

1992 Mazda B2200 B2600i Workshop Manual

FOREWORD

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

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

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

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

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Mazda Motor Corporation
HIROSHIMA, JAPAN

APPLICATION:

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

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VEHICLE IDENTIFICATION NUMBERS (VIN)

JM2UF123*NO 250001~
JM2UF223*NO 250001~
JM2UF323*NO 250001~
JM2UF113*NO 250001~
JM2UF213*NO 250001~
JM2UF313*NO 250001~
JM2UF114*NO 250001~
JM2UF314*NO 250001~
JM2UF414*NO 250001~
JM2UF814*NO 250001~
JM2UF514*NO 250001~
JM2UF223*NO 250001~

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153 JG 06 001

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.

94AUG13 002

HOW TO USE THIS MANUAL

PREPARATION

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

Example:

N TIE-ROD END BOOT AND STEERING GEAR BOOT

TIE-ROD END BOOT AND STEERING GEAR BOOT

PREPARATION

43 U-TIE BOOT Fiber, ball joint 	44 HISS SST Hydraulic boot 

SMUGIX-032

SST NUMBER

43 HISS SST
Hydraulic boot

SST NAME

SST ILLUSTRATION

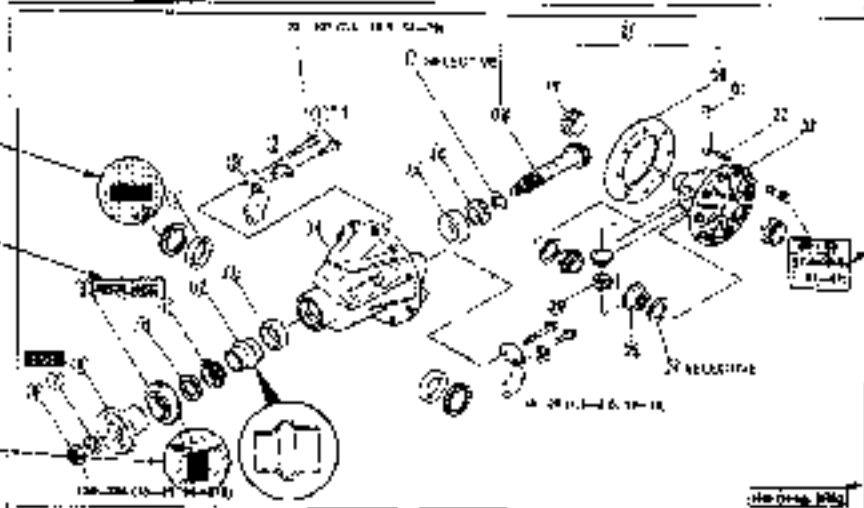


SMUGIX-032

REPAIR PROCEDURE

- 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.
- Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration.
- Pages related to service procedures are shown under the illustration. Refer to this information when servicing the related part.

Example:



SHOWS NEEDS SST

SHOWS EXPENDABLE PARTS

SHOWS APPLICATION POINT OF OIL, ETC.

SHOWS RELATED PAGE FOR SERVICE

SHOWS TIGHTENING TORQUE SPECIFICATION *2

SHOWS TIGHTENING TORQUE UNIT

SHOWS VISUAL INSPECTION INFORMATION

1 Ball
2 Lock plate
3 Bearing nut
4 Adjusting screw
5 Bearing outer race
6 Locknut
7 Washer
8 Compression spring

16 Using inner race
Remove
Inspect for damage or deformation
Reinstall
17 Spacer
18 Drive gear
Remove
Inspect gears and teeth for wear or damage
Adjustment of teeth
Adjustment

page M-22
page M-21
page M-21
page M-22
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*1: The numbering (ex ①) shows service procedure.

*2: Units shown in Nm (m.kg, ft-lb) unless otherwise specified

SYMBOLS

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

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

9MUGX-005

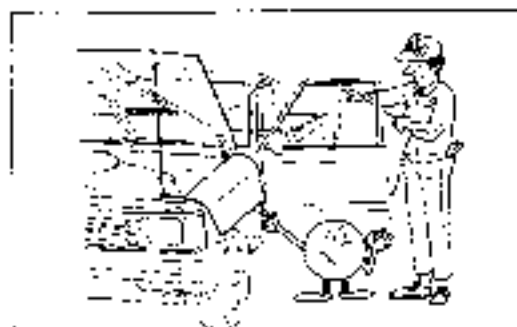
Note

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.

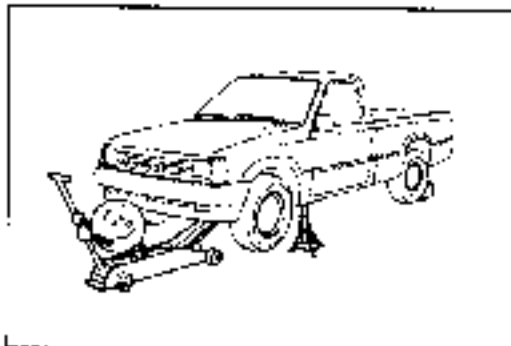
9MUGX-006



9MUGX-007

FUNDAMENTAL PROCEDURES**PROTECTION OF THE VEHICLE**

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



SMU3IX-006

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.

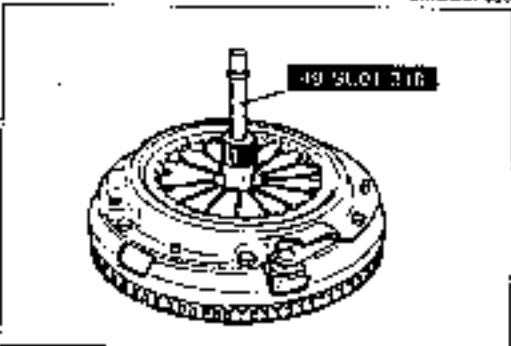
Start the engine only after making certain the engine compartment is clear of tools and people.



SMU3IX-008

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

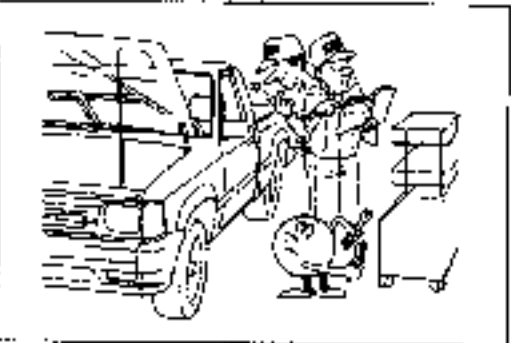
Be sure that all necessary tools and measuring equipment are available before starting any work.



47 105X-005

SPECIAL TOOLS

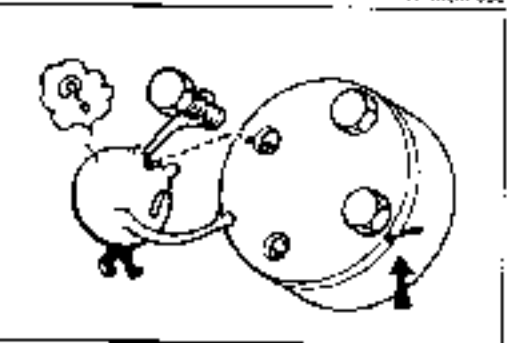
Use special tools when they are required.



47 106X-000

REMOVAL OF PARTS

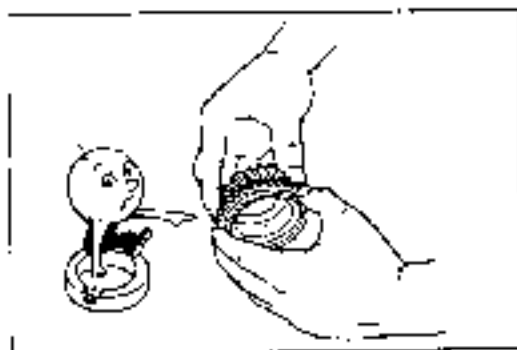
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



SMU3IX-029

DISASSEMBLY

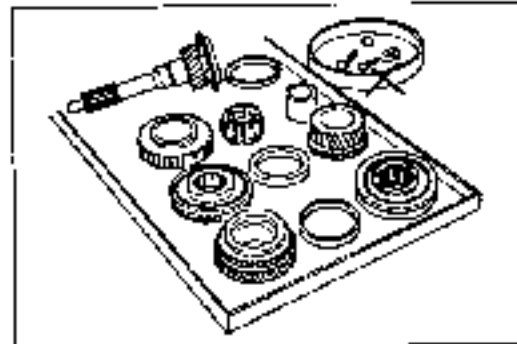
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



SMUGIX-040

1. Inspection of parts

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

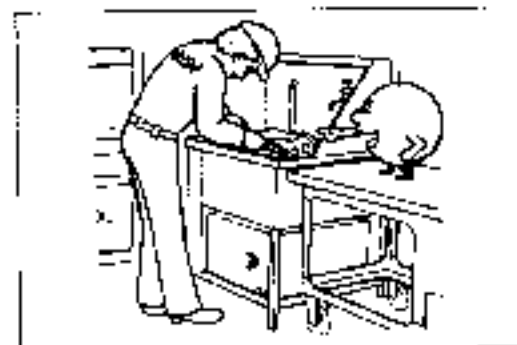


AMJG-X-C41

2. Arrangement of parts

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

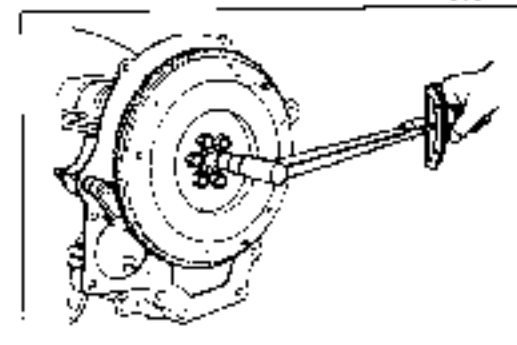
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



L7UUGX-010

3. Cleaning parts for reuse

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



SMUGIX-001

REASSEMBLY

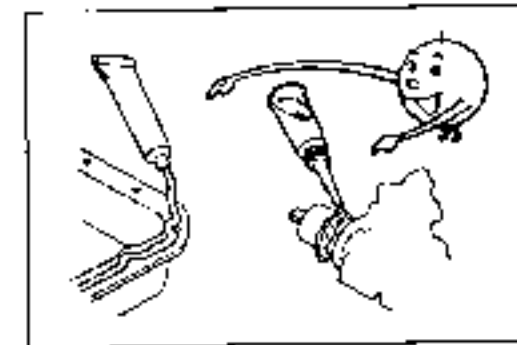
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts. Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in Section TD for tightening torques not mentioned in the main text.

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

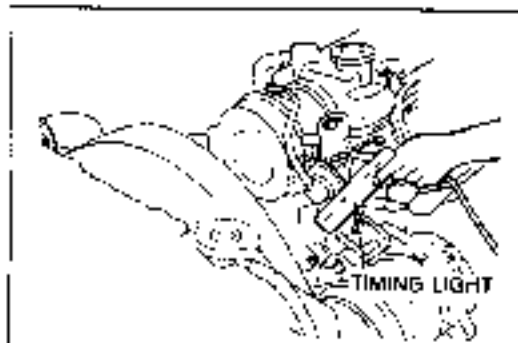
1. Oil seals	2. Gaskets
3. O-rings	4. Lock washers
5. Cotter pins	6. Nylon nuts

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.



2HOJELP46

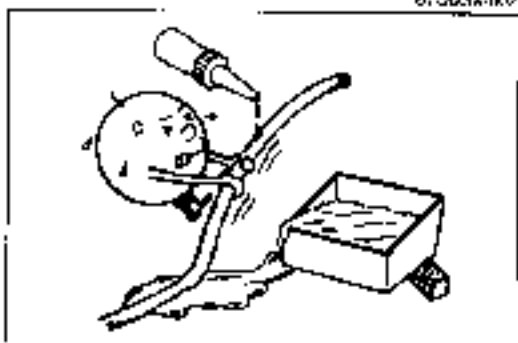


67UGX-007

ADJUSTMENTS

Use suitable gauges and/or testers when making adjustments.

GI



67UGX-006

RUBBER PARTS AND TUBING

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

JACK AND SAFETY STAND (RIGID RACK) POSITIONS

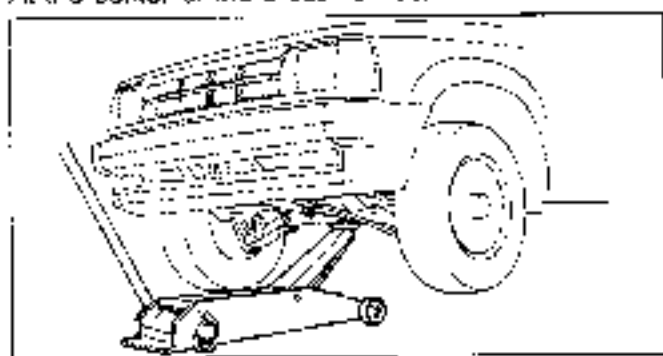
FRONT

Jack position:

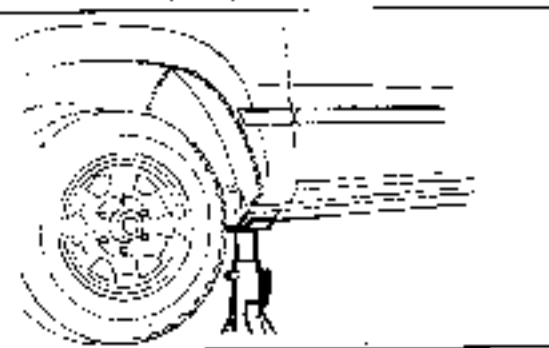
At the center of the crossmember

Safety stand positions:

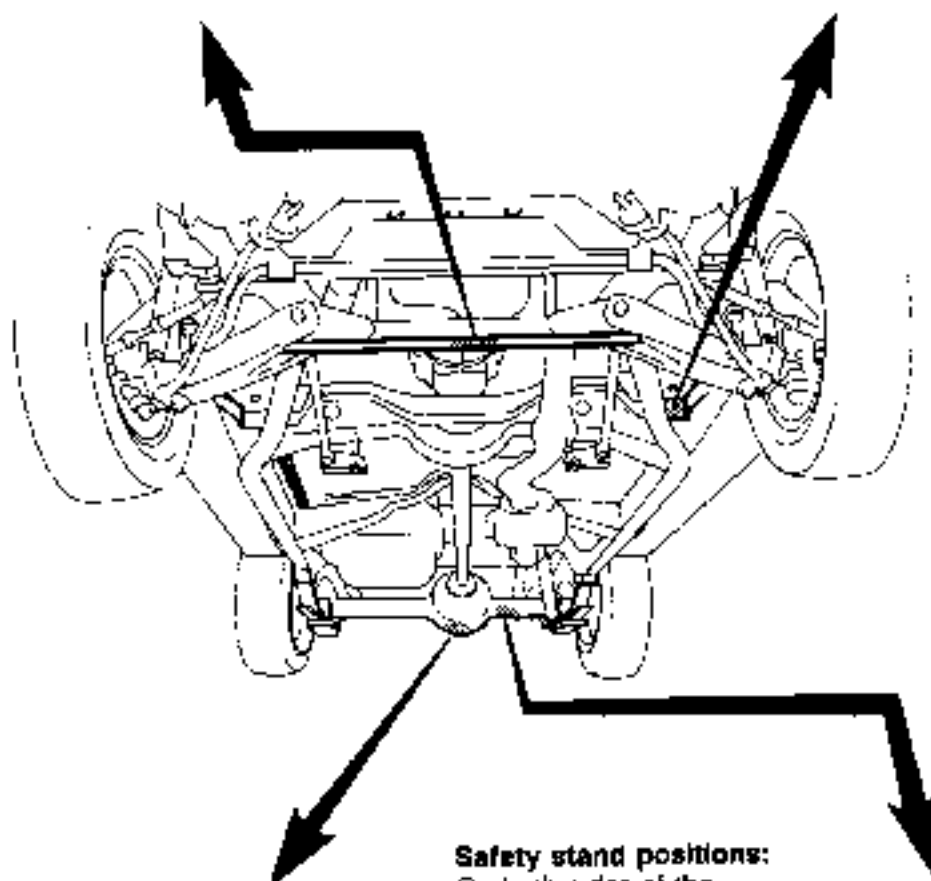
On both sides of the jack point



4EG0GK-013



4EG0GK-019



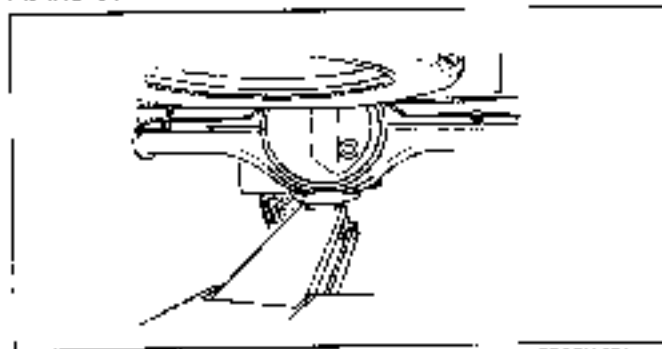
REAR

Jack position:

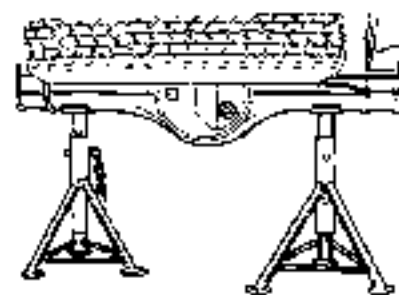
At the center of the differential

Safety stand positions:

On both sides of the differential



4EG0GK-021



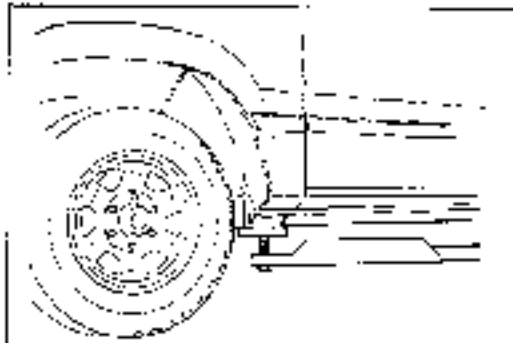
4EG0GK-022

VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

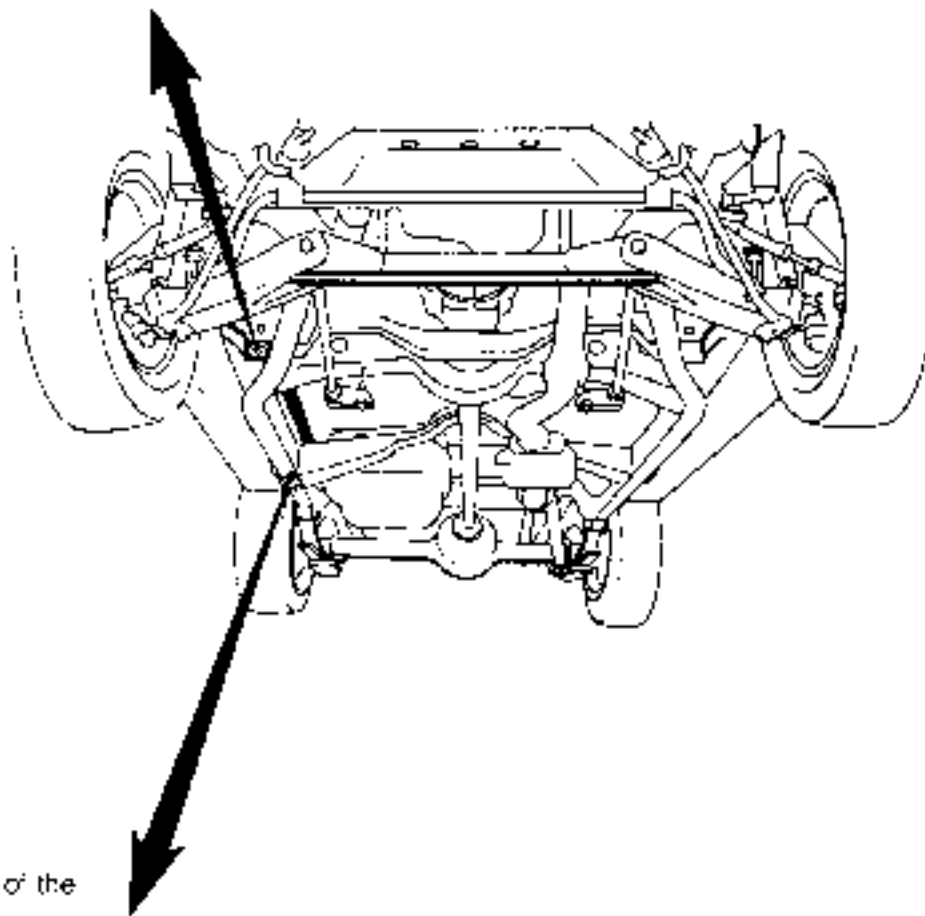
FRONT

Jack point:

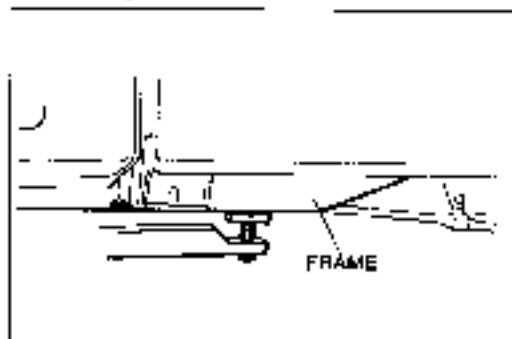
On both sides of the jack point



2BL003X-002



REAR

Leaf-spring:On both sides of the
leaf-spring

4CG00X-027



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



35U36X-007

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

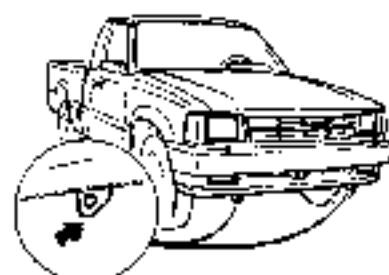
If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use a wheel dolly. With all 4 wheels on the ground, the vehicle may be towed only forward. In this case, do not exceed the following towing speed and/or distance or transmission damage could result.

	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.

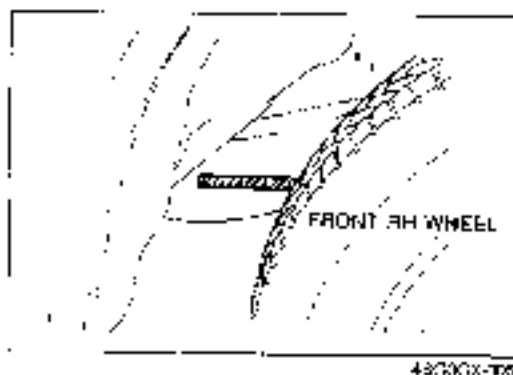


45U36X-007

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).

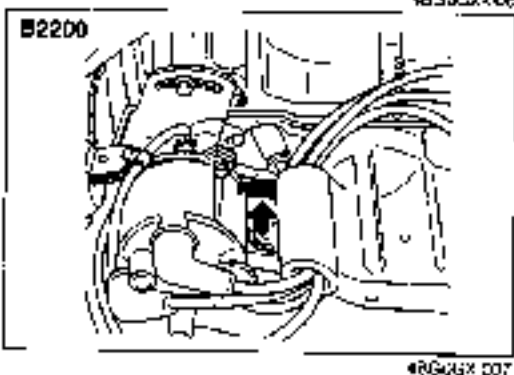
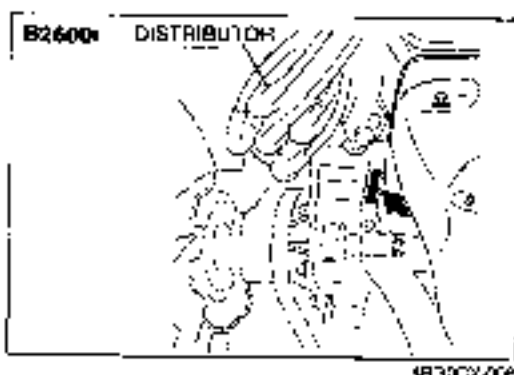
CHASSIS NUMBER LOCATION



UNITS

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

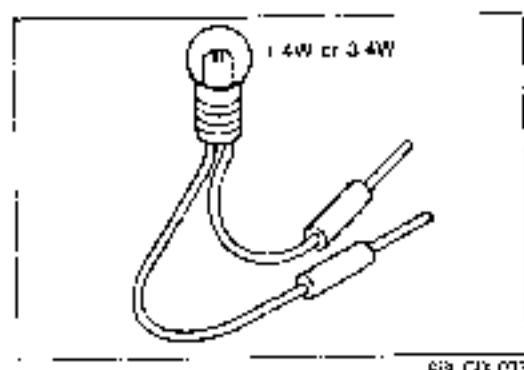
4B300X-016

ENGINE MODEL
AND NUMBER LOCATION

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
ECAT	Electronically-controlled automatic transmission
ECU	Engine control unit
EEC	Exhaust emission control system
EGR	Exhaust gas recirculation
ELR	Emergency locking retractor
ETR	Electrical tuning radio
EX	Exhaust
Fig.	Figure
HAT	Hydraulically controlled automatic transmission
HJA	Hydraulic lash adjuster
IC	Integrated circuit
IG	Ignition
IN	Intake
INT	Intermittent
ISC	Idle speed control
LH	Left hand
LSD	Limited slip differential
MAS	Mixture adjust screw
MIL	Mallfunction indicator light
M/T	Manual transmission
MTR	Mechanical tuning radio
OD	Outer diameter
OFF	Switch off
ON	Switch on
PBV	Preheating bypass valve
PCV	Positive crankcase ventilation
PS	Power steering
RFW	Remble free wheel hub
RH	Right hand
SW	Switch
TAS	Throttle adjust screw
TDC	Top dead center
VRS	Vibration reducing silencer

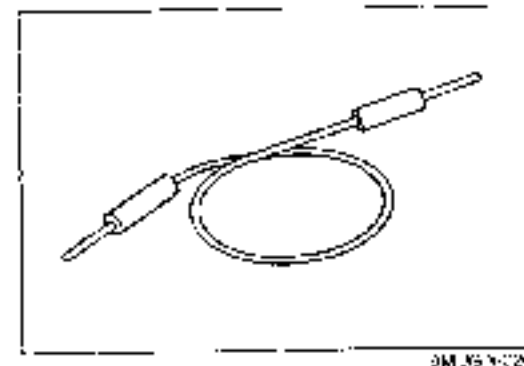
19U3X-001

**CAUTION****ELECTRICAL TROUBLESHOOTING TOOLS****Test Light**

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

Caution

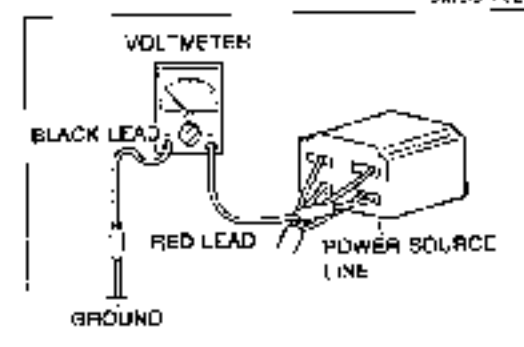
When checking the control unit, never use a bulb over 3.4W.

**Jumper Wire**

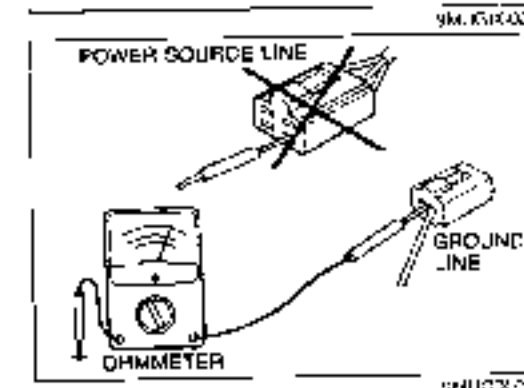
The jumper wire is used for testing by shoring across switch terminals and ground connections.

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.

**Voltmeter**

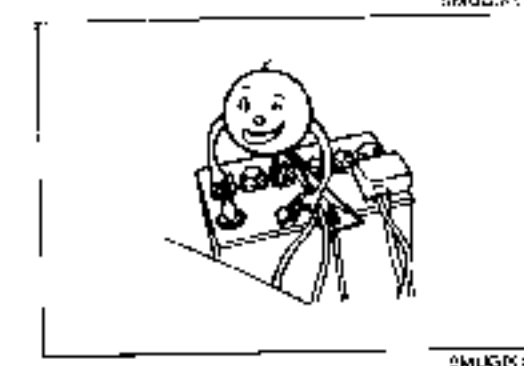
The DC voltmeter is used to measure of circuit voltage. A voltmeter with a range of 15V or more is used by connecting the positive (+) probe (red lead wire) to the point where voltage is to be measured and the negative (-) probe (black lead wire) to a body ground.

**Ohmmeter**

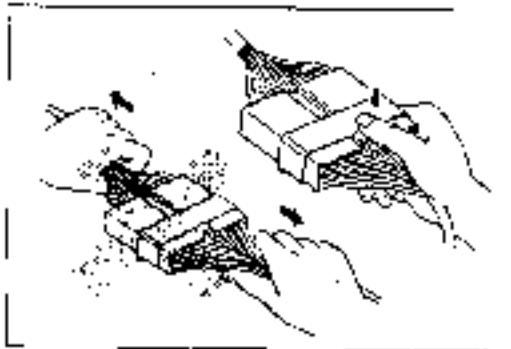
The ohmmeter is used to measure the resistance between two points in a circuit and also to check for continuity and diagnosis of short circuits.

Caution

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

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

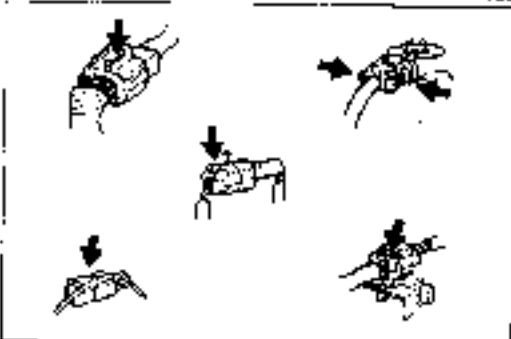
Before disconnecting connectors or replacing electrical parts, disconnect the negative battery cable.



9K1173-4020

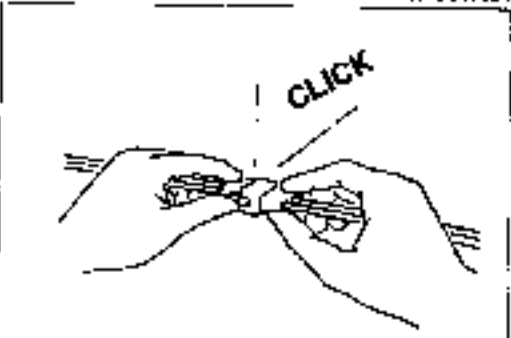
Connectors**Removal of connector**

Never pull on the wiring harness when disconnecting connectors.



9MUG0X-024

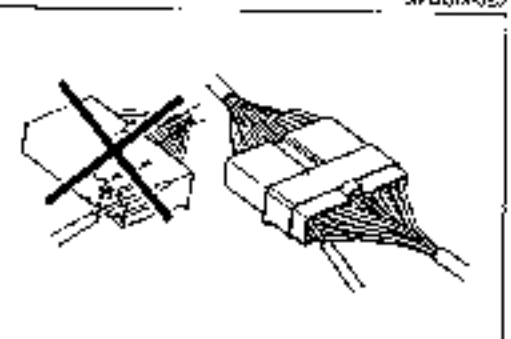
Connectors can be removed by pressing or pulling the lock lever as shown.



9WU01X-025

Locking of connector

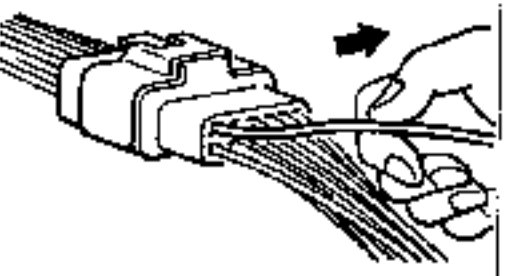
When locking connectors, make sure to listen for a click that will indicate they are securely locked.



9WU1F5X-026

Inspection

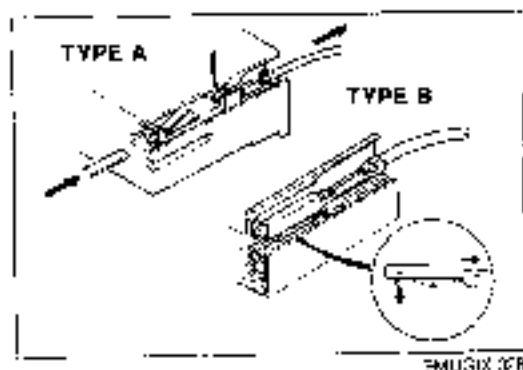
When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wire harness side.



9K11X3-X-CE7

Terminals**Inspection**

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



Replacement of terminals

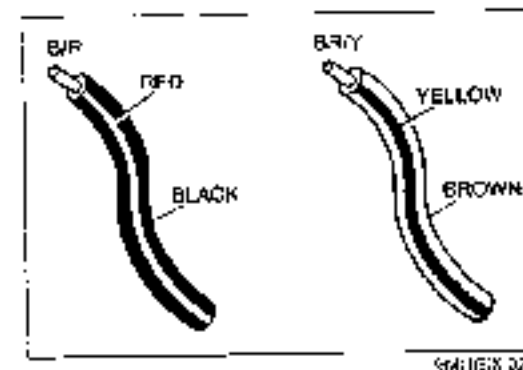
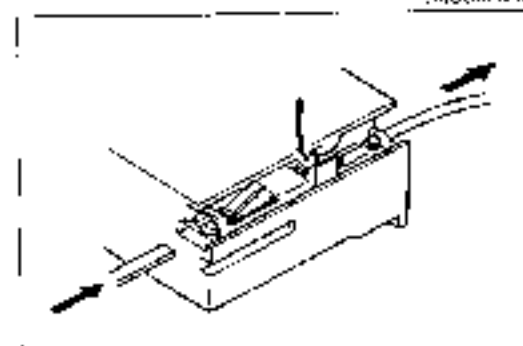
Use the appropriate tools to remove the terminal as shown. When installing the terminal, be sure to insert it until it locks securely.

<Female>

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

<Male>

Same as the female type

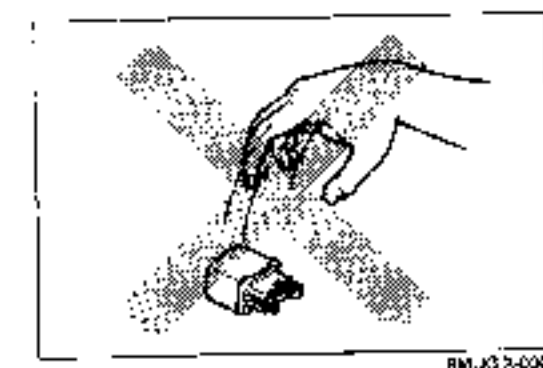


Wiring Harness

Wiring color codes

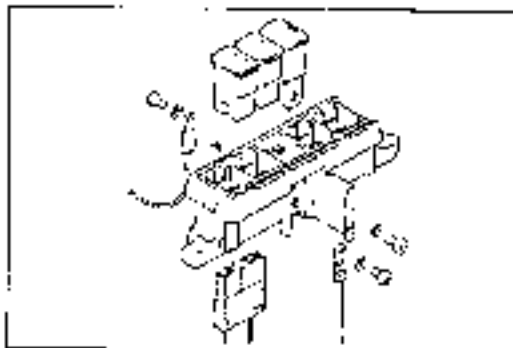
Two-color wires are indicated by a two-color code symbol. The first letter indicates the base color of the wire and the second the color of the stripe.

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

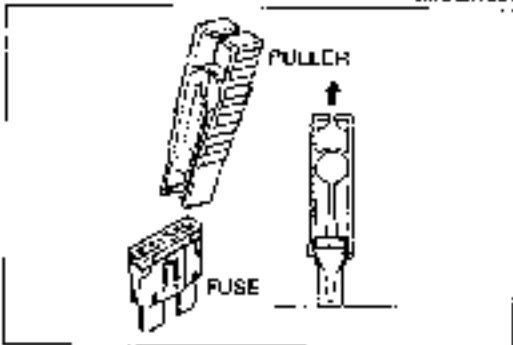


Sensors, Switches, and Relays

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



SMUCIX 031



SMUCIX 702

Fuse Replacement

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

PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE SERVICES

PRE-DELIVERY INSPECTION	A- 2
PRE DELIVERY INSPECTION TABLE	A- 2
SCHEDULED MAINTENANCE SERVICES	
(USA)	A- 3
SCHEDULE 1	
(NORMAL DRIVING CONDITION) B260Di ..	A- 3
SCHEDULE 1	
(NORMAL DRIVING CONDITION) B2200 ...	A- 7
SCHEDULE 2	
(UNIQUE DRIVING CONDITION) B2800i	A-10
SCHEDULE 2	
(UNIQUE DRIVING CONDITION) B2200	A-13
SCHEDULED MAINTENANCE SERVICES	
(CANADA)	A-16

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:

- Green exterior finish, 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, 87—108 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, coolant and hydraulic lines, fittings, connections and components for leaks
- Engine oil level
- Oil level in steering gearbox
- Power steering fluid level (if equipped)
- Brake and clutch master cylinder fluid levels
- Windshield washer reservoir fluid level
- Headlight cleaner reservoir fluid level (if equipped)
- Radiator coolant level
- Tightness of battery terminals

3. INTERIOR

- **INSTALL** the following parts:

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

- **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 pedal	B26ED	181—201 (7.12—7.91)	0.6—3.0 (0.02—0.12)
Brake pedal	B27ED	181—191 (7.13—7.52)	1.0—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 (EGI)
- 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 ± 5 rpm/NT; 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:

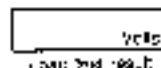
- Brake operation
- Clutch operation
- Steering control
- Operation of meters and gauge
- Squeaks, rattles or unusual noises
- Emergency locking mechanism
- Cruise control system (if equipped)
- Operation of transfer case (4x4 only)

7. AFTER ROAD TEST

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

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

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



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

PSUJAX-002

SCHEDULED MAINTENANCE SERVICES (USA)

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

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

SCHEDULE 1 (NORMAL DRIVING CONDITION)

B2800

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)

B2600I

Maintenance operation	Interval										Service data and inspection point	Page
	Number of months or miles (Kilometers), whichever comes first											
	Months	7.5	15	22.5	30	37.5	45	52.5	60			
	× 1,000 miles	7.5	15	22.5	30	37.5	45	52.5	60			
	× 1,000 km	12	24	36	48	60	72	84	96			
Engine												
Engine oil		R	H	R	R	R	R	R	I		• Oil pan capacity: 4.5 liters (4.6 US qt, 4.0 imp qt)	D 7
Oil filter		R	H	R	R	R	R	R	I		• Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 imp qt)	D 7
Drive belt											• Check for damage	D2-5
Air cleaner element					R						• Tension	D2-116
Oxygen sensor**												D2-182
PCV valve											• Check operation	D2-183
Hoses and tubes for emission*												D2-7
IGNITION SYSTEM												
Spark plug											• Plug type: 16 1.1 mm (0.043 in) gap	G 22
											• Recommended spark plugs	
					R						NGK ZFR5F-11* ZFR5B-11 KIYDON D150 KIYDON D150	
											Standard plug	
Ignition timing											• Ignition timing: 4° ± 0.5° BTDC	G-24
FUEL SYSTEM												
Idle speed		I-1					I-1				• Idle speed: 1300-1350 rpm (M1) 750-790 rpm in P range (M1)	F2-118
Fuel filter									R			F2-149
Fuel lines											• Fit type, connections and components for leaks	F2-143
COOLING SYSTEM												
Cooling system											• Hoses for leaks or wear	E 5
											• Coolant level	
											• Coolant capacity: With heater: 7.5 liters (7.9 US qt, 6.6 imp qt) Without heater: 6.0 liters (6.3 US qt, 5.1 imp qt)	F 5

SBL-CAY-004

SCHEDULE 1 (NORMAL DRIVING CONDITION) (Cont'd)
B2600H

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		
Maintenance operation	At 1,000 miles	7.5	15	22.5	30	37.5		
	At 1,000 km	12	24	36	48	60		
CHASSIS AND BODY								
Brake link hoses and connectors								
Brake fluid								
							• Proper attachment and connections • Brake fluid: FMVSS 116 DOT3 or SAF J-1083	P-5
							• Caliper operation • Thickness of disc rotor: Minimum: 4x2: 20mm (0.79 in); 4x2: 18mm (0.71 in)	P-2
							• Thickness of pad: Minimum: 3.0mm (0.118 in)	P-21
							• Wheel cylinder operation and leakage • Lining for wear or damage • Thickness of lining: Minimum: 1.0mm (0.04 in)	P-24
							• Drum inner diameter: Maximum: 261.5mm (10.30 in)	
							• Oil level (dimensions): 220mm (0.87 in) • Gear oil API service GL-4 viscosity 15W-90	N-12
Monitor idling gear oil							• Operation and looseness • Fluid leakage or nozing	N-9
Steering shaft elbows and gear housing							• Free play: 5-20mm (0.20-0.79 in)	N-7
Sleeving linkage to rod ends and arms							• Check for looseness and damage • Check for excessive play	
Suspension ball joints (front)							• Damage, looseness and grease leakage • Grease: NLGI No.2	N-18
Under arm shafts							• Clean and check for damage • Replace or apply lithium grease (NLGI No.2)	N-25
Front wheel bearing							• Oil capacity: 4x2: 2.9 liters (3.0 US qt, 2.5 Imp qt); 4x4: 3.7 liters (3.9 US qt, 3.3 Imp qt)	N-27
Manual transmission oil							• Oil capacity: 2.0 liters (2.1 US qt, 1.8 Imp qt)	N-7
Transfer case oil (4x4)							• Cracking, cam/lub, leakage and consistency • Lubricate with grease	N-40
Lubricate dust seals (4x4)								
Propeller shaft joints								

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		
	<1,000 miles	7.5	15	22.5	30	37.5	45	52.5	60			
Maintenance operation	x 1,000 km	12	24	36	48	60	72	84	96			
CHASSIS AND BODY												
Automatic transmission fluid										11	• Replacement fluid capacity Approx. 4.0 liters (4.2 U.S. qt, 3.5 Imp. qt)	K1-35 K2-43
Rear axle oil (4 x 2, 4 x 4) Front axle oil (4 x 4)										4	• Oil Capacity Rear: 1.7 liters (1.8 U.S. qt, 1.5 Imp. qt) Front: 1.5 liters (1.6 U.S. qt, 1.3 Imp. qt)	M-4
Bolts and nuts on chassis and body										1	• Retighten all loose nuts and bolts	
Exhaust system four on end										1	• Insulation clearance	
AIR CONDITIONER SYSTEM												
Refrigerant											• Check refrigerant charge	U-28
Compressor											• Check 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

K1-35
K2-43

M-4

U-28
U-31

**SCHEDULE 1 (NORMAL DRIVING CONDITION)
B2200**

Chart symbols:

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

Remarks:

After 60 months or 60,000 miles (96,000 km), continue to follow the described maintenance at the recommended intervals.
As for * marked items in this maintenance chart, note the following points:

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

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 x 1,000 km	7.5	15	22.5	30	37.5	45	52.5	60			
Engine												
Engine oil		R	P	I	R	R	R	R	R		* Oil per capacity 3.9 liters (4.1 US qt, 3.4 imp qt)	D-7
Oil filter			P	I	R	R	R	F	R		* Oil filter capacity: 0.22 liter (0.23 US qt, 0.19 imp qt)	D-7
Choke system (California only)											* Spray cleaning agent	F1-94
Idle switch ¹⁾ (California only)					C							F1-105
Drive belts											* Check for damage * Tension	B1-5
Air cleaner element												F1-60
Engine timing (FCI)												B1-8
Oxygen sensor ²⁾												F1-65
EGR control valve ³⁾ (California only)												B1-62
PCV valve ⁴⁾											* Check operation	F1-79
Filters and hoses for emission ⁵⁾												F1-70
HAC for filter (California only)												F1-76

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

Interval	Number of months or miles (kilometers), whichever comes first								Page									
	Maintenance operation																	
	Months	7.5	15	22.5	30	37.5	45	50										
x 1,000 miles																		
x 1,000 km																		
IGNITION SYSTEM																		
Spark plugs									G 22									
- Plug gap 0.75–0.85mm (0.028–0.033 in) Carburetor 1.0–1.1mm (0.039–0.043 in) EGI - Recommended spark plugs <table><tr><td>Carburetor</td><td>NGK BFR6ES*</td><td>NIHONKENSO W16EXR U*</td></tr><tr><td>EGI</td><td>DP16ES-11*</td><td>W16EXR-UT**</td></tr><tr><td></td><td>BPR6ES-11</td><td>W20EXR U1*</td></tr></table> *Standard plug - Ignition timing: 5–7° BTDC										Carburetor	NGK BFR6ES*	NIHONKENSO W16EXR U*	EGI	DP16ES-11*	W16EXR-UT**		BPR6ES-11	W20EXR U1*
Carburetor	NGK BFR6ES*	NIHONKENSO W16EXR U*																
EGI	DP16ES-11*	W16EXR-UT**																
	BPR6ES-11	W20EXR U1*																
Ignition timing									G 24									
FUEL SYSTEM																		
Idle speed									F1 112 F2-118									
Fuel hoses									F1-4									
Fuel filter									F1 83									
COOLING SYSTEM																		
Cooling system									E 5									
Engine coolant									L 3									
CHASSIS AND BODY																		
Brake line hoses and connections									P-5									
Brake fluid									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		
Maintenance operation	x 1,000 miles	7.5	15	22.5	30	37.5		
	x 1,000 km	12	24	36	48	60		
Drum brakes (rear)							- Wheel cylinder operation and leakage - Lining for wear or damage - Thickness of lining - Minimum.....1.0mm (0.04 in) - Drum inner diameter - Maximum.....261.5mm (10.30 in) - Oil level (L dimension): 22mm (0.87 in) - Gear oil API service GL-4 Viscosity SAE 90	P 24
Manual steering gear oil								N 12
Steering operations and gear housing							- Operation and lookover - Fluid leakage or oozing - Free play: 5-20mm (0.20-0.78 in) - Check for looseness and carriage - Check for excessive play	N-8
Steering linkage, tie rod ends and arms								N-7
Suspension ball joints/drum								R-11
Upper and shafts							- Driveline, looseness and grease leakage - Grease: NLGI No.2	R-21
Front wheel bearing							- Cross and check for damage - Repack or apply lithium grease (NLGI No.2)	M-35 M 35
Manual transmission oil							- Oil capacity: 5-speed 2.0 liters (2.1 US qt, 1.6 imp qt)	J-7
Automatic transmission fluid							- Replacement fluid capacity: - Approx. 4.0 liters (4.2 US qt, 3.5 imp qt) - Lubricate with grease	K1-35 I-15
Rear axle oil							- Oil capacity: 2.2 liters (2.3 US qt, 1.1 imp qt)	M-4
Bolts and nuts of chassis and body							Tighten all loose nuts and bolts	
Exhaust system leak check							Insulation clearance	
AIR CONDITIONER SYSTEM								
Refrigerant							Recharge the refrigerant amount annually	U 28
Compressor							Check compressor	U-34
All locks and hinges								

SCHEDULE 2 (UNIQUE DRIVING CONDITION)

826041

Chart symbols

- 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.
Remarks:

- As for the 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	60			
Maintenance operation	x1,000 miles	5	10	15	20	25	30	35	40	45	50	60			
	x1,000 km	8	16	24	32	40	48	56	64	72	80	96			
ENGINE															
Engine oil		R	R	R	R	R	R	R	R	R	R	R	Oil can capacity: 4.5 liters (4.8 U.S. qt, 4.0 Imp qt)	D-7	
Oil filter		R	H	H	R	R	H	R	R	R	R	R	Oil filter capacity: 0.22 liter (0.23 U.S. qt, 0.19 Imp qt)	D-7	
Drive belts													Check for damage	B2-5	
													Tension		
Air cleaner element															F2-116
Oxygen sensor ¹															F2-182
PCV valve ²													Check operation		F2-183
															F2-7

¹ Check for emission¹

² Check for emission²

³ Check for emission³

⁴ Check for emission⁴

⁵ Check for emission⁵

⁶ Check for emission⁶

⁷ Check for emission⁷

⁸ Check for emission⁸

⁹ Check for emission⁹

¹⁰ Check for emission¹⁰

¹¹ Check for emission¹¹

¹² Check for emission¹²

¹³ Check for emission¹³

¹⁴ Check for emission¹⁴

¹⁵ Check for emission¹⁵

¹⁶ Check for emission¹⁶

¹⁷ Check for emission¹⁷

¹⁸ Check for emission¹⁸

¹⁹ Check for emission¹⁹

²⁰ Check for emission²⁰

²¹ Check for emission²¹

²² Check for emission²²

²³ Check for emission²³

²⁴ Check for emission²⁴

²⁵ Check for emission²⁵

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²⁷ Check for emission²⁷

²⁸ Check for emission²⁸

²⁹ Check for emission²⁹

³⁰ Check for emission³⁰

³¹ Check for emission³¹

³² Check for emission³²

³³ Check for emission³³

³⁴ Check for emission³⁴

³⁵ Check for emission³⁵

³⁶ Check for emission³⁶

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³⁸ Check for emission³⁸

³⁹ Check for emission³⁹

⁴⁰ Check for emission⁴⁰

⁴¹ Check for emission⁴¹

⁴² Check for emission⁴²

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⁴⁹ Check for emission⁴⁹

⁵⁰ Check for emission⁵⁰

⁵¹ Check for emission⁵¹

⁵² Check for emission⁵²

⁵³ Check for emission⁵³

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⁵⁹ Check for emission⁵⁹

⁶⁰ Check for emission⁶⁰

⁶¹ Check for emission⁶¹

⁶² Check for emission⁶²

⁶³ Check for emission⁶³

⁶⁴ Check for emission⁶⁴

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⁶⁹ Check for emission⁶⁹

⁷⁰ Check for emission⁷⁰

⁷¹ Check for emission⁷¹

⁷² Check for emission⁷²

⁷³ Check for emission⁷³

⁷⁴ Check for emission⁷⁴

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⁷⁹ Check for emission⁷⁹

⁸⁰ Check for emission⁸⁰

⁸¹ Check for emission⁸¹

⁸² Check for emission⁸²

⁸³ Check for emission⁸³

⁸⁴ Check for emission⁸⁴

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⁸⁶ Check for emission⁸⁶

⁸⁷ Check for emission⁸⁷

⁸⁸ Check for emission⁸⁸

⁸⁹ Check for emission⁸⁹

⁹⁰ Check for emission⁹⁰

⁹¹ Check for emission⁹¹

⁹² Check for emission⁹²

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⁹⁵ Check for emission⁹⁵

⁹⁶ Check for emission⁹⁶

⁹⁷ Check for emission⁹⁷

⁹⁸ Check for emission⁹⁸

⁹⁹ Check for emission⁹⁹

¹⁰⁰ Check for emission¹⁰⁰

¹⁰¹ Check for emission¹⁰¹

¹⁰² Check for emission¹⁰²

¹⁰³ Check for emission¹⁰³

¹⁰⁴ Check for emission¹⁰⁴

¹⁰⁵ Check for emission¹⁰⁵

¹⁰⁶ Check for emission¹⁰⁶

¹⁰⁷ Check for emission¹⁰⁷

¹⁰⁸ Check for emission¹⁰⁸

¹⁰⁹ Check for emission¹⁰⁹

¹¹⁰ Check for emission¹¹⁰

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¹¹³ Check for emission¹¹³

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¹¹⁷ Check for emission¹¹⁷

¹¹⁸ Check for emission¹¹⁸

¹¹⁹ Check for emission¹¹⁹

¹²⁰ Check for emission¹²⁰

¹²¹ Check for emission¹²¹

¹²² Check for emission¹²²

¹²³ Check for emission¹²³

¹²⁴ Check for emission¹²⁴

¹²⁵ Check for emission¹²⁵

¹²⁶ Check for emission¹²⁶

¹²⁷ Check for emission¹²⁷

¹²⁸ Check for emission¹²⁸

¹²⁹ Check for emission¹²⁹

¹³⁰ Check for emission¹³⁰

¹³¹ Check for emission¹³¹

¹³² Check for emission¹³²

¹³³ Check for emission¹³³

¹³⁴ Check for emission¹³⁴

¹³⁵ Check for emission¹³⁵

¹³⁶ Check for emission¹³⁶

¹³⁷ Check for emission¹³⁷

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SCHEDULE 2 (UNIQUE DRIVING CONDITION) (Cont'd)
B2600D

Interval	Number of months or miles (Kilometers), whichever comes first													Service data and inspection point	Page							
	Maintenance operation																					
	Months	5	10	15	20	25	30	35	40	45	50	55	60									
Maintenance operation	>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									
IGNITION SYSTEM																						
Spark plug								H					R	Q-29								
• Plug gap 1.0–1.1mm (0.039–0.043 in) • Recommended spark plugs: <table><tr><td>VGK</td><td>ZHRS-11</td></tr><tr><td></td><td>ZFR3E-11</td></tr><tr><td>NIPPONDENSO</td><td>K-16CR-11</td></tr><tr><td></td><td>K-20CR-11</td></tr></table> • Standard plug • Ignition timing, 4° BTDC															VGK	ZHRS-11		ZFR3E-11	NIPPONDENSO	K-16CR-11		K-20CR-11
VGK	ZHRS-11																					
	ZFR3E-11																					
NIPPONDENSO	K-16CR-11																					
	K-20CR-11																					
FUEL SYSTEM																						
Idle speed														F2-118								
Fuel filter														F2-149								
Fuel lines														F2-149								
COOLING SYSTEM																						
Cooling system														E-5								
Engine coolant														E-5								
CHASSIS AND BODY																						
Brake line hoses and connections														P-5								
Brake fluid														P-2								
Disc brake (front)														P-21								
Drum brakes (rear)														P-24								
Engine oil (For Puerto Rico)																						
Replace every 3,000 miles (or 3 months)																						

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

Interval	Number of months or miles (kilometers), whichever comes first												Page
	Months	5	10	15	20	25	30	35	40	45	50	55	60
Maintenance	x 1,000 miles	5	10	15	20	25	30	35	40	45	50	55	60
Operation	x 1,000 km	8	16	24	32	40	48	56	64	72	80	88	96
CHASSIS AND BODY													
Steering operations and gear routing													V-9
Steering linkage tie rod ends and arms													N-7
Suspension ball joints (front)													R-16
Upper arm shafts													R-21
Front wheel bearing													M-25
Manual steering gear oil													M-27
Automatic transmission fluid													N-12
Manual transmission oil													K1-35
Rear axle oil (4 x 2, 4 x 4)													K2-43
Front axle oil (4 x 4)													J2-7
Balls and nuts for chassis and body													M-4
Exhaust system heat shields													
Transfer case oil (4 x 4)													J2-7
Differential dust boots (4 x 4)													M-40
Protektor wheel joints													L-15
AIR CONDITIONER SYSTEM													
Refrigerant													U-28
Compressor													U-31
Alf ocks 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 * marked items in this maintenance chart, note the following points:

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

Interval	Number of months or miles (Kilometers), whichever comes first																Service data and inspection point	Page
	Months x 1,000 miles	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75		
Maintenance operation		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75		
ENGINE		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75		
Engine oil		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	* Oil pan capacity: 3.9 ltrs (4.1 US qt, 5.4 Imp qt)	D-7
Oil filter		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	* Oil filter capacity: 0.22 liter (2.3 US oz, 0.19 Imp qt)	D-7
Choke system (California only)				C ¹													* Spray cleaning agent	F1-84
Idle switch (California only)				I														F1-105
Drive belts																	* Check for damage: * Fasten	B1-5
Air cleaner element				I ¹														F1-80
Engine timing belt																		B1-8
Oxygen sensor *																		F1-55
SPV control valve (California only)																	* Check operation	F1-82
PCV valve *																		F1-79
Exhaust and tubes for emission *																		F1-10
FAC air filter (California only)																		F1-76

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

B2200

Interval		Number of months or miles (Kilometers), whichever comes first												Page	
		Months		5	10	15	20	25	30	35	40	45	50		55
Maintenance operation		>1,000 miles	5	10	15	20	25	30	35	40	45	50	55	60	65
		>1,000 km	8	16	24	32	40	48	56	64	72	80	88	96	104
IGNITION SYSTEM															
Spark plugs										R					R
															G 22
Ignition timing															G-24
FUEL SYSTEM															
Idle speed															
															F1-112 F2-118
Fuel lines															F1-4
Fuel filter															F1-83
COOLING SYSTEM															
Cooling system															F-5
Engine coolant															F-5
Engine oil (For Fleet Fleet)															
CHASSIS AND BODY															
Brake line hoses and connections															P-5
Brake fluid															P-2
Disc brakes (front)															P-21

210-940002

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SCHEDULED MAINTENANCE SERVICES (CANADA)

SCHEDULED MAINTENANCE SERVICES (CANADA)

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

ENGINE

Engine oil	R	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	I	I	I
Engine timing belt	FOR 2200 ¹												R

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
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
FOR valve	FOR CARB												R
Oxygen sensor													

Replace every 125,000 kilometers

CHASSIS & BODY

Automatic transmission fluid level			I				I						I
Transmission oil M/T and A/T							P						R
Oil level in final drive and transfer case (in models so equipped)							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
Brake fluid							R						R
Disc brakes							I						I
Rear drum brakes							I						I
Front wheel bearings							L						L
Tire inflation pressure and tire wear													
Rotate tires													
Manual steering gear oil level													I
Power steering fluid level		I	I				I			I	I		I
Steering operation and linkage (includes four wheel alignment)							I						I
Steering gear housing for flexplay and click							I						I
Suspension components front and rear							I						I

Rotate every 24,000 kilometers or every 15 months

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)	8 (5)	16 (10)	24 (15)	32 (20)	40 (25)	48 (30)	56 (35)	64 (40)	72 (45)	80 (50)	88 (55)	96 (60)

CHASSIS & BODY

Upper arm shafts													
All chassis and body nuts and bolts				T						T			T
Exhaust system heat shield													
All locks and hinges			L		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.

MAZDA 015

ENGINE (B2200)

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HYDRAULIC LASH ADJUSTER (HLA)
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COMPRESSION
INSPECTION, PAGE B1-6
STANDARD: 1,197 kPa (12.2 kg/cm², 17.3 psi)-300 rpm
MINIMUM: 898 kPa (9.5 kg/cm², 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 (1.9-2.5 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)
W/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)

FIGURE 107

1. Engine

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

2. Timing belt

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Installation page B1-10
Inspection page B1-44

3. Cylinder head gasket

Removal page B1-13
Installation page B1-15

OUTLINE

SPECIFICATIONS

Engine			F2	
Item			Carburetor	EGI
Type			Gasoline, 4 cycle	
Cylinder arrangement and number			Inline 4 cylinders	
Combustion chamber			Multispherical	
Valve system			OHV, belt driven	
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 ² , 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)	800 ± 5	750 ± 20
		A/T (P range)	800 ± 5	770 ± 20
Ignition timing (TEN terminal)	BTDC		6° ± 1° at idle	
Firing order			1-3-4-2	

25-3001-002

TROUBLESHOOTING GUIDE

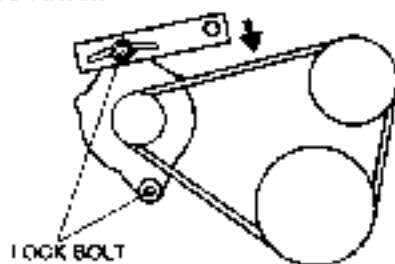
Problem	Possible Cause	Remedy	Page
Difficult starting	Malfunction of engine-related components		
	Burned valve	Replace	B1-35
	Worn piston, piston ring, or cylinder	Replace or repair	B1-40, 42
	Leaked cylinder head gasket	Replace	91-13
Poor idling	Malfunction of fuel system	Refer to Section F	
	Malfunction of electrical system	Refer to Section G	
	Malfunction of engine-related components		
	Malfunction of H ₂ A	Replace	B1-40
Excessive oil consumption	Poor valve-to-valve seal contact	Repair or replace	B1-57
	Leaked cylinder head gasket	Replace	B1-13
	Malfunction of fuel system	Refer to Section F	
	Malfunction of ignition system	Refer to Section G	
Oil working up	Worn piston ring groove or sticking piston ring	Replace	B1-42
	Worn piston or cylinder	Replace or repair	B1-40, 42
	Oil working down		
	Worn valve seal	Replace	B1-57
Oil leakage	Worn valve stem or guide	Replace	B1-35
		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/replace	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	B1-38
	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	Adjust or repair	B1-40
	Worn piston or piston pin	Replace	B1-43
	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

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- Tap/rot 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.

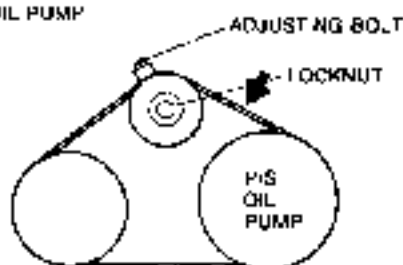
ALTERNATOR



LOCK BOLT

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P/S OIL PUMP

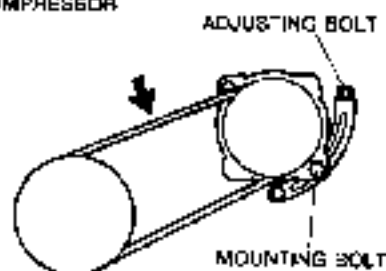


ADJUSTING BOLT

LOCKNUT

3EUCB-1092

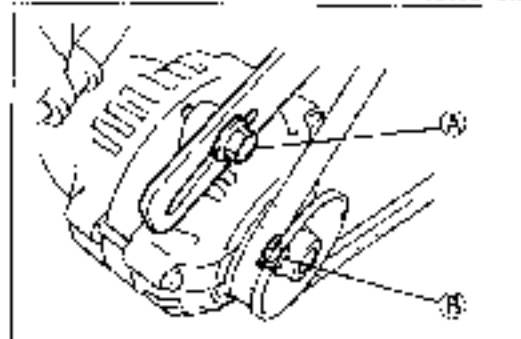
A/C COMPRESSOR



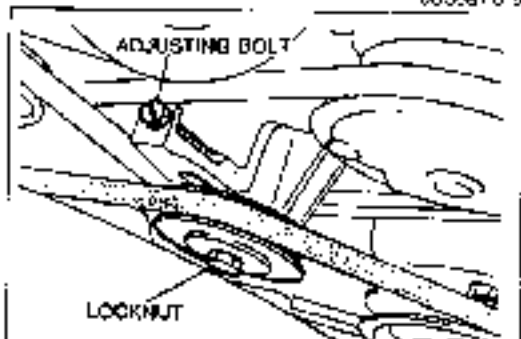
ADJUSTING BOLT

MOUNTING BOLT

03033-118



03038-10-9



LOCKNUT

3EUCB-1093

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	491-540 (50-55, 110-121)	392-491 (40-50, 86-110)
P/S oil pump	245-254 (25-30, 55-56)	136-245 (20-25, 41-55)
A/C compressor	441-540 (45-55, 96-121)	340-441 (35-45, 77-99)

Adjustment

- (1) Alternator belt

If necessary, loosen the alternator bolts and adjust the belt deflection.

Tightening torque

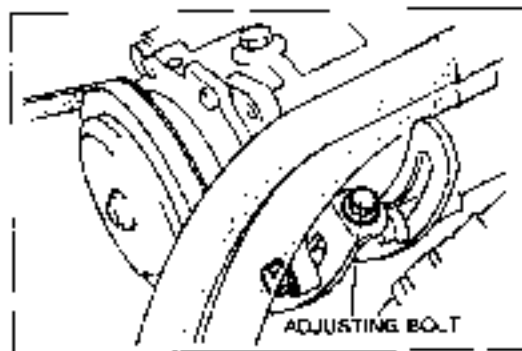
Bolt A: 31-46 N·m (3.2-4.7 m·kg, 23-34 ft·lb)
Bolt B: 37-52 N·m (3.8-5.3 m·kg, 27-38 ft·lb)

- (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)



8FACB-009

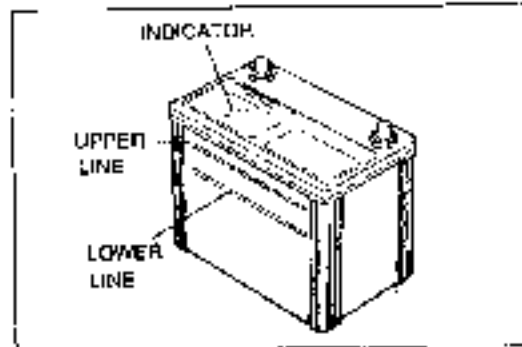
- (3) A/C compressor belt
If necessary, loosen the mounting bolts and adjust the belt deflection by turning the adjusting bolt.

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. 1. Noise stops 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 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	Check oil pressure. (Refer to Section D). If lower than specification, check for cause. Oil pressure: 304—402 kPa (3.1—4.1 kg/cm², 44—58 psi)-3000 rpm
	Faulty HLA	(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	Check oil level. Drain or add oil as necessary.
	Deteriorated oil	Check oil quality. If deteriorated, replace with specified type and amount of oil.

22UCB-000



20UBB-007

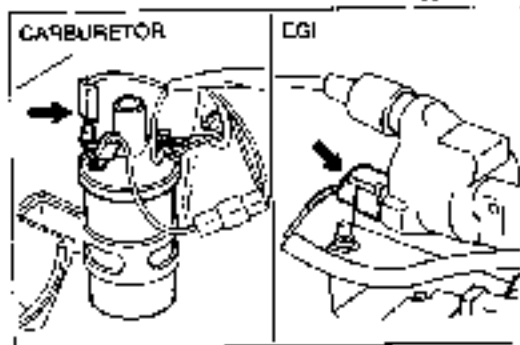
COMPRESSION

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

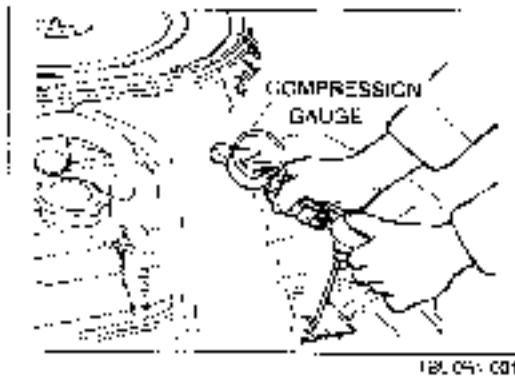
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Sections F1, F2.)

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



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/cm², 173 psi)-300 rpm

Minimum:

834 kPa (8.5 kg/cm², 121 psi)-300 rpm

B1

Possible Cause

If compression is low, pour heavy oil into the cylinder and turn the crankshaft several times.
Check compression once more.

Is compression increased?

YES

1. Worn piston or piston rings
2. Worn cylinder wall

NO

Is compression in adjacent cylinder low?

YES

1. Defective cylinder head gasket
2. Distorted cylinder head

NO

1. Improper valve seating
2. Valve sticking in guide
3. Defective cylinder head gasket

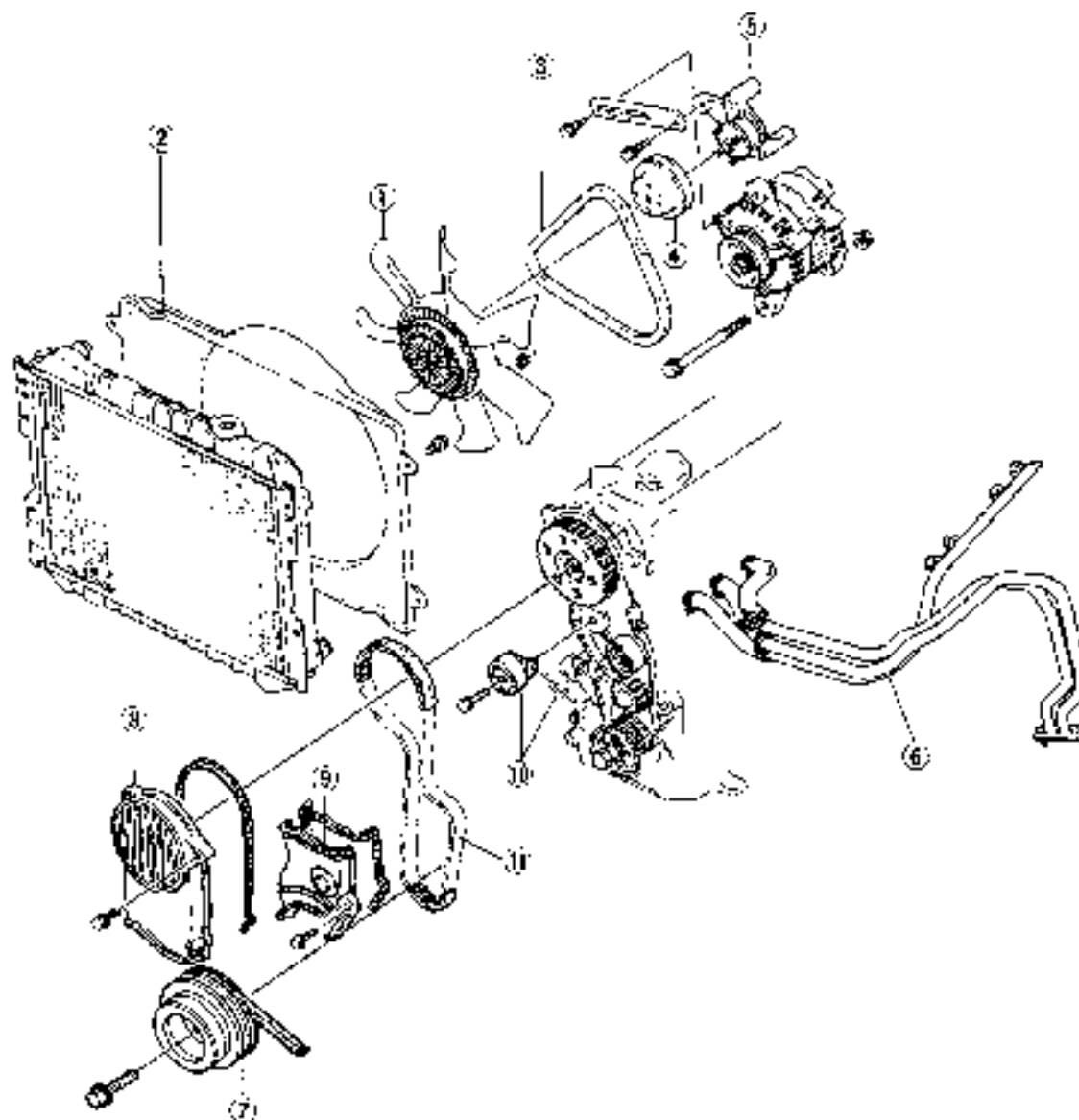
86-1113-1/22

ON-VEHICLE MAINTENANCE

TIMING BELT

Removal

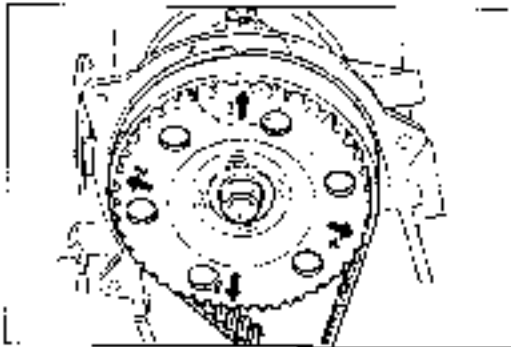
1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the order shown in the figure referring to the **Removal note**.



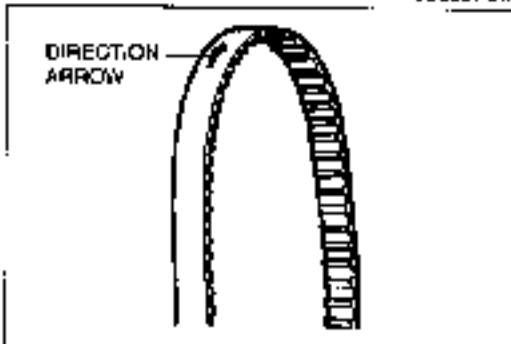
15LGB1-4002

1. Cooling fan
2. Radiator cowl
3. Alternator drive belt
4. Cooling fan pulley
5. Cooling fan bracket
6. Secondary air pipe assembly (Carburetor)

7. Crankshaft pulley
8. Timing belt cover upper
9. Timing belt cover lower
10. Timing belt tensioner and spring
11. Timing belt



93U029-013



93U017-024

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

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.)

93U0261-014

Installation

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

Caution

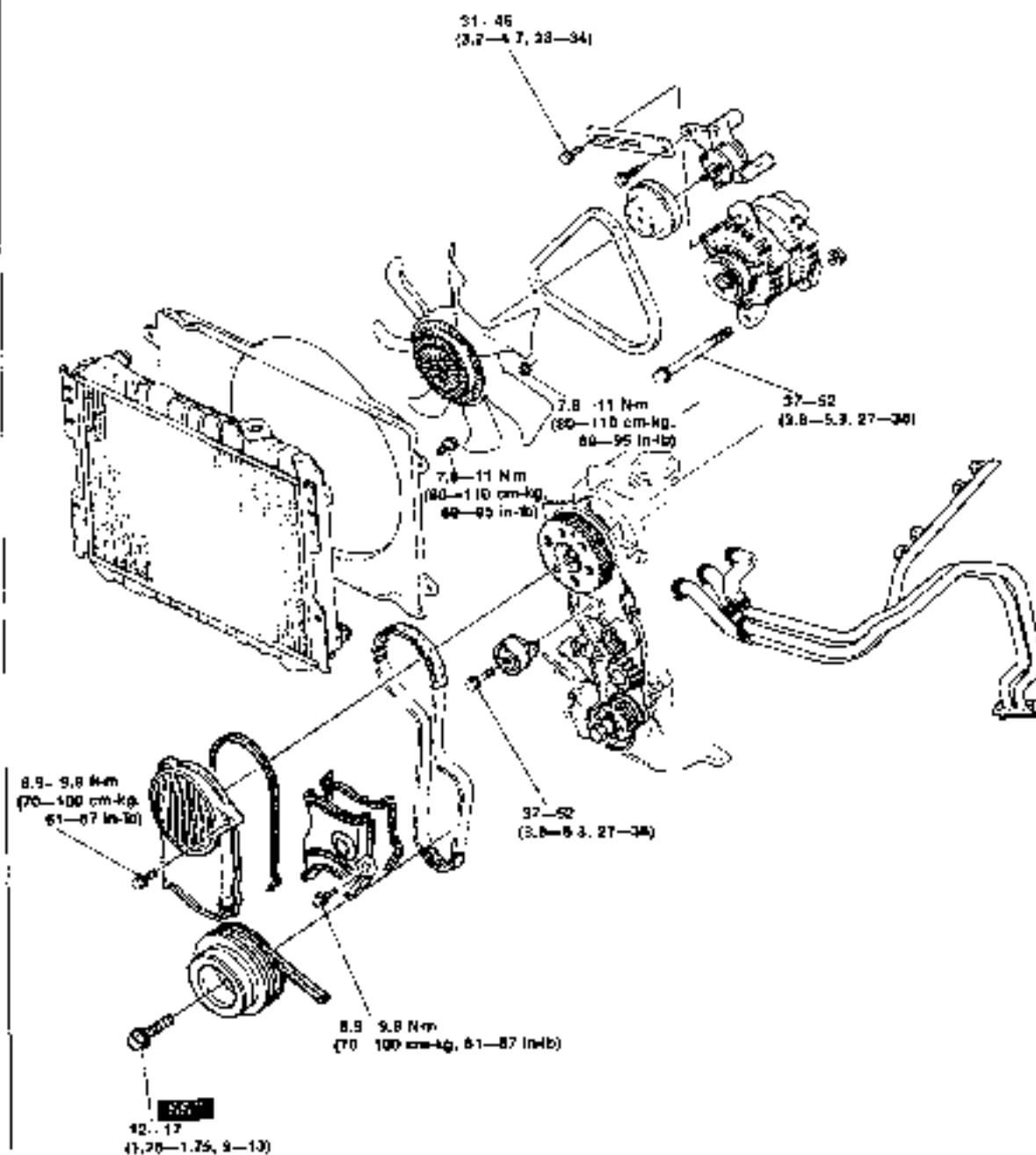
After radiator cowl installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowl.

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

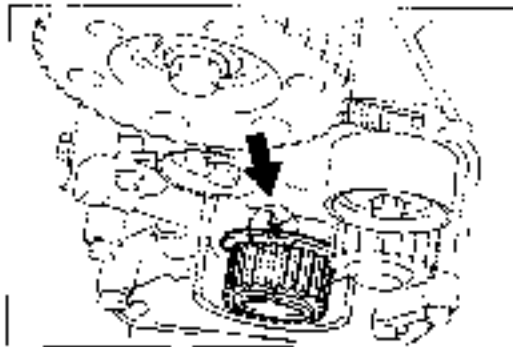
Note

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

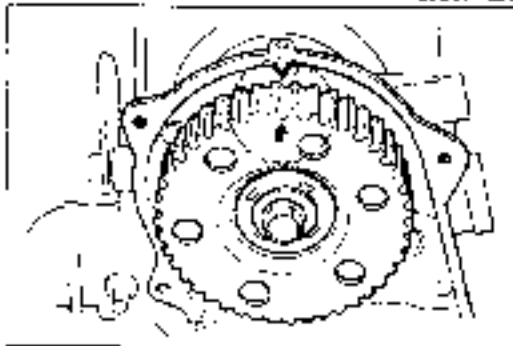
b) Squeeze the clamp lightly with large pliers to ensure a good fit.

Torque Specifications

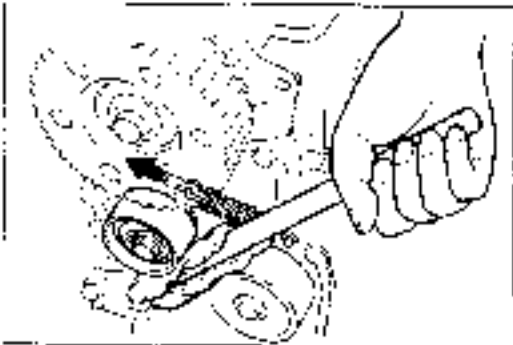
N·m (cm·kg, ft·lb)
8 (P.10) 8-10



BEJ01X 226



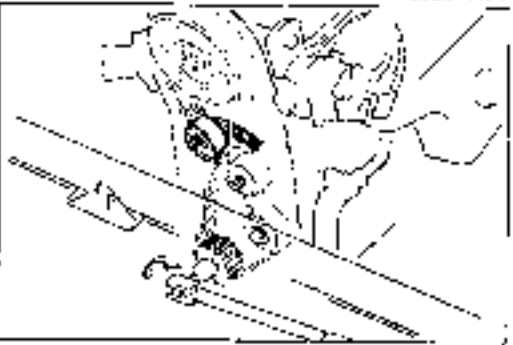
99J01X 014



75G01A 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 $\uparrow$ 1 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.

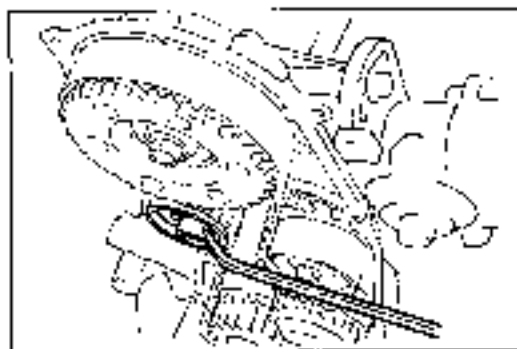
Note

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.

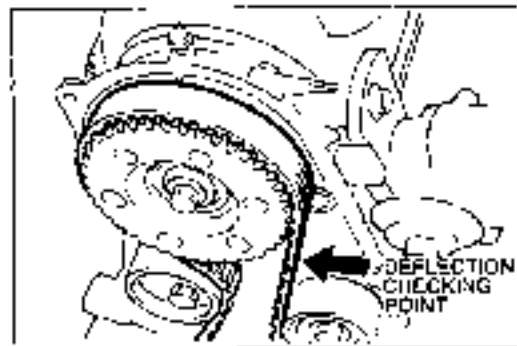


69C01E-02E

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.

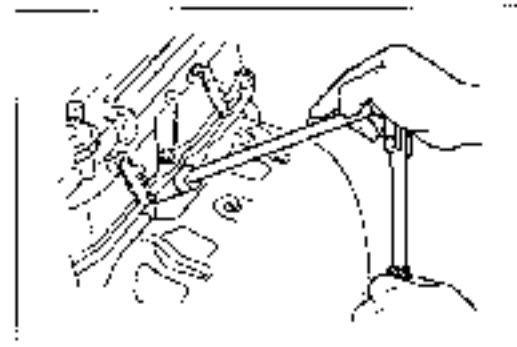
Timing belt deflection/98 N (10 kg, 22 lb)

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.



2B-J081-C13

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.

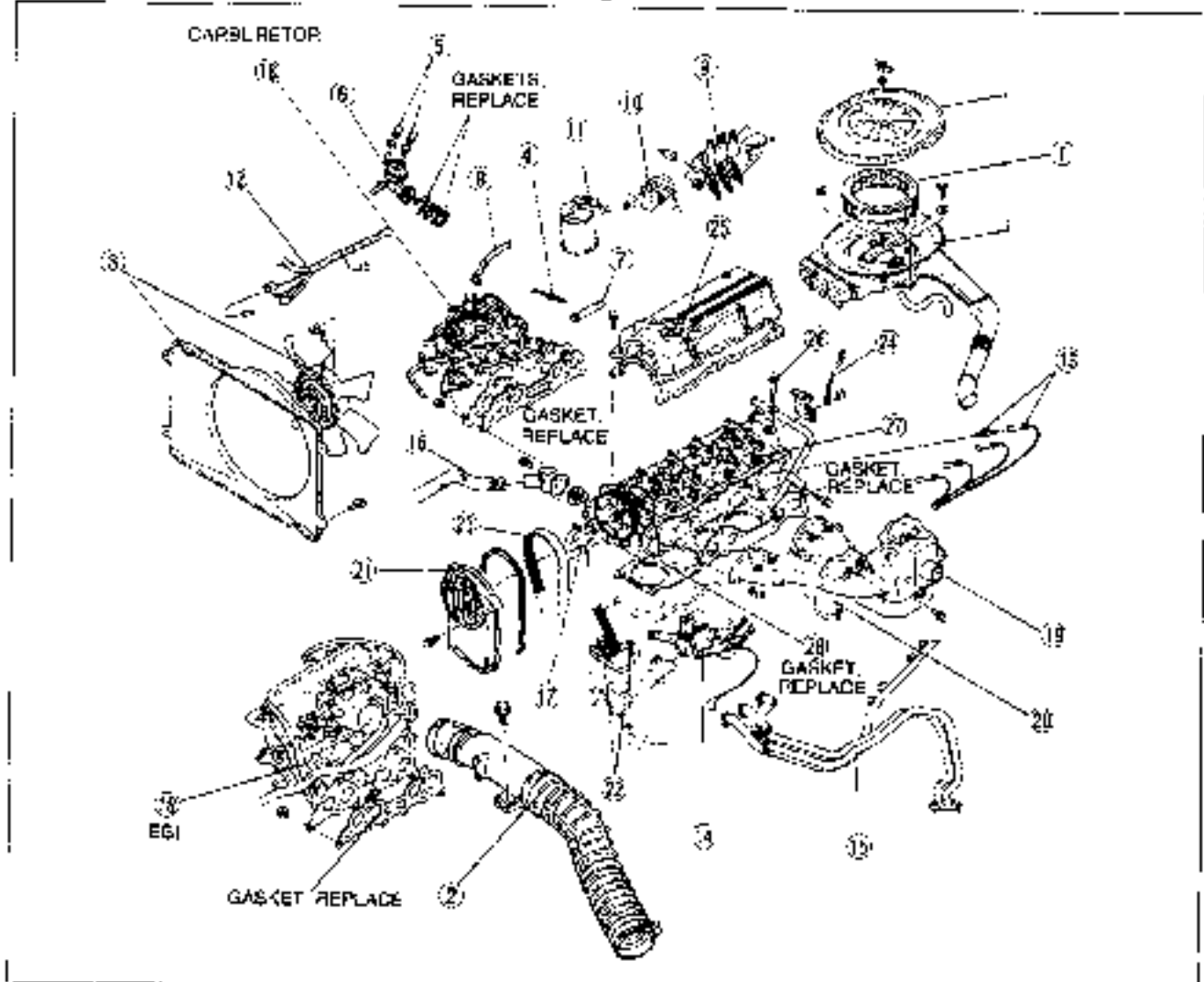
9R-CB1-D10

CYLINDER HEAD GASKET

Removal

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

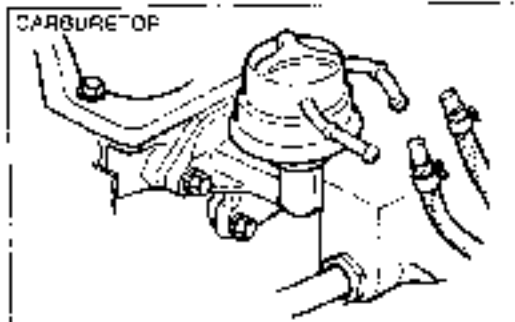
1. Disconnect the negative battery cable
2. Remove the engine undercover.
3. Drain the engine coolant
4. Remove in the order shown in the figure referring to the **Removal note**



1. Air cleaner assembly (Carburetor)
2. Air intake hose (EGI)
3. Cooling fan and radiator cowl
4. Accelerator cable
5. Fuel hoses
6. Fuel pump (Carburetor M/T)
7. Heater hoses
8. Brake vacuum hose
9. Three-way solenoid valve assembly
10. Duty solenoid valve assembly
11. Canister hoses
12. Engine harness
13. High-tension leads and spark plugs
14. Distributor

15. Secondary air pipe assembly (Carburetor)
16. Radiator hose, upper
17. Water by-pass hose
18. Intake manifold assembly
19. Exhaust manifold insulator
20. Exhaust manifold
21. Timing belt cover, upper
22. Timing belt tensioner and spring
23. Timing belt
24. Engine ground
25. Cylinder head cover
26. Cylinder head bolt
27. Cylinder head
28. Cylinder head gasket

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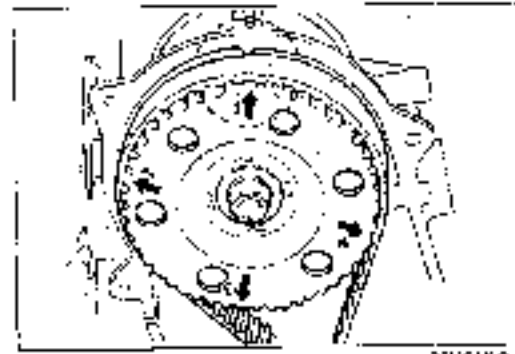
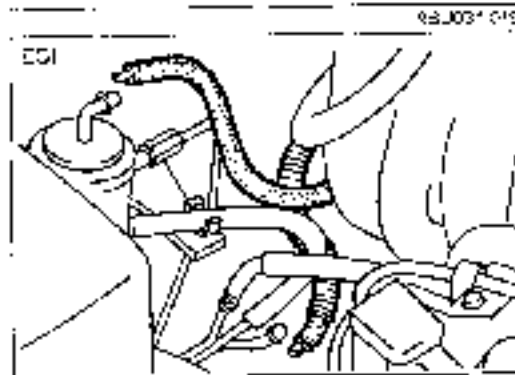


Removal note Fuel hose

Note

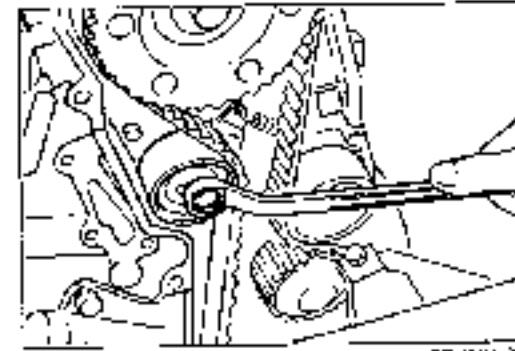
- Cover the hose with a rag because fuel will spray out when disconnecting.
- Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.

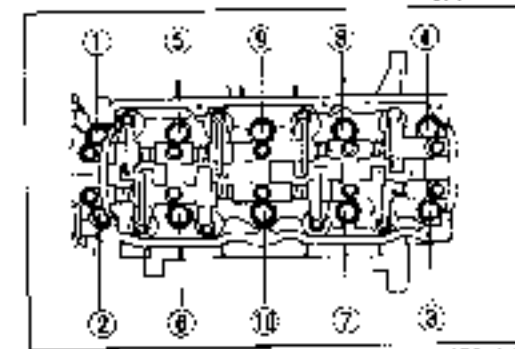


Timing belt

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

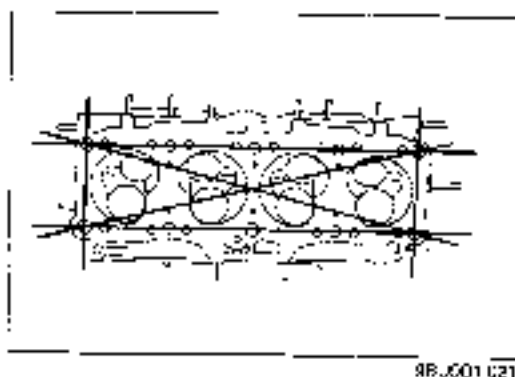


- Loosen the timing belt tensioner lock bolt.
- Shift the tensioner outward as far as possible, then temporarily tighten it.
- Remove the timing belt and secure it out of the way to prevent damage during removal and installation of the cylinder head.



Cylinder head bolt

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

**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.

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

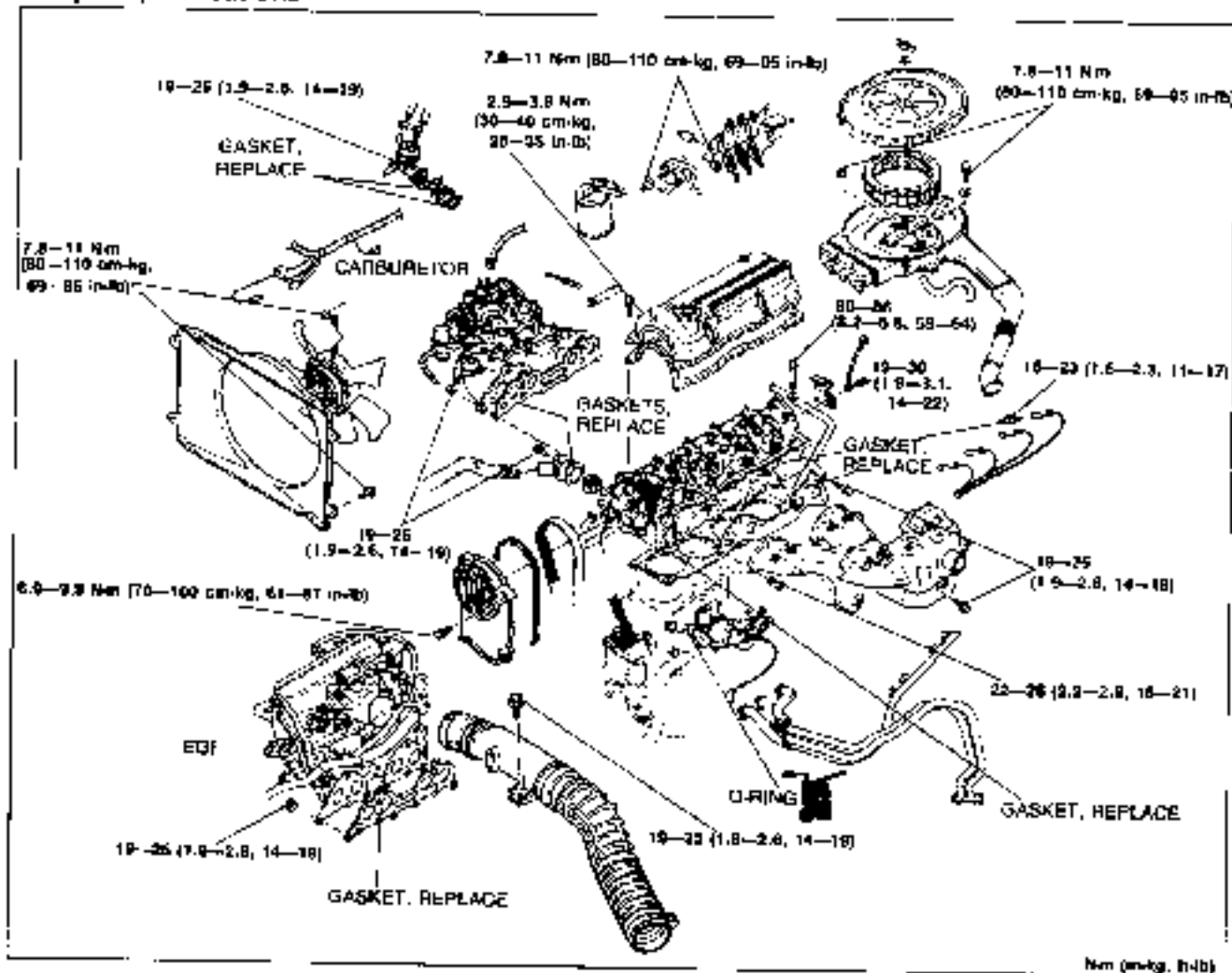
After radiator cowl installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowl.

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

Note

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

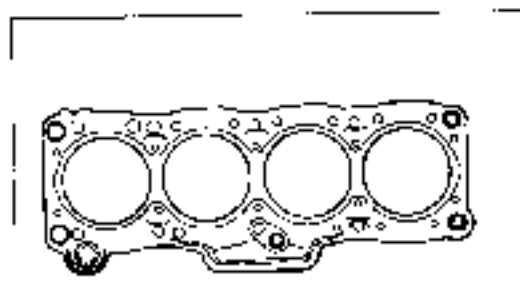
b) Squeeze the clamp lightly with large pliers to ensure a good fit.

Torque Specifications

Nm (cm·kg, in·lb)

9B,051 092

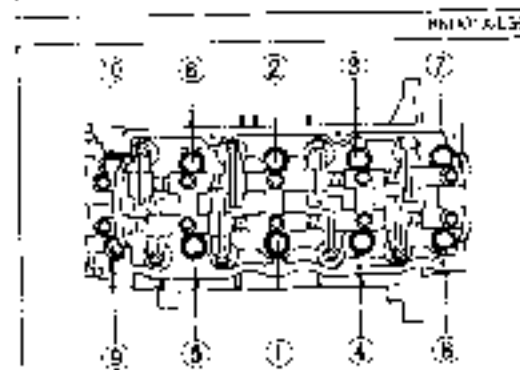
B1-15



Installation note

Cylinder head

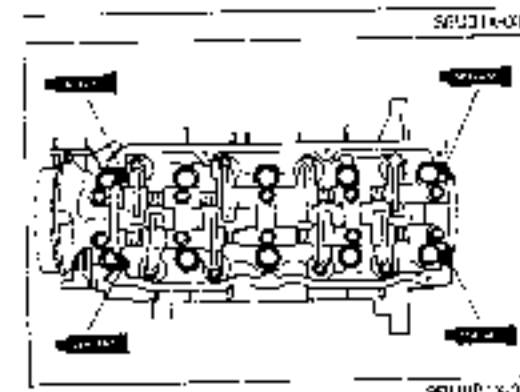
1. Thoroughly remove all dirt and oil from the top of the cylinder block with a rag.
2. Place a new cylinder head gasket in position.



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)

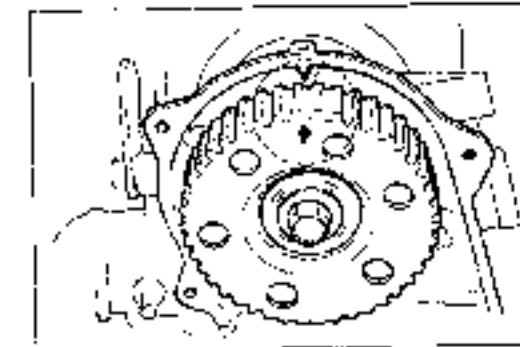


Cylinder head cover

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.

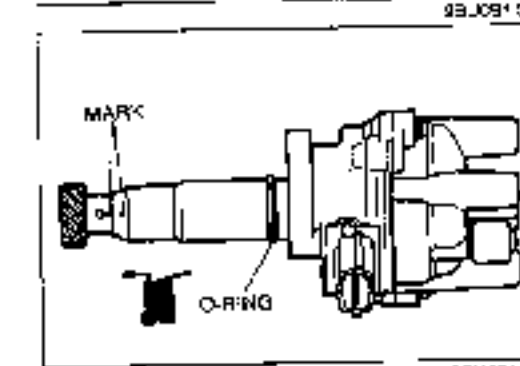
Tightening torque:

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



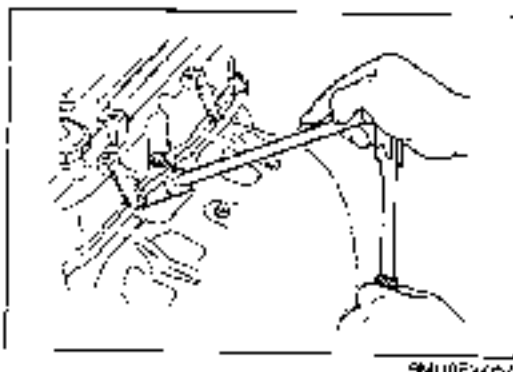
Timing belt

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.



9M101F2467

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.

9M10613-056

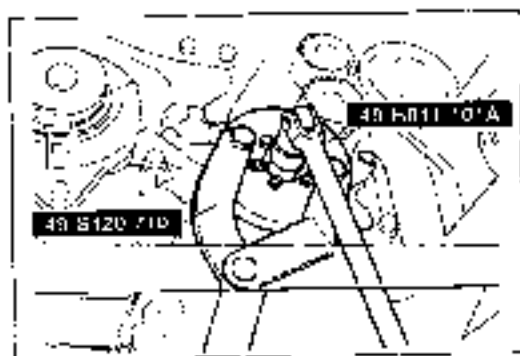
FRONT OIL SEAL

Preparation
SST

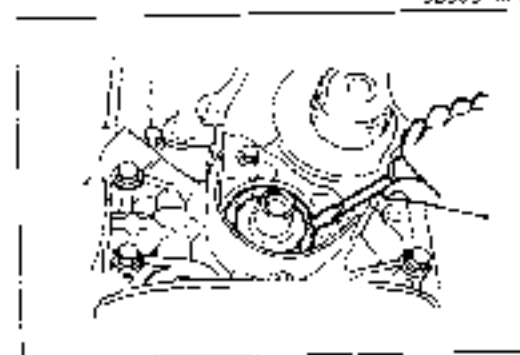
49 5120 710	49 4011 101A
Holder, cot pin; barge	Crankshaft lock tool



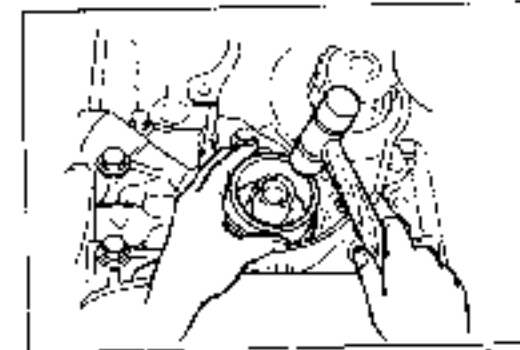
92U021-113



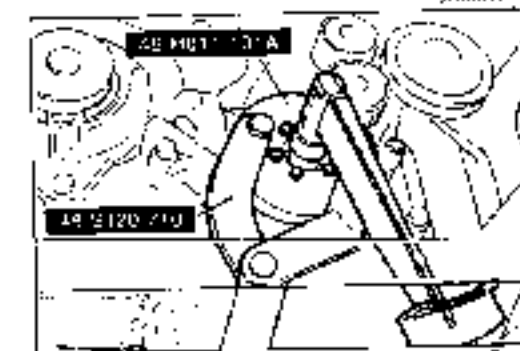
92U021-114



92U021-115



92U021-116



92U021-117

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

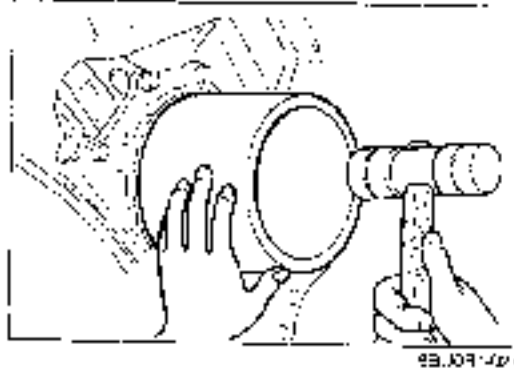
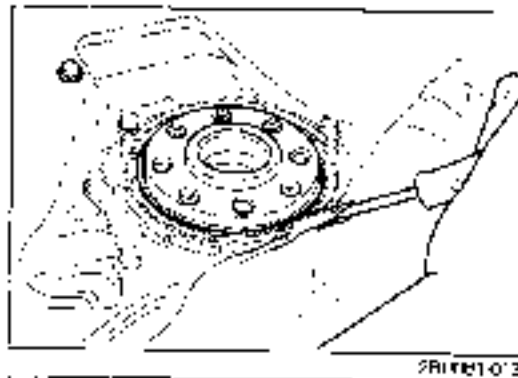
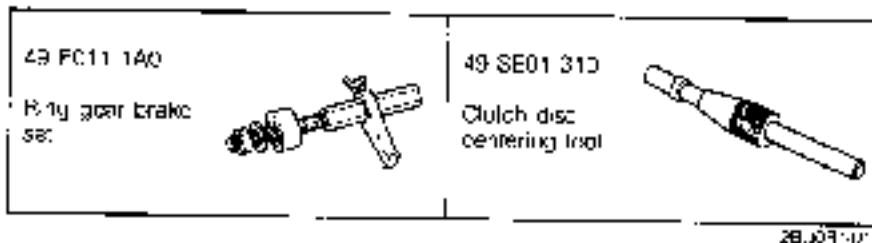
Install the timing belt pulley with the SST.

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****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.

28J09-1077

REMOVAL

PREPARATION

SST

49 W025 585A

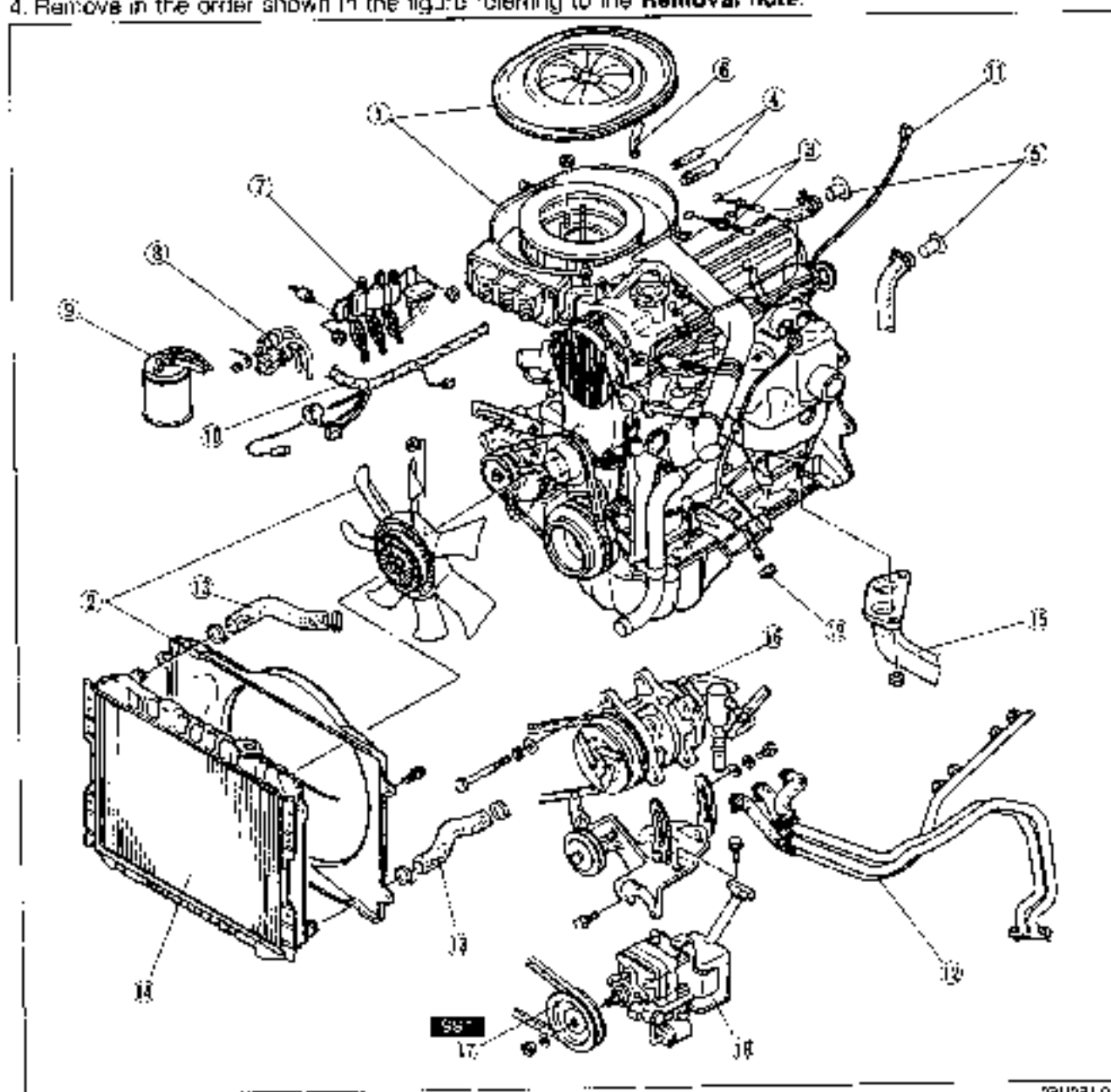
Adjust wrench



5M00P74066

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**.

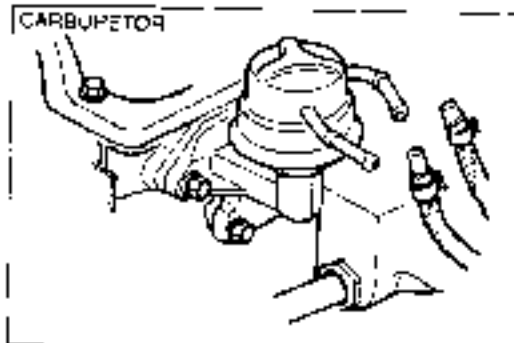


32U021 014

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

ISL02F1625

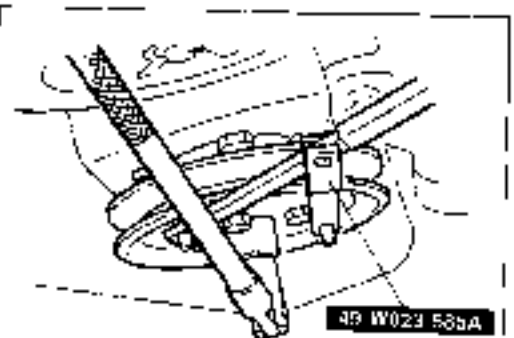


Removal note Fuel hose

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



P/S oil pump pulley

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



P/S oil pump, A/C compressor

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

B1

ENGINE STAND INSTALLATION

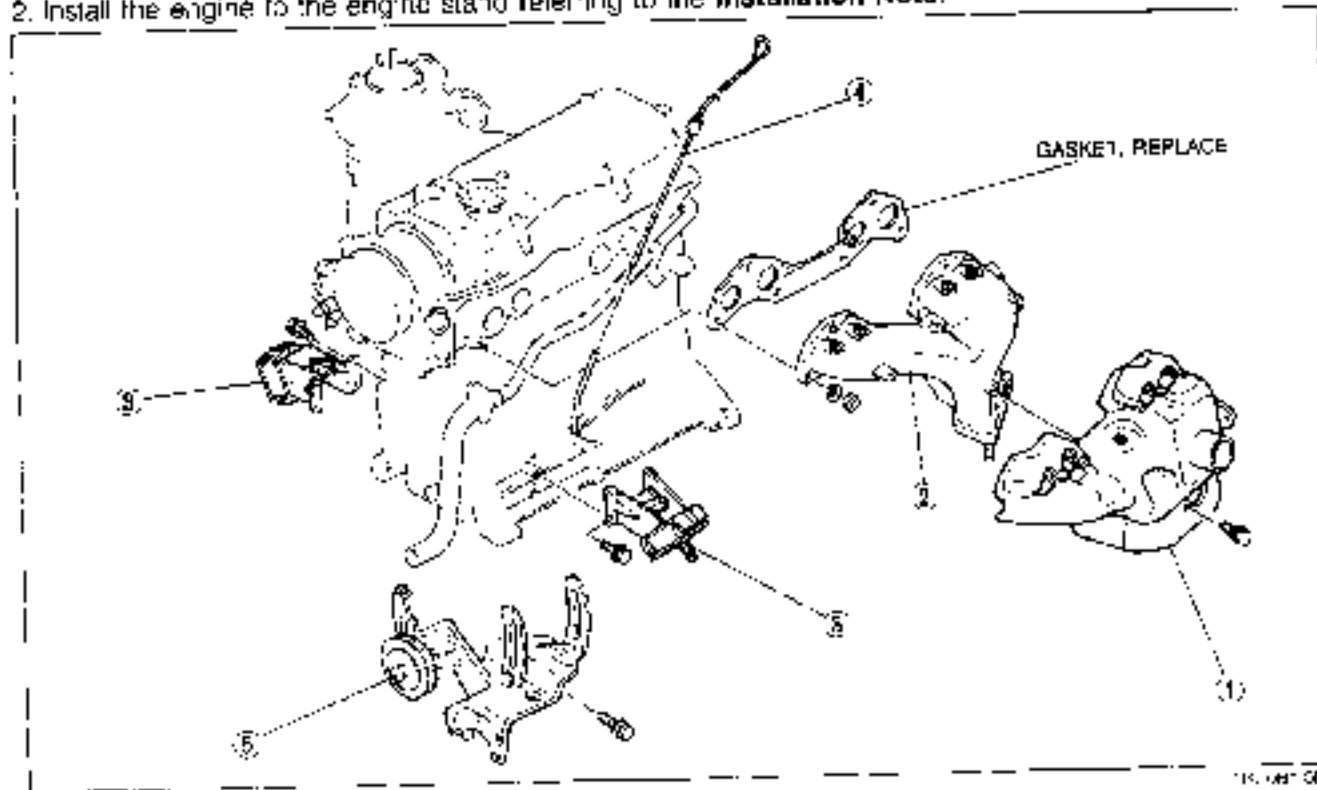
ENGINE STAND INSTALLATION

PREPARATION SST

49 D1C7 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 Bolts (Part of 49 L010 1A0) 	SMUK129-013

INSTALLATION

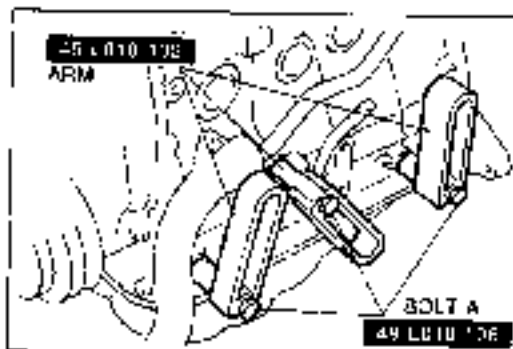
1. Remove the parts in the order shown in the figure.
2. Install the engine to the engine stand referring to the **Installation Note**.



