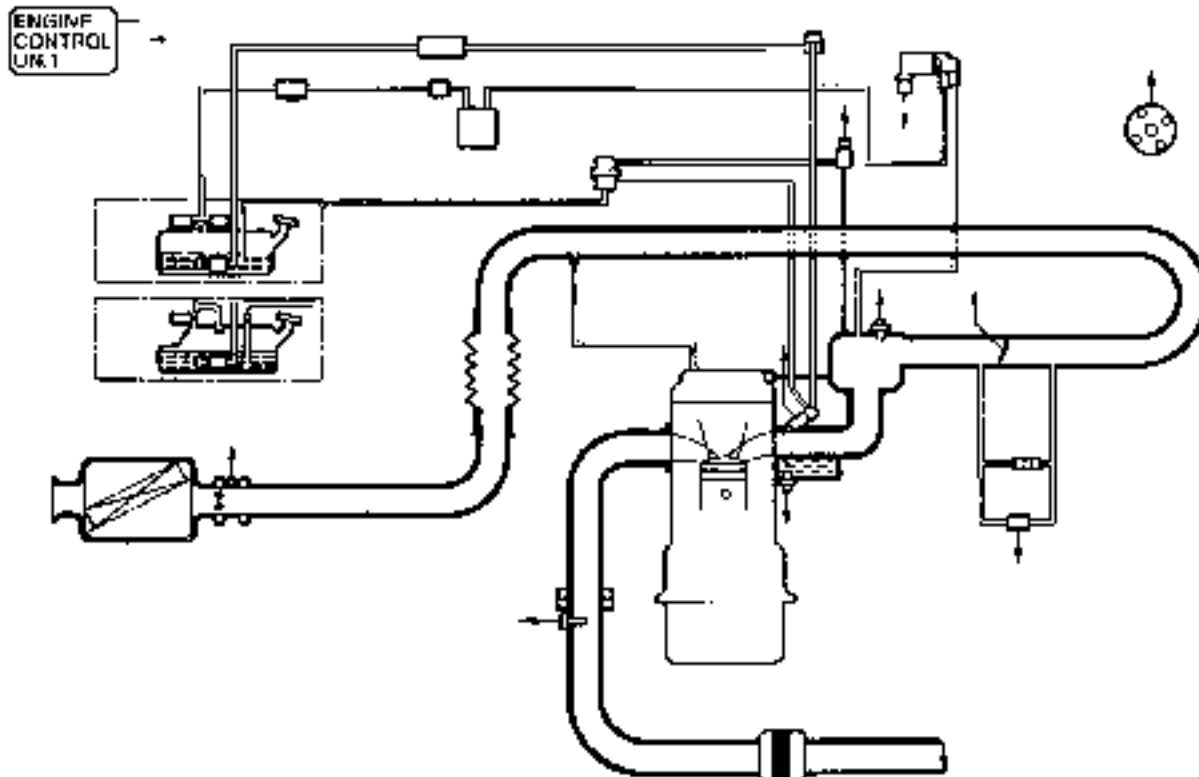




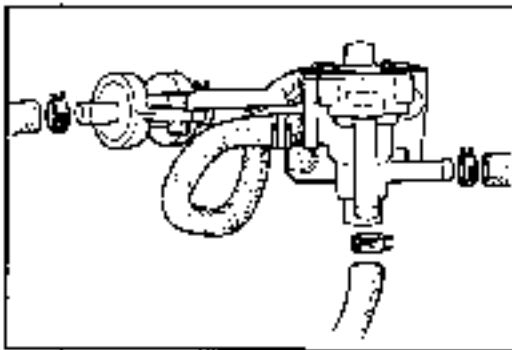
Gasoline fumes			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for leaks	Yes: Replace No: Go to Next Step	
2	Check if fumes are emitted from check-and-cut valve	Yes: Check check-and-cut valve	F2-166 Yes: Check two-way check valve Purge line clogging No: Replace check-and-cut valve F2-166
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 No: Go to Next Step	F2-122
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 (LY) and disconnect vacuum hose (white) from solenoid valve. Check for vacuum at solenoid valve.	Yes: No:	ECU malfunction Check (2X) terminal voltage F2-175 Replace solenoid valve (Purge control) F2-165

20.802.943

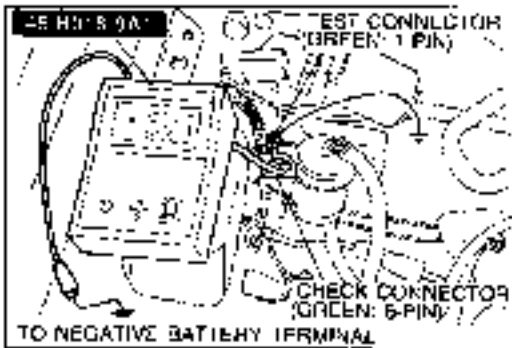
STEP 1



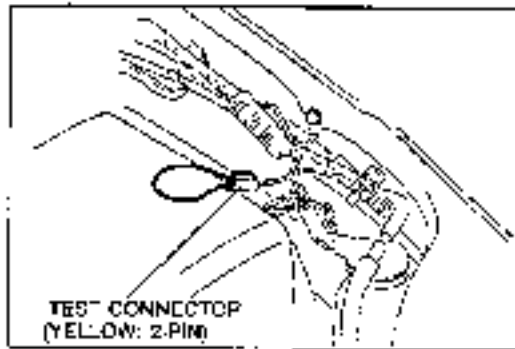
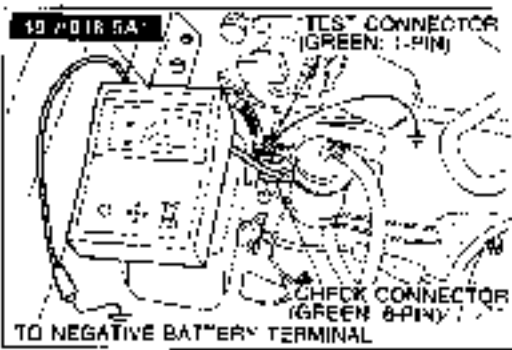
STEP 2



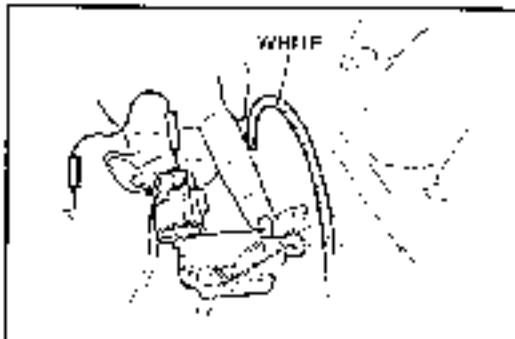
STEP 3



STEP 4



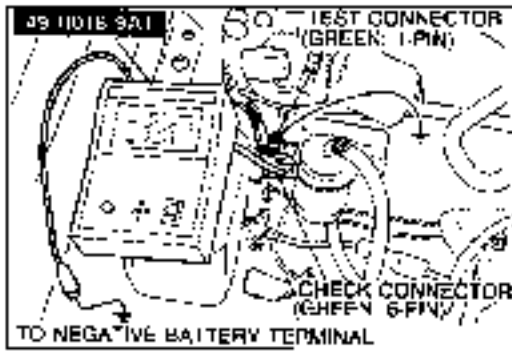
STEP 5



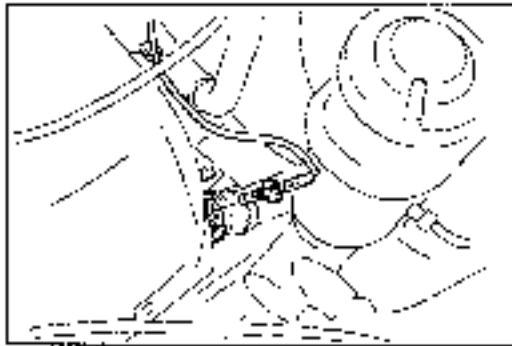
MIL always ON						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	(California) Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]	<b>"88"</b> Replace ECU <b>"00"</b> Wiring between ECU (-E) terminal and MIL short to ground				
2	(Federal and Canada) Check if emission system parts replacement time has come  Emission system parts replacement schedule: Every 60,000 and 90,000 miles (Federal) or 90,000 and 130,000 km (Canada)	Yes	Check if MIL has been reset by exchanging MIL set connector	Yes	Replace mileage sensor	Section T
		No		No	Reset the MIL	F2-167
					Replace mileage sensor	Section T

1B J0F2 037

STEP 1



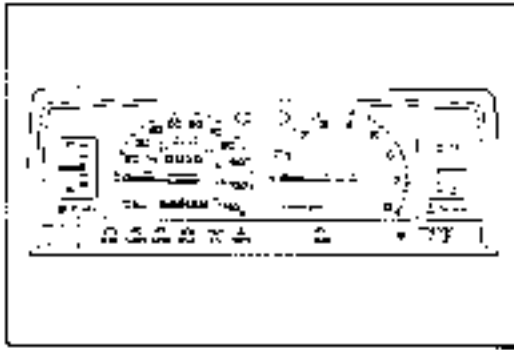
STEP 2



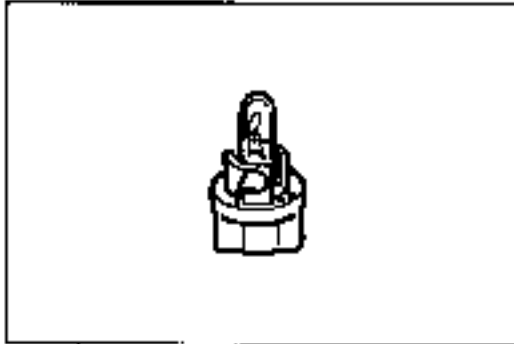
MIL never ON					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check if other indicator lamps illuminate	Yes	Go to Next Step		
		No	Check power supply circuit to combination meter		Section T
2	Check bulb of the MIL	Yes (California only) Ground ECU (1F) terminal Check if MIL illuminates	Yes	Replace ECU	F2-175
			No	Wiring between ECU and MIL open	
				(Federal and Canada); MIL set connection loose or disconnected	F2-187
				(Federal and Canada); Replace mileage sensor	Section T
No	Replace				

15UGF2-035

STEP 1



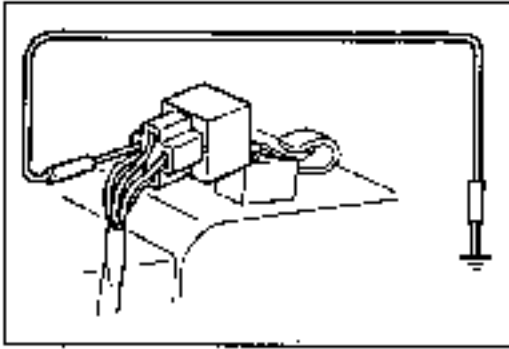
STEP 2



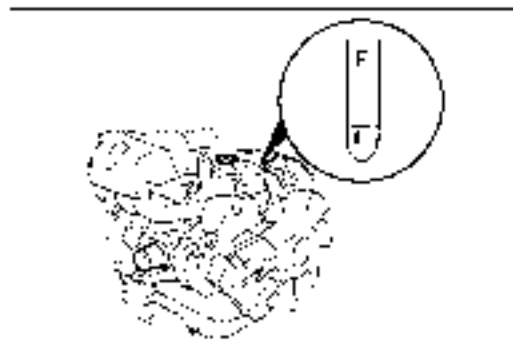
A/C does not work							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if condenser fan operates when grounding A/C relay terminal wire (LW) (IGN ON)	Yes	Check voltage at ECU (1Q) terminal with SST Voltage at idle after warm up (V) (A/C and blower switches ON)	F2-175	Yes	ECU malfunction (Check (1Q) terminal voltage)	F2-175
		No			Wiring between ECU (1Q) and A/C relay open		
		No	Check A/C system		No	A/C system malfunction	Section U

1BU04-2-039

STEP 1







SM1X12-057

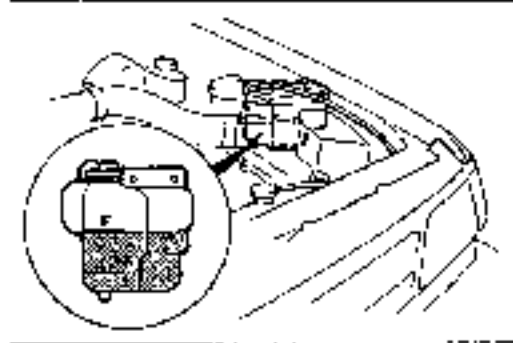
## ENGINE TUNE-UP

### BASIC INSPECTION

#### Engine Oil

Check the engine oil level and condition with the oil level gauge.

Add or change the oil if necessary.



SM1J3P2456

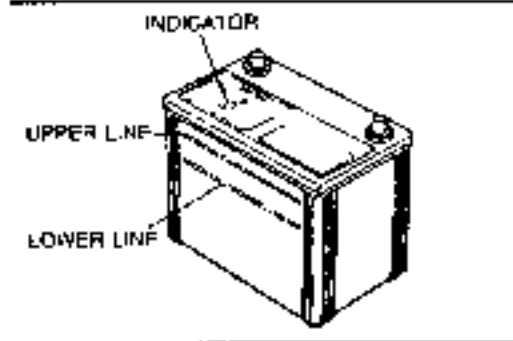
### Coolant Level (Cold engine)

#### Warning

a) Never remove the radiator cap while the engine is hot.

b) Wrap a thick cloth around the cap while carefully removing it.

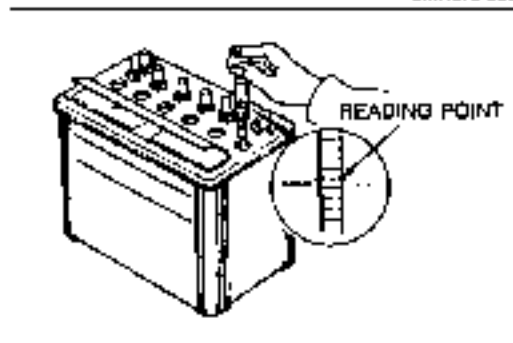
1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks.  
Add coolant if necessary.



SM110F2-059

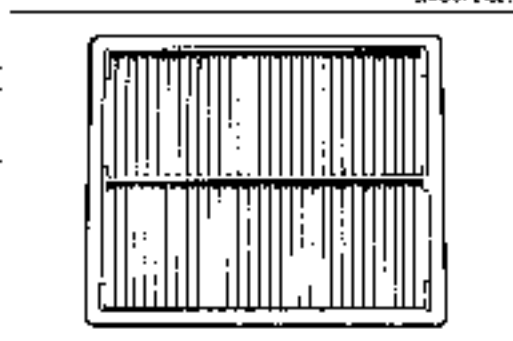
### Battery

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.



SM100F1-063

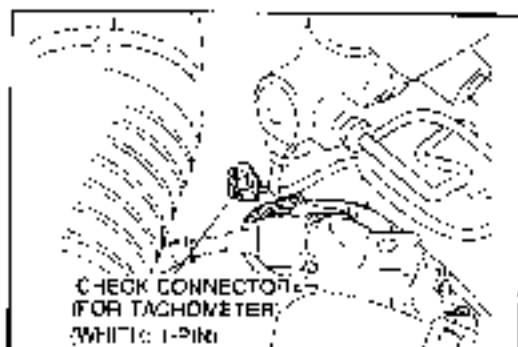
3. Check the specific gravity by using a hydrometer. If the specific gravity reading is **1.200 or less**, recharge the battery. (Refer to Section G.)



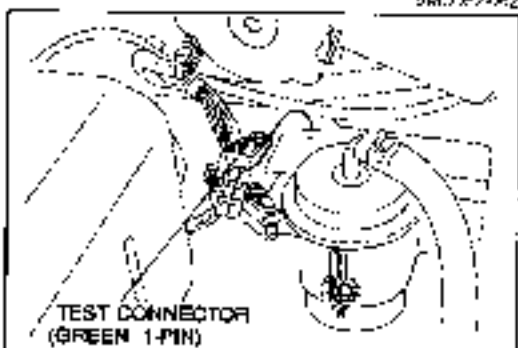
SM1JCF2-061

### Air Cleaner Element

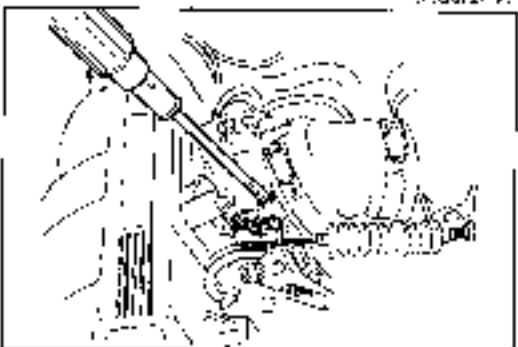
Visually check the air cleaner element for excessive dirt, damage, or oil. Clean or replace it if necessary.



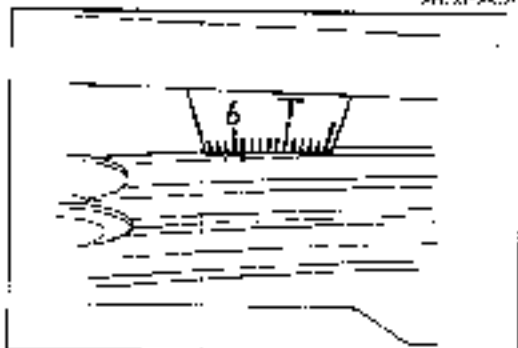
DM, F2-122



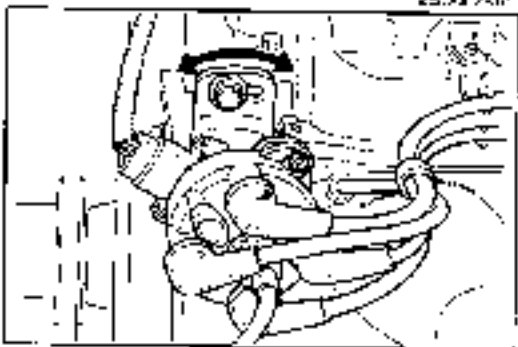
94U0F2-27



2R, AF200V



2B, J07-210



NR, CF-2 125

**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)**

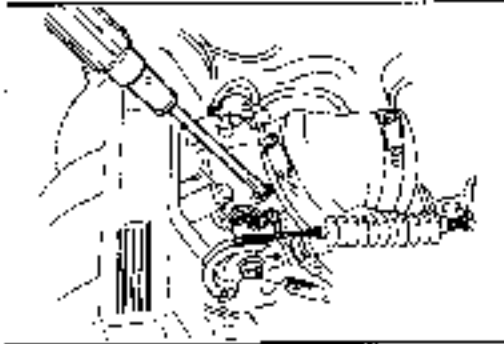
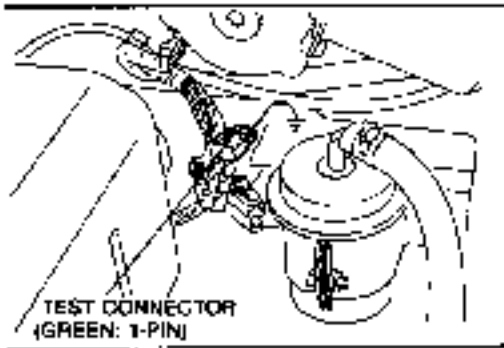
5. Check if the timing mark (Yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

**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 Nm (1.9—2.6 m·kg, 14—19 ft·lb)**

8. Remove the jumper wire.

**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.

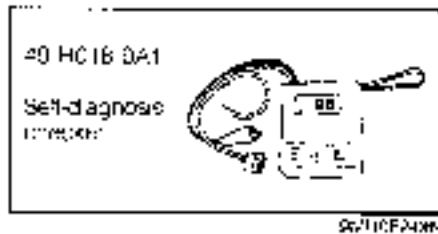
**Idle speed: 730—770 rpm (M/T)  
750—790 rpm (A/T, P range)**

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

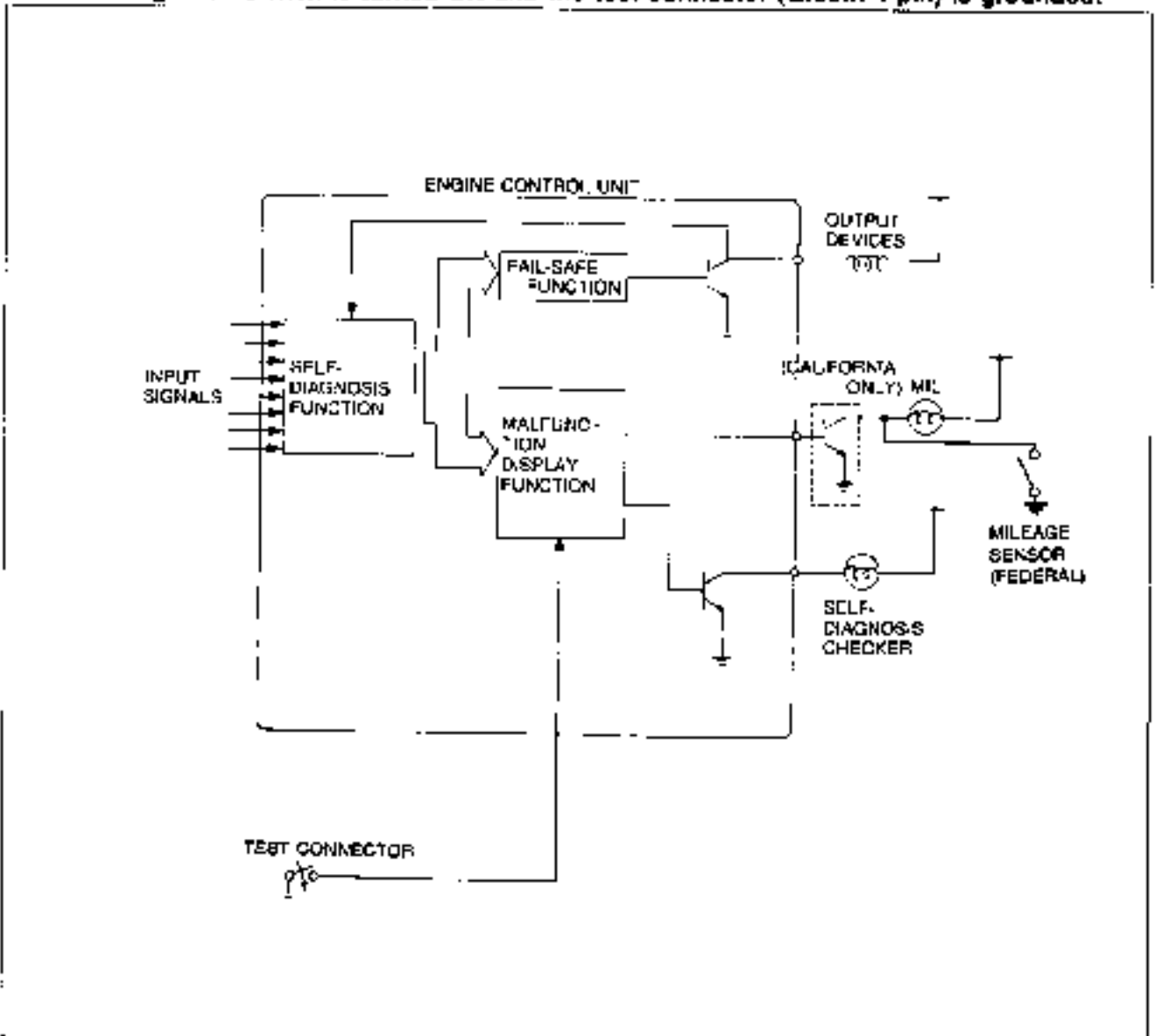


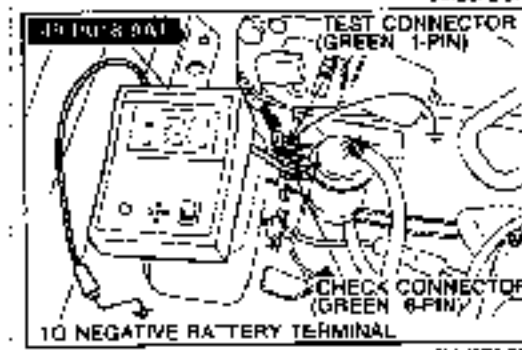
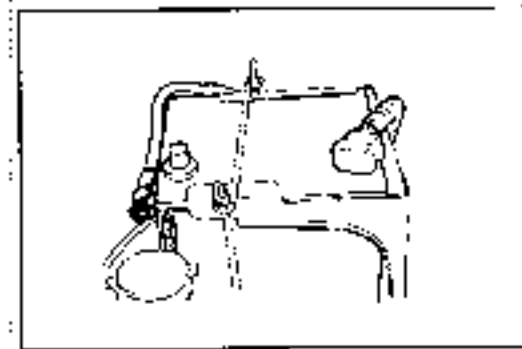
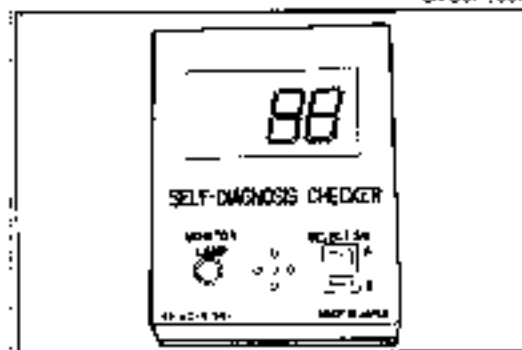
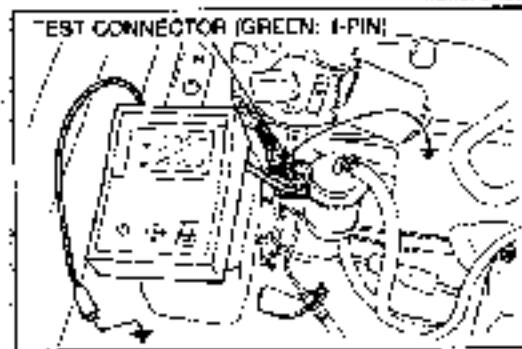
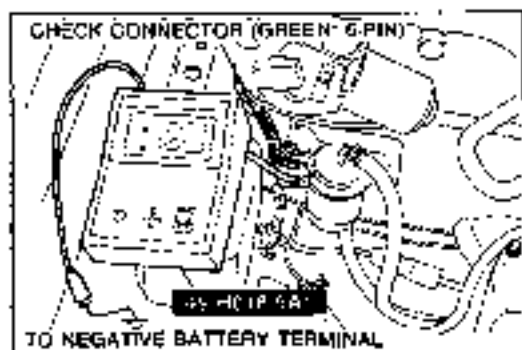
When troubles occur in the main input devices or output devices, check for the cause using the **SST**. Failures of each input and output device are indicated and retrieved from the engine control unit as malfunction code numbers.

**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.





### 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 '86), 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.

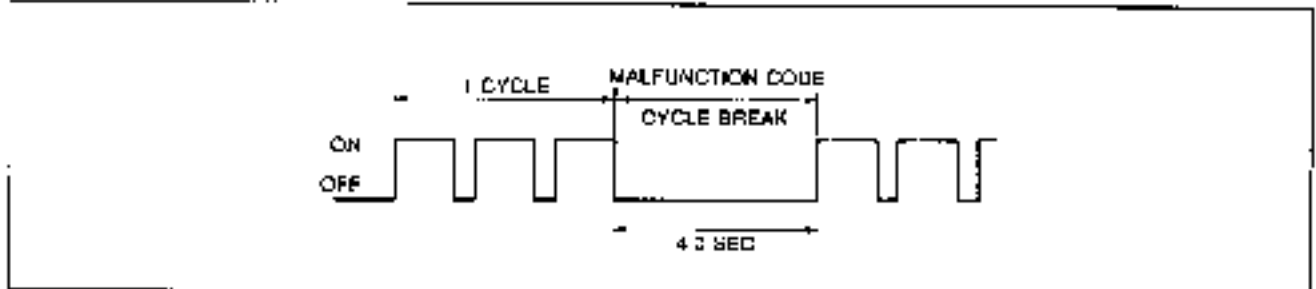
**PRINCIPLE OF CODE CYCLE**

Malfunction codes are determined as shown below.

98U04A-0-7

**1. Code cycle break**

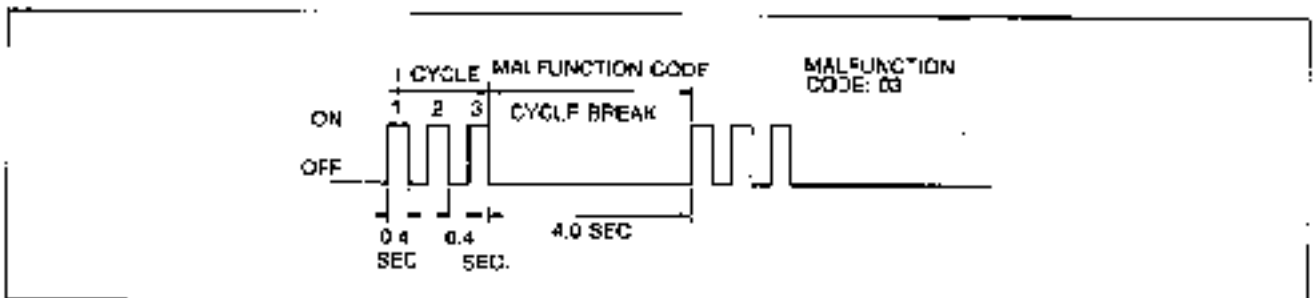
The time between malfunction code cycles is 4.0 sec (the time the MIL (California only) and the buzzer are off).



98U0F2-050

**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.

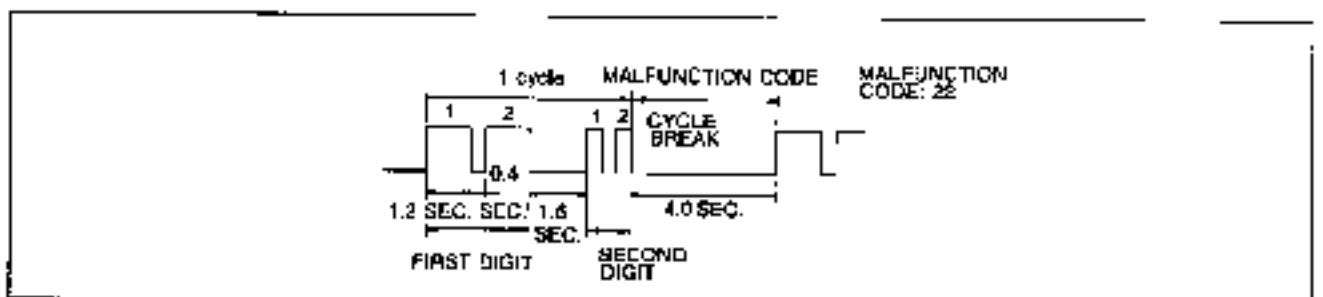


98U0F2-051

**3. First digit of malfunction code (tens position)**

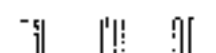
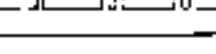


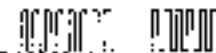
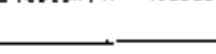

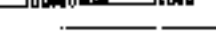
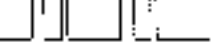
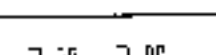
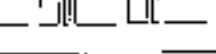

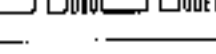

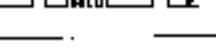

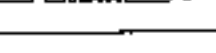

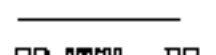

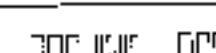
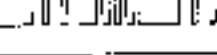

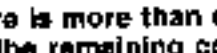
The digit in the tens position of the malfunction code represents the number of times the MIL (California only) and the buzzer are on 1.2 sec during one cycle.

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.



98U0F2-052

## CODE NUMBERS

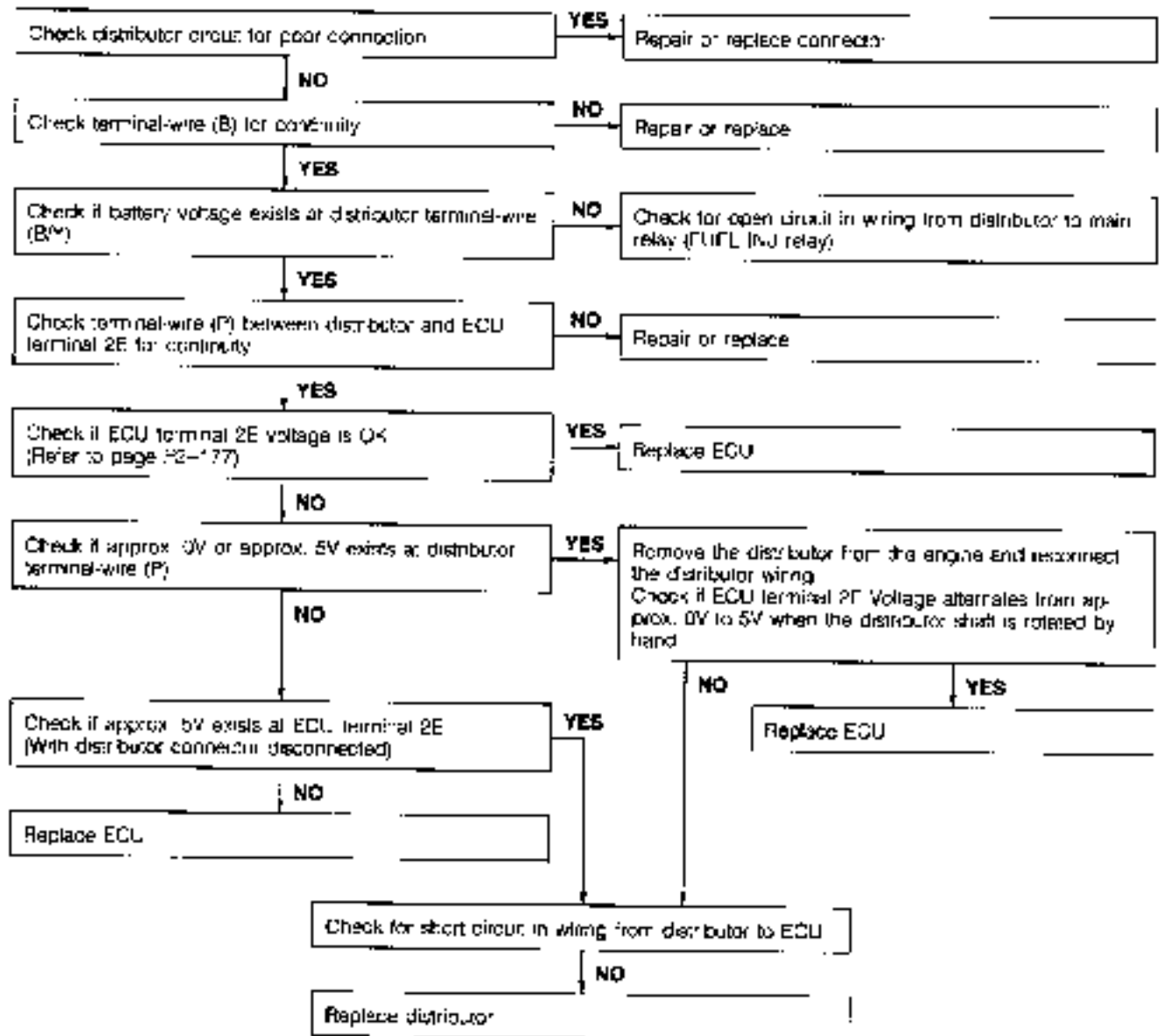
Code No.	Malfunction display		Sensor or subsystem	Self-diagnosis	Fail-safe
	ON	OFF			
02	ON 	OFF 	No signal	No No signal	
03	ON 	OFF 	G signal	No G signal	Cancels 2-group injection
08	ON 	OFF 	Airflow sensor	Open or short circuit	Basic fuel injection amount fixed as for two driving modes (1) Idle switch ON (2) Idle switch OFF
09	ON 	OFF 	Water thermometer	Open or short circuit	Maintains constant 20°C (68°F) command
11	ON 	OFF 	Intake air thermometer (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	
28	ON 	OFF 	Solenoid valve (purge control)		
34	ON 	OFF 	Solenoid valve (idle speed control)		

SDVJF2-003

**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.

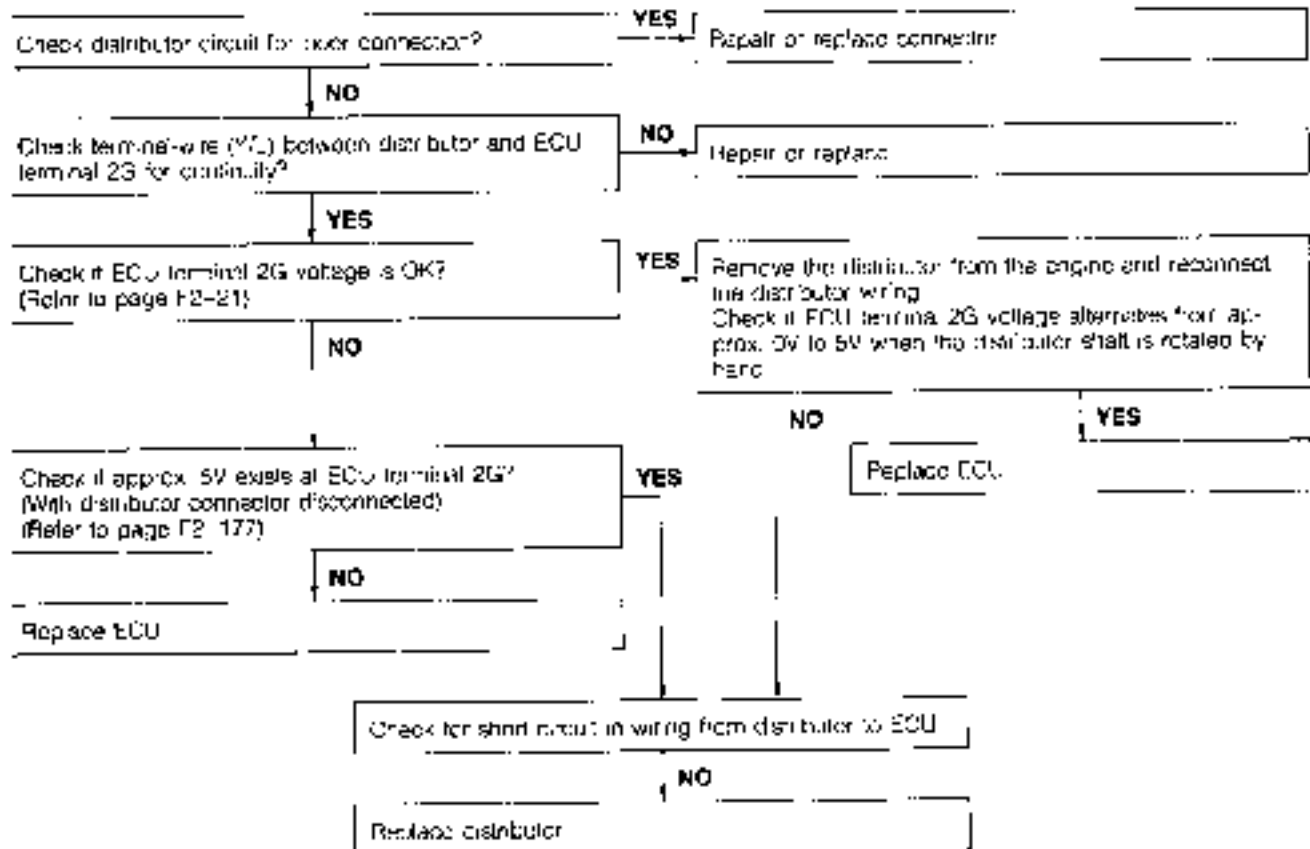
If a malfunction code number is shown on the **SST**, check the following chart along with the wiring diagram.

**Code No.02 (Distributor No-signal)****PC: Possible Cause**

18L0F2-10



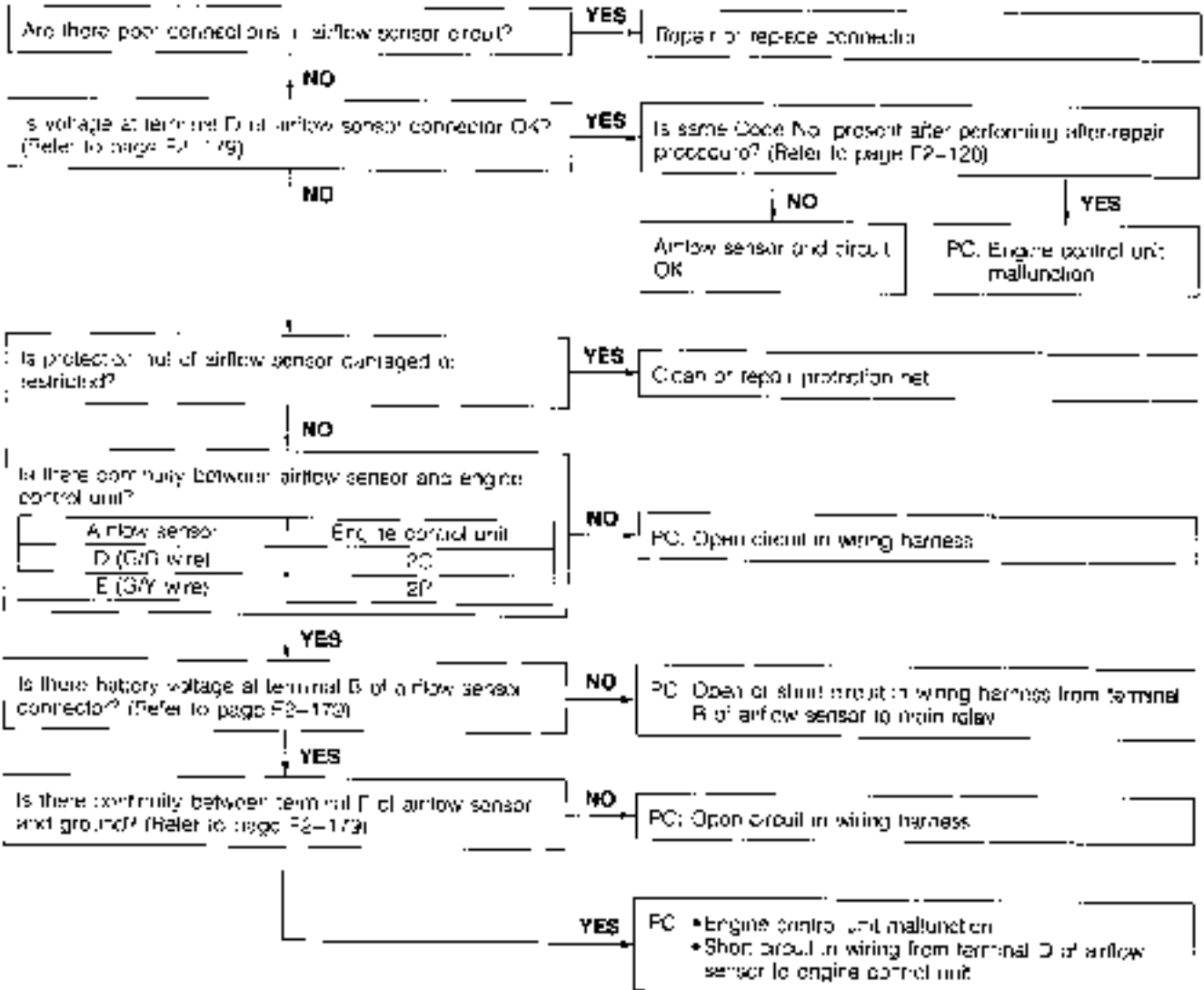
### Code No.03 (Distributor G-signal)



TRUCK-102

Code No.08 (Airflow sensor)

PC: Possible Cause



2000-2-031

Code No.09 (Water thermosensor)

PC: Possible Cause

Are there poor connections at water thermosensor circuit?

YES

Repair or replace connector

NO

Is there continuity between water thermosensor and engine control unit?

NO

PC: Open circuit in wiring harness from water thermosensor to engine control unit

Water thermosensor	Engine control unit
A (R/W wire)	2Q
B (BR/B wire)	2D

YES

Is resistance of the water thermosensor OK?

Resistance

Coolant temp	Resistance
-20°C (-4°F)	14.5 - 17.8 kΩ
20°C (68°F)	2.2 - 2.7 kΩ
80°C (176°F)	280 - 350Ω

NO

Replace water thermosensor

YES

Is same Code No. present after performing after-repair procedure? (Refer to page F2-120)

NO

Water thermosensor and circuit OK

YES

Are engine control unit 2Q and 2D terminal voltages OK? (Refer to page F2-177)

NO

PC: Engine short circuit in wiring harness

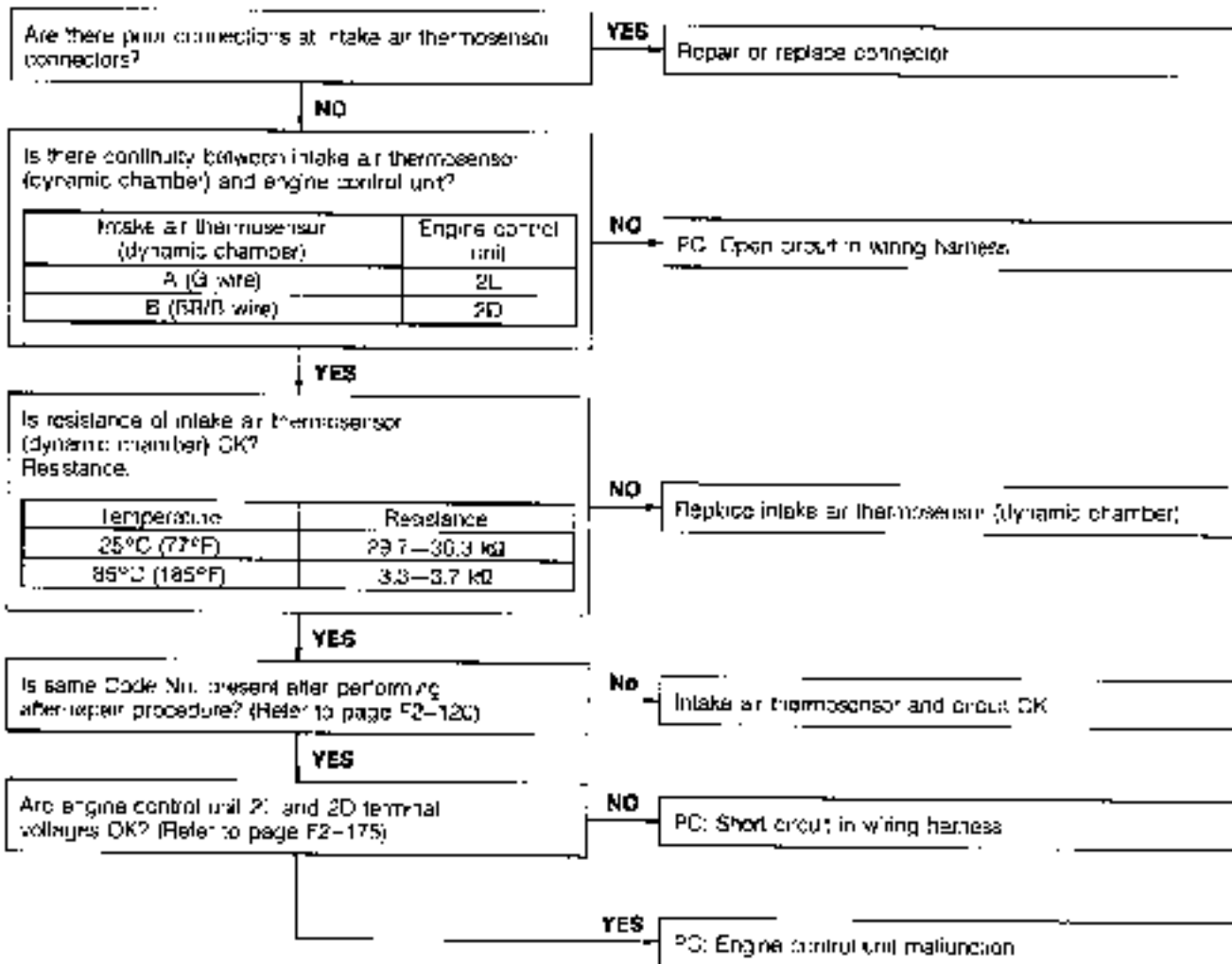
YES

PC: Engine control unit malfunction

18UJ2-041

**No.11 Code (Intake air thermosensor)**

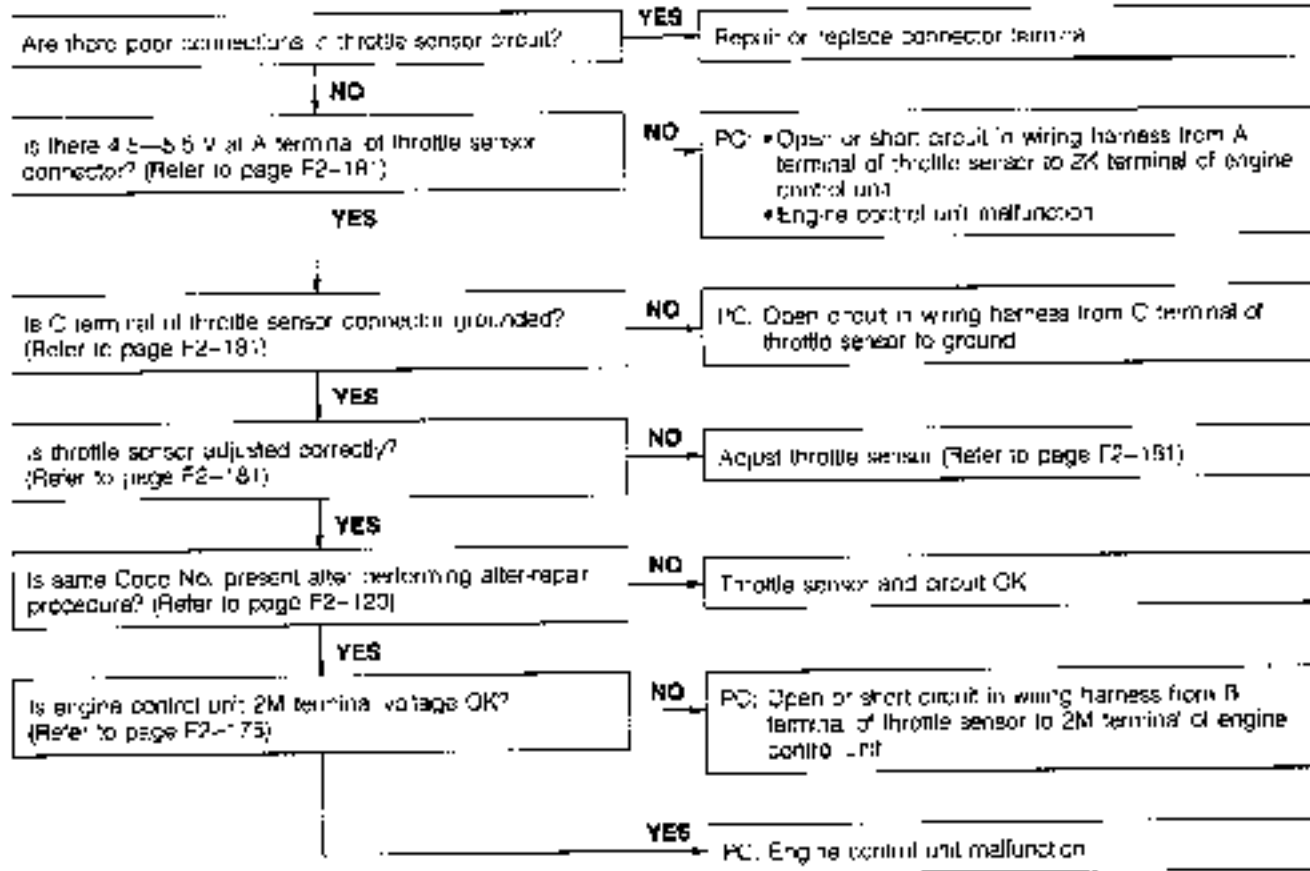
**PC: Possible Cause**



18UJF2-047

### Code No.12 (Throttle sensor)

PC: Possible cause



12UDF2-0A3

### Code No.14 (Atmospheric pressure sensor in ECU)

Replace ECU

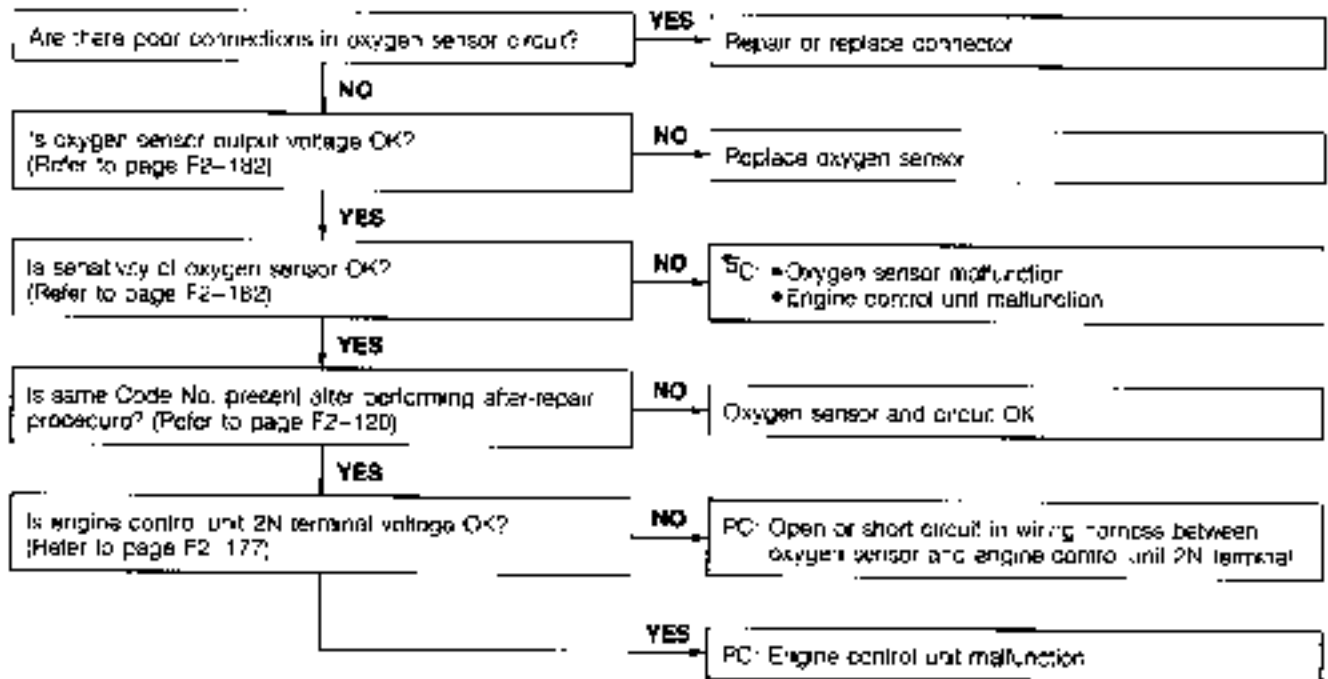
061072-053

## Code No.15 (Oxygen sensor—Inactivation)

PC: Possible Cause

**Note**

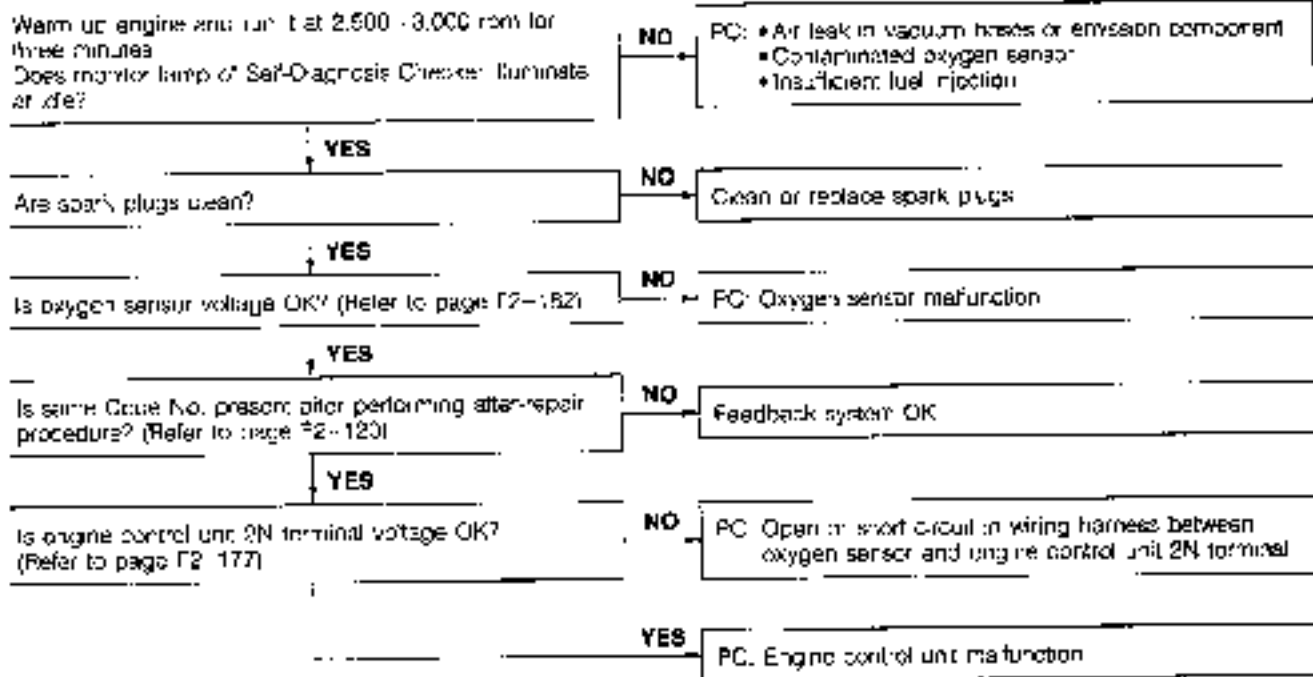
When Codes No.15 and 17 are present at the same time, first perform the checking procedure for Code No.17. (Refer to page F2-130.)



26004-2025

Code No.17 (Oxygen sensor—Inversion)

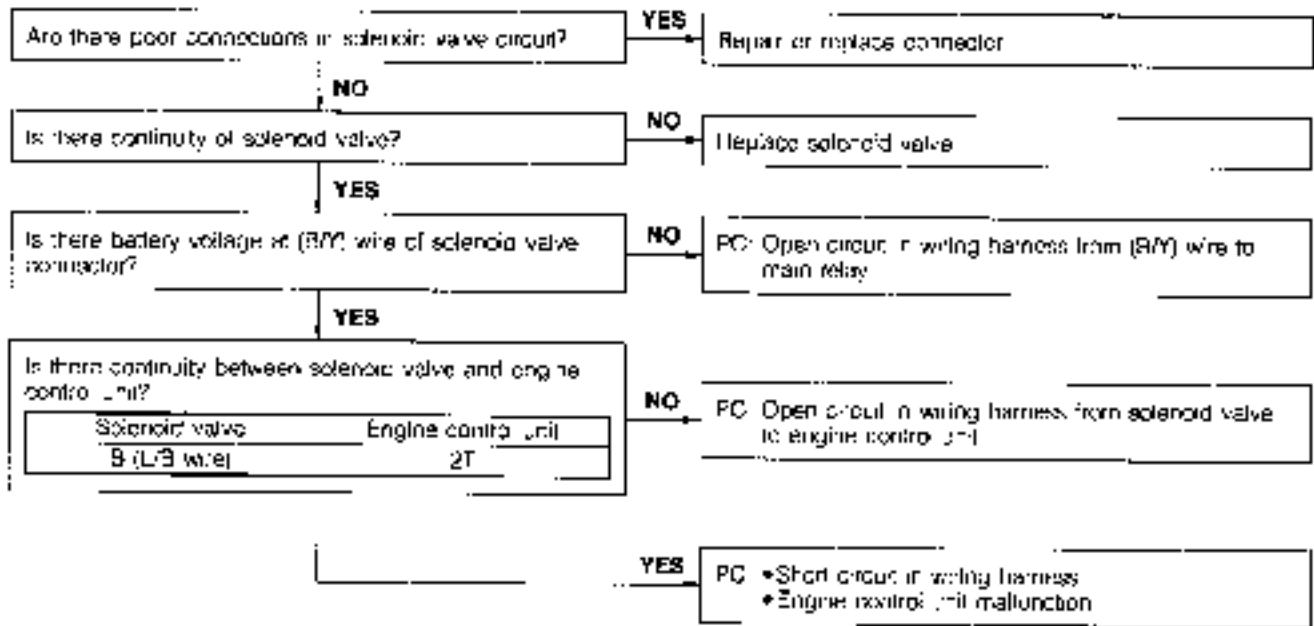
PC: Possible Cause



2EUDF2 CPS

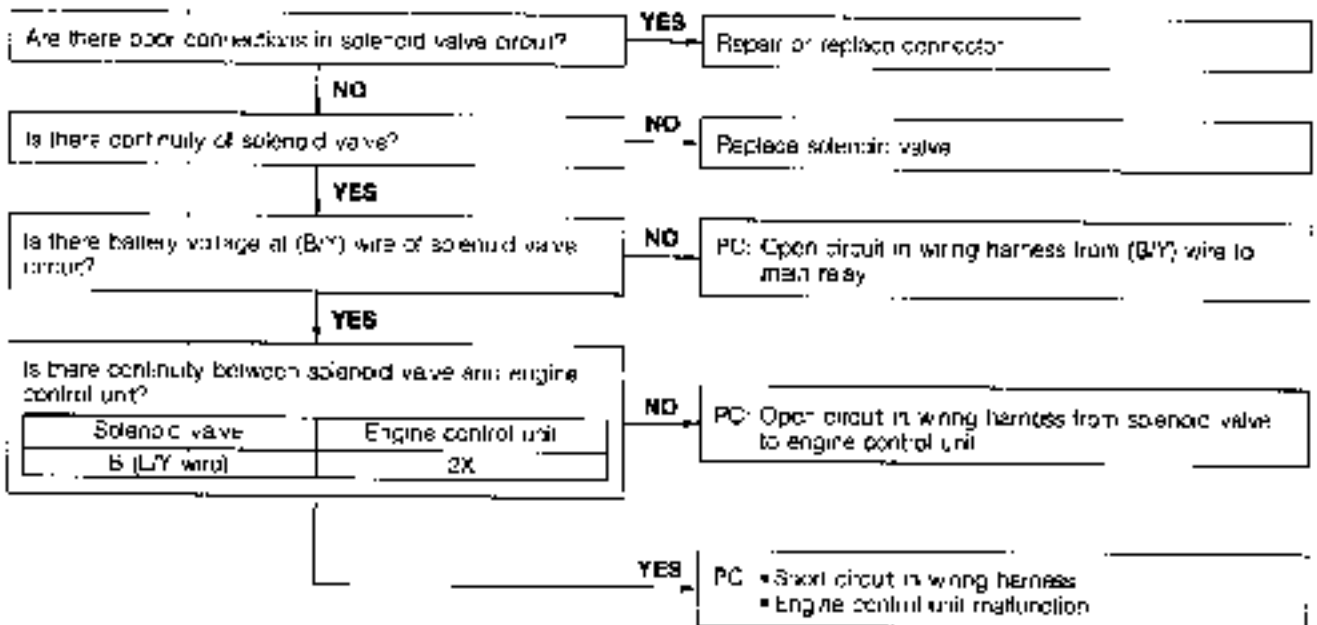
**Code No.25 (Solenoid valve—Pressure regulator control)**

**PC: Possible Cause**



35LUPA056

**Code No.26 (Solenoid valve—Purge control)**

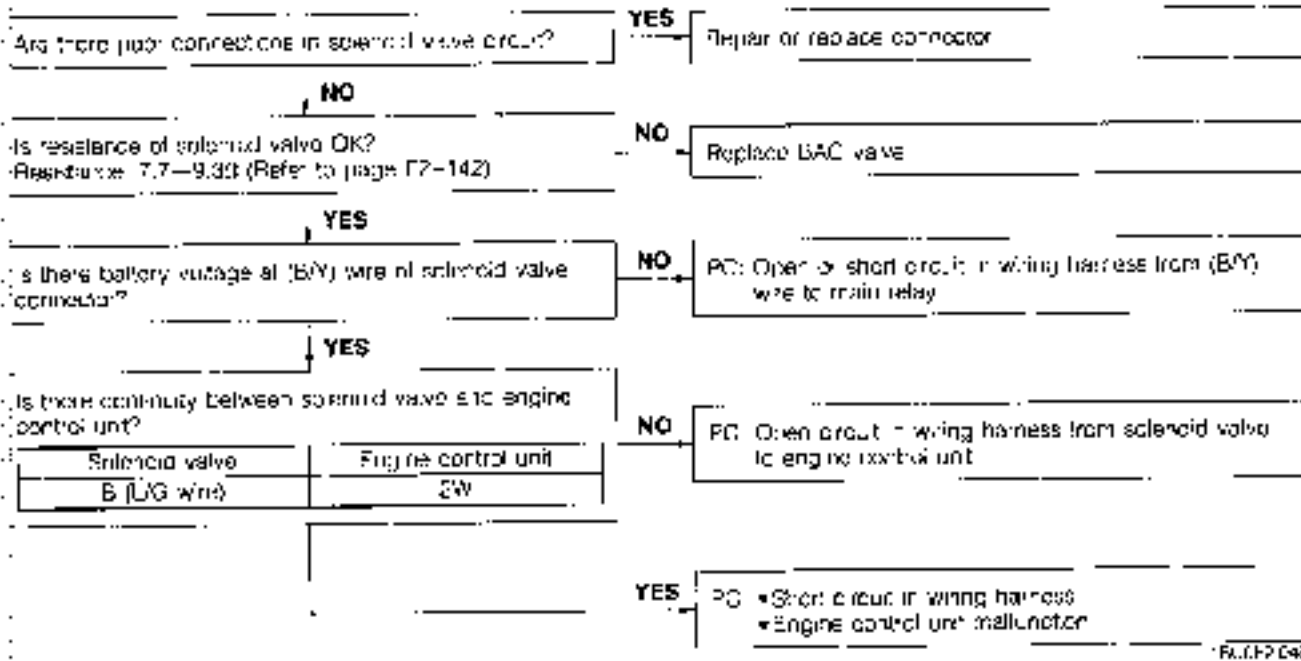


35UOF7-067



### Code No.34 (Solenoid valve—Idle speed control (ISC))

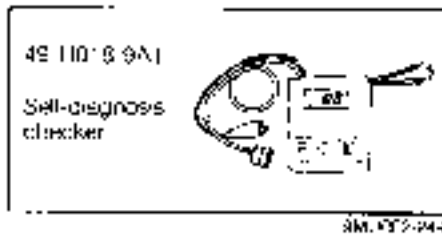
PC: Possible Cause



F2-132 C48

SWITCH MONITOR FUNCTION

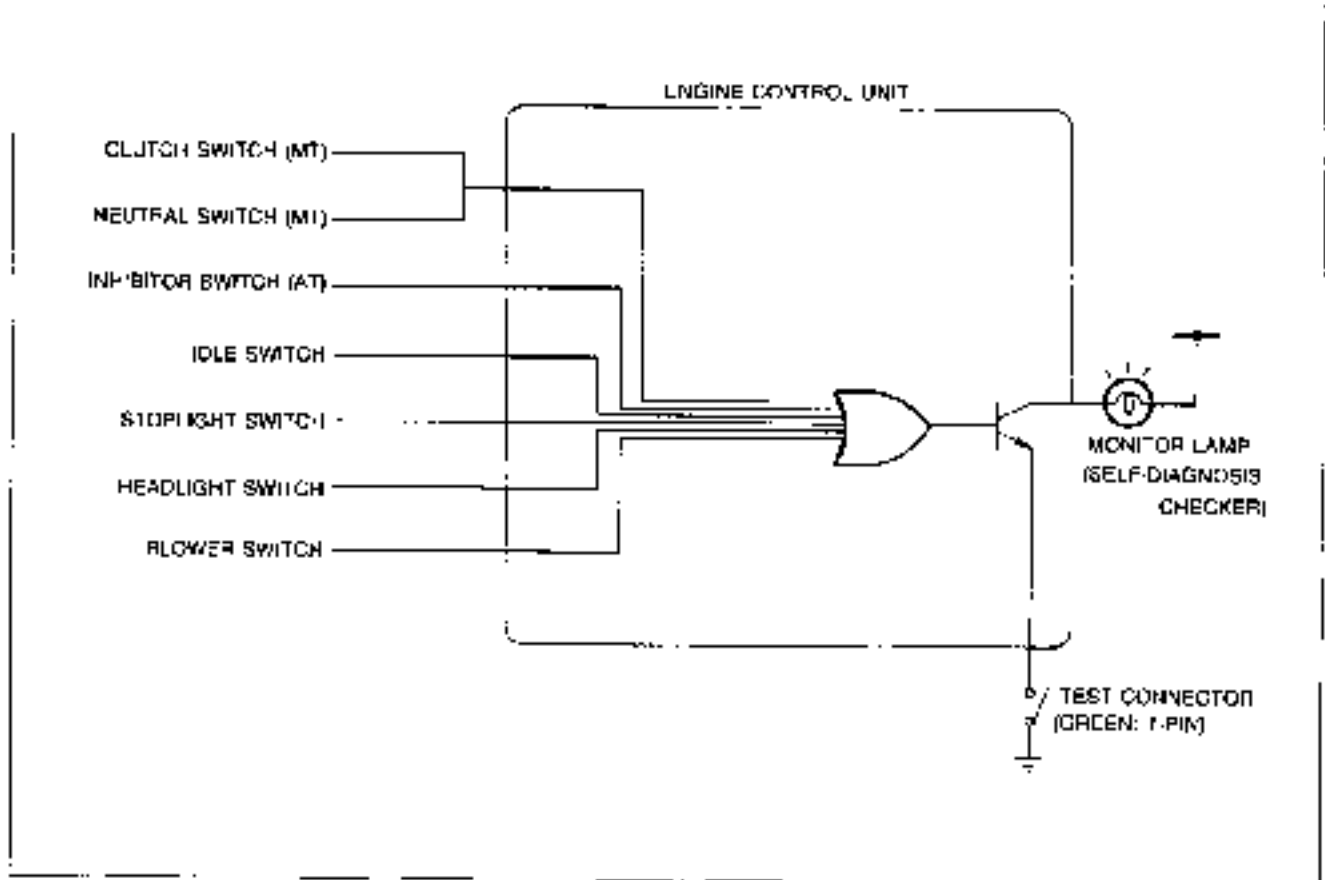
PREPARATION  
SST



Individual switches can be monitored by the SST.

**Note**

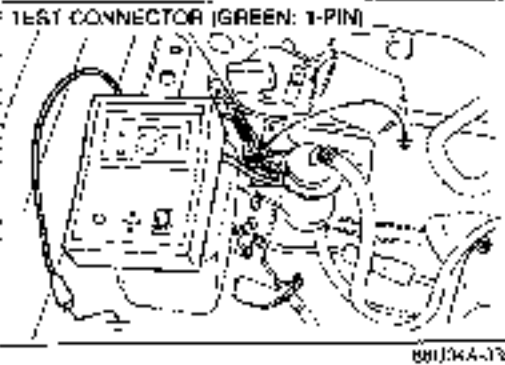
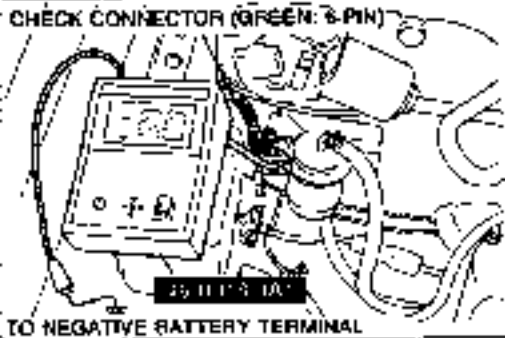
The test connector must be grounded and the ignition switch ON (engine stopped).



9E077094

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)	S, D or R range	N or P range	
Idle switch	Pedal depressed	Pedal released	
Stoplight switch	Pedal depression	Pedal released	
Headlight switch	ON	OFF	Headlight switch lights ON
Blower switch	ON	OFF	Blower motor ON

9E077095



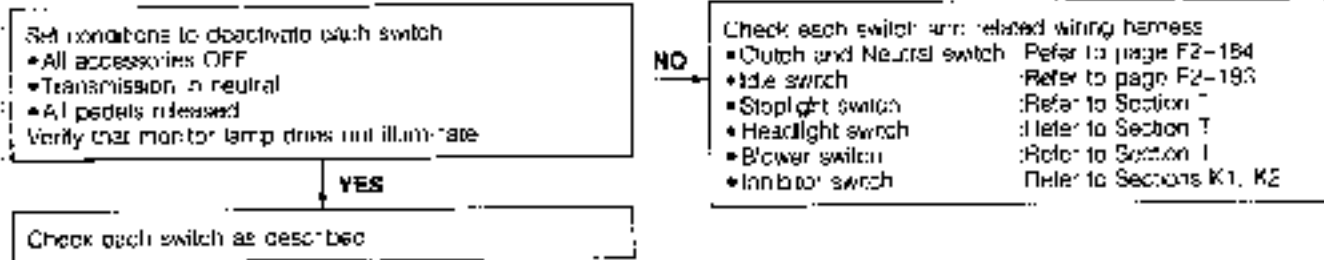
### INSPECTION PROCEDURE

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

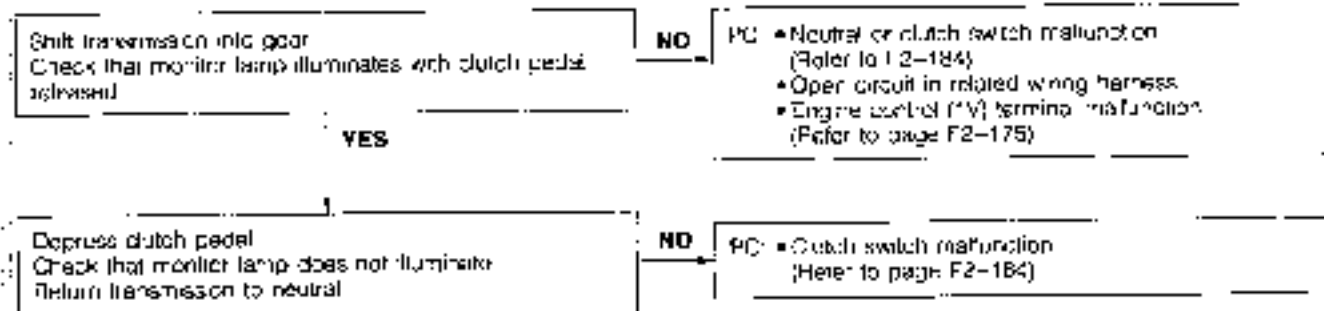
- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

### Procedure



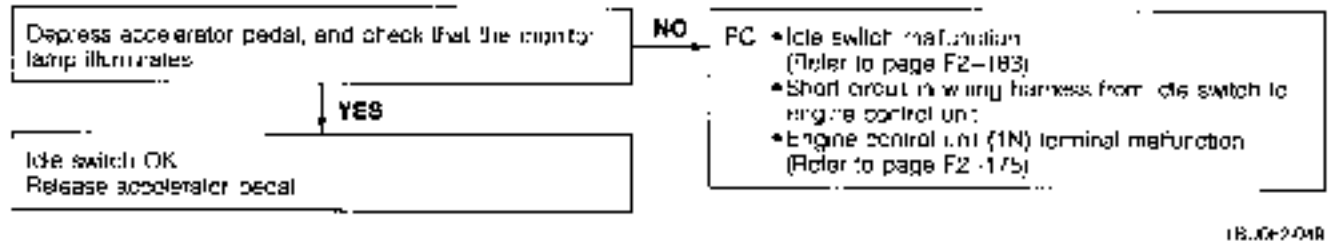
29J0F2 32\*

### Neutral and Clutch switch (M/T)

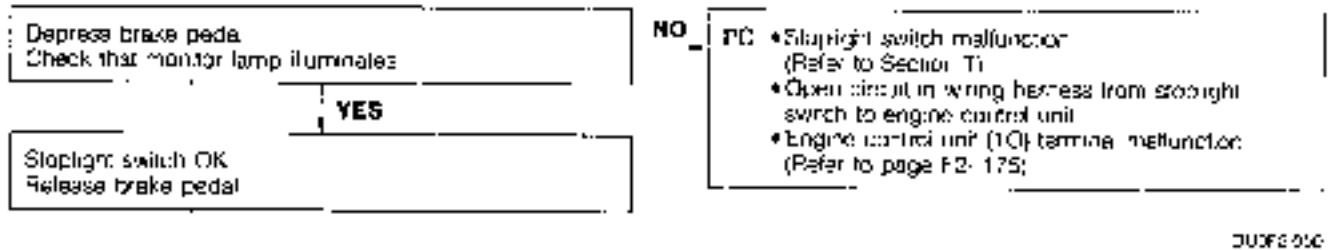


10J07048

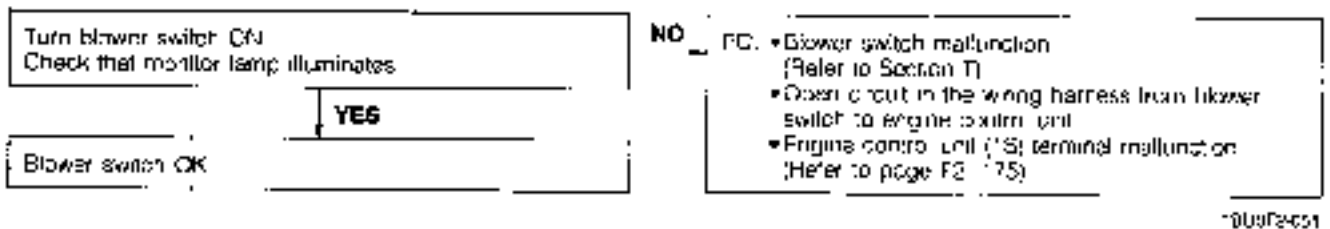
**Idle switch**



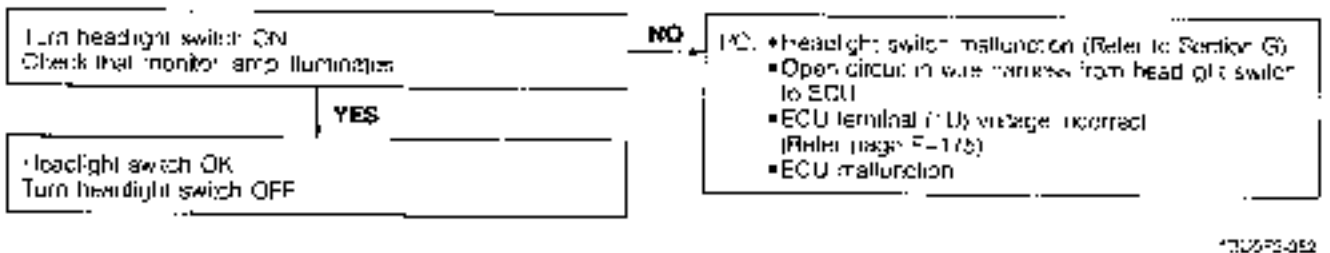
**Stoplight switch**



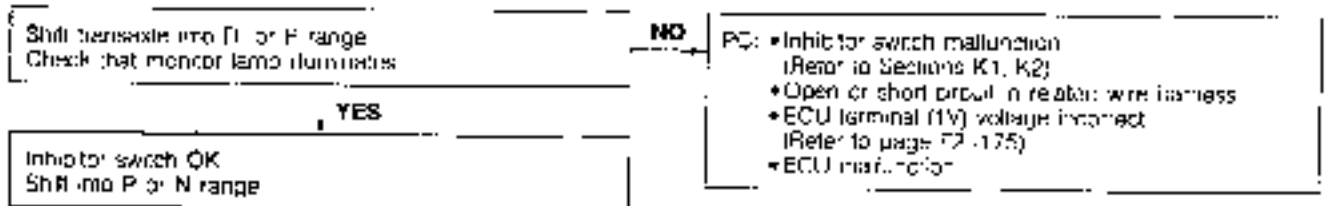
**Blower switch**



**Headlight switch**



**Inhibitor switch (AT)**



## 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 (ECU) terminal malfunction  
(Refer to page F2-175)

YES

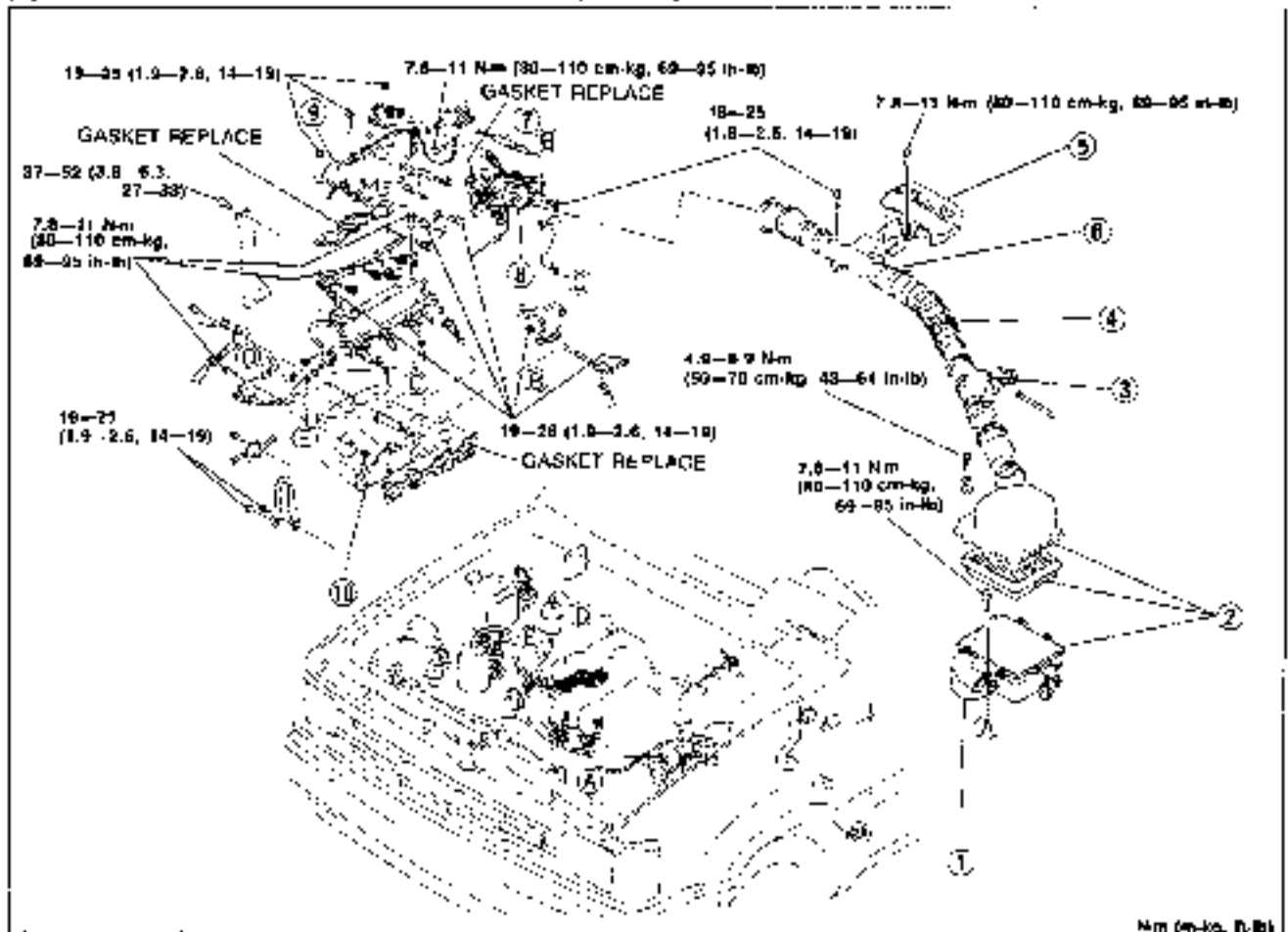
Headlight switch OK  
Turn OFF headlight switch

18U0F2-034

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.



Nm (cm·kg, ft·lb)  
16, KP2 056

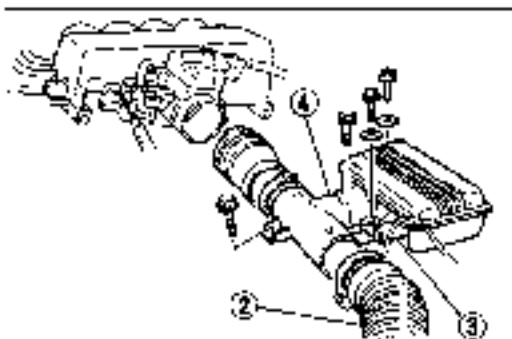
Inspection

1. Check for air leaks by listening for sucking noises.
2. Visually check the components for damage and replace if necessary.

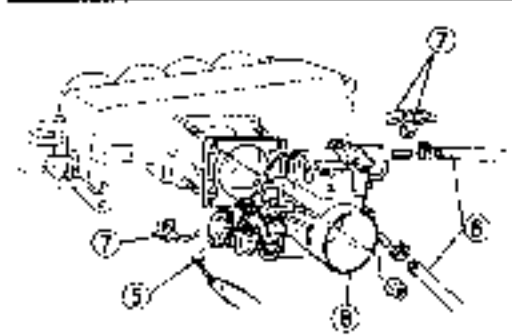
1. Air duct Inspect for damage	5. Resonance chamber (G6) Inspect for damage	9. Dynamic chamber Inspect for damage
2. Air cleaner Inspect for excessive dirt, damage, or oil	6. Air pipe Inspect for damage	Removal and Installation .. page F2-139
3. Airflow sensor Inspection and Replacement ..... page F2-179	7. Accelerator cable Inspection and Replacement ..... page F2-139	10. Intake manifold Inspect for damage Removal and Installation .. page F2-140
4. Air hose Inspect for damage	8. Throttle body Removal and Inspection ..... page F2-138	

Caution

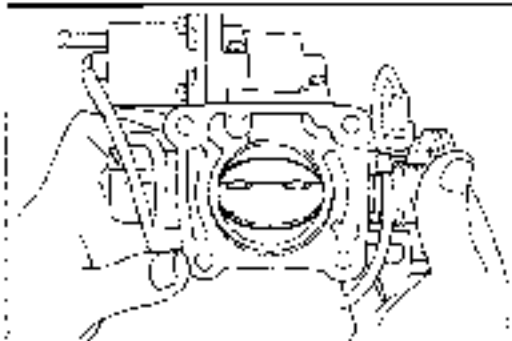
- a) The air cleaner must be replaced at the intervals outlined in the maintenance schedule.
- b) Never drive the vehicle without the air cleaner element, otherwise, damage to the airflow sensor (hot wire) will occur.
- c) Never use an oil permeated air cleaner element, otherwise, contamination of the hot wire will occur.



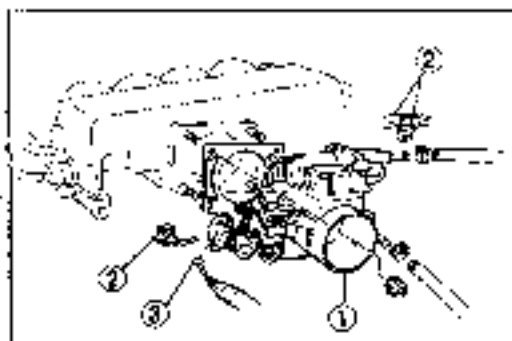
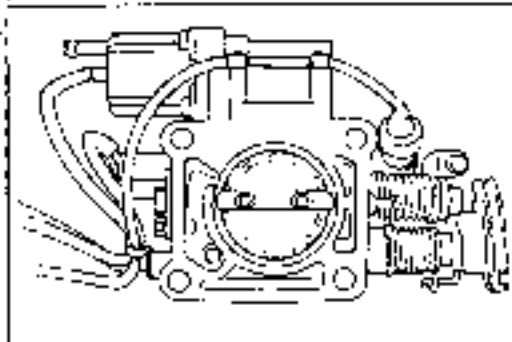
2BUJF2 C29



CBUOF2-090



01M,0F2-24



CBUOF2-090

**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 (G5).

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.

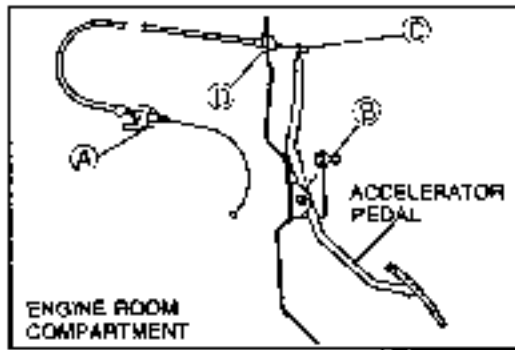
**Note**

- Use a new gasket.

**Tightening torque:**

19—25 N·m (1.8—2.6 m·kg, 14—19 ft·lb)

2. Connect the connectors.
3. Install the accelerator cable.

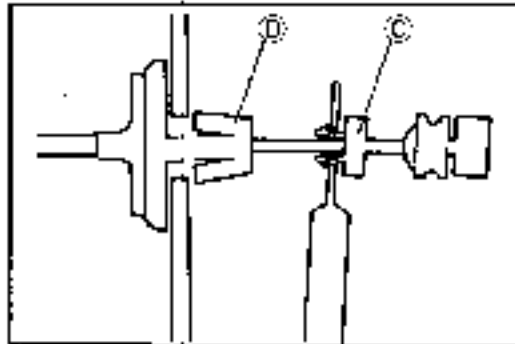


9M.JCF2-107

**ACCELERATOR CABLE**

**Inspection**

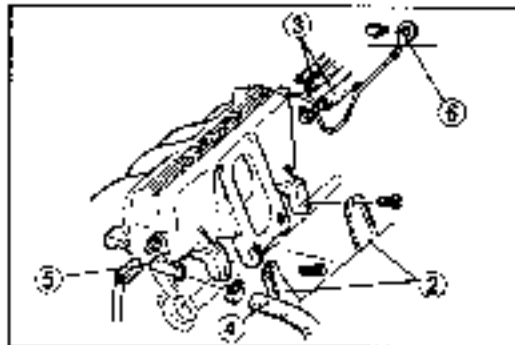
1. Check deflection of the cable. If deflection exceeds 1—3mm (0.039—0.118 in), adjust it by turning nuts A.
2. Depress the accelerator pedal to the floor and check that the throttle valve opens fully. Adjust with bolt B if necessary.



9M.JCF2-108

**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 laps of stay (C) and remove the accelerator cable from the pedal arm.
4. Compress the laps of stay (C) 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.



11UJ-2-103

**DYNAMIC CHAMBER**

**Removal**

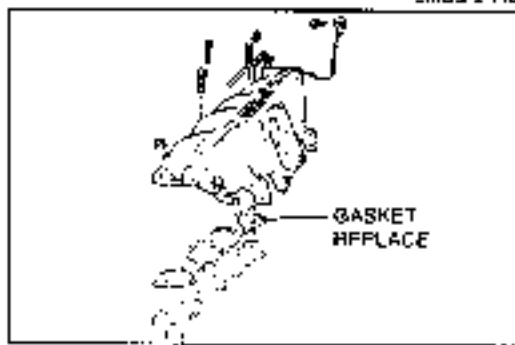
1. Remove the throttle body. (Refer to page F2-138.)
2. Remove the dynamic chamber brackets.
3. Disconnect the vacuum hoses.
4. Disconnect the PCV hose.
5. Disconnect the intake air thermosensor connector.
6. Disconnect the ground wire.



9M.JCF2-110

7. Remove the injector harness bracket.

8. Remove the dynamic chamber.



9M.JCF2-111

**Installation**

Install in the reverse order of removal.

**Note**

Use a new gasket.

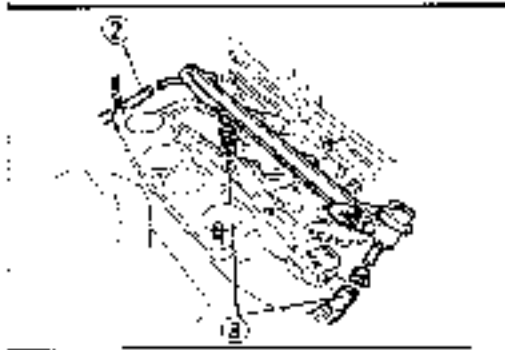
**Tightening torque**

Dynamic chamber and dynamic chamber bracket:  
19—25 Nm (1.9—2.6 m-kg, 14—19 ft-lb)

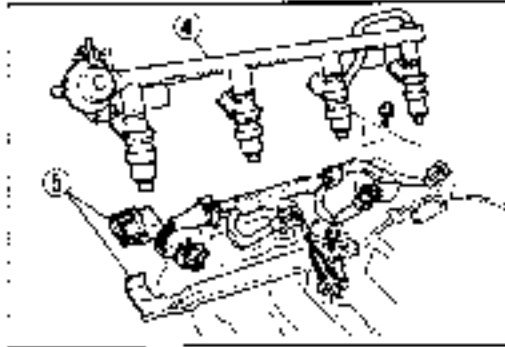
**Ground wire:**

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)

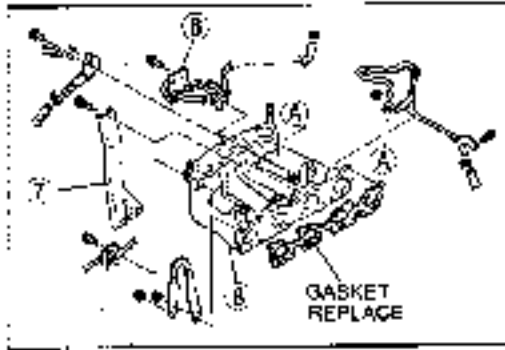




IDLDF2 067



9VLD2 113



9VLD2 114

### 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.)

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:

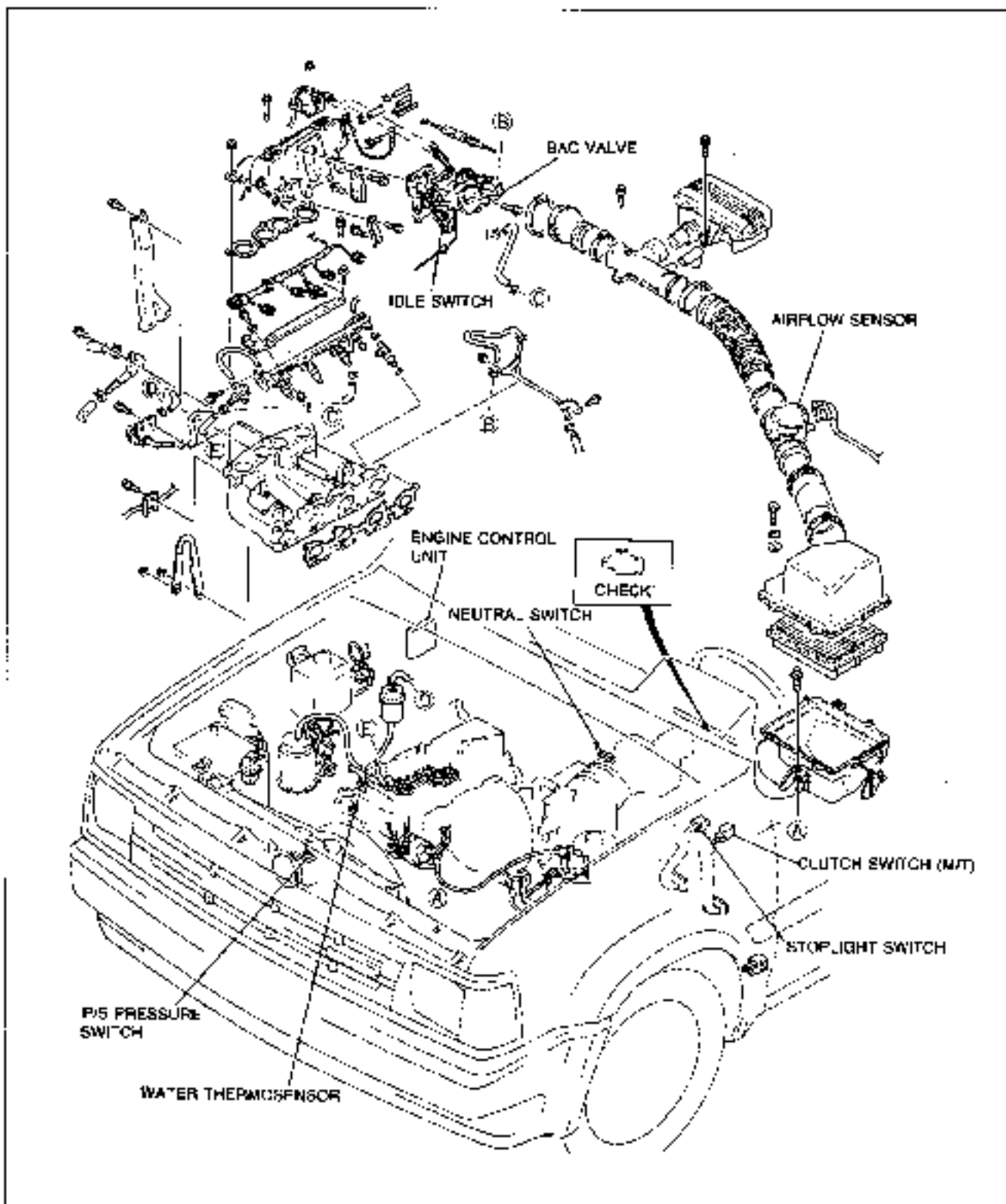
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Pulsation damper and injector harness bracket:

7.6—11 N·m (80—110 cm·kg, 69—95 in·lb)

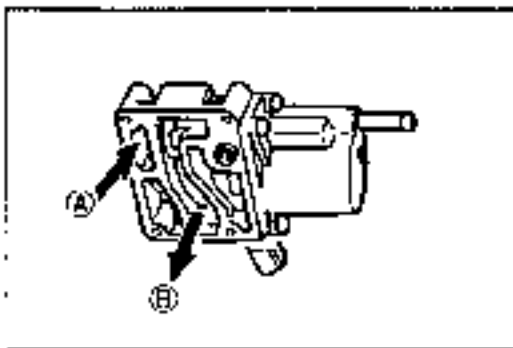
**IDLE SPEED CONTROL (ISC) SYSTEM**

**DESCRIPTION**

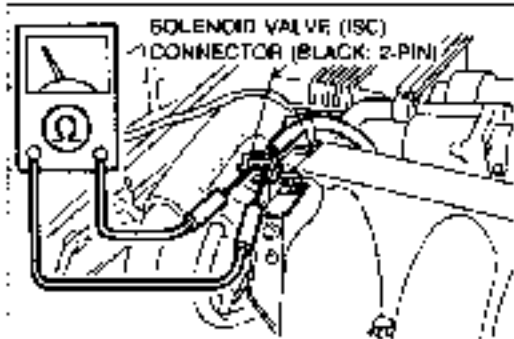


3MJC02-115

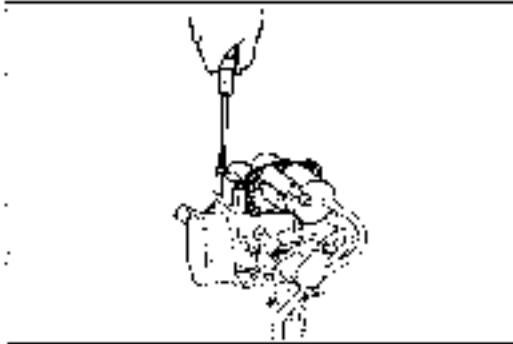
To improve idle smoothness, the ISC system controls the intake air amount by regulating the bypass air amount that passes through the throttle body. This system consists of the BAC valve and the control system. The BAC valve consists of the air valve that functions only when the engine is cold and the solenoid valve (ISC) that works throughout the entire engine speed range.



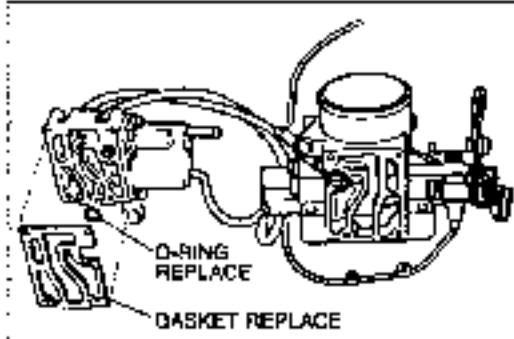
RUCF2-056



RVA\_CFA-117



BVUCF2-119



QVUCF2-119

**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.

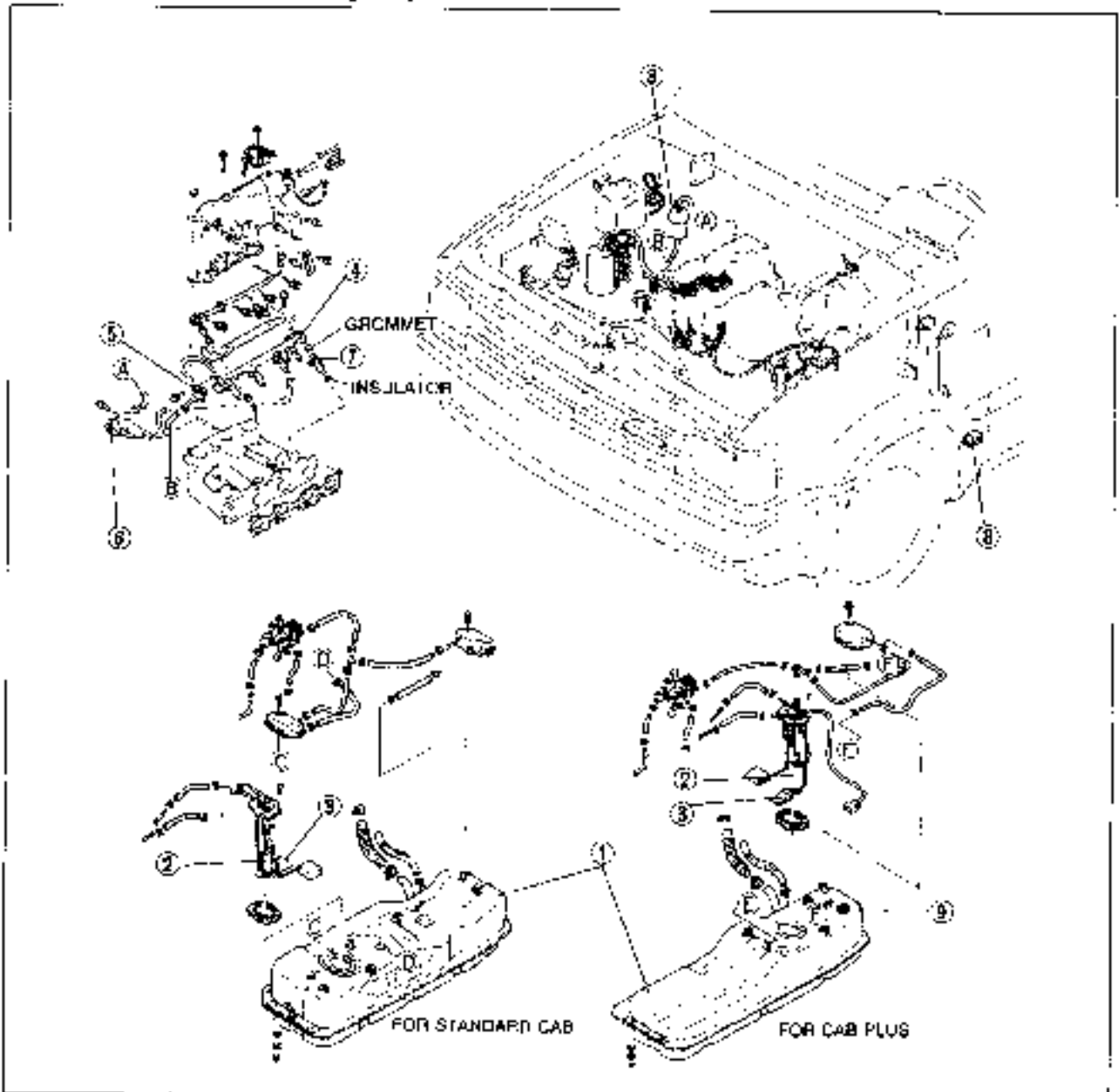
**Tightening torque:**

**2.6—3.4 Nm (25—35 cm·kg, 22—30 in·lb)**

FUEL SYSTEM

STRUCTURAL VIEW

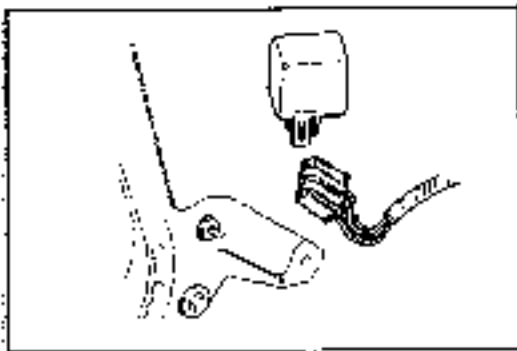
This system supplies the necessary fuel for combustion at a constant pressure to the fuel injectors. Fuel is metered and injected into intake manifold according to the injection control signals from the engine control unit. It consists of the fuel tank, the fuel pump, the fuel filters, the delivery pipe, the pressure regulator, the injectors, and the circuit opening relay.



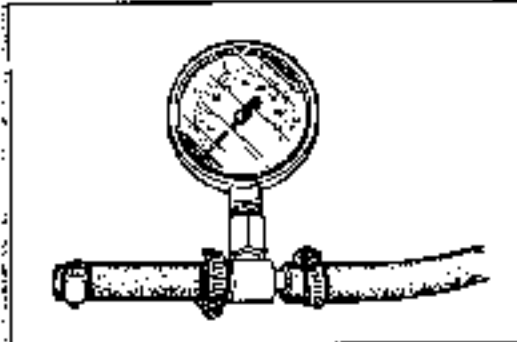
- 1. Fuel tank  
Removal..... page F2-147  
Installation... page F2-149
- 2. Fuel pump  
Inspection... page F2-150  
Replacement. page F2-152

- 3. Fuel filter  
Replacement. page F2-149
- 4. Delivery pipe
- 5. Pressure regulator  
Inspection..... page F2-154  
Replacement. page F2-155
- 6. Pulsation damper  
Inspection, Removal, and  
Installation., page F2-155

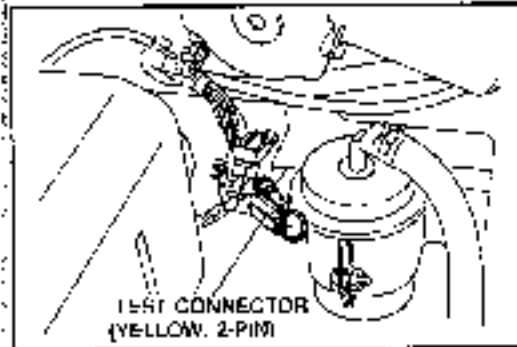
- 7. Injector  
Removal..... page F2-156  
Inspection..... page F2-157  
Installation... page F2-156
- 8. Circuit opening relay  
Inspection, Removal, and  
Installation. page F2-153
- 9. Fuel vapor valve  
Inspect for damage



3Rr.CF2-076



3vL.CF2-122



3vL.CF2-123

**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.

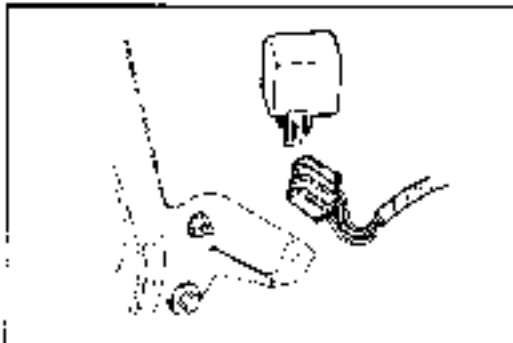
**Caution**

**Install hose clamps to secure the fuel pressure gauge to the fuel filter and the fuel main hose to prevent fuel leakage.**

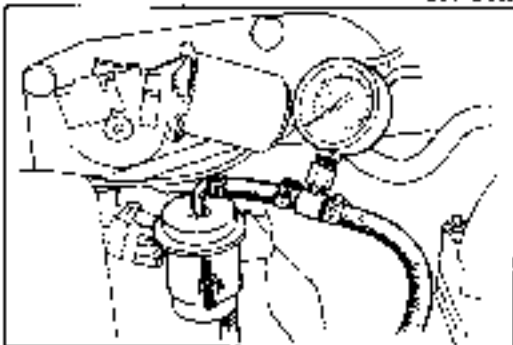
**Priming Fuel System**

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.

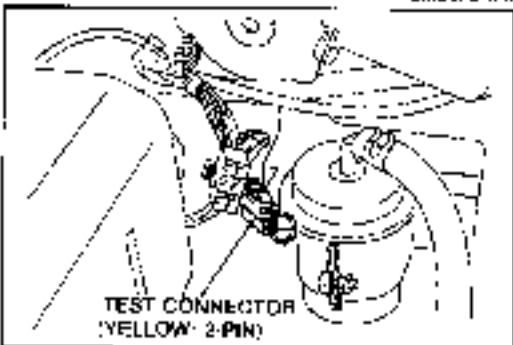
1. Connect the terminals of the test connector (Yellow, 2-pin) with a jumper wire.
2. Turn the ignition switch ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper wire.



1BUCF2-063



3M\_KF2-125



9M\_KF2-126

**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.)

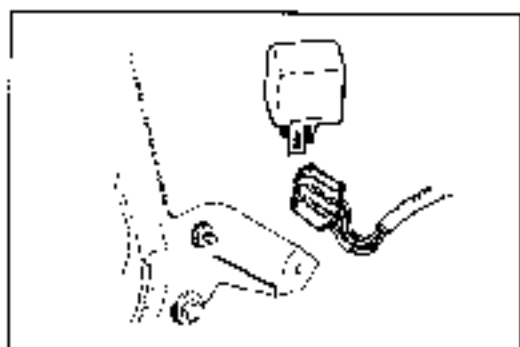
1. Disconnect the negative battery terminal
2. Install a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Connect the terminals of the test connector (Yellow 2-pin) with a jumper wire.
5. Turn the ignition switch 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:**

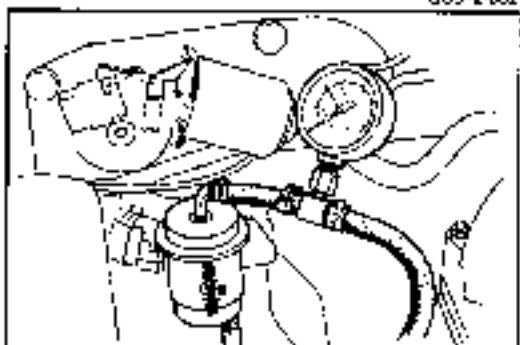
**More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)**

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.)

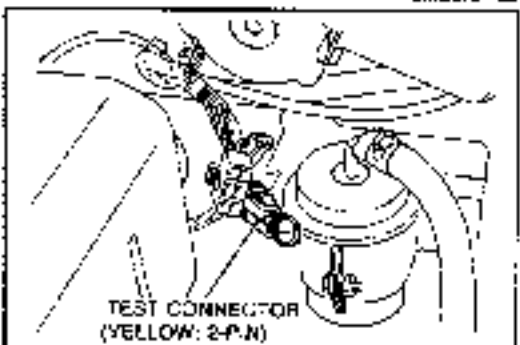
1BUCF2-064



\*BU012-062



\*SMU0F2-020

TEST CONNECTOR  
(YELLOW: 2-PIN)

\*BLCF2-063

### 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 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:

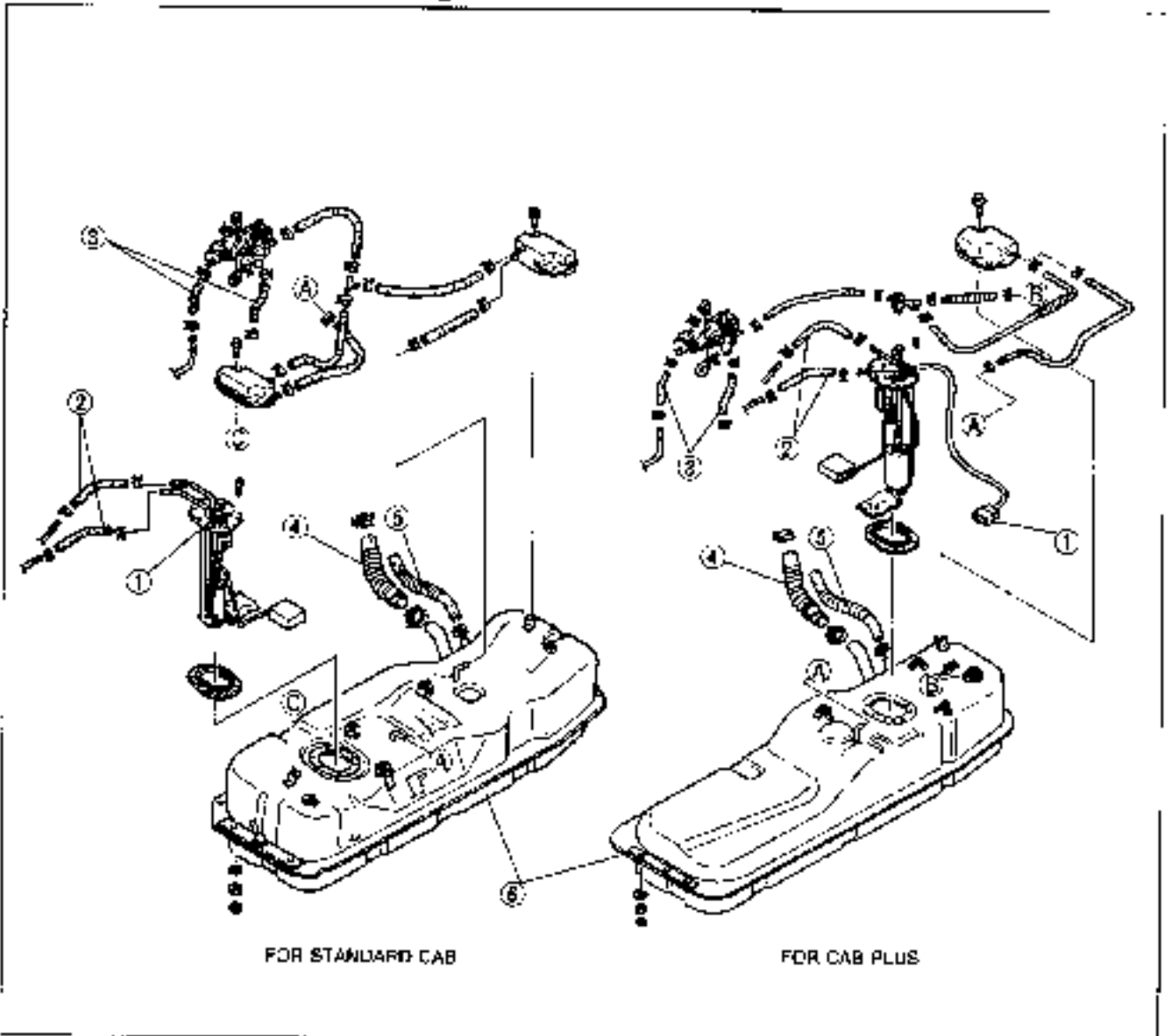
265—314 kPa (2.7—3.2 kg/cm<sup>2</sup>, 38—46 psi)

- 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.



10J0F2-064

**Note**

**Drain the fuel from the fuel tank before removing the tank.**

- |                        |                                  |
|------------------------|----------------------------------|
| 1. Fuel pump connector | 5. Breather hose                 |
| 2. Fuel hoses          | 6. Fuel tank                     |
| 3. Evaporative hoses   | Inspect for cracks and corrosion |
| 4. Fuel filter hose    | Repair or replace if necessary   |

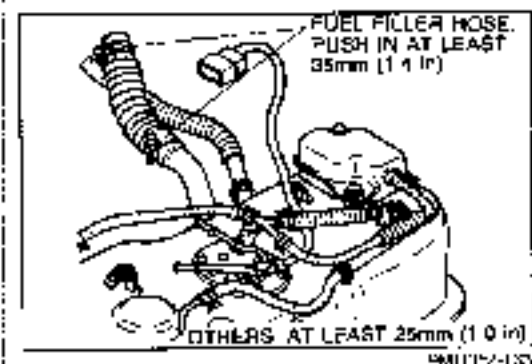
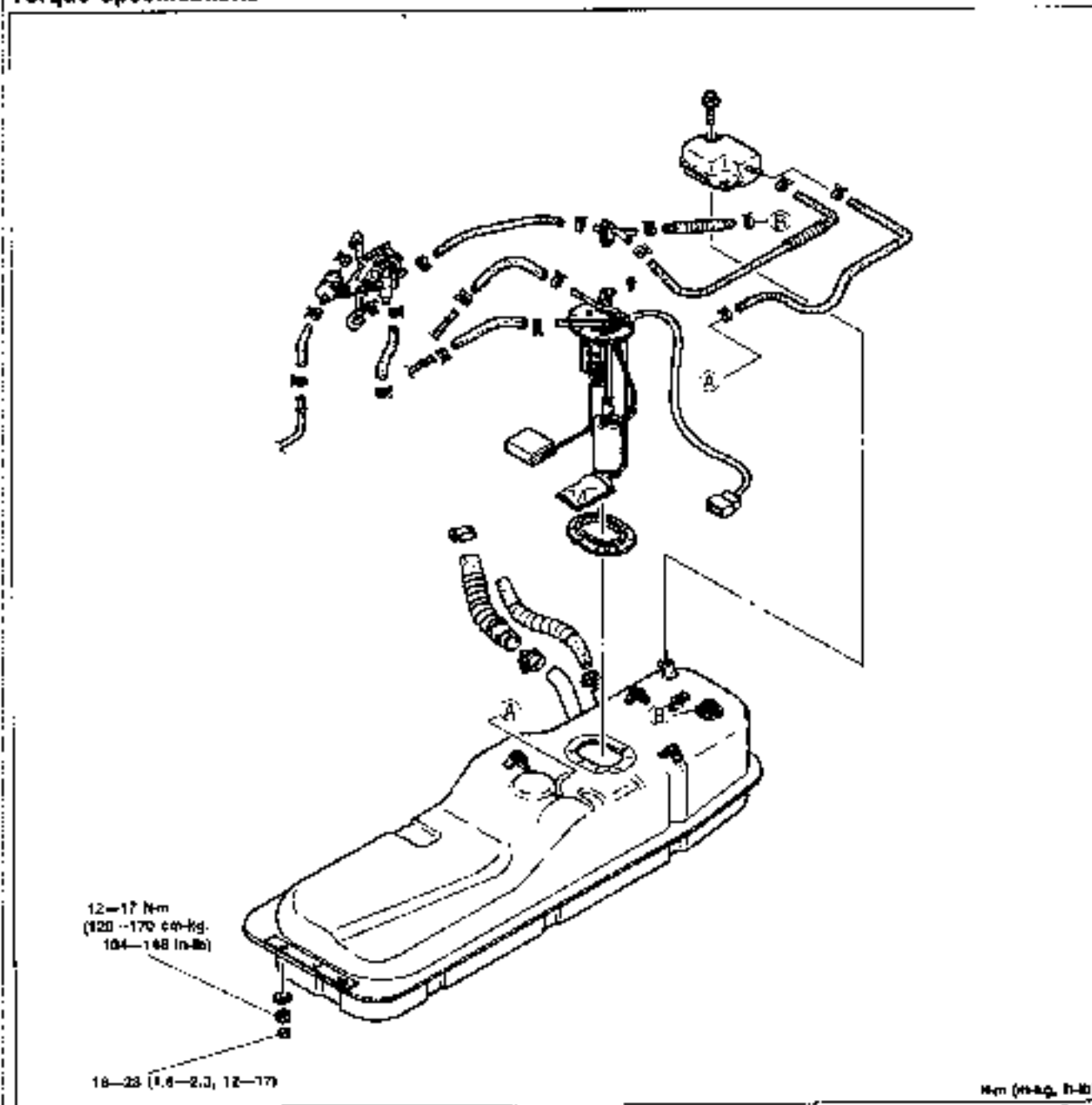
**Warning**

**Before repairing the fuel tank, clean it thoroughly with steam to remove all explosive gas.**

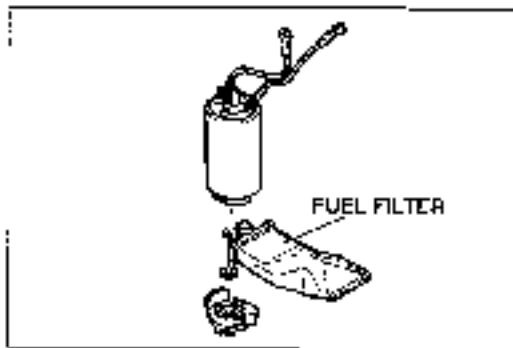


**Installation**

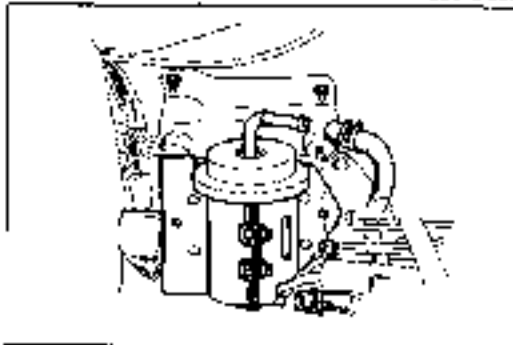
Install in the reverse order of removal, referring to **Installation Note**.

**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)**.



10UJF2 965



9MUJF2 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.

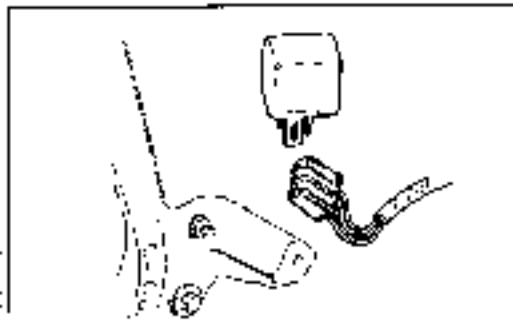
**Warning**

**Always work away from sparks or open flames.**

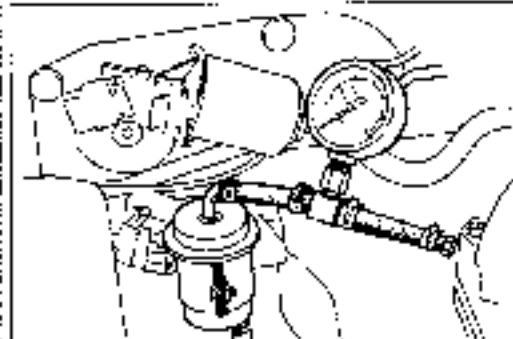
1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and bracket.
3. Install in the reverse order of removal.

**Note**

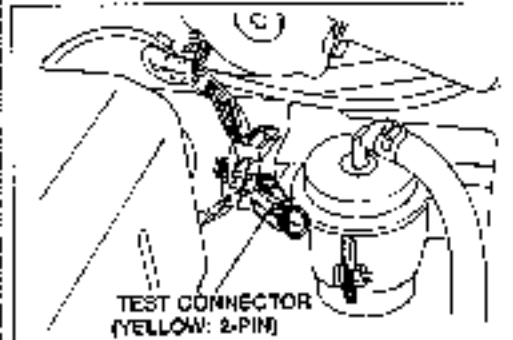
**When installing the filter, push the fuel hoses fully onto the fuel filter.**



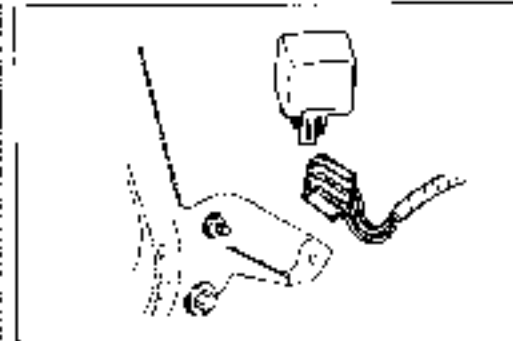
1BU0F24066



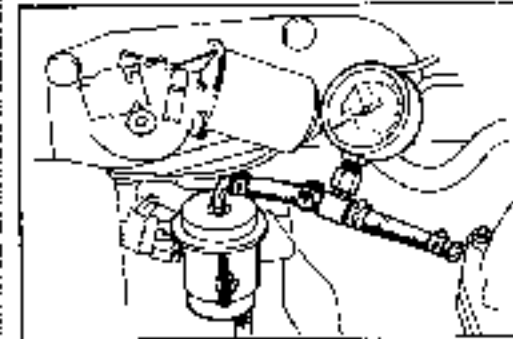
9WUCF2'33

TEST CONNECTOR  
(YELLOW: 2-PIN)

9BU0F24064



1BU0F2 067



9WUCF2'41

**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:**

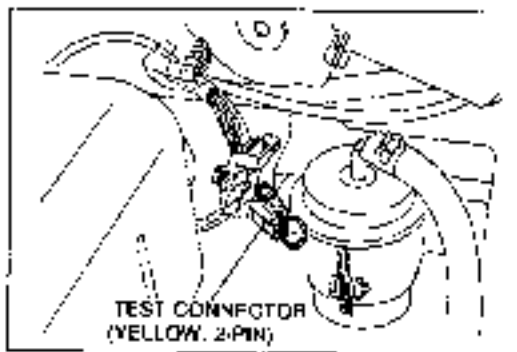
**More than 343 kPa (3.5 kg/cm<sup>2</sup>, 50 psi)**

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.

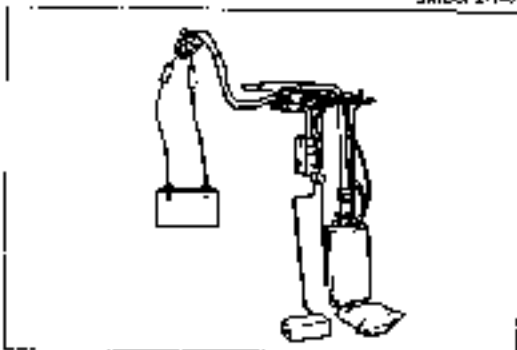


5MUDP2-142

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.



2PL0FPA001

**Fuel pump operation**

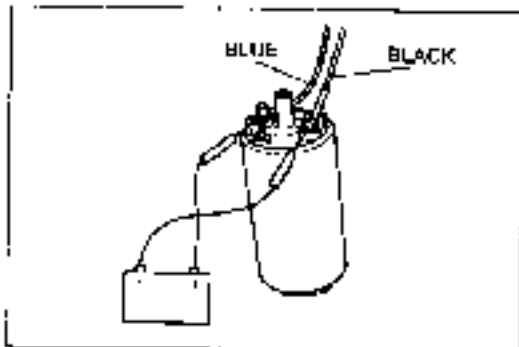
Only when fuel pump operating sound is not heard from fuel filler port (with IGN ON and test connector [yellow: 2-pin] connected) and circuit opening relay is normal

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.

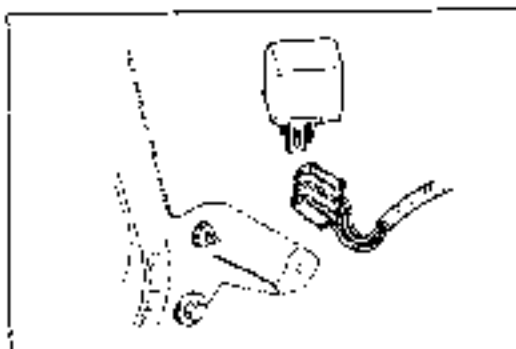
Operates — Check wiring between fuel pump connector and fuel pump for open or short circuit

Does not operate—Replace fuel pump

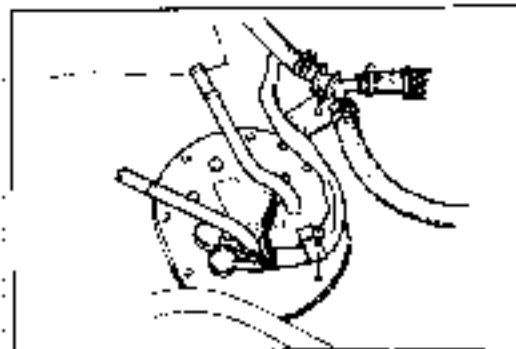
### Replacement

#### Warning

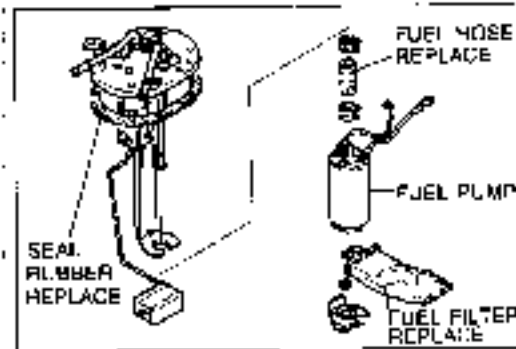
- Before performing the following procedures, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.



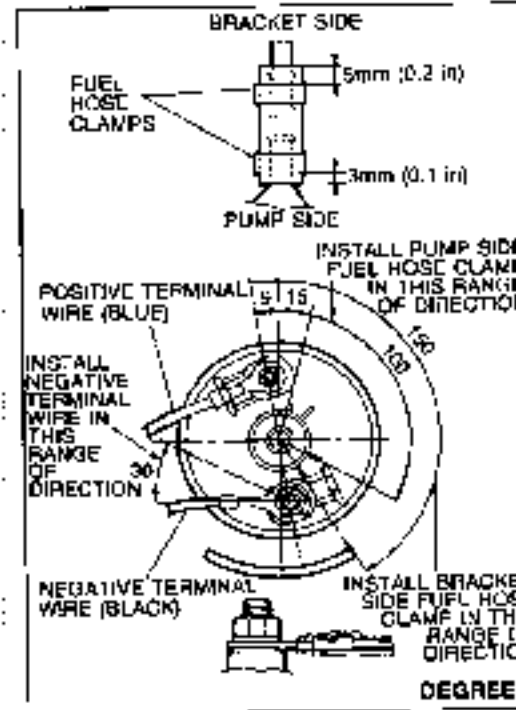
1BUD12-069



1BUD12-070



1EUD7327



33L012 134

- Remove the fuel tank. (Refer to page F2-147.)
- Remove the fuel pump and fuel tank gauge unit assembly.

- Remove the fuel pump.
- Install in the reverse order of removal, referring to **Installation note**.
- After installation, confirm that the fuel pump and fuel level gauge operates correctly. (Refer to page F2-151 and Section 4.)

#### Installation note

##### Fuel filter

Use a new fuel filter.

##### Fuel pump terminals

- Install the fuel pump terminals as shown.
- Tighten the nuts with the specified torque.

#### Tightening torque:

**Positive terminal (Blue)..... 1.2—2.0 Nm**  
(12—20 cm·kg, 10—17 in·lb)

**Negative terminal (Black).... 2.3—3.4 Nm**  
(23—33 cm·kg, 20—29 in·lb)

##### Fuel hose

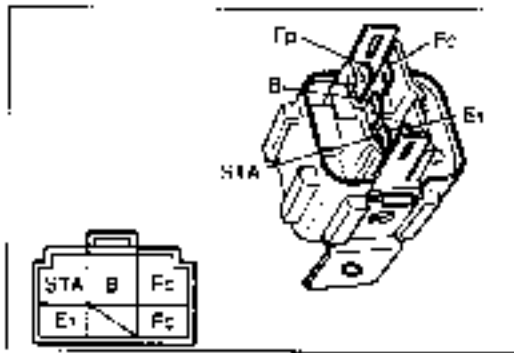
- Use a new fuel hose.
- Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.
- Install clamps as shown.

##### Fuel pump

Install the fuel pump to the bracket correctly.

##### Seal rubber

Use a new seal rubber.



29UCF2-032

**CIRCUIT OPENING RELAY**

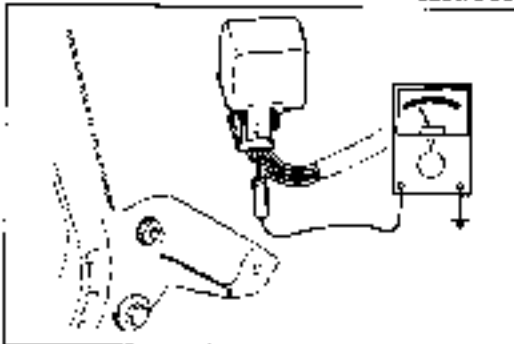
**Inspection**

**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.



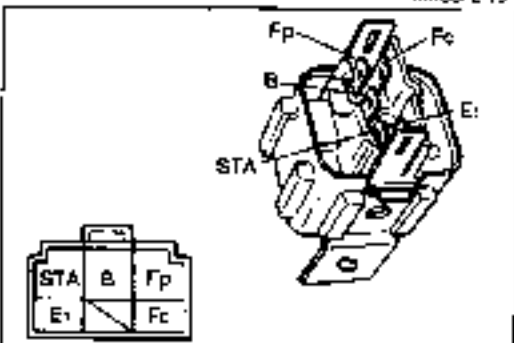
HMJ3 2-15'

**Relay circuit**

Check voltage between the terminals and a ground with a voltmeter.

Condition	Terminal	Fp	Fc	B	STA	E1
Ignition switch: ON	Fp	0V	12V	12V	0V	0V
	Fc	12V	0V	12V	12V	0V
At idle	Fp	12V	0V	12V	0V	0V

If not as specified, check the related wiring harness.



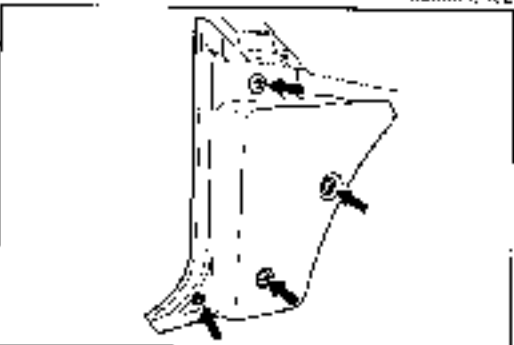
31M JCF2-122

**Resistance**

Check resistance between the terminals using an ohmmeter.

Between terminals	Resistance (Ω)
STA-E1	2'-43
B-Fc	10Ω-226
B-Fp	∞

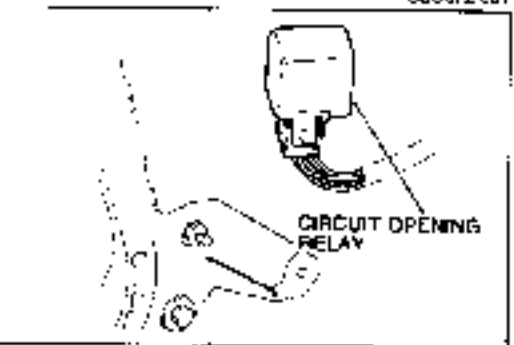
If not as specified, replace the circuit opening relay.



60U0F2-001

**Removal**

1. Remove the front side trim on the driver's side.

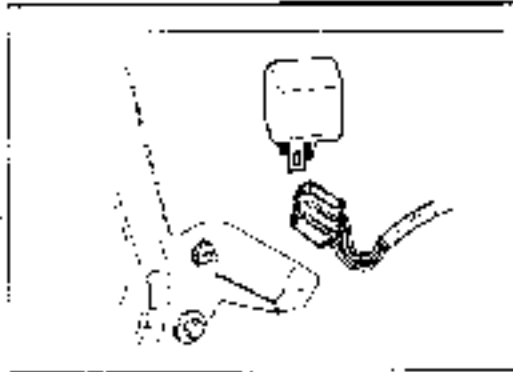


66 JCF2-092

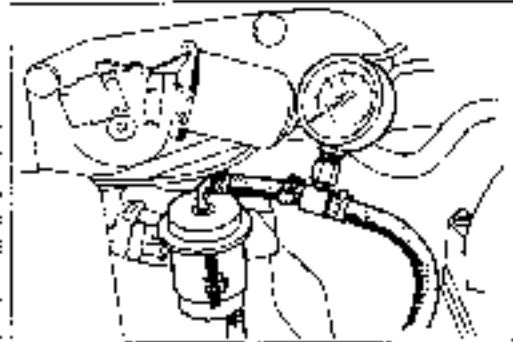
2. Remove the circuit opening relay.

**Installation**

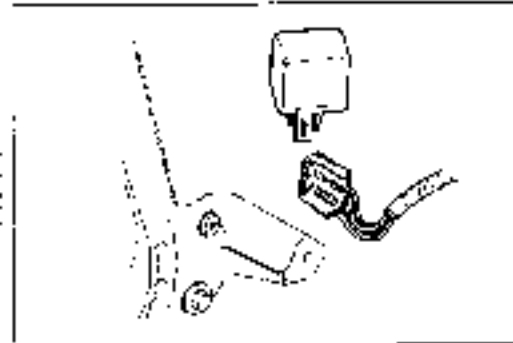
Install in the reverse order of removal.



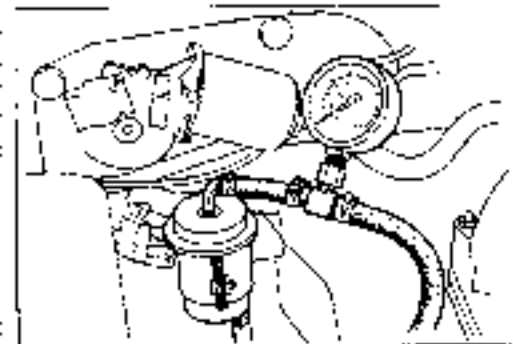
3A0JF2-077



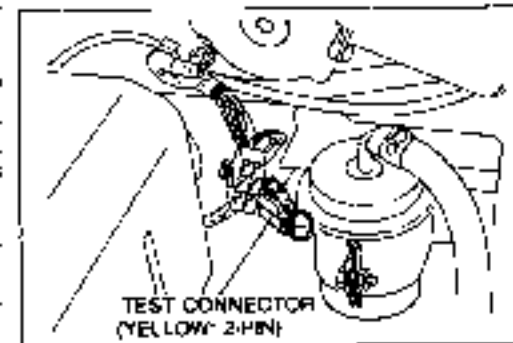
3C0JF2-082



3E0JF2-073



3E0JF2-077

TEST CONNECTOR  
(YELLOW, 2-PIN)

3E0JF2-050

**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**

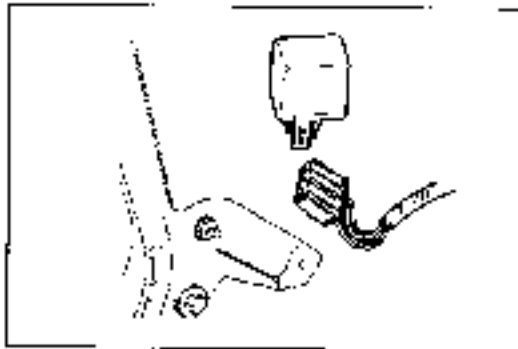
Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)

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.

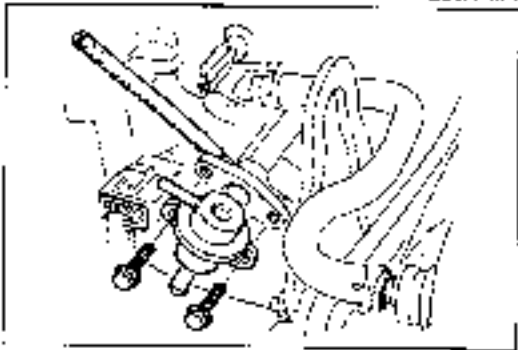
**Fuel pressure:**

More than 147 kPa (1.5 kg/cm<sup>2</sup>, 21 psi)

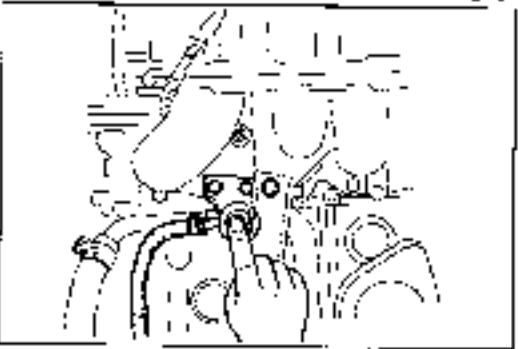
9. If as specified, replace the pressure regulator.



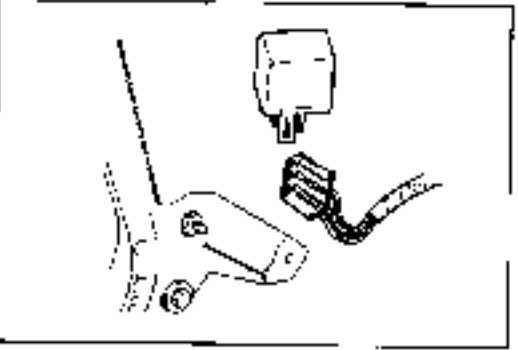
BU0F2-074



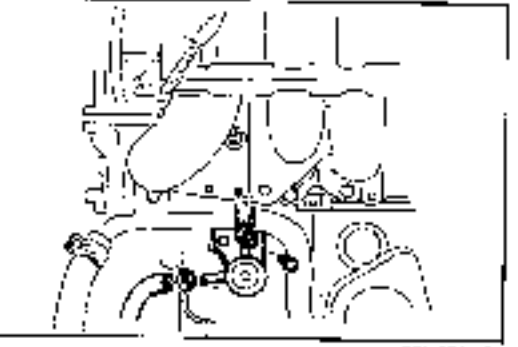
QVL1:F2-181



ZBU0F2-133



IDU0F2-C75



3SLCF2-115

### Replacement

#### 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.)
- When replacing fuel system parts, keep sparks, cigarettes, and open flames away from the fuel and all parts.

- Disconnect the vacuum hose.
- Disconnect the fuel return hose.
- Remove the pressure regulator.

#### Tightening torque:

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)

- Install in the reverse order of removal.

### PULSATION DAMPER

#### Inspection (G8)

- Place a finger on the screw of the pulsation damper head.
- Check that pulsation is felt while the engine is running.

### Removal

#### 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.)
- When replacing fuel system parts, keep sparks, cigarettes, and open flames away from the fuel and all parts.

- Disconnect the fuel hoses.
- Remove the pulsation damper.

#### Installation

Install in the reverse order of removal.

#### Tightening torque:

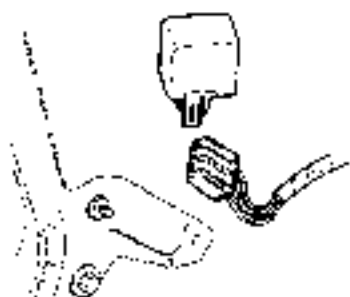
7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)



### 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.



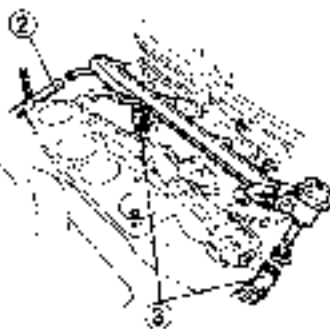
15LCP2076

1. Remove the dynamic chamber. (Refer to page F2-139.)



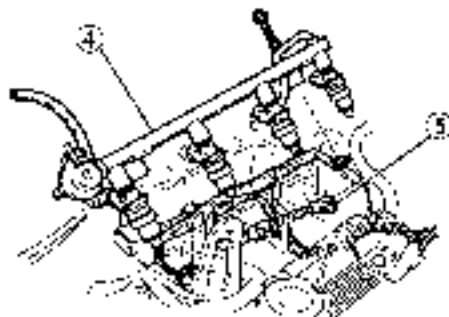
18U012477

2. Disconnect the vacuum hose.
3. Disconnect the fuel hoses



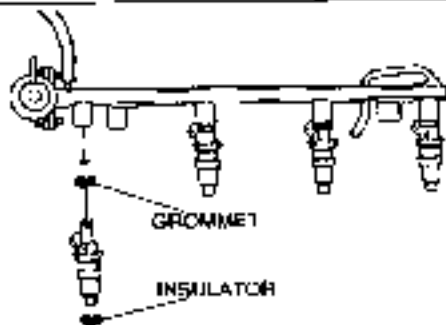
WMI12-2-156

4. Remove the delivery pipe with the pressure regulator.
5. Disconnect the injector connectors

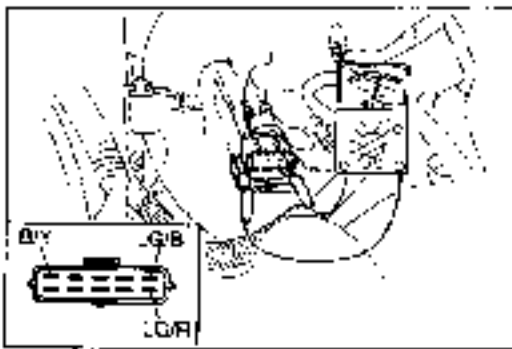


EMU02 165

6. Remove the grommets, injectors, and insulators



WMIJF2 166



9MUCF2-167

**Inspection**

**Injector resistance (On-vehicle inspection)**

(When no injector operating sound is heard)

1. Check resistance at the injector harness connector (FMIN-01) with an ohmmeter.

Individual injector	Terminal	Resistance
No. 1 and/or 2	(B/Y)-(G/B)	6-8Ω
No. 3 and/or 4	(B/Y)-(L/G/P)	6-8Ω

Correct——Check related wiring harness

Not correct—Check injector resistance  
(Component inspection)

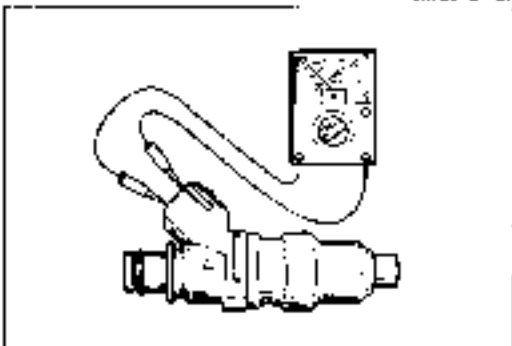
**Injector resistance (Component inspection)**

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.

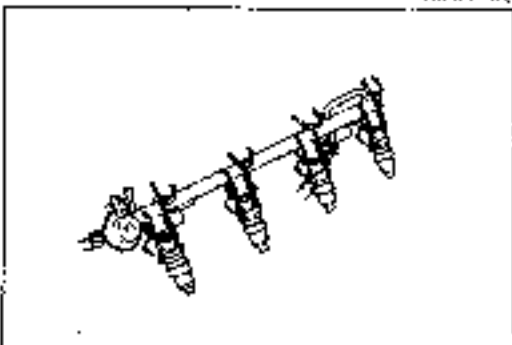
Not correct—Replace injector



9MUCF2-168

**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.



9MUCF2-169

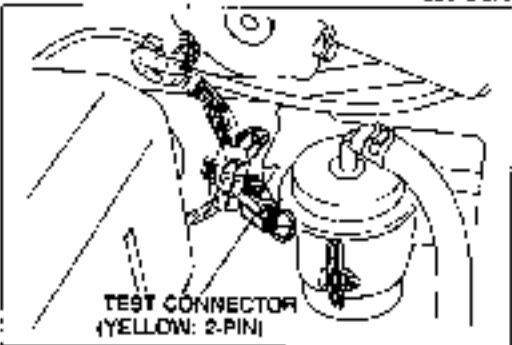
**Caution**

**Affix the injectors firmly to the delivery pipe so that no movement of the injectors is possible.**

**Warning**

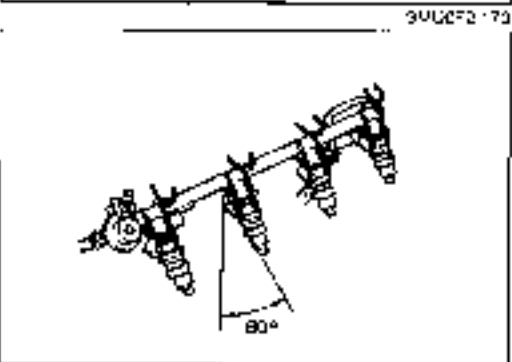
**Be extremely careful when working with fuel. Always work away from sparks or open flames.**

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.



9MUCF2-170

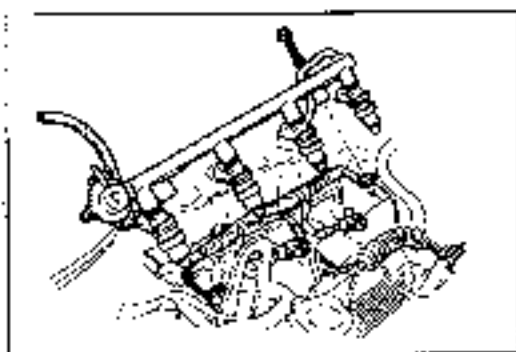
6. Tilt the injectors approx. 60 degrees and check that no fuel leaks from the injector nozzles.
7. If fuel leaks from an injector, replace it.



9MUCF2-171

**Note**

**After 1 minute a drop of fuel from the injector is acceptable.**



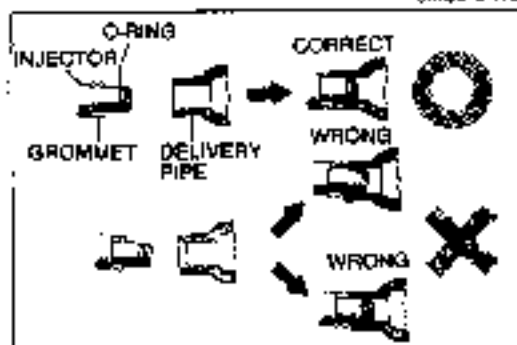
SMU0F2-172

**Installation**

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

**Tightening torque****Delivery pipe:**

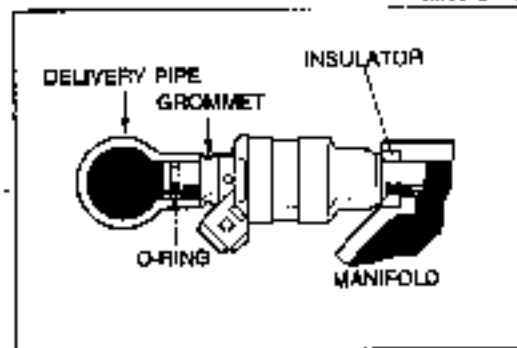
19–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)



EMU0F2-173

**Installation note**

1. Use new injector O-rings
2. Apply a small amount of engine oil to the O-rings before installing

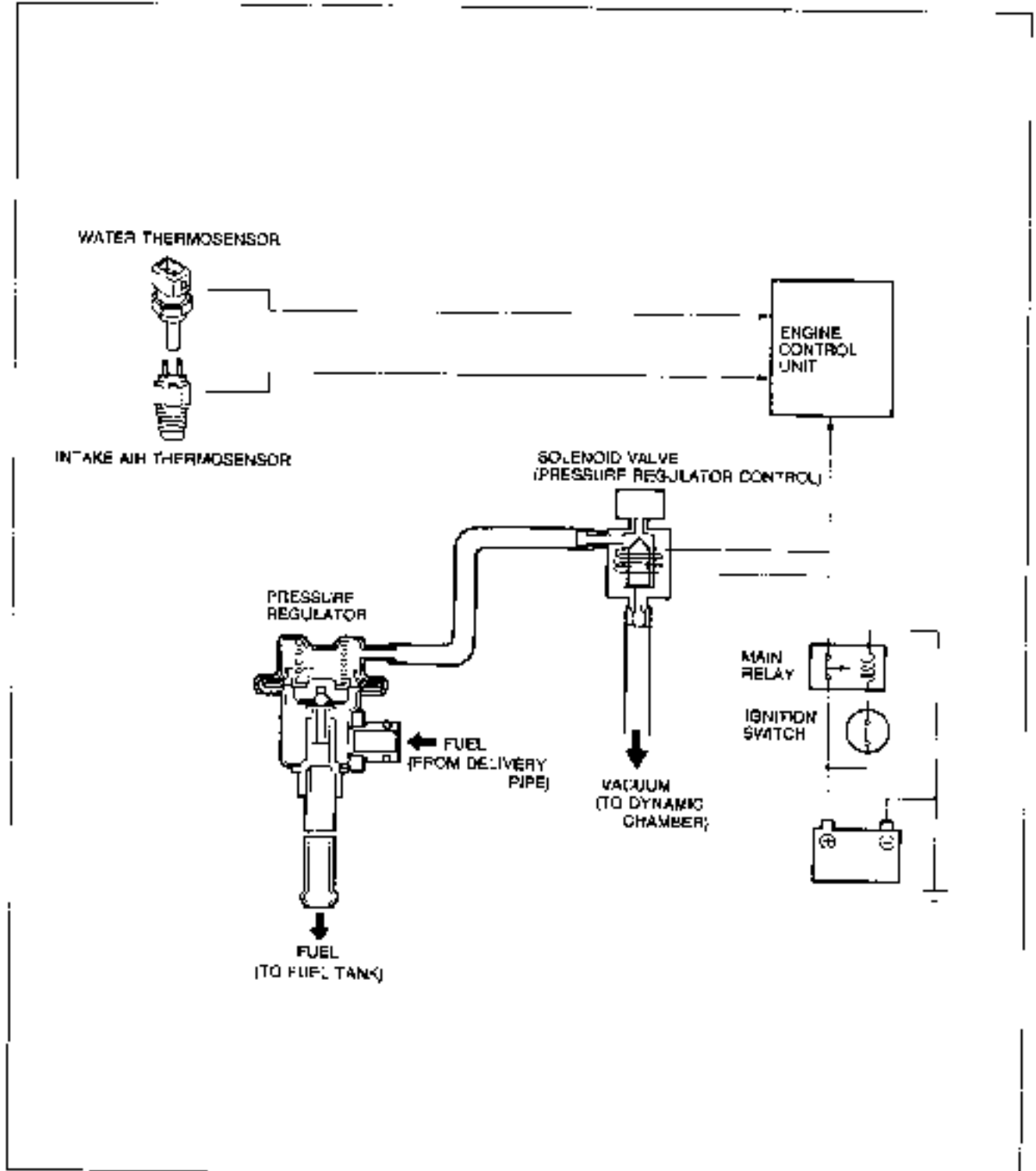


SMU0F2-174

3. Install the injectors and the injector insulators.

PRESSURE REGULATOR CONTROL (PRC) SYSTEM

DESCRIPTION



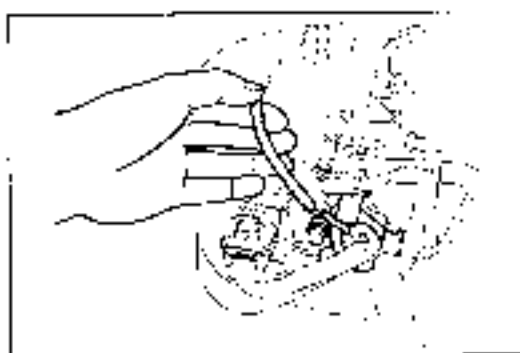
12L10F2-080

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)**.

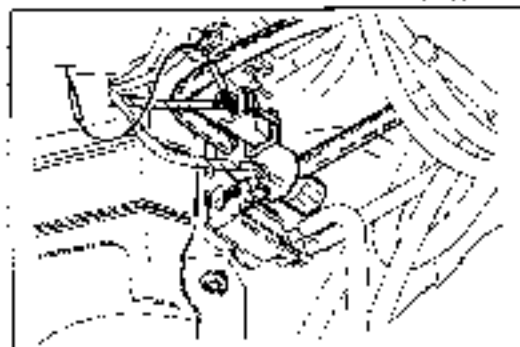
**Specified time: Approx. 120 seconds**

**Operating condition: Coolant temperature — above 90°C (194°F)**

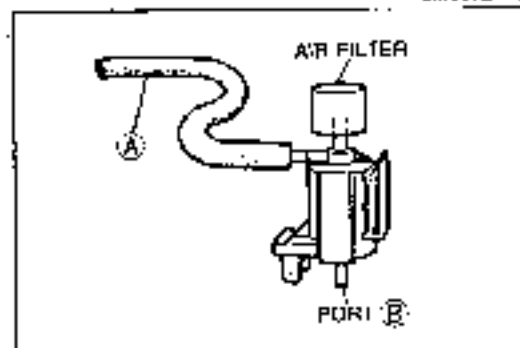
**Intake air temperature — above 75°C (167°F)—G6, 65°C (149°F)—F2**



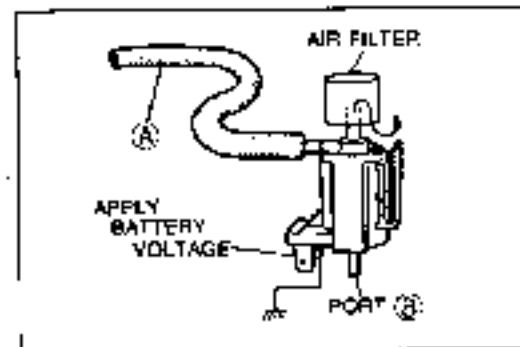
94110F2-79



EMU0F2-177



94110F2-78



2BJ0F2-034

**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 left.
- 3 Ground the solenoid valve terminal wire (L/B) with a jumper wire. Check that no vacuum is left.
- 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

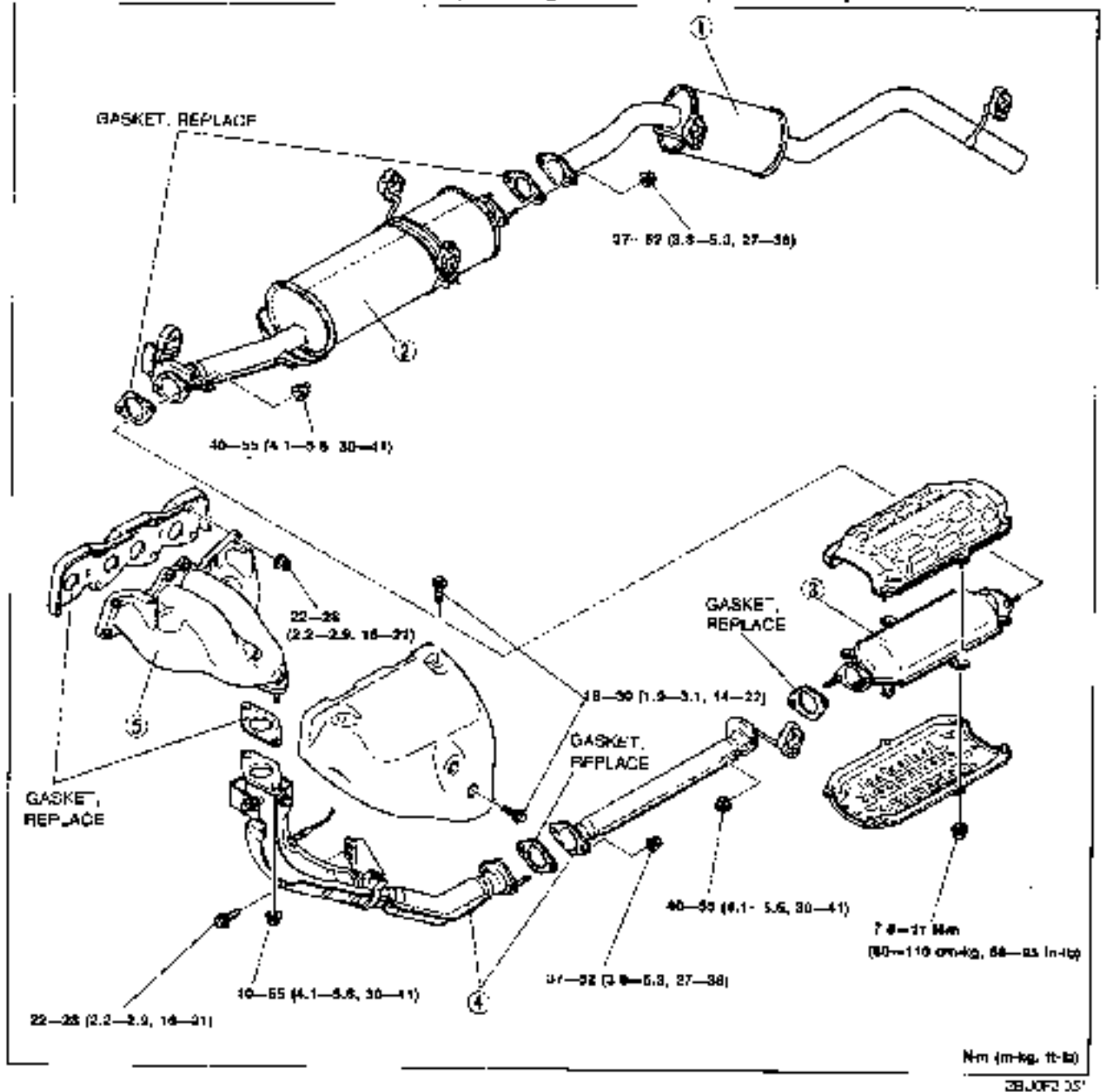
## COMPONENTS

## 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

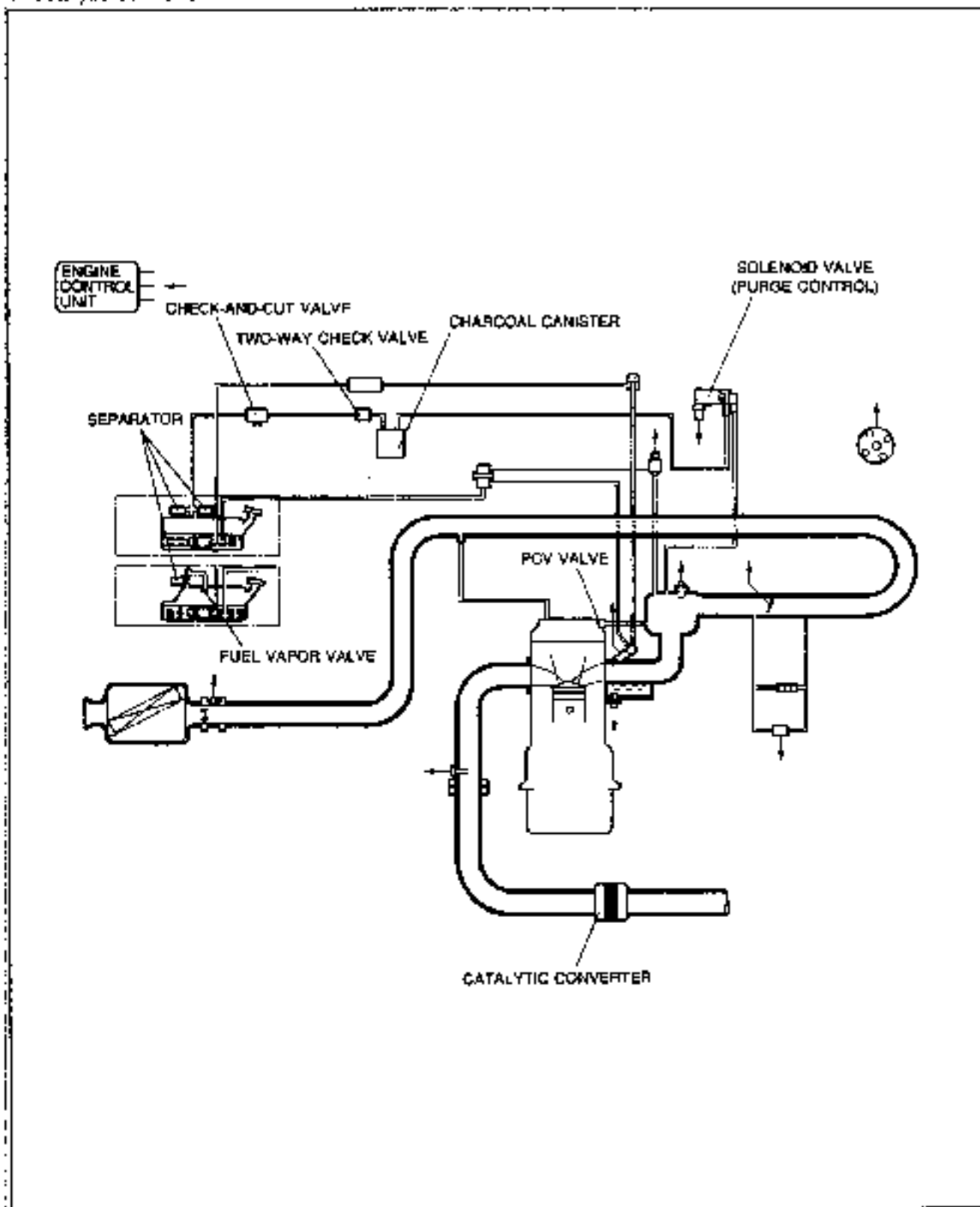
# F2 OUTLINE OF EMISSION CONTROL SYSTEM

## OUTLINE OF EMISSION CONTROL SYSTEM

### STRUCTURAL VIEW

To reduce CO, HC, and NO<sub>x</sub> emissions, the following systems are employed.

1. Positive crankcase ventilation (PCV) system
2. Evaporative emission control system
3. Catalytic converter



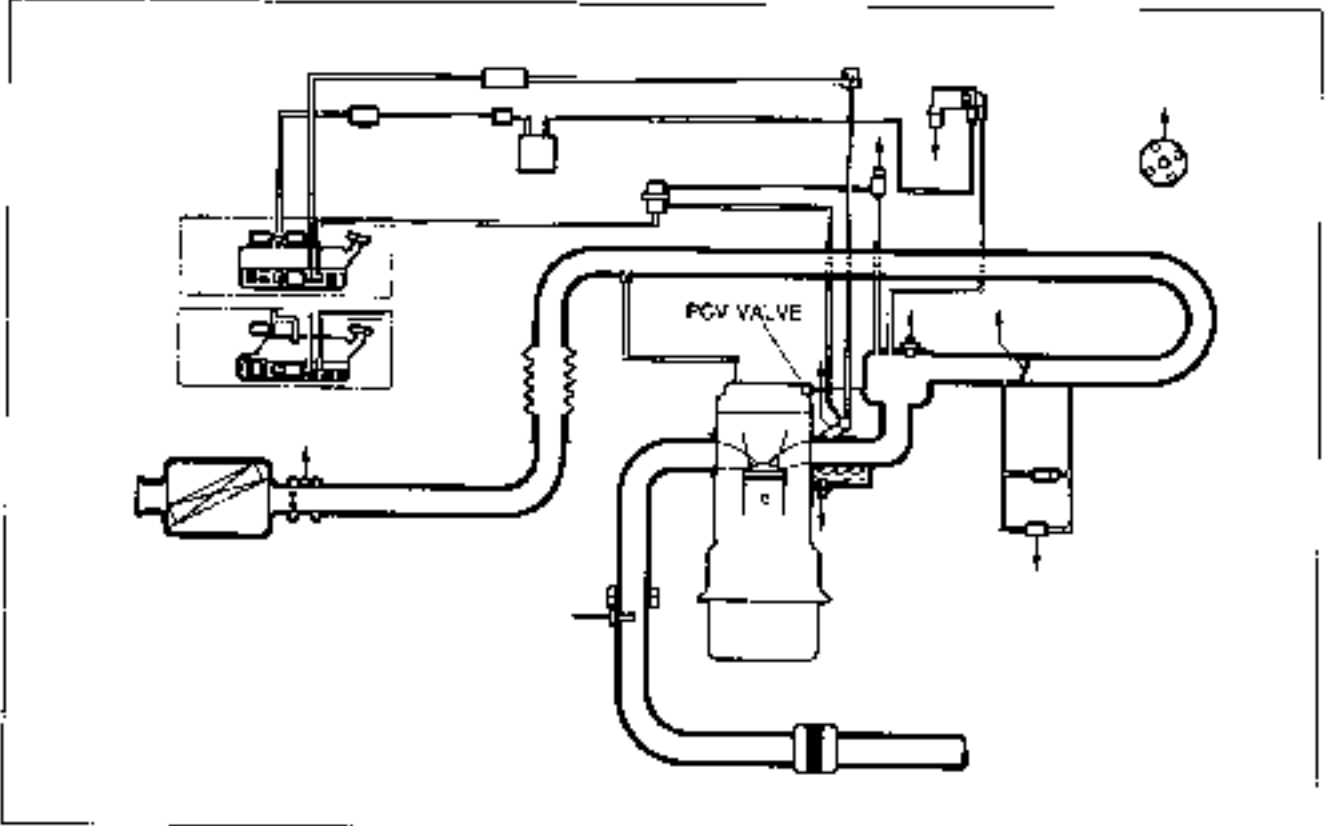
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

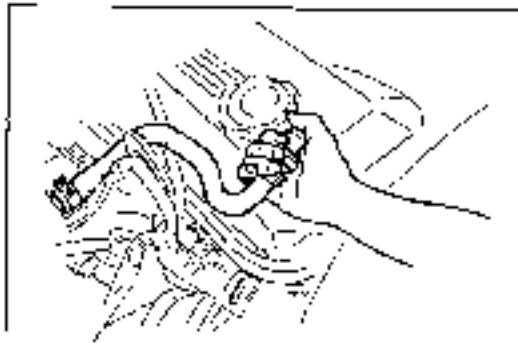
The PCV valve is operated by the intake manifold vacuum.

When the engine is running at i.d.e, 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.



9MUDF2-182

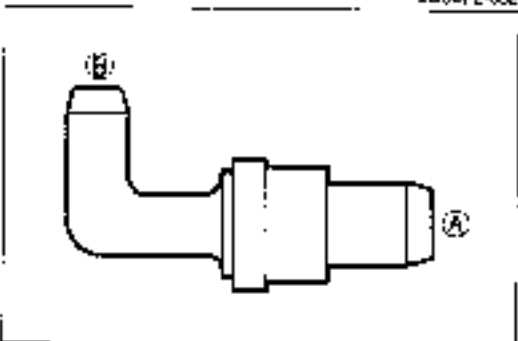


2BUDF2-052

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.



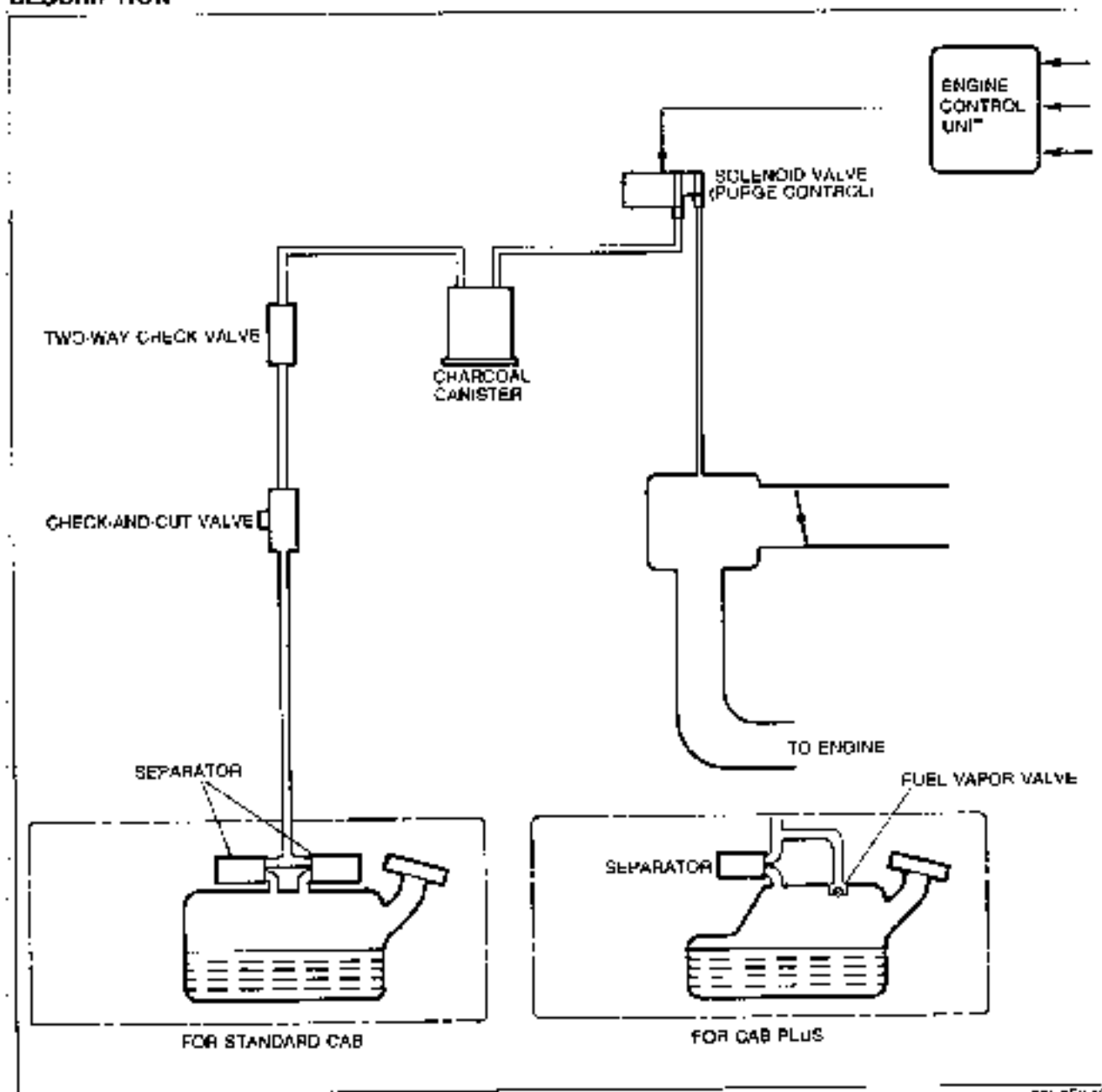
9MUDF2-184

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



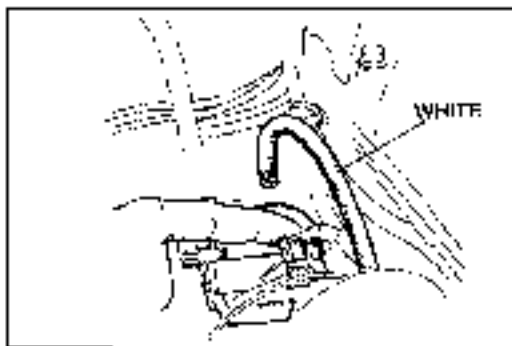
3BL072-100

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.

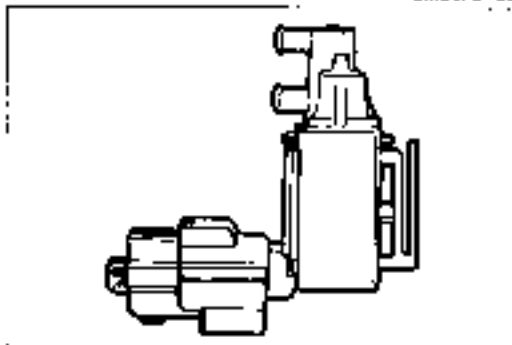
**Operation**

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.

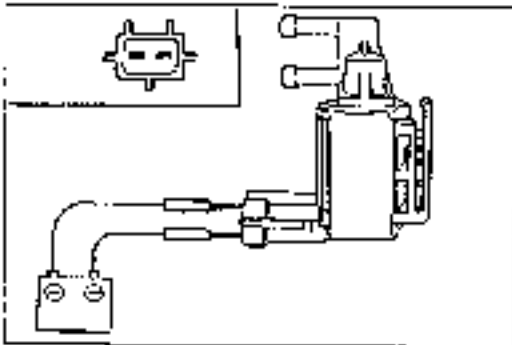
- (1) After warm up
- (2) Driving in gear
- (3) Accelerator pedal depressed (idle switch OFF)
- (4) Oxygen sensor functioning normally



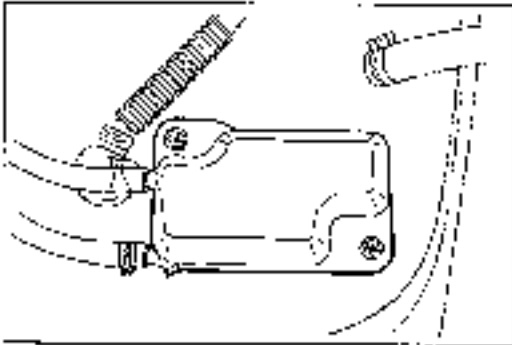
3MJC03-136



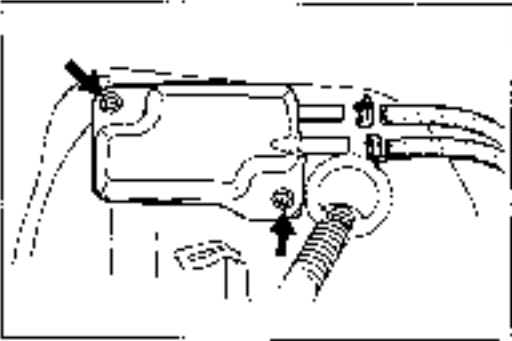
9VLC03-137



9MAY2-138



1407-1382



12U072-093

**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.

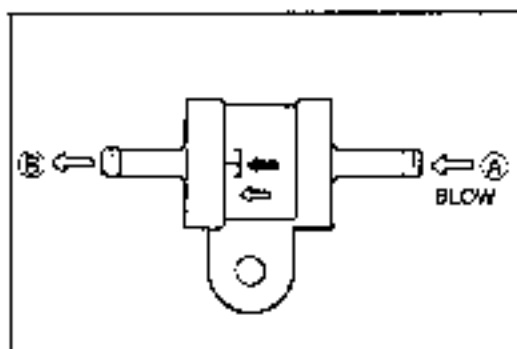
3. Disconnect the solenoid valve connector and connect **12V** and a ground to the terminals of the solenoid valve.
4. Check that the air flows through the valve.
5. If not as specified, replace the solenoid valve.

**SEPARATOR****Inspection**

1. Remove the fuel tank. (Refer to page F2-147.)
2. Visually check the separator for damage, replace it if necessary.

**Replacement**

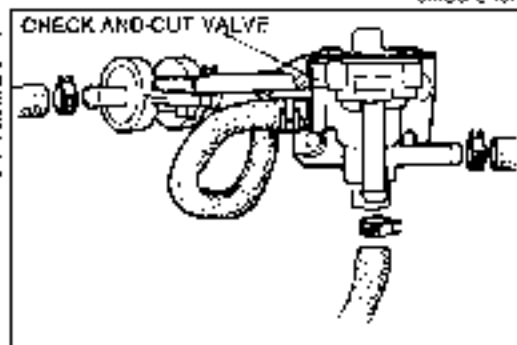
1. Remove the fuel tank. (Refer to page F2-147.)
2. Disconnect the fuel hoses.
3. Remove the separator.
4. Install in the reverse order of removal.



9MUKF2-157

**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.



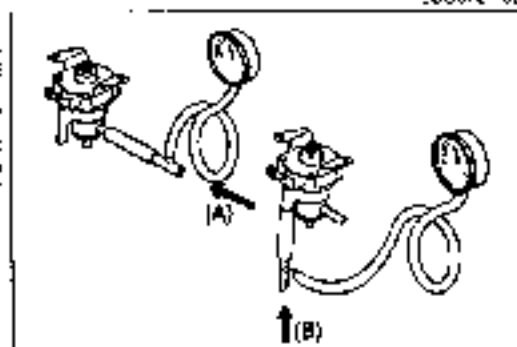
9DU9F2-138

**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.



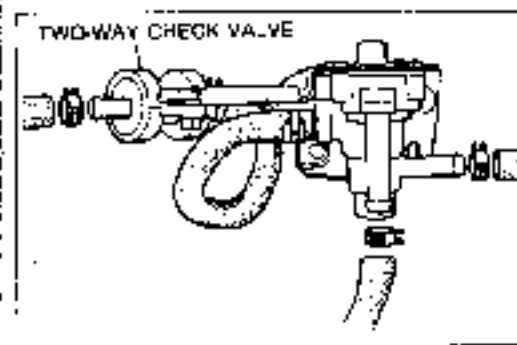
93.0F2-107

**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.



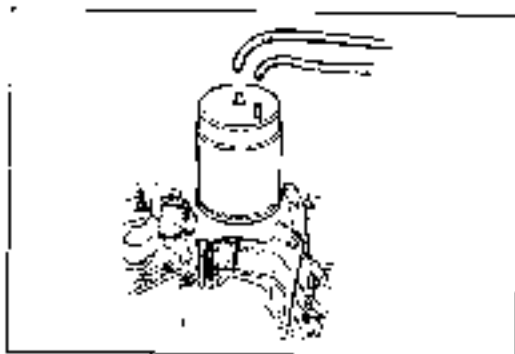
9R.0F2-108

**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.



1ELCF2.c60

**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.

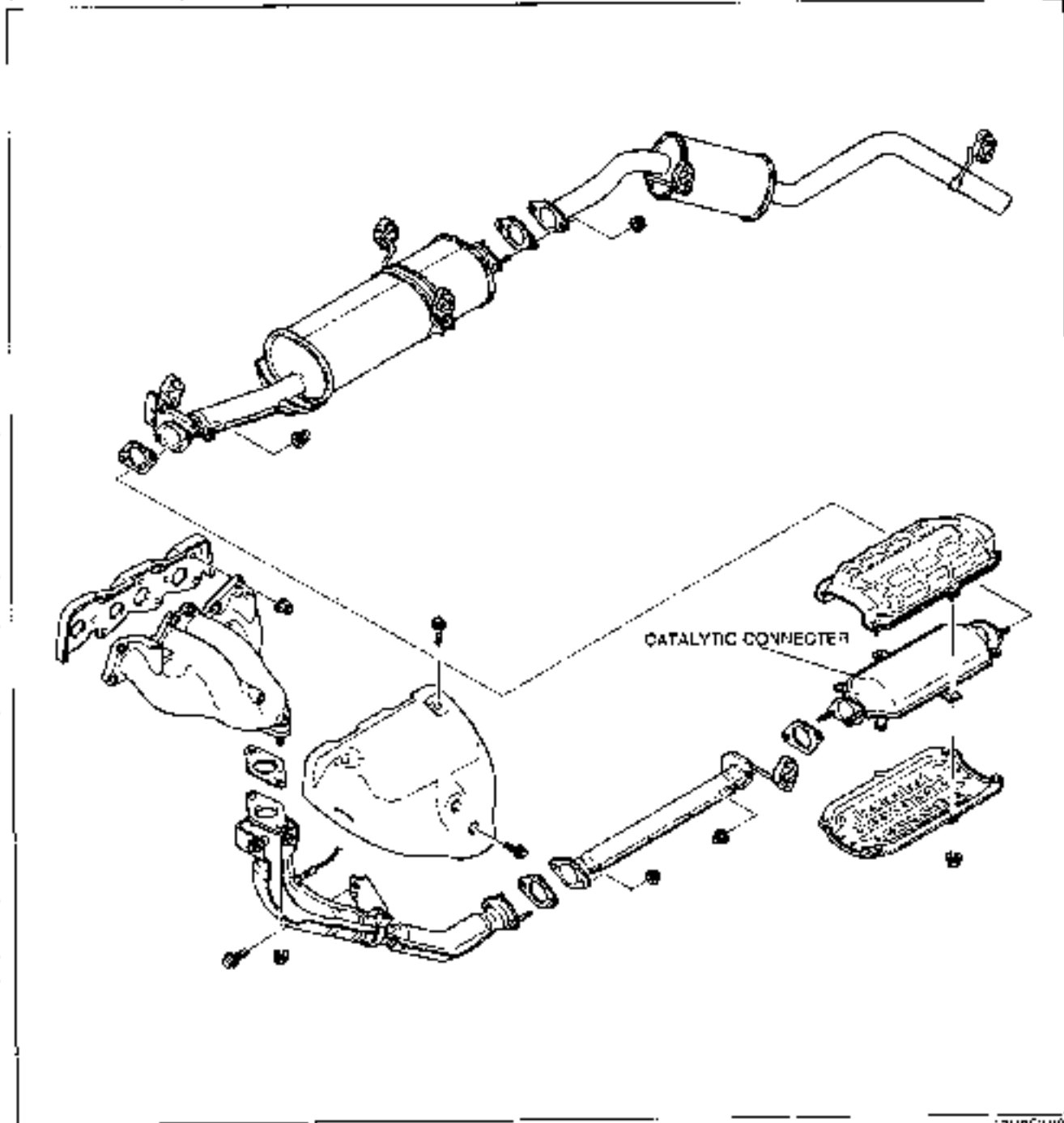
**FUEL VAPOR VALVE**

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).



## 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.)

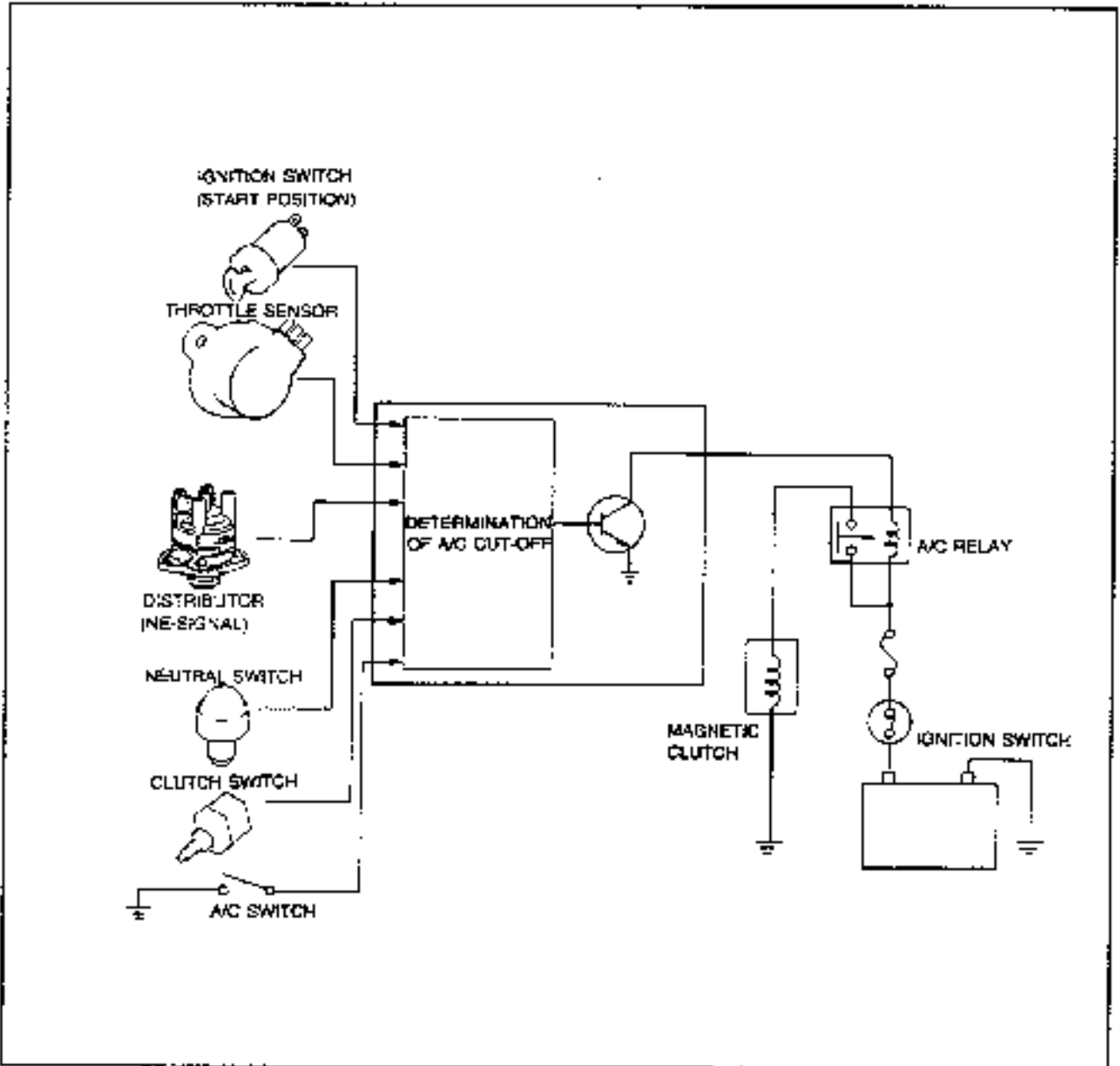
## Note

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.



95L(F2-11)

**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	



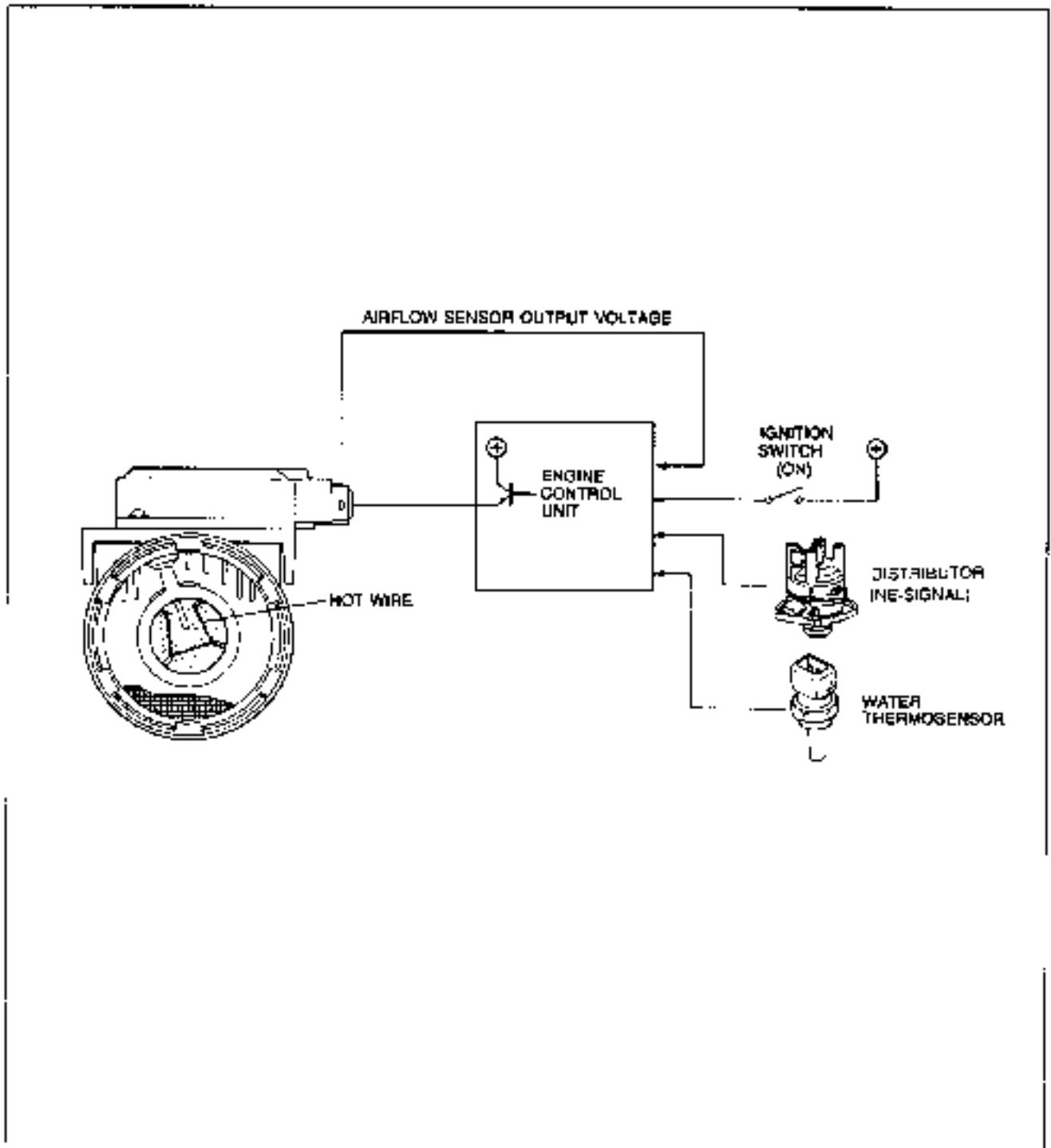
V6LCP2-111

**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



969 10F2-201

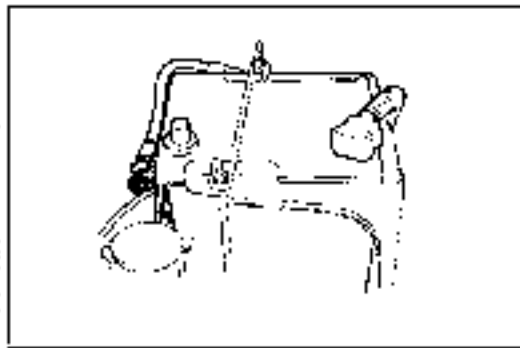
The airflow sensor is equipped with a self-cleaning feature that momentarily super-heats the hot wire to burn off contaminants that may have collected on the wire.

**Operation**

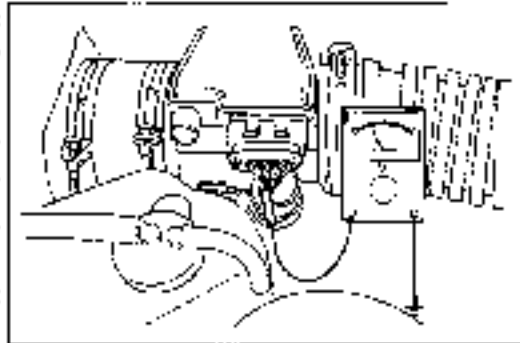
Burn-off occurs after the engine has been stopped (ignition switch OFF), and the following conditions are met.

- 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.

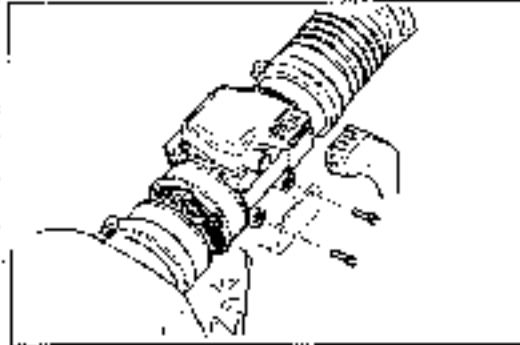




29UJF2 036



13LDF7 087



BJJF 2-036

**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 (Z/H) of the engine control unit. (Refer to page F2-177.)

**Voltage:**



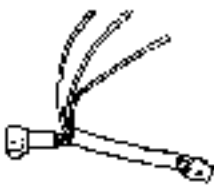


**Approx. 0V just after ignition switch OFF.**

**Approx. 8–12V momentarily 2–5 seconds after ignition switch OFF.**

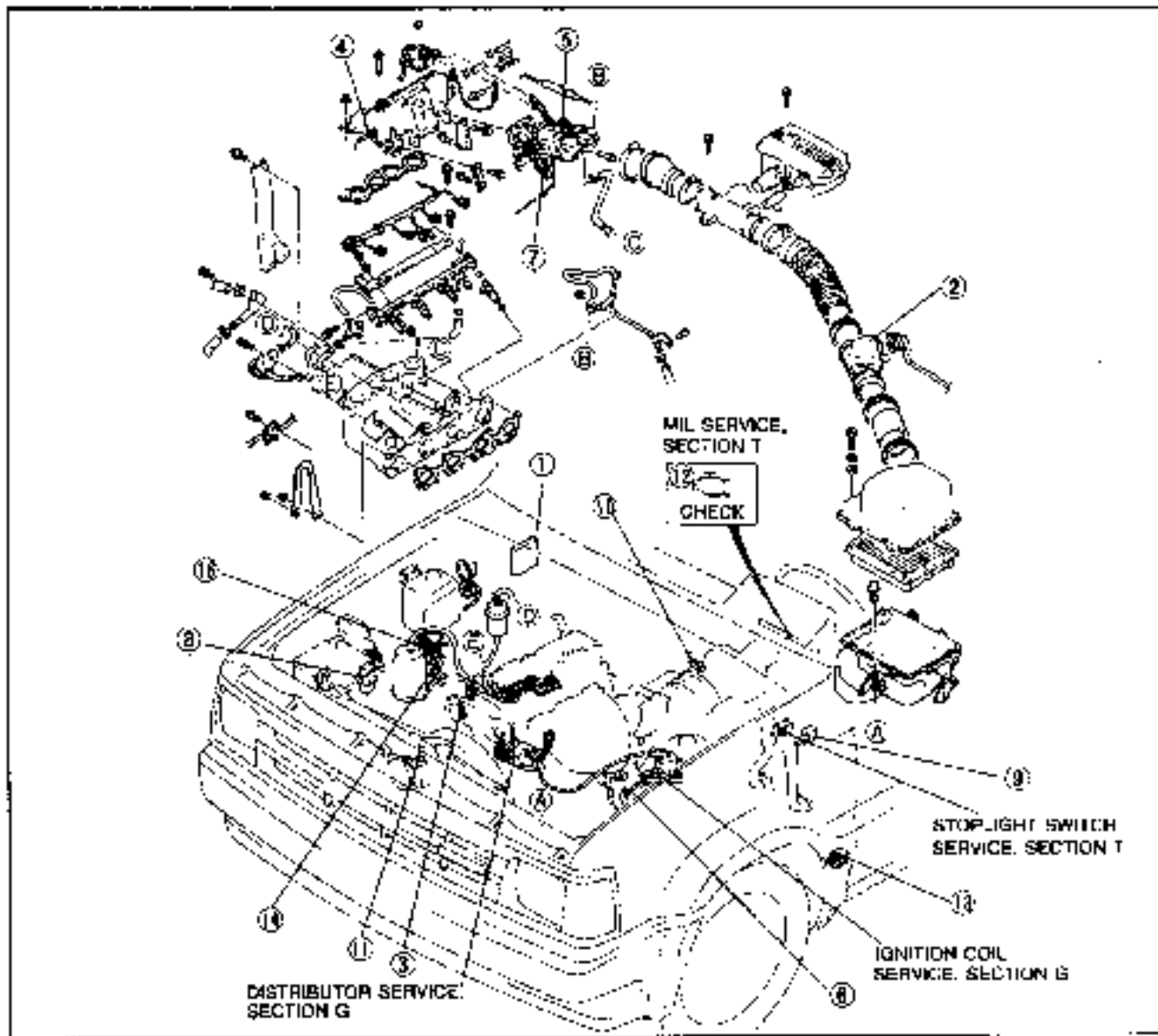
6. If as specified, replace the airflow sensor.
7. If not as specified, check the voltage at the engine control unit (2F), (2Q), and (1I) terminals (Refer to page F2-177.) and the related wiring harness.

## CONTROL SYSTEM

PREPARATION  
SST

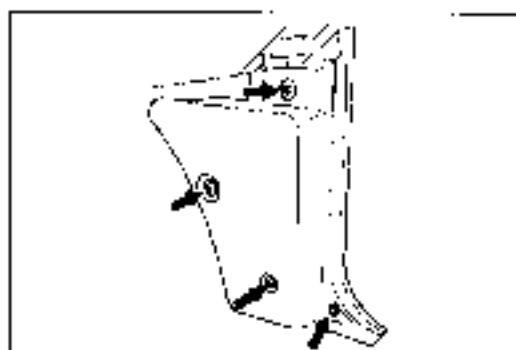
<p>49 9200 102 Engine signal monitor</p> 	<p>49 G018 903 Adsorber harness</p> 	<p>49 G018 901 Adaptör harness</p> 
<p>49 G018 9A1 Self-diagnosis checker</p> 	<p>49 G018 904 Sheet</p> 	<p>08UJF2-07E</p>

### STRUCTURAL VIEW



18J007-0211

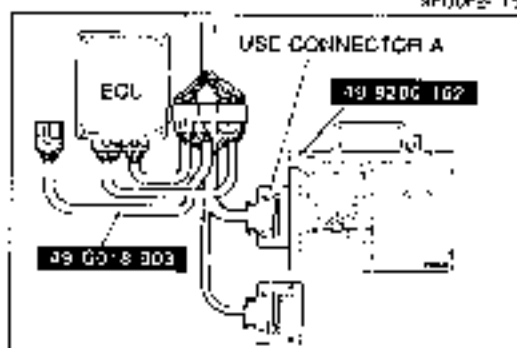
- |   |   |  |
|---|---|--|
| 1. Engine control unit<br>Inspection ..... page F2-175  | 6. Oxygen sensor<br>Inspection .. page F2-182<br>Replacement<br>..... page F2-182 | 11. P/S pressure switch<br>Inspection and<br>Replacement<br>..... page F2-185        |
| 2. Airflow sensor<br>Inspection and<br>Replacement<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 thermometer<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 F2-183 |
| 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 F2-180                                 |
| 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 F2-185                    |



MF10F2-15

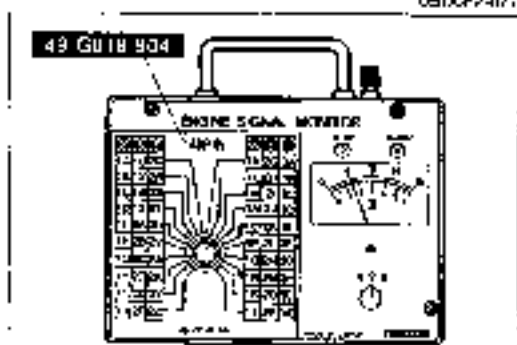
**ENGINE CONTROL UNIT****Inspection**

1. Remove the front side trim on the passenger's side.



G510F2-177

2. Connect the **SST** to the engine control unit.

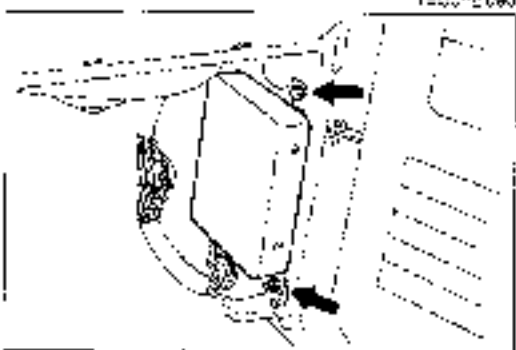


12U0F2-080

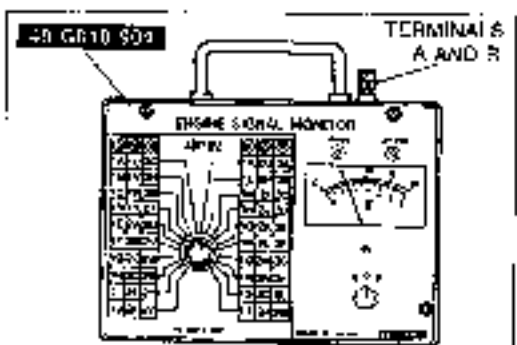
3. Place the **SST (Sheet)** on the **Engine Signal Monitor**.

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 problems found, replace the ECU. (Refer to above.)



5M10F2-15

**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 back-up
1B	○		Main relay	Ignition switch OFF	0V	
				Ignition switch ON	V <sub>b</sub>	
				During turn-off (airflow sensor)	0V	
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 7 seconds (Buzzer does not sound)	V <sub>b</sub>	
				Buzzer sounds	Below 2.5V	
				Buzzer not sounds	V <sub>b</sub>	
1G		○	Main relay	Ignition switch OFF	V <sub>b</sub>	
				During turn off (airflow sensor)	0V	
				Ignition switch ON	0V	
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) (1-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	0V	Ignition switch ON
				Test connector (Green, 1-pin) grounded	0V	
1L	○		Ground (M/T) Opn. (A/T)	Ignition switch ON	0V	
				Ignition switch ON	V <sub>b</sub>	
1M	○		Speed sensor (A/T)	Ignition switch ON	0 or 4.5—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	○		Stop/ign switch	Brake pedal released	0V	Ignition switch ON
				Brake pedal depressed	V <sub>b</sub>	
1P	○		PS pressure switch	Ignition switch ON	V <sub>b</sub>	
				PS ON (at idle)	0V	
				PS 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
1H	○		Ground (ECAT)	Ignition switch ON	0V	For GS
				Ignition switch ON	V <sub>B</sub>	
1S	○		Blower switch	Blower OFF	V <sub>B</sub>	Ignition switch ON
				Blower ON	Below 1.5V	
1I						
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) Other condition	0V V <sub>B</sub>	Ignition switch ON
2A	—		Ground (E01)	Constant	0V	
2B	—		Ground (E02)	Constant	0V	
2C	—		Ground (E*)	Constant	0V	
2D	—		Ground (E2)	Constant	0V	
2E		○	Distributor	Ignition switch ON	0 or 5V	Ve-Signal
				Idle	2V	
2F		○	Igniter	Ignition switch ON	0 or 5V	Ignition timing signal
2G	○		Distributor	Idle	Approx. 3.0V	G-Signal
				Ignition switch ON	0 or 5V	
2H		○	Airflow sensor (Burkhill)	Just after ignition switch OFF	0V	Burn off function momentarily
				Burn off (2-5 seconds after ignition switch OFF) (Refer to page F2-174)	8-12V	
2I	—	—	—	—	—	—
2L	—	—	—	—	—	—
2K		○	Valve	Ignition switch ON	4.5-5.5V	
2L	○		Intake air thermometer (Dynamic chamber)	At 20°C (68°F)	Approx. 2.5V	
2V	○		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	
2O	○		Airflow sensor (Intake B' 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 thermometer	Engine coolant temperature 20°C (68°F)	Approx. 2.5V	Ignition switch ON
				After warm up	Approx. 0.2V	
2R						
2S						
2T		○	Solenoid valve (FRC)	For 120 seconds after ignition switch OFF -On	Below 2.5V	During test condition, Coolant temp. above 80°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>	Other conditions
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
					V <sub>B</sub>	
				Idle	V <sub>B</sub>	

### Terminal voltage

V<sub>B</sub>: Battery voltage

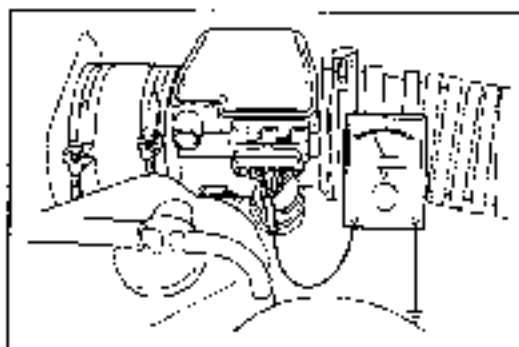
Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
2V		○	Injector G6 (No. 1, 2) F2 (No. 3, 4)	Ignition switch ON	V <sub>B</sub>	Engine Signal Monitor. Green and red lights flash
				Idle	V <sub>B</sub>	
2W		○	Solenoid valve (Idle speed control)	Ignition switch ON	Approx. 1 V	Engine signal 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 - 1.6V*	
2Y		○	HAT control unit	Ignition switch ON	V <sub>B</sub>	For G6 HAT
				Accelerator for pedal fully depressed	0V	
2V		○	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	-	-	-	-	-	-

2B-30F2-007

### Terminal location

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

2B-30F2-067



70UJF2 035

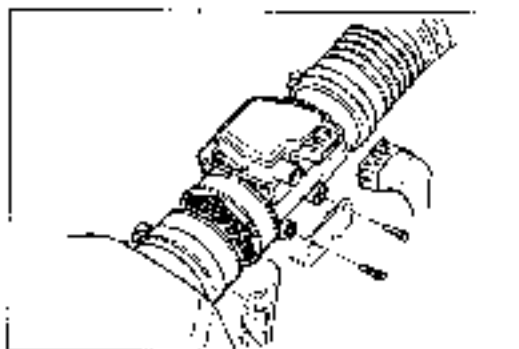
**AIRFLOW SENSOR****Inspection**

1. Remove the rubber boot from the air flow 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	1.0—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 air flow sensor.

16JUF2 034



94UJF2 215

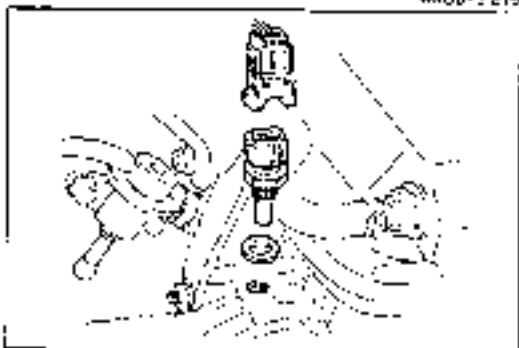
**Replacement**

1. Disconnect the connector
2. Loosen the air hose clamps.
3. Remove the bolts.
4. Remove and replace the air flow sensor.

**Caution**

Install the air flow sensor with the arrow on the sensor aligned with airflow direction.

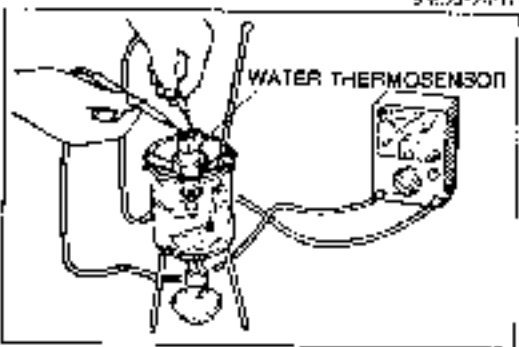
5. Tighten the hose clamps.
6. Reconnect the connector to the sensor.



94UJF2 017

**WATER THERMOSENSOR****Removal**

1. Disconnect the water thermosensor connector
2. Remove the water thermosensor.



94UJF2 018

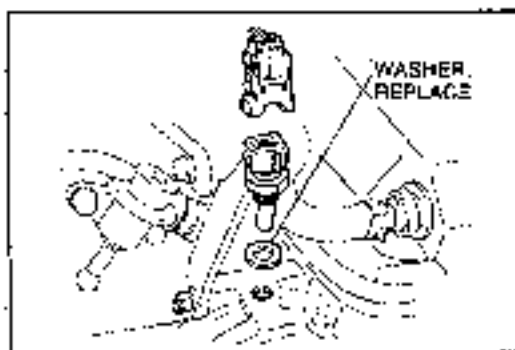
**Inspection**

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)	11.5—17.6 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





9M\_UF2 219

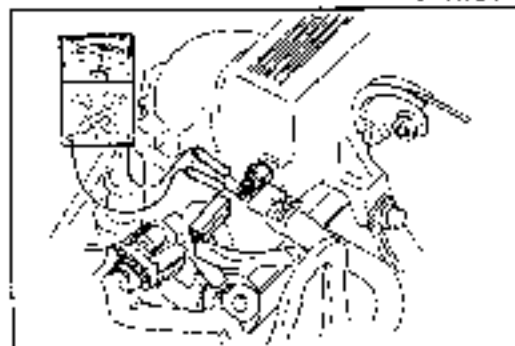
**Installation**

1. Install the water thermostat sensor and a new washer.

**Tightening torque:**

25–29 N·m (2.5–3.0 m·kg, 18–22 ft·lb)

2. Connect the water thermostat sensor connector.



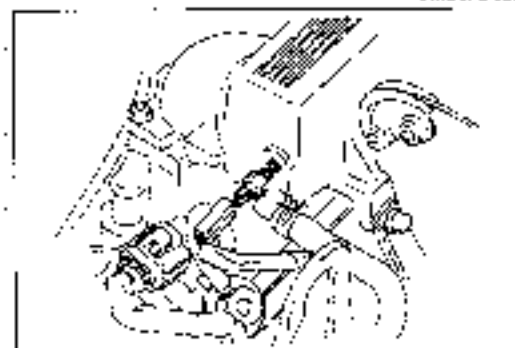
9M\_UF2 220

**INTAKE AIR THERMOSTATOR (IN DYNAMIC CHAMBER)****Inspection**

1. Disconnect the intake air thermostat sensor 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 thermostat sensor.



9M\_UF2 221

**Replacement**

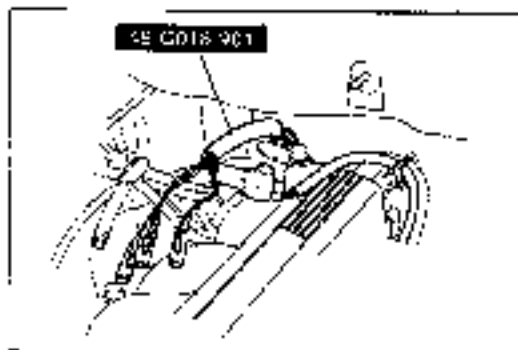
1. Disconnect the intake air thermostat sensor connector.
2. Remove the sensor.
3. Install the sensor.

**Note**

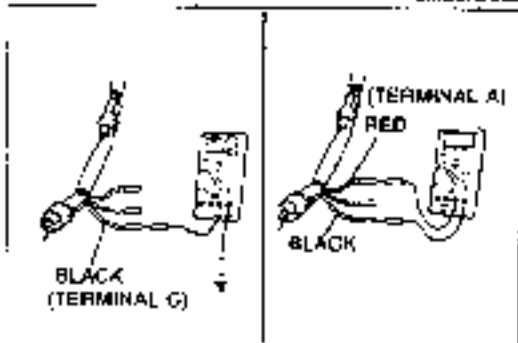
When installing the sensor, tighten to the specified torque.

**Tightening torque:**

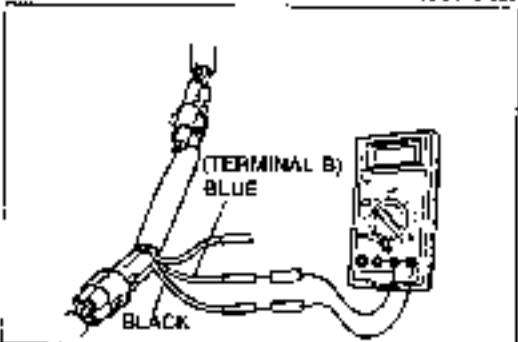
8.9–8.8 N·m (70–80 cm·kg, 61–78 in·lb)



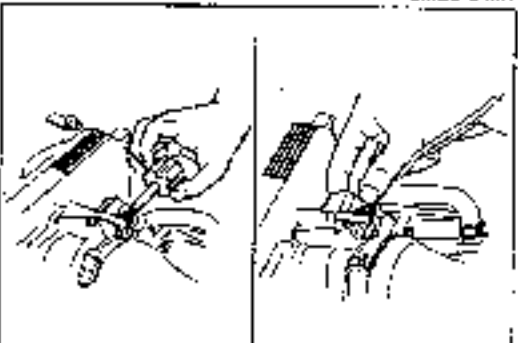
9AUDF2-222



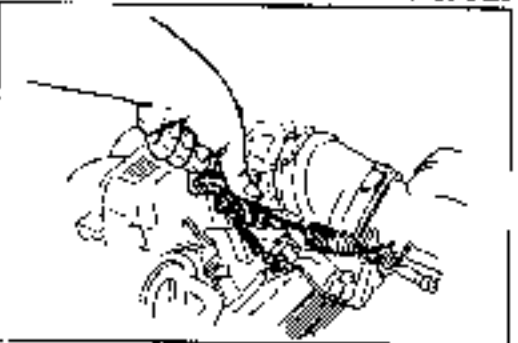
2BU0F2 C30



9MUDF2-224



9MUDF2-226



9AUDF2-228

## 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**

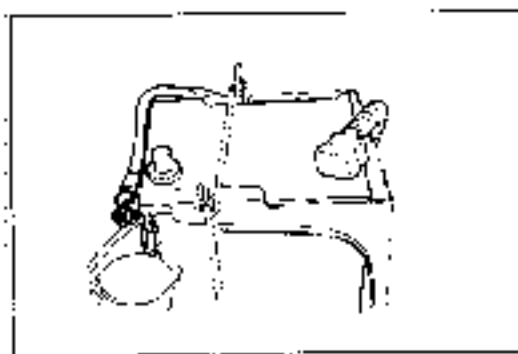
7. If not as specified, check the battery voltage and wiring harness. If these are OK, replace the engine control unit.
8. Record the RED wire voltage.
9. Check that BLUE wire voltage for the recorded RED wire voltage is as specified.

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	0.47—0.61
4.60—4.69	0.38—0.55	5.20—5.29	0.43—0.62
4.70—4.79	0.30—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	0.4—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	3.50—4.23	5.10—5.19	4.05—4.79
4.60—4.69	3.66—4.32	5.20—5.29	4.13—4.86
4.70—4.79	3.74—4.41	5.30—5.39	4.21—4.96
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		

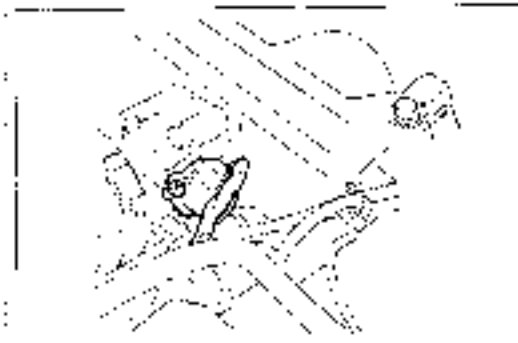


9MUD-2-227

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.

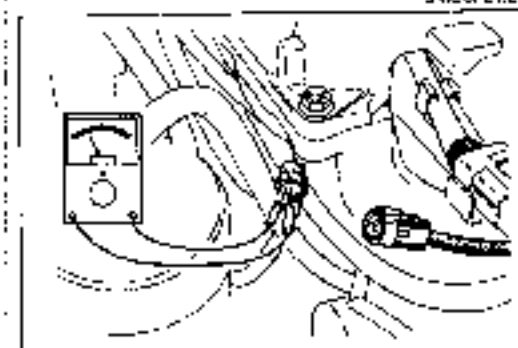


9MUCF2-221

### OXYGEN SENSOR

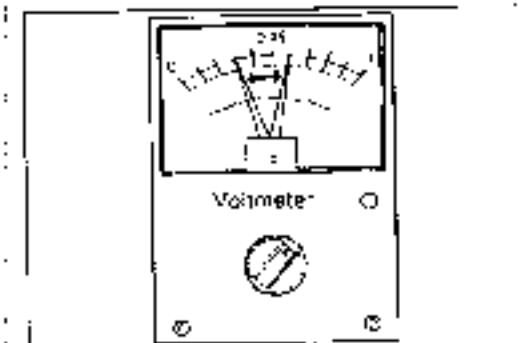
#### Inspection of Terminal Voltage

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**.



9MUCF2-229

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.



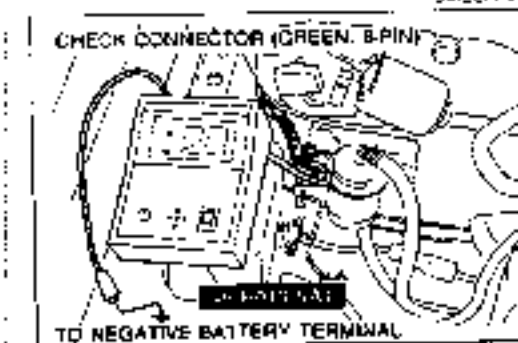
9MUCF2-231

#### Inspection of Sensitivity

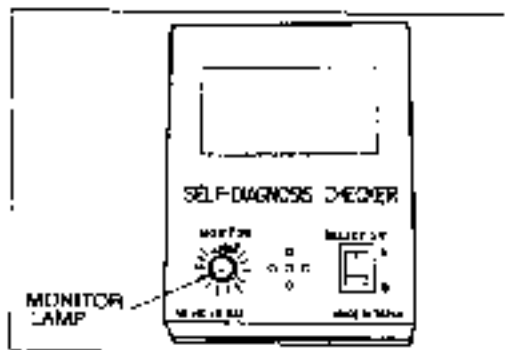
1. Warm up the engine to the normal operating temperature.
2. Connect the **SST** to the check connector (Green: 6-pin) and the negative battery terminal.

#### Note

**Do not ground the test connector (Green: 1-pin) during inspecting the oxygen sensor sensitivity.**



9MUCF2-231



9KJ10F7239



9M110F2230



15L017089

- 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.

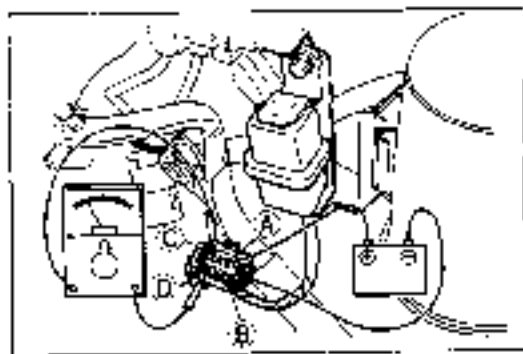
#### IDLE SWITCH

##### 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.)



### 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	

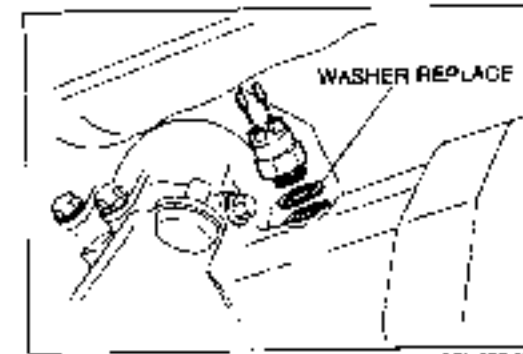
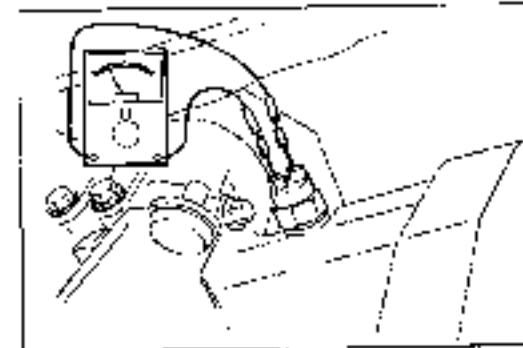
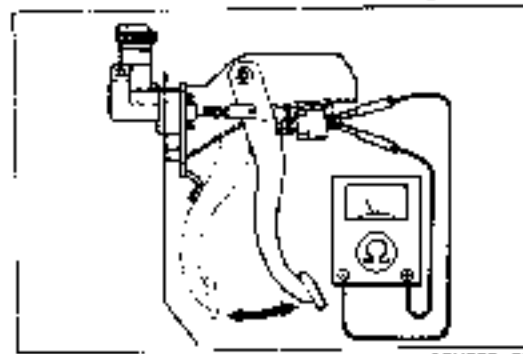
4. If not as specified, replace the neutral switch.

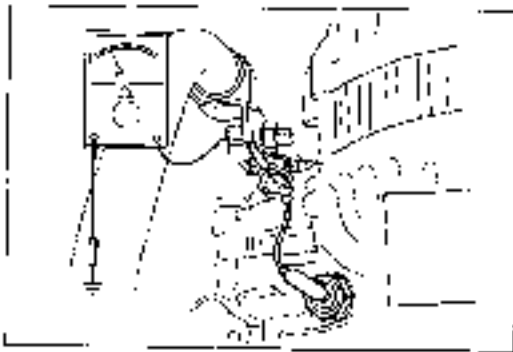
### Replacement

Replace the neutral switch as shown in the figure.

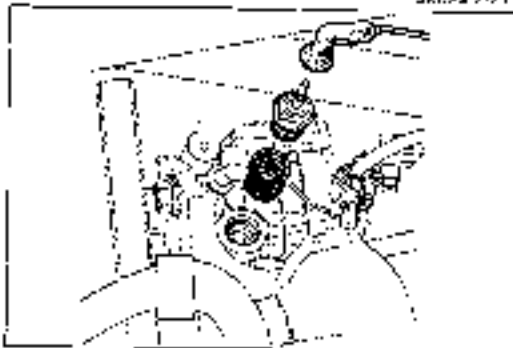
#### Tightening torque:

39—59 Nm (4—6 m·kg, 29—43 ft·lb)





9M-002-211



09112F-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.

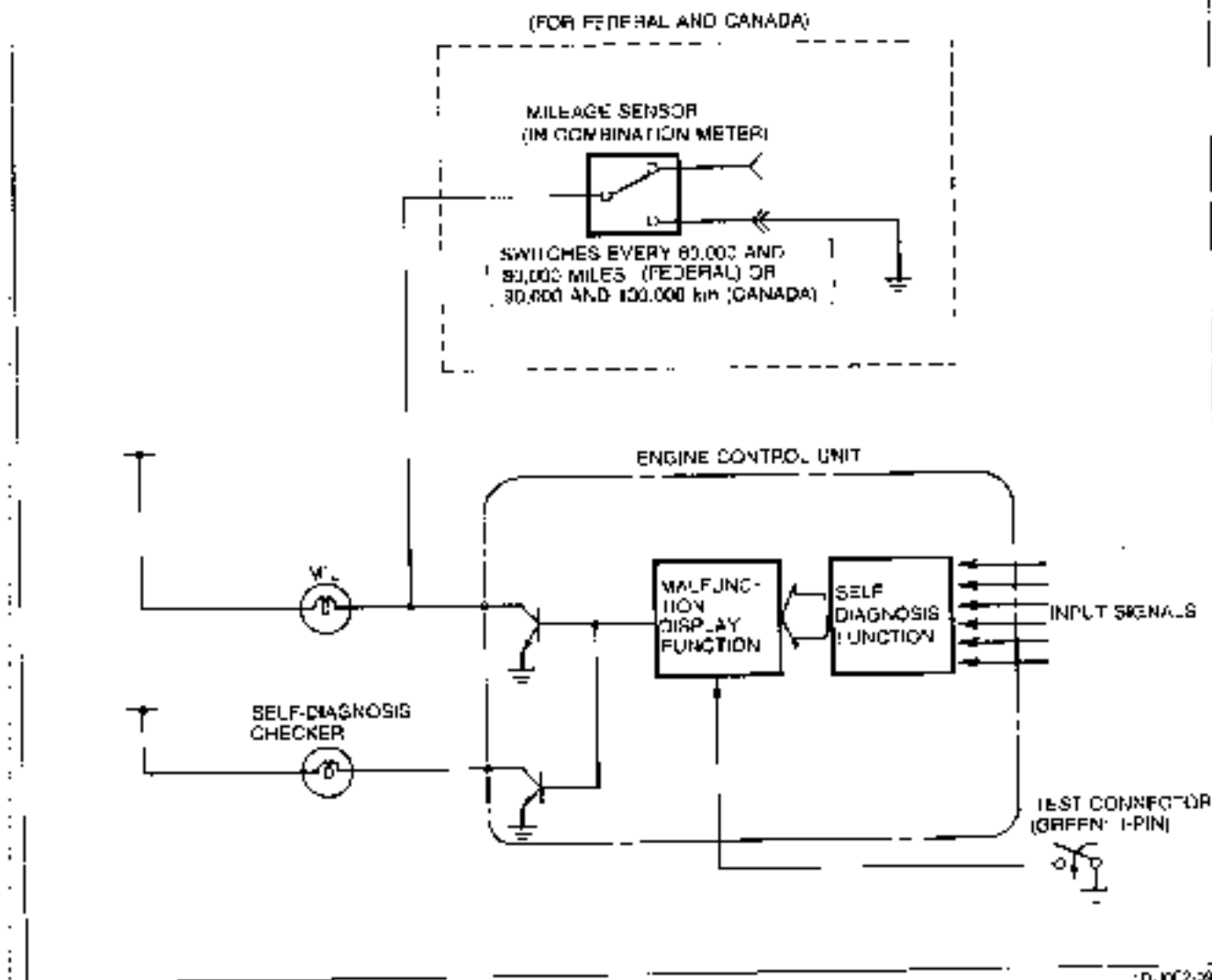
**Replacement**

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)

**(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**

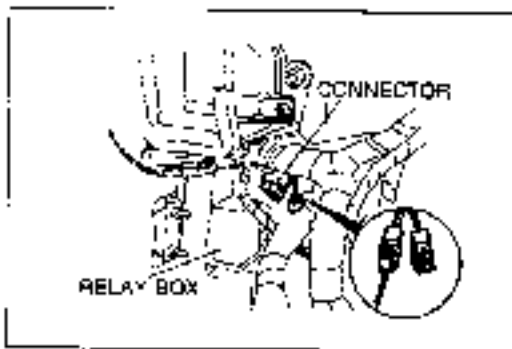
- When the MIL comes on, replace the specified emission control system part. (Refer to Scheduled Maintenance.)
- After replacing the specified emission control system part, reset the MIL. (Refer to page F2-167.)

**Caution**

If the combination meter assembly is replaced, remove the odometer from the old unit and install it in the new meter assembly.

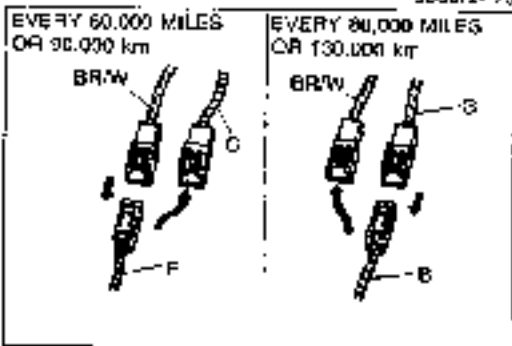
**(For California)**

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.

3BU0F2-25





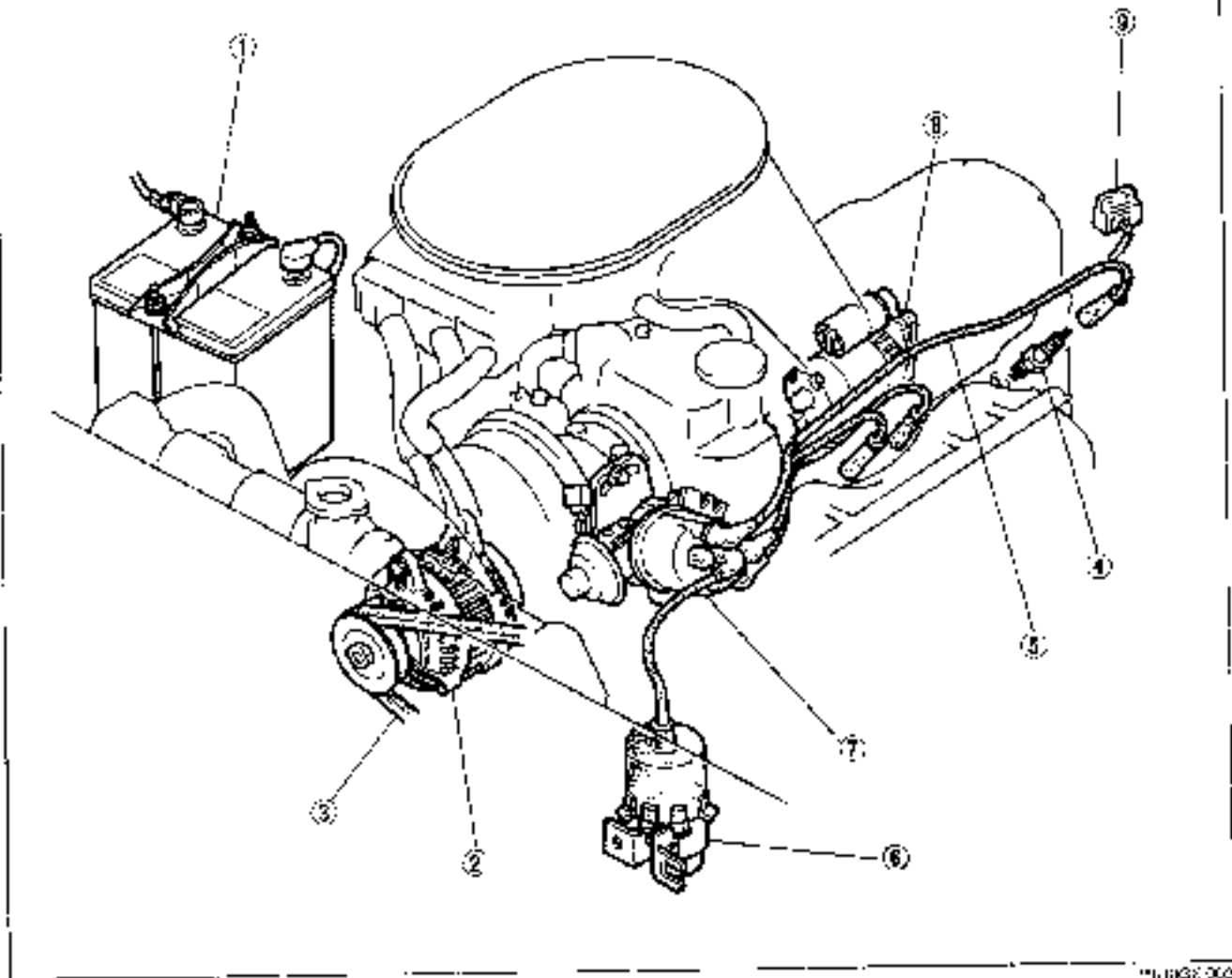
# ENGINE ELECTRICAL SYSTEM

<b>INDEX</b> .....	G- 2	<b>IGNITION COIL</b> .....	G-28
<b>OUTLINE</b> .....	G- 4	SPARK TEST.....	G-23
SPECIFICATIONS.....	G- 4	REMOVAL AND INSTALLATION.....	G-23
<b>TROUBLESHOOTING GUIDE</b> .....	G- 5	INSPECTION.....	G-23
<b>BATTERY</b> .....	G- 7	<b>DISTRIBUTOR</b> .....	G-24
INSPECTION.....	G- 7	ON-VEHICLE INSPECTION.....	G-24
RECHARGING.....	G- 7	SPARK TEST.....	G-24
DIAGNOSIS.....	G- 8	IGNITION TIMING.....	G-24
<b>ALTERNATOR</b> .....	G- 9	SPARK ADVANCE CONTROL.....	G-25
PREPARATION.....	G- 9	REMOVAL.....	G-26
CHARGING SYSTEM.....	G- 9	DISASSEMBLY AND ASSEMBLY.....	G-27
SELF DIAGNOSIS SYSTEM.....	G-10	INSPECTION.....	G-28
TROUBLESHOOTING.....	G-11	IGNITER.....	G-29
REMOVAL.....	G-14	INSTALLATION.....	G-30
DISASSEMBLY AND ASSEMBLY.....	G-15	<b>STARTING SYSTEM</b> .....	G-31
INSPECTION.....	G-16	STARTER.....	G-31
INSTALLATION.....	G-18	ON-VEHICLE INSPECTION.....	G-32
V-BELT TENSION.....	G-18	REMOVAL AND INSTALLATION.....	G-33
<b>IGNITION SYSTEM</b> .....	G-19	DISASSEMBLY AND ASSEMBLY.....	G-34
PREPARATION.....	G-19	INSPECTION.....	G-37
TROUBLESHOOTING.....	G-21	CHECKING OPERATION.....	G-39
<b>SPARK PLUGS</b> .....	G-22	<b>STARTER INTERLOCK SYSTEM</b>	
SPARK TEST.....	G-22	(M/T).....	G-41
REMOVAL AND INSTALLATION.....	G-22	INTERLOCK SWITCH.....	G-41
INSPECTION.....	G-22		
<b>HIGH-TENSION LEADS</b> .....	G-22		
INSPECTION.....	G-22		

28-167-001

## INDEX

## F2 CARBURETOR



## 1. Battery

- Inspection ..... page G- 7
- Recharging ..... page G- 7
- Diagnosis..... page G- 8

## 2. Alternator

- Troubleshooting  
..... page G- 11
- Removal..... page G-14
- Disassembly and  
assembly ..... page G-15
- Inspection ..... page G-16
- Installation ..... page G-18

## 3. V-Belt

- Adjustment..... page G-18

## 4. Spark plug

- Spark test ..... page G- 22
- Removal and  
installation..... page G-22
- Inspection ..... page G-22

## 5. High-tension lead

- Inspection ..... page G-22

## 6. Ignition coil

- Spark test ..... page G-23
- Removal and  
installation..... page G-23
- Inspection ..... page G-23

## 7. Distributor

- Spark test ..... page G-24
- Ignition timing.. page G-24
- Spark advance  
control..... page G-25
- Removal ..... page G-26
- Disassembly and  
assembly ..... page G-27
- Inspection ..... page G- 28
- Installation ..... page G- 30

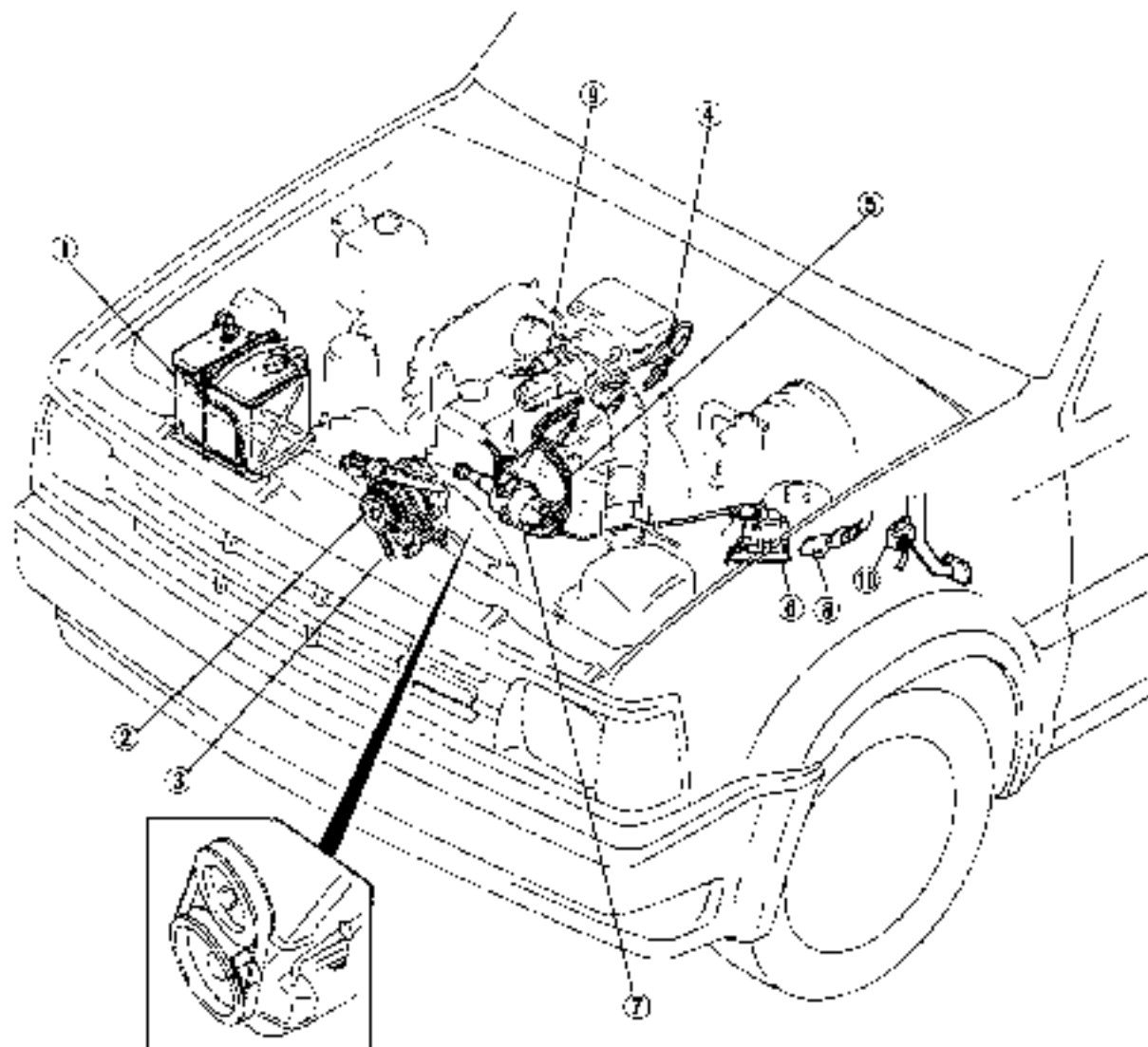
## 8. Starter

- On-vehicle  
inspection ..... page G-32
- Removal and  
installation..... page G-33
- Disassembly and  
assembly ..... page G-34
- Inspection ..... page G-37
- Checking  
operation ..... page G-39

## 9. Starter interlock switch

- Inspection ..... page G- 41

F2 EGI, Q6



- |  |  |   |
|--|--|---|
| <p>1. Battery<br/>                 Inspection ..... page G- 7<br/>                 Recharging ..... page G- 7<br/>                 Diagnosis ..... page G- 8</p> <p>2. Alternator<br/>                 Troubleshooting<br/>                 ..... page G- 11<br/>                 Removal ..... page G-14<br/>                 Disassembly and<br/>                 assembly ..... page G-15<br/>                 Inspection ..... page G-16<br/>                 Installation ..... page G-18</p> <p>3. V-Belt<br/>                 Adjustment ..... page G-18</p> <p>4. Spark plug<br/>                 Spark test . . . page G-22<br/>                 Removal and<br/>                 installation ..... page G-22<br/>                 Inspection ..... page G- 22</p> | <p>5. High-tension lead<br/>                 inspection . . . . . page G-22</p> <p>6. Ignition coil<br/>                 Spark test ..... page G- 23<br/>                 Removal and<br/>                 installation ..... page G- 23<br/>                 Inspection ..... page G-23</p> <p>7. Distributor<br/>                 Spark test ..... page G-24<br/>                 Ignition timing .. page G-24<br/>                 Spark advance<br/>                 control ..... page G-25<br/>                 Removal ..... page G-26<br/>                 Disassembly and<br/>                 assembly ..... page G-27<br/>                 Inspection . . . . . page G-28<br/>                 Installation ..... page G-30</p> <p>8. Igniter<br/>                 Inspection ..... page G-29</p> | <p>9. Starter<br/>                 On-vehicle<br/>                 inspection ..... page G- 32<br/>                 Removal and<br/>                 installation ..... page G-33<br/>                 Disassembly and<br/>                 assembly . . . . . page G-34<br/>                 Inspection ..... page G-37<br/>                 Checking<br/>                 operation ..... page G-39</p> <p>10. Starter interlock switch<br/>                 Inspection ..... page G-41</p> |
|--|--|---|

FL003X-000

## OUTLINE

## SPECIFICATIONS

Item	Engine	F2 Carburetor	F2 EGI	G6	
Battery	Voltage	12 Negative ground			
	Type and capacity (20-hour rate)	60D20P 75D26H Maintenance-free	50D20R (U.S.A.) 75D26R (Canada) Maintenance-free	50D20R 80D26R Maintenance-free	
Dark current <sup>1</sup>	mA		MAX. 200		
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	Standard	21.5 (0.840)		
		Minimum	8.0 (0.315)		
Drive belt deflection mm (in) (38 N (10 kg) 22 cm)	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) Cosial reduction (A/T)		Reduction	
	Output	V-KW		12.1 P (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)
	Type	Fully transistorized (HEI)		Electronic spark advance (Photo-diode type)	
Centrifugal spark advance (Crank angle/Engine speed) degree/cm	0:1,000				
	11.0:2,000				
	11.0:3,000				
Vacuum spark advance (Crank angle/Vacuum) degree/inch (inHg)	0:100 (3.9)		5-7°	5-7°	
	-2.0:260 (10.2)				
Ignition timing	5-7°		5-7° (1st connector grounded)	5-7° (1st connector grounded)	
Spark plug	Type	NGK	BPR5CS <sup>1,2</sup> BPR5ES	RPR5ES-11 <sup>1,2</sup> BPR5ES-11	ZFR5F-11 <sup>1,2</sup> ZFR5F-11
		NGK DENSO	W10EXR-U <sup>1,2</sup> W20EXR-U	W16EXR-U11 <sup>1,2</sup> W20EXR-U11	KJ16CR-11 <sup>1,2</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			1-2-4-2		

<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

2800RX-002

**TROUBLESHOOTING GUIDE**

Problem	Page
Will not crank	G-5
Discharged battery	G-5
Crank slowly	G-8

**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 1 Section T Section 1
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

G

18LJ00X-004

**Discharged battery**

\* Numbers show checking order.

Condition	Related parts	Battery			Alternator			V-belt		
		1	2	3	1	2	3	1	2	3
Vehicle not started for extended period		1								
Electrical load	Heavy use					2				
	Load left ON	1								
Normal use			3			2				

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

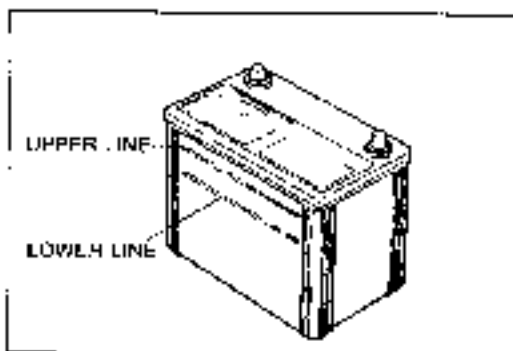
18LJ00Y-005

**Crank Slowly**

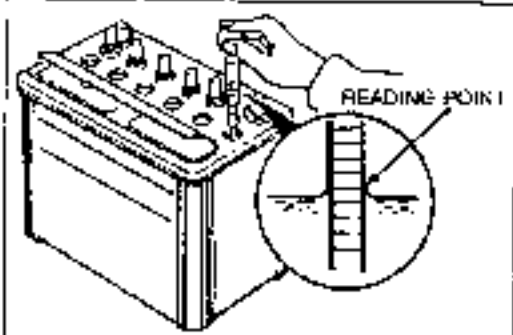
Possible cause	Remedy	Page
Battery and related parts	Clean and tighten	G-7
Poor contact of battery terminal(s)	Clean and repair	G-7
Flux grounding of negative cable	Replace	G-7, 8
Insufficient voltage caused by battery malfunction	Repair or recharge	G-7
Voltage drop caused by discharged battery		
Starter		
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	Refer	Page
No spark Weak spark	Refer to Ignition System Troubleshooting	G-21

1EUB3X 006



CDU06X-069



1BLCEX-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%

09.001X-109

**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)
60D25R	Under 6	Max. 20
75D25R	Under 6.5	
90D26R		

**Slow Charging**

It is not necessary to remove the vent caps to perform a slow charge.

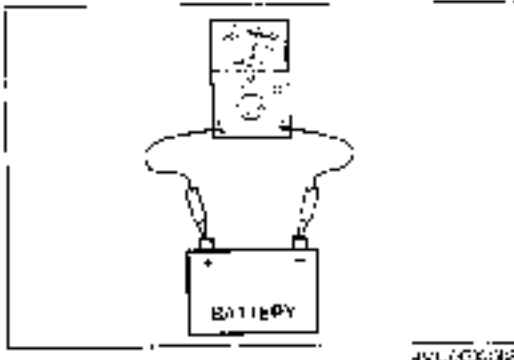
**Quick Charging**

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.

09.001X-060



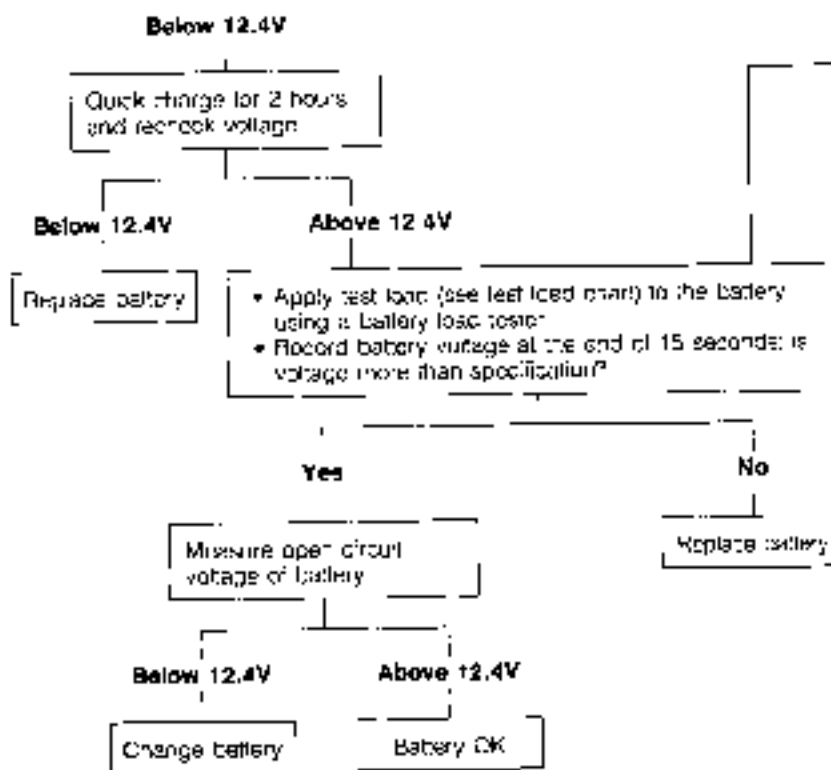
**DIAGNOSIS**

**Voltage check**

1. Disconnect the battery terminals from the battery.
2. Connect a voltmeter to the battery.

**Battery discharge test**

Measure open circuit voltage of battery with a digital voltmeter capable of reading 0.01V



Test load

Battery	Load (A)
50D20R	150
75D25R	195
80D26R	190

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)	9.2
-7°C (20°F)	9.0
-12°C (10°F)	8.7
-18°C (0°F)	8.5

161775A-008



ALTERNATOR

PREPARATION  
SST

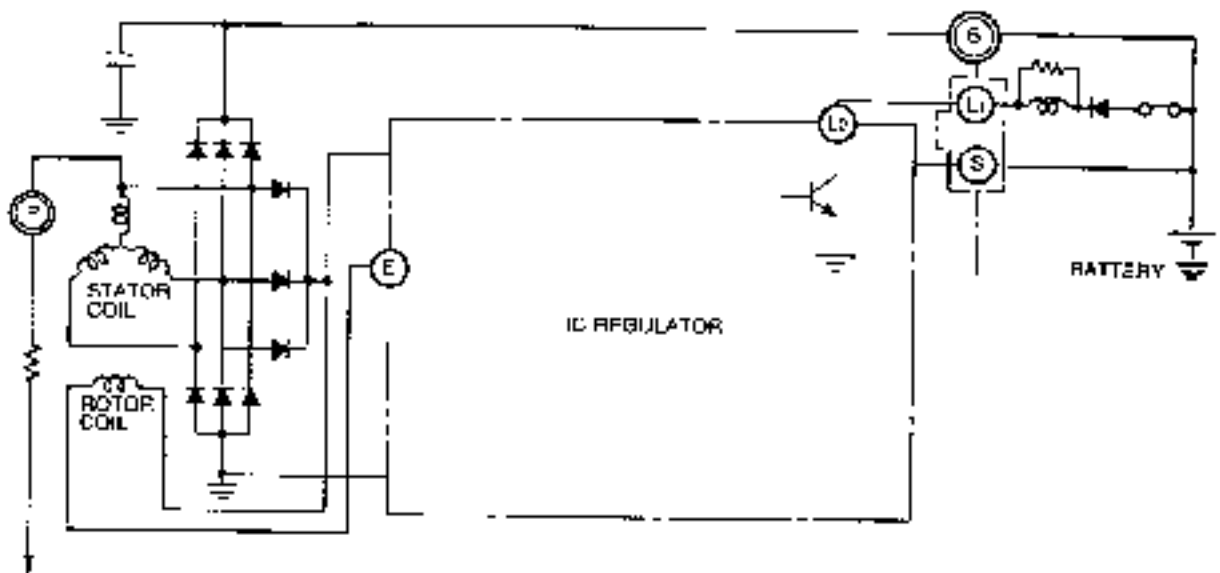
49 9200 020

Tenskin gauge,  
ribbed belt



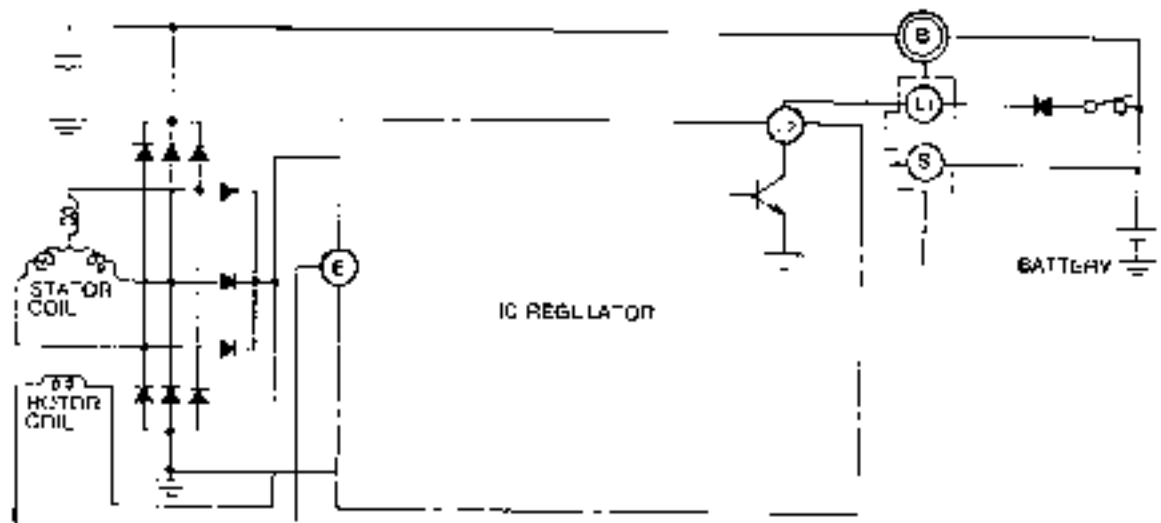
2-9937 002

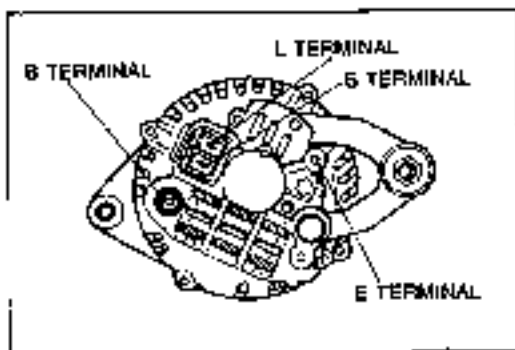
F2 CARBURETOR, F2 EGI



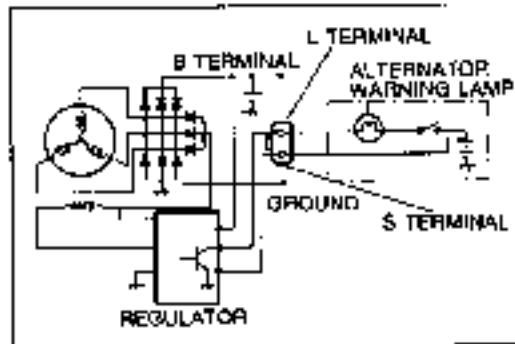
G

06





09U03X-010



J2C00X-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.

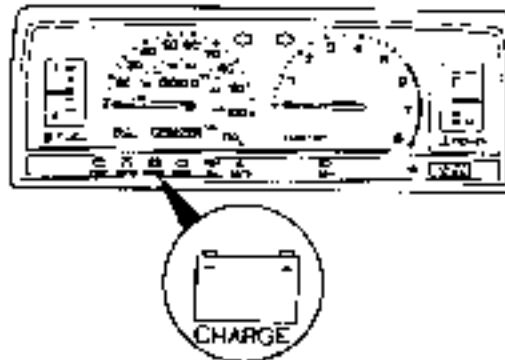
If a problem arises, the alternator warning lamp illuminates.

1. S circuit open
2. No voltage output
3. Field circuit open
4. B circuit open
5. Voltage output too high

## TROUBLESHOOTING

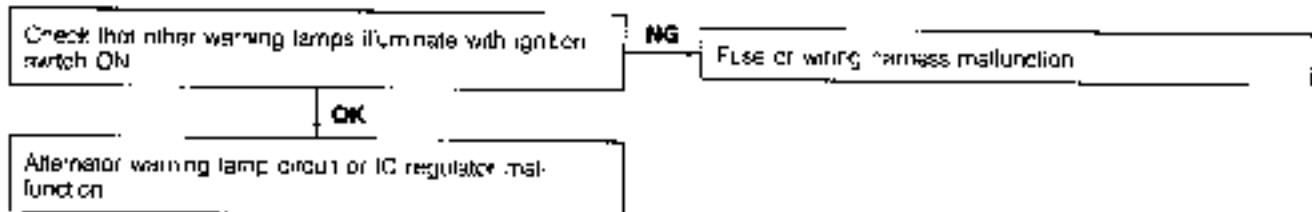
### Preliminary Check

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.



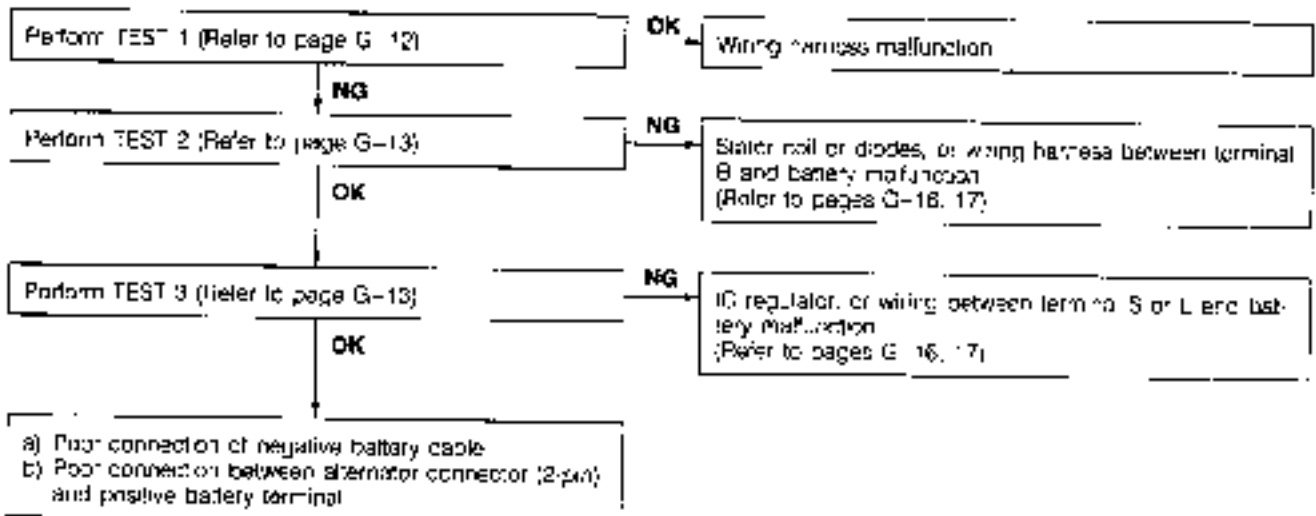
9M, 105A-11

### 1. Alternator warning lamp will not illuminate



9H, 105X-12

### 2. Alternator warning light illuminates when engine running



18U00X-03

## 3. Battery discharged

Does alternator warning lamp illuminate when engine running?	YES	Perform troubleshooting No.2 (Refer to page G-11)
	NO	

a) Alternator warning lamp circuit malfunction  
b) Check other electrical components

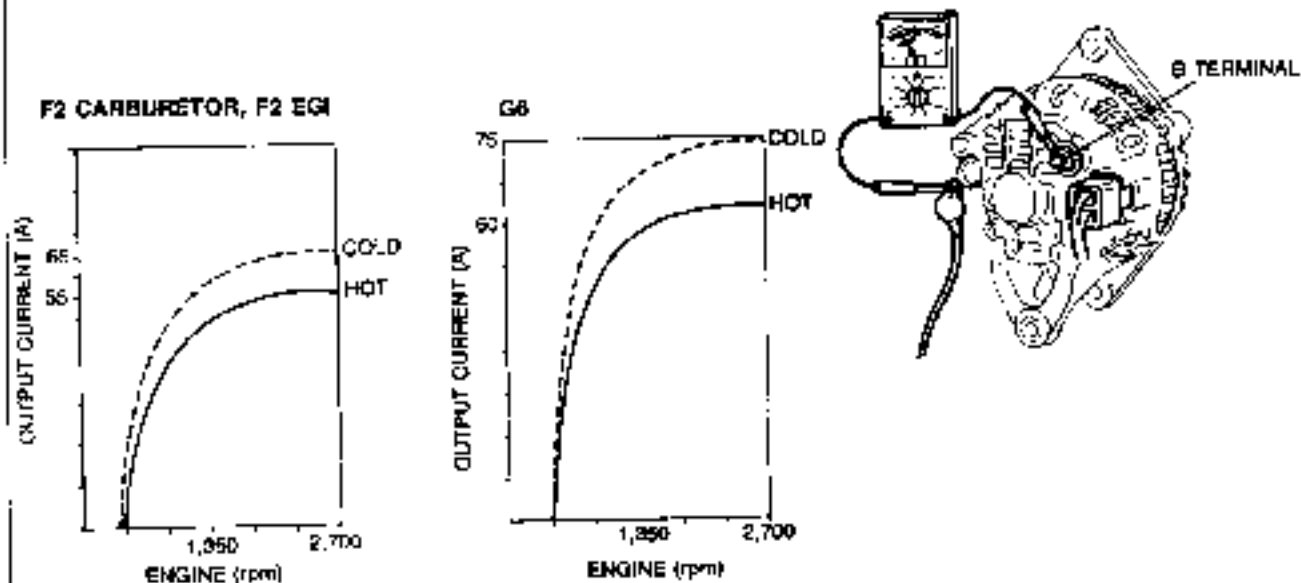
181005A-2/0

**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**

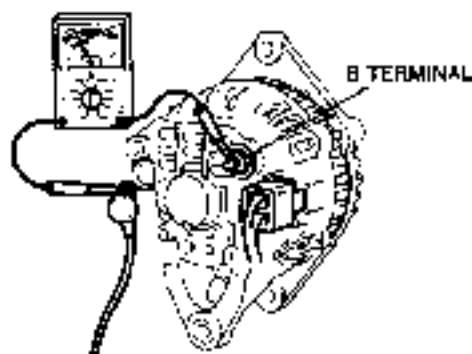
**Caution**  
**Do not ground terminal B.**



1.P.063-L14

**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**.

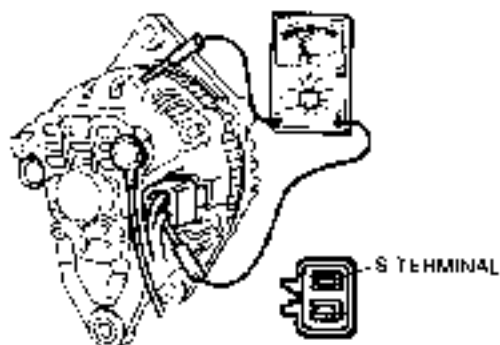


DIA.FOX 010

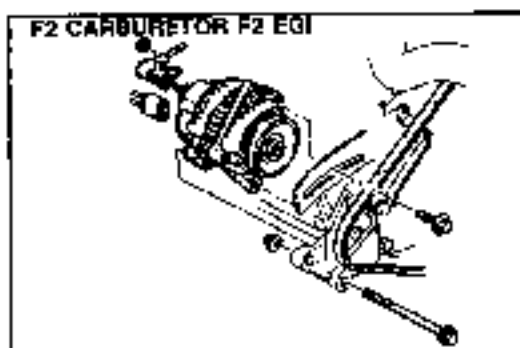
**TEST 3**

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**

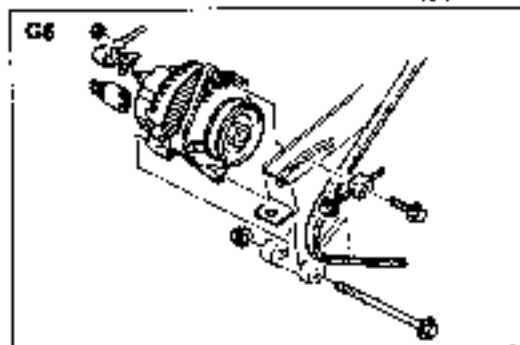
**Voltage: 14.1—14.7V**



D6103X-016



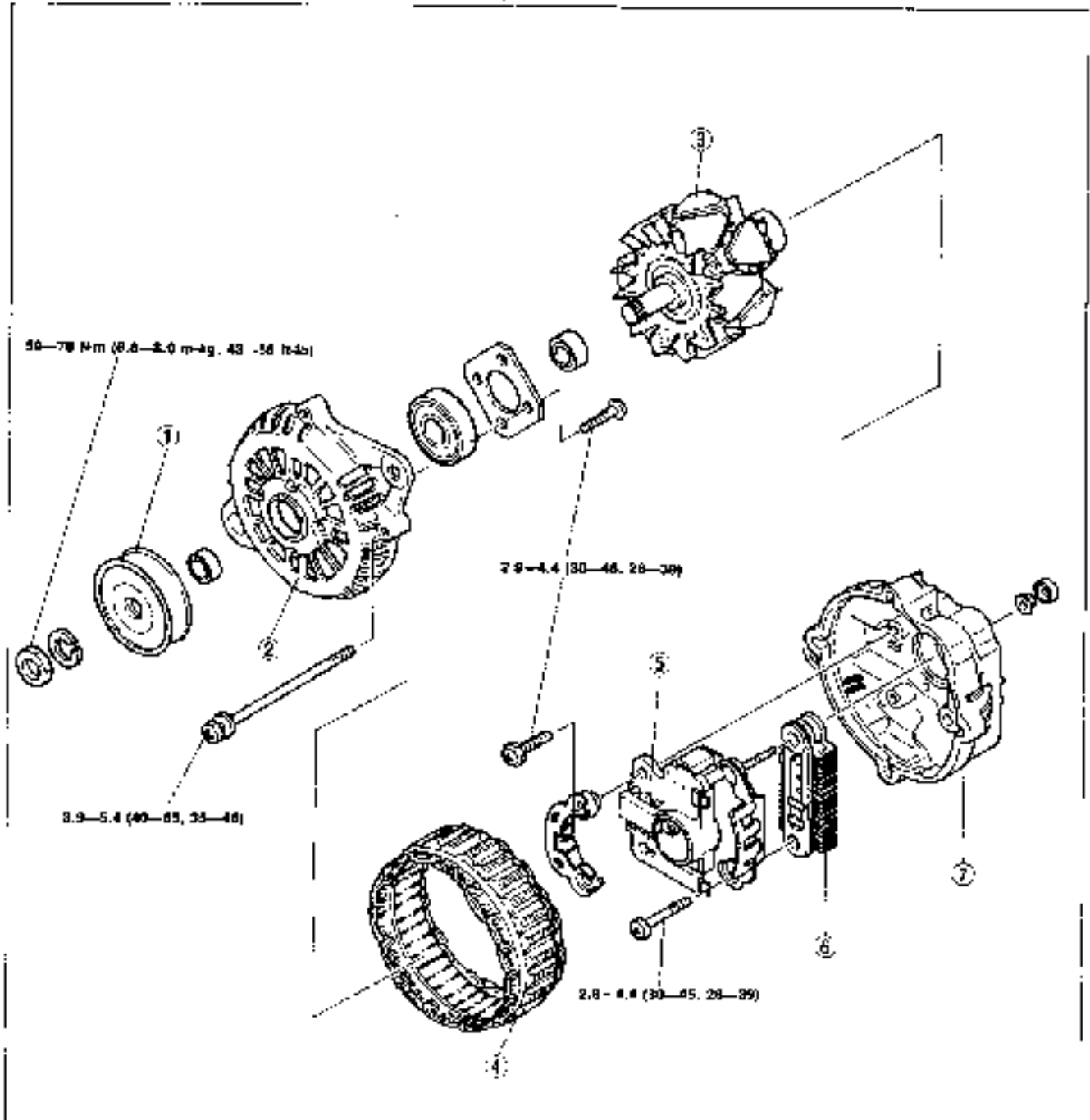
92U07X-215

**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**

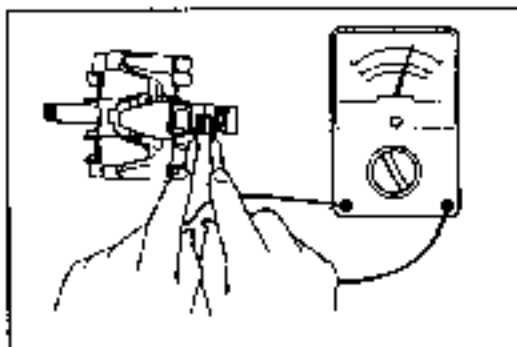
1. Disassemble in the order shown in the figure
2. Assemble in the reverse order of disassembly



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

Nm (lb-ft, in-lb)  
28000000



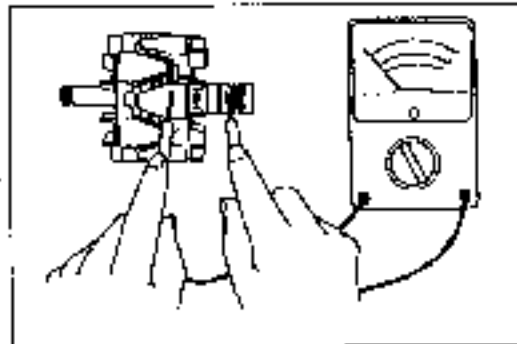
DPLWGX-018

**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



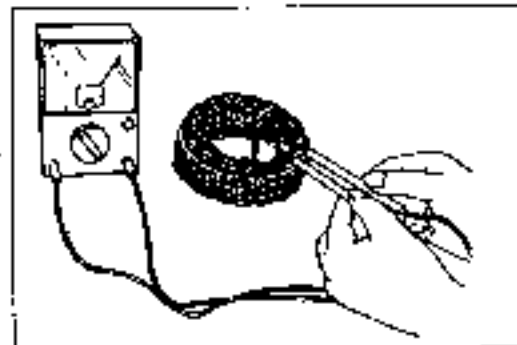
DMLUGX-029

**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**

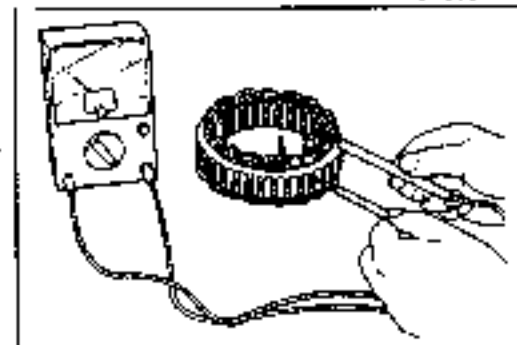
- If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.



DMLUGX-090

**Stator****1. Wiring damage**

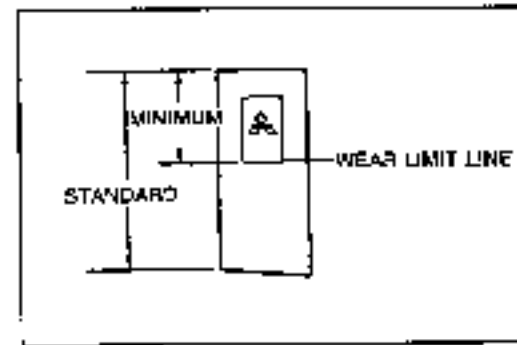
- (1) Check for continuity between the stator coil leads by using an ohmmeter.
- (2) Replace the stator if there is no continuity



DPLUGX-081

**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.



DFA.CCX-019

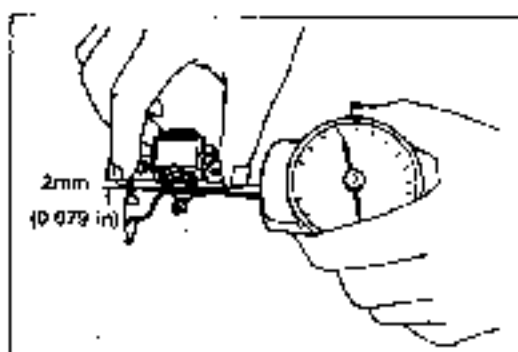
**Brush**

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)**





00UJGX-32C

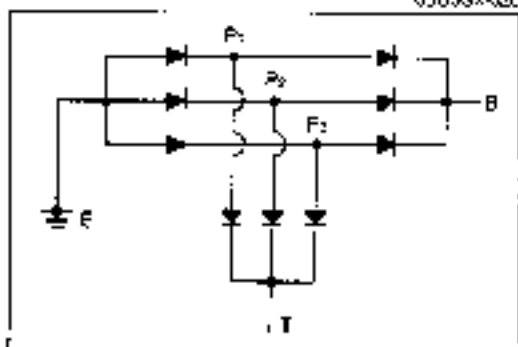
### Brush Spring

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: 1.8—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).



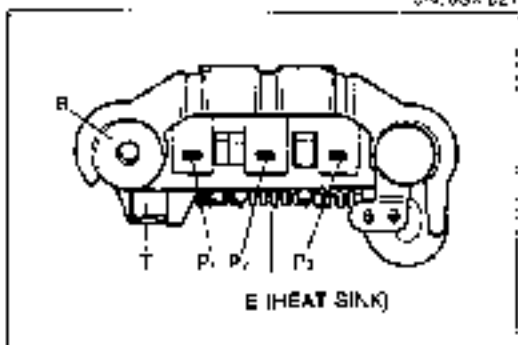
00UJGX-021

### Rectifier

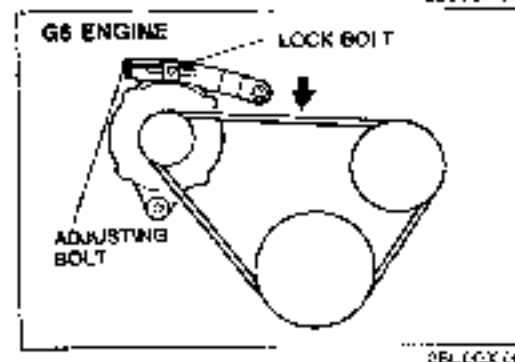
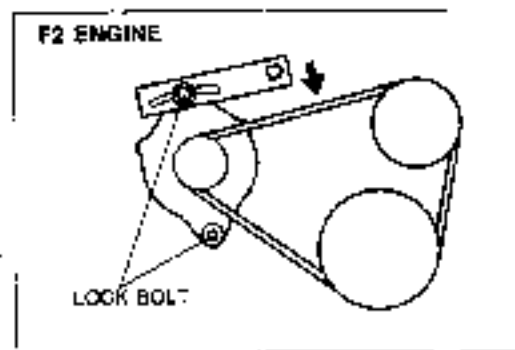
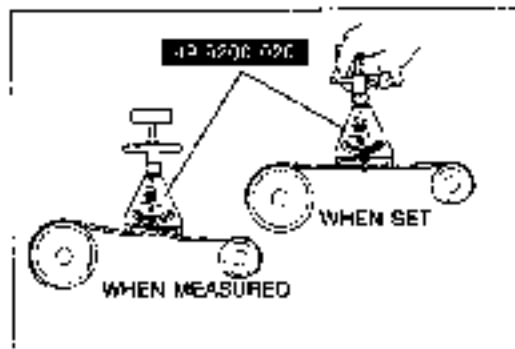
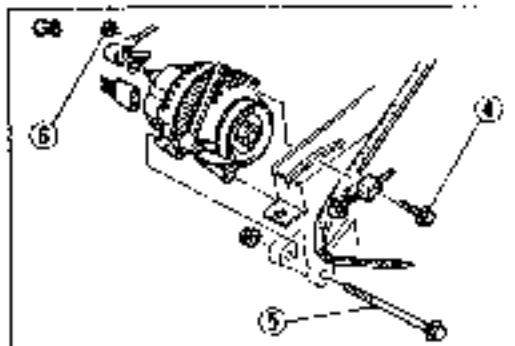
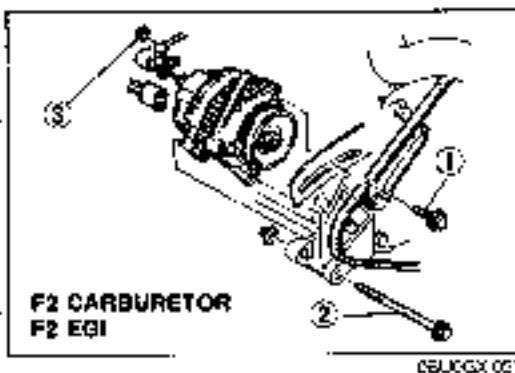
1. Check for continuity of the diodes by using an ohmmeter

Negative (Back)	Positive (Red)	Continuity
E		Yes
B	P <sub>1</sub> , F <sub>2</sub> , P <sub>2</sub>	No
		No
	E	No
P <sub>1</sub> , F <sub>2</sub> , P <sub>2</sub>	B	Yes
	T	Yes

2. Replace the rectifier.



00UJGX-025



## 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—18 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

- Loosen the alternator mounting bolt and adjusting bolt and adjust the tension.

## Standard tension

## Note

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

Using the SST, check the belt tension.

N (kg, lb)

Bel.	F2 (Carburetor, EGI)	G6
Alternator	New: 401—540	New: 549—638
	(50—55, 113.0—121.0)	(56—65, 123.2—143.0)
	Used: 390—401	Used: 461—519
	(40—50, 88.0—110.0)	(47—56, 103.4—123.2)
		Limit: 275 (20, 61.5)

## Deflection

## Note

- Check the drive belt deflection by applying moderate pressure midway between the pulleys shown in the figure.
- A belt is considered "new" if it has been used on a running engine for less than five minutes. Set the deflection accordingly.
- Check the belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped.

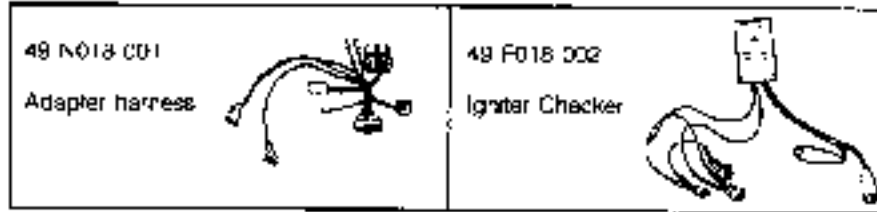
mm (in) (35 N (7.0 kg, 22 lb))

Bel.	F2 (Carburetor, EGI)	G6
Alternator	New: 7.0—8.0	New: 10.0—12.0
	(0.28—0.31)	(0.33—0.47)
	Used: 6.0—9.0	Used: 11.0—13.0
	(0.31—0.35)	(0.43—0.51)
		Limit: 16 (0.63)

- Tighten all bolts and recheck the tension.

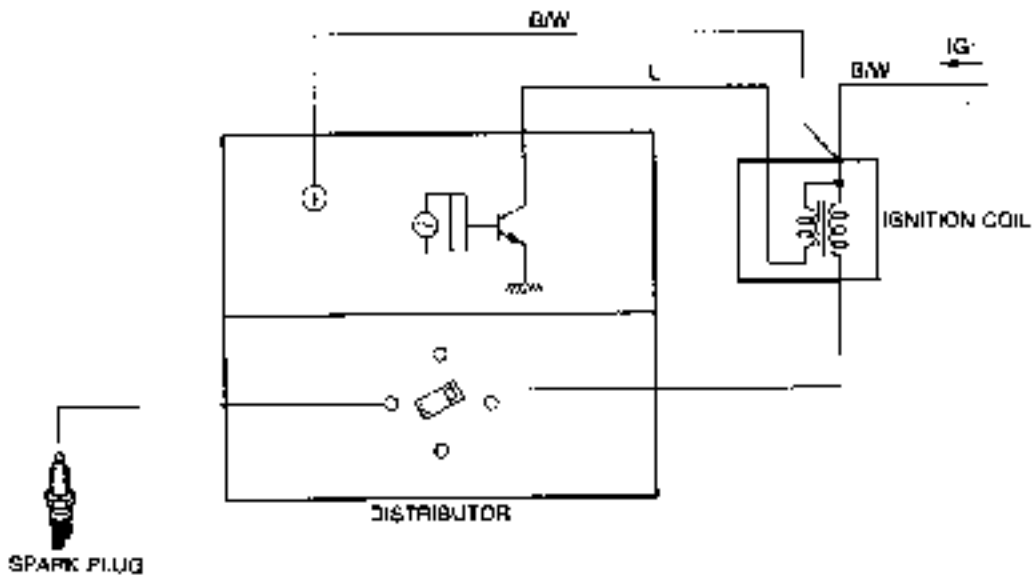
IGNITION SYSTEM

PREPARATION  
SST

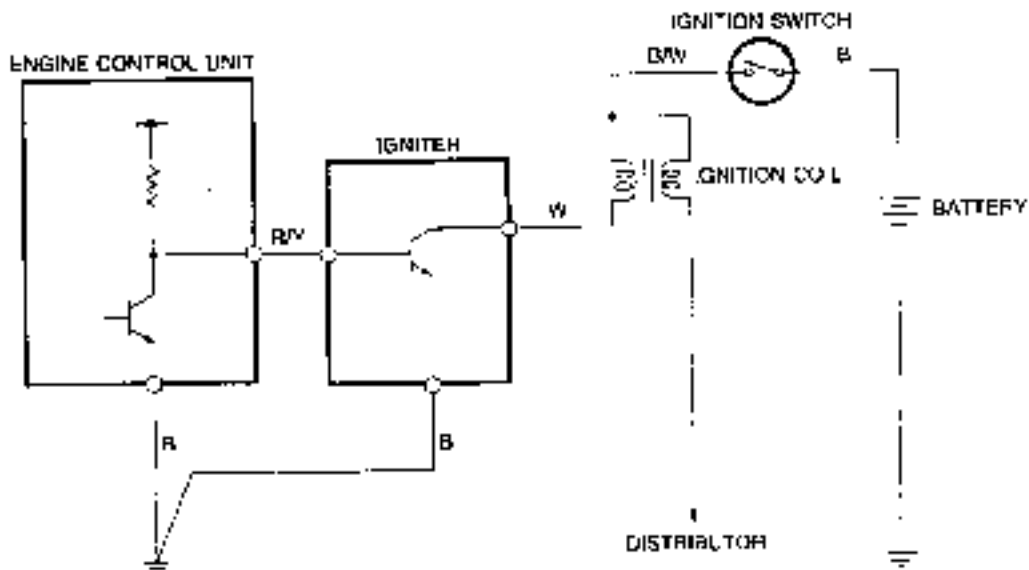


29U3G7 008

**F2 CARBURETOR**



**F2 EGI, G6**



**TROUBLESHOOTING**

**NO FIRE (NO SPARK, WEAK SPARK)**

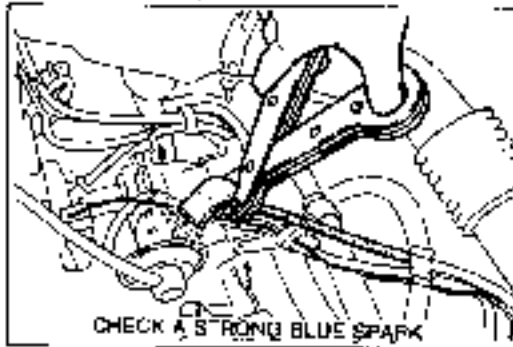
All cylinders

Note: When check spark test, hold lead with insulated pliers approx. 5–10mm (0.20–0.39 in) from a ground or cap.

Ignition coil spark test (Refer to page G-23)	OK	Distributor pickup coil resistance (F2 Carb.) (Refer to page G-28) wiper (F2 EG, G6) (Refer to page G-29) ignition coil resistance (Refer to page G-23) High-tension lead resistance (Refer to page G-23)
	NG	
Distributor spark test (Refer to page G-24)	OK	Distributor cap or rotor (Refer to page G-26)
	NG	
Spark plug spark test (Refer to page G-22)	OK	High-tension lead resistance (Refer to page G-22)
	NG	
Spark plug gap dirty Plug gap: 0.75–0.85mm (0.029–0.033 in)...F2 (Carb.), 1.0–1.1mm (0.039–0.043 in)...F2 (EG), G6 (Refer to page G-22)		
<b>Some cylinder(s)</b>		
Spark plug gap dirty	Plug gap: 0.75–0.85mm (0.029–0.033 in)...F2 (Carb.), 1.0–1.1mm (0.039–0.043 in)...F2 (EG), G6 (Refer to page G-22)	
High-tension lead resistance (Refer to page G-22)		
Distributor cap	(Refer to page G-26)	

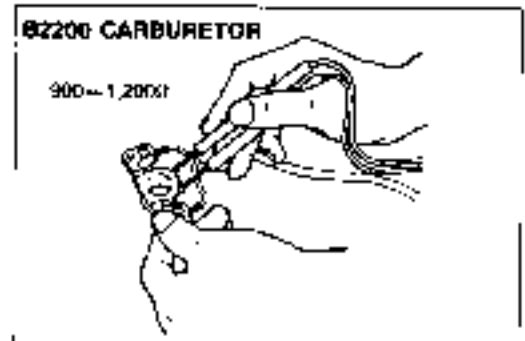
18U03X C-2

**Ignition coil spark test**



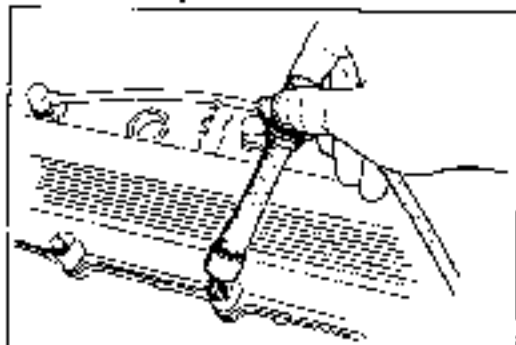
9M J06X C64

**Distributor pickup coil resistance**



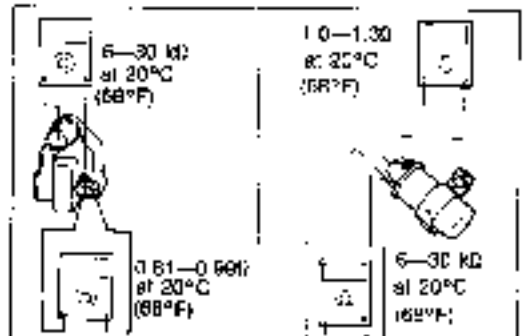
9M J06X C62

**Distributor spark test**



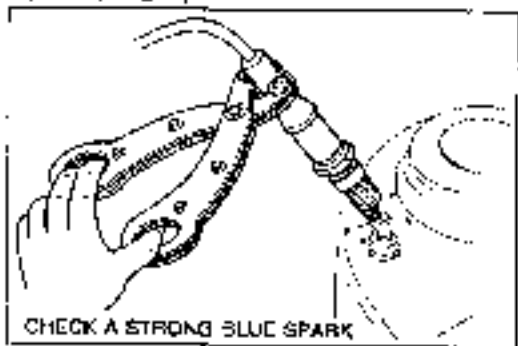
9M J06X C65

**Ignition coil resistance**



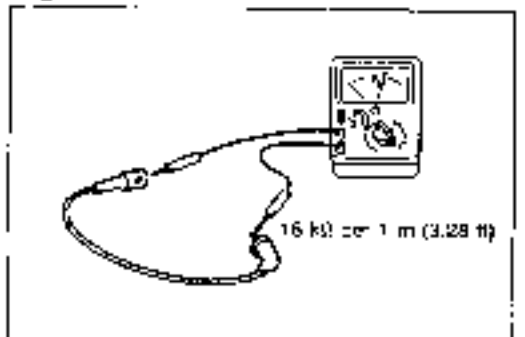
9M J06X C67

**Spark plug spark test**

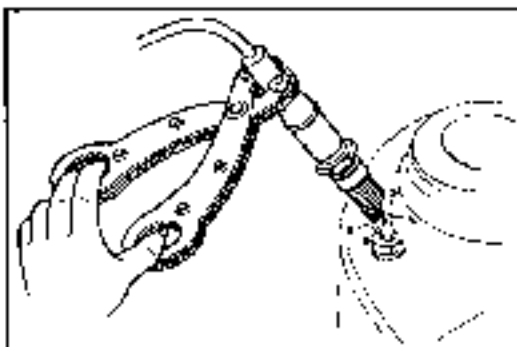


9M J06X C66

**High-tension lead resistance**



9M J06X C68

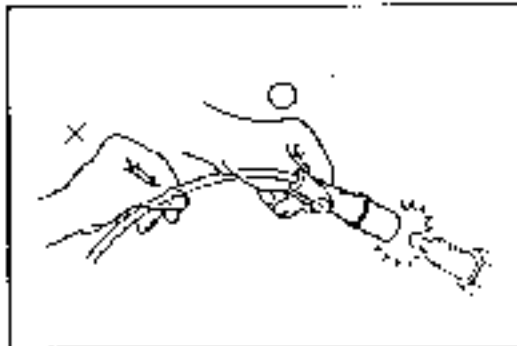


9MUCG3-031

## 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.



9MUCG4-032

### 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.

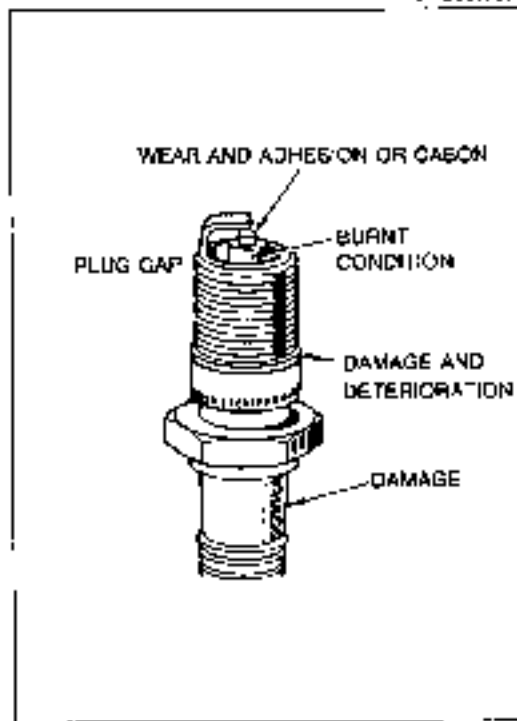
#### Spark plug tightening torque:

**15—23 Nm (1.5—2.3 m·kg, 11—17 ft·lb)**

### INSPECTION

Check the following points. If a problem is found, replace the spark plug.

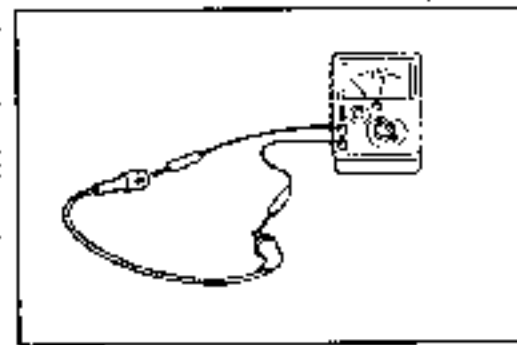
1. Damaged insulation
2. Worn electrodes
3. Carbon deposits  
If cleaning is necessary, use a plug cleaner or a wire brush. Clean the upper insulator also.
4. Damaged gasket



9MUCG5-033

#### 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**



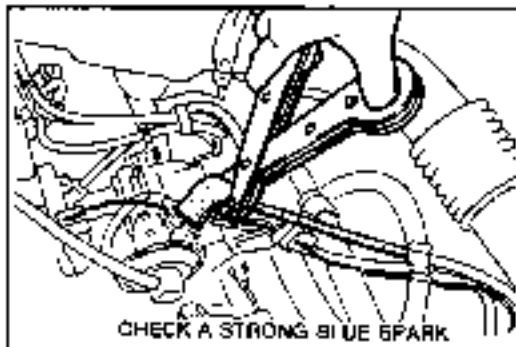
03JDCX-026

## HIGH-TENSION LEADS

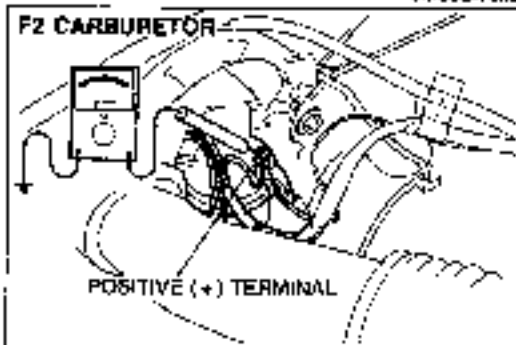
### INSPECTION

Use an ohmmeter to measure the resistance.

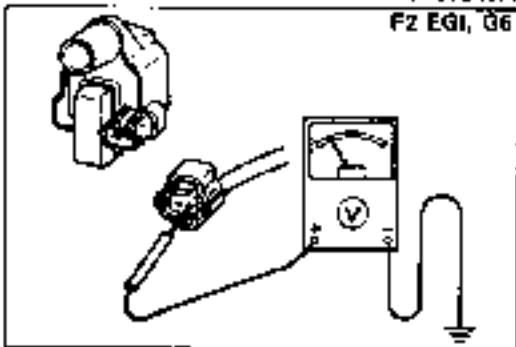
**Resistance: 16 kΩ per 1 m (3.28 ft)**



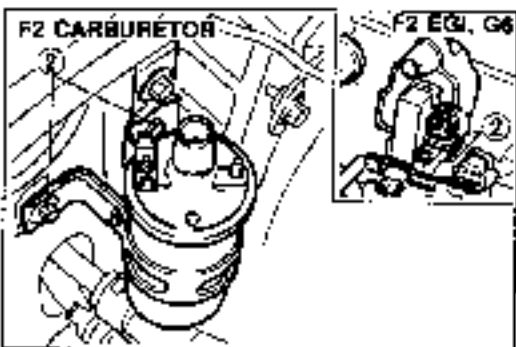
9K1J00K G13



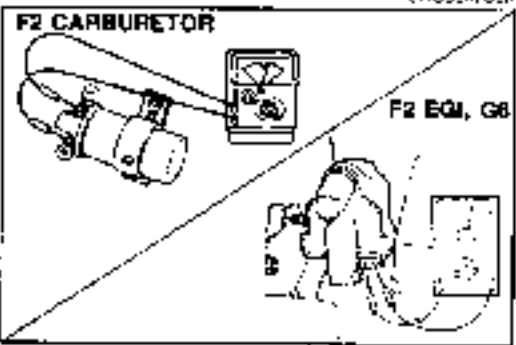
9YU5GX-071



F2 EGI, G6



DMU05X 028



DMU05X 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 insulation bolts.
3. Install in the reverse order of removal.

### INSPECTION

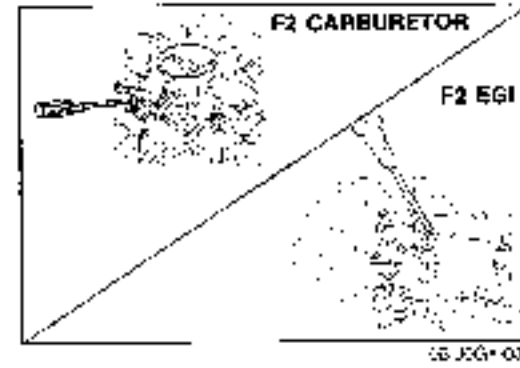
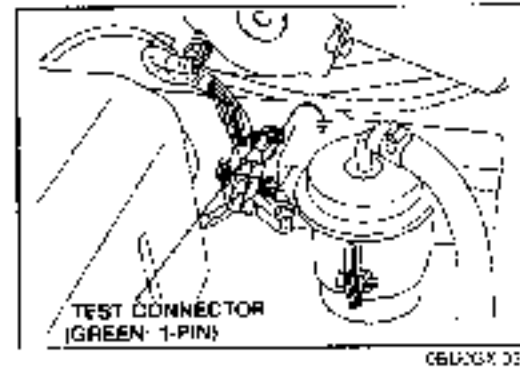
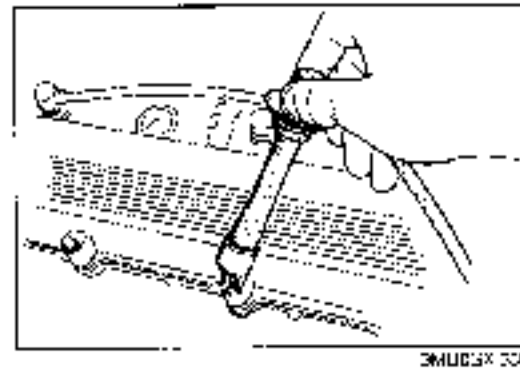
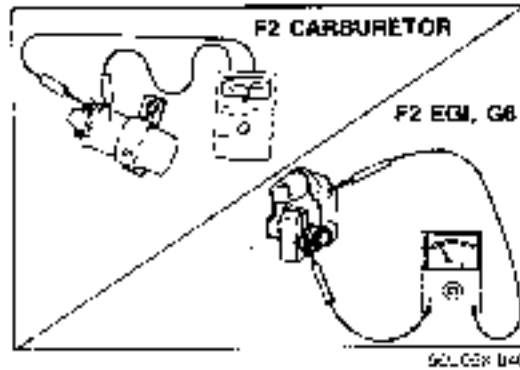
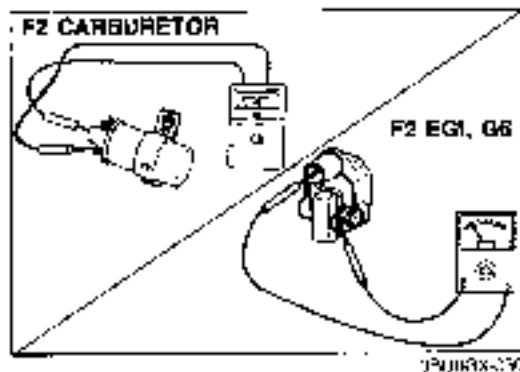
#### Primary Coil

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**

**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.

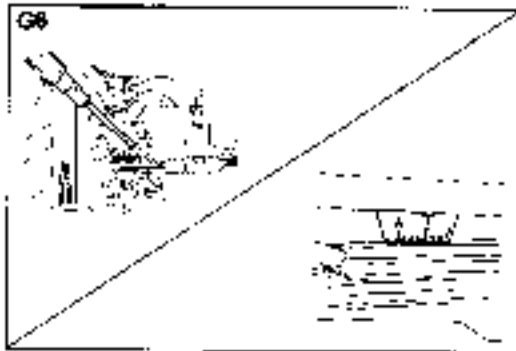
**Idle speed:**

(RPM)

	F2 Carburetor	F2 EGI	G6
M/T	800-850	730-770	730-770
A/T	800 (P)	750-790	750-790

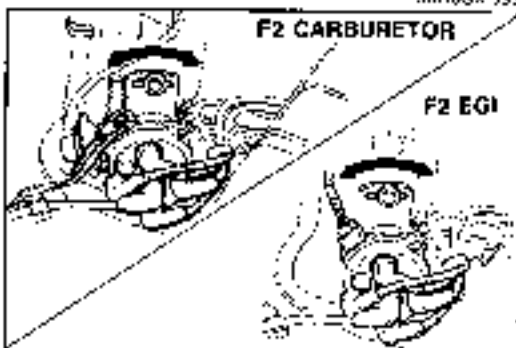
(M/T: Neutral, A/T: P range)





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)**

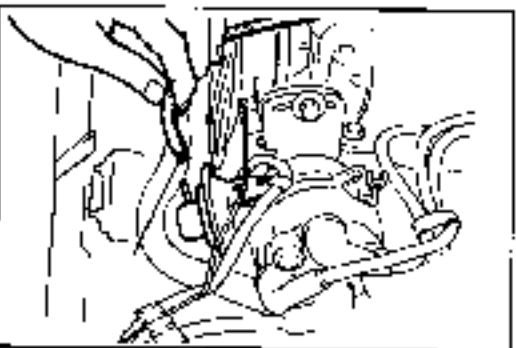
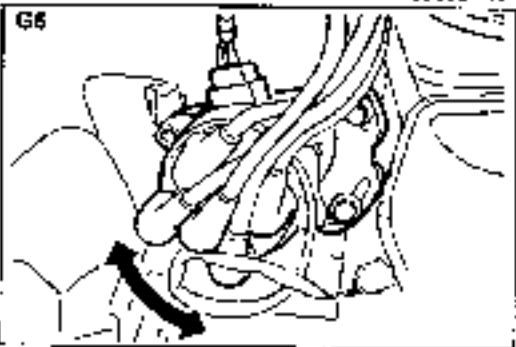


6. If the mark is not aligned, loosen the distributor lock nut or bolts and turn the distributor housing to make the adjustment.
7. Tighten the distributor lock nut or bolts to specified torque.

**Tightening torque:**

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

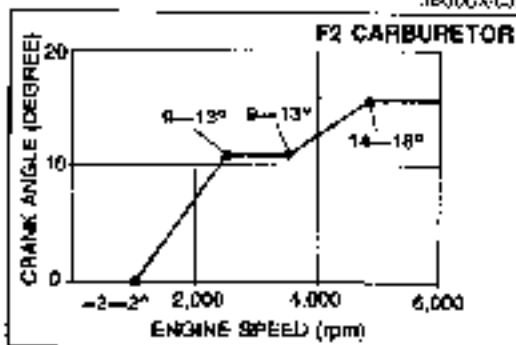
8. Disconnect the jumper wire from the test connector (F2 EGI, G6)

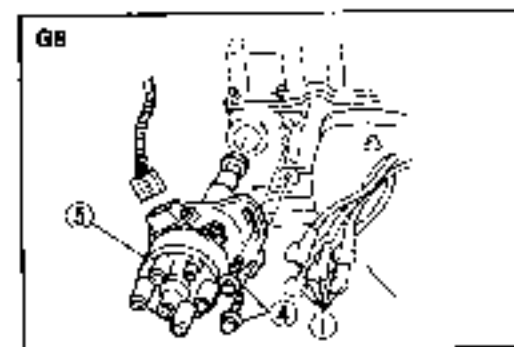
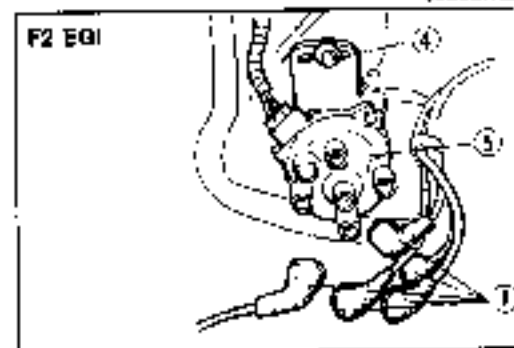
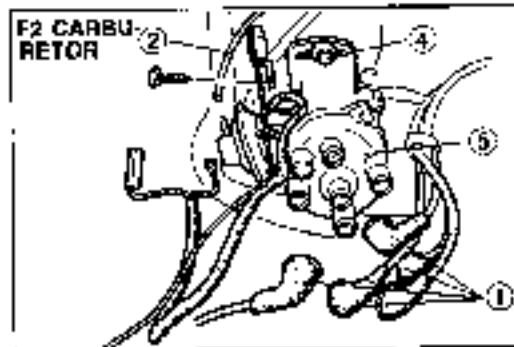
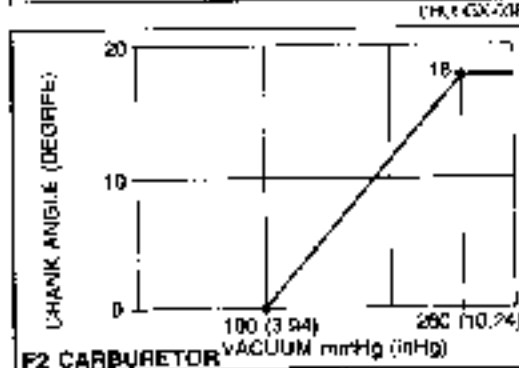
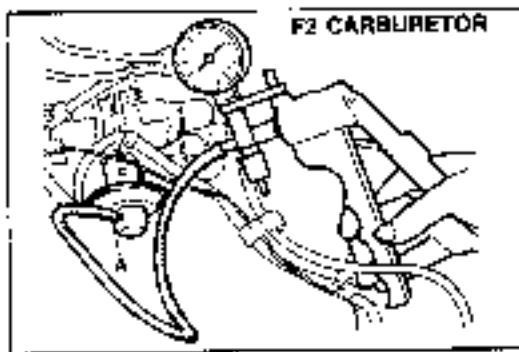


### SPARK ADVANCE CONTROL

#### 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



**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.

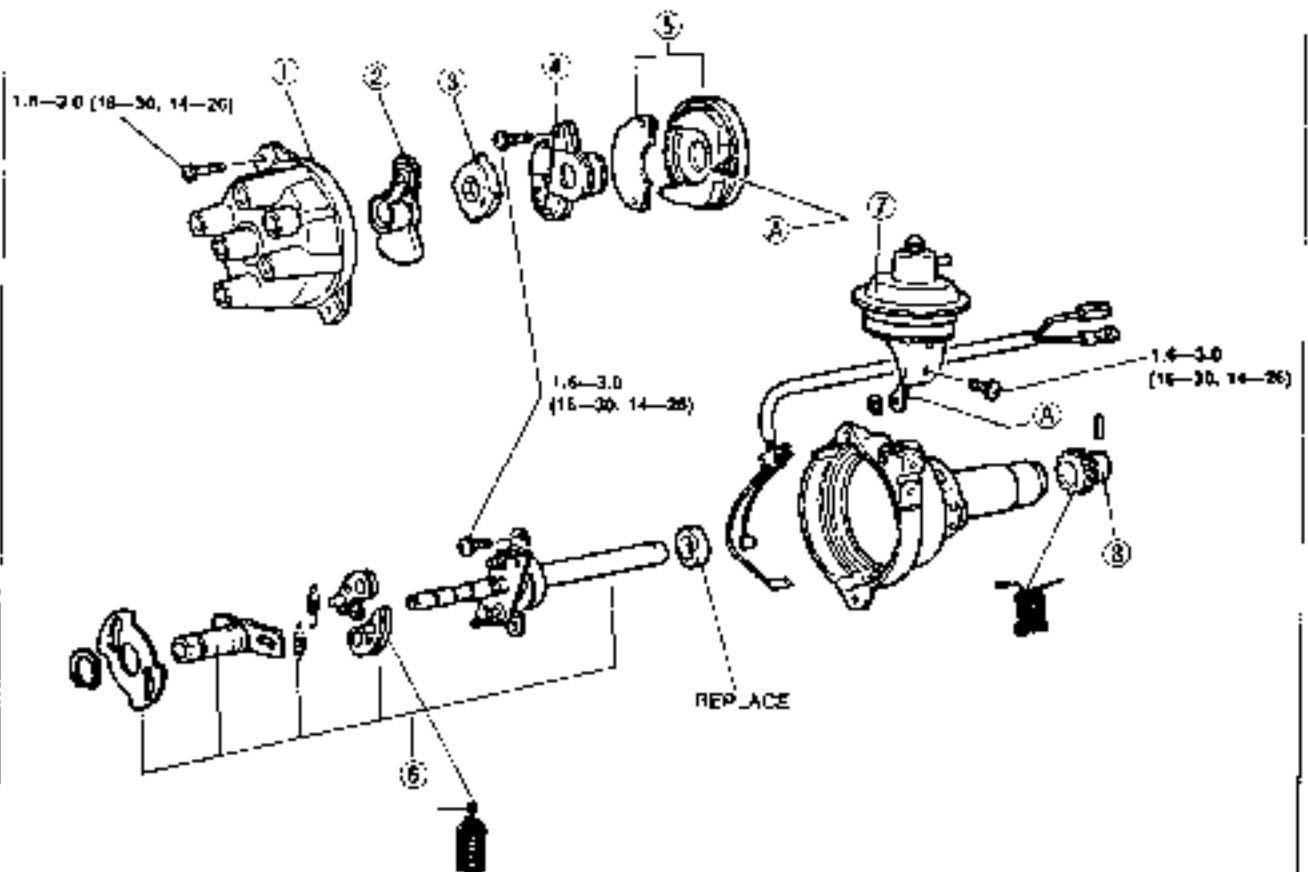
**Note**

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

**P2 CARBURETOR**



Mm (cm-lb, in-lb)

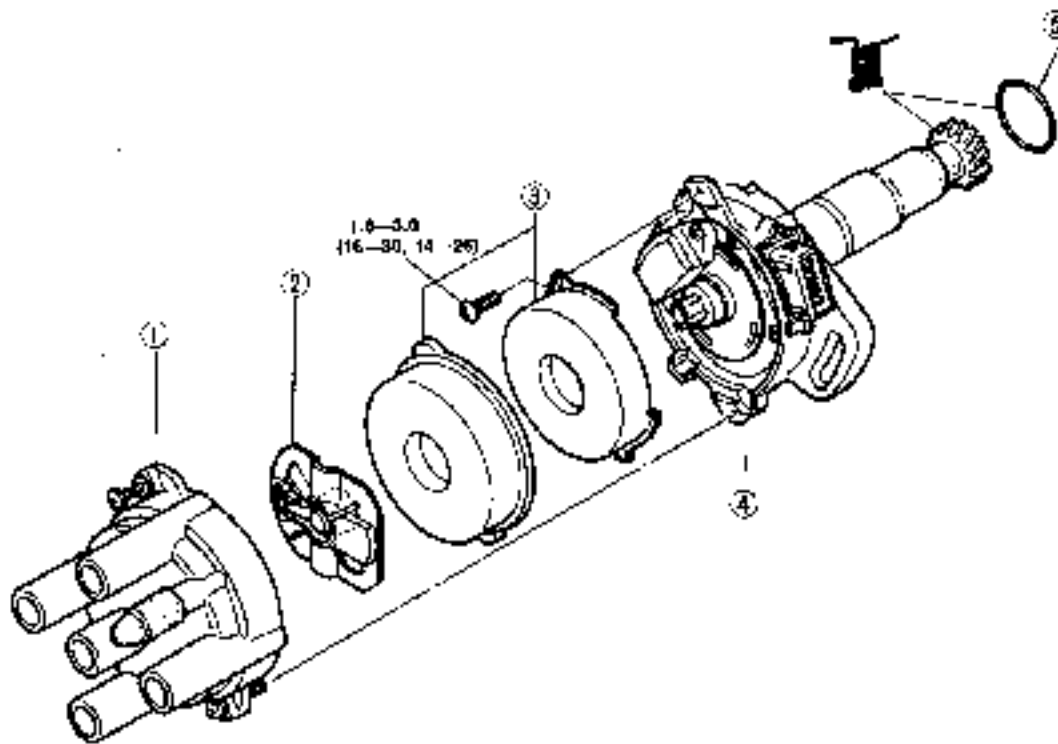
6BL06X-031

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

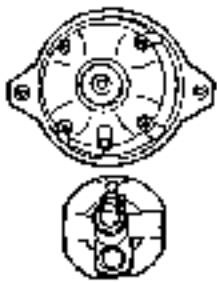


Nm (cm-kg, in-lb)  
DRI10GX-039

1. Cap
2. Rotor
3. Cover

4. Crank angle sensor
5. O-ring

F2 EGI, G6



F2 CARBURETOR



DRI10GX-040

**INSPECTION****Cap and Rotor**

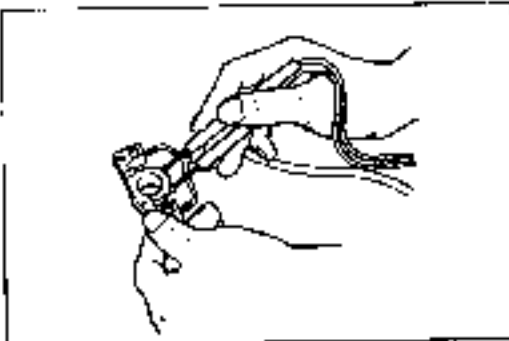
1. Check for corrosion, damage, and cracks.
2. Replace if necessary.

**Pickup Coil with Igniter (F2 Carburetor only)**

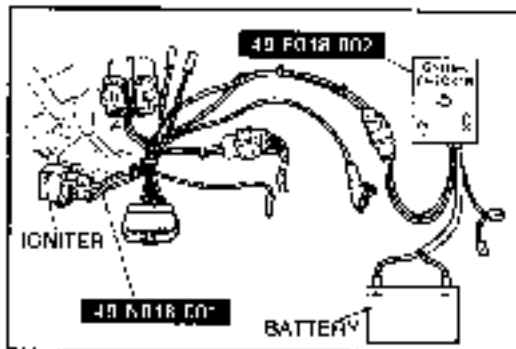
1. Connect an ohmmeter to the pickup coil.
2. Measure the resistance.

**Resistance: 900—1,200Ω**

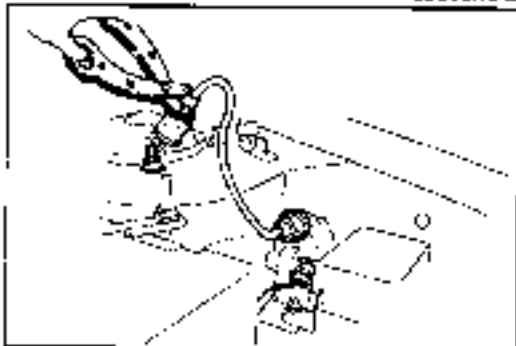
3. If it is not within specification, replace it.



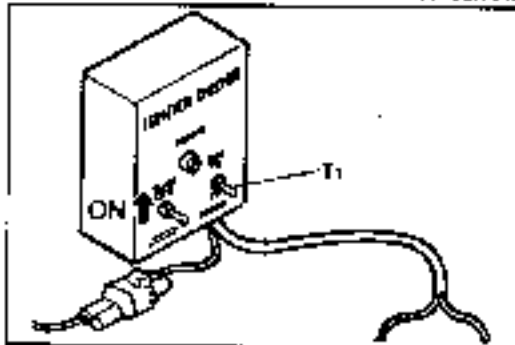
DRI10GX-041



28L CEX-D42



53A001X-040



53A001X-072

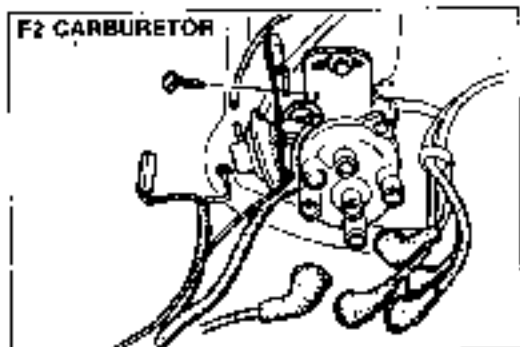
**IGNITER (F2 EG, G6)**

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.

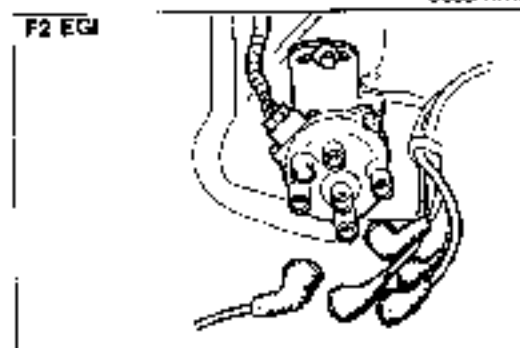
**Caution**

**Hold the SW2 ON for no longer than one second.**

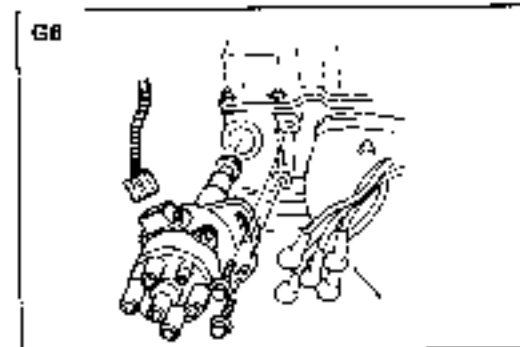
7. Flip the SW2 ON and OFF, and verify that strong blue sparks are discharged from the high-tension lead.



18J0G4013



95LCEK 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.

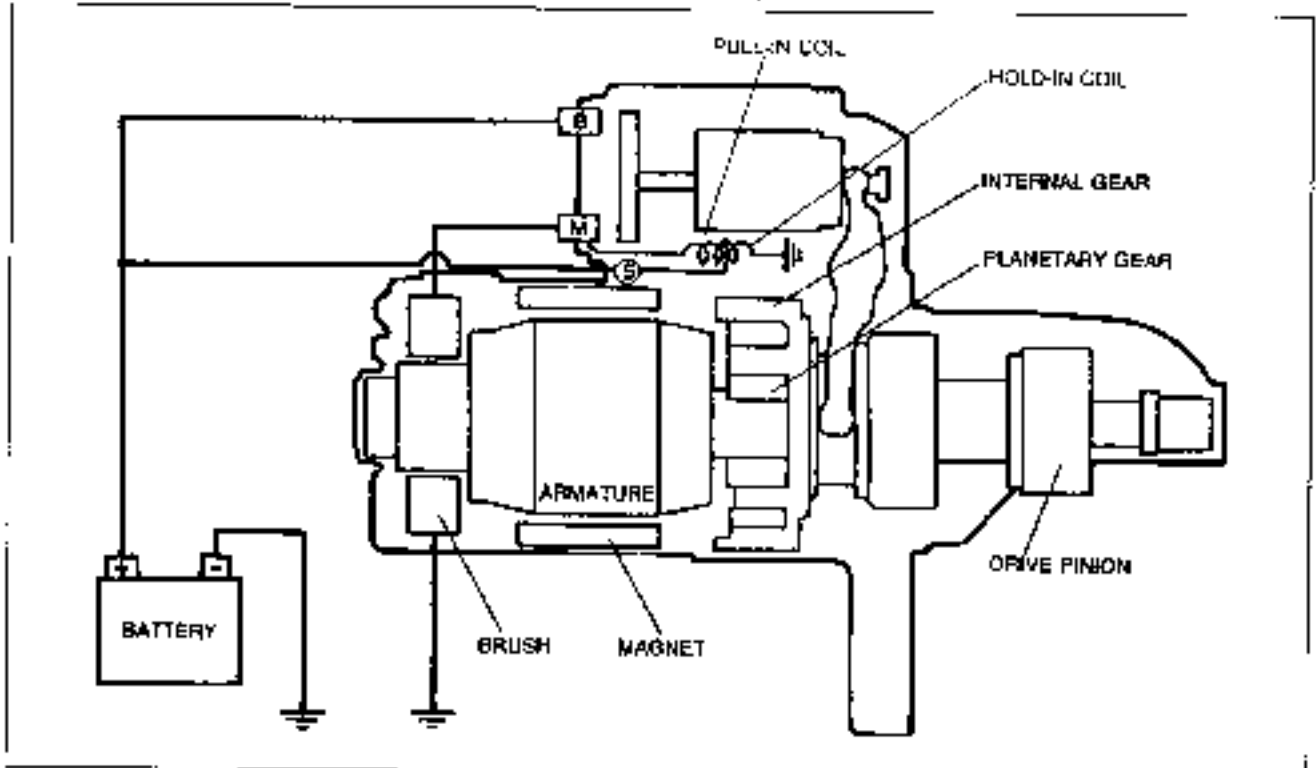
**Torque specification:**

19–25 Nm (1.9–2.6 m-kg, 14–19 ft-lb)

STARTING SYSTEM

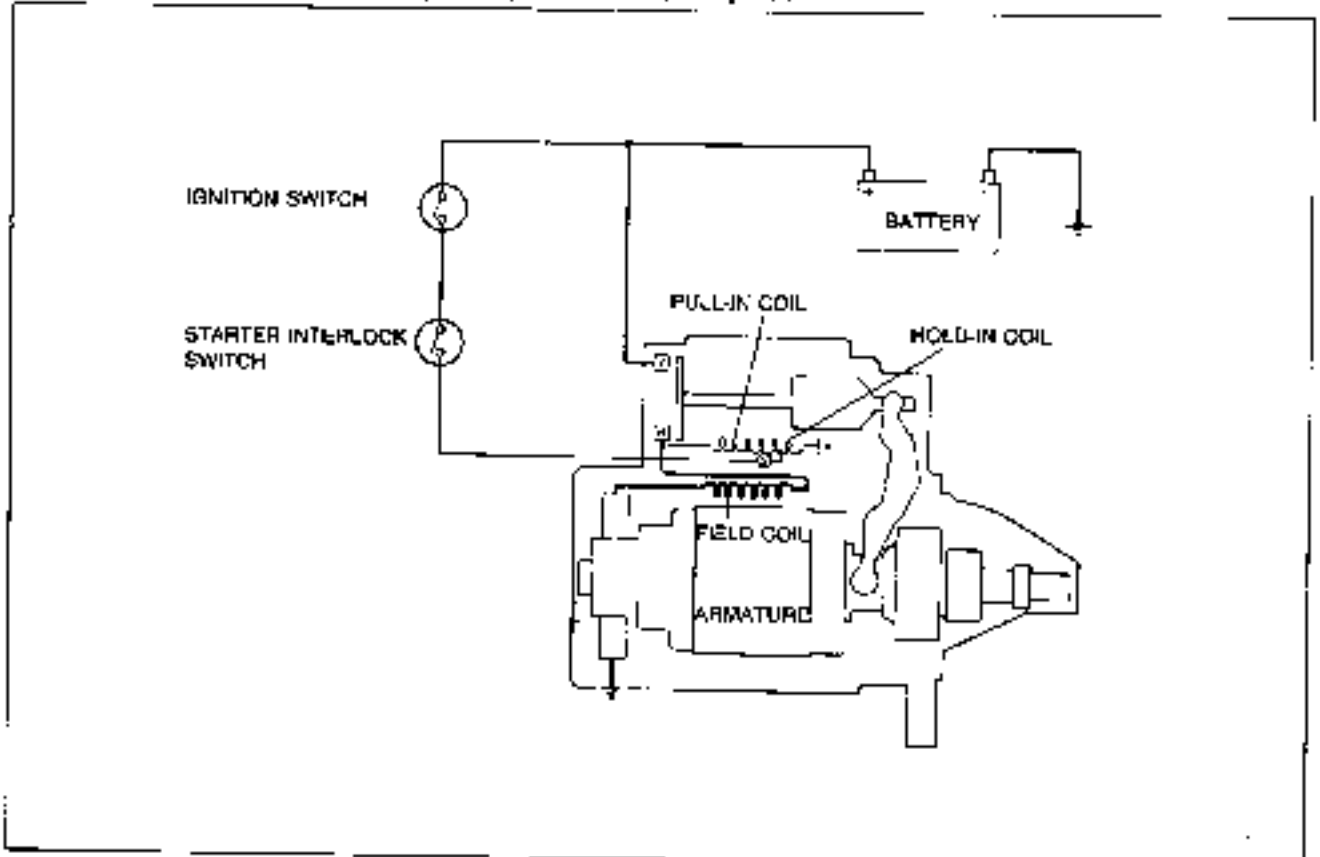
STARTER

Coaxial Reduction Type (1.4 kW)—F2 (Carburetor, EGI) A/T



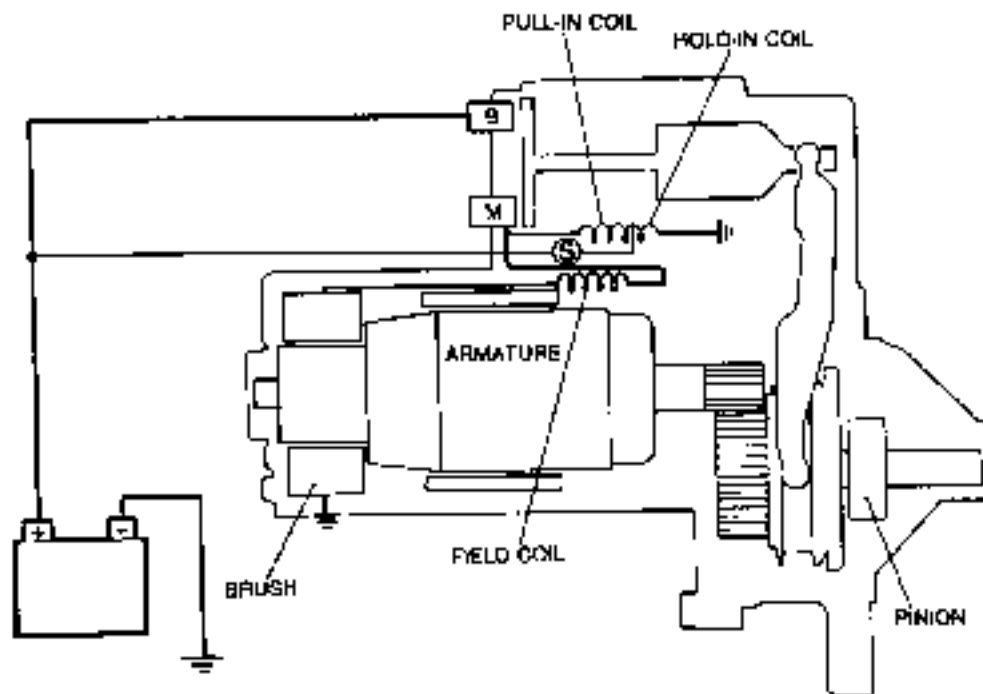
0EUN0X-042

Non-Reduction Type (0.95 kW)—F2 (Carburetor, EGI) M/T

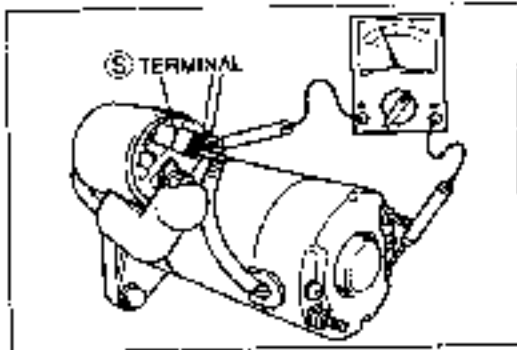


0EUN0X-044

Reduction Type (1.2 kW)—G6 M/T, (1.4 kW)—G6 A/T



03U32X-04E



swf1002-07F

**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**

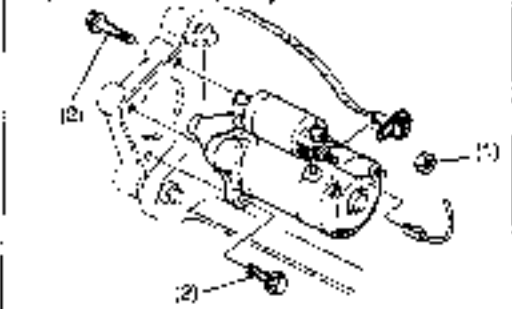
If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

**Note**

The cranking speed is greatly affected by the viscosity of the engine oil.

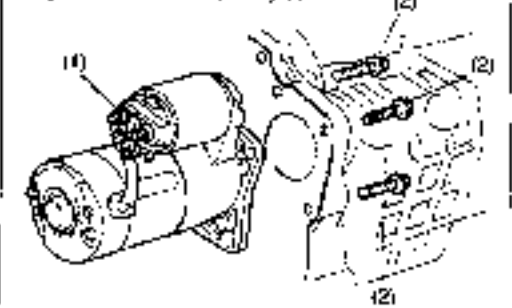


F2 (CARBURETOR, EGI) M/T



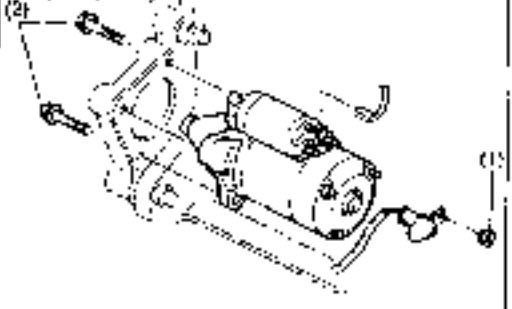
09L130X-032

F2 (CARBURETOR, EGI) A/T



09L130X-032

G6 (M/T, A/T)

**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 Nm (90—130 cm-kg, 78—113 in-lb)

Bolt (2):

37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)

G6—M/T, A/T

Nut (1):

9.8—12 Nm (100—120 cm-kg, 87—104 in-lb)

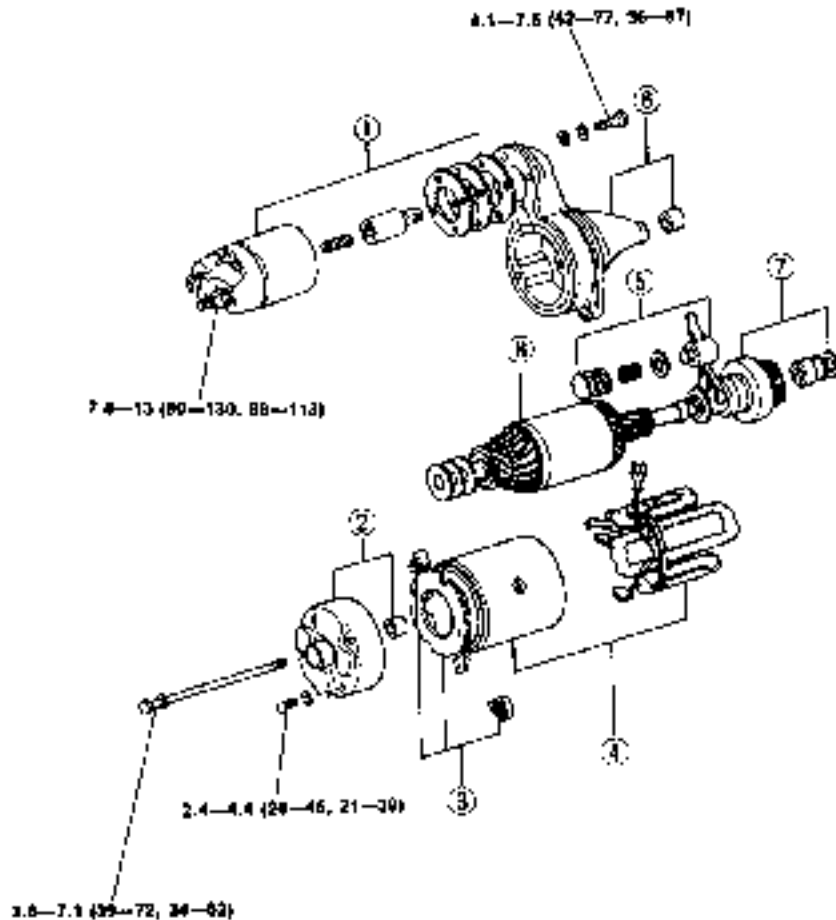
Bolt (2):

37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)

**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)**

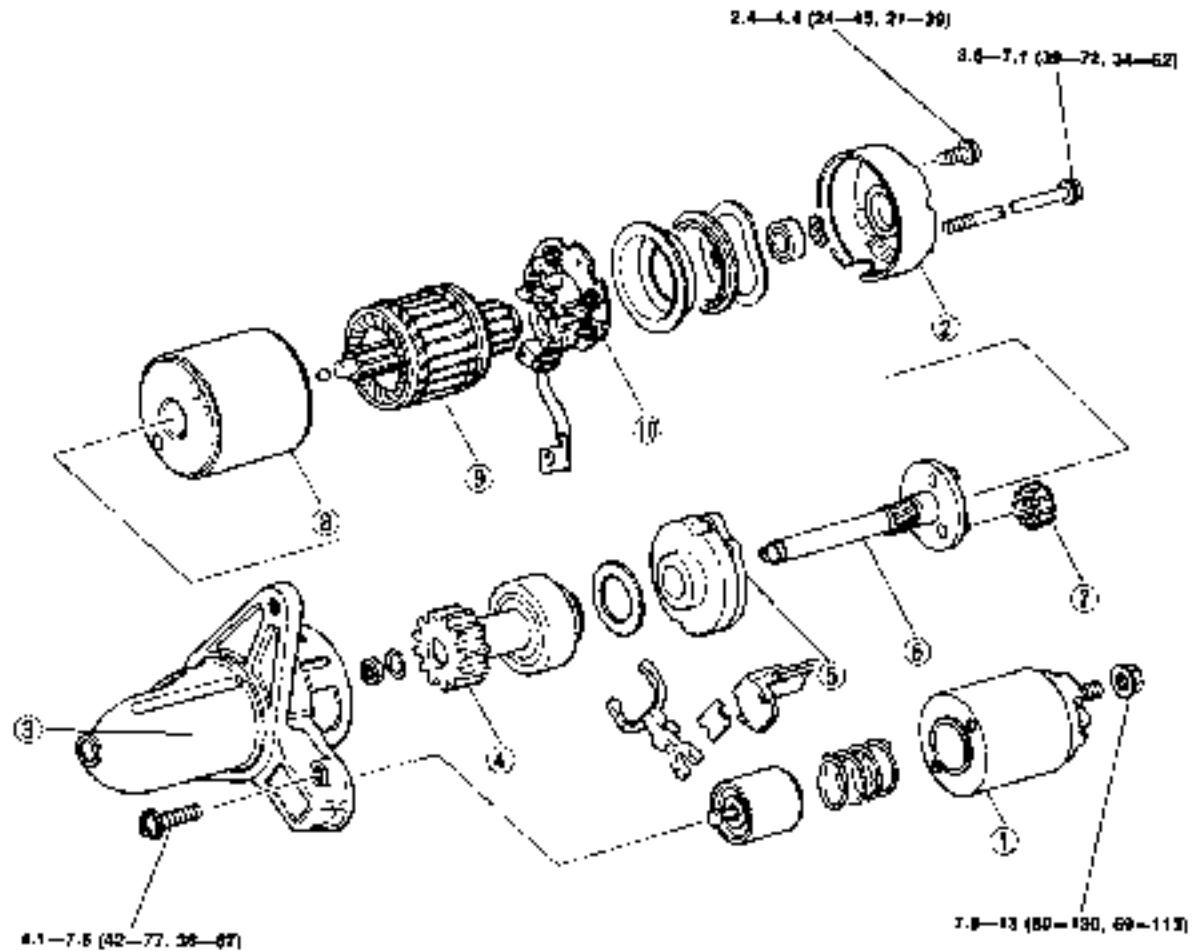


N.m (cm-kg, in-lb)

1B-J03X014

- |   |                 |                                |                 |
|---|-----------------|--------------------------------|-----------------|
| 1. Magnetic switch<br>Inspection.....       | ..... page G-38 | 5. Lever                       |                 |
| 2. Rear housing                             |                 | 6. Front cover                 |                 |
| 3. Brush holder assembly<br>Inspection..... | ..... page G-39 | 7. Drive pinion                |                 |
| 4. Field coil<br>Inspection.....            | ..... page G-38 | 8. Armature<br>Inspection..... | ..... page G-37 |

F2 (CARBURETOR, EGI) A/T  
(COAXIAL REDUCTION TYPE 1.4 kW)



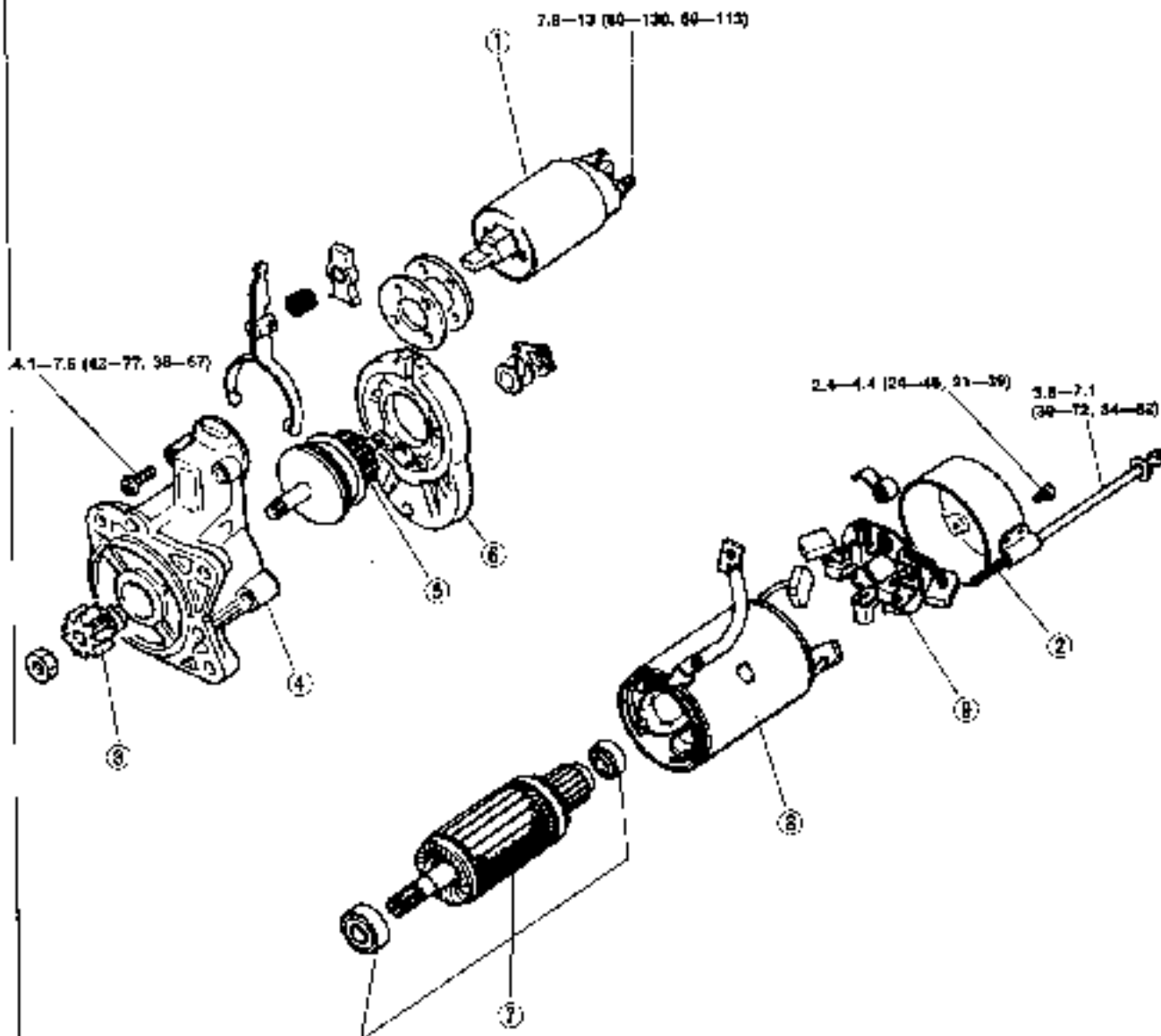
4mm (0.157 in.)

10J0GK-C15

- 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

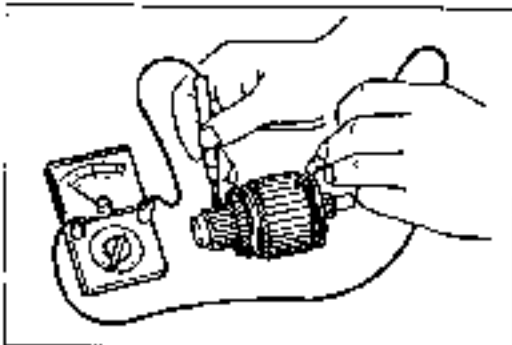
GB (M/T, A/T)  
 (REDUCTION TYPE M/T 1.2 kW, A/T 1.4 kW)



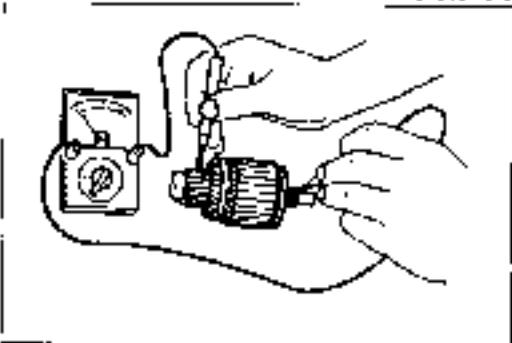
Net (cm-kg, in-lb)  
 1/110000-015

- 1 Magnetic switch  
 Inspection..... page G-38
- 2 Rear housing
- 3 Drive pinion
- 4 Front cover
- 5 Reduction gear
- 6 Center bracket

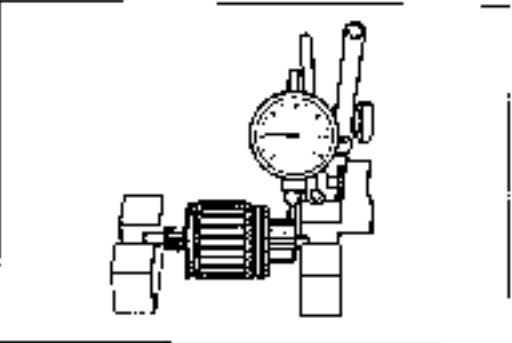
- 7 Armature  
 Inspection..... page G-37
- 8. Field coi.  
 Inspection..... page G-38
- 9 Brush holder assembly  
 Inspection..... page G-39



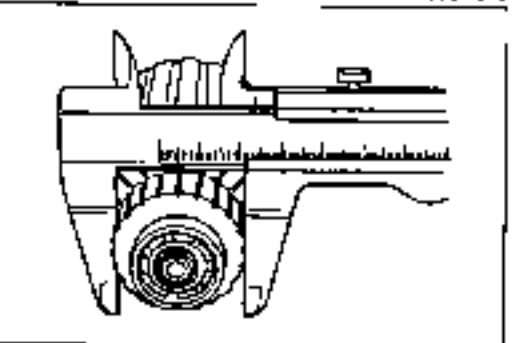
67UJ5F-049



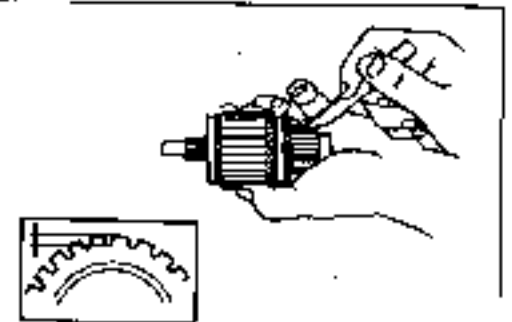
67UJ5K-049



68JXGX-058



08LU5GX-051



08LU5GX-078

**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	I 2 (Carburetor EGI)	G6
Standard vibration mm (in)	0.25 (0.002)	0.03 (0.001)
Limit mm (in)	0.4 (0.004)	0.05 (0.002)

**Note**

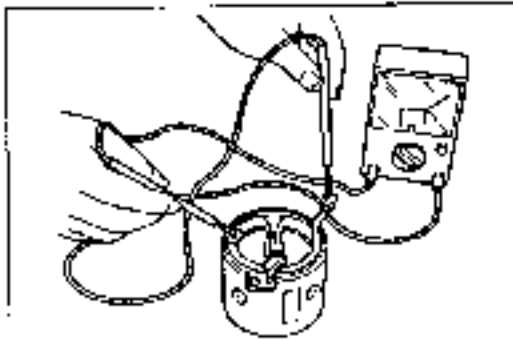
Before checking, be sure that there is no play in the bearings.

4. Outer diameter of the commutator  
Replace the armature if the outer diameter of the commutator is 0.1mm 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.

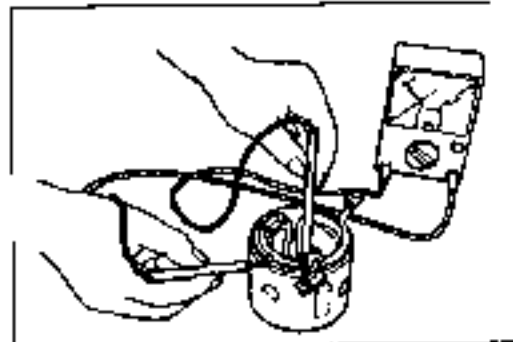
**Standard depth: 0.5—0.8mm (0.020—0.031 in)**  
**Limit depth: 0.2mm (0.008 in)**



49025X-085

**Field Coil****1. Wiring damage**

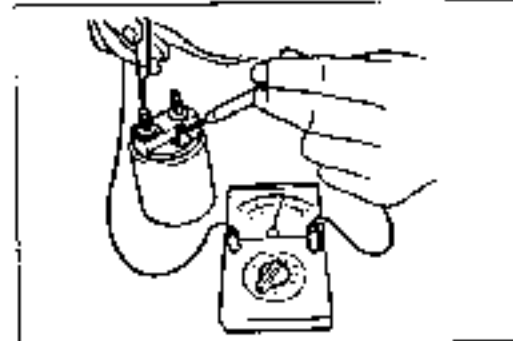
- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.



49025X-085

**2. Ground of the field coil**

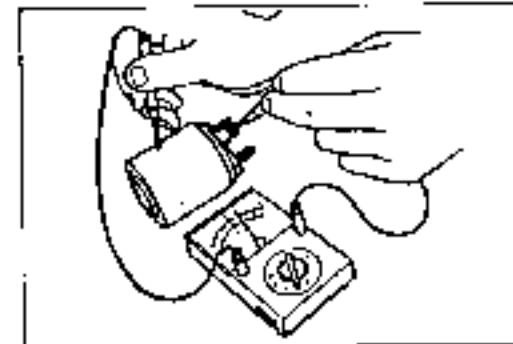
- (1) Check for continuity between the connector and yoke by using a circuit tester.
  - (2) Repair or replace the yoke assembly if there is continuity.
- 3. Installation of the field coil**  
Replace the yoke assembly if the field coil is loose.



67L08X-055

**Magnetic Switch****1. Wiring damage (③ terminal - ④ terminal)**

Check for continuity between the ③ terminal and the ④ terminal with a circuit tester. Replace the magnetic switch if there is no continuity.



67L08X-055

**2. Wiring damage (③ terminal - body)**

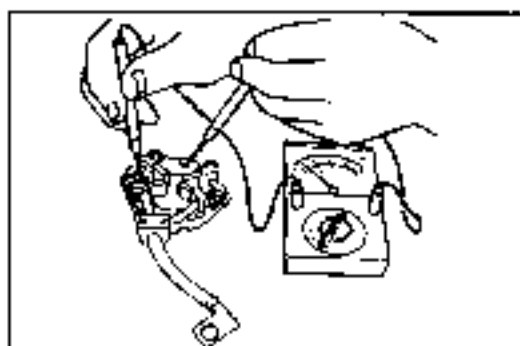
Check for continuity between the ③ terminal and the body with a circuit tester. Replace the magnetic switch if there is no continuity.



67L08X-055

**3. Ground of magnetic switch**

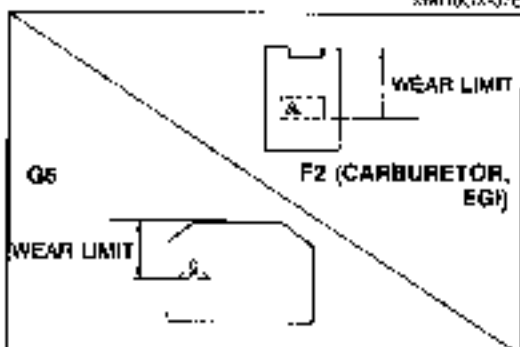
Check for continuity between the ④ and ③ terminals with a circuit tester. Replace the magnetic switch if there is continuity.



SM110GX-07c

**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.



DEL0GX-061

**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)

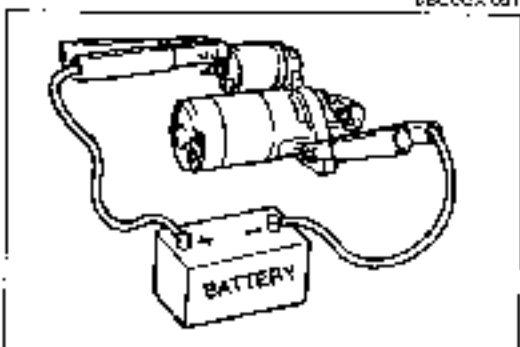
**CHECKING OPERATION**

**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.

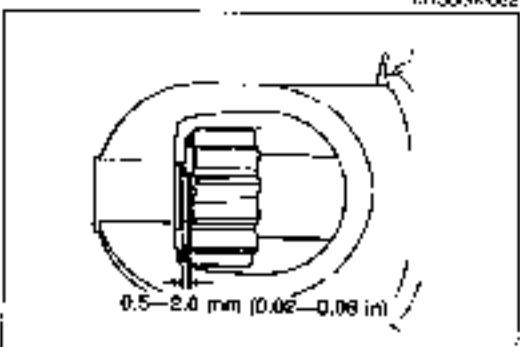


CRJ03K-062

Measure the pinion gap while the pinion is pulled out.

**Specification: 0.5—2.0mm (0.02—0.08 in)**

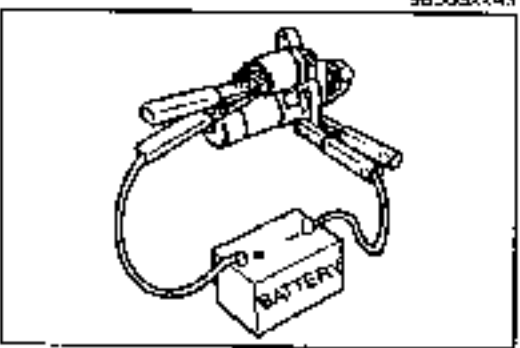
Adjust the pinion gap with an adjust washer (drive housing front cover—magnetic switch) if it is not within specification.



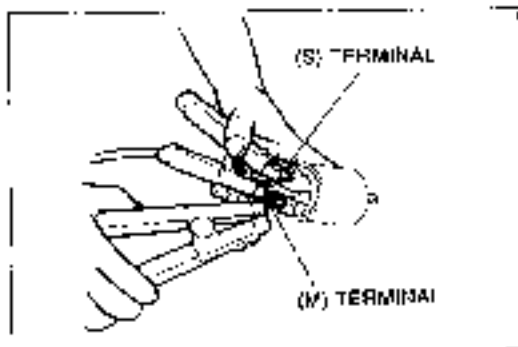
98J06X-043

**Return test [F2 (Carburetor, EGI) A/T and G6 (M/T, A/T)]**

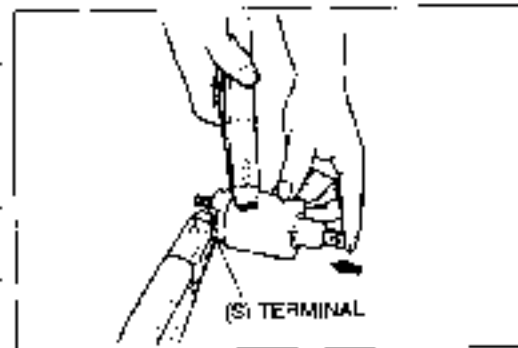
1. Disconnect the motor wire from the M terminal, and then connect the battery power to the M terminal and ground the body.
2. Pull out the overrunning clutch with a screwdriver. Check that the overrunning clutch returns to its original position when released.



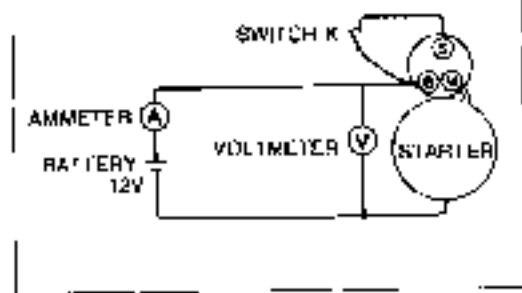
08J06X-051



CS-000-004



10L00X-055



10L00X-056

**Full-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.**

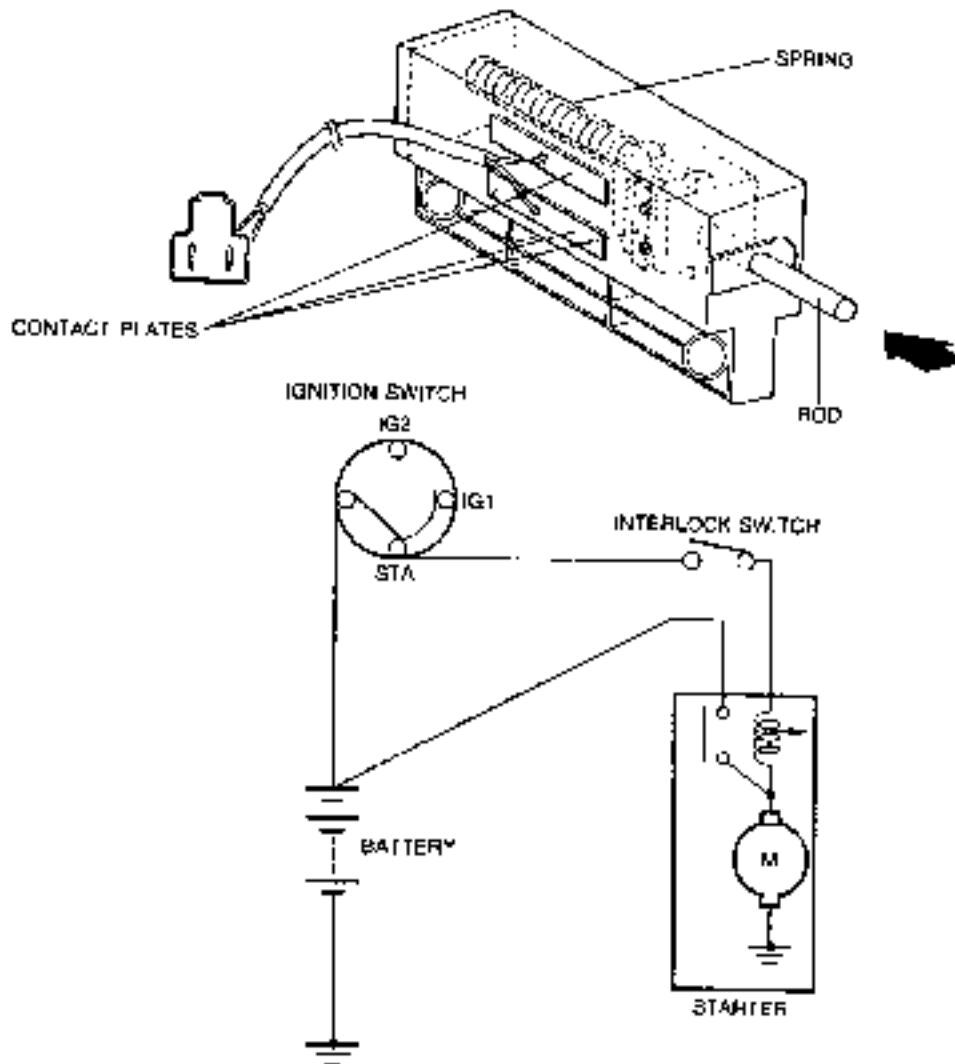
2. Close switch K to run the starter.
3. Check for the following:

Engine	[F2 (Carburetor, LCI) M/T]	[F2 (Carburetor, EGI) M/T]	GE M/T	GE M/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 shift speed (rpm)	6,000 min	3,000 min	4,000 min	3,000 min

4. If any abnormality is noted, check for the cause according to "Inspection".

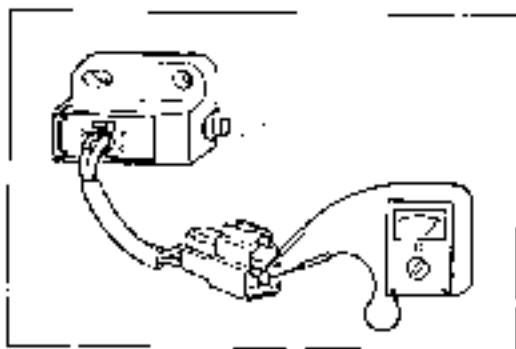


STARTER INTERLOCK SYSTEM (M/T)



AVL104875

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.