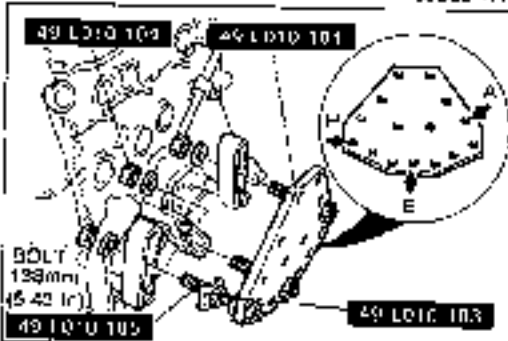
1. Exhaust manifold insulator
2. Exhaust manifold
3. Engine mounts

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

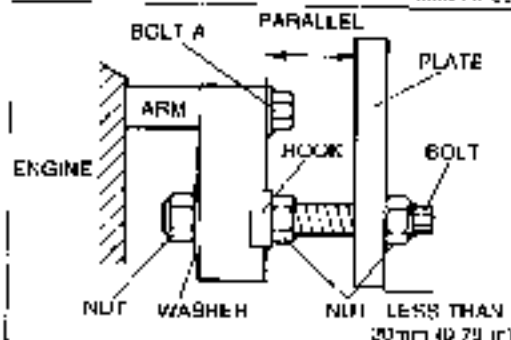
15. 487 005



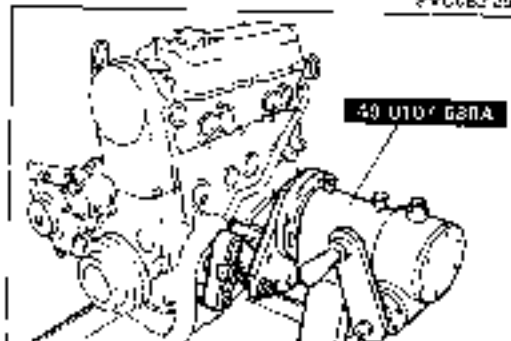
90001117



90001117



90001117



90001117

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**.

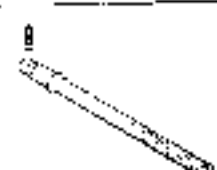
B1

DISASSEMBLY

DISASSEMBLY

PREPARATION

SST

49 E011 1A0 Ring gear brake set		49 D636 100A Arm, valve spring lifter		49 G030 2F2 Pivot, valve spring lifter	
49 1285 071 Pulver. bearing		49 L011 0A0 Piston pin setting tool set		49 L011 0C1 Support block body (Part of 49 L011 0A0)	
49 L011 0C0 Support block head (Part of 49 L011 0A0)		49 L011 004 Screw (Part of 49 L011 0A0)		49 L011 006 Pulver & installer (Part of 49 L011 0A0)	
49 L011 008 Guide (Part of 49 L011 0A0)		49 L011 010 Centering tool (Part of 49 L011 0A0)		49 L011 011 Holder (Part of 49 L011 0A0)	

299100-0.0

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.

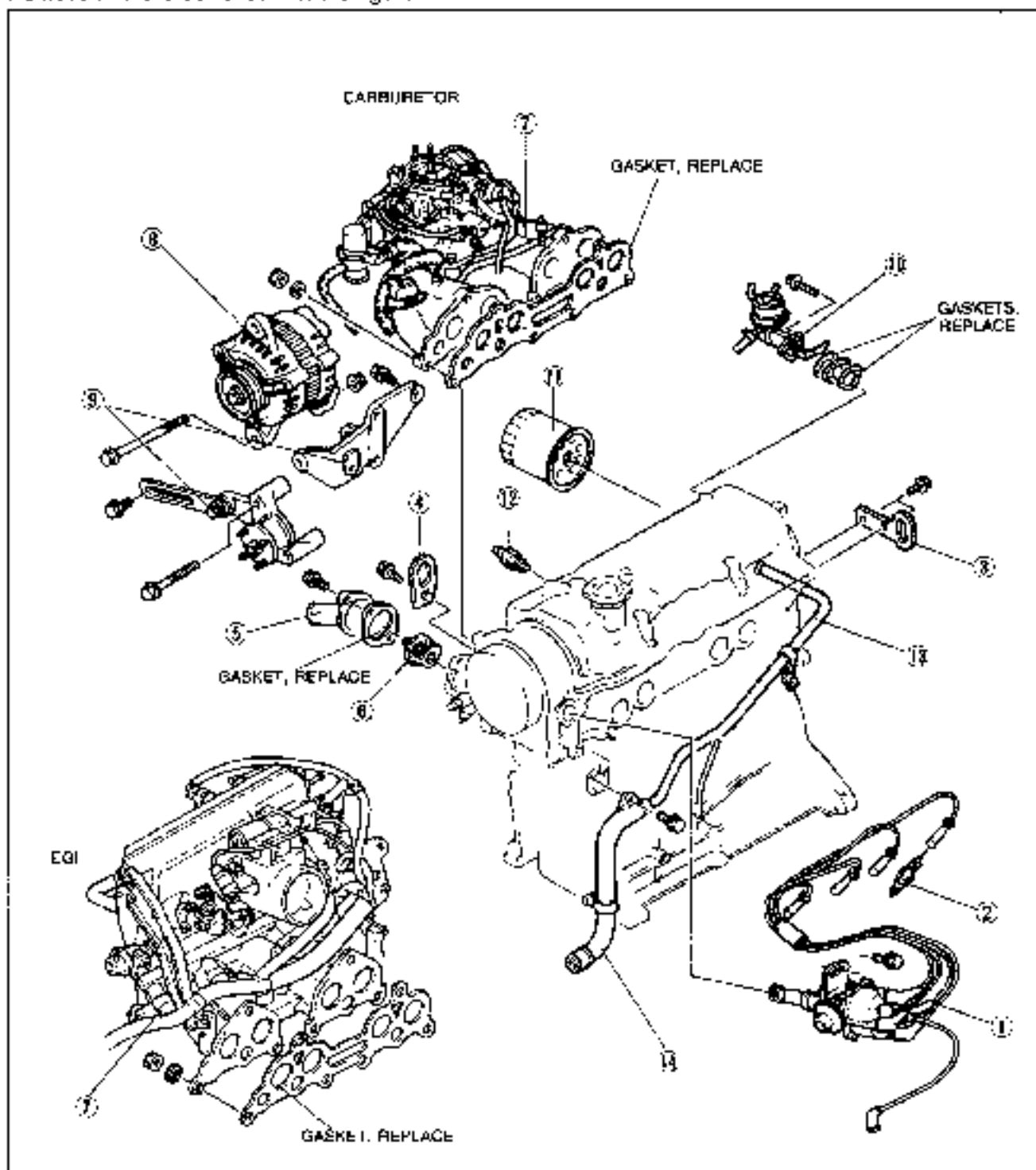
Note

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

300100-0.0

AUXILIARY PARTS

Remove in the order shown in the figure



BUCB1-007

1 Distributor and high-tension leads

2 Spark plugs

3 Rear engine hanger

4 Front engine hanger

5 Thermostat cover

6 Thermostat

Service Section E

7 Intake manifold assembly

8 Alternator

9 Alternator bracket and cooling fan bracket

10 Fuel pump (Carburetor M/T)

11 Oil filler

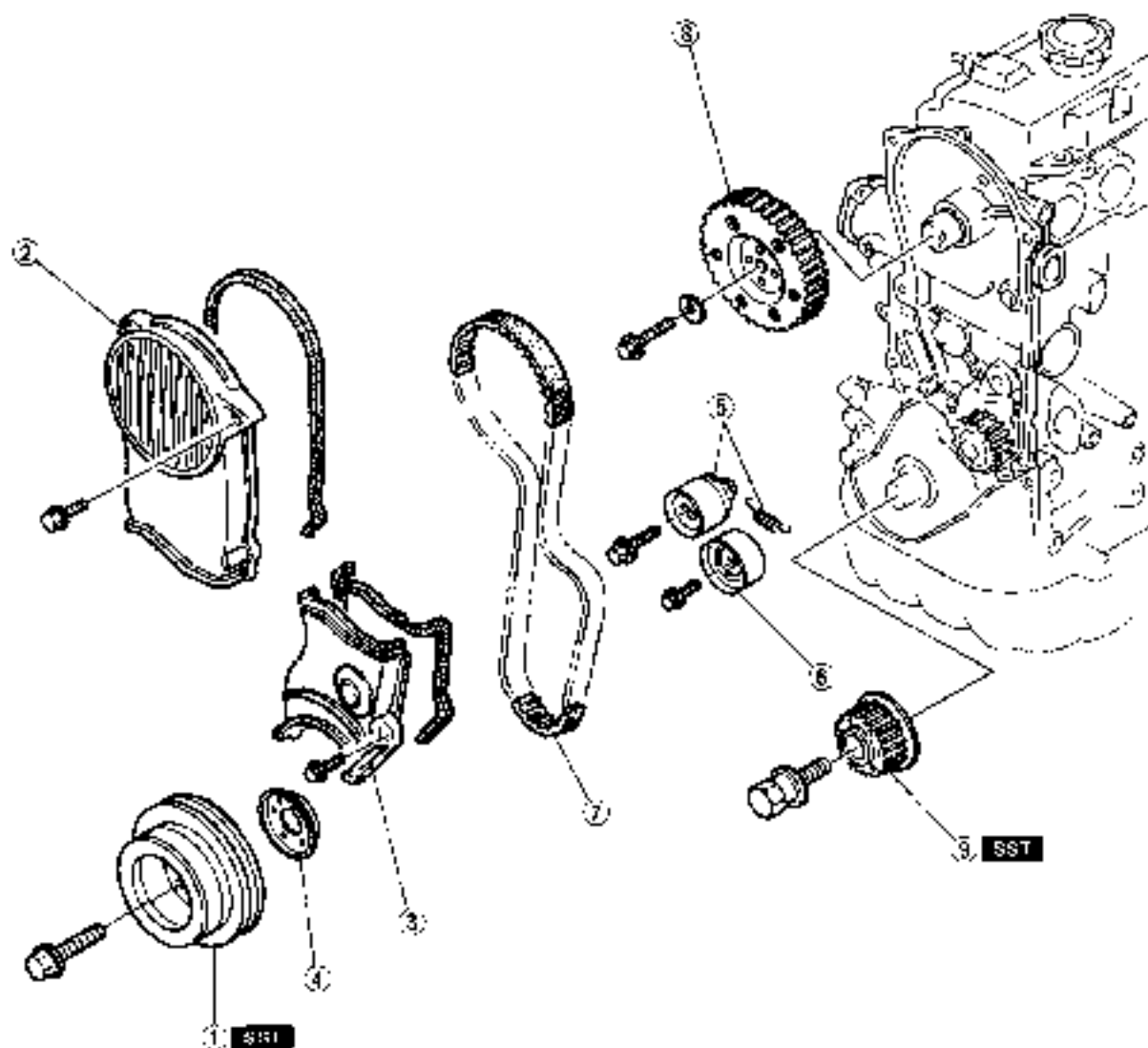
12 Oil pressure switch

13 Coolant bypass pipe

14 Coolant inlet pipe

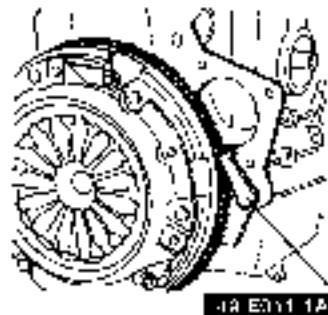
TIMING BELT

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
2. Upper timing belt cover
3. Lower timing belt cover
4. Ballo plate
5. Timing belt tensioner and spring

6. Timing belt idler pulley
7. Timing belt
8. Camshaft pulley
9. Timing belt pulley

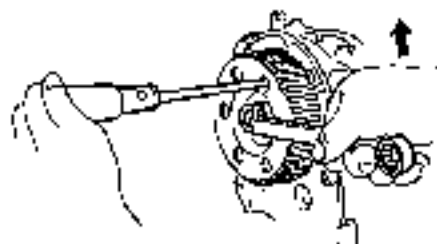


JIS E011 1A0

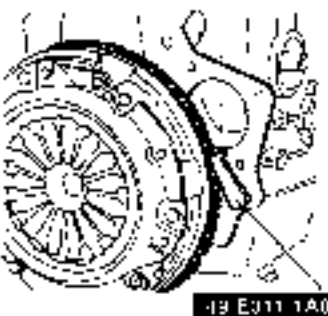
79301 A-121

DIRECTION
ARROW

76321A 122



76201A 123



JIS E011 1A0

95121A 124

Disassembly note**Crankshaft pulley**

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

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.

Camshaft pulley

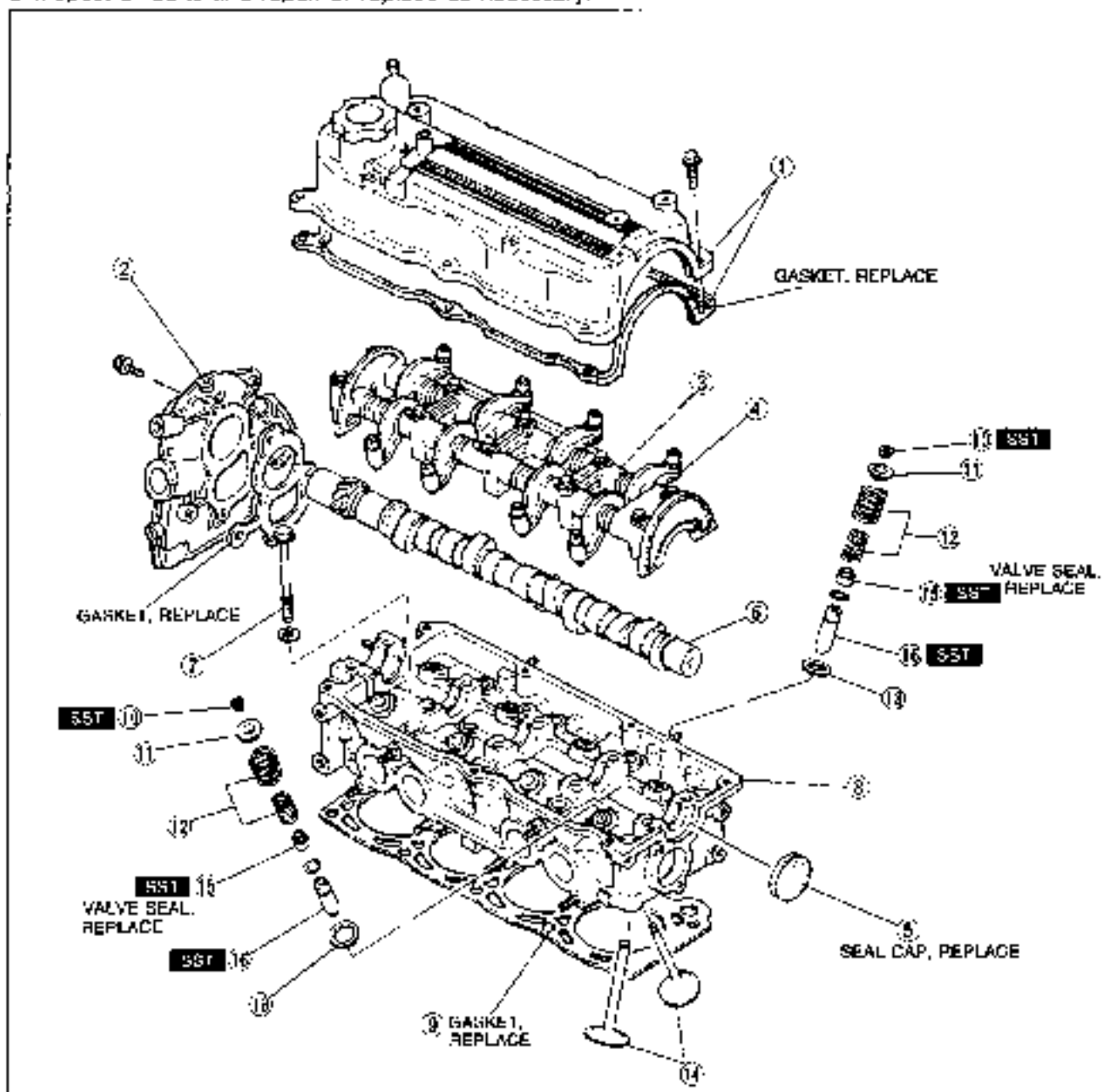
Remove the pulley lock bolt using a screw driver to prevent the camshaft from turning.

Timing belt pulley

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

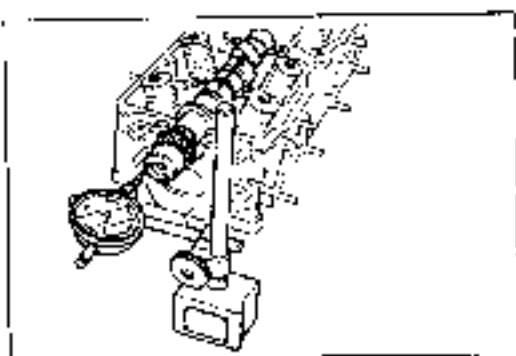
CYLINDER HEAD

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

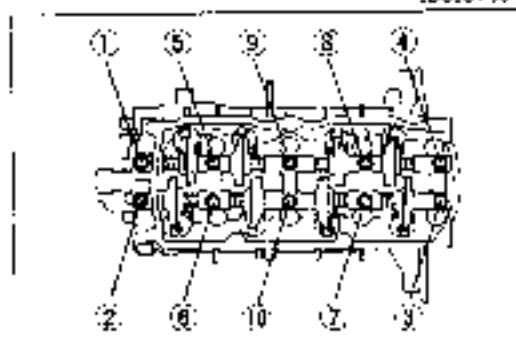


RJSB:009

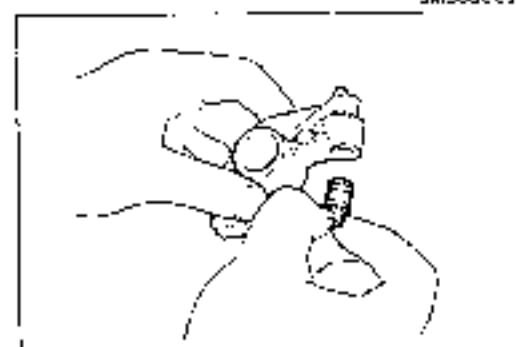
1. Cylinder head cover and gasket	9. Cylinder head gasket
2. Front housing	10. Valve keepers
3. Rocker arm and shaft assembly	11. Upper spring seat
Inspection..... page B1-40	12. Valve spring, outer and inner
4. Hydraulic lash adjuster (HLA)	Inspection..... page B1-36
Inspection..... page B1-40	13. Lower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



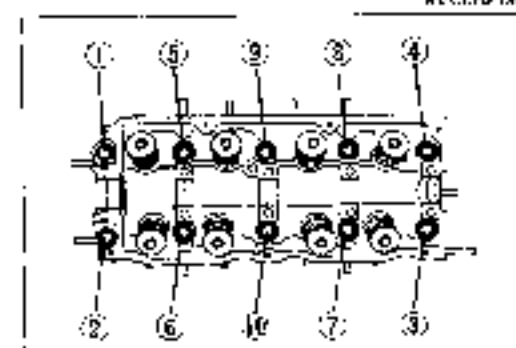
SBJ261-004



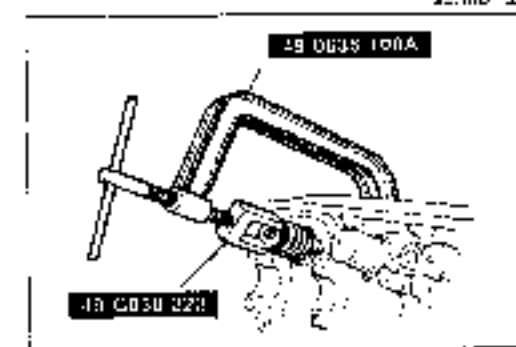
DMJ042-041



HVL002-002



ABJ001-001



HVL002-002

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.)

Rocker arm and shaft assembly

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

Caution

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

Hydraulic lash adjuster (HLA)

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

Caution

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

Cylinder head bolt

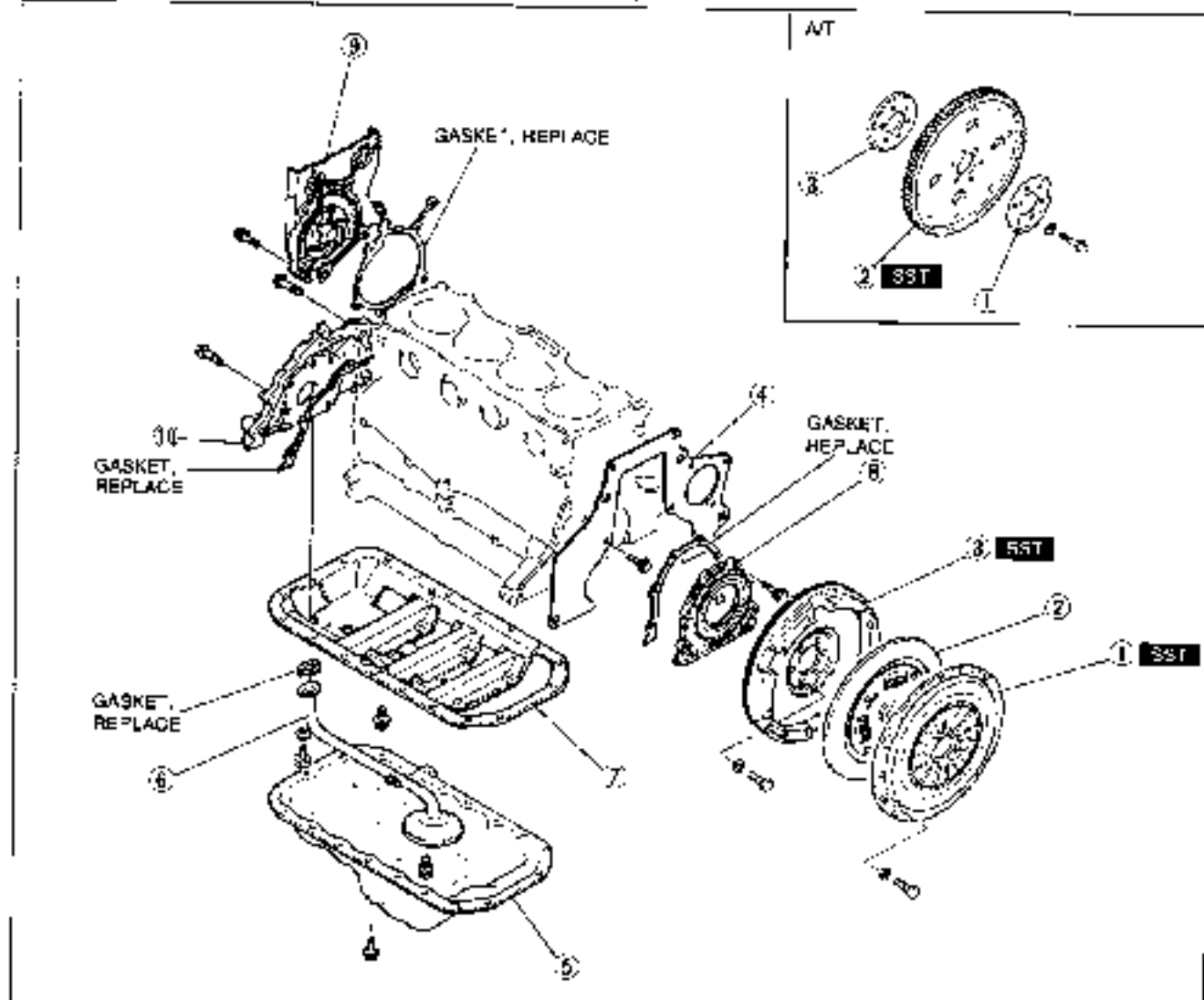
Loosen the cylinder head bolts in two or three steps in the order shown in the figure.

Valve

Remove the valves from the cylinder head with the SST.

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.



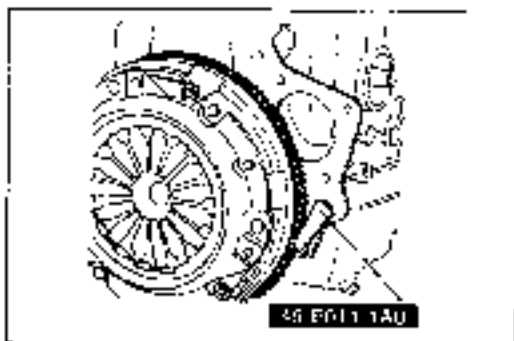
- 1. Clutch cover (M/T), Backing plate (A/T)
 - 2. Clutch disc (M/T), Drive plate (A/T)
 - 3. Flywheel (M/T), Adapter (A/T)
 - 4. End plate
 - 5. Oil pan
- Inspect for damage

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

Disassembly note

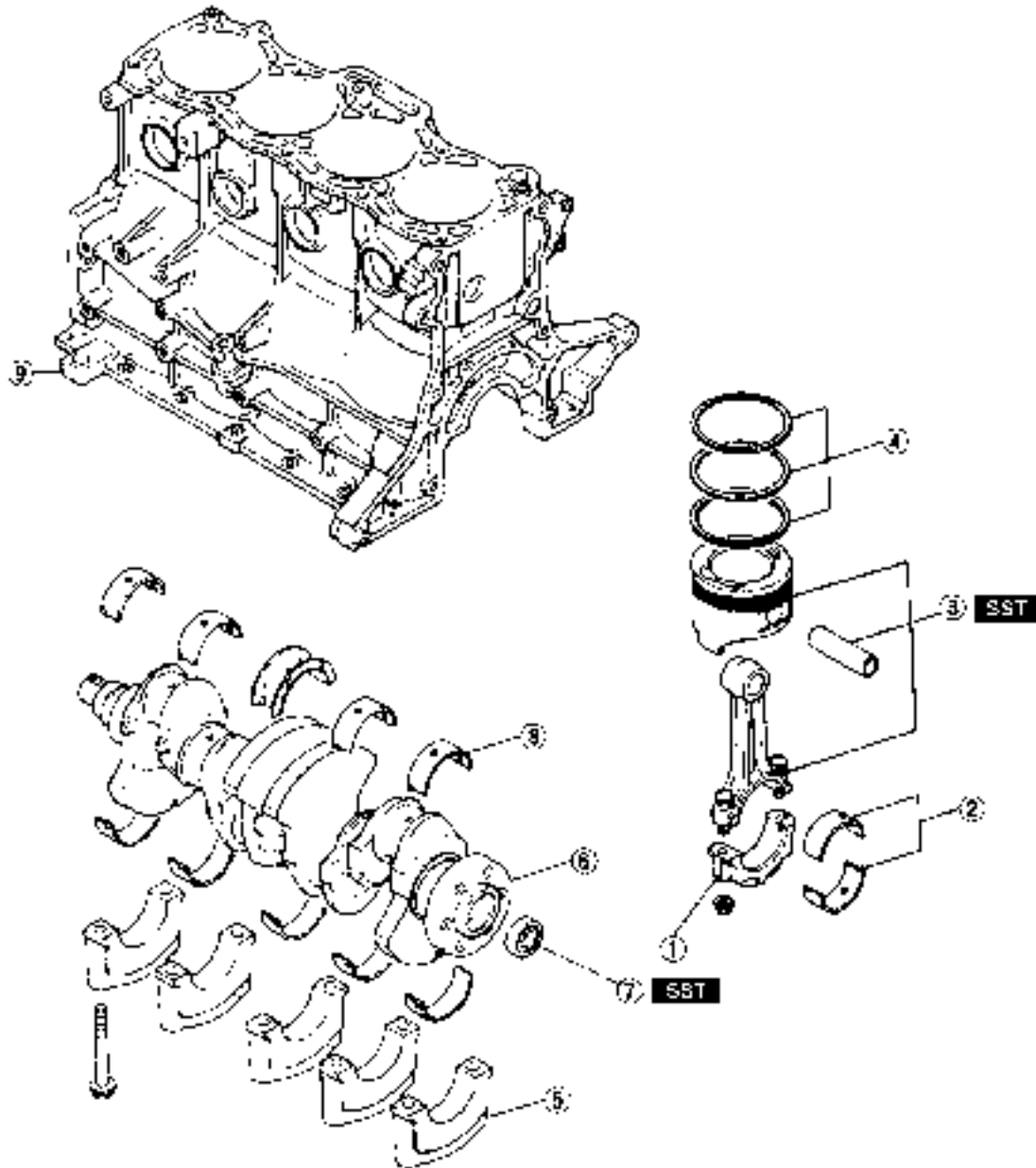
Clutch cover, flywheel (M/T) or drive plate (A/T)

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

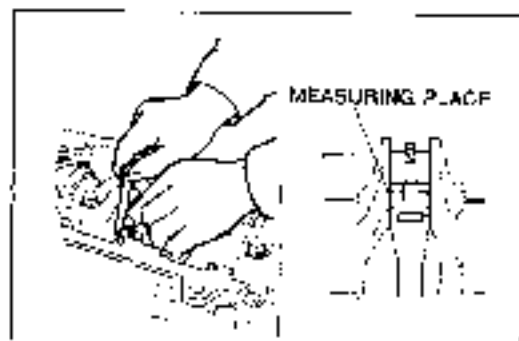


CYLINDER BLOCK II

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

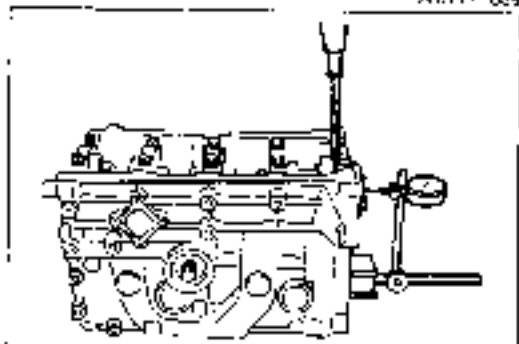


5001177-029

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. Crank pin oil clearance (Refer to page B1-51.)

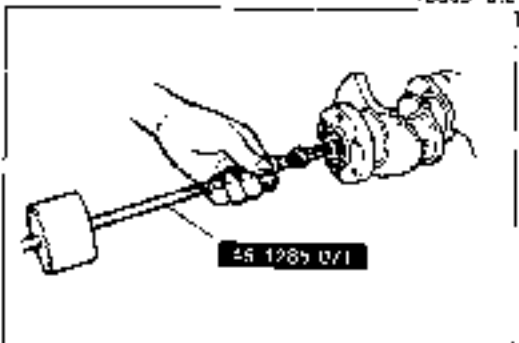


18005-012

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.)



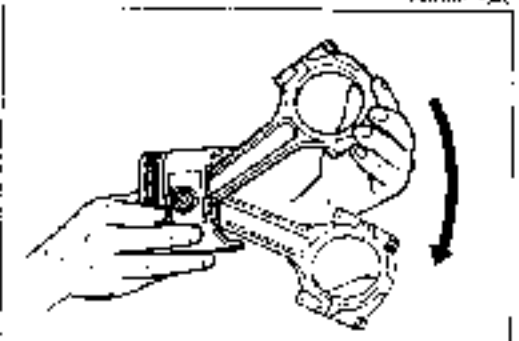
5401011-040

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

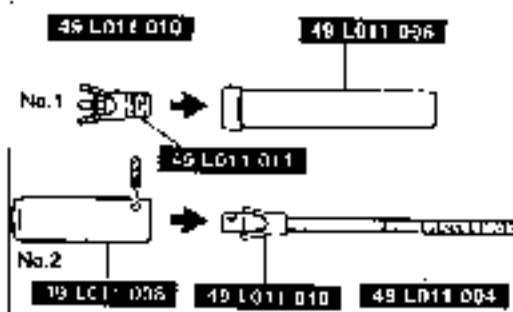
When replacing and/or cleaning the crankshaft, remove the pilot bearing.



9V-0039-06

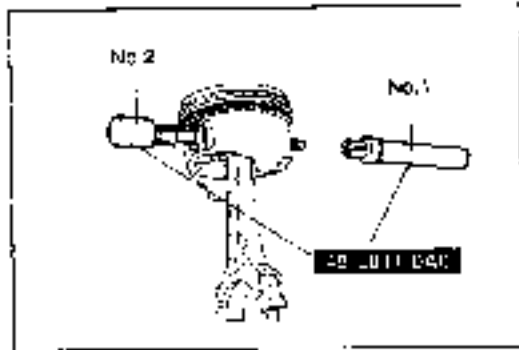
Piston and connecting rod

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.

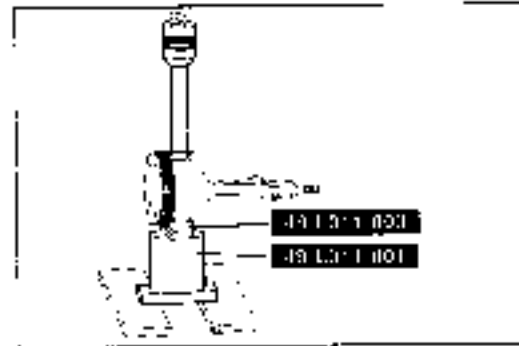


240002-036

2. Assemble the SST as shown.



6MA083-756



3MJOB2 '00

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

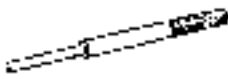
4. Mount the piston and connecting rod in the **SST** as shown.

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

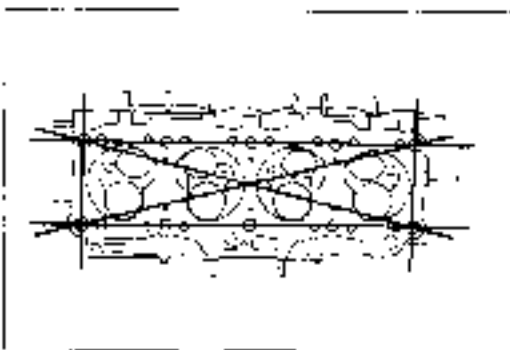
49 0221 251A Remover & installer, valve guide 	49 L012 0A0 Installer sol. valve seat & valve guide 	49 L012 002 Body (Part of 49 L012 0A0) 
49 L012 003 Installer (Part of 49 L012 0A0) 	49 L012 004 Nut (Part of 49 L012 0A0) 	9A1J002 *01

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.

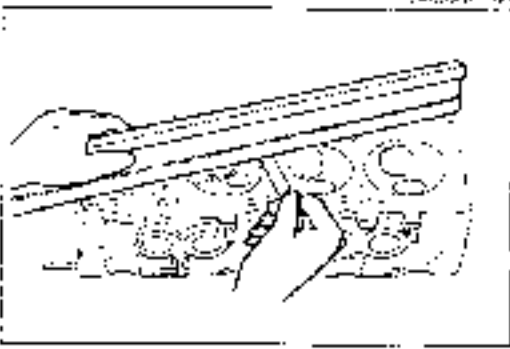
Caution

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

9A1J012 *02



9A1J012 *03



9A1J012 *04

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.

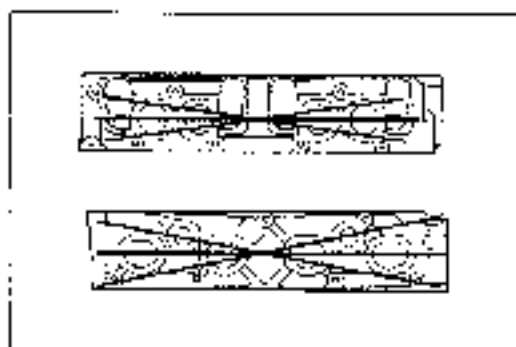
Height: 91.95—92.05mm (3.620—3.624 in)

Grinding: 0.20mm (0.008 in) max.

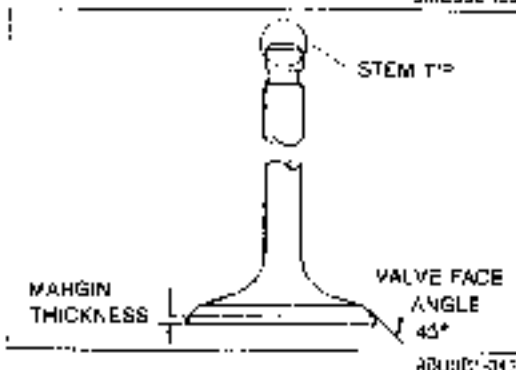
Note

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

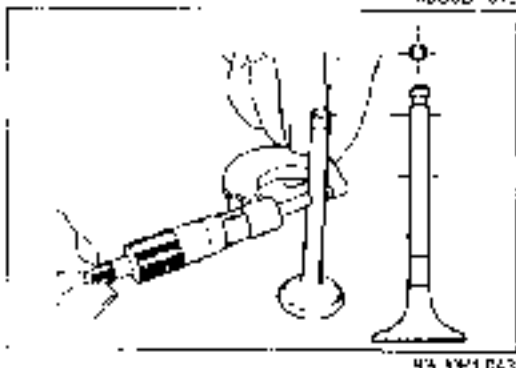
- Sinking of valve seat
- Damage of manifold contact surface
- Camshaft oil clearance and end play



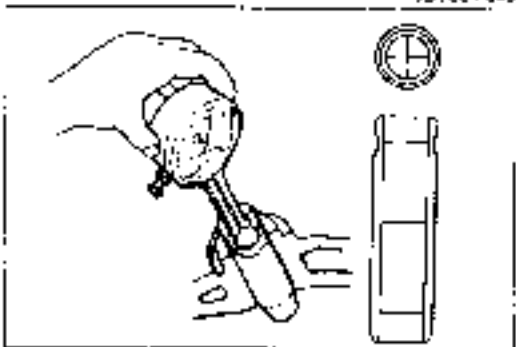
JML332 129



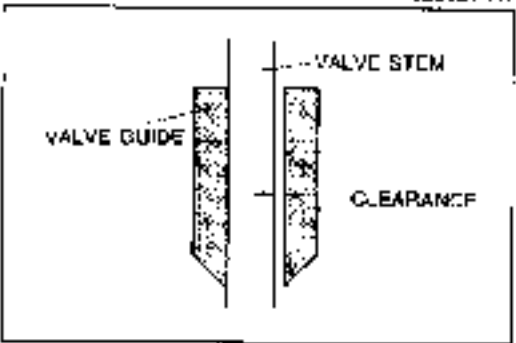
ADU007-343



93.A041 043



EBL007-544



2EL01X 081

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

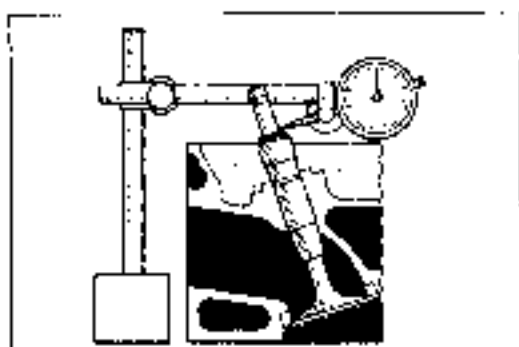
IN : 8.07—8.09mm (0.3177—0.3185 in)

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.



RMJ062-09

(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)

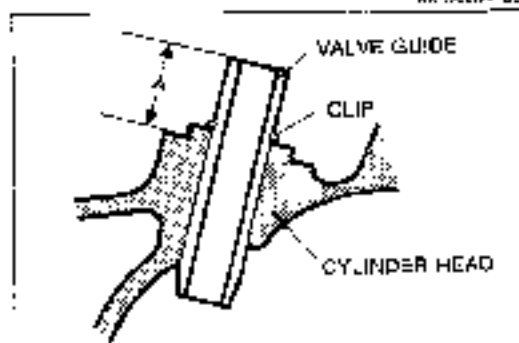
EX : 0.030—0.085mm (0.0012—0.0026 in)

Maximum: 0.20mm (0.008 in)

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

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

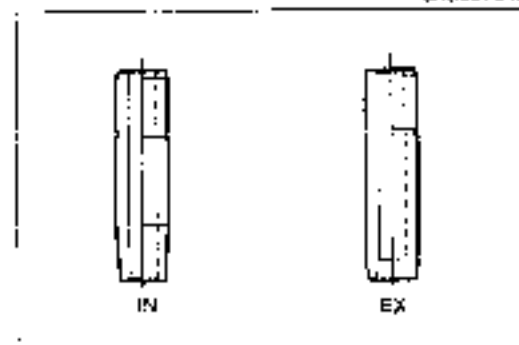
Height: 19.1—19.6mm (0.752—0.772 in)



RMJ031-045

Replacement of valve guide**Note**

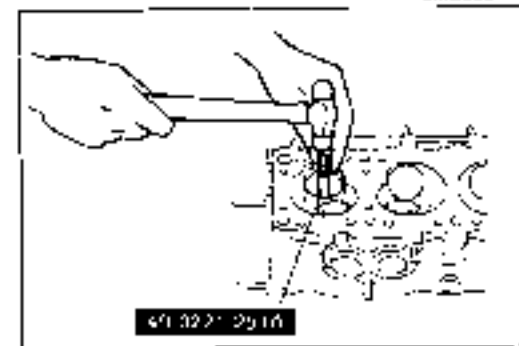
Although the shapes of the intake and exhaust valve guides are different, use the exhaust valve guide on both sides as a replacement.



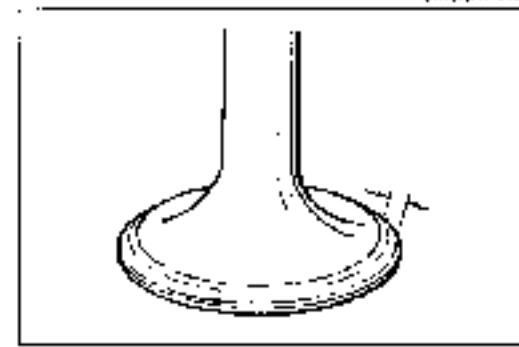
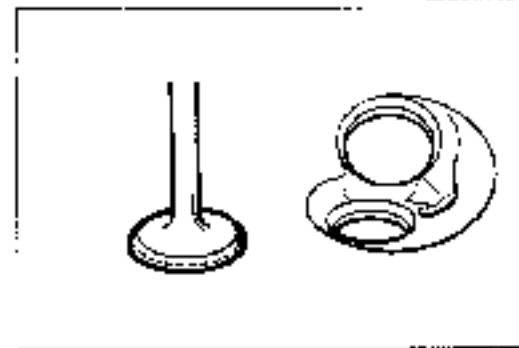
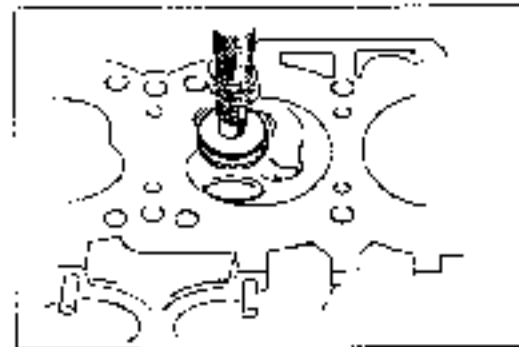
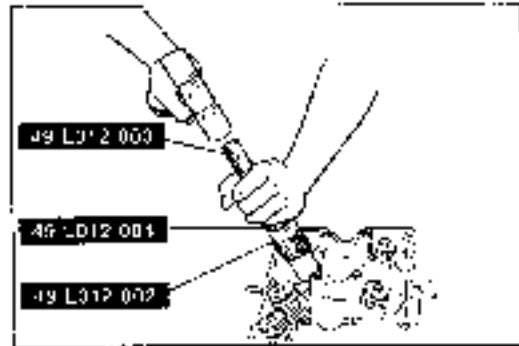
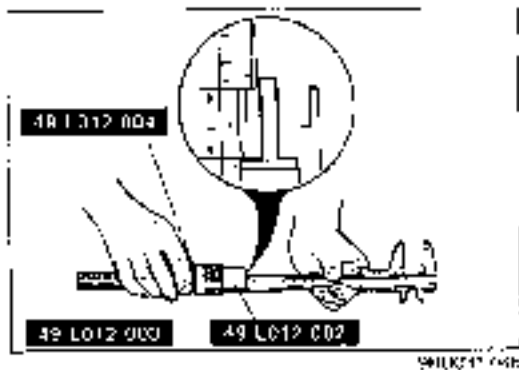
BMJ032-11

Removal

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



901, (PA) 12

**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

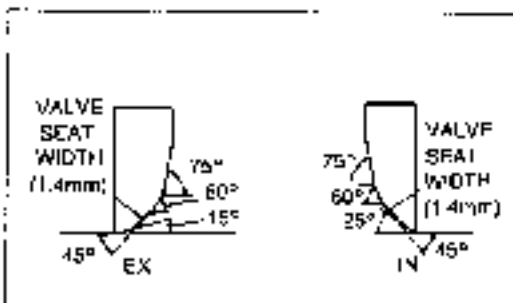
Valve Seal

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

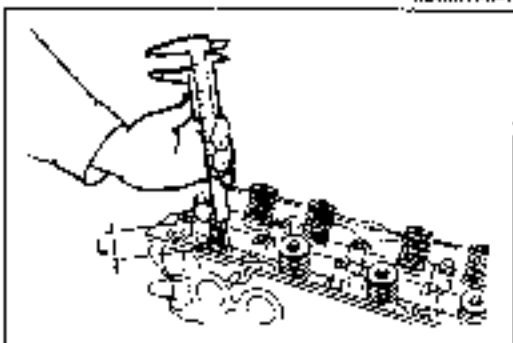
3. Apply a thin coat of Prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
 - (1) If blue does not appear 360° around the valve face, replace the valve.
 - (2) If blue does not appear 360° around the valve seat, resurface the seat.

5. Check the seat contact width.

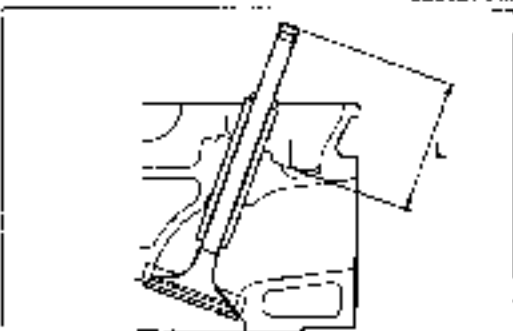
Width: 1.2—1.6mm (0.047—0.063 in)



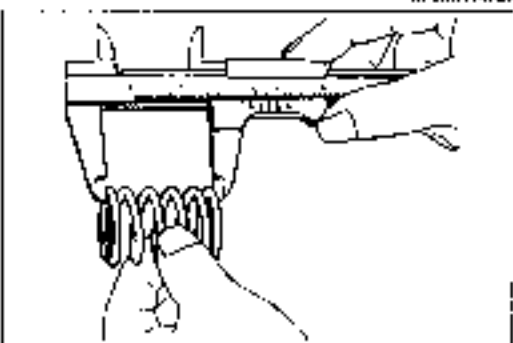
9BLCR1-047



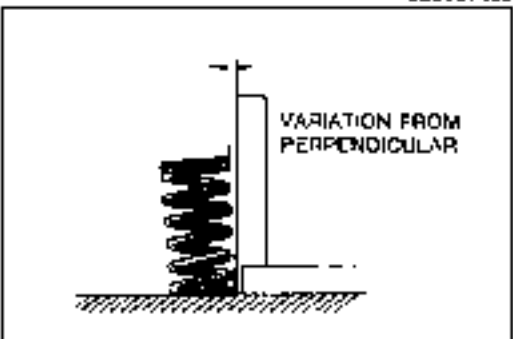
9SU0E1-043



9PLCR1-140



9BU0E1-030



9BJ0E1-051

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)

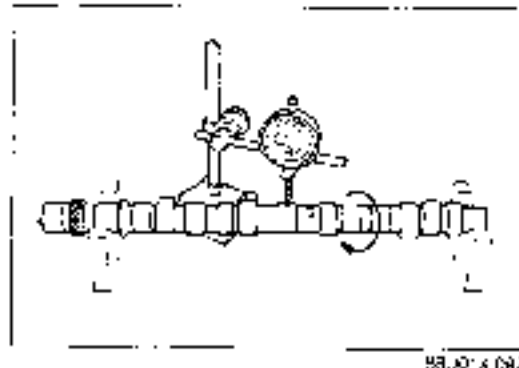
Minimum Outer: 50.4mm (1.984 in)

Inner: 42.7mm (1.681 in)

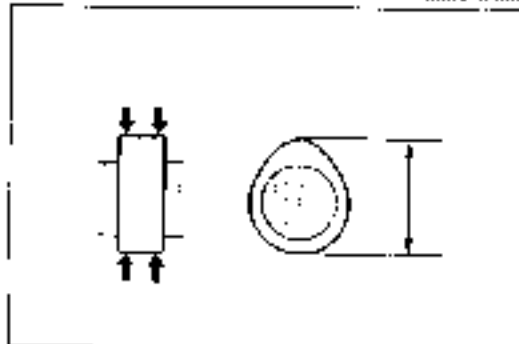
Out of square

Outer: 1.8mm (0.07 in) max.

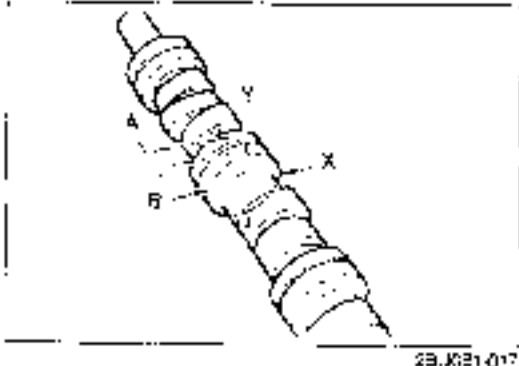
Inner: 1.5mm (0.06 in) max.



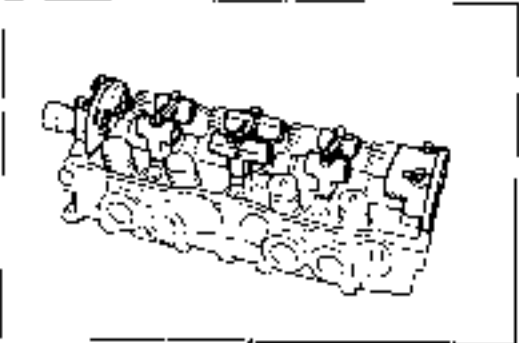
98J01A 032



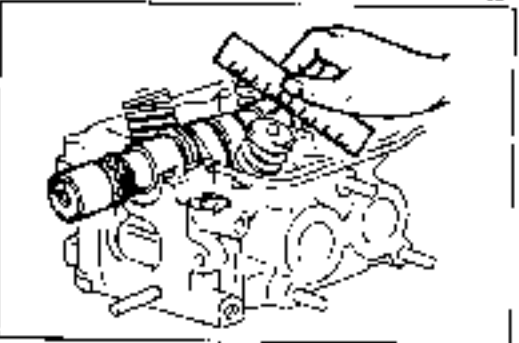
89U00 052



29J021 017



00M05 024



00M05 024

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:

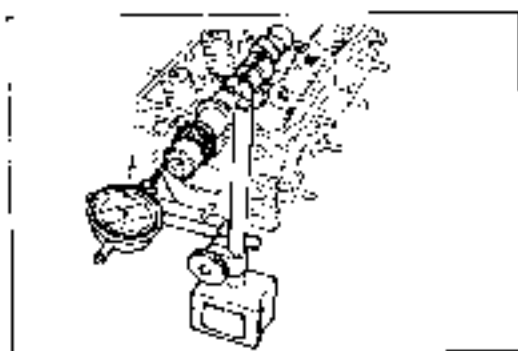
0.035—0.085mm (0.0014—0.0033 in)

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

0.065—0.115mm (0.0026—0.0045 in)

Maximum: 0.15mm (0.006 in)

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

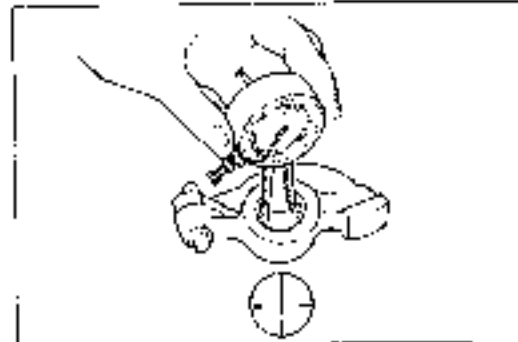


9PLC6-054

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)



93L00-055

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. 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: 15.000—15.027mm (0.5900—0.5910 in)

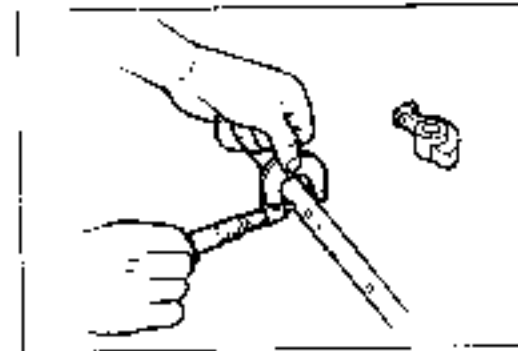
- (2) Measure the rocker arm shaft diameter.

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

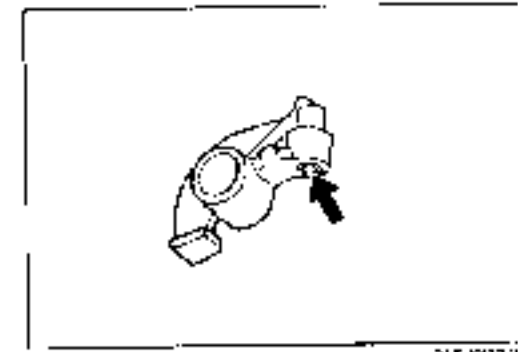
- (3) Subtract the shaft diameter from the rocker arm diameter.

Oil clearance: 0.018—0.061mm (0.0006—0.0024 in)

Maximum: 0.10mm (0.004 in)



9PLC61-056



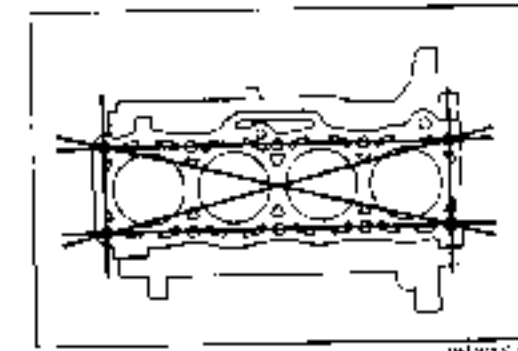
9ATJ092-256

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.



96X112-100

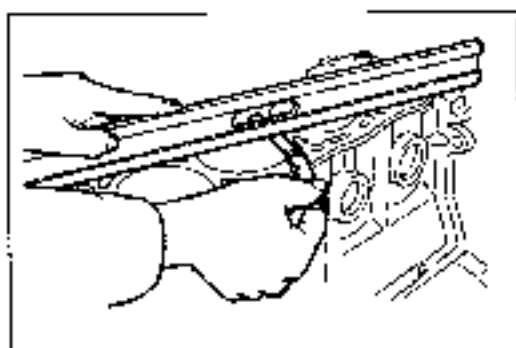
Cylinder Block

1. Check the cylinder block. Repair or replace if necessary.

- (1) Leakage damage
- (2) Cracks
- (3) Scoring of wall

2. Measure the distortion of the top surface of the cylinder block in the six directions as shown in the figure.

Distortion: 0.15mm (0.006 in) max.

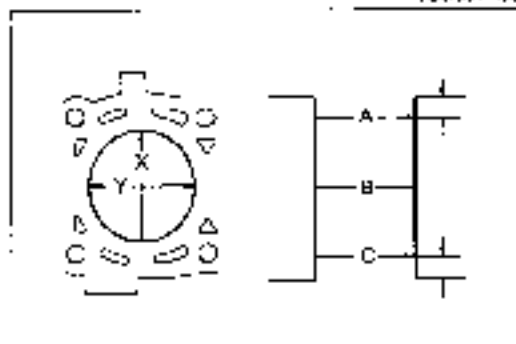


96U781-785

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.



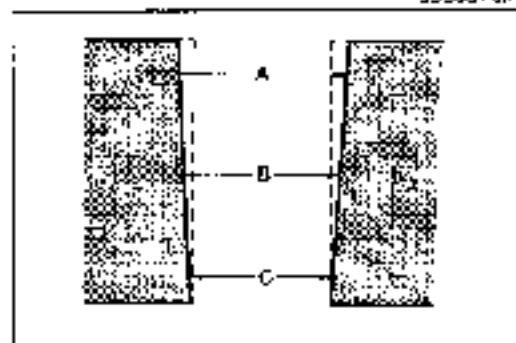
95J601-08*

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)

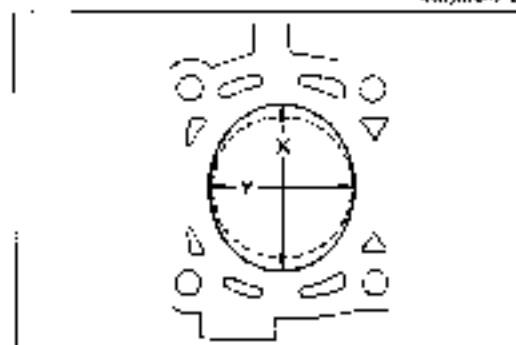
Size	Range	Diameter
Standard		95.000—95.019 (3.3858—3.3865)
0.25 (0.010) oversize		95.250—95.269 (3.3957—3.3964)
0.50 (0.020) oversize		95.500—95.519 (3.4055—3.4063)



96U781-249

- (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.



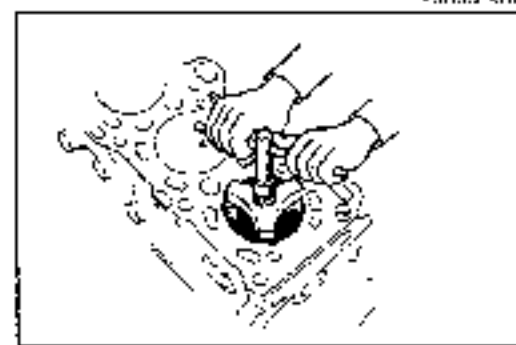
29U031-116

- (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.

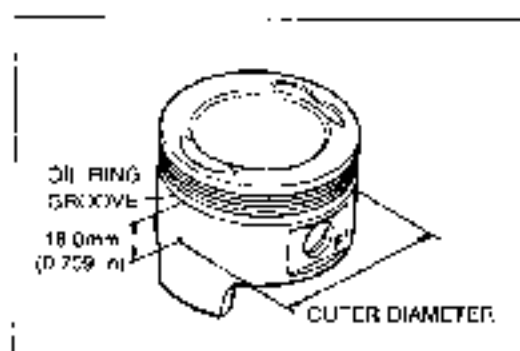
Caution

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

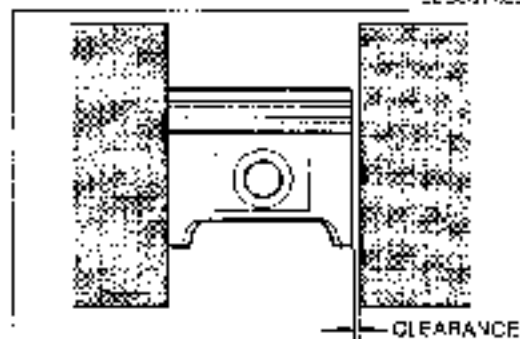


96U01-102

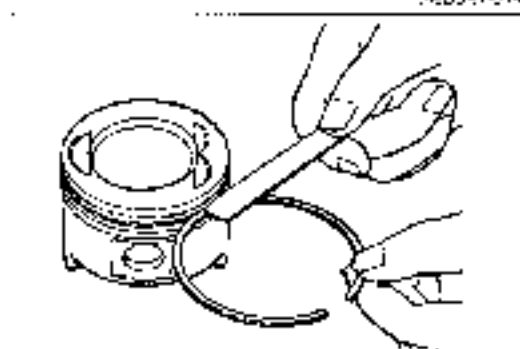
5. If the upper part of the cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



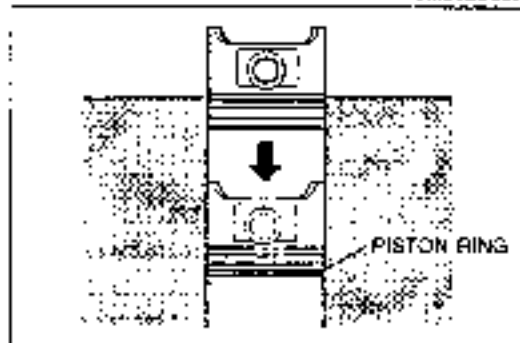
9BUCB1 053



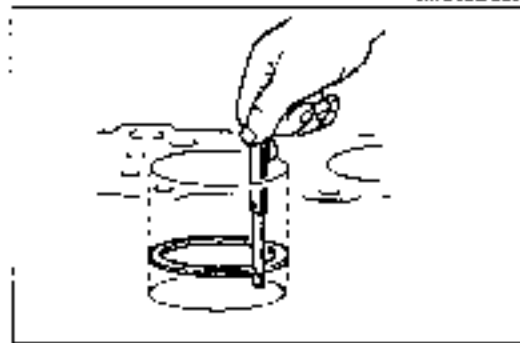
9BUCB1 054



9BUCB2 262



9BUCB2 253



9BUCB2 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
Standard		85.941 85.964 (3.3836 - 3.3844)
0.25 (0.010) oversize		86.191 - 86.214 (3.3935 - 3.3942)
0.50 (0.020) oversize		86.441 86.464 (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.

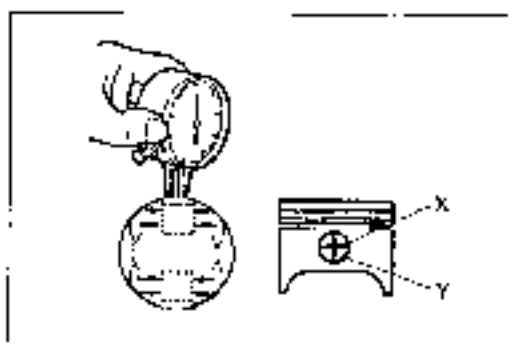
End gap

Top : 0.20—0.35mm (0.008—0.014 in)

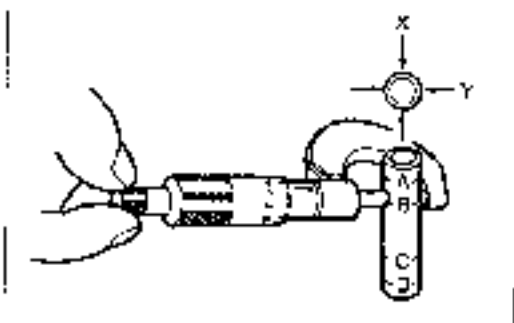
Second: 0.15—0.30mm (0.006—0.012 in)

Oil rail : 0.20—0.70mm (0.008—0.028 in)

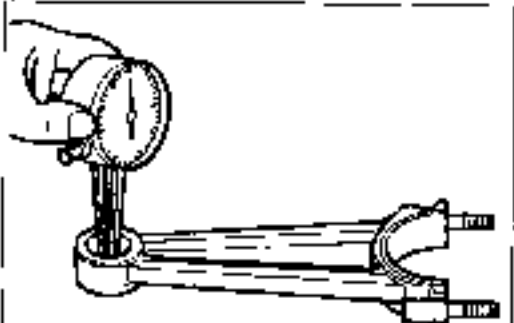
Maximum: 1.0mm (0.039 in)



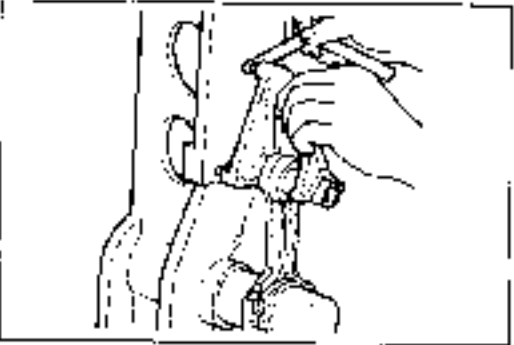
95U157-067



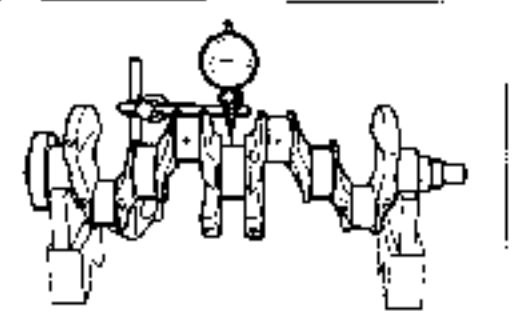
94U731-066



90U731-063



90U731-062



90U731-061

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)

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.

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)

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

Bend: 0.24mm (0.0094 in) max.

Length (Center to Center):

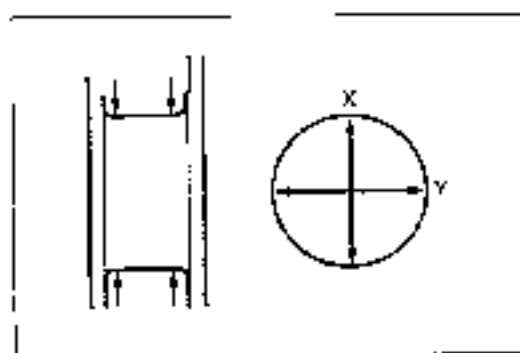
158.45—158.55mm (6.2382—6.2421 in)

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

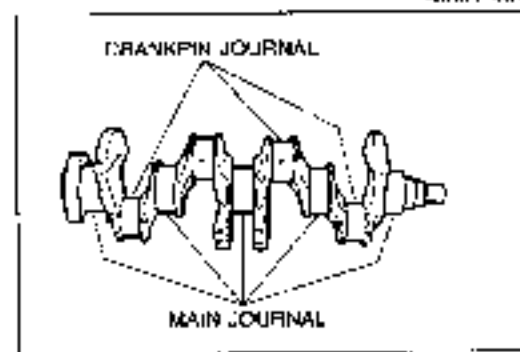
Crankshaft

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.

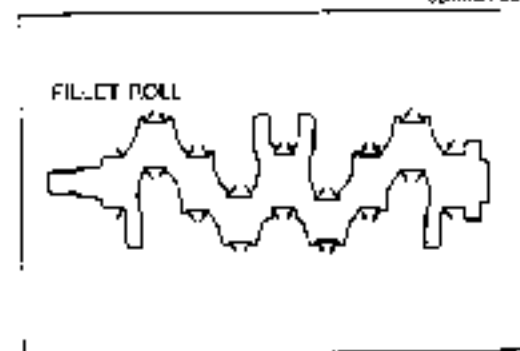
Runout: 0.03mm (0.0012 in) max.



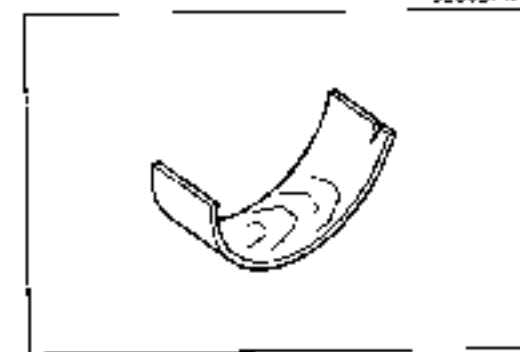
981K21-067



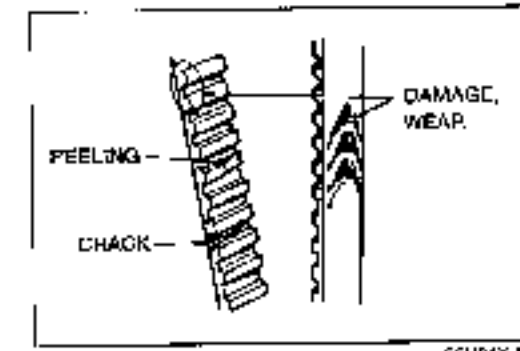
981K21-064



981K21-065



981K21-067



981K21-113

- 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 (2.0056—2.0061 in)
Out-of-round: 0.05mm (0.0020 in) max.

- 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	59.683—59.711	(2.3501—2.3508)
	No.3	59.687—59.705	(2.3469—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

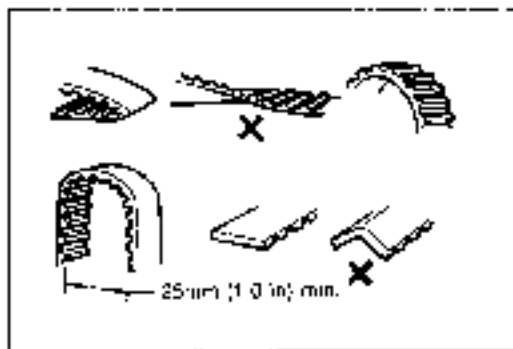
Do not grind the fillet roll.

Main Bearing and Connecting Rod Bearing

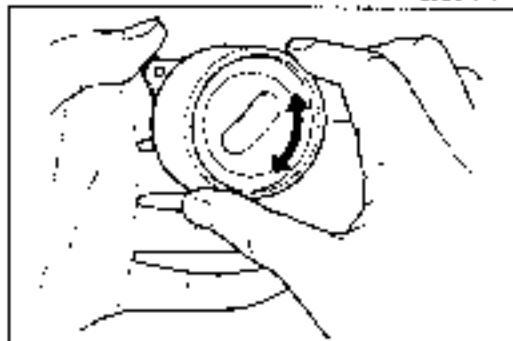
Check the main bearings and the connecting rod bearings for peeling, scoring, or other damage.

Timing Belt

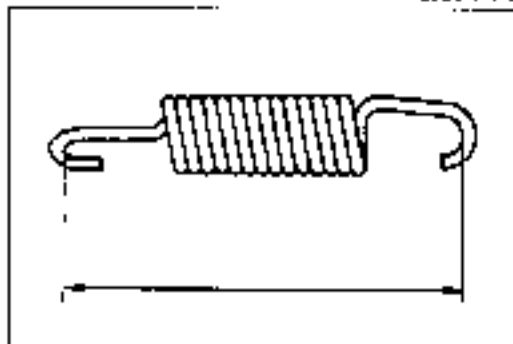
- Replace the timing belt if there is any oil or grease on it.
- Check the timing belt for damage, wear, peeling, cracks, or hardening. Replace if necessary.



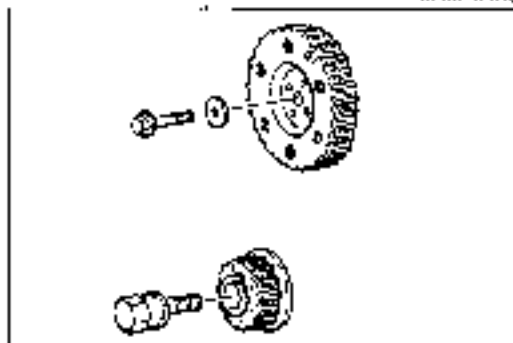
96L012-114



96L012-115



96L012-116



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

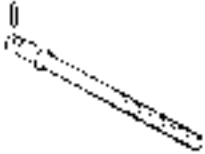
Do not clean the pulley with cleaning fluids. If necessary, use a rag to wipe it clean.

Timing Belt Cover (lower and upper)

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

ASSEMBLY

PREPARATION
SST

49 L011 0A0 Piston pin setting tool set 	49 L011 001 Support block body (Part of 49 L011 0A0) 	49 L011 003 Support block head (Part of 49 L011 0A0) 
49 L011 004 Screw (Part of 49 L011 0A0) 	49 L011 005 Slipper bolt (Part of 49 L011 0A0) 	49 L011 006 Puller & installer (Part of 49 L011 0A0) 
49 L011 008 Guide (Part of 49 L011 0A0) 	49 L011 010 Centering tool (Part of 49 L011 0A0) 	49 L011 011 Holder (Part of 49 L011 0A0) 
49 F011 1A0 Ring gear brake set 	49 L012 0A0 Installer set, valve seal & valve guide 	49 L012 001 Installer (Part of 49 L012 0A0) 
49 L012 002 Body (Part of 49 L012 0A0) 	49 L012 005 Spacer (Part of 49 L012 0A0) 	49 DE36 100A Arm valve spring lifter 
49 G030 222 Pivot valve spring clip 	49 SE01 310 Centering tool, clutch disc 	

F01001-016

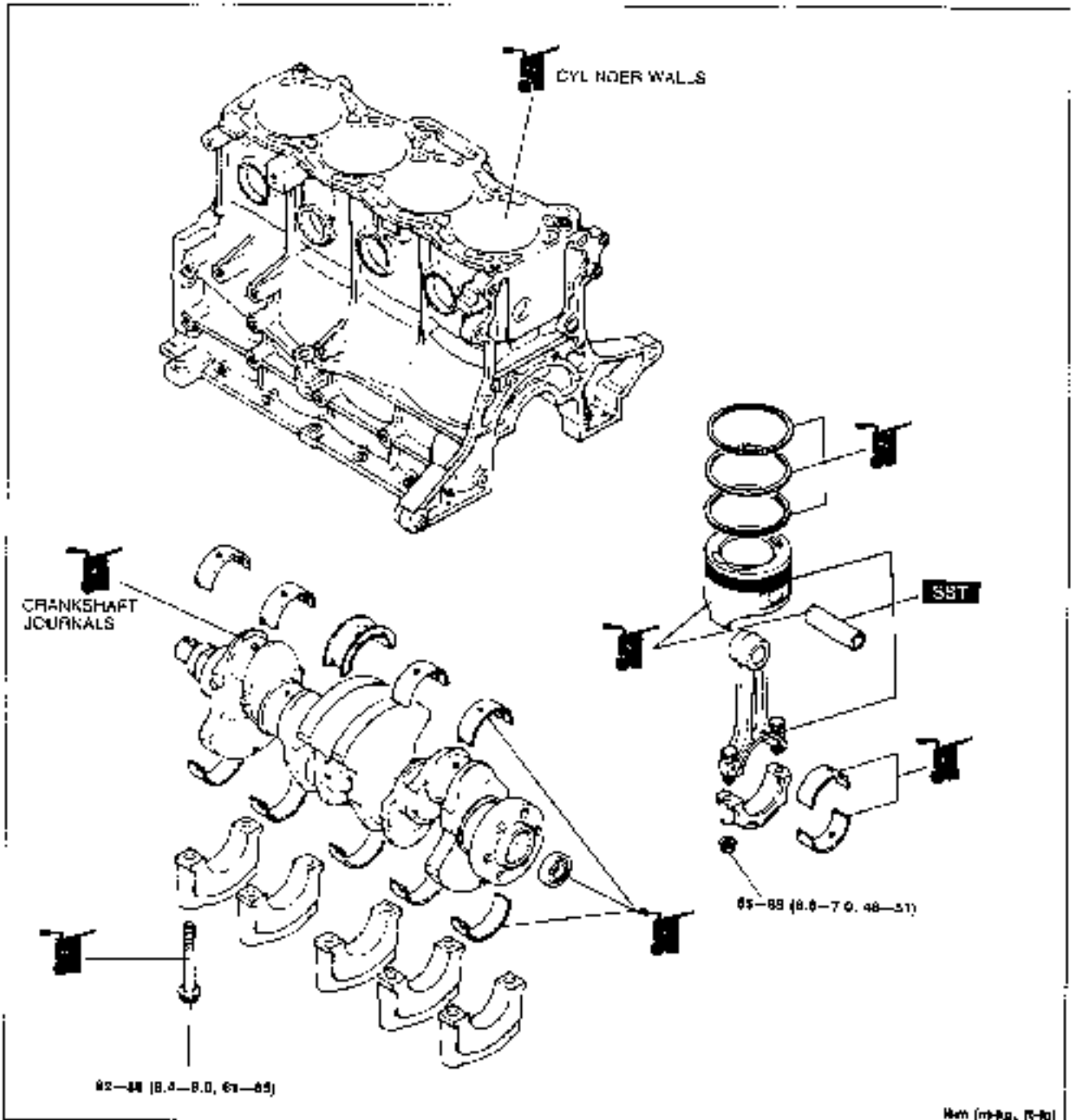
1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace chain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

Caution

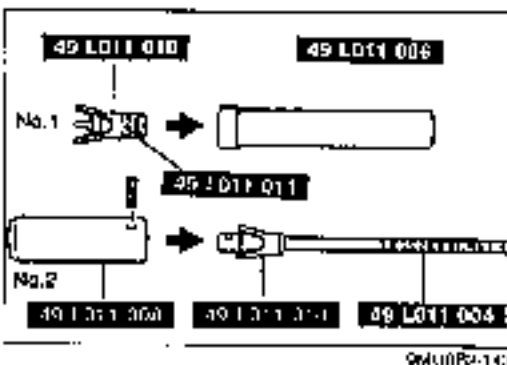
Do not reuse gaskets or oil seals.

39V0002-11

CYLINDER BLOCK I Torque Specifications

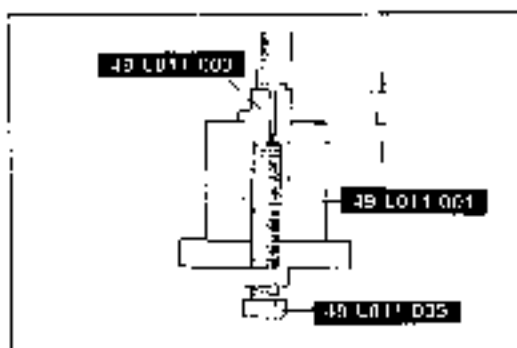


Rev (m-kg, ft-lb)
39031114



Connecting Rod

1. Assemble the SST as shown.

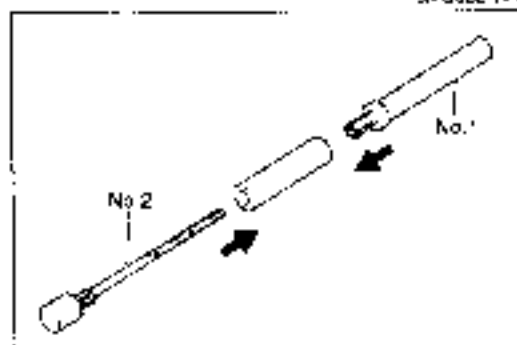


99V062 134

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

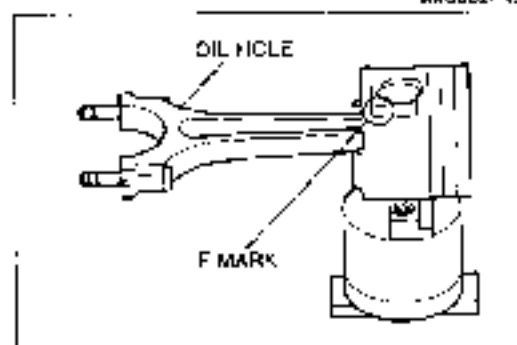
Depth L: 59.5—59.7mm (2.342—2.450 in)

- Tighten the lock nut.



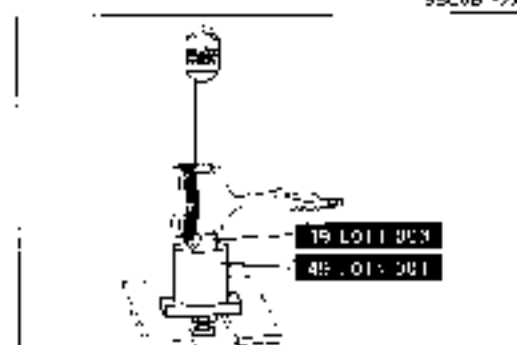
99V062 145

- Insert the **SST** No. 2 into the piston pin as shown and fully screw in the **SST** No. 1.
- Apply engine oil to the piston pin.



99V062 156

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



99V062 167

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

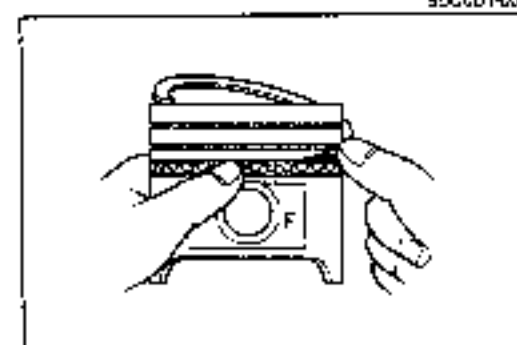
- Check the oscillation torque of the connecting rod. (Refer to page B1-32.)

Piston Ring

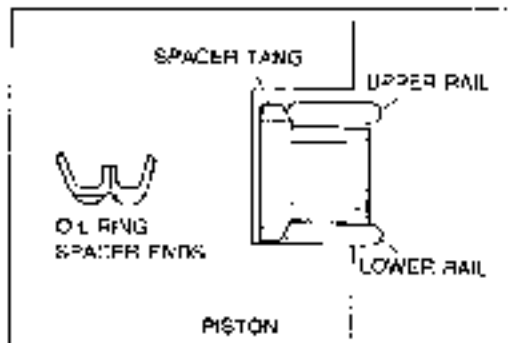
- Install the three-piece oil rings on the pistons.
 - Apply engine oil to the oil ring spacer and rails.
 - Install the oil ring spacer so that the opening faces upward.
 - Install the upper rail and lower rail.

Note

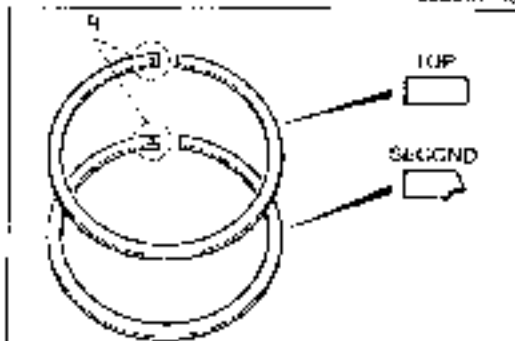
- The upper rail and lower rail are the same.
- Each rail can be installed with either face upward.



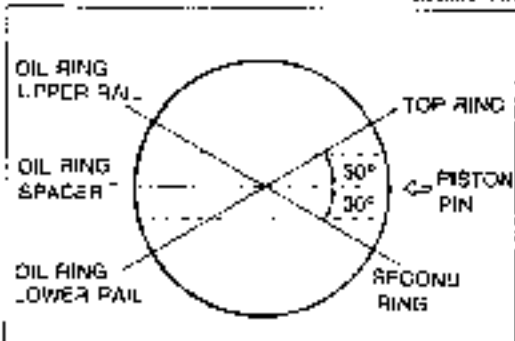
99V062 178



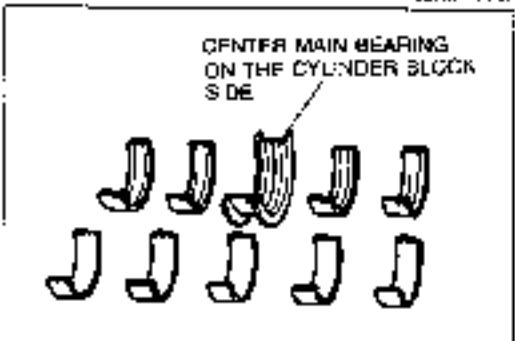
69331A-145



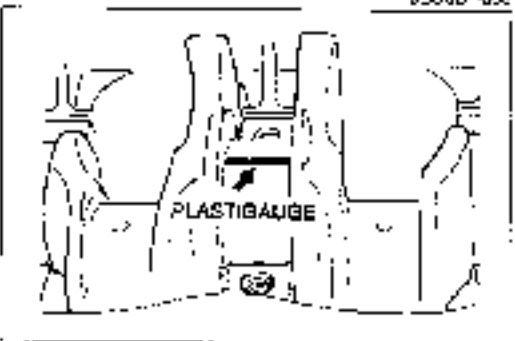
0V1052-145



6652-4-147



2500B-353



0M11052-262

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

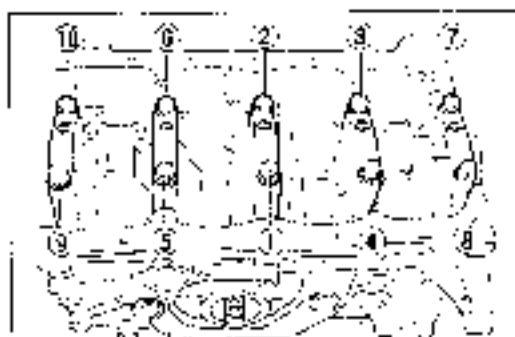
- Before installing the crankshaft, inspect the main bearing oil clearances as described.

Note

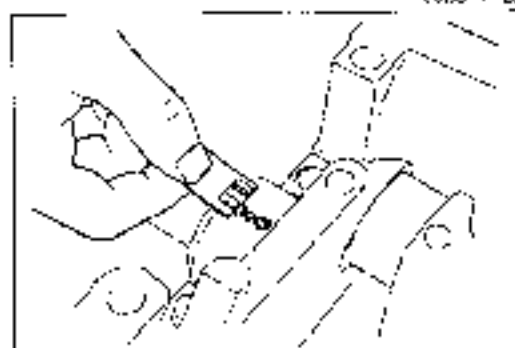
- The center main bearing on the cylinder block side has thrust shoulders.

Oil clearance inspection

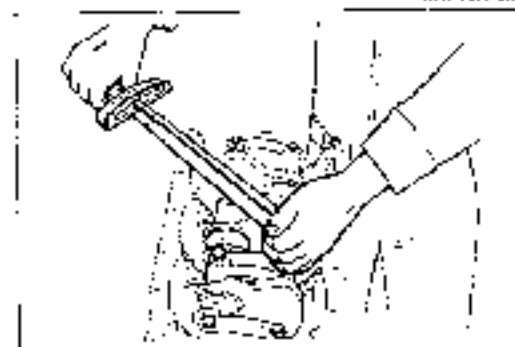
- (1) Remove any foreign material and oil from the journals and bearings.
- (2) Install the upper main bearings in the cylinder block.
- (3) Set the crankshaft in the cylinder block.
- (4) Position the Plastigauge on top of the journals in the axial direction.



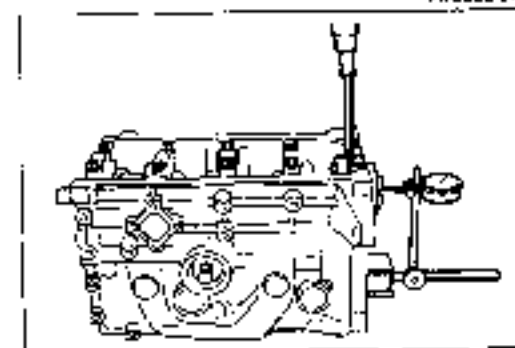
861007-129



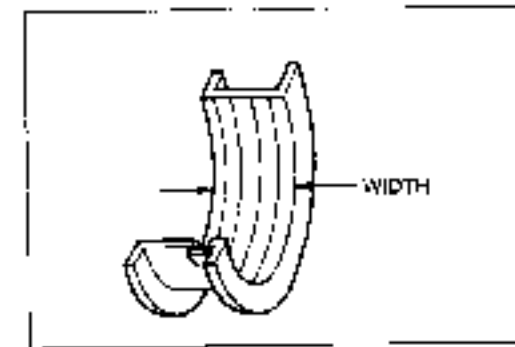
861007-065



861007-274



861007-267



861007-216

- (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 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 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)**

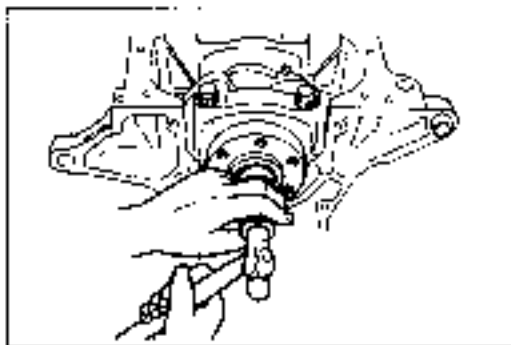
2. Apply a liberal amount of engine oil to the main bearings and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and mark.
4. Verify that the crankshaft rotates smoothly by hand.

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.

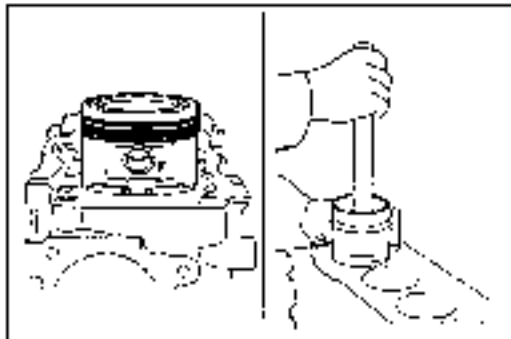
Center main bearing width**Standard: 27.94—27.99mm (1.1000—1.1020 in)****0.25mm (0.010 in) undersize:****28.04—28.09mm (1.1040—1.1059 in)****0.50mm (0.020 in) undersize:****28.12—28.17mm (1.1071—1.1091 in)****0.75mm (0.030 in) undersize:****28.20—28.25mm (1.1102—1.1122 in)****Note****Wider thrust width is available only in undersize center main bearing.**



780018-01/2

Pilot Bearing

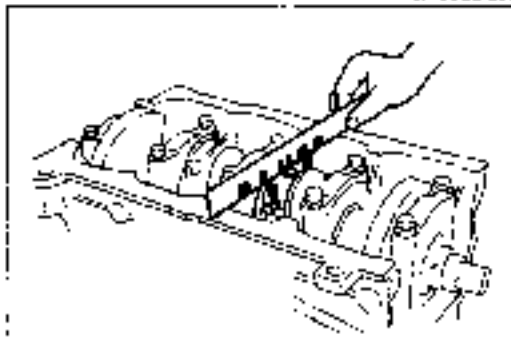
1. Apply engine oil to the outer circumference of the bearing.
2. Set a piece of pipe (outer diameter 30–34mm, 1.18–1.34 in) against the outer race of the bearing. Then tap it evenly into the crankshaft.
3. Lubricate the bearing with grease.



5MJD83-206

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).



5MJD83-152

Connecting Rod Cap

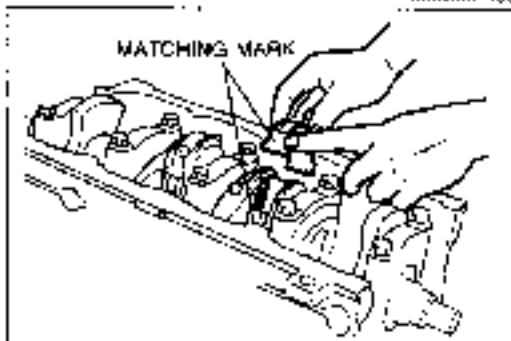
1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

Connecting rod cap tightening torque:

65–69 Nm (5.6–7.0 m·kg, 48–51 ft·lb)

Oil clearance: 0.027–0.067mm (0.0011–0.0026 in)

Maximum: 0.10mm (0.004 in)

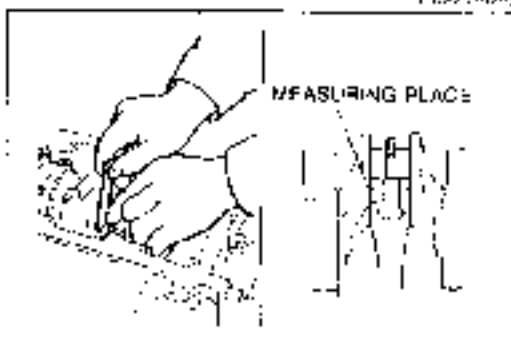


780018-01/2

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.)



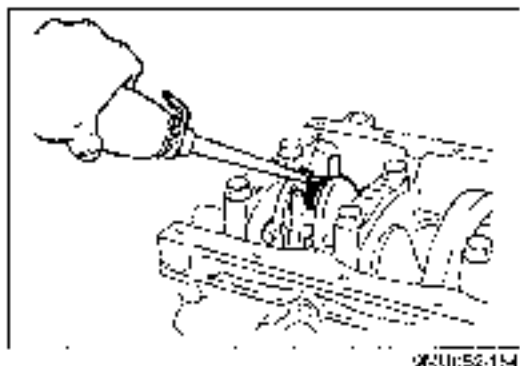
5MJD83-206

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.



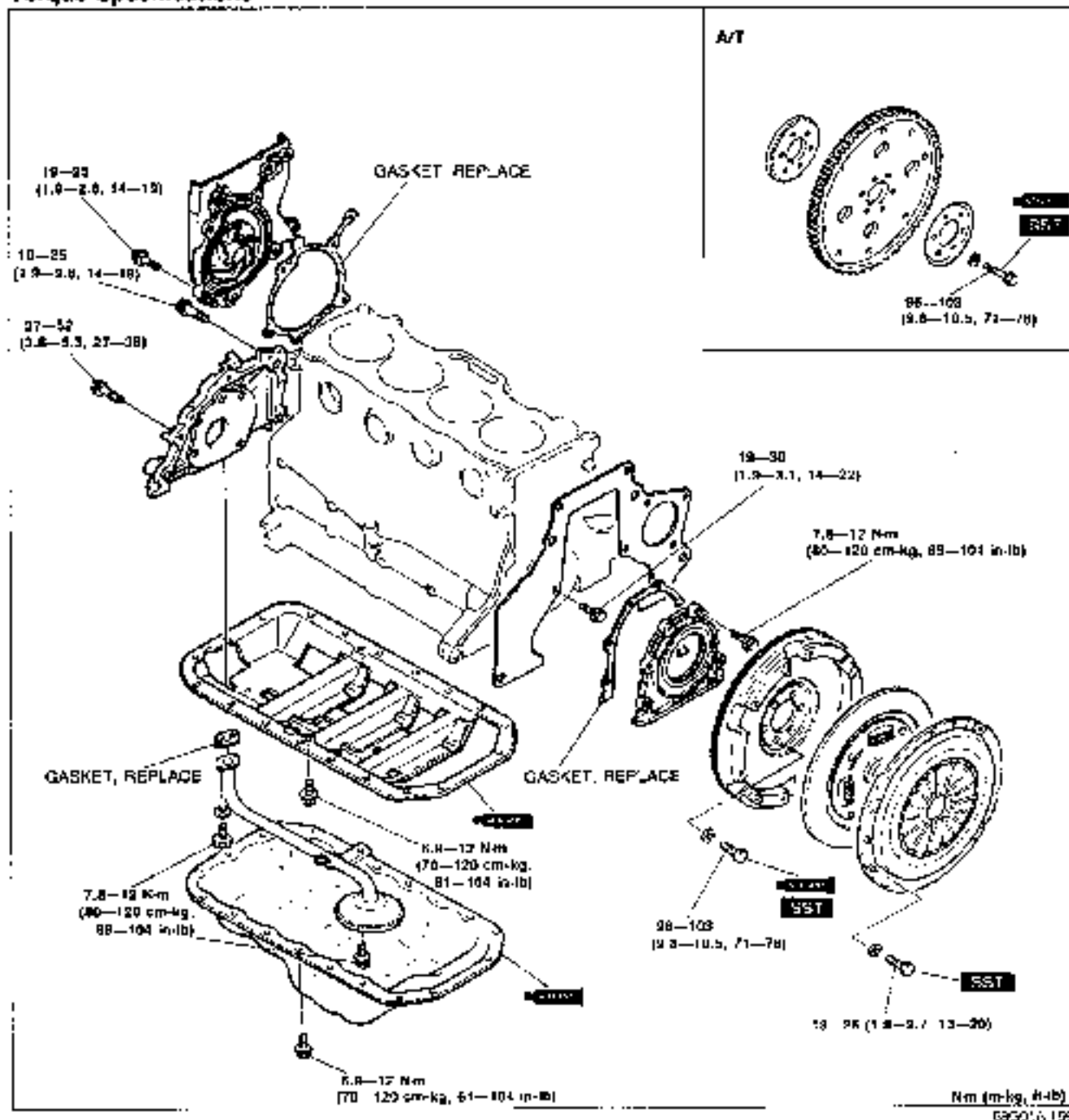
4. Apply a liberal amount of engine oil to the crankpin journal and connecting rod bearing.
5. Install the connecting rod cap with the alignment marks aligned.

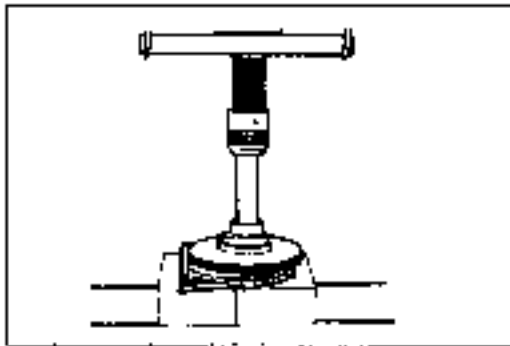
Tightening torque:

65—69 N·m (6.5—7.0 m·kg, 48—51 ft·lb)

6. Verify that the crankshaft rotates smoothly by hand.

CYLINDER BLOCK II Torque Specifications





8PLCD1-039

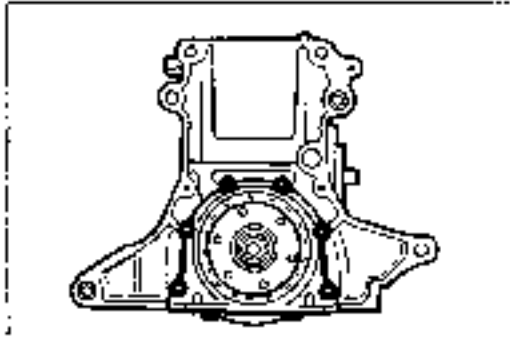
Rear Cover

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.

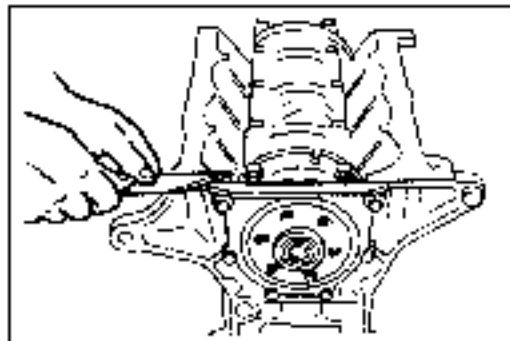


8PLCR1-100

4. Install the rear cover and a new gasket.

Tightening torque:

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

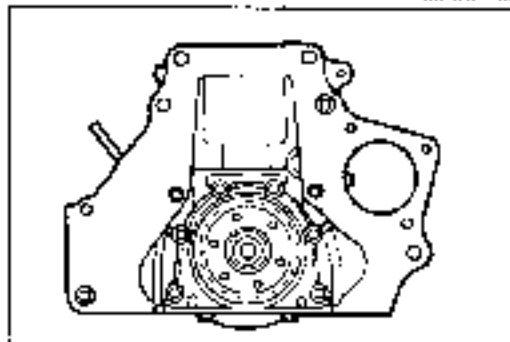


8PLCR1-102

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.



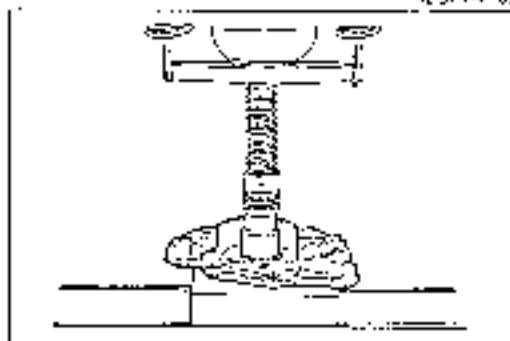
4P0C1A-100

End Plate

Install the end plate.

Tightening torque:

19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)



8PLCP-101

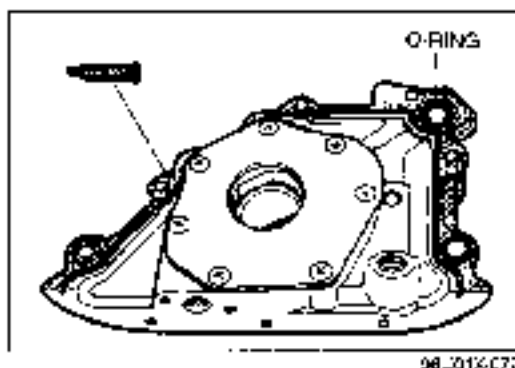
Oil Pump

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.

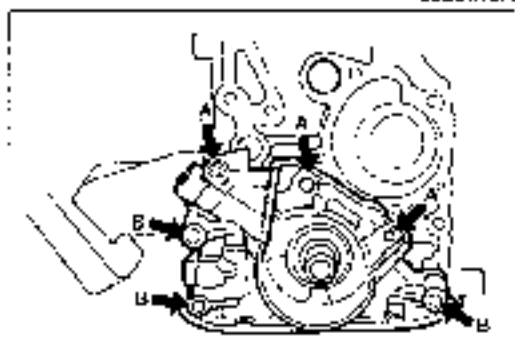


98-0116-C72

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.



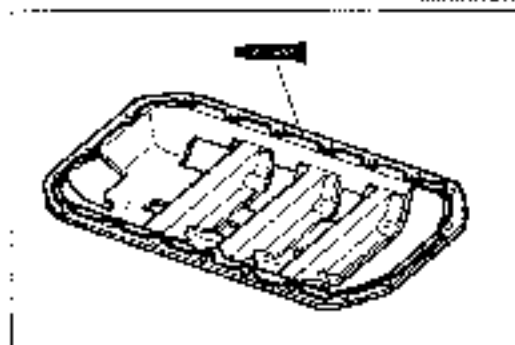
98-0116-C73

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.



99-0021-102

Stiffener

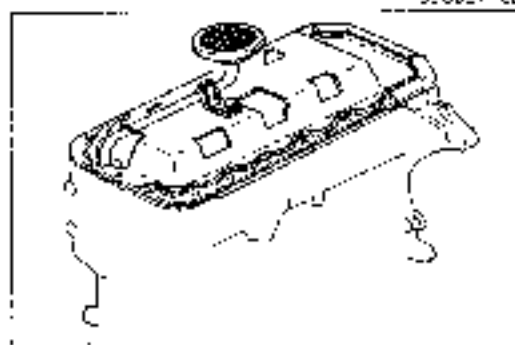
1. Remove any dirt or other material from the contact surface.
2. Apply a continuous bead of silicone sealant to the stiffener along the inside of the bolt holes and overlap the ends.
3. Install the stiffener.

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.



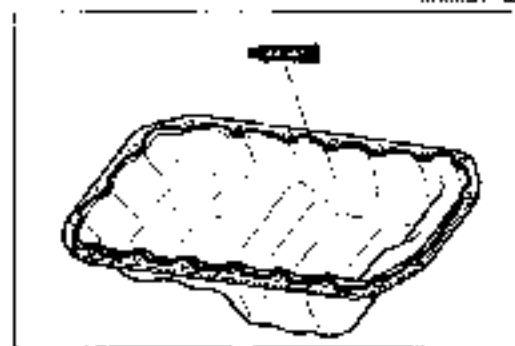
99-0021-103

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)



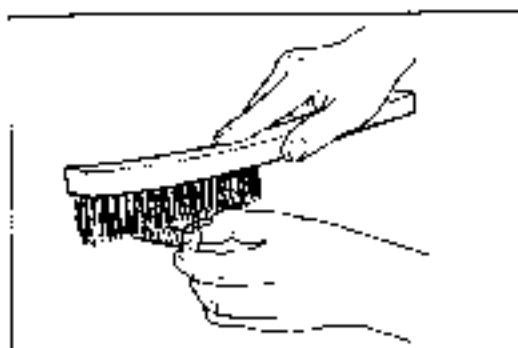
99-0021-104

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:

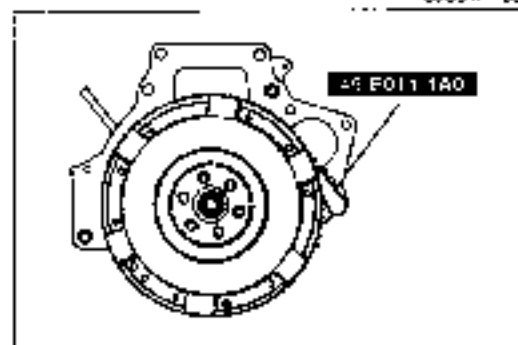
6.9—12 N·m (70—120 cm·kg, 61—104 in·lb)



95U0210-139

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.



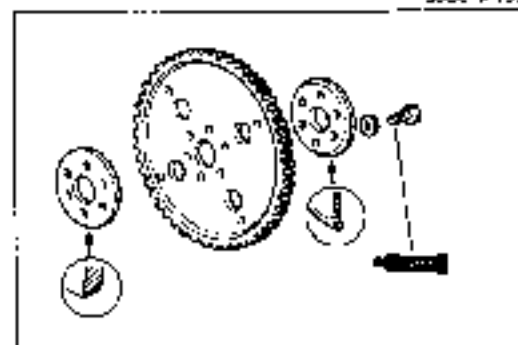
95U0210-136

(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)



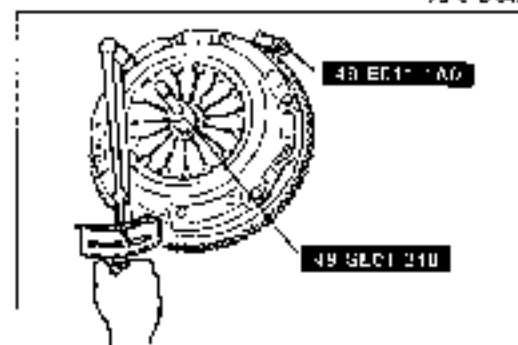
75PC-D-040

(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)



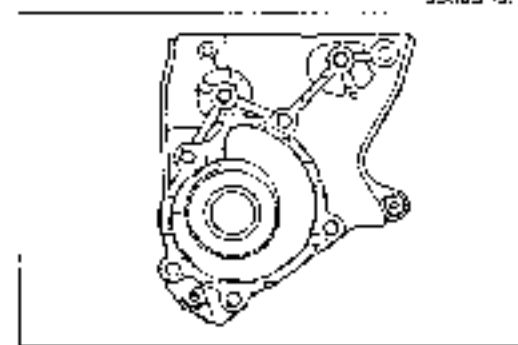
05U0210-137

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)

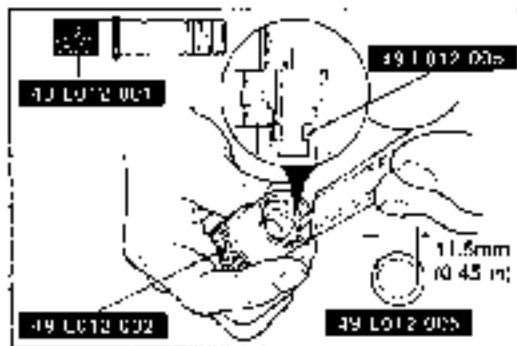


05U0210-053

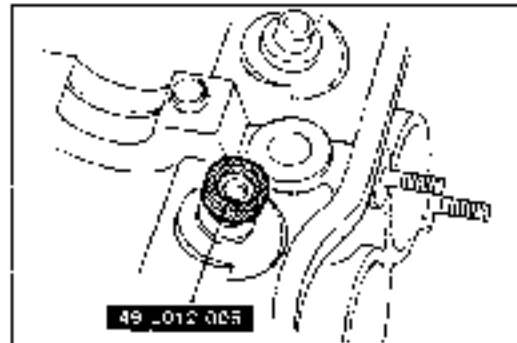
Water Pump

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

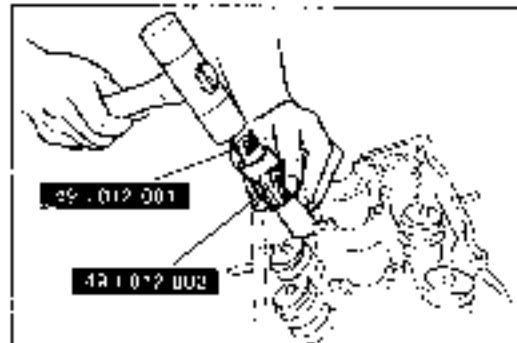
ASSEMBLY (CYLINDER HEAD)



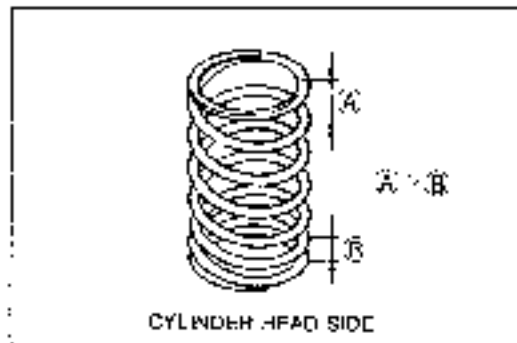
96U097-072



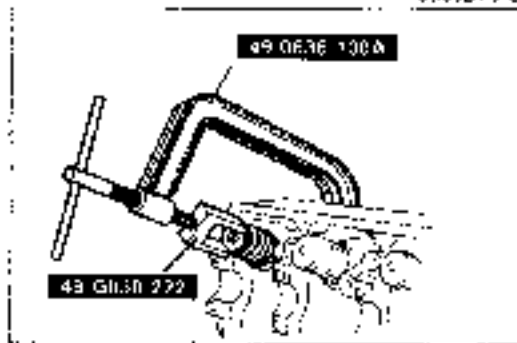
06LKB-072



06LKB-072



95U0D15-0



06LKB-072

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.