77J05X 216

**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

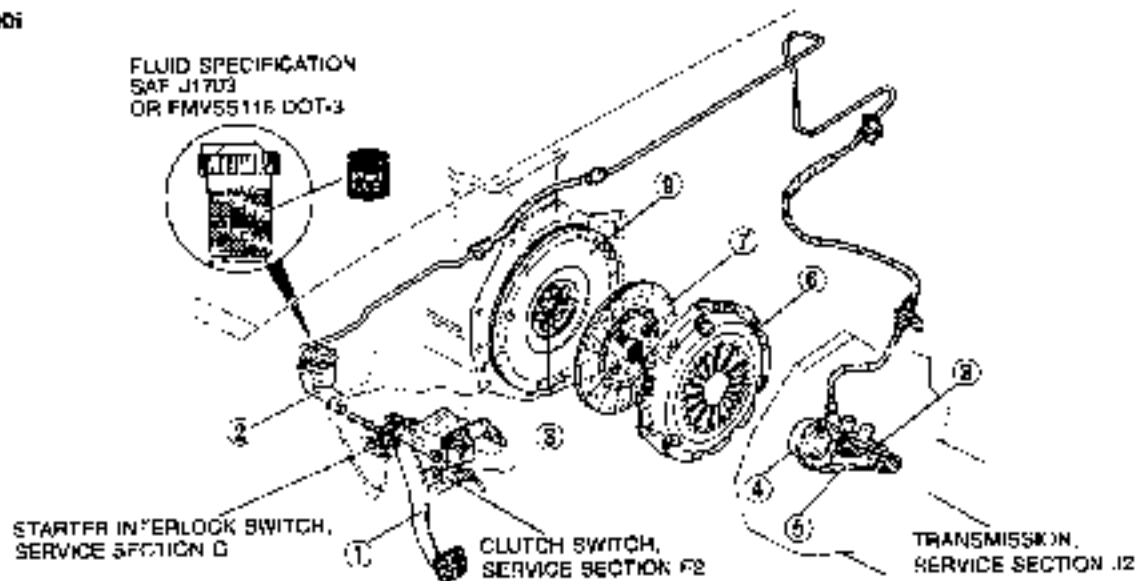
<b>INDEX</b> .....	H- 2
<b>OUTLINE</b> .....	H- 3
SPECIFICATIONS.....	H- 3
<b>TROUBLESHOOTING GUIDE</b> .....	H- 3
<b>CLUTCH FLUID</b> .....	H- 4
PREPARATION.....	H- 4
REPLACEMENT.....	H- 4
<b>CLUTCH PEDAL</b> .....	H- 5
ADJUSTMENT.....	H- 5
REMOVAL, INSPECTION, AND INSTALLATION.....	H- 6
<b>CLUTCH MASTER CYLINDER</b> .....	H- 8
PREPARATION.....	H- 8
REMOVAL AND INSTALLATION.....	H- 8
AIR BLEEDING.....	H- 9
OVERHAUL.....	H-10
<b>CLUTCH RELEASE CYLINDER</b> .....	H-12
PREPARATION.....	H-12
REMOVAL AND INSTALLATION.....	H-12
AIR BLEEDING (REFER TO PAGE H-9.)	
OVERHAUL.....	H-13
<b>CLUTCH UNIT</b> .....	H-15
PREPARATION.....	H-15
REMOVAL AND INSTALLATION.....	H-16
<b>RELEASE BEARING</b> .....	H-18
INSPECTION.....	H-18
<b>CLUTCH COVER</b> .....	H-18
INSPECTION.....	H-18
<b>CLUTCH DISC</b> .....	H-18
INSPECTION.....	H-18
<b>FLYWHEEL</b> .....	H-19
INSPECTION.....	H-19

29. 1000 (01)

## INDEX

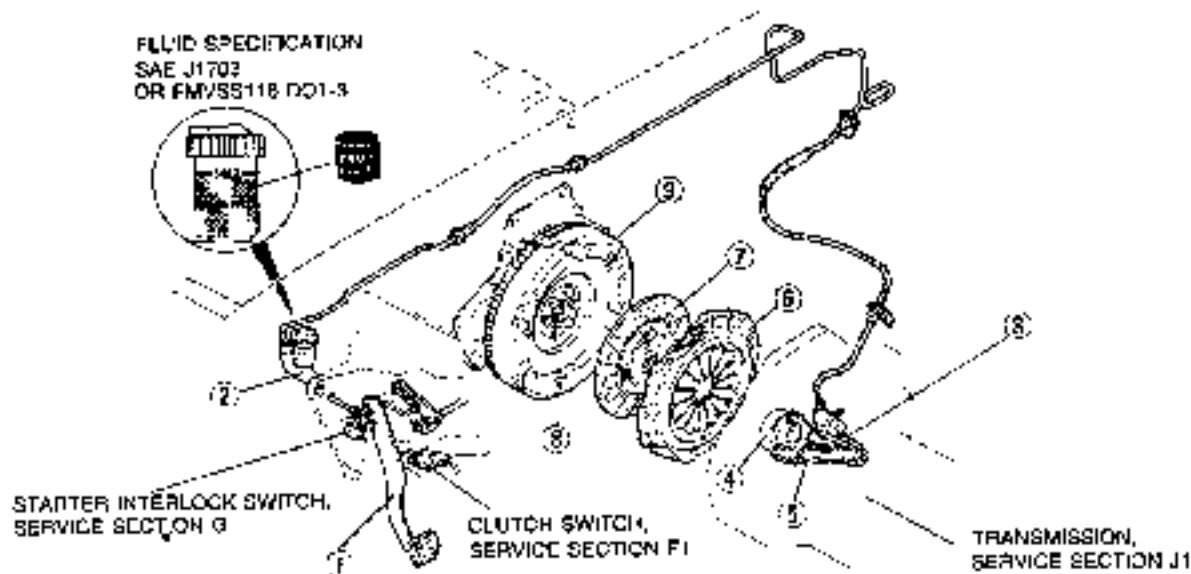
B2600i

FLUID SPECIFICATION  
SAE J1703  
OR FMVSS116 DOT-3



B2700

FLUID SPECIFICATION  
SAE J1703  
OR FMVSS116 DOT-3



299, UHX-302

- |   |   |   |
|---|---|---|
| 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>B2700 ..... 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- 16   | 9. Flywheel<br>Removal and<br>Installation ..... page H- 16<br>Inspection ..... page H-19   |

OUTLINE

SPECIFICATIONS

Item		Model	B2500i	B2200	
Clutch control			Hydraulic		
Clutch cover	Type		Diaphragm spring		
	Set load	N (kg, lb)	5,404 (560, 1,232)	4,807 (490, 1,075)	
Clutch disc	Outer diameter	mm (in)	250 (9.84)	226 (8.89)	
	Inner diameter	mm (in)	100 (3.94)	150 (5.91)	
	Thickness	Pressure plate	mm (in)	2.5 (0.14)	4.1 (0.16)
		Flywheel face	mm (in)	2.5 (0.14)	
Clutch pedal	Type		Suspension		
	Ratio		EQ		
	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)	12.87 (0.625)		
Release cylinder inner diameter		mm (in)	19.05 (0.750)		
Clutch fluid			SAE J1703 or FMVSS110 DOT-5		

383000421

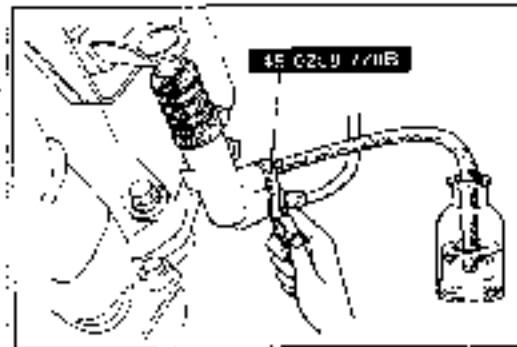
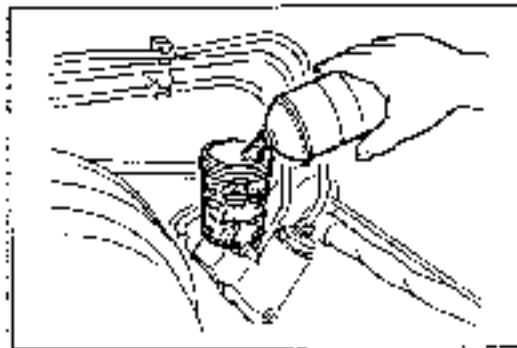
H

TRUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Slipping	Clutch disc facing worn excessively	Replace	H-10
	Clutch disc facing surface hardened or oil on surface	Repair or replace	H-16
	Pressure plate damaged	Repair or replace	H-10
	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
Faulty disengagement	Excessive rollout or damaged clutch disc	Replace	H-10
	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	-	
Clutch vibrates when accelerating	Oil on facing	Repair or replace	H-16
	Torsion spring weakened	Replace	H-16
	Clutch disc facing hardened or damaged	Repair or replace	H-10
	Clutch disc facing rivets cause	Replace	H-16
	Pressure plate damaged or excessive rollout	Replace	H-16
	Flywheel surface hardened or damaged	Repair or replace	H-16
Loose or worn engine mount	Tighten or replace	-	
Clutch pedal sticking	Repair shaft not properly lubricated	Lubricate or replace	H-6
Abnormal noise	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

285-0118-002

## CLUTCH FLUID

PREPARATION  
SST

## REPLACEMENT

**Note**

The fluid in the reserve tank must be maintained at the 3/4 level or higher during replacement.

**Caution**

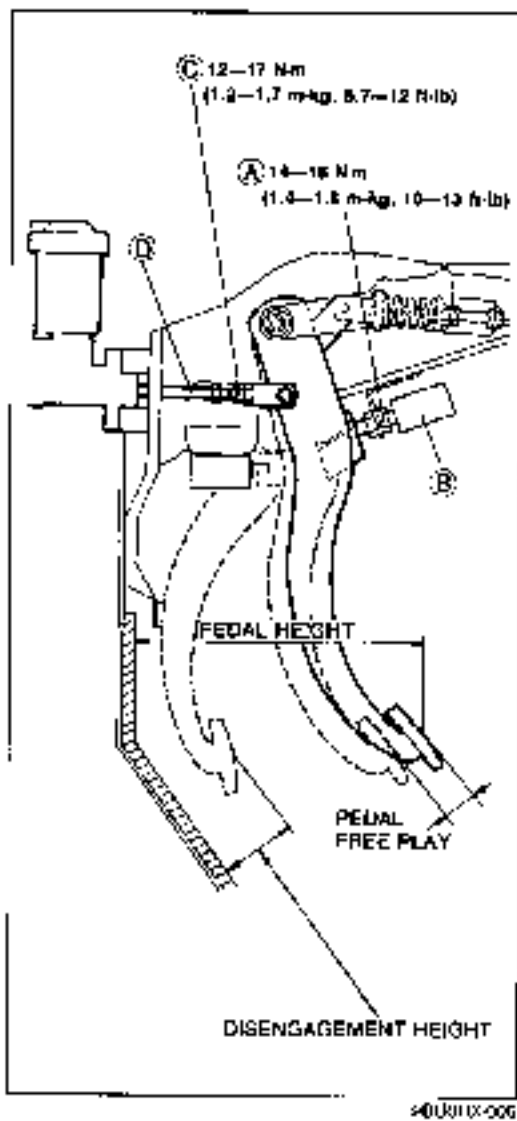
- a) Be careful not to spill clutch fluid on a painted surface. If this should happen, wash it off immediately.
- b) Do not mix different brands of clutch fluid.
- c) Do not reuse the clutch fluid which was drained out.

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 Nm (60—70 cm-kg, 52—61 in-lb)

8. Add fluid to the MAX mark.
9. Check for correct clutch operation.



## CLUTCH PEDAL

### ADJUSTMENT

#### Clutch Pedal Height Inspection

Measure the distance from the upper surface of the pedal pad to the carpet.

#### Pedal height

**B2600:** 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 Nm (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

**B2600:** 71mm (2.80 in)

**B2200:** 65mm (2.60 in)

(With carpet)

3. Tighten locknut (C).

#### Tightening torque:

**12–17 Nm (1.2–1.7 m·kg, 8.7–12 ft·lb)**

4. After adjustment, inspect the pedal height.

**REMOVAL, INSPECTION, AND INSTALLATION**

Remove in the order shown in the figure.

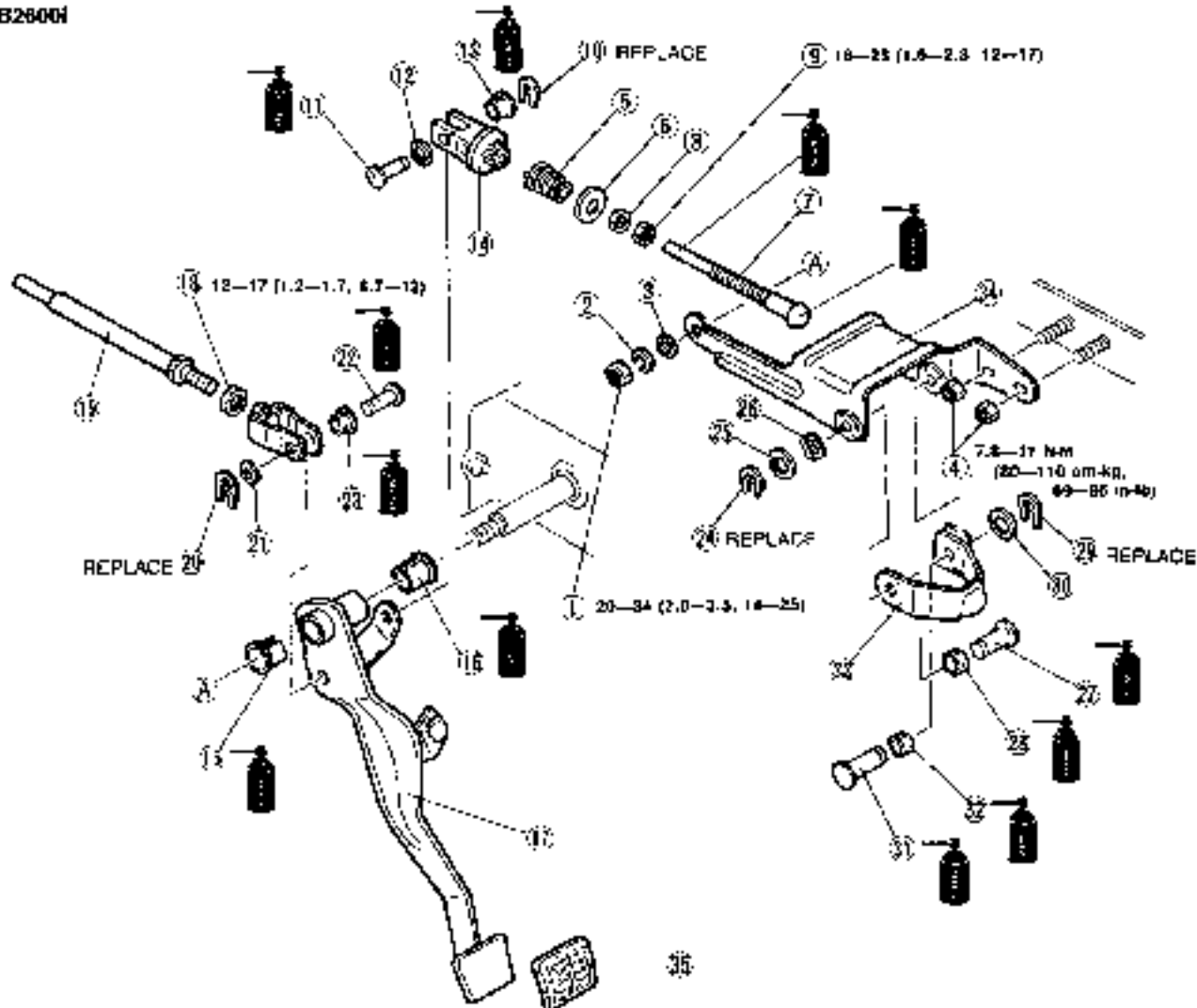
Inspect all parts and repair or replace as necessary.

Install in the reverse order of removal.

**Note**

Apply white grease to the bushings and pins when installing.

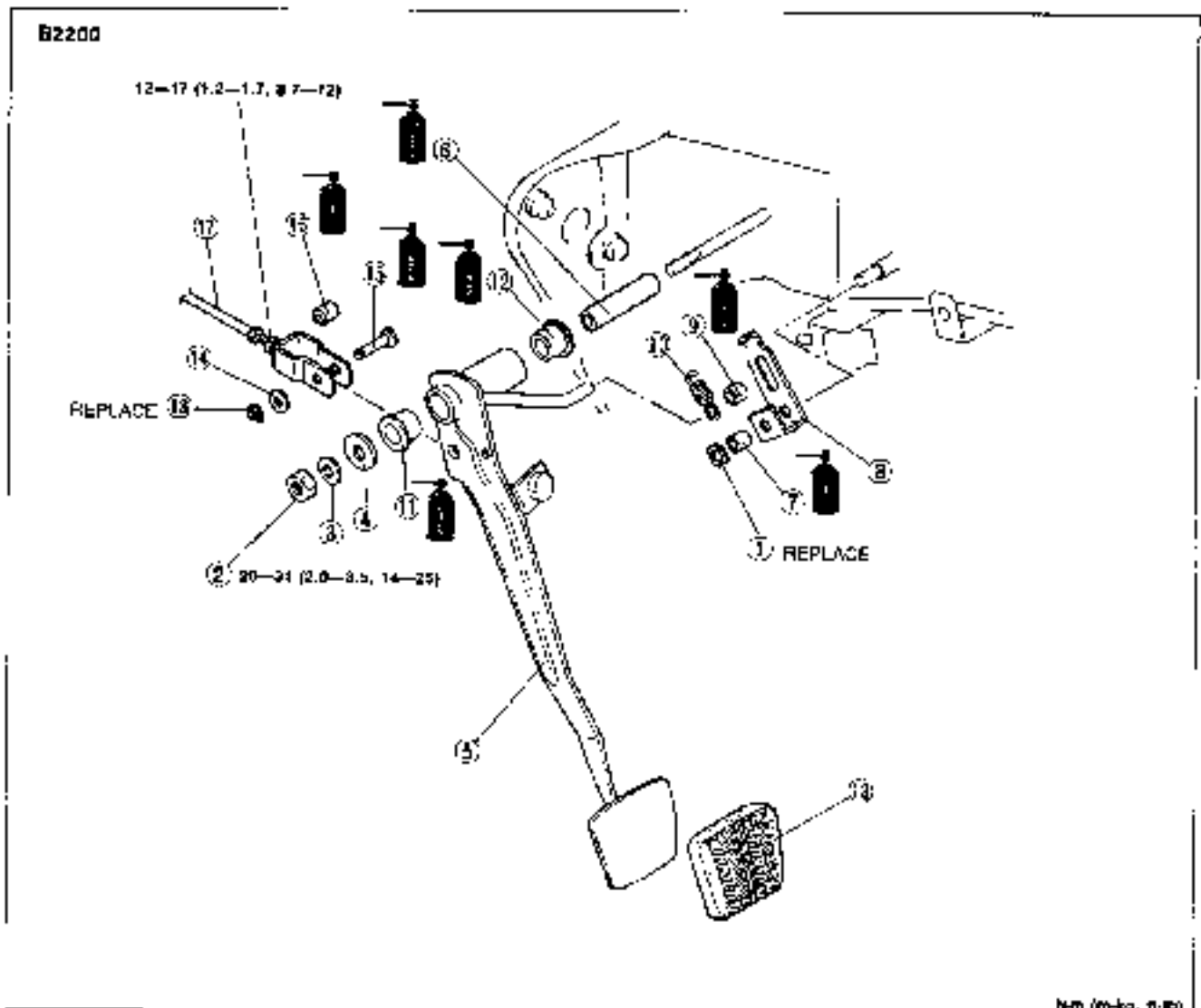
B2600i



Nm (m.kg, ft.lb)

04.12'15.001

- |   |  |  |
|---|--|--|
| 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<br>Adjustment .. page H-5       | 28. Bushing<br>Inspect for wear                |
| 5. Assist spring<br>Adjustment. .... page H-7 | 18. Nut  | 29. Clip                                       |
| 6. Spring seat                                | 19. Push rod<br>Inspect for damage or<br>bending | 30. Spacer                                     |
| 7. Clutch pedal rod                           | 20. Clip   | 31. Pin  |
| 8. Assist spring pin                          | 21. Wave washer                                  | 32. Bushing                                    |
| 9. Locknut                                    | 22. Pin  | 33. Assist lever                               |
| 10. Clip                                      | 23. Bushing                                      | 34. Assist bracket                             |
| 11. Pin                                       | 24. Clip   | 35. Pedal pad<br>Inspect for wear or<br>damage |
| 12. Spacer                                    |  |  |
| 13. Bushing                                   |  |  |



Nm (m-kg, ft-lb)  
GM30-1002

- |                                    |                         |   |
|------------------------------------|-------------------------|---|
| 1. Clip                            | 8. Clutch assist lever  | 16. Spacer                                    |
| 2. Nut                             | 9. Assist lever bushing | 17. Push rod<br>Inspect for damage or bending |
| 3. Washer                          | 10. Spring              | 18. Pedal pad<br>Inspect for wear or damage   |
| 4. Spacer                          | 11. Bushing             |   |
| 5. Clutch pedal<br>Adjustment..... | H-5                     |   |
| 6. Spacer                          | 12. Bushing             |   |
| 7. Bushing                         | 13. Clip                |   |
|                                    | 14. Spacer              |   |
|                                    | 15. Pin                 |   |

### Adjustment (B2600i)

#### Assist spring

1. Turn the assist spring nut until the spring length is correct.

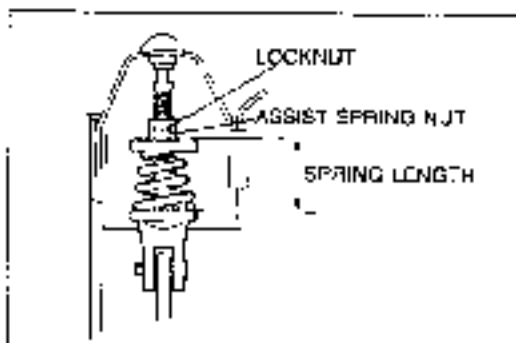
**Standard spring length:**  
36.5—37.5mm (1.44—1.48 in)

2. Tighten the locknut.

**Tightening torque:**  
16—23 Nm (1.6—2.3 m-kg, 12—17 ft-lb)

#### Clutch pedal height and free play

Refer to page H-5.



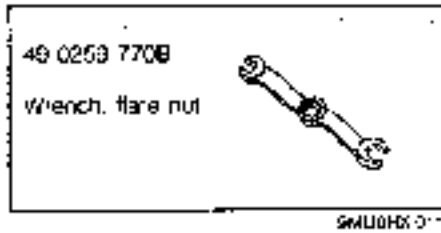
90° GP-3, 610



### CLUTCH MASTER CYLINDER

#### PREPARATION

##### SST

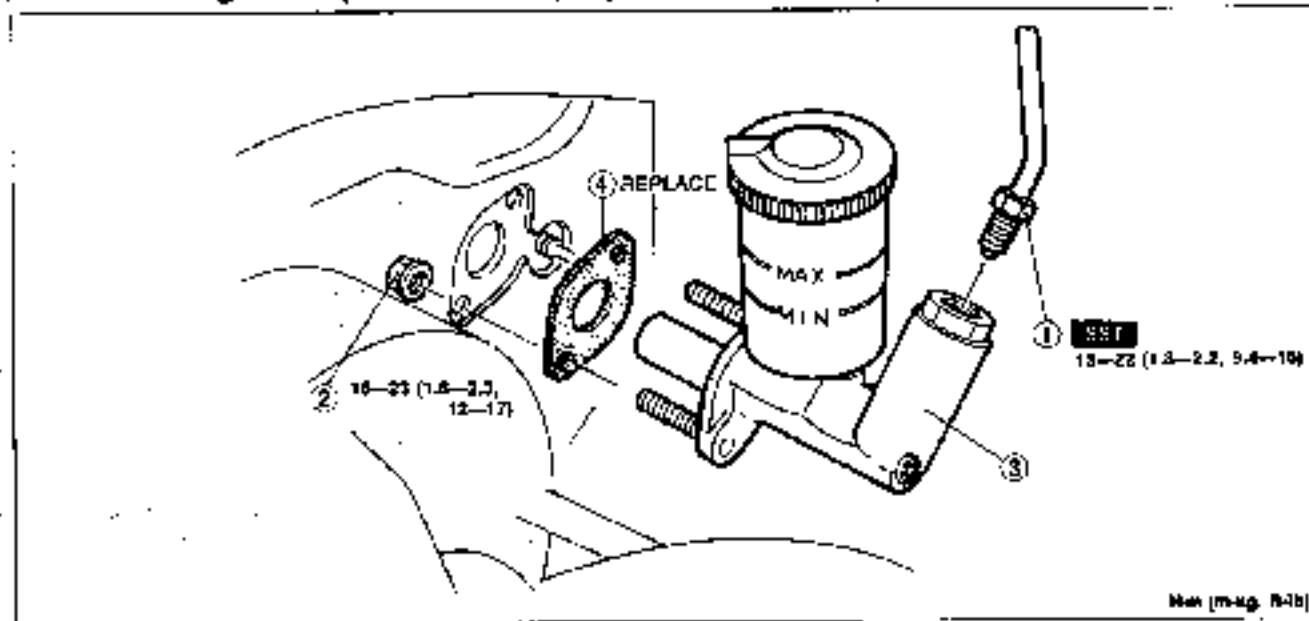


#### REMOVAL AND INSTALLATION

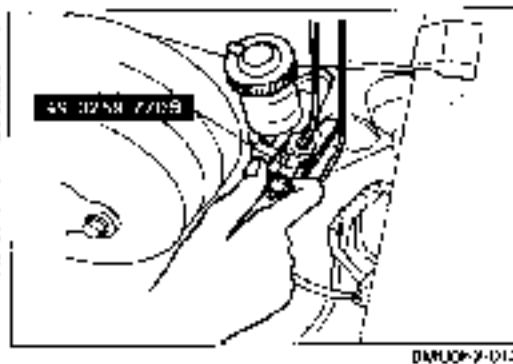
Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

#### 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.



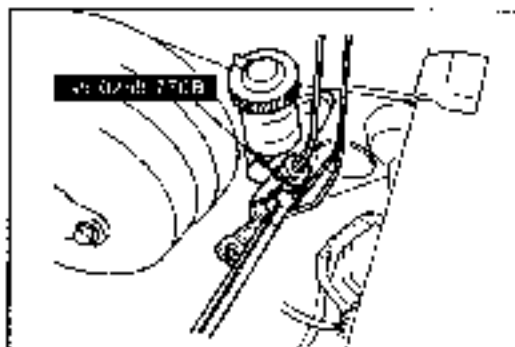
- |   |        |   |           |
|---|--------|---|-----------|
| 1. Clutch pipe<br>Removal ..... page H- 8<br>Installation ..... page H- 9 | 2. Nut | 3. Clutch master cylinder<br>Overhaul ..... page H-10<br>Check for fluid leakage<br>from the cylinder bore.<br><b>AIR BLEEDING</b><br>..... page H- 9 | 4. Gasket |
|---|--------|---|-----------|



#### Removal note

##### Clutch pipe

Disconnected the clutch pipe with the SST.



18L0PK 022

**Installation note****Clutch pipe**

Tighten the clutch pipe with the **SST**.

**Tightening torque:**

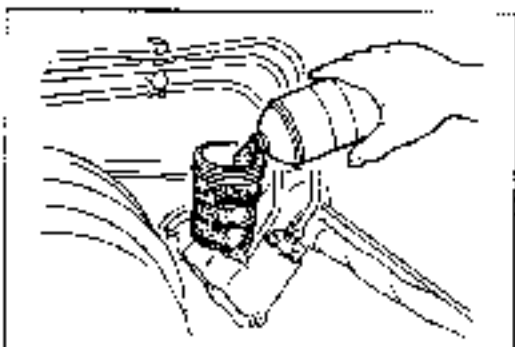
**13—22 Nm (1.3—2.2 m·kg, 9.4—16 ft·lb)**

**Air Bleeding**

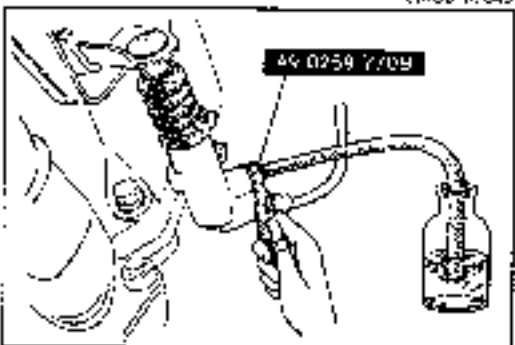
After installation, bleed the clutch system.  
(Refer to below.)

**Inspection and Adjustment****Clutch pedal height and free play**

Refer to page H-5



8M034K 049



9200HX 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 Nm (60—70 cm·kg, 52—61 in·lb)**

7. Check for correct clutch operation.
8. Verify that there is no fluid leakage.

### OVERHAUL

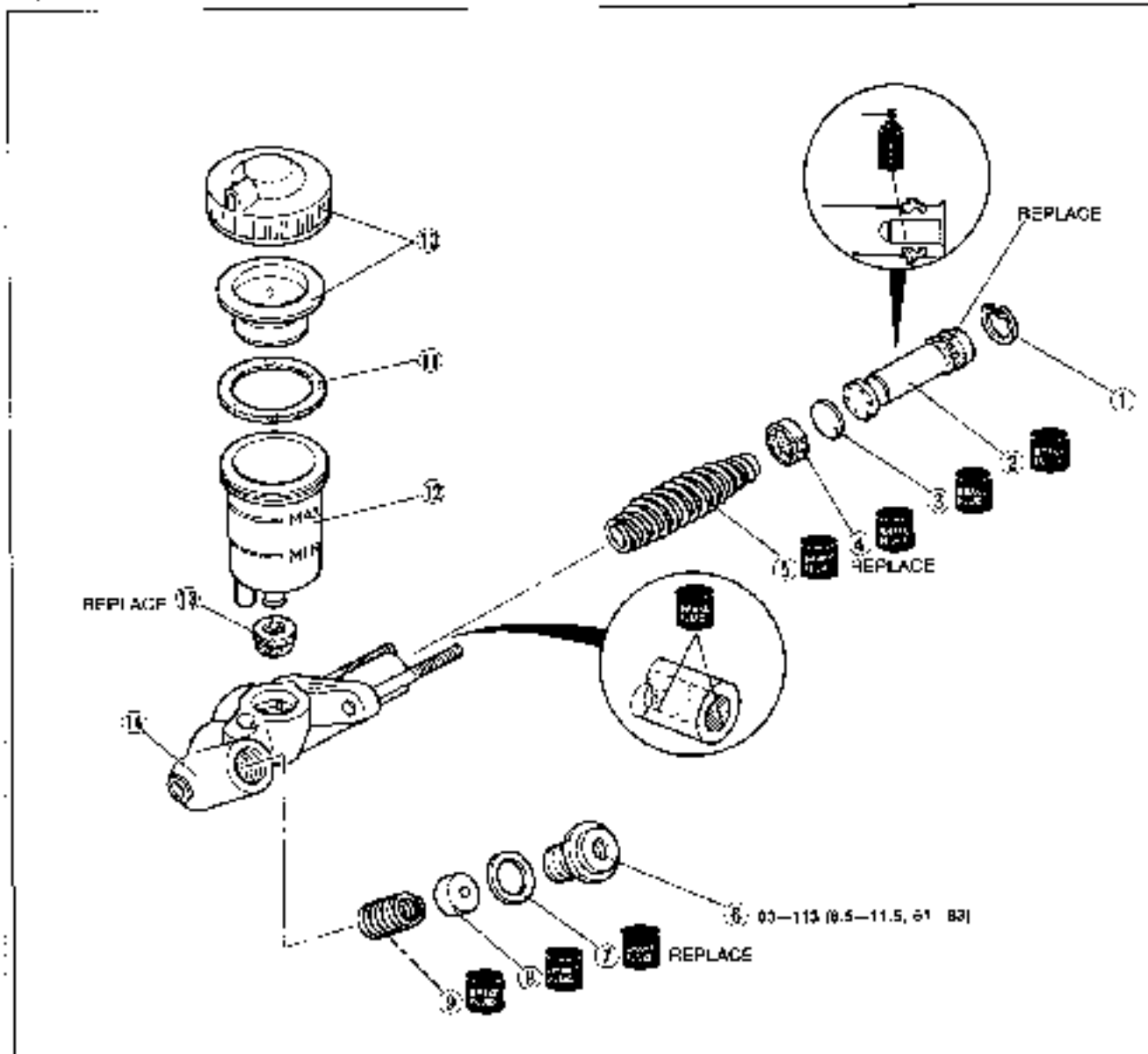
Disassemble in the order shown in the figure, referring to **Disassembly note**

Inspect all parts and repair or replace as necessary.

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

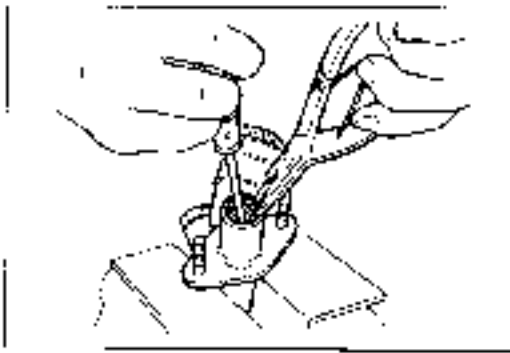
### Caution

**Clean the disassembled parts in solvent and blow through all ports and passages with compressed air.**



Nm (m-kg, ft-lb)  
1/2 IN. HZ-001

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



9AUB-04-018

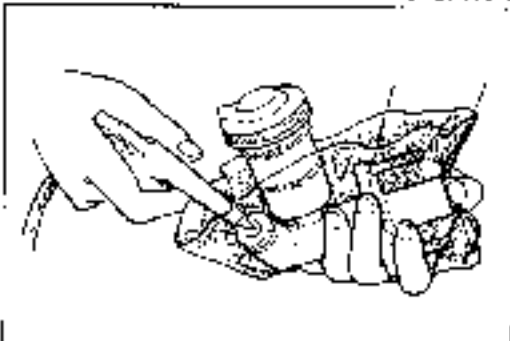
#### Disassembly note

##### 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.



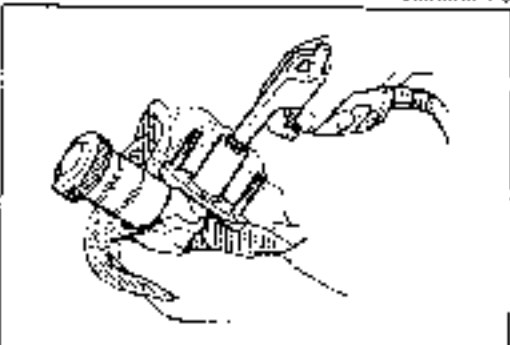
9AUB-04-019

#### 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.



9AUB-04-020

#### One-way valve piston and return spring

#### Caution

Hold a rag over the master cylinder to prevent the piston and spring from jumping out.

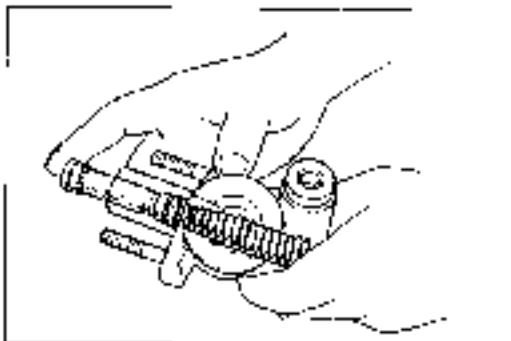
Remove the piston by applying compressed air through the cylinder bore.

#### 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.

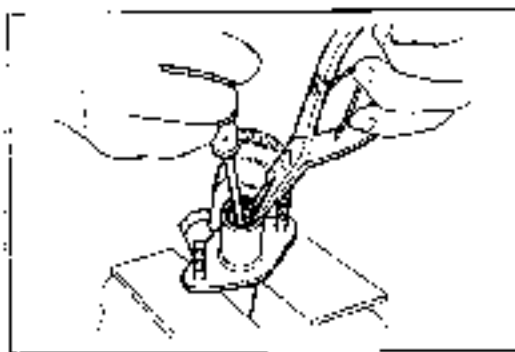
9AUB-04-021



9B-ANIX-014

#### 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.)



9M-J02-X-C03

### 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, fare num.



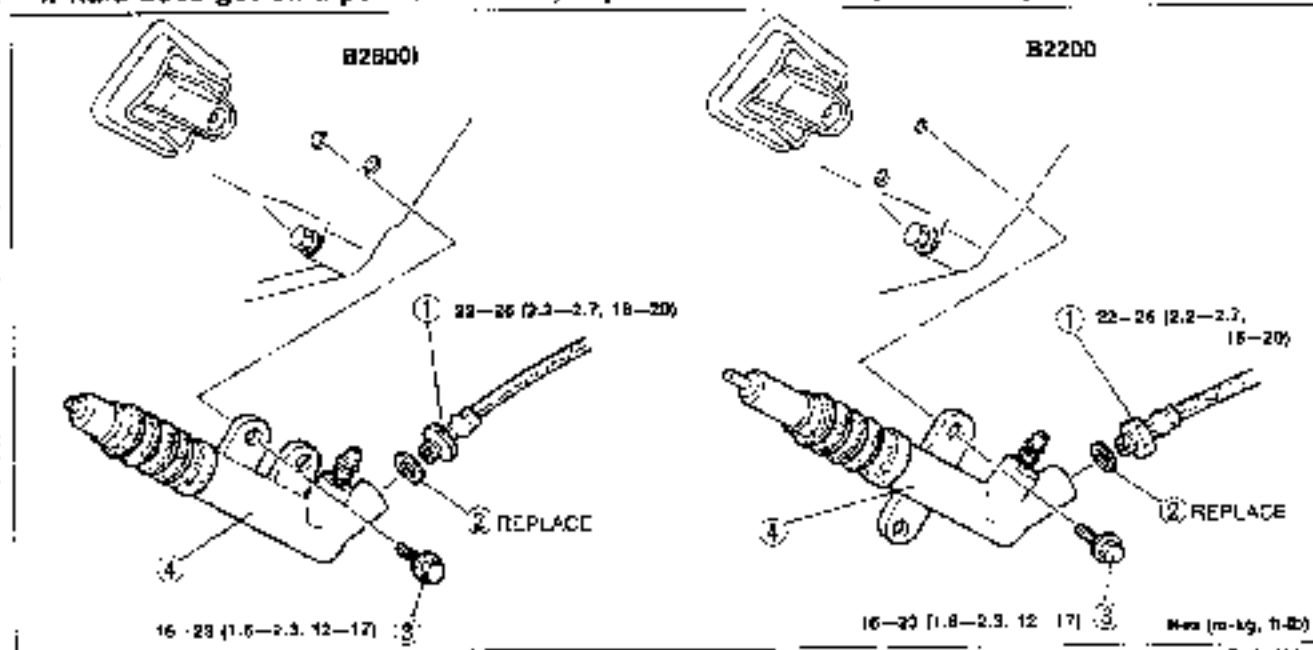
9M-U1-D-024

### 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**.

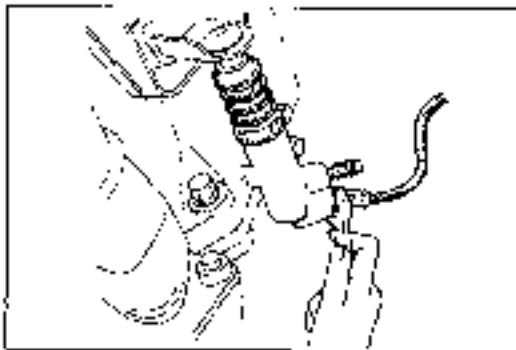
#### Caution

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  |



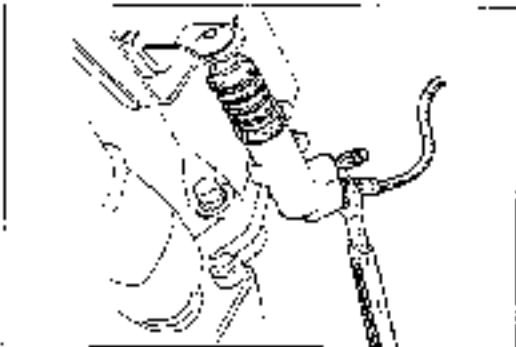
PH.C. X-016

**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



PH.C. X-017

**Installation note**  
Flexible hose

Tighten the flexible hose.

**Tightening torque:**

22—26 Nm (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.

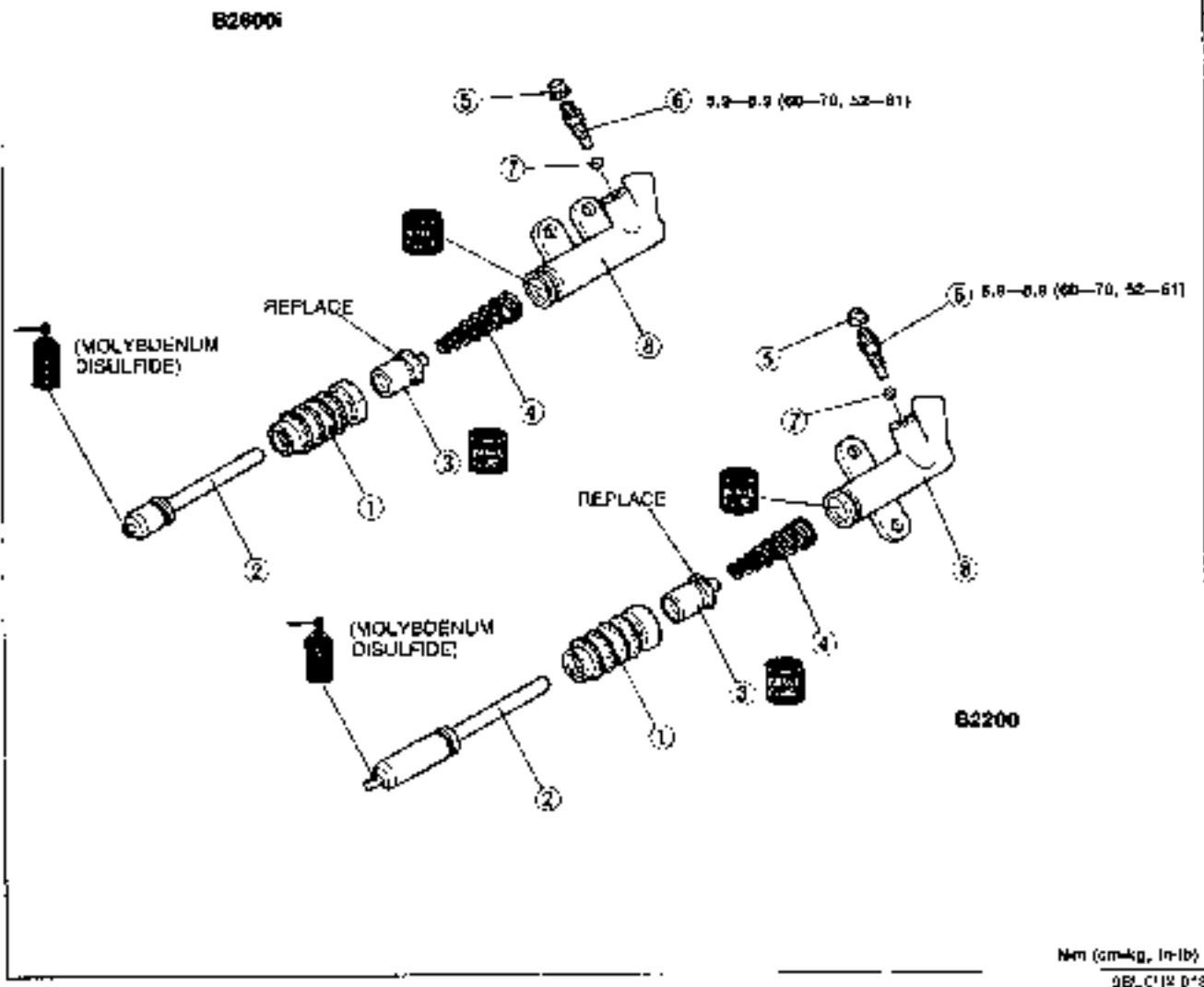
Assemble in the reverse order of disassembly.

**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.

PH.C. X-005

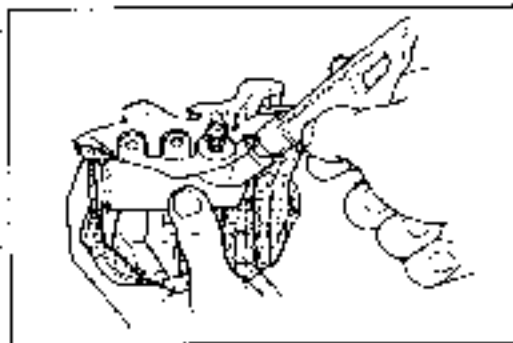
## CLUTCH RELEASE CYLINDER



- 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



98L C10-918


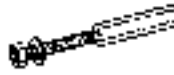



### Disassembly note Piston and cup assembly

**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 EC11 1A0 Brake cal. big gear</p> 	<p>49 ED11 103 Shaft (Part of 49 EC11 1A0)</p> 	<p>49 ED11 104 Collar (Part of 49 ED11 1A0)</p> 
<p>49 ED11 105 Stopper (Part of 49 ED11 1A0)</p> 	<p>49 SF01 310A Center bolt clutch disc</p> 	<p>2910HX-004</p>

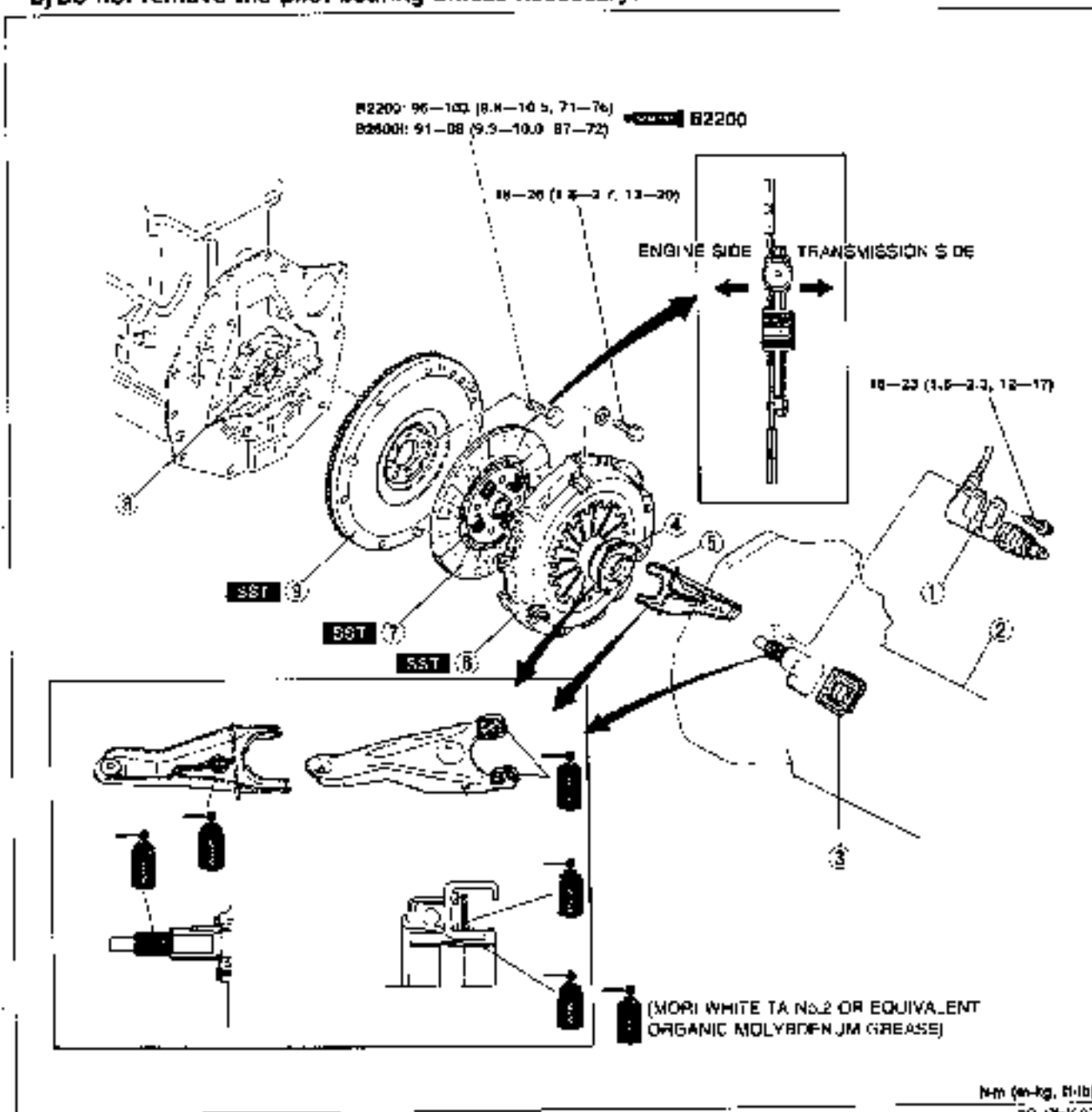


## REMOVAL AND INSTALLATION

Remove in the order shown in the figure, referring to **Removal note**.  
Install in the reverse order of removal, referring to **Installation note**.

## Note

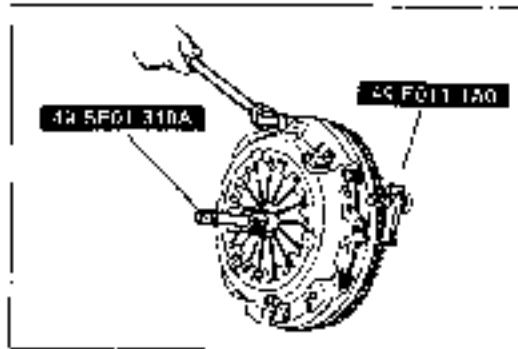
- a) Remove the clutch release cylinder with the flexible hose connected.  
b) Do not remove the pilot bearing unless necessary.



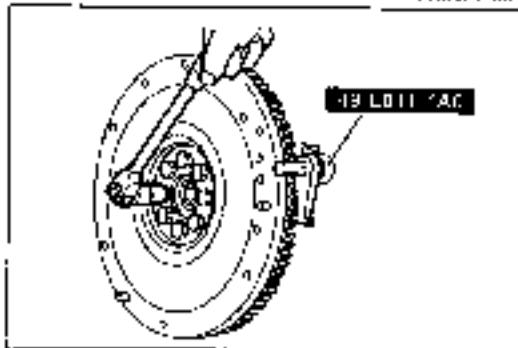
1. Clutch release cylinder
2. Transmission  
Service..... Section J1 or J2
3. Boot
4. Release bearing  
Inspection ..... page H-18
5. Release fork

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

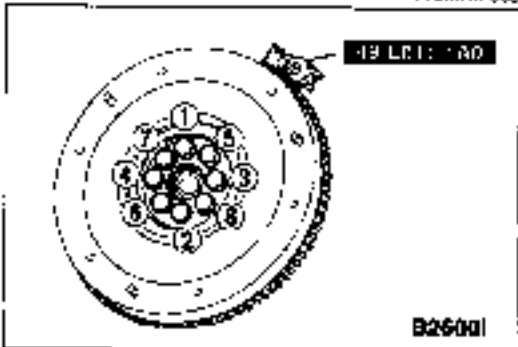
8. Pilot bearing  
B2200..... Section B1  
B2600..... Section B2
9. Flywheel  
Removal..... page H-17  
Inspection..... page H-19  
Installation..... page H-17



2FA-063-0017

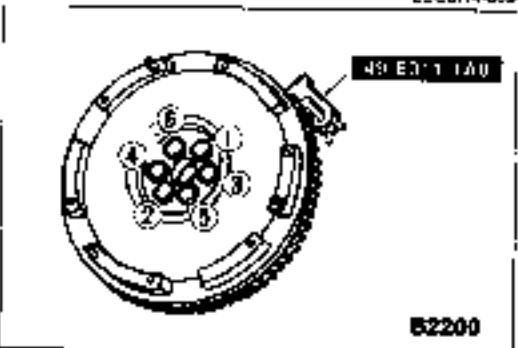


2FA-063-0017



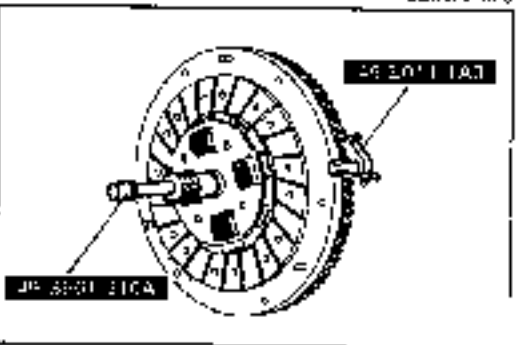
B2600

2FL0HX-006



B2200

2FL0HX-006



2FL0HX-006

**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**

B2600: 91—98 N·m (9.3—10.0 m·kg, 67—72 ft·lb)

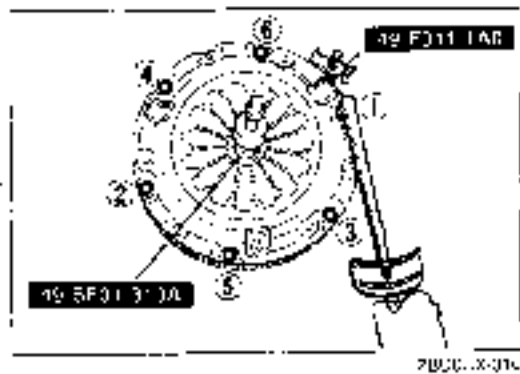
**Tightening torque**

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 Moly 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

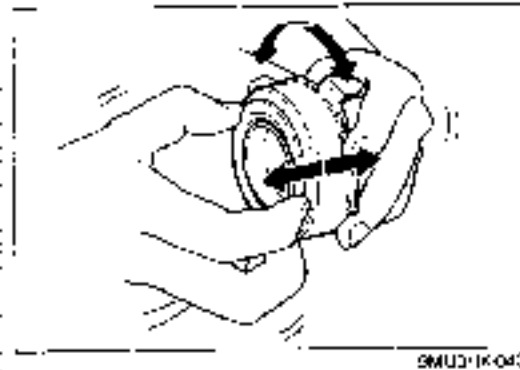


## Clutch cover

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 Nm (1.8—2.7 m-kg, 13—20 ft-lb)**



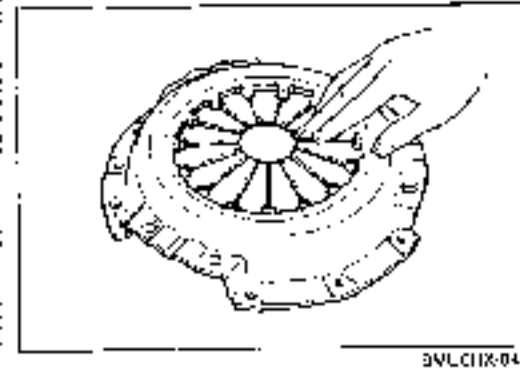
## RELEASE BEARING

### 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

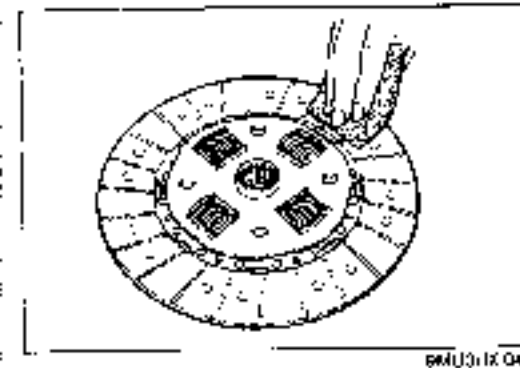
### INSPECTION

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

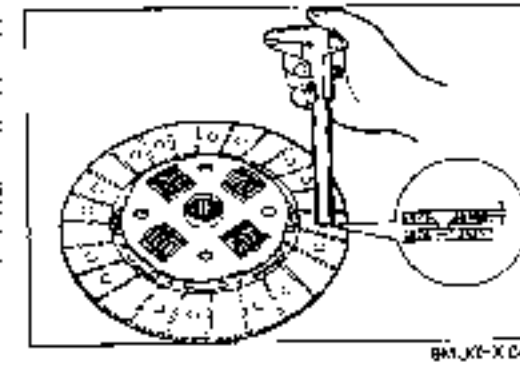
### INSPECTION

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)**



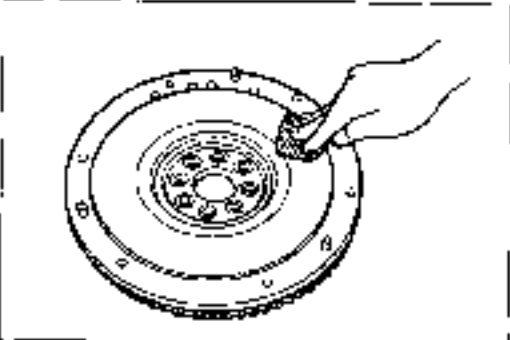
9FLCHX-026

4. Measure the clutch disc runout with a dial indicator. Replace the clutch disc if runout is excessive.

**Maximum runout**

**B2600: 1.0mm (0.039 in)**

**B2200 : 0.7mm (0.028 in)**



9MJCX-0648

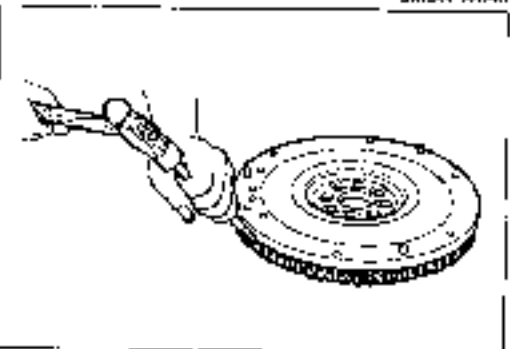
## FLYWHEEL

### 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.**



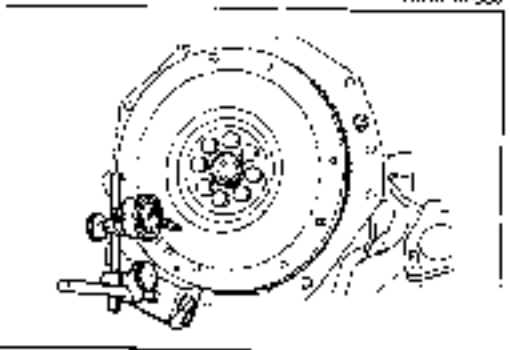
13104X-009

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.**



9MJCX-061

3. Measure the flywheel runout with a dial indicator. Replace the flywheel if runout is excessive.

**Maximum runout: 0.2 mm (0.008 in)**

# MANUAL TRANSMISSION (B2200)

<b>INDEX</b> .....	J1- 2
<b>OUTLINE</b> .....	J1- 3
SPECIFICATIONS.....	J1- 3
STRUCTURAL VIEW.....	J1- 4
POWER FLOW.....	J1- 5
<b>TROUBLESHOOTING GUIDE</b> .....	J1- 6
<b>TRANSMISSION OIL</b> .....	J1- 7
INSPECTION.....	J1- 7
REPLACEMENT.....	J1- 7
<b>TRANSMISSION</b> .....	J1- 8
PREPARATION.....	J1- 8
REMOVAL AND INSTALLATION.....	J1- 9
DISASSEMBLY.....	J1-10
INSPECTION.....	J1-17
ASSEMBLY.....	J1-19

28U001 001

J1

## INDEX

### OIL SPECIFICATION

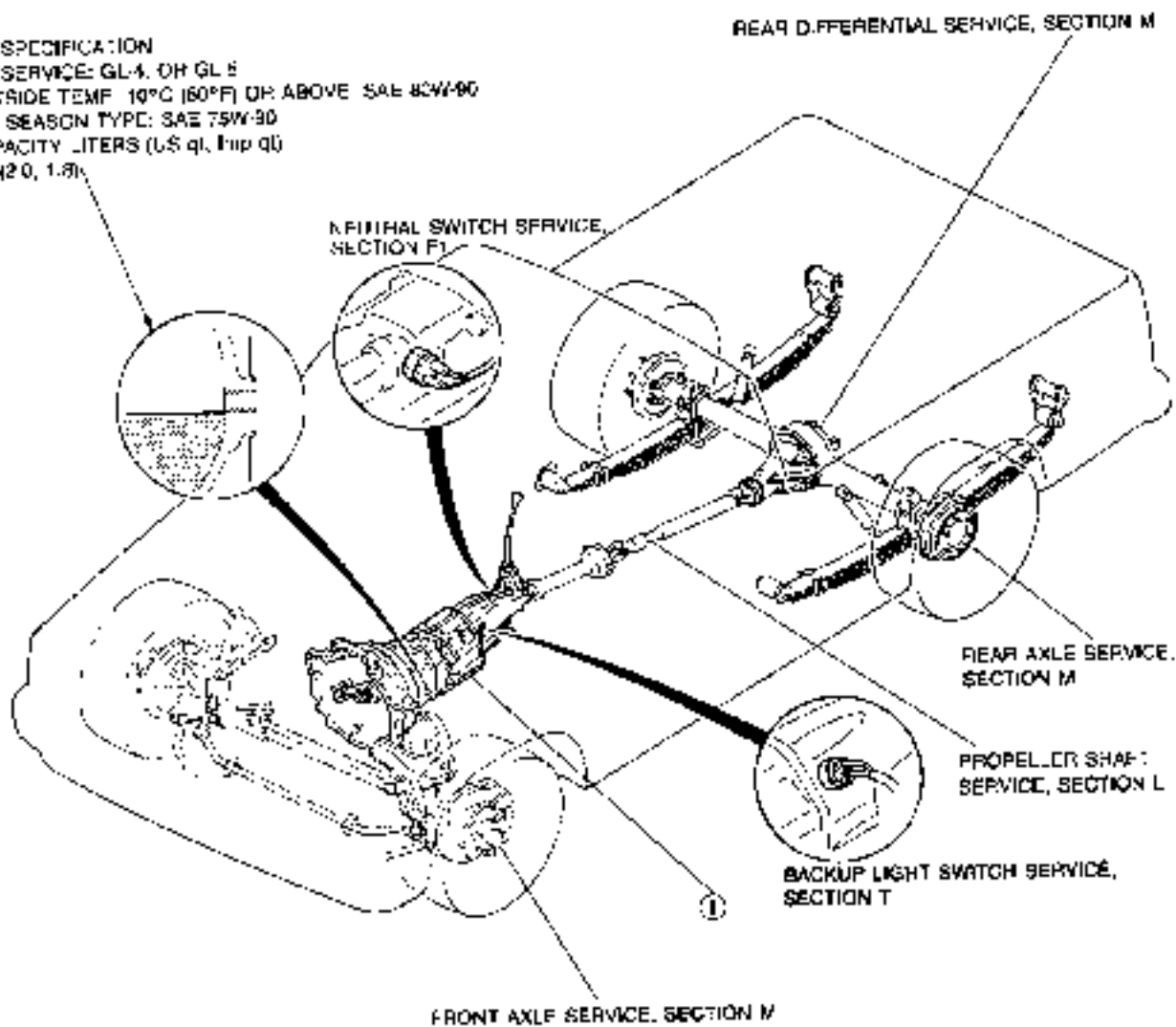
API SERVICE: GL-4, OR GL-5

OUTSIDE TEMP: 10°C (60°F) OR ABOVE SAE 80W-90

ALL SEASON TYPE: SAE 75W-90

CAPACITY: LITERS (U.S. qt, Imp qt)

2.0 (2.0, 1.8)



291001-000


### 1. Transmission

Removal ..... page J1- 9  
 Disassembly .. ..... page J1-10

Inspection ..... page J1-17  
 Assembly ..... page J1-19  
 Installation ... ..... page J1- 9

OUTLINE

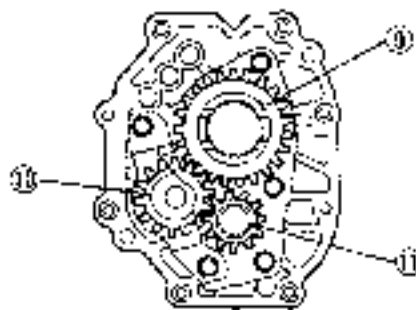
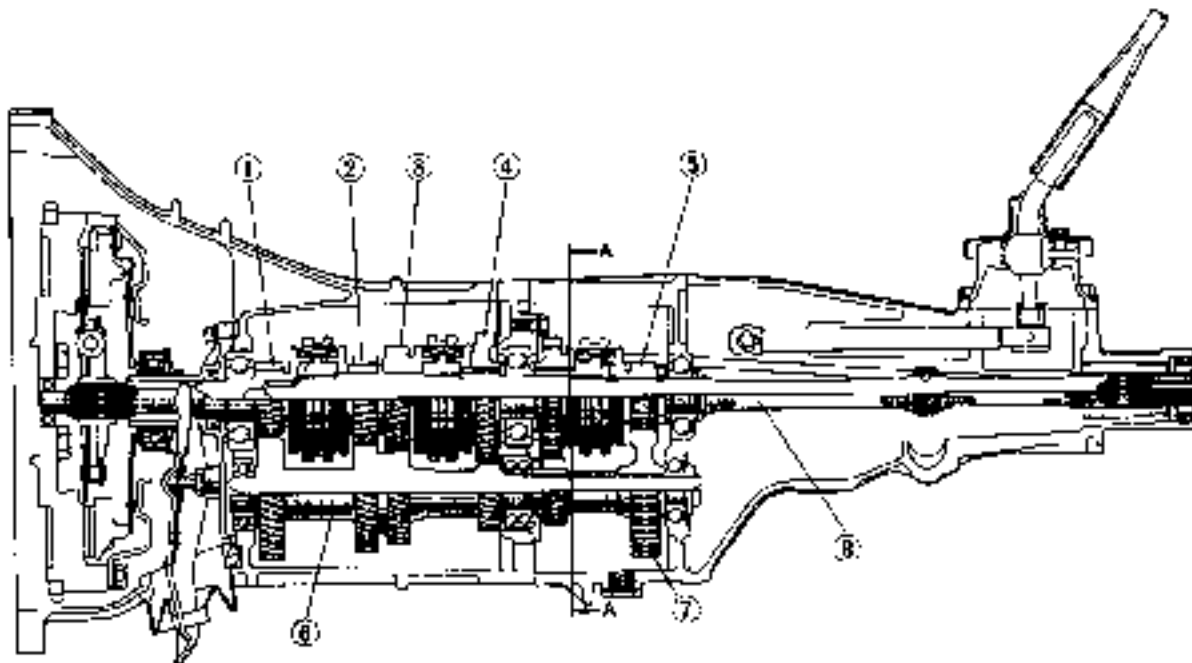
SPECIFICATIONS

		Model/Transmission		B2200	
Item				M5M-D	
Synchronization mechanism				Forward: Synchronizer Reverse: Constantmesh	
Shift type				5-speed, floor shift	
Shift pattern					
Gear ratio	1st			3.677	
	2nd			2.156	
	3rd			1.410	
	4th			1.000	
	5th			0.838	
	Reverse			3.493	
Oil	Grade			API service GL-4 or GL-5	
	viscosity	All-season			SAE 75W-90
		Above 10°C (50°F)			SAE 80W-90
Capacity	liters (US qt, Imp qt)		2.0 (2.1, 1.6)		

J1

23-6J1-002

STRUCTURAL VIEW



VIEW A-A

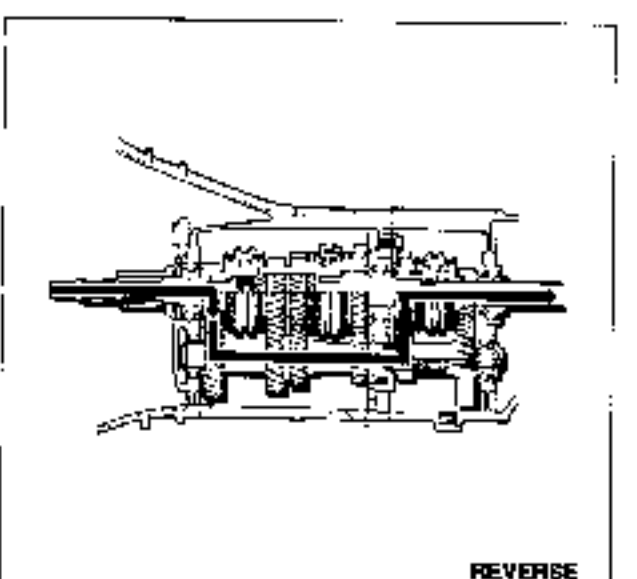
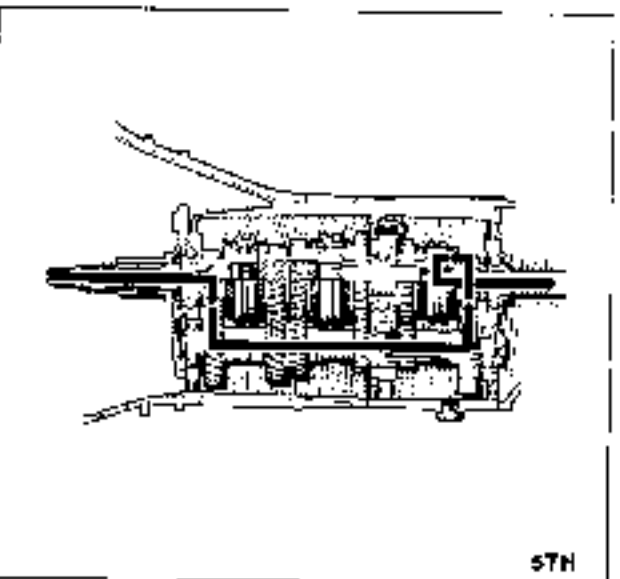
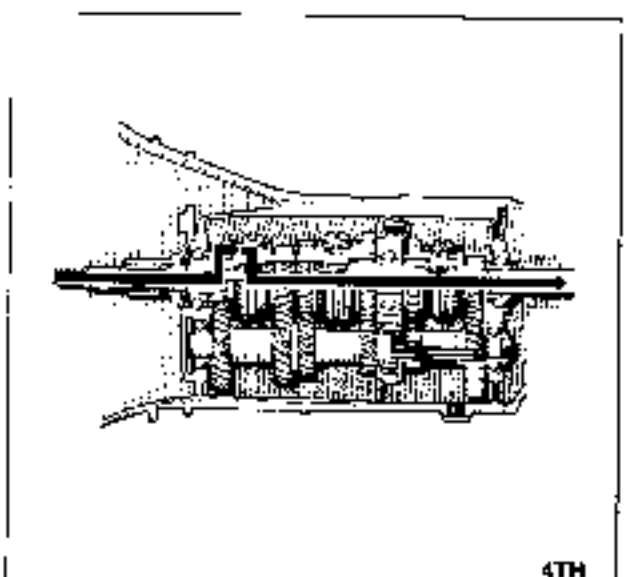
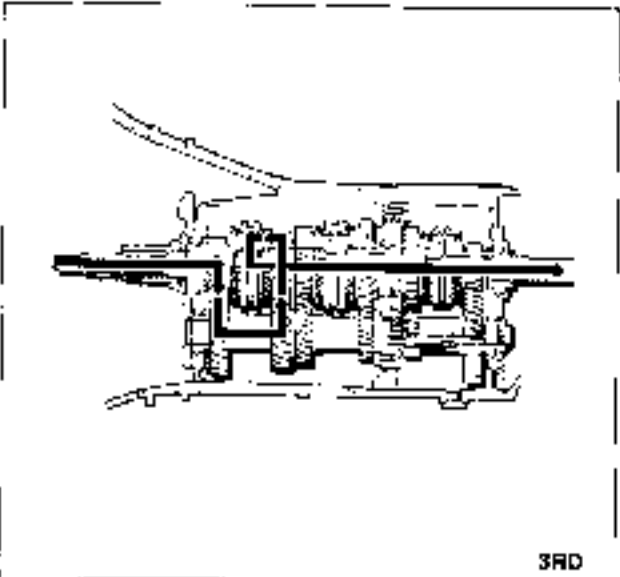
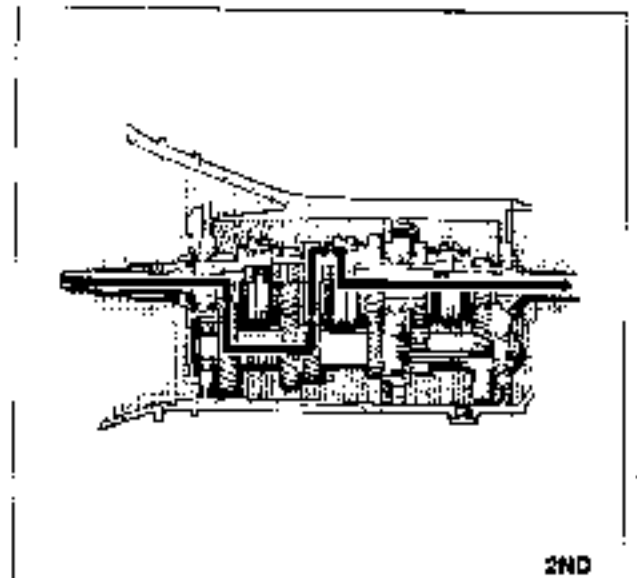
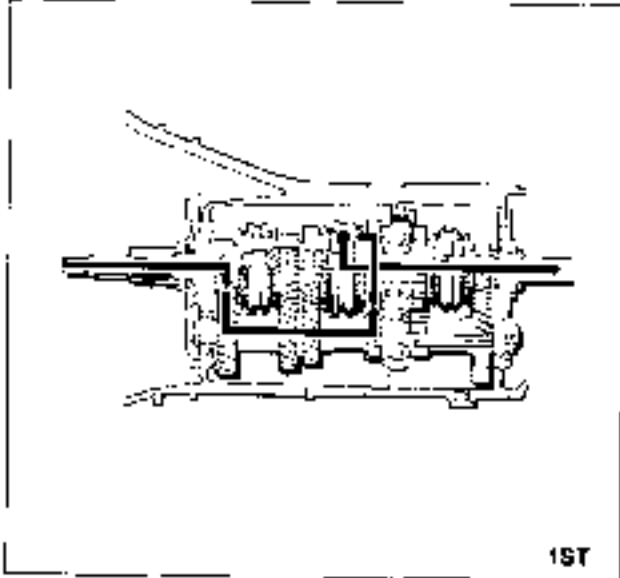
GMJ1X 024

- 1 Main drive gear (4th gear)
- 2 3rd gear
- 3 2nd gear
- 4 1st gear
- 5 5th gear
- 6 Countershaft

- 7 Counter 5th gear
- 8 Mainshaft
- 9 Reverse gear
- 10 Reverse idler gear
- 11 Counter reverse gear



POWER FLOW



J1

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Abnormal noise	Insufficient oil	Add oil	J1-7
	Deterioration of oil quality	Replace with specified oil	J1-7
	Worn bearing	Replace	J1-13
	Worn contact surface of countershaft gear	Replace	J1-17
	Worn contact surface of gears	Replace	J1-17
	Excessive gear backlash	Adjust	-
Difficult to shift	Damaged gear teeth	Replace	J1-17
	Insufficient oil	Add oil	J1-7
	Deterioration of oil quality	Replace with oil of specified quality	J1-7
	Worn synchronizer ring	Replace	J1-15
	Worn synchronizer cone of gear	Replace	J1-15
	Poor contact of synchronizer ring and gear cone	Replace	J1-15
Jumps out of gear	Excessive longitudinal play of gears	Replace	J1-17
	Worn bearing	Replace	J1-15
	Improper disengagement of clutch	Refer to Section H	-
	Weak or bent ball spring	Replace	J1-11
	Weak or shift fork end spring	Replace	J1-11
	Worn shift fork	Replace	J1-11
Jumps out of gear	Worn clutch hub	Replace	J1-17
	Worn clutch hub sleeve	Replace	J1-18
	Worn gears	Replace	J1-17
	Excessive gear backlash	Replace	J1-17
	Worn bearing	Replace	J1-15
	Incorrect installation or loose engine mounts or transmission mounts	Tighten	J1-9

280001-004



9B-U31-026

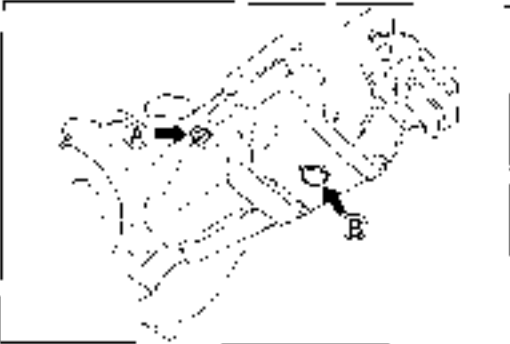
## TRANSMISSION OIL

## INSPECTION

1. Remove check plug (A).
2. Verify that the oil is at the bottom of the check plug hole. If it is low, add the specified oil from check plug (A).
3. Apply sealant to the plug threads before installing.

## Tightening torque

(A): 25–39 Nm (2.5–4.0 m·kg, 18–29 ft·lb)



9E-U01-006

## REPLACEMENT

## Note

Replace drain plug (B) washer with a new one whenever removed.

1. Remove the plugs (A) and (B) with washer.
2. Drain the oil into a suitable container.
3. Wipe all plugs clean.
4. Apply sealant to plug thread (A).
5. Install the drain plug ((B) w/in new washer).

## Tightening torque

(B): 39–59 Nm (4.0–6.0 m·kg, 29–43 ft·lb)

6. Add the specified oil from check plug (A) port until the level reaches the bottom of check plug hole.

**Capacity: 2.0 liters (2.1 US qt, 1.8 Imp qt)**

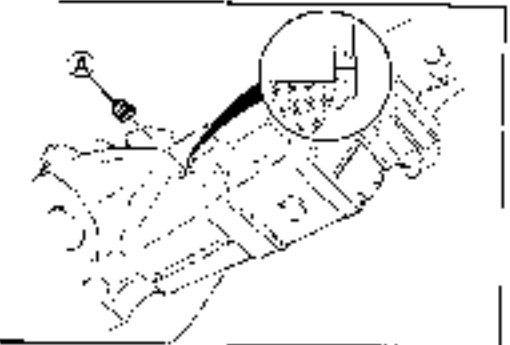


FB-U01-006

7. Install plug (A).

## Tightening torque

(A): 25–39 Nm (2.5–4.0 m·kg, 18–29 ft·lb)


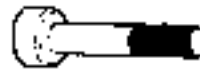


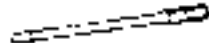
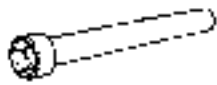


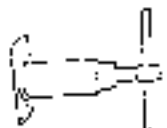

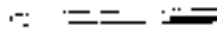


9U-U31-026

### TRANSMISSION

#### PREPARATION

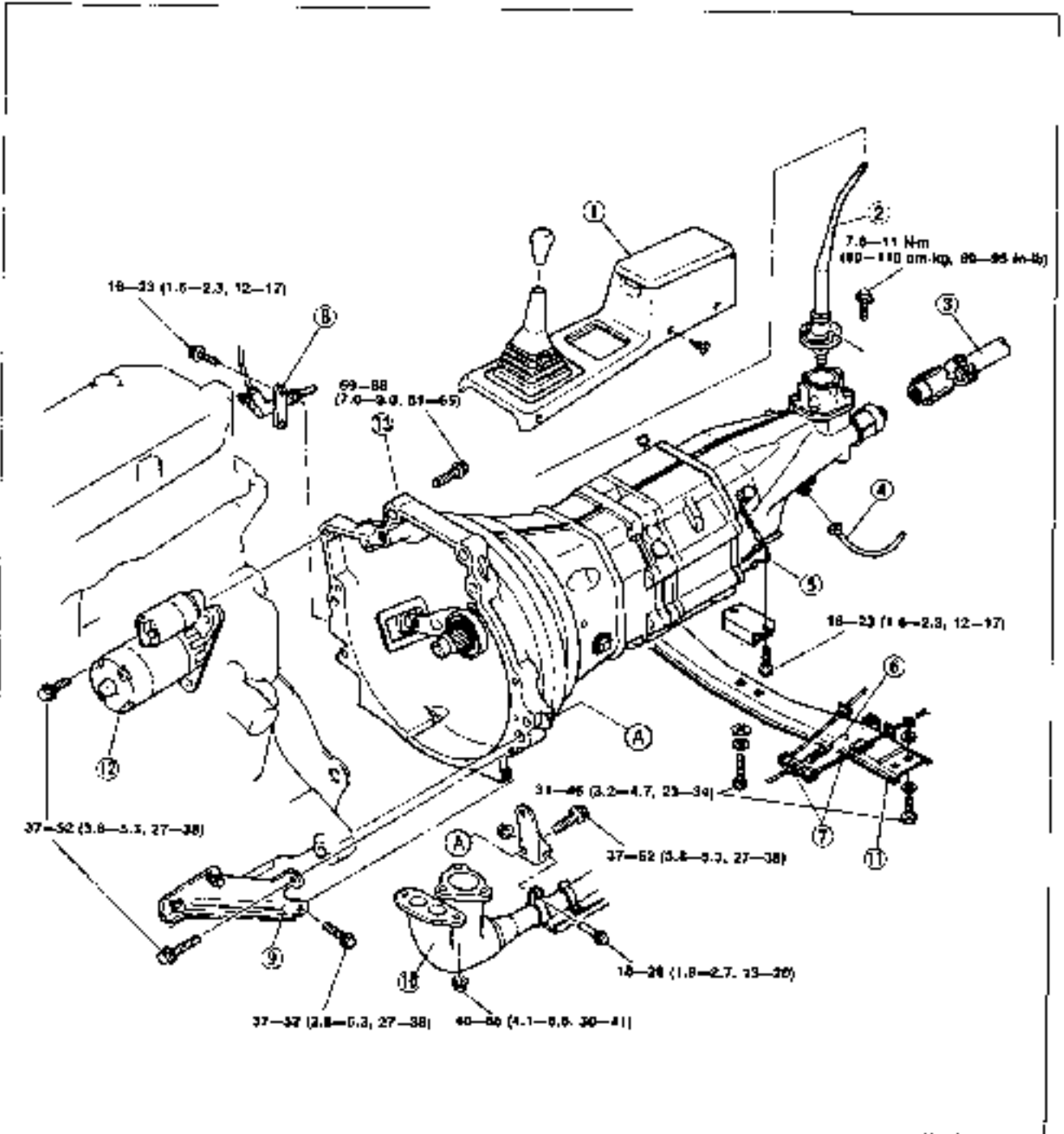
#### SST

<p>49 0838 425C</p> <p>Puller, spl. bearing</p> 	<p>49 0520 330</p> <p>Instalr., transmission bearing</p> 	<p>49 0526 145</p> <p>Pulley, 1st pulley boss</p> 
<p>49 0259 440</p> <p>Holder, main shaft</p> 	<p>49 0852 350</p> <p>Guide, shift fork</p> 	<p>4B 1213 465A</p> <p>Wrench, main shaft locknut</p> 
<p>49 H07 101</p> <p>Hook</p> 	<p>4B 077C 570</p> <p>Puller, bearing</p> 	<p>4B 0505 430</p> <p>Main drive shaft pusher</p> 
<p>4G 0180 321A</p> <p>Instaler, bearing</p> 		<p>49 0187 451A</p> <p>Guide, interlock pin assembly</p> 

2FUC4-306

**REMOVAL AND INSTALLATION**

- 1 Disconnect the negative battery cable.
- 2 Raise the vehicle and support it with safety stands
- 3 Drain the transmission oil into a suitable container
- 4 Remove in the order shown in the figure.
- 5 Install in the reverse order of removal.



J1

- |                         |                            |                              |
|-------------------------|----------------------------|------------------------------|
| 1. Console              | 5. Wiring harness          | 11. Transmission crossmember |
| 2. Gearshift lever      | 6. Return spring           | 12. Starter                  |
| 3. Propeller shaft      | 7. Parking brake cables    | 13. Transmission             |
| Service ..... Section L | 8. Clutch release cylinder | Disassembly ... page J1-10   |
| 4. Speedometer cable    | 9. Gusset plate            | Inspection ..... page J1-17  |
| Service ..... Section T | 10. Exhaust pipe           | Assembly ..... page J1-19    |

Nm (m.kg, ft.lb)  
EBLE7-307

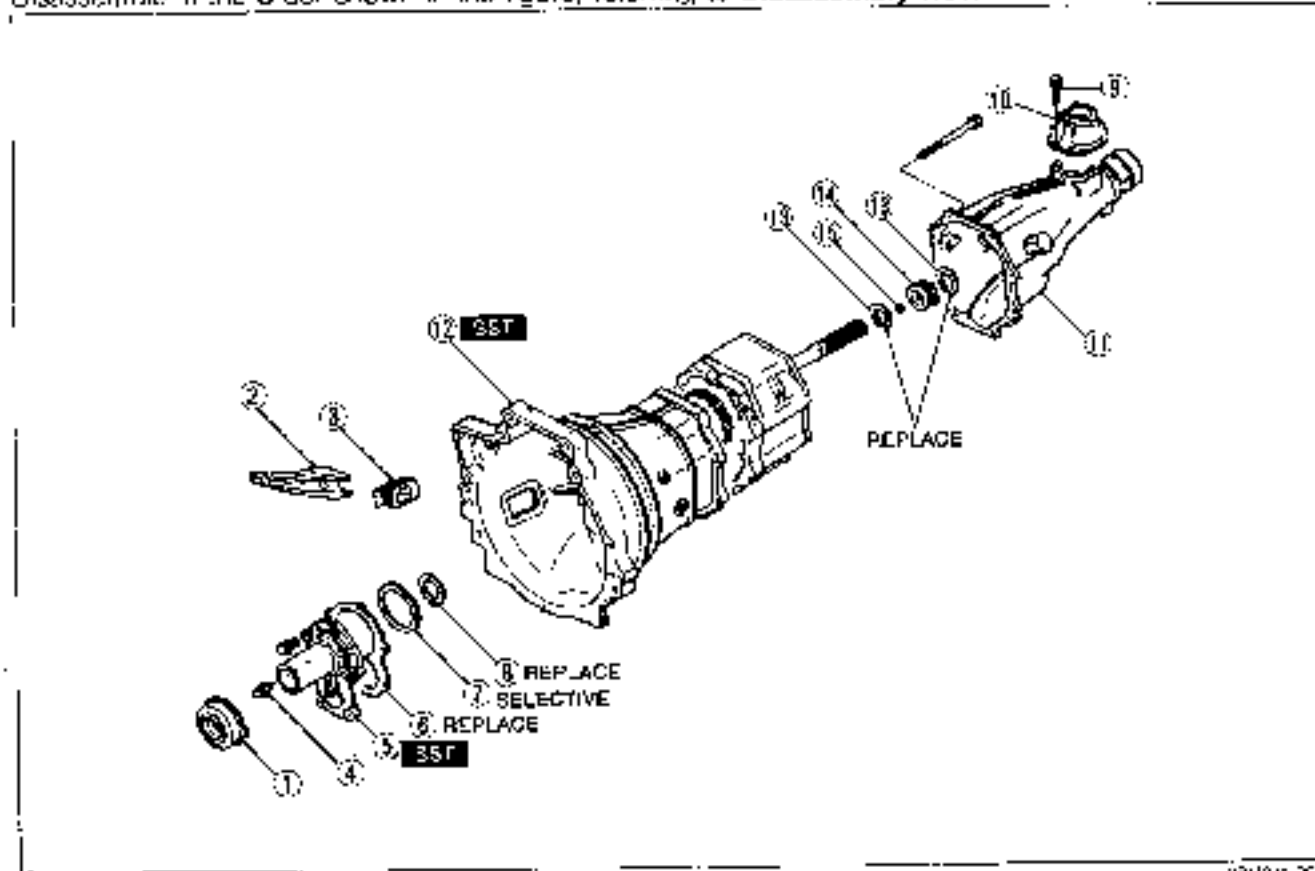
### DISASSEMBLY

#### Precaution

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 a compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

#### Housing Components

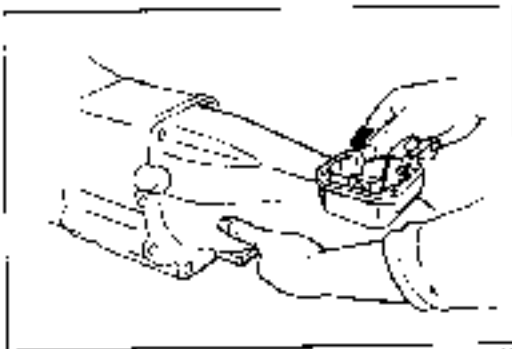
Disassemble in the order shown in the figure, referring to **Disassembly Note**



PA1101-008

1. Release bearing
2. Clutch release fork
3. Boot
4. Bolt
5. Front cover
6. Gasket
7. Adjustment shim(s)
8. Snap ring
9. Bolt

10. Control case
11. Extension housing  
Removal ..... page J1-10
12. Transmission case  
Removal ..... page J1-11
13. Snap rings
14. Speedometer drive gear
15. Ball



200071-012

#### Disassembly note Extension housing

1. Move the control rod end to the neutral position
2. Turn it and remove the exterior housing

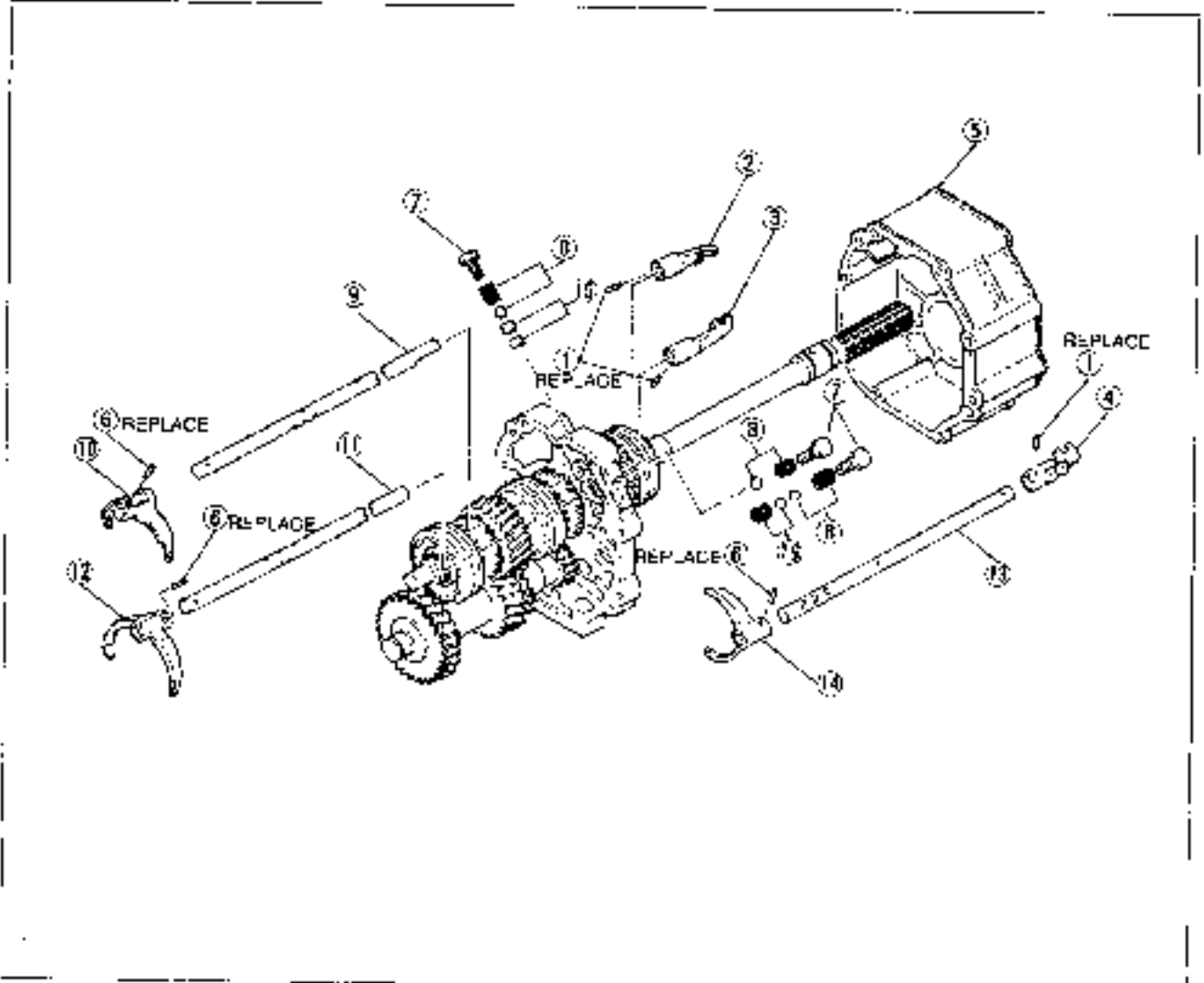


**Transmission case**

Remove the transmission case from the intermediate housing and gear assembly with the SST

**Shift Fork and Shift Rod Parts**

Disassemble in the order shown in the figure.

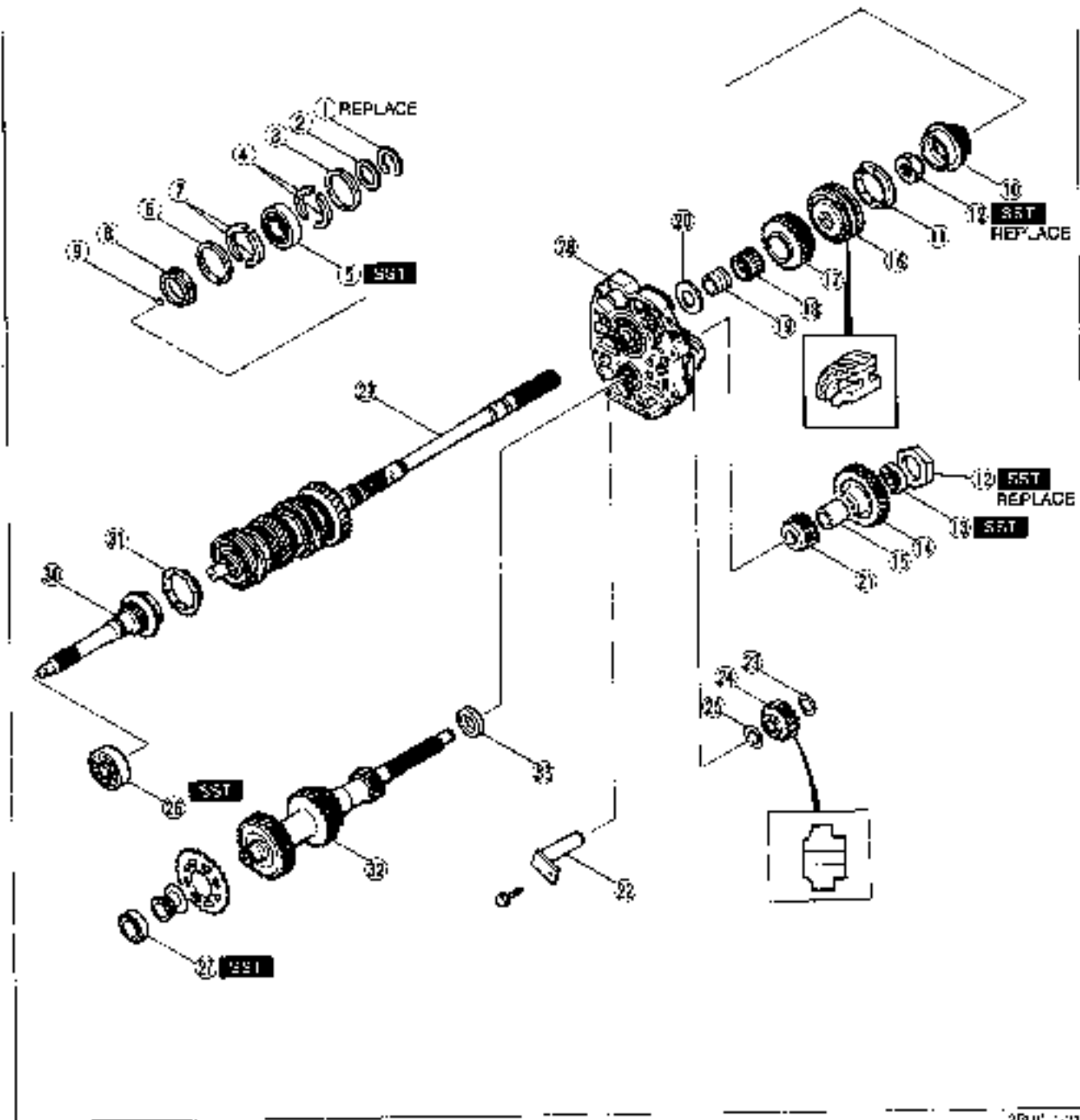


- |                                |                              |
|--------------------------------|------------------------------|
| 1. Roll pins                   | 9. Shift rod (1st/2nd)       |
| 2. Shift rod end (1st/2nd)     | 10. Shift fork (1st/2nd)     |
| 3. Shift rod end (3rd/4th)     | 11. Shift rod (3rd/4th)      |
| 4. Shift rod end (5th/reverse) | 12. Shift fork (3rd/4th)     |
| 5. Intermediate housing        | 13. Shift rod (5th/reverse)  |
| 6. Roll pins                   | 14. Shift lock (5th/reverse) |
| 7. Cap pins                    | 15. Interlock pins           |
| 8. Springs and balls           |                              |

79032-004

### Main and Countershaft parts

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



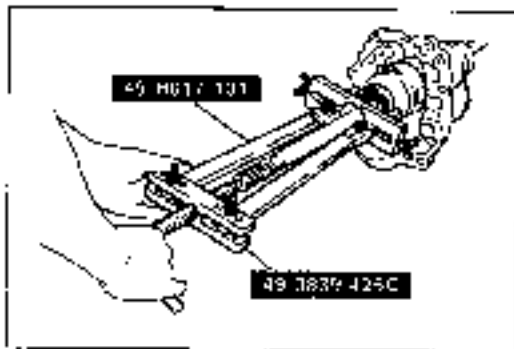
- 1. Snap ring
- 2. Washer
- 3. Retaining ring
- 4. C washers
- 5. Ball bearing  
Removal ..... page J1-13
- 6. Retaining ring
- 7. C washers
- 8. Thrust lock washer
- 9. Ball

- 10. 5th gear
- 11. Synchronizer ring
- 12. Locknut  
Removal ..... page J1-14
- 13. Ball bearing  
Removal ..... page J1-13
- 14. Counter gear
- 15. Spacer
- 16. Clutch h.b. assembly (5th reverse)

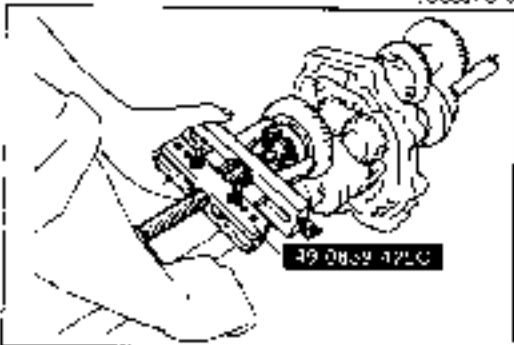


- 17. Reverse gear
- 18. Needle bearing
- 19. Inner race
- 20. Washer
- 21. Counter reverse gear
- 22. Reverse idle gear shaft
- 23. Washer
- 24. Reverse idle gear
- 25. Washer
- 26. Ball bearing  
Removal..... page J1-13

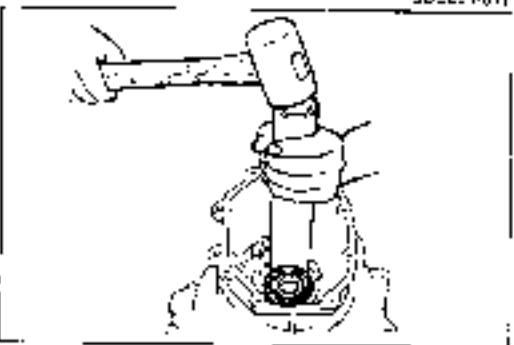
- 27. Ball bearing (front)  
Removal..... page J1-13
- 28. Bearing housing assembly  
Removal..... page J1-14
- 29. Mainshaft and gear assembly
- 30. Main drive gear
- 31. Synchronizer ring
- 32. Countershaft gear
- 33. Spacer



49 8617 101  
49 1839 425C  
46 J011-016



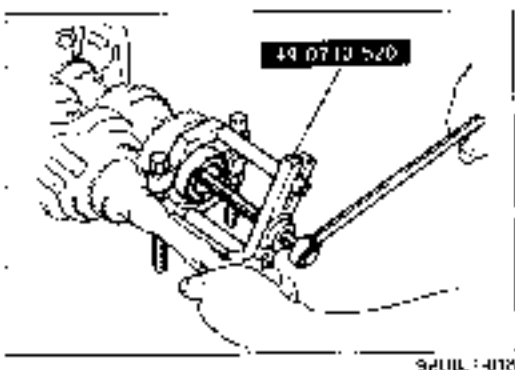
49 0839 425C  
3B-C-1-017



49 0839 425C

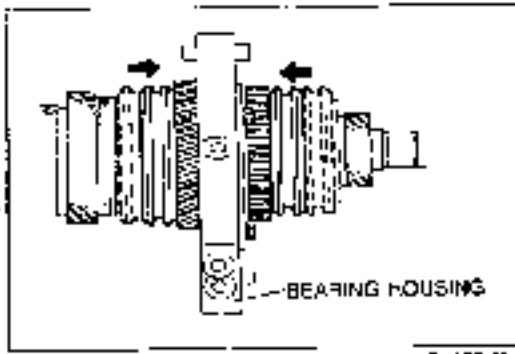
**Disassembly note**  
**Bearing**

1. Remove the snap ring, washer, retaining ring, and O washers; then remove the mainshaft rear bearing with the **SST**.
2. Remove the locknut (Refer to page J1-14) and the countershaft rear bearing with the **SST**.
3. Remove the main drive gear bearing from the transmission case.



9200L-4118

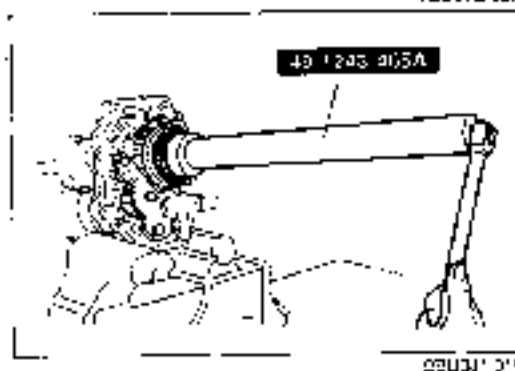
4. Remove the countershaft front bearing with the **SST**.



76LCTB 007

**Locknut**

1. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition.
2. Use a suitable tool to uncrimp the tabs of the locknut for 5th/reverse clutch hub.

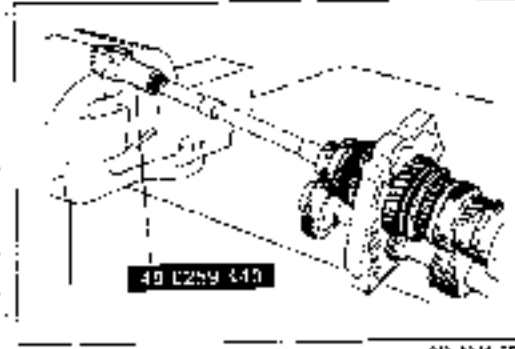


02031-319

3. Locknut for 5th/reverse clutch hub
  - (1) Secure the bearing housing in a vise.
  - (2) Remove the locknut with the **SST**.

**Caution**

- a) Do not reuse the locknut after it has been removed.
- b) Use pads in the vise.

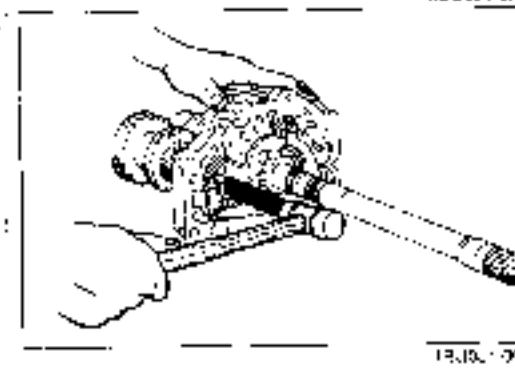


8B J01 EP3

4. Locknut for counter shaft rear bearing
  - (1) Connect the **SST** to the mainshaft, and mount them securely in a vise.
  - (2) Loosen the locknut and remove it.

**Bearing housing assembly**

1. Remove the bearing housing by lightly tapping the countershaft with a copper hammer
2. Remove the spacer.



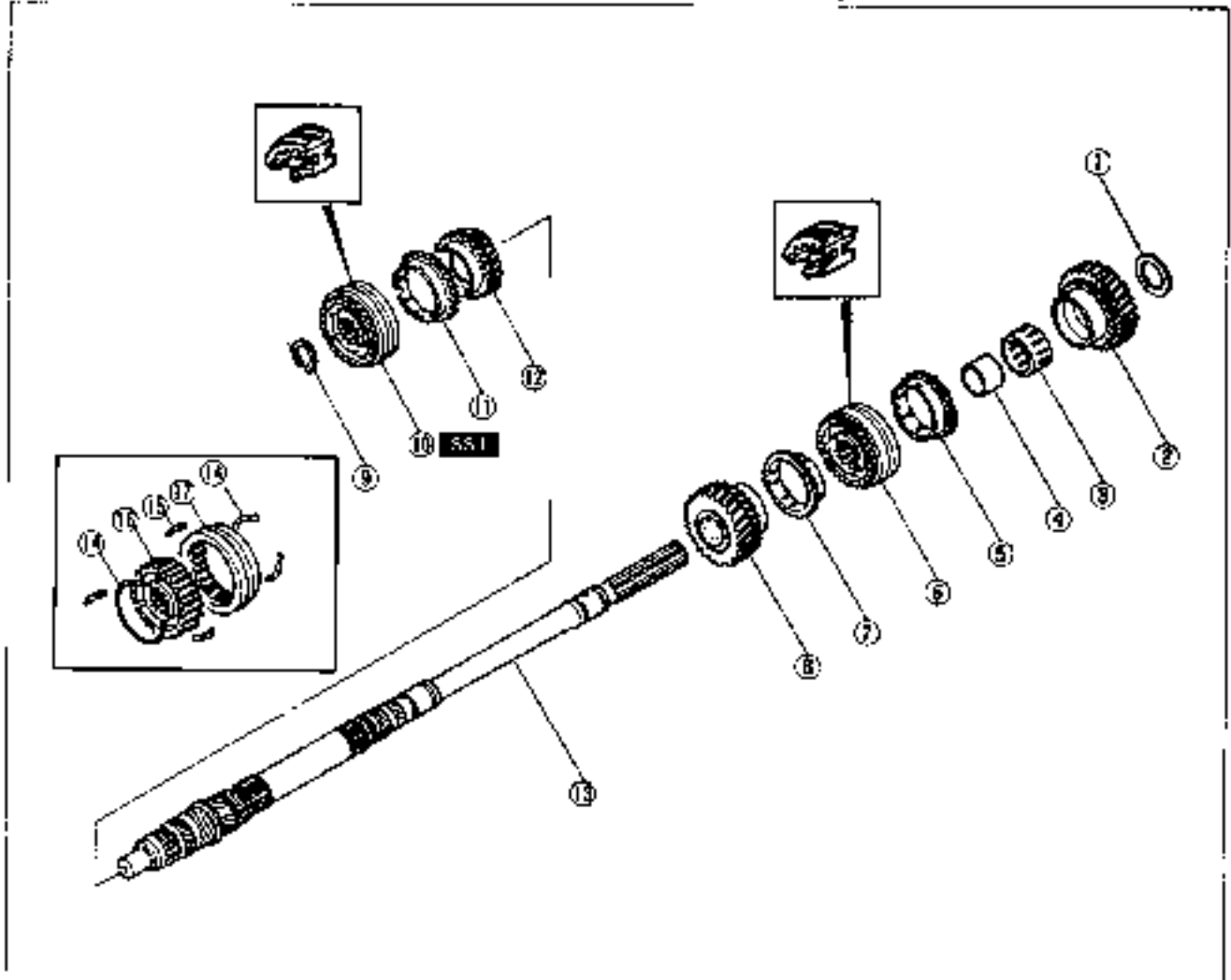
13JL-79C

**Note**

If bearing housing roller bearing is replaced, replace the spacer as a set.

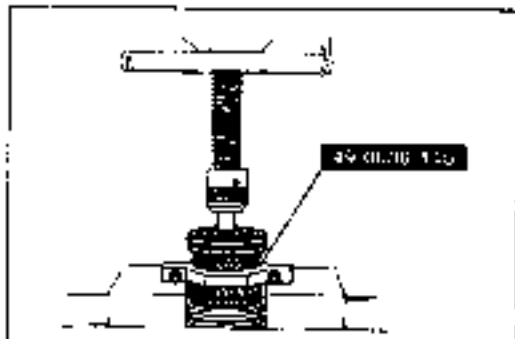
**Mainshaft Parts**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



2010-01

- |                                  |                                   |                              |
|----------------------------------|-----------------------------------|------------------------------|
| 1. Washer                        | 7. Synchronizer ring (2nd)        | 12. 3rd gear                 |
| 2. 1st gear                      | 8. 2nd gear                       | 13. Mainshaft                |
| 3. Needle bearing                | 9. Snap ring                      | 14. Synchronizer key springs |
| 4. Inner race                    | 10. Clutch hub assembly (3rd/4th) | 15. Synchronizer key         |
| 5. Synchronizer ring (1st)       | Removal ... page 11-15            | 16. Clutch hub               |
| 6. Clutch hub assembly (1st/2nd) | 11. Synchronizer ring (3rd)       | 17. Clutch hub sleeve        |



PREV. C12

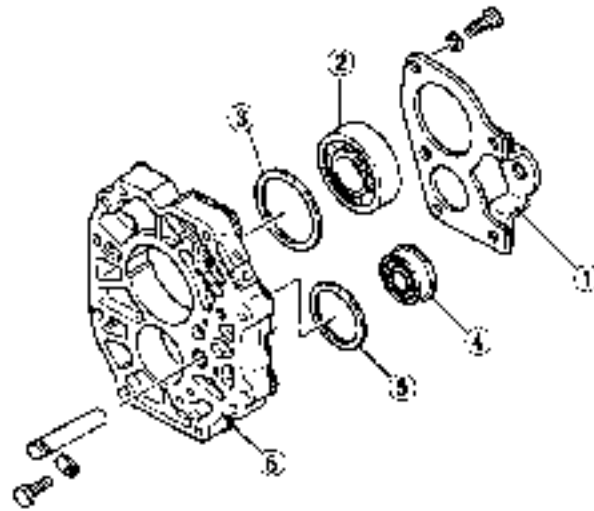
**Disassembly note**

**Clutch hub assembly (3rd/4th)**

1. Place the **SST** between 2nd gear and 3rd gear
2. Support the mainshaft by hand to prevent it from falling, and press out the clutch hub assembly

### Bearing Housing Parts

Disassemble in the order shown in the figure



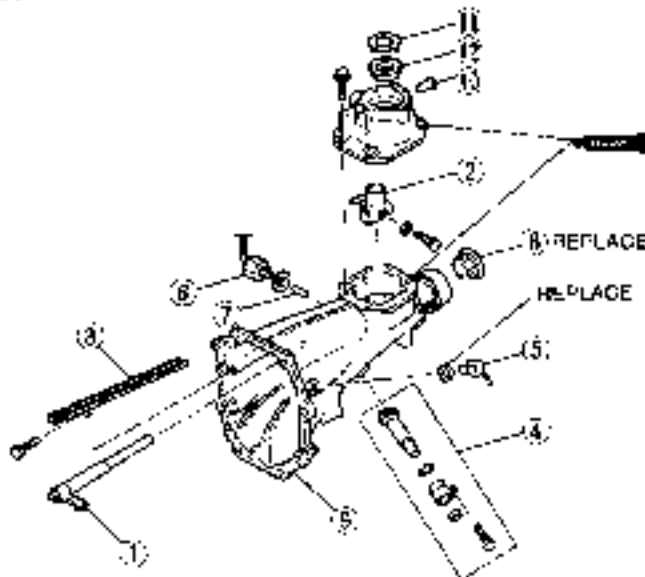
28J311-C-2

- |                    |                    |
|--------------------|--------------------|
| 1. Bearing cover   | 4. Roller bearing  |
| 2. Ball bearing    | 5. Adjustment shim |
| 3. Adjustment shim | 6. Bearing housing |

### Extension Housing Parts

Disassemble in the order shown in the figure.

#### 5-SPEED TRANSMISSION



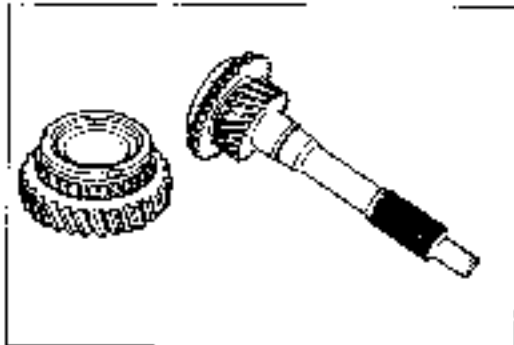
28J311-C-3

- |                            |                                |                      |
|----------------------------|--------------------------------|----------------------|
| 1. Control lever           | 6. Neutral switch              | 9. Extension housing |
| 2. Control rod end         | 7. Pin                         | 10. Pin              |
| 3. Oil passage             | 8. O-ring seal                 | 11. Wave washer      |
| 4. Speedometer driven gear | Do not remove if not necessary | 12. Bushing          |
| 5. Backup light switch     |                                |                      |

**INSPECTION**

Inspect all parts, and repair or replace as necessary.

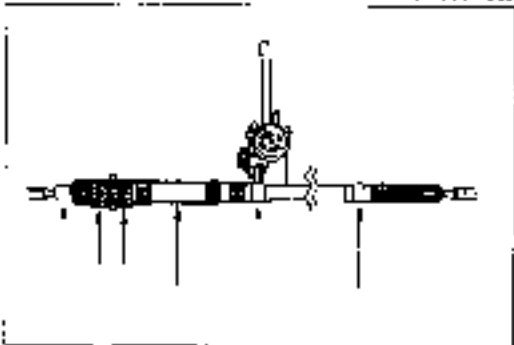
9MUD.X.054



9MUD.X.055

**Each gear and main drive gear**

1. Inspect synchronizer cones for wear.
2. Inspect individual gear teeth for damage, wear, cracks.
3. Inspect synchronizer ring matching teeth for damage or wear.
4. Inspect main drive gear splines for damage or wear.



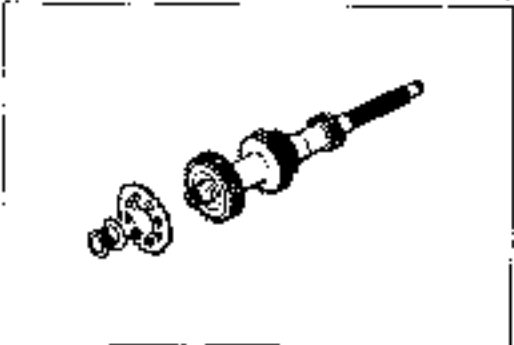
9MUD.X.056

**Mainshaft**

1. Measure the mainshaft runout.

**Maximum: 0.03mm (0.0012 In)**

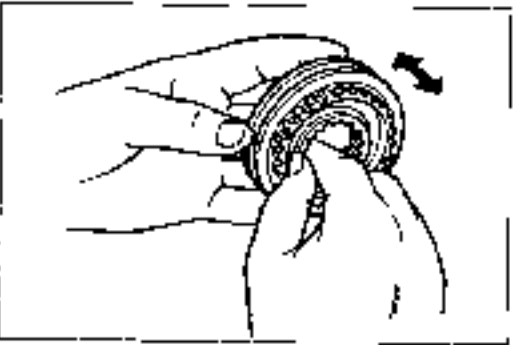
2. Inspect splines for damage or wear.



9MUD.X.057

**Countershaft**

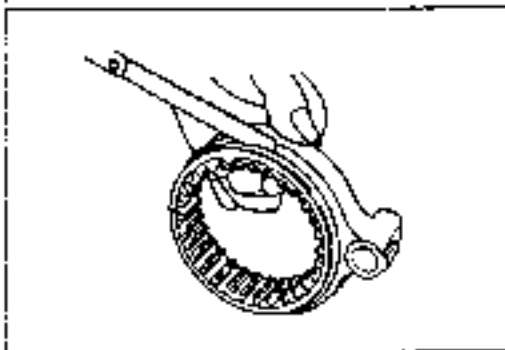
1. Inspect gear teeth for damage, wear, cracks.
2. Inspect splines for damage or wear.



9MUD.X.058

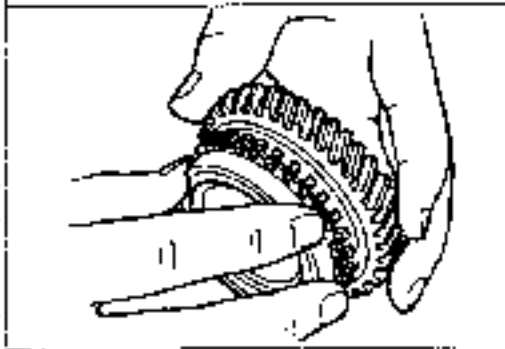
**Clutch hub assembly**

1. Inspect for clutch hub sleeve and hub operation.
2. Inspect individual gear teeth for damage, wear, cracks.
3. Inspect synchronizer key for damage, wear, cracks.



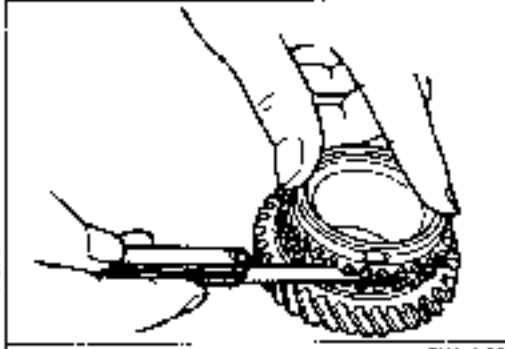
4. Measure the clearance between hub sleeve and release fork.

**Standard clearance:**  
0.2—0.3mm (0.008—0.012 in)  
**Maximum:** 0.5mm (0.020 in)



#### Synchronizer ring

1. Inspect individual synchronizer ring teeth for damage, wear, cracks.
2. Inspect taper surface for wear or cracks.

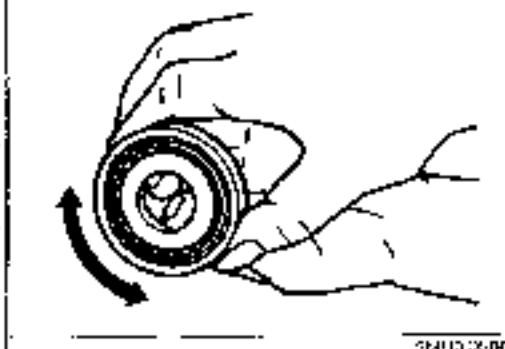


#### Note

**Set the synchronizer ring squarely in the gear; then measure around the circumference.**

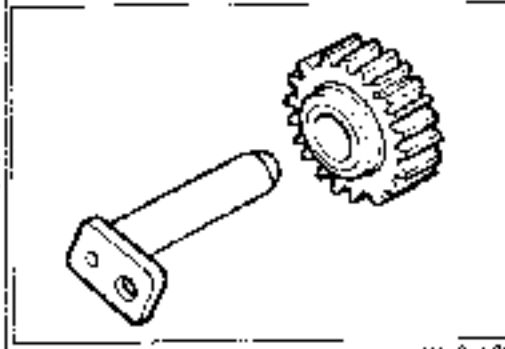
3. Measure the clearance between synchronizer ring and flank surface of gear.

**Standard clearance:** 1.5mm (0.059 in)  
**Minimum:** 0.8mm (0.031 in)



#### Bearing

Inspect for damage or rough rotation.



#### Reverse idler gear and shaft

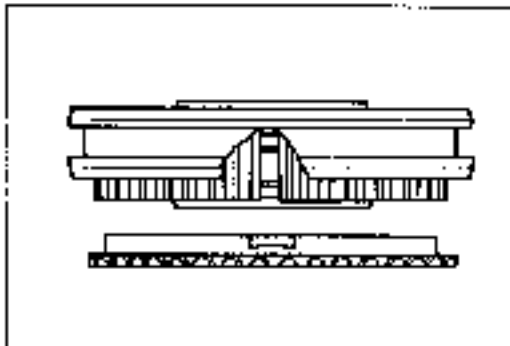
1. inspect gear teeth for damage, wear, cracks.
2. Measure the clearance between reverse idler gear bush and shaft.

**Standard clearance:**  
0.02—0.05mm (0.0008—0.0020 in)  
**Maximum:** 0.15mm (0.006 in)

**ASSEMBLY****Precaution**

1. All O-rings and gasket must be replaced with the new ones included in the overhaul kit.
2. Assemble the parts within 10 minutes after applying sealant. Allow all sealant to cure at least 30 minutes after assembly before filling the transmission with transmission oil.
3. After assembly, shift the transmission to each position, and check that the smooth and correct operation.

JEUJ1-047



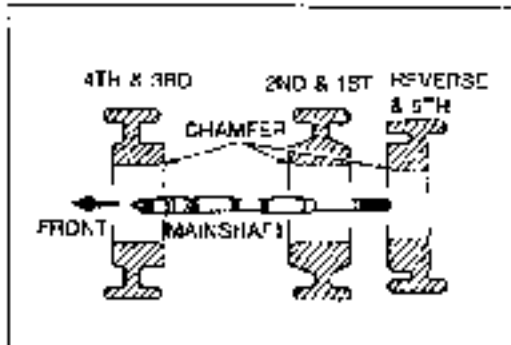
15-001-002

**Assembly procedure****Caution**

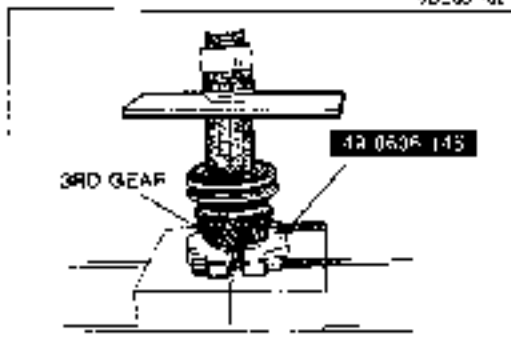
Align the synchronizer ring grooves with the clutch hub keys during installation.

**Note**

- a) Press each clutch hub assembly onto the mainshaft in the proper direction.
- b) Install the clutch hubs with the chamfers of the inner gear teeth as shown.

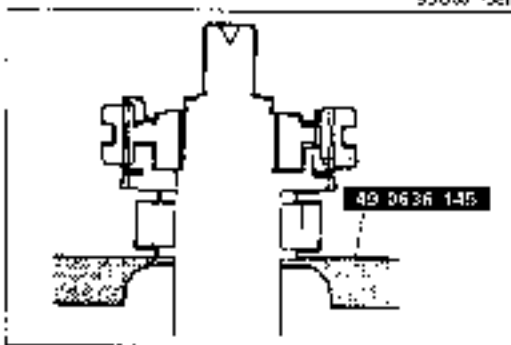


50-001-021



9J00J1-021

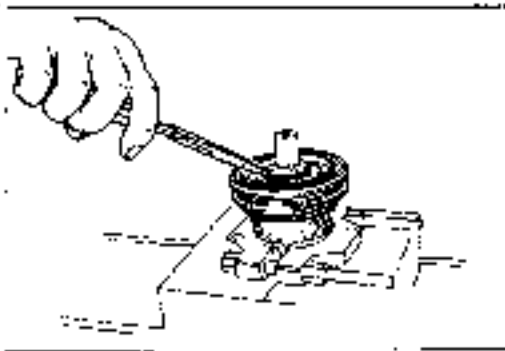
1. Place the 3rd gear and synchronizer ring on the mainshaft.
2. Press on the clutch hub assembly (3rd/4th) by using a suitable pipe and the SST.



4R3124-021

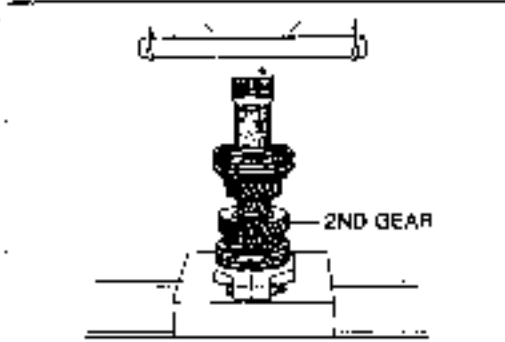
**Caution**

In pressing on the assembly, be sure to align the synchronizer ring and clutch hub (3rd/4th) grooves.



4B301/2429

3. Insert the snap ring by using snap ring pliers

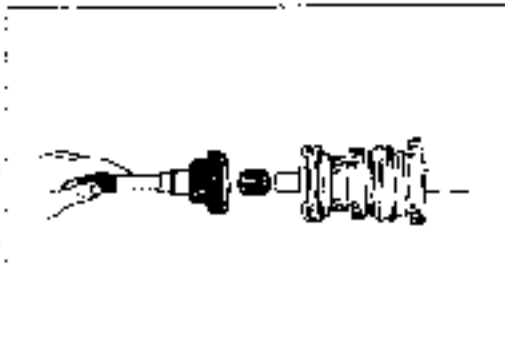


49007X 020

4. After mounting the 2nd gear and synchronizer ring on the mainshaft, use a suitable piece of pipe to press on the clutch hub assembly (1st/2nd)

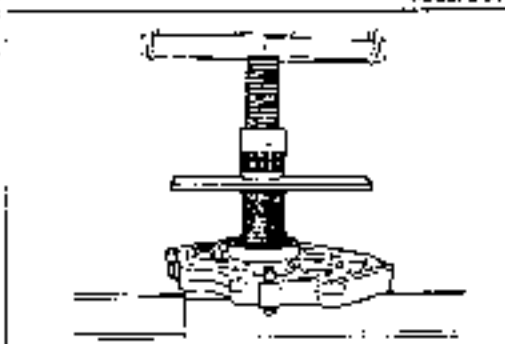
**Caution**

Same as the caution for Step 2.



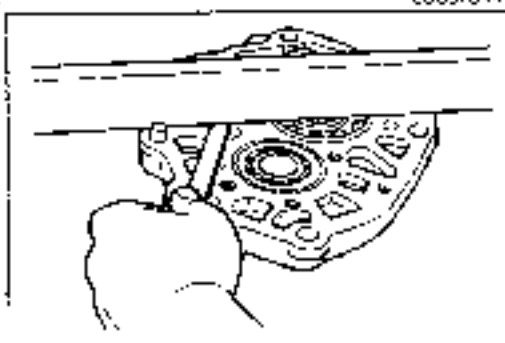
82027B 017

5. After installing the synchronizer ring, inner race, needle bearing, 1st gear, and washer to the mainshaft, install the needle bearing, synchronizer ring, and main drive gear.



82007B 019

6. Press the ball bearing and roller bearing into the bearing housing along with adjustment shims using a suitable piece of pipe.



4B302X 020

7. Measure the clearance between the ball bearing and the bearing housing.  
If the clearance is not within the standard, adjust it by using an adjustment shim(s).

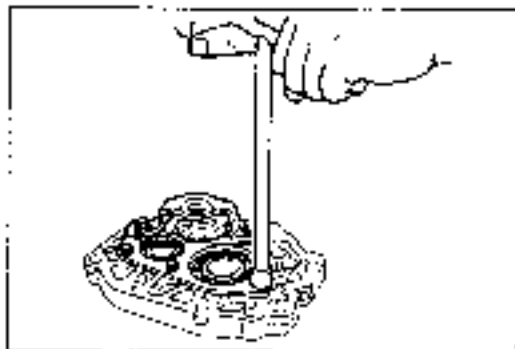
**Standard clearance:**

$0 \pm 0.05\text{mm}$  ( $0 \pm 0.002\text{ in}$ )

**Adjustment shim:**

0.1mm (0.004 in), 0.3mm (0.012 in)





4-0073-019

- 8 Install the bearing cover to the bearing housing.

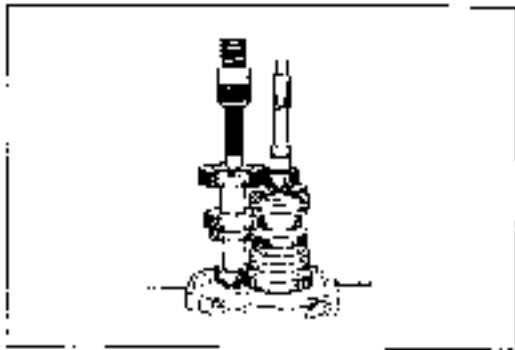
**Tightening torque**

**Bearing cover:**

16—23 Nm (1.6—2.3 m·kg, 12—17 ft·lb)

**Shaft bracket (black bolts):**

36—54 Nm (3.7—5.5 m·kg, 27—40 ft·lb)



95LGP-029

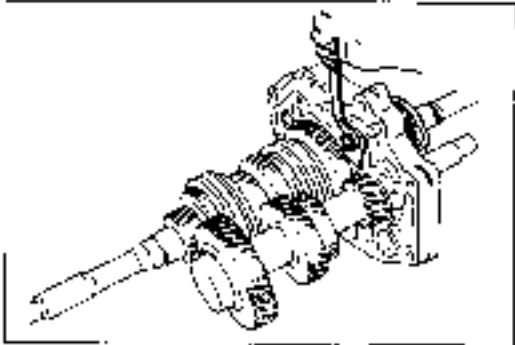
9. (1) Place the spacer on the roller bearing.

**Note**

**Replace spacer and bearing as a set.**

- (2) Place the mainshaft and main drive gear assembly and the counter gear

- (3) Use a suitable round bar to press in the countershaft.



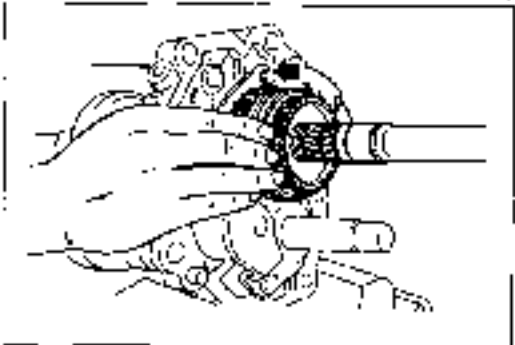
06-021-015

10. (1) Secure the reverse idle gear and 2 washers to the reverse idle gear shaft.

**Tightening torque:**

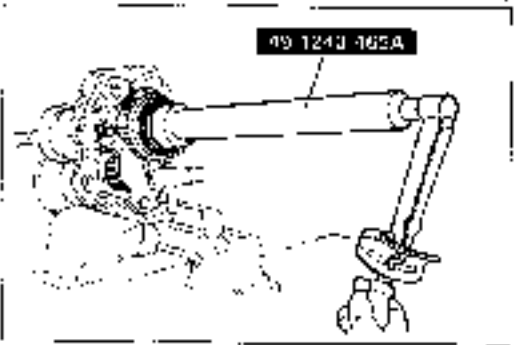
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)

- (2) Install the counter reverse gear washer, inner race, needle bearing, reverse gear, and clutch hub assembly (5th/reverse).



03001-016

- \*1. Secure the bearing housing in a vise installed the pads.  
\*2. Slide the clutch hub sleeve onto 1st and reverse gears to lock the mainshaft.



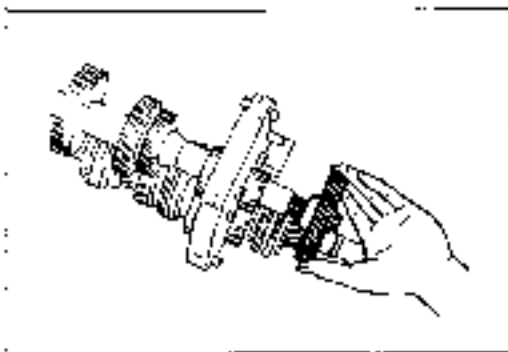
29101-017

13. (1) Install the clutch hub assembly (5th/reverse), and tighten a new locknut with the **SST**.

**Tightening torque:**

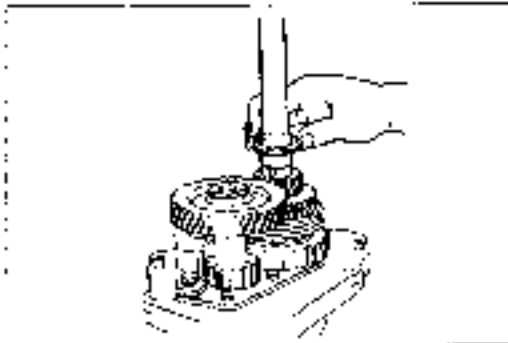
128—206 Nm (13—21 m·kg, 94—152 ft·lb)

- (2) Use a chisel to crimp the locknut.



SBLO1019

14. (1) Install the 5th gear and the synchronizer ring to the mainshaft.
- (2) Install the spacer and counter gear.
- (3) Install the locknut and fully tighten it by hand.

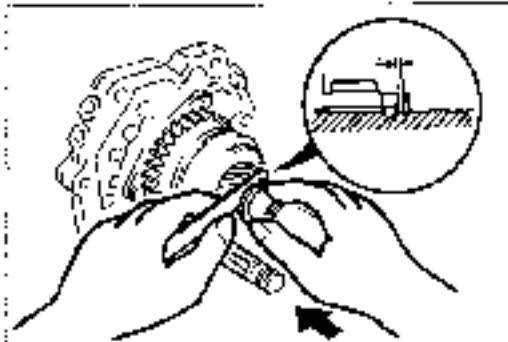


281011419

15. (1) Insert the ball and the thrust lock washer for 5th gear.
- (2) Install only the two 3.0mm (0.118 in) thick C-washers in the front mainshaft groove.

**Caution**

If the C-washers are not pushed fully forward the 5th gear side, the measurement will be incorrect.



79061020

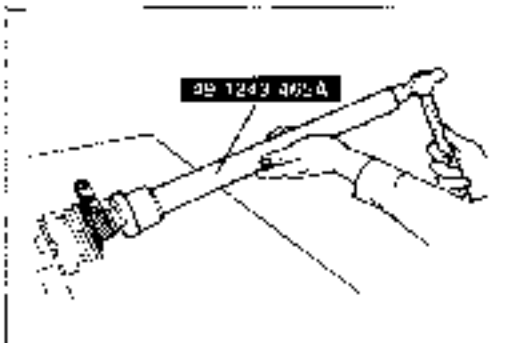
16. While pushing the C-washers toward the 5th gear side, measure the clearance between the thrust lock washer and C-washers. If the clearance is not as specified select the proper thrust lock washer.

**Standard play:** 0.1—0.3mm (0.004—0.012 in)

**Thrust lock washer thickness:**

- 6.4mm (0.252 in), 6.5mm (0.256 in)
- 6.6mm (0.260 in), 6.7mm (0.264 in)

17. Install the retaining ring.

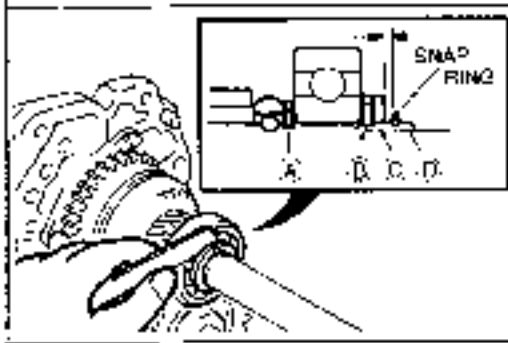


28101021

18. Drive on the mainshaft rear bearing by using the SST, fully seating it against the front C-washers.
19. Install the original C-washers and hold them with the retaining ring.
20. Install the washer and new snap ring.

**Caution**

- a) If the points A through D as shown in figure, are not pressed together tightly, the measurement will be incorrect.
- b) If the C-washers will not fit into the rear mainshaft groove, select the proper thickness C-washers.
- c) Ensure both C-washers at this position are the same thickness.



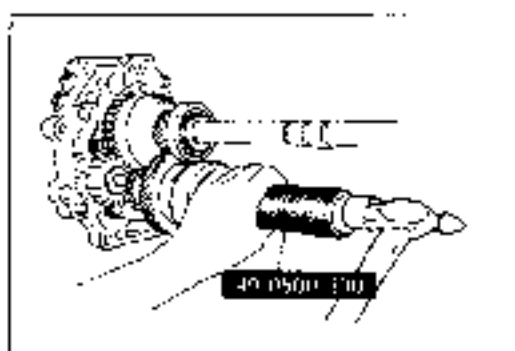
28101022

21. With points A through D pressed tightly together, measure the clearance between the washers and snap ring. If the clearance is not as specified, select the proper C-washers.

**Standard play:** 0.1mm (0.004 in) or less

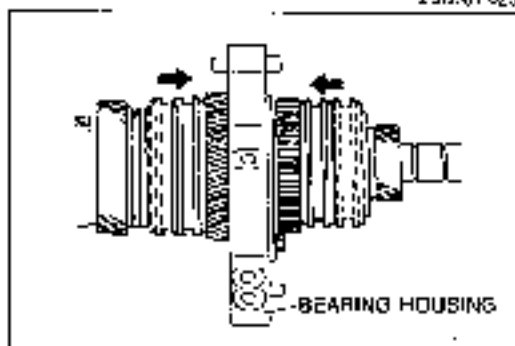
**C washer thickness:**

- 2.9mm (0.114 in), 3.0mm (0.118 in),
- 3.1mm (0.122 in), 3.2mm (0.126 in)



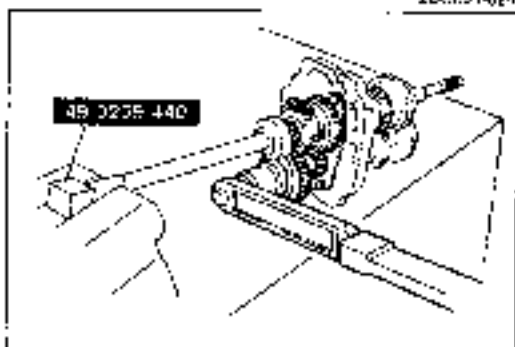
2911AH 023

22. Drive on the ball bearing to the countershaft with the **SST**.



2ELCJ1-024

23. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in a double-engaged condition.



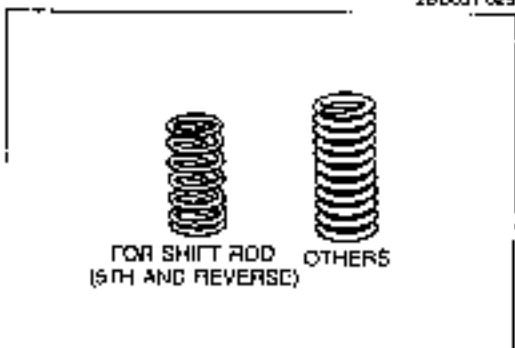
2BL0J1 025

24. (1) Install the **SST** on the mainshaft, and place them securely in a vise.  
(2) Tighten the countershaft rear bearing view locknut

**Tightening torque:**

**118—157 N·m (12—16 m·kg, 87—116 ft·lb)**

(3) Use a chisel to crimp the locknut.

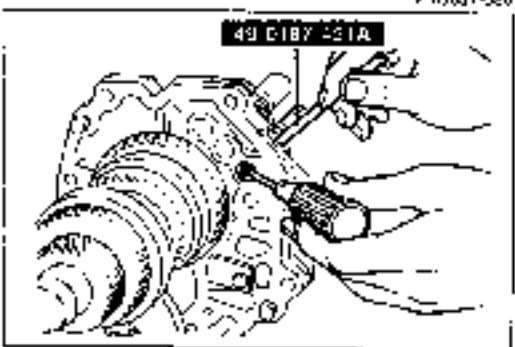


F410J1 026

25. Insert the spring and ball (5th/reverse) into the bearing housing.

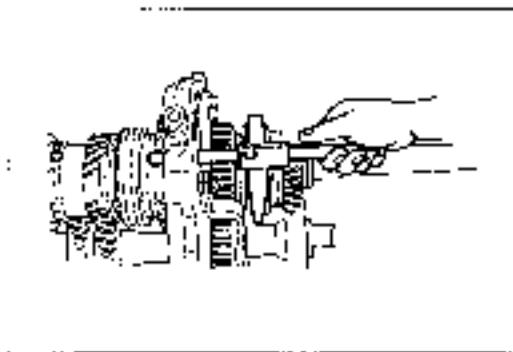
**Note**

**There are 2 types of springs; be sure to install them correctly.**

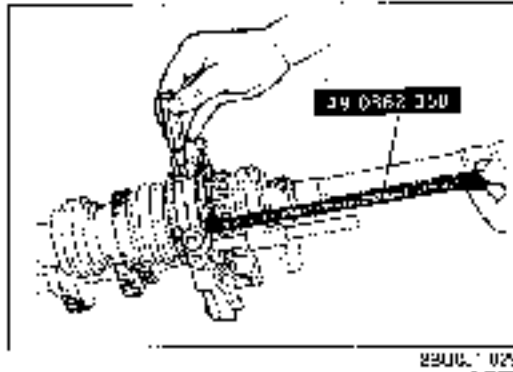


2ELCJ1 027

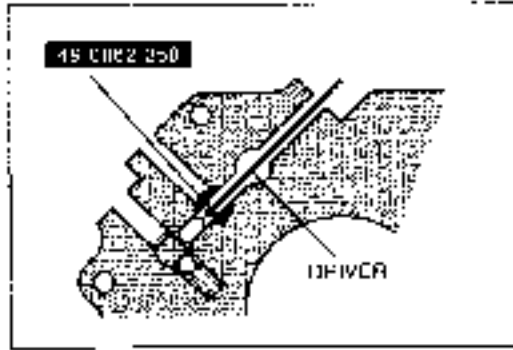
26. Press the spring and ball (5th/reverse) with the **SST** and a flat-tipped screwdriver to install the shift rod.



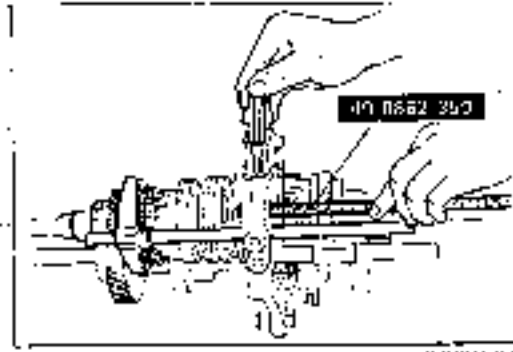
27. Install the shift fork and rod (5th/reverse) to the bearing housing.



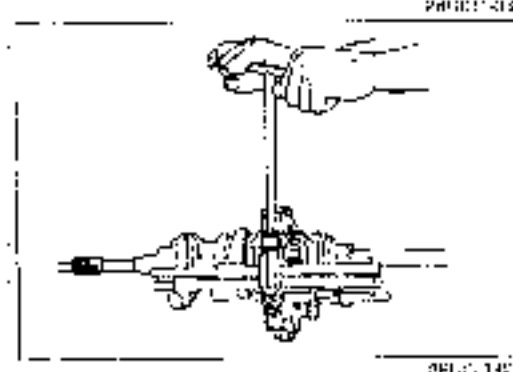
28. Position the interlock pin into the bearing housing with the SST.



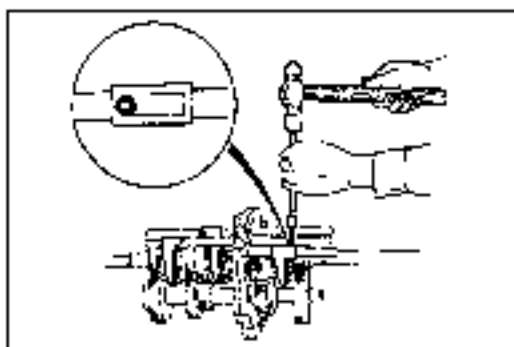
29. Check to be sure that the interlock pin fits correctly.



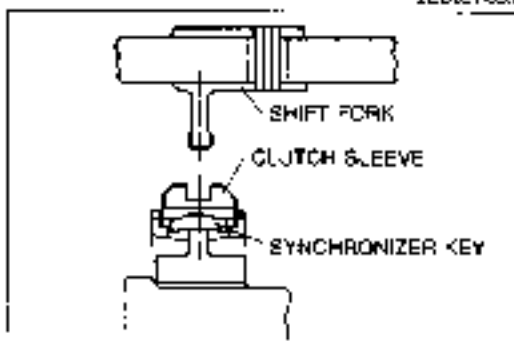
30. Install the shift fork and rod (3rd/4th), and install the interlock pin into the bearing housing the same way as in Step 28.



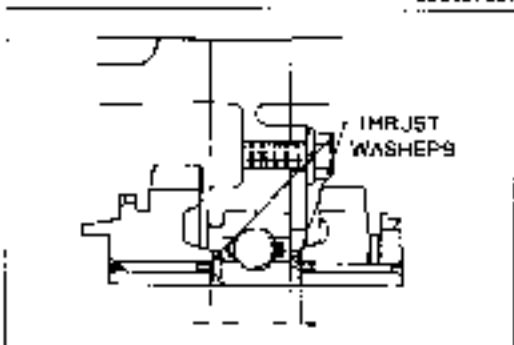
31. Install the shift fork and rod (1st/2nd), the springs, balls, and caps.



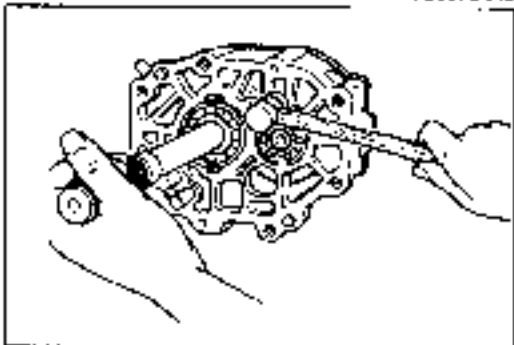
2BU01-038



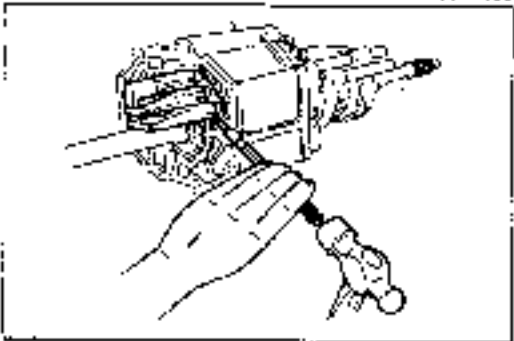
5BL01-034



7BU53-012



2BU01-035



2BU01-035

32. Install the new roll pins into each shift fork.

**Caution**

The roll pin should be installed so that the groove of the pin faces as shown in the figure.

33. Check to be sure that the centers of the shift fork and clutch hub sleeve are aligned properly.

If they are not, select the proper thrust washer for between 1st gear and the mainshaft bearing, and reverse gear and the mainshaft bearing.

The following thrust washer thicknesses are available.

2.2mm (0.0866 in)	3.2mm (0.1260 in)
2.7mm (0.1063 in)	3.7mm (0.1457 in)
3.0mm (0.1181 in)	

**Caution**

The total thicknesses of both front and rear thrust washers should be 5.9mm (0.2323 in) or 6.0mm (0.2362 in).

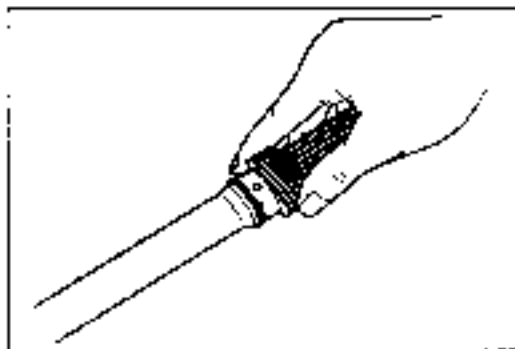
34. Coat the intermediate housing contact surfaces attached to the bearing housing with sealant.

35. Mount the intermediate housing to the bearing housing by tapping it lightly with a plastic hammer.

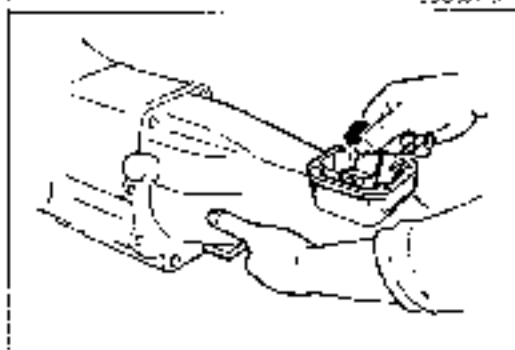
36. Install the shift rod end on each shift rod.

**Caution**

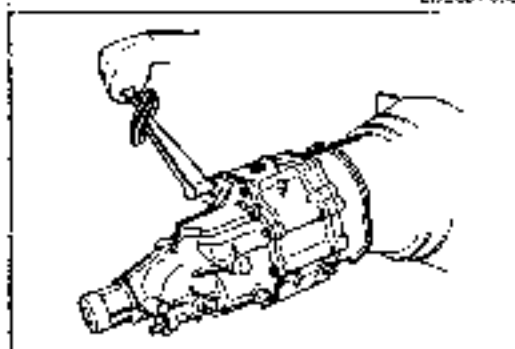
The roll pin should be installed so that the groove of the pin faces toward the front.



37. Mount the ball and speedometer drive gear; then secure them with the new snap ring.



38. Coat the contact surfaces of the extension housing and intermediate housing with sealant.  
 39. While turning the control rod end to the left, mount the extension housing.  
 40. Coat the surfaces of the transmission case and bearing housing.



41. Mount the transmission case, and tighten the balls.

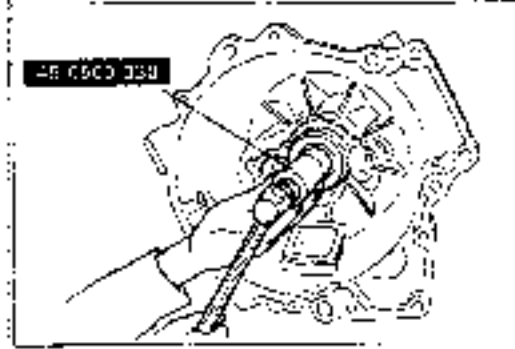
**Tightening torque:**

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

42. Install the control case with gasket; the gasket is coated with sealant on both sides.

**Tightening torque:**

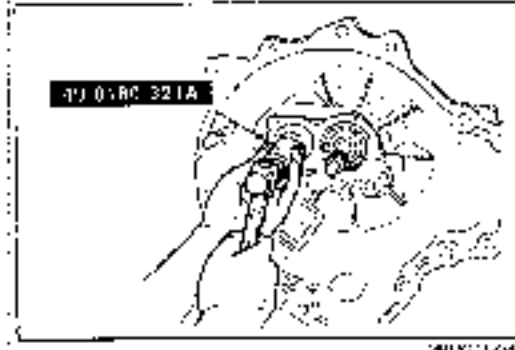
**18–26 N·m (1.8–2.7 m·kg, 13–20 ft·lb)**



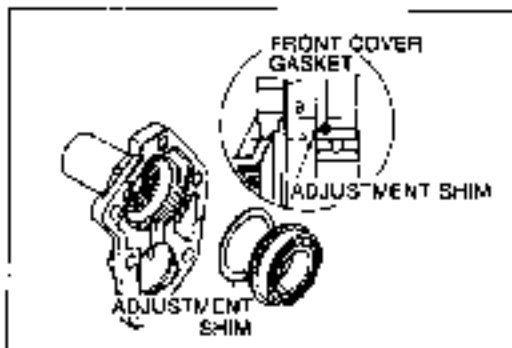
43. Install the ball bearing (main drive gear) with the **SST**, and secure it with the new snap ring.

**Caution**

**At this time, the synchronizer ring groove of the main drive gear should be aligned with the synchronizer key.**



44. Install the ball bearing (countershaft) with the **SST**, and secure it with the new snap ring.



ZEUGJ 342

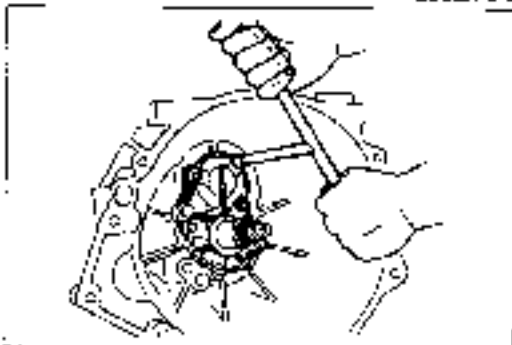
45. After measuring dimensions (A) and (B) shown in the figure, use an adjustment shim(s), as specified below, of the thickness corresponding to the value of (A) minus (B), so that bearing end play will be within the standard value.

**Bearing end play: 0—0.1mm (0—0.004 in)**

**Adjustment shim thickness:**

0.15mm (0.006 in)

0.30mm (0.012 in)



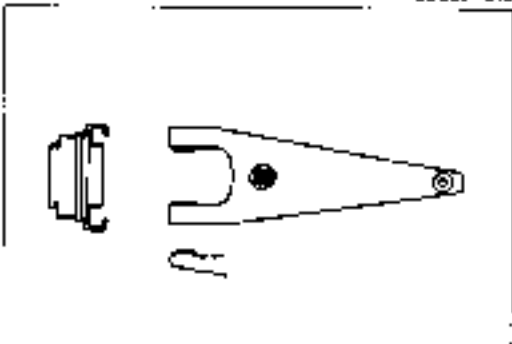
ZEUGJ 343

46. Install the gasket and front cover.

**Tightening torque:**

18—28 Nm (1.8—2.7 m·kg, 13—20 ft·lb)

47. Install the control case and the gearshift lever.  
48. Check the gearshift lever operation.



ZEUGJ 344

49. Apply a coat of molybdenum disulphide grease to the parts of the release bearing and release fork indicated by the shaded lines in the figure.  
50. Install the release bearing and release fork.

# MANUAL TRANSMISSION (B2600i)

<b>INDEX</b> .....	J2- 2
<b>OUTLINE</b> .....	J2- 3
<b>SPECIFICATIONS</b> .....	J2- 3
<b>STRUCTURAL VIEW</b> .....	J2- 4
<b>POWERFLOW</b> .....	J2- 5
<b>TROUBLESHOOTING GUIDE</b> .....	J2- 6
<b>TRANSMISSION</b> .....	J2- 6
<b>TRANSMISSION OIL</b> .....	J2- 7
<b>INSPECTION</b> .....	J2- 7
<b>REPLACEMENT</b> .....	J2- 7
<b>REMOVAL AND INSTALLATION</b> .....	J2- 8
<b>TRANSMISSION</b> .....	J2- 9
<b>PREPARATION</b> .....	J2- 9
<b>DISASSEMBLY</b> .....	J2- 9
<b>INSPECTION</b> .....	J2-21
<b>ASSEMBLY</b> .....	J2-24

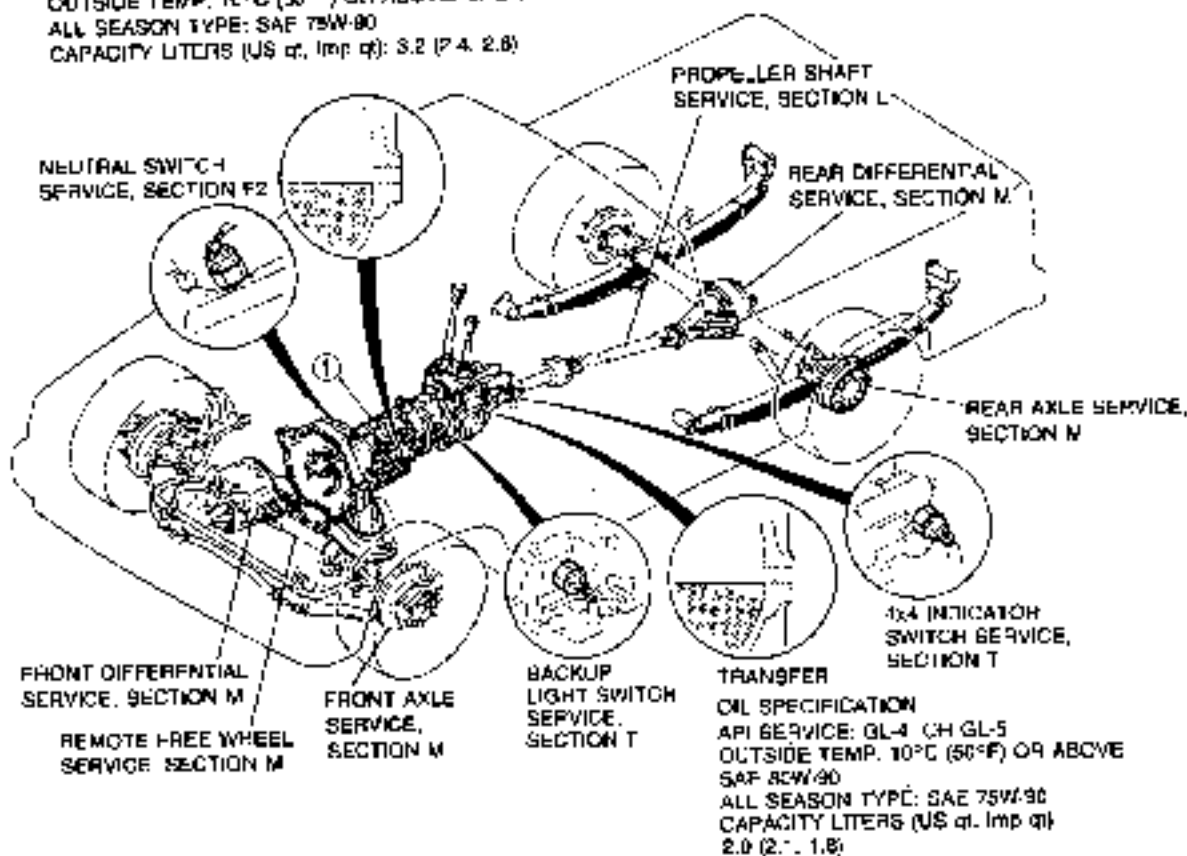
DEUCIS 001

J2



INDEX

TRANSMISSION  
 OIL SPECIFICATION  
 API SERVICE: GL-4, OR GL-5  
 OUTSIDE TEMP. 10°C (50°F) OR ABOVE: SAE 90W-90  
 ALL SEASON TYPE: SAE 75W-90  
 CAPACITY LITERS (US qt., Imp qt): 3.2 (7.4, 2.8)





1B, J0, 2-1011

1. Transmission

Removal .....	page J2 - 8
Disassembly .....	page J2 - 9
Inspection .....	page J2-21
Assembly .....	page J2-24
Installation .....	page J2 - 8

OUTLINE

SPECIFICATIONS

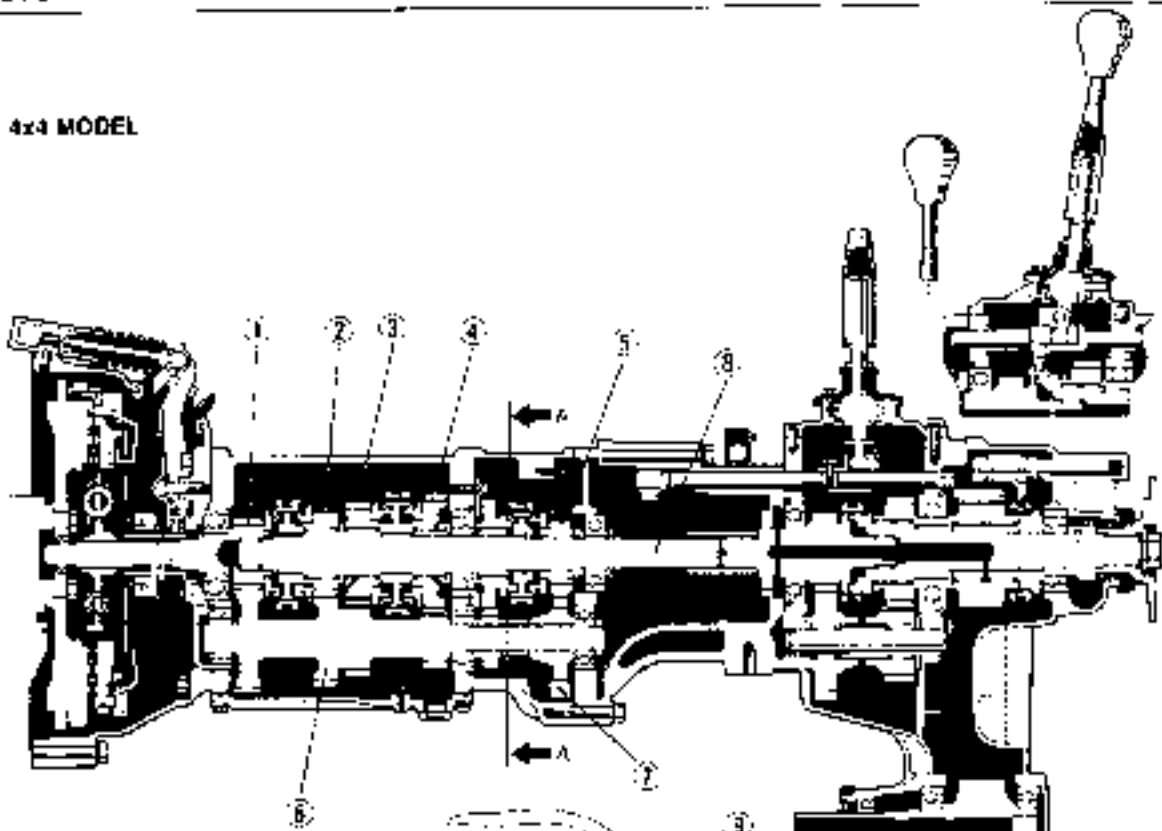
Item		Model	B2B00		
			R5M-D	R5MX-D	
			4x2	4x4	
Synchronesh™ system	Transmission	Forward: Synchronesh Reverse: Synchronesh			
	Transfer case	-	Constant-mesh		
Shift type	Transmission				
	Transfer case	-			
Gear ratio	Transmission	1st	3.730		
		2nd	2.58		
		3rd	1.990		
		4th	1.000		
		5th	0.816		
		Reverse	3.52*		
	Transfer case	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 70W-90		
Capacity liters (US qt, Imp qt)	Transmission	2.3 (3.0, 2.5)	3.2 (3.4, 2.6)		
	Transfer case	-	2.0 (2.1, 1.8)		

J2

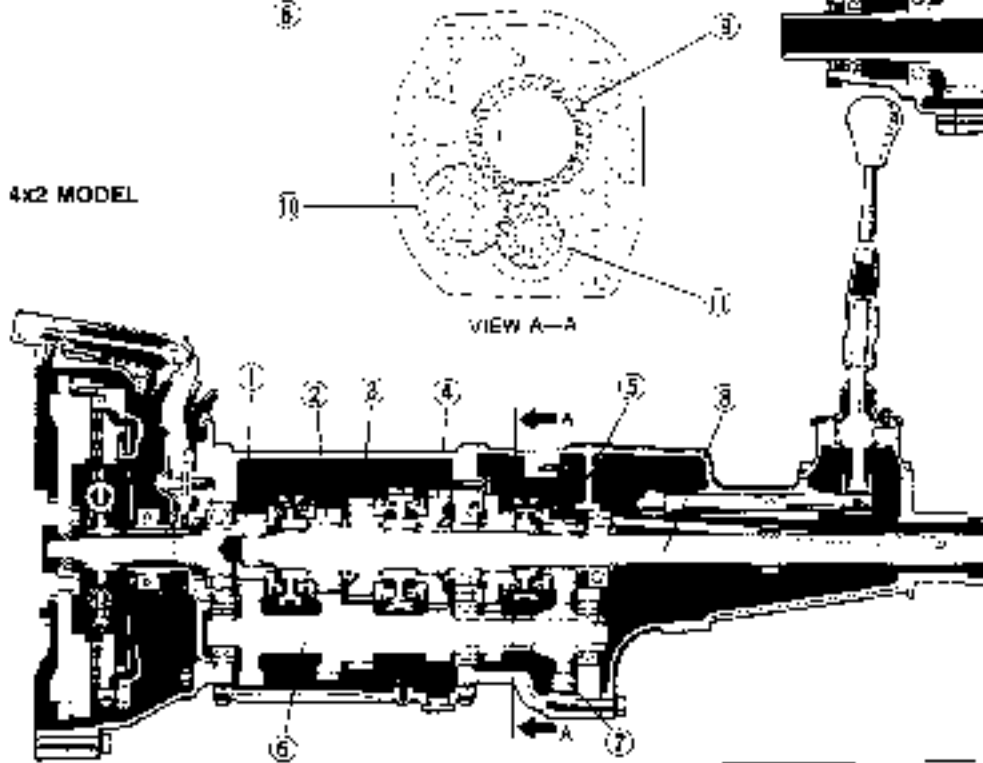
09UD-2-002

STRUCTURAL VIEW

4x4 MODEL



4x2 MODEL

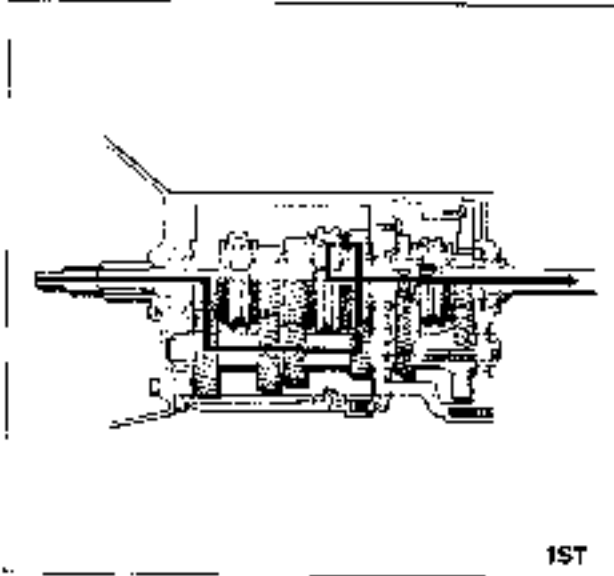


CEJ002 004

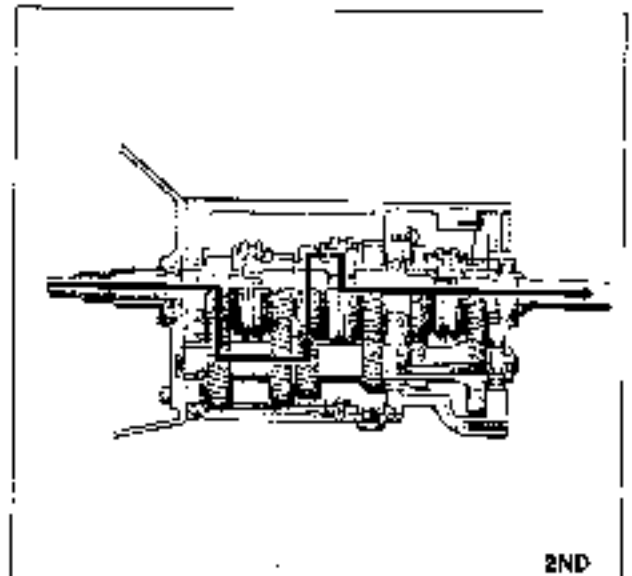
- 1. Main drive gear (4th gear)
- 2. 3rd gear
- 3. 2nd gear
- 4. 1st gear
- 5. 5th gear
- 6. Countershaft

- 7. Counter 5th gear
- 8. Mainshaft
- 9. Reverse gear
- 10. Reverse idler gear
- 11. Counter reverse gear

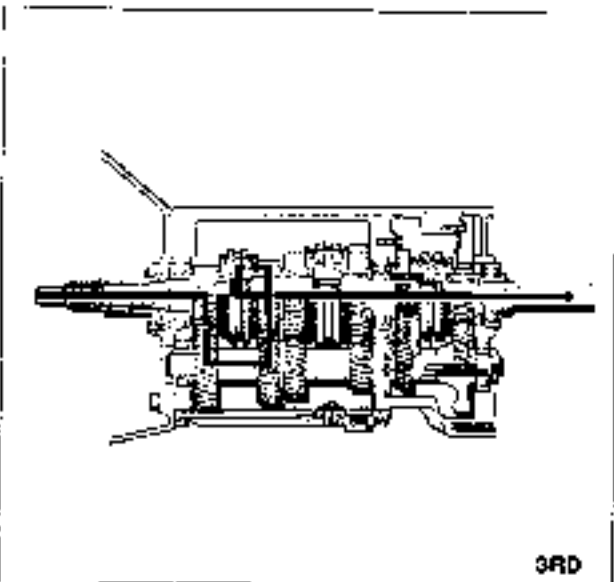
POWERFLOW



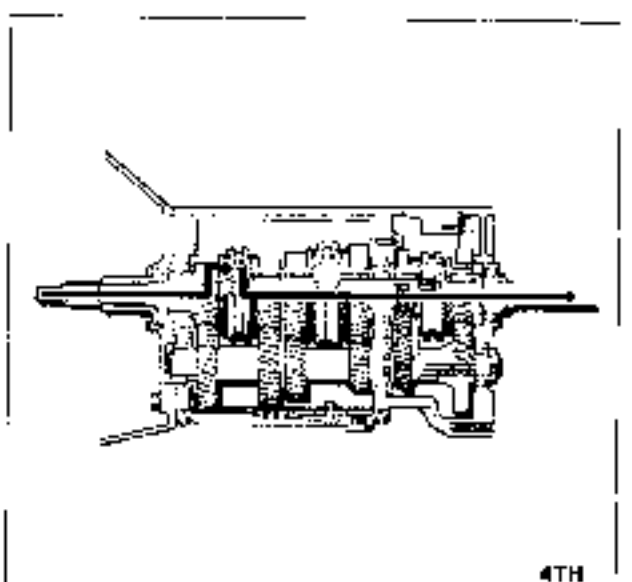
1ST



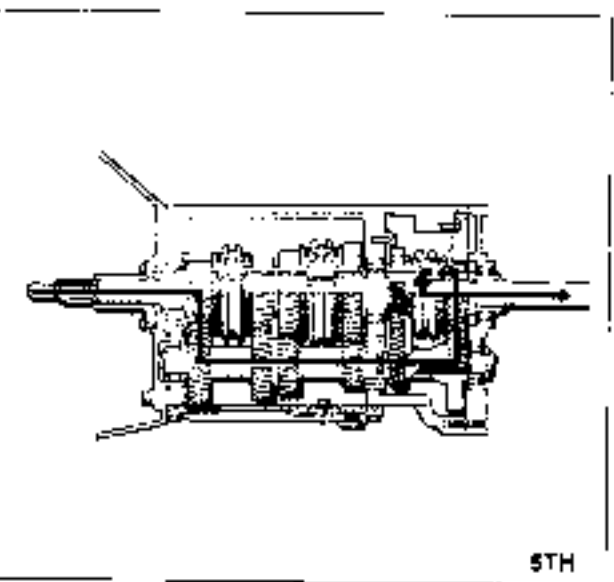
2ND



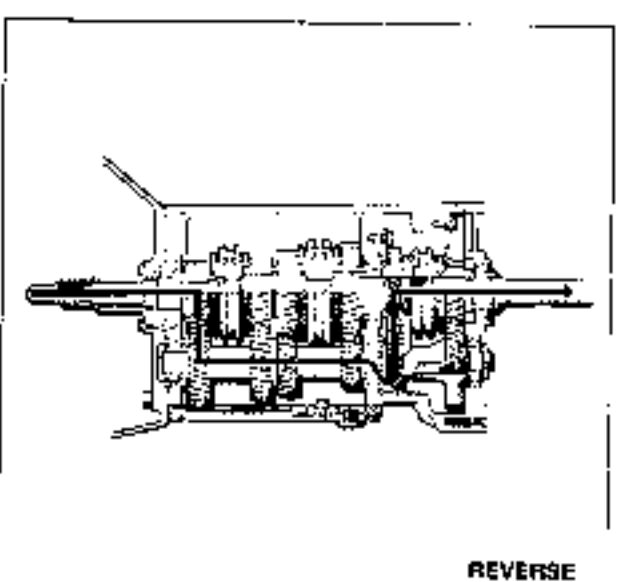
3RD



4TH



5TH



REVERSE

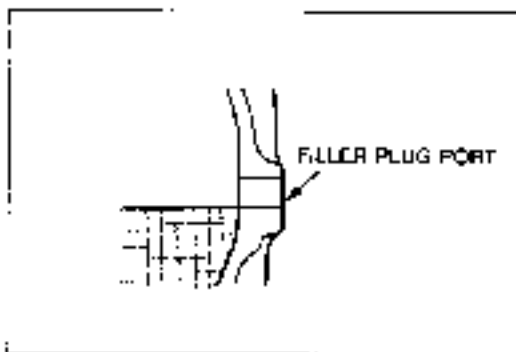
J2

## TROUBLESHOOTING GUIDE

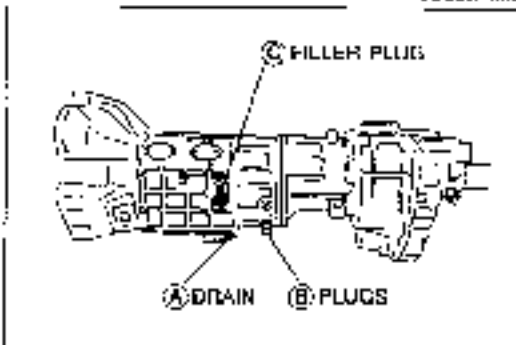
## TRANSMISSION

Problem	Possible Cause	Remedy	Page
Abnormal noise	Insufficient oil	Add oil	J2- 7
	Deterioration of oil quality	Replace with specified oil	J2- 7
	Worn bearing	Replace	J2-22
	Worn contact surface of countershaft gear	Replace	J2-21
	Worn contact surface of gears	Replace	J2-21
	Excessive gear backlash Damaged gear teeth	Replace Replace	— J2-21
Difficult to shift	Insufficient oil	Add oil	J2- 7
	Deterioration of oil quality	Replace with oil of specified quality	J2- 3
	Wear or play of control lever end or shift fork	Replace	J2-21
	Worn synchronizer ring	Replace	J2-22
	Worn synchronizer cone of gear	Replace	J2-22
	Flaw contact of synchronizer ring and gear cone	Replace	J2-22
	Excessive longitudinal play of gears	Replace	J2-21
Worn bearing	Replace	J2-22	
Improper disengagement of clutch	Refer to Section H	—	
Jumps out of gear	Weak or detent ball spring	Replace	J2-23
	Weak or shift rod end spring	Replace	J2-23
	Worn shift fork	Replace	J2-21
	Worn clutch rub	Replace	J2-22
	Worn clutch hub sleeve	Replace	J2-22
	Worn gears	Replace	J2-21
	Excessive gear backlash	Replace	—
	Worn bearing	Replace	J2-22
	Incorrect installation or loose engine mounts or transmission mounts	Tighten	J2- 8

OBL0J2 00K



35L6J2-003



2241LF-005

## TRANSMISSION OIL

### INSPECTION

Remove the filler plug. Verify that the oil level is near the filler plug hole. If it is low, add specified oil.

### REPLACEMENT

1. Remove the plugs (A), (B) and (C), and drain the oil into a suitable container.
2. Wipe all plugs clean.
3. Apply sealant to the threads of the drain and filler plug.
4. After the oil has drained, install the drain plugs (A) and new washer, (B).

#### Tightening torque

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

**B: 25–39 N·m (2.5–4.0 m·kg, 18–29 ft·lb)**

5. Add the specified oil from filler plug (C) hole until the level reaches the bottom of filler plug (C) hole.

#### Capacity

**4x2 models: 2.8 liters (3.0 US qt, 2.5 Imp qt)**

**4x4 models: 3.2 liters (3.4 US qt, 2.8 Imp qt)**

6. Install filler plug (C).

#### Tightening torque:

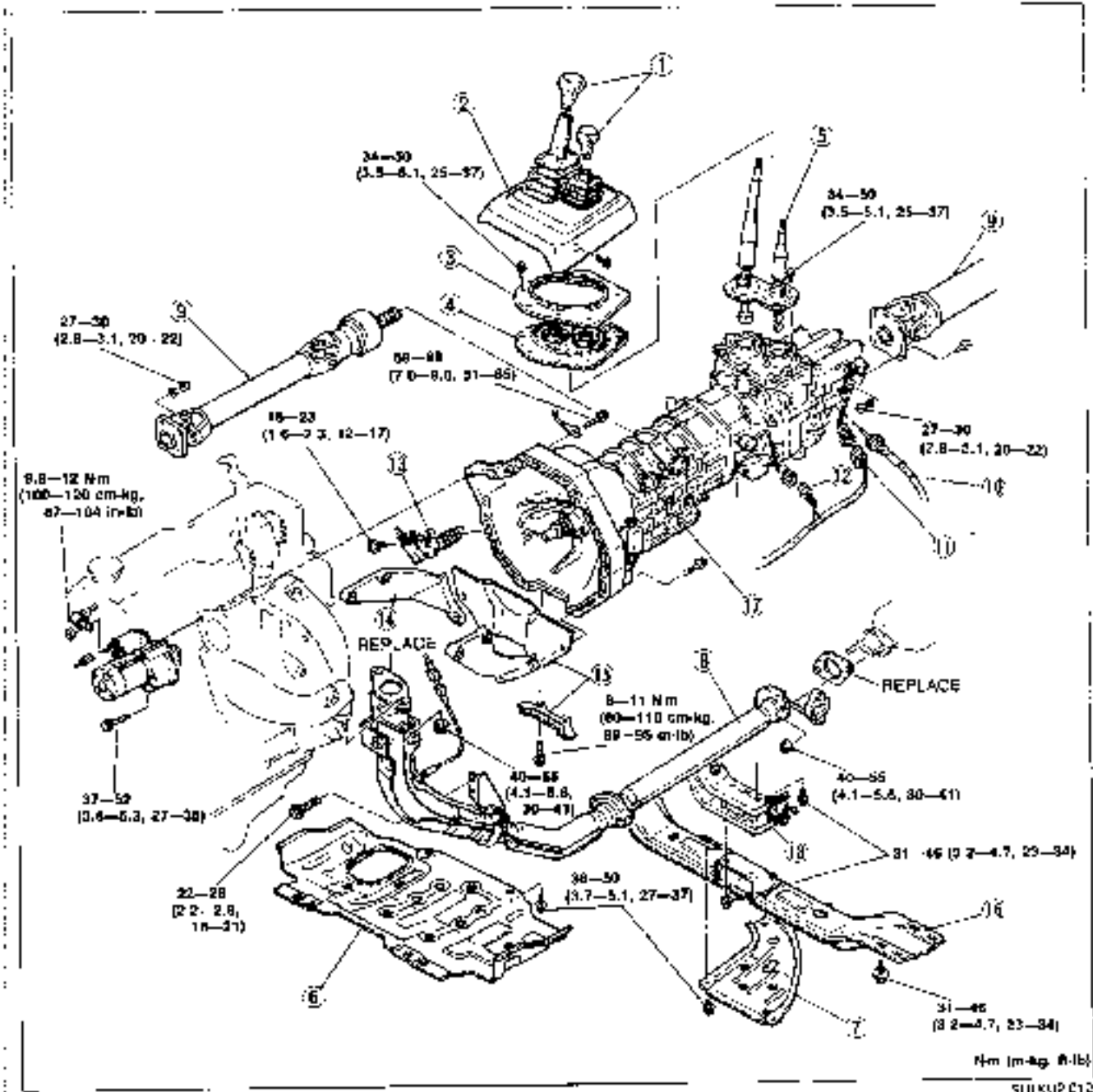
**25–39 N·m (2.5–4.0 m·kg, 18–29 ft·lb)**

J2

### REMOVAL AND INSTALLATION

1. Disconnect the negative battery cable.
2. Raise the vehicle and support it with safety stands.
3. Drain the transmission oil.
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal.

95102 CAS


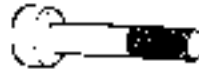

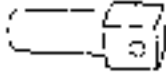

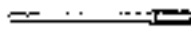
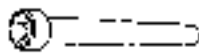









- |                         |                                    |                                      |
|-------------------------|------------------------------------|--------------------------------------|
| 1. Shift lever knobs    | 8. Exhaust pipe                    | 15. Undercover                       |
| 2. Console box          | 9. Front and rear propeller shafts | (Lower M/T approx. 20mm,<br>0.79 in) |
| 3. Insulator plate      | 10. Speedometer cable              | 16. Transmission cross member        |
| 4. Boot                 | 11. 4x4 indicator SW connector     | 17. M/T complete                     |
| 5. Shift lever assembly | 12. Back-up light SW connector     | 18. M/T mount bracket                |
| 6. Rear undercover      | 13. Clutch release cylinder        |                                      |
| 7. Transfer case cover  | 14. Gusset plate                   |                                      |

TRANSMISSION

PREPARATION

SST

<p>49 0029 425C Pulley set bearing</p> 	<p>49 0600 330 Insulator, transmission bearing</p> 	<p>49 0635 145 Pulley fan pulley fans</p> 
<p>49 0120 440 Holder, mainshaft</p> 	<p>49 F017 101 Holder, synchronizer ring</p> 	<p>49 0662 350 Guide, shift fork</p> 
<p>49 1243 465A Wrench, mainshaft, conical</p> 	<p>49 H017 101 Hook</p> 	<p>49 0710 520 Pulley bearing</p> 
<p>49 F401 330B Insider set, bearing</p> 	<p>49 F401 331 Body (Part of 49 F401 330B)</p> 	<p>49 F401 335A Attachment A (Part of 49 F401 330B)</p> 
<p>49 F401 337A Attachment C (Part of 49 F401 330B)</p> 	<p>49 UU27 003 Insulator, oil seal</p> 	<p>REBUJ2013</p>

J2

DISASSEMBLY

Precaution

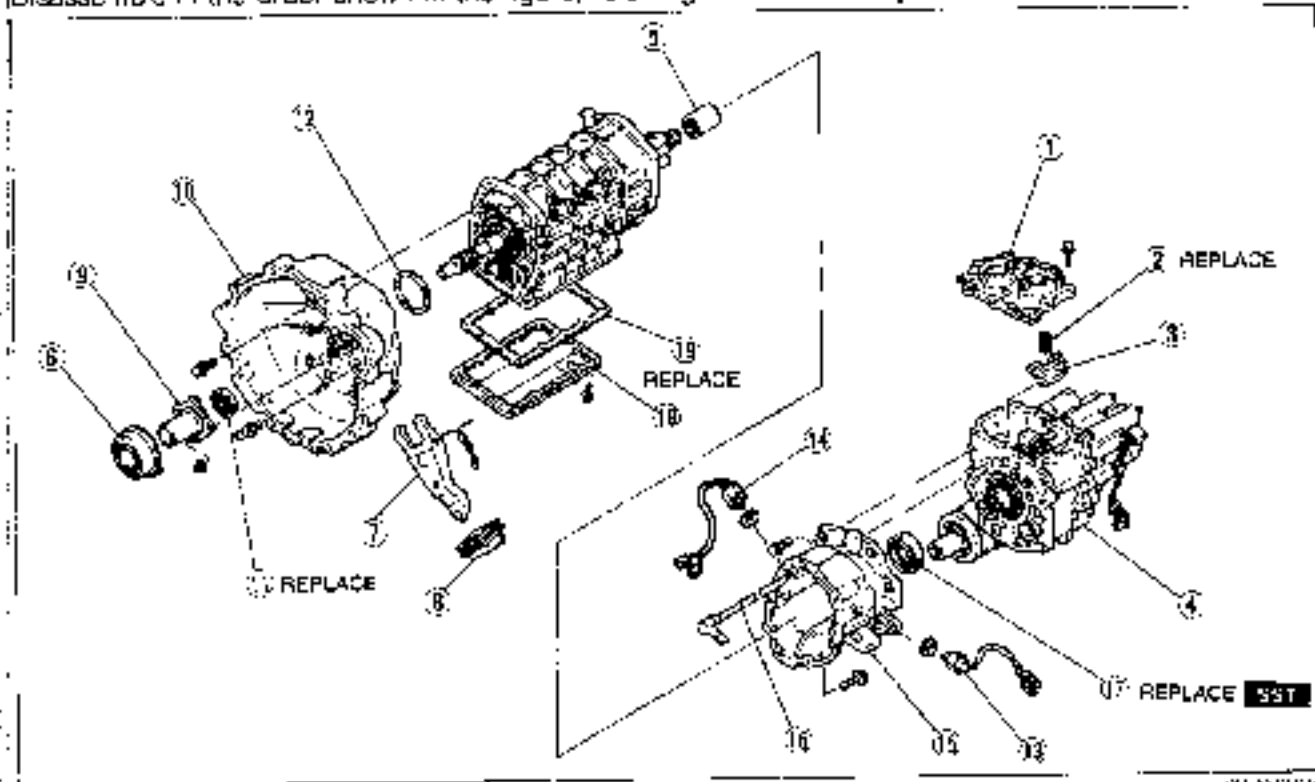
1. Clean the transmission exterior thoroughly with steam or cleaning solvents or both, before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with a compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

08JUL24X09



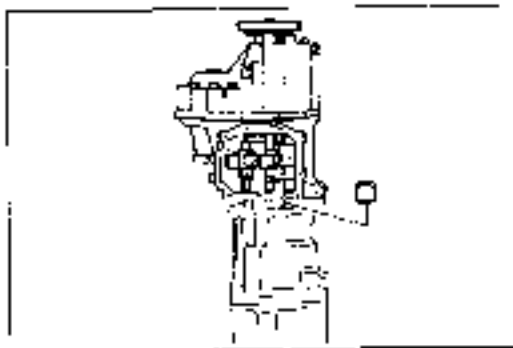
### Transfer Case, Clutch Housing, and Extension Housing (4x4)

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



08J00240-0

- |  |                     |   |
|--|---------------------|---|
| 1. Control cover assembly                    | 7. Release fork     | 14. Neutral SW                                    |
| 2. Roll pin                                  | 8. Bolt             | 15. Extension housing<br>Removal ..... page J2-10 |
| 3. Control lever end                         | 9. Front cover      | 16. Control rod                                   |
| 4. Transfer case<br>Removal ..... page J2-10 | 10. Clutch housing  | 17. Oil seal                                      |
| 5. Input shaft                               | 11. Oil seal        | 18. Undercover                                    |
| 6. Release bearing                           | 12. Adjusting shim  | 19. Gasket  |
|  | 13. Backup light SW |   |

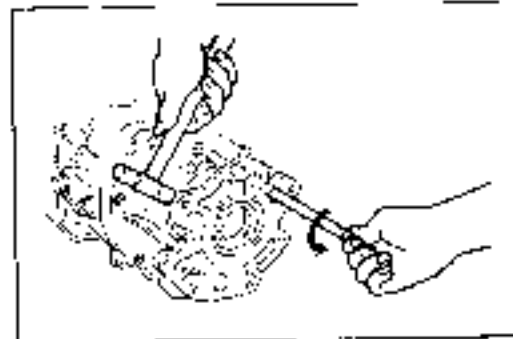


CBL00201

#### Disassembly note

##### Transfer case

Set the transmission in a vertical position. Lift the transfer case off vertically to prevent damaging the control rod.



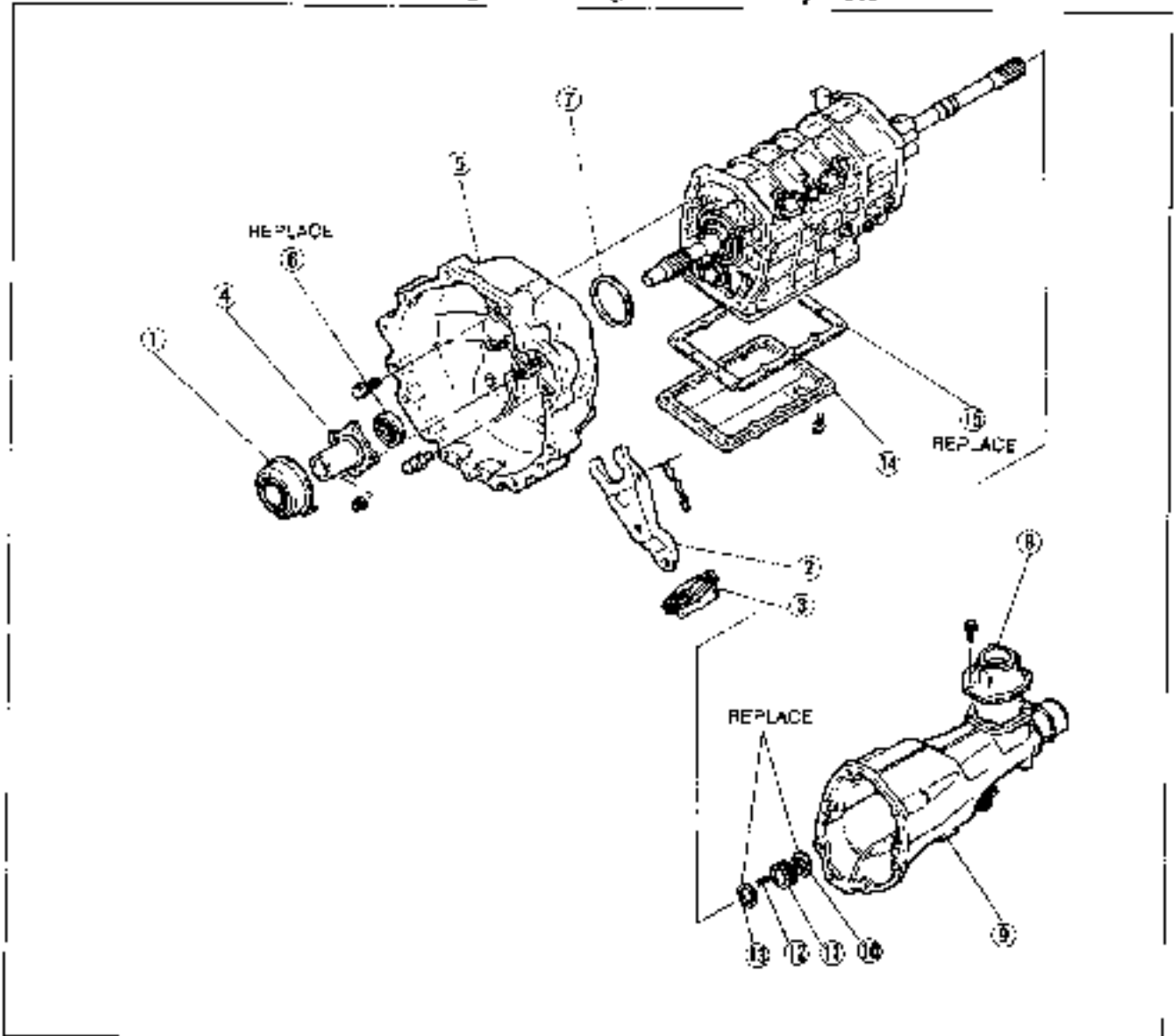
TBL004002

##### Extension housing

Turn the control rod in the direction of the arrow, and remove the extension housing.

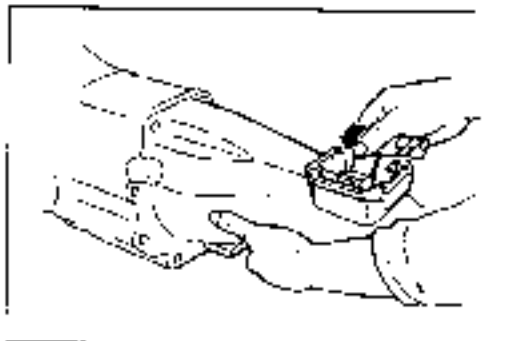
**Clutch Housing and Extension Housing (4x2)**

Disassemble in the order shown in the figure, referring to **Disassembly Note**



39JUL2012

- |                    |                            |               |
|--------------------|----------------------------|---------------|
| 1. Release bearing | 7. Adjusting shim          | 12. Key       |
| 2. Release fork    | 8. Control cover assembly  | 13. Snap ring |
| 3. Boot            | 9. Extension housing       | 14. Oil pan   |
| 4. Front cover     | Removal ..... page J2 -11  | 15. Gasket    |
| 5. Clutch housing  | 10. Snap ring              |               |
| 6. Oil seal        | 11. Speedometer drive gear |               |



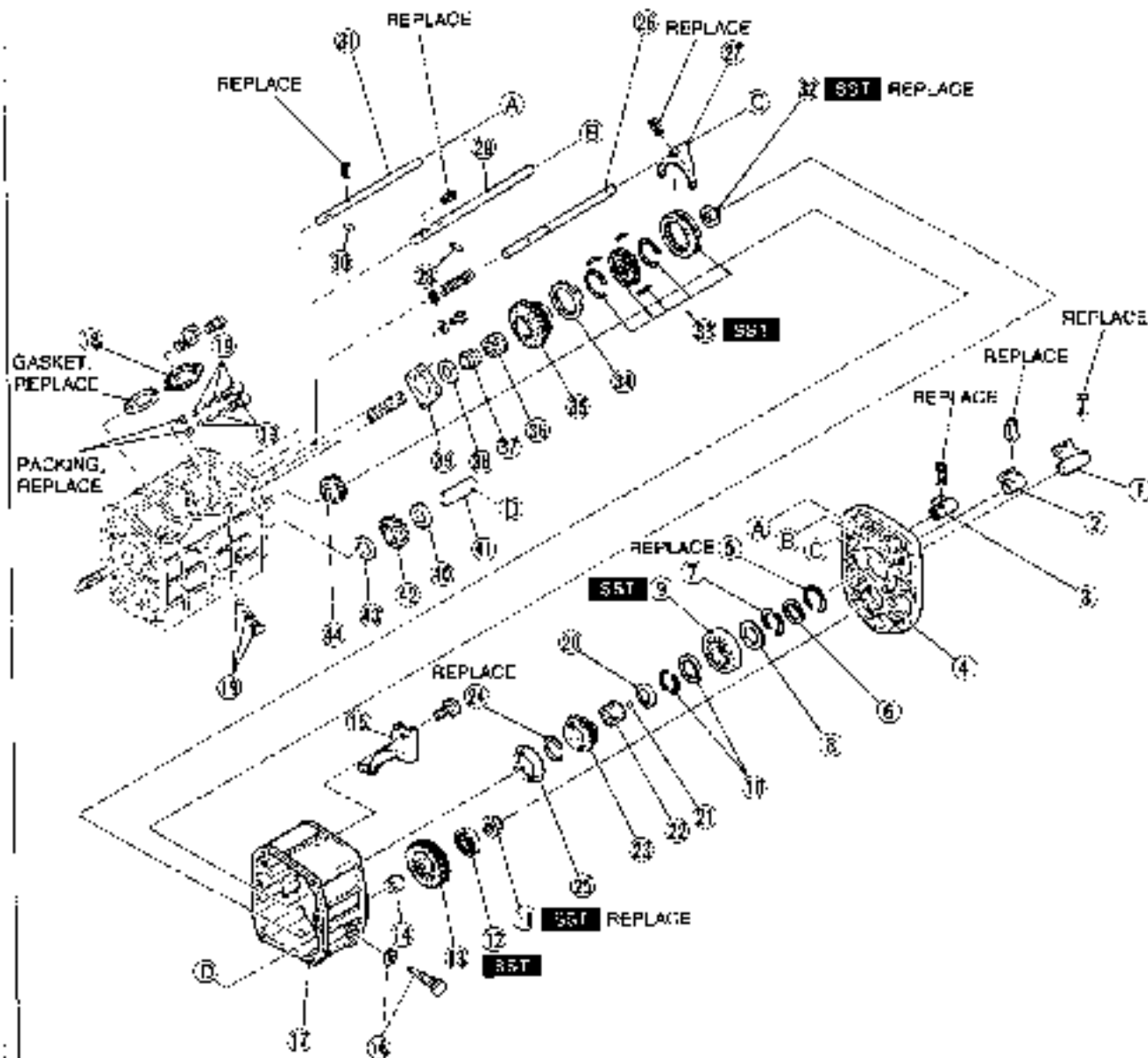
CRU642013

**Disassembly note**  
**Extension Housing**

1. Move the control rod end to the neutral position.
2. Push the control rod to the left, and remove the extension housing.

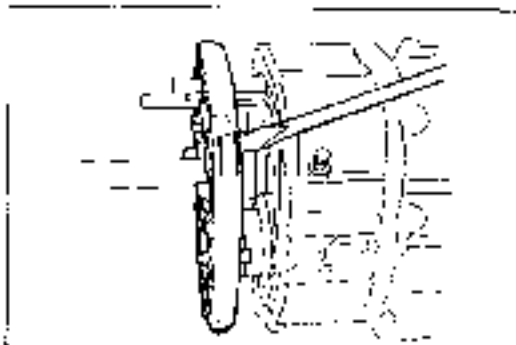
### 5th/Reverse Gear and Housing Parts

Disassemble in the order shown in the figure, referring to **Disassembly Note**

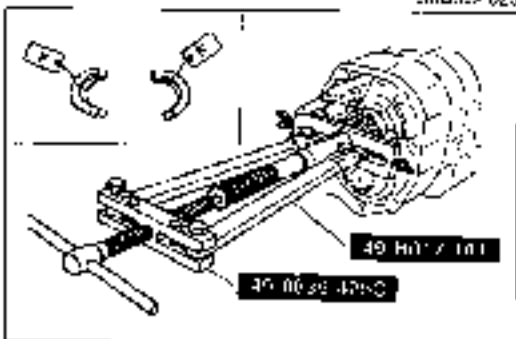


1. 5th/Reverse shift rod end Installation..... page J2-35	16. Set bolt and washer	30. Interlock pin
2. 3rd/4th shift rod end Installation..... page J2-35	17. Center housing Removal..... page J2-14 Installation..... page J2-33	31. 1st/2nd shift rod Removal..... page J2-15 Installation..... page J2-32
3. 1st/2nd shift rod end Installation..... page J2-35	18. Blind cover	32. Locknut
4. Bearing housing Removal..... page J2-13 Installation..... page J2-35	19. Cap plug, spring, and detent ball	33. Clutch hub assembly (5th/Reverse) Removal..... page J2-15 Inspection..... page J2-22
5. Snap ring	20. Thrust lock washer	34. Synchronizer ring (Reverse) Inspection..... page J2-22
6. Thrust washer	21. Steel ball	35. Reverse gear Inspection..... page J2-21 Installation..... page J2-31
7. C-washer	22. Bearing Inspection..... page J2-22	36. Bearing Inspection..... page J2-22
8. Retaining ring	23. 5th gear Inspection..... page J2-21 Installation..... page J2-31	37. Inner race
9. Mainshaft rear bearing Removal..... page J2-13 Inspection..... page J2-22 Installation..... page J2-34	24. Retaining ring	38. Thrust washer
10. C-washer and retaining ring	25. Synchronizer ring (5th) Inspection..... page J2-22	39. Bearing cover
11. Locknut	26. 5th/Reverse shift rod Removal..... page J2-14 Installation..... page J2-32	40. Thrust washer
12. Countershaft rear bearing Removal..... page J2-14 Inspection..... page J2-22 Installation..... page J2-34	27. 5th/Reverse shift fork Installation..... page J2-32	41. Reverse idler gear shaft Inspection..... page J2-23
13. Counter 5th gear Inspection..... page J2-21	28. Interlock pin	42. Reverse idler gear Inspection..... page J2-23
14. Spacer	29. 3rd/4th shift rod Removal..... page J2-15 Installation..... page J2-32	43. Thrust washer
15. Oil guide		44. Counter reverse gear Inspection..... page J2-21

98J02-016



6M103R 025



6M103R 026

**Disassembly note**

**Bearing housing**

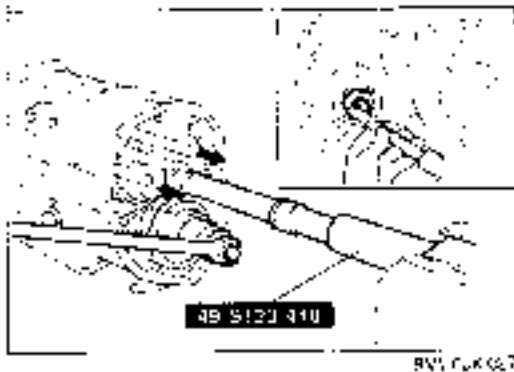
Carefully pry the bearing housing away from the transmission case with a screwdriver, being careful not to damage the housing or case. Slide the bearing housing off the mainshaft.

**Mainshaft rear bearing**

**Note**

The front and rear C-washers may have different thicknesses.

1. Remove the snap ring, washer, retaining ring, and C-washers.
2. For proper reassembly identify the front and rear C-washers.
3. Remove the mainshaft rear bearing with the SST.



### Countershaft rear bearing

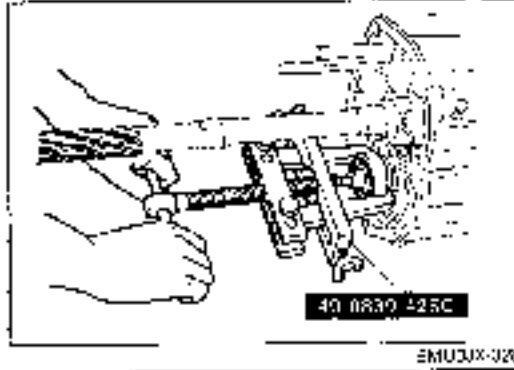
#### Caution

Do not reuse the locknut.

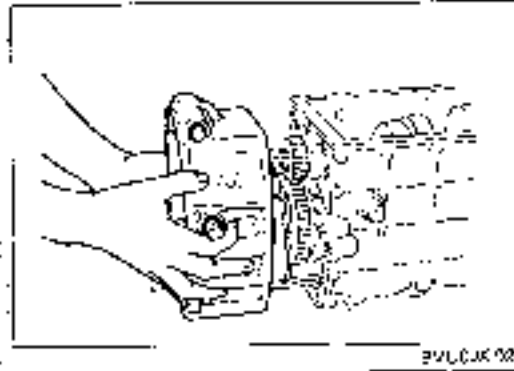
1. Uncrimp the lap of the locknut.
2. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in a double-engaged condition.

#### Note

Use the protective plates to prevent damage to the SST.

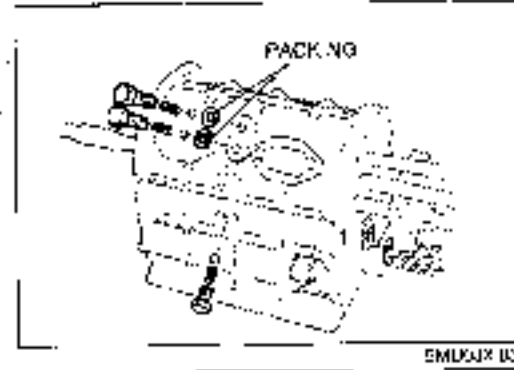


3. Hold the mainshaft with the **SST** and a vise.
4. Remove the locknut.
5. Remove the countershaft rear bearing with the **SST**.



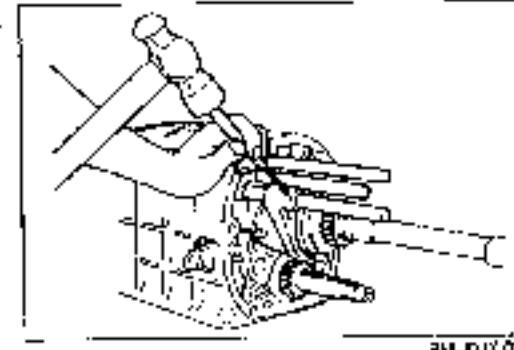
### Center housing

1. Remove the cap screws from the center housing.
2. Remove the center housing. If necessary, tap the housing with a plastic hammer.

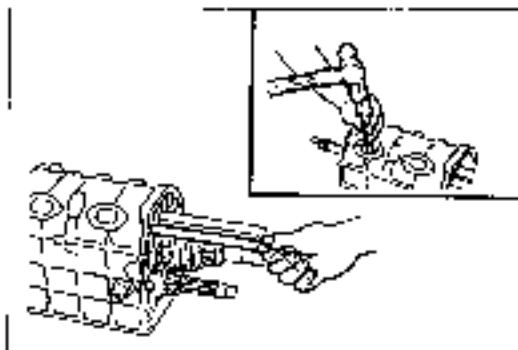


### 5th/reverse shift rod

1. Remove the packing and three cap plugs, then the detent balls and springs.



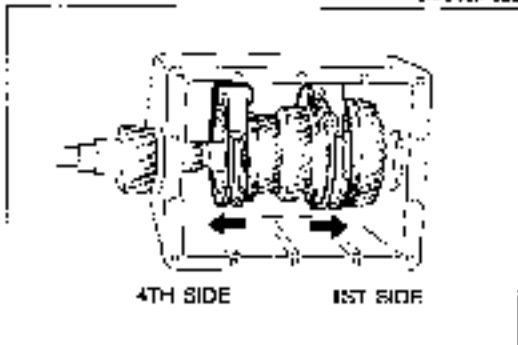
2. Drive the rod pin from the 5th/Reverse shift fork. Slide the 5th/reverse shift rod out of the transmission case.



24406-2-C33

**1st/2nd, and 3rd/4th shift rods**

1. Remove the blind covers and gaskets.
2. Shift the transmission into 4th gear. This will provide adequate space to drive out the roll pin. Drive the roll pin from the 3rd/4th shift fork.
3. Slide the 3rd/4th shift rod out from the rear of the transmission case.
4. Drive the roll pin from the 1st/2nd shift fork. Slide the 1st/2nd shift rod out from the rear of the transmission case.
5. Remove the interlock pins.

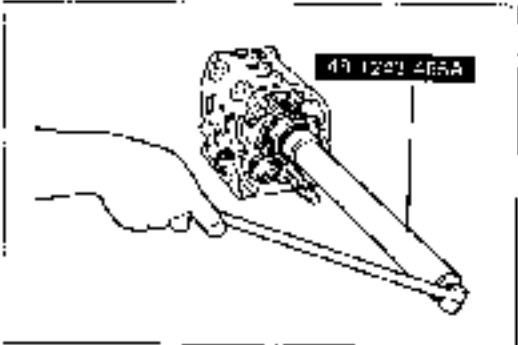


4TH SIDE 1ST SIDE

221002-005

**5th/Reverse clutch hub assembly**

1. Unclamp the tab of the locknut.
2. Shift into 1st gear and 4th gear to lock the rotation of the mainshaft.

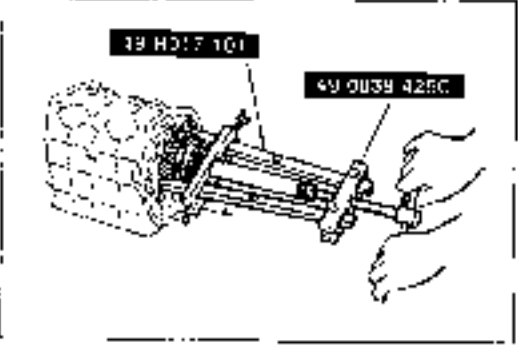


97 0016-005

**Caution**

**Do not reuse the locknut.**

3. Remove the locknut with the **SST**.

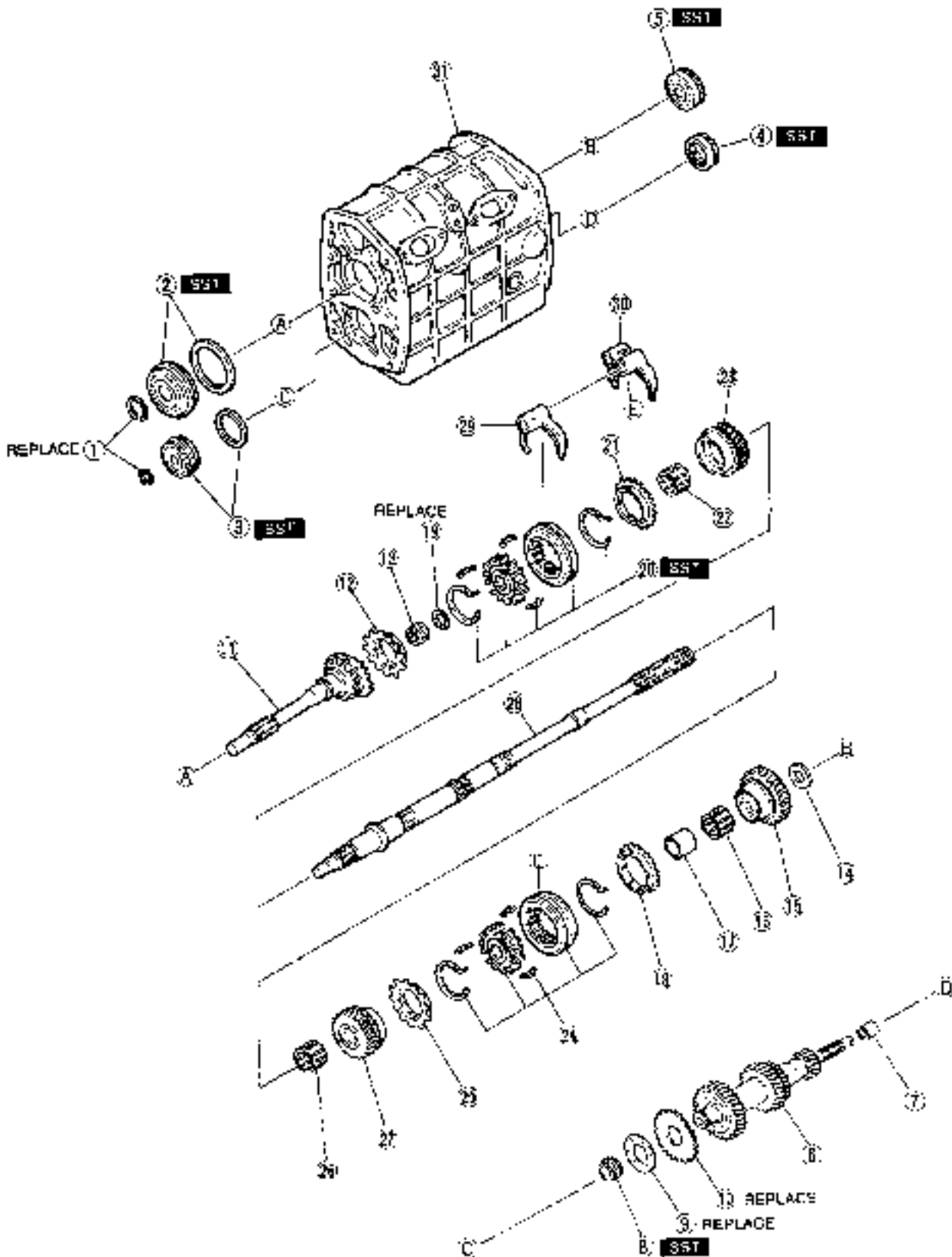


5M 0113-009

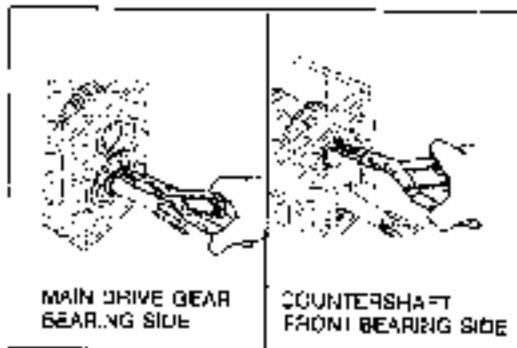
4. Remove the bearing cover installation bolts.
5. Attach the **SST** to the bearing cover and remove the assembly, which consists of the following parts:
  - 5th/Reverse clutch hub assembly
  - Synchronizer ring
  - Needle bearing
  - Inner race
  - Reverse gear
  - Thrust washer
6. Remove the thrust washers, reverse idler gear shaft, and reverse idler gear.

### Mainshaft

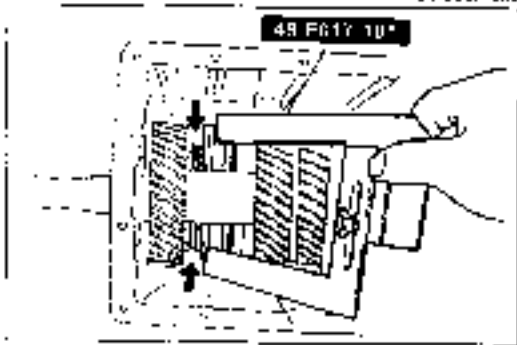
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



1. Snap ring Removal . . . . . page J2-17	8. Countershaft front bearing spacer Removal . . . . . page J2-20 Installation . . . . . page J2-27	21. Synchronizer ring (3rd) Inspection . . . . . page J2-22
2. Main drive gear bearing and adjustment shim Removal . . . . . page J2-17 Inspection . . . . . page J2-22	9. Diaphragm spring	22. Bearing Inspection . . . . . page J2-22
3. Countershaft front bearing and adjustment shim Removal . . . . . page J2-18 Inspection . . . . . page J2-22 Installation . . . . . page J2-27	10. Friction gear	23. 3rd gear Inspection . . . . . page J2-21
4. Countershaft center bearing Inspection . . . . . page J2-22	11. Main drive gear Inspection . . . . . page J2-21	24. Clutch hub assembly (1st/2nd) Removal . . . . . page J2-20 Inspection . . . . . page J2-22
5. Mainshaft front bearing Removal . . . . . page J2-18 Inspection . . . . . page J2-22 Installation . . . . . page J2-28	12. Synchronizer ring (4th) Inspection . . . . . page J2-22	25. Synchronizer ring (2nd) Inspection . . . . . page J2-22
6. Countershaft Removal . . . . . page J2-19 Inspection . . . . . page J2-21 Installation . . . . . page J2-26	13. Bearing Inspection . . . . . page J2-22	26. Bearing
7. Countershaft center bearing inner race Removal . . . . . page J2-20	14. Thrust washer Inspection . . . . . page J2-21	27. 2nd gear Inspection . . . . . page J2-21
	16. Bearing	28. Mainshaft Removal . . . . . page J2-19 Inspection . . . . . page J2-21 Installation . . . . . page J2-26
	17. Inner race	29. 3rd/4th shift fork
	18. Synchronizer ring (1st) Inspection . . . . . page J2-22	30. 1st/2nd shift fork
	19. Snap ring Removal . . . . . page J2-17	31. Transmission case Installation . . . . . page J2-26
	20. Clutch hub assembly (3rd/4th) Removal . . . . . page J2-19 Inspection . . . . . page J2-22	



3A001X C39



3A001X D40

**Disassembly note**

**Snap ring**

**Caution**

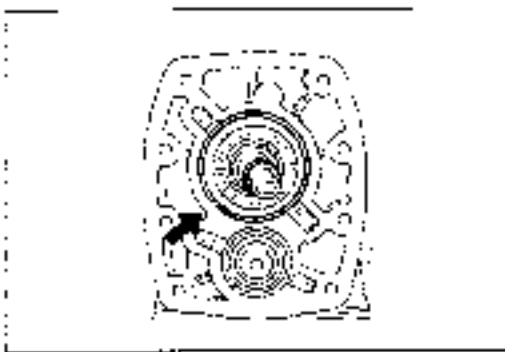
Do not reuse the snap ring.

Remove the snap rings.

**Main drive gear bearing**

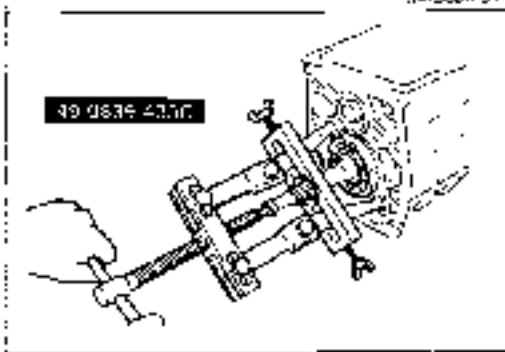
1. Install the SST between the 4th gear synchronizer ring and synchronismesh gear on the main drive gear.





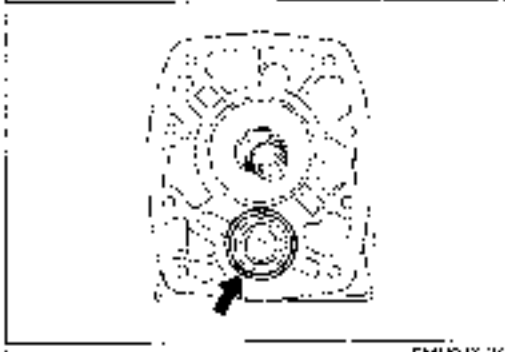
5M100X 041

2. Turn the bearing snap rings so that the ends are **90°** to the case grooves.



5M100X 042

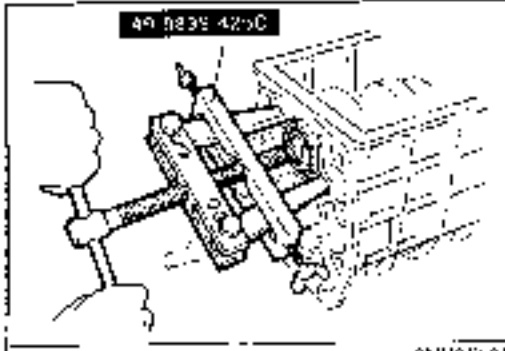
3 Remove the main drive gear bearing with the **SST**.



5M100X 043

**Countershaft front bearing**

1. Turn the bearing snap rings so that the ends are **90°** to the case grooves

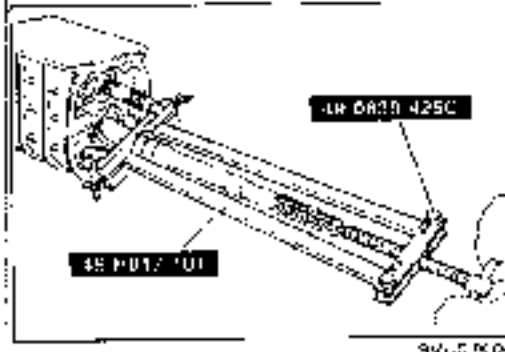


5M100X 044

**Note**

Replace the countershaft front bearing and countershaft front spacer as one assembly.

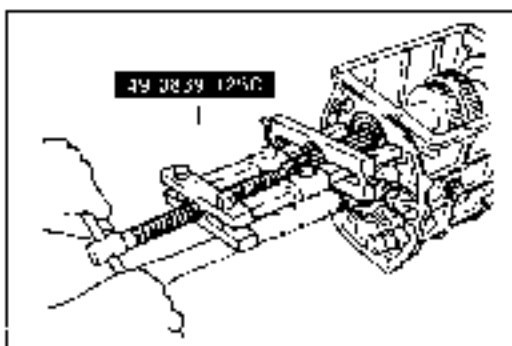
2. Remove the countershaft front bearing with the **SST**.



5M100X 045

**Mainshaft front bearing**

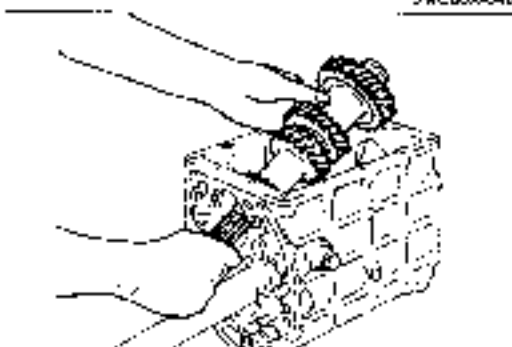
Remove the mainshaft front bearing with the **SST**



DWL60X-048

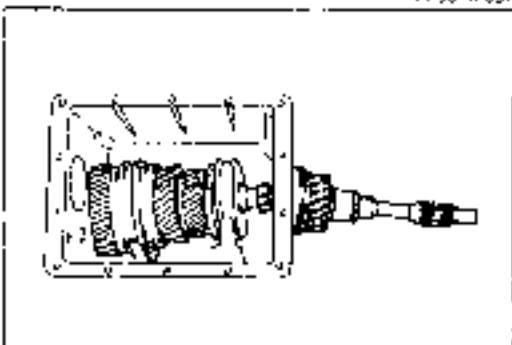
**Countershaft**

1. Remove the countershaft center bearing with the **SST**.



771070-037

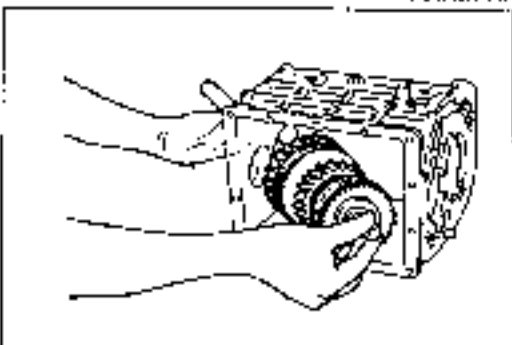
2. Remove the countershaft.



921053-047

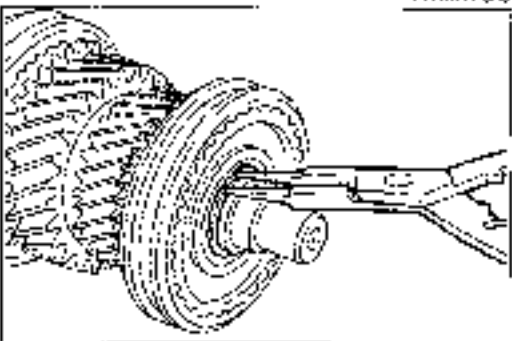
**Mainshaft and gear assembly**

1. Remove the main drive gear from the transmission case.



771054-036

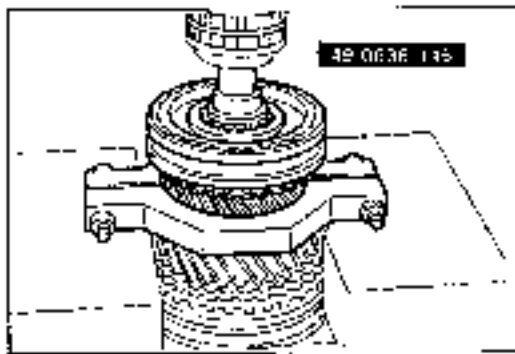
2. Remove the mainshaft and gear assembly from the transmission case.



94ML3LX-048

**3rd/4th clutch hub assembly****Caution****Do not reuse the snap ring.**

1. Remove the snap ring from the front of the mainshaft.



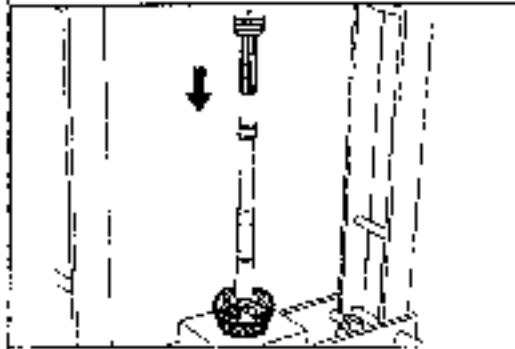
3M.J01X-349

2. Position the **SST** between 2nd and 3rd gears

**Caution**

Hold the mainshaft with one hand so that it does not fall.

3. Press the mainshaft out of 3rd gear and 3rd/4th clutch hub assembly.



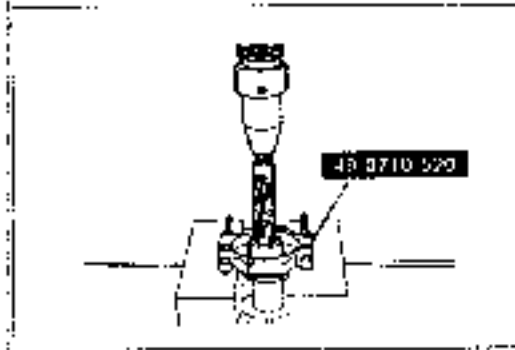
4M.J01X-250

**1st/2nd clutch hub assembly**

**Caution**

Hold the mainshaft with one hand so that it does not fall.

Press the 1st/2nd clutch hub assembly and 1st gear sleeve from the mainshaft



5M.J01X-111

**Countershaft center bearing inner race**

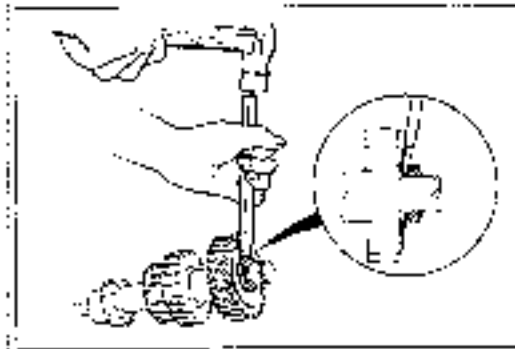
**Caution**

Hold the countershaft with one hand so that it does not fall.

**Note**

Replace the countershaft center bearing and countershaft center bearing inner race as one assembly.

Remove the inner race of the countershaft center bearing from the countershaft with the **SST**



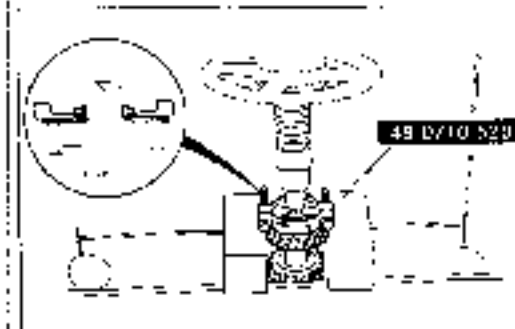
7M.J01X-007

**Countershaft front bearing spacer**

1. Tap the spacer away from the diaphragm spring.

**Note**

- a) Replace the countershaft front bearing and spacer as an assembly if either is replaced.
- b) Do not reuse the diaphragm spring.



2M.J01X-008

2. Position the **SST** under countershaft front bearing spacer

**Caution**

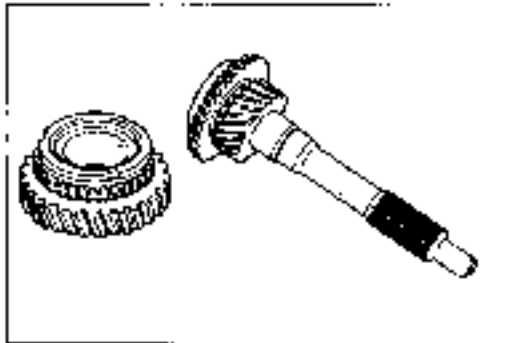
Hold the countershaft with one hand so that it does not fall.

3. Press the countershaft out of the countershaft front bearing spacer.
4. Remove the diaphragm spring and friction gear

**INSPECTION**

inspect all parts, and repair or replace as necessary.

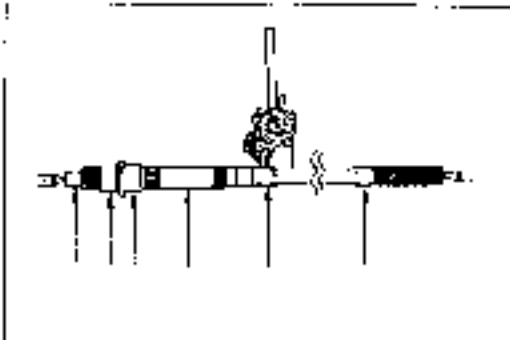
9MUBJX066



9MUBJX066

**Each gear and main drive gear**

1. Inspect synchronizer cones for wear.
2. Inspect individual gear teeth for damage, wear, cracks.
3. Inspect synchronizer ring matching teeth for damage or wear.
4. Inspect main drive gear splines for damage or wear.



9KJLJX066

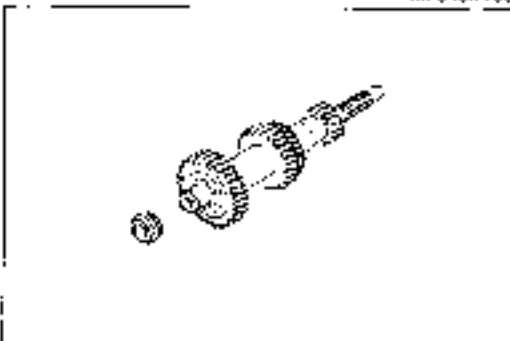
**Mainshaft**

1. Measure the mainshaft runout.

**Maximum: 0.03mm (0.0012 in)**

2. Inspect splines for damage or wear.
3. Measure the clearance between mainshaft and gear (or bush).

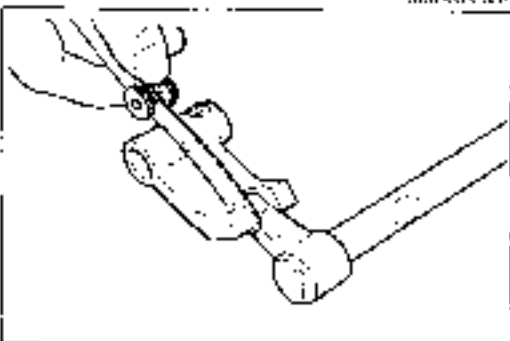
**Maximum: 0.15mm (0.006 in)**



9MKNJC357

**Countershaft**

1. Inspect gear teeth for damage, wear, cracks.
2. Inspect splines for damage or wear.

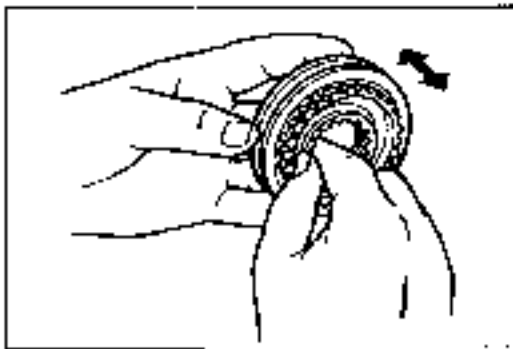


9BLGJZ032

**Control lever and shift rod**

Measure the clearance between the control lever and the gear of the shift rod.

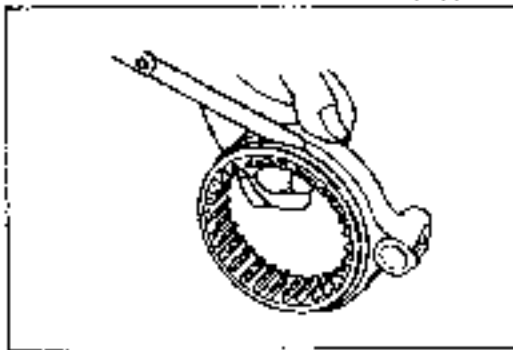
**Clearance: 0.8mm (0.032 in) max.**



9M1221X-050

**Clutch hub assembly**

1. Inspect for clutch hub sleeve and hub operation.
2. Inspect individual gear teeth for damage, wear, cracks.
3. Inspect synchronizer key for damage, wear, cracks.

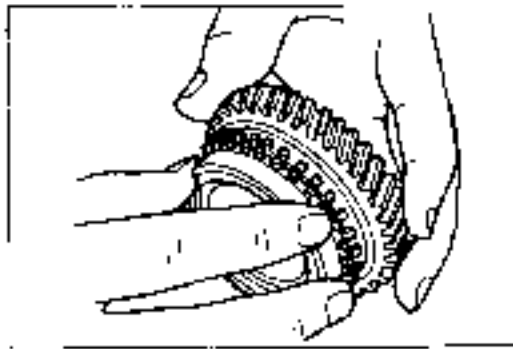


9M1221Y-060

4. Measure the clearance between hub sleeve and release fork.

**Standard clearance:**

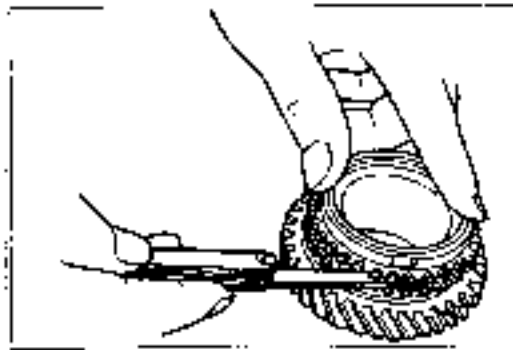
0.2—0.3mm (0.008—0.012 in)

**Maximum:** 0.5mm (0.020 in)

9M1221Z-061

**Synchronizer ring**

1. Inspect individual synchronizer ring teeth for damage, wear, cracks.
2. Inspect taper surface for wear or cracks.

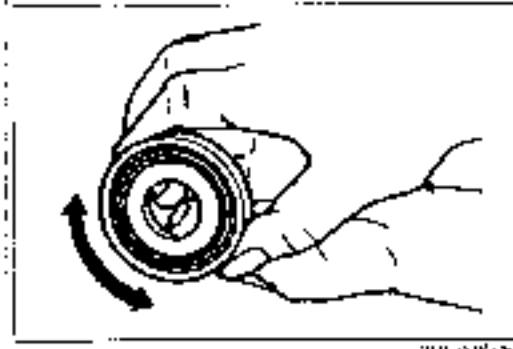


19L026700

**Note**

Set the synchronizer ring squarely in the gear; then measure around the circumference.

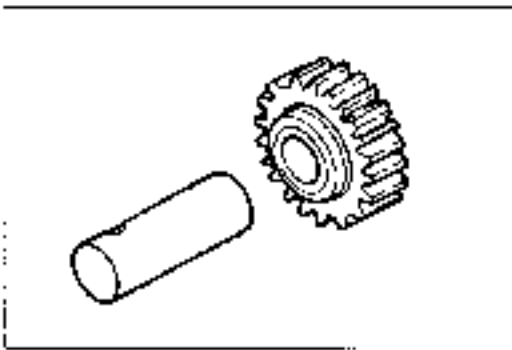
3. Measure the clearance between synchronizer ring and flank surface of gear.

**Standard clearance:** 1.5mm (0.059 in)**Minimum:** 0.8mm (0.032 in)

9M1221A-062

**Bearing**

Inspect for damage or rough rotation.



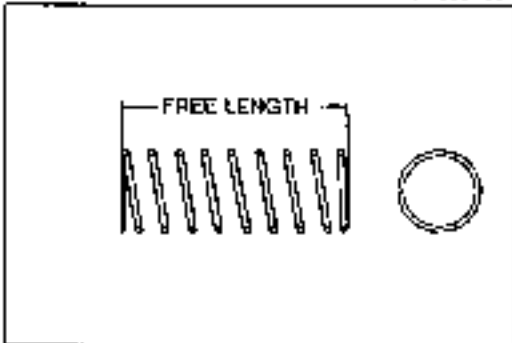
99A.GJJK.054

**Reverse idler gear and shaft**

1. Inspect gear teeth for damage, wear, cracks.
2. Measure the clearance between reverse idle gear bush and shaft.

**Standard clearance:**

0.02—0.05mm (0.0008—0.0020 in)

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

99A.GJJK.063

**Springs**

Measure the free length of spring.

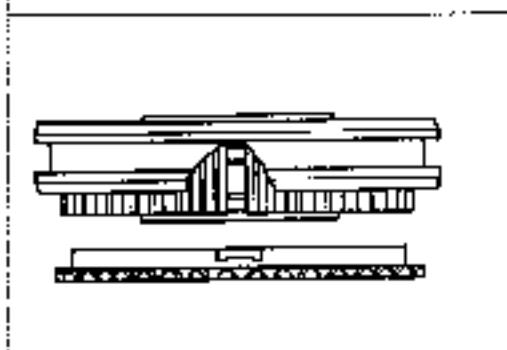
**Standard free length****Detent ball spring: 22.5mm (0.886 in)**

**ASSEMBLY**

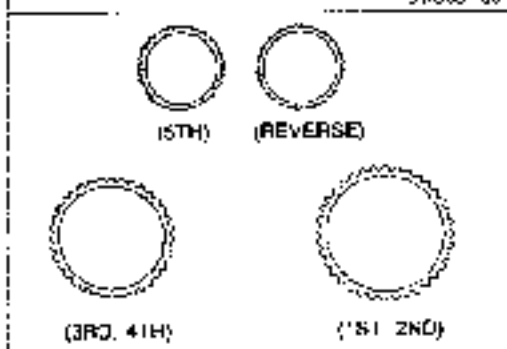
**Precaution**

- All O-rings and gasket must be replaced with the new ones included in the overhaul kit.
- Assemble the parts within 10 minutes after applying sealant. Allow all sealant to cure at least 30 minutes after assembly before filling the transmission with transmission oil.
- After assembly, shift the transmission to each position, and check that the smooth and correct operation.

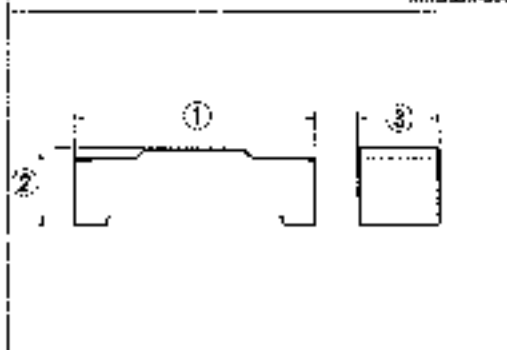
2903JX-014



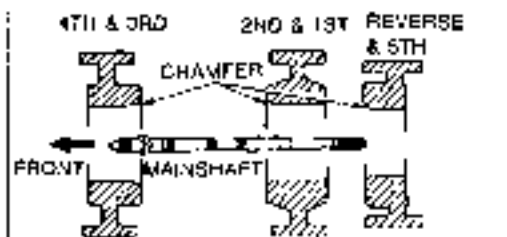
9MJCUX-067



9MJCUX-068



9MJCUX-069



9MJCUX-070

**Clutch hub**

**Caution**

Align the synchronizer ring grooves with the clutch hub keys during installation.

**Note**

- a) The synchronizer rings all have the same basic shape. Carefully note these distinguishing features.
  - 5th and Reverse synchronizer rings are the smallest.
  - 5th has notches in the teeth.
  - 4th and 3rd are the next larger and are exactly the same.
  - 2nd and 1st are the biggest and are exactly the same.
- b) There are two types of synchronizer keys.

Standard dimensions are as follows:

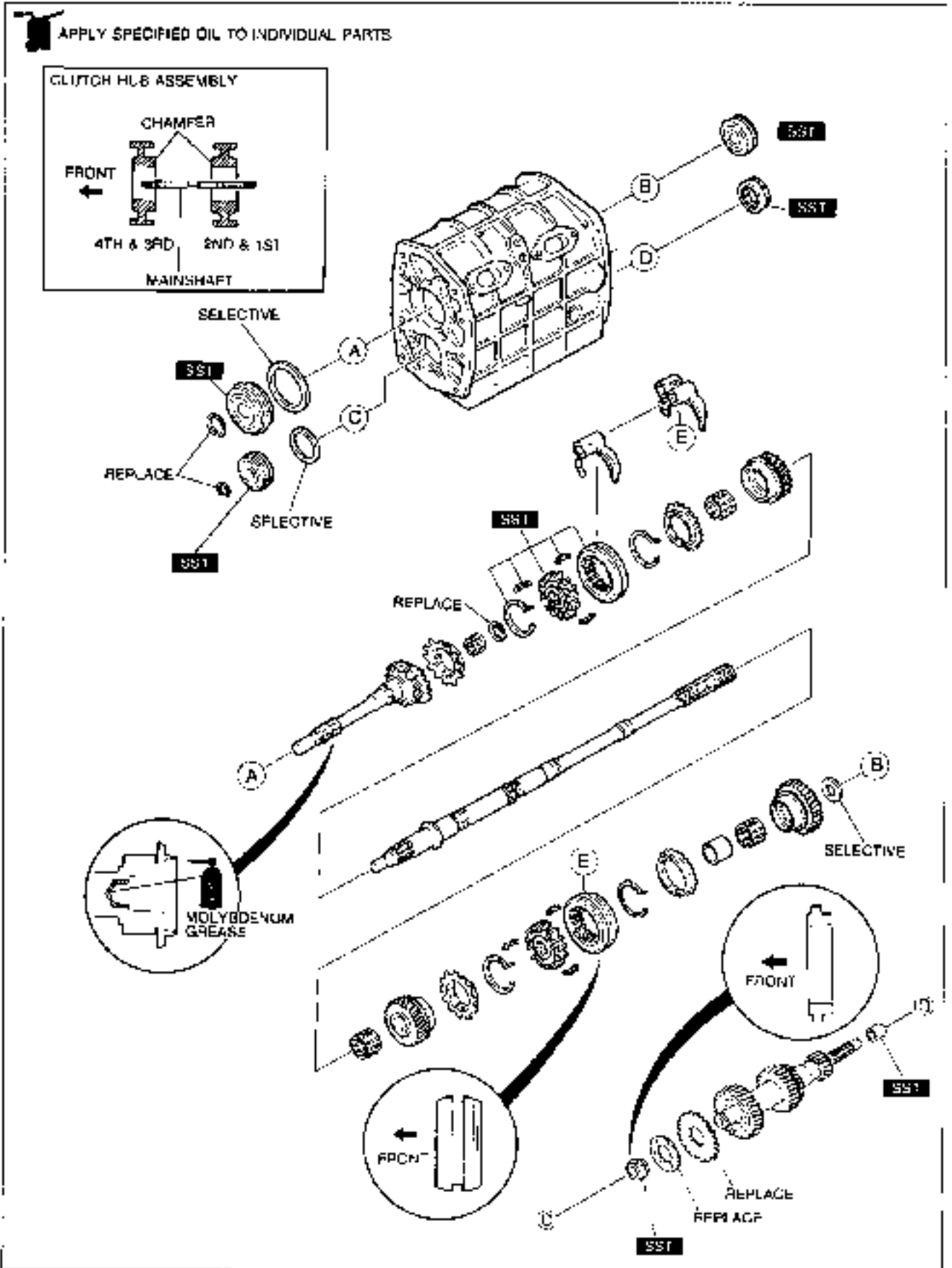
mm (in)

	①	②	③
1st and 2nd	18 (0.709)	5.45 (0.215)	5 (0.236)
3rd, 4th, 5th, and Rev.	17 (0.669)	4.25 (0.167)	5 (0.197)

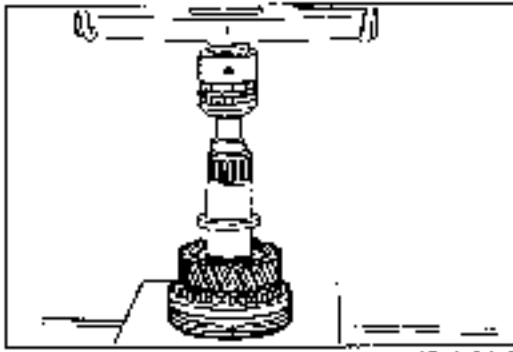
- c) Press each clutch hub assembly onto the mainshaft in the proper direction.
- d) Install the clutch hubs with the chamfers of the inner gear teeth as shown.

**Mainshaft**

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



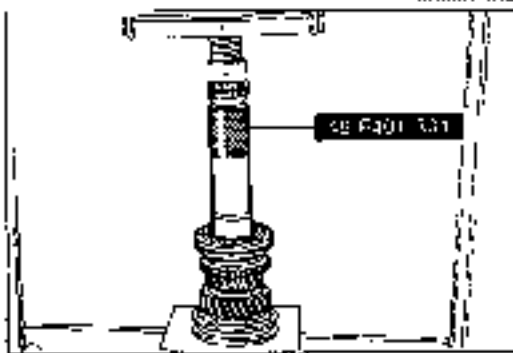




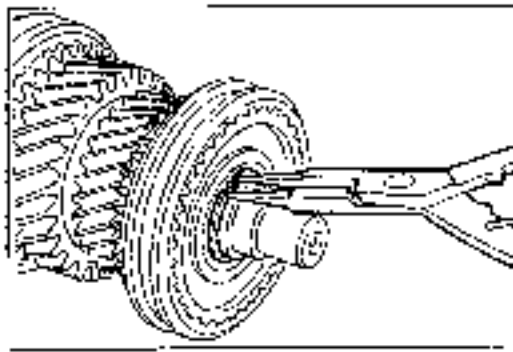
### Assembly note

#### Mainshaft

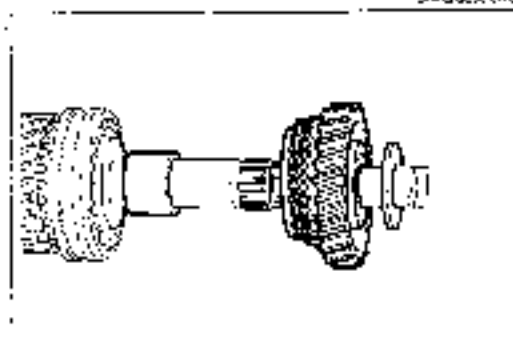
1. Set the 2nd gear and the 1st/2nd clutch hub assembly on the mainshaft, then press in the mainshaft.



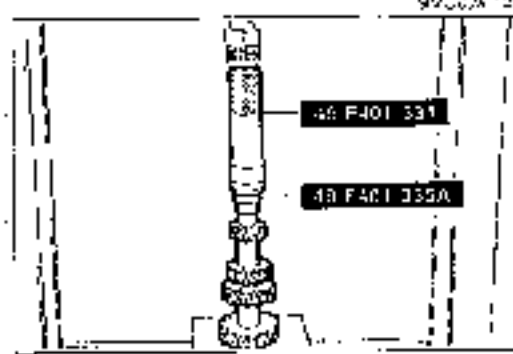
2. Set the 3rd gear, needle bearing, and 3rd/4th clutch hub assembly on the mainshaft, then press on the 3rd/4th clutch hub assembly with the **SST**.



3. Install a new snap ring on the front of the mainshaft.

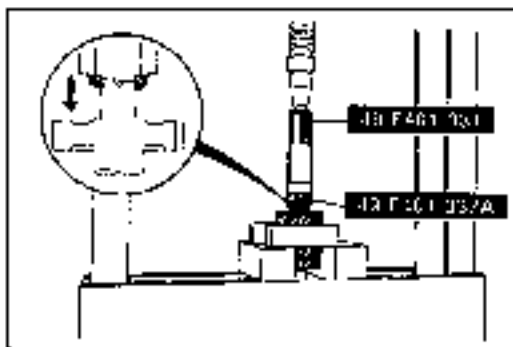


4. Install the inner race, 1st gear, and thrust washer.



#### Countershaft

Press the inner race of the countershaft rear bearing onto the countershaft with the **SST**.



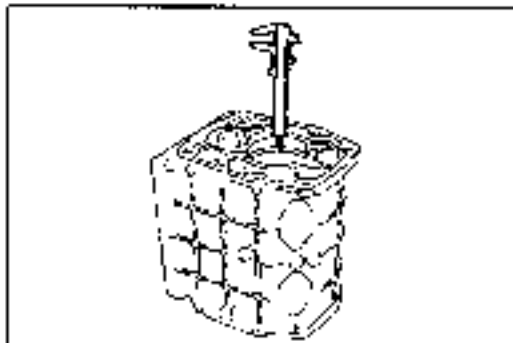
9MU3K-074

### Countershaft front bearing spacer

#### Note

Replace the countershaft front bearing and countershaft front bearing spacer as one assembly.

1. Install the friction gear, diaphragm spring, and countershaft front bearing spacer.
2. Press the countershaft front bearing spacer onto the countershaft with the SST.

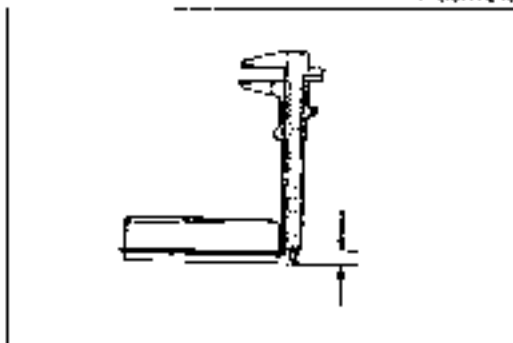


77X07A-016

### Measurement of Bearing Thrust Play

#### Mainshaft bearing

1. Measure the depth of the mainshaft bearing bore in the rear of the transmission case.



7FEC7A-056

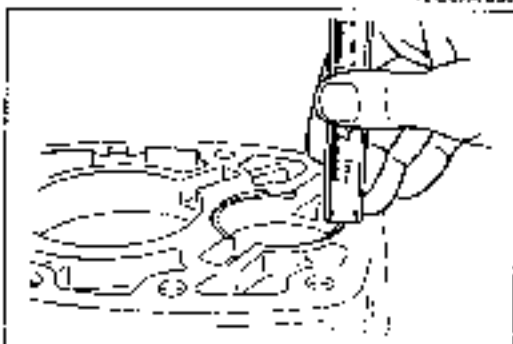
2. Measure the mainshaft bearing height. The difference between the two measurements indicates the required thickness of the adjustment shim.

#### Standard thrust play:

0—0.1mm (0—0.004 in)

#### Adjustment shim thickness:

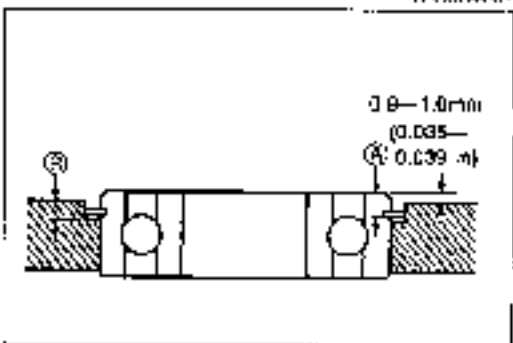
0.1mm (0.004 in), 0.3mm (0.012 in)



1FG07A-067

### Countershaft front bearing

1. Measure depth B of the countershaft front bearing bore in the transmission case.



7EBC1A-068

2. Measure the countershaft front bearing spring height A.
3. Choose an adjustment shim that will allow the difference between the two measurements to be equal to the standard bearing height.

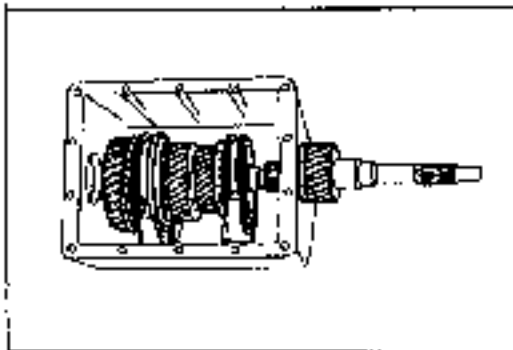
$$A - B + \text{Adjustment shim(s)} = 0.9 - 1.0\text{mm} \\ (0.035 - 0.039 \text{ in})$$

#### Standard bearing height on installing:

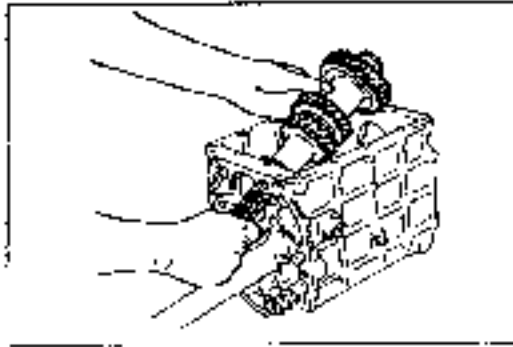
0.9—1.0mm (0.035—0.039 in)

#### Adjustment shim thickness:

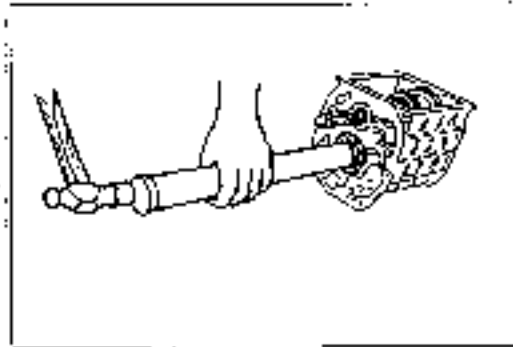
0.1mm (0.004 in), 0.3mm (0.012 in)



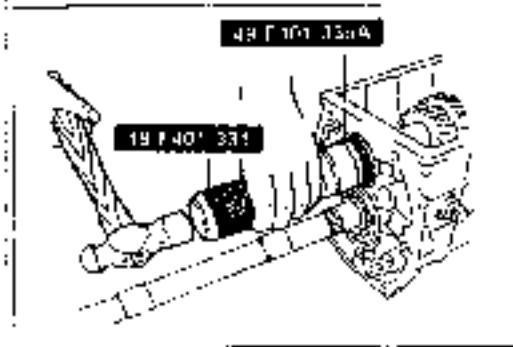
8MADUK279



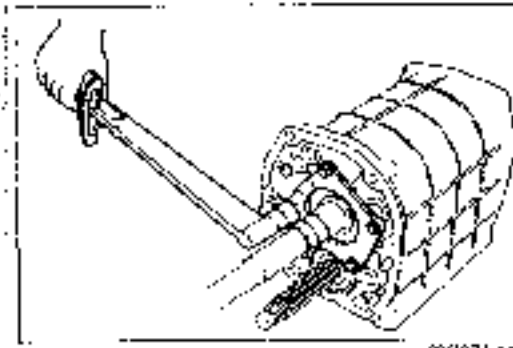
8MUDX078



7EG5TA 051



7HJ270150



680674-17

**Transmission case**

1. Position the 1st and 2nd shift forks and 3rd and 4th shift forks into the grooves of the clutch hub and sleeve assemblies.
2. Apply molybdenum grease to the needle bearing and install it in the main drive gear.
3. Install the main drive gear onto the front of the mainshaft.
4. Set the countershaft gear into the case, making sure that the countershaft gears engage each gear of the mainshaft assembly.

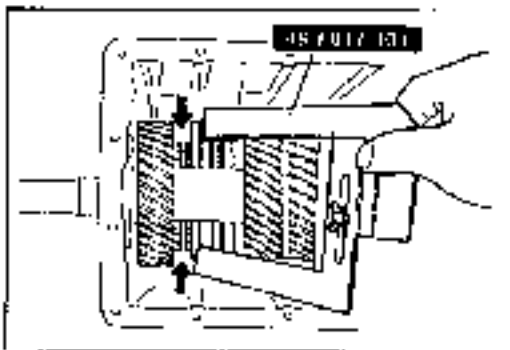
**Bearing for transmission case**

1. Install the correct shim onto the rear of the mainshaft as determined by "Measurement of Bearing Thrust Play".
2. Drive on the mainshaft bearing with a suitable pipe.
3. Drive the countershaft center bearing onto the rear of the countershaft with the **SST**.

4. Install the bearing cover

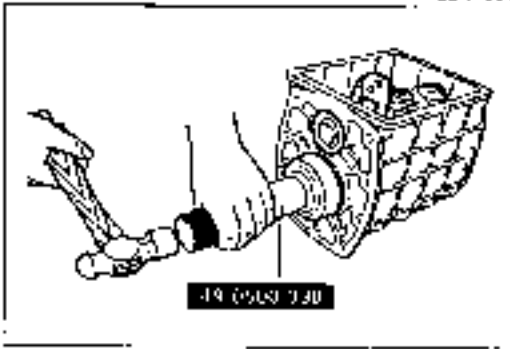
**Tightening torque:**

18—26 Nm (1.6—2.7 m-kg, 13—20 ft-lb)



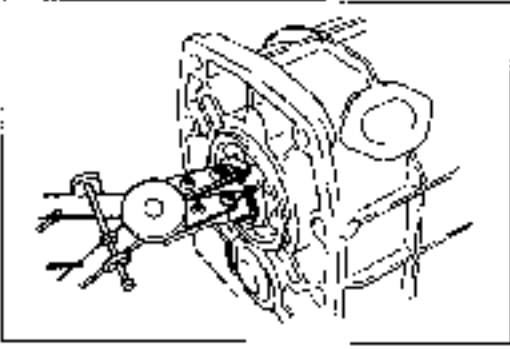
77307A-051

5. Install the **SST** between the 4th synchronizer ring and synchronesh gear or the main drive gear



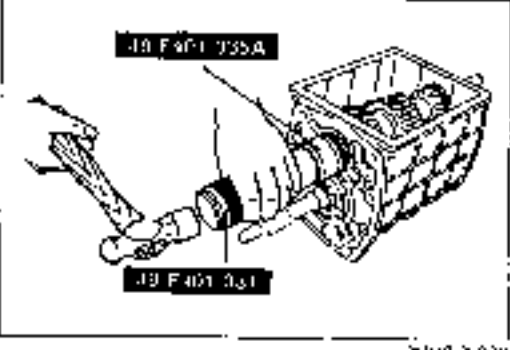
77307A-052

6 Drive on the main drive gear bearing with the **SST**.



3VLC6K 077

7 Install a new snap ring to secure the main drive gear bearing

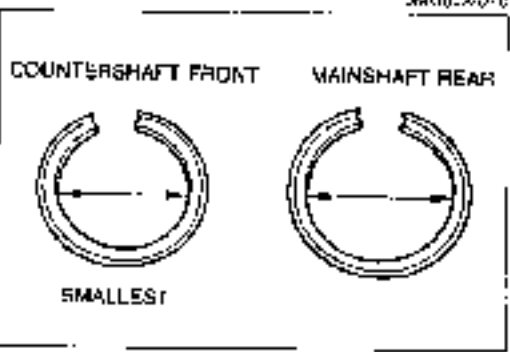


3VU03A-070

**Note**

Replace the countershaft front bearing and countershaft front bearing spacer as one assembly.

- 8. Install the correct shim into the countershaft front bearing as determined by "Measurement of Bearing Thrust Play"
- 9. Drive on the countershaft front bearing with the **SST**



3VU03A 073

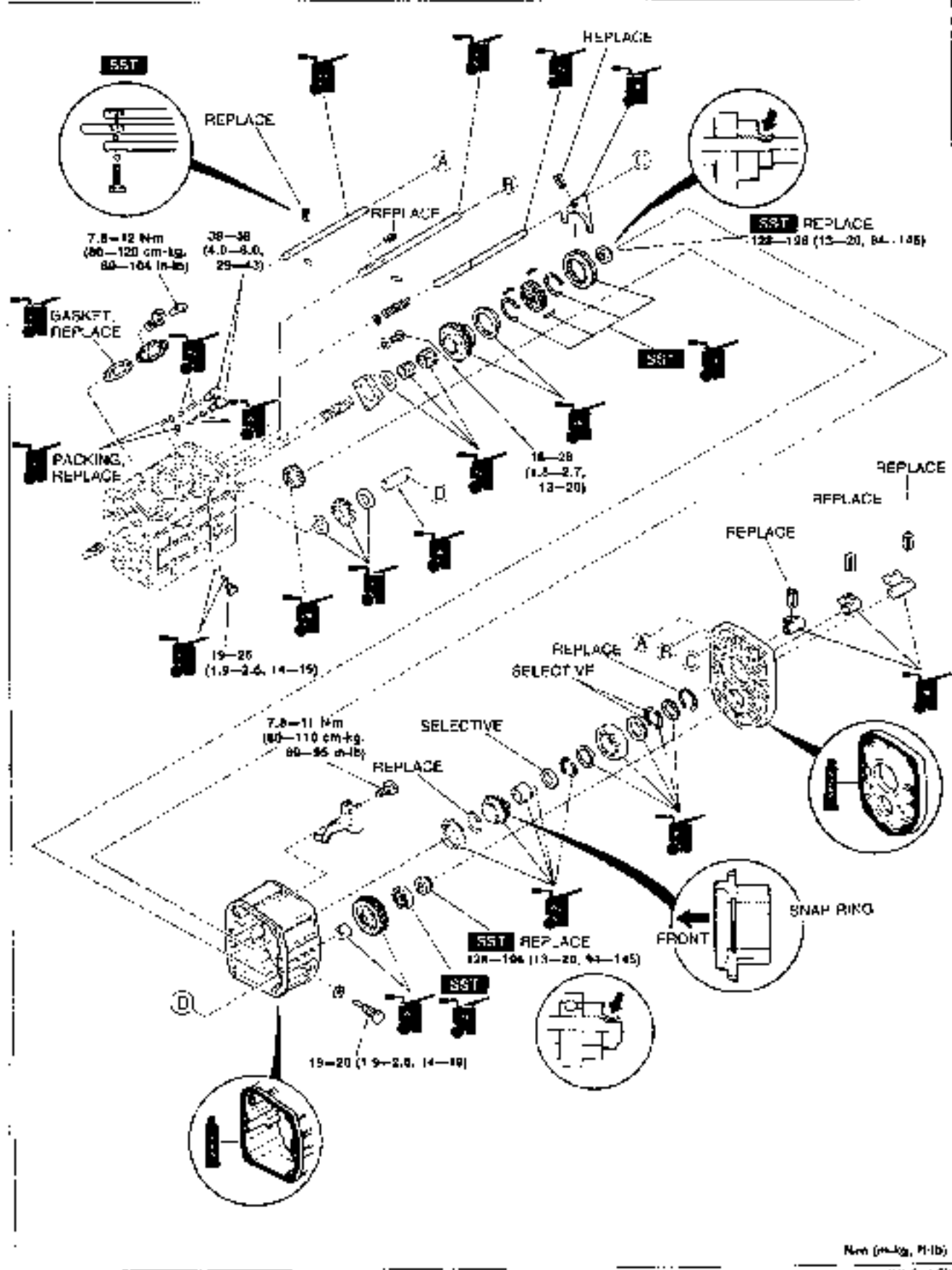
**Note**

Do not confuse the front and rear bearing snap rings. The countershaft front snap ring is smallest.

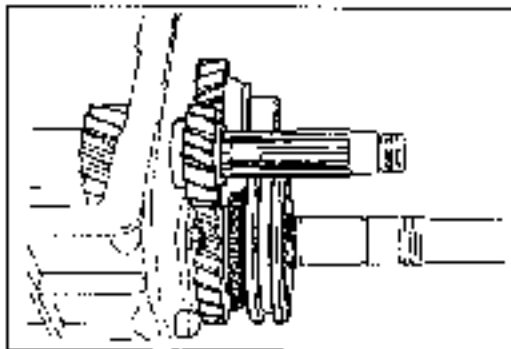
10. Install a new snap ring to secure the countershaft front bearing.

5th/Reverse Gear and Housing Parts

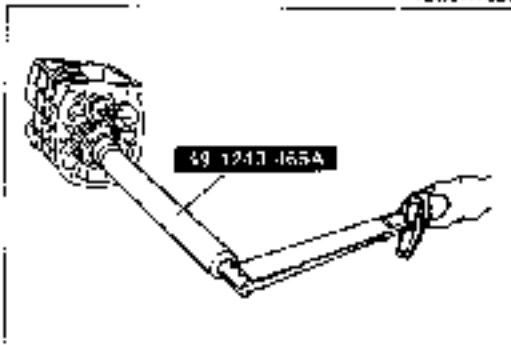
Assemble in the reverse order of disassembly, referring to the Assembly Note



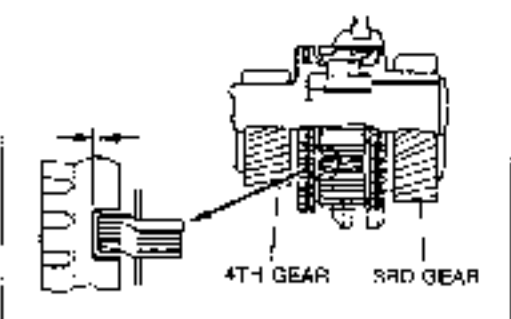
Nm (cm-kg, ft-lb)



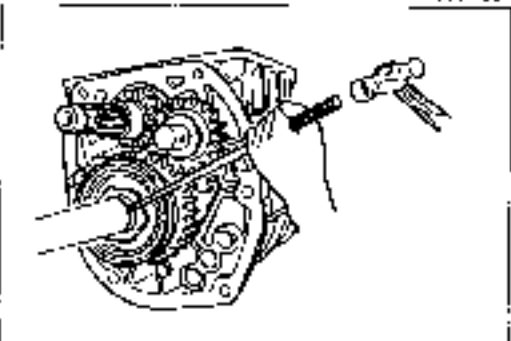
7EGC7A-064



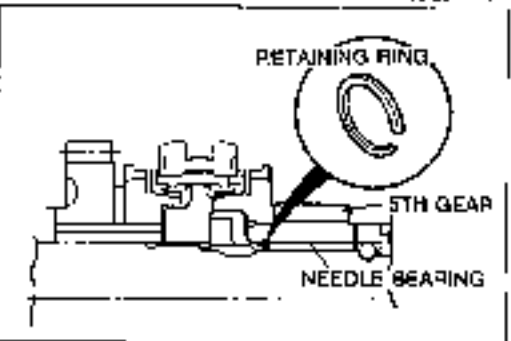
7EQ07A-065



3WJ07A-001



69307A-104



6WJ07A-082

**Assembly note****Reverse gear**

- 1 Install the reverse idler gear and shaft with a spacer on each side of the gear
- 2 Install the counter reverse gear (chamfer side forward) and spacer
- 3 Install the thrust washer, reverse gear, synchronizer ring, annular face, needle bearing, and clutch hub assembly.
- 4 Shift into 1st gear and reverse gear to lock the rotation of the mainshaft.
- 5 Install a new locknut and tighten it with the SST

**Tightening torque:**

128—196 Nm (13—20 m·kg, 94—145 ft·lb)

**Caution**

The total combined thickness of the front and rear thrust washers must equal 6.0mm (0.236 in).

- 6 Check the clearance between the synchronizer key and the exposed edge of the synchronizer ring. If it is not as specified, adjust with the thrust washers on the front and rear of the mainshaft bearing.

**Clearance:** 2.0mm (0.079 in) max.

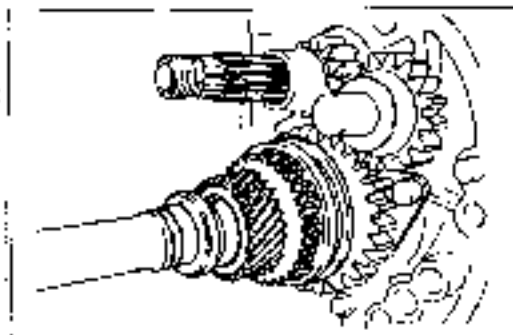
**Available thrust washer thickness:**

2.5mm (0.098 in), 3.0mm (0.118 in)  
3.5mm (0.138 in)

- 7 Stake the locknut into the mainshaft groove.

**5th gear**

- 1 Install the retaining ring to the 5th gear.

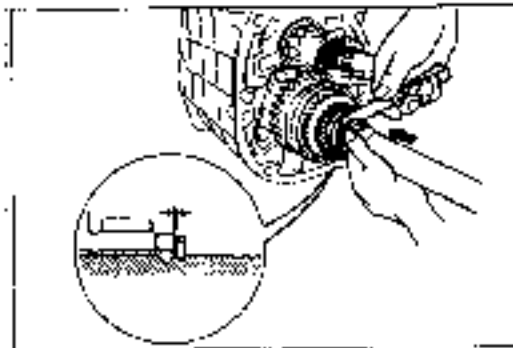


1E0312-004

2. Install the synchronizer ring, 5th gear, and needle bearing.
3. Install the steel ball and thrust lock washer.
4. Install only the two 3.0mm (0.118 in) thick C-washers in the front mainshaft groove and hold them with the retaining ring.

**Note**

If the C-washers are not pushed fully forward in the mainshaft groove the measurement will be incorrect.



1A, C, D, 005

5. While pushing the C-washers forward, measure the clearance between the thrust lock washer and C-washers. If the clearance is not as specified select the proper thrust lock washer.

**Standard:** 0.1—0.2mm (0.004—0.008 in)

**Available thrust lock washer thickness:**

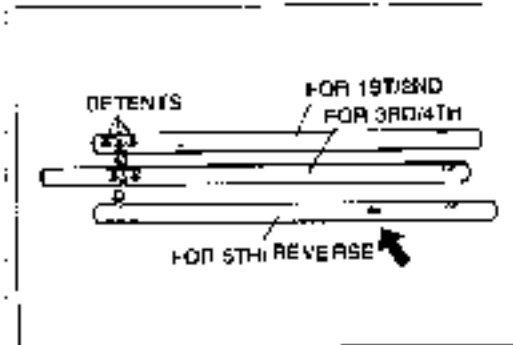
- 6.2mm (0.244 in), 6.3mm (0.248 in)
- 6.4mm (0.252 in), 6.5mm (0.256 in)
- 6.6mm (0.260 in), 6.7mm (0.264 in)

**Shift fork and rod****Note**

A simple way to identify the shift rods is as follows:

- The 3rd/4th shift rod is the longest.
- The 5th/Reverse shift rod has an extra hole for the shift fork at the rear of the rod.

When installing the shift rods, set the detents toward the ball side.

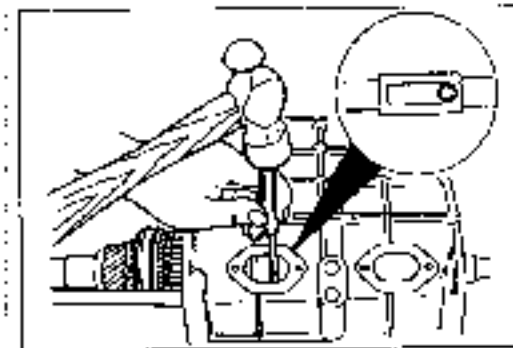


TEG077-001

**Caution**

The roll pin must be installed with the split as shown.

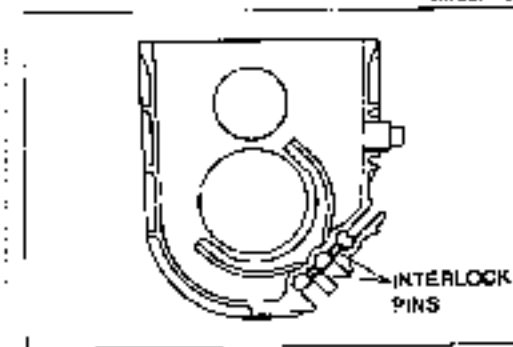
1. Slide the 1st/2nd shift rod into the case.
2. Secure the 1st/2nd shift fork to the rod with the new roll pin.



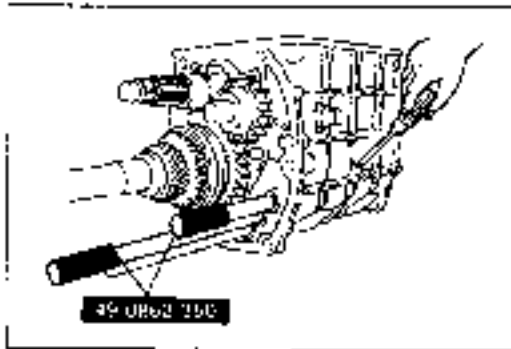
96U037-085

**Note**

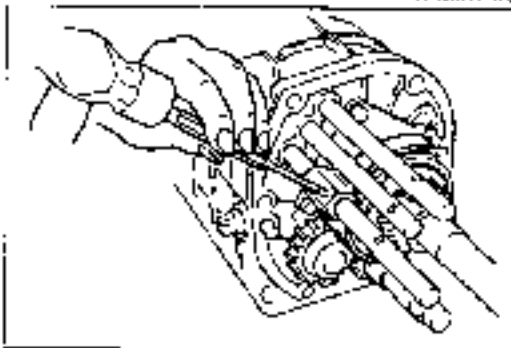
The interlock pins must be installed as shown.



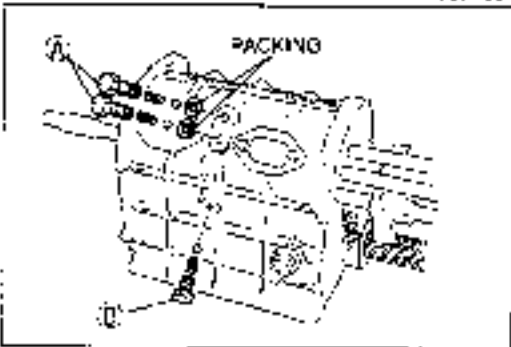
96U, D, J, 086



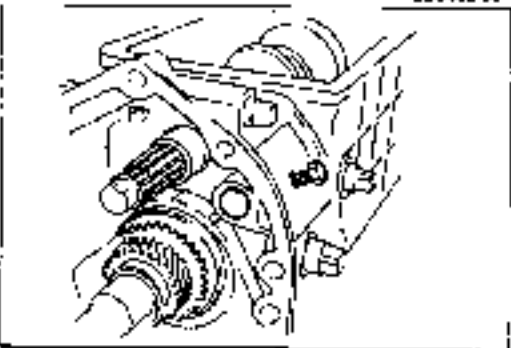
7F03TA100



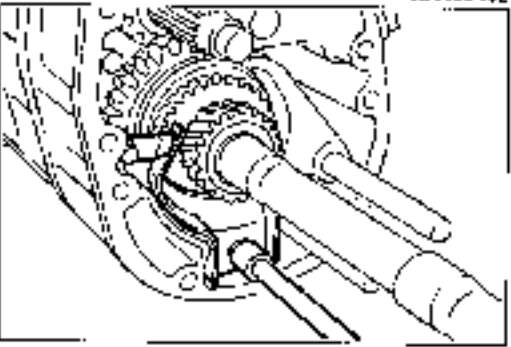
9M UJX-087



29 UJ2-007



28 UJ2-002



84 UJX-080

3. Slide the two **SST** into the transmission case to guide the interlock pins, and insert the first pin.
4. Remove the 3rd/4th shift fork guide from the case.
5. Slide the 3rd/4th shift rod into the case.
6. Secure the 2nd/4th shift rod onto the fork with the new roll pin.
7. Insert the remaining interlock pin and remove the **SST**.

8. Install the 5th/Reverse shift rod.
9. Secure the 5th/Reverse shift fork onto the shift rod with a new roll pin.

10. Install the two blind covers and new gaskets.

#### Tightening torque:

7.8—12 N·m (80—120 cm·kg, 69—104 in·lb)

11. Install the new packing, three center balls, three springs, and three cap bolts.

#### Tightening torque

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

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

#### Center housing

1. Apply sealant to the contact surfaces of the transmission case and center housing.
2. Install the center housing.  
Align the reverse idler gear shaft with the set bolt hole; then install the set bolt and gasket.

#### Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

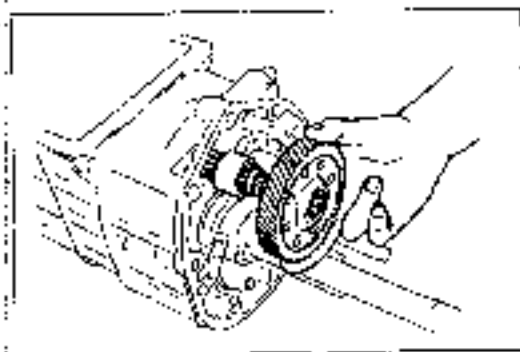
3. Install the oil guide.

#### Tightening torque:

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



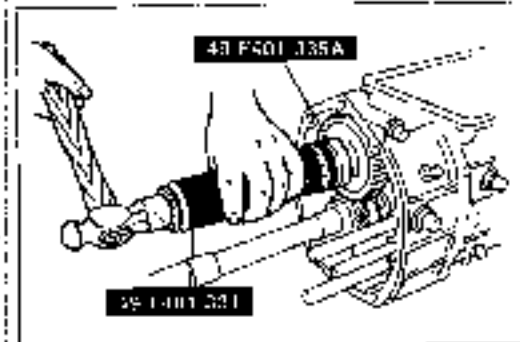
4. Install the spacer and counter 5th gear.



3VL.C.R.0E1

### Rear Bearing

1. Drive on the countershaft rear bearing with the SST.



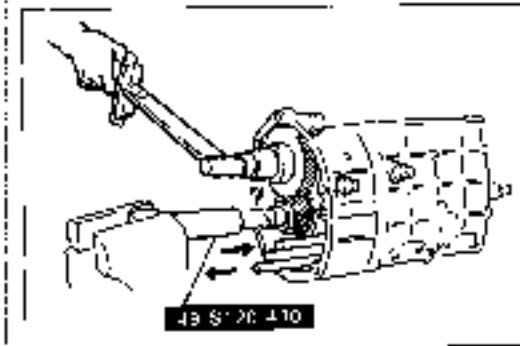
49 F401-135A

29 F401-281

### Note

Use the protective plates to prevent damage to the SST.

2. Connect the SST to the mainshaft and mount it securely in a vise.
3. Shift into 1st gear and reverse gear to lock the countershaft.
4. Install the new countershaft locknut.



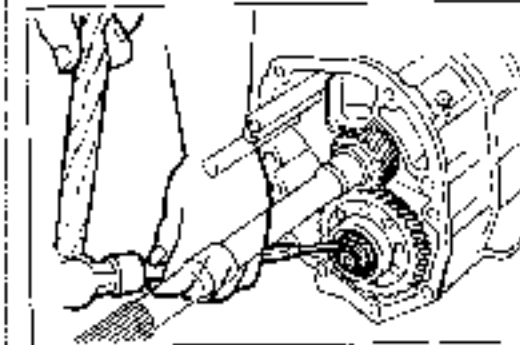
49 S120-110

3VL.L.0C02

### Tightening torque:

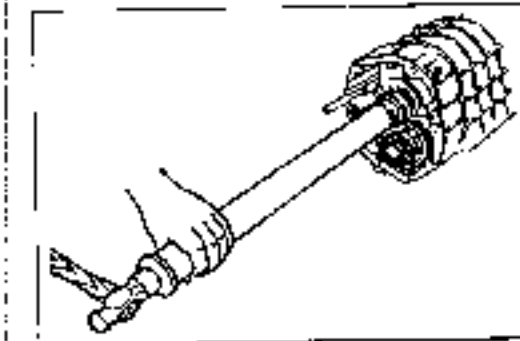
128—196 N·m (13—20 m·kg, 94—145 ft·lb)

5. Stake the locknut into the countershaft groove.

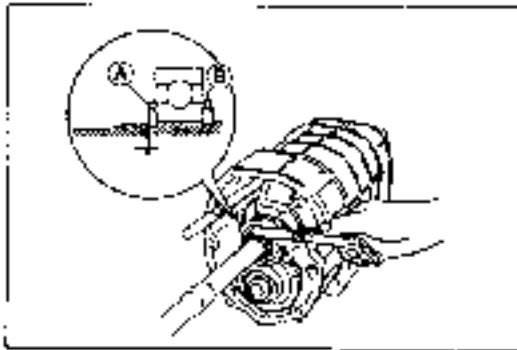


3VL.A30-053

6. Drive on the mainshaft rear bearing with a suitable pipe, fully seating it against the front C washers.



291.K117-008



95LJ017-004

7. Install the C-washers and hold them in place with the retaining ring.

**Note**

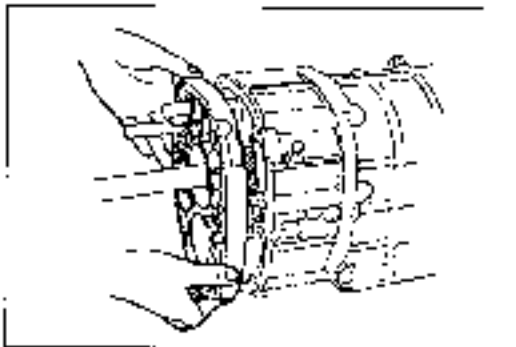
- a) If the points A and B as shown in the figure, are not pressed together tightly, the measurement will be incorrect.
- b) If the C-washers will not fit into the rear mainshaft groove, select the proper thickness C-washers.
- c) Ensure both C-washers at this position are the same thickness.

8. With the points A and B pressed tightly, together, measure the clearance between the C-washers and the groove. If the clearance is not as specified, select the proper C-washers.

**Standard: 0–0.1mm (0–0.004 in)**

**Available C-washer thicknesses:**

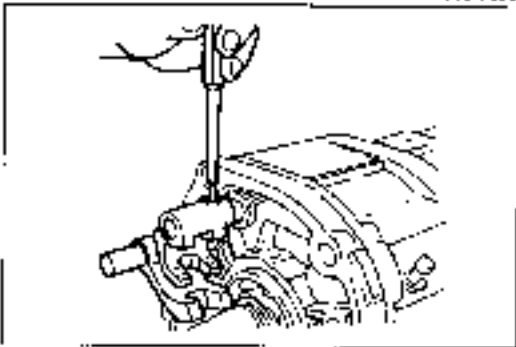
- 2.9mm (0.114 in), 3.0mm (0.118 in),
- 3.1mm (0.122 in), 3.2mm (0.126 in)



95LJ018-095

**Bearing housing**

1. Apply sealant to the contact surfaces of the center housing and bearing housing.
2. Install the bearing housing onto the center housing.



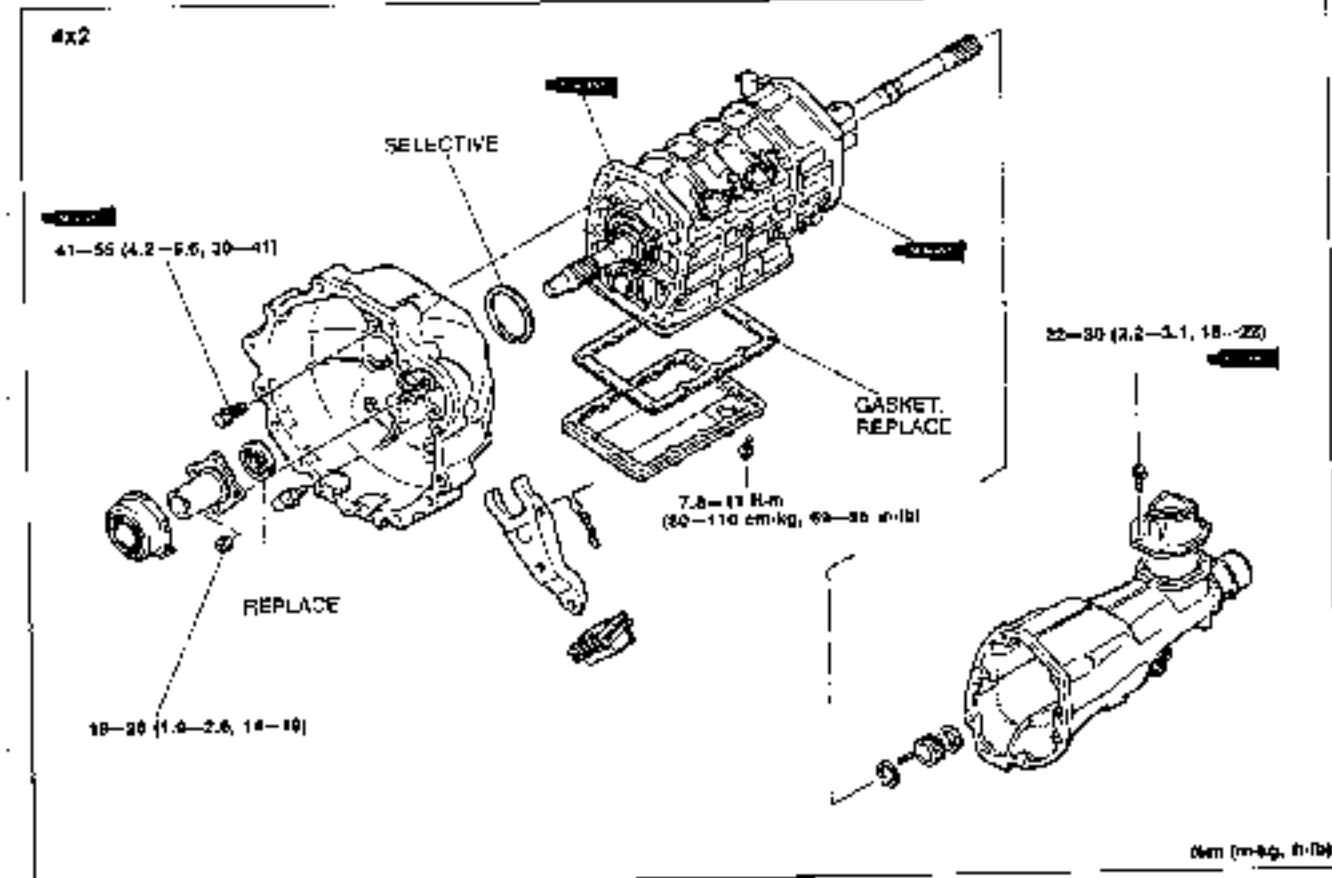
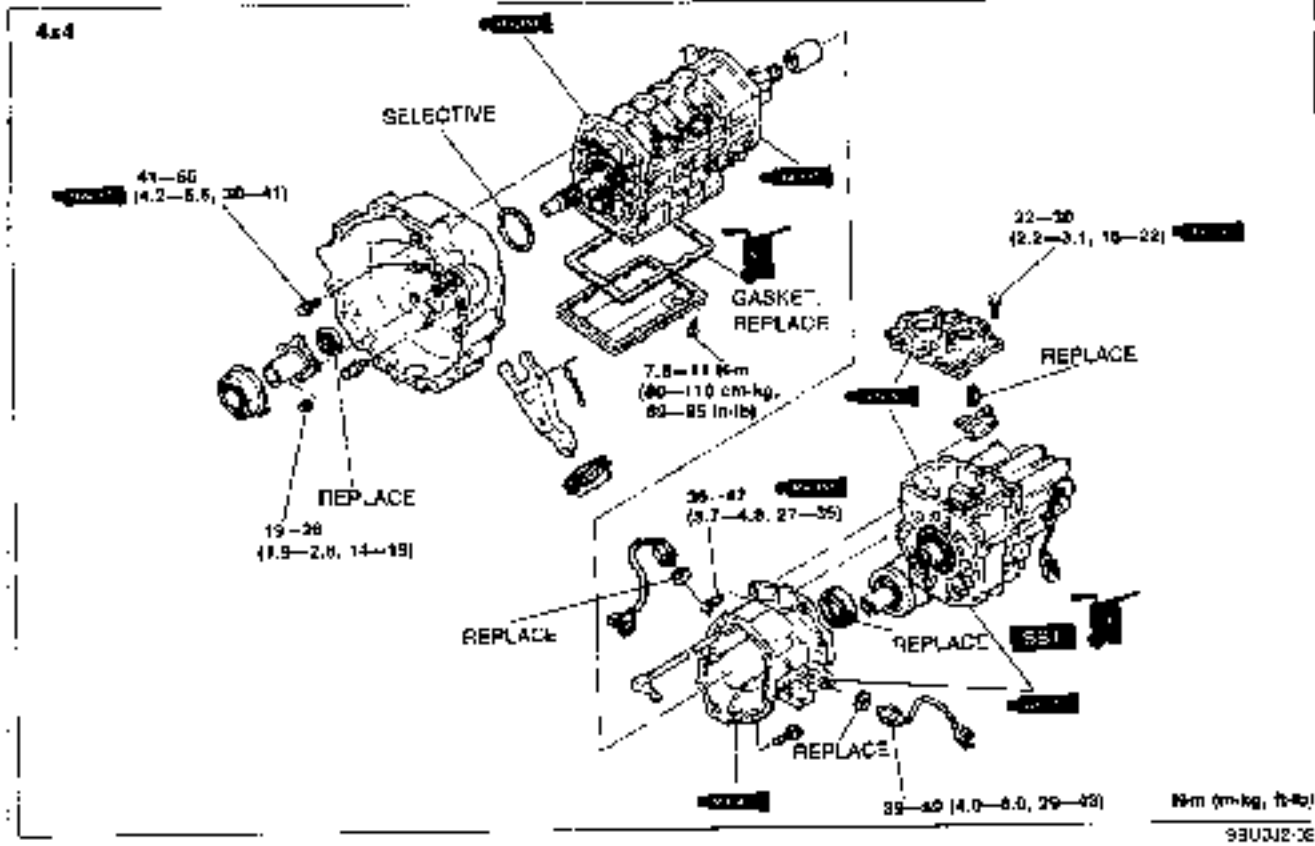
95LJ020-091

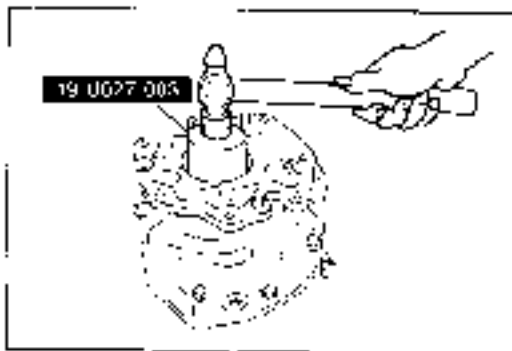
**Shift rod end**

- Install the shift rod ends onto the proper shift rods, and secure them with new roll pins.

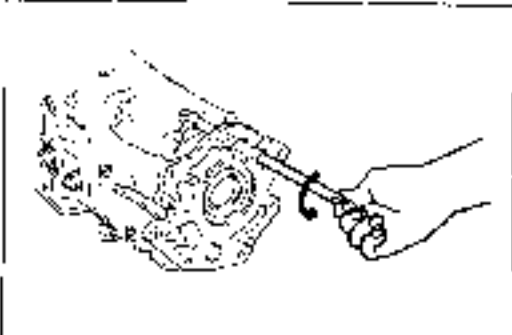
### Transfer Case, Clutch Housing and Extension Housing

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

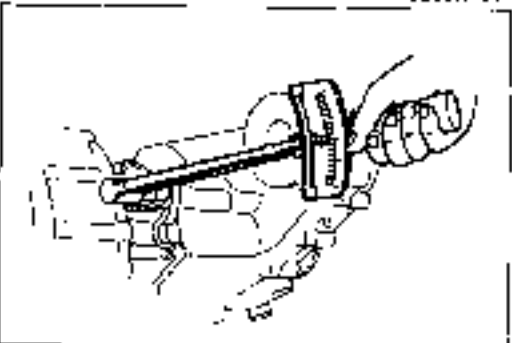




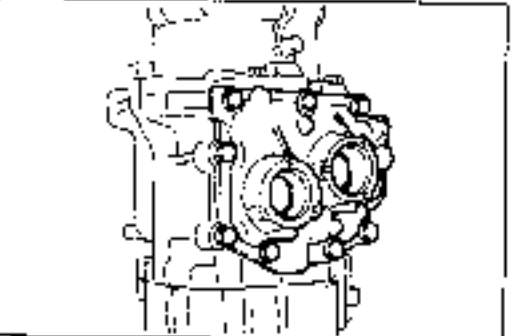
CB-J002-015



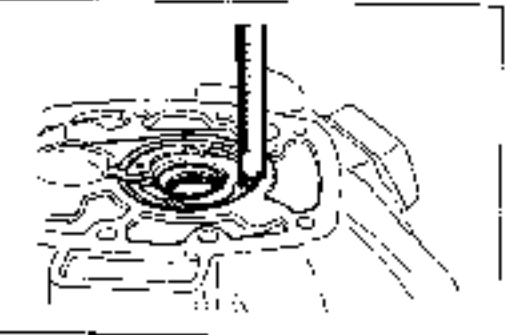
82U074-244



8B-G-121-27



82U032-024



88U074-04C

**Assembly note****Extension housing**

1. Apply oil to the new oil seal lip, and install it in the extension housing with the SST.

2. Install the control rod in the extension housing.
3. Coat the contacting surfaces of the extension housing and bearing housing with sealant.
4. Install the extension housing on the bearing housing.

**Tightening torque:**

31—46 Nm (3.2—4.7 m-kg, 23—34 ft-lb)

5. Install the back up tight SW.

**Tightening torque:**

39—59 Nm (4.0—6.0 m-kg, 29—43 ft-lb)

**Transfer case**

1. Install the input sleeve.  
Coat the contacting surfaces of the transfer case and extension housing with sealant.
2. Install the control lever and when the transfer case is set on the extension housing.
3. Apply sealant to the threads of bolts, and tighten them.

**Tightening torque:**

36—47 Nm (3.7—4.8 m-kg, 27—35 ft-lb)

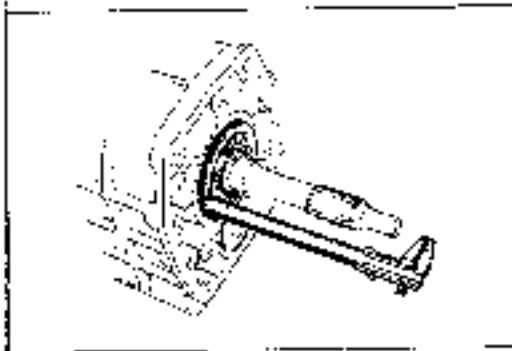
4. Secure the control lever end with a new roll pin.
5. Coat the contacting surfaces of the control case assembly and transfer case with sealant.
6. Install the control case assembly to the transfer case.
7. Apply sealant to the threads of the bolts, and tighten.

**Tightening torque:**

22—30 Nm (2.2—3.1 m-kg, 16—22 ft-lb)

**Clutch housing**

1. Measure the depth of the main drive gear bearing bore in the clutch housing by using vernier calipers.



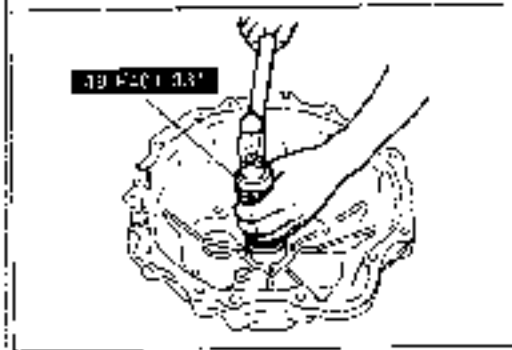
JBL004052

2. Measure the main drive gear bearing height. The difference between the two measurements indicates the required thickness of the adjusting shim.

**Standard thrust play: 0—0.1mm (0—0.004 in)**

**Adjusting shim thickness:**

- 0.3mm (0.012 in), 0.4mm (0.016 in),
- 0.5mm (0.020 in), 0.6mm (0.024 in),
- 0.7mm (0.028 in)



JBLP01037

CBL037C10

3. Apply oil to the new oil seal lip, and with the **SST** to install it to the clutch housing.

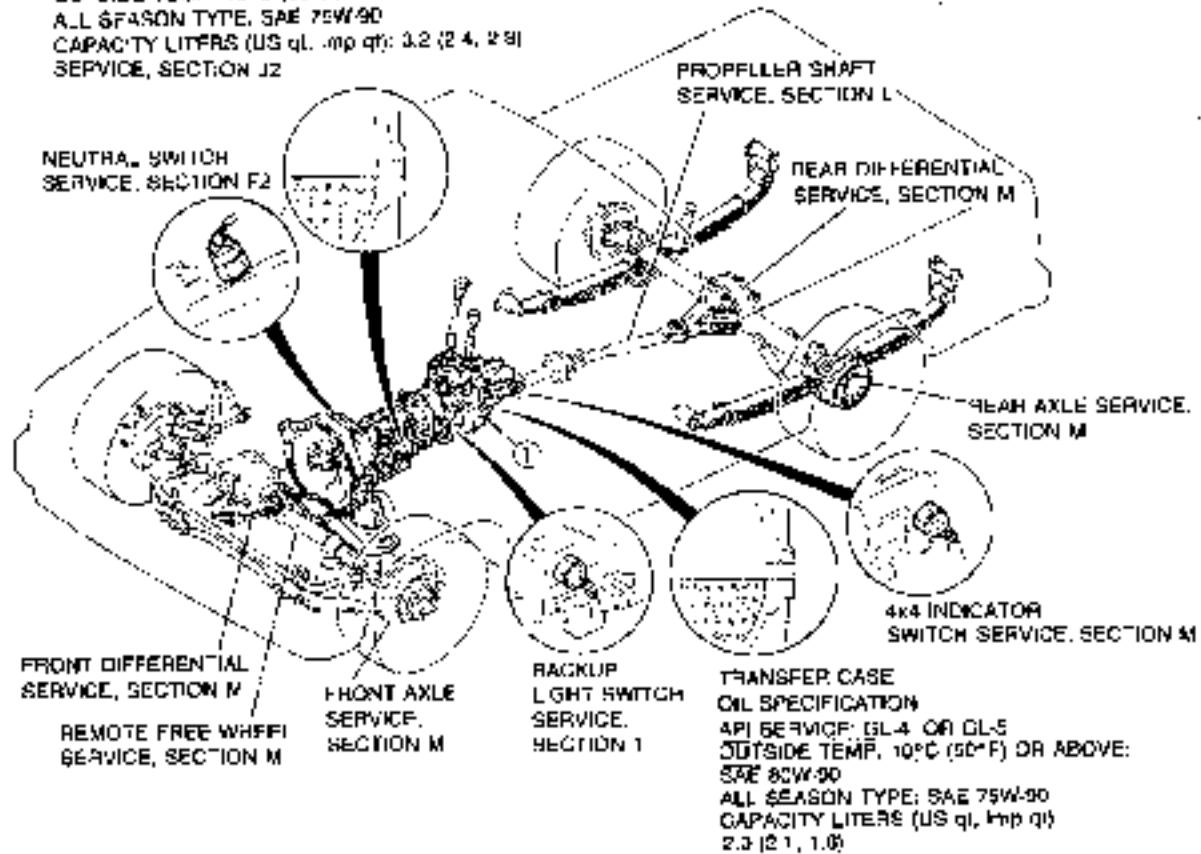
# MANUAL TRANSMISSION (TRANSFER CASE)

<b>INDEX</b> .....	J3- 2
<b>OUTLINE</b> .....	J3- 3
SPECIFICATIONS.....	J3- 3
STRUCTURAL VIEW.....	J3- 4
POWERFLOW (TRANSFER) .....	J3- 5
<b>TROUBLESHOOTING GUIDE</b> .....	J3- 6
TRANSFER CASE .....	J3- 6
<b>TRANSFER CASE OIL</b> .....	J3- 7
INSPECTION.....	J3- 7
REPLACEMENT.....	J3- 7
<b>TRANSFER CASE</b> .....	J3- 8
PREPARATION.....	J3- 8
DISASSEMBLY .....	J3- 9
INSPECTION.....	J3-15
ASSEMBLY .....	J3-18

TABLE J3-031

INDEX

TRANSMISSION  
 OIL SPECIFICATION  
 API SERVICE: GL-4, OR GL-5  
 OUTSIDE TEMP. 10°C (50°F) OR ABOVE: SAE 80W-90  
 ALL SEASON TYPE: SAE 75W-90  
 CAPACITY LITERS (US qt., Imp qt): 3.2 (2.4, 2.8)  
 SERVICE, SECTION J2




08UCJ-402

1. Transfer case		
Disassembly .....	.....	page J3-9
Inspection .....	.....	page J3-15
Assembly .....	.....	page J3-18

OUTLINE

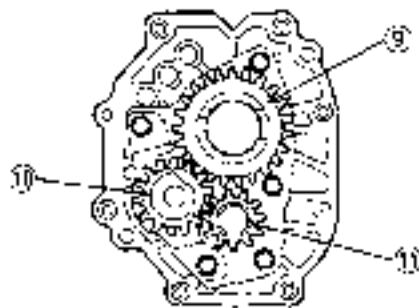
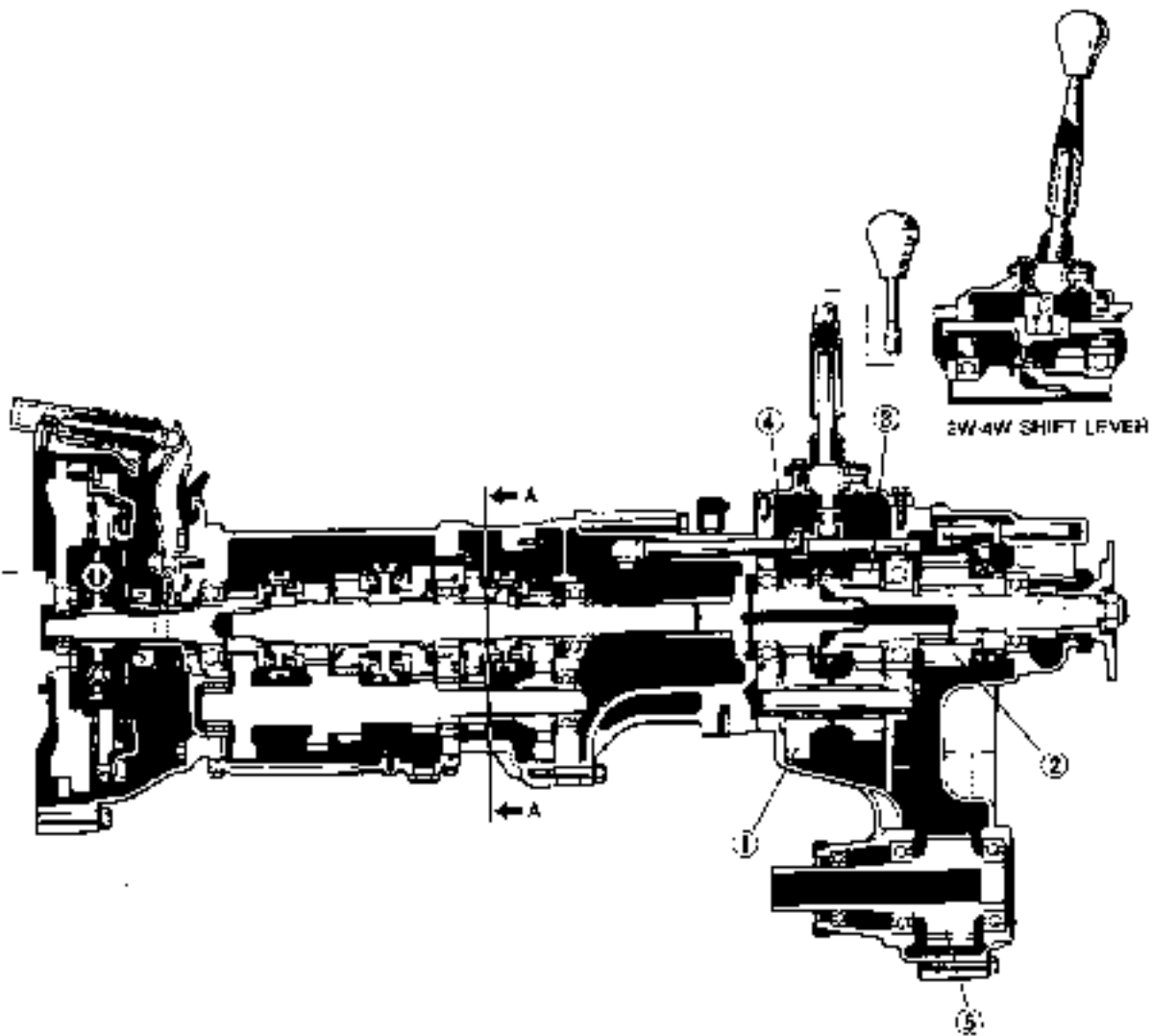
SPECIFICATIONS

		Model	B26001
			RSUX-D
			4x4
Synchronizer 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)	

08111,3-000



## STRUCTURAL VIEW

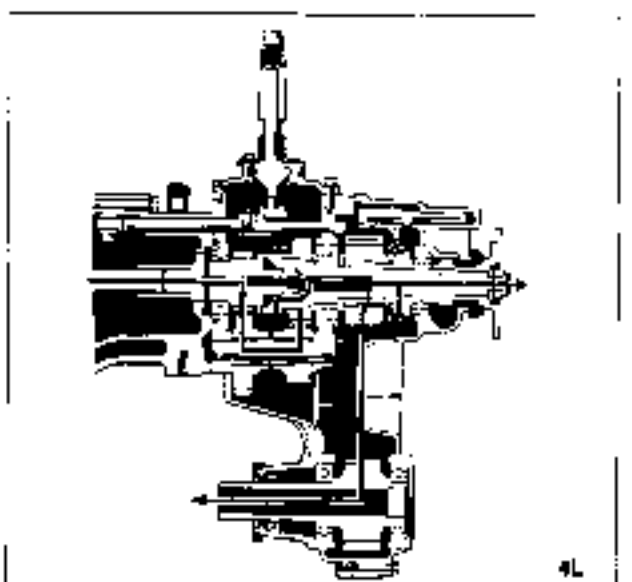
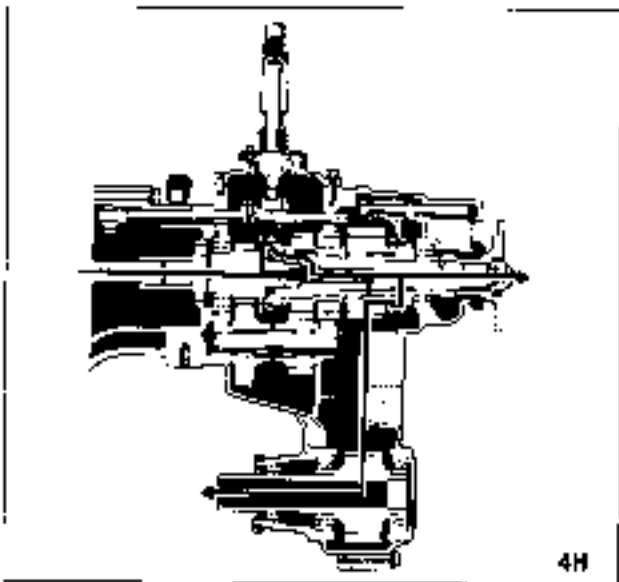
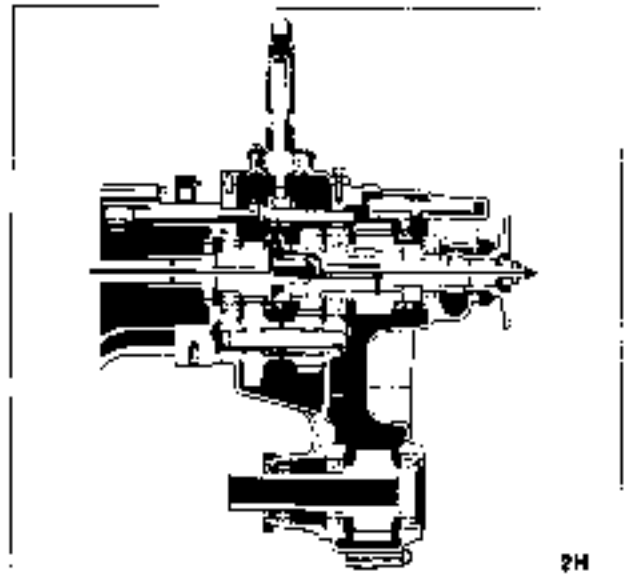
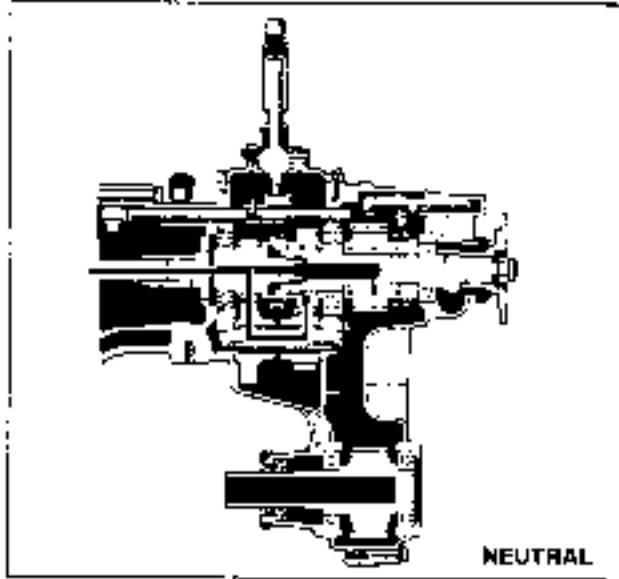


08J0,3-004

- 1. Counter gear
- 2. Front drive sprocket
- 3. Low gear

- 4. Input gear
- 5. Drive sprocket

POWERFLOW (TRANSFER)



J3

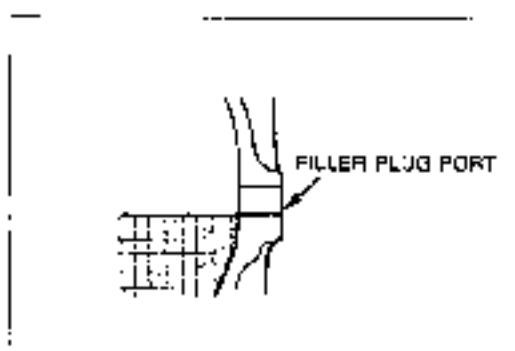
981003 C08

### TROUBLESHOOTING GUIDE

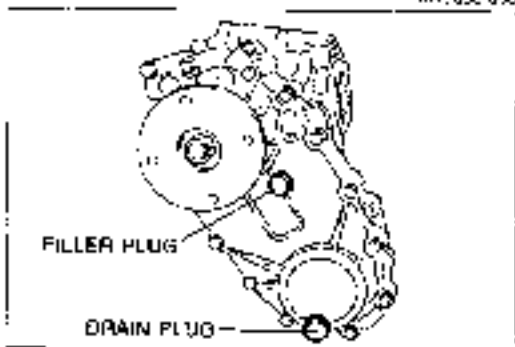
#### TRANSFER CASE

Problem	Possible Cause	Remedy	Page
Abnormal noise	Insufficient oil	Add oil	J3-7
	Deterioration of oil quality	Replace with specified oil	J3-3
	Worn bearing	Replace	J3-16
	Worn contact surfaces of counter gear	Replace	J3-16
	Worn contact surfaces of gears	Replace	J3-16
	Excessive gear backlash	Replace	—
Difficult to shift	Damaged gear teeth	Replace	J3-16
	Insufficient oil	Add oil	J3-7
	Deterioration of oil quality	Replace with oil of specified quality	J3-3
	Wear or play of 2W-4W shift fork or shift rod	Replace	J3-16
	Wear or play of H-L shift fork or shift rod	Replace	J3-16
	Excessive longitudinal play of gears	Replace	—
Jumps out of gear	Worn bearing	Adjust or replace	J3-16
	Weak or broken detent ball spring	Repair	J3-17
	Wear of 4-L shift fork	Replace	J3-17
	Wear of 2W-4W shift fork or weak spring	Replace	J3-17
	Worn clutch hub	Replace	J3-17
	Worn clutch hub sleeve	Replace	J3-17
	Worn gear sliding part	Replace	J3-16
	Excessive gear backlash	Replace	—
	Worn bearing	Replace	J3-17
	Loose engine mounts or transmission mounts	Tighten	—

CP11B-3006



10R-023-006



10R-023-007

## TRANSFER CASE OIL

### INSPECTION

Remove the filler plug. Verify that the oil level is near the filler plug hole. If it is low, add specified oil.

### REPLACEMENT

#### Note

Replace the gasket with new one whenever removed.

1. Remove the drain plug and filler plug; drain the oil into a suitable container.
2. After the oil has drained, reinstall the drain plug with new gasket.

#### Tightening torque:

39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)

3. Add oil until the level reaches the bottom of the filler plug hole.

**Capacity: 2.0 liters (2.1 US qt, 1.8 Imp qt)**

4. Install the filler plug with new gasket.





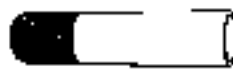
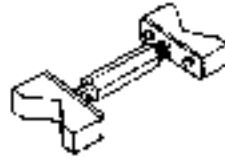
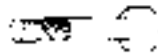
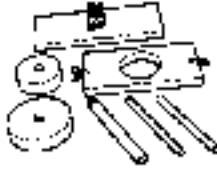
#### Tightening torque:

39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)

### TRANSFER CASE

#### PREPARATION

#### SST

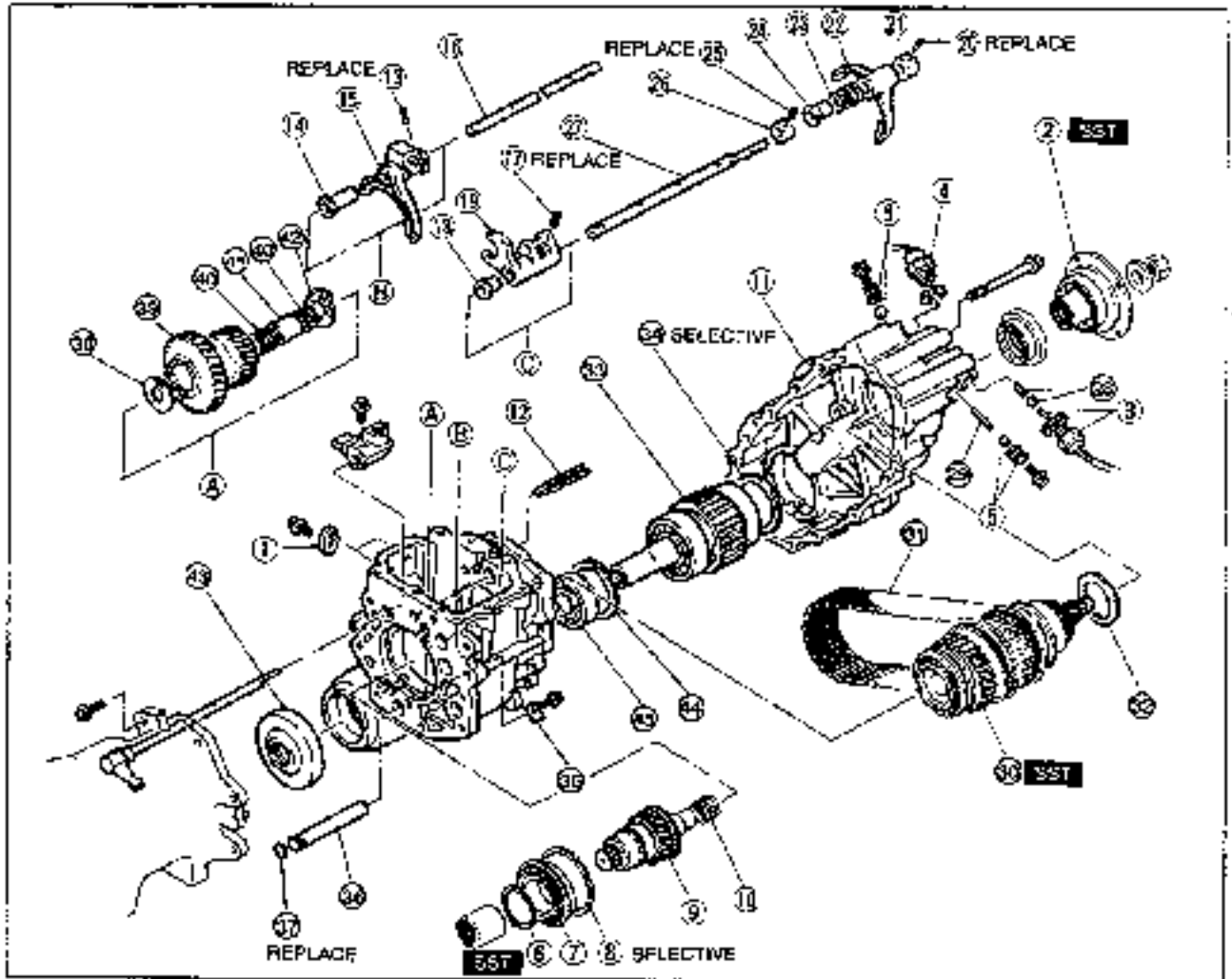
<p>49 S120 710</p> <p>Holder, coupling flange</p> 	<p>49 0B39 425U</p> <p>Pulcr set, bearing</p> 	<p>49 G030 370</p> <p>Removing plate</p> 
<p>49 F40 331</p> <p>Body</p> 	<p>49 D727 415</p> <p>Installer, bearing</p> 	<p>49 S231 385</p> <p>Chain expansion tool</p> 
<p>49 0500 330</p> <p>Installer, bearing</p> 	<p>49 11017 350</p> <p>Gauge set, shim sheet</p> 	<p style="text-align: right;">SB10J2 025</p>

**DISASSEMBLY**

**Precaution**

1. Clean the transfer 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 a compressed air, and check that there are no obstructions
3. Wear eye protection when using compressed air to clean components.

**Transfer Case Components**



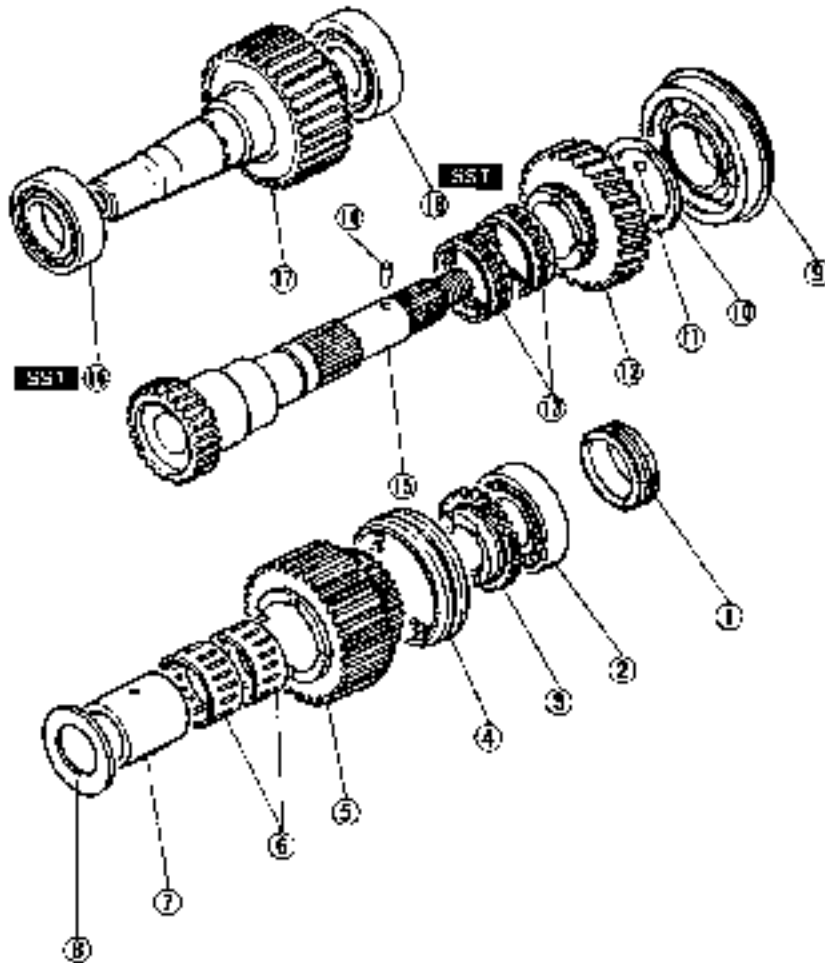
COX-0-000

- |  |                           |                                   |
|--|---------------------------|-----------------------------------|
| 1. Stopper pin   | 15. H-L shift fork        | 31. Chain                         |
| 2. Companion flange                                    | 16. H-L shift rod         | 32. Adjusting shim                |
| 3. Transfer case switch (4x4 indicator switch) and pin | 17. Roll pin              | 33. Front drive sprocket assembly |
| 4. Transfer case switch (Neutral switch) A/T           | 18. Spacer                | 34. Adjusting shim                |
| 5. Detent ball and spring                              | 19. 2W-4W shift arc       | 35. Lock plate                    |
| 6. Snap ring   | 20. Roll pin              | 36. Countershaft                  |
| 7. Bearing   | 21. Retainer              | 37. O-ring                        |
| 8. Adjusting shim                                      | 22. 2W-4W shift fork      | 38. Thrust washer                 |
| 9. Input shaft gear                                    | 23. Spring                | 39. Counter gear                  |
| 10. Bearing  | 24. Spacer                | 40. Bearing                       |
| 11. Chain cover  | 25. Roll pin              | 41. Spacer                        |
| 12. Oil passage  | 26. Retainer              | 42. Thrust washer                 |
| 13. Roll pin   | 27. 2W-4W shift rod       | 43. Oil seal                      |
| 14. Spacer   | 28. Pin and ball          | 44. Snap ring                     |
|  | 29. Interlock pin         | 45. Bearing                       |
|  | 30. Output shaft assembly |                                   |

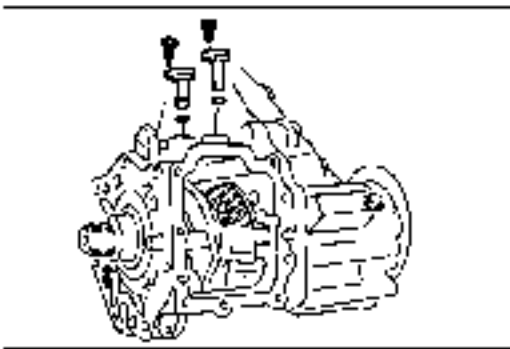
## Output Shaft Components



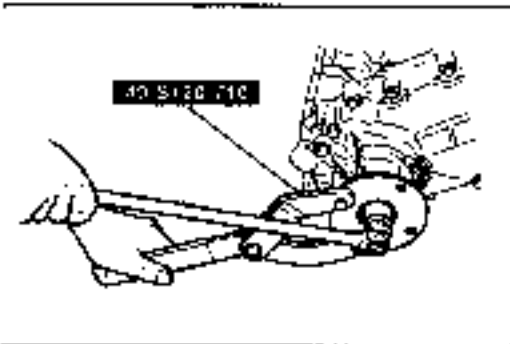
APPLY INDIVIDUAL PARTS TO SPECIFIED OIL



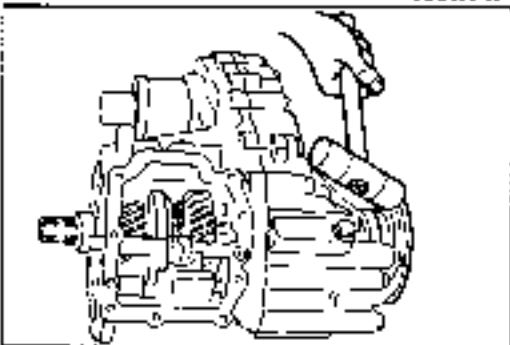
- |                           |                        |                          |
|---------------------------|------------------------|--------------------------|
| 1. Speedometer drive gear | 7. Spacer              | 13. Needle bearing       |
| 2. Bearing                | 8. Thrust washer       | 14. Roll pin             |
| 3. 2W-4W clutch hub       | 9. Bearing             | 15. Output shaft         |
| 4. 2W-4W hub sleeve       | 10. Thrust lock washer | 16. Bearing              |
| 5. Drive sprocket         | 11. Steel ball         | 17. Front drive sprocket |
| 6. Needle bearing         | 12. Low gear           |                          |



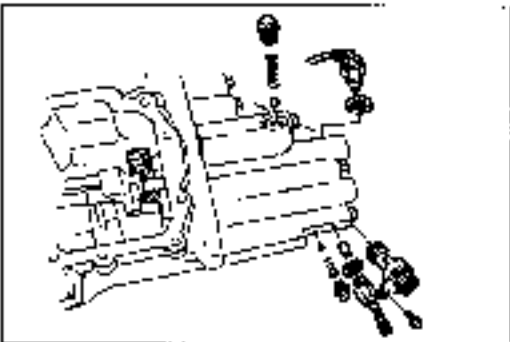
1B.015-002



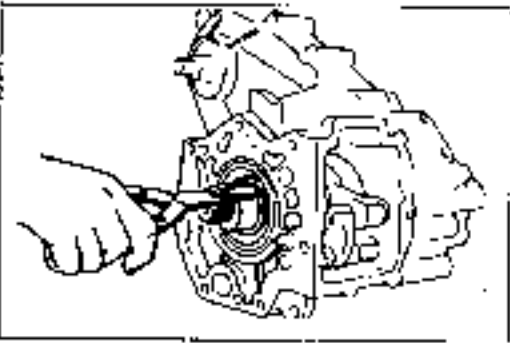
8DL6JE-027



7BU37A-07



0B.015-010



7BU077-073

**Disassembly procedure**

1. Remove the stopper pins

2. Hold the companion flange with the **SST** and remove the companion flange nut.

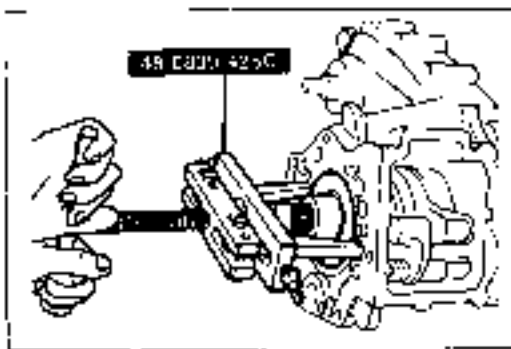
3. Remove the companion flange by lightly tapping the back side with a plastic hammer.

4. Remove the 4x4 indicator switch, oil, neutral switch (A/T), plugs, detent springs, and balls.

5. Remove the speedometer driven gear.

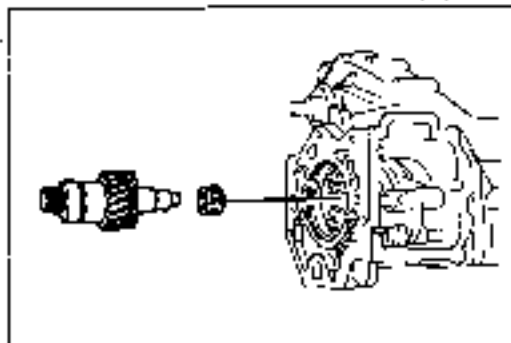
6. Remove the snap ring





SR60124/28

7 Remove the bearing with the SST

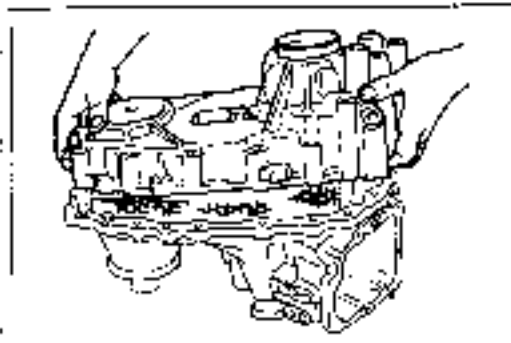


78LC1A075

8 Remove the input shaft gear and bearing

**Note**

For removal, position the flat section of the gear toward the countershaft gear.

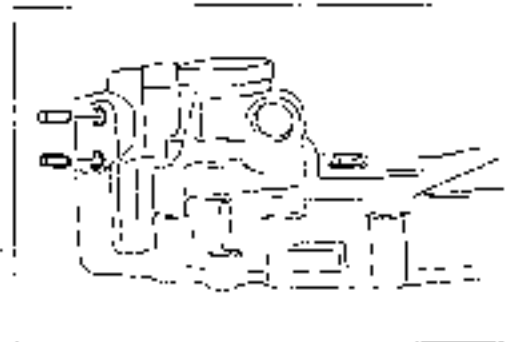


13J07A075

9 Using a plastic hammer, separate the chain cover from the transfer case, and remove the chain cover

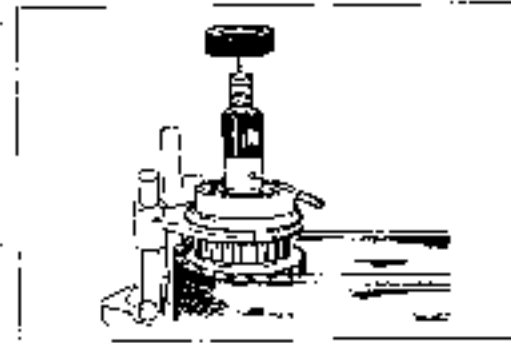
**Caution**

Lift off the chain cover vertically to prevent damaging the shift rods.



16J07A082

10 Remove the pin and interlock pin from the chain cover by using a magnet.

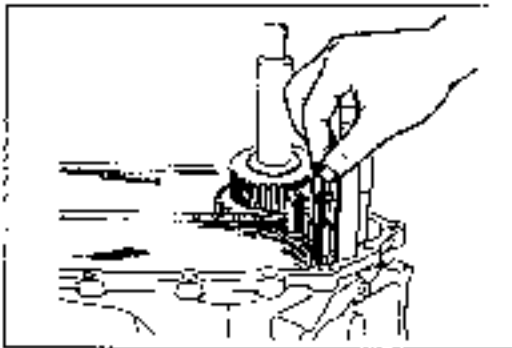


13J07A077

11 Remove the speedometer drive gear from the output shaft.  
12 Remove the knock pin and bearing

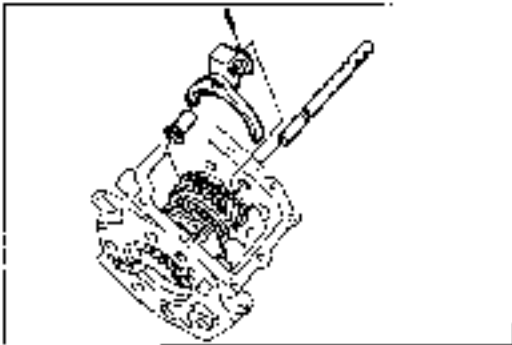
**Note**

If the bearing is difficult to remove, use a small pry bar to pry it off.



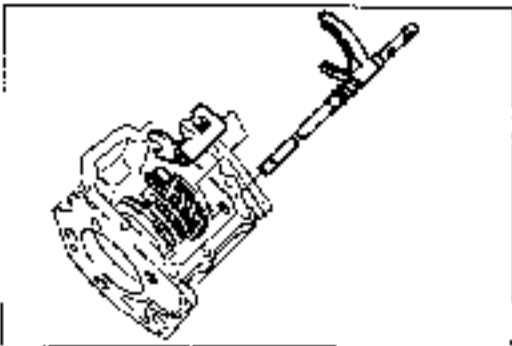
75L C7A-C78

13. Remove the oil passage by lightly tapping it with a plastic hammer



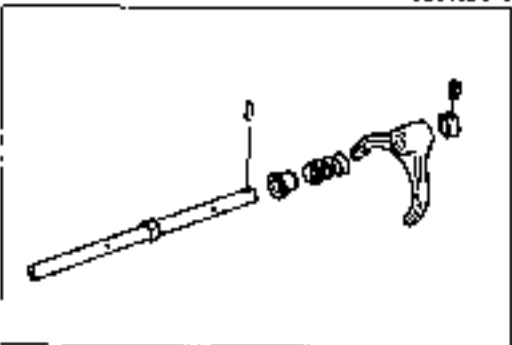
6A1012-054

14. Tap out the roll pin and remove the H-L shift rod, spacer, and shift fork



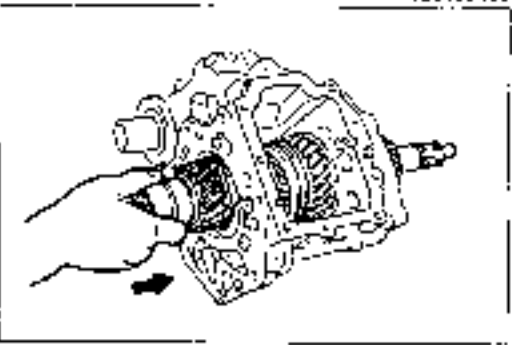
89L C2-079

15. Tap out the roll pin, and remove the 2W-4W shift rod as assembly, spacer, and 2W-4W shift end.



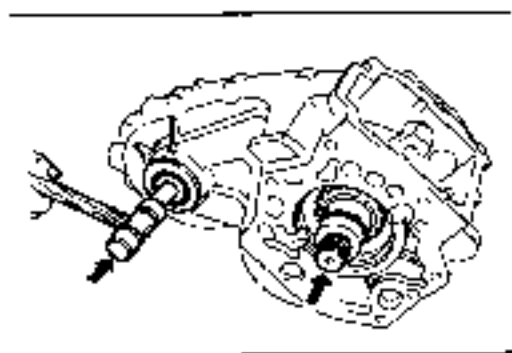
89L C3-030

16. Tap out the roll pins and remove the retainers, 2W-4W shift lock, spring, and spacer. Remove the pin for the 4x4 indicator switch from the rod

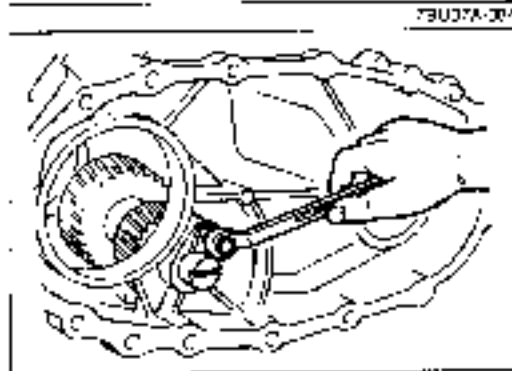


76L C7A-C83

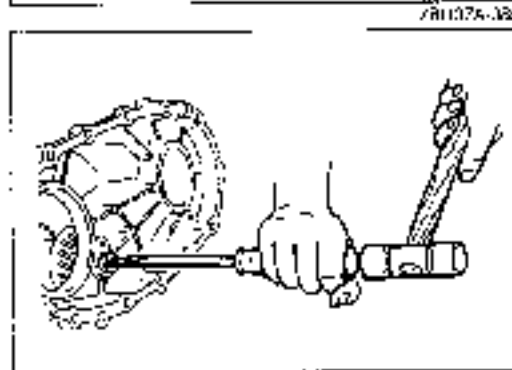
17. Set the input shaft gear on the output shaft.



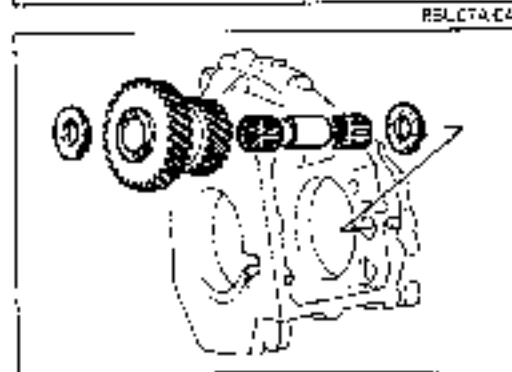
- 18. Remove the output shaft and the front drive sprocket from the transfer case housing by lightly tapping the input shaft gear and the front drive sprocket with a plastic hammer.
- 19. Remove the input shaft gear from the transfer case housing.



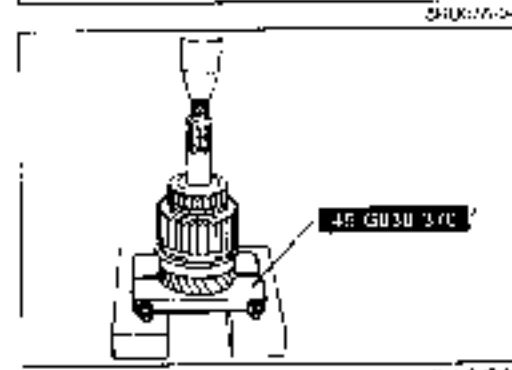
- 20. Remove the lock plate.



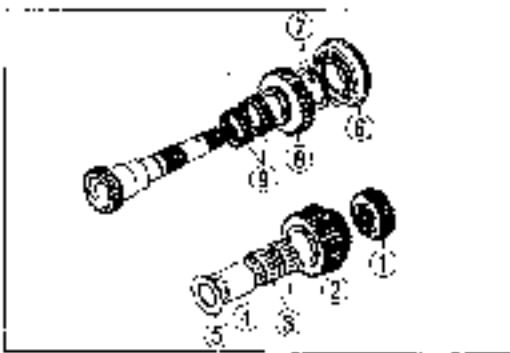
- 21. Tap out the countershaft with a screwdriver and hammer.



- 22. Remove the counter gear and thrust washers.
- 23. Remove the needle bearings and spacer from the counter gear.
- 24. Remove the O-ring from the countershaft.

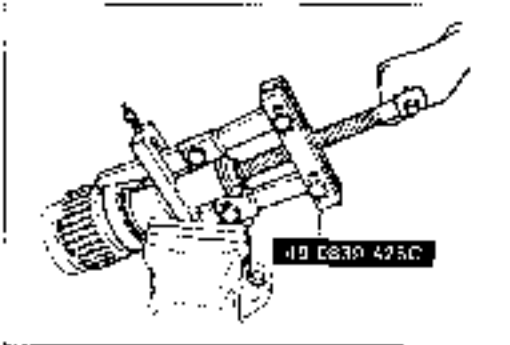


- 25. Press the output shaft assembly with the SST.



92U317 032

26. Remove the parts from the output shaft in the order shown:
- (1) 2W/4W clutch hub
  - (2) Drive sprocket
  - (3) Needle bearings
  - (4) Spacer
  - (5) Thrust washer
  - (6) Bearing
  - (7) Thrust lock washer and steel ball
  - (8) Low gear
  - (9) Needle bearings



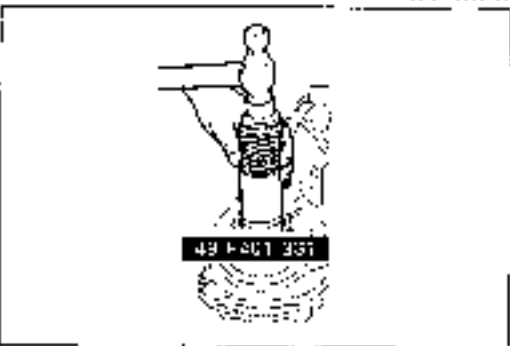
109 01 032

27. Remove the bearings from both sides of the front drive sprocket with the **SST**.



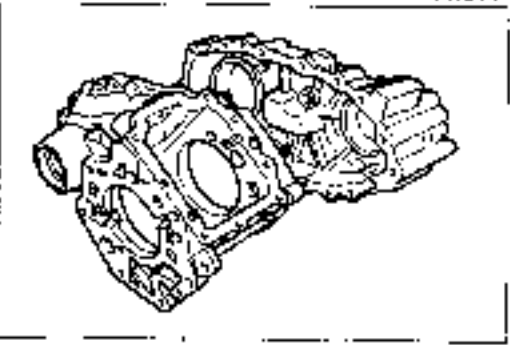
78 01 0401

28. Remove the oil seals  
29. Remove the snap ring



146 02 031

30. Press out the front sprocket bearing with the **SST**.

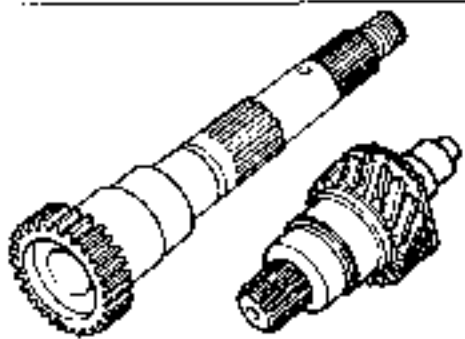


74 01 0401

### INSPECTION

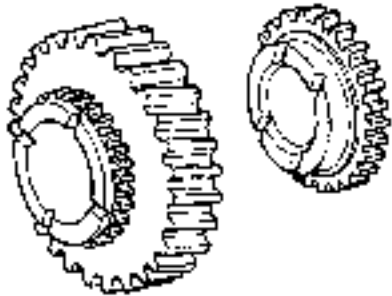
Inspect each of the items listed below.  
Repair or replace if necessary.

1. Transfer case housing and cover for cracks, damage or damaged mating surfaces.



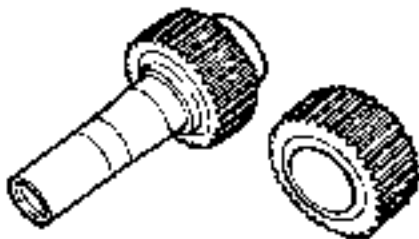
791107A-024

- 2. Input shaft gear and output shaft for wear, damage, or damaged teeth.
- 3. Input shaft gear and output shaft for clogged oil passages.



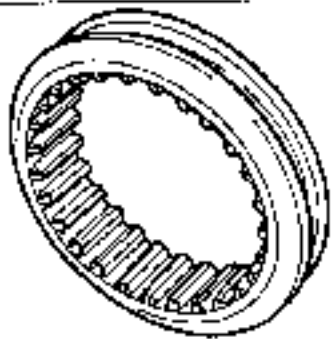
791107A-025

- 4. Low gear and 2W-4W clutch hub for wear, damage, or damaged teeth.



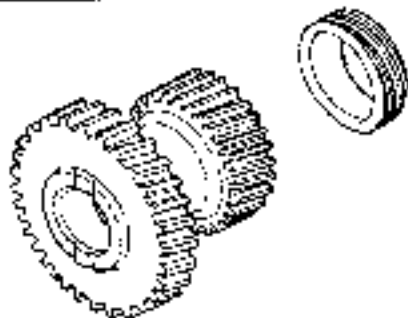
66C07X-4W7

- 5. Drive sprocket and front drive sprocket for wear, damage, or damaged teeth.



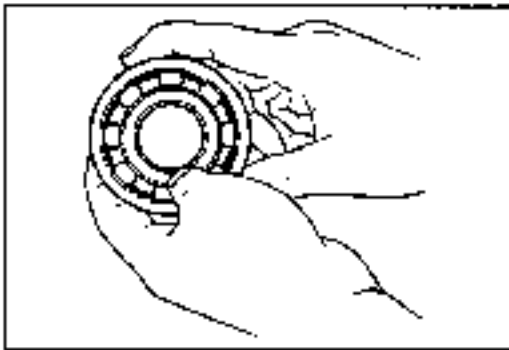
791107A-016

- 6. Hub sleeve splines for wear or damage.
- 7. Hub sleeve groove for wear or damage.



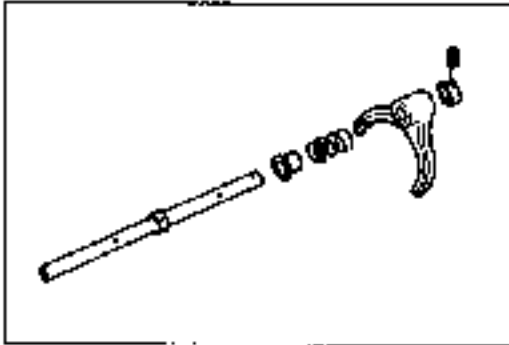
891107A-034

- 8. Counter gear, countershaft, and speedometer drive gear for wear or damaged teeth.



AF3076073

9. Bearings for rough operation or noise while turning

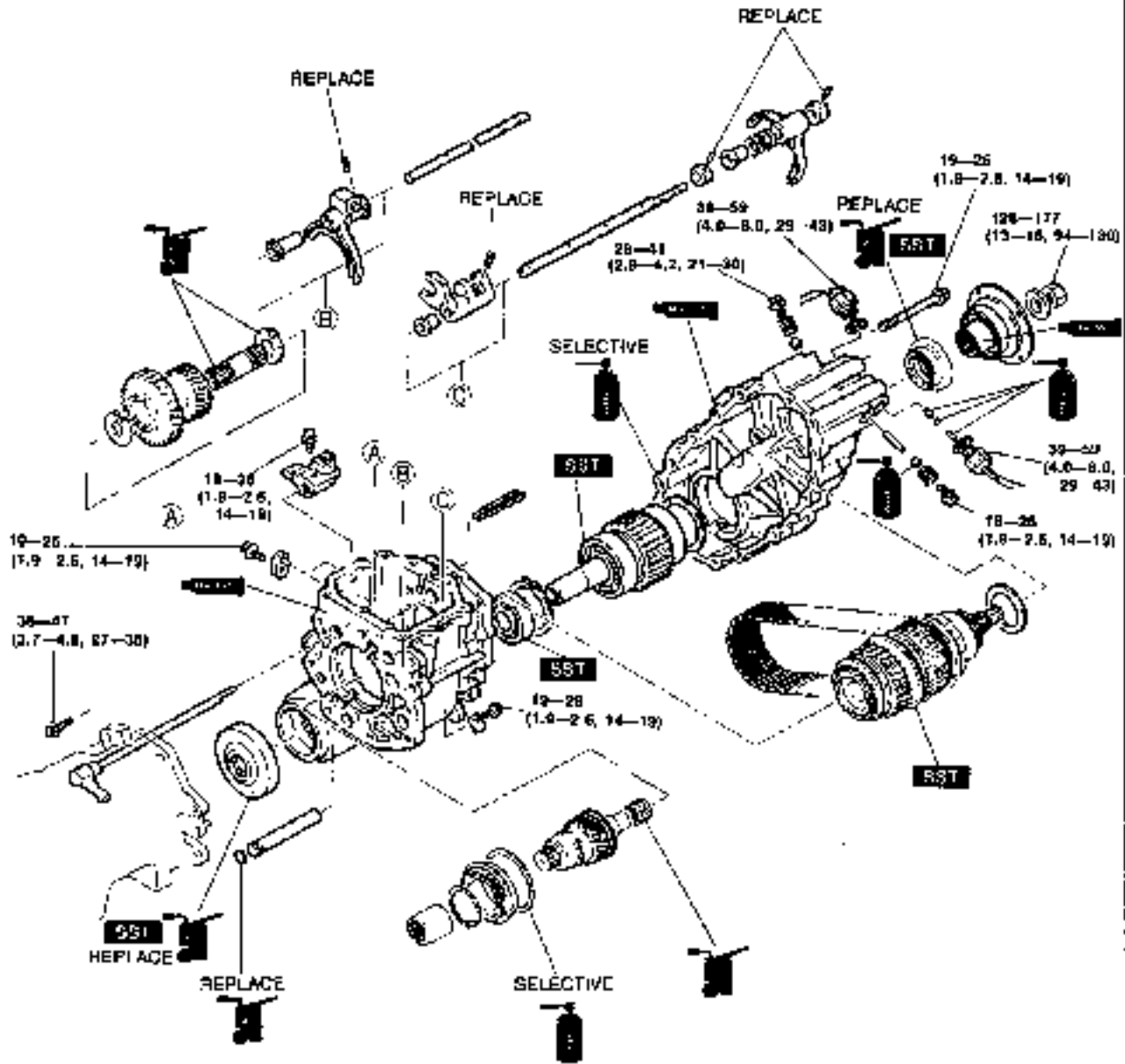


7DUJ7A.085

10. Shift fork or shift rod for wear or damage.  
11. Shift spring for weakening.

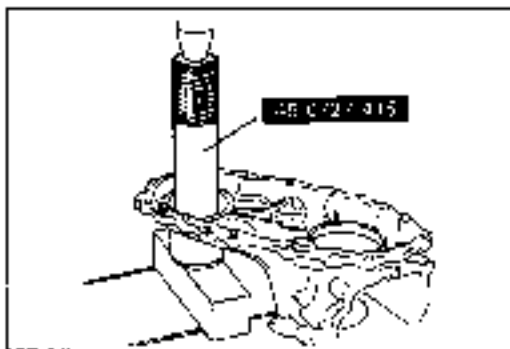
## ASSEMBLY

### Torque specifications



Nm (m-lb, ft-lb)

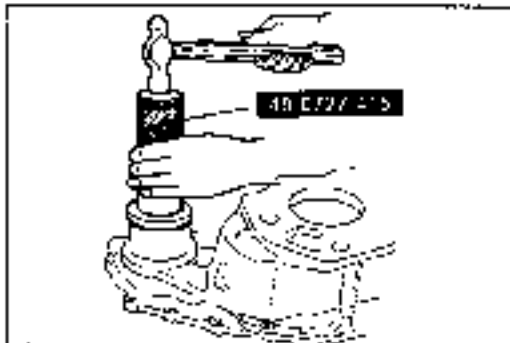
96J312436



12U302-006

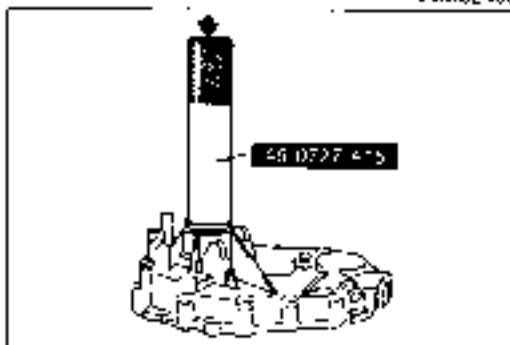
**Assembly procedure**

1. Press the bearing into the transfer case housing with the **SST**.
2. Install the snap ring to secure the bearing



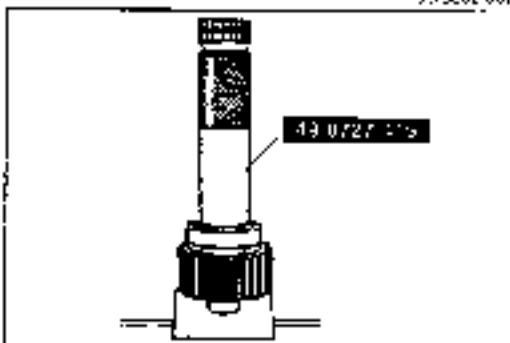
091U32-006

3. Apply oil to the new oil seal lip, and install the oil seal into the transfer case housing with the **SST**.



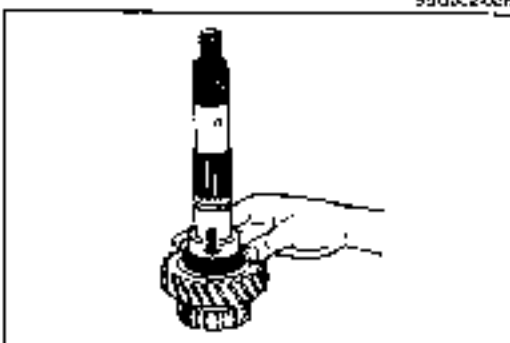
95 002 097

4. Apply oil to the new oil seal lip, and install the oil seal into the chain cover with the **SST**.



90UD-200F

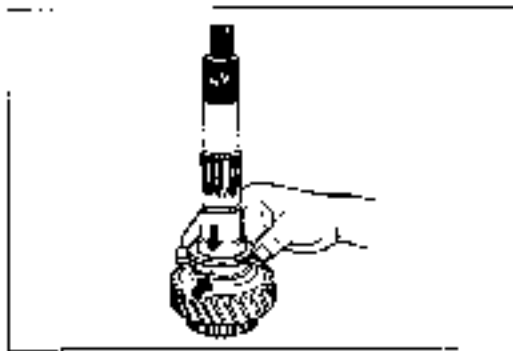
5. Press the bearings onto both sides of the front drive sprocket with the **SST**. Press the bearings on until they stop.



7ELC76-105

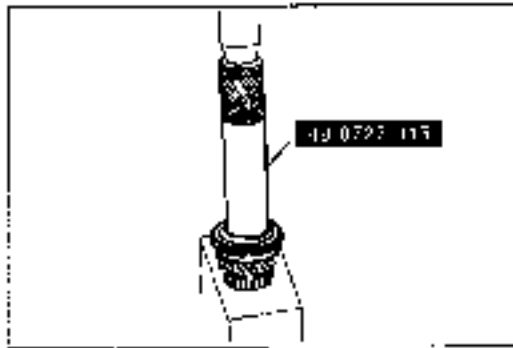
6. Install the low gear on the output shaft. Put oil on the needle bearings, and set the gear on the shaft.





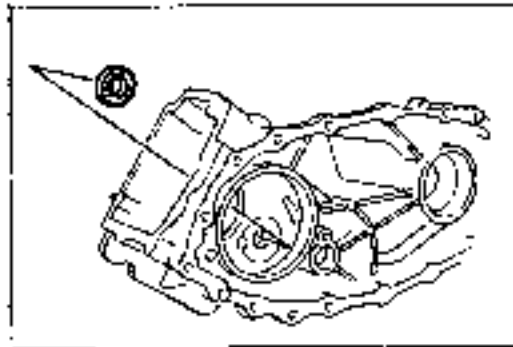
7BL076-104

7. Set the steel ball in the shaft, and install the thrust lock washer.



7BL072-115

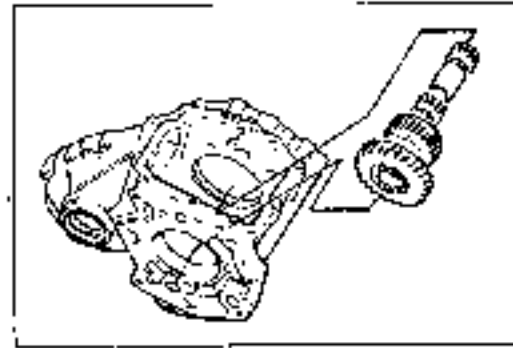
8. Press the bearing onto the output shaft with the **SST**.



7BL073-126

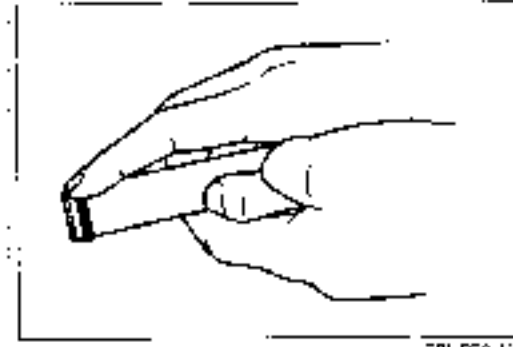
9. Install the counter gear as follows.

(1) Apply oil to the contact surface of the thrust washer and the housing, and install the washer so that the dished (convex) part of the washer sets down into the housing.



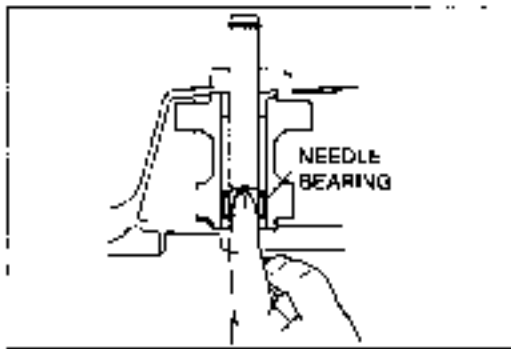
7BL073-107

(2) Applying oil to the needle bearings, install them and the spacer into the counter gear.  
 (3) Install the counter gear into the housing.

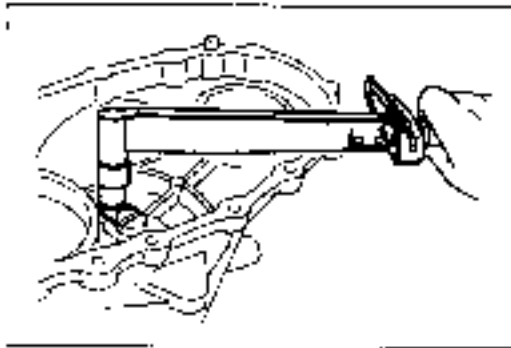


7BL074-138

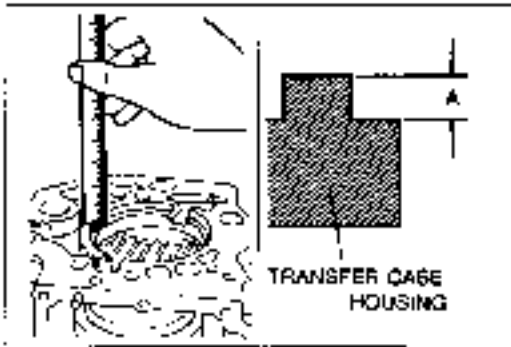
(4) Apply oil to the new O-ring, and install it on the countershaft.



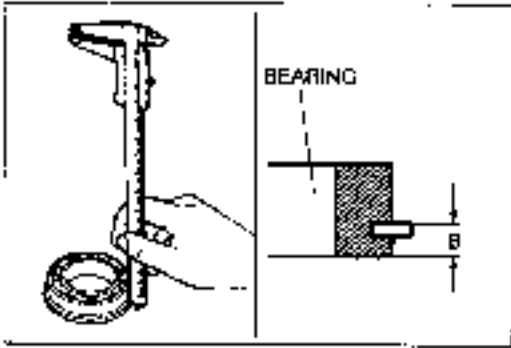
7B.07A.129



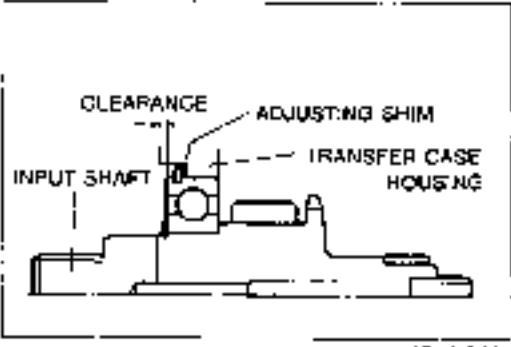
CE607X.08



7B.08A.113



7B.09A.114



7B.10.004

- (5) Center the inside needle bearing, and slide the countershaft into the case.

- (6) Install the lock plate and tighten the bolt.

**Tightening torque:**

**19–26 Nm (1.9–2.6 m·kg, 14–19 ft·lb)**

- 10 Install the input shaft assembly as follows.
- (1) Measure the bearing bore depth (A) of the housing with vernier calipers.

- (2) Measure the height (B) of the bearing cup with vernier calipers and a surface plate.
- (3) Calculate the difference between (A) and (B) to determine the clearance.