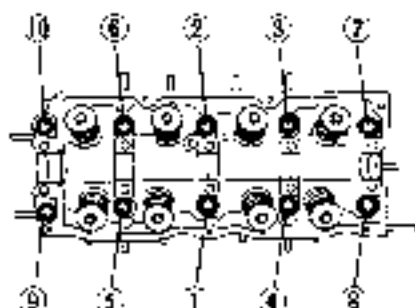
Note

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

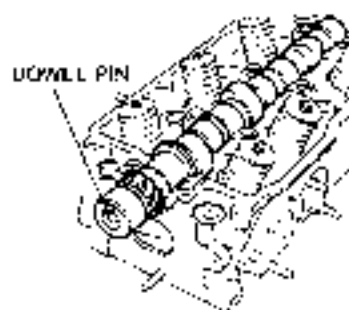
Cylinder Head

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:

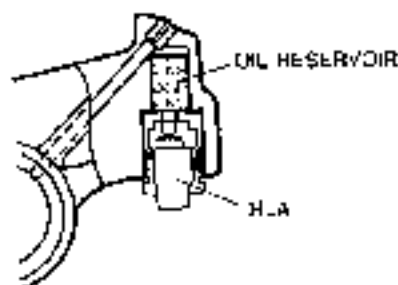
80—86 Nm (8.2—8.8 m·kg, 59—64 ft·lb)



50LC7X-142

Camshaft

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



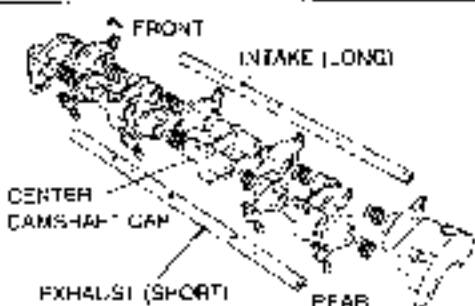
26UD7X-49

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

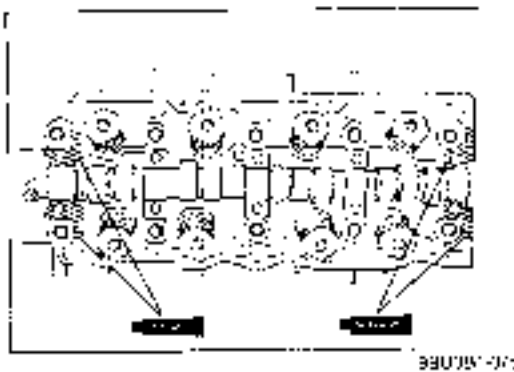
1. Assemble the rocker arm and shaft assembly as shown in the figure.

Caution

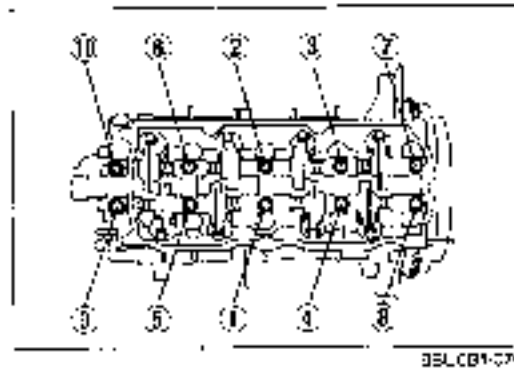
Be sure that rocker arm shaft oil holes (in the center camshaft cap) face each other.

Note

Use the installation bolts for alignment.



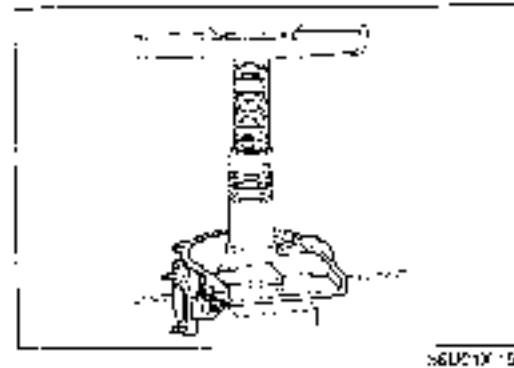
2. Apply silicone sealant to the shaded areas shown in the figure.
3. Apply liberal amount of clean engine oil to the cam lobes and journals.



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

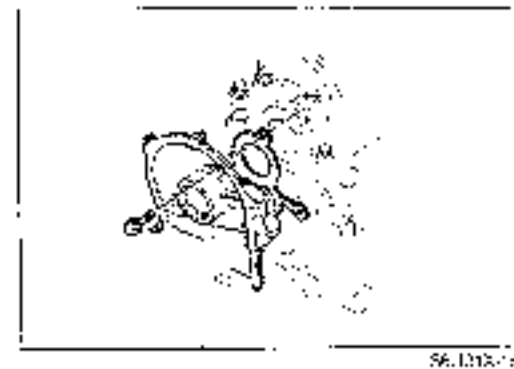
Tightening torque:

18–26 N·m (1.8–2.7 m·kg, 13–20 ft·lb)



Front Housing

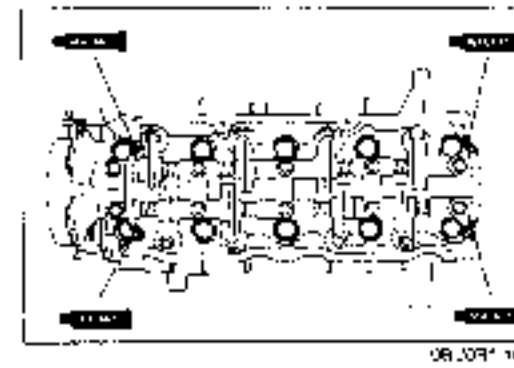
1. Apply engine oil to the front housing and a new oil seal.
2. Press the oil seal into the front housing.



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

Tightening torque:

18–25 N·m (1.9–2.6 m·kg, 14–19 ft·lb)



Cylinder Head Cover

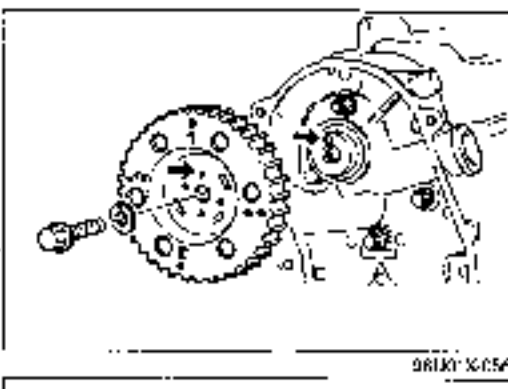
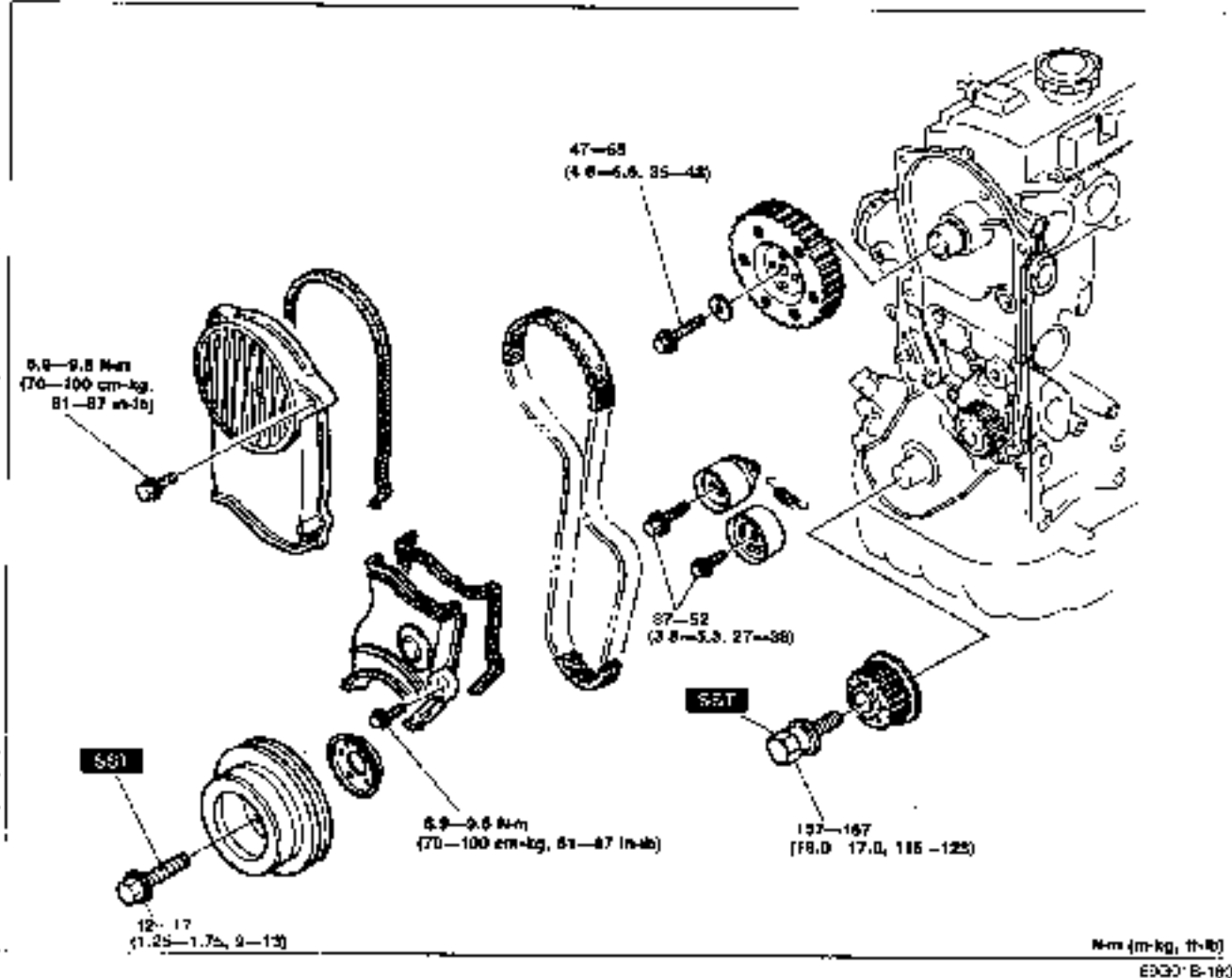
1. Apply silicon sealant to the shaded areas shown in the figure.
2. Install the cylinder head cover.

Tightening torque:

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

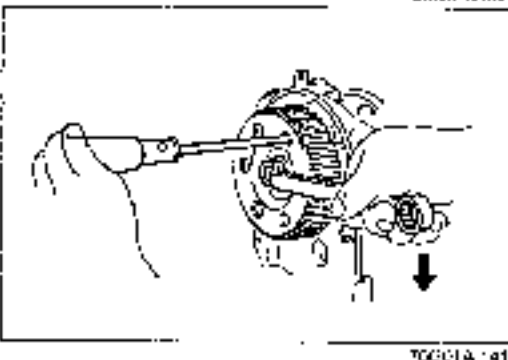
TIMING BELT

Torque Specifications



Camshaft Pulley

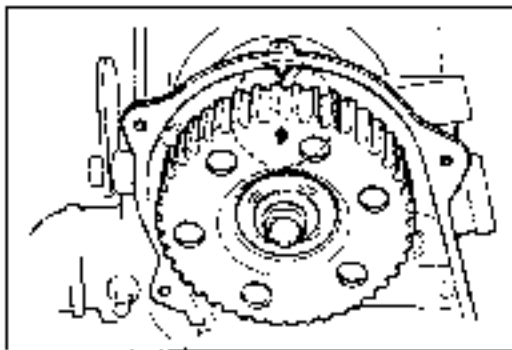
1. Install the camshaft pulley on the camshaft with the dowel pin fit into the hole at the ↑1 mark.



2. Tighten the camshaft pulley lock bolt.

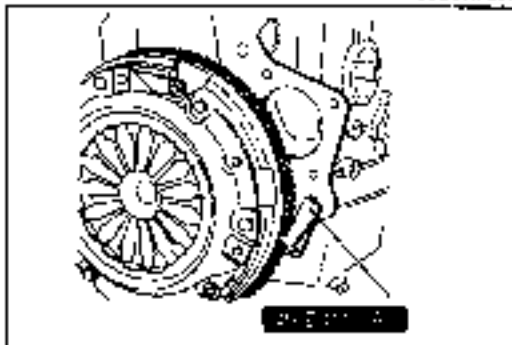
Tightening torque:

47—65 N·m (4.8—6.6 m·kg, 35—48 ft·lb)



36J01X-037

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



09U03B1-016

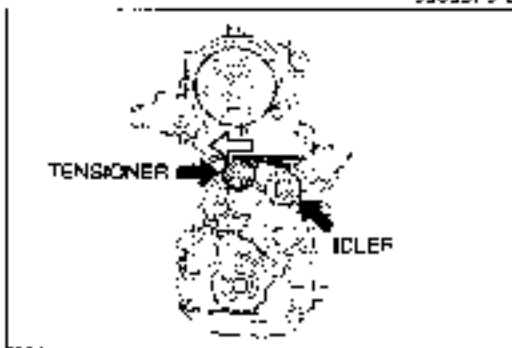
Timing Belt Pulley

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

Tightening torque:

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

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



030001-0165

Timing Belt Idler Pulley

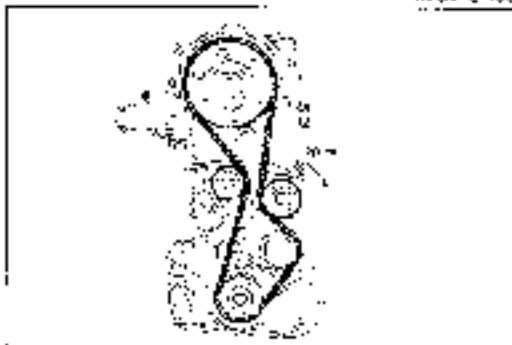
Install the timing belt idler pulley.

Tightening torque:

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

Timing Belt Tensioner

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



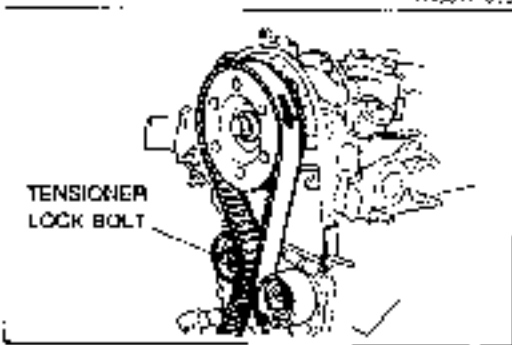
703010-0095

Timing Belt

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

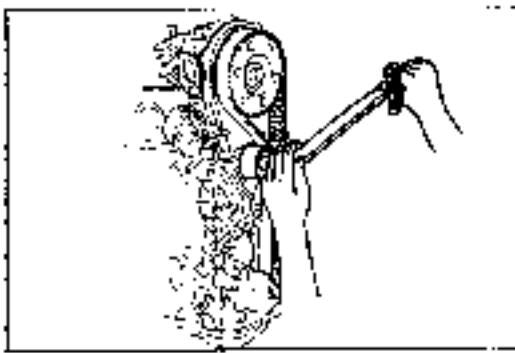
Caution

- 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.



36J01X-038

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



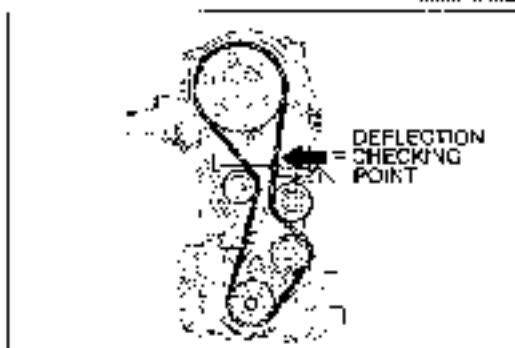
98LCE10060

5. Tighten the timing belt tensioner lock bolt.

Tightening torque:

37—62 N·m (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.



98LCE10061

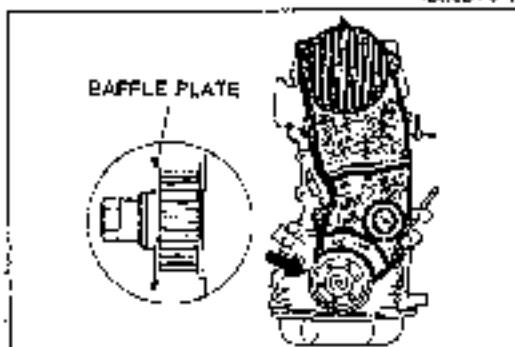
7. Check the timing belt deflection.

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)



98LCE10062

Baffle Plate

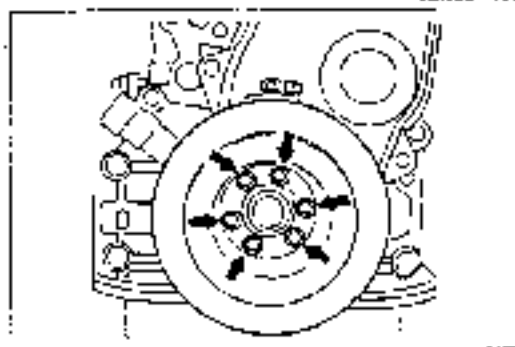
Position the baffle plate on the timing belt pulley.

Timing Belt Cover

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

Tightening torque:

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



98LCE10063

Crankshaft Pulley

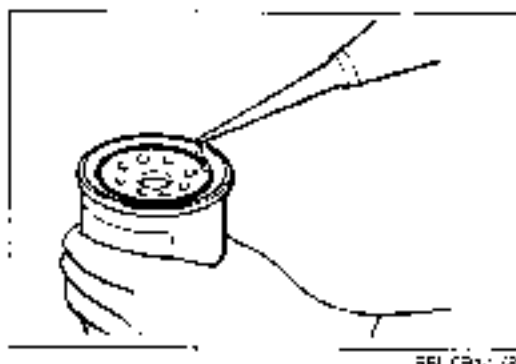
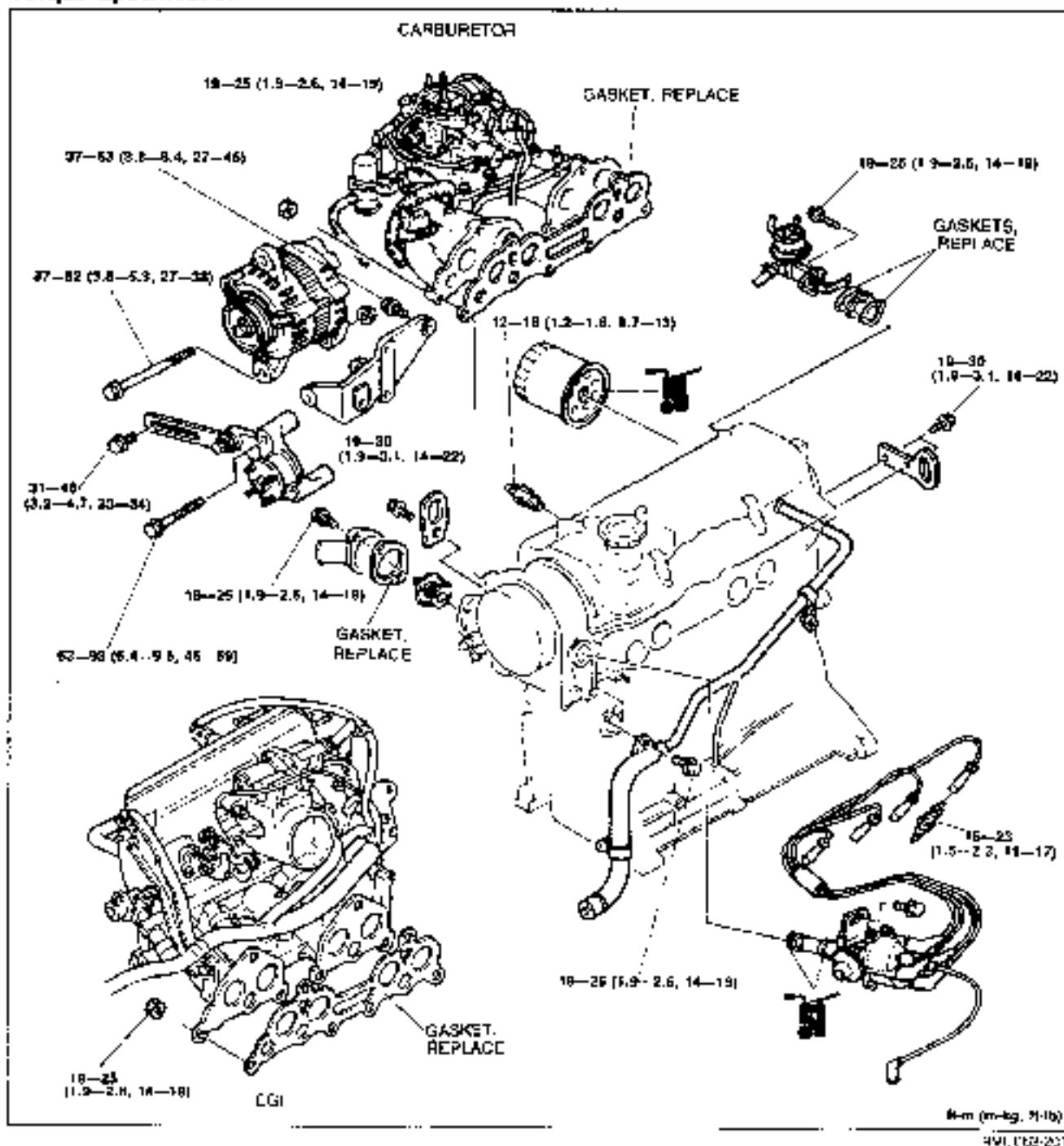
Install the crankshaft pulley.

Tightening torque:

12—17 N·m (1.25—1.75 m·kg, 9—13 ft·lb)

AUXILIARY PARTS

Torque Specification



Oil Pressure Switch

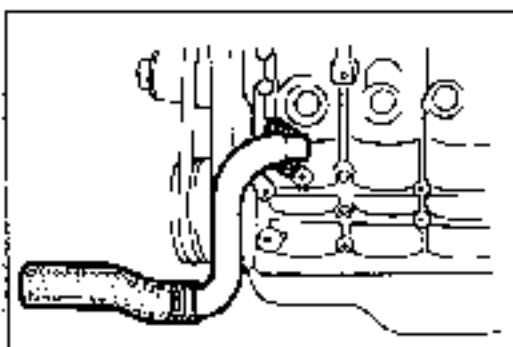
Install the oil pressure switch.

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.



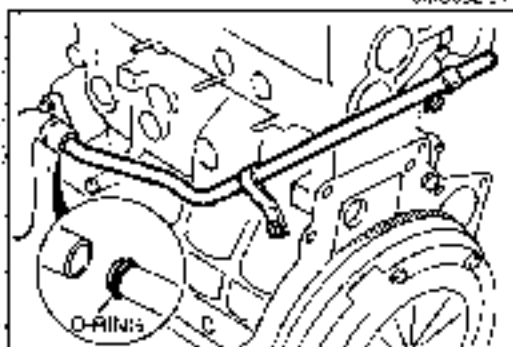
SMU052-2-1

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)



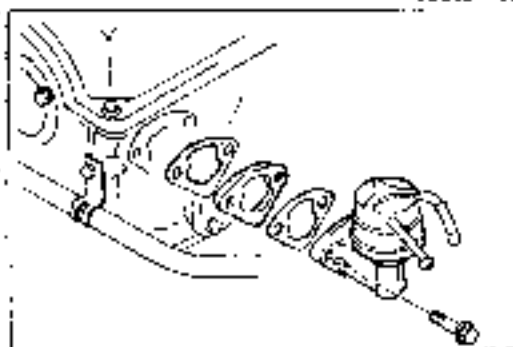
9B-J061-1-09

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)



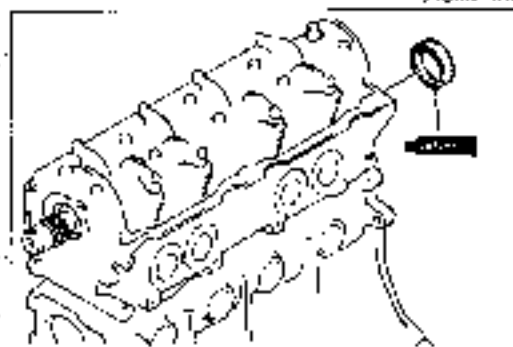
9B-J061-1-09

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:

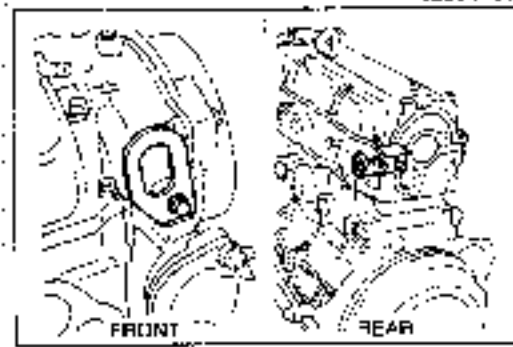
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



9B-J061-1-09

Seal Cap

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



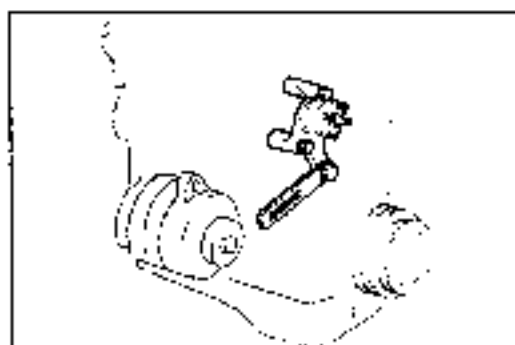
9B-J061-1-09

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)



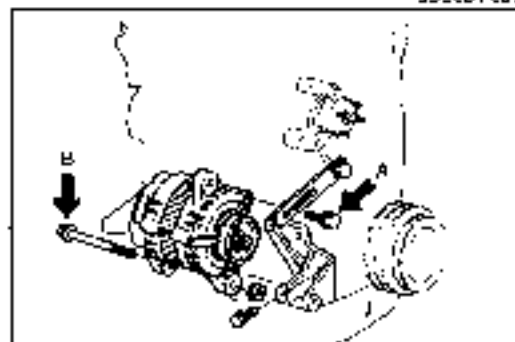
95LXC81-081

Cooling Fan Bracket

Install the cooling fan bracket.

Tightening torque:

83—93 N·m (8.4—9.5 m·kg, 46—69 ft·lb)



95LXC81-082

Alternator and Alternator Bracket

1. Install the alternator bracket.

Tightening torque:

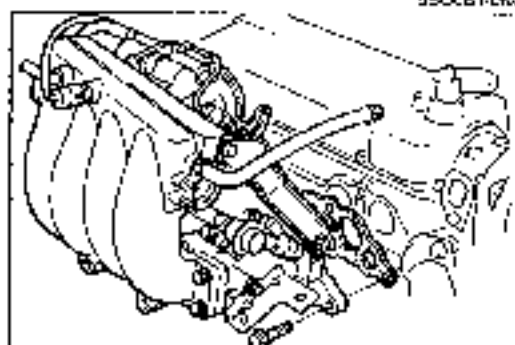
37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)

2. Install the alternator

Tightening torque:

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

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



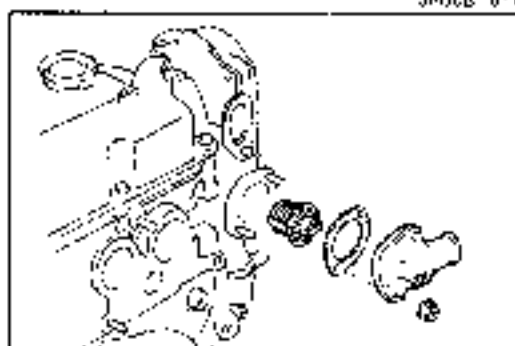
95LXC81-083

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 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



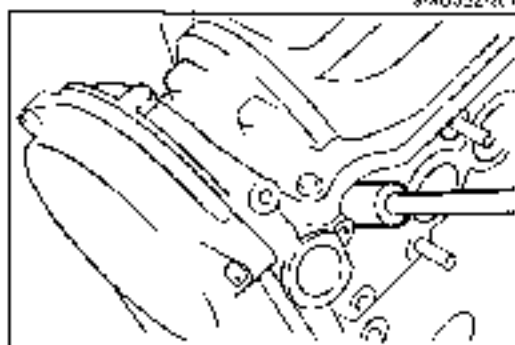
95LXC81-084

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)



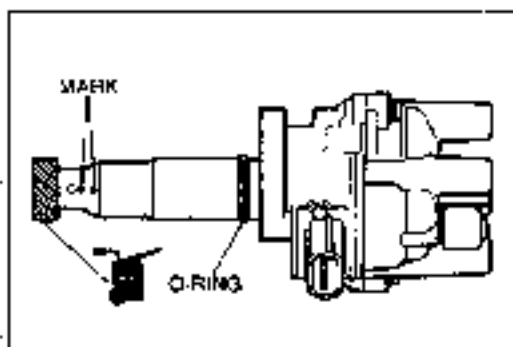
95LXC81-085

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 N·m (1.5—2.3 m·kg, 11—17 ft·lb)



DEUCE 141

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

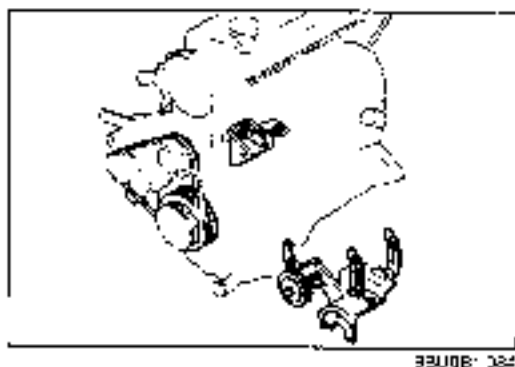
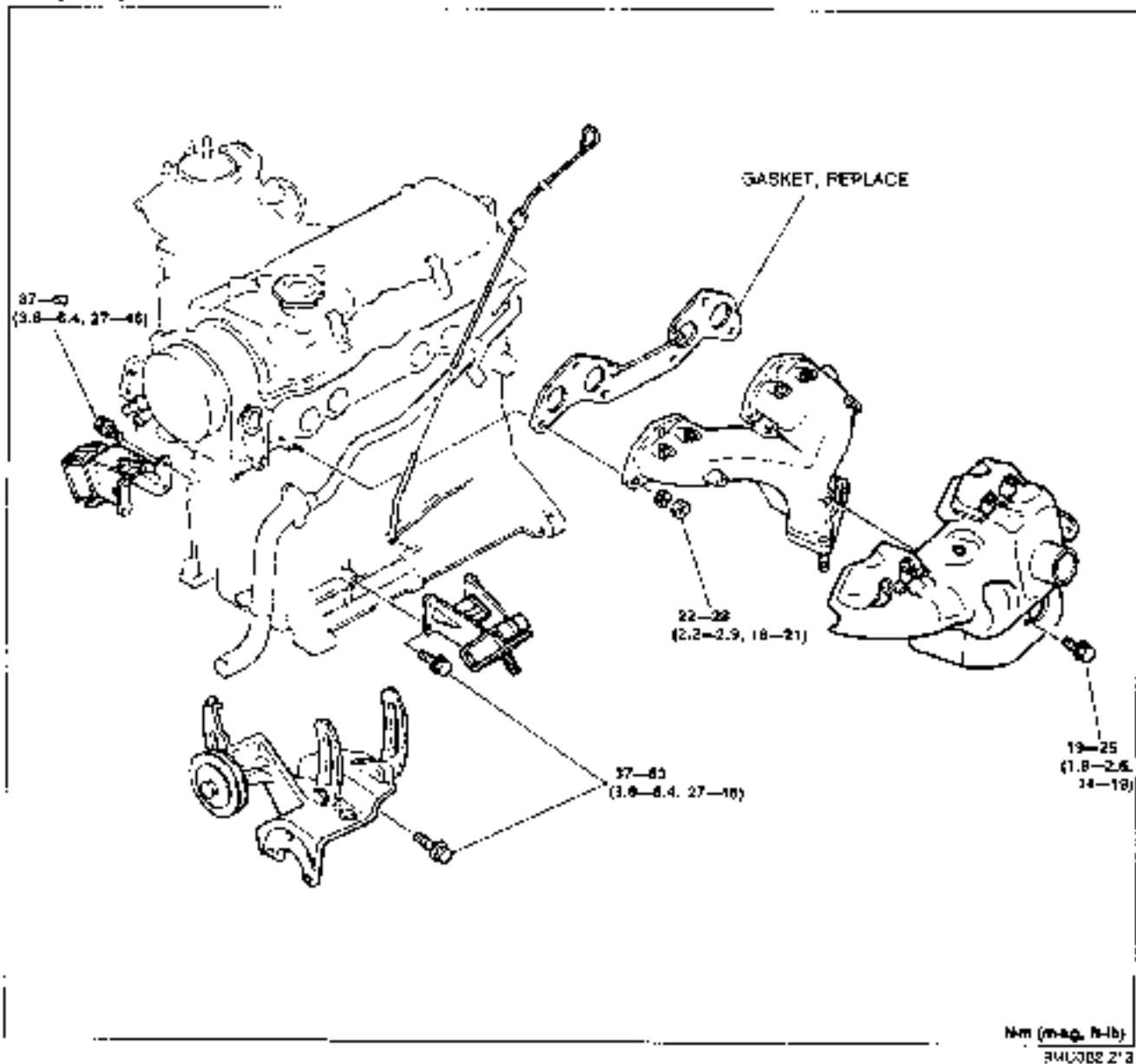
Install the high-tension leads.

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



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-kp, 27-46 ft-lb)



90U0321-036

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)



90U0321-036

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

9ST

19 WD23 505A

Adjust wrench



92100Be-773

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

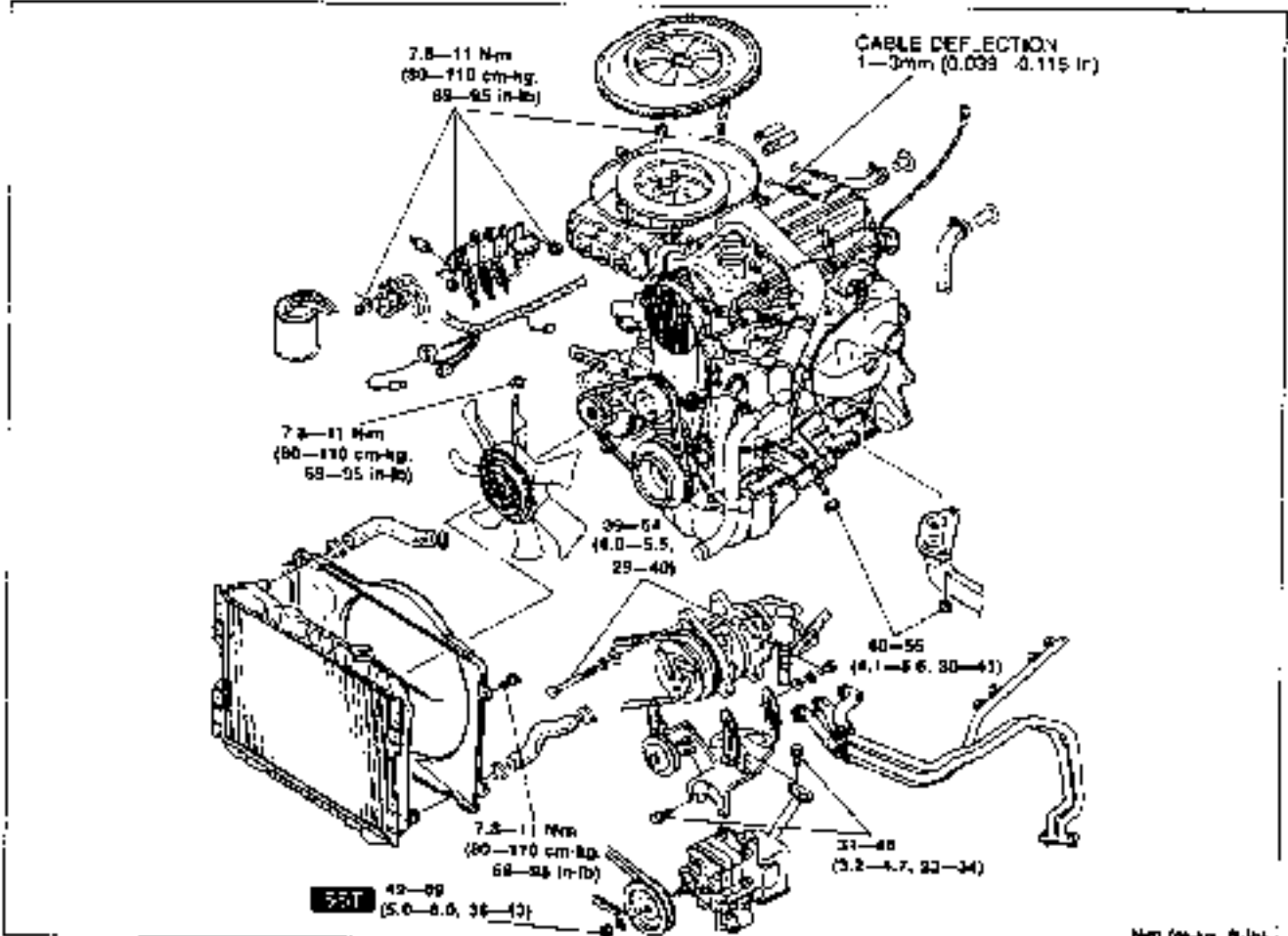
After radiator cowl installation, rotate the cooling fan by hand and verify that the fan blade does not touch the radiator cowl.

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.

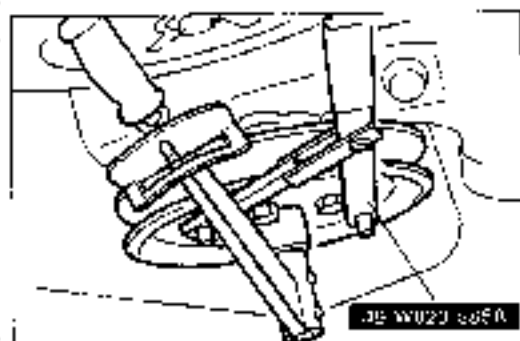
Torque Specifications



N·m (kg-cm, ft-lb)

800021 087

B1-69



95L0B1 093

Installation note

P/S Oil Pump

1. Install the P/S oil pump.

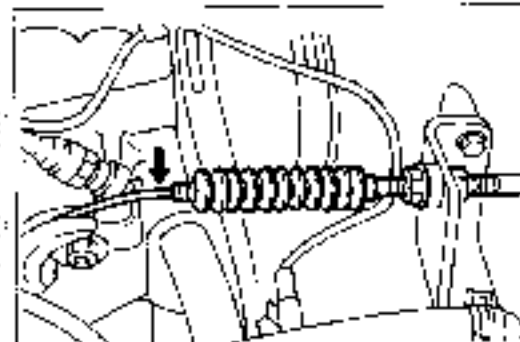
Tightening torque:

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)

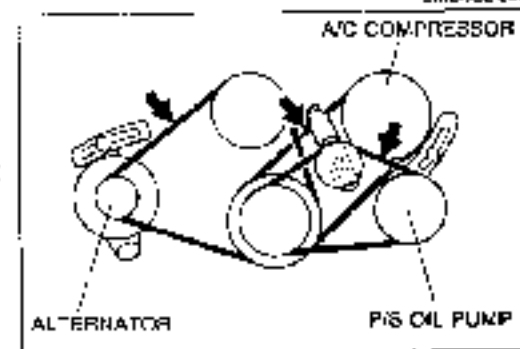


EM0002 049

Accelerator Cable

Install the accelerator cable.

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



95L0B1 099

Drive Belt

Install and adjust the drive belt deflection.
(Refer to page 51—5.)

Note

Alternator drive belt can be adjusted after cooling fan installation.

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

1. Install the manual transmission. (Refer to Section J.)
2. 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.

02U0B-015

ENGINE (B2600i)

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250332v1

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COMPRESSION
INSPECTION, PAGE B2-6
STANDARD: 1,265 kPa (12.8 kg/cm², 182 psi) 270 rpm
MINIMUM: 881 kPa (10.0 kg/cm², 142 psi) 280 rpm

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

INTAKE MANIFOLD
TIGHTENING TORQUE
19-25 (1.9-2.5, 14-19)

ENGINE COOLANT INSPECTION,
SERVICE, SECTION E

ENGINE OIL INSPECTION,
SERVICE, SECTION D

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 (0.28-0.29)	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)

(BU097415)

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

OUTLINE

SPECIFICATIONS

Item		Engine		G6
Type				Gasoline, 4-cycle
Cylinder arrangement and number				In-line, 4 cylinders
Combustion chamber				Femipod
Valve system				OHC, chain-driven
Displacement		cc (cu. in.)		2,606 (158.97)
Bore and stroke		mm (in.)		92.0 × 98.0 (3.62 × 3.90)
Compression ratio				8.4
Compression pressure		kg/cm ² (psi)-rpm		1,256 (12.8 / 82)-270
Valve timing	IN	Open	ATDC	10°
		Close	ABDC	50°
	EX	Open	BBDC	50°
		Close	ATDC	15°
Valve clearance		IN	mm (in.)	0; Maintenance free
		EX	mm (in.)	0; Maintenance free
Idle speed (Test connector grounded)		MIT		750 ± 20 (Neutral)
		AIT		770 ± 20 (P range)
Ignition timing (TEN terminal grounded)		BTDC		6° ± 1° at idle
Firing order				1-3-4-2

29U982-002

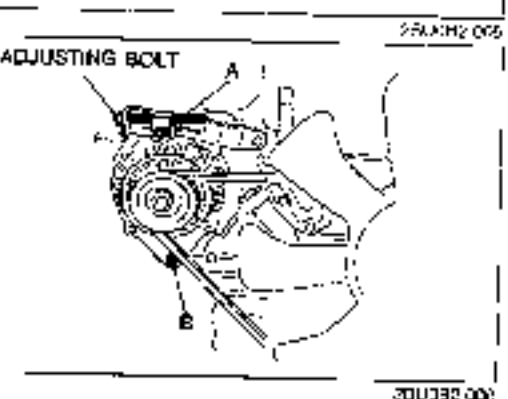
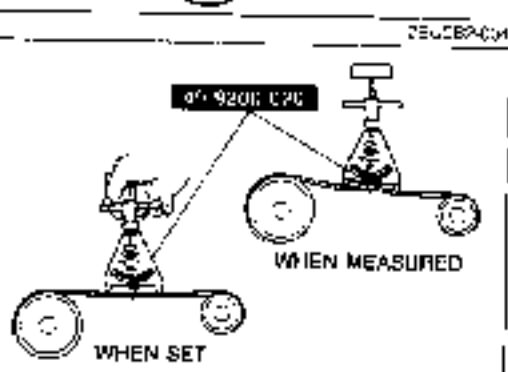
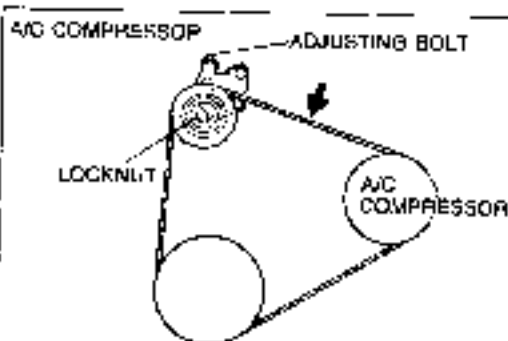
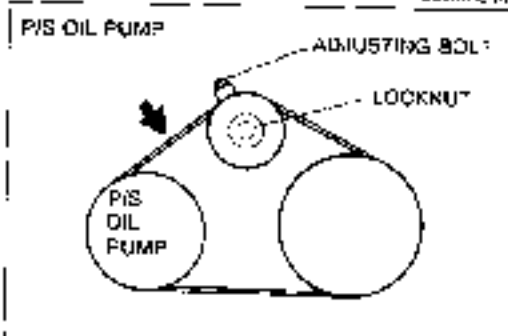
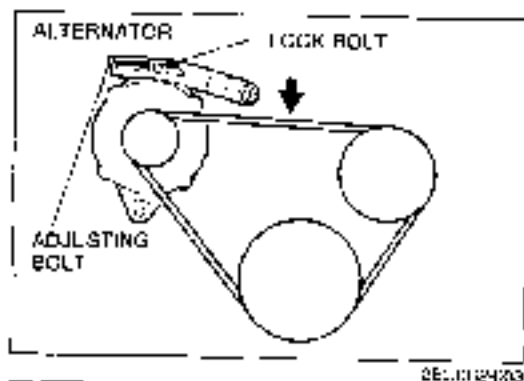
TROUBLESHOOTING GUIDE

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

Problem	Possible Cause	Remedy	Page
Insufficient power	Insufficient compression		
	Malfunction of H.A.	Replace	B2-45
	Compression leakage from valve seat	Repair	B2-42
	Seized valve stem	Replace	B2-40
	Weak or broken valve spring	Replace	B2-43
	Leaked cylinder head gasket	Replace	B2-39
	Cracked or distorted cylinder head	Replace	B2-47
	Scrapping, damaged, or worn piston ring	Replace	B2-47
	Cracked or worn piston	Replace	B2-47
	Malfunction of fuel system	Refer to Section F2	
Abnormal combustion	Others		
	Sticking clutch	Refer to Section V	
	Dragging brakes	Refer to Section P	
	Wrong size tires	Refer to Section Q	
	Malfunction of engine-related components		
	Malfunction of H.A.	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	-
	Malfunction of fuel system	Refer to Section F2	
Engine noise	Crankshaft or bearing related parts		
	Excessive main bearing oil clearance	Replace or repair	B2-56
	Main bearing seized or heat-damaged	Replace	B2-49
	Excessive crankshaft end play	Replace or repair	B2-56
	Excessive connecting rod bearing oil clearance	Replace or repair	B2-57
	Connecting rod bearing seized or heat-damaged	Replace	B2-48
	Balance shaft related parts		
	Improper balancer chain tension	Adjust	B2-63
	Excessive balance shaft bushing oil clearance	Replace	B2-50
	Balance shaft bushing seized or heat-damaged	Replace	B2-50
	Piston-related parts		
	Worn cylinder	Replace or repair	B2-45
	Worn piston or piston pin	Replace	B2-49
	Seized piston	Replace	B2-47
	Damaged piston ring	Replace	B2-47
	Bent connecting rod	Replace	B2-48
	Valves or timing-related parts		
	Malfunction of H.A.*	Replace	B2-45
	Broken valve spring	Replace	B2-40
	Excessive valve guide clearance	Replace	B2-41
	Malfunction of chain adjuster	Replace	B2-6
	Malfunction of cooling system	Refer to Section E	
	Malfunction of fuel system	Refer to Section F2	
	Others		
	Malfunction of water pump bearing	Refer to Section E	B2-5
	Improper drive-belt tension	Adjust	
	Malfunction of alternator bearing	Refer to Section G	
	Exhaust gas leakage	Refer to Section F2	

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



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.

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—0.29)	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 (50—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, 104.5—123.4)	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.

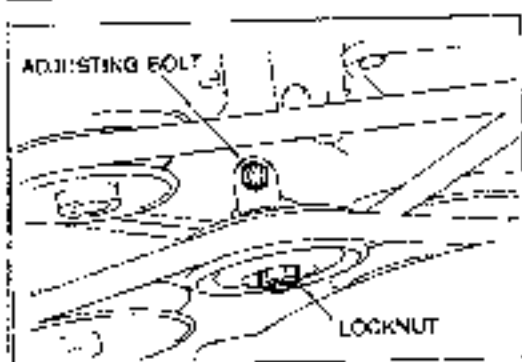
- (1) Alternator belt

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

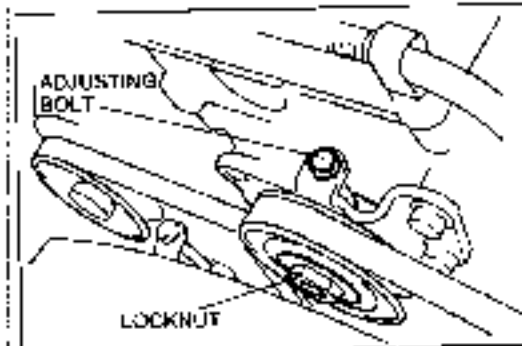
Tightening torque

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)



3M1002 (C)



3M1002 (C)

(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.

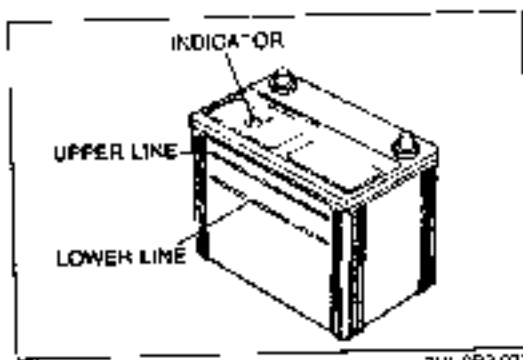
Tightening torque:

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/S is normal. If not, replace HLA.
2. Noise when engine is started after sitting approx. one day.	Oil leakage or HLA	* 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.	Insufficient oil pressure	Check oil pressure (Refer to Section D.) If lower than specification, check for cause.
4. Noise when engine is started after new HLA is installed.	Faulty HLA	Oil pressure: 304—402 kPa (3.1—4.1 kg/cm ² , 44—58 psi) 3000 rpm (Refer to page B2-69)
5. Noise continues more than 10 minutes.		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 0.001 (0.01), replace HLA.
6. Noise occurs during idle after high-speed running.	Incorrect oil amount	Check oil level. Drain or add oil as necessary.
	Deteriorated oil	Check oil quality. If deteriorated, replace with specified type and amount of oil.

28UC93-007



3W10R2-003

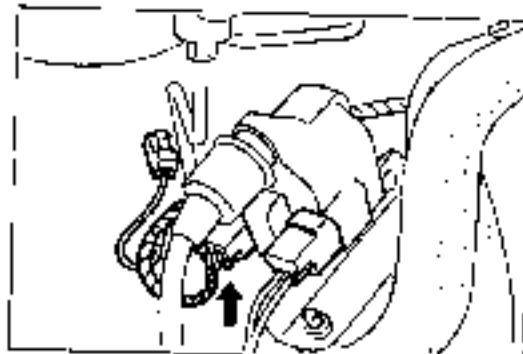
COMPRESSION

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

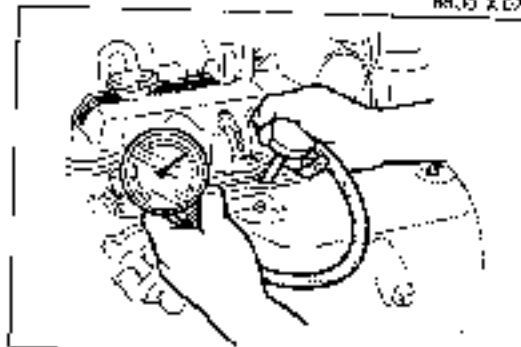
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Section F2)

INSPECTION

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



RM-10-2-CA*



TS-0032-01-8

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.

62

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 (12.6 kg/cm², 182 psi)-270 rpm

Minimum:

981 kPa (10.0 kg/cm², 142 psi)-280 rpm

Possible Cause

If compression is low, pour heavy oil into the cylinder and turn the crankshaft several times. Check compression once more.

Is compression increased?

YES

1. Worn piston or piston rings
2. Worn cylinder wall

NO

Is compression in adjacent cylinder low?

YES

1. Defective cylinder head gasket
2. Distorted cylinder head

NO

1. Improper valve seating
2. Valve sticking in guide
3. Defective cylinder head gasket

50LG18-002

ON-VEHICLE MAINTENANCE

TIMING CHAIN

Preparation

SST

49-5120-710

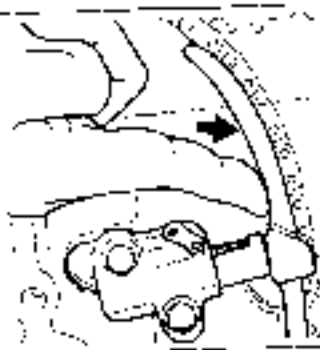
Halter coupling
flange

SMU00P4-15

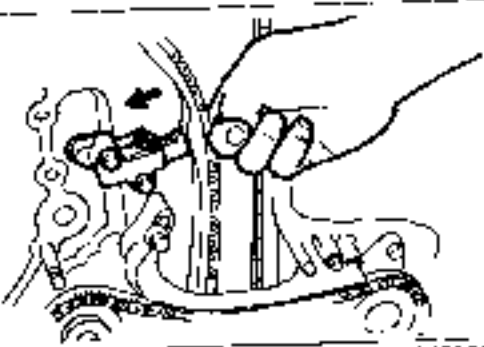


13 NOTCHES

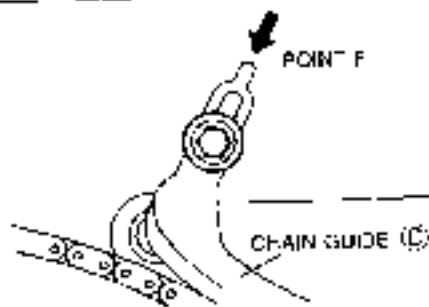
SMU022-16



SMU01P2-17



SMU02P18



POINT F

CHAIN GUIDE (C)

SMU00P4-19

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 pulley and timing gear. Inspect and replace if necessary.
3. Push the chain adjuster sleeve in the direction of the arrow. If it moves back, the ratchet will be faulty. Replace the chain adjuster.

Balancer chain

Note

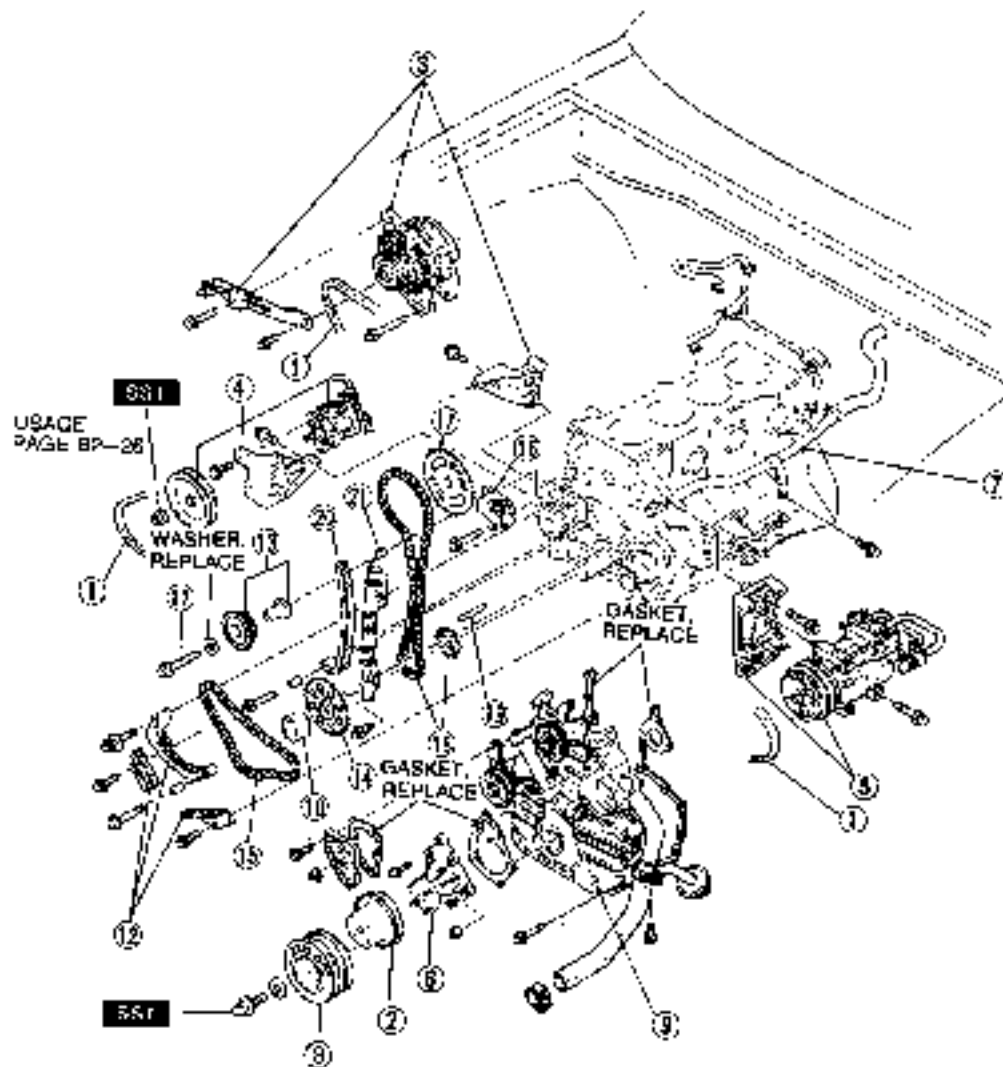
Balancer chain must be replaced if chain guide (C) bottoms at point F when adjusting.

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 cowl 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**.

131092-002

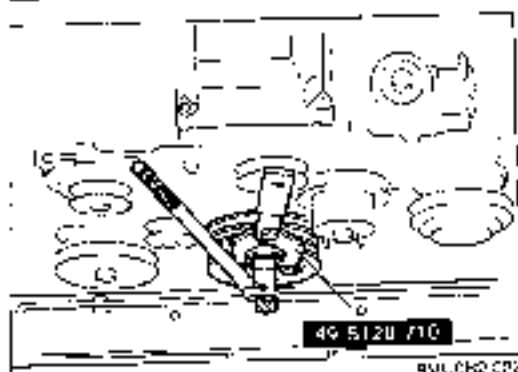
B2



1. Drive belts
2. Water pump pulley
3. Alternator and bracket
4. P/S oil pump and bracket
5. A/C compressor end bracket
6. Water pump
7. Coolant bypass pipe
8. Crankshaft pulley
9. Chain cover
10. Spacer
11. Idler sprocket assembly lock bolt

12. Chain guides
13. Idler sprocket assembly
14. Crankshaft sprocket
15. Balancer chain
16. Chain adjuster
17. Camshaft pulley
18. Timing chain and timing gear
19. Key
20. Chain lever
21. Chain guide

94LCB2-001



Removal note Crankshaft pulley

Crankshaft pulley
Remove the crankshaft pulley with the SST

Inspection

Inspection
Inspection of timing chain related parts. (Refer to page 32-51.)

Inspection of balancer chain related parts. (Refer to page 52-51.)

Installation

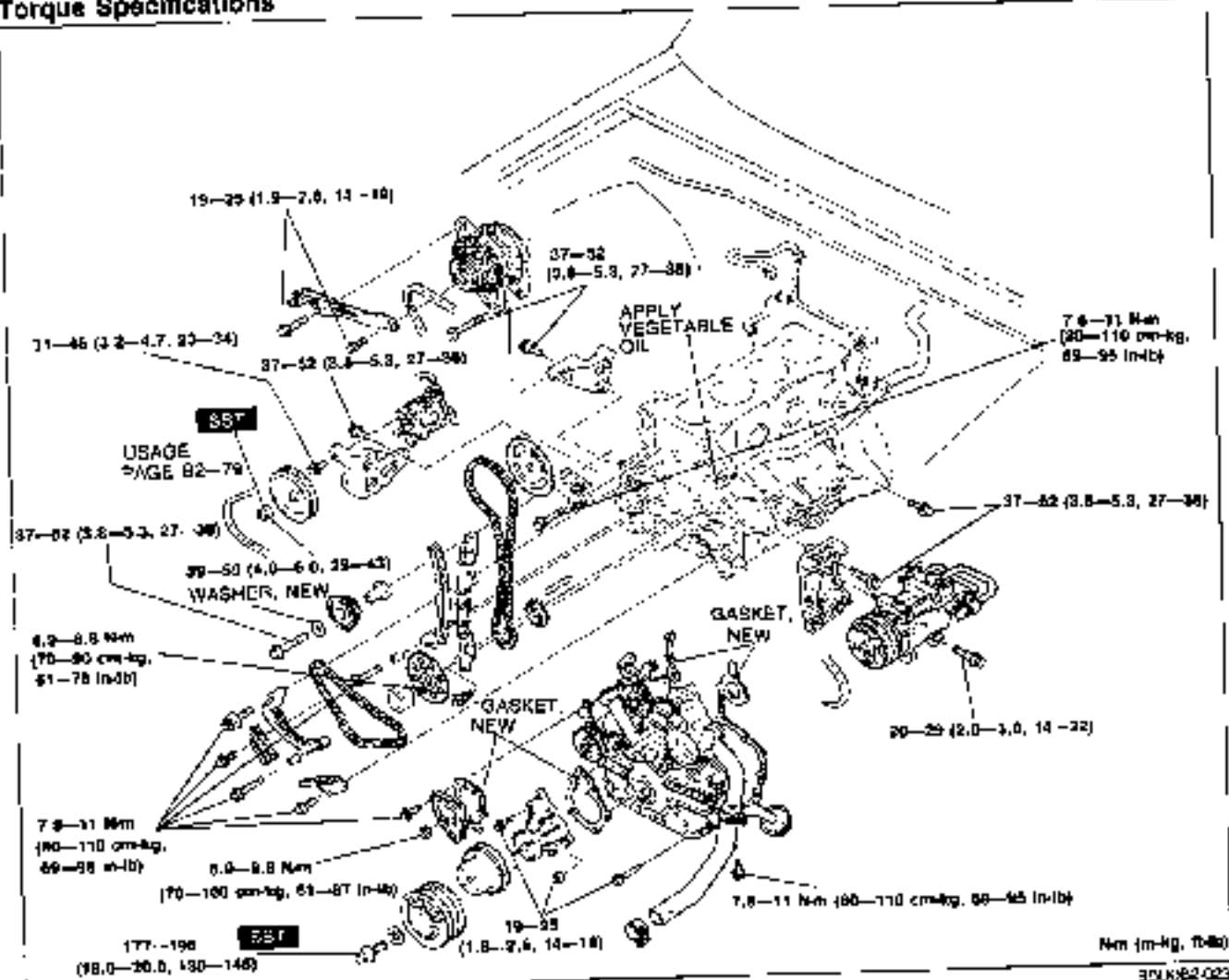
Installation
Install in the reverse order of removal referring to the **Installation note**

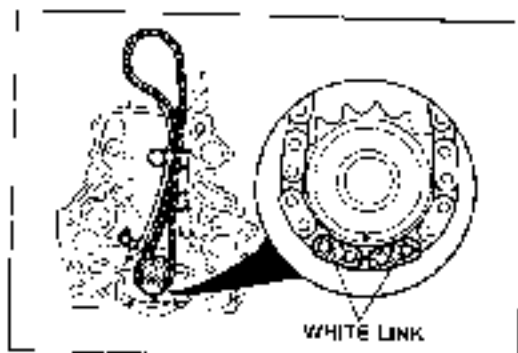
Note

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

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

Torque Specifications

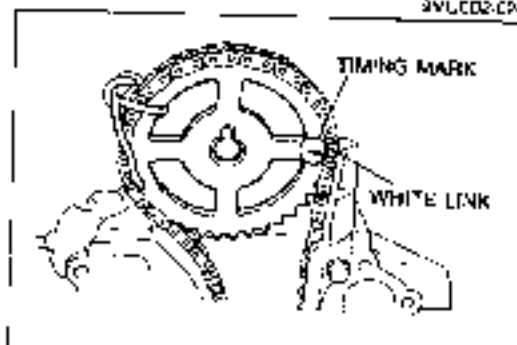




9VUCD2-CP4

Installation note**Timing chain**

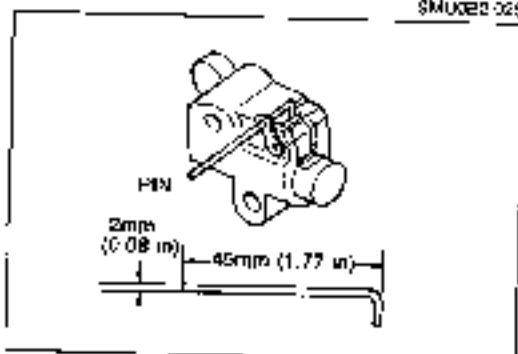
1. Install the key onto the crankshaft.
2. Install the timing chain and the timing gear as shown.



9MUCB2-025

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.



9MUCB2-026

Chain adjuster

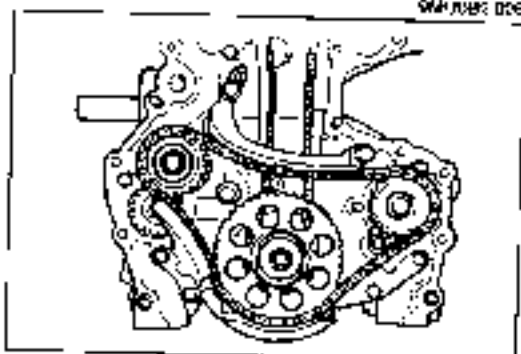
1. Insert the pin into the lever hole to hold the sleeves.
2. Install it onto the cylinder block.

Tightening torque:

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)

Note

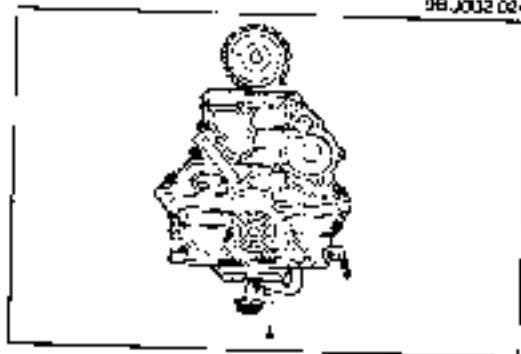
Do not forget to remove the retaining pin before installing the service cover.



9B-J002-024

Balancer chain related parts

(Refer to page B2-60.)



9MUCB2-CP5

Chain cover

1. Install the chain cover with new gaskets.

Tightening torque:

19—25 Nm (1.9—2.5 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)



9VU082 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)



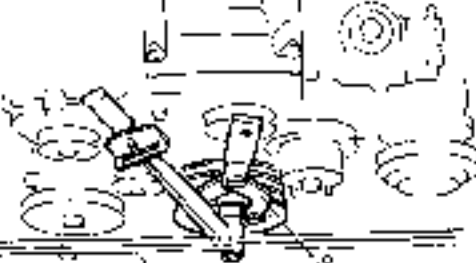
9VU082 039

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

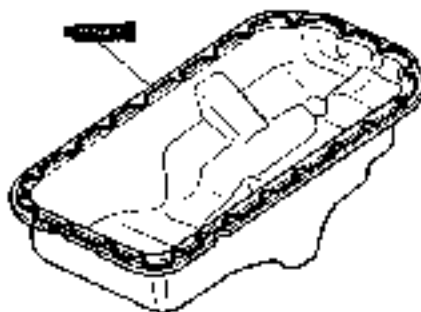
9VU082 041

Crankshaft pulley

Install the crankshaft pulley with the SST.

Tightening torque:

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



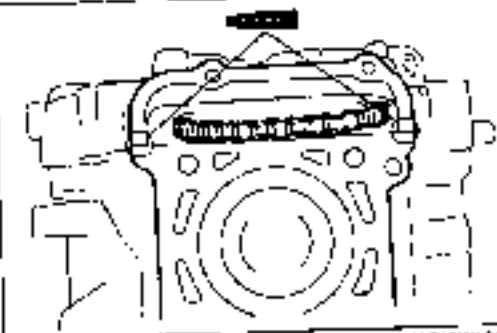
9VU082 042

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:

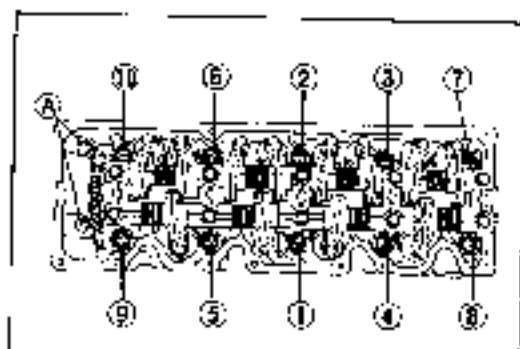
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)



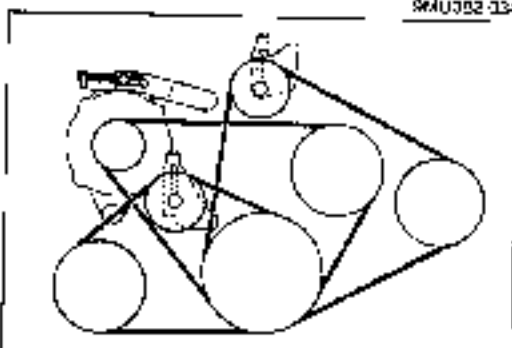
9VU082 043

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.



96AU352-134



96U062-026

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: ④.

Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

Steps After Installation

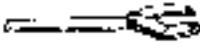
1. Install the radiator cowling and cooling fan. (Refer to Section E.)
2. Adjust the drive belt tension. (Refer to page B2-5.)
3. Add engine oil and coolant to the specified levels.
4. Connect the negative battery cable.
5. Start the engine and do the following:
 - (1) Check for leakage of engine oil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

CYLINDER HEAD GASKET

Preparation

SST

49 3120 /10

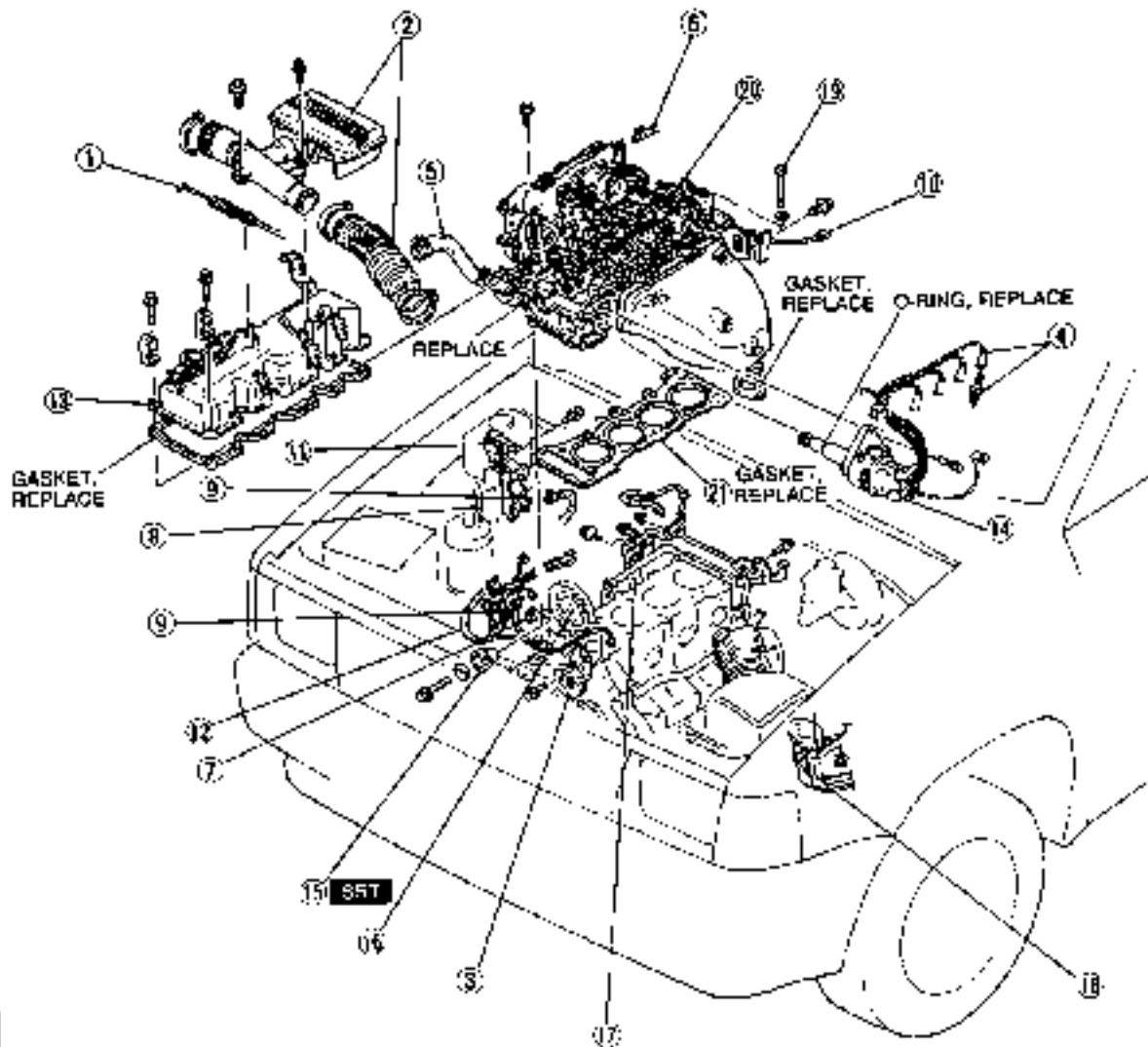
-holder, coupling
flange

980019-046

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**.

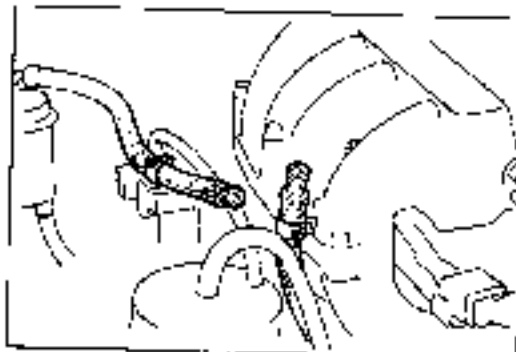


1411322-003

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

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

9M-A002-032

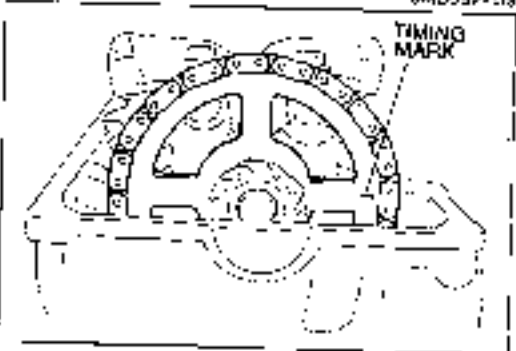


Removal note Fuel hose

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.

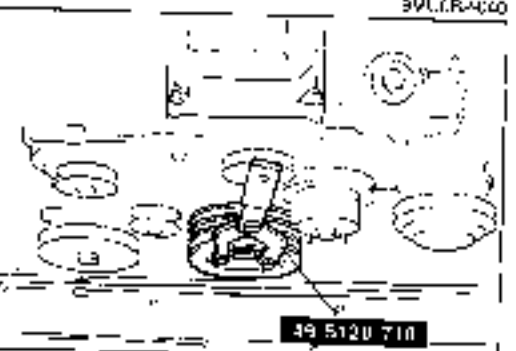


Distributor

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.

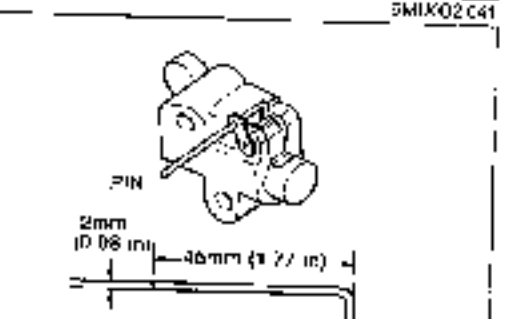
Caution

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.



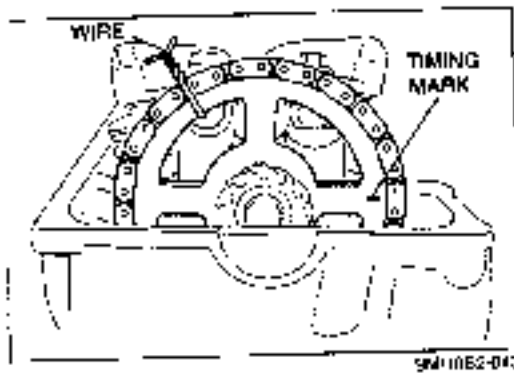
Camshaft pulley

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

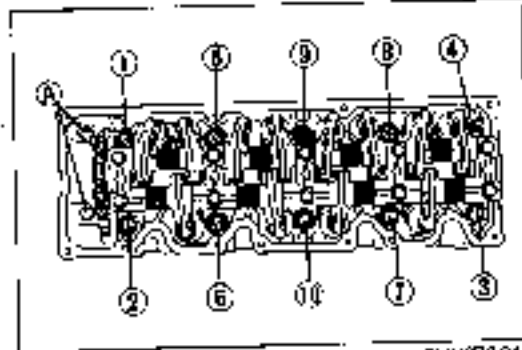
Be especially careful that the pin does not fall.

5M-A002-045



9N110B2-043

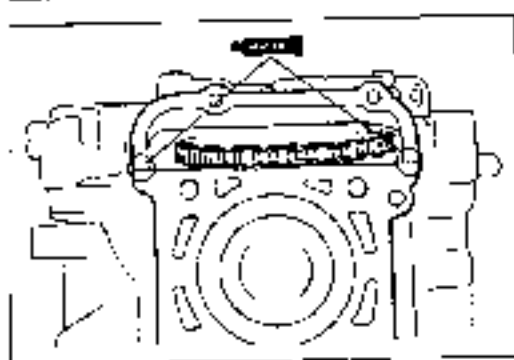
3. Secure the camshaft pulley and the chain with a wire as shown.
4. Remove the camshaft pulley off the camshaft dowel pin.



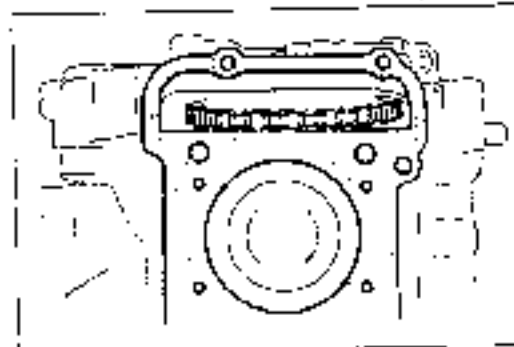
EMU092-044

Cylinder head bolt

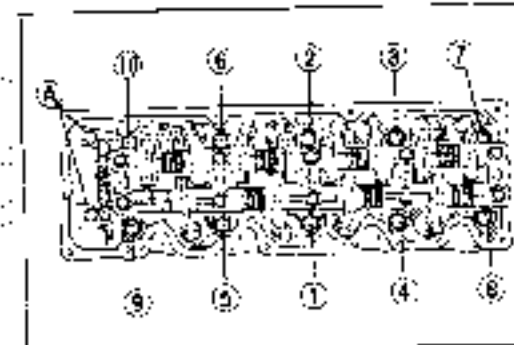
1. Remove the bolts (A).
2. Loosen the remaining cylinder head bolts in two or three steps in the order shown in the figure.



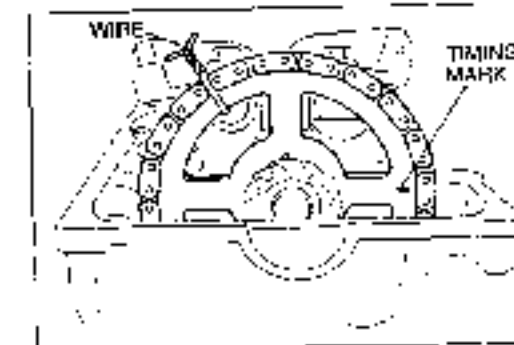
9MUK62 C47



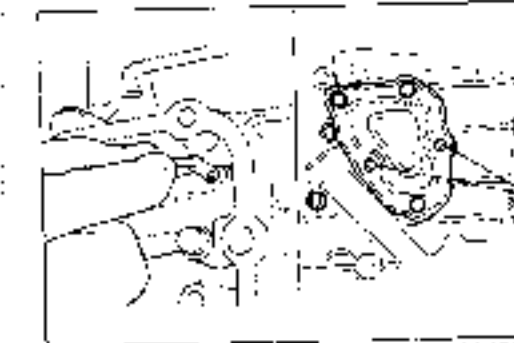
9MUK09 C47



9MUK02 C48



9MUK05 C48



9MUK08 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 N·m (8.2—8.8 m·kg, 59—64 ft·lb)

4. Tighten the remaining small cylinder head bolts ④.

Tightening torque:

16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

Camshaft pulley

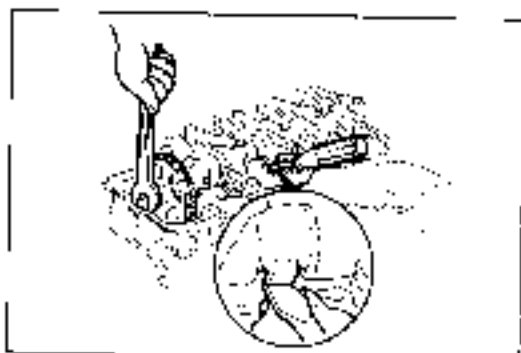
1. Install the camshaft pulley onto the camshaft dowel pin.
2. Remove the wire securing the camshaft pulley and the chain.

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

Tightening torque

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

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



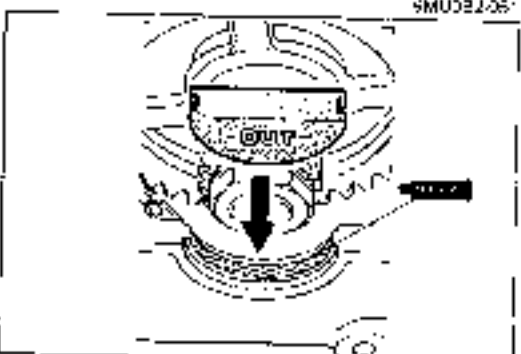
9MUCB2-06

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.

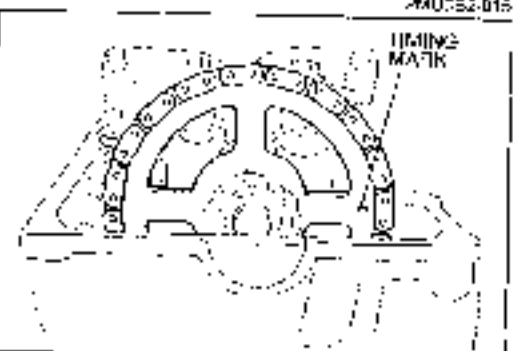
Tightening torque:

49—61 Nm (5.0—6.2 m·kg, 36—45 ft·lb)



9MUCB2-015

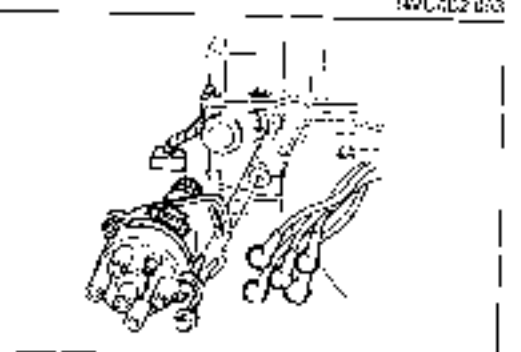
4. Apply sealant to the shaded area as shown, and install the new seal cover.



9MUCB2-003

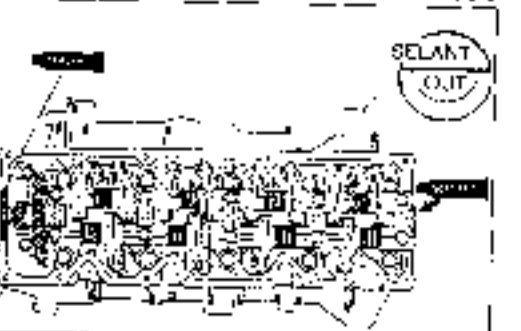
Distributor

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.



9MUCB2-015

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.



9MUCB2-017

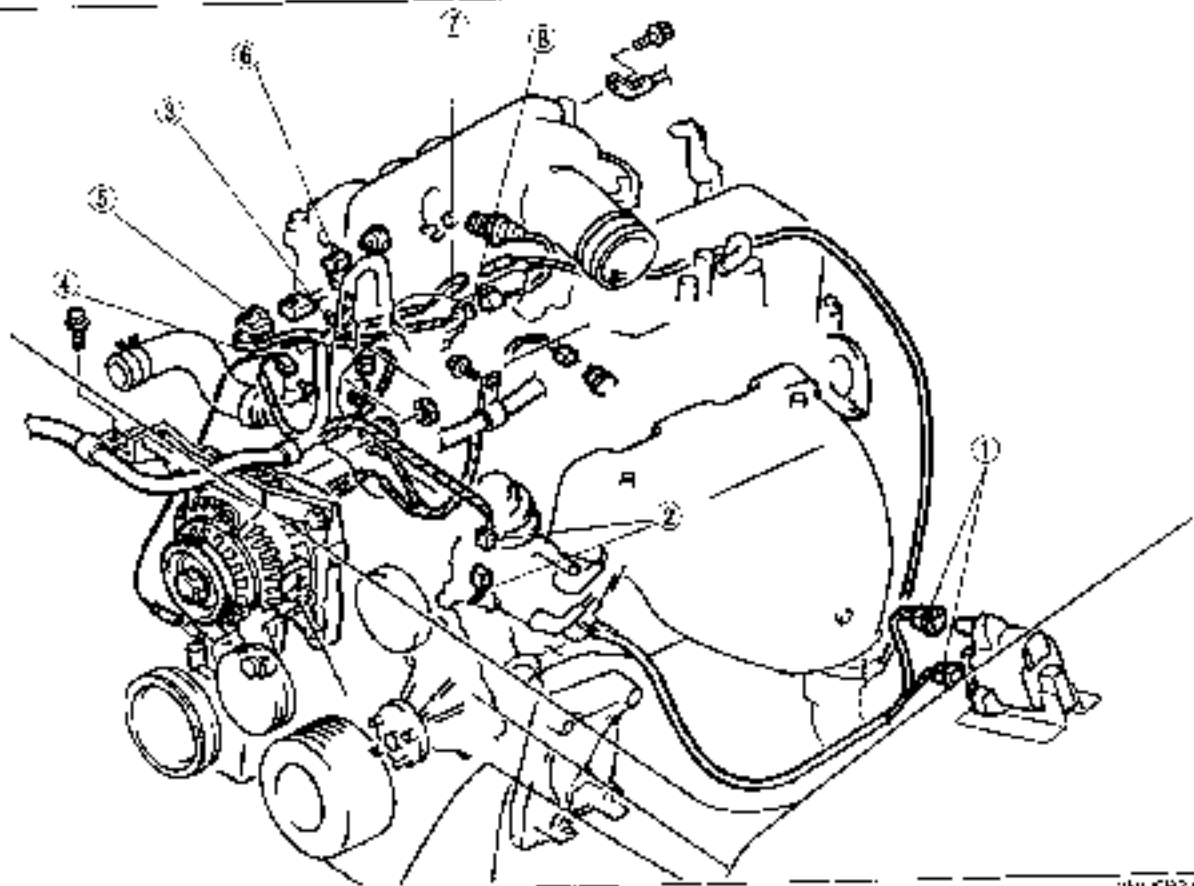
Cylinder head cover

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

Tightening torque:

5.9—8.8 Nm (60—90 cm·kg, 52—78 in·lb)

Emission harness connectors



91U07B2 CGO

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

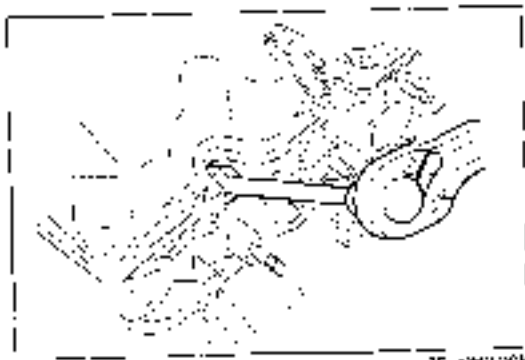
5. Injector harness
6. Intake air thermostat
7. Oxygen sensor
8. Idle switch

Spark plug

Install the spark plugs

Tightening torque:

15—23 Nm (1.5—2.3 m·kg, 11—17 ft·lb)



75-0082 CGO

Steps After Installation

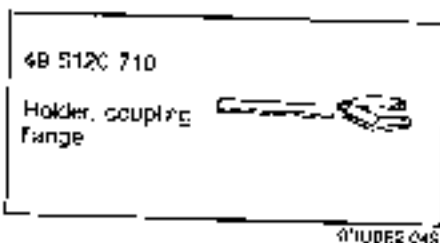
1. Add engine coolant to the specified levels.
2. Connect the negative battery cable.
3. Start the engine and do the following:
 - (1) Check for leakage of engine coolant.
 - (2) Perform engine adjustments if necessary.
 - (3) Recheck the oil and coolant levels.

28J012/03

FRONT OIL SEAL

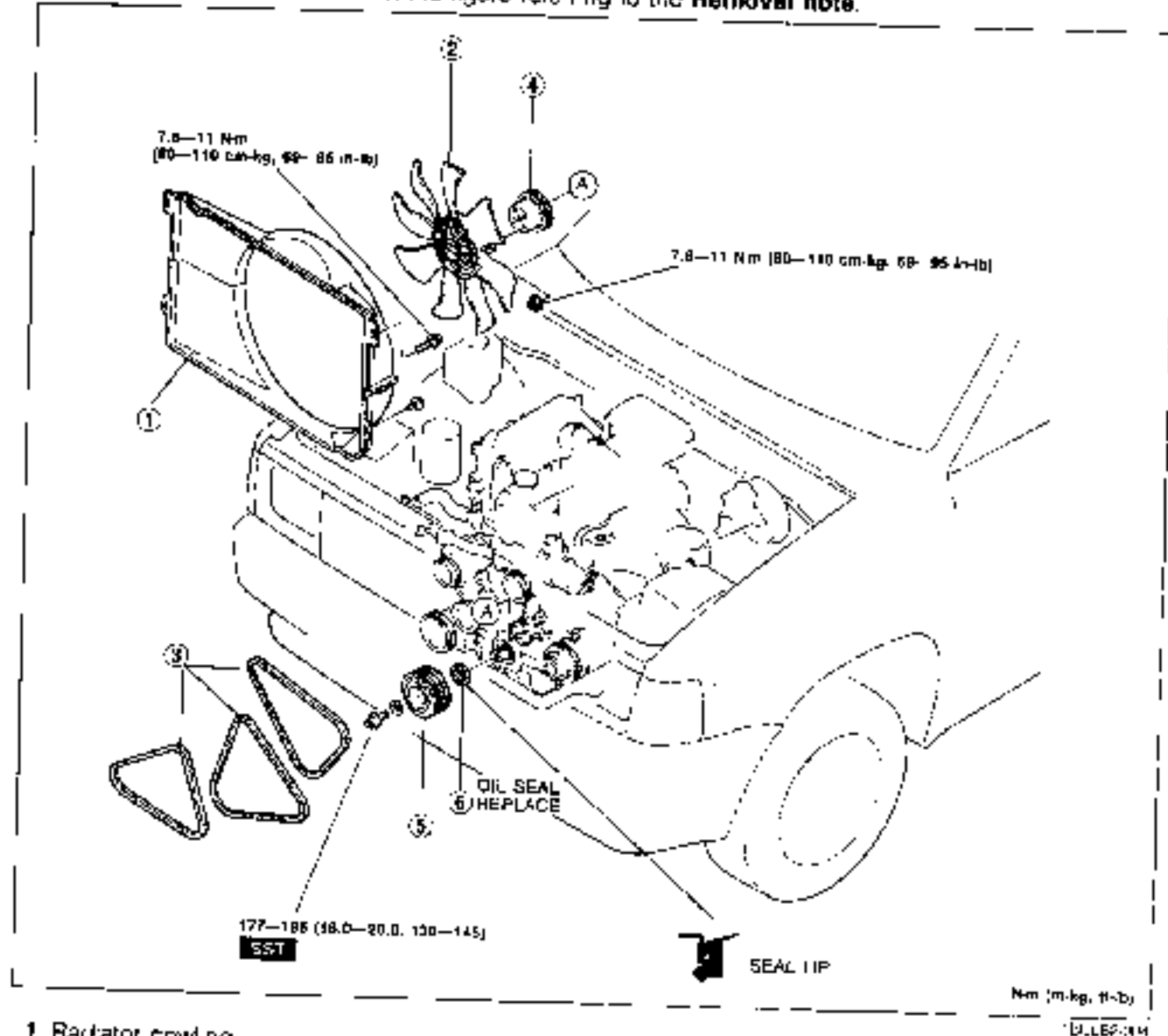
Preparation

SST



Removal

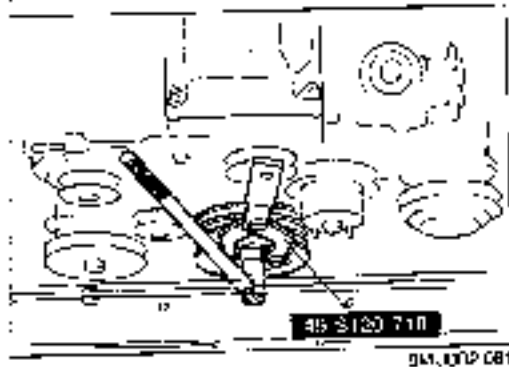
1. Disconnect the negative battery cable
2. Drain the engine oil
3. Remove in the order shown in the figure referring to the **Removal note**.



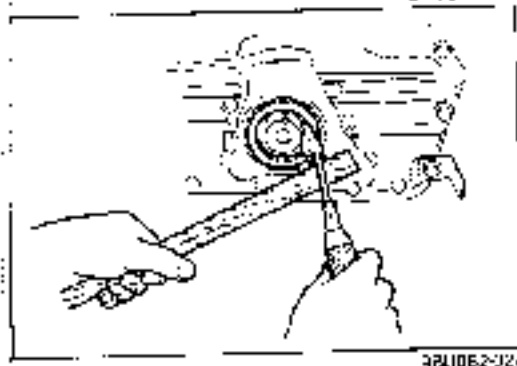
1. Radiator cowl
2. Cooling fan
3. Drive belts

Adjustment..... page B2-5

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

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

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

Note

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

Installation note**Front oil seal**

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

Oil seal outer diameter: 50mm (2.36 in)

Caution

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

Crankshaft pulley

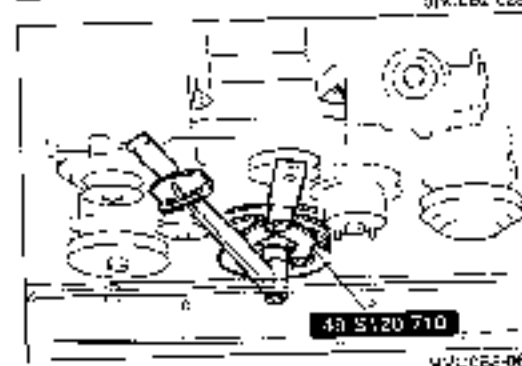
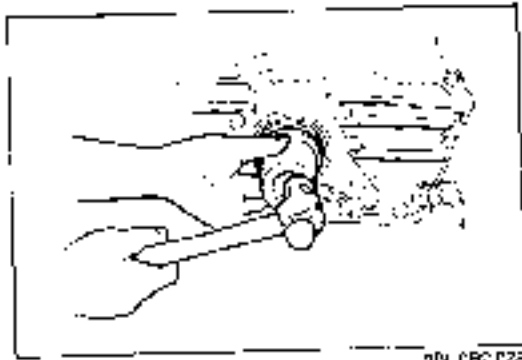
Install the crankshaft pulley with the SST.

Tightening torque:

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

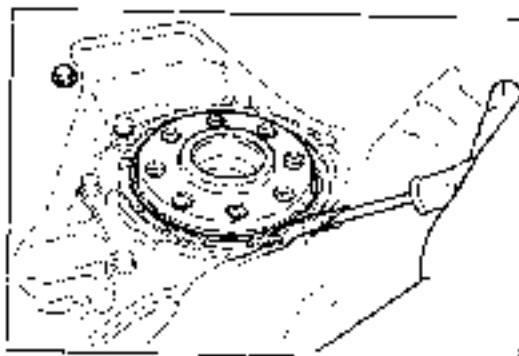
Steps After Installation

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

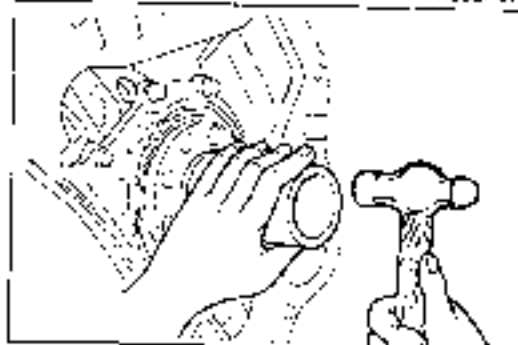


REAR OIL SEAL Preparation SST

49 E011 1A0 Ring gear brake scr. 	49 E011 105 Stopper (Part of 49 E011 1A0) 	49 E011 103 Shaft (Part of 49 E011 1A0) 
49 E011 104 Collar (Part of 49 E011 1A0) 	49 SE01 310A Clutch disc centering tool 	29.0302 000



29.0302 000



29.0302 000

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

LIST

1/4" WD23 585A

Adjust wrench

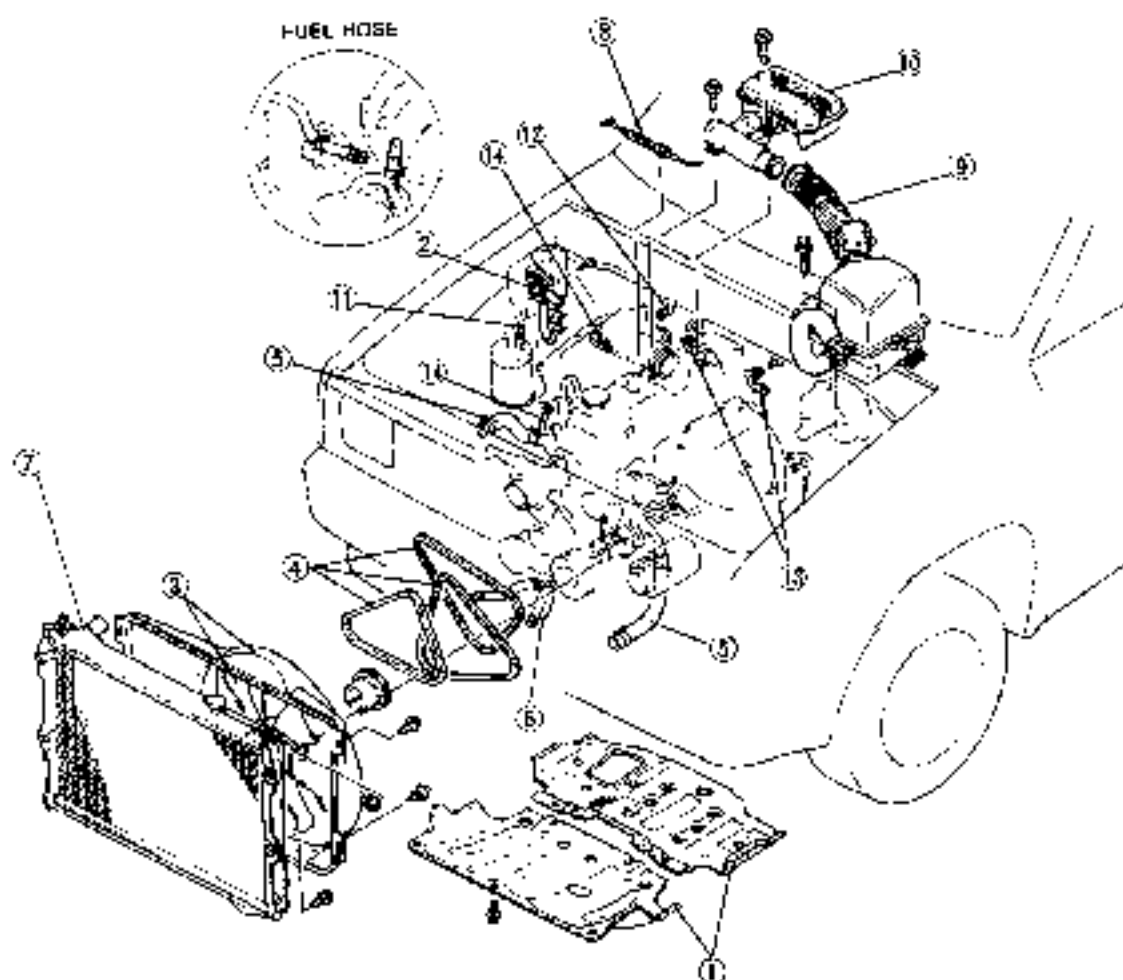


18J0122-000

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

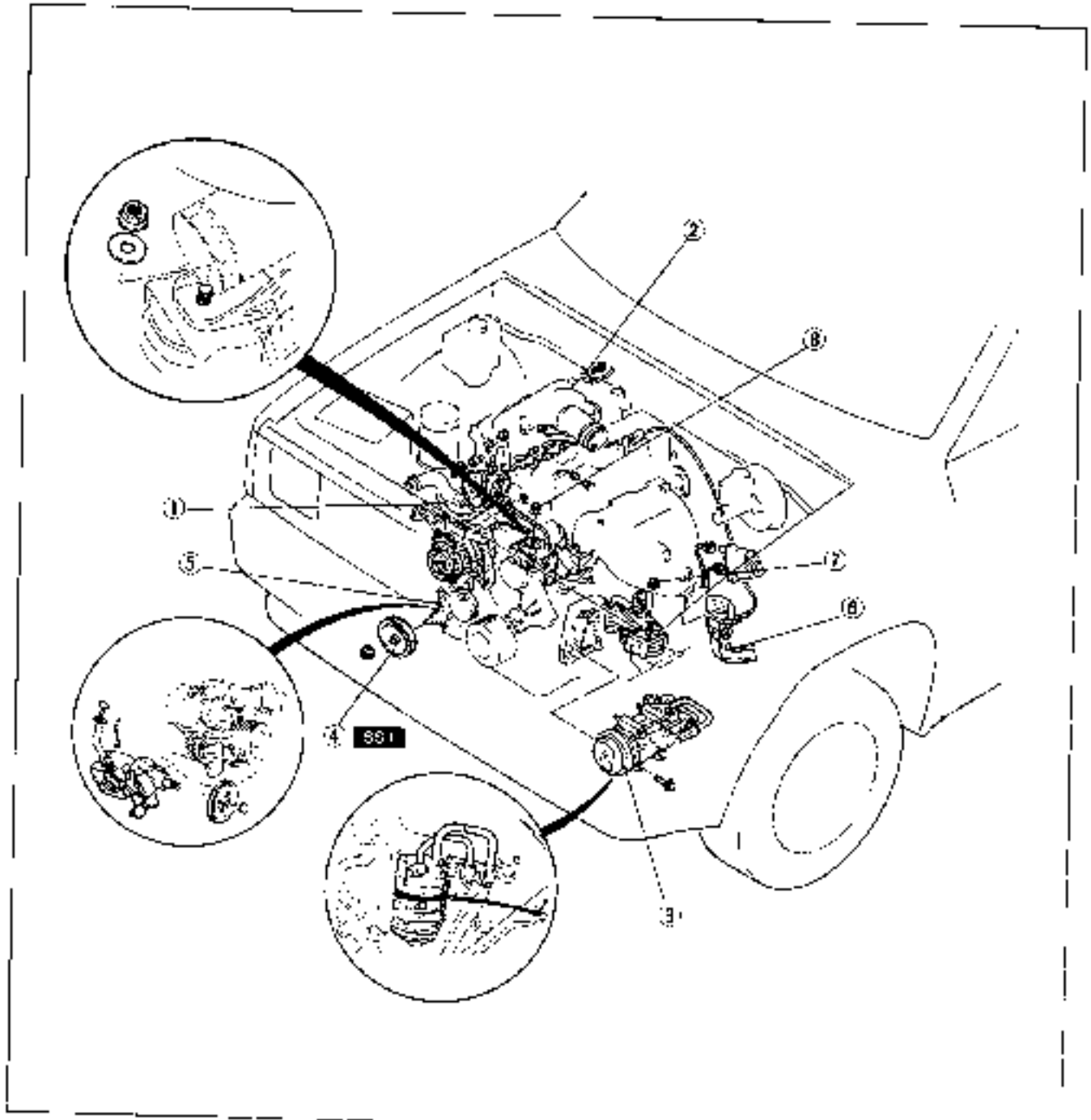


18J0122-000

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

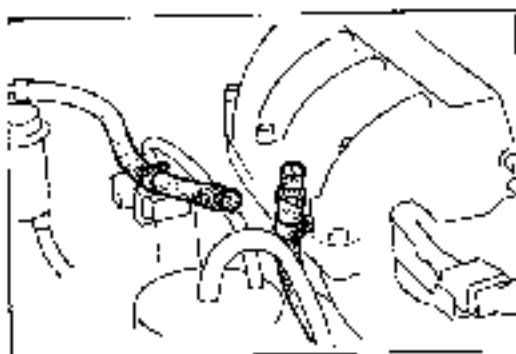
STEP 2

08J002 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

08J002 C02

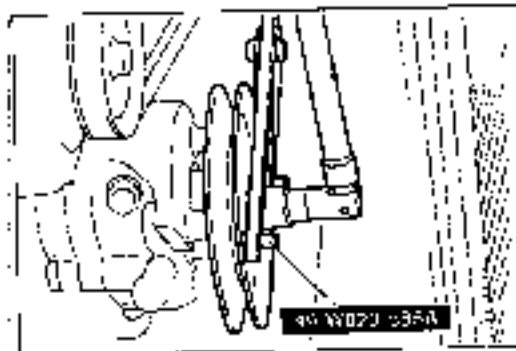


Removal note Fuel hose

Warning

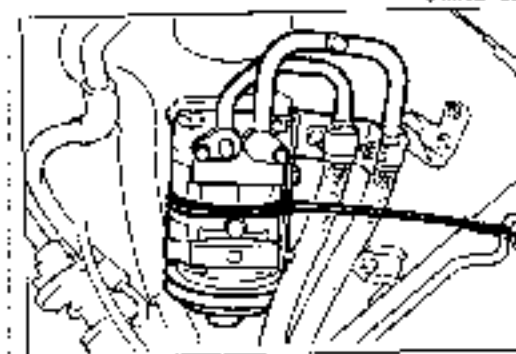
- Cover the hose with a rag because fuel will spray out when disconnecting.
- Keep sparks and open flame away from the fuel area.

Plug the disconnected hoses to avoid fuel leakage.



P/S oil pump pulley

Remove the P/S oil pump pulley with the SST

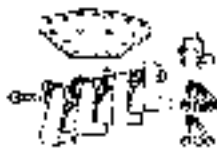
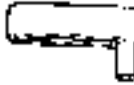


P/S oil pump, A/C compressor

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

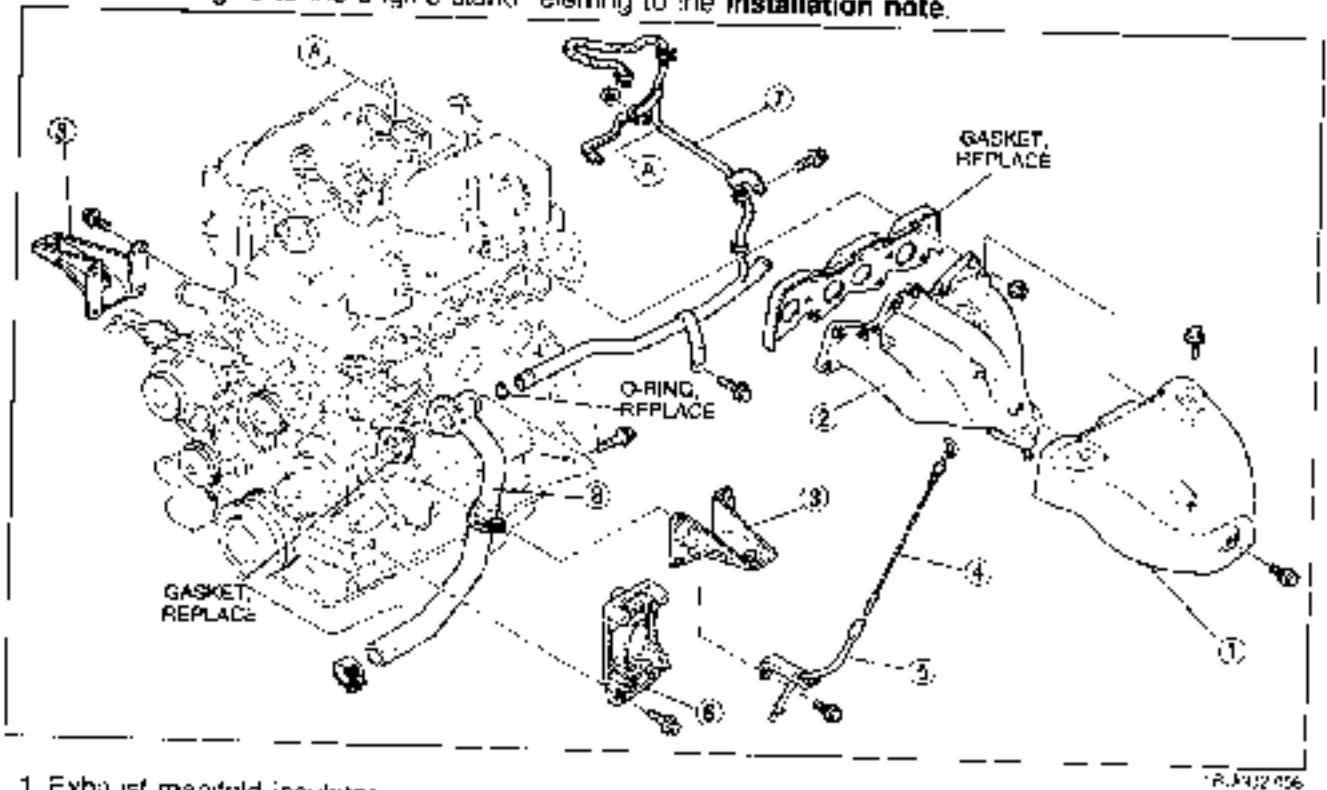
ENGINE STAND INSTALLATION

PREPARATION
SST

49 0107 090A Engine stand 	49 LD10 1A0 Hanger engine stand 	49 LD10 101 Plate (Part of 49 LD10 1A0) 
49 LD10 102 Arms (Part of 49 LD10 1A0) 	49 LD10 103 Hooks (Part of 49 LD10 1A0) 	49 LD10 104 Nuts (Part of 49 LD10 1A0) 
49 LD10 105 Bolts (Part of 49 LD10 1A0)  CATERPILLAR 49 0107 090A	49 LD10 106 Bolts (Part of 49 LD10 1A0) 	

INSTALLATION

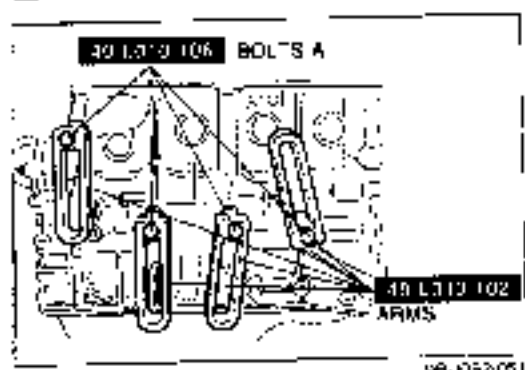
1. Remove the parts in the order shown in the figure
2. Install the engine to the engine stand referring to the **Installation note**.



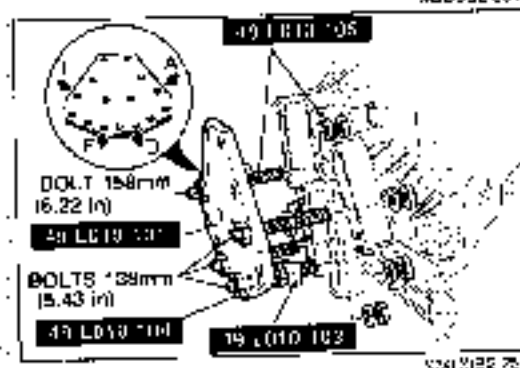
1. Exhaust manifold insulator
2. Exhaust manifold
3. Engine mount
4. Oil level gauge

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

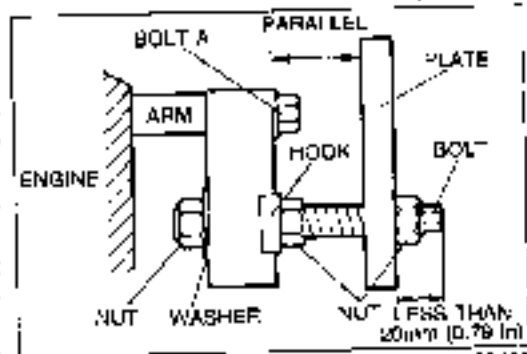
R.1412 056



98J052 051



98J052 052



98J052 053



98J052 054

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

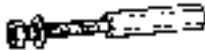
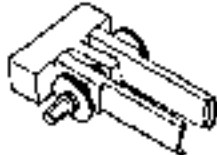
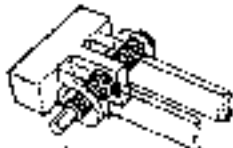
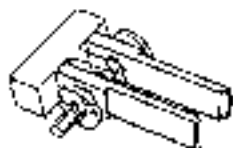
Use special caution while turning the engine stand handle to prevent hand injury.

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

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

DISASSEMBLY

PREPARATION
SST

49 E011 1A0 Ring gear brake set 	49 E011 1C0 Stopper (Part of 49 E011 1A0) 	49 F011 1D3 Shaft (Part of 49 E011 1A0) 
49 E011 1B2 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 B012 0A2) 	49 B012 013 Foot (Part of 49 B012 0A2) 	49 B012 014 Lock nut (Part of 49 B012 0A2) 
49 1285 071 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) 

JBL/CB7-011

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.

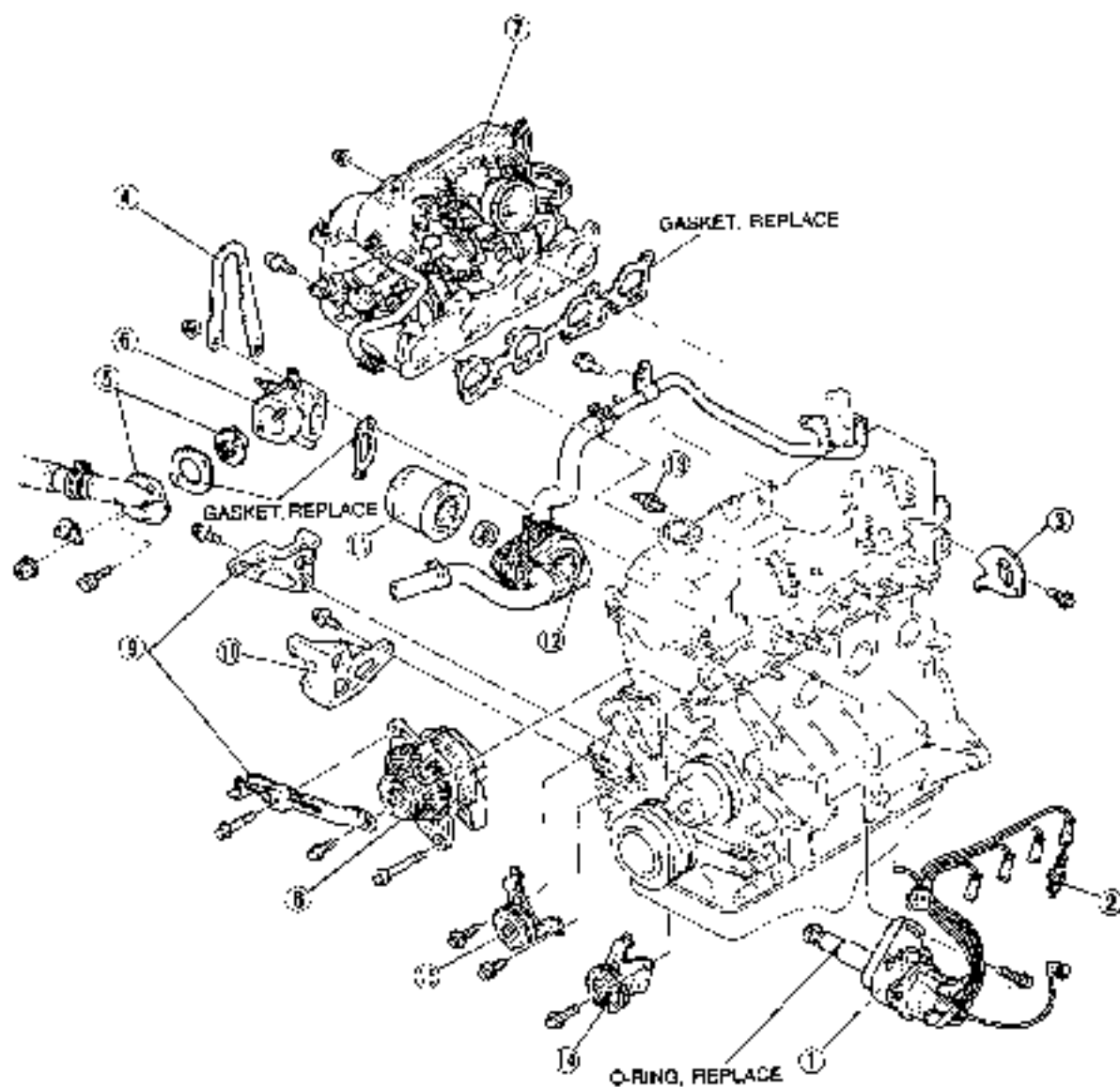
Note

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

JBL/CB7-012

AUXILIARY PARTS

Remove in the order shown in the figure.



180012-407

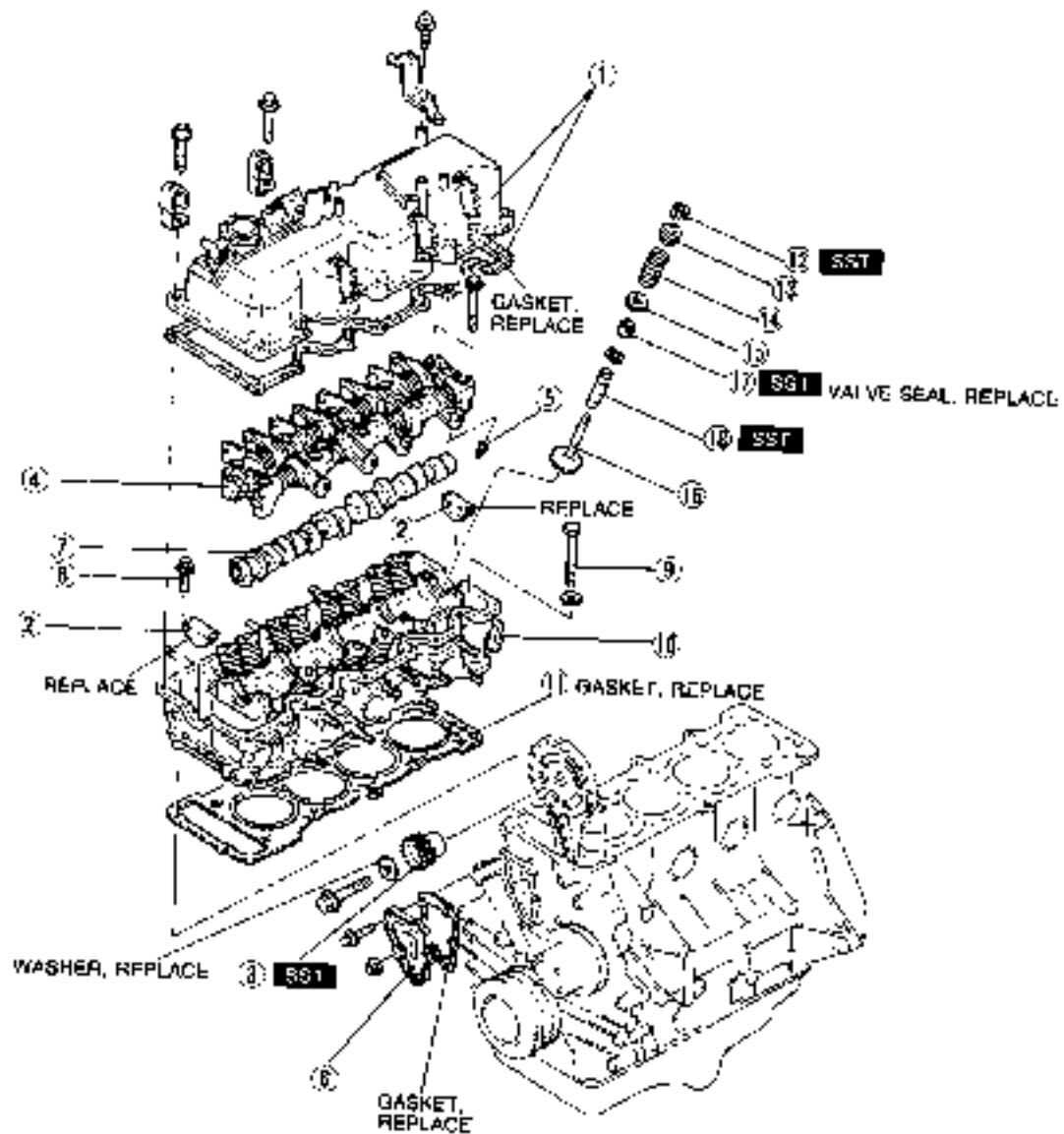
1. Distributor and high-tension lead
2. Spark plug
3. Rear engine hanger
4. Front engine hanger
5. Thermostat and thermostat cover
6. Water outlet
7. Intake manifold assembly

Section E

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

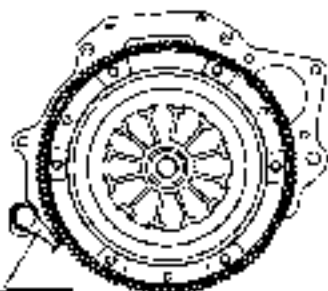
CYLINDER HEAD

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

SUBROCK



25L/CB2-C25

Disassembly note

During disassembly, inspect the following.

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

Distributor drive gear

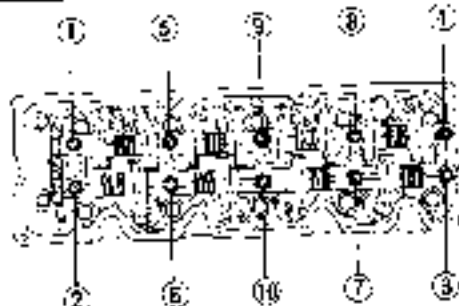
1. Set the SST or equivalent against the flywheel (M/T) or drive plate (A/T).
2. Remove the distributor drive gear.

Rocker arm and shaft assembly

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

Caution

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



25L/CB2-C25

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.



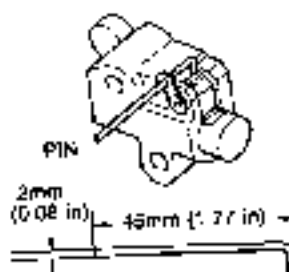
25L/CB2-C25

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

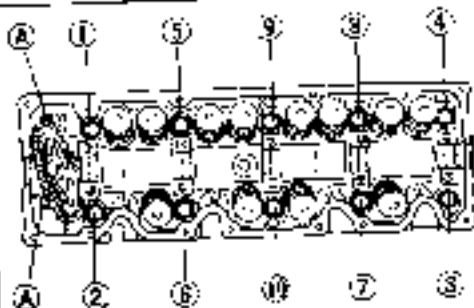
Be especially careful that the pin does not fall.



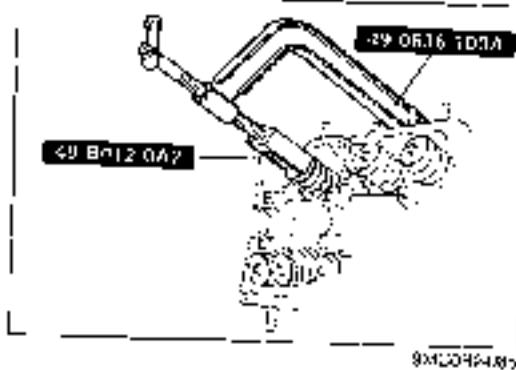
25L/CB2-C25

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.



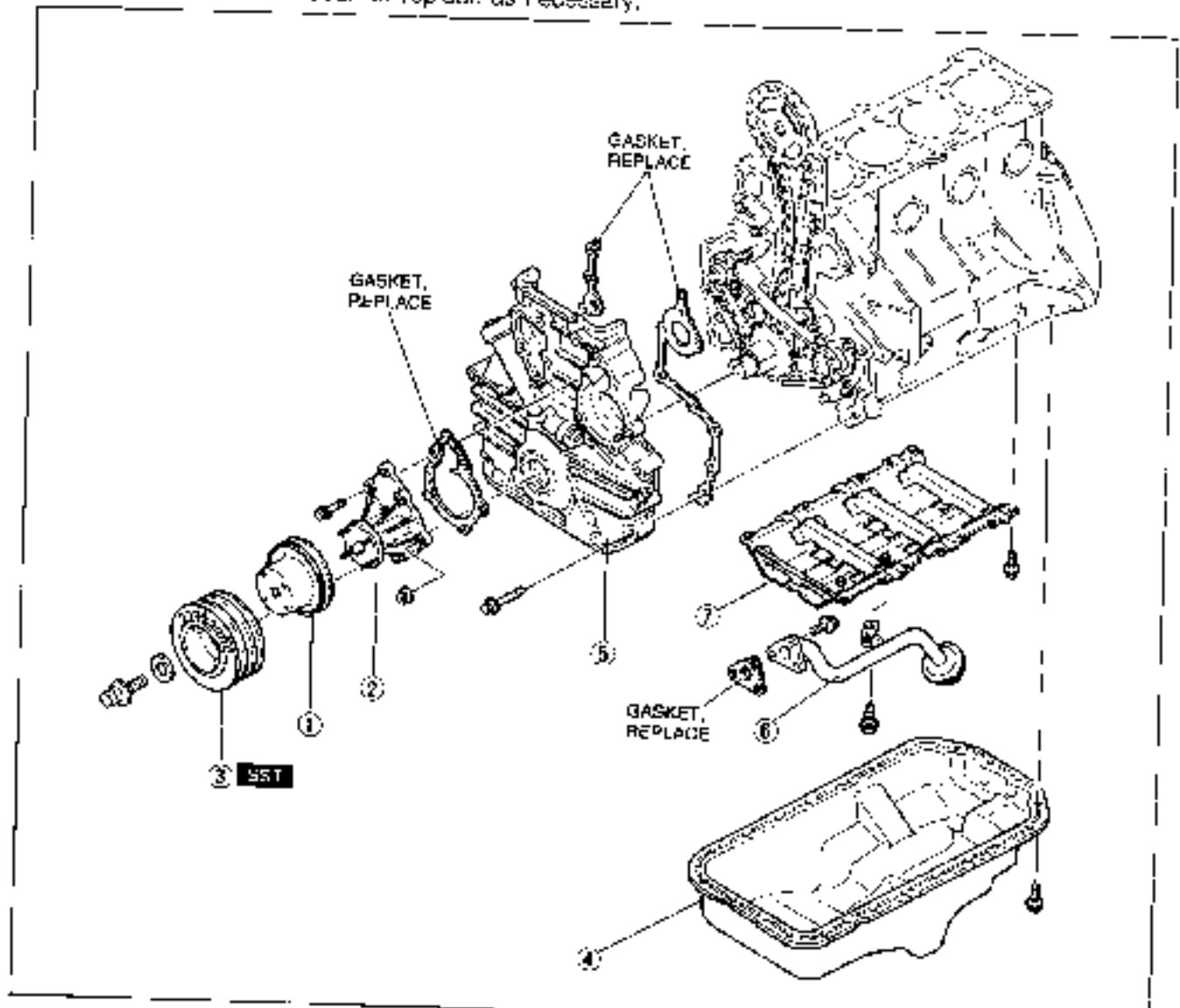
25L/CB2-C25

**Valve**

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

CHAIN CASE AND OIL PAN

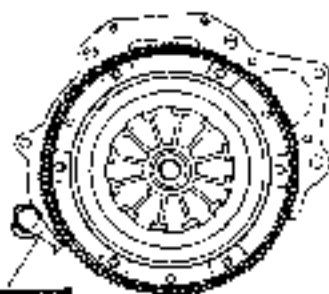
1. Remove in the order shown in the figure referring to the **Disassembly note**.
2. Inspect all parts and repair or replace as necessary.



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)

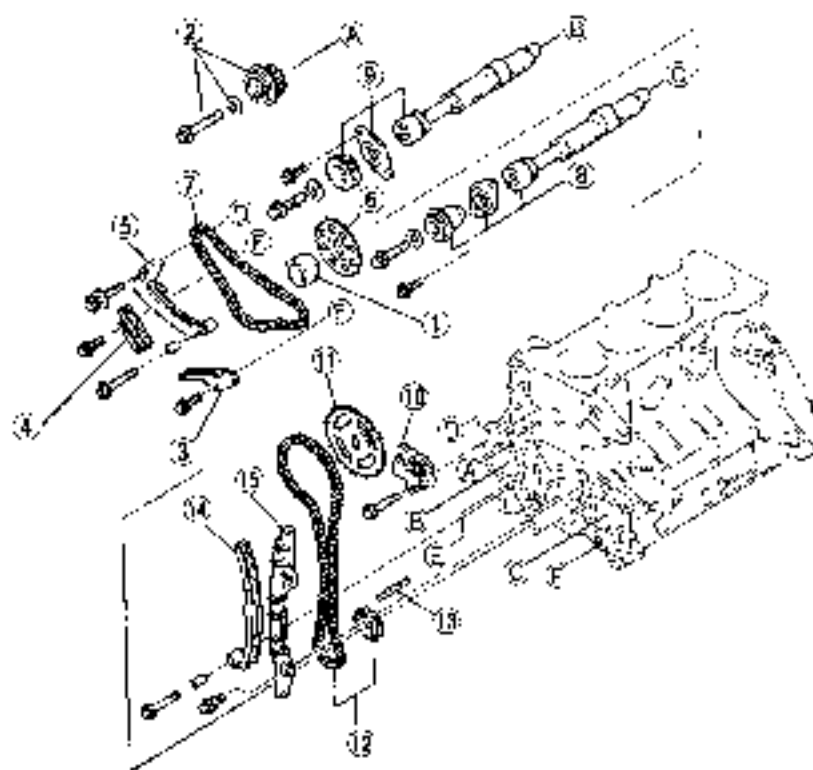
*BUCB2-005

**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.



2FA-CB2-031

1. Spacer

2. Idler sprocket assembly lock bolt

3. Chain guide A

Inspect for wear or damage

4. Chain guide B

Inspect for wear or damage

5. Chain guide C

Inspect for wear or damage

6. Crankshaft sprocket

Inspect for wear or damage

7. Balancer chain

Inspect for wear or damage

8. Left balance shaft assembly

Inspection page B2-50

9. Right balance shaft assembly

Inspection page B2-50

10. Chain adjuster

Inspection page B2- 8

11. Camshaft pulley

Inspect for wear or damage

12. Timing chain and timing gear

Inspection page B2-51

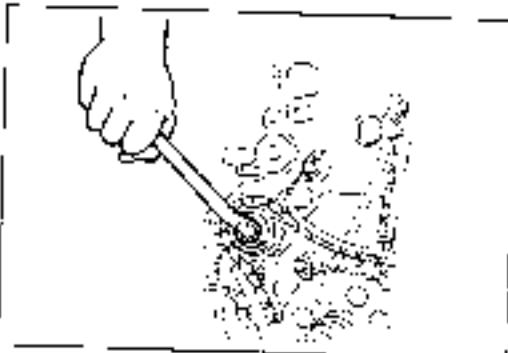
13. Key

14. Chain lever

Inspect for wear or damage

15. Chain guide

Inspect for wear or damage

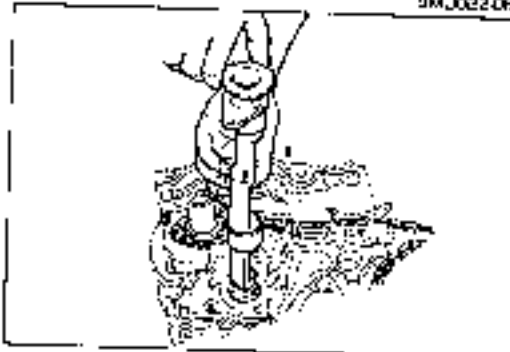


9MUCB2-064

Disassembly note

Idler sprocket assembly lock bolt

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



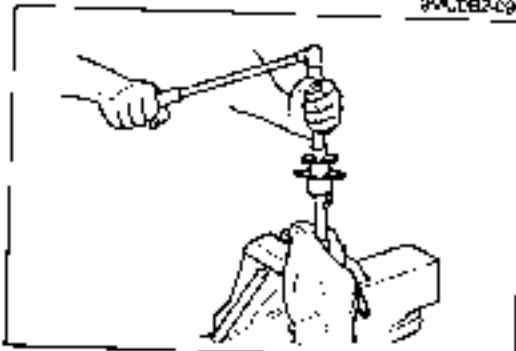
9MUCB2-090

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.



9MUCB2-091

3. Disassemble the balance shaft assembly.

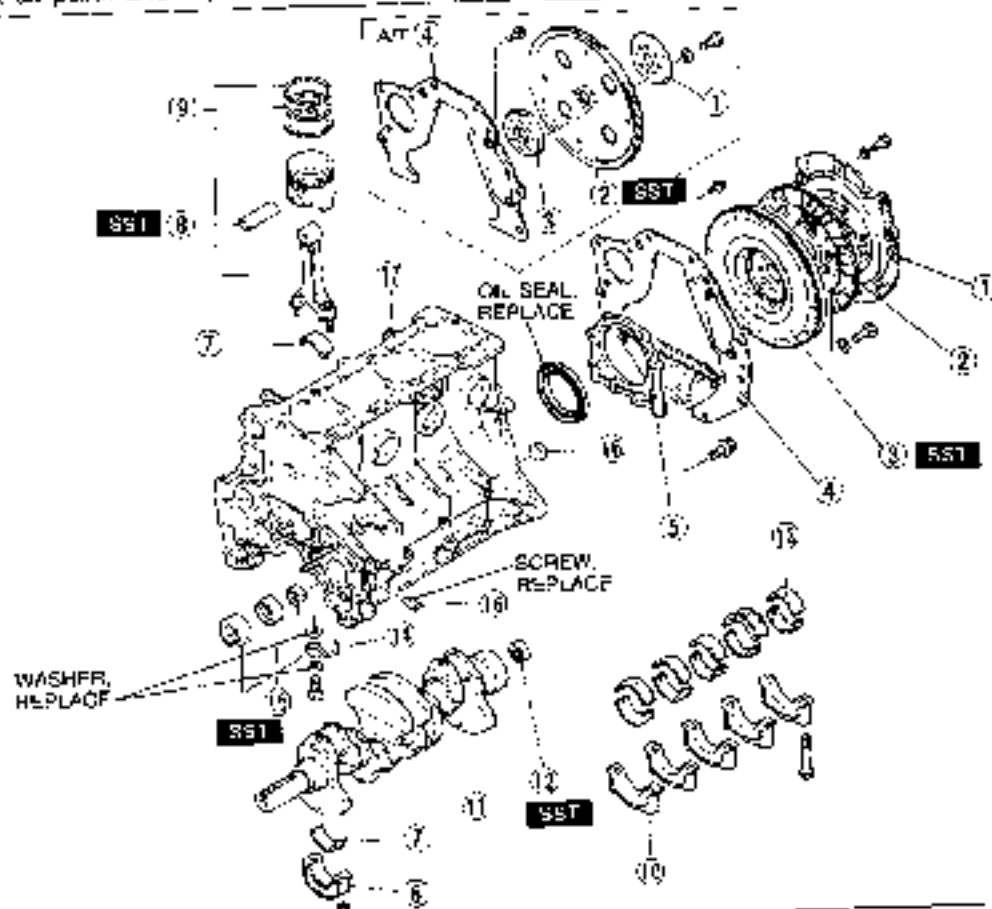
Caution

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.



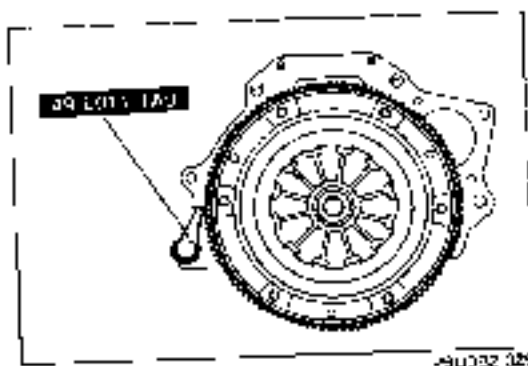
ZB032 018

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	Inspection for peeling, scoring, or damage
7. Connecting rod bearing	14. Oil jet
Inspection 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

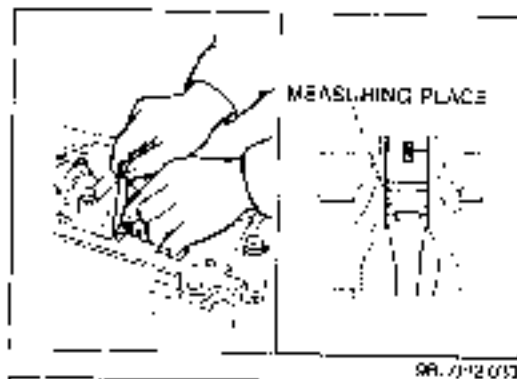
Disassembly note

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.



ZB032 025

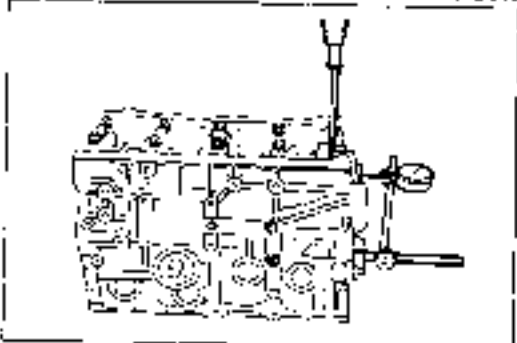


98J112-013

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.)

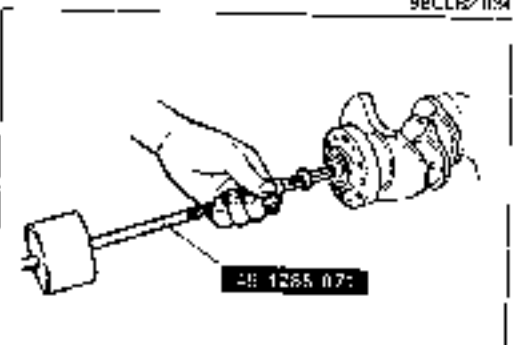


98J112-014

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.)



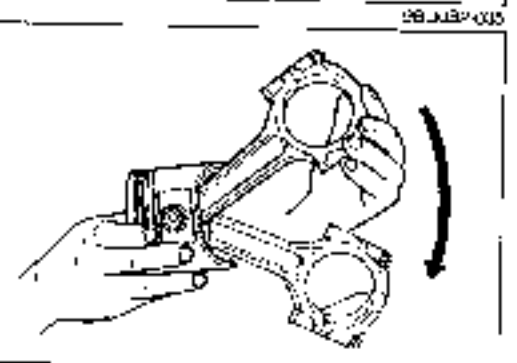
98J112-015

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

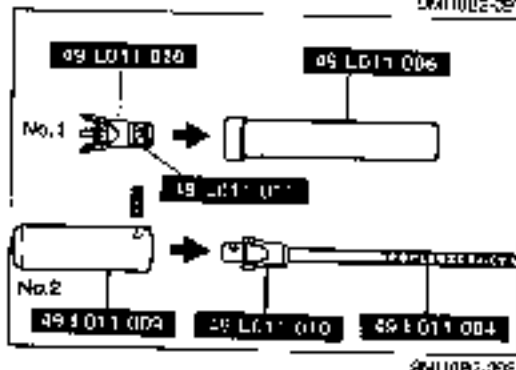
When replacing and/or cleaning the crankshaft, remove the pilot bearing.



98J112-016

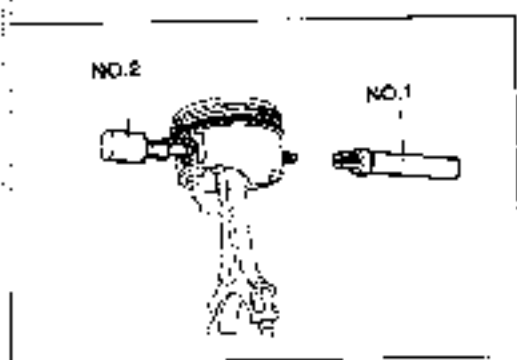
Piston and connecting rod

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.



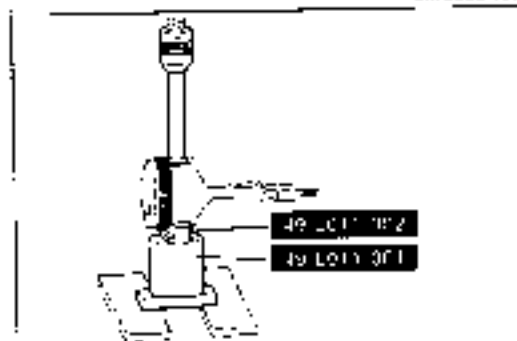
98J112-017

2. Assemble the SST as shown.



DMUB2-086

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



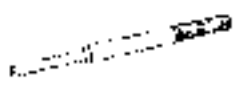
DMUCB2-100

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

INSPECTION AND REPAIR

PREPARATION

SST

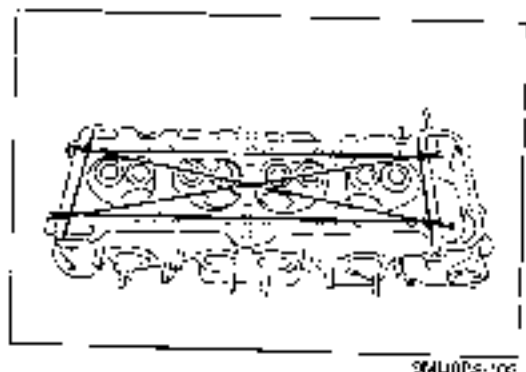
49 L040 000A Turnover & installer, valve guide 	49 L012 0A0 Installer set, valve seal & valve guide 	49 L012 003 Body (Part of 49 L012 0A0) 
49 L012 003 Installer (Part of 49 L012 0A0) 	49 L012 004 Nut (Part of 49 L012 0A0) 	49 L011 2A0 Replacer balance shaft bushing 
49 L011 201 Shaft (Part of 49 L011 2A0) 	49 L011 202 Attachment (Part of 49 L011 2A0) 	49 L011 203 Attachment (Part of 49 L011 2A0) 
49 L011 204 Attachment (Part of 49 L011 2A0) 	9MUCB2-107	

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).

9MUCB2-107

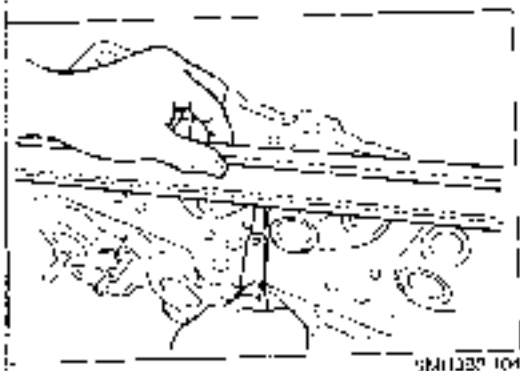


9MUCB2-108

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—3.545 in)
Grinding: 0.20mm (0.008 in) max.

Note

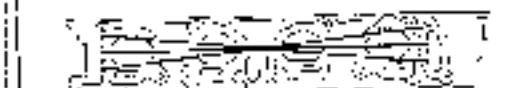
Before grinding the cylinder head, first check the following. Replace if necessary.

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

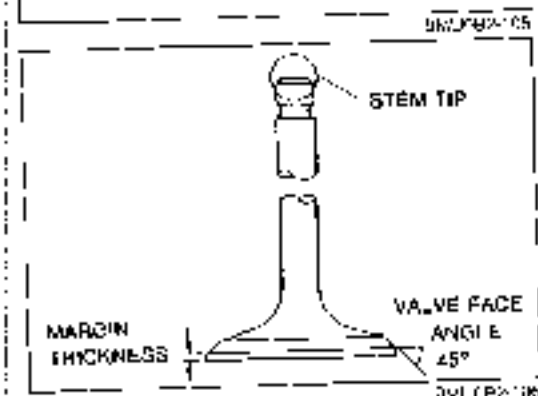


4. Measure the manifold contact surface distortion in the six directions shown in the figure.

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.

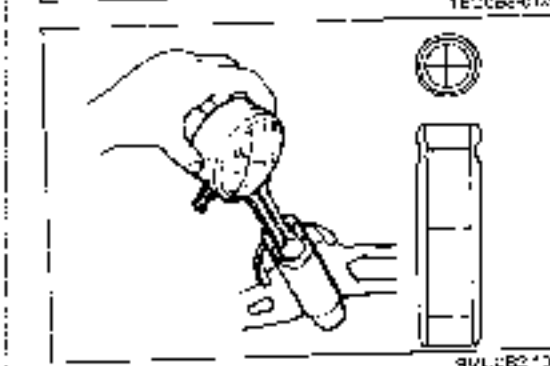
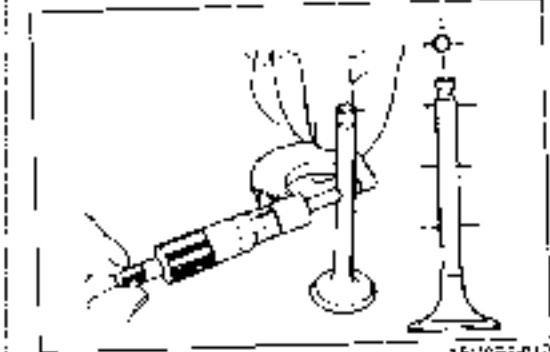
Diameter

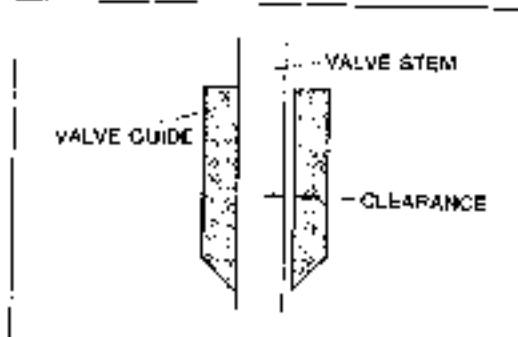
IN: 6.970—6.985mm (0.2744—0.2750 in)
EX: 6.965—6.980mm (0.2742—0.2748 in)

5. Measure the valve guide inner diameter.

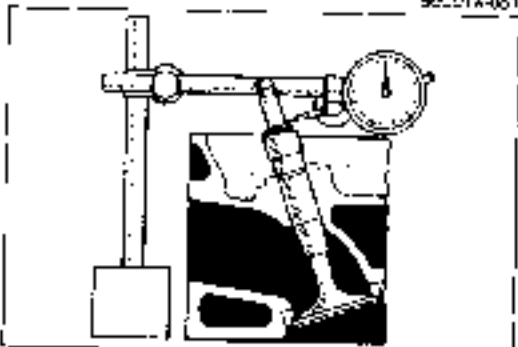
Inner diameter

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

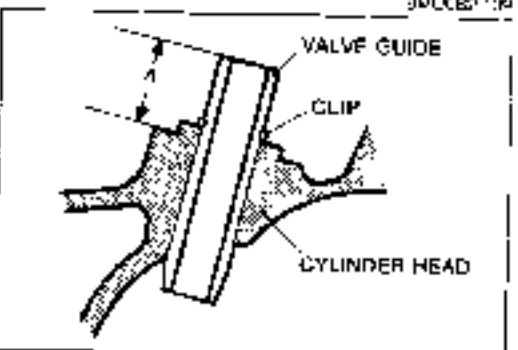




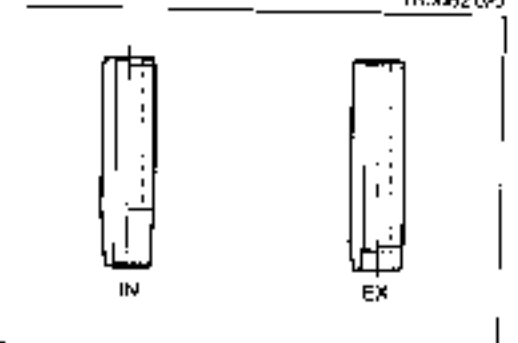
92L01K-081



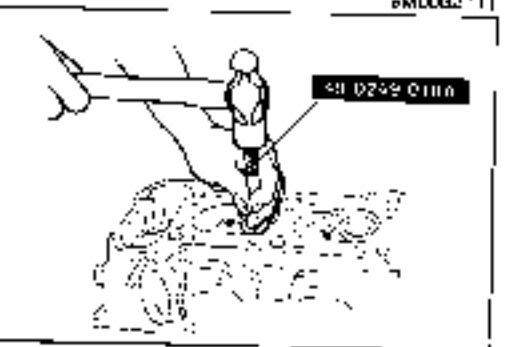
9MUCB2-109



1R-0002-070



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

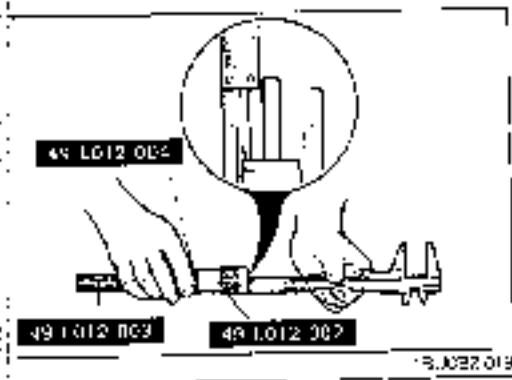
Note

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

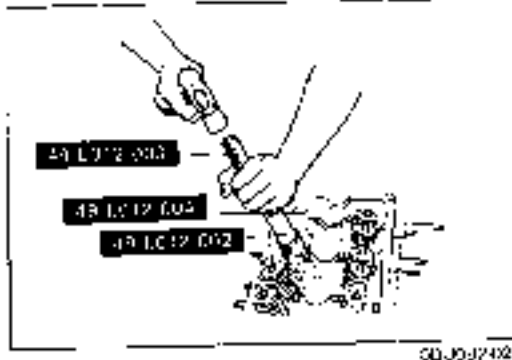
Remove the valve guide from the side opposite the combustion chamber with the SST.

**Installation**

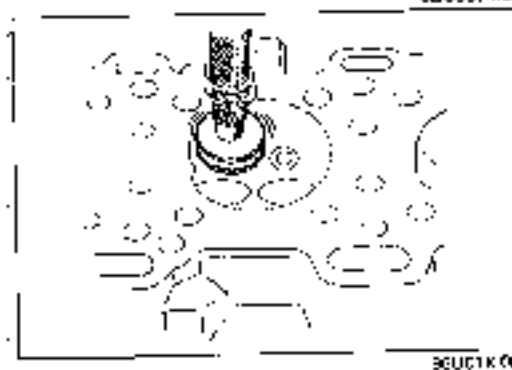
1. Assemble the **SST** so that the depth **L** is as specified.

Depth L: 23.5—24.2mm (0.925—0.953 in)

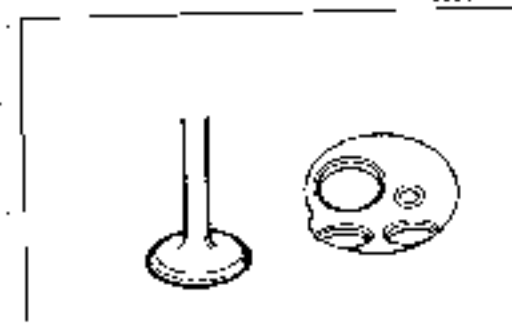
2. Tighten the locknut.



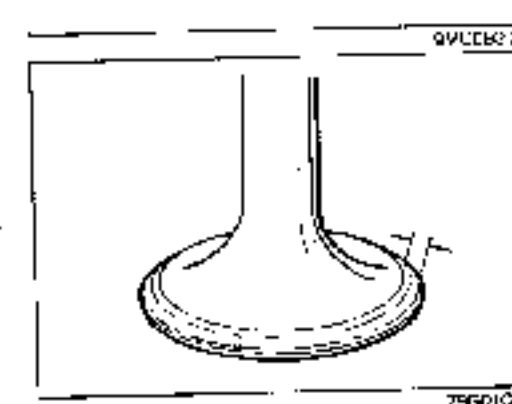
3. Tap the new valve guide in from the side opposite the combustion chamber until the **SST** contacts the cylinder head.
4. Check that the valve guide projection height is within specification.
5. If not within specification, repeat steps 1—4

**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.

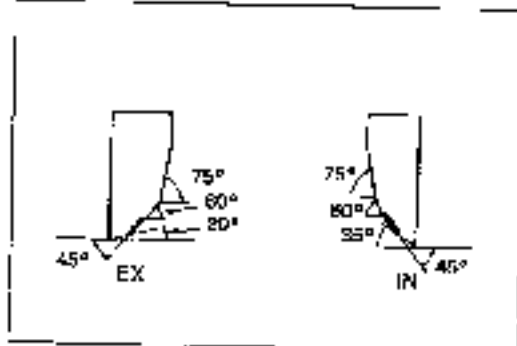


3. Apply a thin coat of Prussian blue to the valve face
4. Check the valve seating by pressing the valve against the seat.
 - (1) If blue does not appear 360° around the valve face, replace the valve.
 - (2) If blue does not appear 360° around the valve seat, resurface the seat.

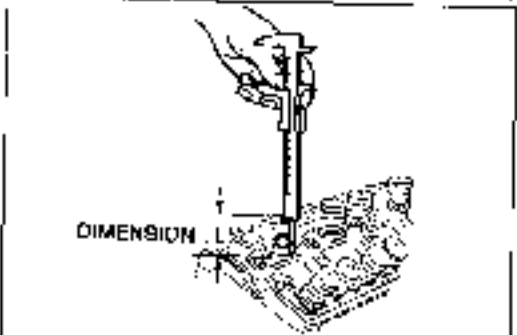


5. Check the seat contact width

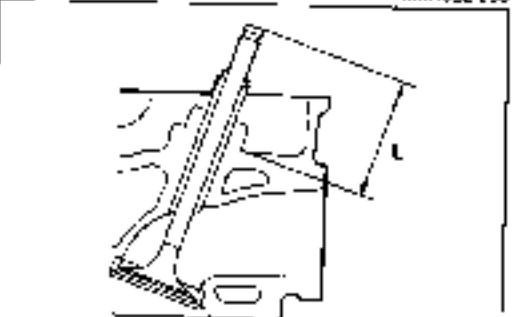
Width: 1.2—1.6mm (0.047—0.063 in)



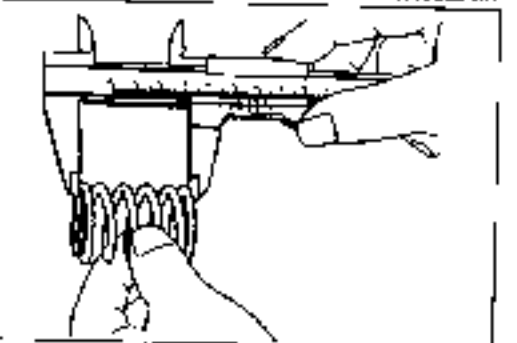
3VLCB2-115



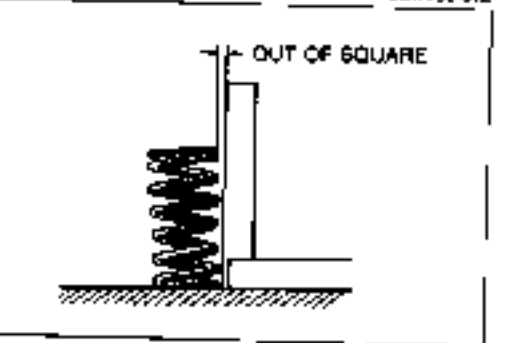
3VLCB2-256



3VLCB2-257



2B-J032-012



3VLCB2-117

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 tapping compound.

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

Dimension L**IN : 49.0mm (1.929 in)****EX : 49.0mm (1.929 in)**

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

IN : 49.0—49.5mm (1.929—1.949 in)**EX : 49.0—49.5mm (1.929—1.949 in)**

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

IN : 49.5—50.5mm (1.949—1.988 in)**EX : 49.5—50.5mm (1.949—1.988 in)**

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

IN : 50.5mm (1.988 in)**EX : 50.5mm (1.988 in)****Valve Spring**

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

Free length**Standard: 50.05mm (1.970 in)****Minimum length:****43.0mm (1.693 in) with a set load of 195—221 Nm (19.9—22.6 m·kg, 144—163 ft·lb)****Out of square: 1.75mm (0.069 in) max.**

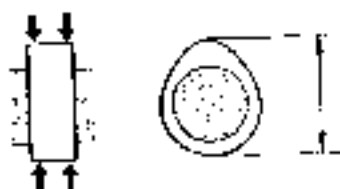


25U01X 052

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.



15-087713

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

Height

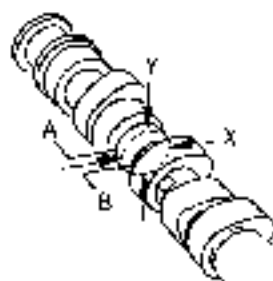
IN: 41.714mm (1.6423 in)

EX: 41.988mm (1.6531 in)

Minimum

IN: 41.514mm (1.6344 in)

EX: 41.788mm (1.6452 in)



10U132014

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

Diameter

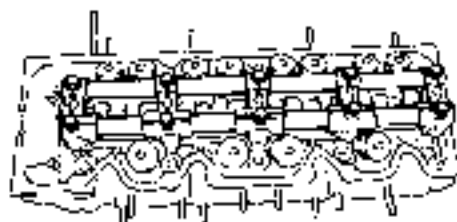
No.1 and No.5:

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.



3M-006170

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

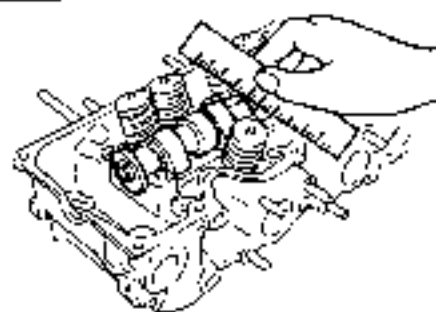
No.1 and 5: 0.035—0.065mm (0.0014—0.0033 in)

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

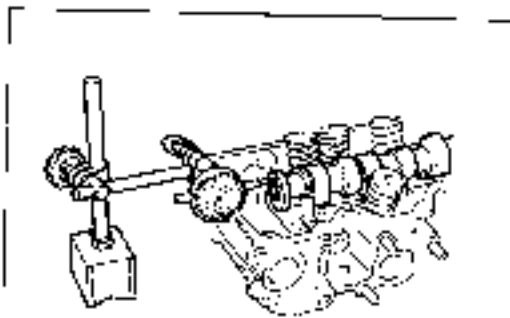
0.065—0.115mm (0.0026—0.0045 in)

Maximum: 0.15mm (0.006 in)

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



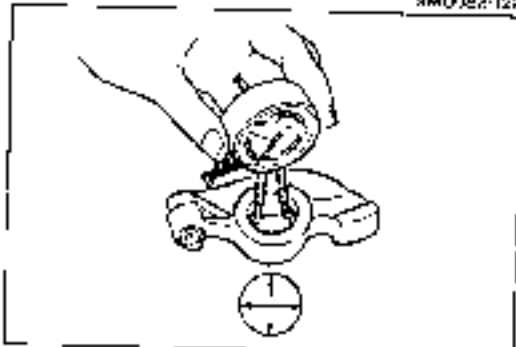
09A1111F9-121



9MU082-12P

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)



9MU002-23

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.

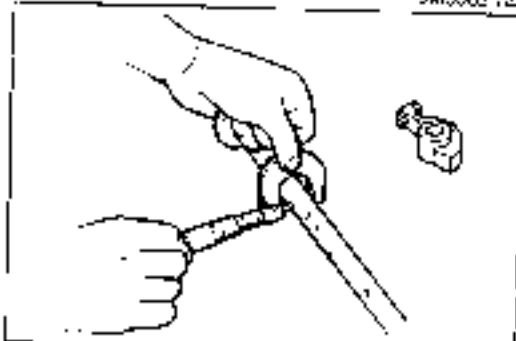
Diameter: 21.000—21.033mm (0.8268—0.8281 in)

- (2) Measure the rocker arm shaft diameter

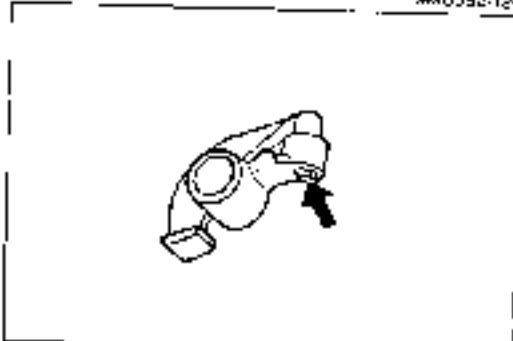
Diameter: 20.959—20.980mm (0.8252—0.8260 in)

- (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)



9MU032-12P



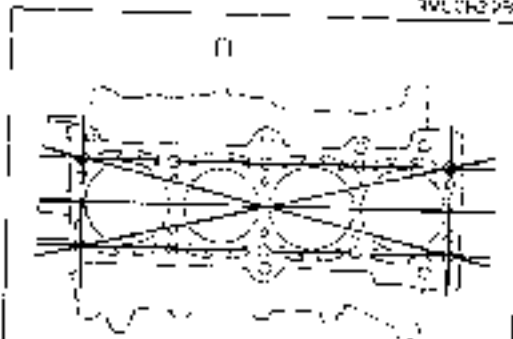
7VU023-29P

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.



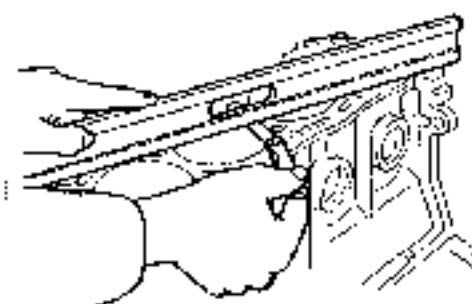
9MU014-10C

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.

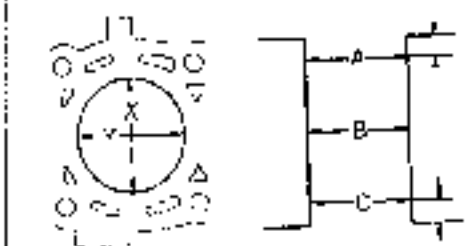
Distortion: 0.15mm (0.006 in) max.



9M1JY92-125

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.



9M1J022-125

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

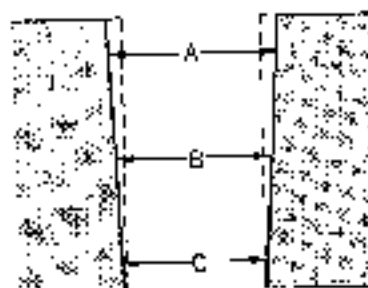
Cylinder bore

mm (in)

Size	Bore	Diameter
Standard		92.000 92.022 (3.6220 - 3.6230)
0.25 (0.010) oversize		92.250 - 92.272 (3.6300 - 3.6330)
0.50 (0.020) oversize		92.500 92.522 (3.6420 - 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.



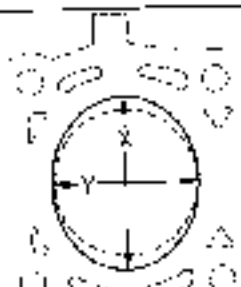
9M1J022-225

- (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.

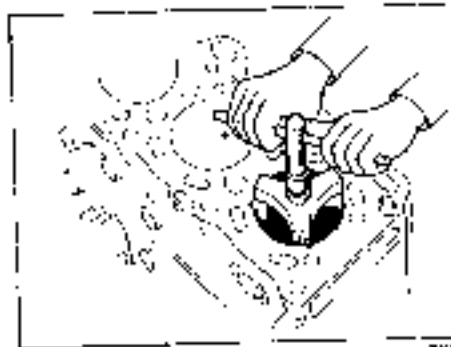
Caution

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

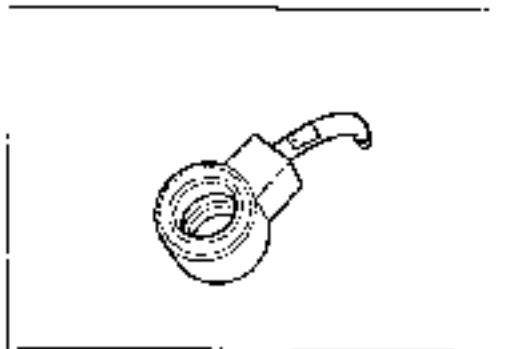


9M1J022-225

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



9M1J01X-1C2



9M.1002-281

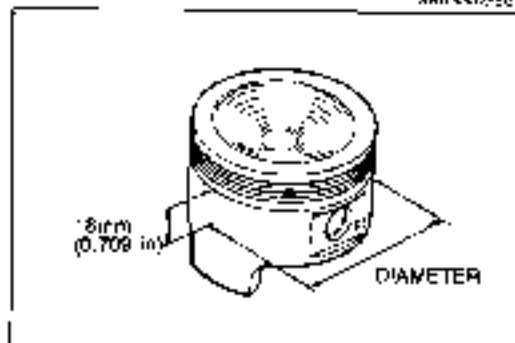
Oil Jet

1. Check the oil jet for clogging.

Note

Make sure the oil passages are not clogged.

2. Make sure the ball moves smoothly.



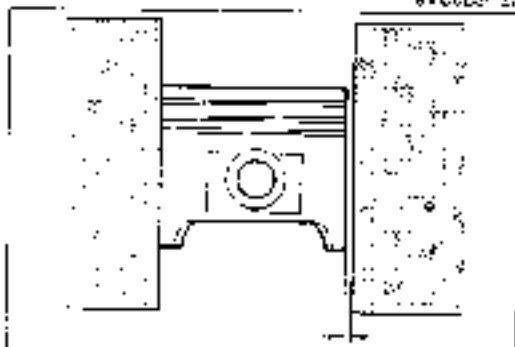
9V.002-127

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—3.6291)
0.50 (0.020) oversize		92.435—92.455	(3.639—3.6400)



9M.002-129

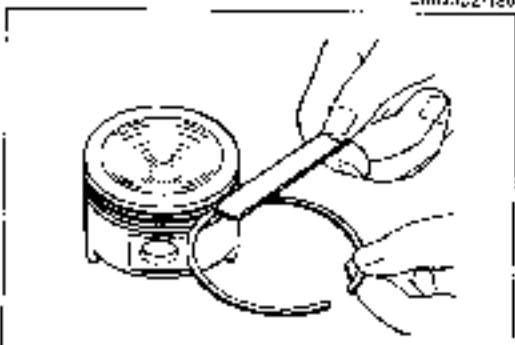
3. Check the piston-to-cylinder clearance.

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.



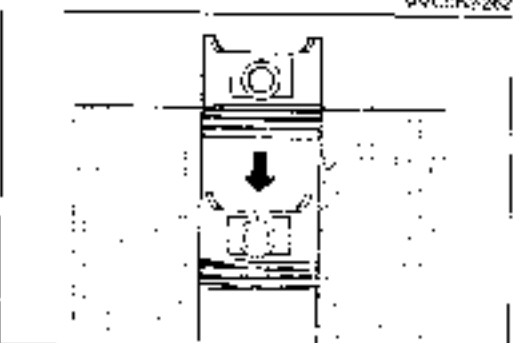
9V.003-282

Piston and Piston Rings

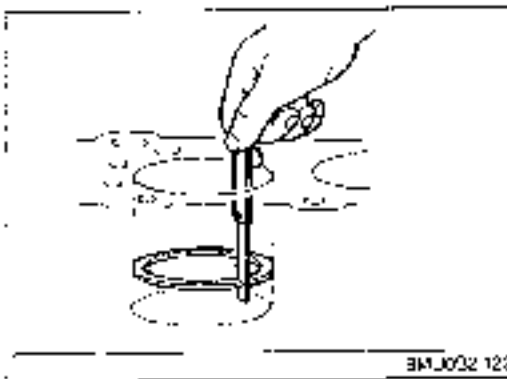
1. Measure the piston ring to ring and clearance around the entire circumference by using a new piston ring.

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.



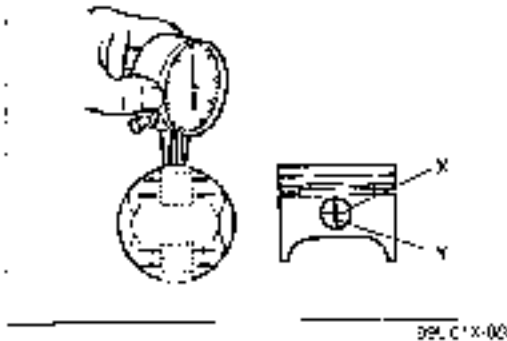
9M.002-283



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

End gap

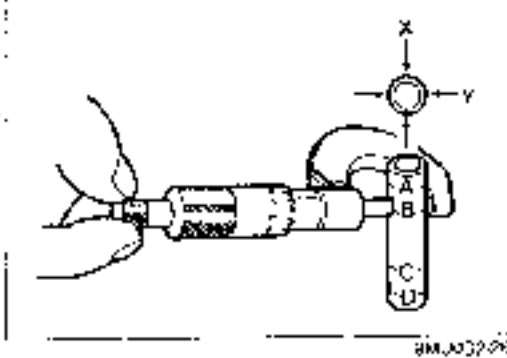
Top : 0.20—0.35mm (0.008—0.014 in)
Second: 0.25—0.40mm (0.010—0.016 in)
Oil rail : 0.20—0.70mm (0.008—0.028 in)
Maximum: 1.0mm (0.039 in)



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)



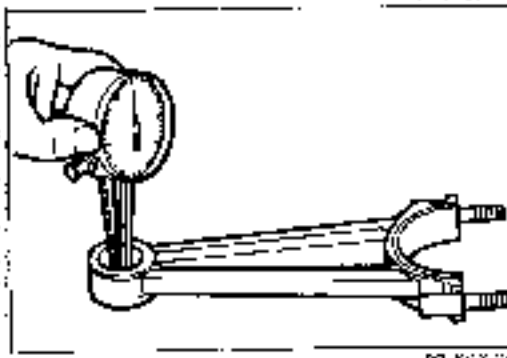
2. Measure the piston pin diameter in X and Y directions at four points.

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.



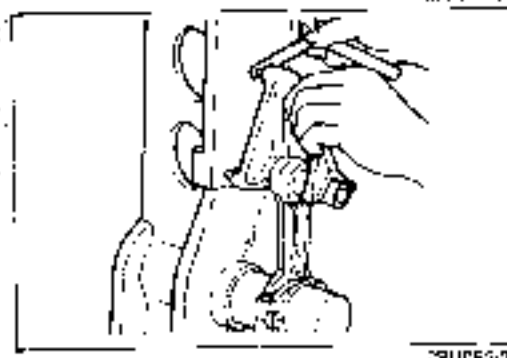
Connecting Rod

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)



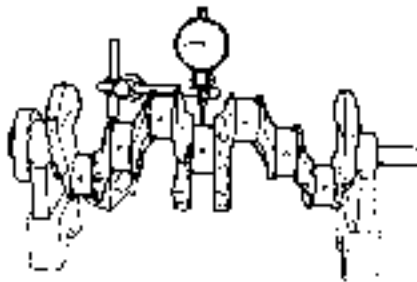
3. Check each connecting rod for bend. Repair or replace if necessary.

Bend: 0.249mm (0.0098 in) max.

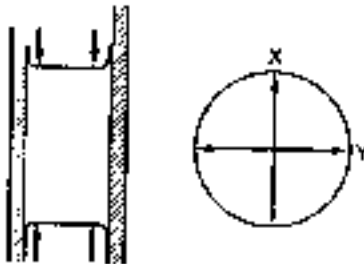
Length (Center to Center):
 166.45—166.55mm (6.553—6.557 in)

Caution

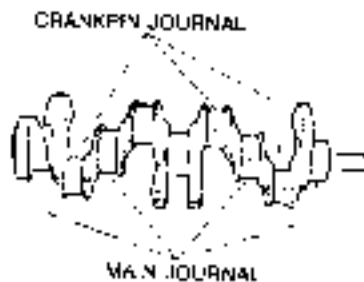
If the connecting rod is replaced, the connecting rod cap and bolts must also be replaced because they are a matched set.



9AUC57 131



5DGM18-119



5AUC28 366



5AUC18 183



5AUC12 C77

Crankshaft

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

Runout: 0.03mm (0.0012 in) max.

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

Main journal

Diameter: 59.937–59.955mm (2.3597–2.3604 in)

Minimum: 59.89mm (2.358 in)

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

Crankpin journal

Diameter: 50.940–50.955mm (2.0055–2.0061 in)

Minimum: 50.89mm (2.004 in)

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

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

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

Main journal diameter undersize

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

Crankpin journal diameter undersize

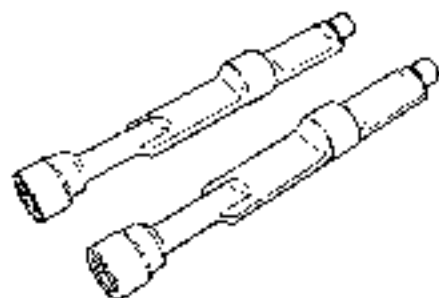
		mm (in)	
Bearing size		Journal diameter	
0.25 undersize		50.690–50.705 (1.9957–1.9963)	
0.50 undersize		50.440–50.455 (1.9858–1.9864)	
0.75 undersize		50.190–50.205 (1.9763–1.9769)	

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.



Balance Shaft

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

Oil clearance

Front : 0.050—0.115mm (0.0020—0.0045)

Center: 0.080—0.145mm (0.0031—0.0057)

Rear : 0.080—0.145mm (0.0031—0.0057)

Balance Shaft Bushing Replacement

Removal

Note

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

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

Note

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

4. Remove the blind screw of the removed bushing

L1: 229mm (9.0 in)

L2: 326mm (12.8 in)

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.

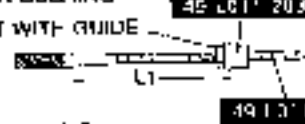
REMOVAL



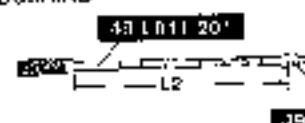
FRONT BUSHING



CENTER BUSHING



REAR BUSHING



INSTALLATION



REAR BUSHING

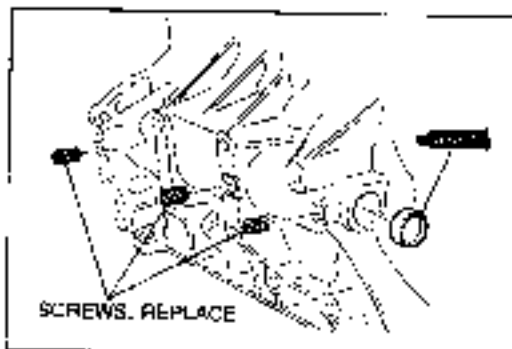


CENTER BUSHING



FRONT BUSHING

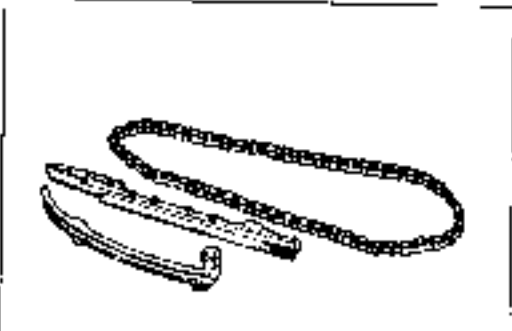




9MJC02-135

5. Install new blind screws.

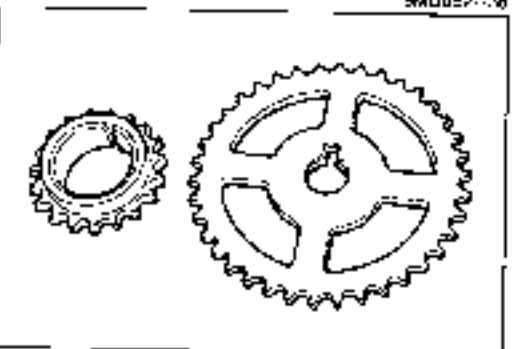
6. Apply sealant to the blind plug and install it in the cylinder block.



9MJC02-136

Timing Chain, Chain Lever, and Chain Guide

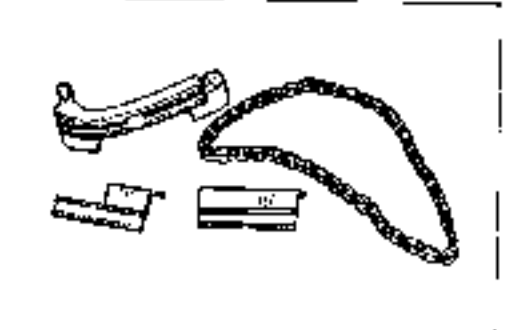
1. Check the timing chain for wear, damage, and cracks. Replace if necessary.
2. Check the rubber of the chain lever for wear, damage, peeling, and cracks. Replace if necessary.



9MJC02-137

Timing Gear and Camshaft Pulley

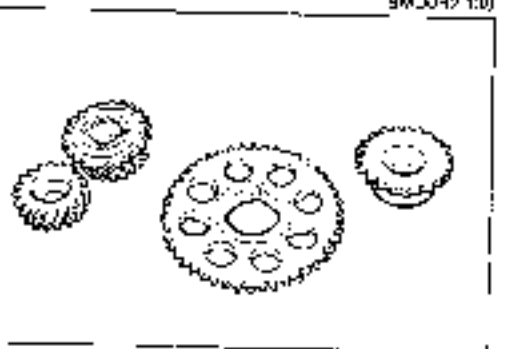
Check the timing gear and camshaft pulley for wear, damage, and cracks. Replace if necessary.



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

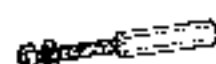
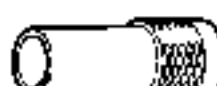
Check the crankshaft sprocket and balance shaft sprocket for wear, damage, and cracks. Replace if necessary.

Caution

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

ASSEMBLY

PREPARATION
5ST

49 L011 0A0 Piston pin setting tool set 	49 L011 001 Support block body (Part of 49 L011 0A0) 	49 L011 002 Support block head (Part of 49 L011 0A0) 
49 L011 004 Screw (Part of 49 L011 0A0) 	49 L011 005 Stopper bolt (Part of 49 L011 0A0) 	49 L011 006 Pulley & installer (Part of 49 L011 0A0) 
49 L011 009 Guide (Part of 49 L011 0A0) 	49 L011 010 Centering limit (Part of 49 L011 0A0) 	49 L011 011 Holder (Part of 49 L011 0A0) 
49 E011 1A0 Ring gear brake set 	49 E011 1C5 Stopper (Part of 49 E011 1A0) 	49 E011 103 Shaft (Part of 49 E011 1A0) 
49 L011 104 Collar (Part of 49 E011 1A0) 	49 L012 0A0 Installer set valve seal & valve guide 	49 L012 001 Installer (Part of 49 L012 0A0) 
49 L012 002 Body (Part of 49 L012 0A0) 	49 L012 005 Spacer (Part of 49 L012 0A0) 	49 U036 10CA Arm valve spring filter 
49 B012 0A2 Pilot, valve spring filter 	49 B012 012 Body (Part of 49 B012 0A2) 	49 B012 013 Foot (Part of 49 B012 0A2) 
49 B012 014 Lock nut (Part of 49 B012 0A2) 	49 SE01 310A Centering tool, clutch disc 	

29-0024-013

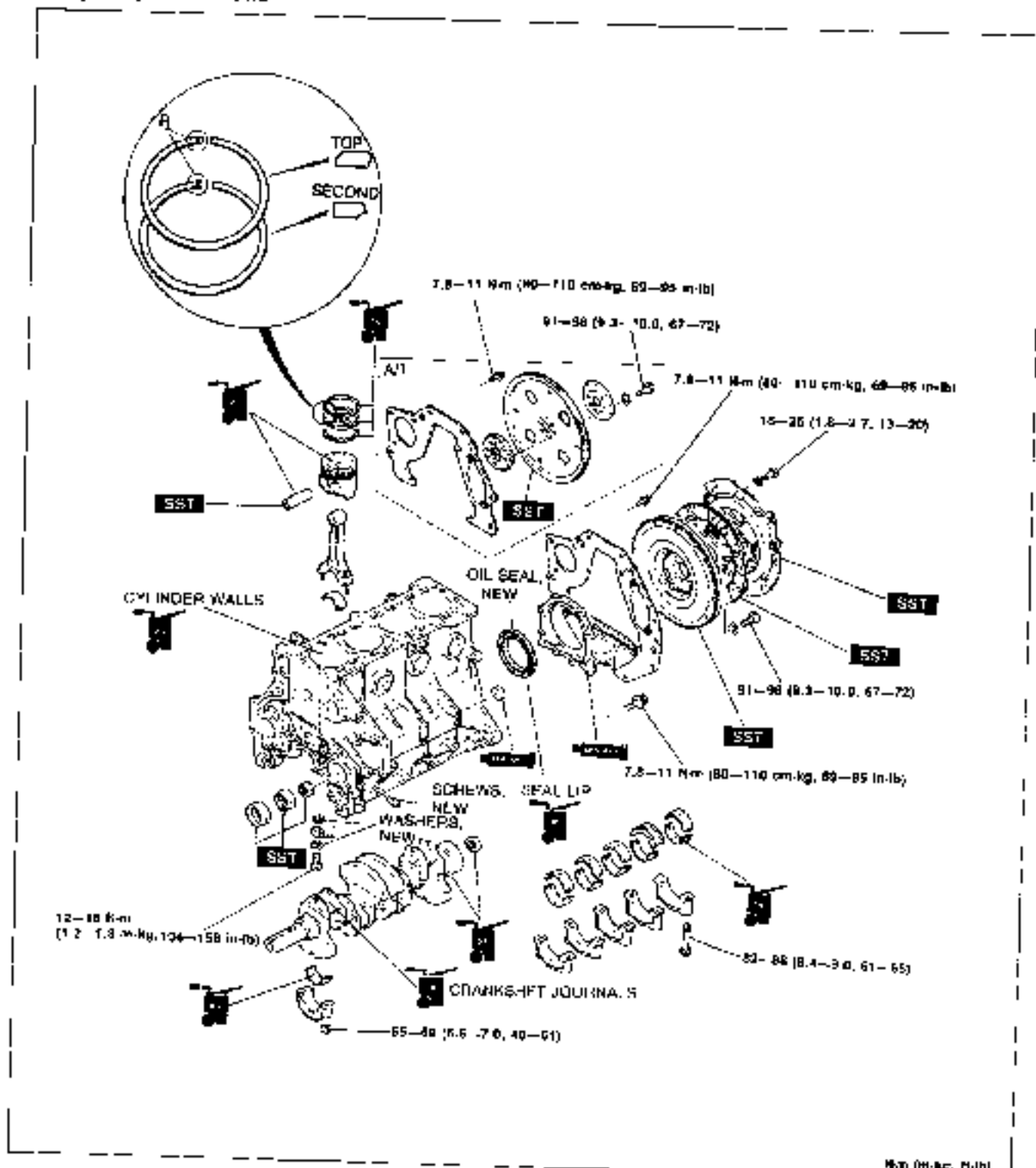
1. Clear all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace main bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

Caution

Do not reuse gaskets or oil seals.

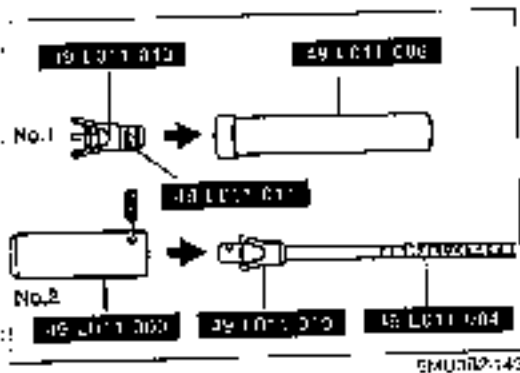
CYLINDER BLOCK Torque Specifications

GM1392-11

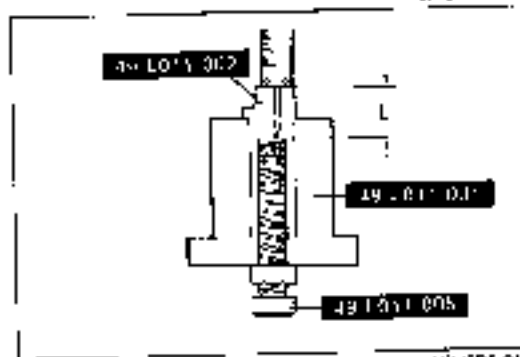


Nm (m-kg, ft-lb)

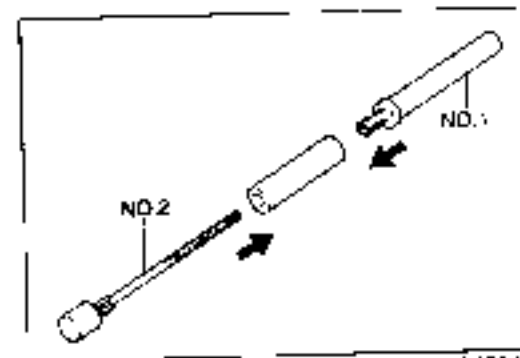
GM1392-11
B2-53



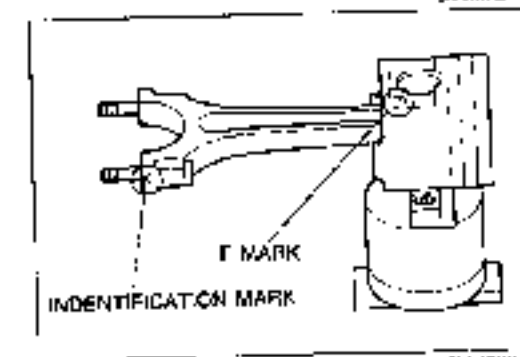
SMUD02-145



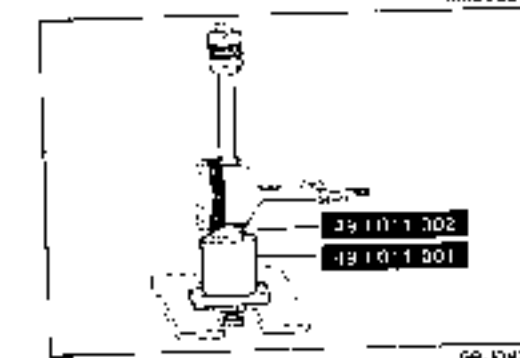
FAC085-018



99/L002-145



SMUD02-146



SEJ027-008

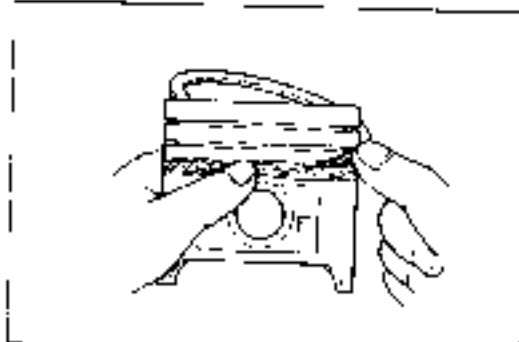
Connecting Rod1. Assemble the **SST** as shown.2. Set the **stopper bolt** (49 L011 005) so that the depth **L** is as specified**Depth L: 59.5—59.7mm (2.343—2.350 in)**

3. Tighten the locknut

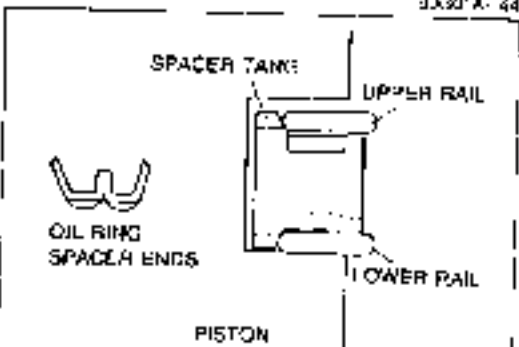
4. Insert the **SST** No.2 into the piston pin as shown and fully screw in the **SST** No.1.

5. Apply engine oil to the piston pin

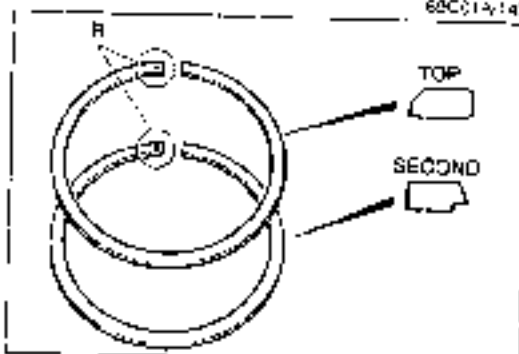
6. Set the piston on the **SST** with the **F** mark facing upward
7. Align the identification mark to the cap of the large end of connecting rod and **F** mark on the piston as shown in the figure.8. Press the piston pin into the piston and connecting rod until the **SST** contacts the stopper bolt.
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.)



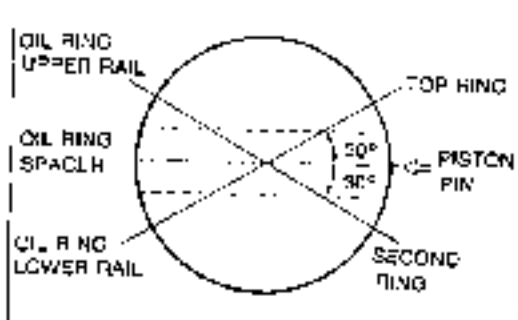
3000 A-44



60014-145



34U022-148



34U022-147



34U022-012

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

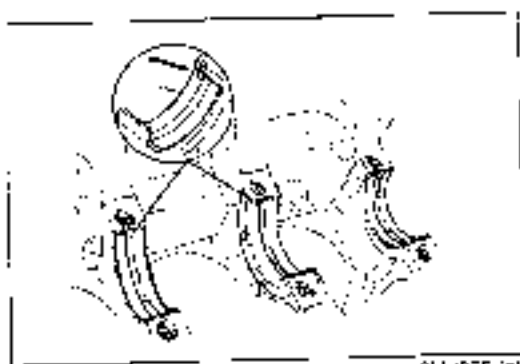
1. Install the new gaskets of the oil jet.
2. Install the oil jet as shown in the figure.

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.



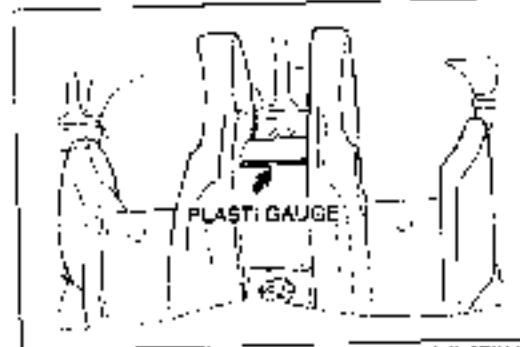
05MUGP 100

Crankshaft

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

Note

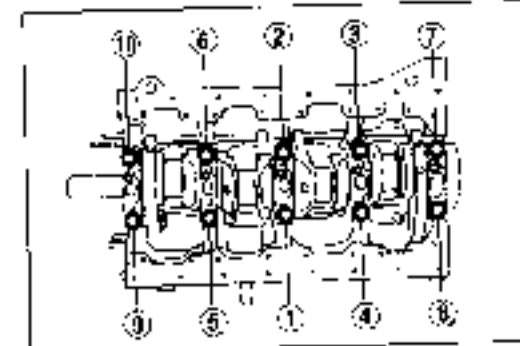
The No.4 bearing has thrust shoulders in the cylinder block.



05MUGB 200H

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.



05J07X-123

- (5) Install the main bearing caps along with the lower main bearings according to the cap number and $\blackleft$ 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

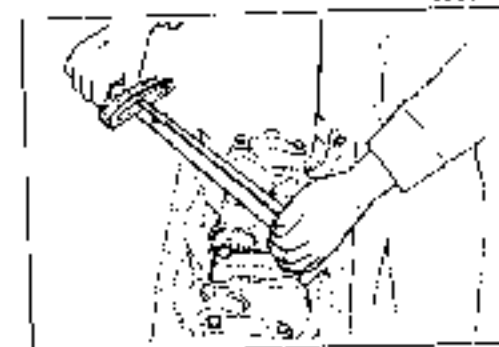
Do not rotate the crankshaft when measuring the oil clearances.



05J080-340

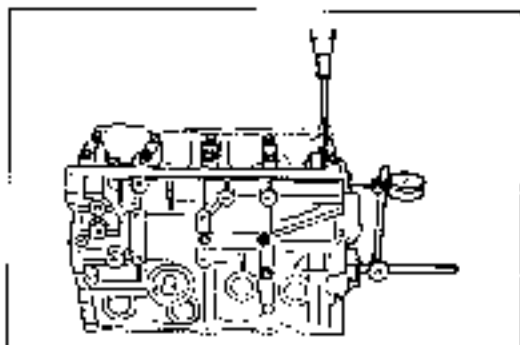
- (7) Remove the main bearing caps, and measure the Plastigauge at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance.
If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings.
(Refer to page B2-49.)

Oil clearance: 0.025—0.044mm (0.0010—0.0017 in)
Maximum: 0.08mm (0.0031 in)

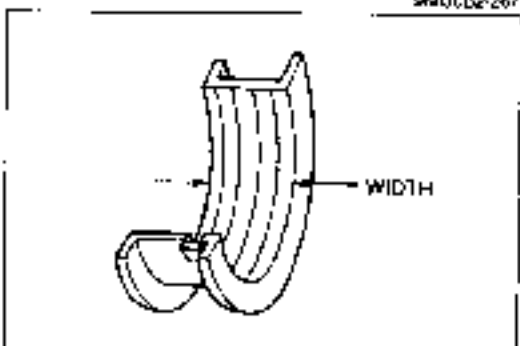


05MUGB 214

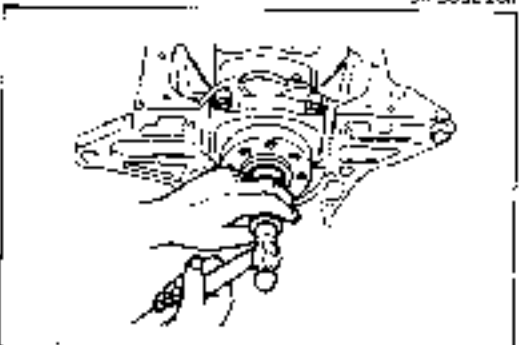
2. Apply a liberal amount of engine oil to the main bearings and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and $\blackleft$ mark.
4. Verify that the crankshaft rotates smoothly by hand.



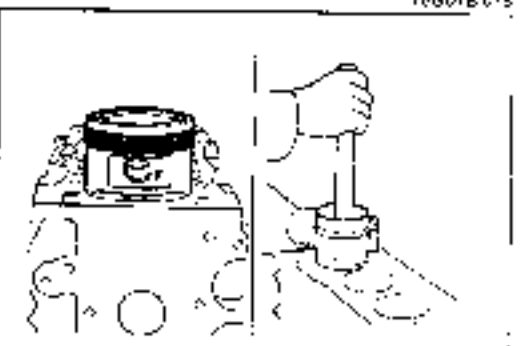
9MUC02-267



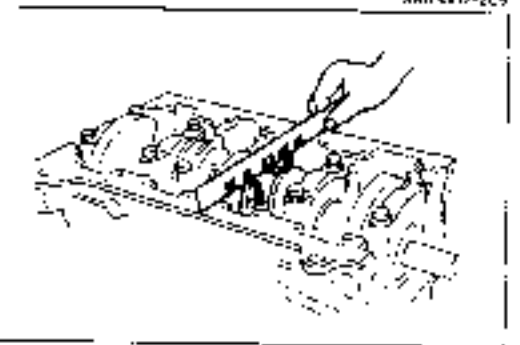
9MUC02-268



78G01B-075



5MUC02-269



5MUC02-152

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.

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

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.

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).

Connecting Rod Cap

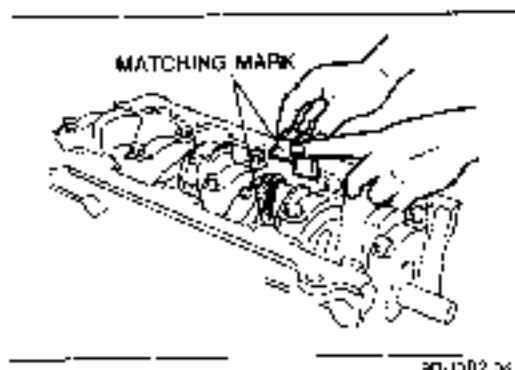
1. Check the connecting rod bearing clearances using the same procedure as used for the main bearing oil clearance.

Connecting rod cap tightening torque:

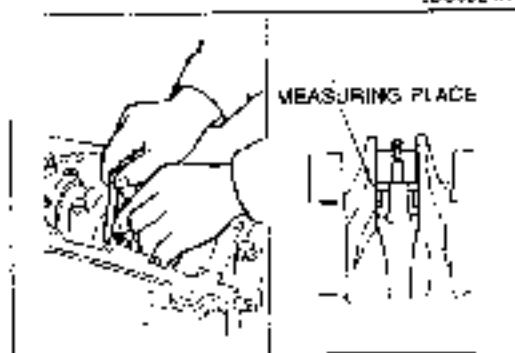
55—59 Nm (6.6—7.0 m·kg, 48—51 ft·lb)

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

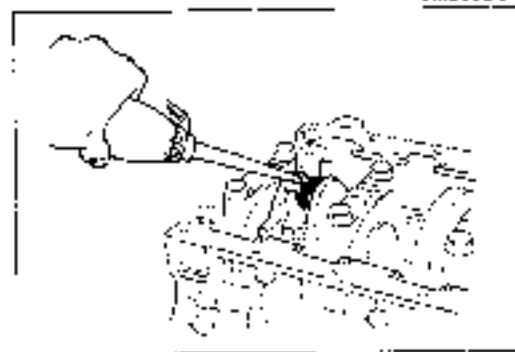
Maximum: 0.10mm (0.0039 in)



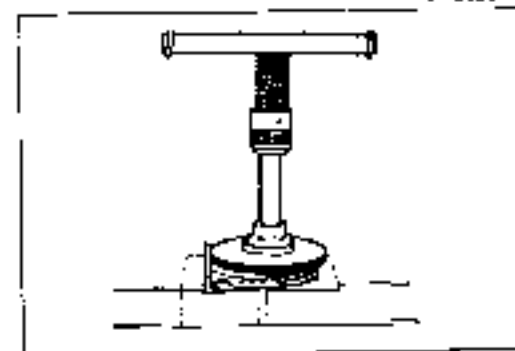
80J002-34



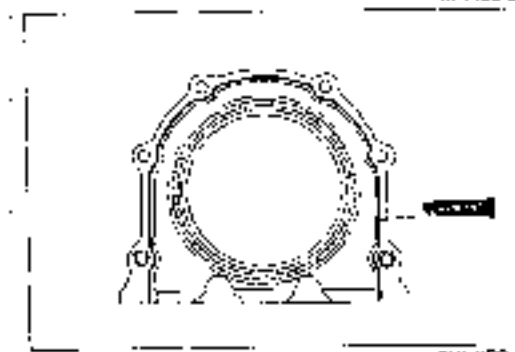
8WLC02-670



09MLCB2-154



48-10B2-047



9WLC02-155

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)

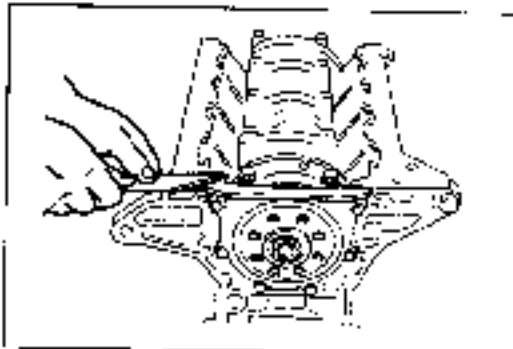
Caution

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)

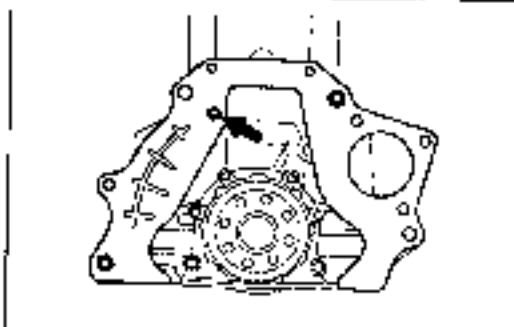


9MUCB2-156

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.



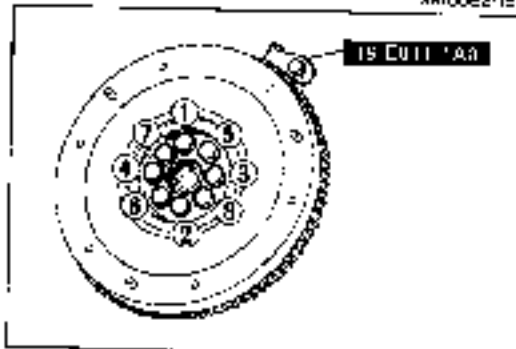
9MUCB2-157

End Plate

Install the end plate.

Tightening torque:

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



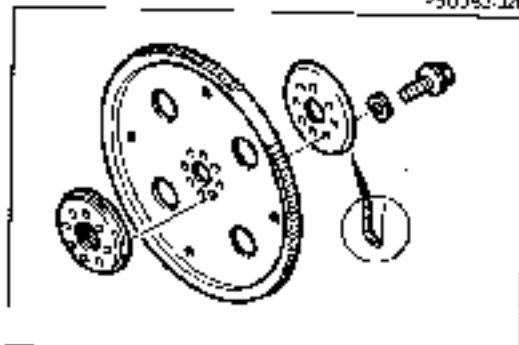
9J0383-326

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)



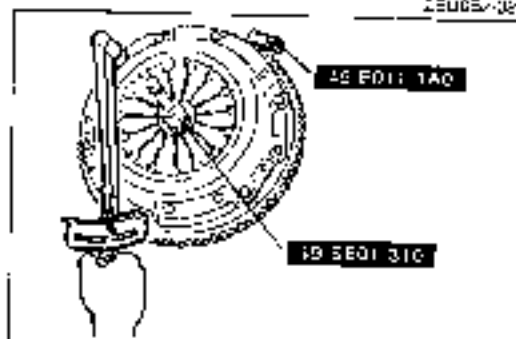
25U05-087

(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)



9J10E2-004

Clutch Disc and Clutch Cover (M/T)

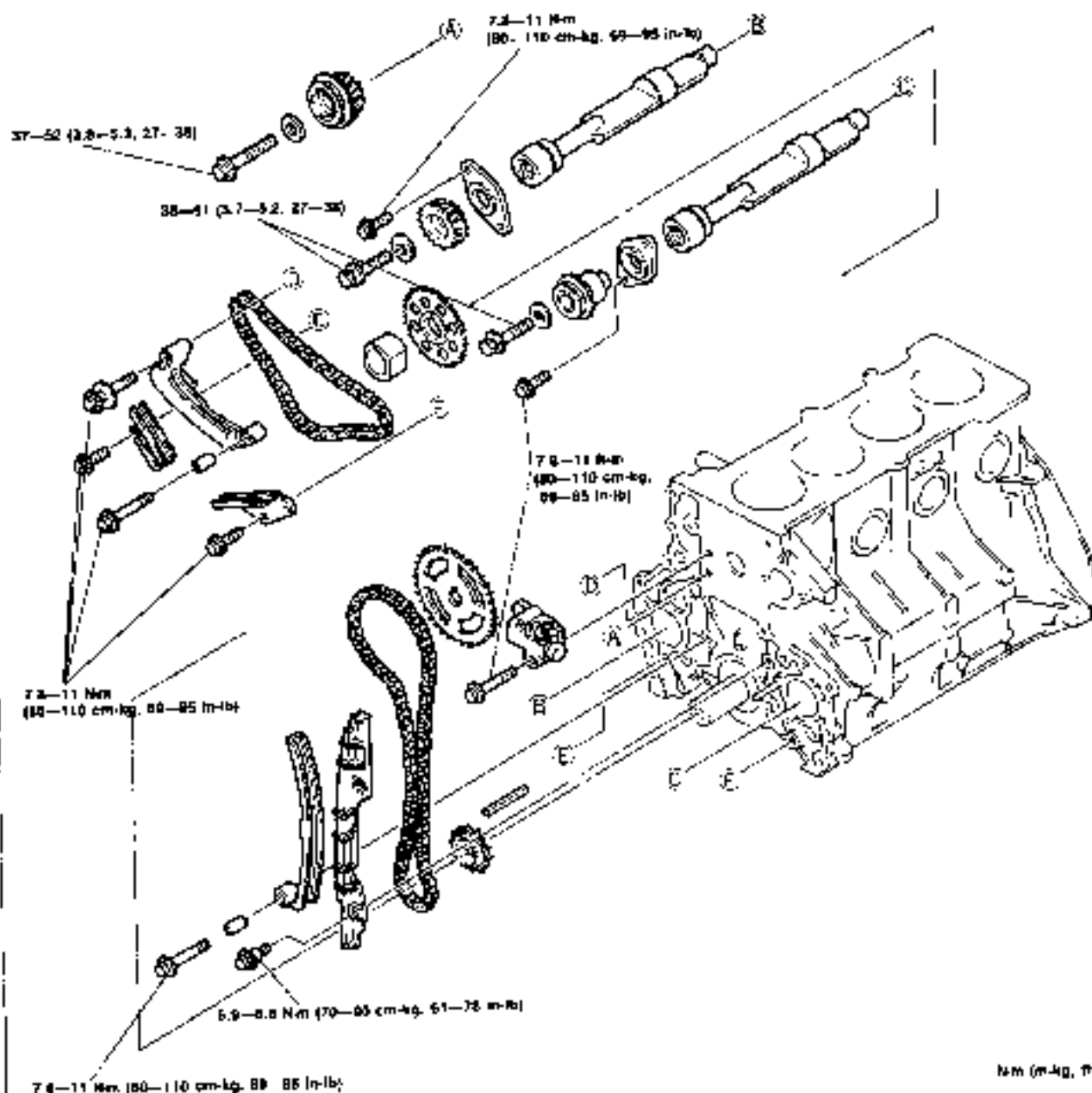
Install the clutch disc and clutch cover using the SST or equivalent.

(Refer to Section H.)

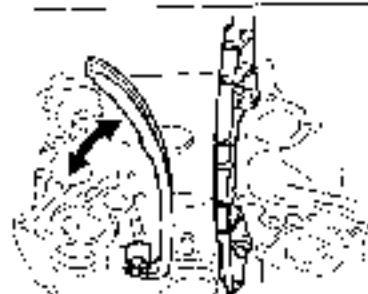
Tightening torque:

18—25 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

BALANCER CHAIN AND TIMING CHAIN Torque Specification

[illegible]

1164.174.2.1 H3



Chain Guide and Chain Lever

1. install the chain guide

Tightening torque:

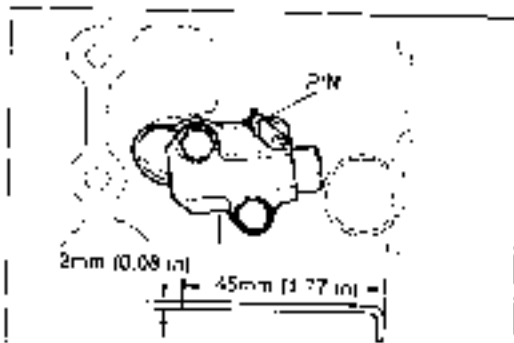
6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)

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

Tightening torque:

7.8–11 Nm (50–110 cm.kg; 59–95 in.-lb)

9.11.2.1.1



SKU252-164

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:

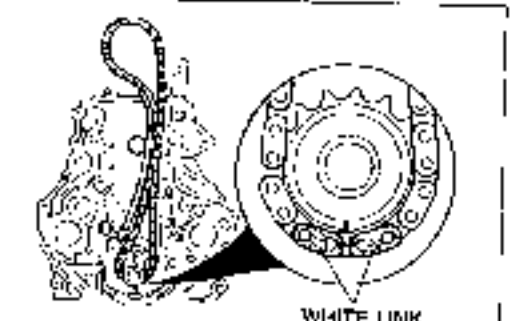
7.0—11 N·m (60—110 cm·kg, 69—95 in·lb)



9M_082-165

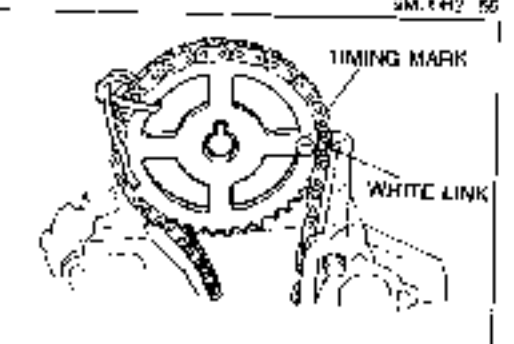
Timing Chain and Timing Gear

1. Install the key onto the crankshaft.



9M_042-55

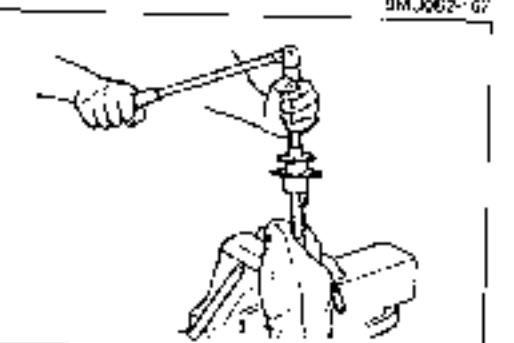
2. Install the timing chain and timing gear as shown.



9M_062-67

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.



9M_082-85

Left and Right Balance Shaft

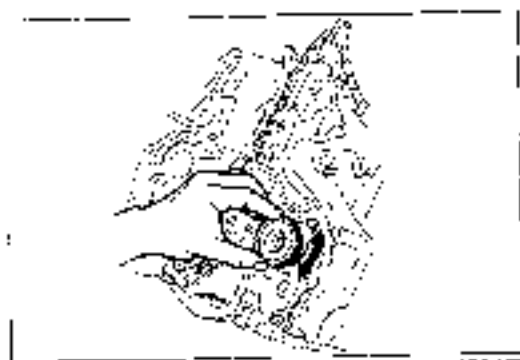
1. Assemble the left and right balance shaft.

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 balance shaft bushings and journals during installation.

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

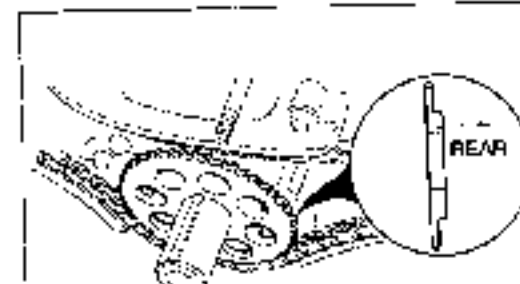


9VU.CB2.170

5. Tighten the thrust plate lock bolts.

Tightening torque:

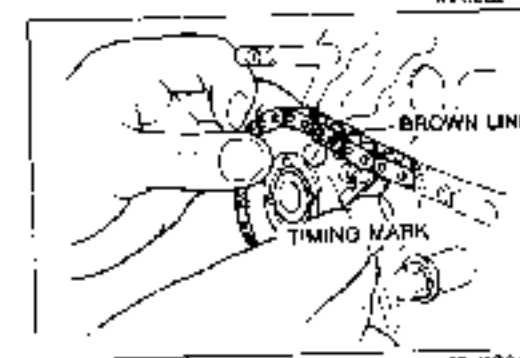
7.8—11 N·m (80—110 cm·kg, 59—95 in·lb)



9VU.CB2.171

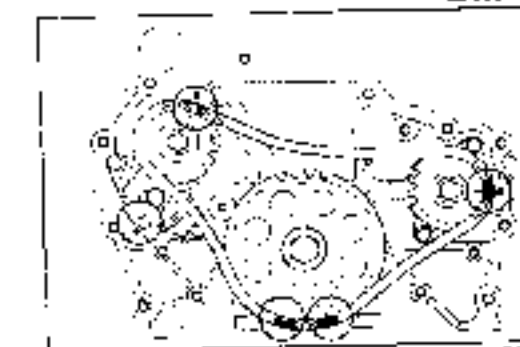
Balancer Chain

1. Install the crankshaft sprocket.



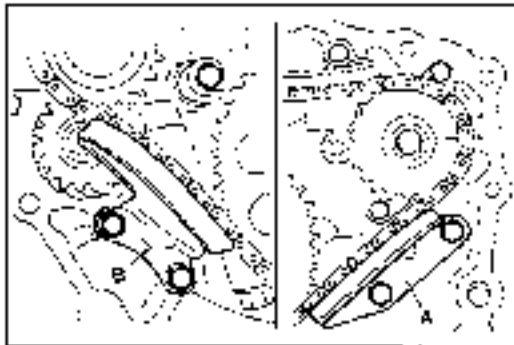
2B.J02.001

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.

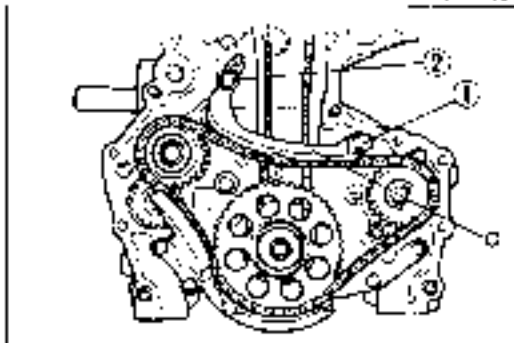


2DA.CB2.C33

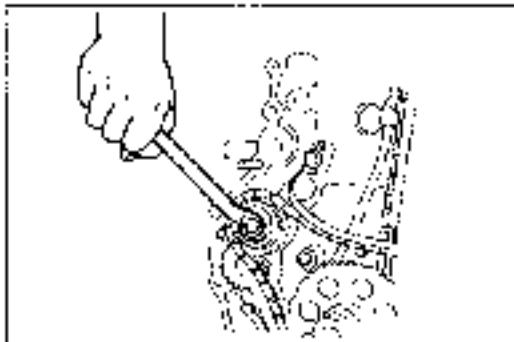
3. Install the balancer chain so that the five (5) alignment marks on the chain, sprocket, and block align, and attach the idler sprocket assembly to the cylinder block.
4. Loosely tighten the idler sprocket assembly lock bolt.



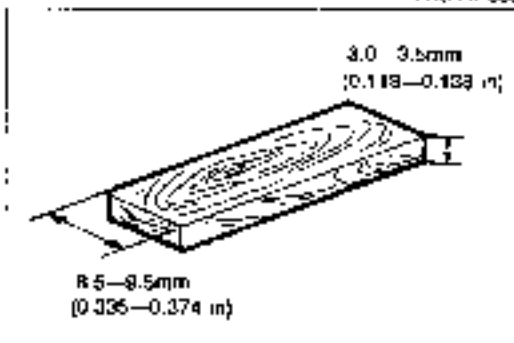
2E1000-034



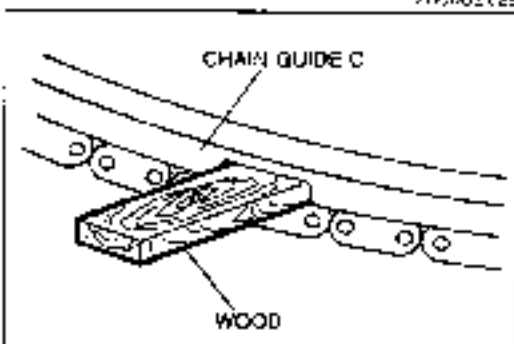
710722-035



2E1000-036



2E1000-037



2E1000-038

5. Install the chain guide A and B.

Tightening torque:

7.8—11 Nm (80—110 cm-kg, 69—95 in-lb)

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).

7. Tighten the idler sprocket assembly lock bolt.

Tightening torque:

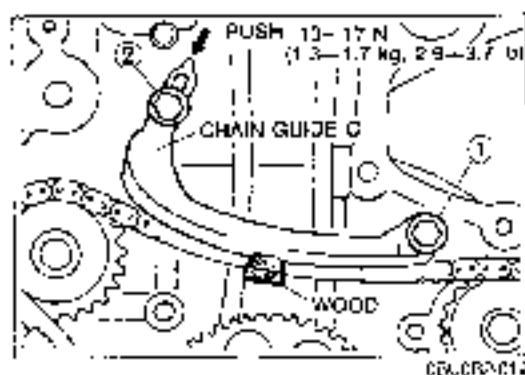
37—52 Nm (3.8—5.3 m-kg, 27—38 ft-lb)

8. Install the spacer.

Adjustment of balancer chain tension

1. Fabricate a piece of hard wood as shown.

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 (80—110 cm-k_g, 69—95 in-lb)

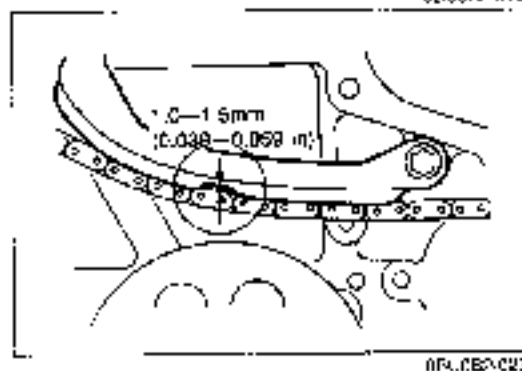
4. Remove the wood from between the chain and chain guide C.

Caution

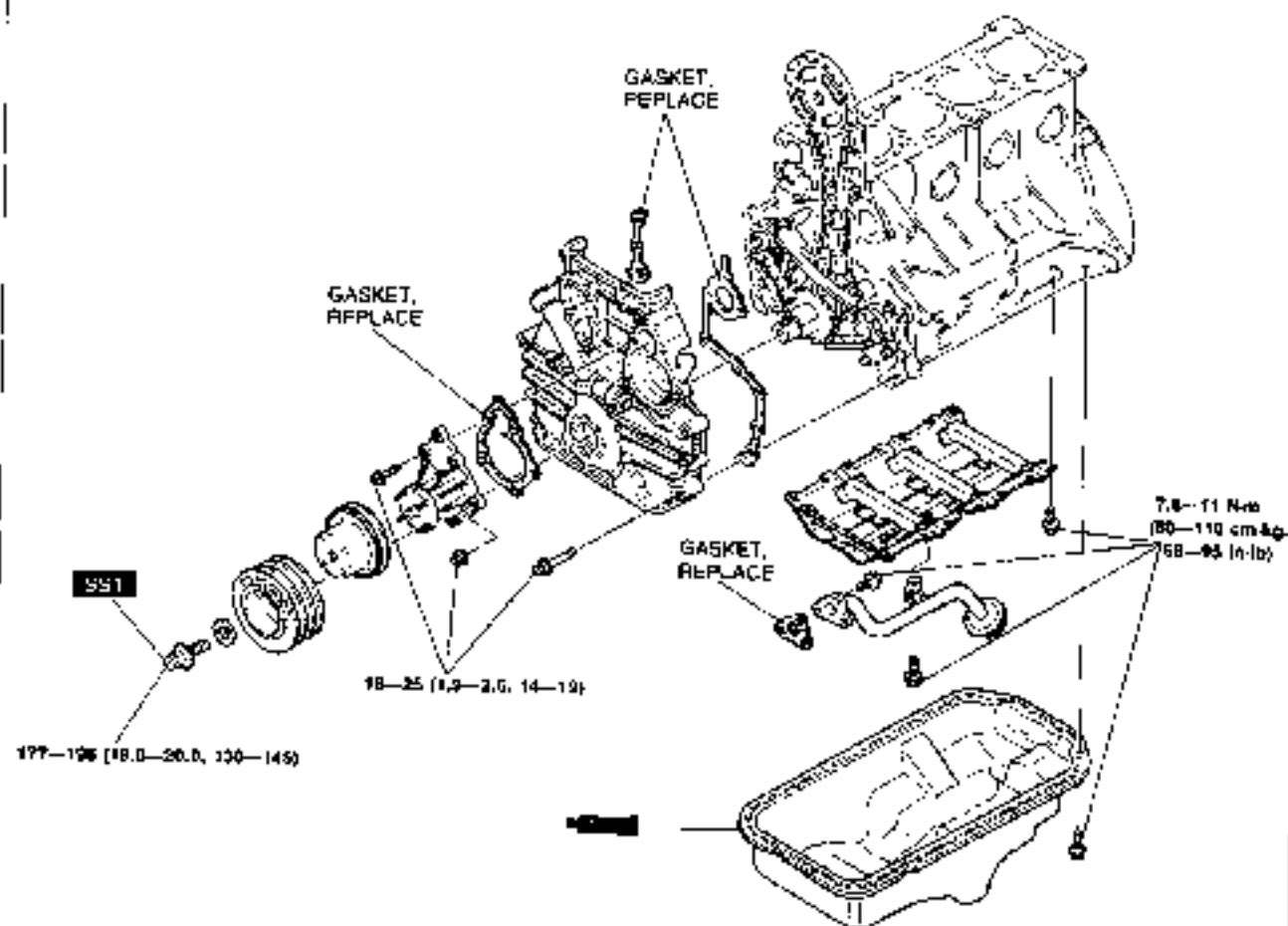
Do not leave any wood shavings around the chain and chain guide.

5. Measure the chain slack.

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

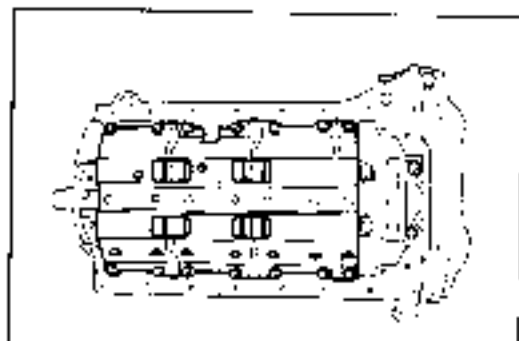


CHAIN CASE AND OIL PAN Torque Specifications



Nm (m-kp, ft-lb)

BMJ082-160



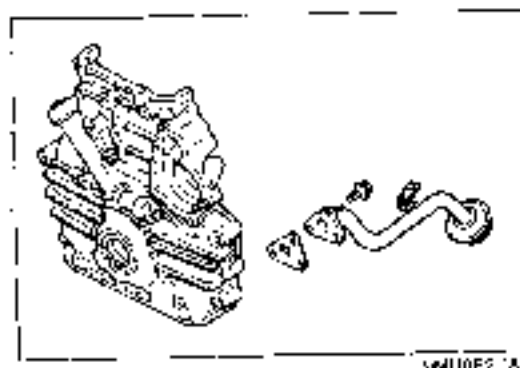
BMJ082-18*

Vibration Reducing Stiffener (VRS)

Install the vibration reducing stiffener.