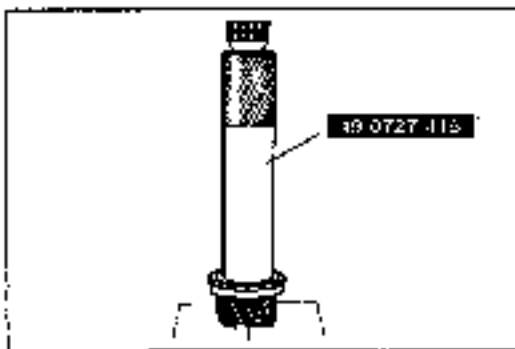
$$\text{Difference (Clearance)} = A - B$$

- (4) Select and install the proper shim to obtain the standard clearance.

**Adjusting shim thickness:**

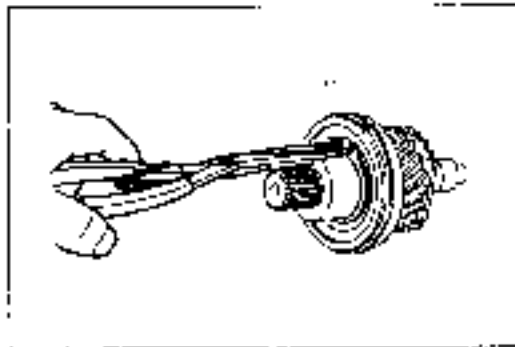
mm (in)		
0.7 (0.028)	0.8 (0.032)	0.9 (0.035)
1.0 (0.039)	1.1 (0.043)	1.2 (0.047)

**Standard clearance: 0–0.1mm (0–0.004 in)**



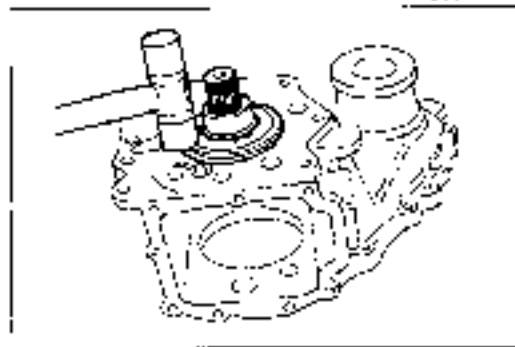
98J302-040

(5) Press the bearing onto the input shaft gear with the SST.



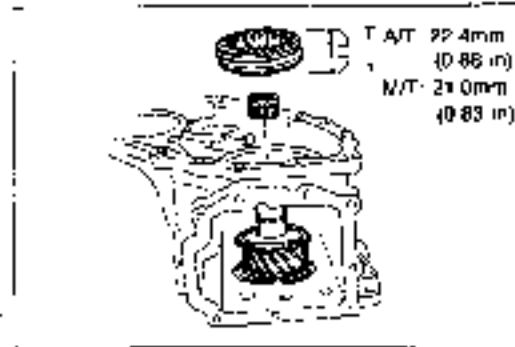
75-079-116

(6) Install the snap ring.



7E107A-115

(7) Install the input shaft assembly into the housing by lightly tapping the outer race of the bearing with a plastic hammer.

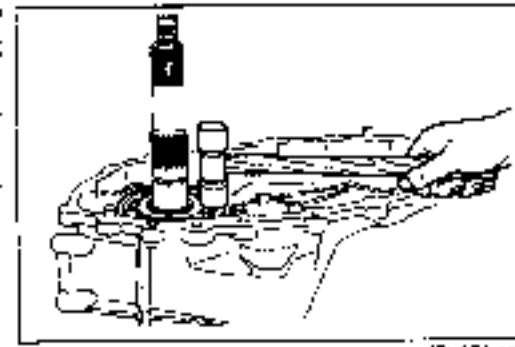


61A-62-013

11. Install the needle bearing and H-L hub sleeve onto the input shaft.

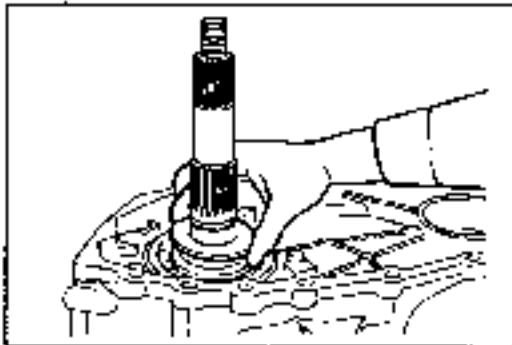
**Note**

To identify the H-L hub sleeve from the 2W-4W sleeve, the thickness of the H-L hub sleeve is 22.4mm (0.88 in); A/T, 21.0mm (0.83 in); M/T and the 2W-4W hub sleeve is 18.0mm (0.71 in).



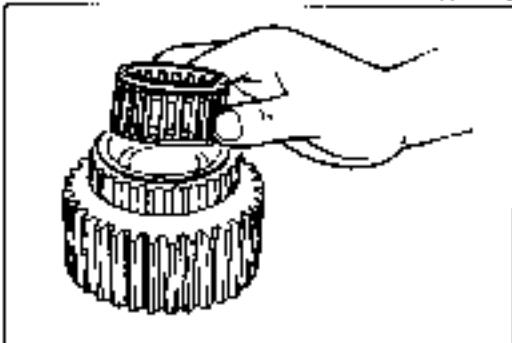
7E107A-117

12. Install the output shaft into the housing by lightly tapping the outer race of the bearing with a plastic hammer.



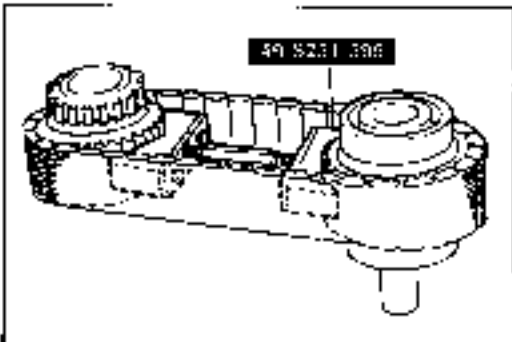
7EL074-116

13. Set the thrust washer on the output shaft.



7BK076-110

14. Apply oil to the needle bearings, and install them onto the drive sprocket along with the spacer.

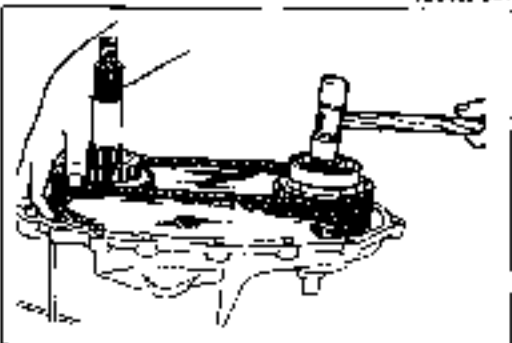


9BU07-021

15. Install the chain on the drive sprocket assembly and the front drive sprocket, and expand the chain with the **SST** to set the center-to-center distance for easy installation into the housing.

**Note**

**Do not overtighten the chain expansion tool.**



7D\_07A-171

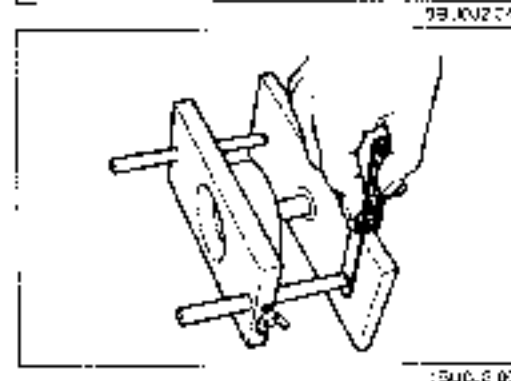
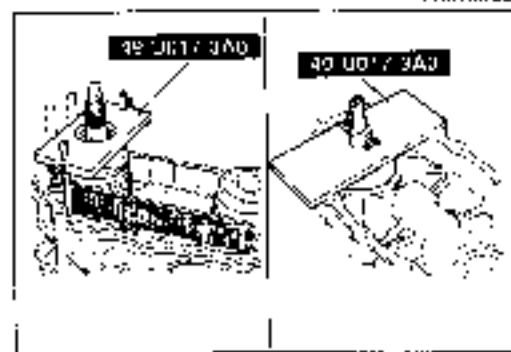
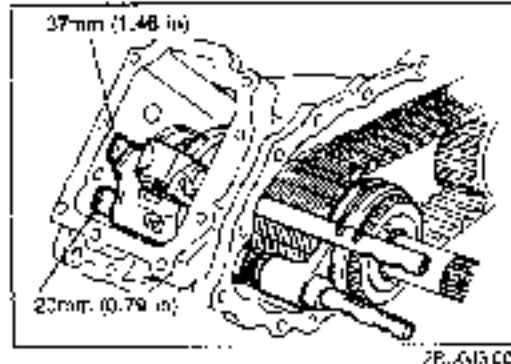
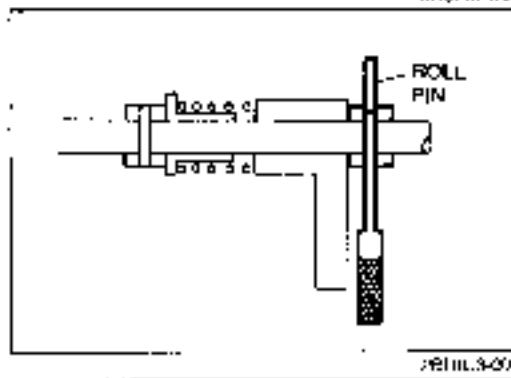
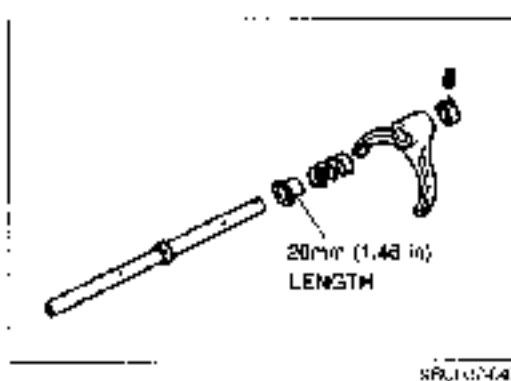
16. Install the front drive sprocket assembly into the housing by lightly tapping it with a plastic hammer, keeping the chain horizontal.

17. After installation, verify that the chain rotates smoothly.



49 0600 30

18. Tap in the 2W-4W clutch hub with the **SST**.



19. Install the 2W-4W shift fork onto the shift rod as follows.
  - (1) Slide the retainer onto the shift rod, and secure it with the new roll pin.
  - (2) Install the spacer (20mm, 0.79 in), spring, 2W-4W shift fork, and the other retainer.

- (3) Secure the retainer with the new roll pin.

### Note

Use a pin punch as a guide when the roll pin is lapped in.

20. Assemble the 2W-4W Hub sleeve to the shift fork, and insert them to the transfer case housing.
21. Set the 2W-4W shift end and spacer (20mm, 0.79 in) into the case, and slide the shift rod assembly through it.
22. Secure the 2W-4W shift end to the rod with the roll pin.
23. Install the H-L shift fork, spacer (37mm, 1.46 in), and rod into the transfer case housing.
24. Secure the H-L shift fork with the new roll pin.

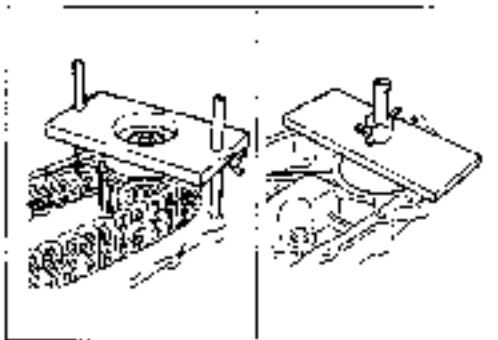
25. Install the bearing onto the output shaft.
26. Measure the bearing height and the bearing bore depth for the output shaft with the SST.

27. Put the two pieces of the gauge set together and measure the clearance.
28. Select the proper adjusting shim to adjust the clearance.

**Standard clearance: 0—0.1mm (0—0.004 in)**

**Adjusting shim thickness:**

			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)			

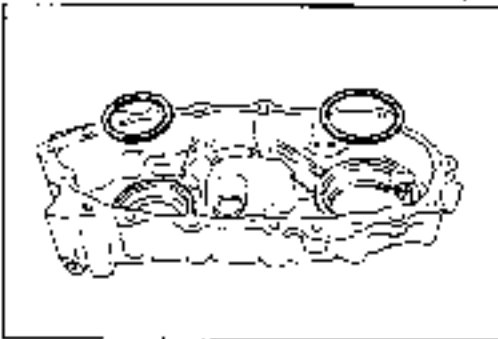


29. Select the proper adjusting shim for the front drive sprocket bearing in the same way as for the output shaft side.

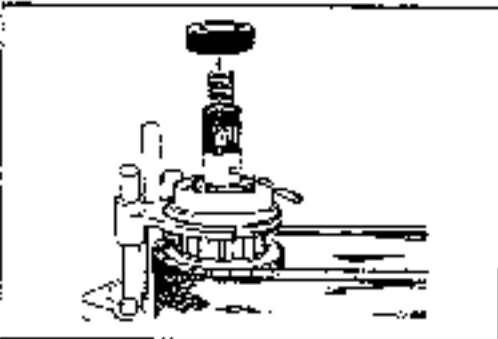
Standard clearance: 0—0.1mm (0—0.004 in)

Adjusting shim thickness:

			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)		

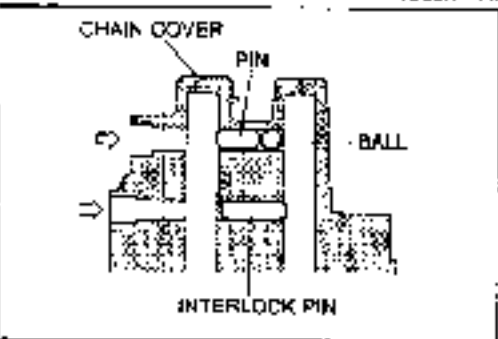


30. Apply grease to the adjusting shims selected, and place them in the chain cover.

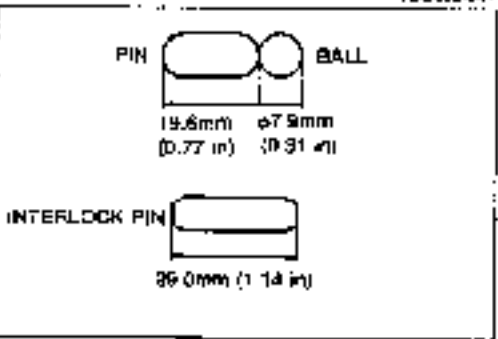


31. Install the knock pin into the output shaft, and install the speedometer drive gear.

32. Install the oil passage into the case.

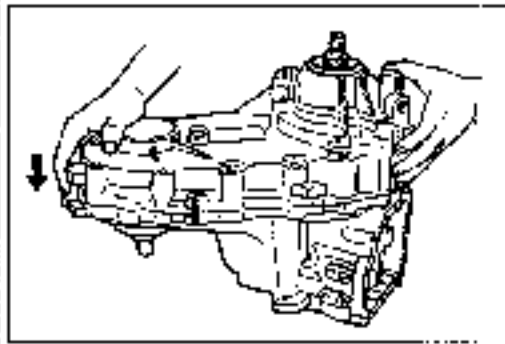


33. Apply grease to the ball pin, and interlock pin, and install them into the chain cover.



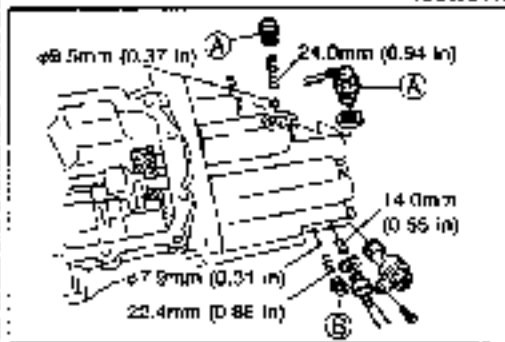
**Note**

The pins are different, as shown in the figure.



34. Apply sealant to the mating surface of the chain cover, and set the cover on the housing.
35. Apply sealant to the threads of the bolts, and tighten.

**Tightening torque:**  
 19–26 N·m (1.9–2.6 m·kg, 14–19 ft·lb)

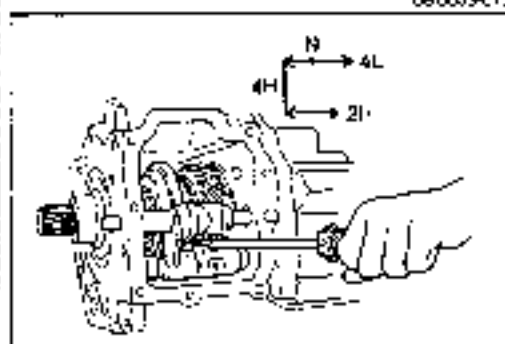


36. Apply sealant to the threads of the plugs.
37. Install the balls, springs, and plugs.

**Tightening torque**  
**A:** 28–41 N·m (2.9–4.2 m·kg, 21–30 ft·lb)  
**B:** 19–26 N·m (1.9–2.6 m·kg, 14–19 ft·lb)

38. Install the pin and 4x4 indicator switch.

**Tightening torque:**  
 39–59 N·m (4.0–6.0 m·kg, 29–43 ft·lb)



39. Install the neutral switch (A/T).

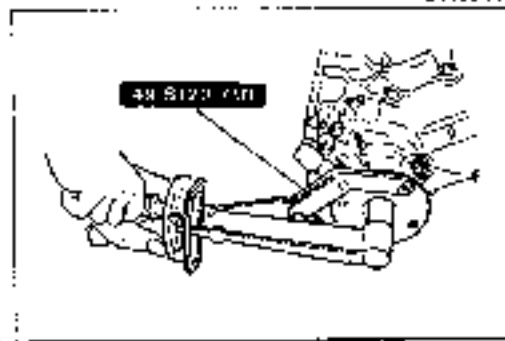
**Tightening torque:**  
 39–59 N·m (4.0–6.0 m·kg, 29–43 ft·lb)

40. Install the speedometer driven gear.

**Tightening torque:**  
 7.8–11 N·m (80–110 cm·kg, 69–95 in·lb)

41. Use a screwdriver to verify that the transfer case shifts smoothly.

42. Apply transmission oil to a new oil seal and install it.
43. Install the companion flange with the SST



**Tightening torque:**  
 128–177 N·m (13–18 m·kg, 94–130 ft·lb)

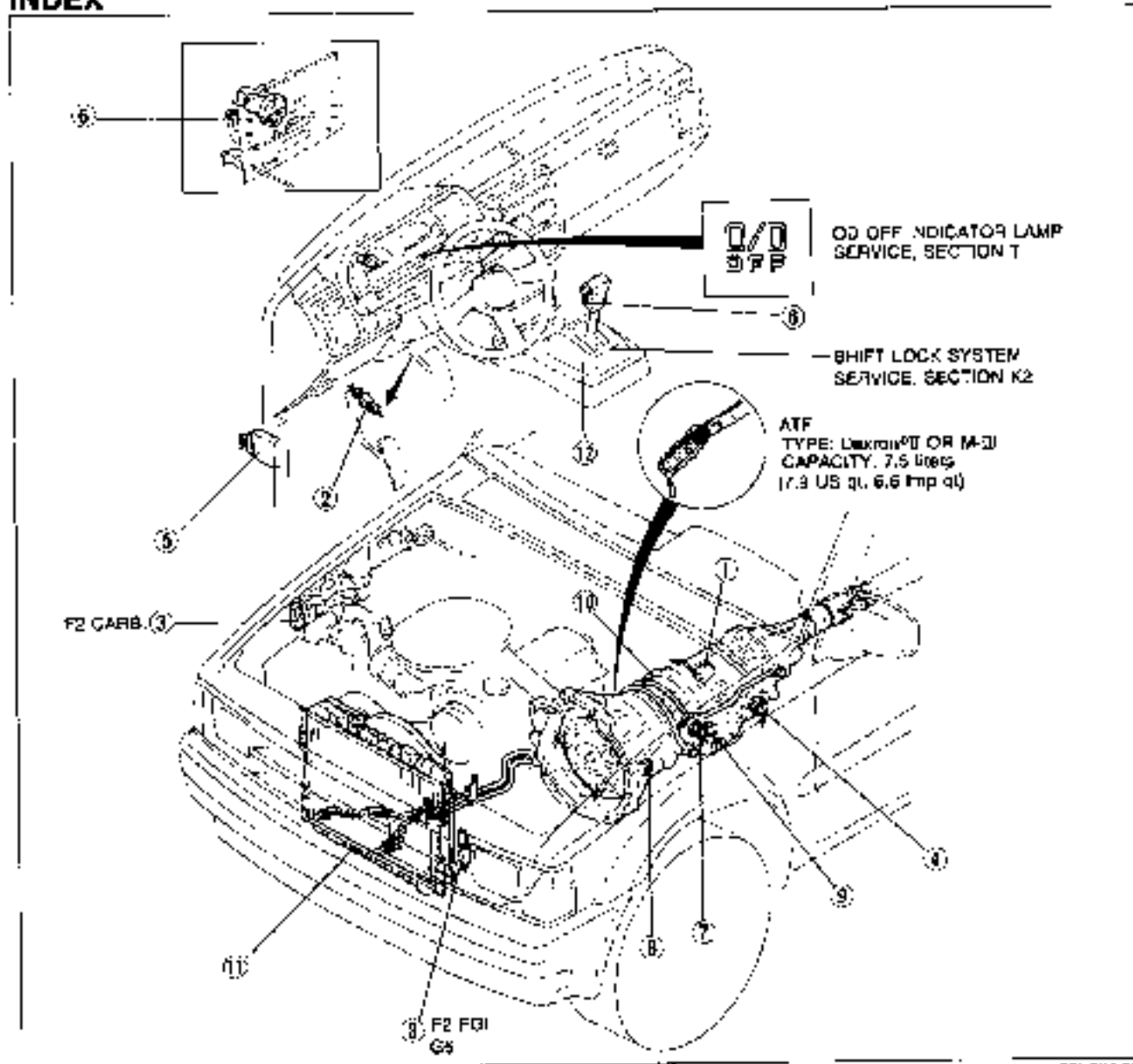
# AUTOMATIC TRANSMISSION

## (Hydraulically-Controlled)

<b>INDEX</b> .....	K1- 2	OD CONNECTING SHELL AND	
<b>OUTLINE</b> .....	K1- 3	OD PLANETARY GEAR UNIT	
SPECIFICATIONS.....	K1- 3	(OD SUN GEAR,	
STRUCTURAL VIEW.....	K1- 4	OD PLANETARY PINION	
POWER FLOW DIAGRAM.....	K1- 5	CARRIER, OD CLUTCH HUB)....	K1- 54
OPERATION OF COMPONENTS ..	K1- 5	<b>DIRECT CLUTCH</b> .....	K1- 56
FLUID PASSAGE LOCATIONS.....	K1- 6	OD BAND SERVO.....	K1- 61
<b>TROUBLESHOOTING</b> .....	K1- 8	DRUM SUPPORT,	
GENERAL NOTE.....	K1- 8	ACCUMULATOR, AND OD CASE	K1- 64
CLICK DIAGNOSIS CHART.....	K1- 9	2ND BAND SERVO.....	K1- 68
<b>ELECTRICAL SYSTEM</b>		FRONT CLUTCH.....	K1- 71
<b>INSPECTION</b> .....	K1- 13	REAR CLUTCH.....	K1- 76
OD OFF SWITCH FUNCTION.....	K1- 13	CONNECTING SHELL AND	
KICKDOWN AND 4-3 SWITCH		FRONT PLANETARY GEAR UNIT	
FUNCTION.....	K1- 13	(REAR CLUTCH HUB, FRONT	
CRUISE CONTROL SWITCH		PLANETARY PINION CARRIER,	
FUNCTION.....	K1- 13	REAR SUN GEAR).....	K1- 81
<b>MECHANICAL SYSTEM TEST</b> .....	K1- 14	REAR PLANETARY GEAR UNIT	
PREPARATION.....	K1- 14	(CONNECTING DRUM, REAR	
STALL TEST.....	K1- 14	PLANETARY PINION CARRIER,	
TIME LAG TEST.....	K1- 17	ONE-WAY CLUTCH).....	K1- 83
LINE PRESSURE TEST.....	K1- 18	LOW AND REVERSE BRAKE.....	K1- 87
GOVERNOR PRESSURE TEST.....	K1- 20	GOVERNOR.....	K1- 92
LINE PRESSURE CUTBACK		EXTENSION HOUSING AND	
POINT TEST.....	K1- 21	PARKING MECHANISM.....	K1- 95
<b>ROAD TEST</b> .....	K1- 22	OIL SEAL.....	K1- 97
D-RANGE TEST.....	K1- 22	CONTROL VALVE BODY.....	K1- 98
2-RANGE TEST.....	K1- 23	UPPER VALVE BODY.....	K1-101
1-RANGE TEST.....	K1- 23	CONTROL VALVE BODY.....	K1-104
P-RANGE TEST.....	K1- 23	VACUUM DIAPHRAGM.....	K1-107
<b>ELECTRONIC SYSTEM</b>		TRANSMISSION UNIT (ASSEMBLY)	K1-110
<b>COMPONENTS</b> .....	K1- 25	<b>OIL COOLER</b> .....	K1-125
INHIBITOR SWITCH.....	K1- 25	<b>DRIVE PLATE</b> .....	K1-126
KICKDOWN AND 4-3 SWITCH.....	K1- 26	<b>SHIFT MECHANISM</b> .....	K1-127
KICKDOWN RELAY.....	K1- 27	INSPECTION.....	K1-127
KICKDOWN SOLENOID.....	K1- 27	ADJUSTMENT.....	K1-127
OD OFF SWITCH.....	K1- 28	REMOVAL AND INSTALLATION...	K1-128
OD CANCEL SOLENOID.....	K1- 28	<b>HYDRAULIC CIRCUIT</b> .....	K1-131
LOCKUP SOLENOID.....	K1- 29	P RANGE.....	K1-131
OIL PRESSURE SWITCH.....	K1- 30	R RANGE.....	K1-132
4A1 CONTROL UNIT.....	K1- 30	N RANGE.....	K1-133
<b>AUTOMATIC TRANSMISSION</b>		D RANGE, 1ST GEAR.....	K1-134
<b>FLUID (ATF)</b> .....	K1- 33	D RANGE; 2ND GEAR.....	K1-135
INSPECTION.....	K1- 33	D RANGE; 3RD GEAR.....	K1-136
<b>TRANSMISSION</b> .....	K1- 36	D RANGE; OD.....	K1-137
TRANSMISSION UNIT		D RANGE; OD, LOCKUP OFF.....	K1-138
(REMOVAL AND INSTALLATION)	K1- 36	D RANGE; OD, LOCKUP ON.....	K1-139
TRANSMISSION UNIT		D RANGE; KICKDOWN.....	K1-140
(DISASSEMBLY).....	K1- 38	2 RANGE.....	K1-141
TORQUE CONVERTER.....	K1- 49	1 RANGE, 1ST GEAR.....	K1-142
OIL PUMP.....	K1- 49	1 RANGE, 2ND GEAR.....	K1-143



## INDEX



CB.LCK1-302

1. Inhibitor switch			
Inspection .....	page K1- 25		
Adjustment .....	page K1- 25		
2. Kickdown and 4-3 switch			
Inspection (Kickdown switch) .....	page K1- 26		
Inspection (4-3 switch) .....	page K1- 26		
Adjustment .....	page K1- 27		
3. Kickdown relay			
Inspection .....	page K1- 27		
4. Kickdown solenoid			
Inspection .....	page K1- 27		
5. 4AT control unit			
Inspection .....	page K1- 30		
6. OD OFF switch			
Inspection .....	page K1- 28		
7. OD cancel solenoid			
Inspection .....	page K1- 28		
8. Lockup solenoid			
Inspection .....	page K1- 29		
9. Oil pressure switch			
Inspection .....	page K1- 30		
10. Automatic transmission			
Removal .....	page K1- 36		
Disassembly .....	page K1- 38		
Assembly .....	page K1-110		
Installation .....	page K1- 36		
11. Oil cooler			
Removal, Inspection,			
and Installation .....	page K1- 125		
12. Shift mechanism			
Inspection .....	page K1-127		
Adjustment .....	page K1-127		
Removal and Installation .....	page K1-128		

OUTLINE

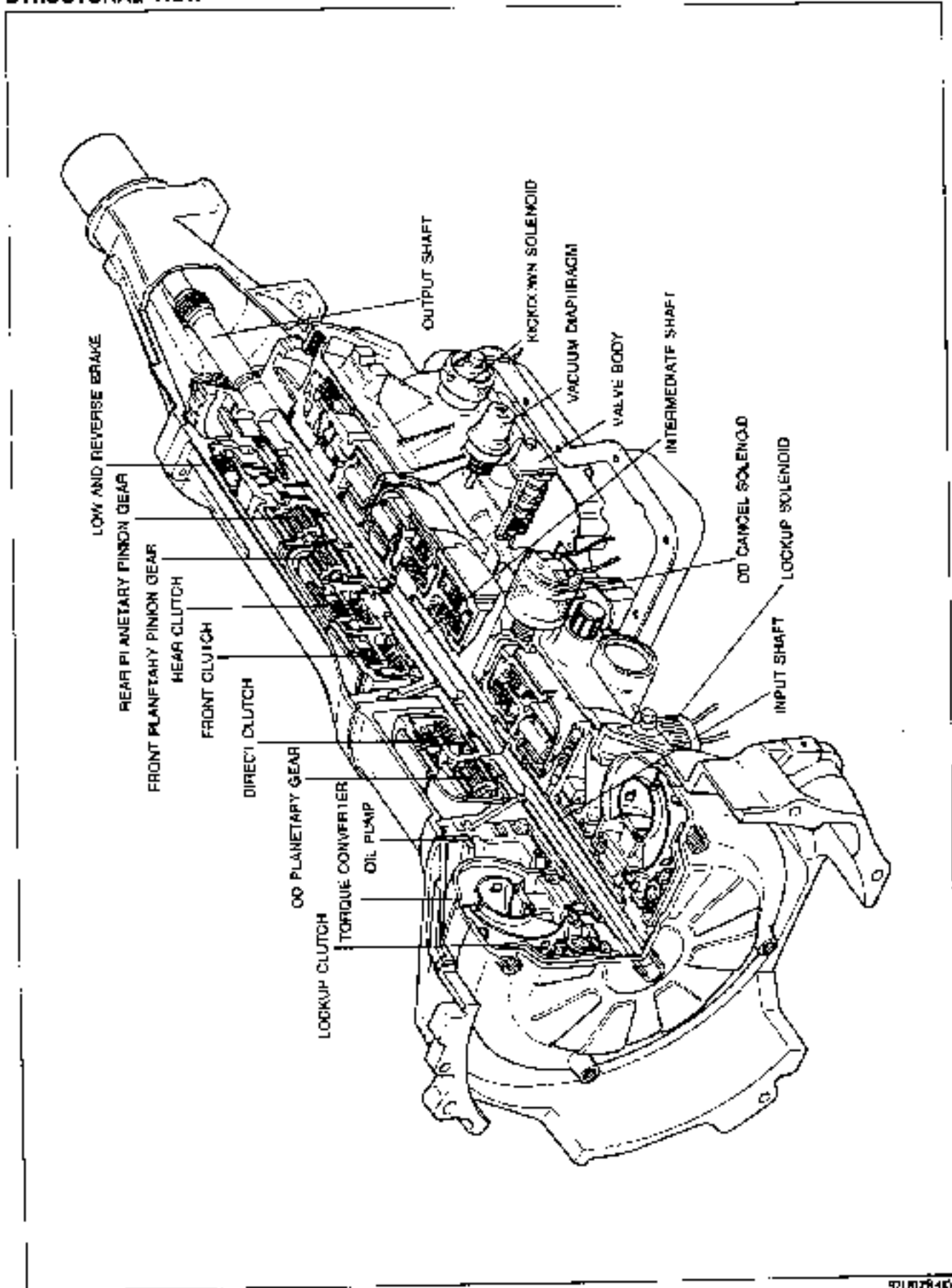
SPECIFICATIONS

Item	Transmission/Engine	N44-HL	
		F2	G6
Torque converter stall torque ratio			1.900
Gear ratio	1st		2.841
	2nd		1.941
	3rd		1.000
	OD (4th)		0.720
	Reverse		2.400
	Direct clutch		2/2
Number of drive/driven plates	Front clutch	3/5	4/5
	Rear clutch		5/5
	Low and reverse brake		5/5
Servo diameter (Piston outer diameter/rear inner diameter) mm (in)	OD band servo	63/43 (2.36/1.57)	63/36 (2.30/1.42)
	2nd band servo	72/44 (2.83/1.73)	63/56 (3.10/2.21)
Automatic transmission fluid (ATF)	Type	Dexron <sup>®</sup> III or M-III	
	Capacity liters (US qt. Imp qt.)	Total	7.5 (7.0, 6.6)
		On gear	4.0 (4.2, 3.5)

78L0K-1-00

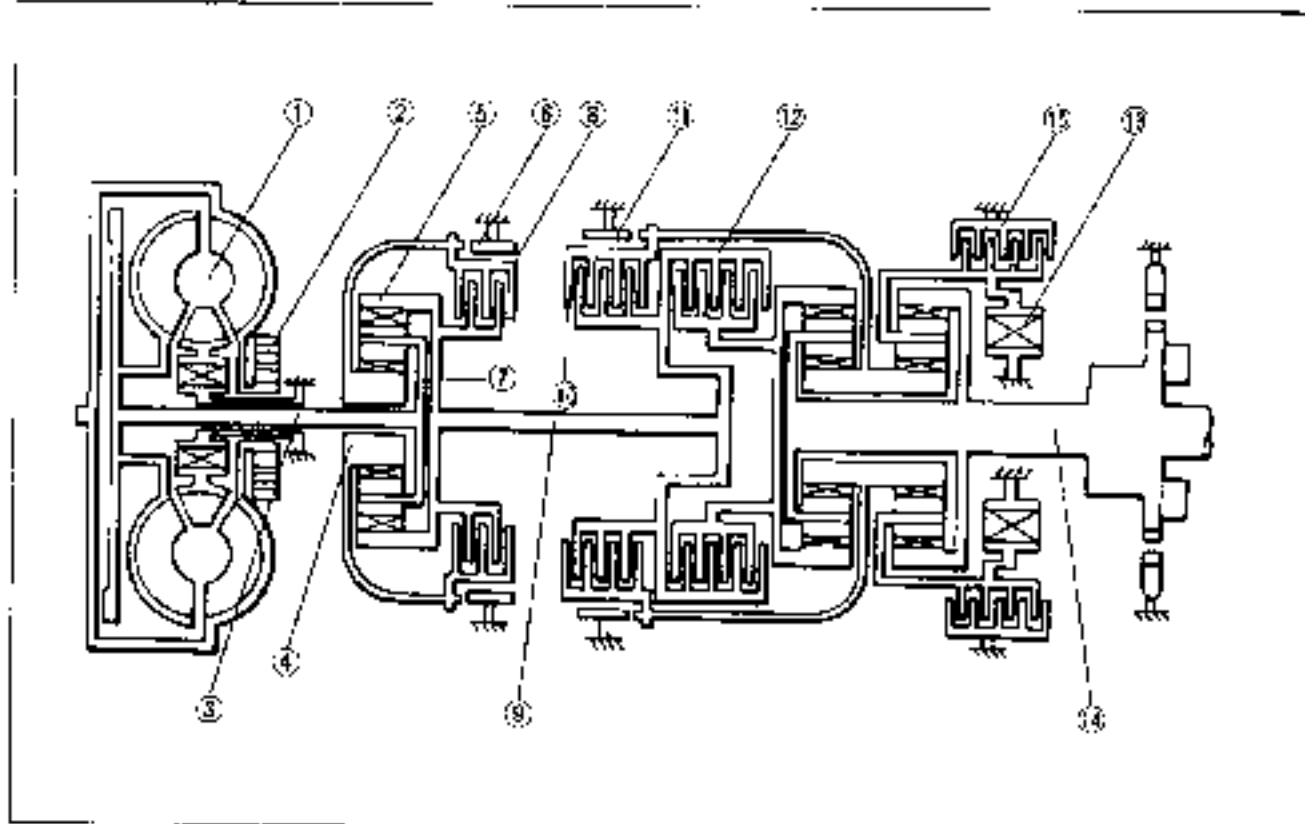
K1

STRUCTURAL VIEW



97U078404

POWER FLOW DIAGRAM



9M11012-002

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 |

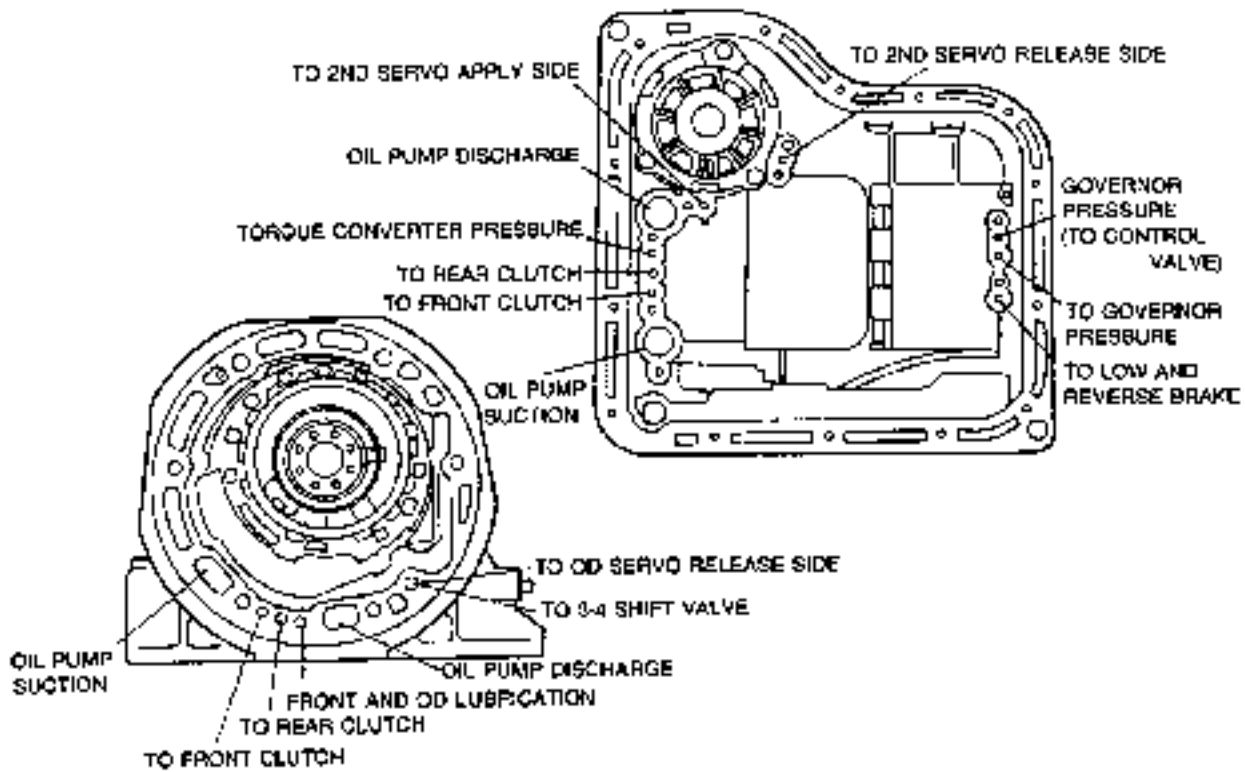
OPERATION OF COMPONENTS

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 servo remain deactivated because of the larger release pressure side area. Brake band does not operate.

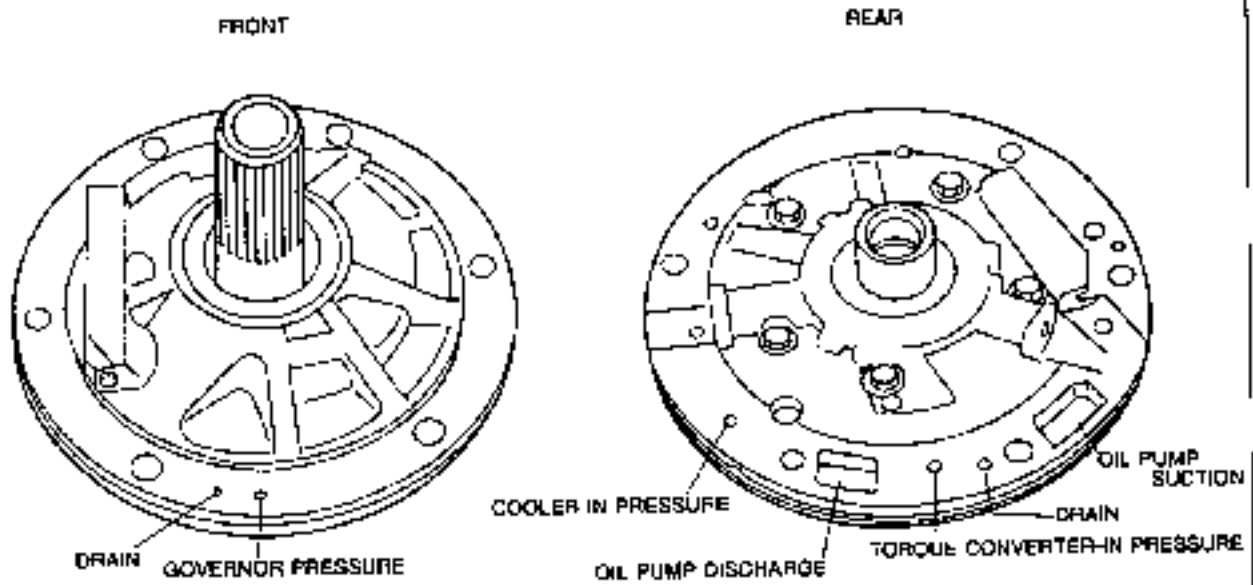
9M11012-005

### FLUID PASSAGE LOCATIONS Transmission Case



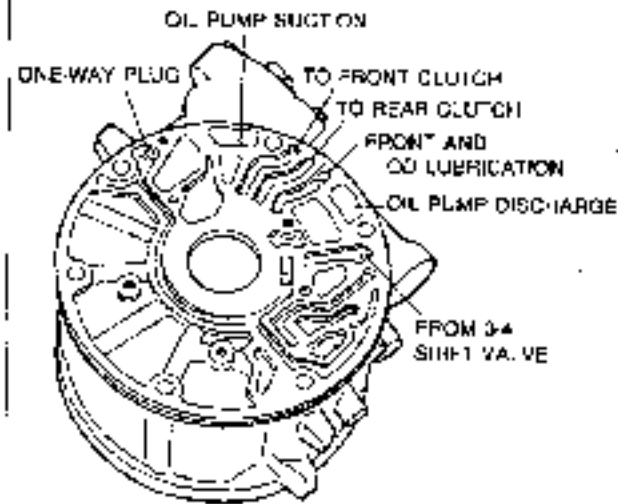
9M,JK2-006

### Oil Pump



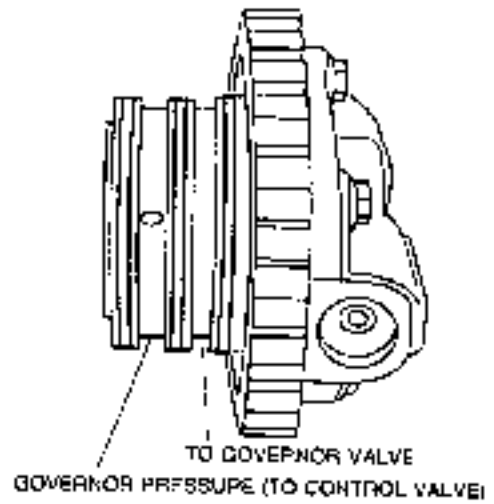
9M,JK2-007

OD Case



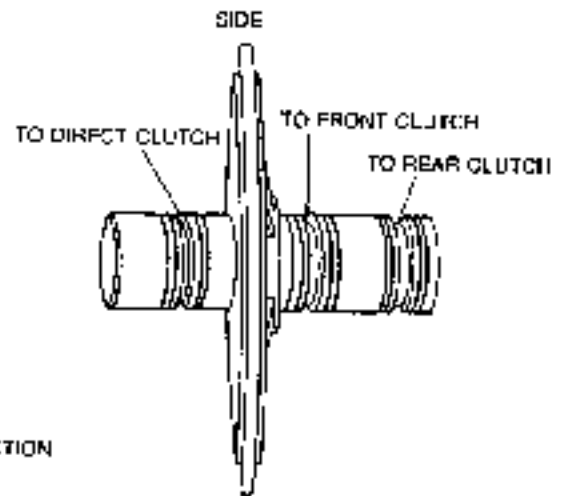
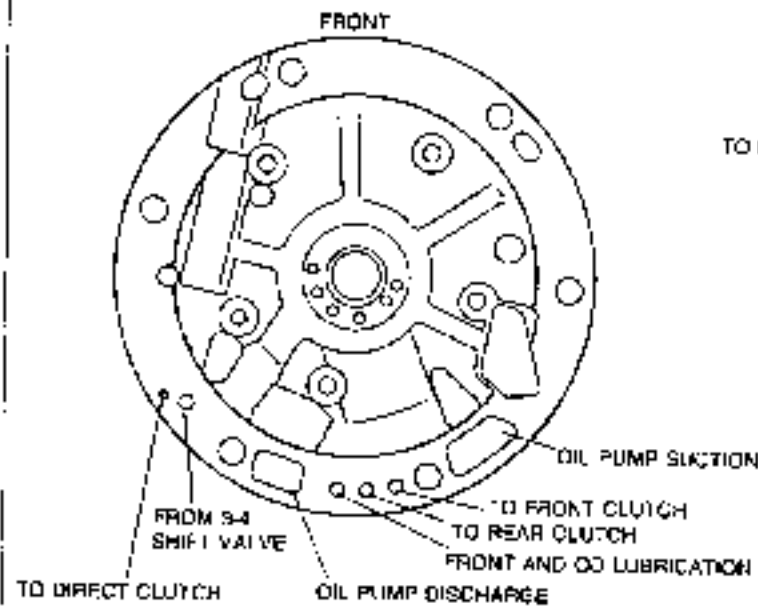
9M...CK2-008

Parking Gear (Oil Distributor)



9M...CK2-009

Drum Support



9M...CK2-010

K1

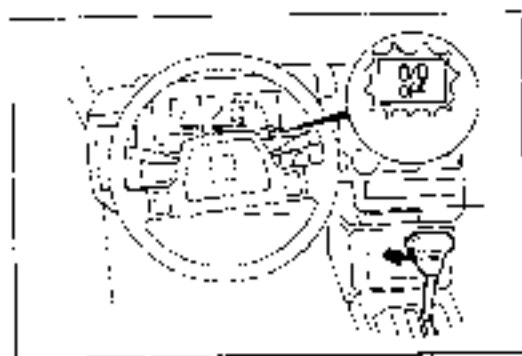
## TROUBLESHOOTING

## 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.

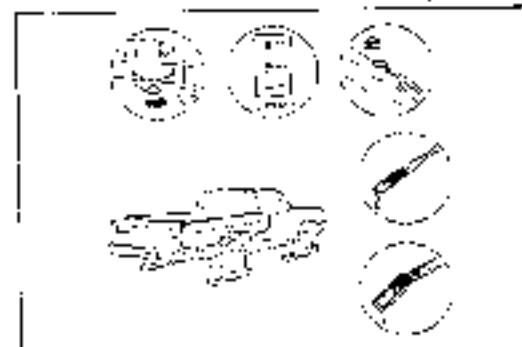
3M2J0K2011



0R11R1-004

**Step 1: Electrical System Inspection**

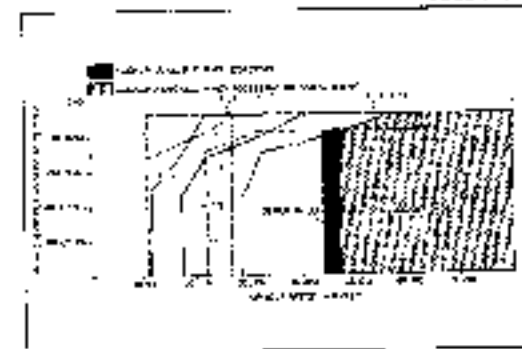
Check the electrical system. (Refer to page K1-13.)



0B0UK-006

**Step 2: Mechanical System Test**

Check the engine stall speed, time lag, line pressure, and governor pressure. (Refer to page K1-14.)



0E0UK-000

**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 step of the troubleshooting process to locate the cause of the problem quickly.

3B00K-027

**QUICK DIAGNOSIS CHART**

The QUICK DIAGNOSIS CHART shows different problems and the relationship of components that might be the cause.

- 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.
- Components indicated in the "Electrical System Inspection" column can be checked for malfunction through this inspection.
- Components indicated in the "Mechanical System Test" column can be checked for malfunction by the results of the oil pressure test.
- Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
- The numbers in the chart indicate the order of inspection for detecting malfunctions.
- Circled numbers indicate that the transmission must be removed from the vehicle.
- The checking, adjusting, repair, and replacement procedures for components are described in the page(s) shown in the "Reference page" column.

9M50-C2-01-9

Item	ON VEHICLE										OFF VEHICLE																							
	Inspection point and reference page		Preliminary		Electronic control system					Hydraulic control system					Powertrain																			
	K <sup>1</sup> -38	K <sup>1</sup> -127	Section F:	K1-25	K1-20,27	Section G:	K1-20	K1-26	K1-29	K1-107	K1-111	K <sup>1</sup> -10,21	K1-59	K1-92	K1-61	K1-65	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K <sup>1</sup> -71	K1-76	K1-81	K1-60	K1-87	K1-83	K1-84,81	K1-95			
A, F keys and condition	X																																	
Shift mechanism	X	X																																
Engaging idc speed arc condition	X	X																																
Inhibitor switch and wiring		X																																
Knob and det. knob and det. wiring			X																															
Ignition switch and starter				X																														
OD OFF switch					X																													
ON control solenoid						X																												
Lockup solenoid							X																											
Vacuum diaphragm and piping								X																										
Engining idc speed																																		
Line and governor pressure																																		
Control valve body																																		
Governor valve																																		
OD band screw																																		
2nd band servo																																		
Accumulator																																		
Transmission air cracks																																		
OD cancel valve																																		
Lockup control valve																																		
Oil pump																																		
Torque converter																																		
Direct clutch																																		
Front clutch																																		
Rear clutch																																		
OD brake band																																		
Sync brake band																																		
Low and reverse brake																																		
One-way clutch																																		
Planetary gear																																		
Parking gear																																		
Parking gear																																		

K1



Item	ON VEHICLE												OFF VEHICLE																					
	Inspection point and reference page	Preliminary	Electronic control system						Hydraulic control system						Powertrain																			
			K1-30	K1-32,7	Section F	K1-25	Section G	K1-26,27	K1-28	K1-29	K1-29	K1-107	K1-14	K1-10(2)?	K1-93	K1-92	K1-61	K1-60A	K1-60	K1-6	K1-64	K1-50	K1-50	K1-49	K1-26	K1-71	K1-76	K1-61	K1-68	K1-67	K1-63	G-54(1,2)	K1-25	
Does not shift from 1st to 2nd	1																																	
Does not shift from 2nd to 3rd	1		3																															
Does not shift from 3rd to OD	1		3		5	5																												
Lockup does not occur in OD								3																										
Does not shift from OD to 3rd	1				6	7																												
Does not shift from 3rd to 2nd or from OD to 2nd	1								2																									
Does not shift from 2nd to 1st or from 3rd to 1st	1									2																								
Does not kickdown when accelerator depressed in 3rd within kickdown range	1										2																							
Does not kickdown when accelerator depressed in OD within kickdown range	1																																	
Excessive engine speed when accelerated in 3rd due to delayed kickdown	1	2																																
Excessive engine speed when accelerated in OD due to delayed kickdown	1	2																																
Does not shift from 3rd to 2nd on D range to 2-range shift	1	2																																
Does not shift from 3rd to 1st on D range to 1-range shift	1	2																																

Item	ON VEHICLE										OFF VEHICLE																						
	Inspection point and reference page	Preliminary		Electronic control system				Hydraulic control system				Powertrain																					
		K1-33	K1-127	Section F1	K1-25	K1-26,27	Section G	K1-25	K1-28	K1-29	K1-107	K1-14	K1-202	K1-35	K1-92	K1-61	K1-68	K1-64	K1-3	K1-34	K1-59	K1-50	K1-49	K1-53	K1-7	K1-70	K1-8	K1-65	K1-87	K1-83	K1-53/84	K1-85	
	A/F over and condition shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Kickdown switch, kickdown switch, and wiring	Ignition switch and starter	OD OFF switch	OD control solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD hand servo	2 <sup>nd</sup> band servo	Adjustment	Transmission filter check	UD control valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2 <sup>nd</sup> brake band	Low a/c reverse brake	One-way clutch	Planetary gear	Parking gear			
Shift shock	Excessive 1 <sup>st</sup> to 2 <sup>nd</sup> range shift shock								3		4																						
	Excessive 1 <sup>st</sup> to 2 <sup>nd</sup> shift shock	1							3		4																						
	Excessive 2 <sup>nd</sup> to 3 <sup>rd</sup> shift shock							1		2	3																						
	Excessive 3 <sup>rd</sup> to OD shift shock							1		2	3																						
	Vehicle brakes when shifted from 1 <sup>st</sup> to 2 <sup>nd</sup>	1										2																					
	Vehicle brakes when shifted from 2 <sup>nd</sup> to 3 <sup>rd</sup>	1										3																					
Shift point	Vehicle brakes when shifted from 3 <sup>rd</sup> to OD	1									3																						
	Shift shock felt when accelerator depressed and deceleration occurs	1		3				2		4	5	6		7																			
	Excessively large 2 <sup>nd</sup> to 1 <sup>st</sup> shock in 1 range	1						2	3	4	5																						
	Excessively high 1 <sup>st</sup> to 2 <sup>nd</sup> , 2 <sup>nd</sup> to 3 <sup>rd</sup> , and 3 <sup>rd</sup> to OD shift points	1		3				2		4	5	6																					
	Excessively high OD in 3 <sup>rd</sup> , 3 <sup>rd</sup> to 2 <sup>nd</sup> , and 2 <sup>nd</sup> to 1 <sup>st</sup> shift points	1		3				2		4	5	6																					
	Kickdown operates or engine overruns when depressing pedal in 3 <sup>rd</sup> beyond kickdown vehicle speed limit	1	2								3	4	5																				
Shift sequence	Kickdown operates or engine overruns when depressing pedal in OD beyond kickdown vehicle speed limit	1	2							3	4	5																					
	Shifts directly from 1 <sup>st</sup> to 3 <sup>rd</sup>										2	3																					
	Shifts directly from 1 <sup>st</sup> to OD										2	3																					
	Shifts from 2 <sup>nd</sup> to 1 <sup>st</sup> , or 2 <sup>nd</sup> to 3 <sup>rd</sup> in 2 range	1									2	3																					
Shifts from 1 <sup>st</sup> to 2 <sup>nd</sup> , or 2 <sup>nd</sup> to 3 <sup>rd</sup> in 1 range	1										2																						

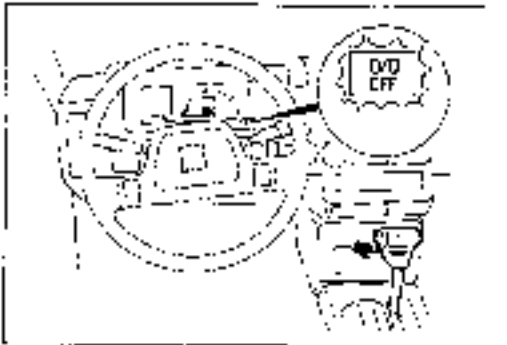
Item	ON VEHICLE										OFF VEHICLE																									
	Inspection point and reference page		Pre-liminary	Electronic control system			Hydraulic control system					Powertrain																								
			K1-33	K1-127	Section 11	K1-26	K1-26, 27	Section 13	K1-26	K1-28	K1-29	K1-107	K1-14	K1-18, 20, 22	K1-36	K1-82	K1-61	K1-68	K1-24	K1-6	K1-61	K1-50	K1-50	K1-23	K1-55	K1-71	K1-76	K1-67	K1-68	K1-67	K1-63	K1-83, 84	K1-86			
ATF level and condition																																				
Shift mechanism																																				
P engine idle speed and condition																																				
Inhibitor switch and wiring																																				
Miscellaneous solenoids, and wiring																																				
Inhibitor switch and plate																																				
OD OFF switch																																				
OD cancel solenoid																																				
Lockup solenoid																																				
Vec. uni. captrain 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 linkage band																																				
2nd brake band																																				
Low and reverse brake																																				
One-way clutch																																				
Planetary gear																																				
Parking gear																																				

041, 042, 1, 007

## ELECTRICAL SYSTEM INSPECTION

In this inspection, the function of the electrical control system (inhibition of O/D and lockup) and components are checked.

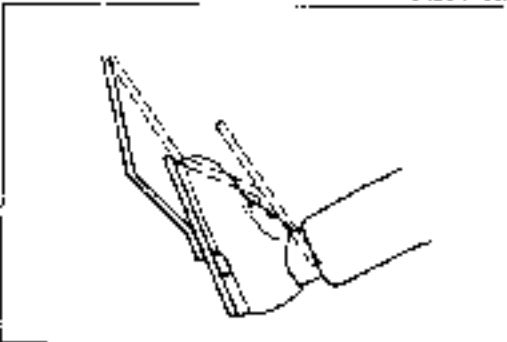
0K1JCK2-016



0K1JCK1-008

**OD OFF SWITCH FUNCTION**

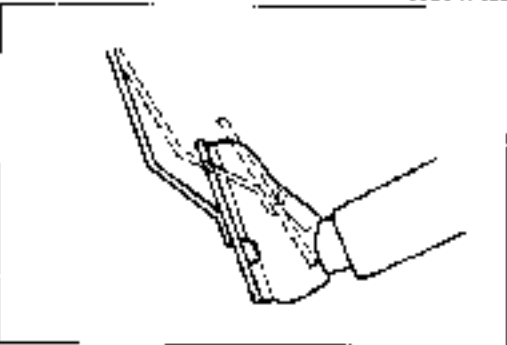
1. Drive the vehicle in D range.
2. Check that OD and lockup are provided.
3. Depress the OD OFF switch, and check that OD and lockup operations are canceled.
4. If not correct, check the OD OFF switch, OD cancel solenoid and lockup solenoid. (Refer to pages K1-28, 29.)



0B1JCK1-003

**KICKDOWN AND 4-3 SWITCH FUNCTION****Kickdown Switch Function**

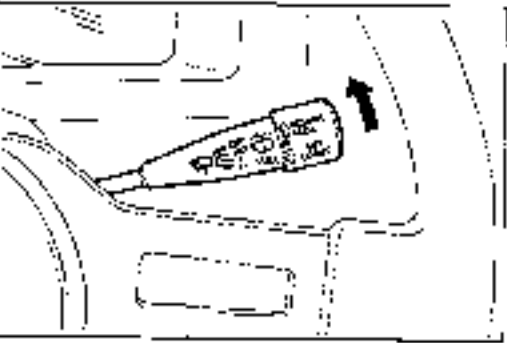
1. Drive the vehicle in D range.
2. Depress the accelerator pedal 7/8 or more, and check the kickdown.
3. If it is not correct, check the kickdown switch, kickdown solenoid and kickdown relay. (Refer to pages K1-26, 27.)



0B1JCK1-003

**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.)



0B1JCK1-003





**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

<p>49 C376 40CA Gauge set, oil pressure</p> 	<p>49 HC75 435 Adapter oil pressure gauge</p> 	<p>49 H019 002 Adapter</p> 
<small>19-20-01-009</small>		
<p>49 B019 901 Gauge, oil pressure</p> 		


#### STALL TEST

This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

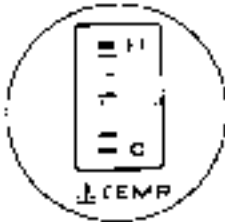
#### Preparation

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, 140–155°F).
3. Engage the parking brake and use wheel chocks at front and rear of the wheels.

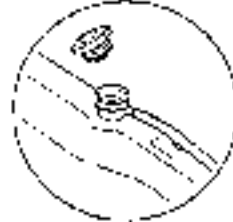
ENGAGE PARKING BRAKE



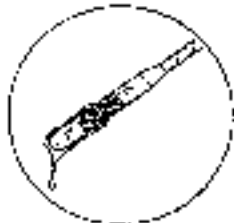
WARM UP ENGINE



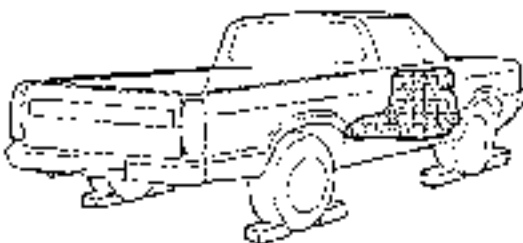
COOLANT LEVEL



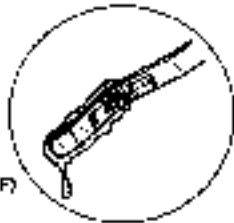
ENGINE OIL LEVEL



WHEEL CHOCK



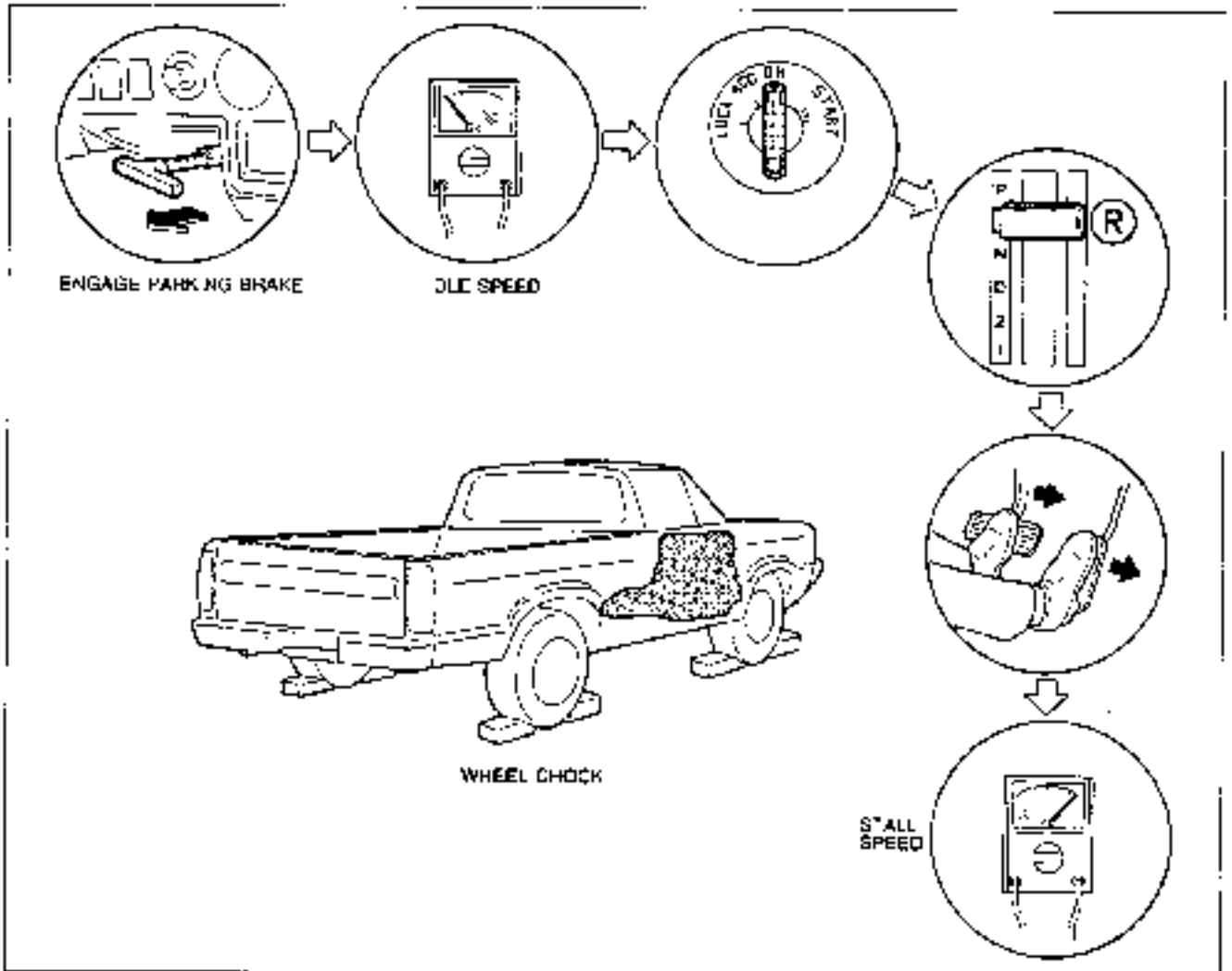
ATF FUEL



TEMPERATURE  
60–70°C (140–155°F)

39-016-1-012

## Procedure



2PL01K1 1002

1. Connect a tachometer to the engine.
2. Start the engine and check the idle speed in P range. (Refer to Section: F1, F2.)

**Idle speed**

F2 Carb. : 800—850 (800  $\pm$  5%) rpm  
 F2 EGI, G6: 750—790 rpm

3. Shift the selector lever to N 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

00001014

### Evaluation of Stall Test

Condition		Possible cause
Above specification	In all ranges	Inefficient lube 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 time
		One-way clutch slipping with torque converter

9M, J042 027

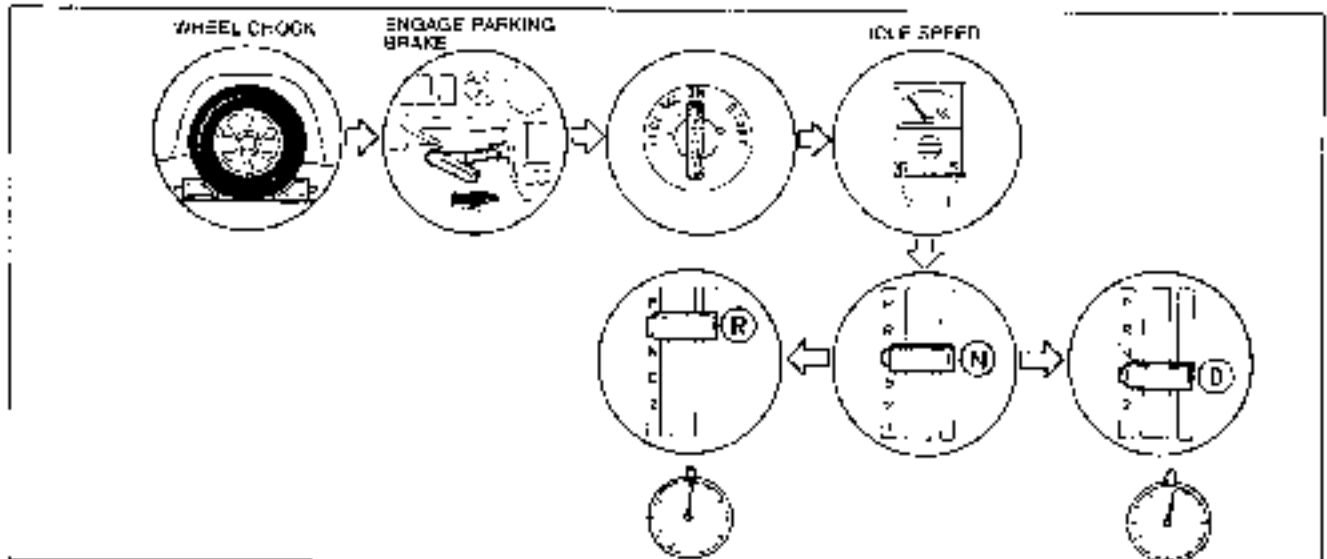
**TIME LAG TEST**

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 STA\_\_ TEST. (Refer to page K1-14.)

**Procedure**



2P.061-910

1. Start the engine and check the idle speed in P range. (Refer to Sections F1, F2.)

**Idle speed**

F2 Carb. : 800—850 (800  $\pm 50$ ) 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.

**Specified time lag:** 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 slip to Front clutch slipping
	Less than specification	Stuck orifice check valve Excessive line pressure

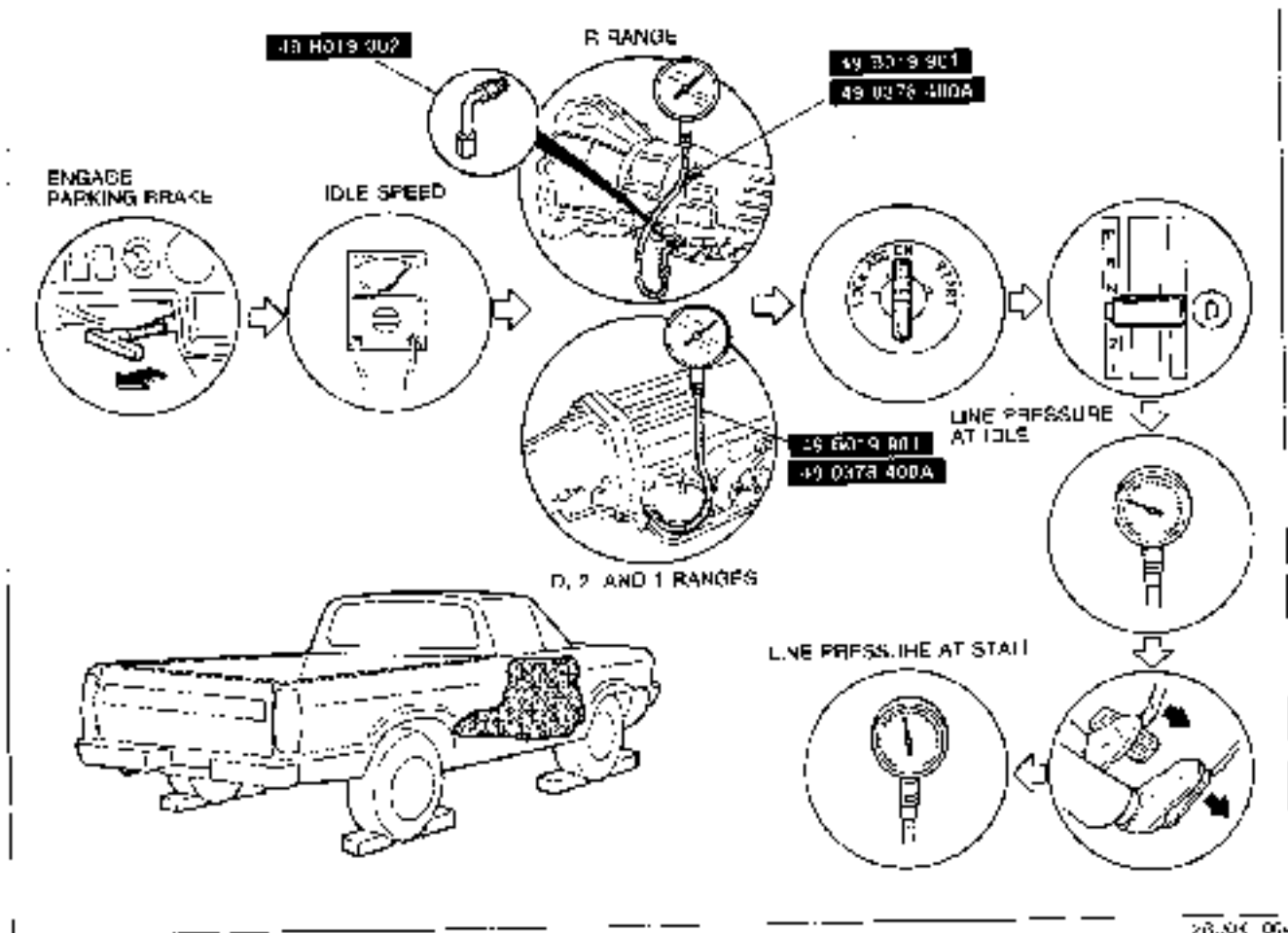


**LINE PRESSURE TEST**

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**

1. Start the engine and check the idle speed in F 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	G8 engine	F2 engine	G8 engine
D, 1	294—392 (3.0—4.0, 43—57)		932—1,120 (9.5—11.3, 135—164)	1,118—1,315 (11.1—13.4, 162—191)
2	620—1,148 (6.0—11.7, 85—163)	1,015—1,570 (10.3—16.0, 146—225)	921—1,177 (9.0—12.0, 142—172)	1,403—1,589 (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—1,823 (17.7—19.6, 252—273)	2,188—2,374 (22.3—24.2, 317—341)

PB\_LK1-017

**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
		Suck pressure regulator valve
		Fluid leakage from the direct clutch and/or UD 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 lines	
	Leaking vacuum diaphragm	

9VJ0K2-032

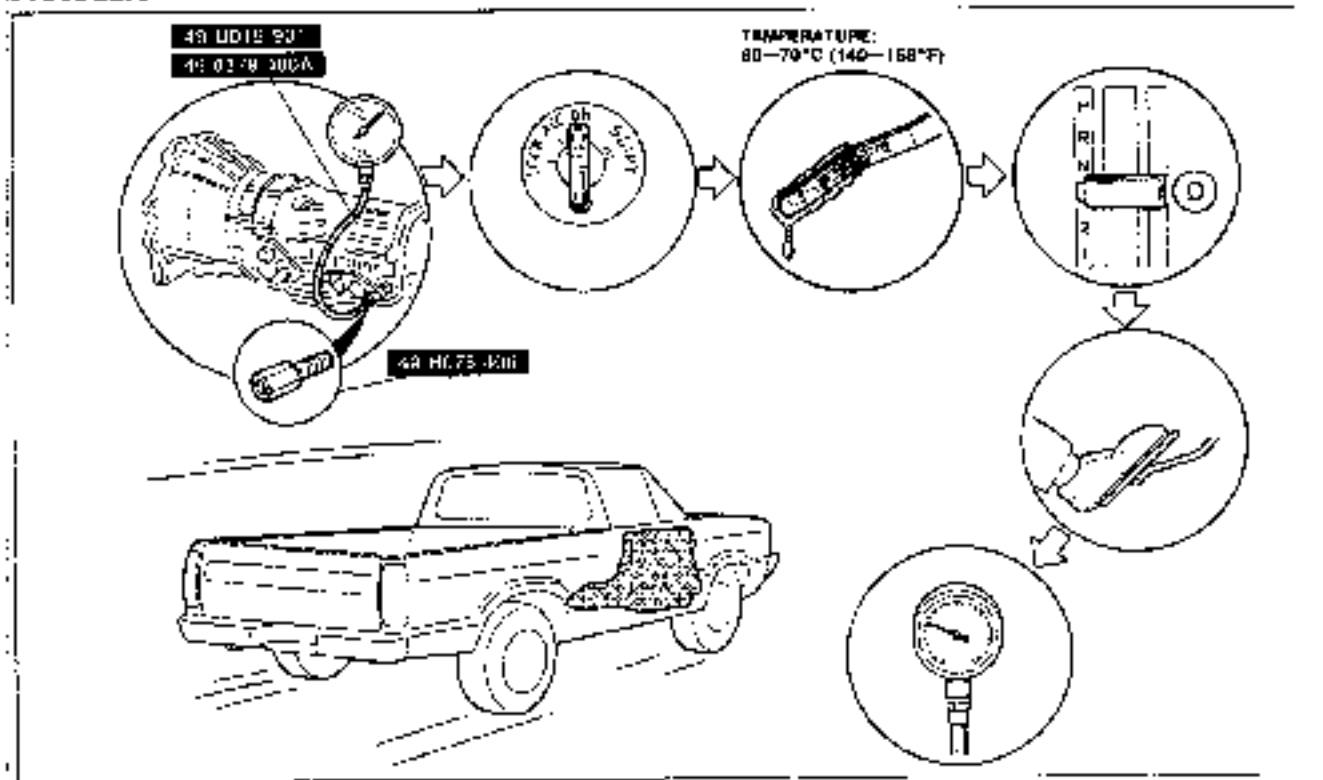
### GOVERNOR PRESSURE TEST

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



2DL5K14-02

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. 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—125 (0.7—1.3, 10—18)	66—127 (0.6—1.5, 10—21)	76—137 (0.6—1.4, 11—20)
55 (34)	157—235 (1.6—2.4, 23—34)	136—275 (1.0—2.8, 25—40)	156—266 (1.9—2.7, 27—38)
85 (53)	314—412 (3.2—4.2, 45—60)	412—510 (4.2—5.2, 60—74)	398—491 (4.0—5.0, 57—71)

3AJ01019

#### 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

3AJ0K2-035

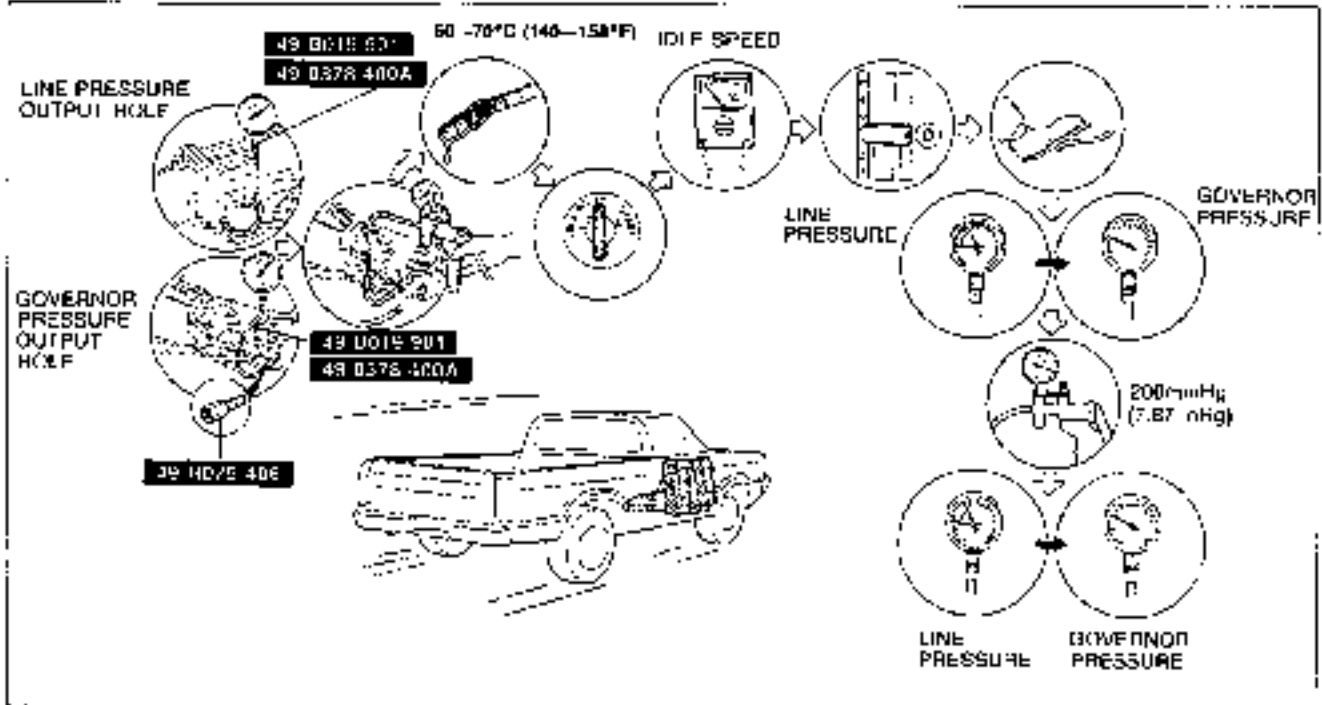
**LINE PRESSURE CUTBACK POINT TEST**

This test checks line pressure cutback point for checking of the hydraulic components.

**Preparation**

1. Connect the **SST** to 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**



25J0K1109

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—157 (1.1—1.7, 16—24)	137—196 (1.4—2.0, 20—28)	128—166 (1.3—1.9, 15—21)
200 (7.87)	59—118 (0.6—1.2, 9—17)	69—128 (0.7—1.3, 11—18)	78—107 (0.8—1.1, 11—20)

34J0K1102

**Evaluation of Cutback Point Test**

Condition	Possible cause
Not within specification	Missing diaphragm nut, too long incorrect, or both Stuck valve in control valve

8M, 9M 2-038

### 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

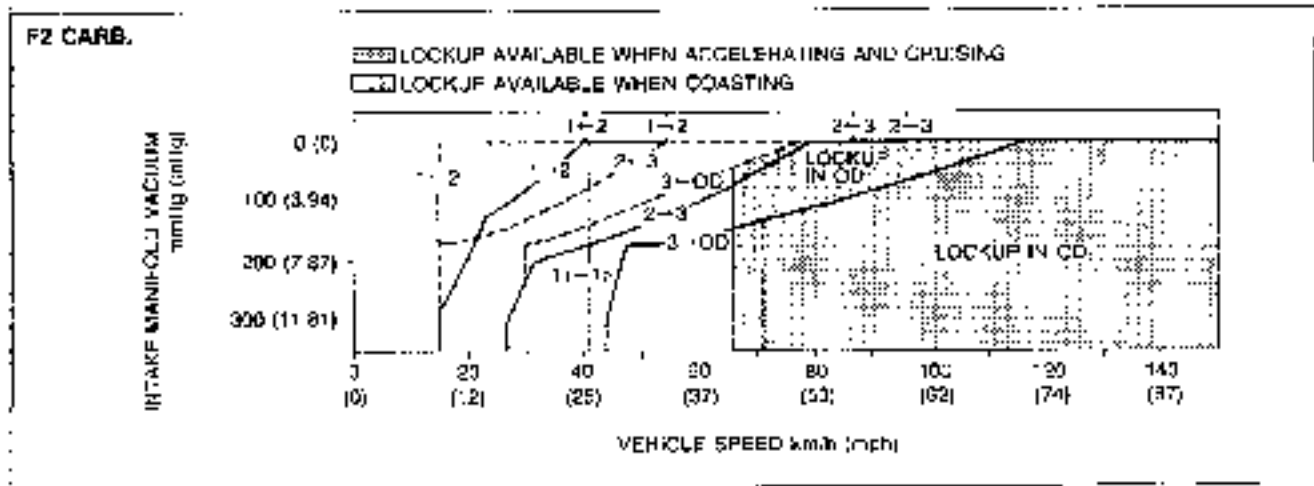
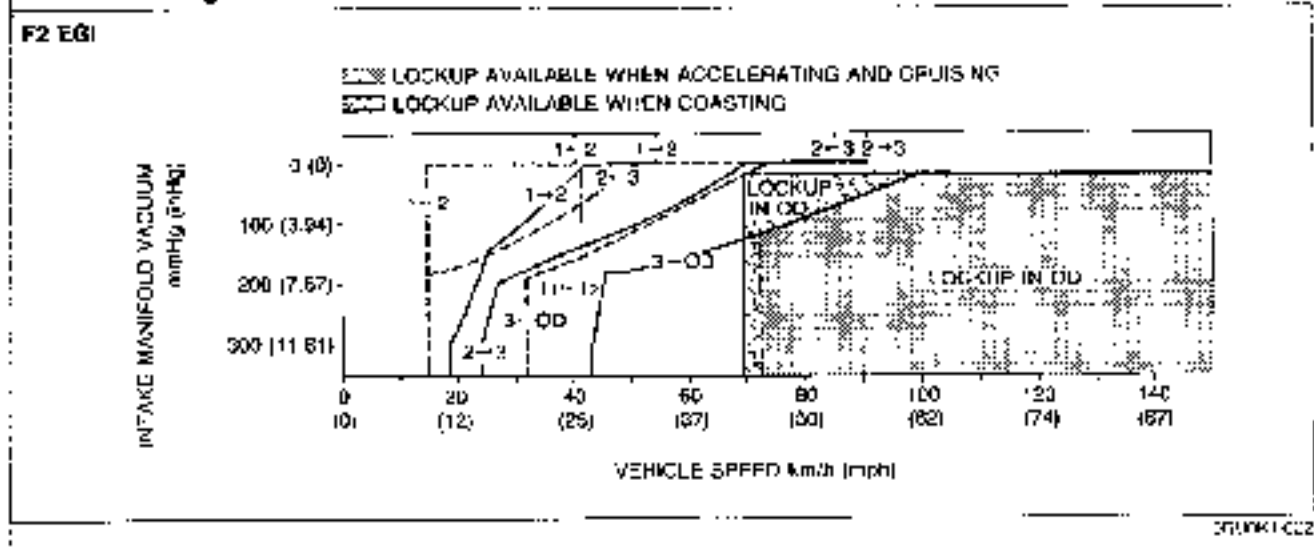
##### Shift Point, Shift Pattern, and Shift Shock

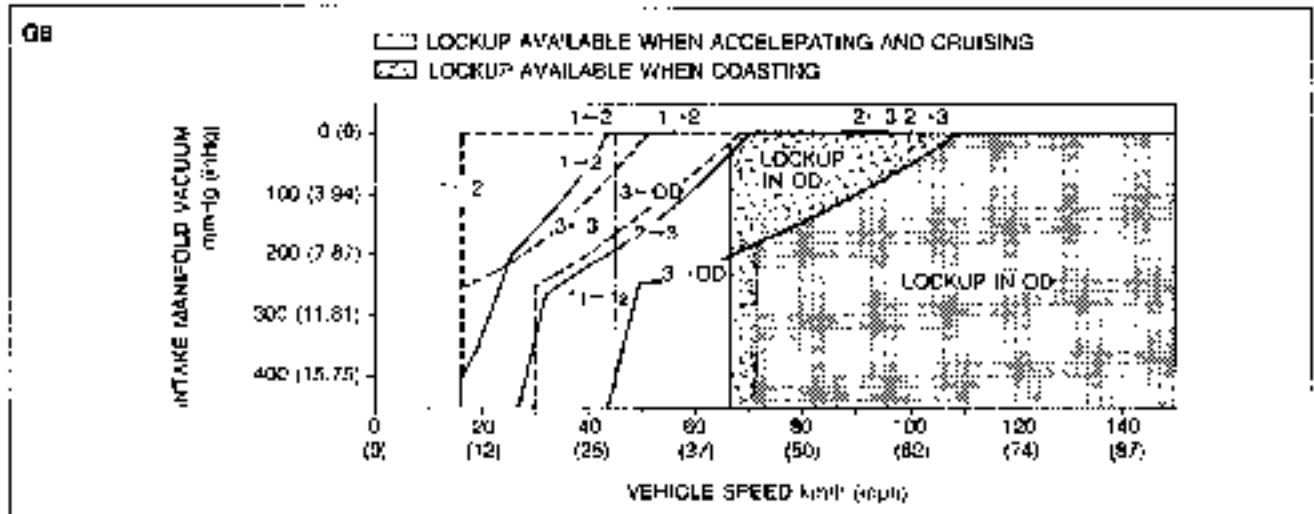
1. Shift the selector lever to D range and depressed the OD OFF switch.
2. Accelerate the vehicle with half and full throttle opening.
3. Check that 1-2, 2-3 and 3-OD upshifts and downshifts and lockup are obtained. The shift points must be as shown in the D range shift diagram.

#### 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





### 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

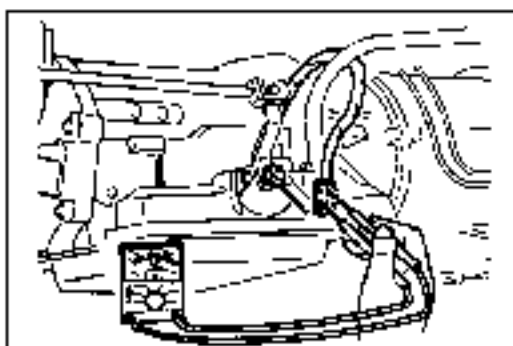
1. Shift into P range on a gentle slope, release the brake, and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at **maximum of 4 km/h (2.5 mph)** on a level surface, and check that the vehicle stops.

AWC000004

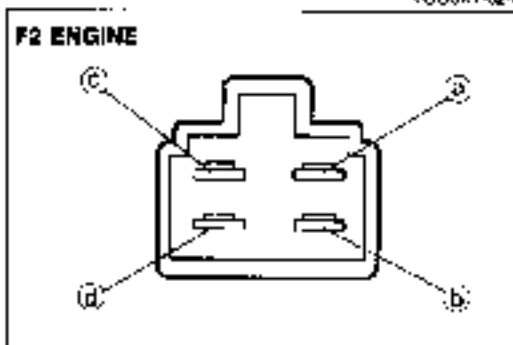
## Vehicle speed at gearshift table

Range	Throttle condition (Manifold vacuum)	Shifting	Vehicle speed km/h (mph)			
			F2 EGI	F2 Carb.	GB	
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>	93-98 (58-61)	88-94 (55-58)	97-103 (60-64)	
		OD → D <sub>3</sub>	Above 54 (52)	Above 83 (51)	Above 91 (56)	
		D <sub>3</sub> → D <sub>4</sub>	54-90 (52-56)	83-89 (51-55)	91-97 (56-60)	
		D <sub>4</sub> → D <sub>5</sub>	37-43 (23-27)	38-44 (24-27)	37-43 (23-27)	
	Half throttle 200 mmHg (7.37 inHg)	D <sub>1</sub> → D <sub>2</sub>	16-22 (10-14)	20-28 (12-16)	21-29 (14-18)	
		D <sub>2</sub> → D <sub>3</sub>	26-35 (16-22)	24-30 (15-18)	40-46 (25-29)	
		D <sub>3</sub> → OD	43-49 (27-30)	42-40 (26-20)	54-70 (40-43)	
		Lockup ON (OD)	68-74 (42-46)	70-76 (43-47)	55-74 (42-46)	
		Lockup OFF (OD)	63-69 (39-43)	66-72 (41-45)	53-59 (39-43)	
		OD → D <sub>3</sub>	26-32 (16-20)	20-35 (18-22)	36-42 (22-26)	
		D <sub>3</sub> → D <sub>4</sub>	12-18 (7-11)	12-18 (7-11)	25-31 (16-19)	
	Fully closed	D <sub>4</sub> → D <sub>5</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)	26-35 (18-22)	27-33 (17-20)	
		D <sub>3</sub> → D <sub>4</sub>	12-18 (7-11)	12-18 (7-11)	13-19 (8-12)	
	1		D <sub>5</sub> → D	12-18 (7-11)	12-18 (7-11)	13-19 (8-12)
	1		D <sub>5</sub> → D <sub>1</sub>	36-44 (24-27)	36-44 (24-27)	41-47 (25-29)

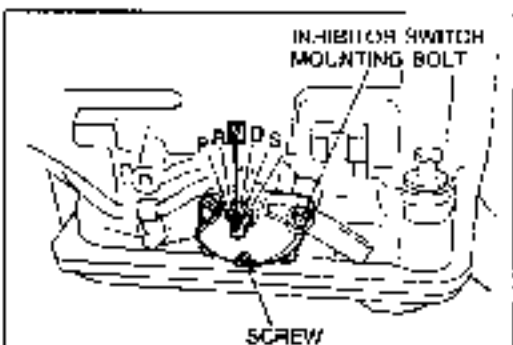
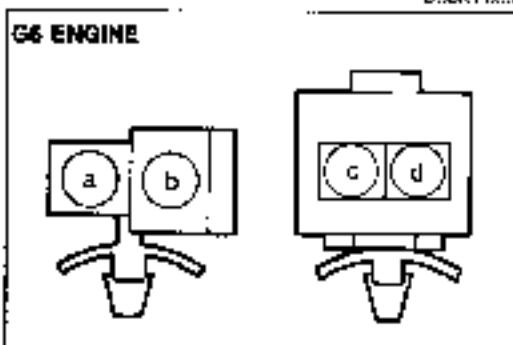
26.001.023



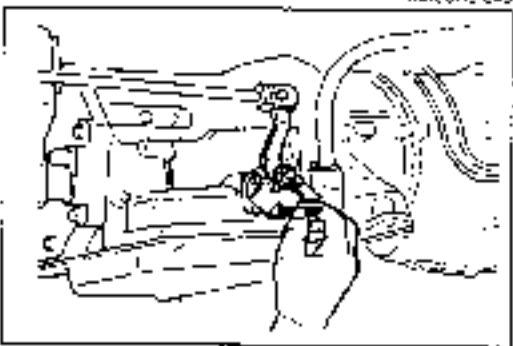
COL0K1-024



-BU0K1-005



96K-0624-05



9N1J0-01-012

## 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 1 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.

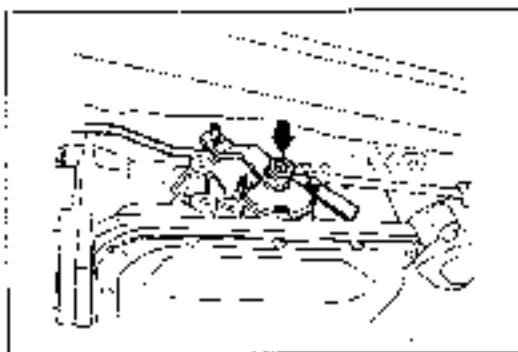
4. Tighten the mounting bolts and remove the pin.

## 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.



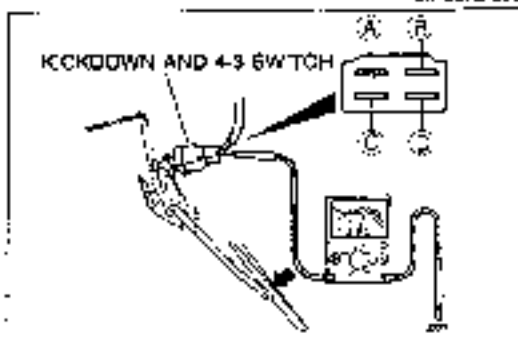


98VJGK2-050

8 Connect the control linkage

### Tightening torque:

29—39 Nm (3.0—4.0 m·kg, 22—29 ft·lb)



98VJGK1-067

### KICKDOWN AND 4-3 SWITCH

#### Inspection

#### Kickdown switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal Ⓒ (YG).

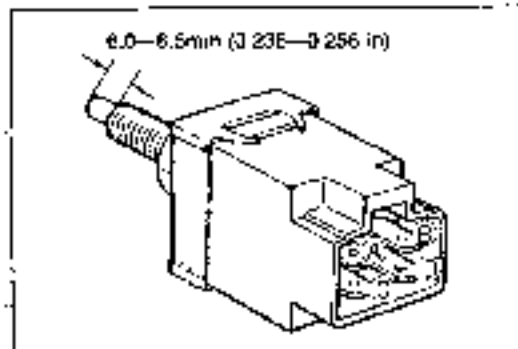
V<sub>B</sub>: Battery voltage

Terminal voltage	Depressed
V <sub>B</sub>	7.0—8.5 (FuR)
0V	0.9—7.8

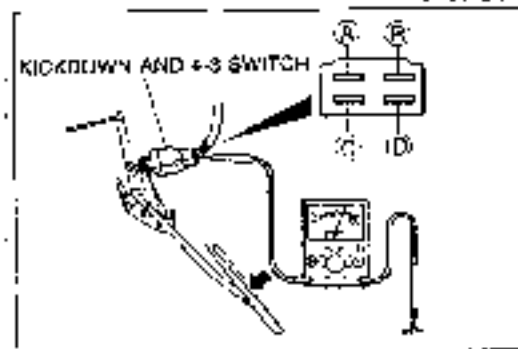
3. If not correct, check the continuity between terminals.

#### Kickdown switch continuity

1. Disconnect the connector.
2. Check the continuity between terminals Ⓒ and Ⓓ 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.



98VJGK2-068



98VJGK1-065

#### 4-3 switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal Ⓐ (GB).

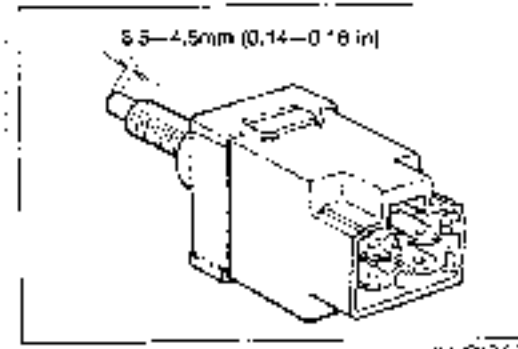
V<sub>B</sub>: Battery voltage

Terminal voltage	Depressed
V <sub>B</sub>	6.8—9.5
0V	0.8—5.6

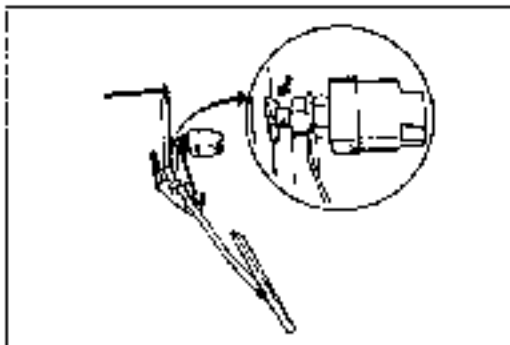
3. If not correct, check the continuity between terminals.

#### 4-3 switch continuity

1. Disconnect the connector.
2. Check the continuity between terminals Ⓐ and Ⓒ 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.



98VJGK2-069



9MJKK2-065

**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 Nm (1.4—1.8 m·kg, 10—13 ft·lb)

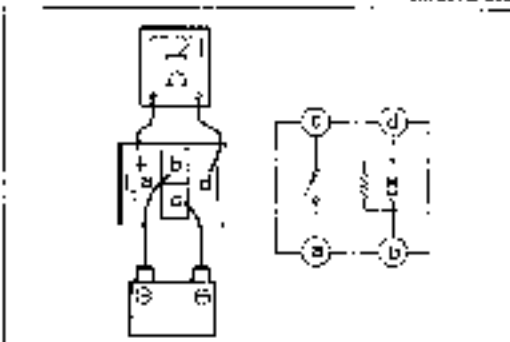


9MUDK2-066

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.



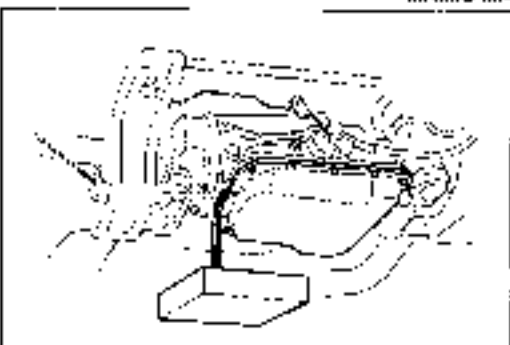
9MUDK2-067

**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 Nm (60—80 cm·kg, 52—69 in·lb)

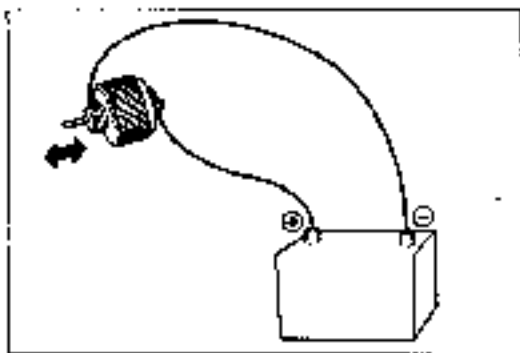


9MUC-07-068

4. Remove the kickdown solenoid.

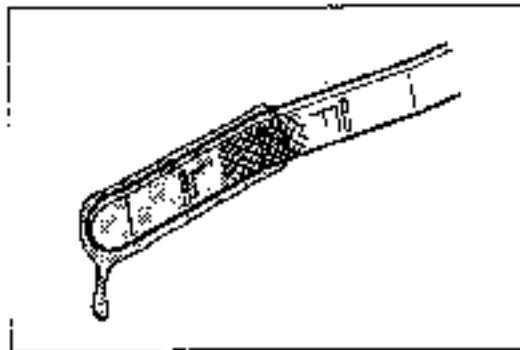


9MUC-07-069



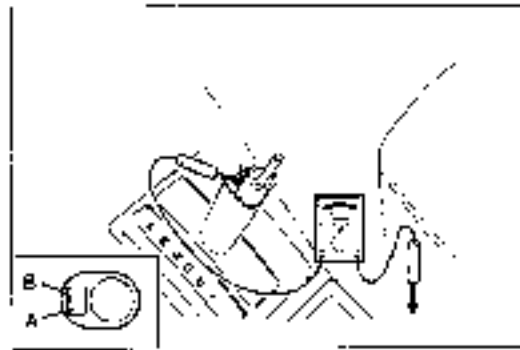
2B11X-079

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.



0B11J-K1-023

8. Add ATF to the correct level. (Refer to page K1-35.)



2A10K1-010

### 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.

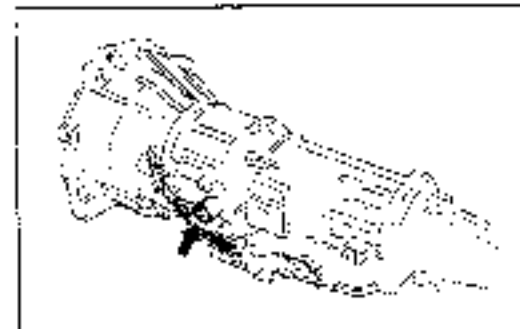
Continuity	Switch
Yes	Proper
No	Decreased

2. If not correct, replace the selector lever knob.

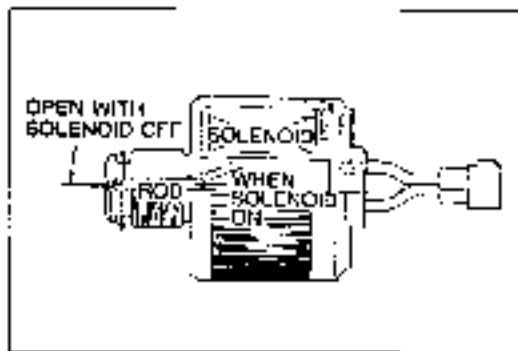
### OD CANCEL SOLENOID

#### 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.



0B11J-K1-026



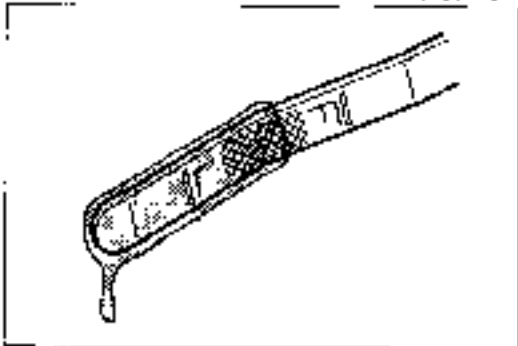
310741 01

4. Apply battery voltage to the solenoid and verify operation of the solenoid.

**Note**

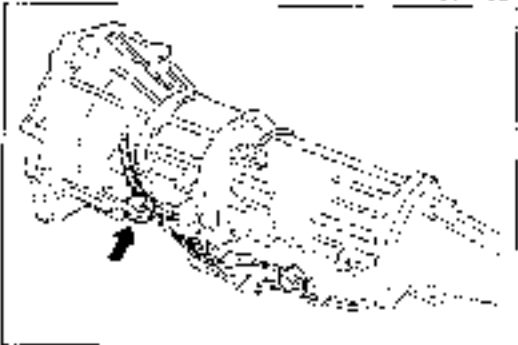
The oil passage should close when current is applied and open when it is cut off.

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.



310741 02

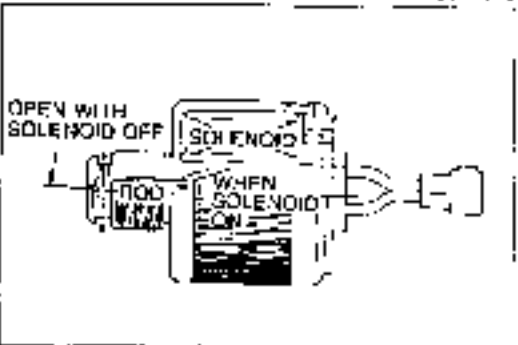
7. Add ATF to the correct level. (Refer to page K1-33.)



310741 03

**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.



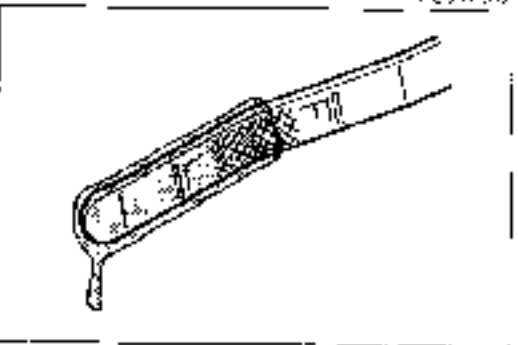
310741 04

4. Apply battery voltage to the solenoid and verify operation of the solenoid.

**Note**

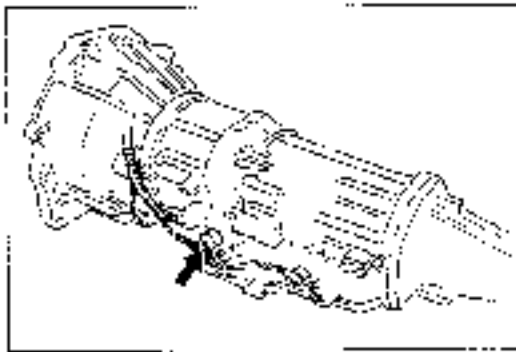
The oil passage should close when current is applied and open when it is cut off.

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.



310741 05

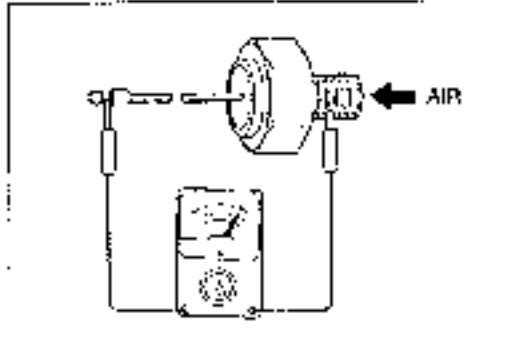
7. Add ATF to the correct level. (Refer to page K1-33.)



03LCK1 033

**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.

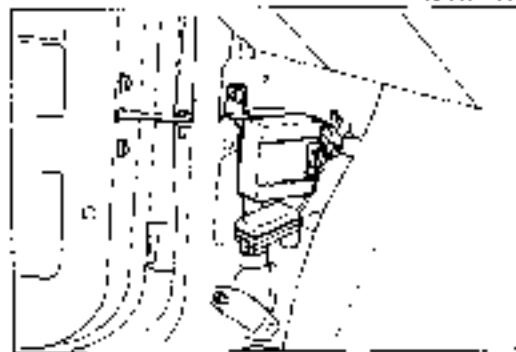


03LCK1 033

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.)

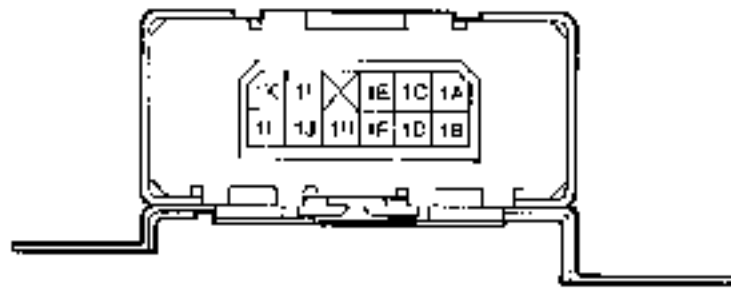


2702K1 010

**4AT CONTROL UNIT****Inspection**

1. Turn the IG switch OFF, and make sure the control unit F terminal is grounded.
2. Turn ON the G switch, and make sure the E terminal voltage is battery voltage.

## F2 engine

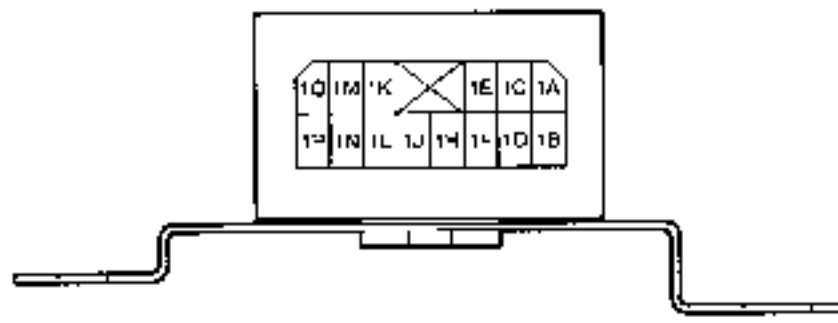


Vs: Battery voltage

Terminal	Connected to	Voltage	Condition
1A (Output)	OD cancel solenoid	Vs Below 1.5V	Solenoid OFF: • OD gear position  Solenoid ON: • 1st, 2nd, and 3rd gear positions (forward ranges) • F, R, and N ranges
1B (Ground)		0V	Constant
1C			
1D			
1E (Input)	OD OFF switch	Vs 0V	OD OFF switch depressed (ON): • OD not available  OD OFF switch released (OFF): • OD available
1F (Input)	Cruise control ctrl	Vs Below 1.5V	Normal conditions  Set or Resume switch ON or vehicle speed 5 km/h (3 mph) lower than preset speed (Driving vehicle cruise control operation)
1H (Input)	Kickdown relay	Vs Below 1.5V	Kickdown relay OFF: • Other than conditions below  Kickdown relay ON: • Kickdown switch On (throttle opening more than 7/8)
1I (Input)	Speed sensor	1.5 - 7V Approx. 7V or below 1.5V	During driving  Vehicle stopped
1J			
1K (Input)	4-3 switch	Vs 0V	Switch ON: • Throttle opening 8/8 - 3/8  Switch OFF: • Other than conditions above
1L			

REWORK 014

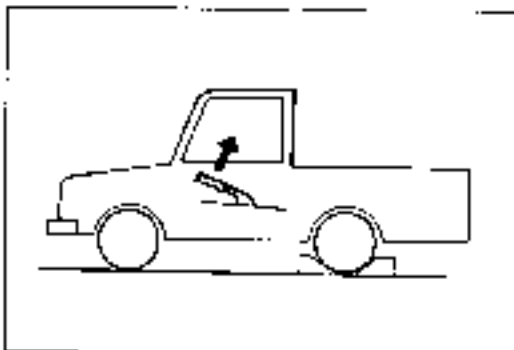
### G5 engine



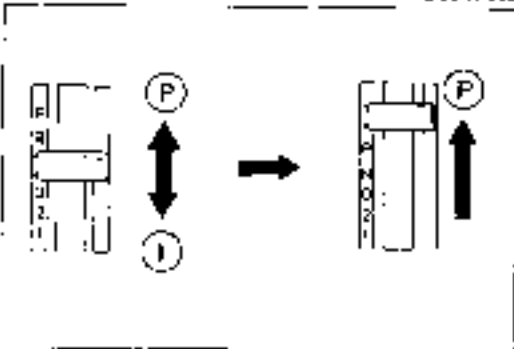
V<sub>B</sub>: Battery voltage

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			
1L (Input)	4-3 switch	V <sub>B</sub>	Switch ON. •Throttle opening (30—0%)
		0V	Switch OFF. •Other than conditions above
1T (Input)	Oil pressure switch	V <sub>B</sub>	Switch OFF. •1st, 2nd, and 3rd gear positions in forward ranges •P, F, 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 control 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, F, 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%)
1N (Output)	Lockup solenoid	V <sub>B</sub>	Solenoid OFF. •Non-lockup
		Below 1.5V	Solenoid ON. •Lockup

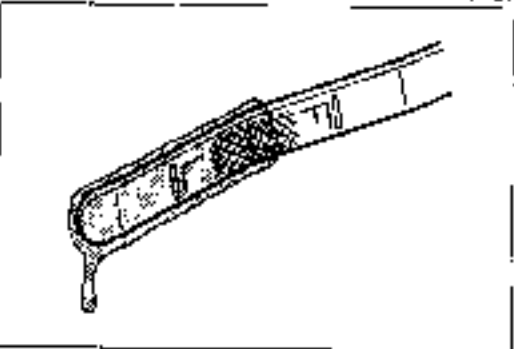
29UJK1-015



BUCK1 20



79000-0125



910-KEN2



79000-0125

**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.**

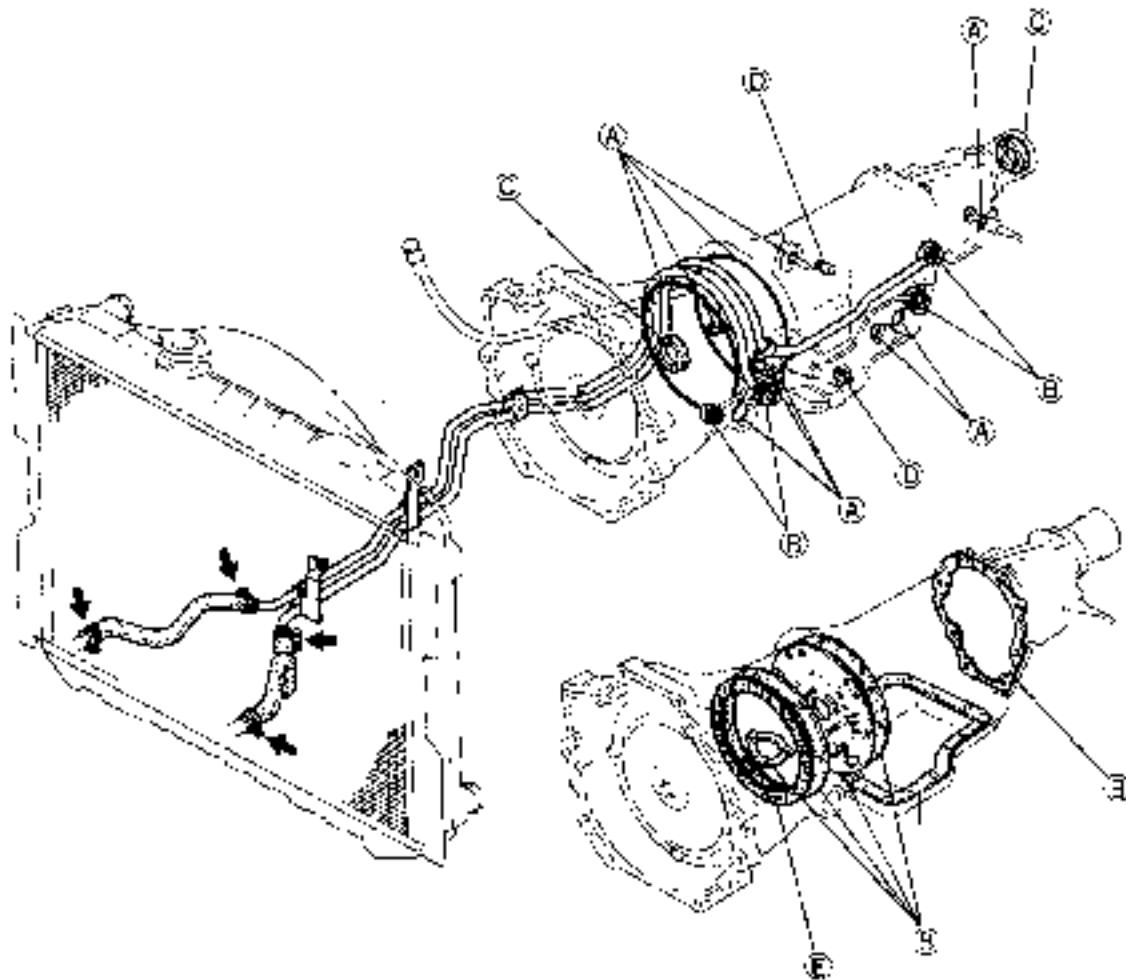
**If the ATF is muddy and varnished, it indicates burned drive plates.**



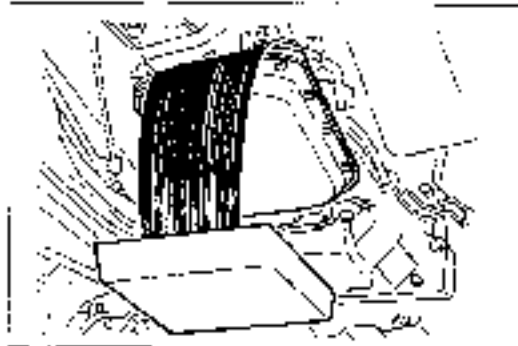
### Fluid leaks

Check for fluid leaks of the transmission as shown below; repair or replace as necessary.

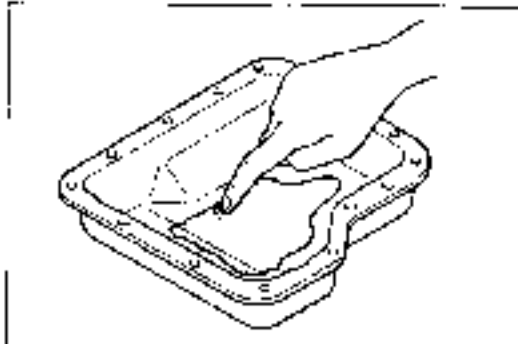
1. Gaskets, O-ring, and plugs
2. Oil hoses, oil pipes, and connections
3. Oil cooler



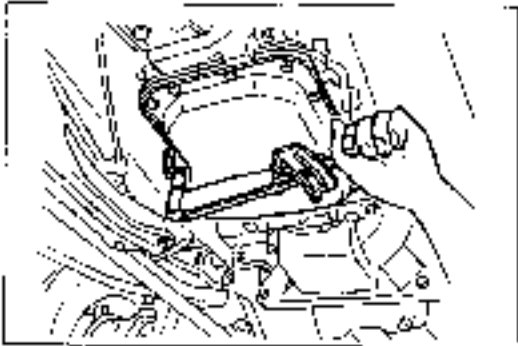
- ⊗ ..... O-RING
- ⊕ ..... GASKET
- ⊗ ..... OIL SEAL
- ⊕ ..... PLUG
- ⊗ ..... OTHERS



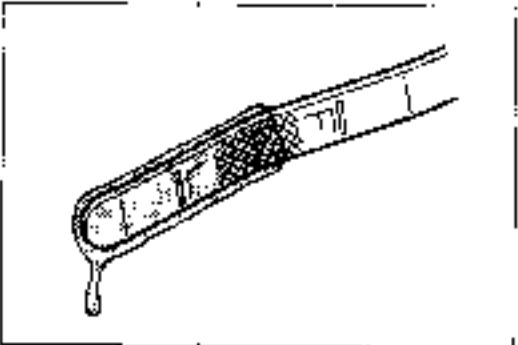
88J0KX 45



88J0KX 432



88J0KX 433



88J0KX 37

## 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 installer 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 Nm (60—80 cm-kg, 52—69 in-lb)**

6. Add approx. 4.0 liters (4.2 US qt, 3.6 Imp qt) ATF, and check the ATF level. (Refer to page K1-33.)

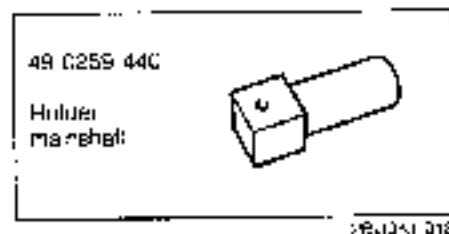
**Specified ATF: Dexron<sup>®</sup> II or M-III**

## TRANSMISSION

## TRANSMISSION UNIT (REMOVAL AND INSTALLATION)

## Preparation

## SST

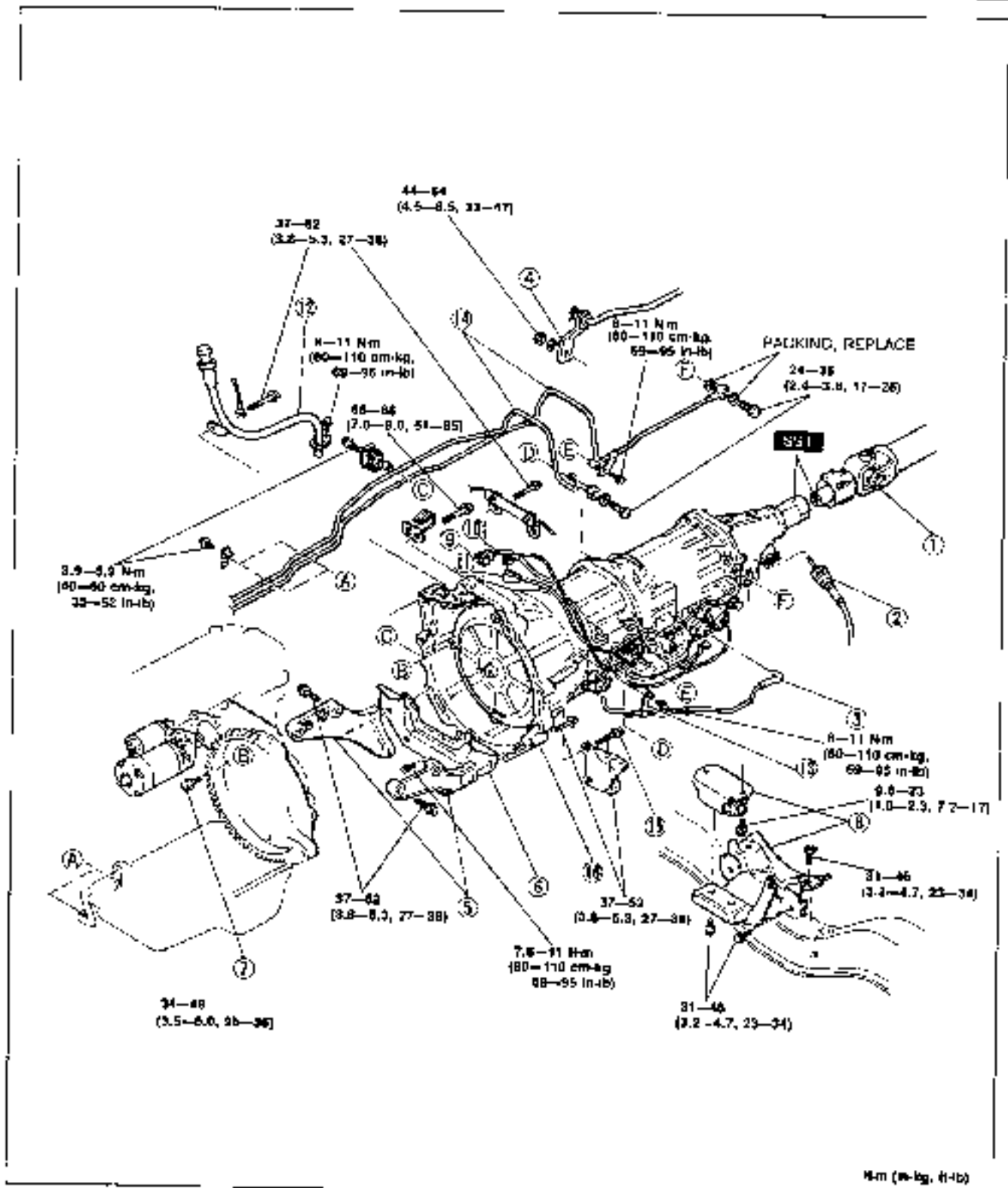


1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the ATF into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.

**Caution**

**Do not turn the transmission over before removing the oil pan.**

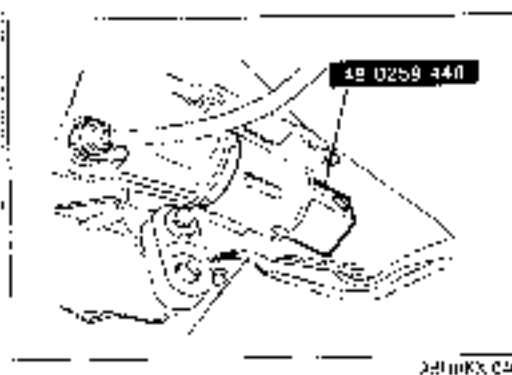
5. After removal, remove the oil pan to check condition of the transmission.
6. Install in the order shown in the figure, referring to **Installation Note**.
7. Fill the transmission with the specified amount and type of the ATF after installation.
8. Warm up the engine, and inspect for oil leakage and transmission operation.



Nm (m-kg, ft-lb)

25110K1-3 9

- |   |  |                                     |
|---|--|-------------------------------------|
| 1. Propeller shaft<br>Removal..... page K1-38 | 7 Torque converter attaching<br>bolt<br>Installation... page K1-26 | 11. OD cancel solenoid<br>connector |
| 2. Speedometer cable                          | B. Mission mount bracket (A<br>lower 30mm (* 2 in))                | 12. Level gauge pipe                |
| 3. Vacuum hose                                | 9. Int bitor SW connector  | 13. Vacuum pipe bracket             |
| 4. Shift lever                                | 10. Kickdown solenoid connector                                    | 14. Oil cooler pipe                 |
| 5. Gusset plates                              |  | 15. Mission mount bolt              |
| 6. Undercover                                 |  | 16. Automatic transmission          |






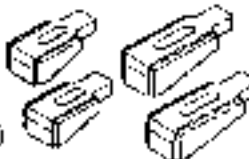

**Removal note**  
**Propeller shaft**

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 880A</p> <p>Engine stand</p> 	<p>49 U019 UA04</p> <p>Transmission hanger</p> 	<p>49 HC75 495B</p> <p>Body (Part of 49 U019 CA04)</p>  <p>1E10541 010</p>
<p>49 U019 000</p> <p>Holder (Part of 49 U019 UA04)</p> 	<p>49 0375 390</p> <p>Fuller oil pump</p> 	

**Precaution**

**General notes:**

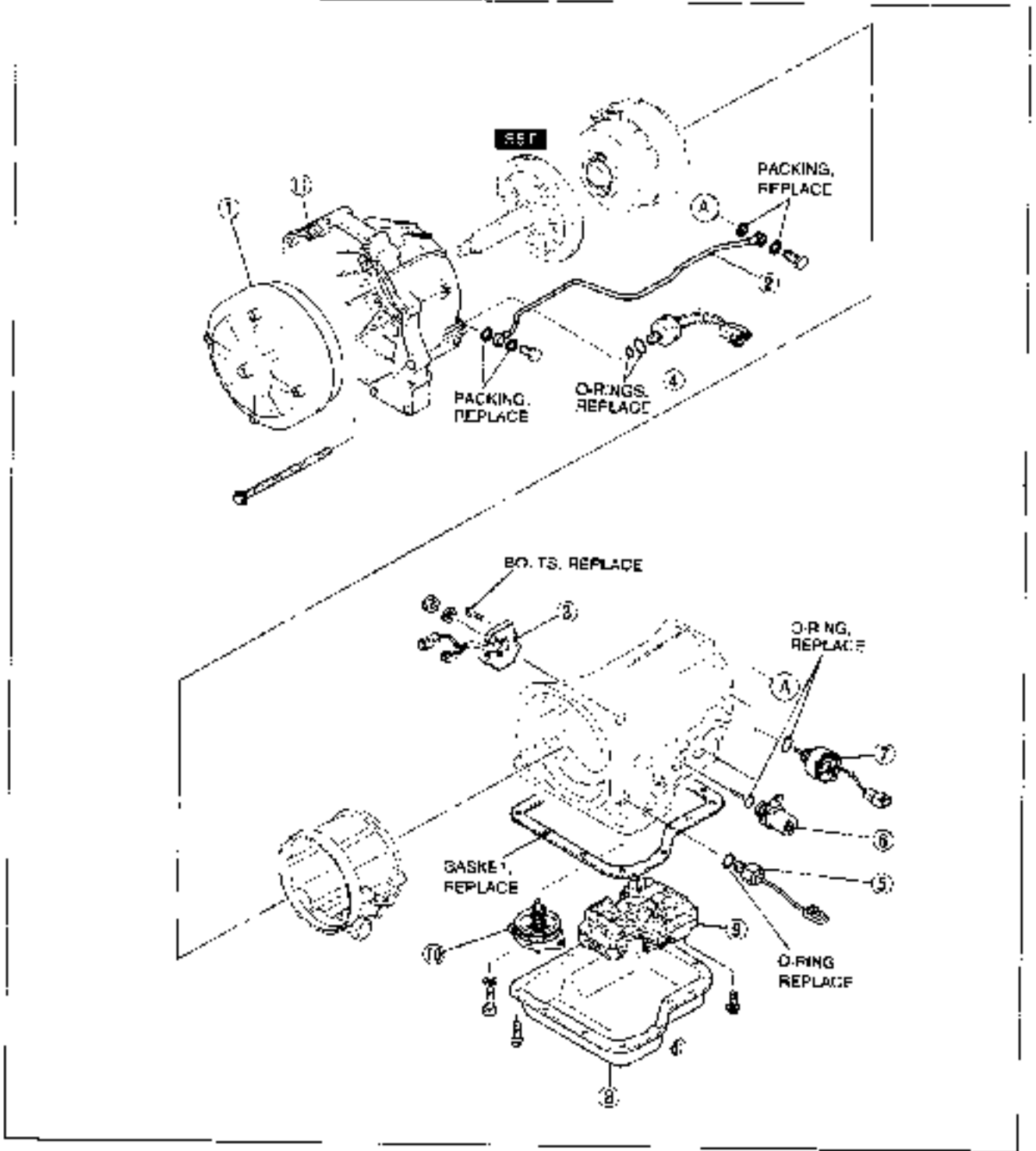
1. Disassemble transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only elastic hammers when applying force to separate the light alloy 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.

9M10K2 030

Components



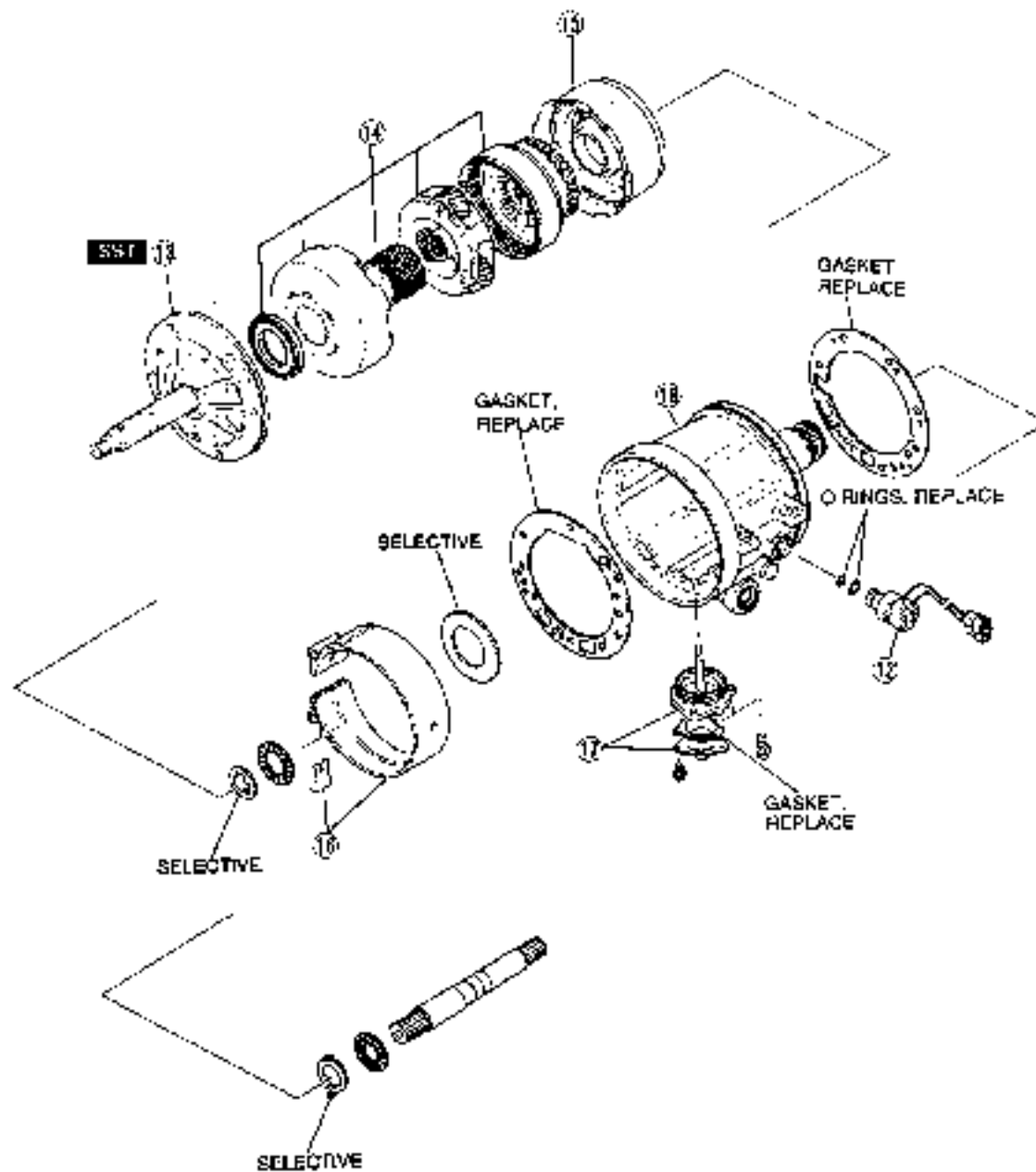
- 1 Torque converter  
Inspection ... page K1-49
- 2 Governor pressure pipe
- 3 Inhibitor switch  
Inspection ... page K1-25  
Adjustment ... page K1-25
- 4 Lockup solenoid (G6 engine)  
Inspection ... page K1-31

- 5. Oil pressure switch (G6 engine)  
Inspection ... page K1-30
- 6 Vacuum diaphragm  
Inspection ... page K1-07
- 7. Kickdown solenoid  
Inspection ... page K1-27
- 8 Oil pan

- 9. Control valve body  
Disassembly, and  
Inspection ... page K1-98  
Assembly ... page K1-104
- 10. 2nd band servo  
Disassembly, and  
Inspection ... page K1-68  
Assembly ... page K1-69
- 11 Converter housing

31000001

### Components (cont'd)



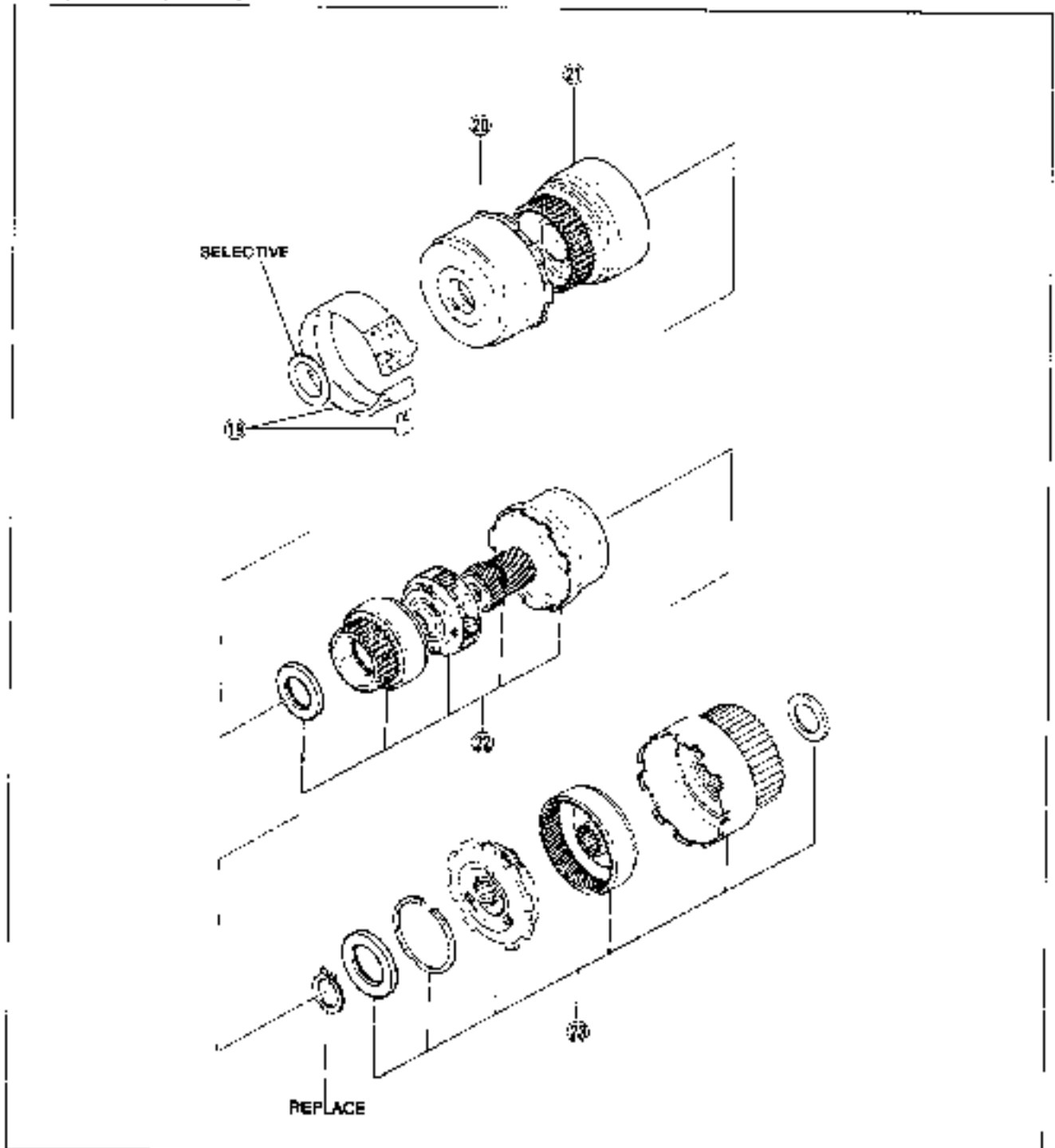
CBU001 039

- 12. OD cancel solenoid  
Inspection ..... page K1-27
- 13. Oil pump  
Disassembly, and  
Inspection .... page K1-50  
Assembly ..... page K1-52
- 14. OD connecting shell and OD  
planetary gear unit  
(OD sun gear, OD planetary  
pinion carrier, OD clutch hub)  
Disassembly, and  
Inspection .... page K1-54  
Assembly ..... page K1-55

- 15. Direct clutch  
Disassembly, and  
Inspection .... page K1-55  
Assembly ..... page K1-59
- 16. OD brake band arc band  
strut
- 17. OD band servo and cover  
Disassembly, and  
Inspection .... page K1-61  
Assembly ..... page K1-62

- 18. Drum support, accumulator,  
and OD case  
Disassembly, and  
Inspection ... page K1-64  
Assembly ..... page K1-65

## Components (cont'd)



31U0K1-039

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)

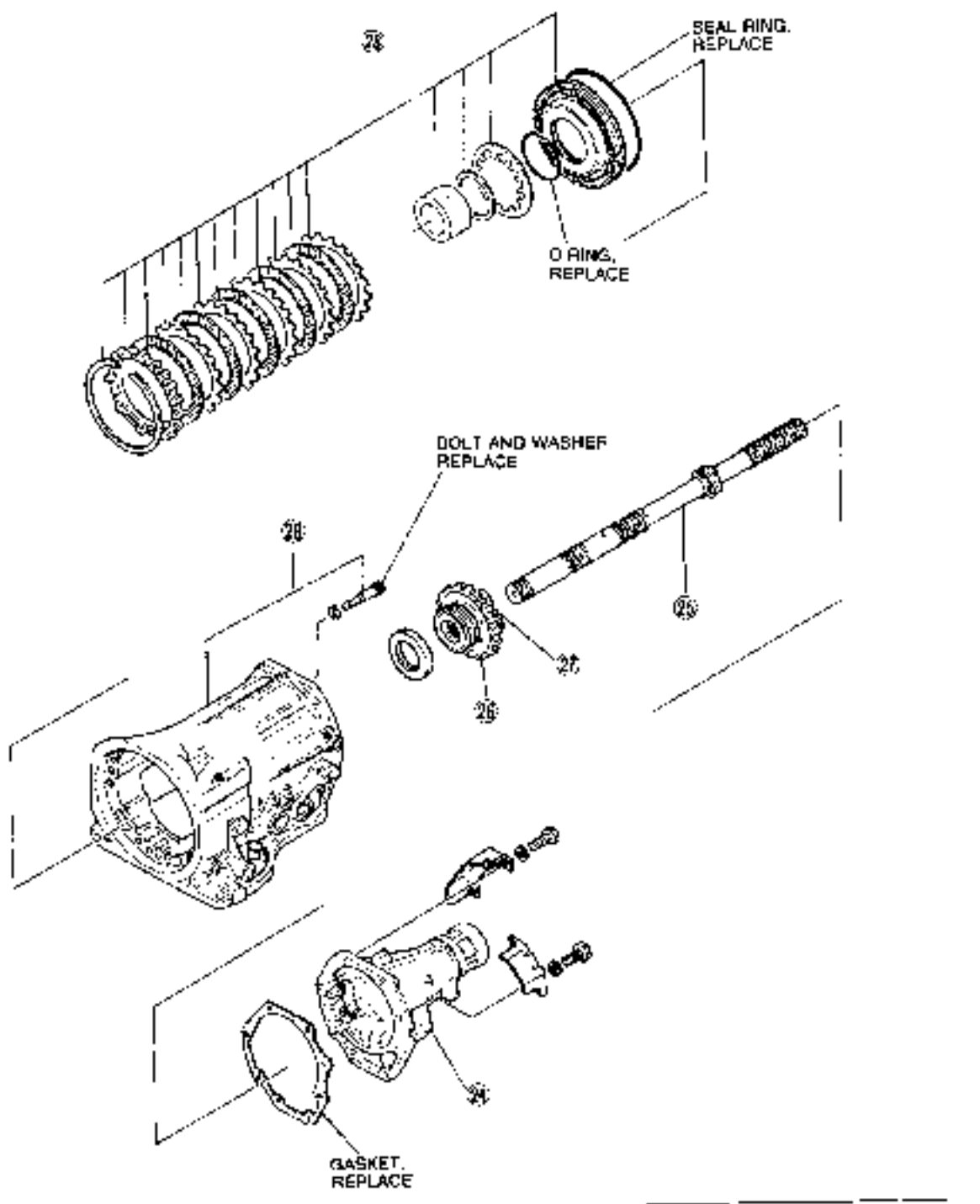
Disassembly, and

Inspection ... page K1-83

Assembly ... page K1-85



### Components (cont'd)

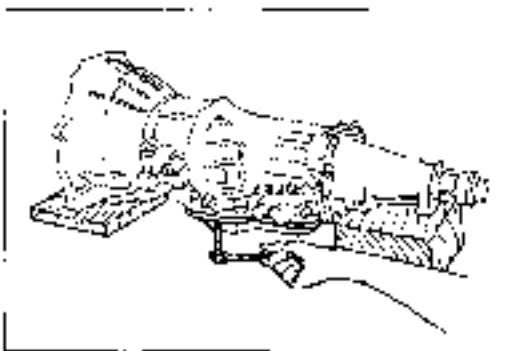


CDLCK1-040

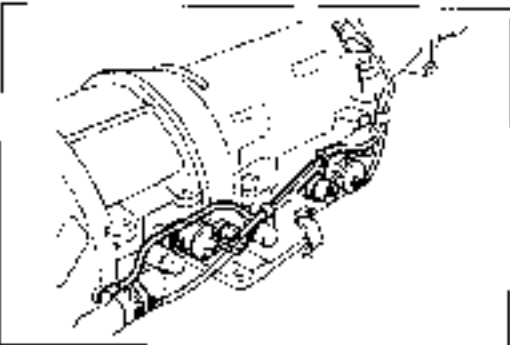
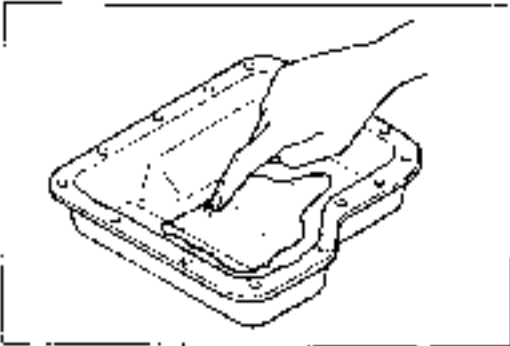
- 24. Extension housing  
Disassembly, and  
Inspection ... page K1-95  
Assembly ... page K1-96
- 25. Output shaft
- 26. Parking gear

- 27. Governor  
Disassembly, and  
Inspection ... page K1-92  
Assembly ... page K1-93

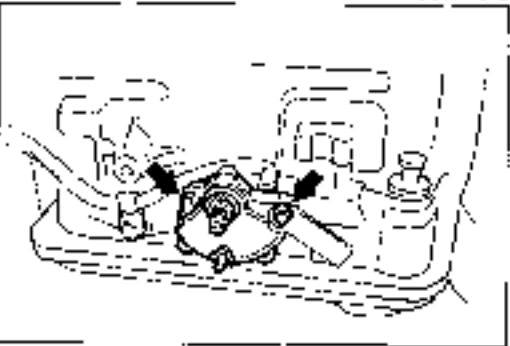
- 28. Low and reverse brake  
Disassembly, and  
Inspection ... page K1-87  
Assembly ... page K1-90



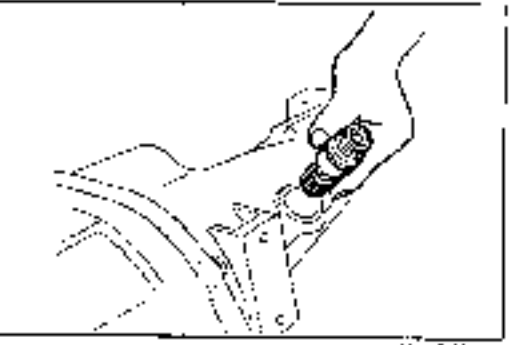
9M JK2 082



\*000K1 012



9M JK2 090



9M JK2 101

**Procedure****Caution**

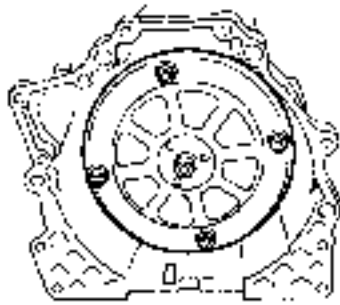
**Keep the transmission oil pan-down so that any foreign material will remain in the pan.**

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.

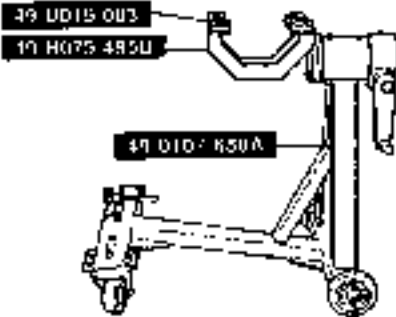


9MUKK2-092

**Caution**

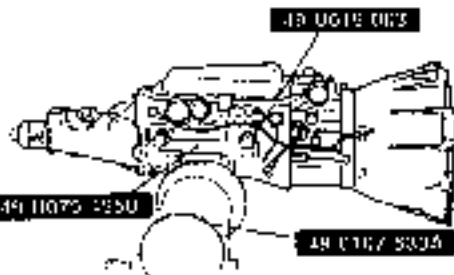
Be careful not to spill the ATF when removing the torque converter.

8. Remove the torque converter.



9WL0K2-098

9. Assemble the SST as shown.



9W11K2-006

10. Mount the transmission onto the SST.  
11. Remove the oil pan and gasket.

**Note**

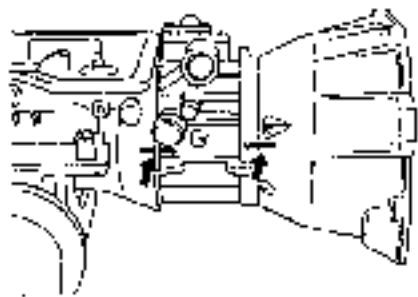
Neatly arrange bolts of different lengths for proper reassembly.

12. Remove the control valve body as shown in the figure.

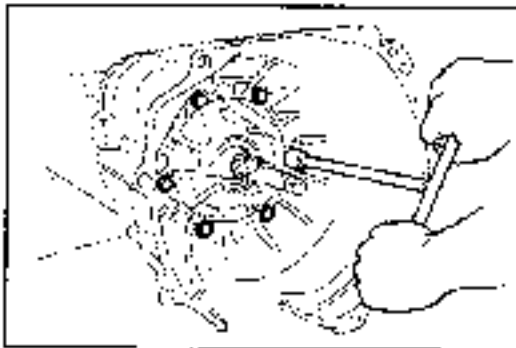


9WU0K2-097

13. Mark the converter housing, OD case, and transmission case for proper reassembly.

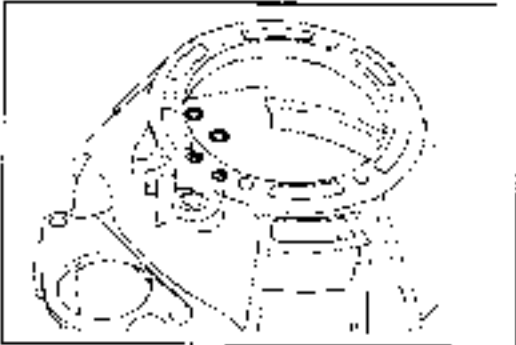


9MUKK2-008



9MUCR2099

14. Remove the converter housing from the OD case



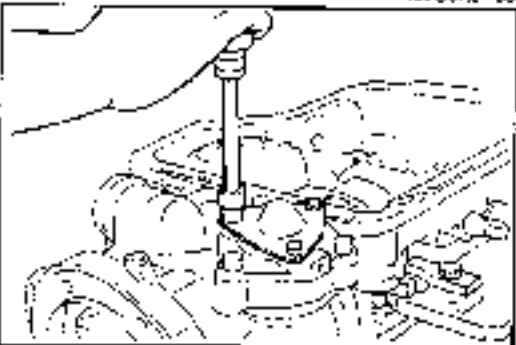
9MUCR2100

15. Remove the O-rings from the converter housing

**Caution**

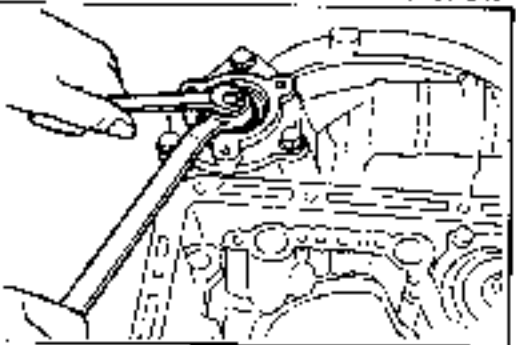
**Do not damage the converter housing.**

16. Clean the sealing compound from the converter housing.



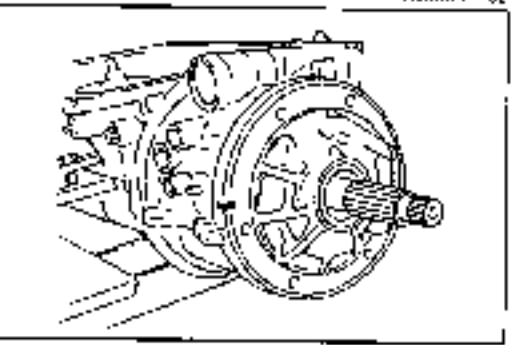
9MU3K2101

17. Remove the OD band servo cover and gasket.



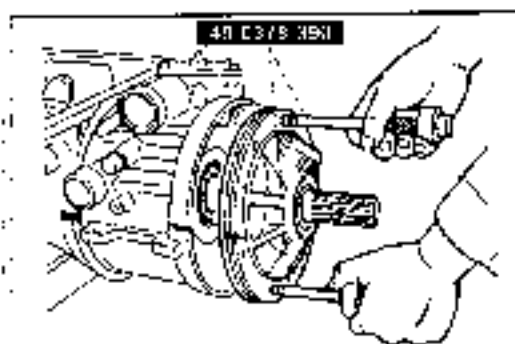
9MU3K2102

18. Loosen the OD band servo locknut and tighten the piston stem.



9MU3K2103

19. Mark the OD case and oil pump for proper reassembly.



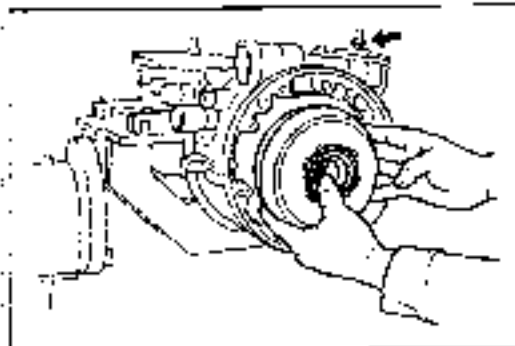
SMJJK2 105

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.

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.

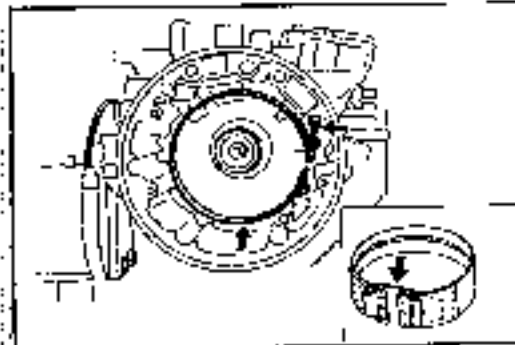


SMJJK2 106

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.

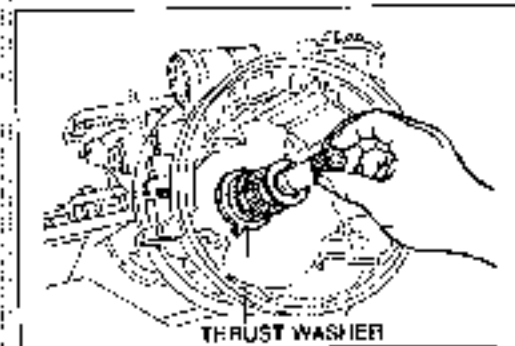
**Caution**

To prevent the brake lining from cracking or peeling, do not stretch the OD brake band. Secure it with a wire clip.



SMJJK2 107

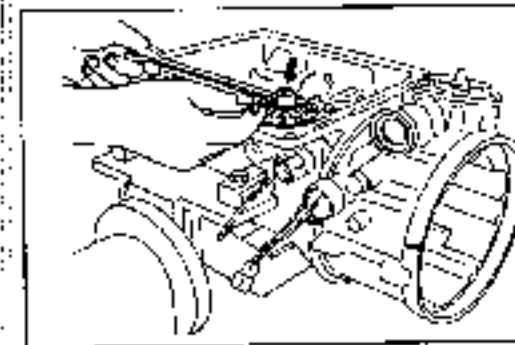
23. Remove the OD brake band and band strut



SMJJK2 108

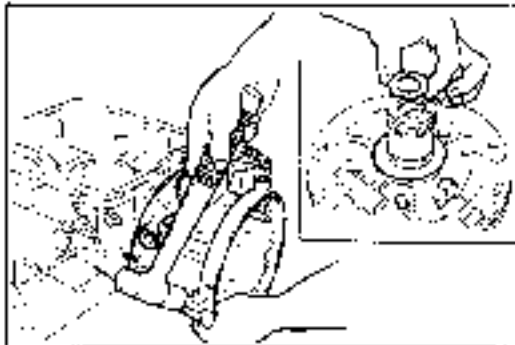
24. Remove the bearing races, bearing, and thrust washer. Inspect the following parts and repair or replace as necessary. Remove the intermediate shaft.

- 1) Bearing  
Inspect for damage or rough rotation
- 2) Bearing race  
Inspect bearing surface for scoring or scratches

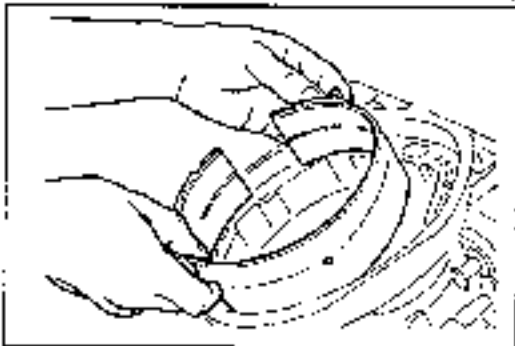


SMJJK2 109

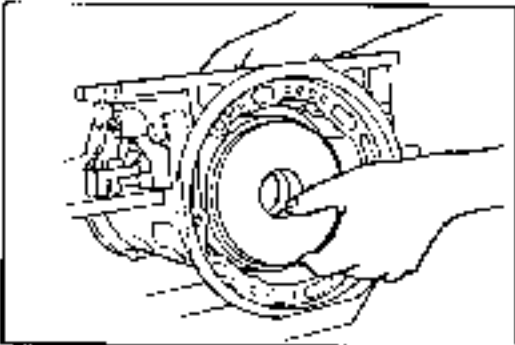
25. Loosen the 2nd band servo locknut and tighten the piston stem



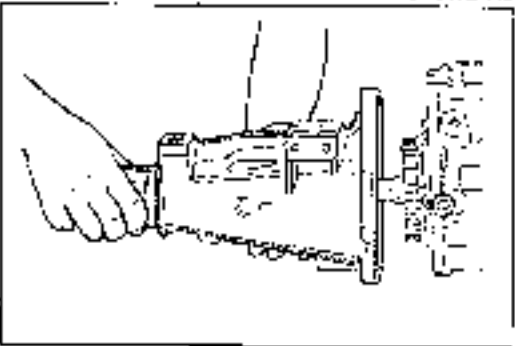
SMU024-112



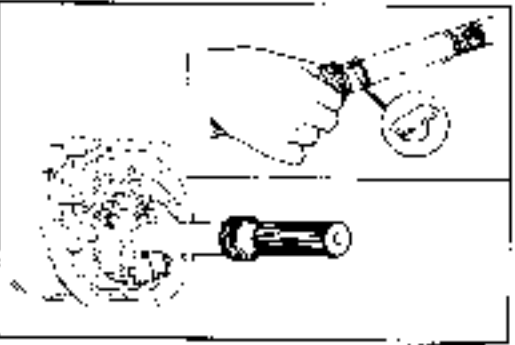
SMU024-111



SMU024-113



SMU024-110



SMU024-109

**Caution****Do not lose the bearing race.**

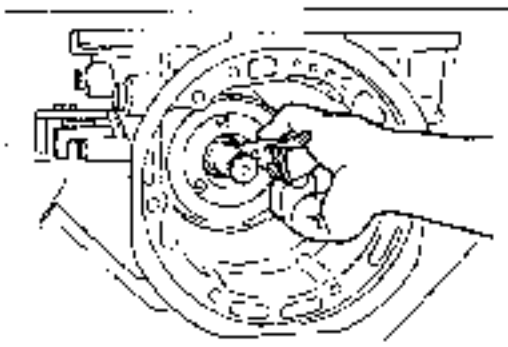
26. Separate the drum support, accumulator and OD case from the transmission case by tapping it lightly with a plastic hammer. Remove the gasket.
27. Remove the bearing race and thrust washer from the drum support, accumulator and OD case.

**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.

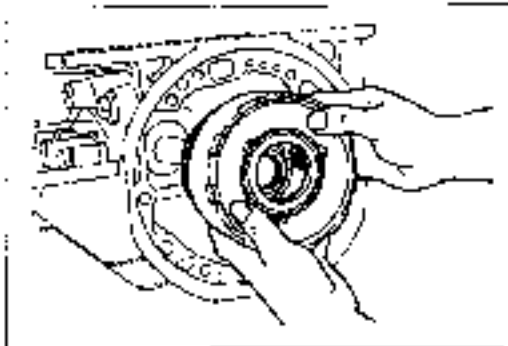
30. Remove the extension housing and gasket.

31. Remove the rear snap ring and speedometer drive gear.
32. Remove the key and front snap ring.



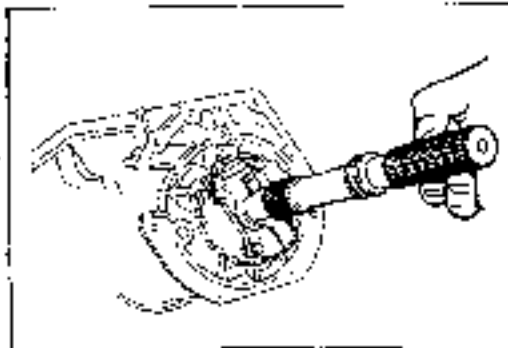
SMUOK2-115

33. Remove the snap ring from the output shaft with snap ring pliers.



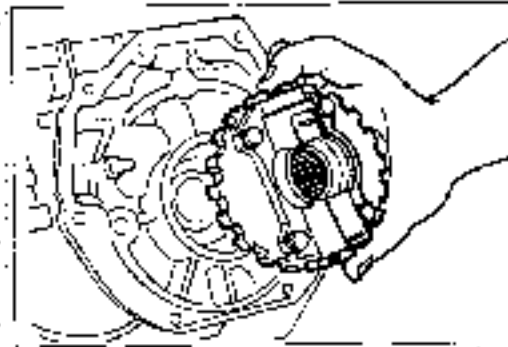
SMUOK2-116

34. Remove the rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch)



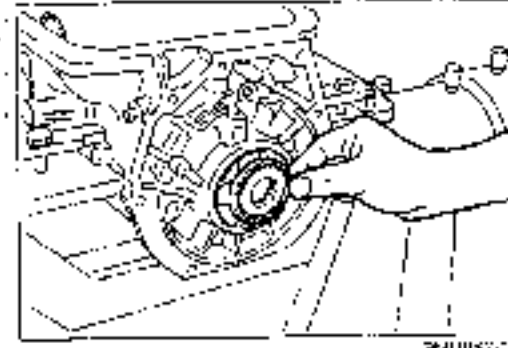
SMUOK2-117

35. Pull out the output shaft.



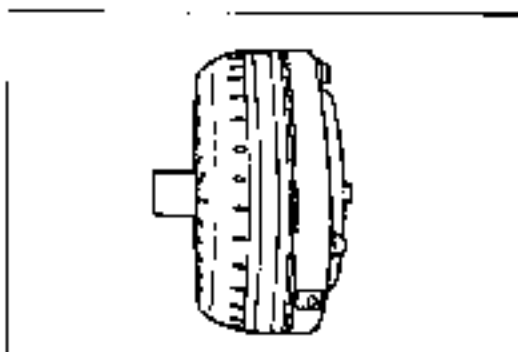
SMUOK2-118

36. Remove the governor valve and parking gear as a unit.



SMUOK2-119

37. Remove the bearing.  
Inspect the following parts and repair or replace as necessary.  
Bearing  
Inspect for damage or rough rotation

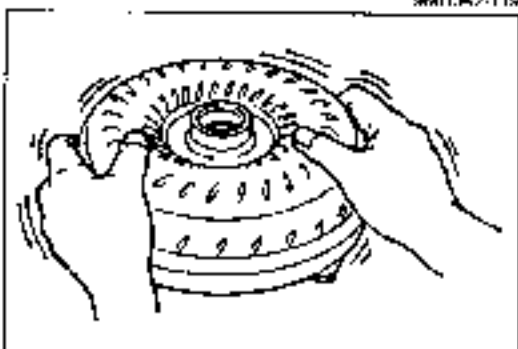


9M11J67-119

**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.











15U0K0-116

**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**

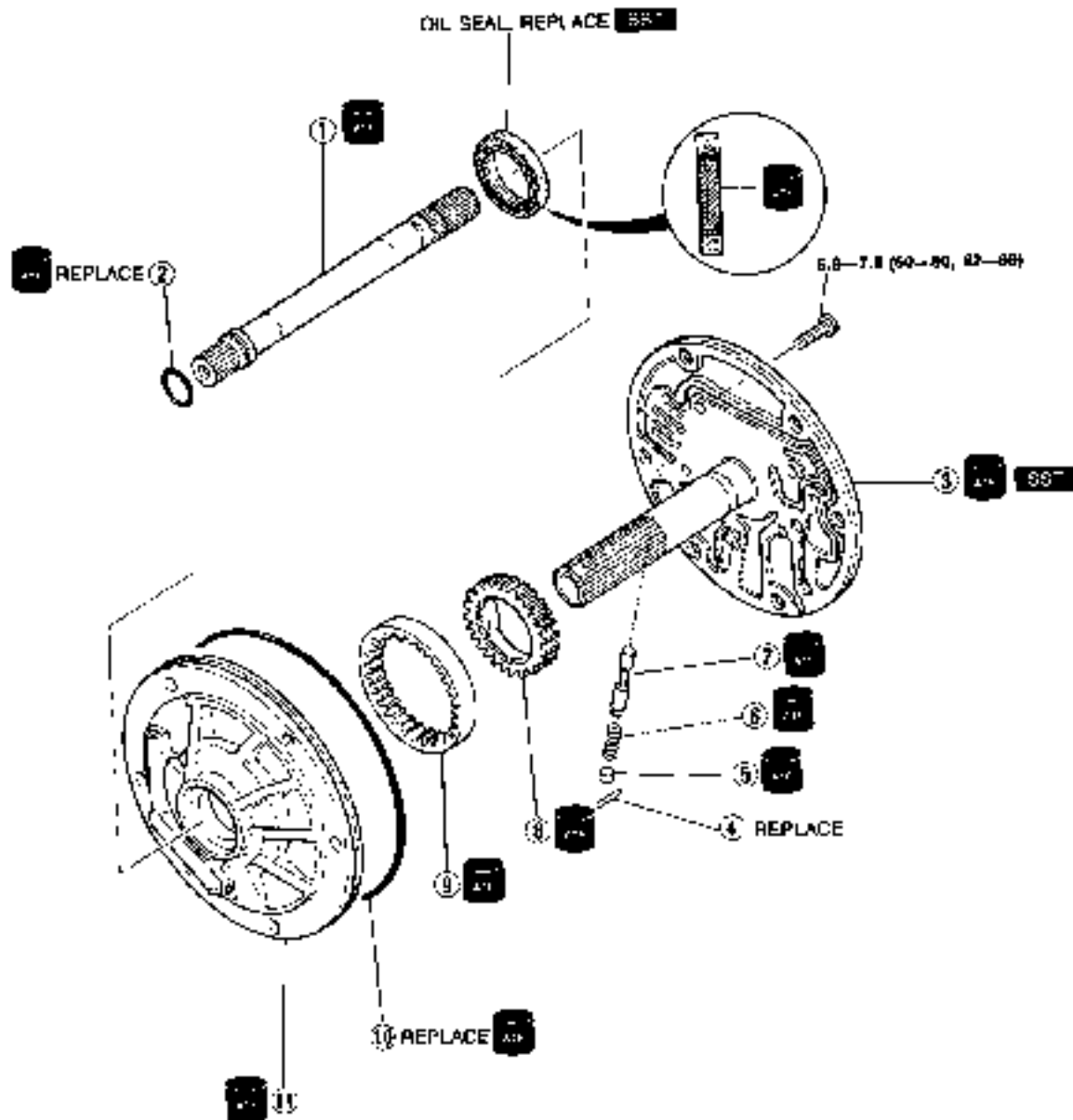
<p>49 S019 0A0</p> <p>Spl centering tool</p> 	<p>49 S019 001</p> <p>Holder (Part of 49 S019 0A0)</p> 	<p>49 SC19 002</p> <p>Shaft (Part of 49 S019 0A0)</p> 
<p>49 S019 003</p> <p>Slack (Part of 49 S019 0A0)</p> 	<p>49 SC19 004</p> <p>Pin (Part of 49 S019 0A0)</p> 	<p>49 G030 795</p> <p>Insulator, Oil seal</p> 
<p>49 G030 796</p> <p>Body (Part of 49 G030 795)</p> 	<p>49 G030 797</p> <p>Handle (Part of 49 G030 795)</p> 	<p>9M11J67-119</p>



**Disassembly and Inspection**

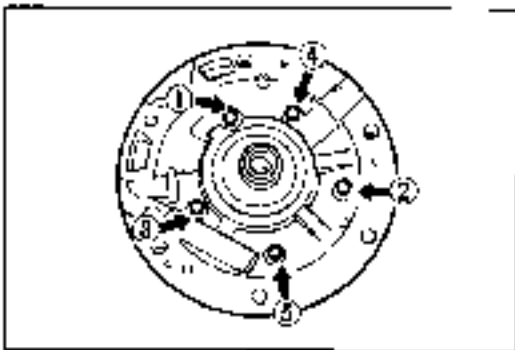
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace as necessary.

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



BLACK 114

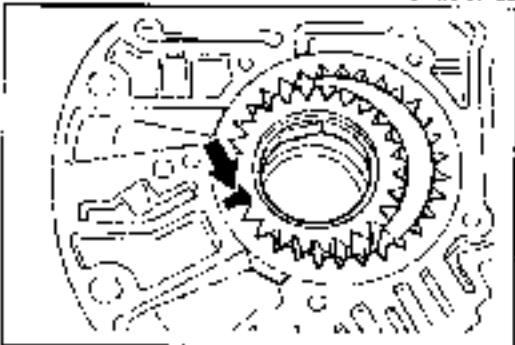
- |  |   |  |
|--|---|--|
| 1. Input shaft                                   | 7. Lockup control valve<br>Inspect for sticking, scoring,<br>or scratches | 9. Outer gear<br>Removal ..... page K1-51<br>Inspection ..... page K1-52 |
| 2. O-ring  | 8. Inner gear<br>Removal ..... page K1-51<br>Inspection ..... page K1-51  | 10. O-ring   |
| 3. Oil pump cover<br>Inspection ..... page K1-51 |   | 11. Oil pump housing<br>Inspect on ..... page K1-51                      |
| 4. Roller pin                                    |   |  |
| 5. Plug  |   |  |
| 6. Spring<br>Inspection ..... page K1-52         |   |  |



9M.0002 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.

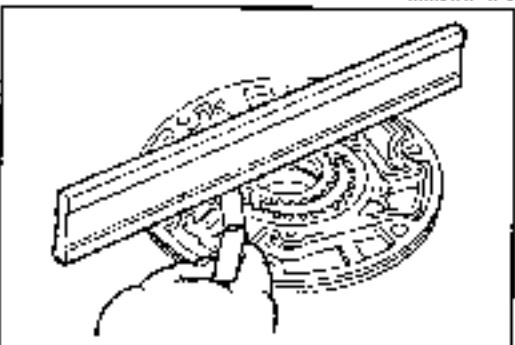


9M.000A-104

**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.



9M.000C 126

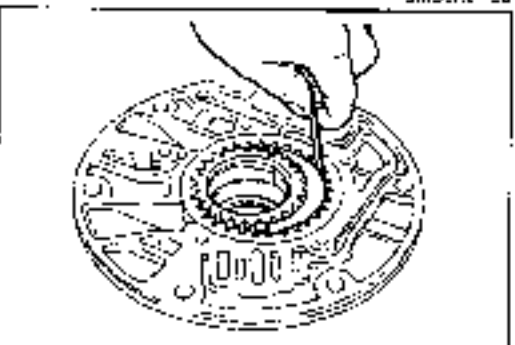
**Inspection****Clearance**

1. Measure the clearance between the gears and the pump cover.

**Standard clearance:**

0.02—0.04mm (0.0008—0.0016 in)

**Maximum clearance: 0.05mm (0.0031 in)**



9M.000E 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)**



9M.000F 128

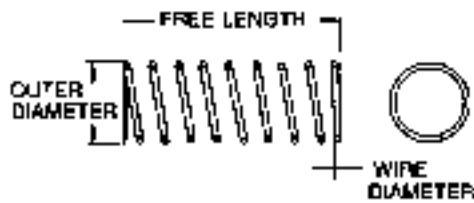
3. Measure the side clearance between the outer gear flange and housing.

**Standard clearance:**

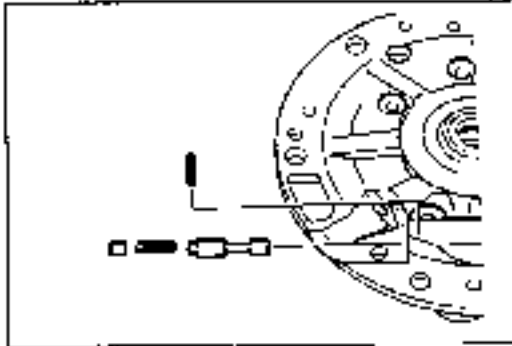
0.05—0.20mm (0.0020—0.0079 in)

**Maximum clearance: 0.25mm (0.0098 in)**

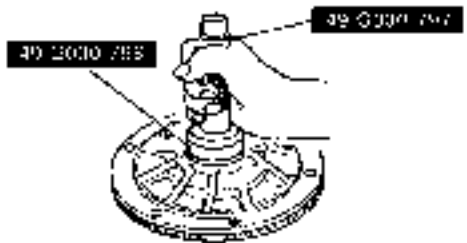
4. If not within specification, replace the oil pump assembly.



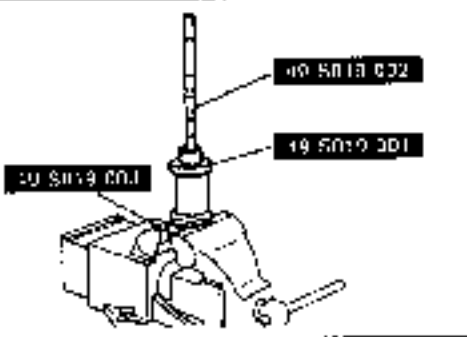
0910K144



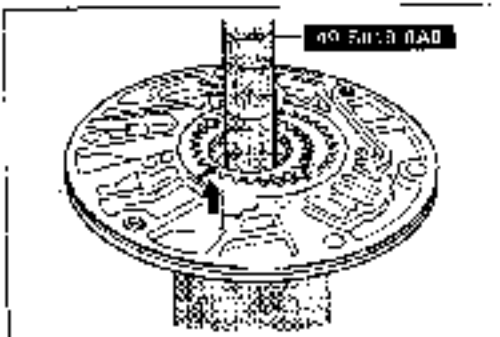
19UCK1115



24L0K2131



9MU0K2137



9MU0K2138

### Spring

1. Measure the spring specifications.

### Specifications

Engine	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
F2 CGI		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)
3E		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 O-ring, and install it with the SST

### Note

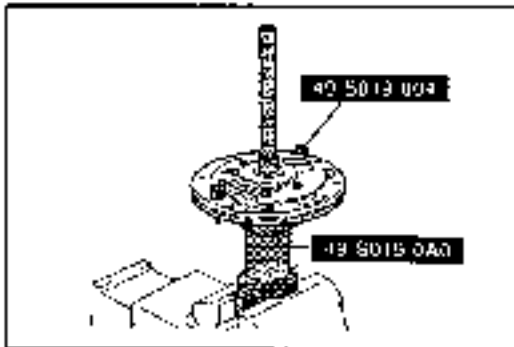
Use protective plates to prevent damaging the SST.

4. Assemble the SST and secure it in a vice.

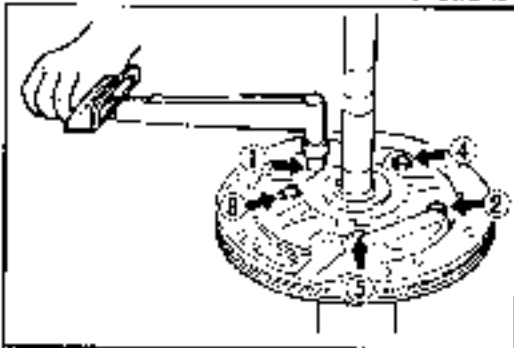
5. Apply ATF to the new O-ring, and place it on the pump cover.

6. Set the pump housing on the SST.

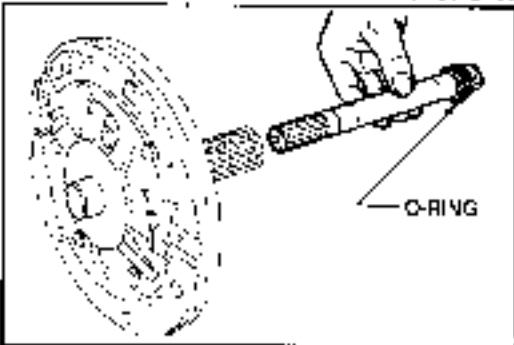
7. Apply ATF to the inner and outer gears, and install them in the pump housing with their matching marks toward the pump cover.



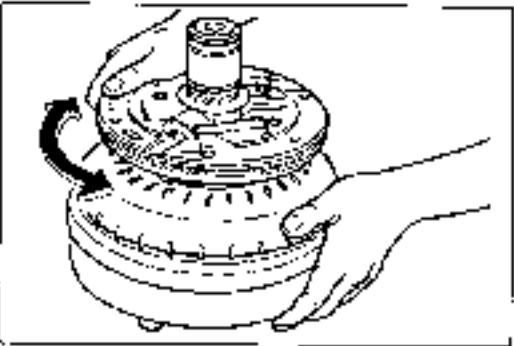
9M\_J0K2-134



9M\_J0K2-135



9M\_J0K2-136



9M\_J0K2-137

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—7.9 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.

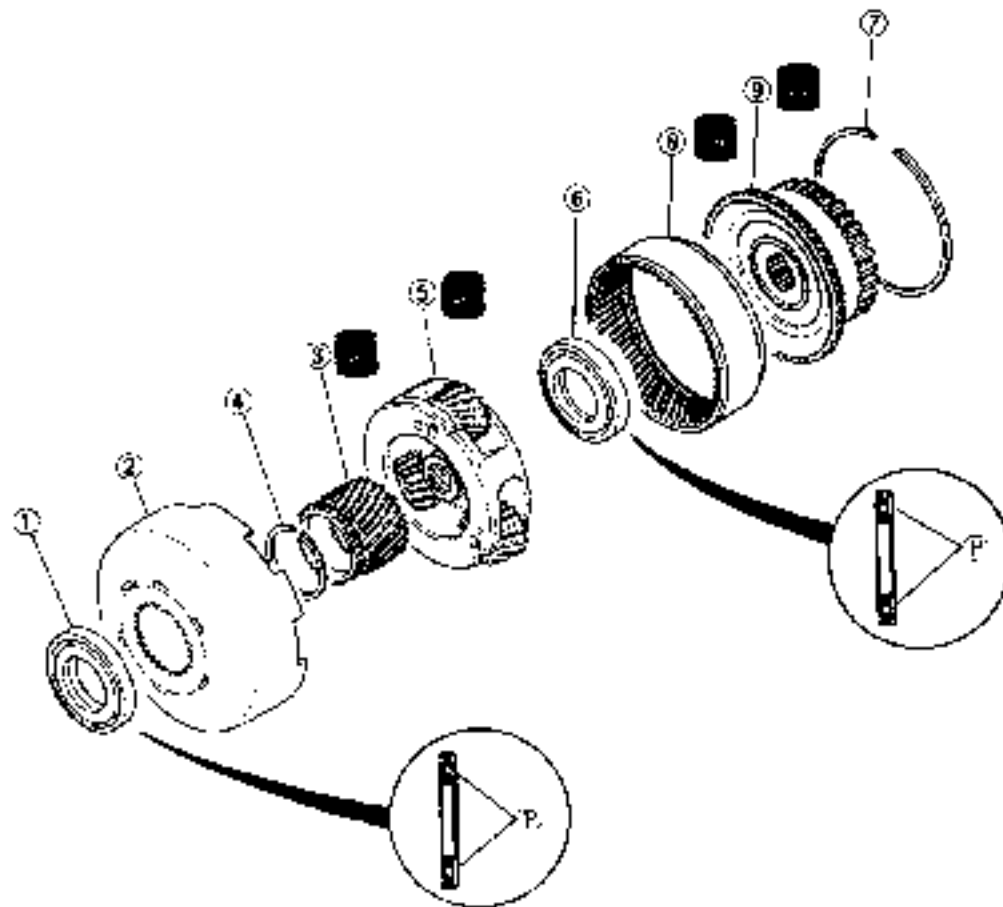
**OD CONNECTING SHELL AND OD PLANETARY GEAR UNIT  
OD SUN GEAR, OD PLANETARY PINION CARRIER, OD CLUTCH HUB)**

**Disassembly and Inspection**

Disassemble in the order shown in the figure.

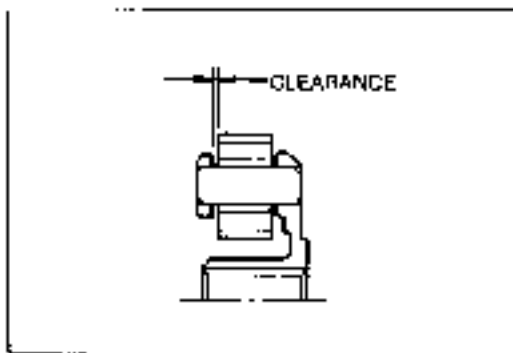
Inspect all parts, and repair or replace as necessary.

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



HEUCK 010

- |  |   |   |
|--|---|---|
| 1. Bearing<br>Inspect for damage or rough rotation                       | 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 | 7. Snap ring  |
| 2. OD connecting shell   | 6. Bearing<br>Inspect for damage or rough rotation  | 8. Internal gear<br>Inspect individual gear teeth for damage, wear, or cracks |
| 3. Sun gear<br>Inspect individual gear teeth for damage, wear, or cracks |   | 9. OD clutch hub  |
| 4. Snap ring   |   |   |



9VLUK2-298

**Inspection****OD planetary pinion carrier**

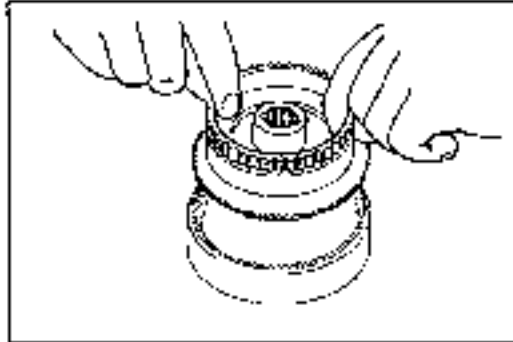
1. Measure the clearance between the pinion washer and the planetary pinion carrier.

**Clearance**

**Standard: 0.2—0.7mm (0.008—0.028 in)**

**Maximum: 0.8mm (0.031 in)**

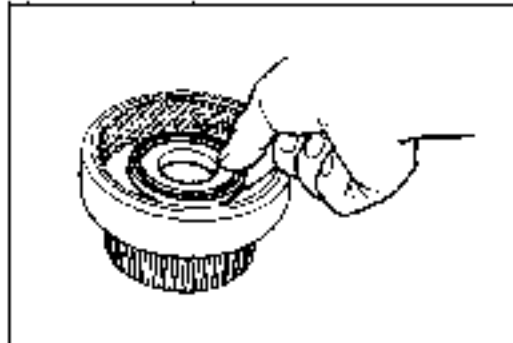
2. If not within specification, replace the planetary pinion carrier.



-BLCK1 E17

**Assembly procedure**

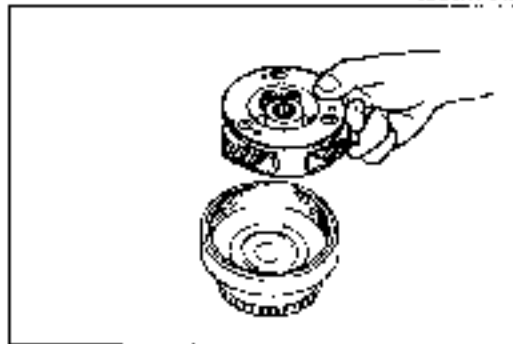
1. Apply ATF to the OD clutch hub and internal gear, and assemble them with the snap ring.



-BLCK1 C45

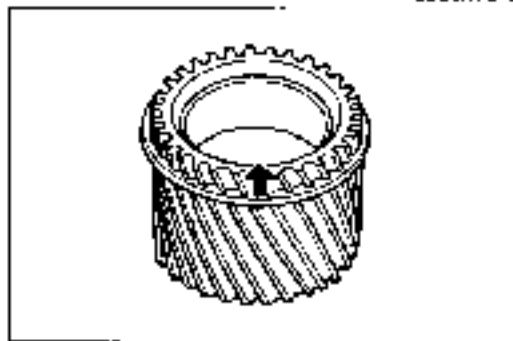
2. Apply petroleum jelly to the bearing, and install it onto the OD clutch hub with the black surface facing upward.

**Bearing outer diameter: 70.0mm (2.756 in)**



-BLCK1 D-6

3. Apply ATF to the OD planetary pinion carrier, and install it into the internal gear.

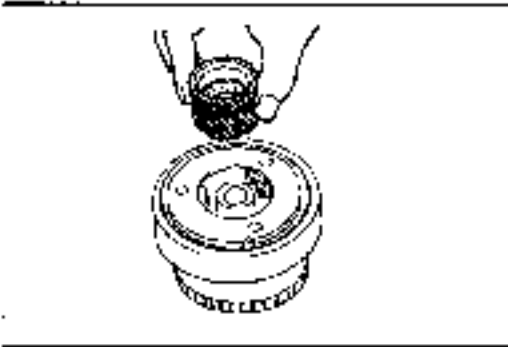


9EUCR-347

**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.

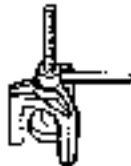


GBLCK1 048

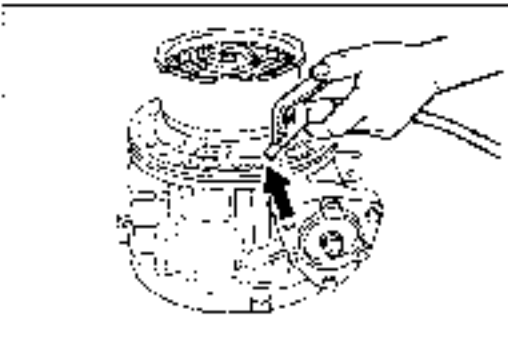
5. Apply ATF to the sun gear, and install it into the OD planetary pinion carrier.

### DIRECT CLUTCH Preparation SST

49 0378 375

Compressor,  
clutch spring

3MLCK2-138



3MLCK2-139

### 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.**

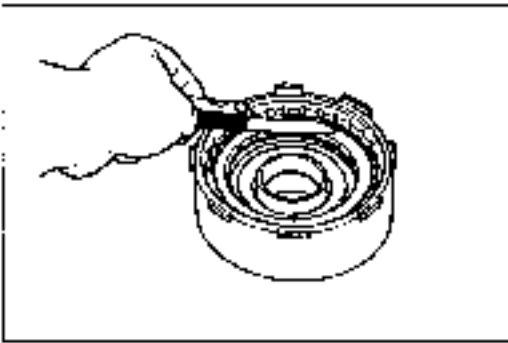
2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace as necessary when assembling.

#### 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.



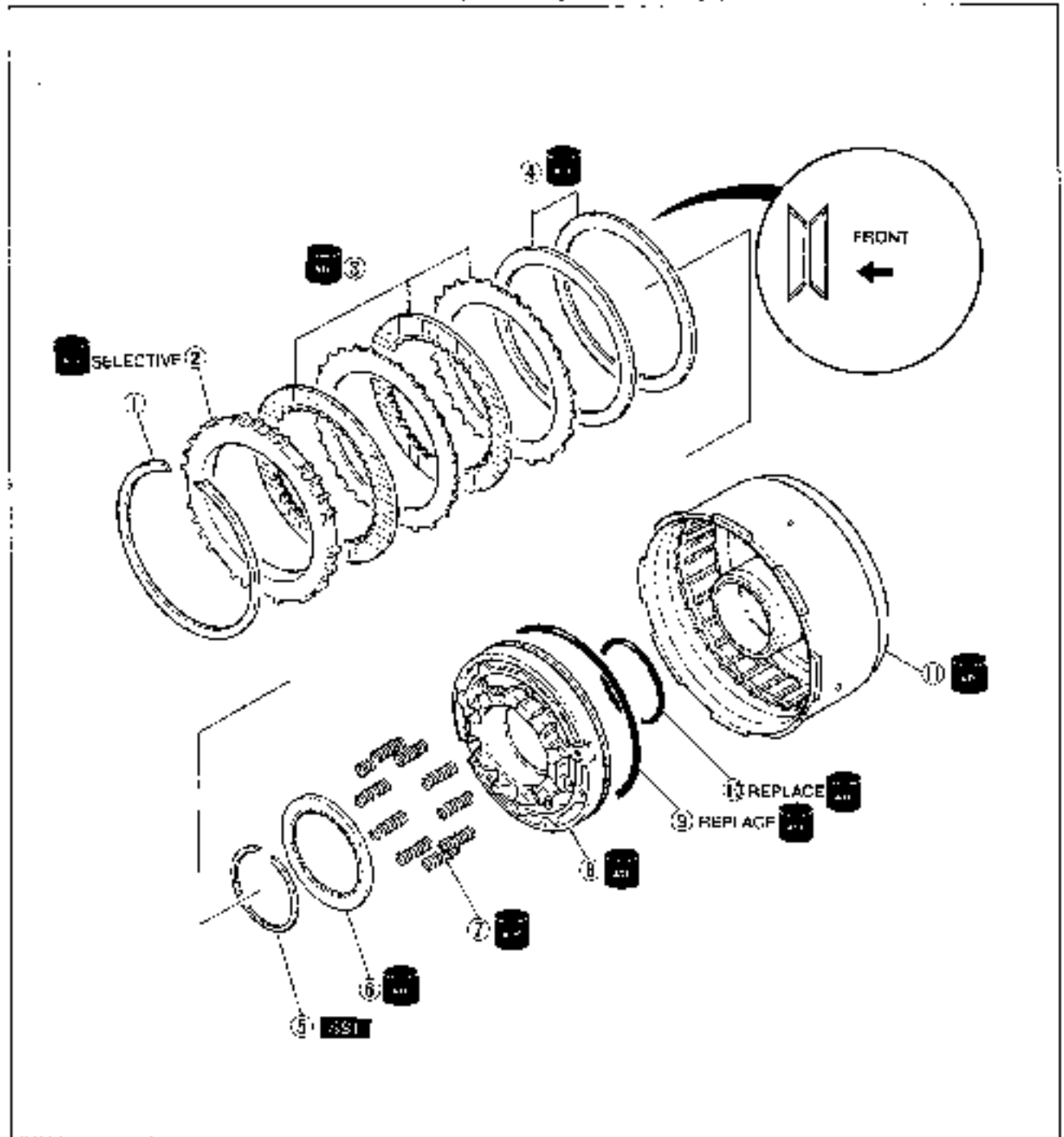
4MLCKA-91

**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**.



- |                                   |                               |                        |
|-----------------------------------|-------------------------------|------------------------|
| 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 |
| Inspection ..... page K1-58       | 8. Clutch piston              |                        |
| 4. Dashed plates                  | Inspect basis for sticking by |                        |
| 5. Snap ring                      | shaking piston                |                        |
| Removal..... page K1-58           | Removal ..... page K1-58      |                        |
|                                   | Inspection ..... page K1-58   |                        |

TRUCK1015

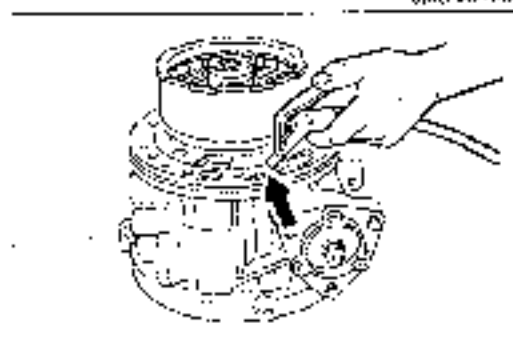




3MJK2 142

**Disassembly note****Snap ring****Caution****Do not damage the snap ring.**

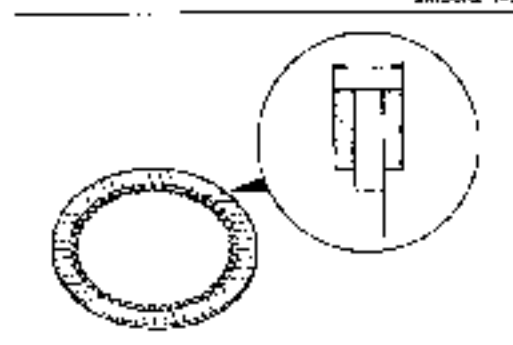
- 1 Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
- 2 Remove the spring retainer and spring.



3MJK2 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.**

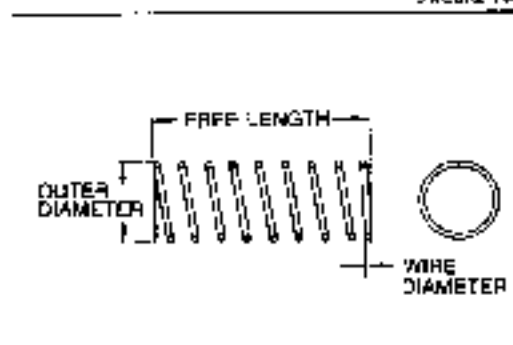
3MJK2 144

**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.



3MJK2 145

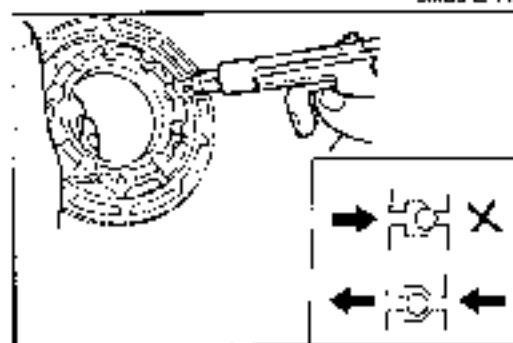
**Return spring**

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.



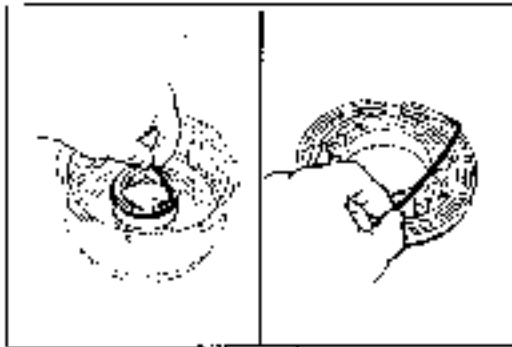
3MJK2 45

**Clutch piston**

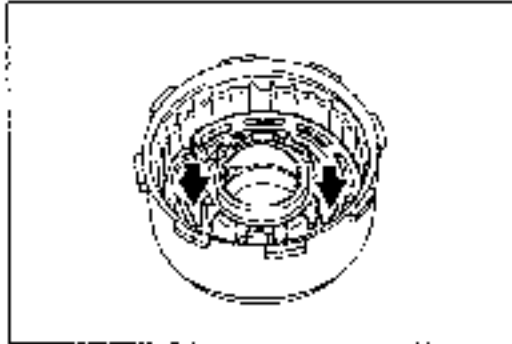
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

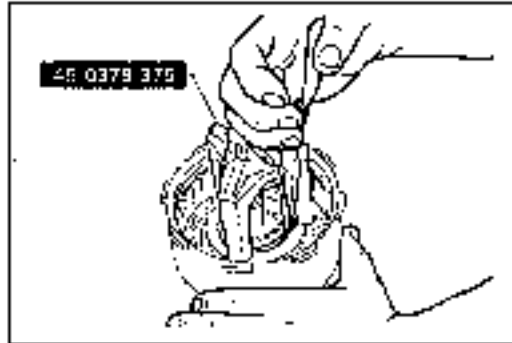
3. If not correct, replace the clutch piston.



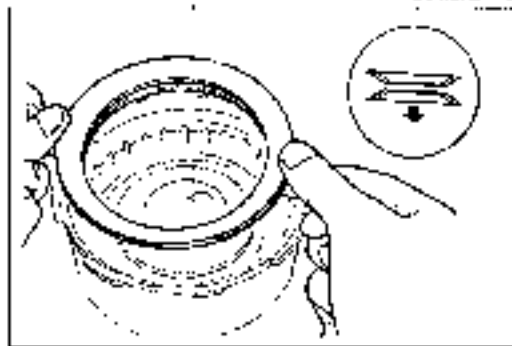
2VLCK1-48



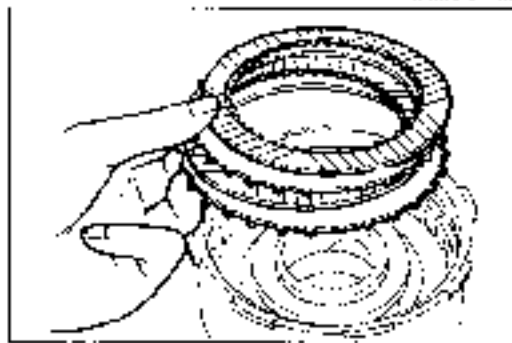
3VLCK2-140



3VLCK2-140



2VLCK3-150



2VLCK3-151

**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.

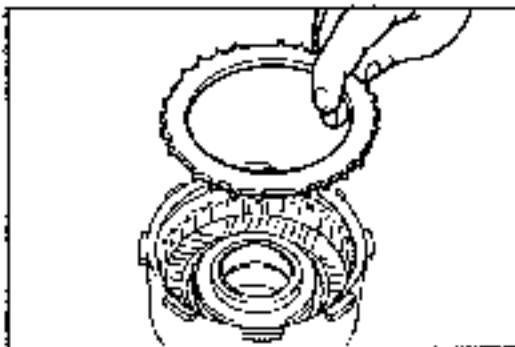
**Caution**

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.



SMU0KX-124

**Caution**

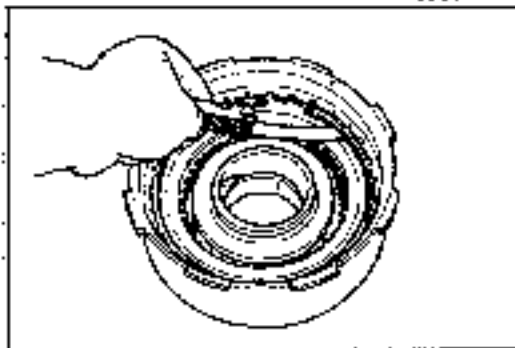
Align the flat portion of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.

- 9 Install the retaining plate.

**Caution**

Do not deform the snap ring.

- 10 Install the snap ring.



SMU0KX-125

- 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)**

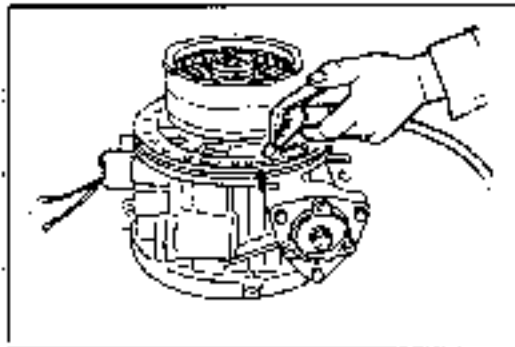
**Retaining plate sizes**

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**

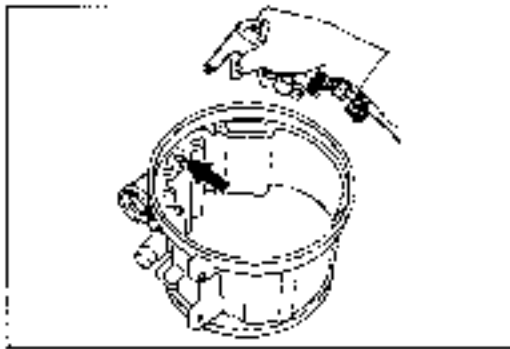
Apply air for no more than three(3) seconds.



SMU0K2-154

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.**



97U3-7-430

**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 damaged 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**

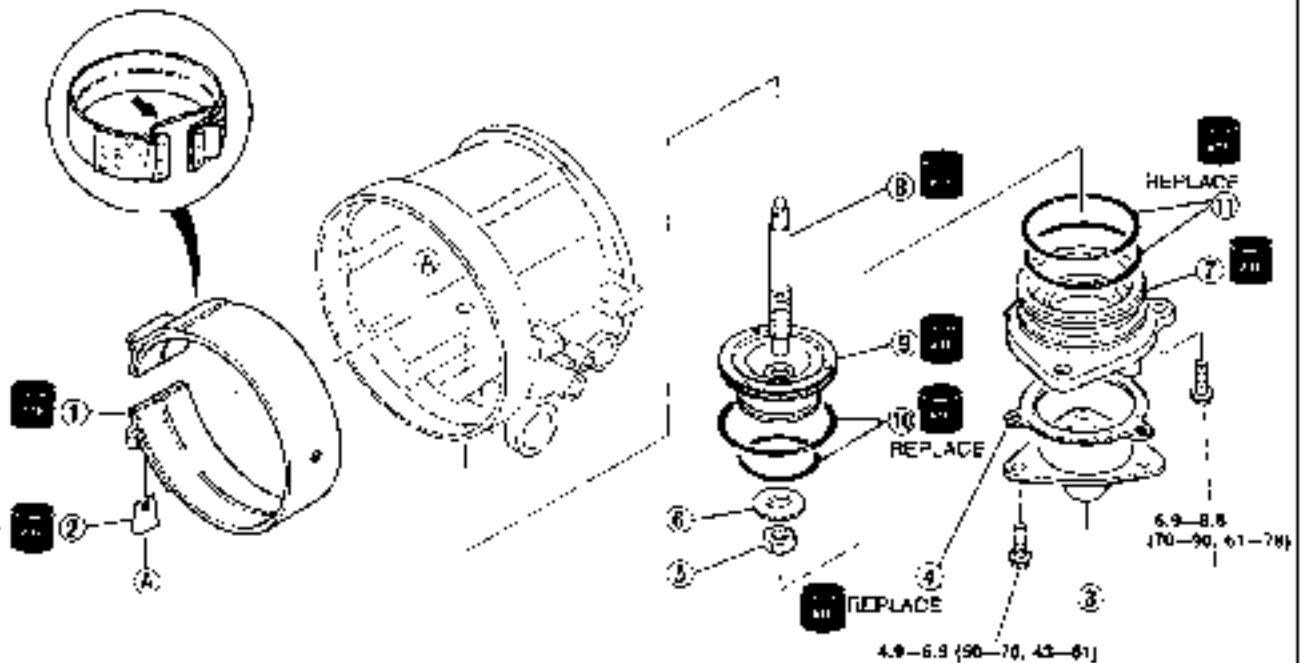
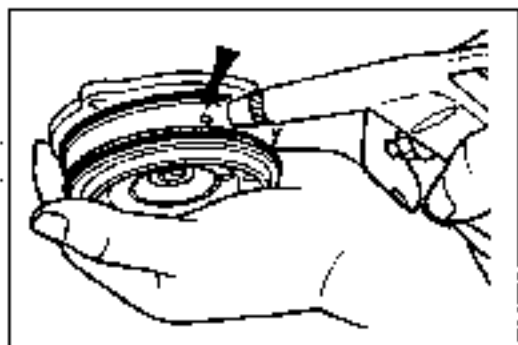


Fig. 10K1-070

10K1-070

- |  |                |   |
|--|----------------|---|
| 1. Brake band<br>Inspect for wear or burring | 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                                    | 6. Piston stem |   |

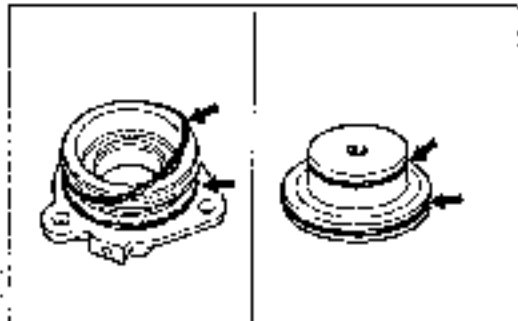


9MJKK2-52

**Disassembly note****Piston assembly**

Remove the piston assembly from the body by applying compressed air through the oil passage hole.

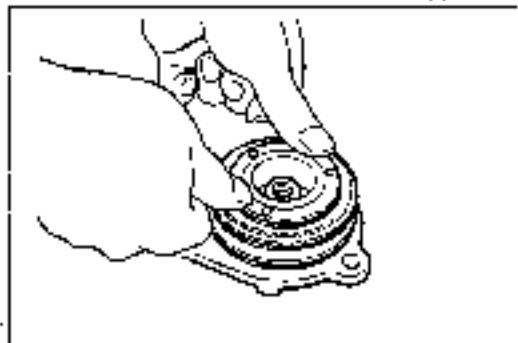
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



1B,OK1-021

**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.



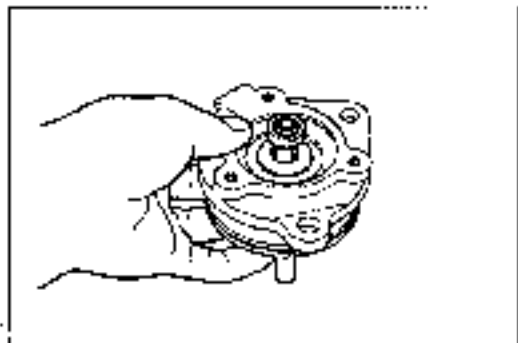
9MJKK2-55

3. Apply ATF to the piston assembly and body.

**Caution**

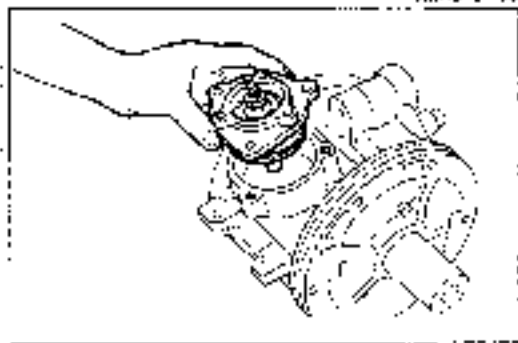
**Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.**

4. Press the piston assembly in the body



5MJKK2-96

5. Apply ATF to the piston stem and washer, and install them into the body.
6. Loosely tighten the nut

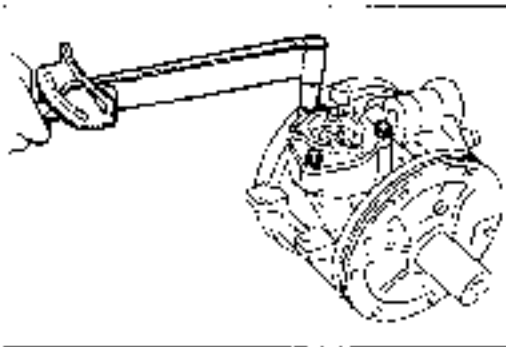


9MJKK2-97

**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

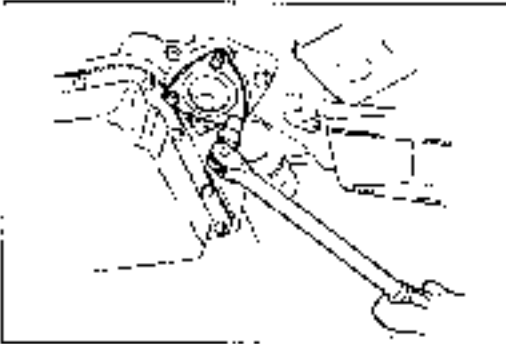


1E1041-109

9 Install and tighten the bolts.

**Tightening torque:**

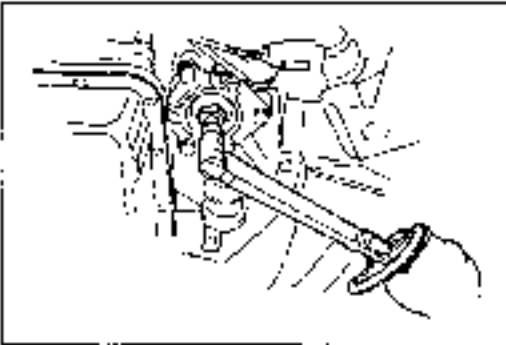
**9.8–14.7 N·m (1.0–1.5 m·kg, 7.2–10.8 ft·lb)**



9M1042-109

**On-vehicle Adjustment**

1 Remove the OD band servo cover and gasket.



1D1041-109

2 Loosen the locknut and tighten the piston stem.

**Tightening torque:**

**8.9–9.8 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.

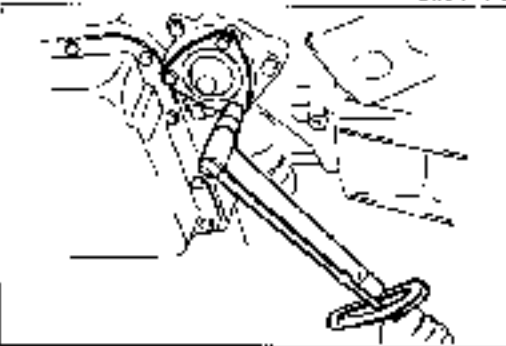
**Tightening torque:**

**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:**




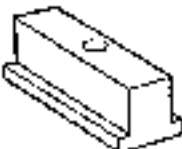

**4.9–6.9 N·m (50–70 cm·kg, 43–61 in·lb)**



9M1042-121

### DRUM SUPPORT, ACCUMULATOR, AND OD CASE

#### Preparation SST

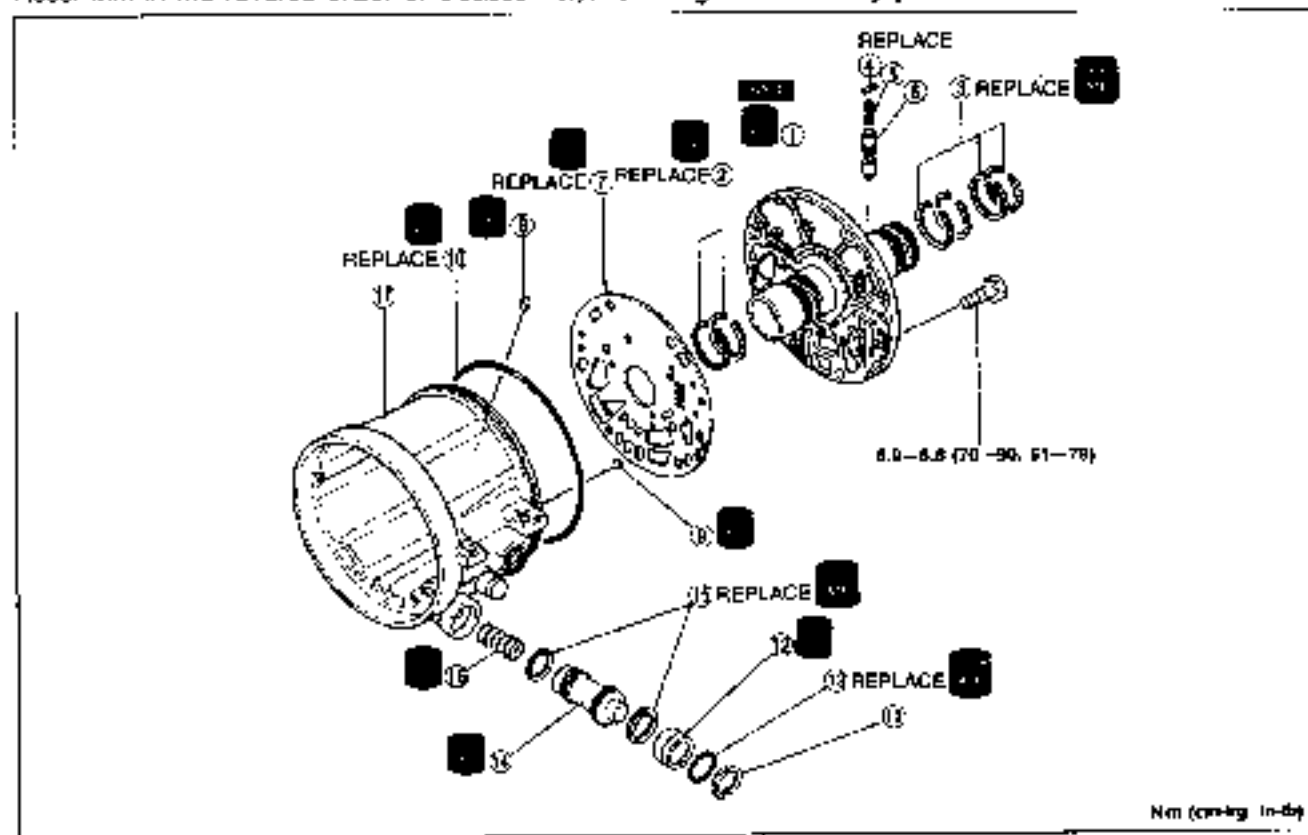
<p>49 5018 0A0</p> <p>Set, centering tool</p> 	<p>49 5019 001</p> <p>Holder (Part of 49 5019 0A0)</p> 	<p>49 5019 002</p> <p>Shaft (Part of 49 5019 0A0)</p> 
<p>49 5019 003</p> <p>Stand (Part of 49 5019 0A0)</p> 	<p>49 5019 004</p> <p>Pin (Part of 49 5019 0A0)</p> 	<p>SMUK2-237</p>

#### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts and repair or replace as necessary.

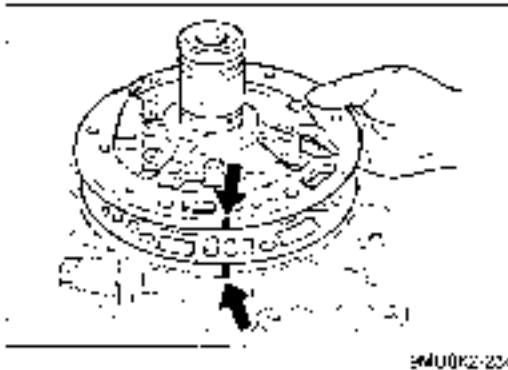
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



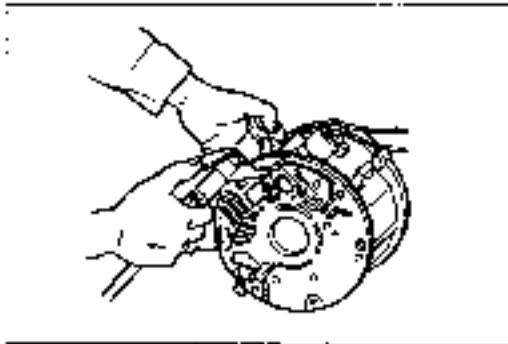
- 1. Drum support  
Removal..... page K1-65  
Inspection..... page K1-65
- 2. Seal rings
- 3. Seal rings
- 4. Roll pin
- 5. Spring  
Inspection..... page K1-65

- 6. OD cancel valve  
Inspect for sticking, scoring,  
or scratches
- 7. Gasket
- 8. One-way valve
- 9. Steel ball
- 10. Seal ring
- 11. Snap ring

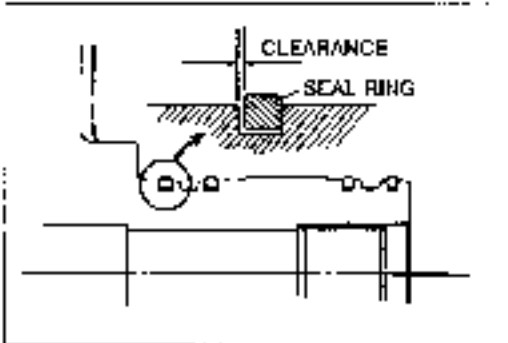
- 12. Accumulator plug  
Removal..... page K1-65
- 13. O-ring
- 14. Accumulator piston
- 15. Seal rings
- 16. Spring  
Inspection..... page K1-65
- 17. OD case



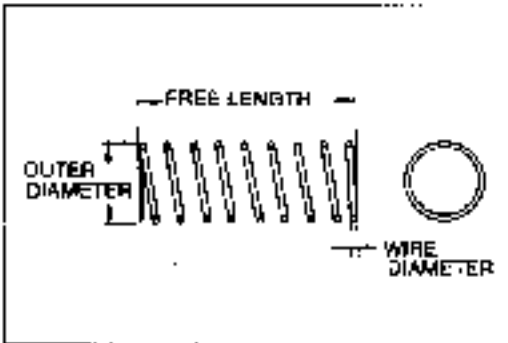
9MUDK2-234



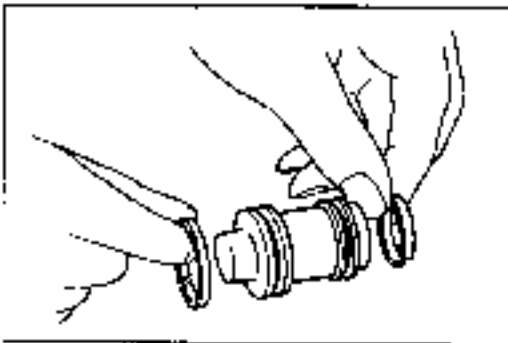
9MUDK3-235



9MUDK3-236



9BUDK1-052



1BLUK1-025

**Disassembly note****Drum support**

Mark the OD case and drum support for proper reassembly, then remove the drum support.

**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.**

**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.

**Spring**

1. Measure the spring specifications.

**Specifications**

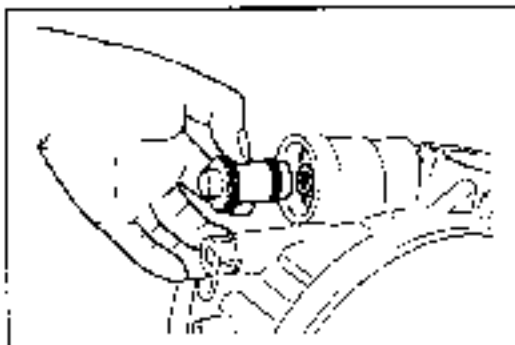
Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
OD cancel	4.95 (0.195)	23.0 (0.906)	14.3	0.05 (0.020)
Accumulator	4.85 (0.191)	39.7 (1.563)	9.3	1.6 (0.071)

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.



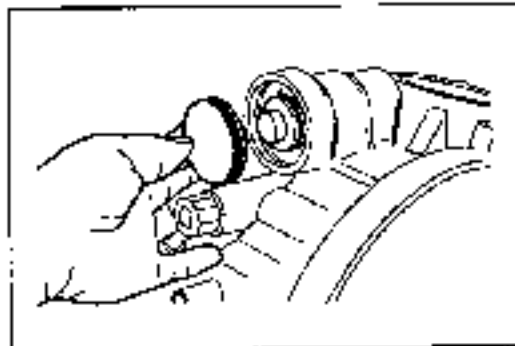


9MUKK2-239

**Caution**

Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.

- Apply ATF to the spring and accumulator piston, and install them into the OD case.



9MUKK2-240

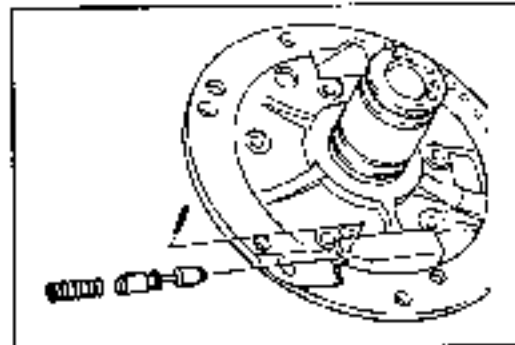
- Apply ATF to a new O-ring, and install it on the accumulator plug.
- Install the accumulator plug and snap ring.

**Caution**

Apply air for no more than three(3) seconds.

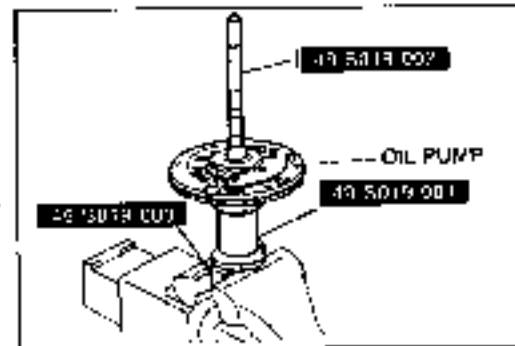
- Check the accumulator operation by applying compressed air through the oil passage.

**Air pressure: 392 kPa (4.0kg/cm<sup>2</sup>, 57 psi) max.**



9MUKK2-242

- Apply ATF to the OD cancel valve and spring, and install it into the drum support.
- Tap in a new roll pin.

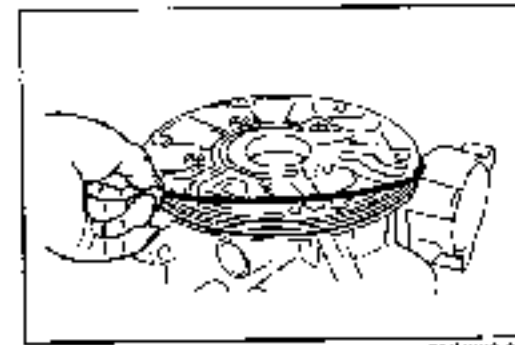


9MUKK2-243

**Note**

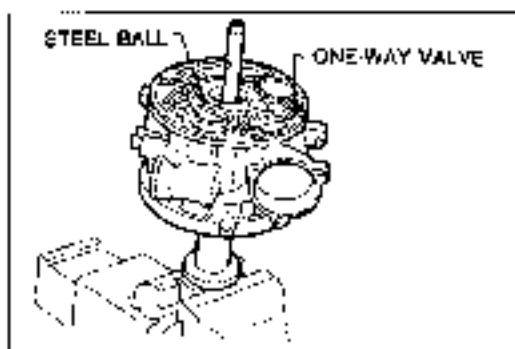
Use protective plates to prevent damaging the SST.

- Set the oil pump onto the SST.

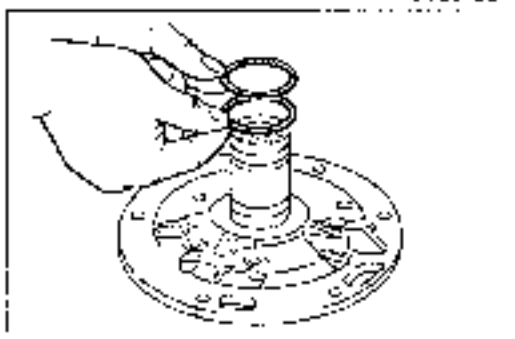


9MUKK2-245

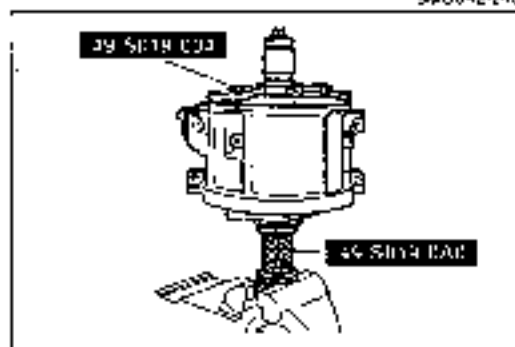
- Apply ATF to a new seal ring, and install it onto the drum support.



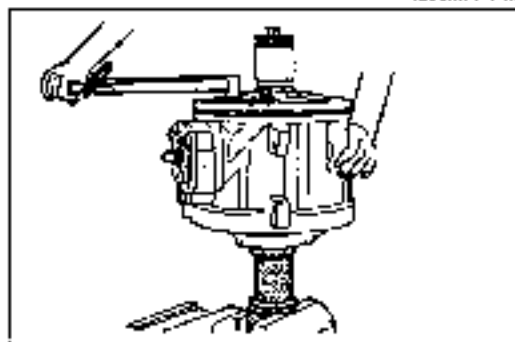
10. Apply ATF to the OD case, and mount it onto the oil pump.
11. Install the steel ball and the one-way valve.



12. Apply ATF to the new seal rings, and install them onto the drum support.



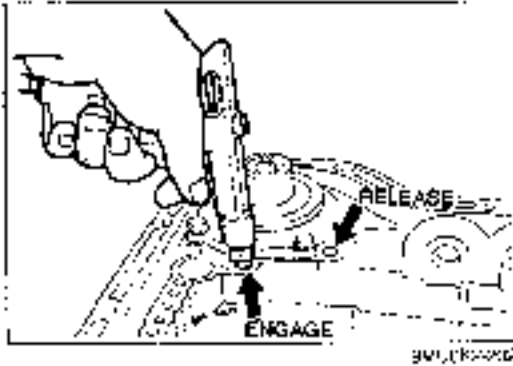
13. Apply ATF to the drum support, and install the support and a new gasket onto the OD case, aligning the marks.
14. Install the SST (pins).



15. Tighten the drum support mounting bolts.

**Tightening torque:**

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



### 2ND BAND SERVO

#### Preinspection

#### 2ND band servo operation

1. Apply compressed air through the air passage as shown.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

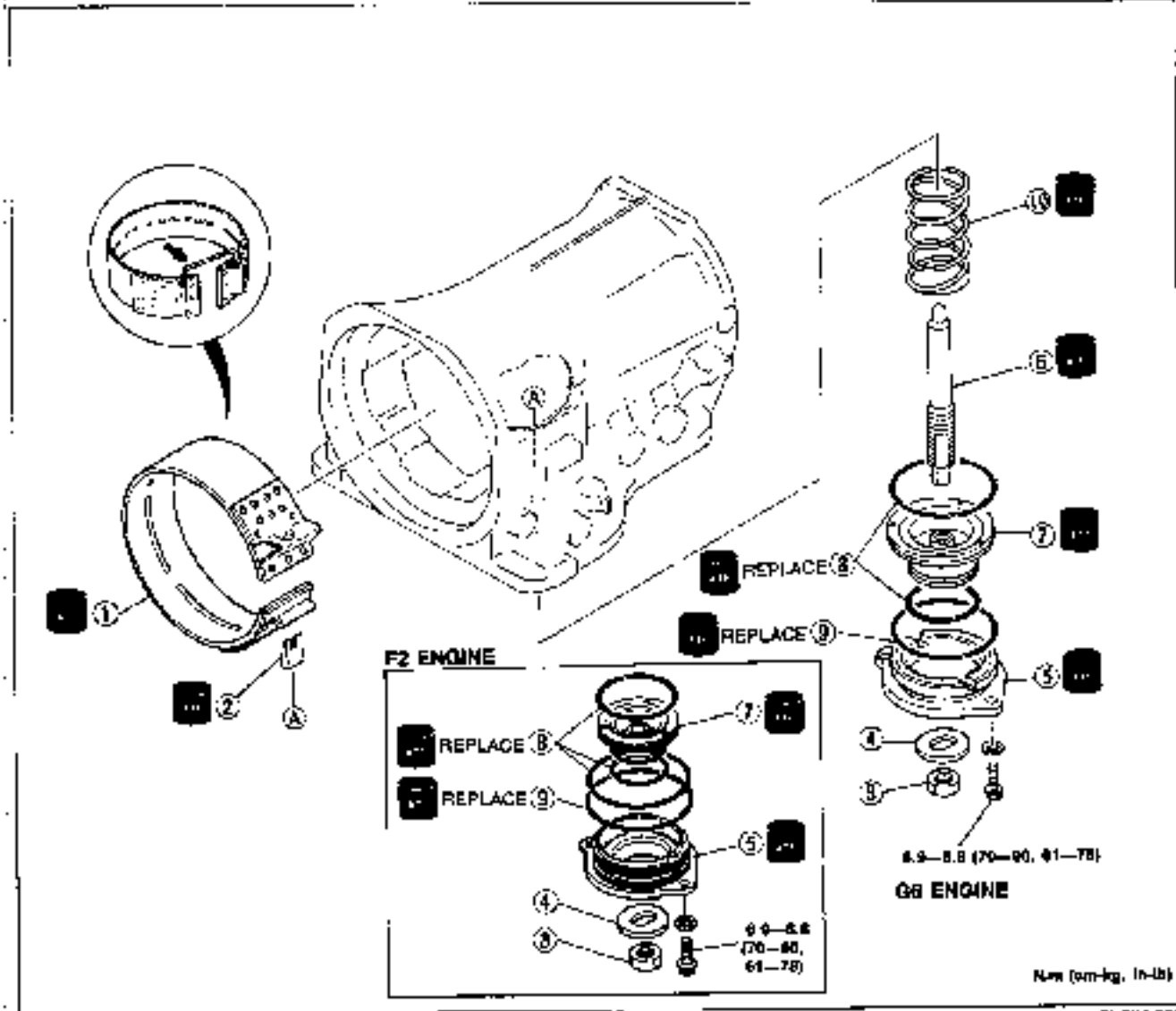
2. Verify that the piston stem moves to the brake band.  
If not, the seal rings or the oil seal may be damaged or the piston assembly may be sticking.  
Inspect them, and replace as necessary when assembling.

### 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**.

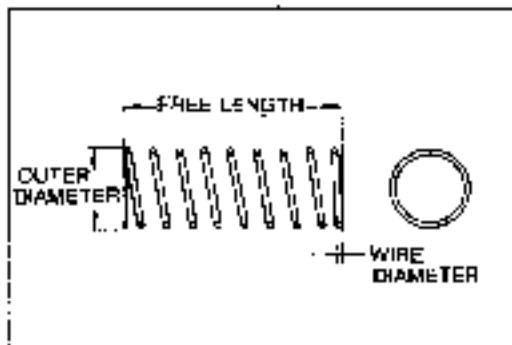


1. Brake band  
Inspect for wear or burning
2. Band strut
3. Nut

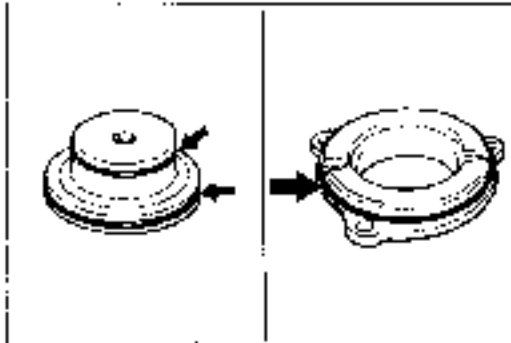
4. Washer
5. Body
6. Piston stem
7. Piston assembly

8. O-ring
9. O-ring
10. Return spring

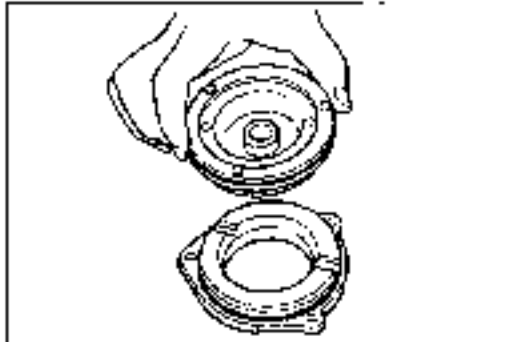
Inspection ..... page K1-69



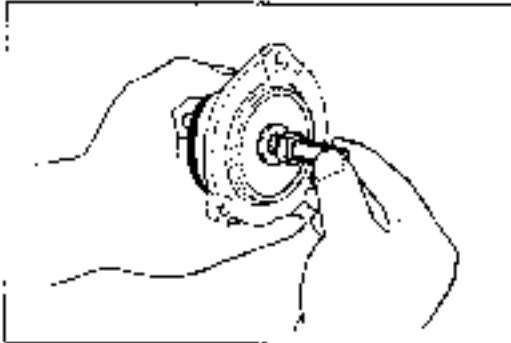
00U041-095



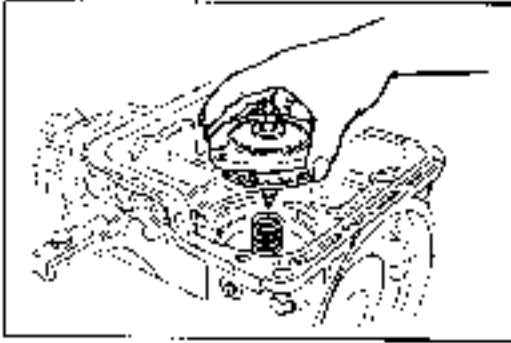
1B\_J0K1-027



9M\_U0K2-025



9M\_U0K2-206



9M\_U0K2-207

**Inspection****Return spring**

1. Measure the spring specifications.

**Specifications**

Engine \ Item	Free length mm (in)	Wire dia. mm (in)
F2	35.0 (1.417)	3.5 (0.138)
G6	35.7 (1.402)	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 D-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.

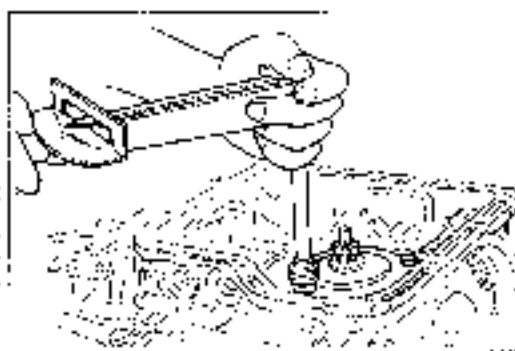
5. Apply ATF to the piston stem and washer, and install them into the body.
6. Loosely tighten the nut.

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

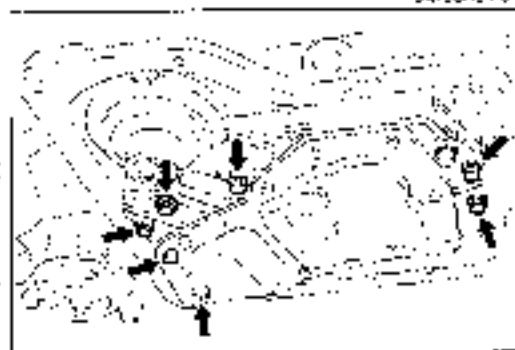


9M JOKK-2007

9. Install and tighten the bolts.

**Tightening torque:**

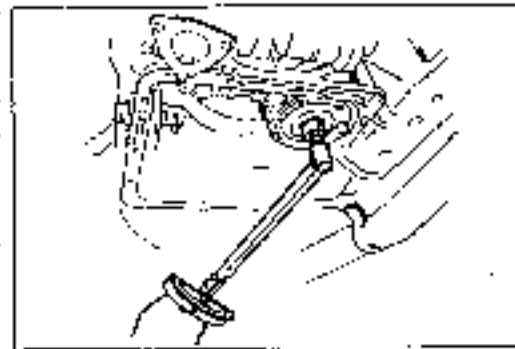
**6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)**



9M JOKK-4852

**On-vehicle Adjustment**

1. Remove the valve body assembly



12U0K-02E

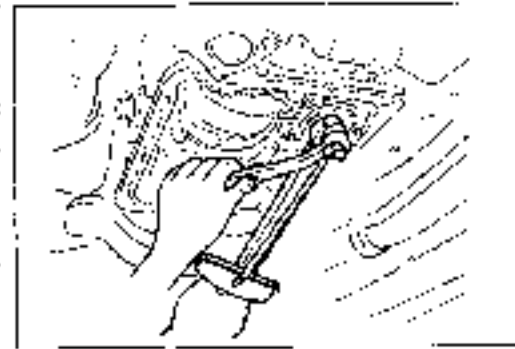
2. Loosen the locknut and lighten the piston stem.

**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**

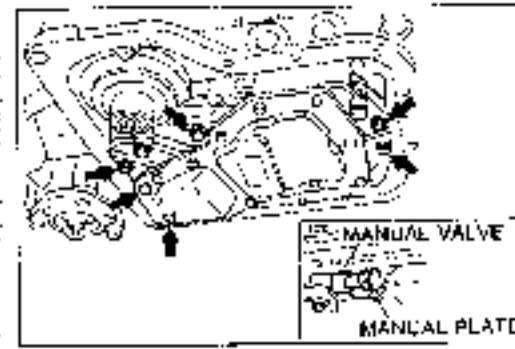


9M JOKK-211

4. Hold the stem and tighten the locknut.

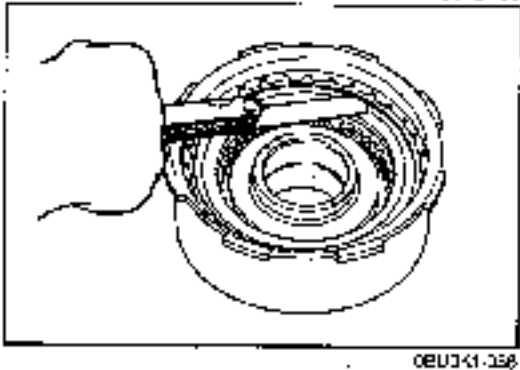
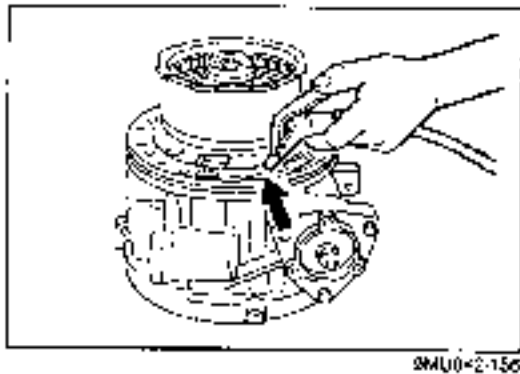
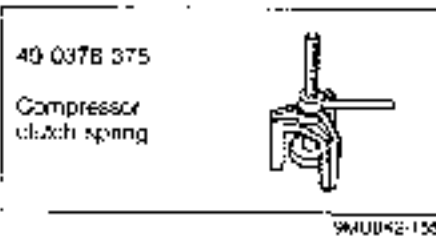
**Tightening torque:**

**15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)**



9M JOKK-253

5. Install the valve body assembly.

**FRONT CLUTCH****Preparation****SST****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)**

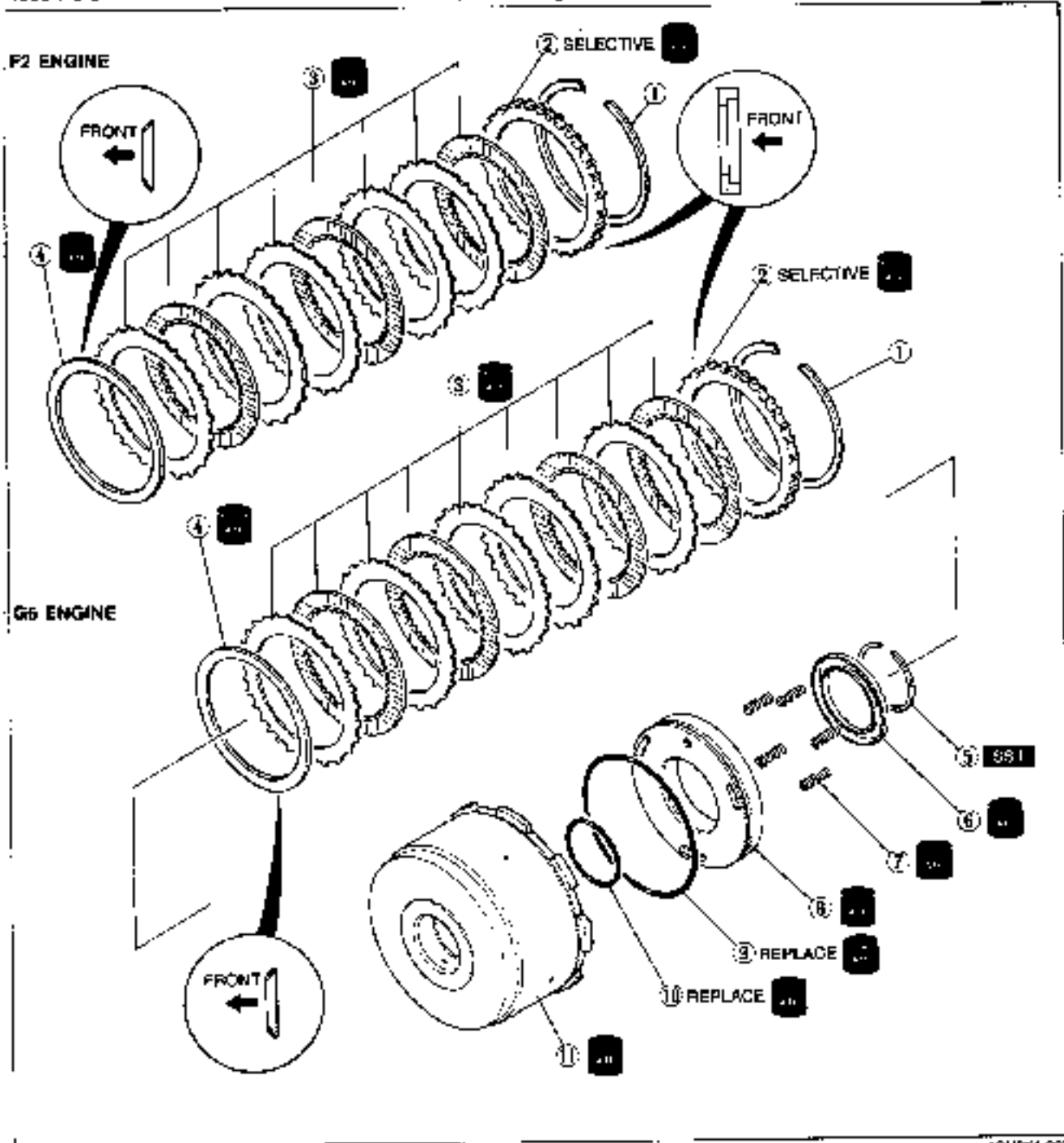
Select and install the correct retaining plate when assembling.

### Disassembly and Inspection

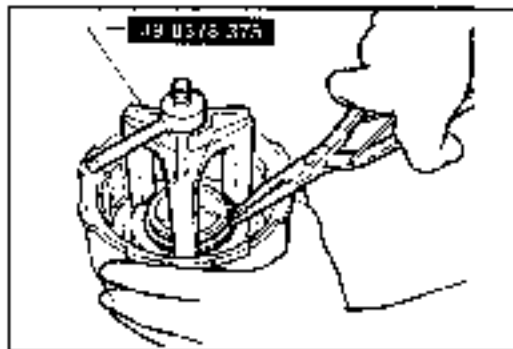
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

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



- |                                   |                                  |                       |
|-----------------------------------|----------------------------------|-----------------------|
| 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 K1-73       | 11. Front clutch drum |
| Inspection ..... page K1-73       | 8. Clutch piston                 |                       |
| 4. Dished plates                  | Inspection balls for sticking by |                       |
| 5. Snap ring                      | shaking piston                   |                       |
| Removal..... page K1-73           | Removal... .. page K1-73         |                       |
|                                   | Inspection ... page K1-73        |                       |



9M,OK2-158

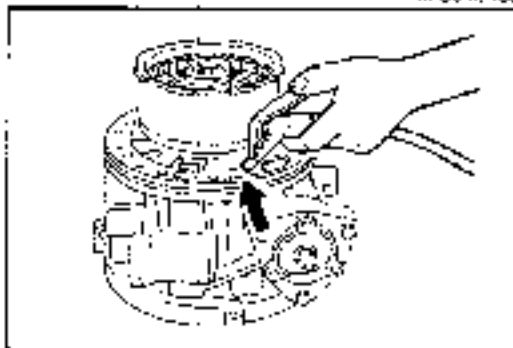
**Disassembly note**

**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.

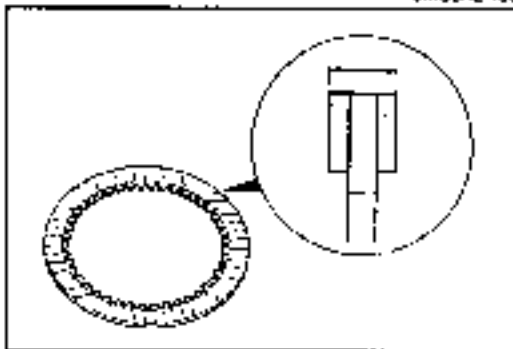


9M,OK2-160

**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.**



9M,OK2-157

**Inspection**

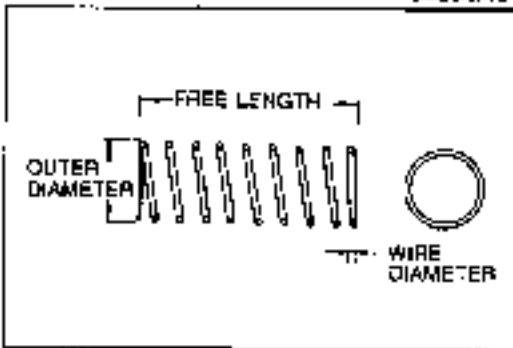
**Drive plate**

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.



9M,OK2-162

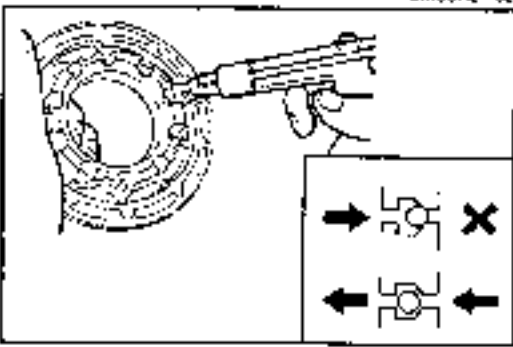
**Return spring**

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.



9M,OK2-163

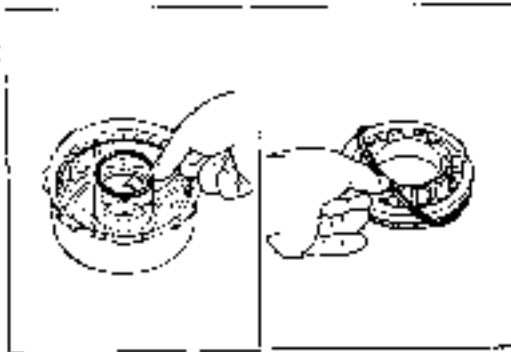
**Clutch piston**

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.

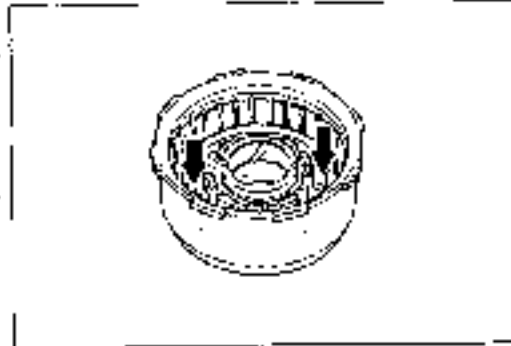




JWUK149

**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.

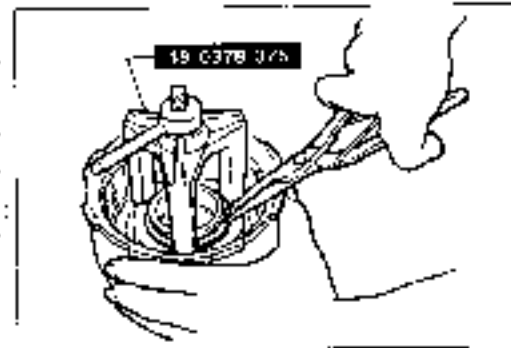


JWUK218

**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 iron clutch drum.
4. Install the piston in the front clutch drum.

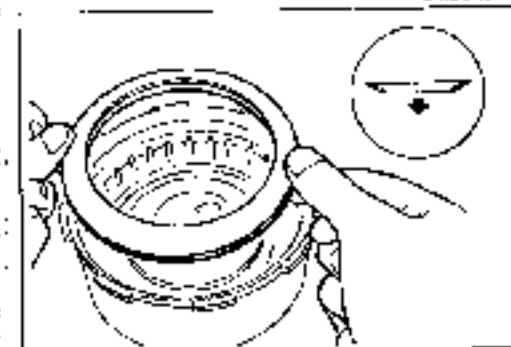


JWUK219

**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.



JWUK2167

7. Install the driven 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.

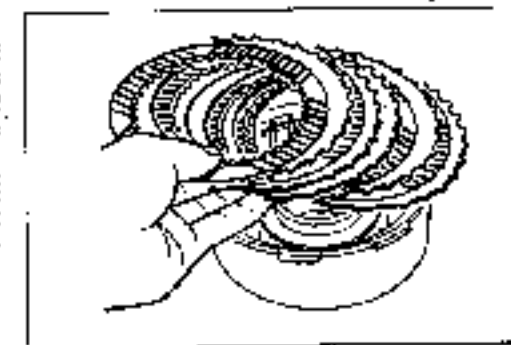
**Note**

Installation order (F2 engine):

Driven-Drive-Driven-Drive-Drive-Driven-Driven-Drive

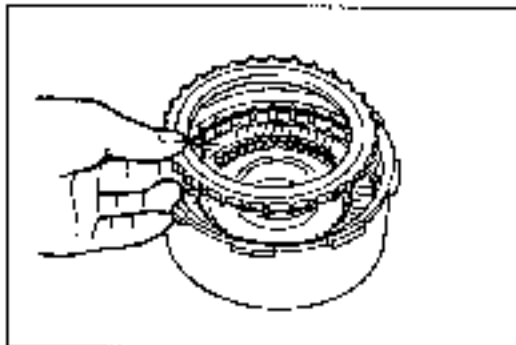
Installation order (G6 engine):

Driven-Drive-Driven-Drive-Driven-Driven-Drive-Driven-Drive

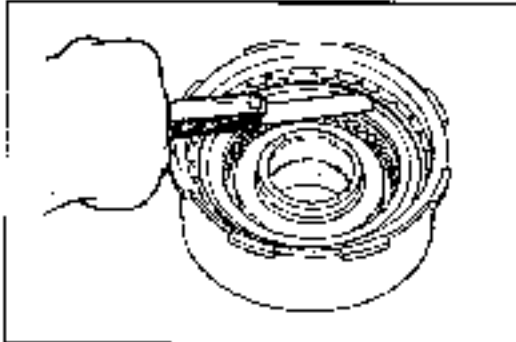


JWUK2158

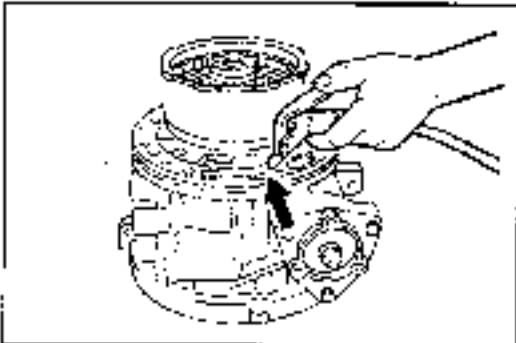
8. Apply ATF to the drive plates and driven plates and install them into the front clutch drum.



SMU0K2-169



BSLCK1-069



SMU0K2-171

**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)
5.5 (0.220)	5.8 (0.228)	6.0 (0.236)

**G6 engine:**

mm (in)

5.5 (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.**

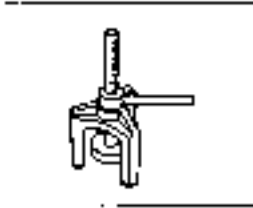
- 12 Install the front clutch onto the drum support along with the seals rings. Apply compressed air through the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

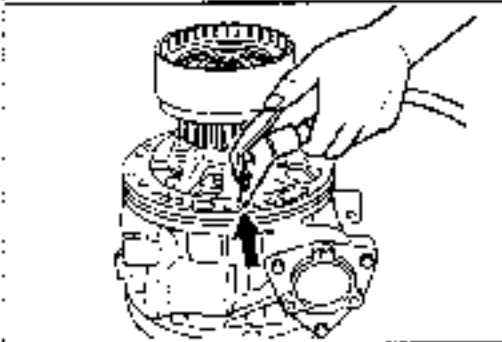
**REAR CLUTCH****Preparation****IST**

49 DS/8 3/6

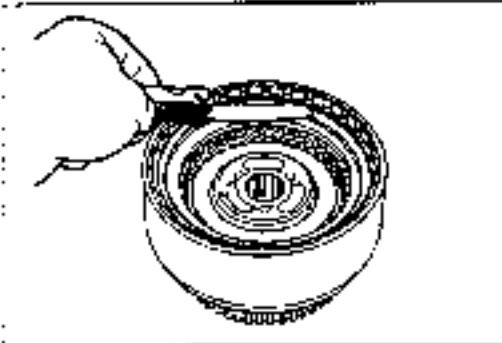
Compressor,  
Clutch spring



9M,JK2-178



8M0062-172



3BL0K-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.

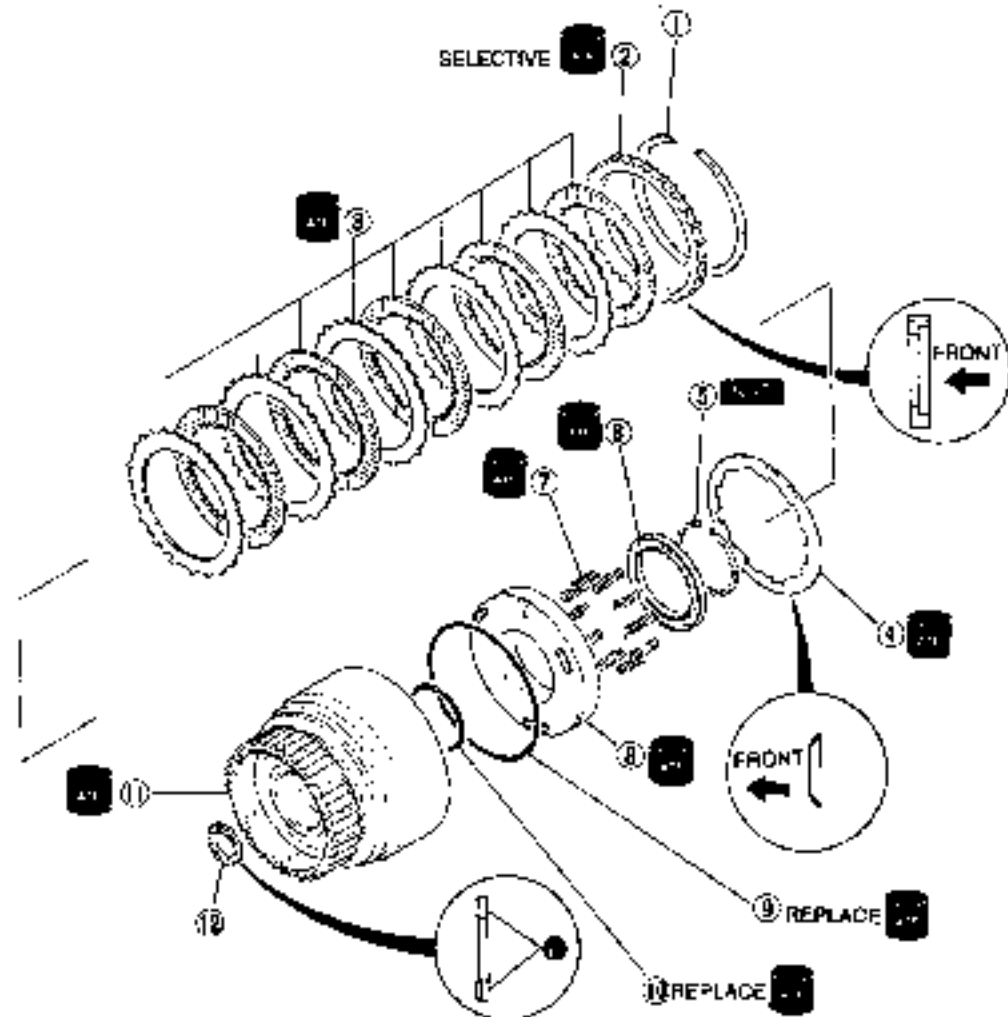
**Clearance: 0.6—1.0mm (0.031—0.039 in)**

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**.

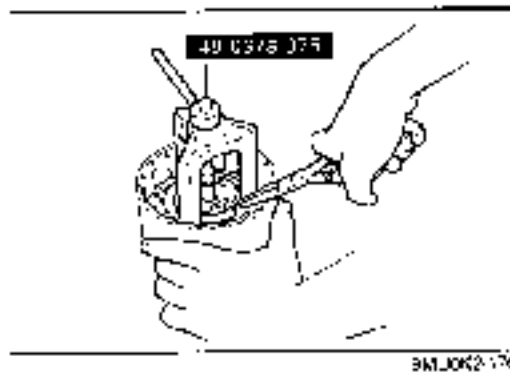


- 1. Snap ring
- 2. Retaining plate
- 3. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... page K1-78
- 4. Dish plate
- 5. Snap ring  
Removal ..... page K1-78

- 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

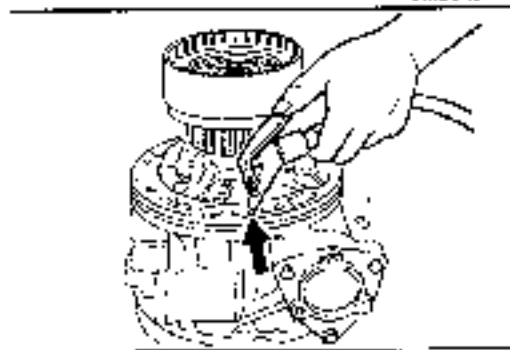
- 9. Seal ring
- 10. O-ring
- 11. Rear clutch drum
- 12. Bearing  
Inspect for damage or  
rough rotation

29LAK1402\*

**Disassembly note****Snap ring****Caution**

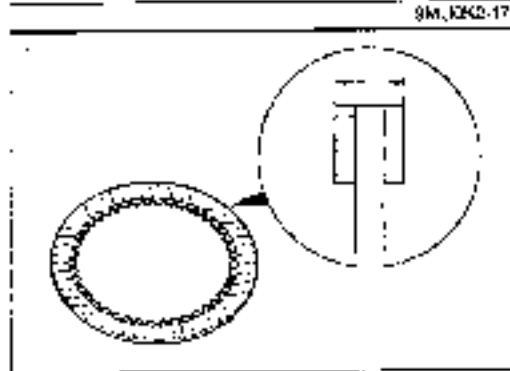
Do not damage the snap ring.

1. Compress the spring with the **SST**, then remove the snap ring with snap ring pliers
2. Remove the spring retainer and spring.

**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.**

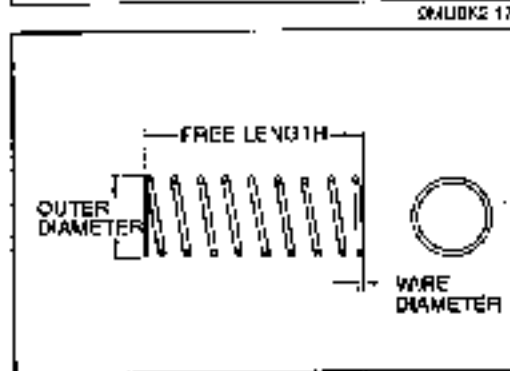
**Inspection****Drive plate**

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.

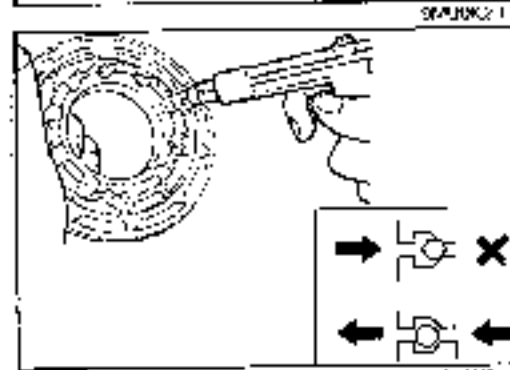
**Return spring**

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 (1.20")	14.5	1.9 (0.075)

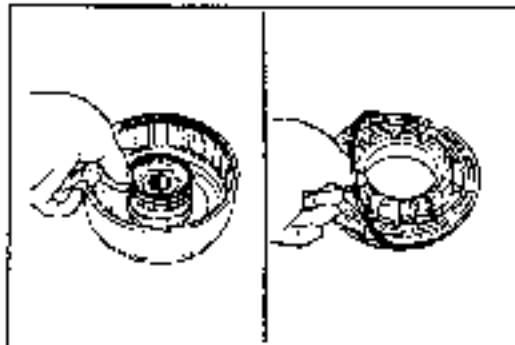
2. If not within specification, replace the return spring.

**Clutch piston**

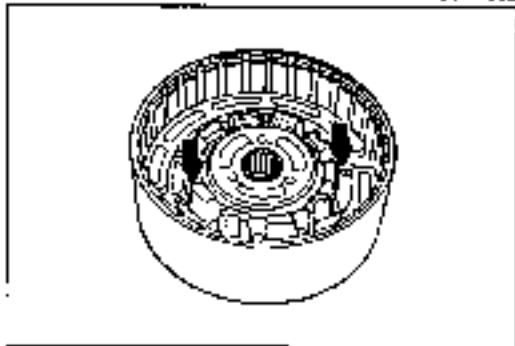
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57psi) max.**

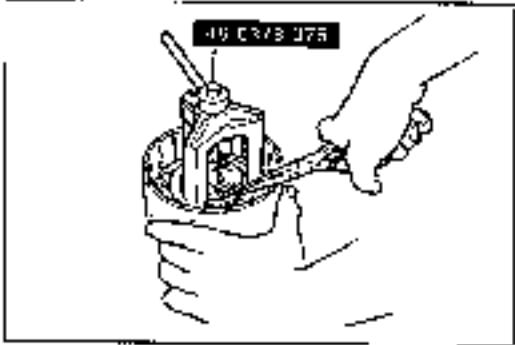
3. If not correct, replace the clutch piston.



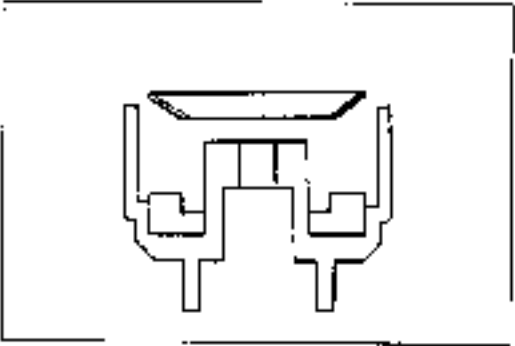
19U0K1-032



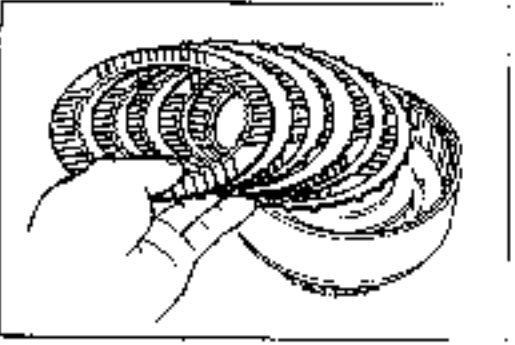
3MUBK2-132



9MUBK2-133



9MUBK2-134



9MUBK2-135

**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**

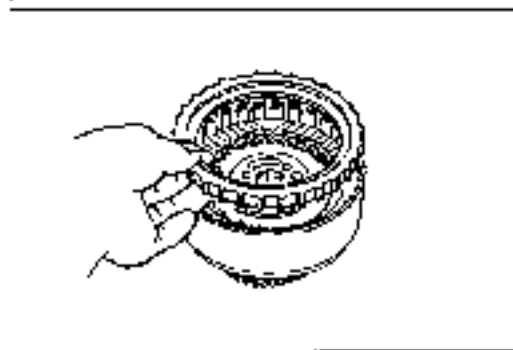
Align the flats of the drive plates with the lubrication hole of the clutch drum, then set them into the drum.

**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.



9MJA0K2 186

**Caution**

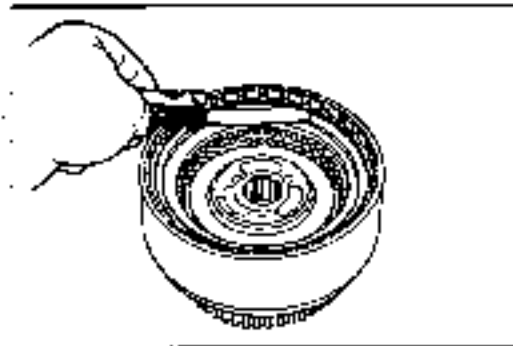
Align the flats of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.

9. Install the retaining plate with the stop facing upward.

**Caution**

Do not deform the snap ring.

10. Install the snap ring.



08JAK1 062

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: 0.8—1.0mm (0.031—0.039 in)**

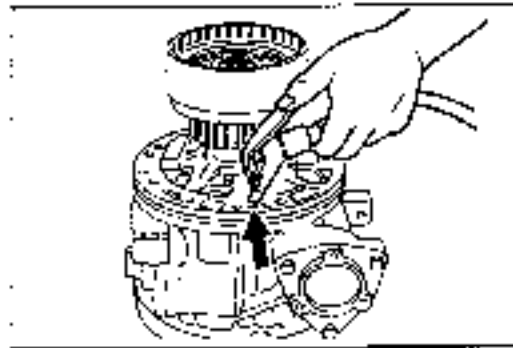
**Retaining plate sizes**

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**

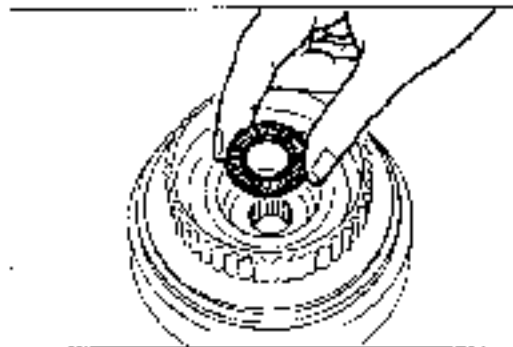
Apply air for no more than three(3) seconds.



9MJA0K2 186

12. 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.**



08JAK1 062

13. Apply petroleum jelly to the bearing race, and install it onto the rear clutch drum

**Bearing race outer diameter: 51.5mm (2.028 in)**

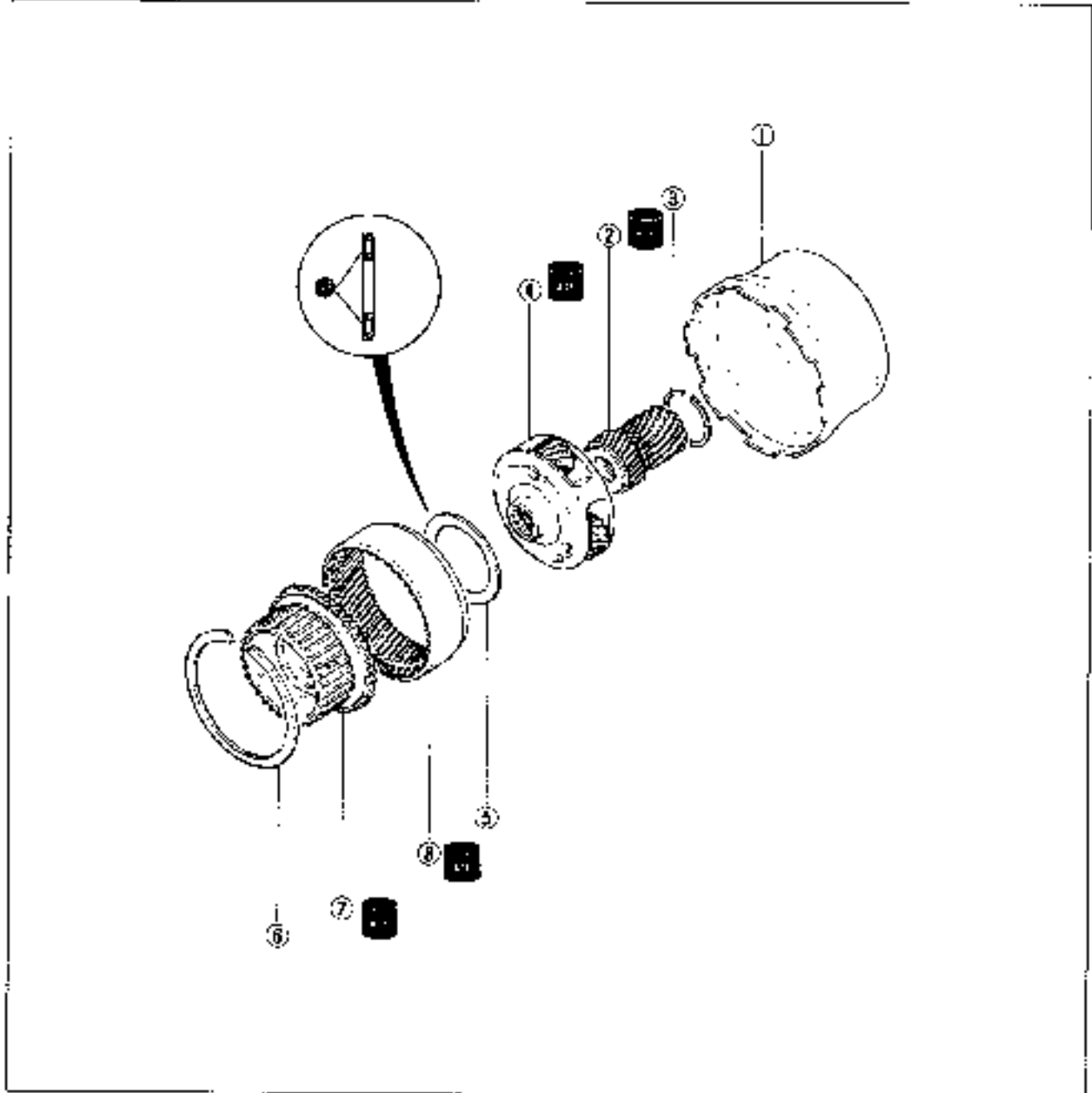
**CONNECTING SHELL AND FRONT PLANETARY GEAR UNIT  
(REAR CLUTCH HUB, FRONT PLANETARY PINION CARRIER, REAR SUN GEAR)**

**Disassembly and Inspection**

Disassemble in the order shown in the figure.

Inspect all parts, and repair or replace as necessary.

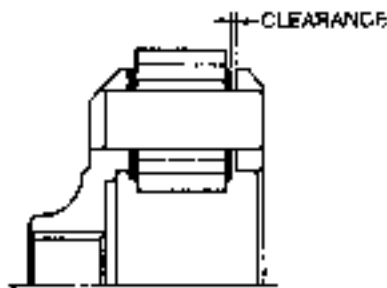
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



18UD-11 033

- |  |  |
|--|--|
| <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> |
|--|--|



**Inspection****Front planetary pinion carrier**

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

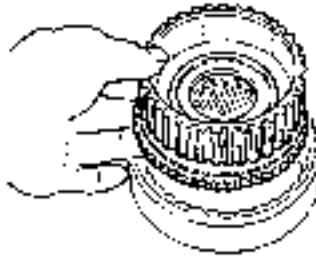
**Clearance**

**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.

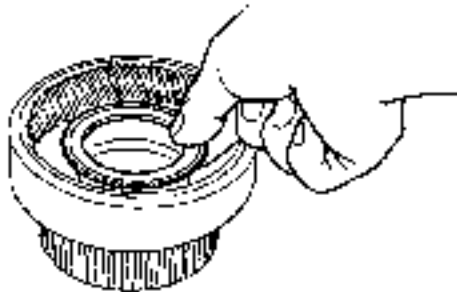
9MUCK2-257



13JUK1-084

**Assembly procedure**

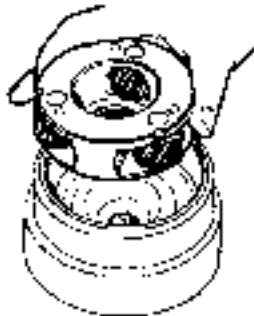
1. Apply ATF to the rear clutch hub and internal gear, and assemble them with the snap ring.



06JUK1-064

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)**



06LCK-065

3. Apply ATF to the front planetary pinion carrier, and install it into the internal gear.



09JUK1-086

**Note**

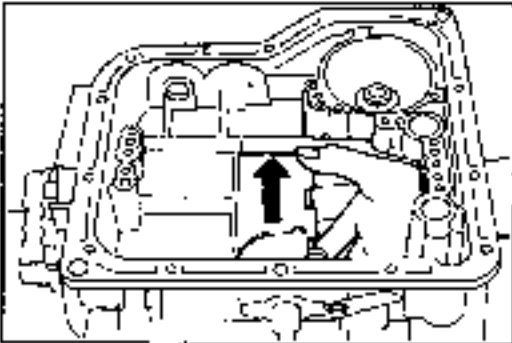
**Pay close attention to the front and rear directions of the sun gear. The grooved side (arrow) is the front.**

4. Install the snap ring onto the sun gear.



6MUC7-067

5. Apply ATF to the sun gear, and install it into the front planetary pinion carrier.



6MUC7-068

**REAR PLANETARY GEAR UNIT  
(CONNECTING DRUM, REAR PLANETARY PINION  
CARRIER, ONE-WAY CLUTCH)**

**Preinspection**

**One-way clutch operation**

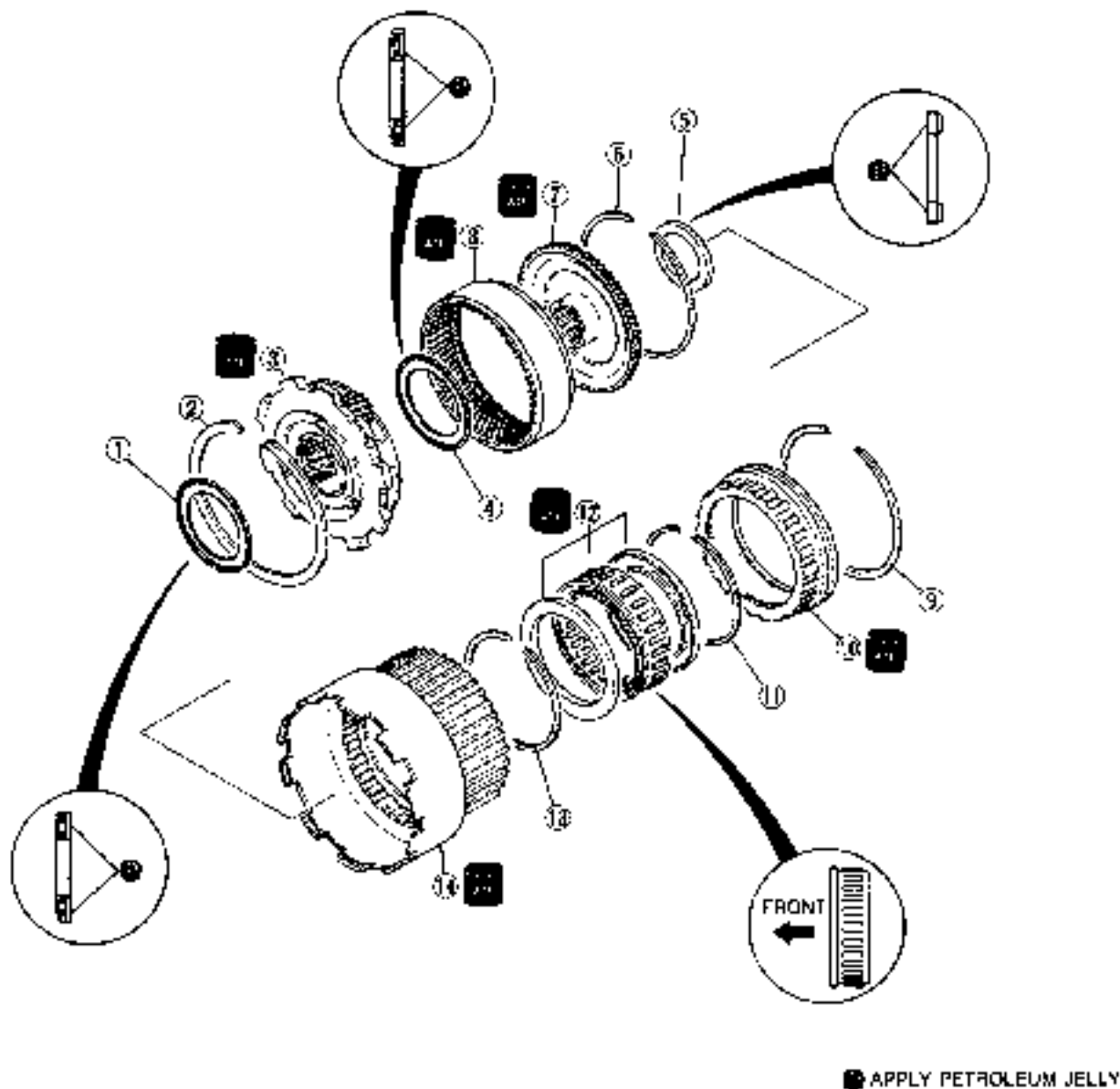
Install the rear planetary gear unit, and check that the rear planetary gear unit rotate smoothly when turned clockwise and locked when turned counterclockwise. If not, replace the one-way clutch.

### Disassembly and Inspection

Disassemble in the order shown in the figure.

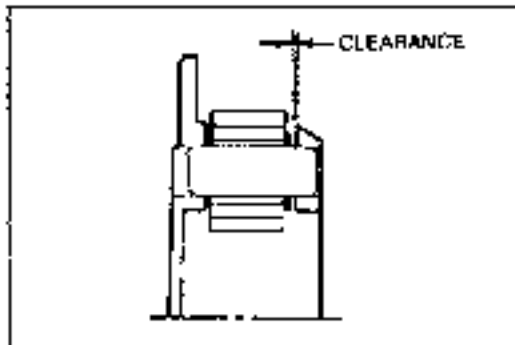
Inspect all parts, and repair or replace as necessary.

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

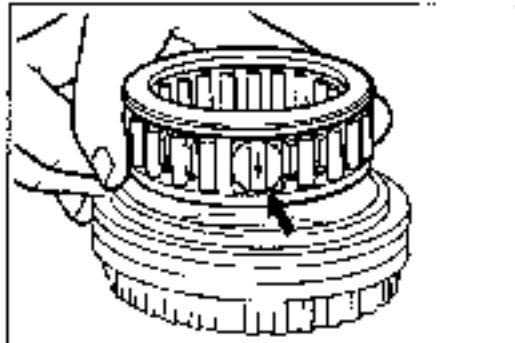


120341-03R

- |   |   |   |
|---|---|---|
| 1. Bearing<br>Inspect for damage or rough rotation  | 4. Bearing<br>Inspect for damage or rough rotation                            | 8. Internal gear<br>Inspect individual gear's teeth for damage, wear, or cracks |
| 2. Snap ring  | 5. Bearing<br>Inspect for damage or rough rotation                            | 9. Snap ring  |
| 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 | 6. Snap ring  | 10. One-way clutch outer race   |
|   | 7. Drive flange<br>Inspect individual gears teeth for damage, wear, or cracks | 11. Snap ring   |
|   |   | 12. One-way clutch  |
|   |   | 13. Snap ring   |
|   |   | 14. Connecting drum   |



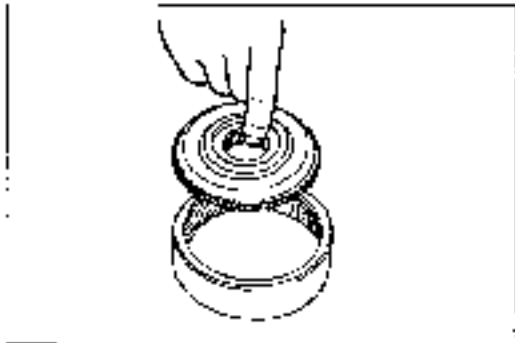
3VLEK2 266



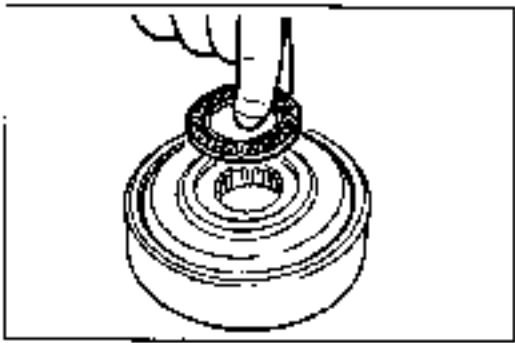
1E07K1 036



HK1J0K2 269



2W1J0K2 270



3M1J0K2 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.

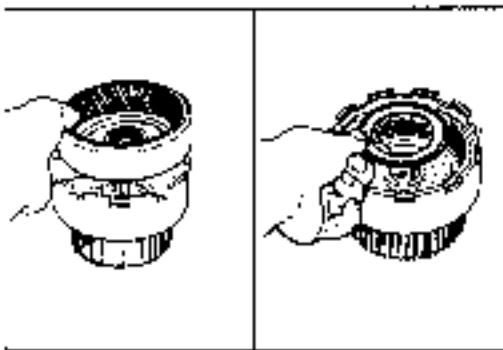
**Assembly procedure****Caution**

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.

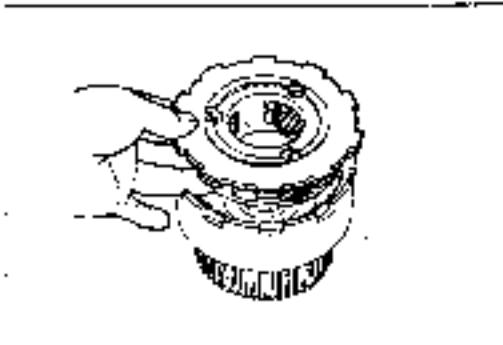
**Bearing outer diameter:** 47.0mm (1.850 in)



09U0K1-026

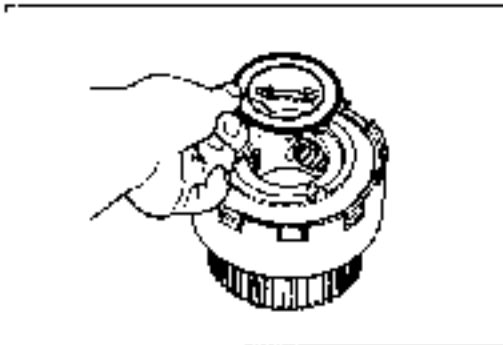
8. Install the internal gear and the drive flange into the connecting drum.
9. Apply petroleum jelly to the bearing, and install it into the drive flange with the black surface facing downward.

**Bearing outer diameter: 70.0mm (2.756 in)**



09U0K1-070

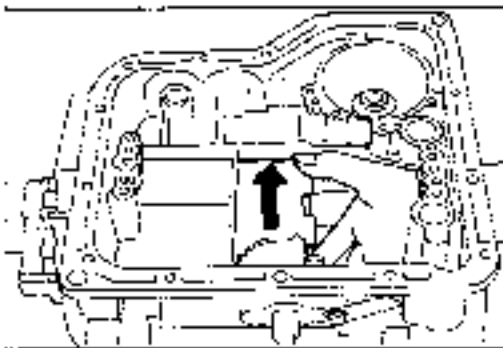
10. Apply ATF to the rear planetary pinion carrier, and install it into the connecting drum.
11. Install the snap ring.



09U0K1-071

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)**

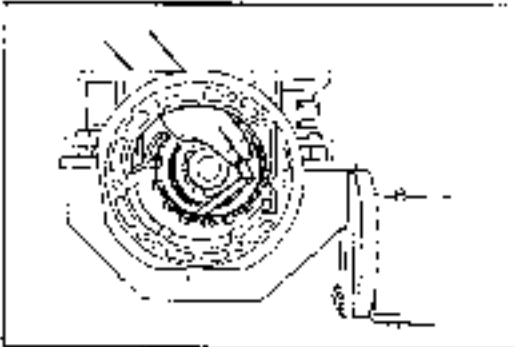
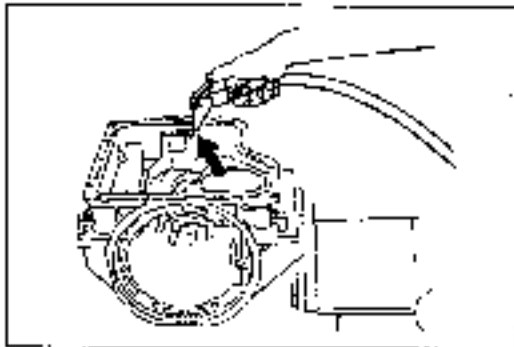
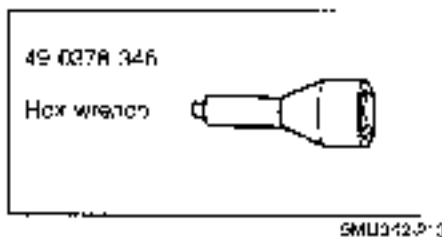


09U0K1-077

**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****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)**

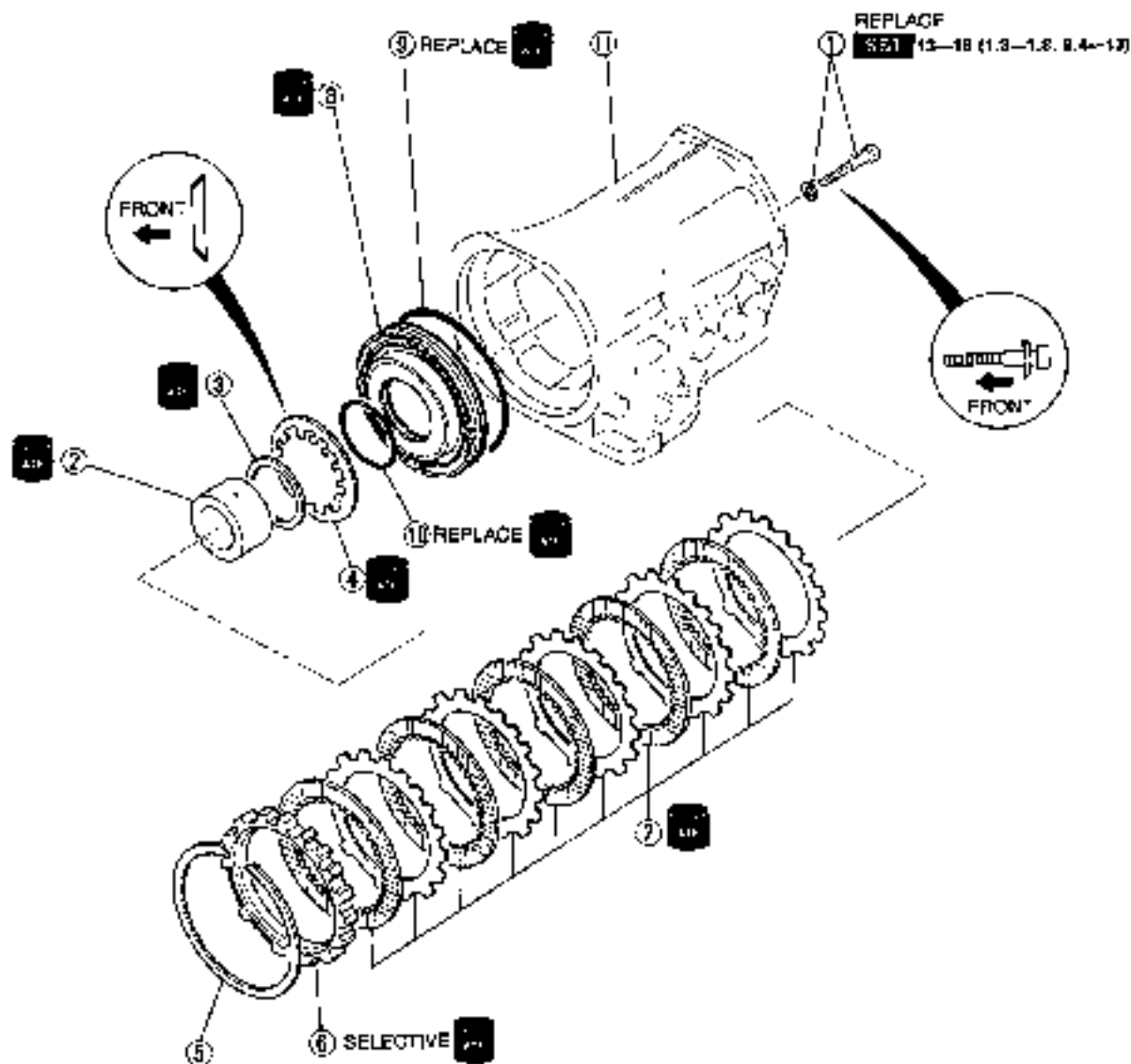
Select and install the correct retaining plate when assembling

### 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**.



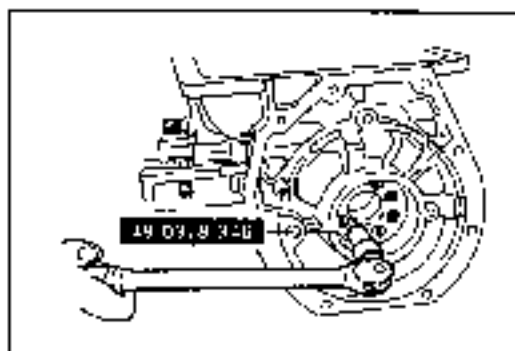
N.m (w.kg, ft.lb)

1907X1-017

1. Align head bolts and dished washers
2. One-way clutch inner race  
Removal..... page K1-89
3. Thrust washer
4. Return spring  
Inspection ... page K1-89
5. Snap ring
6. Retaining plate

7. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ... page K1-89
8. Low and reverse brake piston  
Inspect balls for sticking by shaking piston  
Removal... page K1-89  
Inspection..... page K1-89

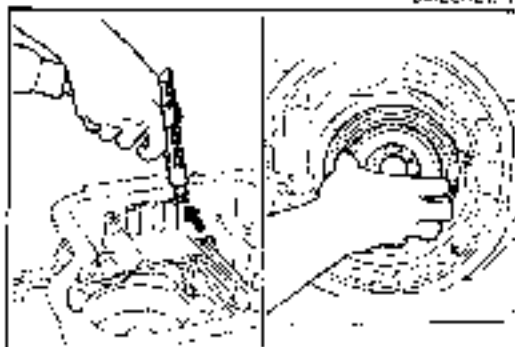
9. Seal ring
10. Q-ring
11. Transmission case



BMT,ON2817

**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.

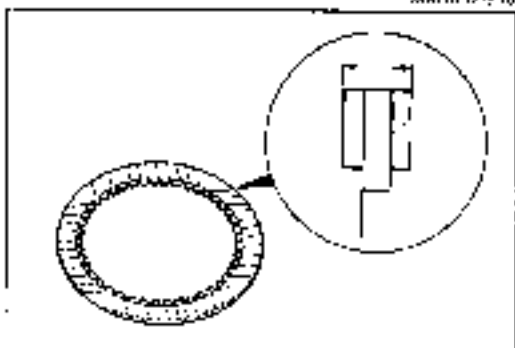


9M1105-218

**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.**



05LCK104

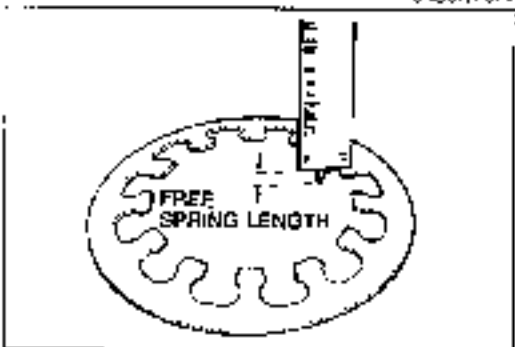
**Inspection****Drive plate**

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.



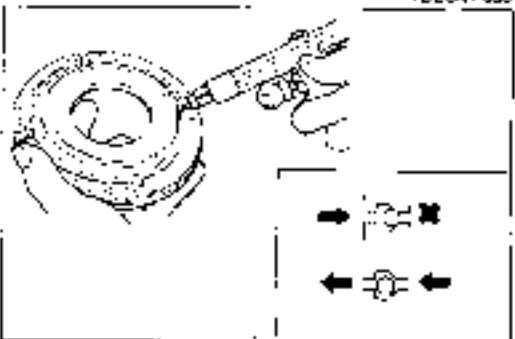
1B,OK103

**Return spring**

1. Measure the return spring free length.

**Spring free length: 5.9—8.2mm (0.232—0.244 in)**

2. If not within specification, replace the return spring.



9M,OK2-22

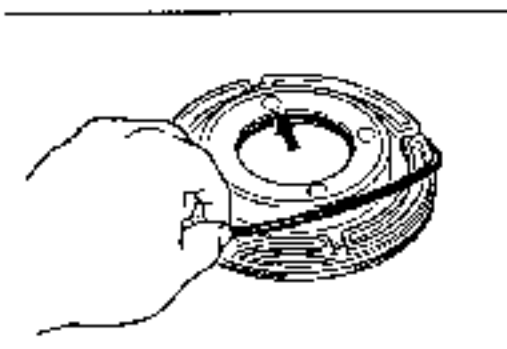
**Clutch piston**

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.

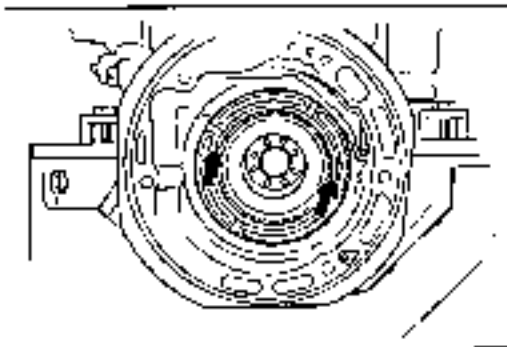
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

3. If not correct, replace the clutch piston.

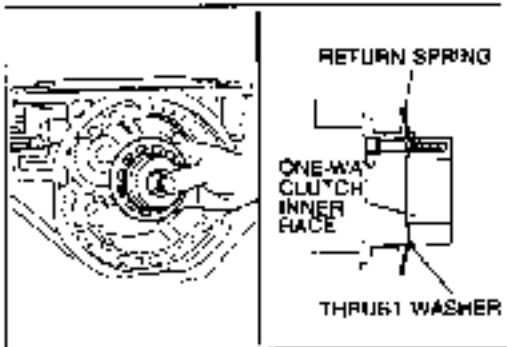




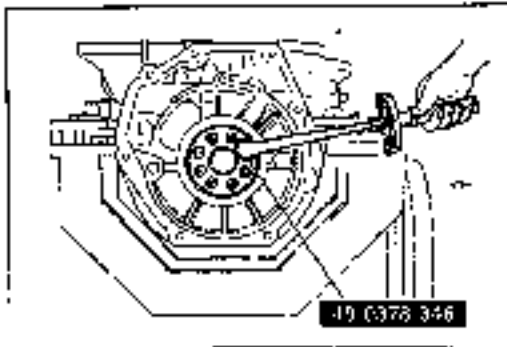
1BL0K1-039



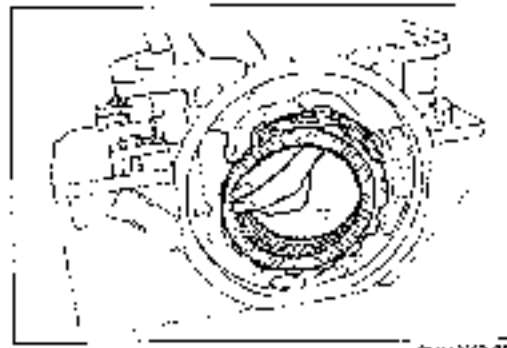
9VUC02-223



9VUBK2-224



1BL0K1-040



9VUC02-225

**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 washers with the SST.

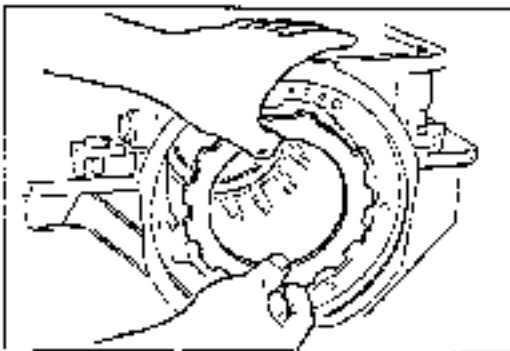
**Tightening torque:**

13–18 N·m (1.3–1.8 m·kg, 9.4–13 ft·lb)

**Note****Installation order:**

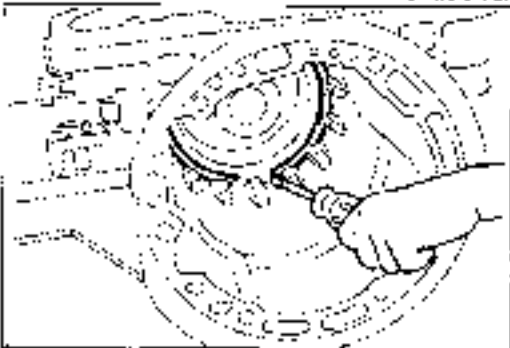
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

8. Apply ATF to the driven plates and driver plates and install them into the transmission case.



BMJ0K2 227

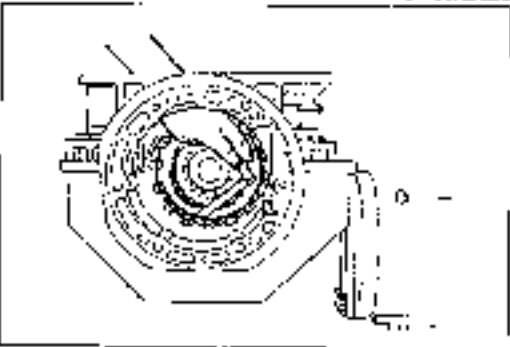
9 Install the retaining plate.



BMJ0K2 228

**Caution**  
Do not deform the snap ring.

10. Install the snap ring with a screwdriver.



BMJ0K2 229

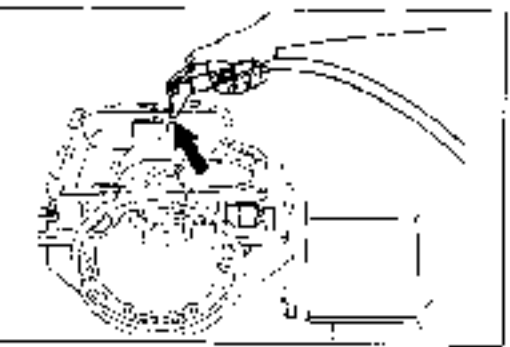
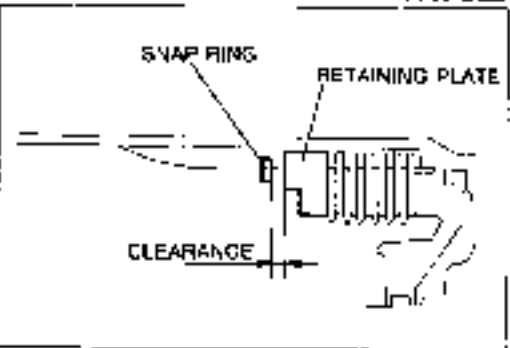
11. Measure the clearance between the snap ring and the retaining plate with a feeler gauge. If not within specification, adjust the clearance by installing the proper retaining plate.

**Clearance: 0.8—1.05mm (0.031—0.041 in)**

**Retaining plate sizes**

mm (in)

7.6 (0.302)	8.0 (0.315)	8.2 (0.323)
8.4 (0.331)	8.6 (0.339)	8.8 (0.346)

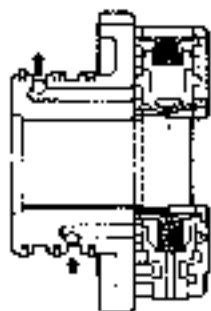


BMJ0K2 231

**Caution**  
Apply air for no more than three(3) seconds.

12 Check operation of the piston by applying compressed air through the air passage of the low and reverse brake.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



RMUCK2-492

**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.

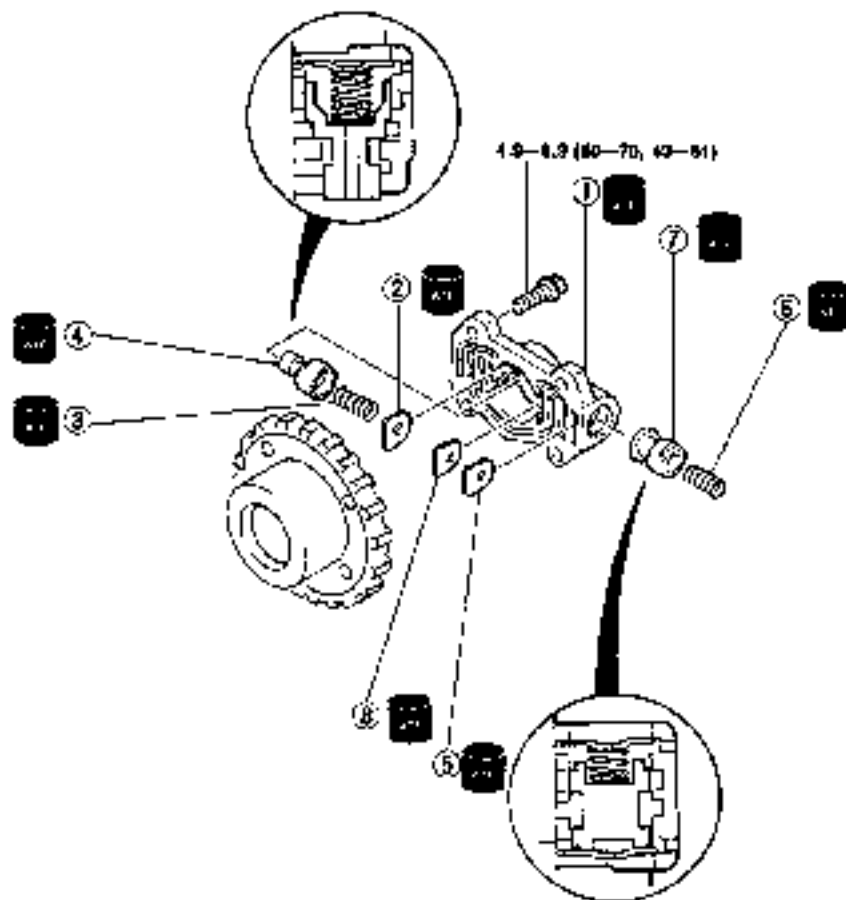
Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown.

**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

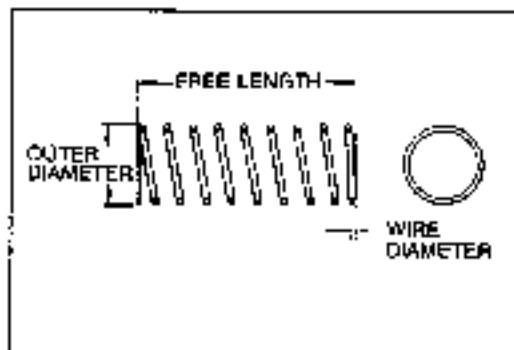
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



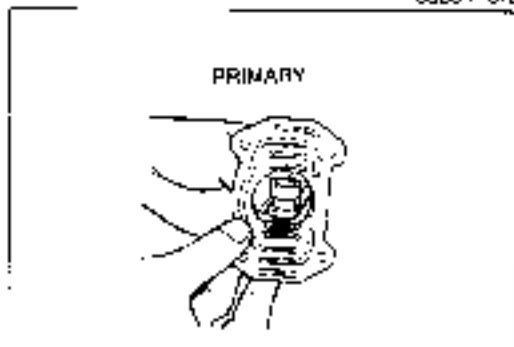
Min (cm-lb, in-lb)

-21167-041

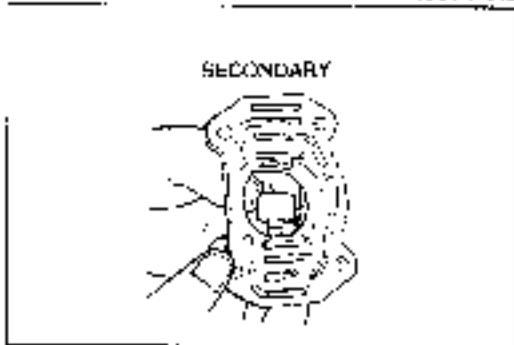
- |   |   |   |
|---|---|---|
| 1. Governor valve body<br>Inspect for damage or scoring     | 4. Secondary governor valve<br>Inspect for sticking, scoring or scratches | 7. Primary governor valve<br>Inspect for sticking, scoring or scratches |
| 2. Retainer plate   | 5. Retainer plate   | 8. Retainer plate   |
| 3. Secondary governor spring<br>Inspection ..... page K1-93 | 6. Primary governor spring<br>Inspection ..... page K1-93                 |   |



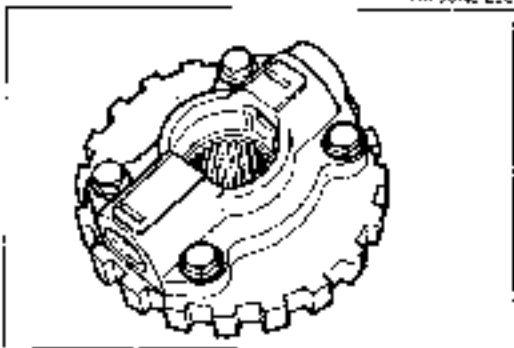
00J04-070



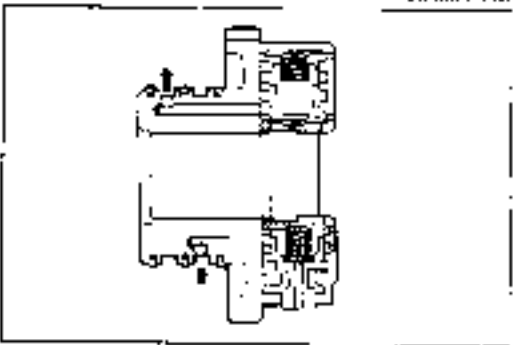
18U3K1-043



9M1J0K2-255



2M1J0K2-260



2M1J0K2-264

**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 Coil	9.0 (0.354)	21.7 (0.854)	10.0	0.9 (0.031)
	F2 EGI	9.2 (0.362)	25.2 (0.992)	7.5	0.7 (0.028)
	GE	9.0 (0.354)	21.7 (0.854)	10.0	0.9 (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.

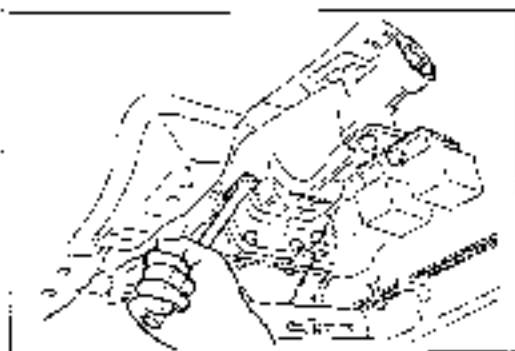
**Tightening torque:**

4.9—6.9 Nm (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.

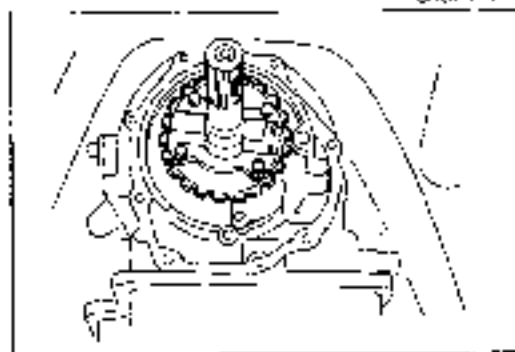
4. Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown in the figure.



UA,011-077

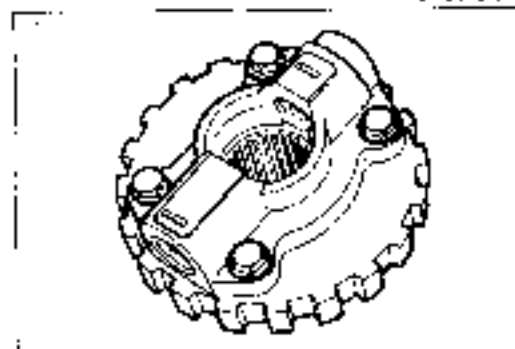
**On-vehicle Removal**

1. Remove the extension housing. (Refer to page K1-95.)
2. Remove the speedometer drive gear.



9V,002-911

3. Remove the governor and parking gear.
4. Separate the governor from the parking gear.



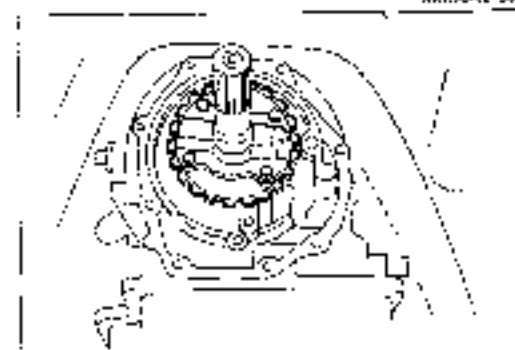
9K1,K02-307

**On-vehicle Installation**

1. Install the governor onto the parking gear.

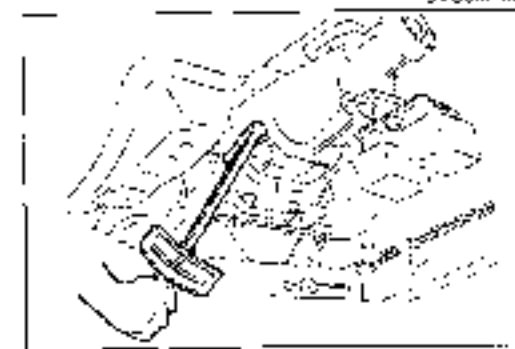
**Tightening torque:**

4.9—6.8 Nm (50—70 cm-kg, 43—61 in-lb)



9V,002-902

2. Install the governor and parking gear onto the output shaft, and secure it with a new snap ring.



CB,016-7479

3. Install the speedometer drive gear.
4. Install the extension housing. (Refer to page K1-95.)

**EXTENSION HOUSING AND PARKING MECHANISM**  
**Disassembly and Inspection**

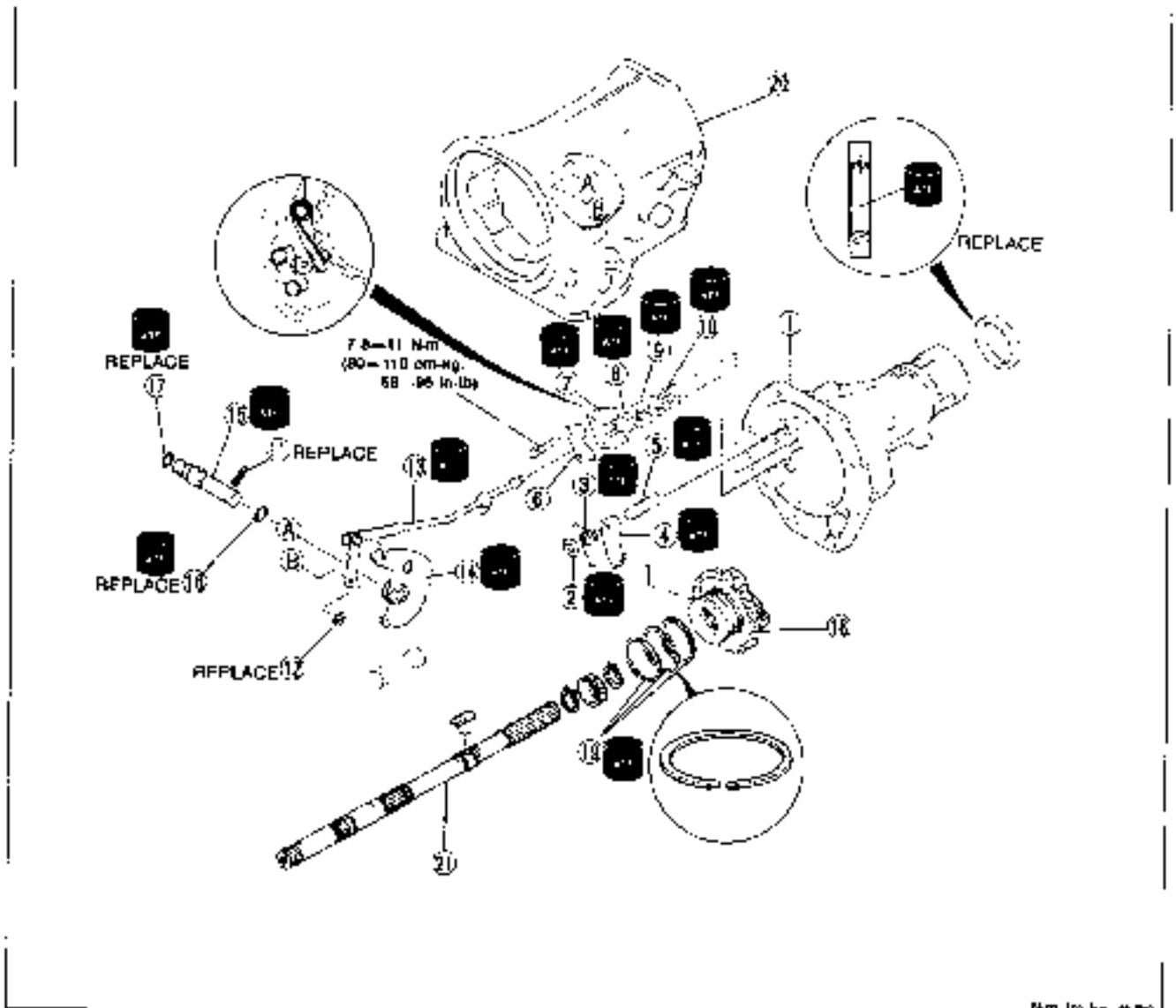
**Caution**

Do not remove the oil seal if not necessary for repairs.

Disassemble in the order shown in the figure, referring to **Disassembly Note**

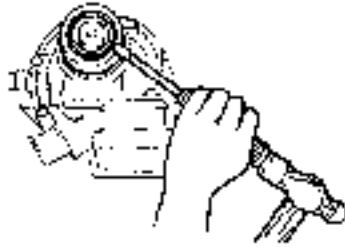
Inspect all parts, and repair or replace if necessary.

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



N·m (m·kg, ft·lb)  
 25L0K1 C22

- |                           |                            |                               |
|---------------------------|----------------------------|-------------------------------|
| 1. Extension housing      | 11. Roll pin               | 18. Parking gear              |
| 2. Dowel spacer           | 12. Retaining ring         | Inspection ... page K1-96     |
| 3. Return spring          | 13. Parking rod            | 19. Seal rings                |
| 4. Parking pawl           | Inspection individual gear | 20. Transmission case         |
| 5. Pawl shaft             | teeth for damage or wear   | 21. Output shaft              |
| 6. Retainer plate         | and condition of spring    | Inspection solines for damage |
| 7. Actuator support       | 14. Manual plate           | or wear                       |
| 8. Steel ball             | 15. Manual shaft           |                               |
| 9. Retainer               | 16. O ring                 |                               |
| 10. Spring                | 17. O ring                 |                               |
| Inspection ... page K1-96 |                            |                               |



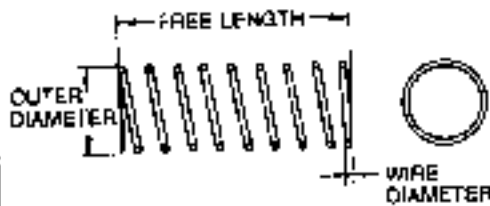
SMU1149-276

### Disassembly note

#### Oil seal

**Caution**  
Do not remove the seal unless necessary.

Remove the oil seal with a screwdriver.



SMU062-277

### Inspection

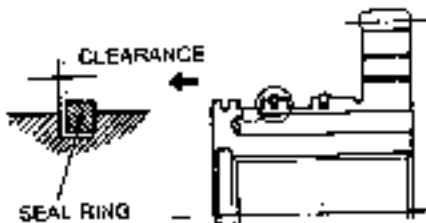
#### Spring

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.



SBJ04X-094

#### 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.

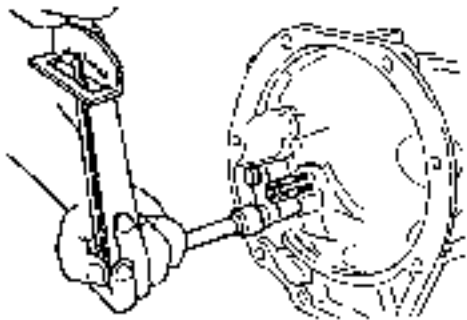
#### Assembly procedure

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.

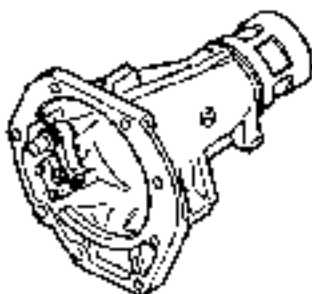
#### Tightening torque:

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

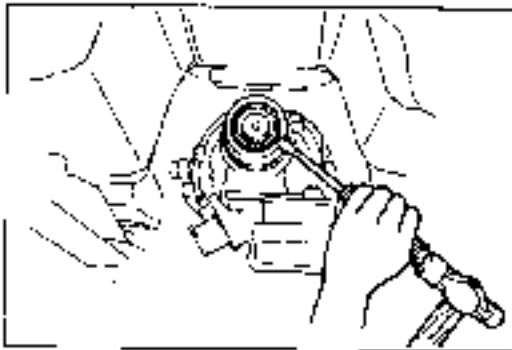
5. Apply ATF to the pawl shaft, and install it into the extension housing.
6. Apply ATF to the parking pawl and return spring, and install them into the extension housing.
7. Apply ATF to the dowel spacer, and install it into the extension housing.



TRUCK1-044



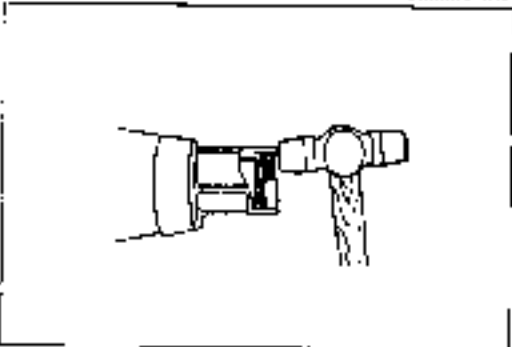
SMU342-283



9M.567-367

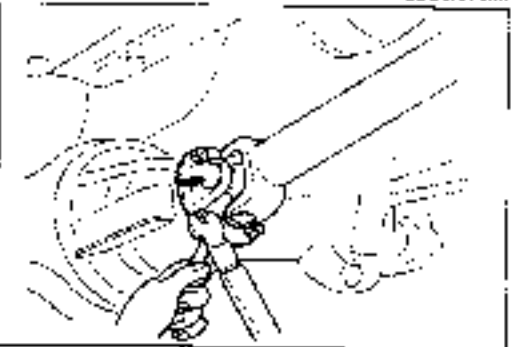
**OIL SEAL****On-vehicle Replacement**

1. Remove the propeller shaft. (Refer to Section L.)
2. Pry the oil seal from the extension housing.



5BLCKX-065

3. Coat the new oil seal lip with ATF.
4. Install the oil seal squarely into the extension housing with a plastic hammer.



3VLCX2-241

5. Install the propeller shaft. (Refer to Section L.)



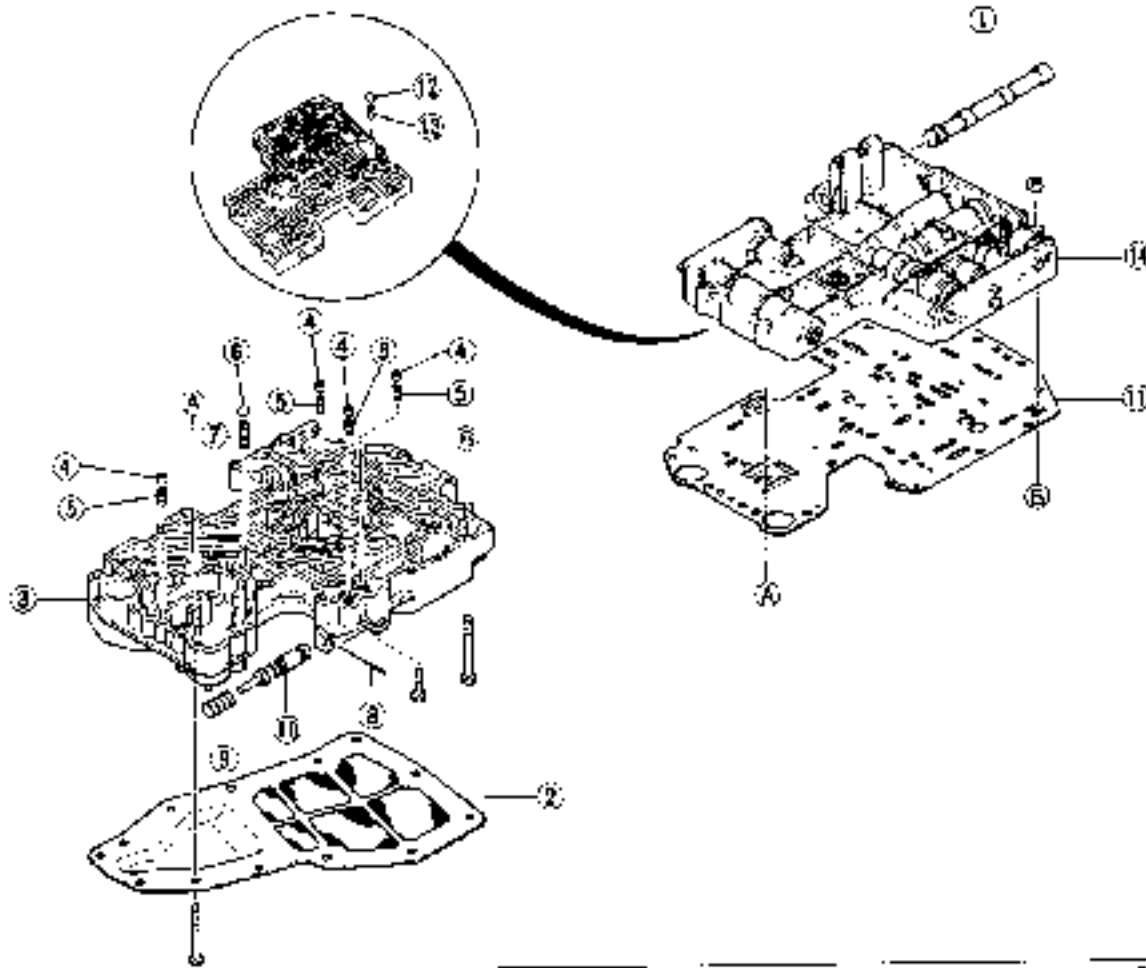
### CONTROL VALVE BODY Disassembly and Inspection

#### Caution

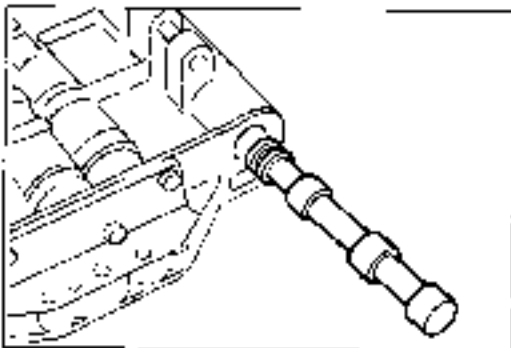
- Be especially careful when handling the control valve because it consists of the most precise and delicate parts of the transmission.
- Neatly arrange the removed parts to avoid confusing them with similar parts.
- Clean the removed parts with cleaning solvent and dry them with compressed air.  
Clean 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.

APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



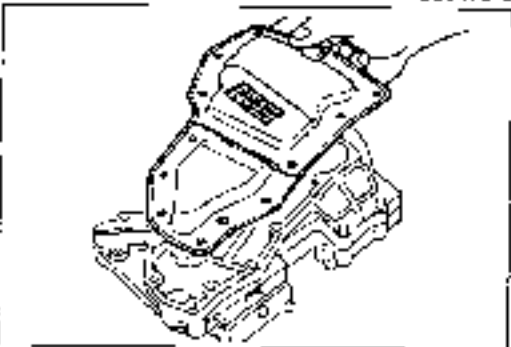
- |  |  |
|--|--|
| 1. Manual valve<br>Inspect for sticking, scoring, or scratches | 3. 3-2 timing spring<br>Inspection..... page K1-100  |
| 2. Oil strainer<br>Inspect for clogging or damage              | 10. 3-2 timing valve<br>Inspect for sticking and scoring                                       |
| 3. Lower valve body<br>Inspect for damage or scoring           | 11. Separate plate<br>Inspect fluid passage for clogging or damage                             |
| 4. Orifice check valve   | 12. Orifice check valve  |
| 5. Orifice check spring<br>Inspection..... page K1-100         | 13. Orifice check spring (F2 engine)<br>Inspection..... page K1-100                            |
| 6. Throttle relief ball  | 14. Upper valve body<br>Disassembly and Inspection... page K1-101<br>Assembly..... page K1-102 |
| 7. Throttle relief spring<br>Inspection... page K1-100         |  |
| 8. Roll pin  |  |



BLOK1 DAE

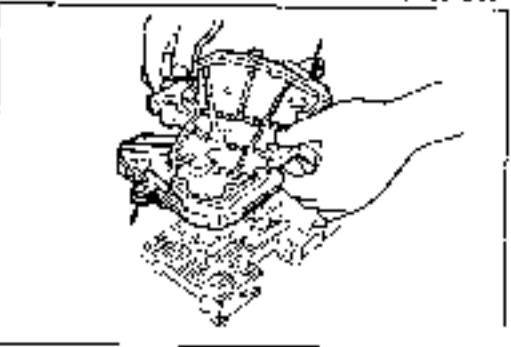
**Disassembly Procedure**

1. Remove the manual valve.



9MJJ02 307

2. Remove the oil strainer.

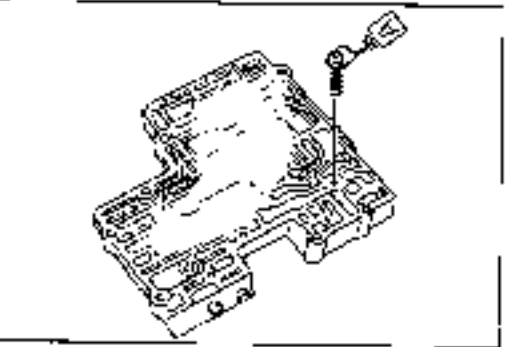


9MJJ02 306

3. Hold the lower valve body and separate plate together with a large clip

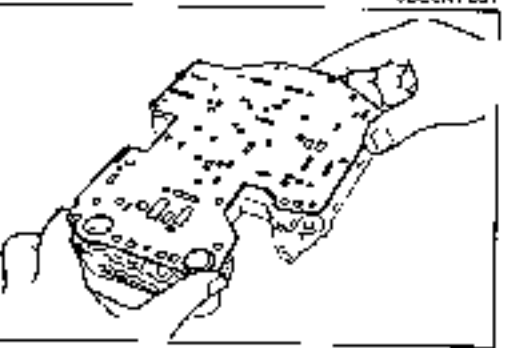
4. Remove the bolts

5. Remove the lower valve body.



CELOK1 EB1

6. Remove the orifice check valve and spring (F2 engine) from the upper valve body



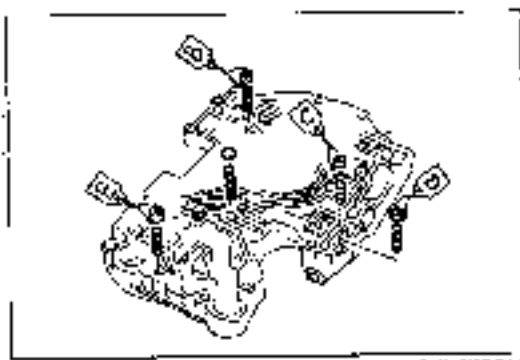
9MJJ02 310

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.

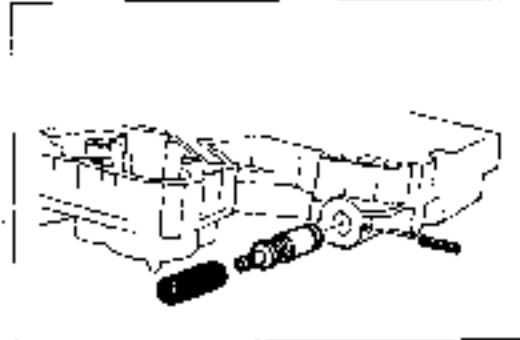


2V.LGK2311

**Note**

Tag the orifice check valves as shown for proper reassembly.

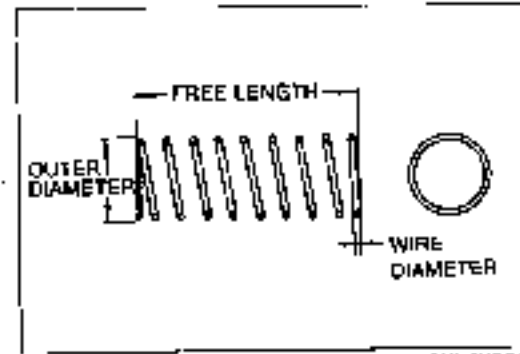
9 Remove the orifice check valves, throttle roll off ball, and springs



2B.VTK1-004

10. Remove the roll pin.

11. Remove the 3-2 timing valve and spring.



RM.LOK2313

**Inspection**

1. Measure the spring specifications.

If not within specification, replace the spring(s).


Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)	
Spring					
Orifice check	5.0 (0.197)	15.5 (0.610)	12.0	0.23 (0.009)	
Throttle reel	5.5 (0.216)	28.2 (1.095)	16.0	0.9 (0.035)	
3-2 timing	F2	7.0 (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)

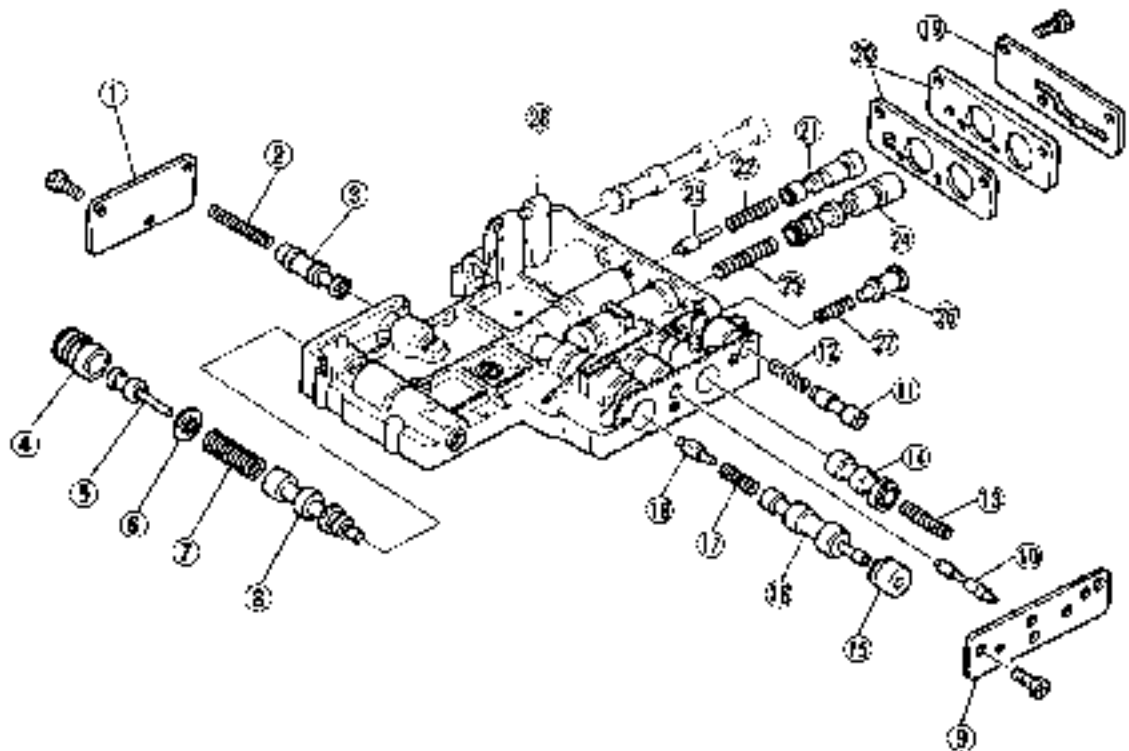
TR.LOK-047

**UPPER VALVE BODY****Disassembly and Inspection**

Disassemble in the order shown in the figure.

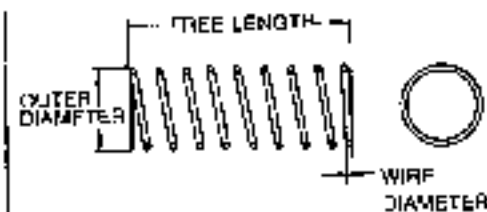
Inspect all parts, and repair or replace as necessary.

 APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



16L CK1 B83

- |  |  |  |
|--|--|--|
| 1. Side plate D  | 11. Downshift valve                            | 20. Separator (G36 engine)                     |
| 2. Second lock spring<br>Inspection ... page K1-102                            | Inspect for sticking, scoring,<br>or scratches | 21. 2-3 shift valve                            |
| 3. Second lock valve<br>Inspect for sticking, scoring,<br>or scratches         | 12. Downshift spring                           | Inspect for sticking, scoring,<br>or scratches |
| 4. Pressure regulator sleeve<br>Inspect for sticking, scoring,<br>or scratches | Inspect ... page K1-102                        | 22. 2-3 shift spring                           |
| 5. Pressure regulator plug<br>Inspect for sticking, scoring,<br>or scratches   | 13. Throttle backup spring                     | Inspect ... page K1-102                        |
| 6. Pressure regulator valve<br>Inspect for sticking, scoring,<br>or scratches  | Inspect ... page K1-102                        | 23. 2-3 shift plug                             |
| 7. Pressure regulator spring   | 14. Throttle backup valve                      | Inspect for sticking, scoring,<br>or scratches |
| Inspect ... page K1-102  | Inspect for sticking, scoring,<br>or scratches | 24. 1-2 shift valve                            |
| 8. Pressure regulator valve<br>Inspect for sticking, scoring,<br>or scratches  | 15. 3-4 shift sleeve                           | Inspect for sticking, scoring,<br>or scratches |
| 9. Side plate B  | Inspect for sticking, scoring,<br>or scratches | 25. 1-2 shift spring                           |
| 10. Vacuum throttle valve  | 16. 3-4 shift valve                            | Inspect ... page K1-102                        |
| Inspect for sticking, scoring,<br>or scratches                                 | Inspect for sticking, scoring,<br>or scratches | 26. Pressure modifier valve                    |
|  | 17. 3-4 shift spring                           | Inspect for sticking, scoring<br>or scratches  |
|  | Inspect ... page K1-102                        | 27. Pressure modifier spring                   |
|  | 18. 3-4 shift plug                             | Inspect ... page K1-102                        |
|  | Inspect for sticking, scoring,<br>or scratches | 28. Upper valve body                           |
|  | 19. Side plate A                               | Inspect for damage or<br>scoring               |



9VL0K2-316

### Inspection

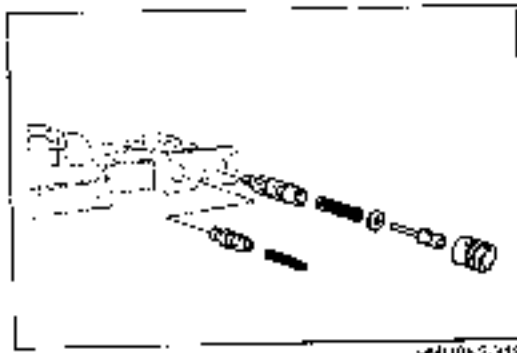
1. Measure the springs specifications.
2. If not within specification, replace the spring(s).

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)	8.0	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)	14.0	0.8 (0.031)
2-3 shift	F2 FGI	6.0 (0.272)	41.0 (1.614)	20.0	0.7 (0.028)
	F2 Carb.	6.3 (0.272)	31.6 (1.244)	16.25	0.8 (0.031)
	G6	7.3 (0.287)	42.0 (1.654)	17.8	0.75 (0.030)
1-2 shift		5.65 (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)	15.5 (0.610)	7.4	0.6 (0.024)

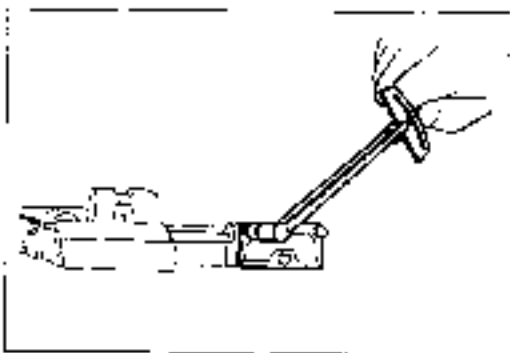
08J0K1-054

### Assembly

1. Insert the pressure regulator valve, spring, spring seal, plug, and sleeve into the lower valve body.
2. Insert the second lock valve and spring into the lower valve body.



08J0K2-312

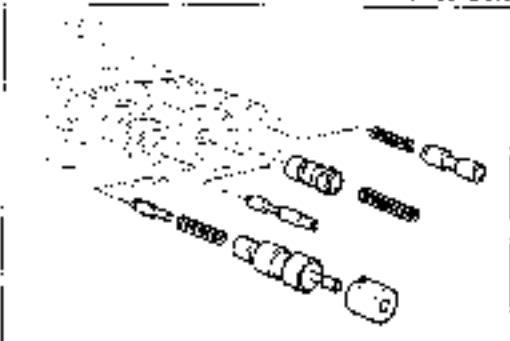


9M\_U042 312

3. Install side plate D in position where it will not interfere with the set plate.
4. Tighten the installation bolts.

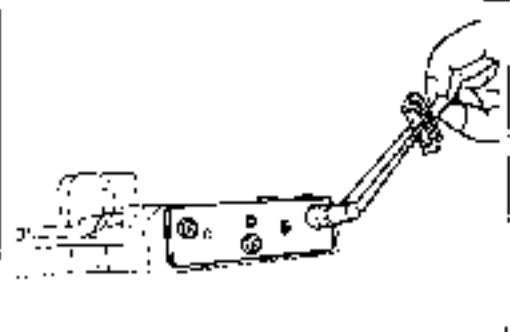
**Tightening torque:**

2.5—3.4 Nm (25—35 cm-kg, 22—30 in-lb)



9M\_U042 315

5. Install 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.

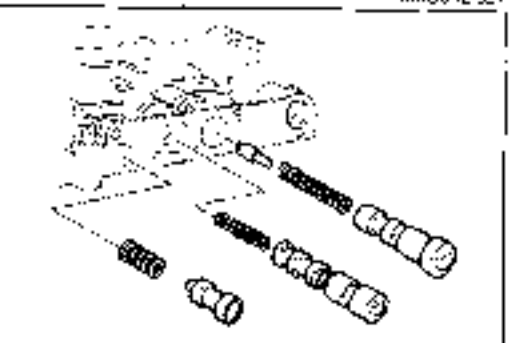


9M\_U042 321

10. Tighten the installation bolts.

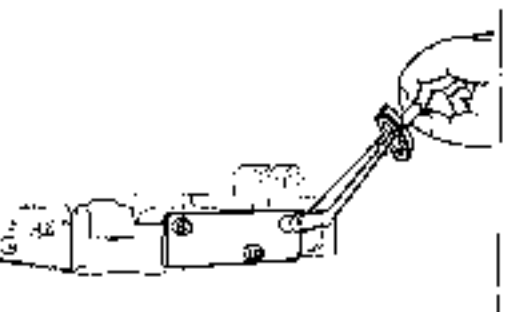
**Tightening torque:**

2.5—3.4 Nm (25—35 cm-kg, 22—30 in-lb)



3BUC 1 085

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.



CBU0K1 148

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 Nm (25—35 cm-kg, 22—30 in-lb)

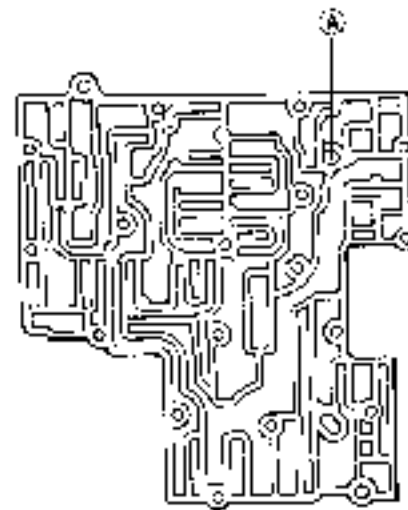
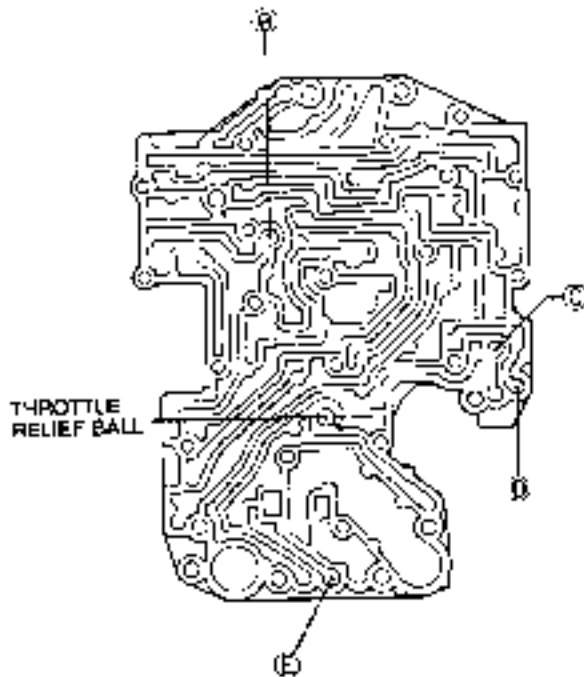
### CONTROL VALVE BODY

Assembly

Drill check valve location

LOWER VALVE BODY SIDE

UPPER VALVE BODY SIDE

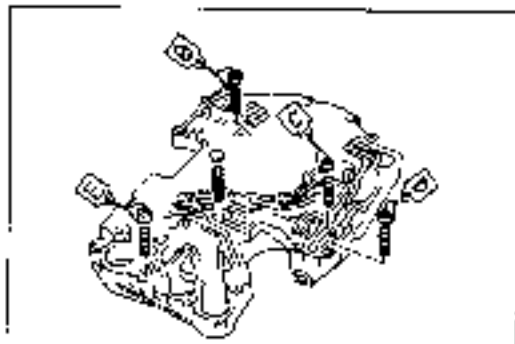


6A1J0K2 224

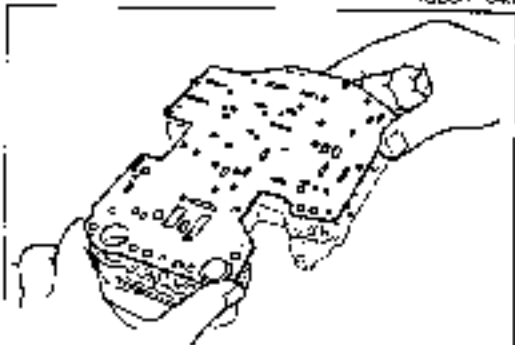
### Orifice check valve specifications

		Orifice diameter		mm (in)
		F2 engine	G8 engine	
Upper valve body side	Ⓐ		φ 2.0 (0.079)	
	Ⓑ		φ 1.5 (0.059)	
Lower valve body side	Ⓒ	φ 1.3		φ 1.7 (0.067)
	Ⓓ	φ 2.0		φ 2.2 (0.087)
	Ⓔ		φ 2.0 (0.079)	

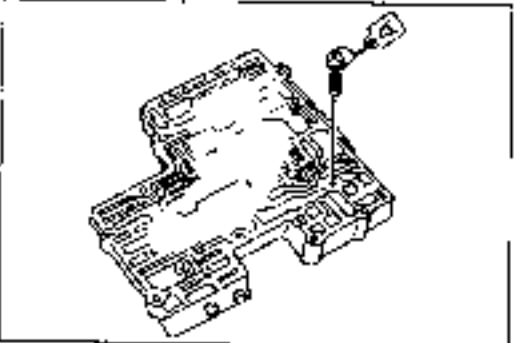
6A1J0K1 085



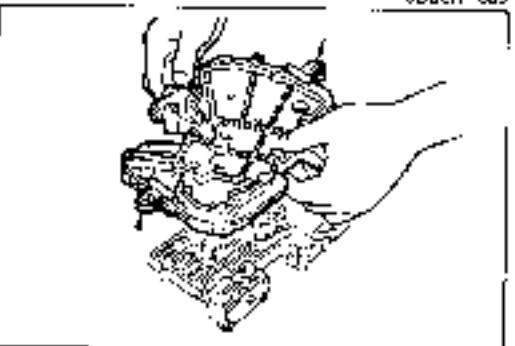
10J0K1-04H



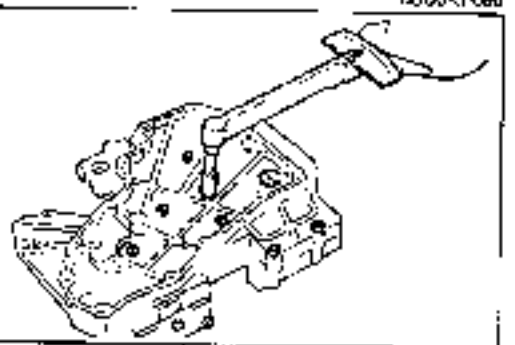
2B00K1-050



0B00K1-08B



0B00K1-080



2B00K1-061

### 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

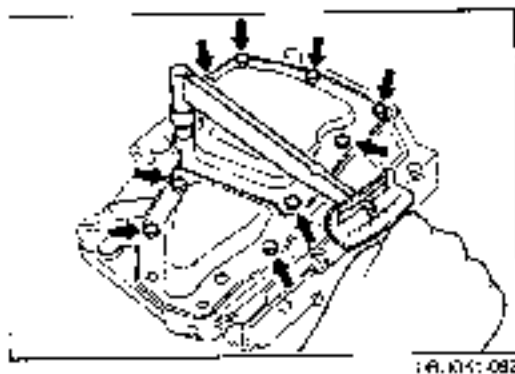
Be sure the orifice check valve and throttle relief ball are properly inserted. (Refer to page K1-104.)

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:

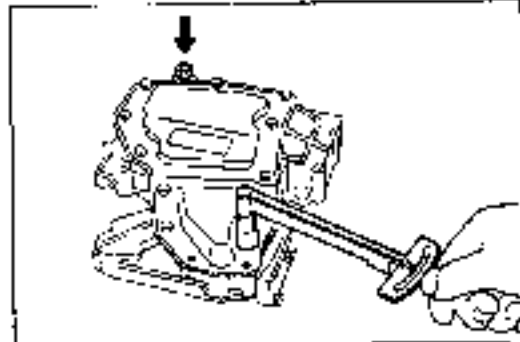
2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)



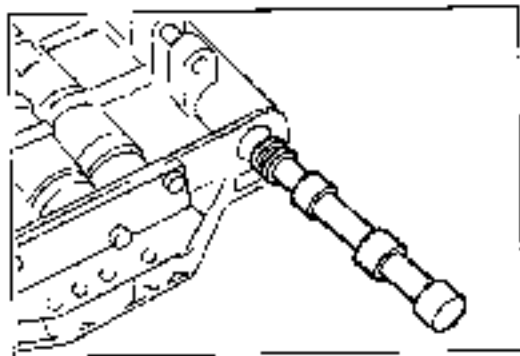


1A-K1-082

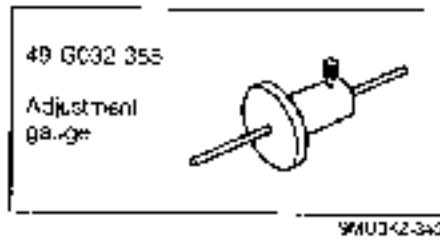
7. Install the oil strainer.

**Tightening torque****Bolt:** 2.9—3.9 N·m (30—40 cm·kg, 25—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

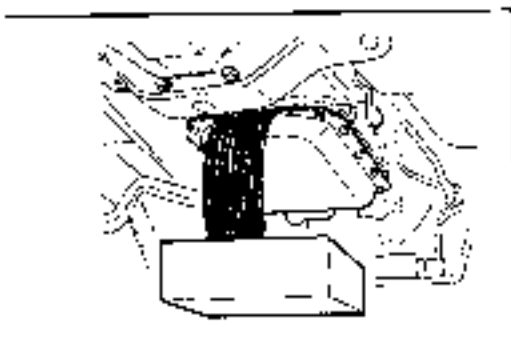


00U341 023

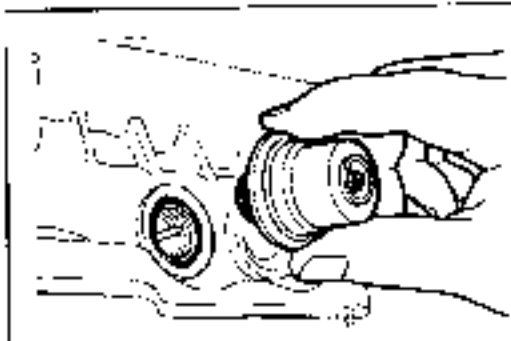
**VACUUM DIAPHRAGM****Preparation****SST****General note**

**Excessive shift shock and improper shifting often indicate a vacuum diaphragm malfunction.**

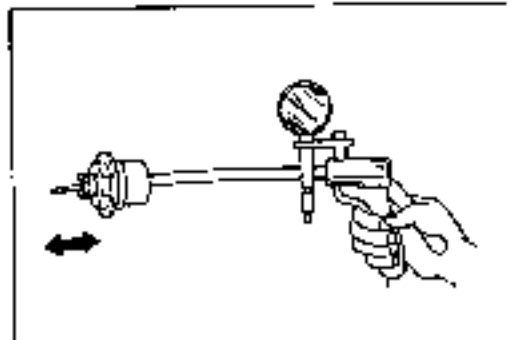
94U142-345



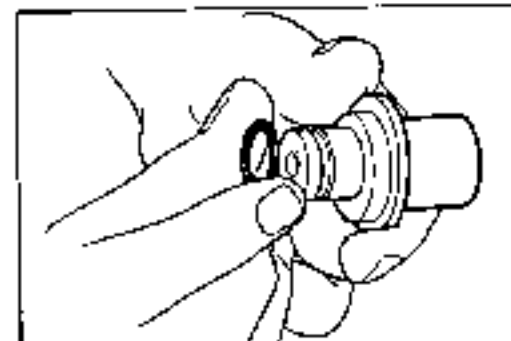
9WU3K2-347



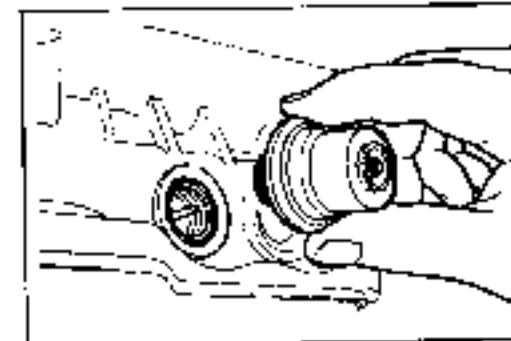
9WU3K2-348



9WU3K2-349



9WU3K2-350



9WU3K2-351

**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.**

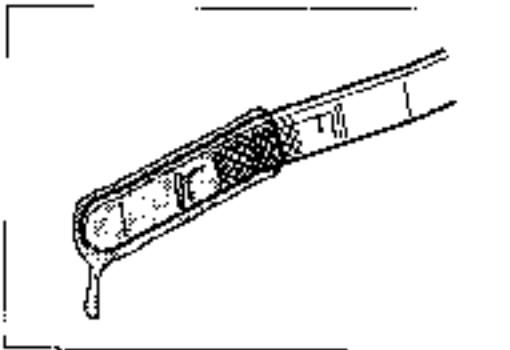
4. Remove the vacuum diaphragm, O-ring, and vacuum diaphragm rod.

**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.

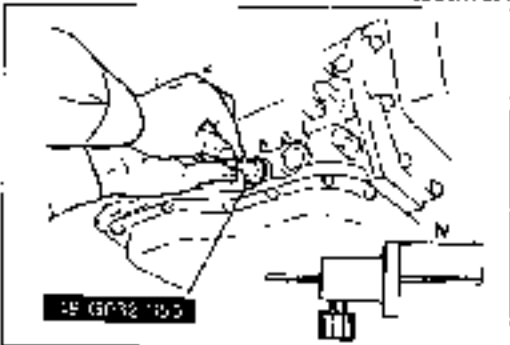
**On-vehicle Installation**

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.



UB J0K1 034

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

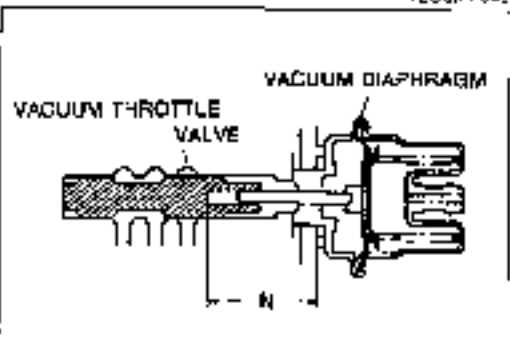


TEUCK 1 049

**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 25.5mm (1.0039 in.)	29.0mm (1.14 in.)
25.55–25.90mm (1.0098–1.0197 in.)	29.5mm (1.16 in.)
25.90–26.40mm (1.0197–1.0394 in.)	29.75mm (1.17 in.)
26.40–26.85mm (1.0394–1.0492 in.)	30.0mm (1.18 in.)
26.85–27.15mm (1.0492–1.0650 in.)	30.5mm (1.20 in.)
27.15mm (1.0689 in.) or over	31.0mm (1.22 in.)