Tightening torque:

7.8-11 Nm (80-110 cm-kp, 68-95 in-lb)

**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)

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.

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)

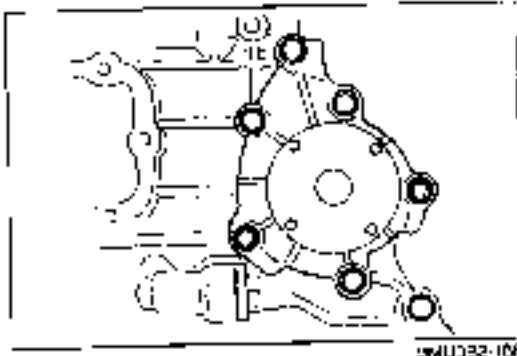
Water Pump

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

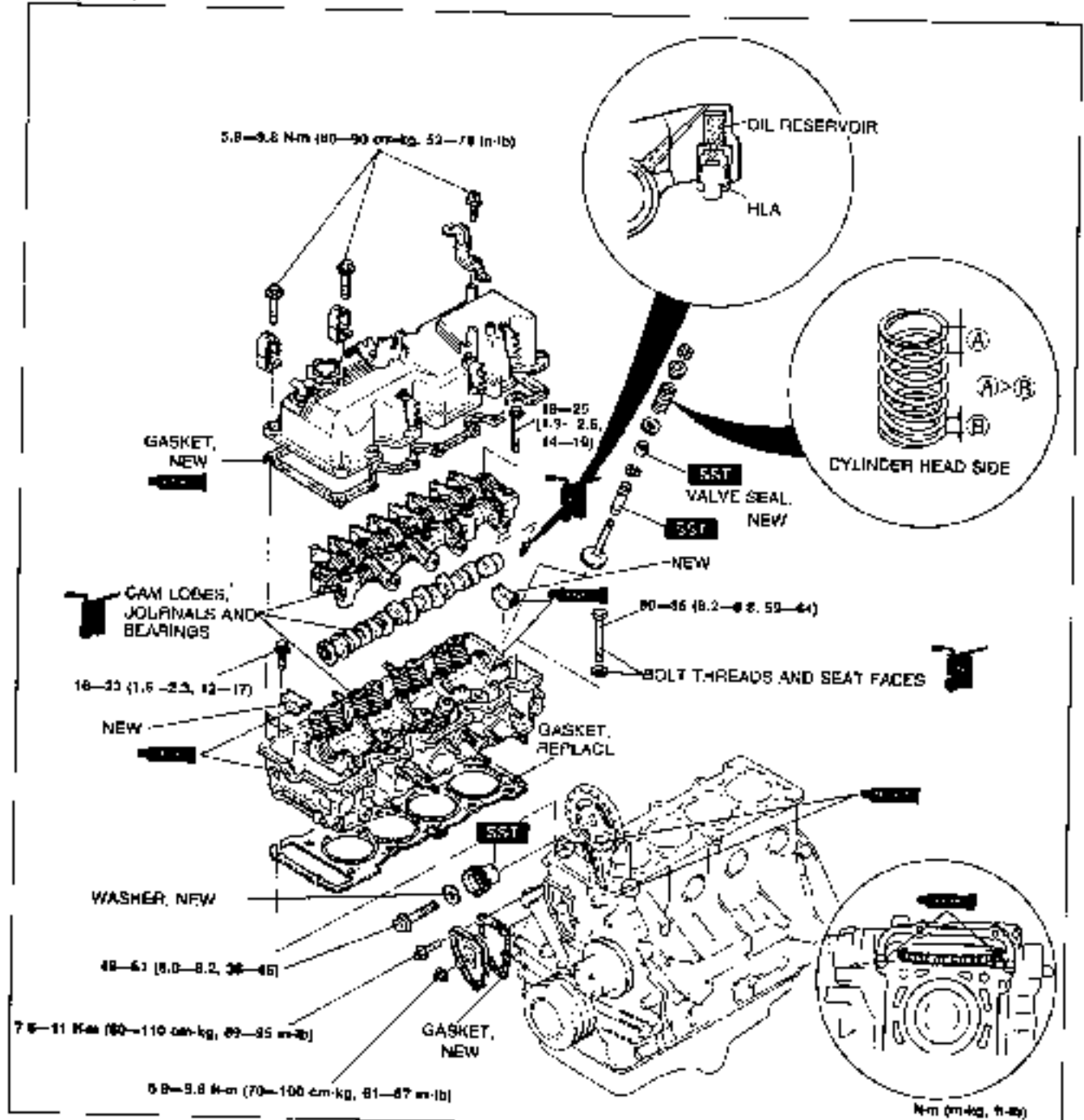
Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

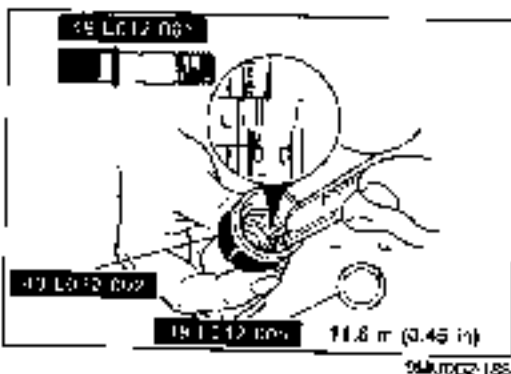
3. Temporarily install the water pump pulley.



CYLINDER HEAD Torque Specifications



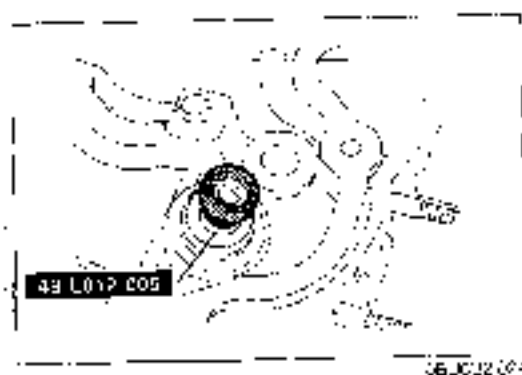
3M/C62-137



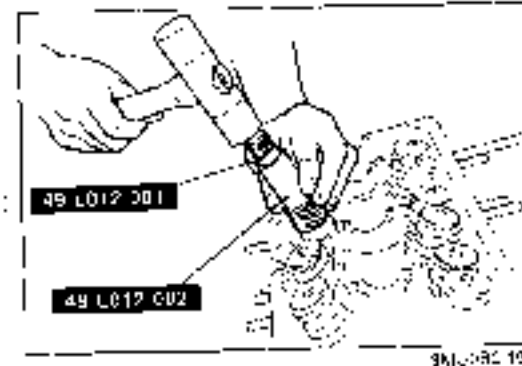
Valve Seal

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

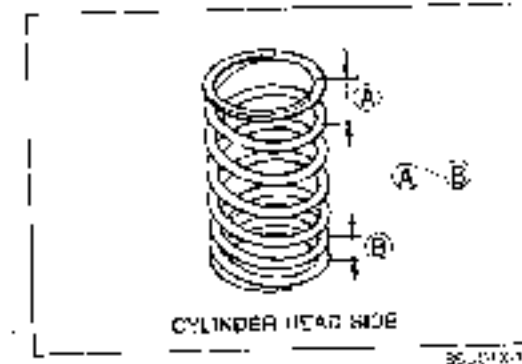
Depth L: 23.5—24.1 mm (0.925—0.949 in)



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.

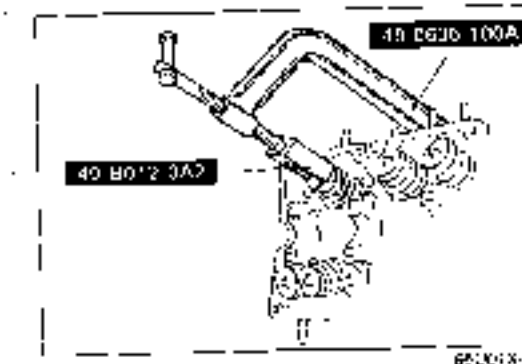


Valve and Valve Spring

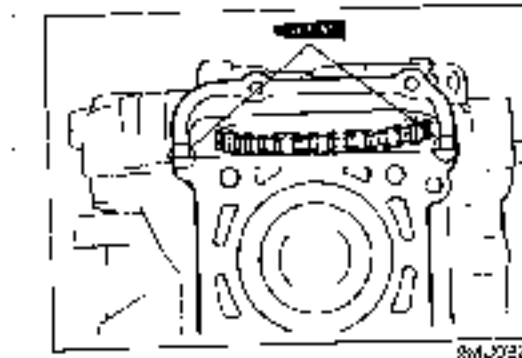
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve springs and the upper spring seat.

Note

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

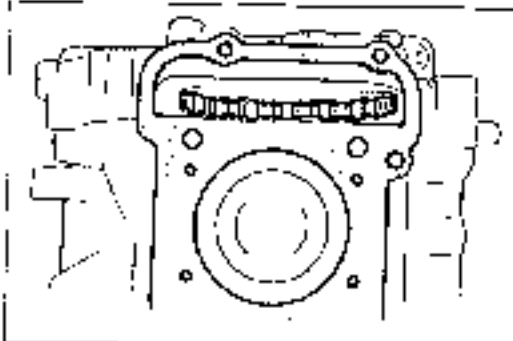


4. Compress the valve spring with the **SST**, then install the valve keepers.
5. Tap the end of the valve stem lightly two or three times with a plastic hammer to confirm that the keepers are all fully seated.

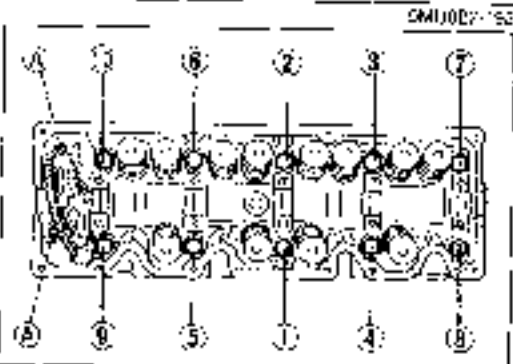


Cylinder Head Gasket

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.

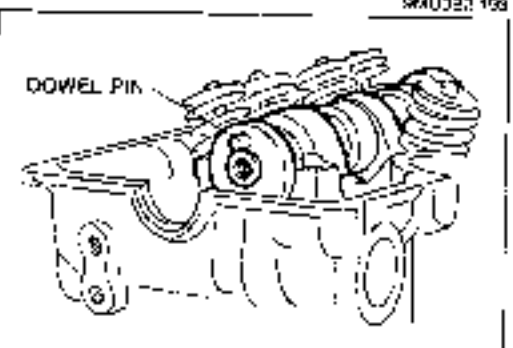
Tightening torque:

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 (1.6—2.3 m·kg, 12—17 ft·lb)



Camshaft

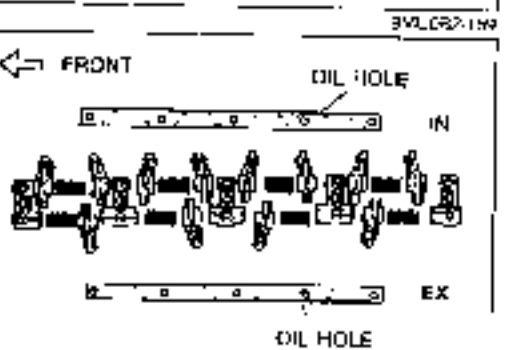
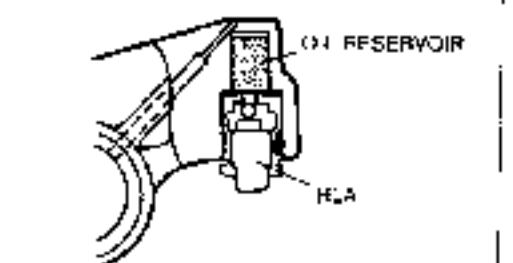
- Apply a liberal amount of engine oil to the journals and bearings.
- Place the camshaft in position with the dowel pin facing straight up.

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.

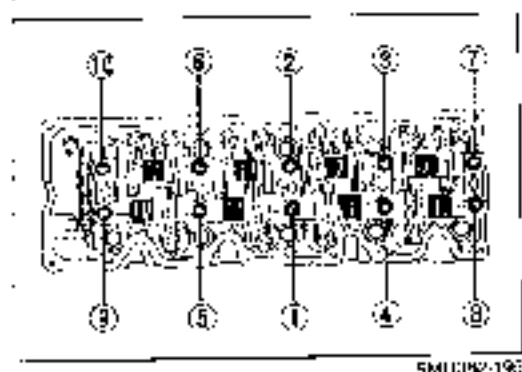


Camshaft Cap, Rocker Arm and Shaft Assembly

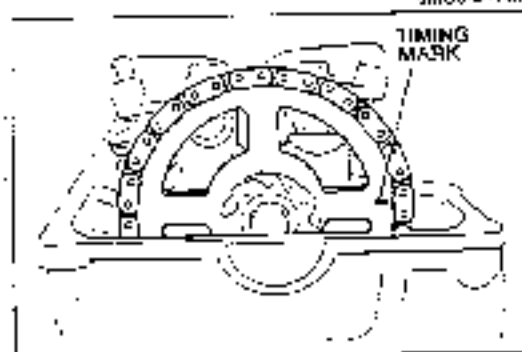
- Assemble the rocker arm and shaft assembly as shown in the figure according to the cap number and ← mark.

Note

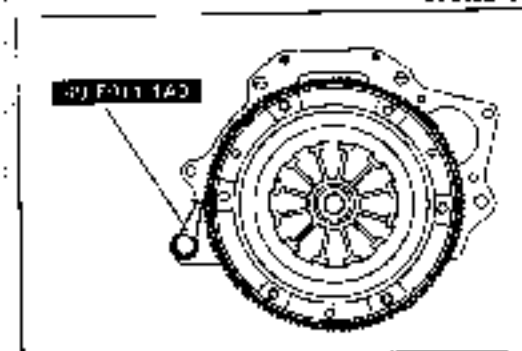
- The intake side shaft has twice as many oil holes as the exhaust side shaft.
- The No.4 camshaft cap has an oil hole from the cylinder head; be certain it is installed correctly.



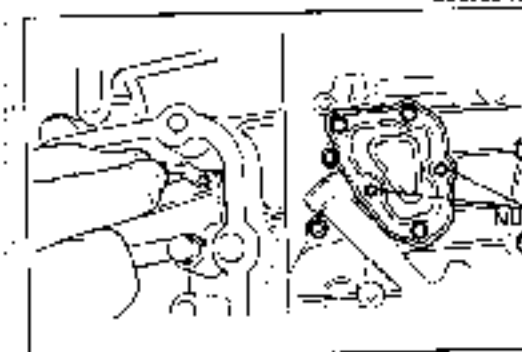
5M0342-193



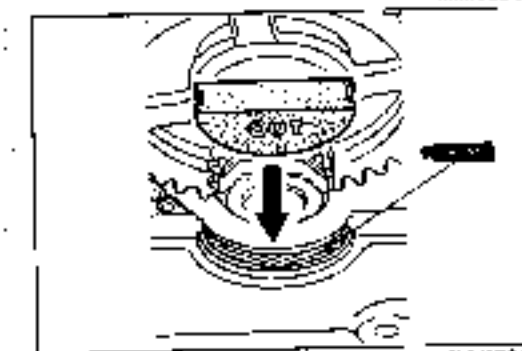
3VLCB2-186



23UD8E-190



CM1X02-026



3M1X02-029

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.

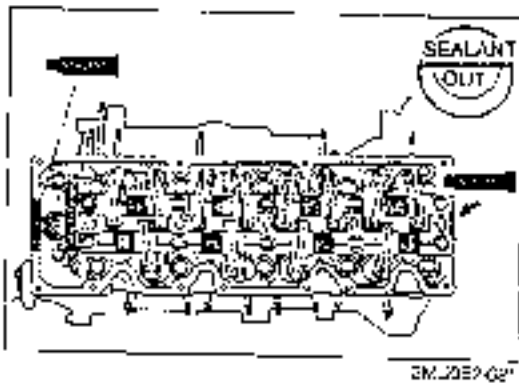
Tightening torque

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

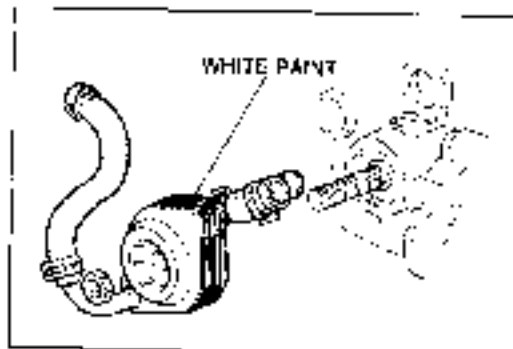
Apply sealant to the shaded area as shown, and install the new seal cover.

**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)



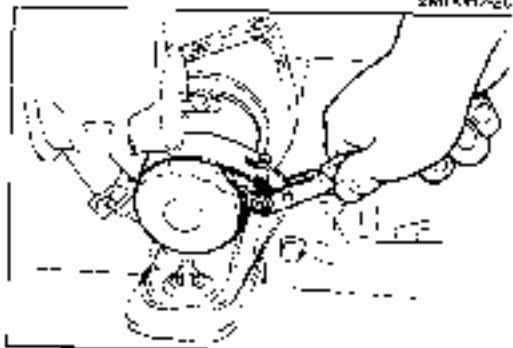
2M109A-203

Oil Cooler

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

Tightening torque:

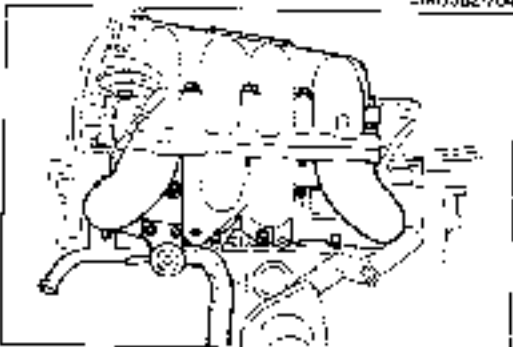
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



2M109B-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.



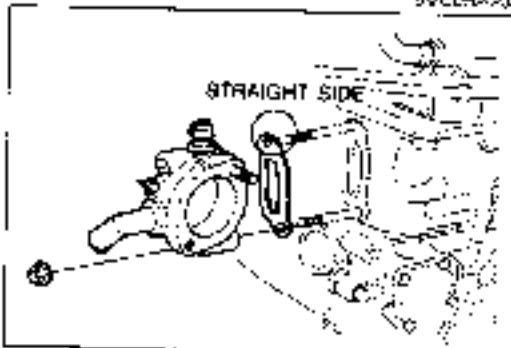
2M109C-705

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)



2M109D-026

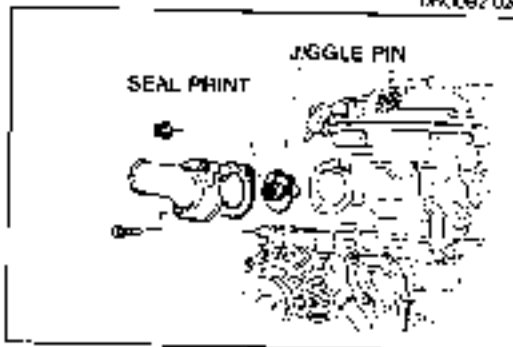
Water Outlet

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.



2M109E-027

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:

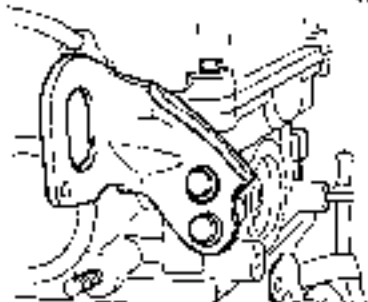
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

FRONT



SMU002-205

REAR



SMU002-206

Engine Hanger

Install the front and rear engine hangers.

Tightening torque:

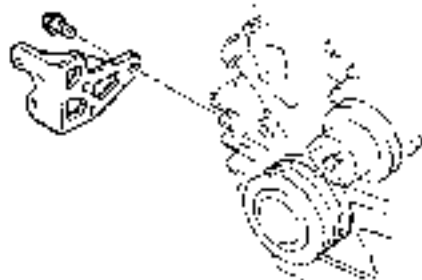
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

P/S Oil Pump Bracket

Install the P/S oil pump bracket.

Tightening torque:

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

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



SMU002-203

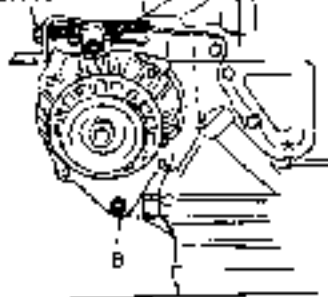
2. Install the alternator.

Tightening torque

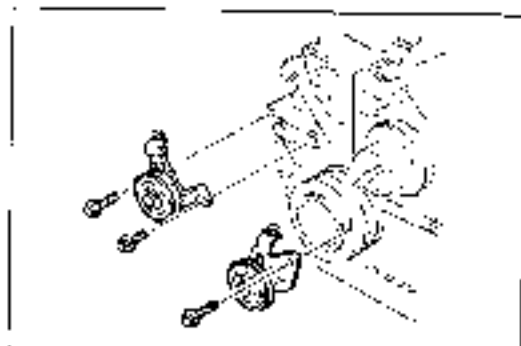
Bolt A: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

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

ADJUSTING BOLT



SMU002-210



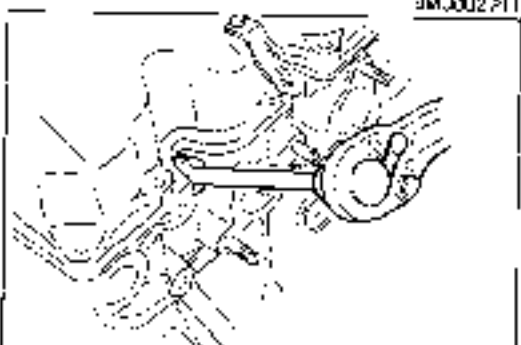
3M, J002 P11

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)



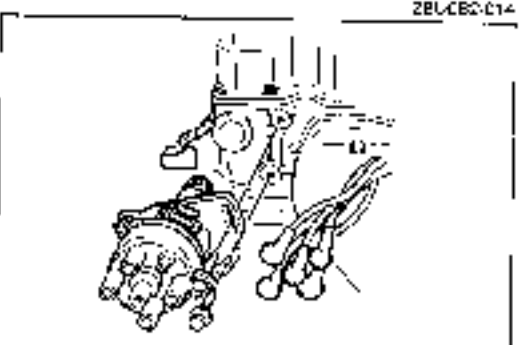
ZEL-CE2-C14

Spark Plug

Install the spark plugs.

Tightening torque:

15—23 Nm (1.5—2.3 m·kg, 11—17 ft·lb)



5M11092-2*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

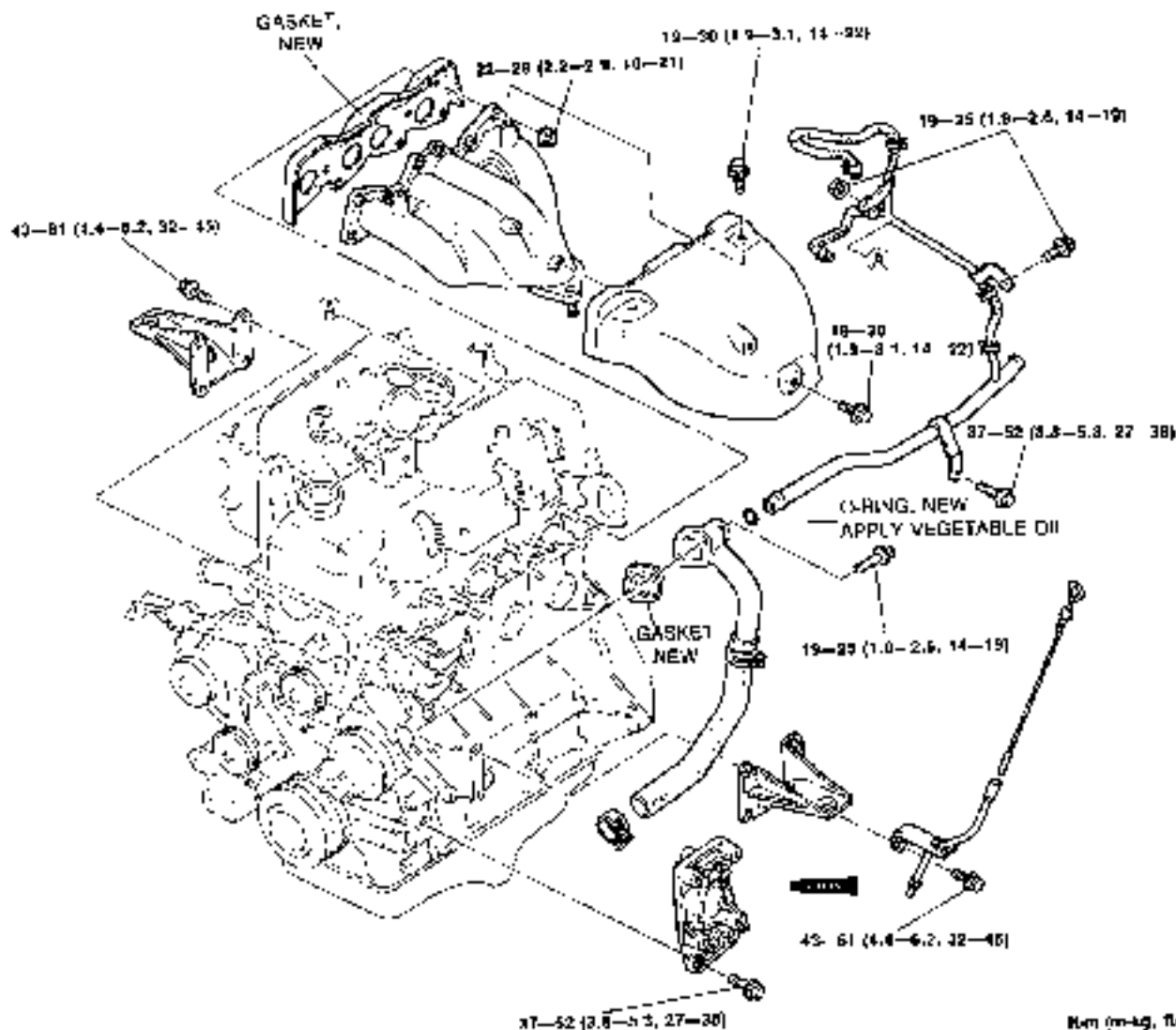
Install the high-tension leads.

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



Nm (m·kg, ft·lb)

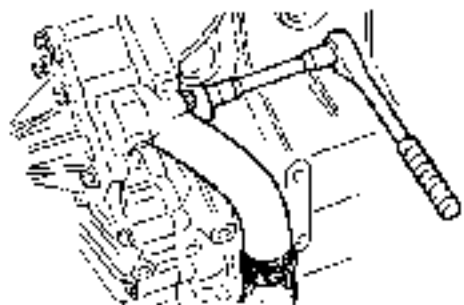
SM118227

Coolant Inlet Pipe and Bypass Pipe

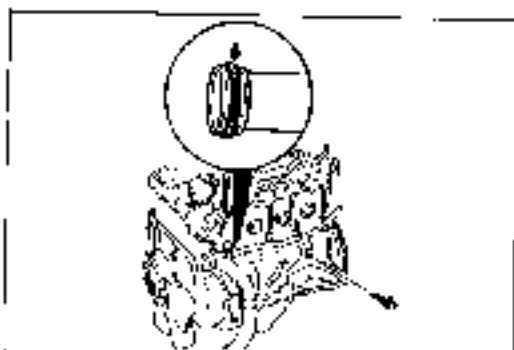
1. Install the coolant inlet pipe with a new gasket.

Tightening torque:

19-25 Nm (1.8-2.6 m·kg, 14-19 ft·lb)



3M J2712-4

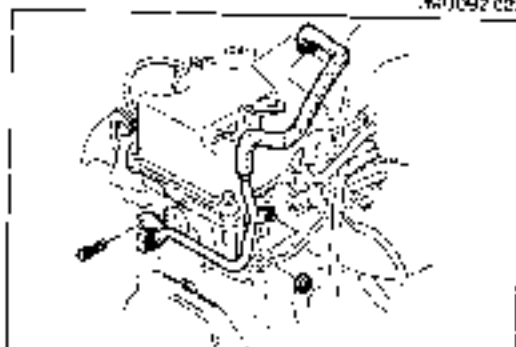


391UC92 023

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)



391UC92 016

4. Tighten the intake manifold nut.

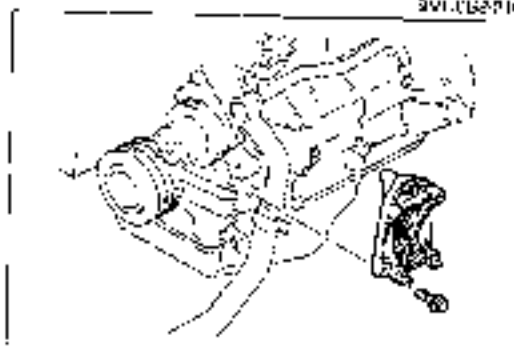
Tightening torque:

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)



391UC92 017

6. Connect the water hose to the BAC valve.

A/C Compressor Bracket

Install the A/C compressor bracket.

Tightening torque:

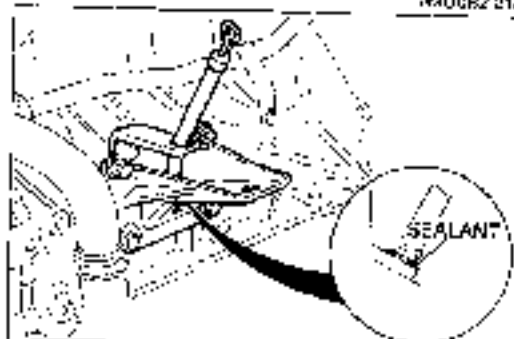
37—52 Nm (3.8—5.3 m·kg, 27—38 ft·lb)



391UC92 018

Oil Level Gauge Pipe and Left Engine Mount

1. Tap in the oil level gauge pipe.



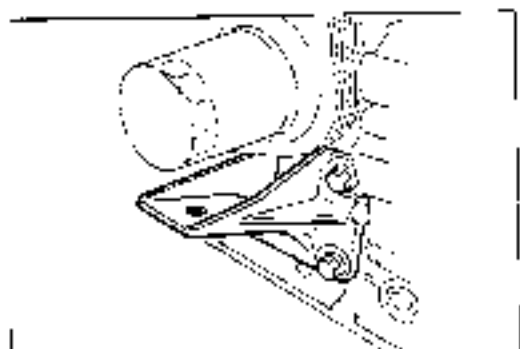
391UC92 019

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)

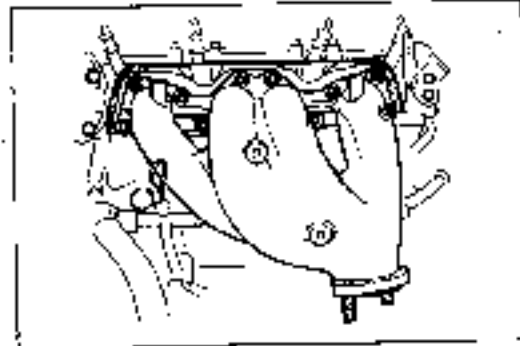
5. Install the oil level gauge.



BMJ002-220

Right Engine Mount

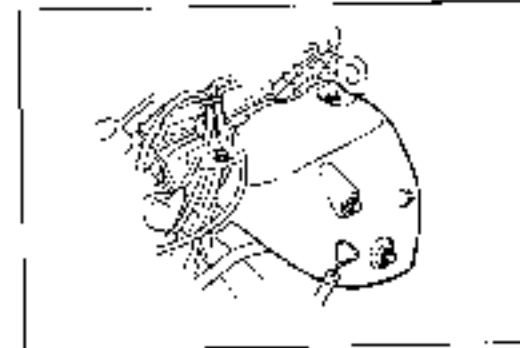
Install the right engine mount.

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

BMJ002-221

Exhaust Manifold

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

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

BMJ002-222

Exhaust Manifold Insulator

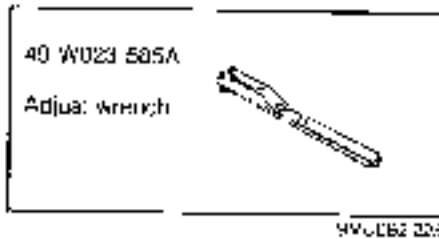
Install the exhaust manifold insulator.

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

INSTALLATION

PREPARATION

SST

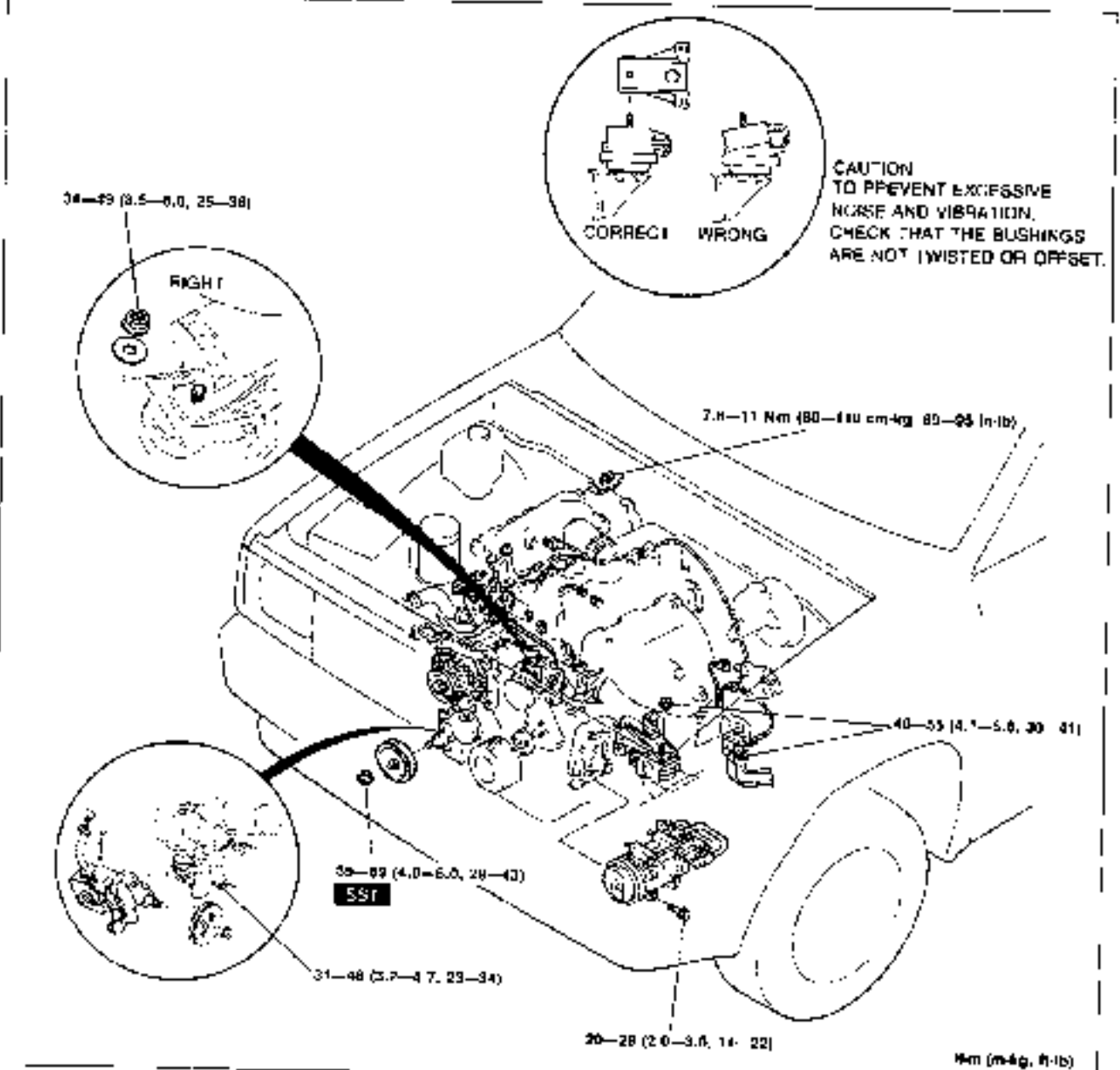


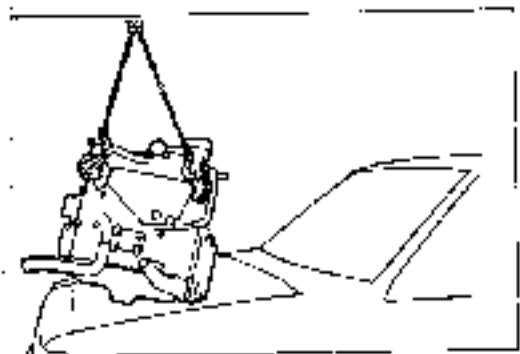
Tighten all bolts and nuts to the specified torques

Warning: Be sure the vehicle is securely supported.

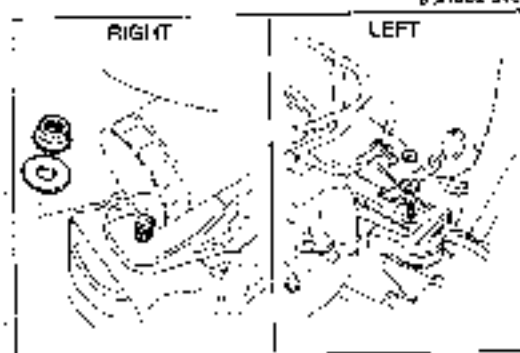
STEP 1

Torque Specifications





8910B2 246



6D-082 C11

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 N·m (3.5—5.0 m·kg, 25—36 ft·lb)

Exhaust Pipe and Bracket

1. Install the exhaust pipe.

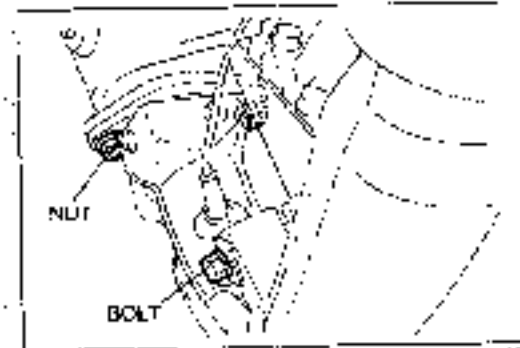
Tightening torque

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

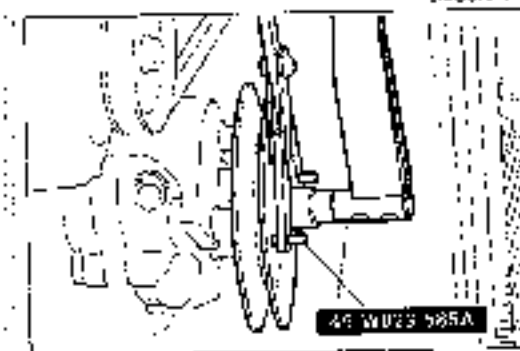
2. Tighten the bracket bolt.

Tightening torque

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



94U010-21



511K62 663

P/S Oil Pump

1. Install the P/S oil pump

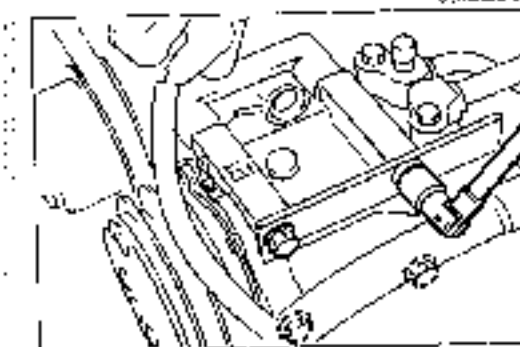
Tightening torque:

31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)

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

Tightening torque:

39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)



63J02 077

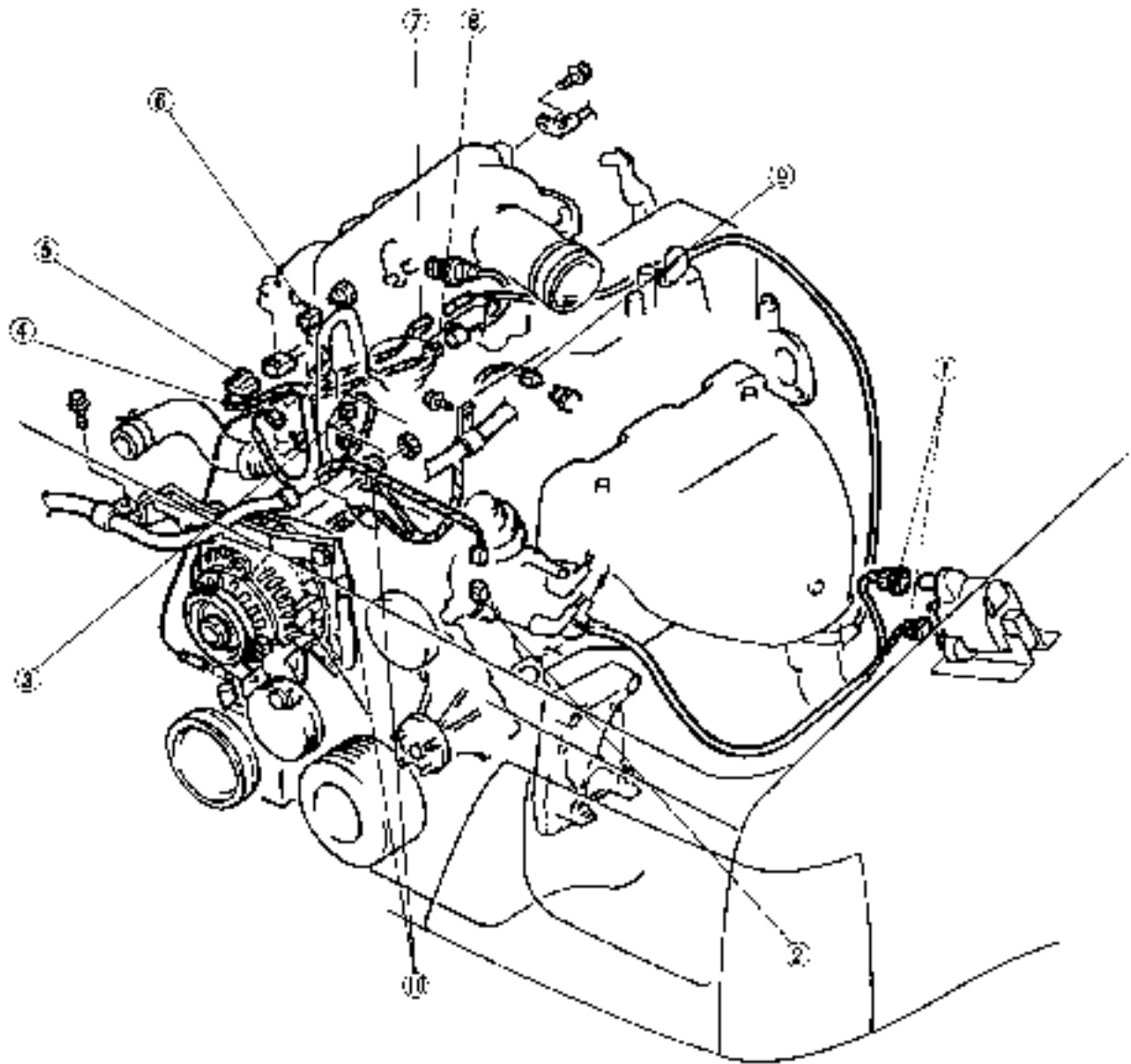
A/C Compressor

1. Install the A/C compressor.

Tightening torque:

39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)

Emission Harness Connectors

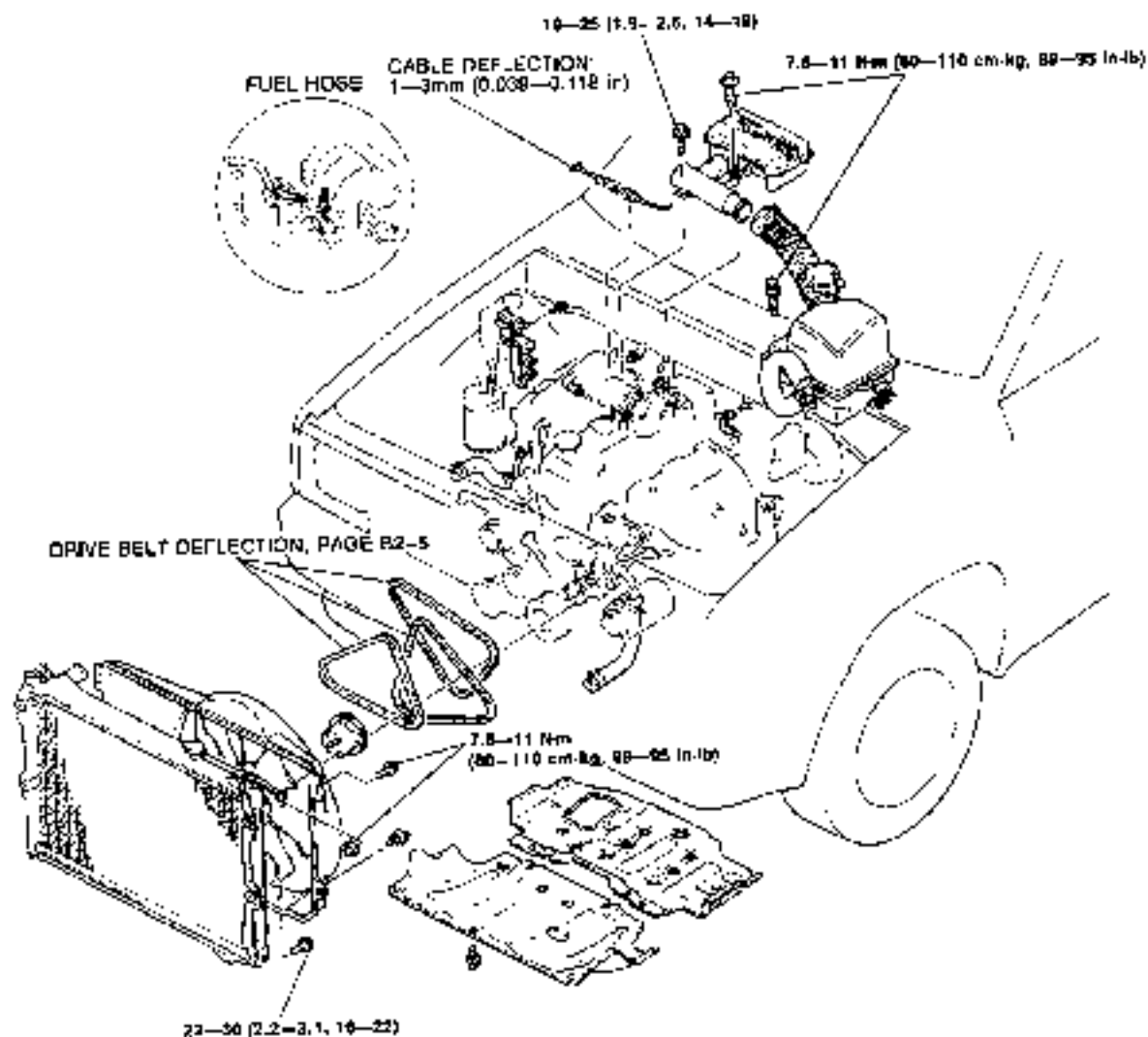


1. IG coil
2. Distributor
3. Water thermostat
4. Fuel gauge unit
5. Injector harness

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

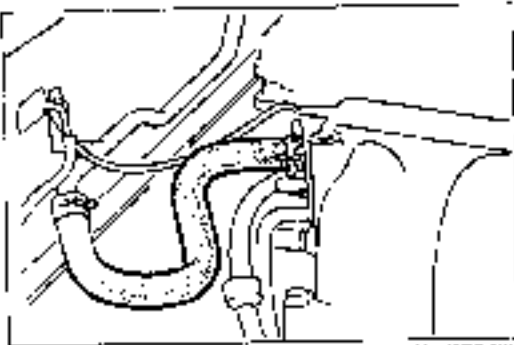
81A0062 237

STEP 3 Torque Specifications

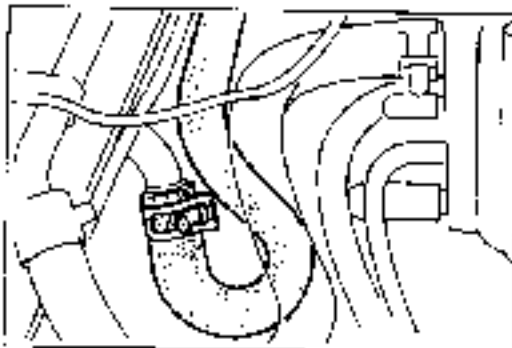


N·m (m·kg, ft·lb)
931.107-255

Brake Vacuum Hose
Connect the brake vacuum hose.



9M-J0922-03R



9MJC03-240

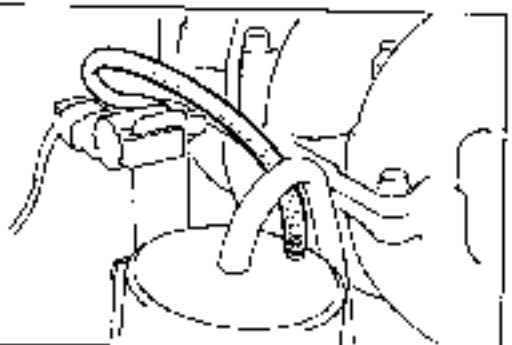
Heater Hose

Connect the heater hoses.



Canister Hose

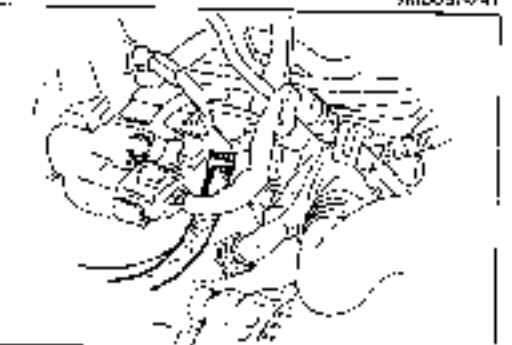
Connect the canister hose.



9MJC03-241

Fuel Hoses

Connect the fuel hoses.



9VLCB2-242

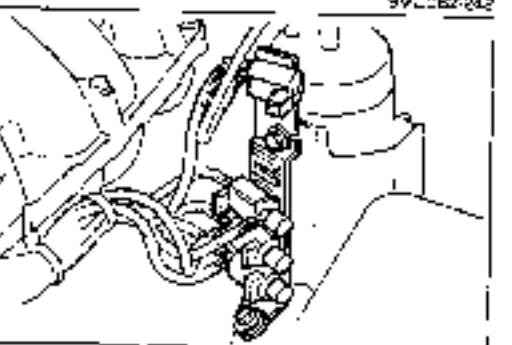
Solenoid Valve

1. Install the solenoid valve.

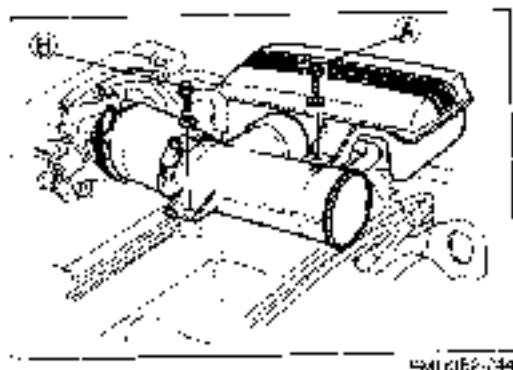
Tightening torque:

7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)

2. Connect the emission harness connector.



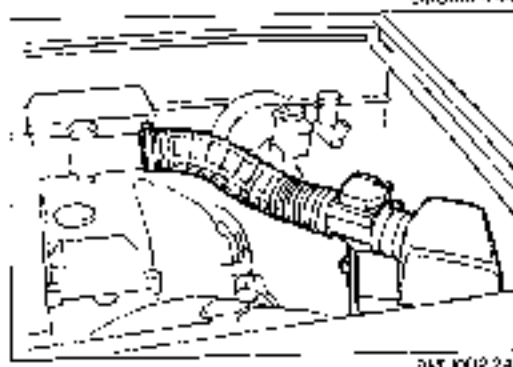
9MJC03-242

**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)

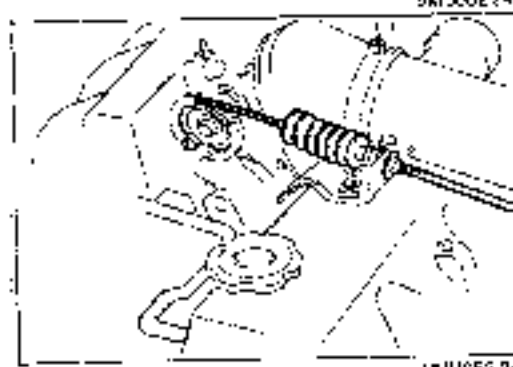
**Air Cleaner**

1. Install the air cleaner.

Tightening torque:

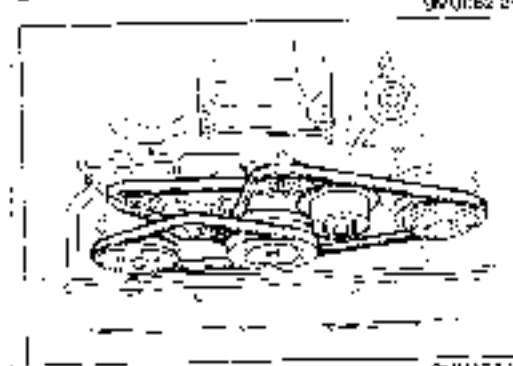
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)

2. Connect the airflow meter connector.

**Accelerator Cable**

Install the accelerator cable.

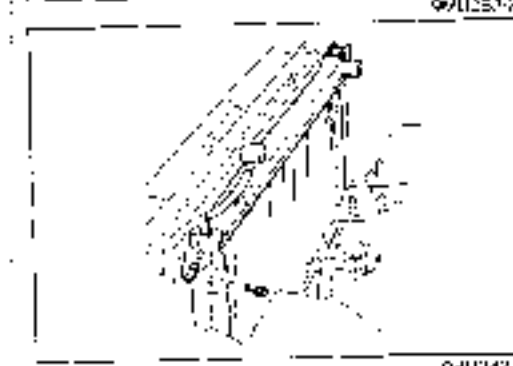
Cable deflection: 1—3mm (0.039—0.118 in)

**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.

**Radiator**

1. Install the radiator.

Tightening torque:

22—30 Nm (2.2—3.1 m·kg, 16—22 ft·lb)

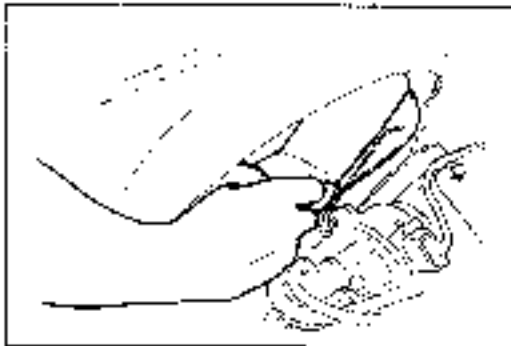
2. Connect the radiator harness, and coolant reservoir hose.
3. Connect the oil cooler hoses. (AT)

- 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.

90A0152-240



90A022-047

Cooling Fan and Radiator Cowling

Install the cooling fan and radiator cowling.

Tightening torque:

7.8—11 N·m (80—110 cm·kg, 68—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

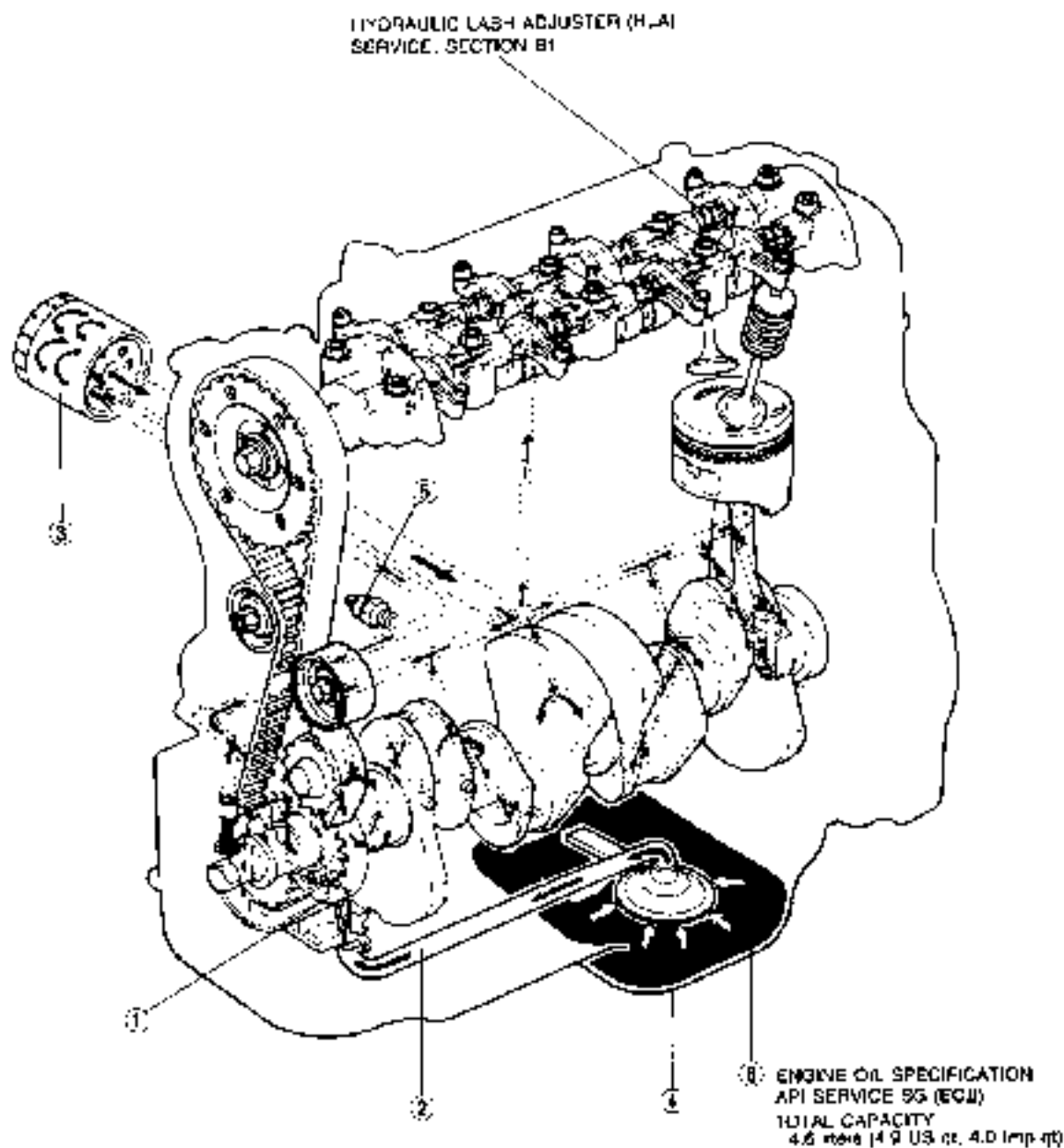
LUBRICATION SYSTEM

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OIL PRESSURE.....	D- 6
ON-VEHICLE MAINTENANCE	D- 7
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OIL FILTER.....	D- 7
OIL COOLER (G6 ENGINE).....	D- 7
OIL PAN.....	D- 8
OIL PUMP.....	D-11

CD: G6A 301

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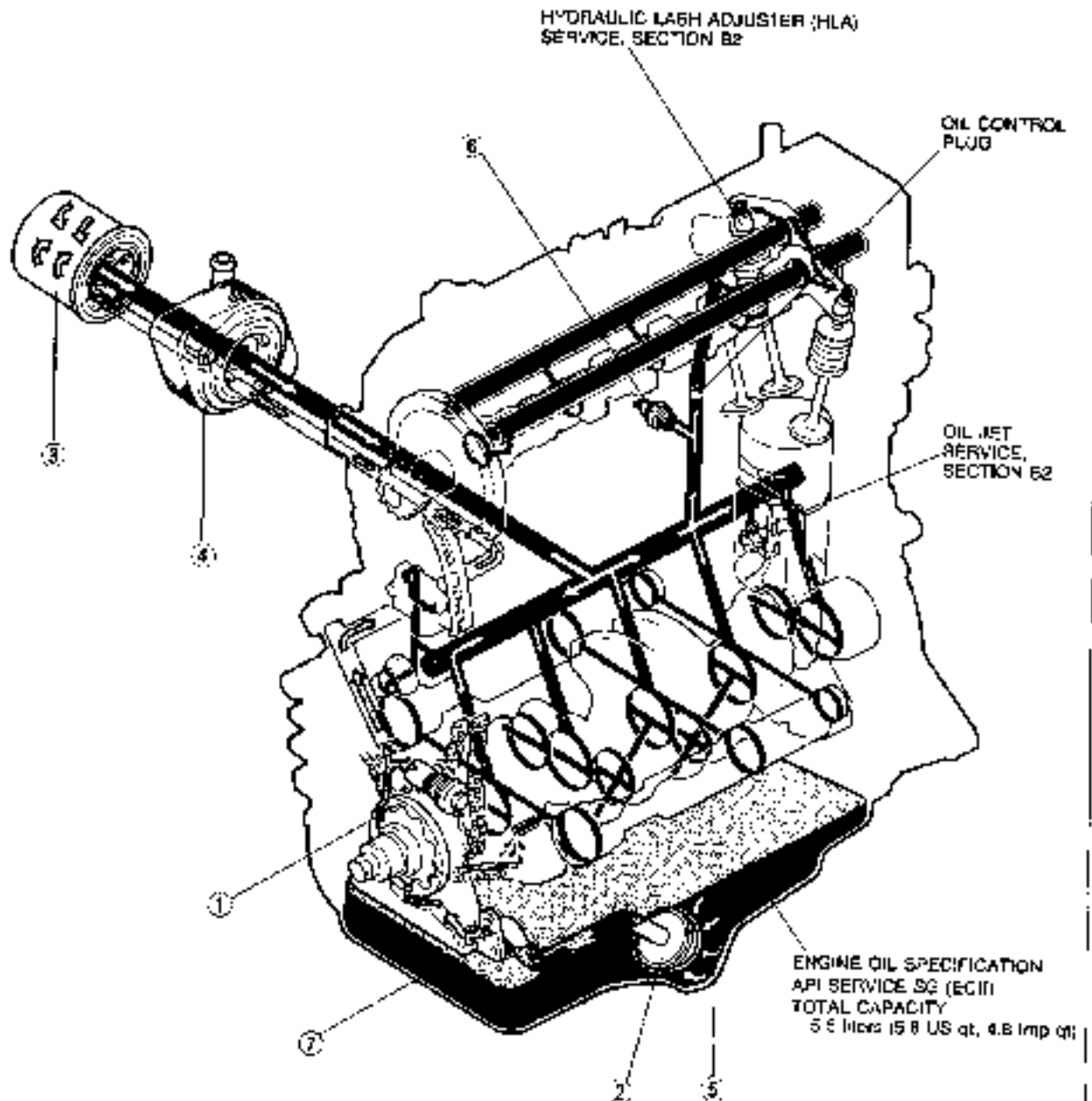
B2200 (F2 ENGINE)



3MJCUX-700

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				

B2600i (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

24000003

OUTLINE

SPECIFICATIONS
F2 ENGINE

Lubrication system			Force-fed type
Oil pump	Type		Trochoid gear
	Relief pressure	kPa (kg/cm ² , psi)	294—392 (3.0—4.0, 43—57)
Oil filter	Type		Full-flow paper element
	Relief pressure differential	kPa (kg/cm ² , psi)	78—118 (0.8—1.2, 11—17)
Oil pressure switch activation pressure			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)

16U0-0-001

G6 ENGINE

Lubrication system			Force-fed type
Oil pump	Type		Trochoid gear
	Relief pressure	kPa (kg/cm ² , psi)	392—491 (4.0—5.0, 57—71)
Oil filter	Type		Full-flow paper element
	Relief pressure differential	kPa (kg/cm ² , psi)	75—118 (0.0—1.2, 11—17)
Oil pressure switch activation pressure			29 (0.3—4.3)
Oil capacity	Total (dry engine)	liters (US qt, Imp qt)	5.5 (5.8, 4.8)
	Oil pan	liters (US qt, Imp qt)	4.5 (4.8, 4.0)
	Oil filter	liter (US qt, Imp qt)	0.22 (0.23, 0.19)
Engine oil			API service SG Energy Conserving II (EC II)

16U004-002

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									

16U004-003

TROUBLESHOOTING 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 R1 (F2 engine) or R2 (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 R1 (F2 engine) or R2 (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	—

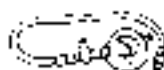
99L C0X 007

ON-VEHICLE INSPECTION

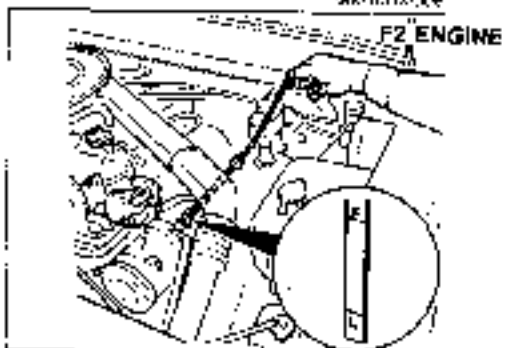
PREPARATION

SST

49 0187 2R0

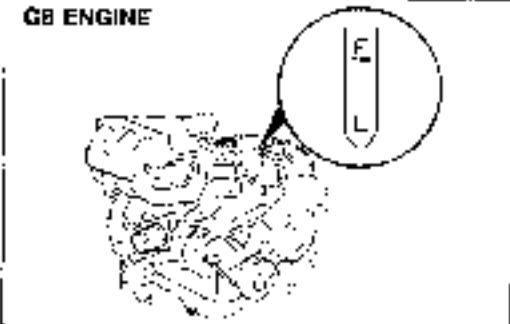
Oil-pressure
gauge

99L C0X 007



99L C0X 007

G6 ENGINE



99L 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.

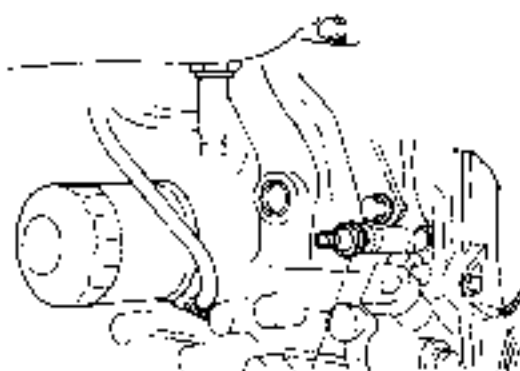
Oil pressure

kg/cm² (psi)

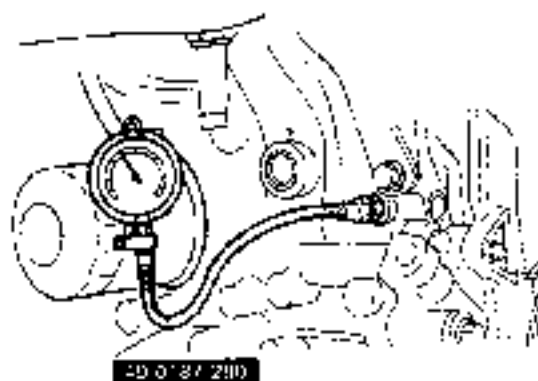
Engine	F2	G6
1,000 rpm	147—245 (1.6—2.6, 24—36)	108—206 (1.1—2.1, 16—30)
3,000 rpm	284—392 (3.0—4.0, 43—57)	304—402 (3.1—4.1, 44—58)

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)

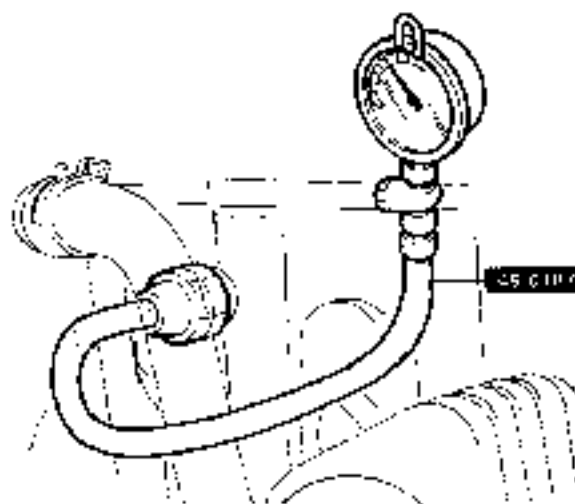


10.0/27.2/200

G6 ENGINE



12—18 Nm (1.2—1.8 m·kg, 8.7—13 ft·lb)

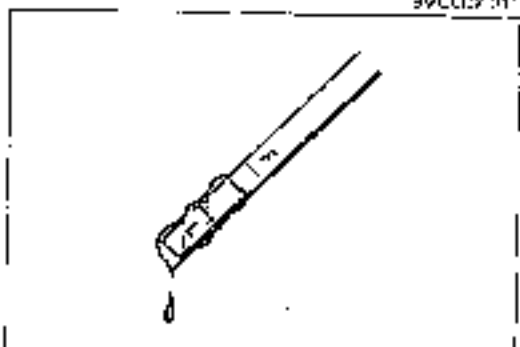


15.0/10/280

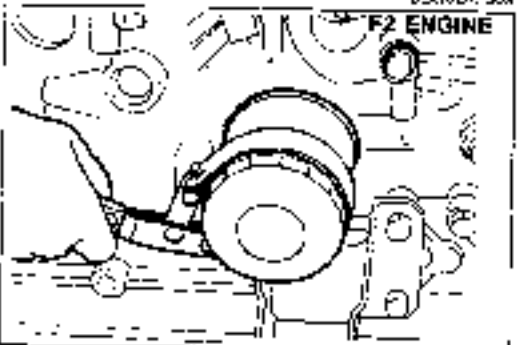
FLS170X003



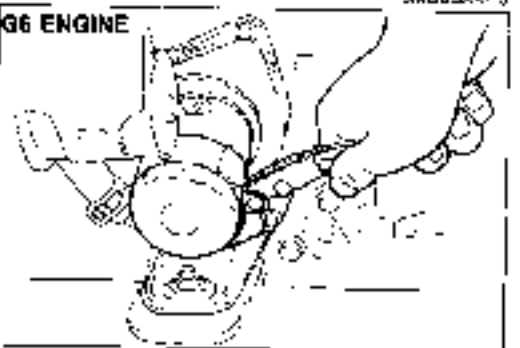
3VULC07 011



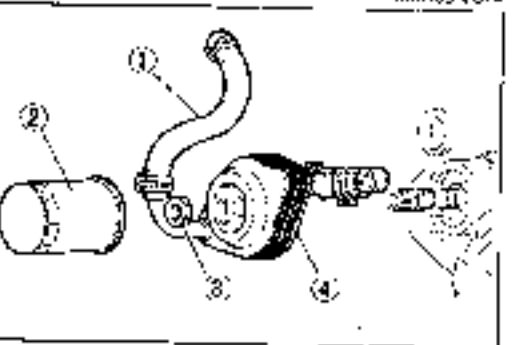
3VULC07 009



3VULC07 010



3VULC07 012



3VULC07 014

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:

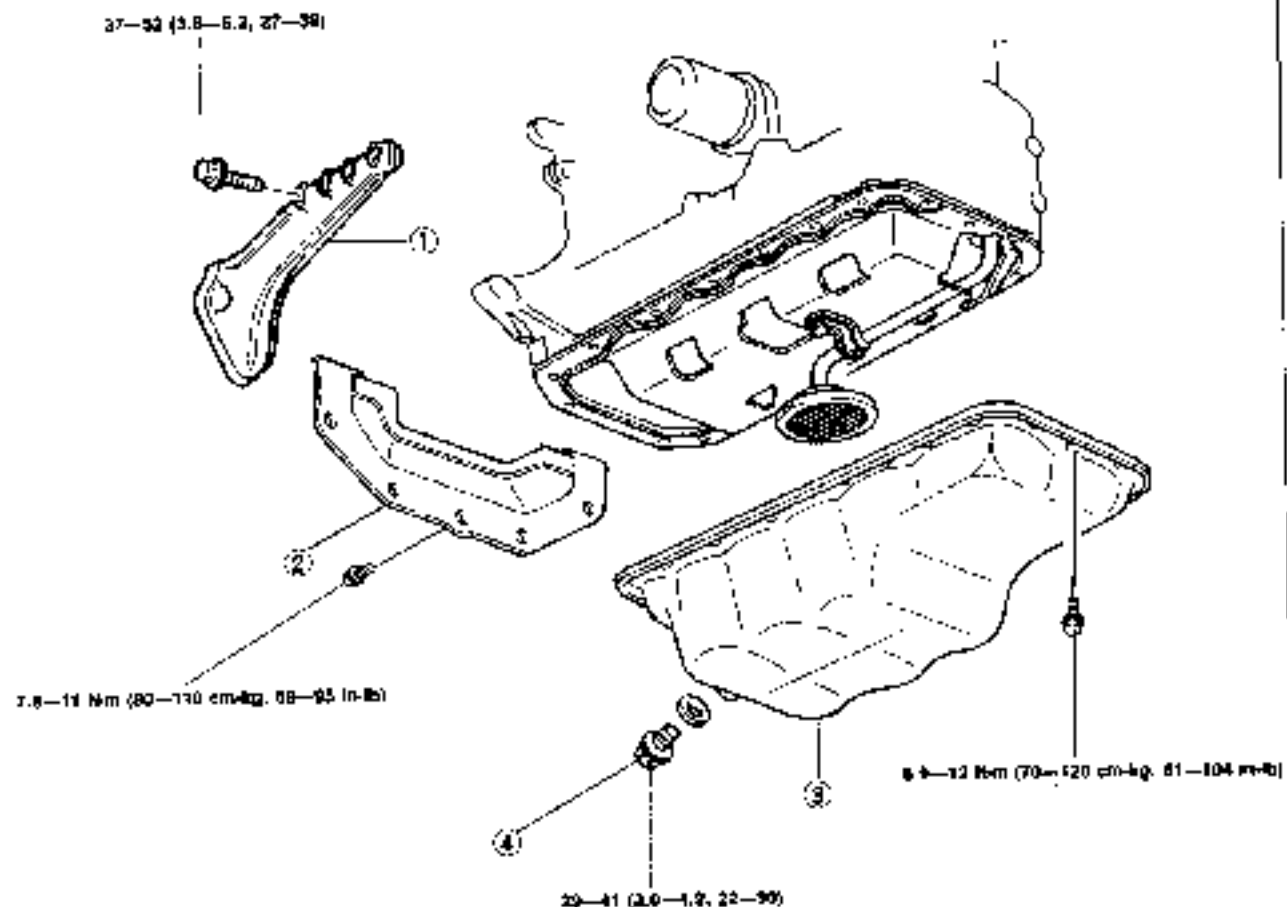
29—39 Nm (3.0—4.0 m·kg, 22—29 ft·lb)

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

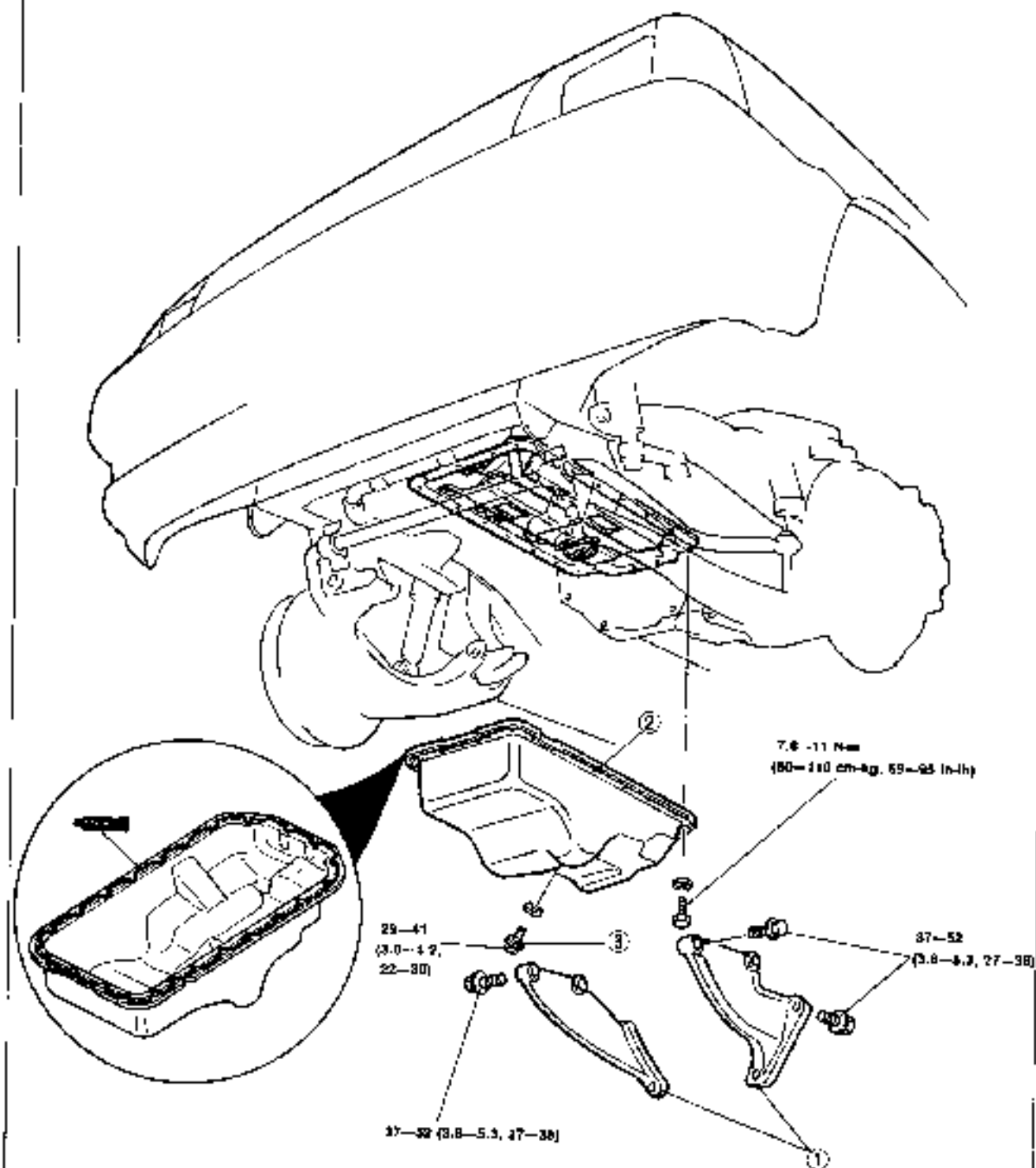


1. Gasket plate
2. Clutch undercover
3. Oil pan

Inspect for cracks, deformation, or damage

4. Drain plug
Inspect for damage to threads

GB ENGINE



1. Gasket plate

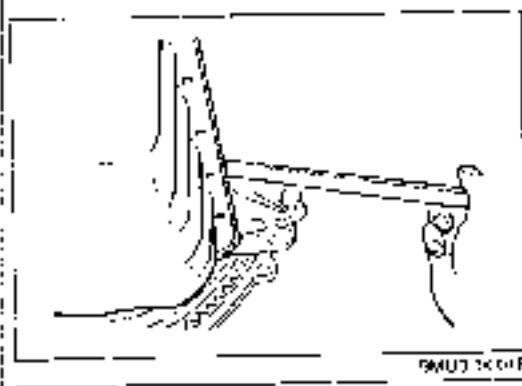
2. Oil pan

Inspect for cracks, deformation, or damage

3. Drain plug

Inspect for damage to threads

N-m (m-kg, ft-lb)
GB-277X-006

**Removal note****Oil pan**

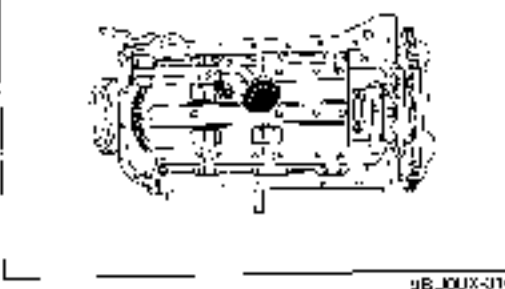
1. Remove the oil pan mounting bolts.
2. Insert a scraper or a suitable tool between the oil pan and the cylinder block to separate them.
3. Remove the oil pan.

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**Installation note****Oil pan**

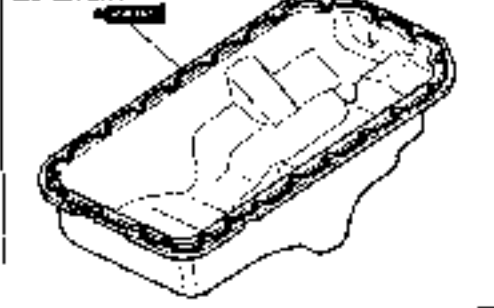
1. Remove any old sealant from the bolts and bolt holes. If the old sealant can not be removed, replace the bolts as necessary.
2. Remove any dirt or other material from the contact surfaces.
3. (With gasket)
Apply sealant to the shaded areas shown in the figure (G6 engine). Then install a new gasket.

(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**

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

Note

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

5. Install the oil pan.

Tightening torque:

6.9—12 N·m

(70—120 cm·kg, 51—104 in·lb) F2 Engine

7.8—11 N·m

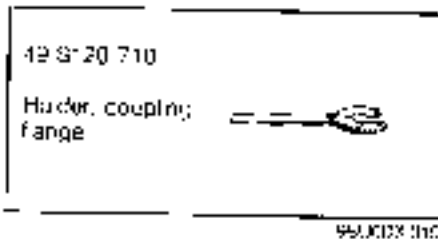
(80—110 cm·kg, 69—95 in·lb) G6 Engine

Step After Installation

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

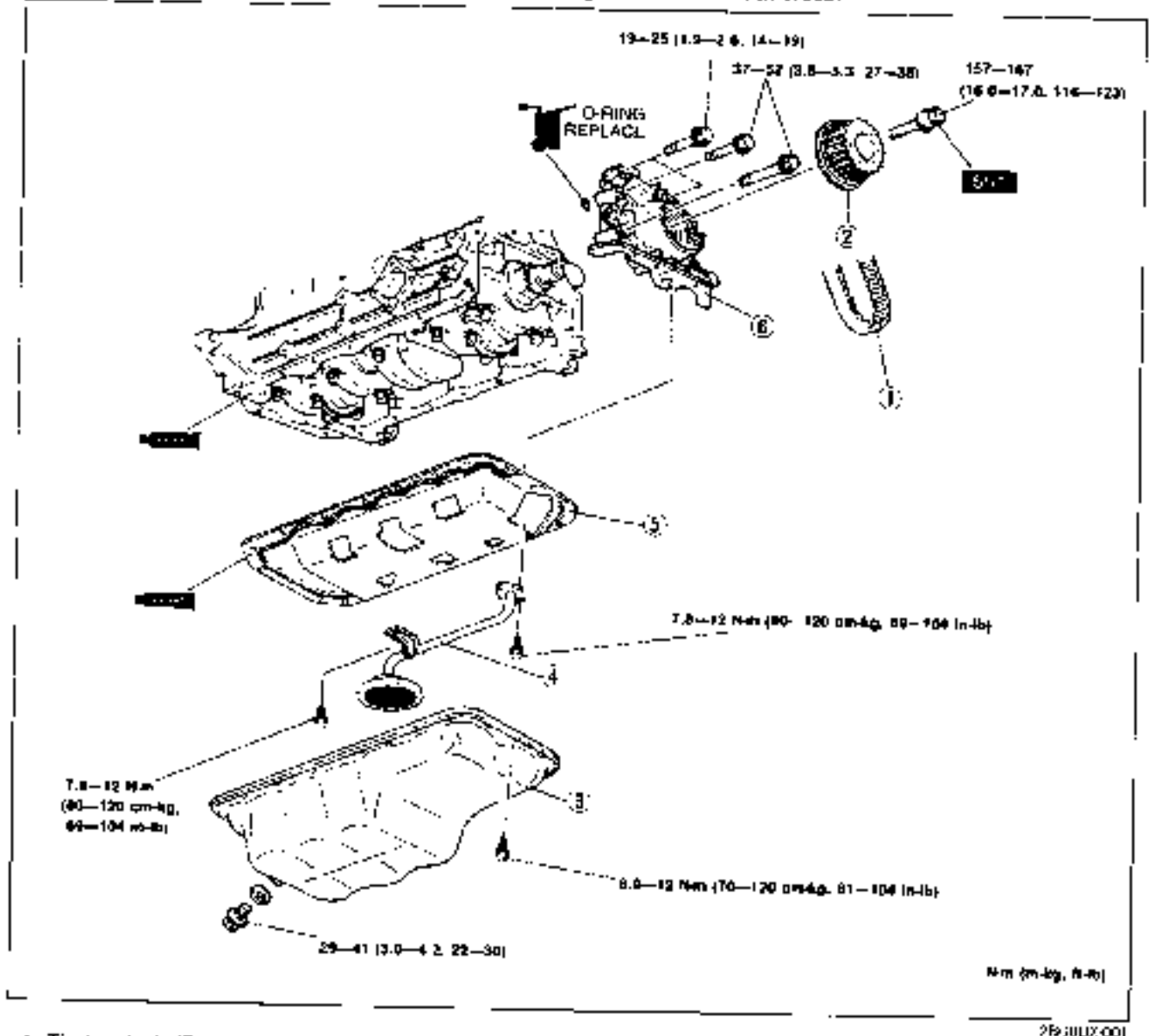
9MUT00X-000

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**.

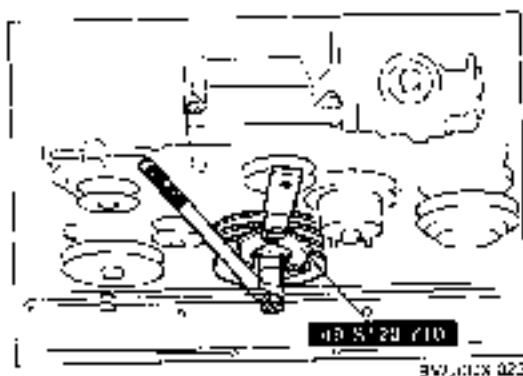


1. Timing belt (Refer to Section B1)
2. Timing belt pulley
3. Oil pan

4. Oil strainer
5. Stiffener
6. Oil pump

D

ON-VEHICLE MAINTENANCE (OIL PUMP)



Removal note

Crankshaft pulley lock bolt

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

Removal

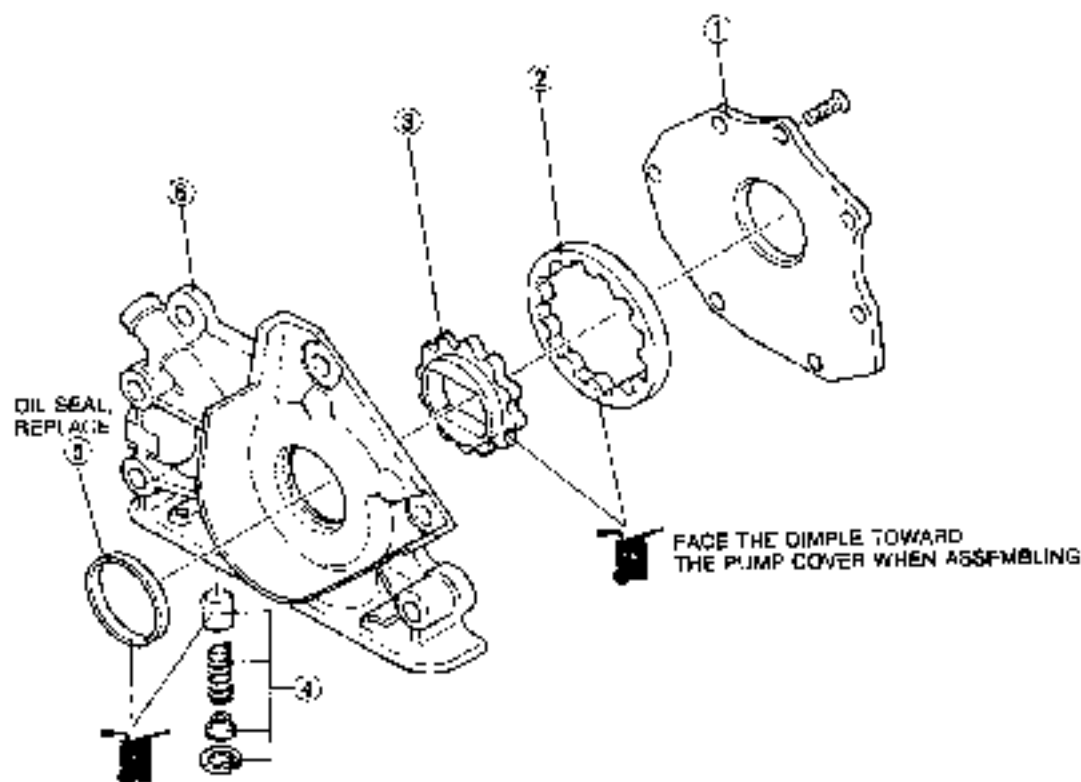
G6 Engine

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

Disassembly

Disassemble in the order shown in the figure.

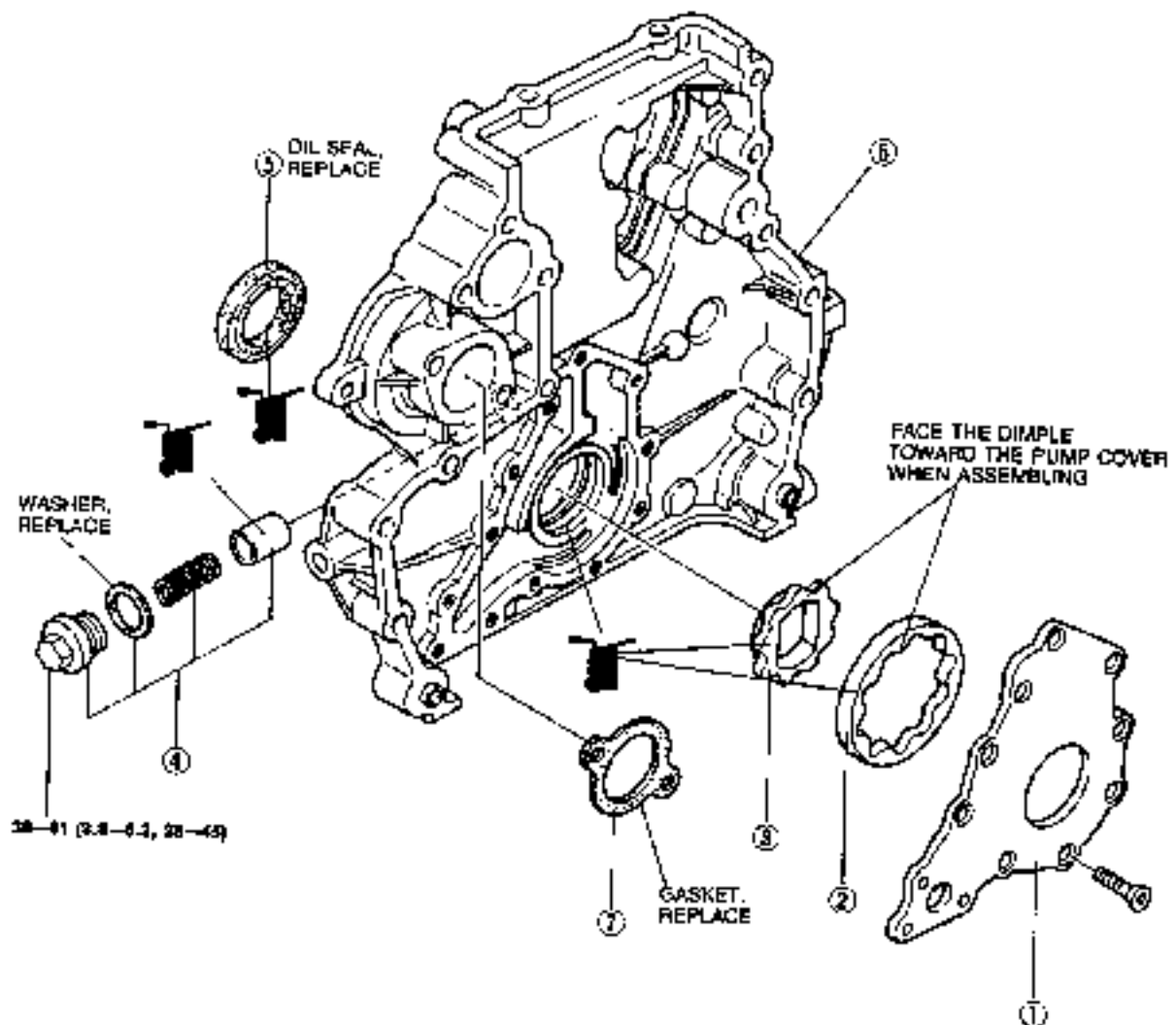
F2 ENGINE



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

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

G6 ENGINE



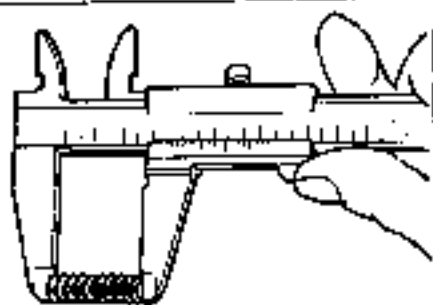
1. Pump cover
2. Outer rotor
3. Inner rotor

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

Hyd (rev'dg. 11-10)
SAWU01Z 025

D

ON-VEHICLE MAINTENANCE (OIL PUMP)



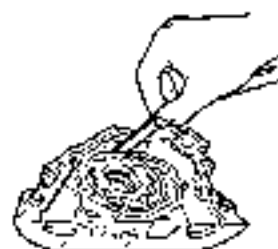
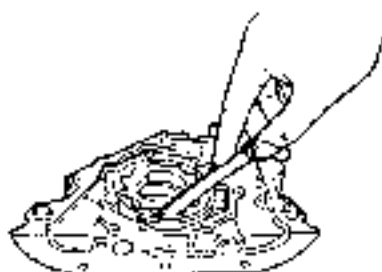
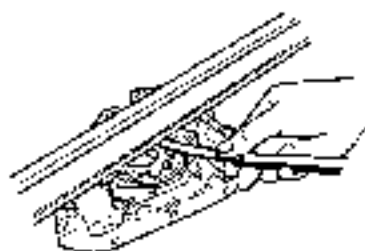
Inspection

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

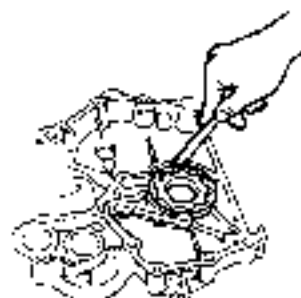
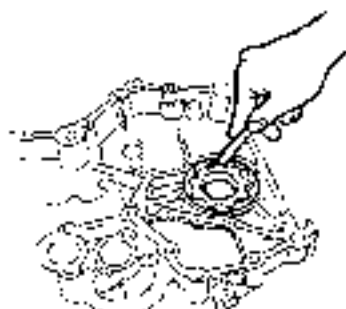
Free length: 46.4mm (1.827 in)

2. Measure the following clearances.

F2 ENGINE



G6 ENGINE



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

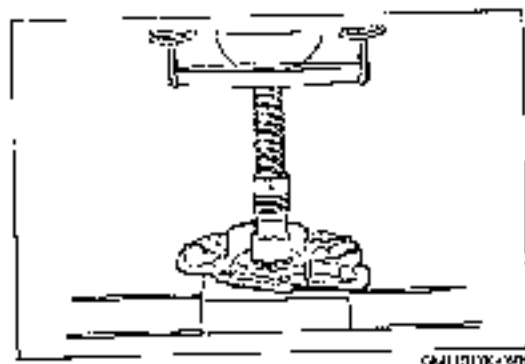
Oil seal

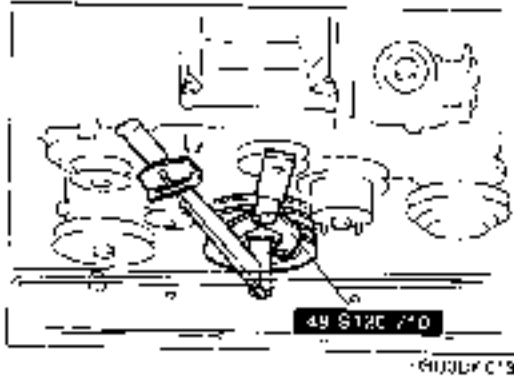
1. Apply engine oil to the pump body and new oil seal lip
2. Press the oil seal in evenly using a suitable piece

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.



**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.

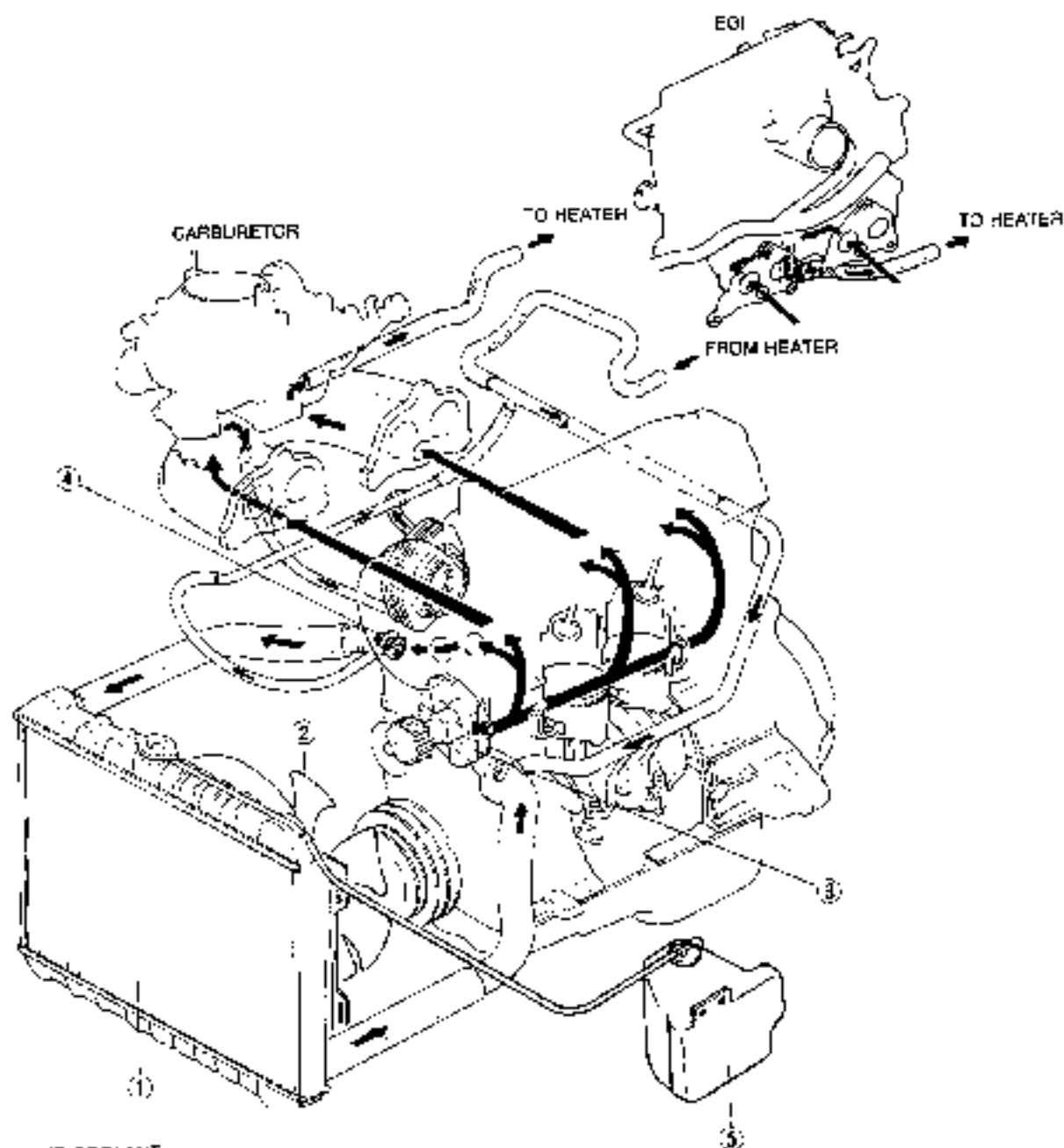
COOLING SYSTEM

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

28L05X4,01

INDEX

62200 (F2 ENGINE)



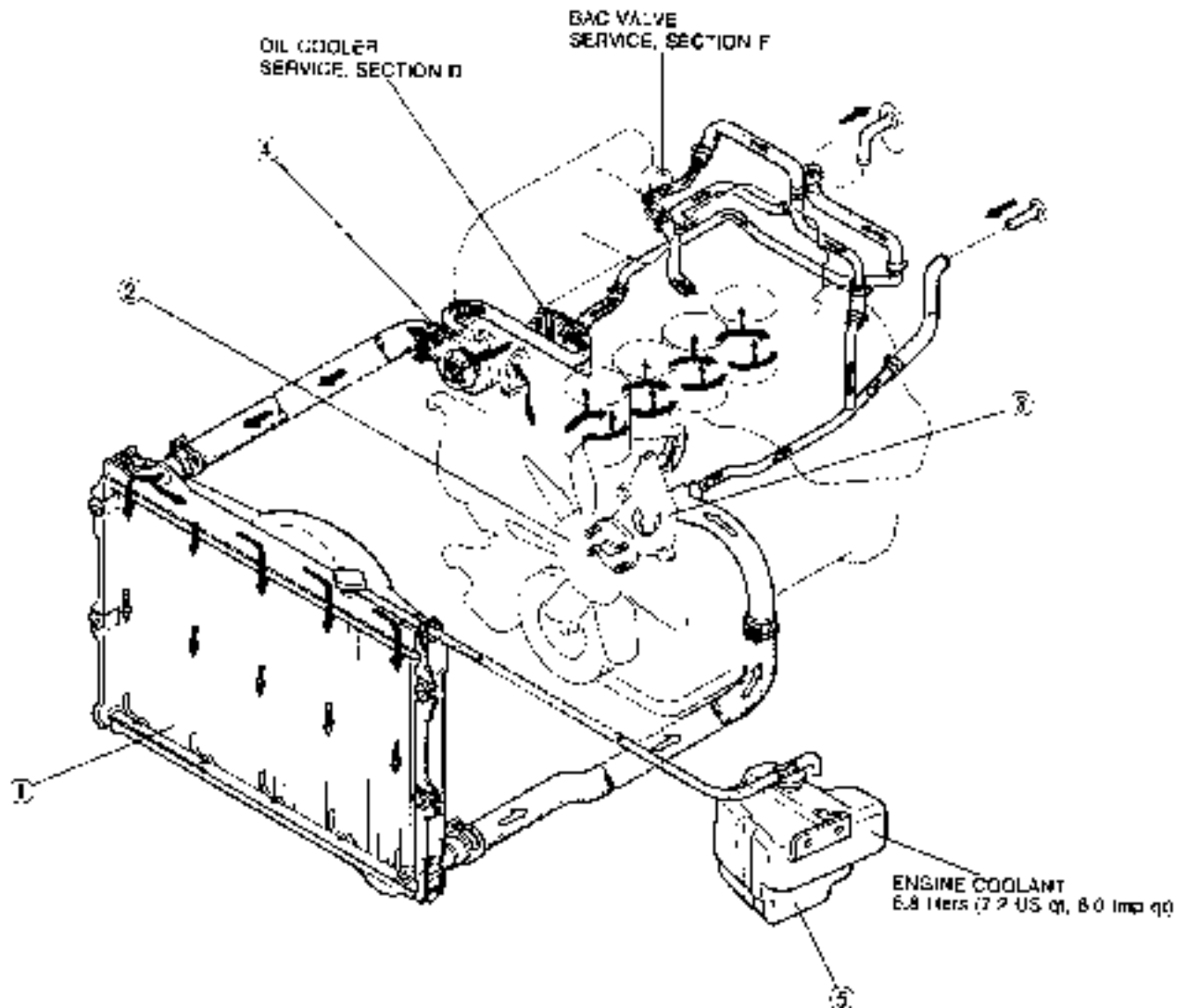
ENGINE COOLANT*
 WITH HEATER: 7.5 liters (7.9 US qt, 6.61 imp qt)
 WITHOUT HEATER: 7.0 liters (7.4 US qt, 6.2 imp qt)

97AUCX-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)



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

79VLCX 033

OUTLINE

SPECIFICATIONS

Item		Engine model	F2	G6
Cooling system			Water-cooled, forced circulation	
Coolant capacity	Liters (US qt., Imp. qt.)	With heater	7.5 (7.9, 6.6)	7.5 (7.9, 6.6)
		Without heater	6.9 (7.3, 6.1)	6.0 (7.3, 6.1)
Water pump	Type		Centrifugal	
	Water seal		Unitied mechanical seal	
Thermostats	Type		Wax	Wax, two-stage
	Opening temperature	°C (°F)	88.5 (189—190)	Main: 95.5—99.5 (188—193) Sub: 83.5—86.5 (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 ² , 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	380 (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-8
	Thermostat malfunction	Replace	E-10
	Water passage clogged	Clean	E-5
	Water pump malfunction	Replace	E-8
Corrosion	Impurities in coolant	Replace	E-5

3M03EX-002

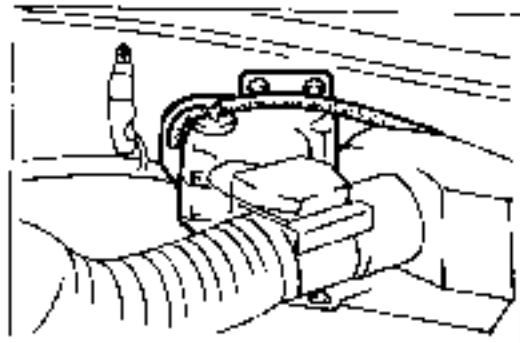
ON-VEHICLE INSPECTION

PREPARATION
SST

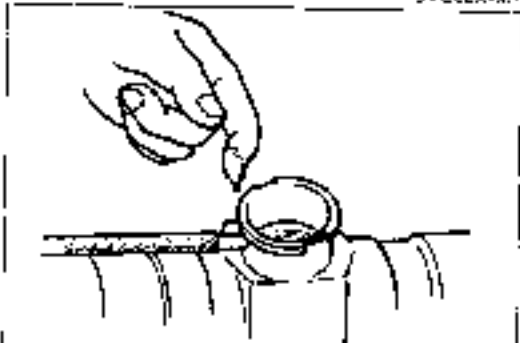
49 9200 145 Radiator cap tester adapter set:		49 9200 146 Adapter A (Part of 49 9200 145;		49 9200 147 Adapter B (Part of 49 9200 145)	

3MLCEX 606

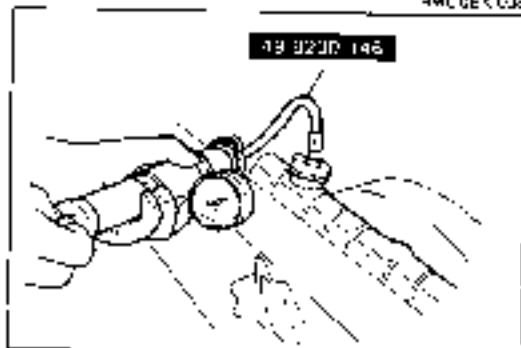
E



3MLCEX 607



4MLCEX 033



3MLCEX 605

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.

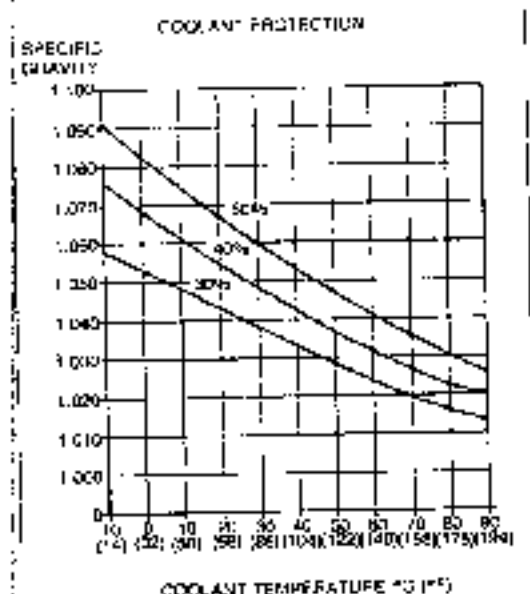
Coolant Leakage

1. Connect a tester and SST to the radiator inlet port.
2. Apply **103 kPa (1.05 kg/cm², 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-010

REPLACEMENT

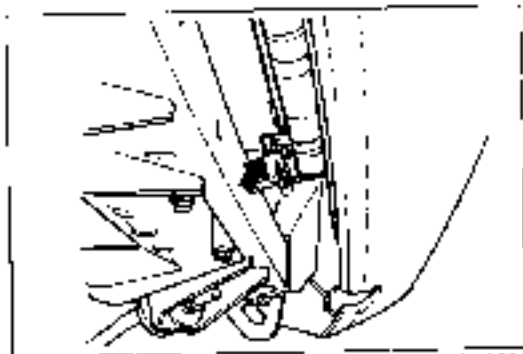
Warning

- 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.



25LJ057-004

AIR BLEEDING AND REFILLING SYSTEM

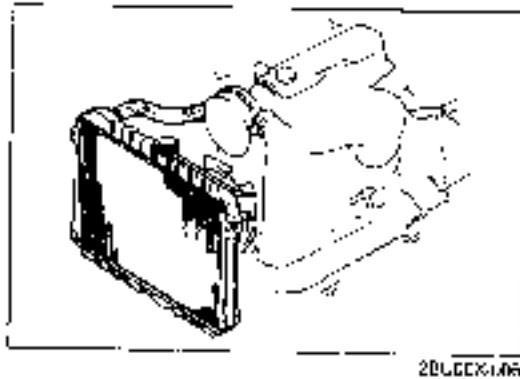
When the coolant is drained, bleed the cooling system after refilling it.

- 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.

25LJ057-005



2000X100

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

Caution

If the temperature increase beyond normal, there is excessive air in the system.

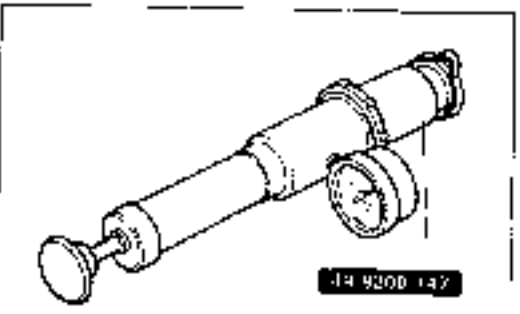
Stop the engine, allow the engine to cool, and repeat Steps 1—3.

- Run the engine above idle several times as specified.

Speed: 2,200—2,800 rpm × 5 sec.

- 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.

E



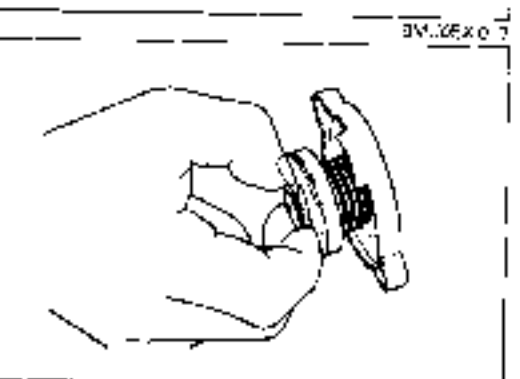
14 9200 147

3000X100

RADIATOR CAP

Radiator Cap Valve

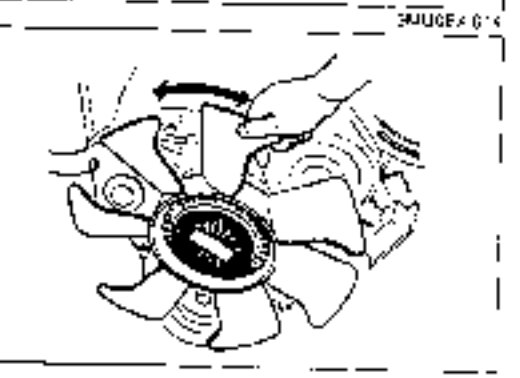
- Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
- Attach the radiator cap to a tester with the SST. Apply pressure gradually to 74—103 kPa (0.75—1.05 kg/cm², 11—15 psi).
- Wait about 10 seconds; then check that the pressure has not decreased.



3000X100

Negative Pressure Valve

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



3000X100

COOLING FAN

Inspection

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

ON-VEHICLE MAINTENANCE

RADIATOR

Removal, Inspection and Installation

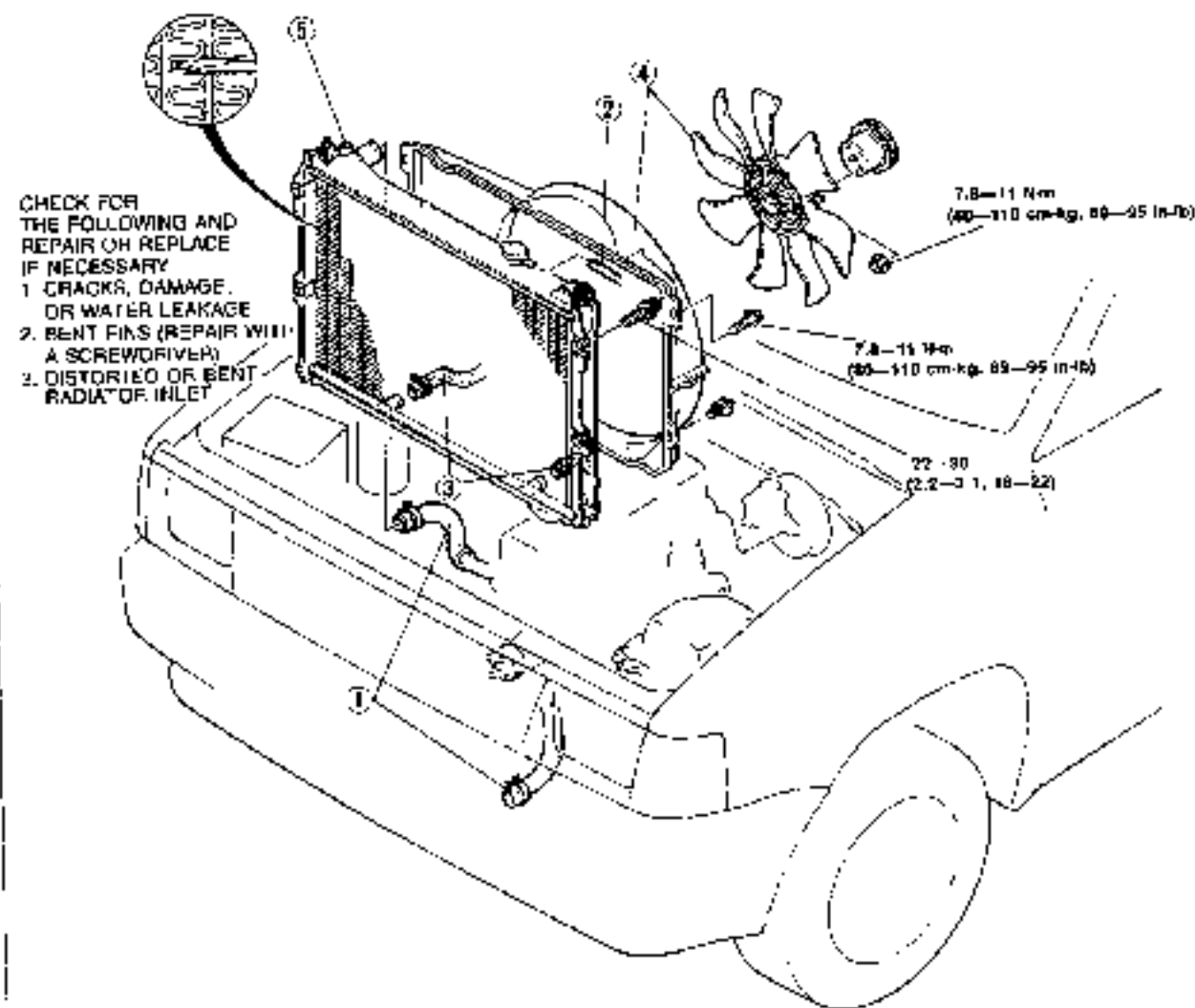
1. Drain the engine coolant.
2. Remove in the order shown in the figure.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal.

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.



Nm (cm·kg, ft·lb)

10 J073 001

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.

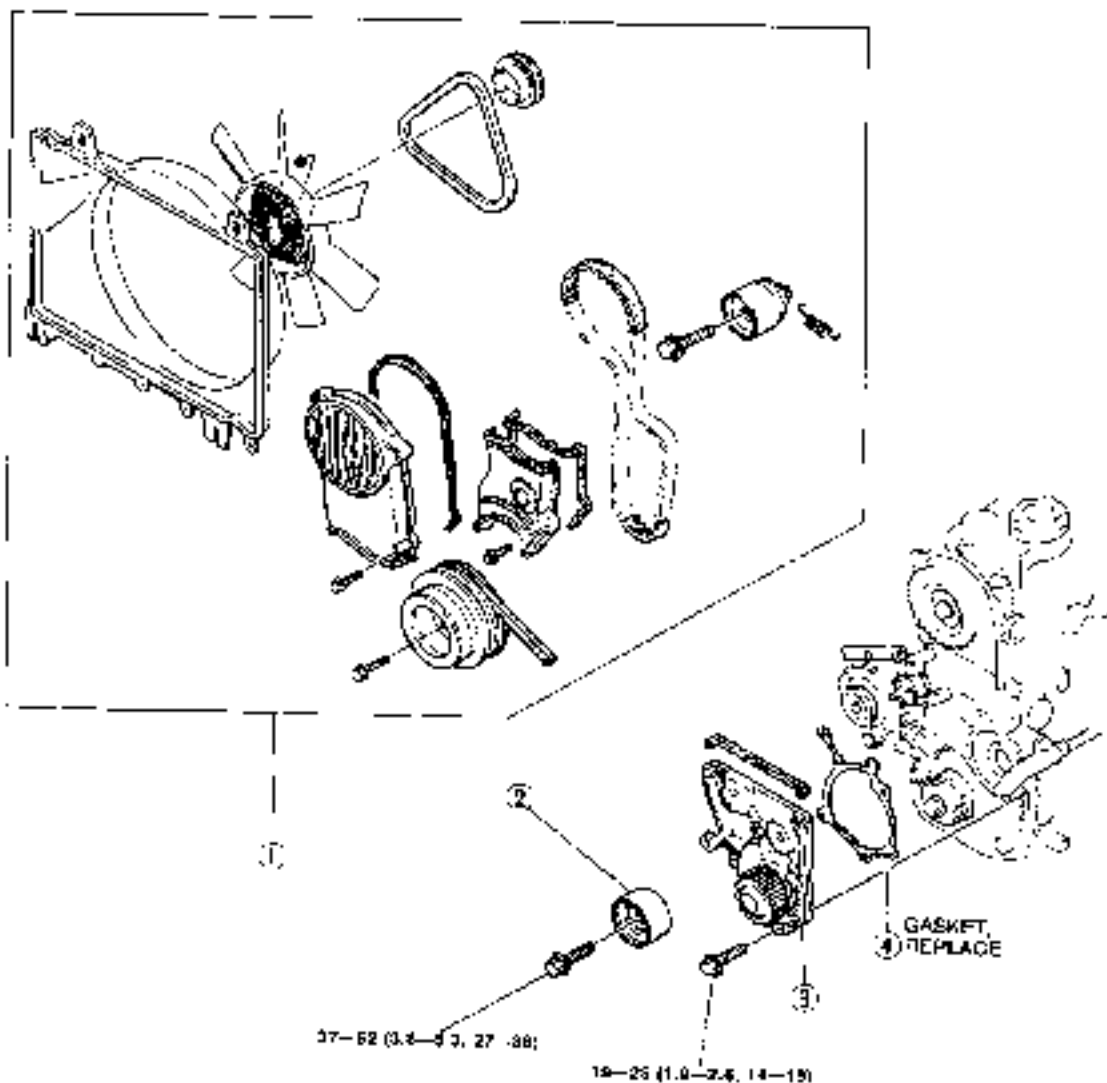
Caution

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.

F2 ENGINE

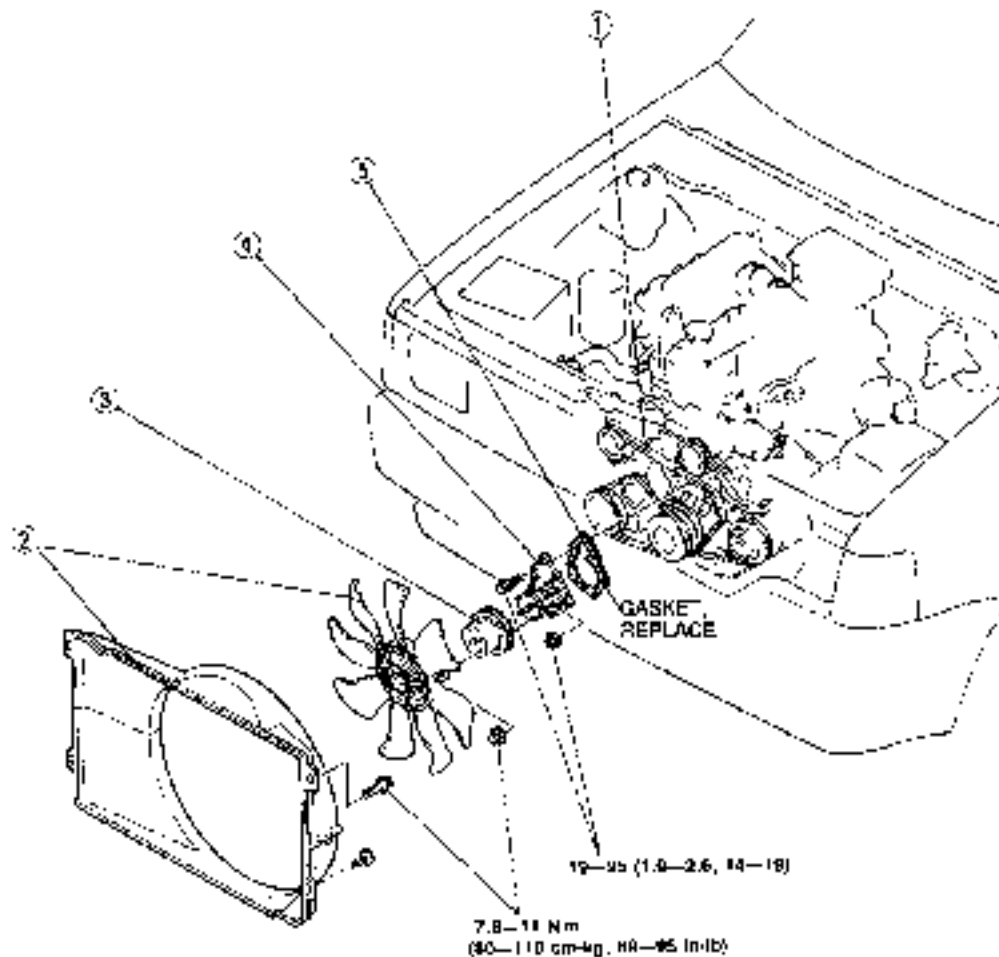
Not in kg, N·lb

90367-001

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

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

G6 ENGINE



BMJ0-K079

- 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

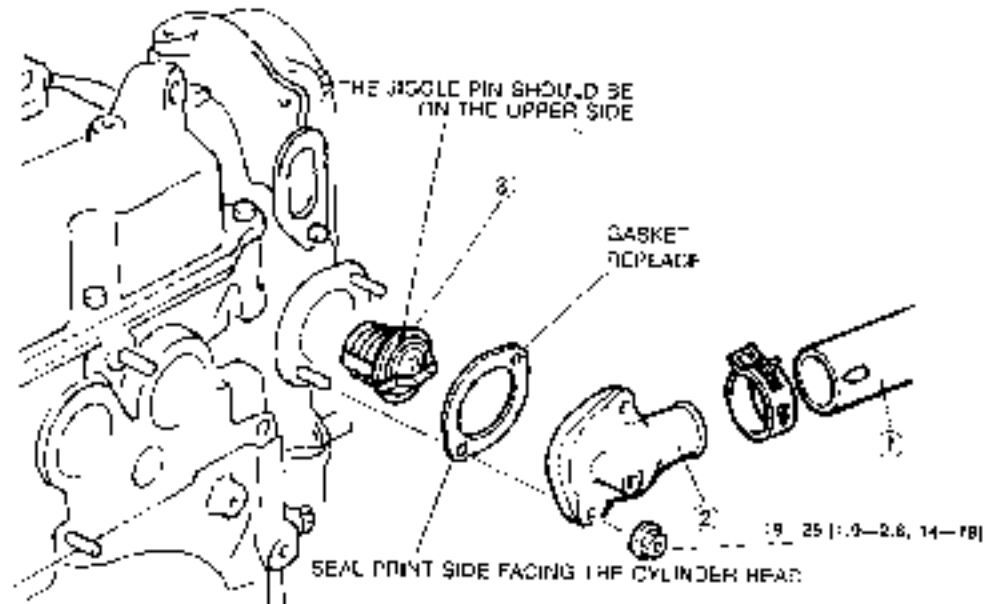
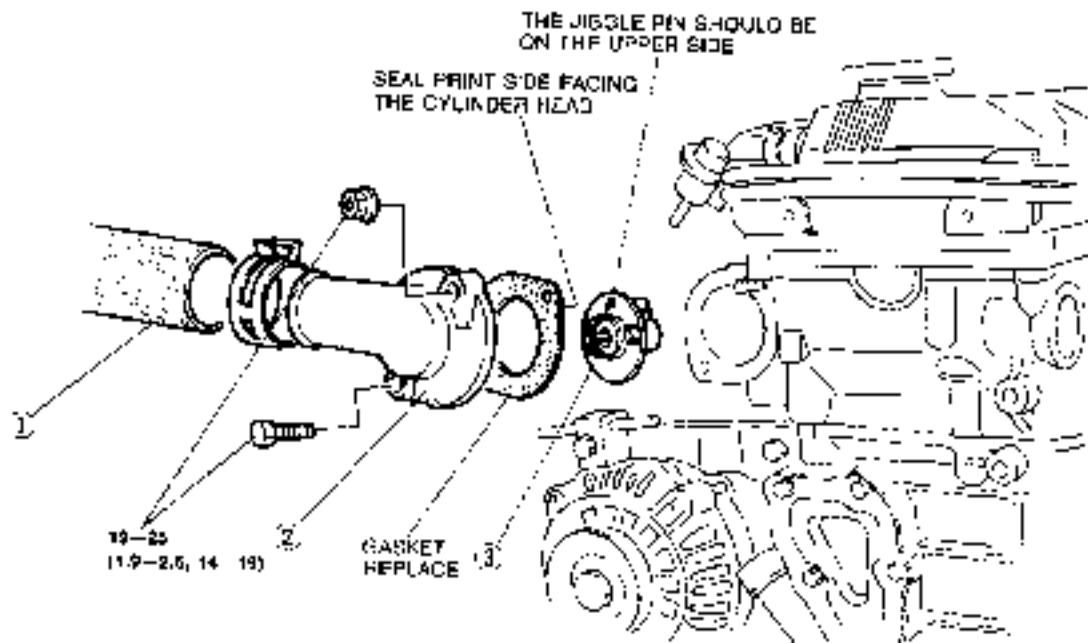
Steps After Installation

- 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.

BMJ0-K079

THERMOSTAT**Removal**

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

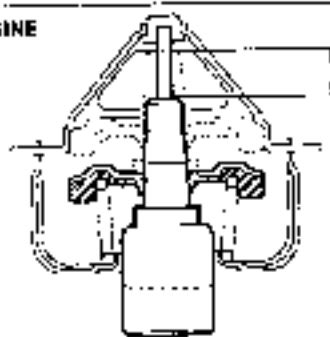
F2 ENGINE**G8 ENGINE**

Nm (ft-lb, N·lb)
2.0 (1.4, 1.4)

1. Upper radiator hose
2. Thermostat cover

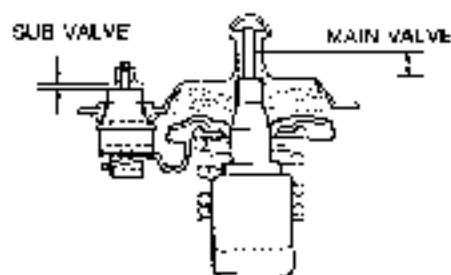
3. Thermostat inspection page E-12

F2 ENGINE



JBTJ003 003

G6 ENGINE



030075X 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—68.5 (198—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 tightly with large pliers to ensure a good fit.

JBTJ003 003

Steps After Installation

1. Add engine coolant to the specified level.
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.

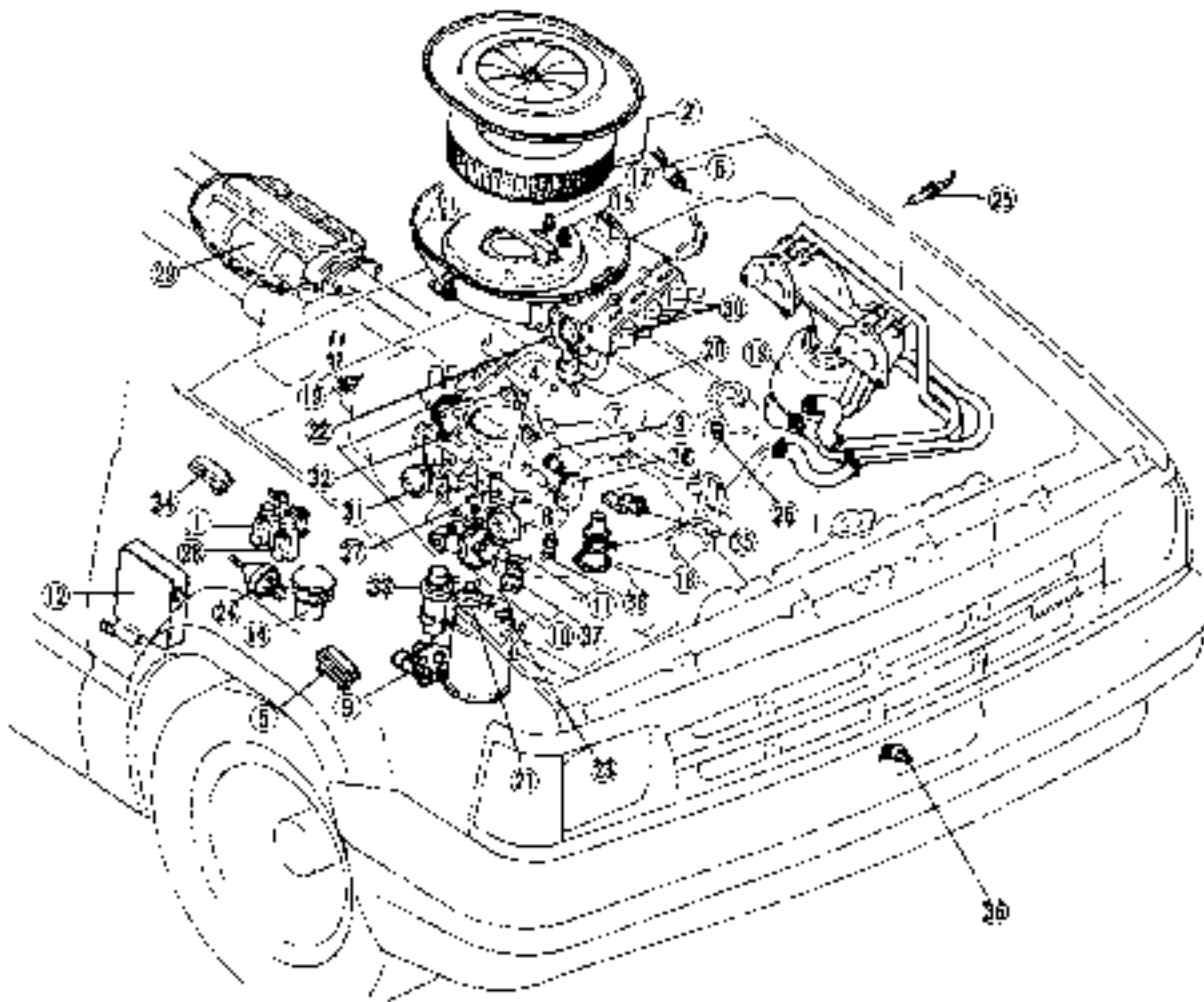
030075X 025

FUEL AND EMISSION CONTROL SYSTEMS (CARBURETOR)

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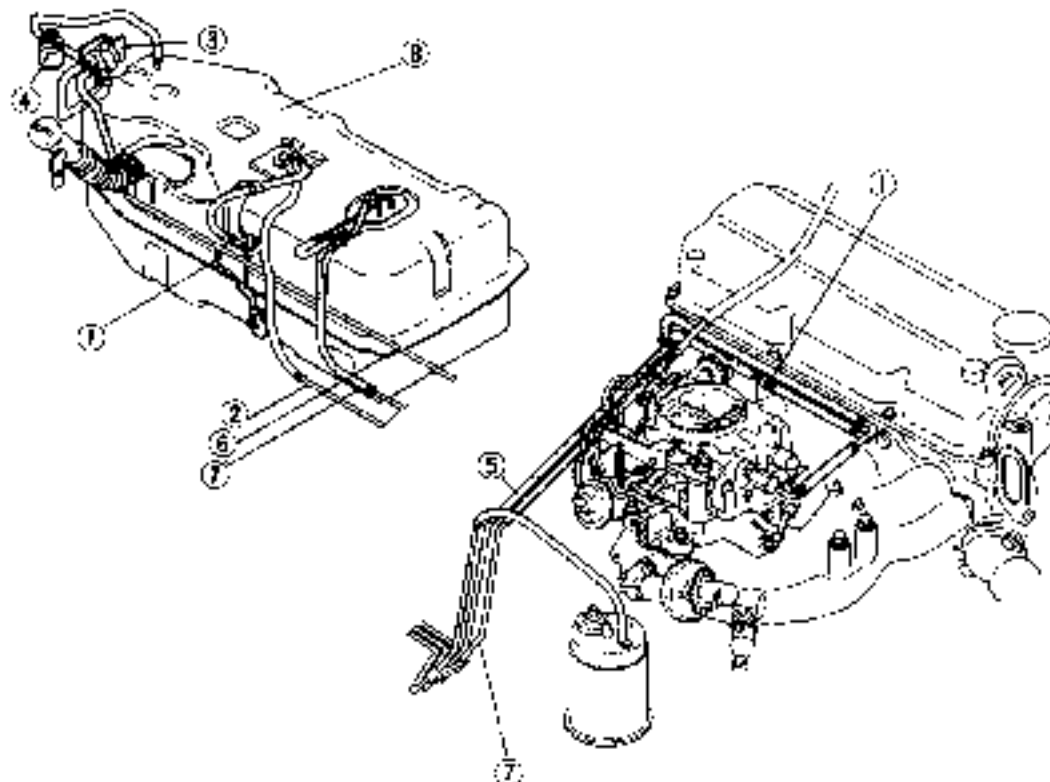
INHIBITOR SWITCH
SERVICE, SECTION K1



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7200F1-031

VEHICLE WITH A/T



JBL-CH1-036

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OUTLINE

SYSTEM DIAGRAM

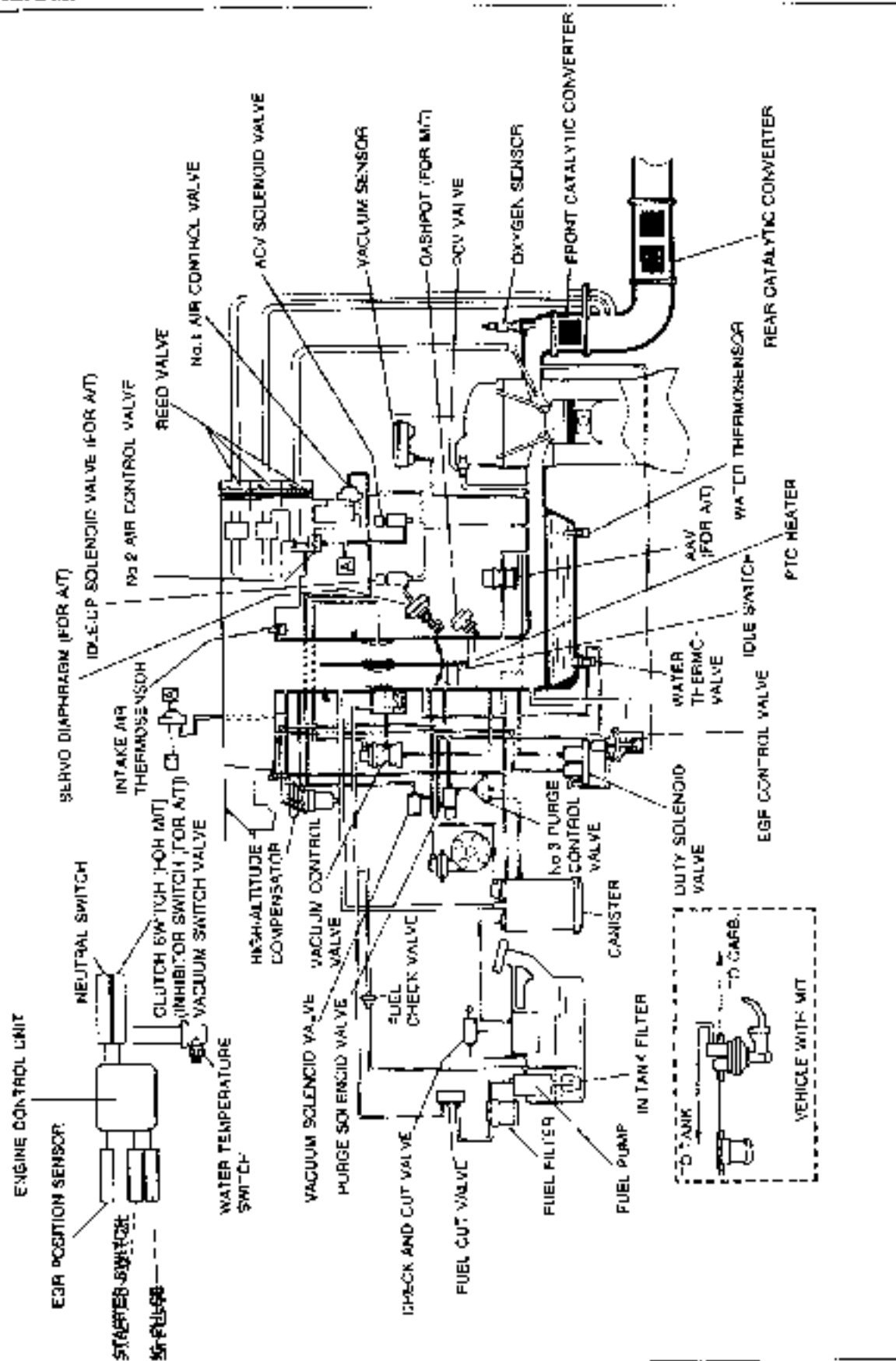


FIGURE 102

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 fuel 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 when 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 deceleration	
Duty solenoid valve	Controls vacuum to activate EGR control valve	
1) Vent valve	Opens vent according to signal from engine control unit	
2) Vacuum valve	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 thermosensor Vacuum sensor Atmospheric pressure sensor Water temperature switch Intake air thermosensor Oxygen sensor EGR position sensor Idle switch Neutral and clutch switch or inhibitor switch Air conditioner

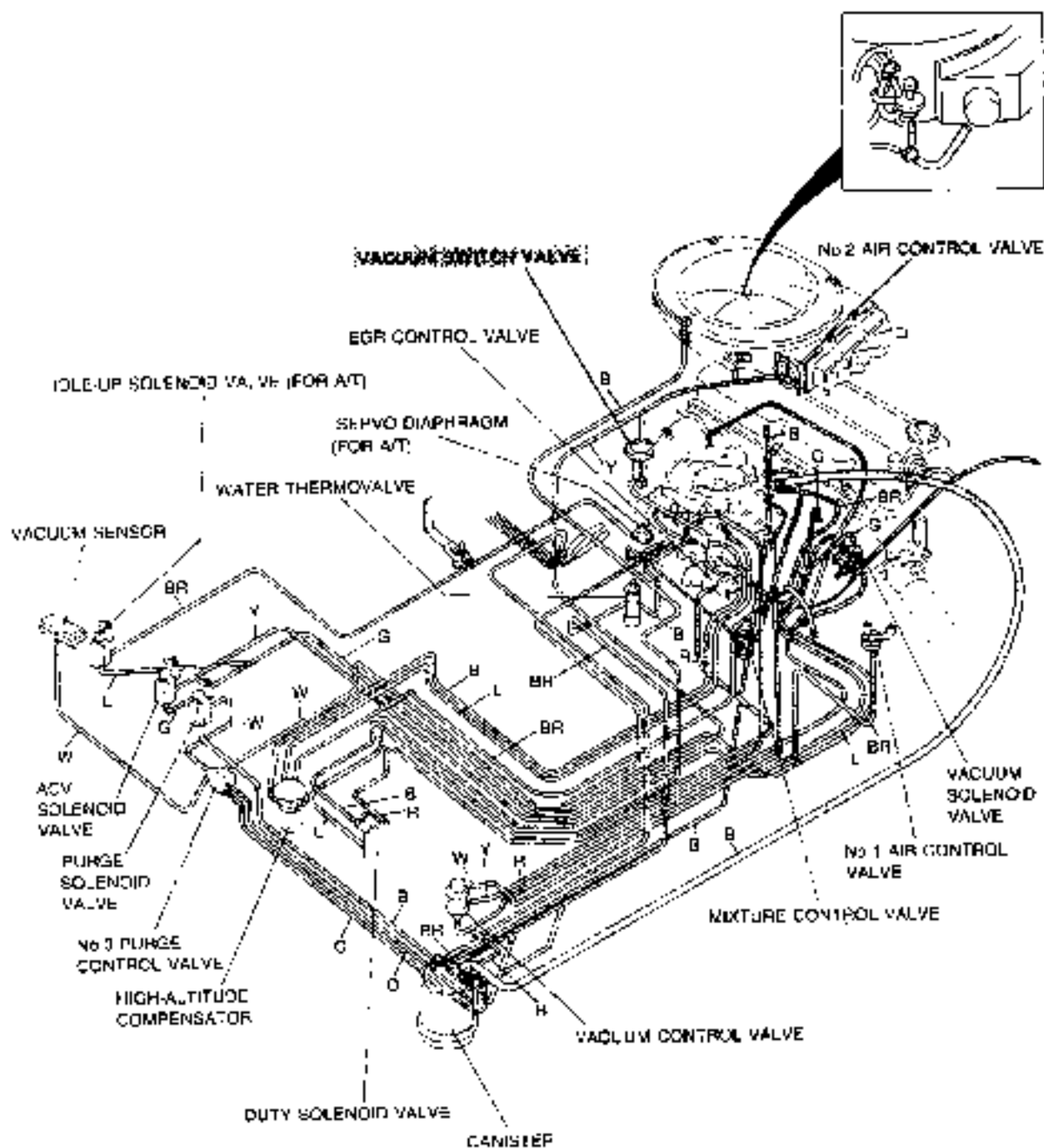
F1

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 ₂ and H ₂ 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 steady 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 air/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 running.	
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 ₂ and H ₂ 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 driving.	
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 thermostatic valve	Opens and closes depending on engine coolant temperature.	Opens at 46—54°C (114.8—129.2°F) or higher.

16100F1-0735

VACUUM HOSE ROUTING DIAGRAM



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

53U043-504

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	ECR 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

780048 JLN

SPECIFICATIONS

Item		Transmission		Manual		Automatic	
Fuel tank capacity	Short sec	L (or U.S. gal, Imp. gal)		56 (14.8, 12.3)			
	Long sec	L (or U.S. gal, Imp. gal)		66 (17.4, 14.5)			
Fuel filter	Type			Filter paper with magnet			
Fuel pump	Type			Mechanical		Electrical	
	Fuel pressure	kPa (kg/cm ² , psi)		38-32 (0.25-0.32, 3.7-4.7)		20-25 (0.20-0.25, 2.8-3.6)	
	Flow rate	cc (in ³ /min)		0.80 (52.5)		1.50 (70.2)	
	Type			Downward, 2-barrel, 2-stage, auto-choke			
Carburetor	Throat diameter	Pr	mm (in)	30 (1.181)			
		Sec.	mm (in)	34 (1.339)			
	Venturi diameter	Pr	mm (in)	24.5 x 1.5 x 8 (0.965 x 0.591 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 (0.0236)			
		Sec.	mm (in)	0.50 (0.0197)			
	Slow jet	Pr	mm (in)	0.52 (0.0205)			
		Sec.	mm (in)	0.86 (0.0335)			
	Slow air bleed	Pr, No.1	mm (in)	0.80 (0.0315)			
		Pr, No.2	mm (in)	1.10 (0.0433)			
		Sec, No.1	mm (in)	0.60 (0.0236)			
		Sec, No.2	mm (in)	0.50 (0.0197)			
	Coasting richer jet		mm (in)	0.42 (0.0165)			
	Coasting richer air bleed	No.1	mm (in)	1.60 (0.0630)			
		No.2	mm (in)	2.60 (0.1024)			
	High-speed richer jet		mm (in)	1.80 (0.0709)			
	High-speed richer air bleed		mm (in)	1.00 (0.0394)			
	Speed controlled fuel jet		mm (in)	0.85 (0.0335)			
	Speed controlled air bleed		mm (in)	1.50 (0.0591)			
	Float level	High	mm (in)	11.5-12.6 (0.457-0.496)		10.7-11.7 (0.421-0.461)	
		Low	mm (in)	46.0-47.0 (1.811-1.850)			
	Fast idle adjustment	Throttle valve clearance	mm (in)	0.84-1.04 (0.033-0.041)			
		Choke valve clearance	mm (in)	0.60-1.14 (0.024-0.045)			
	Secondary throttle valve adjustment	Throttle valve clearance	mm (in)	7.35-8.25 (0.289-0.325)			
	Unloader system adjustment	Choke valve clearance	mm (in)	2.60-3.82 (0.102-0.143)			
	Choke diaphragm adjustment	Choke valve clearance	mm (in)	1.70-2.16 (0.067-0.085)			
Air cleaner	Fresh air			General, automatic			
	Element type			Wet			
Accelerator cable	Deflection	mm (in)		1-3 (0.04-0.12)			
Idle speed		rpm (in neutral or P range)		800-850 (800-1000)			

250107-1-602

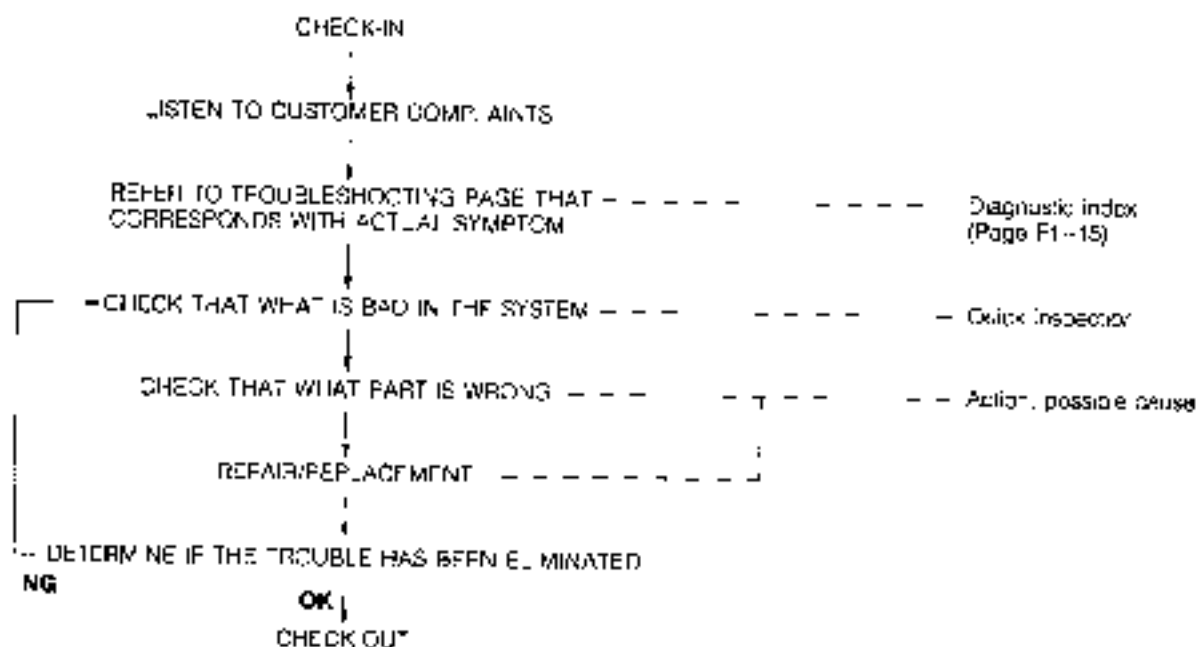
TROUBLESHOOTING GUIDE

HOW TO USE THIS SECTION

Introduction

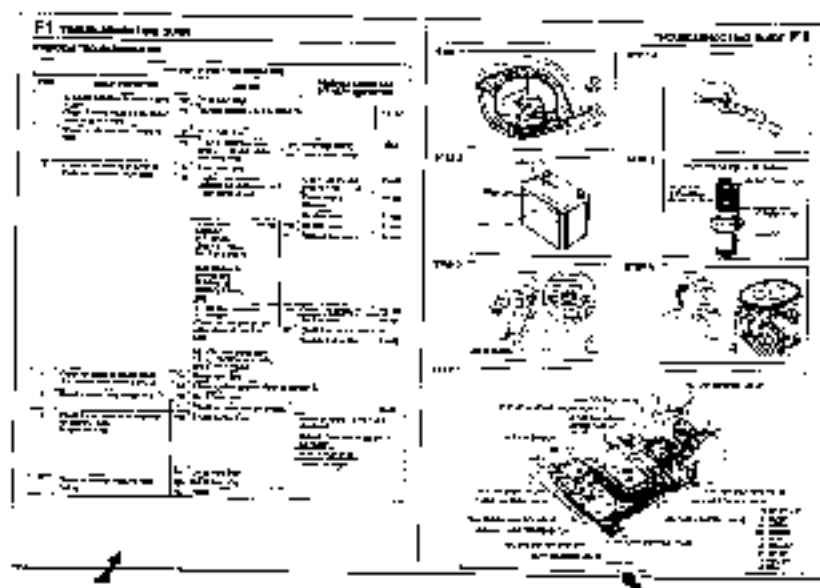
Most of the fuel and emission control system is electronically controlled. Thus, it is sometimes difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a drivability complaint. 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-0797

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

Hard start or won't start (Crank OK)					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Is enough crank oil on the engine crank? Check if engine valve is fully closed when engine is cold	Yes	Go to Next Step	Exhaust system crack assembly	F1-88 F1-110
2	Check if engine oil level is low	Yes	Go to Next Step	Recharge battery and add oil	G-8
3	Check if fuel level is full and speeded with no carburetor sight glass	Yes	Go to Next Step	Check needle and seat for wear or rust	F1-83
		No	Recharge fuel supply tank Adjust needle and seat check points of wear	Check fuel for contaminants	F1-84
		No	Check fuel pump Check fuel filter Check fuel pressure	Check fuel for contaminants	F1-87 F1-87 F1-79

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.

GMJ2-2 312

DIAGNOSTIC INDEX

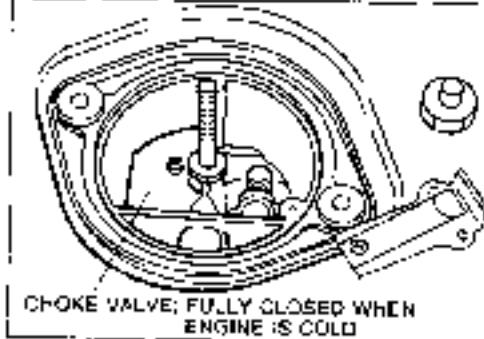
No.	TROUBLESHOOTING ITEM	REMARK	PAGE
1	Hard start or won't start	Engine cranks at normal speed but shows no sign of "firing" or will not continue to run after ignition switch is moved from START position or requires excessive cranking time before starting	F1-18
2	Engine stalls during warm up	Engine stops 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

98-KF-000

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 atop battery is blue	Yes	Go to Next Step	
		No	Check if electrolyte level of battery is between upper and lower lines	Yes: Recharge battery No: Add distilled water Section G
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
				Set float level F1-91
		(Lower than specified) M/T vehicle. Check for spec- ified fuel pressure	F1-83	Yes: No No: Replace fuel pump F1-83
			Fuel pressure: 25—32 kPa (0.26—0.33 kg/cm ² , 3.7—4.7 psi)	
		(Lower than specified) A/T vehicle. Check for fuel pump oper- ation sound at fuel filter port (Ign ON, fuel pump con- trol 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	Intake air system component damaged
				Vacuum hose disconnected or damaged
				Bolts or nuts loose Gasket damaged
7	Check for correct vacuum hose routing	No	Go to Next Step	
		Yes	Go to Next Step	
		No	Repair	

STEP 1

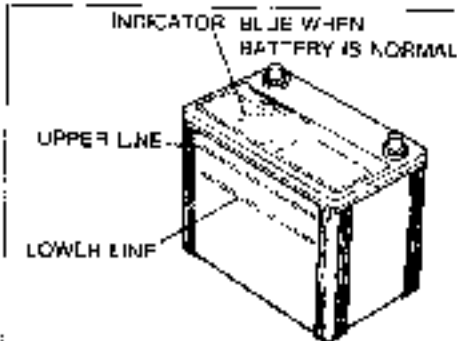


STEP 4

CHECK FOR SPARK WHILE CRANKING



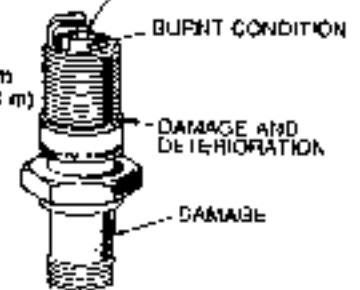
STEP 2



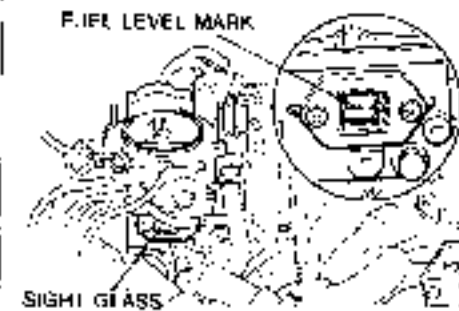
STEP 5

WEAR AND ADHESION OR CARBON

PLUG GAP
0.75-0.85mm
(0.028-0.033 in)



STEP 3

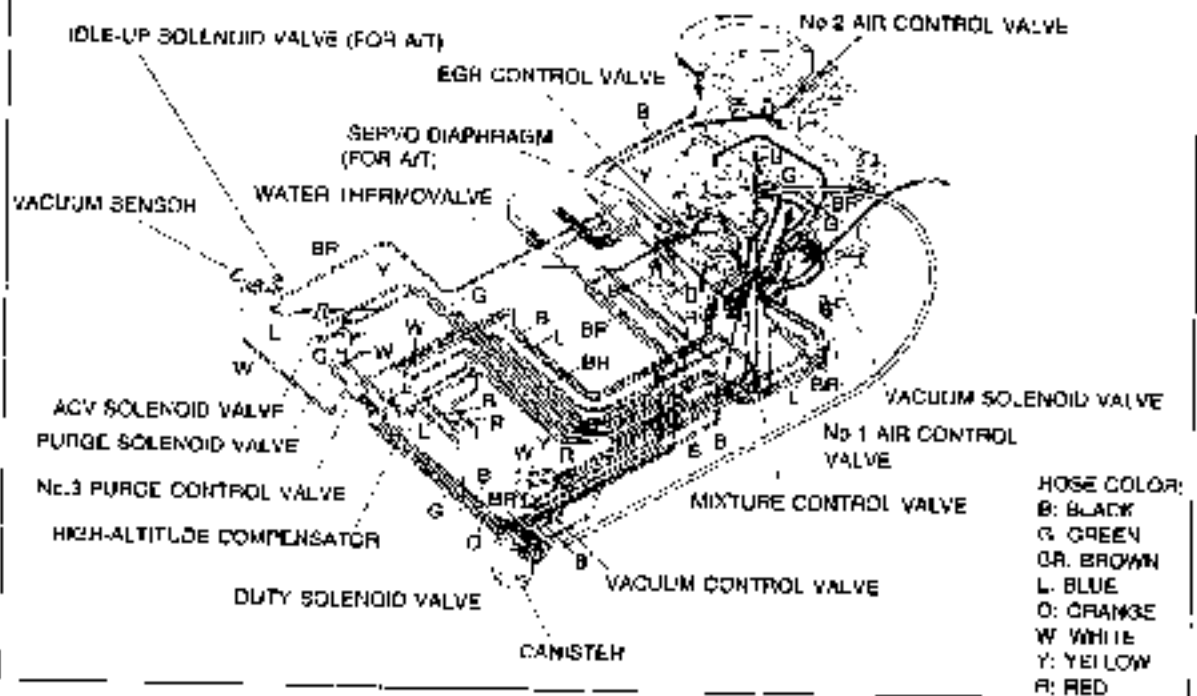


STEP 6

CHECK FOR AIR LEAKAGE



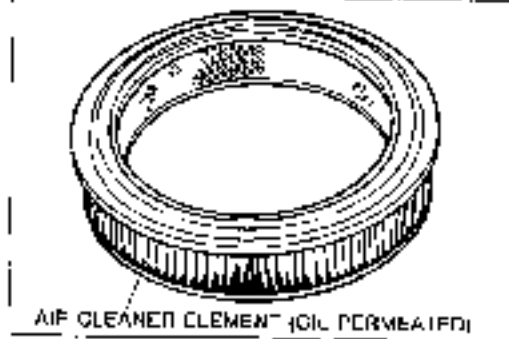
STEP 7



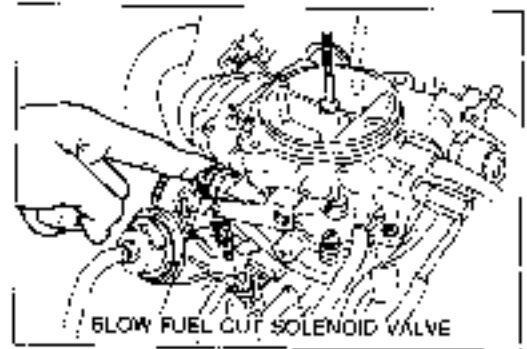
Hard start or won't start (Crank OK) (Cont'd)					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
8	Check if air cleaner element is clean	Yes	Go to Next Step		
		No	Replace		
9	Pinch PCV hose and check if condition improves	Yes	Replace PCV valve		
		No	Go to Next Step		
10	Start 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), (21) terminal voltage with SST	Yes	Check duty solenoid valve
			Voltage: 2K—battery voltage 2L—battery voltage (While cranking)	No	Check ECU (1G) (1G) and (2A) terminal voltage with SST
		No	Check EGR control valve for operation	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	Yes	Check slow fuel cut solenoid valve
			Voltage: Less than 1.5V (Ign ON)	No	Check ECU (2D) terminal voltage with SST
14	Check carburetor	Check points shown		Check jet for clogging	F1-90
				Check nozzle for clogging	F1-90
15	Check engine condition	Check points shown		Camshaft timing	Section B
				Compression	Section B

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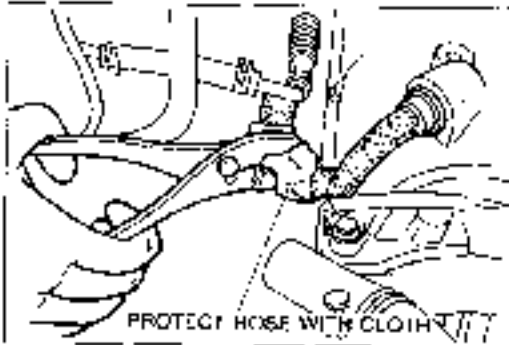
STEP 8



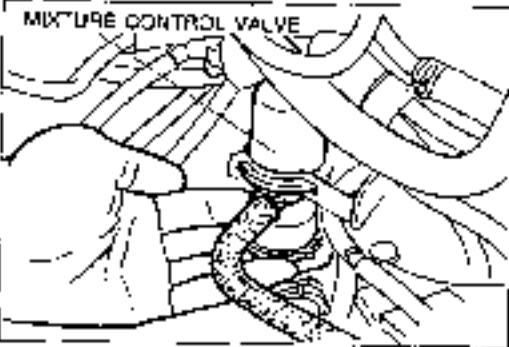
STEP 13



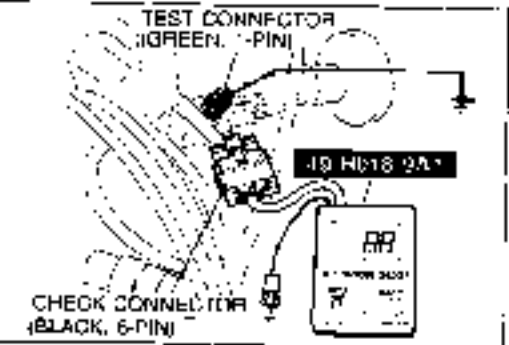
STEP 9



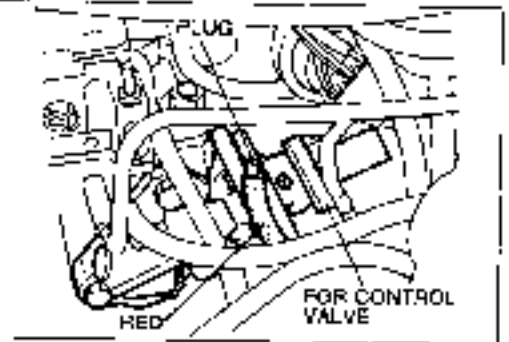
STEP 10



STEP 11

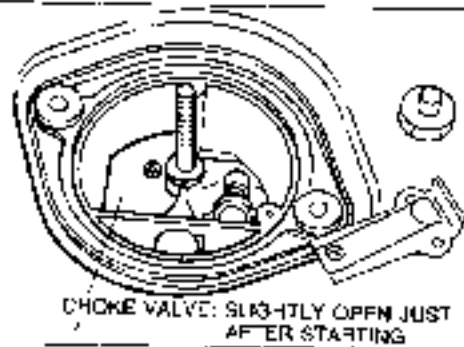


STEP 12

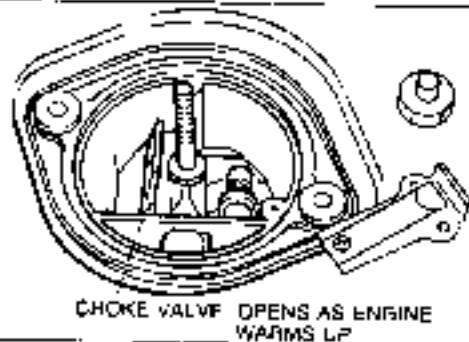


Engine stalls during warm up					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check if choke valve is slightly open just after starting	Yes	Check for correct choke diaphragm adjustment	F1-92	Yes: Go to Next Step
				No	Adjust F1-92
		No	Check points shown		Check choke diaphragm 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 (V/L) wire	Yes	Replace automatic choke assembly F1-87
			Voltage: 6-8V (At idle)	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
					Intake air system components damaged Vacuum hose disconnected or damaged Bolts or nuts loose Gasket damaged
4	Check for air leakage by listening for sucking noises	Yes	Check points shown		
				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		

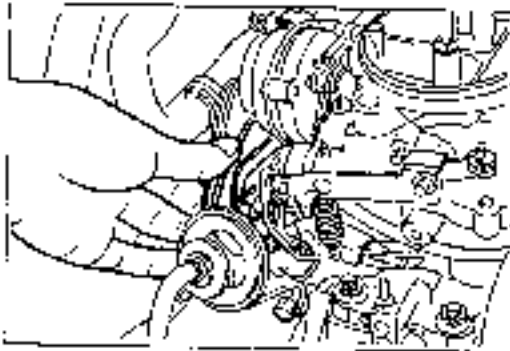
STEP 1



STEP 2



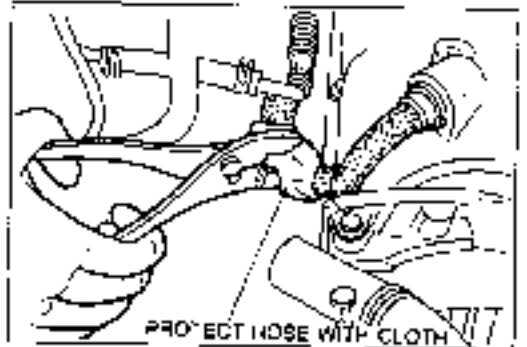
STEP 3



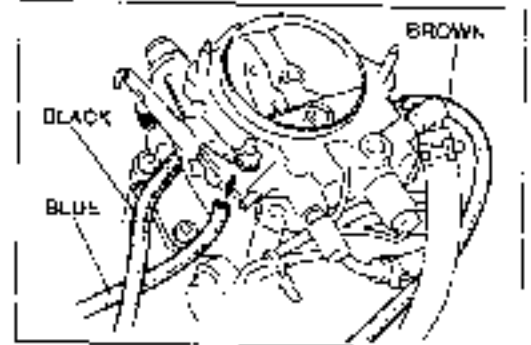
STEP 4



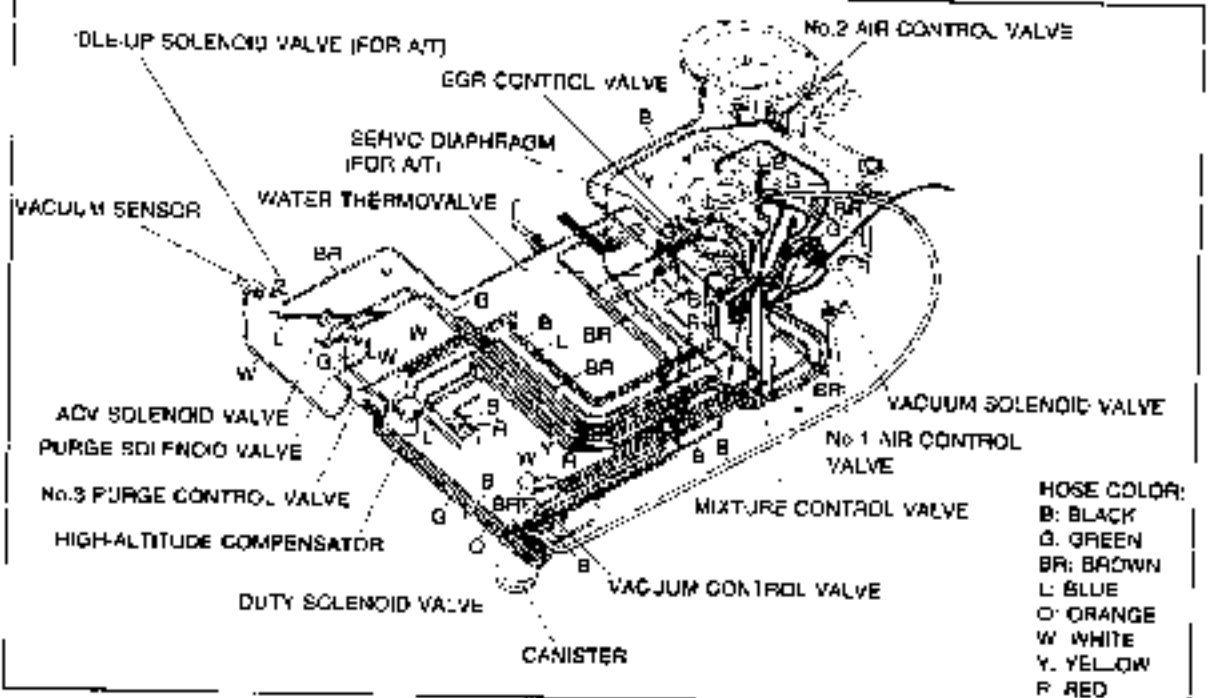
STEP 6



STEP 7



STEP 5



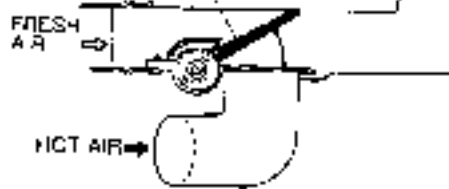
Engine stalls during warm up (Cont'd)

STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
8	Move control valve (for air intake temperature control system) inside air cleaner	Yes	Go to Next Step				
	Verify that it moves freely and that spring force is full	No	Replace air cleaner				
9	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				
10	Check switches for correct coordination with SST monitor arm	Yes	Go to Next Step				
	(Ign ON, test connector (Green 1-pin) grounded)	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	F1-111	Yes	Check duty solenoid valve	F1-88
			Voltage: 2K—battery voltage 2L—battery voltage (During warm up)		No	Check ECU (1C), (1D), 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	

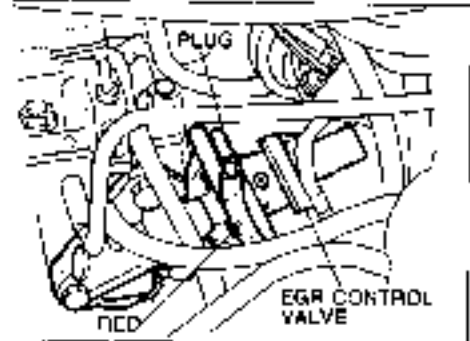
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STEP 8

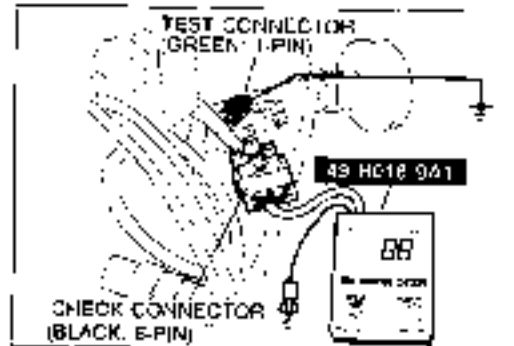
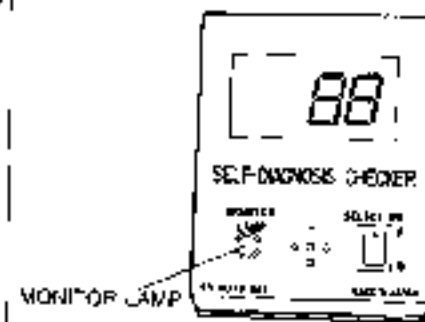
CONTROL VALVE: MOVES FREELY
AND SPRING
FORCE IS FELT



STEP 11



STEP 9

STEP 10
(1)STEP 10
(2)

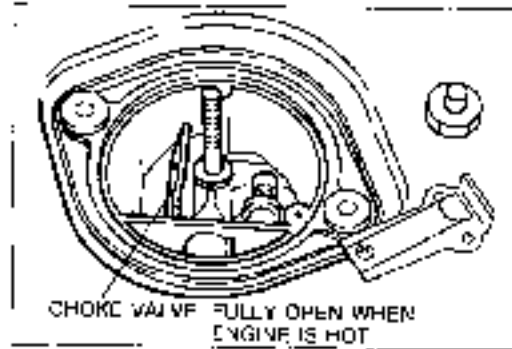
SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RELEASED ⁽¹⁾	OFF
	ACCELERATOR DEPRESSED ⁽¹⁾	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED ⁽²⁾	ON
	CLUTCH PEDAL DEPRESSED ⁽²⁾	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
POSITION SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

⁽¹⁾ Transmission in neutral

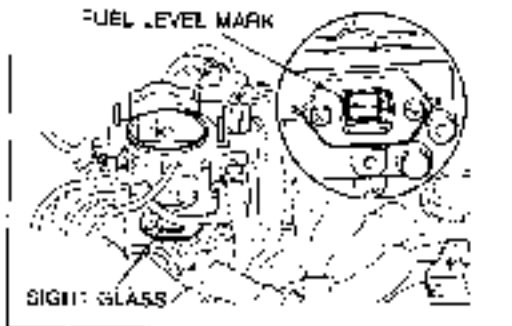
⁽²⁾ Transmission in gear

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	Check voltage at choke heater (Y/L) and Voltage: 5—6V (At idle)	Yes	Replace automatic choke assembly F1-97
				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	(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 ² , 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 fuel pump operation sound at fuel filter port [Ign ON, fuel pump control unit terminal-wire (D/R) and (B/W) jumped]		Yes	Check fuel pressure F1-82
					Set float level F1-91
				No	Check fuel pump control unit Replace fuel pump F1-82
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		F1-86

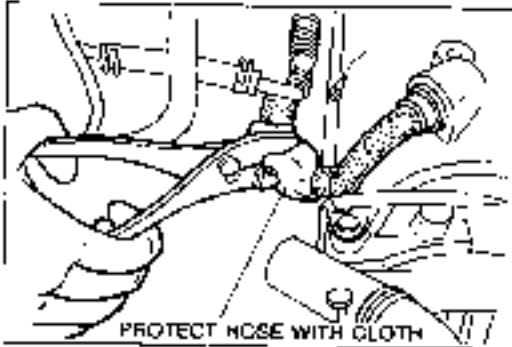
STEP 1



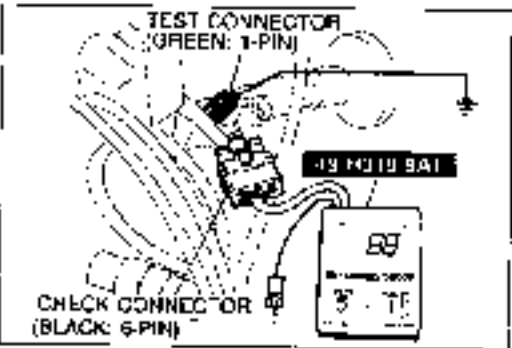
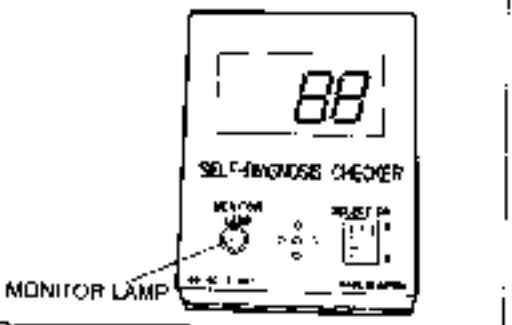
STEP 2



STEP 3



STEP 4

STEP 5
(1)STEP 5
(2)

SWITCH	CONDITION	MONITOR LAMP
1st SWITCH	ACCELERATOR RELEASED ⁽¹⁾	OFF
1st SWITCH	ACCELERATOR DEPRESSED ⁽¹⁾	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED ⁽²⁾	ON
CLUTCH SWITCH	CLUTCH PEDAL DEPRESSED ⁽²⁾	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
NEUTRAL SWITCH	TRANSMISSION IN NEUTRAL	OFF
NEUTRAL SWITCH	IN 1st OR N RANGE	OFF
NEUTRAL SWITCH	IN OTHER RANGES	ON
2nd SWITCH	OFF	OFF
2nd SWITCH	ON	ON

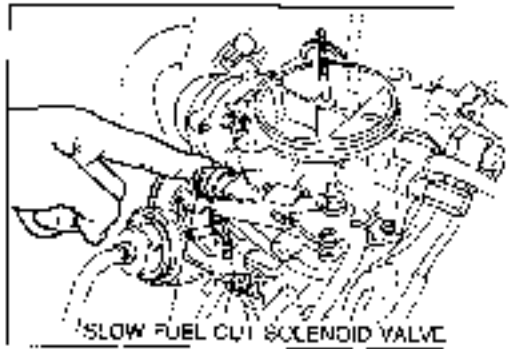
⁽¹⁾ Transmission in neutral⁽²⁾ Transmission in gear

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
			Voltage: Less than 1.5V (Ign ON)		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				
	Opening temperature: 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-ohm) and check if 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) internal voltage	F1-110
						ECU (1D) terminal voltage	F1-110
			(Fixed at 27°)			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
			(Fixed at 35°)			ECU (1C) terminal voltage	F1-110
			Check points shown			Vacuum hose routing	F1-10
			(Fluctuating out of 20°—70° range)			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 point shown			Exhaust valve	F1-55

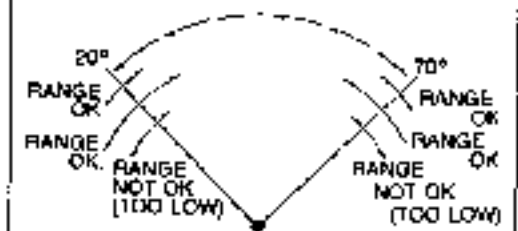
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Note: High RVP (winter) fuel can cause vapor lock in warm weather if used.

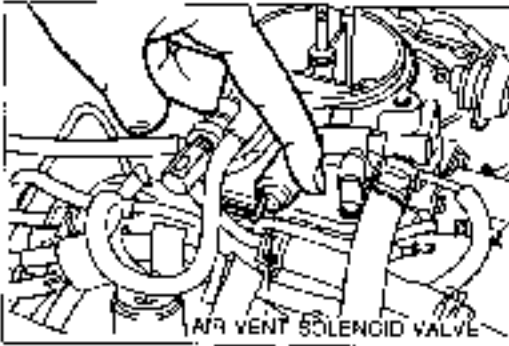
STEP 6

STEP 10
(2)

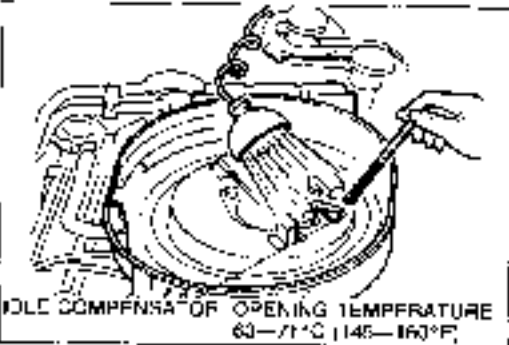
DWELLMETER READING: AT IDLE



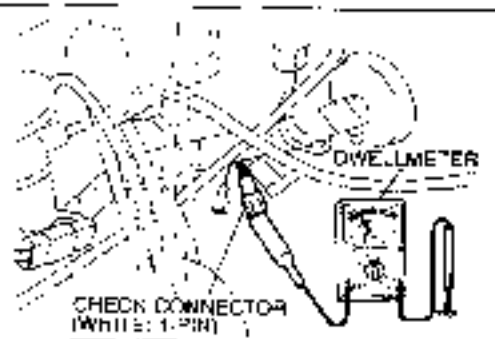
STEP 7



STEP 8



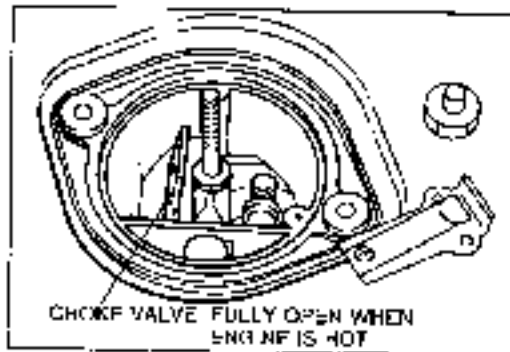
STEP 9

STEP 10
(1)

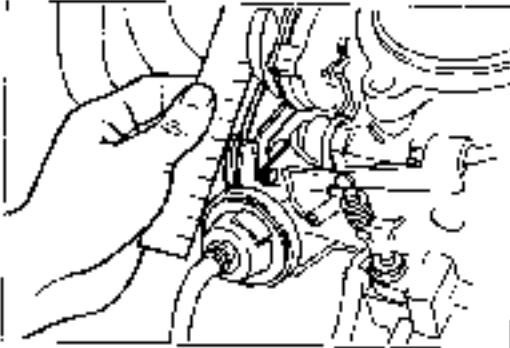
High idle speed after warm up							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check if choke valve is fully open when engine is hot	Yes	Go to Next Step				
		No	Check voltage at choke heater (Y/L) wire Voltage: 8—9V (At Idle)	Yes	Replace automatic choke assembly	F1-87	
				No	Repair or replace wiring harness		
2	Check for correct accelerator cable free play Free play: 1—3mm (0.039—0.188 in)	Yes	Go to Next Step				
		No	Adjust				
3	Check if idle speed can be adjusted by turning TAS	Yes	Adjust idle speed				
		No	Go to Next Step				
4	Check for correct ignition timing (Vacuum hose disconnected)	Yes	Go to Next Step				
		No	Adjust ignition timing				
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				
		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 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))	F1-110 F1-111	Yes	Check idle up solenoid valve	F1-116
				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				
8	Check carburetor	Check pump, shown		Carburetor linkage		F1-92	

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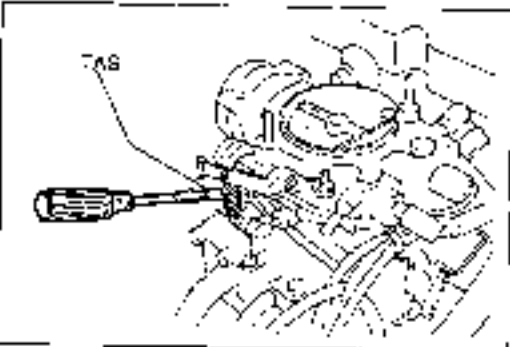
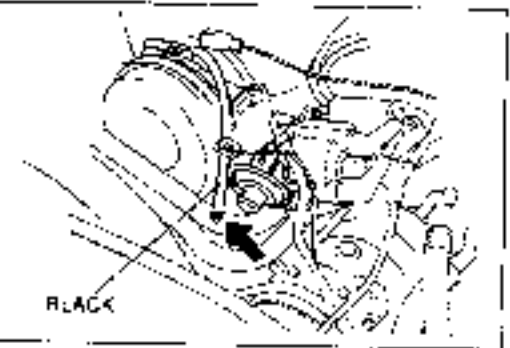
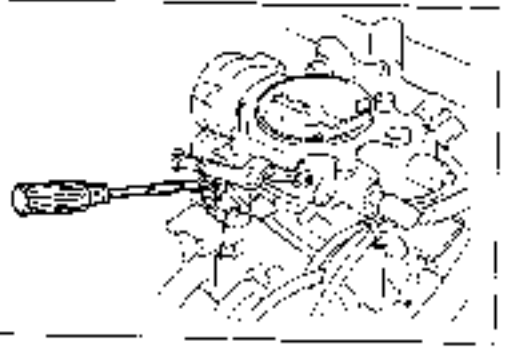
STEP 1



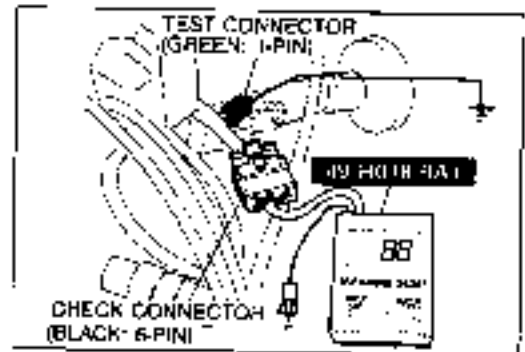
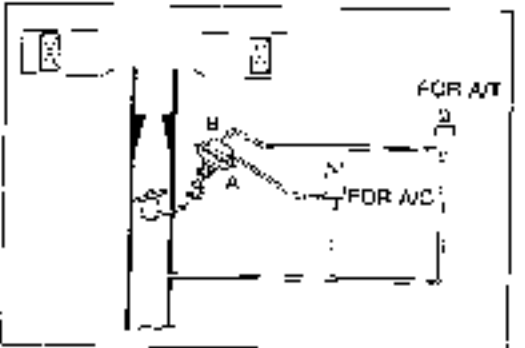
STEP 2



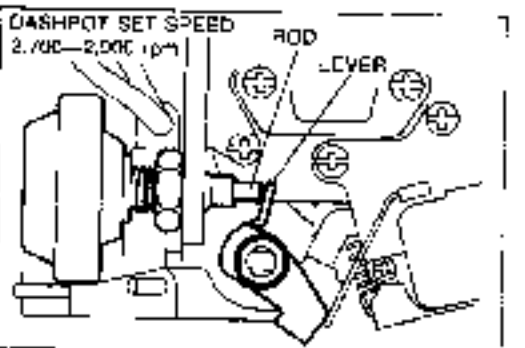
STEP 3

STEP 4
(1)STEP 4
(2)

STEP 5

STEP 6
(1)STEP 6
(2)

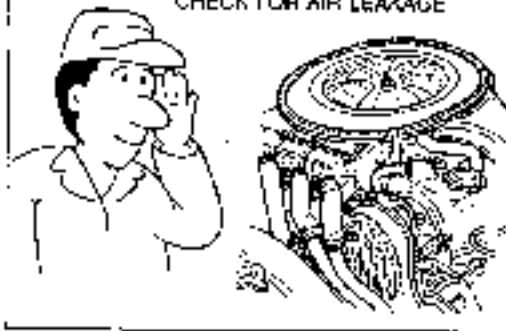
STEP 7



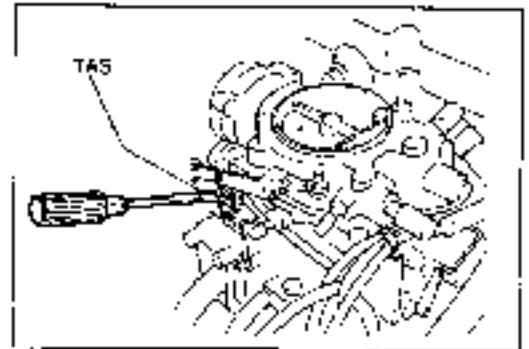
Engine idles roughly or stalls				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for air leakage by listening for sucking noise	Yes	Check points shown	Intake air system component damaged Vacuum hose disconnected or damaged Bolts or nuts loose Gasket damaged
		No	Go to Next Step	
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 ² 3.7—4.7 psi)	F1-83 Yes No	Set float level F1-81 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 unit terminal wire (B/H) and (B/W) unplug)	Yes No	Check fuel pressure F1-82 Set float level F1-91 Check fuel pump control unit Replace fuel pump F1-82
3	Disconnect high-tension lead from individual cylinders and check if condition changes	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	F1-112
		No	Go to Next Step	
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	F1-101
		No	Go to Next Step	
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 1

CHECK FOR AIR LEAKAGE

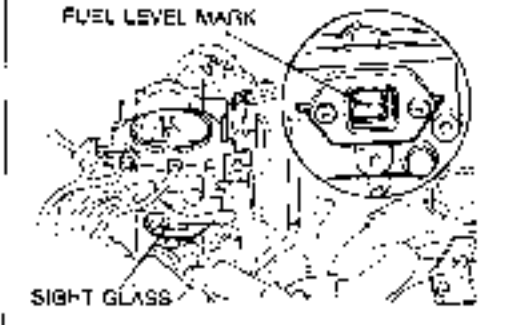


STEP 5



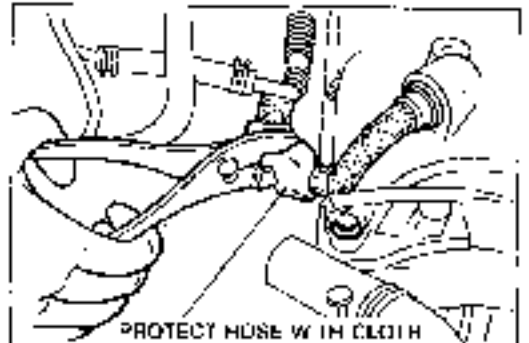
STEP 2

FUEL LEVEL MARK



SIGHT GLASS

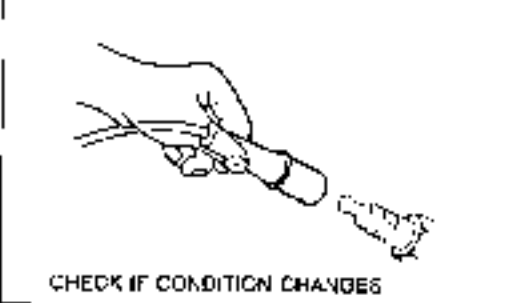
STEP 6



PROTECT HOSE WITH CLOTH

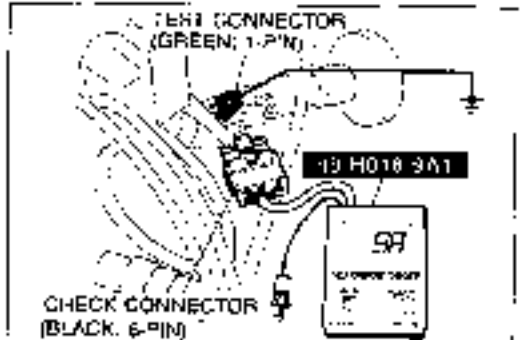
STEP 3

DISCONNECT HIGH-TENSION LEAD



CHECK IF CONDITION CHANGES

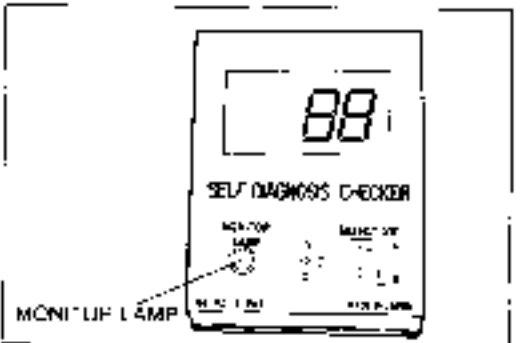
STEP 7



1-PIN CONNECTOR (GREEN, 1-PIN)

13 H010-9A1

CHECK CONNECTOR (BLACK, 6-PIN)

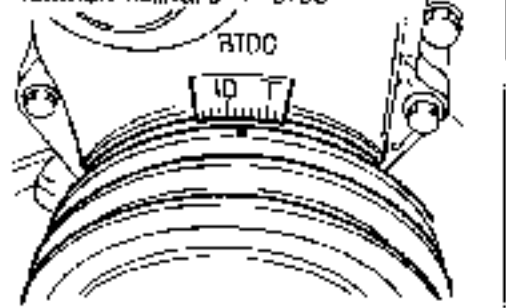
STEP 4
(1)STEP 8
(1)

SELF-DIAGNOSIS CHECKER

MONITOR LAMP

STEP 4
(2)

IGNITION TIMING, 5-7° BTDC



BTDC

STEP 8
(2)

SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATION FULL THROTTLE	OFF
CLUTCH SWITCH	ACCELERATION DEPRESSION	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASE	ON
CLUTCH SWITCH	CLUTCH PEDAL DEPRESSION	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
NEUTRAL SWITCH	TRANSMISSION IN NEUTRAL	OFF
4-5-6-7-8 SWITCH	4-5-6-7-8 RANGE	OFF
4-5-6-7-8 SWITCH	4-5-6-7-8 RANGE	ON
4-5-6-7-8 SWITCH	4-5-6-7-8 RANGE	OFF
4-5-6-7-8 SWITCH	4-5-6-7-8 RANGE	ON

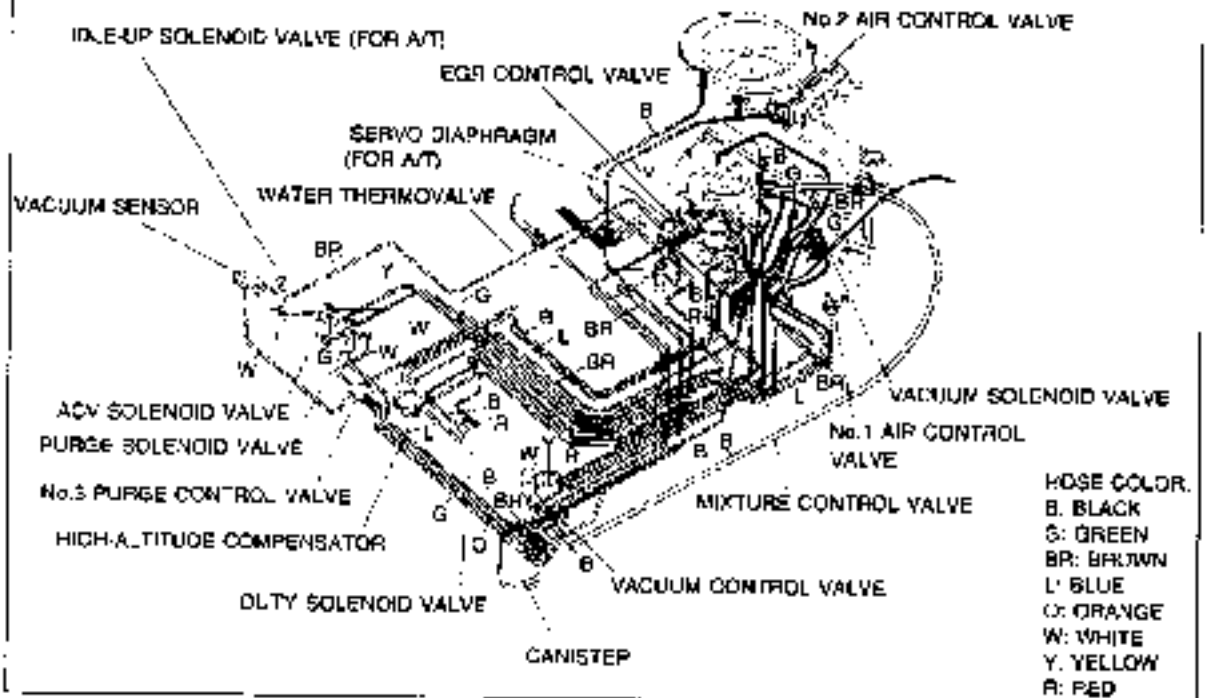
1. Transmission in 1st gear 2. Transmission in 2nd gear

Engine idles roughly or stalls (Cont'd)

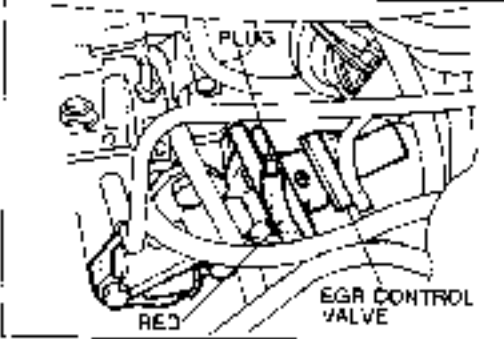
STEP	QUICK INSPECTION	ACTION				POSSIBLE CAUSE AND DETAILED INSPECTION	
9	Check for correct EGR system vacuum hose routing	Yes	Go to Next Step				
		No	Repair or replace vacuum hose				F1-10
10	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (2K) and (2L) terminal voltage with SST	F1-110	Yes	Check duty solenoid valve	F1-83
			Voltage: 2K—Battery voltage 2L—Battery voltage (At Idle)		No	Check ECU (1C), (1D), 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	
11	Check if "ticking" 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 idle compensator is closed when ambient temperature is below 63—71°C (145—150°F)	Yes	Go to Next Step				
		No	Replace idle compensator				
13	Disconnect air hoses (B), (L) and (BR) from carburetor	Yes	Go to Next Step				
	Check high-altitude compensator by blowing through each hose	No	Replace high-altitude compensator				
	500 m (1,640 ft) or higher: Airflows						
	Less than 500 m (1,640 ft): Air does not flow						
14	Check vacuum control valve						F1-80
15	Check carburetor		Check points 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

3R1-04-1-008

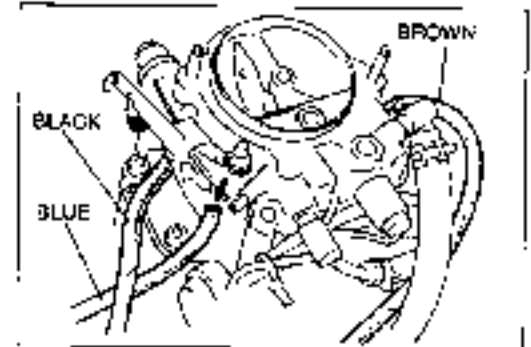
STEP 9



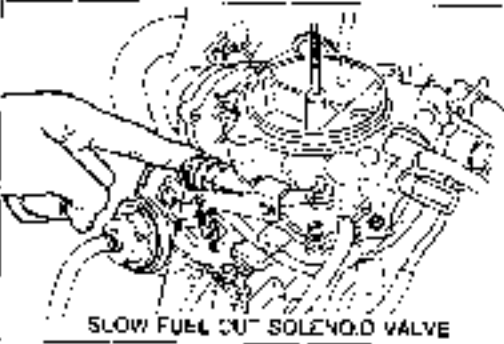
STEP 10



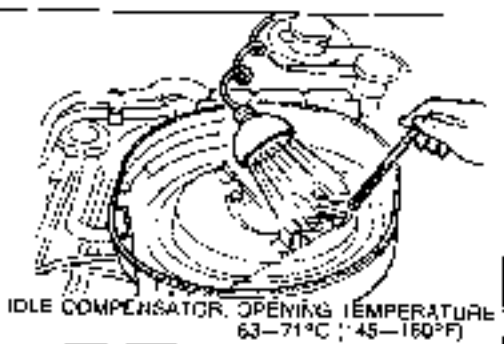
STEP 13



STEP 11

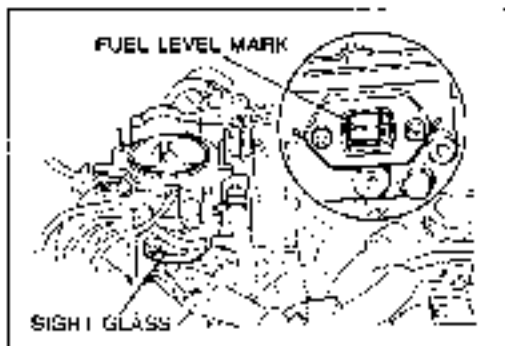


STEP 12

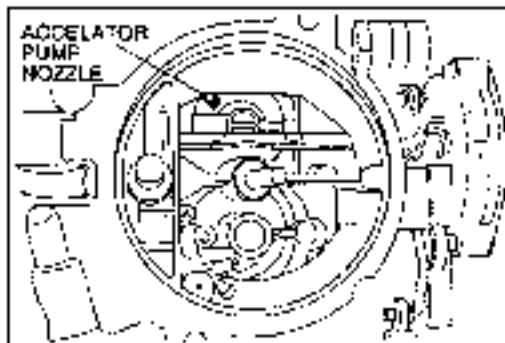
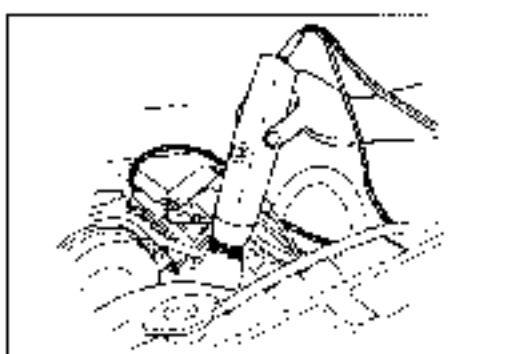
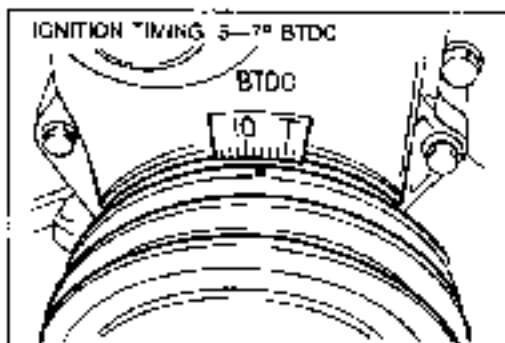


Hesitation on acceleration or start-up					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check if fuel level is at specified mark on sight glass	Yes	Go to Next Step		
		No	(Higher than specified) Disassemble carburetor and check points shown	Check needle and seat for wear or rust	F1-80
				Check float for damage	F1-80
				Set float level	F1-91
				Set float level	F1-91
		(Lower than specified) M/T vehicle: Check for specified fuel pressure Fuel pressure: 25—32 kPa (0.26—0.33 kg/cm ² , 3.7—4.7 psi) (Lower than specified) A/T vehicle: Check for fuel pump operation sound at fuel filter port [Ign ON, fuel pump control unit terminal-wire (B/R) and (B/W) jump]	F1-83	Yes	Set float level
				No	Replace fuel pump
				Yes	Check fuel pressure
				No	Set float level
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	Yes	Replace accelerator pump
				No	Clean carburetor fuel passages
3	Check for correct ignition timing Ignition timing 5—7° BTDC	Yes	Go to Next Step		
		No	Adjust ignition timing		Section G
4	Check for correct idle speed Idle speed 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 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

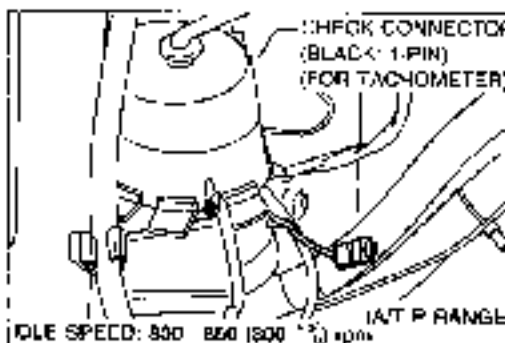
STEP 1



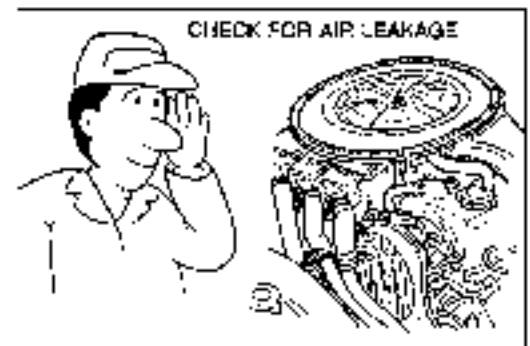
STEP 2

STEP 3
(1)STEP 3
(2)

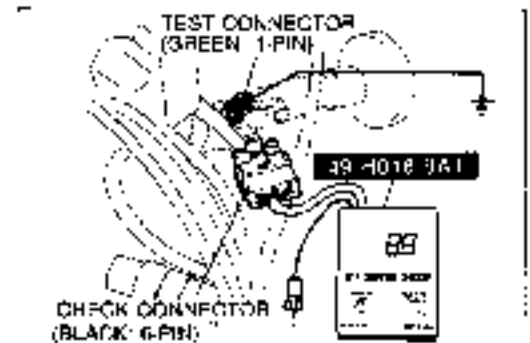
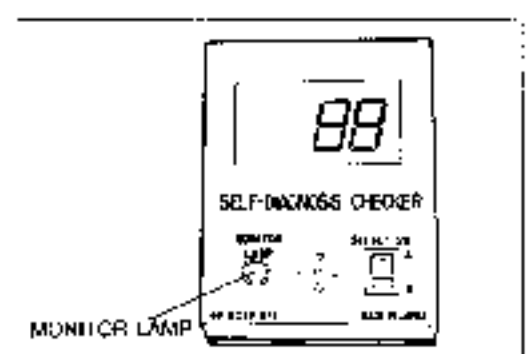
STEP 4



STEP 5



STEP 6

STEP 7
(1)STEP 7
(2)

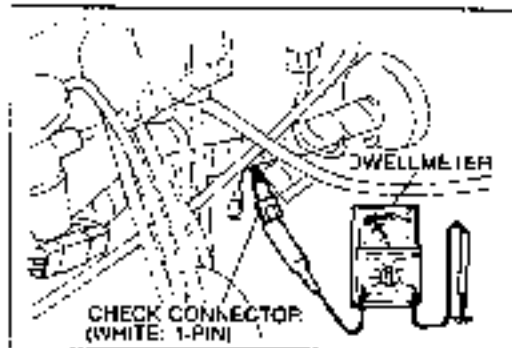
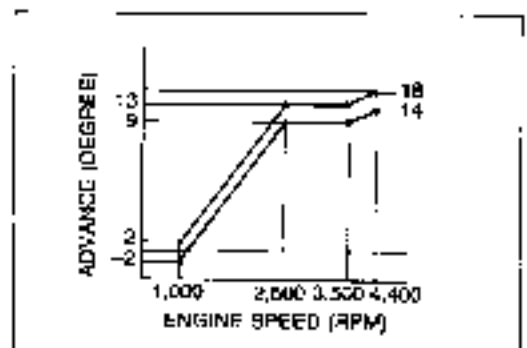
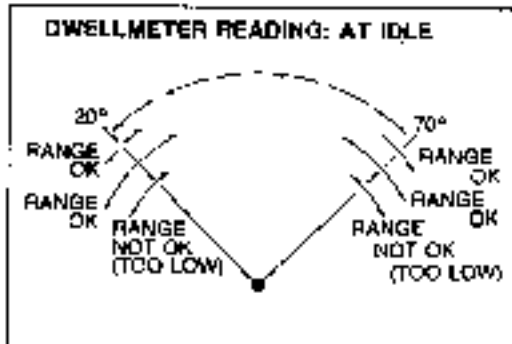
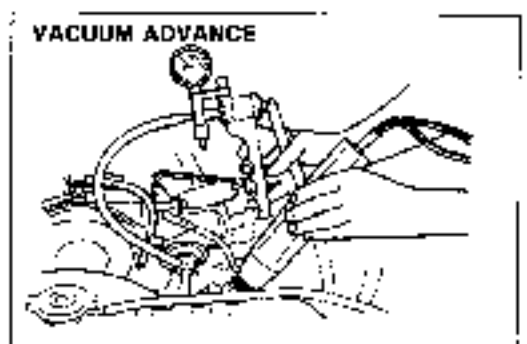
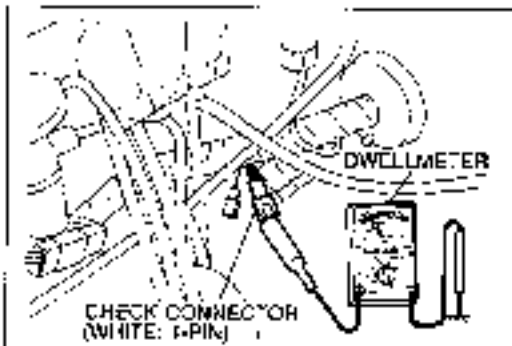
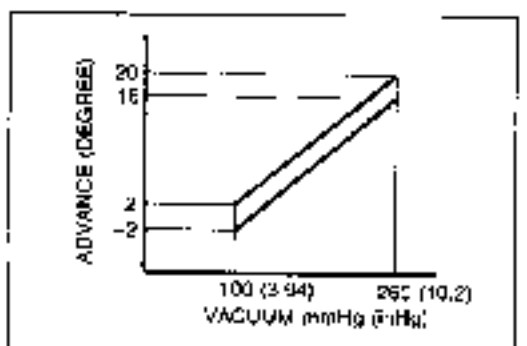
SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RELEASED*	OFF
SWITCH	ACCELERATOR DEPRESS*	ON
CLUTCH-SW. CL	CLUTCH PEDAL RELEASED**	ON
	CLUTCH PEDAL DEPRESS**	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
IGNITION SWITCH	IN PULL POSITION	OFF
	IN OTHER RANGE	ON
A/C SWITCH	OFF	OFF
	ON	ON

* Ignition switch in "LOCK" position
 ** Ignition switch in "ON" position

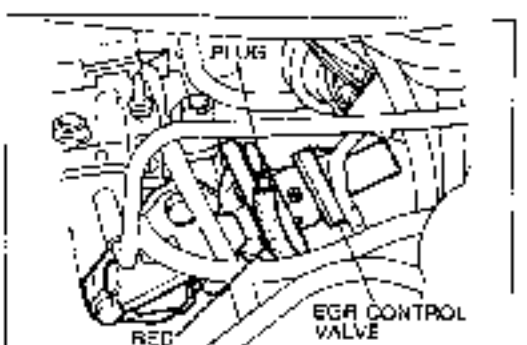
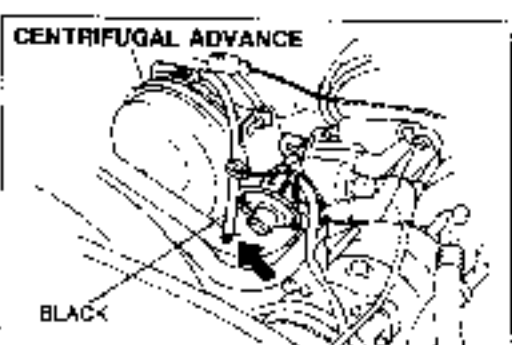
Hesitation on acceleration or start-up (Cont'd)

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°) Check points shown	ECU (2A) terminal voltage	F1-110
				ECU (1E) terminal voltage	F1-110
				ECU (10i) terminal voltage	F1-110
		No	(Fixed at 27°) Check points shown	ECU (11j) terminal voltage	F1-110
				Vacuum hose routing	F1-10
				ECU (11A) terminal voltage	F1-110
		No	(Fixed at 35°) Check points shown	Oxygen sensor sensitivity	F1-55
				ECU (10) terminal voltage	F1-110
		No	(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
				Airflow sensor 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
			Insufficient vacuum 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 SS ⁺	Check duty solenoid valve	F1-83
				Check ECU (10i), (10j), and (2A) terminal voltage with SS ⁺	F1-110
		No	Voltage: Drops from battery voltage and green and red lights flash (While accelerating)		
12	Check carburetor	No	Check EGR control valve	Go to Next Step	
				Replace EGR control valve	
12	Check carburetor	No	Check points shown	Clogged primary main jet or nozzle	F1-88

27000F1-002

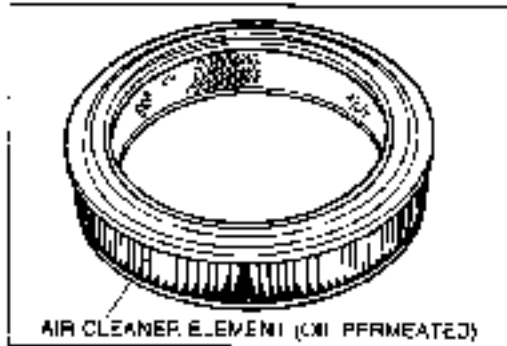
STEP 8
(1)STEP 10
(2)STEP 8
(2)STEP 10
(3)STEP 9
(1)STEP 10
(4)STEP 9
(2)

STEP 11

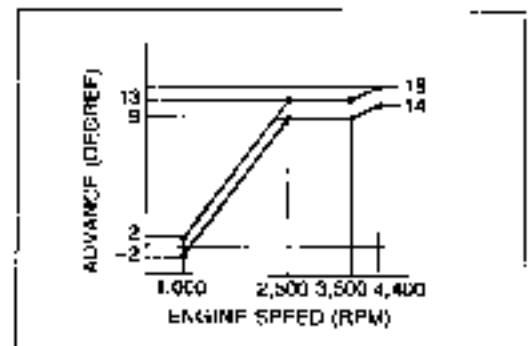
STEP 10
(1)

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 in 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 Fuel pressure: 28—32 kPa (0.26—0.33 kg/cm ² , 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
				Check fuel pump control unit	
				Heptaco fuel pump	F1-82
3	Check ignition timing Ignition timing: 5—7° BTDC	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	F1-10	Yes
			Check for correct vacuum hose routing	No	Repair vacuum hose
					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		

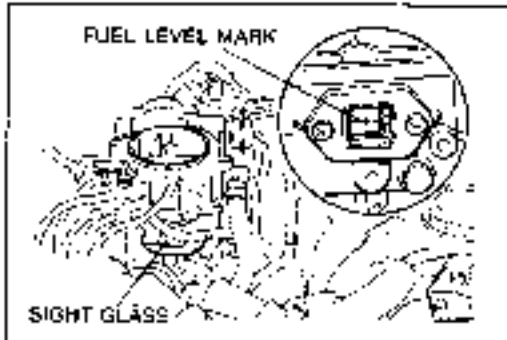
STEP 1



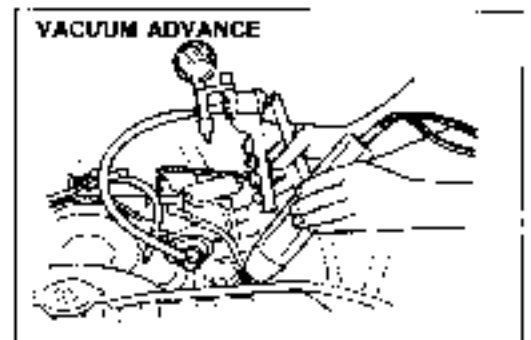
STEP 4 (2)



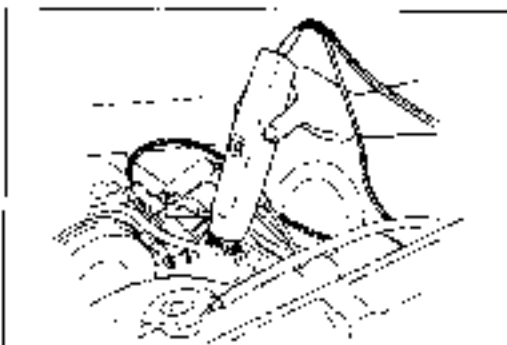
STEP 2



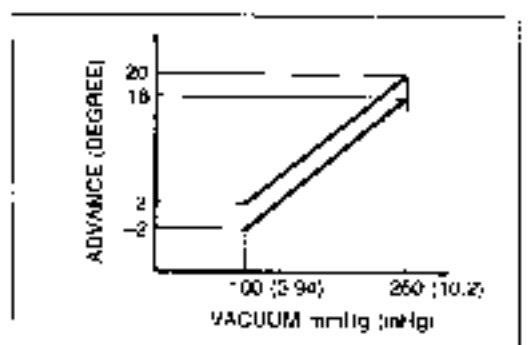
STEP 4 (3)



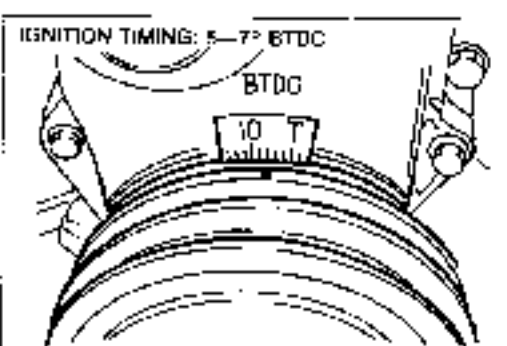
STEP 3 (1)



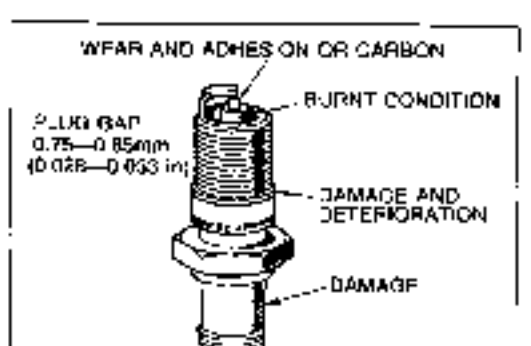
STEP 4 (4)



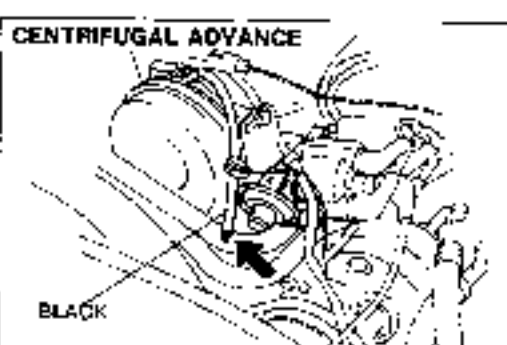
STEP 3 (2)



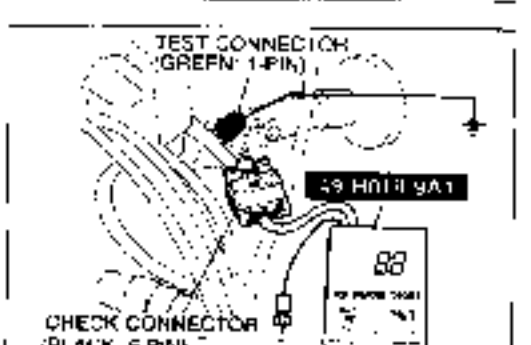
STEP 5



STEP 4 (1)

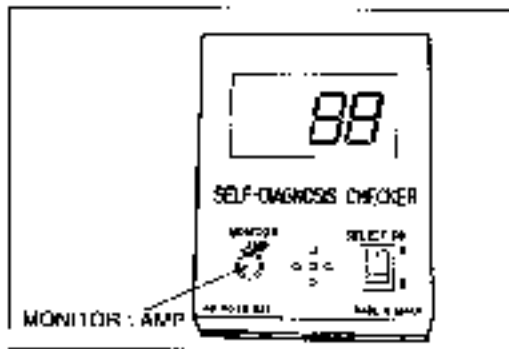


STEP 6

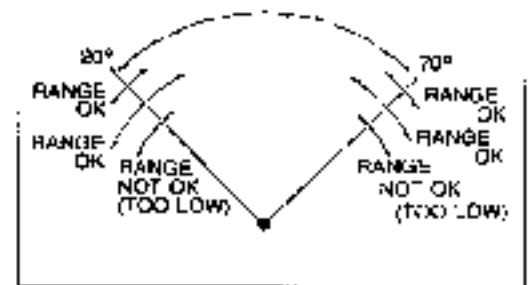


Lack of power (Cont'd)								
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
6	Check switches for correct operation with SST monitor lamp [Ign ON, SST connector (Green 1-pin) grounded]	Yes	Go to Next Step					
		No	Check for cause by referring to specified check sequence			F1-55		
7	Disconnect and plug vacuum hose to EGR control valve and check if condition improves	Yes	Check ECU (24) and (24) terminal voltage with SST Voltage: Drops from battery voltage and green and red lights flash (While acceleration)	F1-111	Yes	Check duty to avoid valve	F1-63	
					No	Check ECU (10), (10), and (24) terminal voltage with SST	F1-110	
		No	Check LGIT control valve for operation	F1-82	Yes	Go to Next Step		
					No	Replace LGIT control valve		
8	Warm up engine and run it at idle Connect dwellmeter to check distributor (White 1 pin) and check if readings within 20°—70°	Yes	Go to Next Step					
		No	(Fixed at 0°) Check points shown	ECU (24) terminal voltage		F1-110		
				ECU (1E) terminal voltage		F1-110		
				ECU (10) terminal voltage		F1-110		
				(Fixed at 27°) Check points shown		ECU (1J) terminal voltage	F1-110	
				Vacuum hose routing		F1-10		
				ECL (1A) terminal voltage		F1-110		
				Oxygen sensor sensitivity		F1-55		
				(Fixed at 25°) 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 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		• Clogged primary main jet or nozzle • Clogged secondary main jet or nozzle • Secondary throttle valve opening F1-112				
11	Check exhaust system for clogging							

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STEP 6
(1)**STEP 6**
(2)

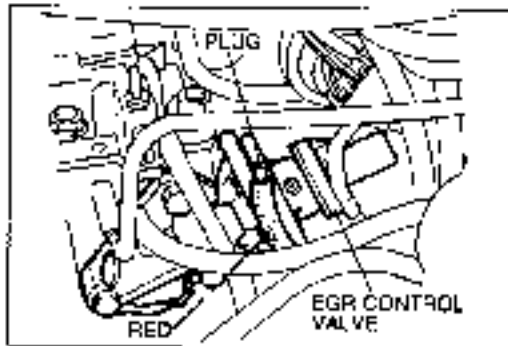
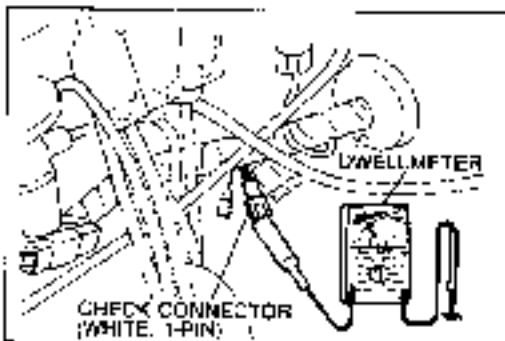
DWELL METER READING: AT IDLE