99 J0KX 008

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

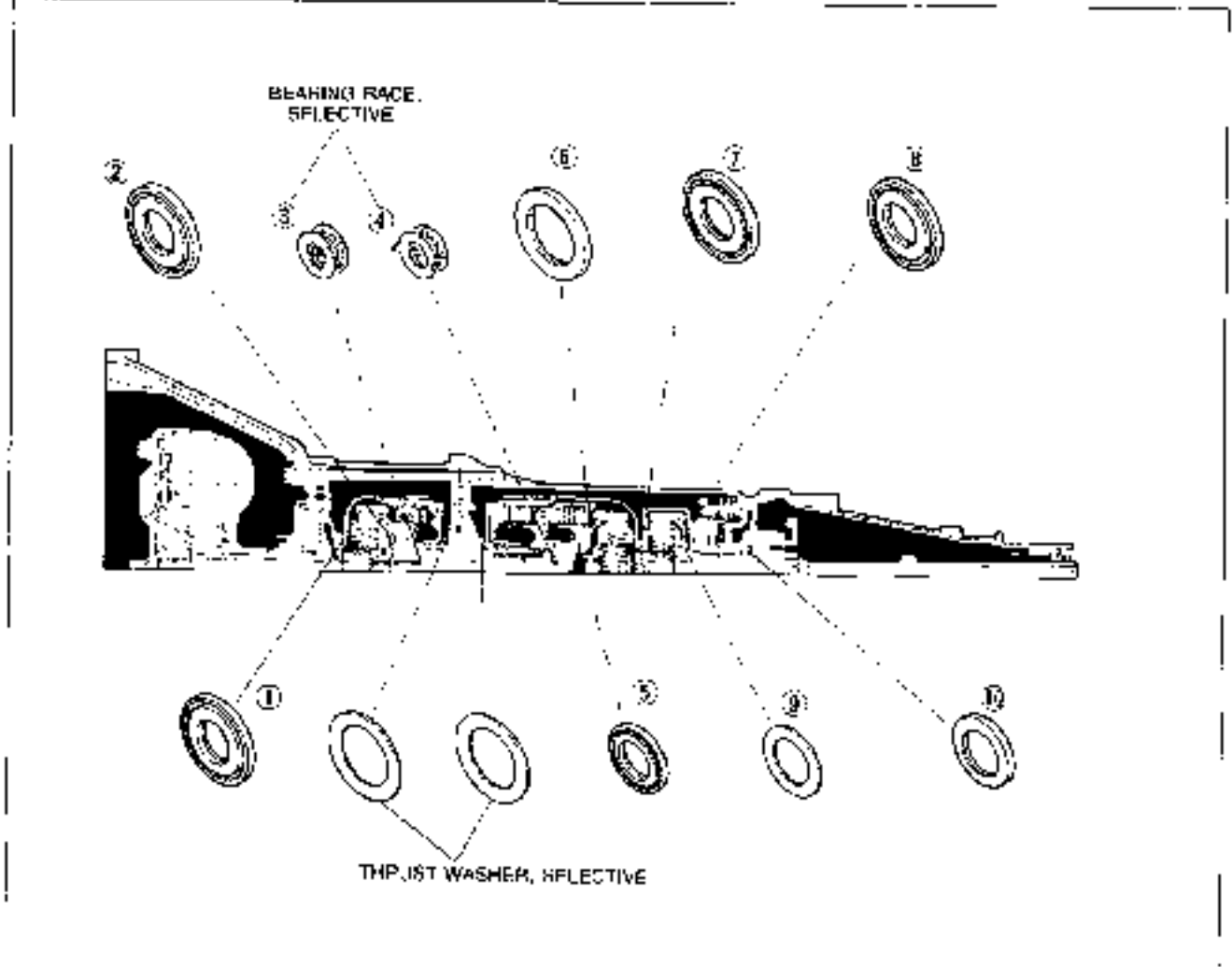
49 C107 360 A Engine stand 	49 U019 0ACA Transmission hanger 	49 H075 495E Body (Part of 49 U019 0ACA)  15.0K1 050
49 U011 003 Holder (Part of 49 U019 0ACA) 	49 G03P 35E Adjustment gauge 	

## 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 lining the transmission with ATF.

87015K1 330

Thrust Washer, Bearing, and Race Location



SMUKN7-107

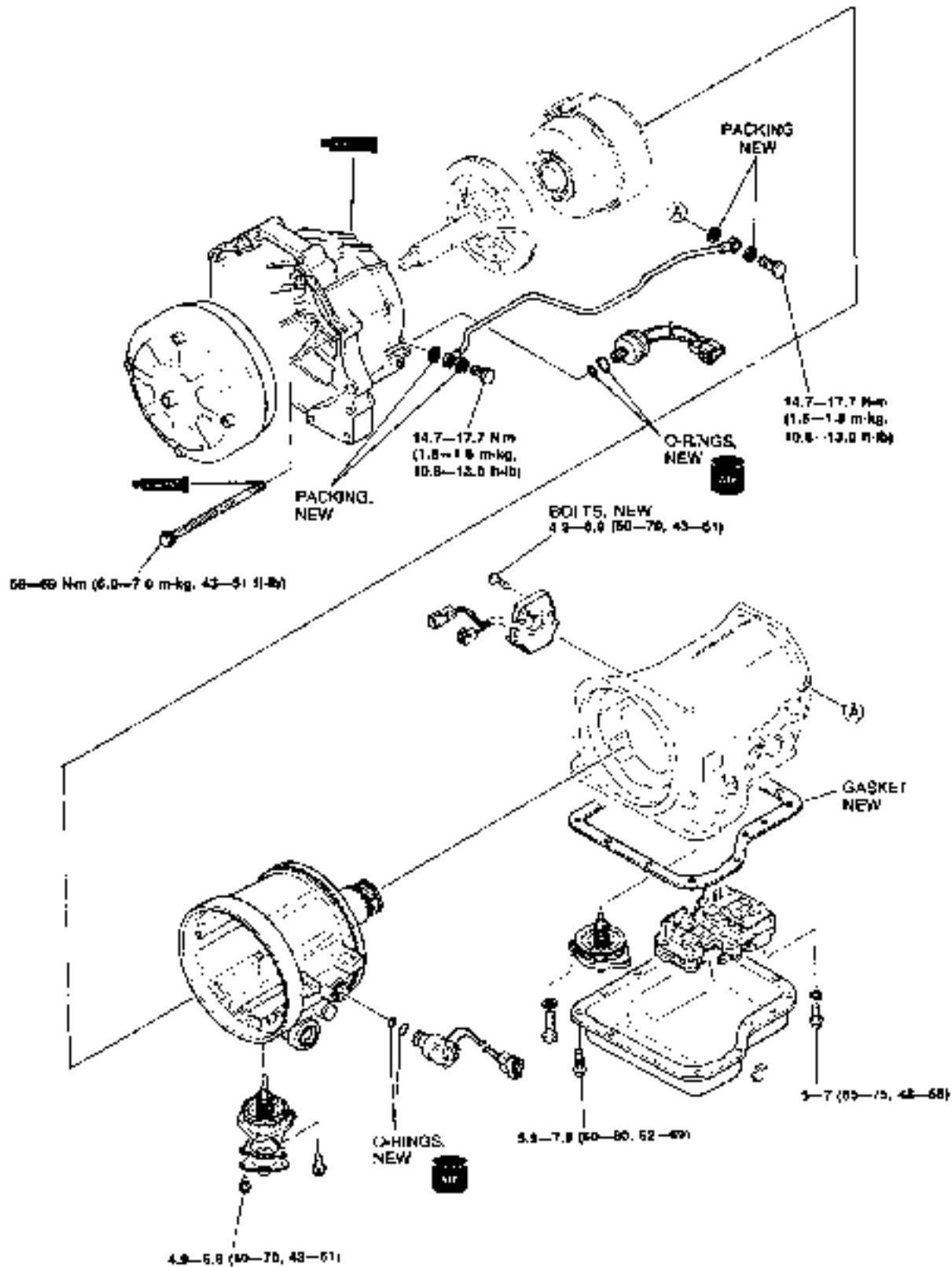
Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in.)	70.0 (2.756)	70.0 (2.756)	58.0 (2.283)	65.0 (2.559)	53.0 (2.087)	70.0 (2.756)
Race	mm (in.)	-	-	53.0 (2.087)	53.0 (2.087)	-	-

		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.)	-	-	-	-

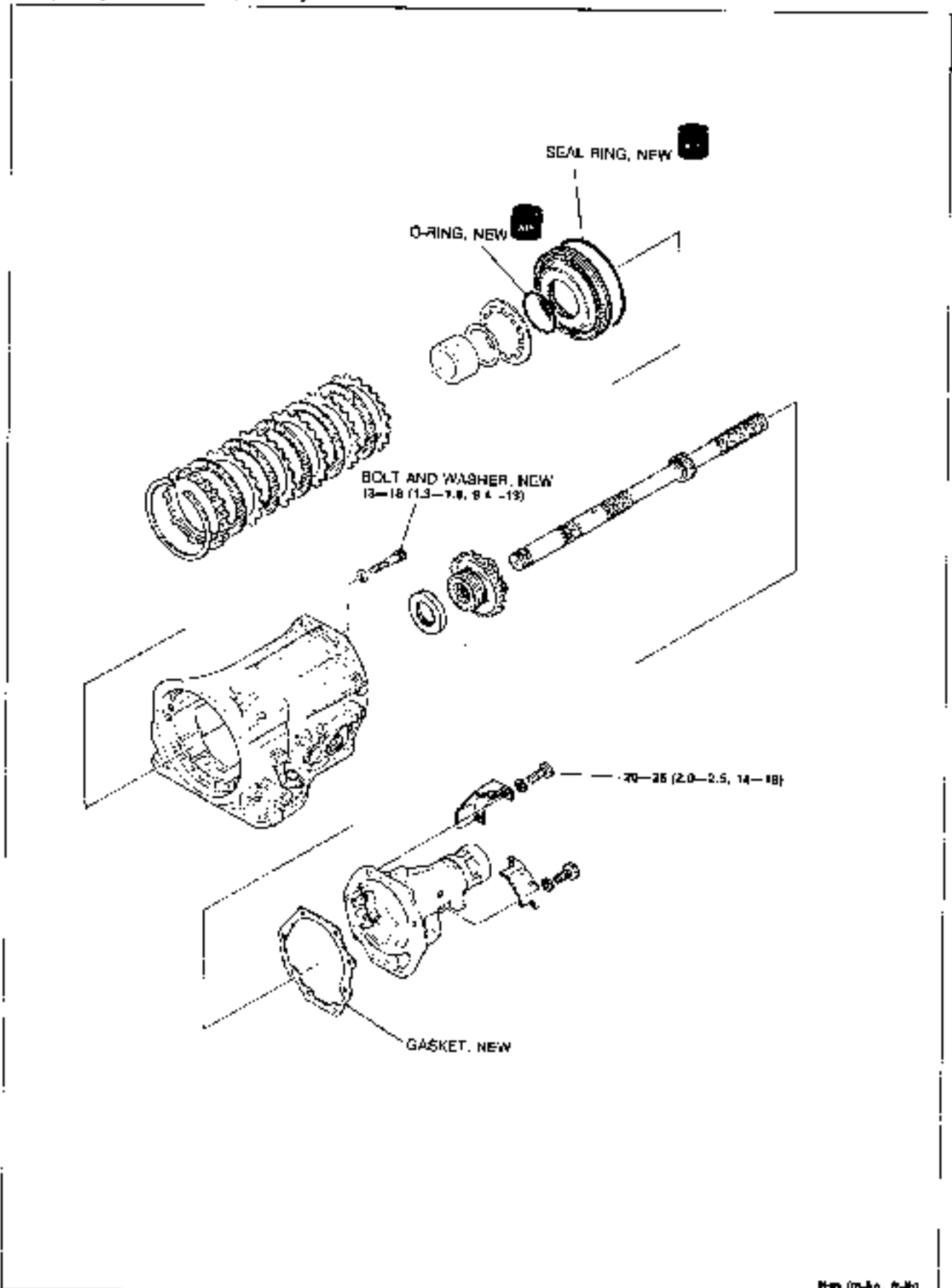
SMUKN7-107

### Torque specifications



Nm (m.kg, ft-lb)  
SAJ002263

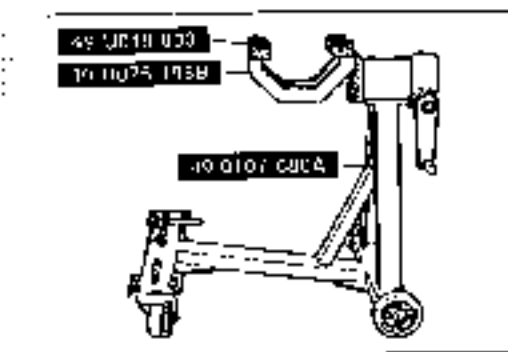
Torque specifications (cont'd)



Nm (m-Ag, ft-lb)

EM.YOKO.435

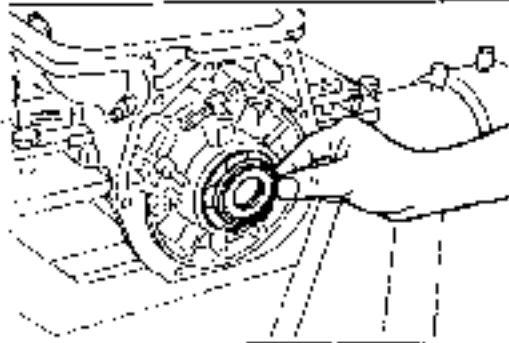




SMJ0K1 35C

**Procedure**

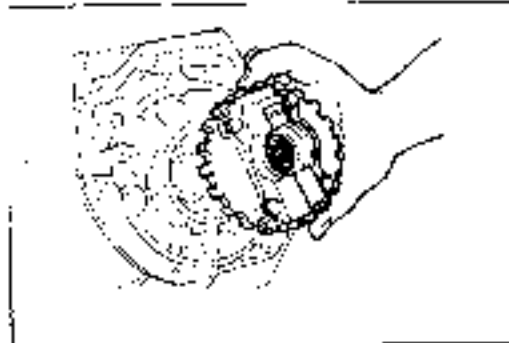
1. Assemble the **SST** as shown.
2. Mount the transmission case onto the **SST**.



T8J0K1 05\*

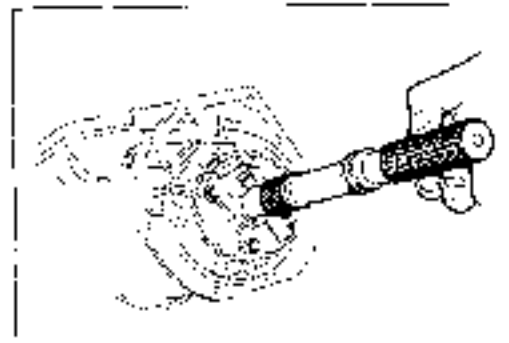
3. Apply petroleum jelly to the bearing, and install it into the rear of the transmission case shown in the figure.

**Bearing outer diameter: 63.0mm (2.087 in)**



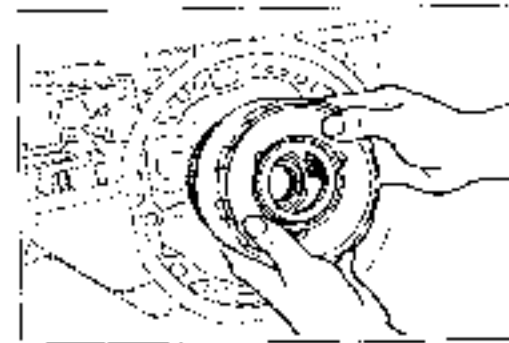
08J0K1 03B

4. Install the oil distributor in the transmission case.



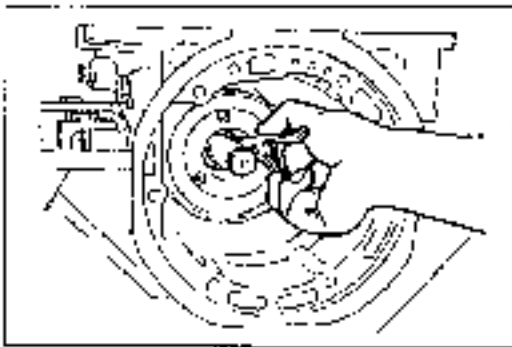
08J0K1 04A

5. Insert the output shaft.

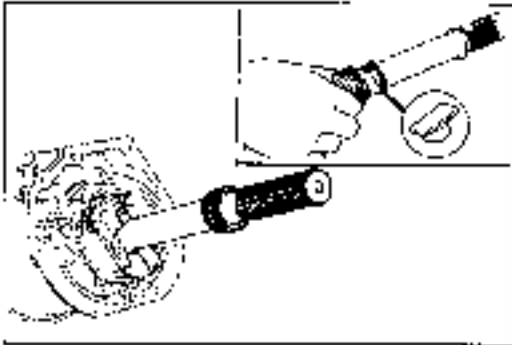


08J0K1 100

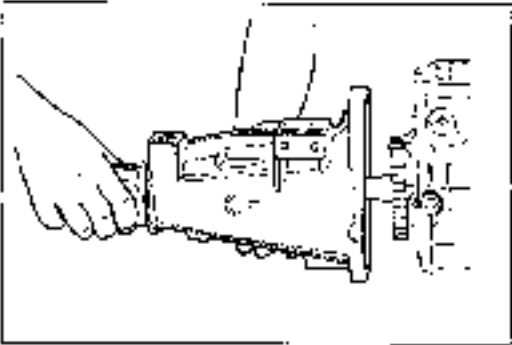
6. Install the rear planetary gear unit (connecting drum, rear planetary pin on carrier and one-way clutch) in the low and reverse brake side.



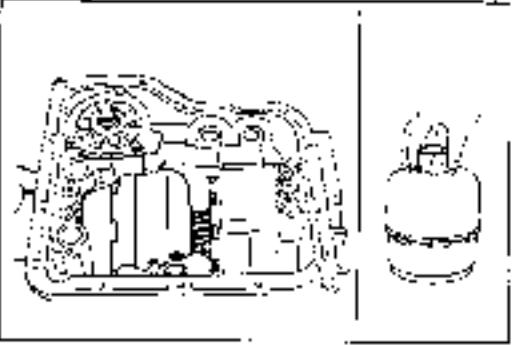
08DU-K1-101



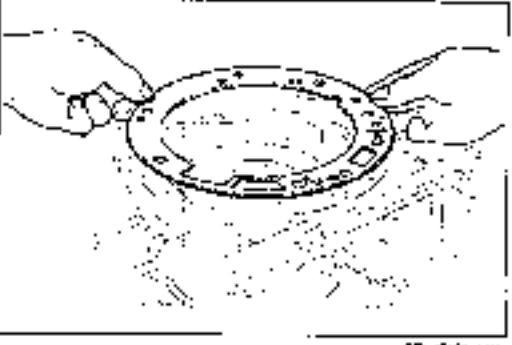
08DU-K1-102



08DU-K1-103



CB-CK1-104



CB-CK1-105

7. Install a new snap ring onto the front of the output shaft.

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

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)**

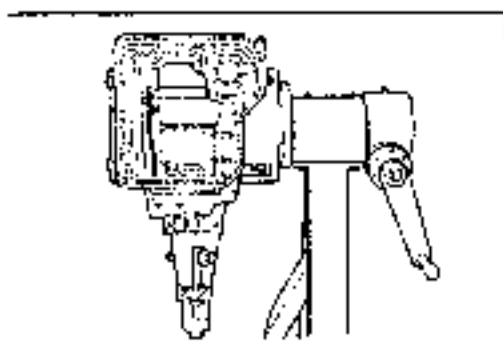
11. Check that the output shaft is locked with the manual lever in P range.

**Caution**

**Be very careful to avoid incorrect assembly of the many similar bearings and races. (Refer to page K1-116.)**

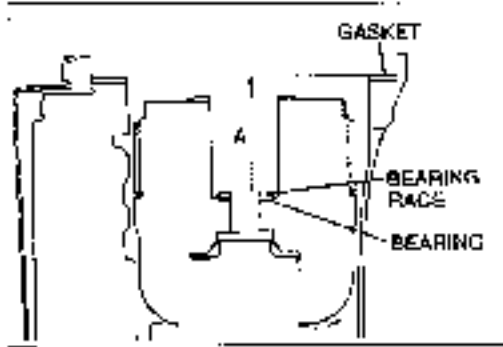
12. Install the front clutch, rear clutch, rear clutch hub, front planetary carrier, connecting shell, internal gear, sun gear, bearing, and bearing races as a unit into the transmission case.

13. Set a new gasket into the front of the case.



CBLCK1-05

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.



SEU7KX-106

- (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.

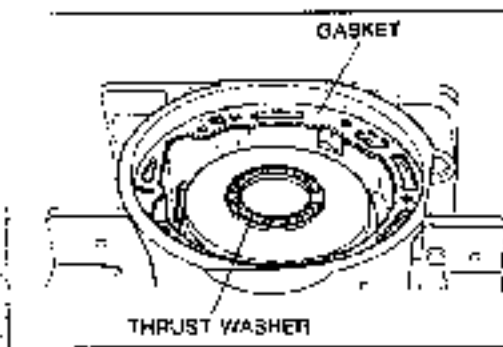
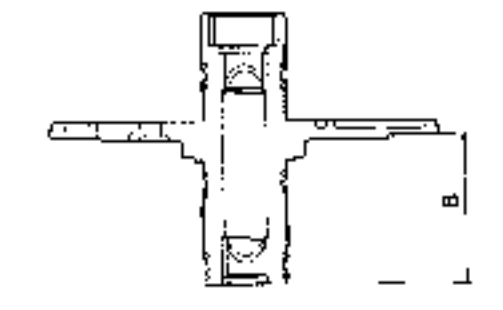
**Total end play: 0.25—0.50mm (0.0098—0.0197 in)**

- (5) Adjust the total end play by selecting the proper bearing race.

**Bearing race sizes**

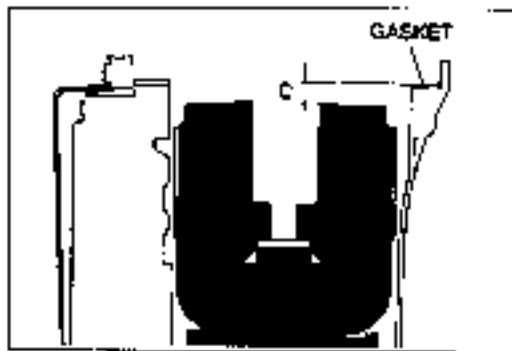
mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)

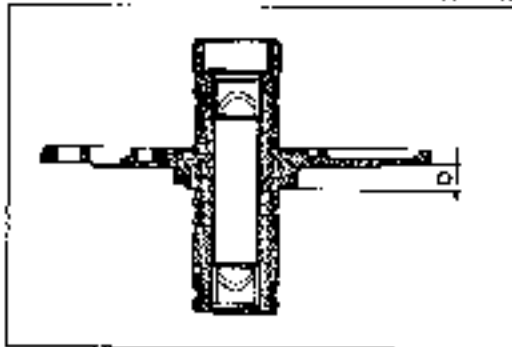


SEU7K1-117

15. Check and adjust the front clutch end play.
- (1) Set the bearing race and bearing in position.



CBUOK1-1-38



- (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:  $T = C - D - 0.1\text{mm (0.004 in)}$**

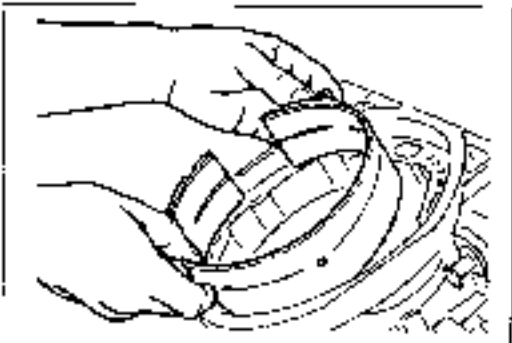
- T : Front clutch end play
- C : The distance between the drum support mounting surface (including the drum support gasket) of the transmission case and the bearing surface on the front clutch assembly.
- D : The distance between the sliding surface of the bearing and the drum support gasket contact 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.

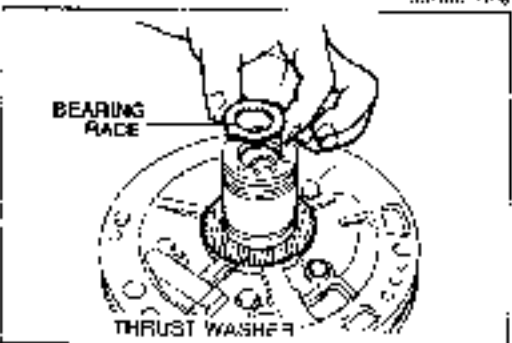
**Thrust washer sizes**

		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)	



CBUOK1-1-46

16. Set the 2nd brake band and strut in position.
17. Tighten the piston stem lightly.



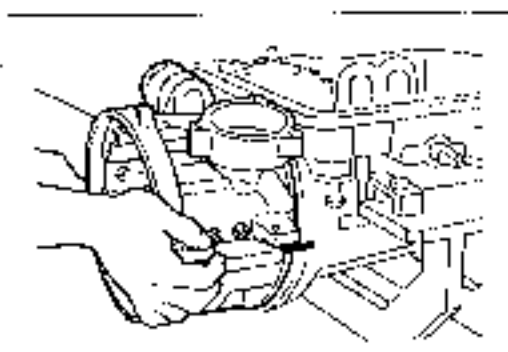
CBUOK1-1-52

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)**



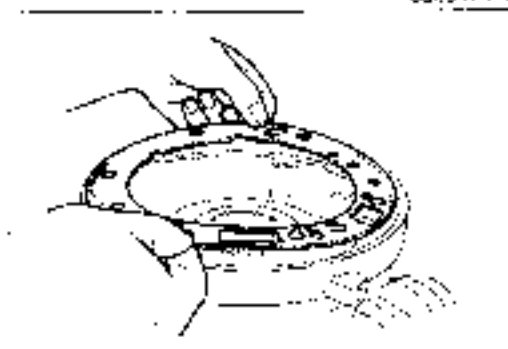
09.04.11

**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.

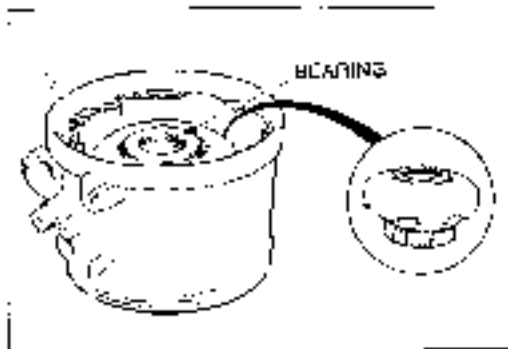
b) Install two bolts for alignment.

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.



09.04.11

20. Set a new gasket in place.



09.04.11

**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**

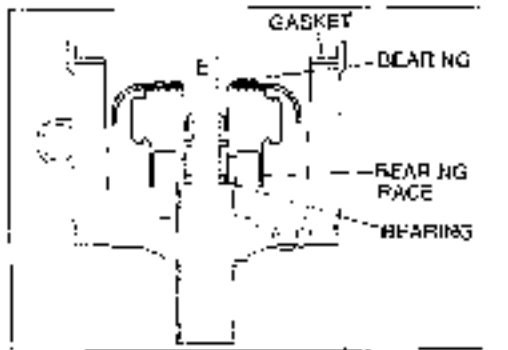
**Install the bearing with the black surface toward the oil pump cover side.**

- (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.

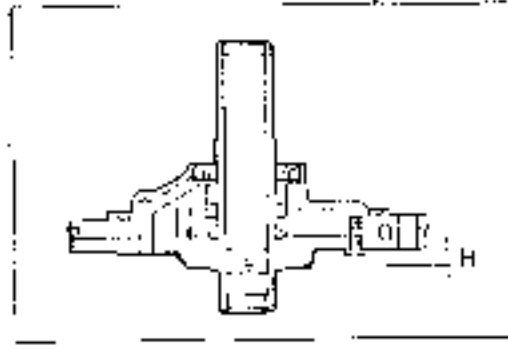
**Formula:  $T = E - H - 0.1\text{mm (0.004 in)}$**

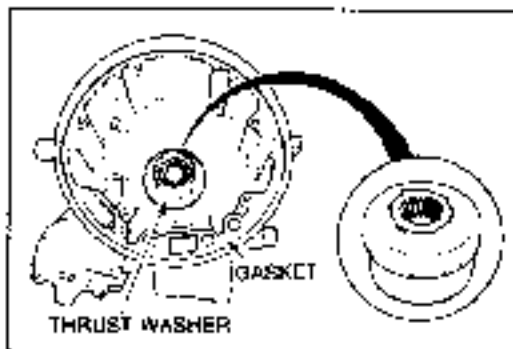
- T : Total end play  
 E : The distance between the oil pump mounting surface (including the oil pump gasket) and the connecting shell bearing surface.  
 H : The distance between the oil pump side connecting shell bearing contact surface and the oil pump gasket contact surface.  
 0.1 : The compression amount of a new gasket.

**Total end play: 0.25—0.50mm (0.0098—0.0197 in)**

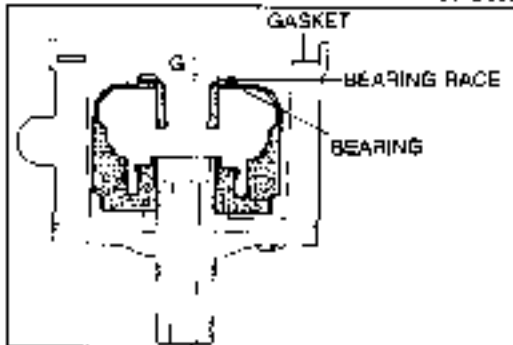


09.04.11

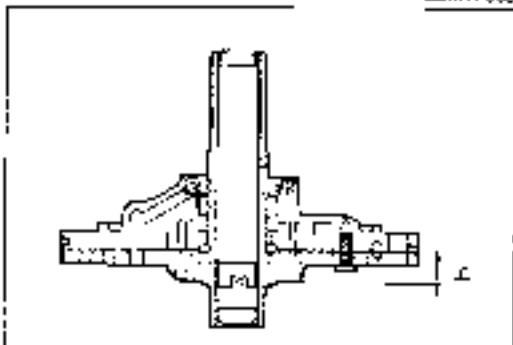




SMU0R2 00C



BLK0K1-053



CBJ0K1 116

- (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 plion 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.

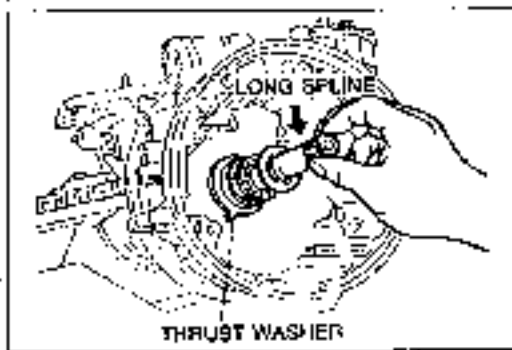
**Total end play: 0.5—0.8mm (0.020—0.031 in)**

- (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 (0.099)	2.7 (0.106)	



08JJK1-16

**Caution**

The end with the long spline is the front.

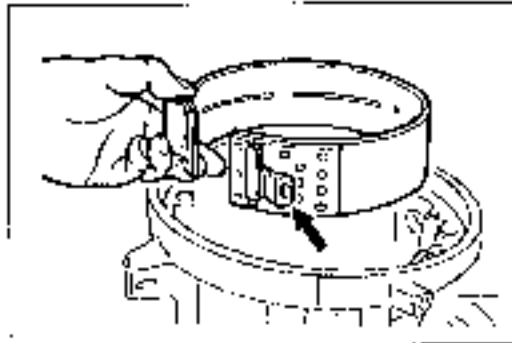
Long spline: 23.0mm (0.906 in)

Short spline: 18.8mm (0.742 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.

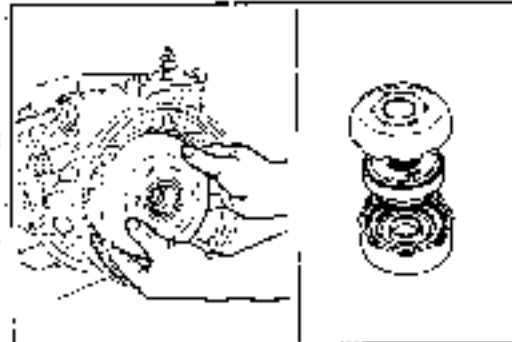
**Bearing outer diameter: 35.0mm (1.318 in)**

**Bearing race outer diameter: 33.0mm (1.299 in)**



08JJK1-17

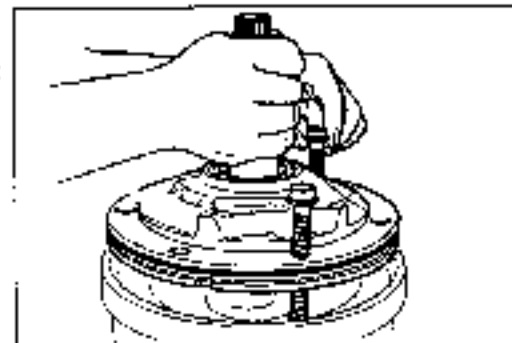
26. Install the OD brake band and band strut



18JJK1-054

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)**



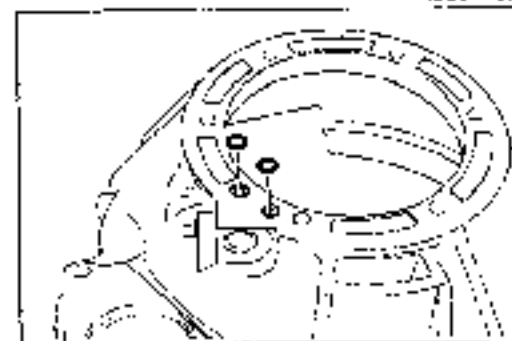
18JJK1-055

**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.

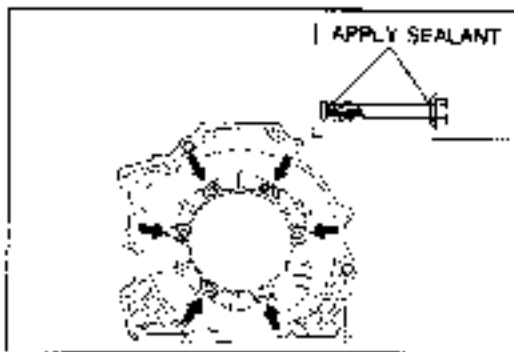
29. Install the oil pump assembly into the transmission case using two converter housing bolts as guide



18JJK1-056

30. Coat the contact surfaces of the converter housing and transmission case with sealant

31. Install new O-rings



1F00K1057

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 criss-cross pattern.

**Tightening torque:**

59—69 Nm (6.0—7.0 m·kg, 43—51 ft·lb)



1B10K1055

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 Nm (1.2—1.5 m·kg, 8.7—10.6 ft·lb)

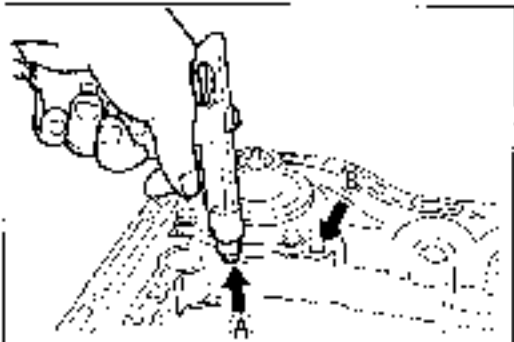
- (2) Loosen the stem the number of turns shown below.

**Stem: 3 turns**

- (3) Hold the stem and tighten the locknut.

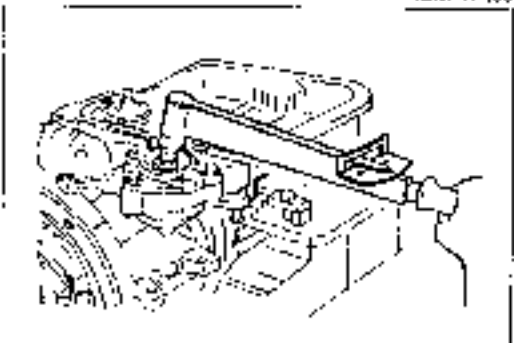
**Tightening torque:**

15—39 Nm (1.5—4.0 m·kg, 11—29 ft·lb)

**Caution****Apply air for no more than three(3) seconds.**

1B10K1056

36. Check the servo piston operation by applying compressed air through the  $\alpha$  passages of the 2nd band servo.

**A: Engage****B: Release****Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

1H00K1067

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 Nm (70—100 cm·kg, 61—87 in·lb)

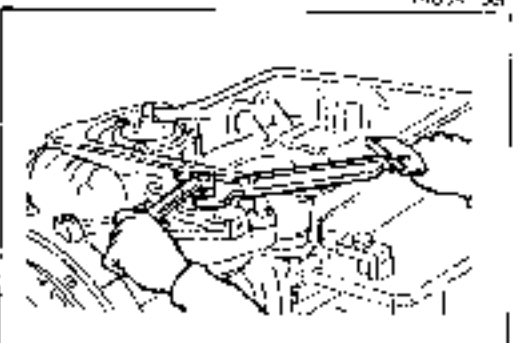
- (2) Loosen the stem the number of turns shown below.

**Stem: 2 turns**

- (3) Hold the stem and tighten the locknut.

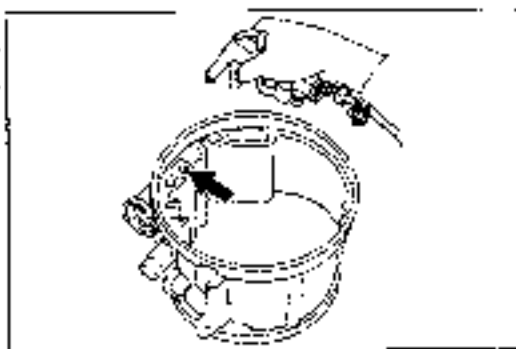
**Tightening torque:**

15—39 Nm (1.5—4.0 m·kg, 11—29 ft·lb)



5M00K2067

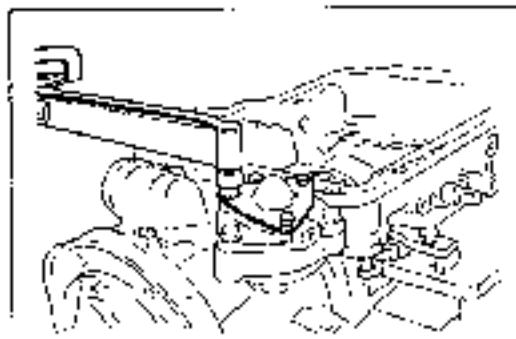




IFLCK1-061

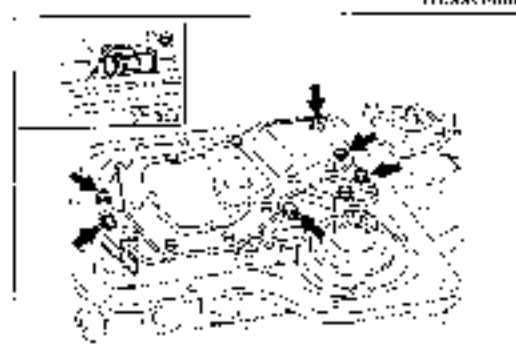
**Caution****Apply air for no more than three(3) seconds.**

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.**

IFLCK1-062

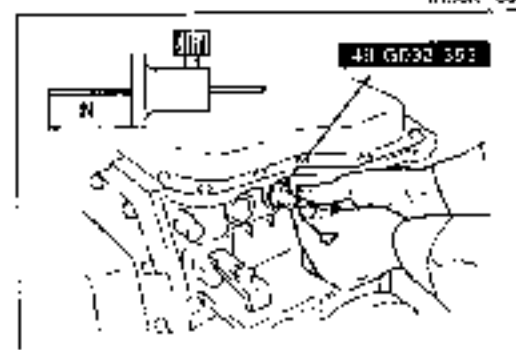
39. Set a new gasket on the OD band servo.  
40. Install the OD band servo cover.

**Tightening torque:****4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)**

IFLCK1-063

**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)**

IFLCK1-064

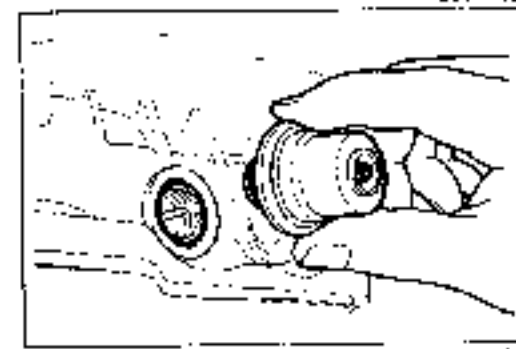
43. Apply ATF to a new O-ring and install it onto the vacuum diaphragm.

44. Select the diaphragm rod.

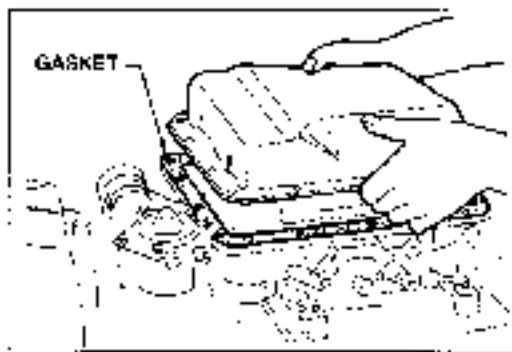
- (1) Measure dimension N with the **SST** and a scale.  
(2) Select the proper diaphragm rod in accordance with the table below.

Dimension N	Applicable diaphragm rod
Below 25.65mm (1.0099 in)	25.0mm (1.14 in)
25.65—25.90mm (1.0099—1.0197 in)	25.5mm (1.16 in)
25.90—26.40mm (1.0197—1.0394 in)	26.75mm (1.17 in)
26.40—26.65mm (1.0394—1.0492 in)	28.0mm (1.15 in)
26.65—27.15mm (1.0492—1.0690 in)	30.5mm (1.20 in)
27.15mm (1.0690 in) or over	31.5mm (1.22 in)

45. Apply ATF to the new O-rings, and install them to the vacuum diaphragm; then install the vacuum diaphragm to the transmission case.



IFLCK1-065

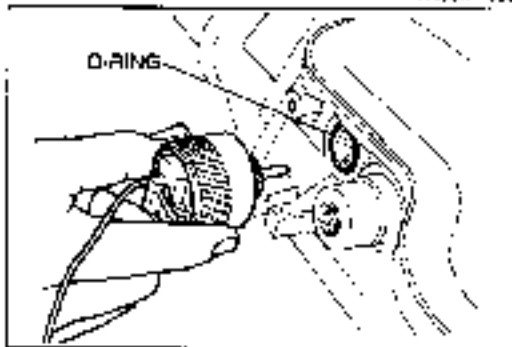


1P4J0K1-055

- 46 Install the oil pan along with a new gasket.
- 47 Install the bracket and the pan mounting bolts.

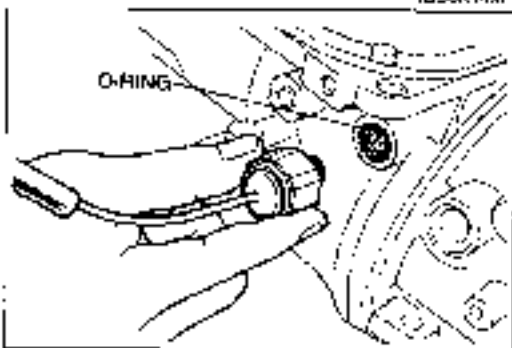
**Tightening torque:**

**5.9—7.8 Nm (60—80 cm-kg, 52—69 in-lb)**



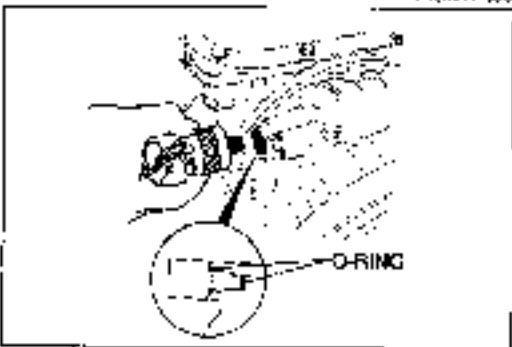
1B4J0K1-067

- 48 Apply ATF to a new O-ring and install it to the transmission case.
- 49 Install the downshift solenoid



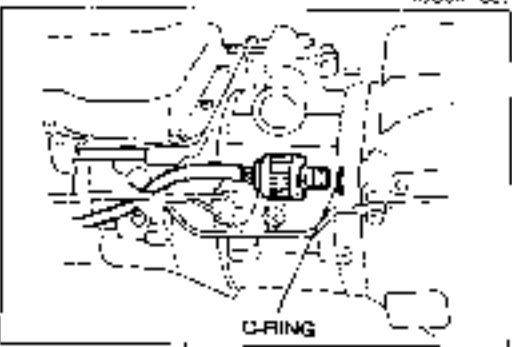
154J0K1-060

- 50 Apply ATF to a new O-ring and install it into the transmission case.
- 51 Install the transmission oil pressure switch



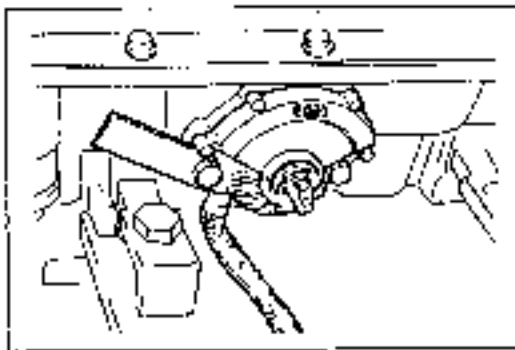
1H4J0K1-065

- 52 Apply ATF to the new O-rings and install them into the transmission case.
- 53 Install the OD cancel solenoid



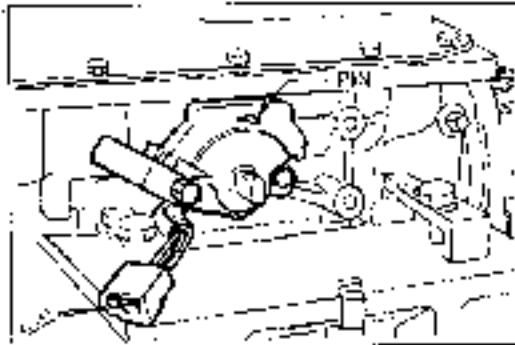
12U341-070

- 54 Apply ATF to the new O rings and install them into the transmission case
- 55 Install the lockup solenoid (G6 engine).



BUCK 025

- 56 Rotate the manual shaft fully reward, then return it two (2) notches to the N position.



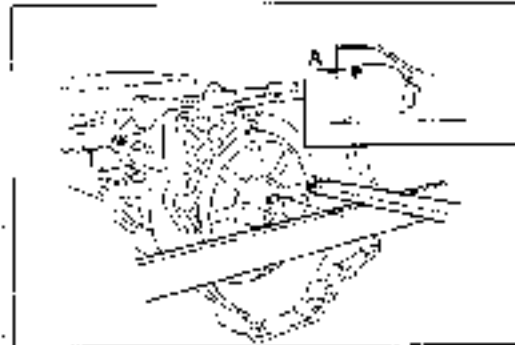
25A,CK1-C25

- 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 Nm (50—70 cm-kg, 43—61 in-lb)**

- 60 Remove the pin, and tighten the screw into the hole.

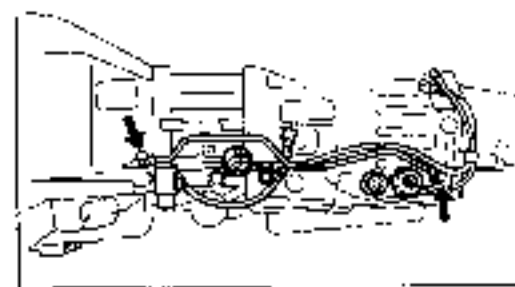


BUCK1-C72

- 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.



BUCK1-C77

- 63 Install the governor pressure pipe

**Tightening torque:**

**14.7—17.7 Nm (1.5—1.8 m-kg, 10.8—13.0 ft-lb)**

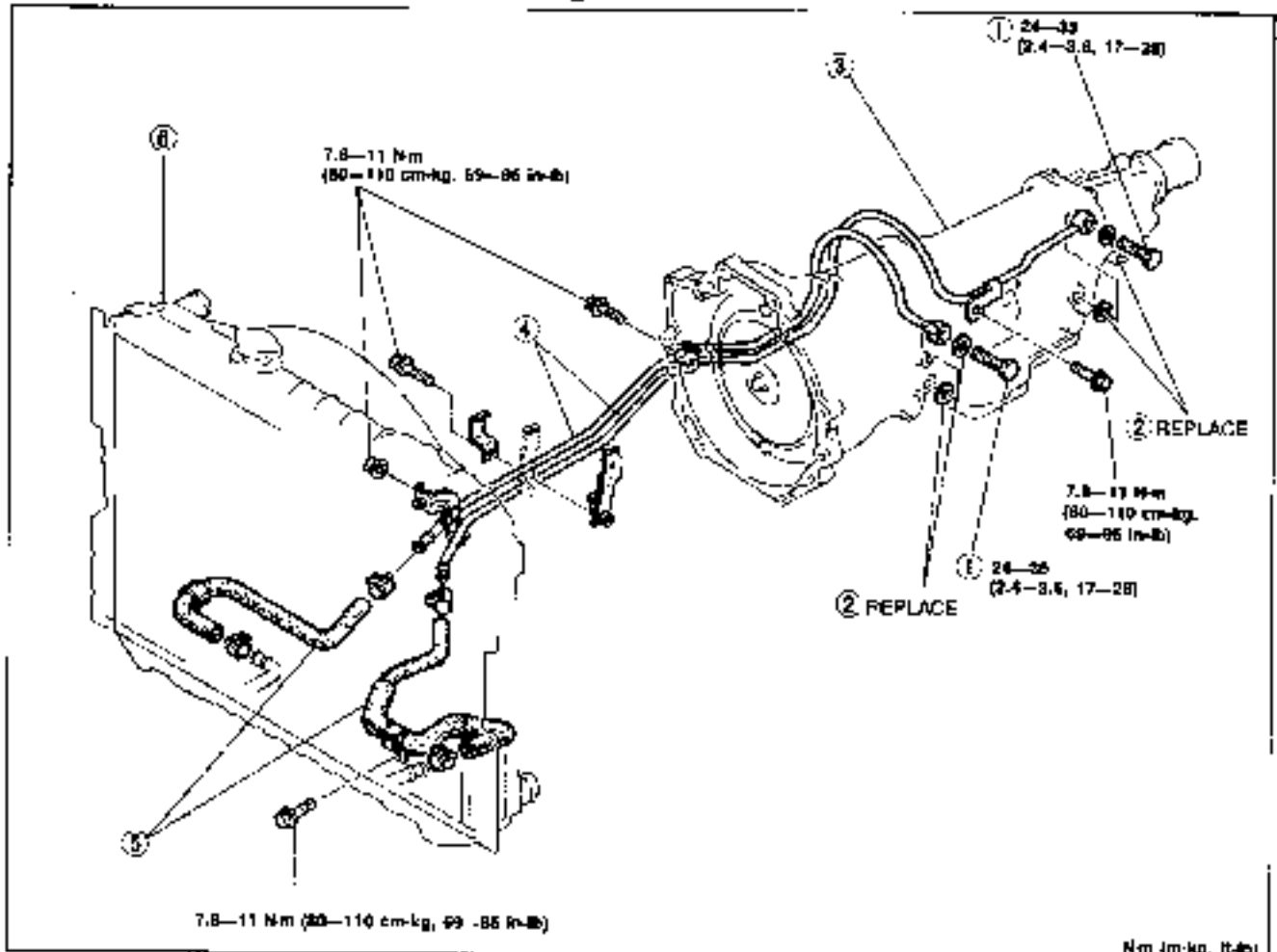
**OIL COOLER**

**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**.



- 1. Connector bolts  
Inspect for clogging

- 2. Packing

- 3. Transmission  
Removal ..... page K1-36  
Installation..... page K1-36

- 4. Oil pipe  
Inspect for damage or cracks

- 5. Oil hose  
Inspect for damage or cracks

- 6. Radiator  
Refer to Section C

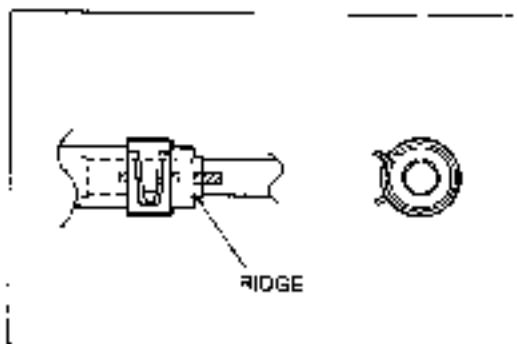
**Installation note**

**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.


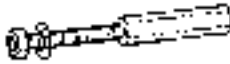


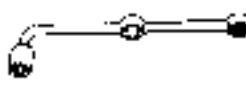
1. Align the marks, and slide the oil cooler hoses onto the oil cooler pipes until it contacts the ridge.
2. Install the hose clamps as shown and tighten them as specified.
3. Verify that the hose clamps do not interfere with other parts.



### DRIVE PLATE

#### Preparation

#### SST

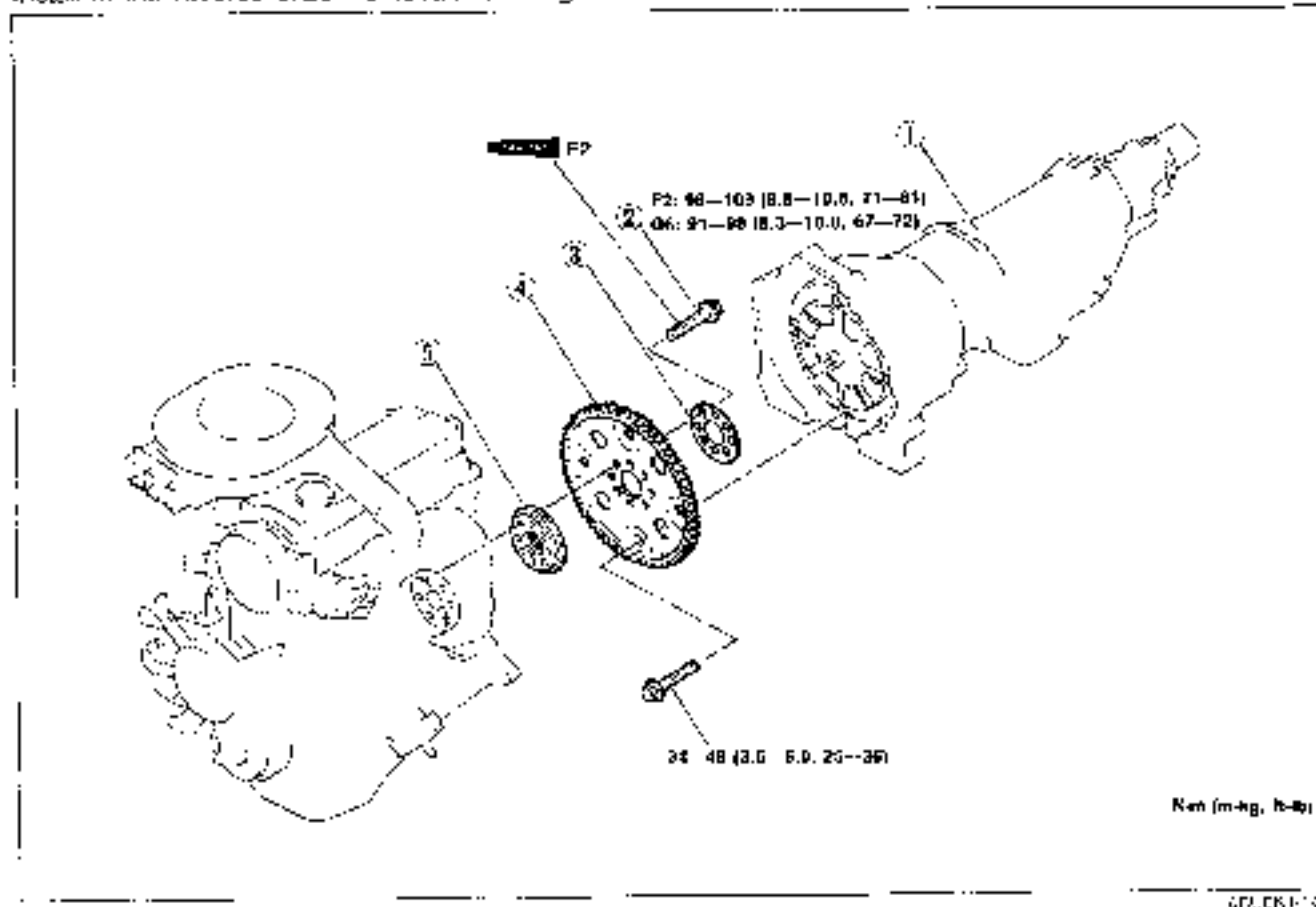
<p>49 E011 1A0 Brake set. ring gear</p> 	<p>49 E011 103 Shaft (Part of 49 E011 1A0)</p> 	<p>49 E011 104 Collar (Part of 49 E011 1A0)</p> 
<p>49 E011 105 Stopper (Part of 49 E011 1A0)</p> 	<p>49 0077 435 Special wrench</p> 	<p>08J0K1-038</p>

#### Removal, Inspection, and Installation

Remove in the order shown in the figure, referring to **Removal Note**.

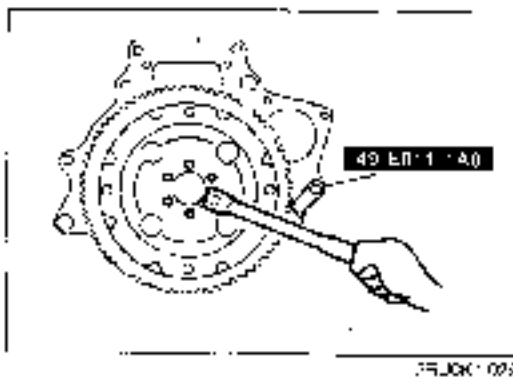
Inspect all parts, and repair or replace as necessary.

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

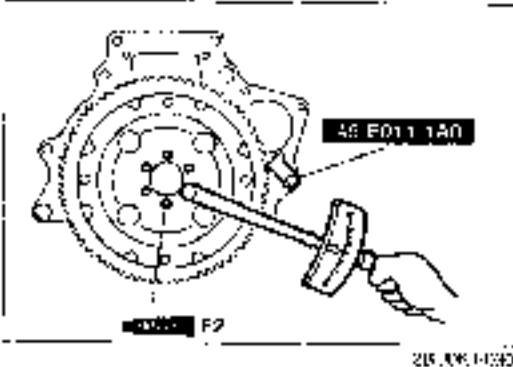


- 1. Transmission  
Removal ..... page K1-36  
Installation ..... page K1-36
- 2. Bolts
- 3. Backing plate

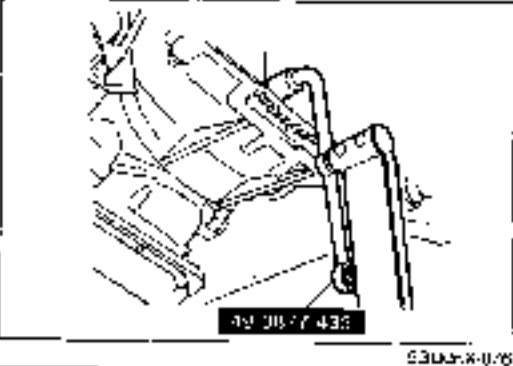
- 4. Drive plate  
Inspect for cracks and ring gear for wear or damage
- 5. Adapter



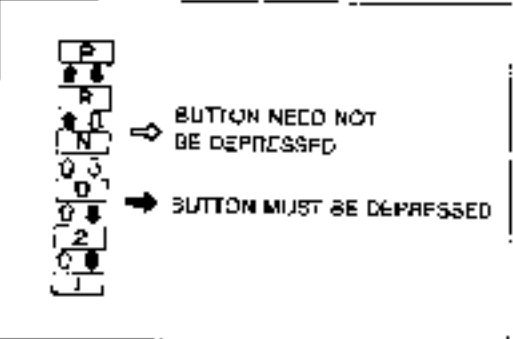
35JUK1073



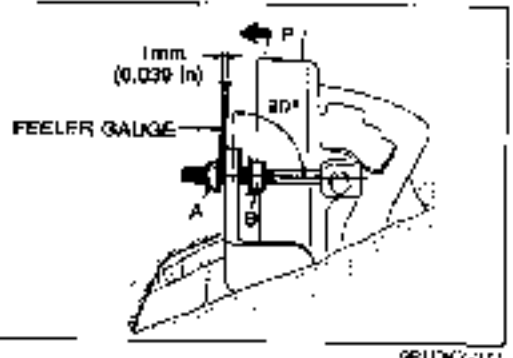
25JUK1073



33JUK1073



54JUK1073



26JUK1073

**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 (9.3—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**

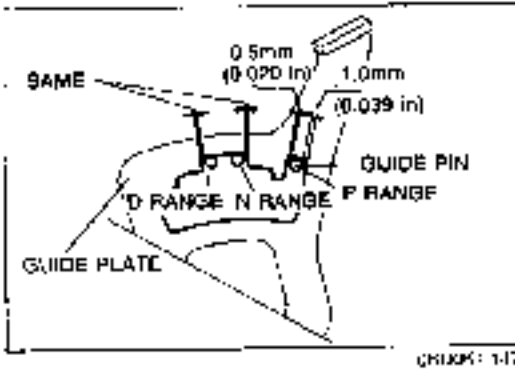
1. Shift the selector lever to P range.
2. Loosen locknuts A and B so that they are both at least 1mm (0.039 in) away from the adjustment lever.
3. Shift the transmission to P range by moving the manual shaft of the transmission.
4. With the link at 90° to the lever, adjust the clearance between the 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)



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.

GROUP: 140

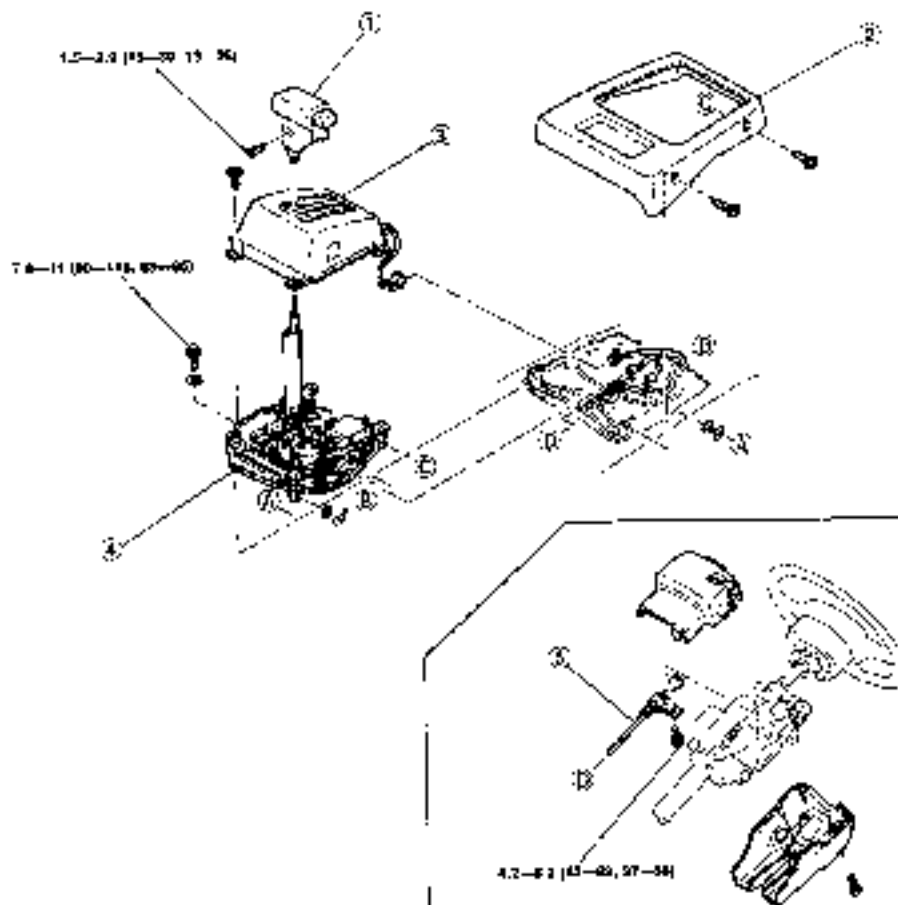
## REMOVAL AND INSTALLATION

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**.



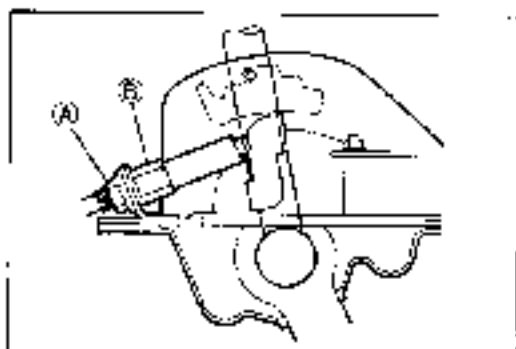
N.m (cm-kg, in-lb)

GROUP: 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

DSJJK1145



DSJJK1145

**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**

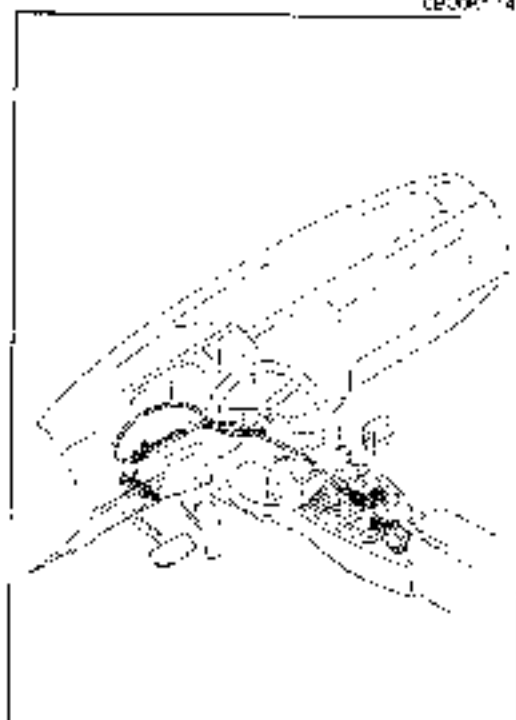
**Do not remove the interlock cable if not necessary.**

- 1. Remove the instrument panel. (Refer to Section S.)
- 2. Remove the interlock cable.

**Installation Note**

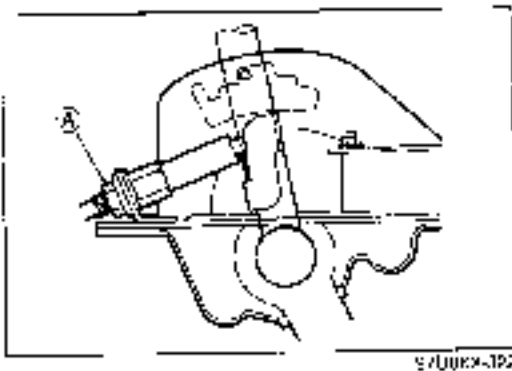
**Interlock cable**

- 1. Install the interlock cable.
- 2. Install the instrument panel. (Refer to Section S.)



DSJJK1130





97UUKX-192

**Selector lever**

1. Shift the selector lever to N range.
2. Install the selector lever.

**Tightening torque:**

7.8–11 Nm (80–110 cm-kg, 69–95 in-lb)

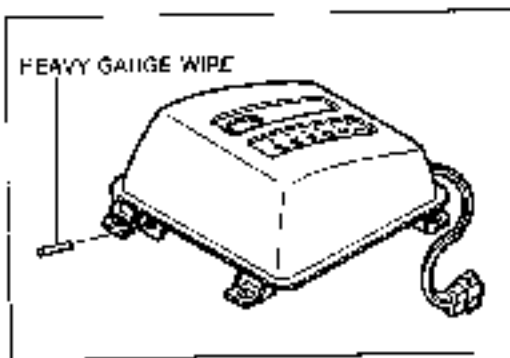
**Caution****Do not kink the cable.**

3. Install the cable and tighten locknut (A).

**Tightening torque:**

9.8–15 Nm (1.0–1.5 m-kg, 7.2–11 ft-lb)

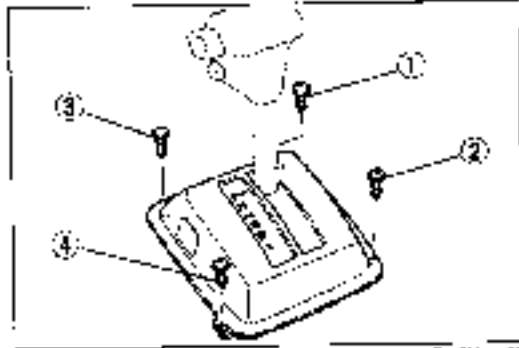
4. Check shift-lock system operation.  
(Refer to page K-159, Steps 5 to 8.)



02UUK1-144

**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.

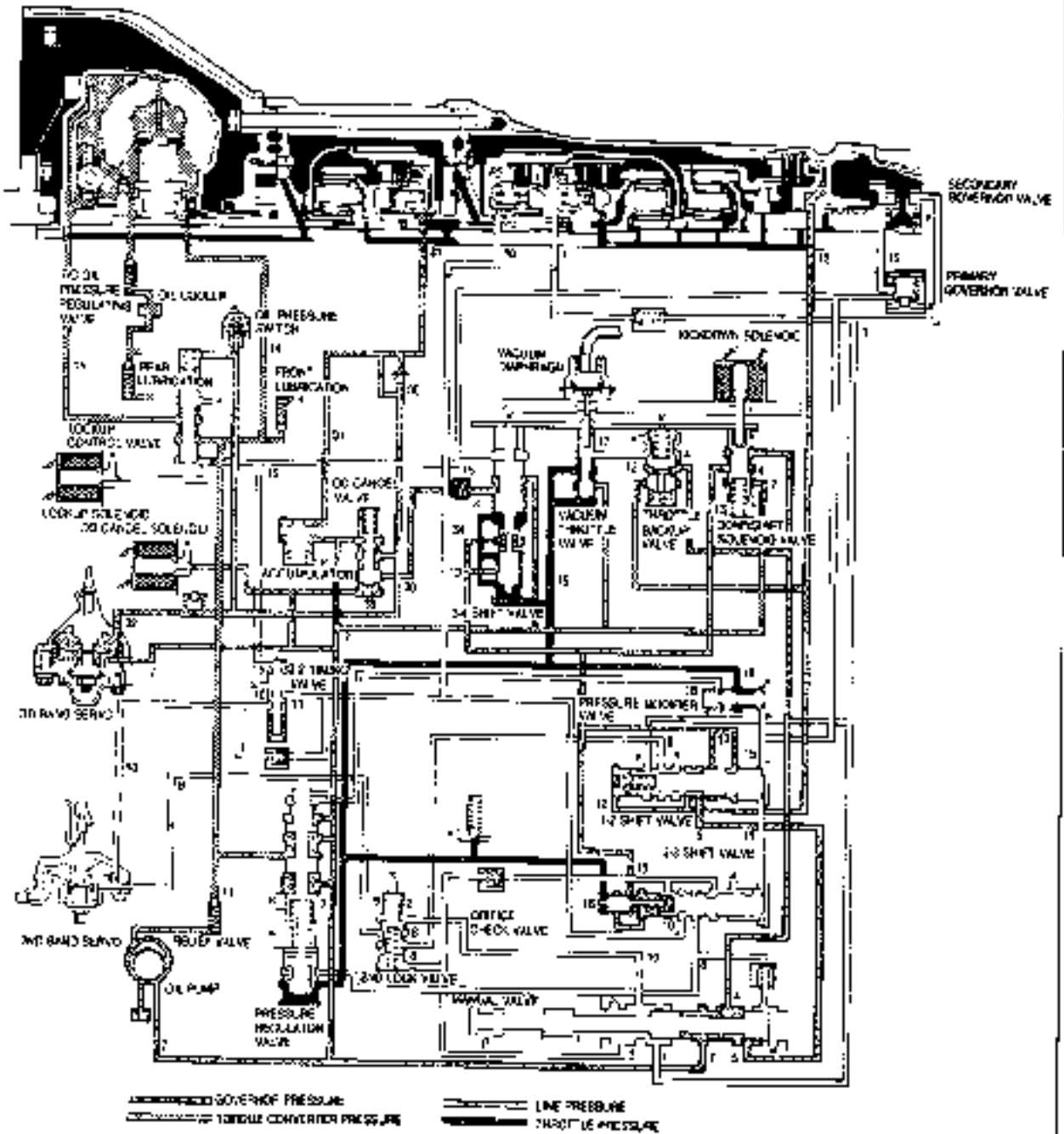


08\_UK1-145

3. Tighten the indicator screws in the order shown in the figure.

HYDRAULIC CIRCUIT

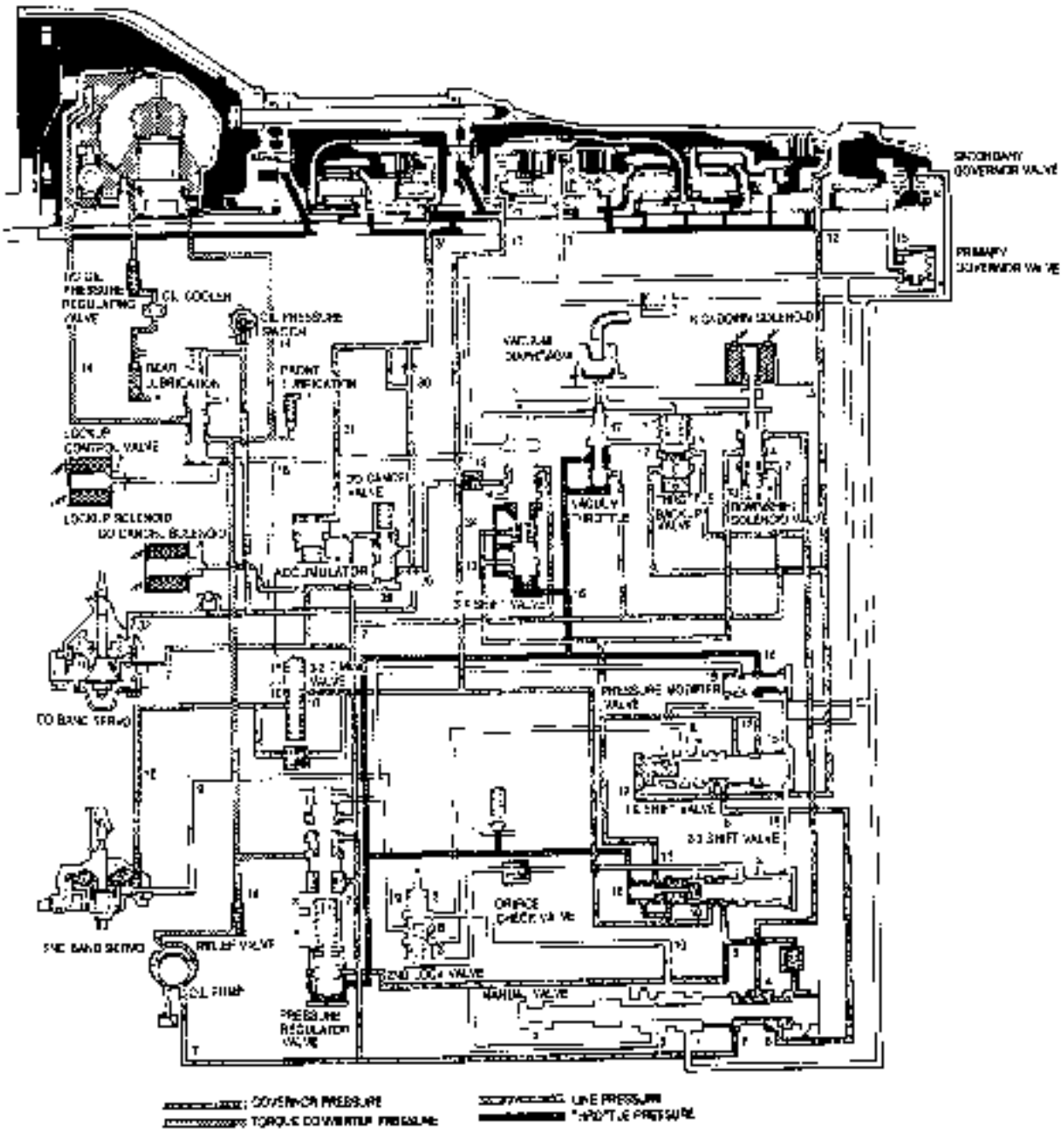
P RANGE



SECONDARY GOVERNOR VALVE  
PRIMARY GOVERNOR VALVE

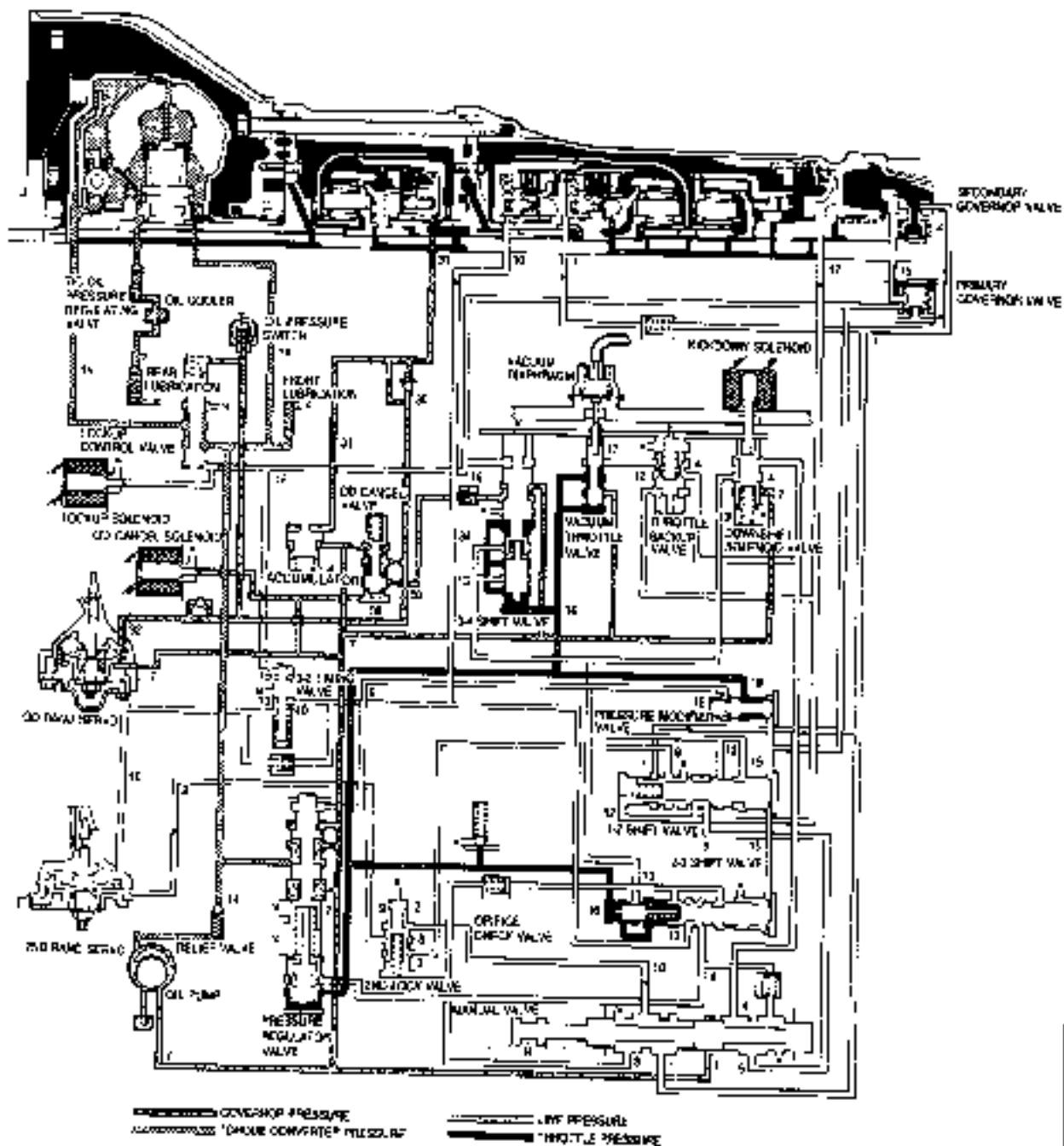
--- GOVERNOR PRESSURE  
... TORQUE CONVERTER PRESSURE  
— LINE PRESSURE  
— THROTTLE PRESSURE

### R RANGE

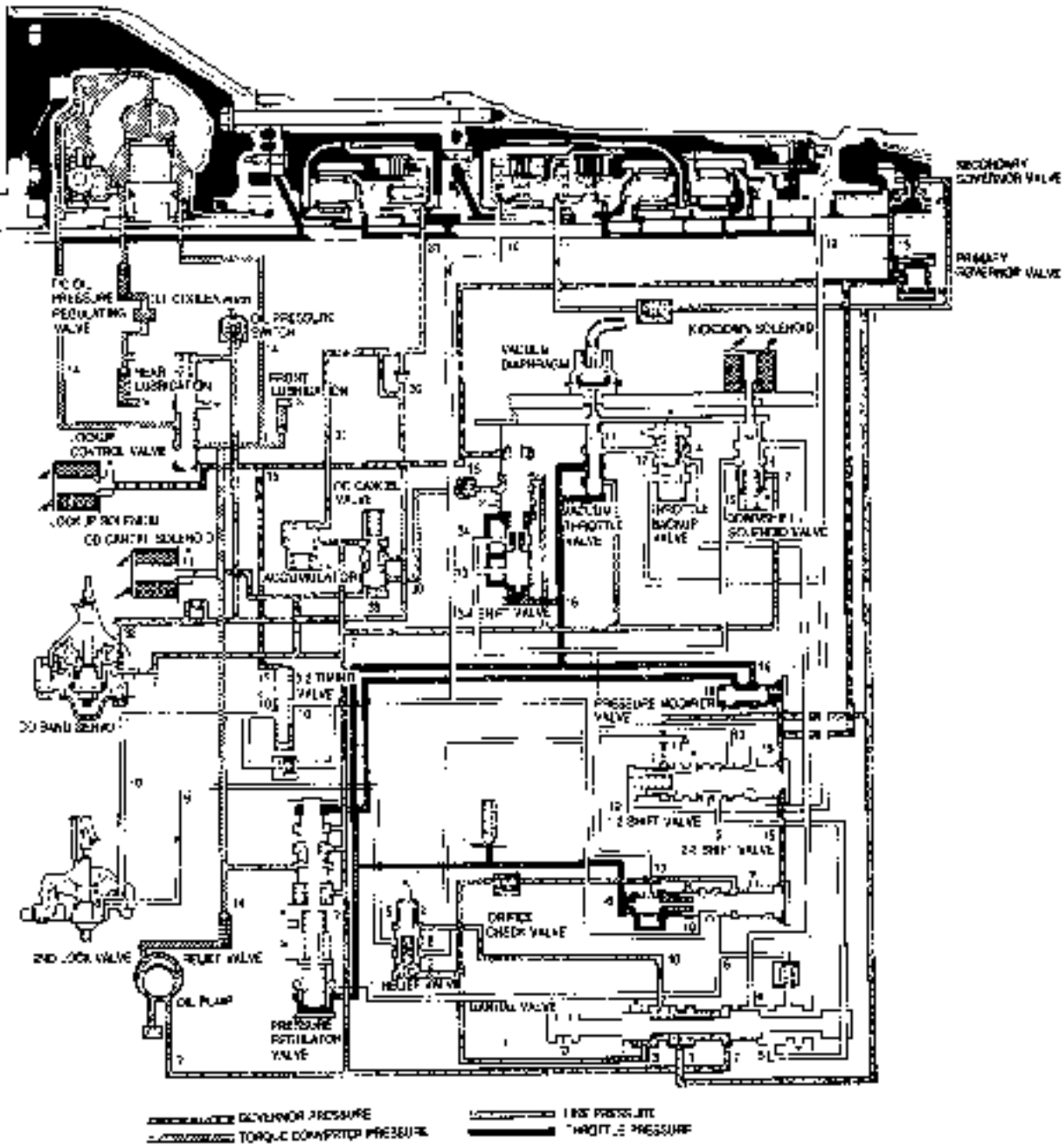


901009-417

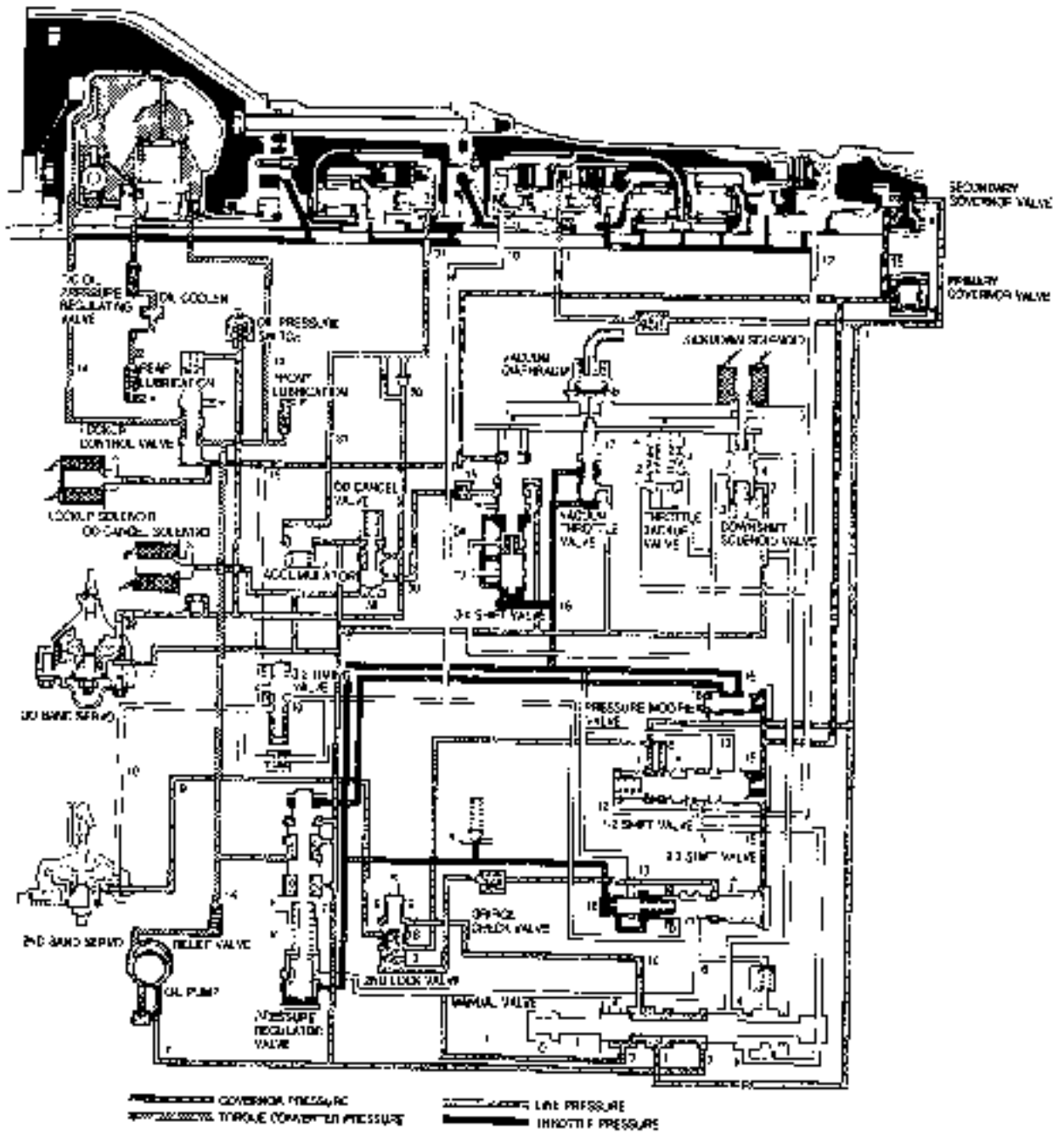
N RANGE



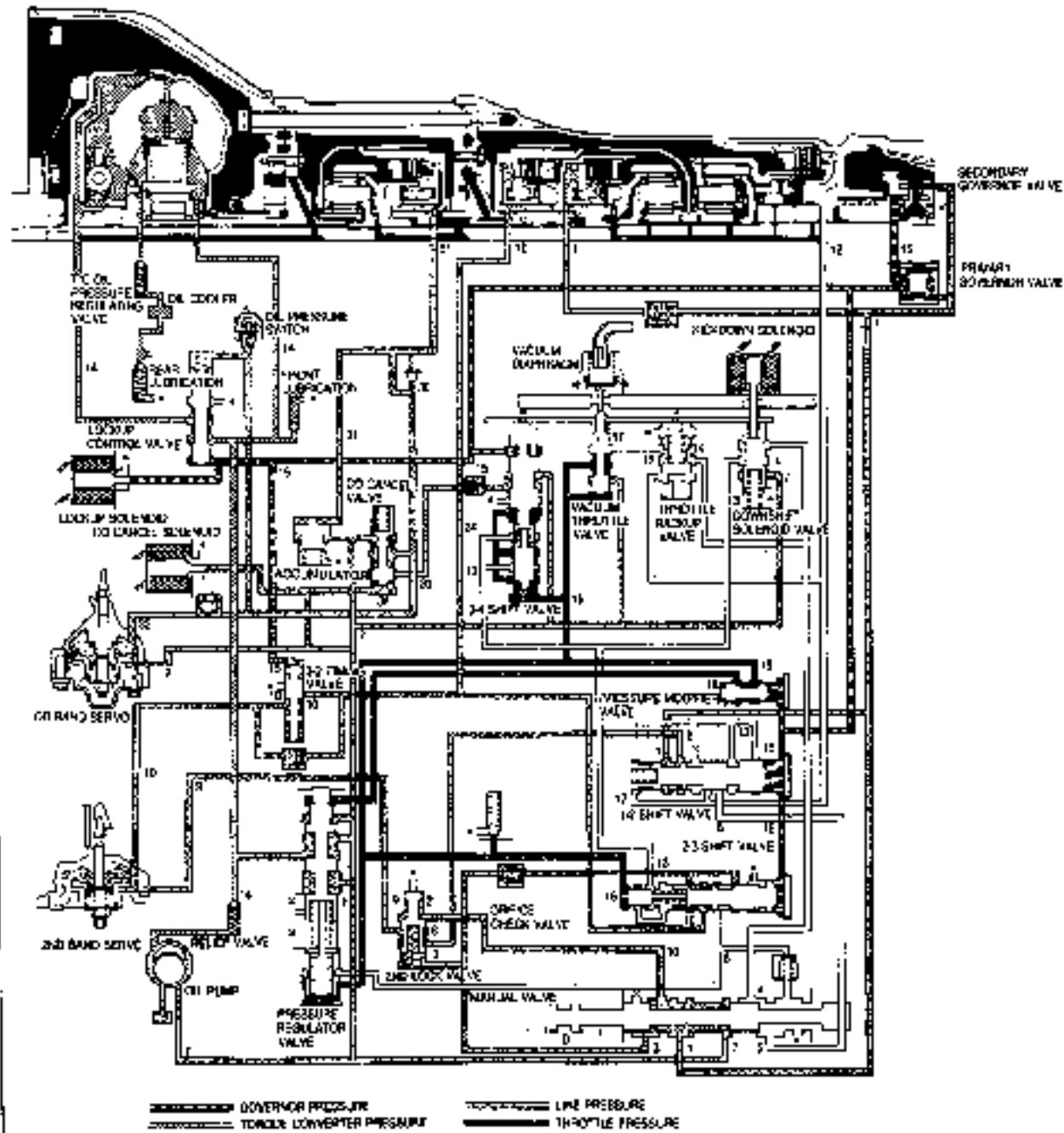
### D RANGE, 1ST GEAR



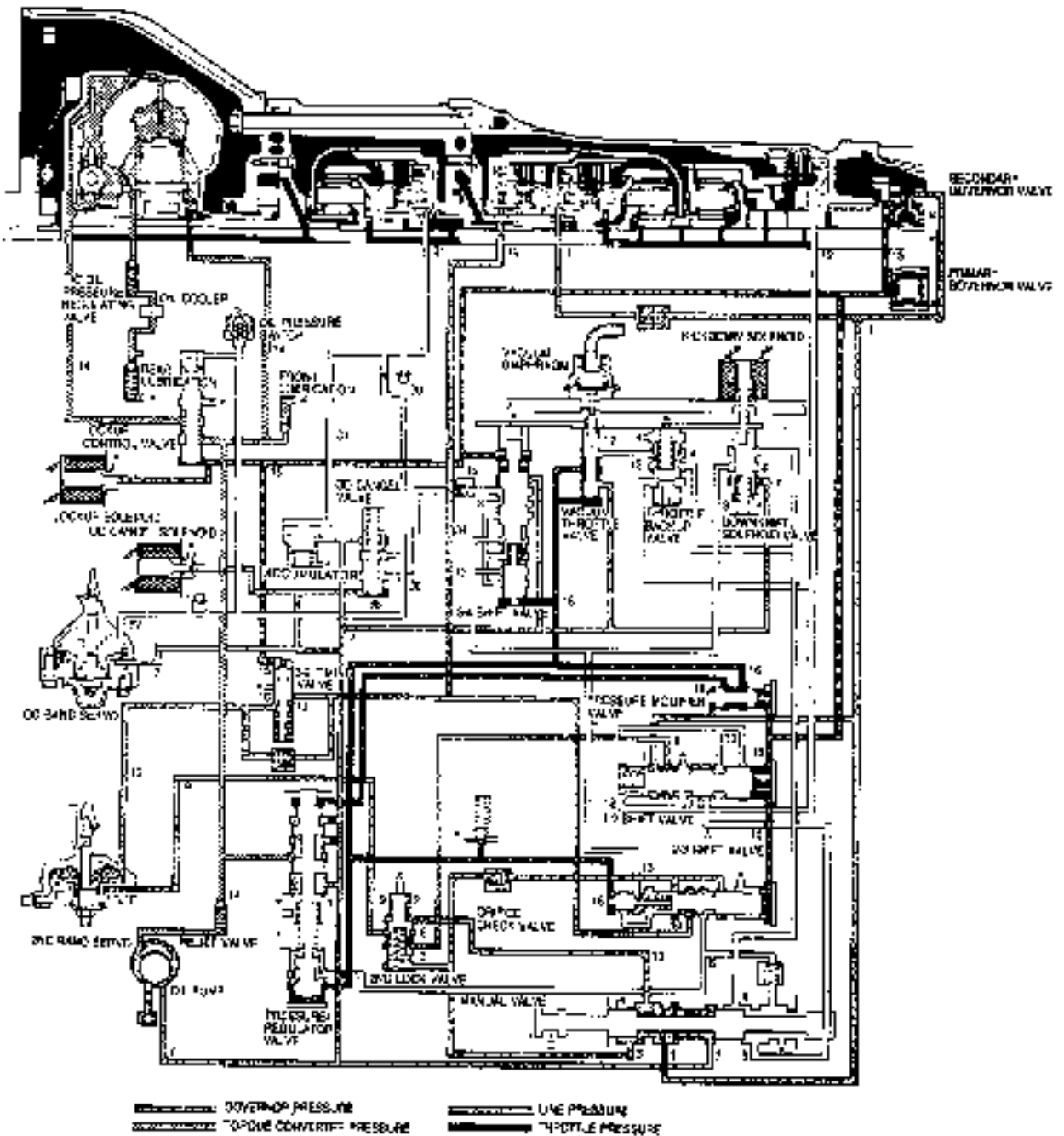
## D RANGE; 2ND GEAR



D RANGE; 3RD GEAR

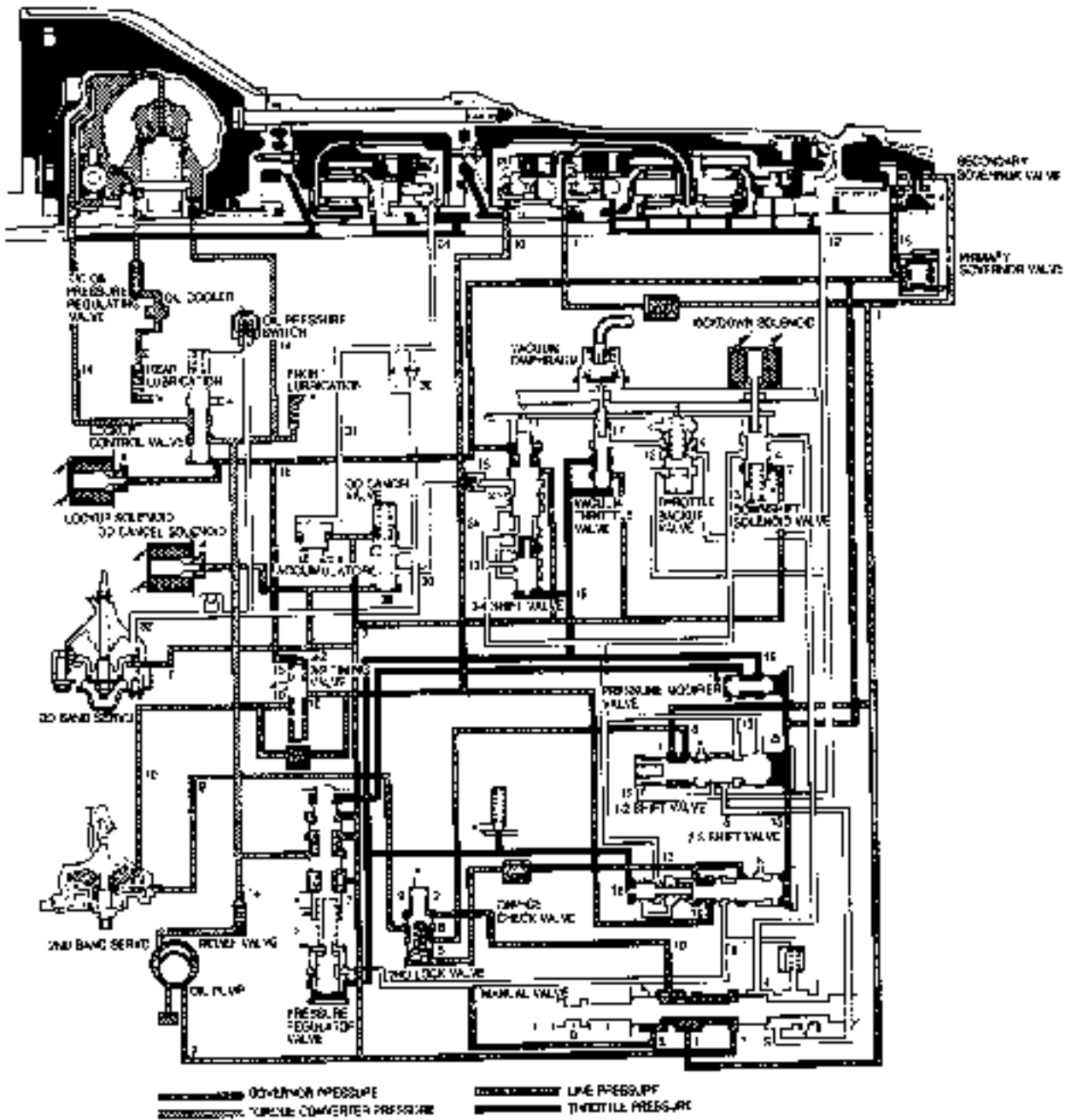


D RANGE; OD

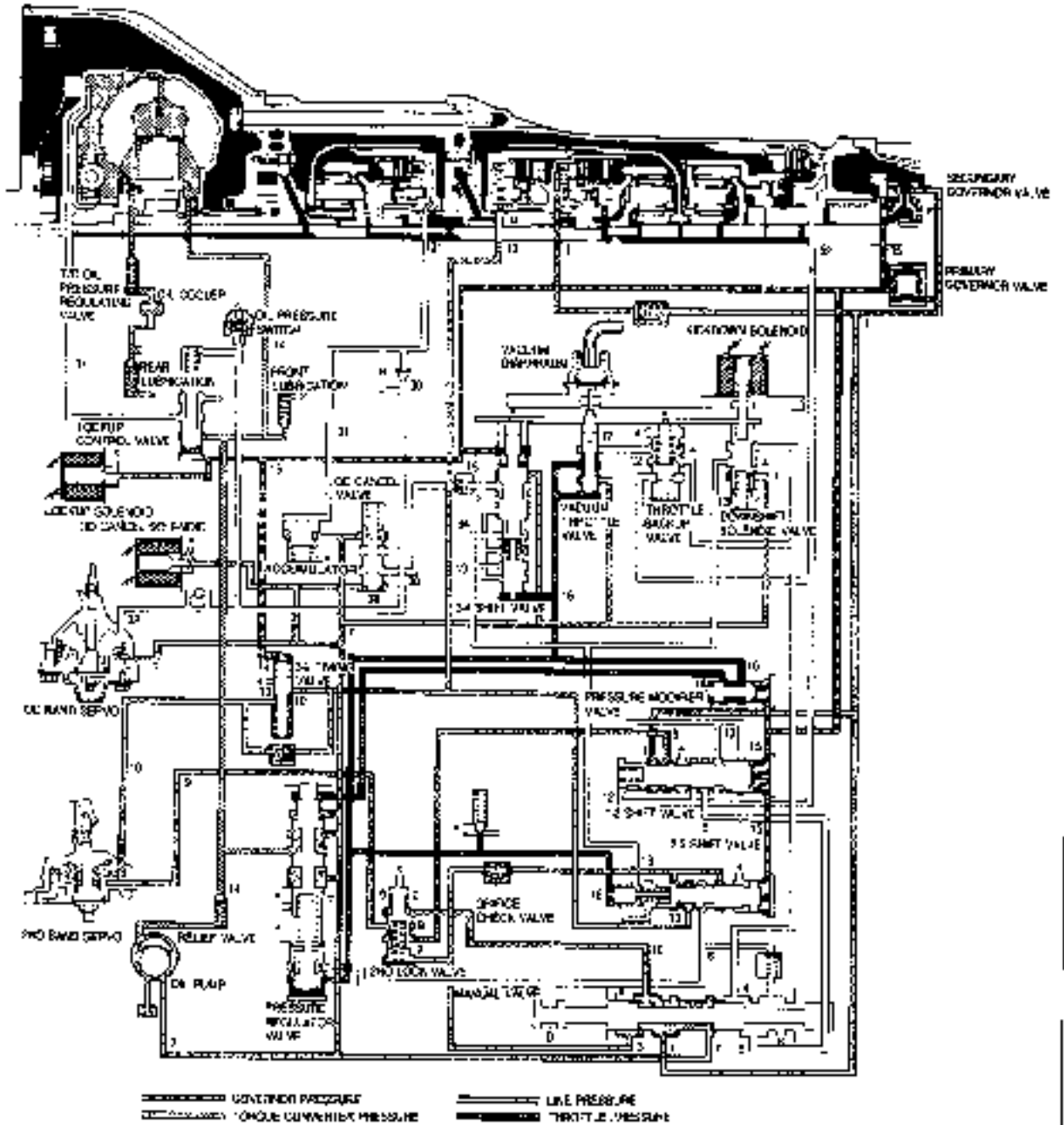




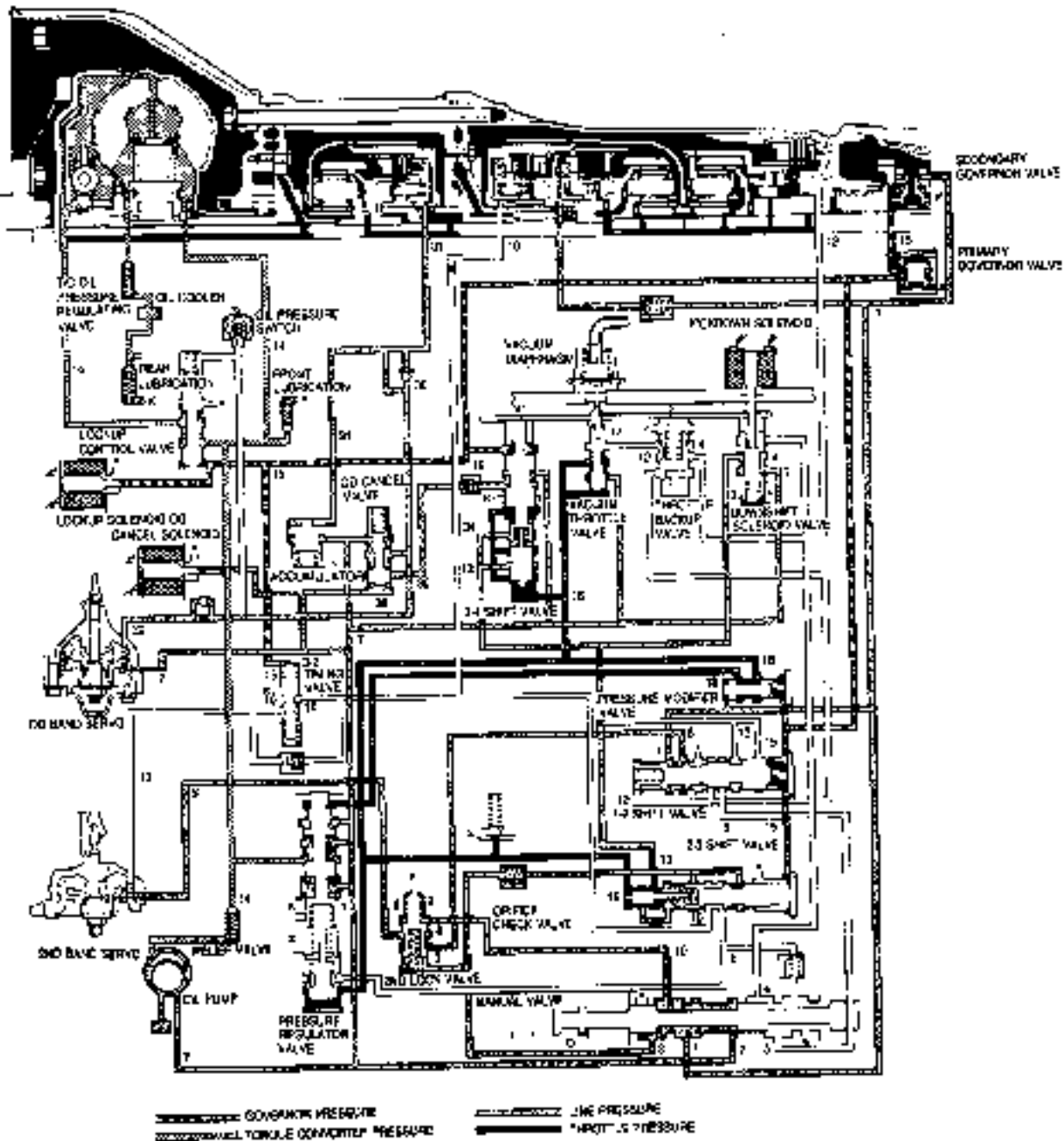
D RANGE; OD, LOCKUP OFF



D RANGE; OD, LOCKUP ON

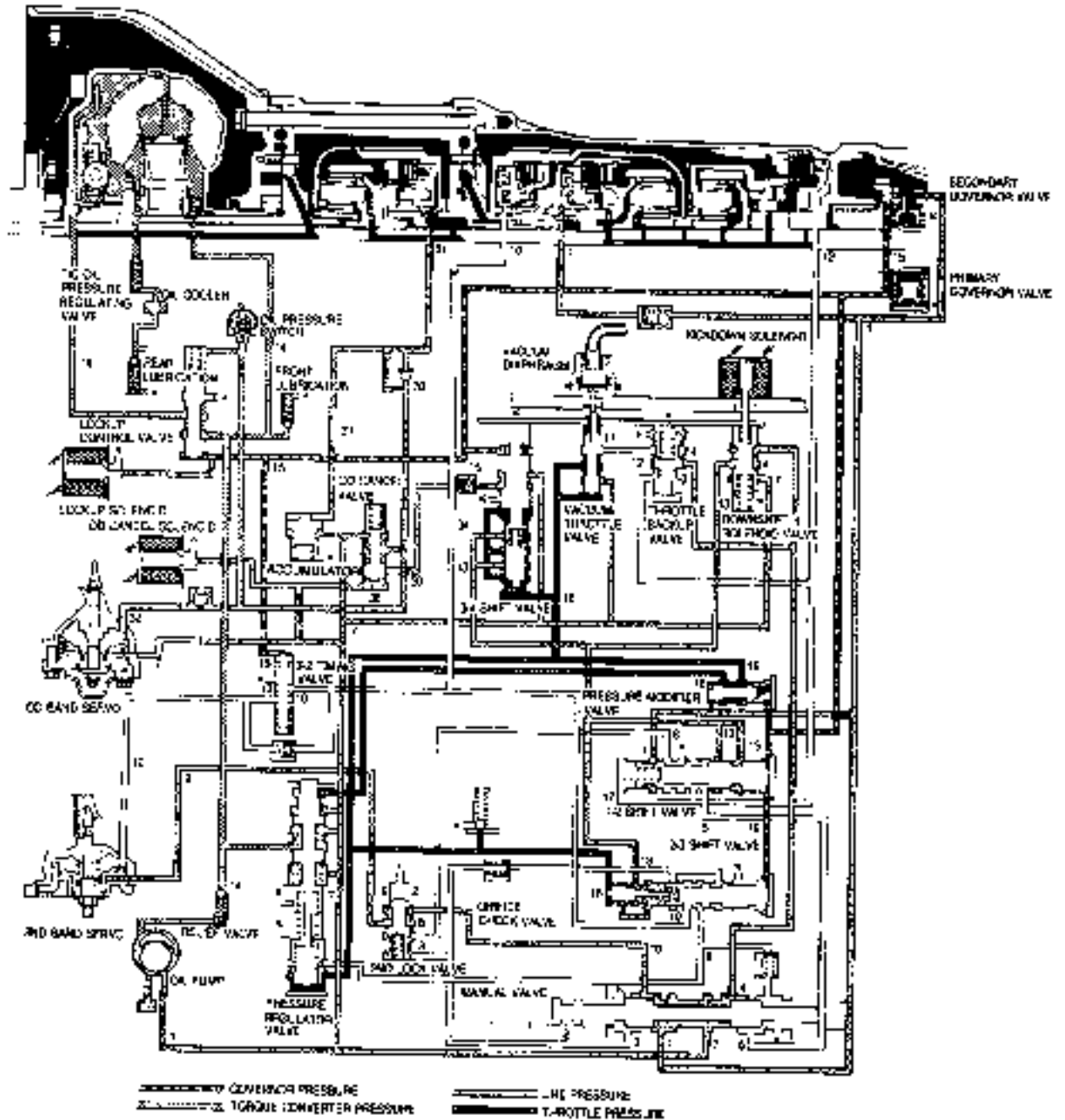


▷ RANGE; KICKDOWN



9MUEK2-446

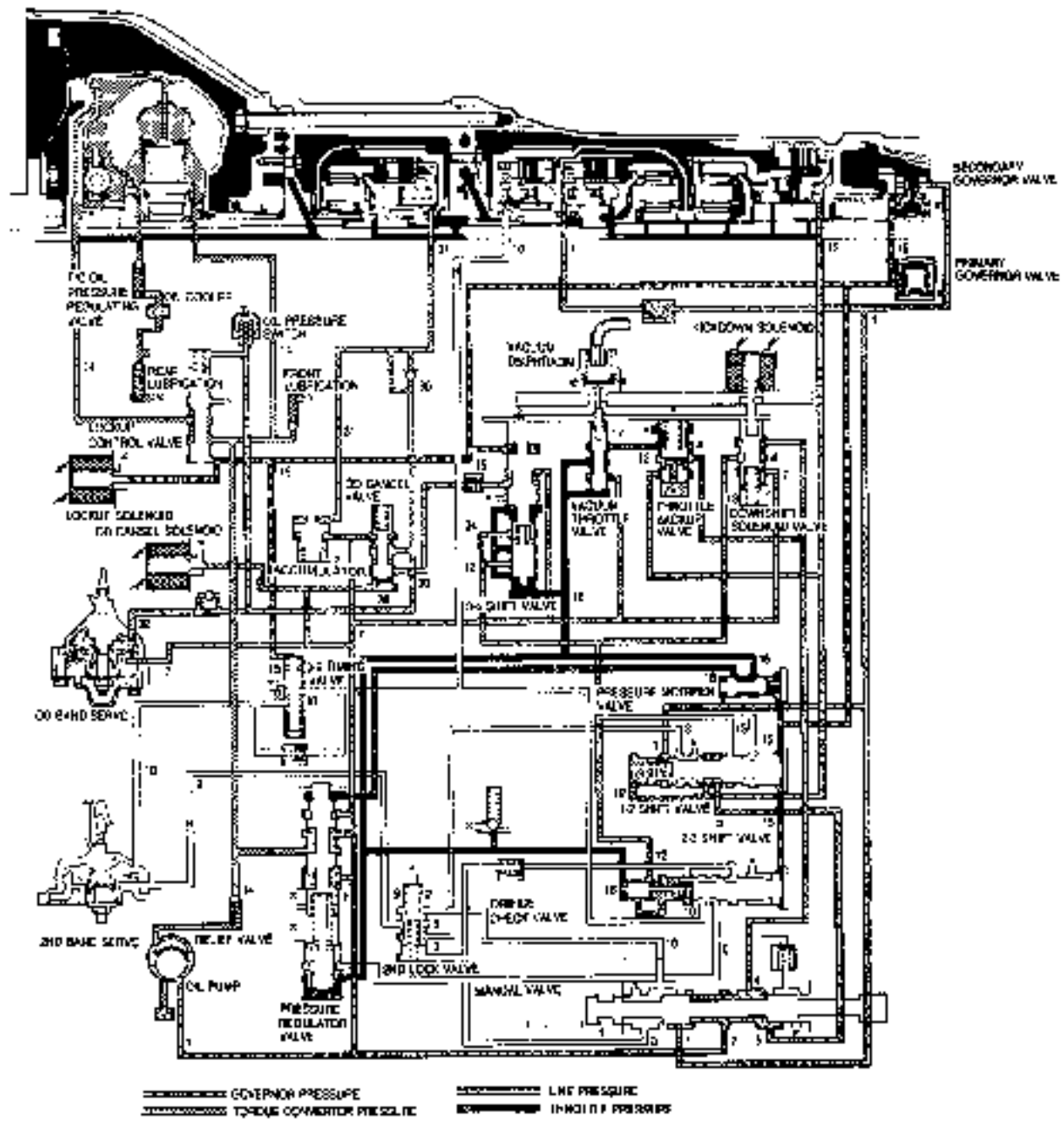
2 RANGE



# K1

## HYDRAULIC CIRCUIT

1 RANGE; 1ST GEAR



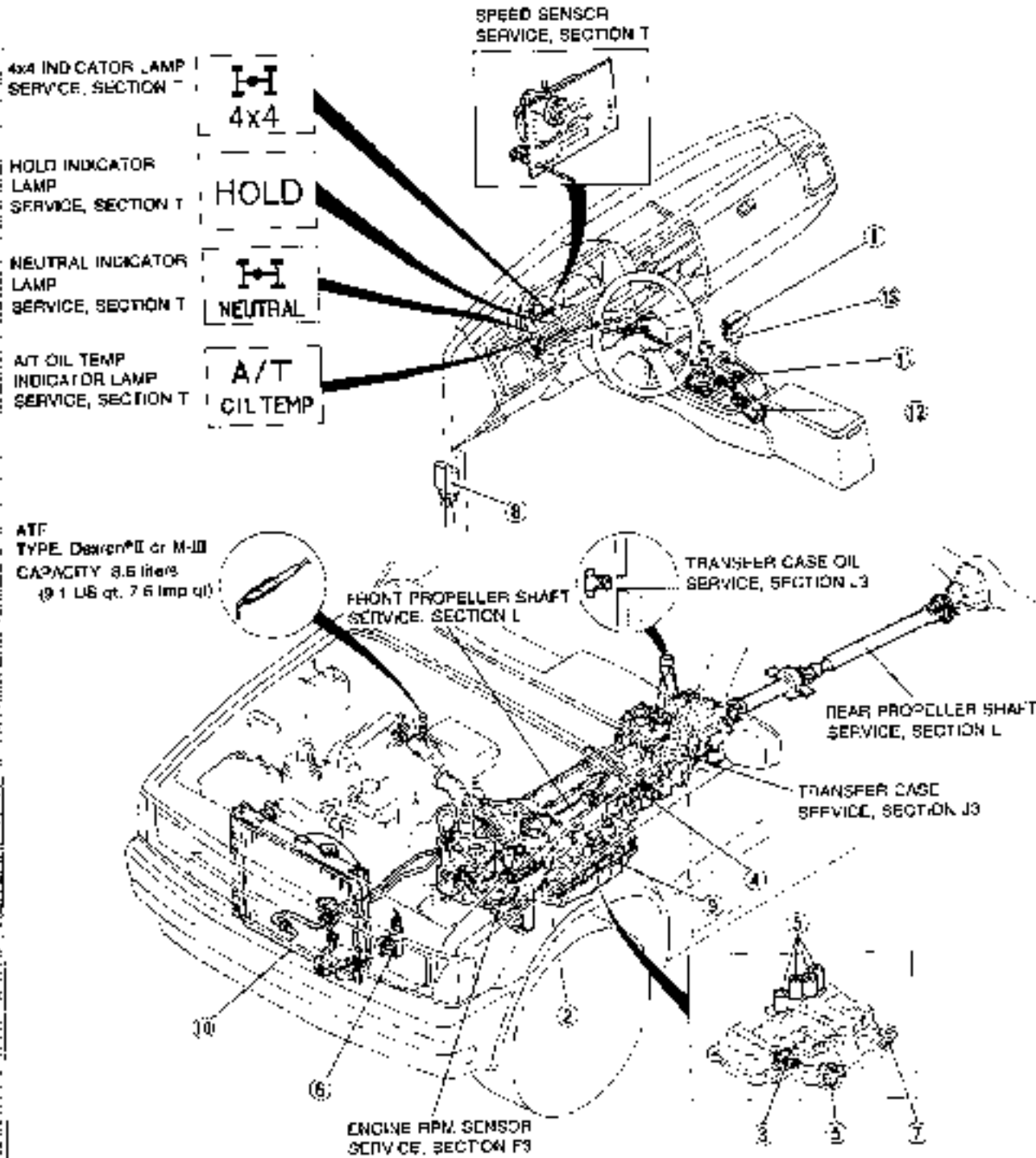
SM11K2-447



# AUTOMATIC TRANSMISSION (Electronically-Controlled)

<b>INDEX</b> .....	K2- 2	<b>OIL PUMP</b> .....	K2- 81
<b>OUTLINE</b> .....	K2- 3	<b>REVERSE CLUTCH</b> .....	K2- 65
<b>SPECIFICATIONS</b> .....	K2- 3	<b>HIGH CLUTCH AND</b>	
<b>CROSS-SECTIONAL VIEW</b> .....	K2- 4	<b>FRONT SUN GEAR</b> .....	K2- 71
<b>POWER FLOW DIAGRAM</b> .....	K2- 5	<b>BAND SERVO</b> .....	K2- 78
<b>OPERATION OF COMPONENTS</b> .....	K2- 5	<b>FRONT INTERNAL GEAR, REAR</b>	
<b>FLUID PASSAGE LOCATION</b> .....	K2- 6	<b>INTERNAL GEAR, FORWARD CLUTCH</b>	
<b>TROUBLESHOOTING</b> .....	K2- 8	<b>HUB, OVERRUNNING CLUTCH HUB</b>	K2- 82
<b>GENERAL NOTES</b> .....	K2- 8	<b>FORWARD CLUTCH DRUM</b>	
<b>QUICK DIAGNOSIS CHART</b> .....	K2- 9	<b>(FORWARD CLUTCH, OVERRUNNING</b>	
<b>SELF-DIAGNOSTIC SYSTEM</b>		<b>CLUTCH, LOW ONE-WAY CLUTCH)</b> .....	K2- 85
<b>INSPECTION</b> .....	K2- 13	<b>LOW AND REVERSE BRAKE</b> .....	K2- 93
<b>SELF-DIAGNOSTIC FUNCTION</b> .....	K2- 13	<b>ADAPTER CASE AND</b>	
<b>EC-AT TESTER</b> .....	K2- 13	<b>PARKING MECHANISM</b> .....	K2- 99
<b>GENERAL NOTES</b> .....	K2- 16	<b>OIL SEAL</b> .....	K2-102
<b>RETRIEVAL PROCEDURES</b> .....	K2- 16	<b>CONTROL VALVE BODY</b>	
<b>INSPECTION PROCEDURES</b> .....	K2- 17	<b>(DISASSEMBLY AND INSPECTION)</b> .....	K2-103
<b>AFTER-REPAIR PROCEDURES</b> .....	K2- 20	<b>UPPER VALVE BODY</b> .....	K2-108
<b>ELECTRIC SIGNAL INSPECTION</b> .....	K2- 21	<b>LOWER VALVE BODY</b> .....	K2-116
<b>INSPECTION PROCEDURES</b> .....	K2- 21	<b>CONTROL VALVE BODY (ASSEMBLY)</b>	K2-121
<b>MECHANICAL SYSTEM TEST</b> .....	K2- 23	<b>ON VEHICLE REMOVAL</b> .....	K2-124
<b>PREPARATION</b> .....	K2- 23	<b>ON VEHICLE INSTALLATION</b> .....	K2-128
<b>STALL TEST</b> .....	K2- 23	<b>TRANSMISSION UNIT (ASSEMBLY)</b> .....	K2-128
<b>TIME LAG TEST</b> .....	K2- 26	<b>TRANSMISSION UNIT (INSTALLATION)</b>	K2-140
<b>LINE PRESSURE TEST</b> .....	K2- 27	<b>OIL COOLER</b> .....	K2-143
<b>ROAD TEST</b> .....	K2- 29	<b>DRIVE PLATE</b> .....	K2-144
<b>D RANGE TEST</b> .....	K2- 29	<b>SHIFT MECHANISM</b> .....	K2-146
<b>S RANGE TEST</b> .....	K2- 32	<b>SHIFT LOCK SYSTEM COMPONENTS</b>	K2-146
<b>L RANGE TEST</b> .....	K2- 33	<b>TROUBLESHOOTING</b> .....	K2-146
<b>P RANGE TEST</b> .....	K2- 33	<b>P RANGE SWITCH</b> .....	K2-148
<b>ELECTRONIC SYSTEM COMPONENTS</b>	K2- 35	<b>SHIFT-LOCK ACTUATOR</b> .....	K2-148
<b>HOLD OFF SWITCH</b> .....	K2- 35	<b>SELECTOR LEVER</b> .....	K2-148
<b>INHIBITOR SWITCH</b> .....	K2- 35	<b>REMOVAL, INSPECTION AND</b>	
<b>ATF THERMOSENSOR</b> .....	K2- 36	<b>INSTALLATION</b> .....	K2-152
<b>SPEED SENSOR 1</b> .....	K2- 37	<b>HYDRAULIC CIRCUIT</b> .....	K2-155
<b>SOLENOID VALVES</b> .....	K2- 38	<b>P RANGE</b> .....	K2-155
<b>DROPPING RESISTOR</b> .....	K2- 38	<b>R RANGE</b> .....	K2-156
<b>ATF THERMOSWITCH</b> .....	K2- 38	<b>N RANGE</b> .....	K2-157
<b>EC-AT CONTROL UNIT</b> .....	K2- 39	<b>D RANGE, 1ST GEAR</b> .....	K2-158
<b>AUTOMATIC TRANSMISSION FLUID</b>		<b>D RANGE, 2ND GEAR</b> .....	K2-159
<b>(ATF)</b> .....	K2- 42	<b>D RANGE, 3RD GEAR</b> .....	K2-160
<b>INSPECTION</b> .....	K2- 42	<b>D RANGE, OD, LOCKUP OFF</b> .....	K2-161
<b>REPLACEMENT</b> .....	K2- 43	<b>D RANGE, OD, LOCKUP ON</b> .....	K2-162
<b>TRANSMISSION</b> .....	K2- 44	<b>S RANGE, 1ST GEAR</b> .....	K2-163
<b>TRANSMISSION UNIT (REMOVAL)</b> .....	K2- 44	<b>S RANGE, 2ND GEAR</b> .....	K2-164
<b>TRANSMISSION UNIT</b>		<b>S RANGE, 3RD GEAR</b> .....	K2-165
<b>(DISASSEMBLY)</b> .....	K2- 47	<b>L RANGE, 1ST GEAR</b> .....	K2-166
<b>TORQUE CONVERTER</b> .....	K2- 58	<b>L RANGE, 2ND GEAR</b> .....	K2-167
<b>ACCUMULATORS</b> .....	K2- 59		

INDEX



GM/DK1152P



1. Hold switch Inspection.....	page K2- 35	9. Automatic transmission Removal .....	page K2- 44
2. Inhibitor switch Inspection .....	page K2- 35	Disassembly .....	page K2- 47
Adjustment .....	page K2- 36	Assembly.....	page K2-128
3. ATF thermosensor Inspection.....	page K2- 36	Installation .....	page K2-140
4. Speed sensor 1 Inspection .....	page K2- 37	10. Oil cooler Removal, Inspection, and Installation .....	page K2- 43
5. Solenoids Inspection .....	page K2- 38	11. P range switch Inspection.....	page K2- 46
6. Drooping resistor Inspection.....	page K2- 38	12. Shift-ock actuator Inspection.....	page K2- 46
7. ATF thermostat Inspection.....	page K2- 38	13. Selector lever Inspection.....	page K2- 49
8. EC-AT control unit Inspection.....	page K2- 39	Adjustment .....	page K2- 50
		Removal, Inspection, and Installation .....	page K2- 52

201002-002

**OUTLINE**

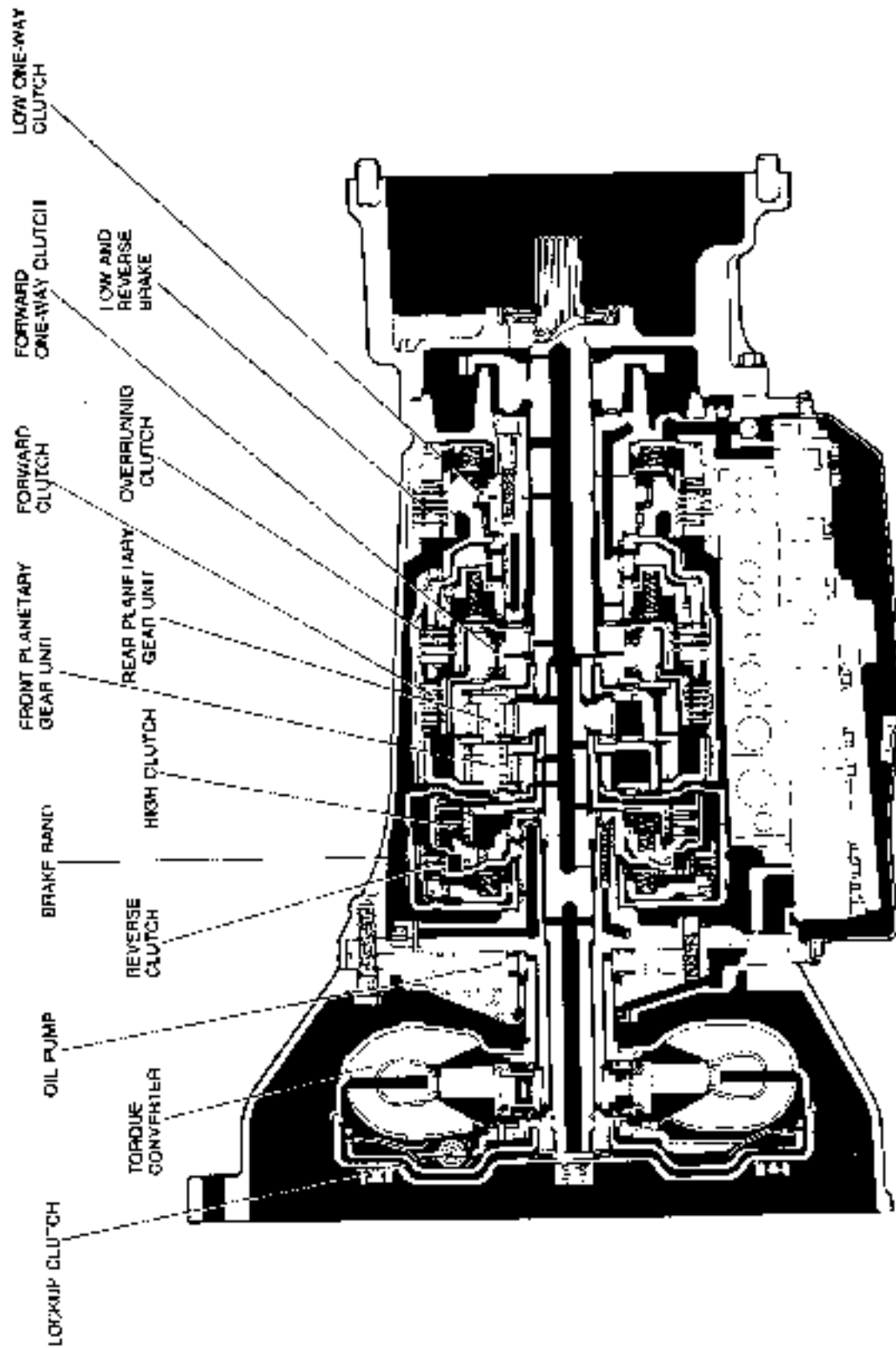
**SPECIFICATIONS**

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 driver driven plates	Reverse clutch	2/2
	High clutch	4/7
	Forward clutch	0/0
	Overrunning clutch	3/5
	Low and reverse brake	0/0
Automatic transmission fluid (ATF)	Type	Denso#0 or M-III
	Capacity liters (US qt., Imp. qt.)	Total Oil pan 6.6 (6.1 / 7.0) 4.0 (4.2 / 3.5)

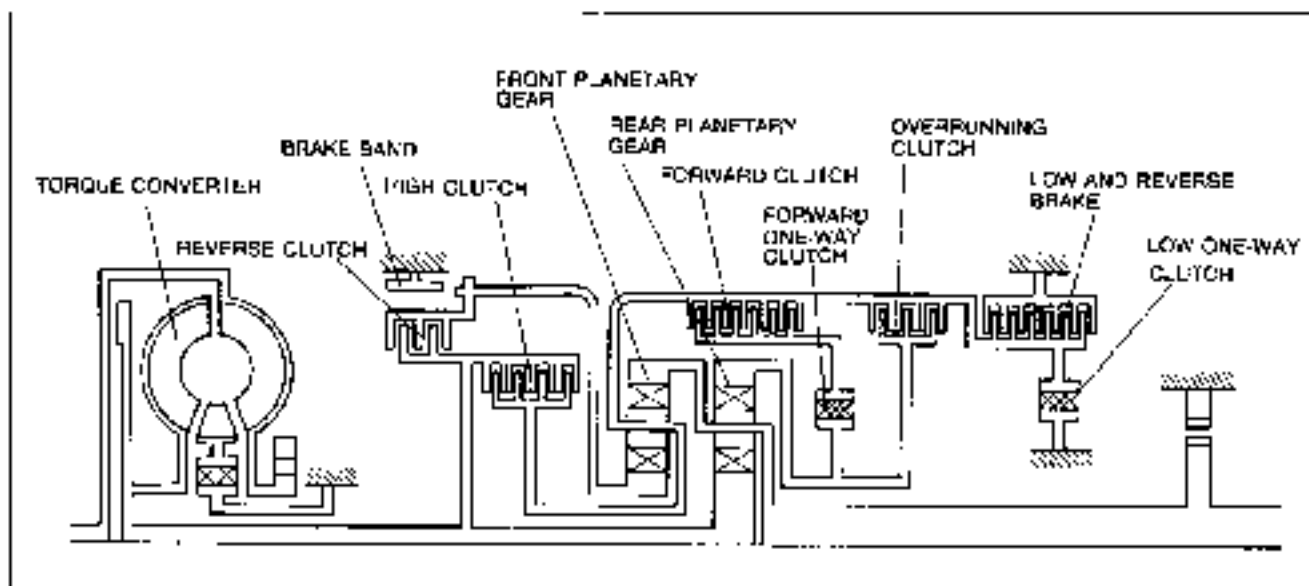
K2

201002-002

CROSS-SECTIONAL VIEW



POWER FLOW DIAGRAM



SMJCK1 026

OPERATION OF COMPONENTS

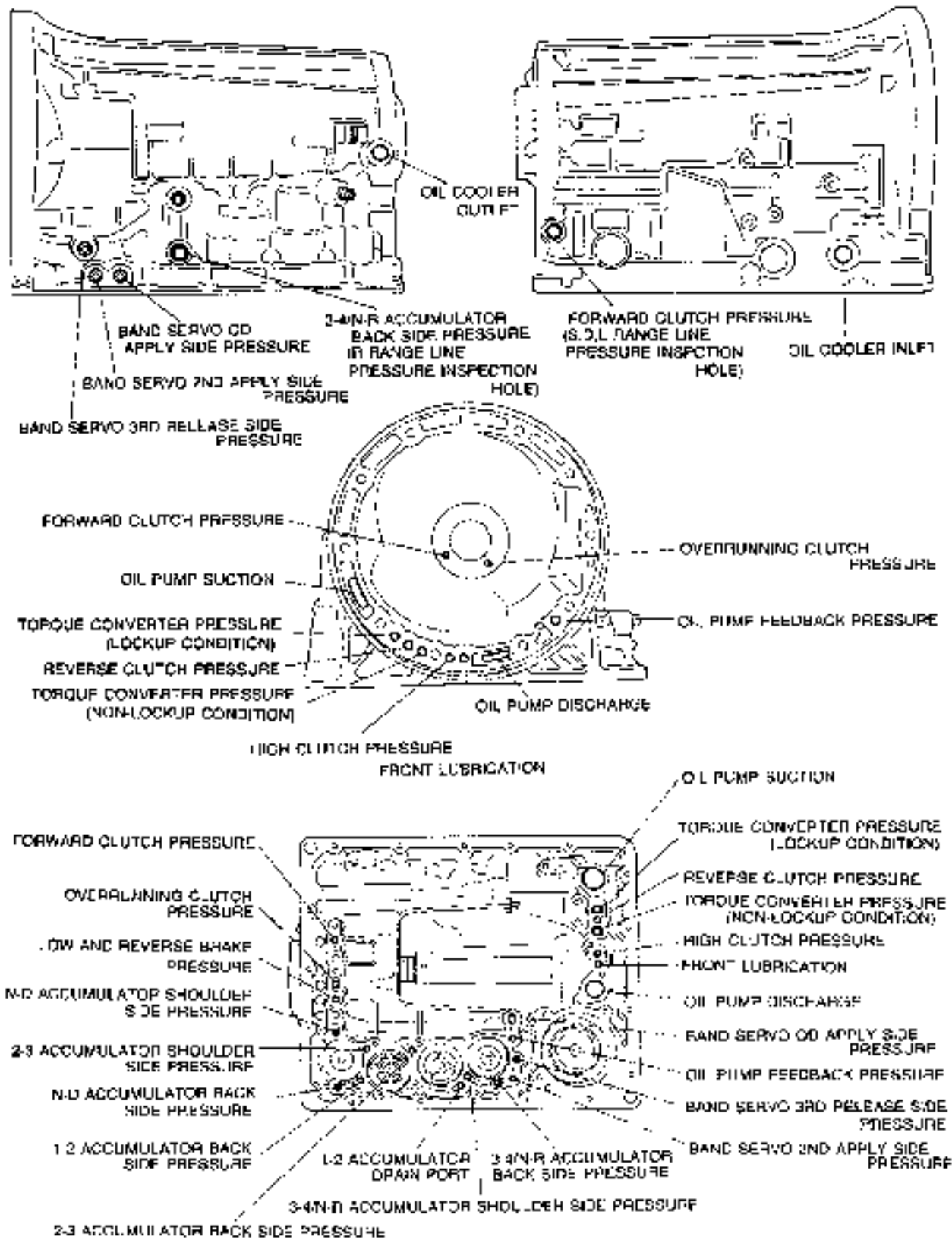
Mode	Range	Gear	Reverse clutch	High clutch	Forward clutch	Overrunning clutch	Brake band		OD applied	Forward one-way clutch	Low one-way clutch	Low and reverse brake	
							2nd applied	3rd released					
ELECTROMOVER	P	Reverse	○									○	
	R												
	N												
	D	1st			○	●				●	●		
		2nd			○	○	○	○ <sup>1)</sup>		●			
		3rd			○	○	○	○ <sup>2)</sup>	○	●			
		OD			○	○	○	○ <sup>3)</sup>	○	●			
	S	1st			○	●				●	●		
		2nd			○	○	○	○ <sup>4)</sup>		●			
		3rd			○	○	○	○ <sup>5)</sup>	○	●			
L	1st			○	○	○			●			○	
	2nd			○	○	○	○		●				
HOLD	D	2nd			○	○	○		●				
		3rd			○	○	○	○ <sup>6)</sup>	○	●			
	S	2nd			○	○	○		●				
		L	1st			○	○			●			○

SMJCK1 026

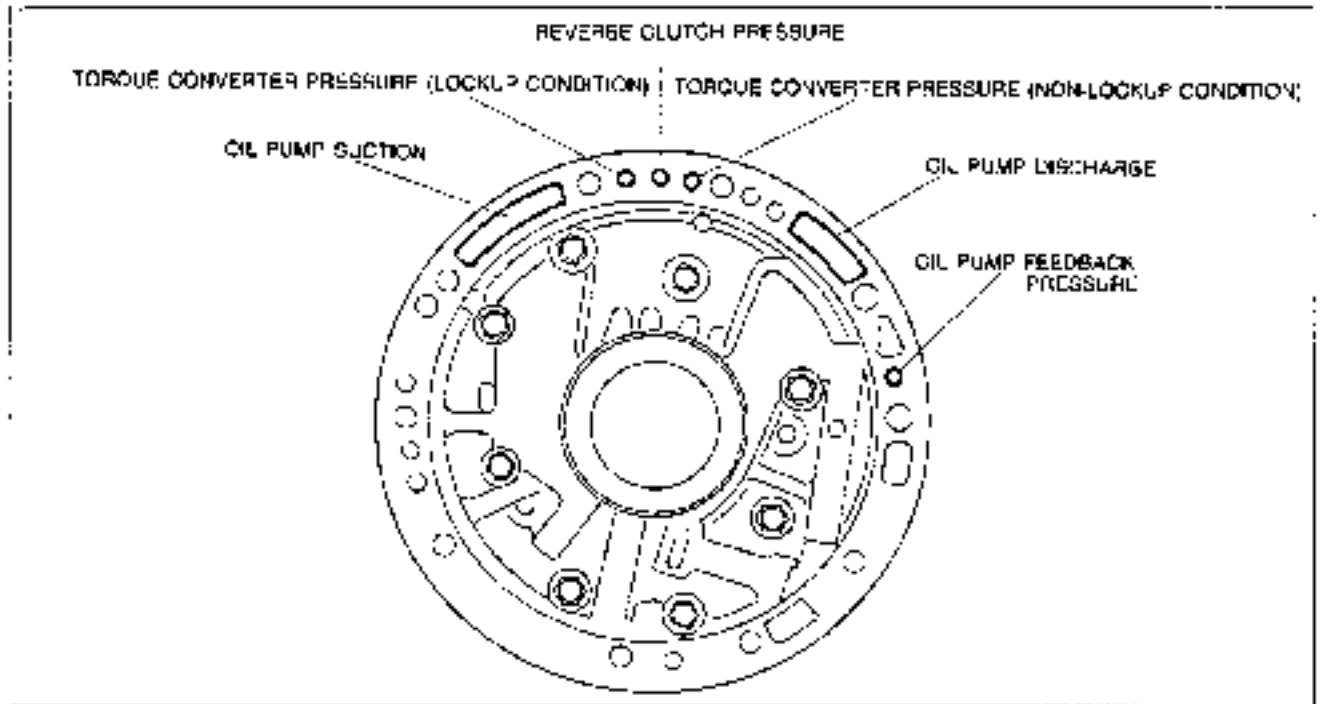
- <sup>1)</sup> Hydraulic pressure is applied to both 2nd applied side and 3rd released side of band servo piston. However, because the area of the 3rd released side is larger than the 2nd applied side, the brake band does not operate.
- <sup>2)</sup> Hydraulic pressure is applied to OD applied side, plus condition <sup>1)</sup> above. Brake band is applied.
- : Operates
- <sup>1)</sup> : Operates when throttle opening is less than 1/5. Engine braking effect available
- <sup>2)</sup> : Operates when throttle opening is less than 1/5. Engine braking effect not available
- <sup>3)</sup> : Operates when the EC-A1 control unit receive OD inhibit signal from the cruise control unit and throttle opening less than 1/8. Engine braking effect available.
- <sup>4)</sup> : Operates when the EC-A1 control unit receive OD inhibit signal from the cruise control unit and throttle opening less than 1/8. Engine braking effect not available
- <sup>5)</sup> : Operates but does not transmit power.
- : Operates during acceleration and cruising.

K2

FLUID PASSAGE LOCATION  
Transmission Case

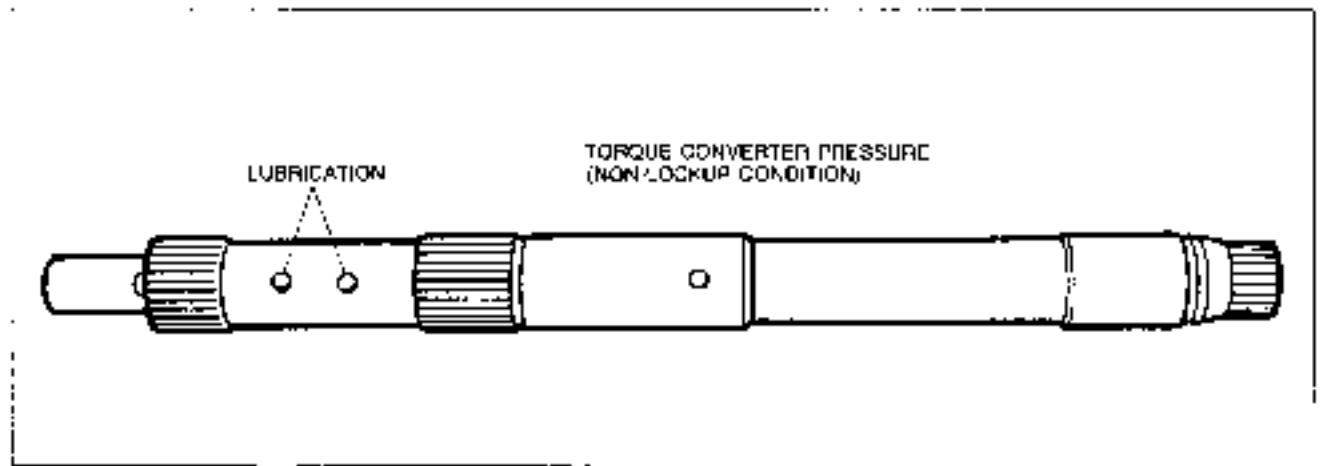


Oil Pump



SMU0K1-009

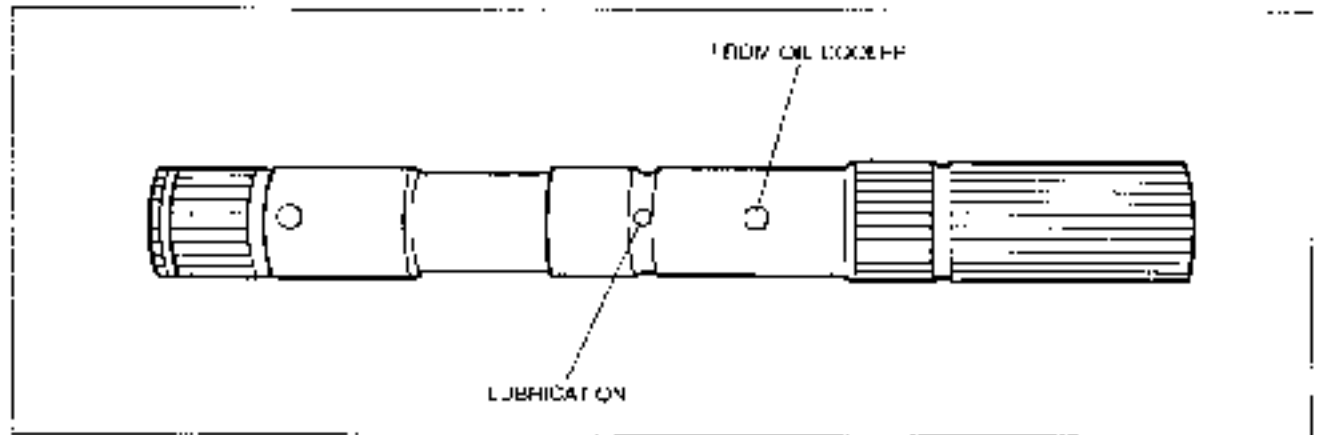
Input Shaft



K2

SMU0K1-009

Output Shaft



SMU0K1-010  
K2-7

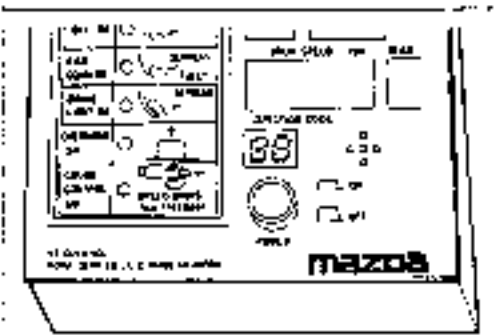
## TROUBLESHOOTING

## 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.

94A00K-31\*



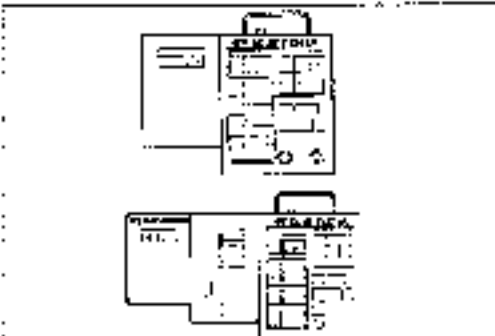
18U0K2-019

**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.)



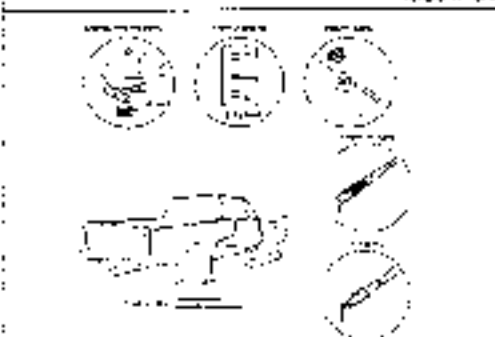
18U0K2-050

**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**

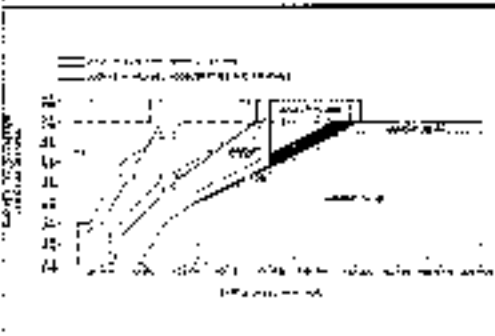
Signals can also be checked by checking the EC-AT control unit terminal voltages with a voltmeter. (Refer to page K2-39.)



18U0K7-081

**Step 3: Mechanical System Test**

Check the engine stall speed, time lag, and line pressure. (Refer to page K2-23.)



18U0K2-082

**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.)

If the 4 steps on page K2-8 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 K2-9 to 12.

In this chart, numbers are used to indicate the components that may be the cause of 51 possible problems. It is necessary to check only those components indicated by numbers during each step of the troubleshooting process to locate the cause of the problem quickly.

**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 "Self-diagnosis" column are diagnosed by the EC-AT control unit self-diagnostic function.  
The EC-AT Tester can be used for easy retrieval of the these signals.
3. Input and output signals of the EC-AT control unit for components indicated in the "EC-AT Tester" column can be easily checked with the EC-AT Tester.
4. Components indicated in the "Mechanical System Test" column can be checked for malfunction by the results of the oil pressure test.
5. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
6. The numbers in the chart indicate the order of inspection for detecting malfunctions.
7. Circled numbers indicate that the transmission must be removed from the vehicle.
8. The checking, adjusting, repair, and replacement procedures for components are described in the page(s) shown in the "Reference page" column.

1811K2-01

Item	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	Section F2	Section G	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-103	K2-50	K2-59	K2-60	K2-59	K2-61	K2-68	K2-85	K2-71	K2-85	K2-82	K2-86	K2-85	K2-83	K2-76	K2-89							
Adjustment		x																																									
Self-diagnosis																																											
EC-AT Tester																																											
Mechanical System Test																																											
Road Test																																											

Item	Inspection point and reference page	ON VEHICLE												OFF VEHICLE																											
		Electronic system												Hydraulic control system				Powertrain																							
		Preliminary			Electronic system					Hydraulic control system				Powertrain																											
		K2-42	K2-146	Section F2	Section U	K2-35	K2-35	Section I	Section F2	Section F2	K2-37	K2-36	Section G	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-37	K2-103	K2-60	K2-58	K2-59	K2-59	K2-6	K2-58	K2-65	K2-7	K2-85	K2-82	K2-85	K2-85	K2-85	K2-85	K2-76	K2-86		
Igniting	Engine does not start in N and/or P range	2																																							
	Engine starts in ranges other than N and P range	1																																							
	Vehicle does not move in D range (moves in L, S, and H ranges)	1																																							
	Vehicle does not move in forward ranges (moves in P range) Extremely poor accelerator															2								4	5																
	Vehicle does not move in R range (moves in forward ranges) Extremely poor accelerator	1													3																										
Accelerating	Vehicle does not move in any range	1	2																																						
	Slippage left when accelerating	1	2							3																															
	Vehicle moves in N range																																								
	Excessive creep No creep	1																																							
No shift	Low maximum speed and poor accelerator	1	2										3 4																												
	Does not shift from 1st to 2nd	3	2 1																																						
	Does not shift from 2nd to 3rd	3	2 1																																						
	Does not shift from 3rd to OD	4	3 1	2																																					
	Lockup does not occur		4						1 2 3	6 5																															
No shift	Does not shift from OD to 3rd	1								2				4 5		3	6																								
	Does not shift from 3rd to 2nd, or from OD to 2nd	1									2			3 4			5																								
	Does not shift from 2nd to 1st or from 3rd to 1st	1			3						2			4 5																											
	Does not kickdown when accelerator is depressed in OD within kickdown range											2		3 4																											



Item	Inspection point and reference page	ON VEHICLE										OFF VEHICLE								
		Preliminary		Electronic system					Hydraulic control system			Powertrain								
		K2-42	K2-46 Section F2 Section G	K2-35 K2-35 Section T Section P2 Section F2 Section P	K2-37 K2-36 Section G	K2-38 K2-30 K2-36 K2-38 K2-38	K2-97 K2-103 K2-59 K2-59 K2-59	K2-58 K2-65 K2-71 K2-82 K2-85	K2-93 K2-78 K2-88											
Excessive engine speed when accelerated in OD due to delayed kickdown																				
Does not shift from 2nd to 1st in L range																				
Excessive N to D range shift shock	1		5	2	4	7	8	5	2	9	10									
Excessive 1st to 2nd shift shock			6	1	5			7	2	4										8
Excessive 2nd to 3rd shift shock			5	1	5			7	2	4										9
Excessive 3rd to OD shift shock			5	1				6	2	4										7
Vehicle brakes when shifted from 1st to 2nd	1																			
Vehicle brakes when shifted from 2nd to 3rd	1																			2
Vehicle brakes when shifted from 3rd to OD	1																			2
Shift shock (H) when accelerator released and deceleration occurs				3	1			4	5	2	6									
Excessively large 2nd to 1st shift shock in L range											1									3
Vehicle brakes when shifted to R range	1 2							4		3	5									7
Excessively high 1st to 2nd, 2nd to 3rd, and 3rd to OD shift points			3		1	2		4	5											
Excessively high OD to 3rd, 3rd to 2nd, and 2nd to 1st shift points					2															
Excessively high or low lockup point					2				3	4										
Shifts directly from 1st to 3rd	1										2									3
Almost no shift shock or excessive slippage at 1st to 2nd shift	1				2					3	5									6
Almost no shift shock or excessive slippage at 2nd to 3rd shift	1				5					3	5									4
Almost no shift shock or excessive slippage at 3rd to OD shift	1				5					3	5									5

Inspection point and reference page	ON VEHICLE								OFF VEHICLE																												
	Preliminary	Electronic system				Hydraulic control system				Powertrain																											
Item	K2-42 K2-146	Section F2 Section G K2-36 K2-35	Section T Section F2 Section F2	Section F2 Section F2	K2-37 K2-38 Section G	K2-38 K2-39 K2-39	K2-38 K2-39 K2-39	K2-37 K2-38 K2-38	K2-27 K2-103 K2-59	K2-59 K2-59 K2-59	K2-61 K2-61 K2-65 K2-67 K2-85	K2-87 K2-85 K2-35 K2-83 K2-78 K2-83																									
	ATF level and condition Sensors and wiring loops	Idle speed and engine condition	Ignition switch and starter injector switch	Head switch	Cruise control switch	Airbrake pressure sensor idle switch	Throttle sensor	Speed sensor 1	A/F thermostat	Engine rpm sensor	Shift solenoid A	Shift solenoid B	Line pressure solenoid	Propeller governor	Lockup solenoid	Overrunning clutch solenoid	Line pressure	Contact valve body	N-D solenoid	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 end 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																						
	Engine overruns or slips when shifting 3rd to 2nd	1				2						4		3	5																						
	Engine overruns or slips when shifting OD to 3rd, or OD to 2nd	1				2						4		3	5																						
Noise	Lockup clutch (or torque converter) slips when locking	1				2						5	4	3	6									8													
	Transmission noisy in D, S, L and N ranges	1				3	4	5						2									9	10													
	Transmission noisy in D, S, L and R ranges	1				3	4	5															9	10													
Others	No engine braking in L range	2	1			3	4			5			7	6														8		9	10						
	Vehicle moves in P or parking gear not disengaged when P is disengaged	1																																			
	Transmission overheats while smoke discharged from exhaust while running	1	2			3						5			6								11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Abnormal odor from oil level gauge pipe																							11	12	13	14	15	16	17	18	19	20	21	22	23	24
Engine stalls when shifting to D, S, L, or R ranges	1												2		3																						

22-01K2-04

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		
83	LOCKUP SOLENOID	0.4sec. 2.0sec.	1.2sec. 0.4sec. 0.4sec. 4.0sec.
84	LINE PRESSURE SOLENOID		

04,PK1-015

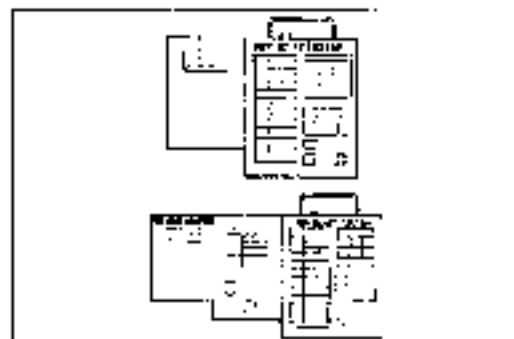


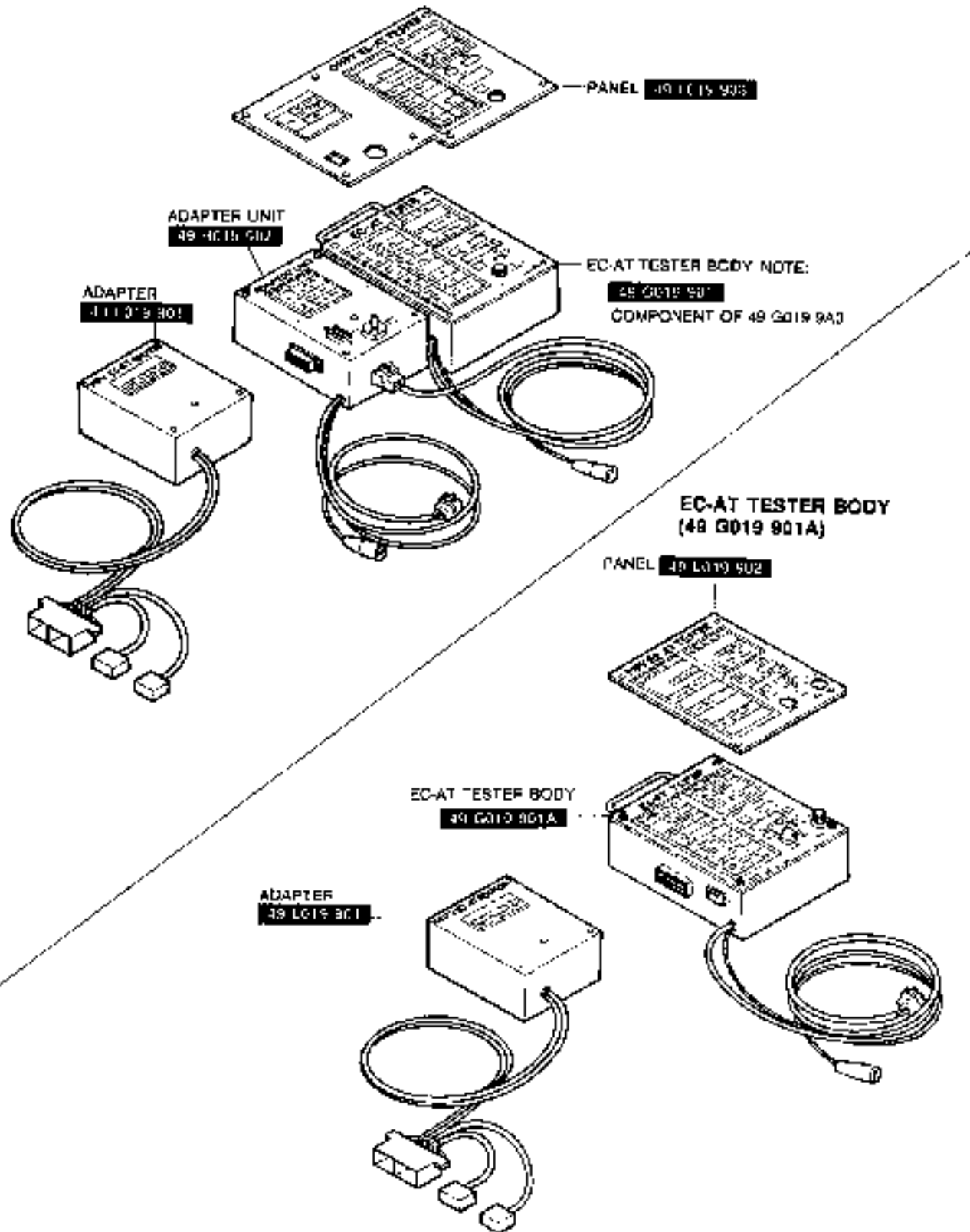
FIGURE 306

EC-AT TESTER

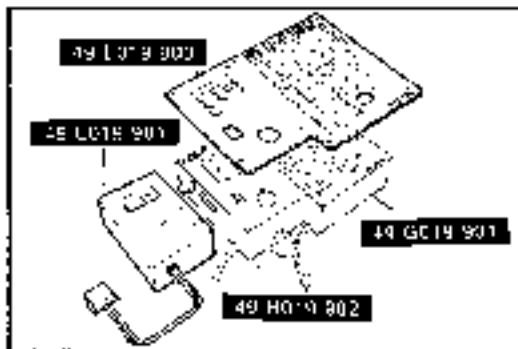
The previous **EC-AT Tester** can be used along with the **Adapter** (49 L019 901).

### Components

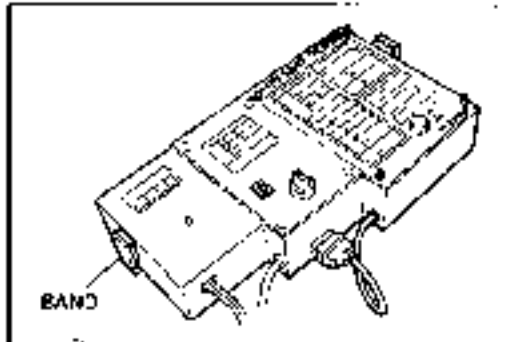
EC-AT TESTER BODY (49 G019 901) AND ADAPTER UNIT (49 H019 902)



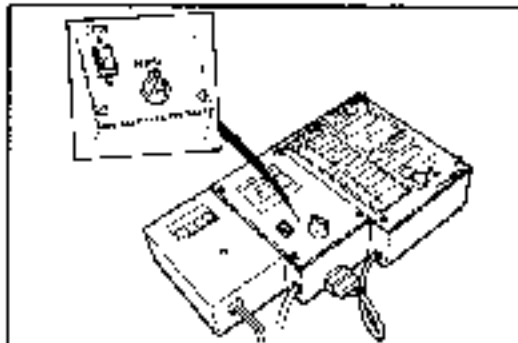
66-078 013



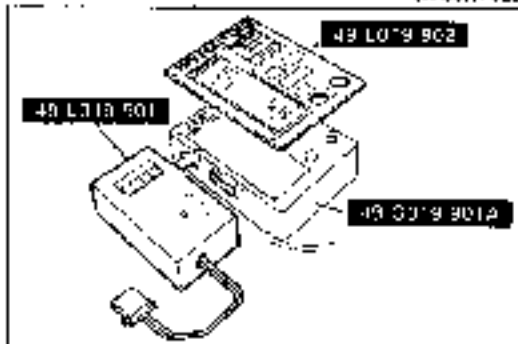
9VUCCK1-015



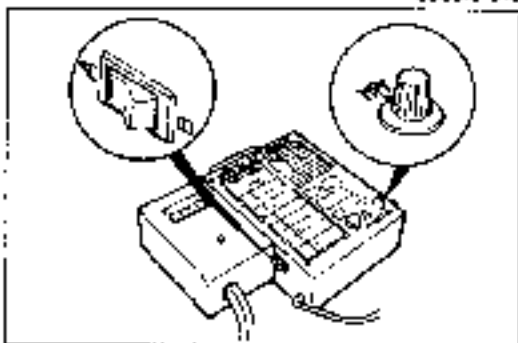
9VUCCK1-021



9VUCCK1-022



9VUCCK1-016



9VUCCK1-024

**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.**

- a. Select the select switch to the **MPV** position.

**For EC-AT tester body (49 G019 901A)**

1. Install the **adapter** (49 L519 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.

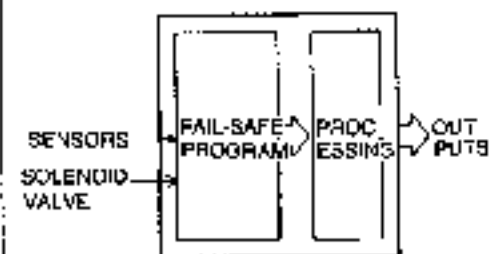
**06 → 4 SEC PERIOD →**  
**62 → 4 SEC PERIOD →**  
**64 → 4 SEC PERIOD →**  
**REPEATS ABOVE**

9M.041-005

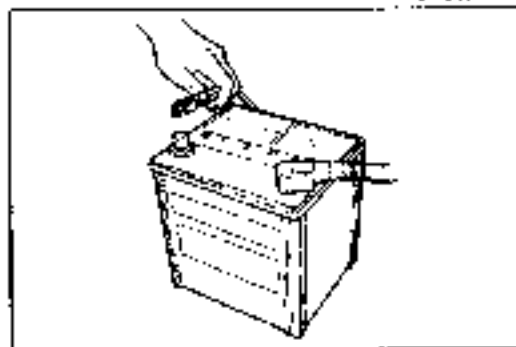
## CHECK CONNECTOR NOT GROUNDED



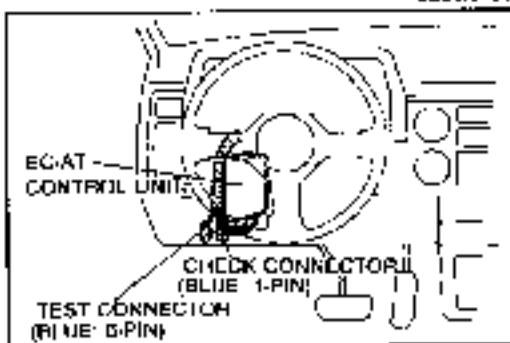
0VLCR-C28



5MUCK-1107



2B.0107-015



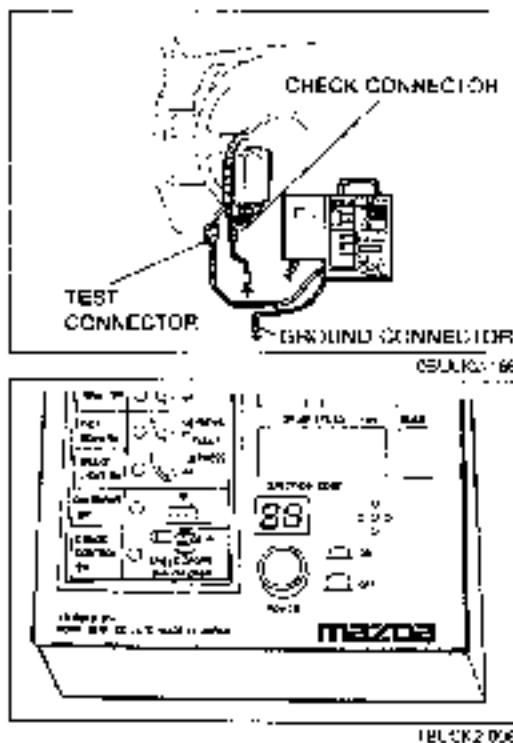
9M.0K-C28

## 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 as function 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.



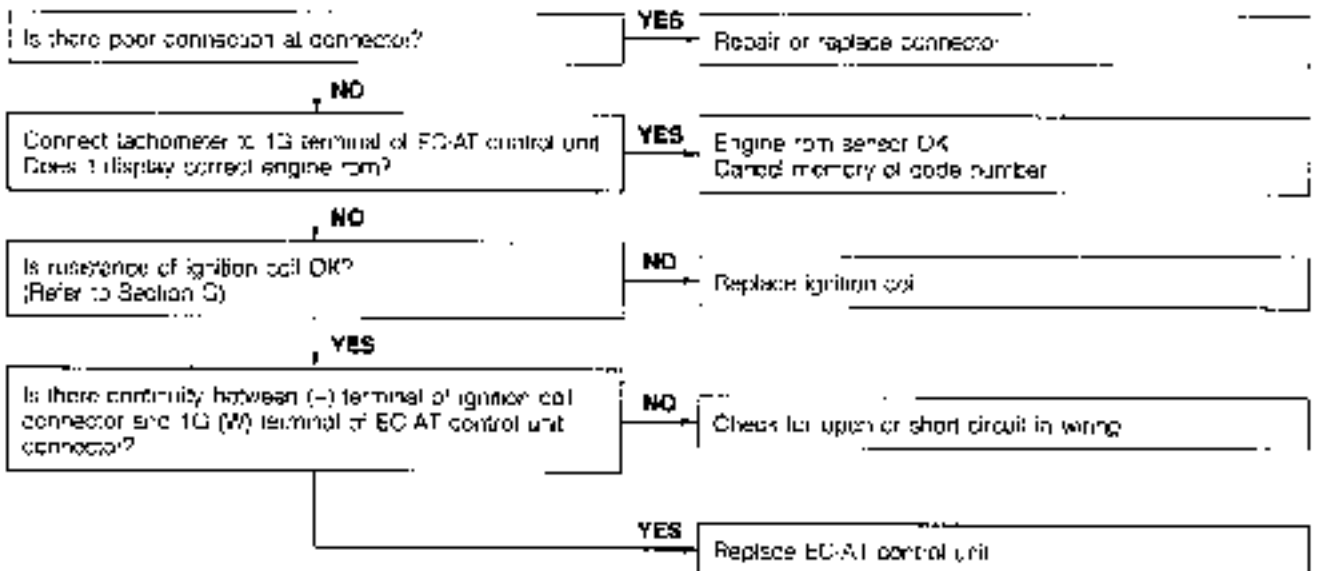
2. Connect the 6-pin connector of the **EC-AT Tester** to the test connector (Blue: 6-pin)
3. Ground the ground connector of the **EC-AT Tester**.
4. Ground the check connector (Blue: 1-pin).
5. Turn the ignition switch ON.
6. Check that "88" flashes on the digital display and that the buzzer sounds 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.)

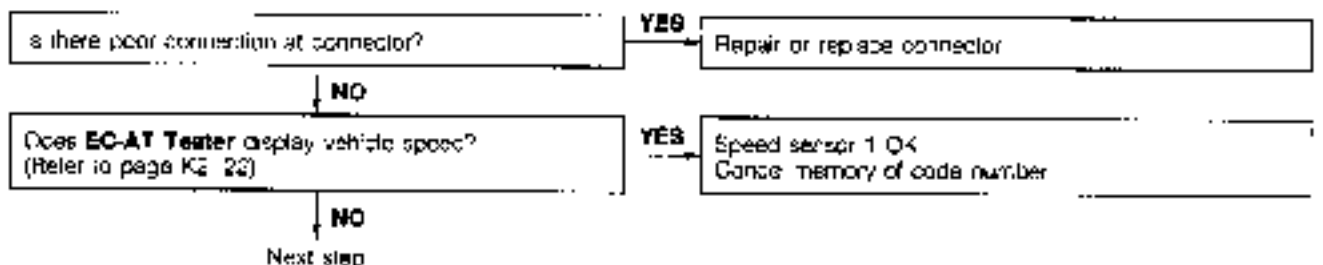
**INSPECTION PROCEDURES**

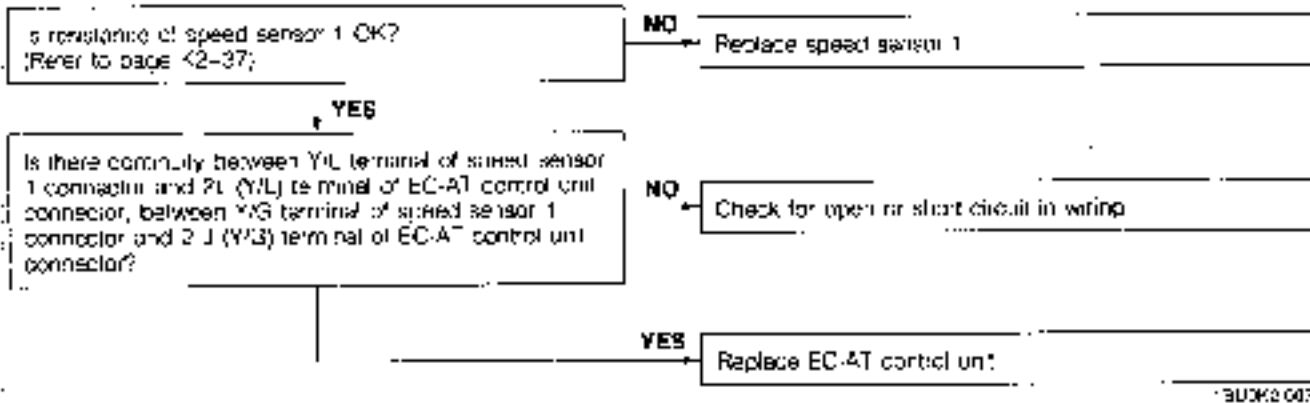
**No.01 Code Display (Engine RPM Sensor)**



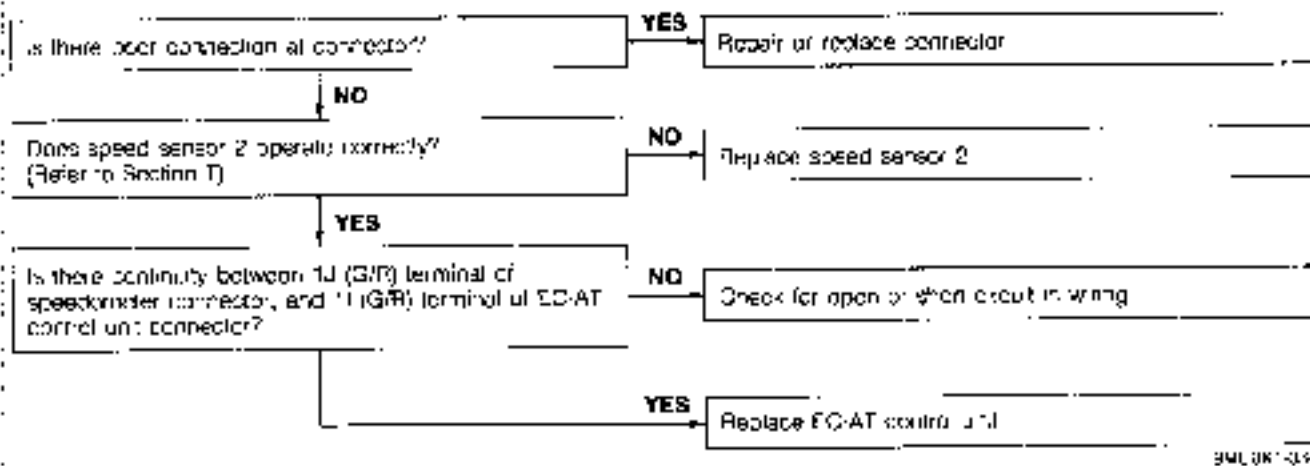
08U0K2 C19

**No.06 Code Display (Speed Sensor 1)**

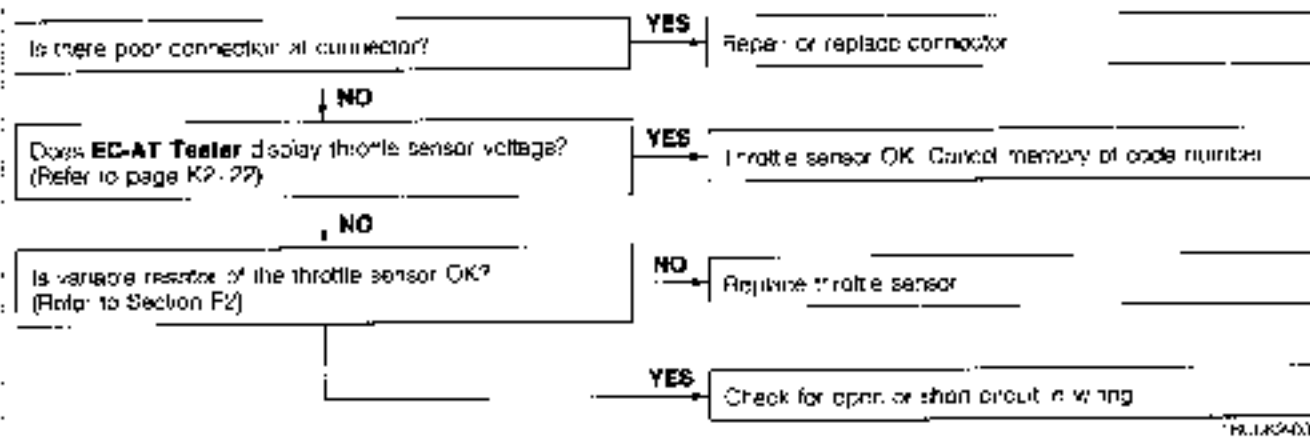




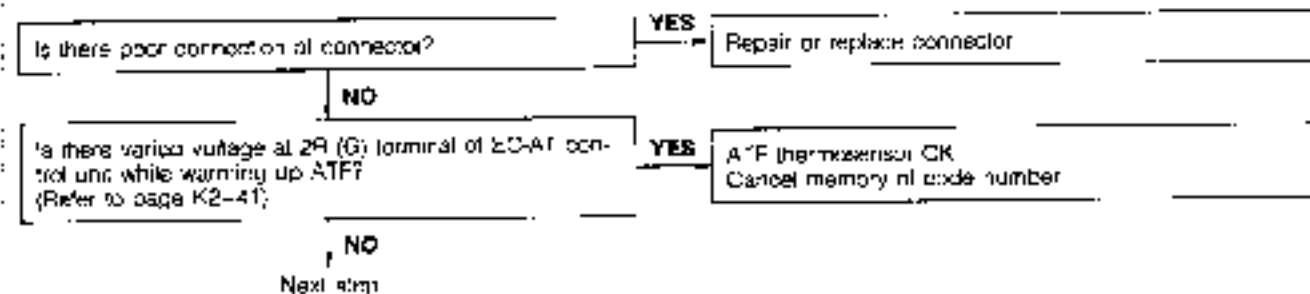
### No.07 Code Display (Speed Sensor 2)



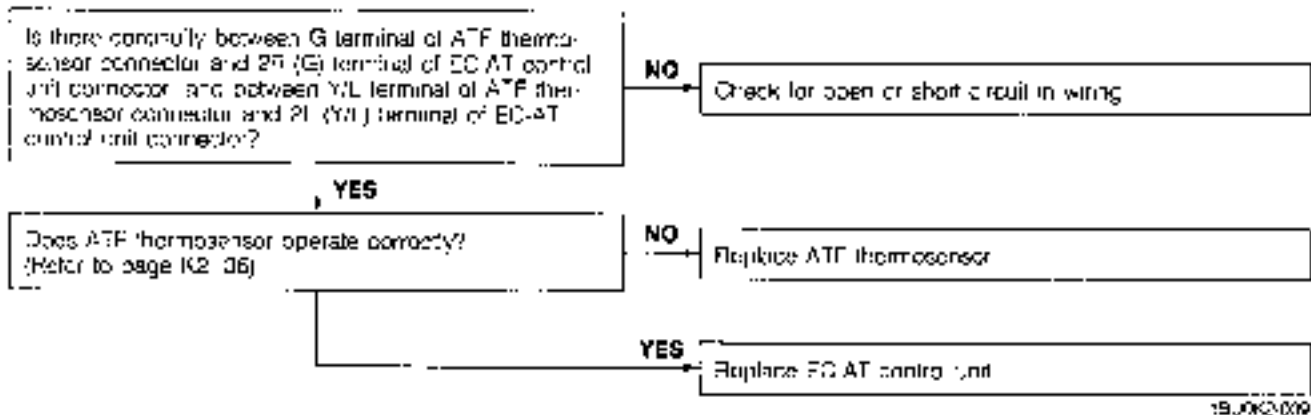
### No.12 Code Display (Throttle Sensor)



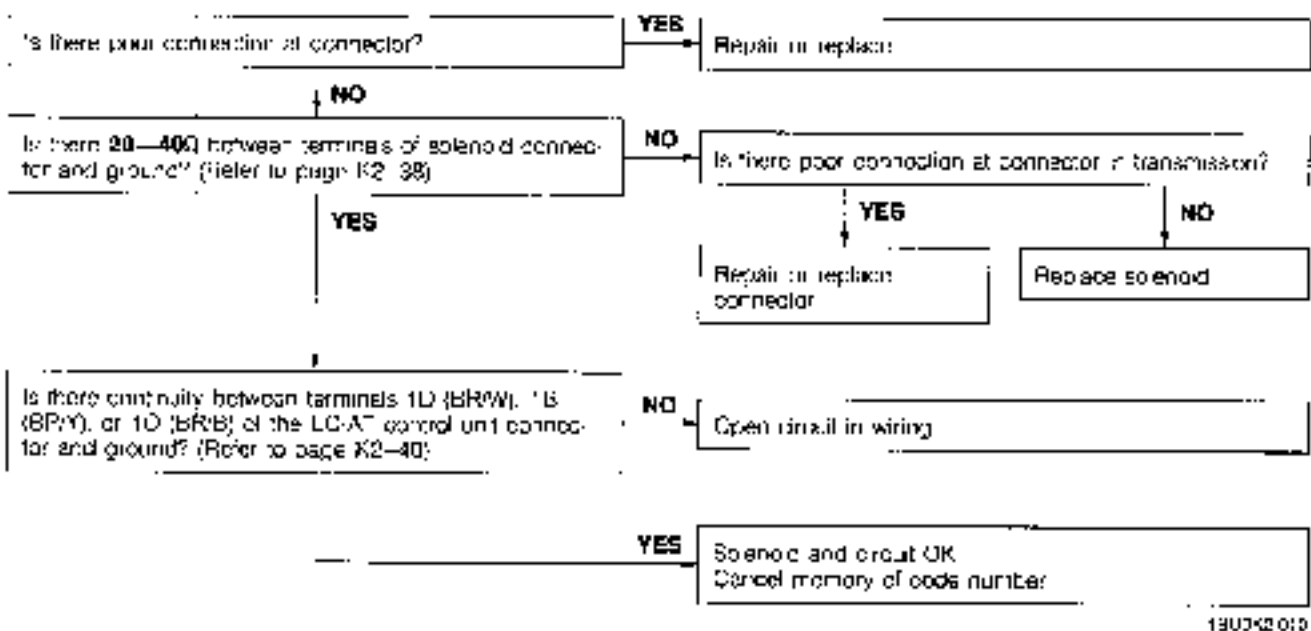
### No.56 Code Display (ATF Thermosensor)



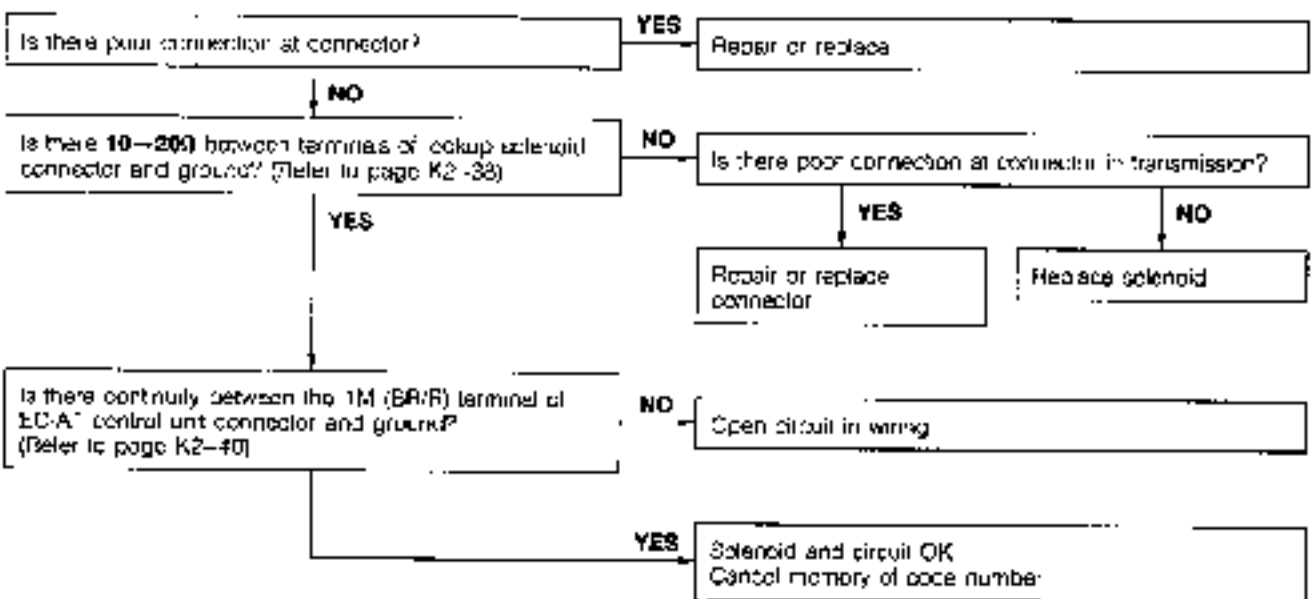




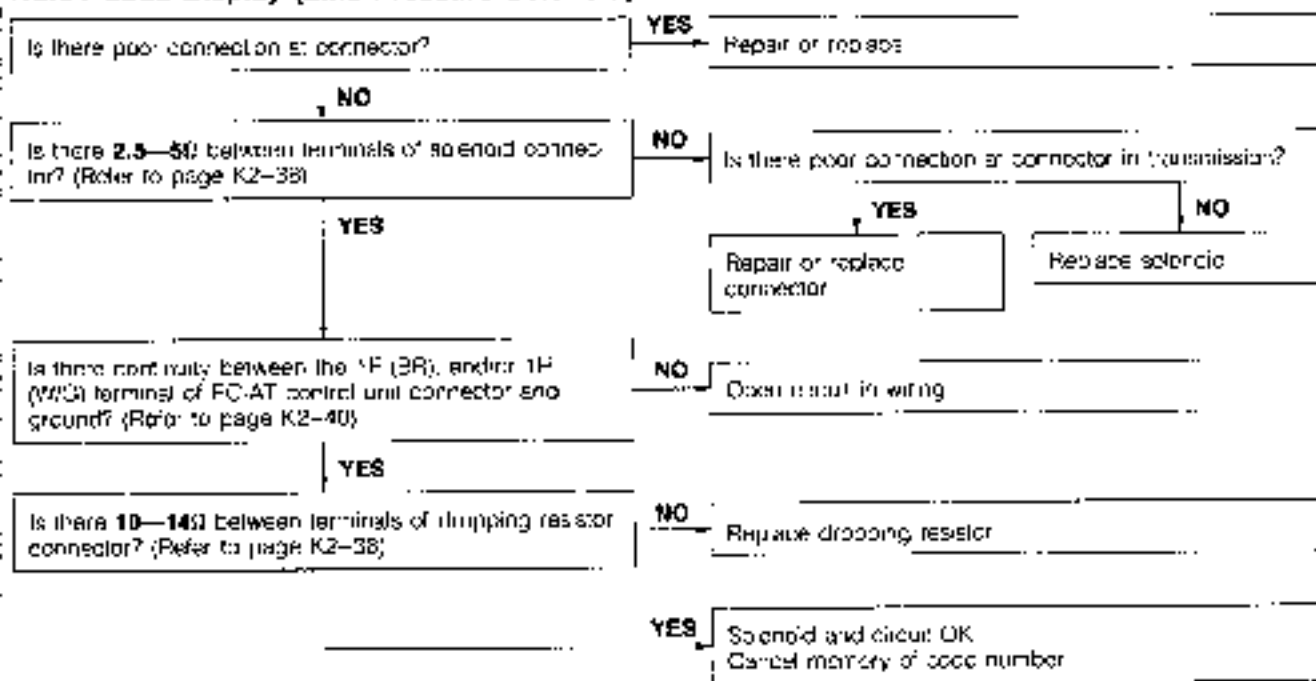
**No.60, 61, or 62 Code Display (Shift Solenoid A, Shift Solenoid B, or Overrunning Clutch Solenoid)**



**No.63 Code Display (Lockup Solenoid)**



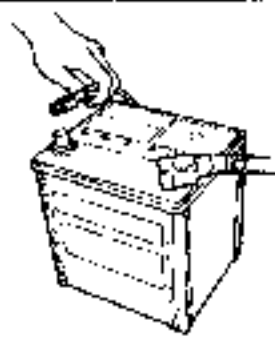
### No.64 Code Display (Line Pressure Solenoid)



15LCK2-012

### 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.
3. Drive the vehicle at 50 km/h (31 mph), then depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.
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.



23U0K9-006

**DRIVE AT 50 km/h (31 mph)**

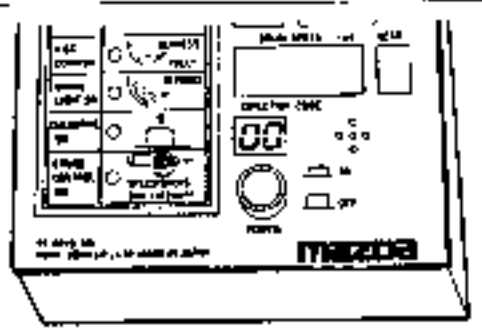
↓

**KICKDOWN**

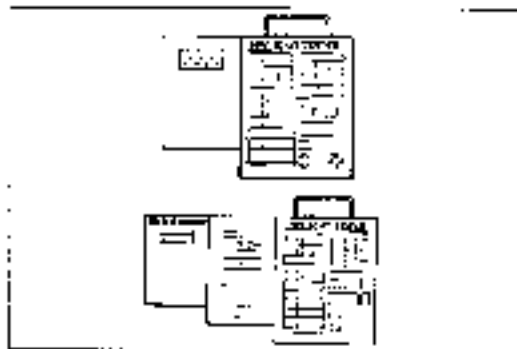
↓

**STOP THE VEHICLE**

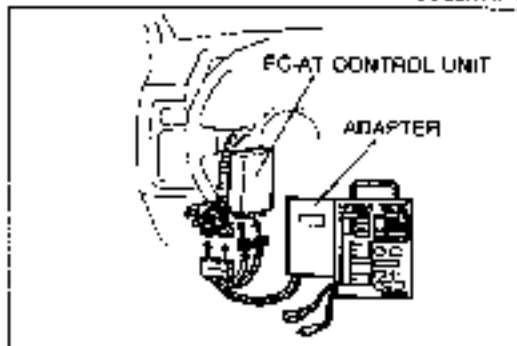
7950-01-008



5MUDK1-404



9VLEK1-2A1



1B,K1K2-013

## 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, R	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 mm-Hg (26.73 in-Hg) which is approximately at 1,500 m (4,921 ft)	Atmospheric pressure sensor (in engine control unit) or wiring		
	OFF	Atmospheric pressure above 679 mm-Hg (26.73 in-Hg)			

## 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 and 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	ECM control unit terminal voltage	Constant	* Throttle sensor or wiring	
VEHICLE SPEED	Vehicle speed table selector speed sensor 1 signal	Constant	Speed sensor 1 or wiring	
ENGINE RPM		Not used	—	
<b>Output (Light)</b>				
FUNCTION	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	




1800K2-01

**Note**

\* : Items should be checked with engine running or while driving.

## MECHANICAL SYSTEM TEST

PREPARATION  
SST

<p>49 C379 400A</p> <p>Gauge set, of pressure</p> 	<p>49 H019 002</p> <p>Adaptor</p> 	<p>49 B019 901</p> <p>Gauge, of pressure</p> 
---	--	--

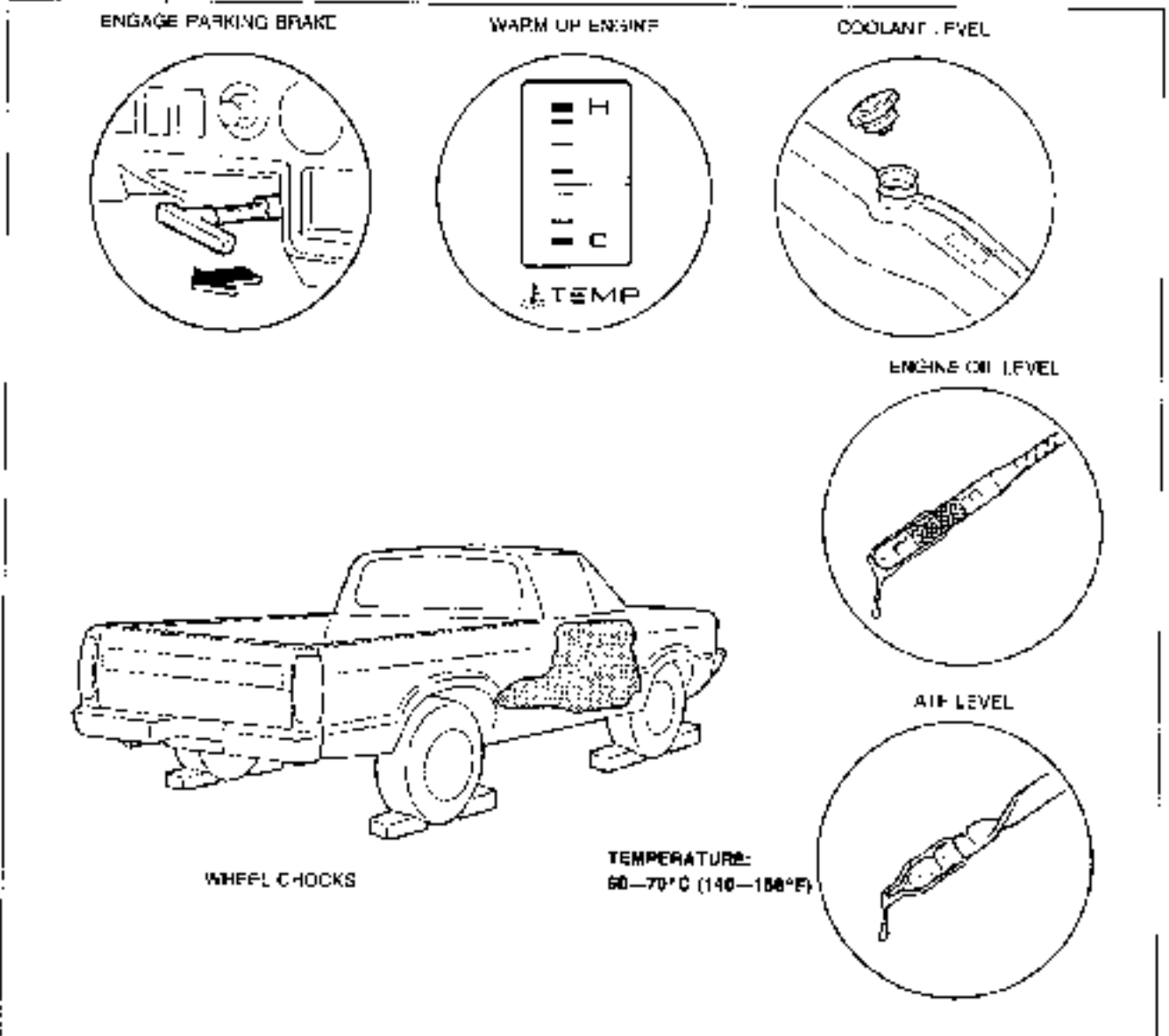
10-00040-02

## STALL TEST

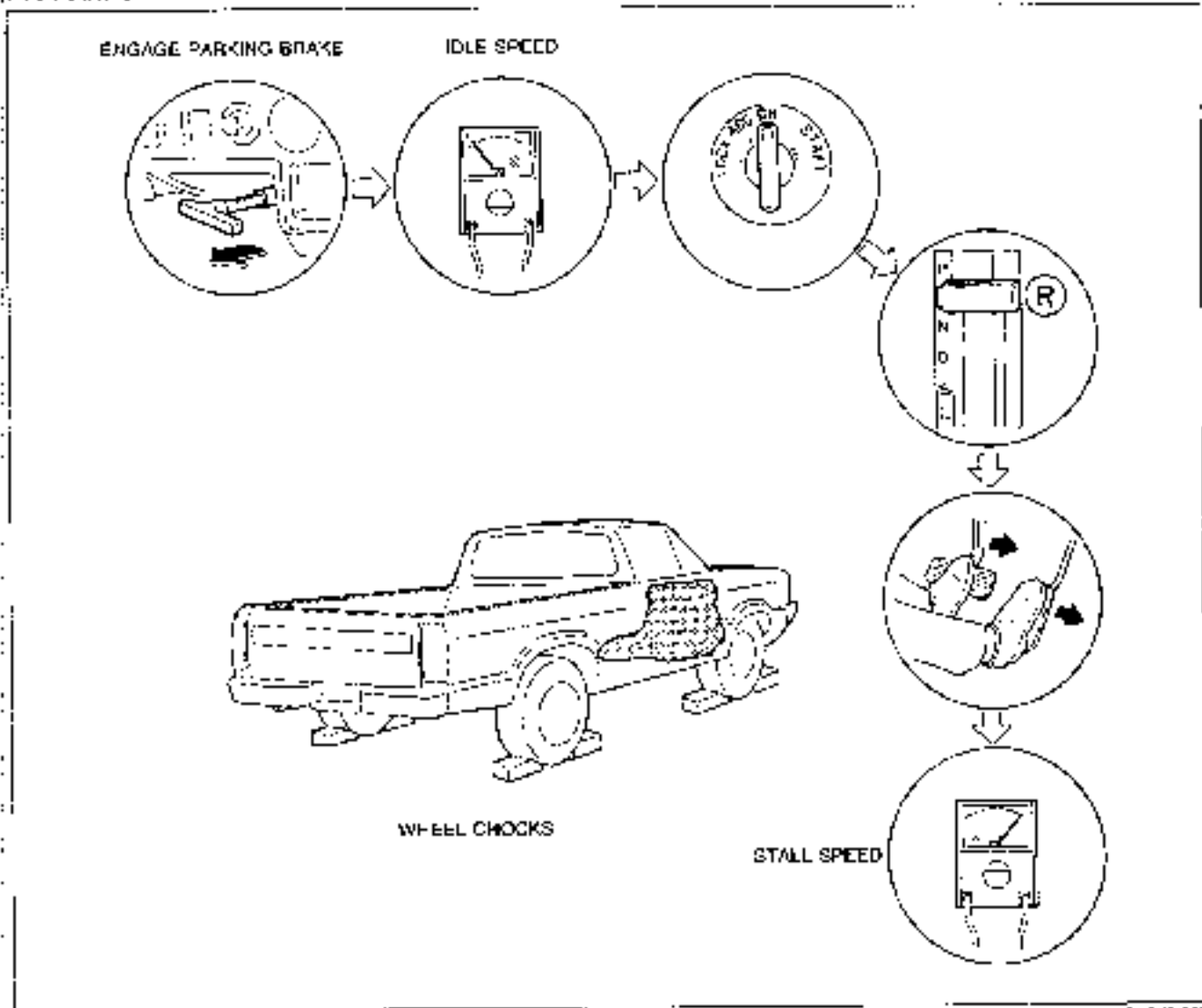
This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

## 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



28-1002-007

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**

9M,081-047

**Evaluation of Stall Test**

Condition		Possible cause
Above specification	In all ranges	Insufficient line pressure <ul style="list-style-type: none"> <li>Worn oil pump</li> <li>Oil leakage from oil pump, control valve, and/or transmission case</li> <li>Stuck pressure regulator valve</li> </ul>
		In D and S ranges <ul style="list-style-type: none"> <li>Forward clutch slipping</li> <li>Forward one-way clutch slipping</li> <li>Low one-way clutch spring</li> </ul>
	In R range <ul style="list-style-type: none"> <li>Low and reverse brake slipping</li> <li>Reverse clutch slipping</li> <li>Perform road test to determine whether problem is low and reverse brake or reverse clutch                             <ul style="list-style-type: none"> <li>a) Engine brake applied in L range 1st                                     <ul style="list-style-type: none"> <li>...Reverse clutch</li> </ul> </li> <li>b) Engine brake not applied in L range 1st                                     <ul style="list-style-type: none"> <li>...Low and reverse brake</li> </ul> </li> </ul> </li> </ul>	
Within specification	All shift control elements within transmission are functioning normally	
Below specification	Engine out of tune	
	One-way clutch slipping within torque converter	

9M,081-046

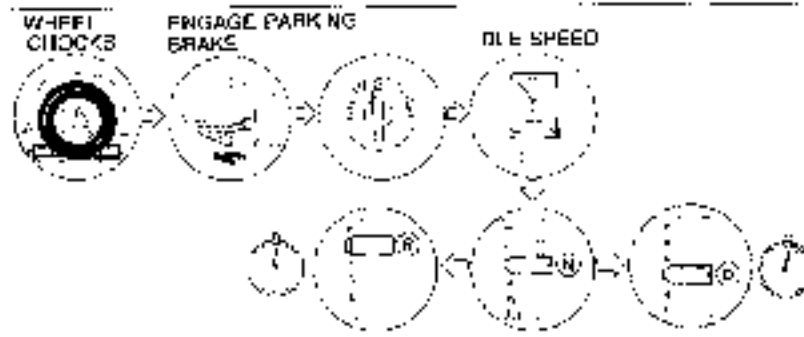
### TIME LAG TEST

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



2B JK7 00H

1. Start the engine and check the idle speed on P range. (Refer to Section F-2.)

**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

2B JK7 00H

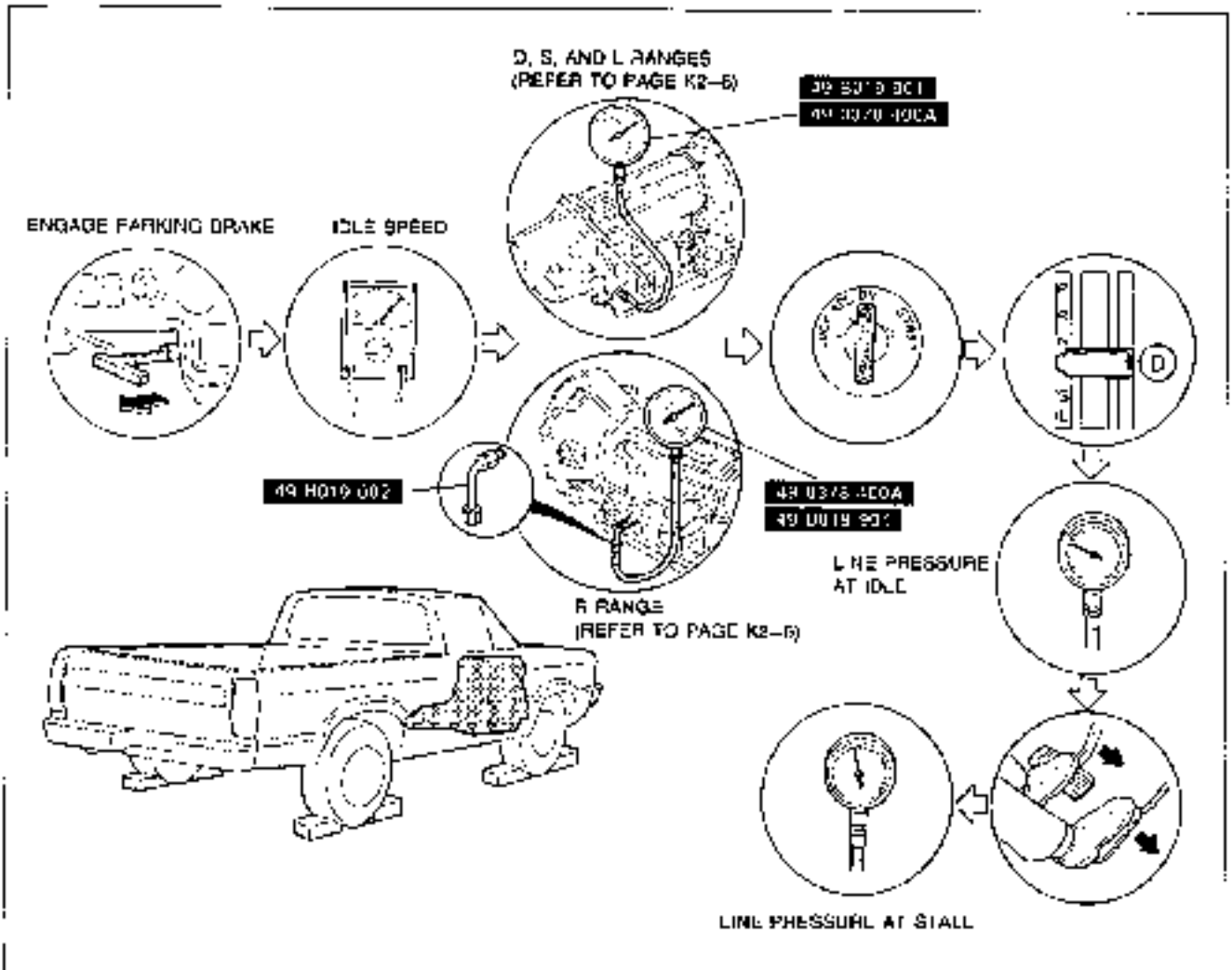


**LINE PRESSURE TEST**

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**

20U0K2-006

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.**

6. 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 start speed for each range in the same manner.

**Specified line pressure:**

Range	Line pressure kPa (kg/cm <sup>2</sup> , psi)	
	Idle	Start
D, S, L	432—471 (4.4—4.8, 63—68)	1,040—1,118 (10.6—11.4, 151—162)
R	598—633 (6.1—6.5, 87—92)	1,452—1,530 (14.8—15.6, 210—222)

26L30K2 C33

7. Install new plugs in the inspection ports.

**Tightening torque: 4.9—9.8 Nm (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 (fluid mode only)	Fluid leaking from hydraulic circuit of band servo 2nd apply side
	Low pressure in L 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 thermostat 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

9M1U3K1 053

## ROAD TEST

**Caution**

Perform the test at normal ATF operating temperature (50--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.

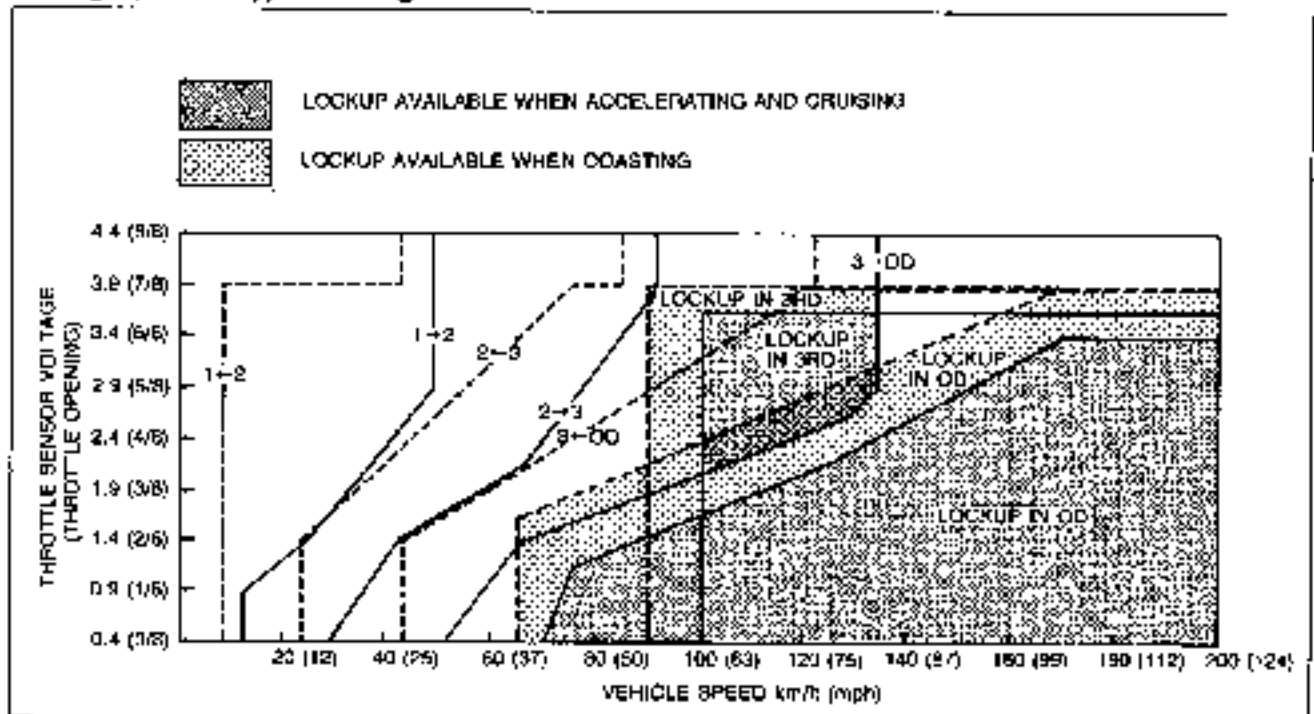
b) There is no overdrive when the ATF temperature is below 10°C (50°F).

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.

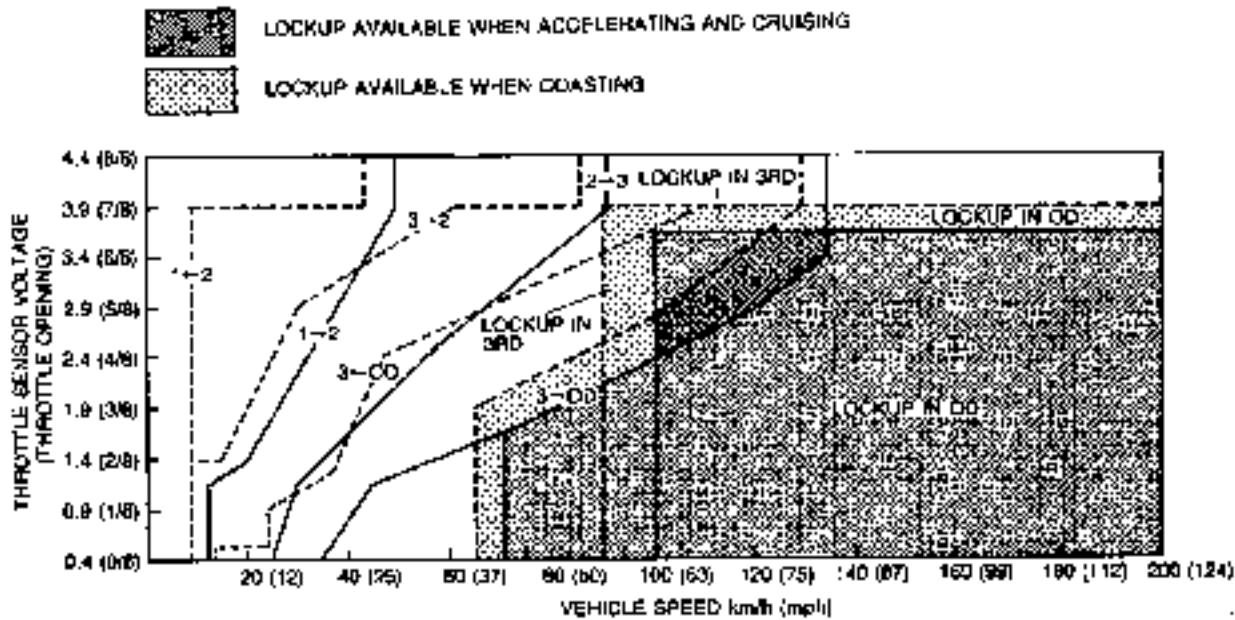
d) There is no overdrive when ATF temperature is below 40°C (104°F).

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**

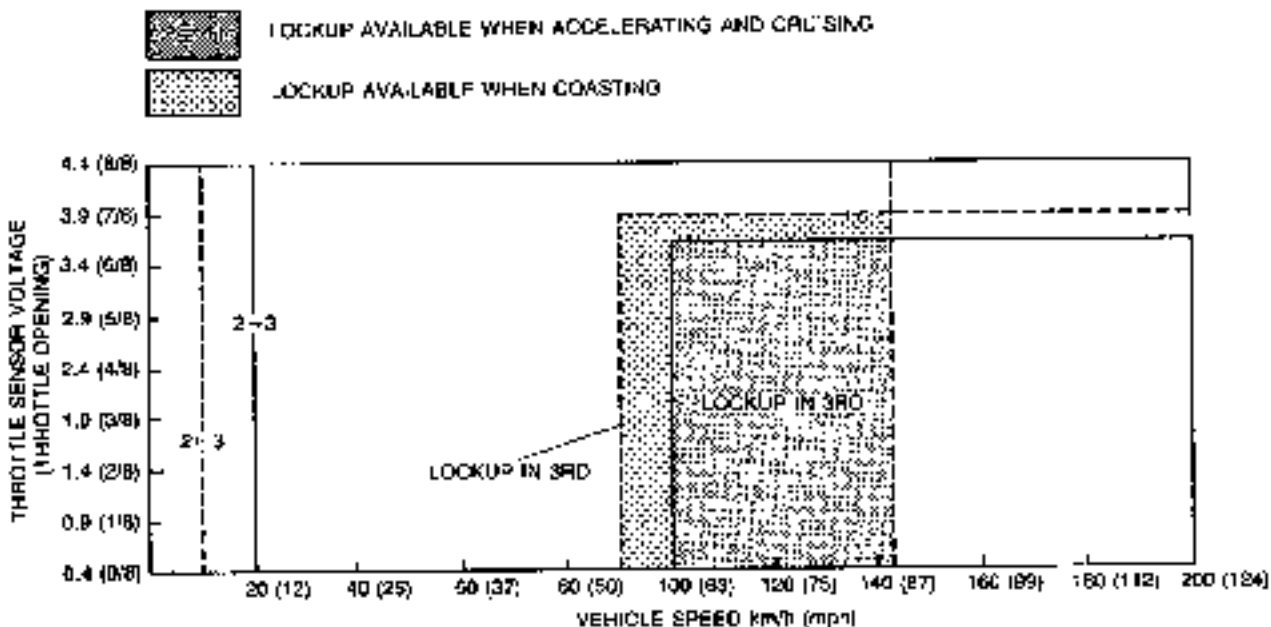
### D range (Power) shift diagram



CPLOCK752

- Select the Hold mode.
- Accelerate the vehicle; check 2-3 up- and downshifts and lockup and that 1st or OD is obtained. The 2-3 shift points are as shown in the D range (Hold) shift diagram.
- 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



79507C 084

## 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
	Intermittent shift points	Throttle sensor out of adjustment Speed sensor 1 not operating properly
Shift shock left 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	

RMU141-036

**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.)

18JJD-001-A

**5 RANGE TEST****Shift Pattern**

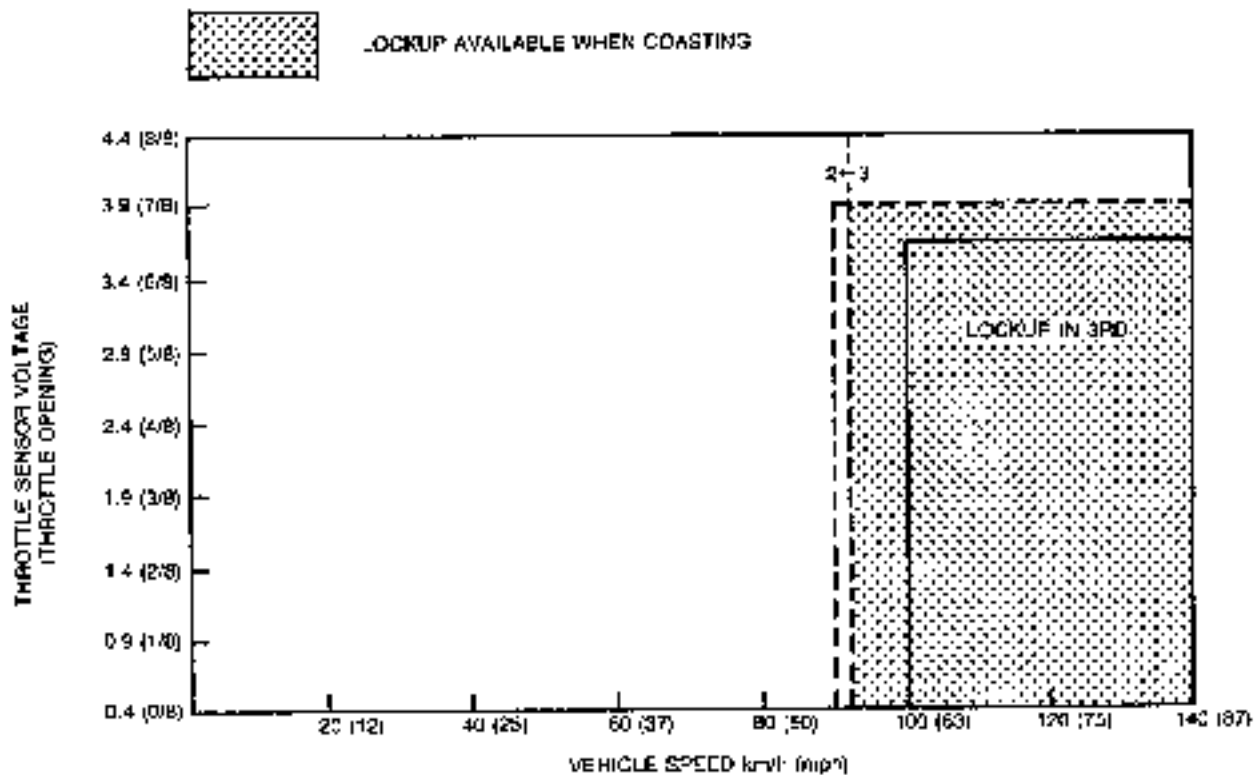
1. Shift the selector lever to S range.
2. Accelerate the vehicle, check that 1-2 and 2-3 up- and downshifts, and lockup are obtained and that no OD is obtained.
3. Decelerate the vehicle and check that engine braking effect is felt in only 3rd and 2nd gear when throttle opening less than 1/8.

**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.
1. 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.
  2. Accelerate the vehicle in S range (Hold mode) and check that 2nd gear is held.
  3. Decelerate the vehicle and check that engine braking effect is felt when throttle opening less than 1/8.

**5 range (Hold) shift diagram**

CBLCK2 C34



JUS37C 475

**Noise and Vibration**

1. 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**

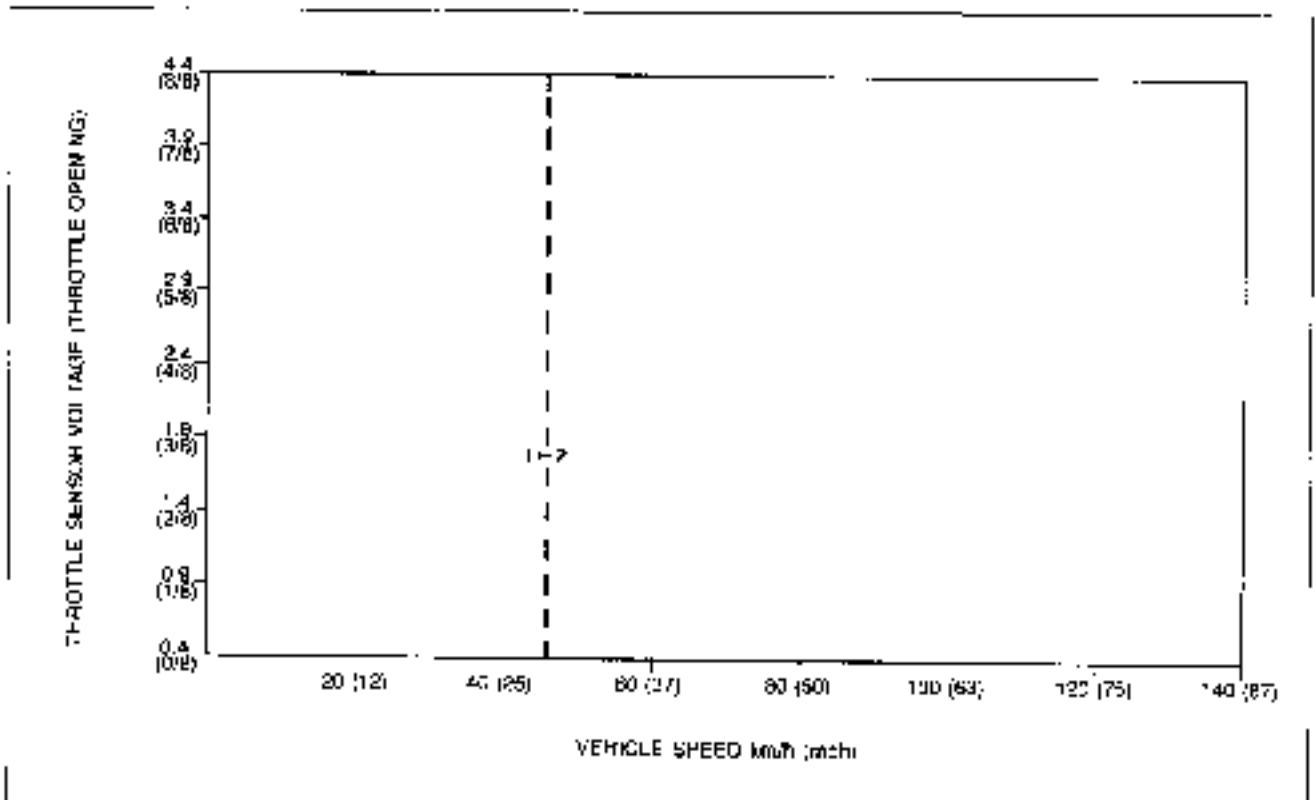
1. Shift the selector lever to L range.
2. Accelerate the vehicle and check that the 1-2 up- and downshifts are obtained and that no 3rd gear, overdrive, or lockup is obtained.

**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**

09U-1K2-336

**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 stops.

SMUCK1.050

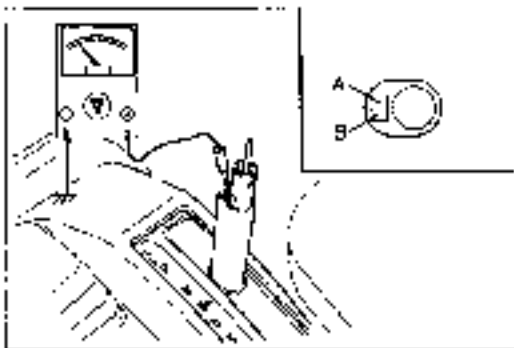
K2-33

Vehicle Speed at Shiftpoint Table

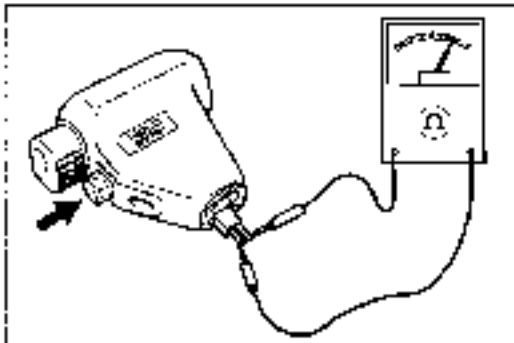
Mode	Range	Throttle condition (Throttle sensor voltage)	SHIF	Vehicle speed km/h (mph)
Normal (Power)	D	Fully opened (4.4 volt)	D <sub>1</sub> → D <sub>2</sub>	47-51 (29-32)
			U <sub>2</sub> → U <sub>1</sub>	87-95 (54-59)
			D <sub>2</sub> → OD	20-139 (80-86)
			U <sub>1</sub> → D <sub>1</sub>	39-43 (24-27)
			D <sub>2</sub> → D <sub>3</sub>	66-72 (41-45)
		Half throttle (1.6-2.2 volt)	Lockup ON (D <sub>2</sub> )	56-104 (60-64)
			D <sub>2</sub> → OD	111-119 (69-74)
			Lockup ON (OD)	125-136 (79-84)
			Lockup OFF (OD)	96-104 (60-64)
			OD → D <sub>3</sub>	71-79 (44-49)
	Kickdown	Fully opened (4.4 volt)	Lockup OFF (U <sub>2</sub> )	86-94 (53-58)
			D <sub>1</sub> → D <sub>2</sub>	42-48 (26-30)
			OD → D <sub>3</sub>	24-134 (17-83)
			OD → D <sub>2</sub>	51-89 (30-55)
			OD → D <sub>1</sub>	41-45 (25-28)
		Half throttle (1.6-2.2 volt)	D <sub>3</sub> → D <sub>2</sub>	51-89 (30-55)
			D <sub>2</sub> → D <sub>1</sub>	41-45 (25-28)
			D <sub>2</sub> → D <sub>1</sub>	41-45 (25-28)
			D <sub>1</sub> → D <sub>2</sub>	47-51 (29-32)
			D <sub>2</sub> → D <sub>3</sub>	87-95 (54-59)
Normal (Economy)	D	Fully opened (4.4 volt)	D <sub>2</sub> → OD	129-139 (80-86)
			D <sub>1</sub> → D <sub>2</sub>	30-34 (19-21)
			D <sub>2</sub> → D <sub>1</sub>	52-59 (32-36)
			D <sub>3</sub> → OD	86-104 (60-64)
			Lockup ON (OD)	96-104 (60-64)
		Half throttle (1.6-2.2 volt)	Lockup OFF (OD)	51-89 (30-55)
			OD → D <sub>3</sub>	43-51 (27-32)
			D <sub>2</sub> → D <sub>1</sub>	22-28 (14-17)
			OD → D <sub>2</sub>	124-134 (77-83)
			OD → U <sub>2</sub>	51-99 (30-55)
Normal	S	Fully opened (4.4 volt)	OD → D <sub>1</sub>	41-45 (25-28)
			D <sub>2</sub> → D <sub>1</sub>	81-89 (50-55)
			D <sub>1</sub> → D <sub>1</sub>	41-45 (25-28)
			U <sub>2</sub> → D <sub>1</sub>	41-45 (25-28)
			S <sub>1</sub> → S <sub>2</sub>	47-51 (29-32)
		Half throttle (1.6-2.2 volt)	S <sub>2</sub> → S <sub>1</sub>	87-95 (54-59)
			S <sub>2</sub> → S <sub>1</sub>	62-89 (51-55)
			S <sub>1</sub> → S <sub>1</sub>	41-45 (25-28)
			S <sub>1</sub> → S <sub>2</sub>	38-43 (24-27)
			S <sub>2</sub> → S <sub>2</sub>	66-72 (41-45)
Normal	L	Fully opened (4.4 volt)	S <sub>2</sub> → S <sub>2</sub>	41-47 (25-29)
			L <sub>1</sub> → L <sub>2</sub>	47-51 (29-32)
			L <sub>2</sub> → L <sub>1</sub>	41-45 (25-28)
			L <sub>1</sub> → L <sub>1</sub>	38-43 (24-27)
			D <sub>2</sub> → D <sub>1</sub>	10-22 (11-14)
		Half throttle (1.6-2.2 volt)	L <sub>2</sub> → D <sub>2</sub>	7-13 (4-8)
			OD → D <sub>2</sub>	138-140 (86-92)
			S <sub>1</sub> → S <sub>1</sub>	88-96 (55-60)
			L <sub>2</sub> → L <sub>1</sub>	44-48 (27-30)
			FOLD	D

120K2-3-00





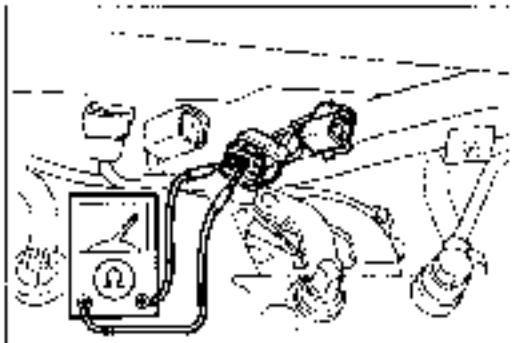
98L1K2 010



98L1K2 021



98L1K2 026



98L1K2 027

## 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.

Vs: Battery voltage

Terminal	Terminal voltage
A and ground	0V
B and ground	Vs

4. If correct, check continuity between the terminals.
5. If not correct, check the wiring harness

**Continuity**

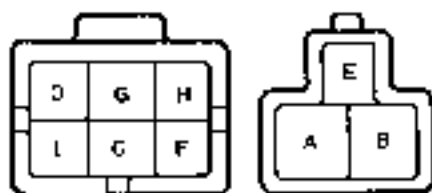
1. Check continuity of the terminals.

Continuity	Switch
Yes	Released
No	Depression

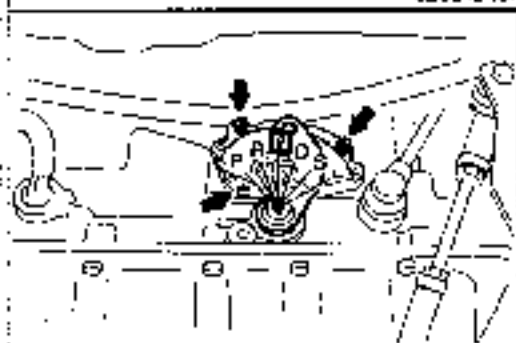
2. If not correct, replace the selector lever knob
3. If not correct, replace the change knob as an assembly.

**INHIBITOR SWITCH****Inspection****Operation**

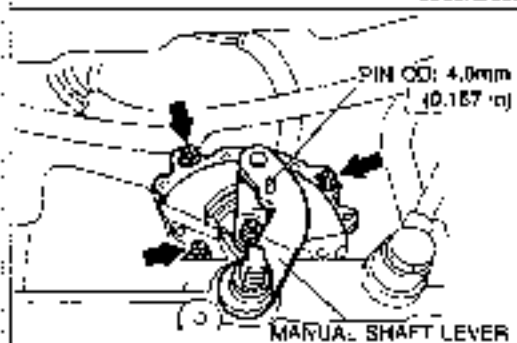
1. Check that the starter operates with the ignition switch at START position and the selector lever in P and N range only and that it does not operate in any other position.
2. Check that the back-up lights illuminate when shifted to the R range with the ignition switch in the ON position.
3. Check the inhibitor switch if it is not as specified.



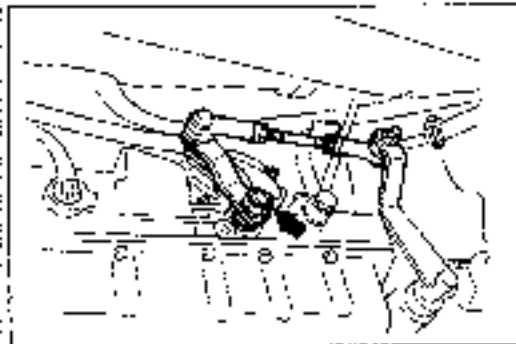
09UJ2-167



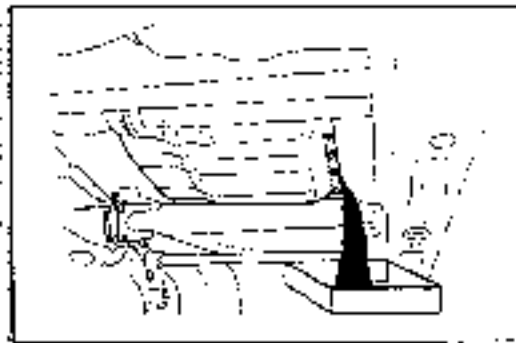
29L0K2-039



29L0K2-011



09L0K1-071



3MUG-1-072

**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	○—○		○—○						
H			○—○	○—○					
N	○—○		○—○		○—○				
L			○—○				○—○		
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.

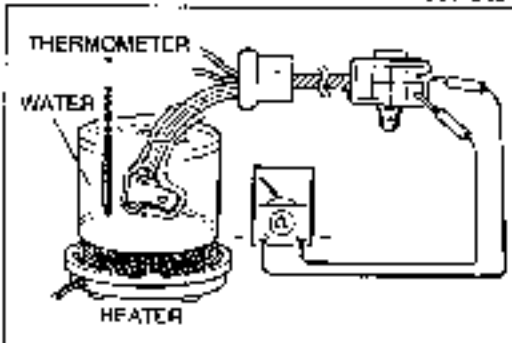
7. Connect the control linkage.

**Tightening torque:****29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)****ATF THERMOSENSOR****Inspection**

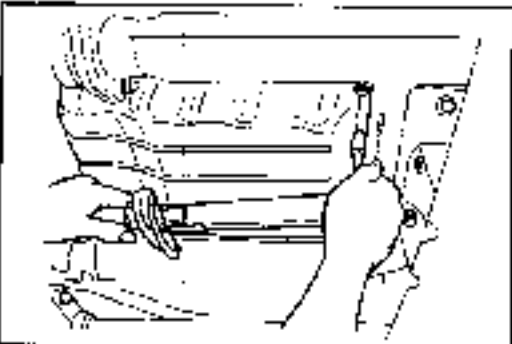
1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts, and drain the ATF into a suitable container.



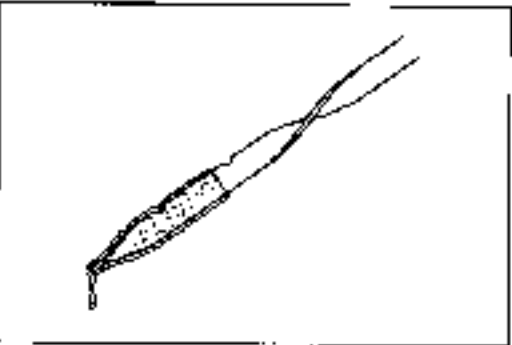
13U042-02\*



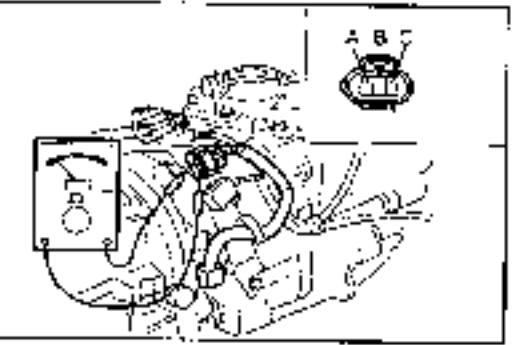
9M110K-0124



1BUCK2-092



1ELIC-09-402\*



12AU1K1 077

- Remove the oil pan.
- Remove the control valve body and solenoid connector. (Refer to page K2-124.)

- Place the ATF thermosensor in water with a thermometer as shown and heat the water gradually.
- 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

- Install the solenoid connector and control valve body. (Refer to page K2-126.)
- Install the oil pan.

**Tightening torque:**

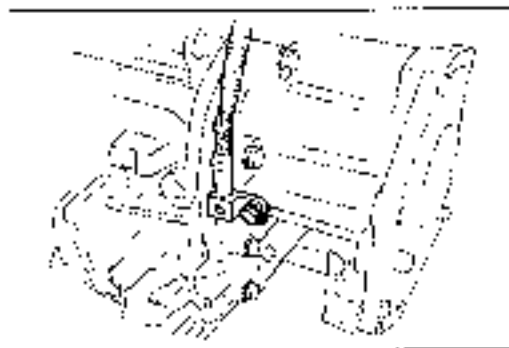
4.9–7.8 Nm (50–80 cm-kg, 43–69 in-lb)

- 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**

- Jack up the vehicle and support it with safety stands.
- Disconnect the connector.
- Measure the resistance between the terminals:

Terminal	Resistance
A and B	304–51Ω
B and C	∞
A and C	∞

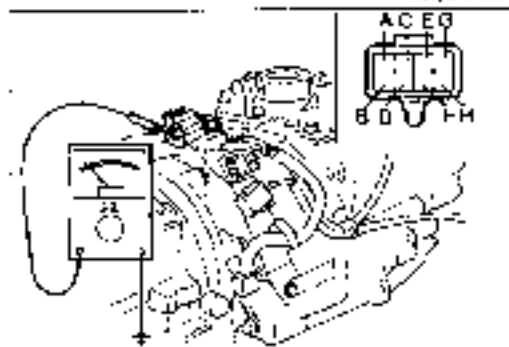


9VUJK1479

4. If not correct, replace the speed sensor 1.

**Tightening torque:**

4.9—5.9 Nm (50—70 cm·kg, 43—61 in·lb)



9H1J0K2342

**SOLENOID VALVES****Inspection**

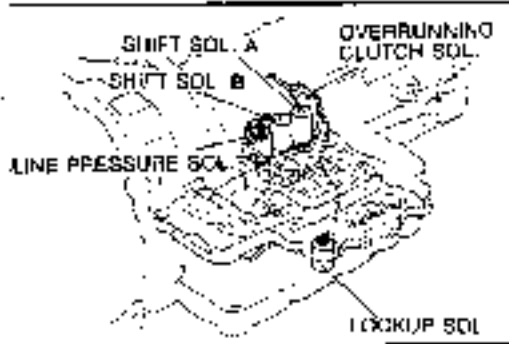
1. Jack up the vehicle and support it with safety stands.
2. Disconnect the connector.
3. Measure the resistance between the terminals.

**Note**

a) Terminal A: ATF thermoswitch

b) Terminal G, H: ATF thermosensor

Terminal	Connected to	Resistance
R	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

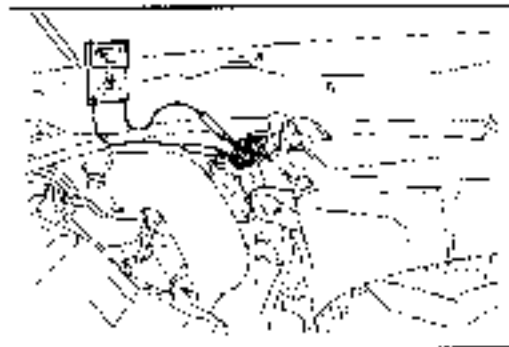


9H1J0K138C

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.



9H1J0K1081

**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.

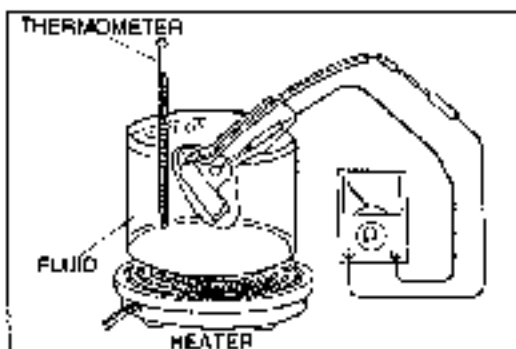
**ATF THERMOSWITCH****Inspection**

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 43°C (103°F)	No



13LJK1074

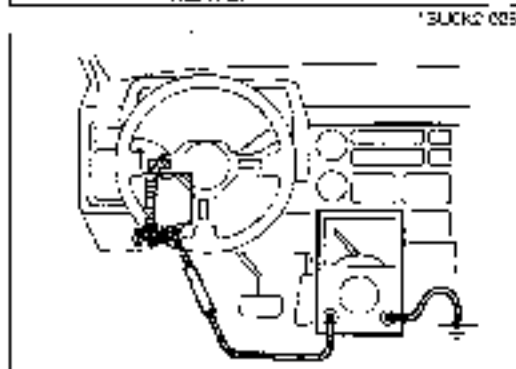


5. If not correct, replace the ATF thermoswitch.
6. Install the ATF thermoswitch and connect the connector.

**Tightening torque:**

**6.9—8.8 Nm (70—90 cm·kg, 51—78 in·lb)**

7. Add ATF to the correct level. (Refer to ATF thermosensor inspection: page K2-36, Steps 8, 9.)



**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**

29	2Q	2O	2M	2K	2I	2G	2C	2G	2A	10	1M	1K	1I	1G	1E	1C	1A
21	2R	2P	2N	2L	2J	2H	2F	2D	2B	1P	1N	1L	1J	1H	1F	1D	1B

RM10F1-052

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)	Shif 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	—	—	Ground	—	—
1D (Output)	Shif solenoid A	1D		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	Ground	V <sub>B</sub>	R range
				0V	Other ranges
1F (Output)	Line pressure solenoid	1F	Ground	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	Ground	Above 1V (AC)	Engine running
				Below 0.5V (AC)	Engine stopped
1H (Output)	Drooping resistor	1H	Ground	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)	Spec sensor 2	1I	Ground	Approx 2—3V	White driving
				0V or 4.5—5.5V	Vehicle stopped
1J (Ground)	—	1J	Ground	0V	Constant
1K (Output)	Hold indicator	1K		V <sub>B</sub>	Power or Economy mode
				0V	Hold mode
1L (Ground)	—	1L	Ground	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	Ground	V <sub>B</sub>	Ignition switch ON
				0V	Ignition switch OFF
1O (Output)	Overrunning clutch solenoid	1O	Ground	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	Ground	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	—	—	Ground	—	—
2D (Input)	Inhibitor switch (N and P ranges)	2D		V <sub>B</sub>	Except P or N ranges
				0V	P or N range
				Below 7V	P or N range and engine crank

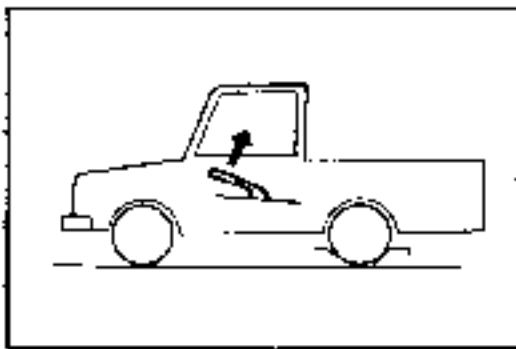
\* Checked with AC range

Vb: Battery voltage

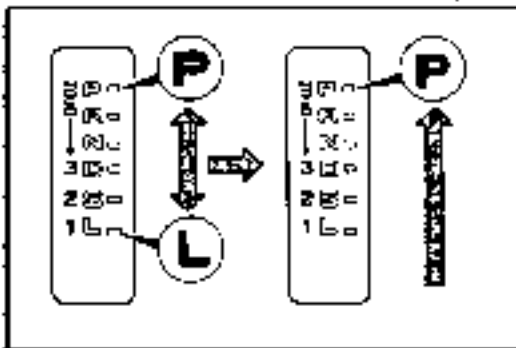
Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	- terminal		
2F (Input)	Cruise control unit	2E	Ground	Above 6V	Normal condition
				Below 1.5V	Set or Resume switch ON or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle cruise control operation)
2F	—	—	—	—	—
2G	Engine 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	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	1 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)
				Vb	S range
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

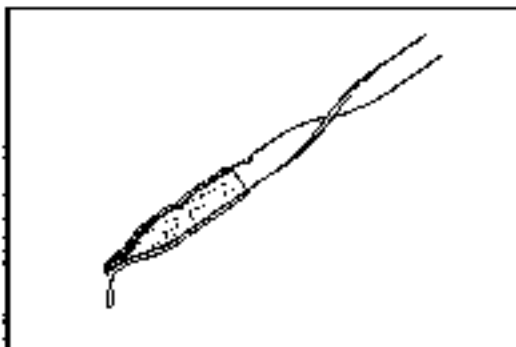
1509K2-012



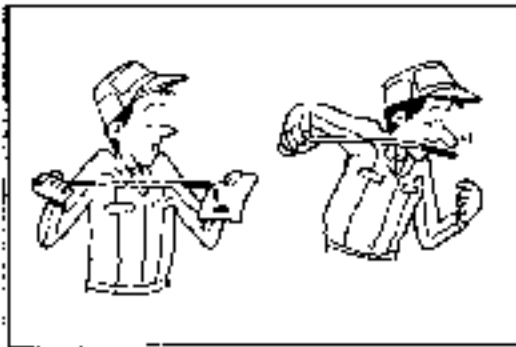
181163-1-077



790070-126



-B1069-010



790070-138

## 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 \_ 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<sup>®</sup> II or M-III**

#### Condition

1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

#### Note

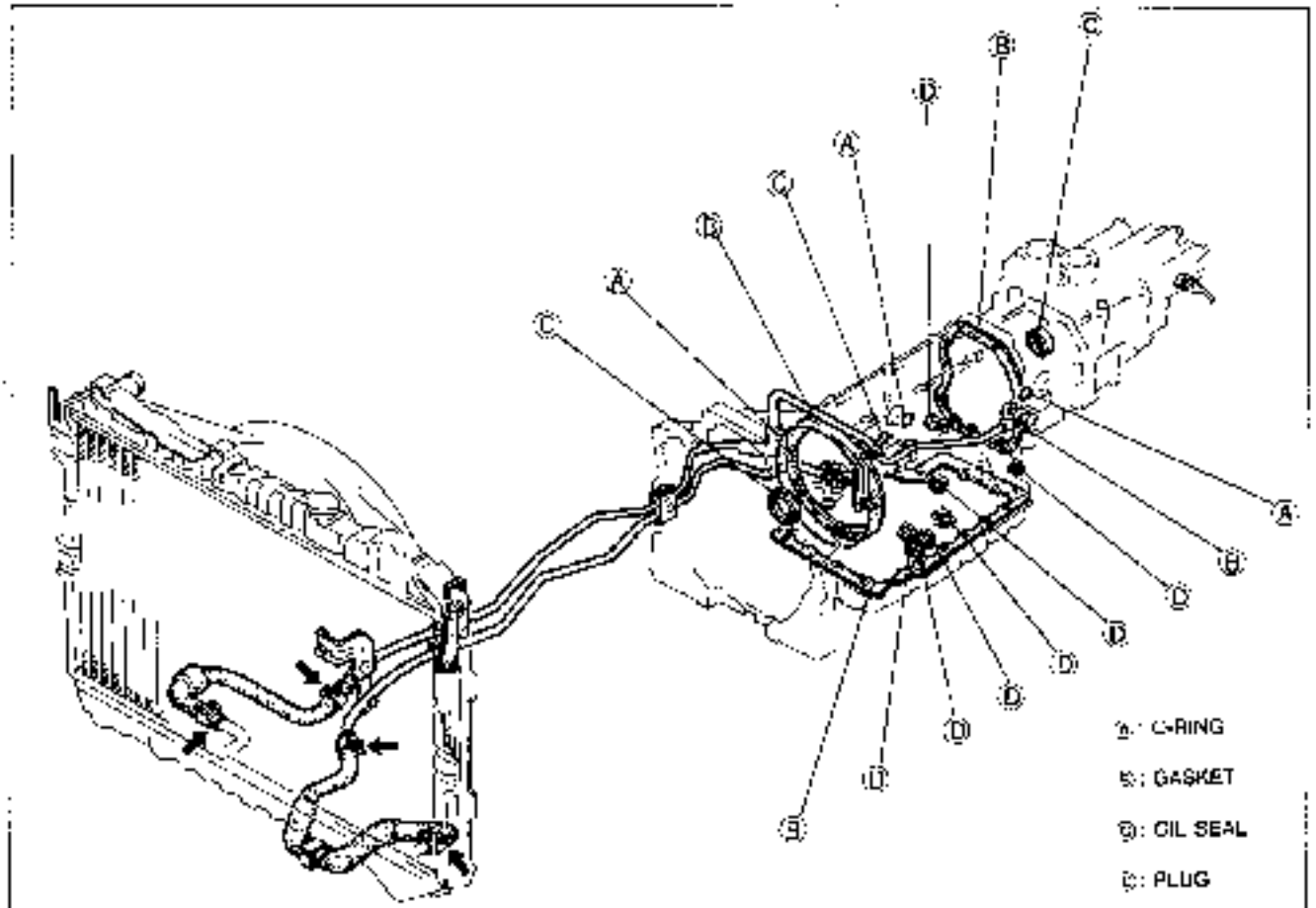
- a) Determine whether or not the automatic transmission should be disassembled by observing the condition of the ATF carefully.
- b) If the ATF is muddy and varnished, it indicates burned drive plates.



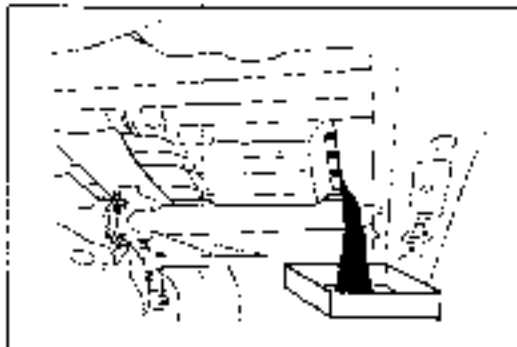
### Fluid leaks

Check for fluid leaks of the transmission as shown below, repair or replace if necessary.

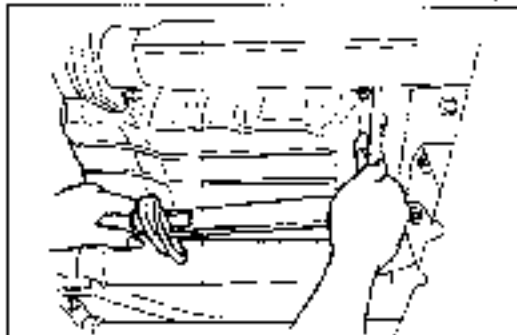
1. Gaskets, C-rings, and plugs
2. Oil hoses and oil pipes, and connections
3. Oil cooler(s)



SM1001-067



29110-0-0-0-4



PR-2004-03

### 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 Nm (50–80 cm-kg, 43–68 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

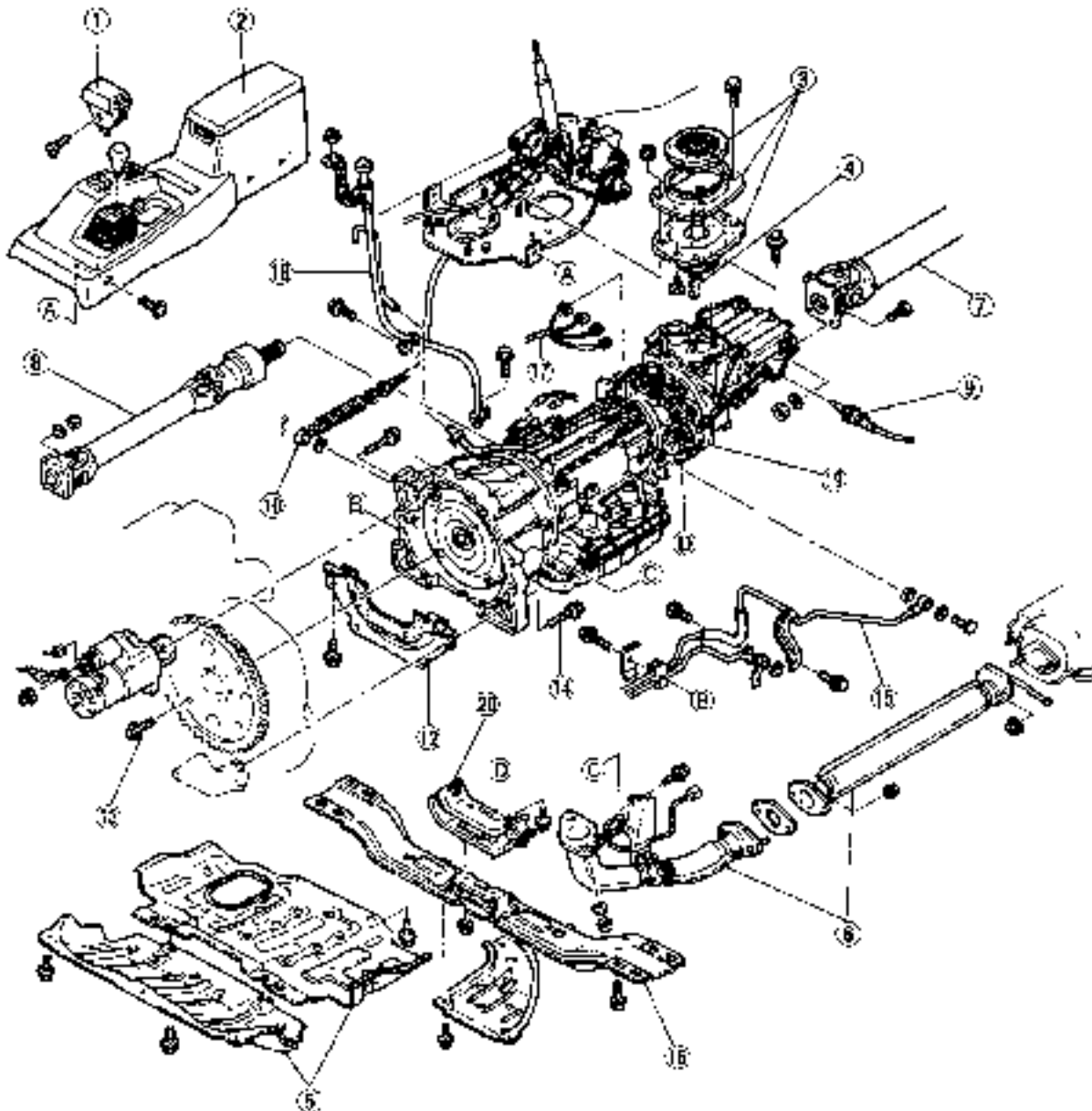
## TRANSMISSION UNIT (REMOVAL)

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.

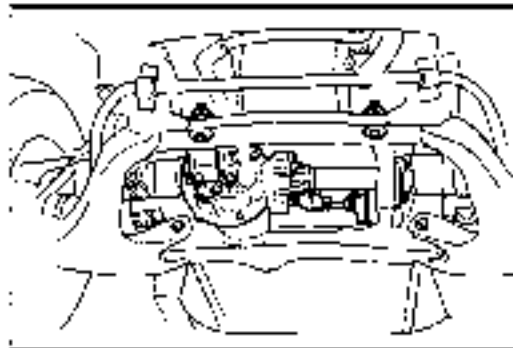
4. After removal, remove the oil pan to check condition of the transmission



25LCK7C16

- |   |  |
|---|--|
| 1. Selector knob  | 12. Under cover  |
| 2. Console box  | 13. Torque converter installation bolt<br>Removal Note. . . . . page K2-46 |
| 3. Insulator plate and boot                               | 14. Transmission installation bolt   |
| 4. 4x4 shift lever  | 15. O' pipe connector and bracket  |
| 5. Under cover  | 16. Cross member<br>Removal Note. . . . . page K2-16                       |
| 6. Exhaust pipe   | 17. Connectors   |
| 7. Rear propeller shaft<br>Service. . . . . Section L     | 18. Oil level gauge and pipe   |
| 8. Front propeller shaft<br>Service. . . . . Section L    | 19. Automatic transmission   |
| 9. Speedometer cable                                      | 20. Transmission mount   |
| 10. Selector cable  |  |
| 11. No.2 cross member<br>Removal Note. . . . . page K2-16 |  |

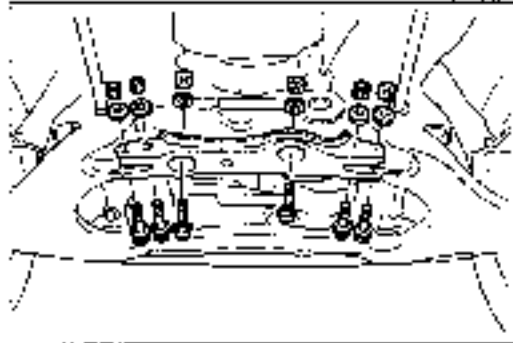
28JOK2017



0BUCK2-050

**Removal note****No.2 cross member**

1. Loosen the differential mounting bolts.



0BUCK2-051

2. Remove the cross member.

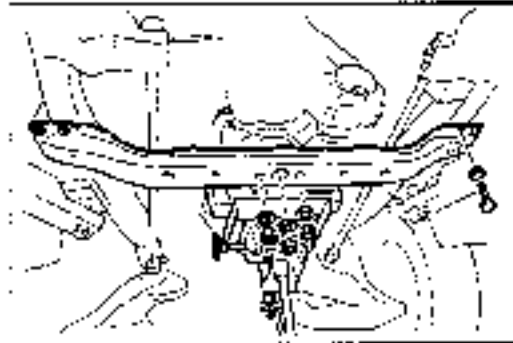


0BUCK2-052

**Torque converter installation bolts**

1. Hold the drive plate with the screwdriver.

2. Remove the torque converter installation bolts.



0BUCK2-054

**Cross member**




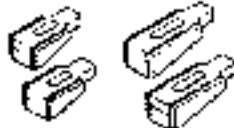

1. Support the transmission with the transmission jack.

2. Remove the cross member.

TRANSMISSION UNIT (DISASSEMBLY)

Preparation

SST

<p>49 0107 600A Engine stand</p> 	<p>49 LG19 0A04 Transmission hanger</p> 	<p>49 H075 405B Body (Part of 49 LG19 0A04)</p> 
<p>49 J019 0C3 Holder (Part of 49 LG19 0A04)</p> 	<p>49 D070 090 Pulley oil pump</p> 	<p>79J0K2 015</p>

### Precaution

#### General Notes:

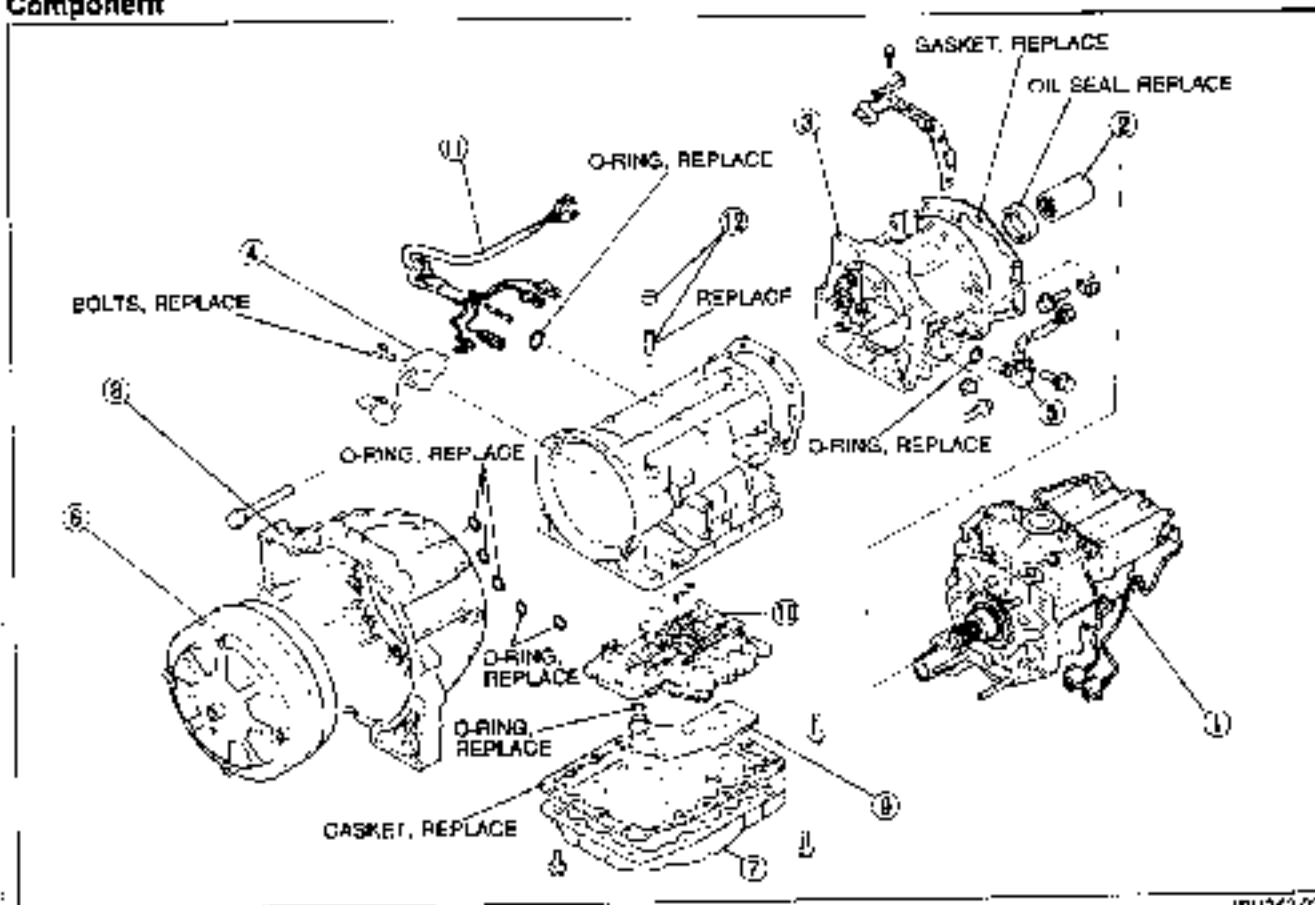
1. Disassemble the transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light 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.

2RU/K2-019

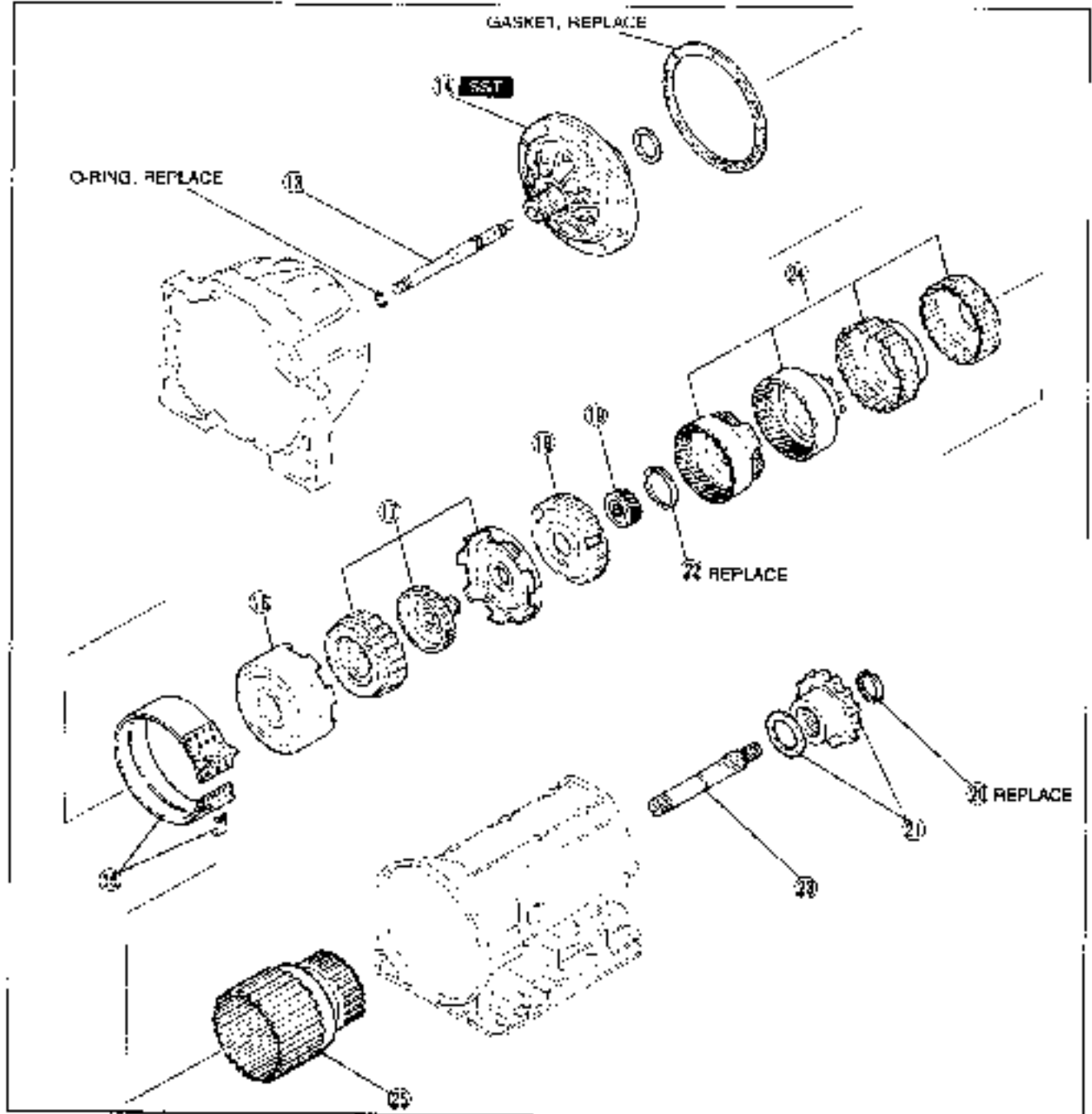
### Component



18U342-031

- |                            |                             |                               |
|----------------------------|-----------------------------|-------------------------------|
| 1. Transfer case           | 5. Spec sensor 1            | 10. Control valve body        |
| 2. Input sleeve            | Inspection ..... page K2-38 | Disassembly and Inspection    |
| 3. Adaptor case            | 6. Torque converter         | ..... page K2-105             |
| Disassembly and Inspection | Inspection ..... page K2-58 | Assembly ..... page K2-123    |
| ..... page K2-99           | 7. Oil pan                  |                               |
| Assembly ..... page K2-100 | 8. Converter housing        |                               |
| 4. Inhibitor switch        | 9. Oil strainer             | 11. Solenoid valve connectors |
| Inspection ... page K2-36  |                             | 12. Anchor end bolt and nut   |
| Adjustment ... page K2-36  |                             |                               |

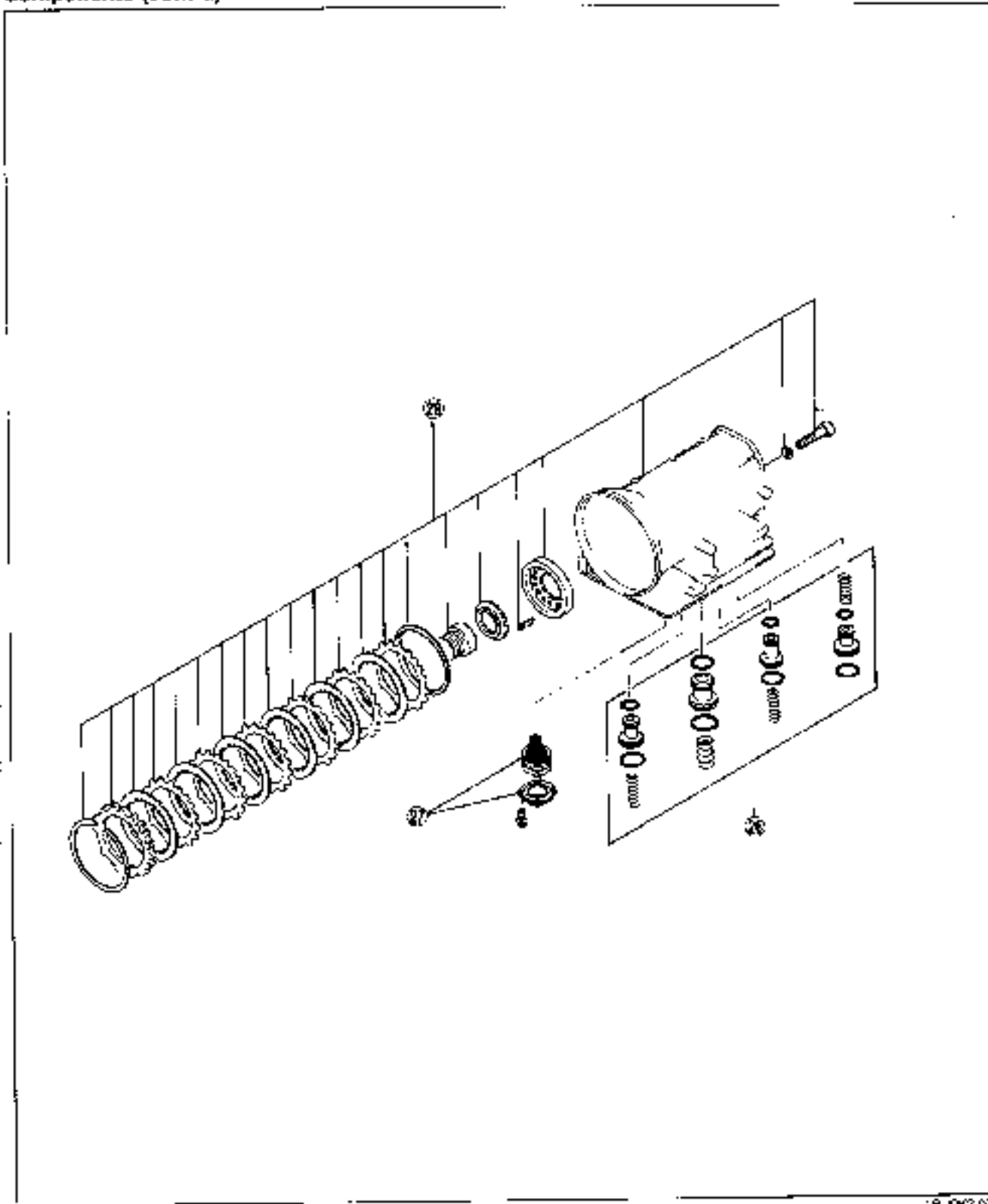
Components (cont'd)



191042002

- |   |   |
|---|---|
| <p>13. Input shaft<br/>                 14. Oil pump<br/>                     Disassembly and Inspection .... page K2-61<br/>                     Assembly ..... page K2-63<br/>                 15. Brake band and strut<br/>                 16. Reverse clutch<br/>                     Disassembly and Inspection .... page K2-66<br/>                     Assembly ..... page K2-68<br/>                 17. High clutch and front sun gear<br/>                     Disassembly and Inspection .... page K2-72<br/>                     Assembly ..... page K2-74<br/>                 18. Front planetary carrier<br/>                 19. Rear sun gear</p> | <p>20. Snap ring<br/>                 21. Parking gear and bearing<br/>                 22. Snap ring<br/>                 23. Output shaft<br/>                 24. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub<br/>                     Disassembly and Inspection . . . . . page K2-82<br/>                     Assembly ..... page K2-83<br/>                 25. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)<br/>                     Disassembly and inspection .... page K2-86<br/>                     Assembly ..... page K2-88</p> |
|---|---|

### Components (cont'd)



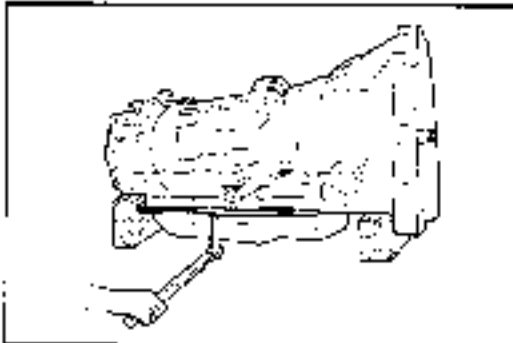
TRUCK-033

26. Accumulator spring and piston  
Disassembly and Inspection  
..... page K2-59  
Assembly ..... page K2-60

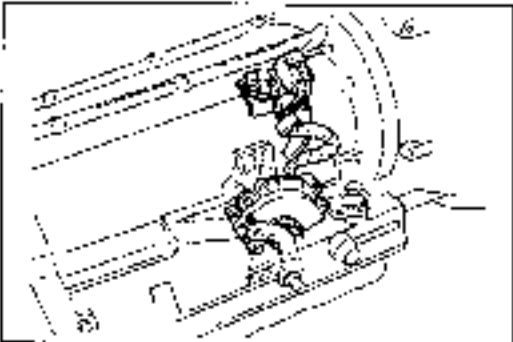
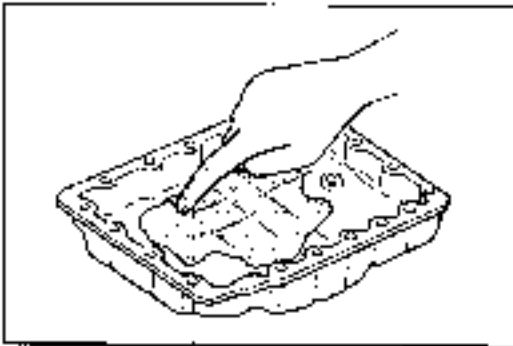
27. Sand servo  
Disassembly and Inspection  
..... page K2-76  
Assembly ..... page K2-79

28. Low and reverse brake piston and spring  
Disassembly and Inspection  
..... page K2-95  
Assembly ..... page K2-96

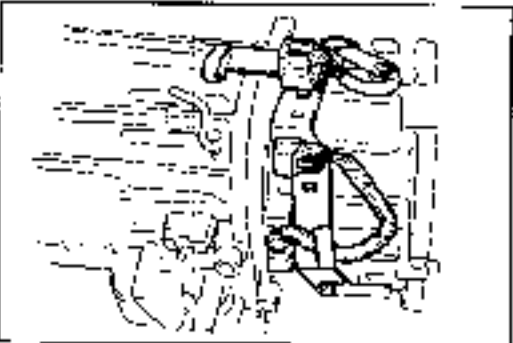




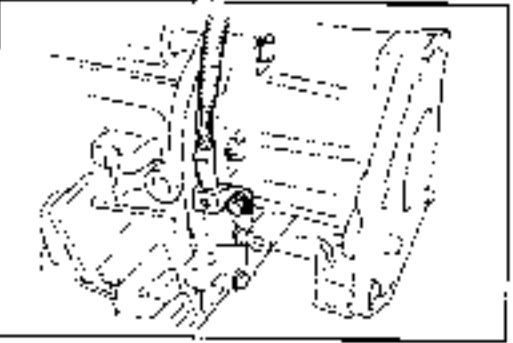
18JJK2-055



J9UJK2-056



J9UJK2-057



18JJK2-061

### 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.

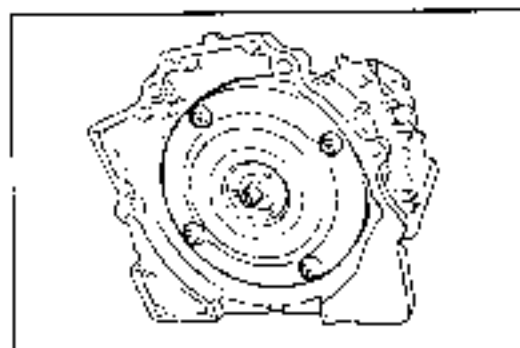
5. Remove the connector bracket from the transmission case.
6. Remove the inhibitor switch.

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.

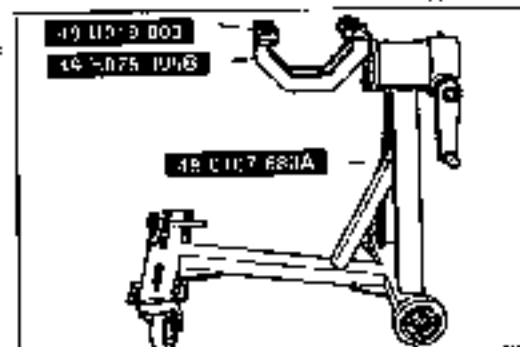


06L0K2-062

**Note**

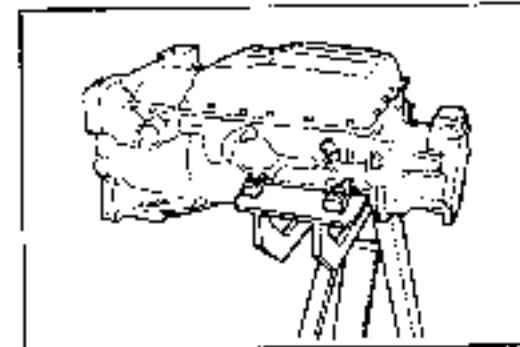
Be careful not to spill the ATF when removing the torque converter.

11. Remove the torque converter.



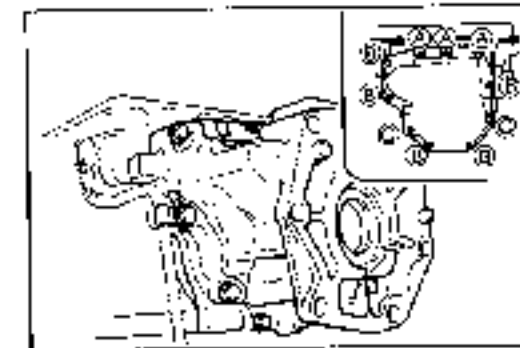
09U0K2-063

12. Assemble the **SST** as shown.



09U0K2-064

13. Mount the transmission to the **SST**.  
14. Remove the oil pan.



2BU0K2-065

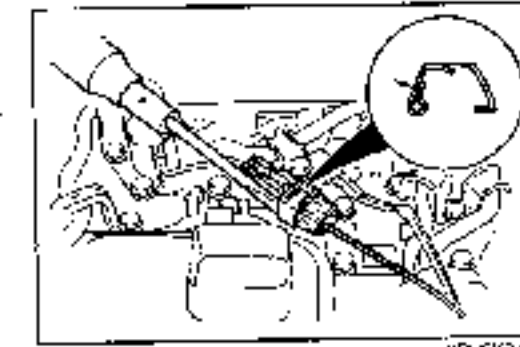
15. Remove the adapter case and gasket.

**Bolt length (Measured from below the head)**

- Ⓐ: 30mm (1.181 in)
- Ⓑ: 45mm (1.772 in)
- Ⓒ: 50mm (1.969 in)

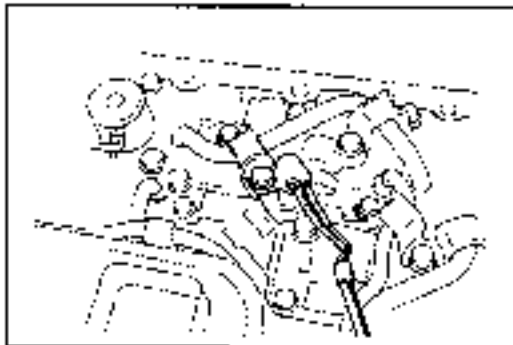
**Caution**

Do not damage the harness or connector.



1FR0K2-066

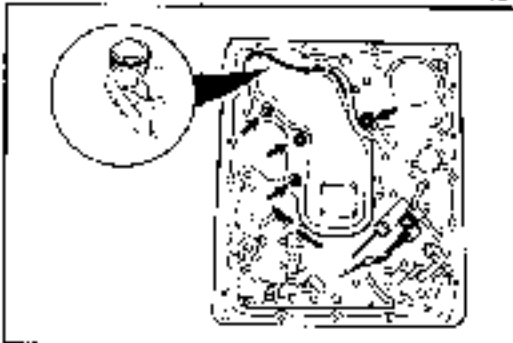
16. Remove the clip.  
17. Disconnect the lock-up solenoid connector.



2B.DK2.02

18. Disconnect the ATF thermosensor.

**Bolt length (Measured from below the head):**  
45mm (1.772 in)



RRJ.CF2.068

19. Remove the oil strainer.

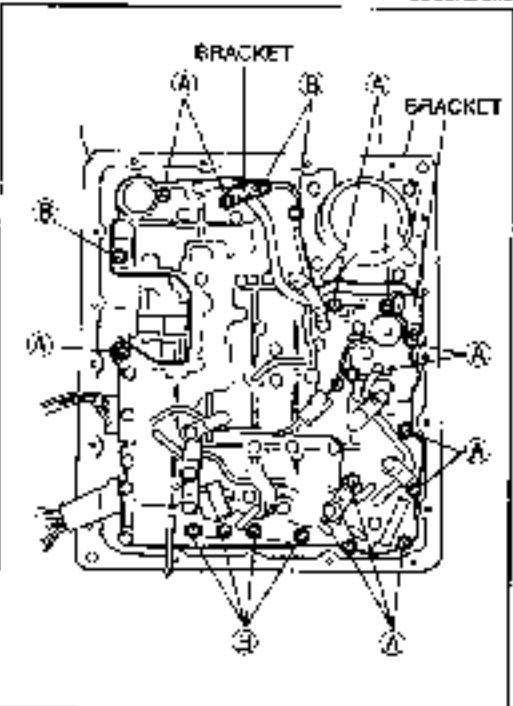
**Bolt length (Measured from below the head):**  
50mm (1.969 in)

20. Remove the O ring from the oil strainer.



EEL.DK2.069

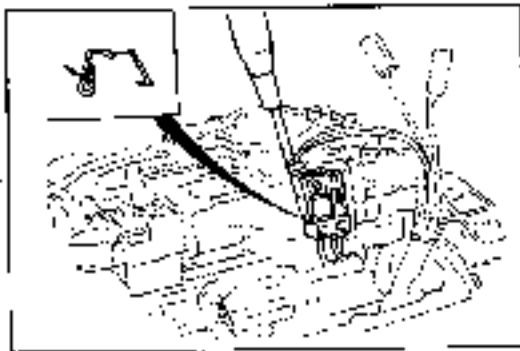
21. Separate the adleroid harness from the harness clip.



I.BUK2.056

22. Remove the bolts (A) and (B), and brackets shown in the figure.

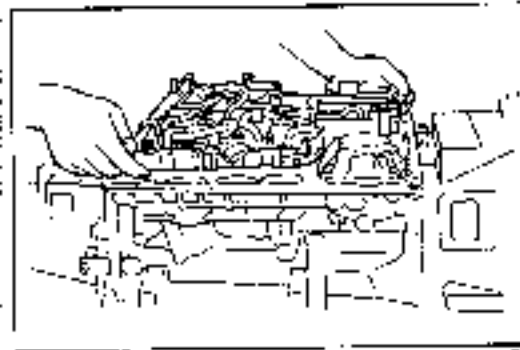
**Bolt length (Measured from below the head)**  
 (A): 33mm (1.299 in)  
 (B): 45mm (1.772 in)



05L0K2-071

**Caution**  
Do not damage the harness or connector.

- 23 Remove the clip.
- 24 Disconnect the solenoid connectors.



05L0K2-072

**Caution**  
Do not remove the control valve body unless you also remove the oil pipes.

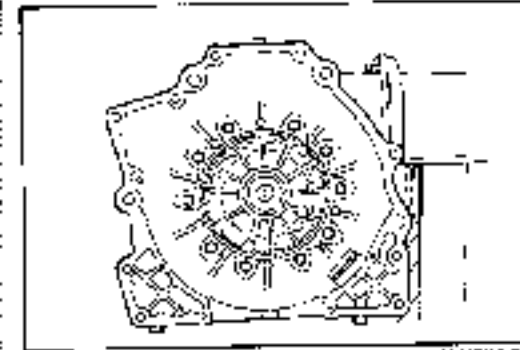
- 25 Remove the control valve body.



05L0K2-073

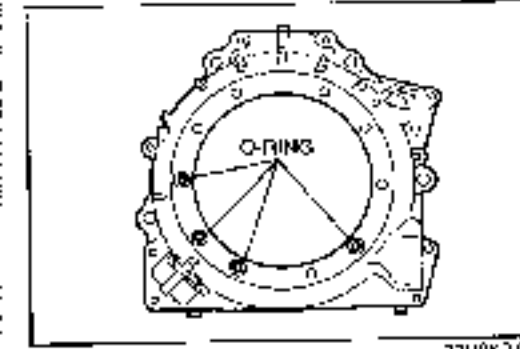
**Caution**  
Do not damage the solenoid connector.

- 26 Remove the solenoid connector from the transmission case.
- 27 Remove the O-ring from the solenoid connector.



05L0K2-074

- 28 Remove the converter housing from the transmission case.



05L0K2-075

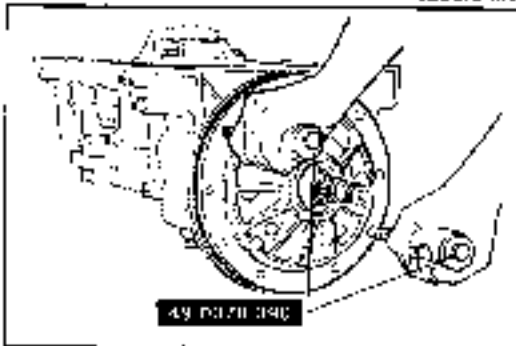
- 29 Remove the O-rings from the converter housing.

**Caution**  
Do not damage the converter housing.

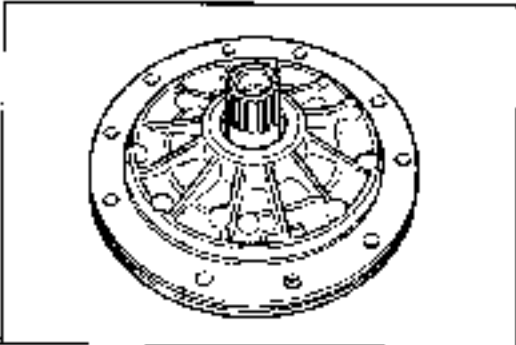
- 30 Clean the sealing compound from the converter housing.



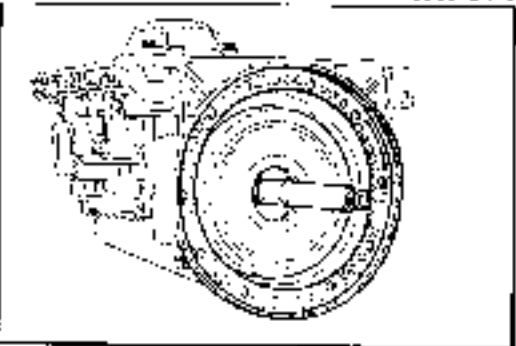
08UUK2-076



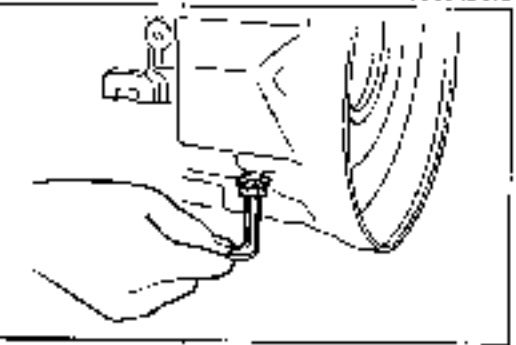
08UUK2-077



03UJ42-078



08UUK2-079



DEL CR21290

### 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

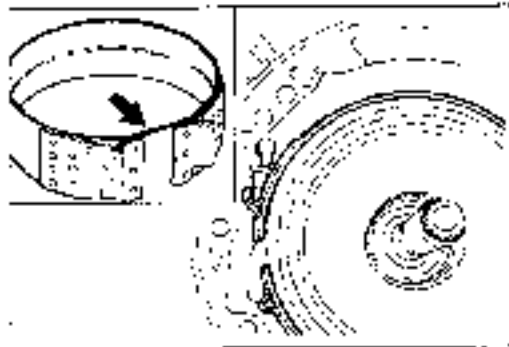
If large amounts of material are found, replace the torque converter and carefully check the transmission for the cause.
4. Install the oil pan with a few bolts to protect the valve body.
5. Remove the connector bracket from the transmission case.
6. Remove the inhibitor switch.

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.

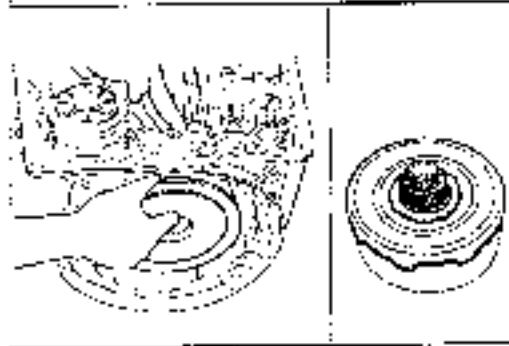


DBLCK2-081

**Caution**

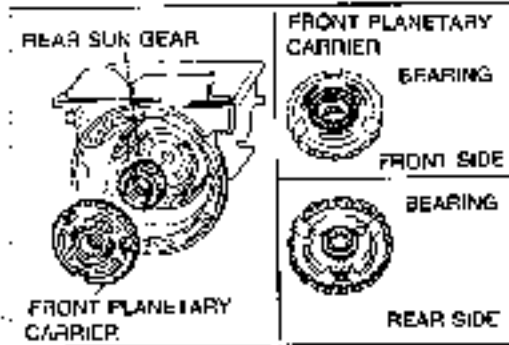
To prevent the brake facing from cracking or peeling, do not stretch the brake band. Secure it with a wire clip.

40. Remove the brake band and the band strut.



03JUN7-052

41. Remove the reverse clutch, high clutch, and the front sun gear from the transmission case as an assembly.



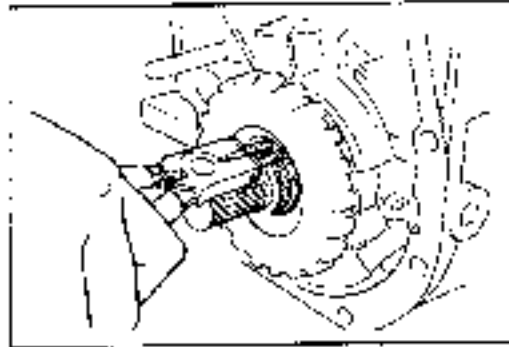
CEJOK2-083

42. Remove the front planetary carrier, bearings, and the rear sun gear.

Inspect the following parts, and repair or replace as necessary.

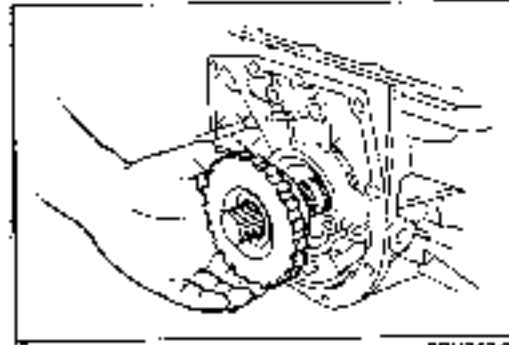
- 1) Front planetary carrier  
Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears
- 2) Rear sun gear  
Inspect individual gear teeth for damage, wear, or cracks
- 3) Bearing  
Inspect for damage or rough rotation

43. Remove the snap ring (rear) from the output shaft.

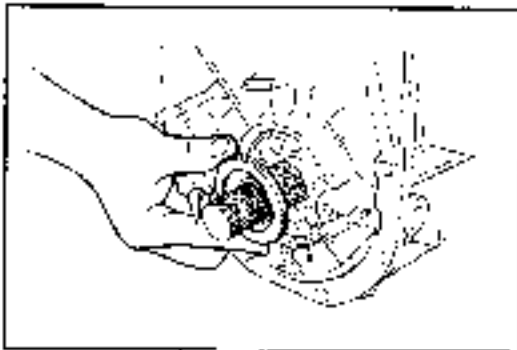


09BUCK2-084

44. Remove the parking gear.

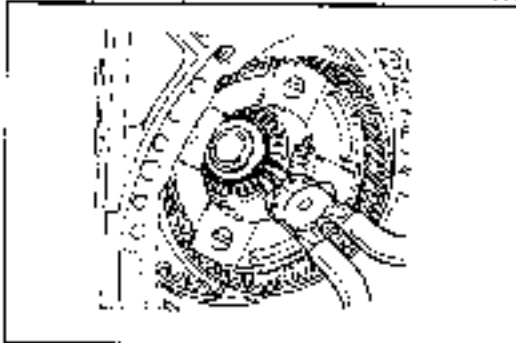


08UJ42-085



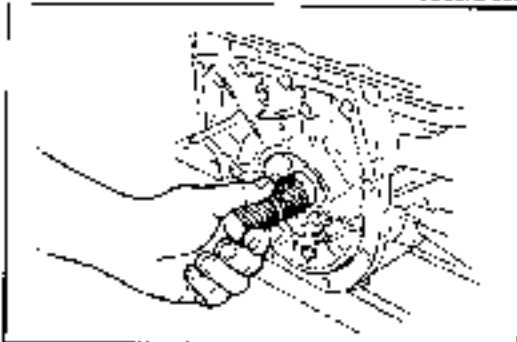
0FLK K2-086

45. Remove the bearing behind the transmission case.



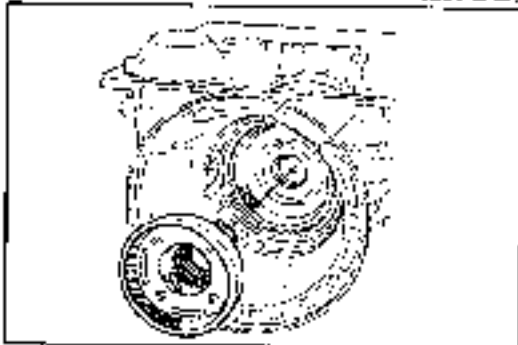
0B LCK2-087

46. While pushing the output shaft forward in slightly, and remove the snap ring (front) from the output shaft.



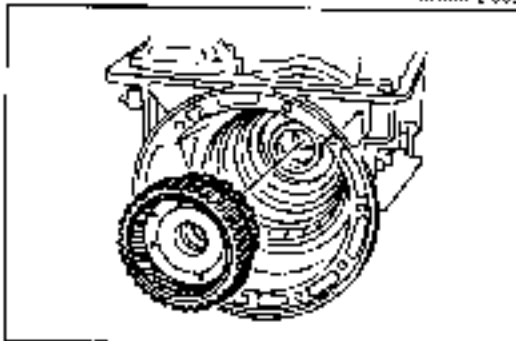
0BUD-42-089

47. Pull out the output shaft.



0FLK K2-089

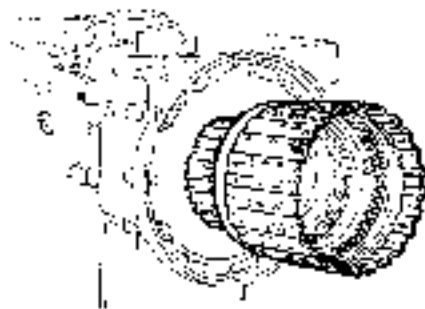
48. Remove the front internal gear (with rear planetary carrier).



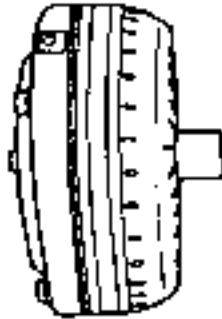
0BUD-42-090

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.



S60002-09



S60006-135

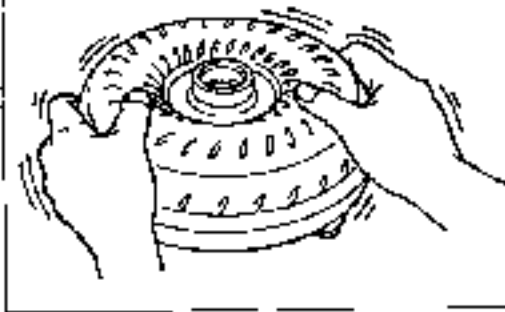
### TORQUE CONVERTER

#### 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.

#### 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.



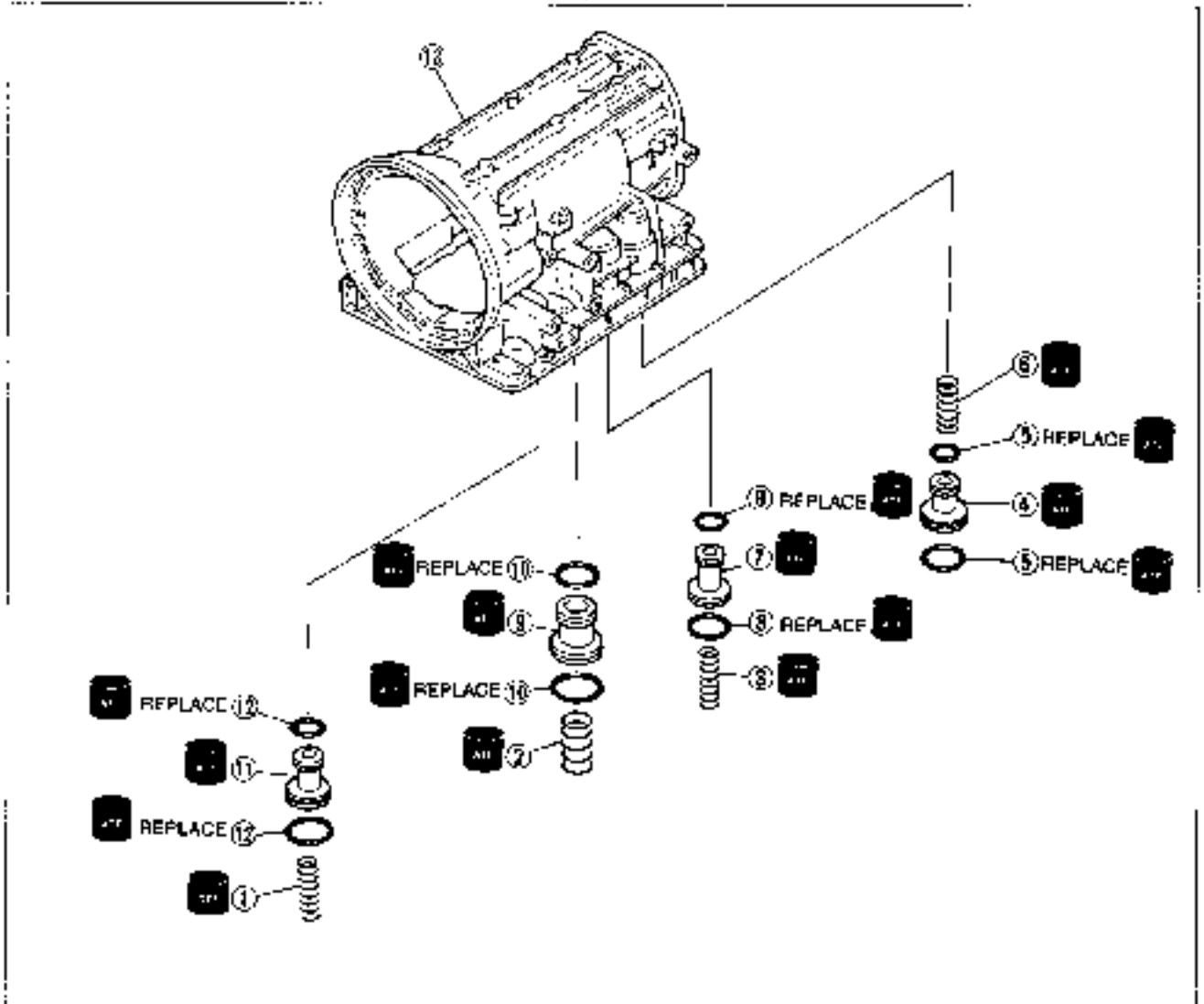
S60006-135



**ACCUMULATORS**

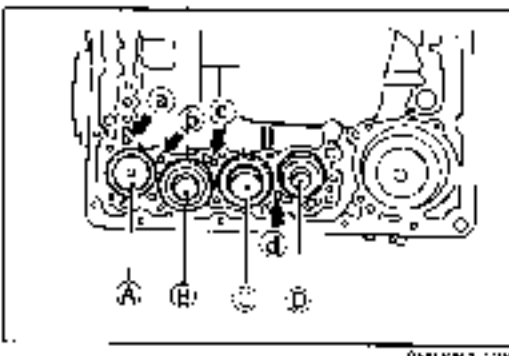
**Disassembly and Inspection**

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace if necessary.



18UOK2-C36

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



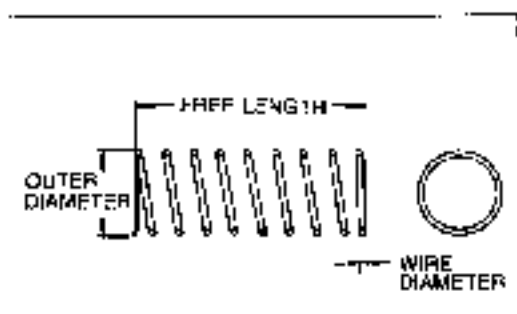
AM1K11-135

**Disassembly note**

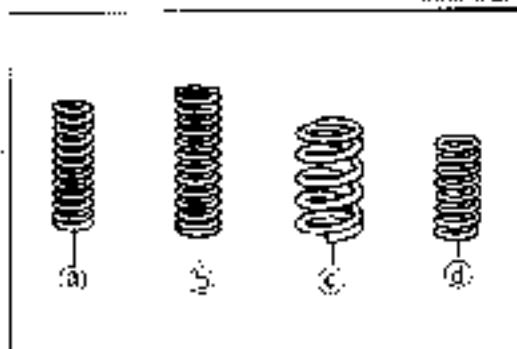
**Accumulator piston**

Remove the accumulator pistons, and springs from transmission case by applying compressed air through the oil passage as shown in the figure.

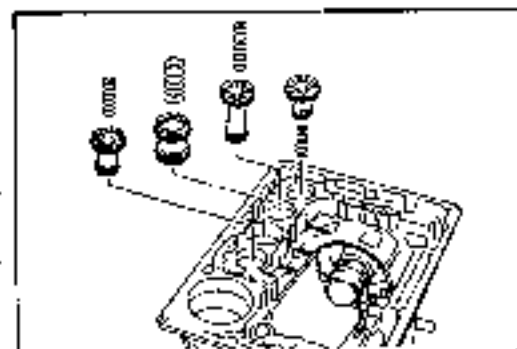
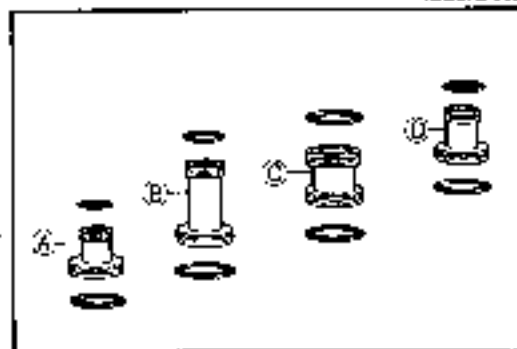
Accumulator	Item	Location	Oil passage
N-D accumulator		A	a
2-3 accumulator		B	b
1-2 accumulator		C	c
3-4/N-R accumulators		D	d



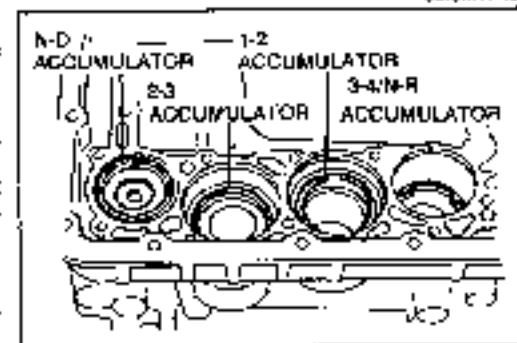
1BUDK2-037



1BUDK2-038



34UDK1-133



34UDK1-143

### 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)	12.5	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)	46.0 (1.811)	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)	
		Large	Small	Large	Small
A	N-D accumulator	45.0 (1.772)	29.0 (1.142)		
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**

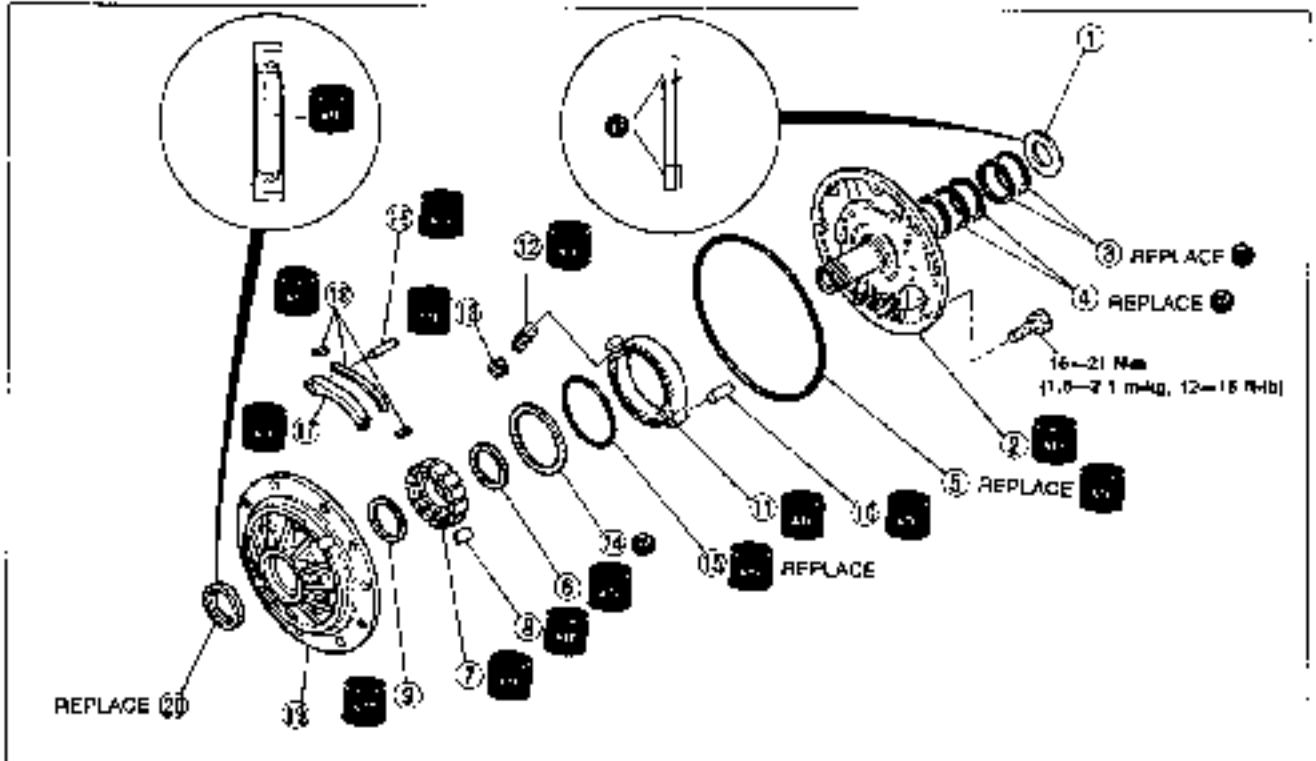
<p>49 G030 795</p> <p>Insulator or seal</p> 	<p>49 G03C 796</p> <p>Block (Parts of 49 G030 795)</p> 	<p>49 G03C 797</p> <p>Handle (Parts of 49 G03C 795)</p> 
---	---	---

SM11341-086

**Disassembly and Inspection**

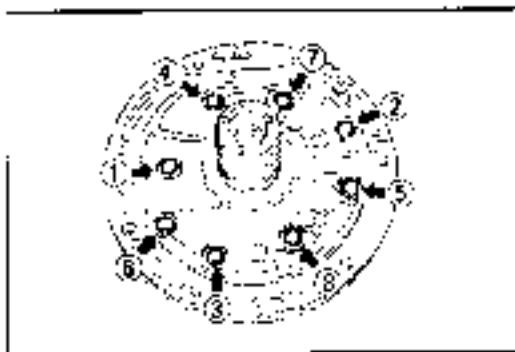
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.



DUCK2-109

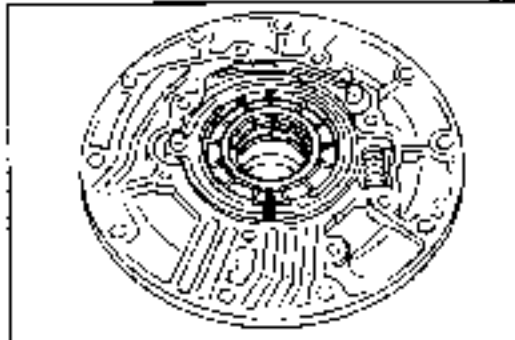
<p>1. Bearing Inspect for damage or rough rotation</p> <p>2. Oil pump cover Disassembly Note ..... page K2-62 Inspection..... page K2-62</p> <p>3. Seal ring (small diameter)</p> <p>4. Seal ring (large diameter)</p> <p>5. Seal ring</p> <p>6. Vane ring</p> <p>7. Rotor Disassembly Note ..... page K2-62 Inspection ..... page K2-63</p> <p>8. Vane Inspection..... page K2-63</p> <p>9. Vane ring</p> <p>10. Pivot pin Disassembly Note ..... page K2-62</p>	<p>11. Cam ring Disassembly Note ..... page K2-62 Inspection..... page K2-63</p> <p>12. Spring Inspection..... page K2-63</p> <p>13. Spring seal</p> <p>14. Friction ring</p> <p>15. O-Ring</p> <p>16. Pivot pin</p> <p>17. Control piston Inspection ..... page K2-63</p> <p>18. Side seal</p> <p>19. Oil pump housing Inspection..... page K2-63</p> <p>20. Oil seal</p>
---	--



BVLCK1-42

**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.

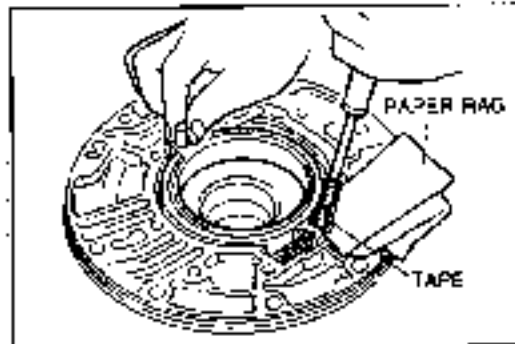


BVLCK1-43

**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.

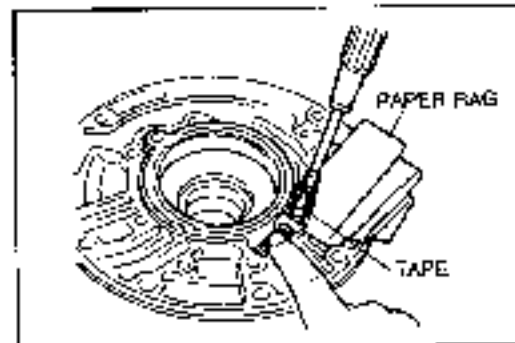


5MLTK-144

**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.

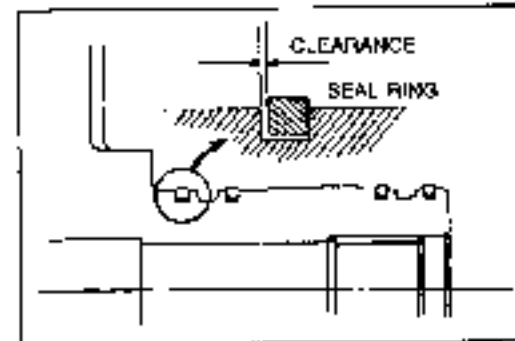


6MLTK-145

**Cam ring****Caution**

- a) Do not 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.



4VULKT-47

**Inspection****Oil pump cover**

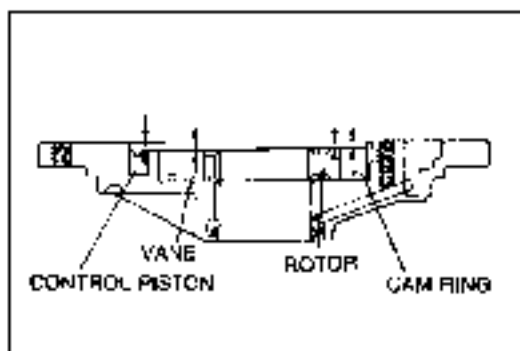
1. Apply petroleum jelly to new seal ring.
2. Measure the clearance between the seal ring and the ring groove.

**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.



SMK104-146

### 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.

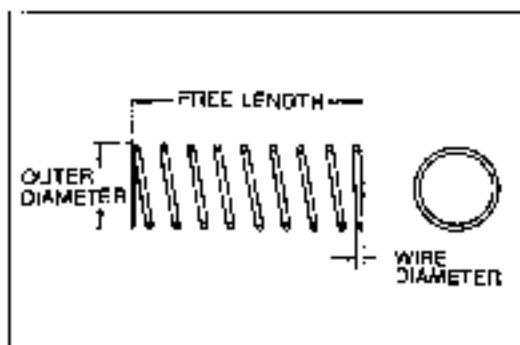
1. Install the cam ring vanes, rotor and control piston.
2. Measure the clearance between the end of the oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences.

#### Clearance

mm (in)

Part	Clearance	Standard	Maximum
Cam ring		0.019—0.024 (0.0004—0.0009)	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.



FMUDK-457

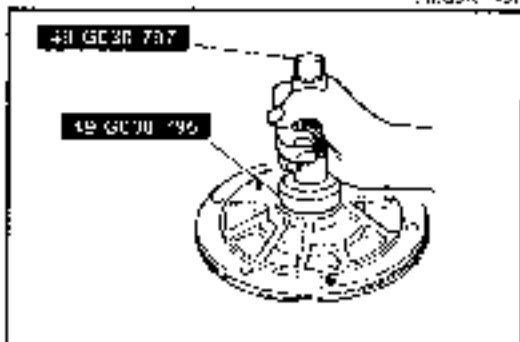
### Cam ring spring

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)	29.0 (1.142)	7.8	2.3 (0.091)

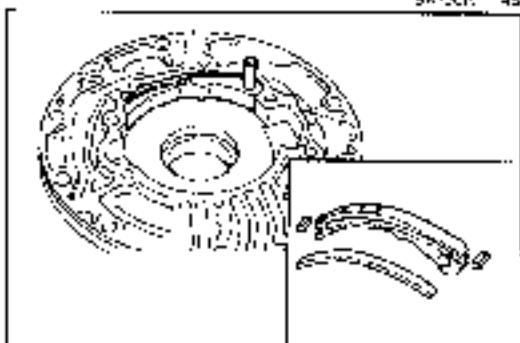
2. If not correct, replace the cam ring spring.



SMK104-145

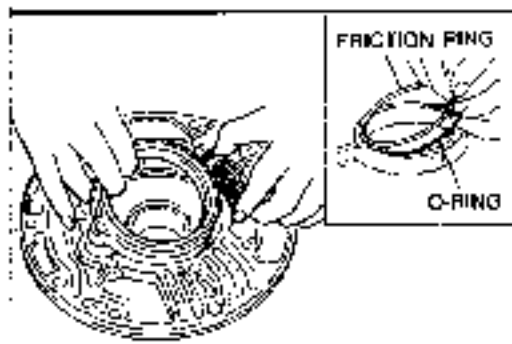
### Assembly

1. Apply ATF to the new oil seal. Install the oil seal with the SST

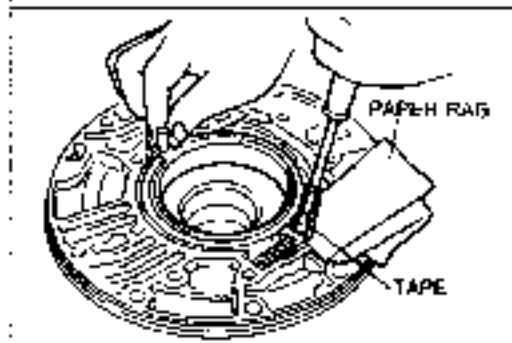


SMK104-145

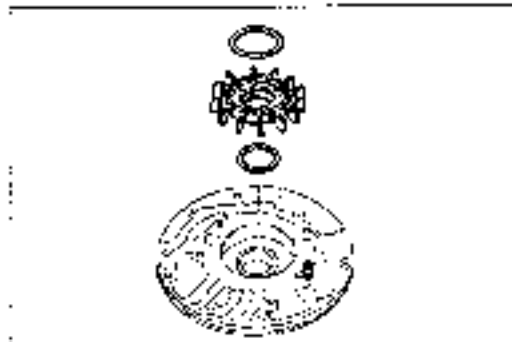
2. Apply ATF to side seal, and install them on the control piston with the black surface facing toward the control piston.
3. Install the control piston and pivot pin.



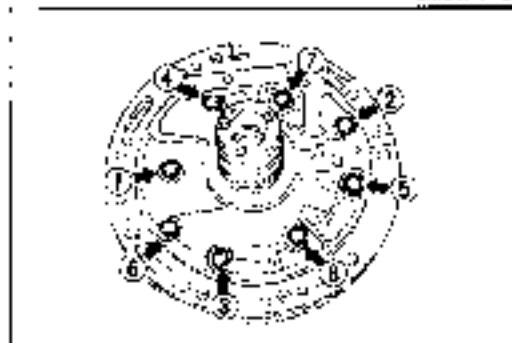
OMLUK1-151



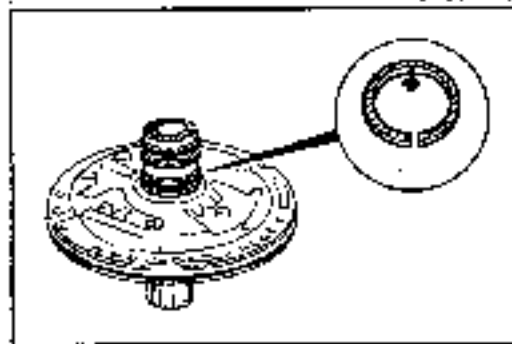
9MUJK1-152



3MLJK1-153



3VLUK1-154



EMUK1-155

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 N·m (1.6–2.1 m·kg, 12–15 ft·lb)

**Caution**

**Do not overexpand the seal rings when installing.**

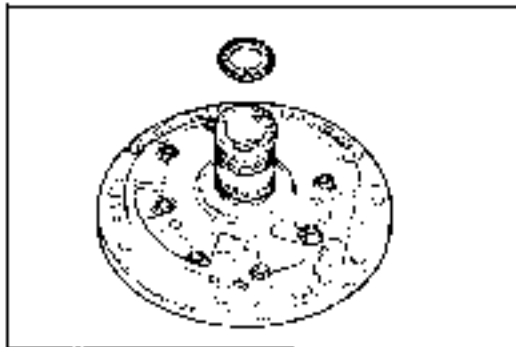
**Note**

- 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



SMU2K1-127






13. Apply petroleum jelly to the bearing, and set it on the oil pump.

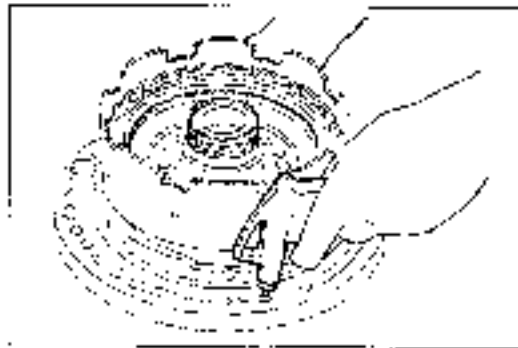
**Bearing outer diameter: 47.0mm (1.850 in)**

## REVERSE CLUTCH

### Preparation

#### SST

<p>49 G019 0A7A</p> <p>Compressor seal, return spring</p> 	<p>49 G019 025</p> <p>Body B (Part of 49 G019 0A7A)</p> 	<p>49 G019 020</p> <p>Plate (Part of 49 G019 0A7A)</p> 
<p>49 GC19 027</p> <p>Attachment A (Part of 49 GC19 0A7A)</p> 	<p>49 G019 029</p> <p>Nut (Part of 49 G019 0A7A)</p> 	<p>2EL362-077</p>



SMU2K1-127

### Inspection

#### 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.**

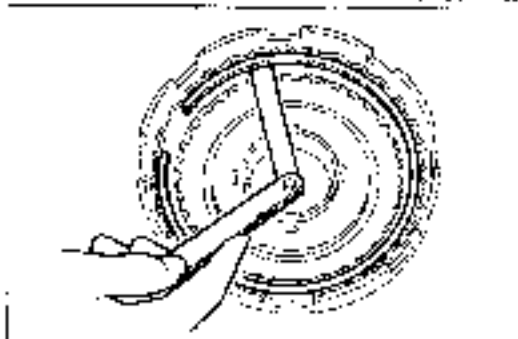
2. Verify that the retaining plate moves to the snap ring. If not, the O ring or the oil seal may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.

#### 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)**

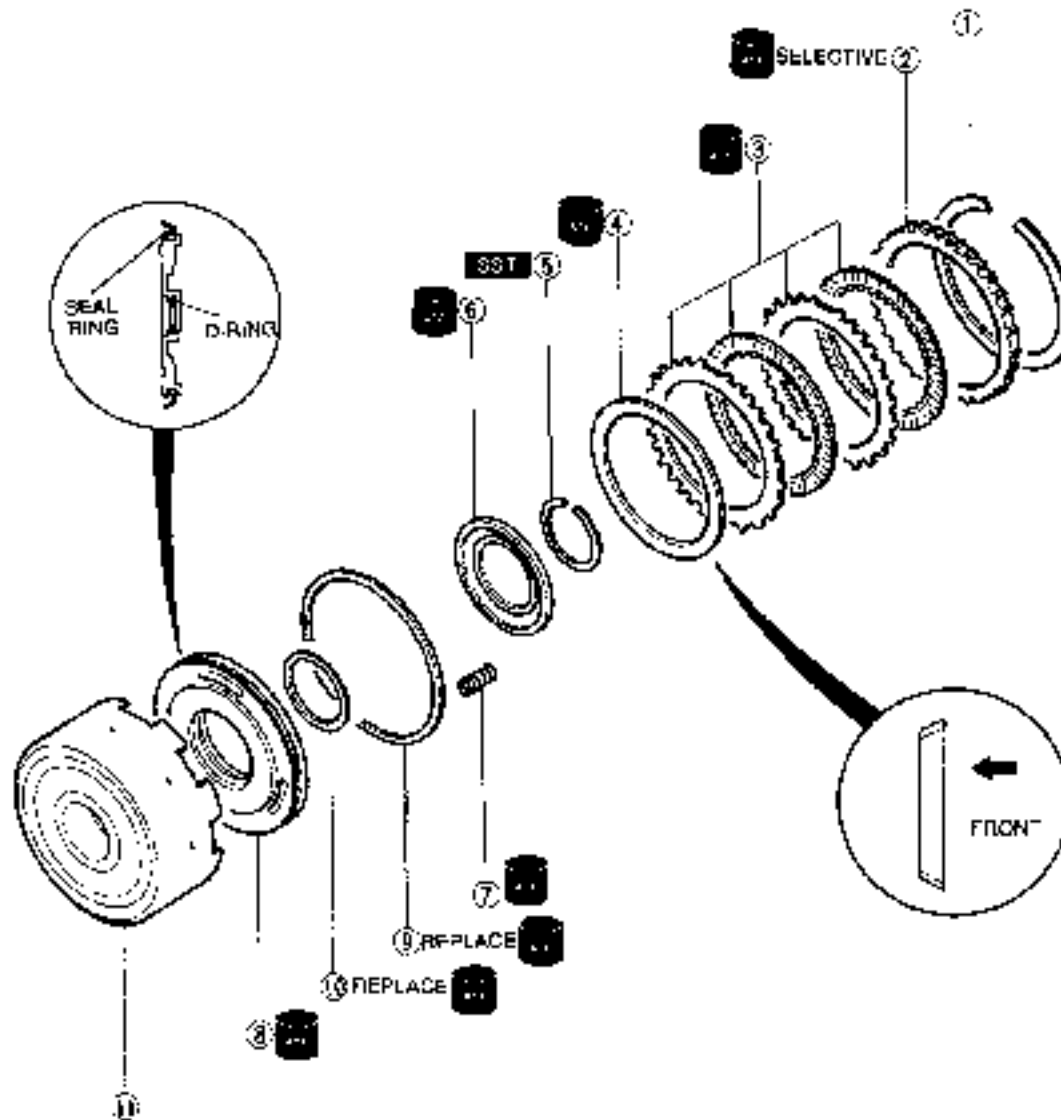
Select the correct retaining plate when assembling.



SMU2K1-130

### Disassembly and Inspection

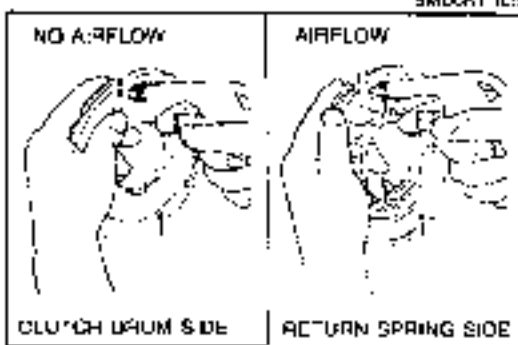
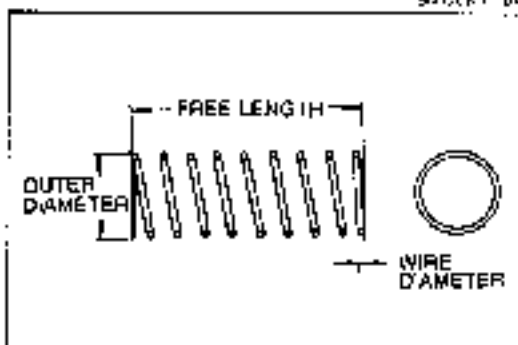
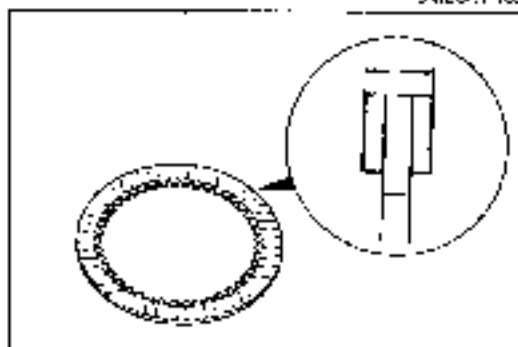
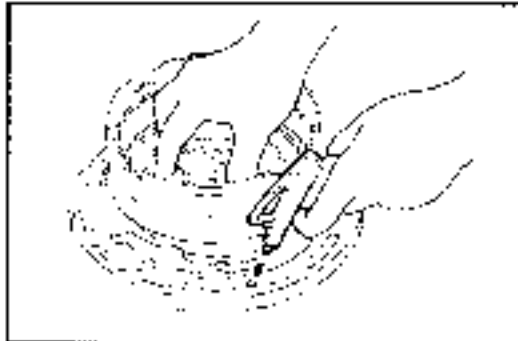
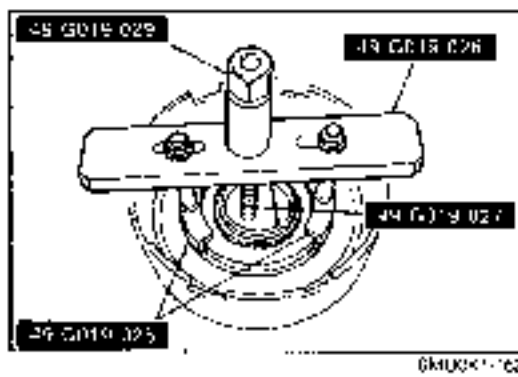
Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts and repair or replace as necessary.



299,000 0000

- |                                   |  |
|-----------------------------------|--|
| 1. Snap ring                      | 7. Return spring                             |
| 2. Retaining plate                | Inspection..... page K2-67                   |
| 3. Drive plates and driven plates | 8. Clutch piston                             |
| Inspect for wear or burning       | Inspect balls for sticking by shaking piston |
| Inspection..... page K2-67        | Disassembly Note..... page K2-67             |
| 4. Dashed plate                   | Inspection..... page K2-67                   |
| 5. Snap ring                      | 9. Seal ring                                 |
| Disassembly Note..... page K2-67  | 10. D-ring                                   |
| 6. Spring retainer                | 11. Reverse clutch drum                      |





### Disassembly note Snap ring

#### Caution

- Depress the spring retainer only enough to remove the snap ring.
- Do not damage the snap ring.

- Compress the spring with the SST, then remove the snap ring with snap ring pliers.
- Remove the spring retainer and spring.

#### Piston

- Install the reverse clutch onto the oil pump along with the seal rings.
- 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

- 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)**

- If not within specification, replace the drive plates.

##### Return spring

- Measure the spring specifications.

##### Specification

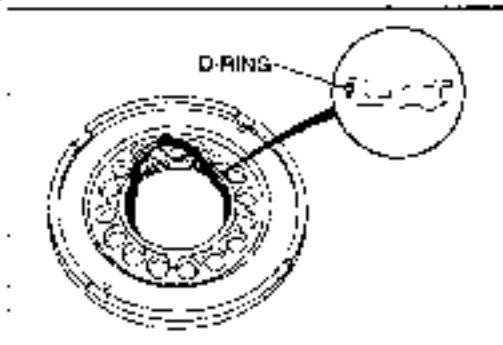
Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
11.6 (0.457)	19.69 (0.775)	4.0	1.5 (0.061)

- If not within specification, replace the return spring.

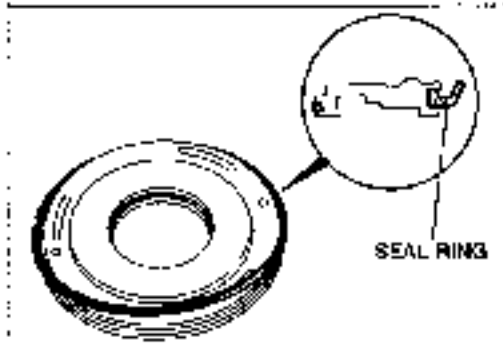
##### Clutch piston

- Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
- Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

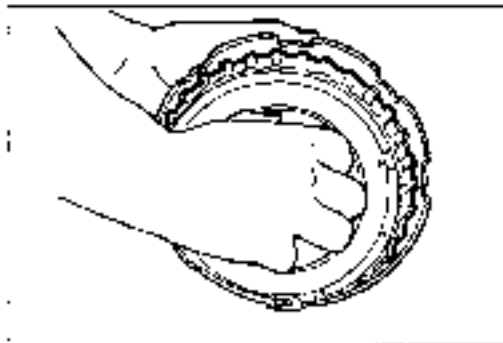
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



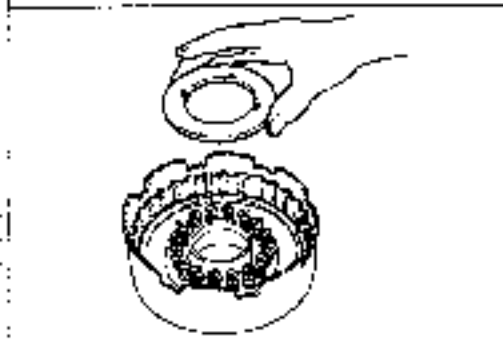
9MJK1 1E7



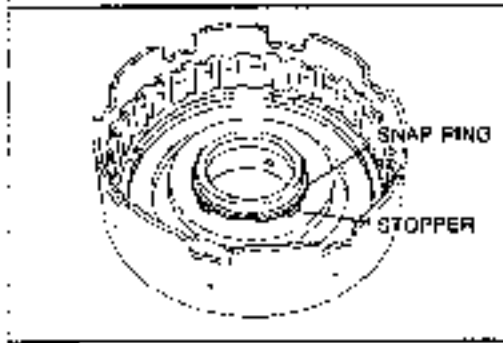
9MJ31 168



9M1,0K1 189



9MJK1 170



9MJK1 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.

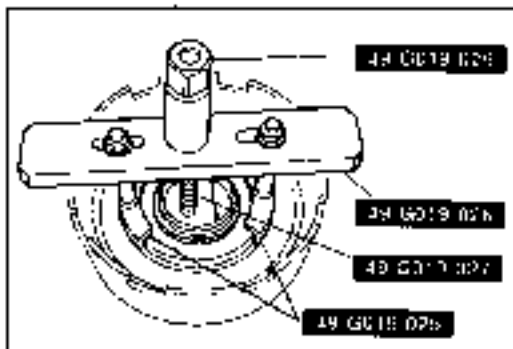
5. Install the return springs and spring retainer.

**Caution**

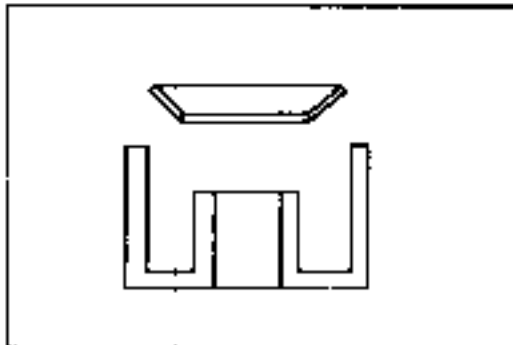
a) Depress the spring retainer only enough to install the snap ring.

b) Do not overexpand the snap ring when installing.

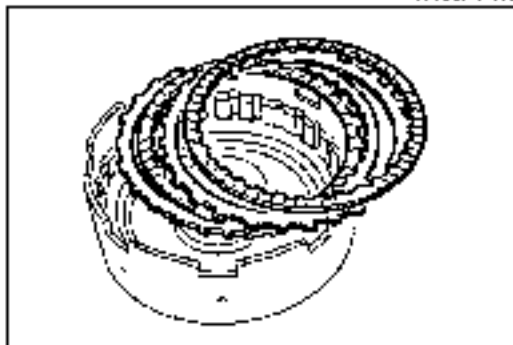
c) Do not align the snap ring end-gap with the spring retainer.



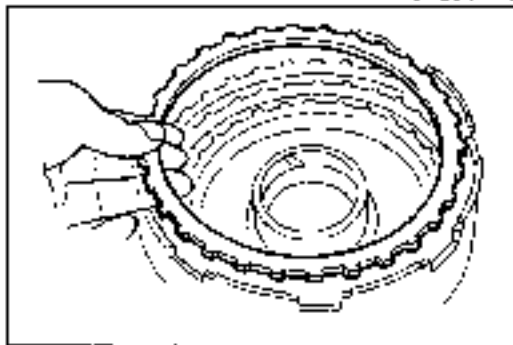
9MJJK1 188



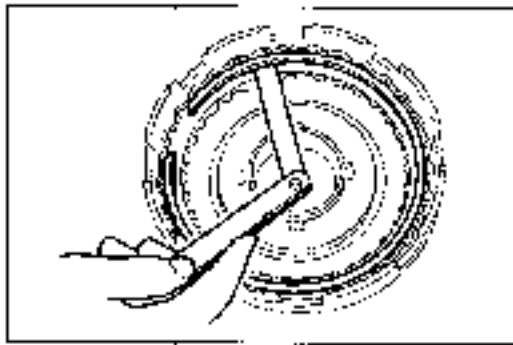
9MJJK1 172



9MJJK1 172



9MJJK1 174



9MJJK1 173

6. Install the snap ring while compressing the springs with the SST.

7. Install the disher 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.

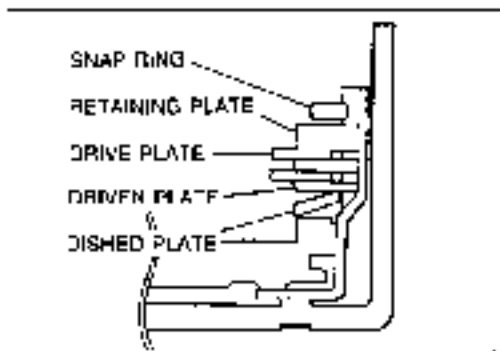
**Standard clearance:**

**0.50—1.20mm (0.020—0.047 in)**

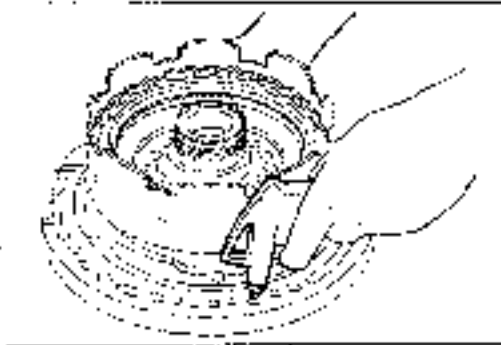
**Retaining plate sizes**

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)	



9M-751-176



6M1361-177

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.**






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.

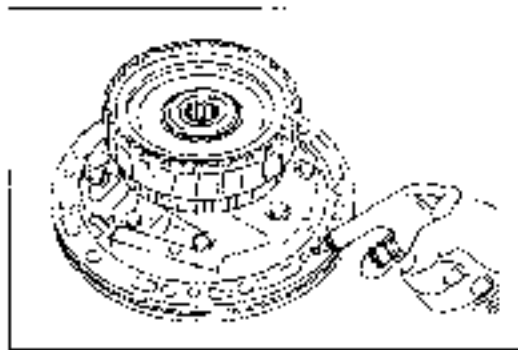
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**

## HIGH CLUTCH AND FRONT SUN GEAR

## Preparation

## SST

<p>49 G019 0A7A</p> <p>Compressor set, return spring</p> 	<p>40 G019 025</p> <p>Body B (Part of 49 G019 0A7A)</p> 	<p>49 G019 026</p> <p>Plate (Part of 49 G019 0A7A)</p> 
<p>49 G019 027</p> <p>Attachment A (Part of 49 G019 0A7A)</p> 	<p>40 G010 029</p> <p>Nut (Part of 49 G019 0A7A)</p> 	<p>2B-JK2-026</p>



3M-JCK-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.**

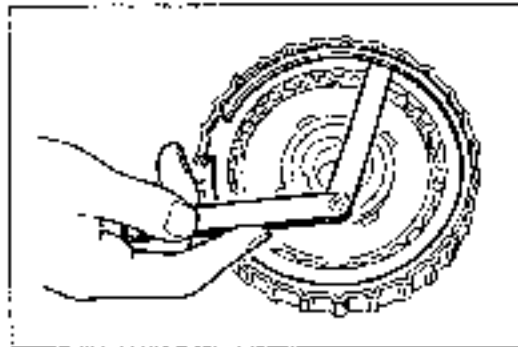
2. Verify that the retaining plate moves toward the snap ring. If not, the D-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.

## Clearance between retaining plate and snap ring

Measure the clearance between the retaining plate and the snap ring.

**Standard clearance: 1.5—3.0mm (0.071—0.118 in)**

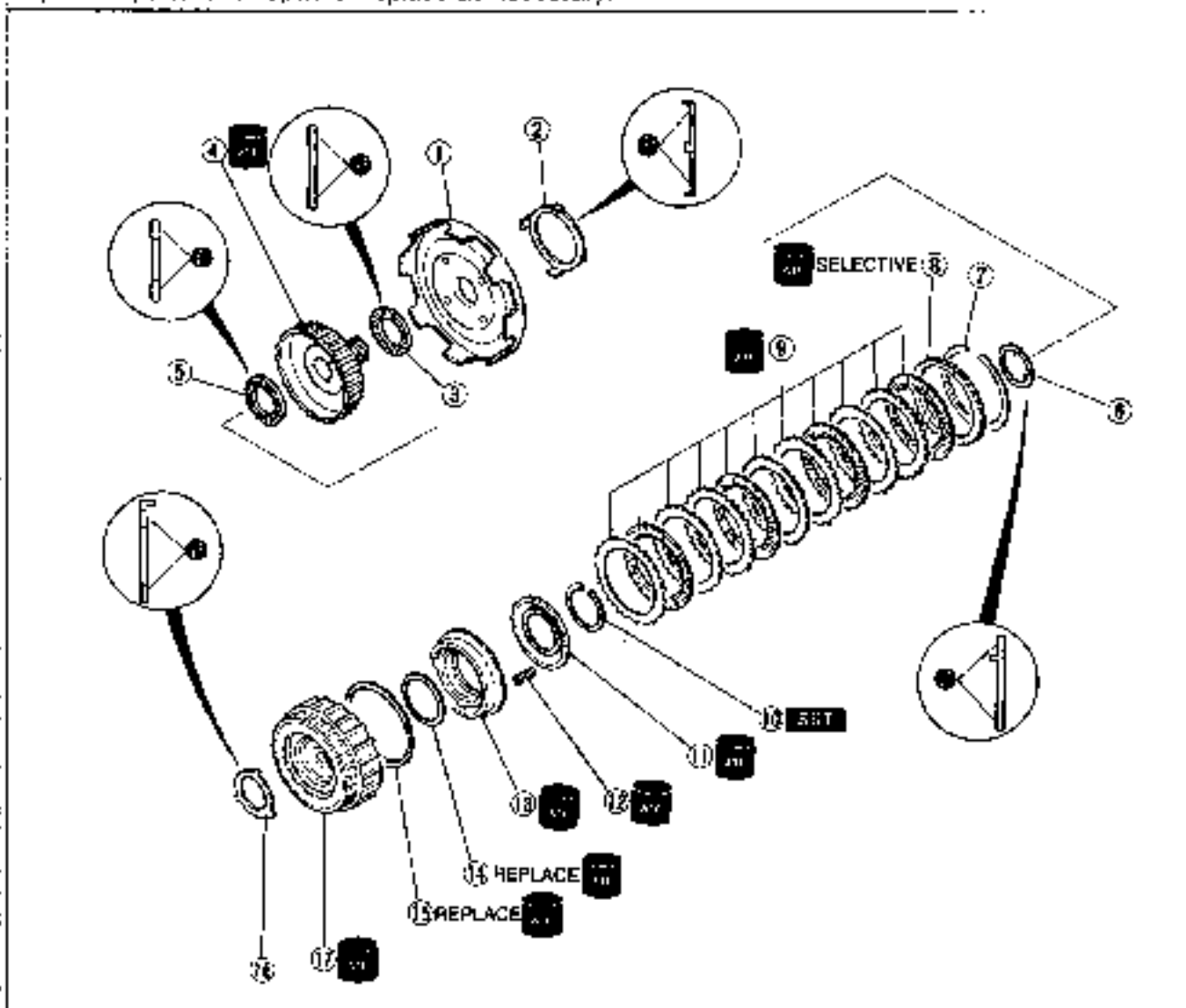
Select and install the correct retaining plate when assembling.



3M-JCK-130

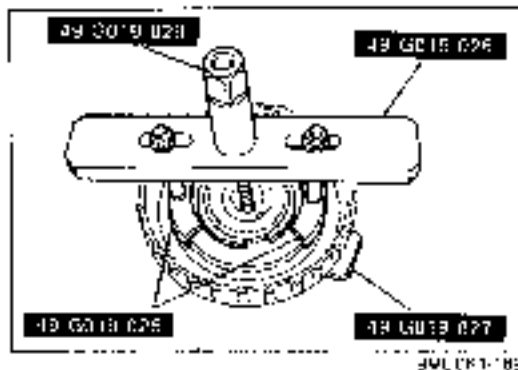
### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**. Inspect all parts, and repair or replace as necessary.



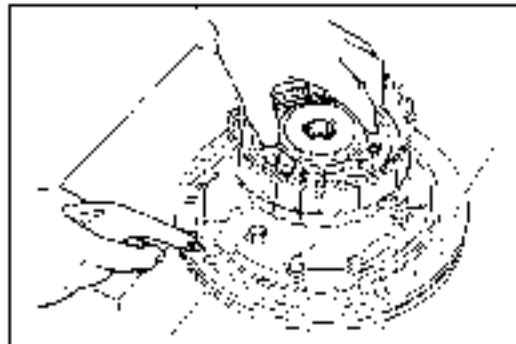
1H, K02, G01

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Front sun gear<br/>Inspect individual gear teeth for damage, wear, or cracks</li> <li>2. Bearing race<br/>Inspect bearing surface for scoring or scratches</li> <li>3. Bearing<br/>Inspect for damage or rough rotation</li> <li>4. High clutch hub</li> <li>5. Bearing<br/>Inspect for damage or rough rotation</li> <li>6. Bearing race<br/>Inspect bearing surface for scoring or scratches</li> <li>7. Snap ring</li> <li>8. Retaining plate</li> <li>9. Drive plates and driver plates<br/>Inspect for wear or burning<br/>Inspection... .. page K2-73</li> </ul> | <ul style="list-style-type: none"> <li>10. Snap ring<br/>Inspect for fracture or wear<br/>Disassembly Note ..... page K2-73</li> <li>11. Spring retainer<br/>Inspect for deformation or wear</li> <li>12. Return spring<br/>Inspection... .. page K2-73</li> <li>13. Clutch piston<br/>Inspect balls for sticking by shaking the piston<br/>Disassembly Note ... .. page K2-73</li> <li>14. D-ring<br/>15. D-ring</li> <li>16. Bearing race<br/>Inspect bearing surface for scoring or scratches</li> <li>17. High clutch drum</li> </ul> |
|--|---|

**Disassembly note****Snap ring****Caution**

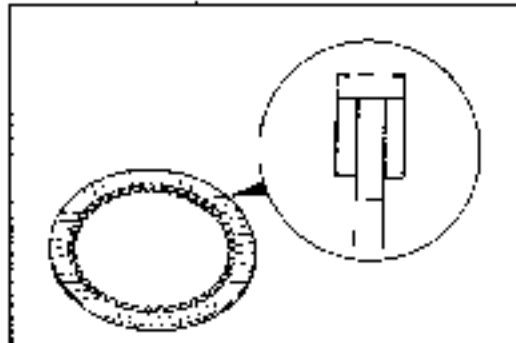
- a) Depress the spring retainer only enough to remove the snap ring.
- b) Do not damage the snap ring.

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.**

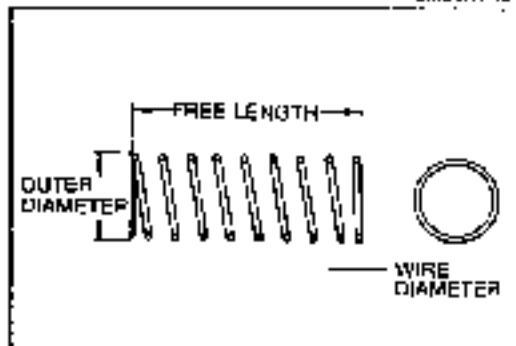
**Inspection****Drive plates**

1. Measure the facing thickness in three places, and determine the average of the three readings.

**Standard thickness: 1.6mm (0.063 in)**

**Minimum thickness: 1.4mm (0.055 in)**

2. If not within specification, replace the drive plates.

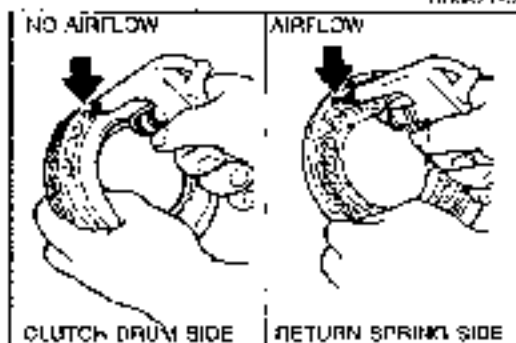
**Return spring**

1. Check the spring specifications.

**Specifications**

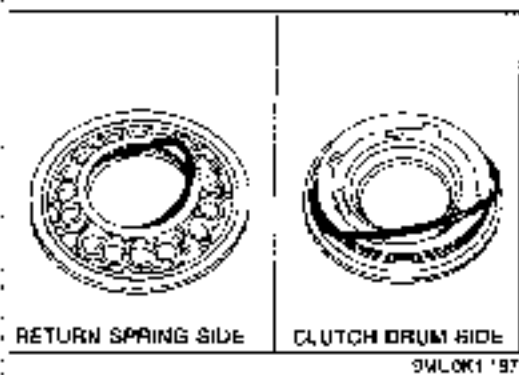
Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
11.8 (0.467)	22.1 (0.870)	6.0	1.3 (0.051)

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.

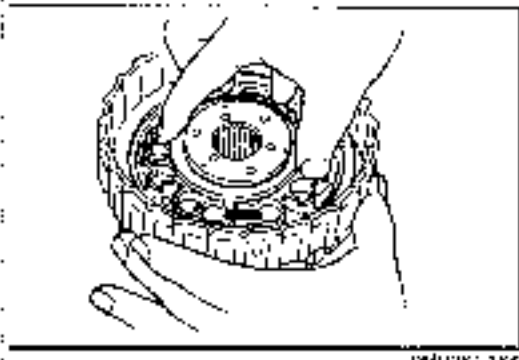
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



### Assembly

#### High clutch

1. Apply ATF to the new D rings and install them into the clutch piston.

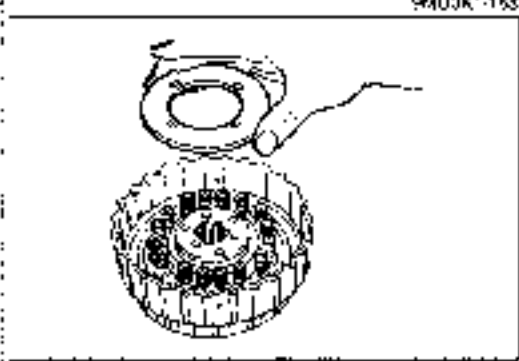


2. Apply ATF to the inner surface of the high clutch drum.

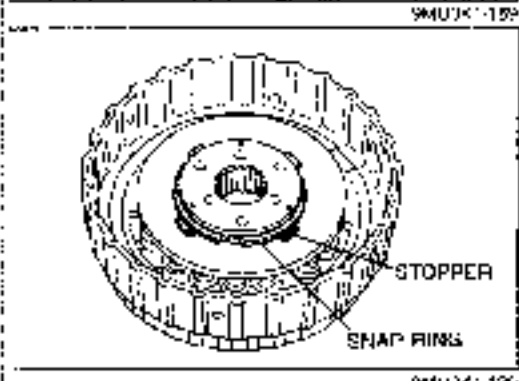
#### Caution

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 retainers.

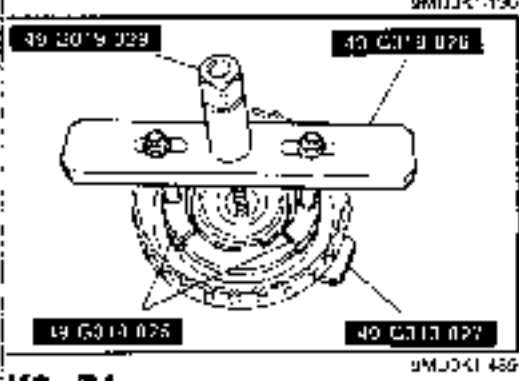


#### Caution

a) Depress the spring retainer only enough to install the snap ring.

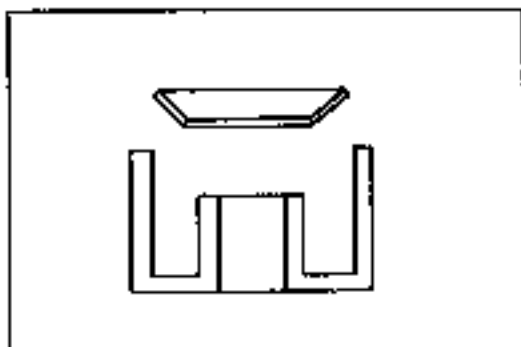
b) Do not over expand the snap ring when installing.

c) Do not align the snap ring end-gap with the spring retainer stop.

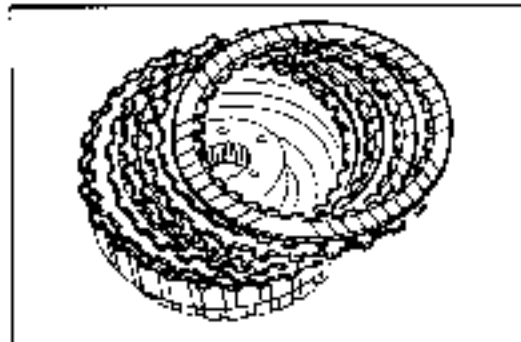


5. Install the snap ring while compressing the springs with the SST.

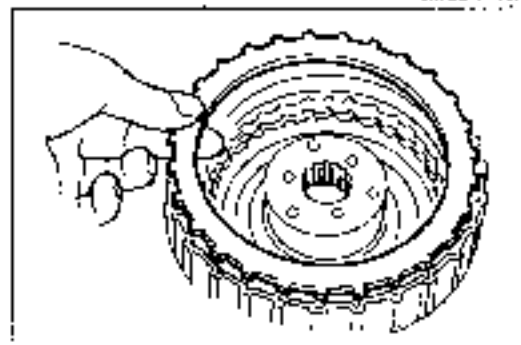




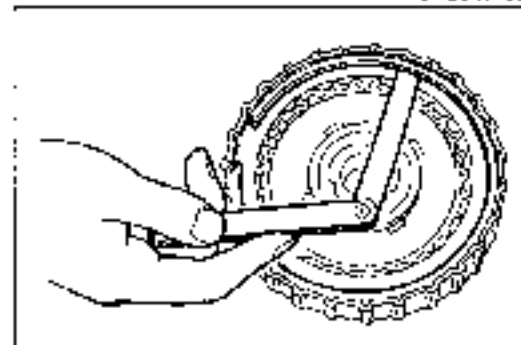
3MJC<1 131



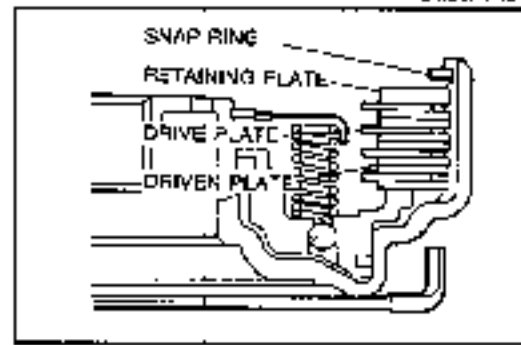
3MJC<1 132



3MJC<1 133



3MJC<1 134



3MJC<1 135

6. Install the dished plate as shown in the figure.

**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.

8. Install the retaining plate

**Caution**

**Do not deform the snap ring.**

9. Install the snap ring.

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**

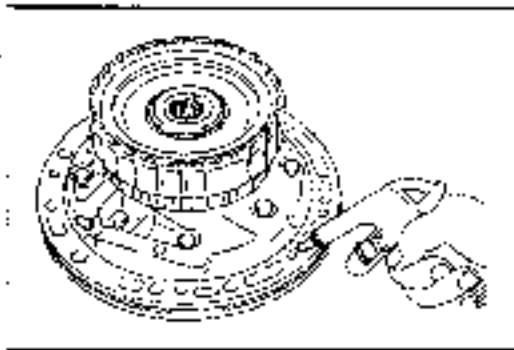
mm (in)			
3.0 (0.118)	3.2 (0.126)	3.4 (0.134)	3.6 (0.142)
3.8 (0.150)	4.0 (0.157)	4.2 (0.165)	4.4 (0.173)

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)

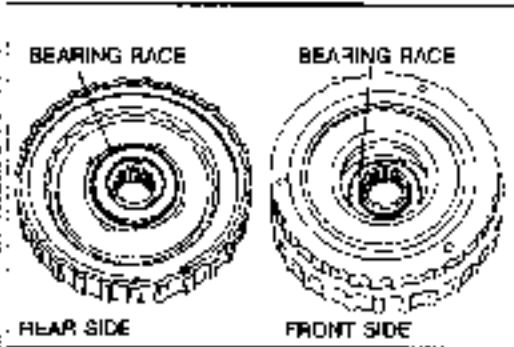


SMUCKY-196

**Caution****Apply air for no more than 3 seconds.**

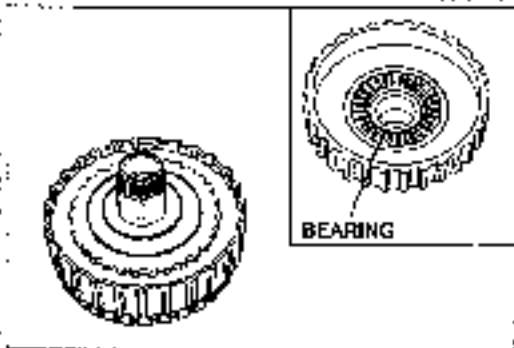
12. Install the high clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



SMUCKY-197

13. Apply petroleum jelly to the bearing races and install them in the high clutch as shown.

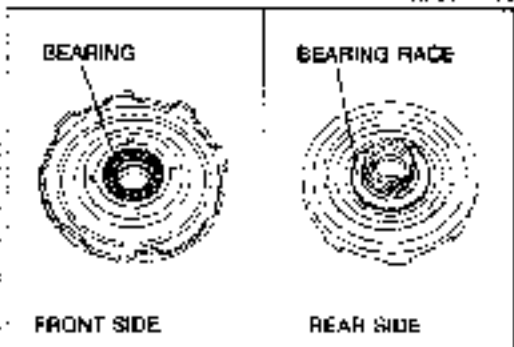
**Bearing race outer diameter****Front side: 43.5mm (1.713 in)****Rear side : 51.5mm (2.028 in)**

SMUCKY-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.



SMUCKY-199

**Front sun gear**

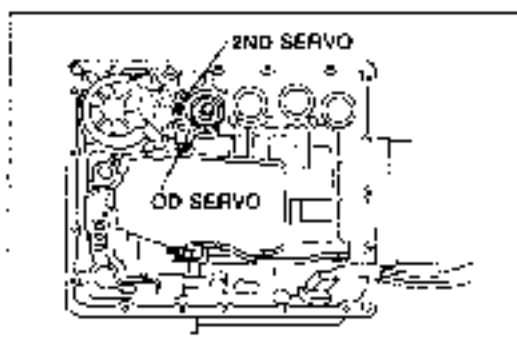
Apply petroleum jelly to the bearing and bearing race, and install them to the front sun gear.

**Bearing outer diameter : 53.0mm (2.087 in)**

**Bearing race outer diameter: 75.0mm (2.953 in)**

---

MEMO



3VLCK-120

### 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.

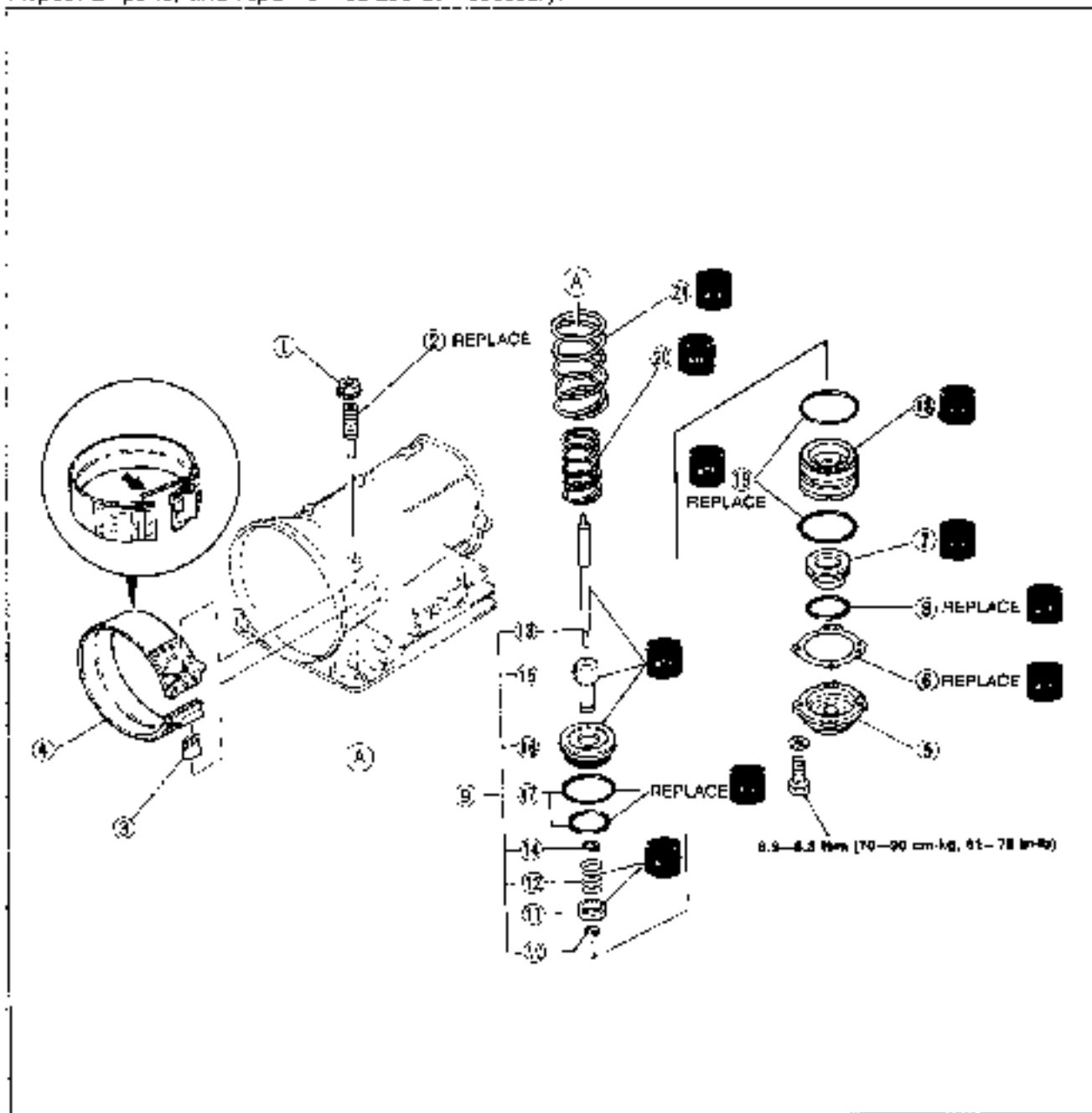
If not, the D-ring or the oil seal may be damaged or fluid may be sticking at the piston assembly.

Inspect them, and replace when assembling.

### Disassembly and Inspection

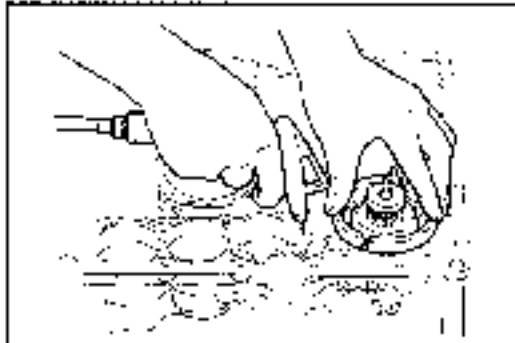
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.