**STEP 6**
(2)

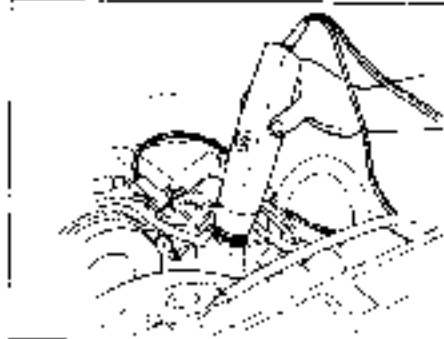
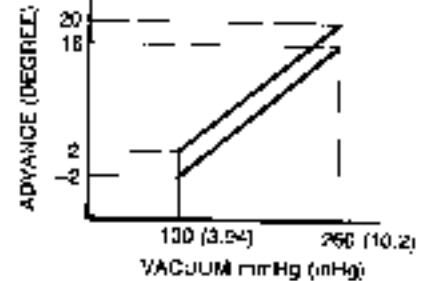
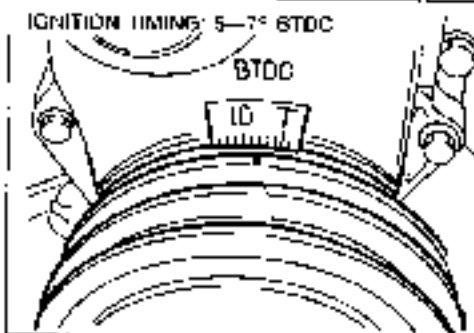
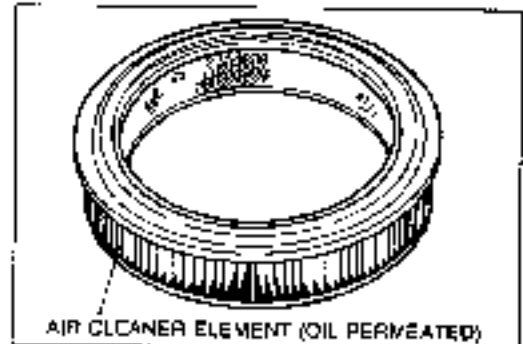
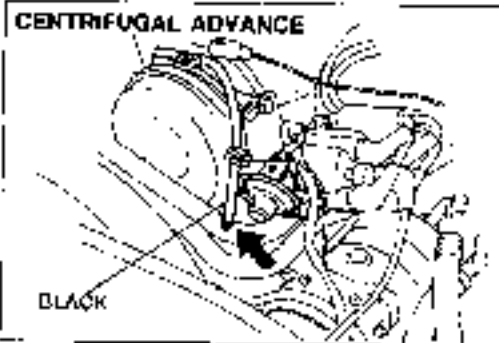
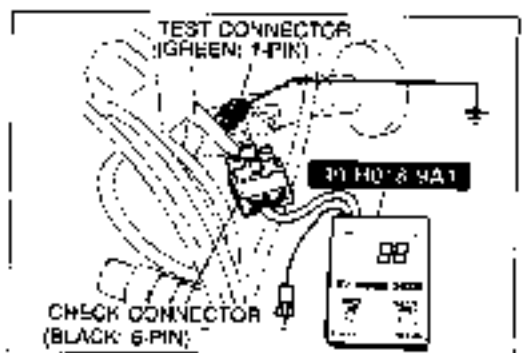
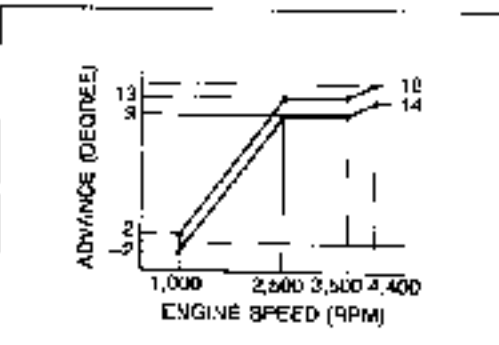
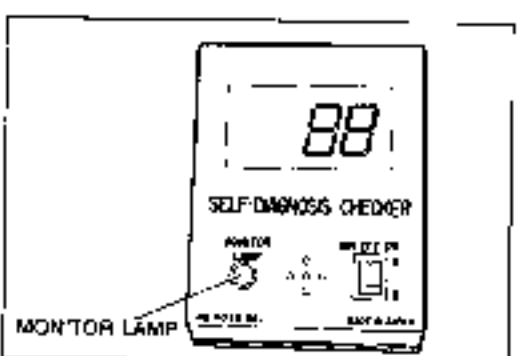
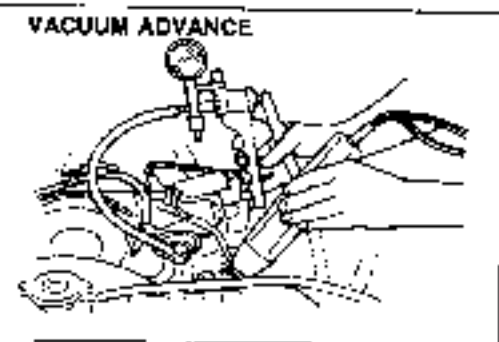
SWITCH	CONDITION	MONITOR LAMP
IDLE SWITCH	ACCELERATOR RE-FASTEN ^{*)}	ON
	ACCELERATOR DE-PRESSED ^{*)}	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED ^{*)}	ON
	CLUTCH PEDAL DE-PRESSED ^{*)}	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	OFF
IN-REAR SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

*) Transmission in neutral

*) 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 Ignition timing: 5—7° BTDC	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 Section G F1-10
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: 4-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 ¹⁾	ON
	ACCELERATOR DEPRESSED ¹⁾	ON
CLUTCH SWITCH	CLUTCH PEDAL RELEASED ¹⁾	ON
	CLUTCH PEDAL DEPRESSED ²⁾	OFF
NEUTRAL SWITCH	TRANSMISSION IN GEAR	ON
	TRANSMISSION IN NEUTRAL	ON
INHIBITOR SWITCH	IN P OR N RANGE	OFF
	IN OTHER RANGES	ON
A/C SWITCH	OFF	OFF
	ON	ON

¹⁾ Transmission in neutral. ²⁾ 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/T) connector Decelerate engine from 3,000 rpm 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 At idle: Less than 1.5V Above 2,500 rpm during deceleration: battery voltage	F1-110 Yes Check slow fuel cut solenoid valve No Check ECU (1N), (2A), (1Q), and (1P) terminal voltage with SST	F1-80 F1-110
7	Disconnect neutral switch (N/T) or inhibitor switch (A/T) connector Decelerate engine from 3,000 rpm 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 At idle: battery voltage At 2,500—1,400 rpm during deceleration: Less than 1.5V	F1-111 Yes Check coasting richer solenoid valve No Check ECU (1N), (2A), (1Q), and (1P) terminal voltage with SST	F1-67 F1-110
8	Disconnect neutral switch (N/T) or inhibitor switch (A/T) connector Decelerate engine from 3,000 rpm and check if "clicking" is heard from coasting advance solenoid valve	Yes	Go to Next Step		
		No	Check ECU (1S) terminal voltage with SST At idle: battery voltage At 2,500—1,700 rpm during deceleration: Below 1.5V	F1-110 Yes Check coasting advance solenoid valve No Check ECU (1N), (2A), (1Q), and (1P) terminal voltage with SST	F1-67 F1-110
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 No Replace mixture control valve	
10	Check if throttle lever separates from dashpot rod at 2,700—2,900 rpm	Yes	Go to Next Step		
		No	Adjust dashpot		F1-58

STEP 6

(1)

M/T

A/T



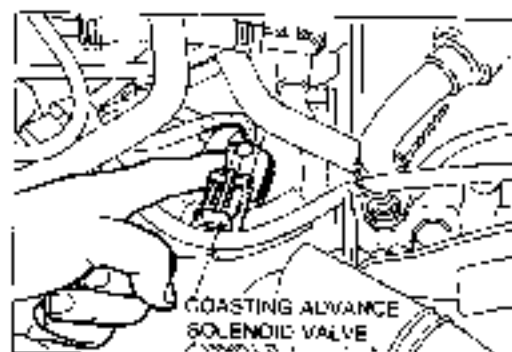
NEUTRAL SWITCH



INHIBITOR SWITCH

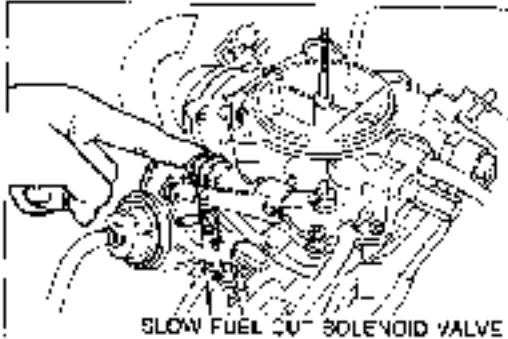
STEP 8

(2)

COASTING ADVANCE
SOLENOID VALVE

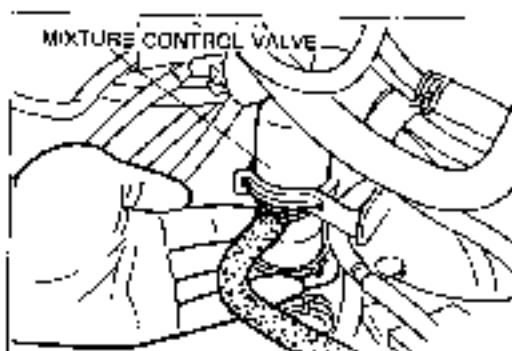
STEP 6

(2)



SLOW FUEL CUT SOLENOID VALVE

STEP 9



MIXTURE CONTROL VALVE

STEP 7

(1)

M/T

A/T

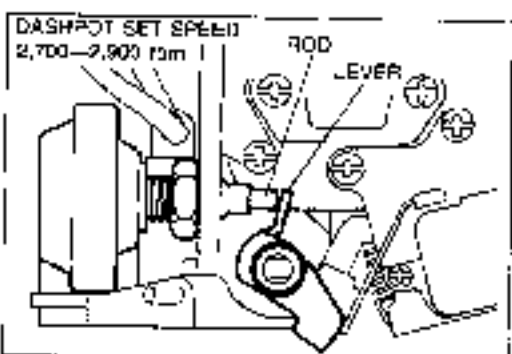


NEUTRAL SWITCH



INHIBITOR SWITCH

STEP 10

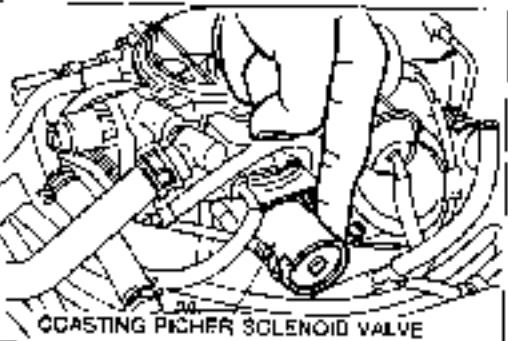
DASHPOT SET SPEED
2,700-2,900 rpm

ROD

LEVER

STEP 7

(2)



COASTING RICHER SOLENOID VALVE

STEP 8

(1)

M/T

A/T



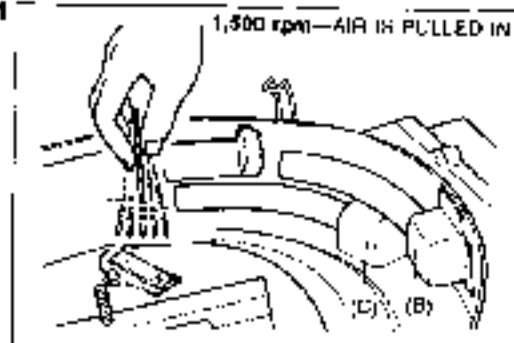
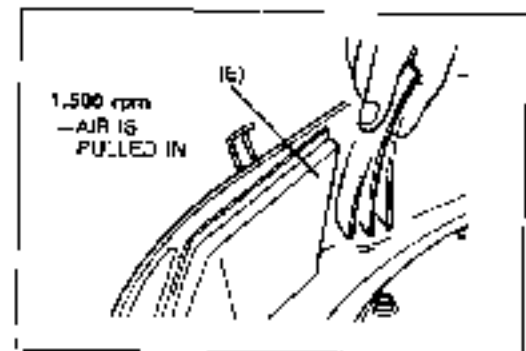
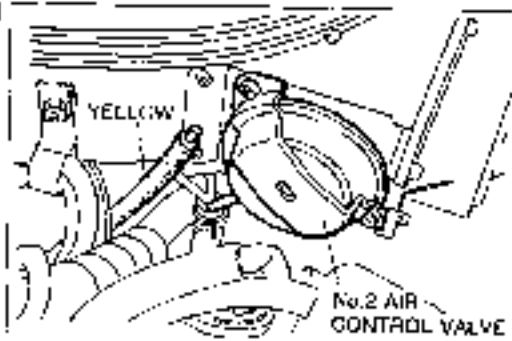
NEUTRAL SWITCH



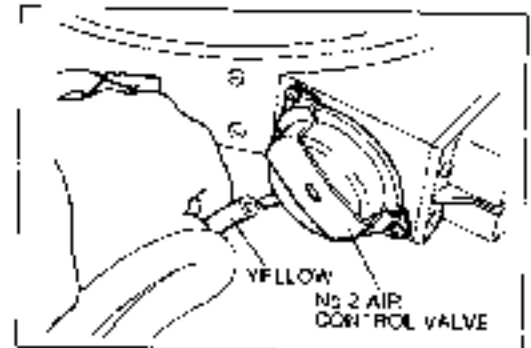
INHIBITOR SWITCH

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.	F1-59	Replace reed valve(s).	F1-60
		No			Replace No.1 air control valve.	F1-60
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.	F1-60	Check reed valve.	F1-60
		No			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 (M).	Yes	Increase engine speed to 1,500 rpm and check if vacuum is left at vacuum hose.	Yes	Go to Next Step.	
		No		No	Check ACV solenoid valve.	F1-60
15	Check engine condition.		Check points shown.		Check compression.	Section B1
					Check valve timing.	Section B1

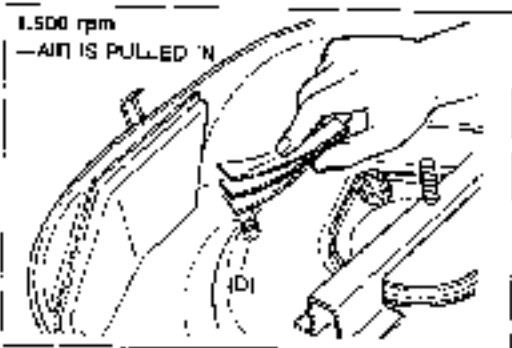
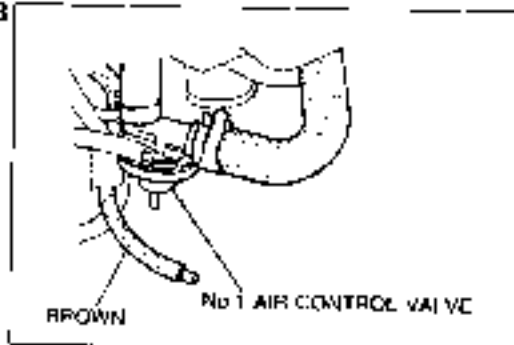
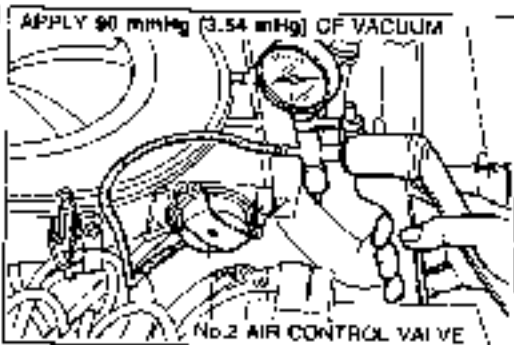
2910F1-020

STEP 11
(1)STEP 13
(3)STEP 11
(2)

STEP 14

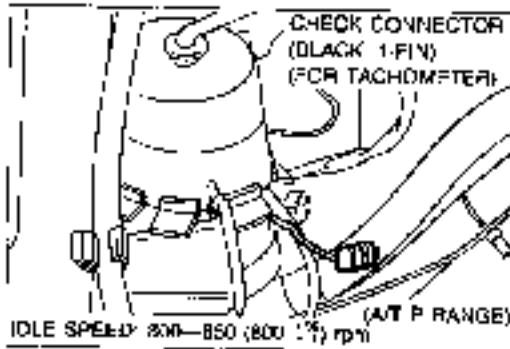


STEP 12

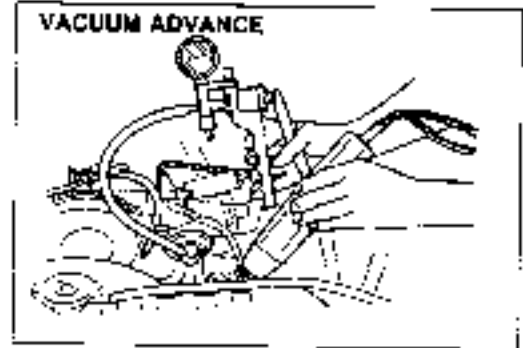
STEP 13
(1)STEP 13
(2)

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:	Brake dragging: Section P Clutch slipping: Section H A/T shifting: Section K1
2	Check for correct idle speed Idle speed: 800—850 (800 $\pm$ 5) rpm (A/T: P range)	Yes: Go to next Step No: Adjust	F1-112
3	Check for correct ignition timing Ignition timing: 6—7° BTDC	Yes: Go to Next Step No: Adjust	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 vacuum hose routing	F1-10
		Yes: Distributor malfunction No: Repair or replace vacuum hose	Section G 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	F1-91
7	Check if choke valve fully opens after warm up	Yes: Go to Next Step No: Replace automatic choke assembly	F1-98

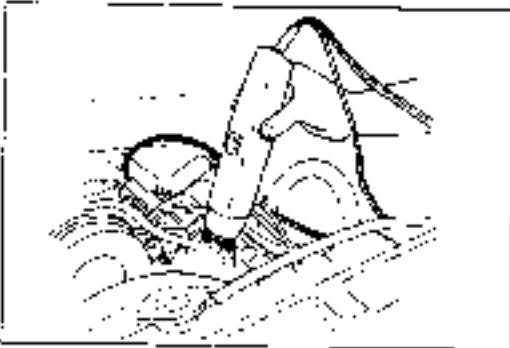
STEP 2



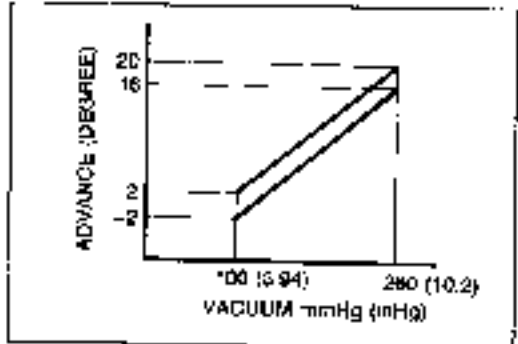
STEP 4 (3)



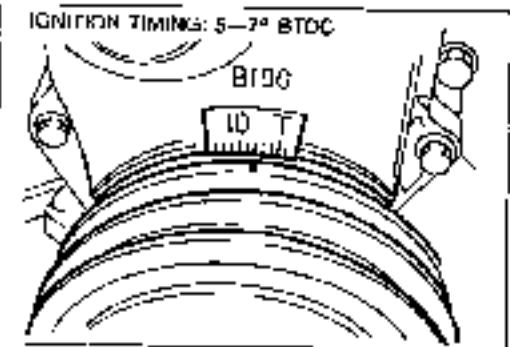
STEP 3 (1)



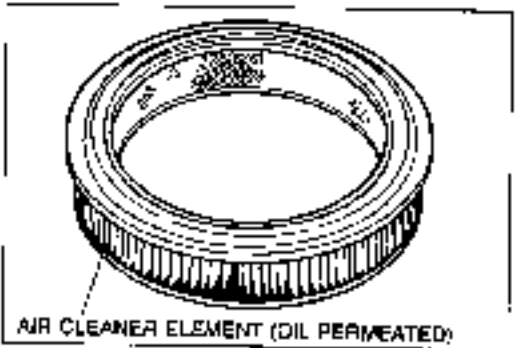
STEP 4 (4)



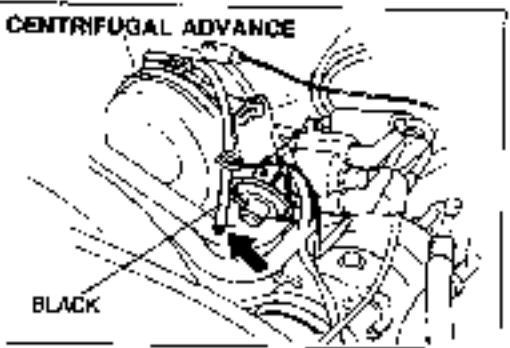
STEP 3 (2)



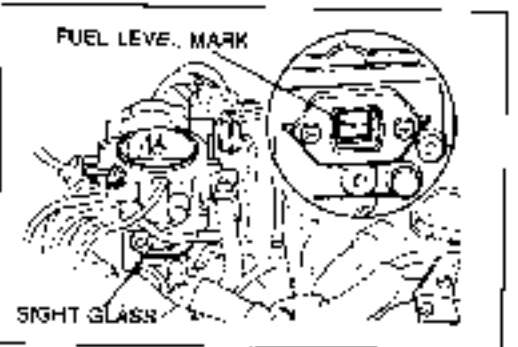
STEP 6



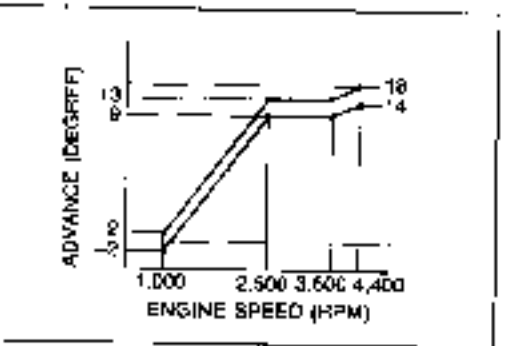
STEP 4 (1)



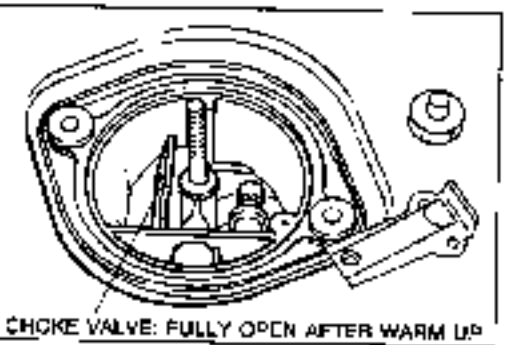
STEP 6



STEP 4 (2)



STEP 7

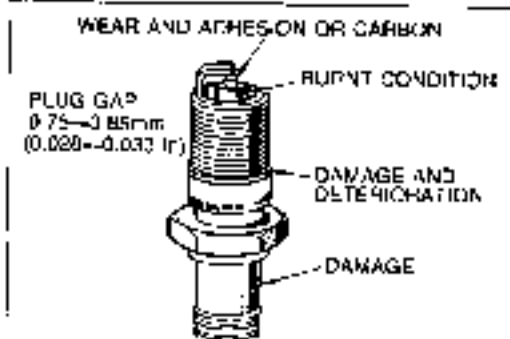


High fuel consumption (Cont'd)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
8	Check if spark plug condition is OK	Yes: Go to Next Step No: Repair or replace	Section G F1-101
9	Check for malfunction coil with SST (Ign. ON, test connector (Green: 1 pin) grounded)	Yes: Check for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

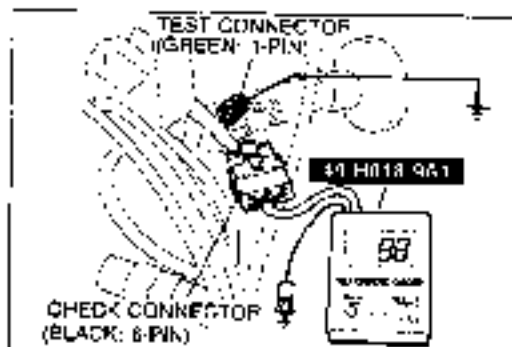
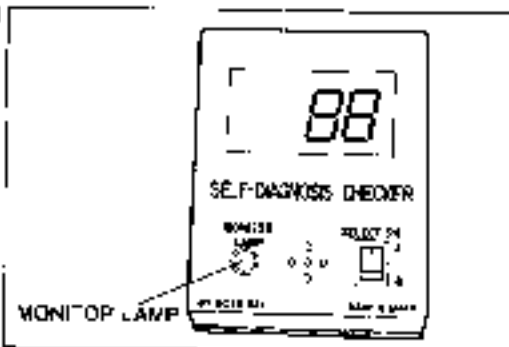
2002-1-010

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

STEP 9

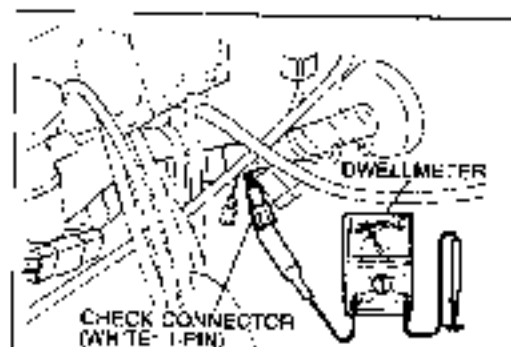
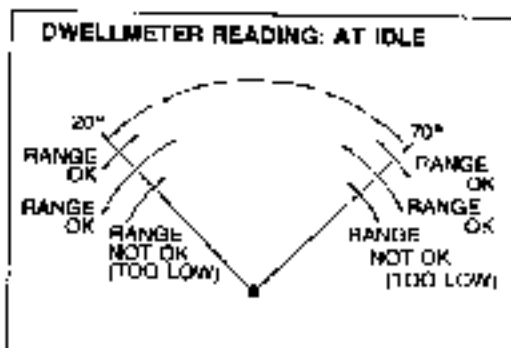


STEP 9

STEP 10
(1)STEP 10
(2)

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

¹⁾ Transmission in neutral
²⁾ Transmission in gear

STEP 11
(1)STEP 11
(2)

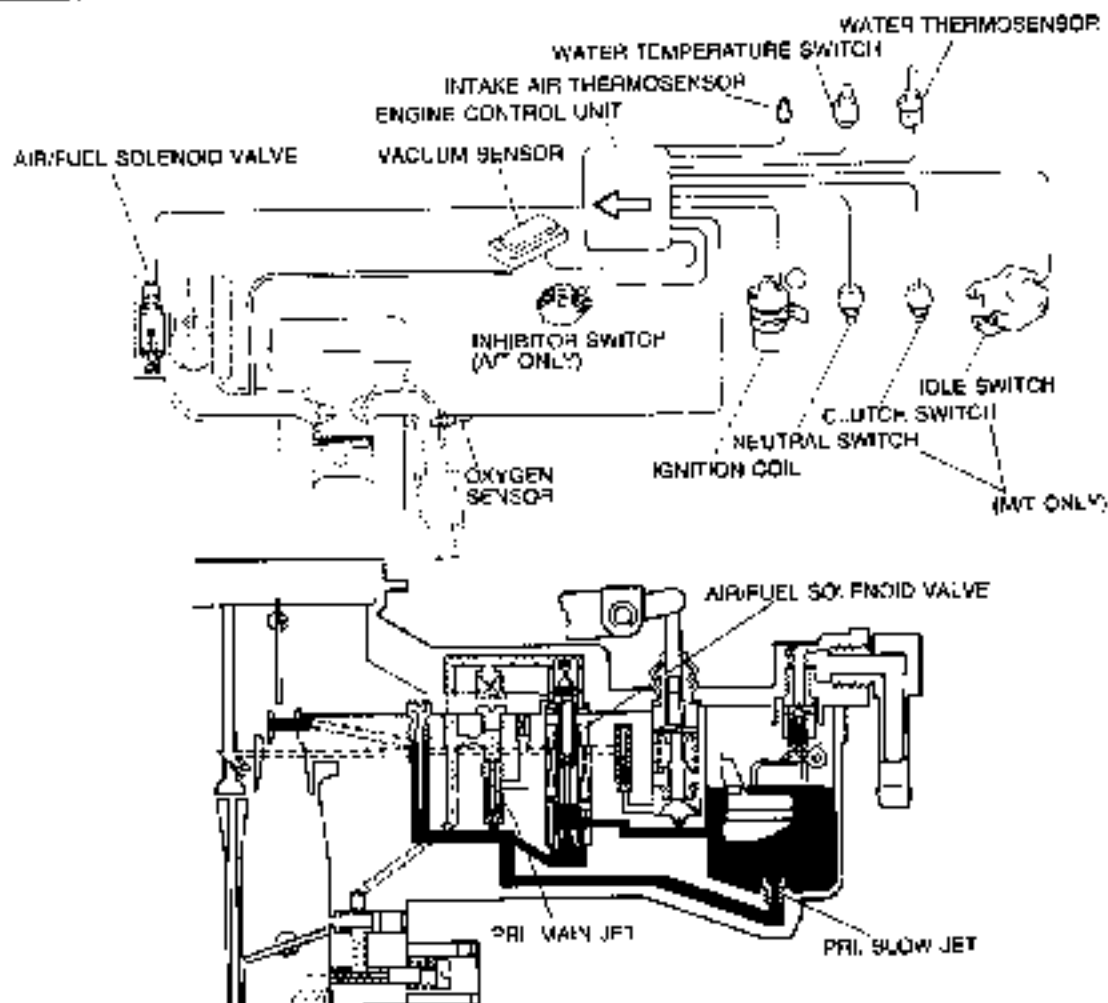
FEEDBACK SYSTEM

PREPARATION
SST

491018 9A1

Self-diagnosis
check

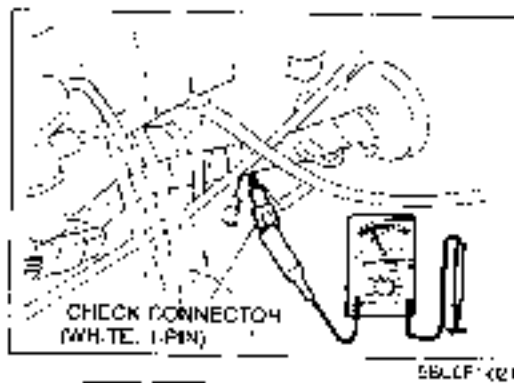
03U0P-C19



03U0P-020

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)

9003F1-022

DWELLMETER READING

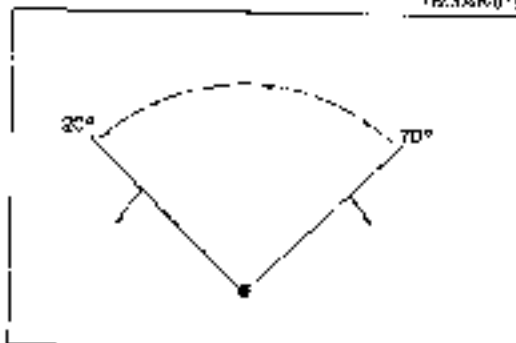
27°
(FIXED DUTY)

9010F1-023

DWELLMETER READING

36°
(FIXED DUTY)

7B-133R015



SYSTEM INSPECTION

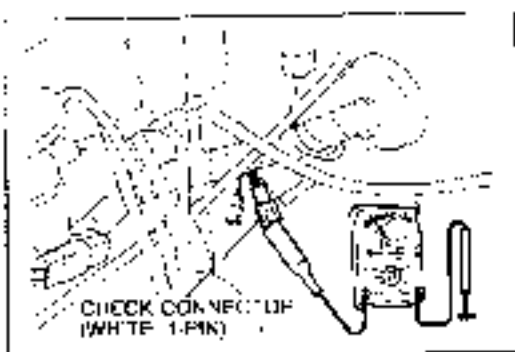
Note

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

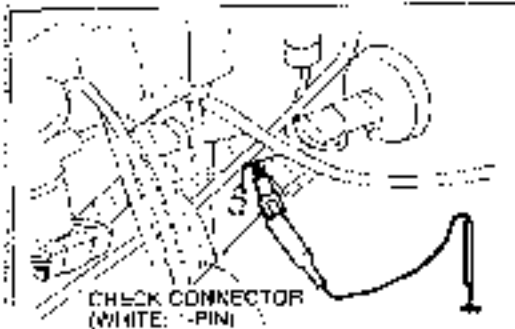
1. Warm up the engine and run it at idle.
2. Connect a dwellmeter to the check connector (White 1-pin), and note the dwellmeter reading.
3. If the dwellmeter reading is fixed at **0°**, check the following.
 - 1) Ignition pulse signal for the engine control unit.
 - 2) Characteristics of the vacuum sensor.
 - 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

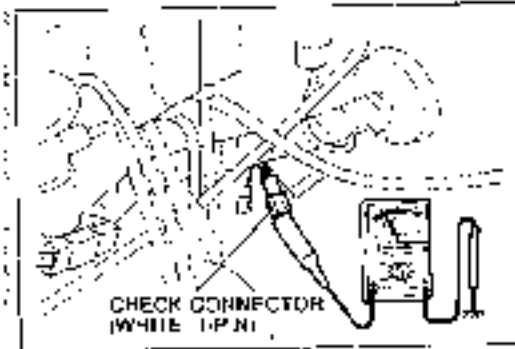
If all these items are in good working condition, adjust the idle mixture (duty) with the mixture adjust screw.



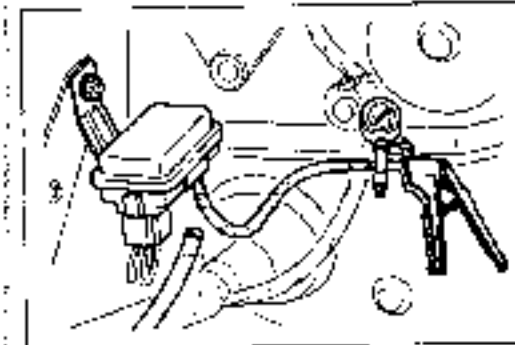
49, JCF-1-025



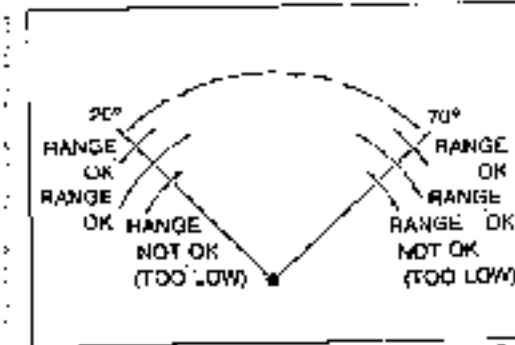
58, JCF-1-026



50, JCF-1-027



78, G4D-C20



78, G4R-C21

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°—70°.

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°—70°.

DWELLMETER READING

0°

(FIXED DUTY)

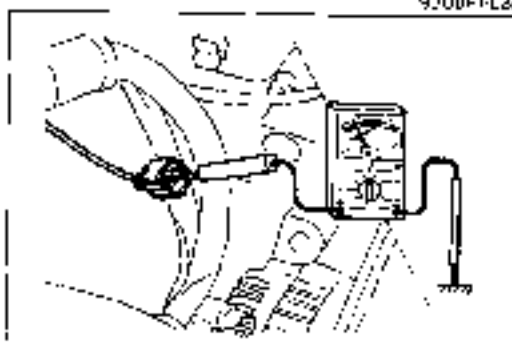
7A00H1-025

DWELLMETER READING

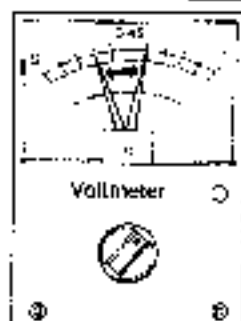
0°

(FIXED DUTY)

9J00H1-028



33L0F1-029



9EUCF1-023



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

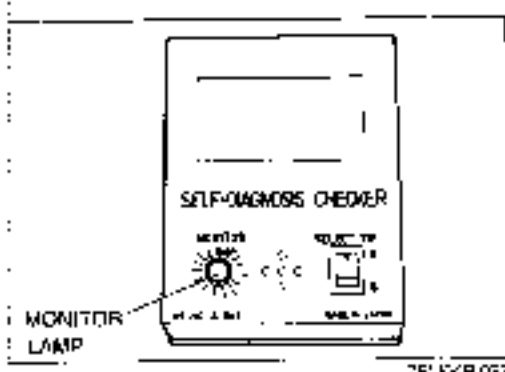
Inspection of Output Voltage

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.

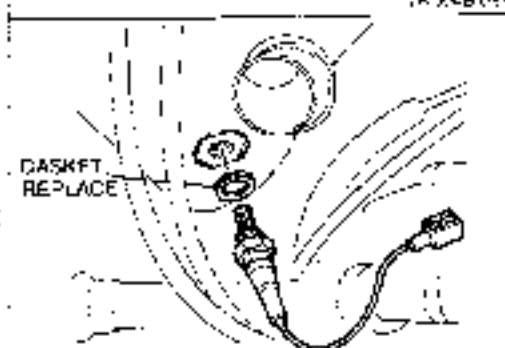
Inspection of sensitivity

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



3. 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

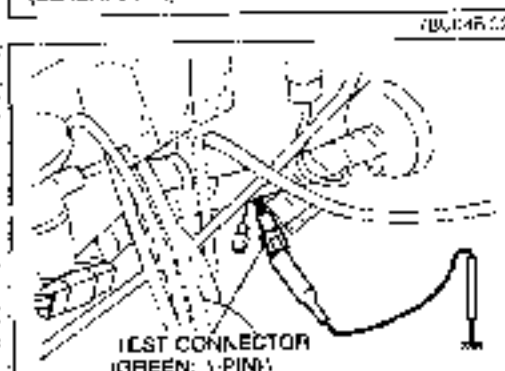
1. Disconnect the connector.
2. Remove the oxygen sensor and gasket.
3. Install the oxygen sensor and gasket as shown.



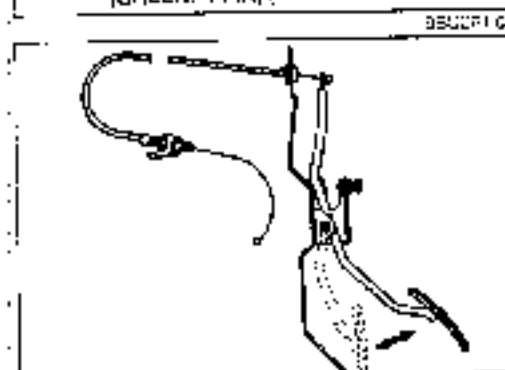
IDLE, CLUTCH, NEUTRAL, AND AIR-CONDITIONER SIGNALS

Inspection

1. With the engine OFF, connect the **Self-Diagnosis Checker** (49 HC18 9A1) to the check connector.



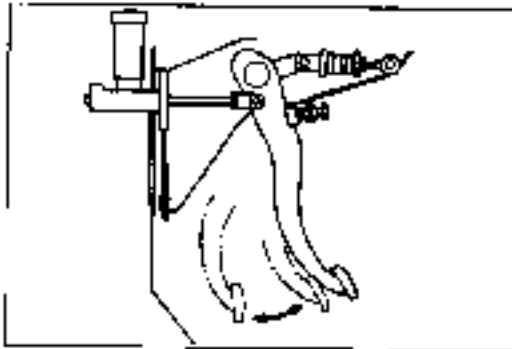
2. Ground the test connector (Green: 3-pin).
3. Turn the ignition switch ON and the air-conditioner switch OFF.



4. 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 1D terminal of the engine control unit and the idle switch.

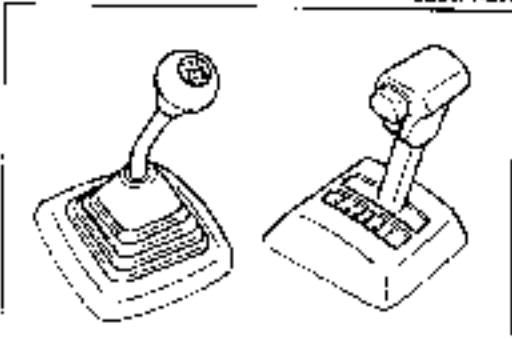


98L0F1-029

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.

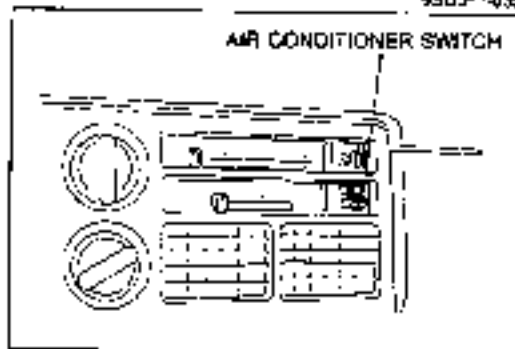


98L0F1-035

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

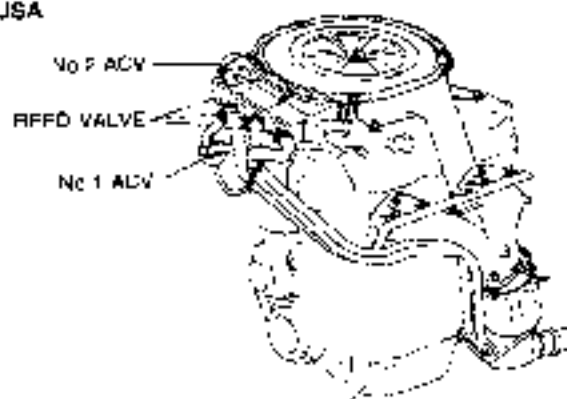
7. With the transmission in neutral and blower motor ON, check the monitor lamp while operating the air conditioner switch.

Condition		Lamp
Air conditioner OFF		OFF
Air conditioner ON		ON

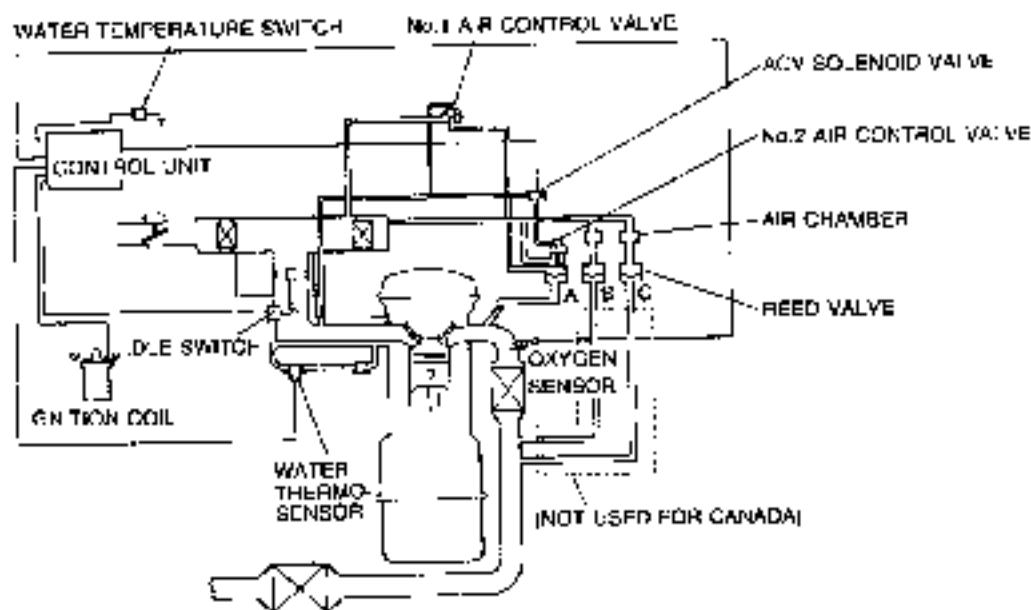
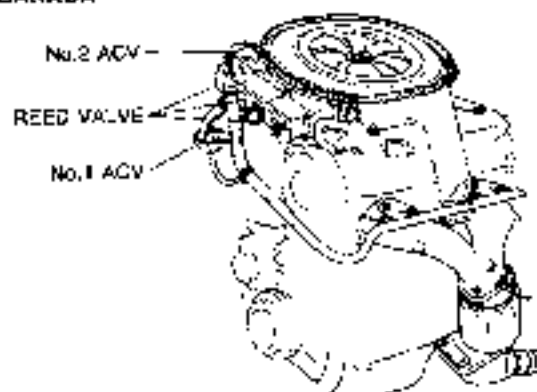
If not correct, check the 2C terminal of the engine control unit.

AIR INJECTION SYSTEM

USA



CANADA



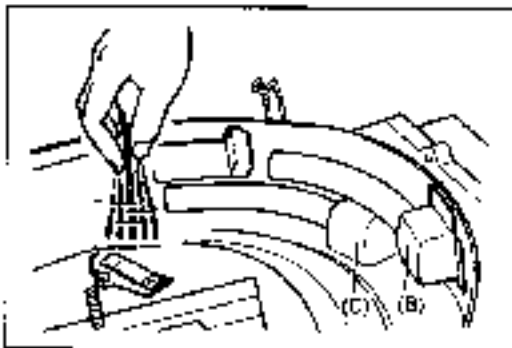
80J0F1-057

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.

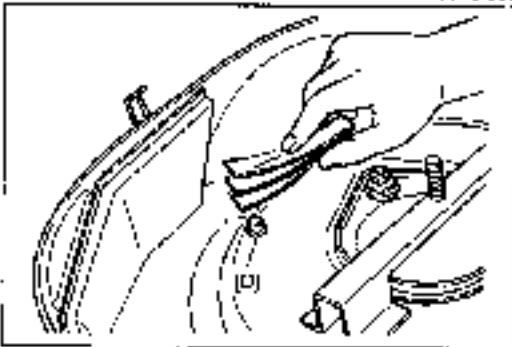
The system comprises the reed valves, air control valves, and ACV solenoid valve controlled by the engine control unit.

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.

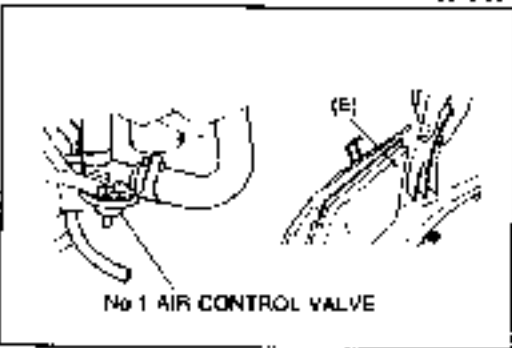
Reed valves B and C supply secondary air into the exhaust pipe just behind the front catalytic converter through exhaust gas pulsation.



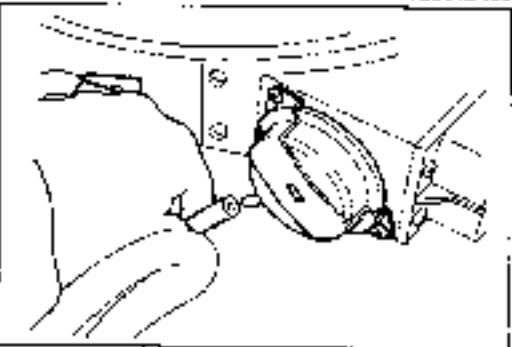
7BLC415-038



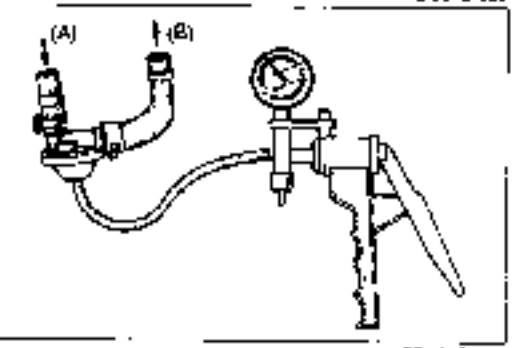
7BJC416-037



7BJC416-038



7BLC417-039



7BLC418-040

SYSTEM INSPECTION

Note

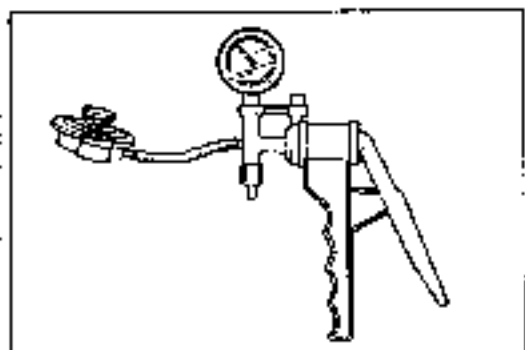
Troubleshoot with the Self-Diagnosis Checker before performing the following steps.

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

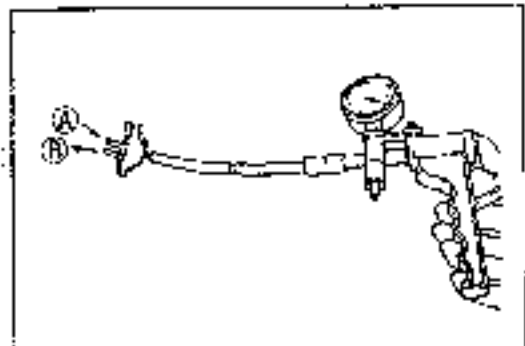
1. Remove No. 1 ACV.
2. Connect a vacuum pump to it.
3. Blow air into (A) and verify that air does not come out of (B).
4. Apply **400 mmHg (15.7 inHg)** vacuum.
5. Blow air into (A) and verify that air comes out of (B).



78J04B-1B5

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).



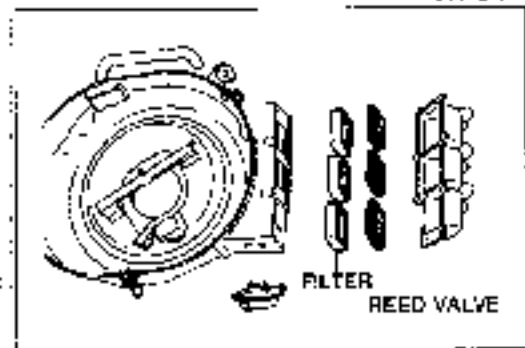
78J04B-231

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: 66-106 mmHg (2.60-4.17 in Hg)

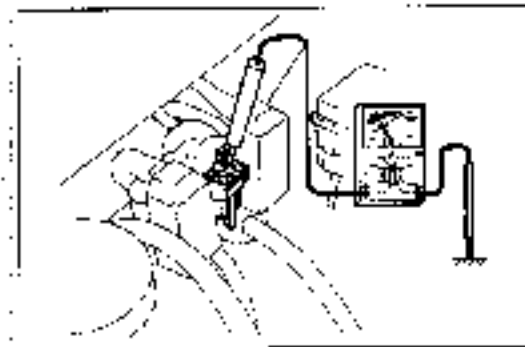
4. If it does not, replace the No.3 purge control valve.



78J04B-042

REED VALVE**Replacement**

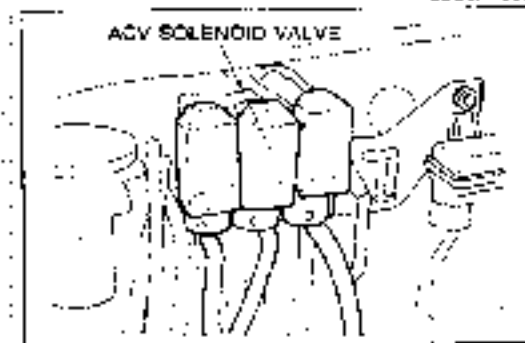
Replace the reed valve as shown, if necessary.



58LCH-1-038

ACV SOLENOID VALVE**Inspection of Signal**

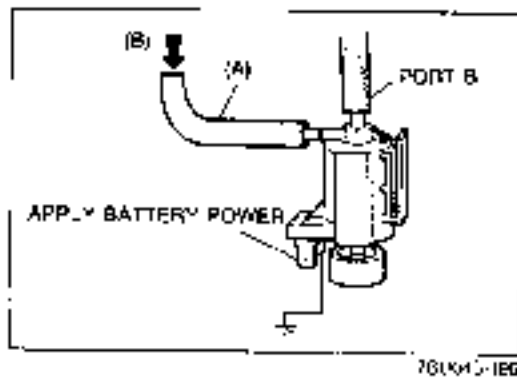
1. Warm up the engine and stop it.
2. Connect the connectors of the water temperature switch with a jumper wire.
3. Connect a voltmeter between (Y) terminal of the ACV solenoid valve and ground.
4. Verify that the voltmeter indicates 0V at approximately 1,500 rpm or higher.
5. If it does not, check the 2J terminal of the engine control unit.



78L04B-044

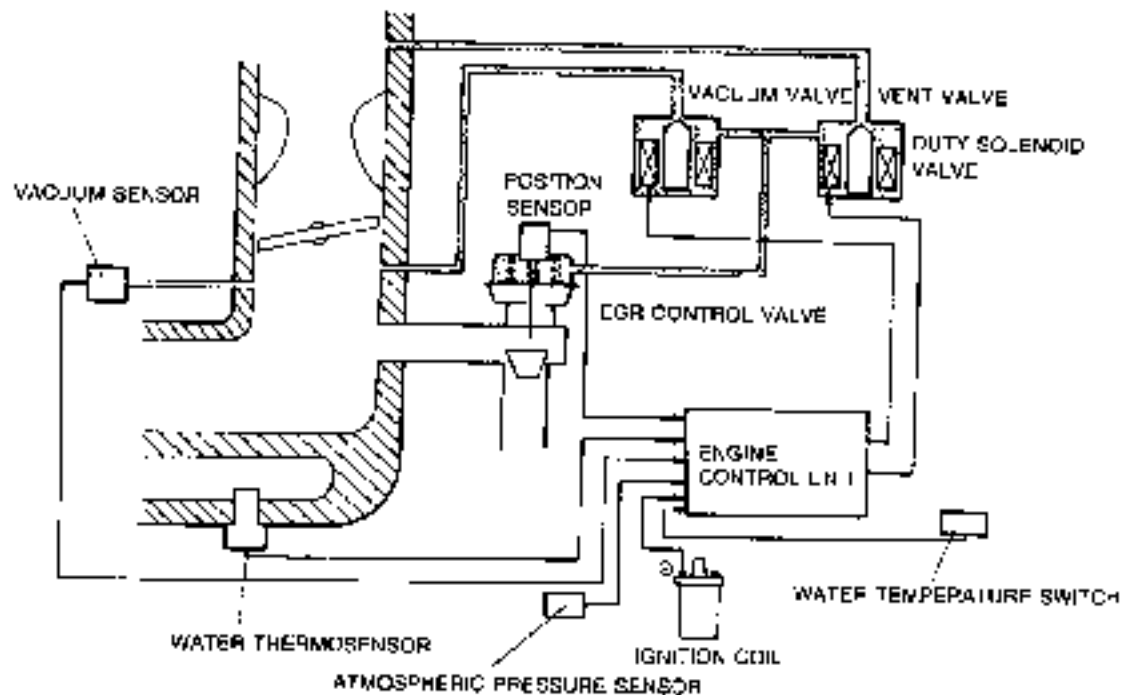
Inspection of valve

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



80J0F1-246

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.

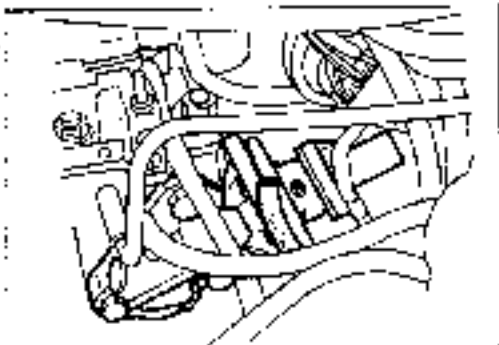
EGR CONTROL VALVE

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

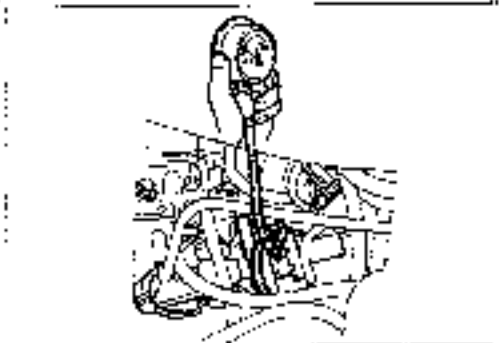
Before replacing the EGR control valve, check the intake air and control systems.



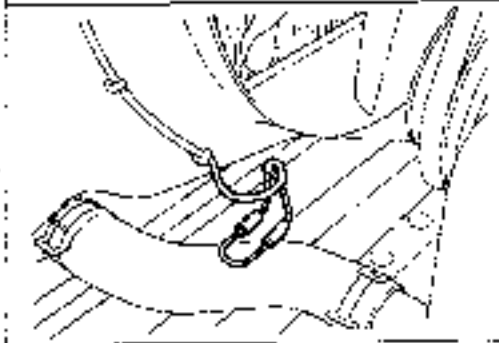
720049-00K



48106F1-041



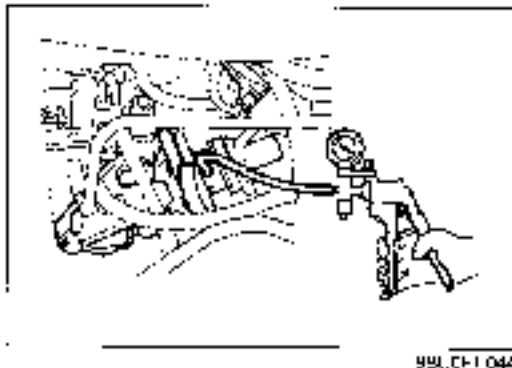
58106F1-042



08106F1-043



720049-00K



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—8 ft·lb)

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 0.5V	
C (B/Y)	4.5—5.5V	

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

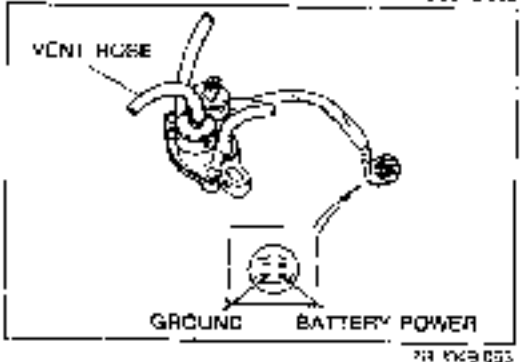
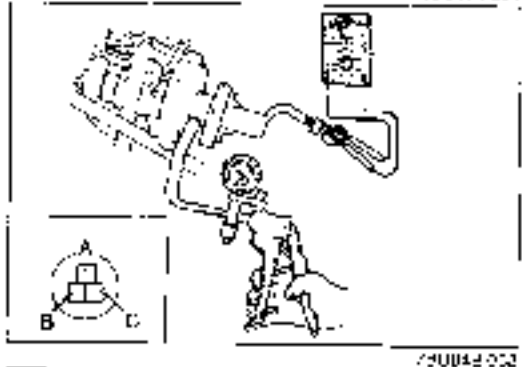
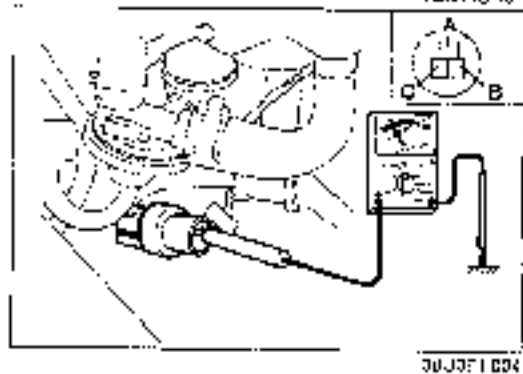
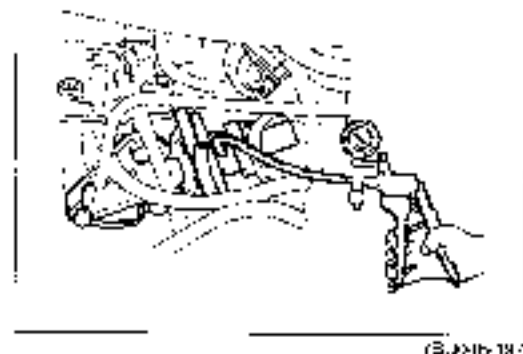
1. Disconnect the sensor connector.
2. Remove the rubber boot from the connector.
3. Check resistance between the terminals while applying **0—150 mmHg (0—5.9 inHg)** vacuum to the EGR control valve, using a vacuum pump.

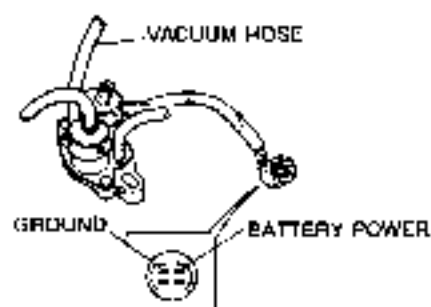
Terminals	Resistance
B—C	5 kΩ
A—C	5.5—10 kΩ
A—B	0.7—6.0 kΩ

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.

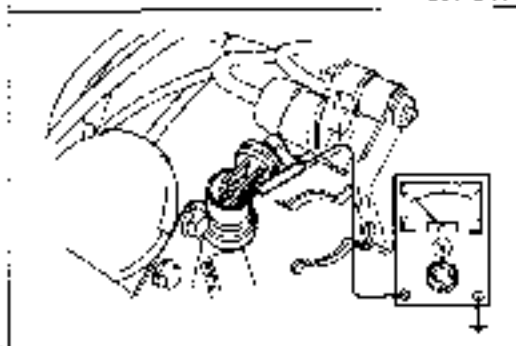




720042-054

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.

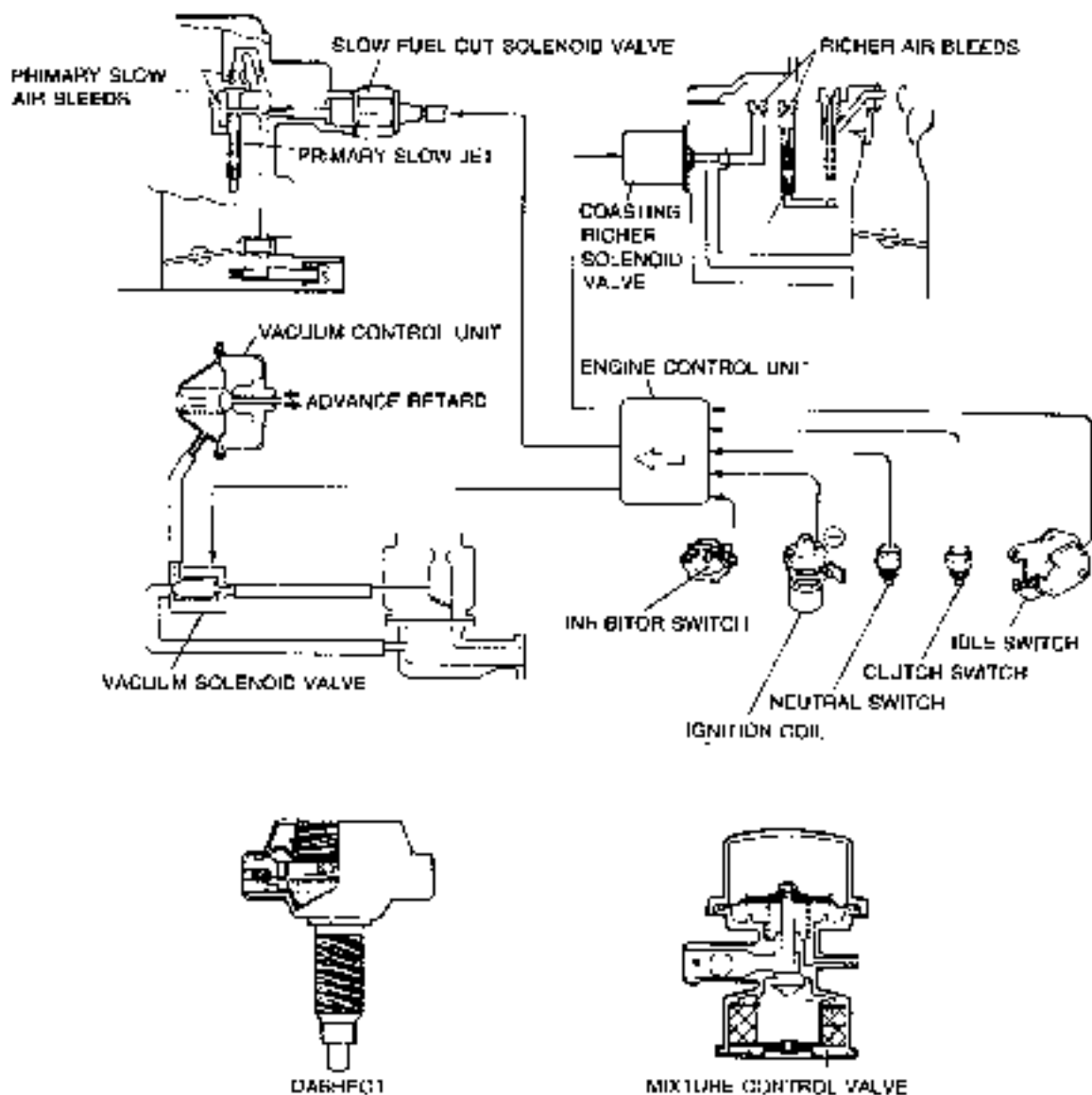


1-101-K0F2

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



92U071447

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.

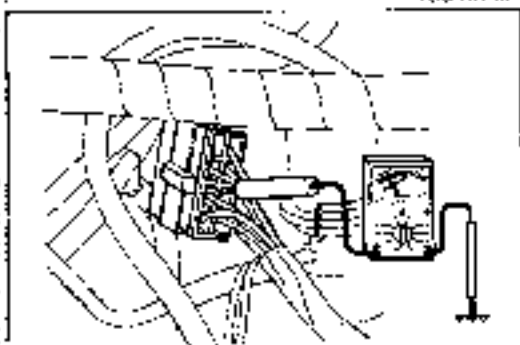
The dashpot commands the throttle valve to close gradually.

M/T

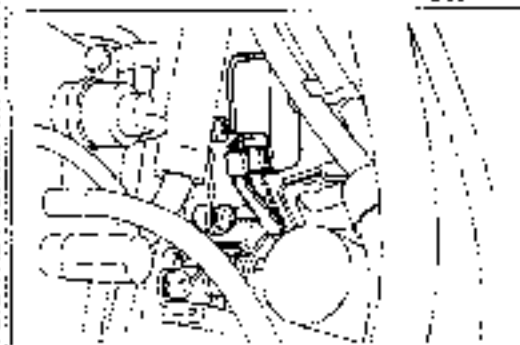
A/T



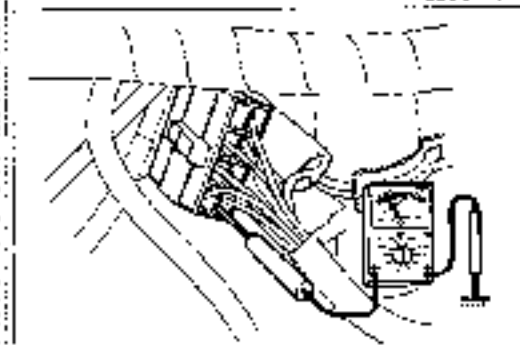
7B, JKR-67



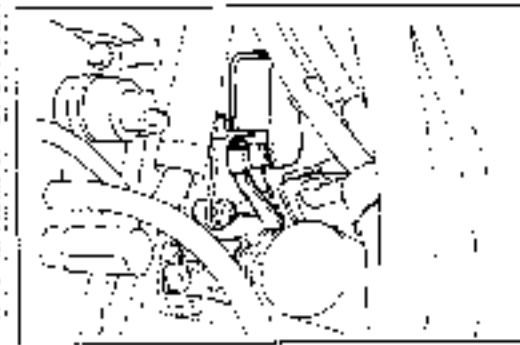
7B, JKH-268



2B, CFT-177



9F, UCH-043



7B, JKH-312

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.

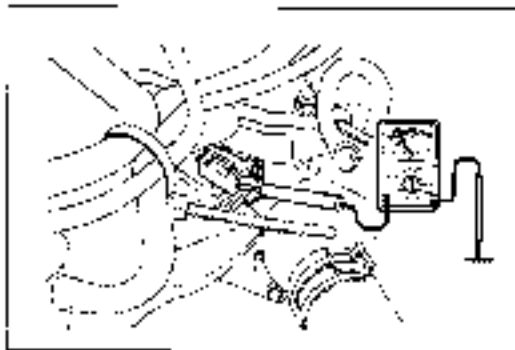
11. Verify that the voltmeter indicates as shown in the following table.

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

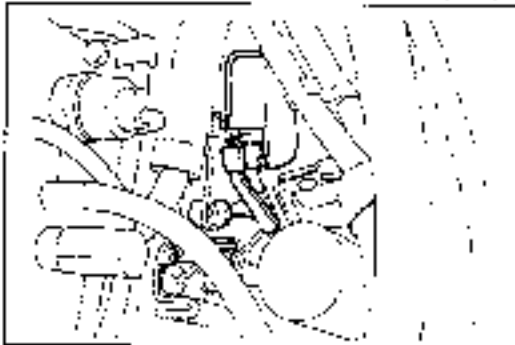
Note

Less than 1.5V is shown 1 sec after the condition is met.

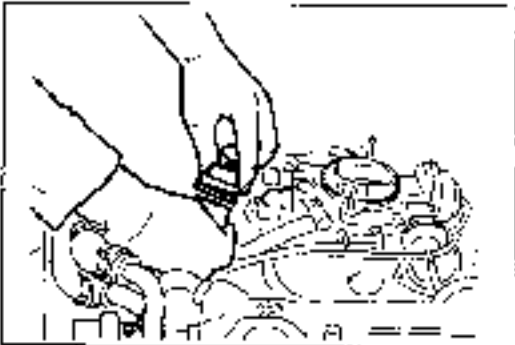
12. If any of these voltages are not indicated, check the 2H terminal of the engine control unit and the coasting richer solenoid valve.



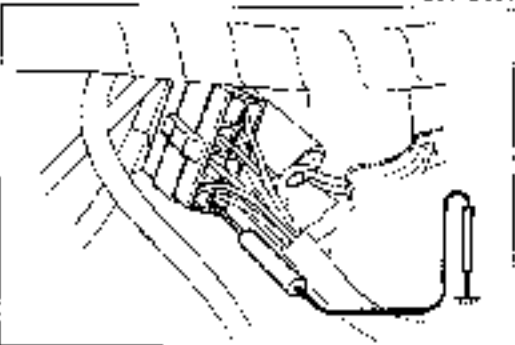
2B,00F1 314



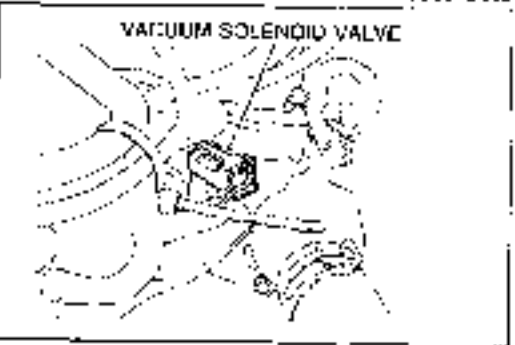
60,00F1-053



7E0043 064



7U,00F2 065



7S,004R 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 1S 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

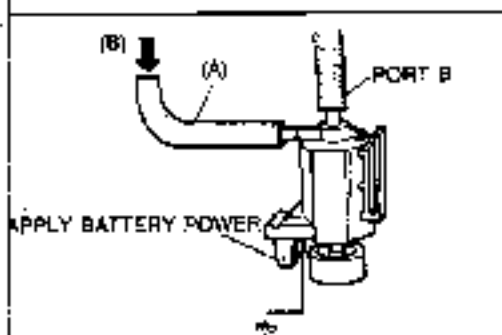
Inspection

- 1 Run the engine at idle.
- 2 Ground H terminal (B/R/B) of the carburetor connector.
- 3 Verify that the engine speed increases.

VACUUM SOLENOID VALVE

Inspection

- 1 Remove the vacuum solenoid valve.



7BLC4B '89

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.

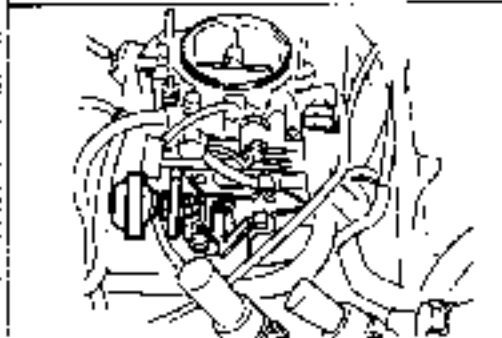


3EGC4A-020

DASHPOT (FOR M/T)

Inspection

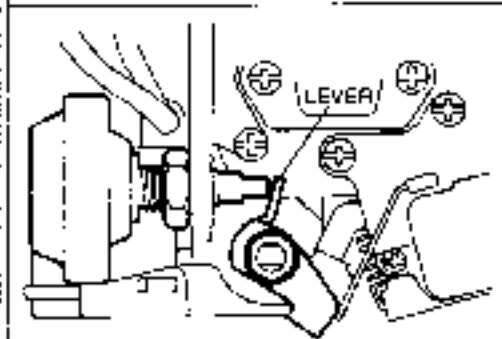
1. Quickly move the throttle lever, and verify that the dashpot rod also comes out quickly to its full stroke, accompanying the movement of the throttle lever.
2. Release the throttle lever, and verify that it returns slowly to the idle position after it has contacted the dashpot rod.



DBLGF-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.

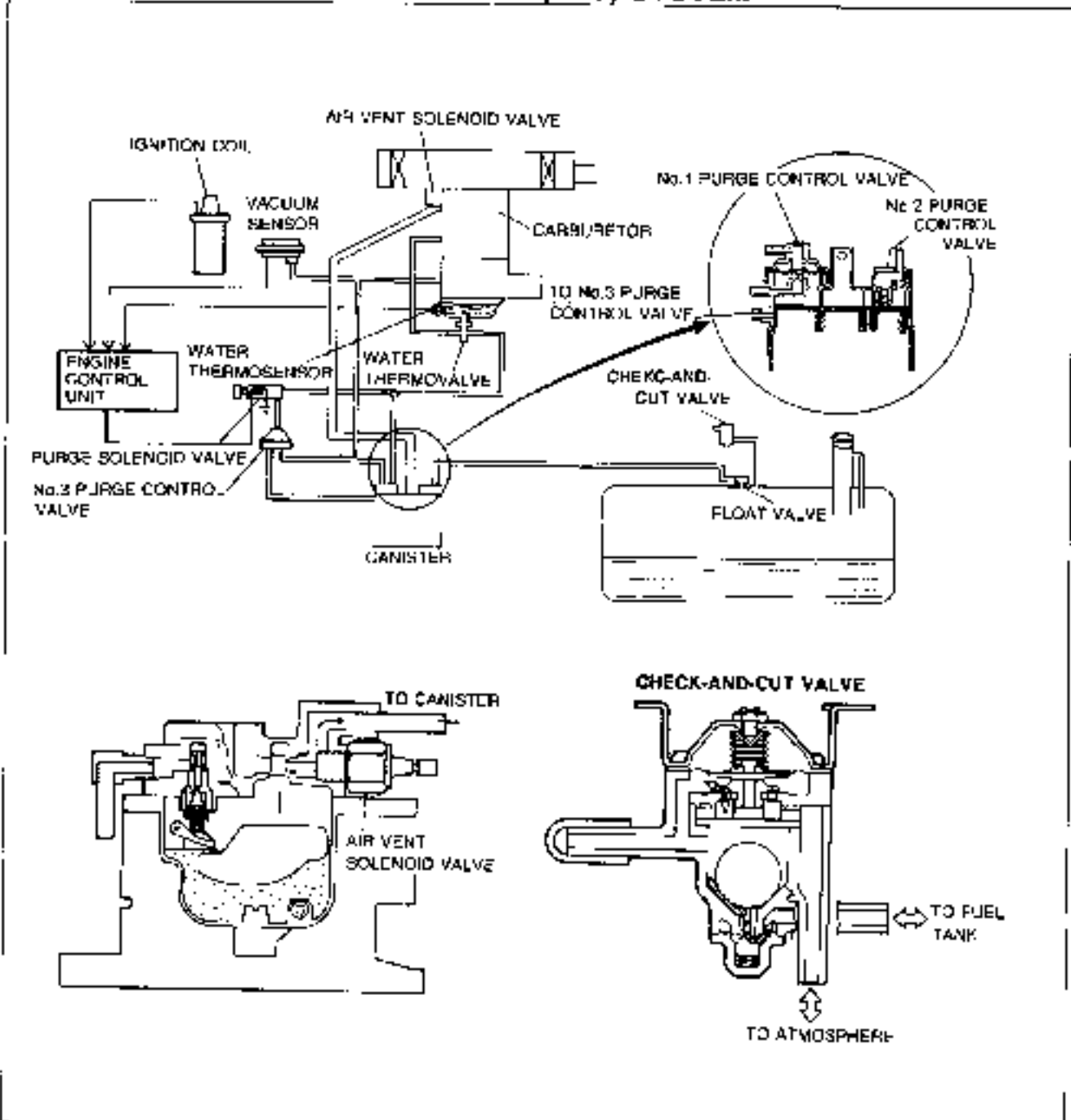


EPLD-1-027

Tightening torque:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM



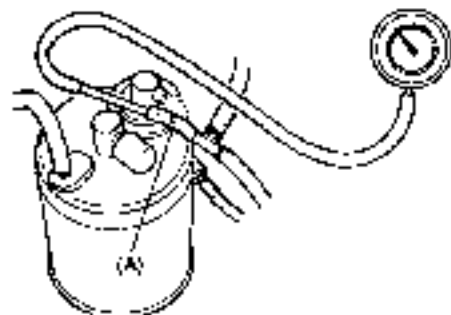
This system stores fuel vapor generated within the fuel tank in the canister and draws the fuel vapor into the intake manifold, burning it there when the engine is started. The system consists of the canister, No. 3 purge control valve, water thermovalve, check-and-cut valve, purge solenoid valve, and 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.

F0054B-06A

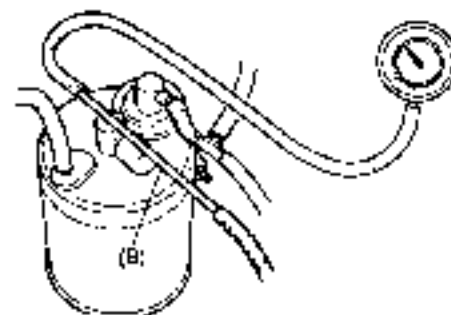
SYSTEM INSPECTION

Note

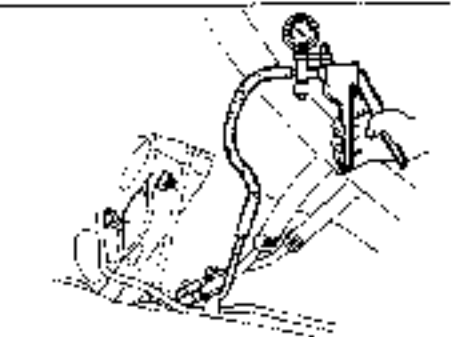
Troubleshoot with the Self-Diagnosis Checker before performing the following steps.



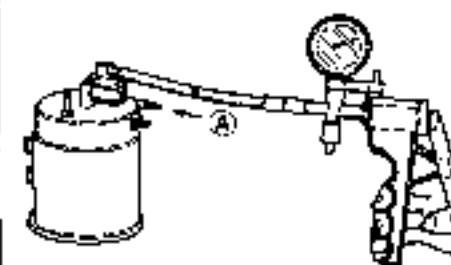
1. Check the vacuum hose routing.
2. If a poor connection, clog, or leak is found, repair or replace the necessary part.
3. Warm up the engine and run it at idle.
4. Disconnect vacuum hose (A) from the No. 1 purge control valve, and connect a vacuum gauge to the disconnected hose.
5. Increase the engine 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.



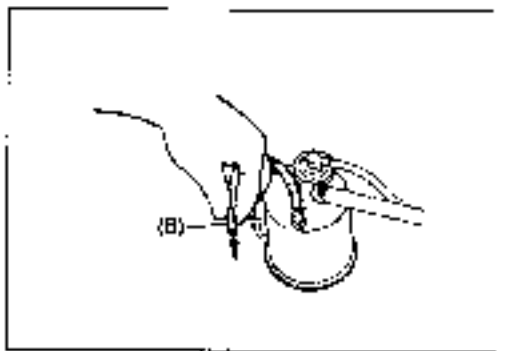
12. Disconnect the evaporation hose from the evaporation pipe.
13. Connect a vacuum pump to the evaporation pipe.
14. Operate the vacuum pump and verify that no vacuum is held.
15. If it is, check the check-and-cut valve and evaporation pipe for clogging.



No. 1 PURGE CONTROL VALVE

Inspection

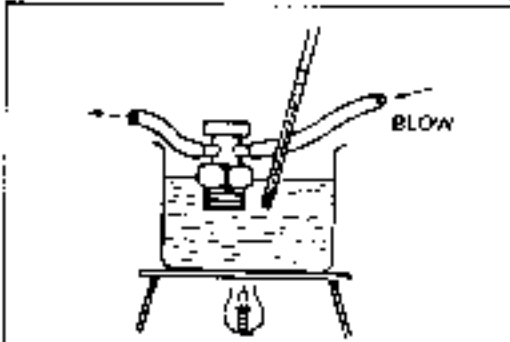
1. Blow through the purge control valve from port (A) and verify that air does not flow.
2. Connect a vacuum pump to the purge control valve.
3. Apply **110 mmHg (4.33 inHg)** vacuum.
4. Blow through port (A) and verify that air flows.



78U0412-200

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.



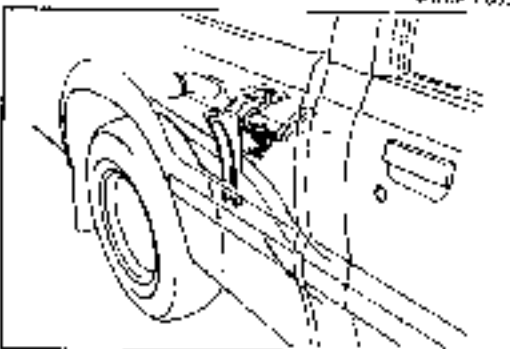
GATE 1 1005

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:

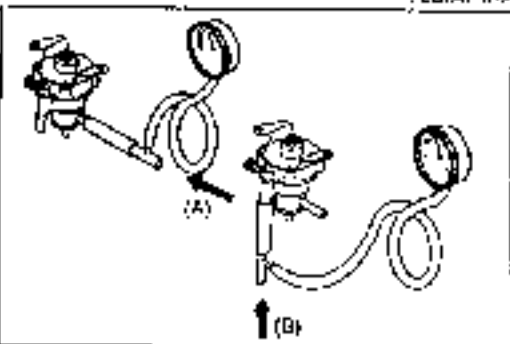
25—53 Nm (2.5—5.5 m·kg, 19—39 ft·lb)



EUCAF 1102

CHECK-AND-CUT VALVE**Inspection**

1. Remove the check-and-cut valve.

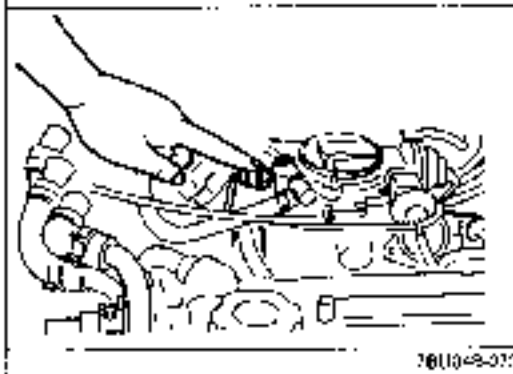


78J0412-200

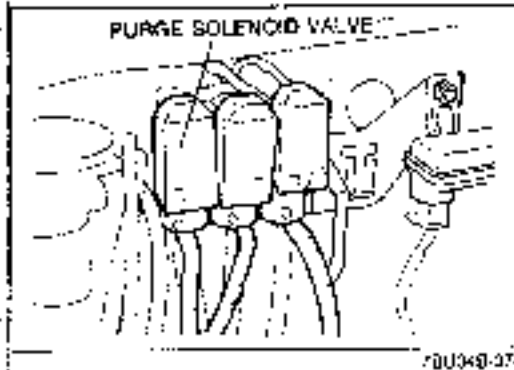
2. Connect a pressure gauge to the passage that normally is connected to the fuel tank.
3. Blow through the valve from port (A), and verify that the valve opens at pressure of **5.39—6.87 kPa (0.055—0.07 kg/cm², 0.78—1.00 psi)**.
4. Remove the pressure gauge, and connect it to the passage to atmosphere.
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/cm², 0.14—0.71 psi)**.

Note

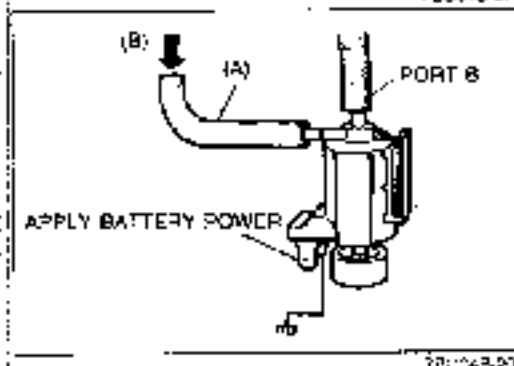
The test should be performed with the valve positioned horizontally. Otherwise, the ball in the valve will move out of position and close the passage.

**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****Inspection of Valve**

1. Remove the purge solenoid valve.



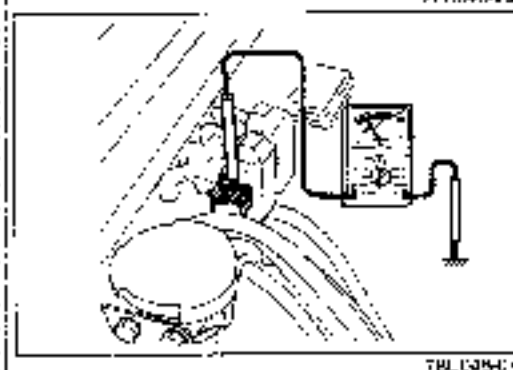
2. Connect hoses to the valve as shown in the figure.

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.

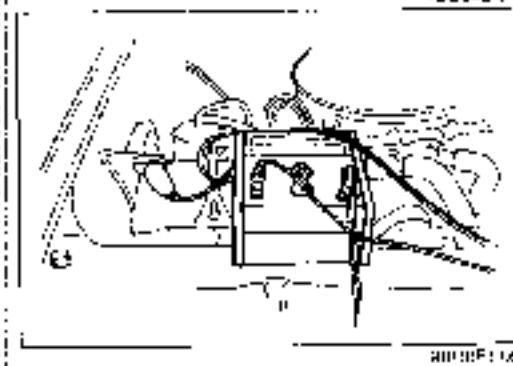
5. Blow air through the valve from hose (A), and verify that air comes out of port (B).

6. If 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.

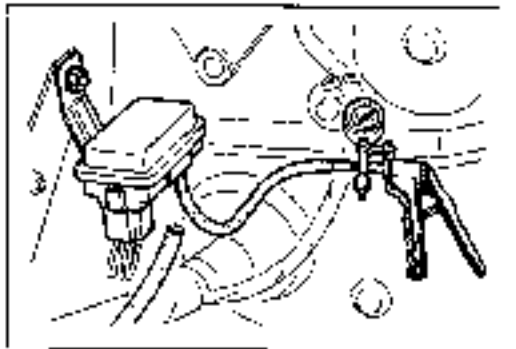
2. Connect a voltmeter between terminal (YR) of the purge solenoid valve and ground.



3. Connect a tachometer to the engine.

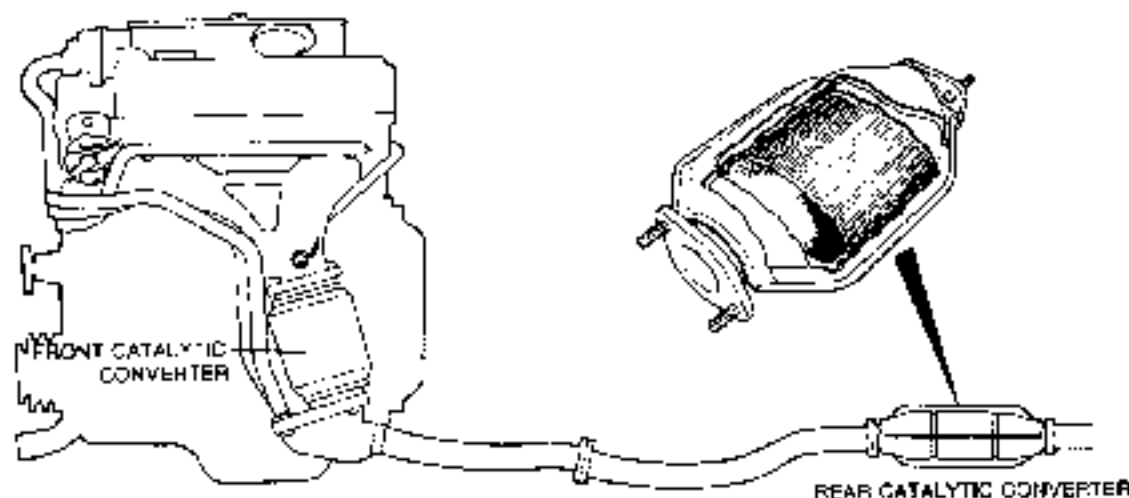
4. Increase the engine speed, and verify that the voltmeter indicates **0V** at more than **1,400 rpm**.

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.



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 thermometer.
 - (2) 1E terminal of the engine control unit and the vacuum sensor.

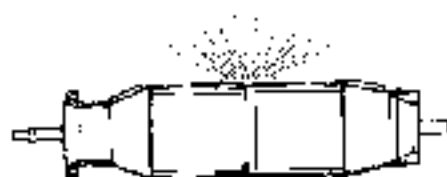
CATALYTIC CONVERTER



88A/C416-102

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
Two-way	Platinum and Rhodium	1,100 cc (67.1 cu in)	Oxidizing	Palladium	1,500 cc (91.6 cu in)

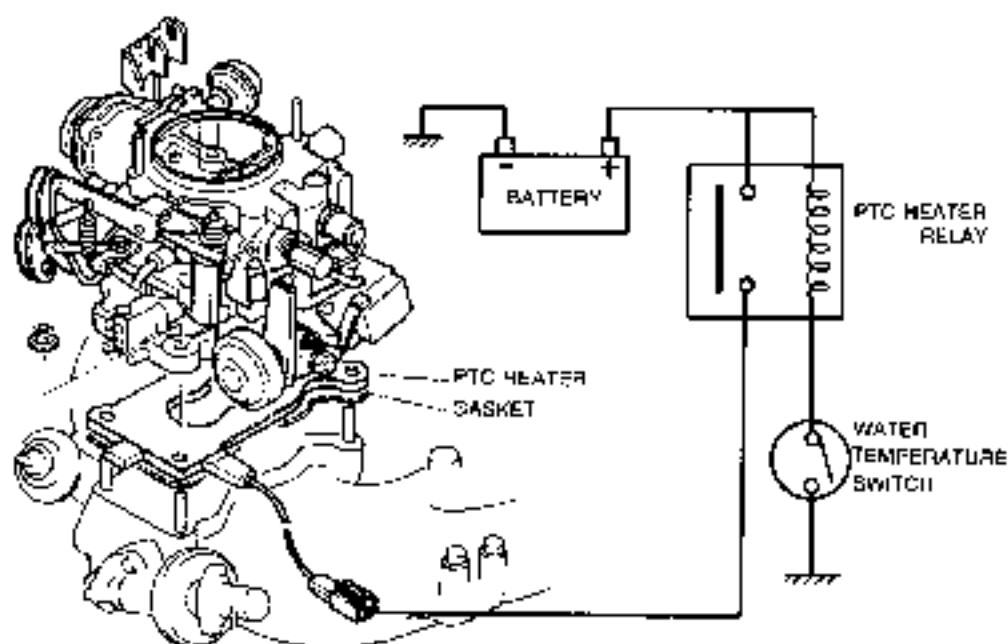
**INSPECTION**

1. Check the catalytic converter for deterioration or restriction.
2. Check the insulation covers welded to the catalytic converter for damage or looseness.

Caution

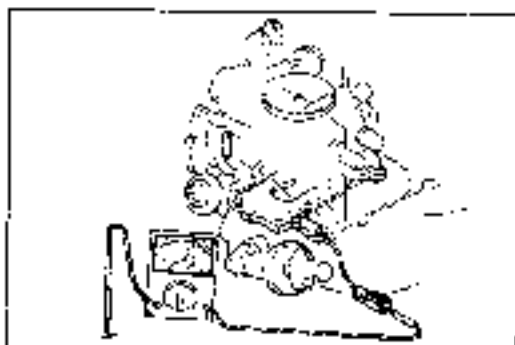
If the insulation cover is touching the catalytic converter housing, excessive heat at the floor will occur.

PTC HEATER SYSTEM



7B-1040-000

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-1040-000

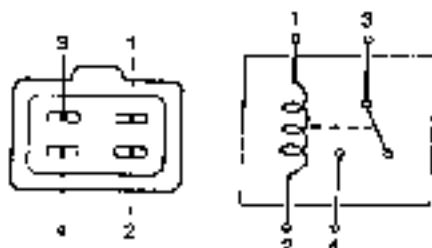
PTC HEATER**Inspection**

1. Disconnect the PTC heater connector.
2. Connect an ohmmeter between the connector and the intake manifold, and verify continuity.

PTC HEATER RELAY**Inspection**

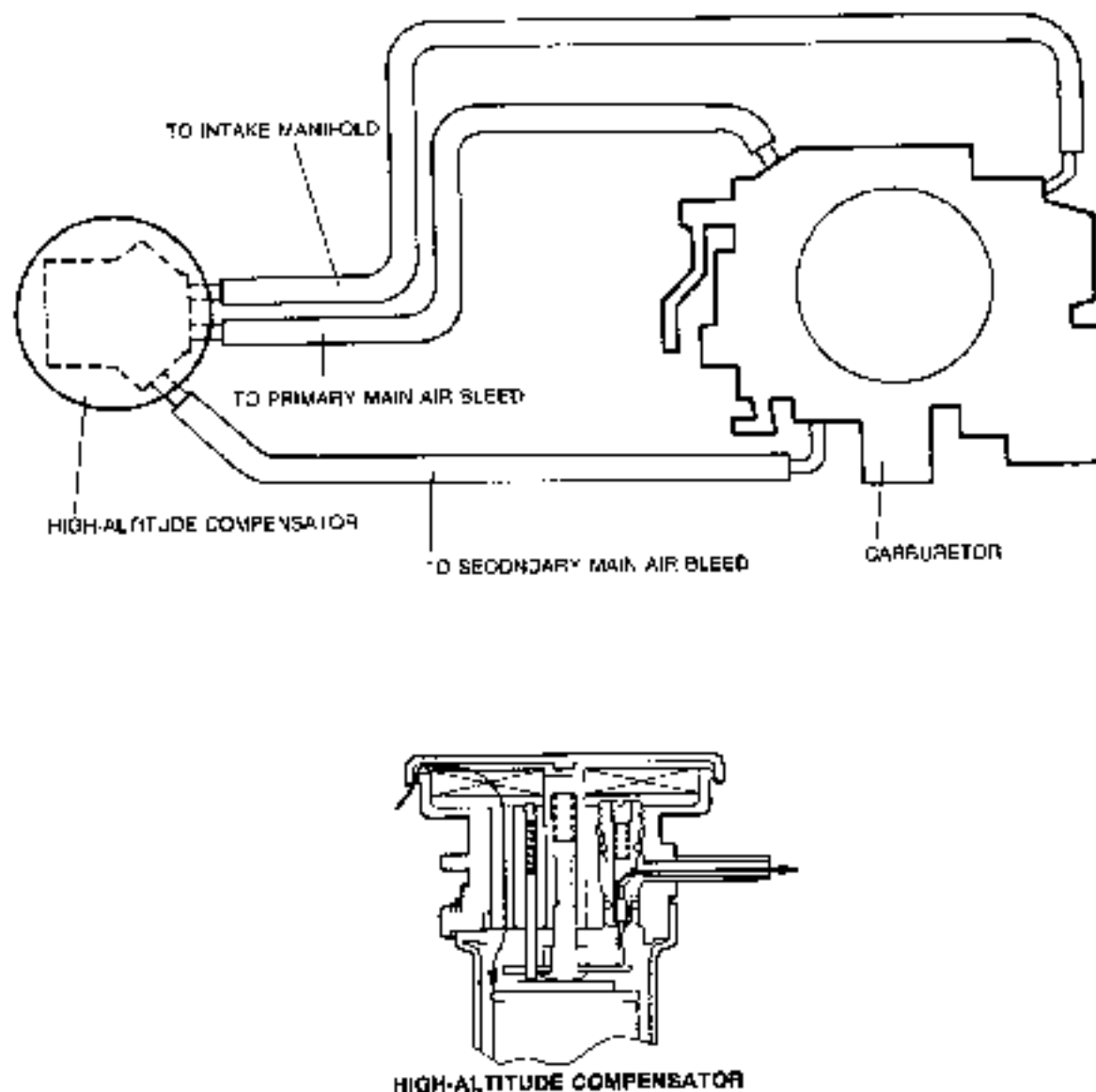
1. Apply battery power (positive to No. 1 terminal and ground No. 2 terminal), and verify continuity at terminals 3 and 4, using an ohmmeter.

Operation	Power not applied	Power applied
Terminals		
3-4	No continuity	Continuity



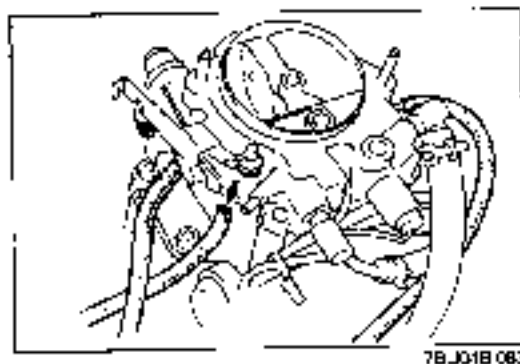
7B-1040-000

ALTITUDE COMPENSATION SYSTEM



7B0046-062

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.



7B J01B 083

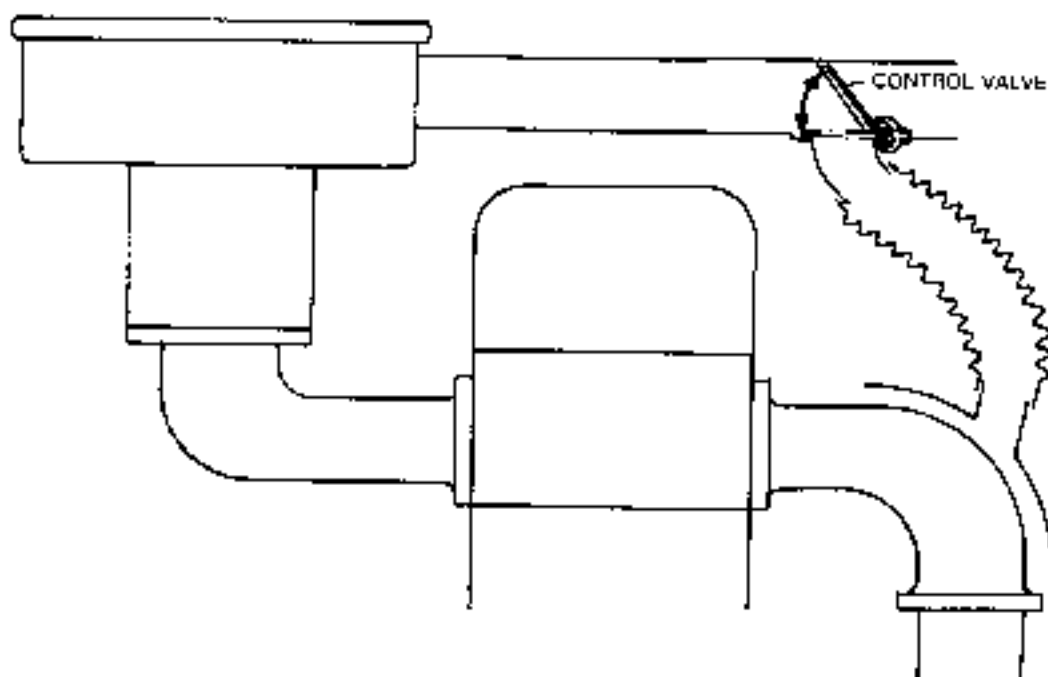
HIGH-ALTITUDE COMPENSATOR**Inspection**

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.

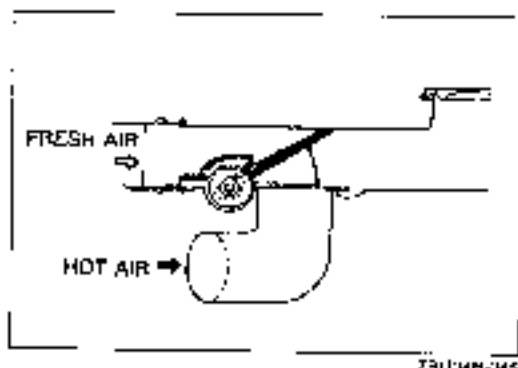
Less than 500 m (1,640 ft)
(Low altitude): Air does not pass.

AIR INTAKE TEMPERATURE CONTROL SYSTEM



70L043-034

This system controls air intake temperature to prevent icing and operates depending on air temperature around the control valve.

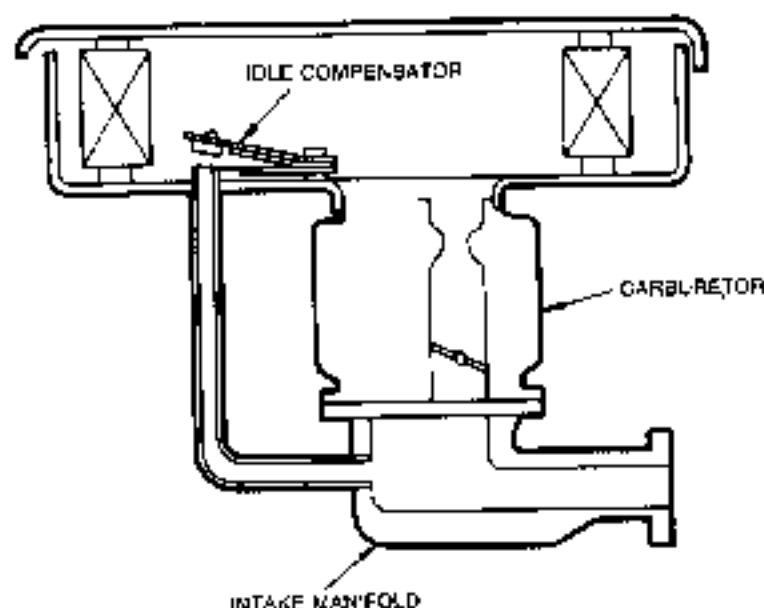


70L043-035

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



F1/C43-085

This system supplies secondary air into the intake manifold to stabilize idle speed when air intake temperature is more than 67°C (153°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°C (160°F), verify that the valve is open. If it's not, replace the idle compensator as an assembly.



7DU043-057

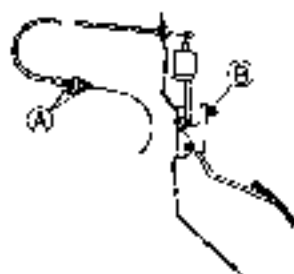
ACCELERATOR CABLE

Inspection

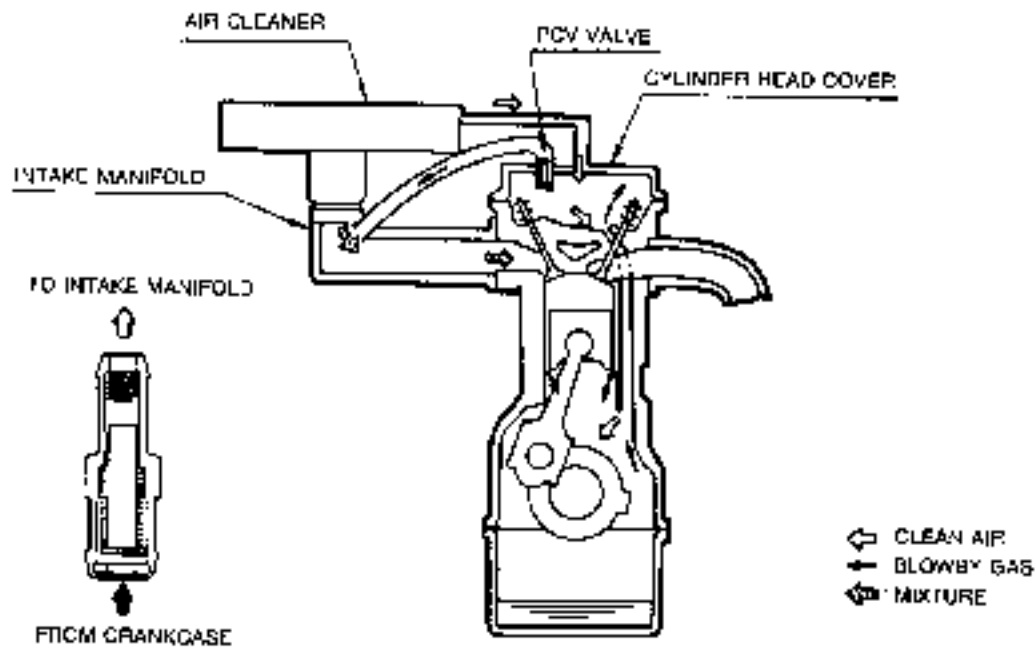
Note

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.

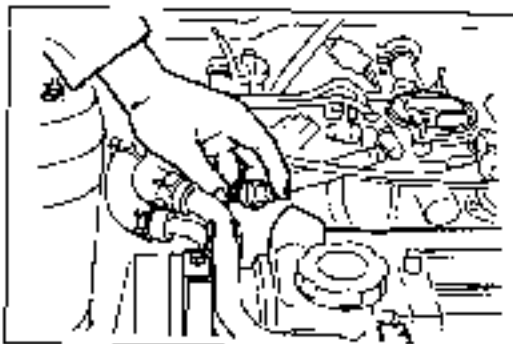


7BU043-025

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

78U04B-CR0

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.

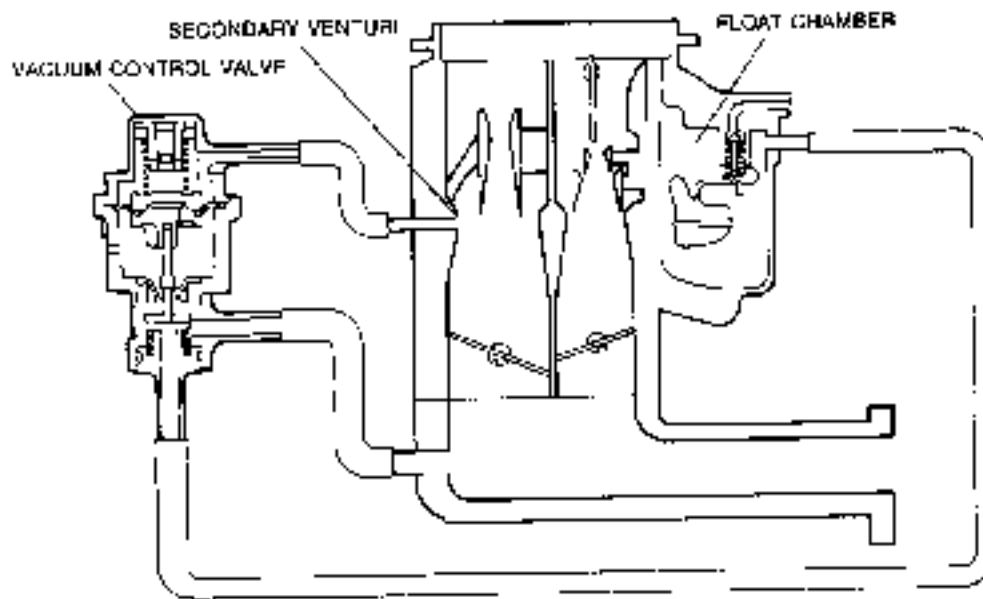


78U04A-CR0

PCV VALVE Inspection

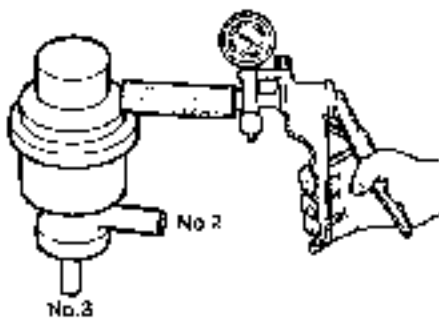
1. Warm up the engine and run it at idle.
2. Disconnect the PCV valve together with the ventilation hose from the cylinder head cover.
3. Block the PCV valve opening with a finger, and verify that the engine speed drops.

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.

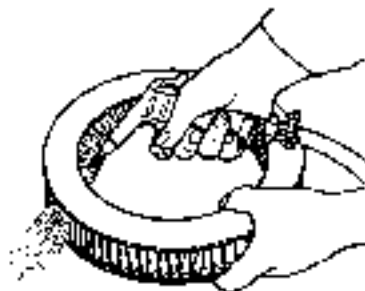
Specification: 40 mmHg (1.57 inHg) or more

AIR CLEANER

AIR CLEANER ELEMENT

Inspection

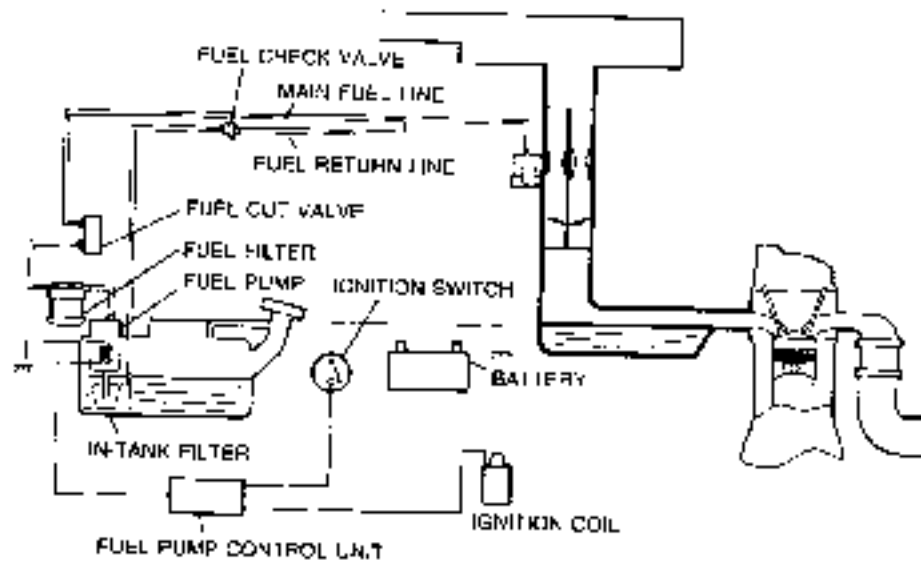
1. Remove the air cleaner element.
2. Blow out the dust with compressed air.
3. Install the air cleaner element.



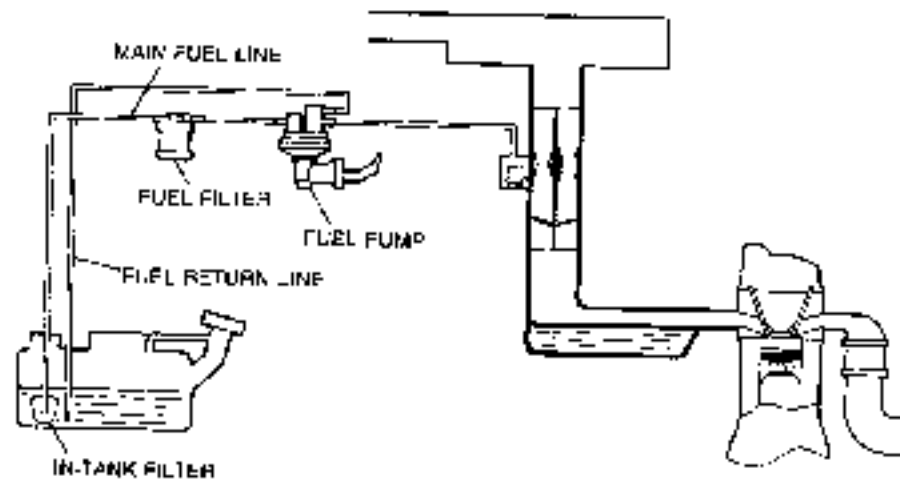
SJOE1-008

FUEL SYSTEM

VEHICLE WITH A/T

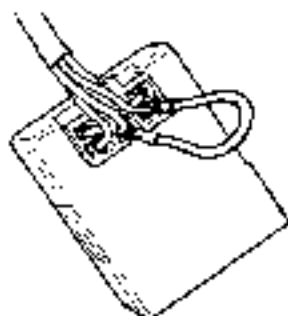


VEHICLE WITH M/T



700313 C03

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.