3VLCK1-99

- |                                      |  |                                      |
|--------------------------------------|--|--------------------------------------|
| 1. Locknut                           | 9. Piston assembly and servo piston retainer | 17. O-ring                           |
| 2. Anchor end bolt                   | 10. Retaining ring (small)                   | 18. Servo piston retainer            |
| 3. Band stud                         | 11. Spring retainer                          | Disassembly Note<br>..... page K2-79 |
| 4. Brake band                        | 12. Return spring C                          | 19. O-ring                           |
| 5. Band servo retainer               | 13. Piston stem                              | 20. Return spring B                  |
| 6. Gasket                            | 14. Retaining ring (large)                   | Inspection .... page K2-79           |
| 7. OD band servo piston              | 15. Servo cushion retainer                   | 21. Return spring A                  |
| Disassembly Note<br>..... page K2-79 | 16. Band servo piston                        | Inspection .... page K2-79           |
| 8. O-ring                            |  | 19U0K2-043                           |



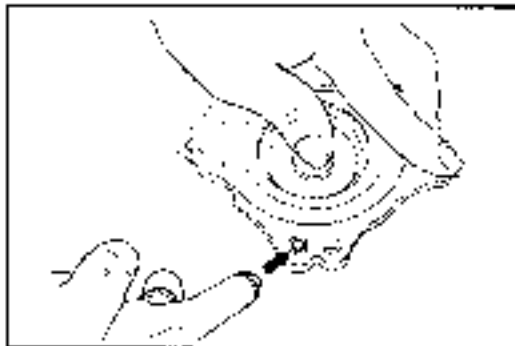
9WU0K1-201

### 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.

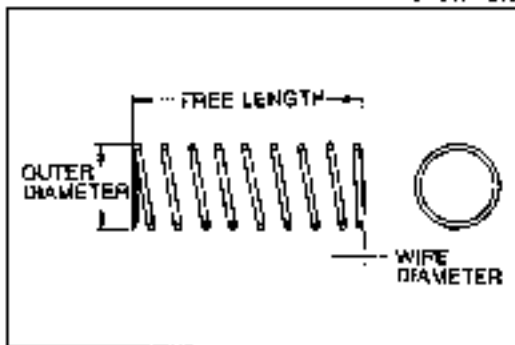
**Air pressure: 392 kPa (4.0 kg/cm<sup>2</sup>, 57 psi) max.**



9WU0K1-202

### OD band servo piston

- Block one of the oil holes in the OD servo piston retainer and the center hole in the OD band servo piston.
- Apply compressed air to the other oil hole in the OD servo piston retainer to remove OD band servo piston from the transmission case.
- Remove the O-ring from the OD band servo piston.



19U0K2-044

### Inspection

#### Return spring

- Measure the spring specifications.

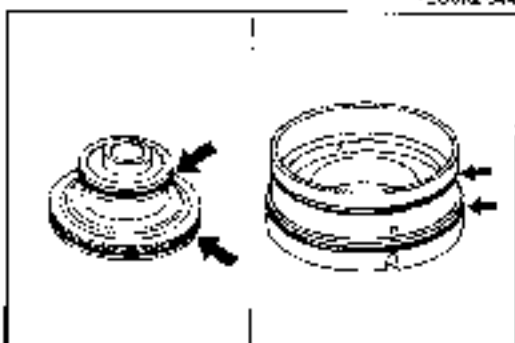
### Specifications

	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)	20.7 (0.815)	3.2	2.6 (0.102)

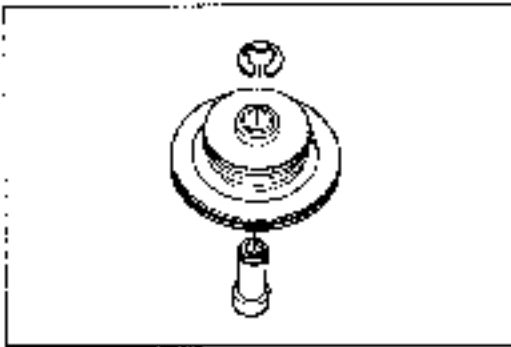
- If not within specification, replace the return spring.

### Assembly

- Apply ATF to the new O-rings and install them onto the servo piston retainer.
- Apply ATF to the new O-rings and install them onto the band servo piston.



5ML0K1-204

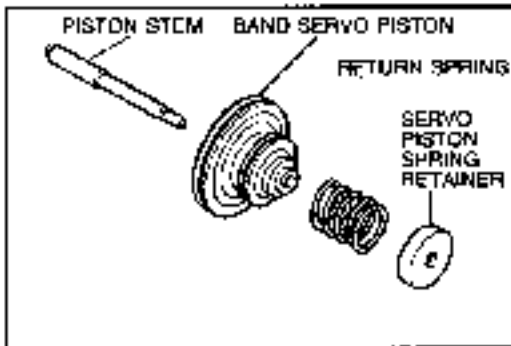


9MUDK1 205

**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.



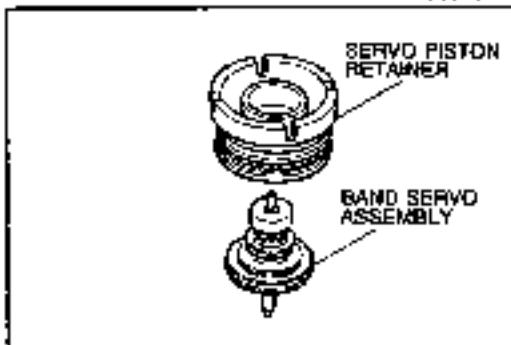
9MUDK2 045

- 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.



1EUBK2-04E

**Caution**

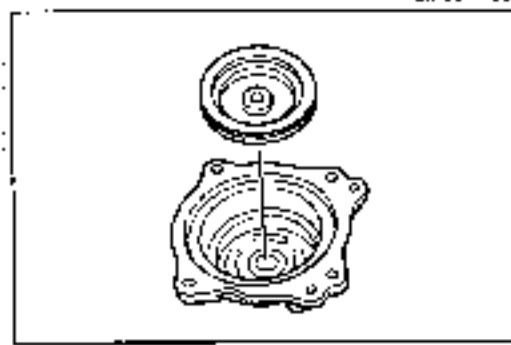
**Apply even pressure to the perimeter of the piston to avoid damaging the O-rings and D-rings when installing.**

- 6 Apply ATF to the band servo piston, and install it onto the servo piston retainer.



9MUDK1 208

- 7 Apply ATF to the new D-ring, and install it onto the OD band servo piston.

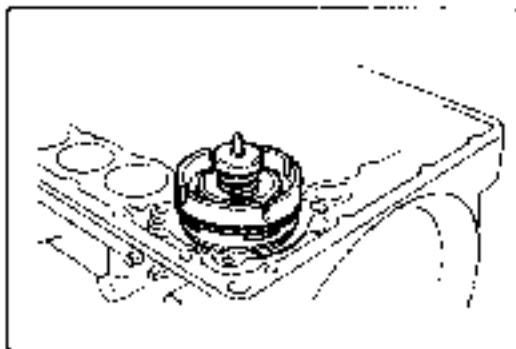


9MUDK1-206

**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.



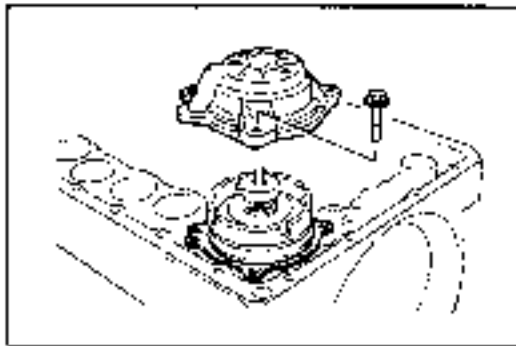
EMUDK1-210

- 9 Install return springs A and B.

**Caution**

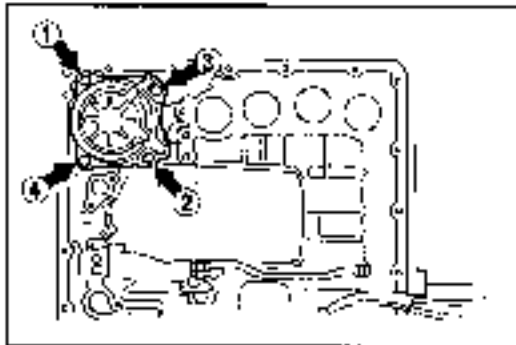
**Apply even pressure to the perimeter of the body to avoid damaging the O-rings when installing.**

10. Apply ATF to the piston assembly, and install it into the transmission case.



3K1J0K1-211

11. Apply ATF to the hand servo retainer and a new gasket, and install them on the transmission case.

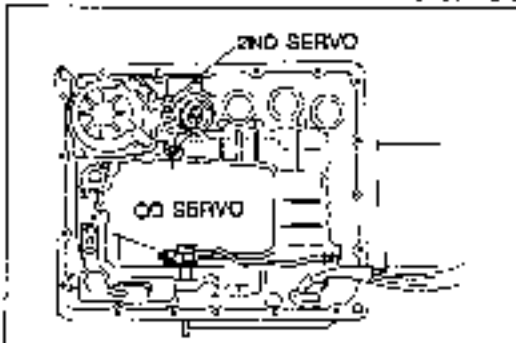


9VUUK1-212

- 12 Tighten the bolts evenly and gradually in the order shown.

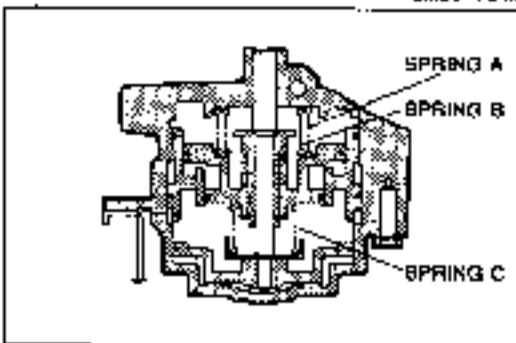
**Tightening torque:**

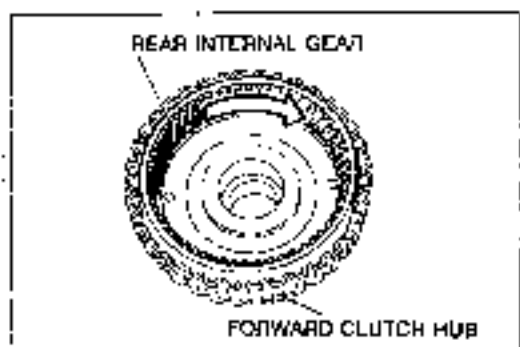
**6.9—8.8 N·m (70—90 cm·kg, 51—78 in·lb)**



9MJO-1-213

13. Check the servo piston operation by applying compressed air through the oil holes.





SMUJ41-192

### FRONT INTERNAL GEAR, REAR INTERNAL GEAR, FORWARD CLUTCH HUB, OVERRUNNING CLUTCH HUB

#### Preinspection

#### Forward one-way clutch operation

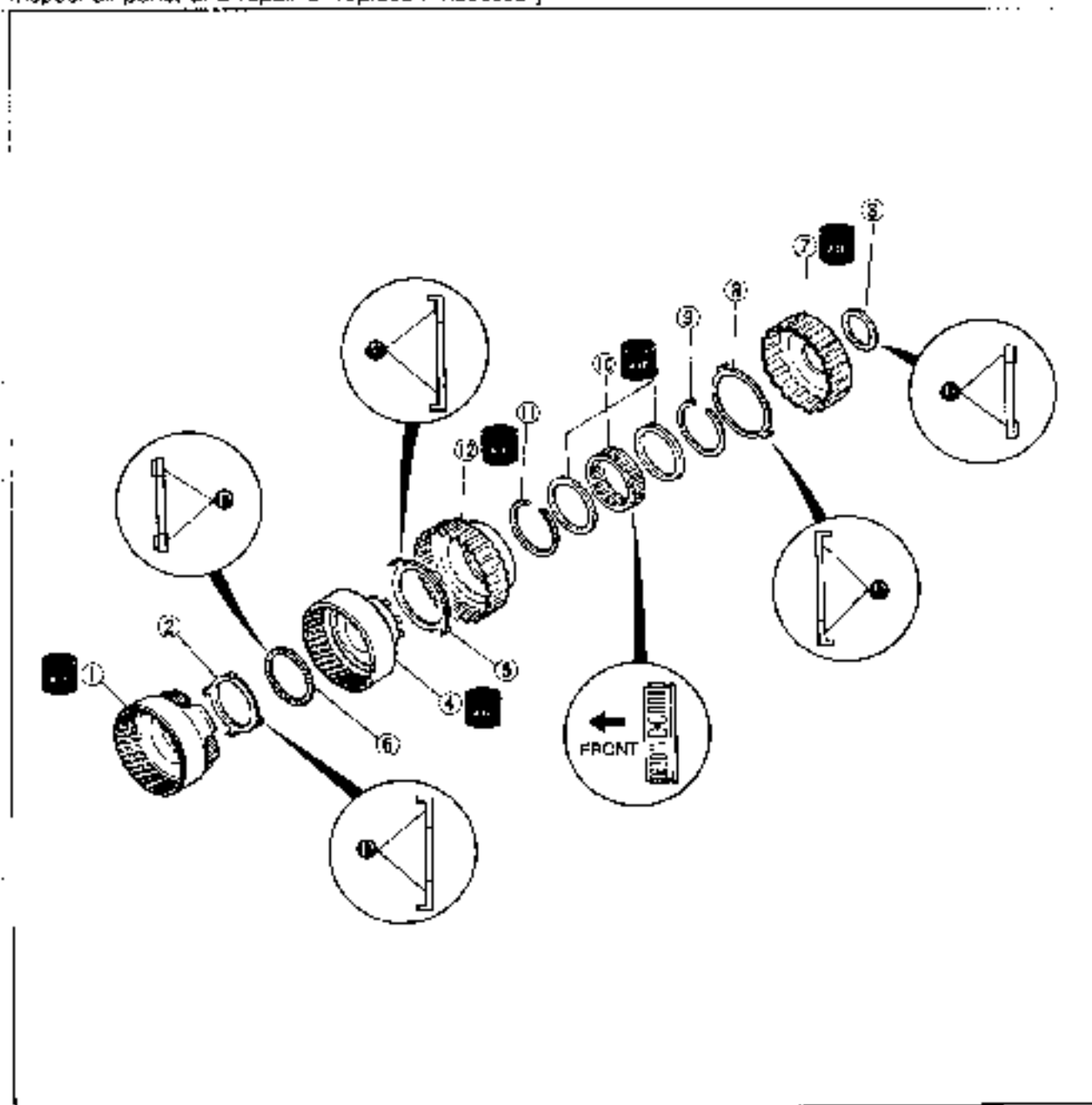
While holding the forward clutch hub, check that the rear internal gear rotate smoothly when turned clockwise and lock when turned counterclockwise.

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 if necessary.

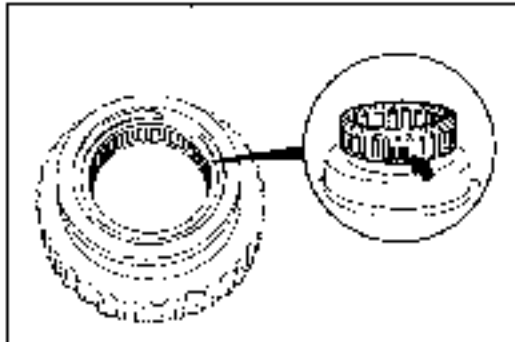


SMUJ41-433

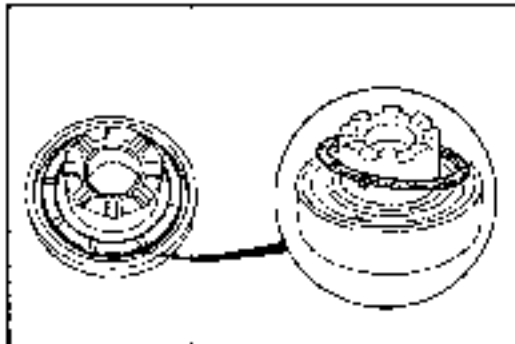


- |  |   |  |
|--|---|--|
| <p>1. Front internal gear (with rear planetary carrier)<br/>Inspect individual gear teeth for damage, wear, or cracks, and rotation of prior gears</p> <p>2. Bearing race<br/>Inspect for bearing surface scoring or scratches</p> | <p>3. Bearing<br/>Inspect for damage or rough 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> |
|--|---|--|

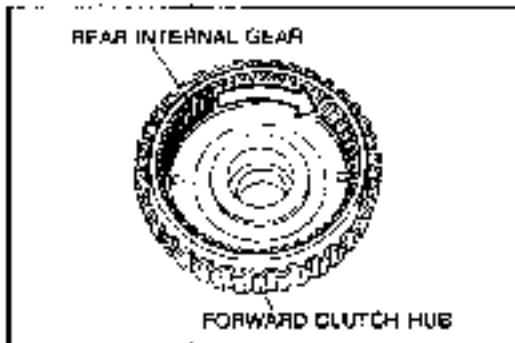
10U0K2-047



8MUK1-2'5



8MUK1-2'6



8MUK1-2'7



8MUK1-2'8

**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.

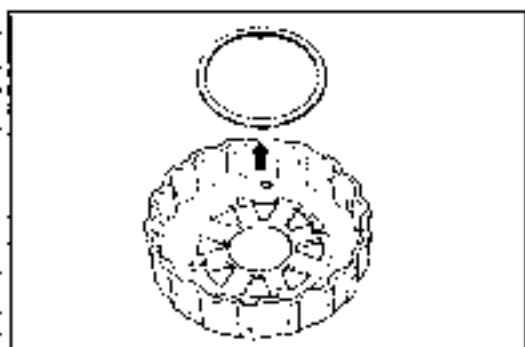
**Note**

**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)**

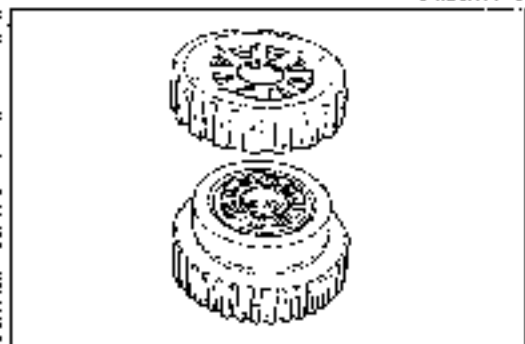


GMJJK1 219

**Note**

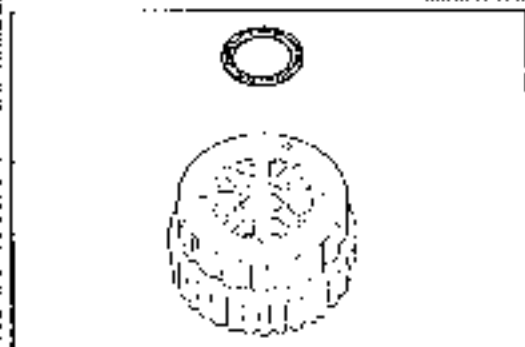
Be sure the locating tabs of the thrust washer are set into the holes in the overrunning clutch hub.

7. Apply petroleum jelly to the thrust washer, and set it in the overrunning clutch hub.



GMJJK1 220

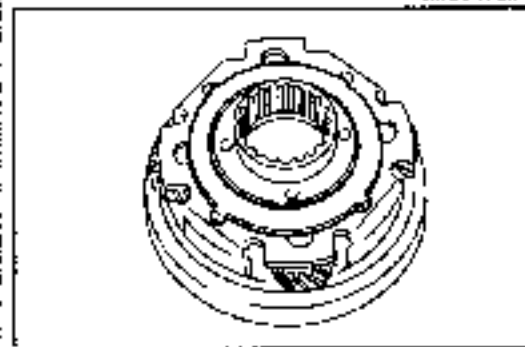
8. Set the overrunning clutch hub on the rear internal gear.



GMJJK1 221

9. Apply petroleum jelly to the bearing, and set it on the overrunning clutch hub.

**Bearing outer diameter: 59.0mm (2.322 in)**





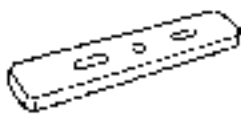



GMJJK1 222

10. Apply petroleum jelly to the bearing race, and set it on the front internal gear.

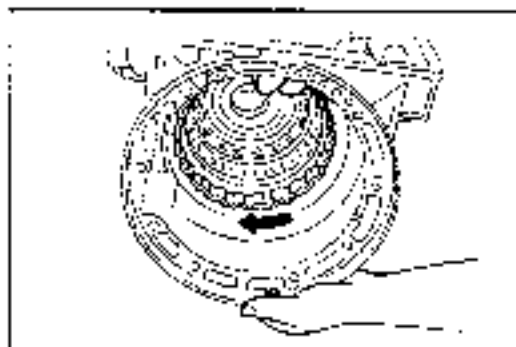
**Bearing race outer diameter: 75.0mm (2.953 in)**

**FORWARD CLUTCH DRUM  
(FORWARD CLUTCH, OVERRUNNING CLUTCH, LOW ONE-WAY CLUTCH)**

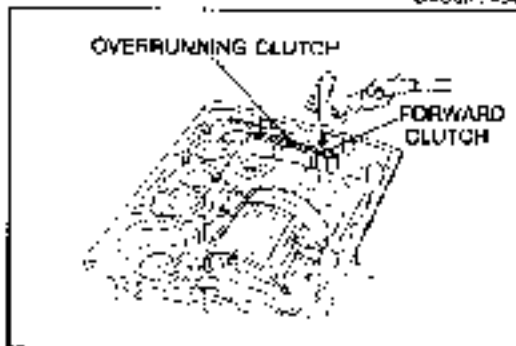
**Preparation  
SST**

<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 G019 001 Bolts</p> 

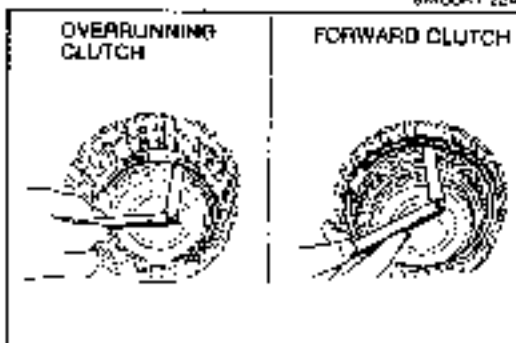
7A00K2 029



8MU0K1 494



8MU0K1 254



02L0K2 195

**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—2.06mm (0.18—0.081 in)**

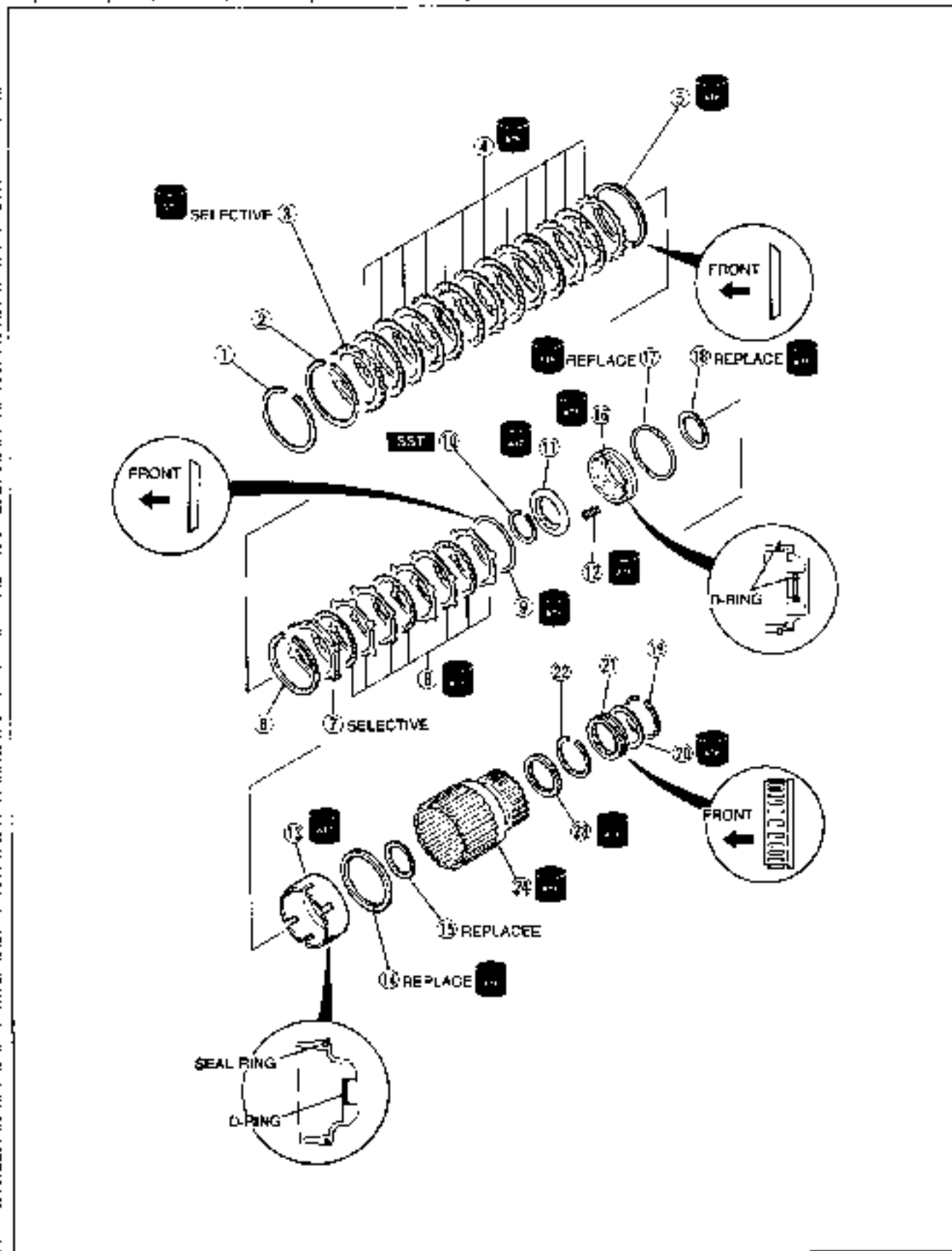
**Overrunning clutch: 1.0—2.0mm (0.039—0.079 in)**

Select the correct retaining plate when assembling if not within specification.

**Disassembly and Inspection**

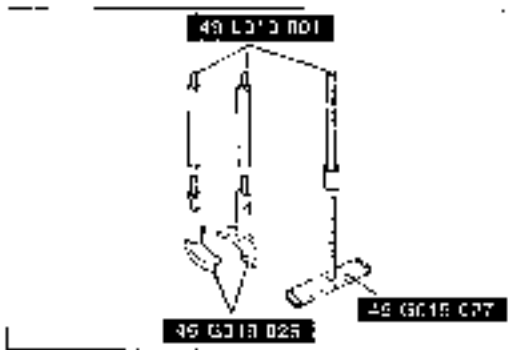
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace if necessary.

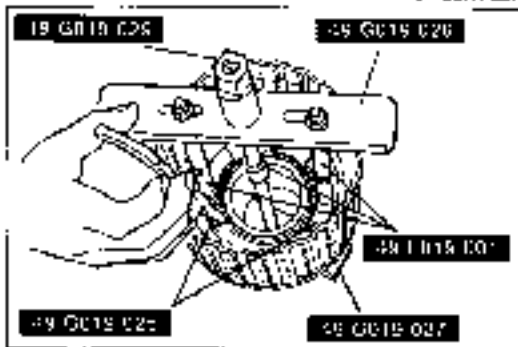


- 1. Snap ring
- 2. Snap ring
- 3. Retaining plate
- 4. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... .. page K2-86
- 5. Dished plate
- 6. Snap ring
- 7. Retaining plate
- 8. Drive plates and driven plates  
Inspect for wear or burning  
Inspection ..... .. page K2-86
- 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

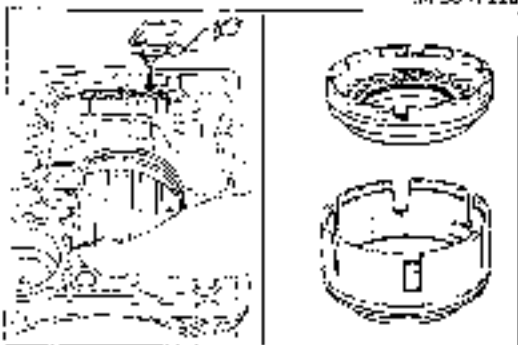
23UD-K2-031



9VLCK1 227



9VJOK1 228



9VLEK1 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.

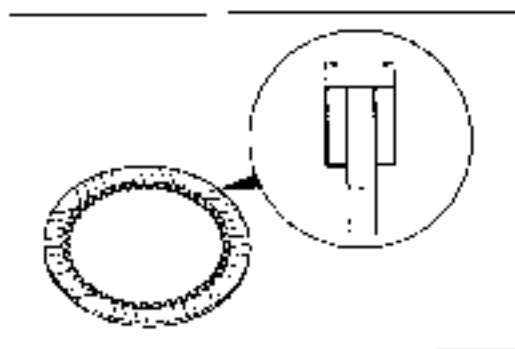
- 2. Compress the springs with the SST, then remove the snap ring with snap ring pliers.
- 3. Remove the spring retainer and springs.

**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.



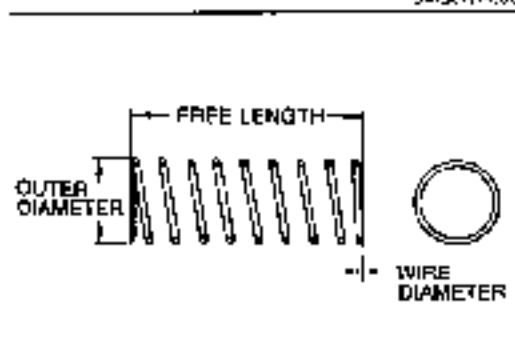
9M5J0K1-230

### 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.



9M5J0K1-231

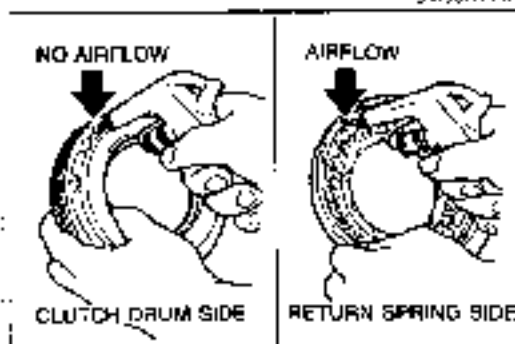
### Return spring

1. Measure the spring specifications.

### Specifications

Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
ø 7 (0.322)	35.8 (1.409)	10.3	1.3 (0.051)

2. If not within specification, replace the spring.

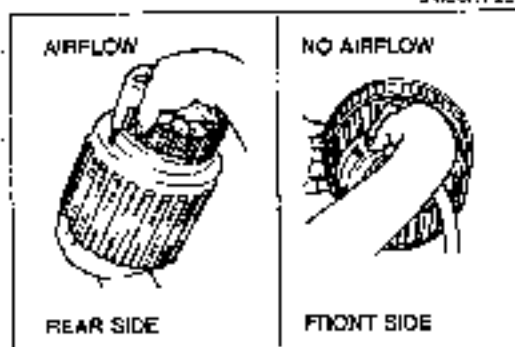


9M5J0K1-232

### 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.**

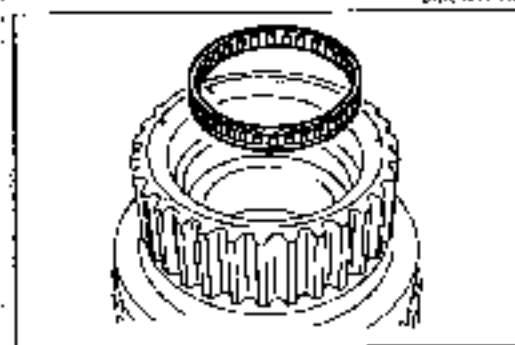


9M5J0K1-233

### 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.**



9M5J0K1-234

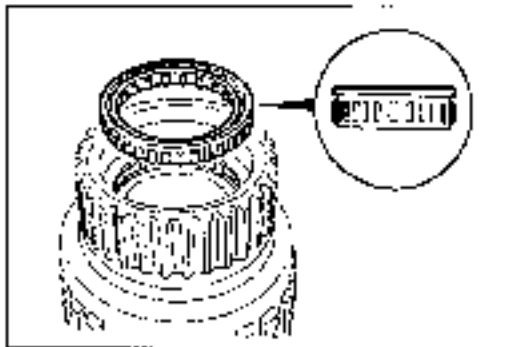
### Assembly

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.

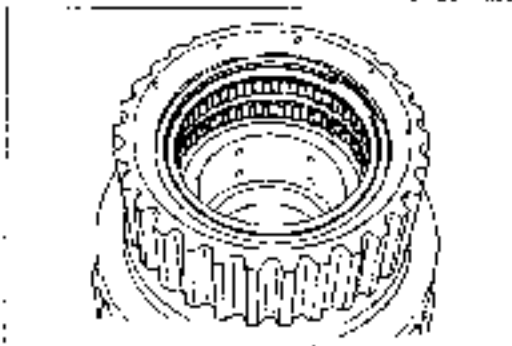


3MJCX1-225

**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.

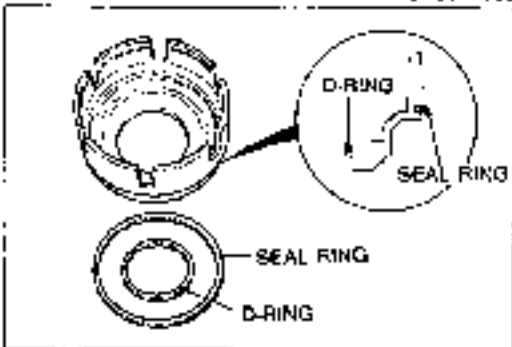


3MJCX1-235

**Caution**

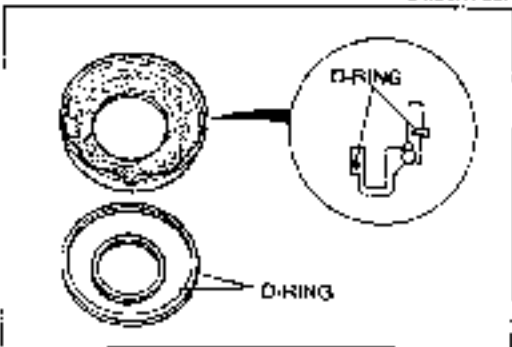
**Do not deform the snap ring.**

4. Apply ATF to the side plate and snap ring, and install them into the forward clutch drum.



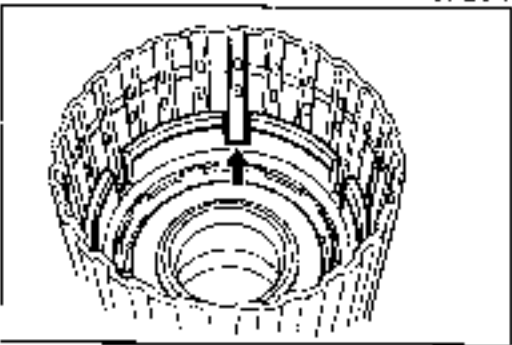
3MJCX1-237

5. Apply ATF to the new D-ring and seal ring, and install them into the forward clutch as shown.



1-4-0162-049

6. Apply ATF to the new D-ring and install them into the overrunning clutch piston as shown.



3MJCX1-238

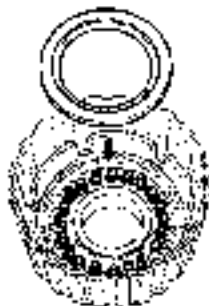
**Caution**

**Apply even pressure to the perimeter of the piston to avoid damaging the seal ring, and D-ring when installing.**

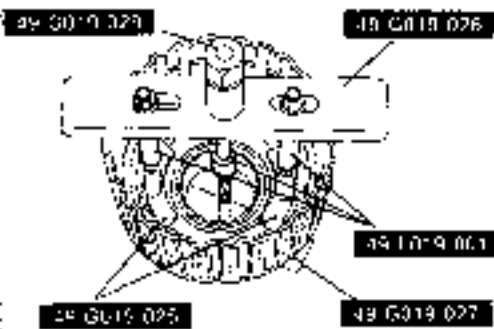
7. Apply ATF to the inner surface of the forward clutch drum and overrunning clutch piston.
8. Install the overrunning clutch piston in the forward clutch drum by turning it evenly and gradually. Align the notches in forward clutch piston with the grooves in forward clutch drum.



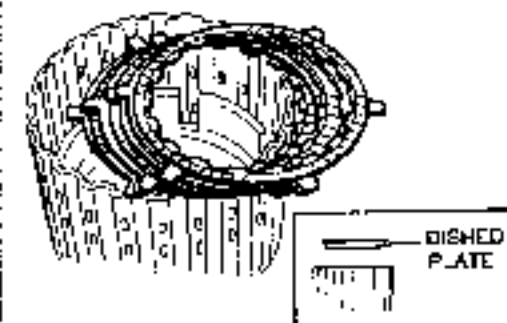
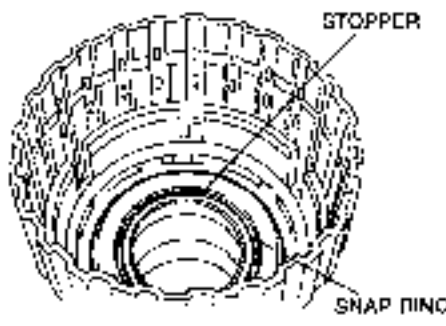
9M10K1-240



9M10K1-241



9M10K1-242



9M10K1-242

**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.

11. Install the 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.
- 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.

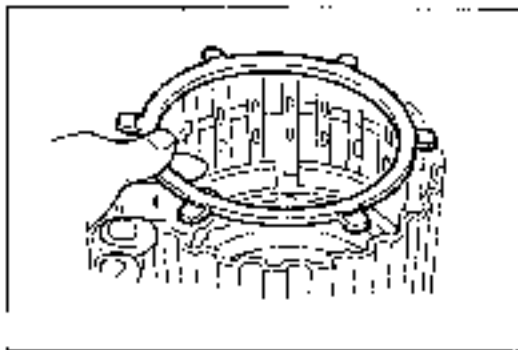
13. Install the dished plate as shown.

**Note****Installation order:**

**Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive**

- 14 Apply ATF to the drive plates and driven plates and install them into the forward clutch piston.



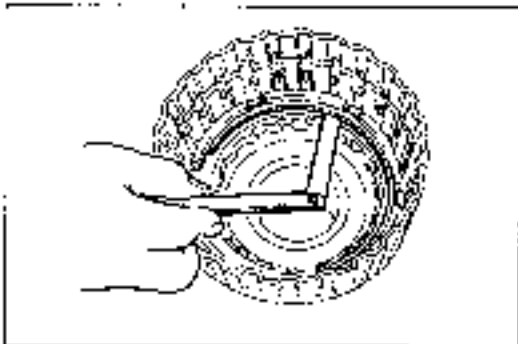


9MJKR1-244

15. Install the retaining plate.

**Caution**  
Do not deform the snap ring.

16. Install the snap ring



9MJKR1-245

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)	

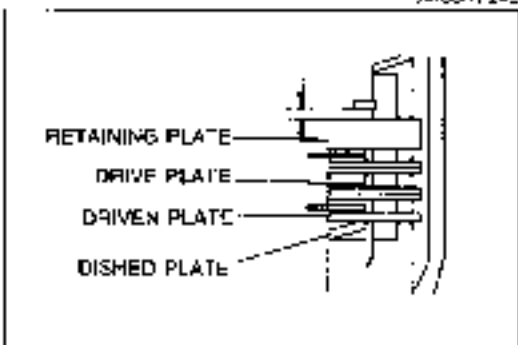
18. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dishod plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

**Standard clearance: 1.0—1.4mm (0.039—0.055 in)**

**Retaining plate sizes**

mm (in)

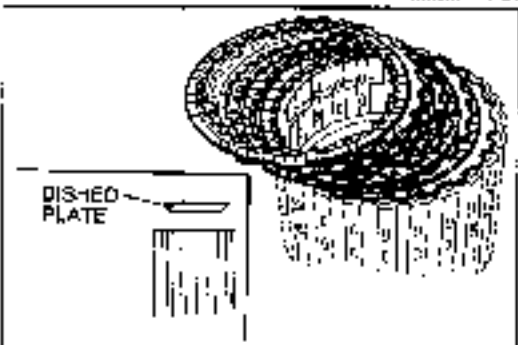
4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	



9MJKR1-246

19. Install the dishod plate as shown

**Note**  
**Installation order:**  
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



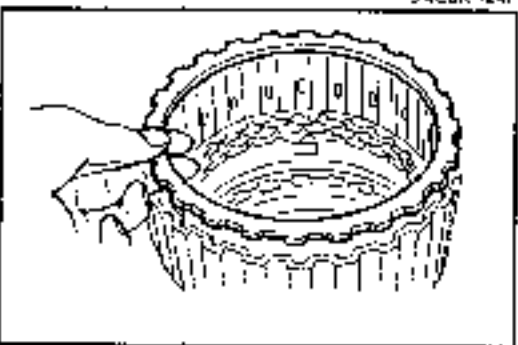
9MJKR1-247

20. Apply ATF to the drive plates and driven plates, and install them into the forward clutch drum.

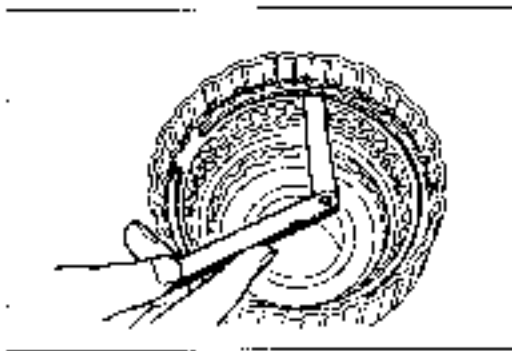
21. Install the retaining plate.

**Caution**  
Do not deform the snap ring.

22. Install the snap ring.



9MJKR1-248



9M/LCK1-248

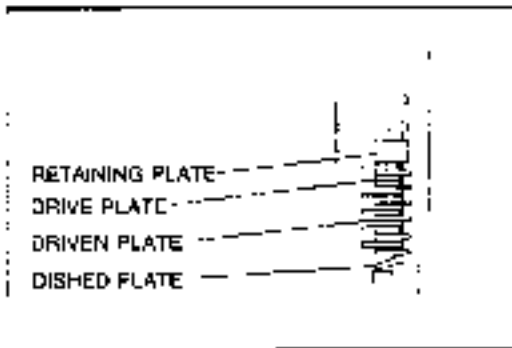
23. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**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)	



9M/LCK1-250

24. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dishied 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)**

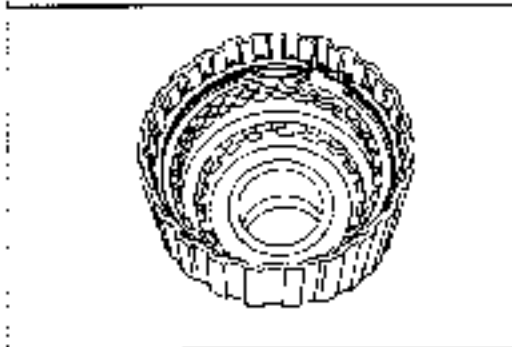
**Retaining plate sizes**

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)	

**Caution**

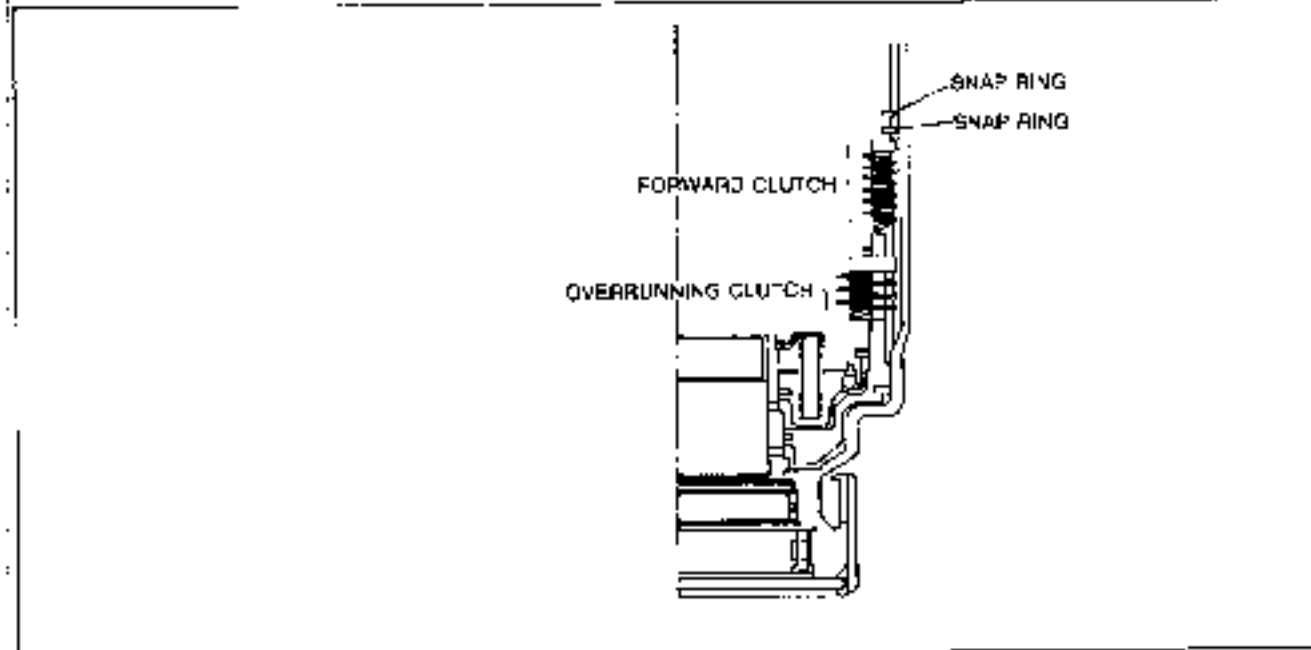
**Do not deform the snap rings.**



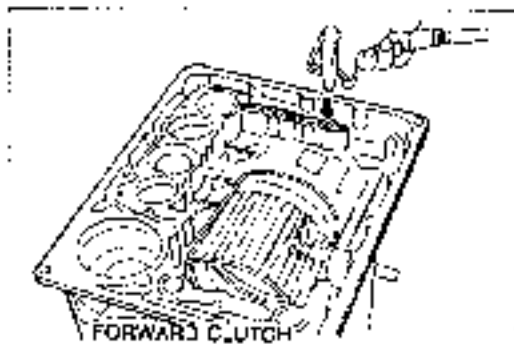
9M/LCK1-251

25. Install the snap ring

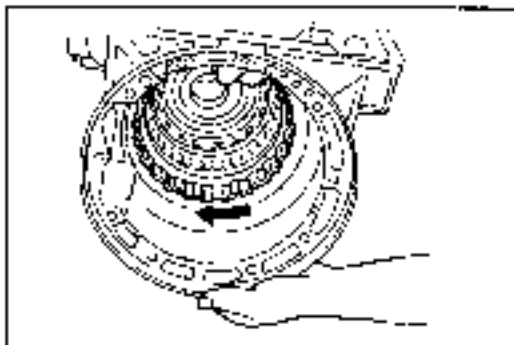
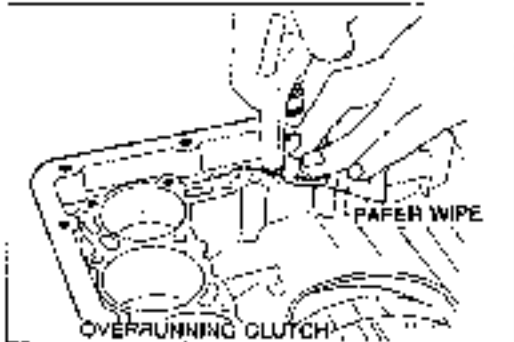
**Installation of proper assembly**



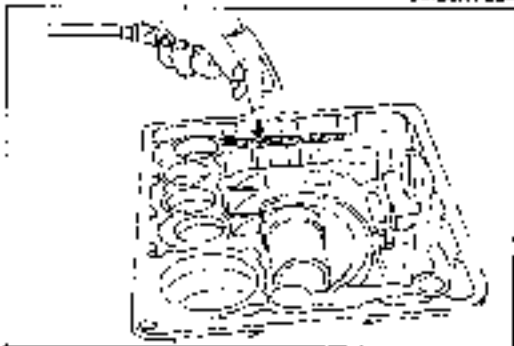
9M/LCK1-252



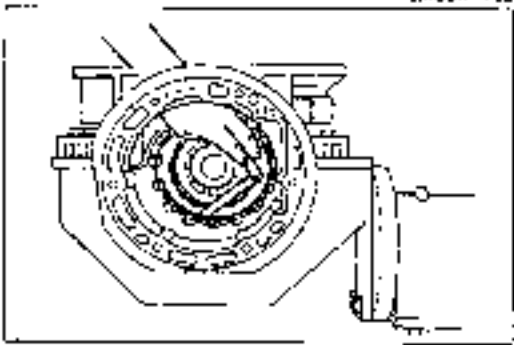
SMUK1-253



SMUK1-254



SMUK1-255



SMUK2-050

**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.**

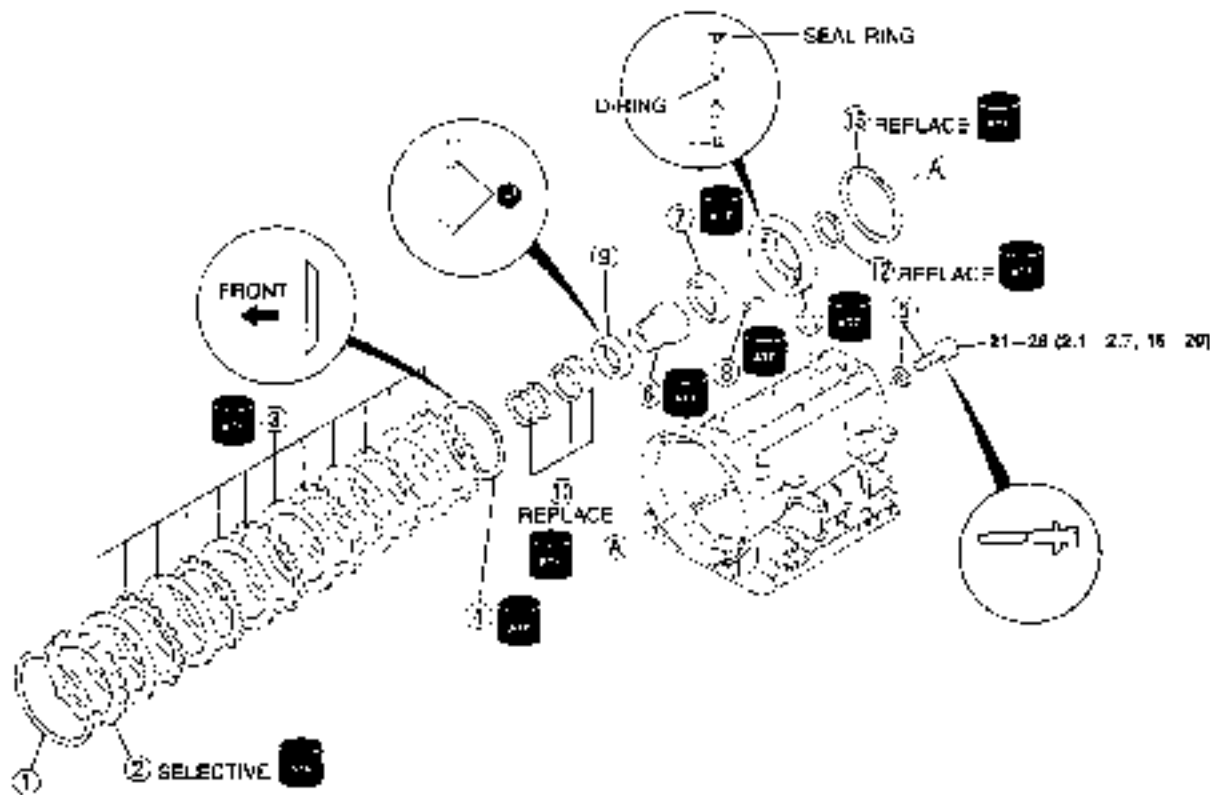
2. Verify that the rotating plates move forward the snap ring. If not the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace when assembling if necessary.

**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.

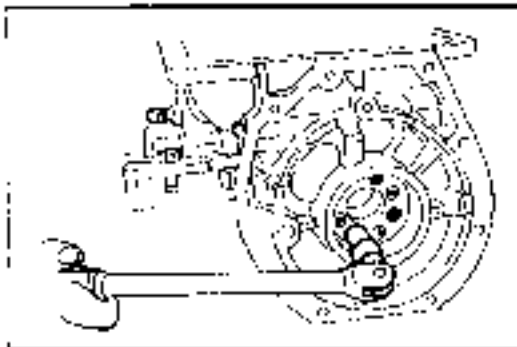
### Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.  
Inspect all parts, and repair or replace if necessary.



Rev (mkg, 0-01)  
TRUCKS 95

- |  |  |
|--|--|
| <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. Alien 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> |
|--|--|



9MJD41 236

**Disassembly note**  
**Low one-way clutch inner race**

**Caution**  
**Do not lose the springs.**

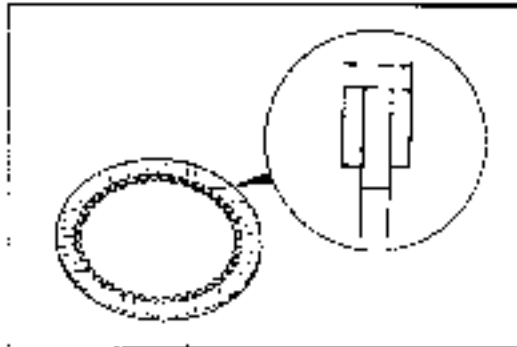
1. Remove the Allen head bolts holding the low one-way clutch inner race and spring retainer.
2. Remove the low one-way clutch inner race, spring retainer, and return springs.



9MJD41 238

**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.**



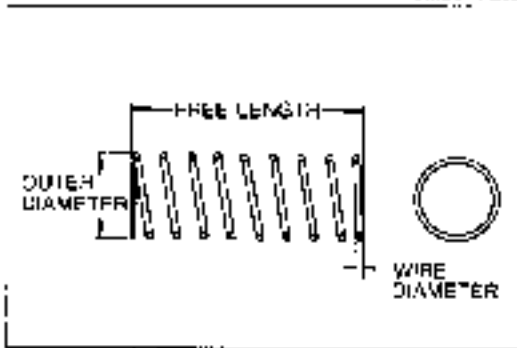
9MJD41 260

**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.



9MJD41 267

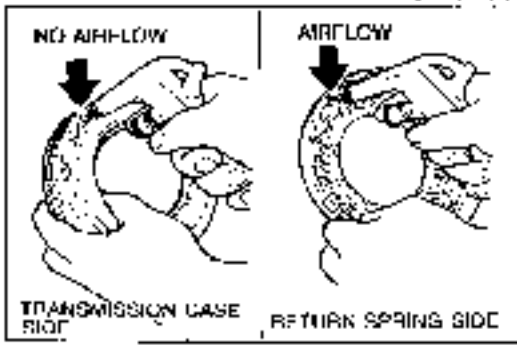
**Return spring**

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.

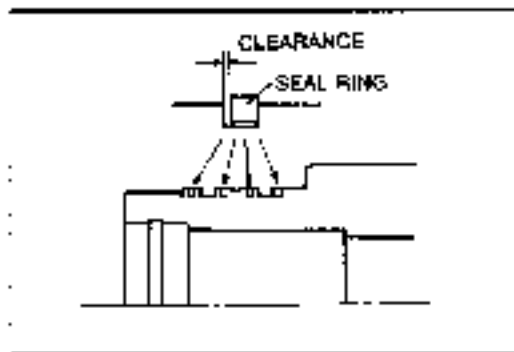


9MJD41 262

**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.**



SMUCK1 263

**Low one-way clutch inner race**

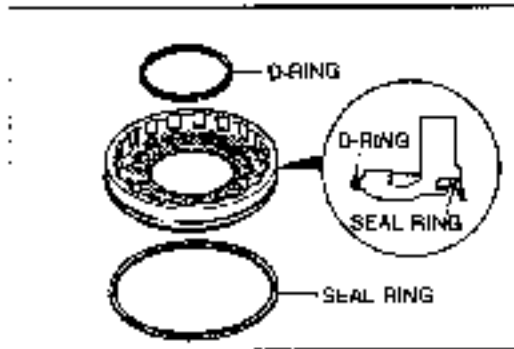
1. Apply petroleum jelly to a new seal ring and install the seal ring.
2. Measure the clearance between the seal ring and the ring groove.

**Standard clearance:**

0.10—0.25mm (0.0039—0.0098 in)

**Maximum clearance: 0.25mm (0.0098 in)**

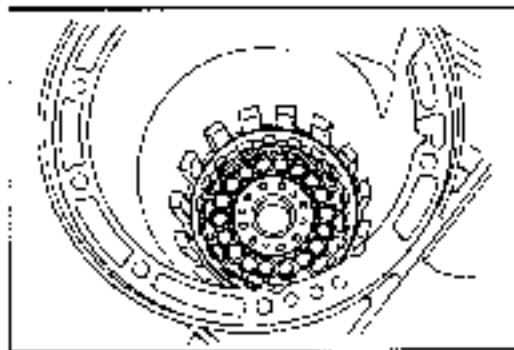
3. If not within specification, replace the low one-way clutch inner race.



SMUCK1 264

**Assembly**

1. Apply ATF to the new D ring and seal ring and install them to the low and reverse brake piston.

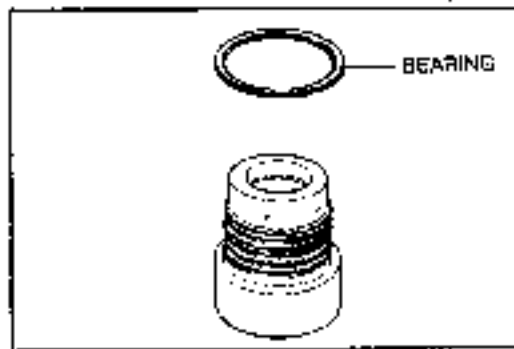


SMUCK1 285

**Caution**

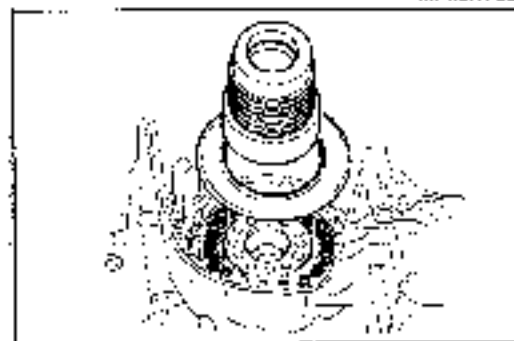
Apply even pressure to the perimeter of the brake piston to avoid damaging the D-ring and seal ring when installing.

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.



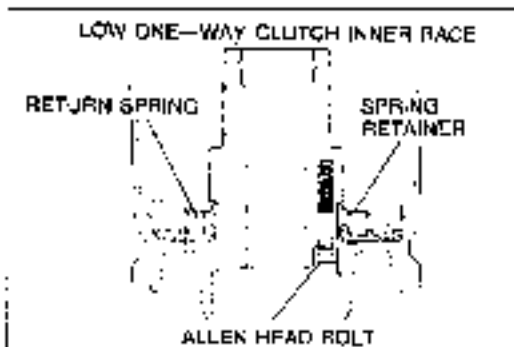
SMUCK1 286

4. Apply petroleum jelly to the bearing, and install it on the low one-way clutch inner race.

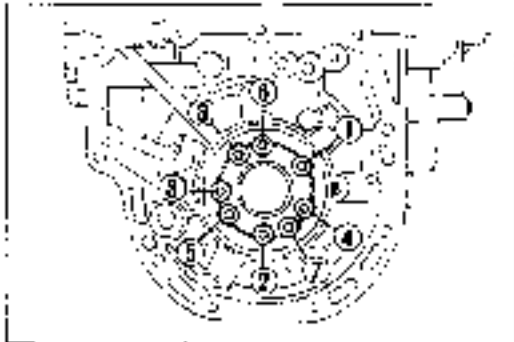
**Bearing outer diameter: 78.0mm (3.071 in)**

SMUCK1 287

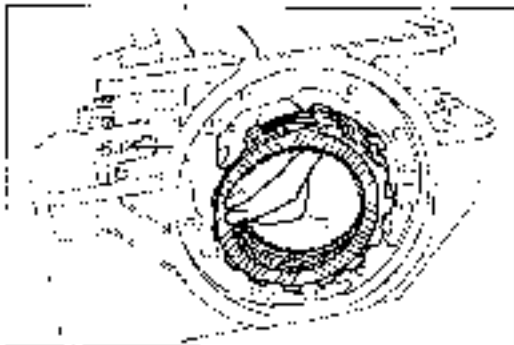
5. Assemble the return spring, spring retainer and low one-way clutch inner race to the low and reverse brake piston.



9M10K1-056



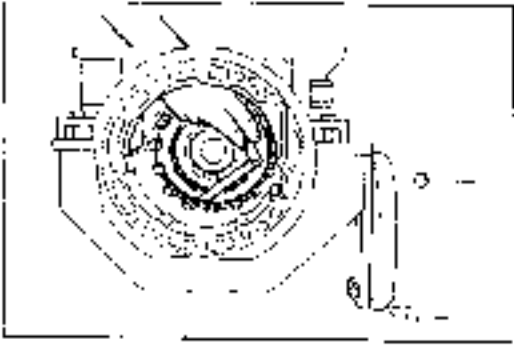
9M10K1-060



9M10K1-070



9M10K1-071



9M10K1-072

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 Nm (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.

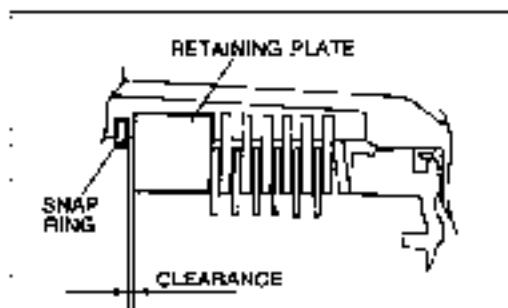
11. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

**Standard clearance: 0.7–2.3mm (0.028–0.091 in)**

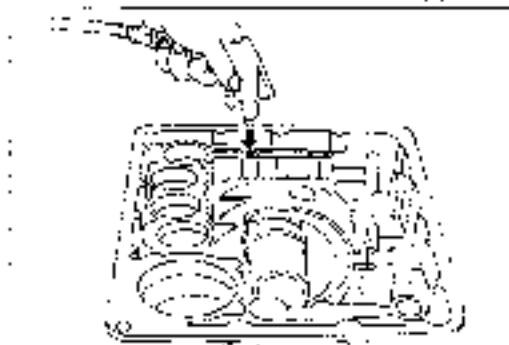
**Retaining plate sizes**

mm (in)

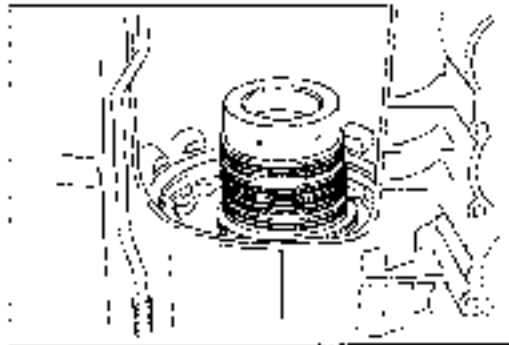
9.0 (0.354)	9.2 (0.362)	9.4 (0.370)
9.6 (0.378)	9.8 (0.386)	10.0 (0.394)



1FLUCK1-053



EMLUK1-273



RMUCK1-275

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 (C.354)	9.2 (C.362)	9.4 (C.370)
9.6 (C.378)	9.8 (C.386)	10.0 (C.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.



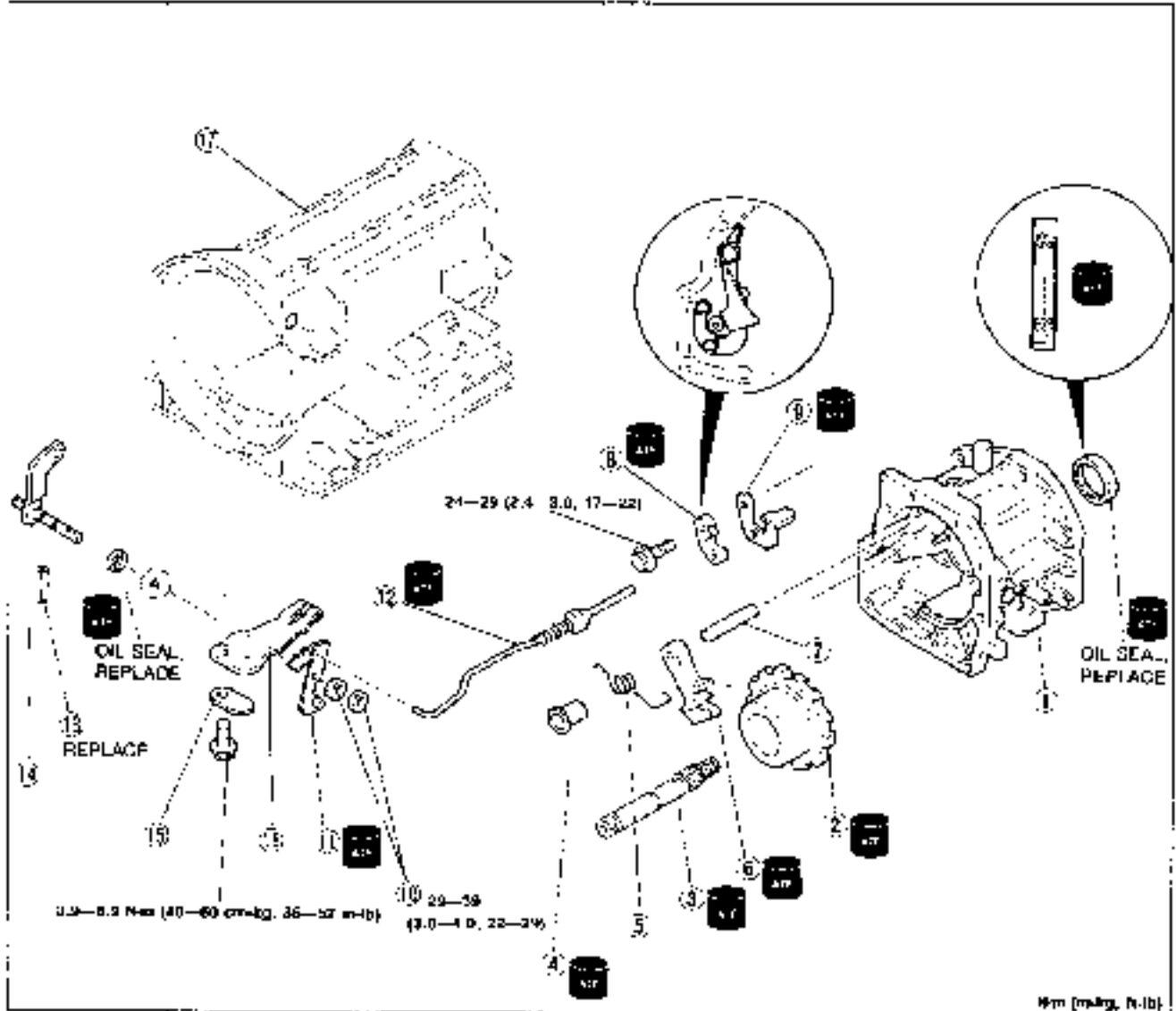
**ADAPTER CASE AND PARKING MECHANISM**

**Disassembly and Inspection**

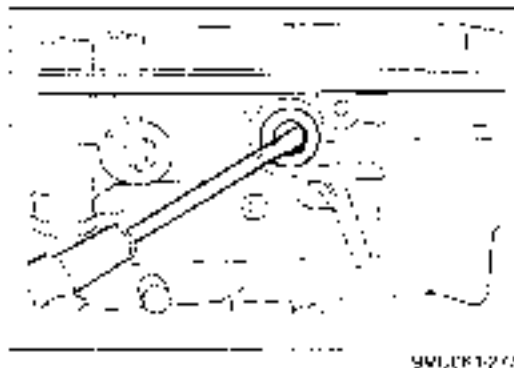
**Caution**

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.



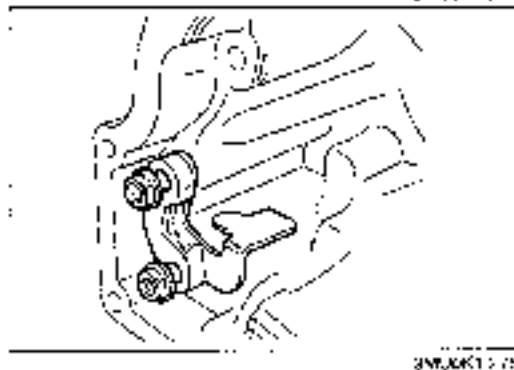
- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Adapter case</li> <li>2. Parking gear<br/>Inspect individual gear teeth for damage or wear and rough rotation of bearing</li> <li>3. Output shaft<br/>Inspect splines for damage or wear</li> <li>4. Parking pawl spacer</li> <li>5. Return spring</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> </ul> | <ul 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                     <ul 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> </ul> </li> </ul> |
|--|---|



**Disassembly note**  
**Oil seal (Transmission side)**

**Caution**  
 Do not remove the seal unless necessary.

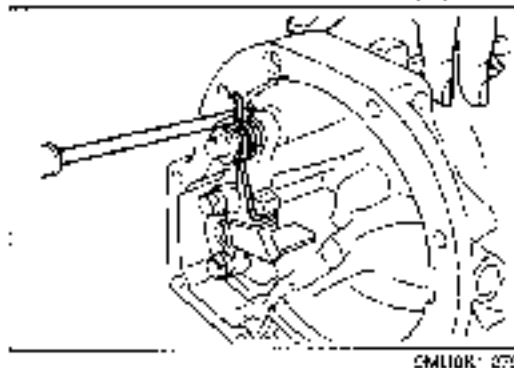
Remove the oil seal with a screwdriver.



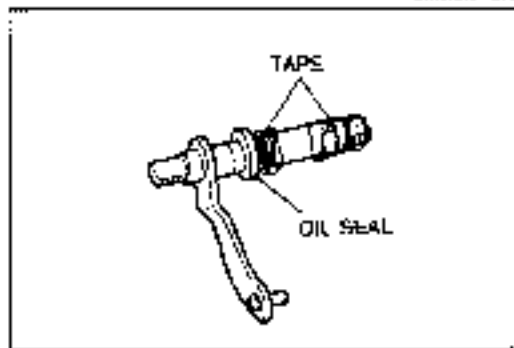
**Assembly**  
**Extension housing**

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)

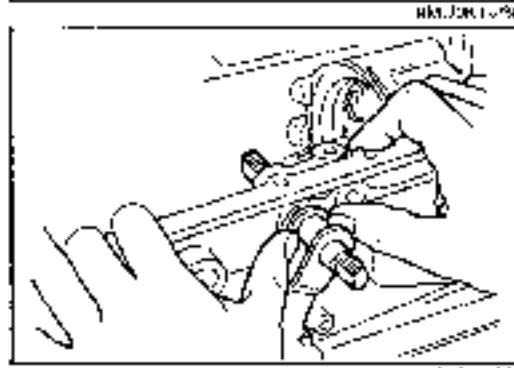


2. Apply ATF to the parking pawl shaft and install it in the extension housing.
3. Apply ATF to the parking pawl, return spring and spacer, and install them in the extension housing.

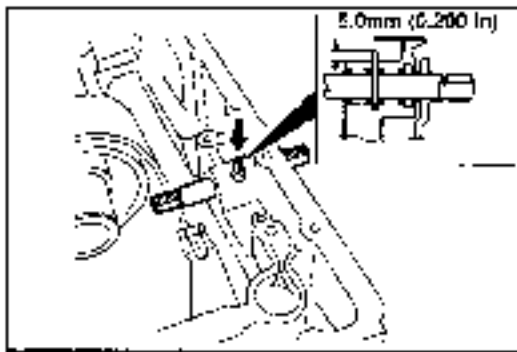


**Manual shaft**

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.

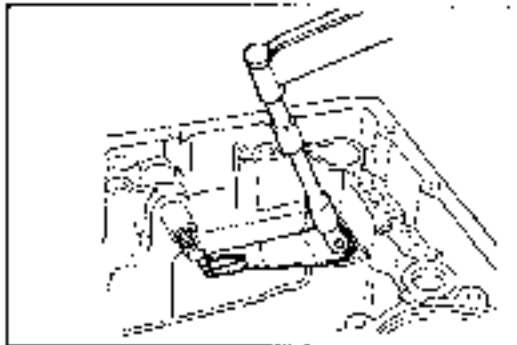


3. Apply ATF to the bearing in the transmission case.
4. Install the manual shaft into the transmission case.
5. Push the oil seal squarely into the transmission case.
6. Remove the tape.



9M1\_A0K 1-202

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.

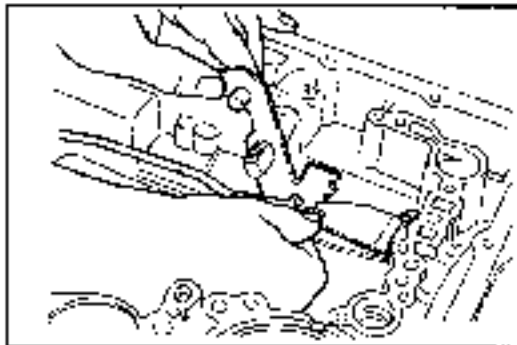


9M1\_A0K 1-202

8. Install the detent spring and spacer.

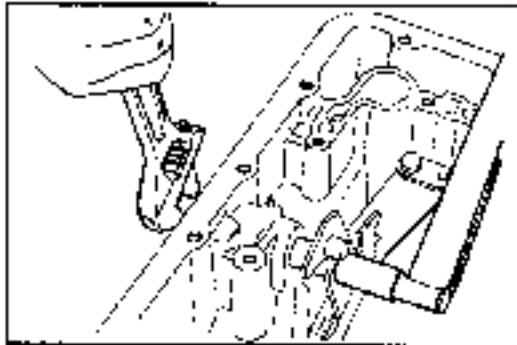
**Tightening torque:**

**3.9—5.9 N·m (40—60 cm·kg, 35—52 in·lb)**



9M1\_A0K 1-202

9. Install the manual plate and parking rod.

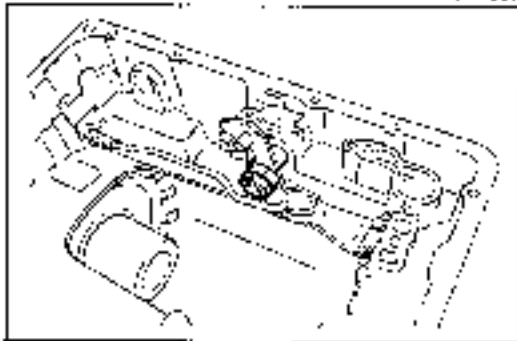


9M1\_A0K 1-202

10. Tighten the locknuts

**Tightening torque:**

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



9M1\_A0K 1-202




11. Check the parking mechanism operation.

### OIL SEAL

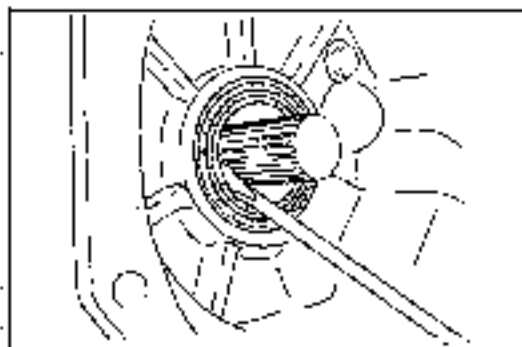
#### Preparation

#### SST

Following **SSTs** used for 4WD model.

<p>49 U027 003</p> <p>Installer, oil seal</p> 	<p>49 G030 795</p> <p>Installer, oil seal</p> 	<p>49 G030 797</p> <p>Handle (Part of 49 G030 795)</p> 
---	---	--

CMU0K1-09F



#### Inspection

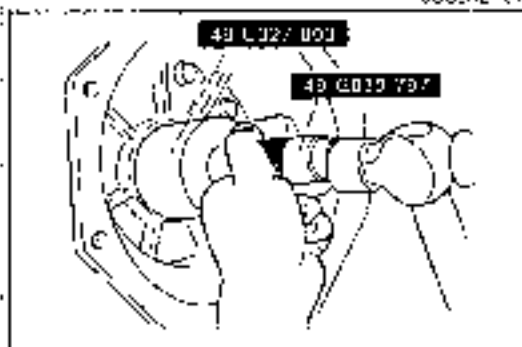
Check for damage, wear, or oil leaking of oil seal. Replace if necessary.

#### 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



CMU0K2-10F

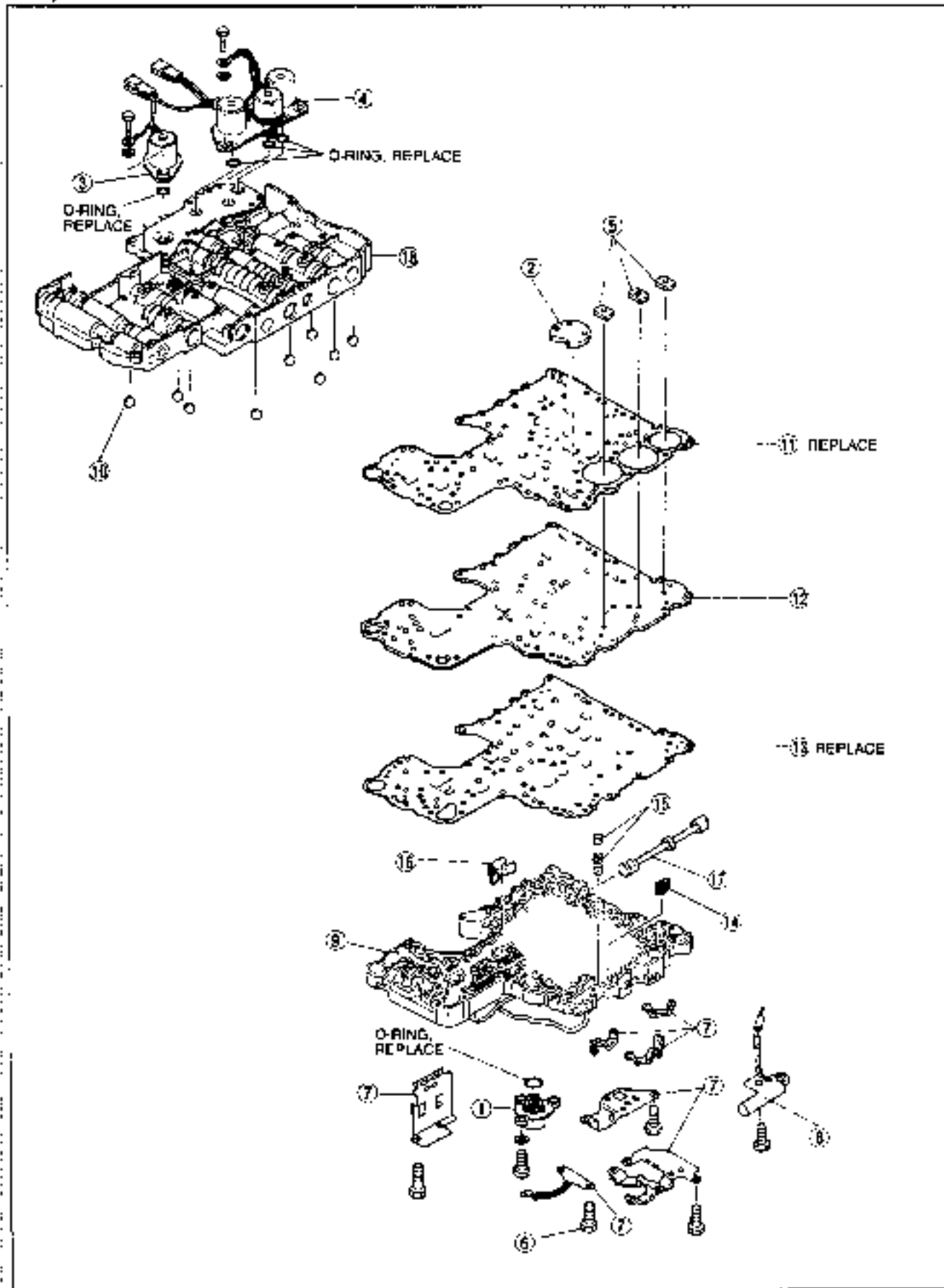
**CONTROL VALVE BODY (DISASSEMBLY AND INSPECTION)****Disassembly and Inspection****Caution**

- 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.

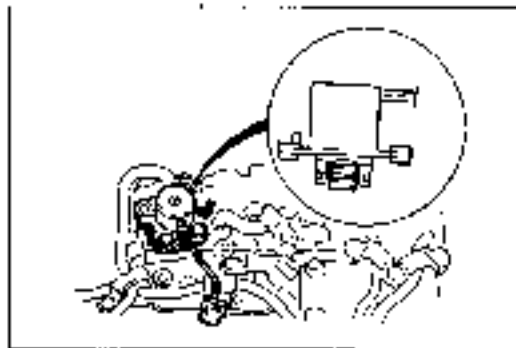
GB1002-02

## Components

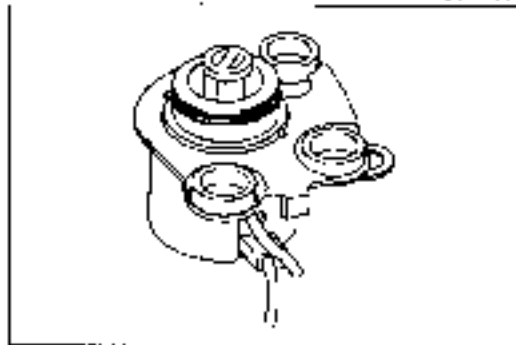


- |  |   |
|--|---|
| <p>1. Lockup solenoid<br/>Inspect filter for clogging or damage<br/>Inspection..... page K2- 38</p> <p>2. Side plate</p> <p>3. Line pressure solenoid<br/>Inspect filter for clogging or damage<br/>Inspection..... page K2- 38</p> <p>4. Overrunning clutch solenoid, shift solenoid A and shift solenoid B<br/>Inspect filter for clogging or damage<br/>Inspection..... page K2 38</p> <p>5. Support plate</p> <p>6. Retaining bolts and nuts<br/>Installation position..... page K2-150</p> <p>7. Brackets<br/>Installation position..... page K2 119</p> <p>8. ATF thermostat<br/>Inspection..... page K2- 38</p> | <p>9. Lower valve body<br/>Disassembly and Inspection .. page K2-116<br/>Installation..... page K2-117</p> <p>10. Steel ball<br/>Installation position..... page K2-119</p> <p>11. Upper gasket</p> <p>12. Separate plate<br/>Inspect fluid passages for clogging or damage</p> <p>13. Lower gasket</p> <p>14. Accumulator filter<br/>Inspect for clogging or damage</p> <p>15. Orifice check valve and spring</p> <p>16. Pilot filter<br/>Inspect for clogging or damage</p> <p>17. Manual valve<br/>Inspect for sticking, scoring, or scratches</p> <p>18. Upper valve body<br/>Disassembly and Inspection .. page K2-105<br/>Assembly..... page K2 111</p> |
|--|---|

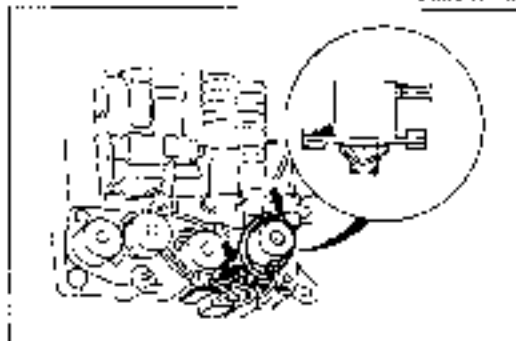
28ALRAC22



9M1041-22



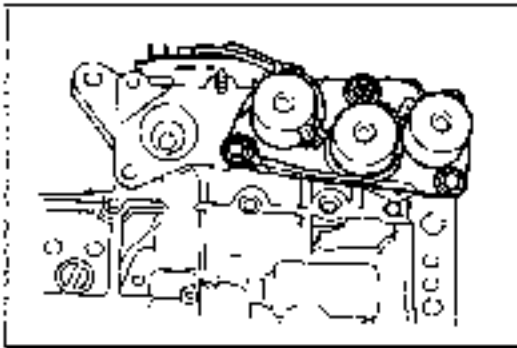
9M1041-209



9M1041-305

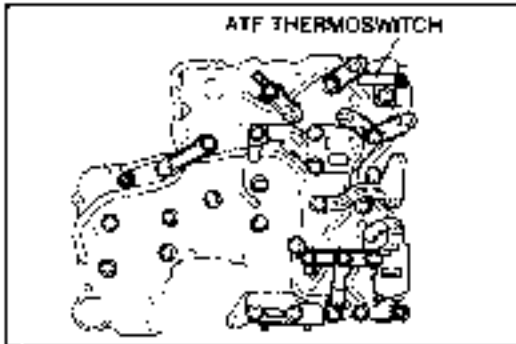
**Procedure**

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.



9MUCR1004

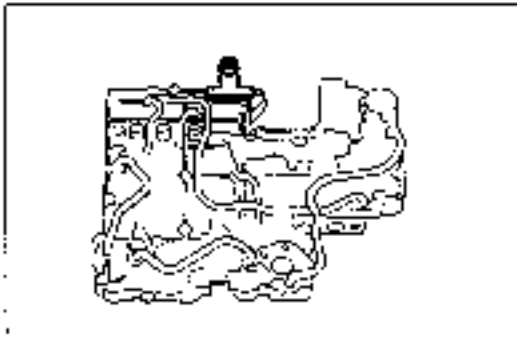
5. Remove the solenoids.
6. Remove the O-rings from the solenoids.



ATF THERMOSWITCH

0R1142-110

7. Remove the support plate
8. Remove the bolts, nuts, brackets, and ATF thermoswitch

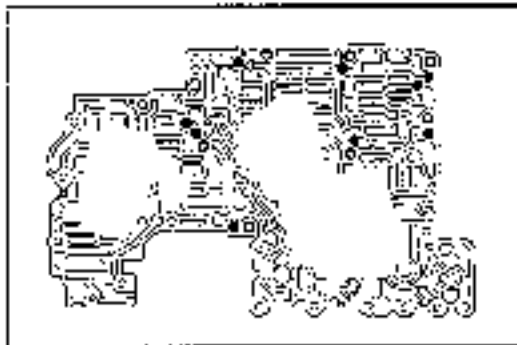


9MUCR1306

**Caution**

- a) Do not scratch the lower valve body.
- b) Be careful not to drop the pilot filter, orifice check valve or spring.

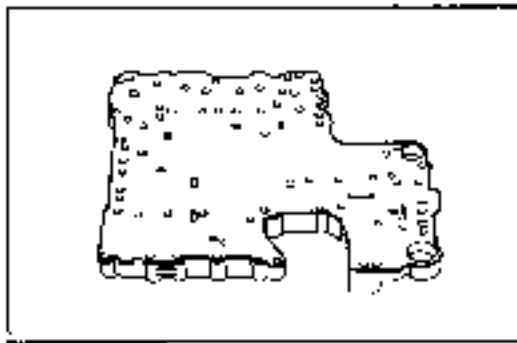
9. Hold the upper valve body, lower and upper gaskets and separate plate with a large clip.
10. Separate the lower valve body from the upper valve body



9VLCR1337

**Caution****Do not drop or lose the steel balls.**

11. Remove the steel balls from the upper valve body.



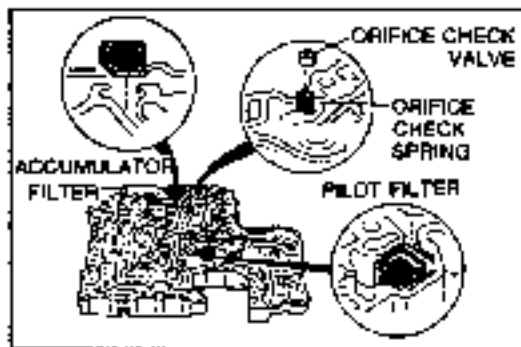
9VLCR1302

12. Face the lower valve body downward, and remove the holding clip.

**Caution****Do not lose the pilot filter, orifice check valve or spring.**

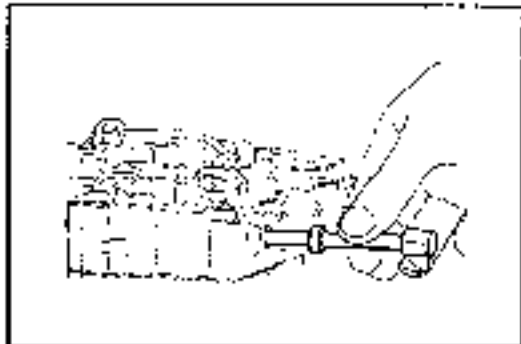
13. Remove the separate plate and gaskets





SMUCK 305

14. Remove the orifice check valve, spring, accumulator filter, and pilot filter



SMUCK 310

15. Remove the manual valve from the upper valve body.

## UPPER VALVE BODY

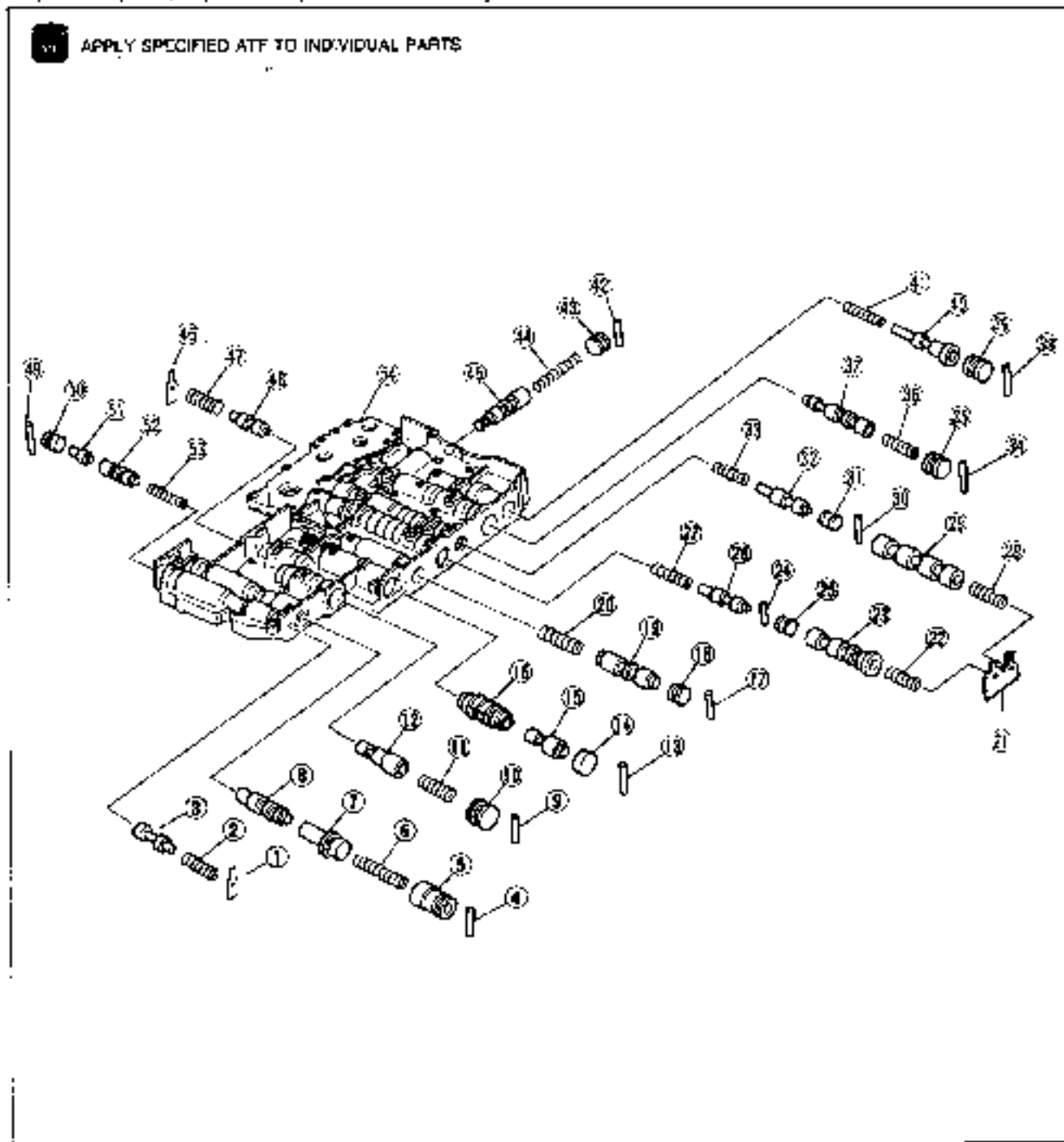
## Disassembly and Inspection

## 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.

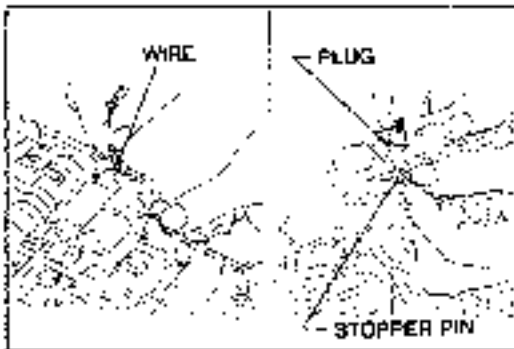
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, repair or replace as necessary.



08J0K2-70

1. Retainer Disassembly Note . . . . .	page K2-110	28. Shift valve A spring Inspect or . . . . .	page K2-111
2. Torque converter relief spring Inspection . . . . .	page K2-110	29. Shift valve A Inspect for sticking, scoring or scratches	
3. Torque converter relief valve Inspect for sticking, scoring or scratches		30. Stopper pin Disassembly Note . . . . .	page K2-110
4. Stopper pin Disassembly Note . . . . .	page K2-110	31. 4-2 relay plug	
5. Pressure regulator sleeve Inspect for sticking, scoring or scratches		32. 4-2 relay valve Inspect for sticking, scoring or scratches	
6. Pressure regulator spring Inspection . . . . .	page K2-110	33. 4-2 relay spring Inspection . . . . .	page K2-111
7. Pressure regulator plug Inspect for sticking, scoring or scratches		34. Stopper pin Disassembly Note . . . . .	page K2-110
8. Pressure regulator valve Inspect for sticking, scoring or scratches		35. Overrunning clutch control plug	
9. Stopper pin Disassembly Note . . . . .	page K2-110	36. Overrunning clutch control spring Inspection . . . . .	page K2-111
10. Pressure modifier plug		37. Overrunning clutch control valve Inspect for sticking, scoring or scratches	
11. Pressure modifier spring Inspection . . . . .	page K2-110	38. Stopper pin Disassembly Note . . . . .	page K2-110
12. Pressure modifier valve Inspect for sticking, scoring or scratches		39. Overrunning clutch reducing plug	
13. Stopper pin Disassembly Note . . . . .	page K2-110	40. Overrunning clutch reducing valve Inspect for sticking, scoring or scratches	
14. Accumulator control plug		41. Overrunning clutch reducing spring Inspection . . . . .	page K2-111
15. Accumulator control valve Inspect for sticking, scoring or scratches		42. Stopper pin Disassembly Note . . . . .	page K2-110
16. Accumulator control sleeve Inspect for sticking, scoring or scratches		43. Shuttle shift valve S plug	
17. Stopper pin Disassembly Note . . . . .	page K2-110	44. Shuttle shift valve S spring Inspection . . . . .	page K2-111
18. Shuttle shift valve D plug		45. Shuttle shift valve S Inspect for sticking, scoring or scratches	
19. Shuttle shift valve D Inspect for sticking, scoring or scratches		46. Retainer Disassembly Note . . . . .	page K2-110
20. Shuttle shift valve D spring Inspection . . . . .	page K2-110	47. Pilot spring Inspection . . . . .	page K2-111
21. Retainer Disassembly Note . . . . .	page K2-110	48. Pilot valve Inspect for sticking, scoring or scratches	
22. Shift valve B spring Inspection . . . . .	page K2-111	49. Stopper pin Disassembly Note . . . . .	page K2-110
23. Shift valve B Inspect for sticking, scoring or scratches		50. Lockup control sleeve	
24. Stopper pin Disassembly Note . . . . .	page K2-110	51. Lockup control plug Inspect for sticking, scoring or scratches	
25. 4-2 sequence plug		52. Lockup control valve Inspect for sticking, scoring or scratches	
26. 4-2 sequence valve Inspect for sticking, scoring or scratches		53. Lockup control spring Inspection . . . . .	page K2-111
27. 4-2 sequence spring Inspection . . . . .	page K2-110	54. Upper valve body Inspect for damage or scoring	



9M.DOK1-3-18

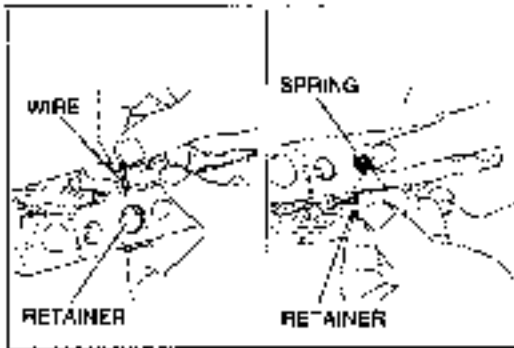
### Disassembly note

#### 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.



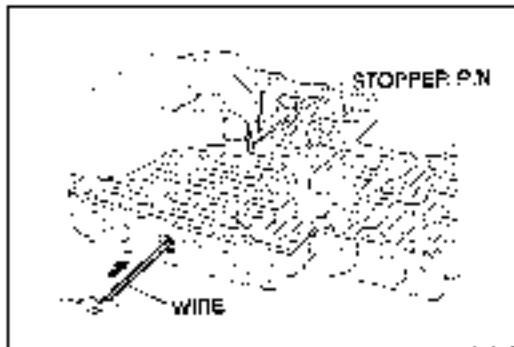
9M.DOK1-3-19

#### 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.



9M.DOK1-3-24

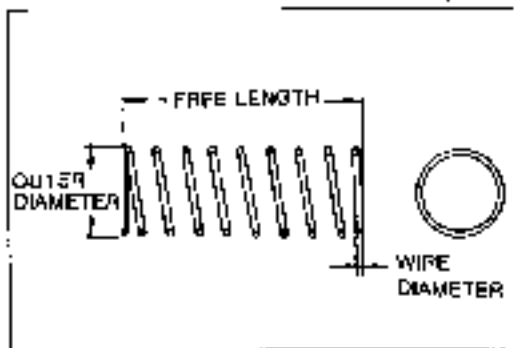
#### 4-2 sequence valve and 4-2 relay valve

#### 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.



9M.DOK1-3-9

#### Inspection

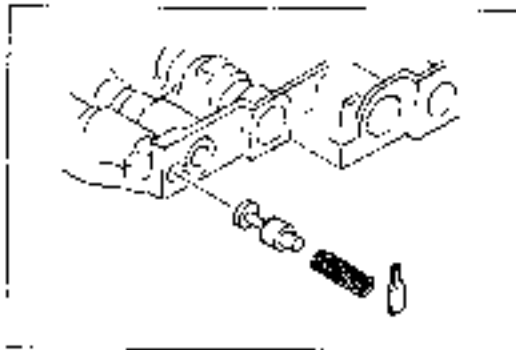
1. Measure the spring specifications.
2. If not within specification, replace the spring(s).

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Torque converter hold valve		9.0 (0.354)	38.0 (1.496)	12.7	1.4 (0.055)
		14.0 (0.551)	44.0 (1.732)	7.9	1.4 (0.055)
Pressure regulator valve	A	6.8 (0.268)	31.95 (1.258)	15.0	0.8 (0.031)
	B	6.9 (0.272)	32.60 (1.283)	22.7	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)

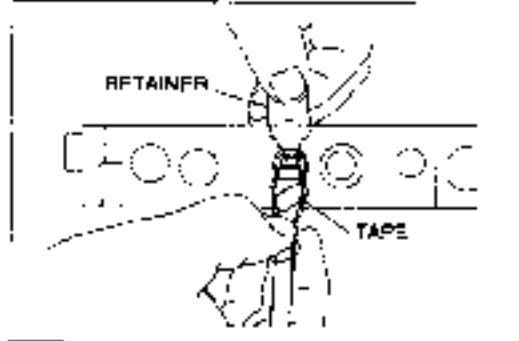
\* Either A, B or C type spring is installed at shipment. Only A type spring is available for replacement.

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
4-2 sequencer valve		6.95 (0.274)	29.1 (1.146)	11.0	0.56 (0.022)
Shift valve B		7.0 (0.276)	25.0 (0.984)	9.6	0.65 (0.026)
4-2 relay valve		6.95 (0.274)	29.1 (1.146)	11.0	0.56 (0.022)
Shift valve A		7.0 (0.276)	25.0 (0.984)	9.6	0.65 (0.026)
Overrunning clutch control valve		7.0 (0.276)	23.6 (0.929)	7.9	0.5 (0.020)
Overrunning clutch reducing valve		7.0 (0.276)	32.5 (0.984)	12.6	0.85 (0.033)
Shift valve S		6.5 (0.256)	43.0 (1.693)	22.2	0.95 (0.037)
Pilot valve		9.1 (0.358)	25.7 (1.012)	8.3	1.1 (0.043)
Lock-up control valve		13.0 (0.512)	18.5 (0.728)	3.5	0.75 (0.030)

39LJK2-J30



DSLCK2-13



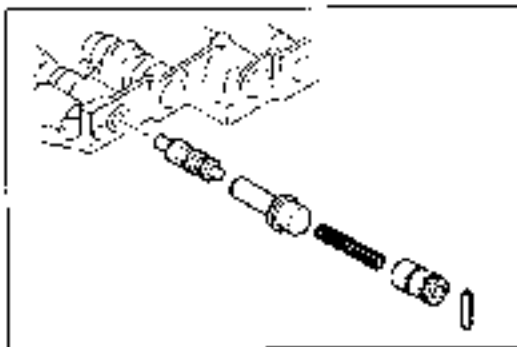
39LJK2-114

**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.

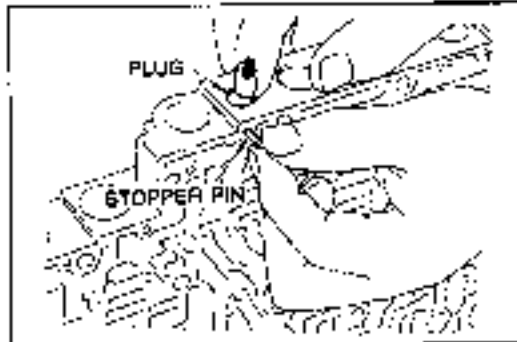


9WLCR1-323

3. Insert the pressure regulator valve, plug, spring, and sleeve.

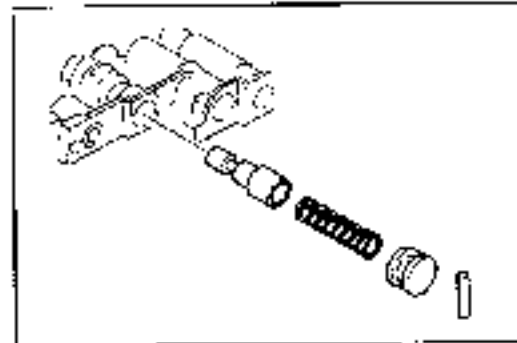
**Note**

- 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.



8MUKK1-321

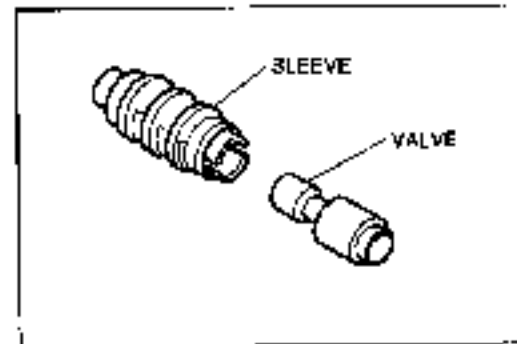
4. Insert the stopper pin while pushing the sleeve.



9WUOK1-322

5. Insert the pressure modifier valve, spring, and plug.

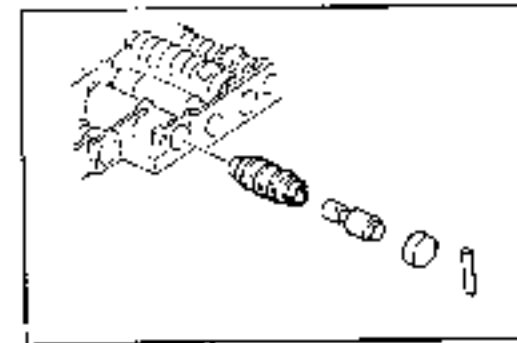
6. Insert the stopper pin while pushing the sleeve.



8MUKK1-323

**Note**

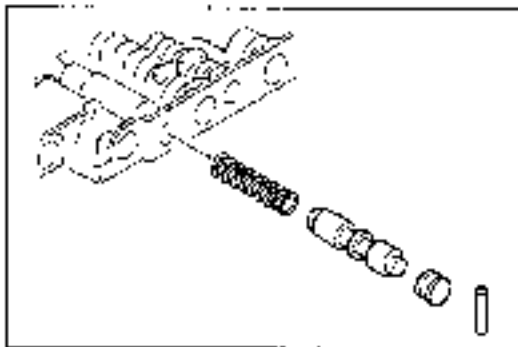
Align the notch of the sleeve with the plug and insert the stopper pin while pushing the plug.



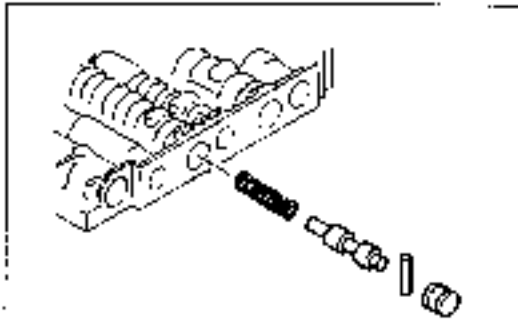
9ELCK2-115

7. Insert the accumulator control valve, sleeve, and plug.

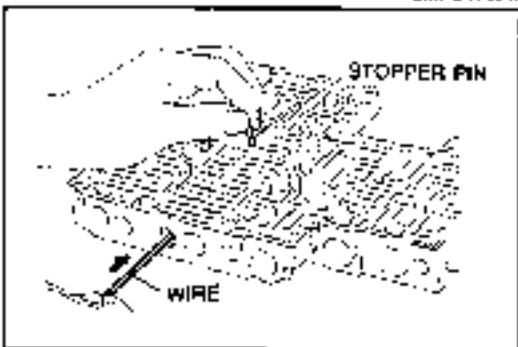
8. Insert the stopper pin while pushing the plug.



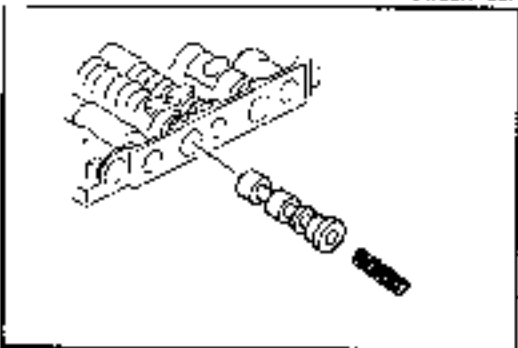
9. Insert the shuttle valve D, spring, and plug.
10. Insert the stopper pin while pushing the plug.



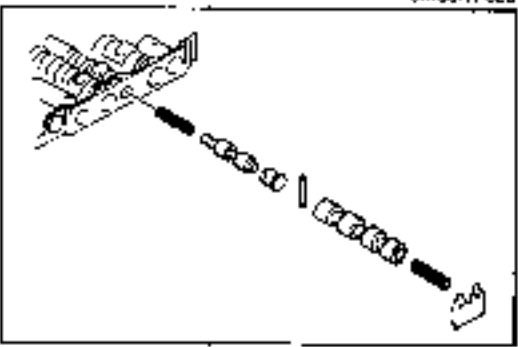
11. Insert the 4-2 sequence valve, spring, and plug.



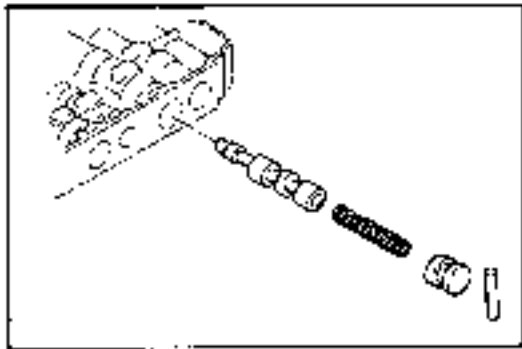
12. Push in the plug with a vinyl tape wrapped **1.5mm (0.060 in)** diameter rod.
13. Insert the stopper pin.



14. Insert the shift valve B.
15. Insert the spring.

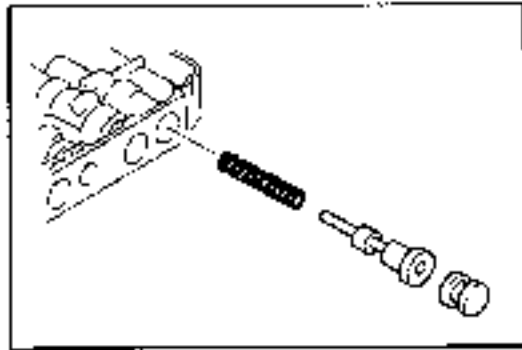


16. Insert the 4-2 relay valve and spring.
17. Insert the stopper pin while pushing the plug.
18. Insert the shift valve A and spring.
19. Insert the retainer while compressing the spring.



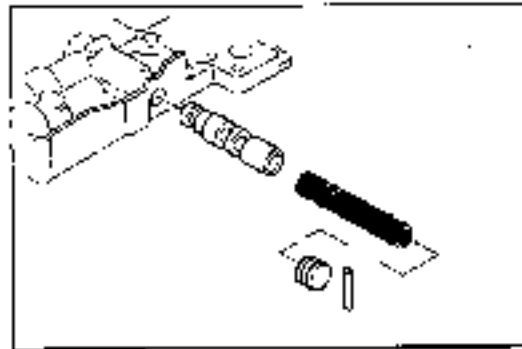
9MUJK1-300

20. Insert the overrunning clutch control valve, spring, and plug.  
 21. Insert the stopper pin while pushing the plug.



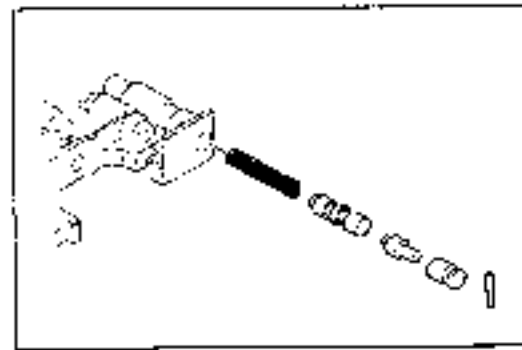
9MUJK1-301

22. Insert the overrunning clutch reducing valve, spring, and plug.  
 23. Insert the stopper pin while pushing the plug.



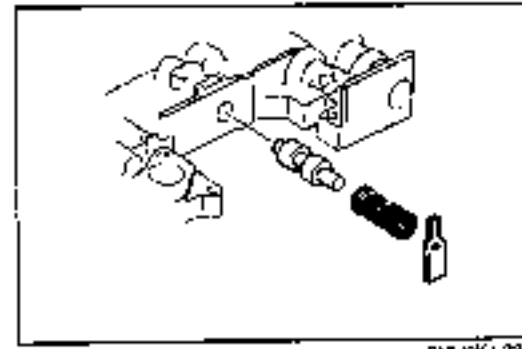
9MUJK1-302

24. Insert the shuttle shift valve S, spring, and plug.  
 25. Insert the stopper pin while pushing the plug.



9MUJK1-303

26. Insert the lockup control valve, spring, plug and sleeve.  
 27. Insert the stopper pin while pushing the sleeve.



9MUJK1-304

28. Insert the pilot valve and spring.  
 29. Insert the retainer while pushing the spring.



---

MEMO

## LOWER VALVE BODY

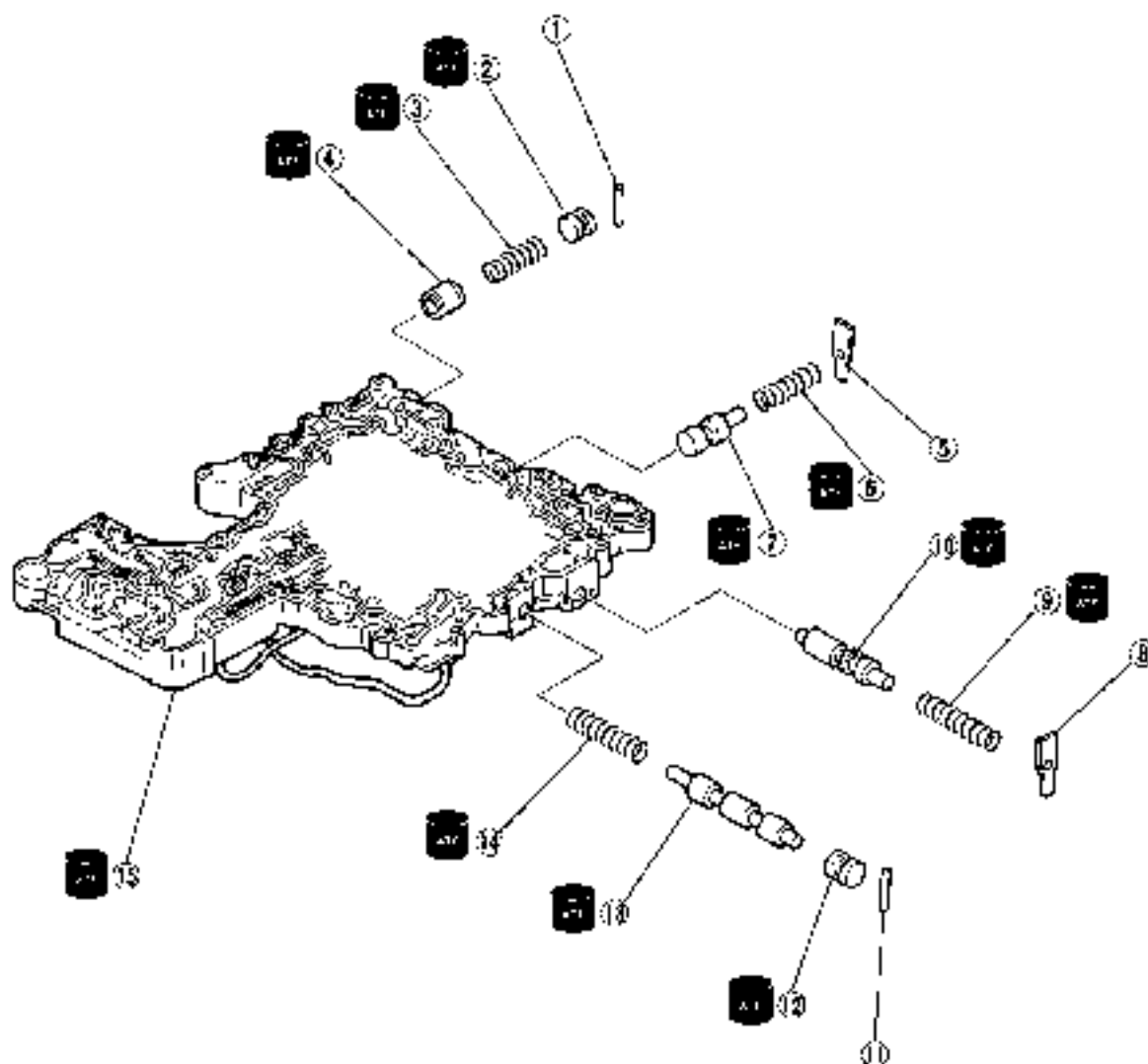
## Disassembly and Inspection

## 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 figures.

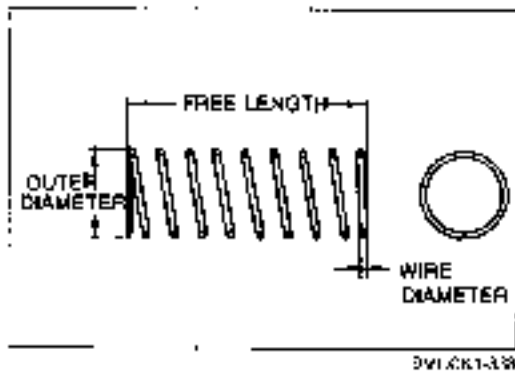
Inspect all parts; repair or replace as necessary.



08JOK2 L71

- 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

18JJK2 059

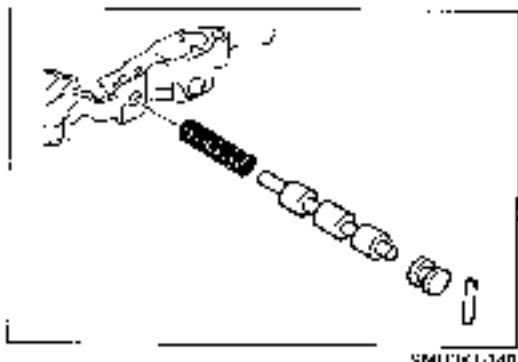


**Inspection**

1. Measure the spring specifications
2. If not within specification, replace the spring(s).

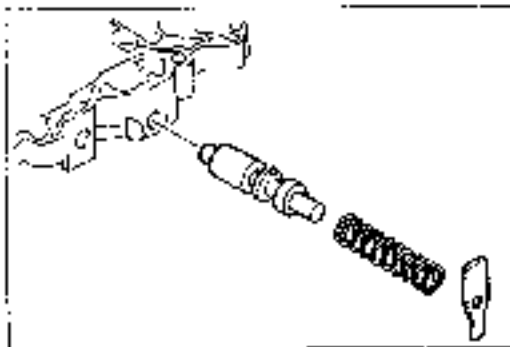
Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Modifier accumulator piston		9.8 (0.386)	30.5 (1.201)	8.75	1.3 (0.051)
1st reducing valve		6.75 (0.266)	25.4 (1.0)	12.5	0.75 (0.030)
Servo charger valve		6.5 (0.256)	33.2 (1.307)	12.0	0.6 (0.024)
3-2 timing valve		6.75 (0.266)	20.55 (0.809)	7.5	0.75 (0.030)

18JJK2 059



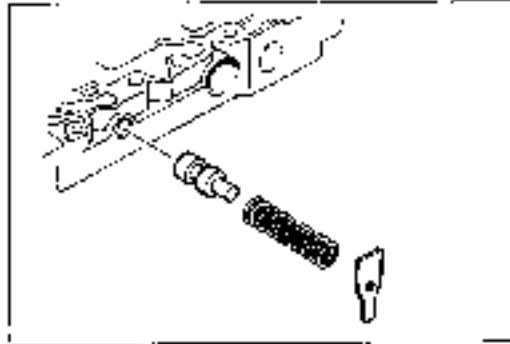
**Installation**

1. Insert the servo charger valve, spring, and plug.
2. Insert the stopper pin while pushing the plug



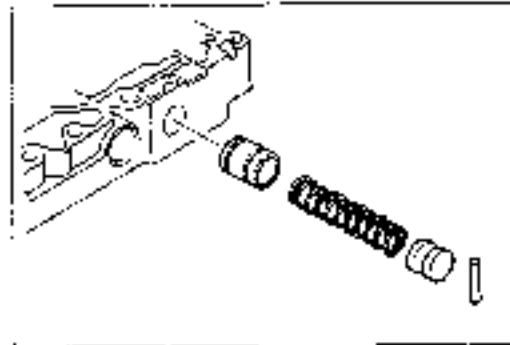
ELCK2 DB6

3. Insert the 3-2 timing valve and spring
4. Insert the retainer while compressing the spring.



BRUCK1-242

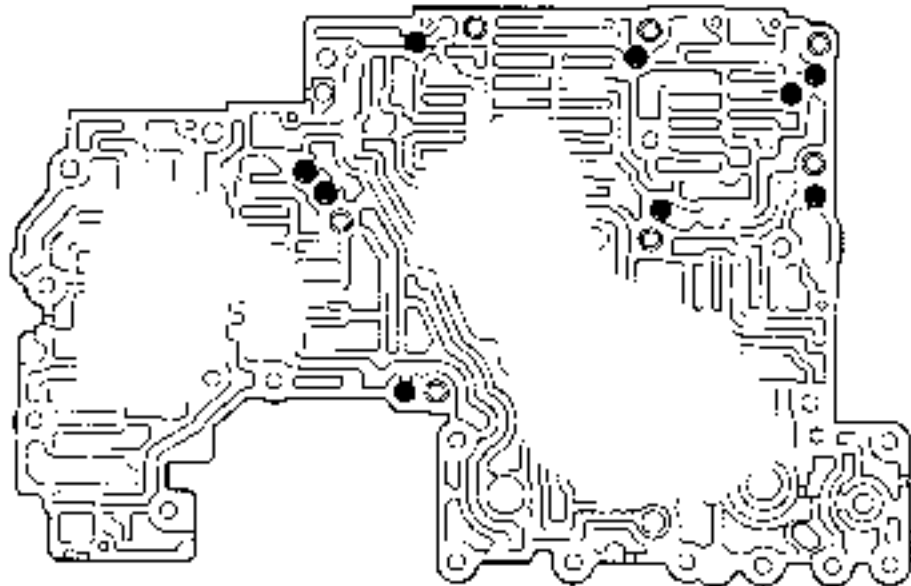
5. Insert the 1st reducing valve and spring.
6. Insert the retainer while compressing the spring.



BMJ3-G 345

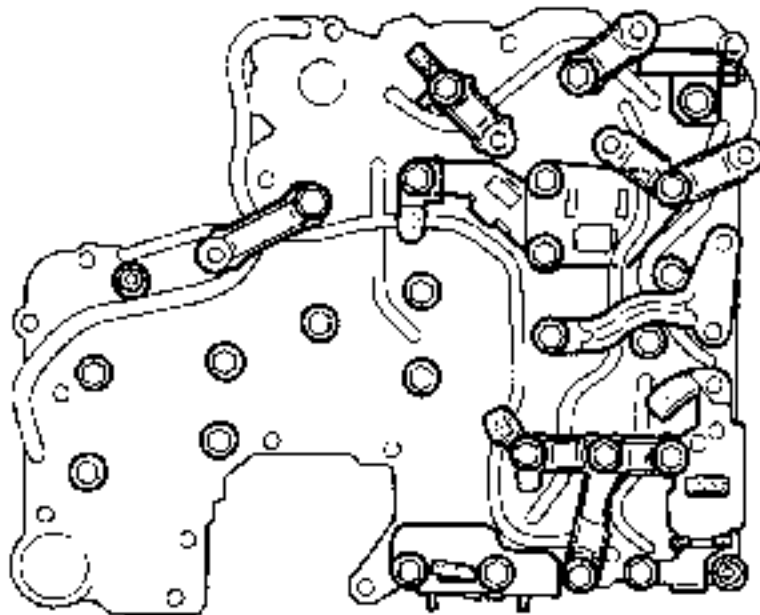
7. Insert the modifier accumulator valve, spring, and plug.
8. Insert the stopper pin while pushing the plug.

Steel ball installation positions



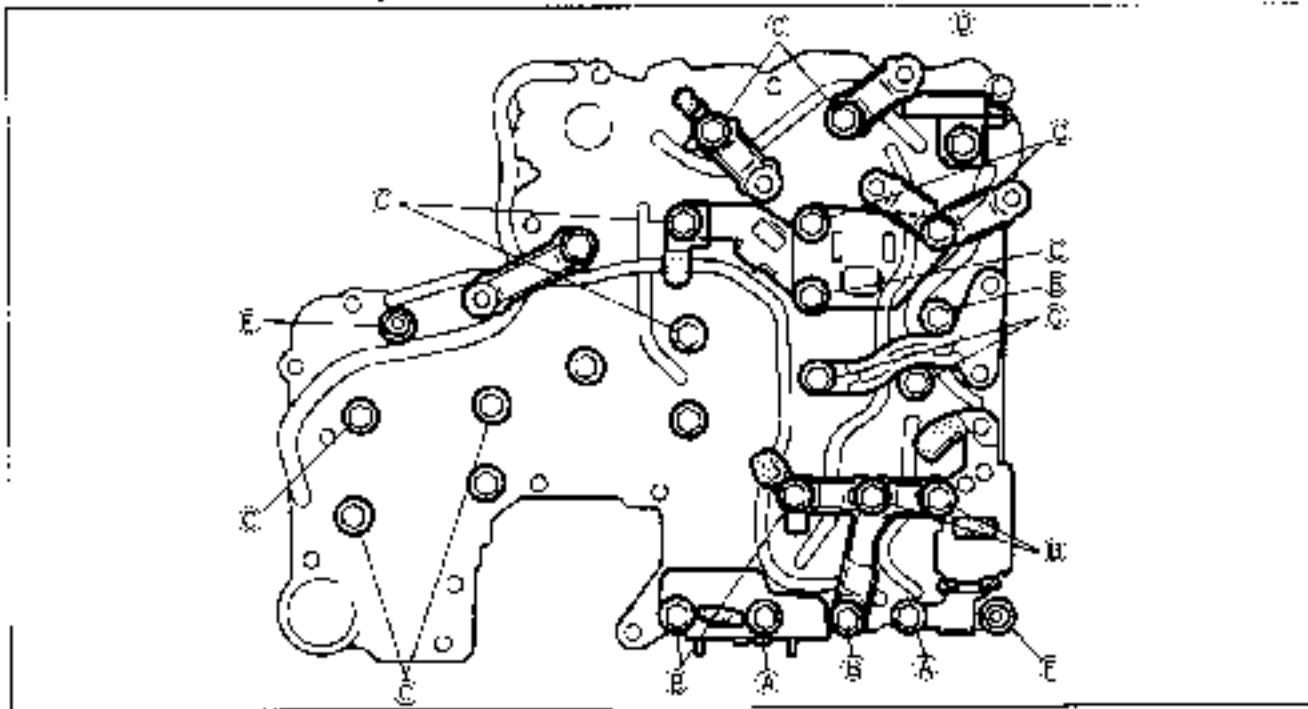
SMCJOK1-244

Bracket installation positions


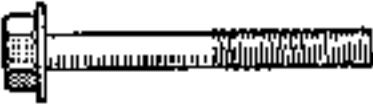




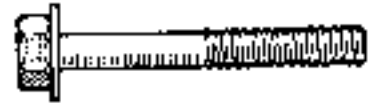


SMCJOK1-345  
K2-119

### Bolts and nuts installation positions



9MJK1-345

Identification letter	Bolts and nuts	Length mm (in)	Torque specification N·m (cm·kg, in·lb)
A		65 (2.559)	6.9-8.5 (70-90, 61-75)
B		50 (1.969)	
C		35 (1.378)	
D		27 (1.063)	
E		55 (2.165)	
F		40 (1.575)	
G		40 (1.575)	

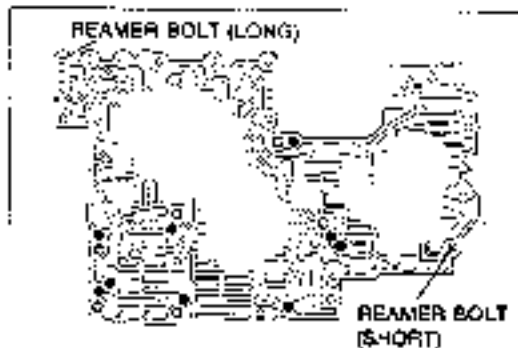
26UKG-120

## CONTROL VALVE BODY (ASSEMBLY)

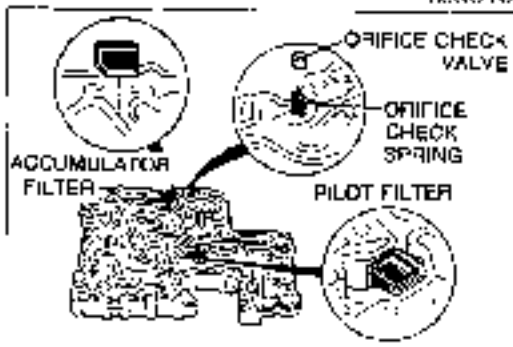
**Caution**

- a) Before assembly, make sure all parts are perfectly clean.
- b) Apply ATF to all parts.  
Do not reuse the gasket or O-ring.

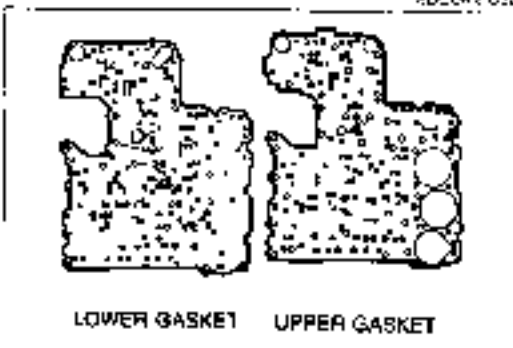
9MUD41-316



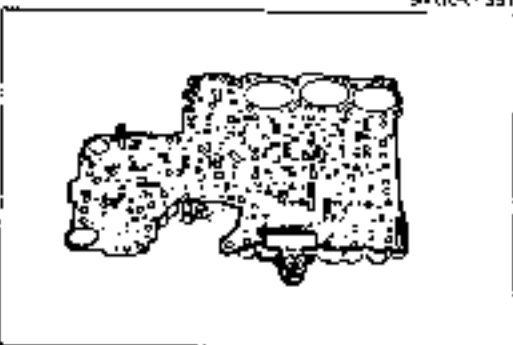
BLOCK 148



BLOCK 153



BLOCK 151

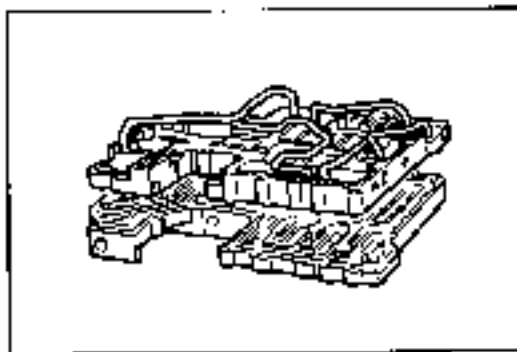
**Procedure**

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.

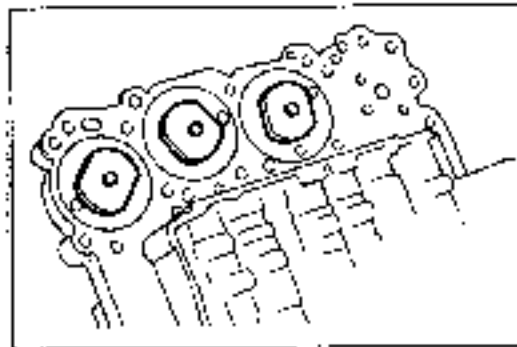
**Caution**

- 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 plates onto the lower valve body and hold both them with a large clip.



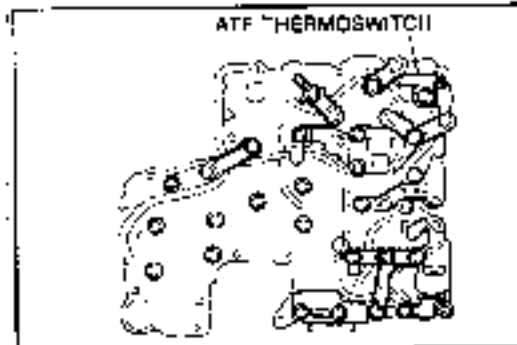
- 4 Set the lower valve body onto the upper valve body.
- 5 Remove a holding clip.

RM1.0K1-352



- 6 The support plate locations are as shown.

SMU0K1-353

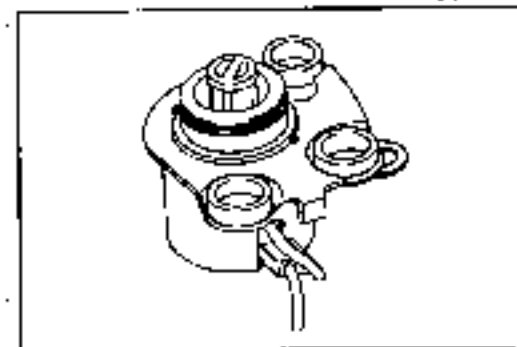


- 7 Install the bolts, nuts, support plates, ATF thermoswitch, and brackets in their proper positions. (Refer to page K2-122 for installation positions.) Tighten the fasteners evenly and gradually.

**Tightening torque:**

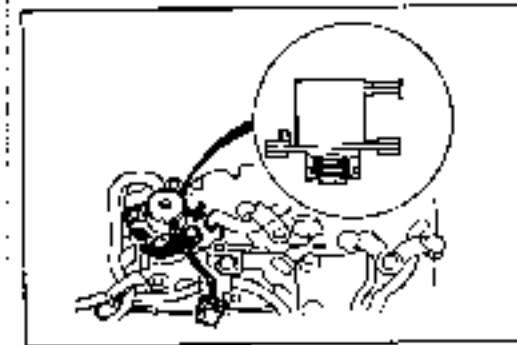
**6.9—9.8 N·m (70—90 cm·kg, 61—78 in·lb)**

\*BULK061



- 8 Install a new O-ring onto the lockup solenoid.

SMU0K1-356



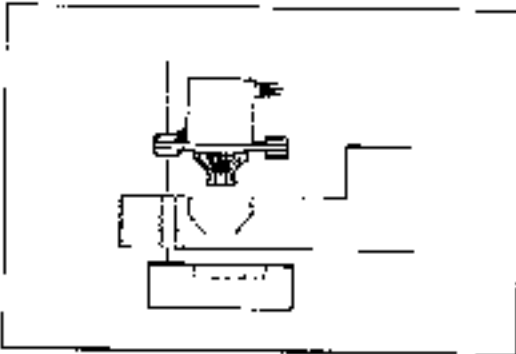
- 9 Install the lockup solenoid and side plate to the control valve body assembly.

**Tightening torque:**

**9.8—13 N·m (1.0—1.3 m·kg, 67—113 in·lb)**

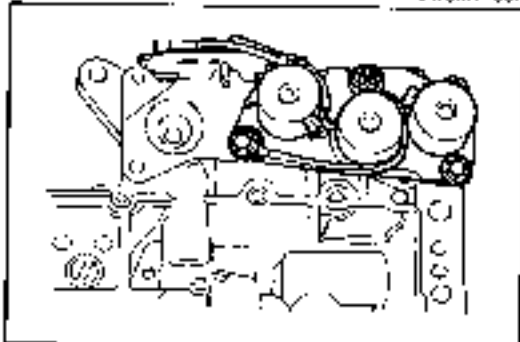
RM1.0K1-358





9MLDK1-357

10. The side plate installation are as shown.

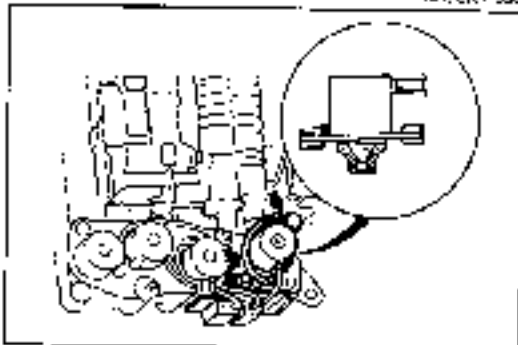


9MLCK1-358

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 Nm (70—100 cm-kg, 61—87 in-lb)**

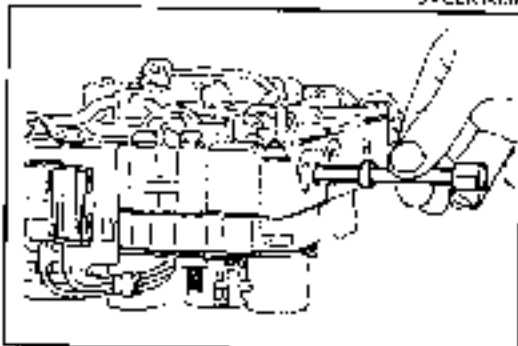


9MLCK1-359

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 Nm (70—100 cm-kg, 61—87 in-lb)**



9MLDK1-360

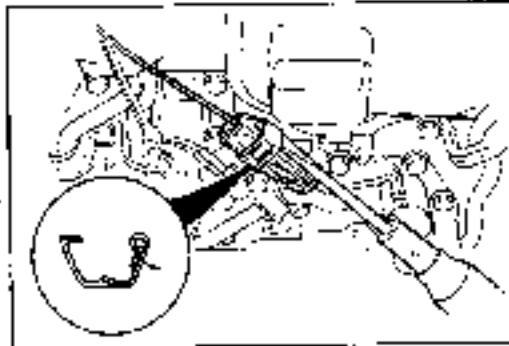
15. Insert the manual valve.



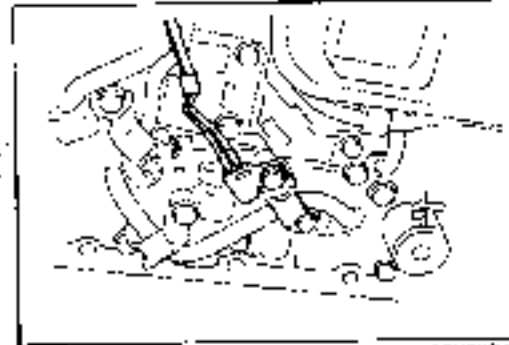
9W/LCK1-201



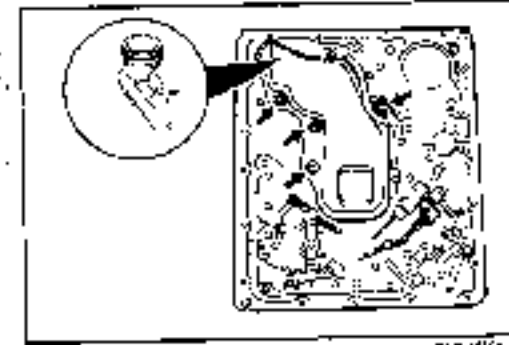
9W/LCK1-202



1B/JK2-172



02U9K2-20



2KH/CK1-205

**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.

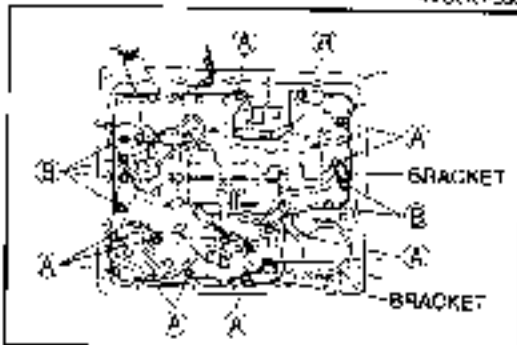
8. Disconnect the ATF thermosensor.

9. Remove the oil strainer.
10. Remove the O-ring from the oil strainer.



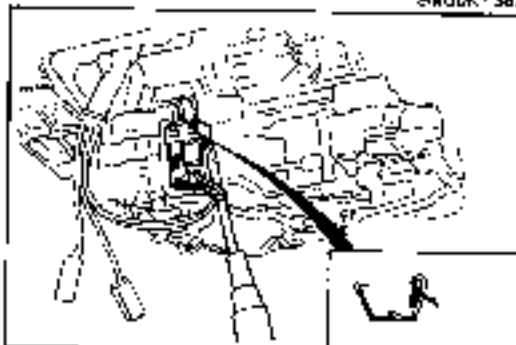
94/UDK1-366

11. Separate the harness of the solenoid connectors from the harness c.p.



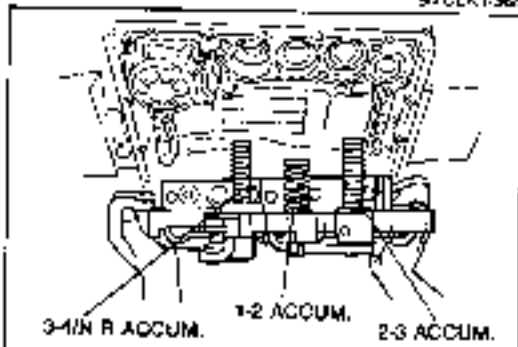
94/UDK1-367

12. Remove the (A) and (B) bolts and bracket shown in the figure



97/UDK1-368

13. Remove the clip.  
14. Separate the solenoid connectors.



94/UDK1-369

**Caution**

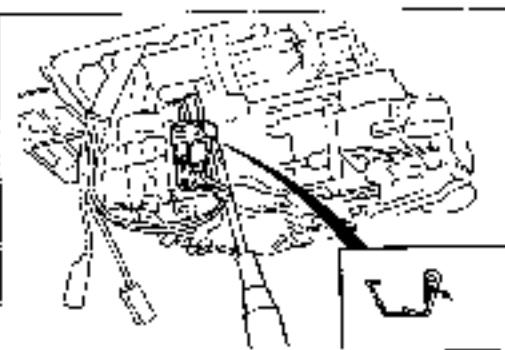
- a) Do not damage the oil pipes.
- b) Do not drop the springs.

15. Remove the control valve body assembly and accumulator springs.



94/UDK1-370

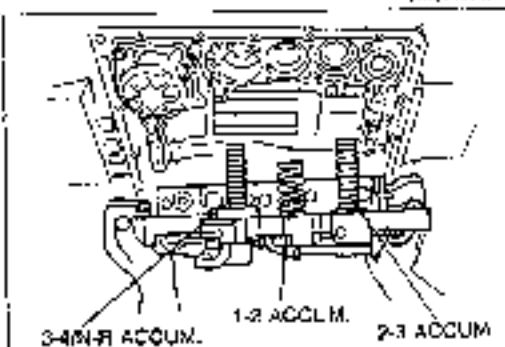
16. If necessary, remove the solenoid connector from the transmission case.



9M14K1-371

**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 cap.



6M14K1-372

4. Set the accumulator springs into the control valve body as shown.

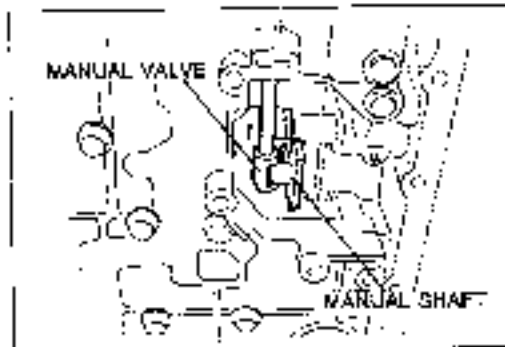
**Spring specifications**

(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		20.3 (0.799)	45.0 (1.772)	3.6	4.0 (0.157)
2-3 accumulator piston		20.0 (0.787)	62.0 (2.441)	11.4	3.5 (0.138)

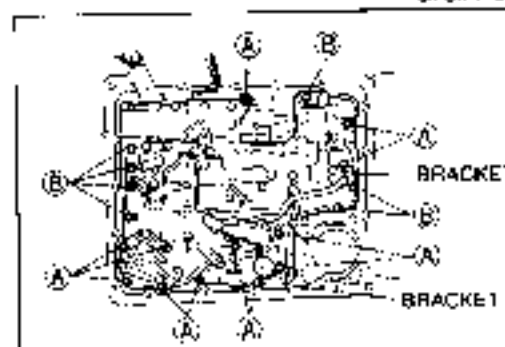
**Note**

- a) Verify that the manual valve and manual shaft are assembled correctly.
- b) Verify that the accumulator springs are installed correctly.



9M14K1-373

5. Set the control valve into the transmission case and secure it.



10M14K1-374

6. Install the control valve mounting bolts and brackets as shown.

**Bolt length (Measured from below the head)**

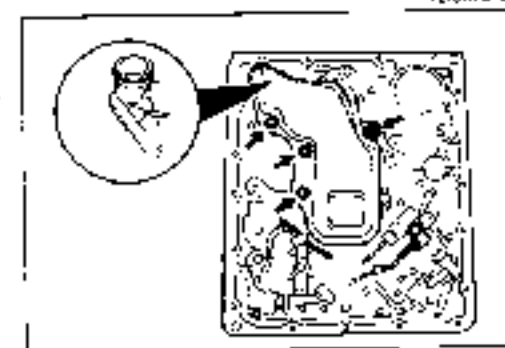
- (A): 33mm (1.299 in)
- (B): 45mm (1.772 in)

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.



9M14K1-375

**Bolt length (Measured from below the head):**  
50mm (1.969 in)

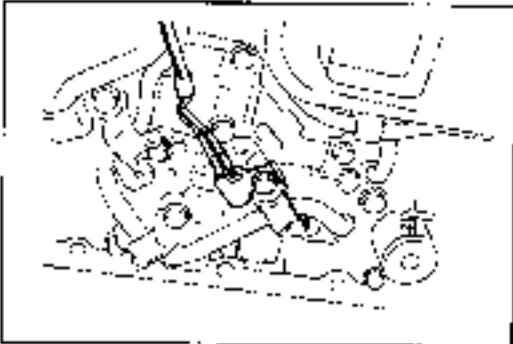
**Tightening torque:**

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



9PLCK1575

10. Mount the harness of the solenoid connectors with the harness clip.



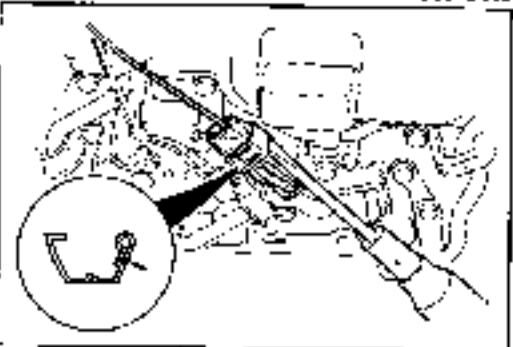
130J42-062

11. Install the ATF thermosensor.

**Tightening torque:**

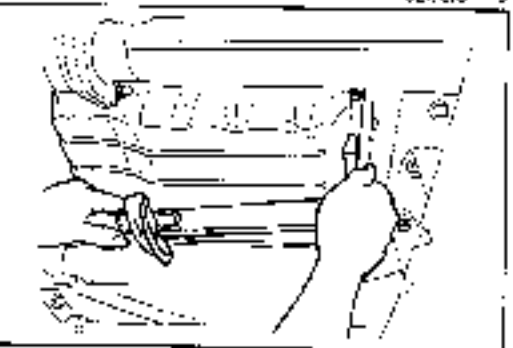
**6.9—8.8 Nm (70—90 cm-kg, 61—78 in-lb)**

**Bolt length (Measured from below the head):**  
**33mm (1.299 in)**



00LCKA175

12. Connect the lockup solenoid connector.  
13. Install the clip.

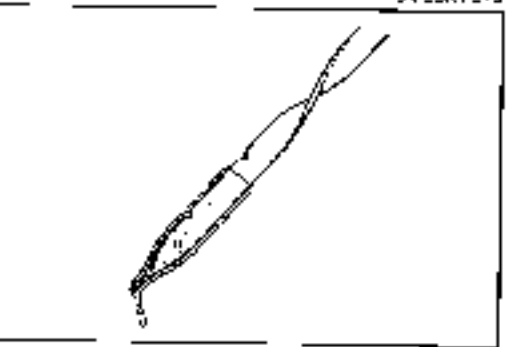


9PLCK1574

14. Set the magnet into the oil pan.  
15. Install the oil pan along with a new gasket.

**Tightening torque:**

**4.9—7.8 Nm (50—80 cm-kg, 43—69 in-lb)**




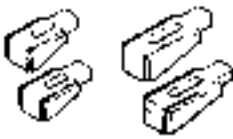


15LJ4K2062

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)

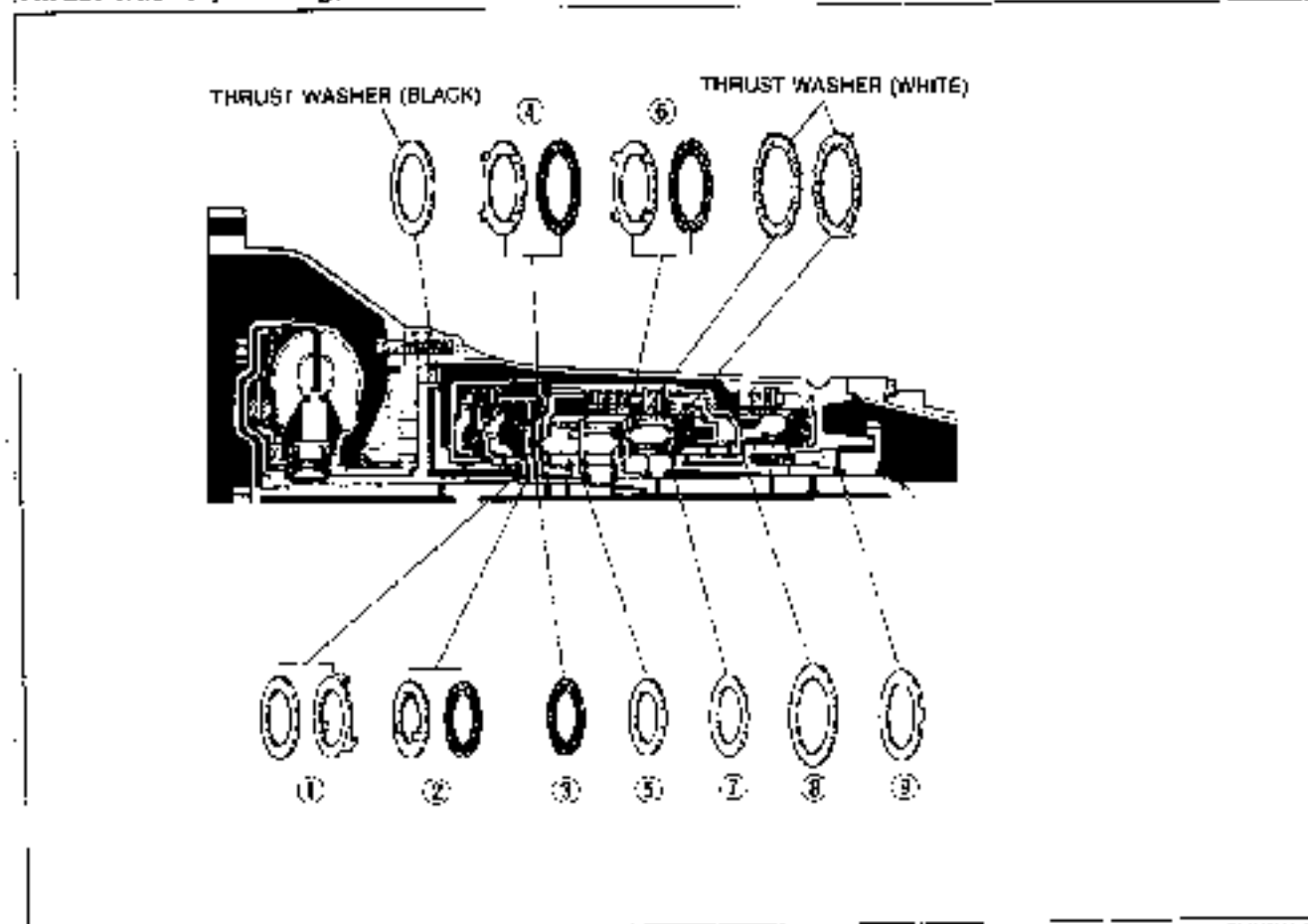
#### Preparation SST

<p>49 C107 6B0A Engine stand</p> 	<p>49 U019 0A0A Transmission hanger</p> 	<p>49 H075 495B Body (Part of 49 U019 0A0A)</p> 
29LDR2003		
<p>49 U019 0C7 Hode (Part of 49 U019 0A0A)</p> 		

#### 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 petro-cum 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



9MURK1-382

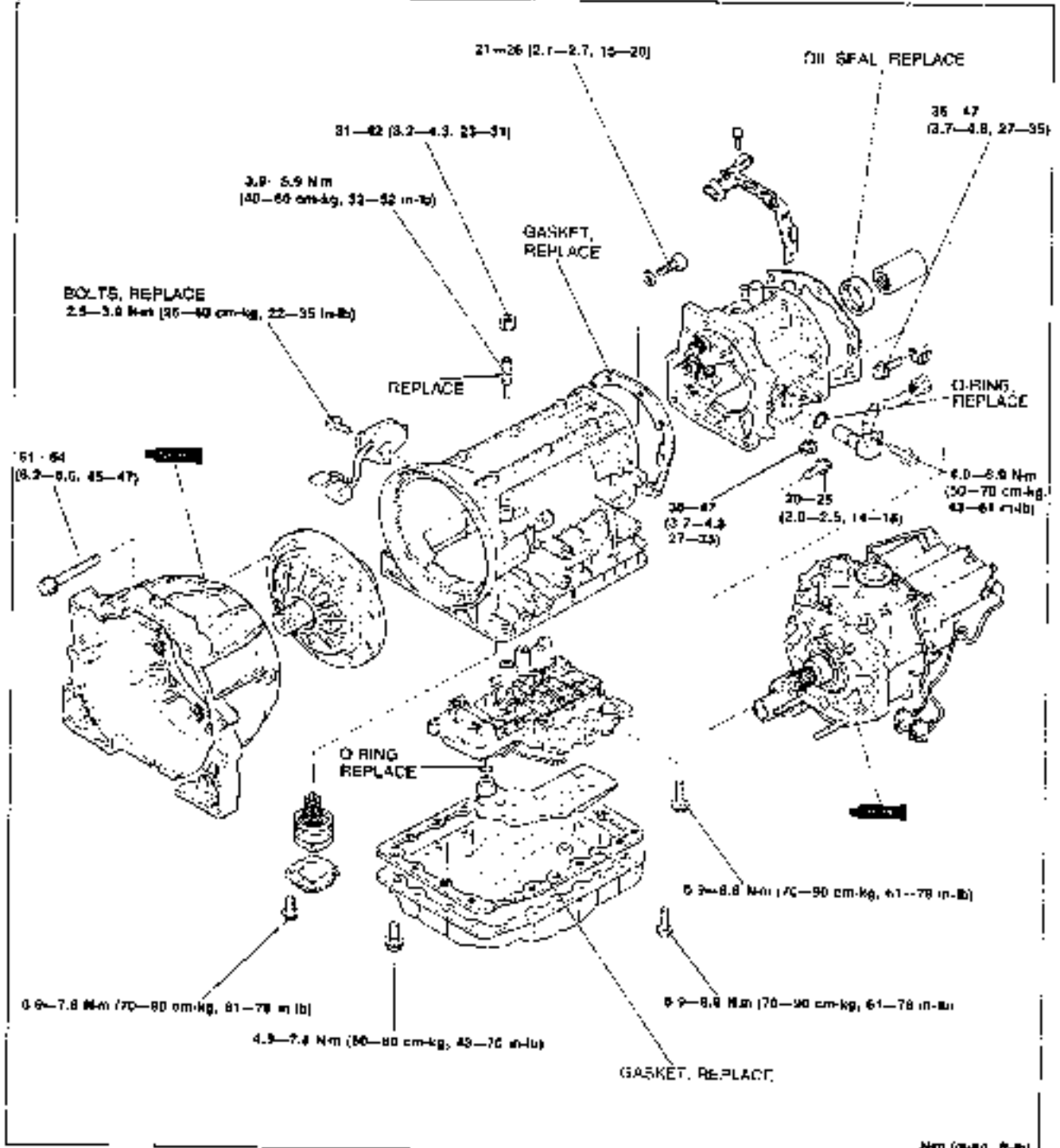
## Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in)	47.0 (1.850)	53.0 (2.087)	63.0 (2.481)	70.0 (2.756)	53.0 (2.087)	79.0 (3.111)
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)	75.1 (2.957)	64.0 (2.520)
Race	mm (in)	—	—	—

SMUCK: 329

## Torque specifications



Nm (m-kg, ft-lb)

Vol. 1001-384

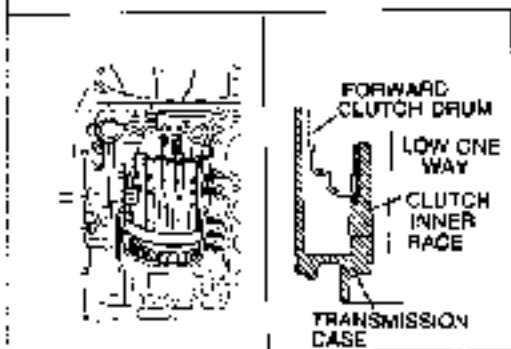
K2-129

## Procedure

**Caution**

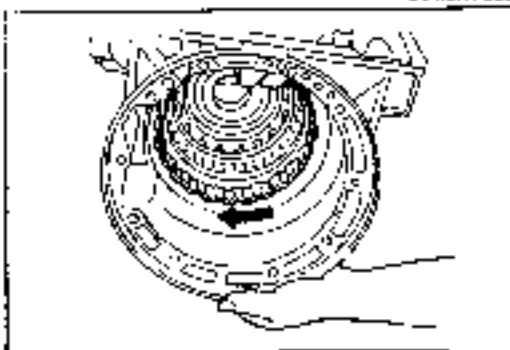
Do not damage the seal ring on the low one-way clutch inner race.

1. Install the forward clutch drum while slowly turning it clockwise until its hub passes fully over the clutch inner race.



941.0K1 385

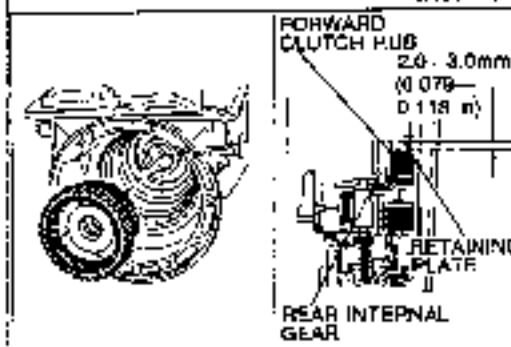
2. Verify that the forward clutch assembly will turn only clockwise.



EMJOK 1382

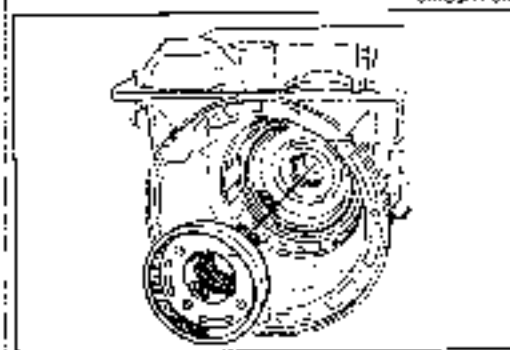
3. Install the rear internal gear, forward clutch hub, and over-running clutch hub in the forward clutch assembly.
4. Measure the height difference between forward clutch retaining plate and top of the forward clutch drum.

**Height: Approx. 2.0—3.0mm (0.079—0.118 in)**



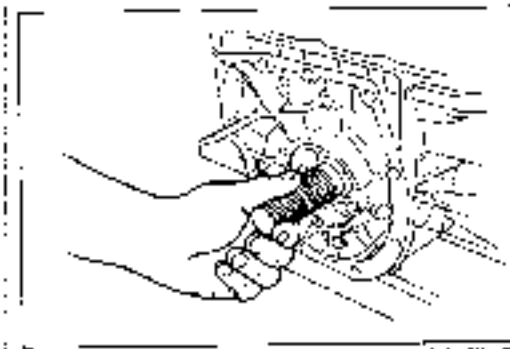
941.0K1 387

5. Install the front internal gear and rear planetary carrier into the forward clutch assembly.



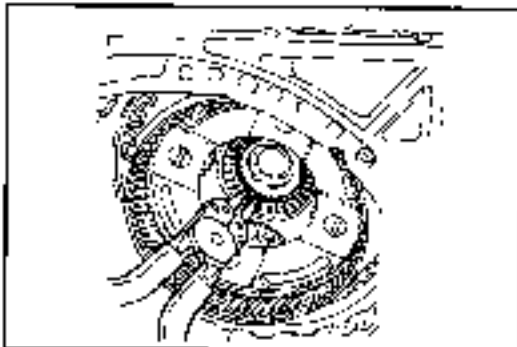
941.0K1 388

6. Insert the output shaft.



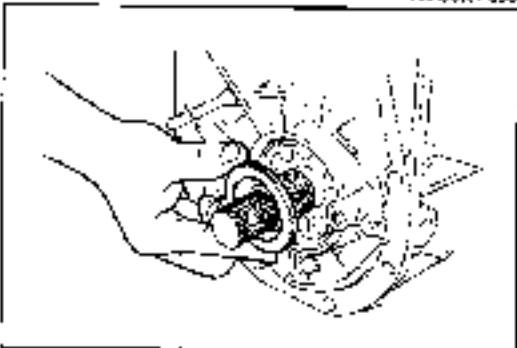
941.0K1 392





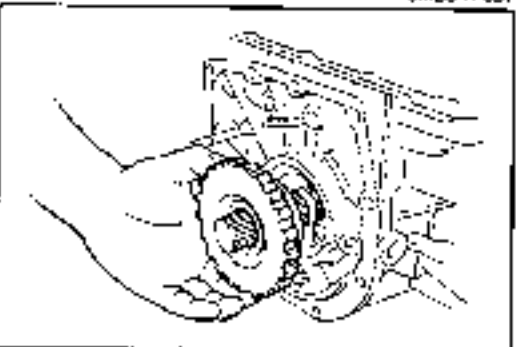
9MUCK1-390

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.



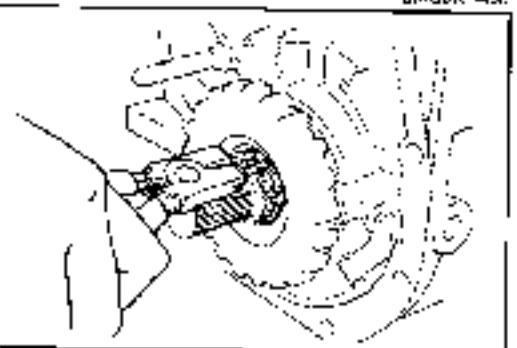
9MUCK1-391

8. Apply petroleum jelly to the bearing and install it to the transmission case with the black surface facing toward the rear.



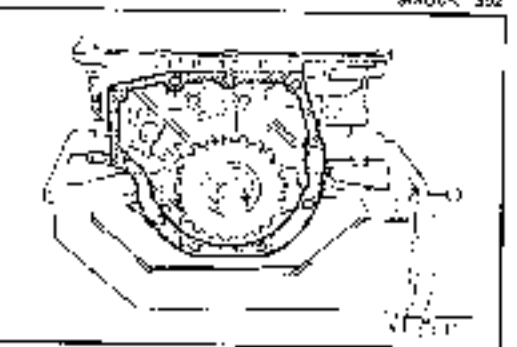
9MUCK1-406

9. Install the parking gear.



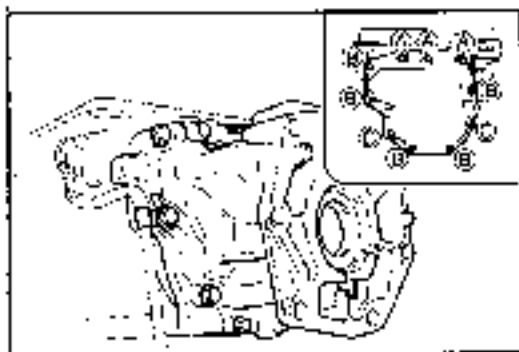
9MUCK1-392

10. Pull the output shaft back slightly, and install a new snap ring on it. Verify that the output shaft will not move forward.



9MUCK2-124

11. Install the new gasket.



24L3142-034

12. Install the extension housing.

**Bolt length (Measured from below the head)**

A: 30mm (1.181 in)

B: 45mm (1.772 in)

C: 50mm (1.969 in)

**Tightening torque:**

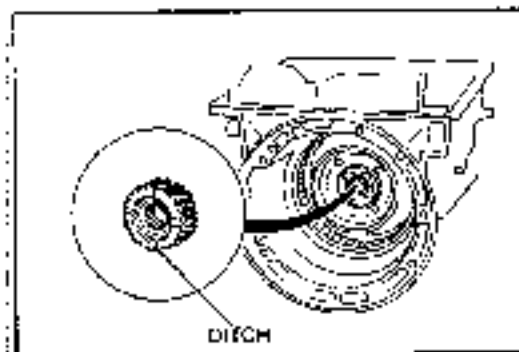
20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

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)

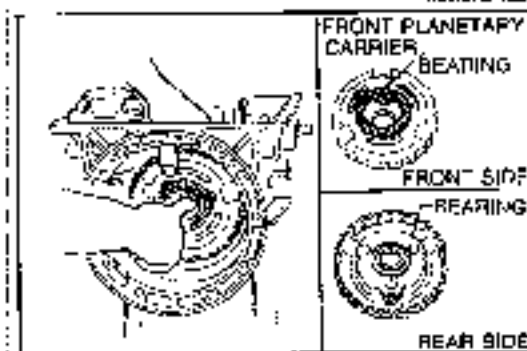


02L16K2-126

**Caution**

Be sure the oil grooves of the rear sun gear face forward as shown.

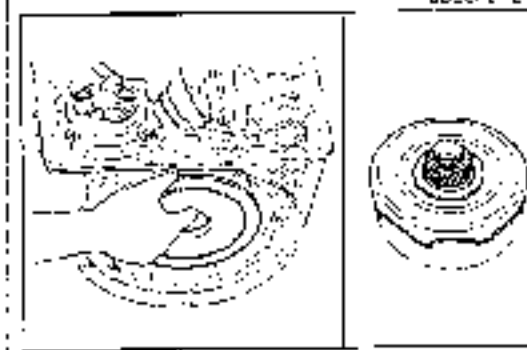
15. Install the rear sun gear into the front internal gear.



08L3047-127

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.



08L3047-127

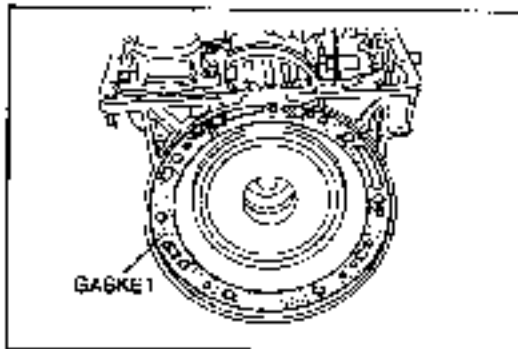
18. The reverse clutch, high clutch, and front sun gear. Install into the transmission case as an assembly.

**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		○○○○○○○○○	○○○○○○○○○

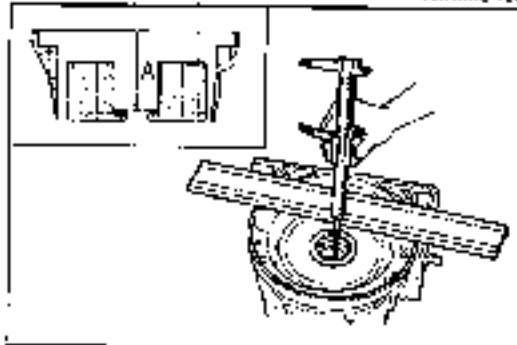
3YLCK1-336



06110K2-128

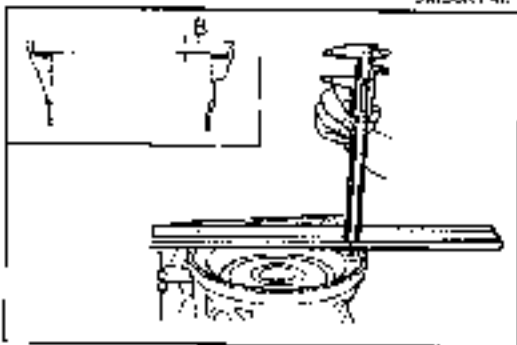
19. Adjust total end play

(1) Install the oil pump gasket.



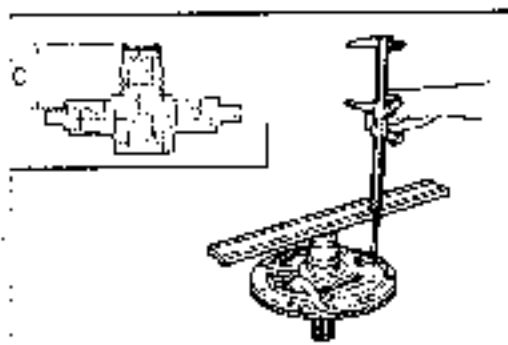
3K1JOK1-4C

(2) Measure height A with vernier calipers and a straight edge.

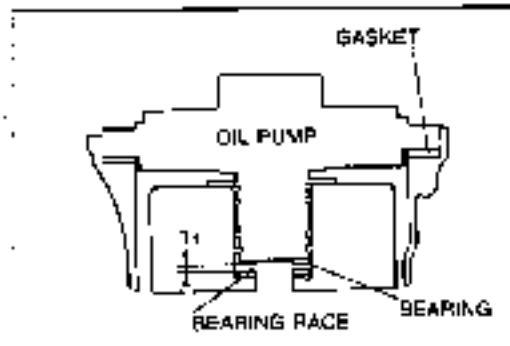


3M1JOK1-8D2

(3) Measure height B with vernier calipers.



SMUCK 433



SMUCK 434

- (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

$$\text{Formula: } T1 = A - B - C - 0.1\text{mm (0.0039 in)}$$

- 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

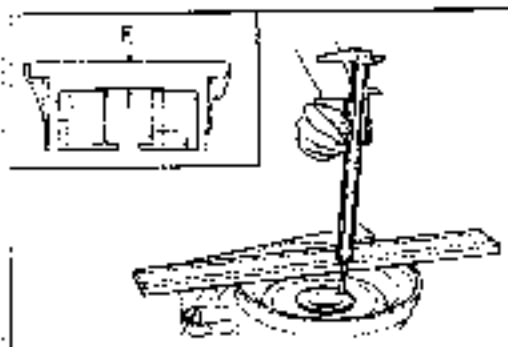
**Oil pump end play specification:**  
 0.25—0.55mm (0.010—0.022 in)

- (7) If the total end play is not within specification, adjust it by selecting and installing the proper bearing race.

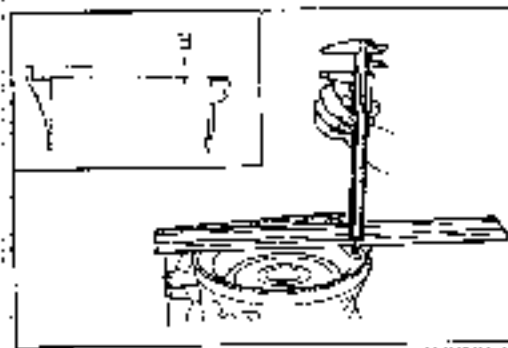
#### Bearing race size

			mm (in)
0.9 (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)	

SMUCK 435



SMUCK 436

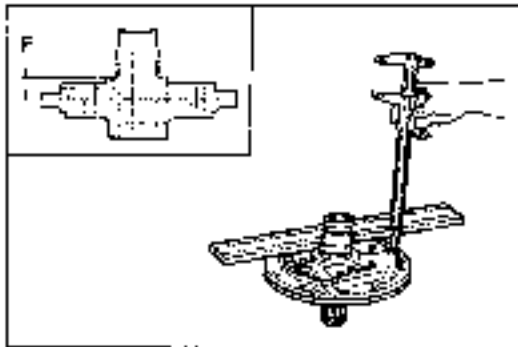


SMUCK 437

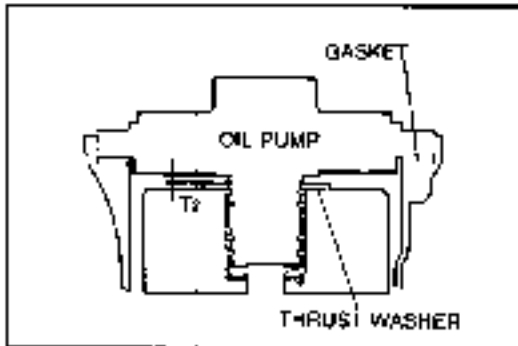
#### 20. Adjust reverse clutch end play.

- (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.



9MUDK1402



9MUDK1403

- (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

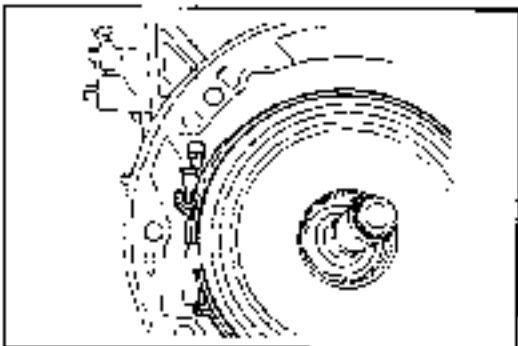
**Reverse clutch end play specification:  
0.55—0.90mm (0.022—0.035 in)**

- (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**

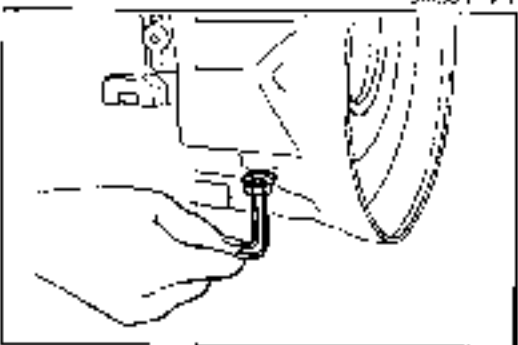
				mm (in)
0.7 (0.028)	0.9 (0.035)	1.1 (0.043)	1.3 (0.051)	
1.5 (0.059)	1.7 (0.067)	1.9 (0.075)		

9MUDK1410



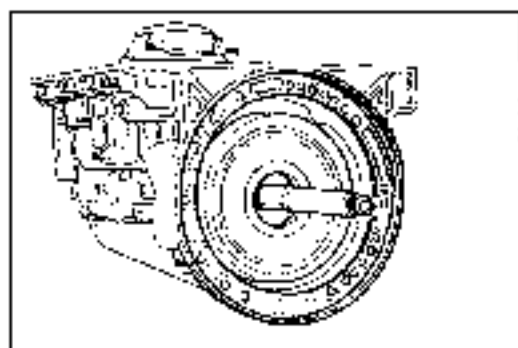
9MUDK1411

21. Apply ATF to the brake band and band strut, and install them into the transmission.



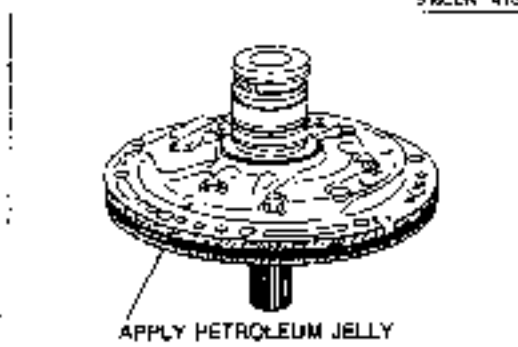
9MUDK1412

22. Install a new anchor end bolt.



RVU.EK1-413

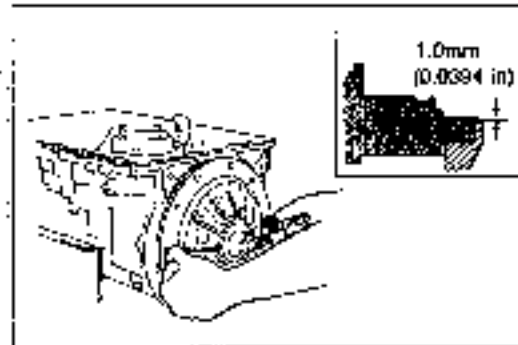
23. Apply ATF to the input shaft, and install it into the transmission case



APPLY PETROLEUM JELLY

RM.FK1-414

24. Apply petroleum jelly to the oil pump assembly as shown.

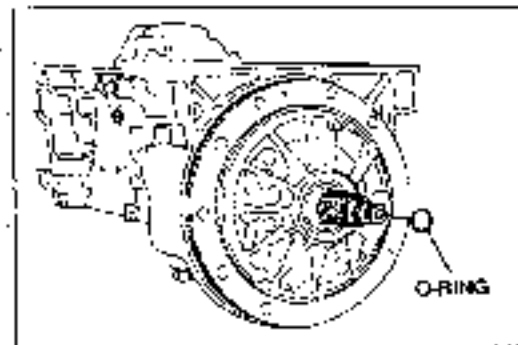


SMUICK-415

**Caution**

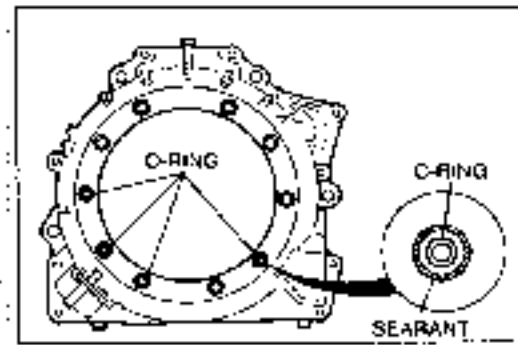
- a) Do not damage the seal rings or O-ring.  
b) Do not use a hammer, plastic or any other kind to install the oil pump.

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)**

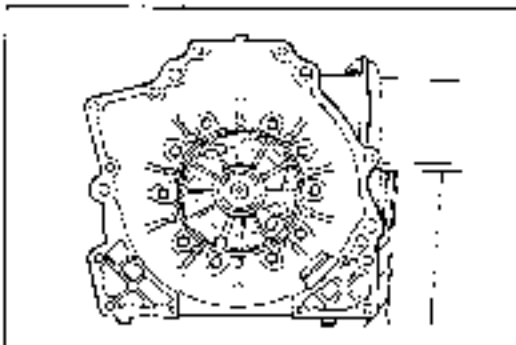
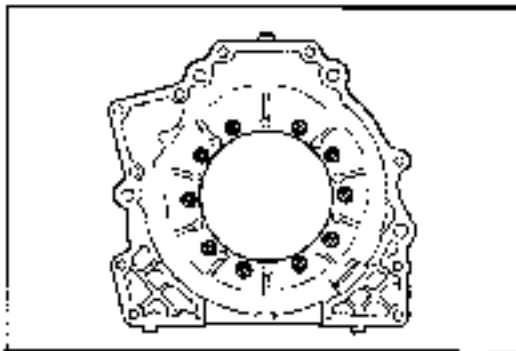
SMUICK-416

26. Apply ATF to a new O-ring, and install it onto the input shaft.



RVU.EK1-417

27. Apply ATF to the new O-rings, and install them into the converter housing, as shown.  
28. Apply sealant lightly, as shown.

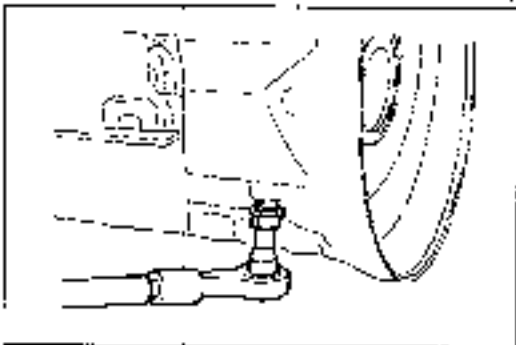


OMLUK1-418

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 Nm (6.2—6.5 m·kg, 45—47 ft·lb)**

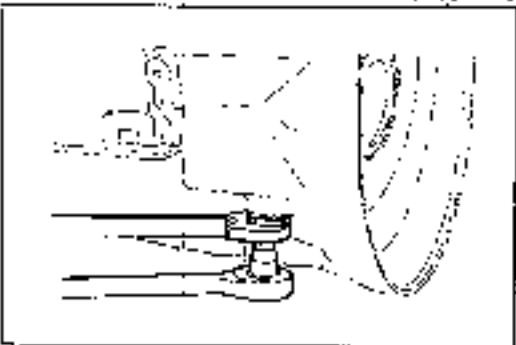


JWJOK1-419

31. Adjust the brake band.  
(1) Tighten the anchor end bolt with the hex wrench.

**Tightening torque:**

**3.9—5.9 Nm (40—60 cm·kg, 35—52 in·lb)**

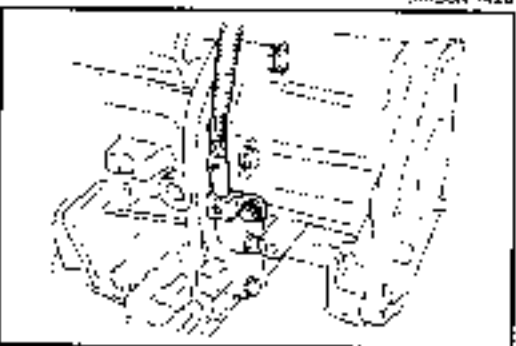


RMJOK-420

- (2) Loosen the anchor end bolt: **2.5** turns  
(3) Install the locknut.  
(4) Tighten the anchor end bolt with the hex wrench and tighten the locknut.

**Tightening torque:**

**31—42 Nm (3.2—4.3 m·kg, 23—31 ft·lb)**

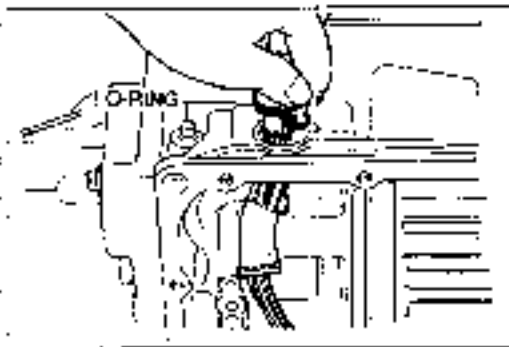


WKTJOK1-421

32. Apply ATF to a new O-ring, and install it onto the speed sensor 1.  
33. Mount the speed sensor 1 into the extensor housing.

**Tightening torque:**

**4.8—6.9 Nm (50—70 cm·kg, 43—61 in·lb)**



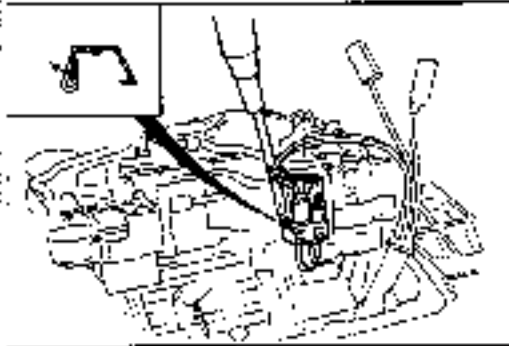
5ML0K1-422

34. Apply ATF to a new O-ring, and install it onto the solenoid connector.

**Caution**

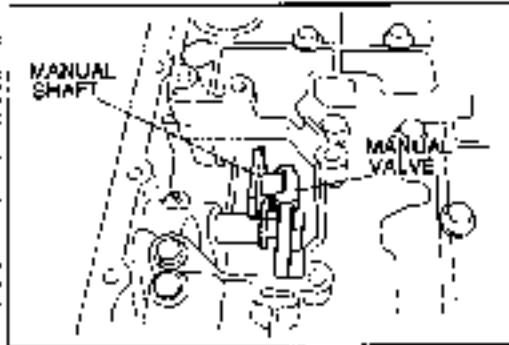
Do not damage the solenoid connector.

35. Install the solenoid connector into the transmission case.



BMU0K1-423

36. Connect the solenoid connector to the solenoids.  
37. Install the clip.



08J0K2-176

**Note**

- a) Verify that the manual valve and manual shaft are assembled correctly.  
b) Verify that the accumulator springs are installed correctly.

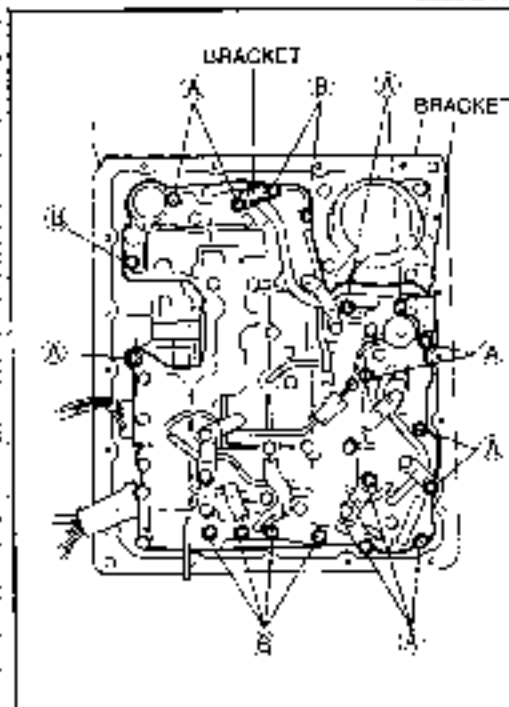
38. Install the valve body assembly, and tighten bolts (A) and (B) evenly.

**Bolt length (Measured from below the head)**

- (A): 33mm (1.299 in)  
(B): 45mm (1.772 in)

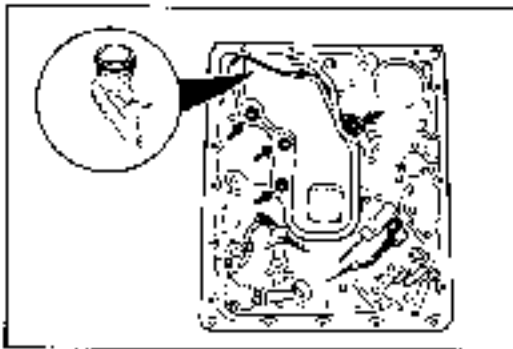
**Tightening torque:**

- 6.9—8.8 Nm (70—90 cm-kg, 61—78 in-lb)



BU0K2-067



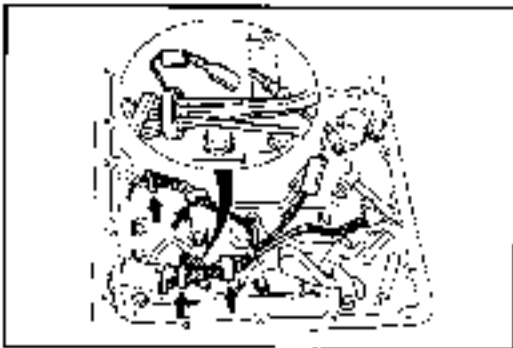


DAJOK2 177

39. Apply ATF to a new O-ring, and install it onto the oil strainer.  
40. Install the oil strainer.

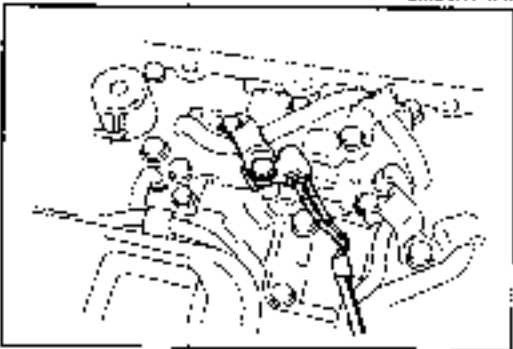
**Bolt length (Measured from below the head):**  
50mm (1.969 in)

**Tightening torque:**  
6.9—8.8 N·m (70—90 cm·kg, 61—75 in·lb)



SMLJK1 429

41. Mount the sensoroid harness with the clips.

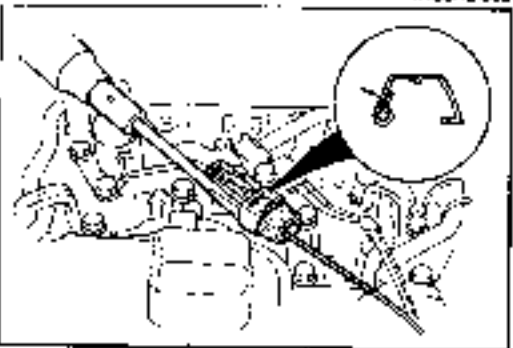


1RJK2 06U

42. Install the ATF thermosensor as shown in the figure.

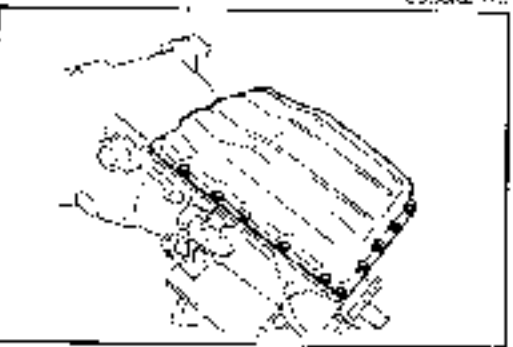
**Bolt length (Measured from below the head):**  
45mm (1.772 in)

**Tightening torque:**  
6.9—8.8 N·m (70—90 cm·kg, 61—75 in·lb)



CBJK2 178

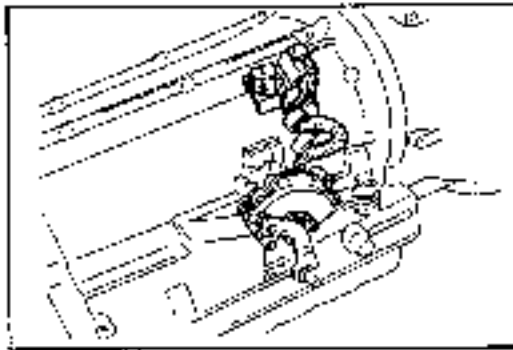
43. Connect the lockup solenoid connector.  
44. Install the clip.



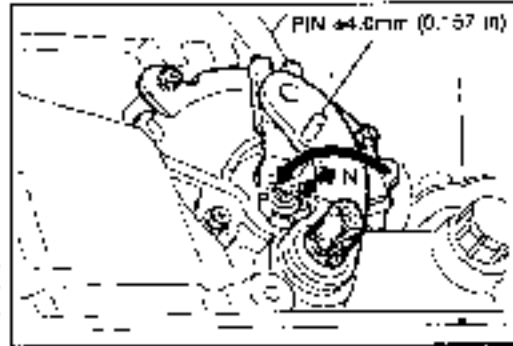
SMLJK1 429

45. Set the magnet into the oil pan.  
46. Install the oil pan along with the new gasket.

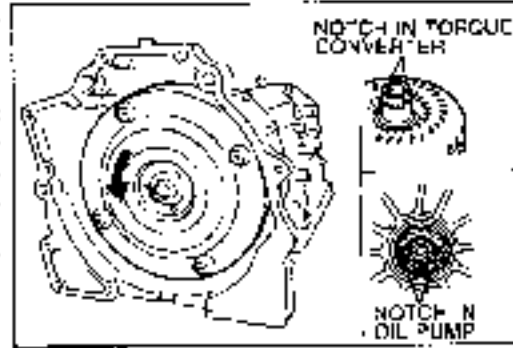
**Tightening torque:**  
4.9—7.8 N·m (50—80 cm·kg, 43—70 in·lb)



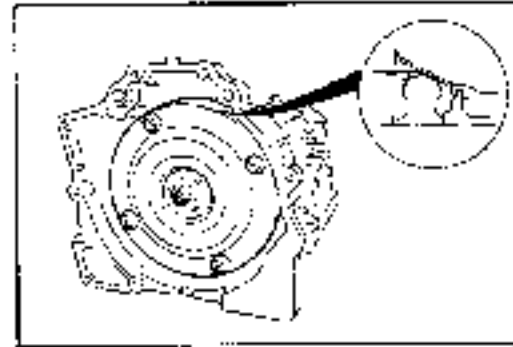
SMU91-010



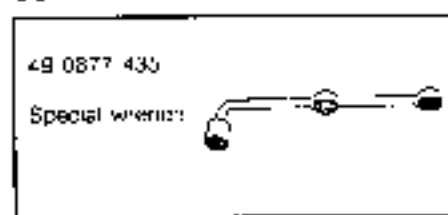
28U0K2410



HM\_KR1-459



.BU9K2470

**TRANSMISSION UNIT (INSTALLATION)****Preparation****SST**

28U0K2470

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 raising previous torque converter, add the same amount of ATF as was drained.

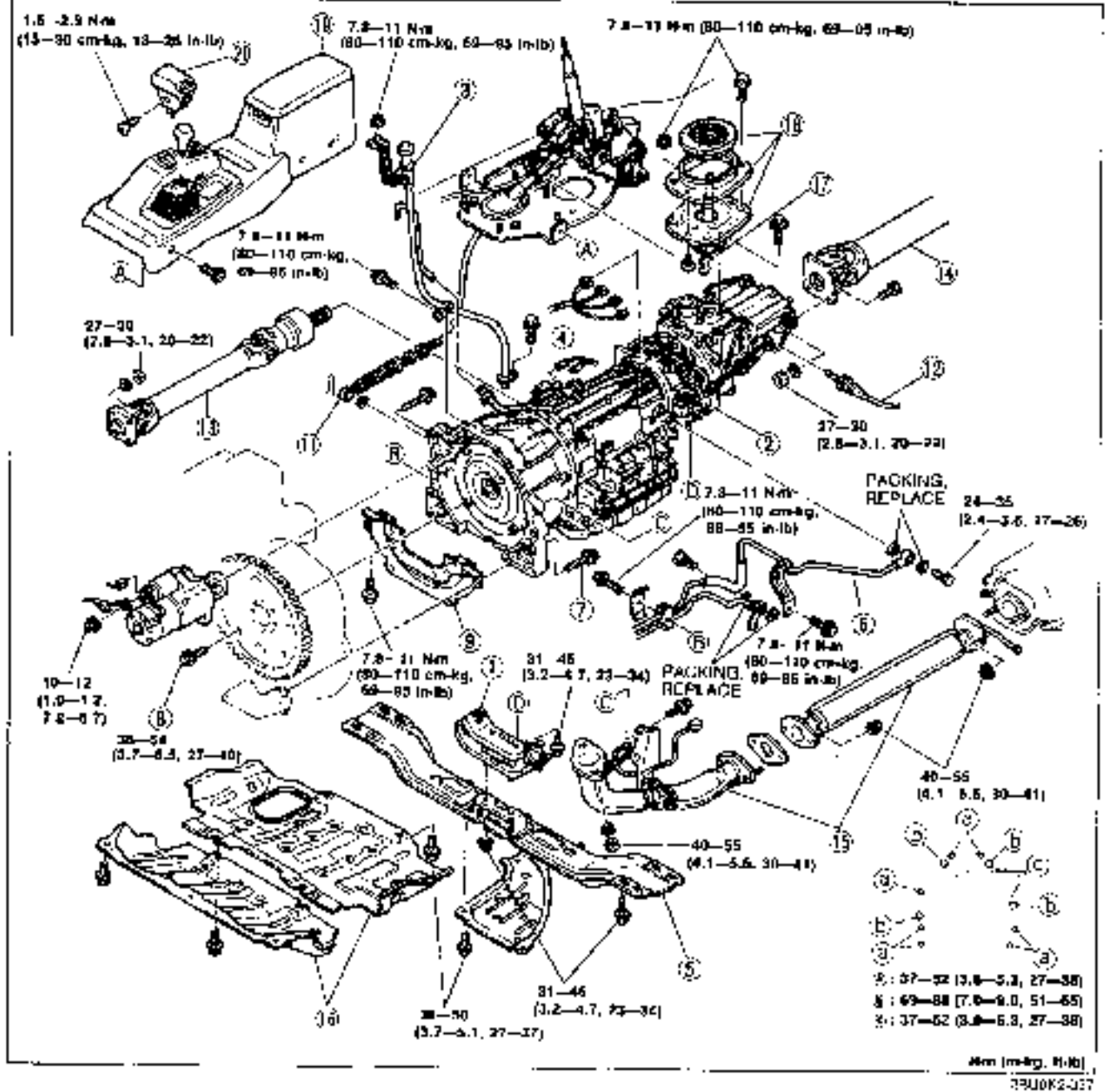
49. Install the torque converter into the transmission.

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.

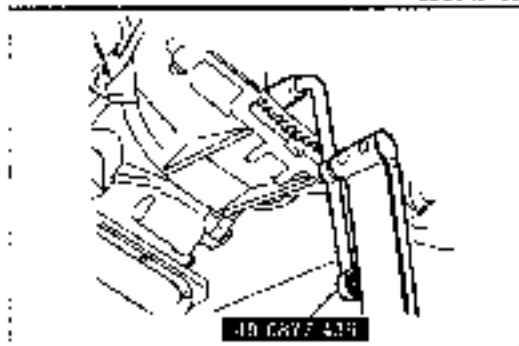


- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Transmission mount</li> <li>2. Automatic transmission</li> <li>3. Oil level gauge and pipe</li> <li>4. Connectors</li> <li>5. Cross member</li> <li>6. Oil pipe connector and bracket</li> <li>7. Transmission installation bolt</li> <li>8. Torque converter installation bolt<br/>Installation Note ..... page K2-144</li> <li>9. Under cover</li> <li>10. No.2 cross member</li> <li>11. Selector cable</li> </ol> | <ol style="list-style-type: none"> <li>12. Speedometer cable</li> <li>13. Front propeller shaft<br/>Service ..... Section L</li> <li>14. Rear propeller shaft<br/>Service ..... Section L</li> <li>15. Exhaust pipe</li> <li>16. Under cover</li> <li>17. 4x4 shift lever</li> <li>18. Insulator plate and boot</li> <li>19. Console box</li> <li>20. Selector knob</li> </ol> |
|---|--|

Nm (cm-kp, ft-lb)  
3900K2-027



JBUCK2-133



JBUCK2-134

JBUCK2-134

**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 Nm (3.6—5.0 m·kg, 25—36 ft·lb)

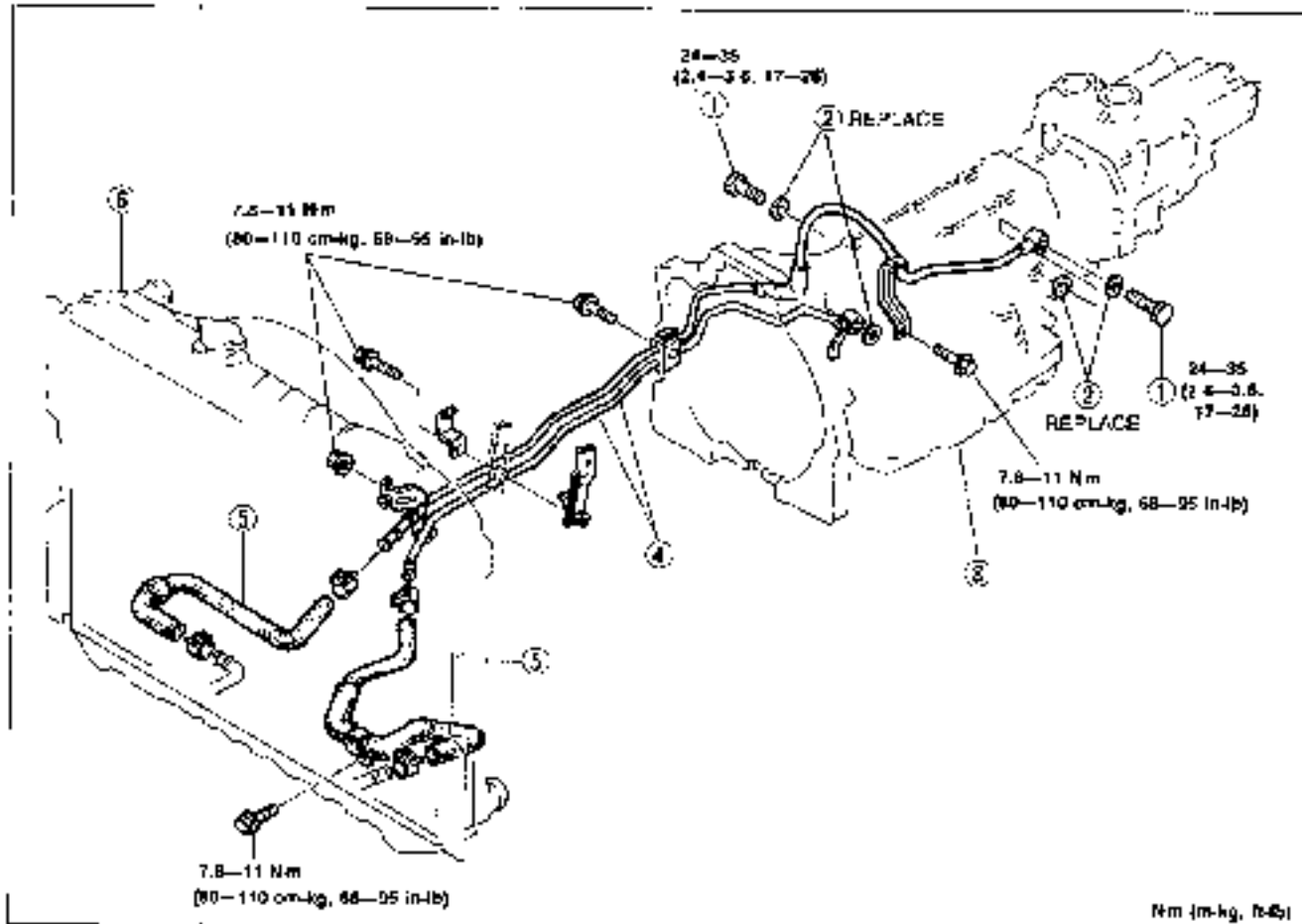
**OIL COOLER**

**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**.



- 1. Connector bolts  
Inspect for clogging

- 2. Packing

- 3. Transmission  
Removal ..... page K2-45  
Installation ..... page K2-141

- 4. Oil pipe  
Inspect for damage or cracks  
Installation Note ..... page K2-143

- 5. Oil hose  
Inspect for damage or cracks

- 6. Radiator  
Service ..... Section E

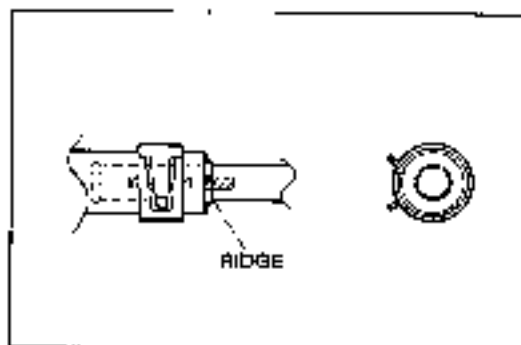
**Installation Note**

**Oil pipe**

**Caution**


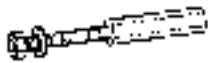


If reuse the hose clamp, position the hose clamp in the original location on the hose. Squeeze the clamp lightly with large pliers to ensure a good fit.

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.



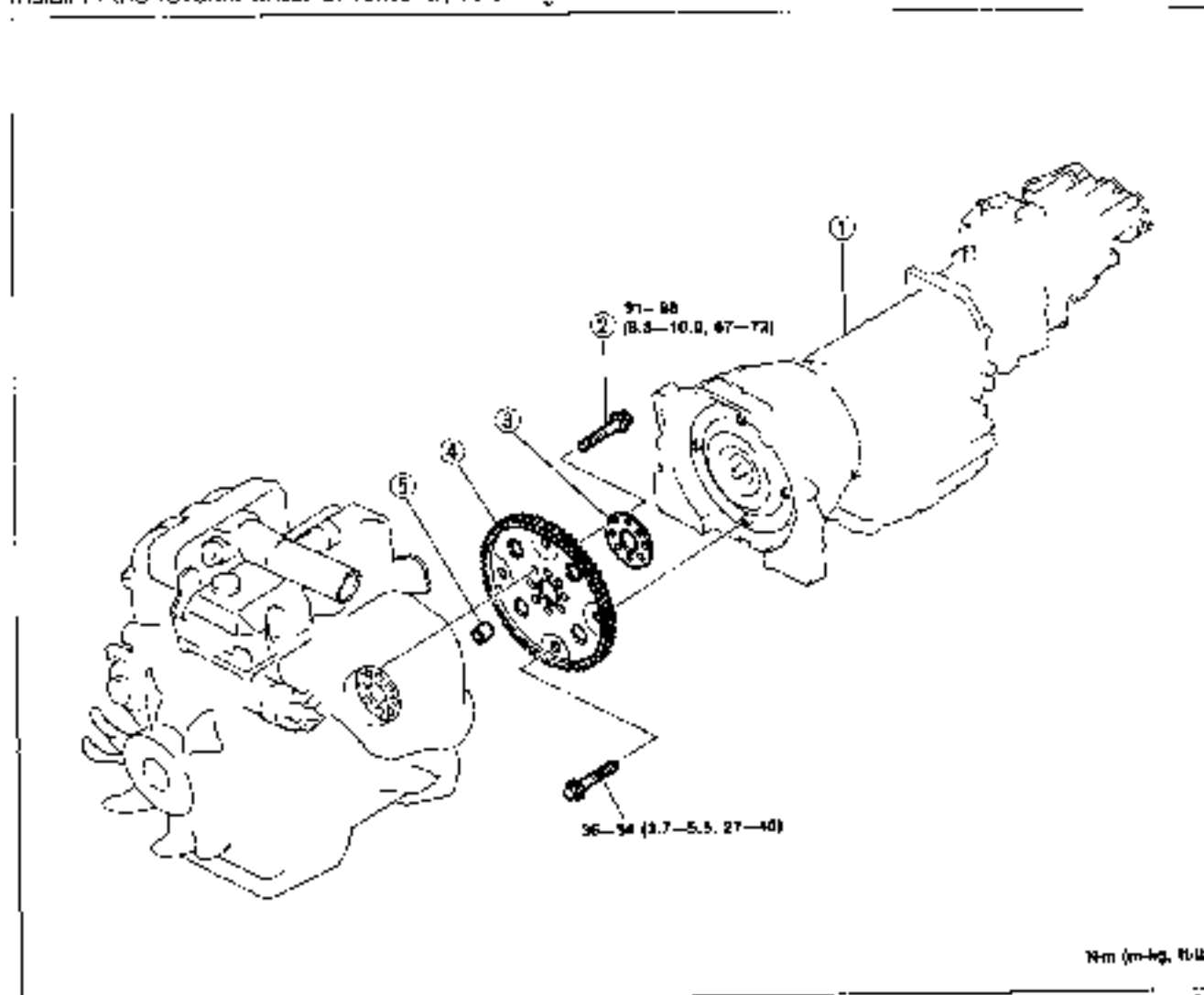
### DRIVE PLATE

#### Preparation SST

<p>49 ED11 1A0 Brake set, ring gear</p> 	<p>49 ED11 103 Shaft (Part of 49 ED11 1A0)</p> 	<p>49 ED11 104 Collar (Part of 49 ED11 1A0)</p> 
P8113424039		
<p>49 ED11 10E Slipper (Part of 49 ED11 1A0)</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**.



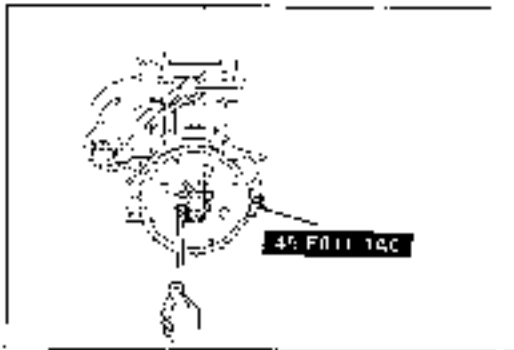
N·m (m·kg, ft·lb)

28 JUNE 2000

- 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

EBL602 Cx1

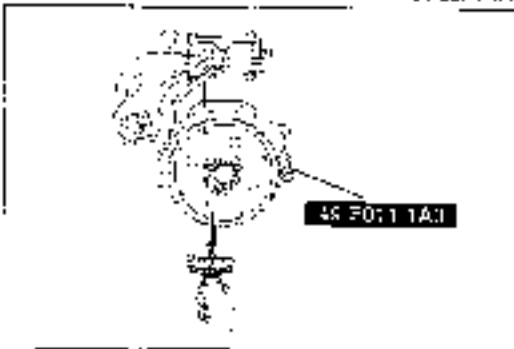


9/LL1-1457

**Removal Note**

**Bolts**

- 1. Remove the drive plate using the **SST** or equivalent.



1E...K2474

**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.

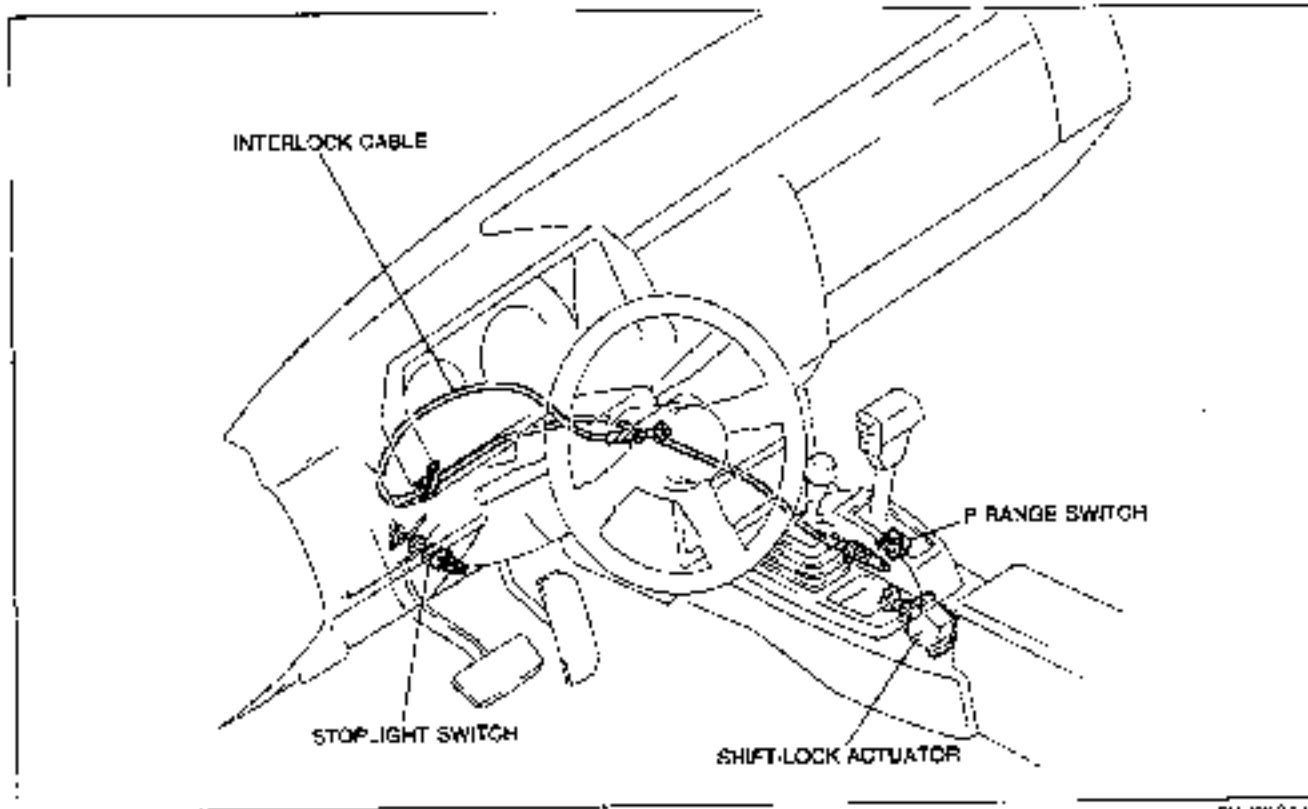
**Tightening torque:**

81—98 N·m (8.3—10.0 m·kg, 67—72 ft·lb)

- 3. Install the transmission. (Refer to page K2-141)

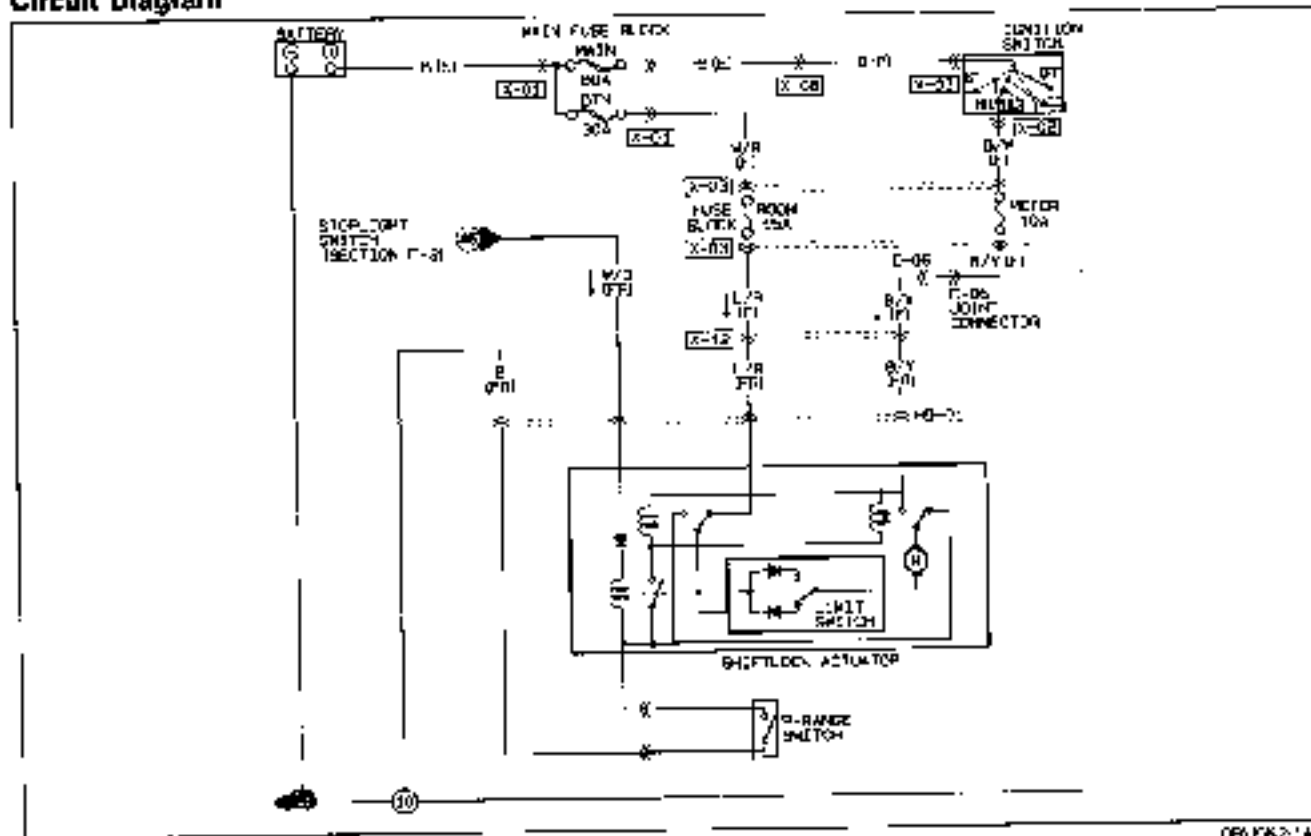
### SHIFT MECHANISM

#### SHIFT-LOCK SYSTEM COMPONENTS



DLJOK2-40

#### TROUBLESHOOTING Circuit Diagram



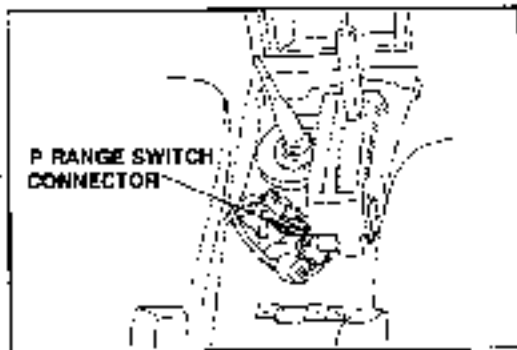
0BUK2-41



## Diagnosis chart

Problem	Possible Cause	Action	Page
Selector lever cannot be moved from P range with brake pedal depressed and ignition switch ON	HCOM 15A fuse not installed or burned	Install or replace	K2-146
	Ign system malfunction	Repair or replace	K2-146
	• Wire harness broken	Connect firmly	K2-146
	• Poor connection	Replace	K2-146
	• VETER 10A fuse burned		
	Ignition switch malfunction	Inspect and replace	Section T
	Stoplight switch remains OFF	Inspect and replace	Section T
	Stoplight system malfunction	Repair or replace	K2-146
	• Wire harness broken	Connect firmly	K2-146
• Poor connection	Replace	K2-146	
• STOP 15A fuse burned			
P range switch remains OFF	Inspect and replace	K2-148	
P range switch system malfunction	Repair or replace	K2-148	
• Wire harness broken (Poor ground)	Connect firmly	K2-148	
• Poor connection			
Shift-lock actuator malfunction	Inspect and replace	K2-148	
• Wire harness broken	Repair wiring harness	K2-148	
• Poor connection	Connect firmly	K2-148	
Misadjustment of selector lever or improper assembly of shift-lock actuator	Adjust or repair	K2-148	
Selector lever can be moved from P range with ignition switch ON, but without brake pedal depressed	HCOM 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
Selector lever can be moved from P range with ignition switch OFF and brake pedal depressed	HCOM 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
Shift-lock actuator operation heard when brake pedal depressed with ignition switch ON in other than P range	P range switch remains ON	Inspect and replace	K2-148
Selector remains locked with emergency override button operated	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
Ignition key can be turned to LOCK position with selector lever in ranges other than P range	Interlock cable	Inspect and replace	K2-151, 152
	• Disconnected		
• Kinked			
• Stuck			
• Spring damaged			
Key cylinder malfunction	Replace	Section N	
Ignition key cannot be turned to LOCK position with selector lever in P range	Interlock cable	Inspect and replace	K2-151, 152
	• Disconnected		
	• Kinked		
• Stuck			
• Spring damaged			
Key cylinder malfunction	Replace	Section N	

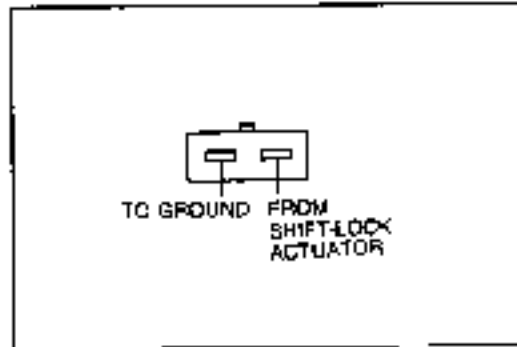
23110K2-042



JBUCK2-143

**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.

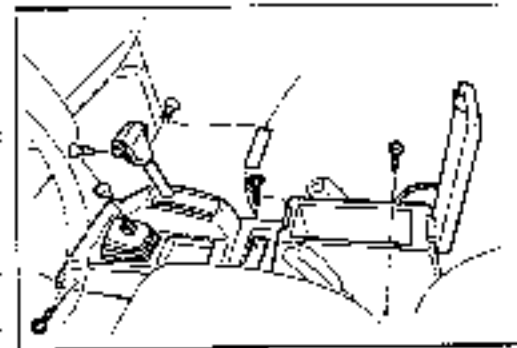


BJD2-076

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.)



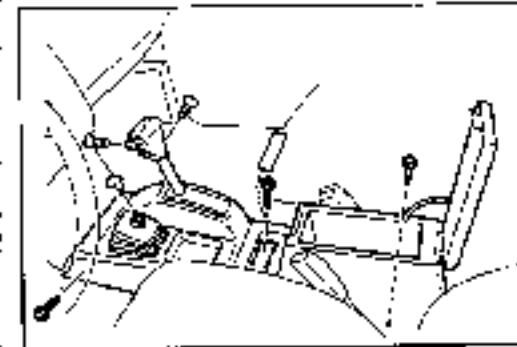
JBUCK2-145

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)

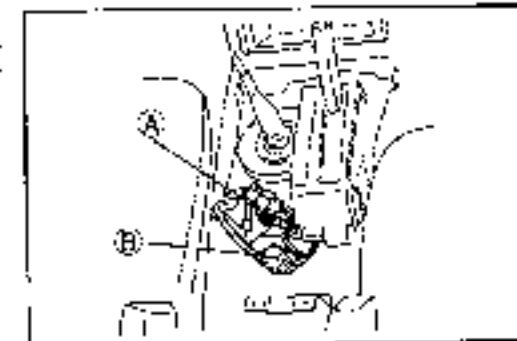
8. Connect the negative battery cable.
9. Check for correct operation of the shift-lock system.



JBUCK2-146

**SHIFT-LOCK ACTUATOR****Inspection****Terminal voltage and continuity**

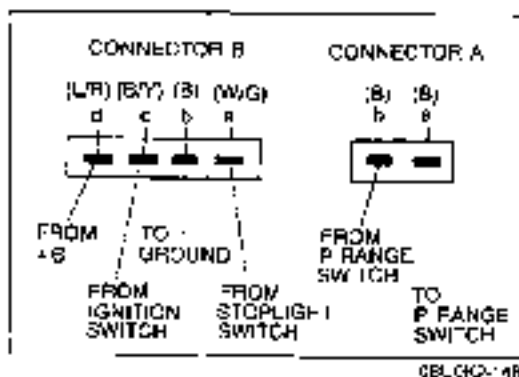
1. Remove the selector knob, and then remove the console.



JBUCK2-147

**Caution**

Disconnect connector B to check continuity between terminal b (harness side) and a ground.

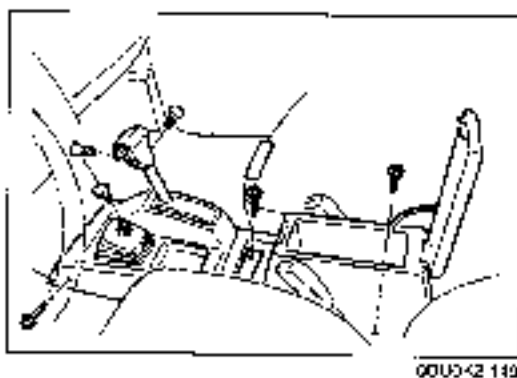


- Turn the ignition switch ON, and check terminal voltages and continuity, referring to the chart below.
- If not as specified, repair the wire harness and/or shift-lock actuator.

V<sub>B</sub>: Battery voltage

Connector	Terminal	Terminal connected to	Condition	Measurement value
A	a	B-b	P range selector lever release button not depressed	0Ω
A	c	B-b	Constant	0Ω
B	a	B-lr	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>

200K2-043



- Install the console.
- 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)

- Check for correct operation of the shift-lock system.

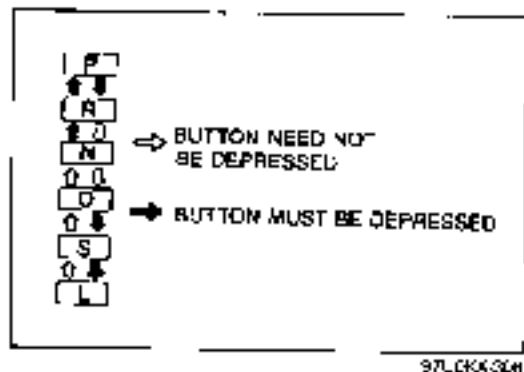
## SELECTOR LEVER

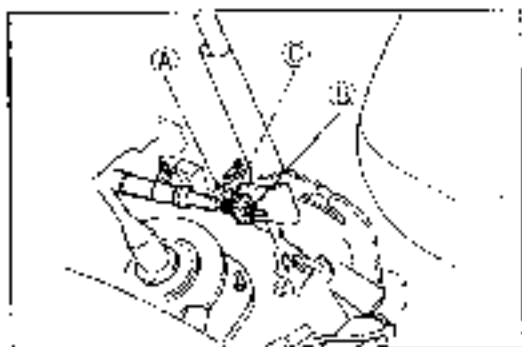
### Inspection

#### Caution

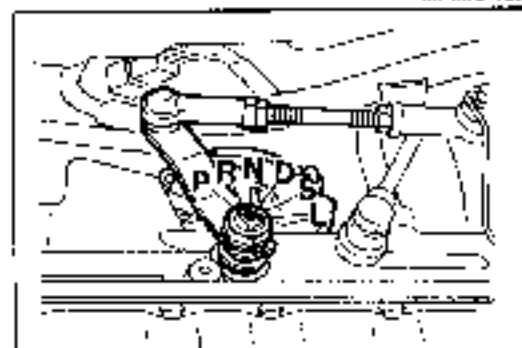
Shift the selector lever from P range to other ranges with ignition switch ON and brake pedal depressed.

- Check that the selector lever can only be shifted as shown in the figure.
- Make sure there is a click at each range when shifted from P → L range.
- Check that the positions of the selector lever and the indicator are aligned.
- Check that the button returns smoothly when pushed to shift.

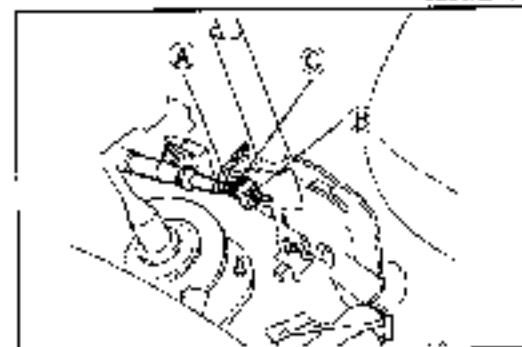




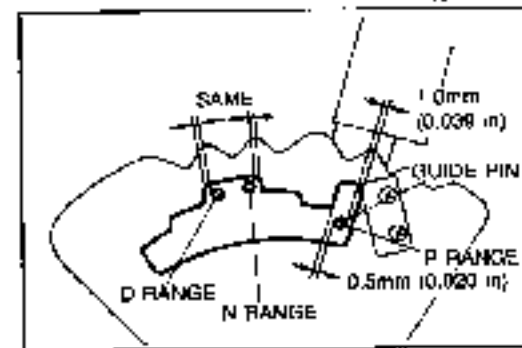
CB JK2-130



CB JK2-131



CB JK2-132



CB JK2-133

**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), locknut (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 Nm (60–110 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 Nm (60–110 cm-kg, 67–95 in-lb)**

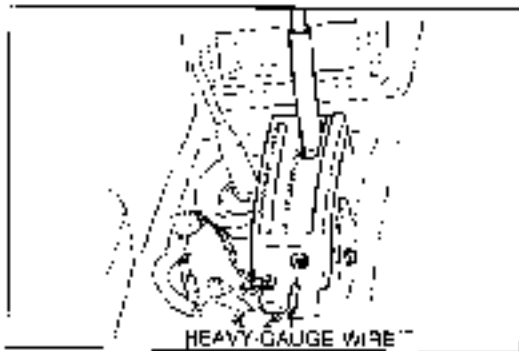
- 8 Check the lever so that the clearance between the guide plate and the guide pin in P range with the push rod lightly depressed is as shown.
- 9 Move the selector lever to N and D ranges and verify that there is the same clearance between the guide plate and guide pin.
- 10 If not as specified, readjust the lever.
- 11 Install the console.
- 12 Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

**Tightening torque:**

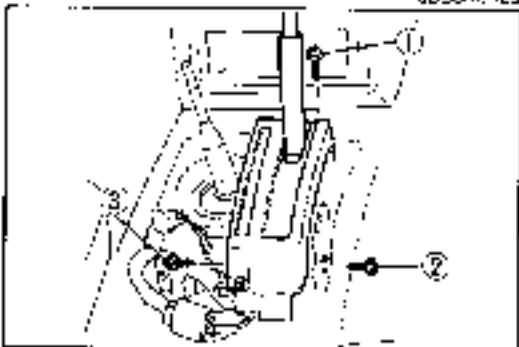
**1.5–2.9 Nm (15–30 cm-kg, 13–26 in-lb)**

- 13 Check for correct operation of the shift-lock system.

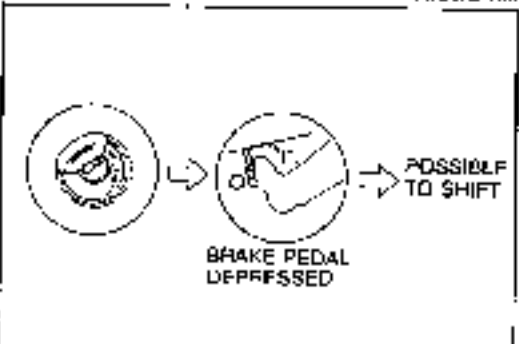
DELCKE-134



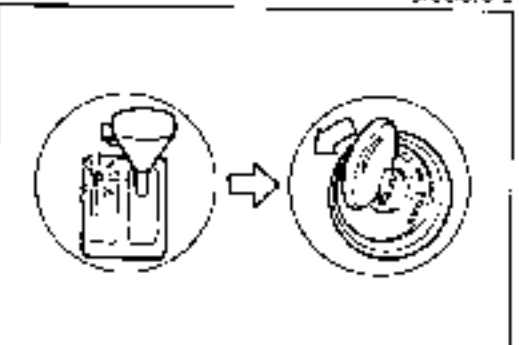
CB JK2-155



DB JK2-156



97 JK2-378



47 JK2-314

**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:**

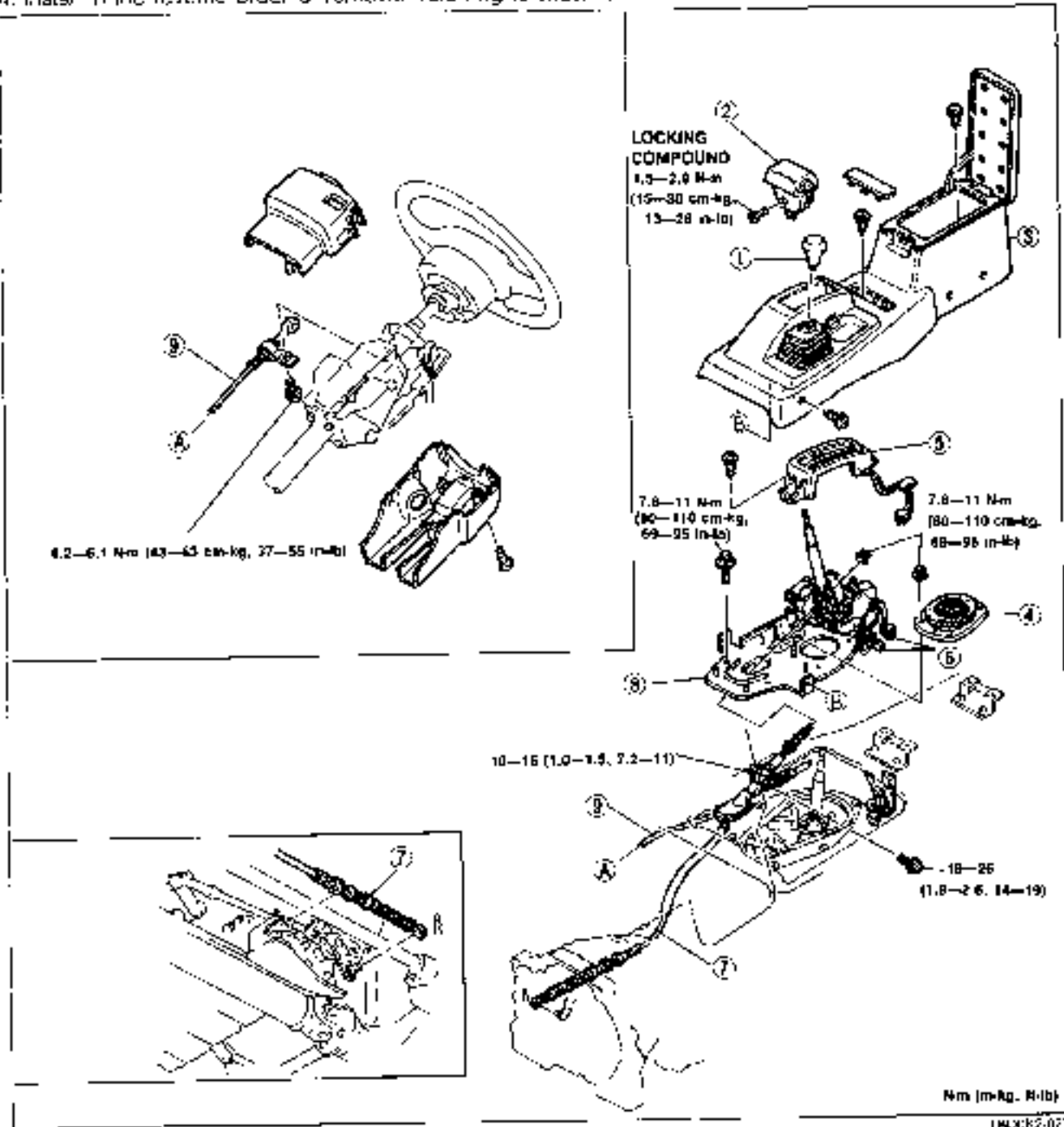
1.5—2.9 Nm (15—30 cm·kg, 13—26 in·lb)

**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**.

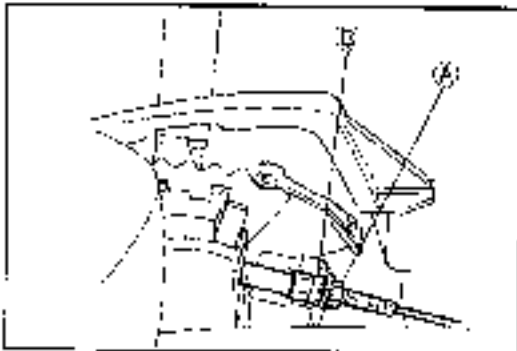


1. 4x4 shift lever knob
2. Selector knob
3. Console
4. Insulator plate and boot  
Installation Note..... page K2-154
5. Indicator panel  
Installation Note..... page K2-154
6. Connectors

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

Nm (m-kg, ft-lb)

1800K2-077



03LCK2-159

**Removal Note**  
**Selector lever**

**Caution**

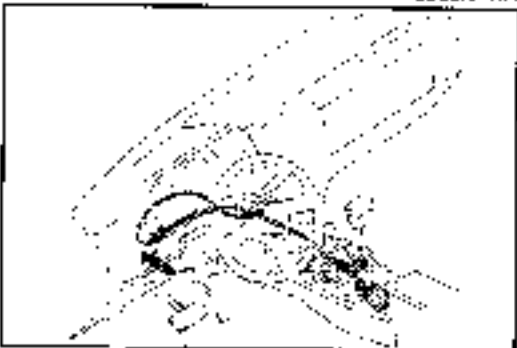
Do not loosen locknut (B). It is factory preset for proper shift-lock system operation.

1. Loosen the locknut (A).

**Caution**

Do not kink the cable.

2. Separate the cable from the selector lever.



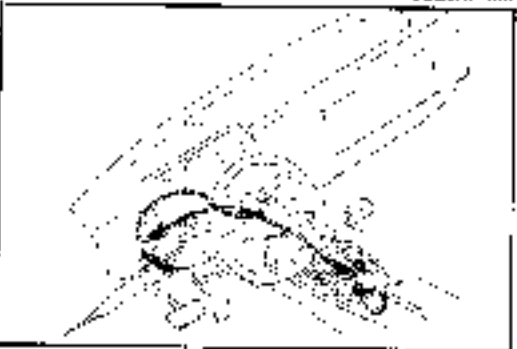
03LCK2-160

**Interlock cable**

**Note**

Do not remove the interlock cable if not necessary.

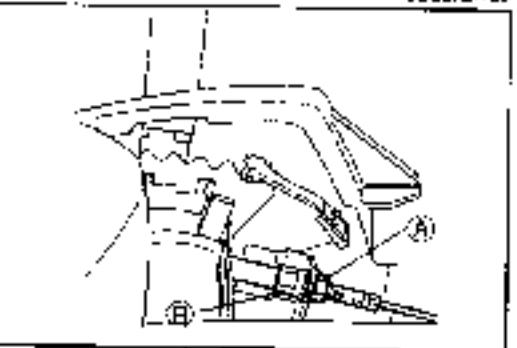
1. Remove the instrument panel. (Refer to Section S.)
2. Remove the interlock cable.



03LCK2-161

**Installation Note**  
**Interlock cable**

1. Install the interlock cable.
2. Install the instrument panel. (Refer to Section S.)



03LCK2-161

**Selector lever**

1. Shift the selector lever to N range.
2. Install the selector lever.

**Tightening torque:**

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)

**Caution**

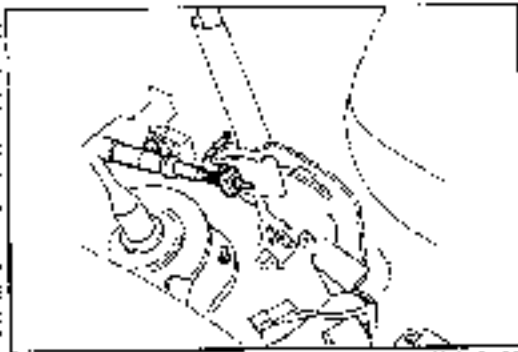
Do not kink the cable.

3. Install the cable and tighten locknut (A).

**Tightening torque:**

9.8—15 Nm (1.0—1.5 m-kg, 7.2—11 ft-lb)

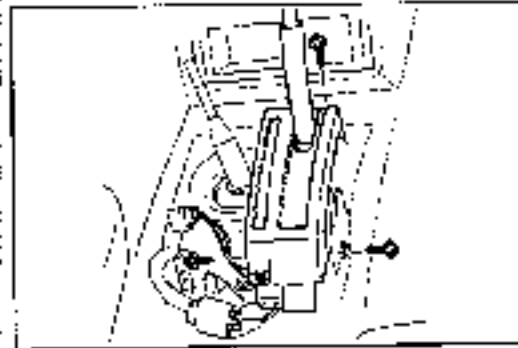
4. Check shift-lock system operation.



JH10K2-155

**Selector cable**

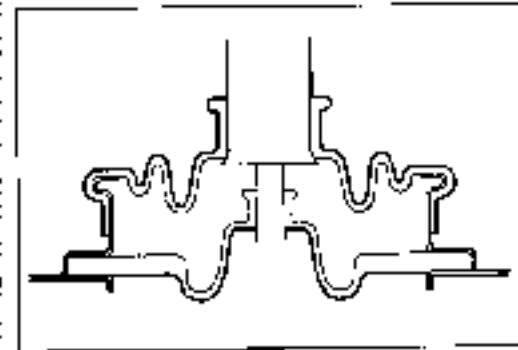
1. Install the selector cable as shown in the figure.
2. Adjust the lever position. (Refer to page K2-154.)



JH10K2-156

**Indicator panel**

1. Install the indicator panel.
2. Adjust the indicator panel. (Refer to page K2-151.)



DUK1K2-156

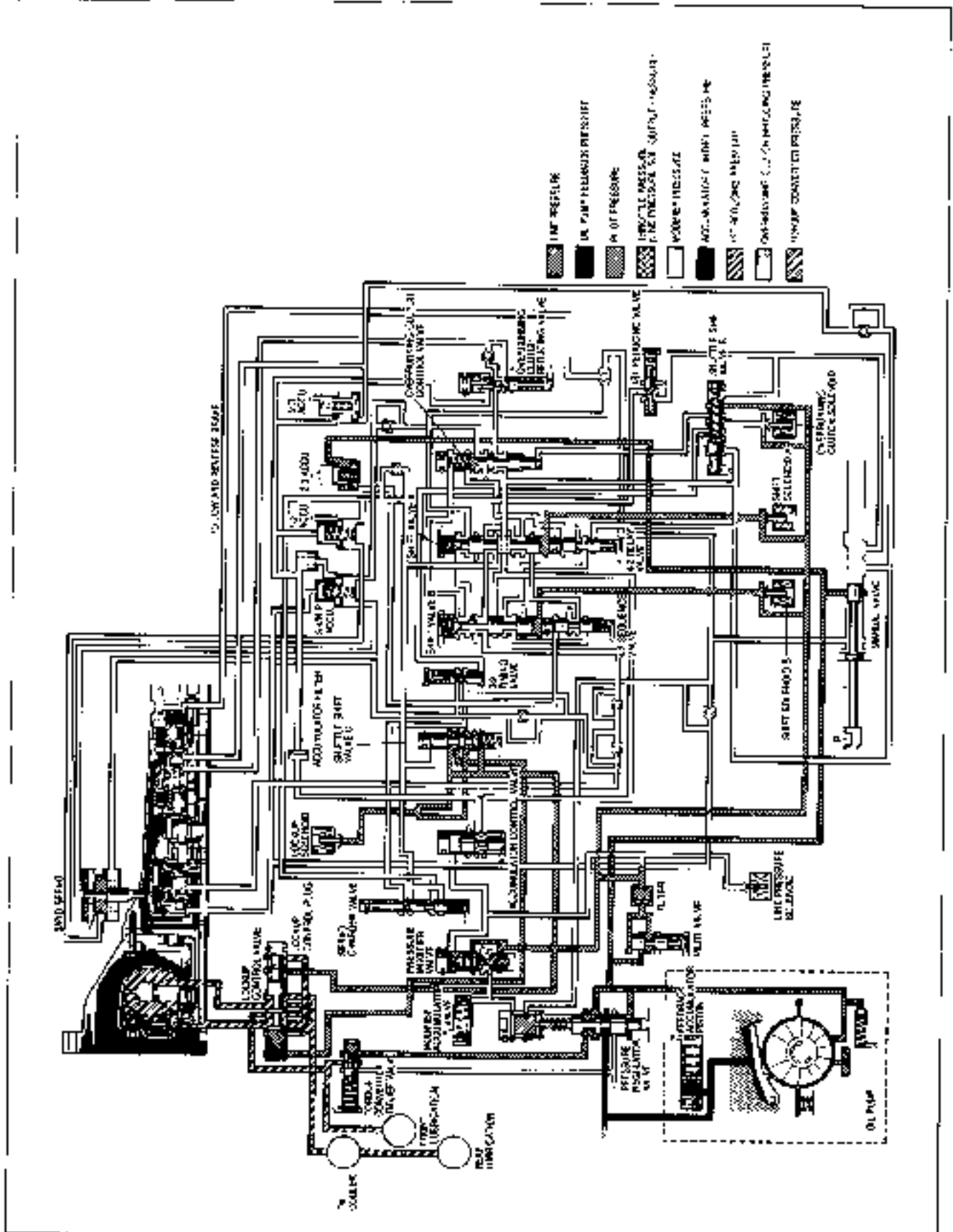
**Insulator panel and boot**

1. Install the insulator panel and boot as shown in the figure.

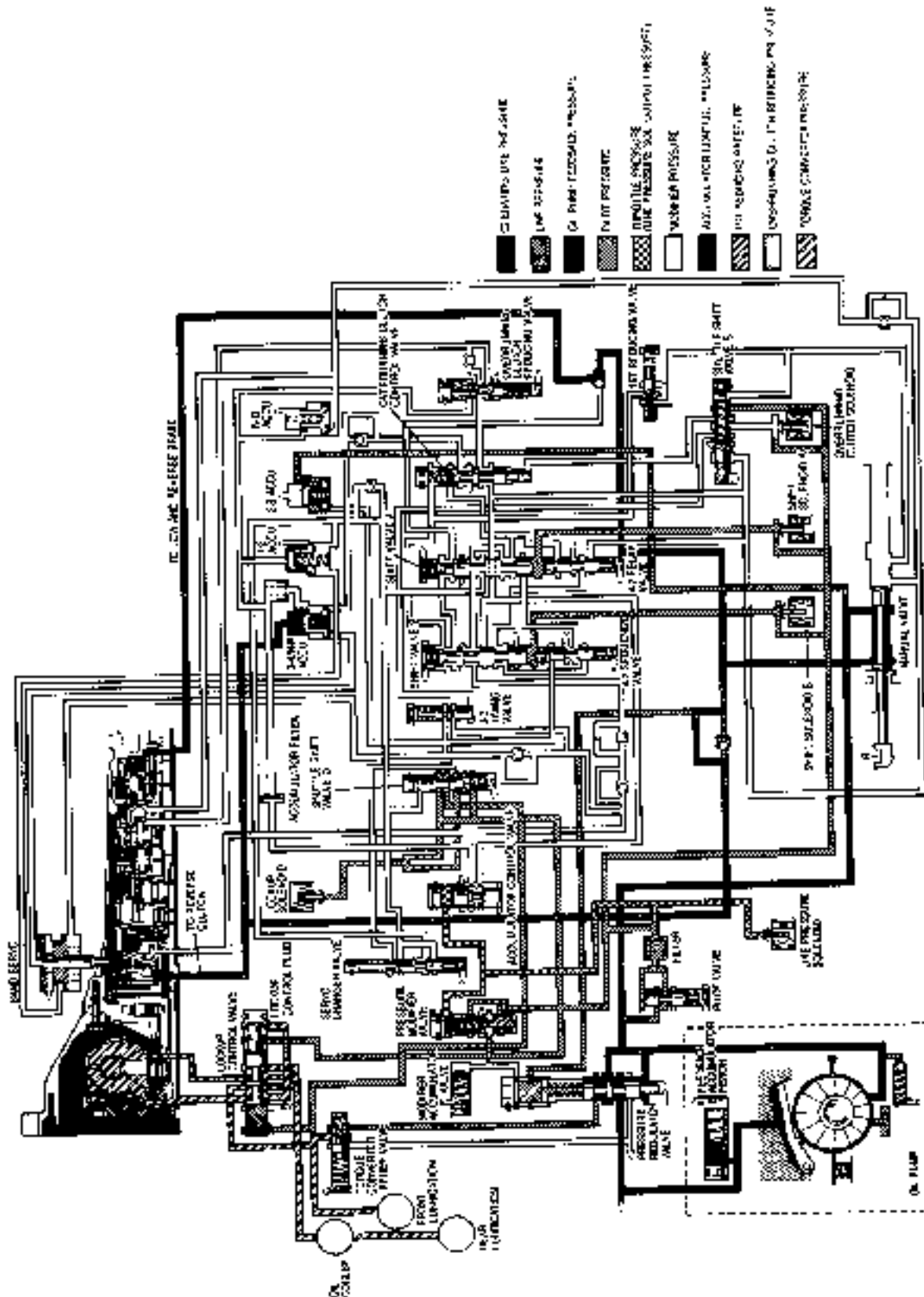


HYDRAULIC CIRCUIT

P RANGE



R RANGE

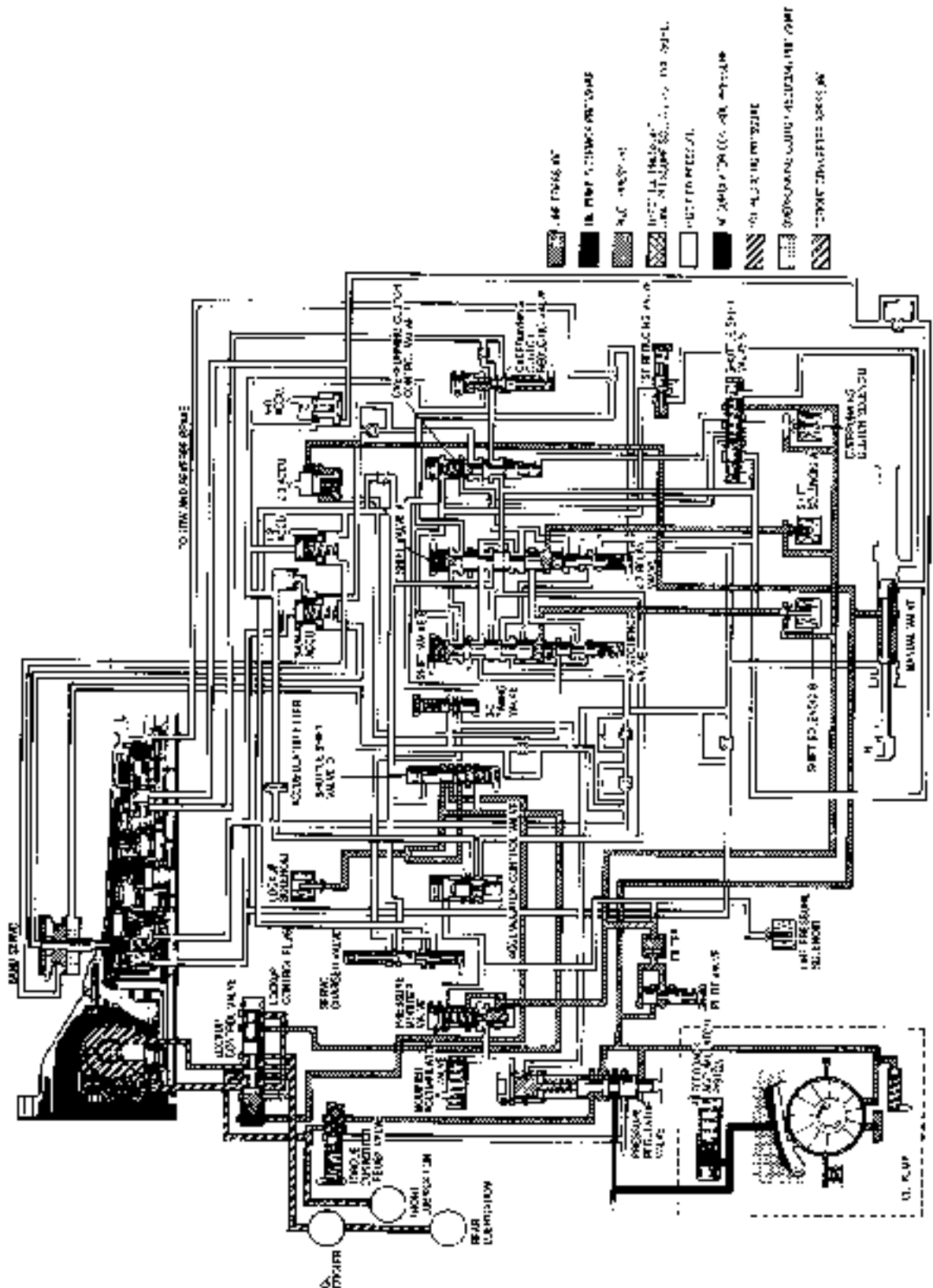


SMU2K1 472

# HYDRAULIC CIRCUIT

K2

N RANGE



- AIR PRESSURE
- HYDRAULIC PRESSURE
- AIR PRESSURE
- HYDRAULIC PRESSURE
- AIR PRESSURE
- HYDRAULIC PRESSURE
- AIR PRESSURE
- HYDRAULIC PRESSURE

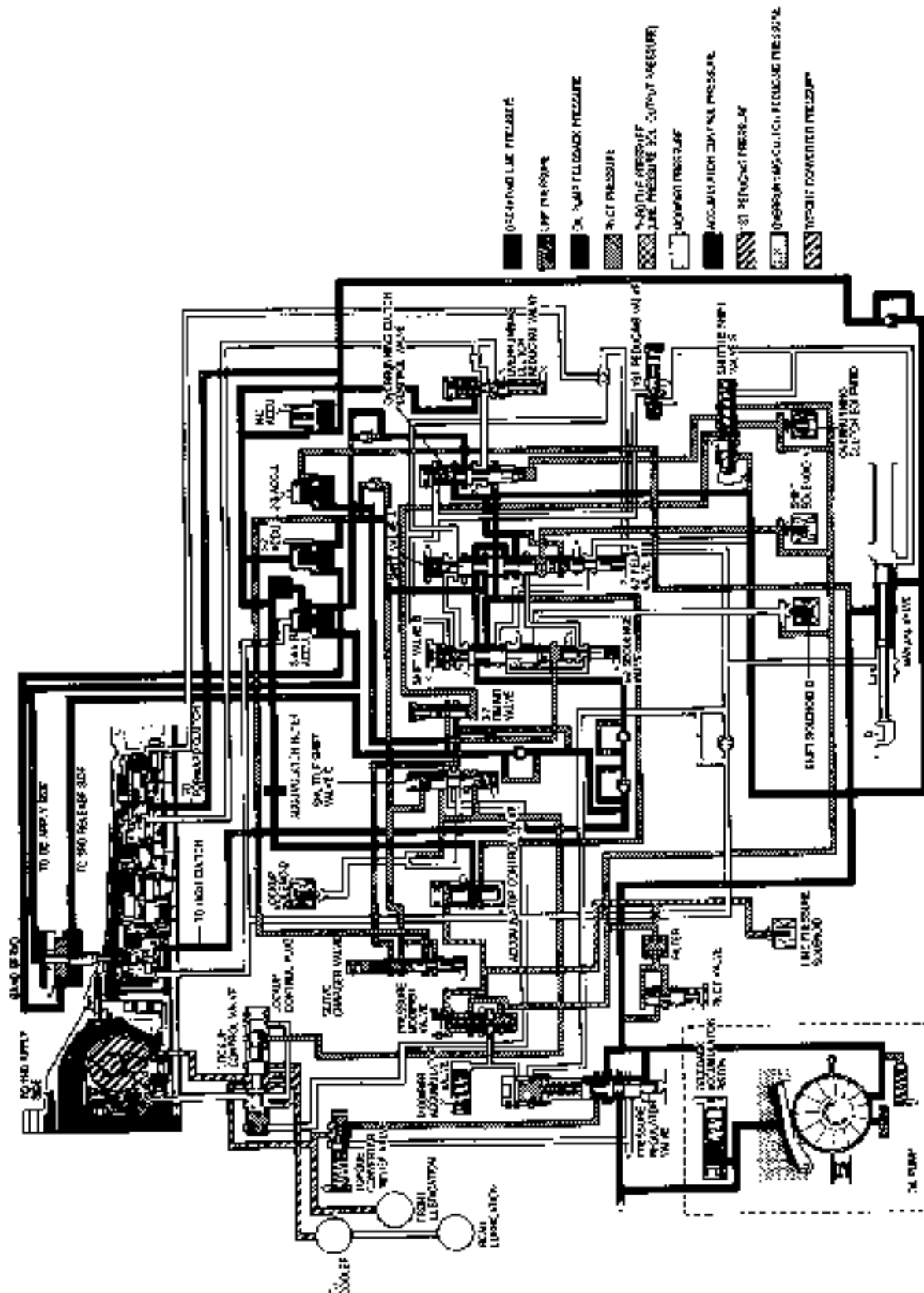








D RANGE; OD, LOCKUP ON



3VLK1-528



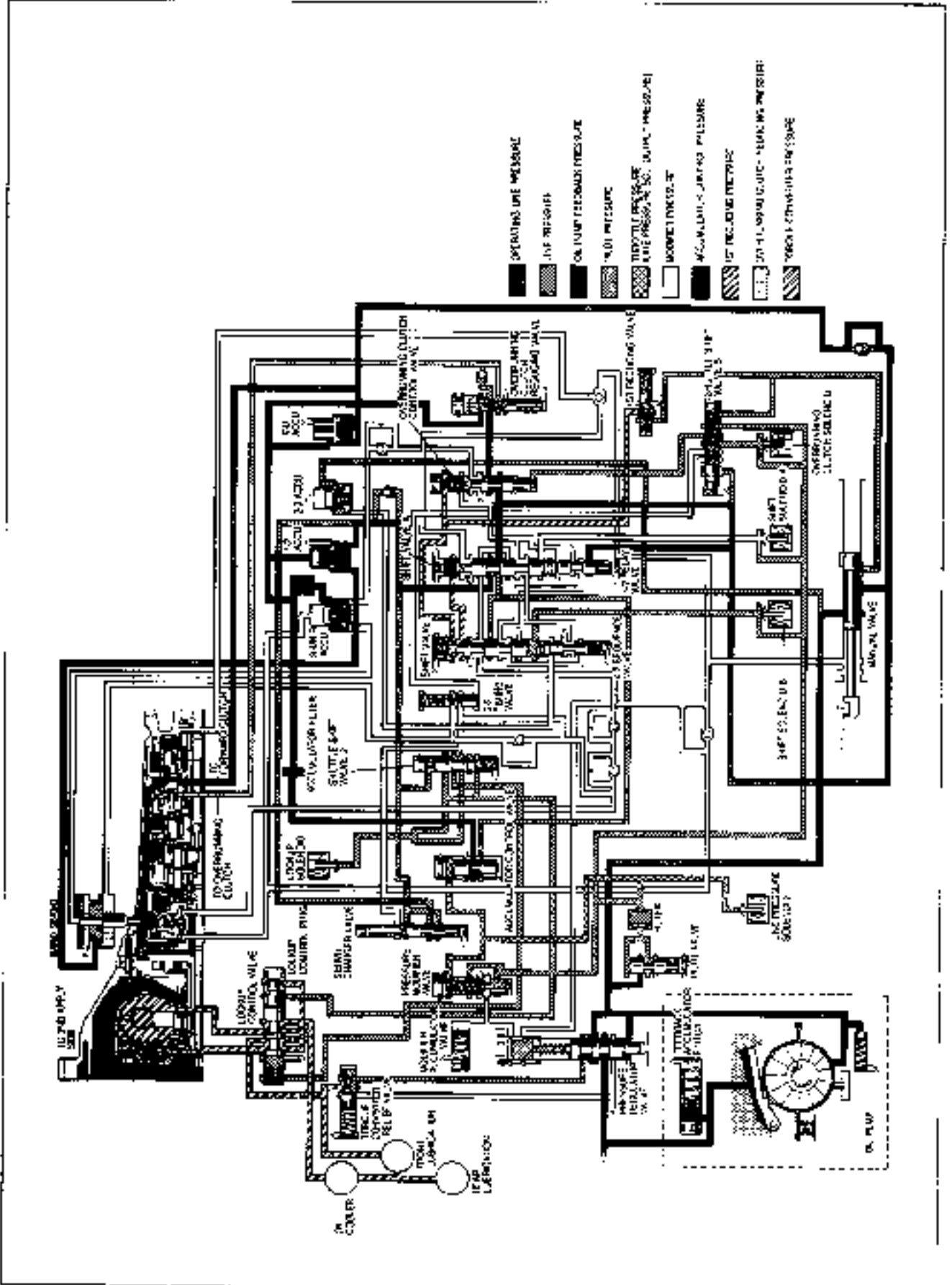








L RANGE; 2ND GEAR



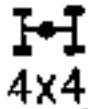
# **AUTOMATIC TRANSMISSION (TRANSFER CASE)**

<b>INDEX</b> .....	<b>K3- 2</b>
<b>OUTLINE</b> .....	<b>K3- 3</b>
<b>SPECIFICATION</b> .....	<b>K3- 3</b>

0311070 00'

## INDEX

4x4  
INDICATOR  
LAMP  
SERVICE,  
SECTION T



HOLD  
INDICATOR  
LAMP  
SERVICE,  
SECTION T

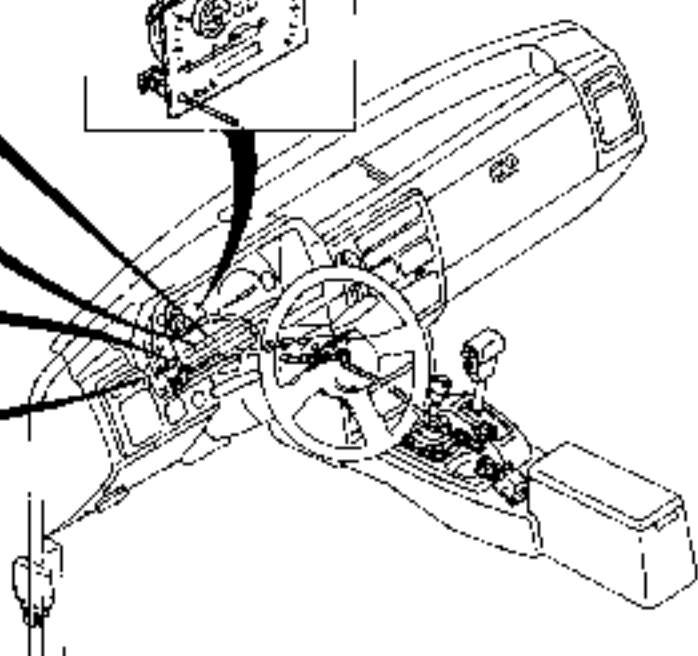
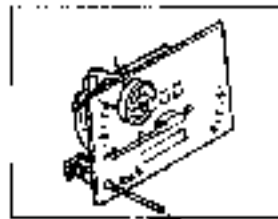
HOLD

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

Engine/Transmission		B2600I	
Item		R4AX-EL 4x4	
Synchronesh 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)	

12UJ43.00:





# PROPELLER SHAFT

<b>OUTLINE</b> .....	L- 2
SPECIFICATIONS (4x2) .....	L- 2
SPECIFICATIONS (4x4) .....	L- 3
<b>TROUBLESHOOTING GUIDE</b> .....	L- 4
<b>PROPELLER SHAFT</b> .....	L- 4
PREPARATION .....	L- 4
REMOVAL AND INSTALLATION .....	L- 5
OVERHAUL .....	L- 8
LUBRICATION .....	L-15

12/10 2401

## OUTLINE

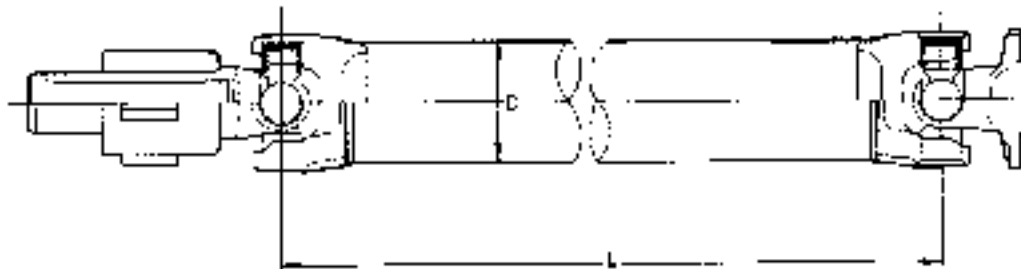
## SPECIFICATIONS (4x2)

Model/Transmission		B2200			
		Short bed		Long bed	
		M/T	A/T	M/T	A/T
Length	L	671.5 (26.44)	1,365 (53.74)	671.5 (26.44)	623.5 (24.56)
	L <sub>1</sub>	745 (29.33)	—	969 (38.15)	969 (38.15)
Outer diameter	D	57 (2.24)	75 (2.95)	57 (2.24)	65 (2.56)
	D <sub>1</sub>	65 (2.56)	—	65 (2.56)	65 (2.56)

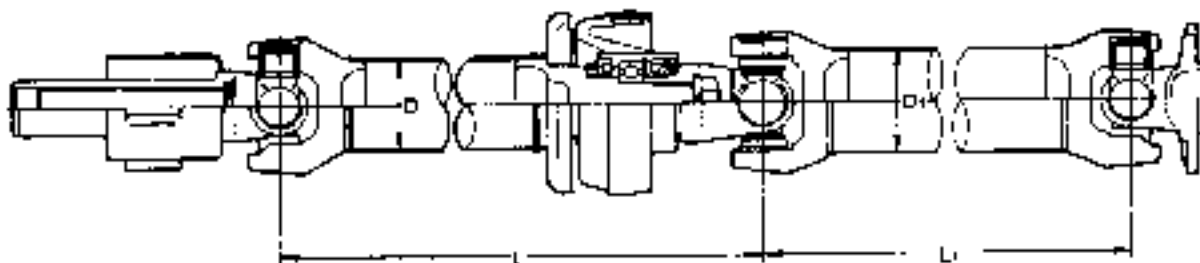
Model/Transmission		B2600I			
		Short bed		Long bed	
		M/T	A/T	M/T	A/T
Length	L	660.5 (26.36)	1,370 (53.94)	669.5 (26.36)	623.5 (24.56)
	L <sub>1</sub>	745 (29.33)	—	969 (38.15)	969 (38.15)
Outer diameter	D	65 (2.56)	75 (2.95)	65 (2.56)	65 (2.56)
	D <sub>1</sub>	65 (2.56)	—	65 (2.56)	65 (2.56)

OBJOXX 002

## SHORT BED A/T



## EXCEPT SHORT BED A/T



SPECIFICATIONS (4x4)

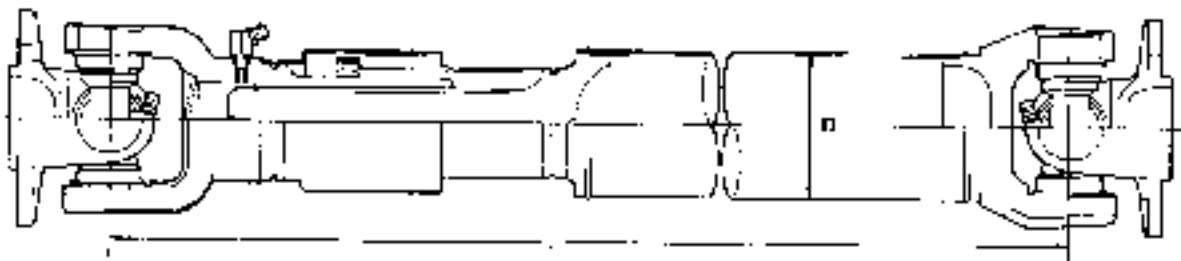
Model/Transmission			B26D01							
			Short bed				Long bed			
			Front propeller shaft		Rear propeller shaft		Front propeller shaft		Rear propeller shaft	
Item		M/T	A/T	M/T	A/T	M/T	A/T	M/T	A/T	
Length	mm (in)	470 (18.50)		1,313 (51.69)		470 (18.50)		543 (21.34)		
		-		-		-		990 (38.98)		
Outer diameter	mm (in) $\varnothing$	57 (2.24)		75 (2.95)		57 (2.24)		75 (2.95)		

9910 X003

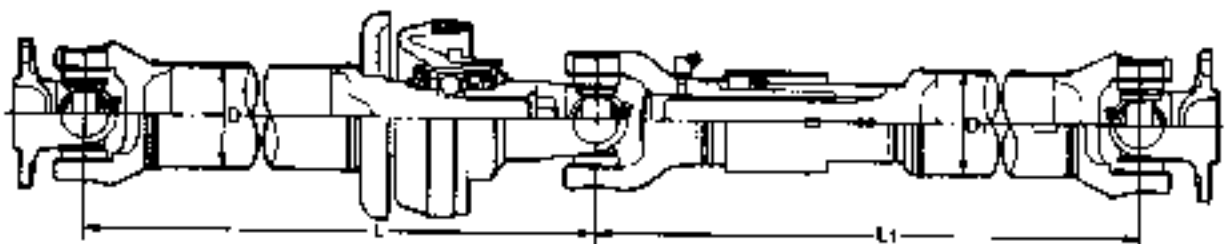
FRONT PROPELLER SHAFT (SHORT AND LONG BED)



REAR PROPELLER SHAFT (SHORT BED)



REAR PROPELLER SHAFT (LONG BED)



# TROUBLESHOOTING GUIDE, PROPELLER SHAFT














## 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-8
	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	-

3R002X-001

## PROPELLER SHAFT

### PREPARATION SST

49 0259 440 Holder, main shaft 	49 0839 425C Puller set bearing 	49 0636 145 Puller, for pulley brass 
49 B025 0A0 Installer, dust seal 	49 H025 001 Body (Part of 49 B025 0A0) 	49 H025 001 Installer, bearing 
49 H025 102 Installer, bearing 	49 H025 002 Installer, dust seal 	49 H025 004 Installer, bearing 
49 F401 331 Body 	49 H025 003 Installer, bearing 	49 J1033 101 Reinner, bearing 
49 S120 44C Holder, main shaft 		

3R002X-010

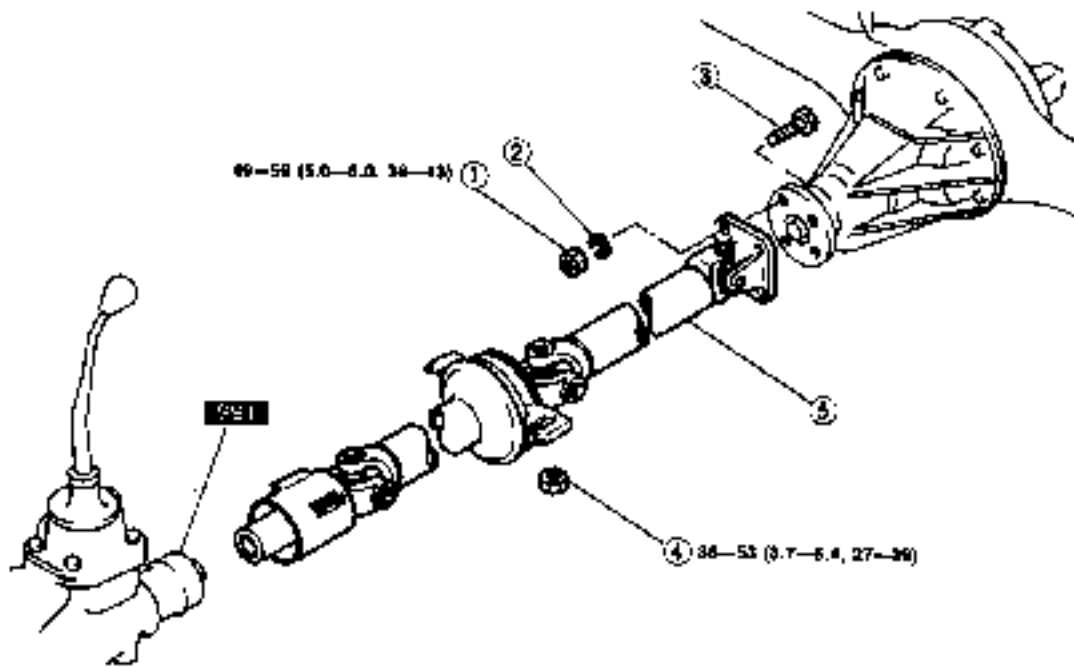
# PROPELLER SHAFT

L

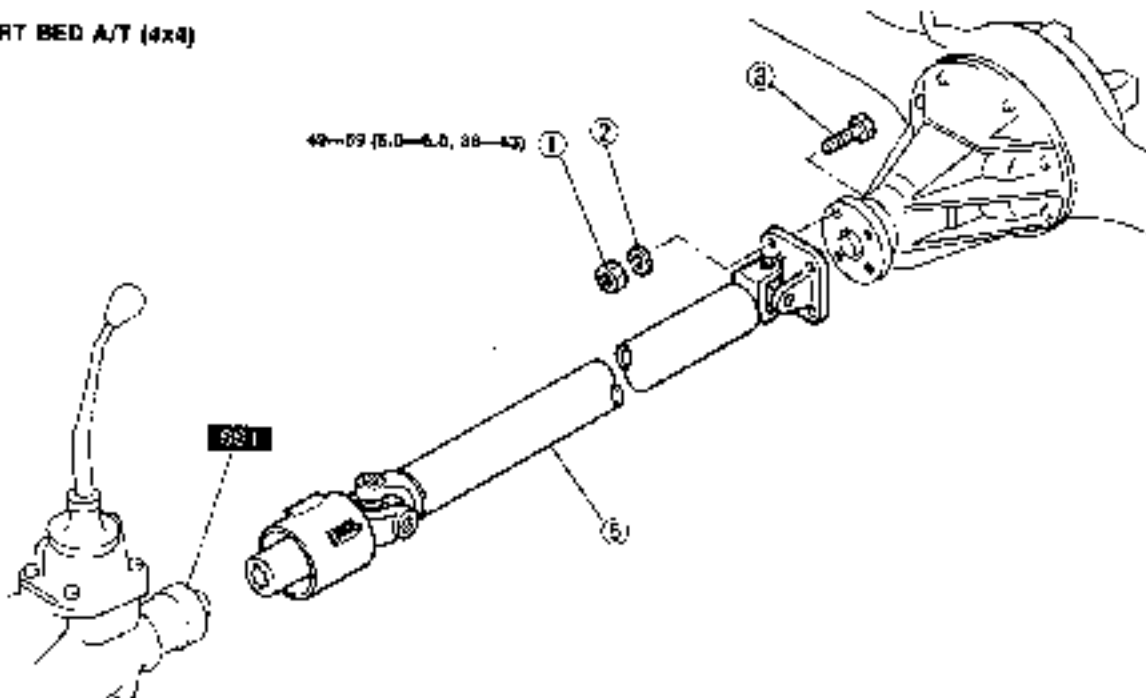
## REMOVAL AND INSTALLATION

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)



Nm (m-kg, ft-lb)  
\*SUCX-001

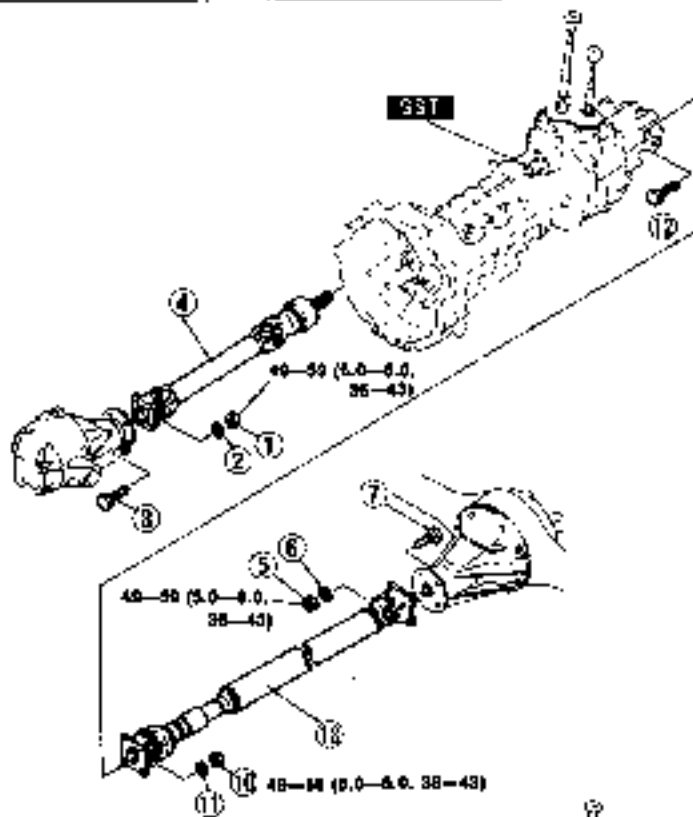
1. Nut
2. Lock washer
3. Bolt
4. Nut

5. Propeller shaft

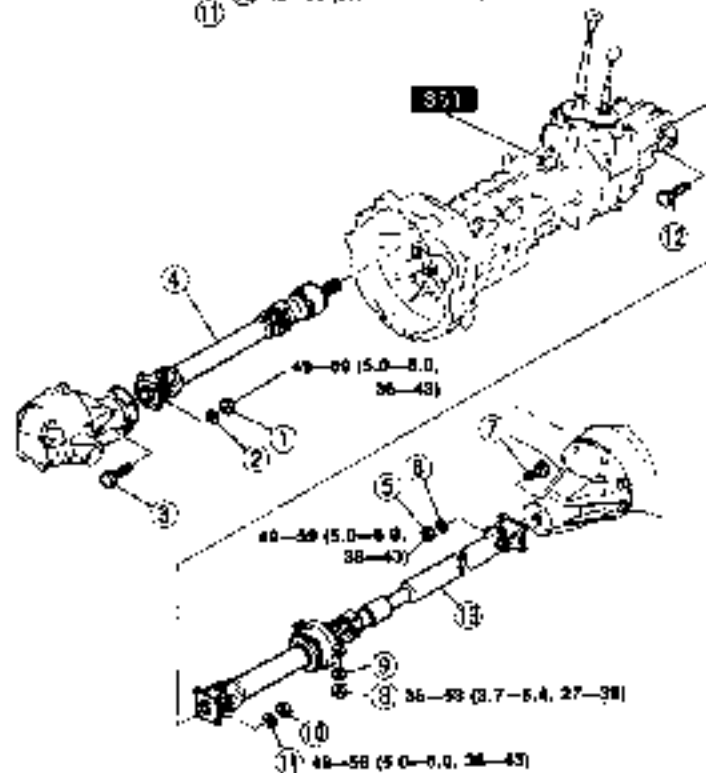
Removal..... page 1-7  
Installation..... page 1-7

# PROPELLER SHAFT

## SHORT BED (4x4)



## LONG BED (4x4)

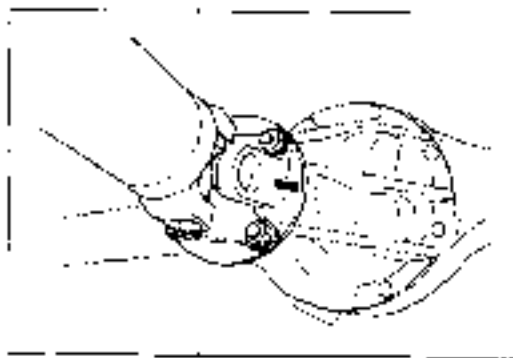


Item (in kg, lb)  
BL00X-100

- 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



83 JULY 008

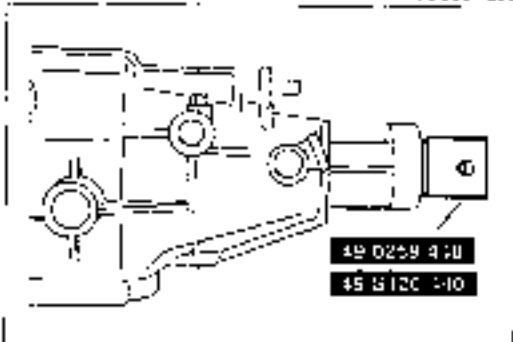
**Removal note**

**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.



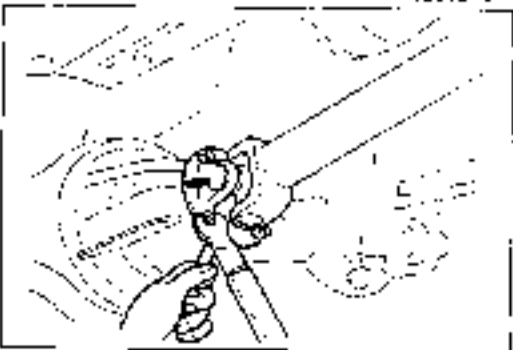
0806LY 017

**(4x2 Model)**

When the propeller shaft is removed from the extension housing, immediately install the SST into the extension housing to prevent oil leakage.

**82200 : 49 0259 440**

**82600: 49 S120 440**



251A3 24X2

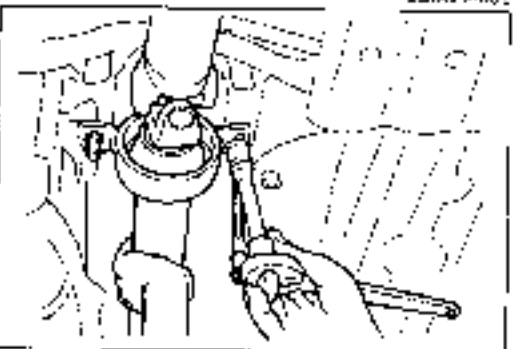
**Installation note**

**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)**

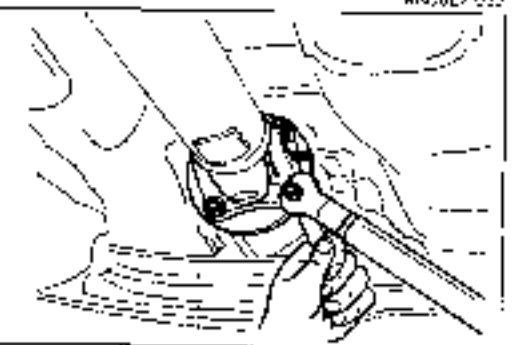


287 JULY 029

2. Install the center bearing support assembly.

**Tightening torque:**

**36—53 N·m (3.7—5.4 m·kg, 27—39 ft·lb)**



28ECLX-000

3. Align the marks, and install the front propeller shaft.

**Tightening torque:**

**48—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

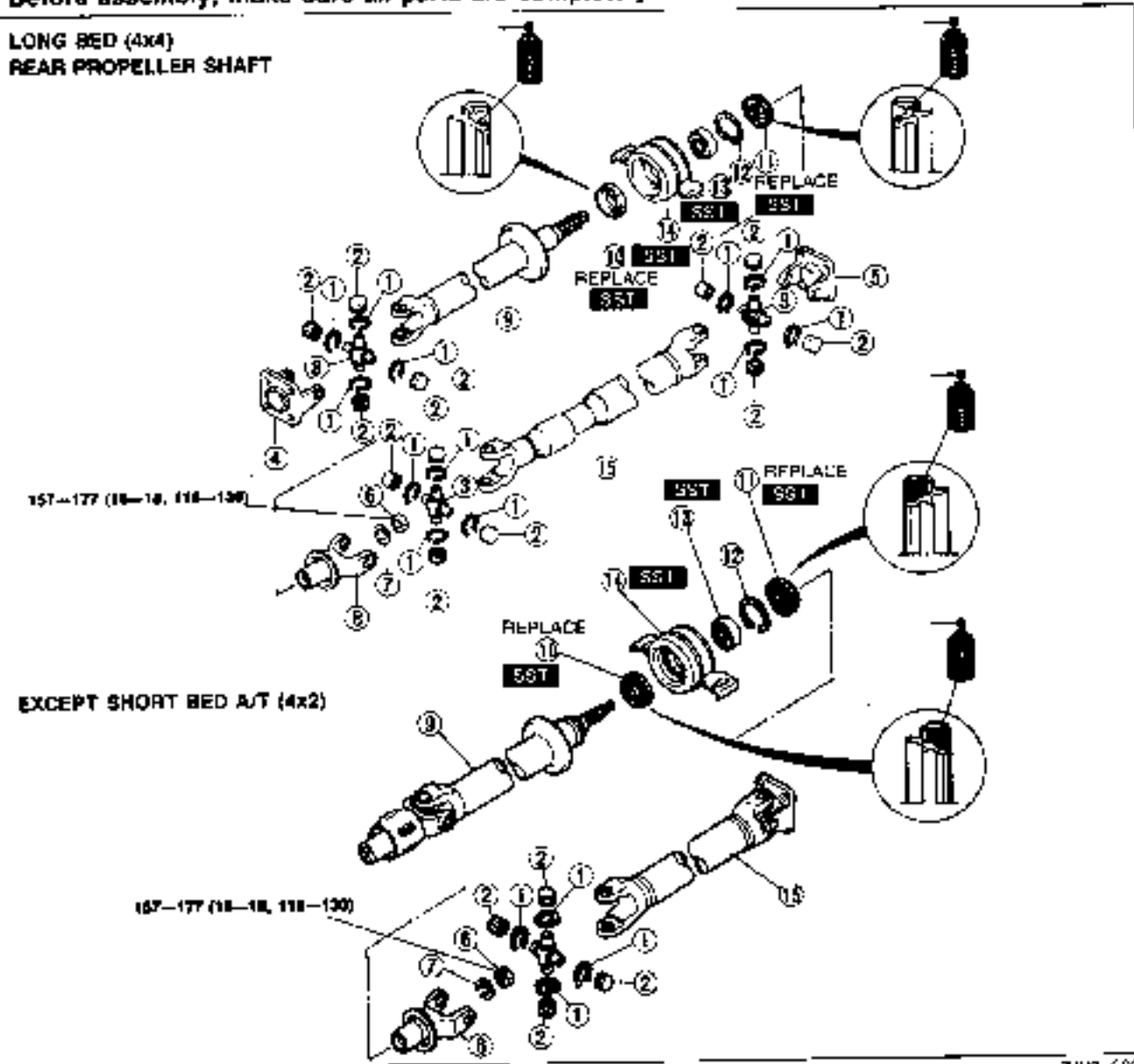
## OVERHAUL

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.**

**LONG BED (4x4)  
 REAR PROPELLER SHAFT**



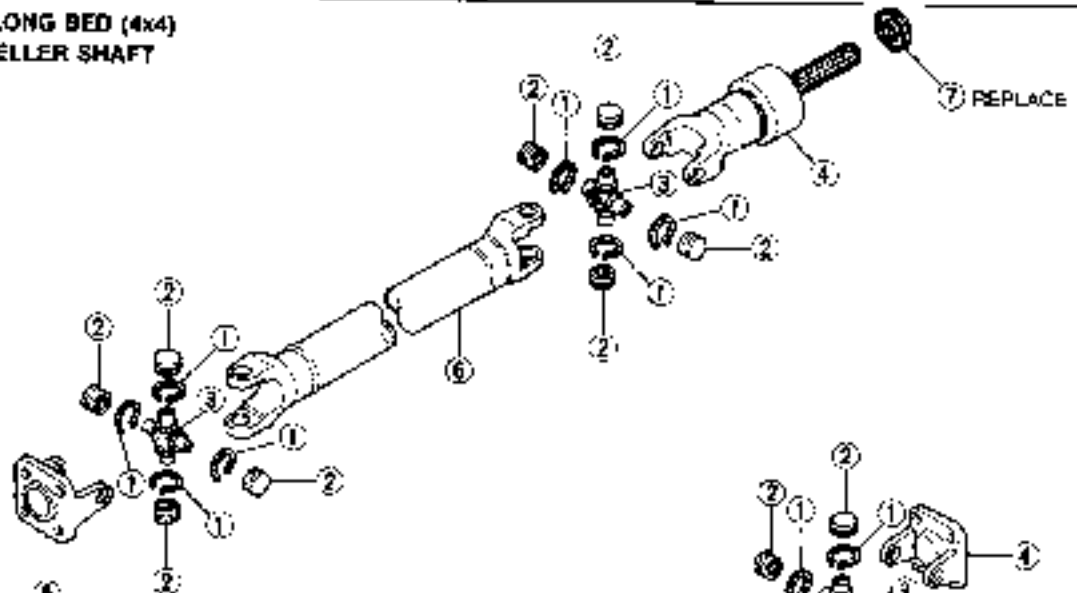
RU03\_K 004

- |   |  |   |
|---|--|---|
| 1. Snap ring<br>Removal .....   | 7. Lock washer<br>8. Center yoke<br>Removal .. .. . page L- 9<br>Installation .. . page L- 4 | 12. Snap ring<br>13. Bearing<br>Removal .....   |
| 2. Bearing cup<br>Inspect for damage or<br>rough rotation             | 9. Front propeller shaft<br>Inspection..... page L-11  | Removal .....   |
| 3. Spider<br>Removal .. .. . page L- 9<br>Installation .. . page L-14 | 10. Front dust seal<br>Removal .. . . . page L-11<br>Installation .. . page L-13             | Inspection..... page L-12<br>Installation .. . page L-12  |
| 4. Front yoke<br>Removal .. .. . page L- 9<br>Installation .....      | 11. Rear dust seal<br>Removal .....  | 14. Center bearing support<br>assembly<br>Removal..... page L- 1<br>Installation .. . page L-13 |
| 5. Rear yoke  | Installation .....   | 15. Rear propeller shaft<br>Inspection..... page L-11   |
| 6. Locknut  |  |   |

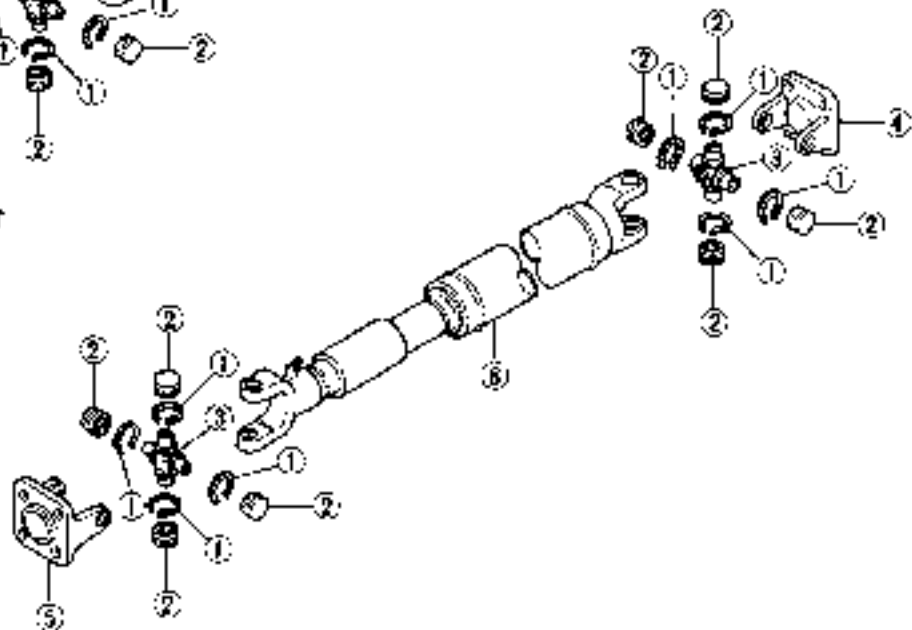
# PROPELLER SHAFT

L

## SHORT AND LONG BED (4x4) FRONT PROPELLER SHAFT

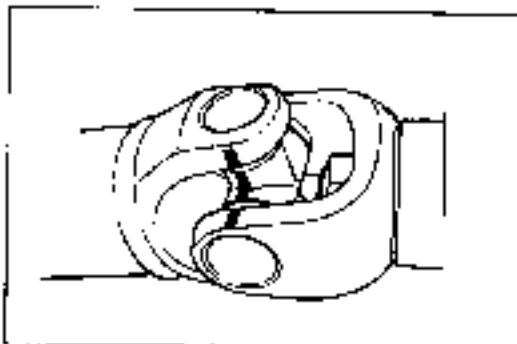


## SHORT BED (4x4) REAR PROPELLER SHAFT



- |  |                             |
|--|-----------------------------|
| 1. Snap ring                               | 5. Rear yoke                |
| 2. Bearing cup                             | Removal..... page L-9       |
| Inspect for damage or rough rotation       | Installation..... page L-14 |
| 3. Spider                                  | 6. Propeller shaft          |
| Removal..... page L-9                      | Inspection..... page L-11   |
| Installation..... page L-14                | 7. Oil seal                 |
| 4. Front yoke                              | Installation..... page L-14 |
| Removal..... page L-9                      |                             |
| Inspect splines for damage, wear or cracks |                             |
| Installation..... page L-14                |                             |

28L01-006



28J0LX-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.

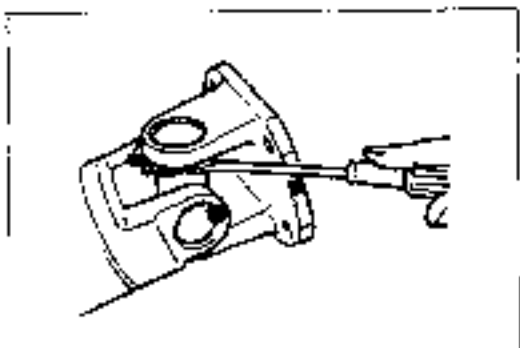
#### Note

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

L-9

## PROPELLER SHAFT

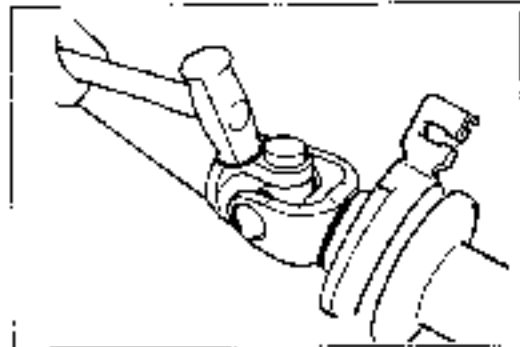


9BUCJK014

### Note

The snap rings cannot be reused.

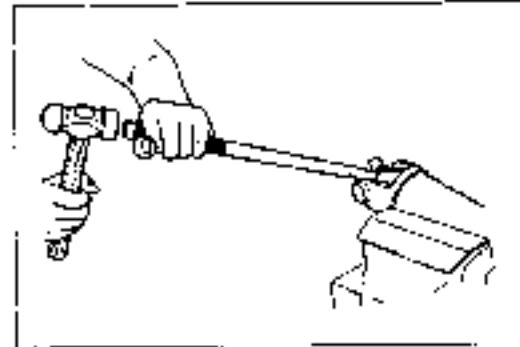
3. Remove all snap-rings with a fat-tip flat-tipped screwdriver.



7BLCBX016

4. Remove the bearings on the propeller shaft side by lightly tapping with a hammer.

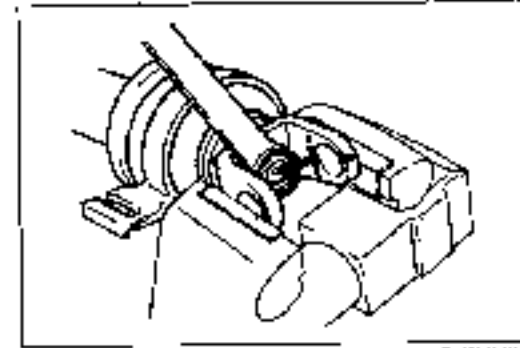
5. Remove the bearings and spider by lightly tapping the spider.



2BLGK007

6. Remove the bearings as shown.

7. Remove the spider.

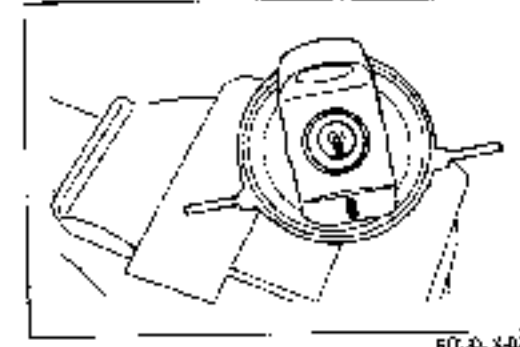


13JULY936

### Locknut

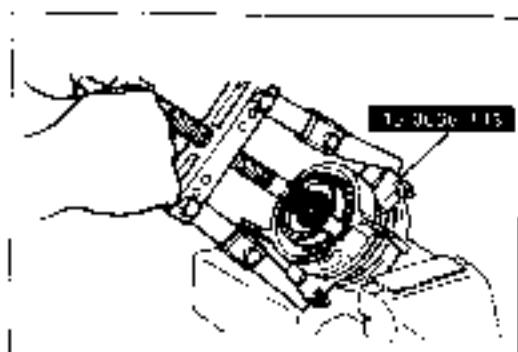
1. Align the marks on the yoke and shaft.

2. Remove the locknut.



607.D. X-026

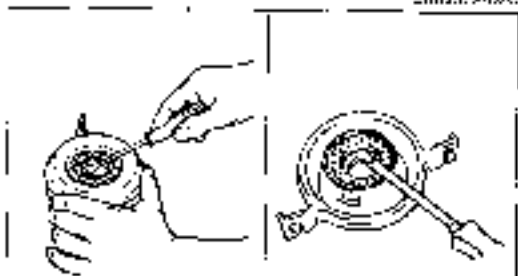
3. Align the marks on the yoke and propeller shaft.



90J26-113

### Center bearing support assembly

Remove the center bearing support assembly with the **SST**.



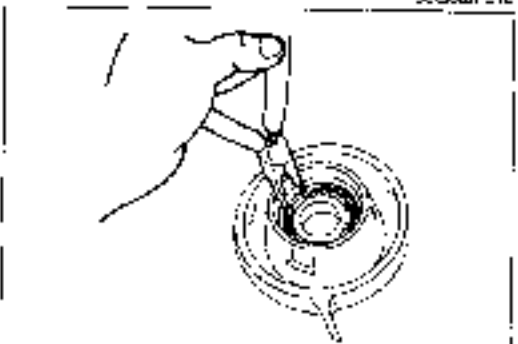
FRONT SIDE

REAR SIDE

### Dust seal

Remove the dust seals as shown.

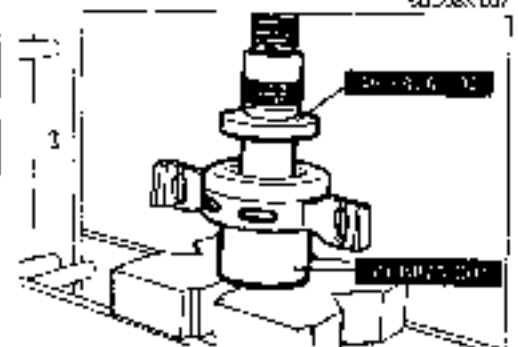
90G08-216



90J26X-007

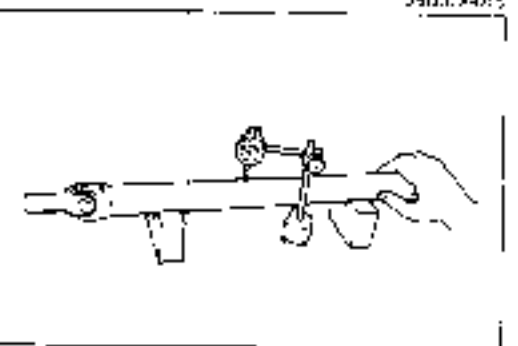
### Bearing

1. Remove the snap-ring with snap-ring pliers.



90J26-113

2. Press the bearing from the support assembly toward front side with the **SST**.



90J26-113

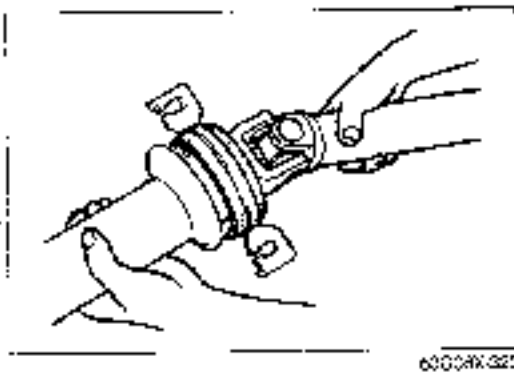
### Inspection

#### 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

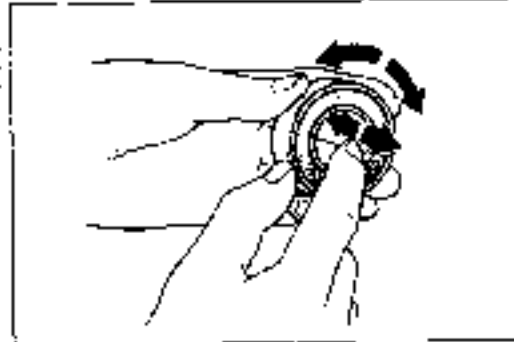


6300AX-023

2. Axial and perpendicular backlash of the universal joint

**Backlash limit: 0.05mm (0.0020 in)**

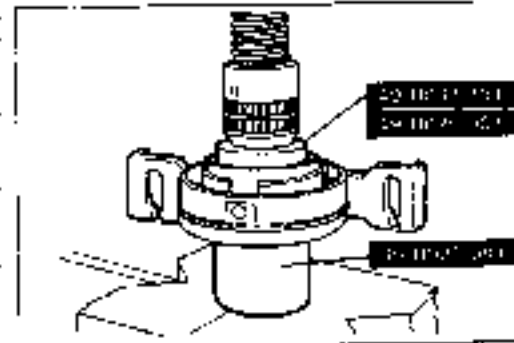
3. Condition of universal joint operation



8XU5-LX-025

### Bearing

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.



9203-K017

### Assembly note

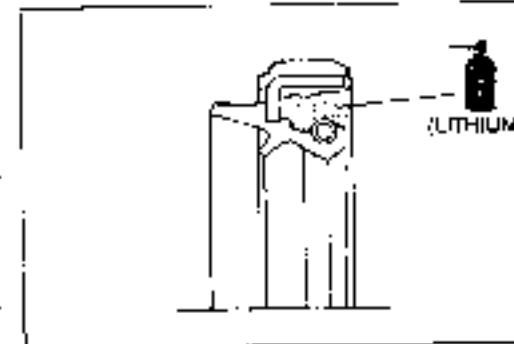
#### Bearing

1. Install the bearing into the bearing support assembly from the rear side with the SST

**B2200 : 49 H033 101**

**B2600i : 49 H025 001**

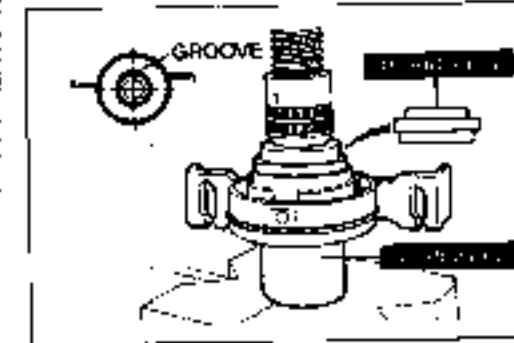
2. Install the snap-ring with the snap-ring pliers



9M110LX-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.

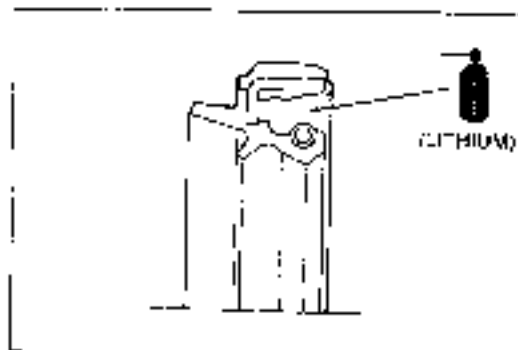


9M110LX-028

### Note

The air bleed groove of the rear dust seal must be installed as shown.

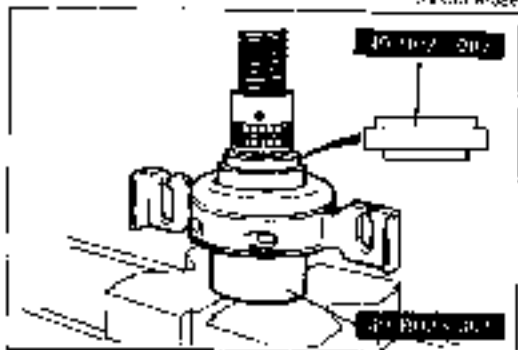
2. Install the rear dust seal into the support assembly from the rear side with the SST as shown in the figure.



(LITHIUM)

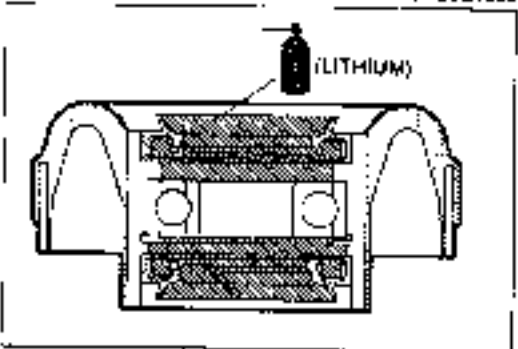
**Front dust seal**

1. Before installing a new front dust seal into the bearing support assembly, apply lithium based grease to the shaded area.



19VJ3\_K036

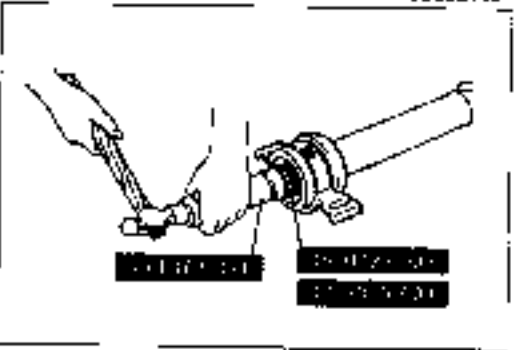
2. Install the front dust seal into the support assembly from the front side with the **SST** as shown in the figure.



(LITHIUM)

9VJ3\_K033

3. Apply lithium based grease to the area indicated by the oblique lines.



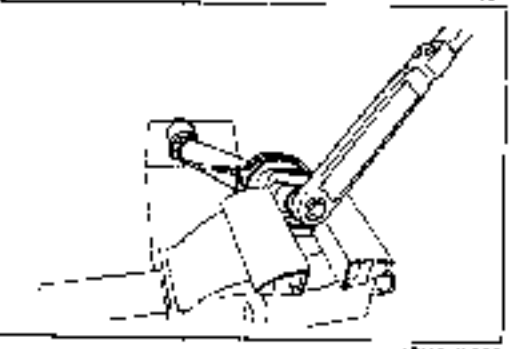
99UBLX 027

**Center bearing support assembly**

1. Install the center bearing support assembly with the **SST**.

**B2200 : 49 H025 003**

**B2600i: 49 H025 004**



1FLC1 X-007

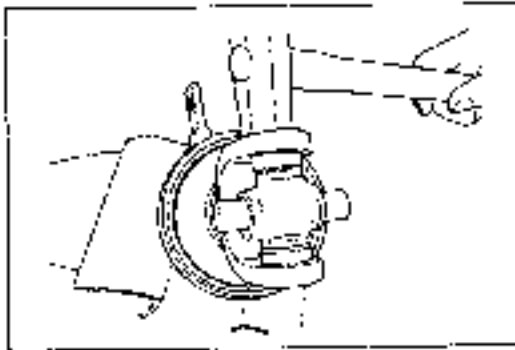
2. Align the matching marks on the yoke and shaft.  
3. Install the center yoke.

**Tightening torque:**

**157—177 N·m (16—18 m·kg, 116—130 ft·lb)**

1BVG X 008

## PROPELLER SHAFT



2800LX-011

### 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

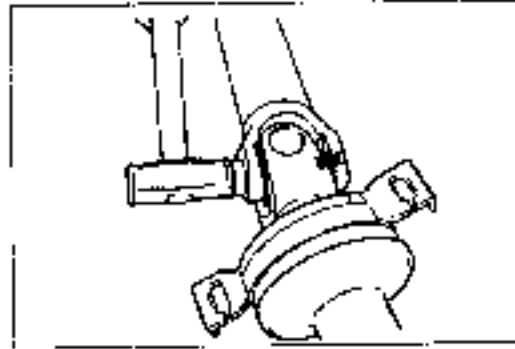
**Align the propeller shaft and spider matching marks.**

2. While in a vise, set 2 bearings in the propeller shaft, and tap them in by using a plastic hammer.

#### Note

**Align the spider and yoke matching marks.**

3. Place the yoke on the propeller shaft, and tap the bearing into the center yoke with a plastic hammer.



2400LX-021

### 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.

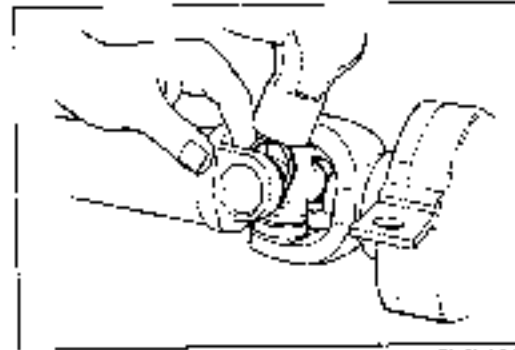
1. Install new snap rings.

#### Starting torque:

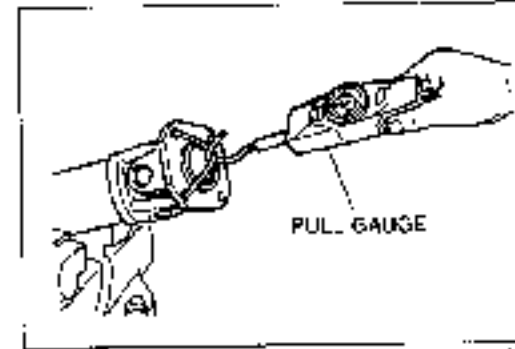
0.294—0.784 Nm (3—8 cm-kg, 2.6—8.8 in-lb)

#### Snap-ring thicknesses:

			mm (")
1.45 (0.0571)	1.48 (0.0583)	1.51 (0.0594)	1.54 (0.0605)
1.57 (0.0618)	1.60 (0.0630)	1.63 (0.0642)	



181CLX-011

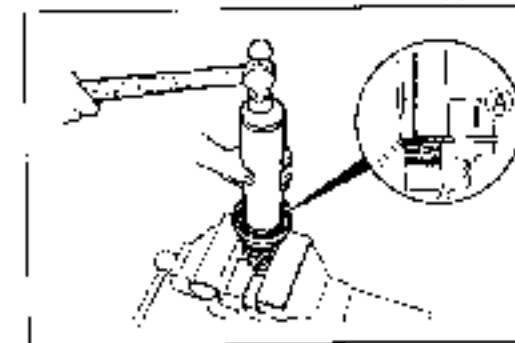


19108X-322

### Oil seal

Tap the new oil seal with a suitable pipe until depth (A) (between oil seal and front yoke) reaches as specified.

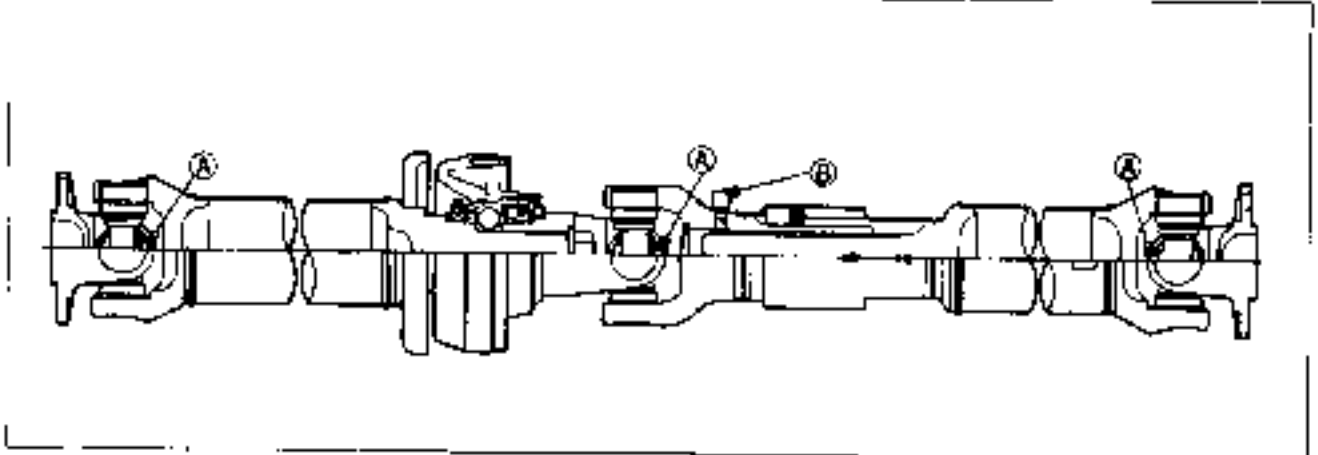
**Depth (A): 1.7—2.3mm (0.067—0.091 in)**



9800\_K46R

**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.



UBU01X.C29

**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)	



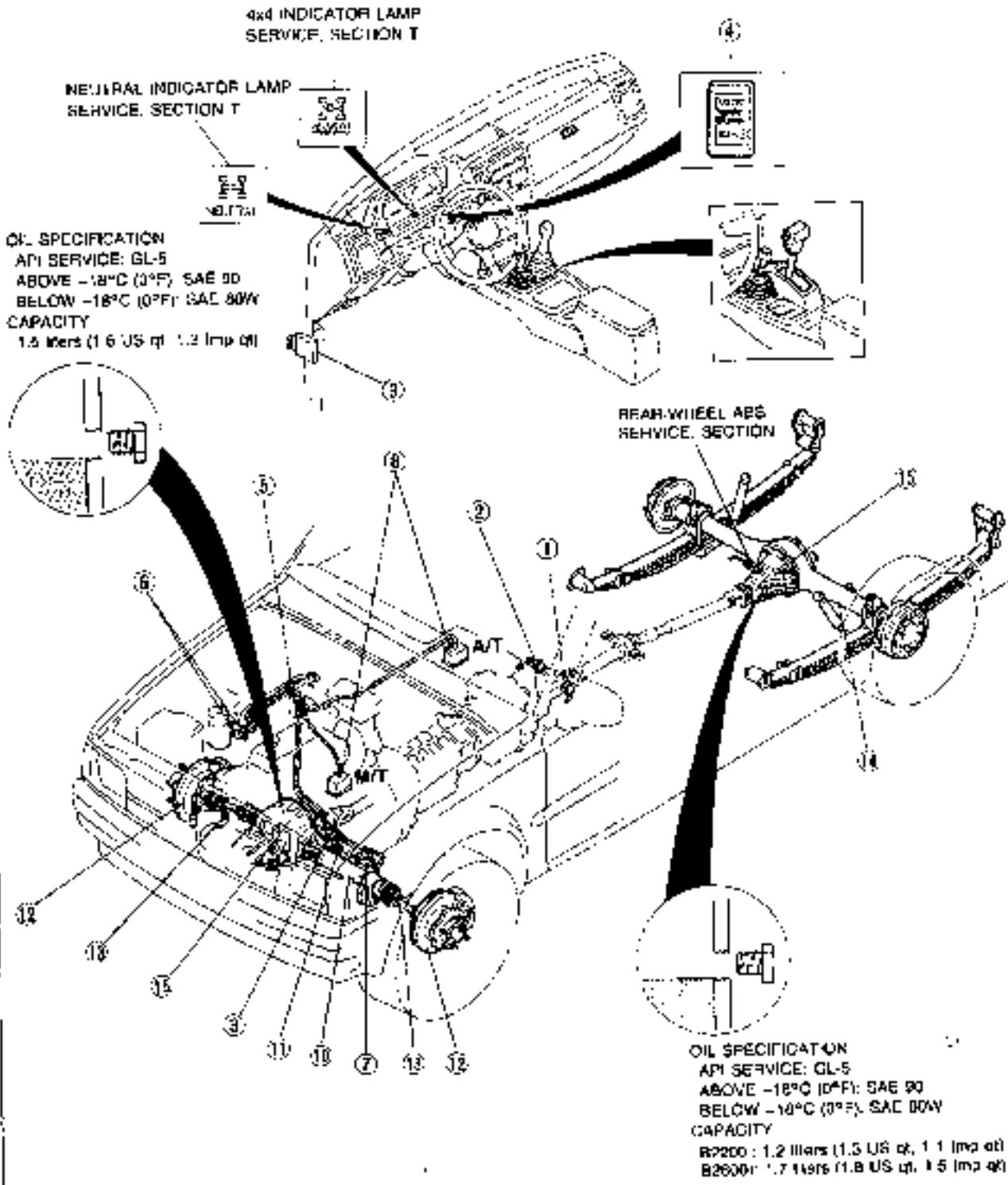


## FRONT AND REAR AXLES

<b>INDEX</b> .....	M- 2	<b>FRONT AXLE (4x2)</b> .....	M-30
<b>OUTLINE</b> .....	M- 4	PREPARATION.....	M-30
SPECIFICATIONS.....	M- 4	WHEEL BEARING PLAY .....	M-31
<b>TROUBLESHOOTING GUIDE</b> .....	M- 5	REMOVAL .....	M-32
REMOTE FREE WHEEL (RFW) UNIT	M- 5	DISASSEMBLY .....	M-33
FRONT AXLE.....	M- 5	INSPECTION .....	M-33
FRONT DIFFERENTIAL.....	M- 6	ASSEMBLY .....	M-34
REAR AXLE .....	M- 6	INSTALLATION.....	M-35
REAR DIFFERENTIAL .....	M- 6	<b>FRONT AXLE DRIVESHAFT (4x4)</b> .....	M-37
<b>REMOTE FREE WHEEL (RFW)</b>		PREPARATION.....	M-37
<b>MECHANISM</b> .....	M- 7	REMOVAL .....	M-37
TRANSFER CASE SWITCH		DISASSEMBLY .....	M-38
(4x4 INDICATOR SWITCH).....	M- 7	INSPECTION.....	M-40
TRANSFER CASE SWITCH		ASSEMBLY .....	M-40
(NEUTRAL SWITCH).....	M- 7	INSTALLATION.....	M-43
RFW SWITCH.....	M- 8	<b>REAR AXLE (4x4 AND 4x2)</b> .....	M-44
RFW MAIN SWITCH AND		PREPARATION.....	M-44
LOCK INDICATOR LAMP .....	M- 8	ON-VEHICLE MAINTENANCE .....	M-45
ONE-WAY CHECK VALVE.....	M- 8	REMOVAL .....	M-46
LOCK AND FREE SOLENOID		DISASSEMBLY .....	M-46
VALVES.....	M- 8	INSPECTION .....	M-47
ACTUATOR.....	M- 9	ASSEMBLY .....	M-47
VACUUM RESERVOIR .....	M-10	INSTALLATION.....	M-49
RFW CONTROL UNIT.....	M-10	<b>DIFFERENTIAL (FRONT AND REAR)</b> .....	M-50
RFW UNIT.....	M-12	PREPARATION.....	M-50
<b>FRONT AXLE (4x4)</b> .....	M-21	ON-VEHICLE MAINTENANCE .....	M-51
PREPARATION .....	M-21	REMOVAL AND INSTALLATION	
WHEEL BEARING PLAY .....	M-22	(FRONT) .....	M-53
REMOVAL .....	M-23	REMOVAL AND INSTALLATION	
INSPECTION .....	M-24	(REAR) .....	M-56
DISASSEMBLY .....	M-25	DISASSEMBLY (4x4 AND 4x2).....	M-57
ASSEMBLY .....	M-26	INSPECTION (4x4 AND 4x2).....	M-61
INSTALLATION.....	M-27	ASSEMBLY (4x4 AND 4x2).....	M-61

ZBU0MK 06.7

INDEX



03JUMW-006

- |   |            |  |            |
|---|------------|--|------------|
| 1. Transfer case switch (4x4 indicator switch)<br>Inspection..... | page M- 7  | 12. Front axle (4x4)<br>Removal.....                                       | page M-23  |
| 2. Transfer case switch (Neutral switch)<br>Inspection.....       | page M- 7  | Inspection.....  | page M- 24 |
| 3. HFW switch<br>Inspection.....                                  | page M- 7  | Disassembly.....   | page M-25  |
| 4. HFW main switch and lock indicator lamp<br>Inspection.....     | page M- 8  | Assembly.....  | page M- 28 |
| 5. One-way check valve<br>Inspection.....                         | page M- 8  | Installation.....  | page M-27  |
| 6. Lock and free solenoid valves<br>Inspection.....               | page M- 8  | Front axle (1x2)<br>Removal.....   | page M-32  |
| 7. Actuator<br>Inspection.....                                    | page M- 9  | Disassembly.....   | page M- 33 |
| 8. Vacuum reservoir<br>Inspection.....                            | page M-10  | Inspection.....  | page M-33  |
| 9. RFW control unit<br>Inspection.....                            | page M-10  | Assembly.....  | page M-34  |
| 10. Joint shaft assembly<br>Removal and installation.....         | page M-13  | Installation.....  | page M-35  |
| Disassembly and inspection.....                                   | page M-14  | 13. Front axle drive shaft (4x4)<br>Removal.....                           | page M- 37 |
| Assembly.....   | page M- 16 | Disassembly.....   | page M-38  |
| 11. Control box assembly<br>Removal and installation.....         | page M- 18 | Inspection.....  | page M-40  |
| Disassembly and assembly.....                                     | page M-19  | Assembly.....  | page M- 40 |
| Inspection.....   | page M- 20 | Installation.....  | page M-43  |
|   |            | 14. Rear axle (1x4 and 4x2)<br>Removal.....                                | page M-46  |
|   |            | Disassembly.....   | page M- 46 |
|   |            | Inspection.....  | page M-47  |
|   |            | Assembly.....  | page M- 47 |
|   |            | Installation.....  | page M-49  |
|   |            | 15. Differential (Front and rear)<br>Removal and Installation (Front)..... | page M-53  |
|   |            | Removal and Installation (Rear).....                                       | page M-56  |
|   |            | Disassembly (4x4 and 4x2).....   | page M- 57 |
|   |            | Inspection (4x4 and 4x2).....  | page M-61  |
|   |            | Assembly (4x4 and 4x2).....  | page M- 61 |

SBL001X-01

## OUTLINE

SPECIFICATIONS  
(4x4)

Item	Model	B2600i	
		M/T	A/T
<b>Front axle</b>			
Bearing play axial direction	mm (in)	C (D)	
Bearing preload (without oil seal load)	Full scale reading N (kg, lb)	6-12 (0.6-1.2, 1.3-2.5)	
<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		Bump 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)	

UPR001X004

## (4x2)

Item	Model	B2200		B2600i	
		M/T	A/T	M/T	A/T
<b>Front axle</b>					
Bearing play axial direction	mm (in)	C (D)			
Bearing preload (without oil seal load)	Full scale reading N (kg, lb)	6-11 (0.6-1.1, 1.3-2.4)			
<b>Rear axle</b>					
Axle casing		Bump 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		3.900	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)		

25U0MX006

## 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- 9, 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 V-51
Oil leakage		Excessive front differential oil Loosely tightened RFW unit Worn or damaged oil seal	Drain oil Tighten or repair Replace	V-51 M-13 M- 14

78JOM4-000

## FRONT AXLE

Problem		Possible Cause	Remedy	Page
Steering wheel vibration		Improperly adjusted wheel bearing play	Adjust	V-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 Bent output shaft Worn or damaged wheel bearing Worn output shaft spline Insufficient grease in joint or spline of drive shaft Excessive backlash on spline of drive shaft worn joint of drive shaft	Replace Replace Replace Replace Repack or replace Replace	— M-13 M-23 M- 25 M-37 M-37
Grease leakage from boot		Loosened or broken boot Faulty boot grommet Excessive grease	Replace Replace Replace	M-38 M-38 M-37
Oil leakage		Cracked axle casing	Replace	—

78JOM4-000

## FRONT DIFFERENTIAL

Problem	Possible Cause	Remedy	Page
Abnormal noise	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	
Heat buildup	Insufficient front differential oil	Add oil	M-51
	Insufficient backlash of gears	Adjust	V-65
	Excessive bearing preload	Adjust	V-64
Oil leakage	Excessive front differential oil	Drain oil	V-51
	Clogged air breather	Repair	-
	Poorly tightened differential carrier	Tighten or repair	M-57
	Worn or damaged oil seal	Replace	M-51

28LDMX004

## REAR AXLE

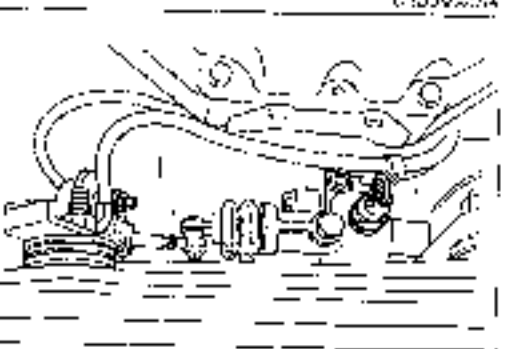
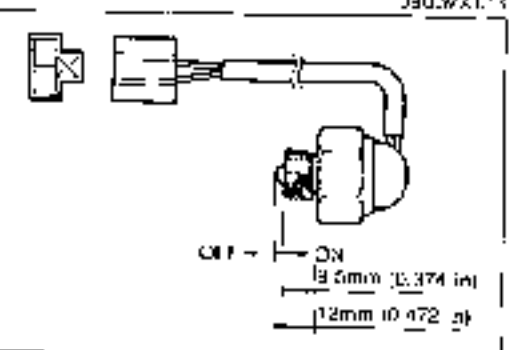
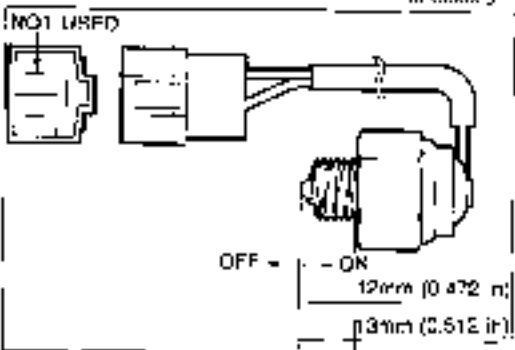
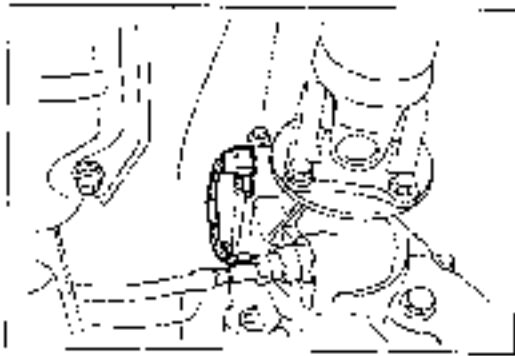
Problem	Possible Cause	Remedy	Page
Abnormal noise	Bent axle casing	Replace	-
	Bent axle shaft	Replace	V-46
	Worn or damaged wheel bearing	Replace	V-46
	Loose bearing locknut	Tighten	M-48
	Worn axle shaft splines	Replace	M-46
Oil leakage	Worn or damaged oil seal	Replace	M-46
	Cracked axle casing	Replace	-

28LDMX004

## REAR DIFFERENTIAL

Problem	Possible Cause	Remedy	Page
Abnormal noise	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	-	
Heat buildup	Insufficient rear differential oil	Add oil	M-51
	Insufficient backlash of gears	Adjust	M-65
	Excessive bearing preload	Adjust	V-64
Oil leakage	Excessive rear differential oil	Drain oil	V-51
	Clogged air breather	Repair	-
	Poorly tightened differential carrier	Tighten or repair	V-57
	Worn or damaged oil seal	Replace	V-51

28LDMX004



## 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.

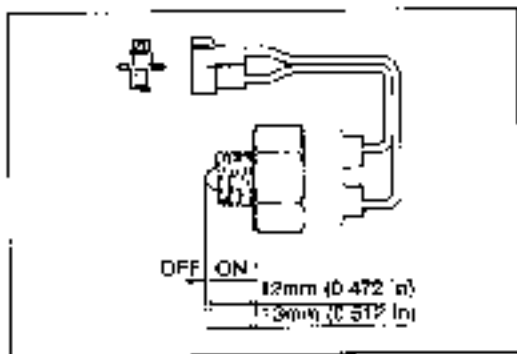
### RFW SWITCH

#### 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.



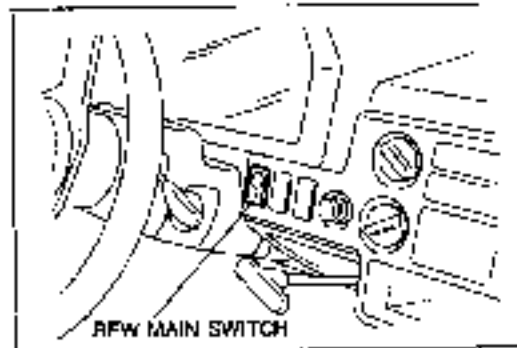
**REMOTE FREE WHEEL (RFW) MECHANISM**



4 Check continuity of the switch with an ohmmeter.

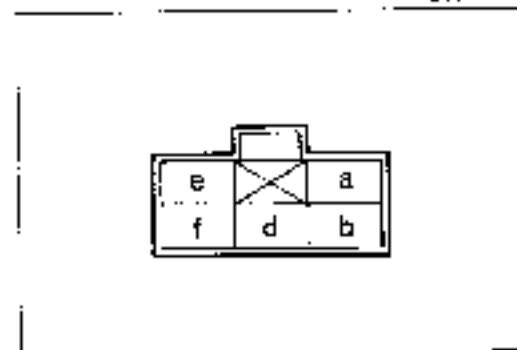
Continuity	Switch
Yes	Depressed
No	Released

5. If not correct, replace the switch.

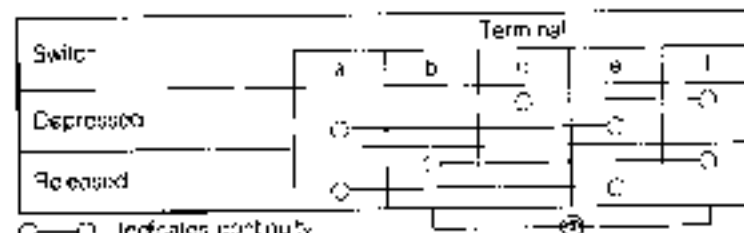


**RFW MAIN SWITCH AND LOCK INDICATOR LAMP Inspection**

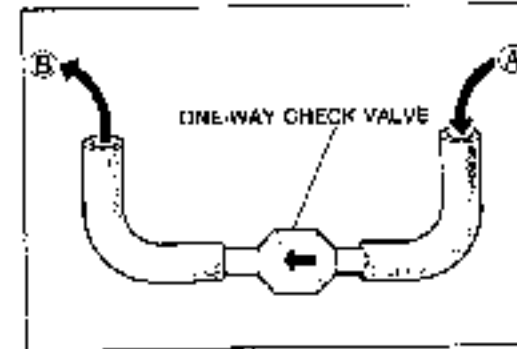
1. Remove the RFW main switch and LOCK indicator lamp. (Refer to Section S.)



2 Check for continuity between the terminals as shown with an ohmmeter.

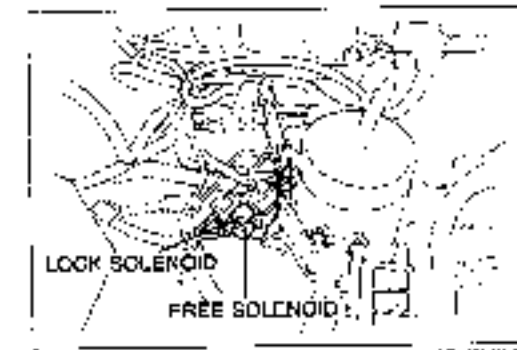


3 If not correct, replace the RFW main switch and LOCK indicator lamp.



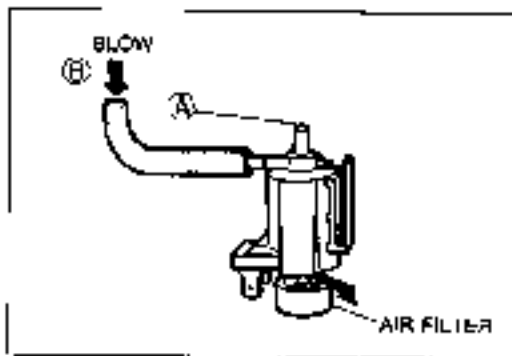
**ONE-WAY CHECK VALVE Inspection**

- 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

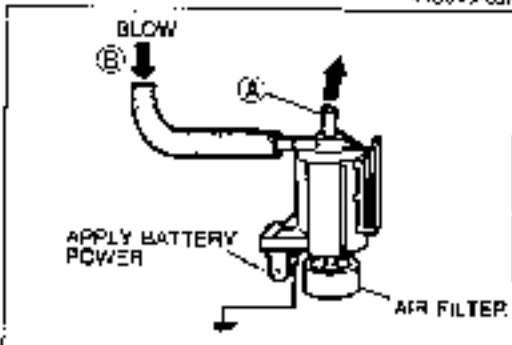


**LOCK AND FREE SOLENOID VALVES Inspection**

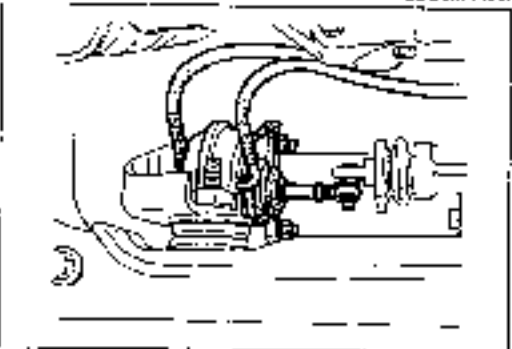
1 Disconnect the vacuum hoses and the connector from each solenoid valve.



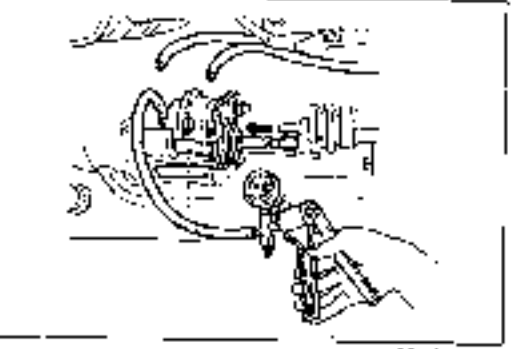
99U00X-032



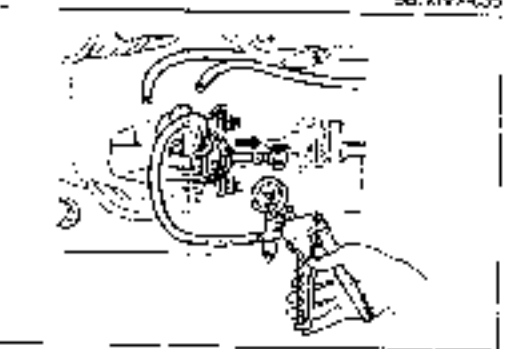
99U00X-033



99U00X-034



99U00X-035



99U00X-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

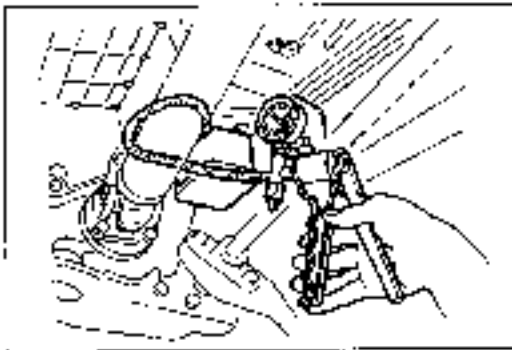
1. Jack up the vehicle and support it with safety stands.
2. Disconnect the vacuum hoses from the actuator

3. Connect a vacuum pump tester to the actuator (free side) as shown.
4. Apply 200 mmHg (7.57 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 250 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:

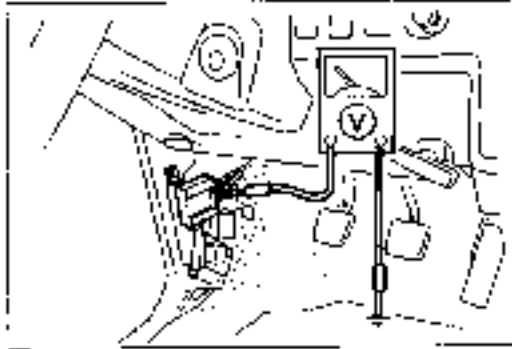
16—23 Nm (1.6—2.3 m·kg, 12—17 ft·lb)



SRIK073-037

**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 in-g) vacuum, and verify that the vacuum is held.
- 4 If not correct, replace the vacuum reservoir.

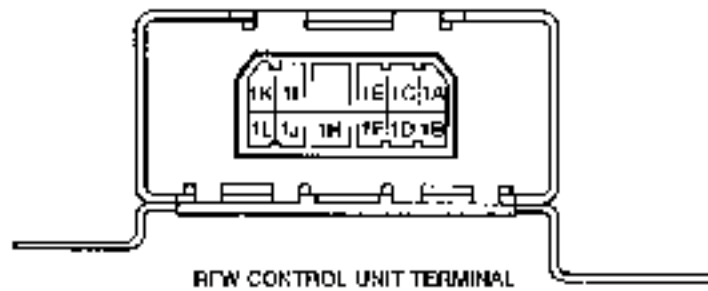


SUDM4-006

**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.

## Terminal Voltage Chart



V<sub>b</sub>: Battery voltage



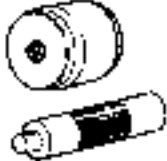

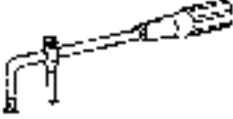




Terminal	Connected to	Voltage	Condition
1A (Output)	Lock solenoid	V <sub>b</sub>	Solenoid OFF • RFW unit "Free"
		Below 0.5V	Solenoid ON • RFW unit "Lock"
1B (Ground)	Body	Below 0.5V	
1C (Output)	Free solenoid	V <sub>b</sub>	Solenoid OFF • RFW unit "Lock"
		Below 0.5V	Solenoid ON • RFW unit "Free"
1D			
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 4L 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 1H, 4L, or N
		Below 0.5V	4x4 indicator switch ON • Transfer case lever 2H
1L (Input)	Neutral switch and neutral indicator lamp (NLT)	V <sub>b</sub>	Neutral switch OFF • Transfer case lever 2H, 4H, or 4L
		Below 0.5V	Neutral switch ON • Transfer case lever N

28JOMX-006

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

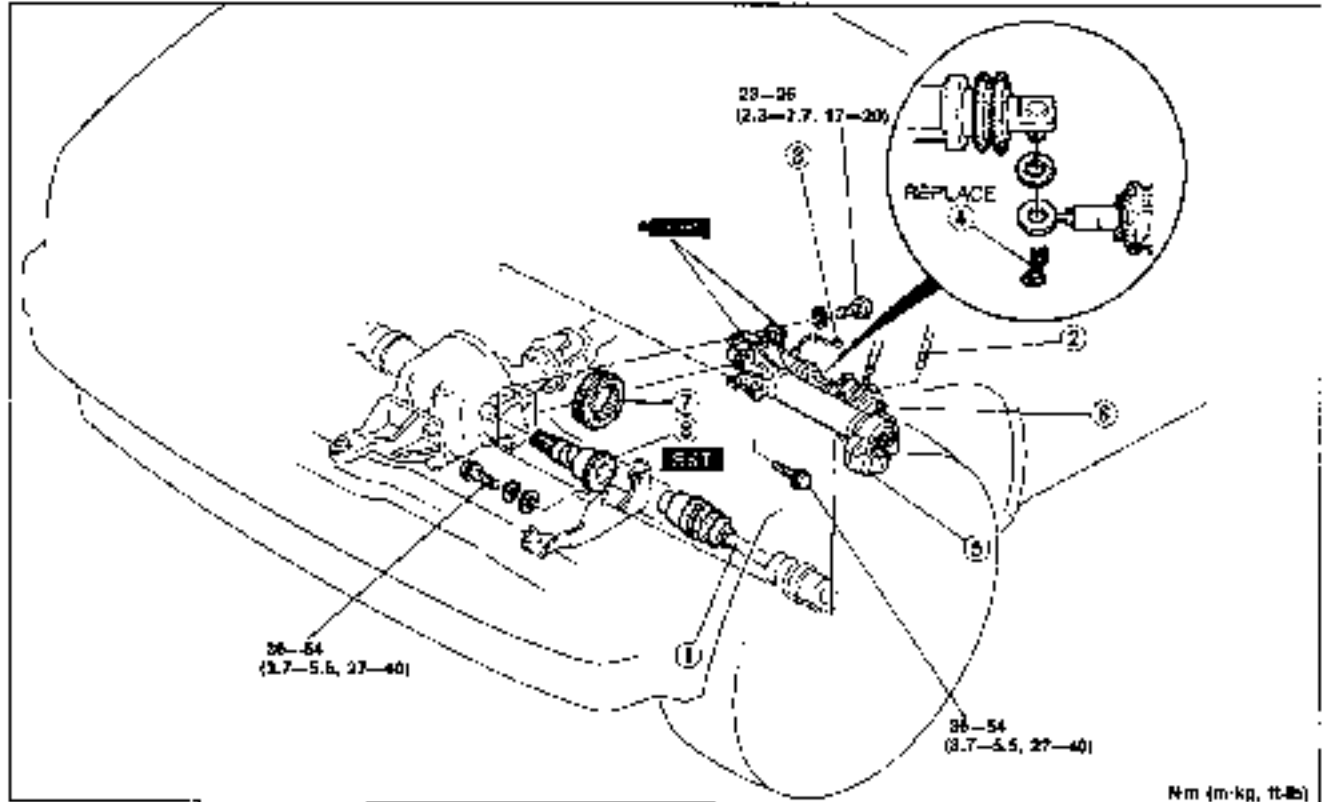
### RFW UNIT Preparation SST

49 0813 215A Puller, nut, for dowel 	49 0710 520 Puller, bearing 	49 W027 0A0 Installer set, of seal 
49 W027 001 Body (Part of 49 W027 0A0) 	49 U027 004 Remover, of seal 	49 M005 795 Body 
49 U027 005 Installer bearing 	49 U027 006 Installer, bearing 	49 U027 007 Installer, of seal 

1B10M0017

**Joint Shaft Assembly  
Removal and installation**

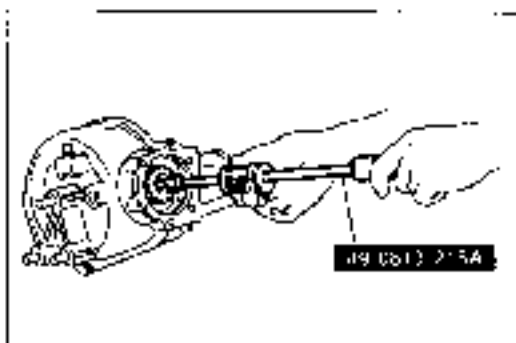
1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the front differential oil
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Add the specified oil to the specified level. (Refer to page M-51.)
7. Connect the negative battery cable.



Nm (m·kg, ft·lb)

29U0002-007

- |                            |   |
|----------------------------|---|
| 1. Front axle drive shaft  | 5. Joint shaft assembly                 |
| Removal..... page M-37     | Disassembly and inspection... page M-14 |
| Disassembly..... page M-38 | Inspection... page M-16                 |
| Inspection..... page M-40  | Assembly..... page M-16                 |
| Assembly..... page M-40    | 6. Control box assembly                 |
| Installation... page M-43  | Removal and installation... page M-18   |
| 2. Vacuum hose             | Disassembly and assembly..... page M-19 |
| 3. RFW switch connector    | 7. Gear sleeve                          |
| 4. Snap pin                | Inspection..... page M-20               |
|                            | 8. Output shaft                         |
|                            | Removal Note..... below                 |



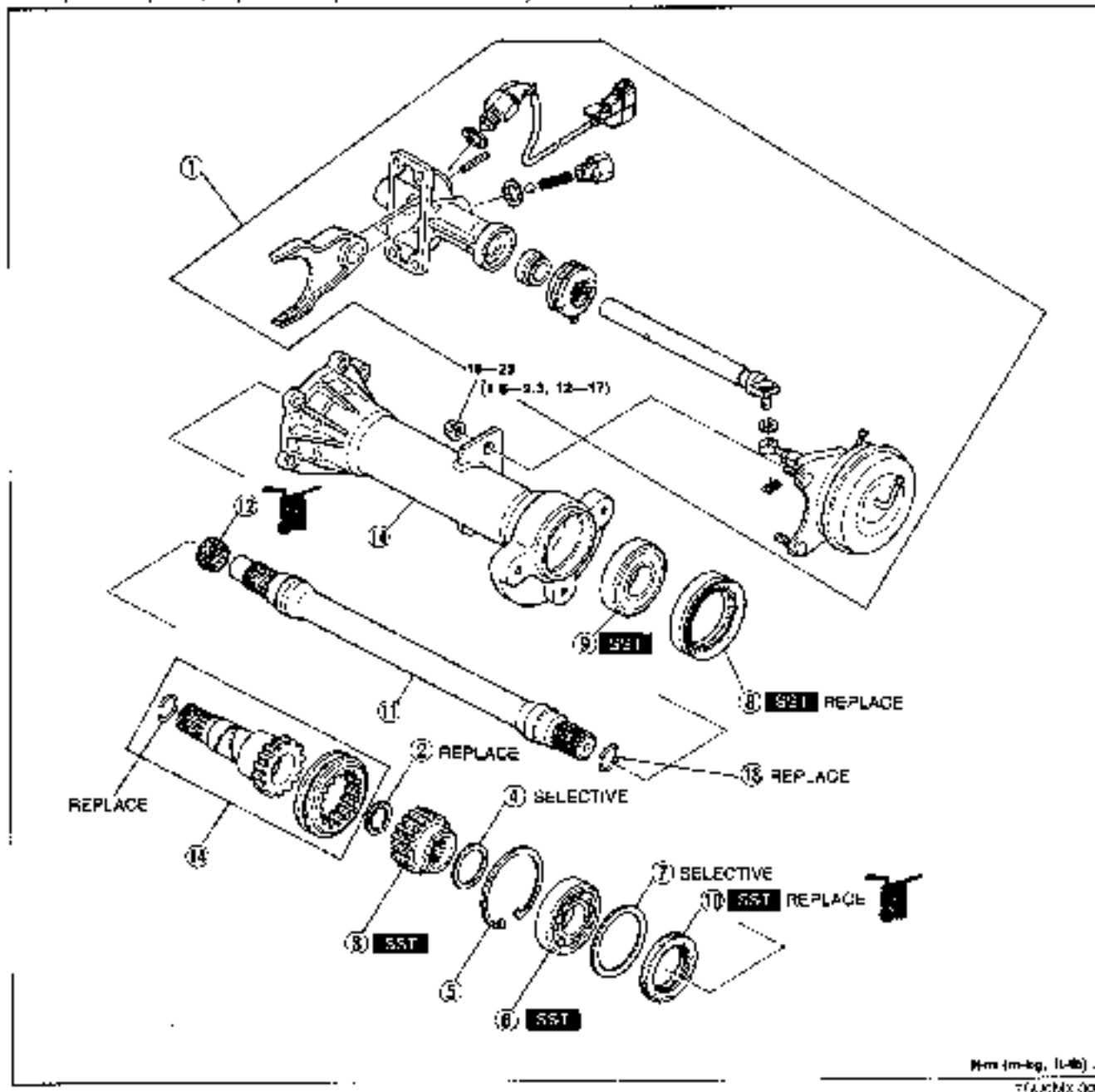
**Removal note**

Remove the output shaft with the SST

32U0002-049

**Disassembly and Inspection**

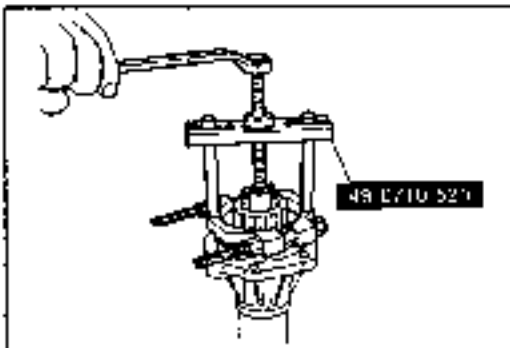
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**
2. Inspect all parts, repair or replace as necessary



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

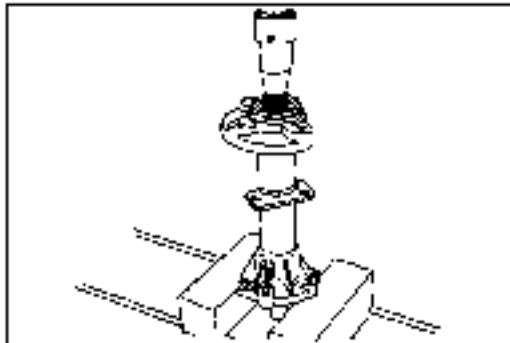


9FLCMX-044

**Disassembly note**

**Remote free wheel hub**

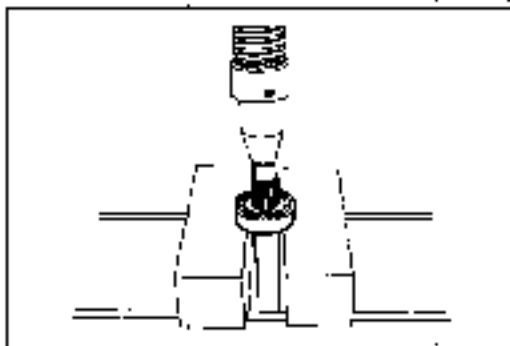
Remove the remote free wheel hub with the SST



9R1MX-045

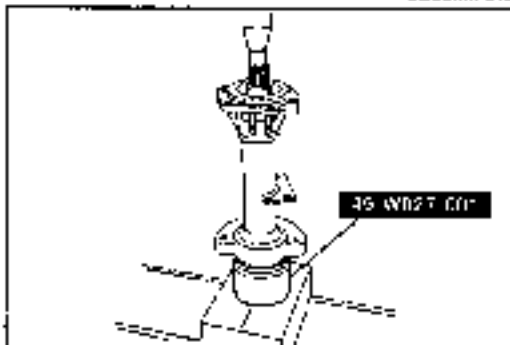
**Ball bearing**

1. Remove the ball bearing and the joint shaft with a press.



9B1CMX-046

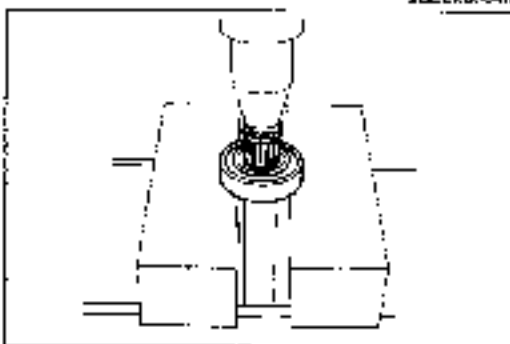
2. Remove the ball bearing with a press.



9ELCMX-048

**Bearing**

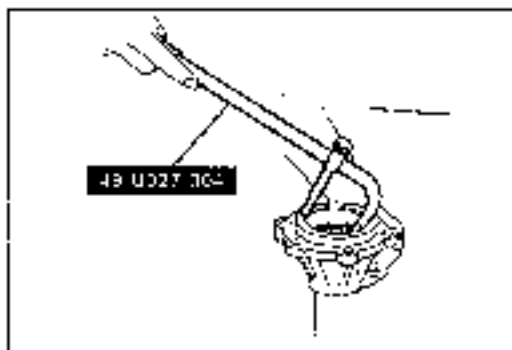
1. Remove the dust seal and bearing with the SST.



9BU7MX-049

2. Remove the bearing with a press.

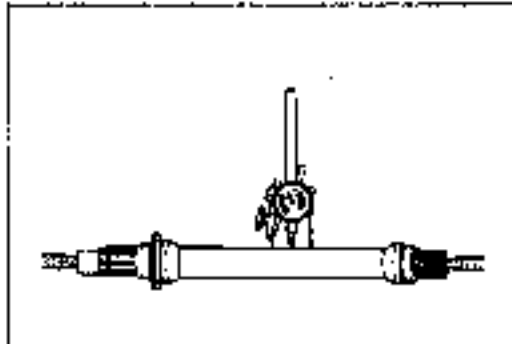




99U074X-C47

**Oil seal**

Remove the oil seal with the **SST**.

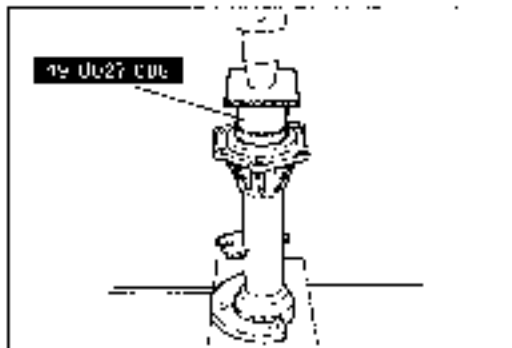


99U074X-C50

**Inspection**

Measure the joint shaft runout.

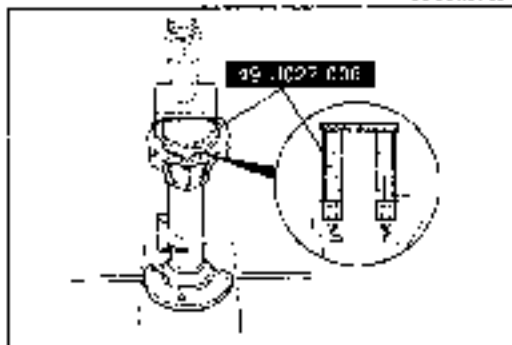
**Maximum runout: 0.03mm (0.0012 in)**



99U074X-C51

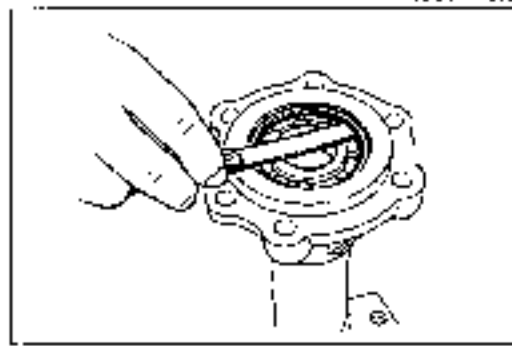
**Assembly**

1. Apply front differential oil to a new oil seal.
2. Install a new oil seal with the **SST**.



99U074X-C52

3. Install the removal shim(s), the ball bearing with the **SST**.
4. Install the retaining ring.



99U074X-C49

**Note**

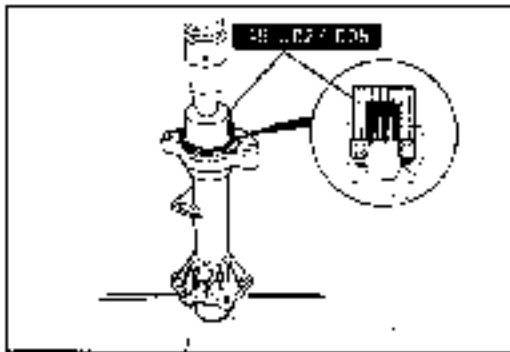
The number of shims must not exceed two.

5. Measure the clearance between the ball bearing and the retaining ring.  
If clearance is not as specified, adjust by adding or removing shims.

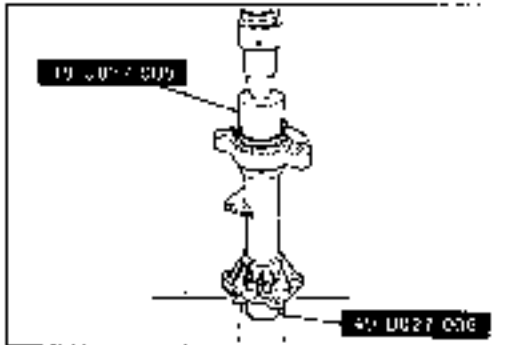
**Maximum clearance: 0.15mm (0.0059 in)**

**Available shim thickness:**

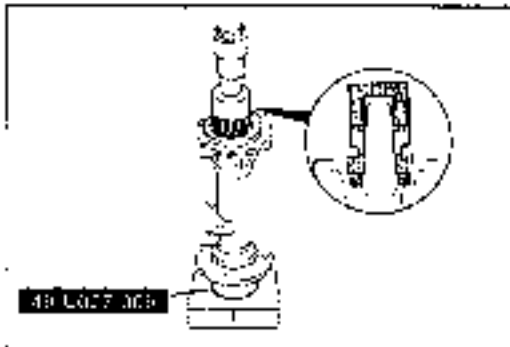
- 0.15mm (0.0059 in), 0.30mm (0.0118 in),
- 0.35mm (0.0138 in), 0.40mm (0.0157 in),
- 0.50mm (0.0197 in)



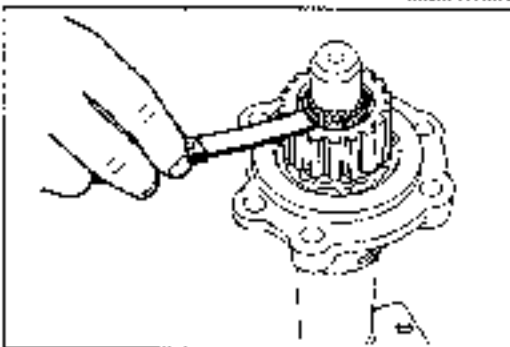
98LGMX-13C



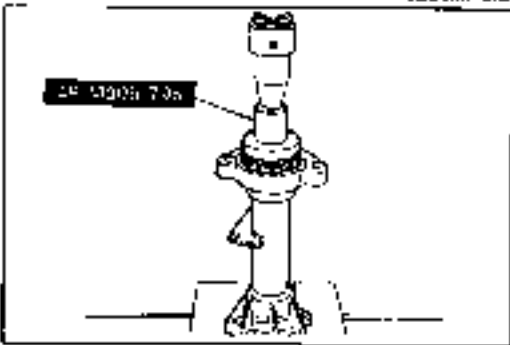
98LGMX-30B



98LGMX-054



98LGMX-015



98LGMX-065

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)

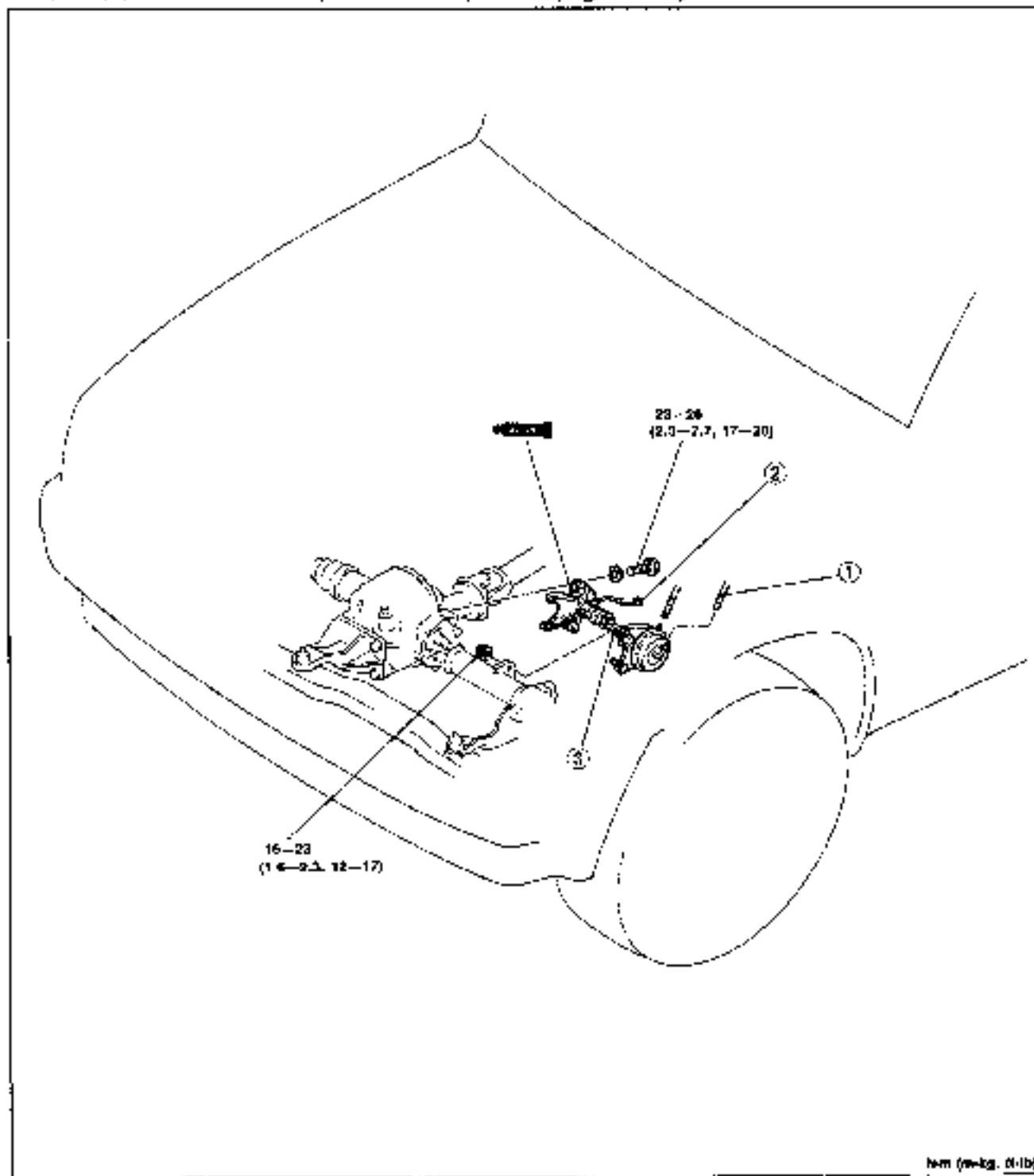
13. Install the new dust seal with the **SST**.

14. Apply front differential oil to needle bearing and install it.

15. Install a new clip to the joint shaft.

### Control Box Assembly Removal and Installation

1. Disconnect the negative battery cable.
2. Jack up the vehicle end 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.)



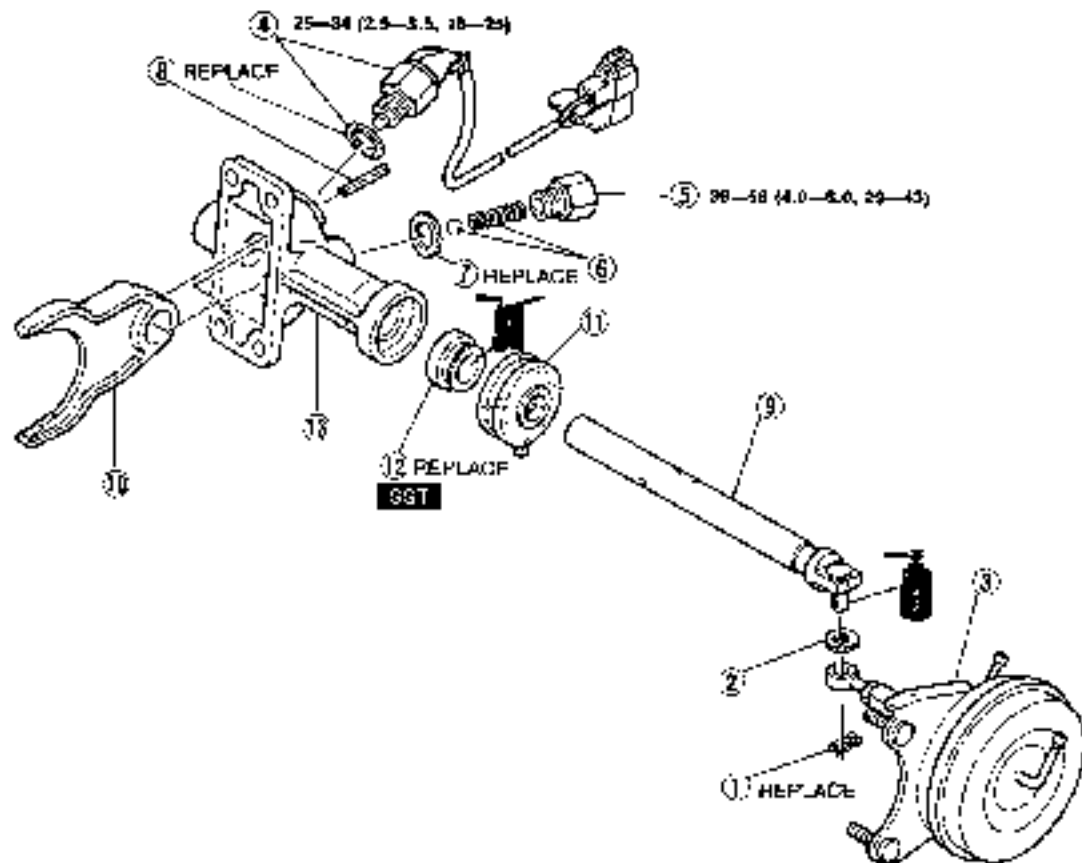
Item (no.-kg. 0-1lb)  
28JOMR 310

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**.

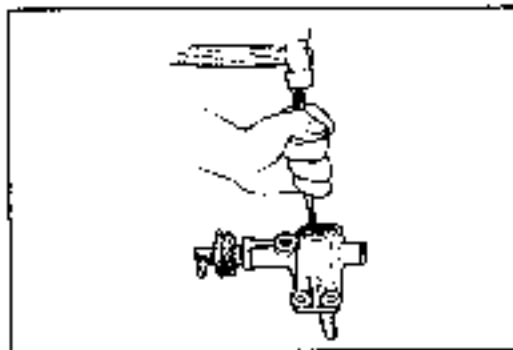


M-19 (M-19g, H-19)  
2BU0Mx-01

- |                                  |                               |
|----------------------------------|-------------------------------|
| 1. Snap pin                      | 9. Change rod                 |
| 2. Washer                        | 10. Shift fork                |
| 3. Actuator                      | 11. Boot                      |
| Inspection ..... page M- 9       | Inspect for damage            |
| 4. RFW switch and washer         | Assembly Note ..... page M-20 |
| Inspection ..... page M- 8       | 12. Oil seal                  |
| 5. Spring cap                    | Assembly Note ... page M-20   |
| 6. Spring and ball               | 13. Control box               |
| 7. Washer                        | Inspect for damage            |
| 8. Roll pin                      |                               |
| Disassembly Note ..... page M-20 |                               |
| Assembly Note ..... page M-20    |                               |

# M

## REMOTE FREE WHEEL (RFW) MECHANISM

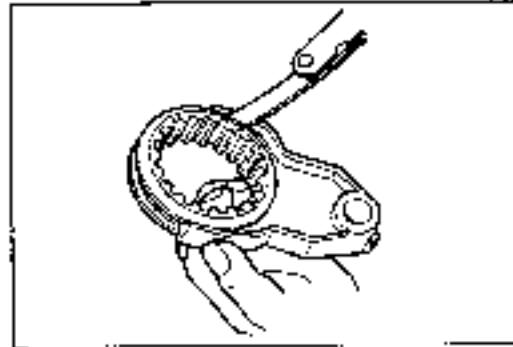


93UDVX-059

### Disassembly note

#### Roll pin

Remove the roll pin as shown in the figure.



93UDVX-012

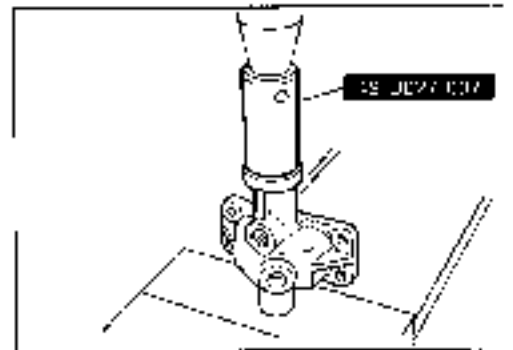
### Inspection

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)

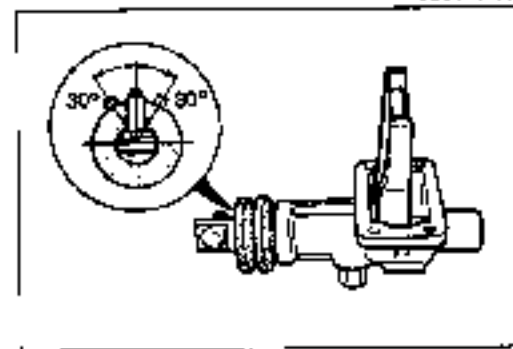


93UDVX-081

### Assembly note

#### Oil seal

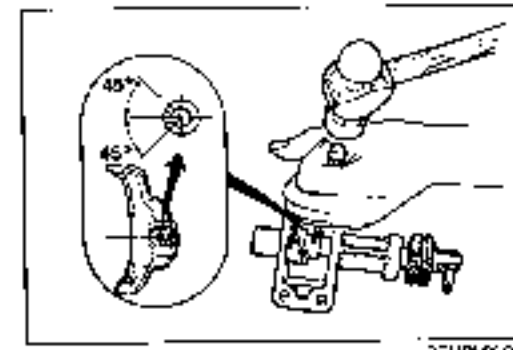
Install a new oil seal with the SST.



93UDVX-080

### Boot

Install the boot as shown in the figure.



93UDVX-062






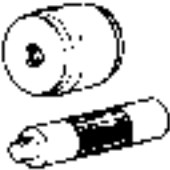




### Roll pin

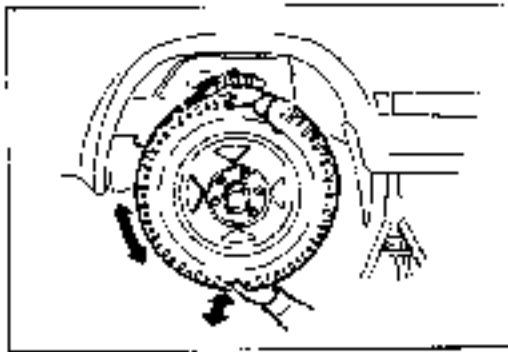
Install a new roll pin as shown in the figure.

**FRONT AXLE (4x4)**

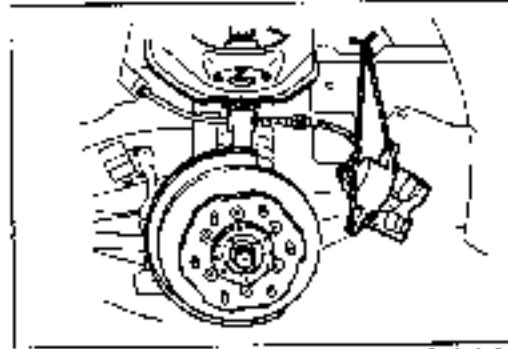
**PREPARATION**

**SST**

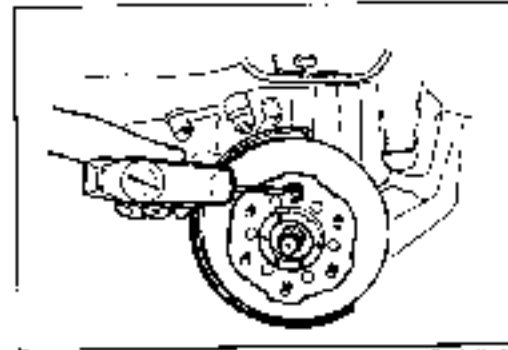
<p>49 B231 635 Wrench front hub locknut</p> 	<p>49 U118 850C Puller, ball joint</p> 	<p>49 D727 575 Puller, ball joint</p> 
<p>49 S231 660 Pulver, needle bearing</p> 	<p>49 U033 101 Installer, bearing</p> 	<p>49 W027 0A0 Installer set oil seal</p> 
<p>49 W027 001 Body (part of 49 W027 0A0)</p> 	<p>49 F027 0A1 Installer set, bearing</p> 	<p>49 F027 007 Attachment 72 (Part of 49 F027 0A1)</p> 
<p>49 F027 005 Attachment 62 (Part of 49 F027 0A1)</p> 	<p>90J0947-004</p>	



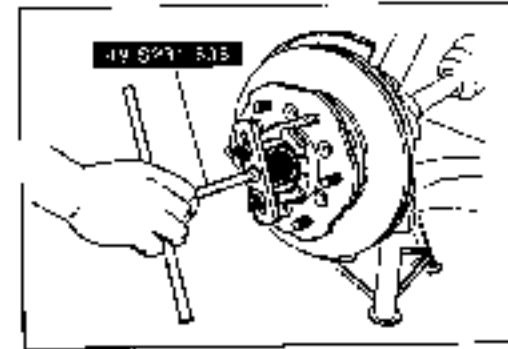
89, LMK-066



28U39X-C-3



28R10M3-014



89, LMK-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**

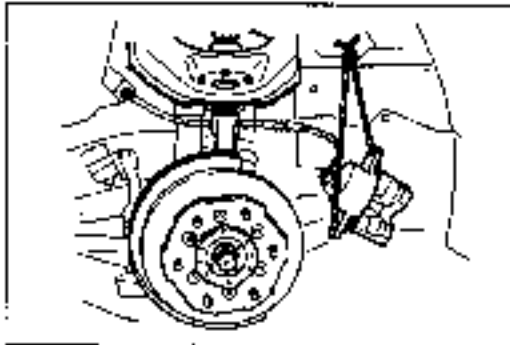
1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.
3. Remove the disc brake caliper assembly, and use a rope to suspend it.
4. Remove the drive flange.
5. Remove the snap ring and spacer.
6. Remove the set bolts and bearing set plate.
7. Tighten the 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)**

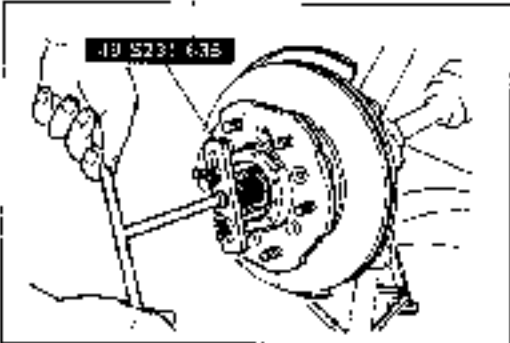
10. Tighten the locknut until the preload reaches the specified preload with the SST.



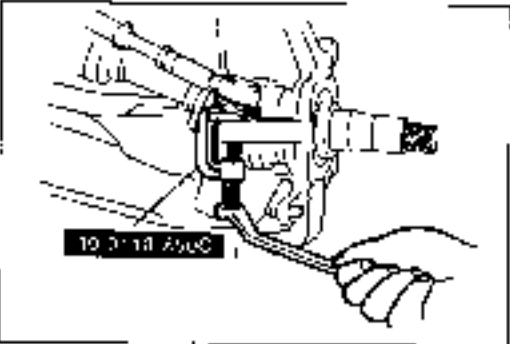
9B J0M7-067



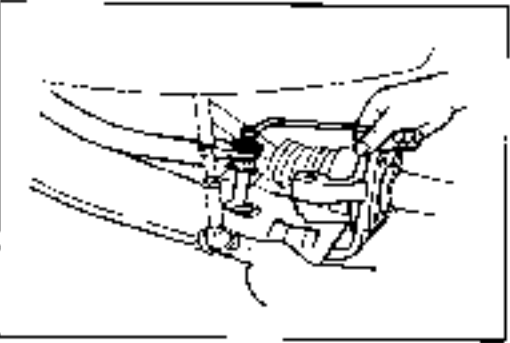
A7C02M-023



9EUD0X-068



20J0VX-059



7EUD0X-013

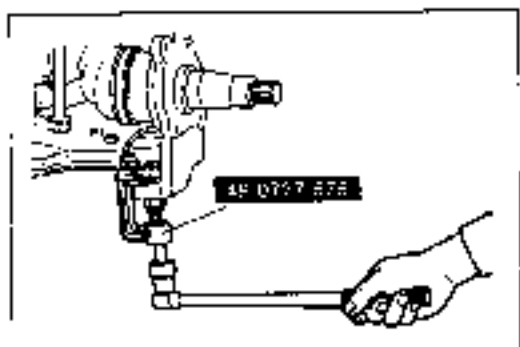
**REMOVAL**

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.

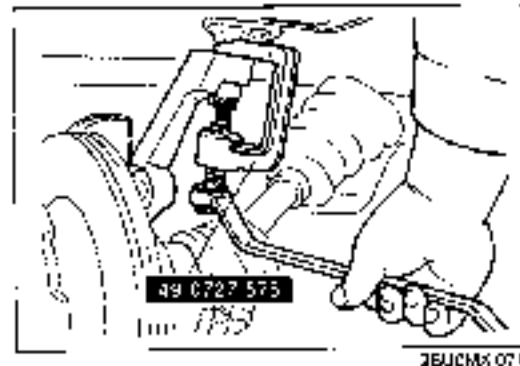


# M

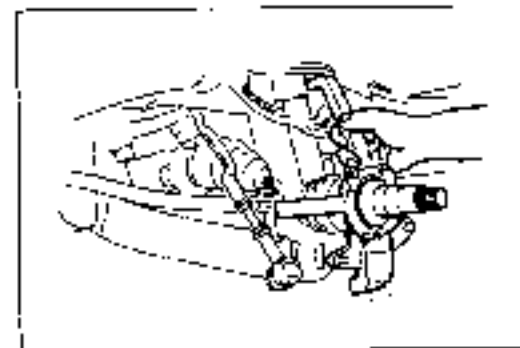
## FRONT AXLE (4x4)



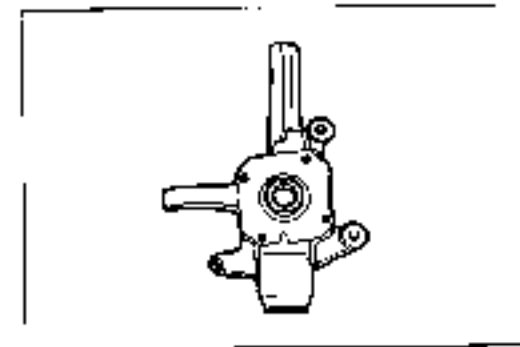
12. Support the lower arm with a jack.
13. After removing the lower arm ball joint nut, separate the knuckle from the lower arm with the **SST**.



14. After removing the upper arm ball joint nut, separate the knuckle from the upper arm with the **SST**.



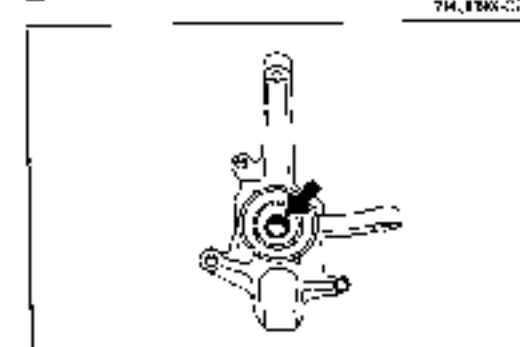
15. Lower the lower arm, and remove the knuckle.



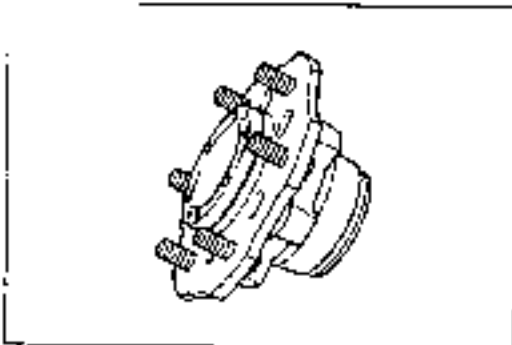
### INSPECTION

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.

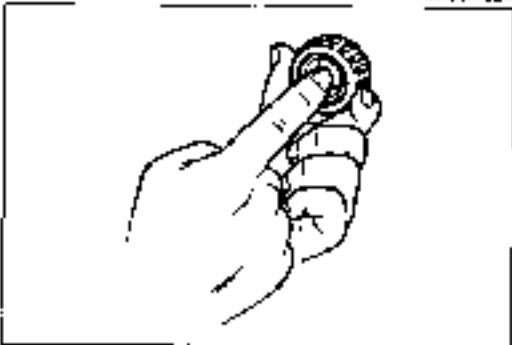


3. Wear and damage of needle bearing



7ELR5X-C2a

4. Cracks and damage to hub.

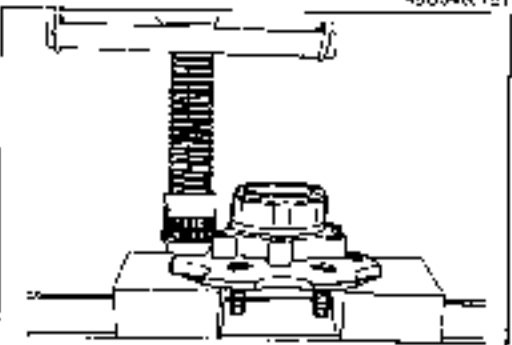


4BU04X-1E1

**Caution**

If replacement is necessary, replace the bearing inner and outer races as a set.

5. Wear and seizure of bearings



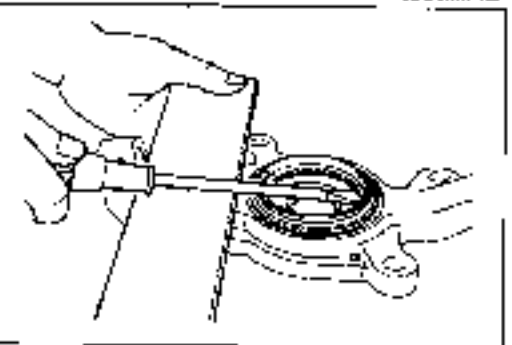
9BL0M2-150

**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.

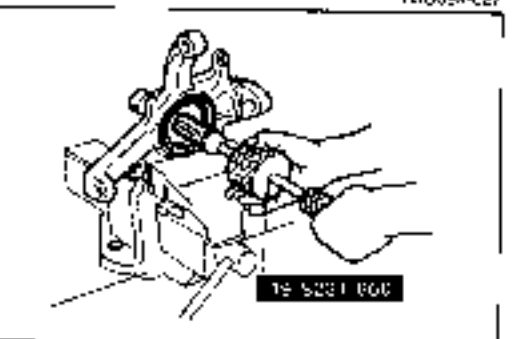


7BUK9X-C27

**DISASSEMBLY**

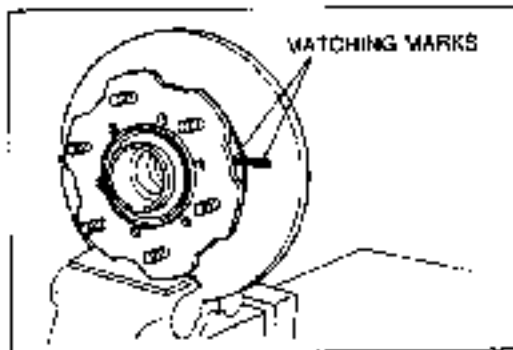
**Knuckle**

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.



4RI1UMK-072

3. Remove the needle bearing from the knuckle with the SST.



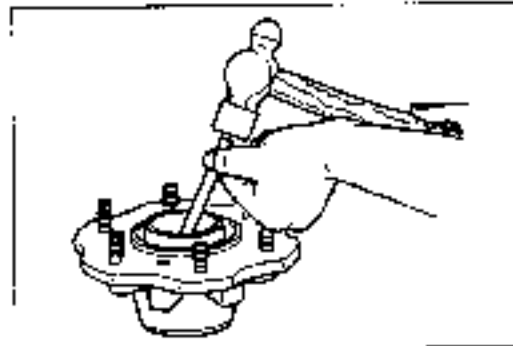
08JOMX-070

### Disc Plate and Wheel Hub

#### Caution

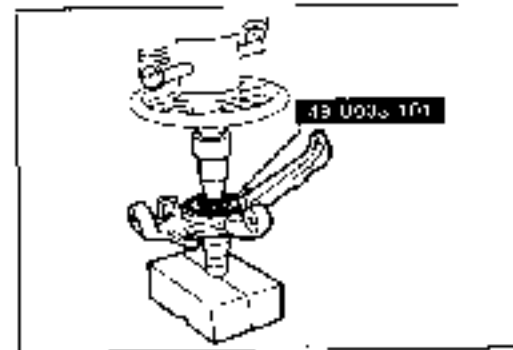
Secure the disc plate in a copper-lined vise.

- After making matching marks on the disc plate and wheel hub, remove the bolts and disassemble the plate and hub.



49G09K-131

- Remove the oil seal, and take out the bearing inner race.
- Using a suitable bar, remove the bearing outer race by lightly tapping with a hammer.

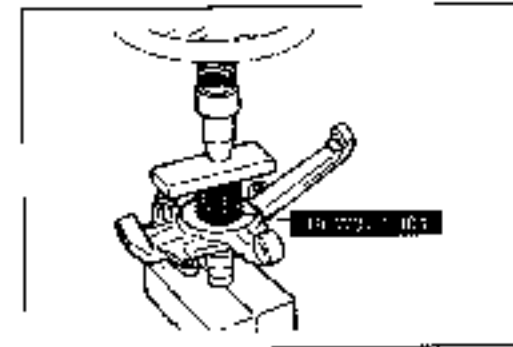


08JOMX-416

### ASSEMBLY

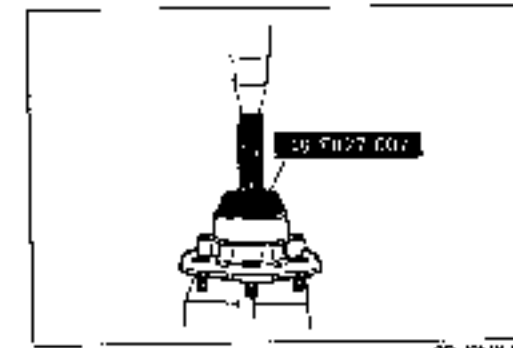
#### Knuckle

- Install a new needle bearing with the **SST**.



18HJOMX-330

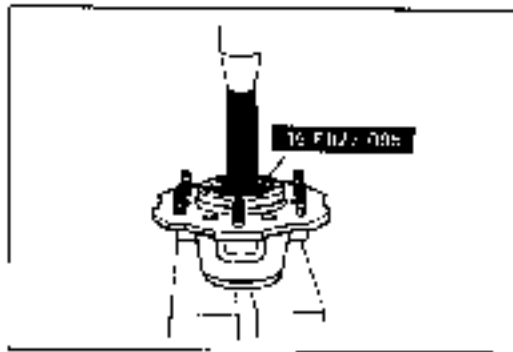
- After installing the inner bearing into the hub, press in the new oil seal with the **SST**.
- Apply lithium based grease to the oil seal lip.



08JOMX-075

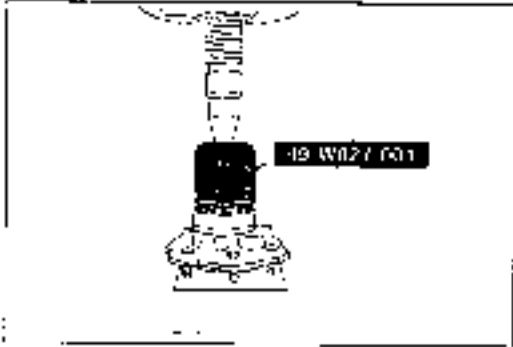
### Disc Plate and Wheel Hub

- Press in the outer side bearing outer race with the **SST**.



9ELCMX-178

2. Press fit the inner side bearing outer race with the **SST**.

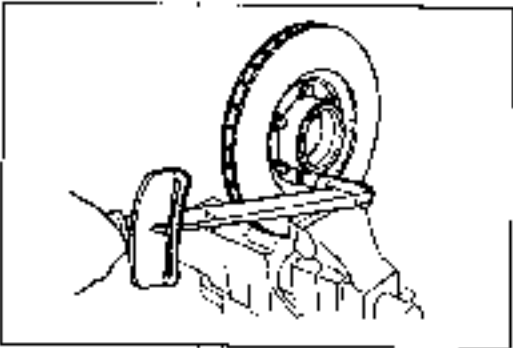


9ELCMX-077

**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.

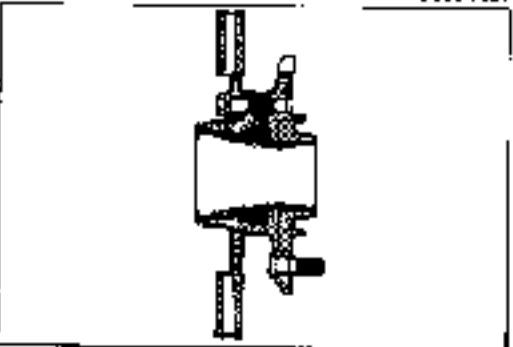


70UC8X-034

5. Align the matching marks of the wheel hub and the disc plate, and tighten the mounting bolts.

**Tightening torque:**

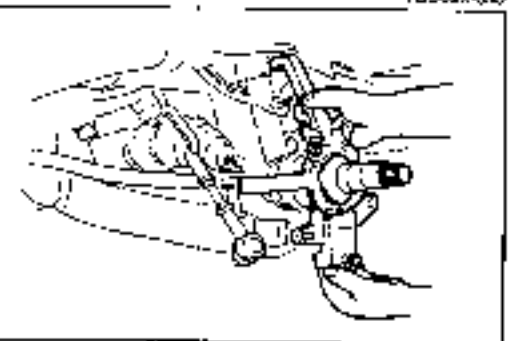
**54—59 Nm (5.5—7.0 m·kg, 40—51 ft·lb)**



7BLJ00X-025

6. Apply grease (lithium base, NLGI No.2) to the area indicated by oblique lines.

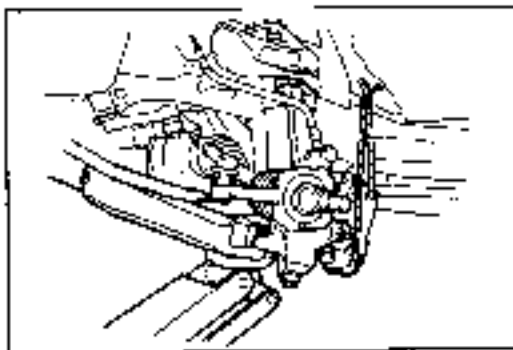
7. Install the outer bearing race and washer in the hub.



9ELCMX-038

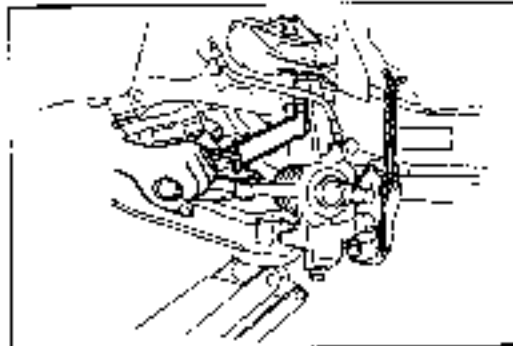
**INSTALLATION**

1. Insert the front axle drive shaft into the knuckle, and install the nut for the lower arm ball joint; tighten it by hand.



2F1000X-007

2. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



2F1000X-011

3. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

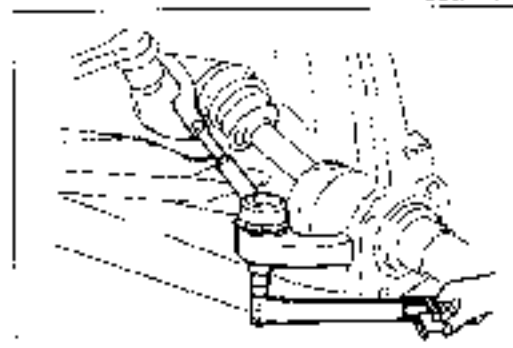
**Tightening torque**

**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)

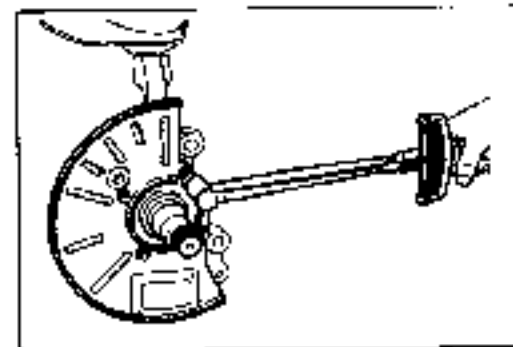


2F1000X-060

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)

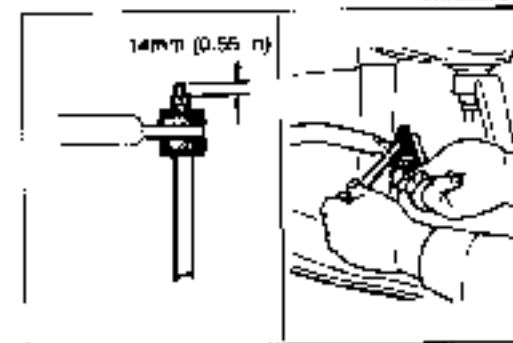


2F1000X-016

5. Install the dust cover to the knuckle.

**Tightening torque:**

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



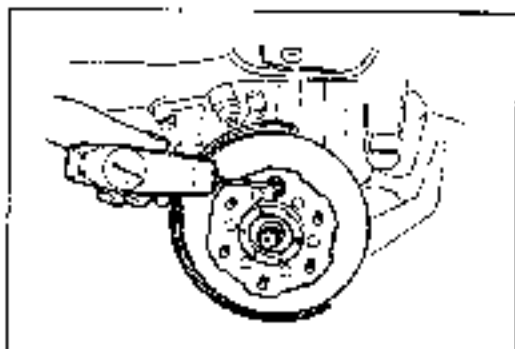
2F1000X-017

6. After loosely installing the lower mount of the shock absorber, install the stabilizer.

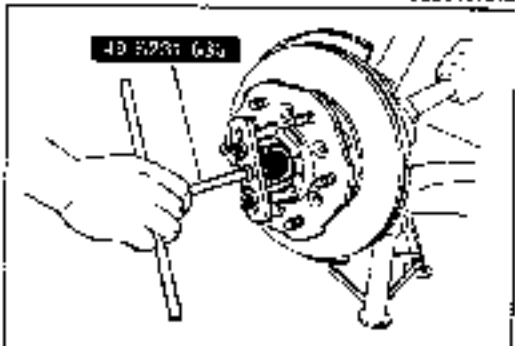
**Tightening torque**

**Stabilizer:**

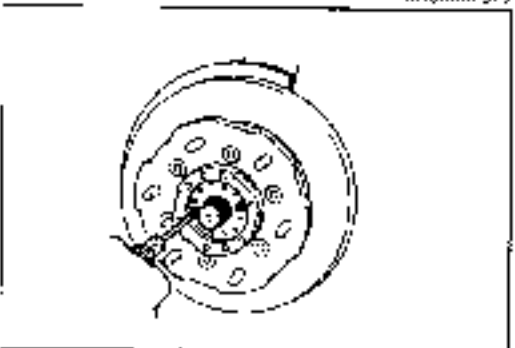
31—46 N·m (3.2—4.7 m·kg, 33—34 ft·lb)



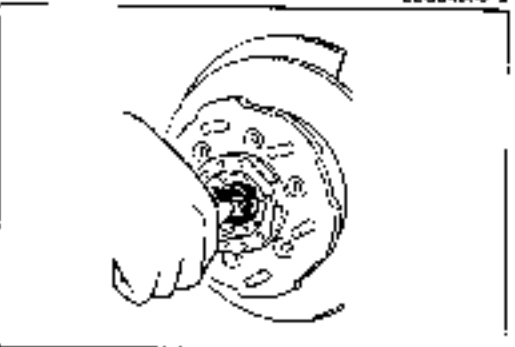
2A00VZ-018



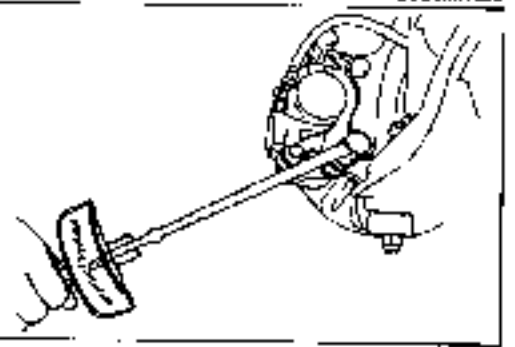
9FJ0M0-079



2EUCAB-019



20J0M0-020



2B00M0-021

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 seal 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 lock nut until the preload reaches the specified preload with the **SST**.

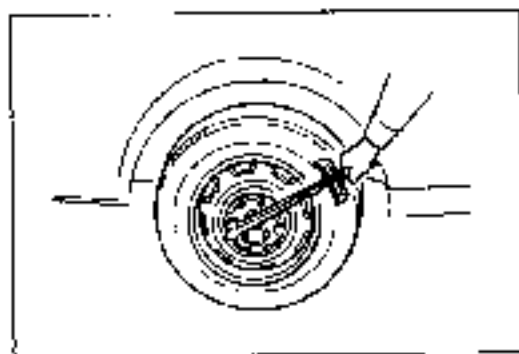
- (5) Install the bearing set plate using two bolts.

**Tightening torque:****5—7 Nm (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 Nm (9—12 m-kg, 65—87 ft-lb)**



EDJ094X-062

9. Install the wheel and drive flange.

**Tightening torque**

**Styled wheel lug nut:**

118—147 Nm (12.0—16.0 m·kg, 87—109 ft·lb)

**Standard wheel lug nut:**

88—116 Nm (9.0—12.0 m·kg, 65—87 ft·lb)

**Drive flange:**

29—34 Nm (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.







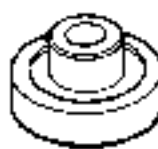
**Tightening torque:**

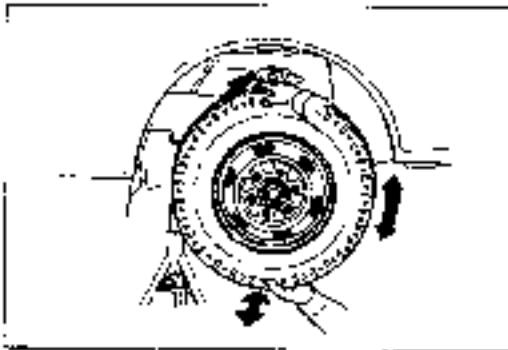
55—80 Nm (5.6—8.2 m·kg, 41—59 ft·lb)

12. Check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)

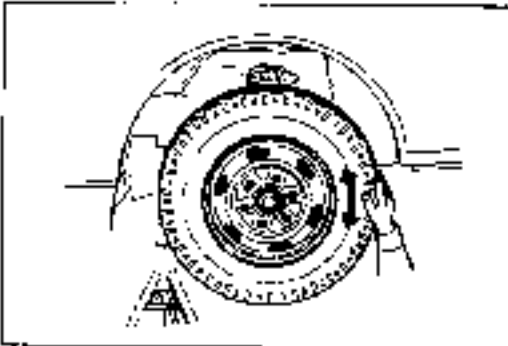
**FRONT AXLE (4x2)**

**PREPARATION  
SST**

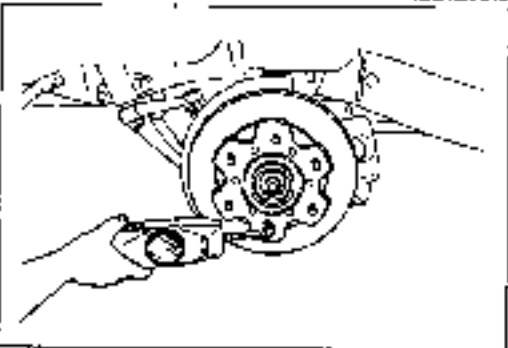
<p>49 C116 650C Puller, ball joint</p> 	<p>49 0727 575 Puller, ball joint</p> 	<p>49 B025 0A0 Installer, dust seal</p> 
<p>49 B025 001 Body (Part of 49 B025 0A0)</p> 	<p>49 G030 797 Handle (Part of 49 B025 0A0)</p> 	<p>49 LC27 002 Installer, oil seal</p> 
<p>49 H033 1C1 Bearing remover</p> 	<p style="text-align: right;">TRUCK06E</p>	



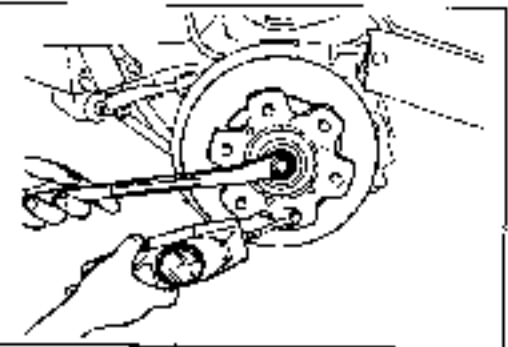
53JOMX 082



4EG12X 012



95UCMX 152



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)**

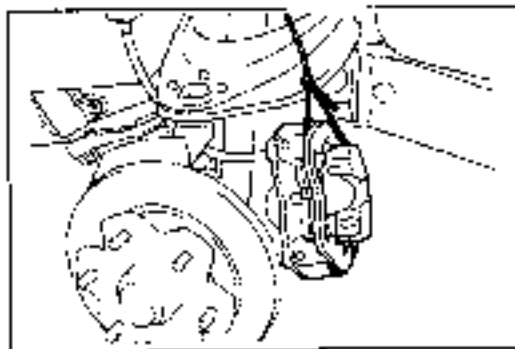
5. Loosen the locknuts so that they can be turned by hand.
6. Attach a pull scale to a wheel lug bolt, and measure the frictional force.
7. Tighten the locknut until the reading (initial turning torque) reaches the specified preload. Insert the set cover, and secure with a new cotter pin.

**Preload**

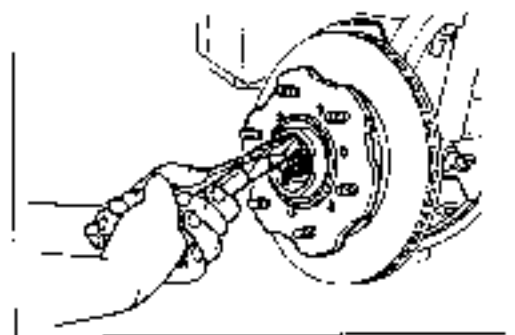
**Frictional force plus:**

**6–11 N (0.6–1.1 kg, 1.3–2.4 lb)**

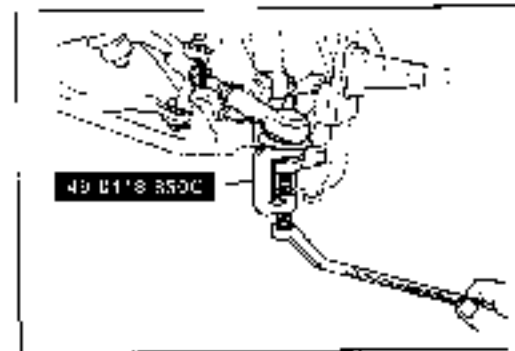




SBL0M5-126

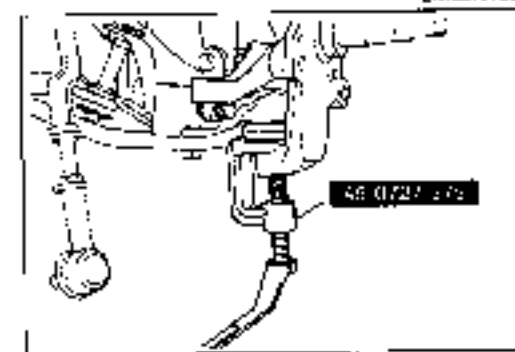


SBL0M5-126



49 0118 350C

SBL0M5-126



49 0127 300

SBL0M5-126



49 0127 300

SBL0M5-126

**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.

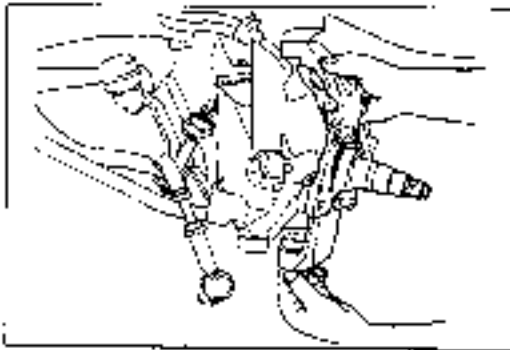
7. After removing the tie rod end nut, with the **SST** to separate the tie rod end from the knuckle.

**Note**

If removal is difficult, lightly tap the ball joint coupling of the knuckle with a hammer.

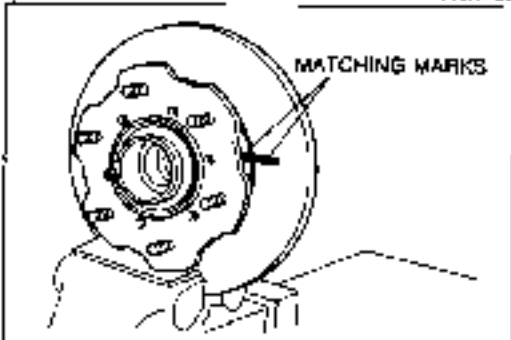
8. After removing the nut of the lower arm ball joint, with the **SST** to separate the knuckle from the lower arm.
9. Reinstall the lower arm ball joint nut, and tighten it by hand.

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.



701J030-20

12. After removing the nut of the lower arm ball joint, remove the knuckle.



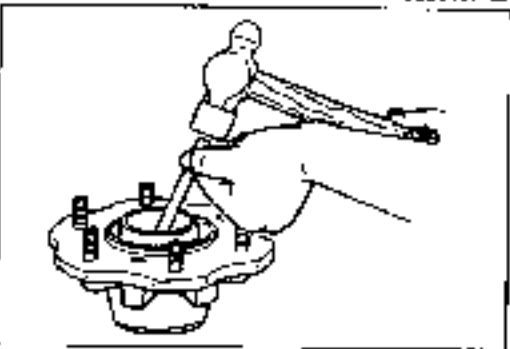
98U030-50

### 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.
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.



4ER12X400

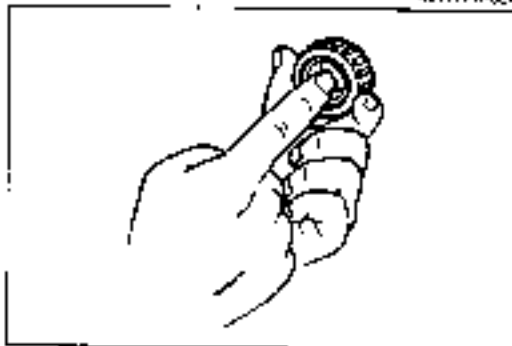
### INSPECTION

Inspect for the following problems, and replace any faulty parts.

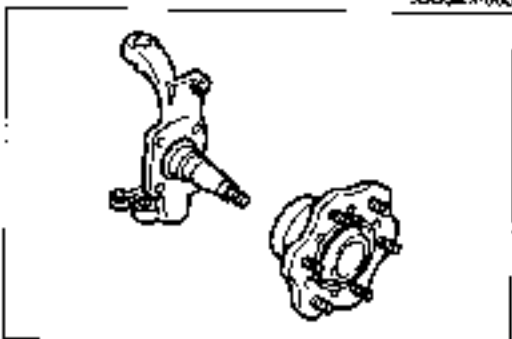
#### Caution

If replacement is necessary, replace the bearing inner and outer races as a set.

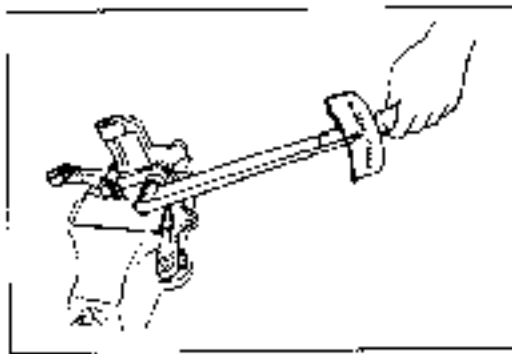
1. Wear, damage, or seizure of bearing
2. Crack and damage to hub
3. Crack and damage to knuckle spindle and wear and rust on the oil seal friction surface
4. Damage to knuckle and knuckle arm
5. Deformation of dust cover
6. Deformation of nub cap
7. Wear and damage to wheel lug bolts



08U04X-000



2BL0M0-000



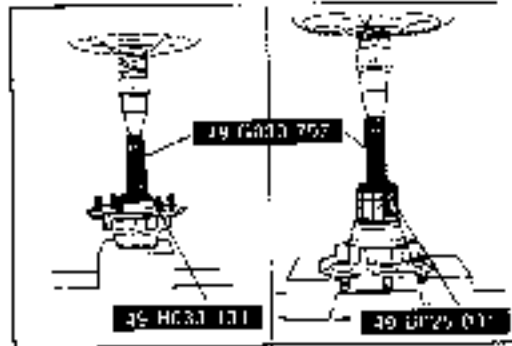
5311MX-013P

**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)

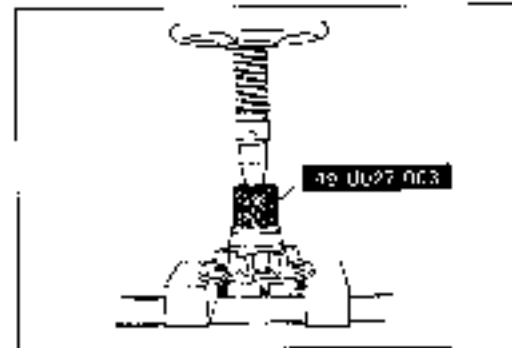


98UOMX-086

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.

**Caution**

Press in the oil seal until it is flush with the hub end surface.

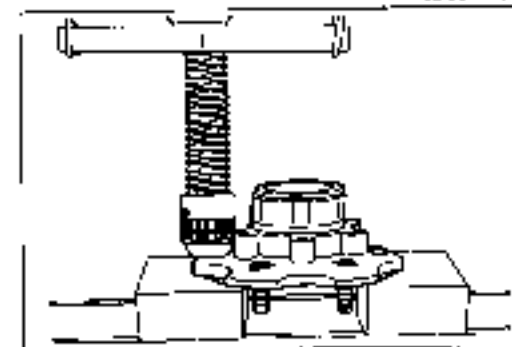


CBUOMX-037

4. Press fit the new oil seal onto the hub with the SST.
5. Apply lithium based grease to the lip.

**Caution**

Do not reuse wheel lug bolts once they have been removed.



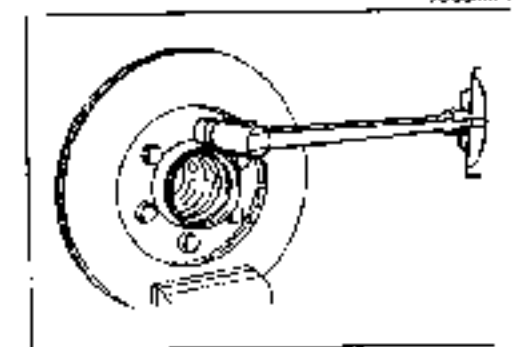
90JUMX-160

6. Use a press to press new wheel lug bolts into the wheel hub.

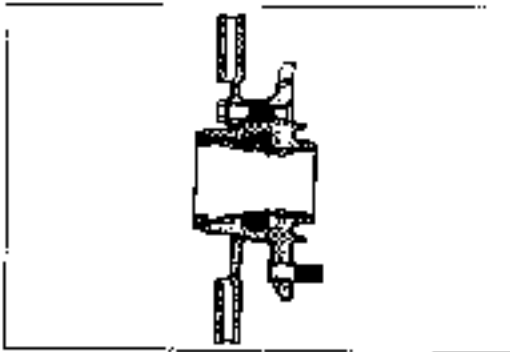
7. Align the matching marks of the wheel hub and disc plate, assemble them, and tighten the mounting bolts.

**Tightening torque:**

54—69 N·m (5.5—7.0 m·kg, 40—51 ft·lb)

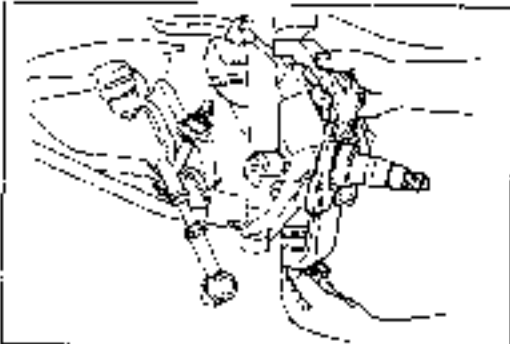


70JOMX-451



3D02K01 E1

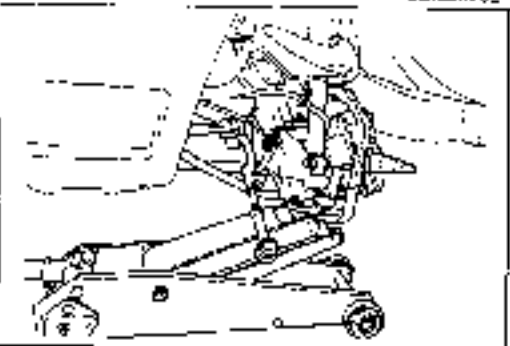
6. Apply lithium based grease to the areas indicated by shaded lines.
9. Install the outer bearing and washer in the hub



5B10KX 02

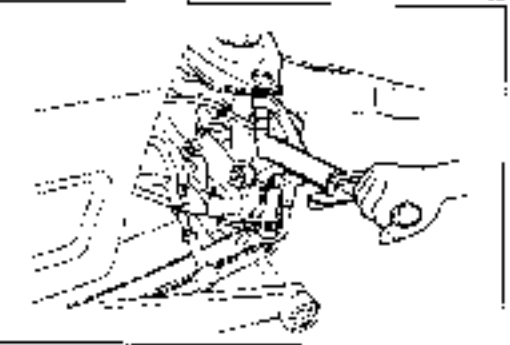
**INSTALLATION**

1. Install the knuckle to the lower arm.
2. Install the nut for the lower arm ball joint, and tighten it by hand.



5B10KX 022

3. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



1B10KX 01E

4. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

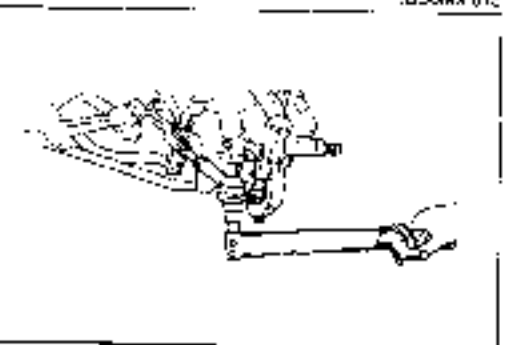
**Tightening torque**

**Upper arm ball joint nut:**

29—51 Nm (3.0—5.2 m·kg, 22—38 ft·lb)

**Lower arm ball joint nut:**

118—157 Nm (12—16 m·kg, 87—116 ft·lb)

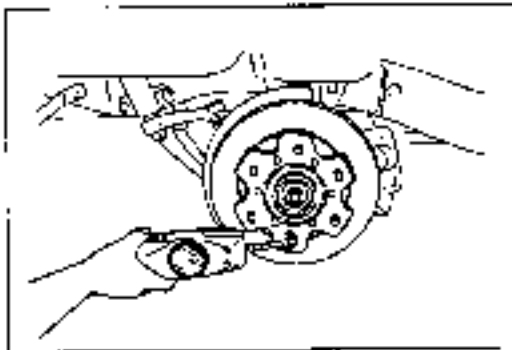


39U3KX C24

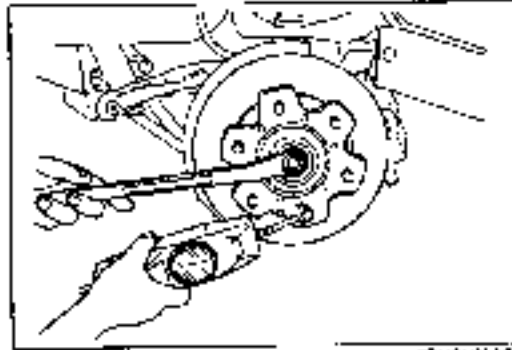
5. Tighten the tie rod and knuckle arm, and secure with a new cotter pin.

**Tightening torque:**

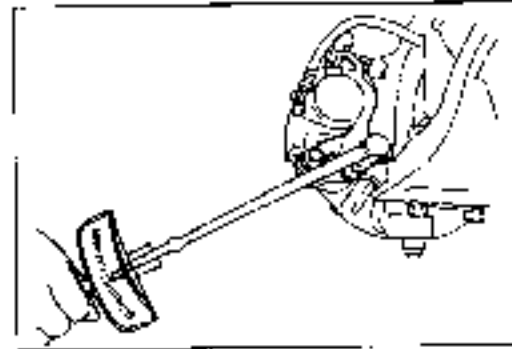
44—69 Nm (4.5—6.0 m·kg, 33—43 ft·lb)



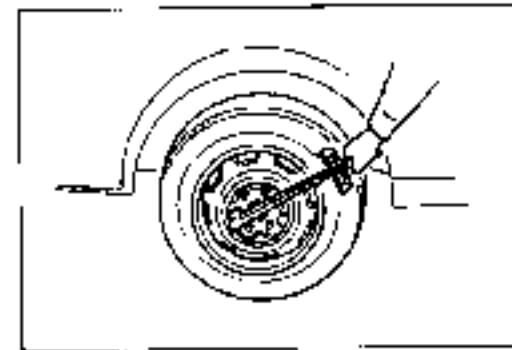
2EJ00MX-029



2EJ00MX-029



rB\_00X\_020



1EJ00MX-018

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 Nm (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:**

**88–106 Nm (9.0–11.0 m·kg, 65–80 ft·lb)**

8. Mount the wheel and tire.

**Tightening torque**

**Standard wheel lug nut:**

**88–118 Nm (9.0–12.0 m·kg, 65–87 ft·lb)**

**Styled wheel lug nut:**

**118–147 Nm (12.0–15.0 m·kg, 87–108 ft·lb)**

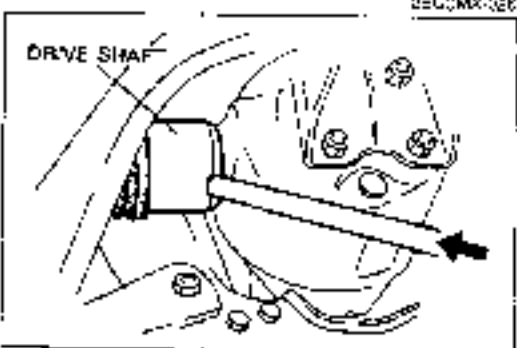
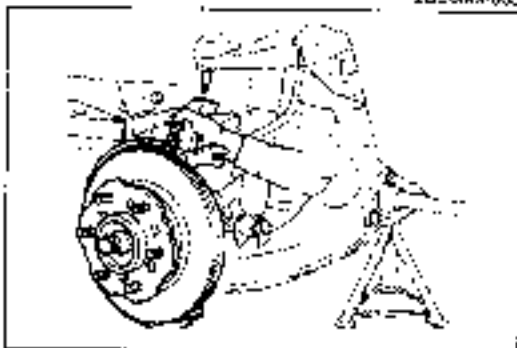
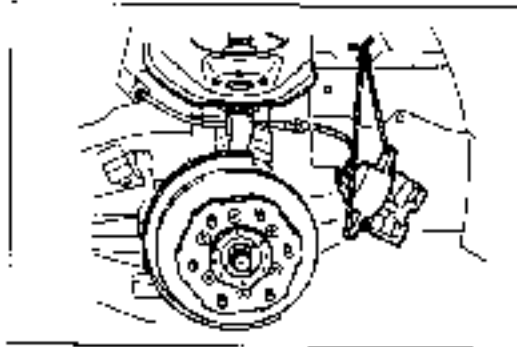
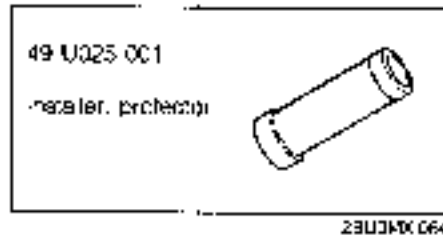
9. Lower the vehicle.

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.

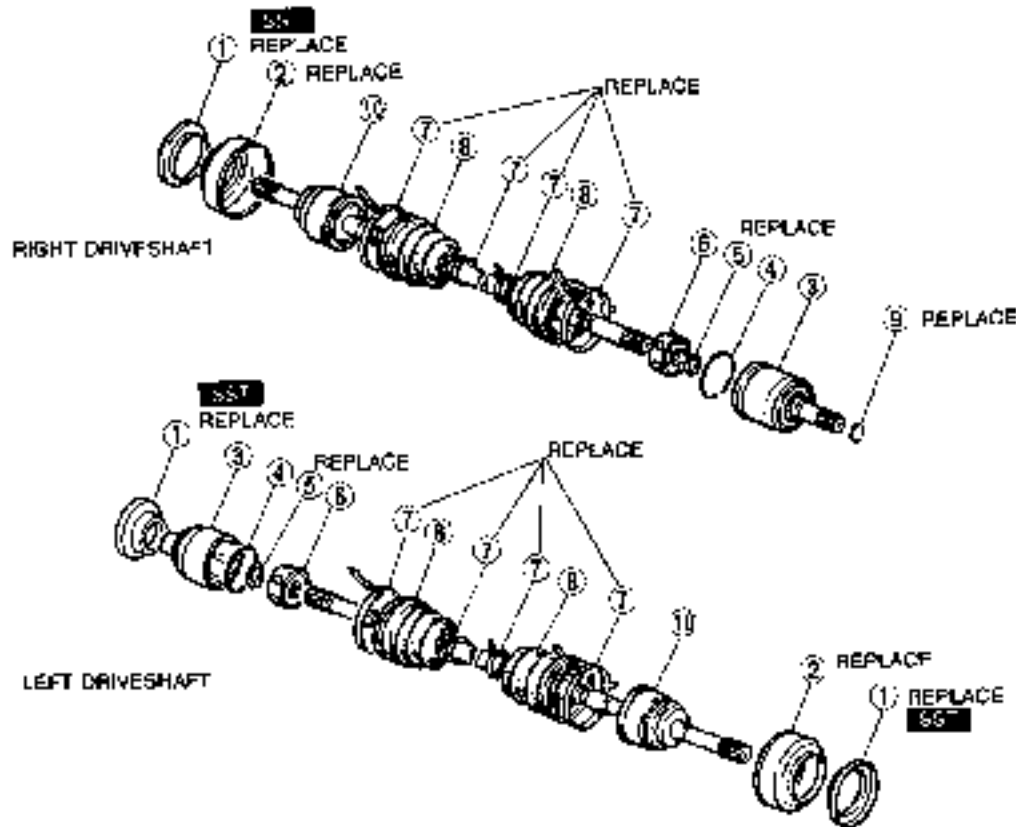
13. Remove the front-axle drive shaft.

## 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.

73U09X-092

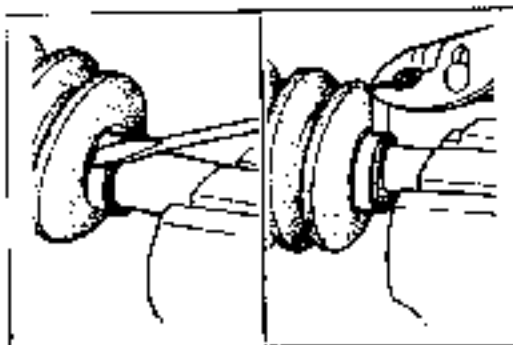


3EL0MK-16K

- Dust cover
- Boot protector
- Outer ring
- Clip

- Snap ring
- Balls, inner ring and cage
- Boot band
- Boot

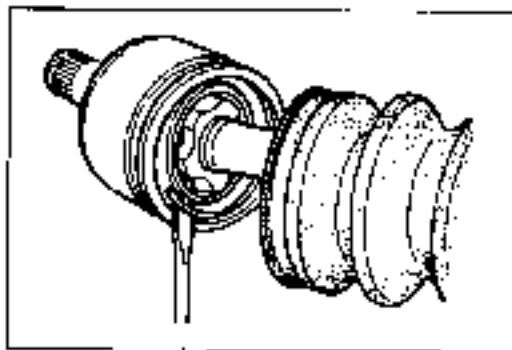
- Clip
- Shaft and ball joint assembly



75U06X-41K

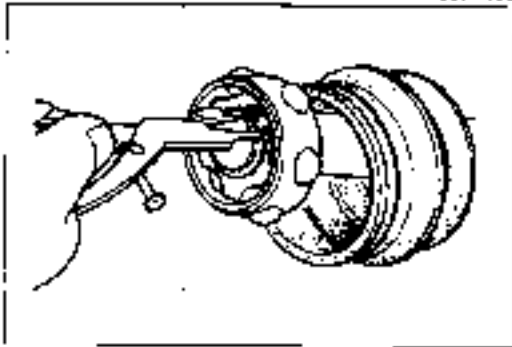
**Removal of Differential Side Boot**

- Pry up the locking clip with a screwdriver, and remove the band with pliers.
- Slide the boot along the shaft to expose the joint.



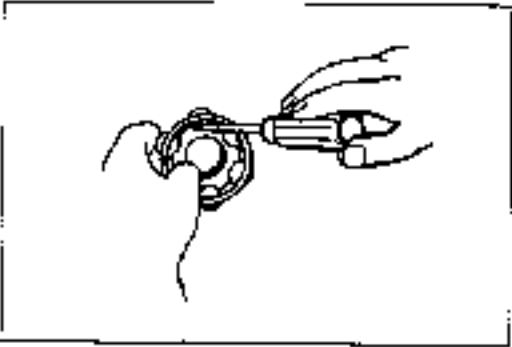
7R J08X 195

3 Remove the cotter pin with a screwdriver.



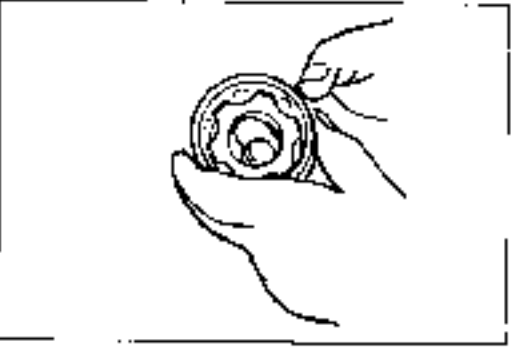
7D J08X 036

4 Remove the snap ring with snap ring pliers



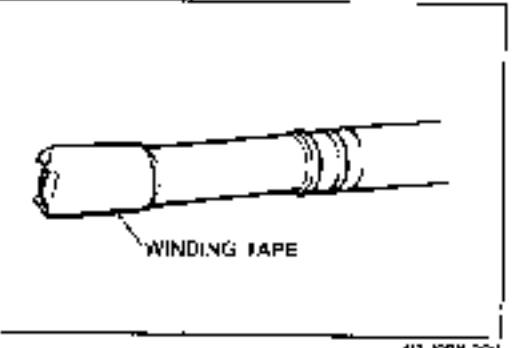
7E J08X 067

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.



7E J08X 088

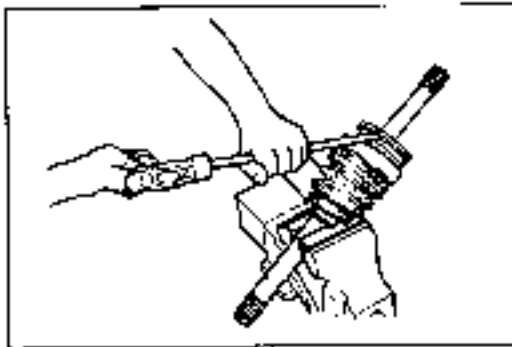
7. Turn the cage about 30 degrees, and separate it from the inner ring.



7B J08X 092

8 Wrap the spline of the shaft with tape to prevent damaging the boot, and remove the boot

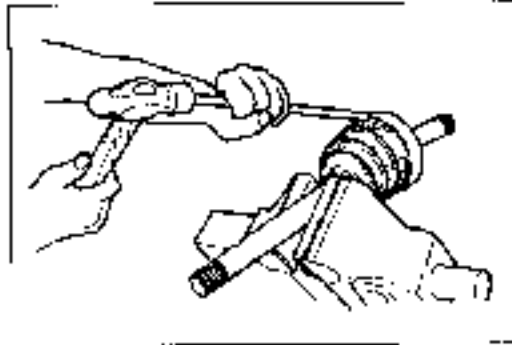




78L09X-102

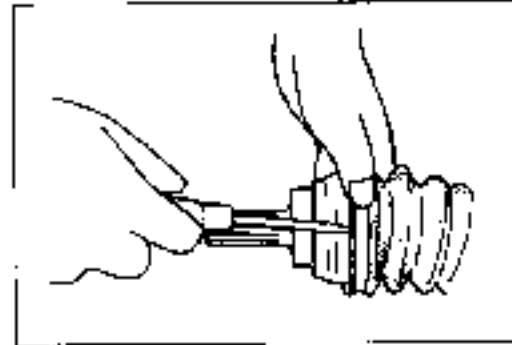
**Removal of Wheel Side Boot**

1. Remove the dust cover by using a suitable round bar and hammer.



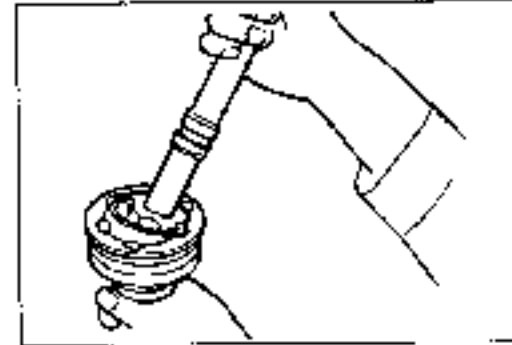
78L09X-103

2. Remove the boot protector by using a suitable round bar and hammer.



78L09X-104

3. Pry up the locking clip with a screwdriver, and remove the band with pliers.



E7L09X-059

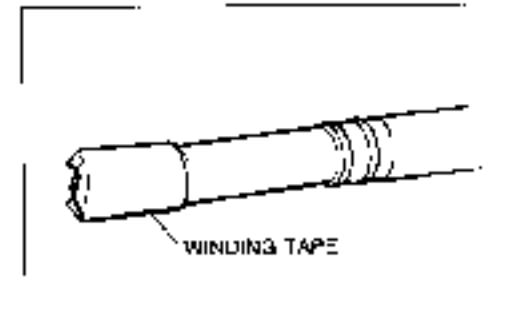
**INSPECTION**

Inspect for the following problems, and replace any faulty parts.

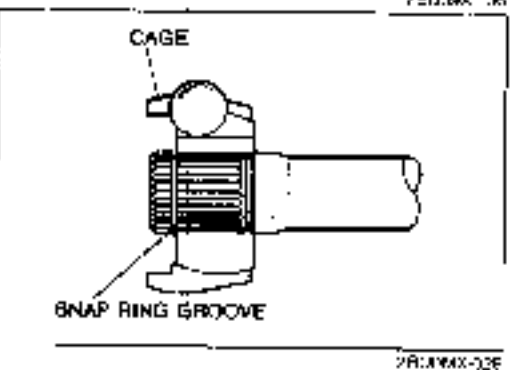
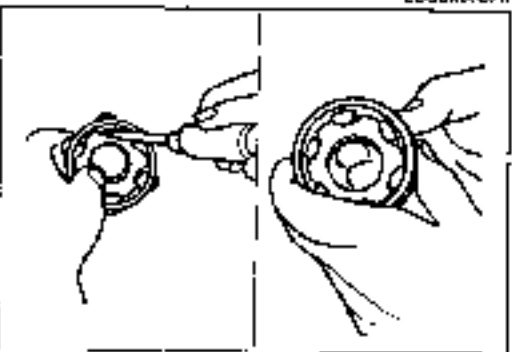
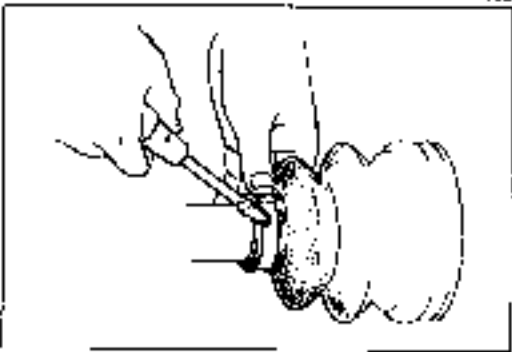
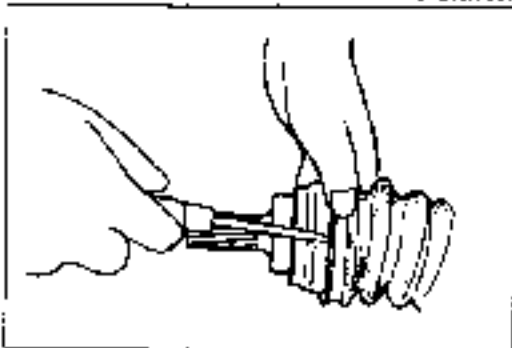
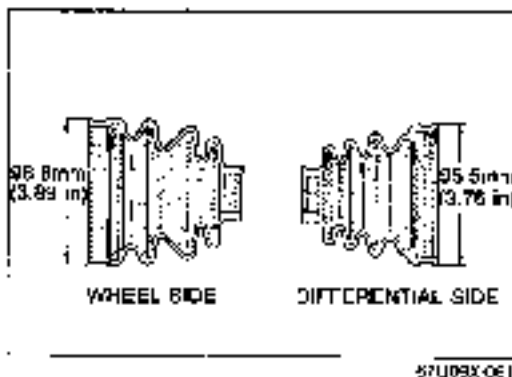
1. Bending, twisting and damage of the shaft
2. Wear on the shaft splines
3. Wear, excessive play, corrosion and damage to the joint on the differential side
4. Excessive play, wear, corrosion, and damage to the joint on the wheel side

**ASSEMBLY****Installation of Differential Side Boot**

1. Wrap the splines on the wheel side of the shaft, and install the boot and a new boot band.



78L09X-105

**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

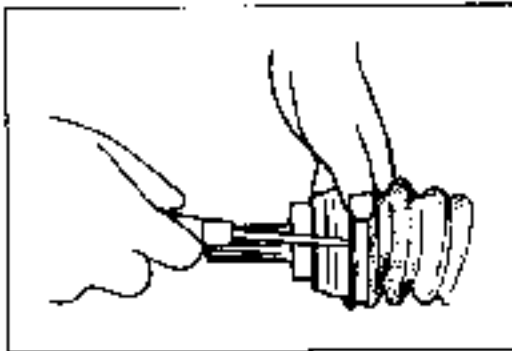
3. Install the differential side boot with a new boot band (the part with the smaller diameter)
4. Attach a new clip to the clip groove in the shaft.

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

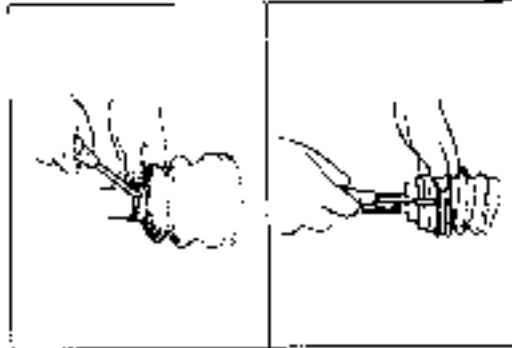
**Caution**

Install the cage with the big end facing the snap ring groove. If reversely installed, the drive shaft may become disengaged.



57UC9X-06E

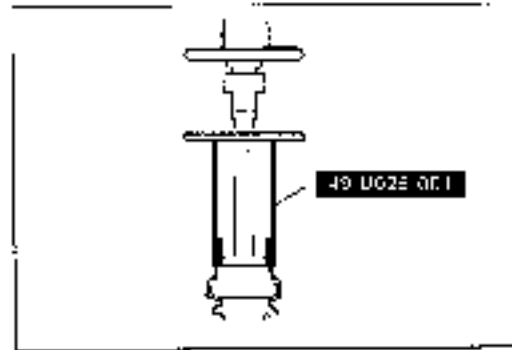
8. Fit the differential side boot onto the outer race and the boot groove of the shaft.
9. Secure the boot with a new boot band.



79J09X-10E

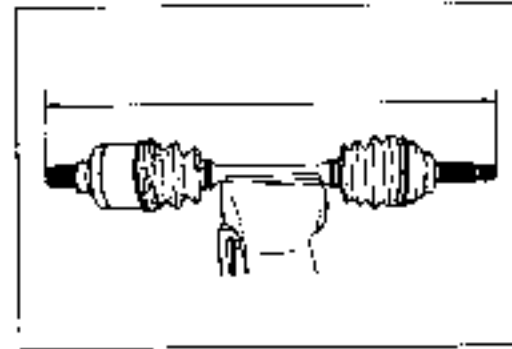
#### Installation of Wheel Side Boot

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.



03UJ94-034

3. Press fit the new dust cover in a press with the SST.

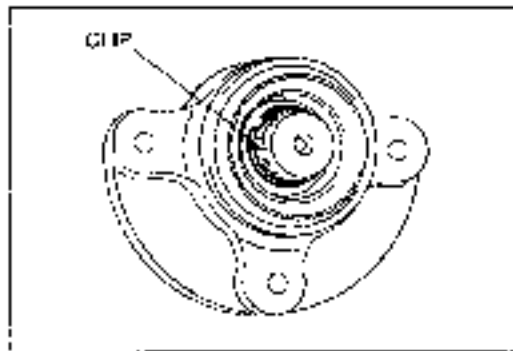


29L0Mx-06E

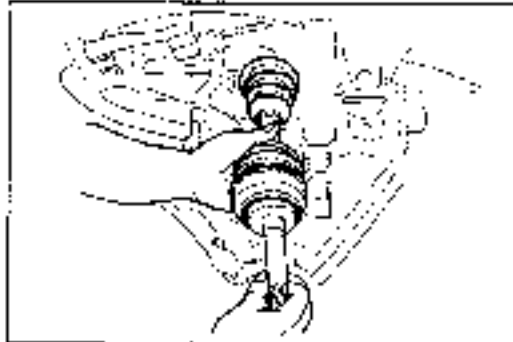
#### Standard length

Right side: 622mm (24.49 in)

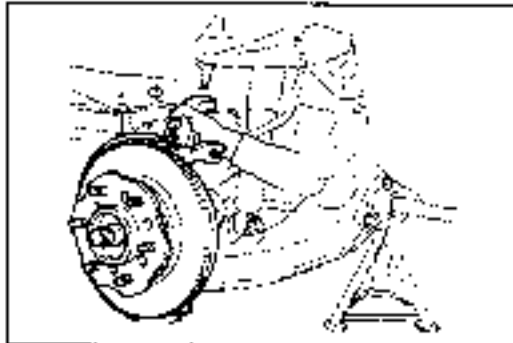
Left side : 554mm (21.81 in)



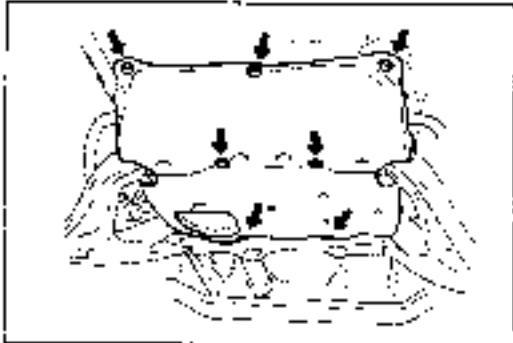
8FC060-030



8FC060-040



25 J0M3-330



8.A3M3-310

**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-26.)

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-23.)

10. Apply sealant to the drive flange and install it.

11. Install the engine undercover.

**Tightening torque:**

31—46 Nm (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 unladen.

**Tightening torque:**

55—80 Nm (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.)


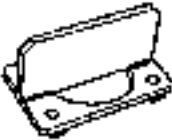





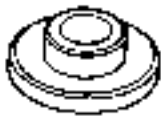


# M

## REAR AXLE (4x4 AND 4x2)

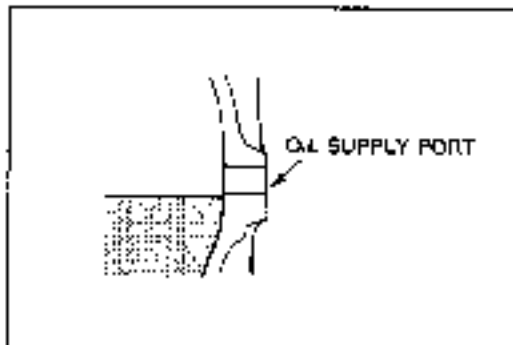
### REAR AXLE (4x4 AND 4x2)

#### PREPARATION

#### SST

<p>48 0603 635A</p> <p>Wrench, rear shell bearing out</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 #62</p> 
<p>48 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> 		

219JUMK-032



9B113V4C87

**ON-VEHICLE MAINTENANCE**

**Rear Axle Oil**

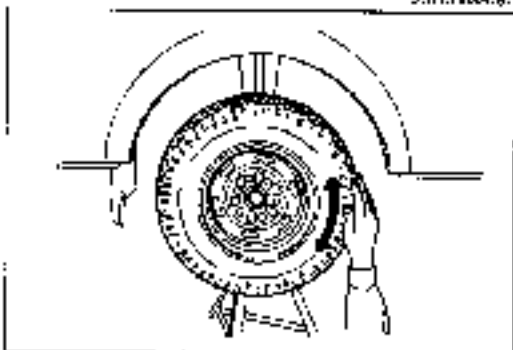
**Inspection**

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—64 N·m (4.0—5.5 m·kg, 29—40 ft·lb)



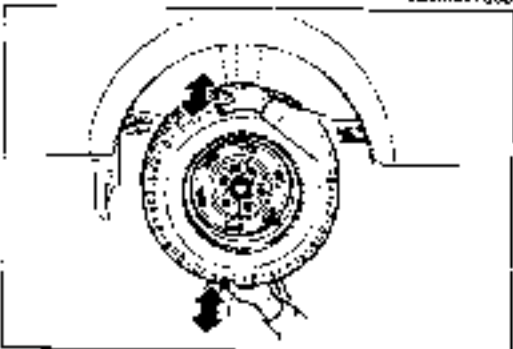
9B113V4C88

**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.

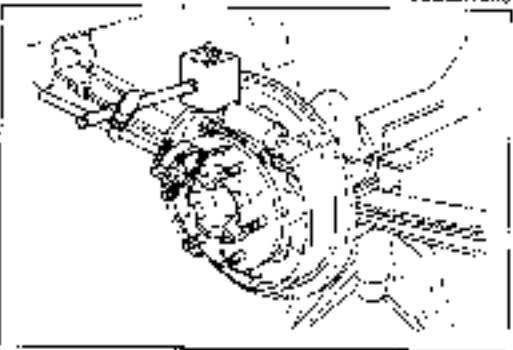


9B113V4C89

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)



9B113V4C90

**Adjustment**

1. Refer to the axle removal section, and remove one axle shaft.

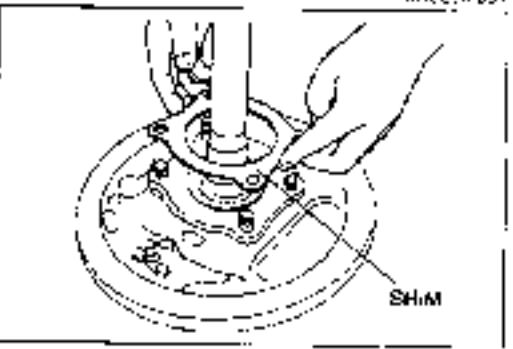
2. Refer to the removal section, and remove the other wheel and brake drum.

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.

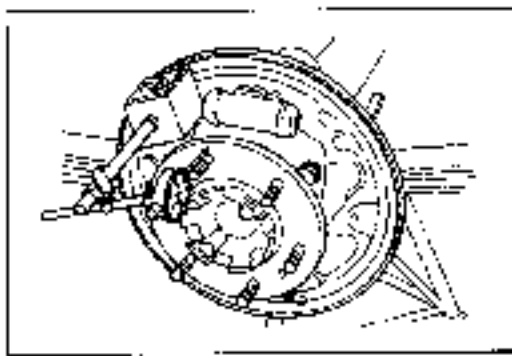


9B113V4C91

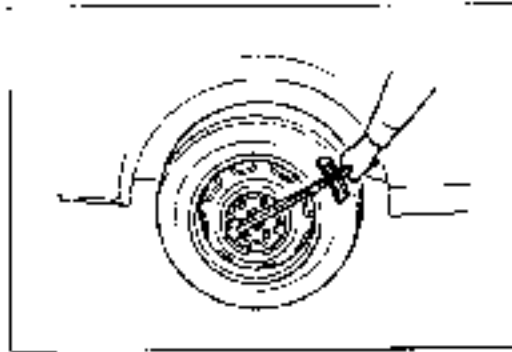
**Shim**

Part No.	Thickness mm (in)
SCB3 26 165	0.10 (0.004)
SCB3 26 166	0.15 (0.006)
SCB3 26 167	0.50 (0.020)
SCB3 26 168	0.75 (0.030)

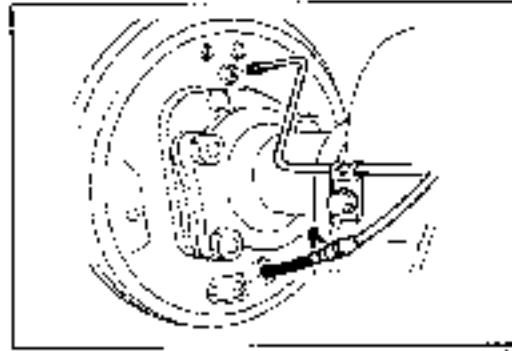
(3) After making the adjustment, reinstall the brake drum and tire. (Refer to page M-49.)



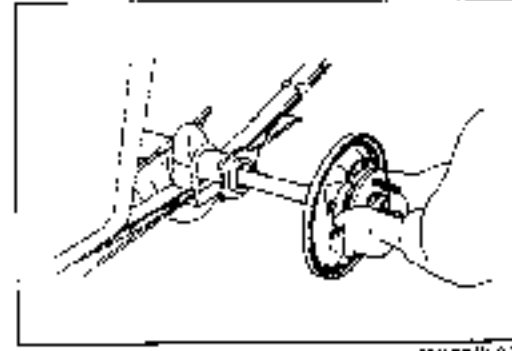
59L09X-001



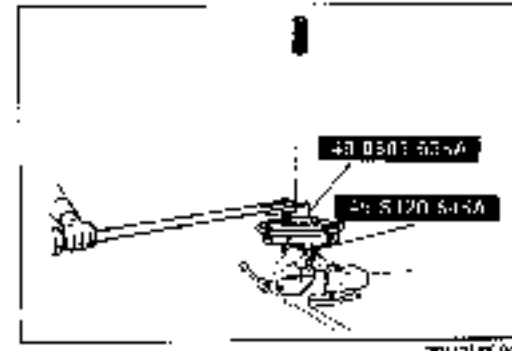
59L09X-004



59L09X-100



59L09X-033



59L09X-004

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.

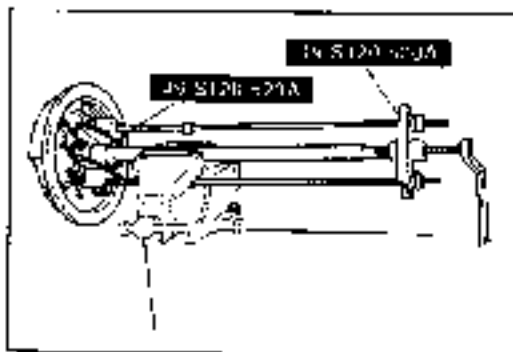
6. If the oil seal in the axle casing is cracked or damaged, replace it.

#### DISASSEMBLY

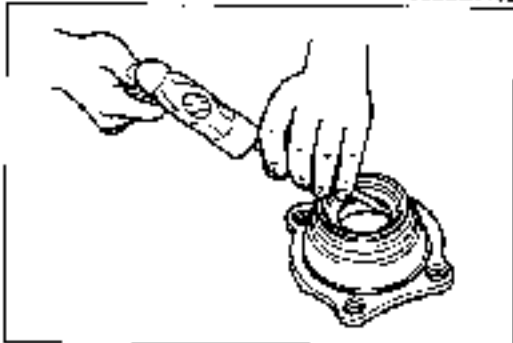
1. Remove the lockwasher.
2. Attach the SST as shown, and remove the bearing locknut from the rear axle shaft.

#### Caution

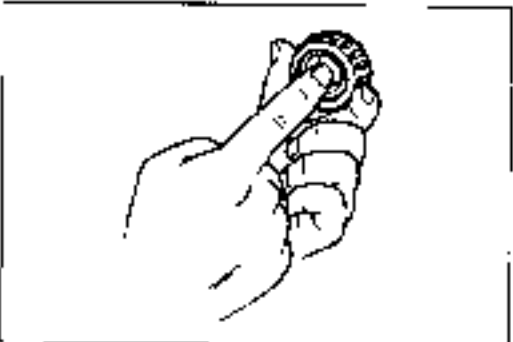
Be careful when removing or installing the bearing locknuts for the left wheels because they are left threaded (tightened by turning counterclockwise).



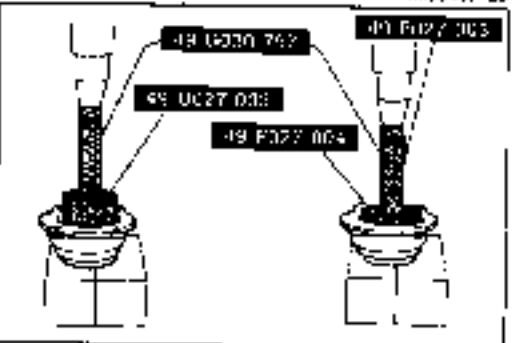
98J04X-102



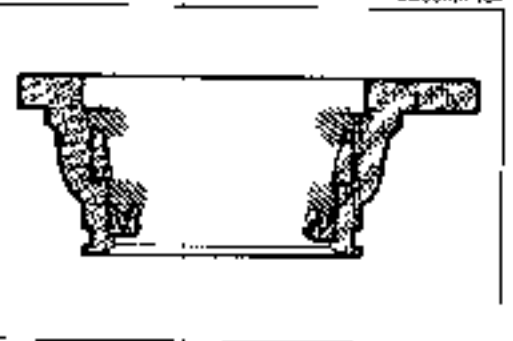
79J00X-017



98J04X-103



98J04X-104



98J04X-106

- 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.

- 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.

- 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.

- Cracks and damage on wheel hub
- Bends and cracks on axle shaft.

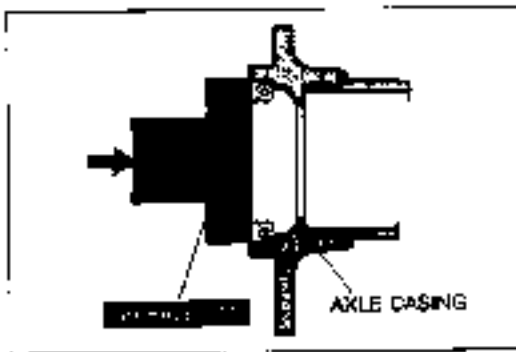
**ASSEMBLY**

- Press fit the new oil seal with the SST
- Press fit the bearing inner race with the SST

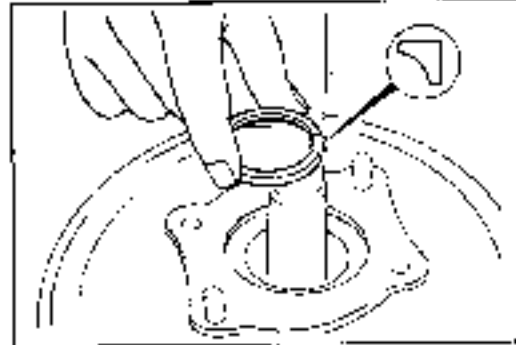
- Liberaly coat with lithium based grease the places indicated by oblique lines in the figure



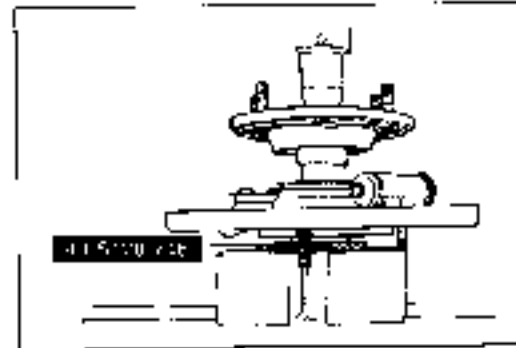
## REAR AXLE (4x4 AND 4x2)



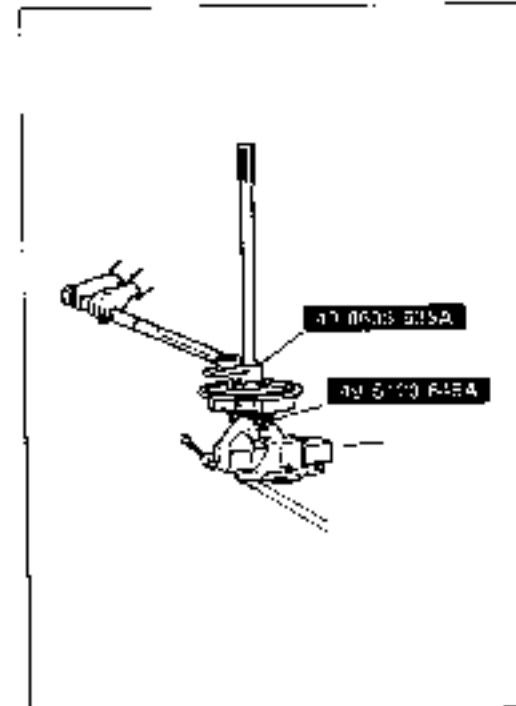
29L0MX-026



29U029-076



99J0MX-136



29L0MX-076

4. Using the **SST**, tap the new oil seal in until it is flush with the end of the axle casing.
5. Coat the oil seal lip with lithium based grease.

6. Install the spacer on the axle shaft.

7. 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.

8. Remove the bearing installer, and attach the bearing locknut to the axle shaft.
9. Using the **SST** to tighten the bearing locknut, and press in the bearing.
10. 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.
11. Tighten the bearing locknut to the specified torque.

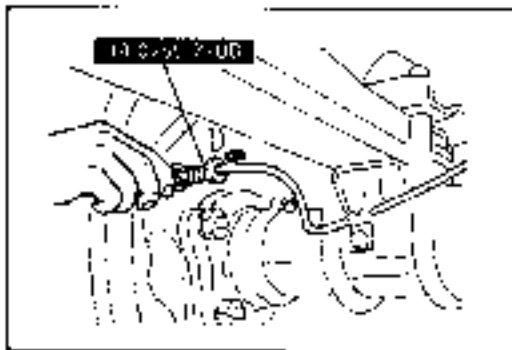
**Tightening torque:**

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 0803 635A).

12. Align the lock washer claws to the locknut notches and crimp the lock washer.



2B-00447-000

**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)**

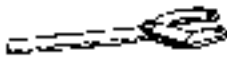






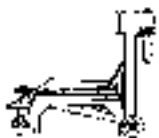











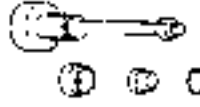




4. Install the parking brake cable, attaching pin, and brake pipe. (Refer to Section P.)
5. Install the brake assembly. (Refer to Section P.)
6. Bleed the air from the brake system. (Refer to Section P.)
7. Install the wheel and tire.
8. After installation, adjust the parking brake lever stroke. (Refer to Section P.)

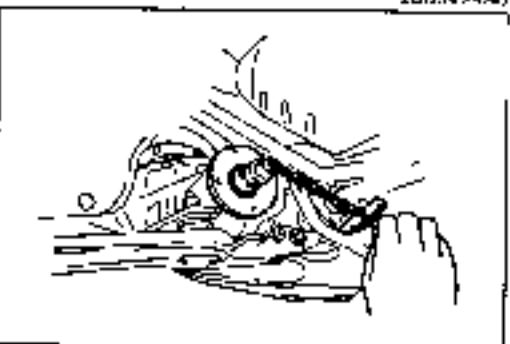
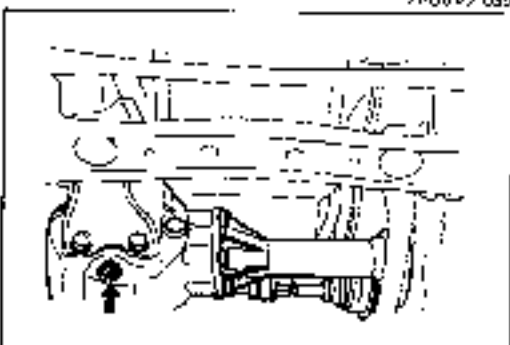
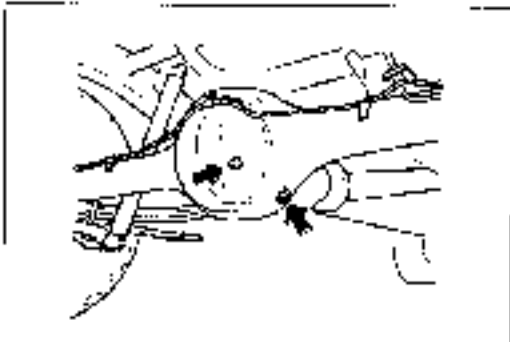
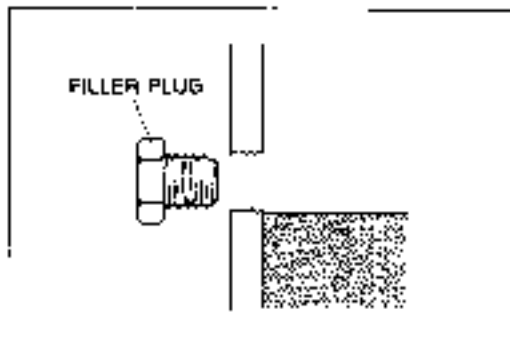
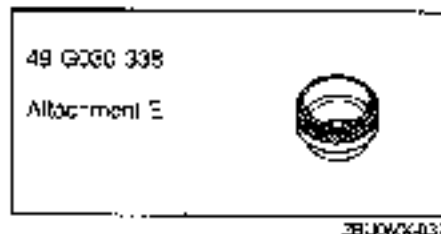
# M

## DIFFERENTIAL (FRONT AND REAR)

### DIFFERENTIAL (FRONT AND REAR)

#### PREPARATION SST

<p>49 5120 710</p> <p>Hook, Coupling tongs</p> 	<p>49 6839 4250</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 795</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 0836 145</p> <p>Puller for pulley boss</p> 
<p>49 H027 002</p> <p>Remover, bearing</p> 	<p>49 F401 331</p> <p>Body</p> 	<p>49 U071 525</p> <p>Installer, bearing</p> 
<p>49 F027 0A1</p> <p>Installer set, bearing</p> 	<p>49 F027 005</p> <p>Attachment ø62 (Part of 49 F027 0A1)</p> 	<p>49 F027 007</p> <p>Attachment ø72 (Part of 49 F027 0A1)</p> 
<p>49 F027 004</p> <p>Attachment ø80 (Part of 49 F027 0A1)</p> 	<p>49 F027 003</p> <p>Handle (Part of 49 F027 0A1)</p> 	<p>49 Q259 720</p> <p>Wrench, diff. side bearing adjust nut</p> 
<p>49 0720 570</p> <p>Gauge body pinion height</p> 	<p>49 8631 565</p> <p>Pinion mock</p> 	<p>49 D660 555</p> <p>Gauge block</p> 
<p>49 0305 555</p> <p>Gauge block</p> 	<p>49 U027 001</p> <p>Collar</p> 	<p>49 U027 001</p> <p>Collar</p> 

**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)**

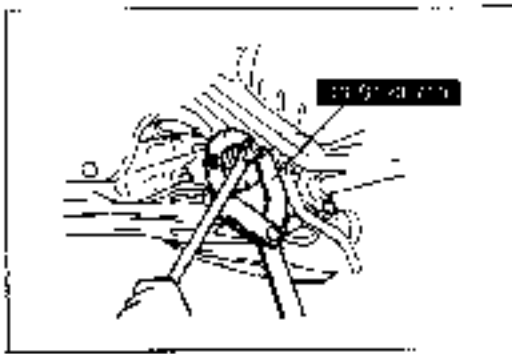
**Oil Seals****Replacement****(Companion flange and differential right side oil seal)**

1. Jack up the vehicle, and support it with safety stands.
2. Drain the differential gear oil.

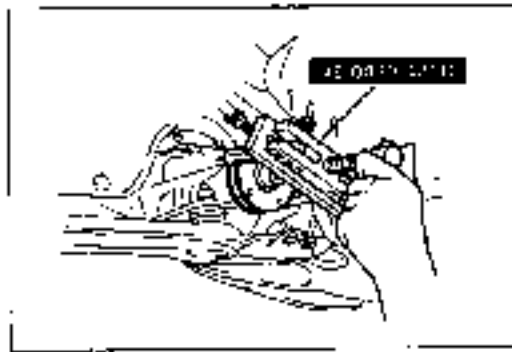
3. Remove the propeller shaft. (Refer to Section L.)
4. Before loosening the locknut, measure the rotation starting torque of the drive pinion (with in the range of the drive pinion and ring gear backlash).

**Note**

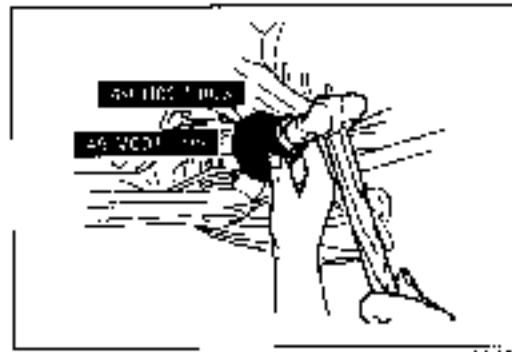
**Make a notation of this torque, and tighten the locknut to set this value during installation.**



5. Hold the companion flange with the **SST**, and remove the locknut.



6. Remove the companion flange with the **SST**.  
7. Remove the oil seal.

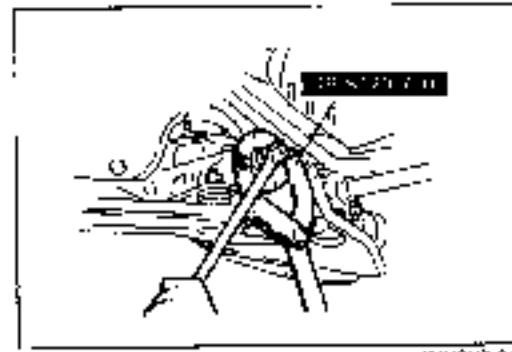


8. Install a new oil seal with the **SST**.

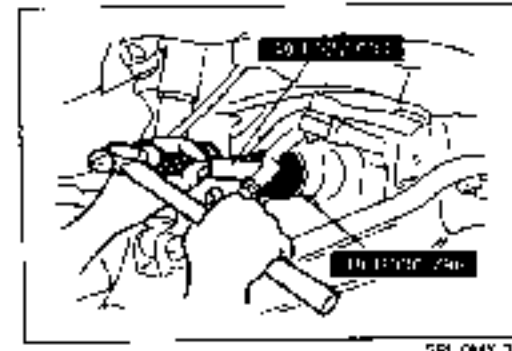
**M-size differential: 49 U027 003**  
**P-size differential: 49 V001 795**

**Note**

Apply a thin coat of lithium based grease to the oil seal lip.



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.)

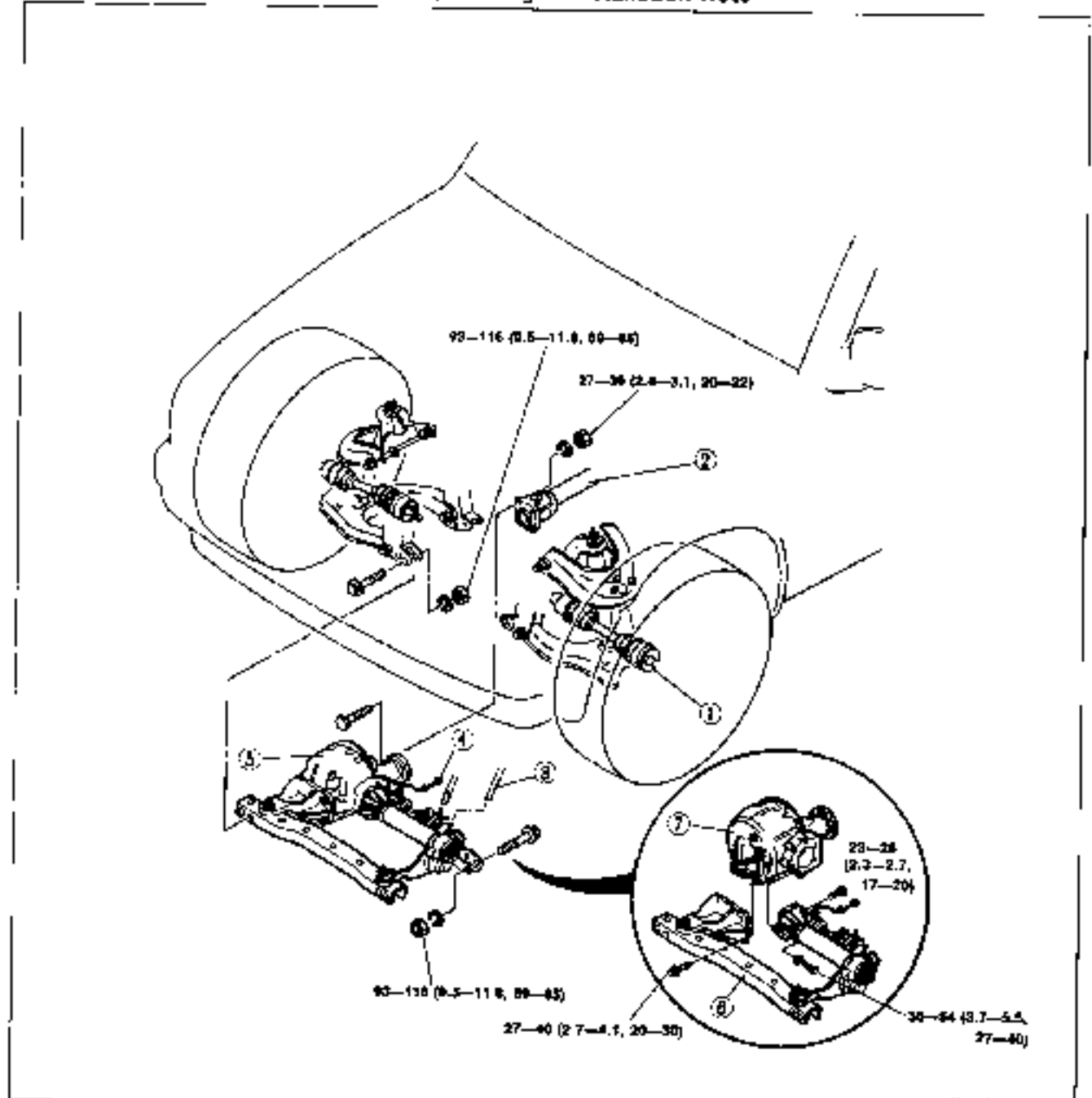


**Front Differential Right Side Oil Seal (4x4)**

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**.



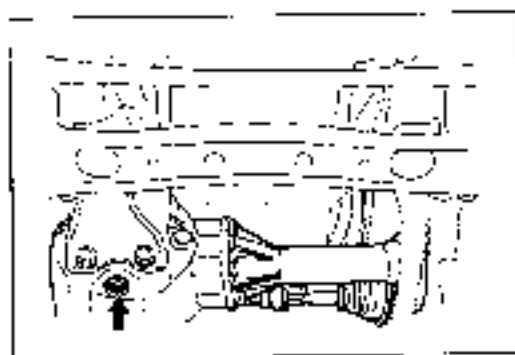
Notes (m-fig. 11.1b)

25L200/013

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

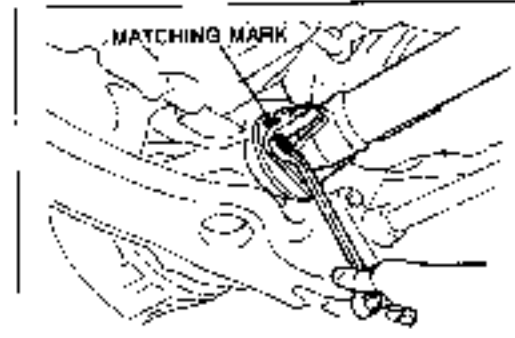
# M

## DIFFERENTIAL (FRONT AND REAR)

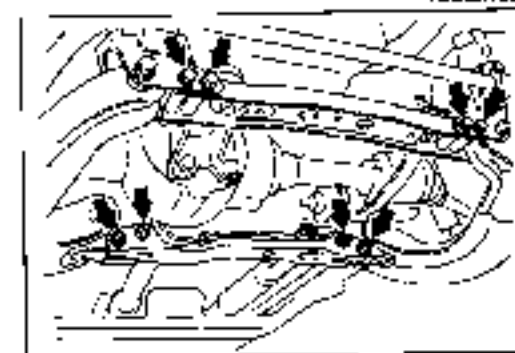


### Removal note

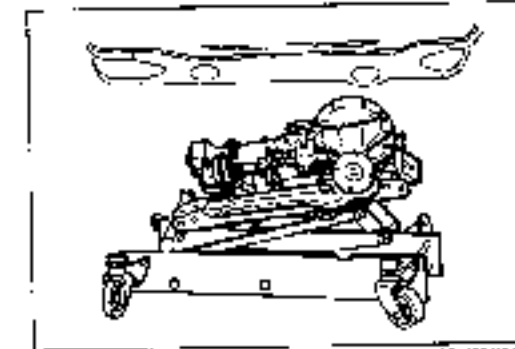
1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the engine undercover.
3. Drain the differential gear oil.
4. Remove the front axle driveshaft. (Refer to page M-37.)



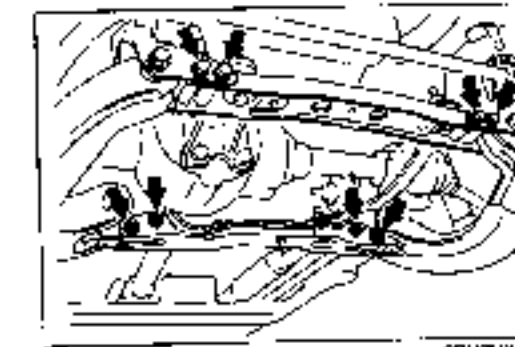
5. Put matching marks on the flanges of the front differential.
6. Remove the front propeller shaft.



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.

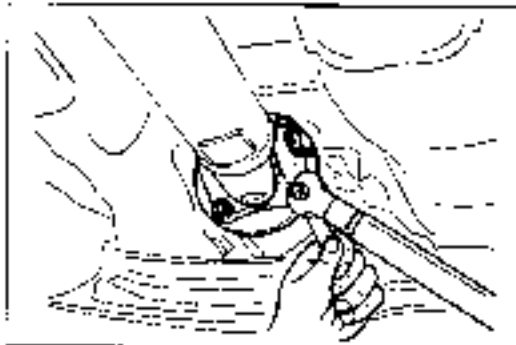


### Installation note

1. Set the differential on the transmission jack.
2. Install the front differential and AFW assembly.

### Tightening torque:

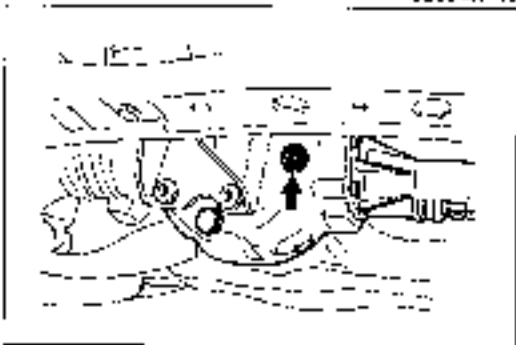
93—116 Nm (9.5—11.8 m-kg, 69—86 ft-lb)



3. Install the propeller shaft. (Refer to Section L.)

**Tightening torque:**

**27–30 Nm (2.8–3.1 m·kg, 20–22 ft·lb)**



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)

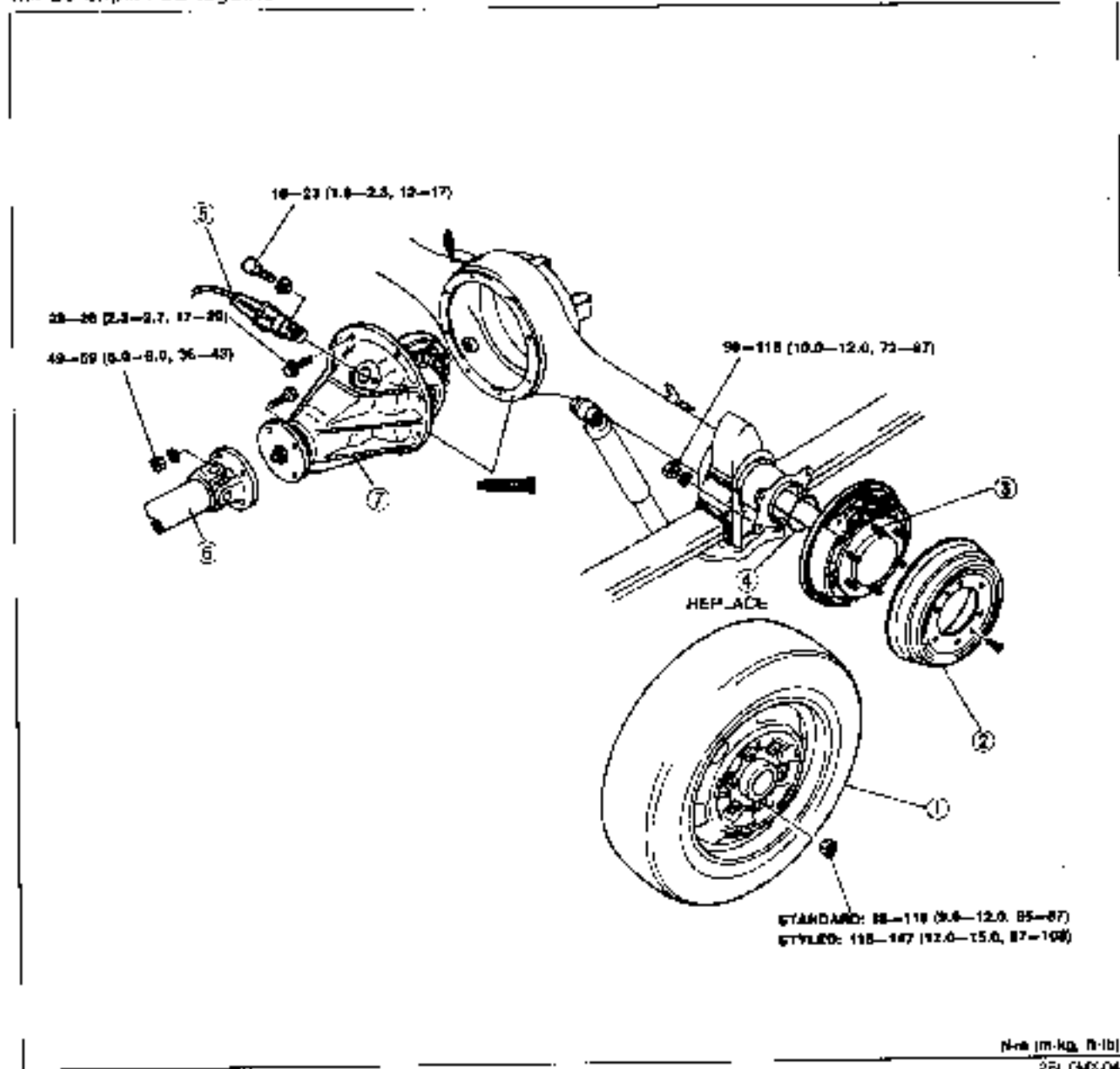
1. Jack up the rear of the vehicle, and support it with safety stands.
2. Drain the rear axle oil.
3. Remove each part in the numbered sequence shown.
4. Pour the rear axle oil until the specific level. (Refer to page M-51.)
5. Install in the reverse order of removal.

### Rear Differential (4x4 and 4x2)

The B2600 rear differential is P-size.

The B7700 rear differential is M-size.

Because the construction of these two parts is the same, their disassemblies, inspection, and reassemblies will be explained together.



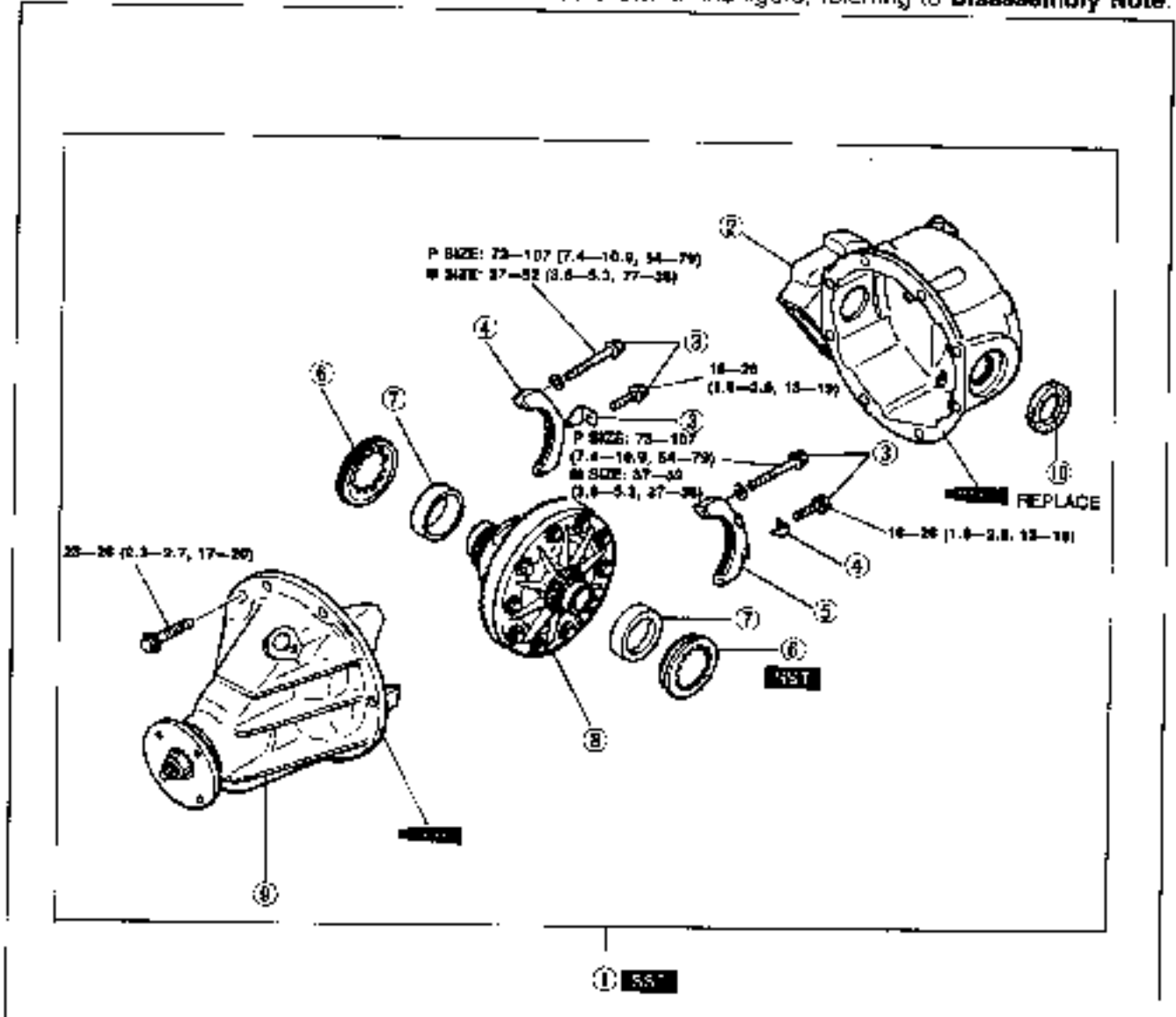
1. Wheel and tire (left and right)
2. Brake drum (left and right; Refer to Section P)
3. Rear axle shaft assembly (left and right)
4. O-ring
5. Rear-wheel ABS sensor

6. Propeller shaft (Refer to Section L)
7. Differential

Disassembly.....	page M-57
Inspection .....	page M-61
Assembly .....	page M-61

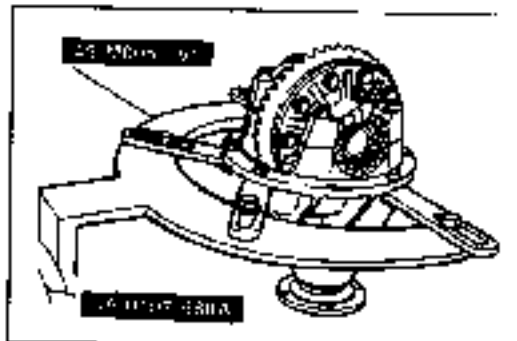
## DISASSEMBLY (4x4 AND 4x2)

Disassemble each part in the numbered sequence shown in the figure, referring to **Disassembly Note**.



Met (m-Eng, N-1b)  
2EL,OMX-04E

- |   |   |  |
|---|---|--|
| <p>1. Differential<br/>Disassembly<br/>Note ..... below</p> | <p>3. Bolts<br/>4. Lock plates<br/>5. Bearing caps<br/>Disassembly<br/>Note ..... page M-58</p> | <p>6. Adjustment screws<br/>7. Bearing outer races<br/>8. Differential gear assembly<br/>9. Differential casing and drive pin-on assembly<br/>10. Oil seal</p> |
|---|---|--|



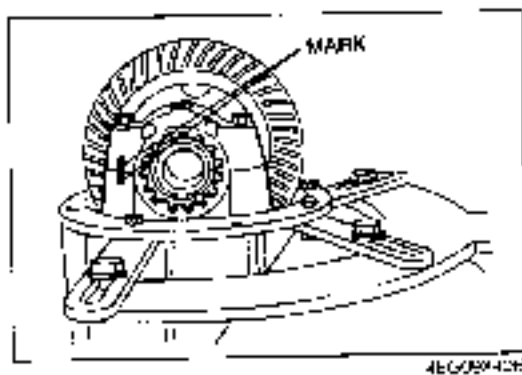
2EL,OMX-047

### Disassembly note Differential

Mount the differential gear assembly on the **SST**.

# M

## DIFFERENTIAL (FRONT AND REAR)



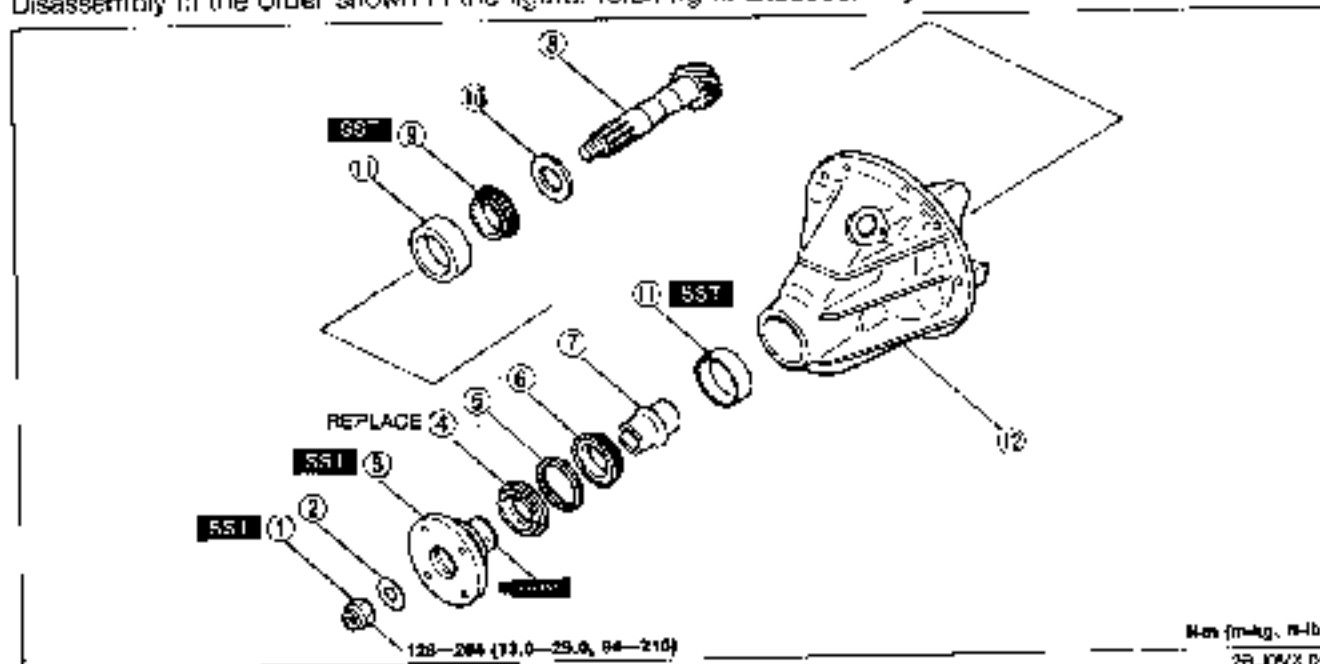
### Bearing Caps

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

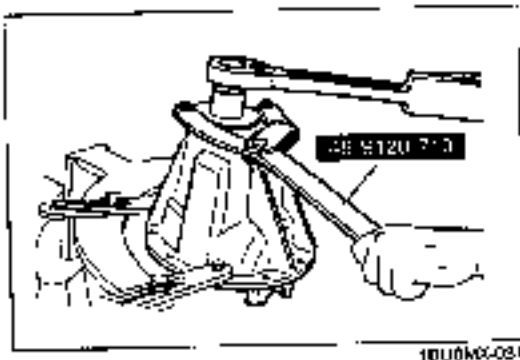
#### Differential casing and drive pinion assembly

Disassembly in the order shown in the figure, referring to **Disassembly note**.



- 1 Locknut  
Disassembly note..... below
- 2 Washer
- 3 Companion flange  
Disassembly note..... page M-59
- 4 Oil seal
- 5 Spacer
- 6 Front bearing  
Disassembly note..... page M-59

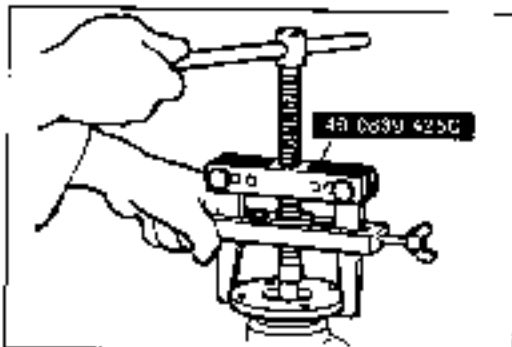
- 7 Collapsible spacer
- 8 Drive pinion
- 9 Rear bearing  
Disassembly note..... page M-59
- 10 Spacer
- 11 Bearing outer races  
Disassembly note..... page M-59
- 12 Differential casing



### Disassembly note

#### Locknut

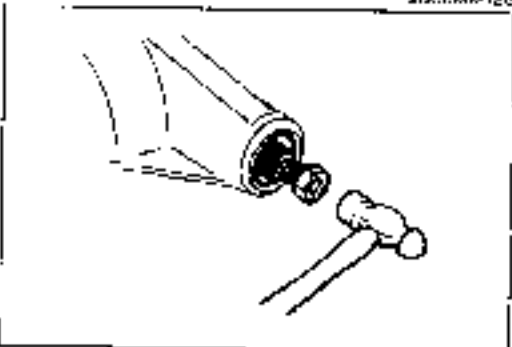
Hold the companion flange with the **SST**, and remove the locknut.



3FA, CMX-126

**Companion flange**

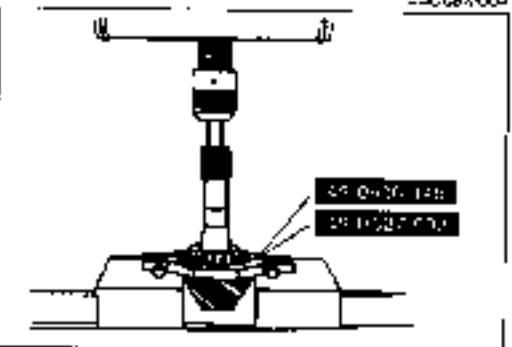
Pull the companion flange off with the SST.



ESL, C9X-004

**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.



HPL, CMX-127

**Rear bearing**

The rear bearing can be pulled off with the SST.

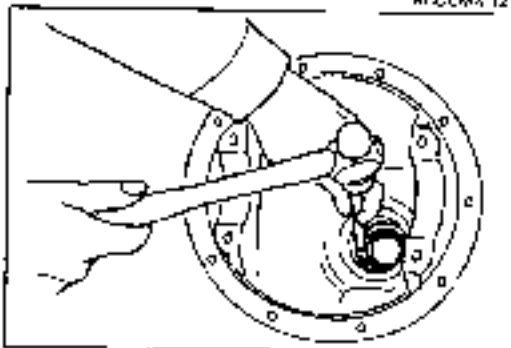
**M-size front differential**

**P-size rear differential: 49 0636 145**

**M-size rear differential: 49 0627 002**

**Note**

Support the drive pinion by hand so that it won't fall.



SRU, C9X-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.

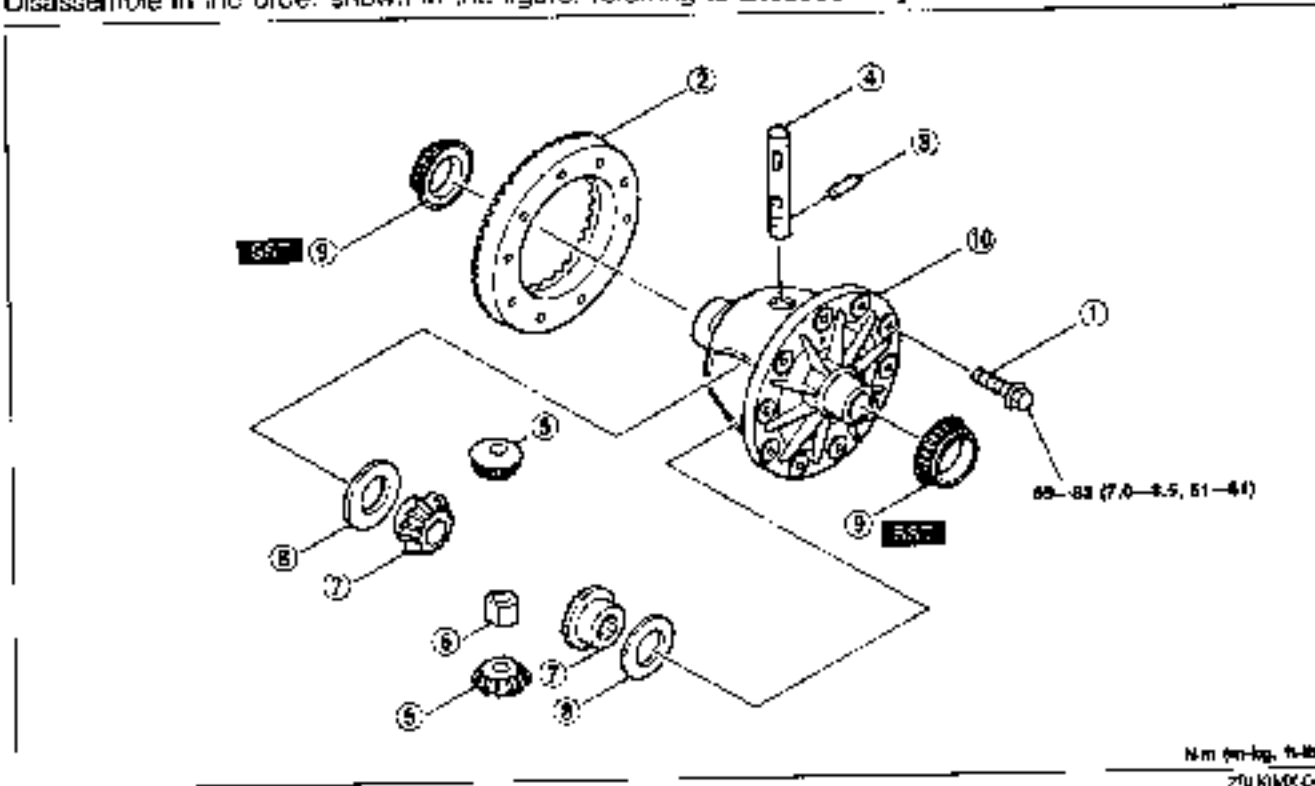
# M

## 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)

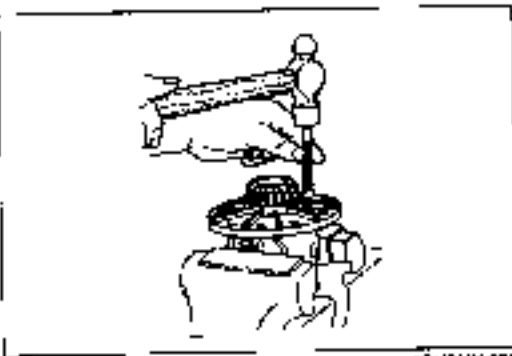
29JUM00-043

1. Bolt
2. Ring gear
3. Knock pin
4. Pinion shaft
5. Pinion gears

6. Thrust block (rear differential)
7. Side gears
8. Thrust washers
9. Side bearings
10. Gear case

Disassembly Note ..... below

Disassembly Note ..... below



10119VX-033

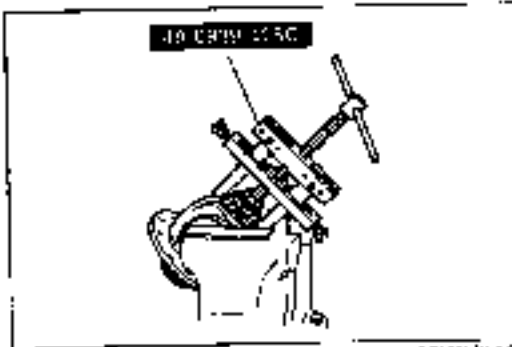
#### Disassembly note

##### 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.



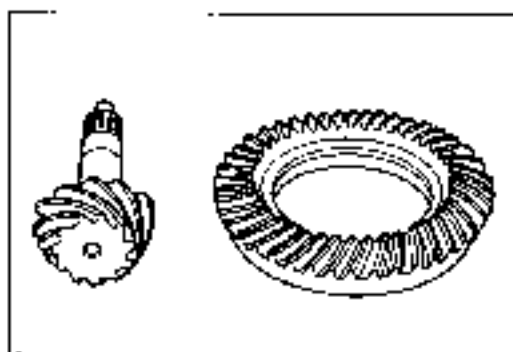
BBJ094X-129

#### Side bearings

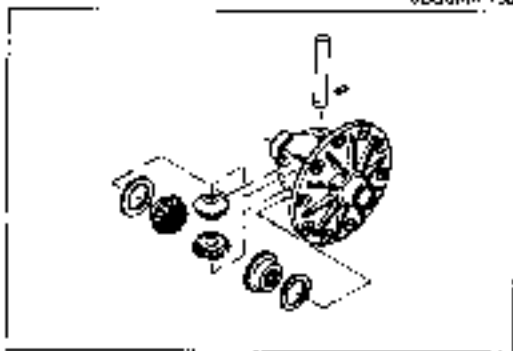
Using parts in the SST, remove the side bearings from the gear case

##### Caution

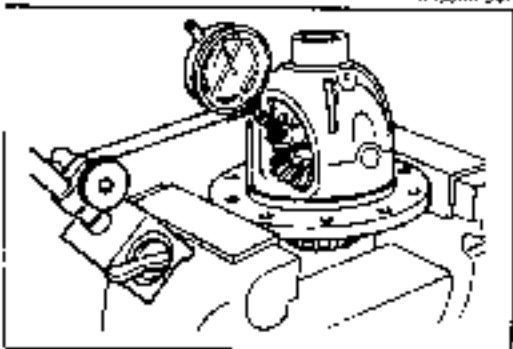
Identify the left bearing so that it can later be reinstalled in the same position.



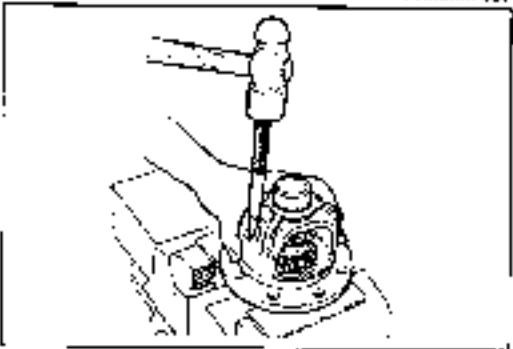
8BUDMX-130



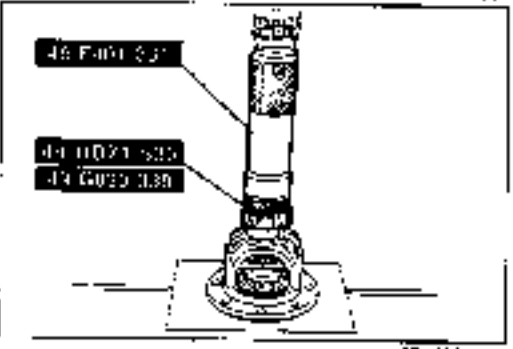
4FGBMX-347



2FLDMX-351



2BLDMX-357



2BLTHMX-002

### 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 (0.0856)

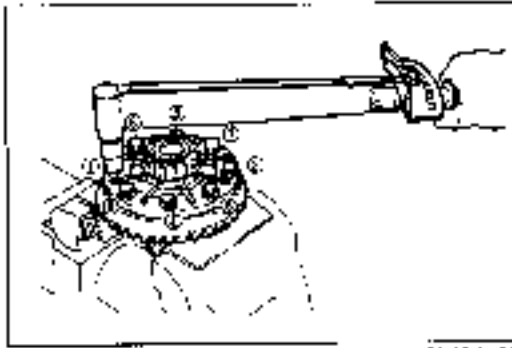
2. Assemble the side gears, thrust washer, thrust block, pinion gears, pinion shaft, and a new knock pin. After installing a new knock pin, make a crimp so that it cannot come out of the gear case.
3. Press the side bearings onto the gear case with the SST.

**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.

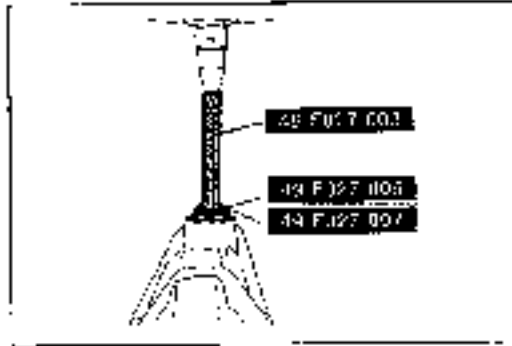
**M****DIFFERENTIAL (FRONT AND REAR)**

98JOMX-101

4. Install the ring gear and tighten the bolts.

**Tightening torque:**

69—83 N·m (7.0—8.5 m·kg, 51—61 ft·lb)



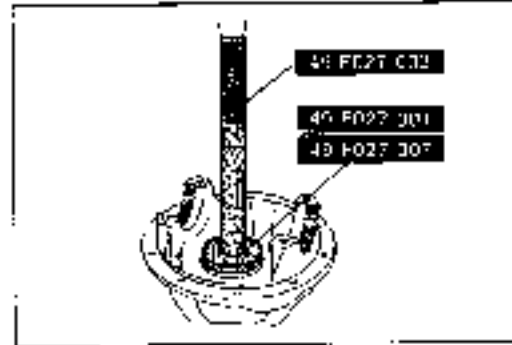
98JOMX-103

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: 48 F027 005



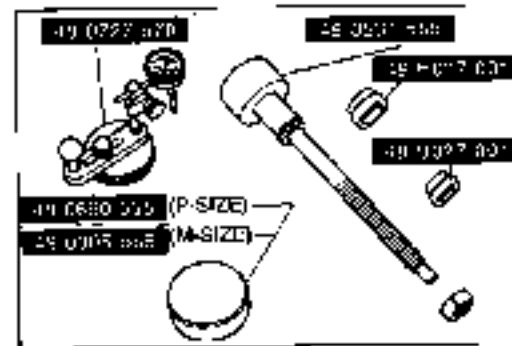
98JOMX-104

6. Press fit the ring gear side bearing outer races with the SST.

4x4 M-size front differential: 49 F027 007

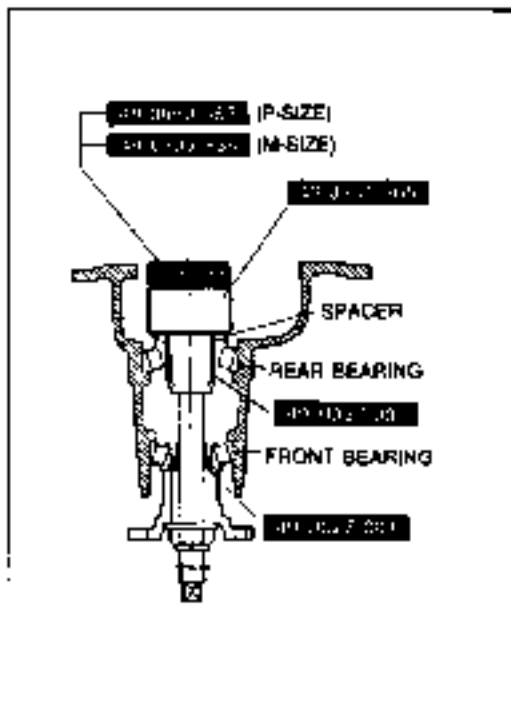
4x4 P-size rear differential: 49 F027 004

4x2 M-size differential: 49 F027 004

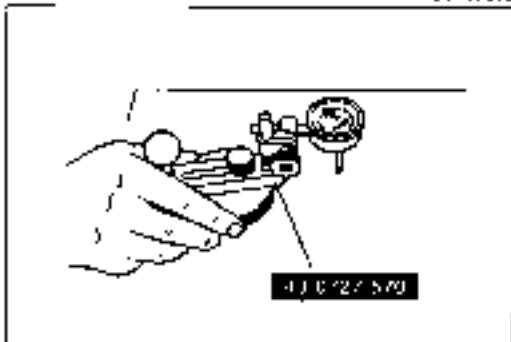


98JOMX-105

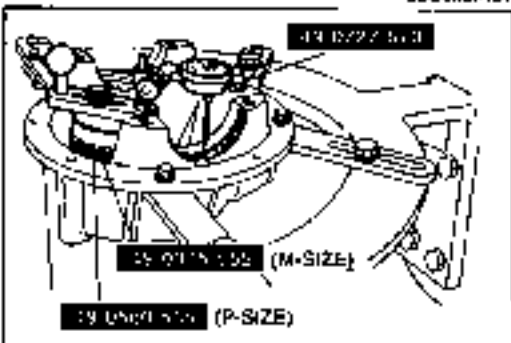
7. Adjust the pinion as follows with the SST.



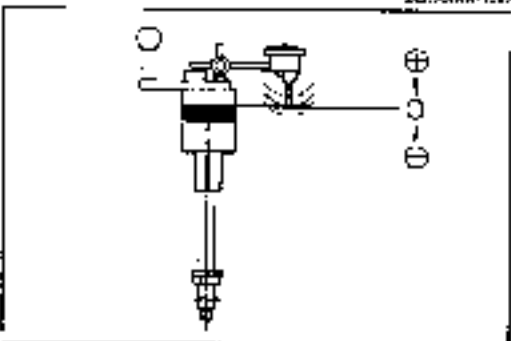
78U04X-063



56L0Mx-137



26L0Mx-136



98U04X-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** or the surface plate, and set the dial indicator to zero.

12. Place the **SST**.
13. Place the laser 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.

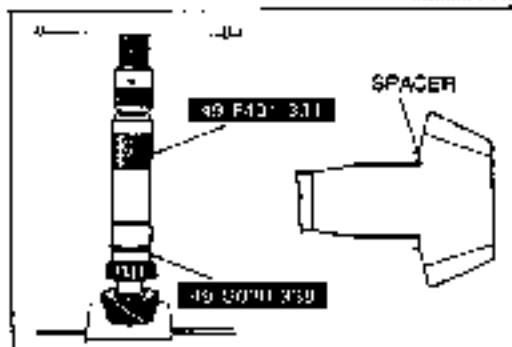
14. Add the two (left and right) values obtained by the measurements taken in step 8, and divide the total by 2.

**Standard: 0mm (0 In)**

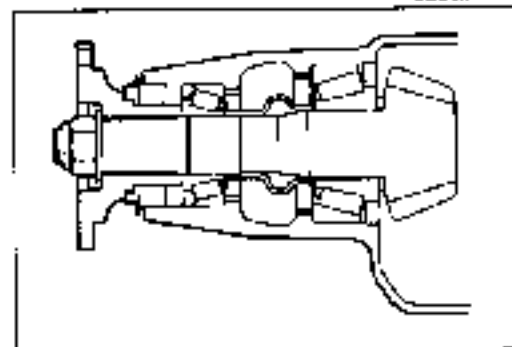


Mark	Thickness	Mark	Thickness
09	3.09mm (0.1213 in)	20	3.29mm (0.1295 in)
11	3.11mm (0.1224 in)	22	3.32mm (0.1307 in)
14	3.14mm (0.1236 in)	26	3.35mm (0.1319 in)
17	3.17mm (0.1248 in)	38	3.38mm (0.1331 in)
20	3.20mm (0.1260 in)	41	3.41mm (0.1343 in)
25	3.23mm (0.1271 in)	44	3.44mm (0.1354 in)
26	3.25mm (0.1283 in)	47	3.47mm (0.1366 in)

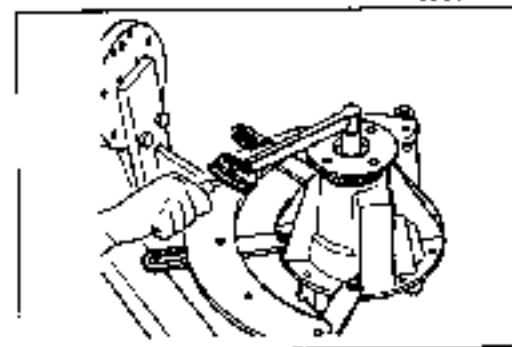
9B.XM4-140



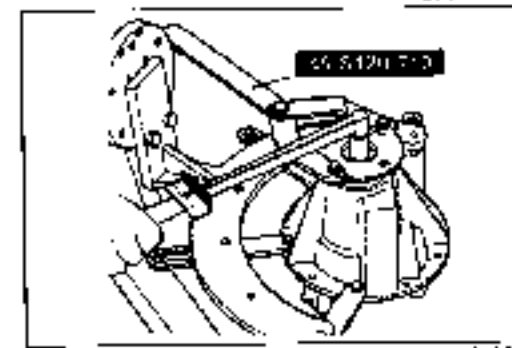
5B.J06X-141



50U0KX-142



2H.XM4-154



1B.CM4-005

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)

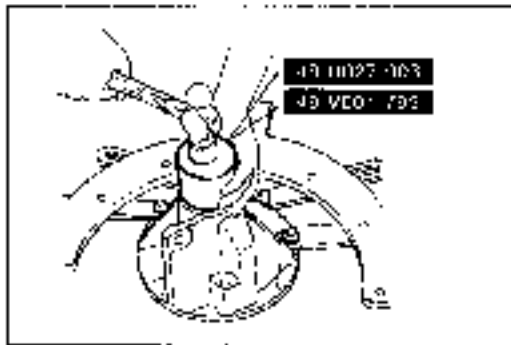
**P-size:**

1.3—1.8 N·m (13—18 cm·kg, 11.3—15.6 in·lb)

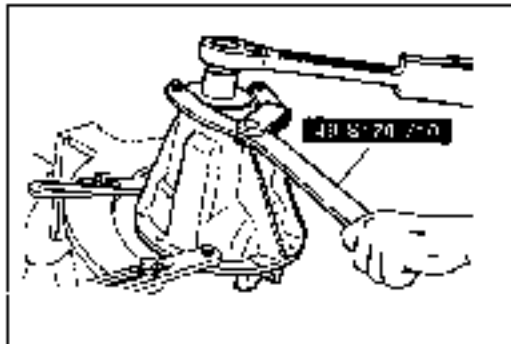
**Locknut tightening torque:**

128—284 N·m (13.0—29.0 m·kg, 94—210 ft·lb)

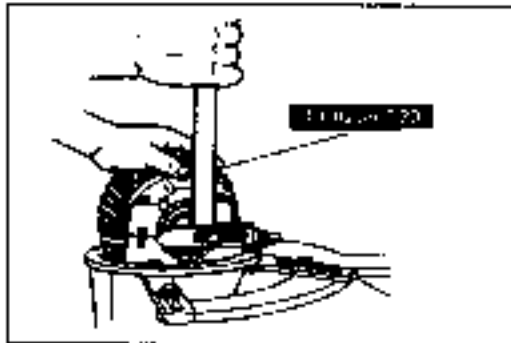
- If the specified preload cannot be obtained within the specified tightening torque range, replace the collapsible spacer with a new one, and check it again.
- Remove the locknut, washer, and companion flange.



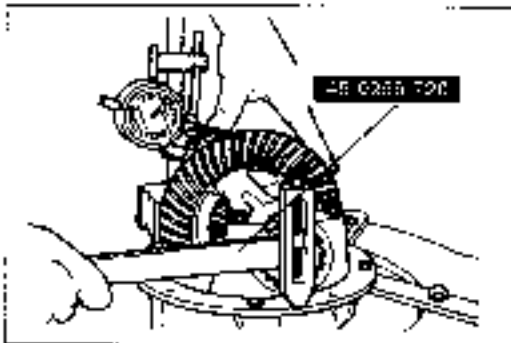
3BU0MX-144



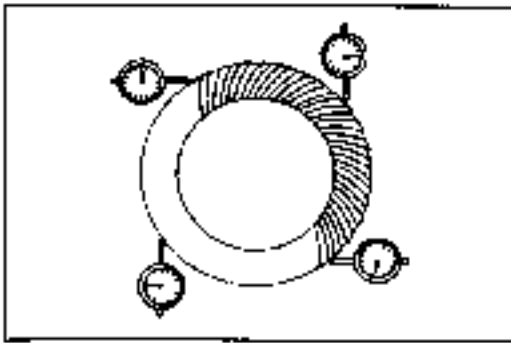
3BU0MX-145



2BU0MX-255



9BU0MX-147



4E339X-084

(5) Tap the new oil seal into the carrier with the **SST**

**M-size differential: 49 UD27 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 slide bearing preload as follows.

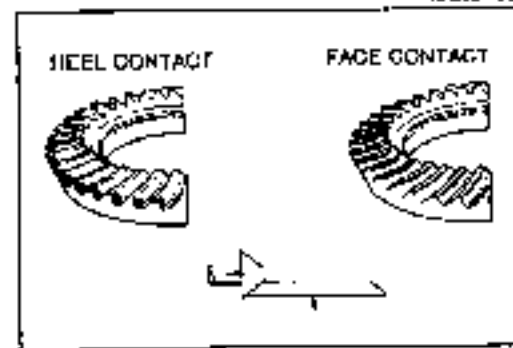
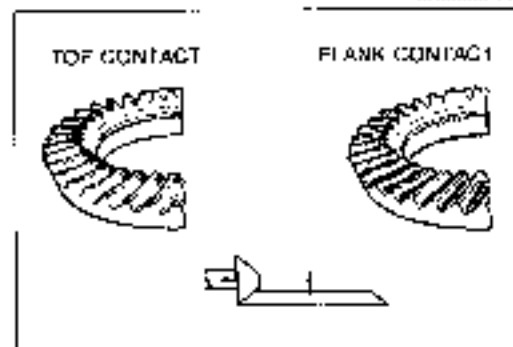
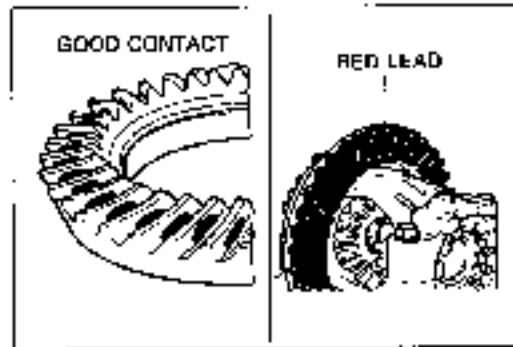
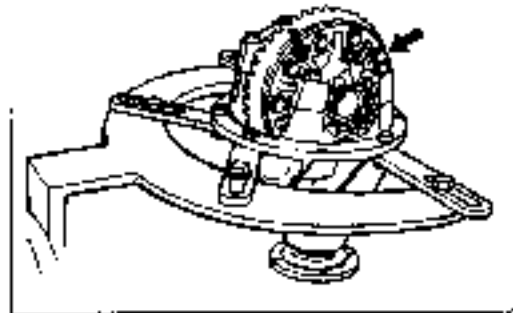
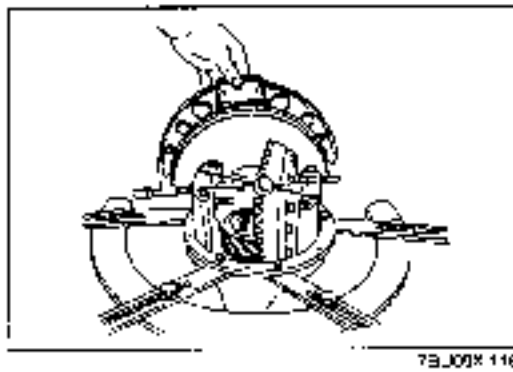
(1) Mark the ring gear at four points at approximately 90° intervals on the ring gear, and mount a dial indicator to the carrier so that the feeler comes in contact at a 90° angle with one of the ring gear teeth.

(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)**



- (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 Nm (3.8—5.3 m·kg, 27—38 ft·lb)

**P-size differential:**

73—107 Nm (7.4—10.9 m·kg, 54—79 ft·lb)

- 2) 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.

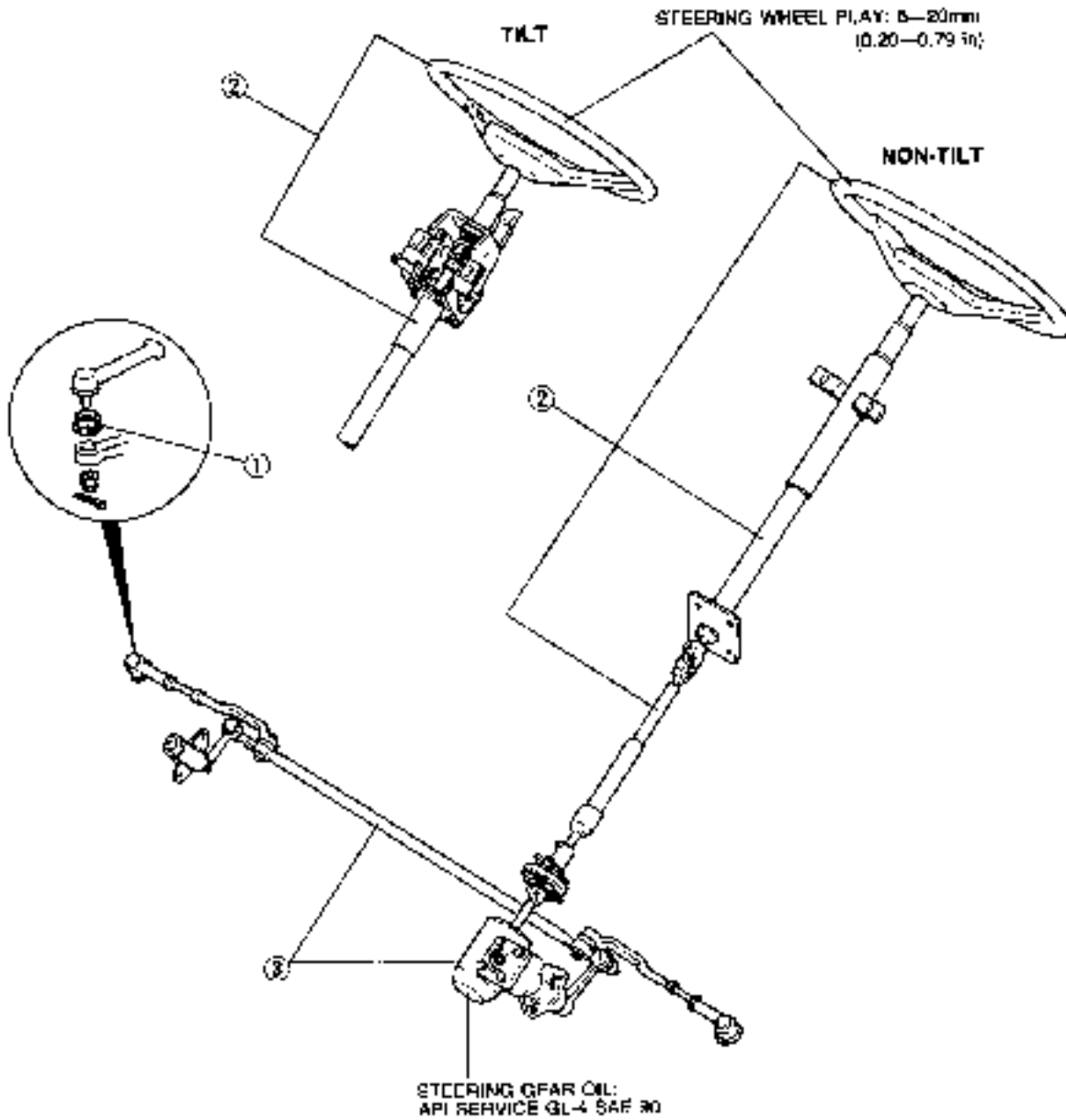
# STEERING SYSTEM

<b>INDEX</b> .....	<b>N- 2</b>
<b>OUTLINE</b> .....	<b>N- 5</b>
SPECIFICATIONS.....	<b>N- 5</b>
<b>MANUAL STEERING</b> .....	<b>N- 5</b>
PREPARATION.....	<b>N- 5</b>
TROUBLESHOOTING GUIDE.....	<b>N- 5</b>
BOOI.....	<b>N- 7</b>
STEERING WHEEL AND COLUMN.....	<b>N- 8</b>
STEERING GEAR AND LINKAGE.....	<b>N-12</b>
<b>ENGINE SPEED SENSING POWER</b>	
<b>STEERING</b> .....	<b>N-18</b>
PREPARATION.....	<b>N-18</b>
TROUBLESHOOTING GUIDE.....	<b>N-18</b>
AIR BLEEDING.....	<b>N-20</b>
POWER STEERING FLUID.....	<b>N-21</b>
STEERING WHEEL AND COLUMN.....	<b>N-24</b>
STEERING GEAR AND LINKAGE.....	<b>N-24</b>
OIL PUMP.....	<b>N-28</b>
DRIVE BELT.....	<b>N-35</b>

1ELU7M-001

INDEX

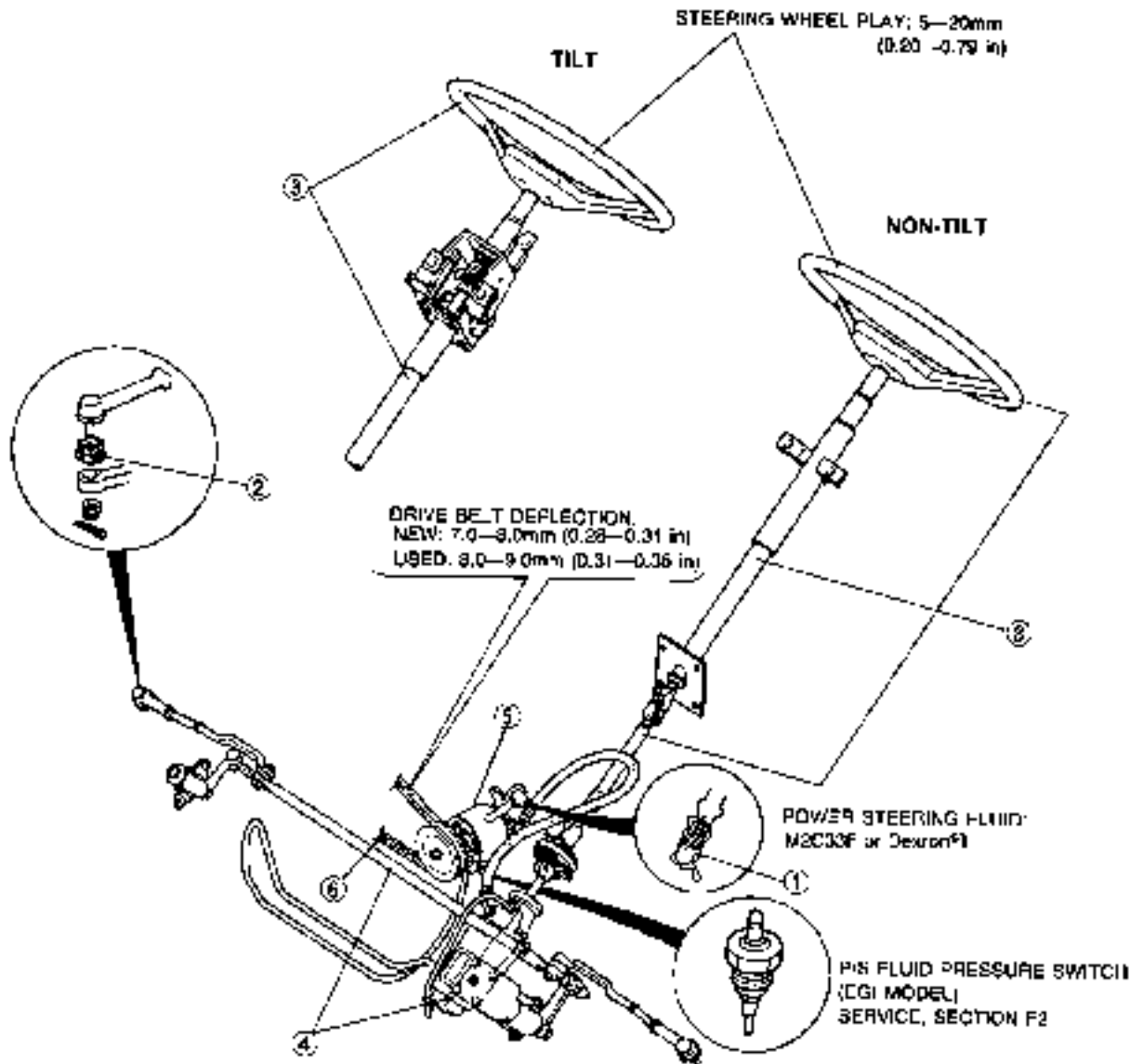
B2200 MANUAL STEERING



3600A-1012

1. Boot Replacement.....	page N-7	3. Steering gear and linkage On-vehicle inspection.....	page N-12
2. Steering wheel and column On-vehicle inspection.....	page N-9	Removal, inspection, and Installation.....	page N-12
Removal and installation.....	page N-10	Disassembly, inspection, and Assembly.....	page N-14
Inspection.....	page N-11		

**B2200 POWER STEERING**

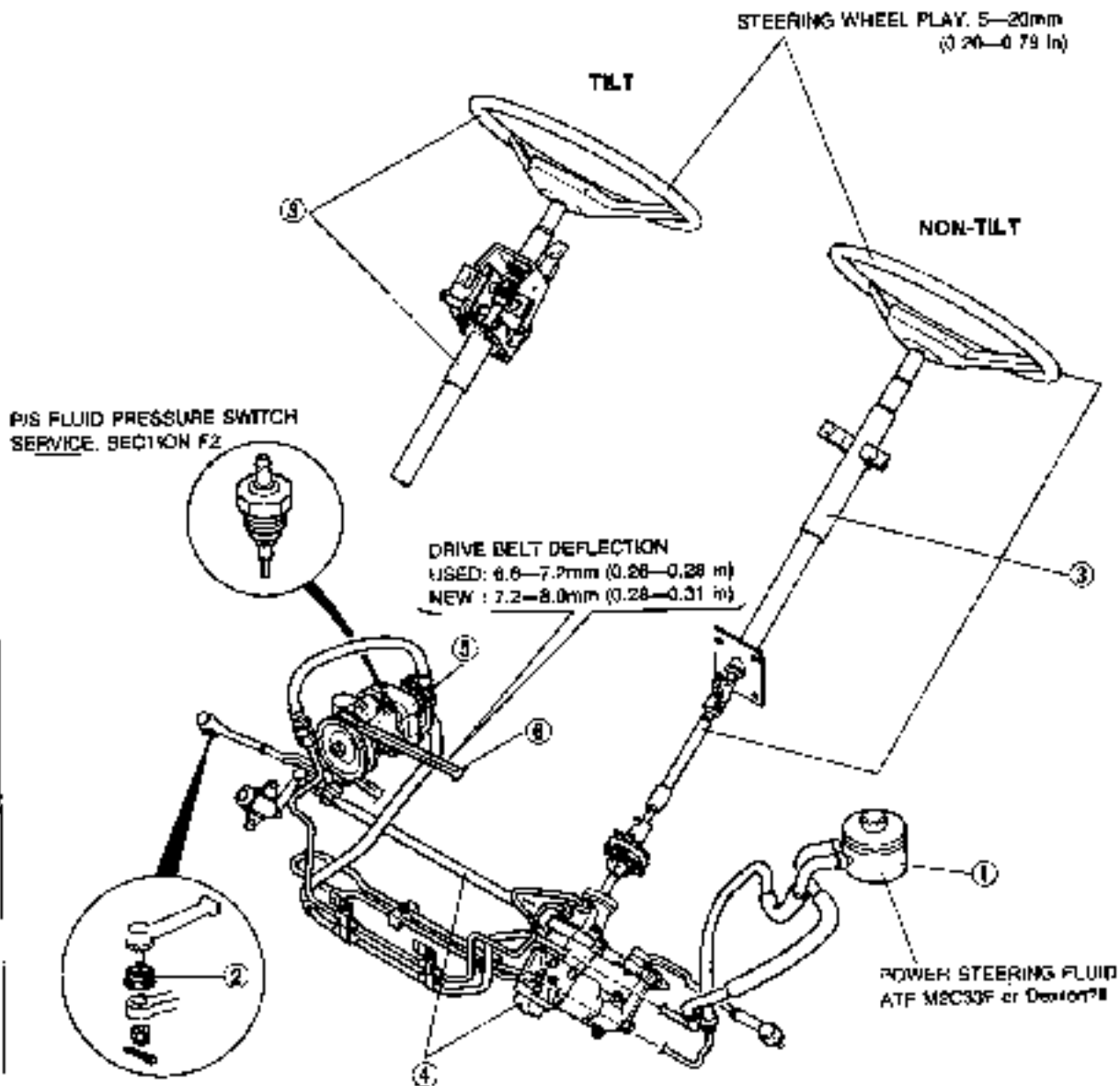


1. Power steering fluid On-vehicle inspection.....	page N 21	4. Steering gear and linkage Removal, inspection, and installation.....	page N-24
2. Boot Replacement.....	page N- 7	Disassembly, inspection, and Assembly.....	page N-26
3. Steering wheel and column On-vehicle inspection.....	page N 24	5. Oil pump Removal and installation ...	page N 28
Removal and installation.....	page N-10	Disassembly, inspection, and Assembly.....	page N-32
Inspection.....	page N-11	6. Drive belt Inspection and Adjustment, ..	page N 35

1903N6-010

N

B2600 POWER STEERING



19L0HX-003

1. Power steering fluid On-vehicle inspection.....	page N-21	4. Steering gear and linkage Removal, inspection, and Installation.....	page N-24
2. Boot Replacement.....	page N-7	Disassembly, inspection, and Assembly.....	page N-26
3. Steering wheel and column On-vehicle inspection.....	page N-24	5. Oil pump Removal and installation.....	page N-28
Removal and installation.....	page N-10	Disassembly, inspection, and Assembly.....	page N-34
Inspection.....	page N-11	6. Drive belt Inspection and adjustment.....	page N-35

OUTLINE

SPECIFICATIONS




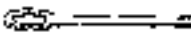
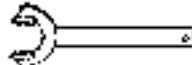
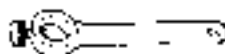
Item	Model	82200		62600
		Manual	Power	Power
Steering wheel	Outer diameter	mm (in)		
	Lock-to-ock	turns		
Steering shaft and joint	Shell type	Collapsible, non tilt or tilt		
	Joint type	Cross-shaft and rubber coupling		
	Tilt stroke	mm (in)		
Steering gear	Type	Ball nut		
	Gear ratio	21 : 25 : 1	17.8 : 1	
Oil	Type	API service SAE 90		
	Capacity*	liters (US qt, Imp qt)	0.34 (0.36, 0.30)	0.80 (0.85, 0.70) 1.20 (1.27, 1.00)
Power steering	Ass't. type	Engine driven sensing		

\* Power steering: complete system

219A00X-001

MANUAL STEERING

PREPARATION

49 1243 785 Insulator, dust boot		49 01-8 650C Puller ball joint		49 0223 805E Pulver, pitman arm	
49 1391 680 Wrench, locknut		49 1D39 585A Adjust. wrench		49 0180 510B Attachment, steering worm bearing preload measurement	

2BL00N-029

N

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Steering "heavy"	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
Steering wheel effort uneven	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-2



## TROUBLESHOOTING GUIDE (Cont'd)

Problem	Possible Cause	Remedy	Page
Excessive steering wheel play	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-17 N-10 N-12 N-17
Steering wheel pulls to one side	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 V Section R Section M
Poor steering wheel return	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
General instability while driving	Deformed steering linkage Incorrect tire pressures Damaged or unbalanced wheels 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
"Shimmy" occurs (steering wheel vibrates left/right)	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 Crossed or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Repair Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten 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 R
Abnormal noise from steering system	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

CH. 100-605

**BOOT**

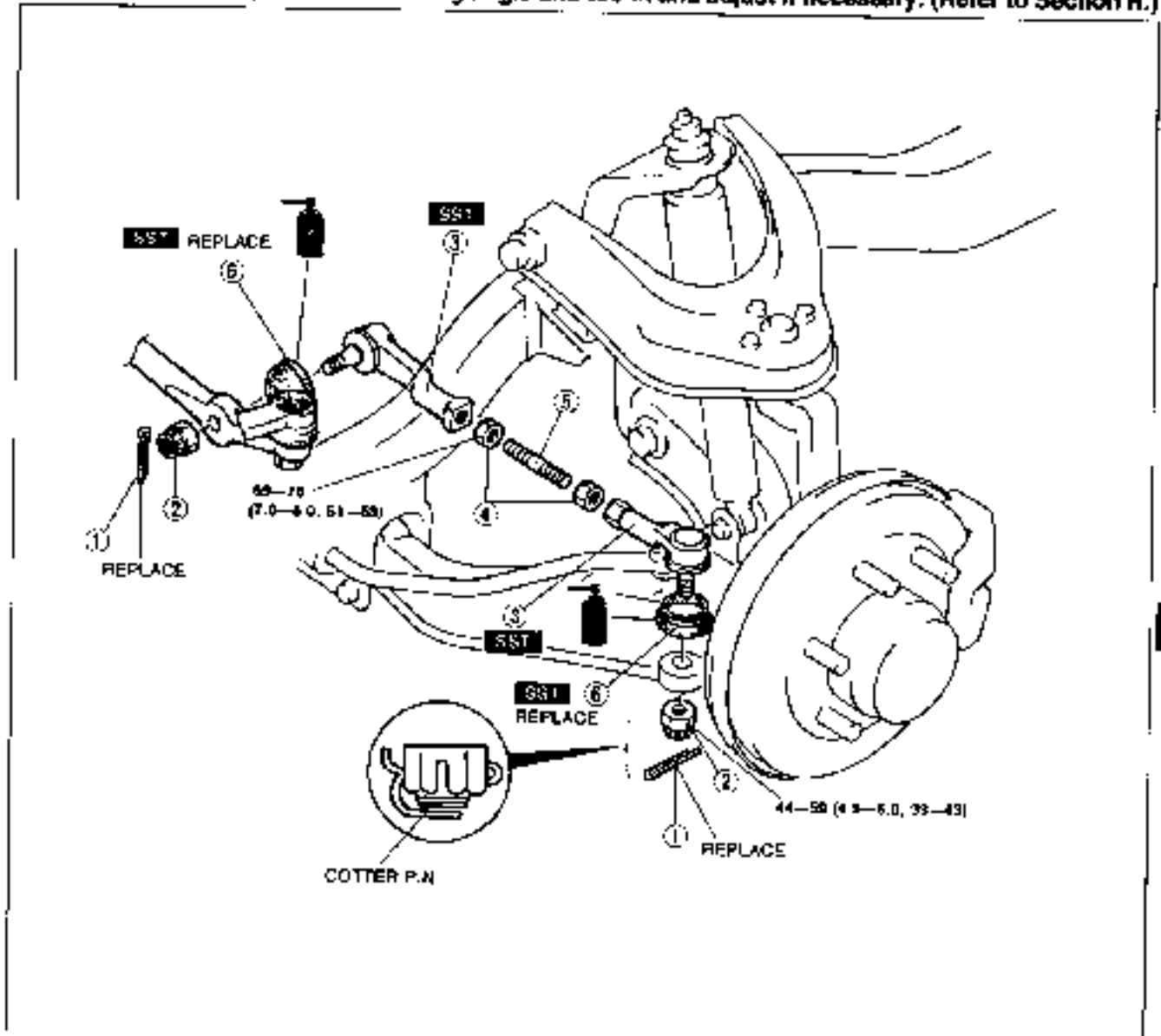
**Replacement**

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)**

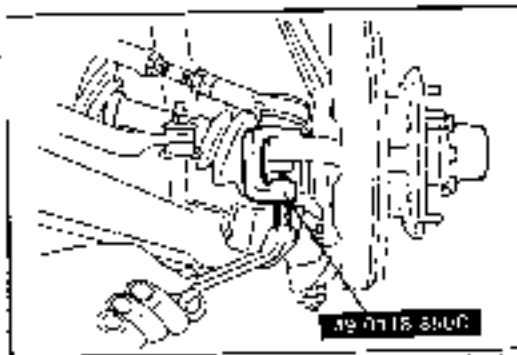
**Note**

After replacement, check the turning angle and toe-in and adjust if necessary. (Refer to Section F.)

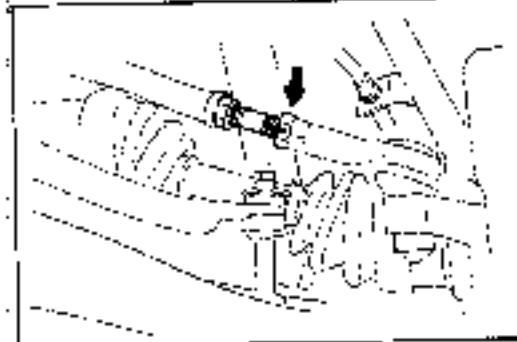


N-m (m·kg, ft·lb)  
 2611K127-002

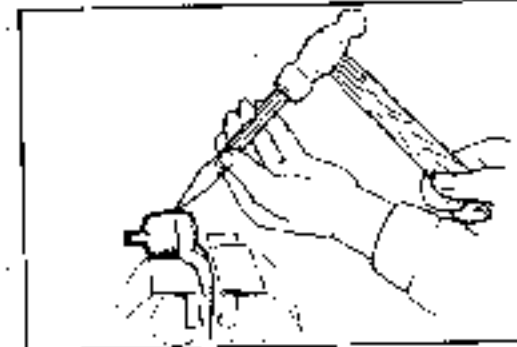
- |                                |                                     |
|--------------------------------|-------------------------------------|
| 1. Cotter pin                  | 5. Tie rod                          |
| 2. Nut                         | 6. Ball joint boot (inner or outer) |
| 3. Ball joint (inner or outer) | Removal Note ..... page N-8         |
| Removal Note ..... page N-8    | Installation Note ..... page N-8    |
| 4. Locknut                     |                                     |



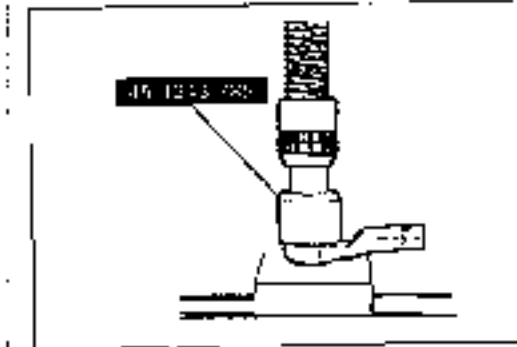
92UCN8-010



28LGVY 030



92UCN8 012



28UCN8-100

**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)**

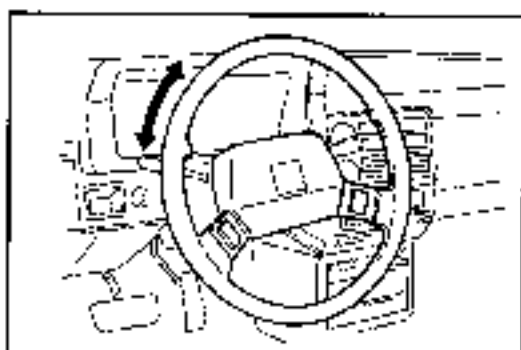
Secure the ball joint in a vise. Place a chisel against the boot and hold it at the angle shown. Remove the boot by tapping with a hammer.

**Caution**

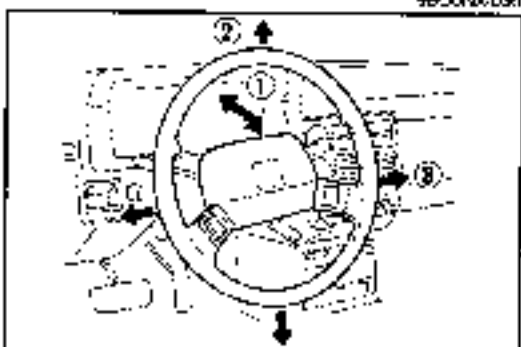
Be careful not to scar the area where the boot attaches to the ball joint.

**Installation note****Ball joint boot (inner or outer)**

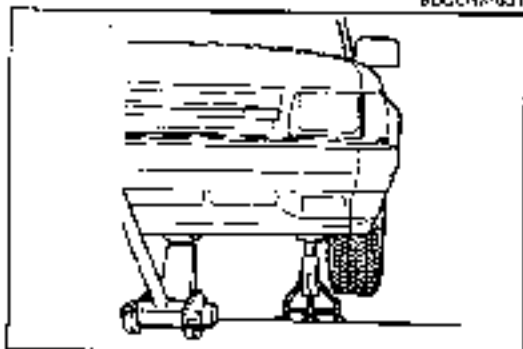
1. Wipe away the grease on ball stud.
2. Put a small amount of grease (lithium base, NLGI No.2) into the new boot and set it onto the ball joint. Press the boot onto the ball joint with the SST.
3. Wipe away any grease that has been expelled from the boot.



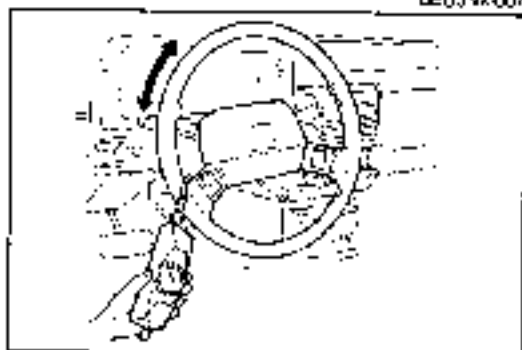
98J10N4-030



88LCHX-031



08U10X-007



79J10X-012

**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.

**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.

**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.

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**

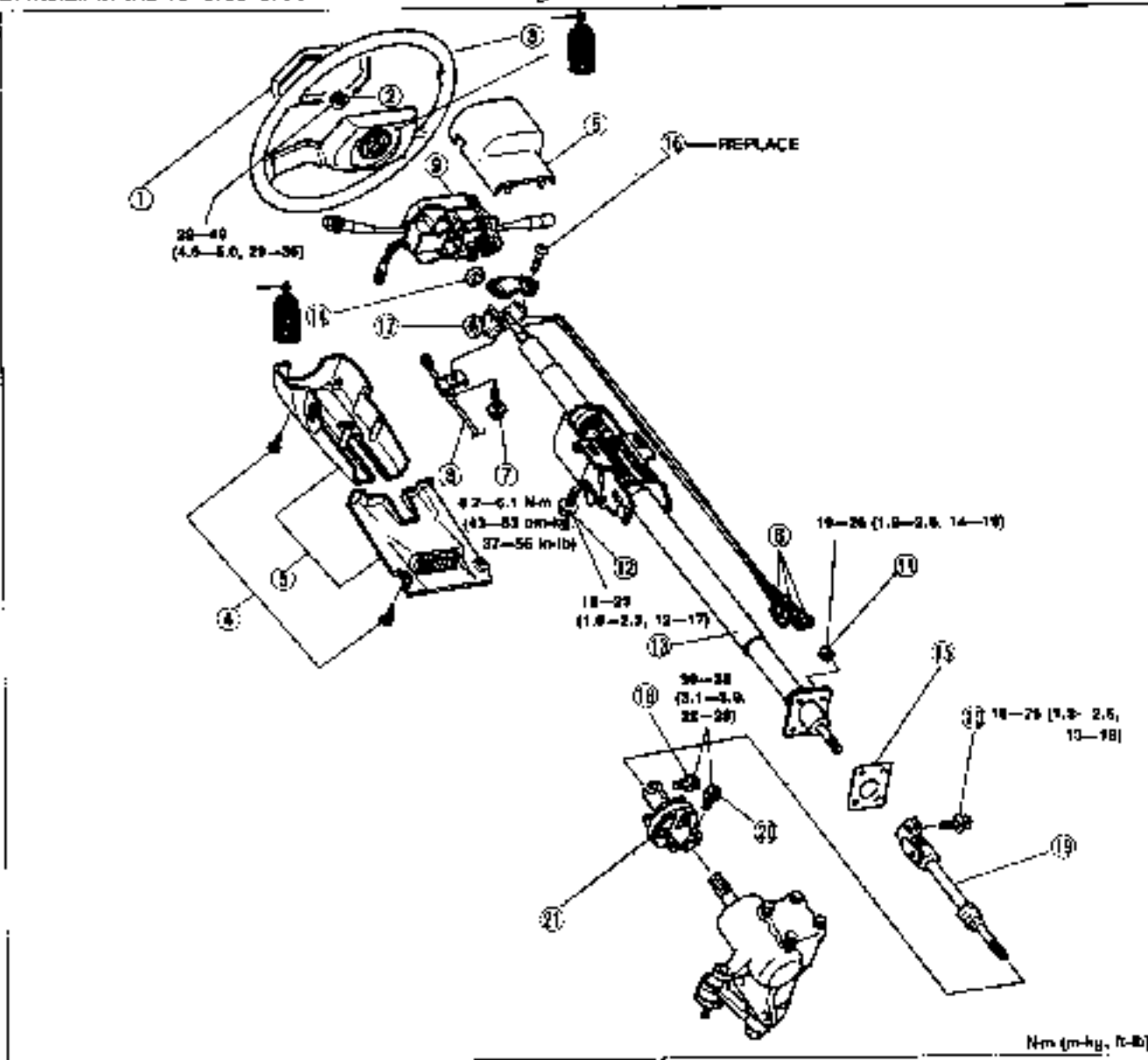
Measure after turning the steering wheel to the left and right 5 times or more.

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.

N

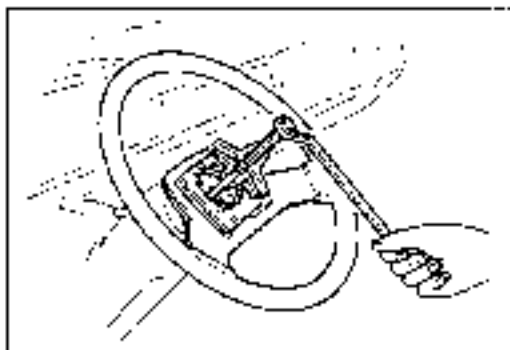
**Removal, Inspection, and Installation**

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**.



Nm (m-kg, ft-lb)  
25JUNX-004

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Horn cover</li> <li>2. Locknut</li> <li>3. Steering wheel<br/>Removal Note ..... page N-11</li> <li>4. Screws</li> <li>5. Column cover</li> <li>6. Combination switch connectors</li> <li>7. Bolt (A/T)</li> <li>8. Key-interlock cable (A/T)</li> <li>9. Combination switch</li> <li>10. Bolt</li> <li>11. Nuts</li> <li>12. Bolts</li> <li>13. Steering shaft assembly<br/>Inspection ..... page N-11</li> </ul> | <ul style="list-style-type: none"> <li>14. Bearing</li> <li>15. Dust cover</li> <li>16. Bolts</li> <li>17. Steering lock assembly<br/>Removal Note ..... page N-11<br/>Inspection ..... page N-11<br/>Installation Note ..... page N-11</li> <li>18. Bolt</li> <li>19. Intermediate shaft<br/>Inspection ..... page N-11</li> <li>20. Bolt</li> <li>21. Rubber coupling<br/>Inspection ..... page N-11</li> </ul> |
|--|---|



83JUNX-034

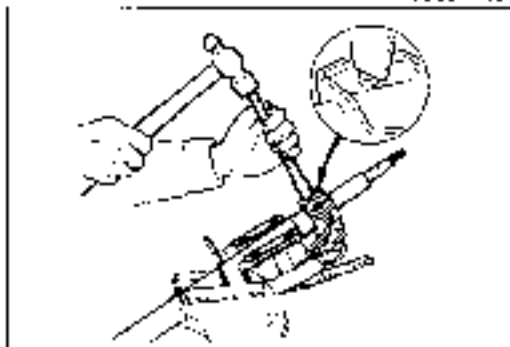
**Removal note**

**Steering wheel**

Remove the steering wheel with a suitable puller.

**Caution**

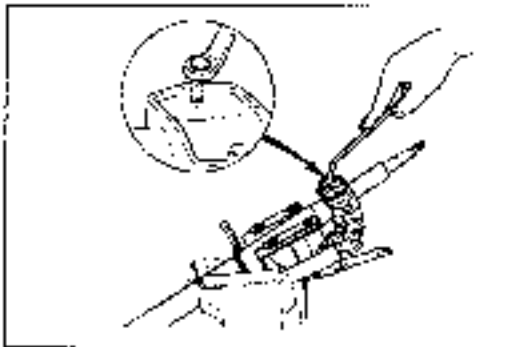
**Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**



85LCNX-006

**Steering lock assembly**

Use a chisel to make a groove in the head of each steering lock installation bolt. Remove the bolts with a screwdriver; then remove the steering lock assembly.

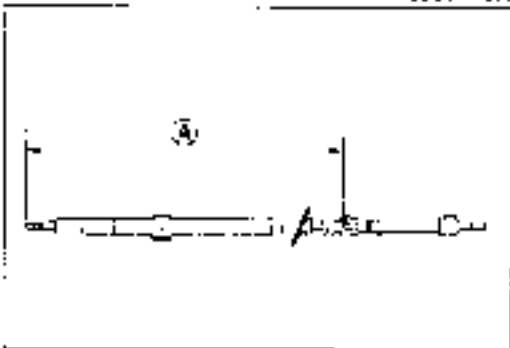


20U04X-005

**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.



25U04X-007

**Inspection**

Check for the following and repair or replace as necessary.

1. Dimensions of steering shaft

**Standard dimensions (A):**

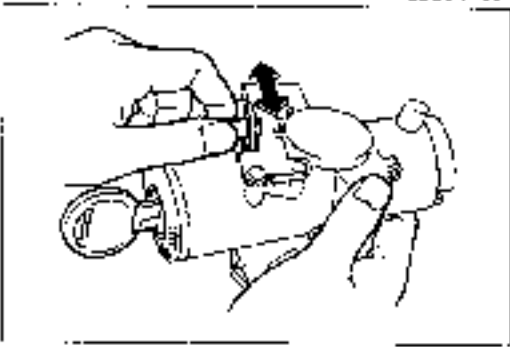
**833.8 ± 1.0mm (32.8 ± 0.04 in)**

2. Operation of intermediate shaft joint

3. Worn of rubber coupling.

4. Steering lock assembly (Automatic transmission only)

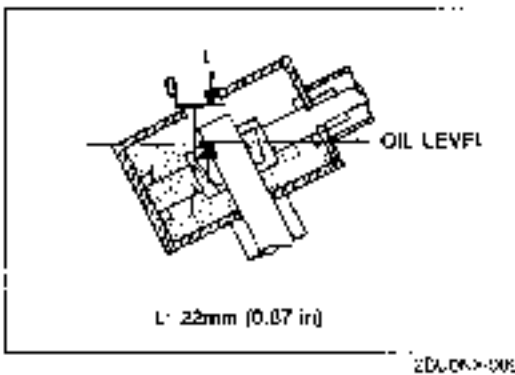
Verify that the cable connector does not move when the key is in the LOCK position and that it moves freely with the key in other positions



2UJ04X-005

**Steering wheel**

With the wheel into straight-ahead position



**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.

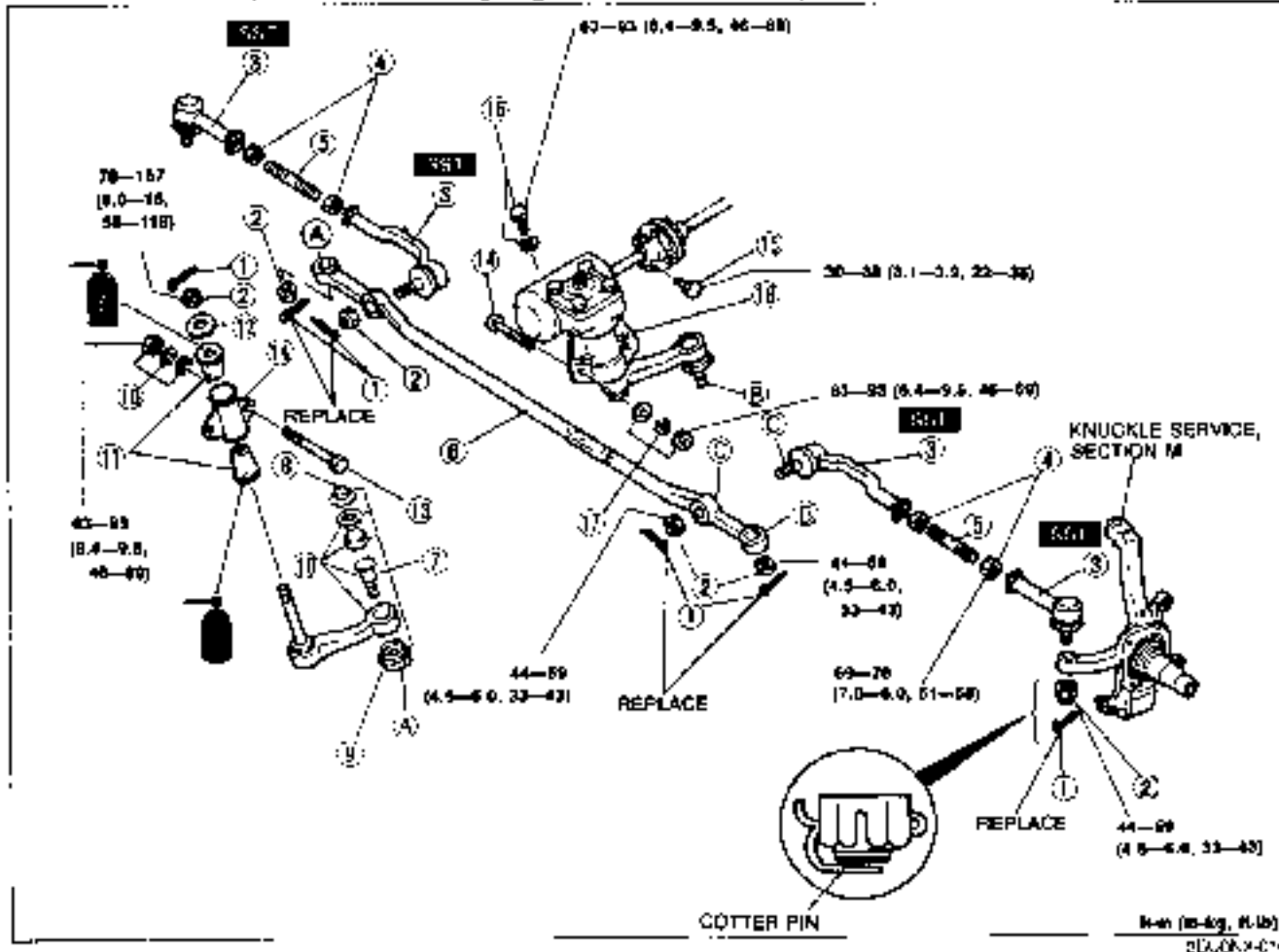
**Tightening torque: Non-styled wheel 88—118 N·m (9—12 m·kg, 65—87 ft·lb)**

**Styled wheel 118—147 N·m (12—15 m·kg, 87—108 ft·lb)**

7. Inspect all parts and repair or replace as necessary.

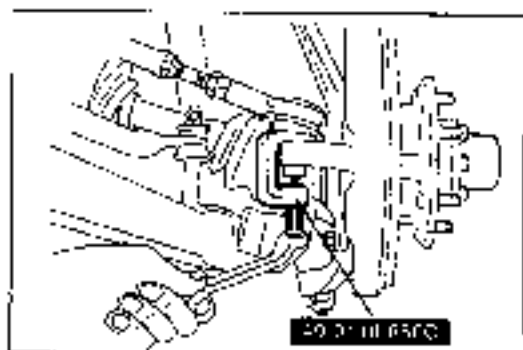
**Note**

**After installation, check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)**



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Cotter pin</li> <li>2. Nut</li> <li>3. Ball joint<br/>Removal Note..... page N-8, 13<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> </ul> | <ul style="list-style-type: none"> <li>10. Idler arm</li> <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. Bolt</li> <li>16. Bolt and washer</li> <li>17. Bolts, nuts, and washers</li> <li>18. Steering gear assembly<br/>Disassembly, Inspection, and<br/>Assembly..... page N-14</li> </ul> |
|--|---|

2BU0NXC11



9ELCHX-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 (Ⓒ—Ⓒ), the pitman arm from the center link (Ⓐ—Ⓑ), and the idler arm from the center link (Ⓐ—Ⓐ).



### Disassembly, Inspection, and Assembly

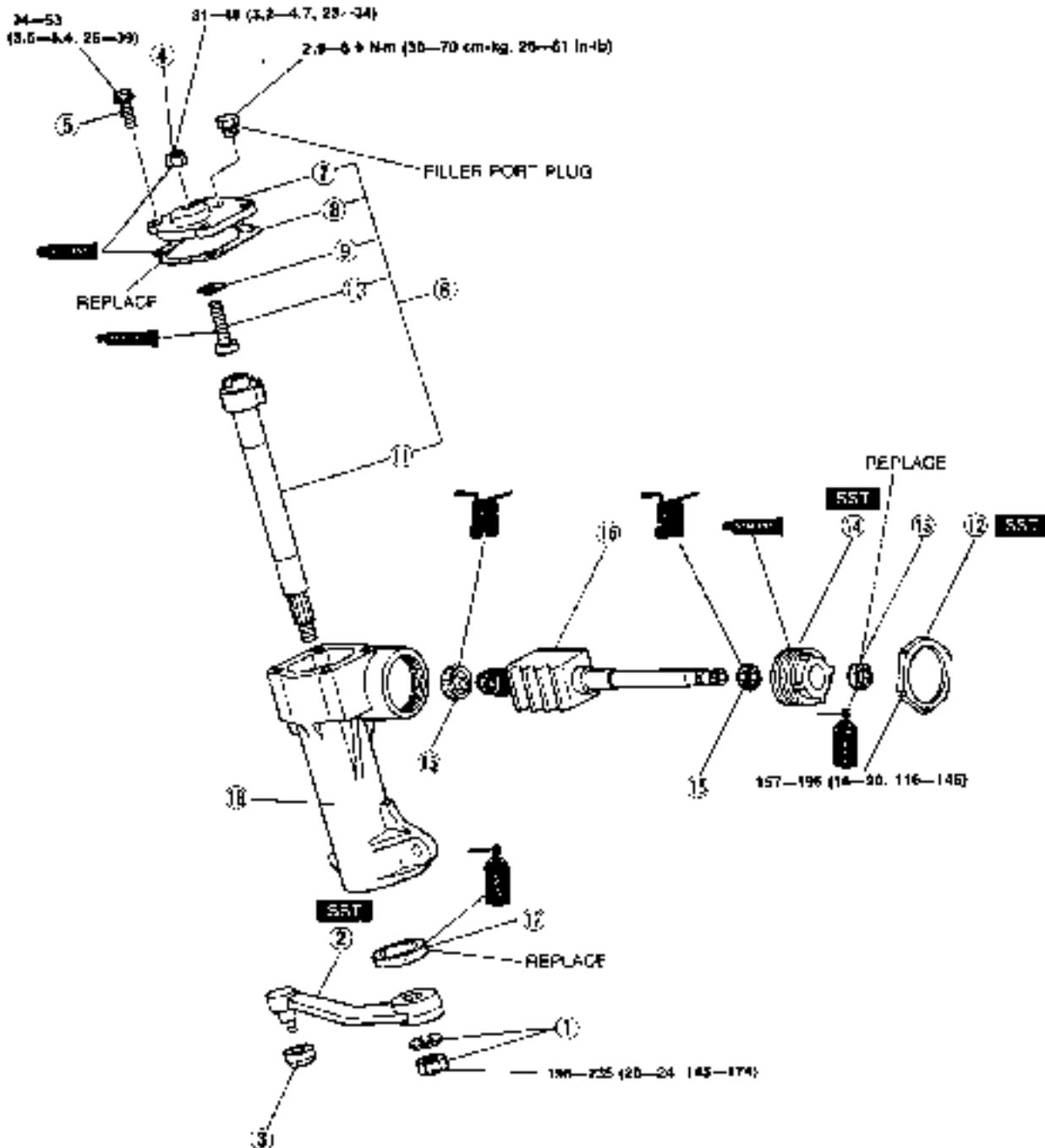
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
3. Inspect all parts and repair or replace as necessary.

#### 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**

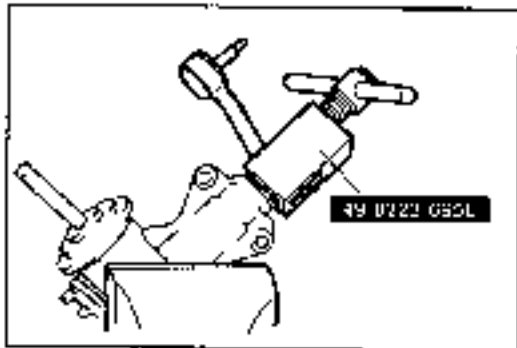
**(Amount: 0.34 liter (0.36 US qt, 0.30 imp qt))**



N-14 (m.kg, ft-lb)  
 CMA ENR 012

- |   |  |
|---|--|
| 1. Nut and washer   | 12. Locknut<br>Disassembly Note ..... below                                      |
| 2. Pitman arm<br>Disassembly Note ..... below<br>Check for damage or cracks               | 13. Oil seal   |
| 3. Dust boot<br>Check for wear or damage  | 14. Adjusting nut<br>Disassembly Note . . . . . page N-16                        |
| 4. Locknut  | 15. Bearing<br>Check for sticking, abnormal noise, or poor operation             |
| 5. Bolts  | 16. Worm ball nut assembly<br>Check for poor rotation or play in axial direction |
| 6. Sector shaft assembly<br>Disassembly Note ..... below<br>Assembly Note ..... page N-16 | 17. Oil seal   |
| 7. Side cover   | 18. Gear housing<br>Check for damage or deformation                              |
| 8. Gasket   |  |
| 9. Adjustment shim  |  |
| 10. Adjusting screw   |  |
| 11. Sector shaft<br>Check for damage or deformation                                       |  |

2E1UDAK-312

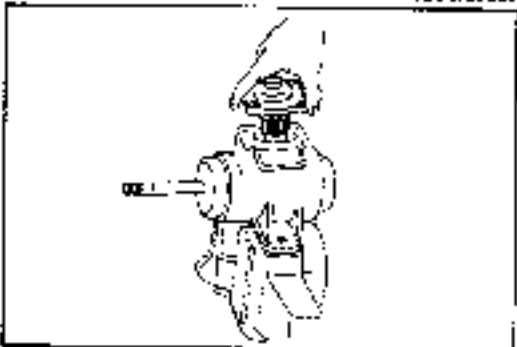


2E1UDAK 320

**Disassembly note**

**Pitman arm**

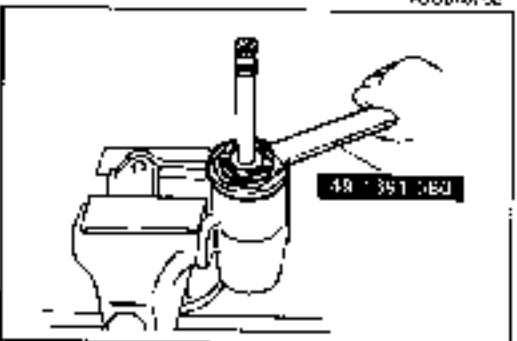
Separate the pitman arm from the gear box with the **SST**.



90UDAK 32\*

**Sector shaft assembly**

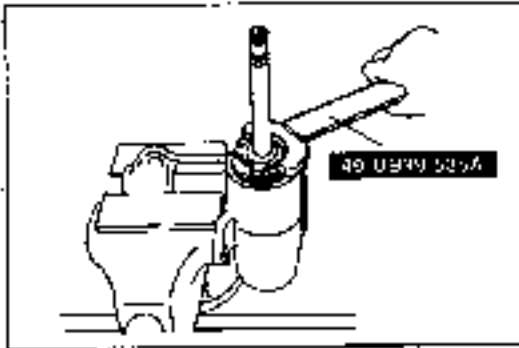
1. Set the sector shaft in the center position.
2. Tap the lower portion of the sector shaft with a plastic hammer to loosen the shaft.
3. Lift the sector shaft assembly out of the gear housing.



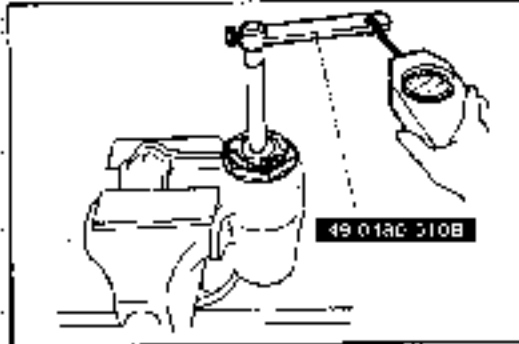
95JONX022

**Locknut**

Remove the locknut with the **SST**.



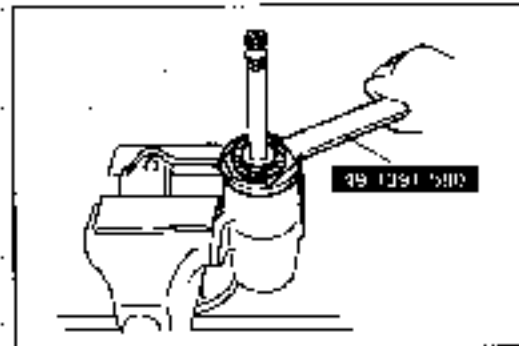
09L12N4-022

**Adjusting nut**Remove the adjusting nut with the **SST**.

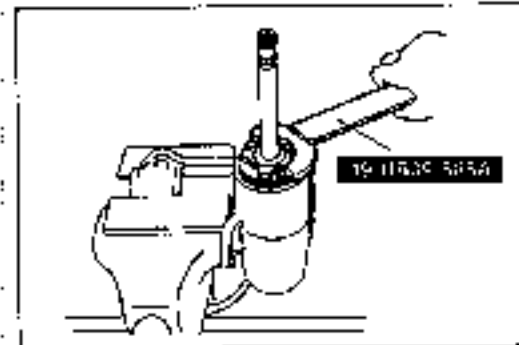
REL-CN7-024

**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)



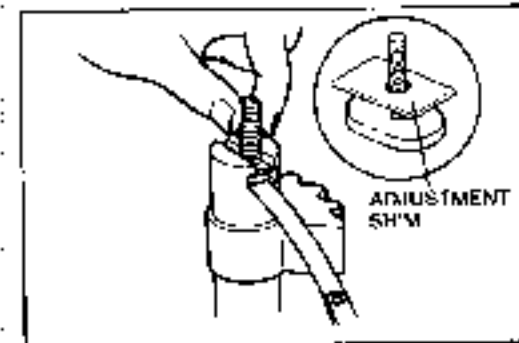
98-J0N4-025

**Adjustment**1. Loosen the locknut with the **SST**.

25L-CH7-013

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)



18-J0N7-027

**Sector shaft assembly**

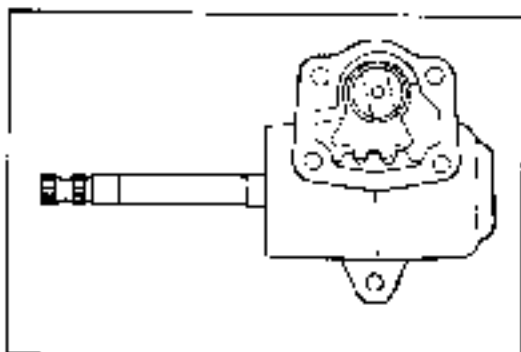
1. Set the adjusting screw and the adjustment shim in the T groove.
2. Measure the clearance in the axial direction.
3. If the clearance exceeds specification, adjust it with available adjustment shims supplied in the adjustment shim kit.

**Clearance in axial direction:**

0–0.1mm (0–0.004 in)

**Available adjustment shims:**

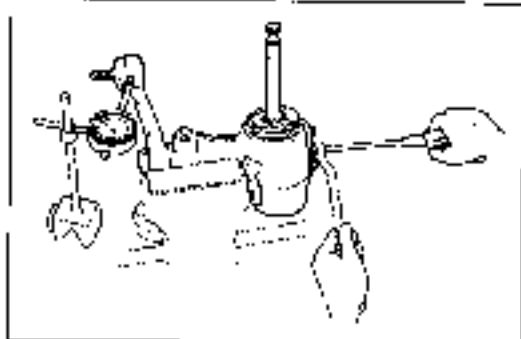
1.97mm (0.077 in), 2.00mm (0.079 in),  
2.03mm (0.079 in), 2.06mm (0.081 in),  
2.09mm (0.082 in)



93UCNX-02B

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: 8–11 N (0.6–1.1 kg, 1.3–2.4 lb)**



93UCNX-02B

**Steering gear backlash**

Turn the adjusting screw to adjust the steering gear backlash

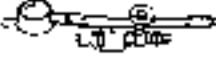






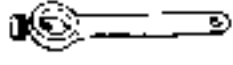

**Note**

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 HD32 671 Adapter, power steering gauge 	49 GC32 302 Adapter, power steering gauge 	49 018 850C Pulser, ball joint 
49 0223 696E Pulser, pinion arm 	49 0183 610B Attachment steering worm bearing preload measuring 	49 W023 525A Adjust. wrench 

LEJND-011

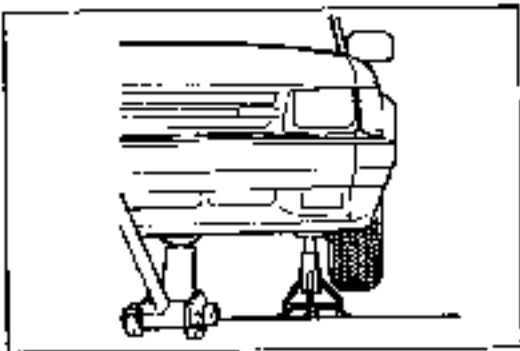
## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Steering "heavy"	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
Inadequate oil pump pressure	Repair or replace	N-30, 31	
Clogged pipes or hose	Replace	-	
Steering wheel effort is uneven	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
Excessive steering wheel play	Improperly adjusted front wheel bearing preload	Adjust	Section V
	Worn steering gear	Replace	N-24
	Worn or damaged steering shaft joints	Replace	N-10
	Loose steering gear box mounting bolts	Tighten	N-24

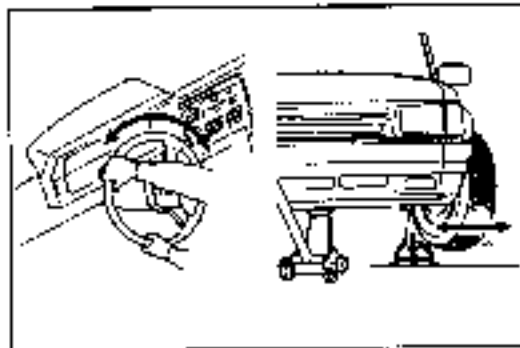
TROUBLESHOOTING GUIDE (Cont'd)

Problem	Possible Cause	Remedy	Page
Steering wheel pulls to one side	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 C — Section R Section R Section M Section P Section M
Poor steering wheel return	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
General instability while driving	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 C Section Q N-10 N-28 Section R Section R Section R Section R Section M
"Shimmy" occurs (steering wheel vibrates left/right)	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 M Section R
Abnormal noises from steering system	Loose oil pump Loose steering gear box Loose oil pump bracket Loose oil pump pulley nut Belt loose/slip 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
Fluid leakage	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

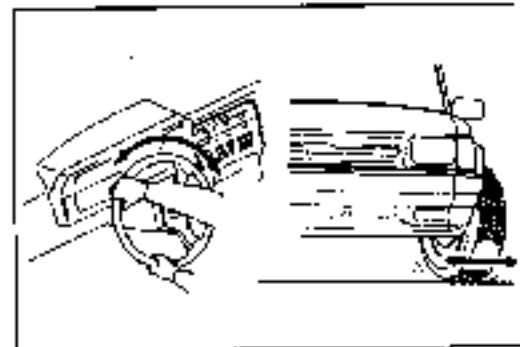
29-00000-314



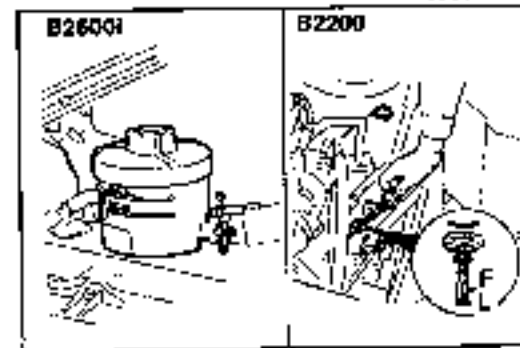
3D10HX-015



6GL-2X-015



99U0NX-067



9R11VX-088

**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.

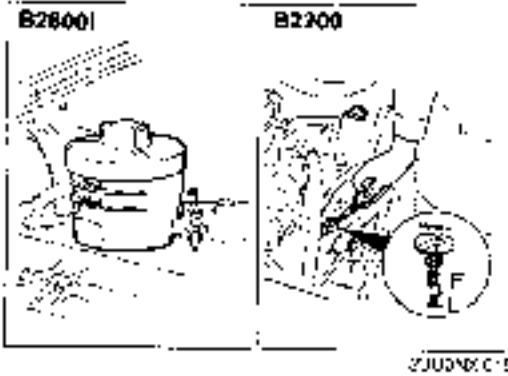
4. Start the engine and run it at idle speed. Turn the steering wheel again fully left and right several times. If a noise is heard in the oil line, air is still present.

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.



**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 or Dexron<sup>®</sup> 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.

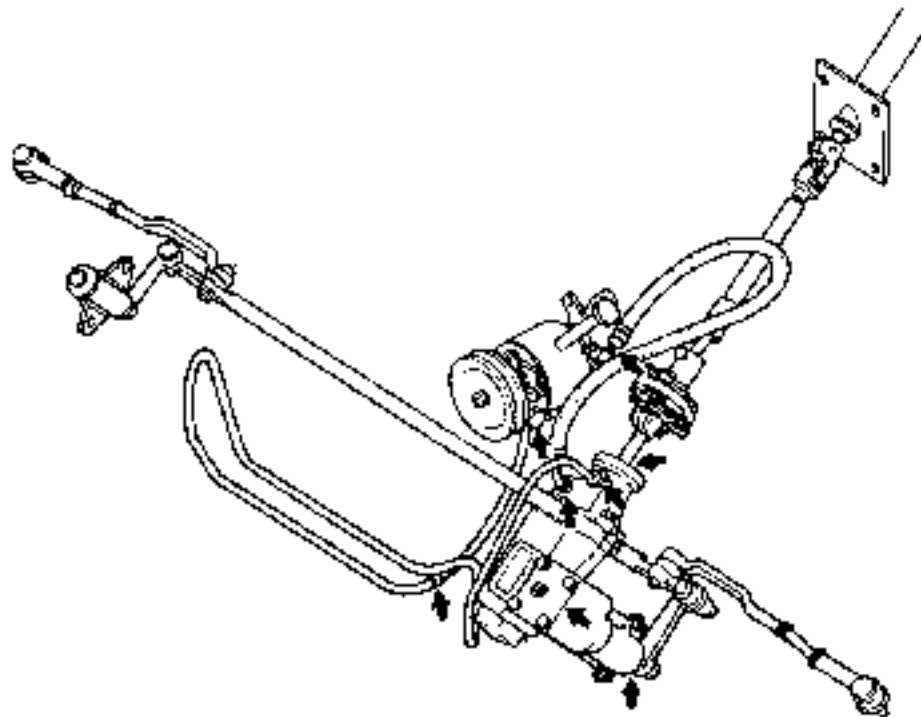
**Caution**

To prevent damage to the steering system, do not keep the steering wheel in the fully turned position for more than 15 seconds.

**Note**

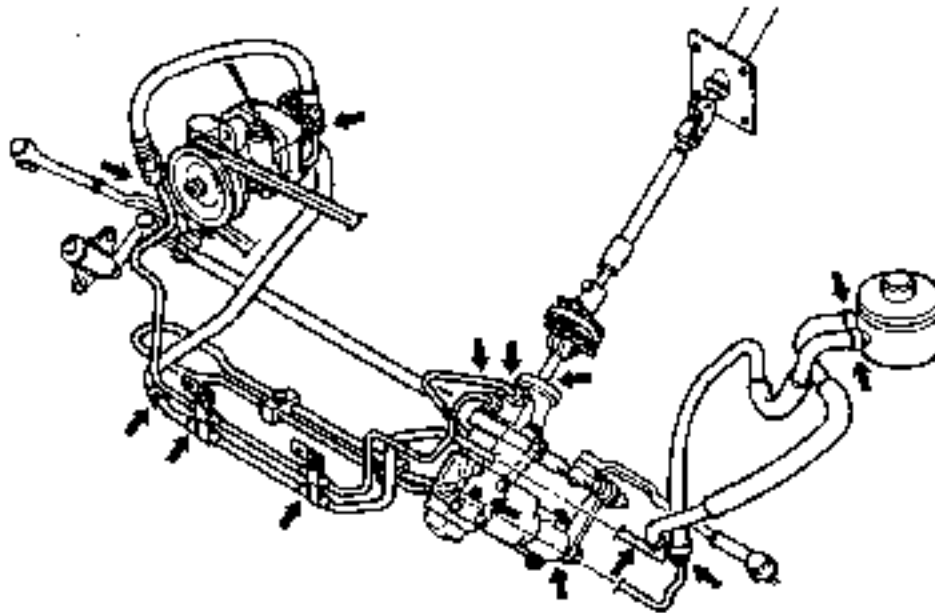
The points where fluid leakage may occur are indicated by arrows in the figure.

B2200





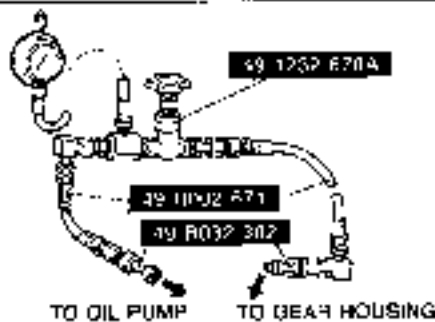
B26001

**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)



BF, CNS-044

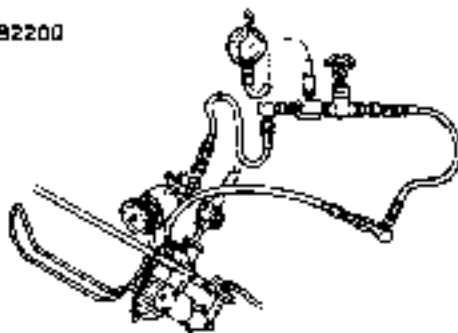
2. Disconnect the high-pressure hose of the oil pump side, and attach the SST.

**Note**

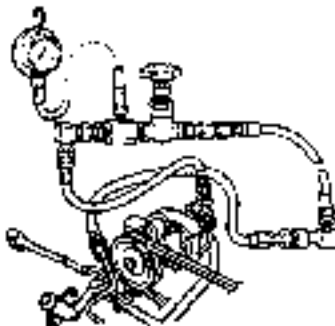
Before disconnecting the hose, mark the connections for proper reinstallation.

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—80°C (122—140°F).

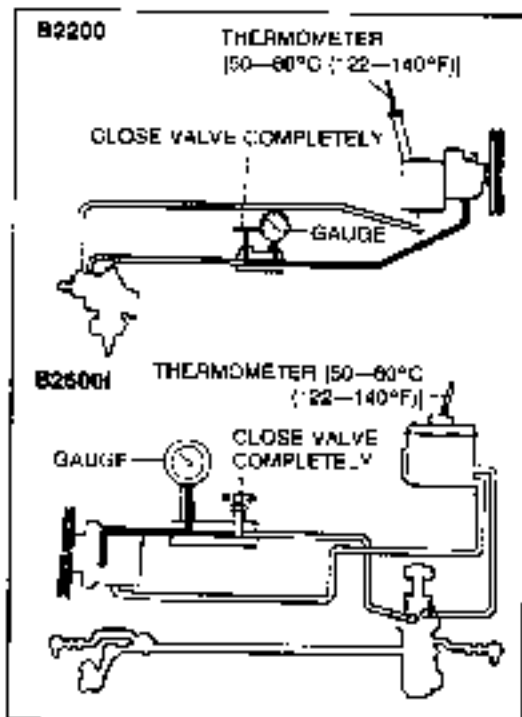
B2200



B2600



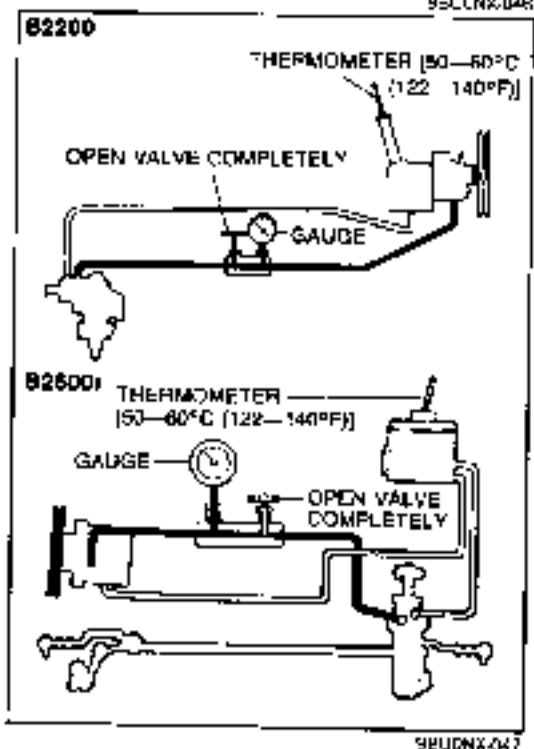
OBU04K-010



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.

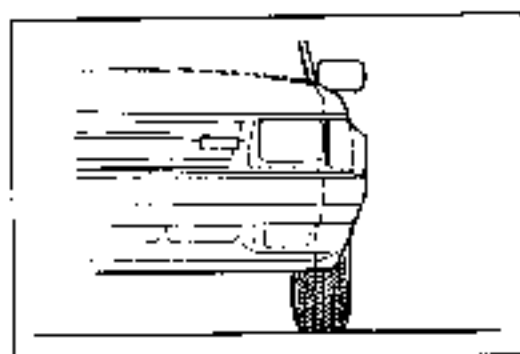


6. Open the gauge valve fully again and increase the engine speed to **1,000—1,500 rpm**.

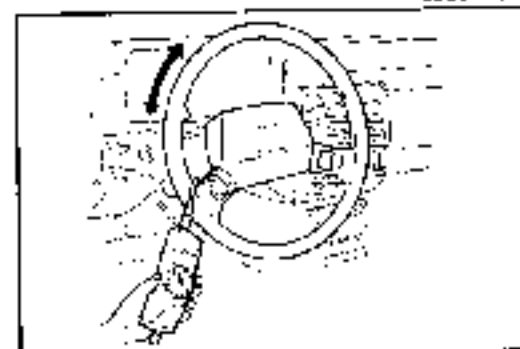
7. Turn the steering wheel fully to the left and right and measure the fluid pressure generated by the gear housing. If the pressure is below specification, replace the gear housing assembly.

**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.



26LONX4119



26LONX 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, junction 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.

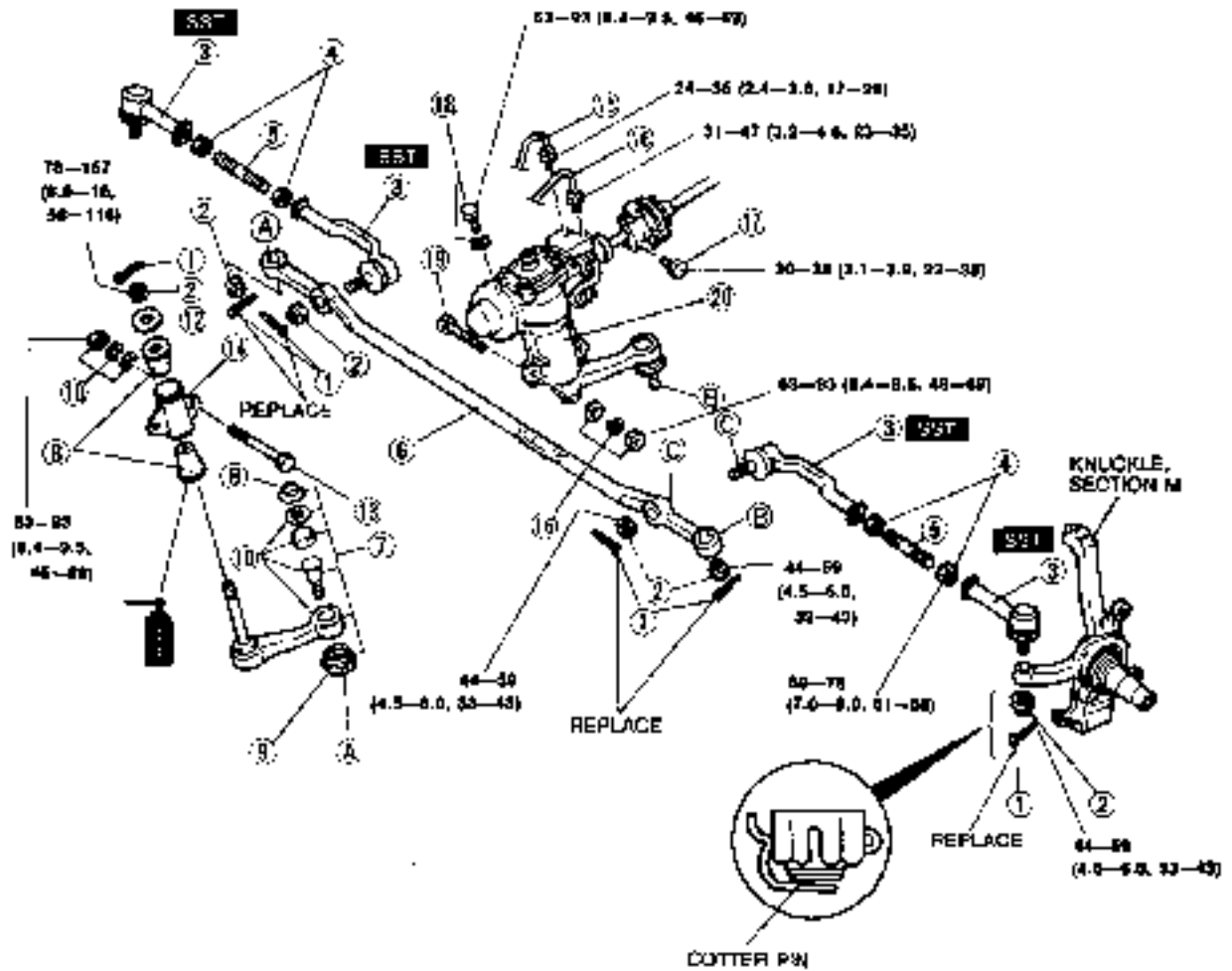
**Tightening torque: Non-styled wheel 88–118 N·m (8–12 m·kg, 65–87 ft·lb)  
Styled wheel 118–147 N·m (12–15 m·kg, 87–108 ft·lb)**

7. Inspect all parts and repair or replace as necessary.

**Note**

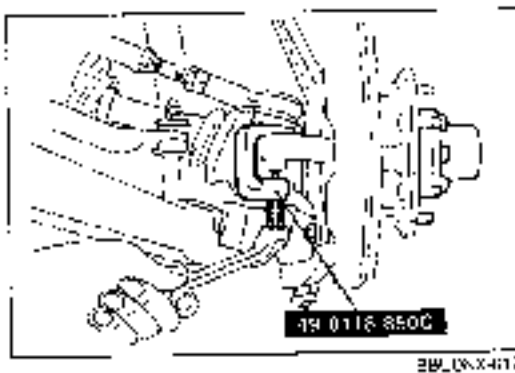
- a) The power steering fluid will leak out when the return pipe and/or the pressure pipe is disconnected. Prepare a suitable container for it to drain into.
- b) After installation: (1) Bleed air from the power steering system. (2) Check the power steering fluid level and add fluid if necessary. (3) Check the system for fluid leakage. (4) Check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)

26LONX4117



Rev (Inch) (Hb)  
29UDXCR

- |   |   |
|---|---|
| <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> |
|---|---|



**Removal note**

**Ball joint, pitman arm and idler arm**

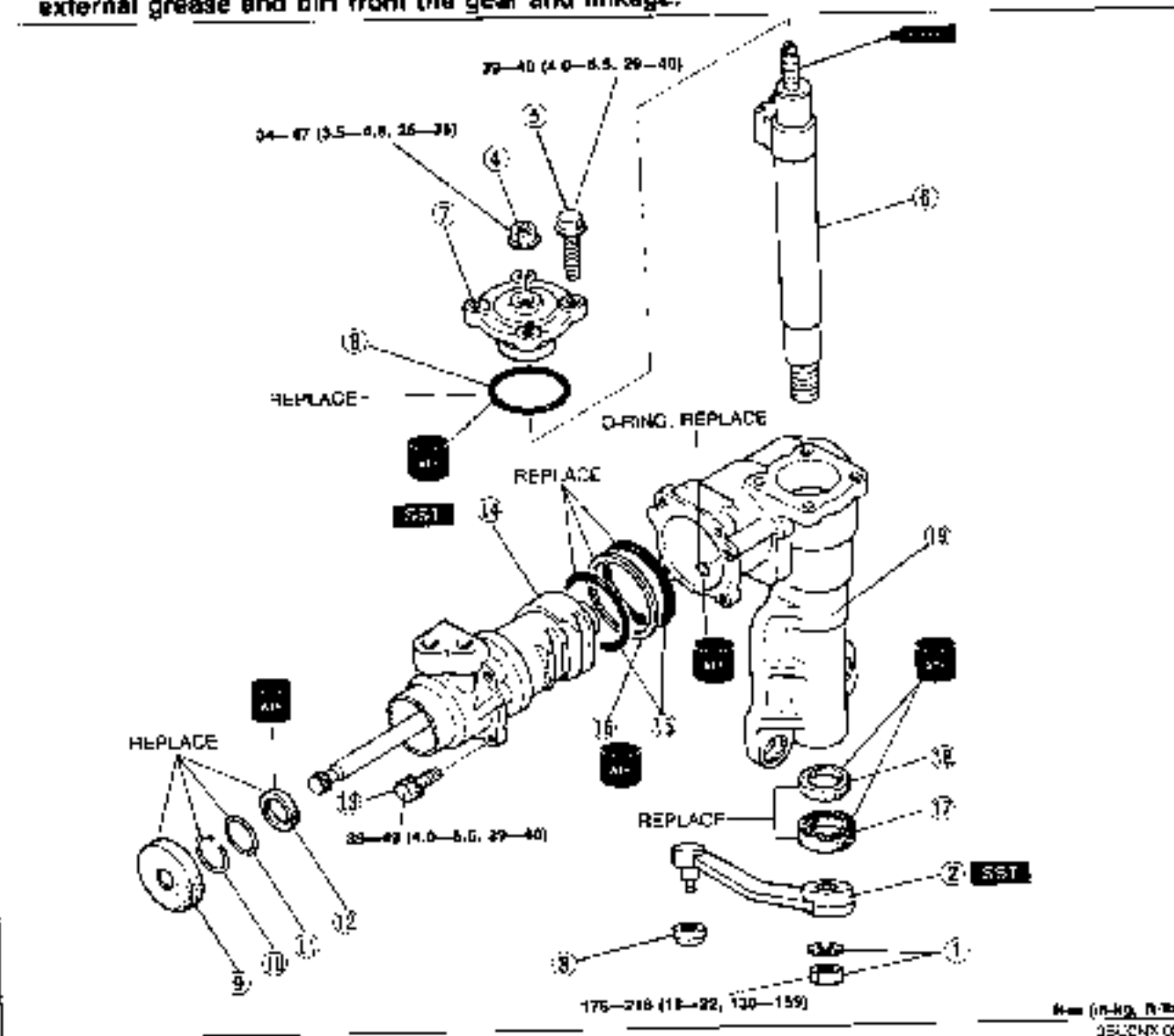
With the **SST**, separate the ball joint from the knuckle and from the center link (C-C), the pitman arm from the center link (B-B), and the idler arm from the center link (A-A).

**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

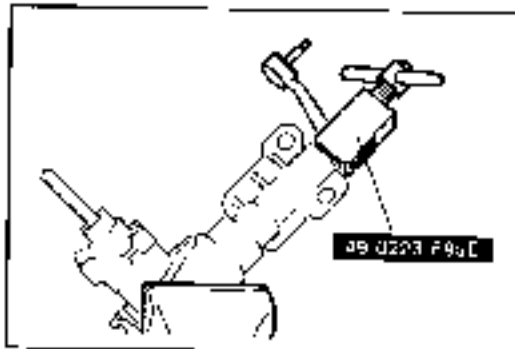
**Caution**

- 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.



- |  |                                 |
|--|---------------------------------|
| 1. Nut and washer                          | 10. Snap ring                   |
| 2. Pitman arm                              | 11. Washer                      |
| Disassembly Note ..... below               | 12. O' seal                     |
| Check for damage or cracks                 | 13. Bolts                       |
| 3. Dust boot                               | 14. Valve and piston assembly   |
| Check for wear or damage                   | Assembly Note ..... below       |
| 4. Locknut                                 | Check for cracks or deformation |
| Loosen; remove after removing sector shaft | 15. O-ring                      |
| 5. Bolts                                   | 16. Piston seal ring            |
| 6. Sector shaft                            | 17. Dust cover                  |
| Disassembly Note ..... below               | 18. Oil seal                    |
| Check for damage or deformation            | 19. Gear housing                |
| 7. Side cover                              | Check for cracks or deformation |
| 8. O-ring                                  |                                 |
| 9. Dust cover                              |                                 |

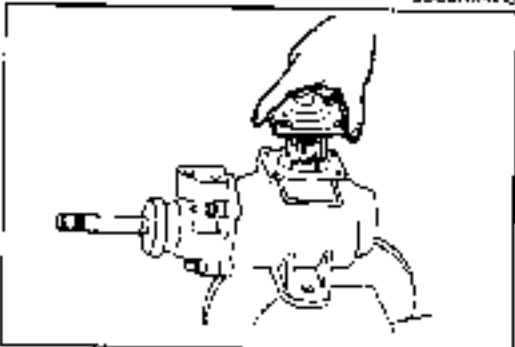
2400N4079



39L0N4053

### Disassembly note Pitman arm

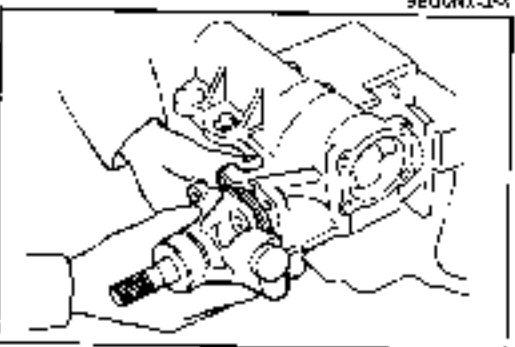
Separate the pitman arm from the gear housing with the **SST**.



39U0N4054

### 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.



39L0N4055

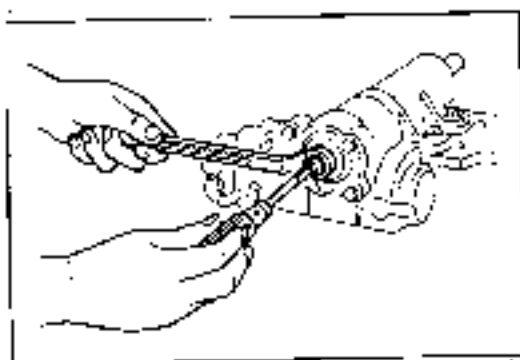
### Assembly note

#### Valve and piston assembly

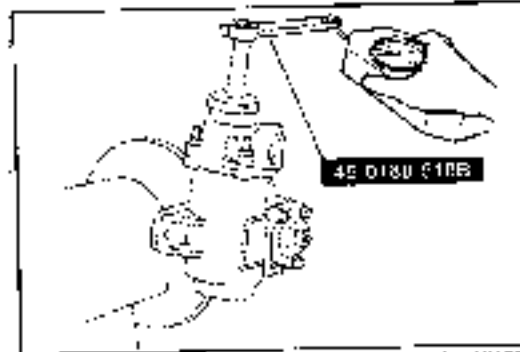
Insert the valve and piston assembly into the gear housing.

#### 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.



09J0NXC24



20J0NXC02

**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—4.6 m·kg, 25—35 ft·lb)

**OIL PUMP****Removal and Installation**

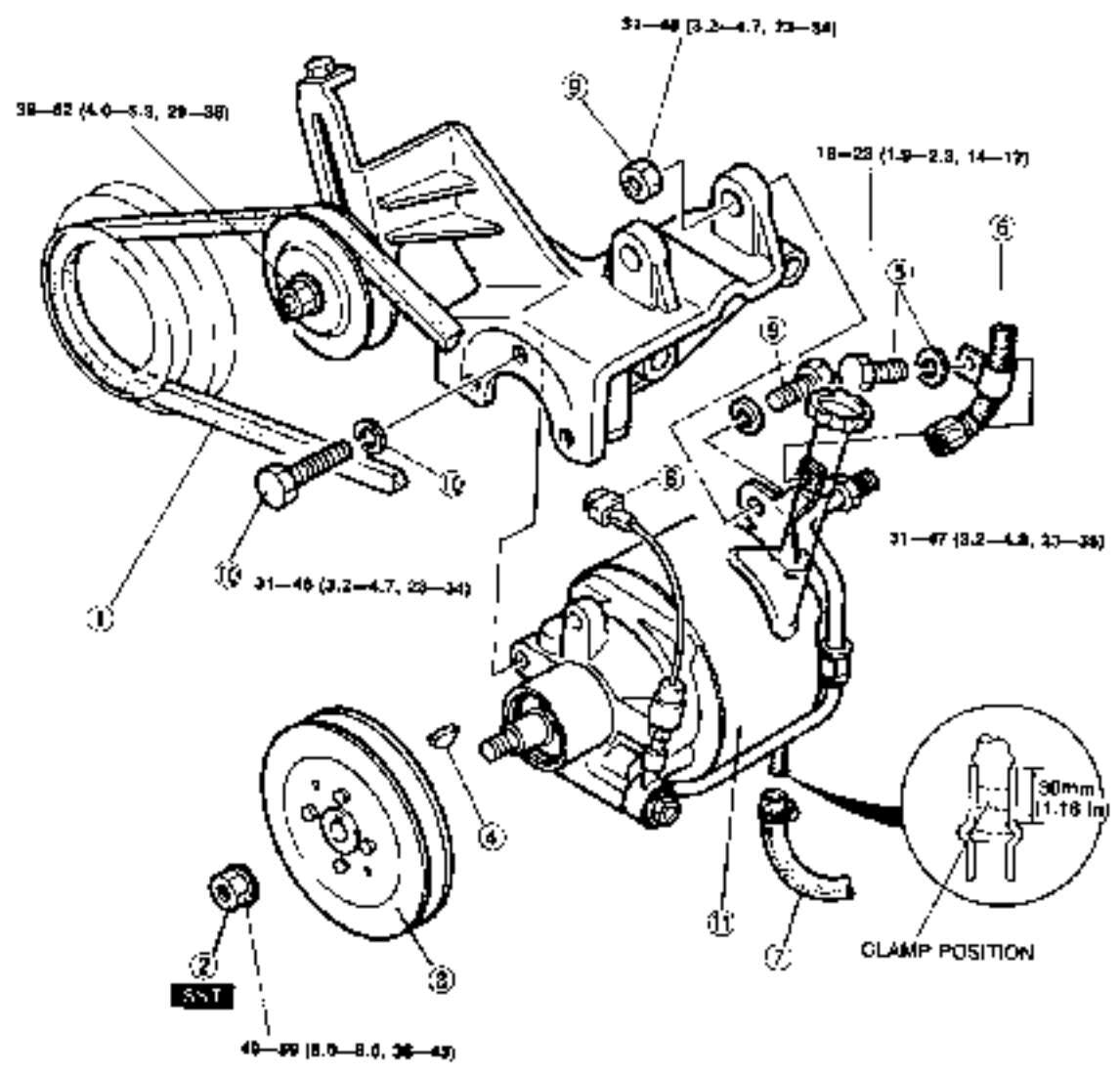
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Inspect all parts and repair or replace as necessary.

**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.

20J0NXC01

B2200

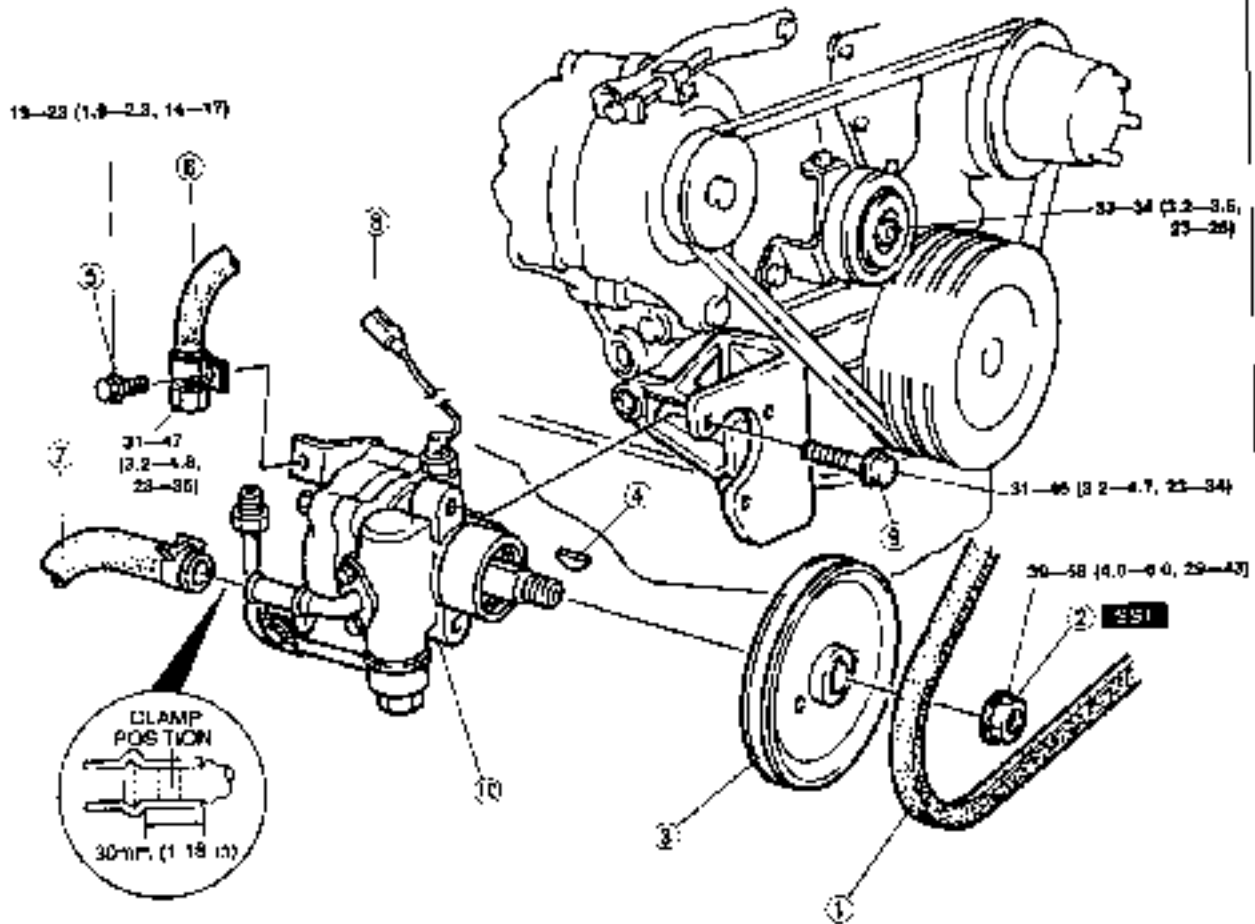


Rev (m-kg, P-kg)  
28U0030-022

- |  |   |
|--|---|
| <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> |
|--|---|



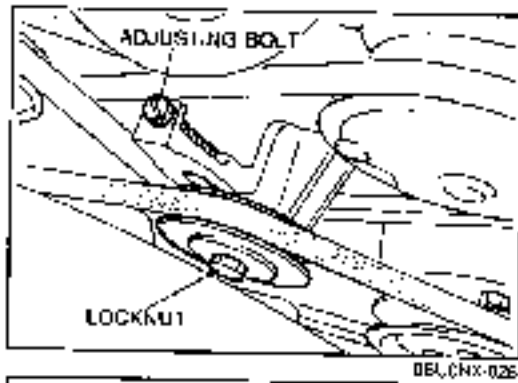
B2800i



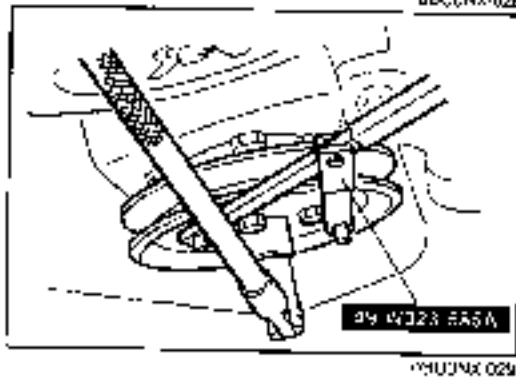
Non (m-kg, ft-lb)  
2BJ0X-029

- 1. Drive belt  
Removal Note ..... page N 31  
Inspection and adjustment ..... page N-35  
Check for damage or wear
- 2. Locknut  
Removal Note ..... page N 31
- 3. Oil pump pulley
- 4. Key
- 5. Bolt

- 6. Pressure hose
- 7. Return hose
- 8. Fluid pressure switch coupler
- 9. Bolts and washers
- 10. Oil pump assembly  
Check for damage or deformation  
Disassembly, Inspection,  
and Assembly ..... page N-34

**Removal note****Drive belt**

Loosen the idler pulley locknut and turn the adjusting bolt to loosen the oil pump drive belt.

**Locknut**

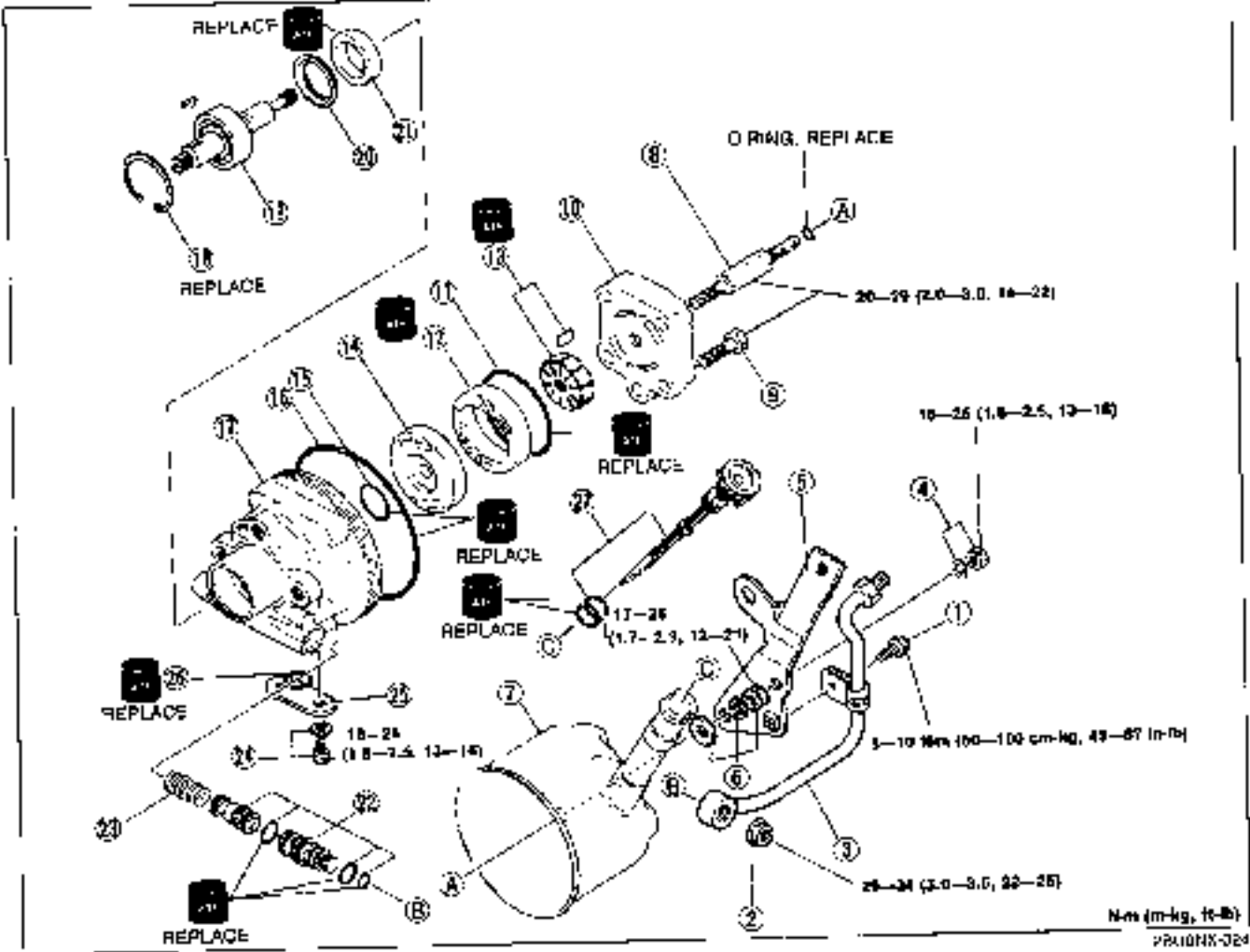
Remove the oil pump pulley locknut while holding the pulley with the **SST**.

**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**

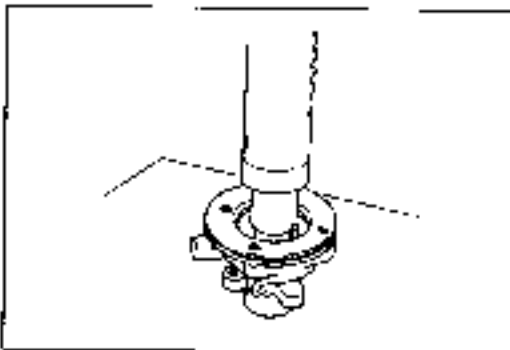
- a) To prevent the entry of dirt, disassemble and assemble in a clean area.
- b) Before disassembly, plug the pipe installation hole; then remove all oil and dirt from the outside surfaces of the oil pump.



- 1. Bolt
- 2. Nut
- 3. Hose connector assembly
- 4. Nut and washer
- 5. Bracket
- 6. Nut and washer
- 7. Oil tank
- 8. Bolt
- 9. Bolts
- 10. Rear body  
Inspect for damage
- 11. O-ring
- 12. Cam ring

- 13. Rotor and vanes  
Inspect friction surface for wear or damage  
Assembly Note  
..... page N-33
- 14. Pressure plate
- 15. O-ring
- 16. O-ring
- 17. Front body  
Inspect for damage
- 18. Snap ring
- 19. Bearing and drive shaft  
Inspect friction surface for wear

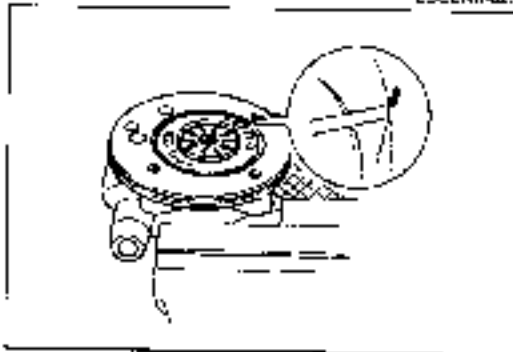
- 20. Retaining ring
- 21. Oil seal  
Assembly Note  
..... page N-33
- 22. Control valve and O-ring  
Inspect for damage
- 23. Spring
- 24. Bolts and washers
- 25. Connector
- 26. O ring
- 27. Level gauge and O-ring



25L0N8-025

**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.



25L0N8-026

**Vanes**

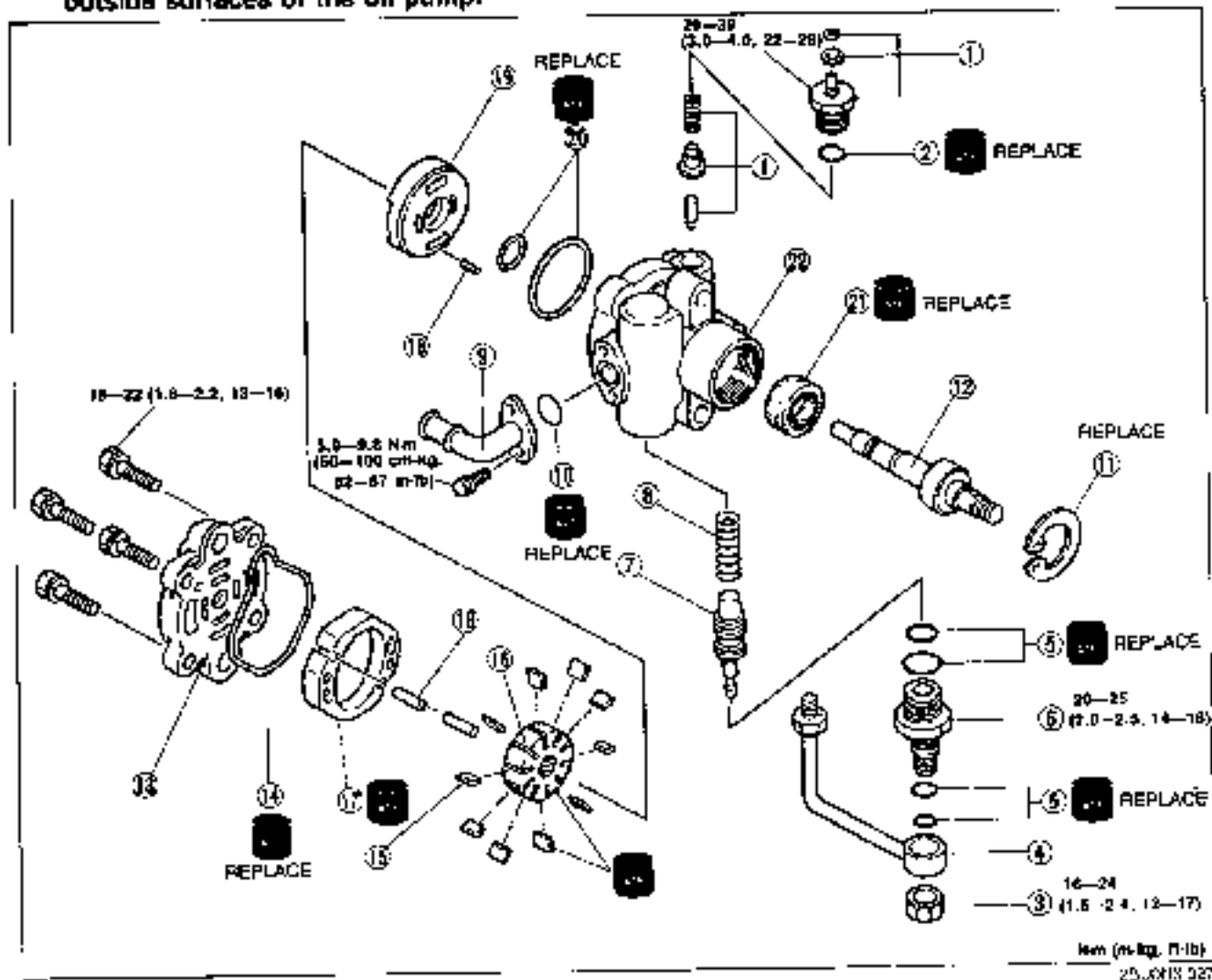
As shown, attach the vanes to the rotor so that the rounded end contacts the cam.

**Disassembly, Inspection, and Assembly (B2600)**

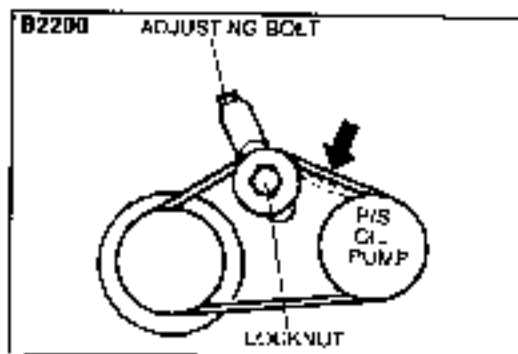
1. The following procedure is for replacement of O-ring and oil seal and bearing. Replace the pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Assemble in the reverse order of disassembly.

**Note**

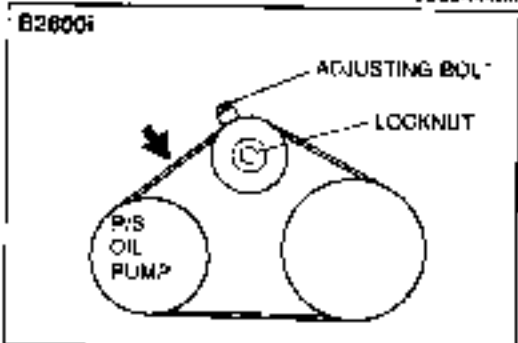
- a) In order to prevent the entry of dirt, disassemble and assemble in a clean area.
- b) Before disassembly, plug the pipe installation hole, and then remove all oil and dirt from the outside surfaces of the oil pump.



- |   |  |   |
|---|--|---|
| 1. Pressure switch                              | 12. Bearing and shaft assembly<br>Inspect for wear or damage | 17. Carrier<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                                   |  |   |



3RUDKX-032



3RUDKX-035

**DRIVE BELT**

**Inspection and Adjustment**

**Inspection**

Check that the drive belt deflector (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	6.5-7.2 (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)	198-245 (20-25, 44-53)
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 Nm (4.0-5.3 m·kg, 29-38 ft·lb)

**B2600i** : 33-34 Nm (3.2-3.5 m·kg, 23-25 ft·lb)

SE-DNR 026



# BRAKING SYSTEM

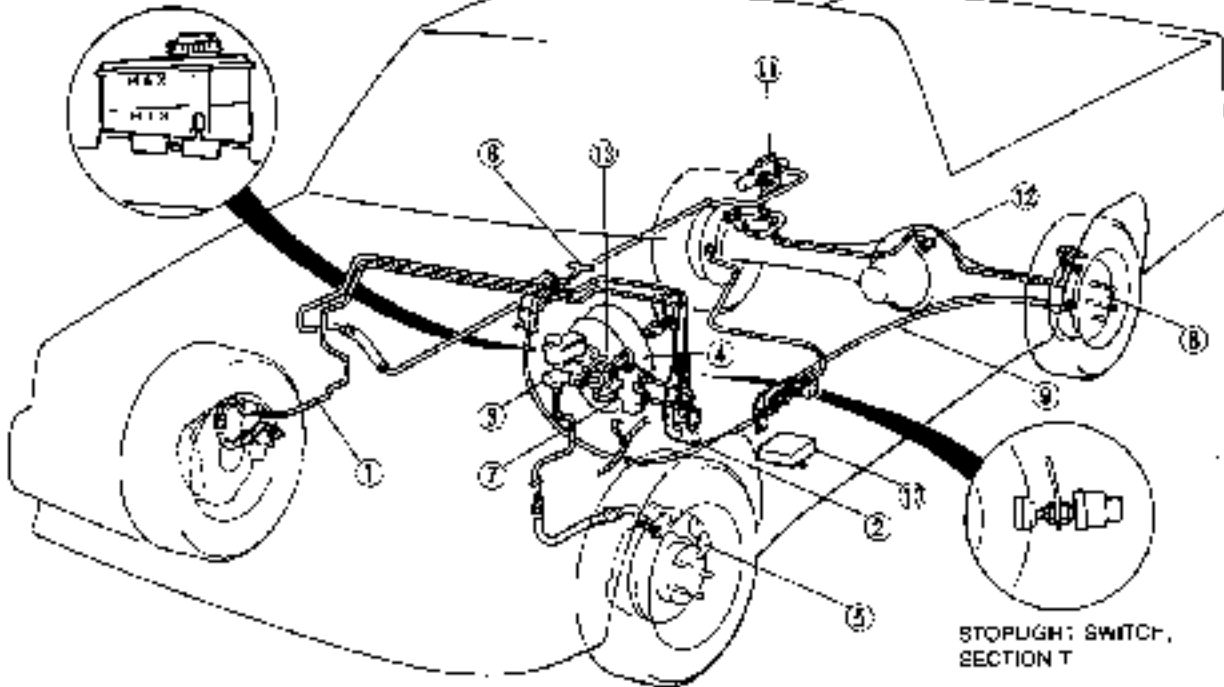
<b>INDEX</b> .....	P- 2
<b>OUTLINE</b> .....	P- 3
SPECIFICATIONS.....	P- 3
<b>CONVENTIONAL BRAKE SYSTEM</b> .....	P- 4
PREPARATION.....	P- 4
TROUBLESHOOTING GUIDE.....	P- 4
BRAKE HYDRAULIC LINE.....	P- 5
BRAKE PEDAL.....	P- 7
MASTER CYLINDER.....	P- 9
POWER BRAKE UNIT.....	P-13
FRONT BRAKE (DISC).....	P-19
REAR BRAKE (DRUM, 4x4).....	P-23
REAR BRAKE (DRUM, 4x2).....	P-27
PROPORTIONING BYPASS VALVE (PBV).....	P-30
<b>PARKING BRAKE SYSTEM</b> .....	P-31
TROUBLESHOOTING GUIDE.....	P-31
PARKING BRAKE LEVER.....	P-31
PARKING BRAKE CABLE.....	P-33
<b>REAR-WHEEL ANTI-LOCK BRAKE SYSTEM (REAR-WHEEL ABS)</b> .....	P-35
PREPARATION.....	P-35
DESCRIPTION.....	P-35
TROUBLESHOOTING GUIDE.....	P-38
CONTROL UNIT.....	P-52
HYDRAULIC UNIT.....	P-53
SPEED SENSOR.....	P-54
SENSOR ROTOR.....	P-55
PRESSURE DIFFERENTIAL SWITCH.....	P-55
WIRING DIAGRAM.....	P-56

130379 301



INDEX

FLUID SPECIFICATION  
FMVSS 118 DOT-3 or SAE J1703



3ELCPX-022

1. Brake hydraulic line			
On-vehicle inspection .....	page P-	5	
Removal and Installation .....	page P-	5	
Air bleeding .....	page P-	5	
2. Brake pedal			
On-vehicle inspection .....	page P-	7	
Removal, Installation and			
Inspection .....	page P-	8	
3. Master cylinder			
Removal and Installation ...	page P-	9	
Inspection .....	page P-	10	
Disassembly, Assembly and			
Inspection .....	page P-	11	
4. Power brake unit			
On-vehicle inspection ...	page P-	13	
Removal and installation .....	page P-	15	
Disassembly and Inspection			
(4x2) .....	page P-	16	
Assembly (4x2) .....	page P-	17	
5. Front brake (disc)			
On-vehicle inspection .....	page P-	19	
Replacement .....	page P-	19	
Removal and Installation .....	page P-	20	
Inspection .....	page P-	21	
Disassembly (caliper) .....	page P-	21	
Inspection (caliper) .....	page P-	22	
Assembly (caliper) .....	page P-	22	
6. Rear brake (drum, 4x4)			
Removal, Installation and			
Inspection .....	page P-	23	
Disassembly, Assembly and			
Inspection (wheel cylinder) ...	page P-	26	
Rear brake (drum, 4x2)			
Removal, Installation and			
Inspection .....	page P-	27	
Disassembly, Assembly and			
Inspection (wheel cylinder)	page P-	29	
7. Proportioning bypass valve (FBV)			
Function check .....	page P-	30	
Removal and Installation .....	page P-	30	
8. Parking brake lever			
On-vehicle inspection .....	page P-	31	
Removal, Installation and			
Inspection .....	page P-	32	
9. Parking brake cable			
Removal and Installation .....	page P-	33	
10. ABS control unit			
Inspection .....	page P-	52	
11. ABS hydraulic unit			
Removal and Installation .....	page P-	53	
12. ABS speed sensor			
Removal, Inspection,			
Installation .....	page P-	64	
13. Pressure differential switch			
On-vehicle inspection .....	page P-	55	

OUTLINE

SPECIFICATIONS




Item	Model	4 x 4		4 x 2	
		Suspended			
Brake pedal	Type	Suspended			
	Pedal lever ratio	3 / 5		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 x thickness) mm <sup>2</sup> (cm <sup>2</sup> ) x mm	4.800 x 10.0 (7.44 x 0.39)			
	Disc plate dimensions mm (in); (outer diameter x thickness)	272 x 22 (10.7 x 0.87)	256 x 20 (10.1 x 0.79)		
Rear drum brake	Type	Curved	Leading trailing		
	Wheel cylinder inner diameter mm (in)	17.46 (0.688)	13.05 (0.750)		
	Lining dimensions mm (in); (width x length x thickness)	② 53 x 243 x 5 (2.1 x 9.6 x 0.20) ③ 56 x 250 x 5 (2.2 x 10.24 x 0.20)	45 x 251 x 6.5 (1.77 x 10.28 x 0.25)		
	Drum inner diameter mm (in)	250 (10.24)			
	Shoe clearance adjustment	Increment type automatic adjuster			
Power brake unit	Type	Tandem	Single		
	Size mm (in)	187 + 213 (7.36 + 8.38)		238 (9.37)	
Braking force control device	Type	Rear wheel Anti-lock Brake System			
Brake fluid	FMVSS 116 DOT-3 or SAE J1170				
Parking brake	Type	Mechanical, 2 rear brakes			
	Operator system	Stick type			

② Primary  
③ Secondary

P

## CONVENTIONAL BRAKE SYSTEM

## PREPARATION

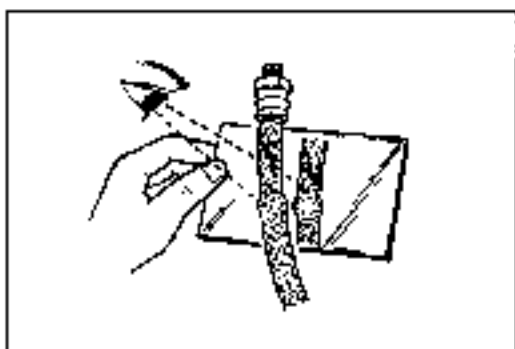
49 0256 770B Wrench, flare nut		49 0043 001 Adjust gauge		49 0221 000C Expand tool, disc brake	
-----------------------------------	---	-----------------------------	---	---	---

2D,CPX,002

## TROUBLESHOOTING GUIDE

Problem	Possible cause	Remedy	Page
<b>Poor braking</b>	Leakage of brake fluid Air in system Worn pad or lining Brake fluid, grease, oil, or water on pad or lining Hardening of pad or lining surface or poor contact Malfunction of disc brake piston Malfunction of master cylinder or wheel cylinder Malfunction of power brake unit Malfunction of check valve (vacuum hose) Damaged vacuum hose Deterioration of flexible hose Malfunction of FBV	Repair Bleed air Replace Clean or replace Grind or replace Replace Repair or replace Repair or replace Repair or replace Replace Replace	P-5 P-19,23,27 P-19,23,27 P-19,23,27 P-21 P-9 P-15 P-15 P-5 P-30
<b>Brakes pull to one side</b>	Worn pad or lining Brake fluid, grease, oil, or water on pad or lining Hardening of pad or lining surface or poor contact Abnormal wear or distortion of disc drum, pad or lining Malfunction of automatic adjuster Looseness of backing plate mounting bolts Malfunction of wheel cylinder Improperly adjusted wheel alignment Unequal tire air pressures	Replace Clean or replace Grind or replace Repair or replace Repair or replace Tighten Repair or replace Adjust Repair or replace	P-19,23,27 P-19,23,27 P-19,23,27 P-19,23,27 — P-23,27 P-23,27 Section B Section Q
<b>Brakes do not release</b>	No brake pedal play Improperly adjusted push rod clearance Clogged master cylinder return port Worn shoe return spring Wheel cylinder not returning properly Malfunction of piston seal of disc brake Excessive runout of disc plate	Adjust Adjust Clean Replace Clean or replace Replace Replace	P-7 P-10 — P-23,27 P-23,27 P-21 Section M
<b>Pedal goes too far (too much pedal stroke)</b>	Air in system Improperly adjusted pedal play Worn pad or lining	Bleed air Adjust Replace	P-6 P-7 P-19,23,27
<b>Abnormal noise or vibration during braking</b>	Worn pad or lining Deteriorated pad or lining Brakes do not release Foreign material or scratches on disc plate or drum contact surface Looseness of backing plate or caliper mounting bolts Poor contact of pad or lining Inefficient grease on sliding parts	Replace Grind or replace Repair Clean Tighten Repair or replace Apply grease	P-19,23,27 P-19,23,27 — — P-23,27 P-19,23,27 —

P,XPX,004



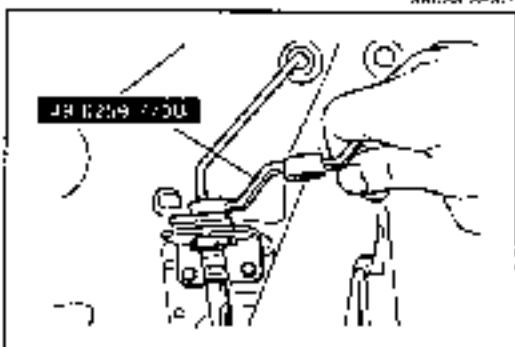
SMJGPX-007

**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



SMJ10FX-006

**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			
			Right	Front		Rear
				Left	Left	Left
Master cylinder			*	*	*	
Wheel cylinder or caliper	Front	Right	*	*	-	
		Left	*	*	-	
	Rear	Right	-	-	*	
		Left	-	-	*	
Hydraulic unit			-	-	-	
Proportioning bypass valve (PBV)			*	*	*	

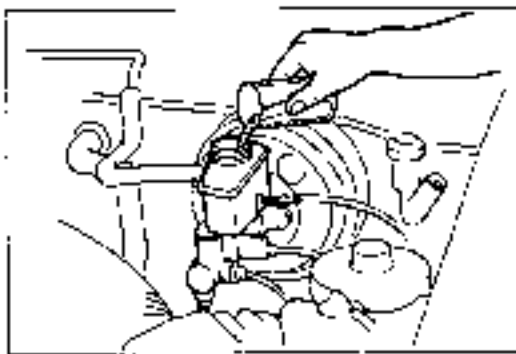
\* Indicates locations where air bleeding is necessary

SMJGPX-076

**Note**

a) Air bleeding must be done from the bleeder screw farthest from the removed parts to the nearest.

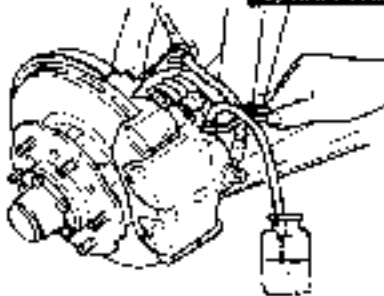
b) It is not necessary to energize the solenoid valves electrically to bleed the rear brakes.



9VLEPXC13

FRONT

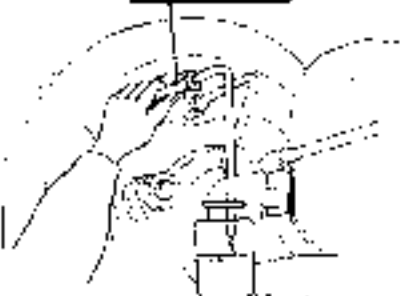
49 0259 7705



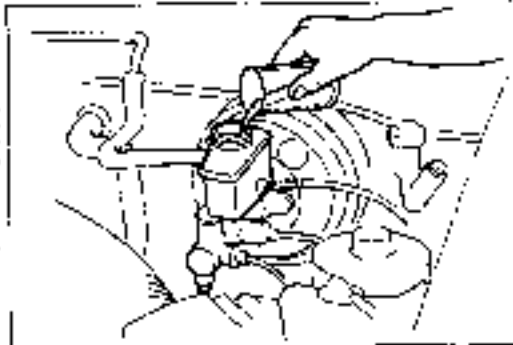
2E4,0196731

REAR

49 0259 7708



3M,00PX 012



7 0103PX021

**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.

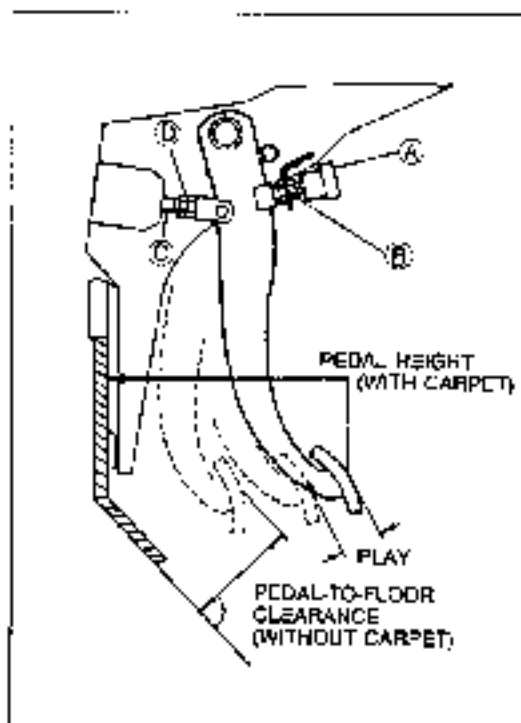
**Caution**

- 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.

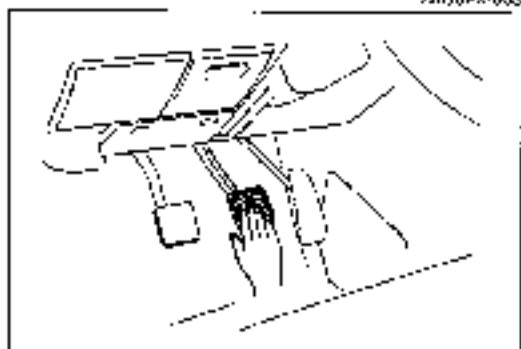
7. After bleeding the air, add brake fluid to the reserve tank up to the specified level.

**Bleeder screw tightening torque**

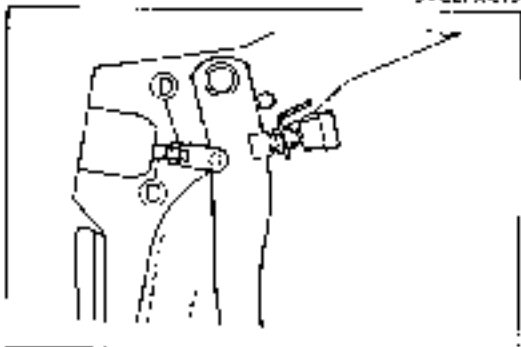
Front: 6–9 N·m (60–90 cm·kg, 52–78 in·lb)  
 Rear : 6–7 N·m (60–70 cm·kg, 52–61 in·lb)



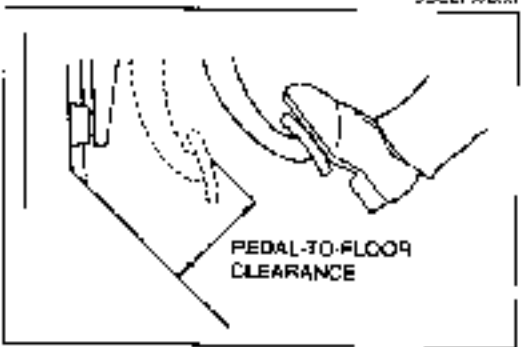
201J0FX-003



90LEPX-015



90LEPX-008



10L0FX-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 Nm (1.4—1.8 m·kg, 10—13 ft·lb)**

**Locknut (D) tightening torque:  
20—29 Nm (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 Nm (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:

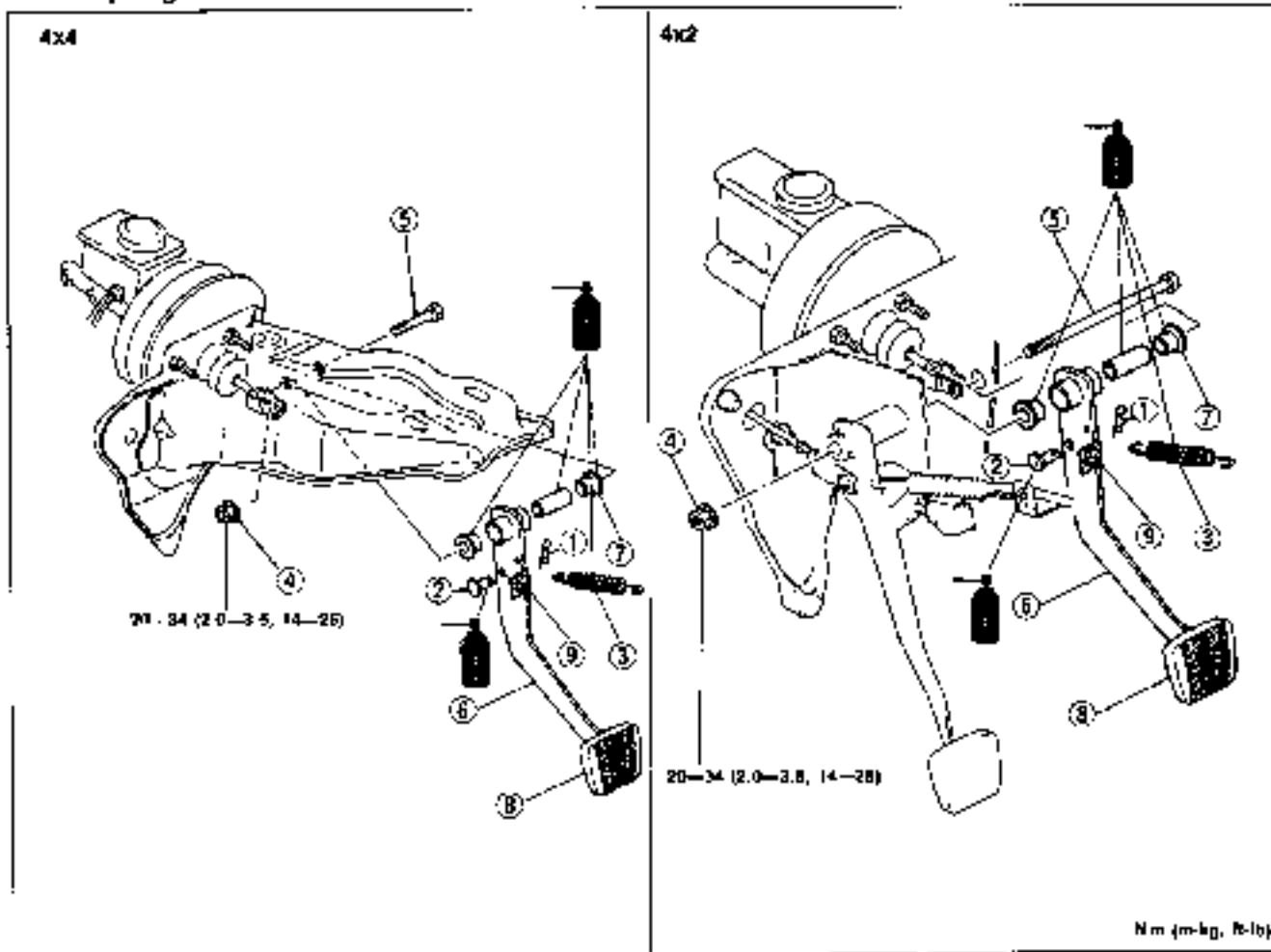
1. Air in brake system
2. Malfunction of automatic adjuster (rear drum brakes)
3. Worn shoes or pads

**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 bonding

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

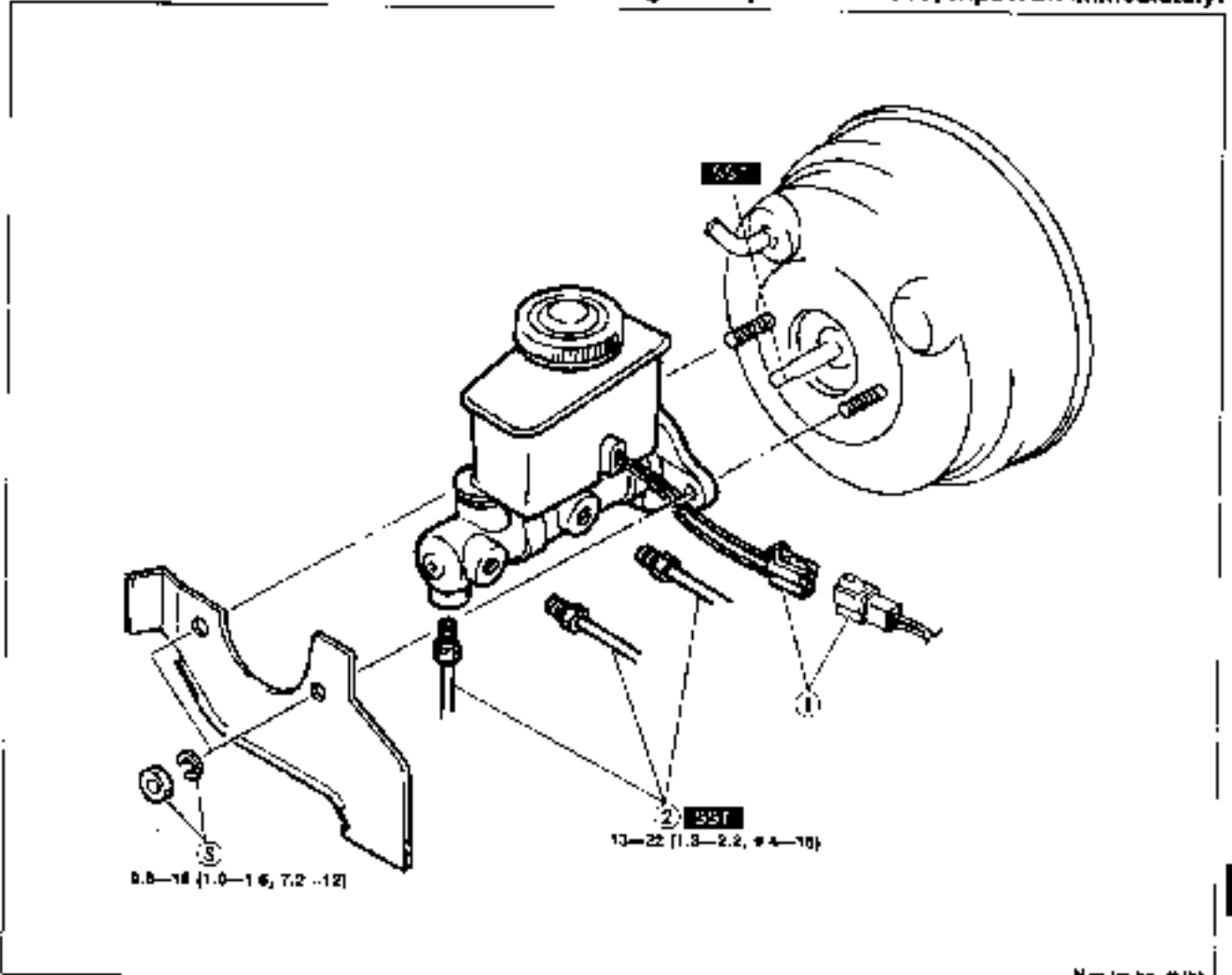
**MASTER CYLINDER**

**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.

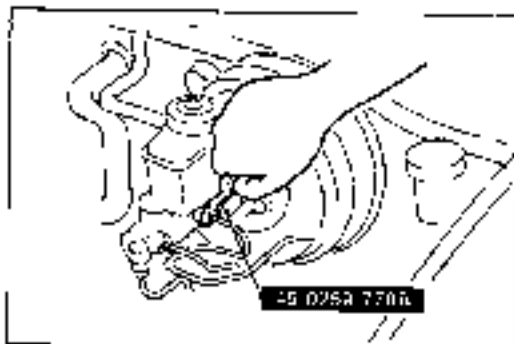
**Caution**

Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.



Nm (m.kg. ft.lb)  
2B,CP9 001

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



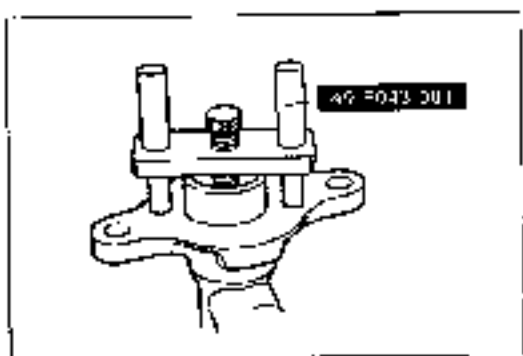
**Removal note**

**Brake pipe**

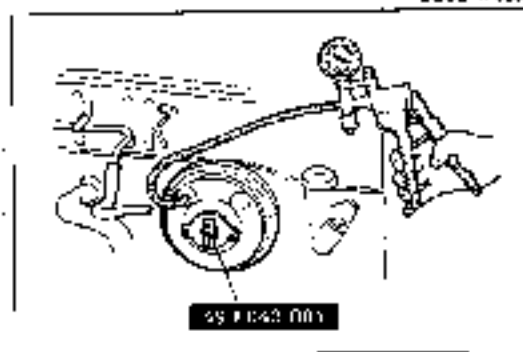
Disconnect the brake pipe from/to the master cylinder with the SST.

2B,CP9 001

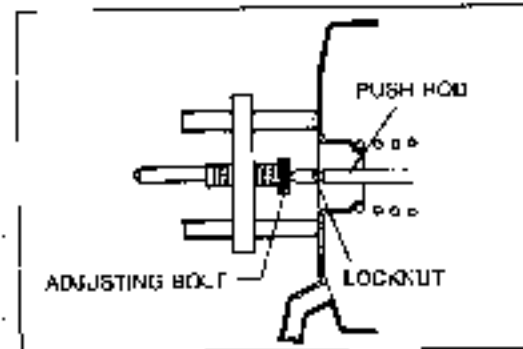




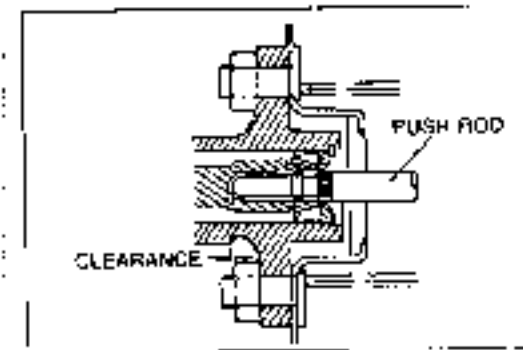
20U3PX 006



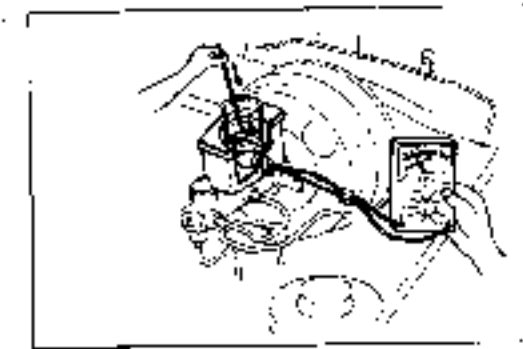
9M J00K 022



28U0PX 006



1E07PX 007



29U0PX 027

**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** at 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
After vacuum applied to unit is approx. 500 mmHg (19.7 inHg)	0.1—0.4 mm (0.004—0.016 in)

**Inspection of fluid level sensor**

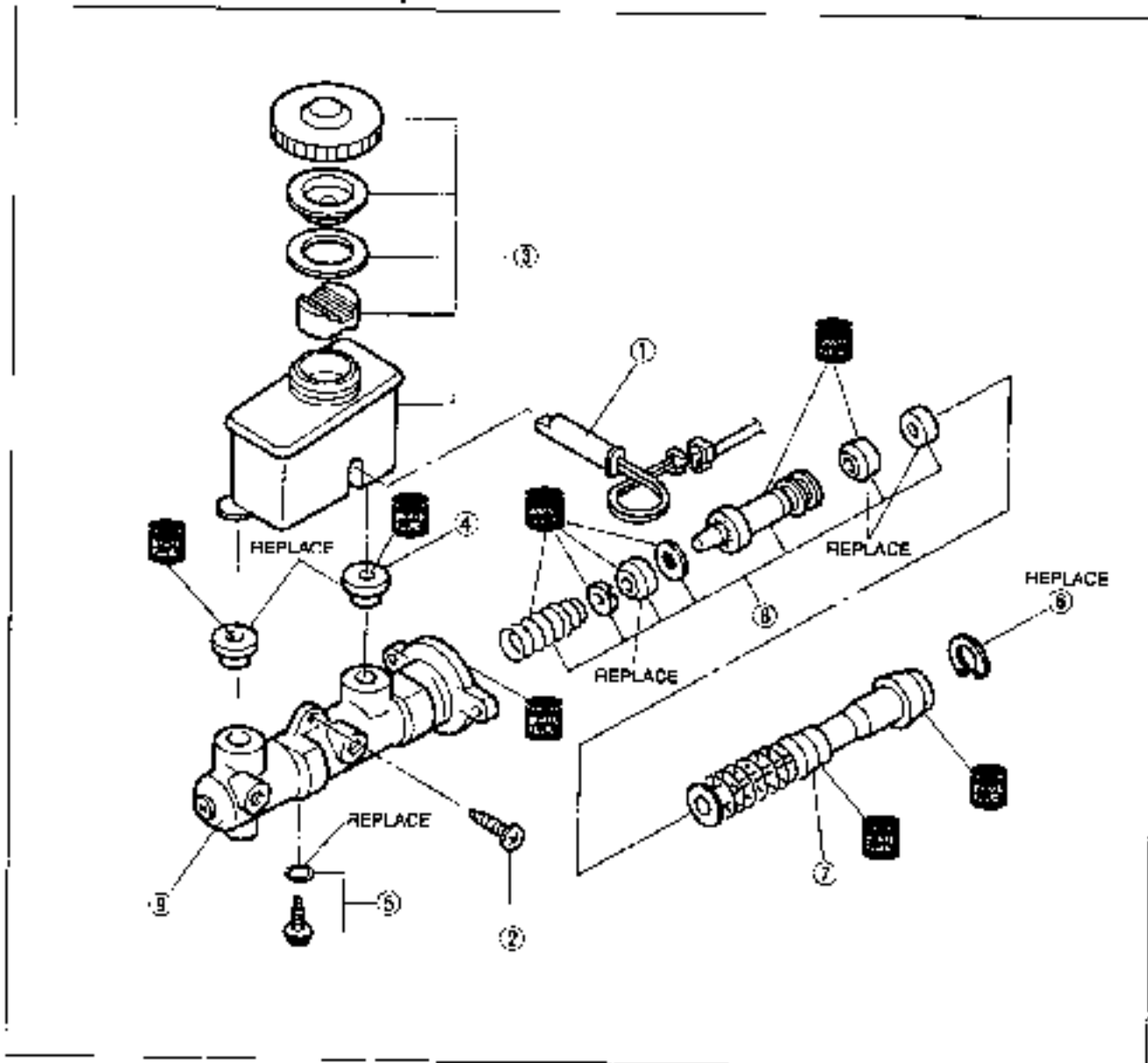
1. Disconnect the fluid level sensor connector.
2. Fill the reservoir with brake fluid up to the specified level.
3. Connect a circuit tester to the connector.
4. Check for continuity when the float is moved up and down.
5. The sensor is good if there is continuity when the float is below the "MIN" mark, 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**.

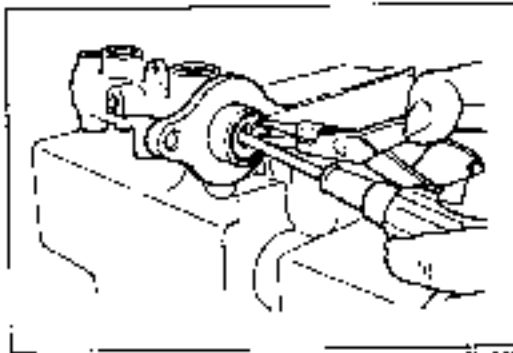
### Caution

- 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.



P3U1PZ.008

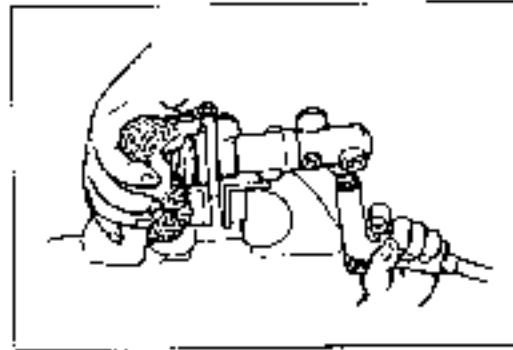
- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Fluid level sensor</li> <li>2. Screw</li> <li>3. Reserve tank assembly<br/>Inspect for damage or deformation</li> <li>4. Bushings</li> <li>5. Stopper screw and O-ring<br/>Assembly Note ..... page P-12</li> <li>6. Snap ring<br/>Disassembly 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> |
|--|---|



HM, 1179-007

**Disassembly note****Snap ring**

Push the piston in to remove or install the snap ring with snap ring pliers.



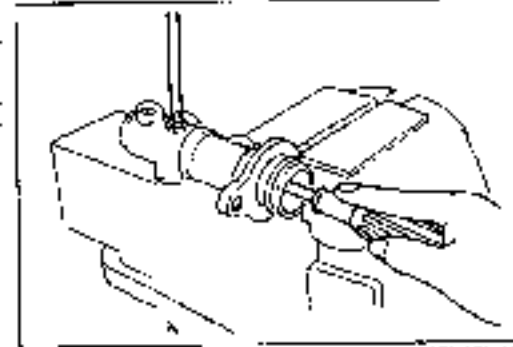
34UC9X, 028

**Secondary piston assembly**

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

**Caution**

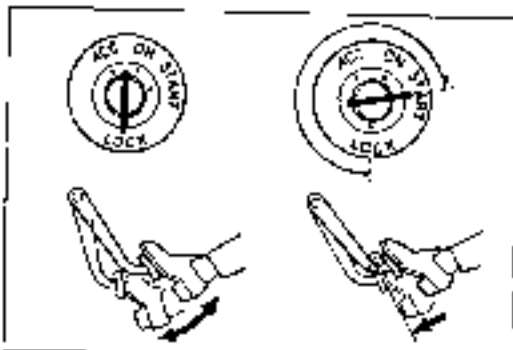
Use a rag to catch the secondary piston assembly.



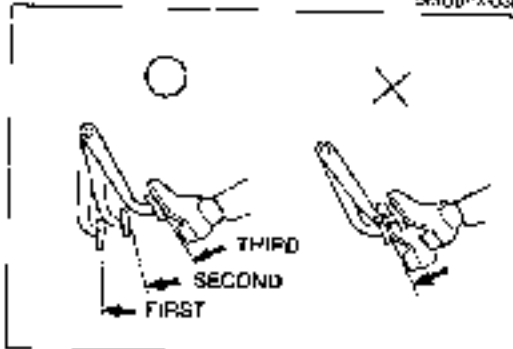
26UCF3, 009

**Assembly note****Stopper screw and O-ring**

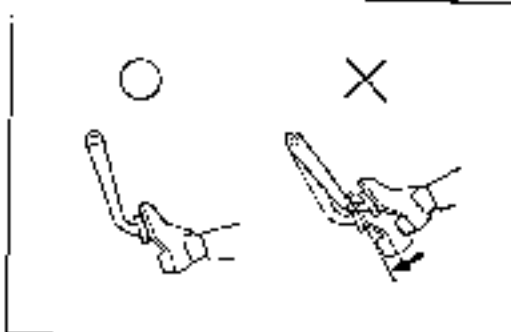
1. Push the primary piston assembly in fully.
2. Install and tighten the stopper screw and new O-ring.
3. Push and release the piston to verify that it is held by the stopper screw.



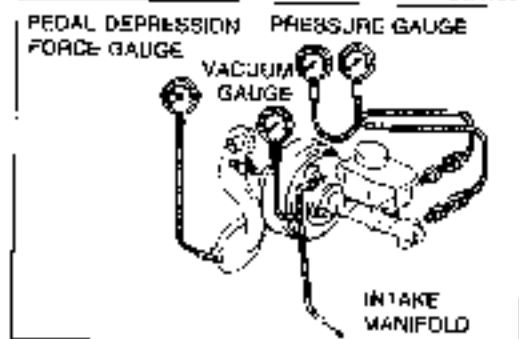
9HJUDPX-036



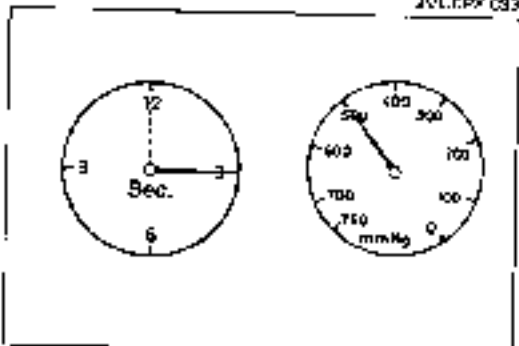
9WUGFX-037



9VJUGFX-038



2VLEFPX-039



9HJUDPX-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 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.

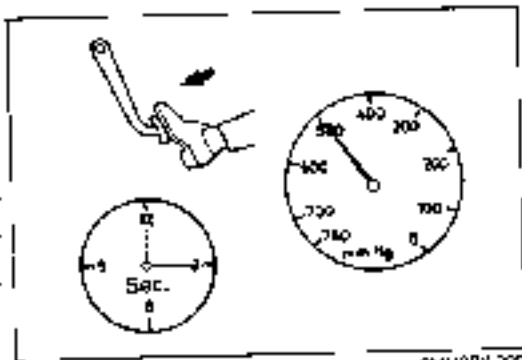
#### Note

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.



97UJ0FX.025

**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.

**b) Checking for hydraulic pressure**

1. If with the engine stopped (vacuum **0 mmHg**) the fluid pressure is within specification, the unit is operating.

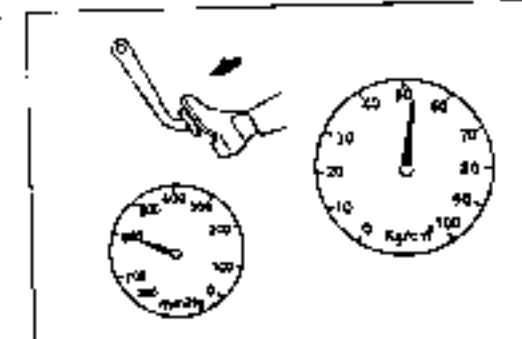
Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	1,952 kPa (20.0 kg/cm <sup>2</sup> , 284 psi) min...Tandem 1,070 kPa (11.0 kg/cm <sup>2</sup> , 158 psi) min...Single



98J0FX.017

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)	5,850 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



99UJ0FX.014

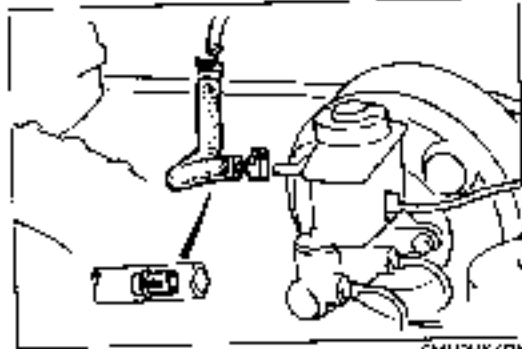
**Inspection of check valve**

**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).



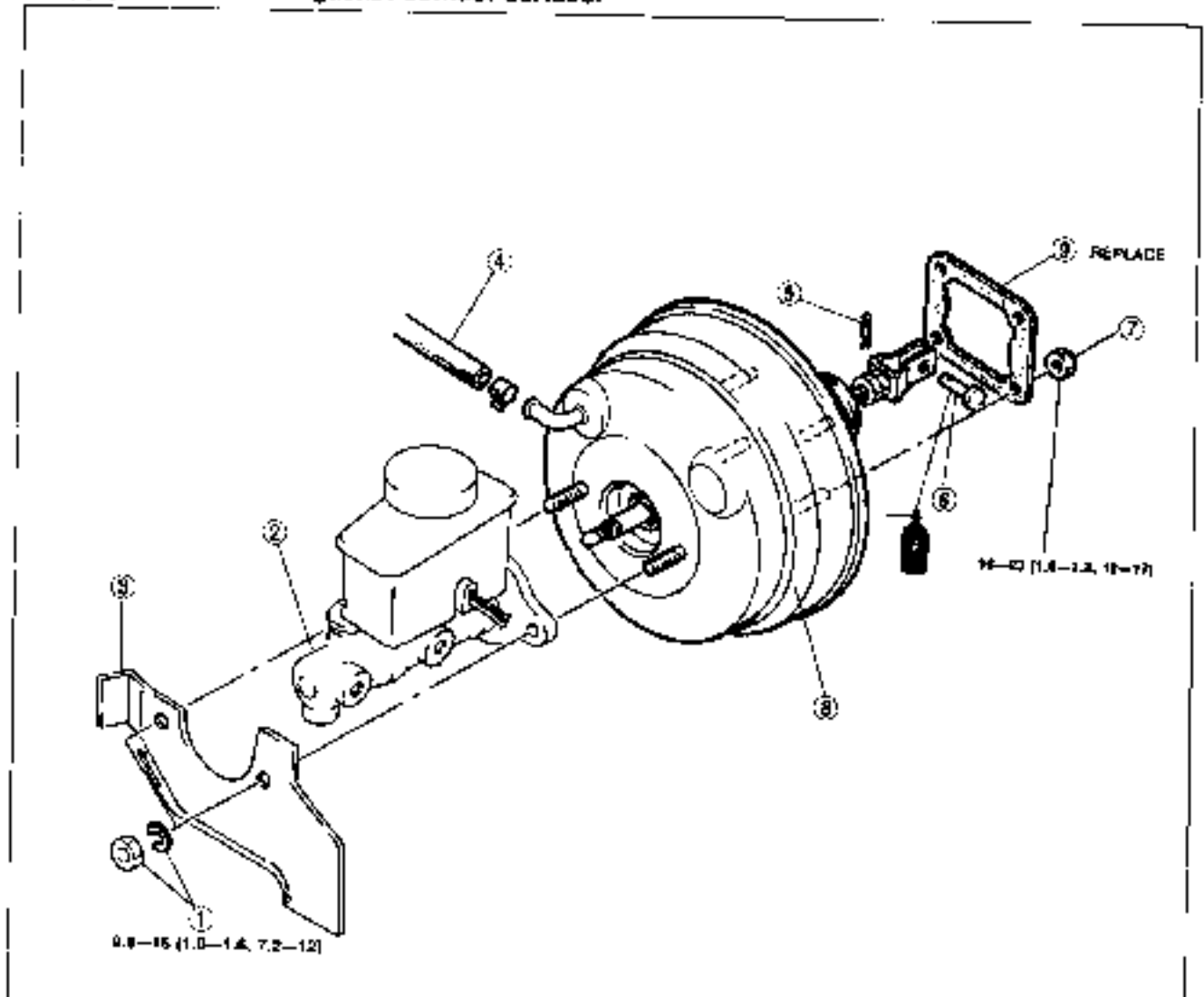
98UJ0FX.028

**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.



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

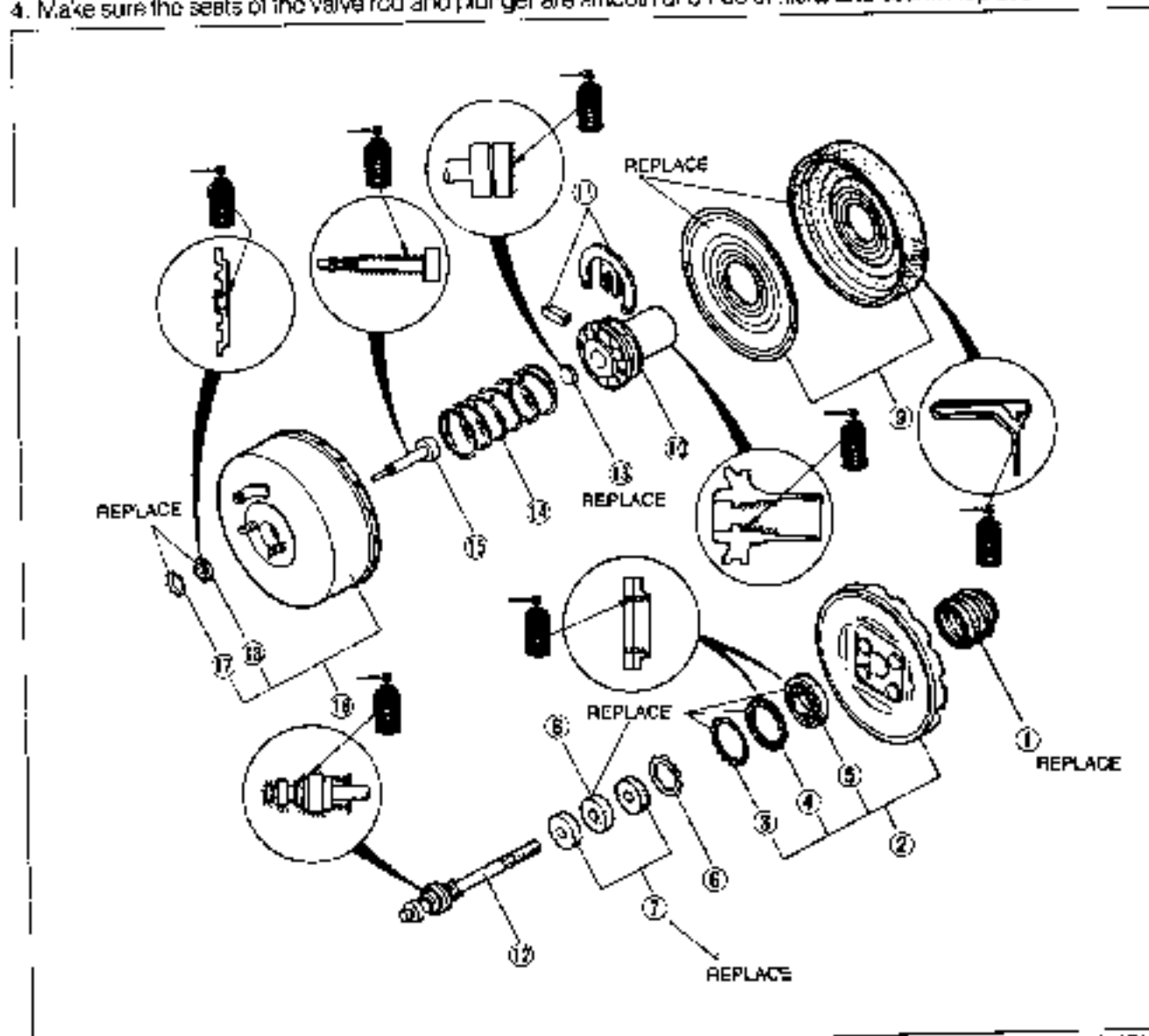
**Note**

Do not disassemble the tandem diaphragm power brake unit (4x4).

Nm (in-lb, ft-lb)  
2FA.CPX-01C

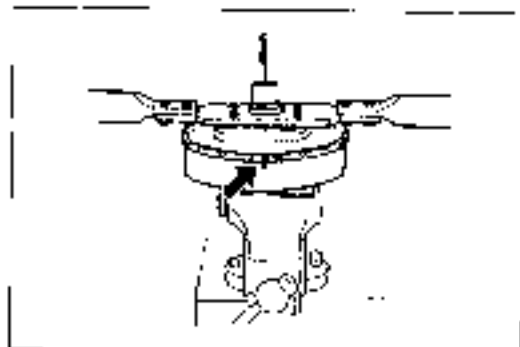
**Disassembly and Inspection (Single diaphragm, 4x2)**

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.



291117X011

- |   |   |
|---|---|
| <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> |
|---|---|

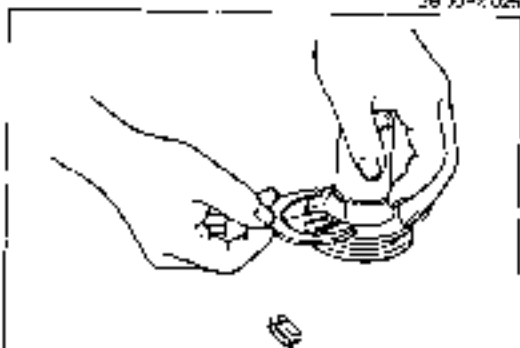


2B J2P4-026

**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.

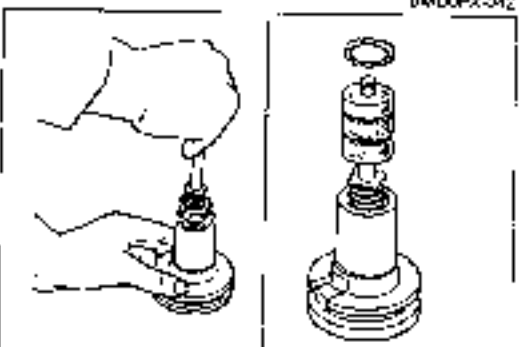
**Caution**  
**The rear shell is spring loaded; loosen it carefully.**



UMUOPX-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.**



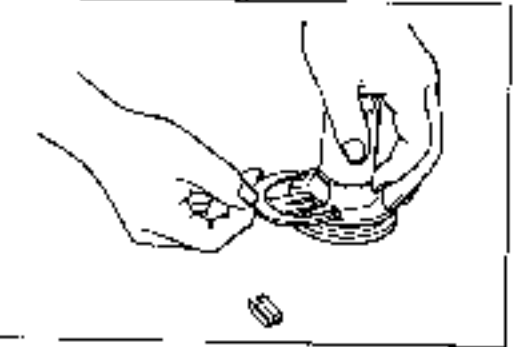
2B J2P4-012

**Assembly (4x2)**

1. Install the valve rod and plunger assembly.
2. Install the new air filter and silencer.
3. Install a new retainer.

4. Install the retainer key.

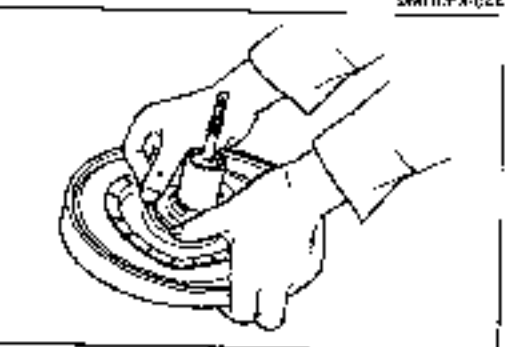
**Caution**  
**Push down the valve rod, align the groove in the valve plunger with the slot of the power piston, and insert the valve retainer key.**



SM11CPX-024

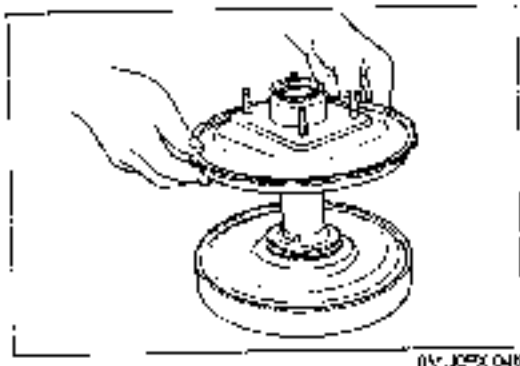
5. Connect the new diaphragm to the power piston and new plate.

**Caution**  
**Make certain the diaphragm is well seated in the groove.**



0B J2P4-060



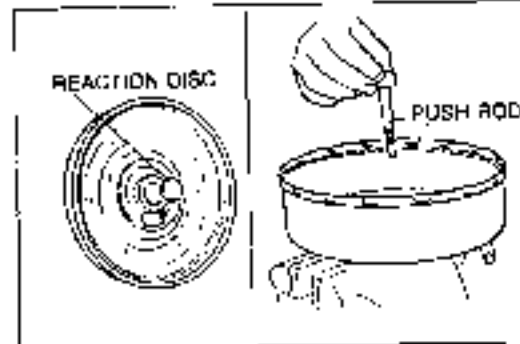


04VJ09X 046

6. Assemble the rear shell assembly.

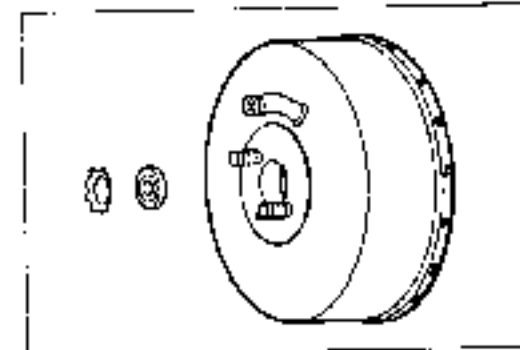
**Caution**

Carefully guide the tube end of the power piston through the seal in the rear shell.



04VJ09X 047

7. Push the reaction disc into the power piston with the push rod.

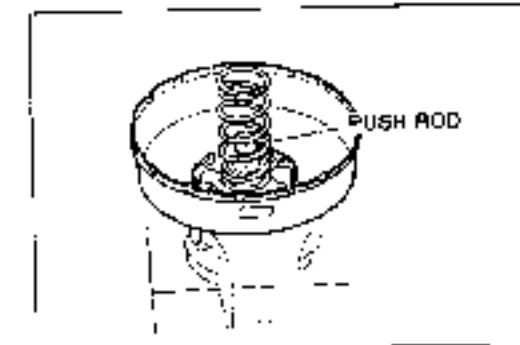


04VJ09X 051

8. Put the new dust seal and new retainer into the front shell.

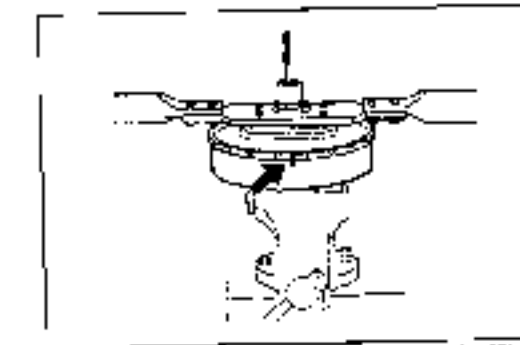
**Caution**

Place the front shell assembly in a vise to complete the following operations.



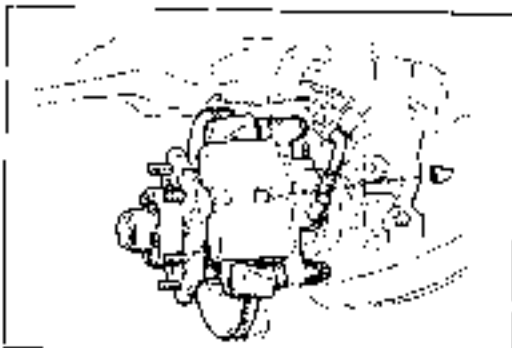
04VJ09X 045

9. Install the push rod.  
10. Install the return spring.



04VJ09X 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.



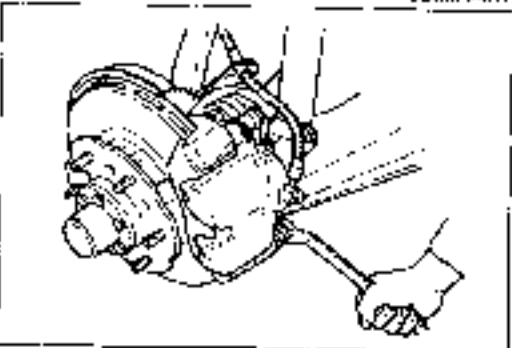
9EL1PX417

## 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 pads is at least: **3.0mm (0.118 in)**.



9MUDPX096

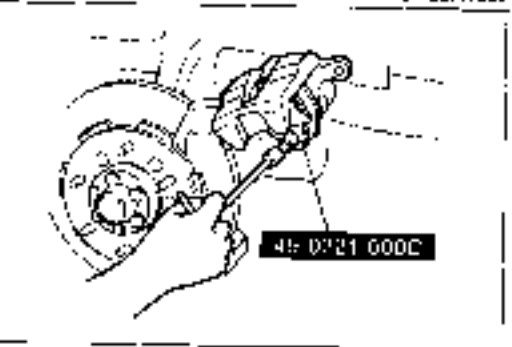
### Replacement

#### 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-on 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.



9EUDPX010

7. Lower the caliper assembly onto the mounting support.
8. Tighten the lock bolt to the specified torque.

#### Tightening torque:

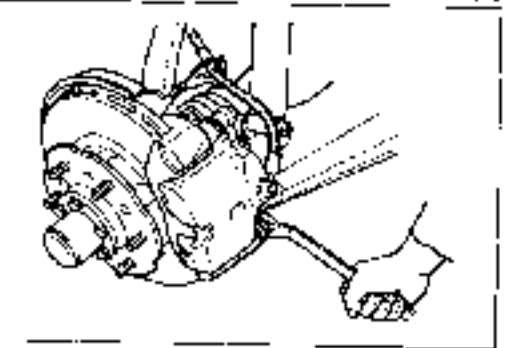
**31—41 Nm (3.2—4.2 m·kg, 23—30 ft·lb)**

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.



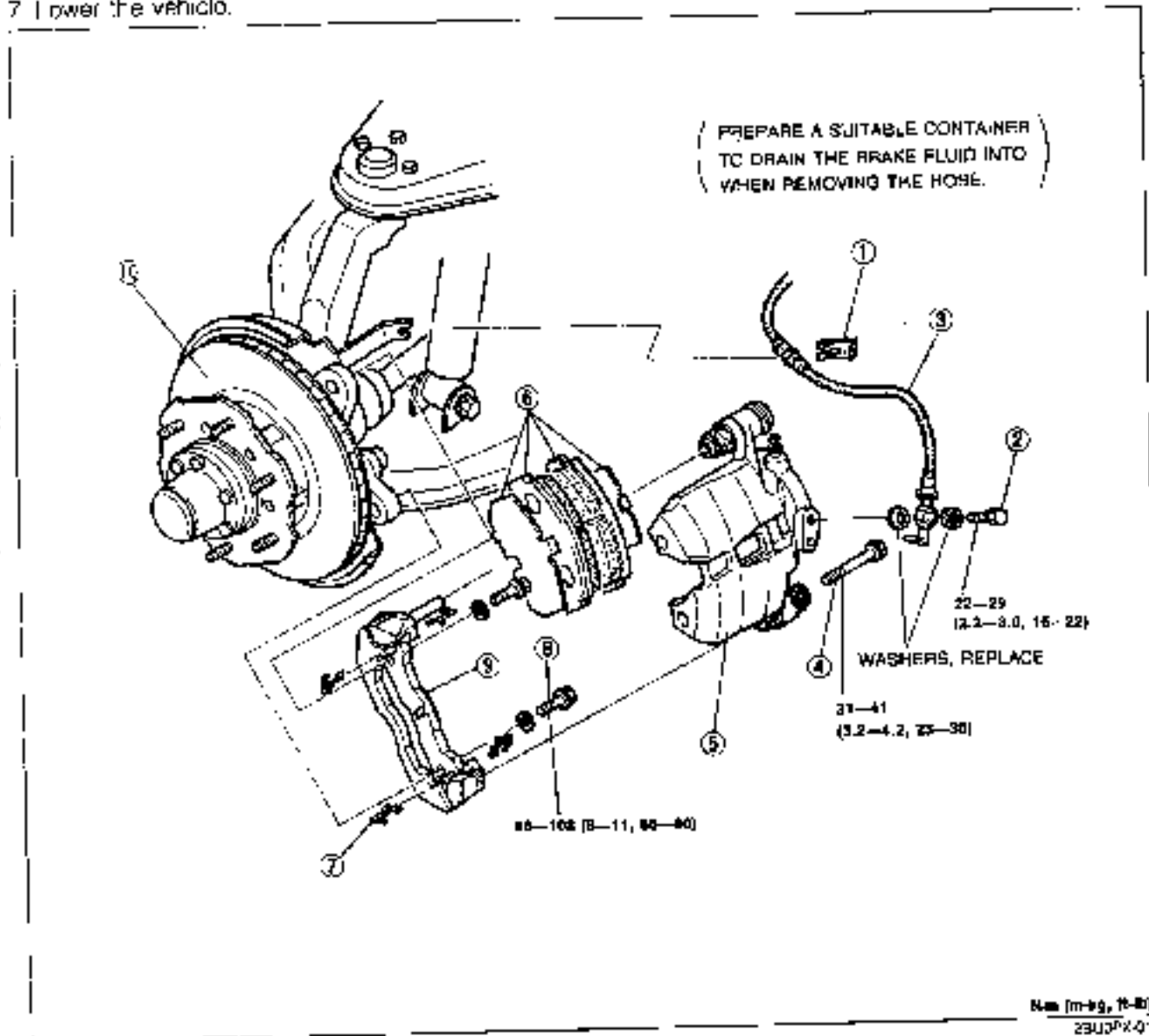
9EL1PX019

**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.

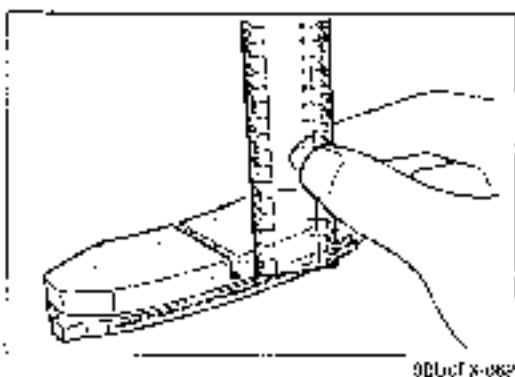
**Tightening torque: Non-styled wheel.... 85—118 Nm (9—12 m·kg, 65—87 ft·lb)**  
**Styled wheel ..... 116—147 Nm (12—15 m·kg, 87—108 ft·lb)**

7. Lower the vehicle.



- 1. Clip
- 2. Bolt
- 3. Brake hose
- 4. Lack bolts
- 5. Brake caliper assembly
  - Disassembly ..... page P-21
  - Assembly ..... page P-22

- 6. Disc pac Inspection..... page P-21
- 7. Shims
- 8. Bolts
- 9. Mounting support
- 10. Disc plate
  - Removal and Installation ..... Section M
  - Inspection..... page P-21



9DBUCF X-062

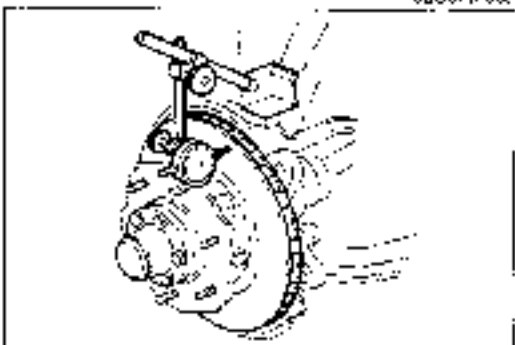
### Inspection

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.**



9DAUCFY-022

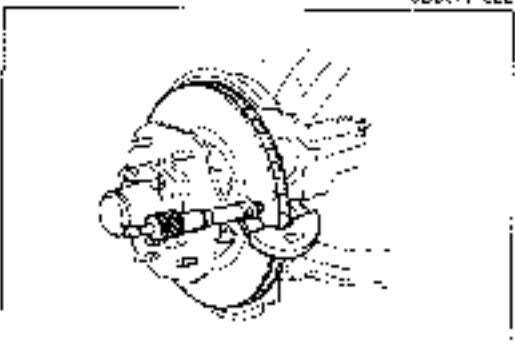
### Disc plate

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.



9BUCPX-021

2. Wear or damage

### Thickness

#### 4x4 model

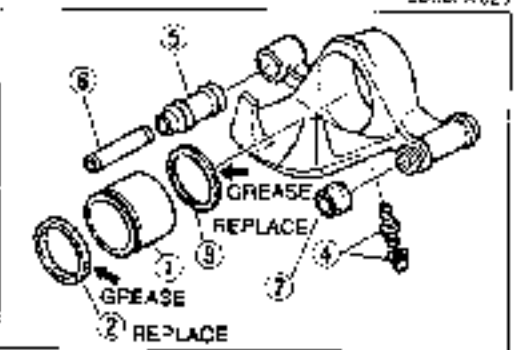
**Standard value: 22mm (0.87 in)**

**Minimum: 20mm (0.79 in)**

#### 4x2 model

**Standard value: 20mm (0.79 in)**

**Minimum: 18mm (0.71 in)**



9BUCPX-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

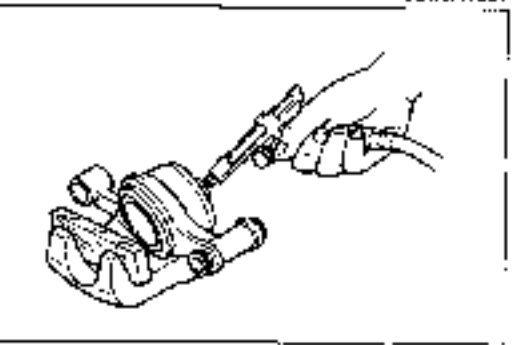
### Disassembly note

#### Piston

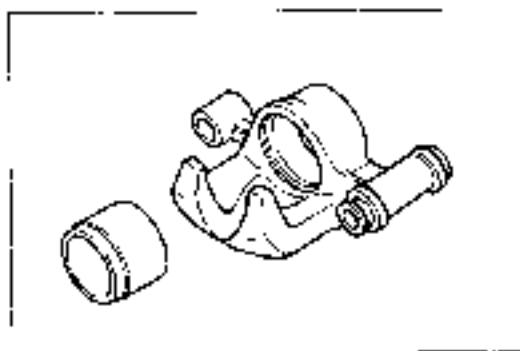
Place a piece of wood in the caliper, then blow compressed air through the hole to force the piston out of the caliper.

#### Caution

**Blow the compressed air slowly to prevent the piston from popping out.**



9FVUCFX-075

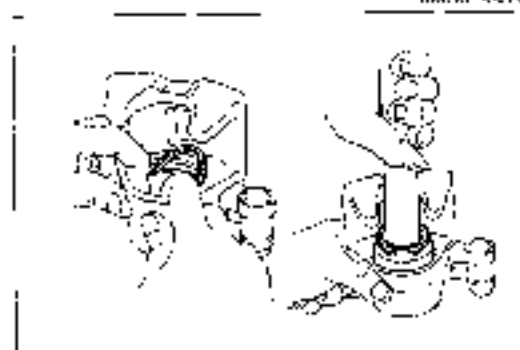


11M.K1-PX-076

**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



25M.K1-PX-026

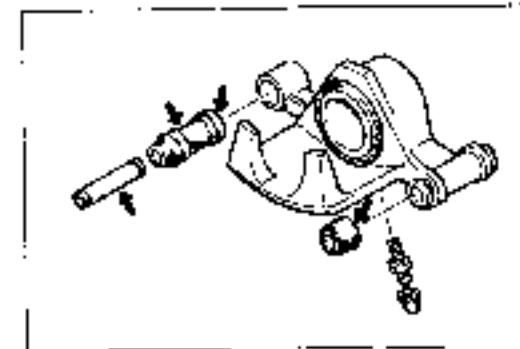
**Assembly (Caliper)**

1. Coat a new piston seal with the grease supplied in the seal kit; then install it in the caliper.



25M.K1-PX-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.



25M.K1-PX-025

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 Nm (12—15 m·kg, 87—108 ft·lb)

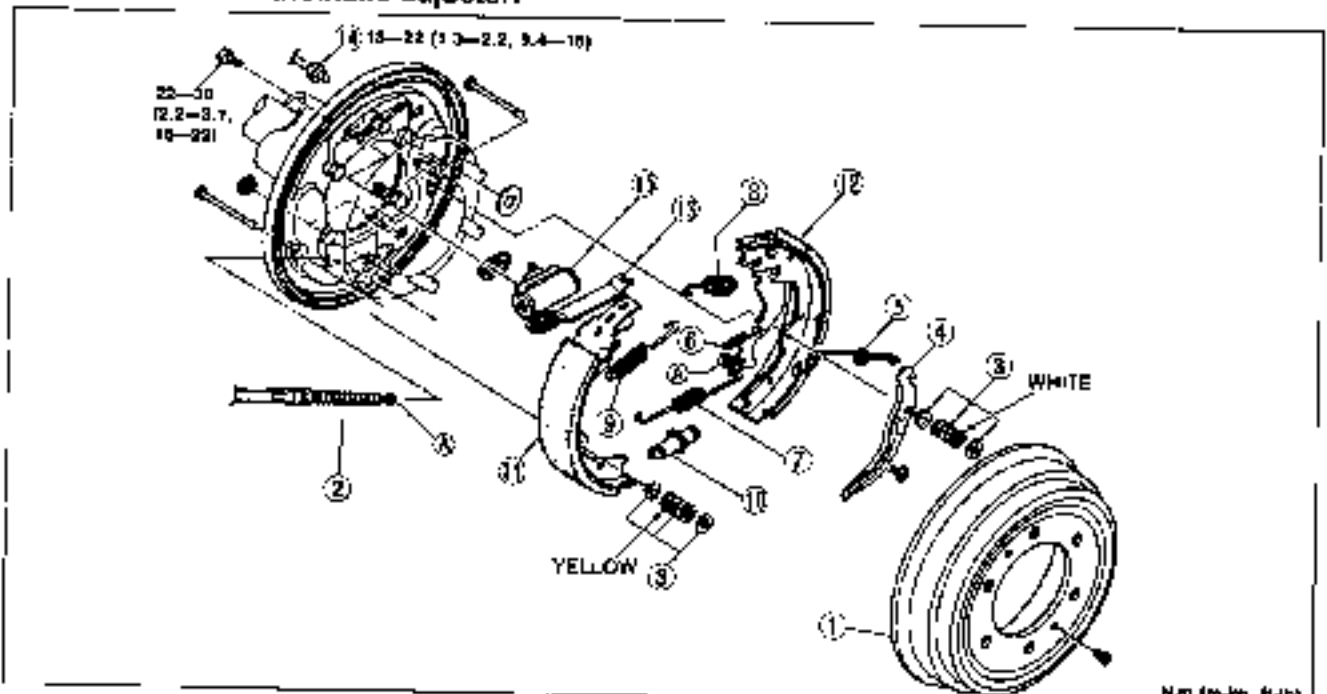
7. Lower the vehicle
8. Adjust the parking lever stroke. (Refer to page P-31.)

### 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.**



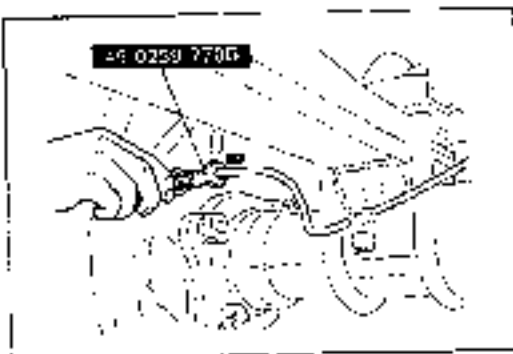
1. Brake drum  
Inspection..... page P-24
2. Parking brake cable
3. Hold spring and sleeve, pin

### 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



EMU10PX-361

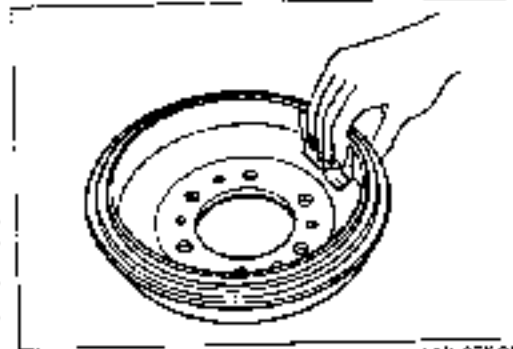
**Removal note**

**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)



SM10PX-052

**Inspection**

Check for the following and repair or replace parts as necessary.

**Brake drum**

1. Scratches, uneven or abnormal wear inside drum

**Note**

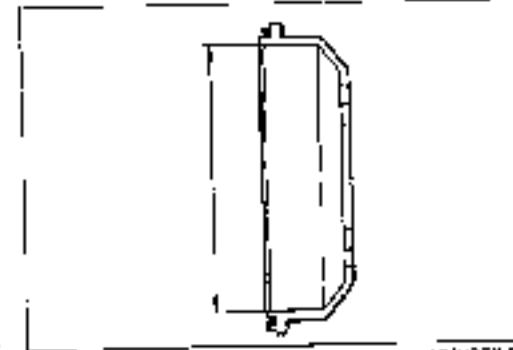
Repair if the problem is minor.

2. Drum inner diameter

Standard diameter: 260mm (10.24 in)  
Diameter limit: 261.6mm (10.30 in)

**Caution**

When repairing or replacing the drum, check the contact with the shoe.



SM10PX-053

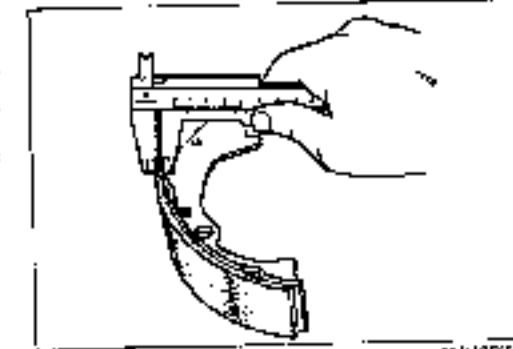
**Brake shoe**

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.

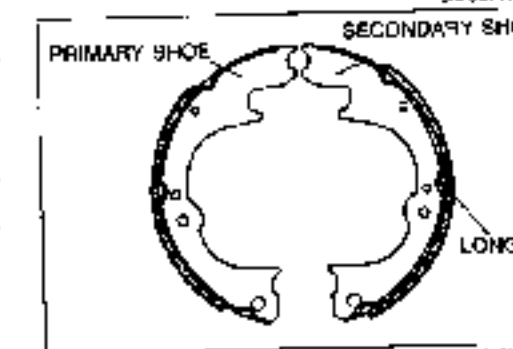


SM10PX-054

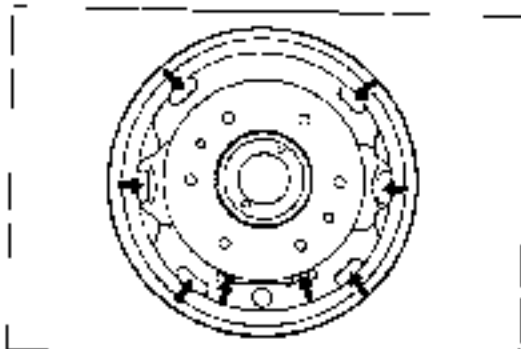
**Installation note**

**Brake shoe**

When installing the brake shoes, be careful not to confuse the primary and secondary shoes.



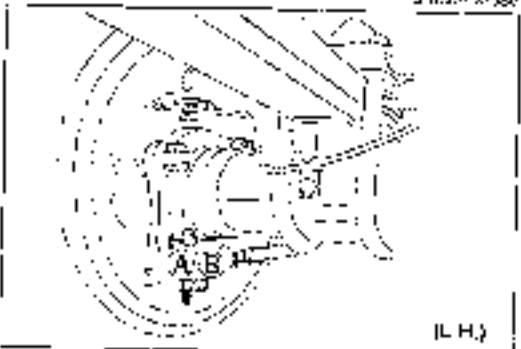
SM10PX-055



9M.LDPX-138

### Grease points

- (1) Piston of wheel cylinder
- (2) Anchor sliding parts
- (3) Projection of backing plate
- (4) Adjusting screw
- (5) Adjusting sleeve contact surfaces



(L.H.)

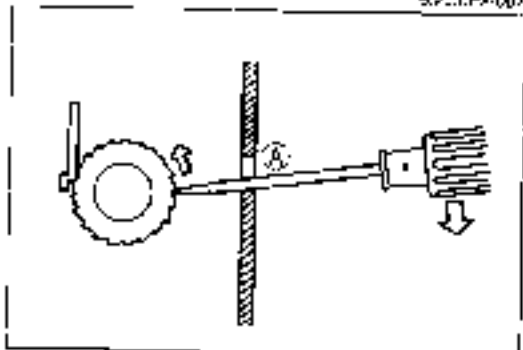
9V.L.PA-107

### Adjustment of brake shoes

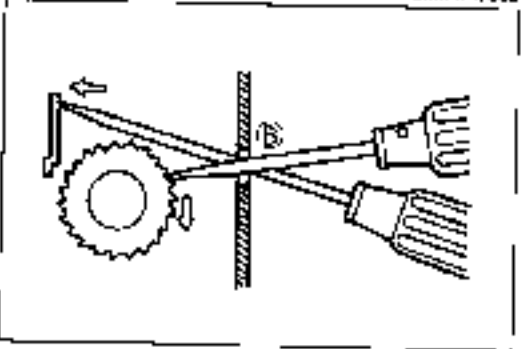
The rear brakes are self-adjusting and require a manual adjustment only after the brake shoes have been replaced or when the operating lever has been moved during some other service operation.

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.



9M.XPY-088



9D.LDPX-028



**Disassembly, Assembly, and Inspection (Wheel cylinder)**

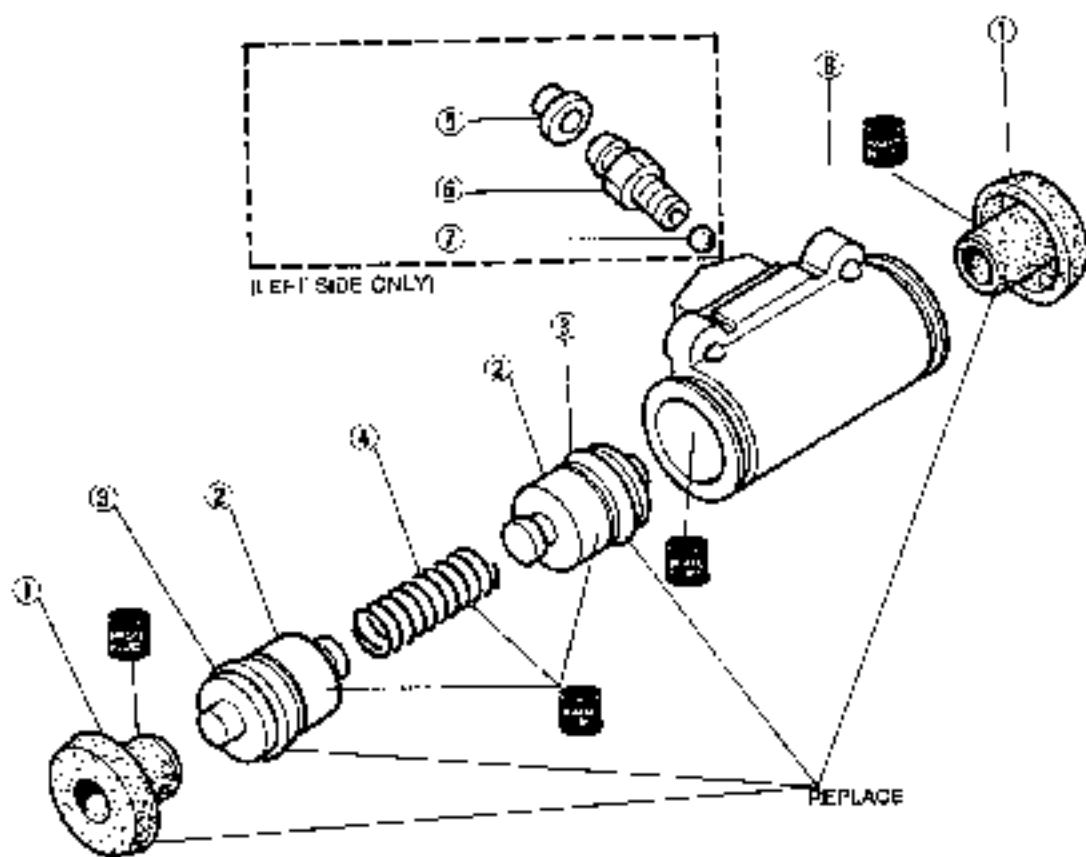
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

**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.



BUKPK-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

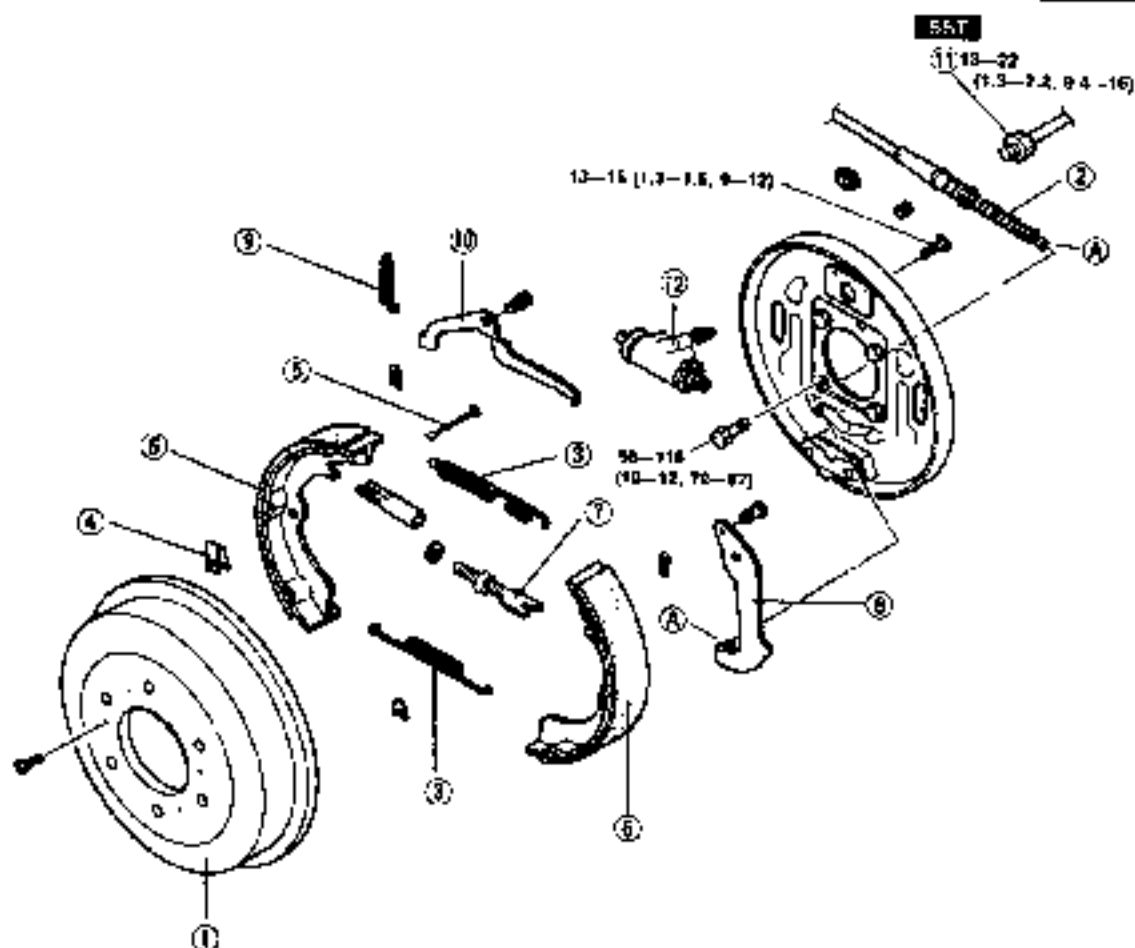
1. Jack up the rear of the vehicle, and support it with safety stands.
2. Remove the wheels, then the rear drum brakes in the sequence shown in the figure.
3. Inspect all components and parts. Replace parts if necessary.
4. Install in the reverse order of removal.
5. After installation, add brake fluid and bleed the air, then check for fluid leakage.
6. Install the wheels.

**Tightening torque: Non-styled wheel .... 88—118 Nm (9—12 m·kg, 65—87 ft·lb)**  
**Styled wheel ..... 118—147 Nm (12—15 m·kg, 87—108 ft·lb)**

7. Lower the vehicle.
8. Adjust the parking brake lever stroke. (Refer to page P-31.)

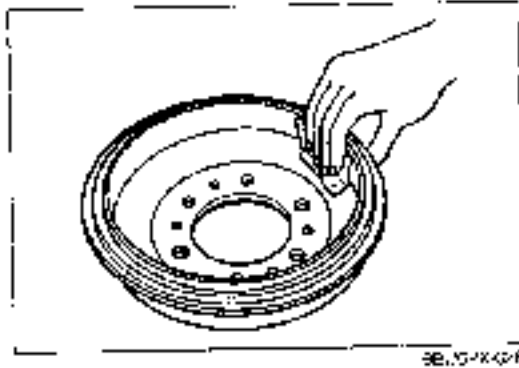
### Note

**Before removal, release the parking brake.**



Nm (m·kg, ft·lb)  
 2BRX09X0115

- |   |  |  |
|---|--|--|
| <ol style="list-style-type: none"> <li>1. Brake drum<br/>Inspection ..... page P-28</li> <li>2. Parking brake cable</li> <li>3. Return spring</li> <li>4. Brake shoe pin</li> </ol> | <ol style="list-style-type: none"> <li>6. Brake shoe<br/>Inspection ..... page P-26<br/>Brake shoe<br/>adjustment .. page P-28</li> <li>7. Adjust screw</li> <li>8. Operating lever</li> </ol> | <ol style="list-style-type: none"> <li>9. Pawl lever return spring</li> <li>10. Pawl lever</li> <li>11. Brake pipe<br/>Removal Note .. page P- 24</li> <li>12. Wheel cylinder assembly<br/>Disassembly, Assembly<br/>and Inspection<br/>..... page P-29</li> </ol> |
|---|--|--|



36L107X42A

**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.

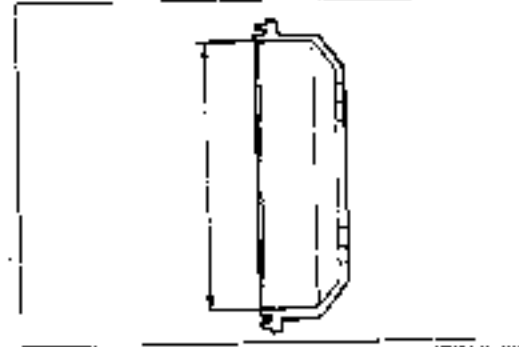
2. Drum inner diameter

**Standard diameter:** 260mm (10.24 in)

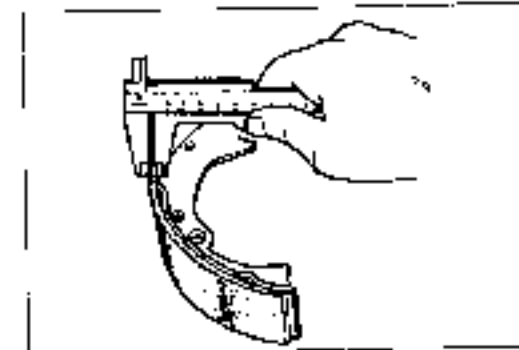
**Diameter limit :** 261.5mm (10.30 in)

**Caution**

When repairing or replacing the drum, examine the contact with the shoe.



43311X866



HFA.CPX.E29

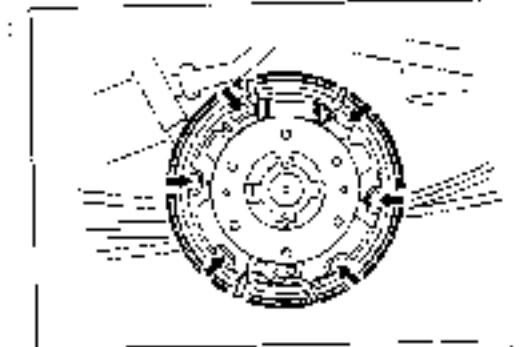
**Brake shoe**

1. Peeling, cracks, and extremely uneven wear of the lining
2. Wear of the lining.

**Thickness limit:** 1.0mm (0.04 in)

**Caution**

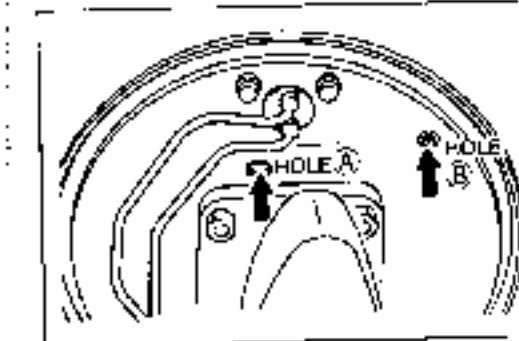
When replacing the shoe assembly, replace it as a set and with an assembly of the same quality.



65J11X427

**Grease points**

Before installation, apply grease to the wheel cylinder and anchor sliding parts (→), the projections of the backing plate (⇨).

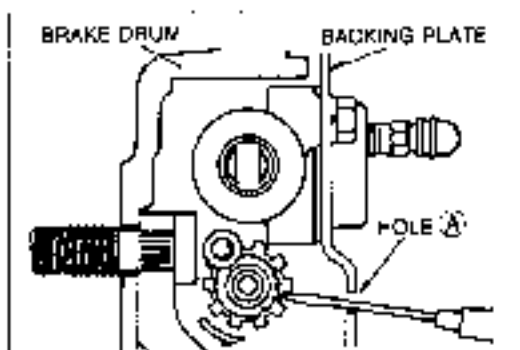


78J.1X410

**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 dirt, 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 hose bugs into the backing plate.

**Disassembly, Assembly, and Inspection (Wheel cylinder)**

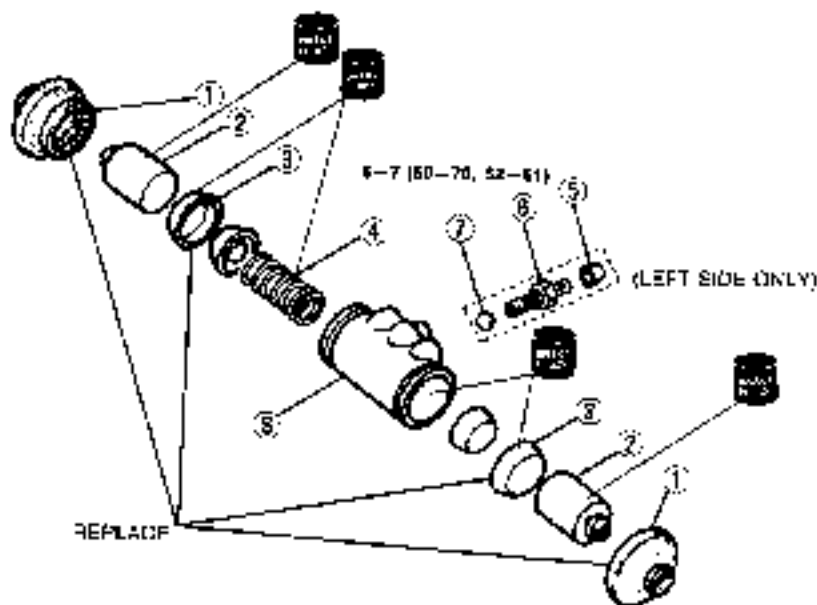
1. Disassemble in the order shown in the figure
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

**Note**

- a) Use a new boot set.
- b) Apply brake fluid to the points shown in the figure.

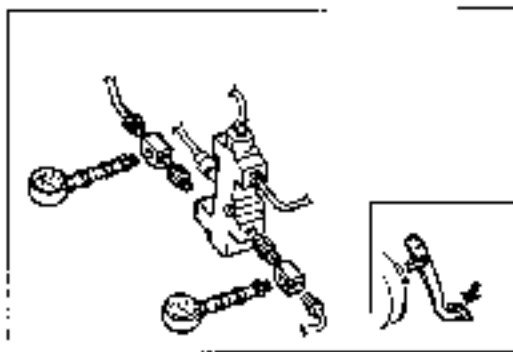
**Caution**

Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.



25 mm (0.98-in.)  
 51mm x 39mm

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Dust boot</li> <li>2. Piston<br/>Inspect for wear of contact surface</li> <li>3. Piston rubber cup</li> <li>4. Spring<br/>Inspect for wear or breaks</li> </ol> | <ol style="list-style-type: none"> <li>5. Rubber cap</li> <li>6. Bleeder screw</li> <li>7. Steel ball</li> <li>8. Wheel cylinder<br/>Inspect for wear, rust, or damage</li> </ol> |
|---|---|

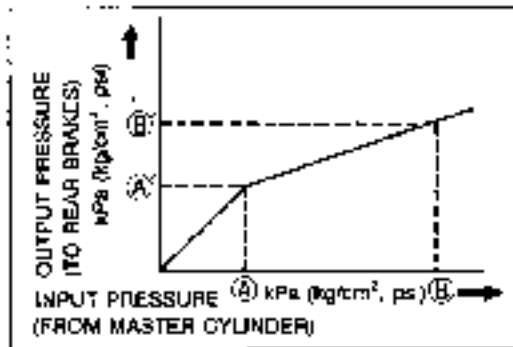


3R110PX-022

**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.



0R110PX-022

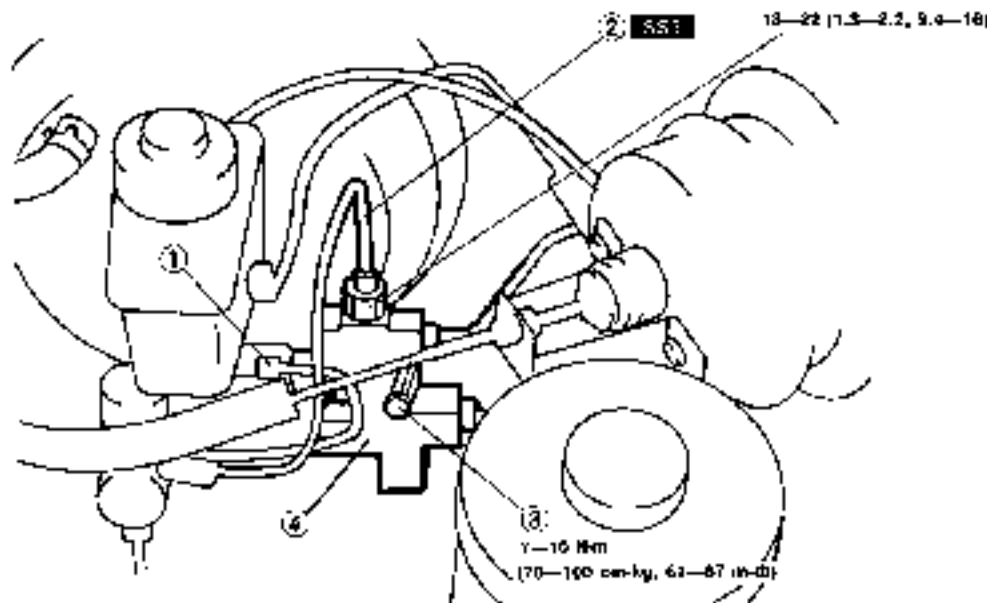
Fluid pressure kPa (kg/cm <sup>2</sup> , psi)			
A	A	B	B'
3,826 (39,555)	3,826 ± 294 (39 ± 3.0, 555 ± 43)	7,645 (80, 1,138)	8,180 ± 294 (83 ± 3.0, 896 ± 43)

**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.)

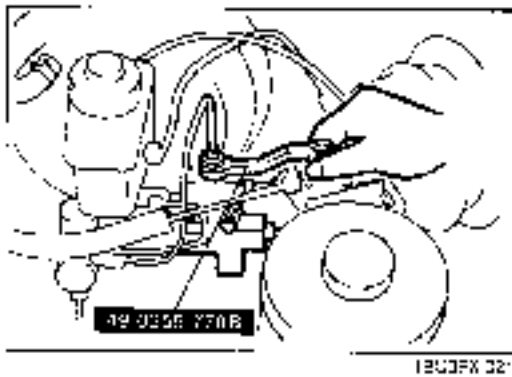


Nm (in-lb, ft-lb)  
2R110PX-01X

1. Pressure differential switch coupler
2. Brake pipes

Removal Note ..... page P-31

3. Ball
4. Proportioning bypass valve



**Removal note**

**Brake pipes**

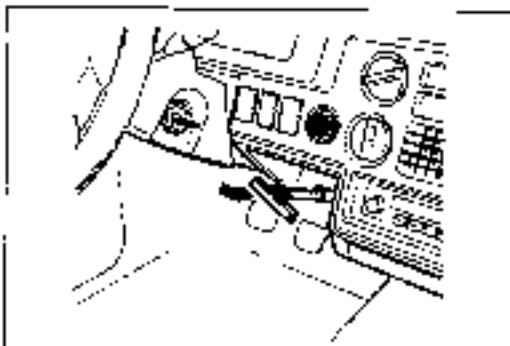
Disconnect or connect the brake pipes from/to the proportioning bypass valve with the **SST**.

**PARKING BRAKE SYSTEM**

**TROUBLESHOOTING GUIDE**

Problem	Possible cause	Action	Page
Brakes do not release	Improper return of parking brake cable or improper adjustment	Repair or adjust	P-31
Parking brake does not hold well	Excessive lever stroke Brake cable stuck or damaged Brake fluid or air in line Hardening or 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

18UJFK 022



CB1KFA 066

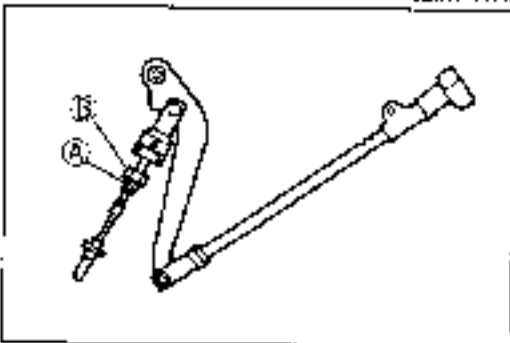
**PARKING BRAKE LEVER**

**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**



7E01DK C12

**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 Nm (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.

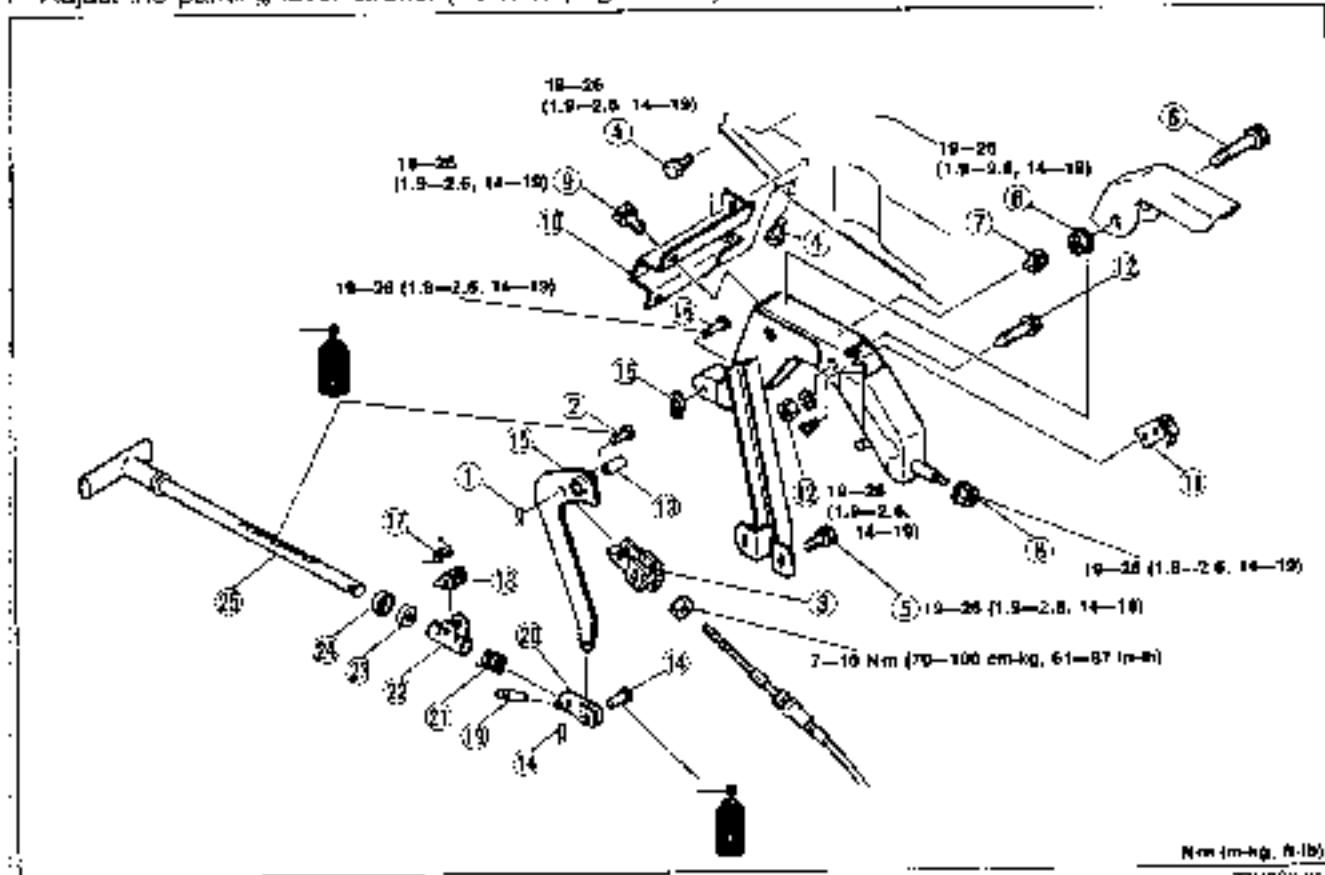
**Caution**

**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.)



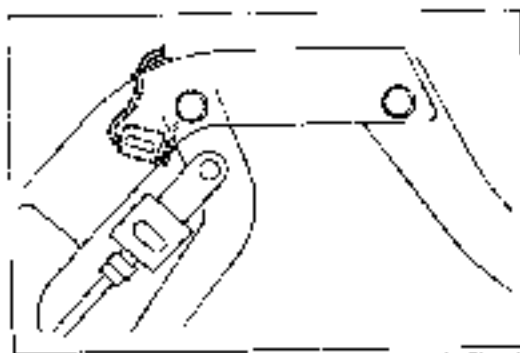
Nm (m.kg, ft.lb)  
ZD00FX-017

- |                            |  |  |
|----------------------------|--|--|
| 1. Clip                    | 11. Parking-brake switch<br>Installation Note..... below | 20. Fork pin   |
| 2. Joint pin               | 12. Bolt and nut   | 21. Spring<br>Inspect for weakness or<br>breakage                |
| 3. Parking cable connector | 13. Pin  | 22. Guide  |
| 4. Bolt                    | 14. Clip and joint pin                                   | 23. Stopper  |
| 5. Bolt                    | 15. Lever  | 24. Stopper seat   |
| 6. Bolt and nut            | 16. Pin and clip   | 25. Rod<br>Inspect sector and ratchet<br>pawl for wear or damage |
| 7. Harness band connector  | 17. Spring   |  |
| 8. Nut                     | 18. Ratchet pawl   |  |
| 9. Bolt                    | 19. Stopper  |  |
| 10. Bracket                |  |  |

### 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.

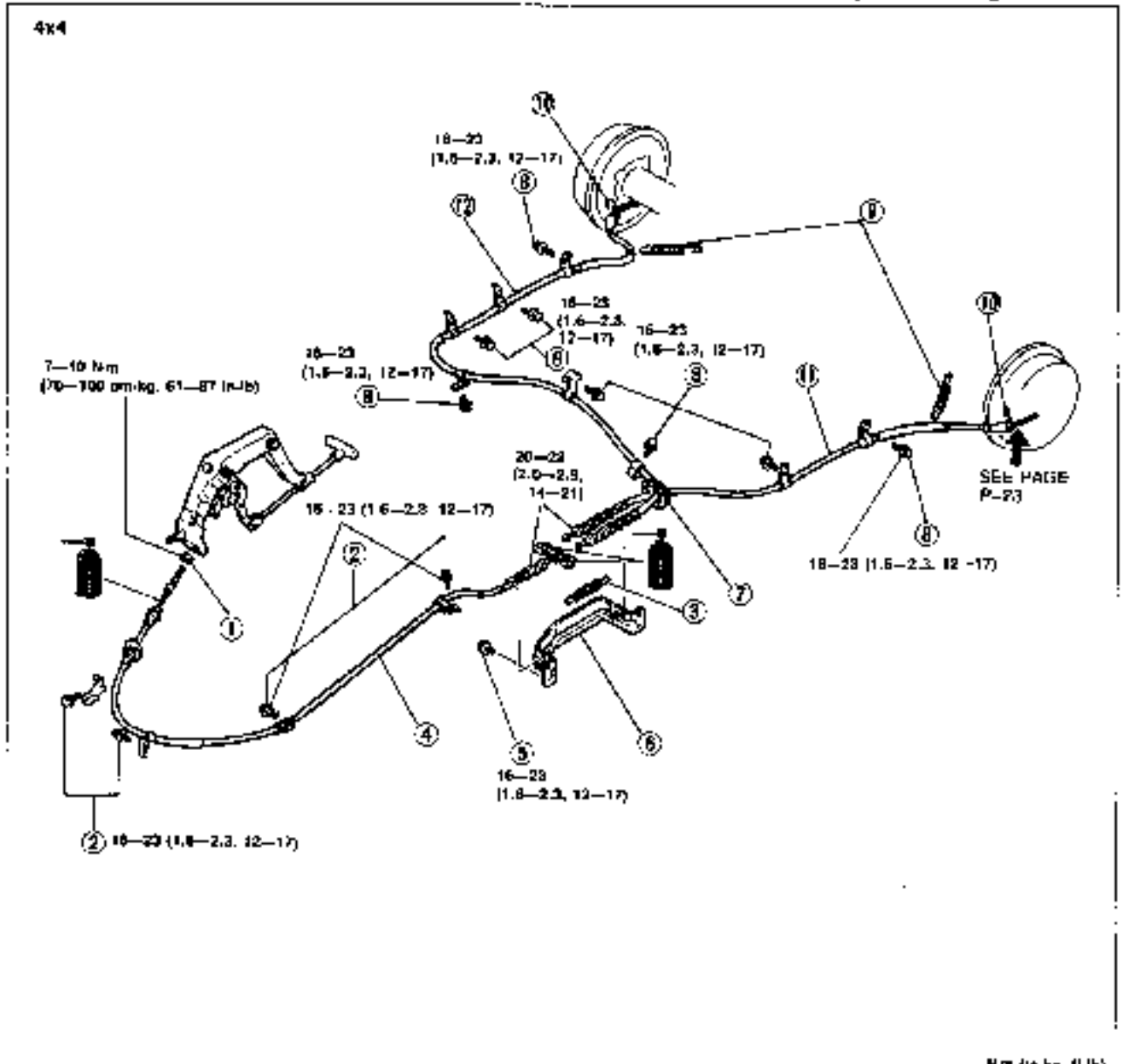


ZD00FX-10

**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 floor mat, 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.

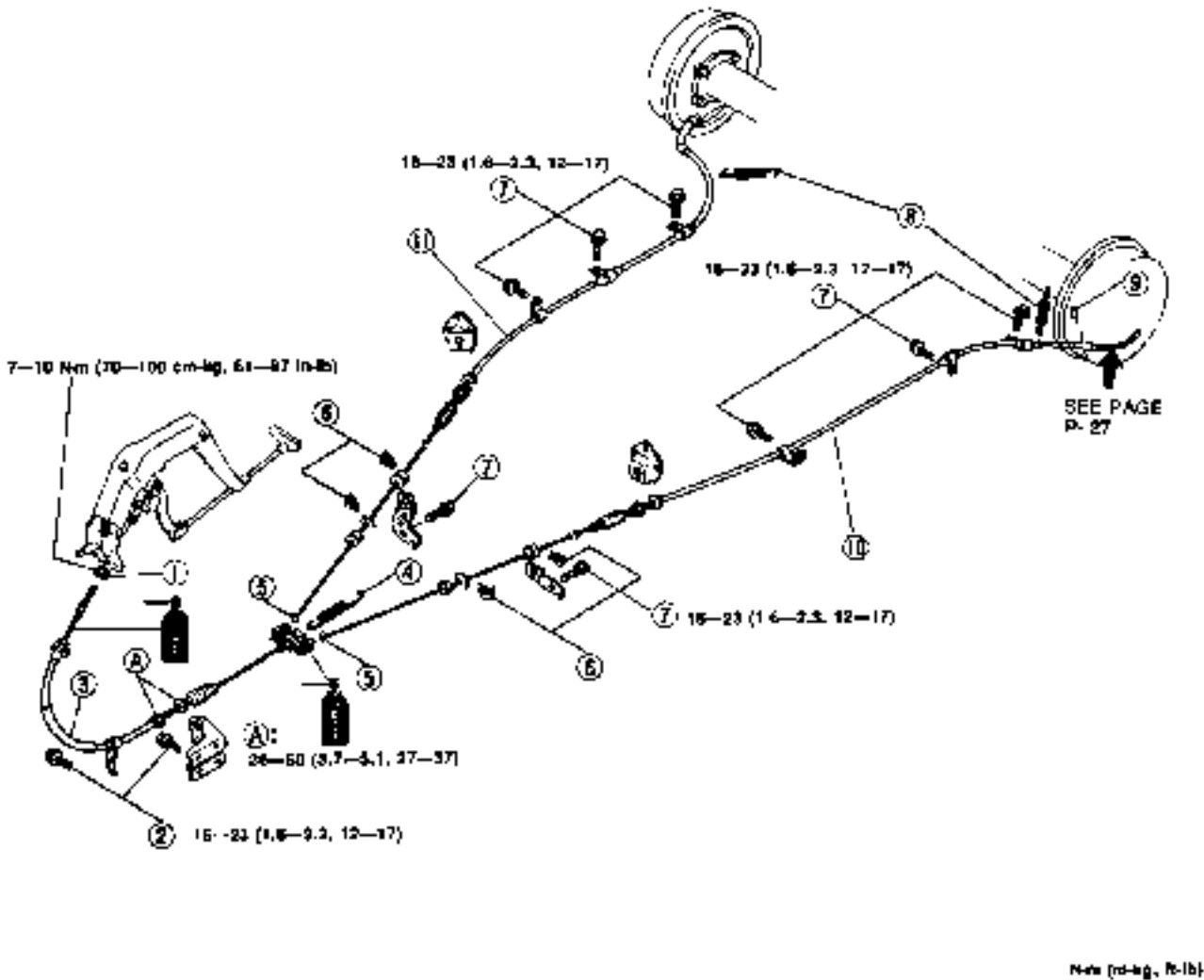


- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Nut</li> <li>2. Bolt</li> <li>3. Spring</li> <li>4. Front brake cable</li> <li>5. Bolt</li> <li>6. Bracket</li> </ol> | <ol style="list-style-type: none"> <li>7. Grout/mel</li> <li>8. Bolt</li> <li>9. Spring</li> <li>10. Clip</li> <li>11. Rear cable, (left)</li> <li>12. Rear cable, (right)</li> </ol> |
|---|---|

Nm (in·kg, ft·lb)  
FAJFA404



4x2

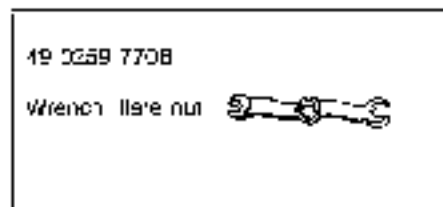


- |                          |                        |
|--------------------------|------------------------|
| 1. Nut                   | 7. Bolts               |
| 2. Bolt                  | 8. Spring              |
| 3. Front brake cable     | 9. Clip                |
| 4. Spring                | 10. Rear cable (left)  |
| 5. Brake cable connector | 11. Rear cable (right) |
| 6. Clip                  |                        |

REAR-WHEEL ANTI-LOCK BRAKE SYSTEM (REAR-WHEEL ABS)

PREPARATION

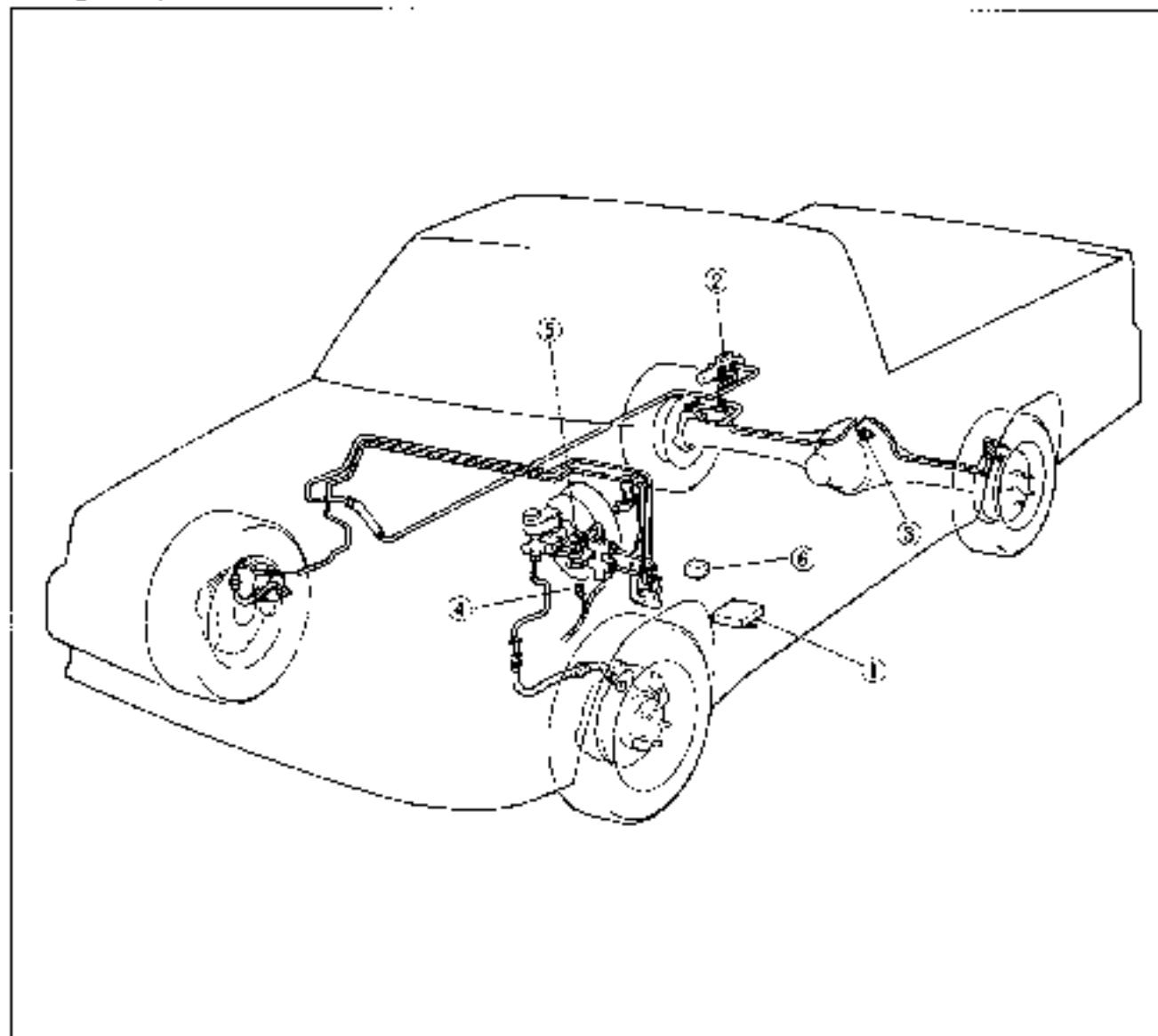
SST



DMJCFX.021

DESCRIPTION

The Rear wheel Anti lock Brake System (Rear wheel ABS) is equipped on all B2200 and B2500. The ABS control unit senses the drop in rear wheel speed and modulates hydraulic pressure to the rear brakes, inhibiting lockup.



1B06FX.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

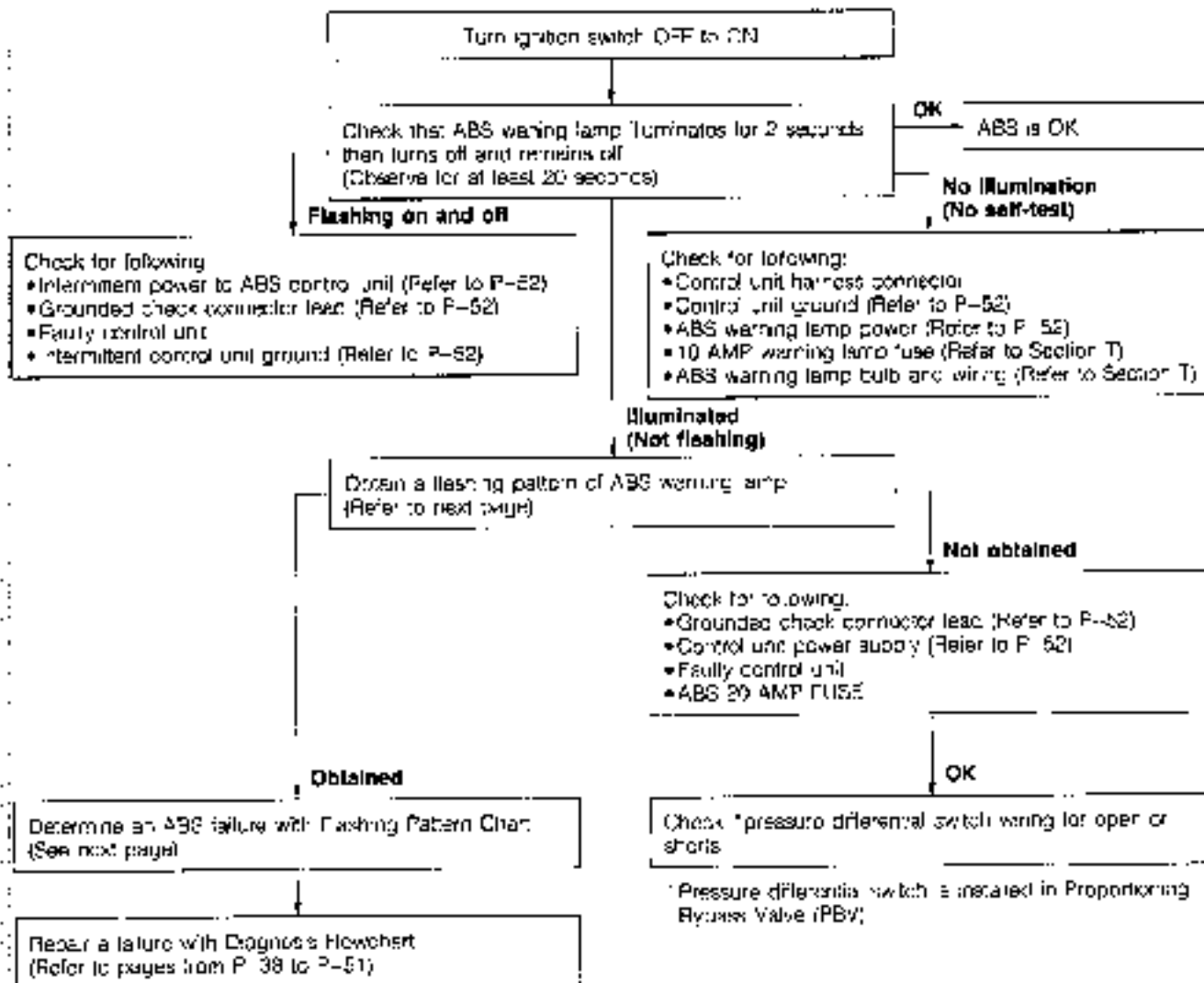
## Outline

The Rear-wheel ABS is composed of electrical components, mechanical components (hydraulic unit), and the components of the standard brake system.

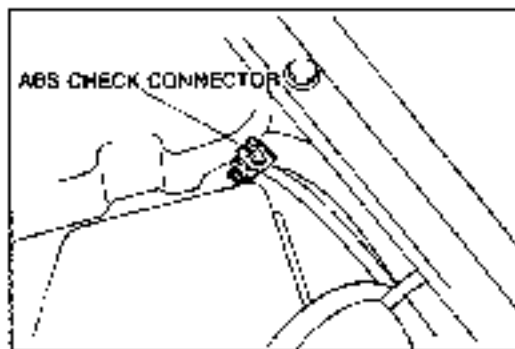
Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the self-diagnosis function within the ABS control unit. And malfunctions are indicated by the warning lamp in the instrument panel. The location of a malfunction is indicated by the technician obtaining a flashing pattern of the ABS warning lamp. The self-diagnosis and indicator functions must be used when diagnosing malfunctions of the ABS.

10.101427

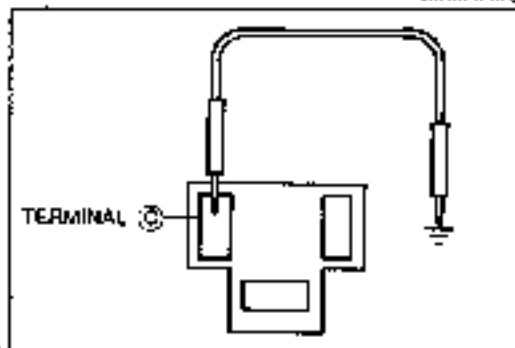
## Troubleshooting Main Flowchart



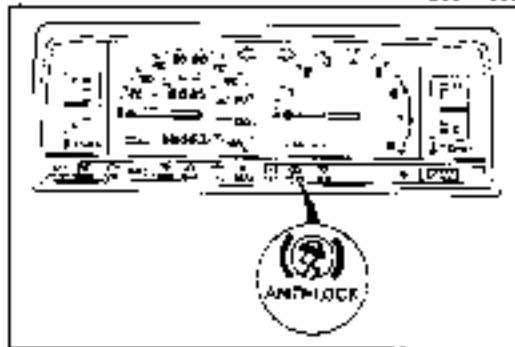
10.101428



76X11CFX-026



15U07X-036



16J07X-028

## 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 (C) (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.

# P

## 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

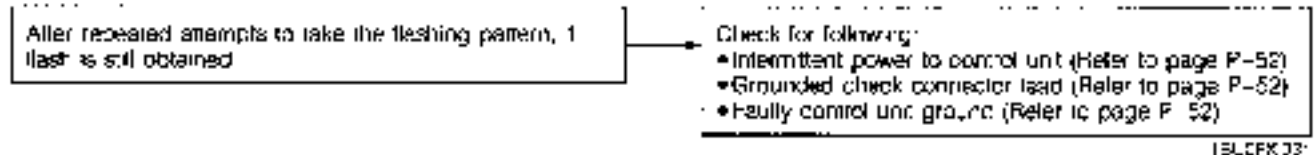
99999X13C

Diagnosis Flowchart

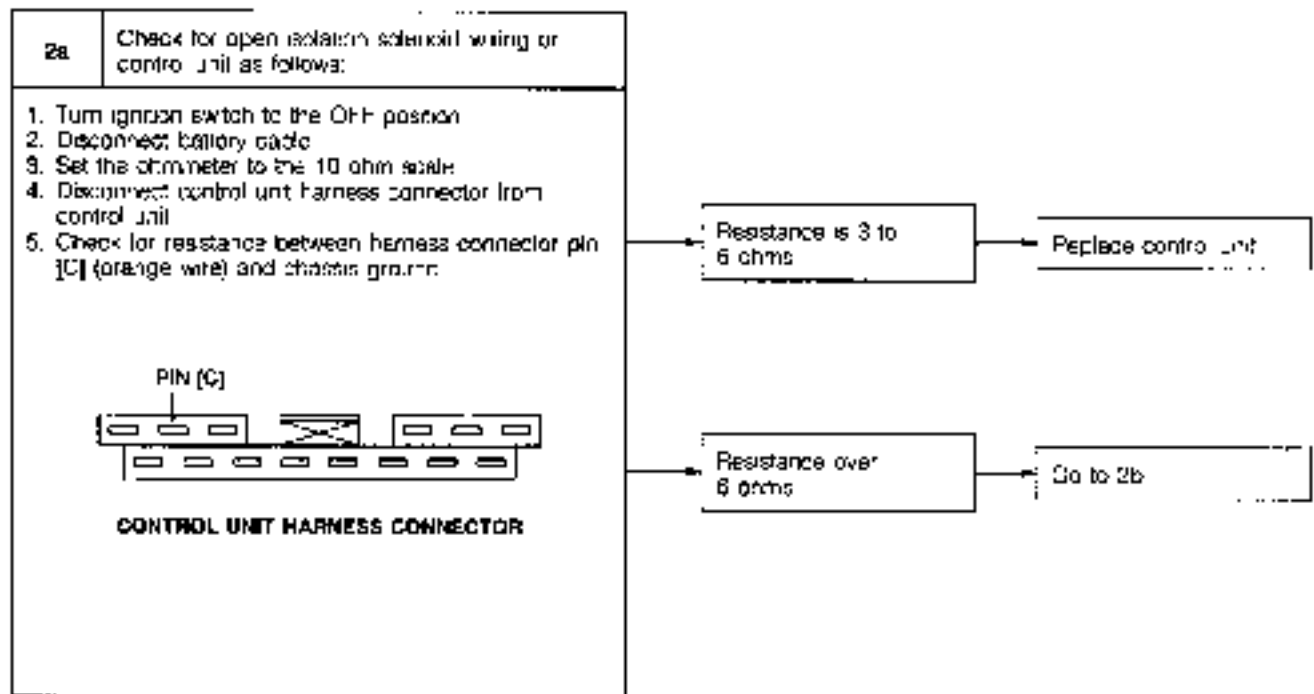
**Caution**

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)
--------------	----------------------------



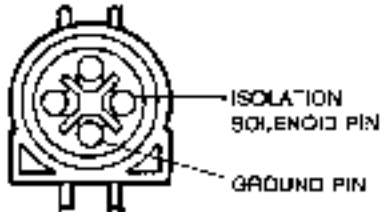
<b>ABS-2</b>	Open isolation solenoid circuit
--------------	---------------------------------



2b

Check for open isolation solenoid in wiring as follows.

1. Disconnect battery cable
2. Set ohmmeter to  $\times 0$  ohm scale
3. Check resistance between valve connector isolation solenoid pin (orange/white wire) and connector ground pin (black wire)



SOLENOID VALVE CONNECTOR

Resistance is 3 to 6 ohms

Repair open in isolation solenoid wire from valve to control unit  
Check for dirty or loose connector pins

Resistance over 6 ohms

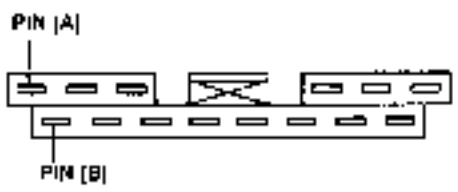
Replace hydraulic unit

1 VULCPX C25

ABS-3 Open dump solenoid circuit

**3a** Check for open dump solenoid wiring or control unit as follows.

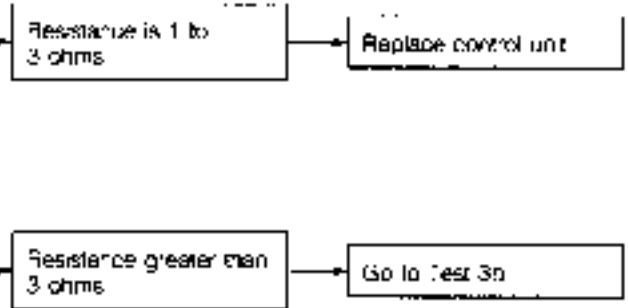
1. Turn ignition switch to the off position
2. Disconnect battery cable
3. Disconnect control unit harness connector from control unit
4. Place the ohmmeter on the 10 ohm scale
5. Check resistance between pin (B) (orange/blue wire) or pin (A) (orange/blue wire) and chassis ground



PIN (A)

PIN (B)

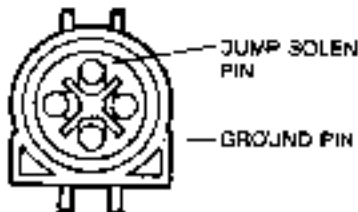
CONTROL UNIT HARNESS CONNECTOR



00.1075-037

**3b** Check for open dump solenoid or wiring as follows:

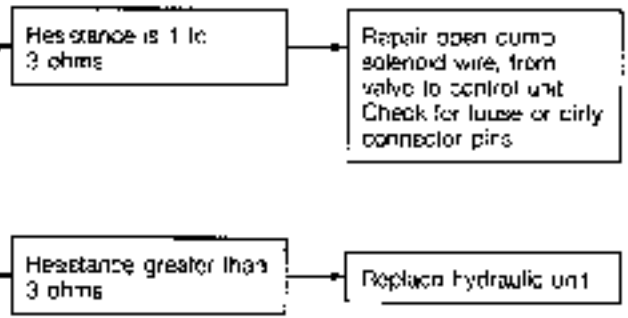
1. Turn the ignition switch to the off position
2. Disconnect battery cable
3. Disconnect solenoid valve harness connector from valve connector
4. Check resistance between valve connector dump solenoid pin (orange/blue wire) and ground pin (black wire)



JUMP SOLENOID PIN

GROUND PIN

SOLENOID VALVE CONNECTOR



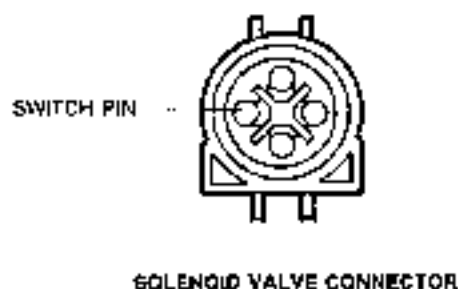
00.1075-036



<b>ABS-4</b>	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



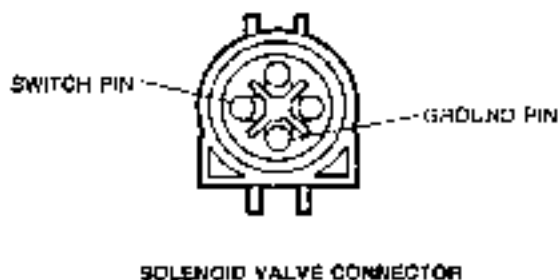
Resistance greater than 10k ohms → Go to Test 4b

Resistance less than 10k ohms → Replace hydraulic unit

1MUSFX 027

**4b** Check for short between solenoid valve switch and valve ground lead as follows

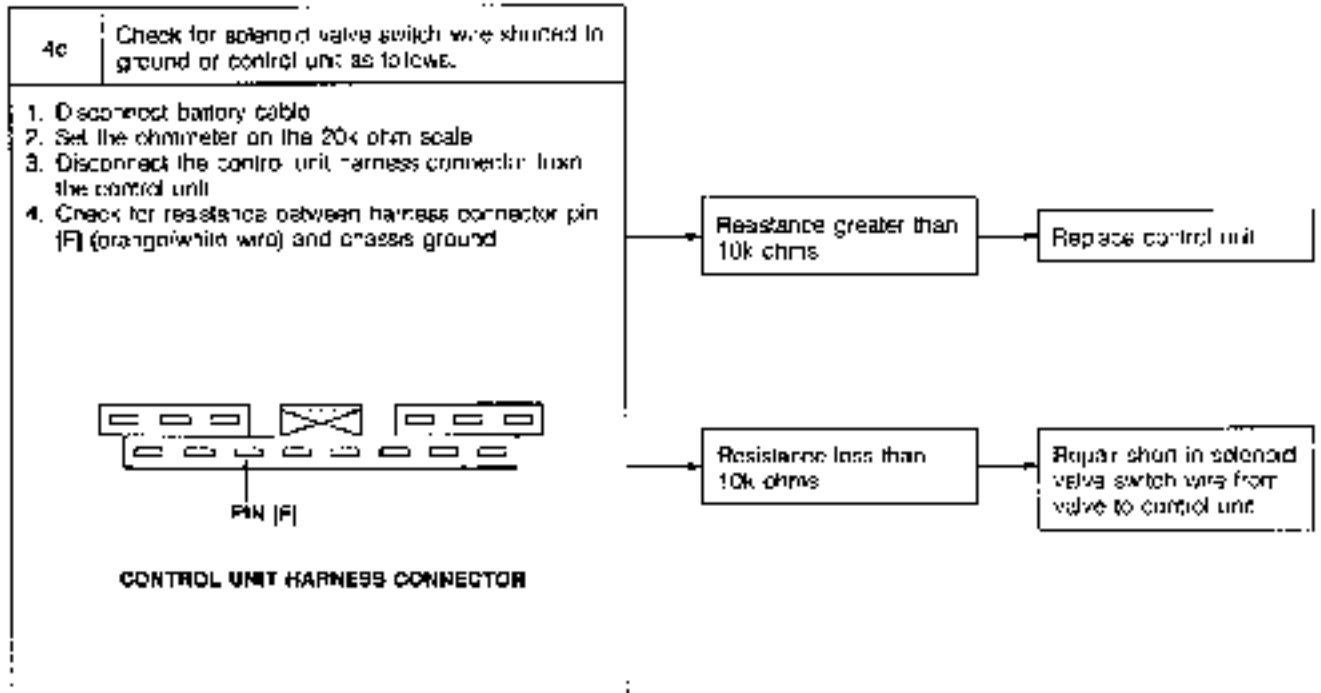
1. Set the ohmmeter on the 20k ohm scale
2. Check resistance between valve connector switch pin (orange wire) and valve solenoid ground pin (black wire)



Resistance greater than 10k ohms → Go to Test 4a

Resistance less than 10k ohms → Replace hydraulic unit

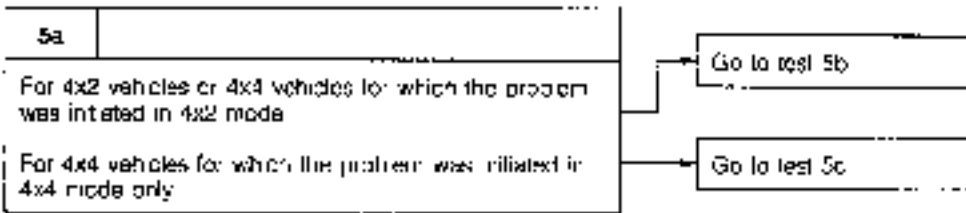
1MUSFX 028



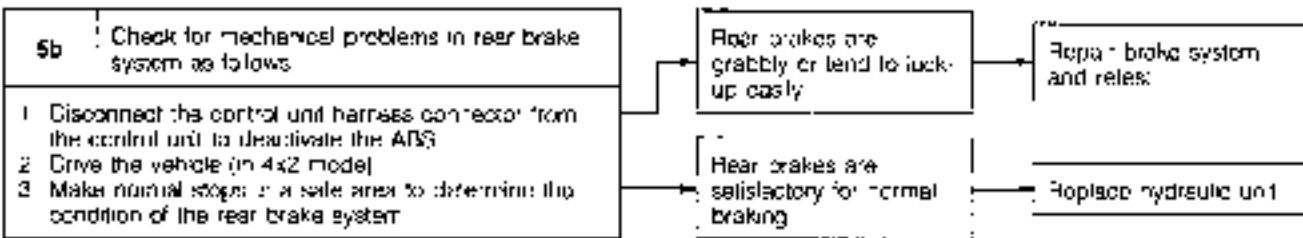
0000PX-24C

**REAR-WHEEL ANTI-LOCK BRAKE SYSTEM**

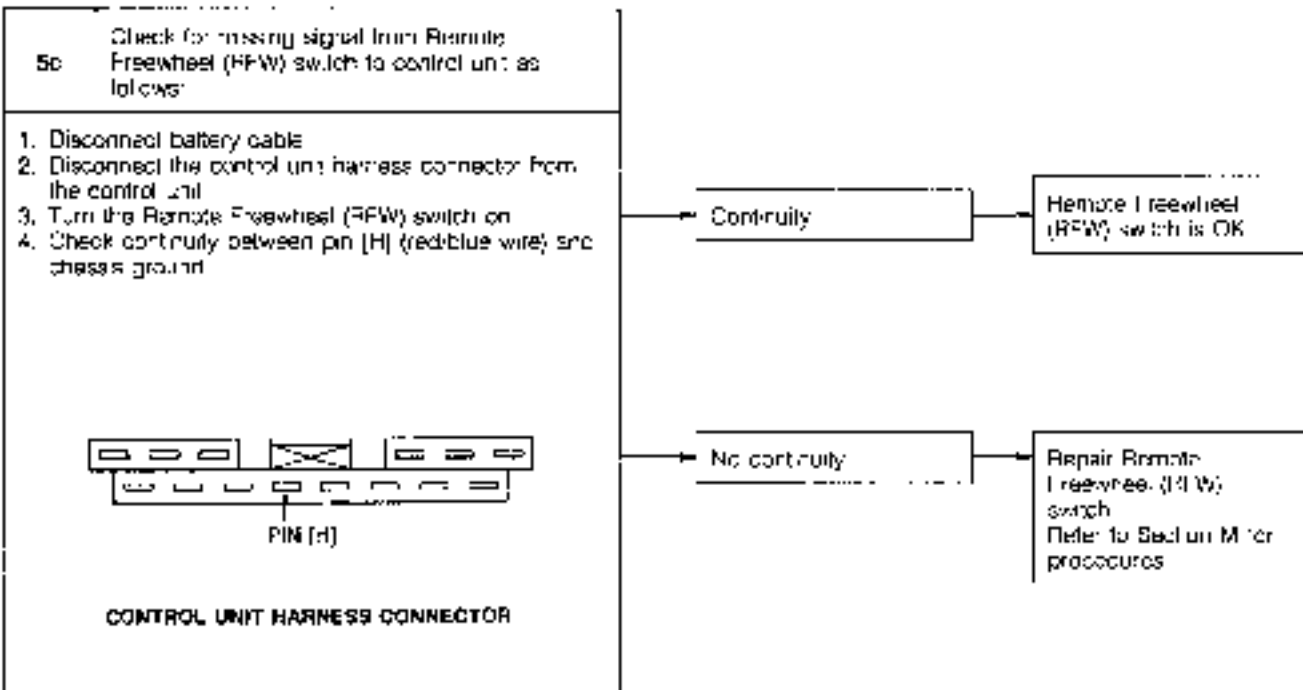
**ABS-5** System dumps too many times in 4x2 (4x2 and 4x4 vehicles) (condition occurs while making normal or hard stops. Rear brake may lock)



16L07K-03B

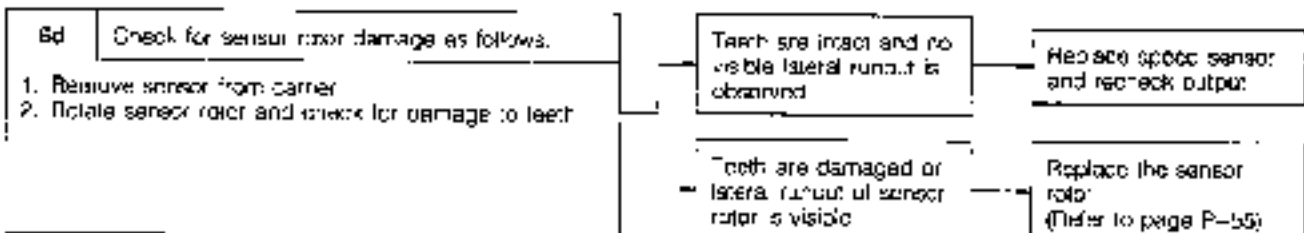
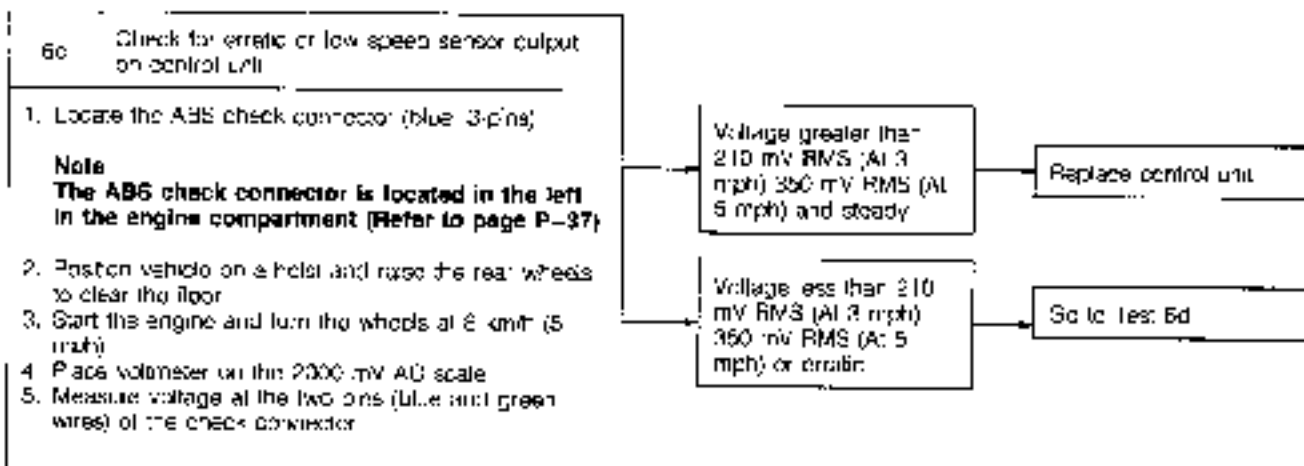
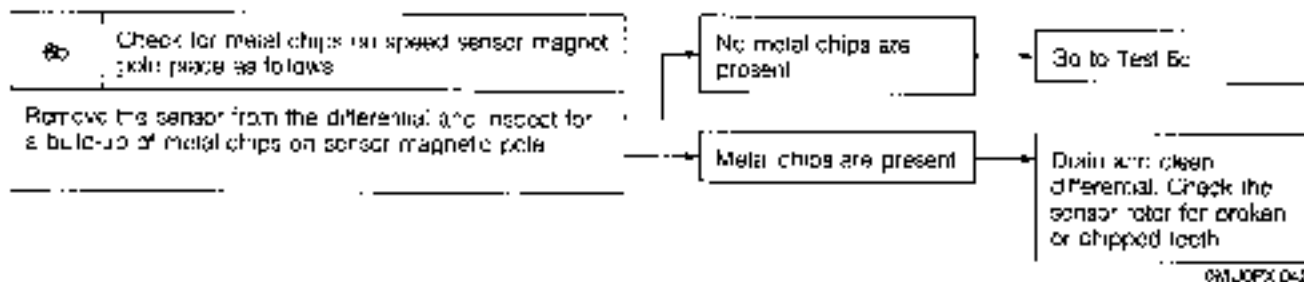
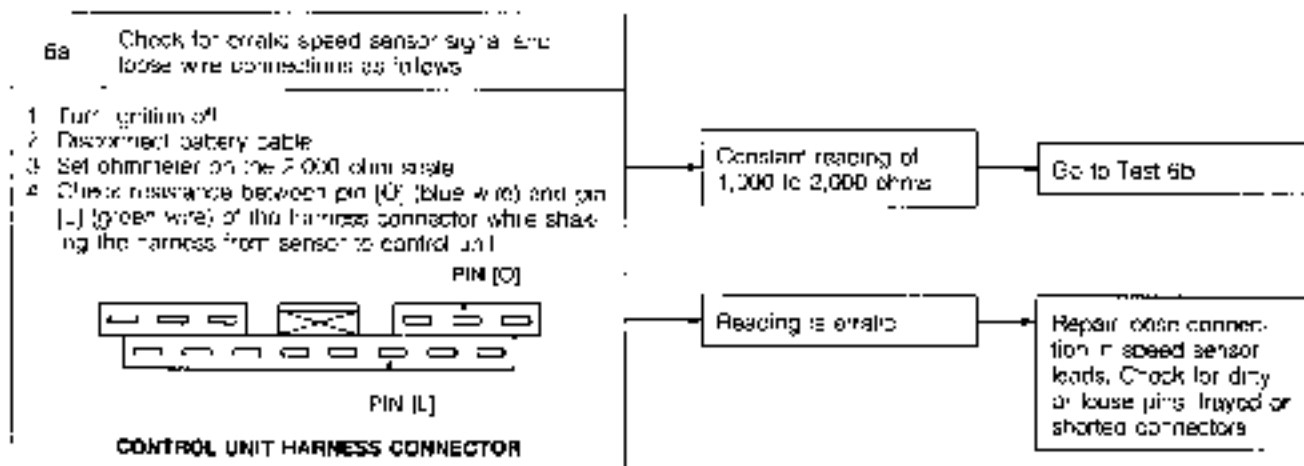


16U07K-01C



16J07K-03E

**ABS-6** (Green sensor signal rapidly cuts in and out) condition only occurs while driving



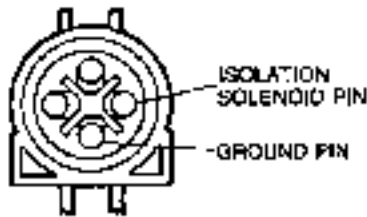
ABS-7

Isolate ground circuit (isolation solenoid)

7a

Check for solenoid 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

28U007-01E

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

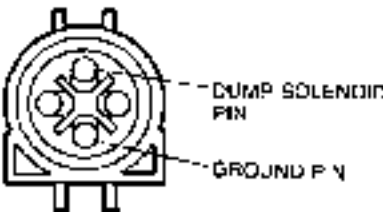
Repair short between solenoid valve and control unit. Reconnect control unit and solenoid valve

28U007-04E

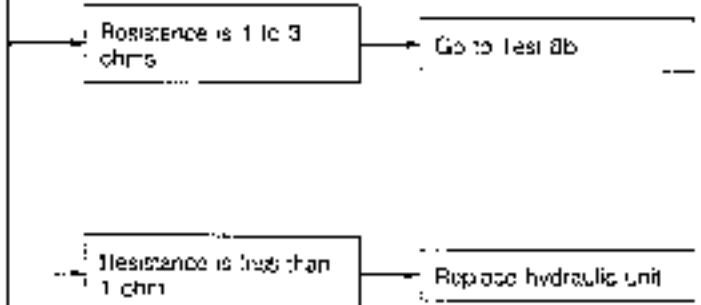
**ABS-B** Shorted ground circuit (Dump solenoid)

**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**



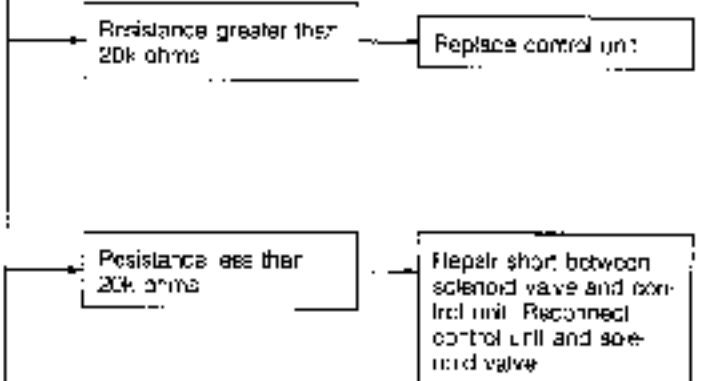
PS1074-019

**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**

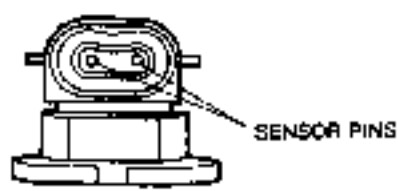


03U074-060

**ABS-9** 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



**SPEED SENSOR CONNECTOR**

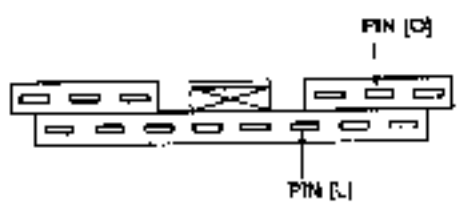
Resistance is 1,000 to 2,500 ohms → Go to Test 9b

Resistance greater than 2,500 ohms → Replace speed sensor

18U0PX-06

**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 (-) (green wire) and (0) (blue wire)



**CONTROL UNIT HARNESS CONNECTOR**

Resistance is 1,000 to 2,500 ohms → Repair control unit

Resistance greater than 2,500 ohms

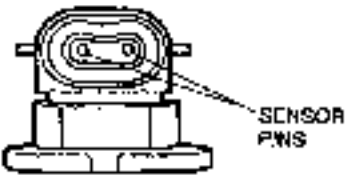
Repair open in speed sensor wires between the speed sensor and control unit. Check for loose or dirty pin connectors

18U0PX-042

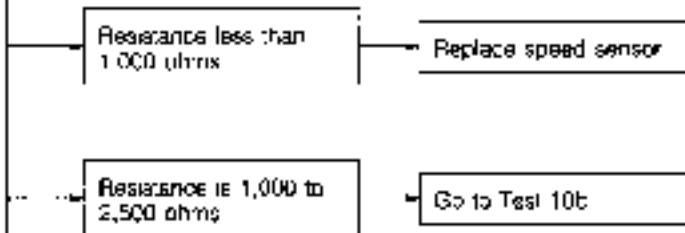
<b>ABS-10</b>	Low speed sensor resistance
---------------	-----------------------------

**10a** Check for shorted speed sensor as follows:

1. Turn ignition off
2. Disconnect the speed sensor harness from the speed sensor
3. Place the ohmmeter on the 20k ohm scale
4. Measure the resistance at the two sensor pins




**SPEED SENSOR CONNECTOR**



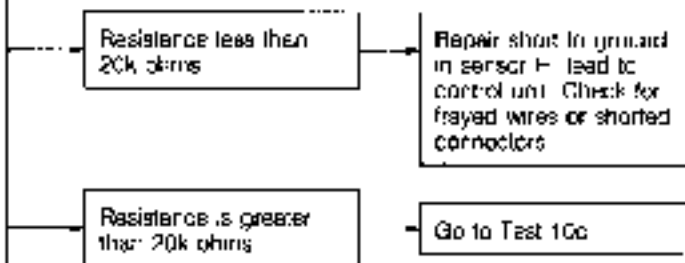
CBL0PX-053

**10b** Check for grounded speed sensor wiring as follows:

1. Turn ignition off
2. Disconnect battery cable
3. Disconnect the speed sensor harness connector from the speed sensor
4. Disconnect the control unit harness connector from the control unit
5. Set the ohmmeter on the 20k ohm scale
6. Measure the resistance from pin [O] (bus wire) of the harness connector to chassis ground



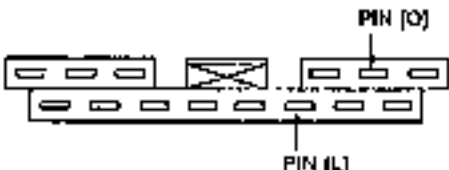
**CONTROL UNIT HARNESS CONNECTOR**



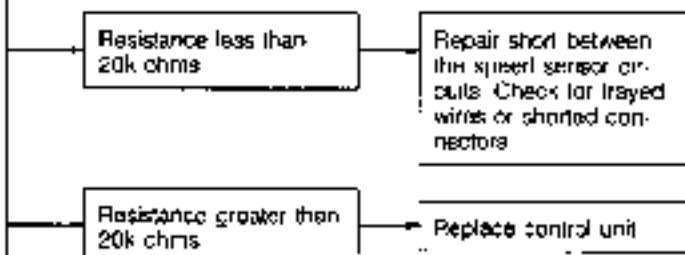
CBL0PX-063

**10c** Check for shorted speed sensor wiring as follows:

1. Turn ignition off
2. Disconnect speed sensor harness connector from the speed sensor
3. Disconnect the control unit harness connector from the control unit
4. Place the ohmmeter on the 20k ohm scale
5. Measure the resistance from pin [L] (green wire) to pin [O] (blue wire) of the harness connector



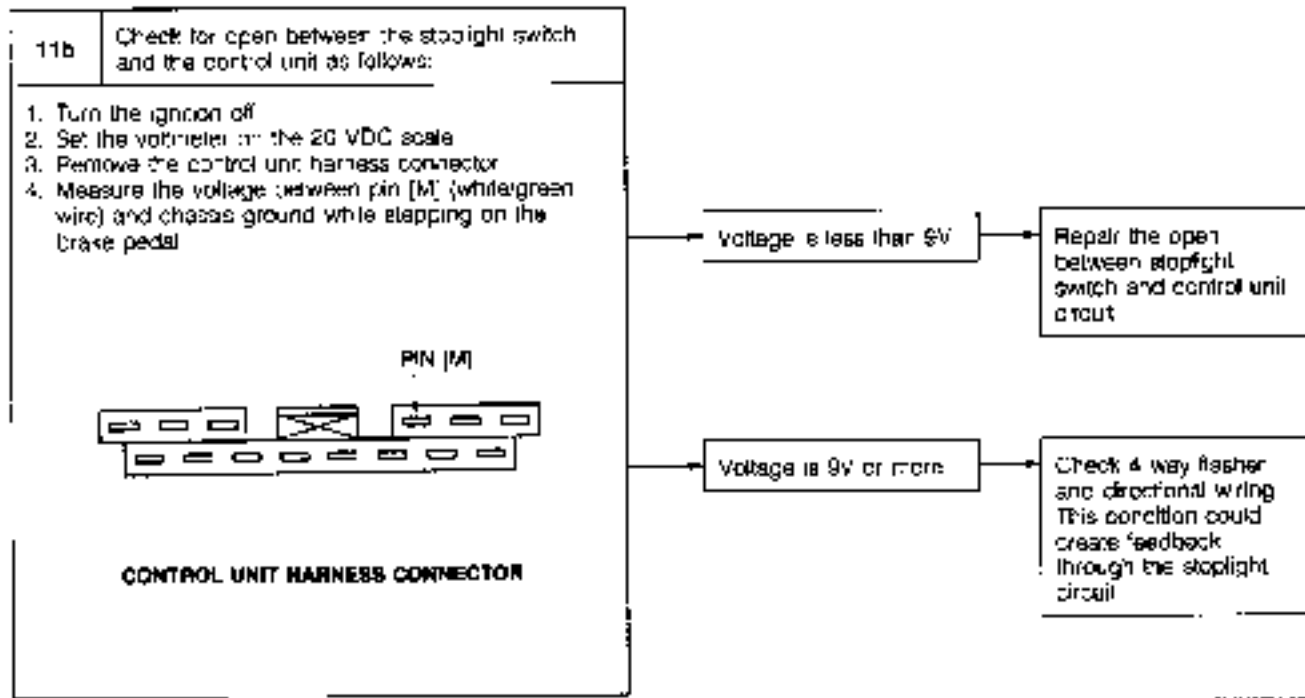
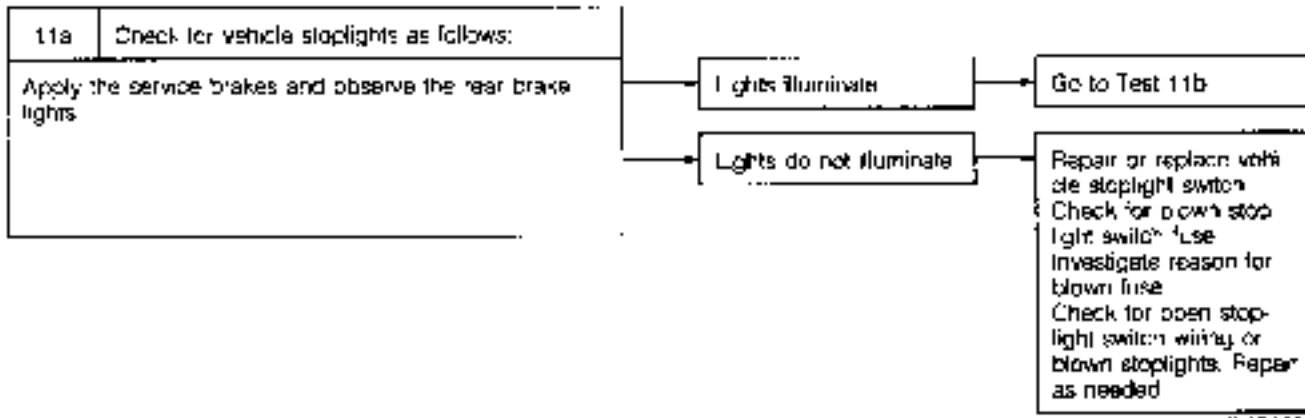
**CONTROL UNIT HARNESS CONNECTOR**



FBL0PX-044  
**P-49**



**ABS-11** Stoplight switch always closed or stoplight switch circuit defective (Condition indicated only when driving above 56 km/h (36 mph))



**ABS-12** (12 flashes should not occur)

After repeated attempts to take the flashing pattern, 12 flashes are still obtained

Replace control unit

CMU07X-058

**ABS-13** Control unit speed circuit phase lock loss failure detected during control unit self-test

Replace control unit

DMU07X-057

**ABS-14** Control unit program check sum failure detected during self test

Replace control unit

DMU07X-050

**ABS-15** Control unit RAM failure detected during self-test

Replace control unit

DMU07X-059

**ABS-16** (16 or more flashes should not occur)

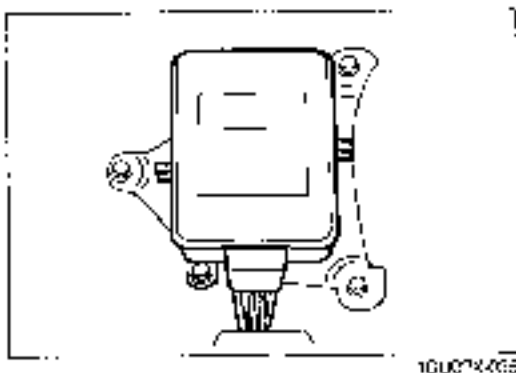
After repeated attempts to take the flashing pattern, 16 or more flashes are still obtained

Replace control unit

CMU07X-060

# P

## REAR-WHEEL ANTI-LOCK BRAKE SYSTEM



### 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

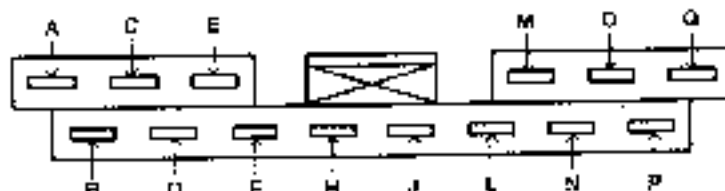
Tester connection ( ) indicates wire color	Measured item	Remark	Resistance (Battery cable off)	Voltage (IG switch ON)
L (G) - 0 (L)	Speed sensor	—	Approx. 4 kΩ	—
P (L/W) - Ground	Battery	—	∞	V <sub>B</sub>
N (R) - Ground	Pressure differential switch (PDS)	Parking sw. ON	1Ω	V <sub>B</sub>
		Parking sw. 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 (L/L) - Ground	Warning alarm	—	Approx. 23Ω	V <sub>B</sub>
B (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
O (L/W) - Ground	Battery	—	∞	V <sub>B</sub>
O (L) - Ground	Speed sensor	—	∞	—
		Switch ON	Approx. 1.0Ω	V <sub>B</sub>
M (W/G) - Ground	Straight switch	Switch OFF		0V
		—	∞	0V
U (U) - Ground	Isolation solenoid	—	3-6Ω	0V
A (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
L (B) - Ground	Ground	—	Continually	—

28J0PK023

#### 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



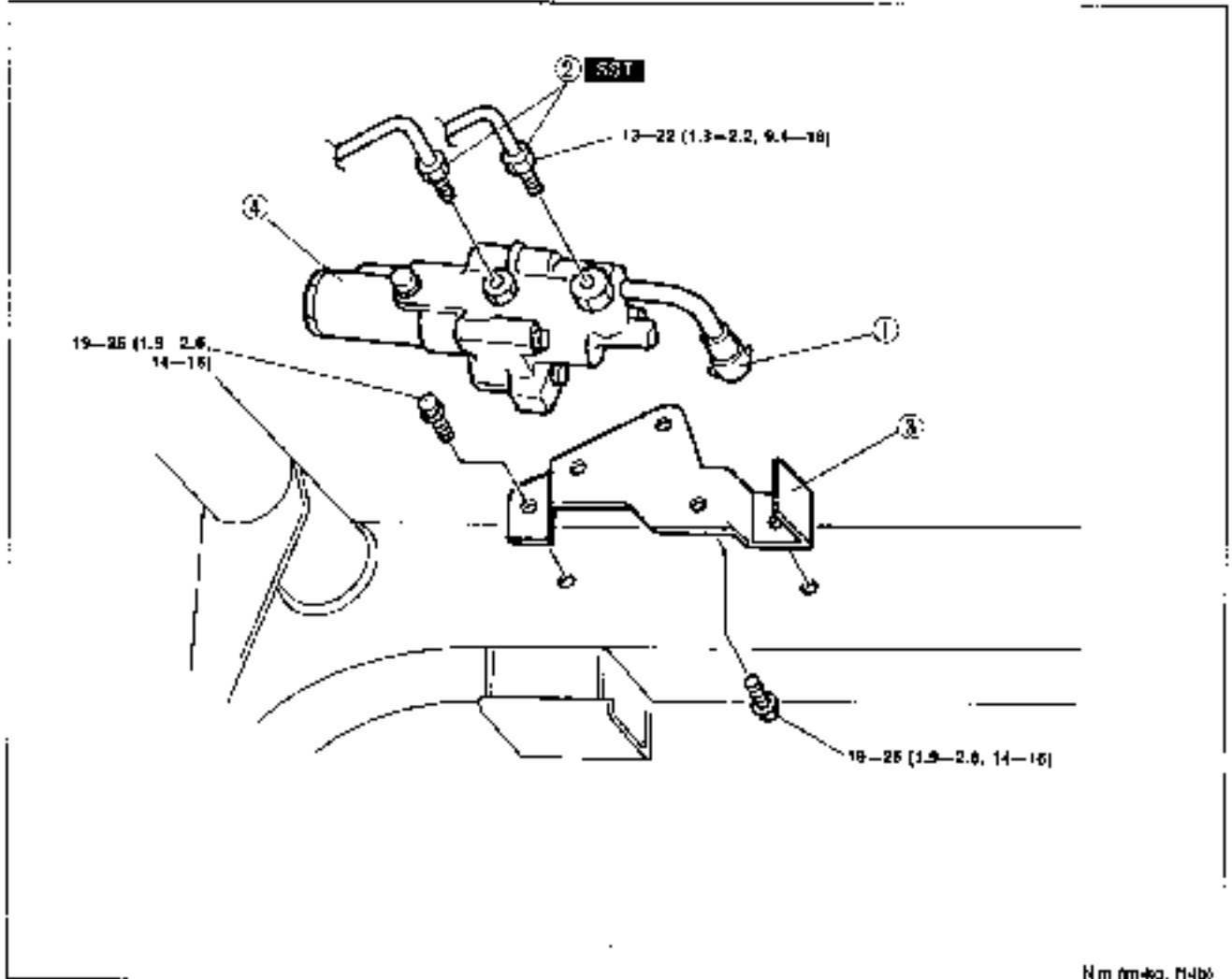
**HYDRAULIC UNIT**

**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.**

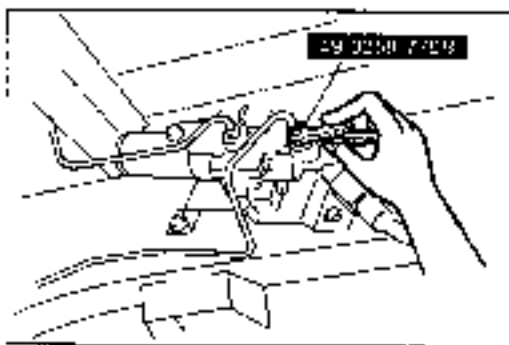


Nm (m·kg, ft·lb)  
2EUGFX471

1. Harness coupler
2. Brake pipe

3. Hydraulic unit bracket
4. Hydraulic unit

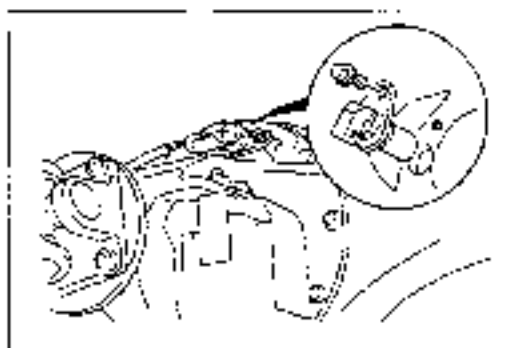
Removal Note ... below



ENR-LPX4114

**Removal Note**  
**Brake pipe**

1. Remove the brake pipes with the SST.



DWLDPX 085

**SPEED SENSOR****Removal**

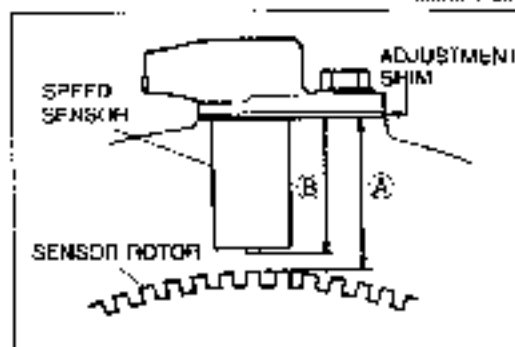
- 1 Remove the harness connector
- 2 Remove the sensor fixing bolt and remove the speed sensor from the axle casing.

**Inspection****Sensor O-ring**

- 1 Check the sensor O-ring for damage and replace if necessary.



DWLDPX 086



DWLDPX 087

**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**

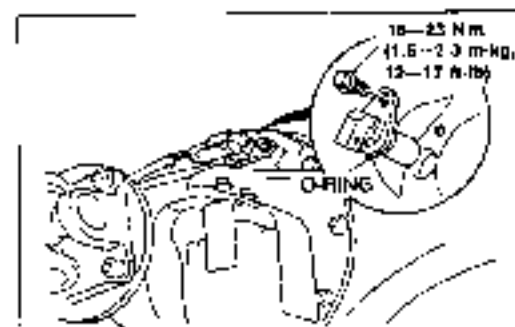
B2600: 0.5—1.2mm (0.020—0.047 in)

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.

DWLDPX 087



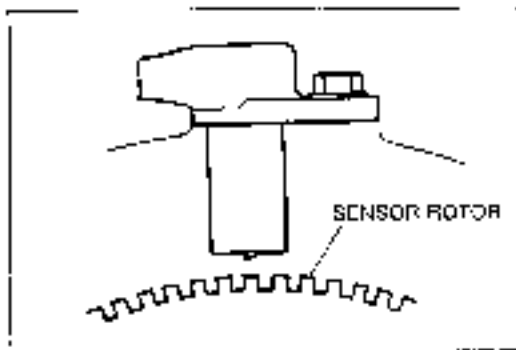
DWLDPX 089

**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)

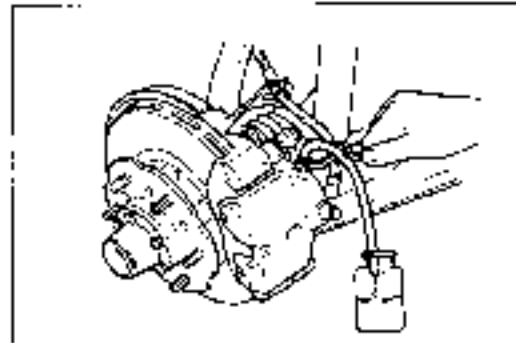


GM1J0P2416

**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.)



GM1J0P2371

**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.



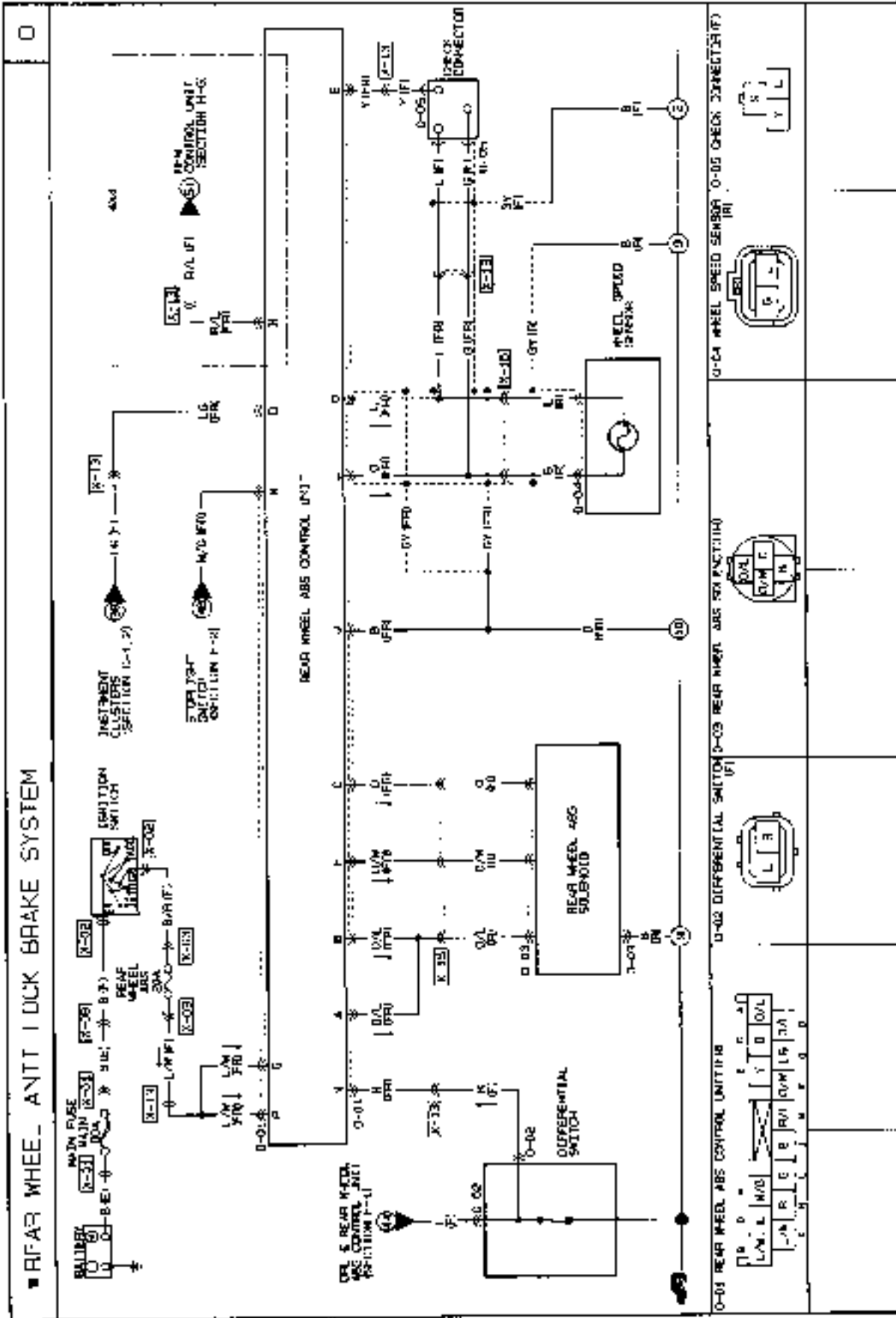
GM1J0P2014

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.

WIRING DIAGRAM



# WHEELS AND TIRES

<b>OUTLINE</b> .....	<b>Q- 2</b>
SPECIFICATIONS.....	<b>Q- 2</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>Q- 2</b>
<b>WHEELS AND TIRES</b> .....	<b>Q- 3</b>
SPECIAL NOTES ABOUT WHEELS AND TIRES .....	<b>Q- 3</b>
NOTES REGARDING TIRE REPLACEMENT.....	<b>Q- 3</b>
INSPECTION AND ADJUSTMENT.....	<b>Q- 3</b>
REMOVAL AND INSTALLATION.....	<b>Q- 4</b>
TIRE ROTATION .....	<b>Q- 5</b>
WHEEL BALANCE ADJUSTMENT .....	<b>Q- 5</b>

SM-1429-001



# Q

## OUTLINE, TROUBLESHOOTING GUIDE

### OUTLINE

#### SPECIFICATIONS

Item	Model	4x4		4x2	
		Standard	Temporary spare	Standard	Temporary spare
Wheels	Size	15 x 6 JJ	16 x 47	14 x 5 1/2 JJ	10 x 47
	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)			
Tires	Type	Stylo or Non-styled			
	Size	P210/75R15 P235/75R15	T155/80D16	P205/75H14	T145/80D16
Tires	Air pressure kPa (kg/cm <sup>2</sup> , psi)	Front	190 (2.0, 28)	4-5 (4.2, 60)	180 (1.8, 26)
		Rear	218 (2.2, 31)		240 (2.5, 35)

2300X001

### TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Excessive or irregular tire wear	Refer to page Q-4 for details		
Premature tire wear	Incorrect tire pressure	Adjust	Q-2
Tire squeal	Incorrect tire pressure Tire deterioration	Adjust Replace	Q-2 —
Road noise or body vibration	Insufficient tire pressure Unbalanced wheel(s) Deformed wheel(s) or tire(s) Irregular tire wear	Adjust Adjust Repair or replace Replace	Q-2 Q-5 —
"Shake" occurs (Steering wheel vibrates up/down)	Excessive tire and wheel runout Loose lug nuts Unbalanced wheel(s) Cracked or worn engine mount rubber Cracked or worn transmission mount rubber	Replace Tighten Adjust or replace Replace Replace	Q-4 Q-5 Section G1,32 Section J1,J2,K1,K2
"Shimmy" occurs (Steering wheel vibrates left/right)	Cracked or worn steering gear mount rubber Loose steering gear mounting bolts Stuck or damaged steering ball joint Excessive tire and wheel runout Loose lug nuts Unbalanced wheel(s) Insufficient tire pressure Unevenly worn tires Malfunction of shock absorber Loose shock absorber mounting bolts Struck or damaged lower arm ball joint Cracked or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten Replace Replace Replace Adjust	Section N Section N Section N — Q-4 Q-5 Q-2 — Section R Section R Section R Section H Section M Section R
Uneven (one-sided) braking	Unequal tire pressures	Adjust	Q-2
Steering wheel doesn't return properly or pulls to either left or right	Incorrect tire pressure Irregular tire wear (left/right) Unequal tire pressures Different types or brands of tires mixed (left/right) Loose lug nuts	Adjust Replace Adjust Replace Tighten	Q-2 Q-2 — Q-4
General driving instability	Unequal tire pressures Damaged or unbalanced wheel(s) Loose lug nuts	Adjust Replace or adjust Tighten	Q-2 Q-5 Q-4
Excessive steering wheel play	Loose lug nuts	Tighten	Q-4

1200X001

WHEELS AND TIRES

SPECIAL NOTES ABOUT WHEELS AND TIRES

Do not use wheels or tires other than the specified types.

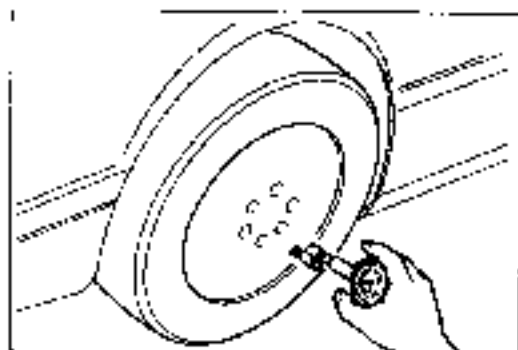
EBLCCX-003

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 ps). 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.

CELUCC-004



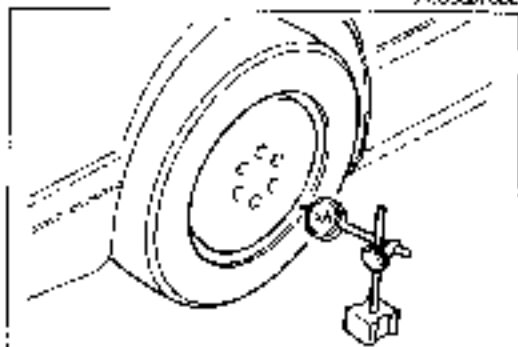
INSPECTION AND ADJUSTMENT

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

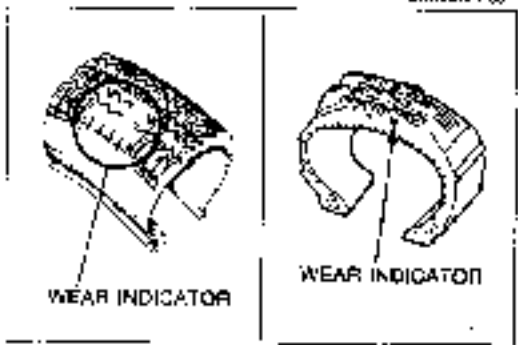
The air pressure must be measured when the tire is cold.



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)



3. Tire wear

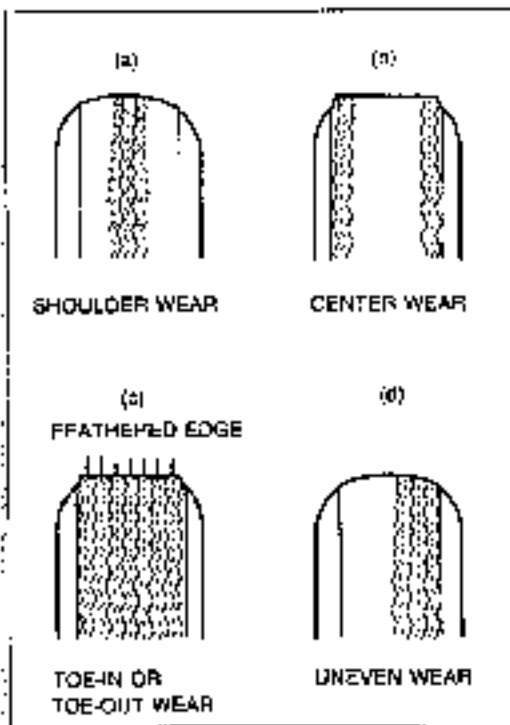
Specifications

Remaining tread

Ordinary tires: 1.6mm (0.063 in) min.  
(Tire should be replaced if wear indicators are exposed.)

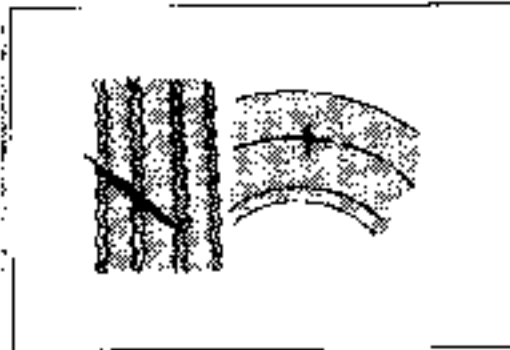
Snow tires: 50% of tread

(Tire should be replaced if wear indicators are exposed.)

**Troubleshooting guide**

Abnormal tire wear patterns shown in the illustration can occur. Refer to the chart for the possible causes and remedies.

	Possible causes	Remedy
(a)	<ul style="list-style-type: none"> <li>• Inflation (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:**

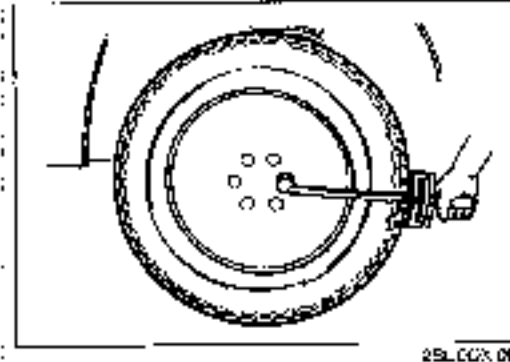
89—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)

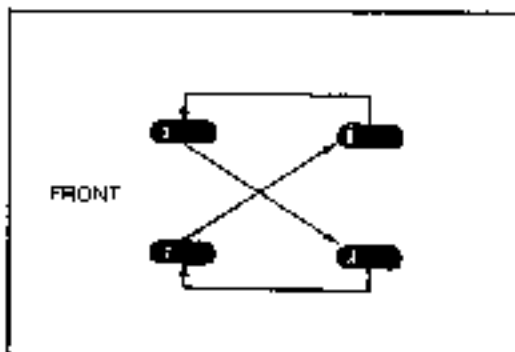
**Styled wheel:**

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.





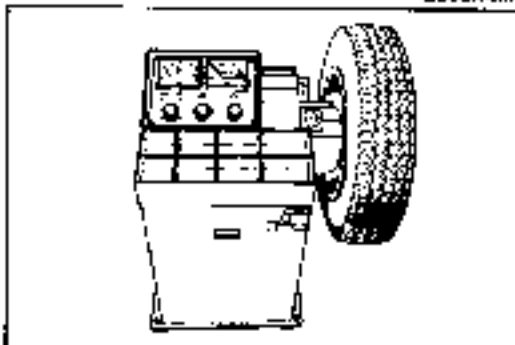
3U0CX-007

## 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.)

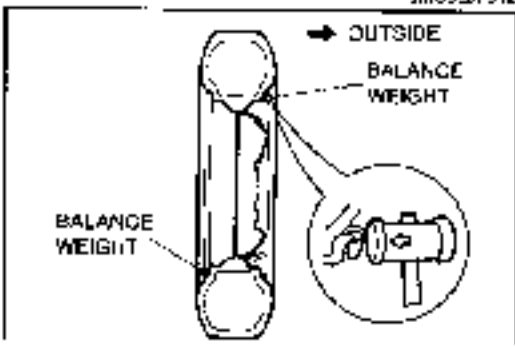


9MUDX-012

## 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)**



0911QX-008

### 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.





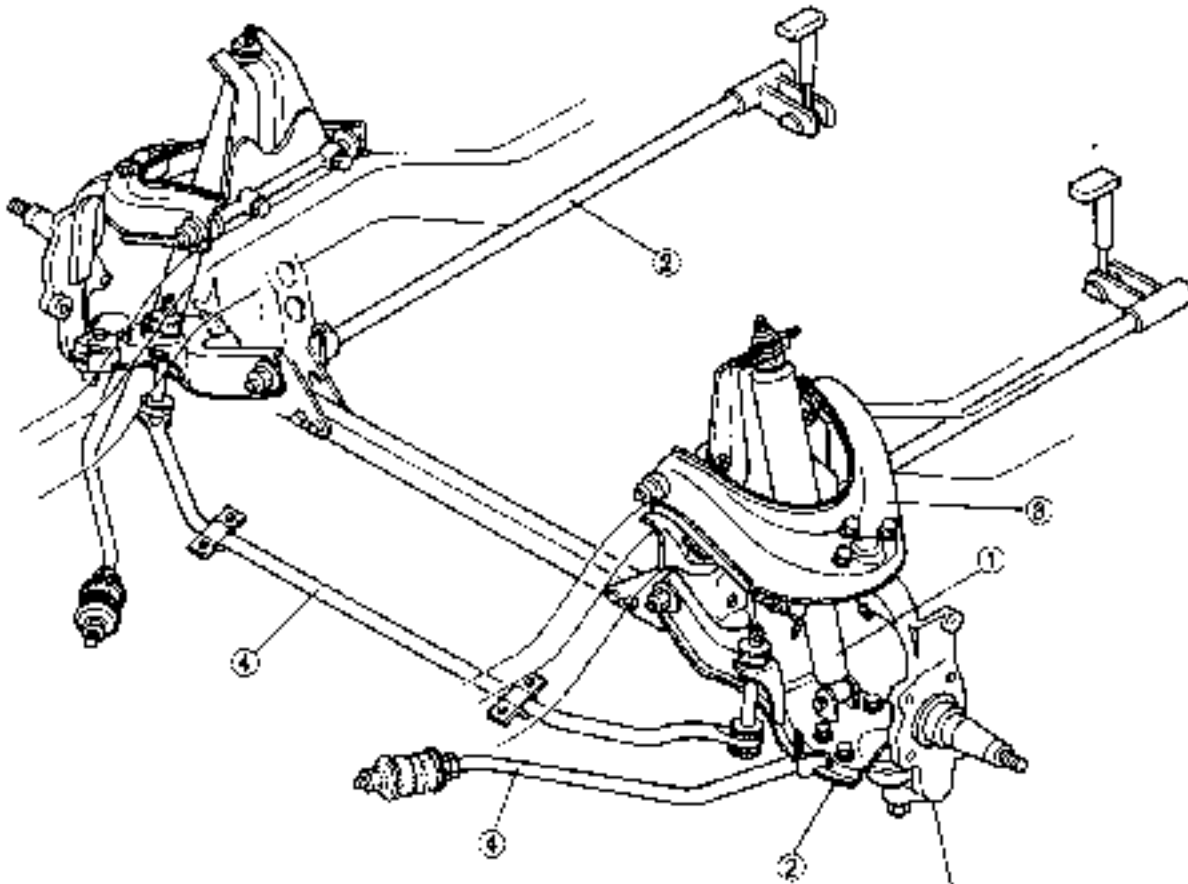
# SUSPENSION

<b>INDEX</b> .....	R- 2
<b>OUTLINE</b> .....	R- 5
SPECIFICATIONS.....	R- 5
<b>TROUBLESHOOTING GUIDE</b> .....	R- 8
<b>WHEEL ALIGNMENT</b> .....	R- 7
PRE-INSPECTION.....	R- 7
FRONT WHEEL ALIGNMENT.....	R- 7
<b>FRONT SUSPENSION</b>	
<b>(DOUBLE WISHBONE)</b> .....	R- 9
PREPARATION.....	R- 9
SHOCK ABSORBER (4x2 AND 4x4).....	R-10
TORSION BAR SPRING AND	
LOWER ARM (4x2).....	R-11
TORSION BAR SPRING AND	
LOWER ARM (4x4).....	R-16
UPPER ARM (4x2 AND 4x4).....	R-21
STABILIZER AND TENSION ROD (4x2).....	R-24
STABILIZER (4x4).....	R-26
<b>REAR SUSPENSION (LEAF SPRING)</b> .....	R-28
SHOCK ABSORBER AND LEAF SPRINGS	
(4x2 AND 4x4).....	R-28

25LCPAL001

## INDEX

## FRONT SUSPENSION (4x2)



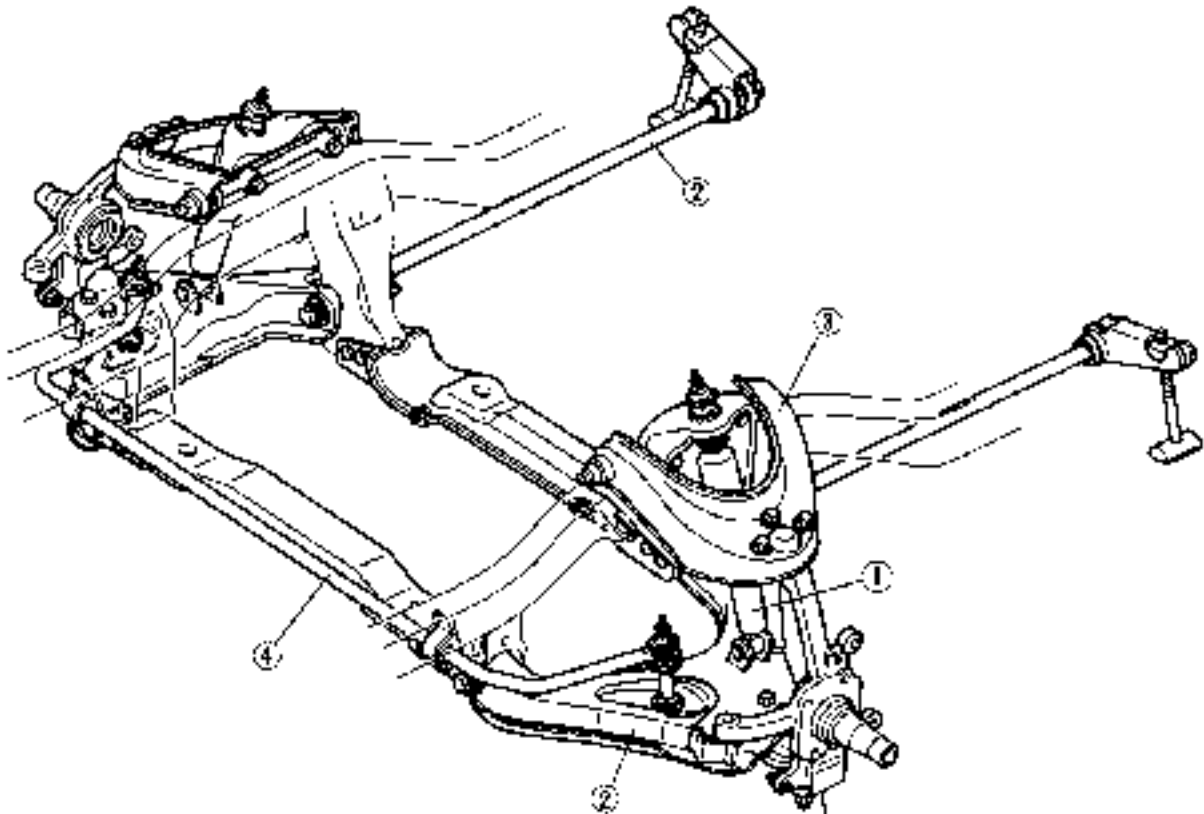
## FRONT WHEEL ALIGNMENT

TOTAL TOE-IN:  $3 \pm 3\text{mm}$  ( $0.12 \pm 0.12$  in 18" + 18")MAXIMUM STEERING ANGLE:  $35^{\circ}00' = 2^{\circ}$  (INNER)  
 $33^{\circ}00' = 2^{\circ}$  (OUTER)CAMBER ANGLE:  $0^{\circ}45' \pm \frac{3}{4}$ 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

SOLICRY 002

- |  |           |  |           |
|--|-----------|--|-----------|
| 1. Shock absorber<br>Removal, inspection, and<br>installation..... | page R-10 | 3. Upper arm<br>Removal and installation.....                | page R-21 |
| 2. Torsion bar spring and lower arm<br>Removal.....                | page R-11 | Inspection.....  | page R-23 |
| Inspection.....  | page R-13 | 4. Stabilizer and tension rod<br>Removal and inspection..... | page R-24 |
| Installation.....  | page R-13 | Installation.....  | page R-25 |

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:  $33^{\circ}30' \pm 2'$  (INNER)  
 $30^{\circ}00' \pm 2'$  (OUTER)

CAMBER ANGLE:  $1^{\circ}30' \pm \frac{15'}{30}$   
 CASTER ANGLE:  $2^{\circ}00' \pm 45'$   
 KINGPIN ANGLE:  $10^{\circ}20'$

KNUCKLE ASSEMBLY SERVICE,  
 SECTION M

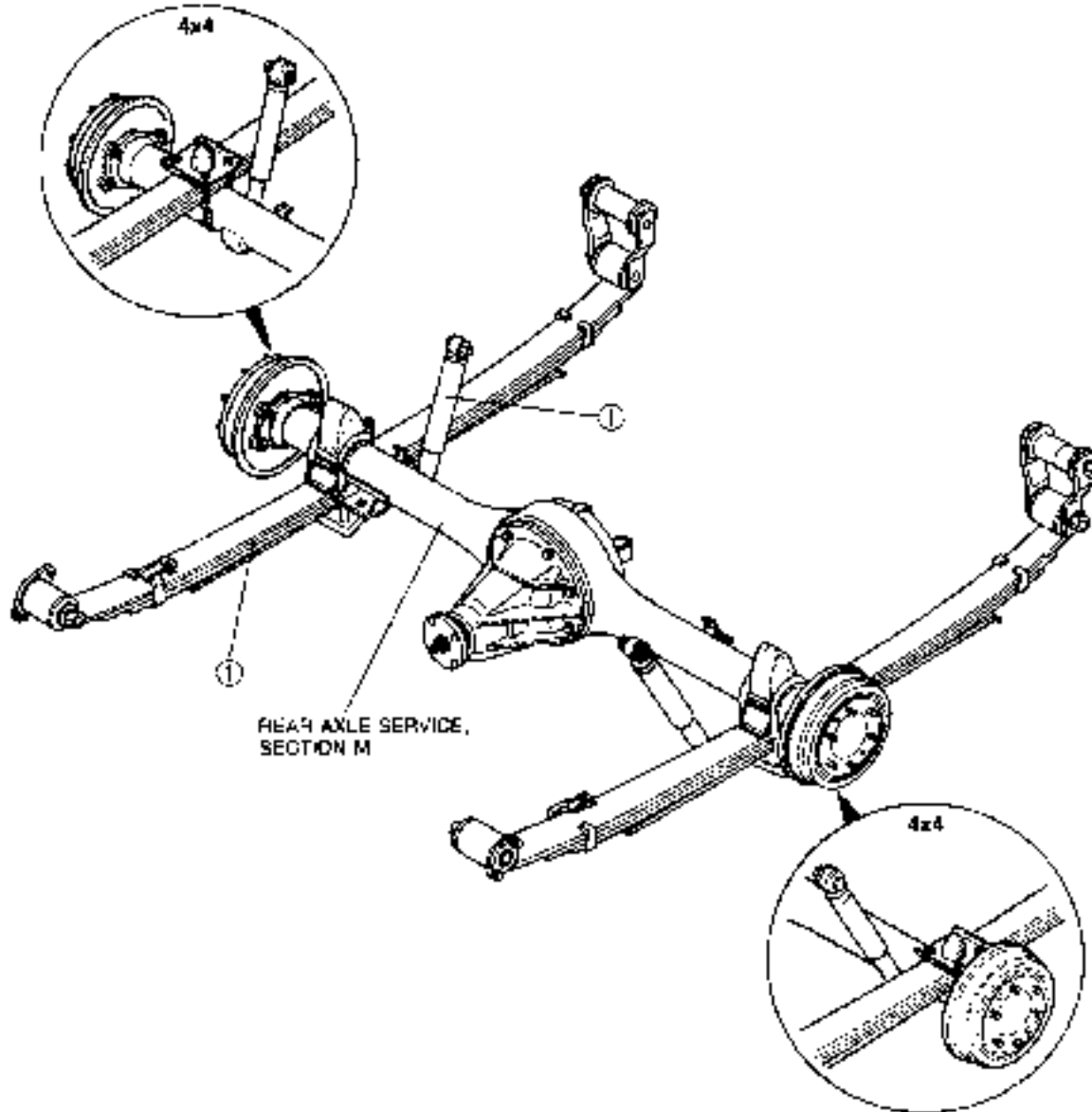
R

29A11R0001

1 Shock absorber Removal, inspection and Installation.....	page R-10	3. Upper arm Removal and Installation .....	page R-21
2 Torsion bar spring and lower arm Removal .....	page R-16	inspection.....	page R-22
Inspection .....	page R-18	4 Stabilizer Removal and inspection .....	page R-26
Installation .....	page R-18	Installation.....	page R-27



## REAR SUSPENSION (4x2 and 4x4)



DREDFX.COM

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	
			Torsion bar spring	
Springs	Type		Torsion bar spring	
	Dimensions (coil 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 (126 ± 25, 409 ± 57)
		Compressed	245 ± 59 (25 ± 6, 66 ± 13)	530 ± 98 (54 ± 10, 119 ± 22)
	Turning angle	Inner	35°00' ± 2°	33°30' ± 2°
Outer		33°00' ± 2°	30°00' ± 2°	
Front wheel alignment (*Unladen condition)	Total toe-in	mm (in)	3 = 3 (0.12 = 0.12)	
	Camber angle	degree	18 ± 18'	
	Caster angle		V/E: 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	
			Semi-elliptical spring	
Springs	Type		Semi-elliptical spring	
	Dimensions (length x width x thickness)	mm (in)	1,566 x 60 x 7 (61.66 x 2.36 x 0.28) 1,522 x 60 x 6 (59.92 x 2.36 x 0.24) 1,366 x 60 x 6 (53.78 x 2.36 x 0.24) 1,190 x 60 x 14 (47.24 x 2.36 x 0.55)	1,422 x 60 x 9 (56.02 x 2.36 x 0.35) 979 x 60 x 6 (38.54 x 2.36 x 0.24) 844 x 60 x 8 (33.23 x 2.36 x 0.24) 630 x 90 x 12 (25.19 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)	1,075 ± 167 (110 ± 17, 242 ± 37)
Compressed		471 ± 98 (48 ± 10, 105 ± 22)	441 ± 98 (45 ± 10, 99 ± 22)	

M/S: Manual steering P/S: Power steering

\* 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
Body rolls	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
Poor riding comfort	Weak torsion bar or leaf spring Malfunctioning shock absorber Excessive tire pressure	Replace Replace Adjust	R-11, 16, 26 R-10, 28 Section Q
Body leans	Weak torsion bar or leaf spring Weak stabilizer bushing	Replace Replace	R-11, 16, 20 R-24, 26
Abnormal noise from suspension system	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
Steering "heavy"	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
Steering wheel pulls to one side	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
Poor steering wheel return	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
General instability while driving	Weak torsion bar spring Worn or damaged stabilizer Malfunctioning shock absorber Improperly adjusted 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
"Shimmy" occurs (Steering wheel vibrates left/right)	Stuck or damaged 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, 20 R-7 Section N Section Q

280218-035

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)**.

JELD-03-003

FRONT WHEEL ALIGNMENT

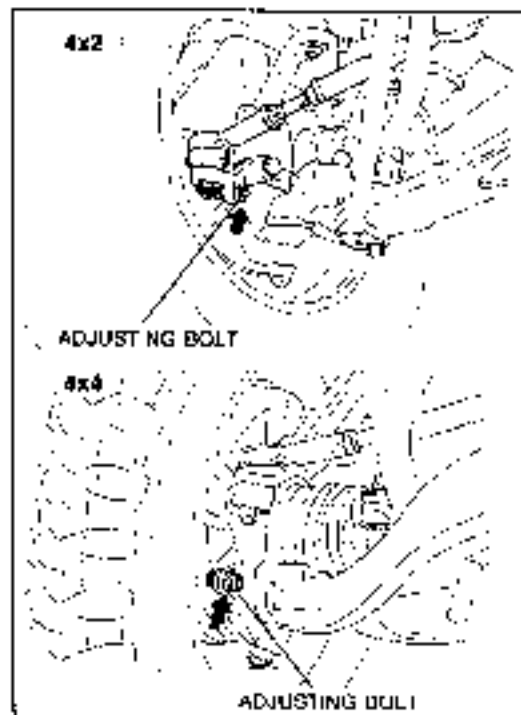
Specifications

Item			Specifications	
			4x2	4x4
Front wheel alignment (*1 Inflator)	Total laser	mm (in)	3 ± 3 (0.12 ± 0.12)	
		degree	17° ± 13'	
	Maximum steering angle	Inner	35°00' ± 2°	33°30' ± 2°
		Outer	33°00' ± 2°	30°00' ± 2°
	Camber angle		0°45' ± 1'	1°00' ± 1'
	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

20J076-001

\*1 Fuel tank full; radiator coolant and engine oil at specified level and spare tire, jack, and tools in designated location.



20J076-002

Adjustment

Maximum steering angle

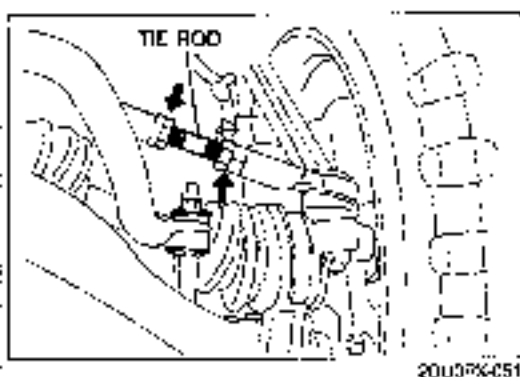
Adjust the turning angle as follows

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)

**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:**

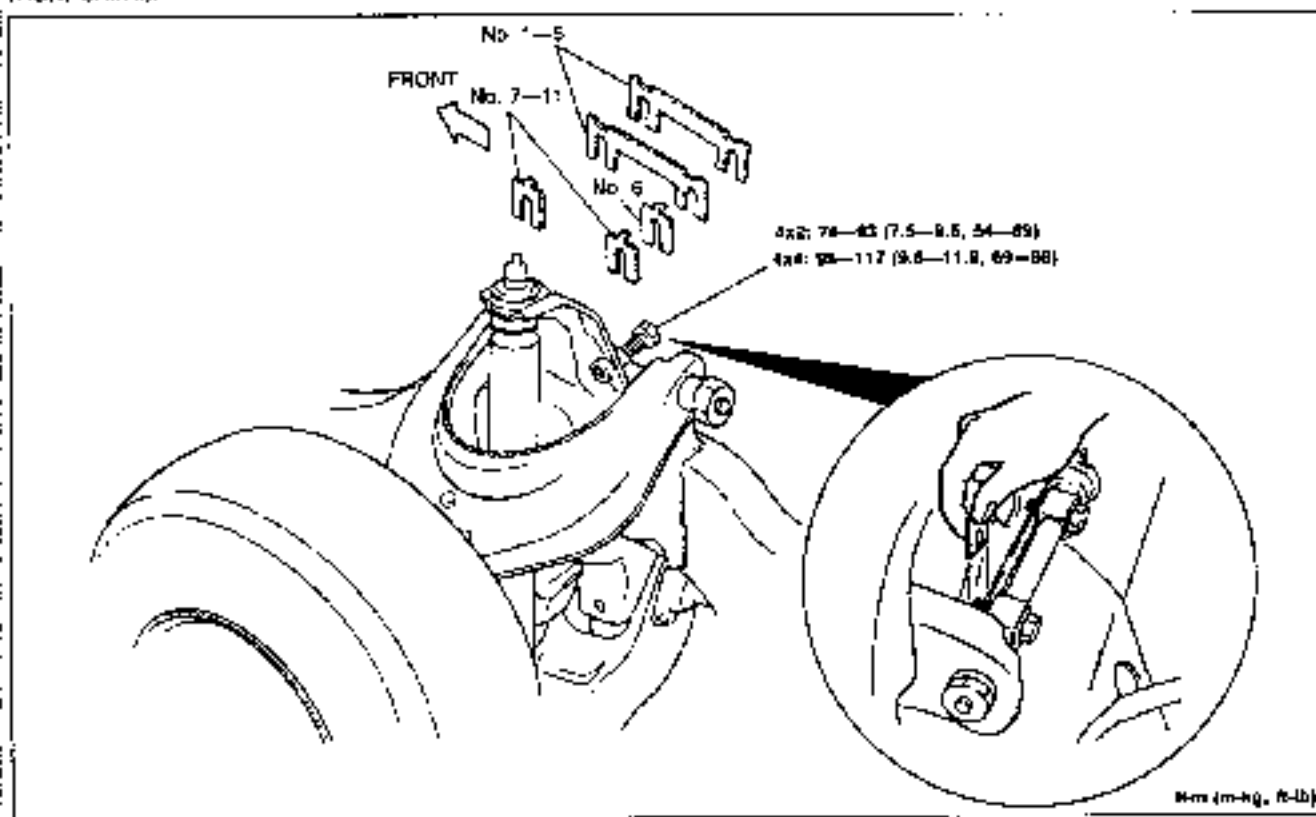
69—78 N·m (7.0—8.0 m·kg, 51—58 ft·lb)

**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.





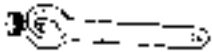
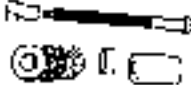










No.	Thickness mm (in)	No.	Thickness mm (in)
1	1.0 (0.004)	7	1.0 (0.004)
2	1.5 (0.063)	8	1.6 (0.063)
3	2.0 (0.079)	9	2.0 (0.079)
4	3.2 (0.126)	10	3.2 (0.126)
5	4.0 (0.157)	11	4.0 (0.157)
6	2.0 (0.079)		

**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 0777 575 Puller, ball joint</p> 	<p>49 S120 755 Installer, dust boot</p> 	<p>49 D180 510B Attachment, pre-cad measurement</p> 
<p>49 U034 2A0 Lower arm bushing puller &amp; installer</p> 	<p>49 U034 201 Shaft (Part of 49 U034 2A0)</p> 	<p>49 U034 202 Support block (Part of 49 U034 2A0)</p> 
<p>49 J034 203 Installo (Part of 49 J034 2A0)</p> 	<p>49 W034 305 Bearing (Part of 49 U034 2A0)</p> 	<p>49 UR39 615 Bushing puller and installer set</p> 
<p>49 JB39 616 Shaft set (Part of 49 JB39 615)</p> 	<p>49 UB39 617 Support block (Part of 49 UB39 615)</p> 	<p>49 UR39 618 Attachment A (Part of 49 UB39 615)</p> 
<p>49 UB39 618 Attachment B (Part of 49 UB39 615)</p> 	<p>49 U034 204 Installer, dust boot</p> 	<p>SEACR06017</p>

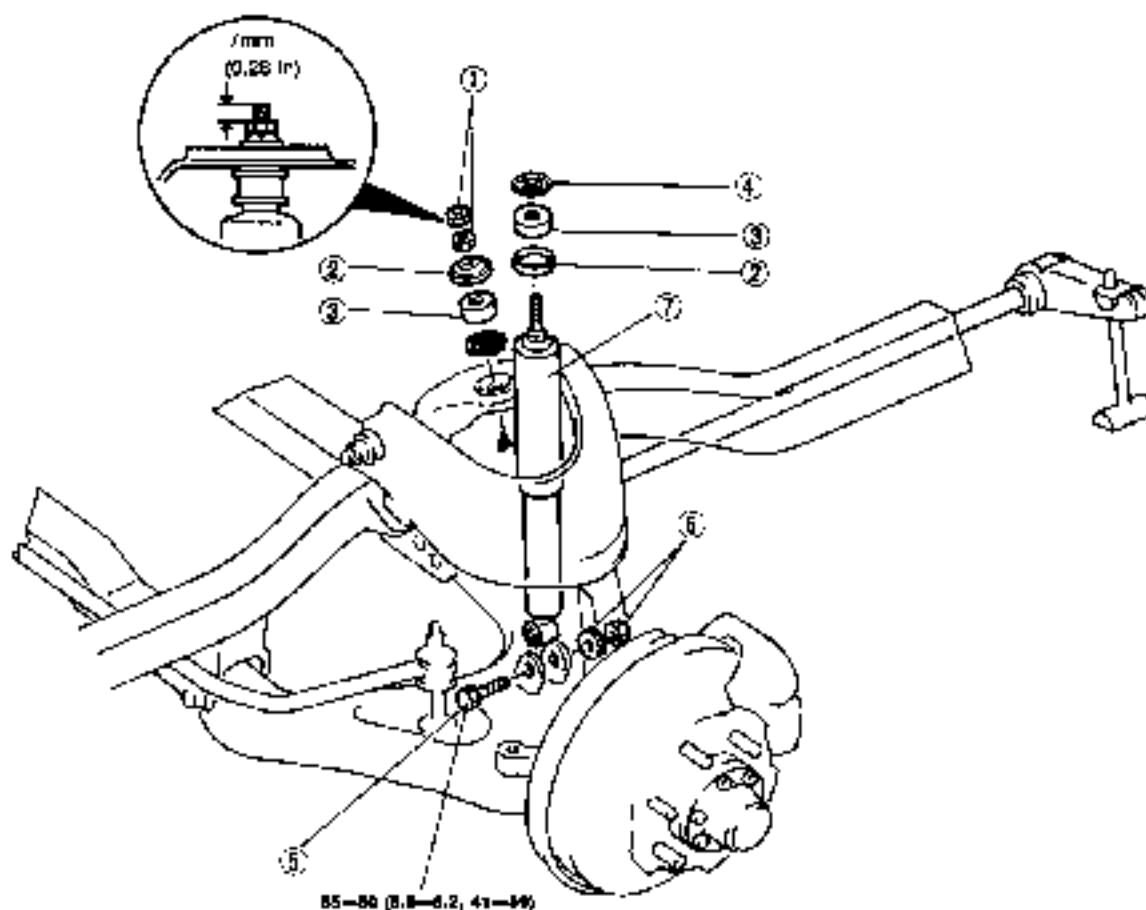
**SHOCK ABSORBER (4x2 AND 4x4)****Removal, Inspection and Installation**

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



Man (85-88, 8-15)  
2000x 052

1. Nuts
2. Retainers
3. Bushings

Check for damage or deterioration

4. Retainer

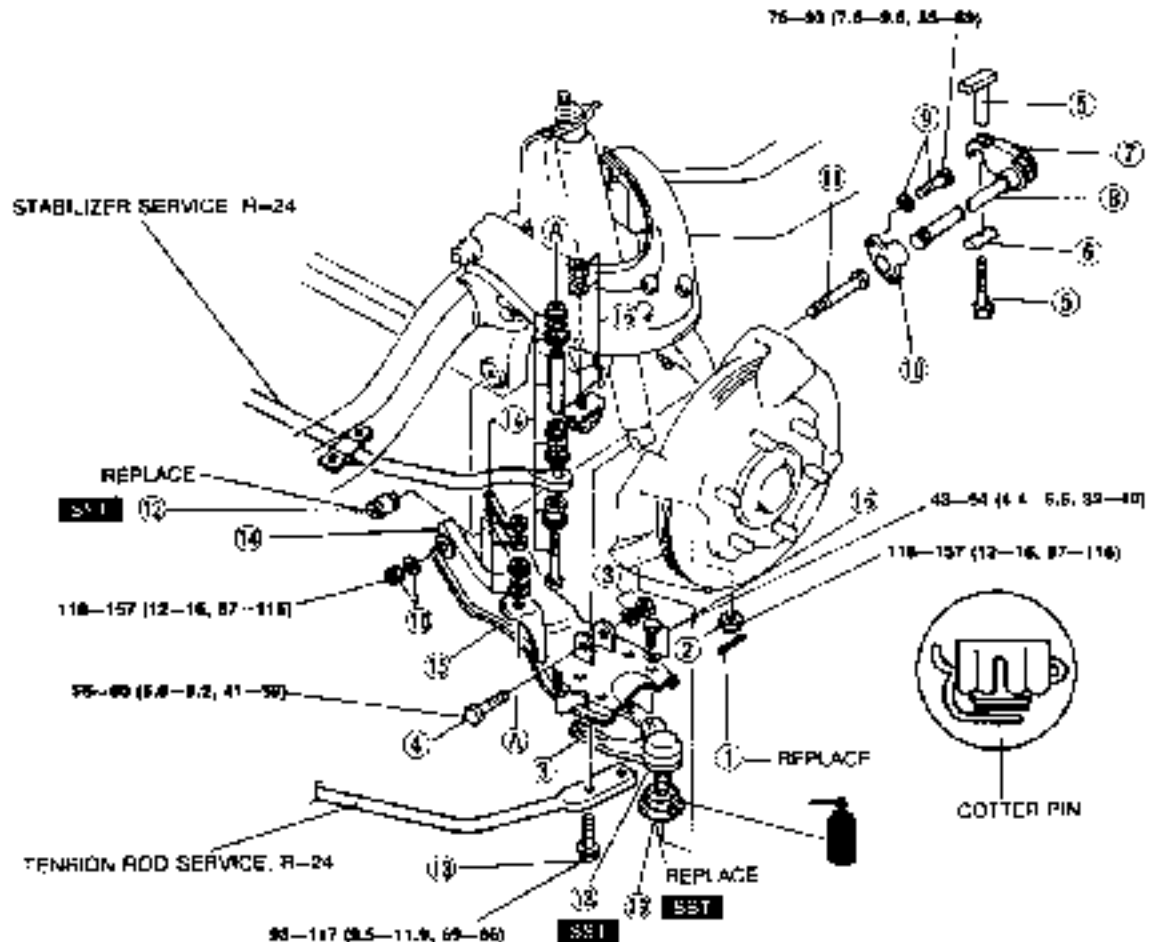
5. Ball
6. Washer and nut
7. Shock absorber

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**.



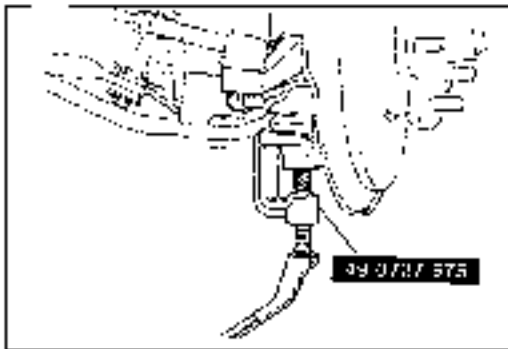
Rev (m-dg, n-b)  
2007-007

- |  |  |
|--|--|
| <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 H-13</li> <li>8. Torsion bar spring<br/>Removal Note..... page R-12<br/>Inspection..... page R 10</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> |
|--|--|



# R

## FRONT SUSPENSION (DOUBLE WISHBONE)

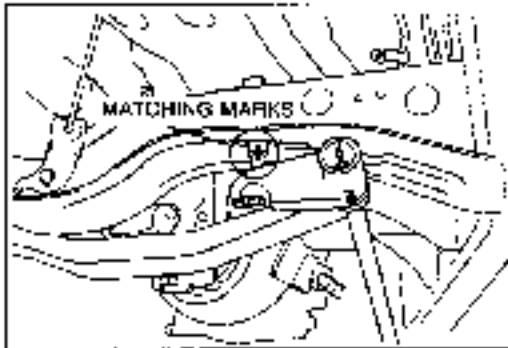


95L0RX020

### Removal note

#### Lower arm ball joint/Knuckle arm

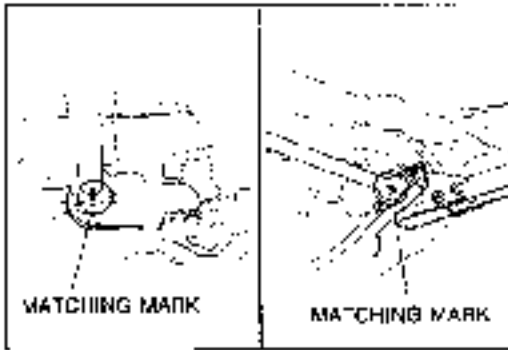
Separate the ball joint from the knuckle arm with the SST.



95L0RX021

### Anchor bolt

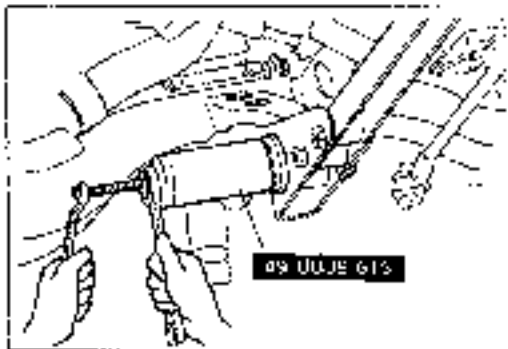
Mark the anchor bolt and swive for reference during reassembly.



95L0RX022

### Torsion bar spring

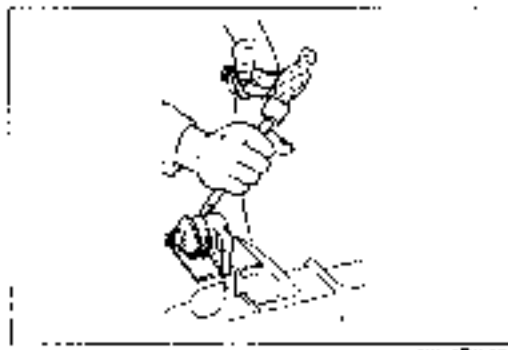
Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



95L0RX023

### Rubber bushing

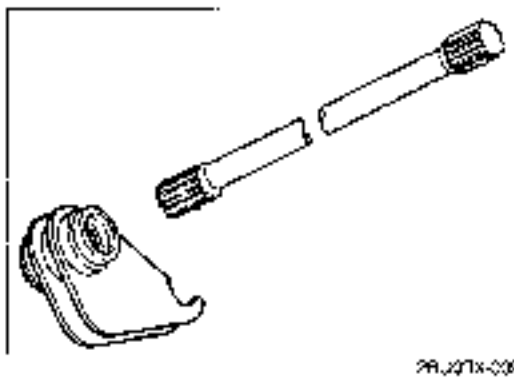
Remove the rubber bushing from the body with the SST. Install the new bushing into the body with the same SST.



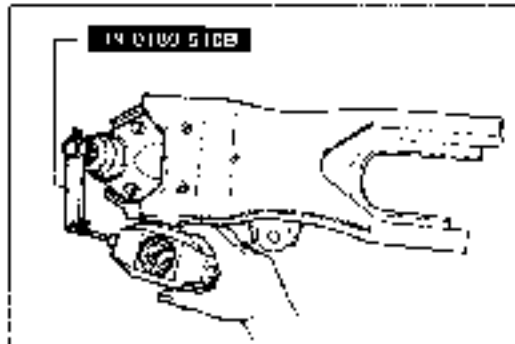
95L0RX024

### Lower arm ball joint boot

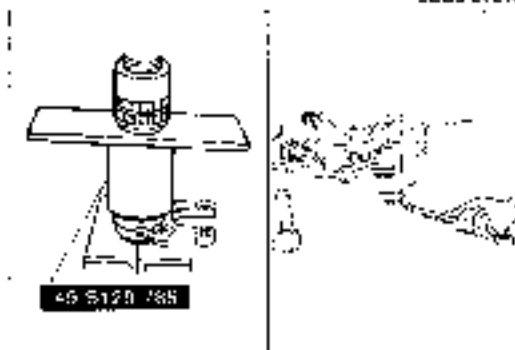
1. Secure the lower arm in a vise protected with brass pads
2. Use a chisel to remove the boot.



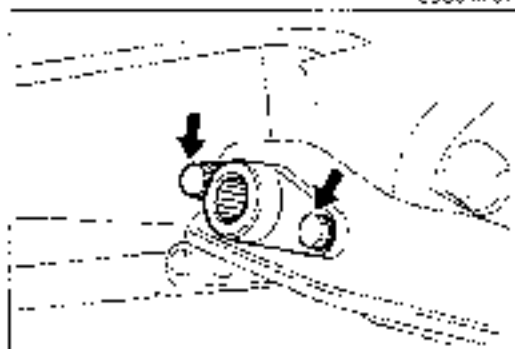
28J27X-009



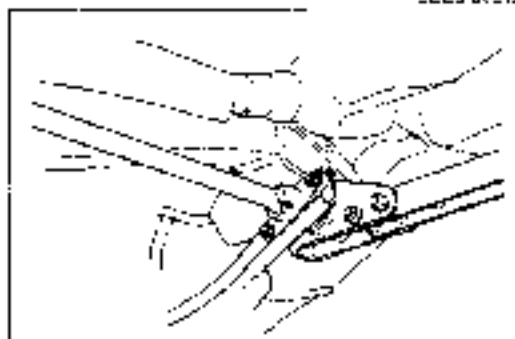
28J37X-010



28J37X-011



28J37X-012



28J24X-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 Nm (12—16 m·kg, 87—116 ft·lb)**

7. Install the torque plate and tighten it to the specified torque.

**Tightening torque:**

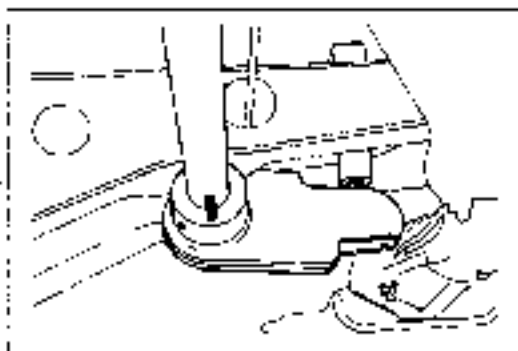
**76—93 Nm (7.6—9.5 m·kg, 55—69 ft·lb)**

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.

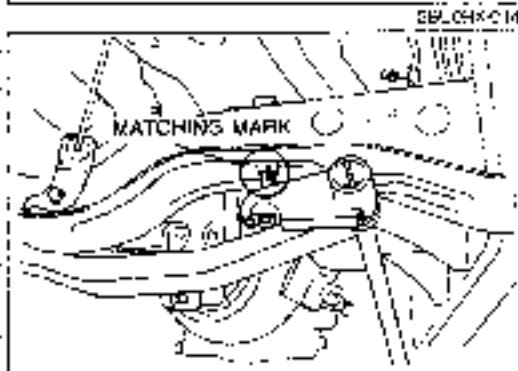
**Yellow: Left bar, White: Right bar**



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.

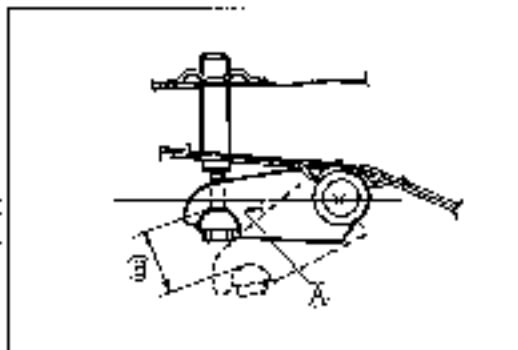


10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.

**Note**

If the anchor bolt was not marked during removal, install it as follows:

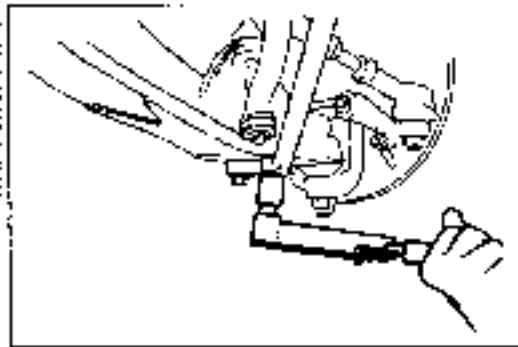
1. Lower the front suspension until the upper arm contacts the rebound stopper.
2. Install the anchor arm so that the angle  $\textcircled{A}$  is  $33^{\circ}30'$ .
3. Install the anchor bolt and tighten it by the amount  $\textcircled{B}$ .

**Amount  $\textcircled{B}$ :**

B2200		B2600
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

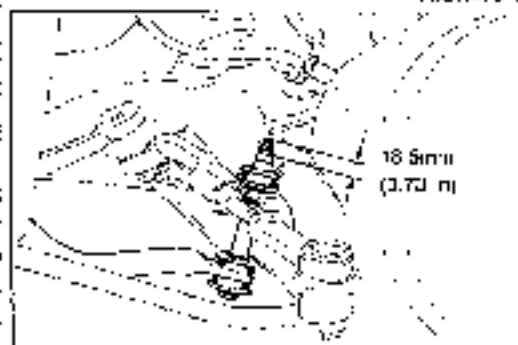
A/T: Automatic transmission



11. Install the tension rod bolt.

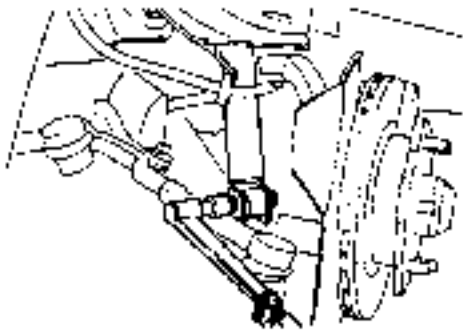
**Tightening torque:**

**93—117 Nm (9.5—11.9 m·kg, 69—85 ft·lb)**



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.



28JJKR016

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.

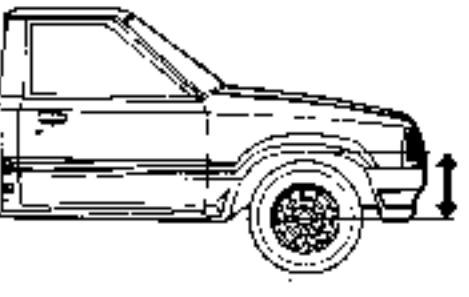
**Tightening torque:**

**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)**



28JJKR017

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 fence or trim.

	mm (in)
Stretch	430 (16.9)
Short	436 (17.2)
Long	451 (17.8)

- (3) If the difference between the left and right is not within the specification, adjust the necessary anchor bolt.

**Vehicle height left/right difference:**

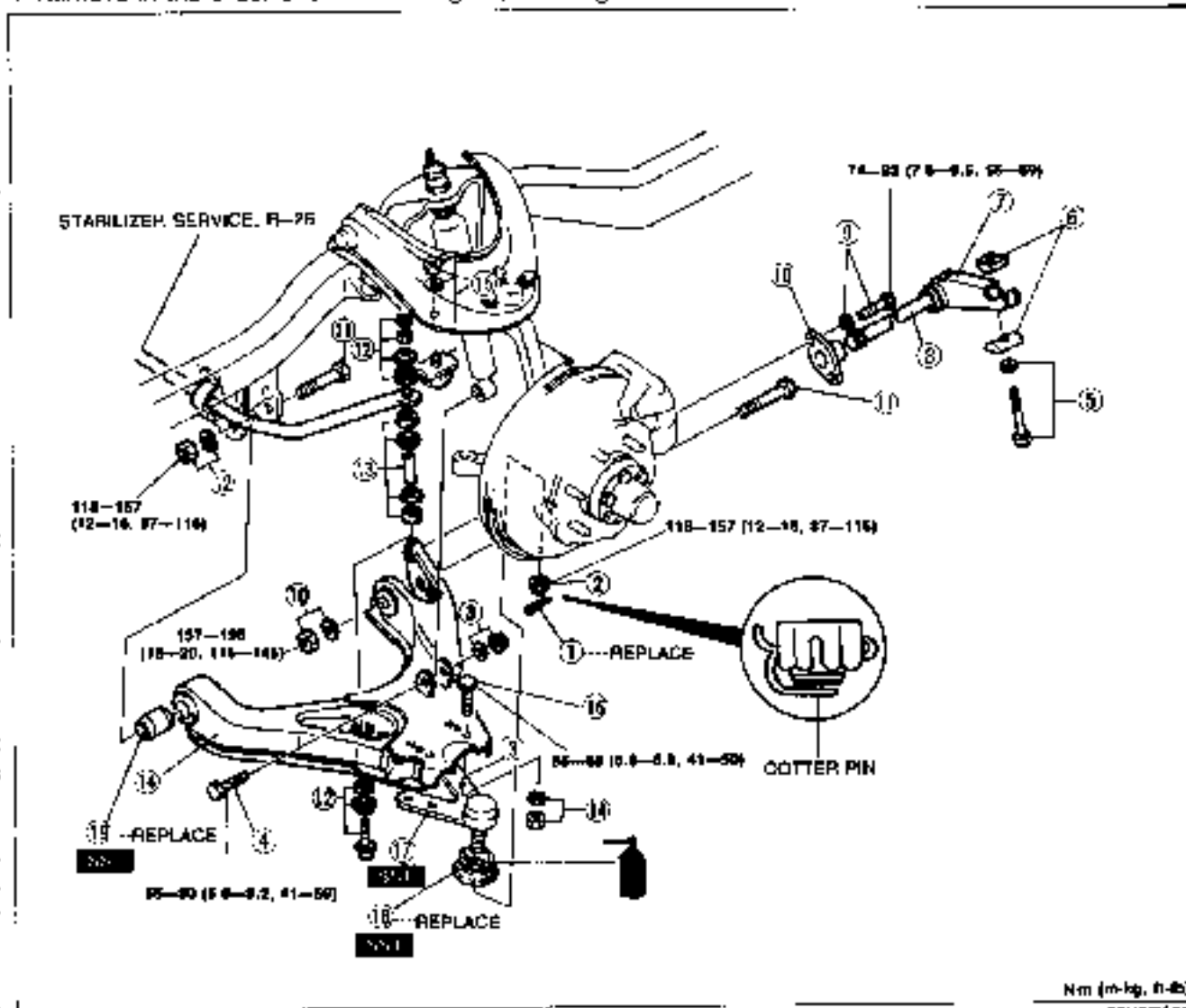
**10mm (0.39 in) max.**

19. Inspect front wheel alignment and adjust it as necessary.

## TORSION BAR SPRING AND LOWER ARM (4x4)

## Removal

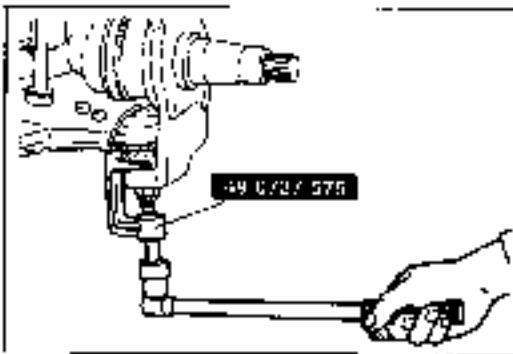
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.



Nm (m.kg, ft.lb)

2BU0R4 029

- |   |  |
|---|--|
| 1. Cotter pin   | 11. Lower arm spindle (rear), washer and nut                   |
| 2. Nut  | 12. Lower arm spindle (front), washer and nut                  |
| 3. Lower arm ball joint, Knuckle arm<br>Removal Note ..... page R-17                | 13. Bolt, bushings, retainers, spacer and nuts<br>(stabilizer) |
| 4. Bolt, washer and nut (Shock absorber)  | 14. Lower arm<br>Inspection ..... page R-18                    |
| 5. Anchor bolt and washer   | 15. Bound bumper, washer, and nut                              |
| 6. Anchor swivel  | 16. Bolts, washers and nuts                                    |
| 7. Anchor arm<br>Removal Note ..... page R-17<br>Inspection ..... page R-18         | 17. Lower arm ball joint<br>Inspection ..... page R-18         |
| 8. Torsion bar spring<br>Removal Note ..... page R-17<br>Inspection ..... page R-18 | 18. Lower arm ball joint end<br>Removal Note ..... page R-17   |
| 9. Bolts and washers  | 19. Lower arm bushing<br>Removal Note ..... page R-18          |
| 10. Torque plate<br>Inspection ..... page R-18                                      |  |

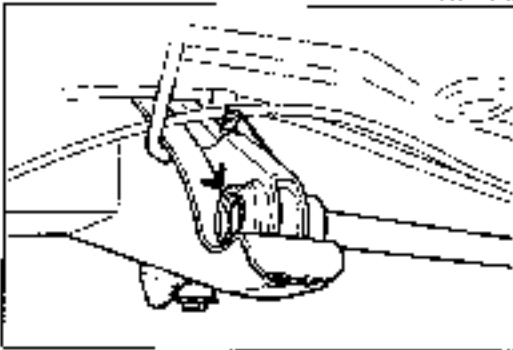


99A078-048

**Removal note**

**Lower arm ball joint/Knuckle arm**

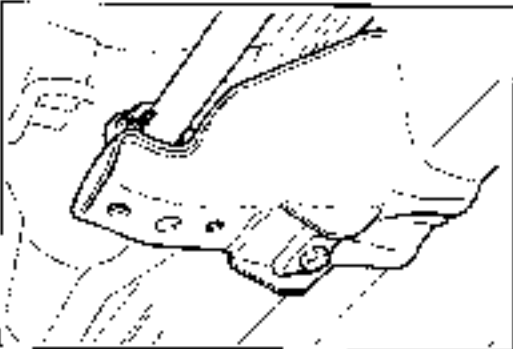
Separate the ball joint from the knuckle arm with the **SST**.



99A078-048

**Anchor arm**

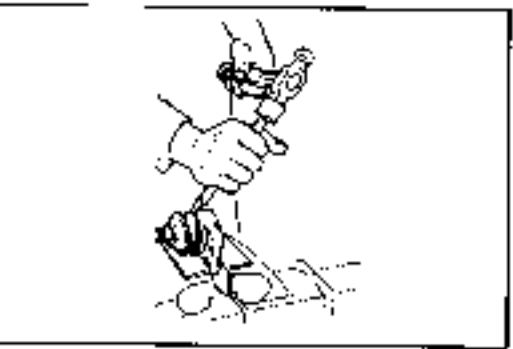
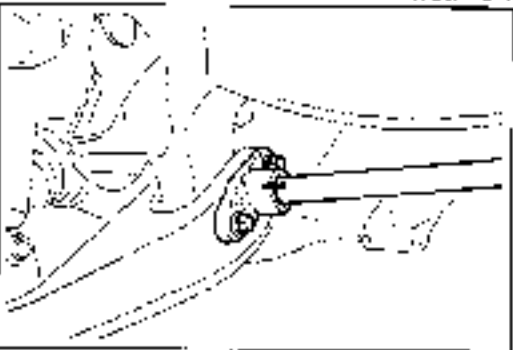
Mark the anchor arm and body for reference during reassembly.



99A078-048

**Torsion bar spring**

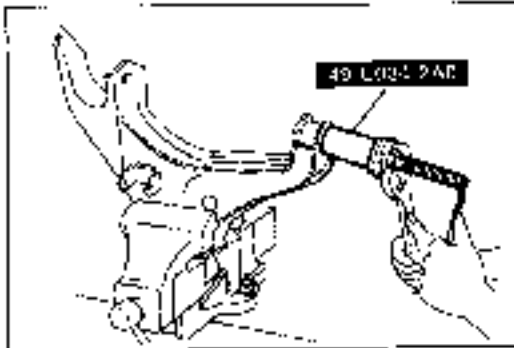
Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



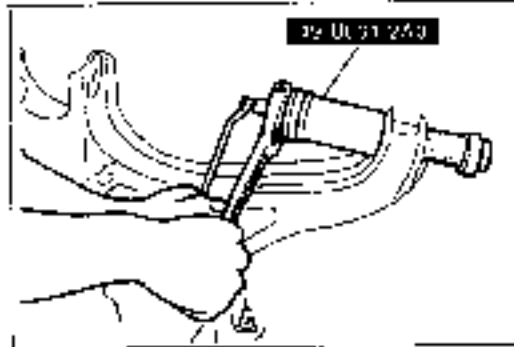
99A078-021

**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.

**Lower arm bushing****Removal:**

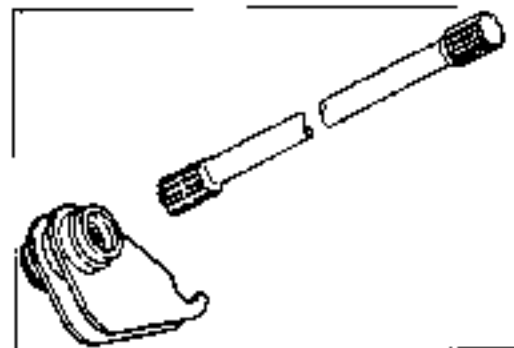
Remove the bushing from the lower arm with the **SST**.

**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.

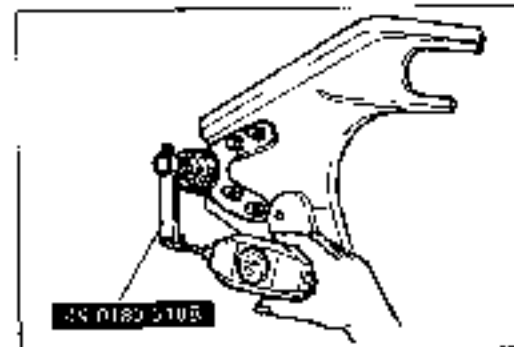
5. Lower arm ball joint preload.

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)

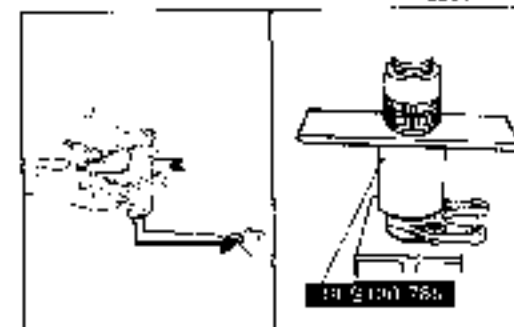
**Installation**

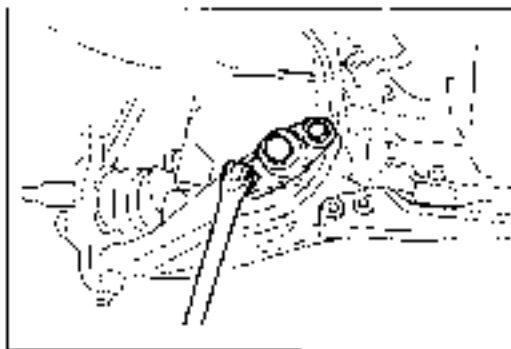
Install as follows.

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)**



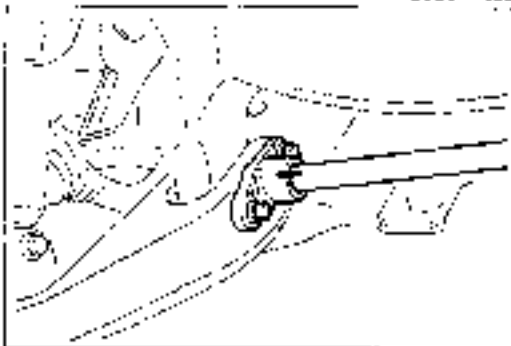


28J0R1-025

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)**



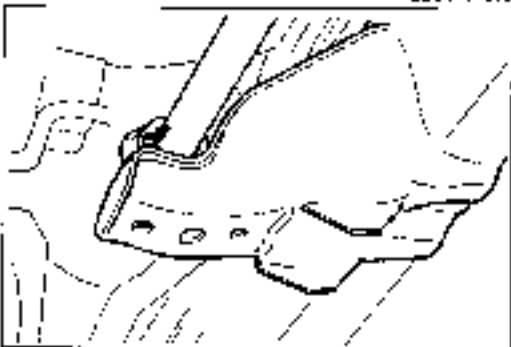
28U771-026

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**

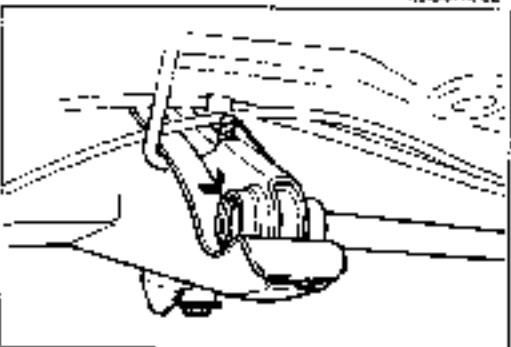


28U0K1-027

9. Align the marks made during removal, and install the anchor arm onto the torsion bar spring.

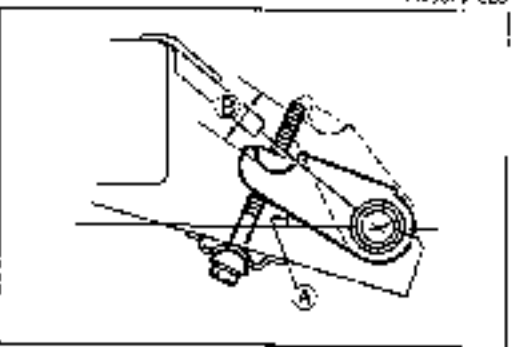
**Caution**

**Coat the serrations of the torsion bar with grease.**



28J1H7-028

10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.



5ELCPK019

**Note**

If the anchor bolt was not marked during removal, install it as follows:

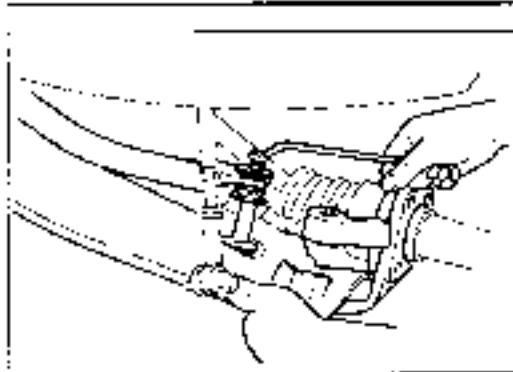
1. Lower the front suspension until the upper arm contacts the rebound stopper.
2. Install the anchor arm so that the angle (A) is 47°.
3. Install the anchor bolt and tighten it by the amount (B).

**Amount (B): 40mm (1.57 in)**

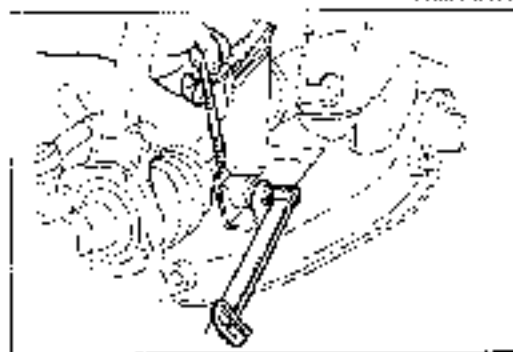


# R

## FRONT SUSPENSION (DOUBLE WISHBONE)



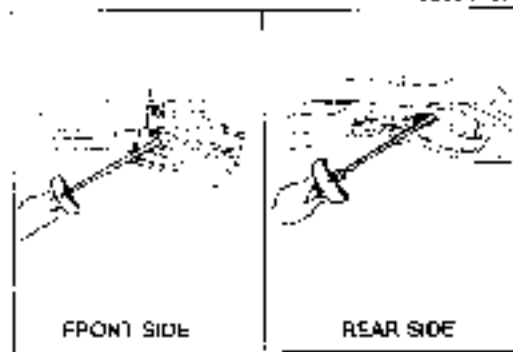
11. Install the stabilizer bolt.  
Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.
12. Install the shock absorber to the lower arm, and temporarily tighten the bolt and nut.
13. Install the wheels.
14. Lower the vehicle from the safety stands.



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, 41–58 ft·lb)**



16. Tighten the lower arm spindle nuts temporarily tightened in Step 5.

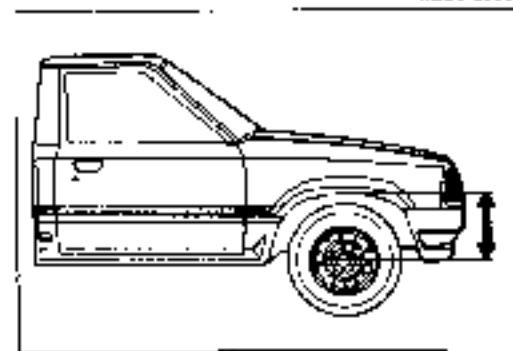
### Tightening torque

#### 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, 116–146 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.

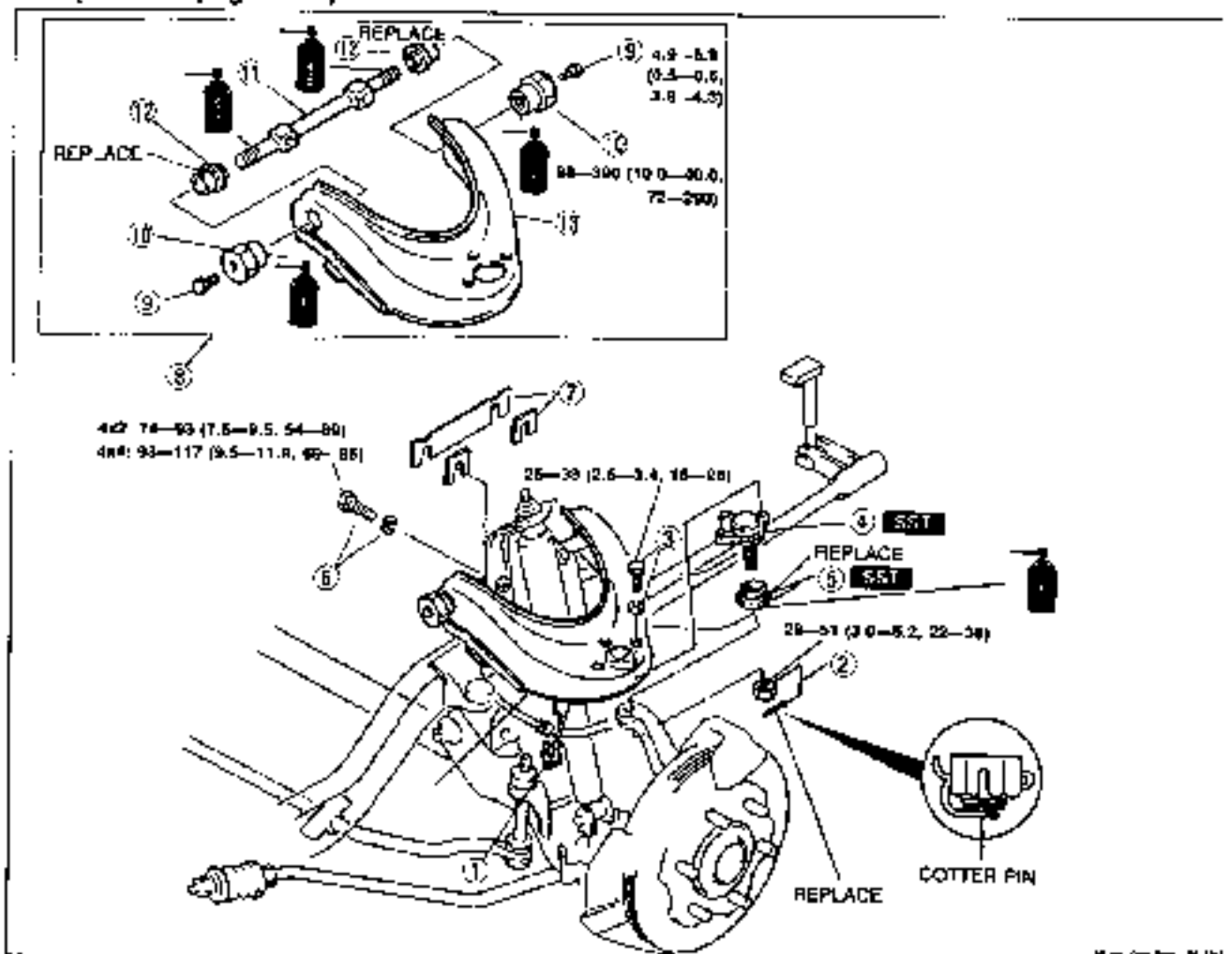
**UPPER ARM (4x2 AND 4x4)**

**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**

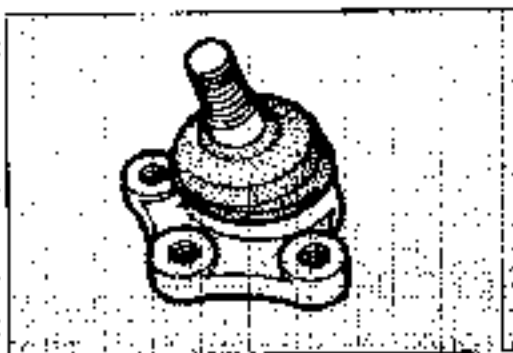
- a) During removal, note the number, amount and position of the adjustment shims so that they are reinstalled in the correct positions.
- b) After installation, check the wheel alignment and adjust it if necessary.  
(Refer to page R-7.)



M-11 (Rev. 11-04)  
29119X-033

- |   |   |
|---|---|
| 1. Clip   | 8. Adjustment shims   |
| 2. Cotter pin and nut   | 9. Upper arm assembly   |
| 3. Upper arm ball joint, Knuckle arm<br>Removal Note, ..... page R-22                           | 10. Plug  |
| 4. Bolts and washers  | 11. Threaded bushing<br>Removal Note..... page R-22<br>Installation Note..... page R-22 |
| 5. Upper arm ball joint<br>Removal Note..... page R-22<br>Inspection..... page R-23             | 12. Upper arm shaft<br>Installation Note..... page R-22<br>Inspection..... page R-23    |
| 6. Upper arm ball joint boot<br>Removal Note..... page R-22<br>Installation Note..... page R-23 | 13. Dust seal   |
| 7. Bolts and washers  | 14. Upper arm<br>Inspection..... page R-23  |

## R FRONT SUSPENSION (DOUBLE WISHBONE)

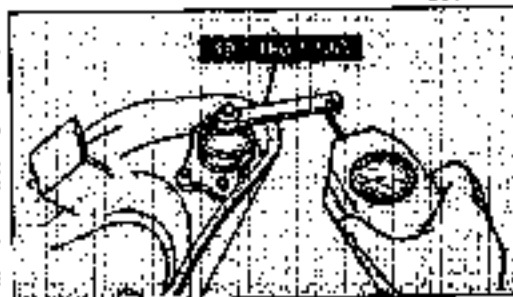


200FX-006

### 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.



1R-105X-024

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)



1B104X-016

### Removal note

#### Upper arm ball joint/Knuckle arm

Using the **SST**, separate the upper arm ball joint from the knuckle arm.



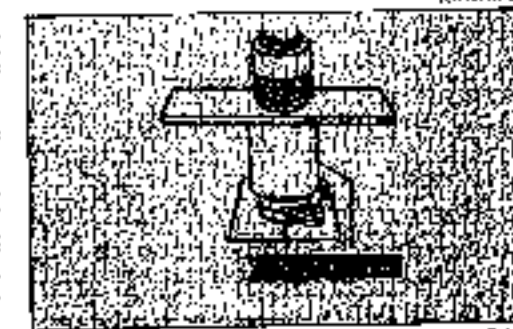
1R-105X-020

#### 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.

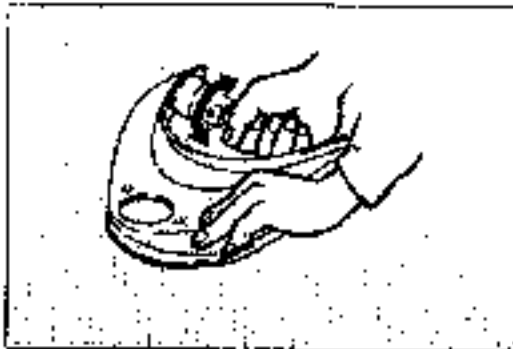


6U-07X-025

#### Upper arm ball joint boot

1. Liberally coat the new boot with grease, and use the **SST** to press it on.

## FRONT SUSPENSION (DOUBLE WISHBONE) R

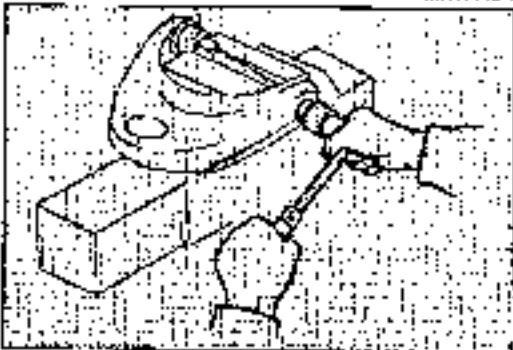


### Inspection

Verify that the upper arm shaft turns smoothly.

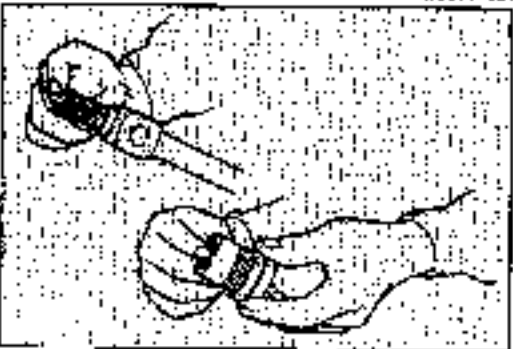
### Caution

If the upper arm shaft cannot be turned smoothly, replace the upper arm and/or threaded bushings.



### Threaded bushing

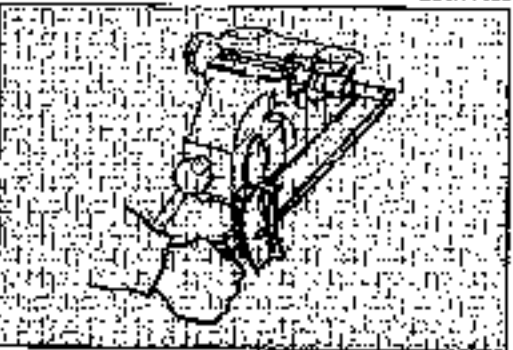
1. Secure the upper arm shaft in a vise.
2. Alternately loosen the threaded bushings in steps.
3. Remove the threaded bushings.



### Installation note

#### Upper arm shaft/Threaded bushing

1. Apply the specified grease to the upper arm shaft and threaded bushings.



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)

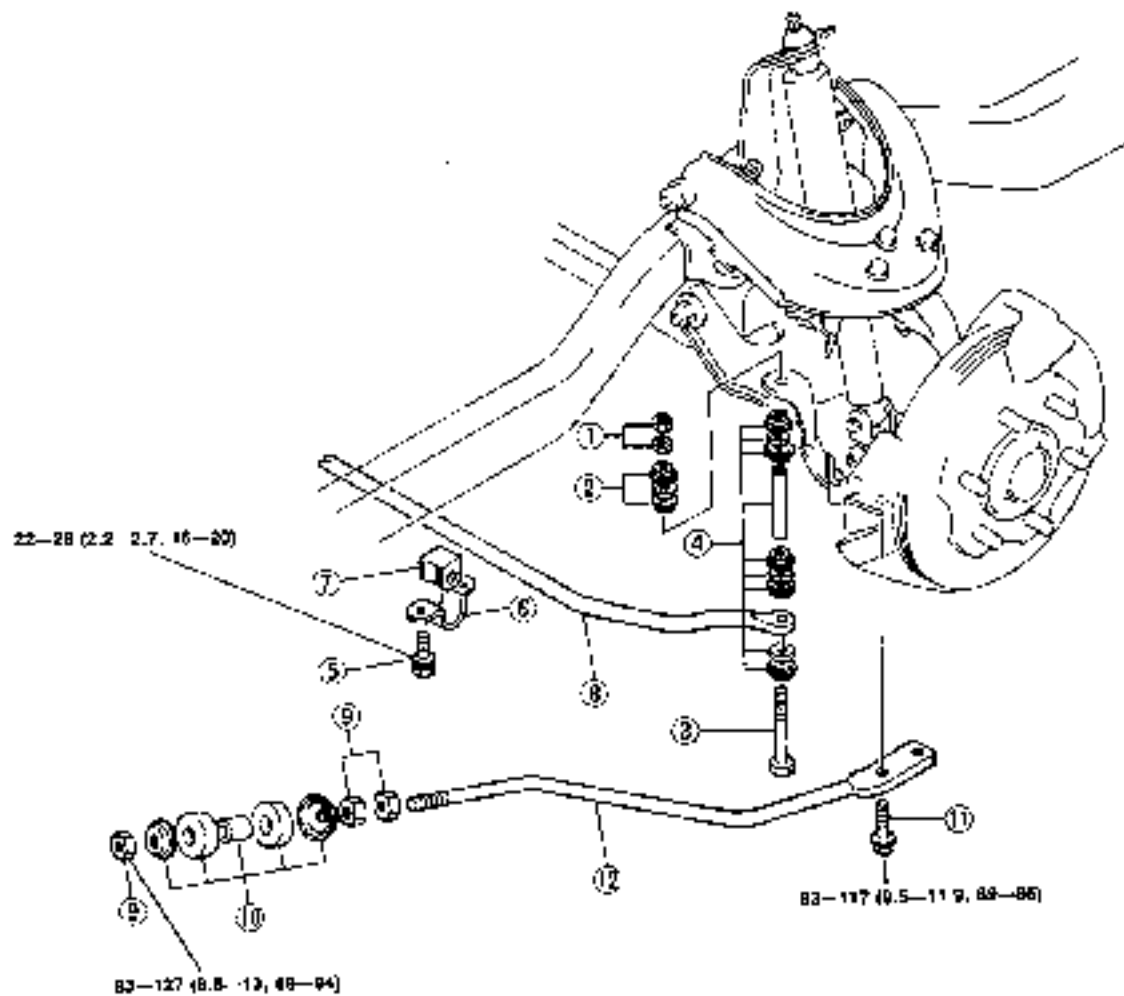
### Caution

If the specified tightening torque cannot be obtained, replace the upper arm and/or threaded bushings.

## STABILIZER AND TENSION ROD (4x2)

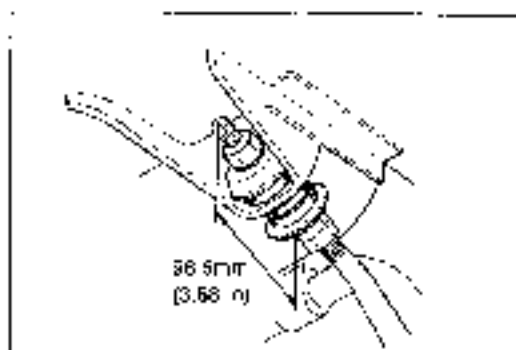
## Removal and Inspection

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.

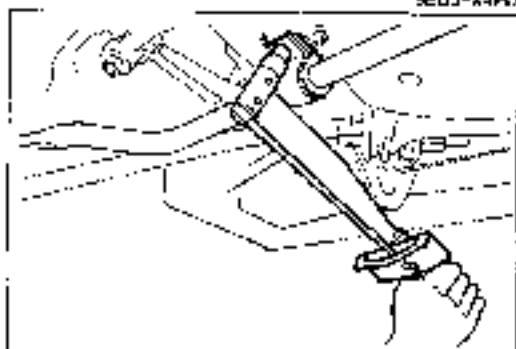


Items (Metric, Imperial)  
22U3764-038

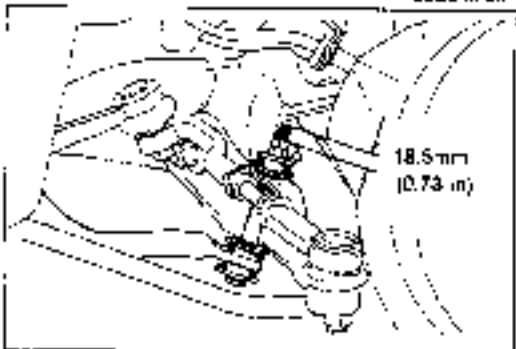
- |  |  |
|--|--|
| 1. Nuts                                      | 8. Stabilizer bar                                    |
| 2. Retainers                                 | Check for bending, cracking, deterioration or damage |
| 3. Bolt                                      | 9. Nuts  |
| 4. Bushings, retainers and spacer            | 10. Bushings and retainers                           |
| Check the bushings for wear or deterioration | 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              |  |



9EUDFX-060



9EUDFX-061



9EUDFX-062

**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.

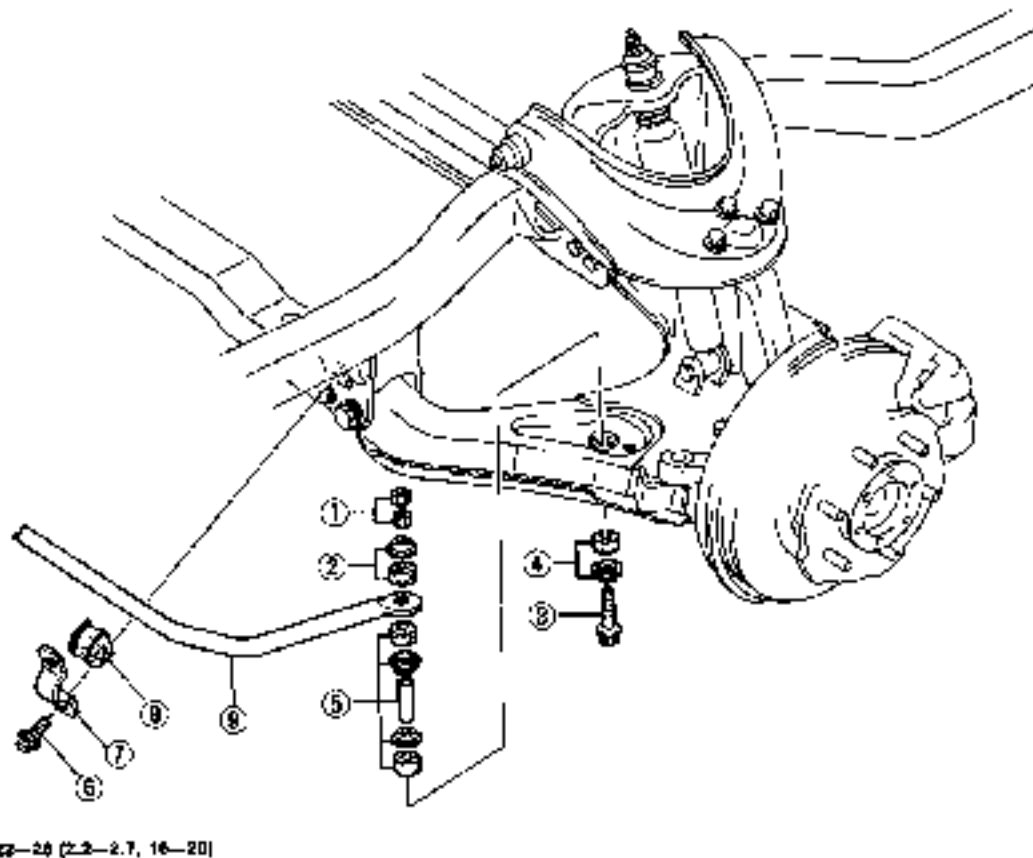
3. Install the stabilizer bolt.

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**

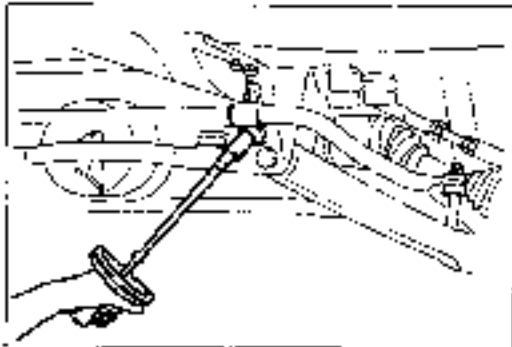
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure.
5. Inspect the stabilizer components and repair or replace as necessary.



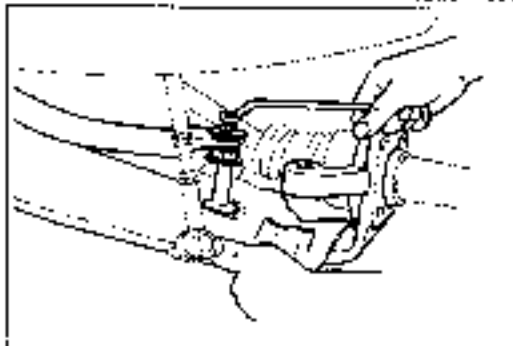
N-m (m-kg, ft-lb)

2RUMRC0-00

- |  |  |
|--|--|
| 1. Nuts  | 5. Retainers, bushings, and spacer<br>Check bushings for wear or deterioration |
| 2. Retainer and bushing<br>Check bushing for wear or deterioration | 6. Bolts   |
| 3. Bolt  | 7. Stabilizer bracket  |
| 4. Retainer and bushing<br>Check bushing for wear or deterioration | 8. Bushing<br>Check for wear or deterioration                                  |
|  | 9. Stabilizer bar<br>Check for cracking, bending, deterioration or damage      |



88A.04X.064



29J0R4.041

**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 ball.

Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the ball.

3. After installation, check the caster angle (Refer to page R-7.)



## REAR SUSPENSION (LEAF SPRING)

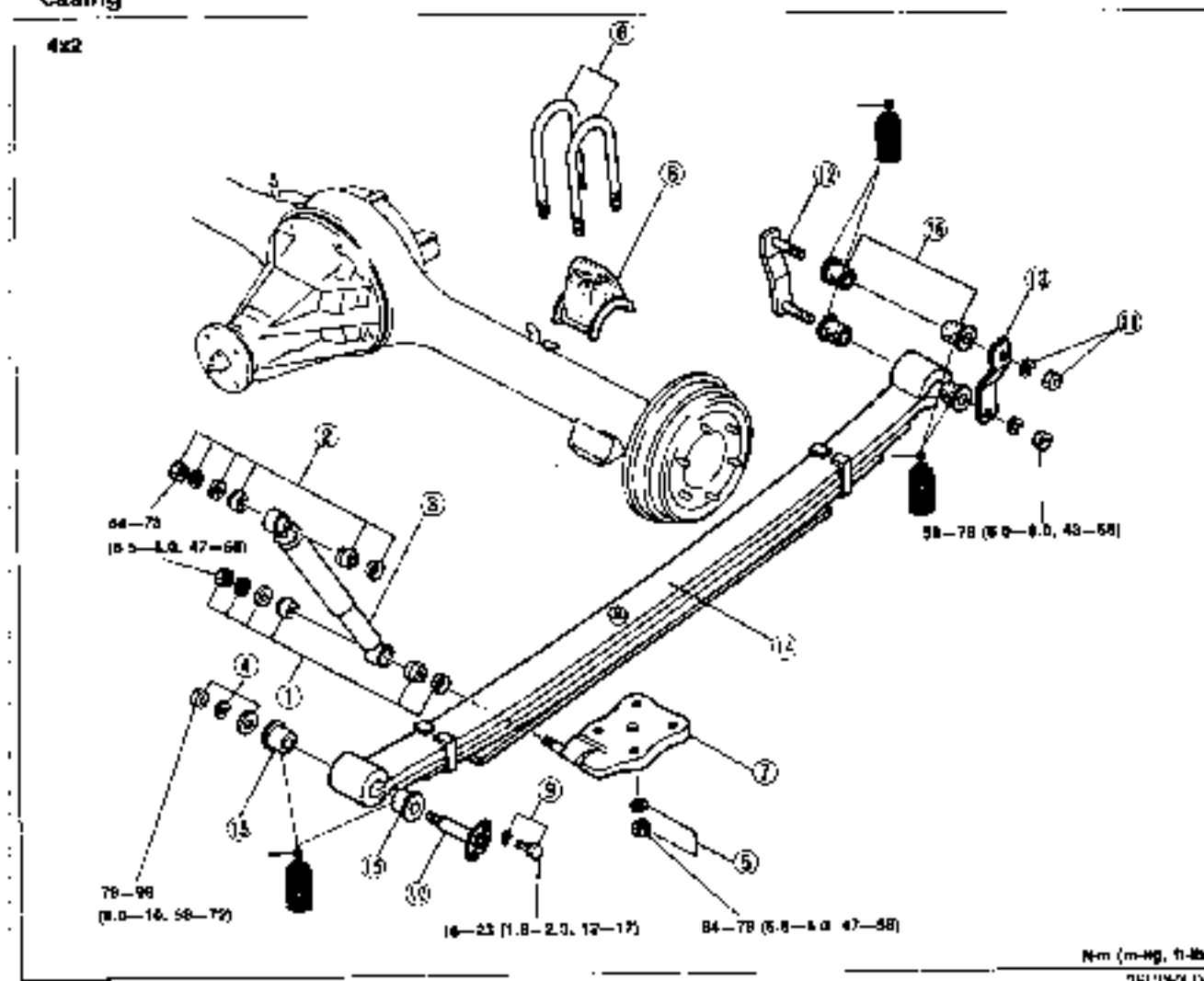
## SHOCK ABSORBER AND LEAF SPRINGS (4x2 AND 4x4)

## 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

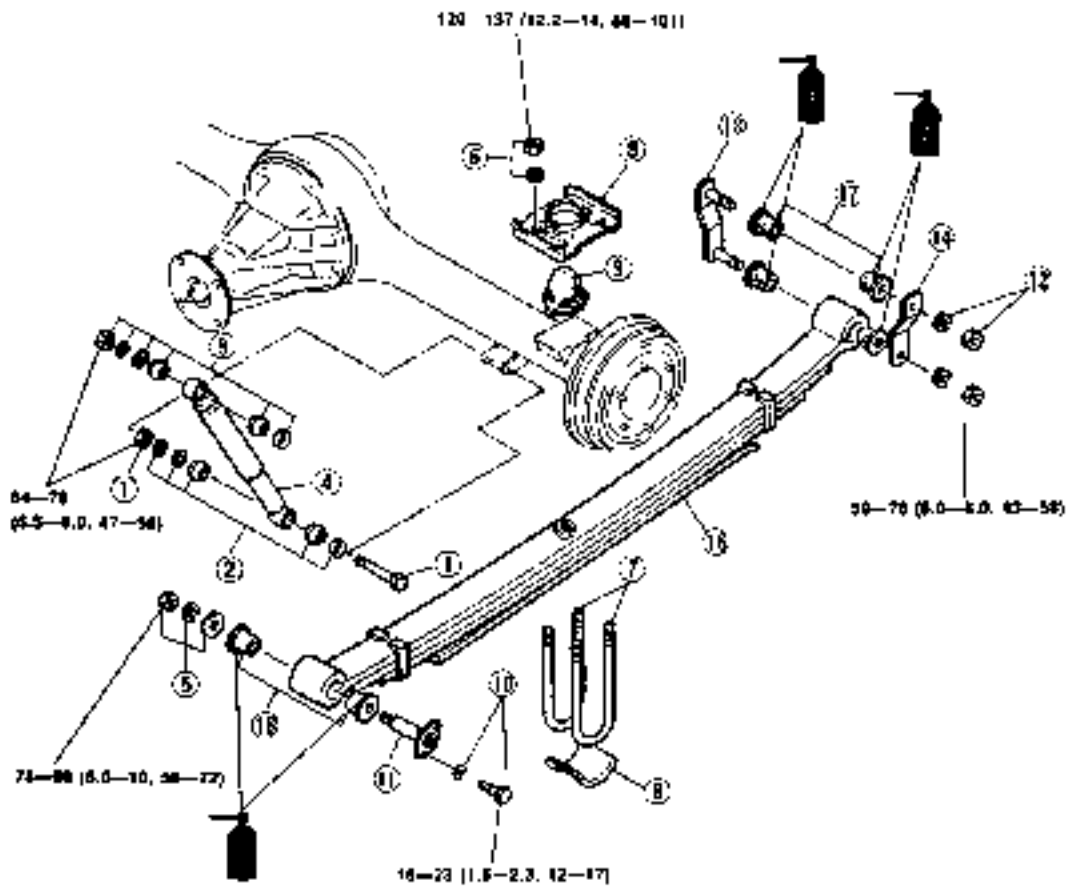
Do not place the safety stands under the rear axle casing. Use a jack to raise or lower the axle casing.



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 pool operation
4. Nut and washers
5. Nuts and washers
6. U-bolts
7. Spring clamp
8. Stopper rubber  
Check for damage or deterioration

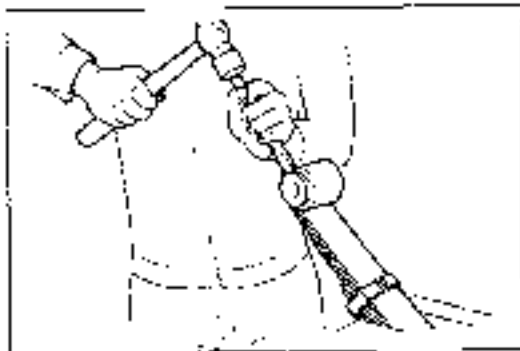
9. Bolts and washers
10. Spring pin
11. Nuts and washers
12. Shackle pin
13. Shackle plate
14. Leaf spring assembly  
Disassembly ..... page R-31  
Assembly ..... page R-31  
Check for weakness or damage
15. Leaf spring bushings  
Remove Nut..... page H-30  
Check for wear or deterioration

4x4



2BLUCRX-040

- |   |  |
|---|--|
| <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>B. 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> |
|---|--|



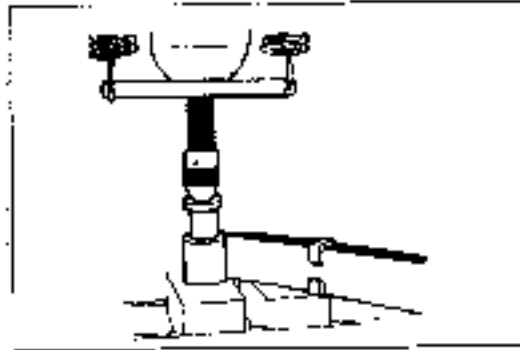
2J0J94-081

**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.



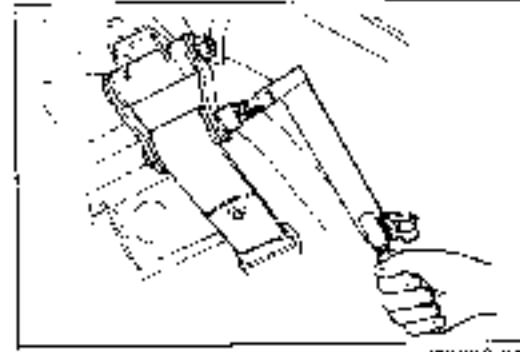
2FA08X-044

**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 torque.



2B0094-045

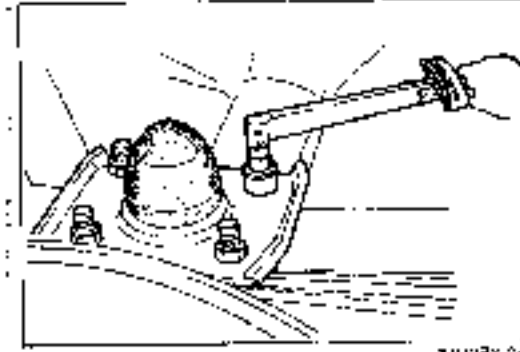
**Tightening torque****Shackle pin:**

59—78 Nm (6.0—8.0 m·kg, 43—58 ft·lb)

**Spring pin:**

78—98 Nm (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.
8. Install the U-bolts, set plates and stopper rubber. Tighten the U-bolt mounting nuts to the specified torque.



2U039X-046

**Tightening torque**

4x2: 64—78 Nm (6.5—8.0 m·kg, 47—58 ft·lb)

4x4:

120—137 Nm (12.2—14.0 m·kg, 88—101 ft·lb)

**Caution**

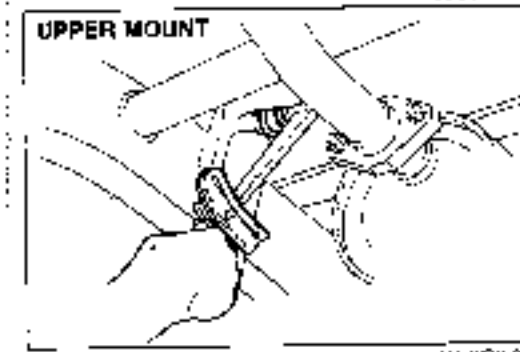
Retighten the nuts to the specified torque after lowering the vehicle (unladen condition).

9. Tighten the shock absorber mounting nuts to the specified torque.

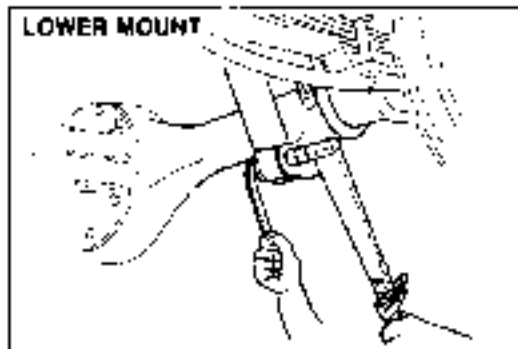
(4x2 and 4x4 Upper mount)

**Tightening torque:**

64—78 Nm (6.5—8.0 m·kg, 47—58 ft·lb)



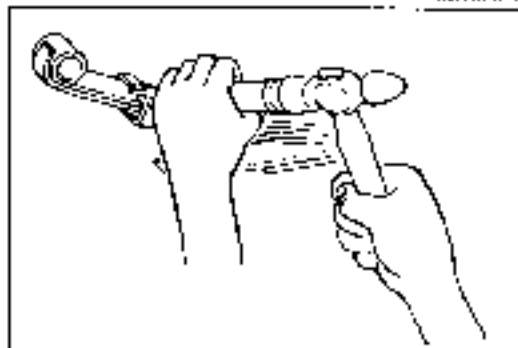
11108X-015



(4x2 and 4x4 Lower mount)

Tightening torque:

84—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)



**Leaf spring assembly  
Disassembly**

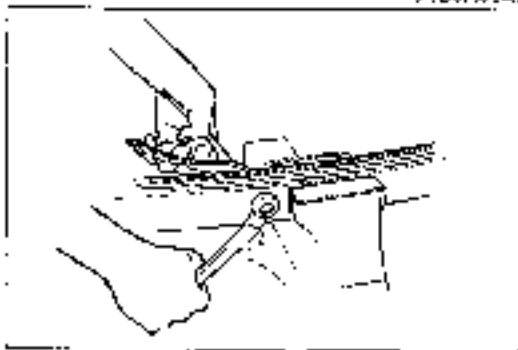
1. Secure the leaf spring assembly in a vise.

**Note**

Use protective plates in the jaws of the vise to prevent damage to the part secured.



2. Uncrimp the clip.
3. Remove the center bolt.

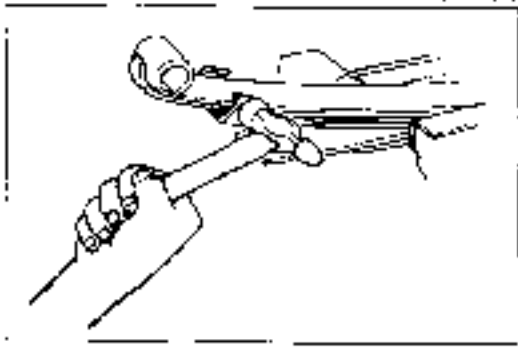


**Assembly**

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)



3. Crimp the clip.

**Caution**

Do not allow any gap between the clip and the springs.

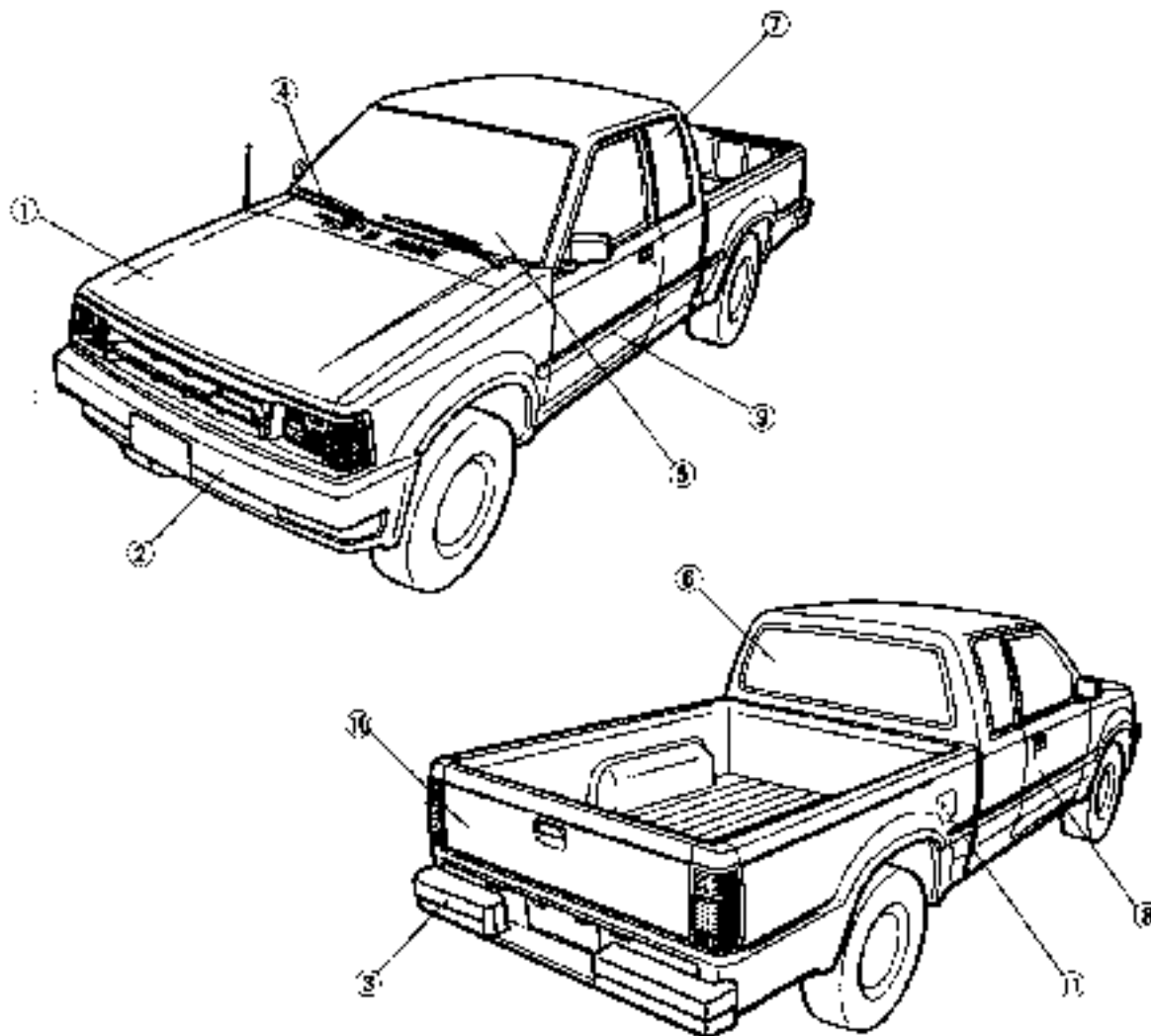


## BODY

<b>INDEX</b> .....	S- 2	<b>SIDE PROTECTOR</b> .....	S-25
<b>HOOD</b> .....	S- 4	STRUCTURAL VIEW .....	S-25
REMOVAL AND INSTALLATION .....	S- 4	REMOVAL .....	S-26
ADJUSTMENT .....	S- 4	INSTALLATION .....	S-26
<b>FRONT BUMPER</b> .....	S- 5	<b>INSTRUMENT PANEL</b> .....	S-27
REMOVAL AND INSTALLATION .....	S- 5	REMOVAL AND INSTALLATION .....	S-27
<b>REAR BUMPER</b> .....	S- 6	INTERLOCK OF INSTRUMENT	
REMOVAL AND INSTALLATION .....	S- 6	PANEL .....	S-28
<b>WINDSHIELD WIPER AND WASHER</b> .....	S- 7	MOUNTING OF INSTRUMENT	
TROUBLESHOOTING GUIDE .....	S- 7	PANEL .....	S-29
WIPER AND WASHER SWITCH .....	S-10	<b>SEATS</b> .....	S-30
WIPER MOTOR .....	S-10	STRUCTURAL VIEW .....	S-30
WASHER MOTOR .....	S-11	INSPECTION .....	S-30
REMOVAL AND INSTALLATION .....	S-12	<b>SEAT BELTS</b> .....	S-31
ADJUSTMENT .....	S-13	STRUCTURAL VIEW .....	S-31
<b>DOOR</b> .....	S-15	INSPECTION .....	S-31
STRUCTURAL VIEW .....	S-15	<b>HEADLINER AND TRIM</b> .....	S-33
ADJUSTMENT .....	S-16	STRUCTURAL VIEW .....	S-33
REMOVAL AND INSTALLATION .....	S-16	REMOVAL .....	S-35
<b>WINDSHIELD</b> .....	S-19	INSTALLATION .....	S-35
PREPARATION .....	S-19	<b>TAILGATE</b> .....	S-37
REMOVAL .....	S-20	DISASSEMBLY .....	S-37
INSTALLATION .....	S-20	ASSEMBLY .....	S-37
<b>BACK WINDOW GLASS</b> .....	S-22	ADJUSTMENT .....	S-37
PREPARATION .....	S-22	<b>FUEL LID REMOTE RELEASE</b> .....	S-38
REMOVAL .....	S-23	REMOVAL AND INSTALLATION .....	S-38
INSTALLATION .....	S-23	<b>BODY DIMENSIONS</b> .....	S-38
<b>QUARTER WINDOW GLASS</b>			
(CAB PLUS) .....	S-24		
REMOVAL AND INSTALLATION .....	S-24		

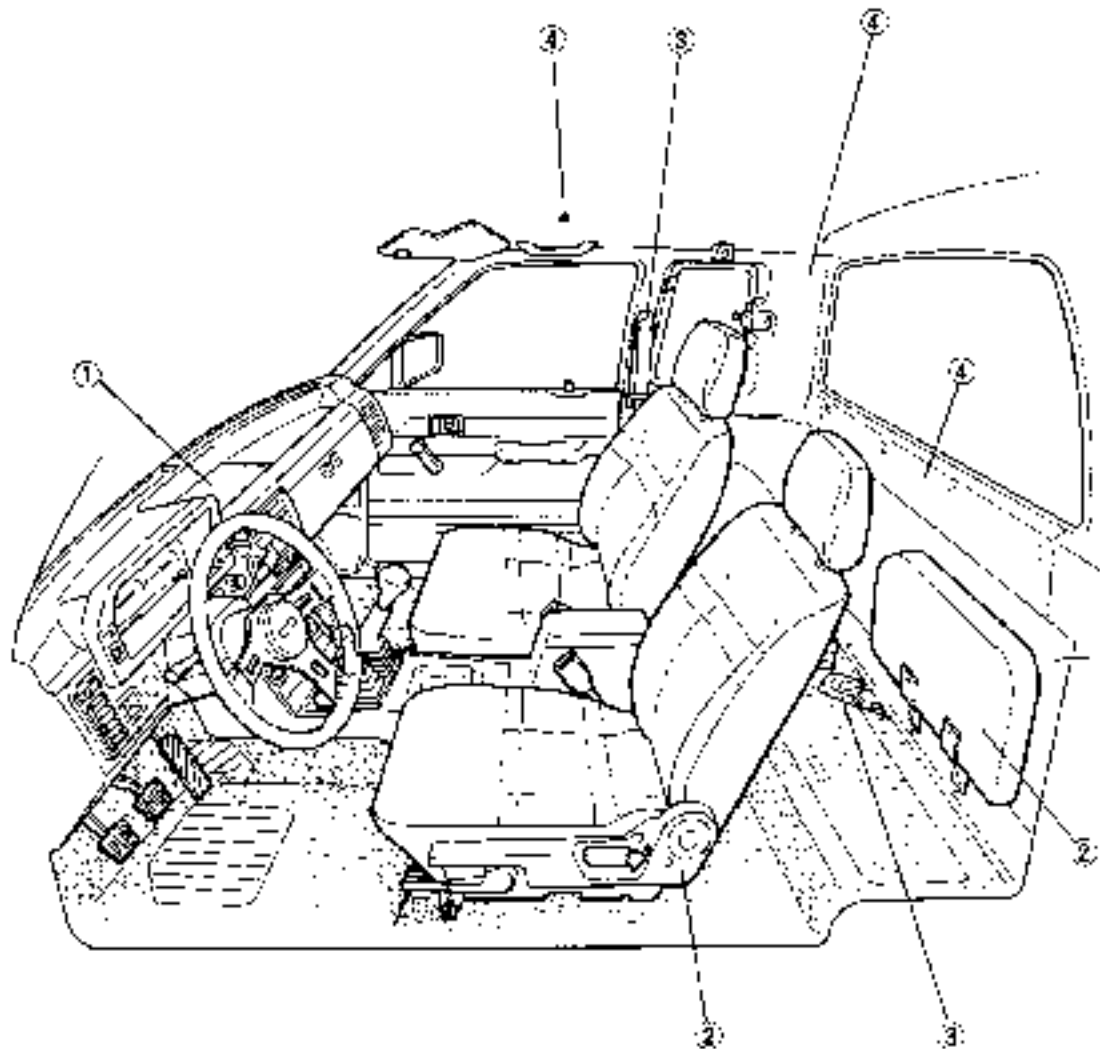
201.05X-001

## INDEX



2B J75X U32

- |   |  |   |
|---|--|---|
| 1. Hood<br>Removal and installation<br>..... page S- 4<br>Adjustment..... page S- 4   | b. Windshield<br>Removal and installation<br>..... page S-19                         | 10. Tailgate<br>Disassembly .... page S-37<br>Assembly..... page S-37<br>Adjustment..... page S- 37 |
| 2. Front bumper<br>Removal and installation<br>..... page S- 5  | 6. Back window glass<br>Removal and installation<br>..... page S-22                  | 11. Fuel filler remote release<br>Removal and installation<br>..... page S-38                       |
| 3. Rear bumper<br>Removal and installation<br>..... page S- 6   | 7. Quarter window glass<br>(Cab plus)<br>Removal and installation<br>..... page S-24 |   |
| 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-18<br>Removal and installation<br>..... page S-16  |   |
|   | 9. Side protector<br>Removal..... page S-26<br>Installation..... page S-26           |   |



1. Instrument panel  
 Removal and installation ..... page S-27  
 Interlock of instrument panel... page S-28  
 Mounting of instrument panel . page S-29
2. Seats  
 Inspection ..... page S-30

3. Seat belts  
 Inspection ..... page S-31
4. Headliner and trim  
 Removal ..... page S-36  
 Installation... ..... page S-35

200267 039



## HOOD

## REMOVAL AND INSTALLATION

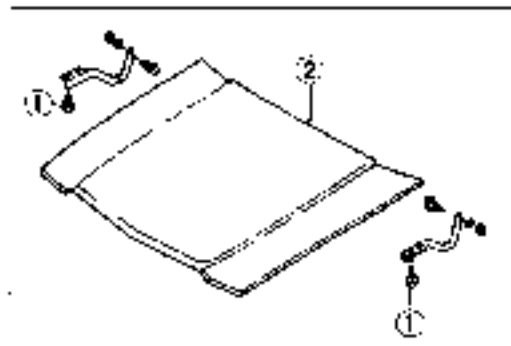
1. Remove in the order shown in the figure.
2. Mark the hood hinge locations on the engine hood for proper reinstallation.
3. Install the hood in the reverse order of removal, and adjust it if necessary.

## Tightening torque:

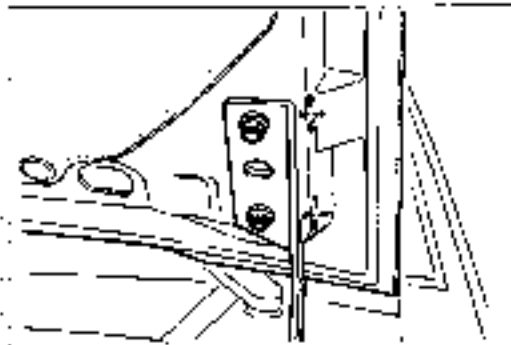
7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

## ADJUSTMENT

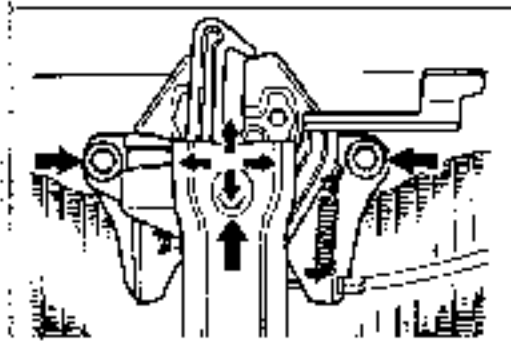
1. Adjust the hood from front and rear and side to side by loosening the nuts attaching it to the hinges to allow repositioning.



19 J084002



75L14X003



68 J084405

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 strike on the hood by loosening the attaching bolts and nut.

## Tightening torque:

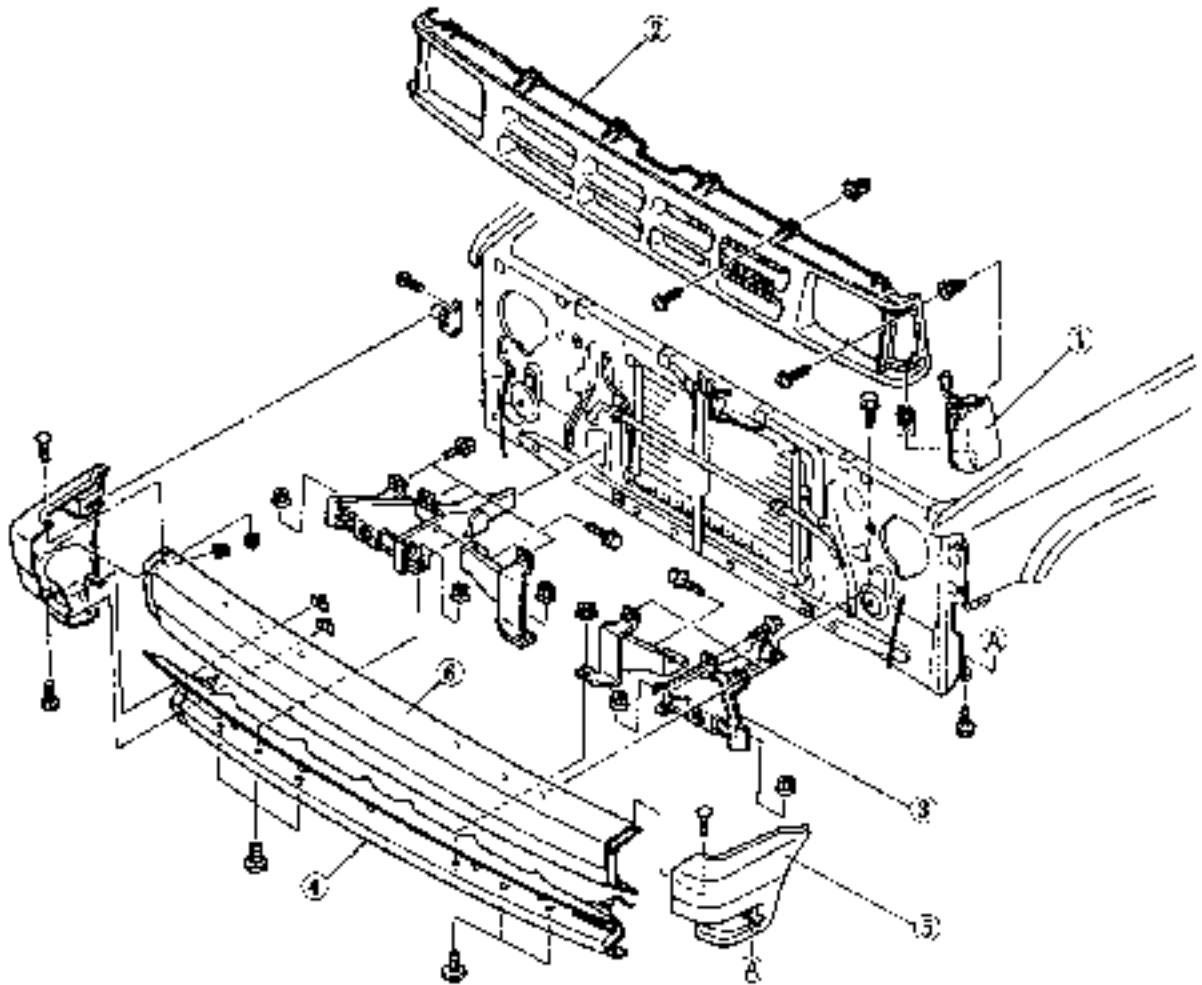
Bolt ... 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

Nut .... 8.8—13 N·m (0.9—1.3 m·kg, 6.5—9.4 ft·lb)

## 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

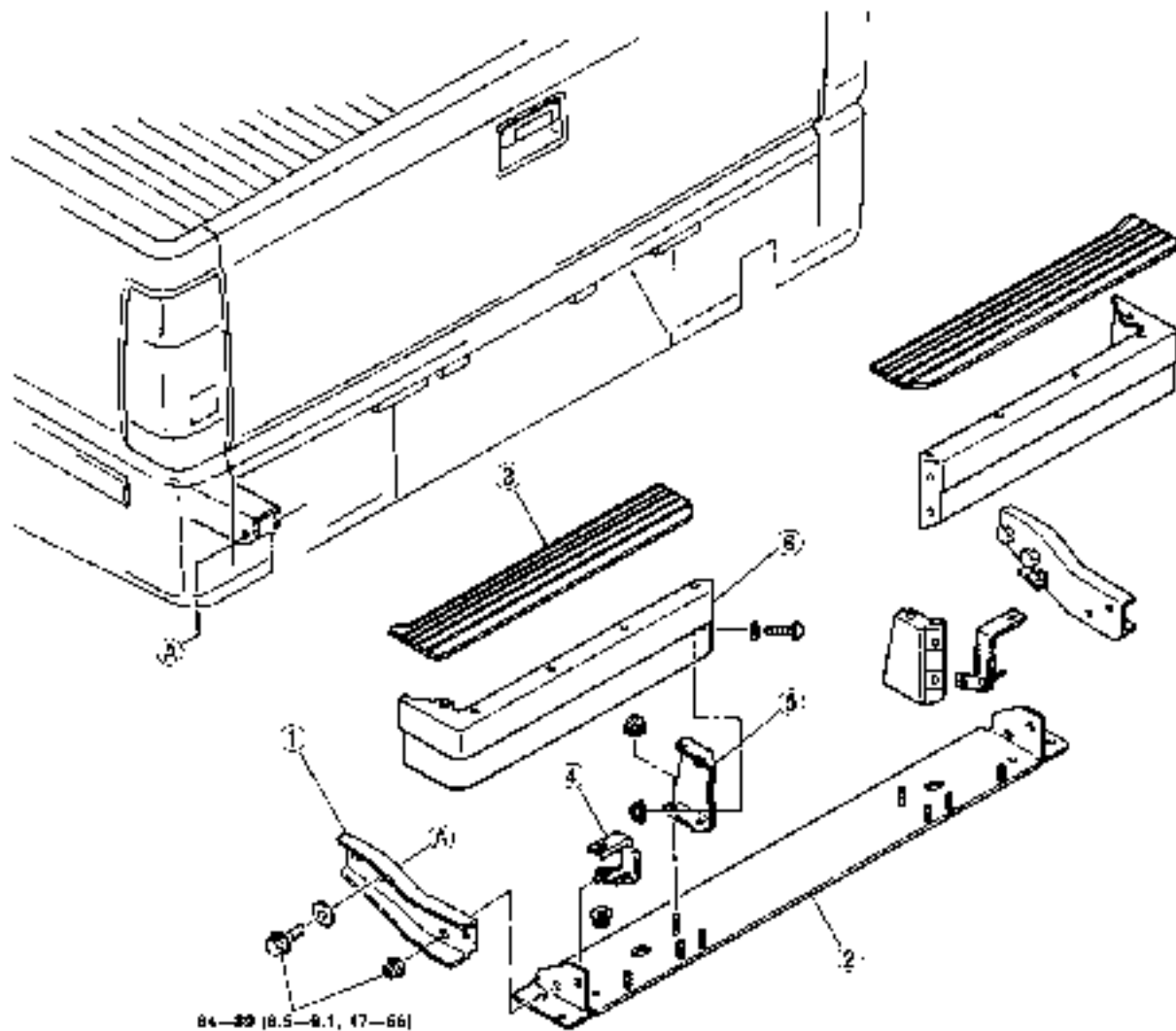
4. Bumper skirt
5. Bumper sides
6. Bumper face

:B. (5/2/01)

## REAR BUMPER

## REMOVAL AND INSTALLATION

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



Nm (m-kg, ft-lb)

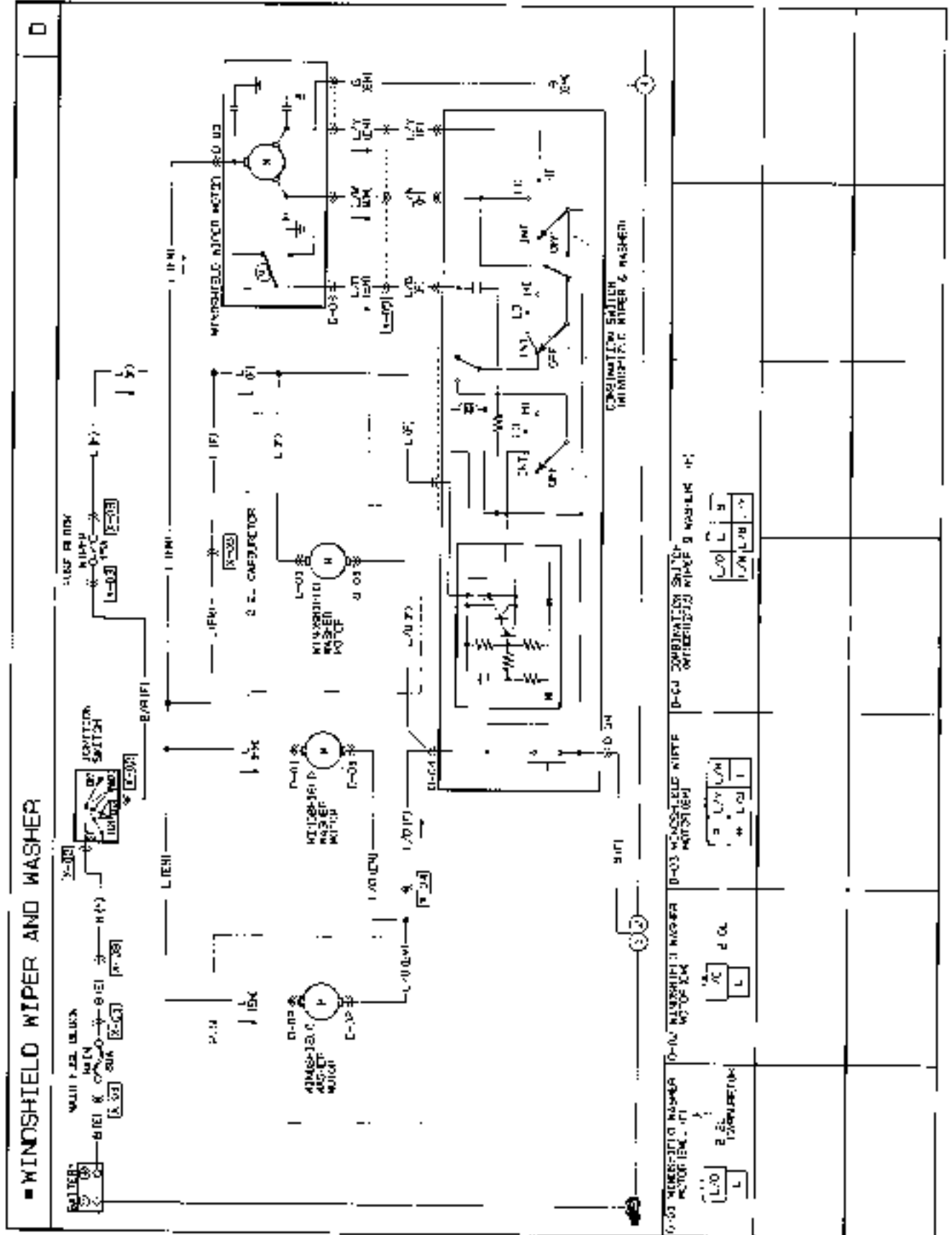
\*3.05X 9/14

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 Low 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

28U05X-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

28U05X-004

Flow No.3	Symptom	Intermittent operation of wiper is not possible (Low/Hi operation is possible)
-----------	---------	--

### Possible cause

- Damaged wiper switch
- Damaged intermittent wiper relay

### Remedy

- Check wiper switch (Refer to page S-10)

28U05X-003

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)

28U05X-002

Flow No.5	Symptom	Wiper continues hi/hi operation after wiper switch is turned OFF
-----------	---------	--

### Possible cause

- Damaged wiper switch

### Remedy

- Check wiper switch (Refer to page S-10)

28U05X-001

Flow No.5	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

2EL05X-010

Flow No.7	Symptom	Washer operates with washer switch turned OFF
-----------	---------	---

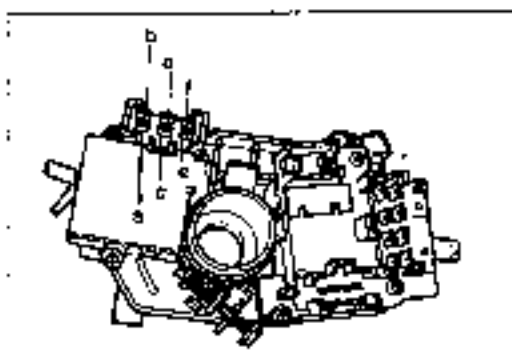
**Possible cause**

- Damaged washer switch

**Remedy**

- Check washer switch (Refer to page S-10)

2Z016X-011



281128X-0-7

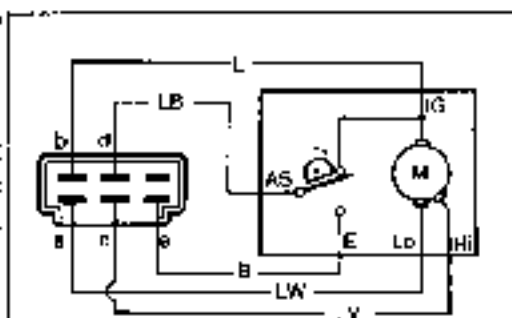
**WIPER AND WASHER SWITCH****Inspection**

1. Check for continuity between terminals by using an ohmmeter

Positions	One touch	Terminal					
		a	b	c	d	e	f
Wiper switch	OFF	ON	○				○
		OFF				○	○
	INT	○				○	
	I (Low)	○	•	•			○
	II (High)	○	○				
Washer switch ON						○	

○—○ Indicates continuity

2. If not as specified replace the combination switch



281128X-0-8

**WIPER MOTOR****Inspection**

1. Check for continuity between terminals by using an ohmmeter

Terminals	Continuity	Note
b-a	Conductive	—
b-c	Conductive	—
b-d	Conductive	Normal resting position
a-d	Conductive	Except for normal resting position

2. Check the operation by applying an electrical source to the motor

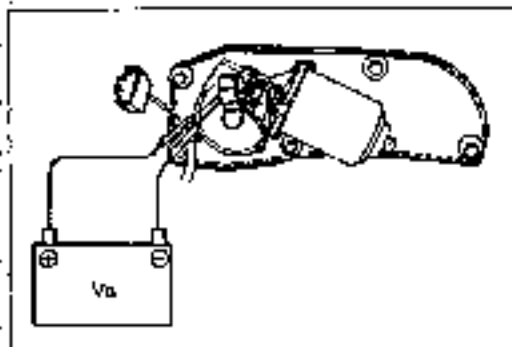
**V<sub>b</sub>: Battery voltage**

Terminal		Operation speed
V <sub>b</sub>	Ground	
b	a	Low
	c	High

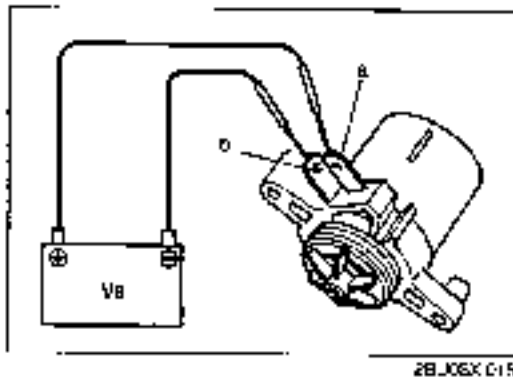
3. Check for continuity between the b and d terminals and between the d and e terminals while operating the motor in low speed.

Terminals	Continuity
b-d	Nonconductive most of the time, and becomes conductive once per turn
d-e	Conductive most of the time, and becomes nonconductive once per turn

4. If not as specified, replace the wiper motor.



281128X-0-9

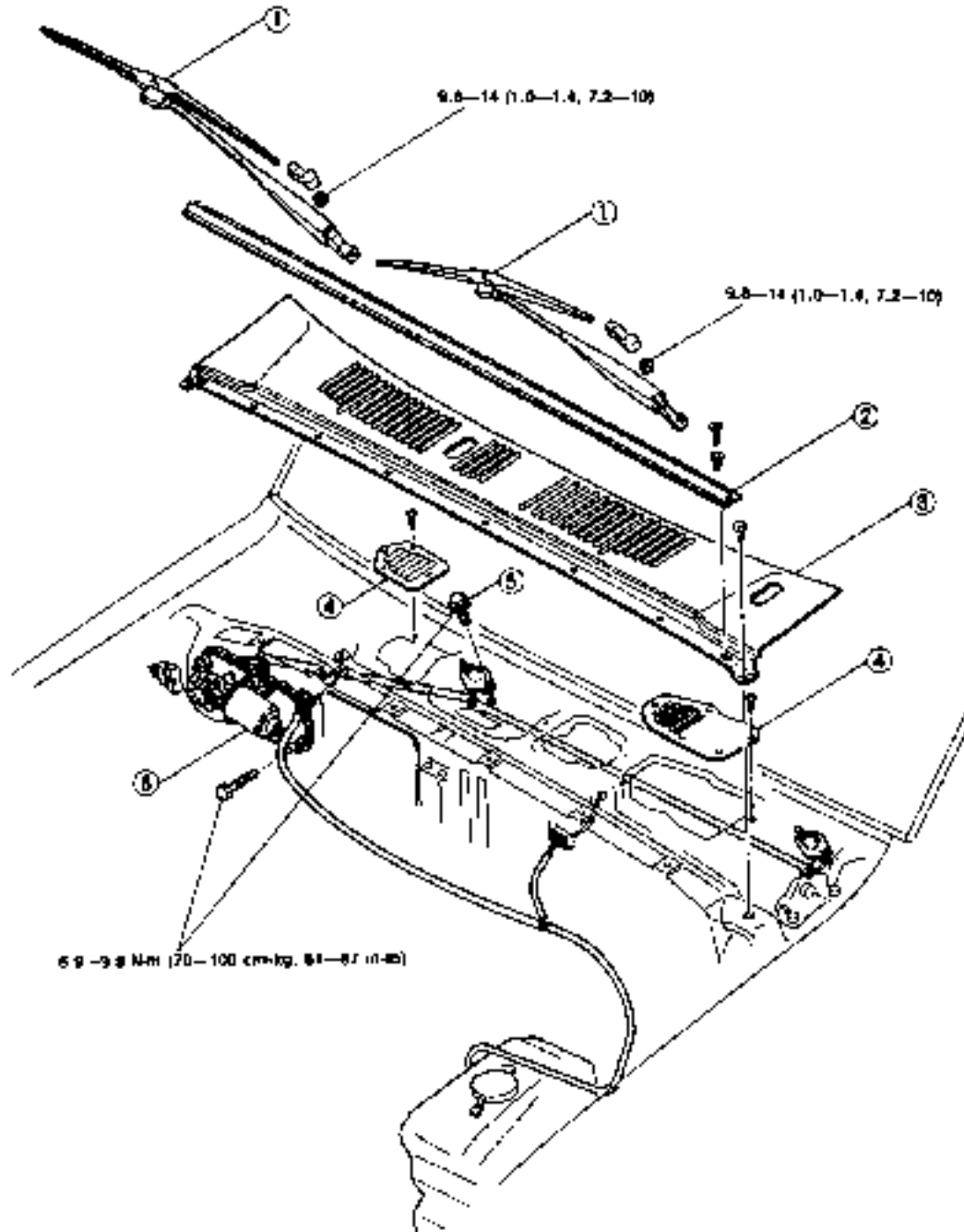
**WASHER MOTOR****Inspection**

- 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

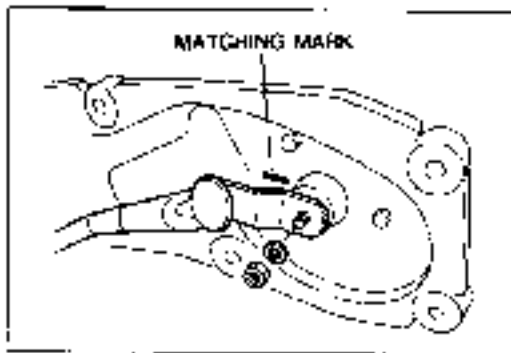
1. Disconnect the negative battery cable.
2. Remove in the order shown, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.



Nm (m·kg, ft·lb)

23076-014

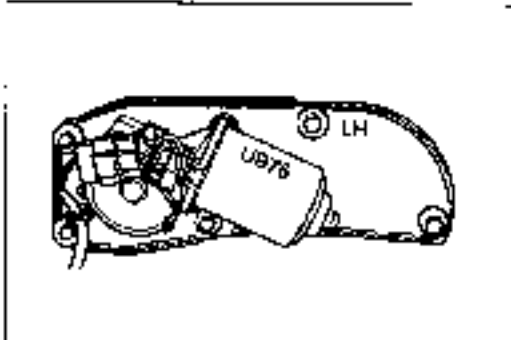
- |                               |                                  |
|-------------------------------|----------------------------------|
| 1 Wiper arms and wiper blades | 4. Seal covers                   |
| 2 Seal rubber                 | 5. Bolt                          |
| 3 Cowl grille                 | 6. Wiper motor and link assembly |



9UJ01X-03E

**Removal and Installation Note**

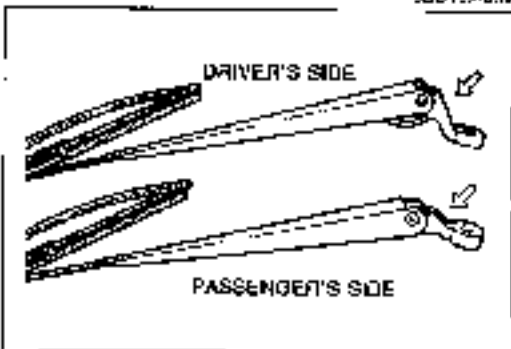
- a) Make matching marks on the wiper motor when removing the wiper link assembly from it.
- b) Align the wiper link with the mark on the wiper motor when installing the wiper link assembly to the motor. The automatic-stop angle is approximately 20.5°.



3BJ1E3-03G

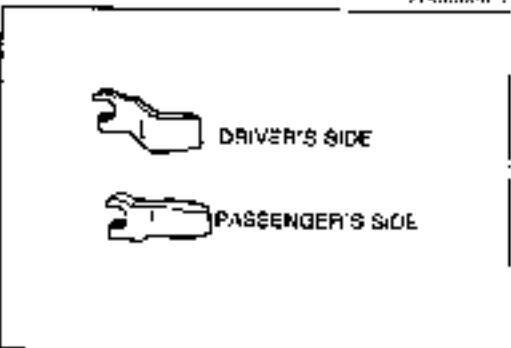
- c) The wiper motor used is per specifications. When replacing the wiper motor, note the identification numbers.

Identification number	Specification
LH (on the bracket)	Without cold-area version
LH + UB76 (on the bracket) + (on the motor)	Cold-area version

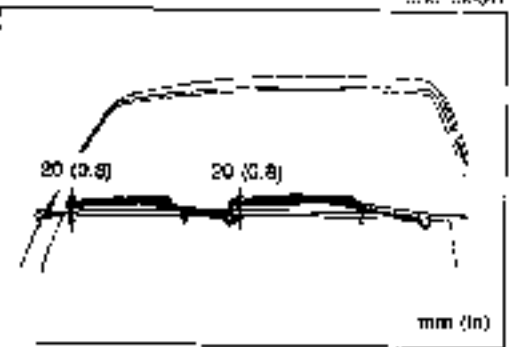


2FL65X-017

- 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.



6FA15Z-041



411J7-006

**ADJUSTMENT**

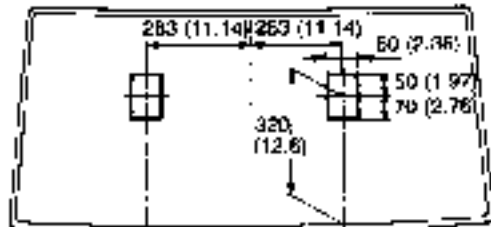
**Arm Height**

Adjust the arm height as shown in the figure, and tighten the arm to the specified torque.

**Tightening torque:**

9.8—14 Nm (1.0—1.4 m·kg, 7.2—10 ft·lb)

## WINDSHIELD WIPER AND WASHER



mm (in)

25U15X043

**Washer Spray**

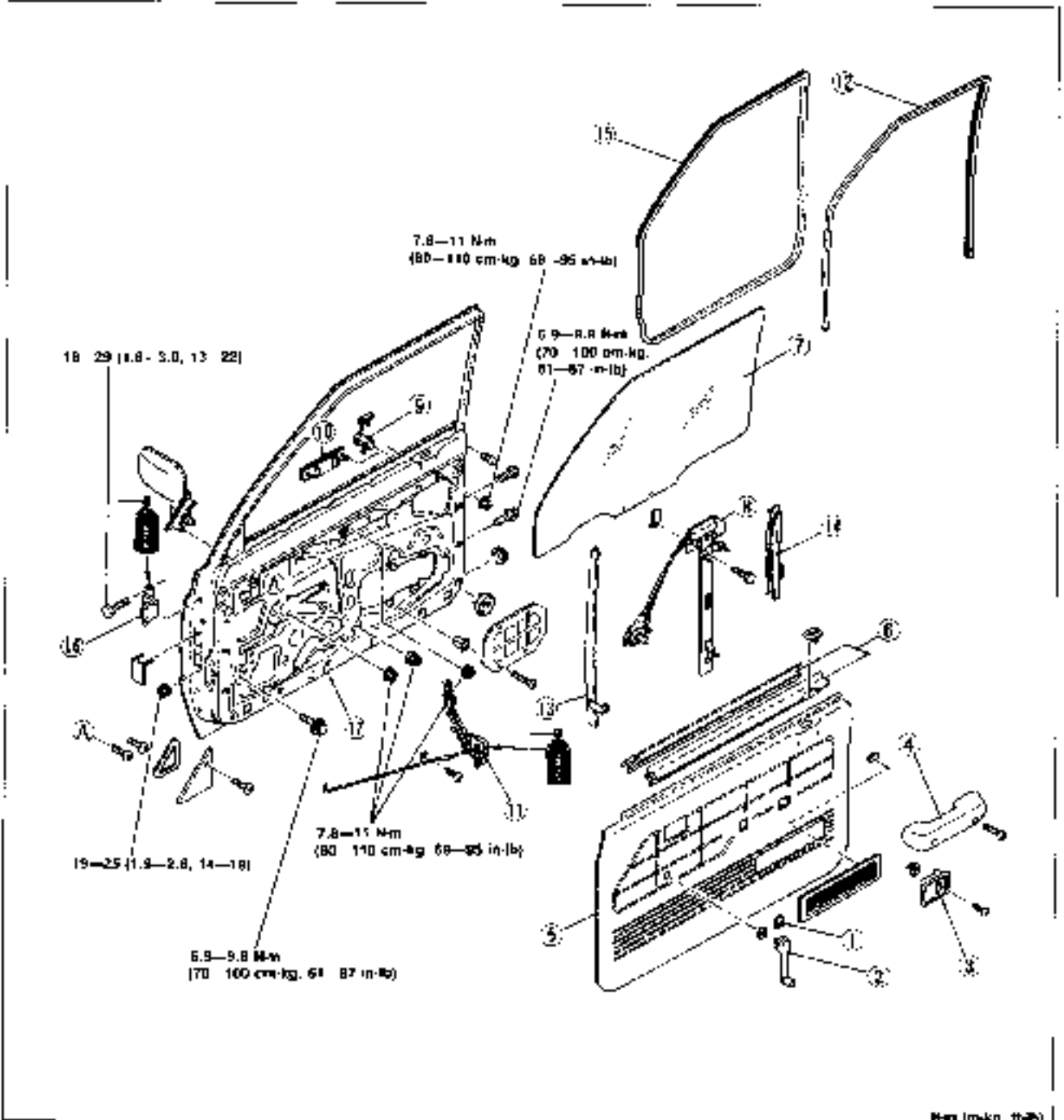
Adjust the aim of the washer spray nozzle by inserting a needle or similar object into the hole of the nozzle and bending it to adjust.

## DOOR

## STRUCTURAL VIEW

## Note

Refer to page S-16 for door lock striker adjustment.

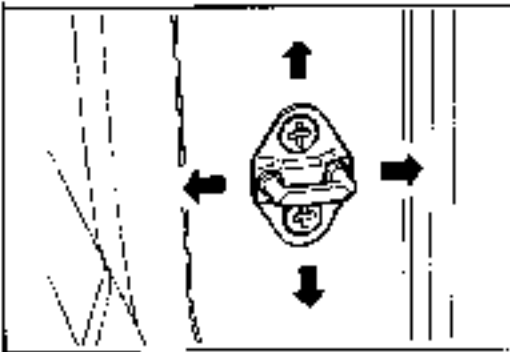
Nm (m-kg, ft-lb)  
TRUCK L<sup>td</sup>

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



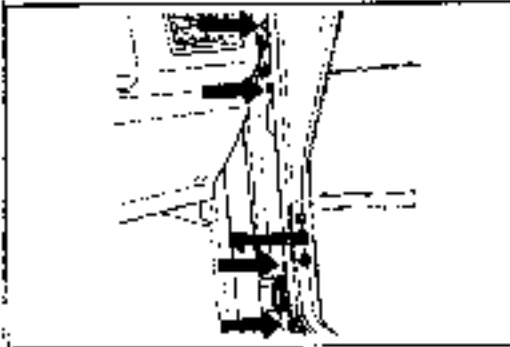
10U05X-006

**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—25 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



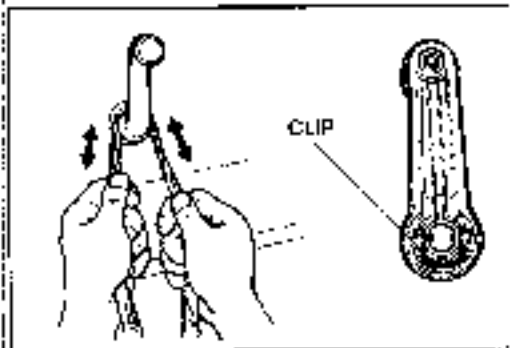
4EG14X-025

**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**

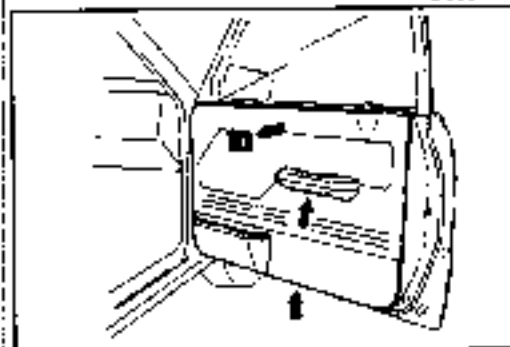
If noise is heard from the checker when the door is opened, apply grease to the checker cam.



01U06X-013

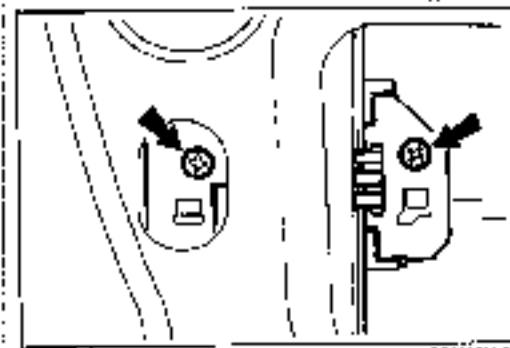
**REMOVAL AND INSTALLATION****Window Regulator**

1. Remove the regulator handle installation clip with a rag as shown in the figure.



99U15X-017

2. Remove door handle, armrest, and door trim.



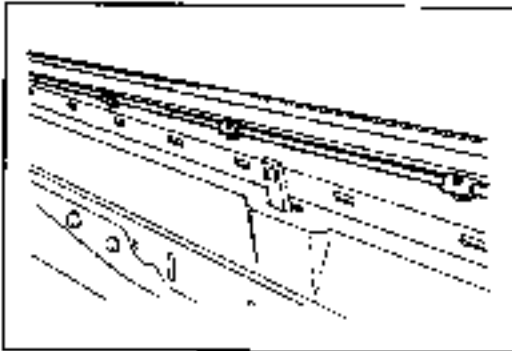
99U15X-018

3. Remove door screen.

**Note**

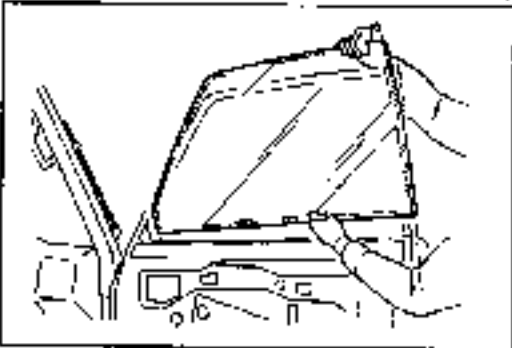
Remove the door screen carefully so that it may be reused.

4. Position the door glass mounting screw so that it can be removed from the access hole.
5. Remove the door glass mounting screws.



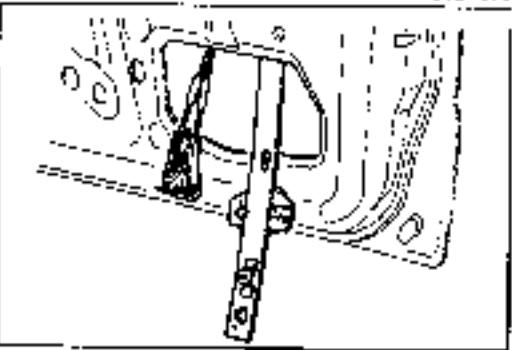
9EL05X-015

- 6 Remove the weatherstrips (inner and outer).
- 7 Remove the glass guide mounting bolt.



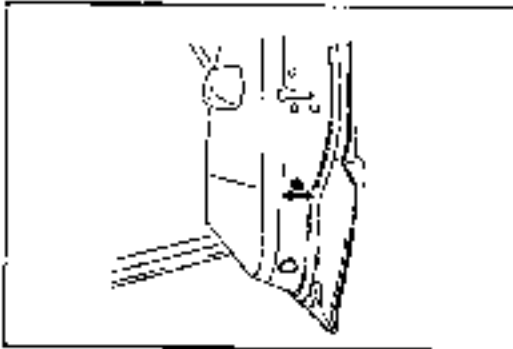
9P05X-07C

- 8 Remove the door glass upward.



0E112X-021

- 9 Remove the mounting bolts, and remove the window regulator from the access hole.

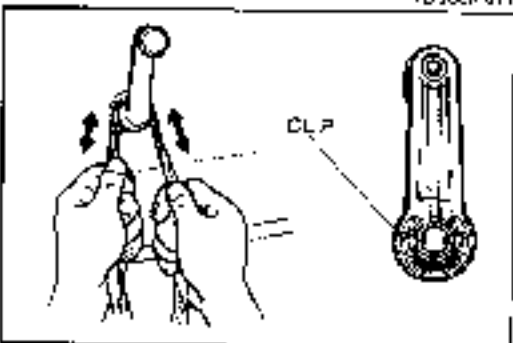


1B106X-011

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

#### Note

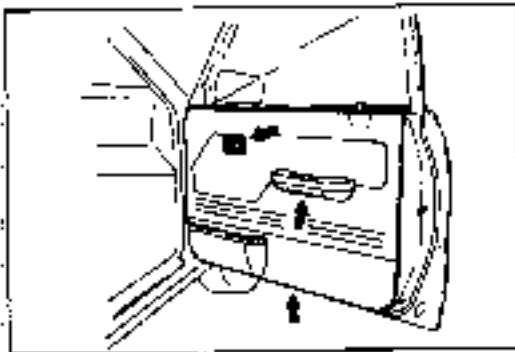
After installing the window regulator, adjust it so that the door glass moves up and down smoothly.



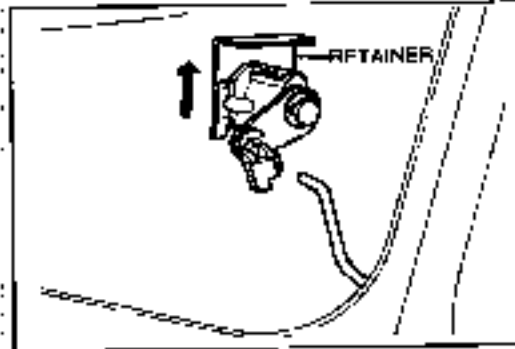
1B106X-012

#### Door Lock

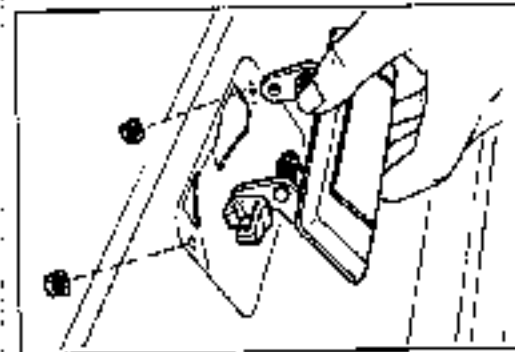
- 1 Raise the door glass all the way.
- 2 Remove the regulator handle installation clip with a rag as shown in the figure.



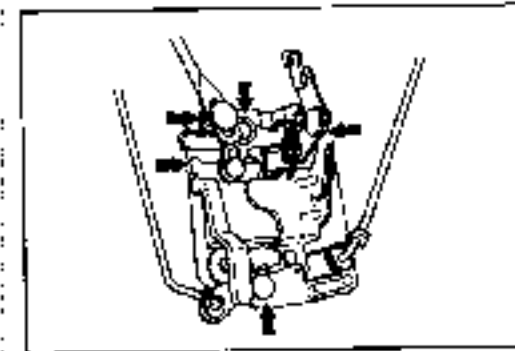
95L05X-024



95L05X-026



95L05X-025



18U05X-019

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.

5. Remove the rod clip and retainer and the key cylinder.
6. Remove the mounting screws and door lock.

7. Remove the mounting nuts, then remove the outer handle.

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

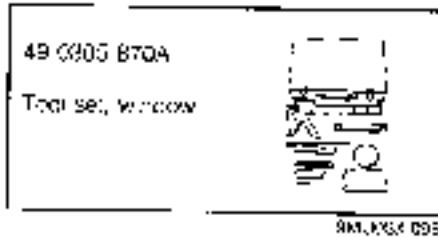
**Note**

- 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

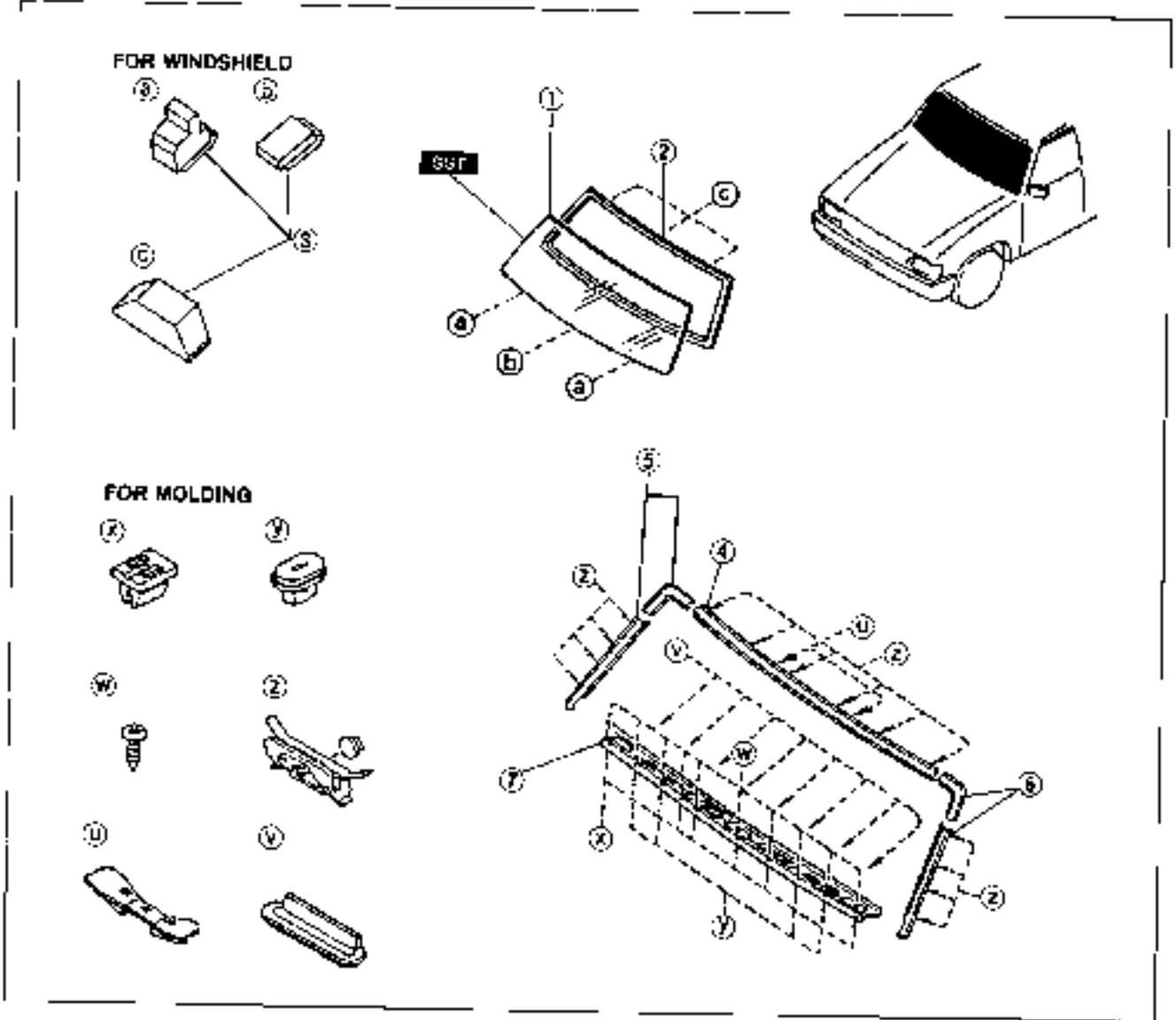


9M, KX54 035

Note

Use SST (49 0305 870A) to remove and install the windshield.

Structural View

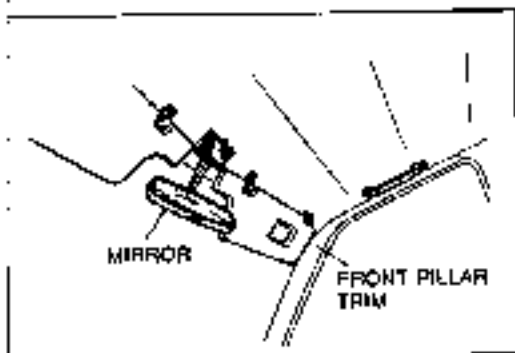


- 1. Windshield
- 2. Dam
- 3. Spacers
- 4. Molding (upper)

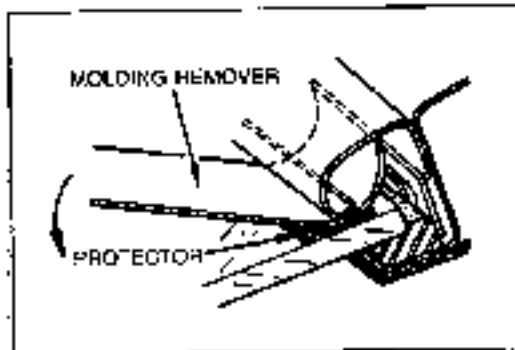
- 5. Molding (right side)
- 6. Molding (left side)
- 7. Molding (lower)

12U552-014



**REMOVAL**

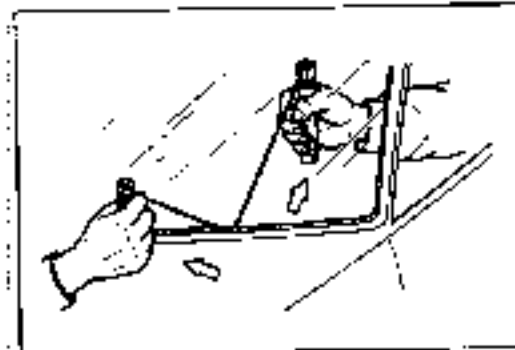
1. Remove the wiper arms and blades. (Refer to page S-12.)
2. Remove the interior mirror and front pillar trims.



3. Insert a suitable protector, and remove the molding by using the molding remover as shown.

**Caution**

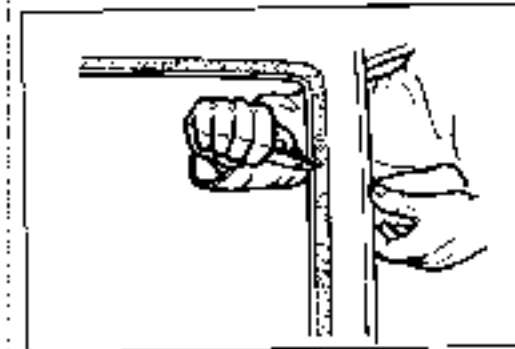
Before removing the molding, apply adhesive tape to the body to protect it from damage.



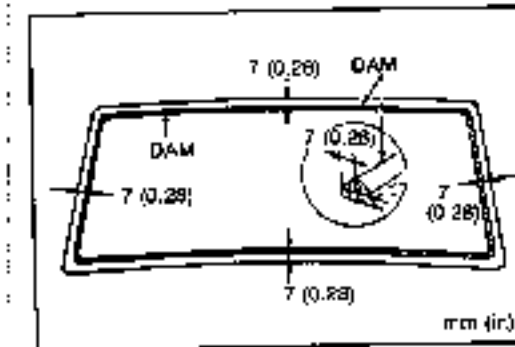
4. Drill a small hole through the sealant.
5. Pass a piano wire through the hole.
6. Wind each end of the wire around a bar.
7. Pull the wire to and from, and saw through the sealant around the edge of the glass. Then remove the glass.

**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**

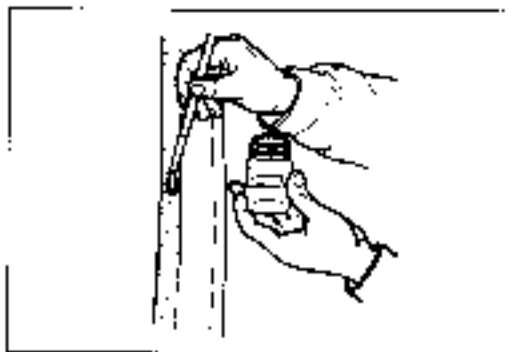
1. Cut away the old sealant with a sharp knife so that 1 to 2mm (0.04 to 0.08 in) thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it 30 minutes to dry. Then put on new sealant to build up to a 2mm (0.08 in) layer.



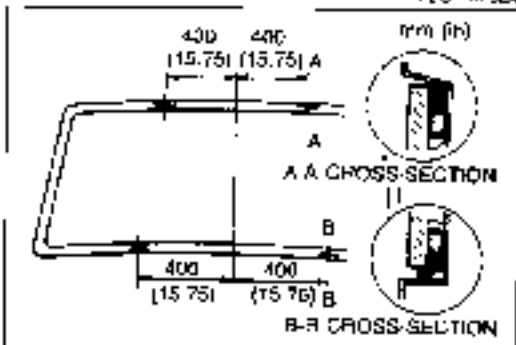
2. Bond the new dam to the glass with a bonding agent. Position it with its outer edge 7mm (0.28 in) from the glass edge and the lip facing outward.

**Caution**

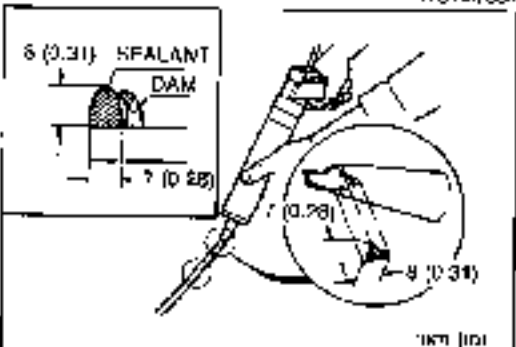
Securely bond the dam so that it is straight and firmly in place.



7EL14X-024

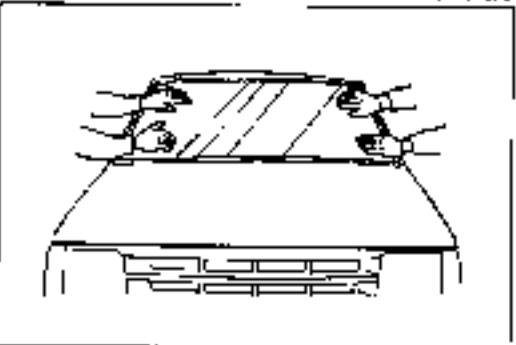


47L14X-067

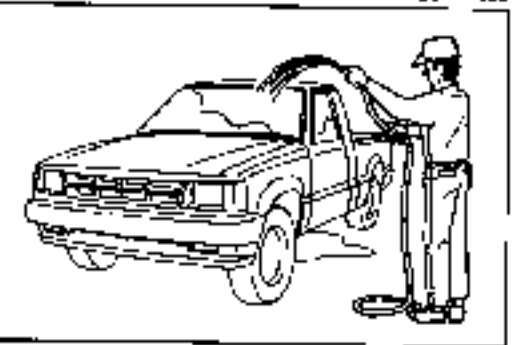


1K71 (10)

7A114X-015



7EL14X-026



3B100X-053

- 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.

- Bond the spacers to the body as shown.

**Caution**

Use the proper spacers for the upper and lower sections.

- Insert the molding clips on their points. Replace any defective clips with new ones.

- 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.

- 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.

- Use a spatula to smooth away any sealant that oozes out. Add more sealant to any points of poor contact.
- 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)**.

- After installing the front window glass, make a water leak test.
- Clip in the molding. Reinstall the interior mirror and pillar trim.

## BACK WINDOW GLASS

## PREPARATION

## SST

49 0259 866A

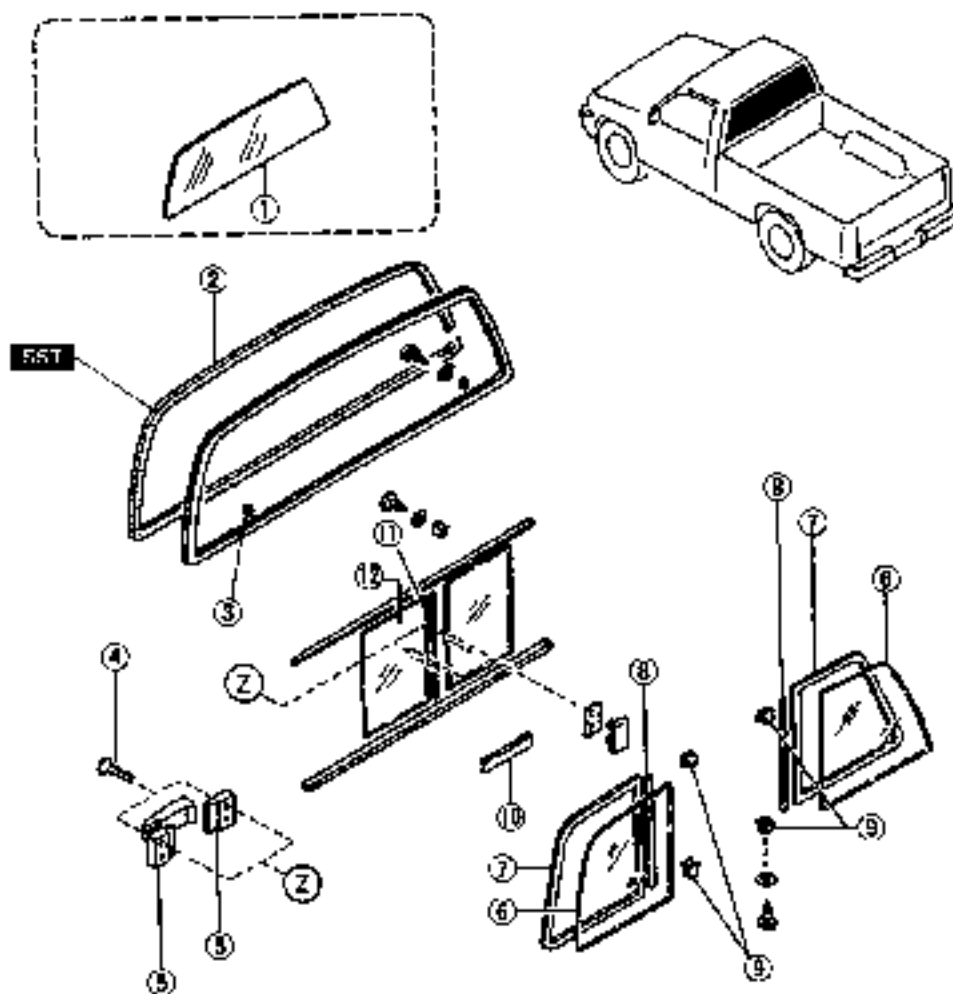
inserting tool,  
sea pusher &  
pade

SST 06X 025

## Note

Use SST (49 0259 866A) to remove and install the back window glass.

## Structural View

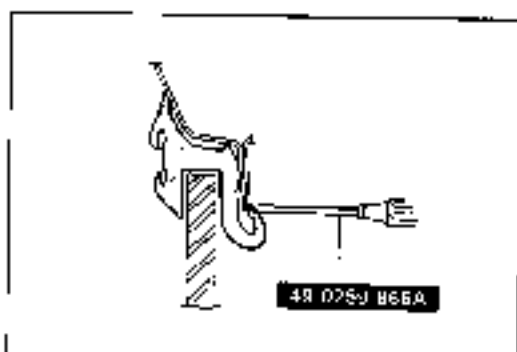


15UC3X 017

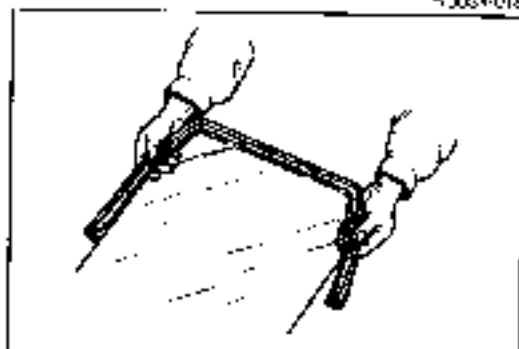
- 1 Back window glass
- 2 Weatherstrip
- 3 Spacer
- 4 Screw

- 5 Spacers
- 6 Back window glass (side)
- 7 Weatherstrip
- 8 Weatherstrip

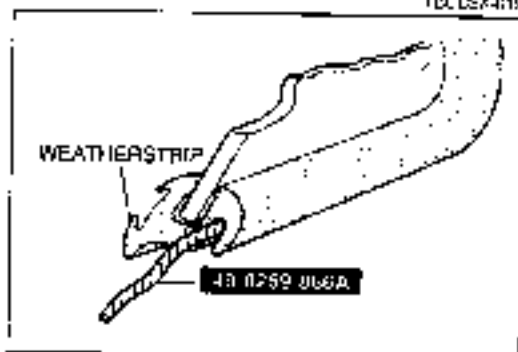
- 9 Rubber seals
- 10 Drain valve
- 11 Weatherstrip (side glass)
- 12 Side glass



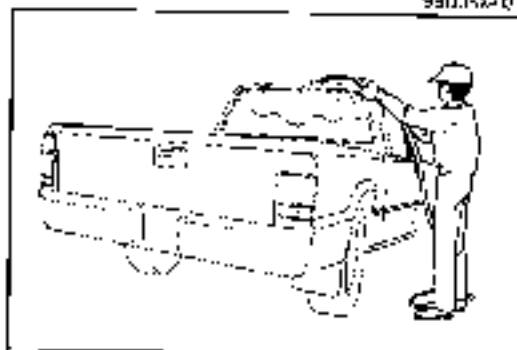
1R J051-018



1DL CSX-R10



93J034-017



86L CSX L38

## 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 when 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

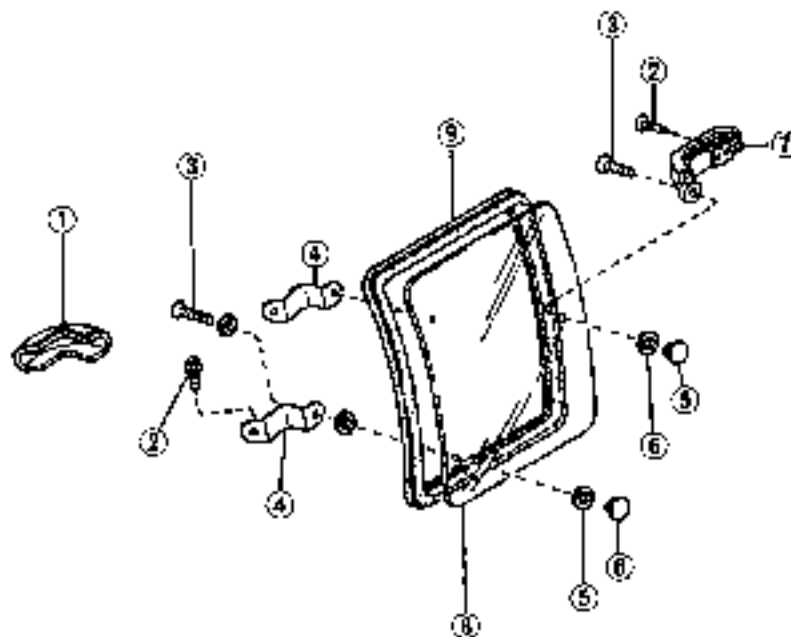
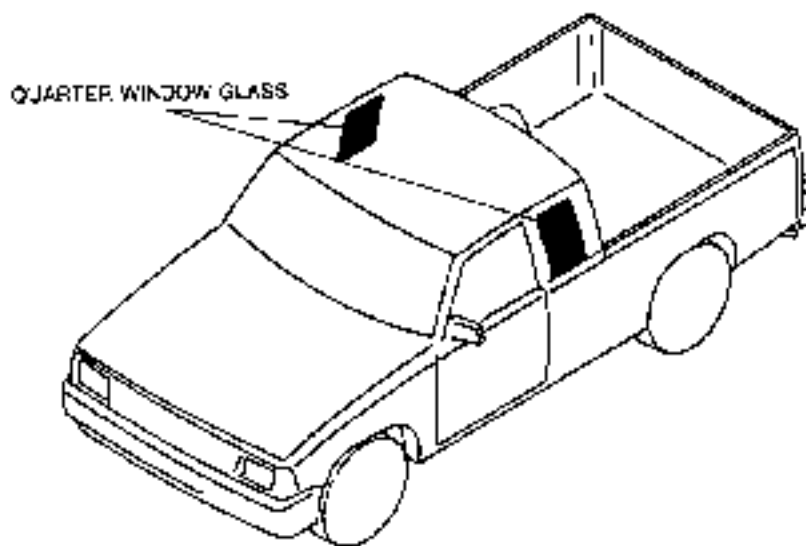
Before installing the back window glass, thoroughly remove any old bonding agent from the glass and the body.

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.



10J35X 020

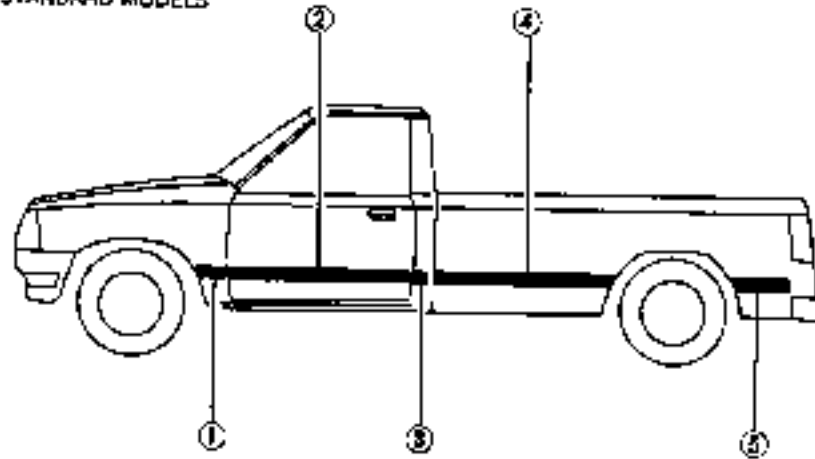
1. Hinge cover
2. Screws
3. Bolts
4. hinges (lower and upper)

5. Glass clamp nuts
6. Washers
7. Quarter window lock
8. Quarter window glass
9. Weatherstrip

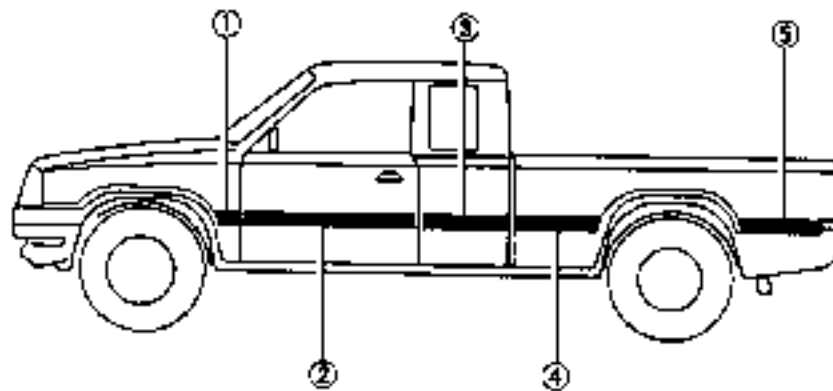
## SIDE PROTECTOR

## STRUCTURAL VIEW

STANDARD MODELS



CAB PLUS MODELS

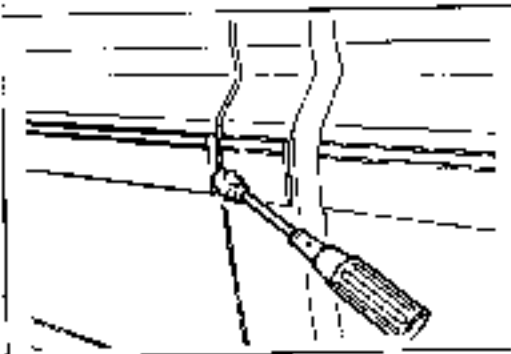


1. Side protector A
2. Side protector B
3. Side protector C

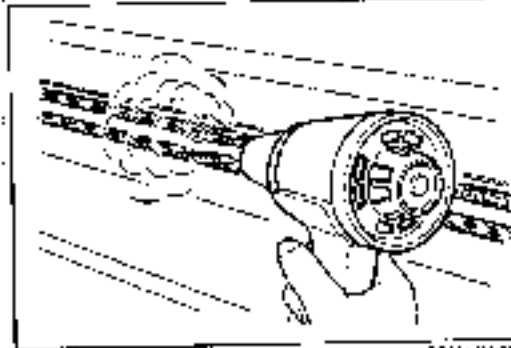
4. Side protector D
5. Side protector E

3BU257-000

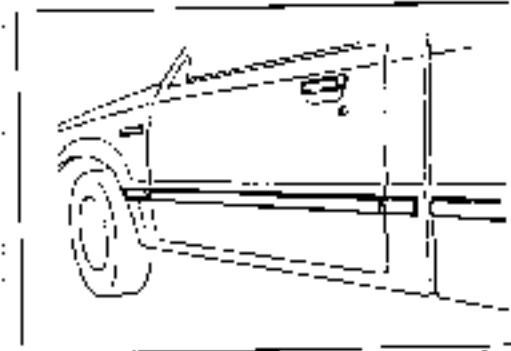
## SIDE PROTECTOR



1EJ03X 011



79114X 035



6BU06K 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.

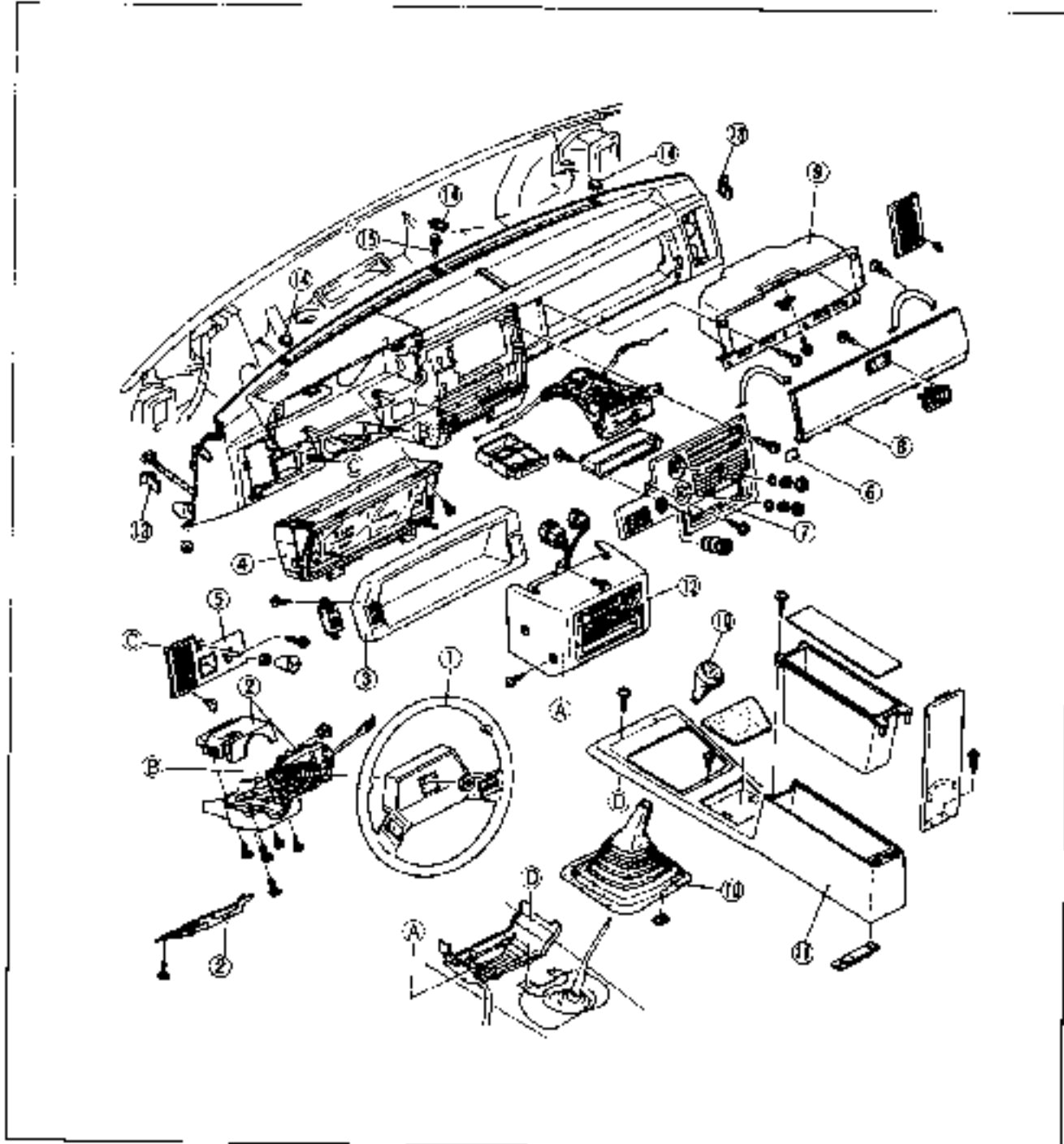
**Note**

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

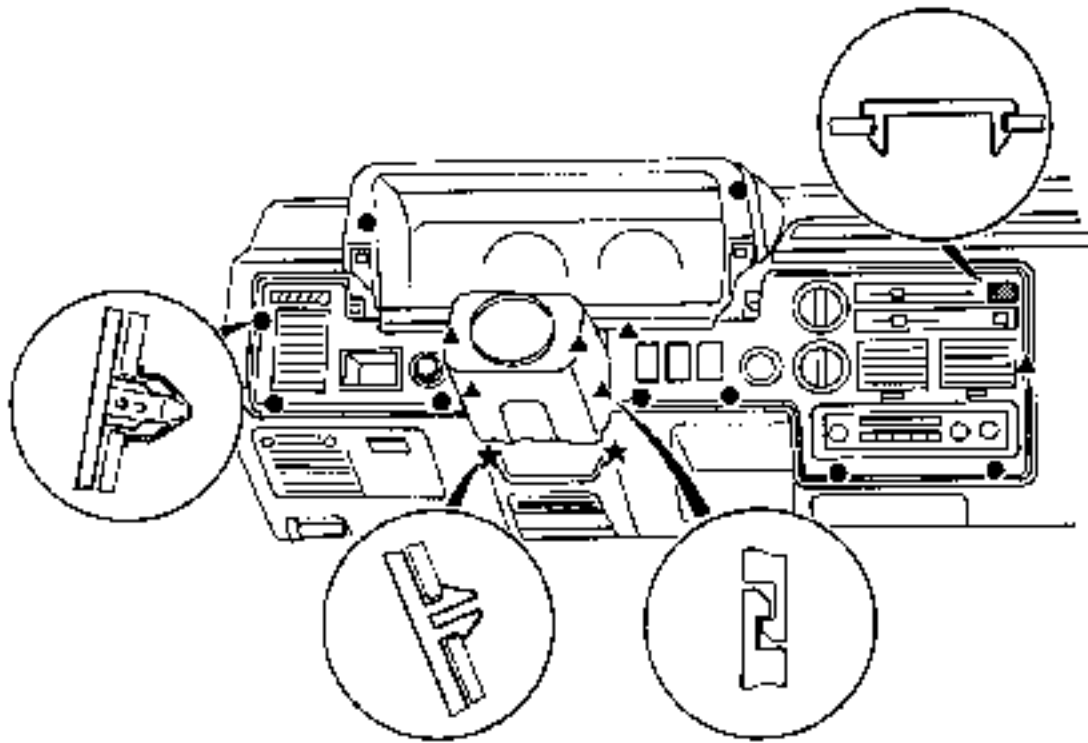


- |  |                          |                                       |
|--|--------------------------|---------------------------------------|
| 1. Steering wheel  | 6. Hole cover            | 12. Radio assembly                    |
| 2. Column cover (upper and lower) and combination switch | 7. Center 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          |                                       |

18U087-02



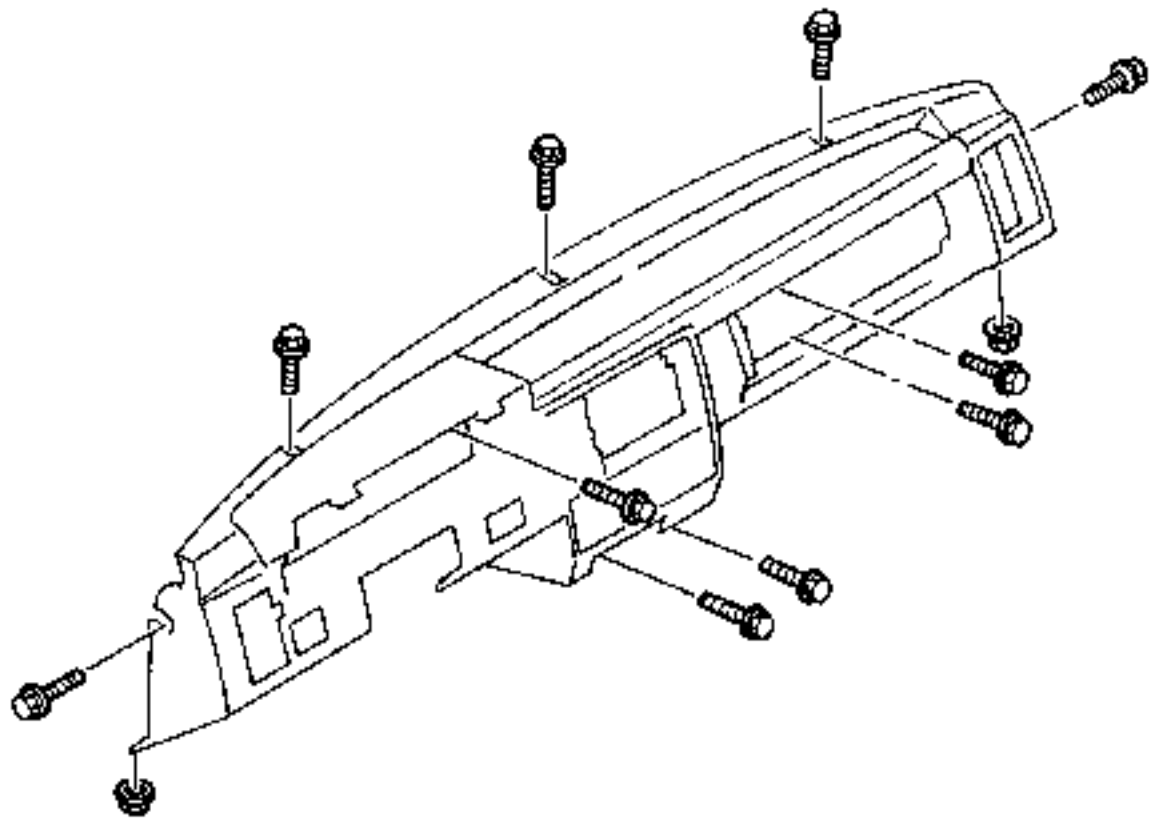
## INTERLOCK OF INSTRUMENT PANEL



50U14X.095

The panels are interlocked as noted.

## MOUNTING OF INSTRUMENT PANEL



TIGHTENING TORQUE:  
7.8—12 N·m (80—120 cm·kg, 60—104 in·lb)

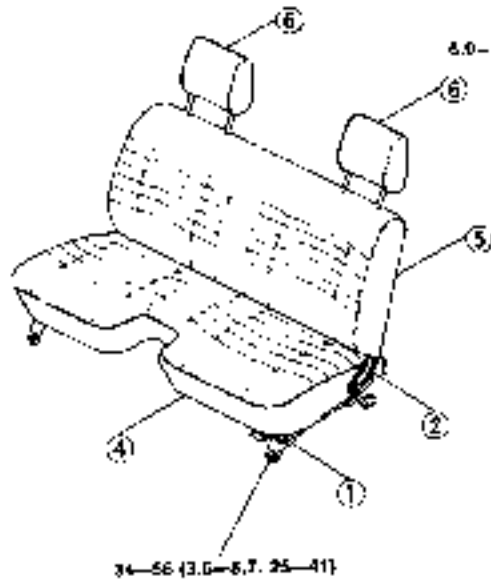
As shown, the instrument panel is mounted by 10 bolts and 2 nuts.

53J14X-03E

## SEATS

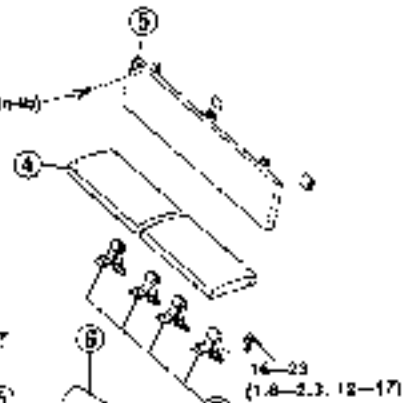
## STRUCTURAL VIEW

FRONT BENCH SEAT

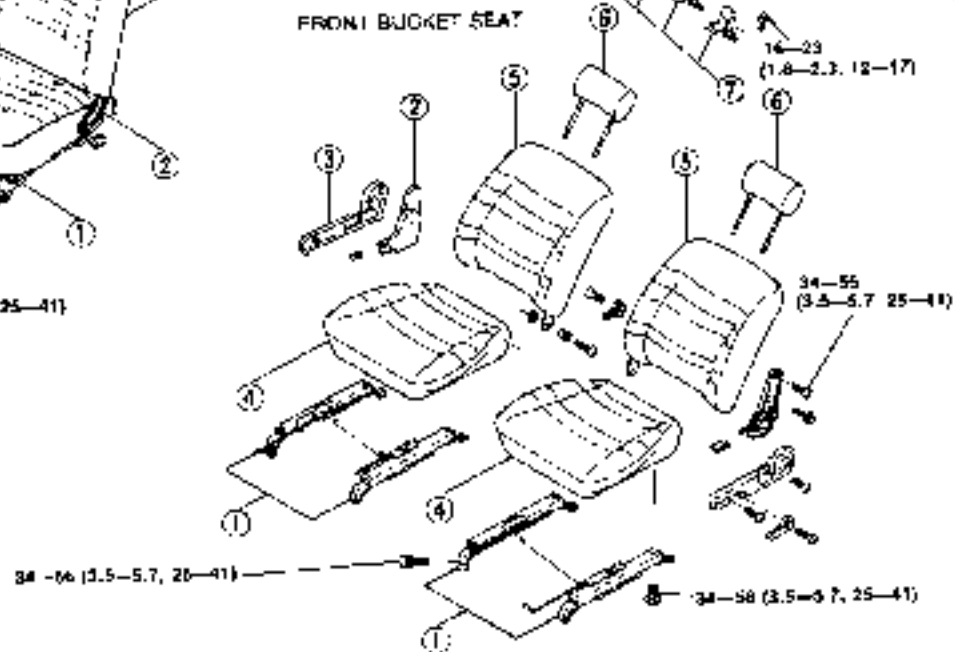


REAR SEAT (CAB PLUS)

8.0-9.8 Nm (70-100 cm-kg, 81-87 in-lb)



FRONT BUCKET SEAT



N-11 (M-KP, N-11)

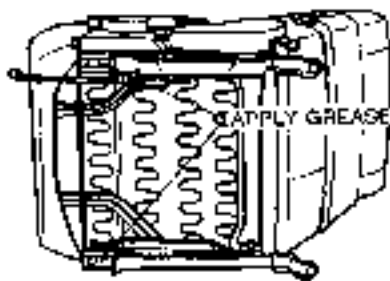
TRUCK-2027

1. Adjuster(s)  
Inspector ..... Described below
2. Reclining knuckle
3. Knuckle cover

4. Seat cushion(s)
5. Seat back(s)
6. Headrests
7. Seat cushion hinges

**INSPECTION**

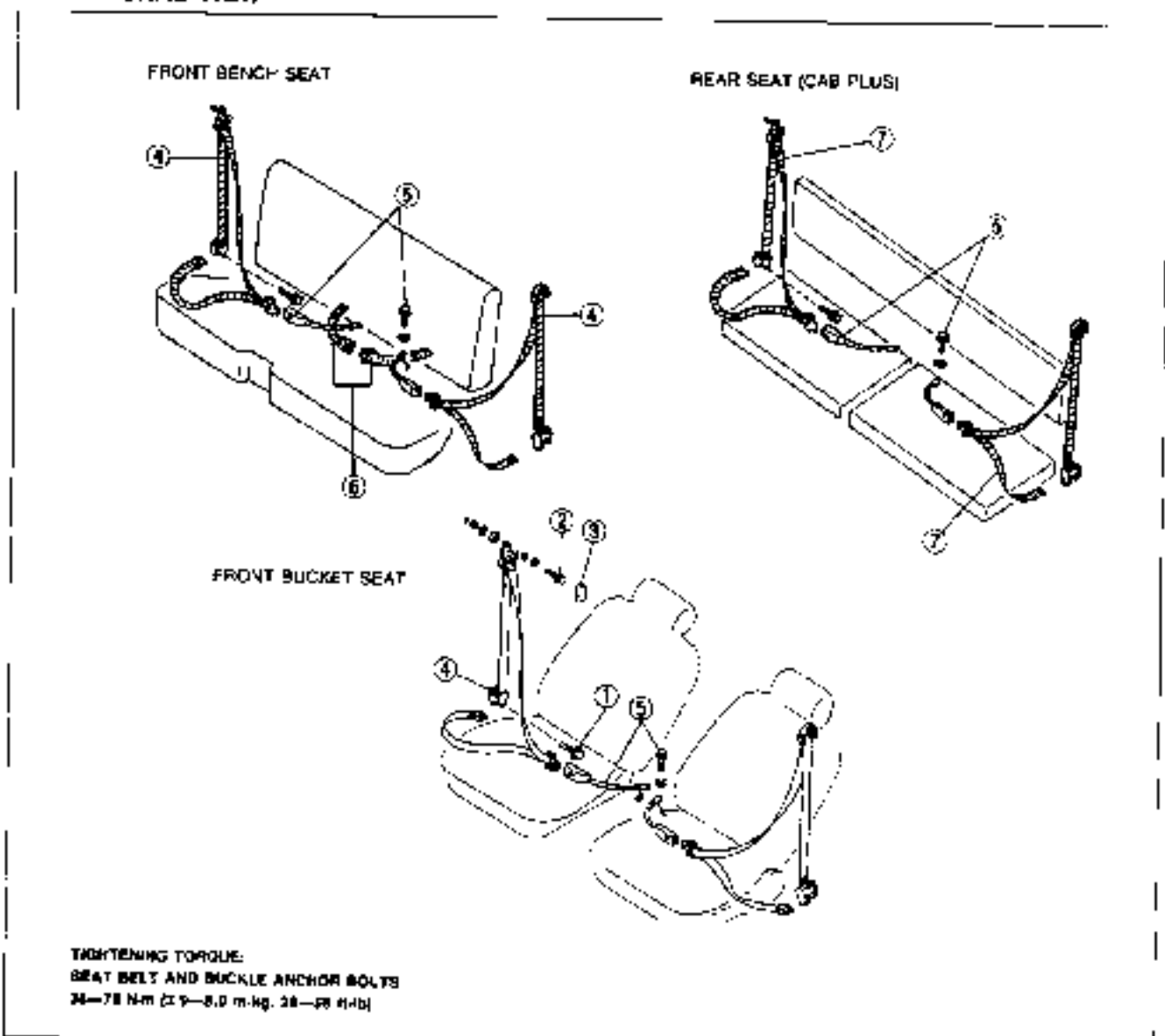
1. Make sure the seat adjuster lever and reclining knuckle move smoothly. Apply grease to the moving parts.
2. Check the adjuster lever for wear.
3. Check the front seat mounting bolts for looseness.



7011-4K020

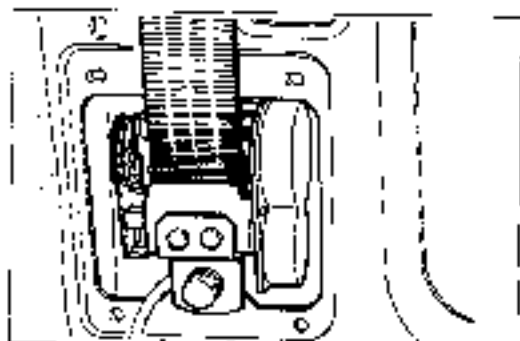
SEAT BELTS

STRUCTURAL VIEW



SPU052-004

- |                                      |                           |
|--------------------------------------|---------------------------|
| 1 Anchor bolt (lower)                | 5. Anchor bolt and buckle |
| 2. Anchor bolt (upper)               | 6. Front seat belts       |
| 3. Cover                             | 7. Rear seat bolts        |
| 4. Retractors and seat belts (outer) |                           |
- Inspection..... Described below



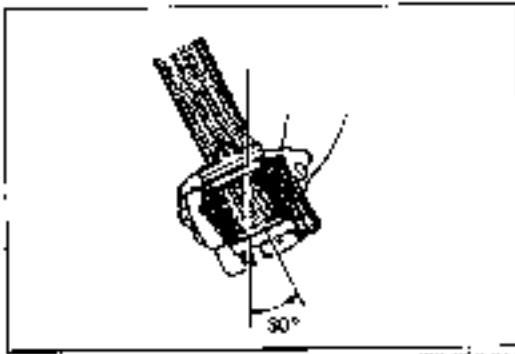
3B...06x-002

INSPECTION

**Caution**  
Do not disassemble the buckle and retractor assembly.

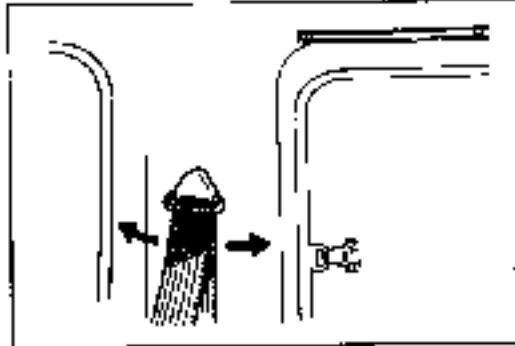
**Emergency Locking Retractor (ELR)**

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.



99L05X446

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.



99UR6X047

#### Shoulder Anchor

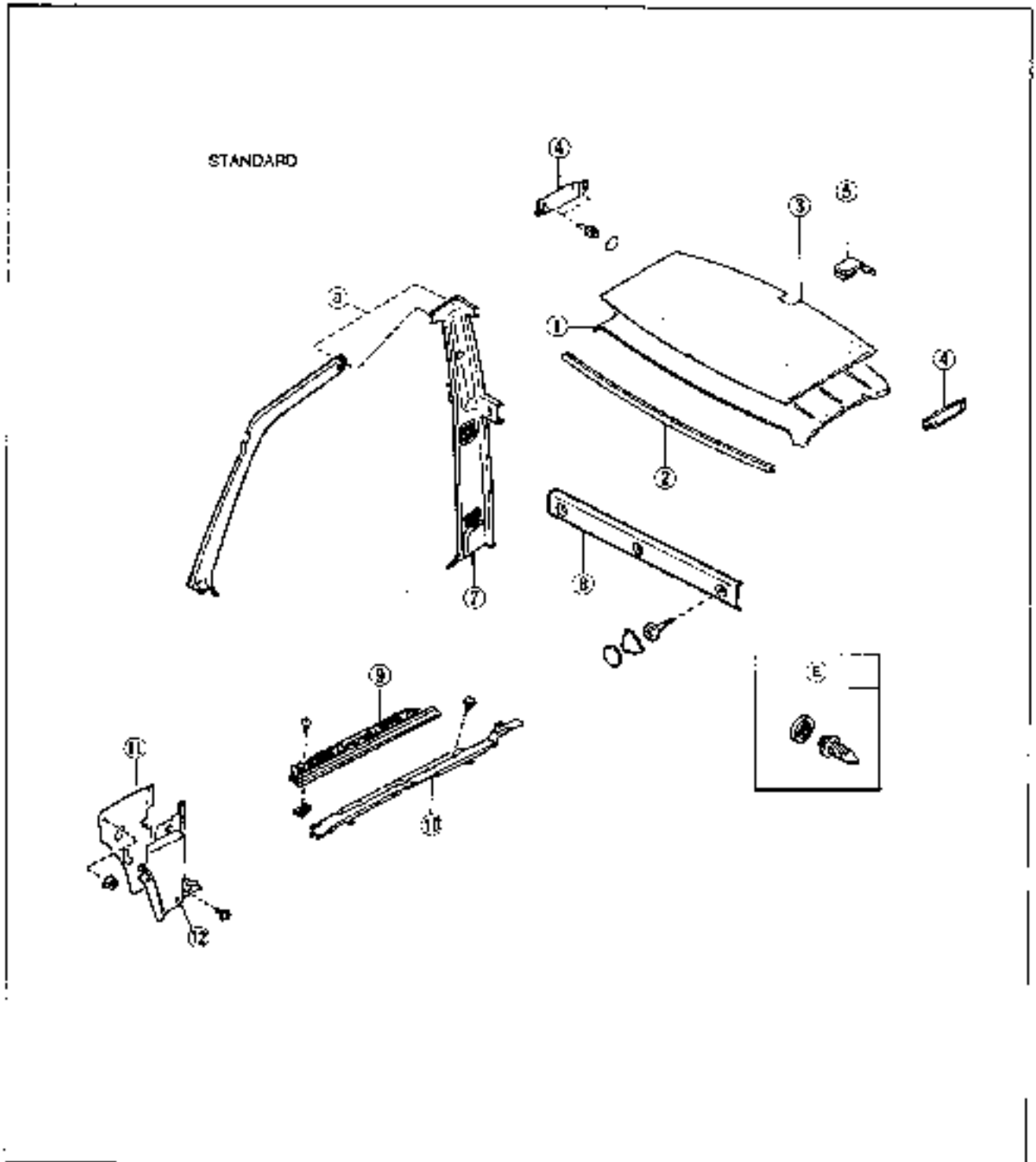
Make sure the anchor works in the circumferential direction with the shoulder anchor bolt tightened.

#### Webbing

Inspect the webbing for scars, tears, and wear and for deformation of the fittings.

HEADLINER AND TRIM

STRUCTURAL VIEW

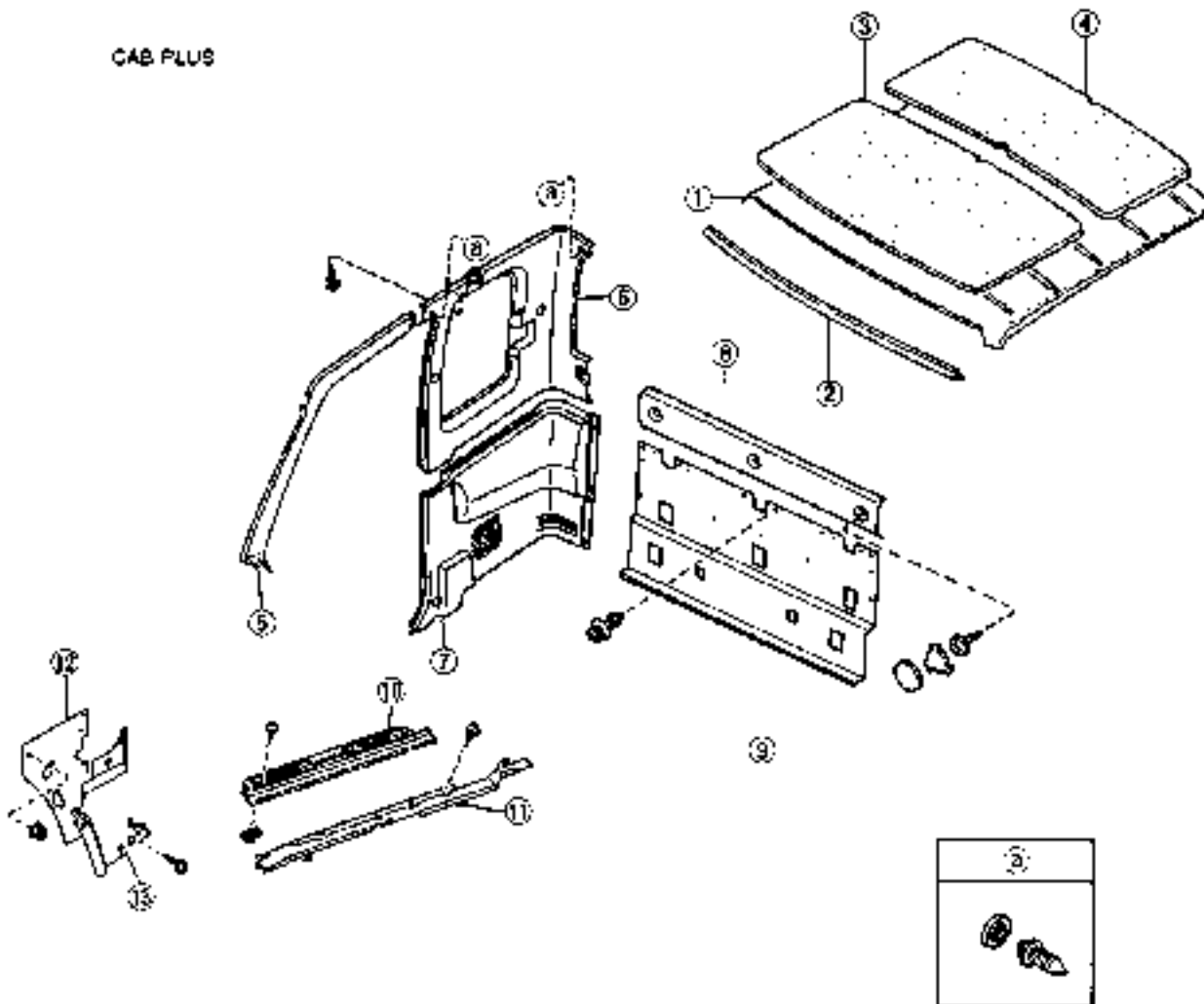


- |                         |           |                       |
|-------------------------|-----------|-----------------------|
| 1. Headliner            |           | 6. Front pillar trim  |
| Removal.....            | page S-35 | 7. B pillar trim      |
| Installation.....       | page S-35 | 8. Back upper garnish |
| 2. Fixing plate         |           | 9. Front scull plate  |
| 3. Front roof insulator |           | 10. Wiring cover      |
| 4. Top side garnish     |           | 11. Cowling insulator |
| 5. Headliner bracket    |           | 12. Front side trim   |

2010EAK007

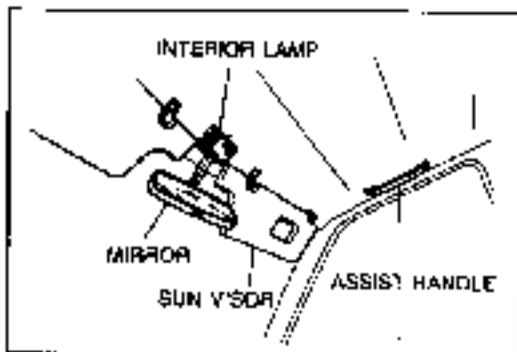
HEADLINER AND TRIM

CAB PLUS

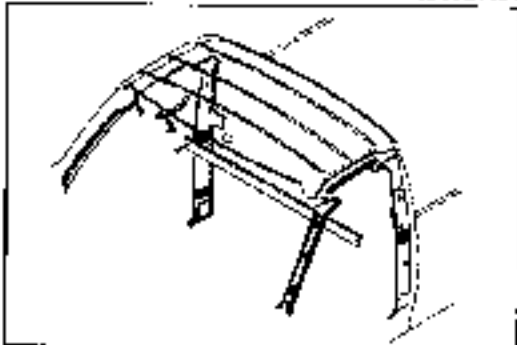


REBUSY 02

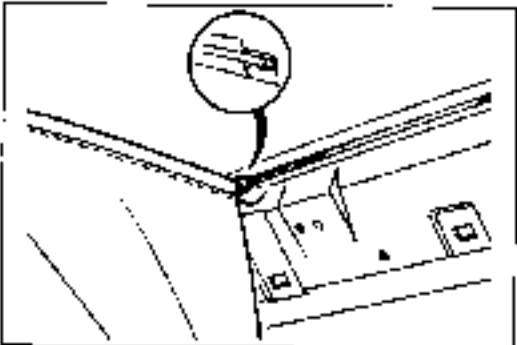
- |                             |                          |
|-----------------------------|--------------------------|
| 1. Headliner                | 7. B pillar trim (lower) |
| Removal..... page S-35      | 8. Back upper trim       |
| Installation..... page S-35 | 9. Backpanel trim        |
| 2. Fixing plate             | 10. Front scuff plate    |
| 3. Front roof insulator     | 11. Wiring cover         |
| 4. Rear roof insulator      | 12. Cow insulator        |
| 5. Front pillar trim        | 13. Front side trim      |
| 6. B pillar trim (upper)    |                          |



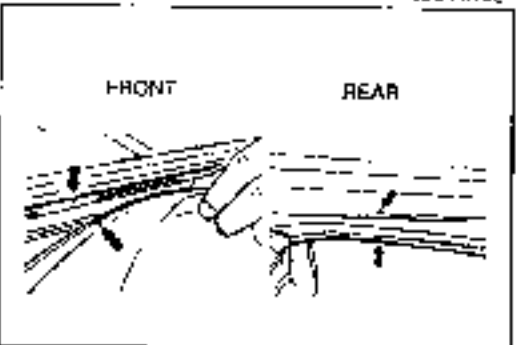
8BU35X 064



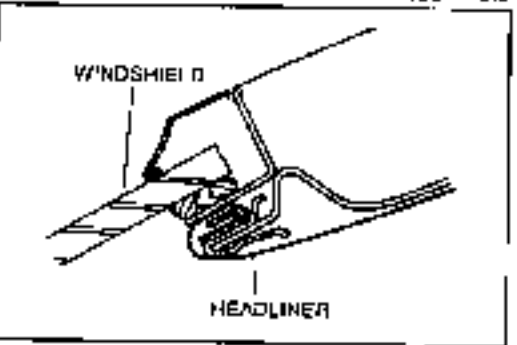
89U05X 050



8BU14X 027



U8J 4X 016



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

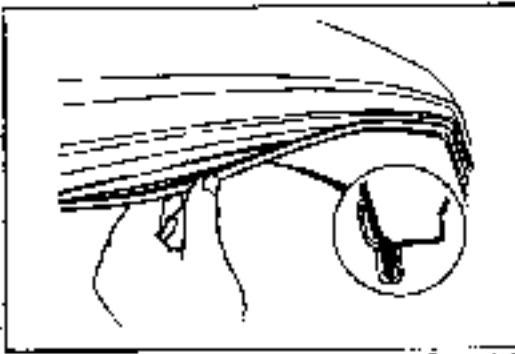
Install in the reverse order of removal, noting the following points

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 in 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.

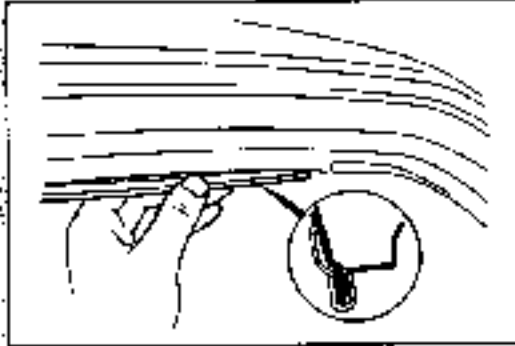


## HEADLINER AND TRIM



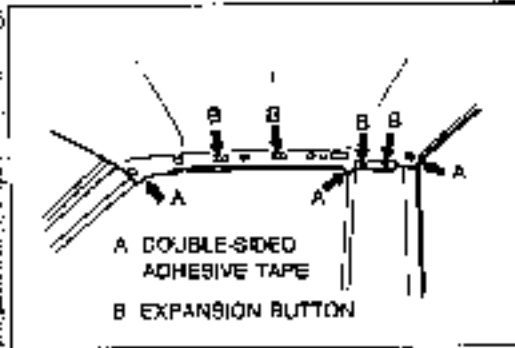
8B J14X-017

5. Insert the rear of the headliner to the body flange.



85L 14X-018

6. Pull the headliner from both sides to remove any looseness, and insert both sides of the headliner to the body flange.



86A 14X-019

7. Apply double-sided adhesive tape between the headliner and the body flange.

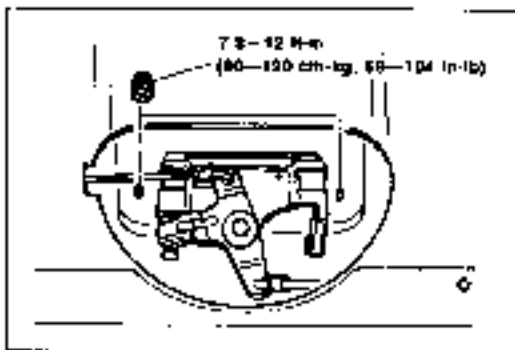
8. Push in the expansion buttons.

**TAILGATE**

**DISASSEMBLY**

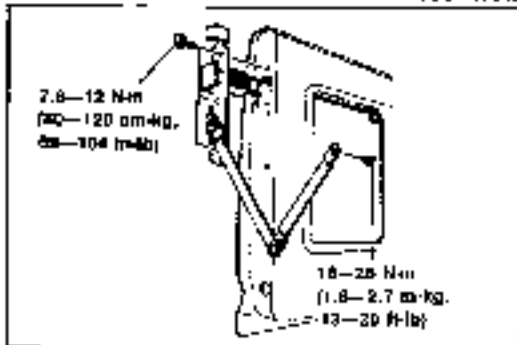
Remove these items in order.

1. Cover
2. Nuts attaching the tailgate lock
3. Disconnect rods from tailgate lock and remove lock.



5U114X049

4. Bolts and latch guide, latch, and rod

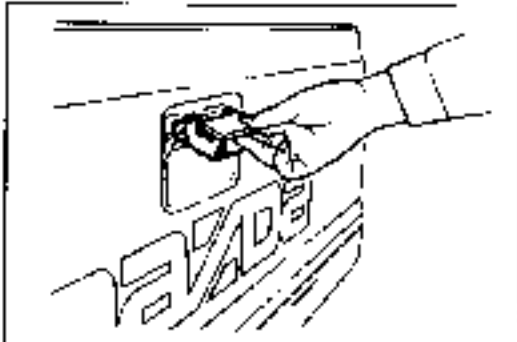


5U114X050

5. Handle

**ASSEMBLY**

Assemble the tailgate in the reverse order of disassembly.



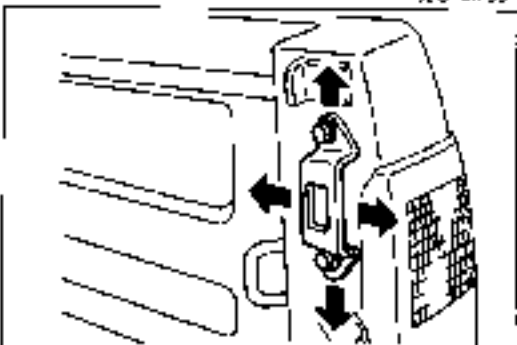
5U114X051

**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 Nm (80-120 cm-kG, 69-104 in-lb)**

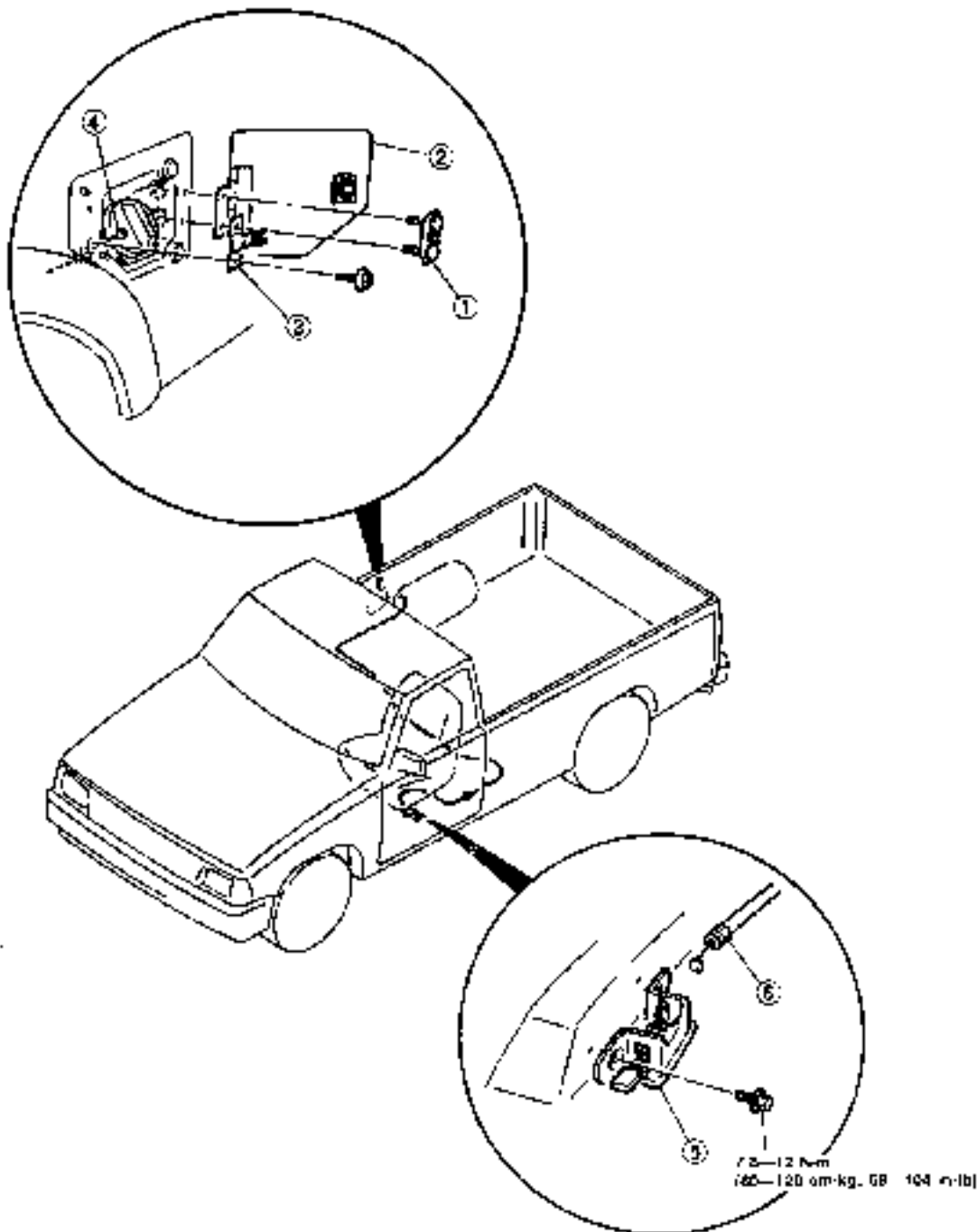


5U114X052

## FUEL LID REMOTE RELEASE

## REMOVAL AND INSTALLATION

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



1. Lift spring
2. Fuel lid
3. Lock plate

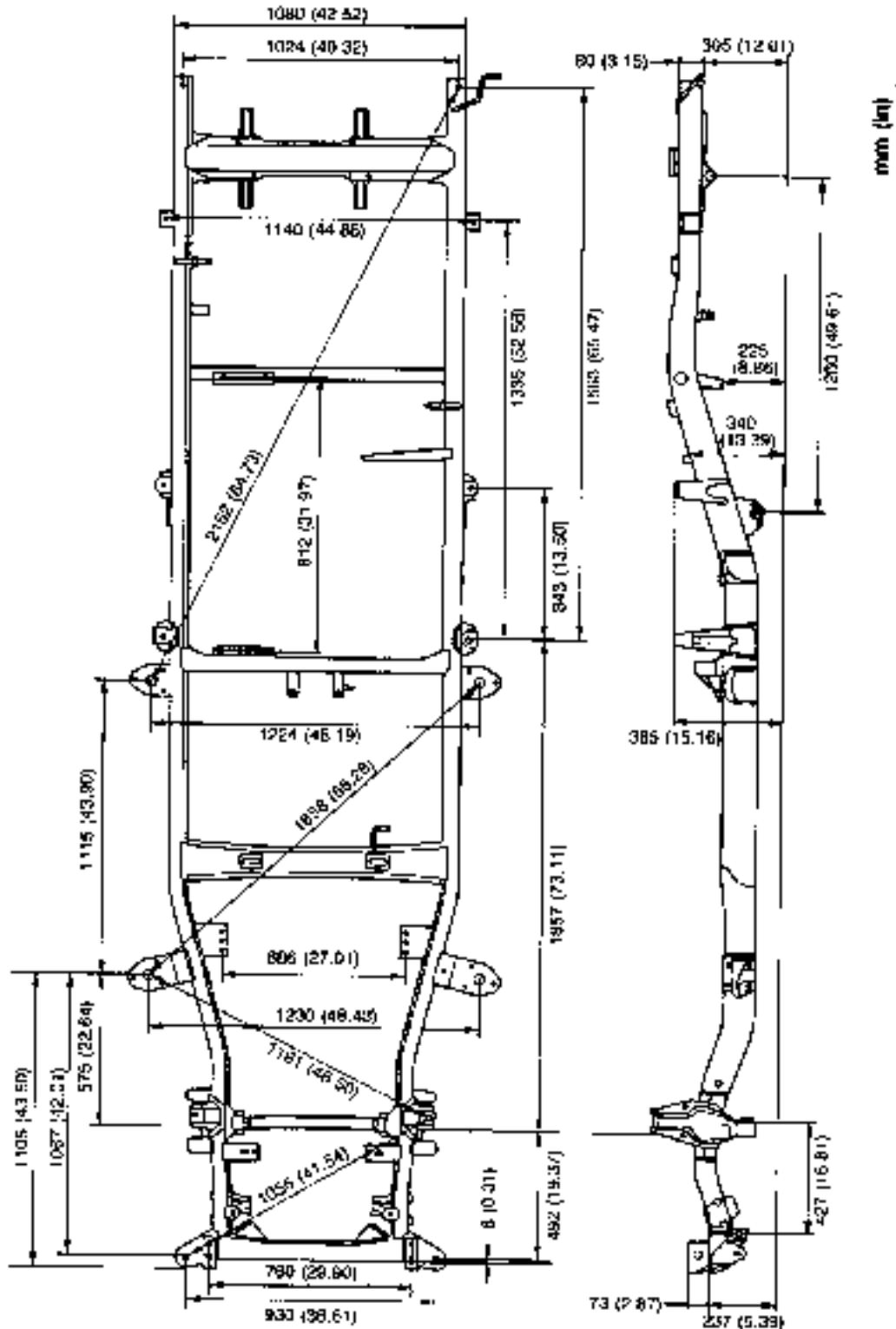
4. Release wire (Fuel lid side)
5. Fuel lid opener
6. Release wire (Opener side)

15L05X-020

BODY DIMENSIONS

(Short Bed)

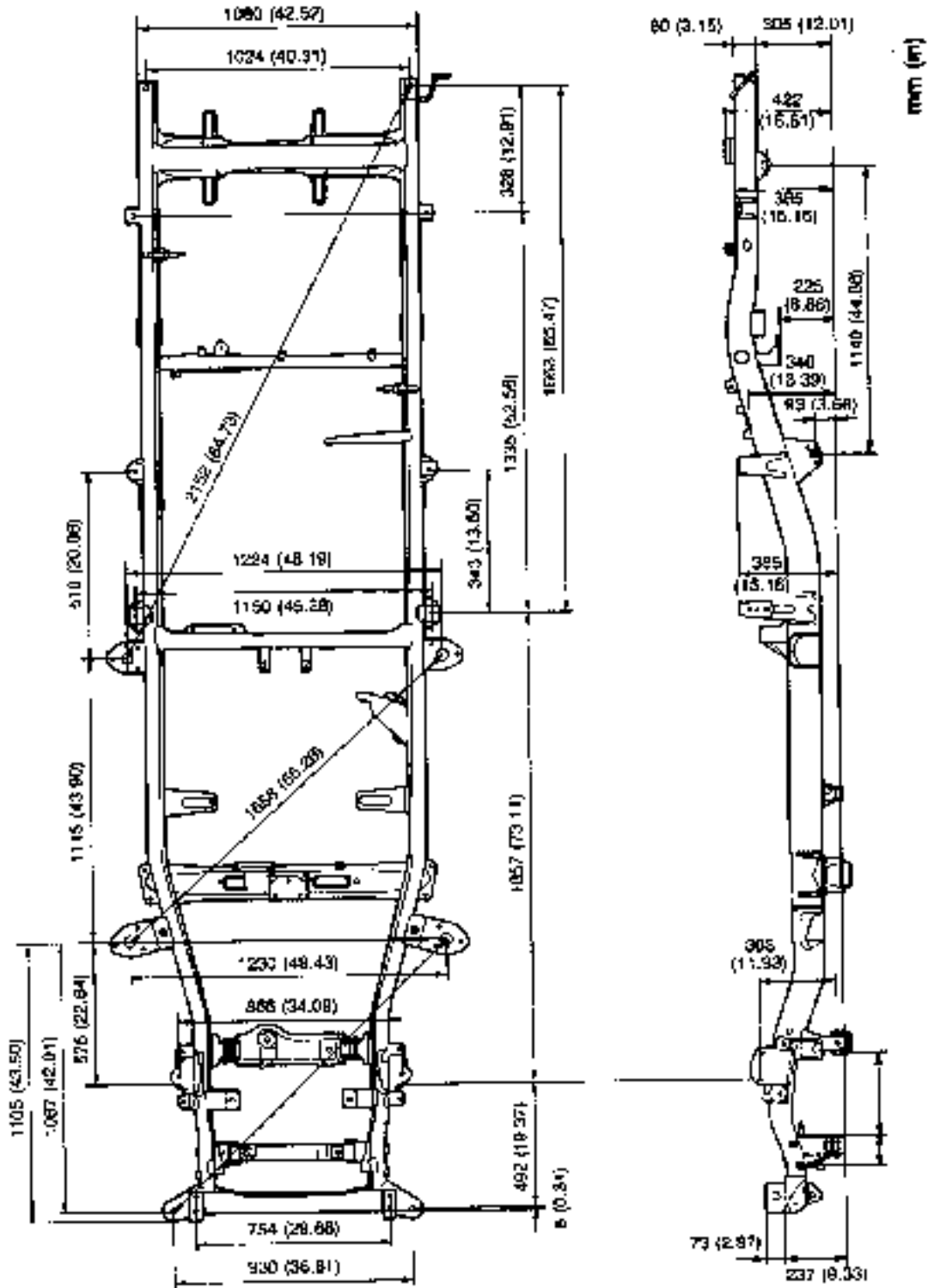
4x2 MODEL (STANDARD)



mm (in)

(Short Bed)

4x4 MODEL (STANDARD)



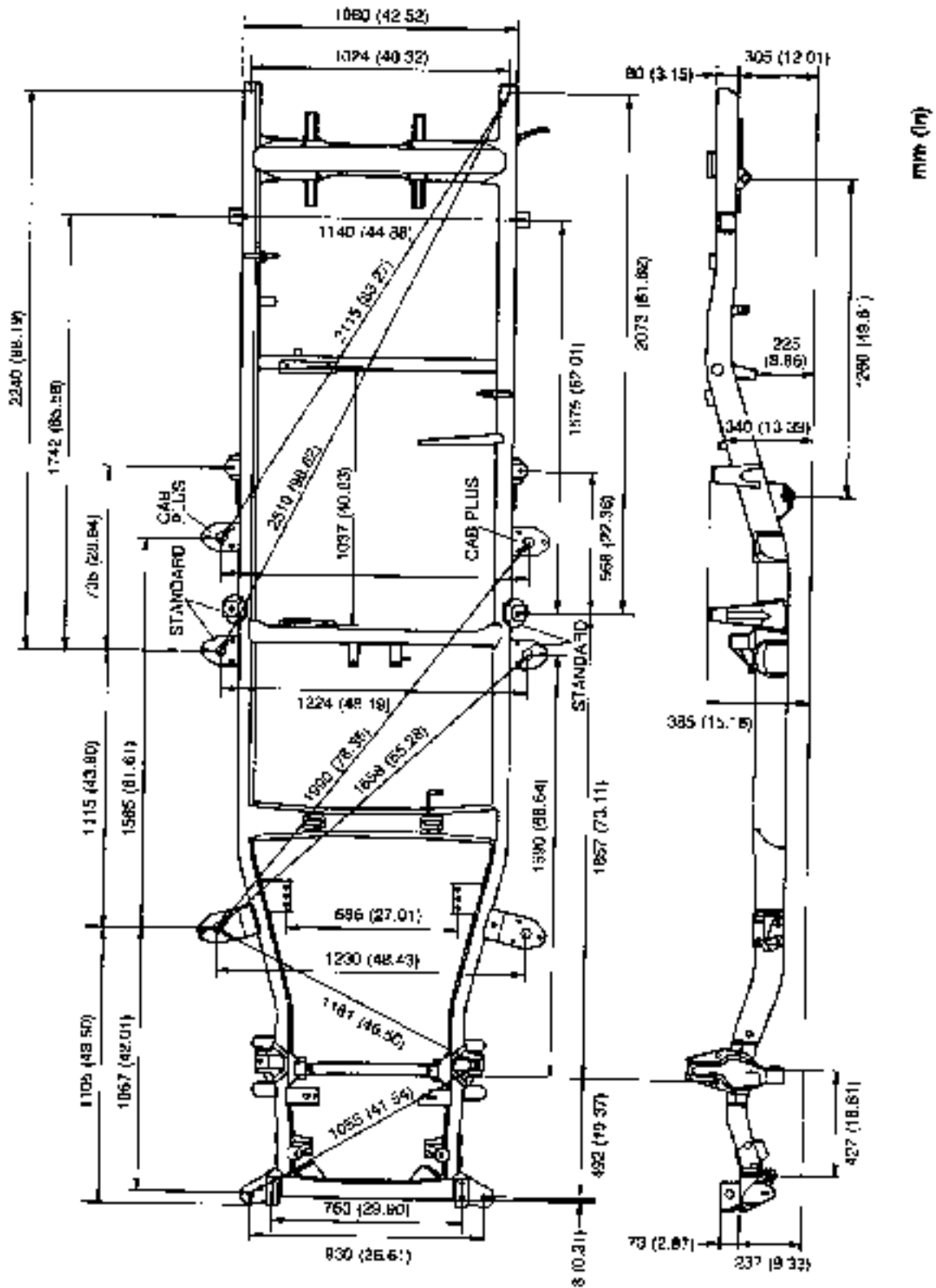
ZBU06X023

# BODY DIMENSIONS

S

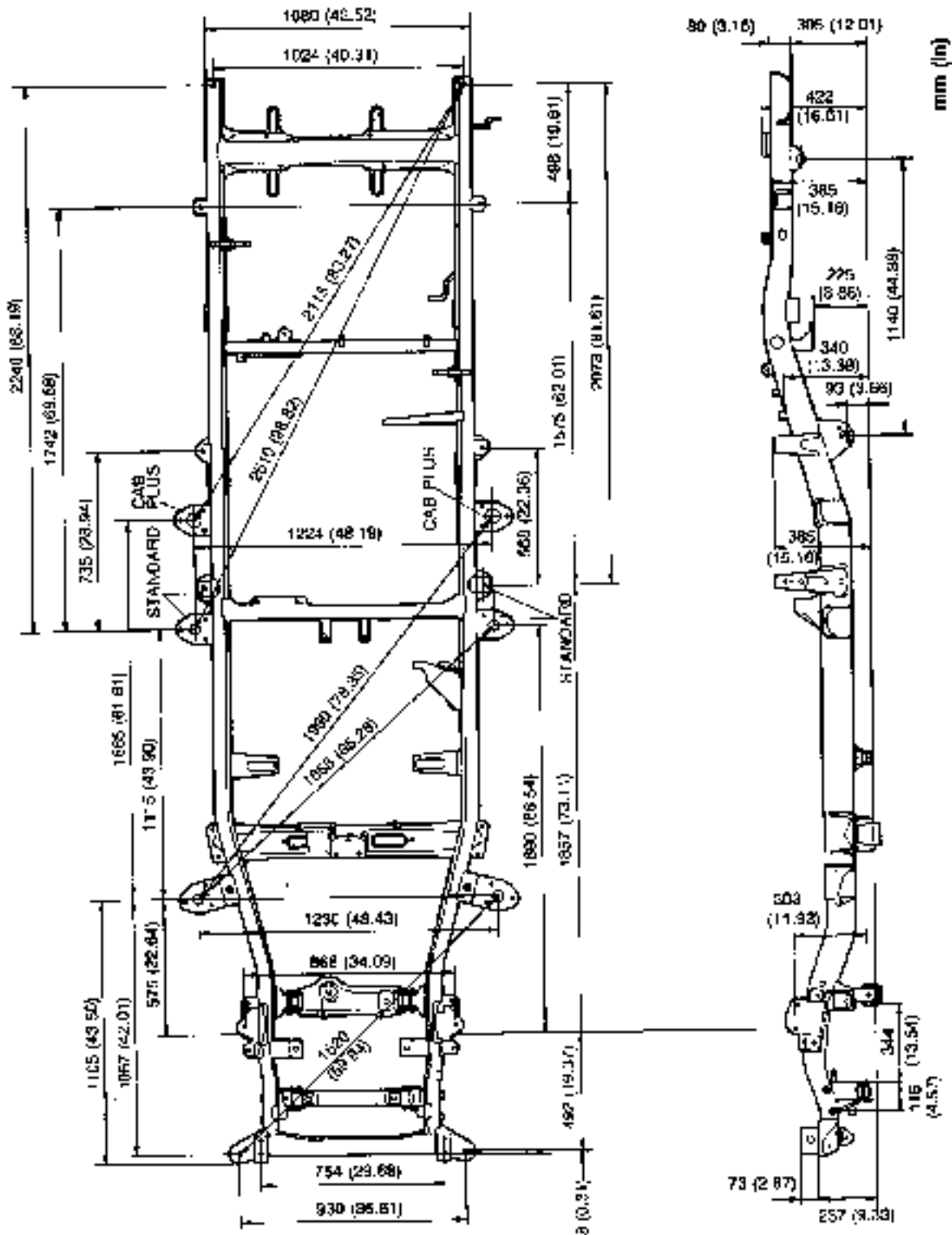
(Long Bed)

4x2 MODEL (STANDARD, CAB PLUS)



[Long Bed]

4x4 MODEL (STANDARD, CAB PLUS)



Before beginning any service procedure, refer to Section T of this manual for airbag system warnings and cautions.

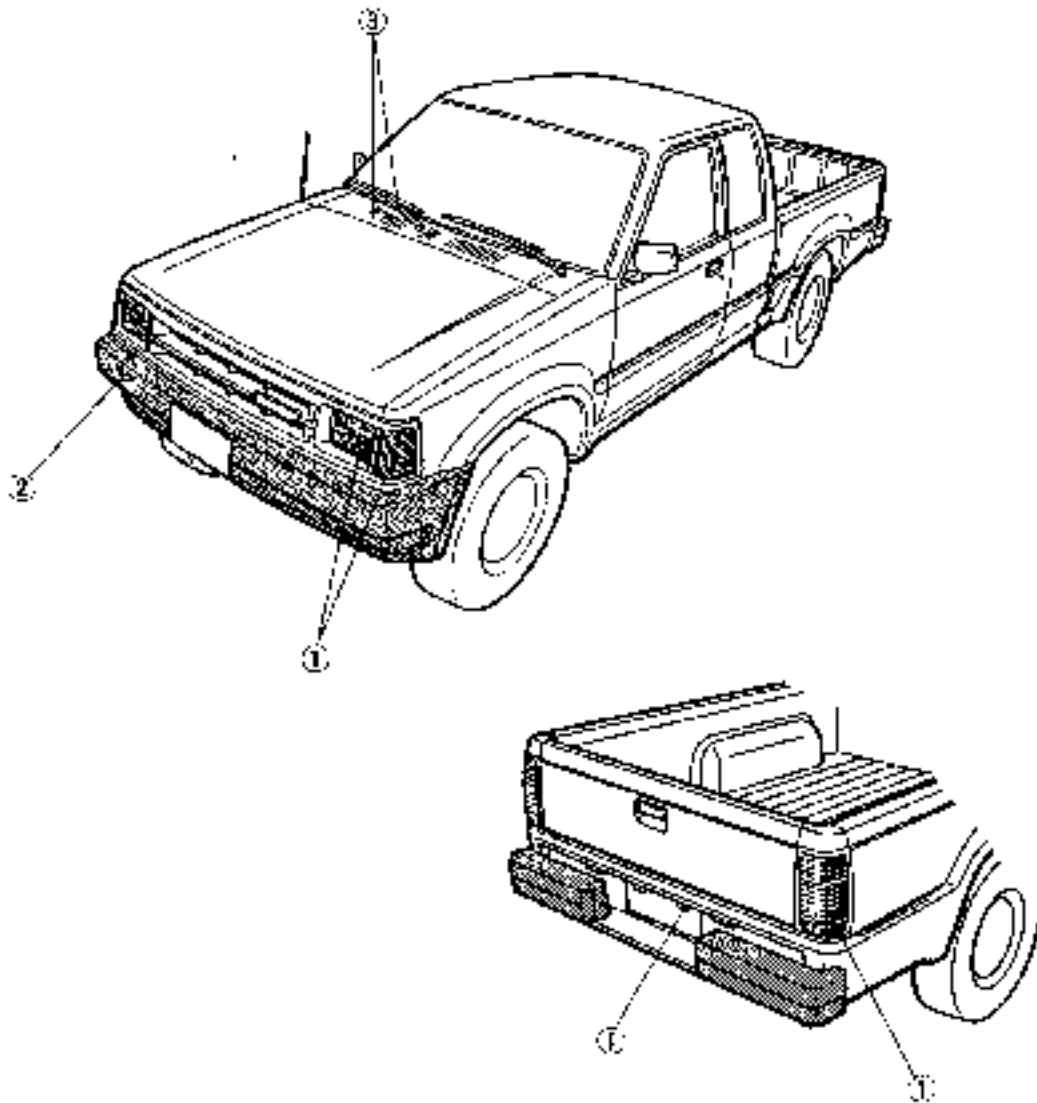
## BODY ELECTRICAL SYSTEM

<b>INDEX</b> .....	T- 2		
<b>INTRODUCTION</b> .....	T- 4		
HOW TO USE THIS SECTION.....	T- 4		
ELECTRICAL TROUBLESHOOTING TOOLS.....	T- 4		
PRECAUTIONS.....	T- 5		
ELECTRICAL SYMBOLS.....	T- 7		
<b>MAIN FUSE AND FUSE BOX</b> .....	T- 8		
STRUCTURAL VIEW .....	T- 8		
REPLACEMENT OF MAIN FUSE.....	T- 8		
<b>SWITCHES</b> .....	T- 9		
IGNITION KEY SWITCH.....	T- 9		
COMBINATION SWITCH.....	T- 9		
CRUISE CONTROL MAIN SWITCH ...	T-10		
REMOTE FREE WHEEL (RFW) MAIN SWITCH.....	T-10		
PANEL LAMP CONTROL SWITCH ...	T-10		
<b>METER</b> .....	T-11		
STRUCTURAL VIEW .....	T-11		
TROUBLESHOOTING GUIDE .....	T-12		
ON-VEHICLE INSPECTION.....	T-12		
REMOVAL AND INSTALLATION .....	T-15		
DISASSEMBLY AND ASSEMBLY.....	T-16		
METER PRINTED CIRCUIT BOARD INSPECTION.....	T-18		
<b>WARNING LIGHTS AND SENDER UNITS</b> .....	T-19		
INSPECTION OF CIRCUIT AND PARTS.....	T-19		
<b>WARNING BUZZER</b> .....	T-22		
ON-VEHICLE INSPECTION.....	T-22		
CIRCUIT DIAGRAM.....	T-22		
<b>LIGHT AND LAMP</b> .....	T-23		
STRUCTURAL VIEW .....	T-23		
HEAD LIGHTS, FRONT PARKING AND SIDE MARKER LIGHTS.....	T-24		
REMOVAL AND INSTALLATION ADJUSTMENT.....	T-24		
REAR COMBINATION LIGHTS (TURN AND HAZARD WARNING LIGHTS, TAIL AND STOPLIGHTS AND SIDE MARKER LIGHTS) .....	T-25		
REMOVAL AND INSTALLATION ADJUSTMENT.....	T-25		
LICENSE PLATE LIGHT.....	T-26		
REMOVAL AND INSTALLATION ADJUSTMENT.....	T-26		
INTERIOR LAMP .....	T-28		
REMOVAL AND INSTALLATION ADJUSTMENT.....	T-27		
TROUBLESHOOTING.....	T-28		
INSPECTION.....	T-35		
<b>HORN</b> .....	T-35		
STRUCTURAL VIEW .....	T-36		
HORN RELAY.....	T-36		
<b>CRUISE CONTROL SYSTEM</b> .....	T-37		
STRUCTURAL VIEW .....	T-37		
CIRCUIT DIAGRAM .....	T-38		
TROUBLESHOOTING.....	T-39		
SELF-DIAGNOSTIC INSPECTION .....	T-42		
CRUISE CONTROL UNIT.....	T-45		
ACTUATOR CABLE .....	T-46		
CLUTCH SWITCH, STOPLIGHT SWITCH.....	T-46		
ACTUATOR .....	T-47		
CRUISE CONTROL MAIN SWITCH ...	T-47		
CRUISE CONTROL SWITCH.....	T-47		
SPEED SENSOR .....	T-48		
<b>AUDIO SYSTEM</b> .....	T-49		
STRUCTURAL VIEW .....	T-49		
OUTLINE OF AUDIO SYSTEM.....	T-51		
REMOVAL AND INSTALLATION .....	T-52		
TROUBLESHOOTING.....	T-55		
RADIO.....	T-58		
CASSETTE DECK.....	T-60		

2HUC13001



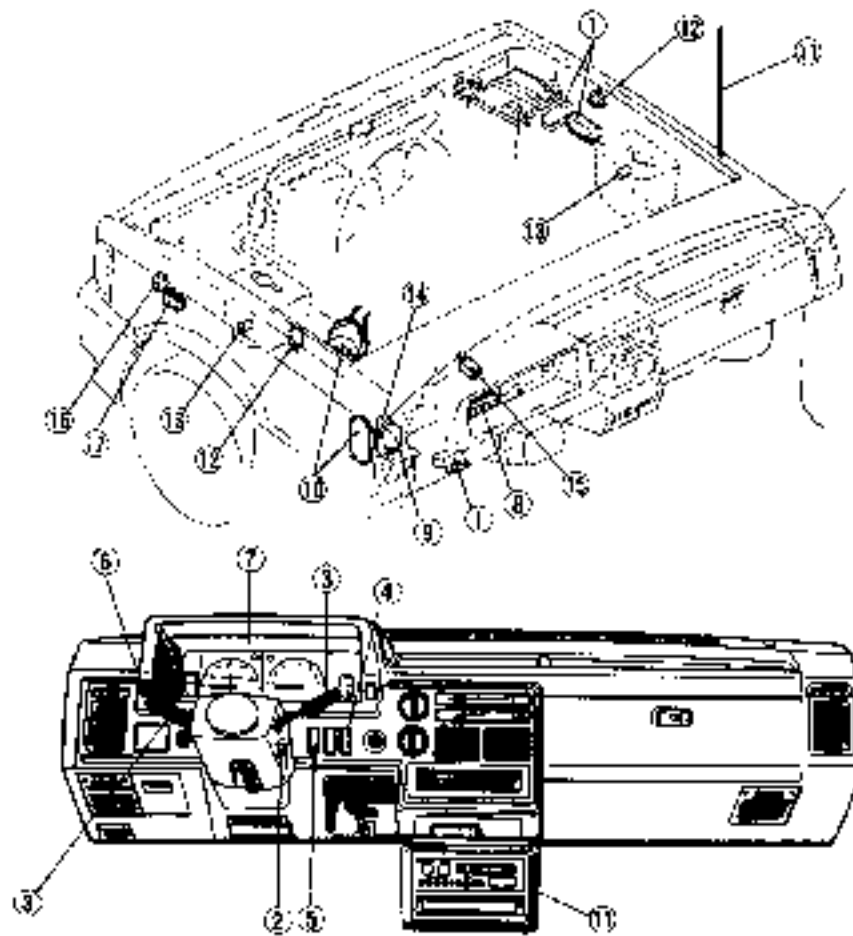
INDEX



30.107X.002

1. Lighting system  
 Troubleshooting ..... page T-28  
 Removal and installation ..... page T-24  
 Inspection ..... page T-35

2. Horn  
 Structural view ..... page T-36  
 Inspection ..... page T-36



2R, 101X 002

1. Main fuse and fuse box Replacement of main fuse	page T- 8	9. Warning buzzer On-vehicle inspection	page T-22
2. Ignition key switch	page T- 9	10. Cruise control system Structural view	page T- 37
3. Combination switch	page T- 9	Troubleshooting	page T- 39
4. Cruise control main switch	page T-10	Self-diagnostic inspector	page T-42
5. Remote free wheel (RFW) main switch	page T-10	Inspection	page T-47
6. Panel lamp control switch	page T-10	Adjustment	page T-46
7. Meter Troubleshooting guide	page T-12	11. Audio system Removal and installation	page T-52
On-vehicle inspector	page T-12	Troubleshooting	page T-55
Removal and installation	page T-15	12. Horn relay	page T-36
Disassembly and assembly	page T-16	13. Flasher unit	page T-35
Meter printed circuit board inspection	page T-18	14. DRL & ABS control unit Troubleshooting	page T-28
8. Warning lights and sensor units Inspection of circuit and parts	page T-19	15. DRL relay	page T-36
		16. DRL resistor	page T-35

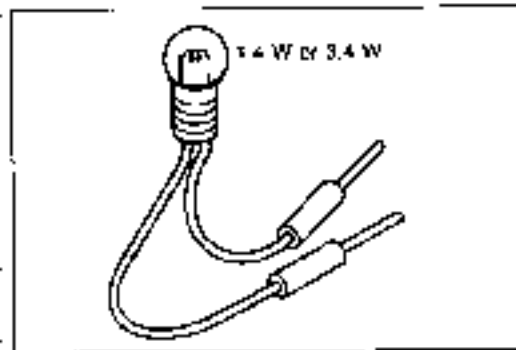
T

## INTRODUCTION

## HOW TO USE THIS SECTION

Information regarding removal and installation of electrical equipment is given in **SECTION 6**. 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.

EBL07X-004



EPV 15X-020

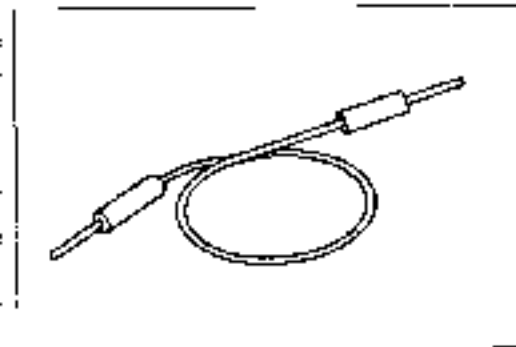
## ELECTRICAL TROUBLESHOOTING TOOLS

## 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.



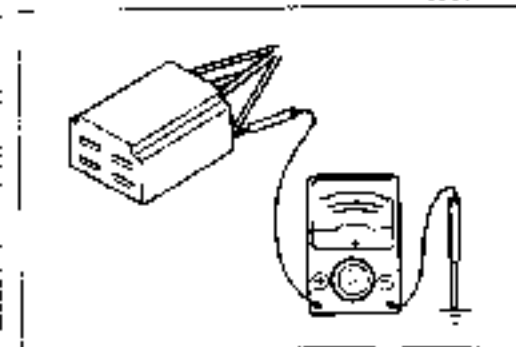
9J077-005

## Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and verifying the condition of ground connections.

## Caution

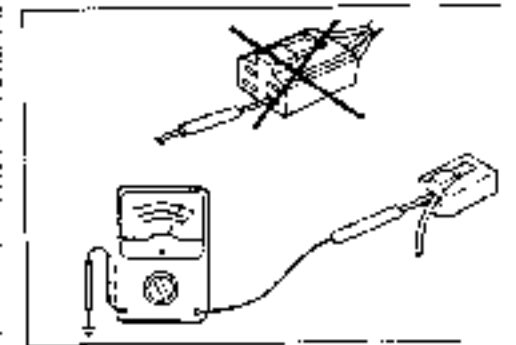
Do not connect the jumper wire between the power source line and the body ground because this may cause burning or other damage to the harnesses.



4V7 0X-006

## 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.



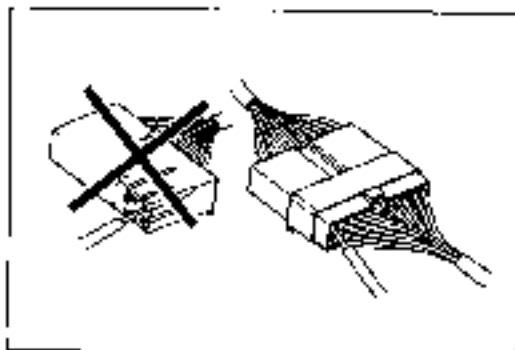
EQU1A-007

## 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

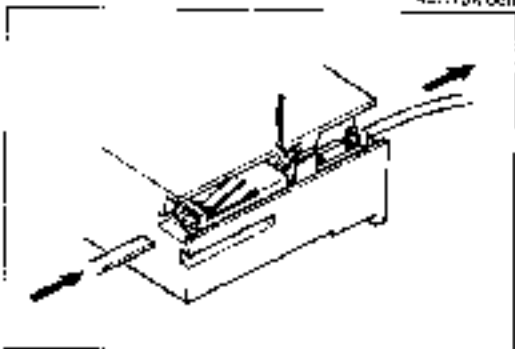
Do not attempt to connect the ohmmeter to any circuit to which voltage is applied because this may burn or otherwise damage the ohmmeter.



4E715X 0011

**Inspection note**

When checking the continuity or voltage with a circuit tester, insertion of the test probe into the receptacle connector may open the filling to the connector and result in poor contact. Therefore, make sure the test probe is inserted from the wire harness side.



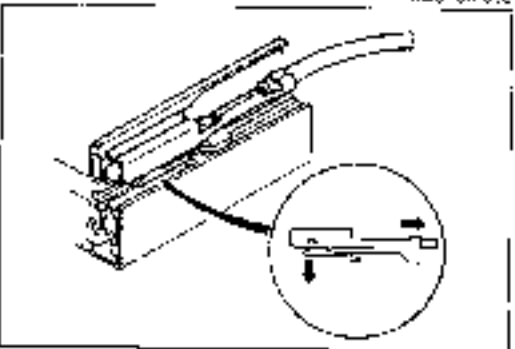
5B1J 0X-070

**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.

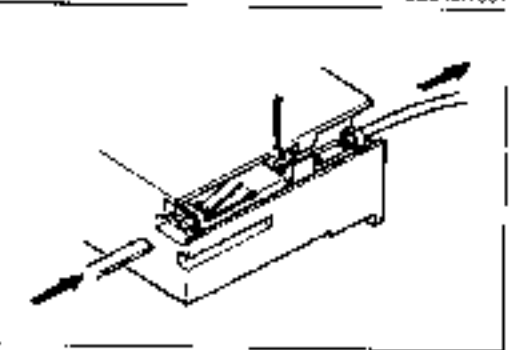
**< Female Type No.1 >**

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.



6B115X 004

**< Female Type No.2 >**



47115X 019

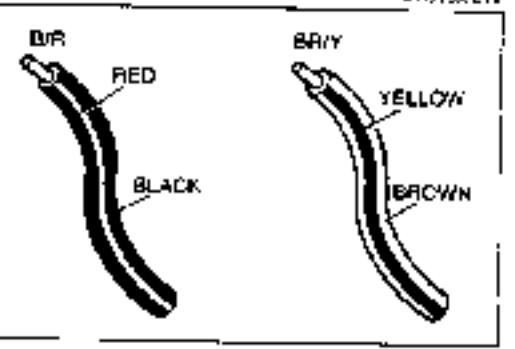
**< Male Type >**

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.



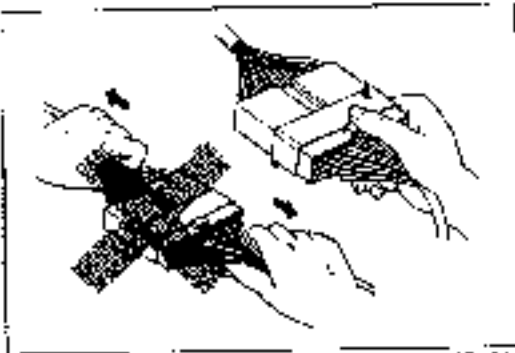
47115X 009

CODE	COLOR
B	BLACK
BR	BROWN
G	GREEN
-	BLUE
LB	LIGHT BLUE
LG	LIGHT GREEN
O	ORANGE
R	RED
v	YELLOW
W	WHITE

### Handling of Bulkhead-type Connectors

#### Removal of the connector

The connector can be removed by pressing the lock lever. Do not cut the wire when removing the connector; be sure to hold the connector itself when disconnecting it.



EBL07X-004

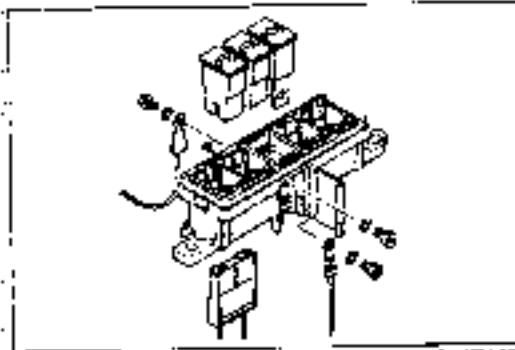
### Replacement of Fuses

When replacing a fuse, be sure to replace it with one of the specified capacity.

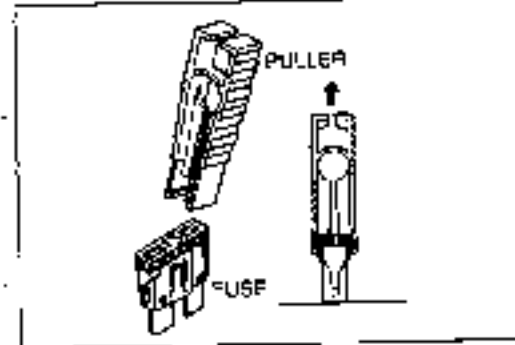
If a fuse fails again after it has been replaced, there is probably a short circuit, and the wiring should be checked.

#### Caution

- a) Be sure the battery (-) terminal is disconnected before replacing a fuse.
- b) When replacing a fuse, use the supplied fuse puller.



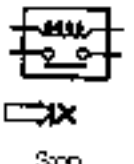
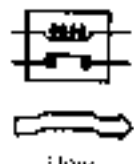
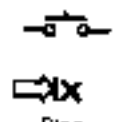


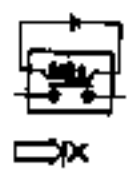
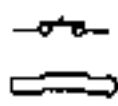
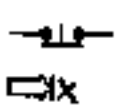
29110TX-005















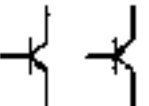



**ELECTRICAL SYMBOLS**

**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)				

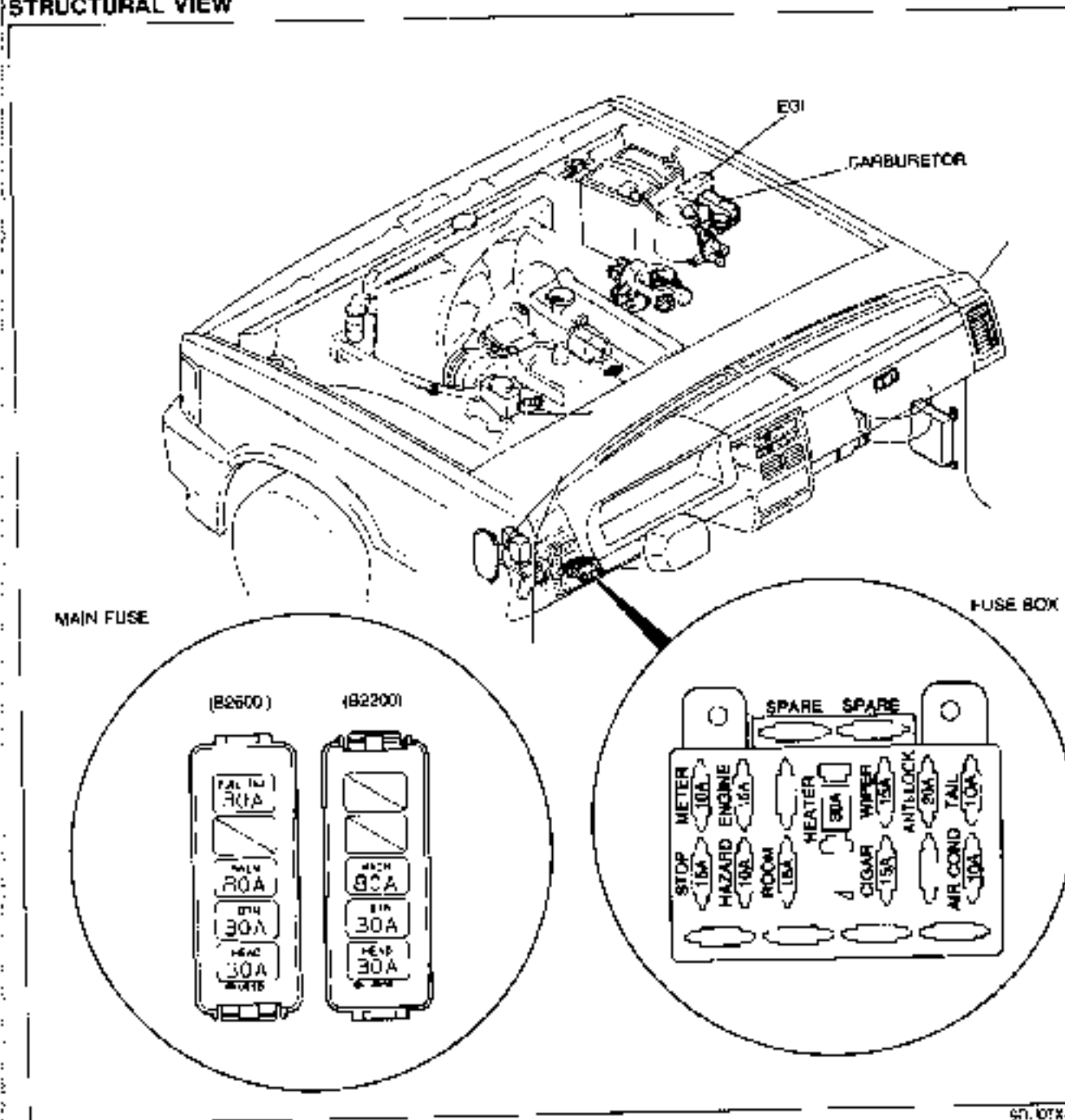
**Other Electrical Symbols**

			
BATTERY	BODY GROUND	FUSE	FUSIBLE LINK
			
MOTOR	COIL SOLENOID	RESISTOR	VARIABLE RESISTOR
			
THERMISTER	DIODE	CONDENSER	LIGHT
			
TRANSISTOR	SPEAKER	CIGARETTE LIGHTER	HEATER

e7U:5W0'3

MAIN FUSE AND FUSE BOX

STRUCTURAL VIEW

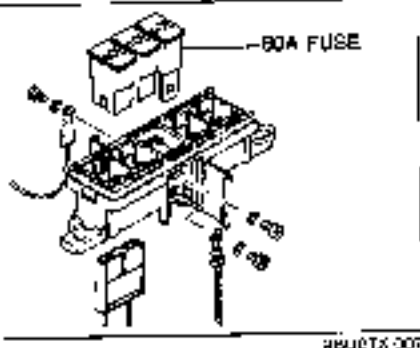


671.107X-306

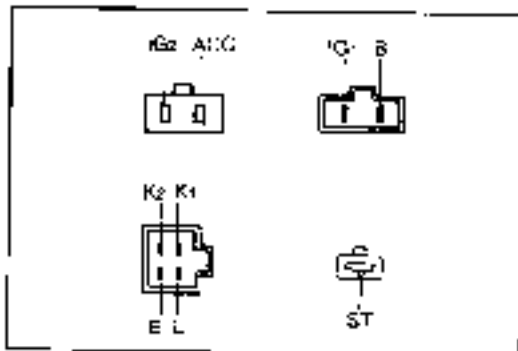
REPLACEMENT OF MAIN FUSE

Disconnect the negative battery cable 30A fuse. Pull out and push in a new one. 60A fuse:

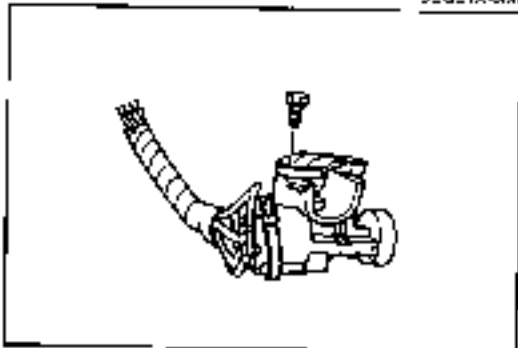
1. Remove the main fuse box.
2. Open the cover.
3. Remove the terminal
4. Pull out the old fuse and push in a new one.



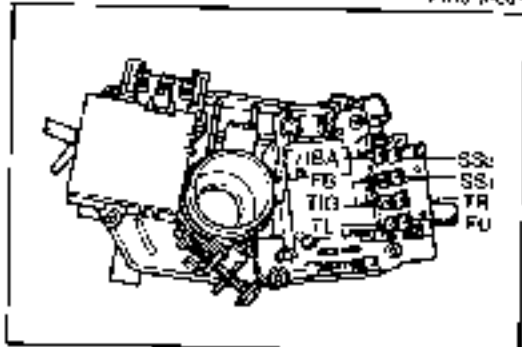
671.107X-307



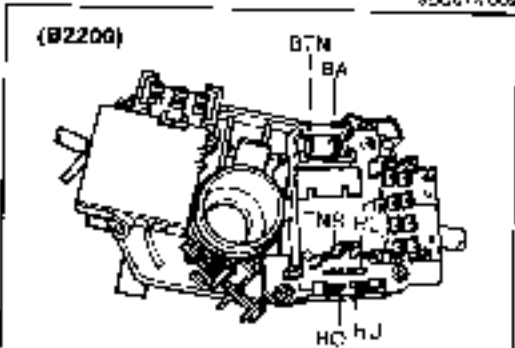
99U2TX.000



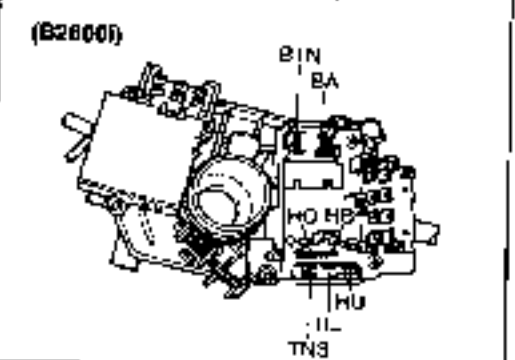
99U2TX.001



99L6TX.000



(B2600)



99L6TX.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	ACC	IG1	IG2	ST	E	K1	K2
Position							
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	FU	TL	TR	TIG	HBA	FB	SS1	SS2
Hazard Turn								
Left	○—○				○—○			
OFF					○—○			
Right	○—○				○—○			
ON	○—○	○—○	○—○		○—○			

○—○ Indicates continuity

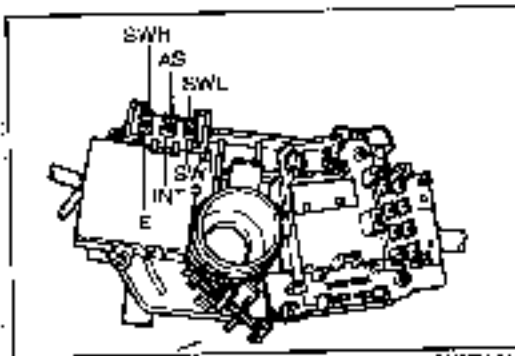
Light, dimmer, and passing switch

Terminal	BTN	NS	B4	HI	HU	H3
Position						
Tail parking	○—○					
Headlight	Low beam	○—○	○—○	○—○		
	High beam	○—○	○—○	○—○		
Passing			○—○		○—○	

○—○ Indicates continuity



**SWITCHES**

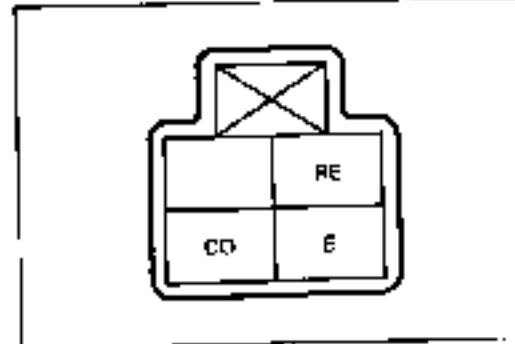


9A110TX 011

**Windshield wiper and washer switch**

Position	Terminal	Terminal					
		AS	SWL	SWH	INT	E	SW
OFF	One touch ON						
	OFF	○	○				
	N		○			○	
Wiper switch	I (Low)		○			○	
	II (High)			○		○	
Washer switch ON						○	○

○—○: Indicates continuity

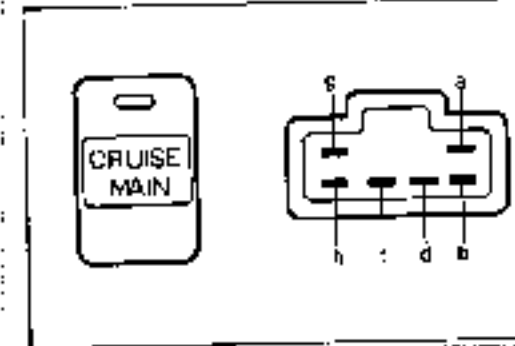


9B037 K04

**Cruise control switch**

Switch	Terminal		
	CO	RE	E
SET/COAST	○		○
RESUME/ACCEL		○	○

○—○: Indicates continuity



0B107X 006

**CRUISE CONTROL MAIN SWITCH**

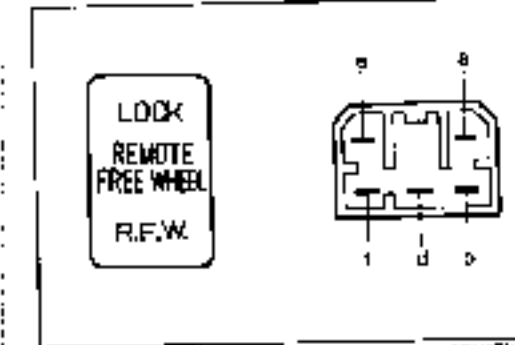
**Inspection**

Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Position	Terminal							
	a	b	c	d	e	f	g	h
Neutral			○	○	○	○	○	○
OFF								
ON	○							

○—○: Indicates continuity



9B037 K04

**REMOTE FREE WHEEL (RFW) MAIN SWITCH**

**Inspection**

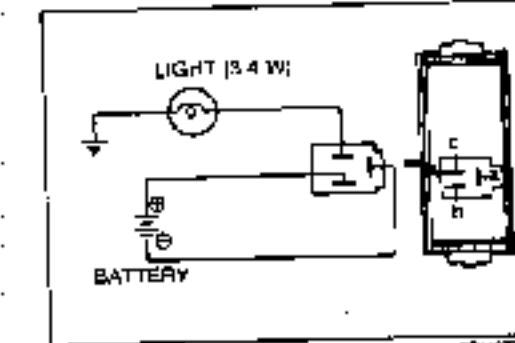
Check continuity between terminals of the switch with an ohmmeter.

If continuity is not as specified, replace the switch.

Position	Terminal				
	a	b	d	e	f
OFF	○			○	
ON	○			○	○

○—○: Indicates continuity

○—○: Illumination lamp



2D00TX 007

**PANEL LAMP CONTROL SWITCH**

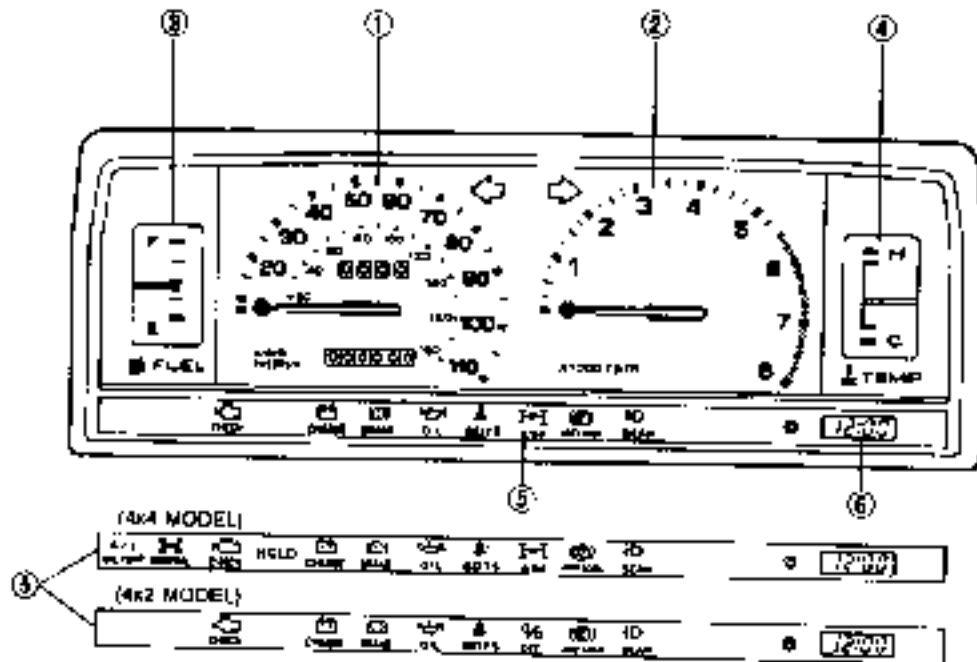
**Inspection**

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.

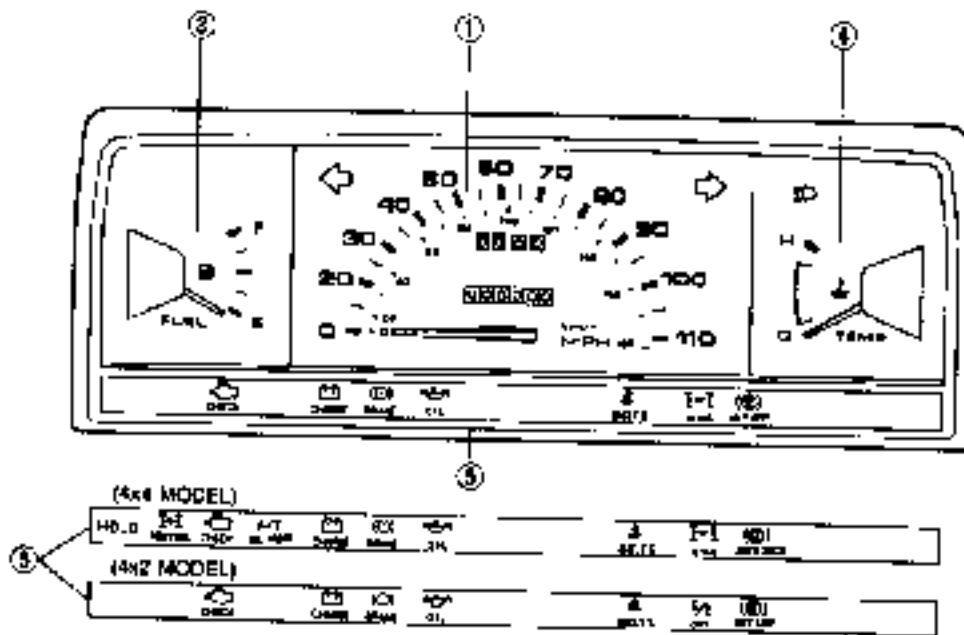
METER

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

ORJ072 007

## TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Speedometer does not work	Faulty speedometer cable Faulty speedometer	Replace Replace	T-12
Speedometer fluctuation	Faulty speedometer cable Faulty speedometer	Replace Replace	T-12
Tachometer does not work	METER fuse blown	Replace fuse and check for short	T-12
	Faulty tachometer Faulty wiring	Check or replace tachometer Repair as necessary	—
Fuel gauge does not work	METER fuse blown	Replace fuse and check for short	—
	Faulty fuel gauge Faulty fuel tank unit Faulty ground or wiring	Check fuel gauge Check fuel tank unit Repair as necessary	T-13 T-13 —
Water temperature gauge does not work	METER fuse blown	Replace fuse and check for short	—
	Faulty water temperature gauge	Check water temperature gauge	T-14
	Faulty water temperature gauge unit Faulty wiring	Check water temperature gauge unit Repair as necessary	T-14 —

98J01X-017

Standard indication (km/h)	Allowable range (km/h)
20	20 - 22.5
40	40 - 43
60	60 - 64.2
120	120 - 128

Standard indication (mph)	Allowable range (mph)
10	10 - 11.4
30	30 - 32
60	60 - 63
90	90 - 94.5

98J01X-018

Standard indication (rpm)	Allowable range (rpm)
1,000	910 - 1,090
2,000	1,810 - 2,000
3,000	2,910 - 3,000
4,000	3,600 - 4,120
5,000	4,290 - 4,150
6,000	5,020 - 6,100

28J01X-003

## 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

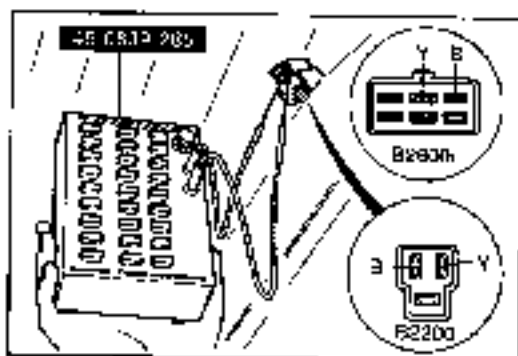
- If significant fluctuation occurs or the speedometer does not move, remove the speedometer cable. If the cable is normal, replace the speedometer assembly.
- Tire wear and improper inflation will increase speedometer error.

## Tachometer

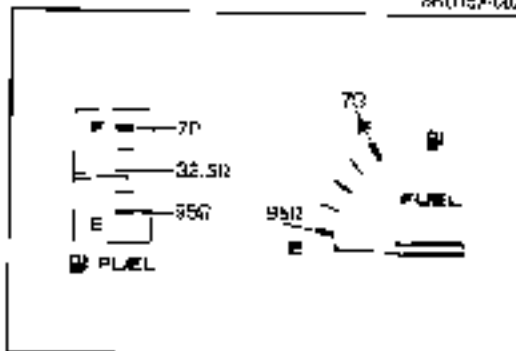
Compare the tester and tachometer indications. If significant error is noted, replace the tachometer.

## Caution

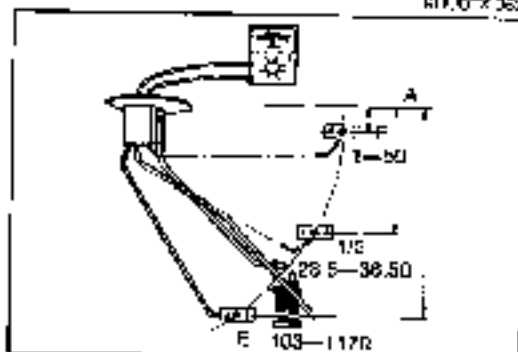
When removing or installing the tachometer, be careful not to drop it or subject it to sharp impact.



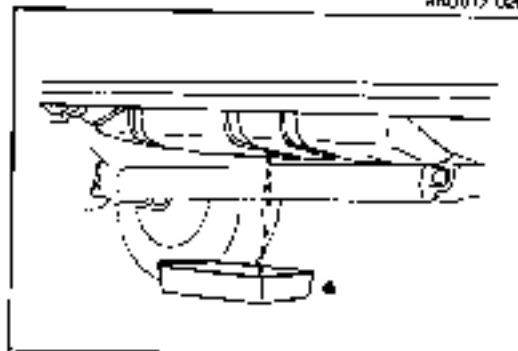
88U157-002



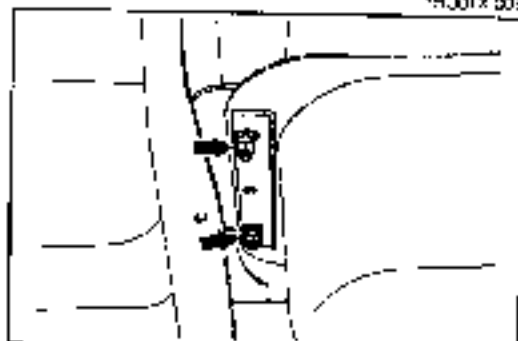
87F107-362



87A0117-002



87A0117-005



47G157-C-5

### 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)	183mm (7.22 in)	263 ± 2.5mm (10.34 ± 0.1 in)
Cap. P.L.s		61 ± 2.5mm (2.38 ± 0.1 in)	181mm (7.13 in)	253.5 ± 2.5mm (10.34 ± 0.1 in)

### Note

To inspect the fuel tank unit, remove the fuel tank.

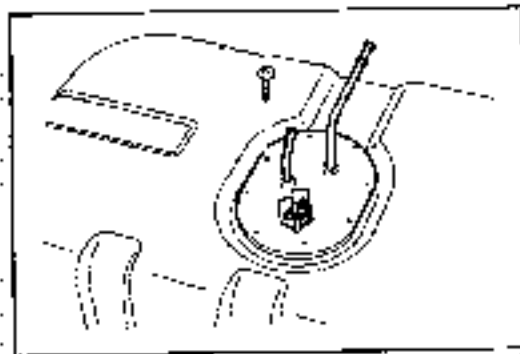
### Removal

1. Jack up the vehicle, and support it with safety stands (rigid racks).
2. Open the filler cap.
3. Drain the fuel.

### Warning

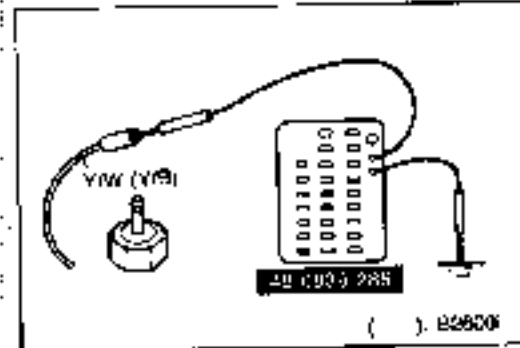
When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.

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.



EBL 15X-063

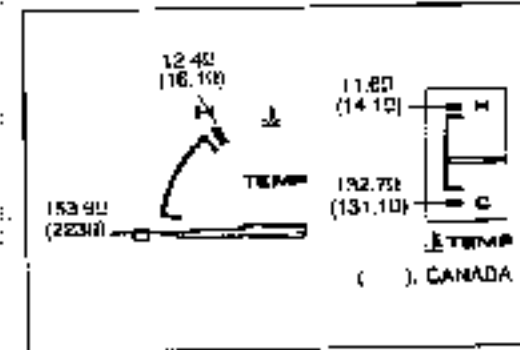
6. Remove the fuel tank unit.
7. Insta. in the reverse order of removal.



JBU 15X-076

### 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 B2600) wire of the gauge unit connector; connect the black lead wire to body ground.

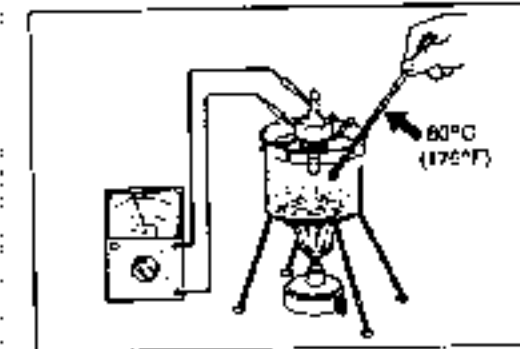


SDU 15X-022

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.



7BU 15X-034

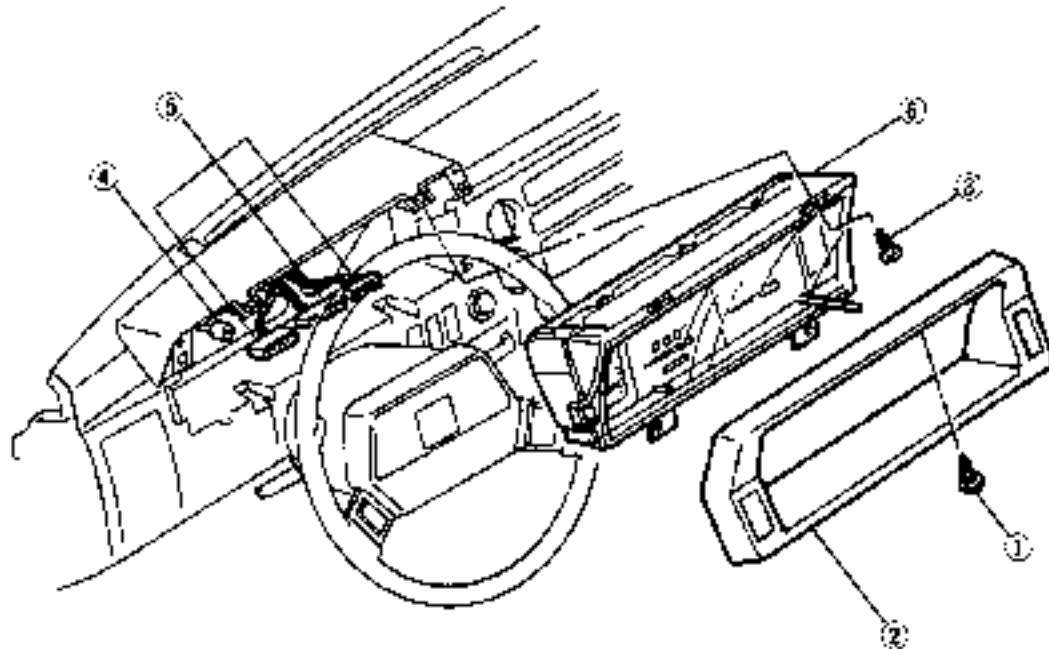
### Water Temperature Gauge Unit

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

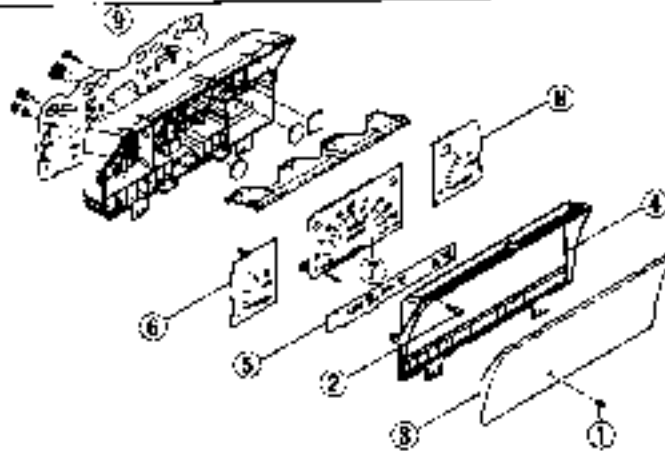
DELTA 022

## 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.

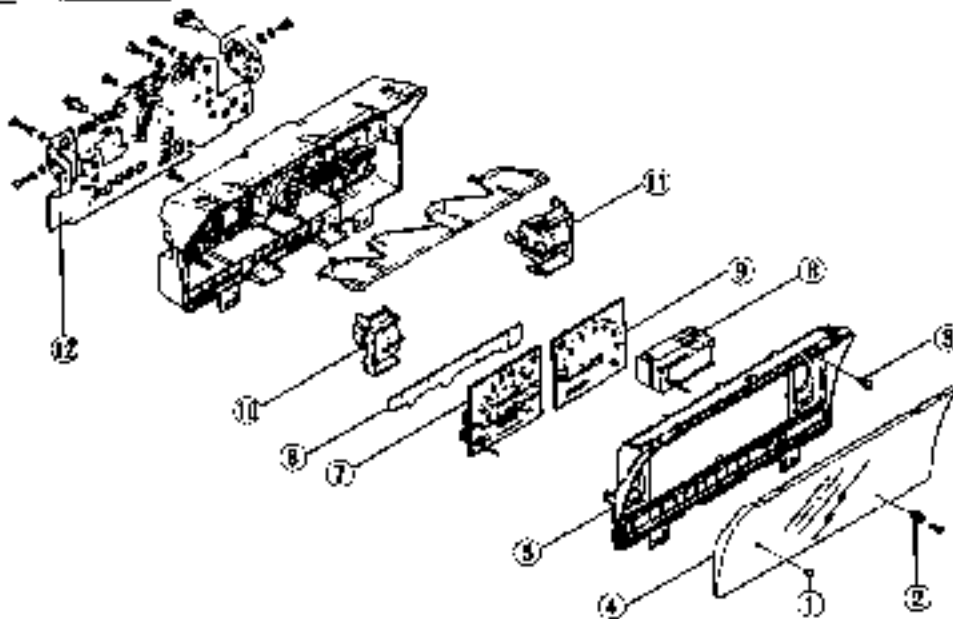


2BLCTX-002

1. Trip meter knob
2. Screw
3. Front lens
4. Window plate
5. Warning plate

6. Fuel gauge
7. Speedometer
8. Water temperature gauge
9. Printed circuit board

Disassembly / Assembly ..... page T-17

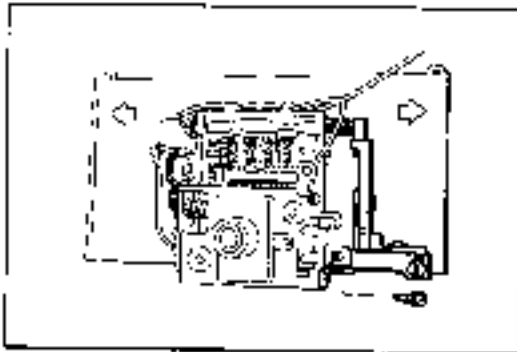


2BLCTX-010

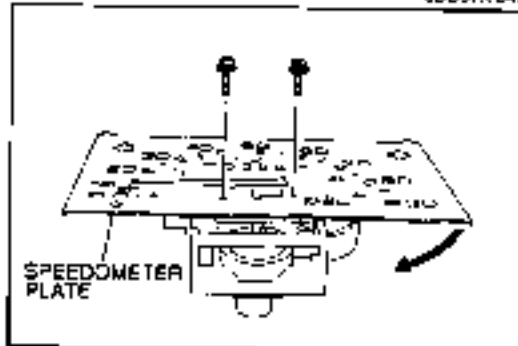
1. Trip meter knob
2. Clock adjusting knob
3. Screw
4. Front lens
5. Window plate
6. Warning plate

7. Speedometer
8. Digital clock
9. Tachometer
10. Fuel gauge
11. Water temperature gauge
12. Printed circuit board

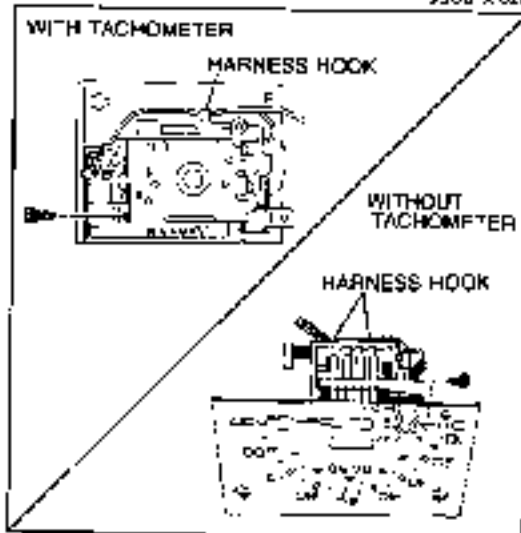
Disassembly / Assembly ..... page T-17



60J0TX-043



9B03TX-026



0E1J3TX-04R

### 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

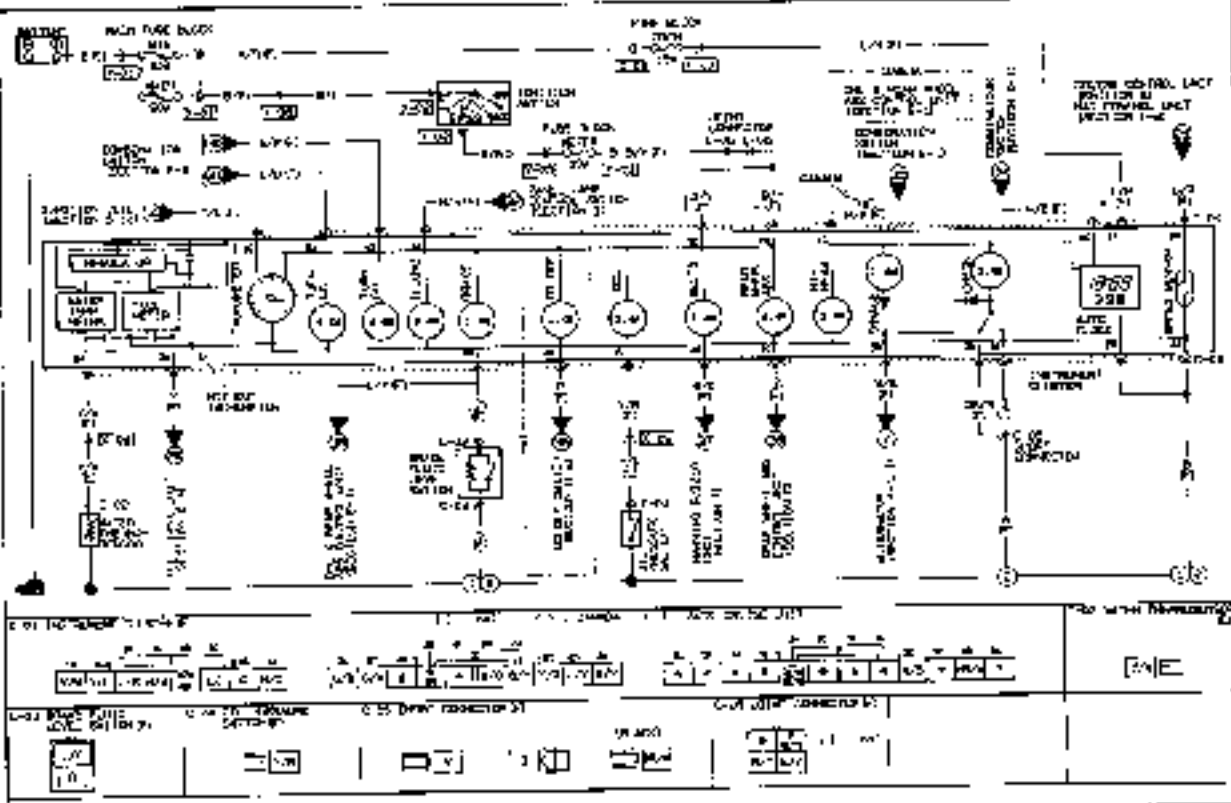
When replacing the speedometer within 60,000 mile, continue to use the previous odometer by transferring it to the new speedometer.



METER PRINTED CIRCUIT BOARD INSPECTION

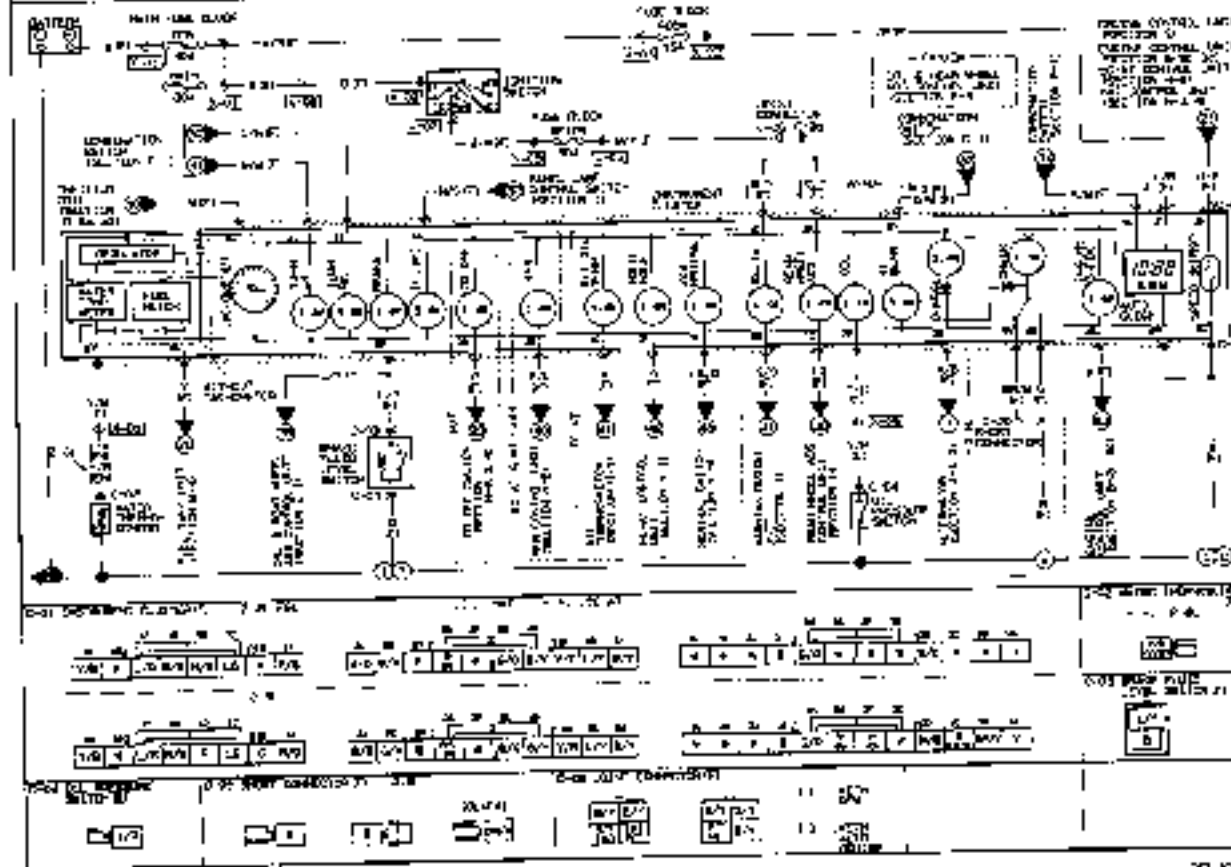
2.2L CARBURETOR INSTRUMENT CLUSTER

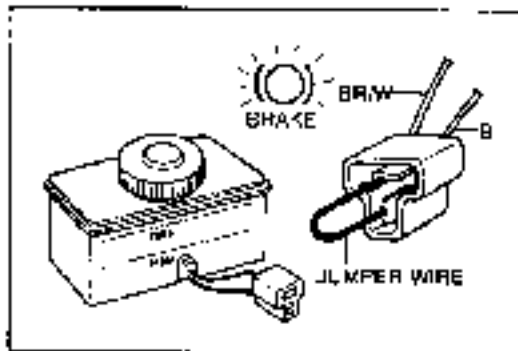
C-1



2.2L EFI & 2.6L INSTRUMENT CLUSTER

C-2





WARNING LIGHTS AND SENDER UNITS

INSPECTION OF CIRCUIT AND PARTS

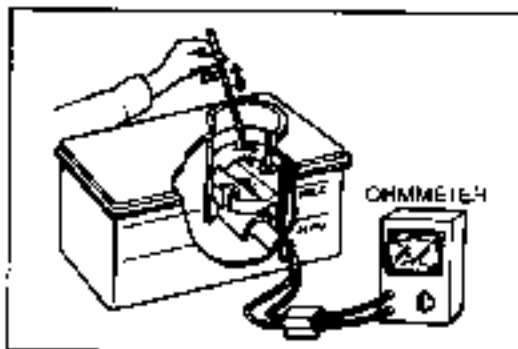
Brake System Warning Light

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.

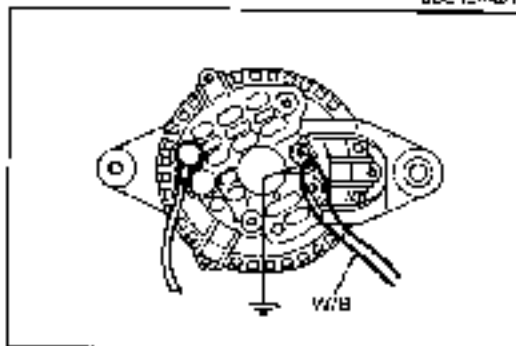


Brake Fluid Level Sensor

Connect an ohmmeter to the terminals of the brake fluid level sensor connector.

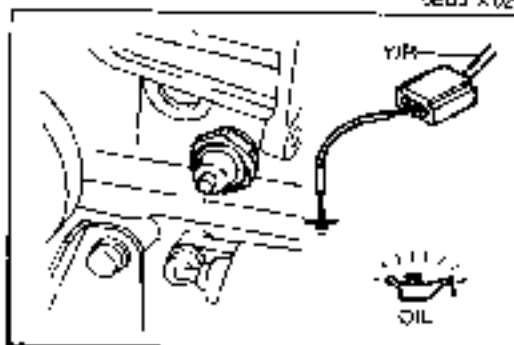
Check for continuity when the float is moved up and down. The sensor is good if there is continuity when the float is below the MIN mark and if there is none when the float is above the MAX mark.

If the sensor does not pass this test, replace it.



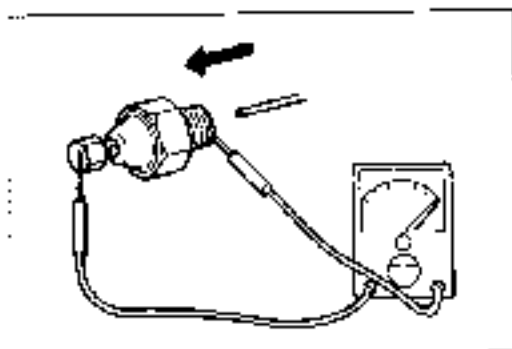
Alternator Warning Light

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.



Engine Oil Pressure Warning Light

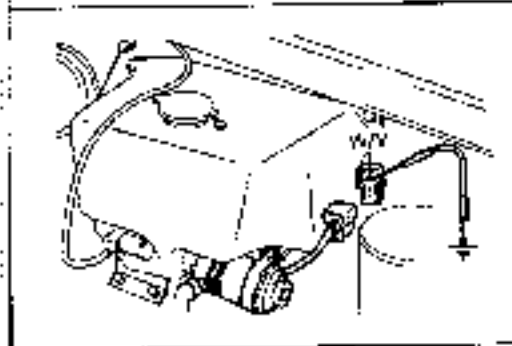
1. Disconnect the connector from the oil pressure switch.
2. Start the engine and connect the connector terminal Y/R to a body ground with a jumper wire.
3. Make sure the oil pressure warning light illuminates.



4F315K40A

**Engine Oil Pressure Switch**

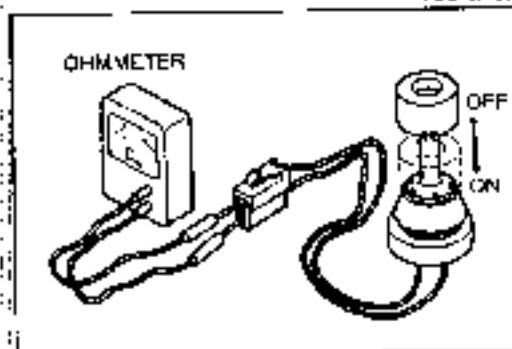
1. Remove the engine oil pressure switch.
2. With an ohmmeter attached as shown in the figure, use a wire to press the engine oil pressure switch inward. The switch is normal if there is no continuity when it is pressed in and if there is continuity when it is returned.
3. If the switch is not normal, replace it.



7BUI5A06P

**Washer Fluid Warning Light**

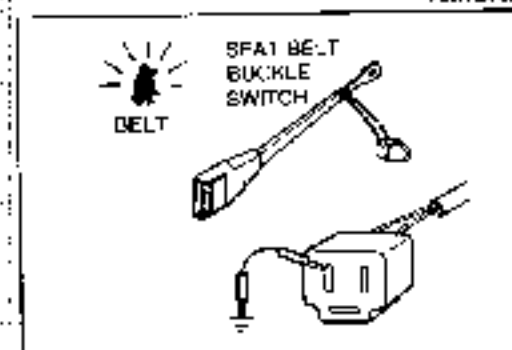
1. Disconnect the connector from the washer fluid level sensor.
2. Start the engine and with a jumper wire connect the connector terminal W/F to a body ground.
3. Make sure the washer fluid warning light illuminates.



7E115K032

**Washer Fluid Level Sensor**

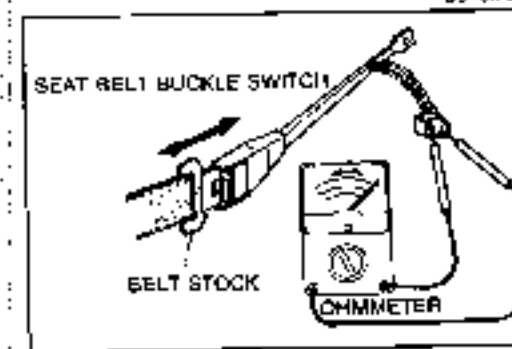
1. Connect the sensor connector to an ohmmeter.
2. Move the sensor float up and down.
3. Make sure there is continuity when the float is at the lowest point.



7DU15K100

**Seat Belt Warning Light**

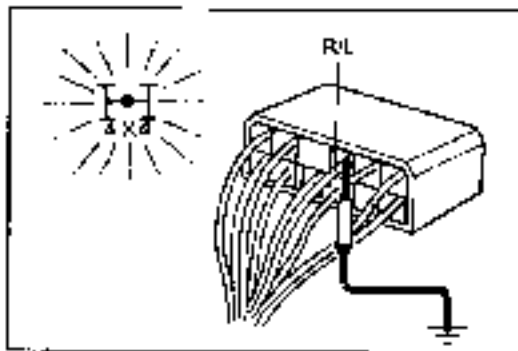
1. Disconnect the connector from the seat belt buckle switch (driver's side).
2. Connect the connector terminal B/F to a body ground.
3. Start the engine and check to be sure that the BELT warning light illuminates for about 6 seconds.
4. If there is no illumination, check the fuse, warning readout, and wiring harness.



4B615X100

**Buckle Switch (driver's belt)**

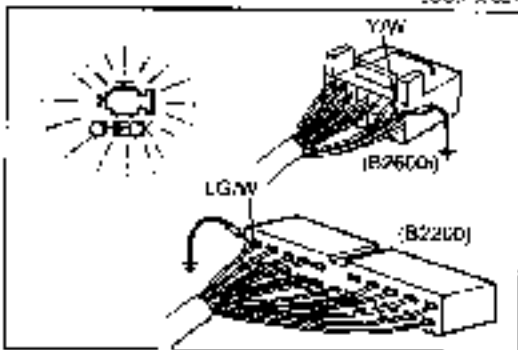
- Insert the seat belt stock into the buckle, and use an ohmmeter to check for continuity of the switch.
- Belt inserted...no continuity  
Belt not inserted...continuity



98U01X021

**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.



98U01X022

**Malfunction Indicator Light (for California and Federal)**

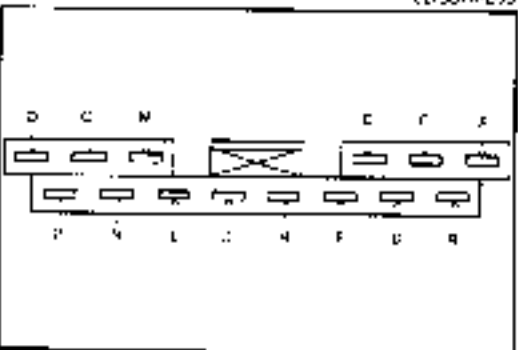
1. Connect the LG/W wire terminal of the FB control unit (B2200) or Y/W wire terminal of the EGI control unit (B2600) to a body ground.
2. Start the engine and check that the warning light illuminates.
3. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and FB control unit (B2200) or EGI control unit (B2600).



98J01X023

**A/T Oil Temperature Warning Light**

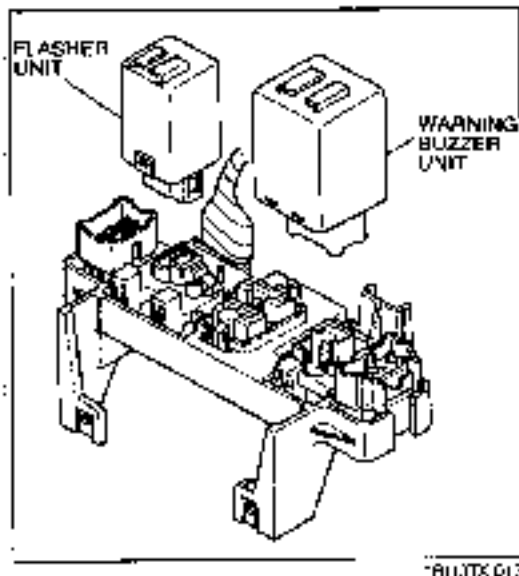
1. Disconnect the connector from the ATF thermoswitch.
2. Connect the connector terminal R to a body ground.
3. Start the engine and check that the warning light illuminates.
4. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and ATF thermoswitch.



98U01X024

**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.



\*R111TX 017

WARNING BUZZER

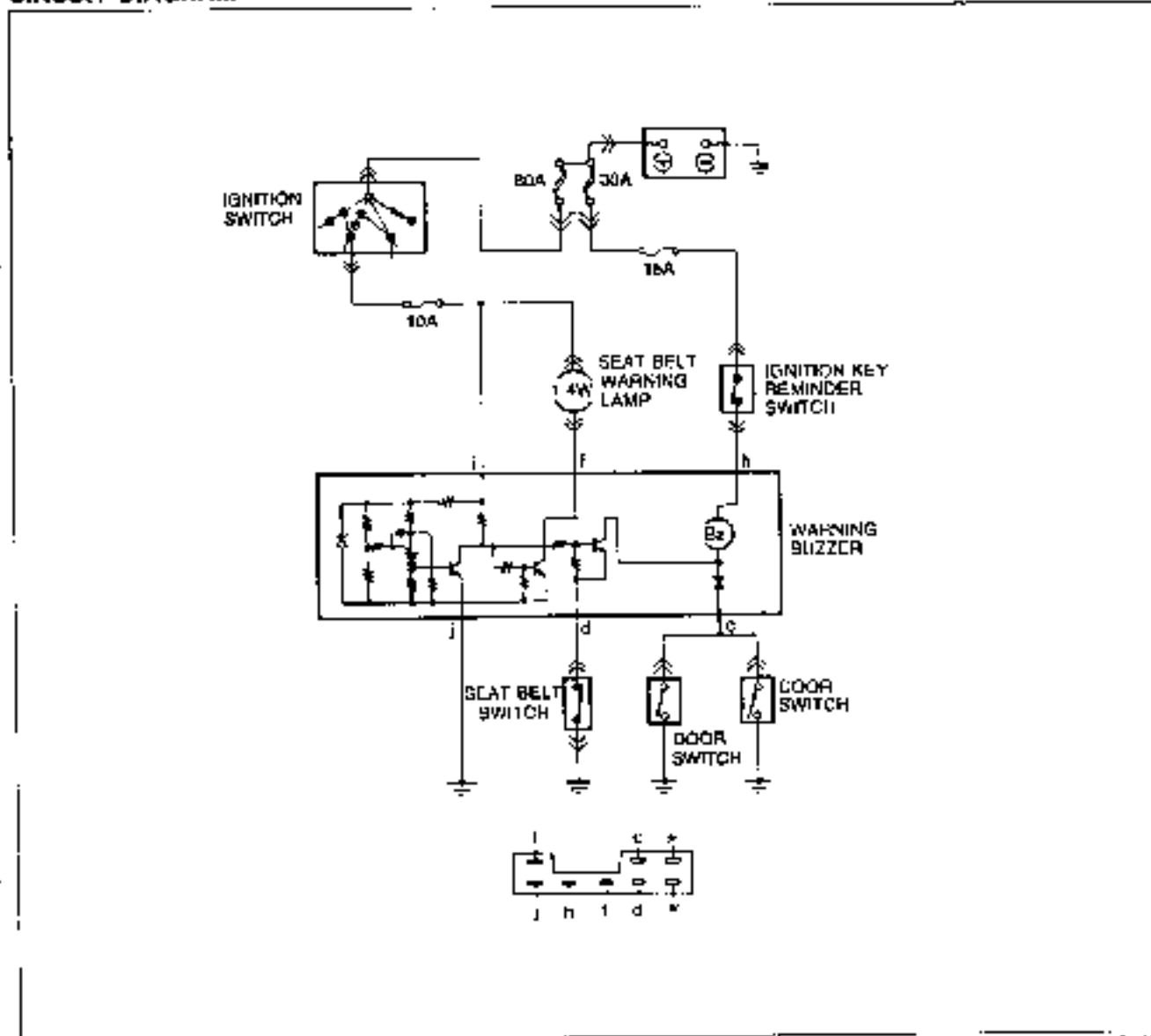
ON-VEHICLE INSPECTION

The warning buzzer system detects certain conditions and warns the driver about them.

The warnings are described below.

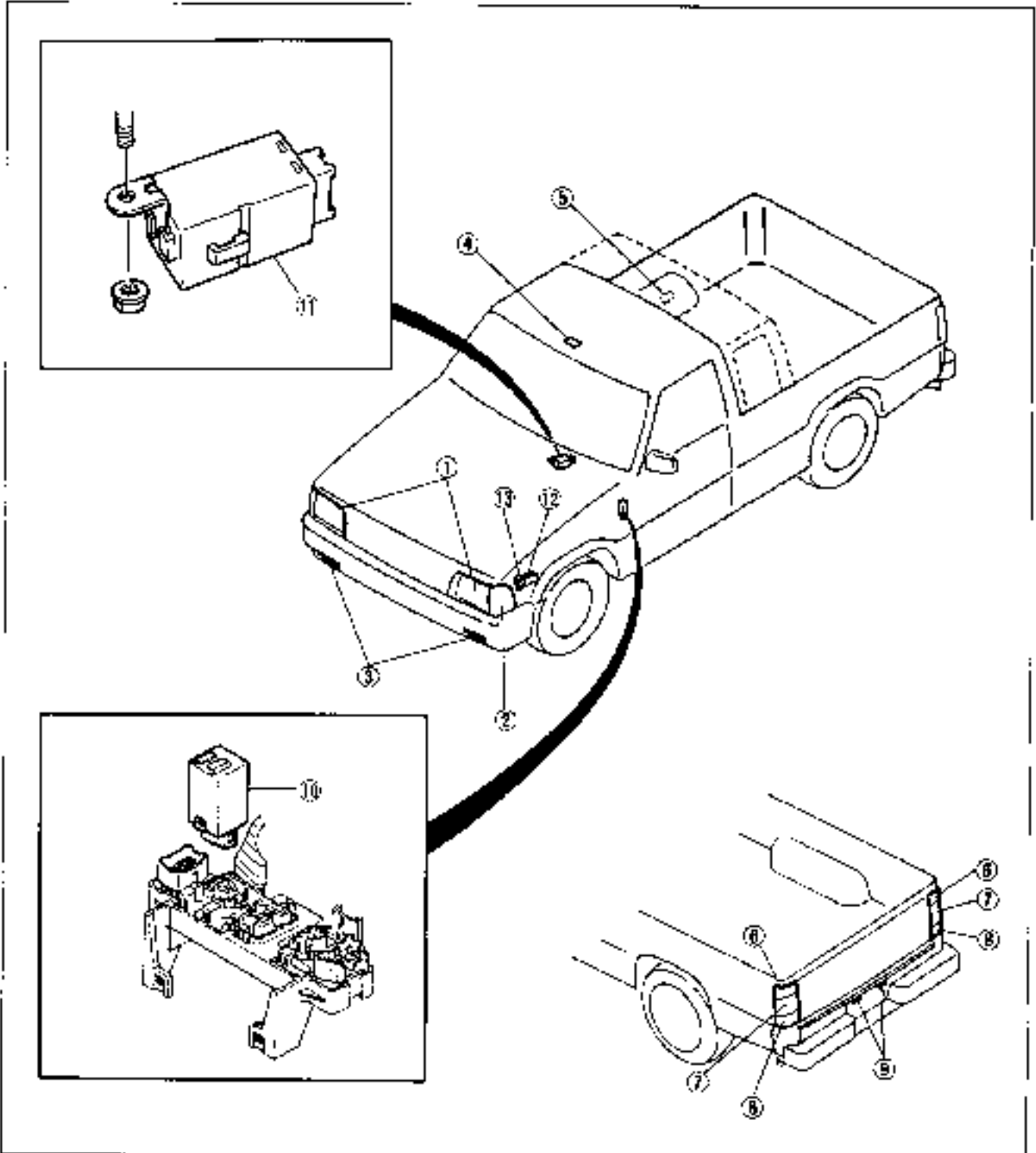
Item	Activation Condition
Seat belt not fastened	(1) Ignition key at ON (2) Seat belt timer functioning (seat belt not fastened after ignition key set to ON)
Ignition key left in ignition	(1) Ignition key at LOCK Ignition key reminder switch ON (ignition key not removed) (2) Door open (door switch ON)

CIRCUIT DIAGRAM



LIGHT AND LAMP

STRUCTURAL VIEW

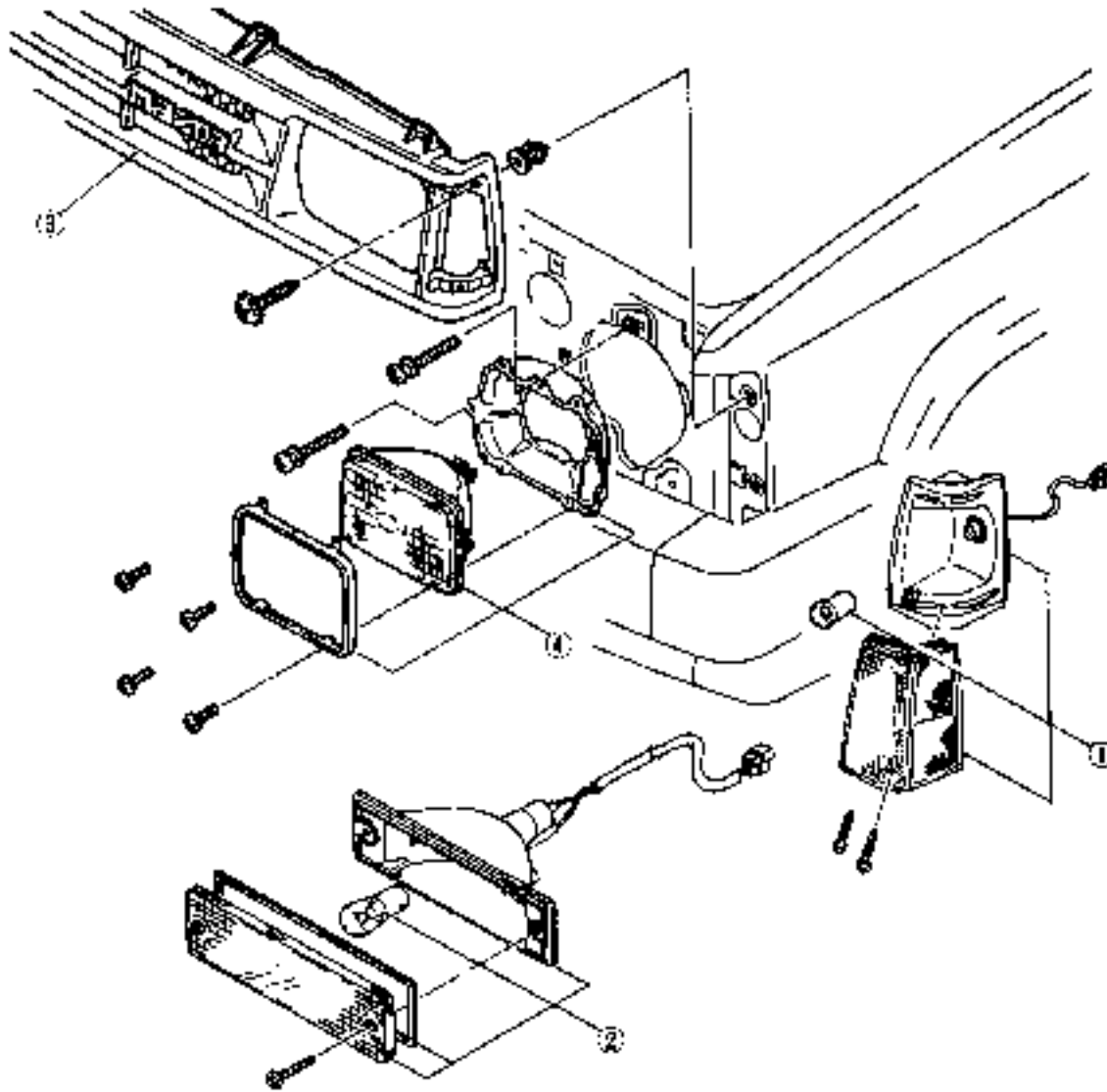


25L113017

- |   |                            |
|---|----------------------------|
| 1. Head lights                                | 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.



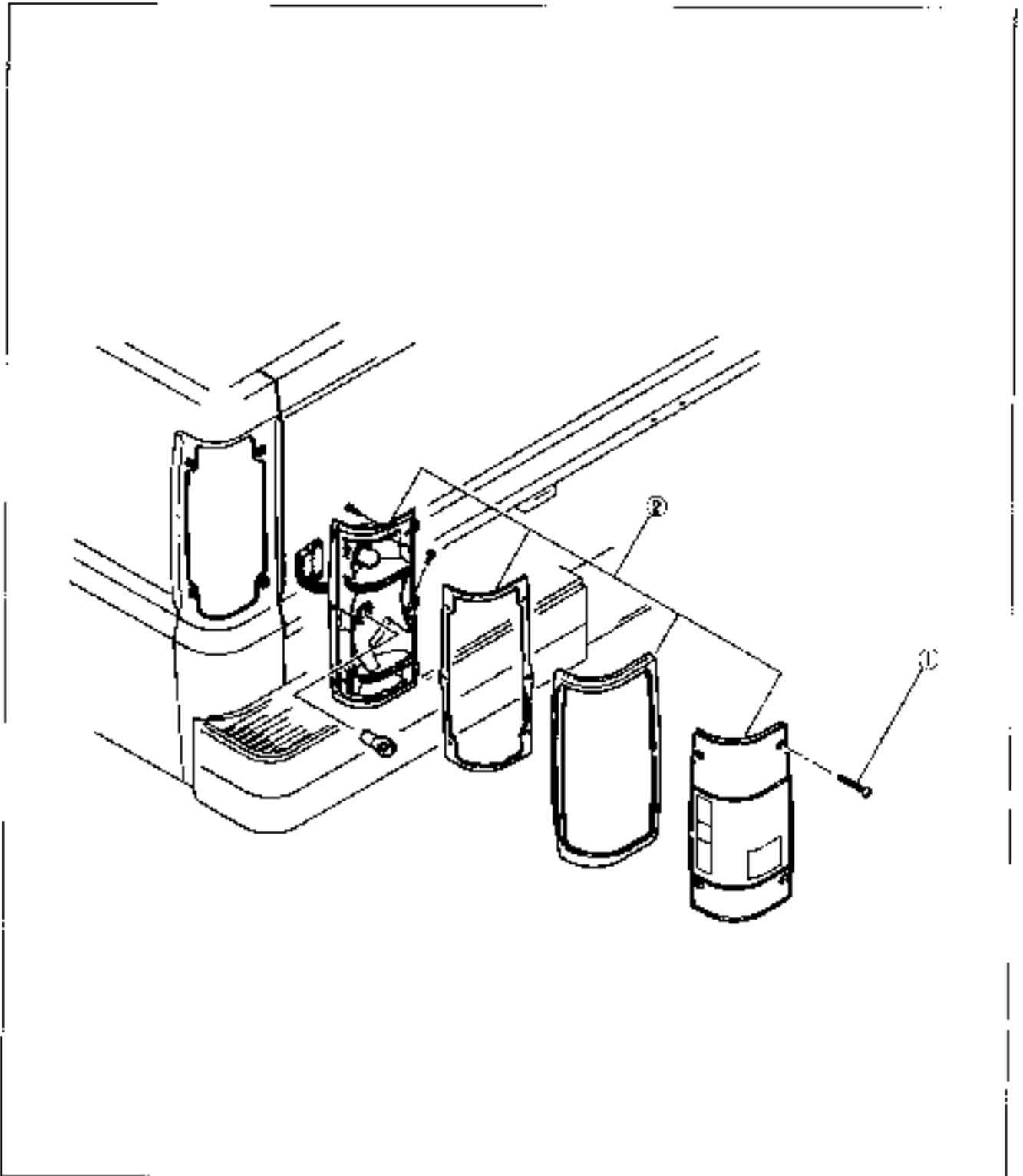
98A.07X-012

1. Front combination light
2. Turn and hazard light

3. Radiator grille
4. Headlight

**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

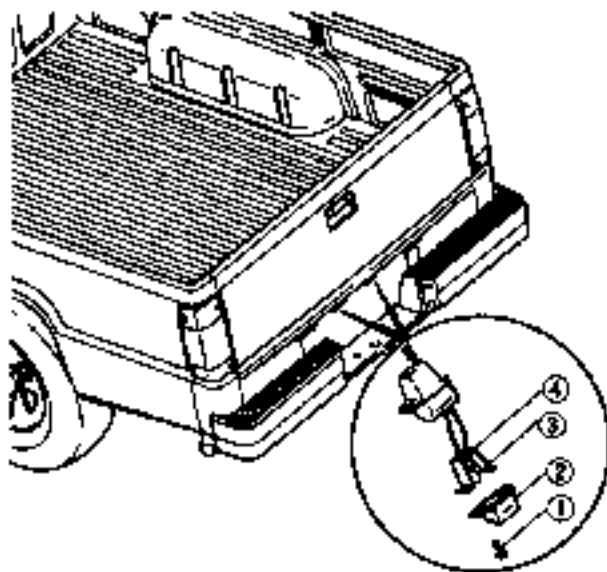
2E1074014



## 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.



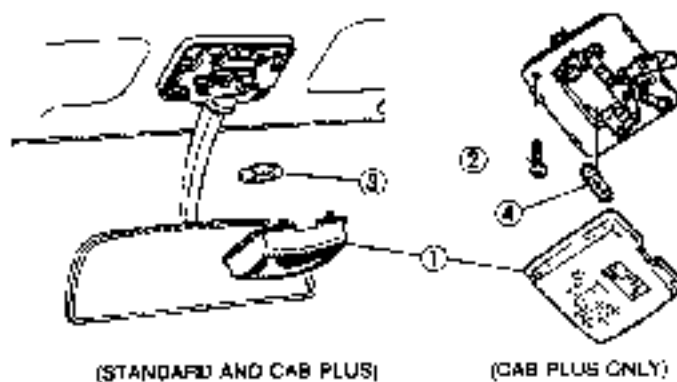
24J01X (15)

1. Screw
2. Lens

3. Bulb (8W)
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.



23J01X (15)

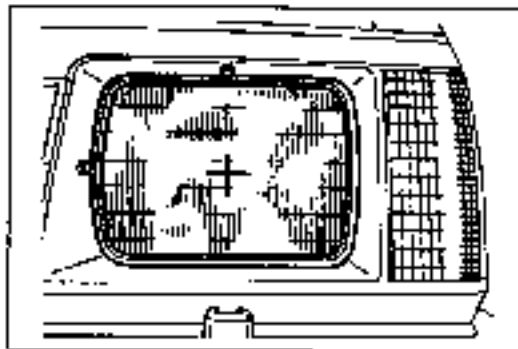
1. Lens
2. Screw

3. Bulb (10W)
4. Bulb (10W)

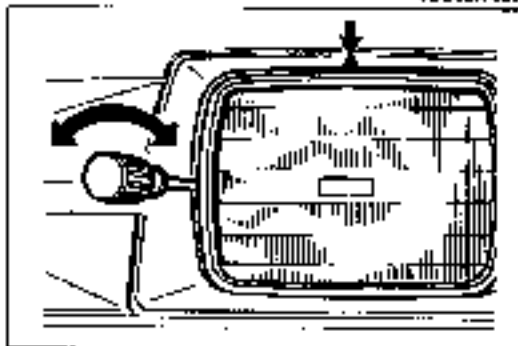
**Specifications**

Light bulb	Wattage (w)	SAE trade number
Headlight	55/55	6052
	85/35	16054
Front parking and side marker lights	8	67
Turn and hazard signal lights	21	1156
Peer turn signal lights	21	1156
Stop and tail light	21/8	1157
Back up light	21	1156
License plate lights	6	—
Interior lamp	10	—

ZEUSTX 017



0DL03X-009



0DU3X-010

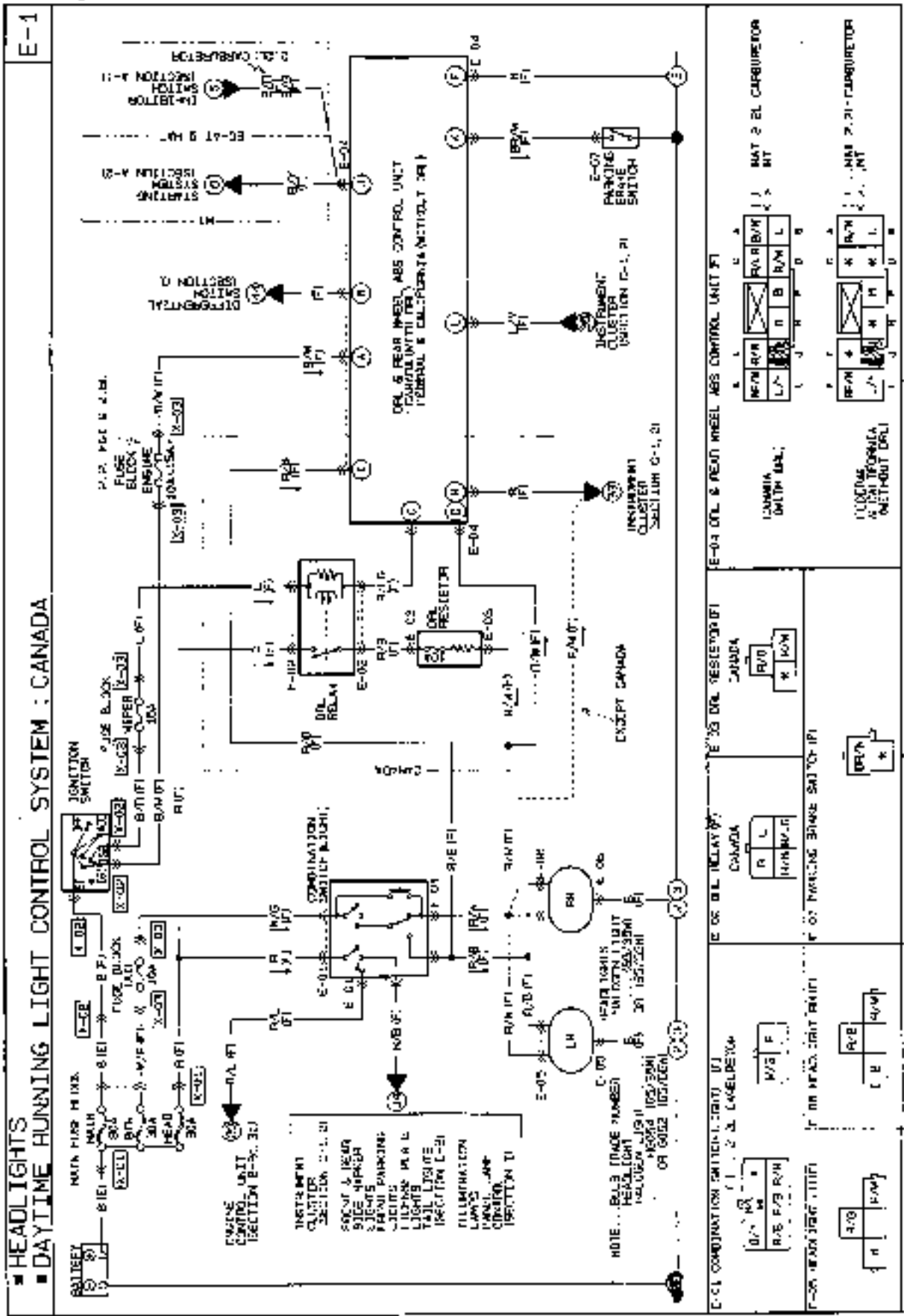
**ADJUSTMENT**

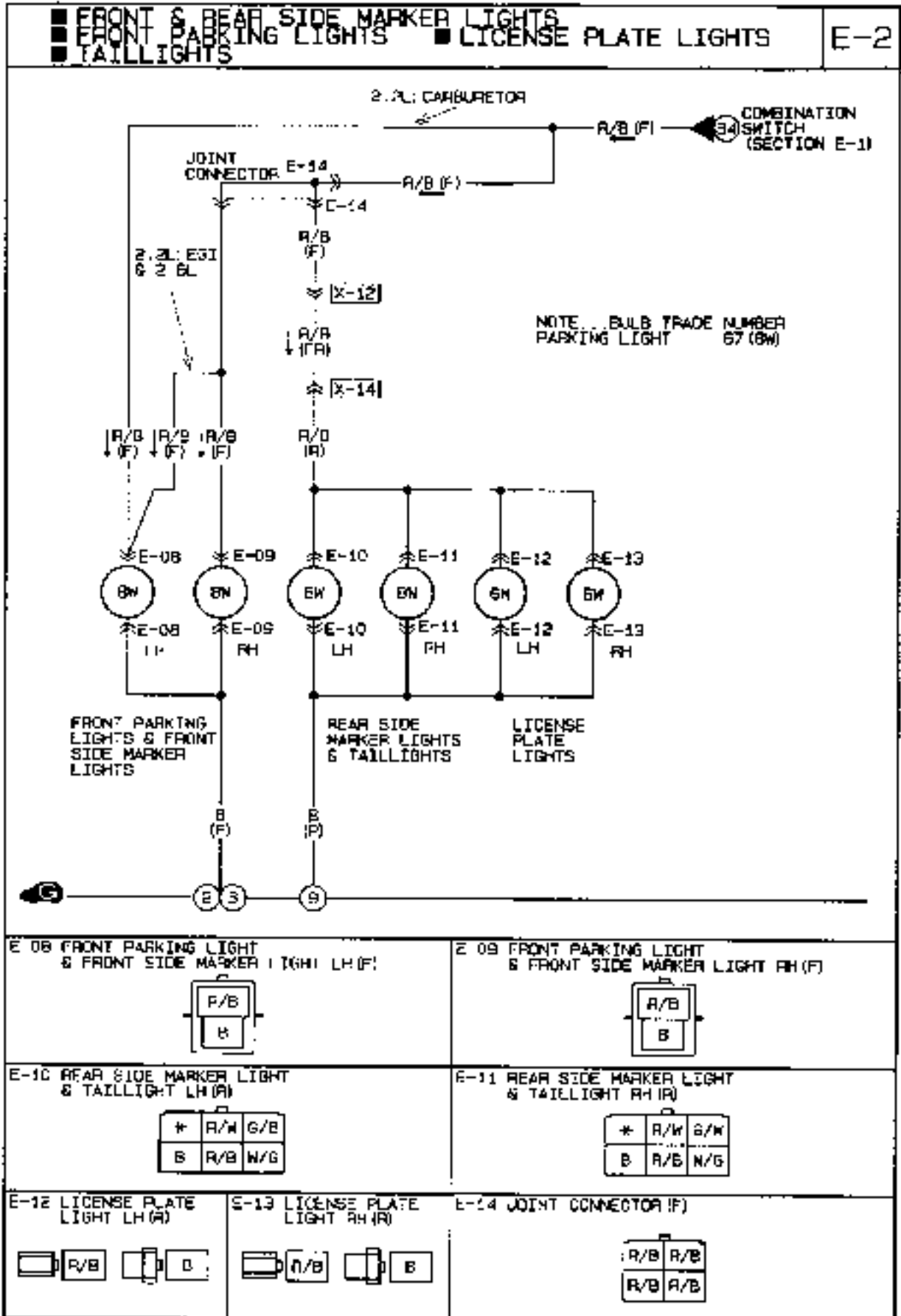
**Headlight Aiming**

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.

TROUBLESHOOTING

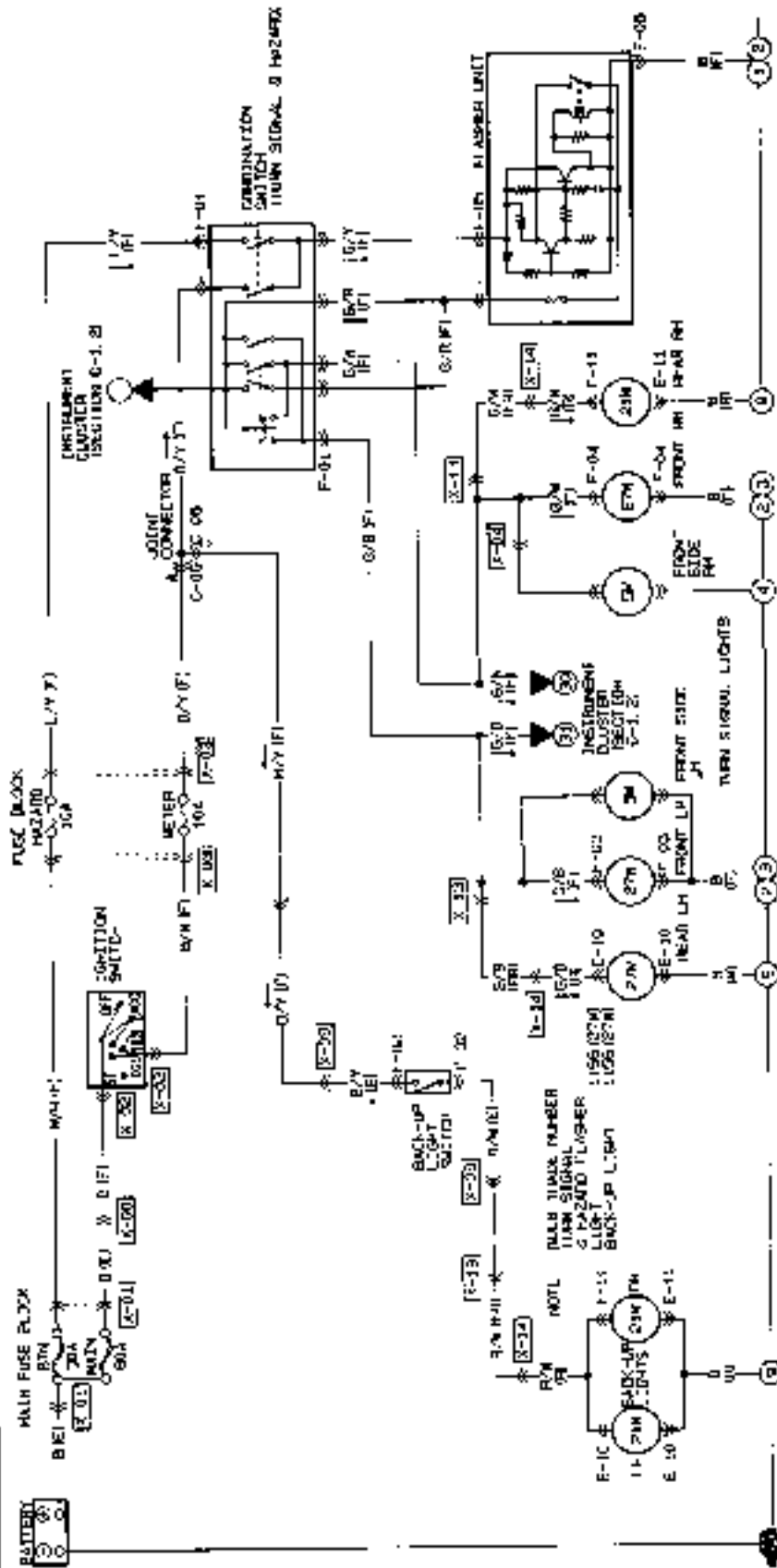
Circuit Diagram



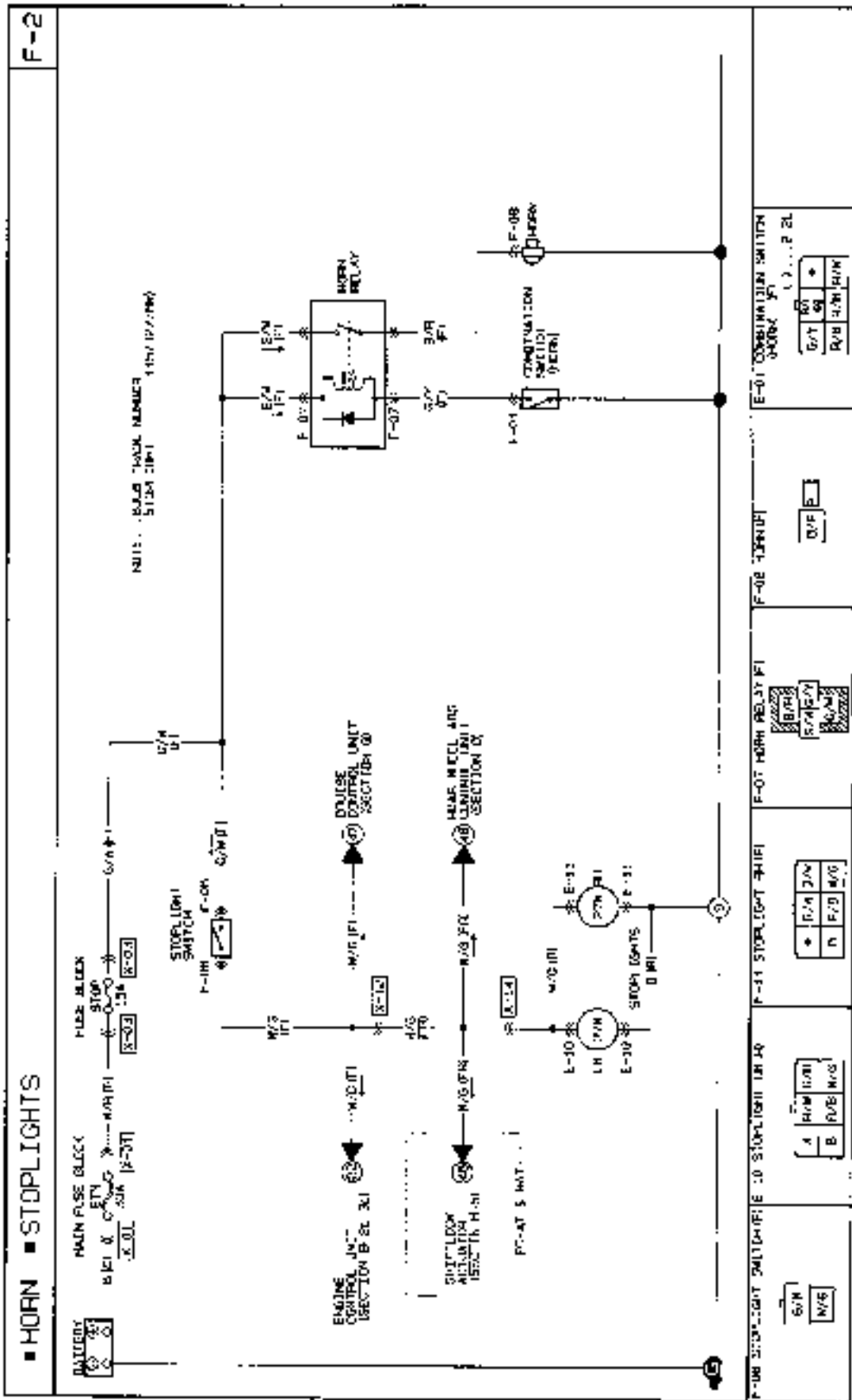


F-1

BACK-UP LIGHTS ■ TURN SIGNAL & HAZARD FLASHER LIGHTS



F-01 COMBINATION SWITCH TURN SIGNAL & HAZARD	F-02 BACK-UP LIGHT SWITCH	F-03 FRONT TURN SIGNAL LIGHT (LH)	F-04 FRONT TURN SIGNAL LIGHT (RH)	F-05 FRONT TURN SIGNAL LIGHT (RH)
10/00 (B/Y) (G/Y) (L/Y) (G/B) (S/W) (S/R)	(N/Y) (R/W) (R/W) (2 2L)	(B/Y) (R/W) (2 H)	(N/Y) (B/W) (N/W) (G/W) (W/D)	(G/W) (S)
F-06 JOINT CONNECTION	F-07 FRONT SIDE TURN SIGNAL LIGHT (LH)	F-08 FRONT SIDE TURN SIGNAL LIGHT (RH)	F-09 FRONT SIDE TURN SIGNAL LIGHT (RH)	
(N/Y) (B/Y) (N/W) (W/D)	(G/B) (S)	(N/W) (B/W) (R/W) (W/D)	(N/W) (S)	



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.

2R-07X-018

Flow No.2	Symptom	All turn signal and hazard warning lights do not illuminate.
-----------	---------	--

## 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.

2R07X-019

Flow No.3	Symptom	All stoplights do not illuminate.
-----------	---------	-----------------------------------

## 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.

2R07X-020

Flow No.4	Symptom	All TNS (taillights, license plate lights, parking lights, side marker lights, back-up lights) do not illuminate.
-----------	---------	---

**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.

20LCTK-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.

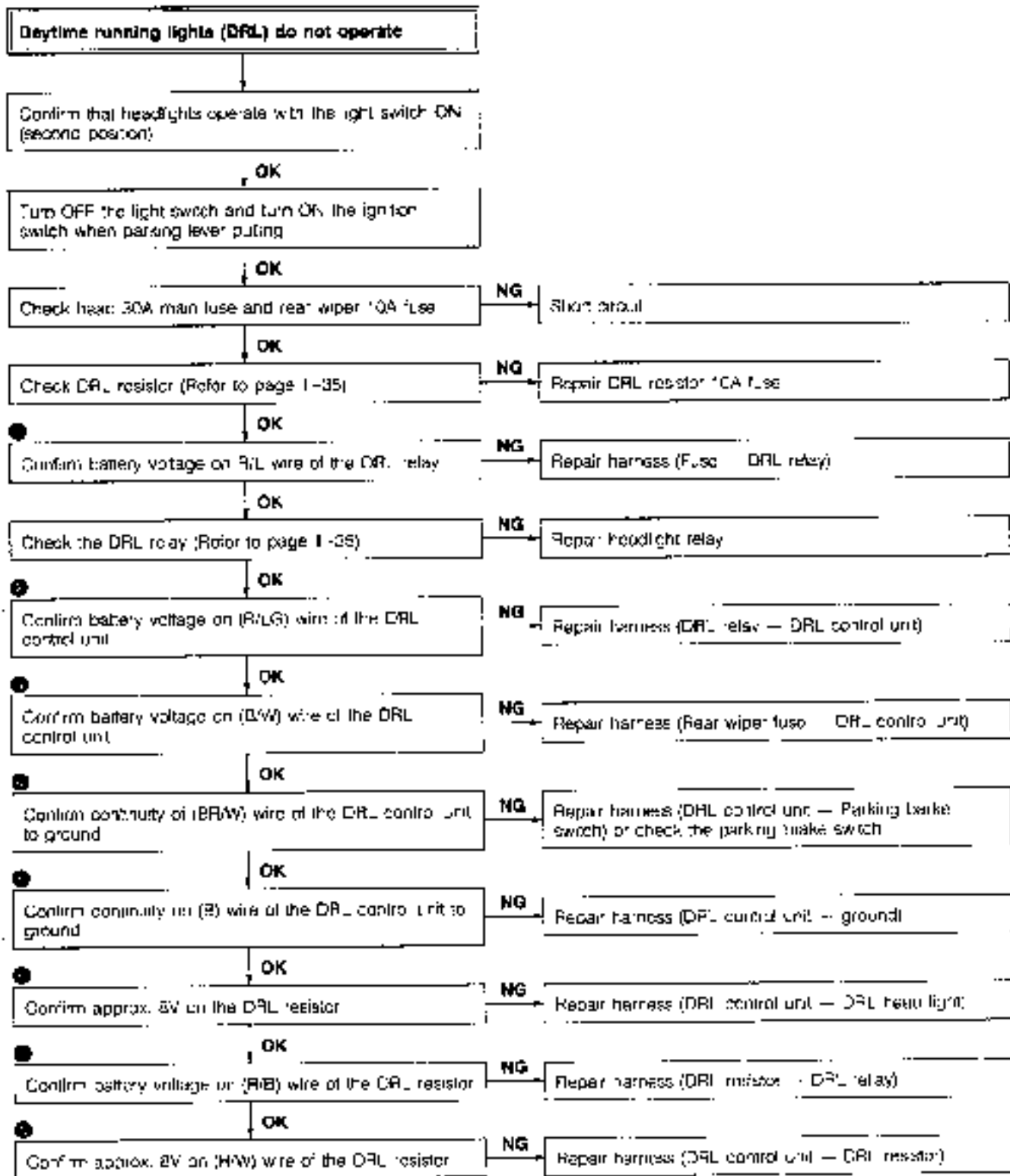
**Remedy**

- Replace ROOM 15A fuse block.
- Check interior lamp switch.
- Check door switch.
- Replace bulb.
- Repair wiring harness.

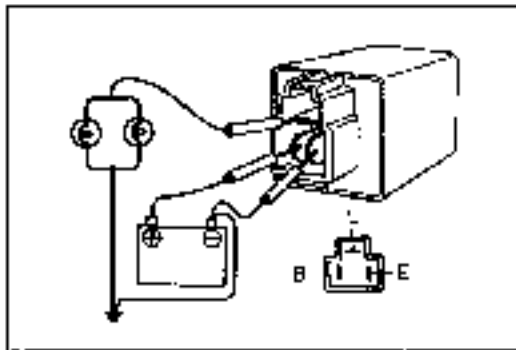
20LCTK-022



(Canada)



PB-67X-023



2BL07A-074

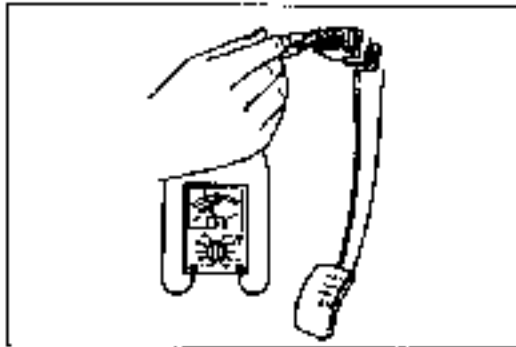
**INSPECTION**

**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**

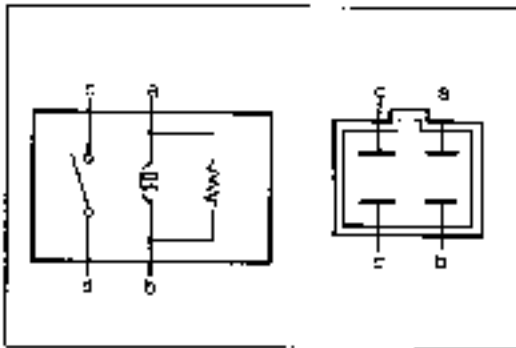
Do not reverse the polarity of the electrical source to the terminal.



2BL07X-041

**Stoplight Switch**

1. Disconnect the 2-pin connector from the switch.
2. Confirm the conductivity between the two terminals of the stoplight switch.



20007X-025

**DRL Relay (Canada)**

1. Disconnect the DRL relay connector and remove the relay.
2. Check for continuity between terminals of the relay.

Va: Battery voltage

Connecting to		a	b	c	d
Va	Ground				
		○	○		
a	b			○	○

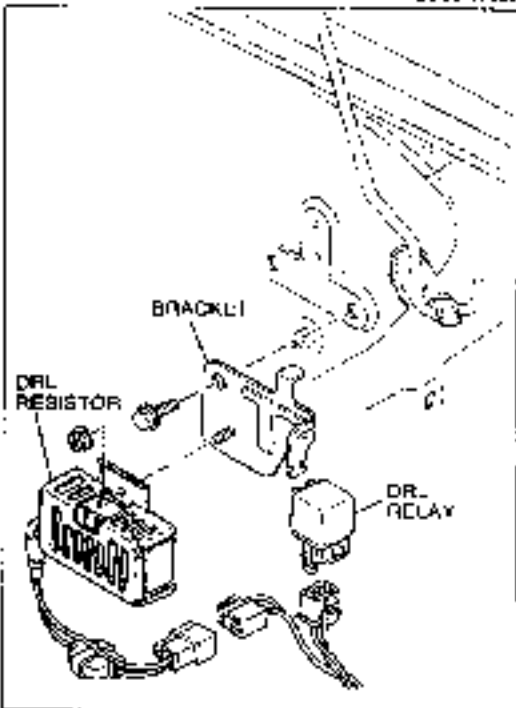
○—○: Indicates continuity

**DRL Resistor (Canada)**

Confirm that 10A fuse is not burnt out.

**Removal and Installation**

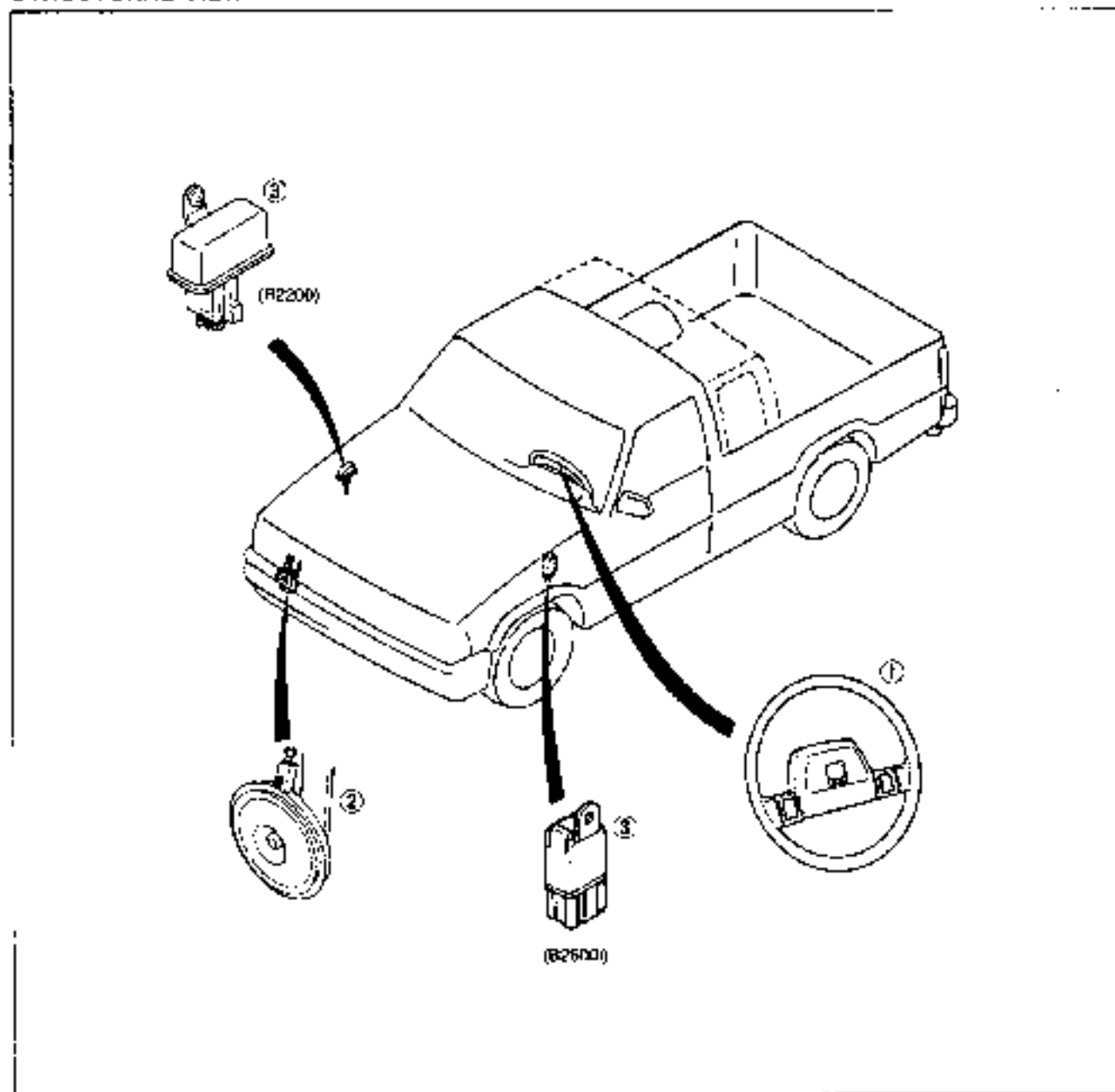
1. Remove the air cleaner. (Refer to Section F2.)
2. Remove the bolt, nut and the bracket.
3. Disconnect the DRL resistor connector and the DRL relay connector.



2BL07X-042

## HORN

## STRUCTURAL VIEW



1. Horn switch

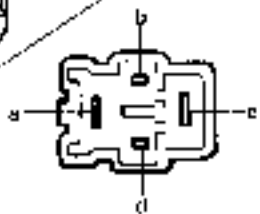
2. Horn

3. Horn relay

(B2600)



(B2600)



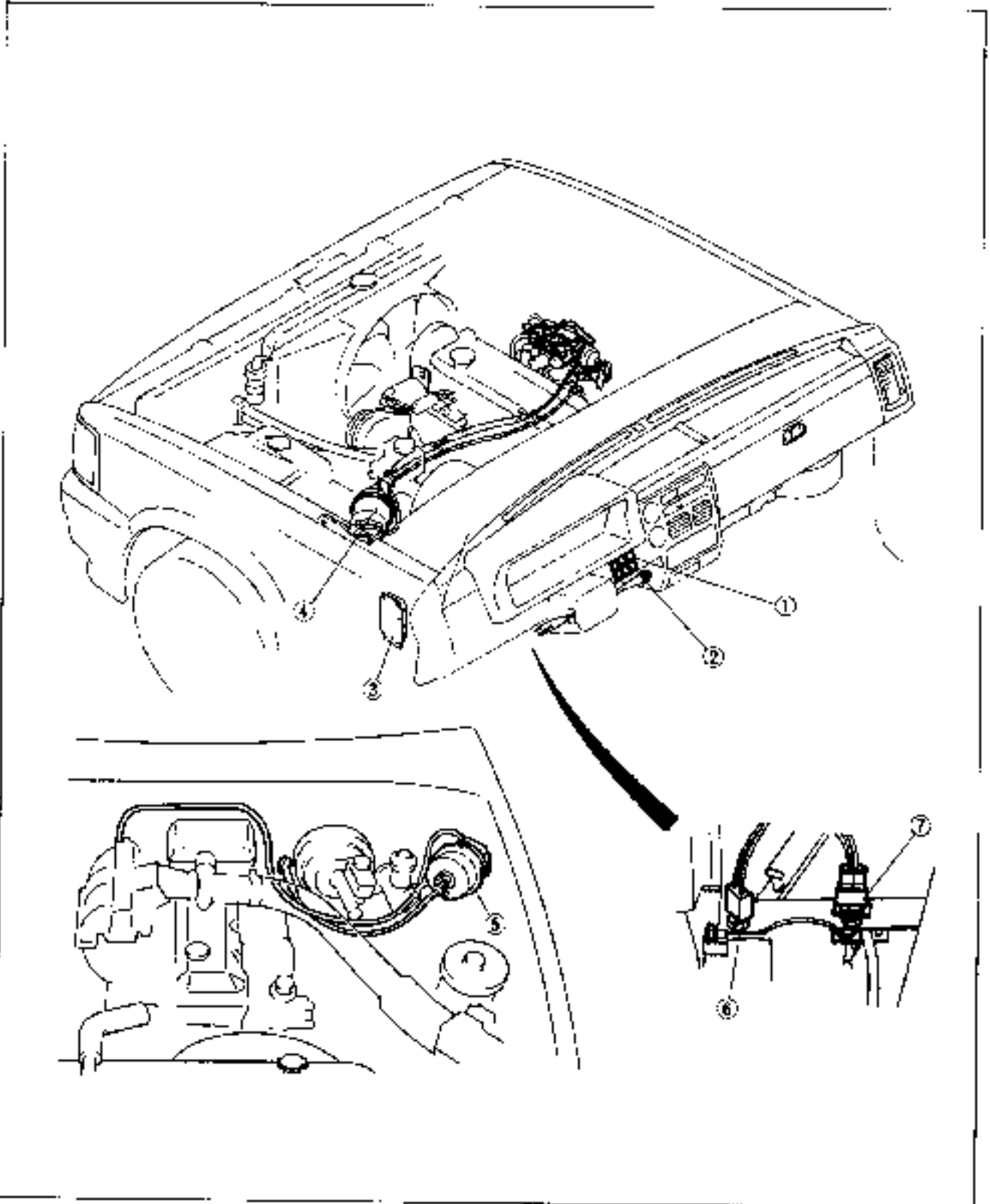
78L118X-026

**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 (c) terminal; then confirm battery voltage of R (a) terminal.

CRUISE CONTROL SYSTEM

STRUCTURAL VIEW



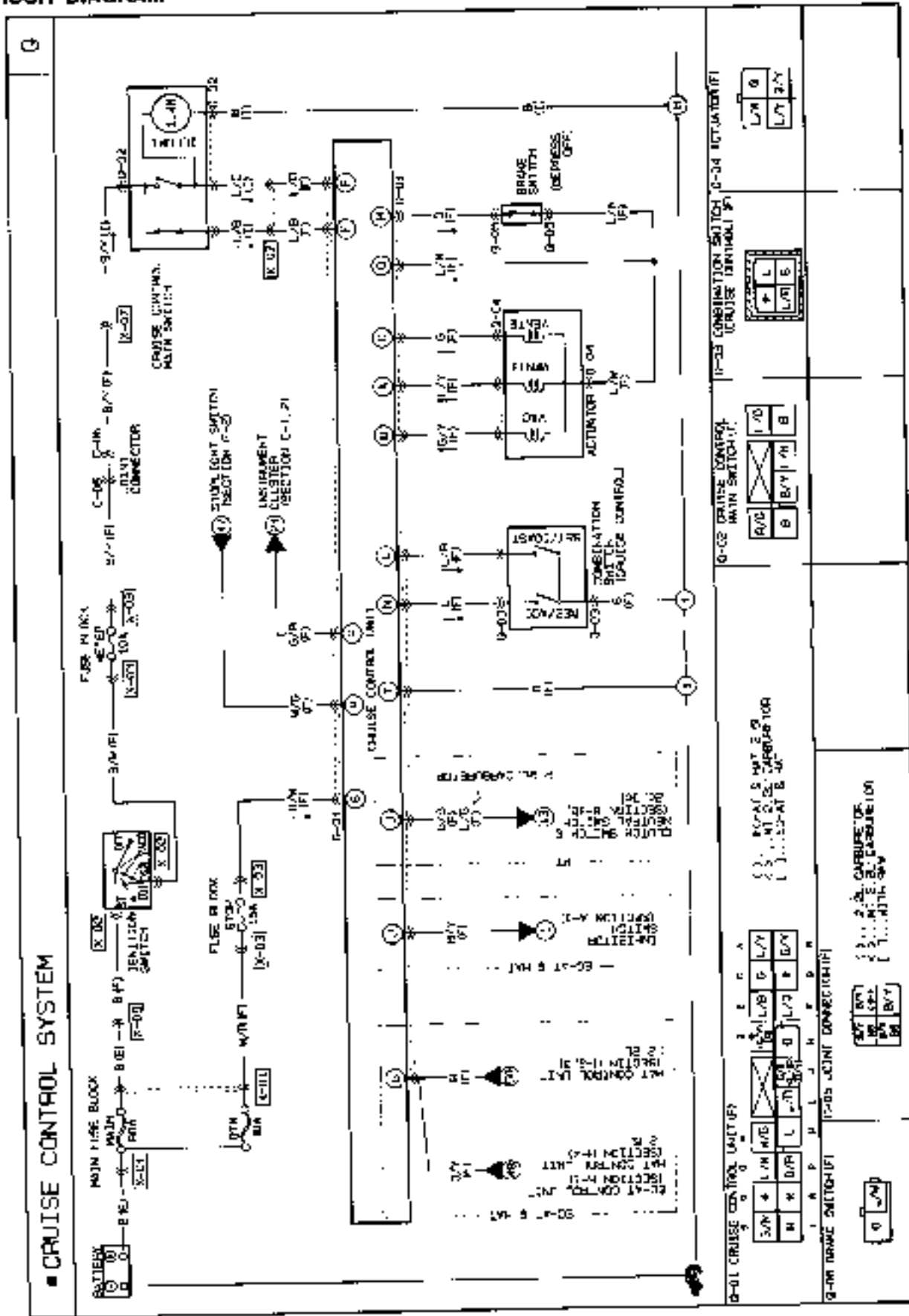
- 1. Main switch
- 2. Control switch
- 3. Control unit

- 4. Actuator (B2200)
- 5. Actuator (B2800)
- 6. Clutch switch

- 7. Stoplight switch

10001X-013

CIRCUIT DIAGRAM



TROUBLESHOOTING

Symptom: Vehicle speed cannot be set. (Cruise control unit will not hold vehicle speed.)

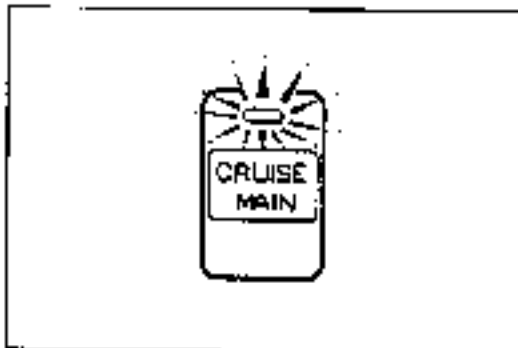
Note

• Before troubleshooting of the system, verify the following items:

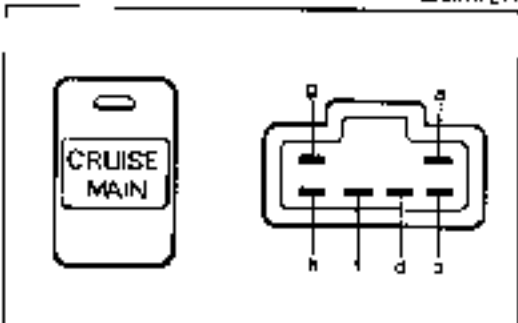
1. Is system being correctly used by customer?
2. Is fuse OK?

Check the fuse. If the fuse is burned, replace it. Check the wire harness for a short circuit.

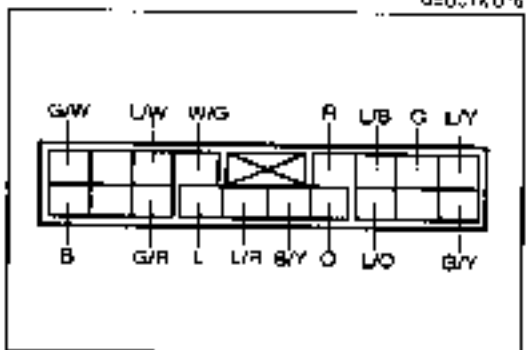
CSJ07X-230



3EJ1TX-211



0EUC7X-076



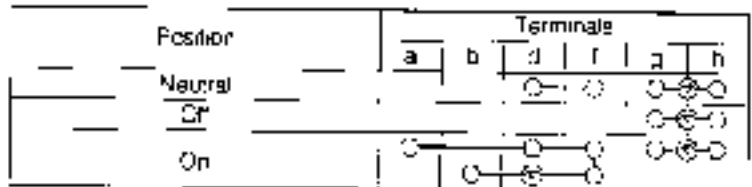
0EJ10X-046

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.



○—○ 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.

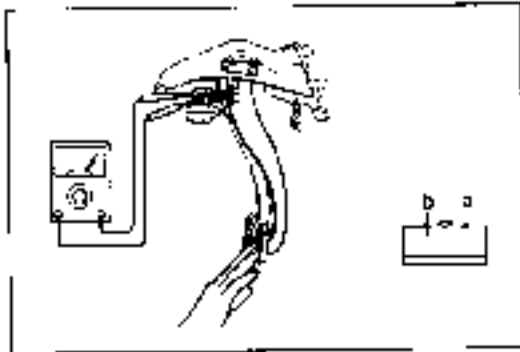
Va: Battery voltage

Terminal	Wire color	Connected to	Test condition	Specification	Action
a	(L/W)	Actuator	Main switch off	0V	Go to Step 4
			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	Va	Repair wire (L/B)
			Main switch on	0V	(Main switch—Cruise control unit)
f	(L/O)	Main switch	Main switch off	0V	Repair wire (L/O)
			Main switch on	Va	(Main switch—Cruise control unit)

V<sub>B</sub>: Battery voltage

Terminal	Wire color	Connected to	Test condition	Specification	Action	
g	(R)	ECM control unit	Ignition switch OFF	0V	Check ECM control unit (Refer to section F)	
			Ignition switch ON	V <sub>B</sub>		
r	(O)	Stoplight switch (For cruise)	Brake pedal depressed	0V	Check stoplight switch (Refer to page T-40)	
			Brake pedal released	9V		
i	(BY)	Clutch switch	Clutch pedal depressed	0V	Check clutch switch (Refer to page T-40)	
			Clutch pedal released	5V		
		Inhibitor switch	Shift in "N" or "P" range	0V		Check inhibitor switch (Refer to page K1-25)
			Shift to other range	5V		
t	(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 sel switch Main switch ON	0V		
w	(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/Accept 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		
a	(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	(L/W)	Battery	Constant	V <sub>B</sub>	Repair wire	
l	(B)	Ground	Constant	0V	Repair wire	

2EUBTX C27



2EUBTX C18

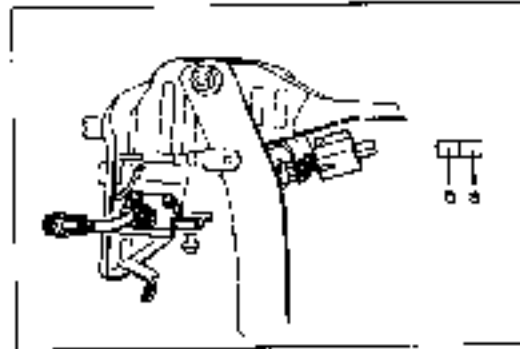
**Step 4 — Inspection of stoplight switch (For cruise)**

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)



2EUBTX C19

**Step 5 — Inspection of inhibitor switch (Refer to Section K1.)**

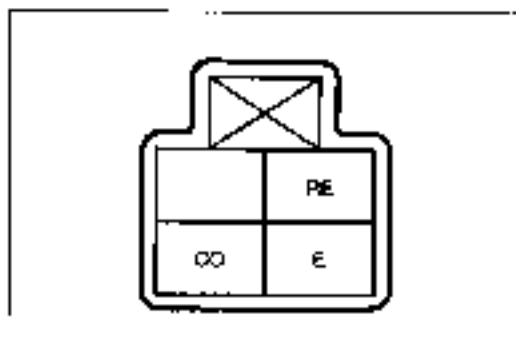
**— Inspection of clutch switch**

1. Disconnect the clutch switch connector.
2. Check continuity between terminals of the switch.

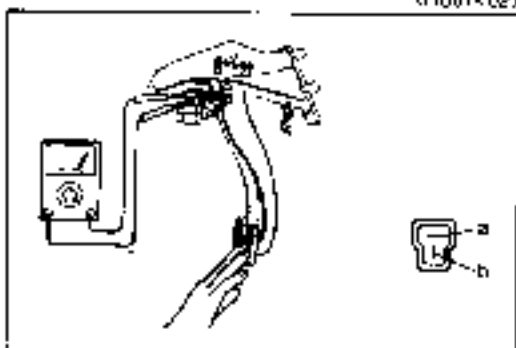
Pedal position	Terminal	
	a	b
Pedal released		
Pedal depressed	○	○

○—○: Indicates continuity

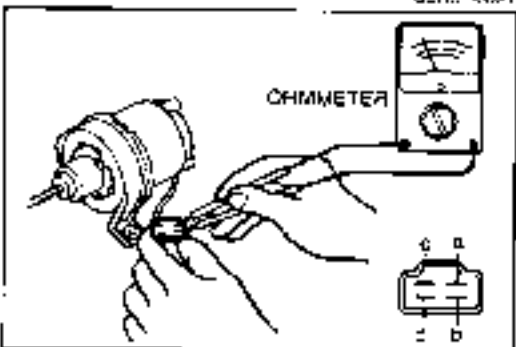
3. If not as specified, replace the clutch switch
4. If the switch is OK, repair the wire harness. (Fuse Clutch switch — Control unit)



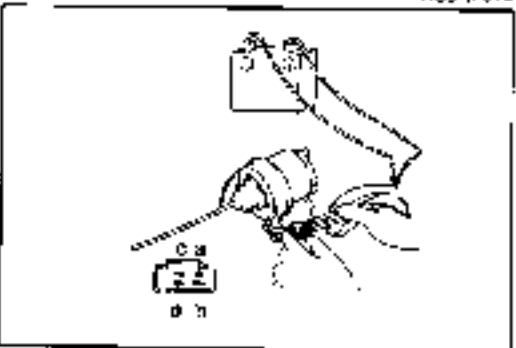
01U07K027



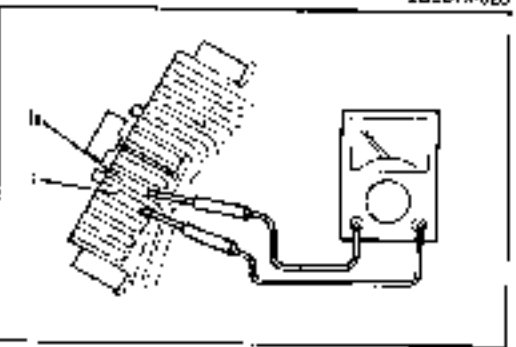
02E1070091



1HUJ7X014



2BL07X023



02U07K027

**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/ACCE	○	○	○

○—○. 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	02600
c-a	60	55
c-b	23	22
c-c	90	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 motor. (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.

2BUJTX-028

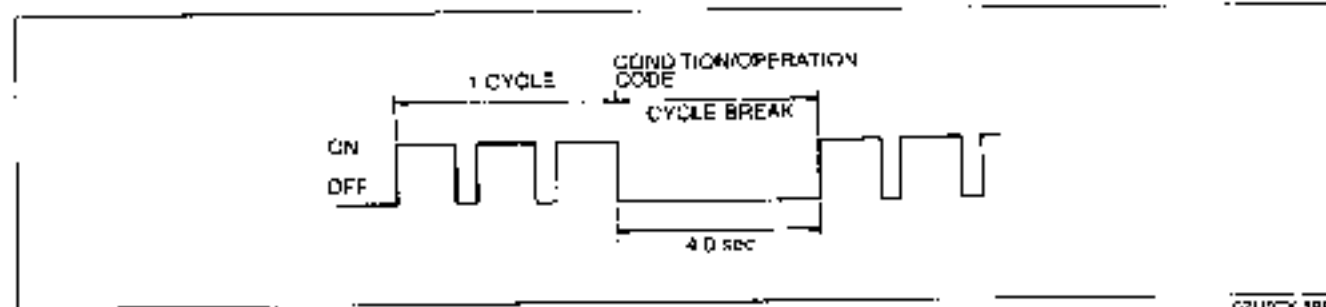
**Principle of Code Cycle**

Condition and operation codes are determined by flashing of the test light connected to the control unit as shown below.

00UJTX-40

**1. Code cycle break**

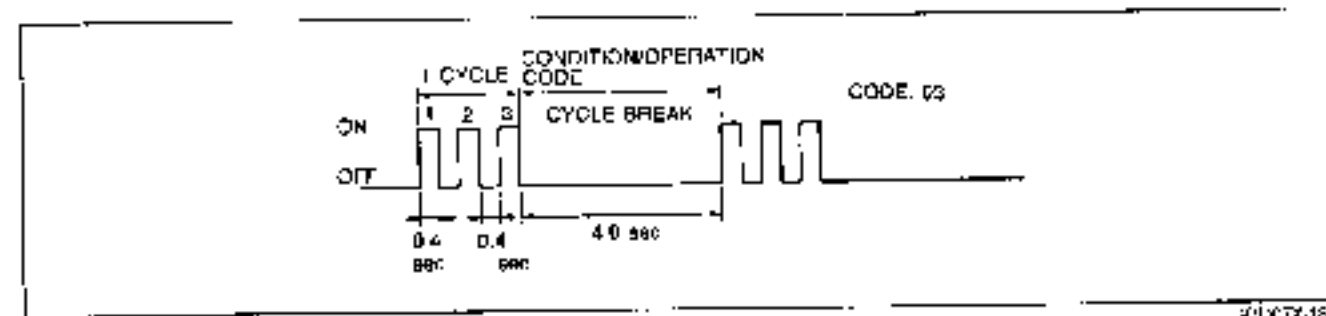
The time between condition/operation code cycles is 4.0 seconds (the time the lamp is off).



07UJTX-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.

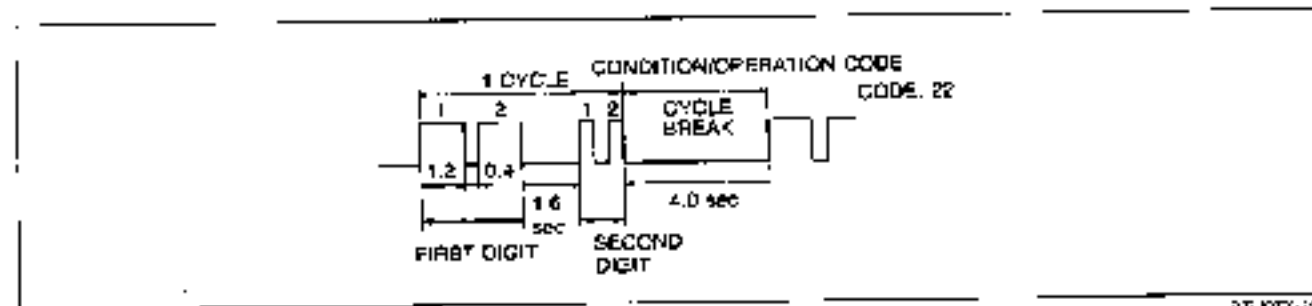


07UJTX-188

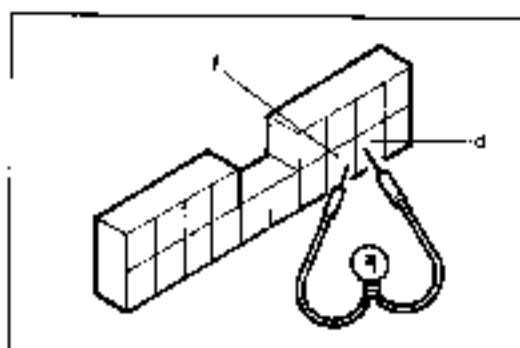
**3. First digit of condition/operation code (tens position)**

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.



07UJTX-188



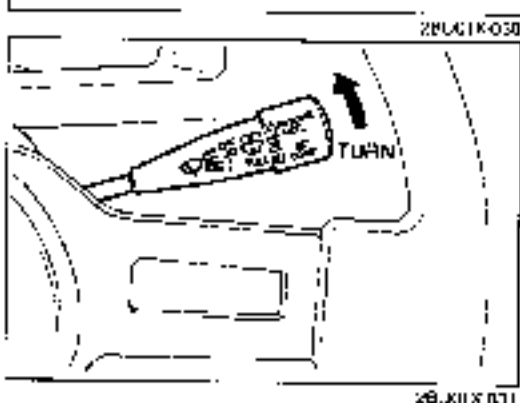
**Inspection Procedure**

**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**

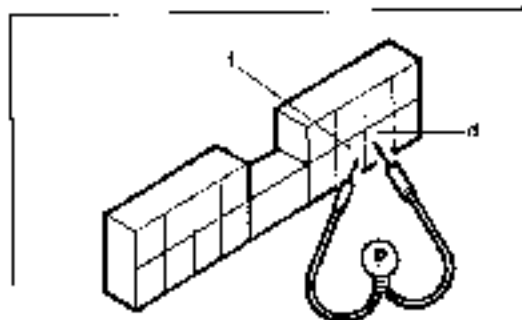
The test light will flash if a malfunction is present.

Pattern of output signal (Test light)	Code No.	Possible Cause	Action
ON: [Three distinct pulses] OFF: [Baseline]	07	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: [Rapid pulse train] OFF: [Baseline]	09	STOP fuse blown Defective wiring (Fuse — Cruise control unit)	Replace fuse Repair harness
ON: [Rapid pulse train] OFF: [Baseline]	07	Both stoplight switches (for vehicle and cruise) are ON simultaneously	Inspect stoplight switches (Refer to pages T-34 and T-35)
ON: [Two distinct pulses] OFF: [Baseline]	11	Defective SET/COAST, or RESUME/ACCEL switch	Inspect cruise control switch (Refer to page T-41)
ON: [Rapid pulse train] OFF: [Baseline]	15	Defective cruise control unit	Go to troubleshooting (Refer to page T-33)

**Note**

If there is more than one malfunction, the code numbers will be indicated in numerical order.

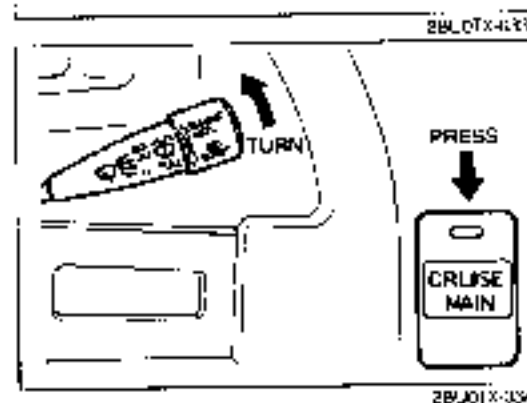
28LUTX-002

**Inspection Procedure****Quick inspection of cruise control system**

1. Locate the cruise control connector.
2. Connect a 14W 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**

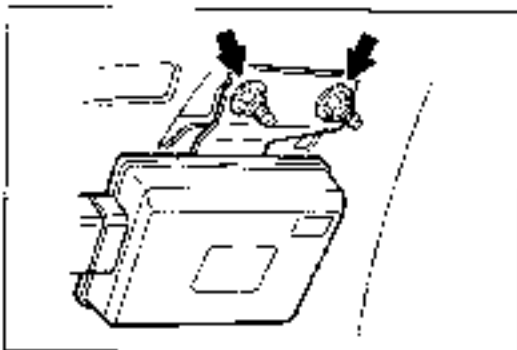
The test light will flash if the system is operating correctly. If the light fails to flash, inspect the system as shown.

**Note**

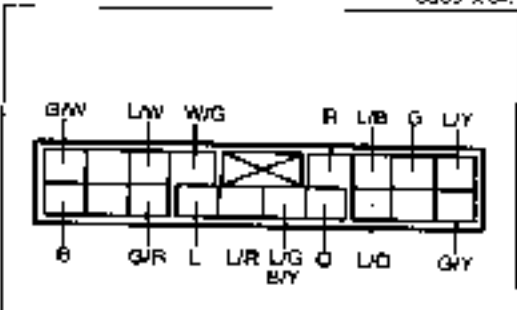
Shift the selector lever to D or R range before performing the inspection. (For ATX)

Procedure	Pattern of output signal (Test light)	Code No.	Action to inspect
Press SET/COAST switch	ON: [Pulse] OFF: [Pulse]	21	Inspect cruise control switch (Refer to page T-41)
Press RESUME/ACCEL switch	ON: [Pulse] OFF: [Pulse]	22	Inspect cruise control switch (Refer to page T-41)
Depress brake pedal	ON: [Pulse] OFF: [Pulse]	31	Inspect stop light switches (Refer to page T-34 and T-35)
Turn ignition switch to ON and shift the selector lever to F or N range (For ATX); Depress clutch pedal (For MTX)	ON: [Pulse] OFF: [Pulse]	35	Inspect inhibitor switch (Refer to Section K) or clutch switch (Refer to Section F)
Drive vehicle above 40 km/h (25 mph)	ON: [Pulse] OFF: [Pulse]	37	Inspect speed sensor or wire harness

SUL:TX-026



00007X 047



00007X 025

**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.

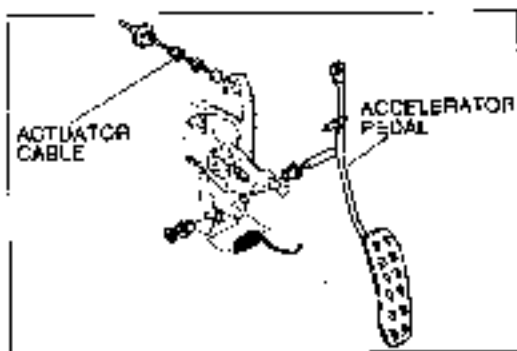
**Note**

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/M)	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)	ECM control unit or IAT control unit	Ignition switch OFF	0V	Check ECM 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	
i	(L/G)	Clutch switch	Clutch pedal depressed	0V	Check clutch switch (Refer to page T-40)
			Clutch pedal released	9V	
	(B/Y)	Inhibitor switch	Shift to "N" or "P" range	0V	
			Shift to other range	9V	
l	(L/R)	Cruise control switch (Set/Coast switch)	Main switch ON	V <sub>a</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>a</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-46)
s	(G/W)	Battery	Constant	V <sub>b</sub>	Repair wire
t	(B)	Ground	Constant	0V	Repair wire

26U07X-408

**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

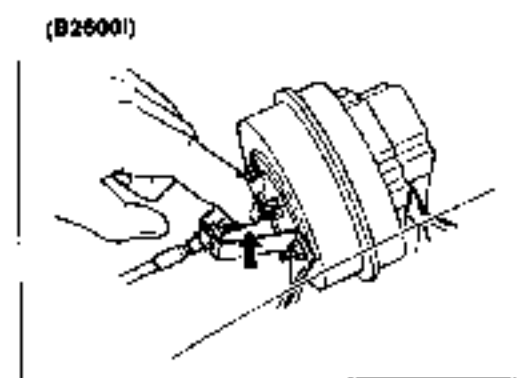
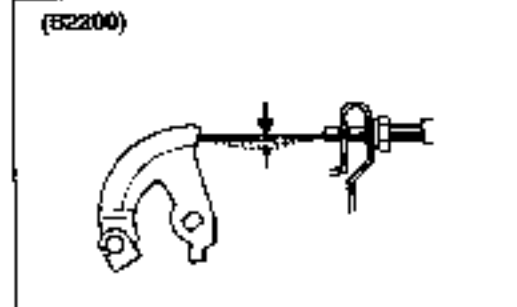
**Installation**

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.

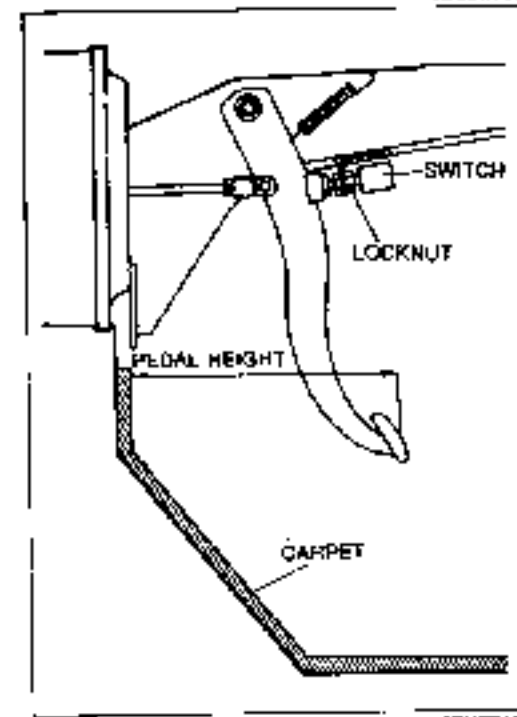
**Clutch pedal height**

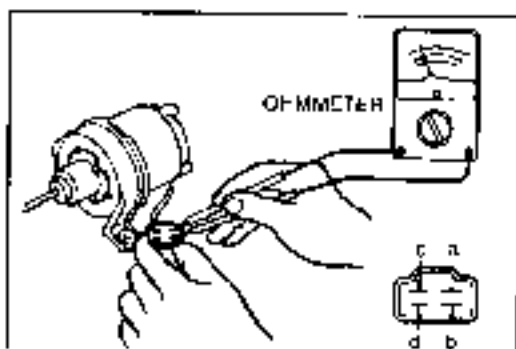
B2200 : 181—191mm (7.13—7.52 in)

B2600i: 191—201mm (7.52—7.91 in)

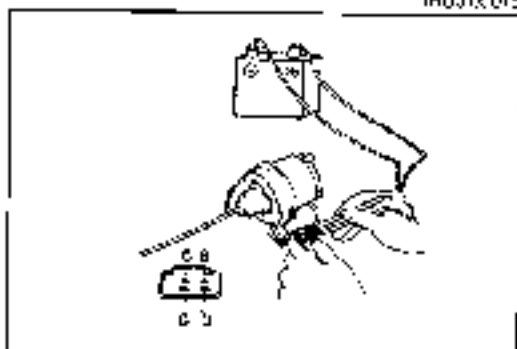
**Brake pedal height:**

180—185mm (7.09—7.28 in)

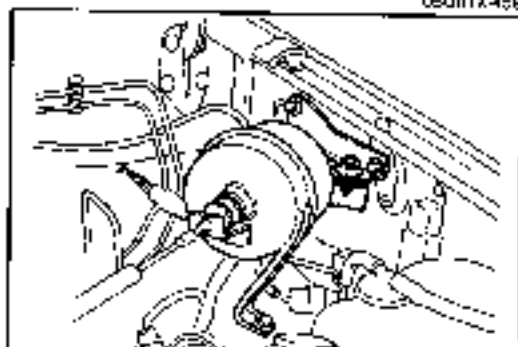




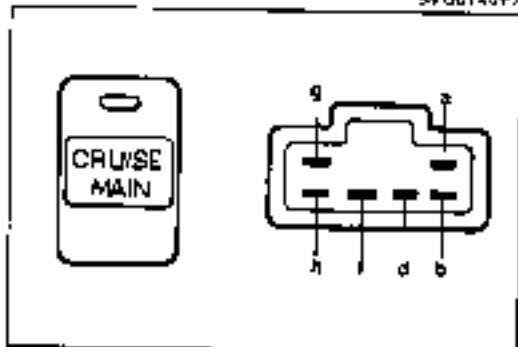
1R0UTX013



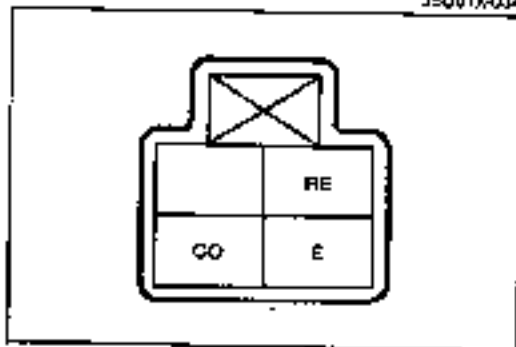
05U0TX408



5VU0TX099



02U0TX034



061K1XC35

**ACTUATOR**

**Inspection**

1. Measure the actuator solenoid resistance using an ohmmeter

Check terminals	Resistance (Approx.)	
	B2200	B2800
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.

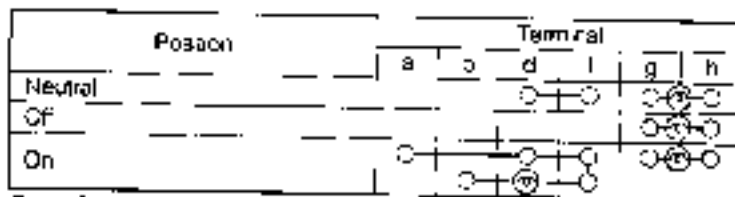
**Installation**

Install in the reverse order of removal.

**CRUISE CONTROL MAIN SWITCH**

**Inspection**

1. Check continuity between terminals of the cruise control main switch:



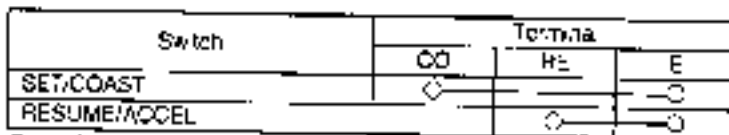
○—○: Indicates continuity

2. If not as specified, replace the cruise control main switch.

**CRUISE CONTROL SWITCH**

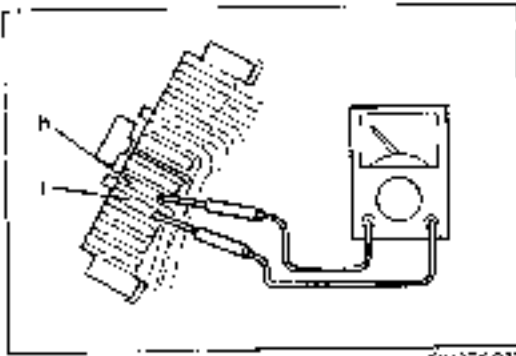
**Inspection**

1. Disconnect the combination switch connector
2. Check continuity between terminals of the combination switch connector.



○—○: Indicates continuity

3. If not as specified, replace the cruise control switch.



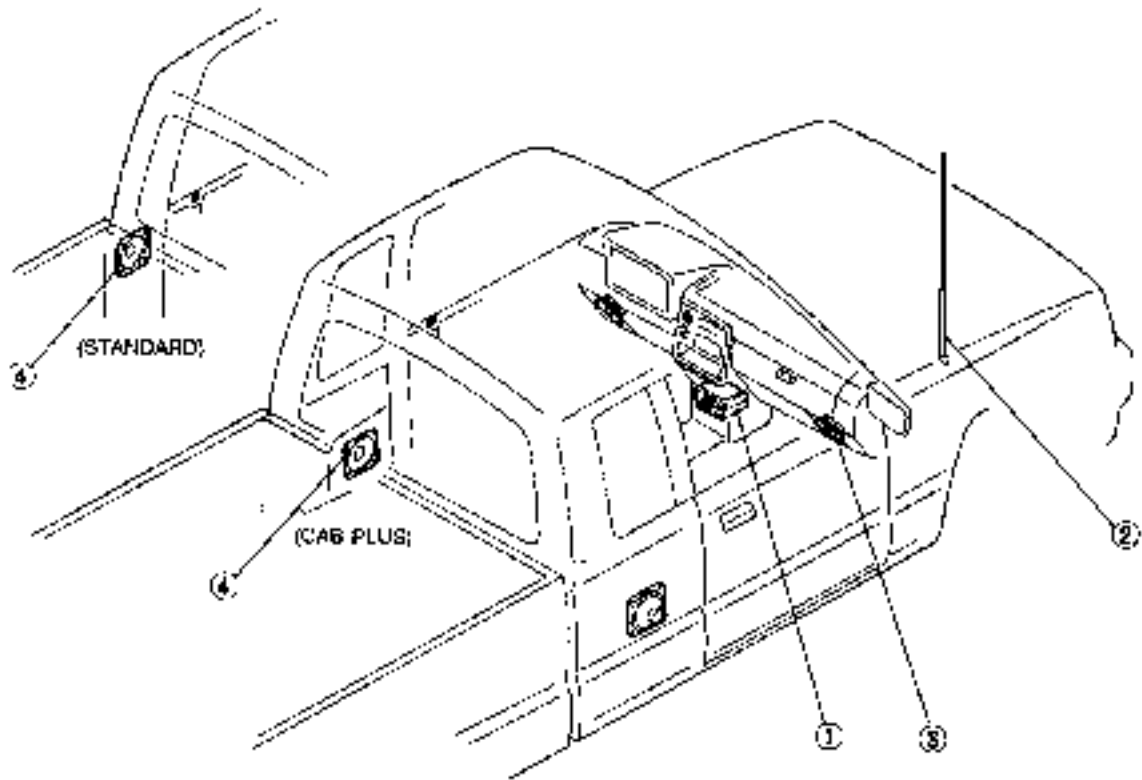
2910176027

**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



1. Audio unit  
2. Antenna

3. Front speaker  
4. Rear speaker

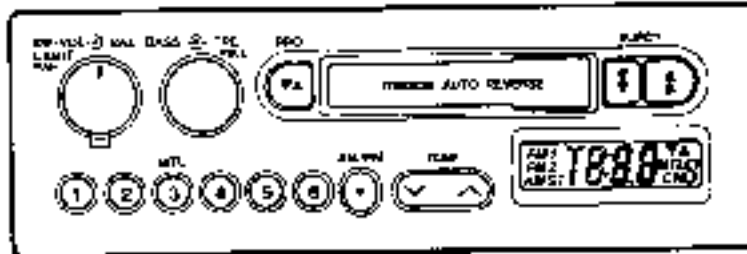
02U07X.C36



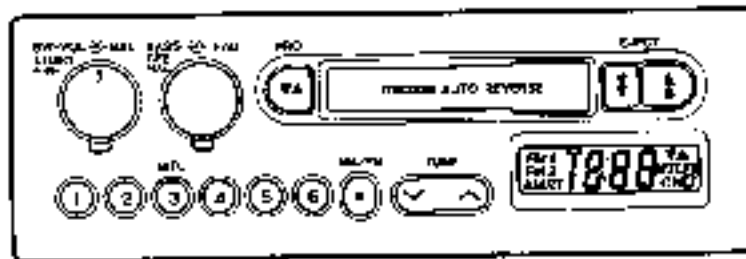
## OUTLINE OF AUDIO

Front view

AM-FM RADIO, CASSETTE TAPE PLAYER

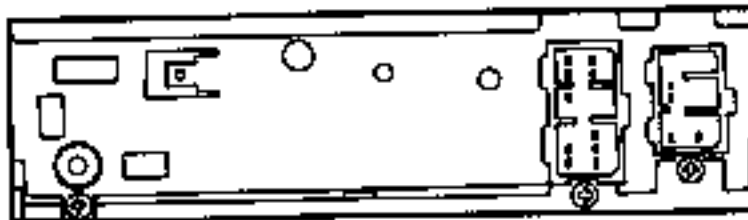


AM-FM RADIO, CASSETTE TAPE PLAYER



00007X037

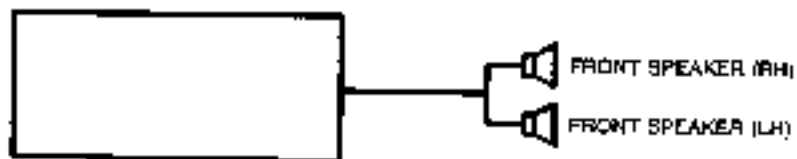
Rear view



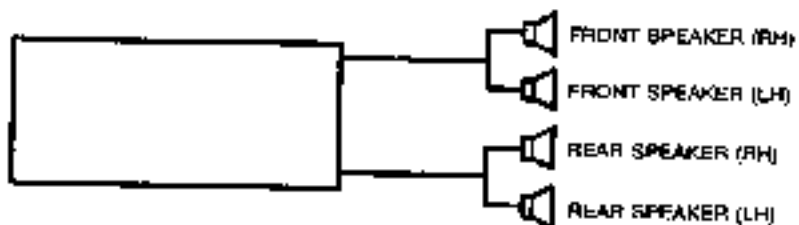
00007X030

SYSTEM

AM-FM RADIO, CASSETTE TAPE PLAYER



AM-FM RADIO, CASSETTE TAPE PLAYER



00U07X-039

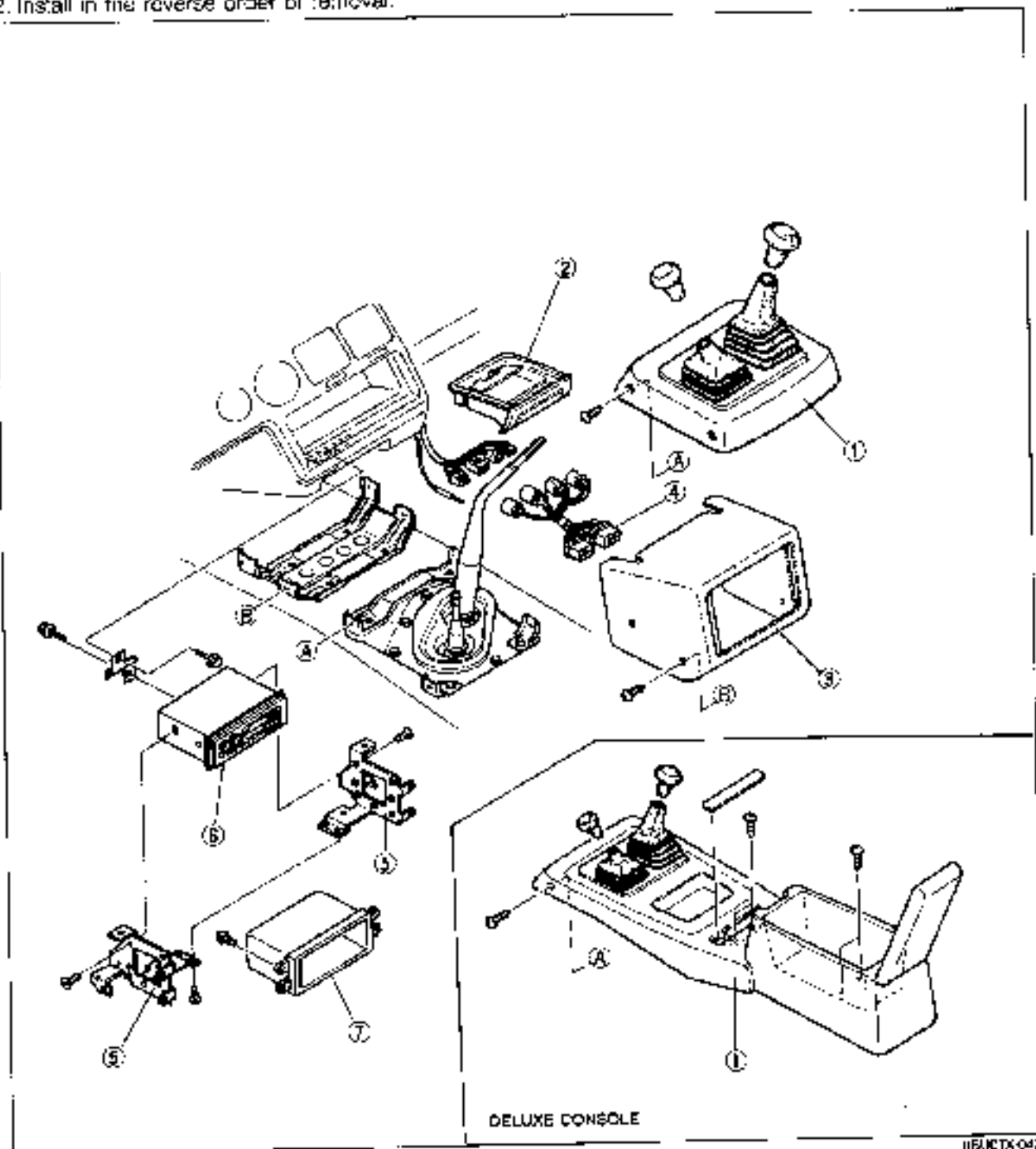
## REMOVAL AND INSTALLATION

**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.



1. Front console
2. Ashtray
3. Audio box

4. Stereo cord
5. Bracket
6. Audio unit

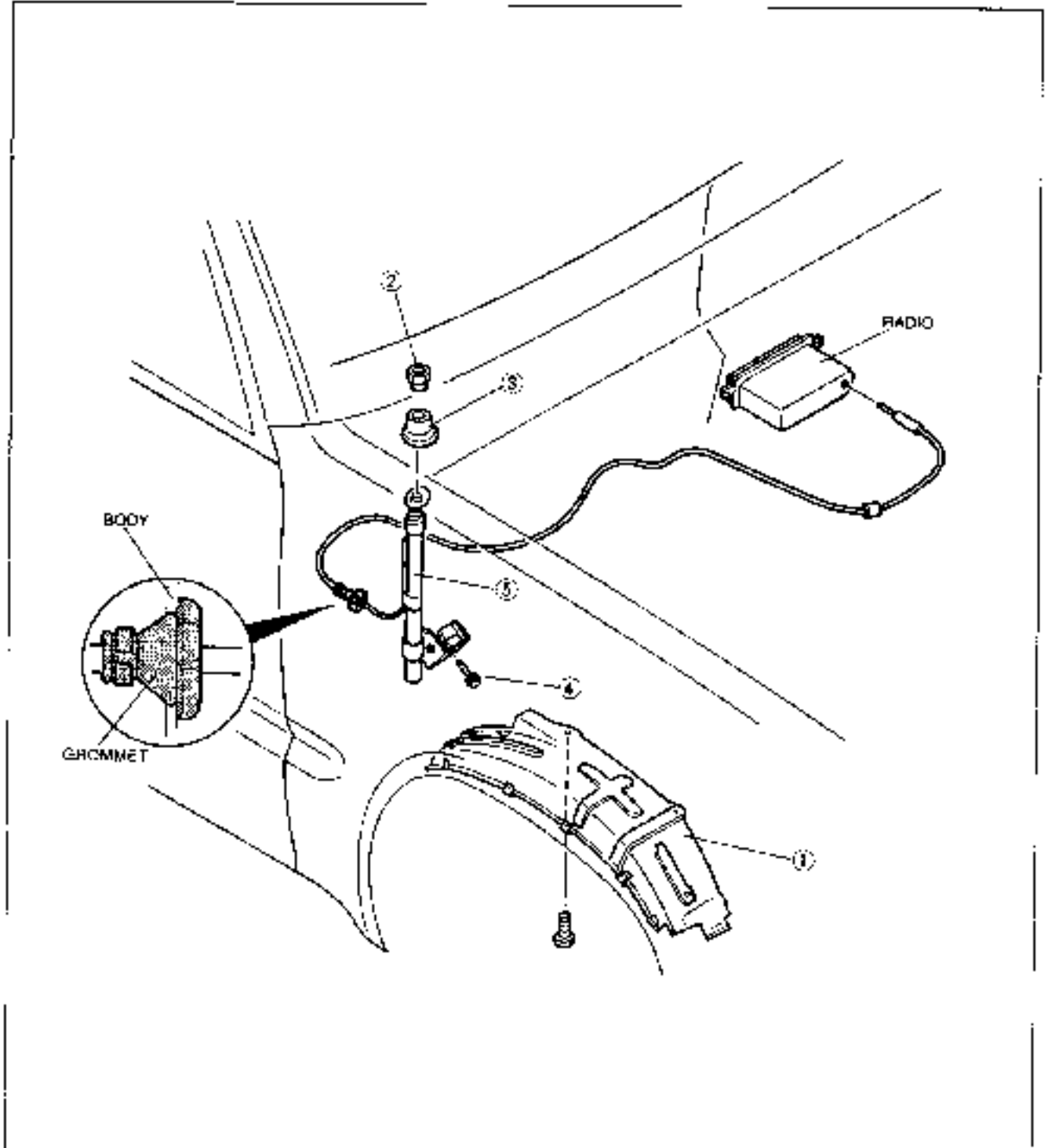
7. Stereo ornament

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 figures.
2. Install in the reverse order of removal.

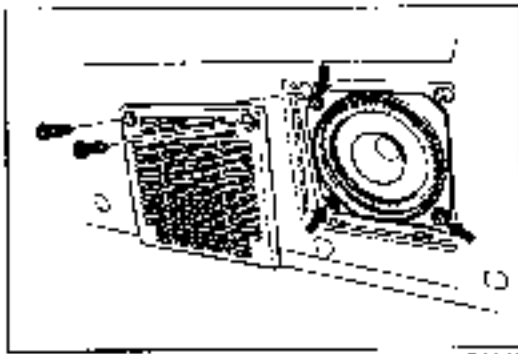


1. Mud guard  
2. Mounting nut

3. Mounting insulator  
4. Mounting bolt

5. Antenna assembly

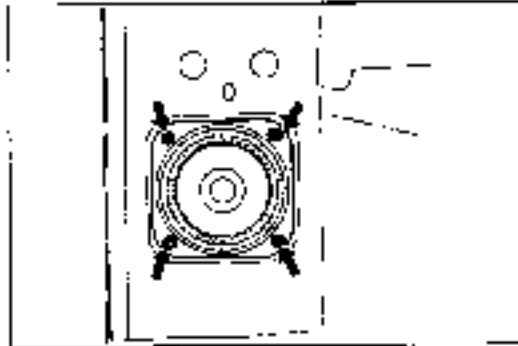
SE-CTA-036



98UJTX-049

**Front Speaker**

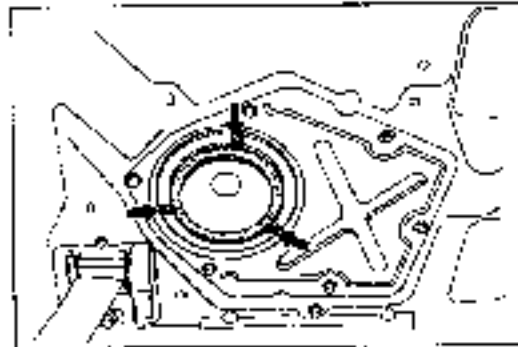
1. Remove the screws and the speaker grille.
2. Remove the screws and disconnect the connector; then remove the speaker.
3. Install in the reverse order of removal.



21UJTX-036

**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.

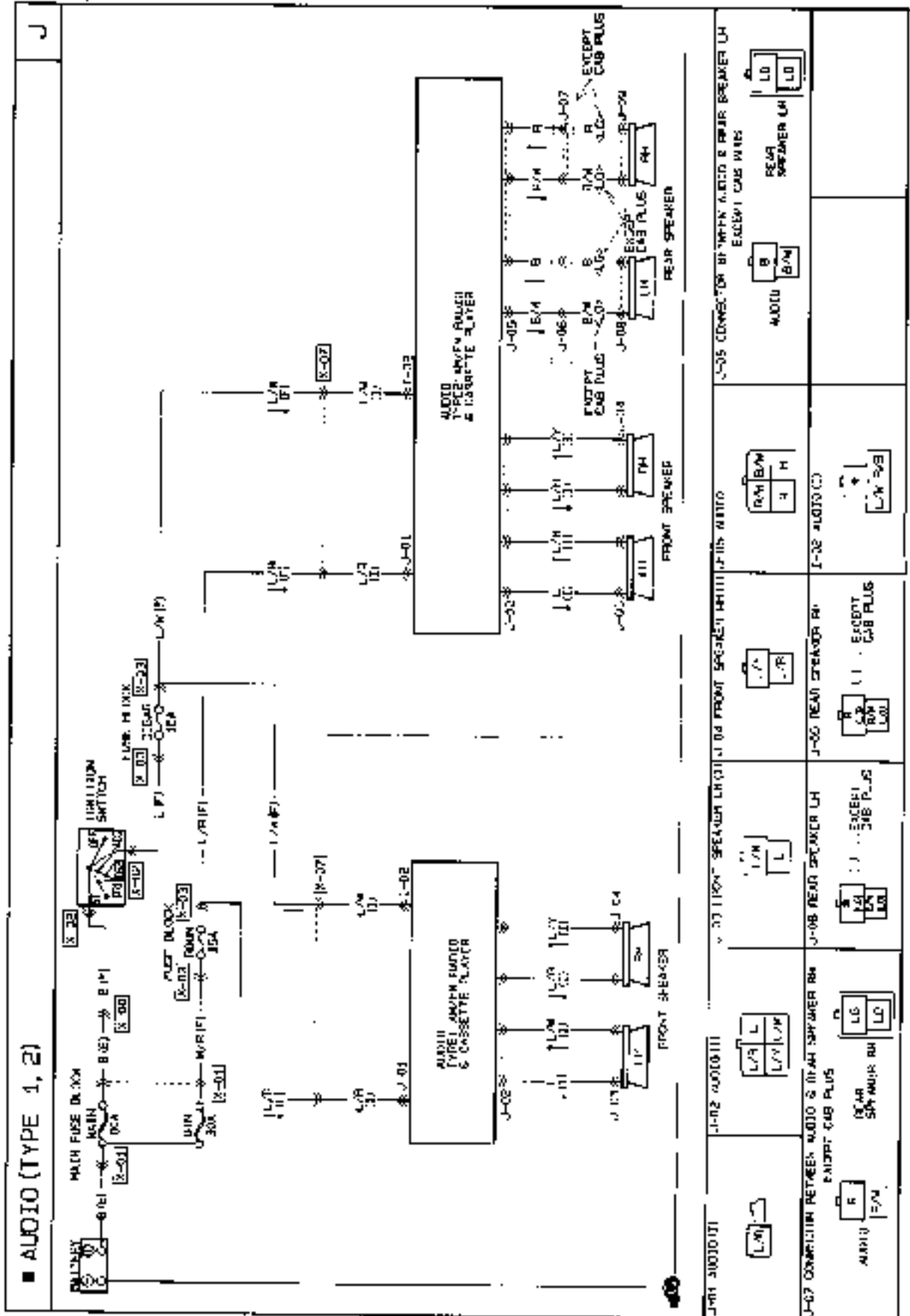


2B,0TX-B40

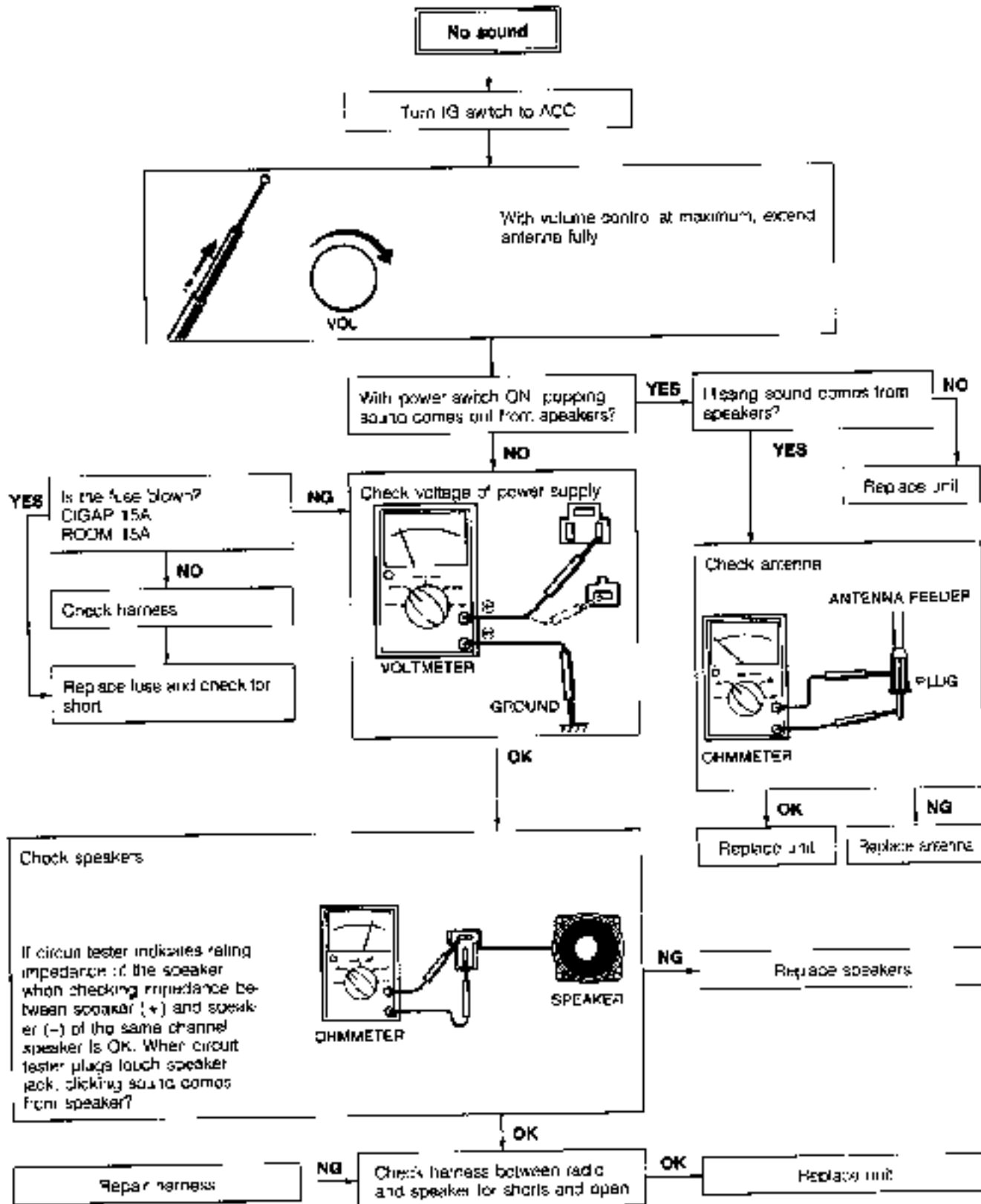
**Cab plus**

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.

## TROUBLESHOOTING Circuit Diagram

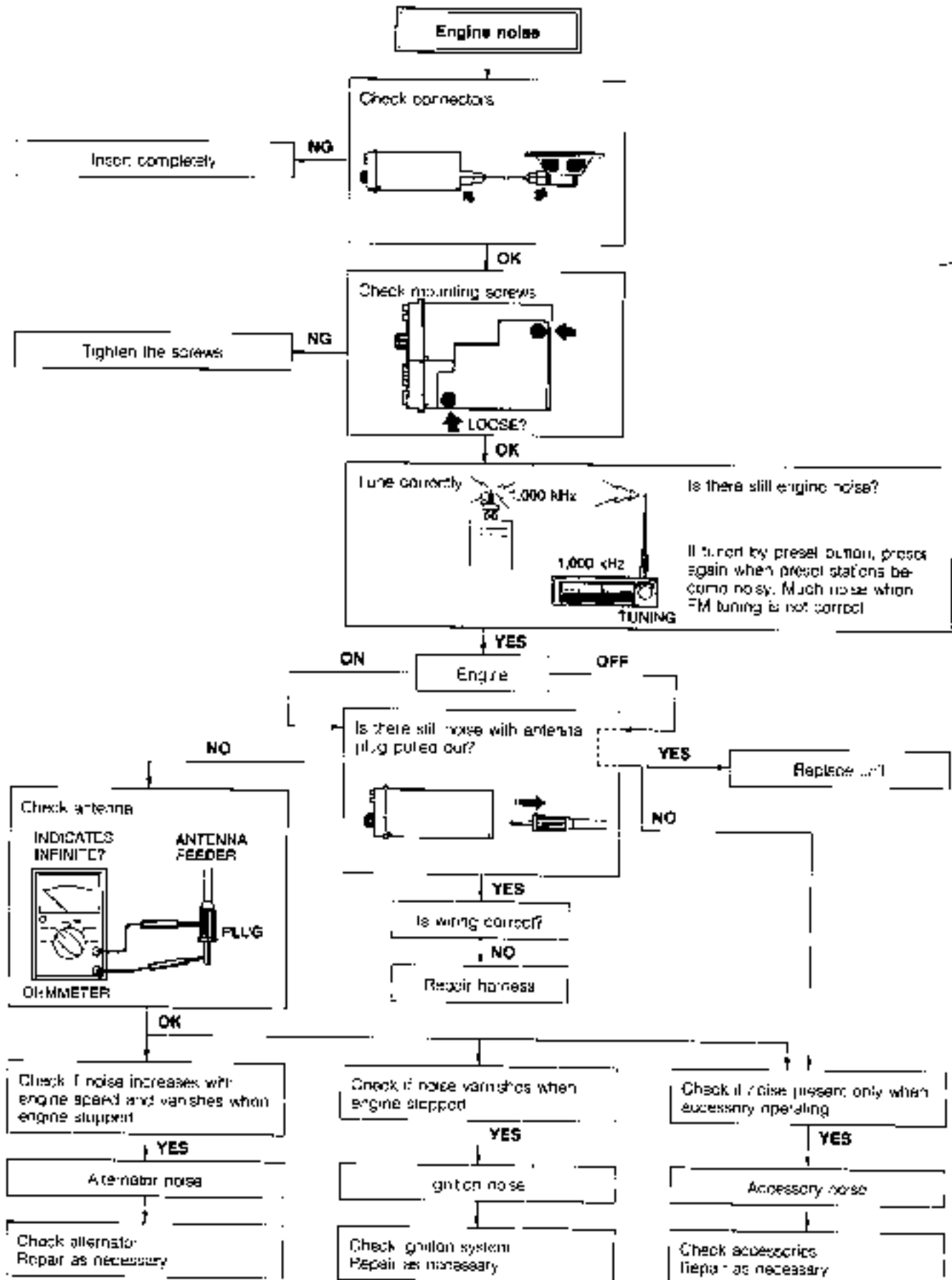


RADIO



08-10134-02

## RADIO



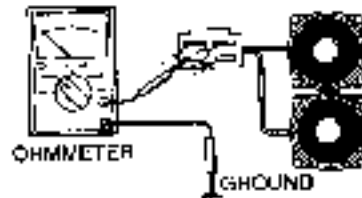


RADIO

Poor tone quality

Check for shorts in speaker harness

Repair harness → NG



If circuit tester indicates infinite ohm when checking voltage of resistance between each speaker lead and car body, speaker harness is OK

OK

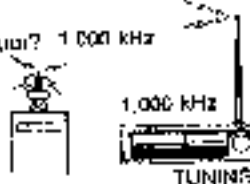
Repair speakers → NG

Check for objects lying on speaker and rattling



OK

Tune correctly  
Is tone quality still poor? 1,000 kHz



If tuned by preset button, preset again when preset stations become noisy

Much noise when FM tuning is not correct

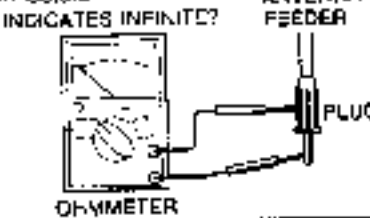
YES

Extend antenna  
Is tone quality still poor?

YES

Replace antenna → NG

Check antenna and lead in for broken connectors



AV:  
With engine off touch antenna and tune to a station whose signal is neither weak nor strong. Other parts of body must not touch the car.  
Volume increase — Antenna is defective  
Volume decrease — All right

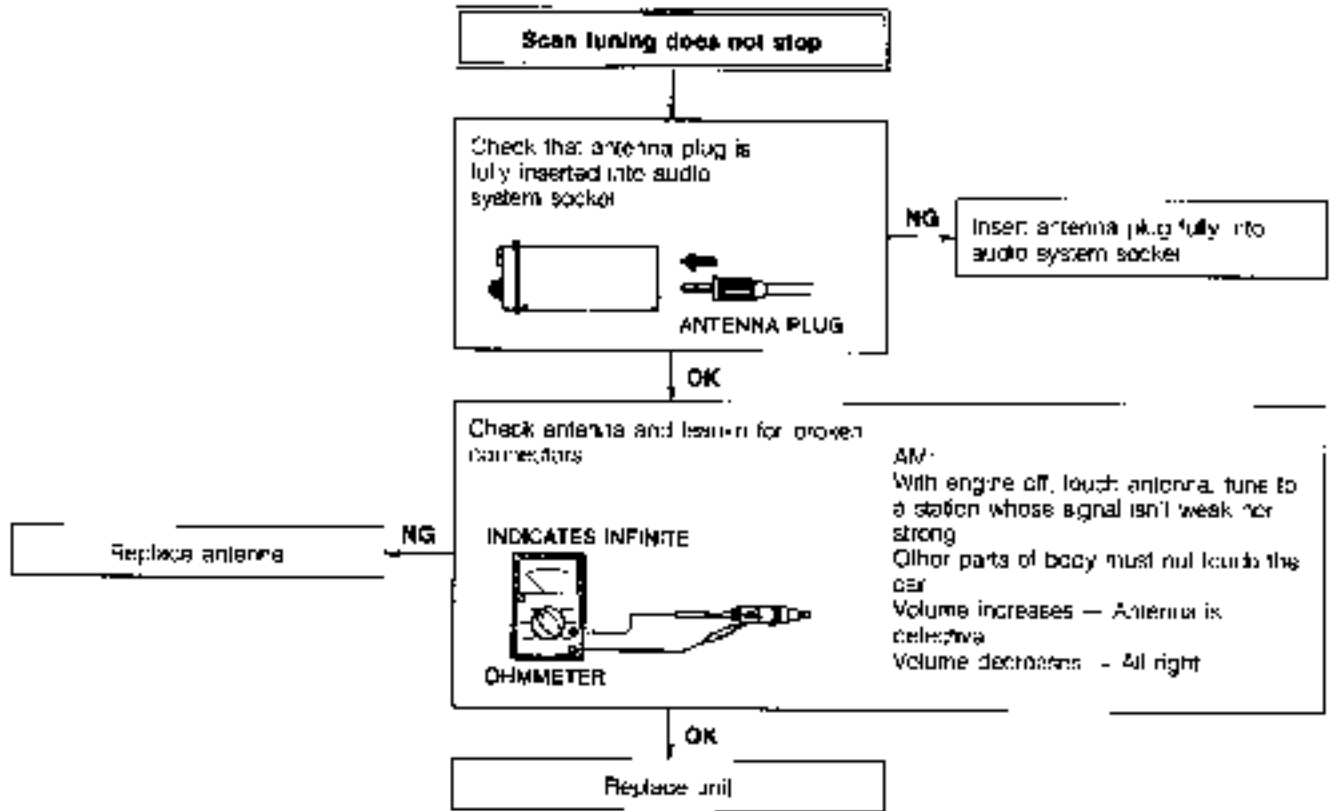
Is propagation cause of poor tone quality? → OK

NO

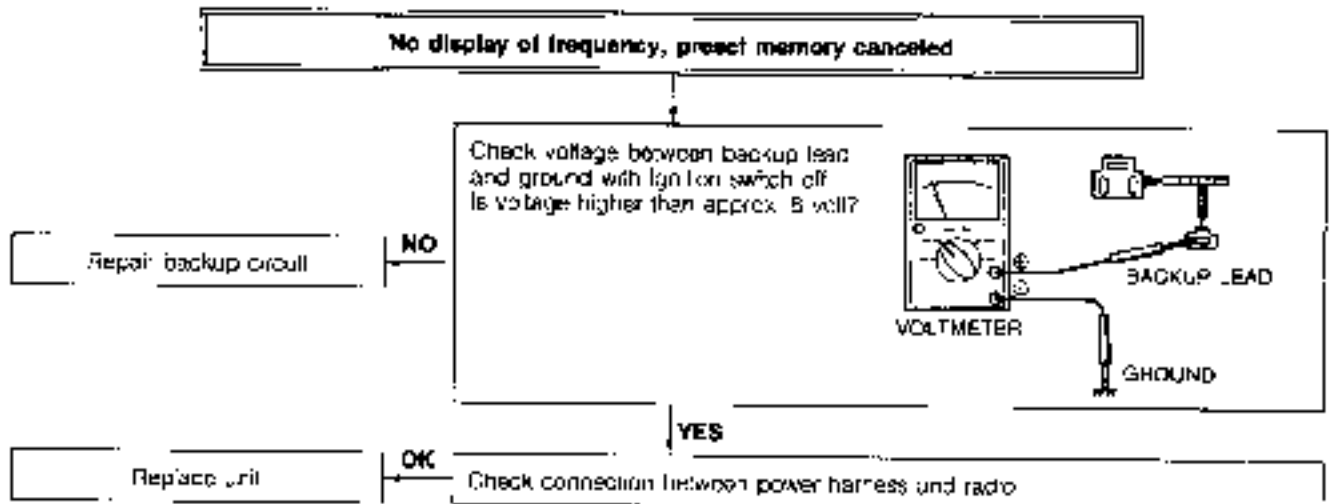
Replace unit

CEJ573 243

## RADIO



1.R1012-064

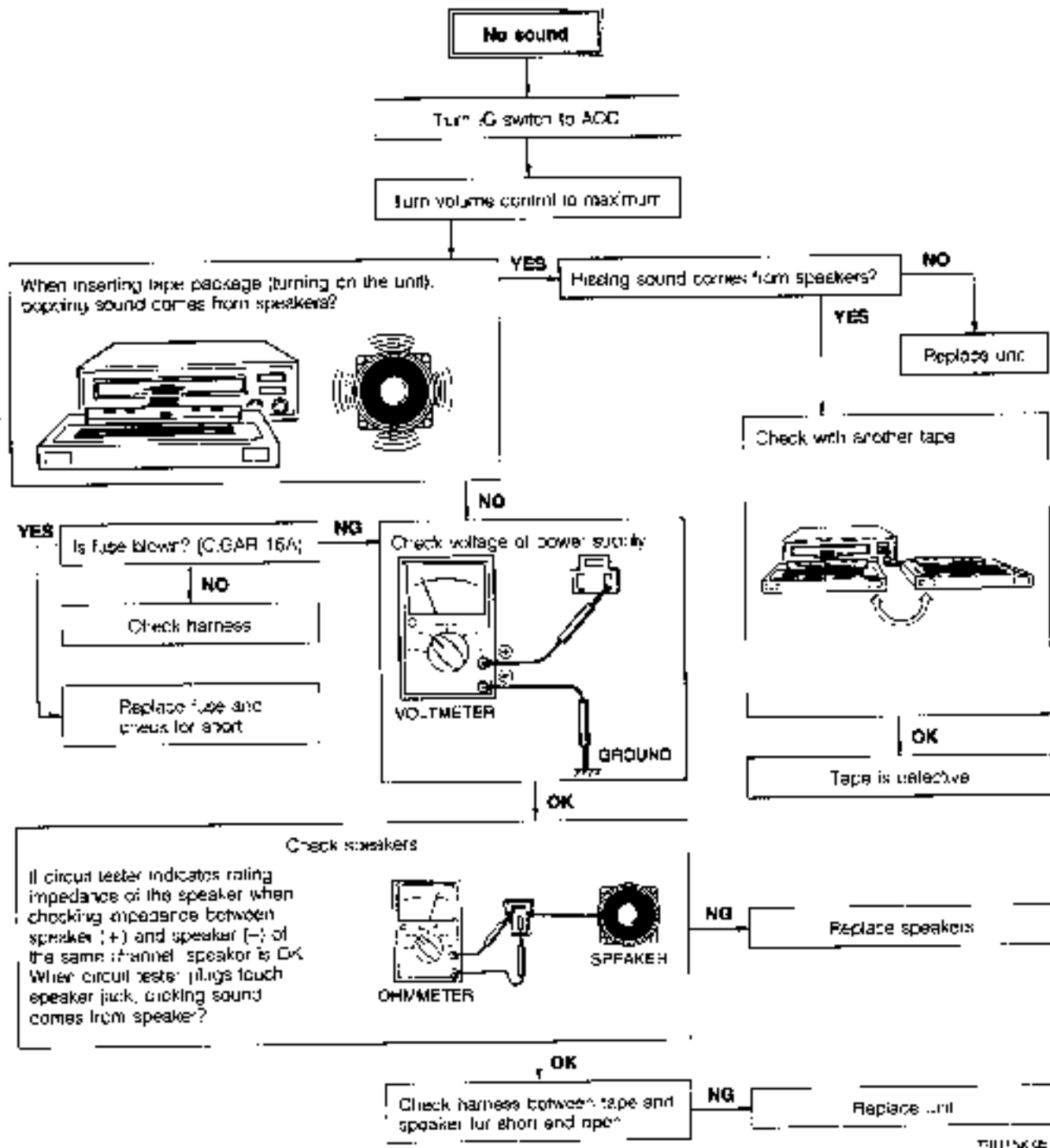


**Note**

**When battery is discharged or radio is disconnected from battery for or during repair, all memory is canceled. Preset stations must be reset.**

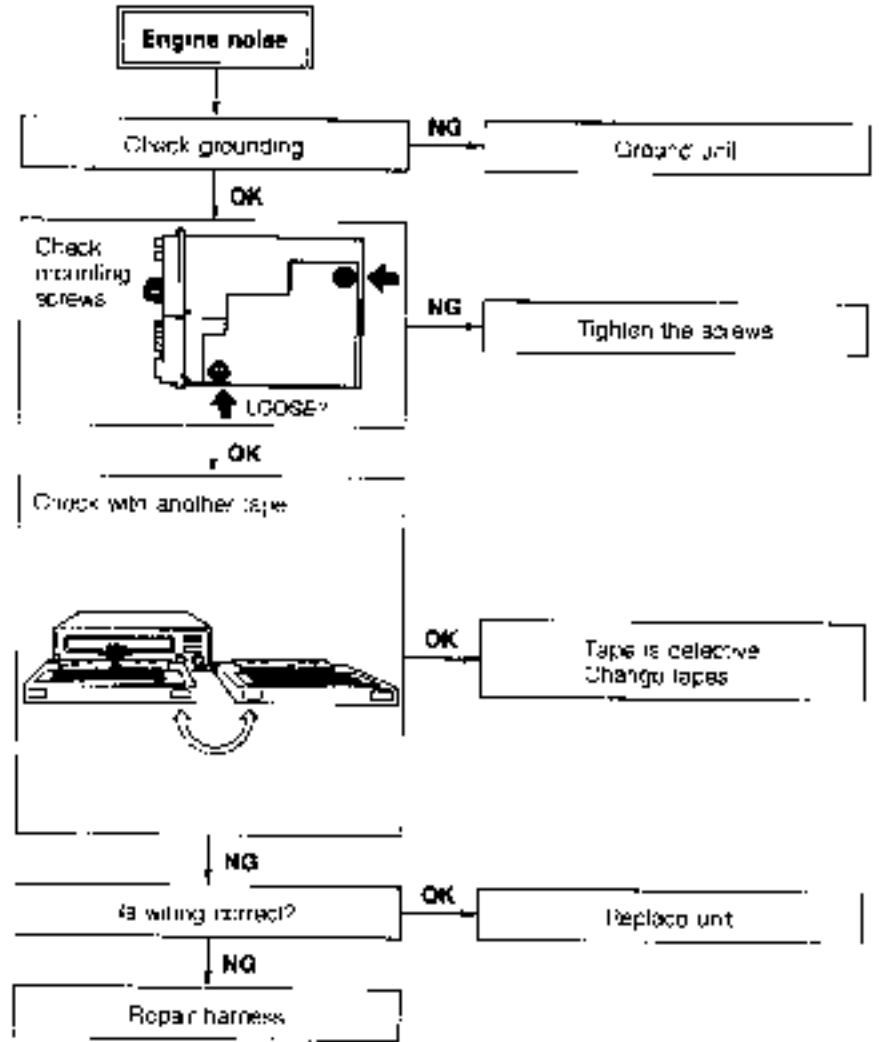
96U13-134

CASSETTE DECK



TJ015K057

CASSETTE DECK

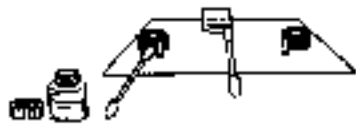


9BUCTX-050

CASSETTE DECK

Poor tone quality

Clean head, capstan, and pinch rollers



Use Alltop Head cleaner or equivalent

NG

Check head, capstan, and pinch roller for oxide and dirt buildup

OK

Check with another tape

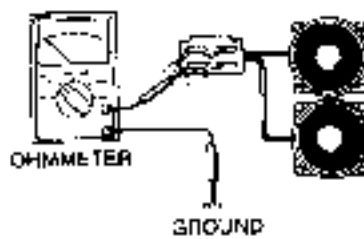


Tape is defective  
Change tapes

OK

NG

Check for shorts in speaker harness



Repair harness

NG

If circuit tester indicates infinite ohm when checking value of resistance between each speaker jack and car body, speaker harness is OK

OK

Repair speakers

NG

Check for objects lying on speaker and wiring

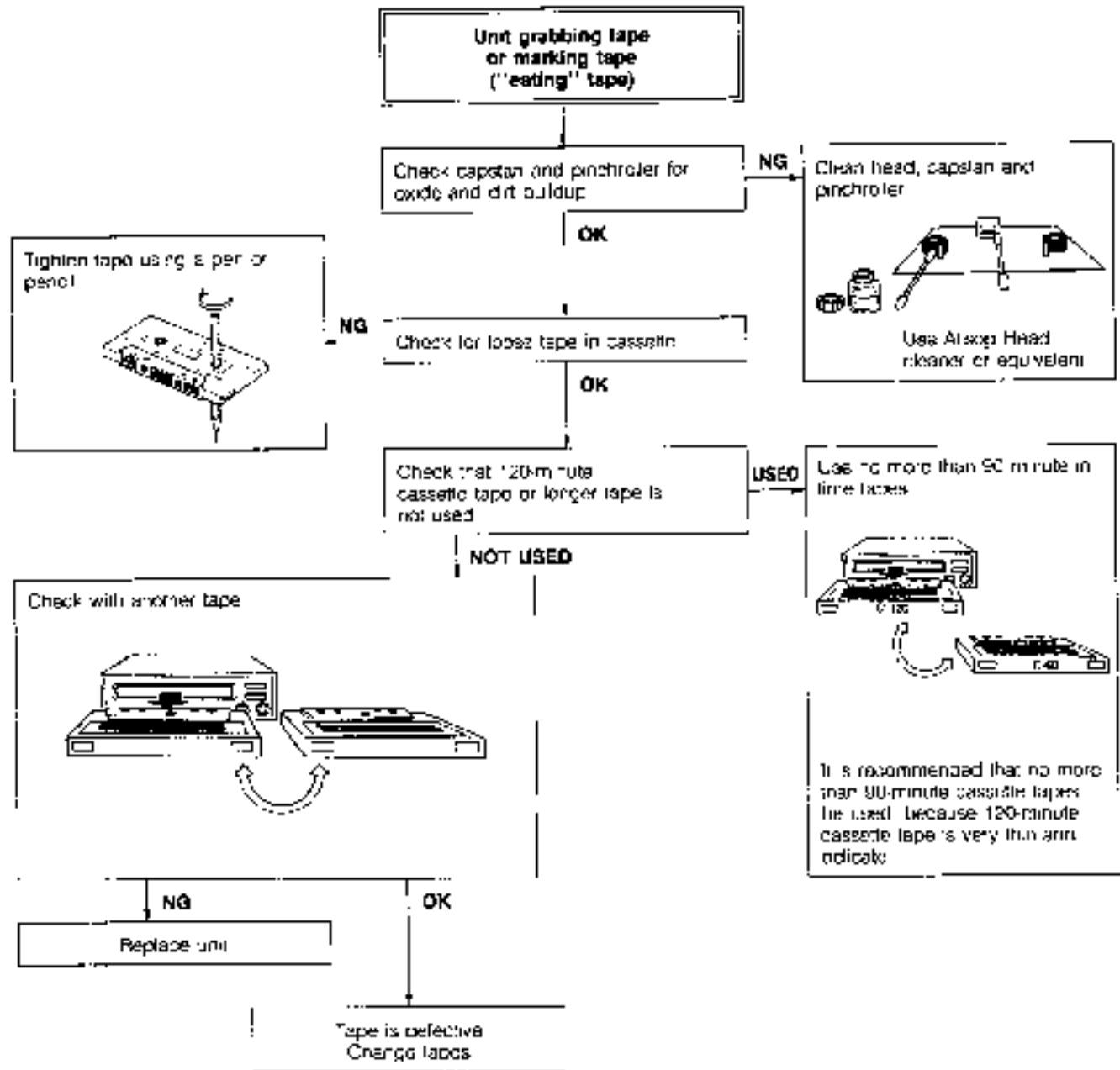


OK

Replace unit

92U31X058

CASSETTE DECK



DELTA DEC



# HEATER AND AIR CONDITIONER SYSTEMS

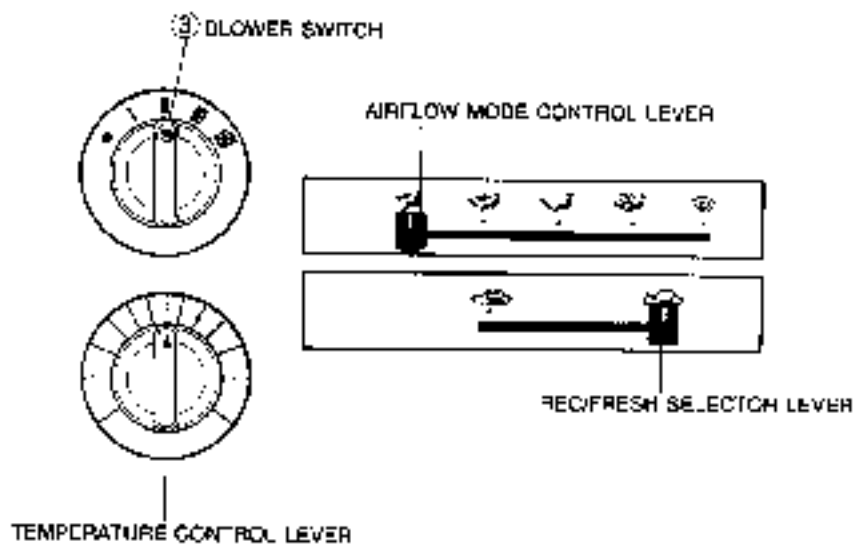
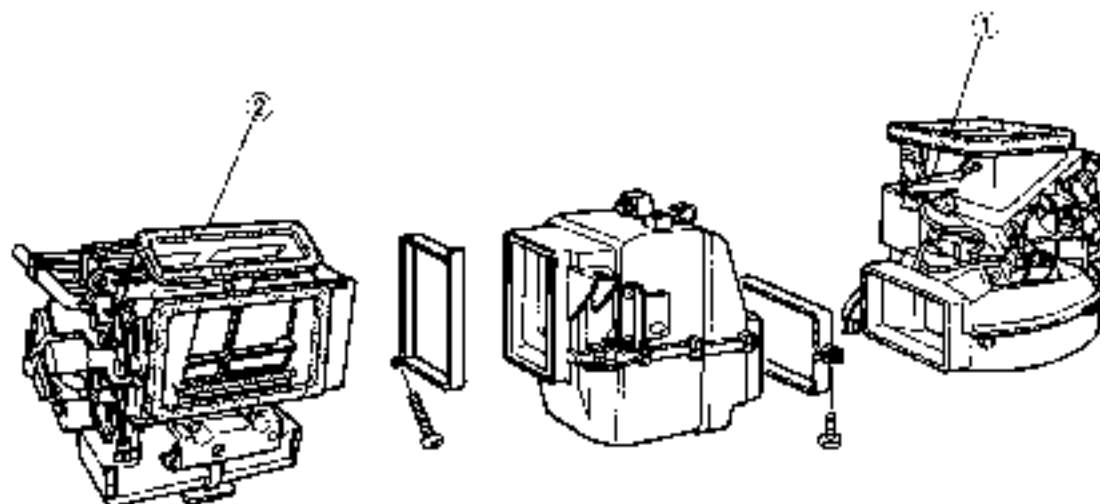
<b>INDEX</b> .....	<b>U- 2</b>
HEATER AND SWITCHES.....	<b>U- 2</b>
AIR CONDITIONER.....	<b>U- 3</b>
<b>TROUBLESHOOTING</b> .....	<b>U- 4</b>
TROUBLESHOOTING GUIDE.....	<b>U- 4</b>
ELECTRICAL TROUBLESHOOTING TOOLS.....	<b>U- 4</b>
<b>CONTROL SWITCH PANEL</b> .....	<b>U-19</b>
REMOVAL AND INSTALLATION.....	<b>U-19</b>
INSPECTION.....	<b>U-20</b>
ADJUSTMENT.....	<b>U-20</b>
<b>BLOWER UNIT</b> .....	<b>U-21</b>
BLOWER MOTOR.....	<b>U-21</b>
BLOWER UNIT.....	<b>U-21</b>
RESISTOR ASSEMBLY.....	<b>U-22</b>
<b>HEATER UNIT</b> .....	<b>U-23</b>
HEATER UNIT.....	<b>U-23</b>
HEATER CORE.....	<b>U-23</b>
<b>REFRIGERANT SYSTEM</b> .....	<b>U-24</b>
SAFETY PRECAUTION.....	<b>U-24</b>
REFRIGERANT CONTAINER	
SERVICE VALVE.....	<b>U-24</b>
REFRIGERANT SYSTEM OPERATION	
PROCEDURE.....	<b>U-25</b>
PERFORMANCE TEST.....	<b>U-29</b>
CHECKING REFRIGERANT CHARGE.....	<b>U-30</b>
CHECKING REFRIGERANT PRESSURE.....	<b>U-30</b>
COOLING UNIT.....	<b>U-31</b>
EVAPORATOR.....	<b>U-32</b>
THERMOSWITCH.....	<b>U-32</b>
PREPARATION.....	<b>U-33</b>
COMPRESSOR.....	<b>U-33</b>
CONDENSER.....	<b>U-43</b>
RECEIVER/DRYER.....	<b>U-45</b>
A/C RELAY.....	<b>U-45</b>
REFRIGERANT PRESSURE SWITCH.....	<b>U-46</b>

S, LN, X4711



INDEX

HEATER AND SWITCHES



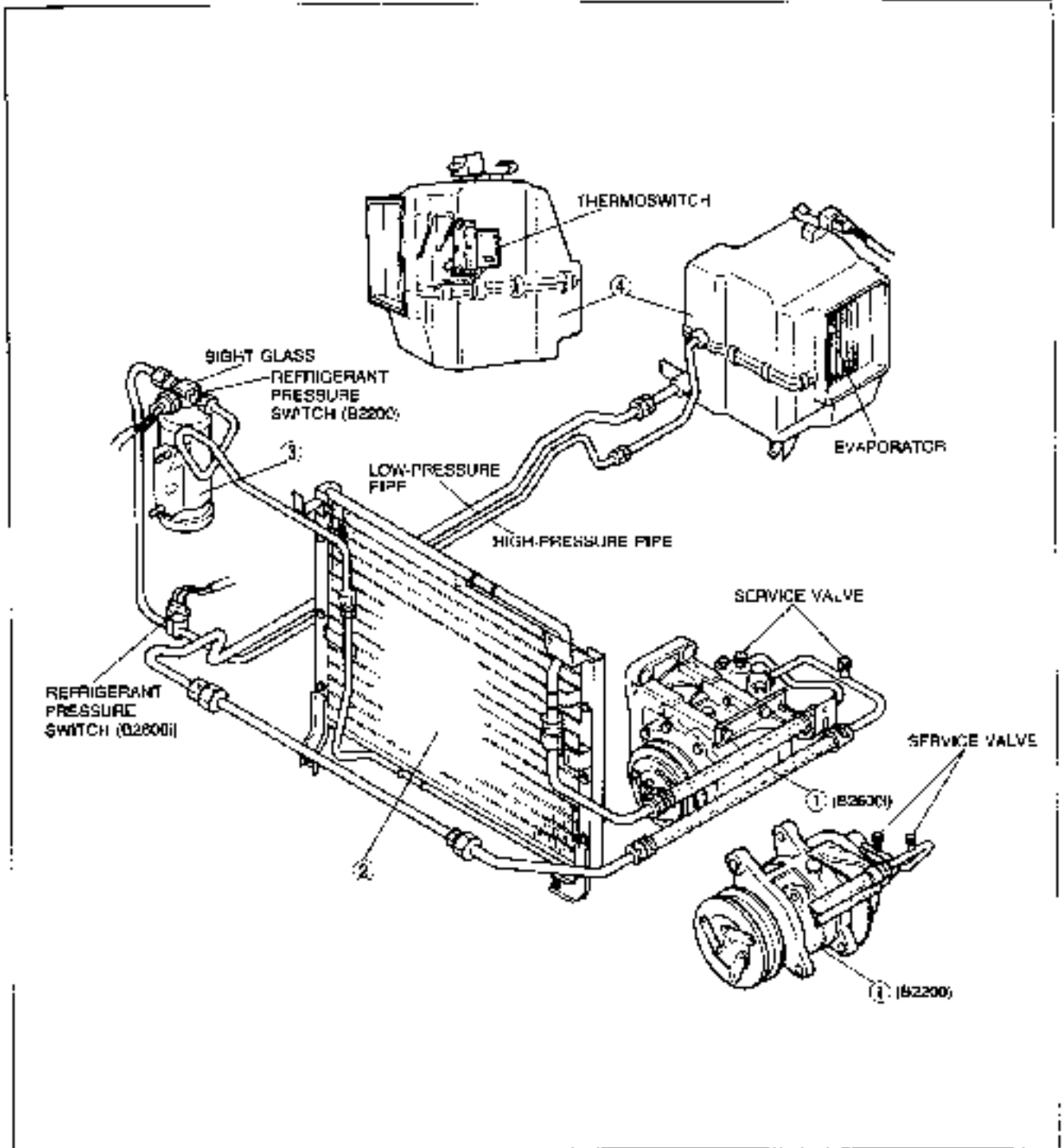
14101A02

1. Blower unit  
 Removal and Installation ..... page U-21  
 Disassembly and Assembly ..... page U-21  
 Inspection ..... page U-21

2. Heater unit  
 Removal and Installation ..... page U-23  
 Disassembly and Assembly ..... page U-23

3. Control switch panel  
 Removal and Installation ..... page U-19  
 Inspection ..... page U-20  
 Adjustment ..... page U-20

**AIR CONDITIONER**



35000-7-502

<b>1. Compressor</b>	
On-vehicle inspection.....	page U-33
Removal.....	page U-34
Installation.....	page U-41
Disassembly.....	page U-34
Assembly.....	page U-39
<b>2. Condenser</b>	
Removal.....	page U-43
Installation.....	page U-44
Inspection.....	page U-42

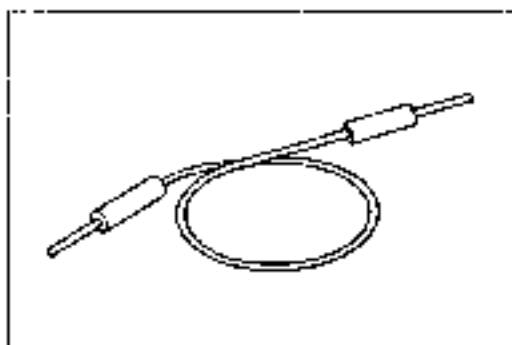
<b>3. Receiver/drier</b>	
On-vehicle inspection.....	page U-45
Removal and Installation.....	page U-45
<b>4. Cooling unit</b>	
Removal.....	page U-31
Installation.....	page U-32
Disassembly and Assembly.....	page U-31
Inspection.....	page U-32

## TROUBLESHOOTING

## TROUBLESHOOTING GUIDE

Symptom	Reference page
Insufficient cooling No cooling Intermittent cooling	U-5
Blower motor does not operate	U-10
Magnetic clutch does not operate	U-13

6R3XJ4RM



9M3XJ4C06

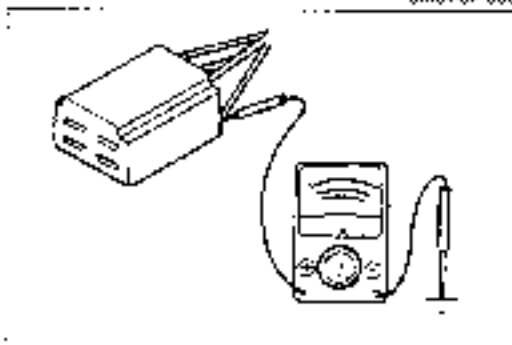
## ELECTRICAL TROUBLESHOOTING TOOLS

**Jumper Wire**

The jumper wire is used for testing by short-circuiting switch terminals and to verify the condition of ground connections.

**Caution**

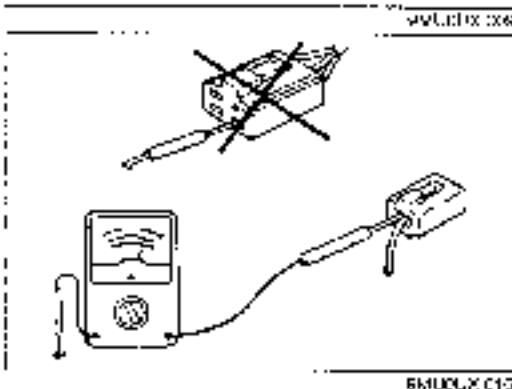
**Do not connect the jumper wire between a power source and a body ground. This may cause burning or other damage to harnesses and electronic components.**



9M3XJ4C06

**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.



6M3XJ4C15

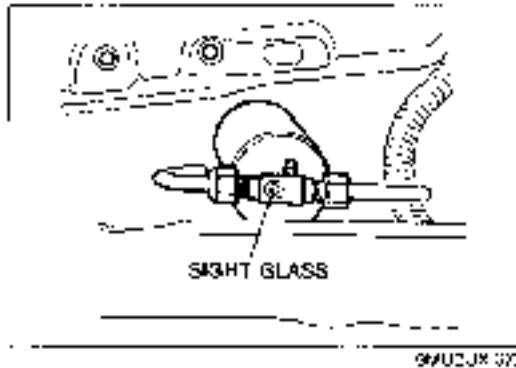
**Ohmmeter**

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

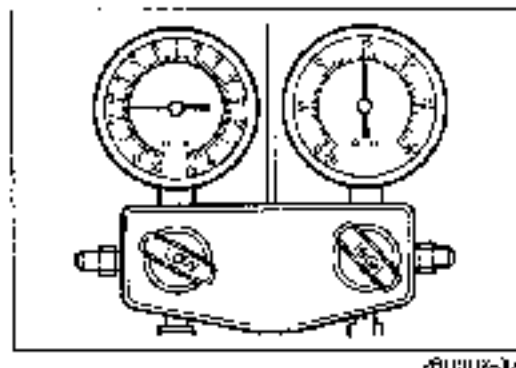


**Step 1 Checking refrigerant charge**

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

5MUSJX 073



**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)**

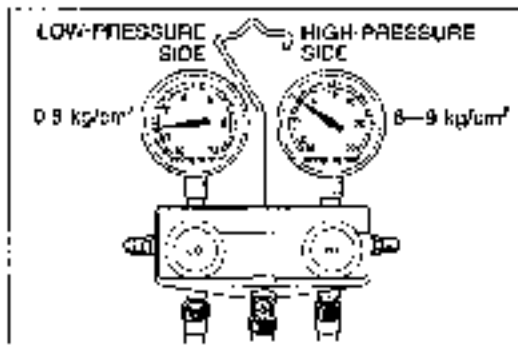
**Low pressure:**

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)

4. If the pressure is not as specified, refer to the following items and check the system.



SB-001-3 (4/8)

**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 connector 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

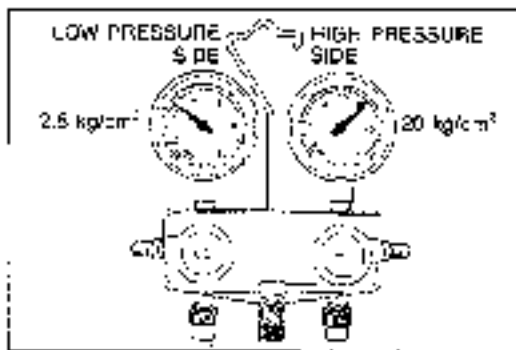
2. If leakage is evident, go to Step 3.

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.)

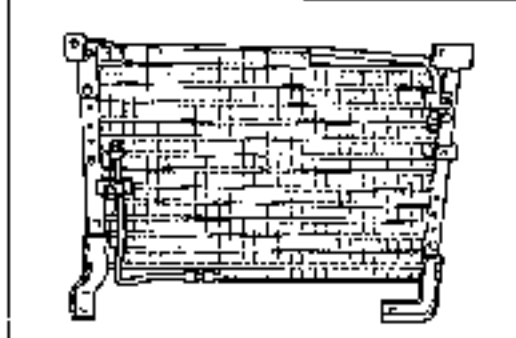
**Step 3**

1. Check tightening torque of the connection where leak was detected.
2. If the connection is loose, tighten the connector, then, evacuate, charge, and test the system.
3. If the connector is properly tightened, replace the O-ring; then, evacuate, charge, and test the system.

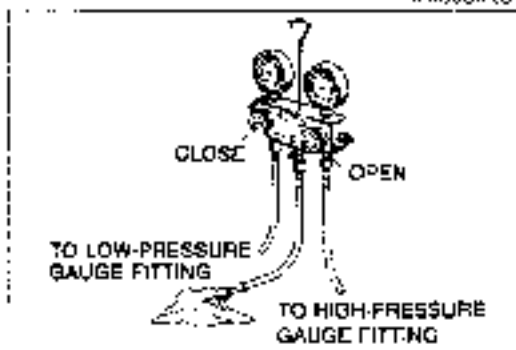
28A10113-004



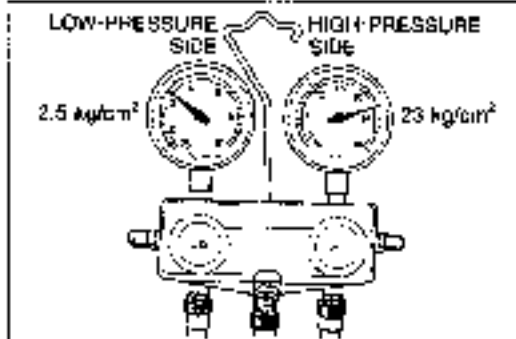
28...00X-000



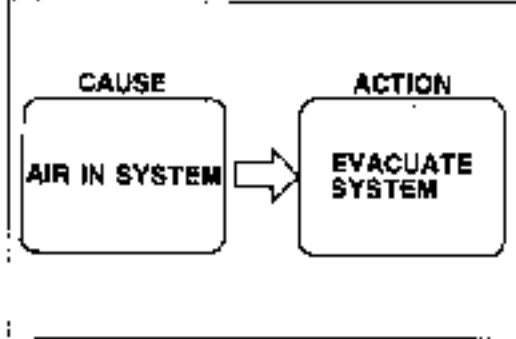
29...00X-001



30...00X-006



31...00X-010



28...00X-000

**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 bends 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.)

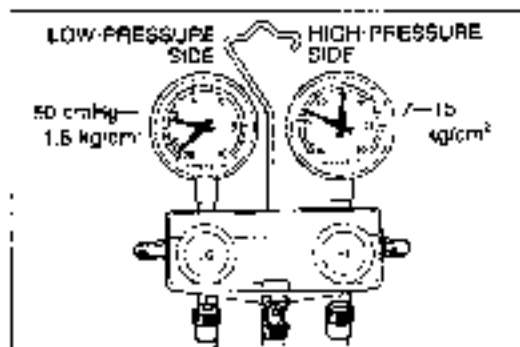
**Step 4**

After charging, check the refrigerant pressure. (Refer to page U-30.)

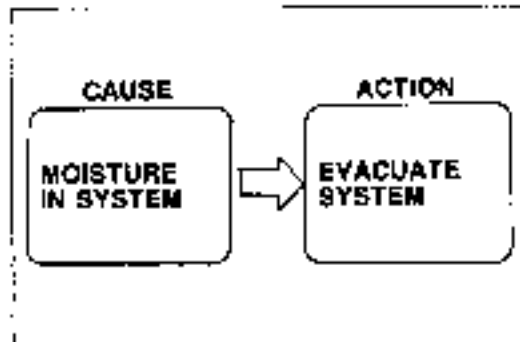
**Step 5**

If low and high pressures are still too high, replace the receiver/drier.

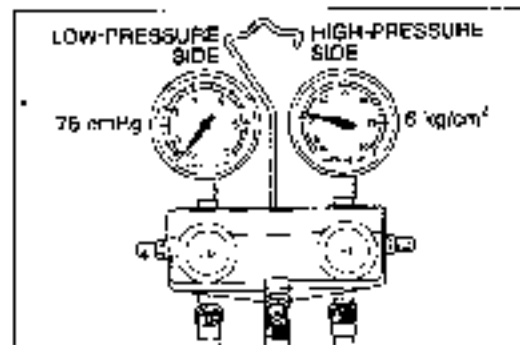




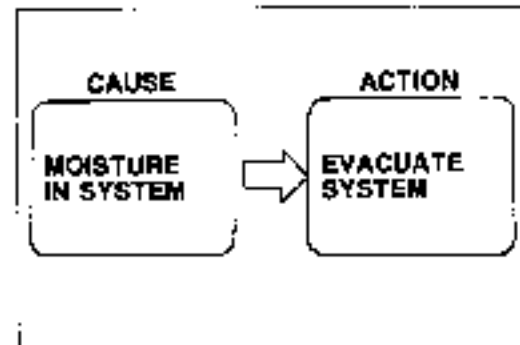
RFA...X-019



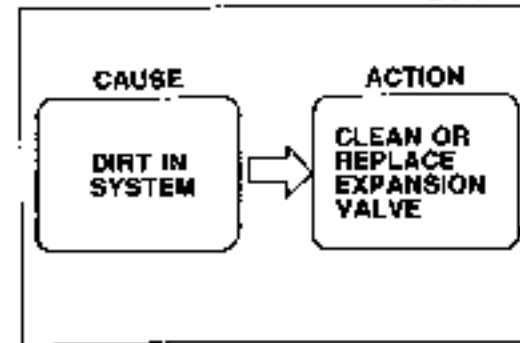
28100...X-017



98100...X-014



29100...X-000



29100...X-000

**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:**  
887—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 599 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)

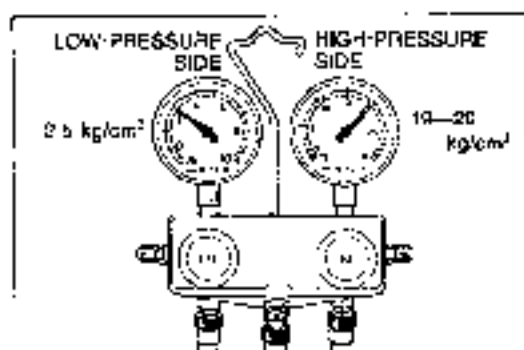
If cause is moisture, refer to "Moisture in system."

## b) If caused by dirt

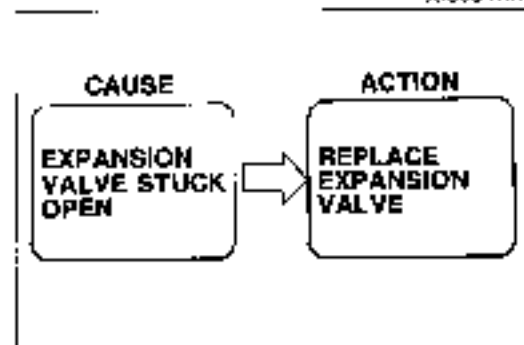
System remains abnormal after being OFF 10 minutes. If caused by dirt, go to Step 2.

**Step 2**

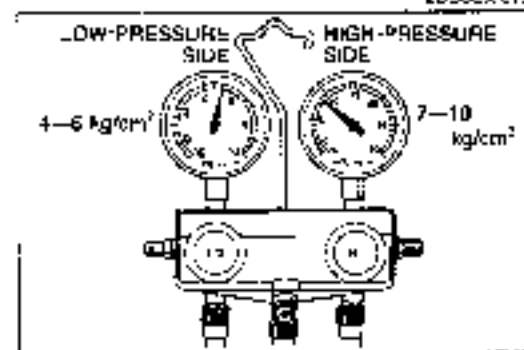
1. Remove the expansion valve. (Refer to page U-31.)
2. Blow out the dirt with compressed air.
3. If unable to remove the dirt, replace the expansion valve.
4. Evacuate, charge, and test the system.



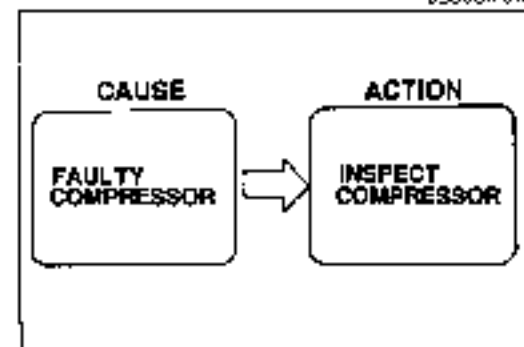
28LJJK112R



28LJJK113



28LJJK113



28LJJK113

**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—951 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-15.
4. If the magnetic clutch is ON, inspect the compressor. (Refer to page U-33.)

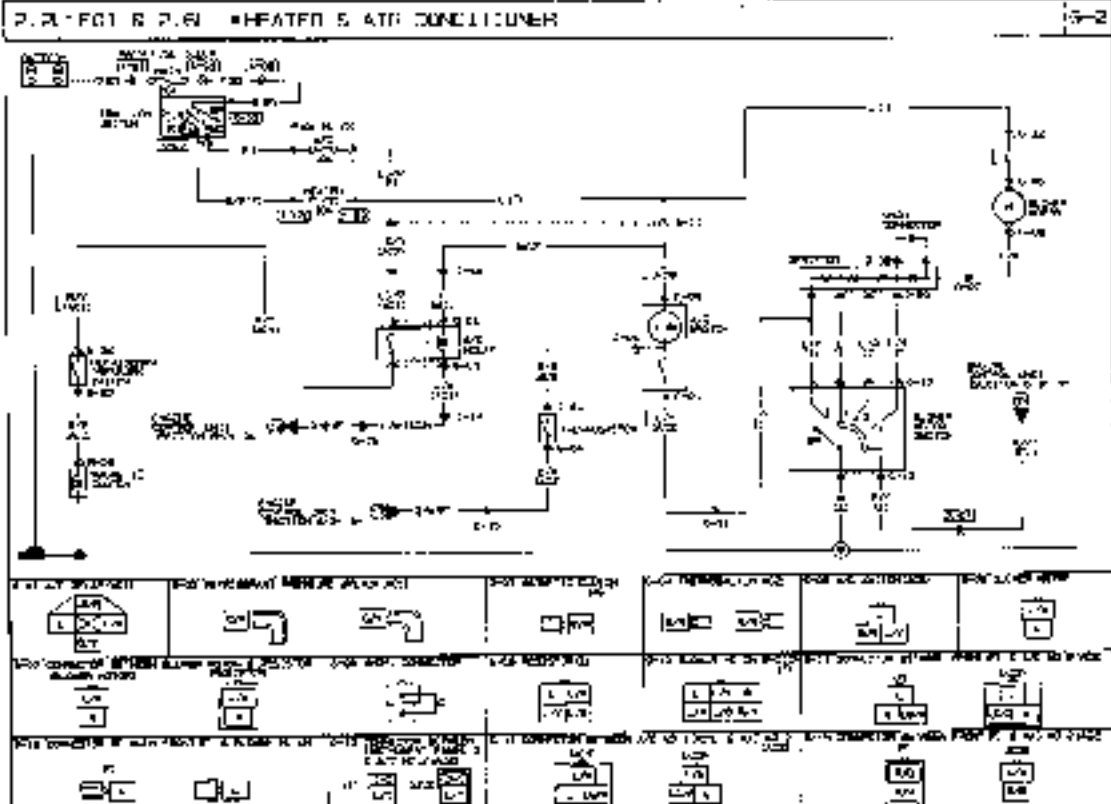
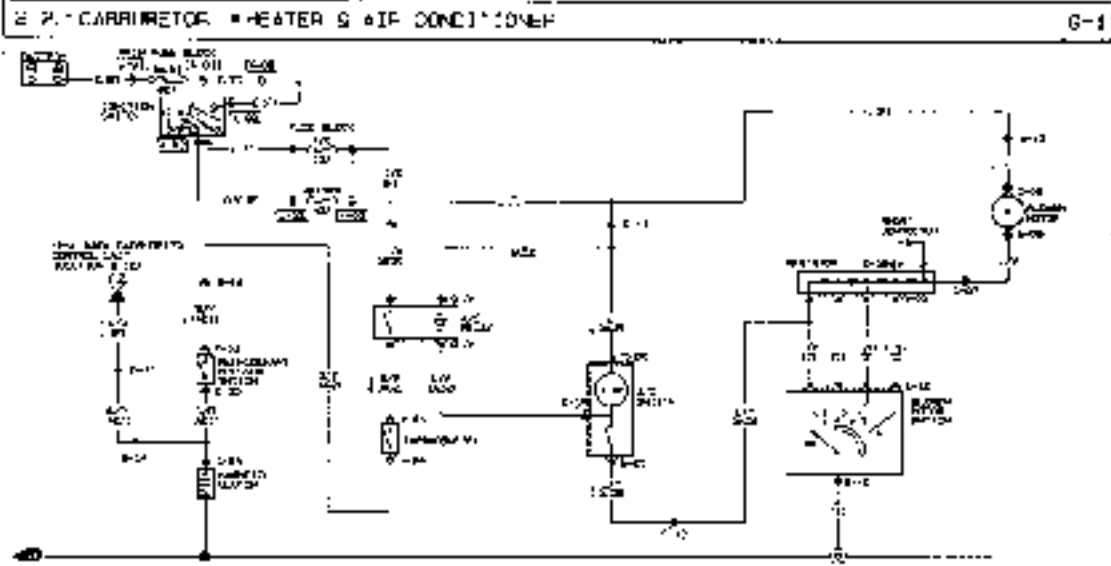


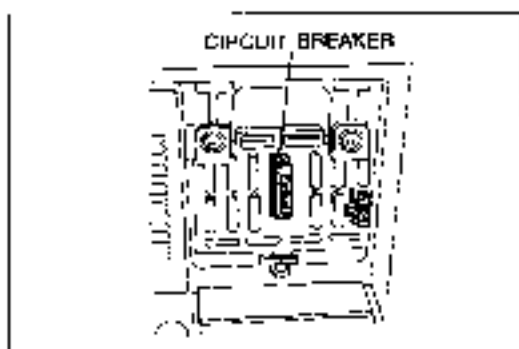
# U

## TROUBLESHOOTING

Symptom: Blower motor does not operate

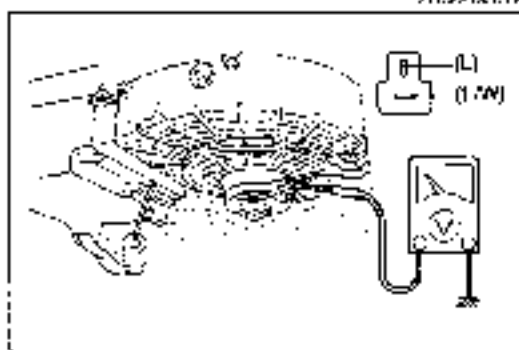
### Circuit diagram





**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.

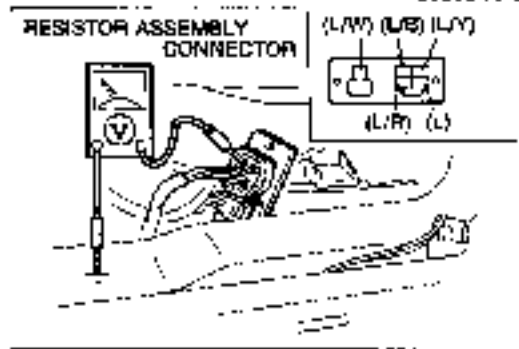


**Step 2**

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

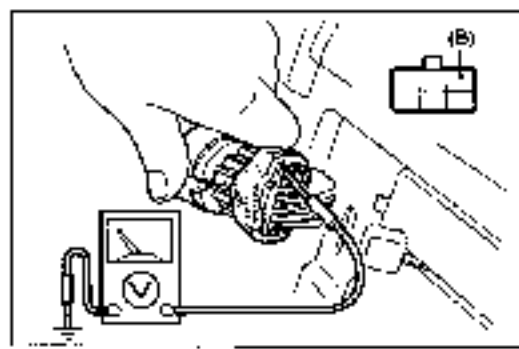


**Step 3**

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/R)
	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/W)
	0V	Replace resistor assembly
(L/R)	V <sub>B</sub>	Go to Step 4
	0V	Replace resistor assembly

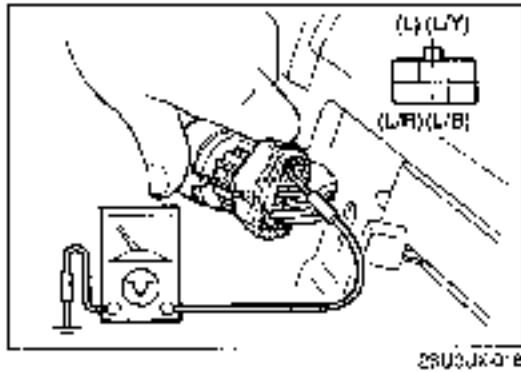


**Step 4**

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)



### 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.

Va: Battery voltage

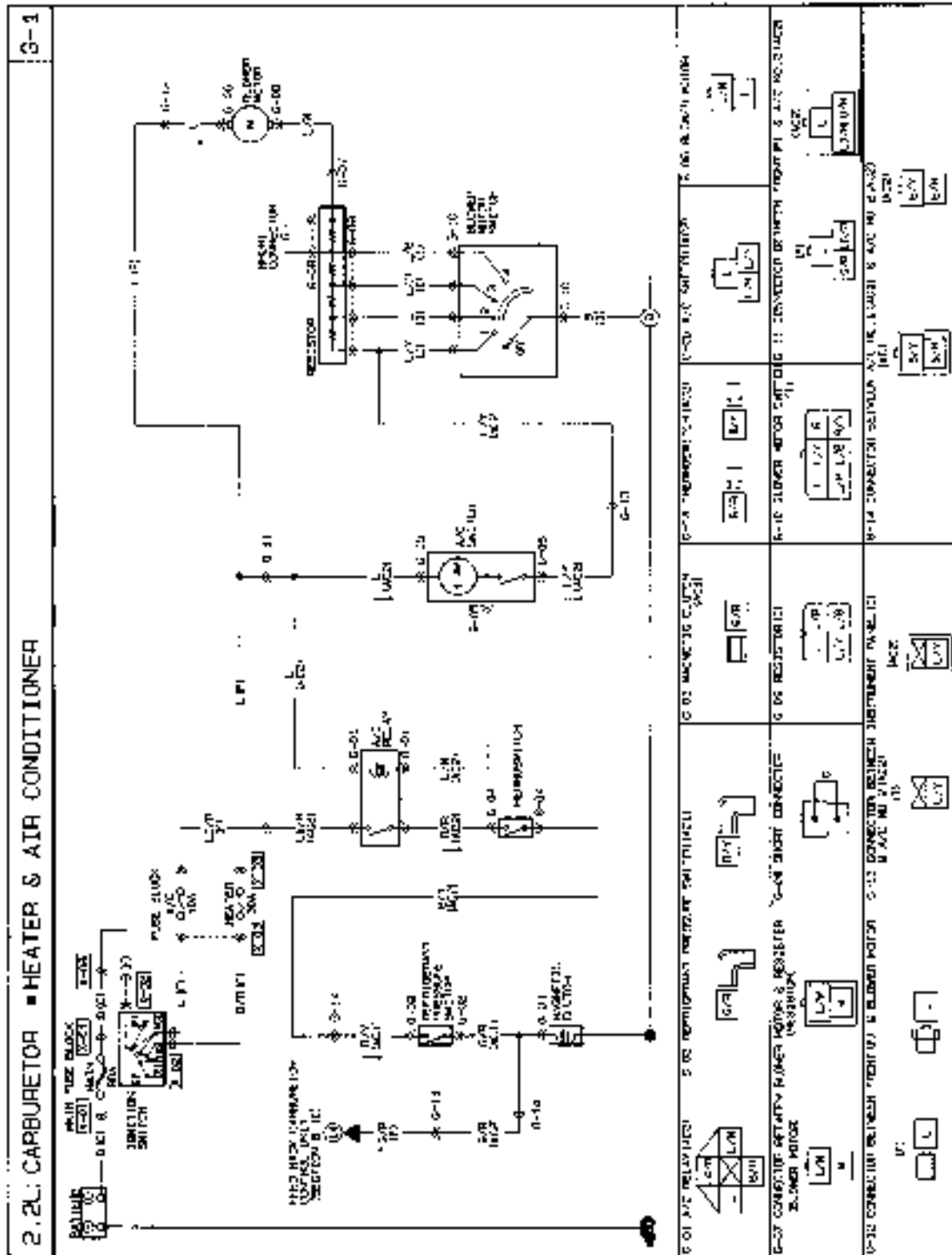
Wire	Voltage	Action
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	Va	Next, check wire (L/R)
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	Va	Next, check wire (L)
(L)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	Va	Next, check wire (L/R)
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	Va	Replace blower switch

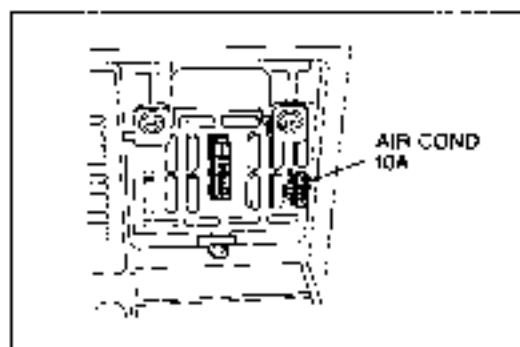
Symptom: Magnetic clutch does not operate

**Note**

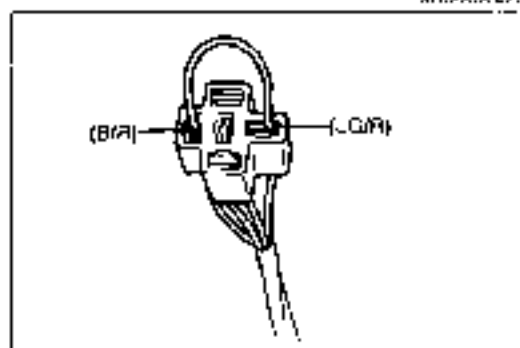
If the blower motor also does not operate, see "Blower motor does not operate", page U-10.

(B2200 Carb.)  
Circuit diagram

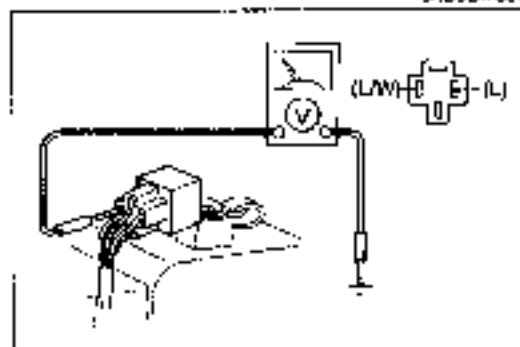




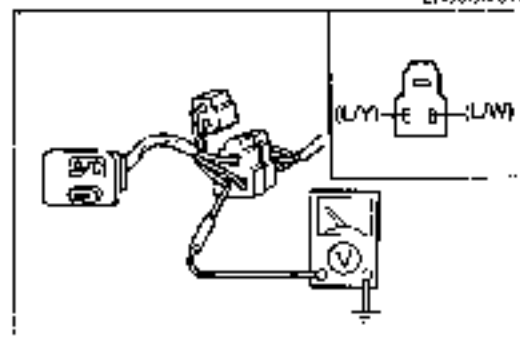
9R...00X-024



9R...00X-027



2P...0LX-017



2P...0LX-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 (L/G/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.

**VB: Battery voltage**

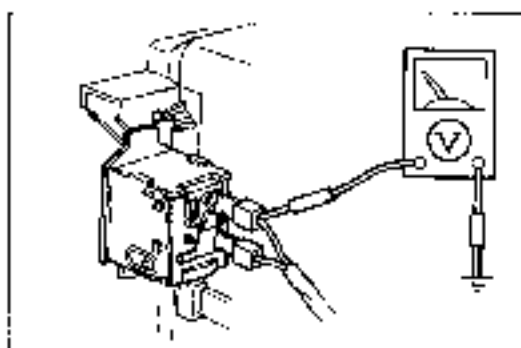
Wire	Voltage	Action
(-)	VB	Next check wire (L/W)
	0V	Repair wiring harness (Circuit breaker—A/C relay)
(L/W)	VB	Go to Step 4
	0V	Replace A/C relay

**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.

**VB: Battery voltage**

Wire	Voltage	Action
(L/W)	VB	Next check wire (L/W)
	0V	Repair wiring harness (A/C relay—A/C switch)
(B/Y)	VB	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch



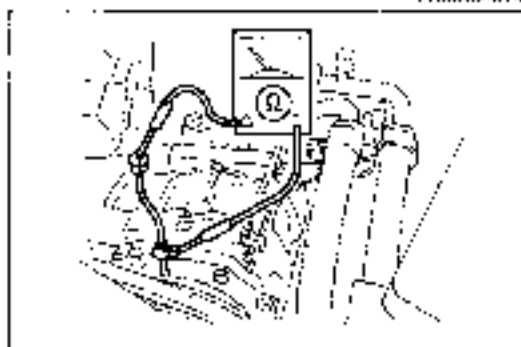
9RJA2-019

### Step 5

1. Turn the ignition switch ON.
2. Measure the voltage at the terminal-wires of the thermostat connector.

**V<sub>b</sub>: Battery voltage**

Wire	Voltage	Action
(B/R)	V <sub>b</sub>	Next, check wire (B/Y)
	0V	Repair wiring harness (A/C fuse—A/C relay—Thermostat)
(B/Y)	V <sub>b</sub>	Disconnect jumper wire and go to Step 6
	0V	Replace thermostat



9PLCUX-031

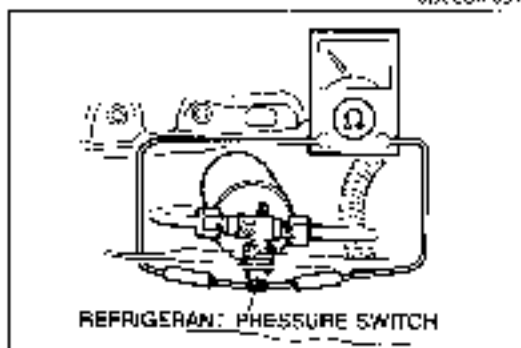
### Step 6

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.**



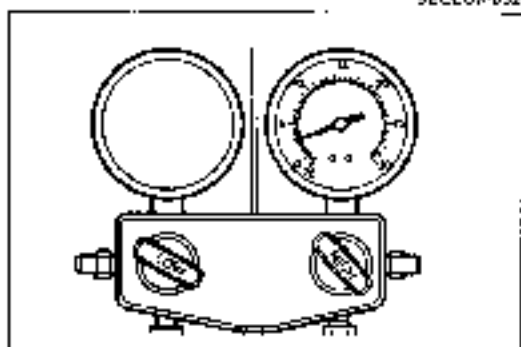
REFRIGERANT PRESSURE SWITCH

9BLCUX-032

### Step 7

Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Repair wiring harness (Thermostat—Refrigerant pressure switch—Magnetic clutch)
No	Reconnect connector and go to step 8



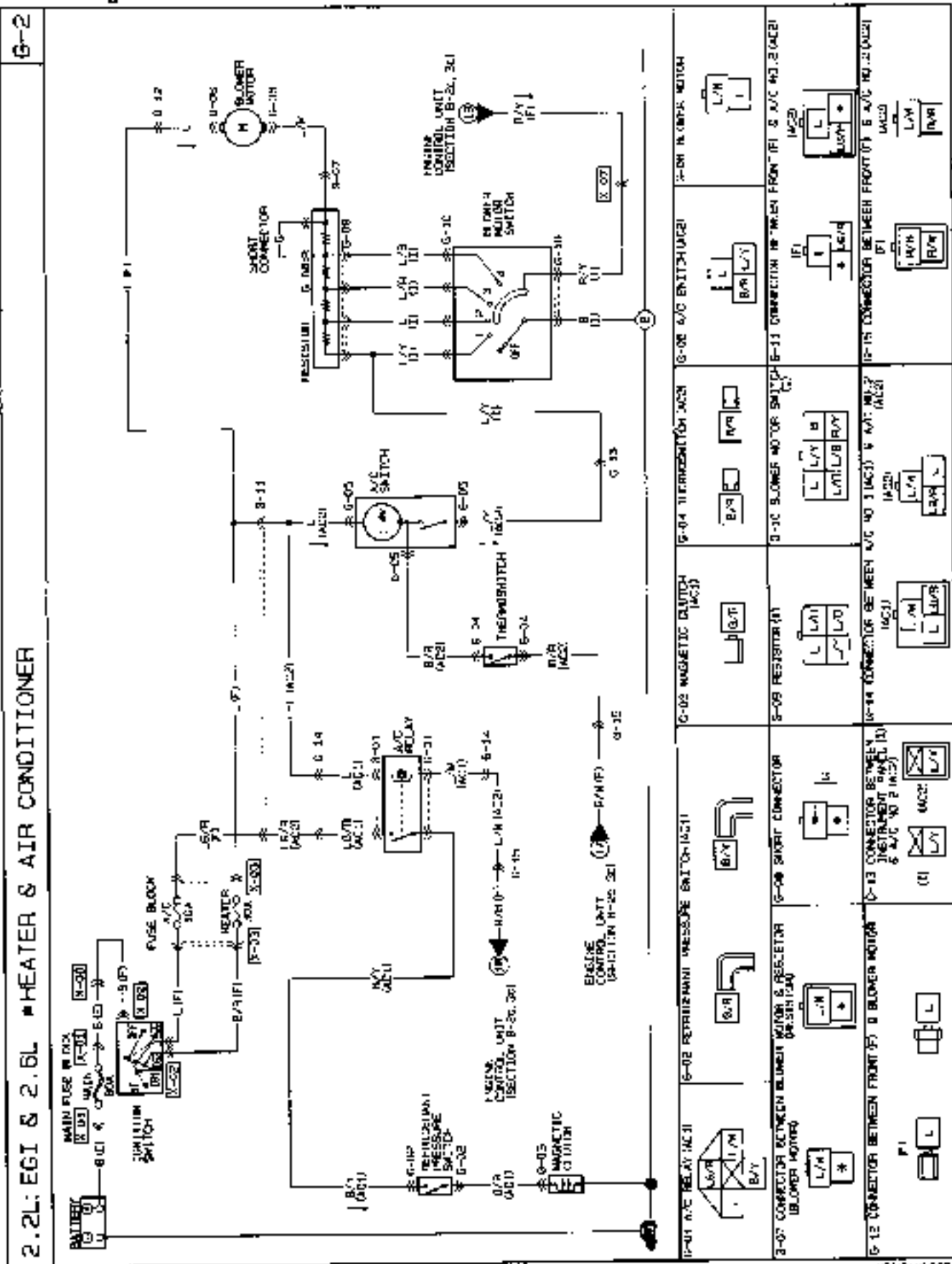
9BLCUX-059

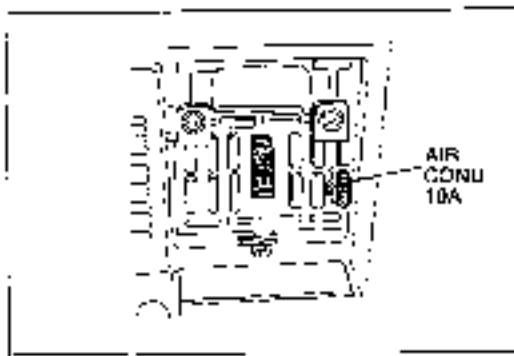
### Step 8

1. Connect the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

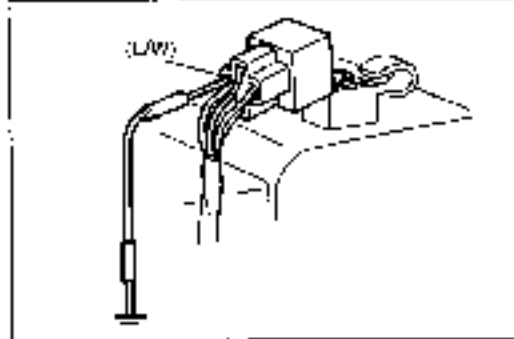
Pressure	Action
More than 2.8 kg/cm <sup>2</sup>	Replace refrigerant pressure switch
Less than 2.8 kg/cm <sup>2</sup>	Check the refrigerant system (Refer to page U-5.)

(B2600i and B2200 EGI)  
Circuit diagram

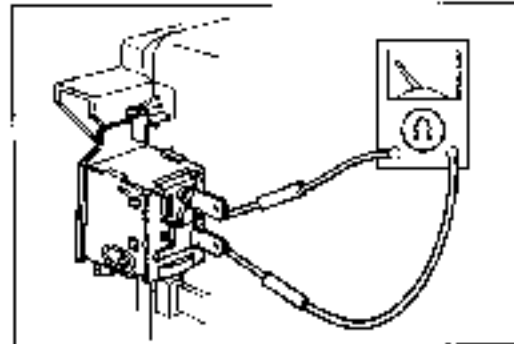




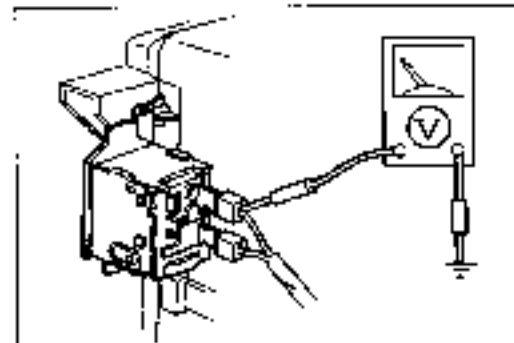
3ELCUX-026



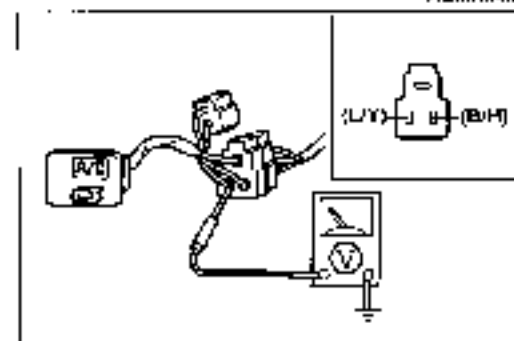
3ELCUX-035



3ELCUX-036



3ELCUX-039



3ELCUX-042

### Step 1

- 1 Check the fuse

Fuse	Ampereage	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 4

### Step 3

- 1 Remove the thermostat connector
- 2 Check for continuity between terminals of the thermostat

Continuity	Action
Yes	Go to Step 4
No	Repair thermostat

### 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 thermostat

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)

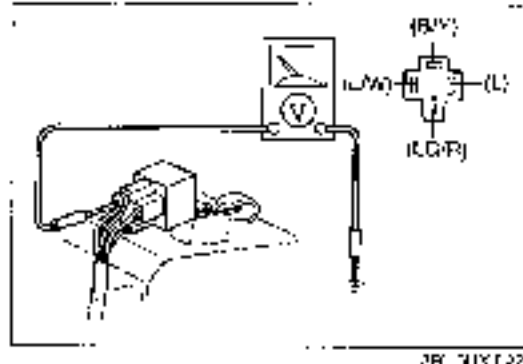
### Step 5

- 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/V)
	0V	Repair wiring harness (Thermostat—A/C switch)
(L/V)	V <sub>B</sub>	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch





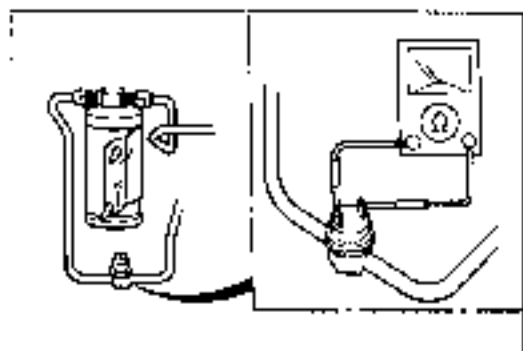
2B\_L0UX 022

**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.

**V<sub>B</sub>: Battery voltage**

Wire	Voltage	Action
(L/W)	V <sub>B</sub>	Go to Step 3
	0V	Next, check wire (L)
	V <sub>B</sub>	Next, check wire (LG/R)
(L)	0V	Repair wiring harness (Circuit breaker—A/C relay)
	V <sub>B</sub>	Next, check wire (B/Y)
(LG/R)	0V	Repair wiring harness (A/C fuse—A/C relay)
	V <sub>B</sub>	Go to Step 7
(B/Y)	0V	Replace A/C relay

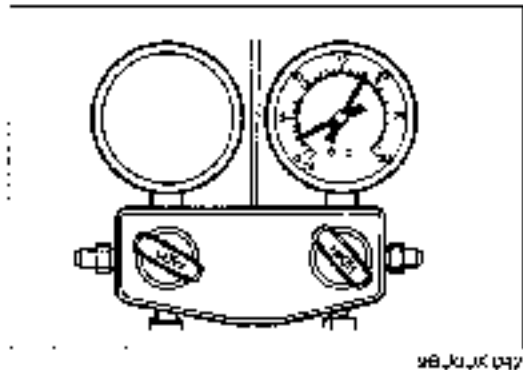


2B\_L0UX 031

**Step 7**

- Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Go to Step 9
No	Go to Step 8



2B\_L0UX 032

**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 1.5 kg/cm <sup>2</sup> or less than 2.1 kg/cm <sup>2</sup>	Check refrigerant system (Refer to page U-21)

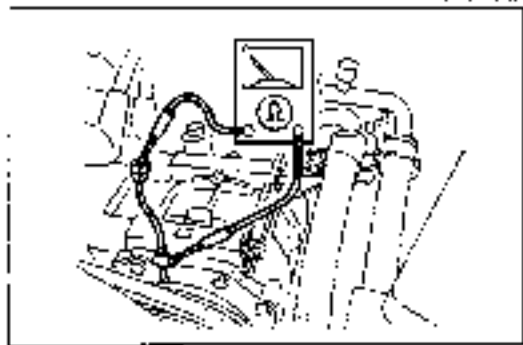
**Step 9**

1. Disconnect the magnetic clutch connector.
2. Check for continuity between the terminal-wire of the magnetic clutch and a ground.

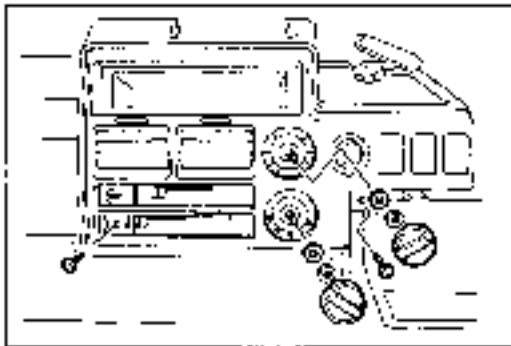
Continuity	Action
Yes	Repair wiring harness (A/C relay—Refrigerant pressure switch—Magnetic clutch)
No	Replace magnetic clutch

**Note**

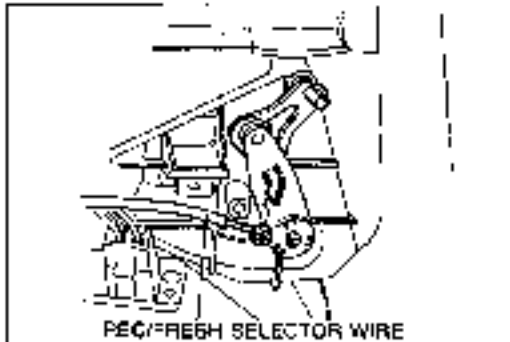
Set the ohmmeter to the x1000 range.



2B\_L0UX 043

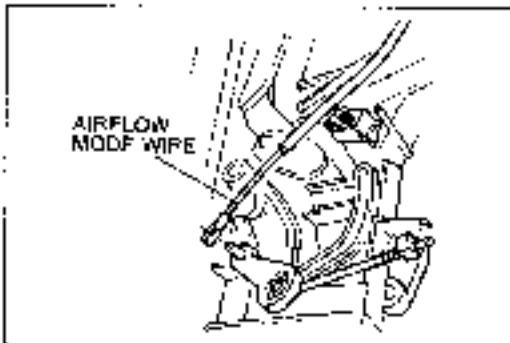


1BU0JX004

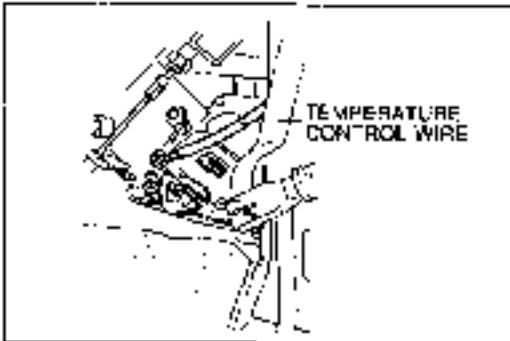


REC/FRESH SELECTOR WIRE

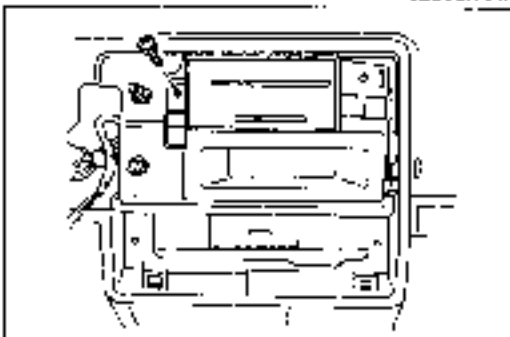
6BU0JX045

AIRFLOW  
MODF WIRE

9FL0JX046

TEMPERATURE  
CONTROL WIRE

9EU0JX047

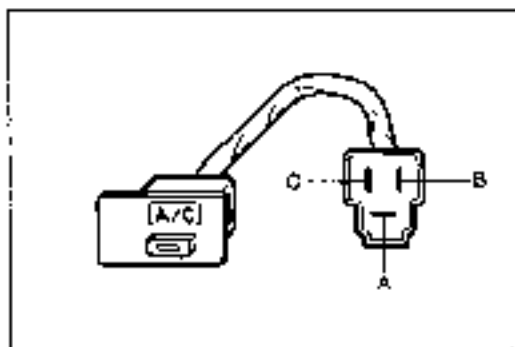


1BL0JX005

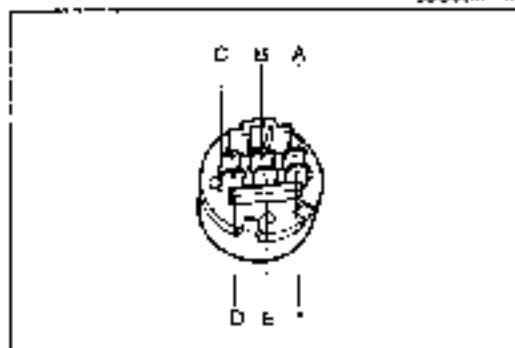
## CONTROL SWITCH PANEL

## REMOVAL AND INSTALLATION

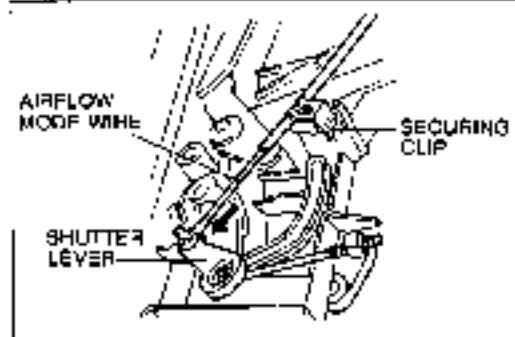
1. Remove the meter hood (Refer to page S-23.)
2. Remove the screws, knobs, and nuts.
3. Disconnect the cigarette lighter connector and A/C switch connector.
4. Remove the center panel.
5. Remove the glove compartment (Refer to page S-23.)
6. Disconnect the REC/FRESH selector wire.
7. Disconnect the 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.



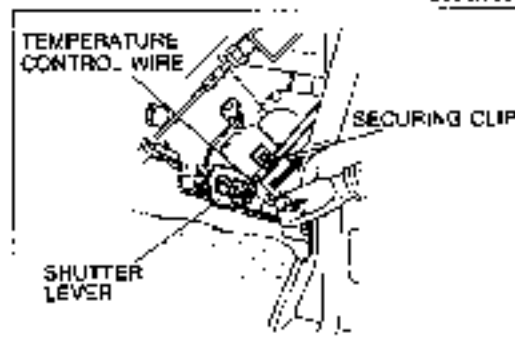
93J0U1X-448



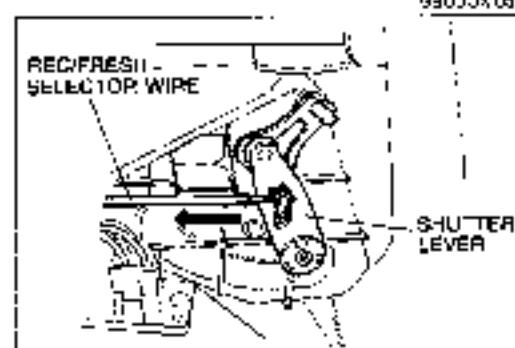
93J0U1X-050



93J0U1X-006



93J0U1X-052



93J0U1X-007

### INSPECTION

#### A/C Switch

Check for continuity between terminals of the switch with an ohmmeter.

Switch position	Terminal A	Terminal B	Terminal C
A/C switch ON	○-----○	○-----○	○-----○
A/C switch DEF	○-----○	○-----○	

○—○: Indicates continuity

#### Blower Switch

Check for continuity between terminals of the switch with an ohmmeter.

Switch position	Terminal A	Terminal B	Terminal C	Terminal D	Terminal E
1	○-----○				
2	○-----○		○-----○		
3	○-----○			○-----○	
4	○-----○				○-----○

○—○: Indicates continuity

### ADJUSTMENT

#### Airflow Mode Wire

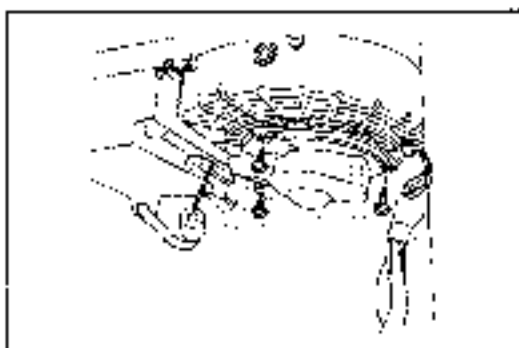
1. Set the airflow mode control lever to DEFROST ( ).
2. With the shutter lever on the heater unit pushed fully downward (direction of arrow), install the airflow mode wire.
3. Attach the securing clip.
4. Turn the blower switch to 4, and make sure no air leaks from the center and floor-area outlets.

#### Temperature Control Wire

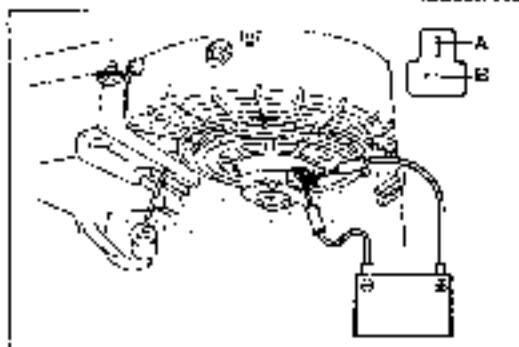
1. Set the temperature control lever to COLD.
2. With the shutter lever on the heater unit pushed fully upward (direction of arrow), install the temperature control wire.
3. Attach the securing clip.
4. Make sure the temperature control lever moves fully from COLD to HOT.

#### REC/FRESH Selector Wire

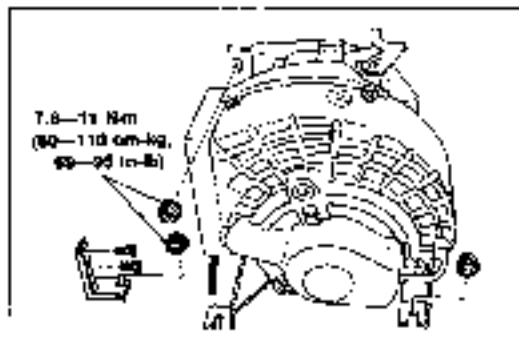
1. Set the REC/FRESH selector lever to RECIRC.
2. With the shutter lever on the blower unit pushed fully forward (direction of arrow), install the REC/FRESH selector wire.
3. Make sure the REC/FRESH selector lever moves fully from RECIRC to FRESH.



1BL3UX 008



2BU6UX 025



03J07X 055

**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**

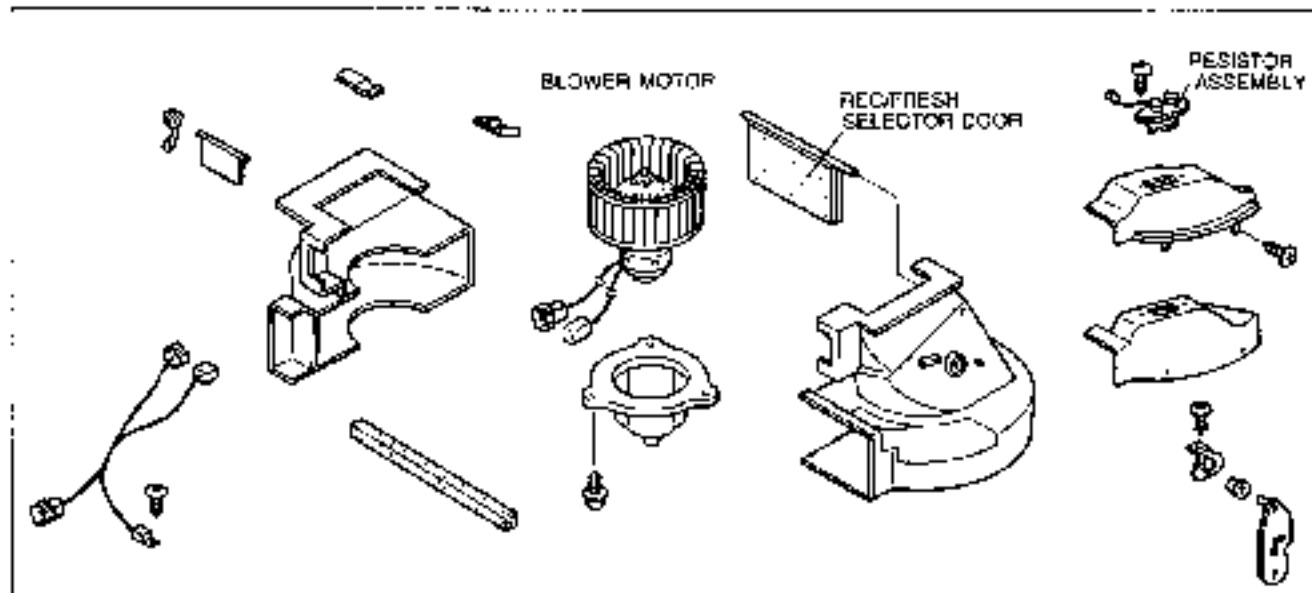
1. Remove the blower motor. (Refer to above.)
2. Remove the seal plate and nuts.
3. Remove the blower unit.

**Installation**

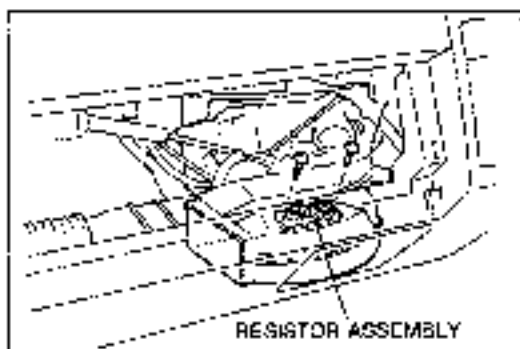
Install in the reverse order of removal.

**Disassembly and Assembly**

Disassemble and assemble as shown.



3BU6UX 057

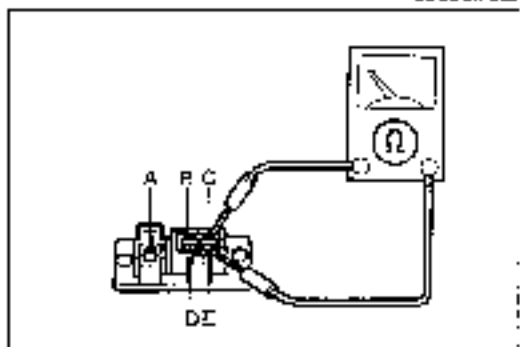


9ELCUX-056

**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.



9ELCUX-056

**Inspection**

Check for continuity between terminals of the resistor assembly.

Terminal	A	B	C	D	E
Continuity	○	○	○	○	○

○—○ Indicates continuity

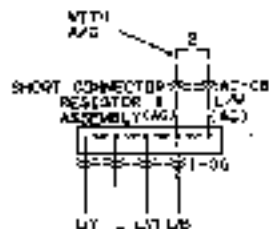
**Note**

Set the ohmmeter to the x1000 range.

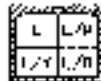
If not as specified, replace the resistor assembly

**Installation**

Install in the reverse order of removal.



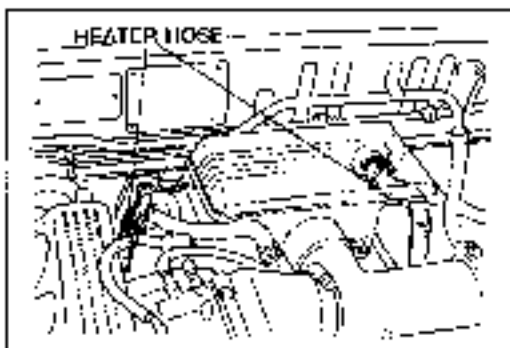
1-06 RESISTOR ASSEMBLY



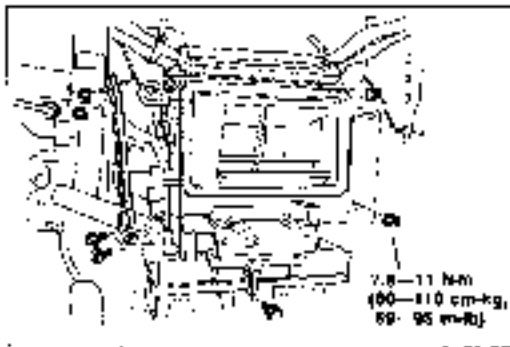
AC-08 SHUNT CONNECTOR WITH A/G



96, C1, 2-089



1B10UX-020



0B10UX-058

## HEATER UNIT

### HEATER UNIT Removal

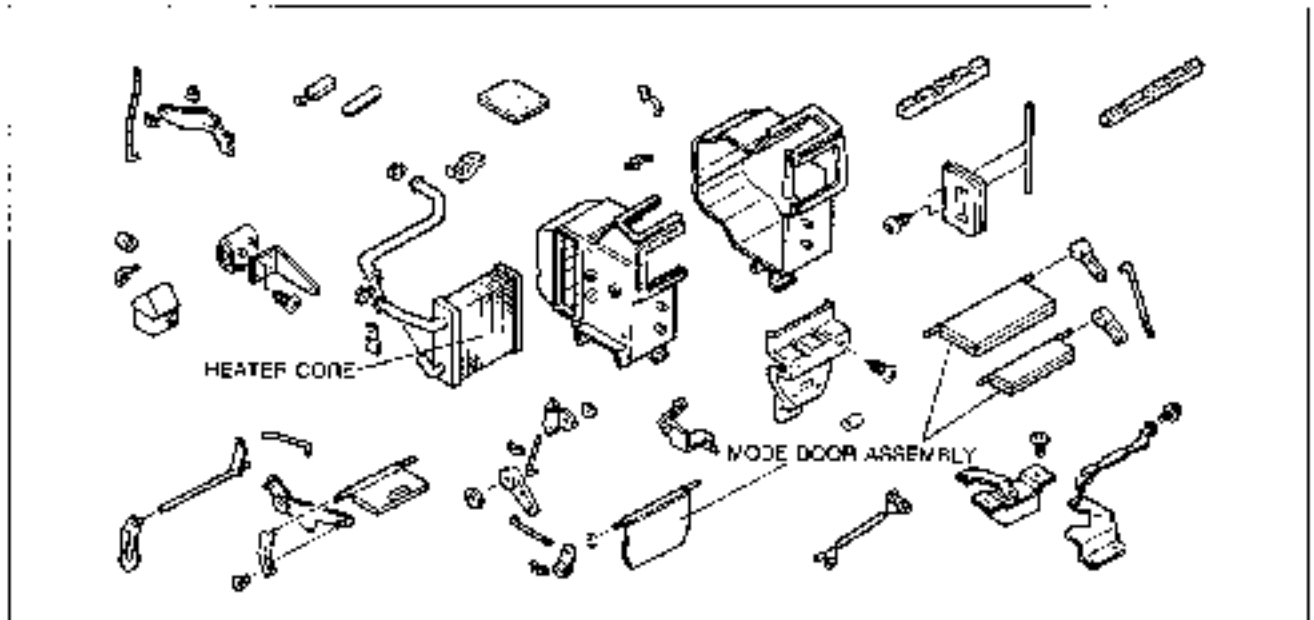
1. Drain the engine coolant. (Refer to Section E.)
2. Disconnect the heater hoses from the heater unit and remove the grommet.
3. Remove the instrument panel. (Refer to page S-23.)
4. Remove the nuts and bolts; then remove the heater unit.

### Installation

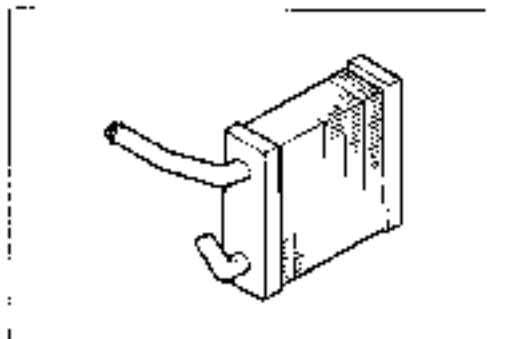
Install in the reverse order of removal.

### Disassembly and Assembly

Disassemble and assemble as shown.



0B10UX-080



0B10UX-057

### HEATER CORE

#### Inspection

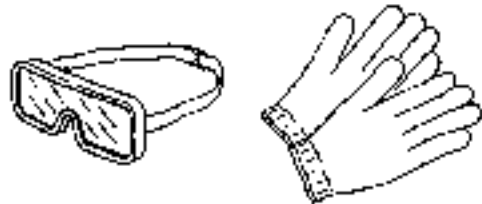
Check for the following and repair or replace parts as necessary:

1. Cracks, damage, or water leakage.
2. Bent fins.
3. Distorted or bent inlet or outlet.

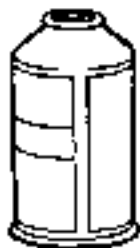
## REFRIGERANT SYSTEM

## SAFETY PRECAUTION

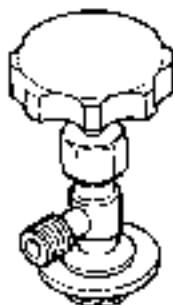
1. R-12 liquid refrigerant is highly volatile. A drop of it on the skin could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. If the refrigerant splashes into the eyes, wash them with clear water immediately. Always wear goggles or glasses to protect the eyes.
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.



23L00R 055



28L00X 024



29J0 JK 005



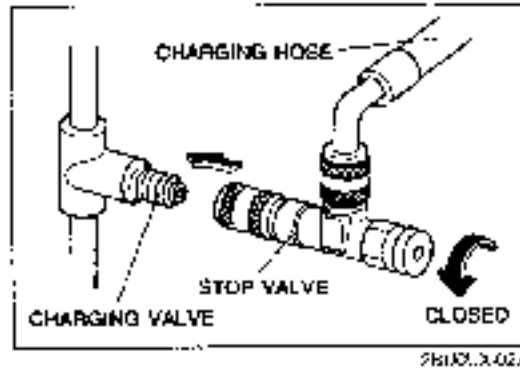
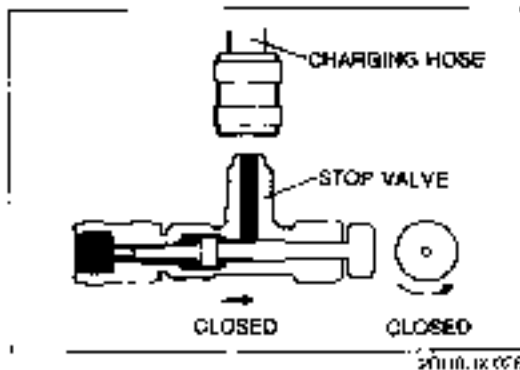
29L00X 025



29L00X 025

## 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 reighten the nut.



**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.

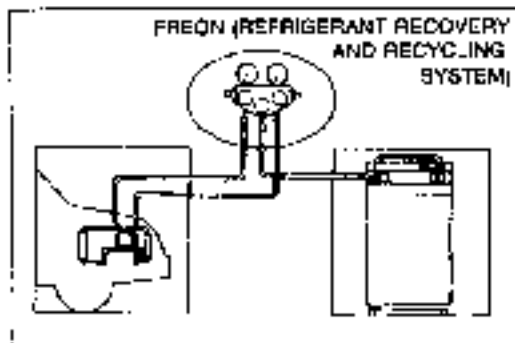
- 1 Turn the knob counterclockwise to close the stop valve
- 2 Install the stop valve to the end of the charging hose of the manifold gauge set.

**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.

2810JX-008

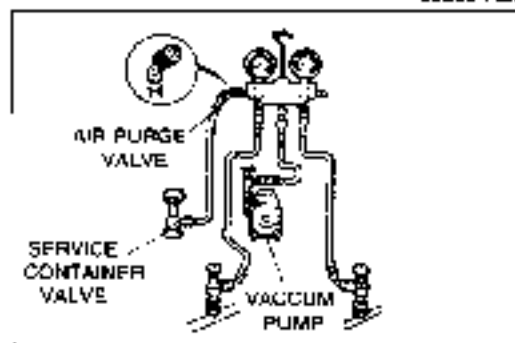


**Refrigerant recovery operation**

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**

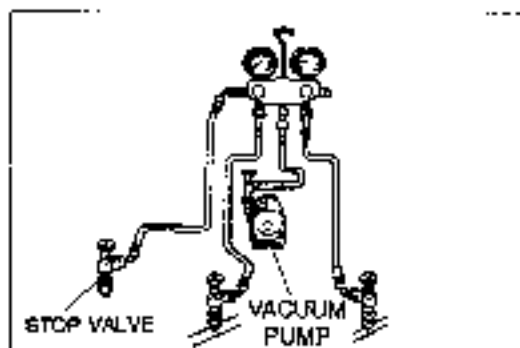
Connect the charging hose and service container valve to the manifold gauge set air purge valve.



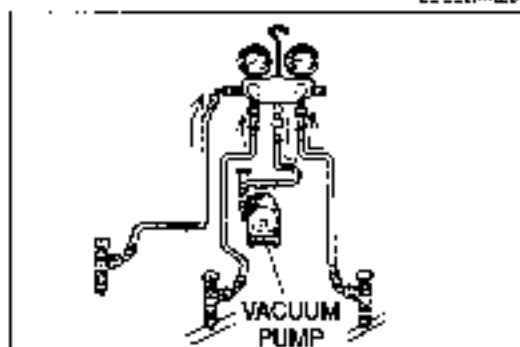
**Caution**

- 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.

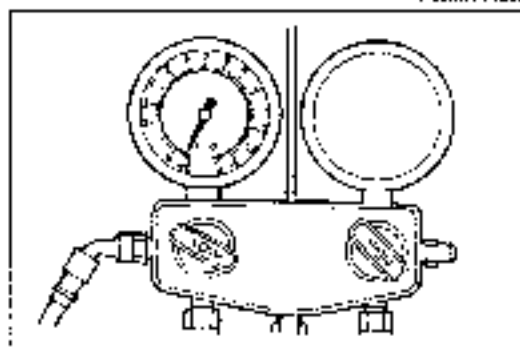
25-2917-031



25-2918-029



25-2919-037



25-2920-035

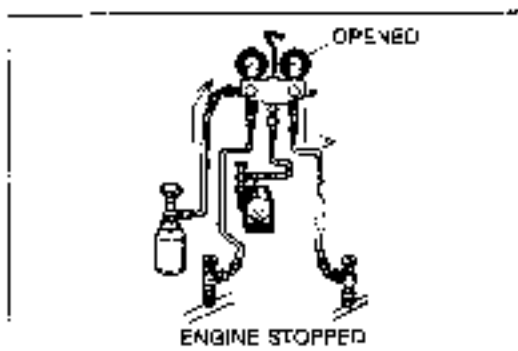
**Charging from iron recovery and recycling system**

Connect the charging hose and stop valve to the manifold gauge set air purge valve.

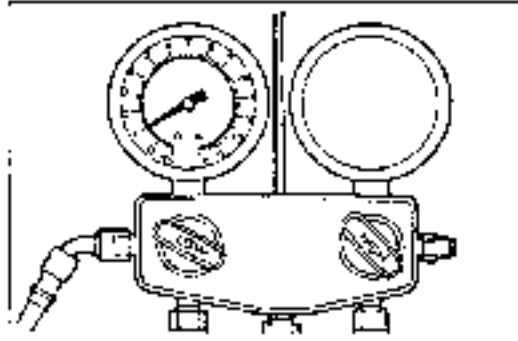
**Caution**

- 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 not 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.



28J9JX 064



E8LCLX 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**

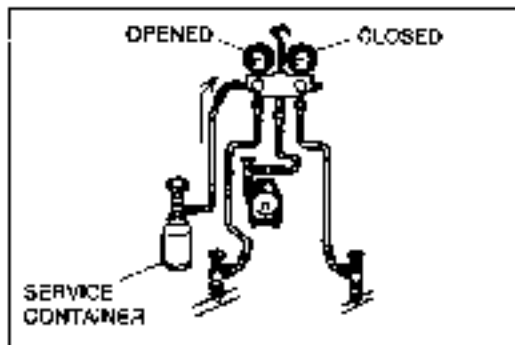
Connect the charging valve of the system to the stop valve (which is connected to the manifold gauge set air purge valve).

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.

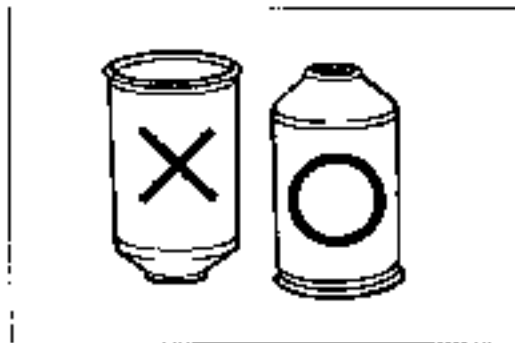
**Caution**

Carry out the leak test in a well-ventilated but still air area because it is affected by moving air.

28J9JX 036



28L21X 037



28J9JX 038

**Initial charging from service container**

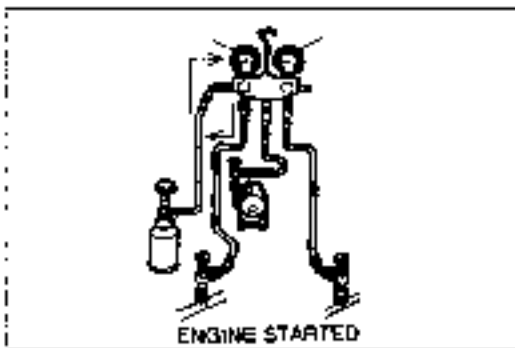
1. Carry out the system evacuation, airtightness test and leak test.
2. Start the engine and actuate the A/C compressor.

**Caution**

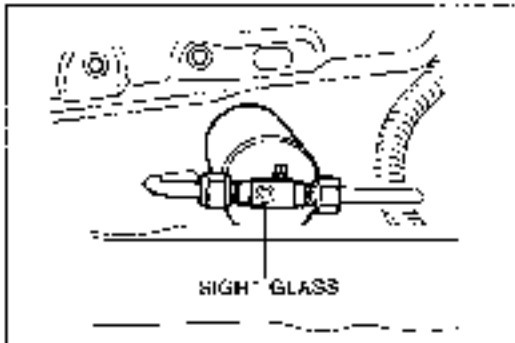
- a) Do not turn the service container upside down while charging when the engine is running.
- b) Do not open the high-pressure side valve while the engine is running.

3. Open the low-pressure side valve of the manifold gauge set and charge the system to specification.

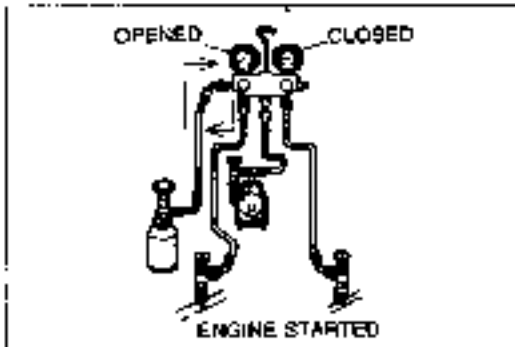
**Specified total refrigerant amount: 800 g (28.24 oz)**



2BLCLX-C39



2BLCLX-C40



2BJULX-C41

4. Close the low-pressure side valve.
5. Stop the engine.
6. Close the stop valves and the service container valve.

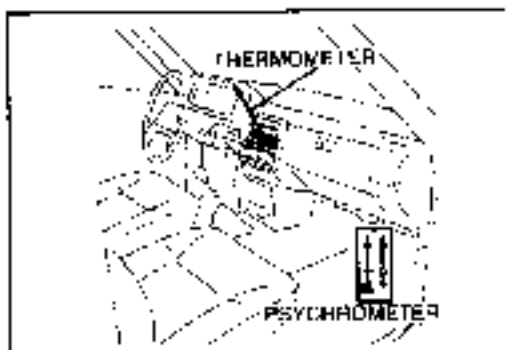
**Caution**

Do not disconnect the stop valves or the service container valve from the charging hoses when there is refrigerant remaining in the hoses.

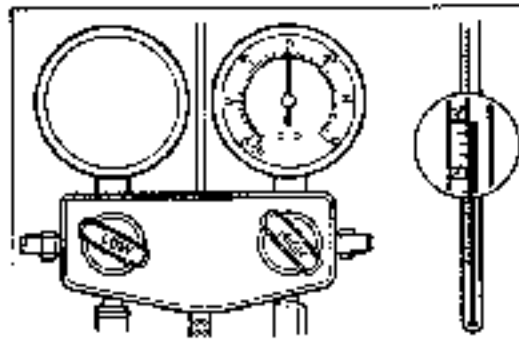
**Refilling****Caution**

- 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.

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.



SDUXXA 075



9BUJX-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:**

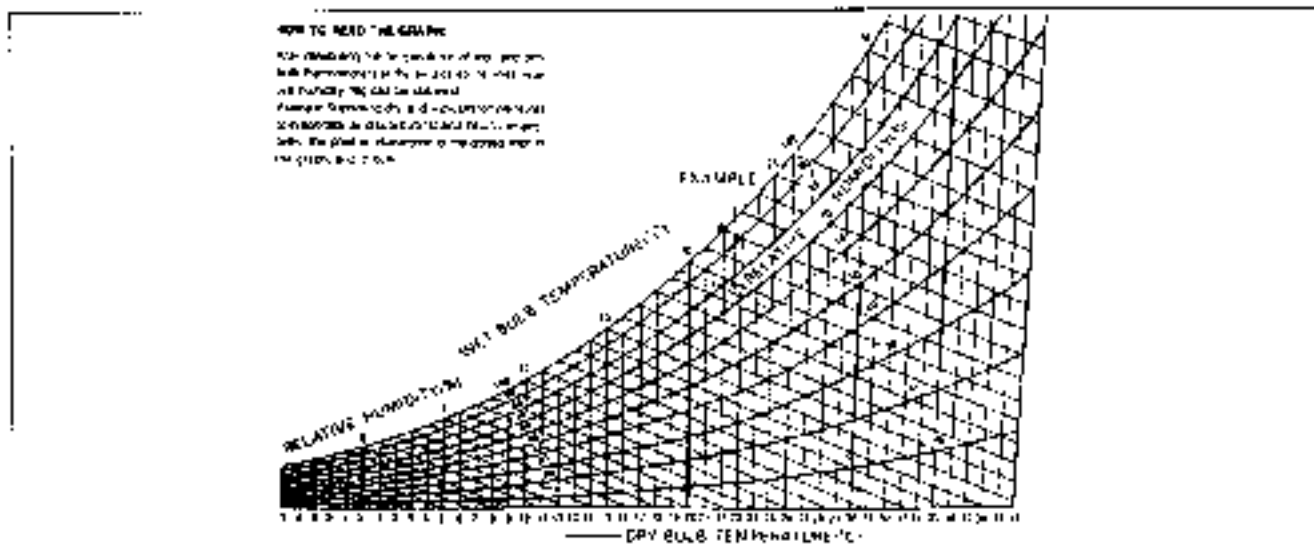
**1,373—1,521 kPa (14.0—15.5 kg/cm<sup>2</sup>, 199—220 psi)**

### Note

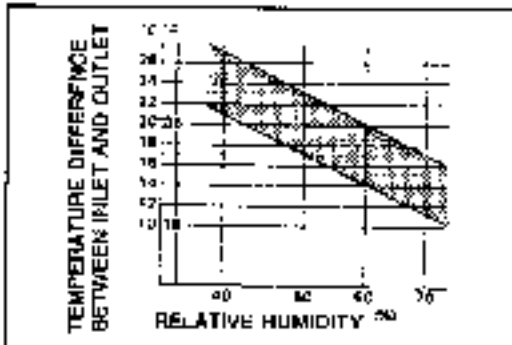
If the high pressure becomes too high, pour cool water on the condenser. If the high pressure is too low, cover the front of the condenser.

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.

9BU16X 100

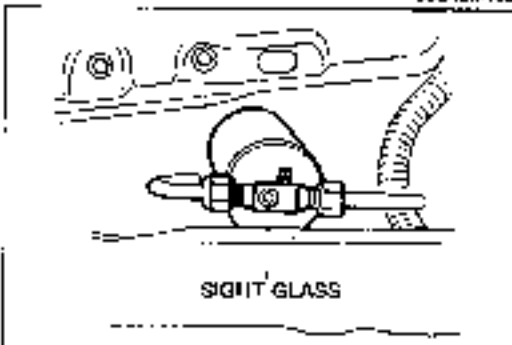


**REFRIGERANT SYSTEM**



98UJEX-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.



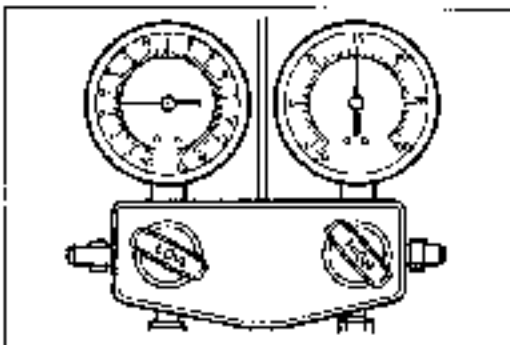
98UJEX-077

**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	Let 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

98UJEX-140



98UJEX-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

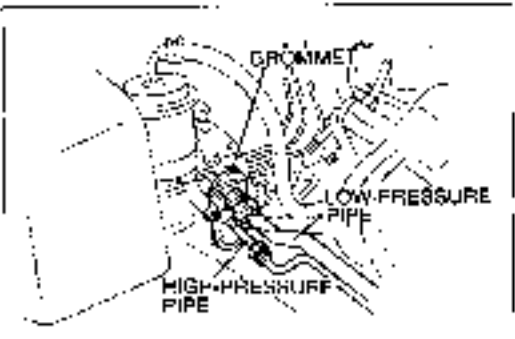
**Specified pressure at 25°C (77°F)**

**Low pressure:**

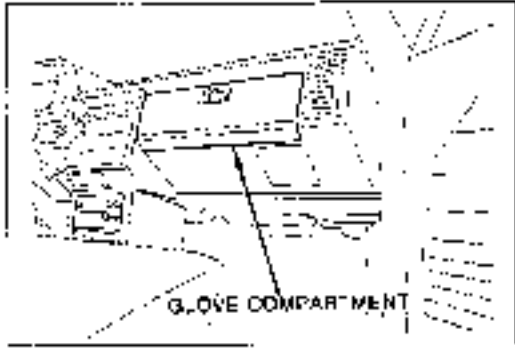
98—167 kPa (1.0—1.7 kg/cm<sup>2</sup>, 14—24 psi)

**High pressure:**

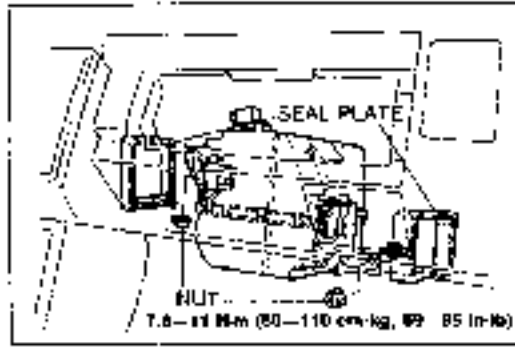
1,030—1,275 kPa (10.5—13.0 kg/cm<sup>2</sup>, 149—185 psi)



98L0UX-035



98L0UX-030

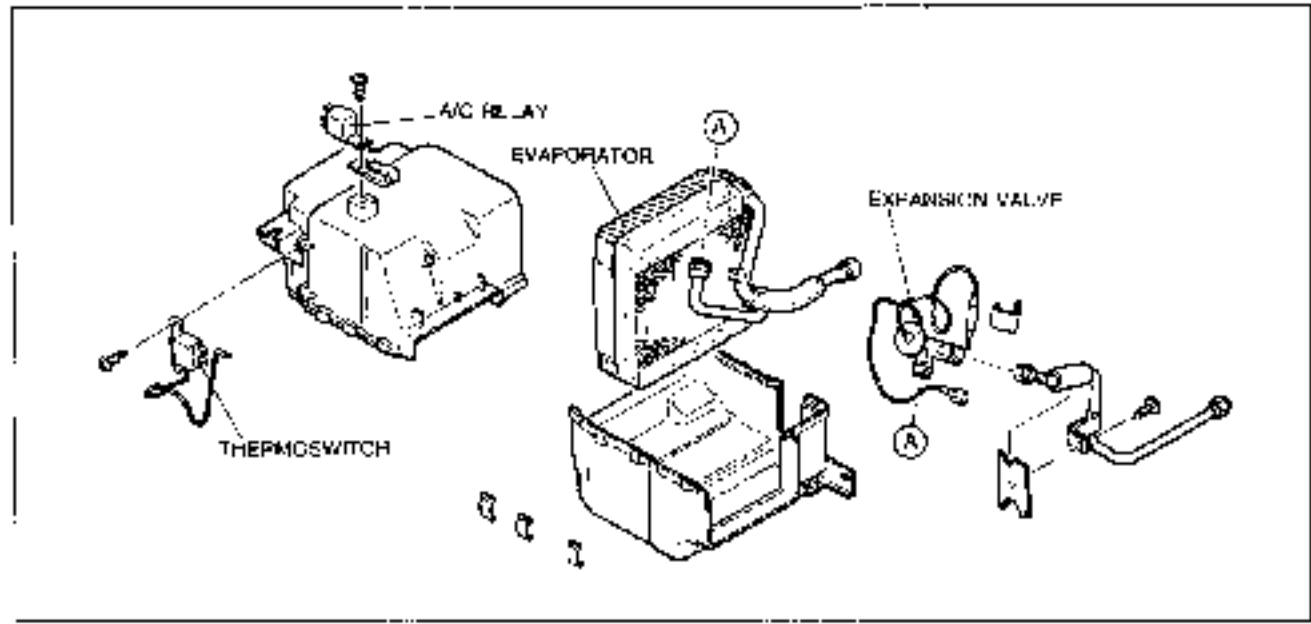


93L0UX-031

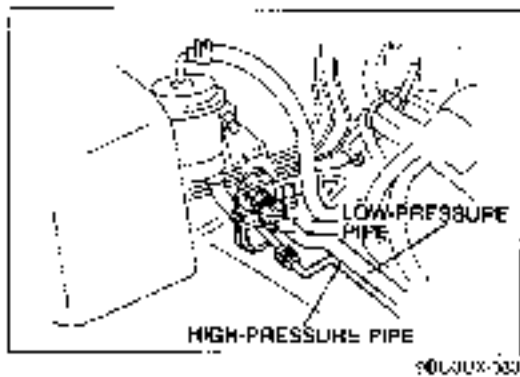
**COOLING UNIT Removal**

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 G-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.



98L0UX-032



90LJ0X-500

**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)**

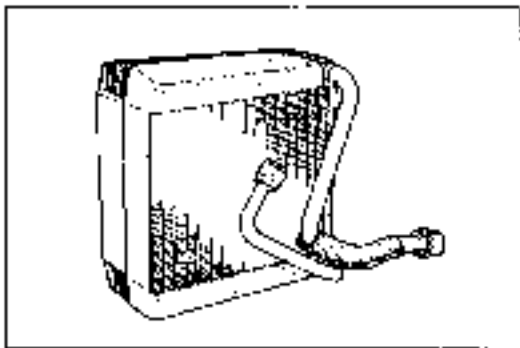
**Tightening torque**

**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)



90LJ0X-504

**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**

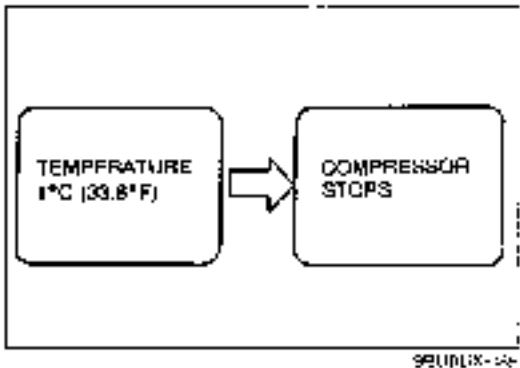
**Never use water to clean the evaporator.**

**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).**



90LJ0X-505

**Removal**

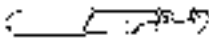










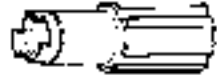

1. Remove the cooling unit. (Refer to page U-31.)
2. Disassemble the cooling unit and remove the thermostat. (Refer to page U-31.)

**Installation**

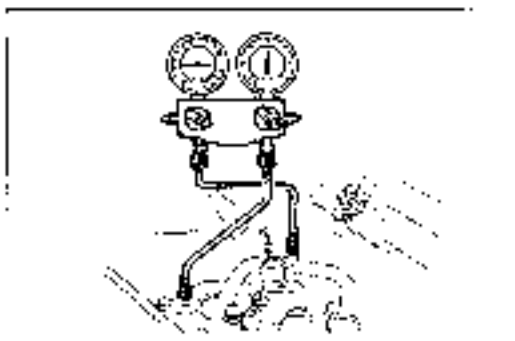
Install in the reverse order of removal.

90LJ0X-506

## PREPARATION SST

<p>0000-41-0809-01</p> <p>Holder, clutch</p> 	<p>0000-41-0810-75</p> <p>Remover &amp; installer, seal seat</p> 	<p>0000-41-0804-57</p> <p>Universal Pulver Body</p> 
<p>0000-41-0804-51</p> <p>Universal Pulver Adapter</p> 	<p>0000-41-0810-76</p> <p>Remove ast. pulley &amp; clutch</p> 	<p>0000-41-0810-77</p> <p>Clutch Pilot</p> 
<p>0000-41-0808-32</p> <p>Pulver, clutch plate</p> 	<p>0000-41-0804-43</p> <p>Installer, clutch rotor bearing</p> 	<p>0000-41-0810-59</p> <p>Clutch Rotor Drive</p> 
<p>0000-41-0808-10</p> <p>Shaft Protector Pilot</p> 	<p>0000-41-0804-12</p> <p>Remover, O ring</p> 	<p>0000-41-0812-11</p> <p>Remover &amp; installer, seal</p> 
<p>0000-41-0812-13</p> <p>Protector, seal sleeve</p> 		

300, R 01\*



2B J01X E43

## COMPRESSOR

### On-vehicle Inspection

1. Install the manifold gauge set. (Refer to page J-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.



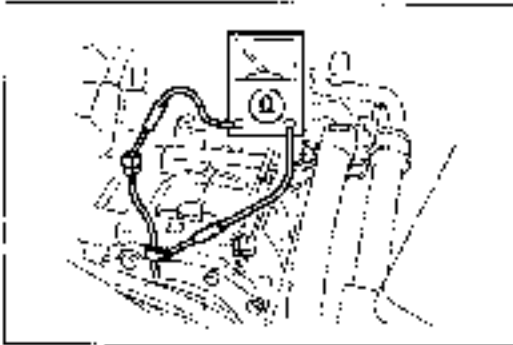


FIGURE 1

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—3.35 $\Omega$  at 20°C (68°F)**

If any of the above is not satisfactory, replace the magnetic clutch.

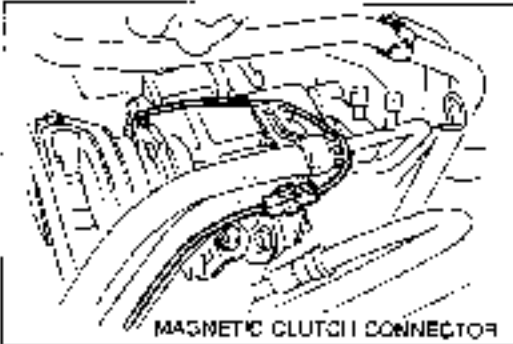
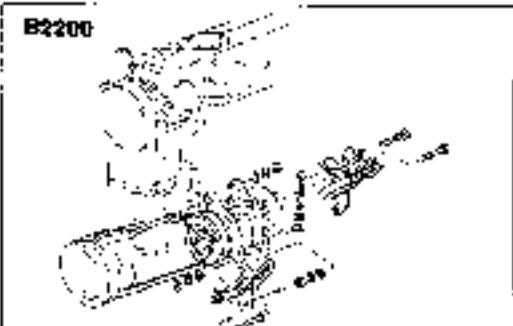


FIGURE 2

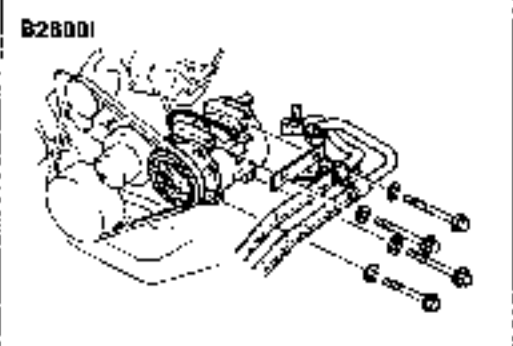
#### Removal

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.



B28001

FIGURE 3

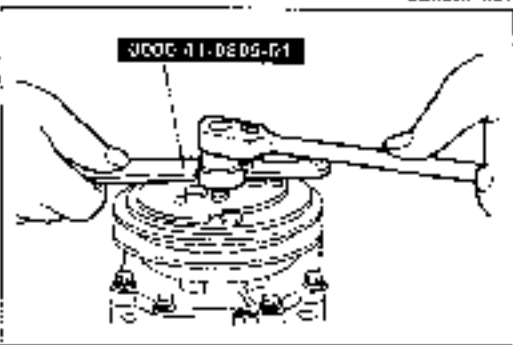
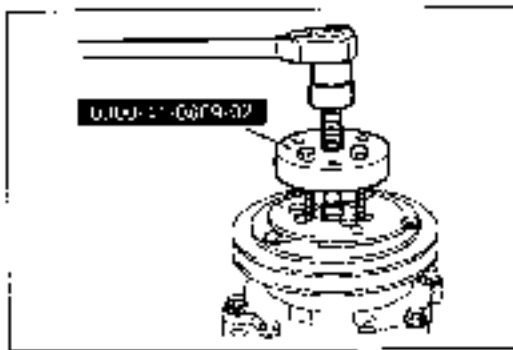


FIGURE 4

#### Disassembly and Assembly

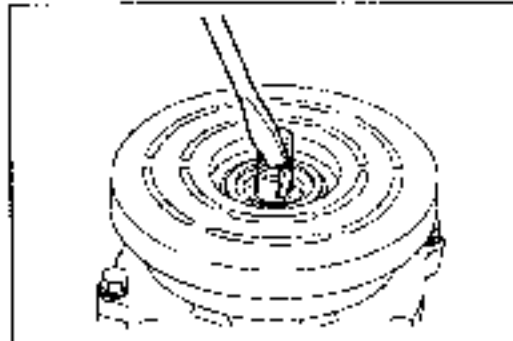
##### Magnetic Clutch removal

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.



9A117-0X-063

- 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.

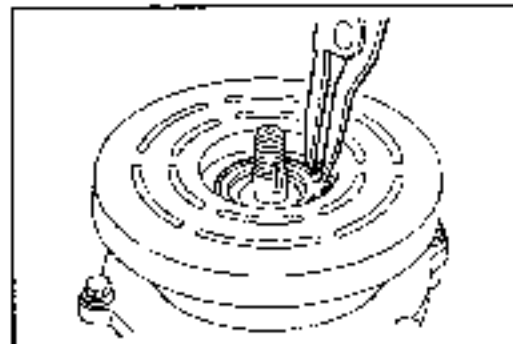


90J01-41094

- 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.

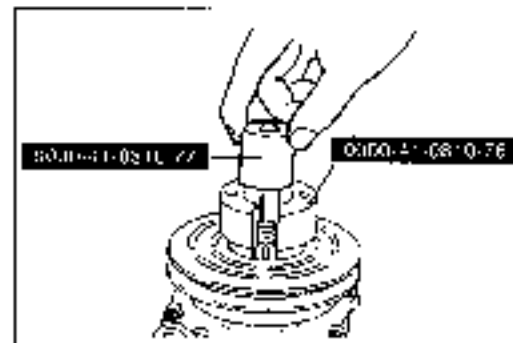


6BLCUX 092

- Remove the external front housing snap ring with snap-ring pliers.

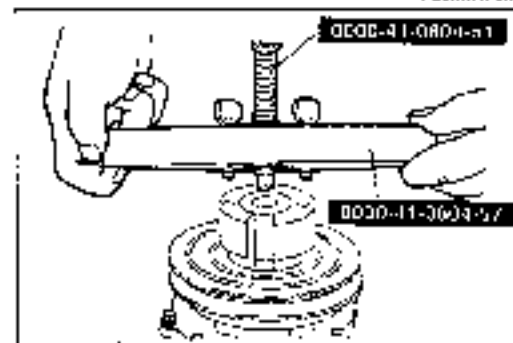
**Note**

Some compressors may have two snap rings in front, one on front housing and the other securing the clutch bearing. Remove both snap rings.



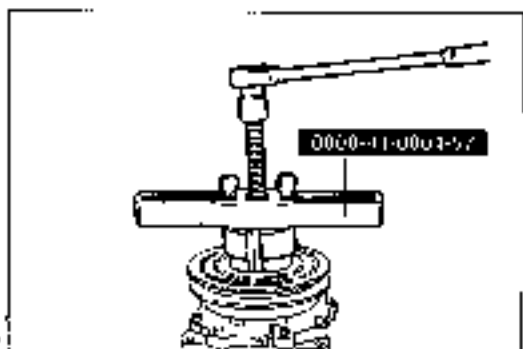
9A1111X-096

- Remove the rotor pulley assembly.
  - Insert the tip of the **SST** pulley jaws into the snap ring groove.
  - Place the **SST** over the shaft.



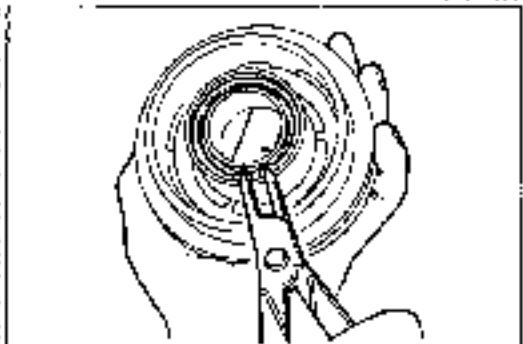
90J01-0027

- Place the **SST** handle onto the puller jaws.
- Finger tighten the securing bolts into the pulley jaws.



S41JN1X-060

- (5) Hold the **SST** handle stationary and turn the pulser center bolt clockwise until the rotor pulley is free.



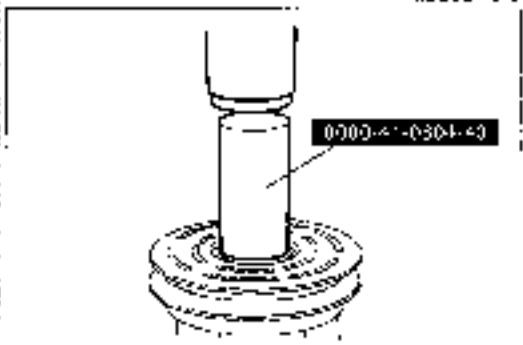
RBLCLX-045

#### 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.



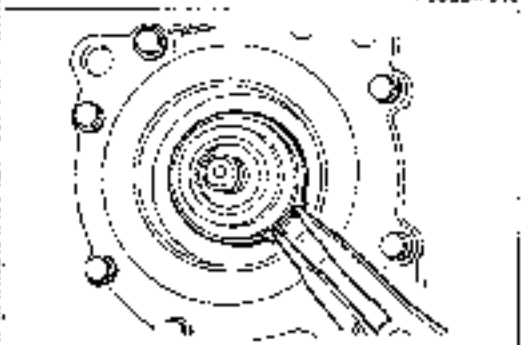
74UJJK-046

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.



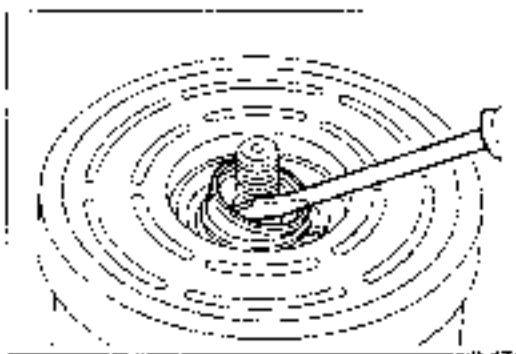
2R...14047

#### Field Coil Removal

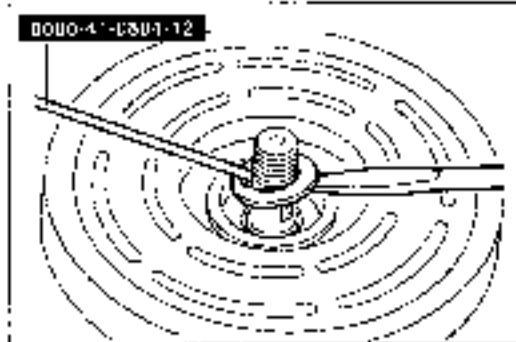
1. Remove the magnetic clutch. (Refer to page U-34.)
2. Remove the field coil.
  - (1) Remove the coil lead wire from the clip atop the compressor front housing.
  - (2) Remove the snap ring and field coil using snap-ring pliers.
3. Install the new field coil in the reverse order of removal.

#### Note

The coil flange protrusion must match the hole in the front housing to prevent coil movement and to correctly locate the lead wire.

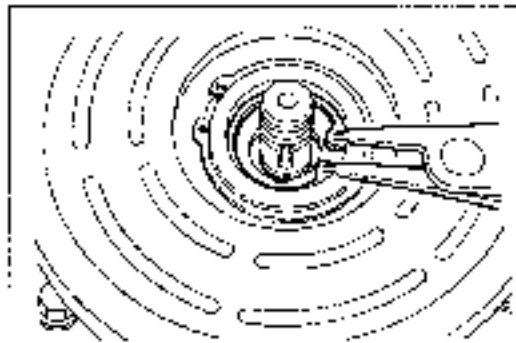


30.17.04.016

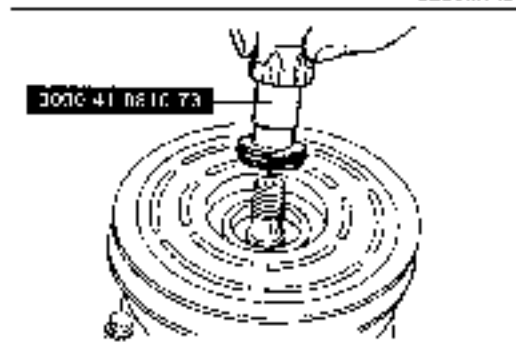


0000-41-1304-12

27.01.01.1.33

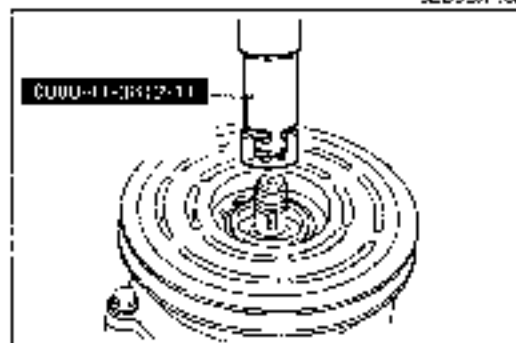


13.03.01.1.04



0000-41-0810-73

30.03.01.1.03



0000-11-31312-11

30.03.01.1.03

**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 retaining snap ring with snap ring pliers

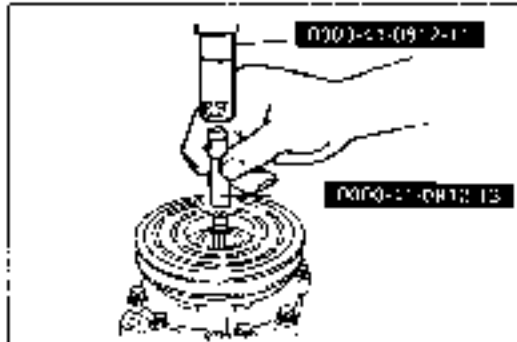
5. Remove the shaft seal seat with the **SST**

- 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.

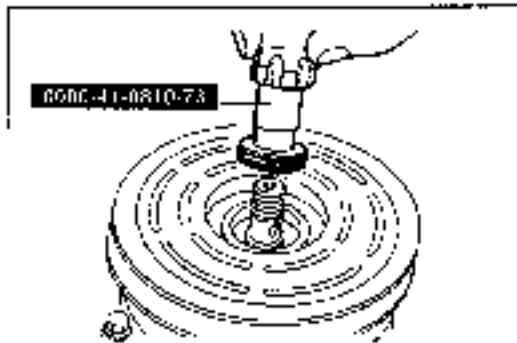
**Shaft Seal Replacement**

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.

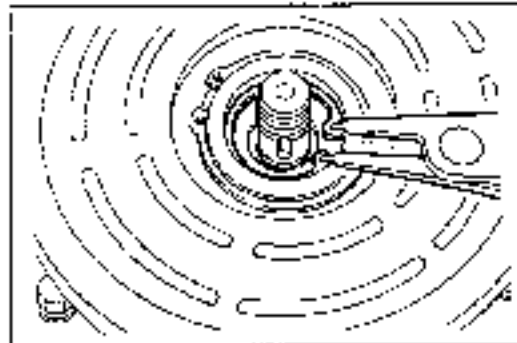
29L00X-049



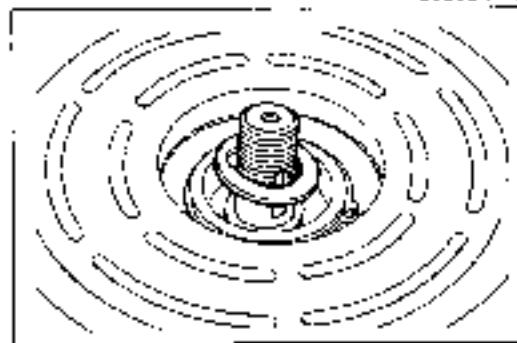
2. Insert the **SST** over the compressor shaft.
3. Do not touch the new seal lip surfaces. Dip the mating surfaces in clean refrigerant oil before proceeding.
4. Engage the slots of the **SST** to the new seal cage, then insert the seal assembly firmly into place in the compressor seal cavity. Twist the tool in the opposite direction to disengage it from the seal cage. Remove the **SST**.



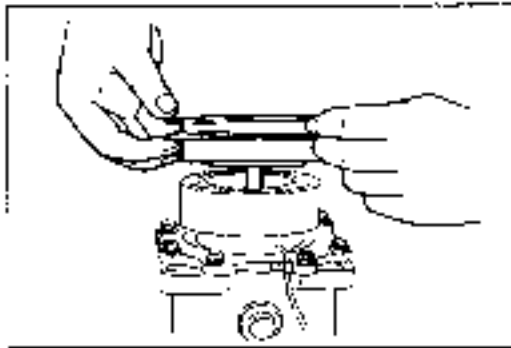
5. Place the new seal seat onto the **SST**. Coat the seat and O ring with clean refrigerant oil and install them into the cavity. Press the seal tightly against the seal; then remove the **SST**.



6. Install the snap ring with the beveled edge facing outward (away) from the compressor. It may be necessary to tightly lap the snap ring to securely position it in its groove.



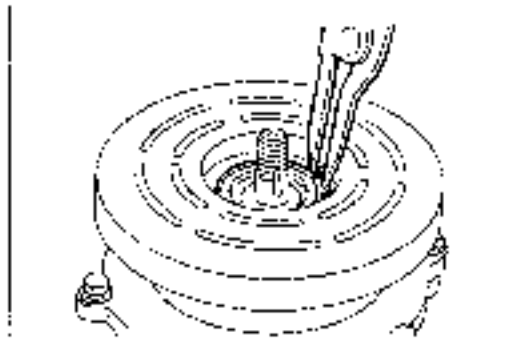
7. Install the clutch spacer shims that were removed.
8. Tap a new felt ring into place.
9. Install the clutch front plate as outlined in the magnetic clutch assembly. (Refer to page U-39.)



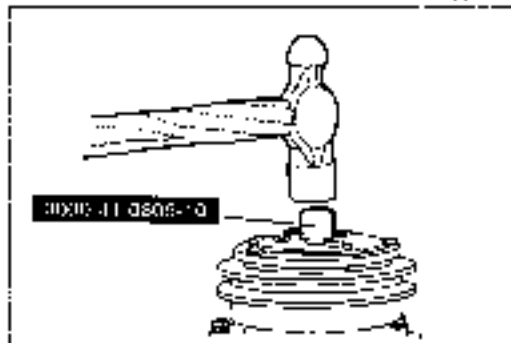
1BUCJX.017



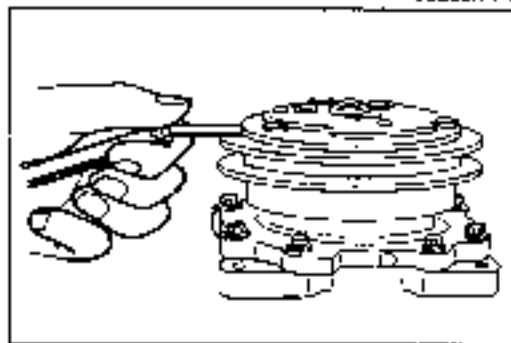
9BUCJX.113



4BUCJX.114



9BUCJX.115



4BUCJX.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:**

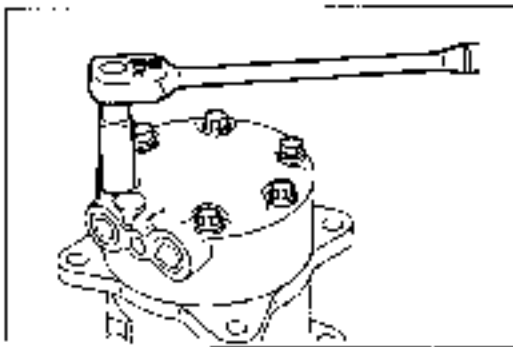
34—44 N·m (3.6—4.6 m·kg, 25—33 ft·lb)

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.

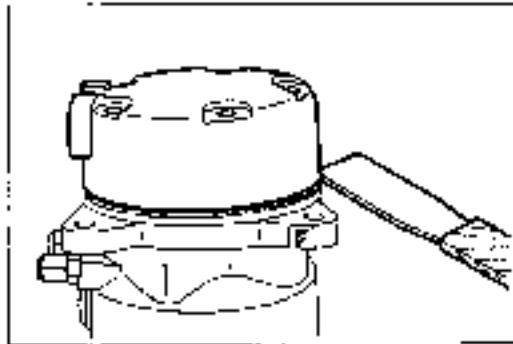
**Air gap: 0.4—0.8mm (0.016—0.031 in)**

**Note**

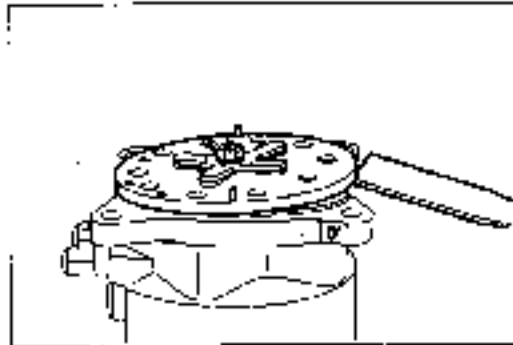
The air gap is determined by the spacer shims. When installing a new clutch assembly, try the original shim first. When installing a new clutch onto a compressor that previously did not have a clutch, use the .040, .020, and .005 shims from the clutch accessory kit. If the air gap does not meet the specification in Step 6, add or subtract shims by repeating Steps 4 and 5.



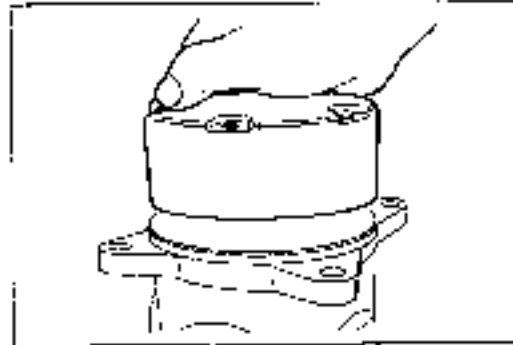
8A.CU17-0 8



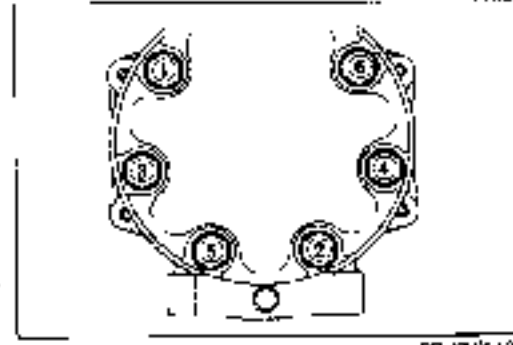
8B.CU18-1 8



8B.UOLX-1 8



8B.UJX 013



8B.UJX 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 rotor. 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

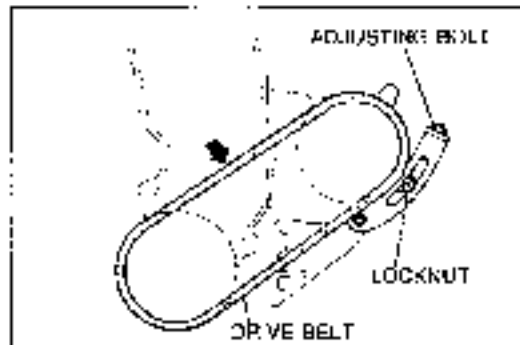
1. Inspect the valve plate for damage and remove all old gasket material.
  - (1) Coat the top of the valve plate with clean refrigerant oil. Position a new gasket over the valve plate locating pins. Align the gasket holes to the oil equalizer and orifice opening.
  - (2) The cylinder head fittings must 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:

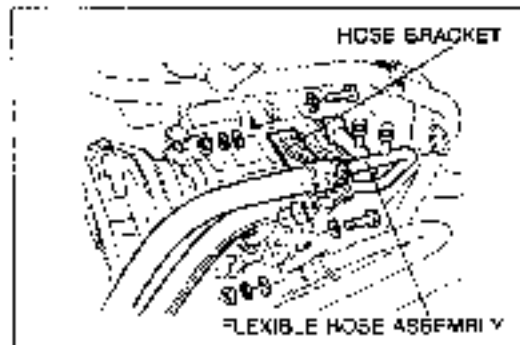
29–39 Nm (3.0–4.0 m-kg, 22–29 ft-lb)



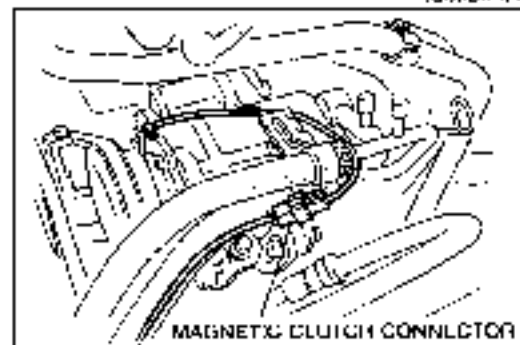
2EUCUR-122



2EUCUR-123



2EUCUR-124



2EUCUR-251

**Installation (B2200)**

1. Install the compressor and loosely tighten the bolts.

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.**

4. Tighten the compressor bracket nut.

5. Tighten the bolts installed in Step 1.

**Tightening torque:**

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

6. Install the hose bracket.

7. Connect the flexible hose assembly to the compressor.

**Tightening torque:**

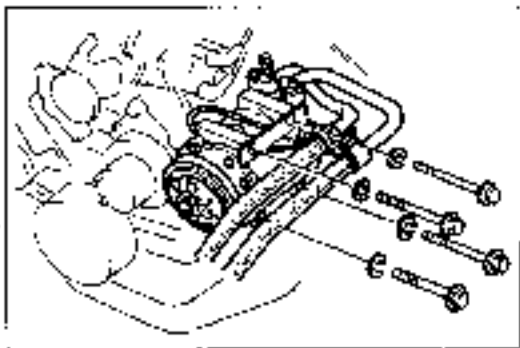
**39—44 Nm (4.0—4.5 m·kg, 29—33 ft·lb)**

8. Connect the magnetic clutch connector.

9. Connect the negative battery cable.

10. Evacuate, charge, and test the system  
(Refer to page U-25.)





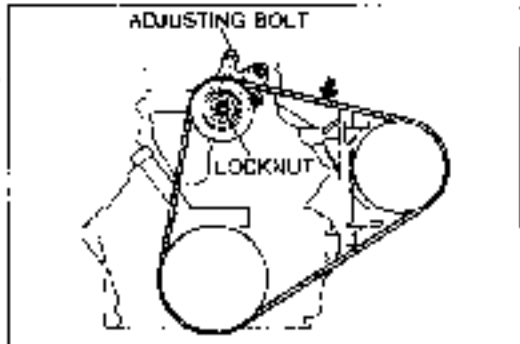
6E0007136

**Installation (B2600)**

1. Install the compressor and tighten the bolts.

**Tightening torque:**

20–29 N·m (2.0–3.0 m·kg, 14–22 ft·lb)



3B100X127

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)

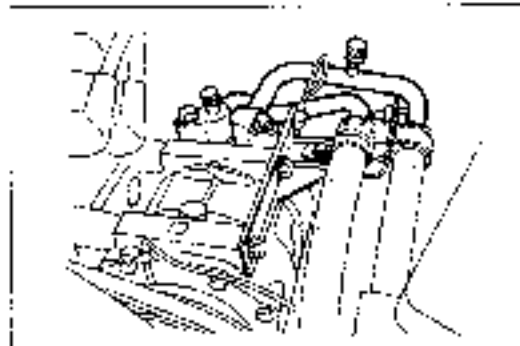
**Drive belt tension**

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.



3B1X00E1

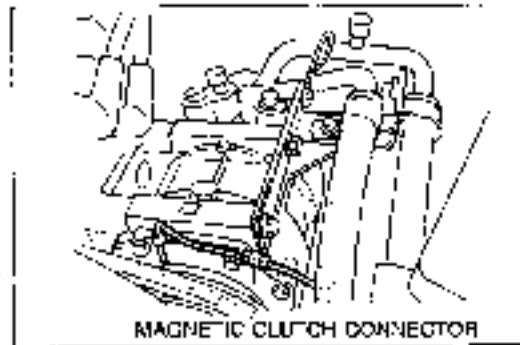
4. Connect the low- and high-pressure pipes to the compressor.

**Tightening torque****Low-pressure pipe:**

29–34 N·m (3.0–3.5 m·kg, 22–25 ft·lb)

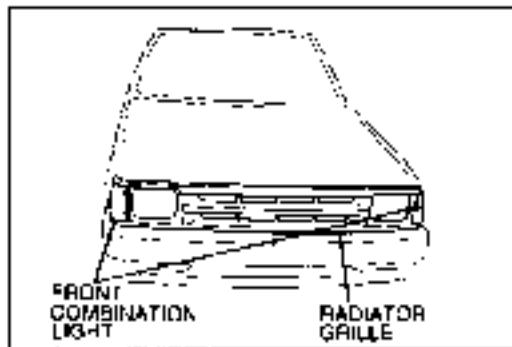
**High-pressure pipe:**

20–25 N·m (2.0–2.6 m·kg, 14–18 ft·lb)

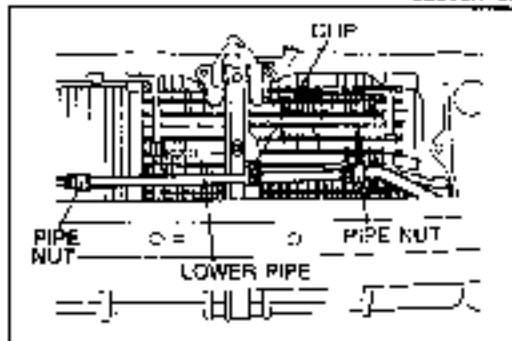


2F101X45H

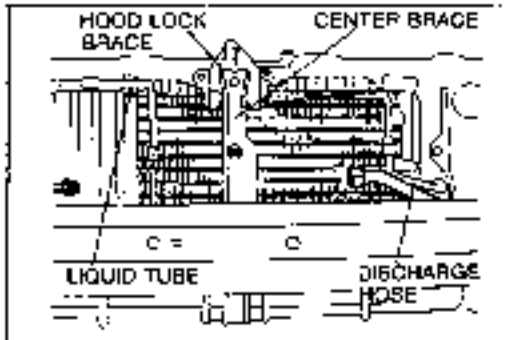
5. Connect the magnetic clutch connector.
6. Connect the negative battery cable.
7. Evacuate, charge, and test the system.  
(Refer to page U-25.)



EBJOLX-130



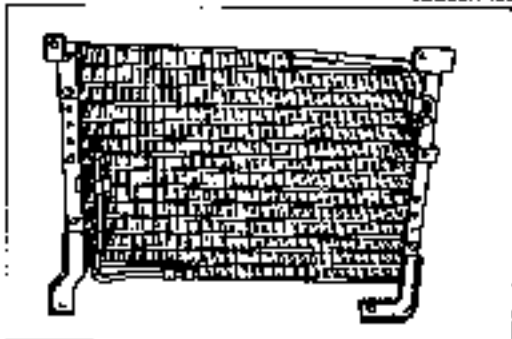
EBJOLX-131



EBLCU7-132



9EUJLX-133



9F9W1X-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.

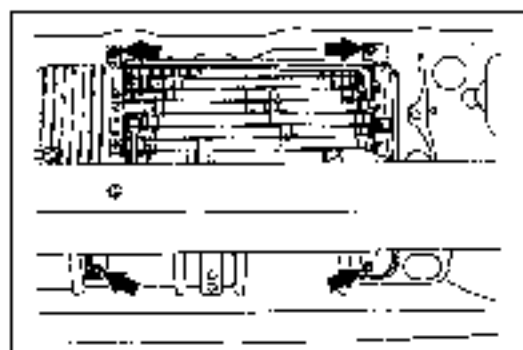
5. Remove the center brace and the hood lock brace.
6. Disconnect the discharge hose and the liquid tube.

7. Remove the nuts and remove the condenser.

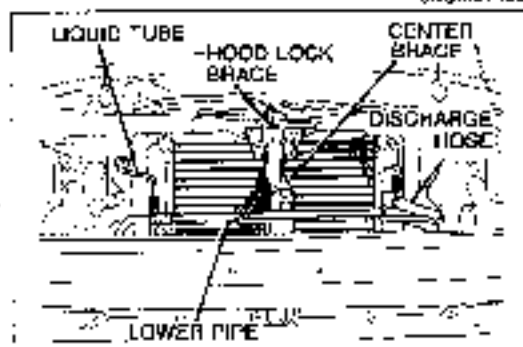
**Inspection**

Check for the following and repair or replace parts as necessary.

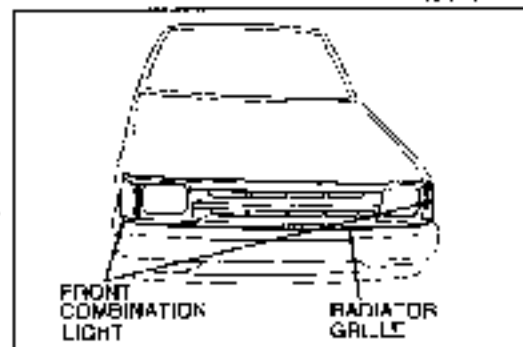
1. Cracks, damage, or refrigerant leakage.
2. Bent fins.
3. Distorted or damaged condenser inlet or outlet.



99J1.D-125



99L.DJX-58



2EUDJX-022

**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)

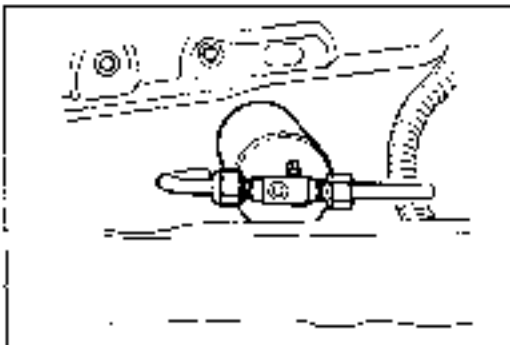
3. Install the clip, hood lock brace, and center brace.

**Installation note**

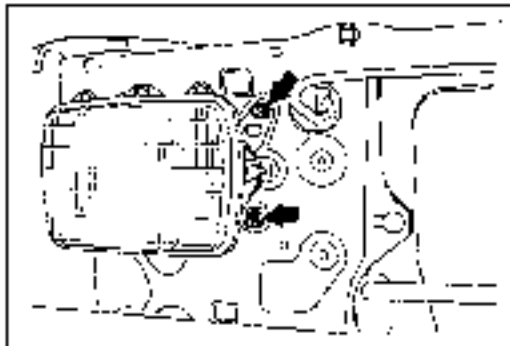
Add compressor oil to the compressor if the condenser was replaced.

**Add: 25—30 cc (1.5—1.8 cu in)**

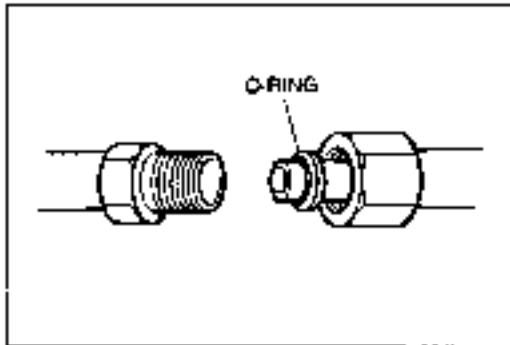
4. Install the radiator grille and the front combination lights.  
5. Evacuate, charge, and test the system.  
(Refer to page U-25)



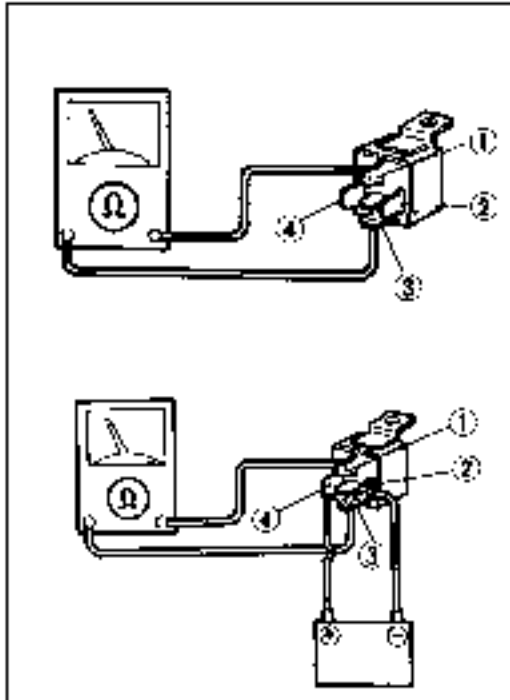
5B100LX-138



5M100LX-190



9B100LX-140



6D100LX-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 Nm (1.2—1.5 m·kg, 98—120 in·lb)**

**A/C RELAY**

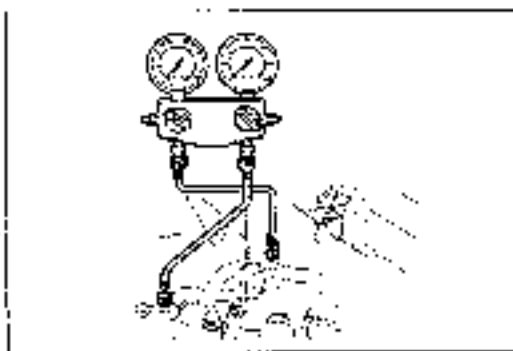
**Inspection**

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



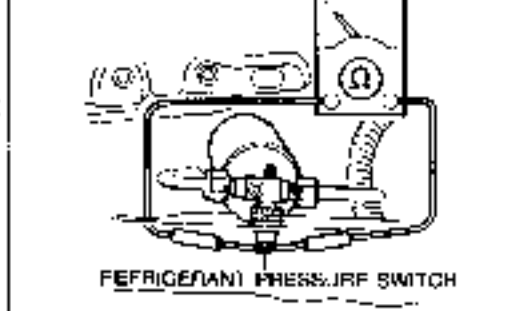
9A10UX-42

**REFRIGERANT PRESSURE SWITCH****Inspection**

1. Install the manifold gauge set (Refer to page U-25.)
2. Measure the refrigerant pressure.

**(B2200)**

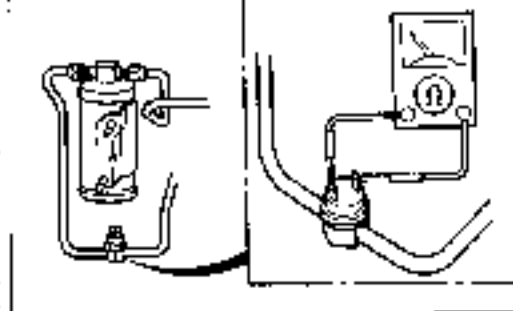
Pressure	Action
More than 2.8 kg/cm <sup>2</sup>	Go to Step 3
Less than 2.8 kg/cm <sup>2</sup>	Charge with refrigerant; then go to Step 3

**B2200**

9P4CUX-144

**(B2600i)**

Pressure	Action
More than 1.8 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 1.6 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

**B2600i**

29U0UX-145

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 (B2600).....	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 (B2600).....	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

(PS, JFCX-001)

A. MEASUREMENTS

Item			Short bed	Long bed	Cab plus
Overall length		mm (in)	4 510 (177.6) 4 640 (182.7)*		4 930 (193.7) 5 050 (198.8)*
Overall width	mm (in)	4x2		1 670 (65.7)	
		4x4		1 705 (67.1)	
Overall height	mm (in)	4x2		1 555 (61.0)	
		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			OHV, 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) r/r)	Standard		1 197 (12.2, 173) 300	
	Minimum		838 (8.5, 121) 300	
	Maximum difference between cylinders		198 (2.0, 28)	
Valve timing	IN	Open BTDC	13°	
		Close ABDC	57°	
	EX	Open BBDC	50°	
		Close ATDC	12°	
Valve clearance		mm (in)	IN: Maintenance-free EX: Maintenance-free	
<b>Cylinder head</b>				
Height		mm (in)	81.95—97.05 (3.224—3.824)	
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	43.5—44.1 (1.728—1.736)	
		EX	38.9—39.7 (1.513—1.521)	
Valve head margin thickness	mm (in)	IN	0.5—1.2 (0.031—0.047)	
		EX	1.3—1.7 (0.051—0.067)	
Valve face angle		IN	45°	
		EX	45°	
Valve length	mm (in)	IN	Standard	111.89 (4.4051)
			Minimum	111.40 (4.3894)
		EX	Standard	111.69 (4.3972)
			Minimum	111.29 (4.3816)
Valve stem diameter	mm (in)	IN	8.330—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 in 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)	1.9—19.5 (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—1.5 (0.047—0.063)		
		EX	1.2—1.5 (0.047—0.063)		
Seat sinking (measure valve protruding length)	mm (in)	IN	Standard	45.5 (1.831)	
			Maximum	48.0 (1.890)	
	EX	Standard	45.5 (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)
		EX	Outer	Standard	52.0 (2.047)
			Minimum	50.4 (1.984)	
			Inner	Standard	44.0 (1.732)
Minimum			42.7 (1.681)		
			44.0 (1.732)		
			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.	
Sealing force/height	N (kg, lb)/mm (in)	IN	Outer	421.6 (43.0, 94.6)/31.0 (1.22)	
			Inner	294.3 (30.0, 66.0)/26.5 (1.04)	
		EX	Outer	421.6 (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	38.056 (1.4984)	
			Minimum	37.856 (1.4906)	
		EX	Standard	38.056 (1.4984)	
			Minimum	37.856 (1.4906)	
Journal diameter	mm (in)	Front and Rear (No. 1,5)		31.940—31.955 (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	0.05—0.15 (0.0020—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—0.6313)	
Rocker arm shaft diameter	mm (in)			15.966—15.984 (0.6286—0.6293)	
Rocker arm-to-shaft clearance	mm (in)	Standard	0.016—0.051 (0.0006—0.0024)		
		Maximum	0.10 (0.004)		
<b>Cylinder block</b>					
Height	mm (in)			301.6 (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		86.200—86.019 (3.3858—3.3856)	
		0.25 (0.010) oversize		86.250—86.269 (3.3957—3.3954)	
		0.50 (0.020) oversize		86.500—86.519 (3.4058—3.4053)	
Cylinder bore taper	mm (in)			0.019 (0.0007) max.	
Cylinder bore out-of-round	mm (in)			0.010 (0.0004) max.	

TD



Item		Engine	F2
<b>Piston</b>			
Piston diameter mm (in) (Measured at 90° to pin bore axis and 10 mm (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 (raft)	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)		155.45-158.55 (6.1236-6.2421)
Bend	mm (in)		0.24 (0.0094) max
Small end bore	mm (in)		21.043-21.961 (0.8284-0.8646)
Big end bore	mm (in)		54.002-54.017 (2.1261-2.1260)
Big end width	mm (in)		26.838-26.890 (1.0568-1.0587)
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	59.893-59.911 (2.3501-2.3508)
		No. 3	59.097-59.705 (2.3299-2.3506)
	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		59.107-59.205 (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	50.590-50.705 (1.9907-1.9963)	
	0.50 (0.020) undersize	50.440-50.455 (1.9858-1.9864)	
	0.75 (0.030) undersize	50.190-50.205 (1.9780-1.9786)	
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	No. 1,2,4,5	0.025-0.043 (0.0010-0.0017)
		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	9.0—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			Petrol	
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) (nom)	Standard	1,255 (12.8, 182) 270	
		Minimum	981 (10.0, 142) 280	
		Maximum difference between cylinders	190 (2.0, 28)	
Valve timing	N	Open BTDC	10°	
		Close ABDC	50°	
	EX	Open BBDC	55°	
		Close ATDC	15°	
Valve clearance	mm (in)	N	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)	N	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	mm (in)	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	6.870—6.985 (0.2744—0.2750)	
		EX	6.965—6.990 (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—0.963)	

TD

Item		Engine	Q6	
<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	49.0 (1.929)
			Maximum	49.5 (1.946)
		EX	Standard	49.0 (1.929)
			Maximum	49.5 (1.949)
<b>Valve spring</b>				
Free length	mm (in)	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	N (kg) lb/ft <sup>2</sup> (in)	IN	195—222 (19.9—22.6, 43.8—49.7)(43 (1.683)	
		EX	195—222 (19.9—22.6, 43.8—49.7)(43 (1.683)	
<b>Camshaft</b>				
Camshaft height	mm (in)	IN	Standard	41.711 (1.6423)
			Minimum	41.514 (1.6344)
		EX	Standard	41.985 (1.6531)
			Minimum	41.785 (1.6452)
Journal diameter	mm (in)	Front and Rear (No. 1, 5)	29.910—29.965 (1.1737—1.1797)	
		Corner (No. 2, 3, 4)	29.910—29.935 (1.1776—1.1793)	
		Out-of-round	Maximum	0.05 (0.002)
Camshaft bearing oil clearance	mm (in)	Front and Rear (No. 1, 5)	0.035—0.065 (0.0014—0.0033)	
		Center (No. 2, 3, 4)	0.065—0.115 (0.0026—0.0045)	
Camshaft runout	mm (in)	Maximum	0.15 (0.006)	
Camshaft end play	mm (in)	Maximum	0.03 (0.0012)	
		Standard	0.02—0.15 (0.0008—0.0059)	
Rocker arm and rocker arm shaft	mm (in)	Maximum	0.20 (0.008)	
		Standard	0.02—0.15 (0.0008—0.0059)	
Rocker arm inner diameter	mm (in)		71.000—71.033 (0.8268—0.8281)	
Rocker arm shaft diameter	mm (in)		20.950—20.990 (0.8252—0.8260)	
Rocker arm to shaft clearance	mm (in)	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.	
Bending	mm (in)		0.20 (0.008) max.	
Cylinder bore diameter	mm (in)	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)		0.018 (0.0007) max.	
<b>Piston</b>				
Piston diameter measured at 90° to pin bore axis and 16.0mm (0.709 in) below oil ring groove	mm (in)	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	mm (in)	Standard	0.058—0.074 (0.0023—0.0029)	
		Maximum	0.15 (0.006)	

Item		Engine	96
<b>Piston ring</b>			
Thickness	mm (in)	Top	1.47 - .49 (0.058 - 0.059)
		Second	1.47 - .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 - 0.0600)
		Second	1.52 - 1.54 (0.0598 - 0.0600)
		Oil	1.02 - 1.04 (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)
Pressing force	N (kg, lb)		4,905 - 14,715 (500 - 1,500 / acc. 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)		22.942 - 22.961 (0.9033 - 0.9040)
Big end bore	mm (in)		54.007 - 54.017 (2.1261 - 2.1269)
Big end width	mm (in)		25.838 - 25.890 (1.0194 - 1.0114)
Connecting rod size clearance	mm (in)	Standard	0.1 - 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 (2.3637 - 2.3604)
		0.25 (0.010) undersize	59.687 - 59.705 (2.3499 - 2.3508)
		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 - 0.057 (0.0011 - 0.0023)
		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)

TD

Item	Engine	G6	
<b>Balance shaft</b>			
Front journal diameter	mm (in)	41.945-41.980 (1.6514-1.6520)	
Center journal diameter	mm (in)	39.945-39.960 (1.5727-1.5732)	
Rear journal diameter	mm (in)	20.945-20.980 (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-vec	
<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 (1.5-2.6, 21-36)
		3,000 rpm	294-392 (3.0-4.0, 43-57)
Inner rotor (with tip) to outer rotor clearance	mm (in)	Standard	0.041-0.084 (0.0017-0.0033)
		Maximum	0.15 (0.0071)
Outer rotor to body clearance	mm (in)	Standard	0.090-0.176 (0.0035-0.0069)
		Maximum	0.20 (0.008)
Side clearance	mm (in)	Standard	0.030-0.090 (0.0012-0.0035)
		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)
		Oil pan	3.9 (4.1, 3.4)
		Oil filter	0.27 (0.23, 0.19)
Grade		API Service 30 Energy Conserving II (ECII)	
Viscosity number	Above -25°C (-13°F)	SAE 15W-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		70 (2.76)		52 (2.04)
Number of impeller blades		5		
Speed ratio		1 : 1.05		1 : 1.3
Water seal type		Unitized mechanical seal		
<b>Thermostat</b>				
Type		Wax		Wax, Two stage
Start to open		86.5 89.5 (188-193)		Main : 86.5-89.5 (188-193) Sub : 83.5 86.5 (182-188)
Full open		100 (212)		
Lift		6.5 (0.23) mm.		Main : 8.0 (0.31) in. Sub : 1.5 (0.06) mm.
<b>Radiator</b>				
Type		Corrugated fin		
Cap opening valve pressure		kPa (kg/cm <sup>2</sup> , psi)		
Cooling circuit checking pressure		kPa (kg/cm <sup>2</sup> , psi)		
Cooling fan		Thermo-modulated		
Type		Thermo-modulated		
Switching temperature OFF → ON		°C (°F)		70 90 (158 194), linear
		M/T	55-65 (131-152), linear	
Number of blades		A/C		-
		M/T	65-76 (152-167), linear	
Outer diameter		mm (in)		410 (16.1)
		M/T	360 (14.0)	
Capacity		liters (US qt, Imp qt)		6.8 (7.2 6.0)
		M/T	7.5 (7.9, 8.6) Without heater : 7.0 (7.4, 8.2)	

## F1. FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR)

Item		Transmission	Manual	Automatic	
Fuel tank capacity		liters (US gal, Imp gal)	Short bed: 55 (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	560 (52.5)   1,150 (70.2)		
Carburetor	Type	Down-draft (2-barrel, 2-stage, automatic)			
	Throat diameter	Primary	mm (in)	30 (1.181)	
		Secondary	mm (in)	34 (1.330)	
	Venturi diameter	Primary	mm (in)	24.5 x 15 x 8 (0.966 x 0.591 x 0.315)	
		Secondary	mm (in)	31 x 16 (1.220 x 0.630)	
	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)	0.32 (0.0126)	
		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)	0.60 (0.0236)	
		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)	1.00 (0.0394)		
	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)	2.50 (0.0984)	
	Fical level	High	mm (in)	11.6—12.5 (0.457—0.492)   10.7—11.7 (0.421—0.461)	
		Low	mm (in)	46.0—47.3 (1.811—1.860)	
	Fast idle adjustment	Throttle valve clearance	mm (in)	0.84—1.04 (0.033—0.041)	
		Choke valve clearance	mm (in)	0.00—1.14 (0.000—0.045)	
	Secondary throttle valve adjustment	Throttle valve clearance	mm (in)	2.35—2.25 (0.093—0.089)	
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—2.10 (0.067—0.083)		
Air cleaner	Fresh filter	B-metal, automatic			
	Element type	Wet			
Accelerator cable	Deflection	mm (in)	1—3 (0.04—0.12)		
Idle speed		rpm	800—850 (800—850) rpm in neutral in P range		
Idle mixture	Duty	Inspection	%		
		Adjustment	%		
Idle up	Automatic transmission	Adjustment speed	rpm		
	Air conditioner	Adjustment speed	rpm		
Dashpot	Adjustment speed	rpm	000—2,100		
Idle switch	Adjustment speed	rpm	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)		

Item	Transmission		Manual	Automatic
EGR control valve	1st	Starts to open mmHg (inHg)	40-60 (1.57-2.30)	
		Fully open mmHg (inHg)	110-130 (4.33-5.11)	
No.1 air control valve	Starts to open	mmHg (inHg)	300-400 (11.0-15.7)	
No.2 air control valve	Starts to open	mmHg (inHg)	50-90 (1.97-3.54)	
Water thermostat	Opened	°C (°F)	More than 46-54 (114.8-129.2)	
Water thermostat	Opened	At radiator °C (°F)	More than 75-79 (58-66.2)	
Water thermo-sensor	Resistance	-20°C (-4°F) kΩ	14.6-17.6	
		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	∞	
Vacuum control valve	Starts to open	mmHg (inHg)	40 (1.57) or more	
No.1 surge control valve	Starts to open	mmHg (inHg)	90-110 (3.54-4.33)	
No.3 surge control valve	Starts to open	mmHg (inHg)	65-106 (2.60-4.17)	
Intake air thermo-sensor	Resistance	-20°C (-4°F) kΩ	14.6-17.6	
		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/I: 750-790			
Ignition timing <sup>1</sup>	BTDC	G6 4-6° F2 5-7°			
<b>Throttle body</b>					
Type	Horizontal draft (2-hand)				
Throat diameter	mm (in)	No. 1 No. 2	G6	40 (1.6) 48 (1.9)	F2 50 (2.0)
<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)		295-314 (2.7-3.2, 38-48)		
<b>Injector</b>					
Type	High-ohmic				
Type of drive	Voltage				
Resistance	Ω		12-16 (at 23°C, 73°F)		
<b>BAG valve (solenoid valve (idle speed control))</b>					
Solenoid resistance	Ω		7.7-9.3 (at 23°C, 73°F)		
<b>BAG valve (air valve)</b>					
Opening temperature	°C (°F)		90±5 (122)		
<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)	14.5-17.9		
		20°C (68°F)	2.2-2.7		
		60°C (136°F)	0.26-0.35		
<b>Intake air thermosensor</b>					
Resistance	kΩ	25°C (77°F)	29.7-30.3		
		95°C (185°F)	3.5-3.7		
<b>Circuit opening relay</b>					
Resistance	Ω	STA - E1	21-43		
		B - Fc	109-226		
		B - Fv	∞		
<b>Fuel tank</b>					
Capacity	liters (U.S. 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	12, Negative ground				
	Type and capacity (20-hour rate)	50D20R 75D26R Maintenance-free	50D20R 75D26R Maintenance-free	50D20R 75D26R Maintenance-free	50D20R 80D28R 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	Standard	21.5 (0.845)			
		Minimum	8.0 (0.315)			
Drive belt deflection (mm) (in) @ 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)		
Type	Non-reduction (M/T) Coaxial reduction (A/T)			Reduction		
Starter	Output		V kW		12-1.2 (M/T) 12-1.4 (A/T)	
	Brush length	Standard	17.0 (0.669) (M/T) 17.5 (0.689) (A/T)		15.0 (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 (P-C)				
	Centrifugal spark advance (Crank angle/Engine speed)	degrees/rpm		Electronic spark advance (Photo-diode type)		
		11.0/3,500				
		13.0/4,400				
Vacuum spark advance (Crank angle/Vacuum)	degrees/mmHg (inHg)		3.0/30 (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	BPR5CS BPR6ES	BPR5CS-1 BPR6ES-1	ZFR5F-11 ZFR5F-11	
		NPX/HHNSO	W16EXH-J W20EXR-J	W16EXR-L-1 W20EXR-L-1	KJ16CR-1 KJ20CR-1	
	Plug gap	mm (in)	0.75—0.85 (0.028—0.033) 1.0—1.1 (0.039—0.043)			
	Eng. 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 rise			8.0	
Full stroke		mm (in)	135 (5.32)	
Height (with carpet)		mm (in)	181-201 (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 drum	
Runout limit		mm (in)	1.0 (0.039)	0.7 (0.028)
Wear limit		mm (in)	0.3 (0.012) from inner head	
Outer diameter		mm (in)	250 (9.84)	225 (8.96)
Inner diameter		mm (in)	160 (6.30)	150 (5.91)
Facing thickness		mm (in)	3.5 (0.14)	
		Flywheel side	3.5 (0.14)	
		Pressure plate side		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	MSM-D
Gearshift lever position			Floor shift
Synchronesh system			Forward synchromesh/Reverse constant-mesh
Gear ratio	1st		3.622
	2nd		2.186
	3rd		1.419
	4th		1.000
	5th		0.858
Reverse			3.403
Oil	Capacity	liters (US qt, imp qt)	2.0 (2.1, 1.6)
	Grade		API Service GL-4 or GL-5
	Viscosity	Above 10°C (50°F) All seasons	SAE 80W-90 SAE 75W-90
Mainshaft runout limit		mm (in)	0.03 (0.0012)
Clearance between synchronizer ring and tank 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	0.6 (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 O 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 (2.0, 2.5)	3.2 (2.4, 2.8)
	Grade		API Service GL-4 or GL-5	
	Viscosity	Above 10°C (50°F) All seasons	SAE 90W-90 SAE 75W-90	
Mainshaft runout limit		mm (in)	0.03 (0.0012)	
Reverse idle gear	Clearance between reverse idler 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 gale 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 90W-90 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 (0.036), 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 (0.036), 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 (0.036), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047)

K1. AUTOMATIC TRANSMISSION (HYDRAULICALLY-CONTROLLED)

Item		Transmission/Engine		NAA-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	1,620—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, 4.0, 5.7)			
		2 range	569—1,148 (6.0—11.7, 85—188)	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, 90—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—1,598 (14.3, 16.3, 20.3, 232)		
		R range	1,736—1,823 (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)		89—128 (0.7—1.3, 10—16)	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)	136—275 (2.0—2.8, 26—40)	185—265 (1.9—2.7, 27—38)	
	Vehicle speed: 85 km/h (53 mph)		314—412 (3.2—4.2, 46—60)	412—570 (4.2—5.2, 60—74)	392—401 (4.0—5.0, 57—71)	
	Output point	Atmospheric pressure	100—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 in-Hg)		59—118 (0.6—1.2, 9—17)	69—128 (0.7—1.3, 10—18)	75—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)			
	Top 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	Sealing and groove clearance	mm (in)	Standard: 0.04—0.16 (0.0016—0.0063)			
			Maximum: 0.10 (0.016)			
Direct clutch	Number of drive/drive plates		2/2			
	Drive plate thickness	mm (in)	Standard: 1.6 (0.063)			
			Minimum: 1.4 (0.055)			
	Clutch clearance	mm (in)	1.8—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 (0.253), 6.6 (0.260), 6.8 (0.268), 7.0 (0.276)			
	End play	mm (in)	0.3—0.8 (0.020—0.031)			
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	G6
Front clutch	Number of drive/driven plates		3/5	
	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)	
	Retaining plate size	mm (in)	5.0 (0.197), 5.7 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228), 6.0 (0.236)	5.9—1.1 (0.235—0.043) 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—0.9 (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 (0.373), 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 (or. dist. bush)	Sealing 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)	38.5 (1.519)	18.0	0.56 (0.022)	
	Pressure regulator	1.7 (0.067)	40.0 (1.575)	15.0	1.2 (0.047)	
	Downshift	5.55 (0.219)	21.9 (0.862)	14.0	0.56 (0.022)	
	Throttle backup	F2	7.1 (0.287)	36.0 (1.417)	18.0	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 (1.192)	14.6	0.8 (0.031)
	2-3 shift	1.2 L31	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)	52.2 (2.055)	18.0	0.55 (0.022)
	Pressure modulator	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)	26.6 (1.048)	6.0	0.9 (0.035)	
On/Off check		5.0 (0.197)	15.5 (0.610)	2.0	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 valves	Primary	F2 Carb.		8.75 (0.344)	21.8 (0.858)	7.0	0.45 (0.018)
				9.0 (0.354)	21.7 (0.854)	10.0	0.8 (0.031)
	Secondary	F2 FGI		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)
Oil pump	Lockup control	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)
Drum support	OD accumulator			14.85 (0.585)	36.7 (1.443)	9.3	1.8 (0.071)
	OD cancel valve			4.85 (0.195)	20.0 (0.906)	14.8	0.65 (0.026)
Band servo	2NU	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					5.0—6.2 (0.232—0.246)		
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—36)	52—58 (32—36)	50—59 (31—37)
		D <sub>2</sub> → D <sub>3</sub>	83—89 (52—54)	88—94 (55—55)	97—103 (60—64)
		OD → D <sub>2</sub>	Above 84 (52)	Above 83 (51)	Above 91 (56)
		D <sub>3</sub> → D <sub>4</sub>	84—90 (52—56)	83—89 (51—55)	91—97 (56—60)
		D <sub>4</sub> → C <sub>1</sub>	37—43 (23—27)	38—44 (24—27)	37—43 (23—27)
	Half throttle 200 mmHg (7.5 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—33 (18—22)	24—30 (15—18)	20—26 (25—29)
		D <sub>3</sub> → OD	43—49 (27—30)	42—48 (26—30)	64—70 (40—43)
		Lockup CR (ON)	68—74 (42—46)	70—76 (43—47)	68—74 (42—46)
		Lockup CR (OFF)	53—59 (33—43)	66—72 (41—45)	63—69 (39—43)
Fully closed	OD → D <sub>1</sub>	28—32 (16—20)	29—35 (18—22)	30—42 (22—26)	
	D <sub>2</sub> → D <sub>2</sub>	12—16 (7—11)	12—16 (7—11)	25—31 (16—19)	
	D <sub>3</sub> → D <sub>1</sub>	12—15 (7—11)	12—16 (7—11)	13—19 (8—12)	
	D <sub>1</sub> → D <sub>2</sub>	12—16 (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>1</sub>	26—32 (16—20)	29—35 (18—22)	27—33 (17—20)	
	D <sub>2</sub> → D <sub>2</sub>	12—16 (7—11)	12—16 (7—11)	13—19 (8—12)	
1		D <sub>2</sub> → D <sub>1</sub>	12—15 (7—11)	12—19 (7—11)	13—19 (8—12)
		1 <sub>1</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		1.545
	3rd		1.000
	OD (4th)		0.694
	Reverse		2.272
Automatic transmission fluid (ATF)	Type		Dexco-®II or M-III
	Capacity liters (US qt, Imp qt)	Total Oil pan	8.8 (9.1, 7.6) 4.0 (4.2, 3.5)
Engine stall speed	rpm	D, S, L and R ranges	2,300—2,300
Time lag	sec.	N → D range	Less than 1.0
		N → R range	Less than 1.2
Line pressure (Pa (kg/cm <sup>2</sup> , psi))	At idle	D, S and L ranges	432—471 (4.4—4.8, 63—68)
		R range	588—638 (6.1—6.5, 87—82)
	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—15.5, 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 using drive/driven plates	0.5—1.2 (0.020—0.047)
	Retaining plate size mm (in)		4.0 (0.157), 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 using 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 using 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		3/3
	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 using 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		8/6
	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)
Spooling 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)	31.05 (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 R	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)	27.8 (0.979)	7.9	0.6 (0.024)	
	Overrunning clutch recuring valve	7.0 (0.276)	32.5 (0.984)	12.8	0.65 (0.033)	
	Stroke shift valve S	5.5 (0.217)	43.0 (1.693)	22.2	0.65 (0.033)	
	Prot. valve	0.1 (0.039)	25.7 (1.012)	2.3	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 (0.385)	37.5 (1.201)	8.75	1.3 (0.051)	
	1st recuring 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	5.75 (0.226)	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)	
	N/O accumulator piston	18.0 (0.709)	43.0 (1.693)	12.3	2.3 (0.091)	
Accumulator	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)	65.0 (2.598)	11.4	3.5 (0.138)	
	3-4/N-R accumulator piston	17.5 (0.681)	55.4 (2.298)	12.3	2.3 (0.091)	
Reverse clutch High clutch	Return	11.6 (0.467)	19.69 (0.775)	4.0	1.3 (0.051)	
	Return	11.6 (0.467)	22.10 (0.870)	6.0	1.3 (0.051)	
Forward & overrunning clutch	Return	9.7 (0.382)	30.8 (1.210)	10.5	1.3 (0.051)	
Low BRC reverse brake	Return	11.6 (0.467)	23.7 (0.933)	5.0	1.1 (0.043)	
	Return A	34.2 (1.346)	45.6 (1.795)	3.0	2.3 (0.091)	
Band servo	Return B	40.3 (1.587)	55.8 (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 (1.5-2.2 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>2</sub> )	96-104 (60-64)
			D <sub>2</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)
	Kickdown	Lockup OFF (D <sub>2</sub> )	D <sub>2</sub> →D <sub>2</sub>	86-94 (53-58)
			D <sub>2</sub> →D <sub>2</sub>	42-46 (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)
			D <sub>2</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 (1.0-2.2 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)
	Kickdown	D <sub>1</sub> →OD	96-104 (60-64)	
		Lockup ON (OD)	96-104 (60-64)	
		Lockup OFF (OD)	81-89 (50-55)	
	S	Fully opened (4.4 volt)	OD→D <sub>3</sub>	43-51 (27-32)
			D <sub>3</sub> →D <sub>2</sub>	22-28 (14-17)
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)	
L	Fully opened (4.4 volt)	D <sub>2</sub> →D <sub>2</sub>	81-89 (50-55)	
		D <sub>2</sub> →D <sub>1</sub>	41-45 (25-28)	
	Half throttle (1.5-2.2 volt)	D <sub>2</sub> →D <sub>1</sub>	41-45 (25-28)	
D <sub>2</sub> →D <sub>1</sub>		41-45 (25-28)		
HOLD	D	Fully opened (4.4 volt)	D <sub>2</sub> →D <sub>2</sub>	47-51 (29-32)
			D <sub>2</sub> →D <sub>2</sub>	87-95 (54-59)
	S	Fully closed (0.4 volt)	OD→D <sub>3</sub>	82-88 (51-55)
			D <sub>3</sub> →S <sub>1</sub>	41-45 (25-28)
L	Fully closed (0.4 volt)	S <sub>1</sub> →S <sub>1</sub>	39-43 (24-27)	
		S <sub>1</sub> →S <sub>1</sub>	66-72 (41-45)	
S	Fully closed (0.4 volt)	S <sub>1</sub> →S <sub>1</sub>	41-47 (26-29)	
		S <sub>1</sub> →S <sub>1</sub>	18-22 (11-14)	
L	Fully closed (0.4 volt)	D <sub>2</sub> →D <sub>2</sub>	7-13 (4-8)	
		OD→D <sub>3</sub>	32-140 (86-92)	
S	Fully closed (0.4 volt)	S <sub>1</sub> →S <sub>1</sub>	58-96 (36-60)	
		S <sub>1</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)
Runout limit	mm (in)	1.57 (0.0618), 1.60 (0.0630)	
Starting torque of universal	Nm (cm-kg, in-lb)	0.294 0.784 (3.0—8.0, 2.6—8.9)	

### M. FRONT AND REAR AXLES

(4x4)

Item		Engine/Transmission	62600	
			M/T	A/T
<b>Front axle</b>				
Bearing play axial direction		mm (in)	0.40	
Bearing preload (without oil seal load)	Pull scale reading	N (kg, lb)	5—12 (0.6 1.2 1.3 2.0)	
<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 -15°C (5°F)	SAE 90	
		Below -15°C (5°F)	SAE 80W	
Amount	liters (US qt, Imp qt)	1.5 (1.6, 1.3)		
Drive pinion preload		Nm (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 0.05 (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			Bump type	
Axle shaft support			Semi-floating type	
Bearing play axial direction	When both shafts are installed	mm (in)	0.05—0.25 (0.002—0.010)	
	When one axle 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 -15°C (5°F)	SAE 90	
		Below -15°C (5°F)	SAE 80W	
Amount	liters (US qt, Imp qt)	1.7 (1.8, 1.5)		

Item	Engine/Transmission		B2600	
			M/T	A/T
Drive pinion preload	N·m (cm·kg, in·lb)		13—18 (13—18, 11.3—15.6)	
Drive pinion and ring gear backlash	mm (in)	Standard	0.05—0.1 (0.0035—0.0040)	
		Minimum	More than 0.05 (0.0020)	
		Allowable variation	Less than 0.07 (0.0026)	
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)	
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)

Item	Engine/Transmission		B2200		B2600	
			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)	Full-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 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			3.009		3.727	
Number of teeth	Ring gear		43		41	
	Drive pinion gear		11		11	
Rear axle oil	Grade		API Service GL-5			
	Viscosity	At 40—10°C (104°F)	SAE 90			
		At 100—12°C (212°F)	SAE 80W			
Amount	liters (U.S. 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 (0.0026)			
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)			
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 (41.9)	
Steering shaft and joint	Shaft type	Collapsible, non tilt or tilt		
	Joint type	Cross-drm and rubber coupling		
	Tilt stroke mm (in)	88 (3.48)		
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 G-4 SAE 90 ATF M2C33F or Dexron®II		
	Capacity <sup>2</sup> liters (US qt, imp. gal)	0.34 (0.36, 0.30)	0.60 (0.65, 0.70)	1.20 (1.27, 1.06)
Power steering	Assist type	Engine speed sensing		
	Fluid pressure kPa (kg/cm <sup>2</sup> , psi)	5,584-9,320 (57.5-95, 1,244-1,361) 9,320-9,810 (95-100, 1,351-1,422)		
Oil pump drive belt	Deflection mm (in) @ 8 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 N (kg, lb)	New	245-284 (25-30, 55-65) 412-471 (42-48, 82.4-105.8)	
		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 capot)		180 (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		Standard	0.04—0.25 (0.002—0.005)		
		mm (in)	Wear limit		
				0.15 (0.006)	
Fluid capacity of reserve tank		liters (US qt., imp qt.)		3.6 (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)		0.5 (0.005)	
Cylinder inner diameter		mm (in)		53.98 (2.125)	
<b>Rear brake (drum)</b>					
Type				Disc servo	Leading-trailing
Shoe clearance adjustment				Self-adjusting	
Thickness of lining	mm (in)	Standard	5.0 (0.20)		
		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		Standard	0.040—0.125 (0.002—0.005)		
		mm (in)	Wear limit		
				0.15 (0.006)	
<b>Parking brake</b>					
Type				Stick type	
Parking lever notches				7—12 notches	
When over is pulled at 196 N (20 kg, 44 lb)					
<b>Power brake unit</b>					
Type				Tandem	Single
Diameter		mm (in)		157 + 213 (7.36 + 8.39)	233 (9.17)
Clearance between master cylinder and brake unit		mm (in)		0—0.5 (0—0.02)	
Fluid pressure per braking force		kPa (kg/cm <sup>2</sup> , psi)		More than 1.982 (20, 284) at 0 mmHg (0 mmHg) More than 5.886 (60, 353) at 500 mmHg (19.7 in-Hg)	More than 1.078 (11, 156) at 0 mmHg (0 mmHg) More than 5.390 (55, 782) at 500 mmHg (19.7 in-Hg)
<b>Rear wheel hydraulic control system</b>					
Type				Rear-wheel Anti-lock Brake System (Rear-wheel ABS)	
<b>Brake fluid</b>					
Grade				FVWS 115 DC1-3 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)	45 (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	1155/90D16	P200/75P14	T135/90D16	
	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 round limit	mm (in)	Horizontal... 2.0 (0.079); Vertical... 1.0 (0.39)				
Wheel unbalance at rim edge (on one side)	g (oz)	10 (0.35)				

R. SUSPENSION

Item	Model	4x2		4x4			
<b>Front Suspension</b>		Double wishbone					
Suspension		Torsion bar spring					
Springs	Type						
	Dimensions (link diameter x length)	mm (in)	21.9 x 901 (0.86 x 35.47)	21.8 x 924 (0.84 x 36.38)			
Stabilizer	Type	Torsion bar					
	Diameter	mm (in)	27 (0.87)	24 (0.94)			
Shock absorbers	Type	Cylindrical, double-acting					
	Damping force N (kg, lb) at 0.3 m/s	Extended	795 ± 118 (80 ± 12, 176 ± 26)	1,825 ± 265 (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	58°00' ± 2°	33°30' ± 2°			
		Outer	33°00' ± 2°	33°00' ± 2°			
		mm (in)	3 ± 3 (0.12 ± 0.12)				
	Toe-in	degree	15' ± 15'				
	Camber angle		0°45' ± 2°		1°00' ± 2°		
	Caster angle		Manual steering: 0°50' ± 45' Power steering: 1°50' ± 45'		2°00' ± 45'		
	Kingspin angle		8°15'				
Caster trail	mm (in)	4.4 (0.17)		12 (0.47)			
<b>Rear Suspension</b>		Rigid axle					
Suspension		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)	579 x 60 x 5 (22.84 x 2.36 x 0.20)			
			966 x 60 x 6 (38.03 x 2.36 x 0.24)	644 x 60 x 6 (25.23 x 2.36 x 0.24)			
			750 x 60 x 14 (29.13 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	587 ± 108 (70 ± 11, 154 ± 24)		1,079 ± 167 (110 ± 17, 242 ± 37)	
			Compressed	471 ± 98 (48 ± 10, 106 ± 22)		441 ± 80 (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	60/35 (-10054)
Parking and front side marker light		5 (87)
Turn signal light	Front	27 (-150)
	Rear	27 (-158)
Backup light		27 (-158)
Stoplight and rear side marker light		27/6 (1157)
License plate light		5
Interior amp		10 (-10 x 2 Cab Plus)
<b>Indicator and warning lights</b>		
Alternator		1.4
Brake		1.4
Cruise (bill)		1.4
Hazard		3.4
High beam		3.4
DIP OFF		1.4
Oil pressure		1.4
Sys. test		1.4
Turn signal		3.4
A/T temperature		1.4
Neutral		1.4
Hudl		1.4
4x4		1.4
Anti-lock		1.4
<b>Illumination lights</b>		
A/C switch		1.4
Ashtray		3.4
Bower		3.4
A/T selector		3.4
Heater		3.4
Meter		3.4
Audio		1.4
RPM meter switch		1.4
Cigarette lighter		0.7
Cruise control main switch		1.4

**U. HEATER AND A/R CONDITIONING SYSTEM**

Item	Specifications	
Refrigerant amount	g (oz)	800 (28.2)
Compressor oil amount	cc (cc/in)	135 (8.2)
Refrigerant initial pressure	kPa (kg/cm <sup>2</sup> , psi)	Low pressure: 95—157 (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		
		Nm	m-kg	ft-lb	Nm	m-kg	ft-lb	Nm	m-kg	ft-lb
6 (0.236)	1 (0.039)	4.2-6.2	0.43-0.63	3-4.6	6.9-9.8	0.7-1.0	5.0-7.2	7.6-11.3	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	6.4-9.3	46-69
14 (0.551)	1.5 (0.059)	—	—	—	75-103	7.7-10.5	56-70	102-137	10-14	75-101
16 (0.630)	1.5 (0.059)	—	—	—	118-157	12-16	85-116	158-211	16-22	115-158
18 (0.709)	1.5 (0.059)	—	—	—	167-225	17-23	123-168	221-299	23-31	163-221
20 (0.787)	1.5 (0.059)	—	—	—	201-314	24-32	171-231	308-417	31-49	227-307
22 (0.866)	1.5 (0.059)	—	—	—	314-423	32-43	231-317	417-564	43-58	307-416
24 (0.945)	1.5 (0.059)	—	—	—	475-548	41-56	298-403	538-726	55-74	396-530

# **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- 6</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>

29U51X-001

**GENERAL INFORMATION**

The letters A and B in the priority column indicate the degree of importance of each tool.

**A.....Indispensable**




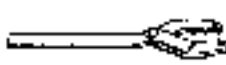

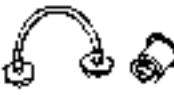


The tools ranked A in this list are indispensable for performing operations satisfactorily, easily, safely, and efficiently. It is, therefore, advisable that all service shops have these tools.







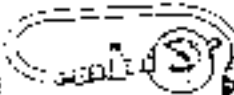
**B.....Selective**

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.

2BU5TX-001

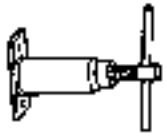

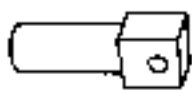





ENGINE


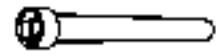
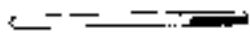
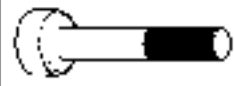
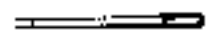
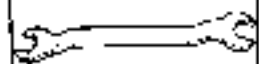


TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 E011 1A0 Brake set, ring gear	A	
49 0636 100A Arm, valve spring lifter	A	
49 S'20 710 Holder, coupling flange	A	
49 1205 07 Pulser, bearing	A	
49 9200 145 Adapter set, radiator cap tester	A	
49 L011 0A0 Piston pin setting tool set	A	
49 3012 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 (GC)	A	
49 L010 1A0 Hanger set, engine stand	A	
49 H011 101A Lock tool, crankshaft	A	 BY 17000
49 U249 C10A Remover & installer, valve guide (G5)	A	
49 0221 251A Remover & installer valve guide (F2)	A	
49 0187 280 Gauge, oil pressure	A	
-	-	-

ST

## 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, manshaft	A	
49 0636 145 Puller, fan pulley boss	A	
49 4017 101 Hook	A	
49 0180 321A Installer bearing	A	
49 F401 331 Boxty (4x4)	A	
49 F401 335A Attachment A (4x4)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0628 425C Puller set, bearing	A	
49 1243 485A Wrench, manshaft locknut	A	
49 0187 461A Guide interlock pin assembly	B	
49 0600 330 Installer, transmission bearing	A	
49 0882 350 Guide, shift fork	B	
49 0164 831A 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 Metallic bearing (4x4)	A	
49 5231 395 Chain expansion tool (4x4)	A	
49 0259 770B Wrench, flare n.c.	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 11017 340A Guide set, worm bevel (4x4)	A	
4B G030 370 Removing plate (4x4)	A	
—	—	—





AUTOMATIC TRANSMISSION

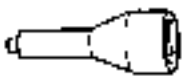



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 11019 0A0A Transmission hanger	A	
4B G07B 390 Pulv. oil pump	A	
4B G019 025 Body B (EC-AT)	A	
4B L019 001 Bolts (EC-AT)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
4B G019 026 Plate (EC-AT)	A	
4B G019 027 Attachment A (EC-AT)	A	
4B G019 029 Nut (EC-AT)	A	
4B G032 35E Adjust. pin, 5# (except EC-A1)	B	



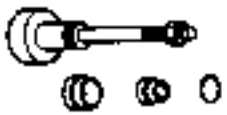
ST




## AUTOMATIC TRANSMISSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 003 Installer of seal (EC-AT)	A	
49 0378 375 Compressor clutch spring (except EC-AT)	A	
49 0378 400A Gauge set, oil pressure	A	
49 H019 007 Adapter	A	



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0378 346 Hex-head wrench (except EC-AT)	A	
49 H075 405 Adapter (except EC-AT)	A	
49 5019 0A0 Self centering tool (except EC-AT)	A	
49 B019 001 Gauge, of pressure	A	



## DIFFERENTIAL

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H027 001 Collar	A	
49 G030 735 Installer, oil seal (4x4)	A	
49 8531 565 Piston 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	

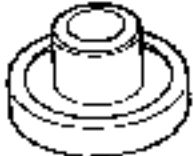

DIFFERENTIAL (CONT'D)

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 block, pinion height	A	
49 0259 720 Adjustment wrench side bearing	B	


PROPELLER SHAFT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 HC25 003 Installer bearing	A	
49 HC25 002 Installer, dust seal	A	
49 B025 001 Body	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 HC33 101 Remover, bearing	A	
49 F025 102 Remover, bearing	A	
—	—	—

FRONT AND REAR AXLES







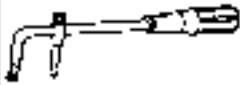



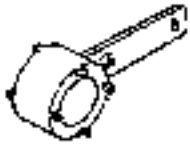




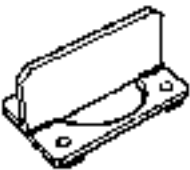
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L027 006 Installer, bearing (4x4)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 004 Attachment φ80	A	


ST




## FRONT AND REAR AXLES (CONT'D)


TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION	TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 005 Installer, bearing (4x4)	A		49 S23 635 Wrench, locknut (4x4)	A	
49 D513 216A Puller, tubular lower	A		49 0727 575 Puller, ball joint	A	
49 U027 007 Installer of seal (4x4)	A		49 U033 101 Installer, bearing (4x4)	A	
49 U027 004 Remover, oil seal (4x4)	A		49 F027 005 Attachment φ52	A	
49 F027 007 Attachment φ72	A		49 W027 001 Installer, oil seal	A	
49 0803 635A Wrench, oil shaft bearing nut	A		49 S120 74B Attachment	A	
49 S120 52CA Puller, rear axle shaft bearing	A		49 MC05 795 Installer set, oil seal (4x4)	A	
49 C118 950C Puller, ball joint	A		49 S120 645A Holder, rear shaft	A	


FRONT AND REAR AXLES (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 3231 660 Puller bearing (4x4)	A	





TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U025 001 Instaler, 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	


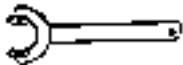
STEERING SYSTEM AND SUSPENSION



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0223 695E Puller, pitman arm	A	
49 1391 580 Wrench, lock-nut	A	
49 W023 565A Adjust wrench	A	
49 B032 302 Adapter	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1232 670A Gauge set power steering	A	
49 H032 E/1 Adapter	A	
49 0118 850C Puller ball joint	A	
49 U034 240 Lower arm bushing puller and installer	A	




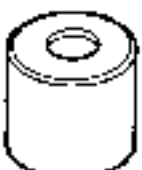

ST




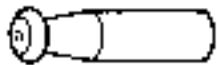

## STEERING SYSTEM AND SUSPENSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0180 510B Pre load measuring attachment	B	
40 JB39 685 Adjust wrench	A	



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 UB39 615 Bushings puller and installer set	A	
4B 1243 785 Installer, dust boot (Upper arm & outer ball joint)	A	


## AIR CONDITIONER SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000 41-0809-01 Hancer, clutch	A	
0000-11-0804-07 Universal puller box	A	
0000-11-0804-01 Universal puller arbor	A	
0000-11-0810-77 Clutch pilot	A	
0000-11-0809-02 Puller, clutch plate	A	






TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000 41-0810-73 Remover & installer, seal seal	A	
0000-11-0810-78 Removal set, pulley & clutch	A	
0000-11-0812-11 Remover & installer, seal	A	
000 41 0812-13 Protector, seal sleeve	A	
0000-11-0809-10 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	



CHECKER AND OTHER EQUIPMENT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H015 9A1 Checker, Self-diagnose	A	
49 G005 870A Tool set, window	A	
49 G015 901 Adapter harness (Throttle sensor)	A	
49 G019 901A EC-A1 tester	A	
49 G018 002 Ignitor checker	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 866A Inserting tool, seal pusher & blade	B	
49 G018 901 EC-A1 tester 49 H019 902 Adapter unit	A	
49 H018 001 Adapter harness (griter checker)	A	
49 9200 182 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 G015 904 Sheet (Engine signal monitor)	A	
49 U018 001 Adapter harness A	A	
—	—	—

# PARTS INDEX

## A

ACCELERATOR CABLE.....	F2-139
A/C RELAY.....	U-45
ACTUATOR.....	M 9, T 47
ACTUATOR CABLE.....	T-46
ADV SOLENOID VALVE.....	F1-60
AIR CLEANER.....	F1-80
AIR CONTROL VALVE (No. 1).....	F1-59
AIR CONTROL VALVE (No. 2).....	F1-60
AIR/FUEL (A/F) SOLENOID VALVE.....	F1-54
AIR VENT SOLENOID VALVE.....	F1-72
AIRFLOW SENSOR.....	F2-79
ALTERNATOR.....	G-9
ATMOSPHERIC PRESSURE SENSOR.....	F1-106
AUTOMATIC TRANSMISSION (ELECTRONICALLY-CONTROLLED).....	K2-1
ACCUMULATORS.....	K2-59
ADAPTER CASE AND PARKING MECHANISM.....	K2-99
ATF THERMOSENSOR.....	K2-36
ATF THERMOSWITCH.....	K2-38
BAND SERVO.....	K2-78
CONTROL VALVE BODY.....	K2-103
DROPPING RESISTOR.....	K2-38
EC-AT CONTROL UNIT.....	K2-39
FORWARD CLUTCH DRUM.....	K2-85
FORWARD CLUTCH HUB.....	K2-82
FRONT INTERNAL GEAR.....	K2-82
HIGH CLUTCH AND FRONT SUN GEAR.....	K2-71
HOLD OFF SWITCH.....	K2-35
INHIBITOR SWITCH.....	K2-35
LOW AND REVERSE BRAKE.....	K2-93
LOWER VALVE BODY.....	K2-116
OIL PUMP.....	K2-61
OIL SEAL.....	K2-102
OVERRUNNING CLUTCH HUB.....	K2-82
P RANGE SWITCH.....	K2-148
REAR INTERNAL GEAR.....	K2-82
REVERSE CLUTCH.....	K2-65
SELECTOR LEVER.....	K2-149
SHIFT-LOCK ACTUATOR.....	K2-148
SOLENOID VALVES.....	K2-38
SPEED SENSOR 1.....	K2-37
TORQUE CONVERTER.....	K2-58
UPPER VALVE BODY.....	K2-108
AUTOMATIC TRANSMISSION (HYDRAULICALLY-CONTROLLED).....	K1-1
ACCUMULATOR.....	K1-64
CONNECTING SHELL.....	K1-61
CONTROL VALVE BODY.....	K1-104
DRIVE PLATE.....	K1-126
DIRECT CLUTCH.....	K1-56
DRUM SUPPORT.....	K1-64
EXTENSION HOUSING AND PARKING MECHANISM.....	K1-95

4AT CONTROL UNIT.....	K1-30
FRONT CLUTCH.....	K1-71
FRONT PLANETARY GEAR UNIT.....	K1-81
GOVERNOR.....	K1-92
INHIBITOR SWITCH.....	K1-25
KICKDOWN AND 4-3 SWITCH.....	K1-26
KICKDOWN RELAY.....	K1-27
KICKDOWN SOLENOID.....	K1-27
LOCKUP SOLENOID.....	K1-29
LOW AND REVERSE BRAKE.....	K1-87
OD BAND SERVO.....	K1-61
OD CANCEL SOLENOID.....	K1-28
OD CASE.....	K1-64
OD CONNECTING SHELL.....	K1-54
OD OFF SWITCH.....	K1-28
OD PLANETARY GEAR UNIT.....	K1-54
OIL COOLER.....	K1-25
OIL PRESSURE SWITCH.....	K1-30
OIL PUMP.....	K1-49
OIL SEAL.....	K1-97
REAR CLUTCH.....	K1-76
REAR PLANETARY GEAR UNIT.....	K1-83
2ND BAND SERVO.....	K1-68
TORQUE CONVERTER.....	K1-49
UPPER VALVE BODY.....	K1-101
AUTOMATIC TRANSMISSION (TRANSFER CASE).....	K3-1

## B

BAC VALVE.....	F2-142
BACK WINDOW GLASS.....	S-22
BATTERY.....	G-7
BLOWER MOTOR.....	U-21
BLOWER UNIT.....	U-21
BOOT.....	N-7
BRAKE PEDAL.....	P-7

## C

CARBURETOR.....	F1-85
CATALYTIC CONVERTER.....	F1-74, F2-168
CHARCOAL CANISTER.....	F2-167
CHECK-AND-CUT VALVE.....	F1-71, F2-166
CIRCUIT OPENING RELAY.....	F2-153
CLUTCH COVER.....	H-17
CLUTCH DISC.....	H-17
CLUTCH MASTER CYLINDER.....	H-8
CLUTCH PEDAL.....	H-5
CLUTCH RELEASE CYLINDER.....	H-12
CLUTCH SWITCH.....	F1-105, F2-180, T-46
COASTING RICHER SOLENOID VALVE.....	F1-67
COMBINATION SWITCH.....	T-9
COMPRESSOR.....	U-33
CONDENSER.....	U-43
CONTROL SWITCH PANEL.....	U-19

# PARTS INDEX

CONTROL VALVE ..... F1-77  
 COOLING FAN ..... E-6  
 COOLING UNIT .. U-31  
 CRUISE CONTROL MAIN SWITCH ..... T-10,47  
 CRUISE CONTROL SWITCH..... T-47  
 CRUISE CONTROL UNIT..... T-49

## D

DASHPOT (FOR MIT) ..... F1-68  
 DIFFERENTIAL (FRONT AND REAR) ..... M-50  
 DISTRIBUTOR ..... G-24  
 DOORS ..... S-15  
 DRIVE BELT ..... N-35  
 DRL RELAY (CANADA) .. T-34  
 DRL RESISTOR (CANADA) ..... T-35  
 DUTY SOLENOID VALVE ..... F1-63  
 DYNAMIC CHAMBER ..... F2-139

## E

EGR CONTROL VALVE ..... F1-62  
 EGR POSITION SENSOR ..... F1-63  
 ENGINE (B2200) ..... B1-1  
   AUXILIARY PARTS ..... B1-63  
   COMPRESSION ..... B1-6  
   CYLINDER BLOCK I ..... B1-30,47  
   CYLINDER BLOCK II ..... B1-31,52  
   CYLINDER HEAD ..... B1-28,56  
   CYLINDER HEAD GASKET ..... B1-13  
   DRIVE BELT ..... B1-5  
   FRONT OIL SEAL ..... B1-18  
   HYDRAULIC LASH ADJUSTER (HLA) .. B1-6  
   REAR OIL SEAL ..... B1-19  
   TIMING BELT ..... B1-8,26  
 ENGINE (B2600) ..... B2-1  
   AUXILIARY PARTS ..... B2-30,72  
   BALANCER CHAIN ..... B2-34,60  
   CHAIN CASE AND OIL PAN ..... B2-33,65  
   COMPRESSION ..... B2-6  
   CYLINDER BLOCK ..... B2-36,53  
   CYLINDER HEAD ..... B2-31,67  
   CYLINDER HEAD GASKET ..... B2-14  
   DRIVE BELT ..... B2-5  
   FRONT OIL SEAL ..... B2-21  
   HLA TROUBLESHOOTING GUIDE ..... B2-6  
   REAR OIL SEAL ..... B2-23  
   TIMING CHAIN ..... B2-8,34,60  
 ENGINE CONTROL UNIT ..... F1-108  
 EVAPORATOR ..... U-32

## F

FLASHER UNIT ..... T-35  
 FLYWHEEL ..... H-18

FRONT AXLE (4x2) ..... M-30  
 FRONT AXLE (4x4) ..... M-21  
 FRONT AXLE DRIVESHAFT (4x4) ..... M-37  
 FRONT BRAKE (DISC) ..... P-19  
 FRONT BUMPER ..... S-5  
 FRONT COMBINATION LIGHTS ..... T-24  
 FUEL CHECK VALVE ..... F1-84  
 FUEL CUT VALVE ..... F1-84  
 FUEL FILTER ..... F1-83, F2-149  
 FUEL LID REMOTE RELEASE ..... S-38  
 FUEL PUMP (EGI) ..... F2-150  
 FUEL PUMP (ELECTRICAL TYPE) ..... F1-82  
 FUEL PUMP (MECHANICAL TYPE) ..... F1-83  
 FUEL PUMP CONTROL UNIT ..... F1-83  
 FUEL TANK ..... F1-84, F2-147  
 FUEL VAPOR VALVE ..... F2-183  
 FUSE BOX ..... T-8

## H

HEADLIGHTS ..... T-24  
 HEADLINER AND TRIM ..... S-33  
 HEATER CORE ..... U-23  
 HEATER UNIT ..... U-23  
 HOOD .. S-4  
 HORN ..... T-36  
 HORN RELAY ..... T-36

## I

IDLE UP SOLENOID VALVE ..... F1-116  
 IDLE SWITCH ..... F1-105, F2-183  
 IGNITION COIL ..... G-23  
 IGNITION KEY SWITCH ..... T-9  
 INHIBITOR SWITCH ..... F1-106  
 INJECTOR ..... F2-156  
 INSTRUMENT PANEL ..... S-29  
 INTAKE AIR THERMOSENSOR, F1-107, F2-180  
 INTAKE MANIFOLD ..... F2-140  
 INTERIOR LAMP ..... T-26

## L

LICENSE PLATE LIGHT ..... T-26  
 LOCK AND FREE SOLENOID VALVES ..... M-9

## M

MAIN FUSE AND FUSE BOX ..... T-8  
 MAIN RELAY ..... F2-184  
 MALFUNCTION INDICATOR LAMP  
   (MIL) ..... F2-186  
 MANUAL TRANSMISSION (B2200) ..... J1-1  
 MANUAL TRANSMISSION (B2600) ..... J2-1

# PARTS INDEX

MANUAL TRANSMISSION  
(TRANSFER CASE) ..... J3-1  
MASTER CYLINDER ..... P-9  
METER ..... T-11  
MIXTURE CONTROL VALVE ..... F1-60

## N

NEUTRAL SWITCH ..... F1-105

## O

OIL COOLER (G6 ENGINE) ..... D-7  
OIL FILTER ..... D-7  
OIL PAN ..... D-8  
OIL PUMP ..... D-11, N-28  
ONE-WAY CHECK VALVE ..... M-8  
OXYGEN SENSOR ..... F1-55, F2-162

## P

PULSATION DAMPER ..... F2-151  
PANEL LAMP CONTROL SWITCH ..... T-10  
PARKING BRAKE CABLE ..... P-33  
PARKING BRAKE LEVER ..... P-31  
PCV VALVE ..... F1-79, F2-163  
PRESSURE REGULATOR ..... F2-154  
PROPELLER SHAFT ..... 4  
PROPORTIONING BYPASS VALVE (PBV) ..... P-30  
PTC HEATER ..... F1-75  
PTC HEATER RELAY ..... F1-75  
PURGE CONTROL VALVE (No.1) ..... F1-70  
PURGE CONTROL VALVE (No.2) ..... F1-71  
PURGE CONTROL VALVE (No.3) ..... F1-71  
PURGE SOLENOID VALVE ..... F1-72

## Q

QUARTER WINDOW GLASS (CAB PLUS) ..... S-24

## R

RADIATOR ..... E-7  
RADIATOR CAP ..... E-6  
REAR AXLE (4x4 AND 4x2) ..... M-44  
REAR BRAKE DRUM, 4x2 ..... P-27  
REAR BRAKE DRUM, 4x4 ..... P-23  
REAR BUMPER ..... S-6  
REAR COMBINATION LIGHTS ..... T-25  
REAR SHOCK ABSORBER AND  
LEAF SPRING (4x2 AND 4x4) ..... R-28  
RECEIVER/DRIVER ..... U-45  
REED VALVE ..... F1-60

REFRIGERANT CONTAINER  
SERVICE VALVE ..... U-24  
REFRIGERANT PRESSURE SWITCH ..... U-46  
RELEASE BEARING ..... H-17  
RFW CONTROL UNIT ..... M-10  
RFW MAIN SWITCH AND  
LOCK INDICATOR LAMP ..... M-8  
RFW UNIT ..... M-12

## S

SEATS ..... S-30  
SEAT BELTS ..... S-31  
SENDER UNITS ..... T-19  
SENSOR ROTOR ..... P-55  
SEPARATOR ..... F2-165  
SHOCK ABSORBER (2x2 AND 4x4) ..... R-10  
SIDE PROTECTOR ..... S-25  
SLOW FUF. CUT SOLENOID VALVE ..... F1-67  
SOLENOID VALVE (PROC) ..... F2-160  
SPARK PLUG ..... G-22  
SPEED SENSOR ..... P-54, T-42  
STABILIZER (4x4) ..... R-26  
STABILIZER AND TENSION ROD (4x2) ..... R-24  
STEERING GEAR AND LINKAGE  
(MANUAL) ..... N-12  
STEERING GEAR AND LINKAGE  
(POWER STEERING) ..... N-24  
STEERING WHEEL AND COLUMN  
(MANUAL) ..... N-9  
STEERING WHEEL AND COLUMN  
(POWER STEERING) ..... N-24  
STOP LIGHT SWITCH ..... T-37

## T

TAILGATE ..... S-37  
THERMOSTAT ..... E-10  
THIRMOSWITCH ..... U-32  
THROTTLE BODY ..... F2-138  
THROTTLE SENSOR ..... F2-181  
TIRES ..... O-9  
TORSION BAR SPRING AND  
LOWER ARM (4x2) ..... R-11  
TORSION BAR SPRING AND  
LOWER ARM (4x4) ..... R-16  
TRANSFER CASE SWITCH  
(4x4 INDICATOR SWITCH) ..... M-7  
TRANSFER CASE SWITCH  
(NEUTRAL SWITCH) ..... M-7  
TWO-WAY CHECK VALVE ..... F2-166

## V

VACUUM CONTROL VALVE ..... F1-80



## PARTS INDEX

VACUUM RESERVOIR ..... M-10  
VACUUM SENSOR..... F1-107  
VACUUM SOLENOID VALVE ..... F1-87

### W

WARNING BUZZER..... T-22  
WARNING LIGHTS AND SENDER UNITS... T-19  
WASHER MOTOR ..... S-11  
WATER PUMP..... E-8  
WATER TEMPERATURE SWITCH ..... F1-105  
WATER THERMOSENSOR..... F1-105, F2-179  
WATER THERMOVALVE..... F1-71  
WHEELS ..... C-3  
WINDSHIELD ..... S-19  
WINDSHIELD WIPER AND WASHER..... S-10  
WIPER MOTOR ..... S-10