3B007-1008

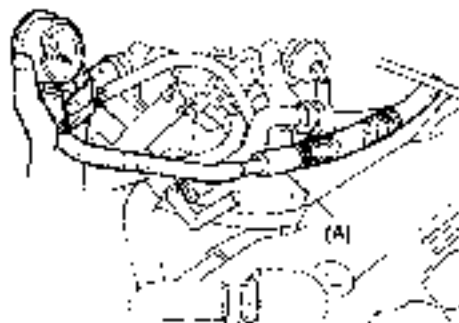
FUEL PUMP (ELECTRICAL TYPE)**Precheck**

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.)



7B0065-008

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/cm², 2.8—3.6 psi)

5. If it is not, replace the fuel pump.

Flow Rate (volume)

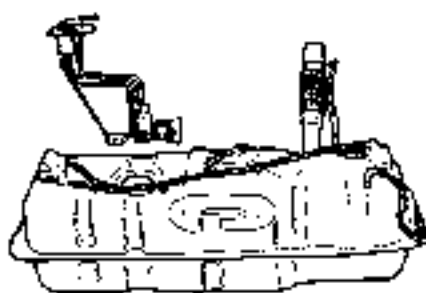
1. Turn the ignition switch OFF.
2. Disconnect the main fuel hose (A), and insert the end into a measuring beaker.
3. Connect the (B) and (D) terminals of the fuel pump control unit with a jumper wire.
4. Turn the ignition switch ON, and measure the amount of fuel pumped.

Volume: More than 1,150 cc (70.2 cu in)/min.

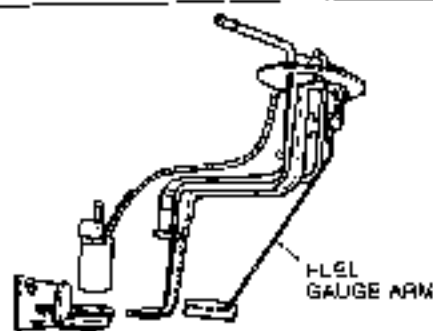
5. If this amount of fuel is not correct, replace the fuel pump.

Replacement

1. Remove the fuel tank.
2. Remove the fuel gauge and fuel pump assembly from the tank.
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.



7B0043-100



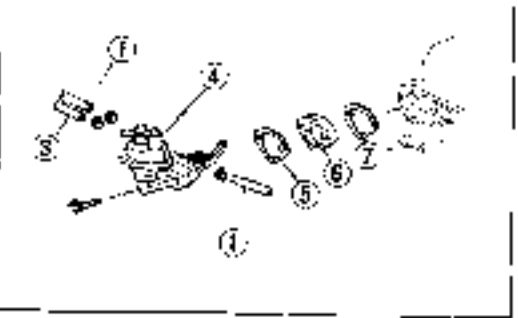
3B00F1-008



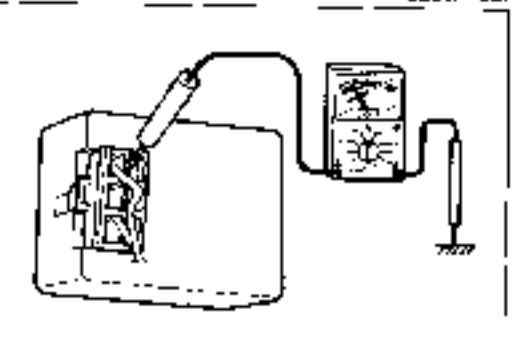
A10343-094



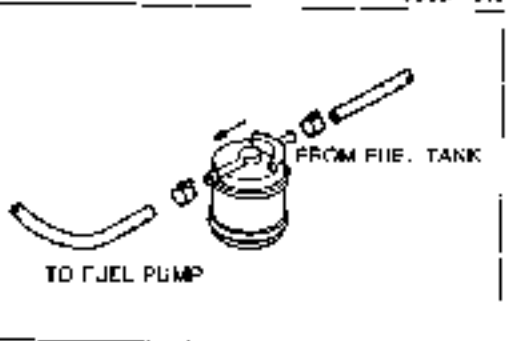
A20344-006



E3J0F-050



E3J0F-010



E3J0F-010

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/cm², 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

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

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.

FUEL PUMP CONTROL UNIT**Inspection**

- Use a voltmeter to check terminal voltages in the following conditions.

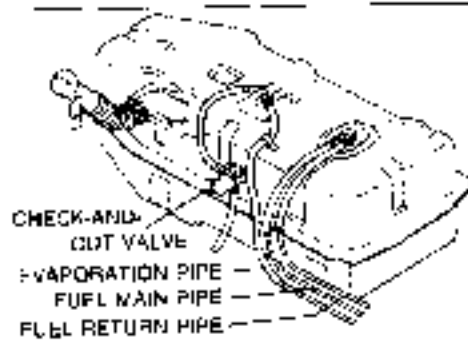
V_B: Battery voltage

	A	B	D	E
IG switch: ON	V _B	0V	V _B	0V
At idle	V _B	V _B	V _B	0V

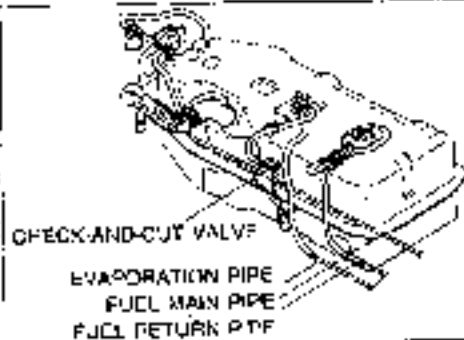
2. If only the (B) terminal is not correct, replace the fuel pump control unit.
3. If others are not correct, check the wiring and related parts.

FUEL FILTER**Replacement**

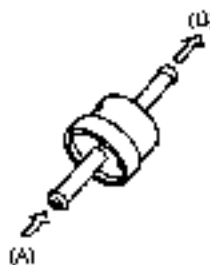
Be sure to install in the correct direction



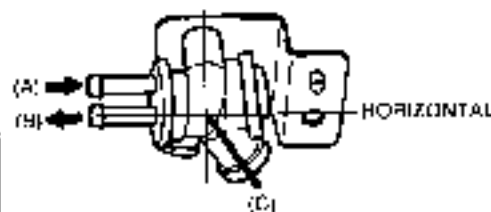
71A-C4B-104



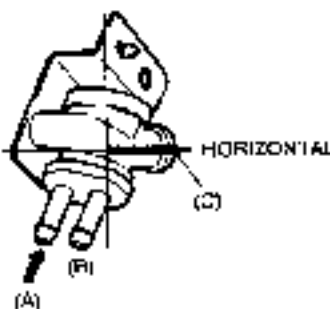
7B0743-105



7B0743-106



7B0743-107



7B0743-108

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**

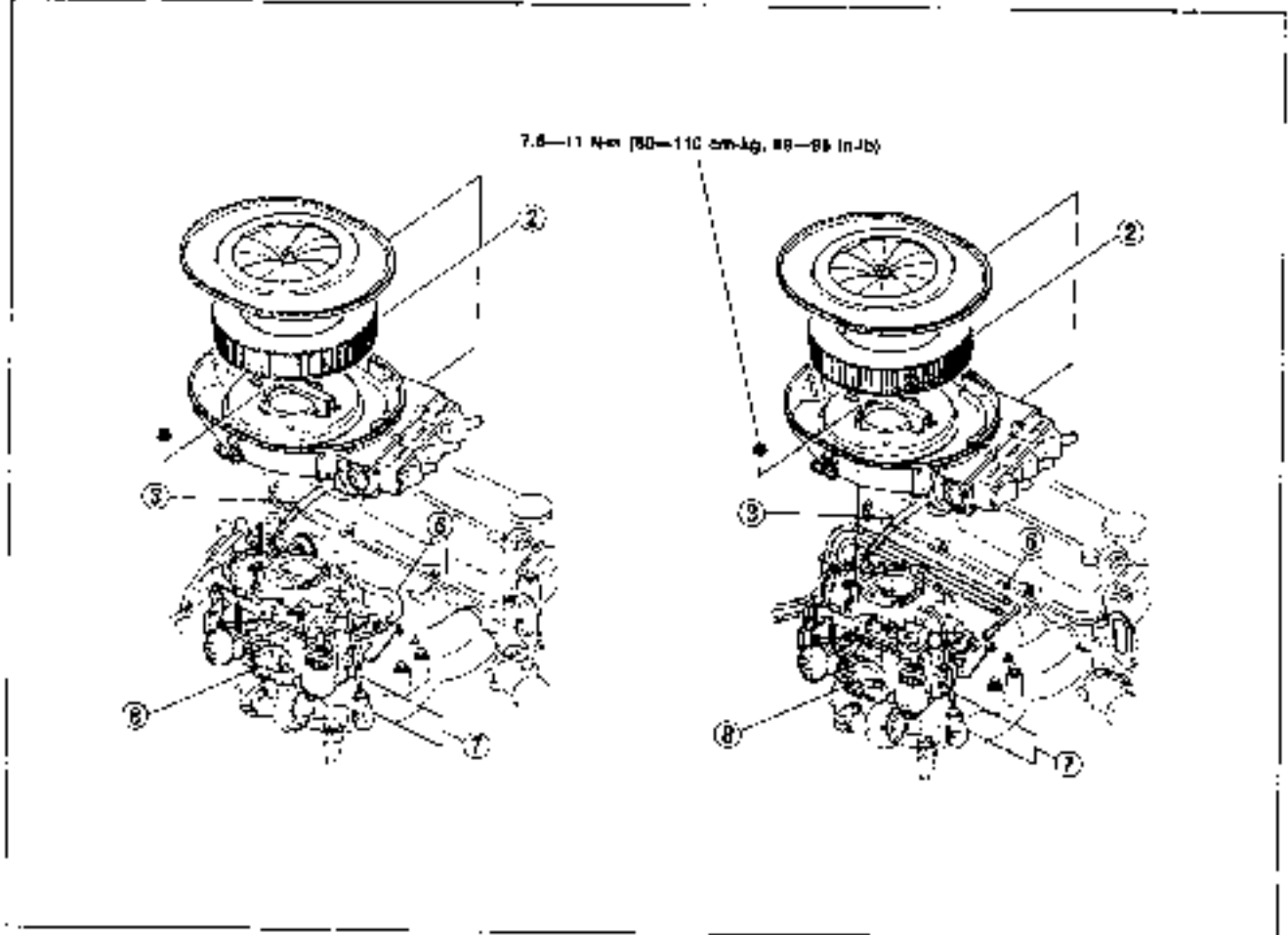
1. Remove the fuel check valve.
2. Verify that air flows through the valve from port (A) to port (B) and not in the reverse direction.
3. If not correct, replace the fuel check valve.

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



9B2JCF-000

Remove or disconnect each part in the sequence shown in the figure.

Warning

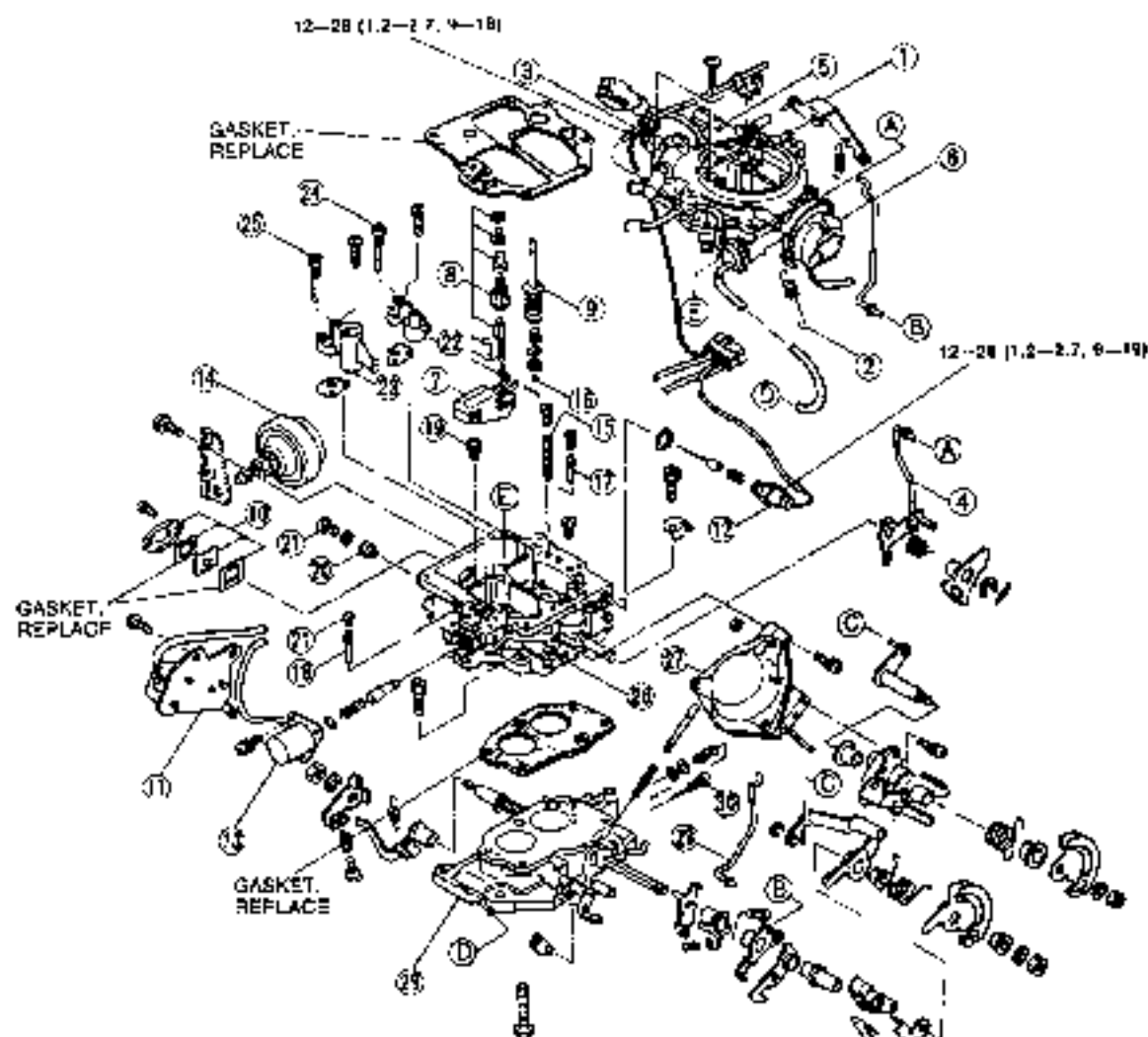
Be extremely careful when working with fuel; always work away from sparks or open flames.

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.

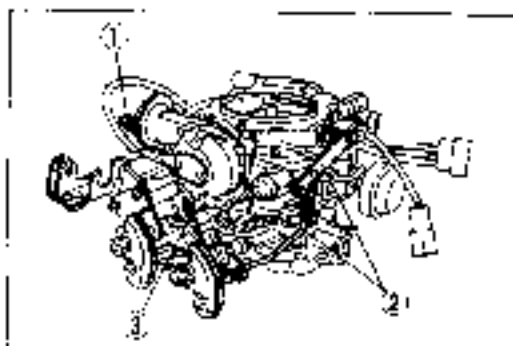
Structural View



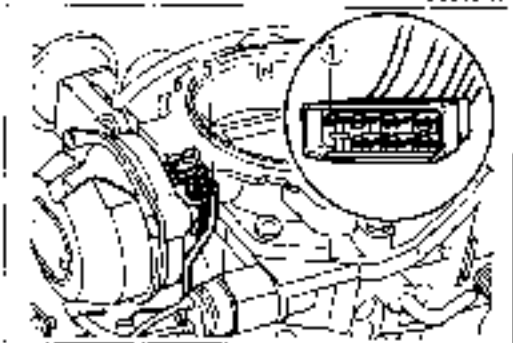
Nen (mkg, 1-16)

CEUOF 1-011

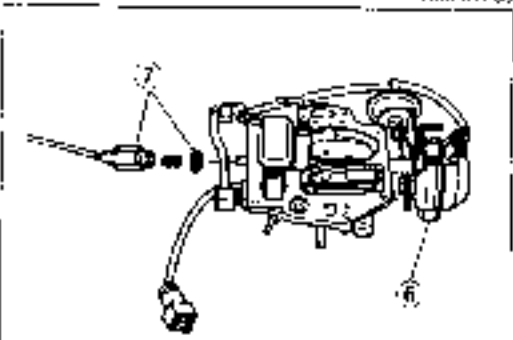
1. Accelerator pump connecting rod	15. Accelerator pump inlet check ball
2. Connect spring	17. Primary slow jet
3. Air vent solenoid valve	18. Secondary slow jet
4. Choke rod	19. Primary main jet
5. Air horn	20. Secondary main jet
6. Automatic choke assembly	21. Plug
7. Float	22. Primary venturi and 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 M/T)	29. Throttle body
15. Accelerator pump outlet check ball and spring	30. Mixture adjust screw



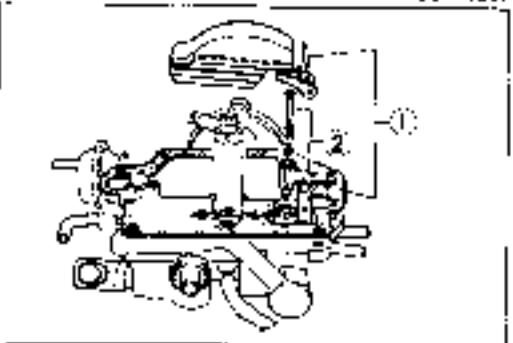
7D,0310 117



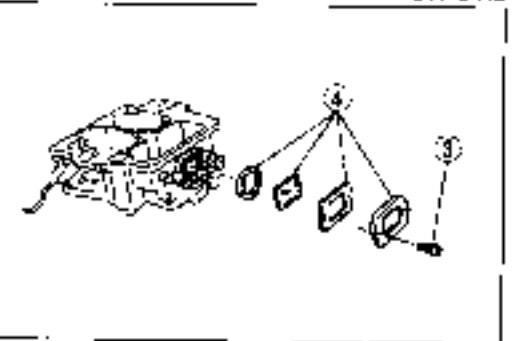
7B,0545-206



7B,03417-207



7D,0418 112



7B,1146-208

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

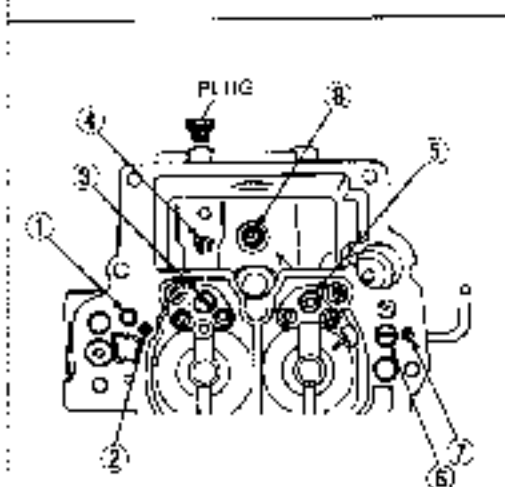
4. Air vent solenoid valve lead (separate from the connector)
5. Choke rod (disconnect)

6. Air horn and automatic choke assembly (separate from main body)
7. Air vent solenoid valve, spring, and gasket, if necessary

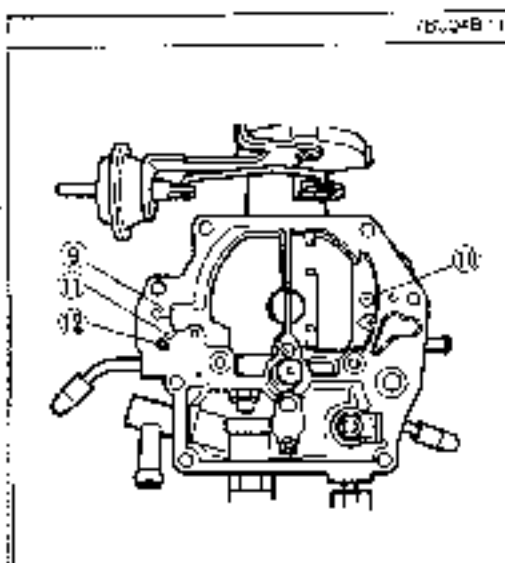
Needle valve and float

1. Float, pin, and gasket
2. Needle valve assembly

3. Fuel bowl sight glass mounting screws
4. Cover, gasket, glass, and rubber gasket

**Air Bleeds and Jets**

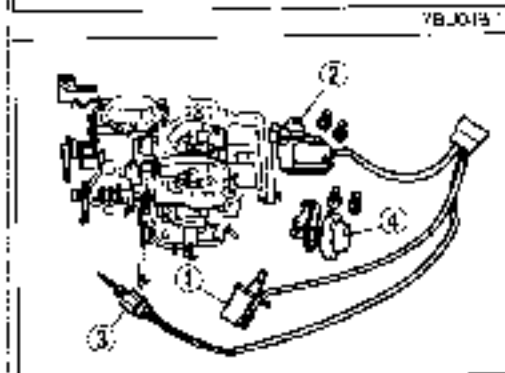
- 1. Secondary slow jet
- 2. Secondary slow air bleed (No.1)
- 3. Secondary main air bleed
- 4. Secondary main jet
- 5. Primary main air bleed
- 6. Slow jet and plug
- 7. Primary slow air bleed (No.1)
- 8. Primary main jet



- 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

**Main body**

- 1. Coasting richer solenoid valve and O-ring
- 2. Idle switch and spring

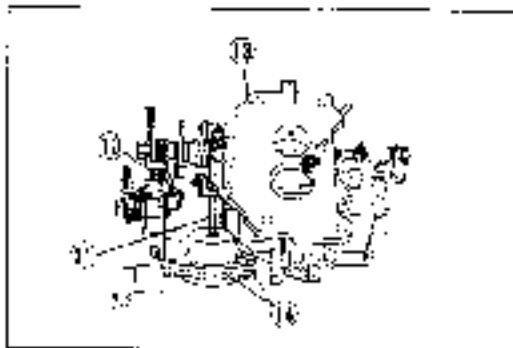
Caution

After installing the idle switch, be sure to adjust it.

- 3. Slow fuel cut solenoid valve, needle valve, spring, and gasket.
- 4. Dashpot bracket and dashpot. (For M/T)



- 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



CJ0001051

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)



78U048-009

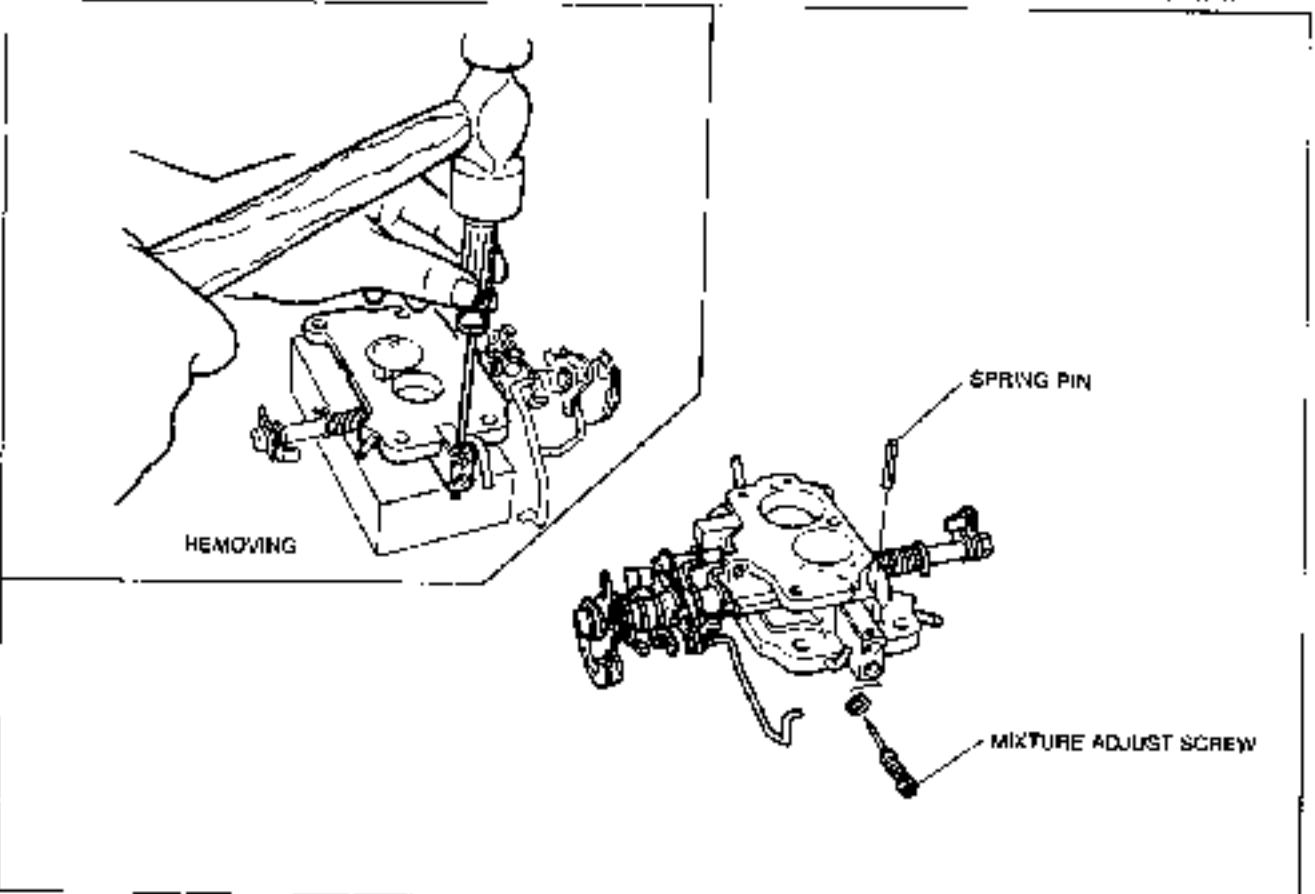
14. Vacuum diaphragm assembly and gasket
15. Diaphragm cover screws and cover
16. Spring and diaphragm
17. Throttle lever hanger screws

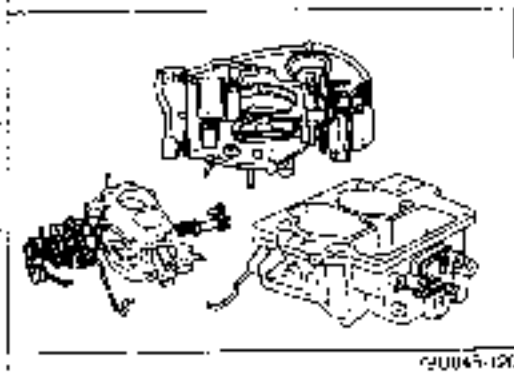
Throttle Body

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.



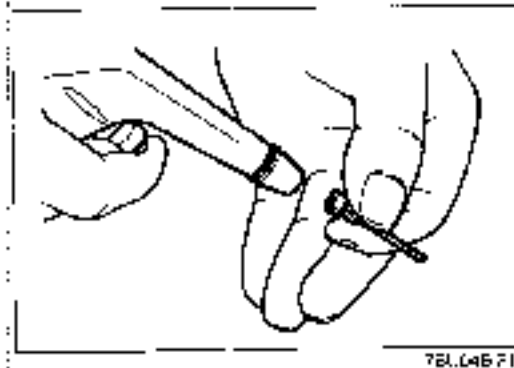
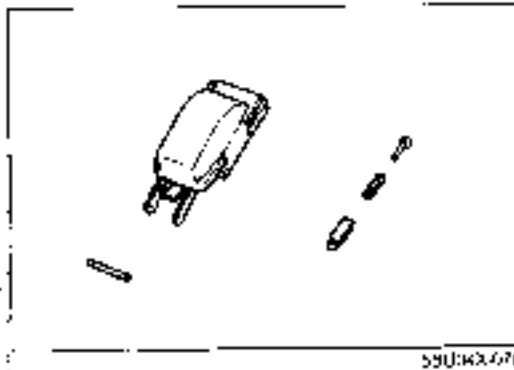


Inspection

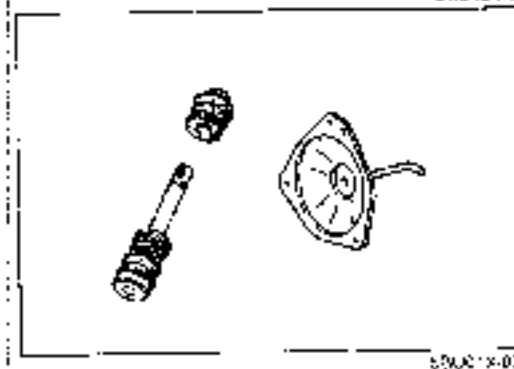
Caution

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.

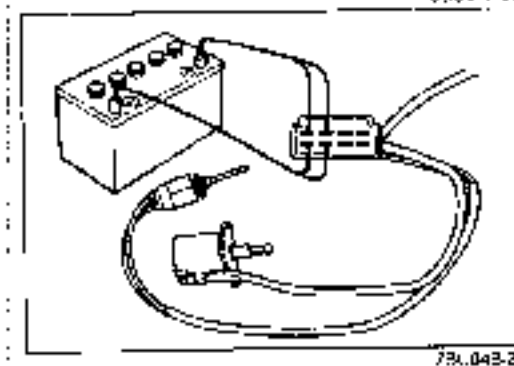
1. Inspect the air horn, main body, and throttle body for cracks or breakage.
2. Inspect the choke shaft and throttle shaft for wear. A worn throttle shaft will allow extra air to mix with the air/fuel mixture and cause lean ratios at low driving speeds.
3. Check the needle and seat for wear or rust.
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.

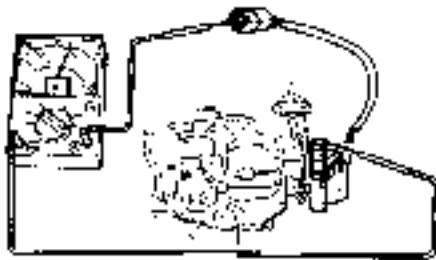


6. Inspect the accelerator pump plunger cup. Replace the plunger if it's worn or damaged.
7. Check the diaphragm for damage.
8. Inspect the mixture adjust screw for burrs or ridges.

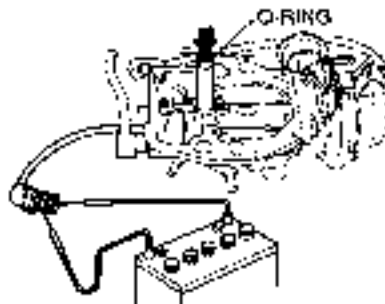


9. Check the operation of the solenoids.

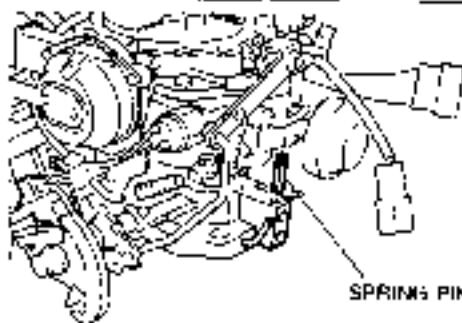
Connect the solenoid to the positive terminal of the battery and ground the body. When current is applied to the solenoid, the valve stem should be drawn into the valve body. If the valve does not operate properly, replace the solenoid.



80J01-1002

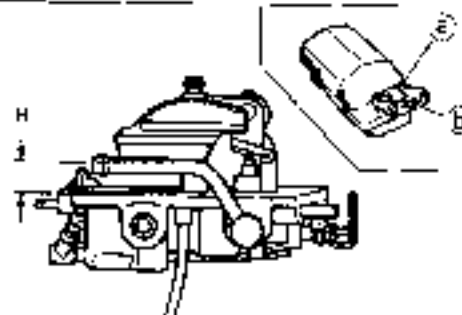


3BLCF-1003

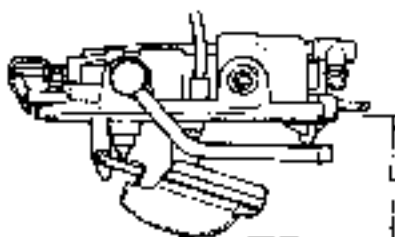


SPRING PIN

7EJ04E-121



7B,0013-122



7B,0013-123

13. Use an ohmmeter to check for continuity between the coupler and the choke heater ground. If there is no continuity, replace the choke heater.
14. 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 stop (a) to adjust.

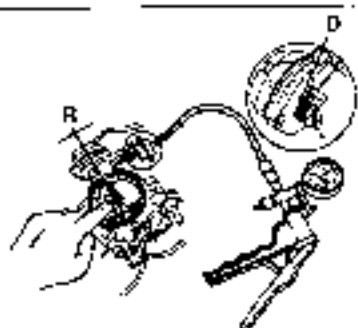
Clearance (H):

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 it is not correct, bend the float stopper (b) to adjust.

Clearance (L): 46.0—47.0mm (1.811—1.850 in)



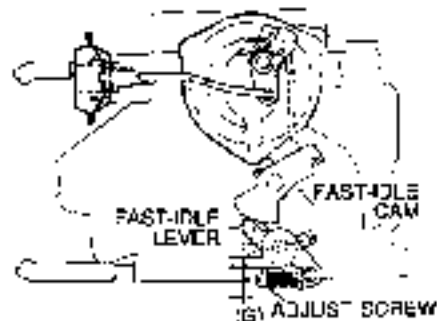
781043-123

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).



781043-124

Fast-idle cam

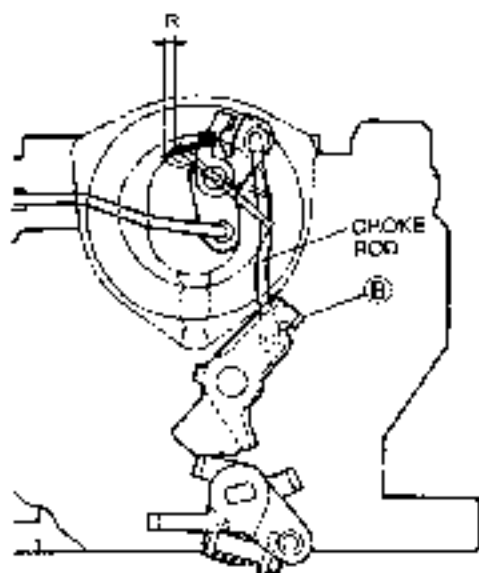
1. Set the fast-idle cam to the second highest position.
2. Adjust the throttle valve clearance (G) by turning the adjust screw.
(The clearance becomes larger as the screw is turned clockwise.)

**Throttle valve clearance (G):
0.84—1.04mm (0.033—0.041 in)**

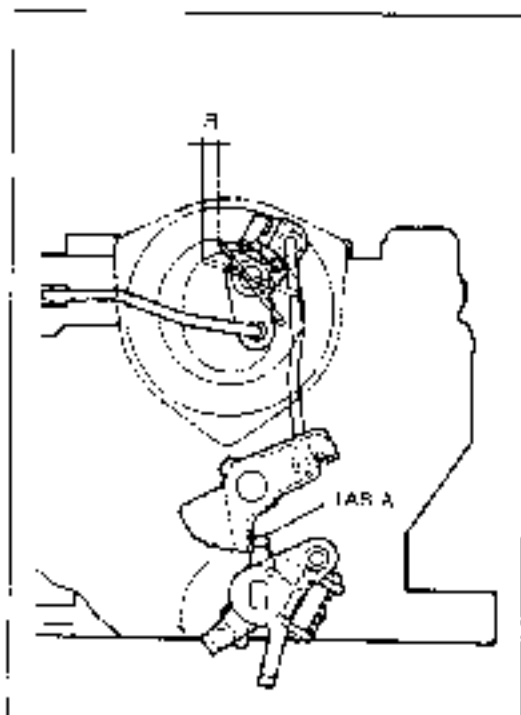
3. Set the fast-idle cam at the second highest position.
4. Check the choke valve clearance (R).

**Choke valve clearance (R):
0.60—1.14mm (0.024—0.045 in)**

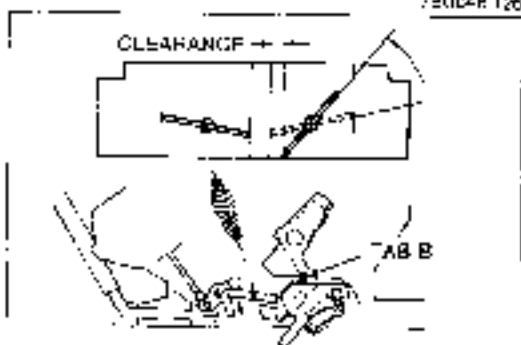
If necessary, adjust the choke valve clearance (R) by bending the starting arm (B). If large adjustments are required, the choke rod should be bent.



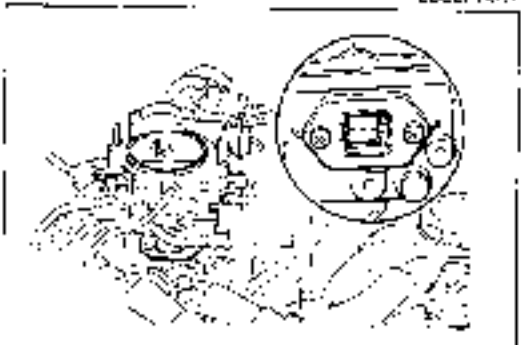
781043-125



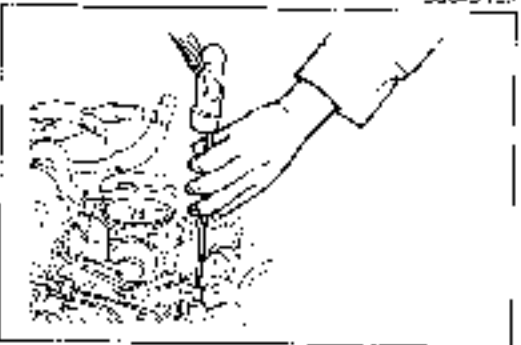
7BUC4B 126



2ELCF10:7



YBUC4B 125



7BUC4B 127

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).

Secondary throttle valve

1. The secondary throttle valve should start to open when the primary throttle valve opens **50—54°** 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.

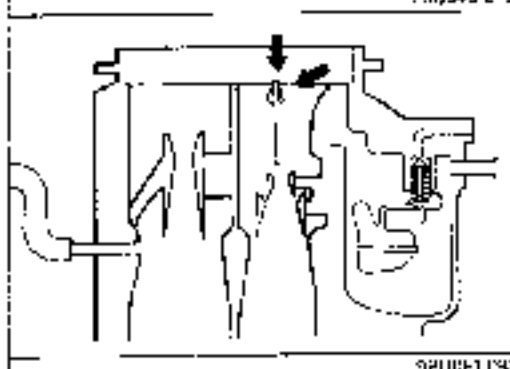
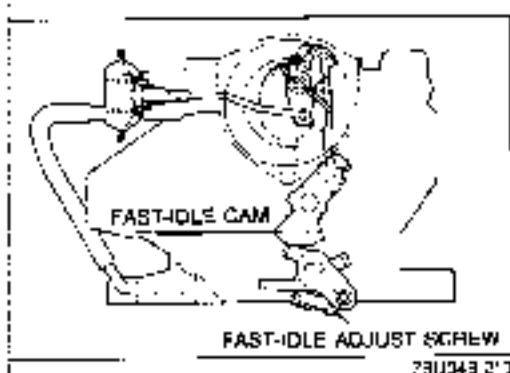
Clearance: 7.35—8.25mm (0.289—0.325 in)

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.
- d) After the idle adjustment is completed, press in the spring pin.
- e) Adjust the dashpot.
- f) Adjust the idle switch.



g) After the idle adjustment has been completed, check the fast idle speed as follows:

1. Warm up the engine to normal operating temperature.
 2. Stop the engine.
 3. Plug the hoses of the idle compensator and feed 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**

49 H018 9A1

Self-diagnosis
checker

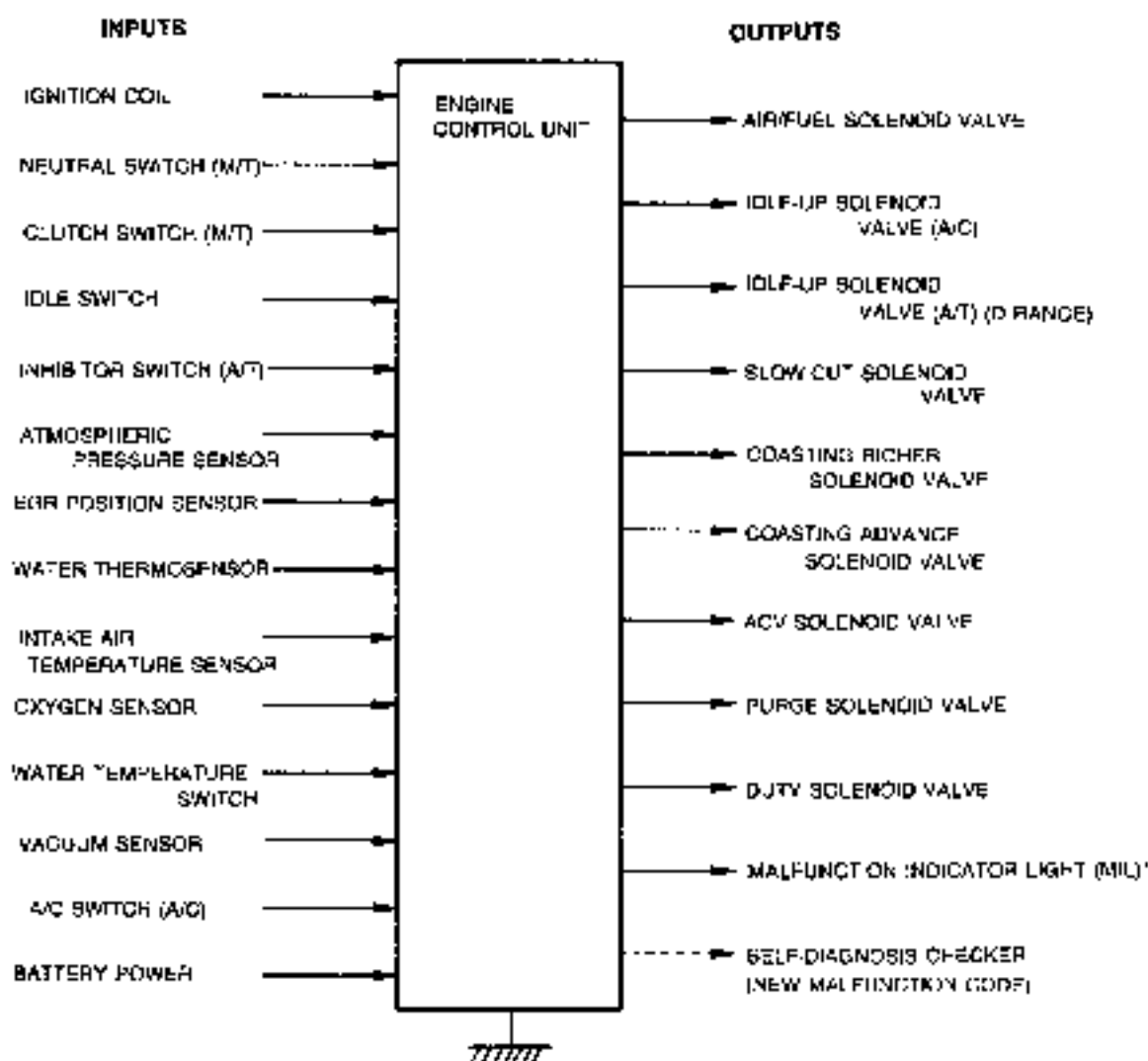
49 U018 001

Adaptor
harness A

49 9300 162

Engine signal
monitor

90JCT-062



EXCEPT CANADA

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**.

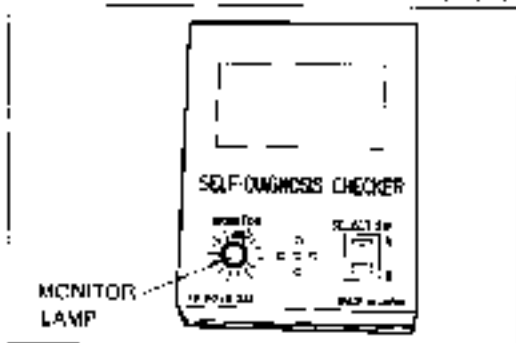
Note (Federal)

The MIL also comes ON at 60,000 miles and 80,000 miles to indicate that maintenance the engine control system is required.

When the light comes ON, inspect, adjust and replace the emission system and parts. (Refer to Scheduled Maintenance)



/BL04B-101



93075-066

TROUBLESHOOTING WITH SELF-DIAGNOSIS CHECKER

The **Self-Diagnosis Checker** (48 H018 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	Idle pulse circuit	ON OFF	—
09	Water temperature circuit	ON OFF	Maintains constant 80°C (176°F) signal
13	Vacuum sensor or circuit	ON OFF	Holds air/fuel solenoid valve to 0% duty and cuts off FGR
14	Air/fuel pressure sensor or circuit	ON OFF	Maintains constant signal of sea level pressure
15	Oxygen sensor or circuit	ON OFF	Holds air/fuel solenoid valve to 20% duty
16	FGR control system FGR position sensor or circuit	ON OFF	Cuts off FGR
17	Feedback system	ON OFF	Holds air/fuel solenoid valve to 30% duty
18	Air/fuel solenoid valve or circuit	ON OFF	—

Code No.	Location of malfunction	Buzzer	Control unit fail-safe function
22	Slow fuel cut solenoid valve or circuit	ON OFF	
23	Coasting richer solenoid valve or circuit	ON OFF	
26	Purge solenoid valve or circuit	ON OFF	
28	Duty solenoid vacuum valve or circuit	ON OFF	
29	Duty solenoid vent valve or circuit	ON OFF	
30	A/CV solenoid valve or circuit	ON OFF	
34	Idle-up solenoid valve (for A/C) or circuit	ON OFF	
35	Idle-up solenoid valve (for A/T) or circuit	ON OFF	
45	Vacuum solenoid valve or circuit	ON OFF	

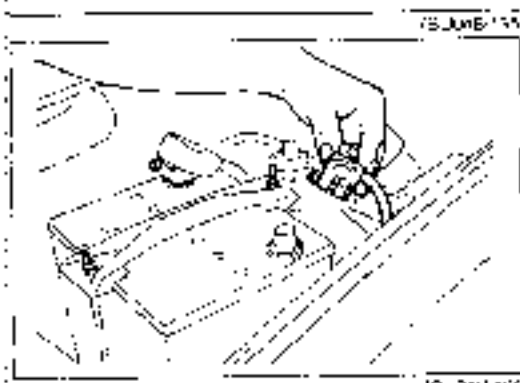
95L02-1067

01 → 4-second period →
 09 → 4-second period →
 13 → 4-second period →
 Repeats above

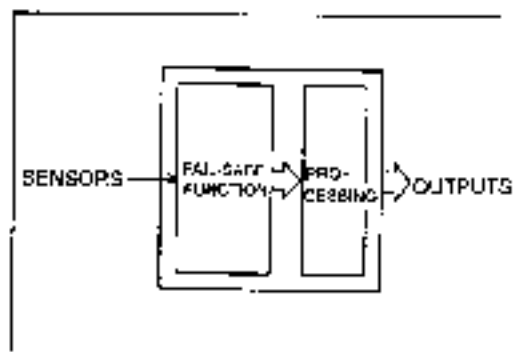
Note

- 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.

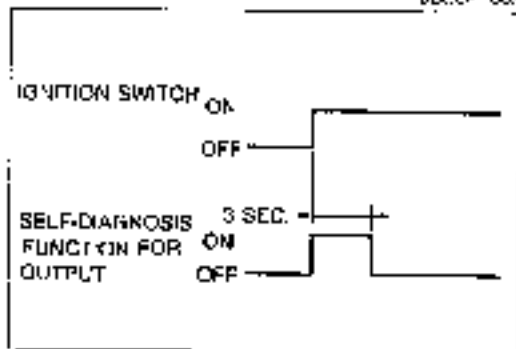
- b) The memory of malfunctions is canceled when the negative battery cable is disconnected for approximately five seconds.



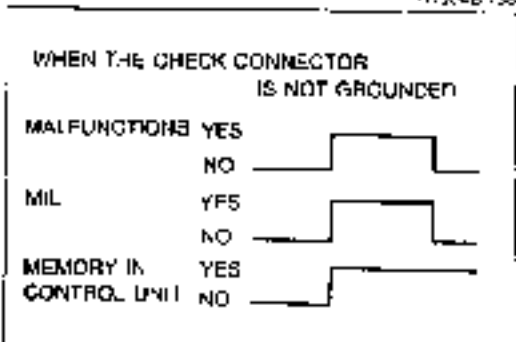
95L02-1067



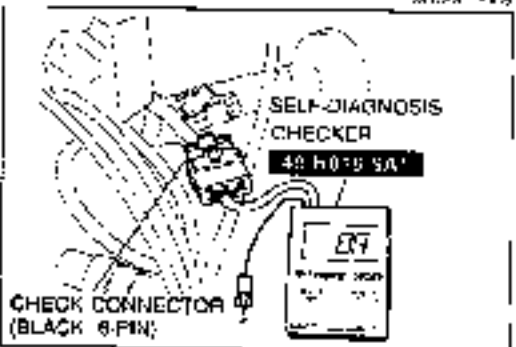
GBLCH-05H



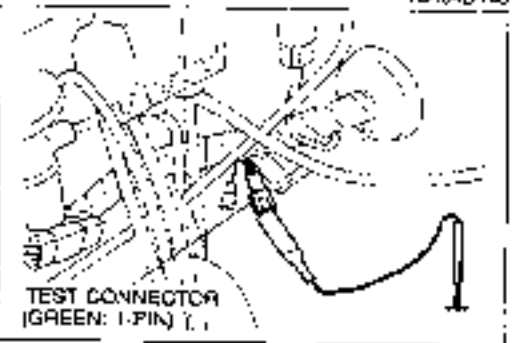
PFAHB-138



38JAF-405



7B-040-120



9B-071-400

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

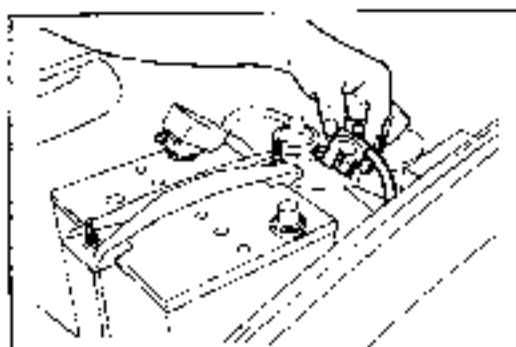
4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **three seconds** after turning the ignition switch ON.
6. If **88** does not flash, check the check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **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



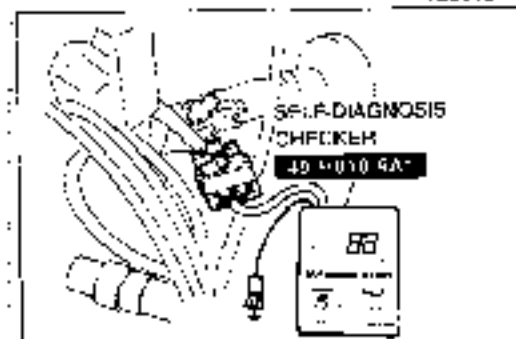
98U0F1 015

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**

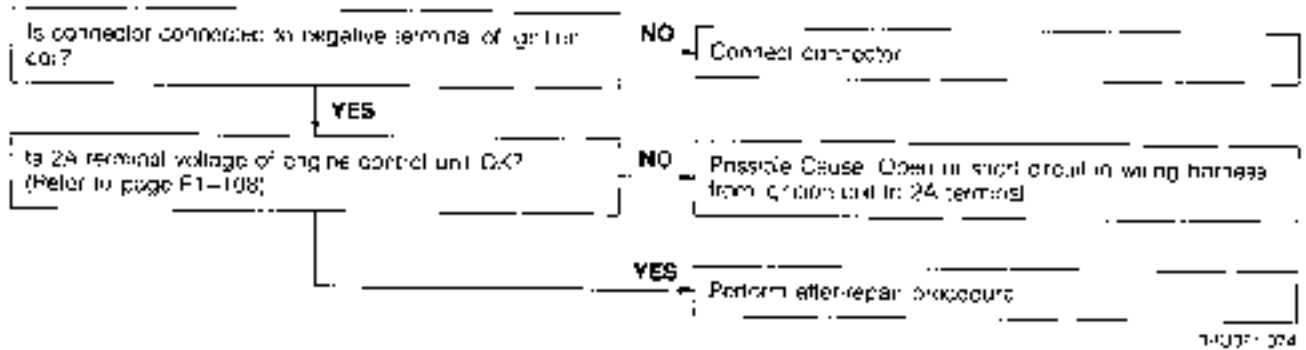
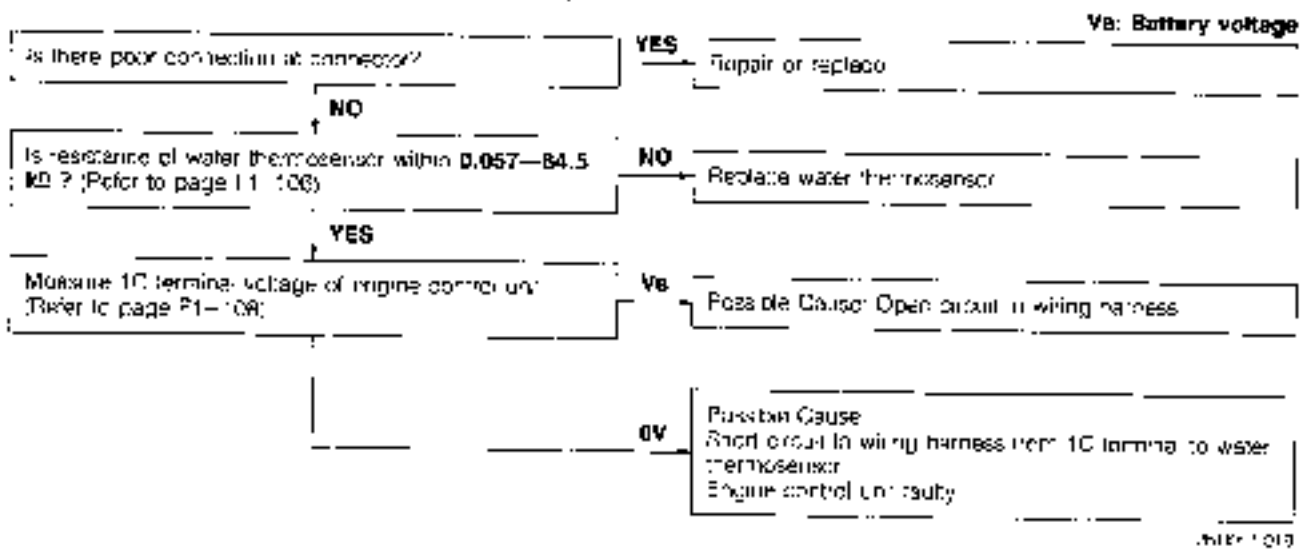
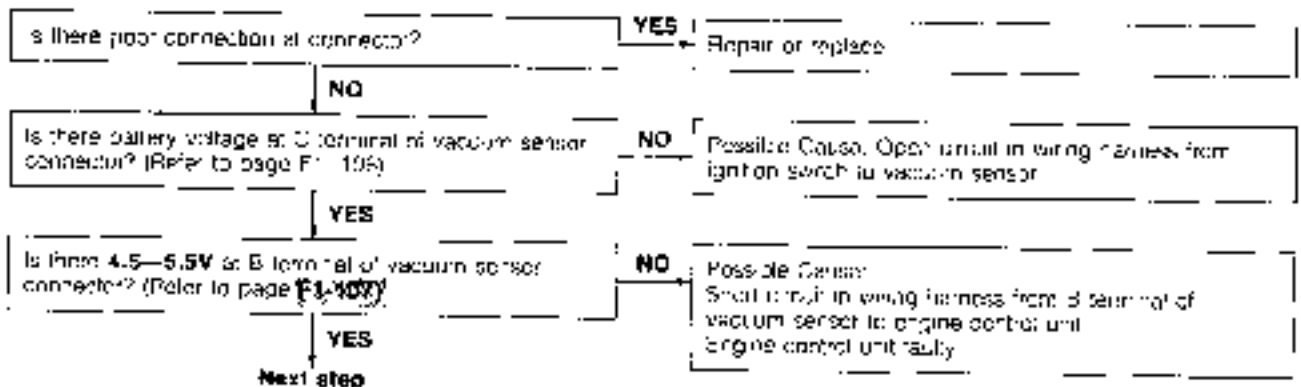
78J04E-149

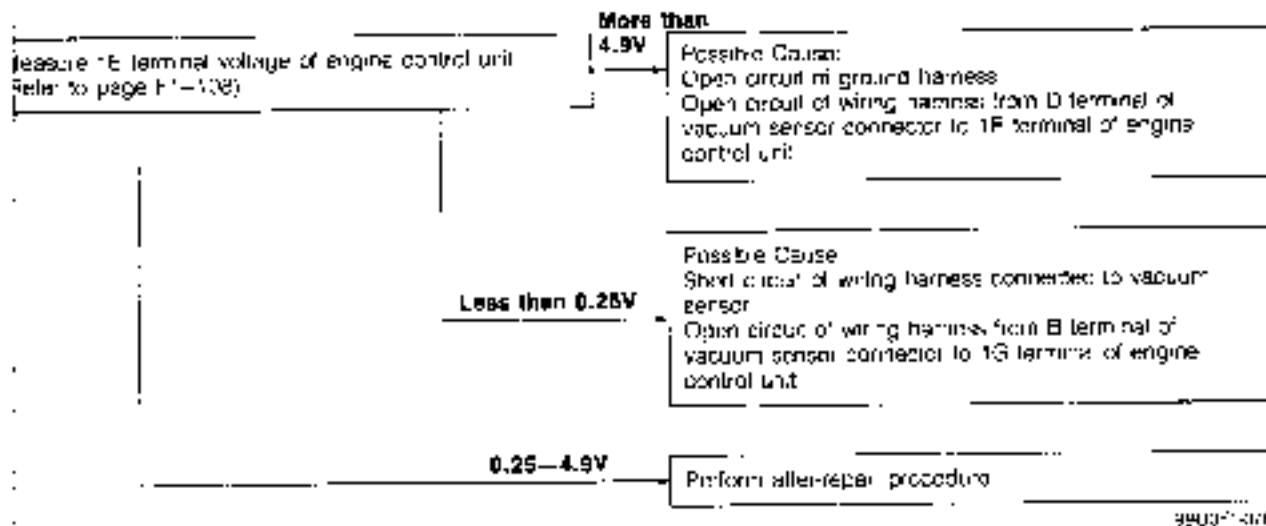


98U0F1 073

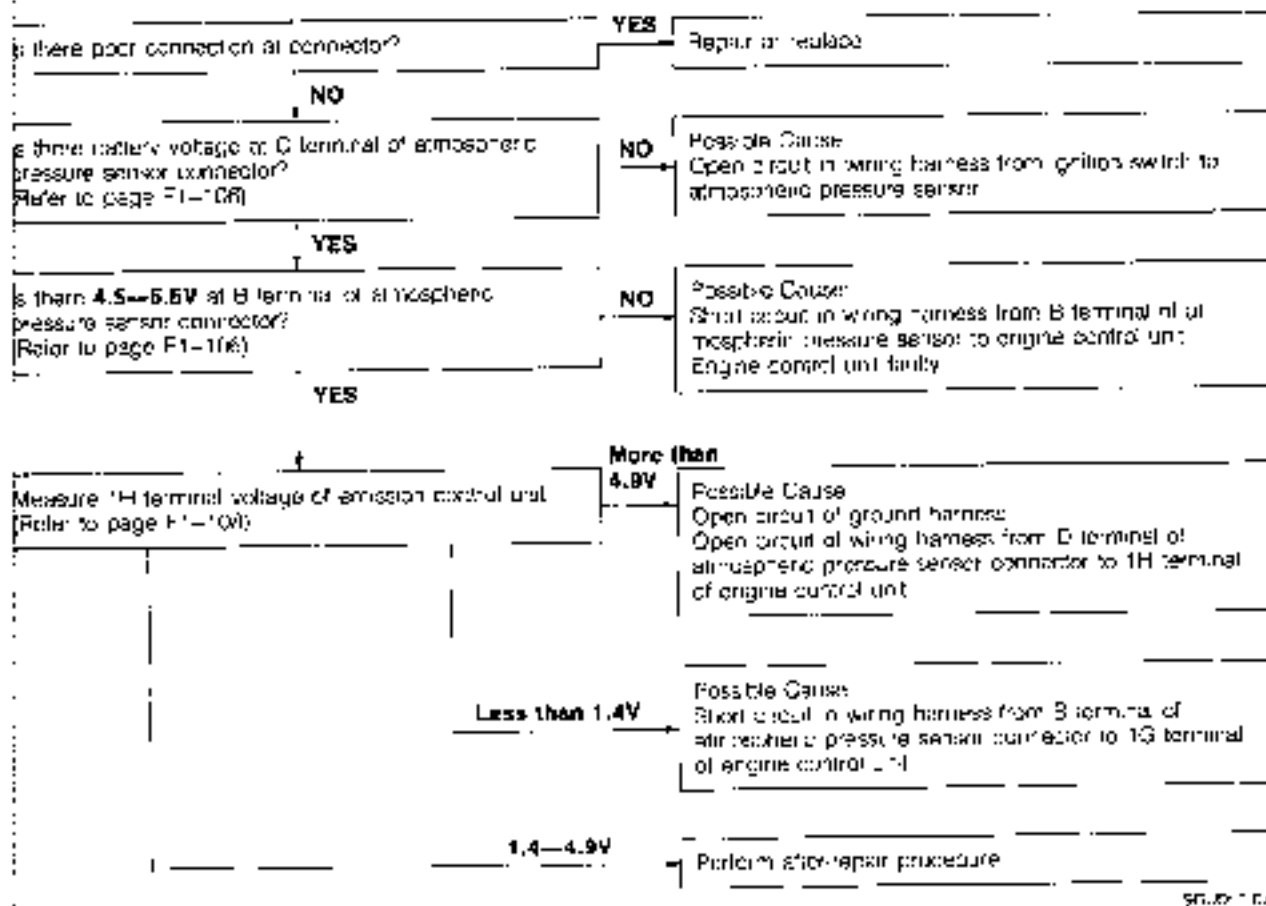
2. Turn the ignition switch ON, but do not start the engine for **8 seconds**.
3. Start and warm up the engine, then run it at **2,000 rpm** for **four minutes**.

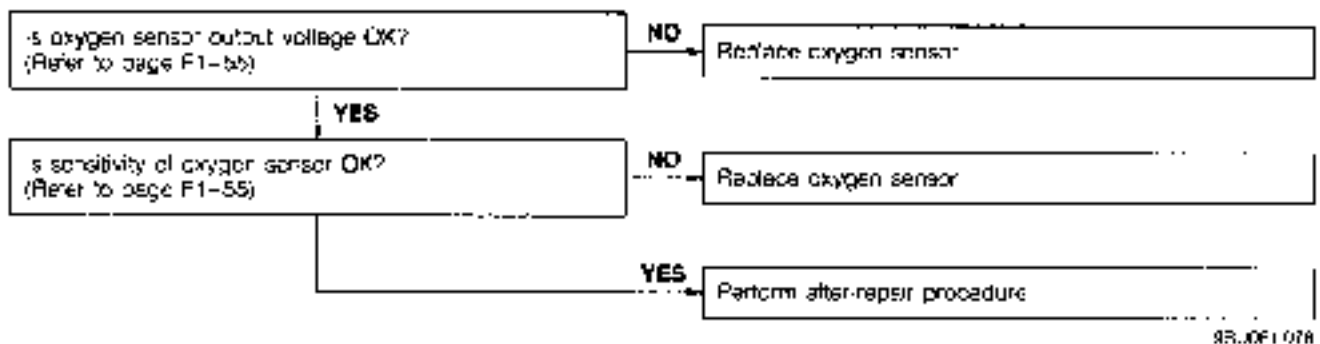
4. Connect the **Self-Diagnosis Checker** (49 H018 9A1) to the check connector.
5. Ground the test connector (Green: 1 pin) with a jumper wire.
6. Verify that no code numbers are displayed.

No.01 code display (IG pulse)**No.09 code display (Water thermosensor)****No.13 code display (Vacuum sensor)**

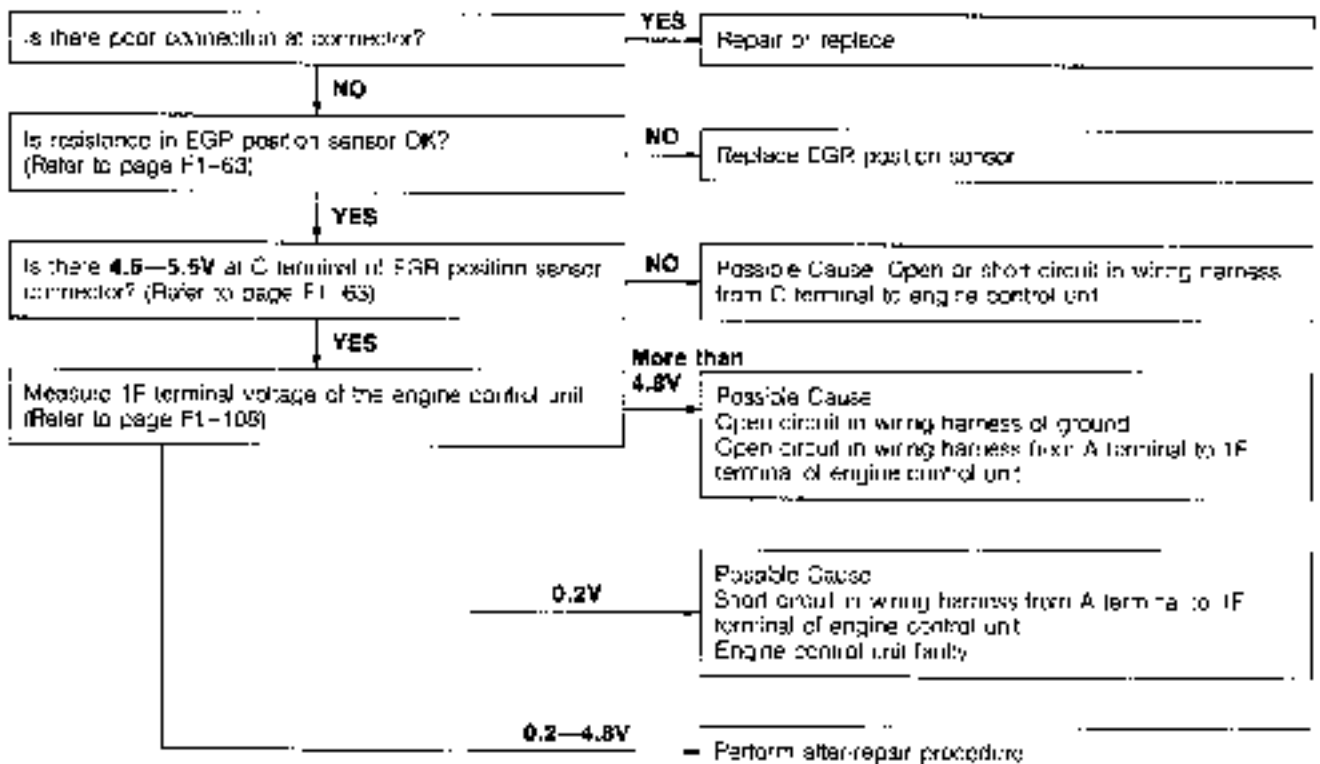


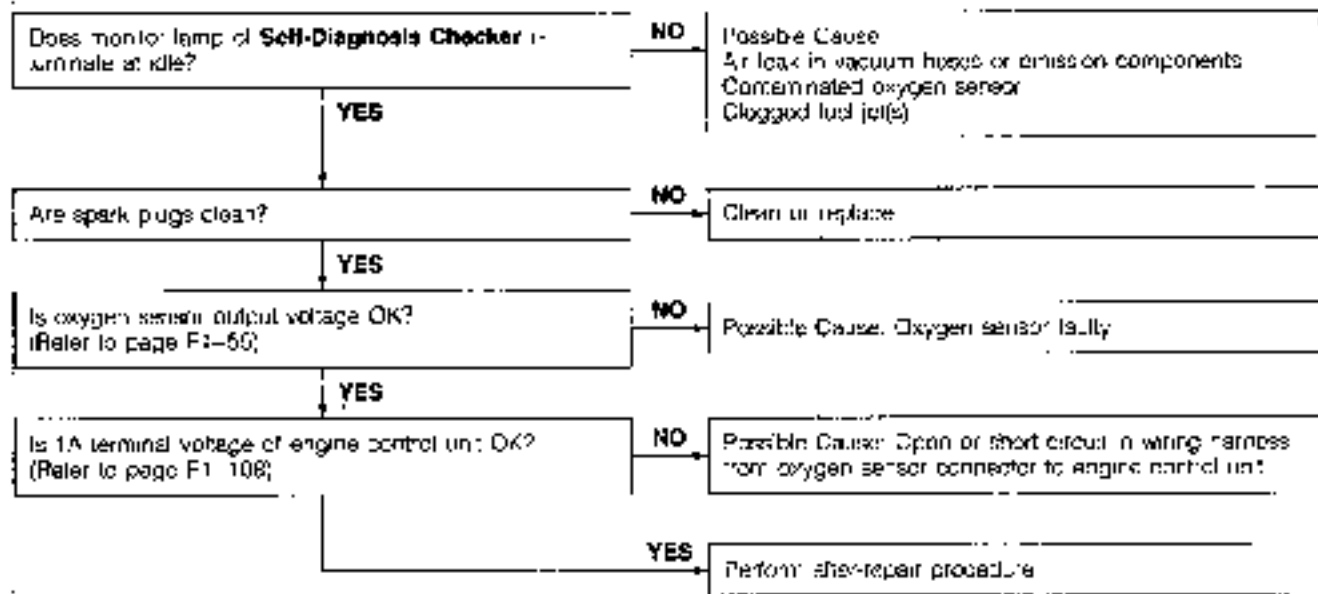
b.14 code display (Atmospheric pressure sensor)



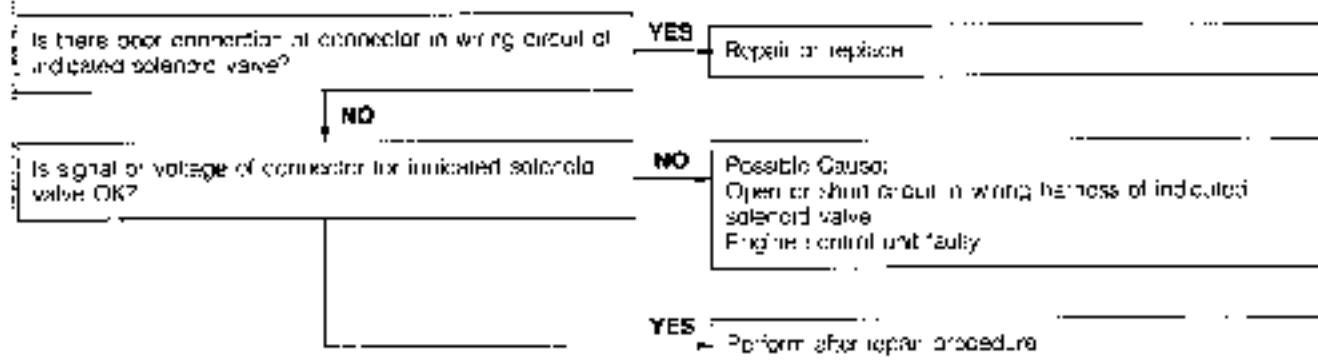
No.15 code display (Oxygen sensor)**No.16 code display (EGR position sensor)****Note**

Inspect the vacuum hose to the EGR control valve for air leakage, blockage and damage if the MIL illuminates only during cruising.

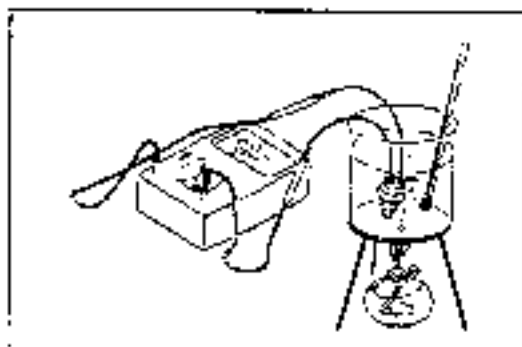


No.17 code display (Feedback system)

SEJ0F1000

No.18, 22, 23, 26, 28, 29, 30, 34, 35, and 45 code displays (Solenoid valves)

SEJ0F1001



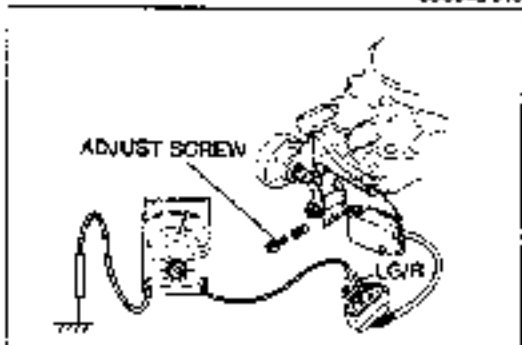
68U043-013

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

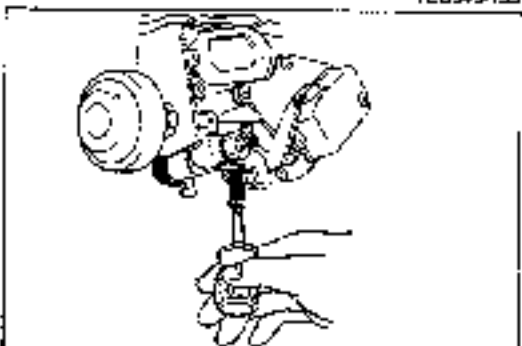
IDLE SWITCH**Inspection**

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.



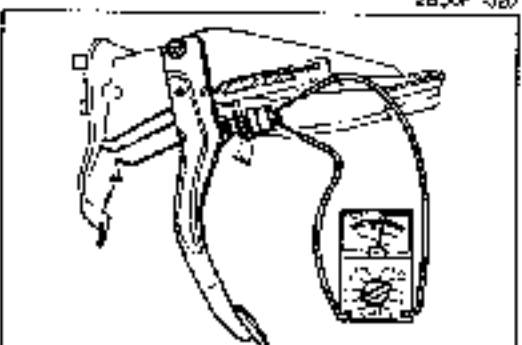
28JOF-020

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.



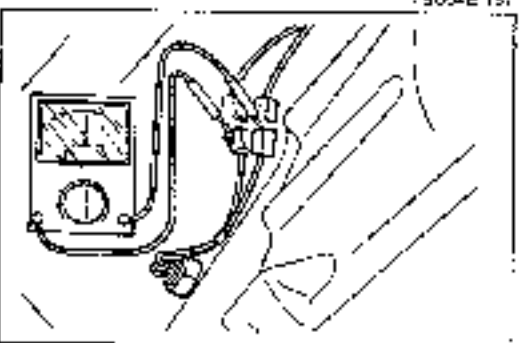
73U04E 157

NEUTRAL SWITCH**Inspection**

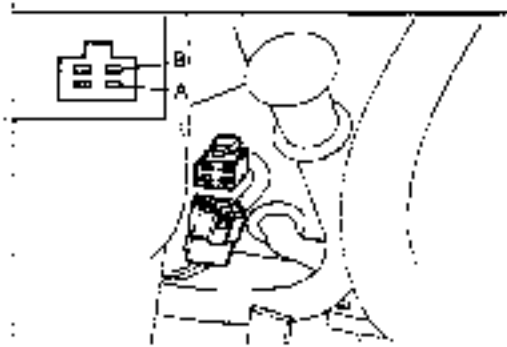
1. Disconnect the switch connector.
2. Check continuity between the terminals.

Continuity	Condition
No	In neutral position
Yes	In other positions

3. If not correct, replace the neutral switch.



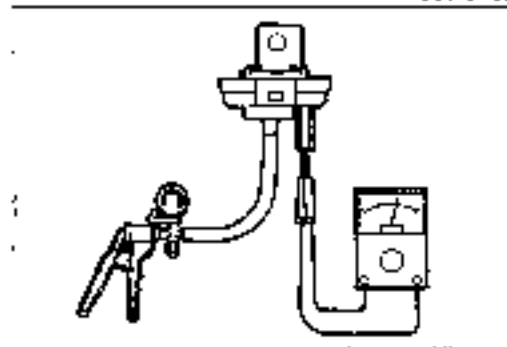
78U04E 166

**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

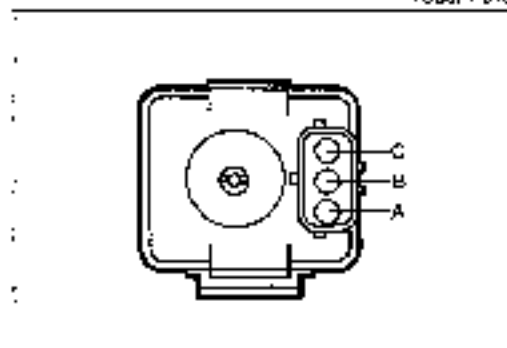
3. If not correct, replace the inhibitor switch.

**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

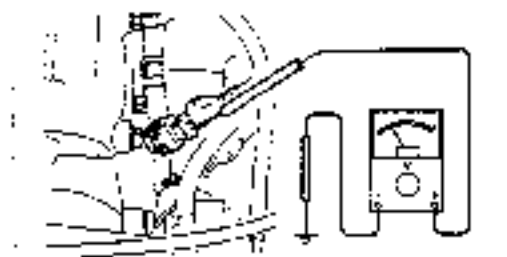


5. If the voltage at A or C terminal is not correct, check the wiring harness.
6. If the voltage at A and C terminals is correct but is not correct at B terminal, replace the atmospheric pressure sensor.

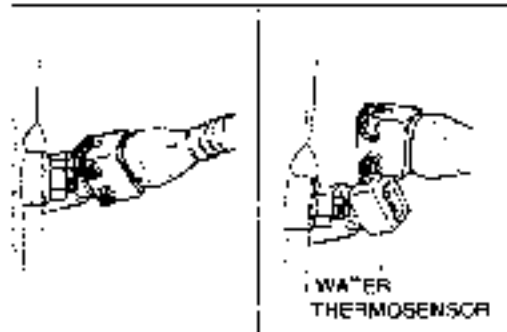
WATER THERMOSENSOR**Inspection of Terminal Voltage**

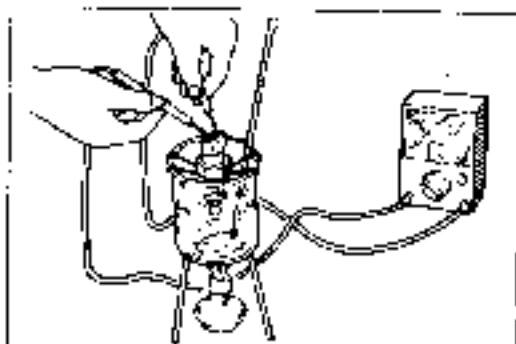
1. Warm up the engine and run it at idle.
2. Remove the rubber boot from connector as shown.
3. Turn the ignition switch ON.
4. Verify that voltage between terminal (L/R) and the ground is as specified.

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.





7DLC4B-013

- 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 (-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

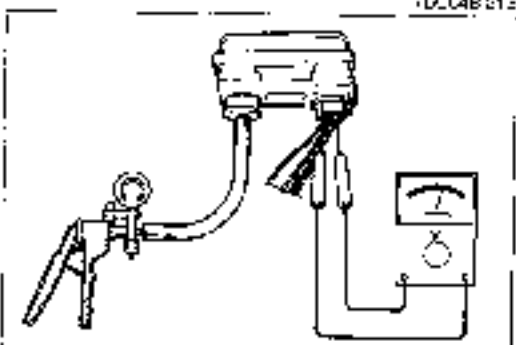
- If it is not, replace the water thermosensor.

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.

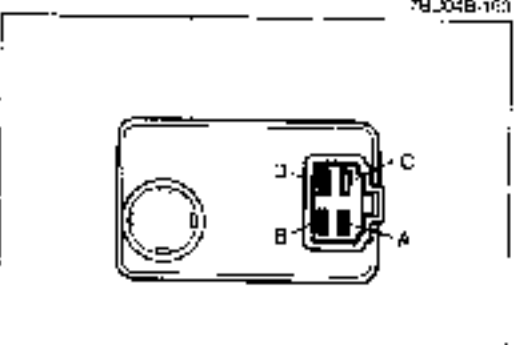
Vacuum: 0—760 mmHg (0—29.9 inHg)



7HJ04B-103

Terminal	Voltage
A	Less than 1.5V
B	4.5—5.5V
C	
D	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 D terminal, replace the vacuum sensor.



7HJ04B-102

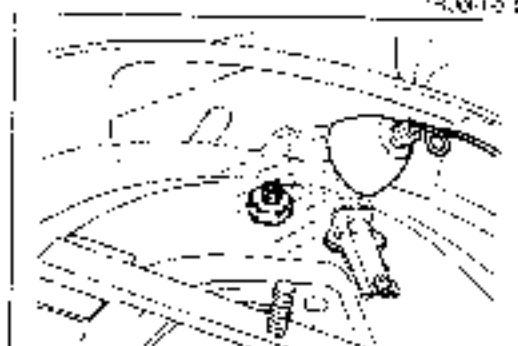
INTAKE AIR THERMOSENSOR

Inspection of Resistance

- Remove the air cleaner cover.
- Remove the rubber boot from the connector.
- Heat the intake air thermosensor, and observe the temperature.
- Use an ohmmeter to check resistance between the terminals of the intake air thermosensor.

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 thermosensor.



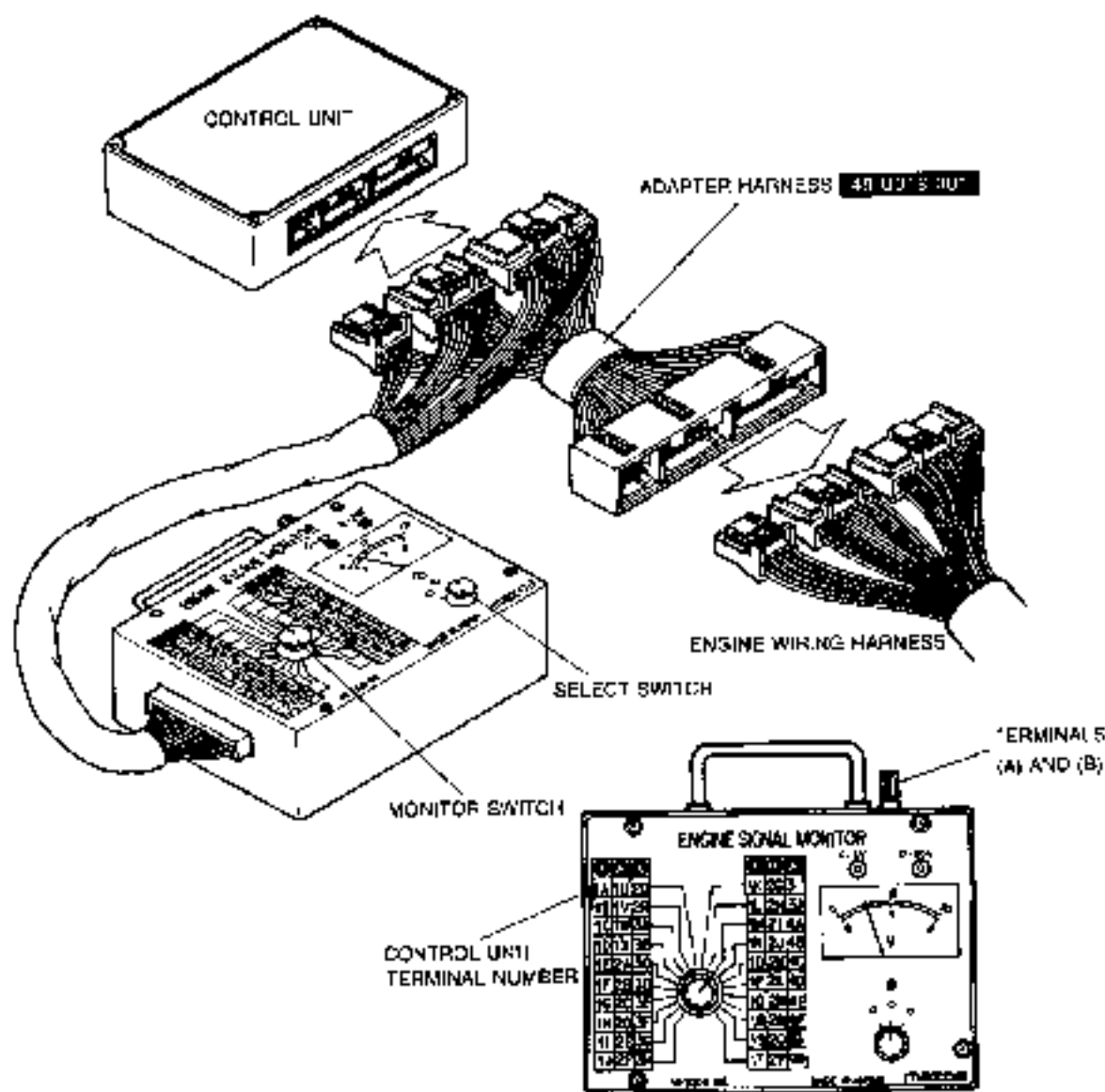
5B11F1-002

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 U018 001)**

6DUCF1-063

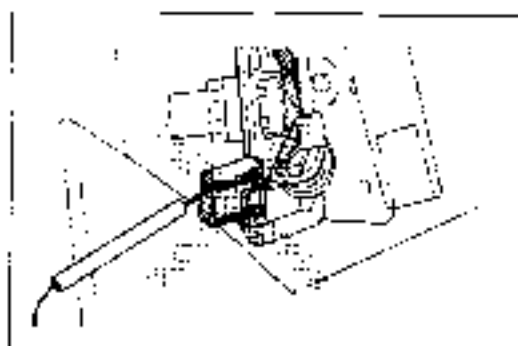
The **Engine Signal Monitor (49 9200 162)** was developed to check the control unit terminal voltages. This monitor easily inspects the individual terminal voltages through selection by the monitor switch.

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 U018 001)**.
2. Turn the select 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

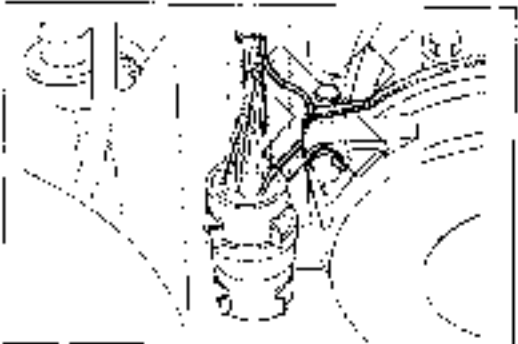
Precaution

1. Never push the circuit tester test probe into the connectors from the engine control unit side.



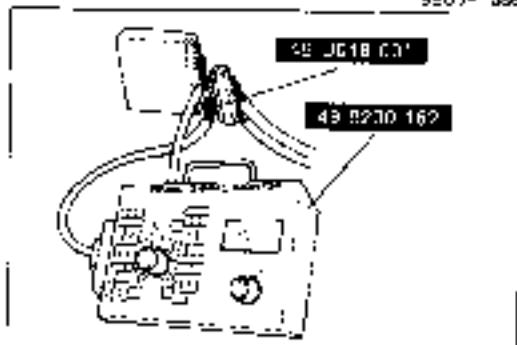
9ELCF1005

2. Before checking the engine control unit, troubleshoot with the **Self-Diagnosis Checker**.



9EUT4-036

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.



9BLSF1007

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 UD18 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.

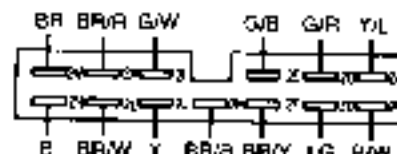
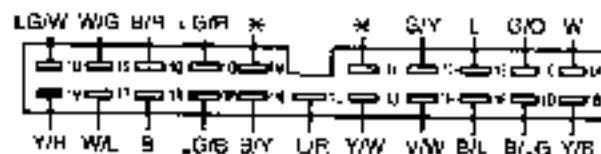
V_B: Battery voltage

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 _B	Check connector; Not grounded
		0V	Check connector; Grounded
1C (Input)	Water temperature	Approx. 0.5V	Warm-up engine (Thermostat Open)
1D (Ground)	Water temperature, EGR position sensor, Vacuum sensor, Atmospheric pressure sensor, Intake air temperature	Less than 1.5V	—
1E (Input)	Vacuum sensor	Approx. 1.3V	At idle
		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 _B	—
1N (Input)	Neutral and clutch switch	V _B	In gear
		Less than 1.5V	In neutral or depress clutch pedal
	Inhibitor switch	Less than 1.5V	In N or P range
		0V	In other ranges
1O (Input)	Idle switch	V _B	At idle
		Less than 1.5V	At more than 1,200 rpm with no load
1P (Ground)	Idle switch	Less than 1.5V	—
1Q (Input)	Water temperature switch	V _B	Radiator coolant temp. above 17°C (63°F)
		Less than 1.5V	Radiator coolant temp. below 17°C (63°F)
1R (Ground)	Engine ground	Less than 1.5V	—
1S (Output)	Coasting advance solenoid valve	V _B	At idle
		Less than 1.5V	At 1,700—2,500 rpm during in gear deceleration
1T (Output)	Idle up solenoid valve (A/E)	Less than 1.5V	At less than 1,000 rpm in R, D, 2, or 1 range
		V _B	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 _B	At idle
		Less than 1.5V	At 1,400 rpm with warmed-up engine
2A (Input)	Ignition coil negative terminal	0V	—
2B (Battery power)	Ignition switch (ON)	V _B	Ignition switch ON
		0V	Ignition switch OFF
2C (Input)	Air conditioner magnetic clutch circuit	V _B	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 _B	At 2,500 rpm or more during in gear deceleration

V_B Battery voltage

Terminal	Connected to	Voltage	Condition
2E (Output)	Self-Diagnosis Checker (Digital display)	V _B	Buzzer: OFF
		Less than 1.5V	Buzzer: ON
		Code signal	When self-diagnosis check connector grounded
2F (Output)	Airfuel (A/F) ratio solenoid valve	Monitor reading: 1.5 ~ 3.8V (fluctuating) Actual voltage: 3.5 ~ V _B (fluctuating)	At idle
		0 ~ 1.4V (fluctuating or fixed)	During running
		V _B	At idle
2H (Output)	Coasting richer solenoid valve	Less than 1.5V	At 2,500 ~ 1,400 rpm with in-gear deceleration (Voltage indicated one second after conditions met)
2I (Output)	Self-Diagnosis Checker (Monitor lamp)	Less than 1.5V	Monitor lamp: ON
		V _B	Monitor lamp: OFF
2J (Output)	ACT solenoid valve	V _B	At idle
		Less than 1.5V	At 1,500 rpm or more, warmed up, no load
		V _B	While cranking
2K (Output)	Duty solenoid valve (Vent)	V _B	During warm up
		V _B	At idle
		Voltage decreases (Green and red lights flash)	During deceleration
		V _B	While cranking
2L (Output)	Duty solenoid valve (Vacuum)	V _B	During warm up
		V _B	At idle
		Voltage decreases (Green and red lights flash)	During deceleration
		V _B	While cranking
2V (Output)	Idle-up solenoid valve (A/C)	Less than 1.5V	At idle (A/C ON)
		V _B	At 1,400 rpm or below (A/C ON)
2W (Ground)	Engine ground	Less than 1.5V	

Connectors



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

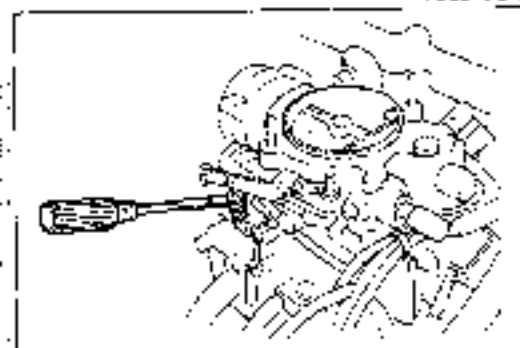
Vehicle with A/T transmission in gear (not P or N) and throttle valve closed fully

b) When inspecting "2E" terminal voltage, connect the Self-Diagnosis checker.

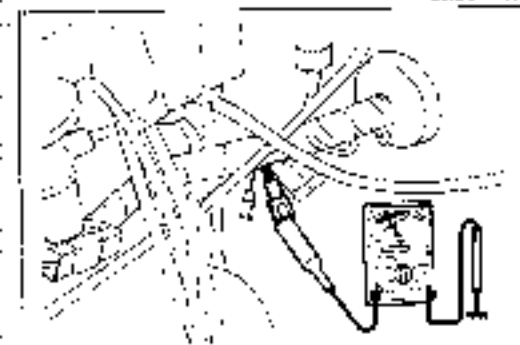
29U3F-021



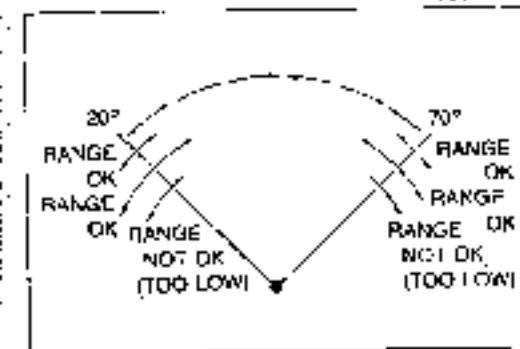
78UCAS-210



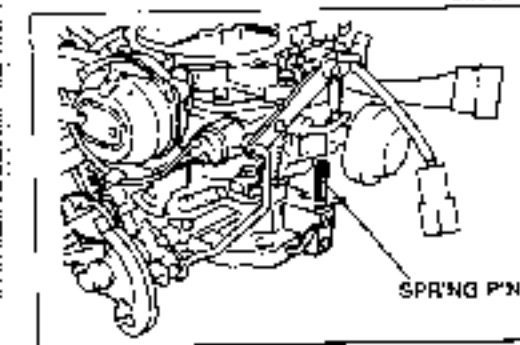
28J0-137



F3UKF-030



78J01V-1



78J01V-1

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 degrees, 4 cylinder) to the air/fuel check connector (8R/Y).

- Check the idle mixture (duty) at the specified idle.

Idle mixture: 20°—70°

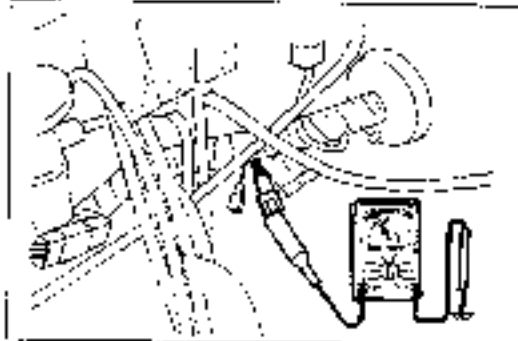
If the idle mixture is not as specified, check the feedback system.

Adjustment

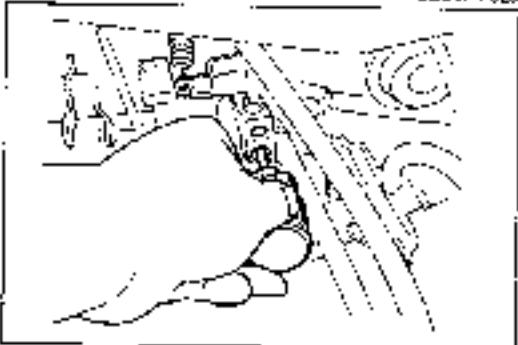
Adjustment of the idle mixture is normally unnecessary.

Note

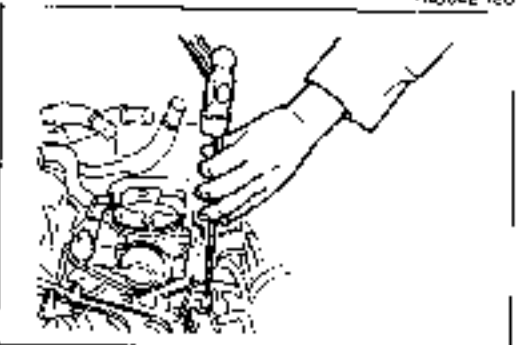
- To adjust the idle mixture, remove the carburetor and knock out the spring pin. Reinstall the carburetor.
- Install the air cleaner and verify that the idle compensator is closed.
- Verify that all vacuum hoses are correctly connected.



25JCF1-023



7RUC2E 180



68U04X 120

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)**.

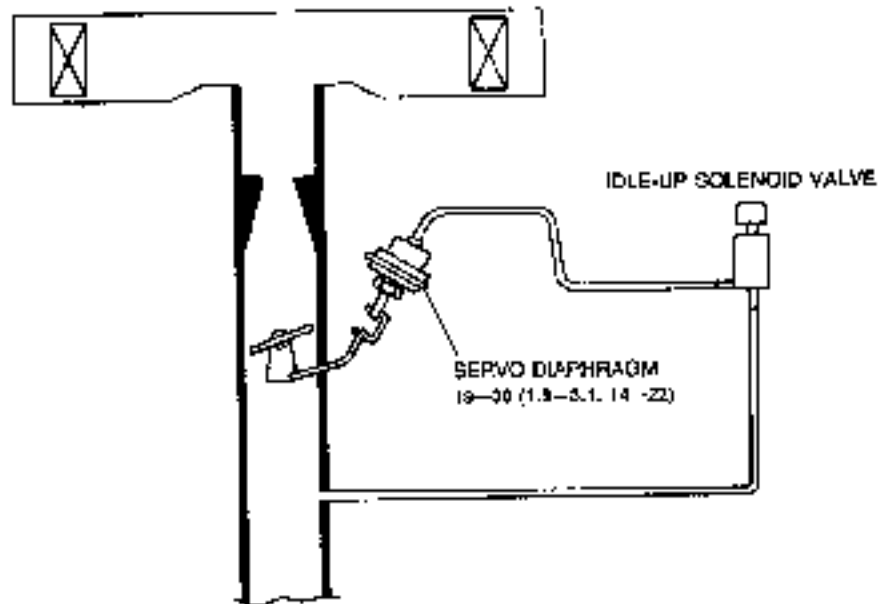
4. Adjust the idle mixture (duty) to specification by turning the mixture adjust screw.

Specification: 27°—45°

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-lb)

790048-18



790048-19

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)

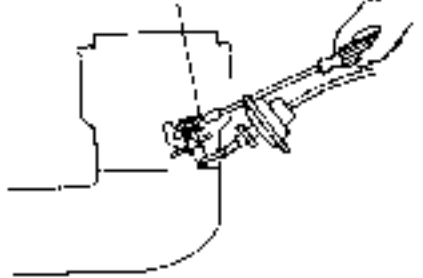
1,300—1,500 rpm (A/C)

Caution

All accessories should be OFF.

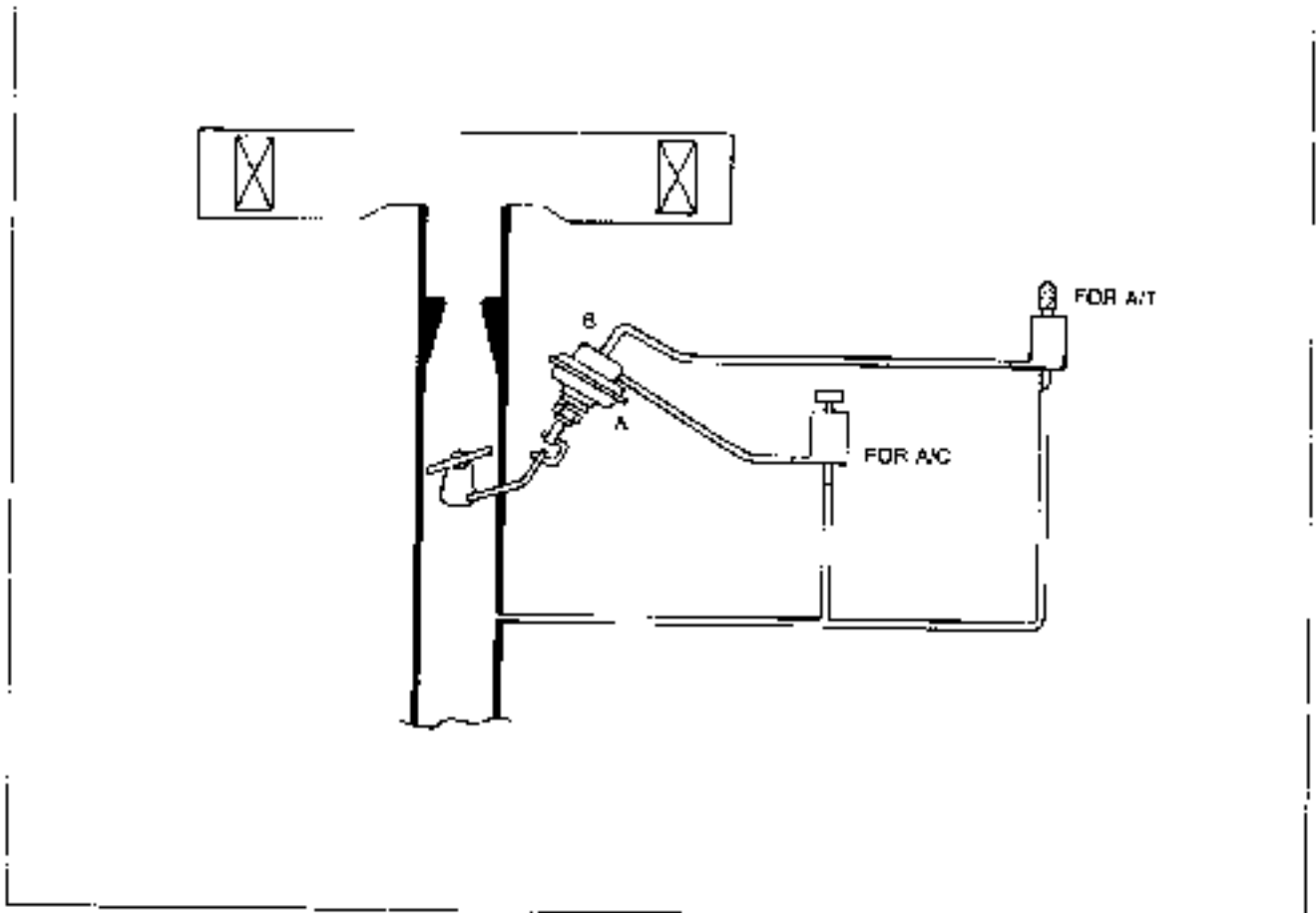
5. If it is not, turn the adjust screw to adjust.

ADJUST SCREW

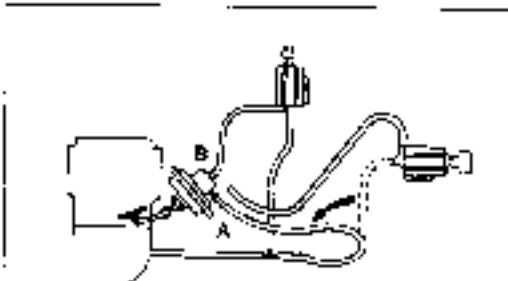


790048-18

**IDLE-UP FOR AUTOMATIC TRANSMISSION (A/T) WITH AIR CONDITIONER (A/C)
(DUAL SERVO DIAPHRAGM)**



73U4B-104



Adjustment

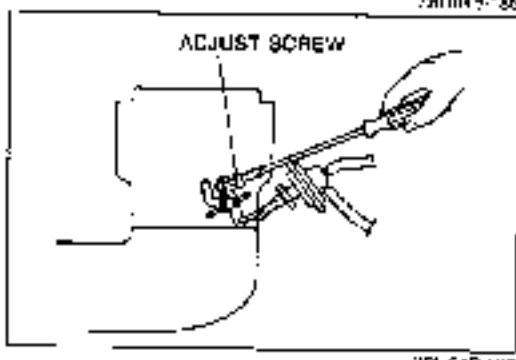
1. Warm up the engine and run it at idle.
2. Connect a tachometer to the engine.
3. Disconnect the vacuum hose from port (A).
4. Connect the intake manifold vacuum directly to port (A), and verify that the engine speed is as specified.

Specification: 1,300—1,500 rpm

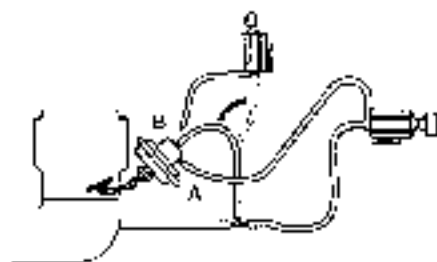
Caution

All accessories should be OFF.

- 5 If it is not, turn the adjust screw to adjust.



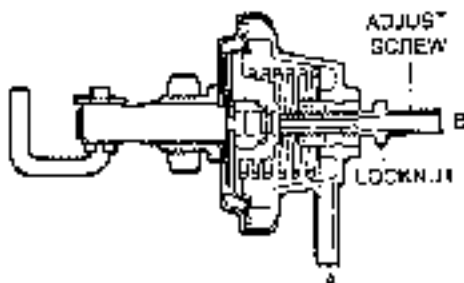
73U4B-105



79J045-107

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



79J045-108

10. If it is not, disconnect the vacuum hose, and turn the adjust screw on the diaphragm head to adjust.

Note

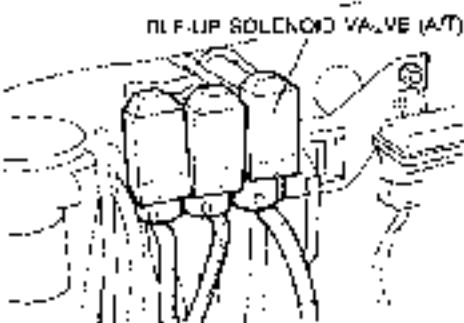
Engine speed is increased when the adjust screw is turned counterclockwise and decreased when the adjust screw is turned clockwise.

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).

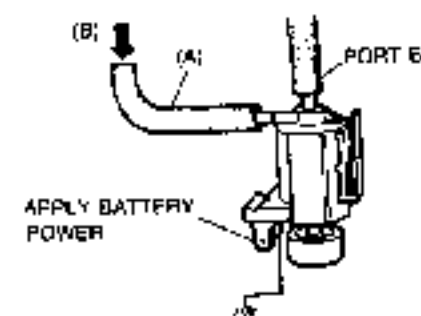
IDLE-UP SOLENOID VALVE

Inspection

1. Remove the idle-up solenoid valve.



79J045-109



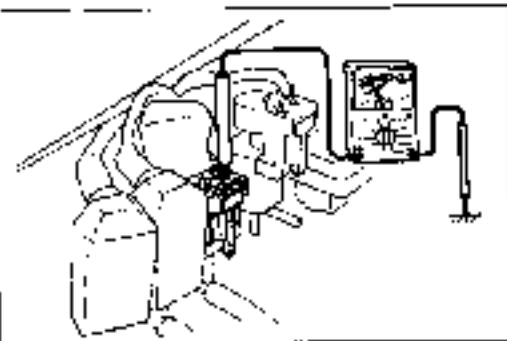
79J045-110

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.

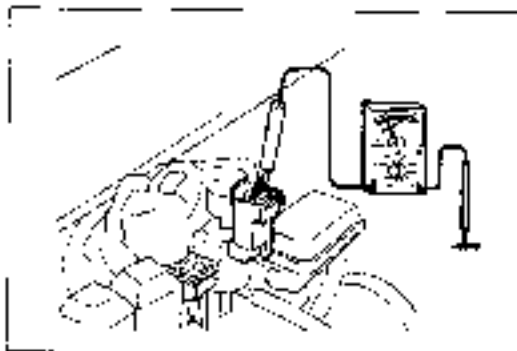
Inspection of Signal (for A/T)

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



28L04-1-001



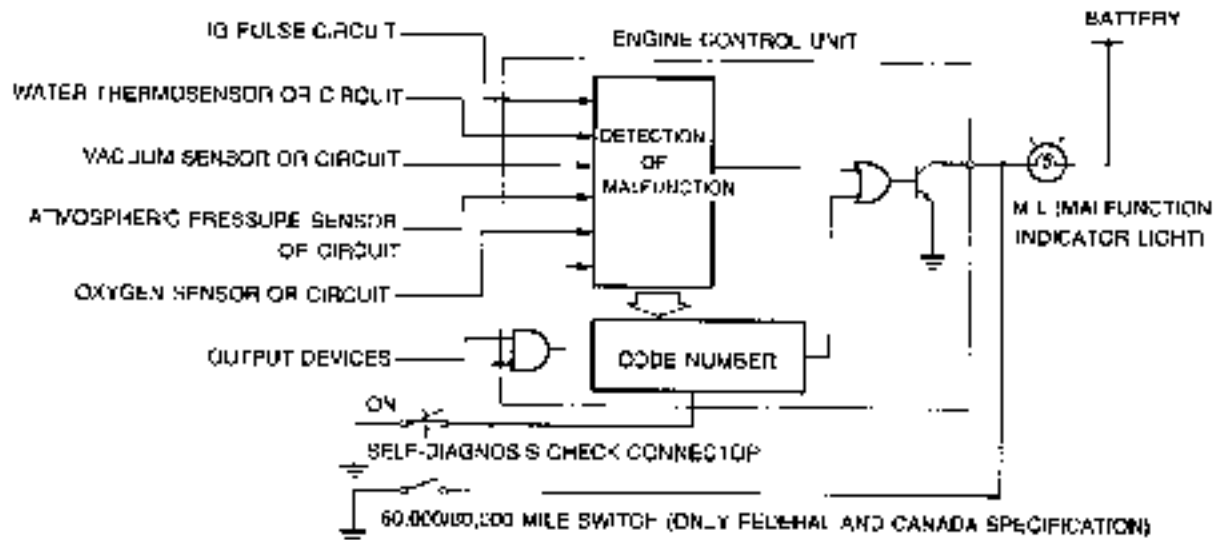
CE-2F-024

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)



3BUCF-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

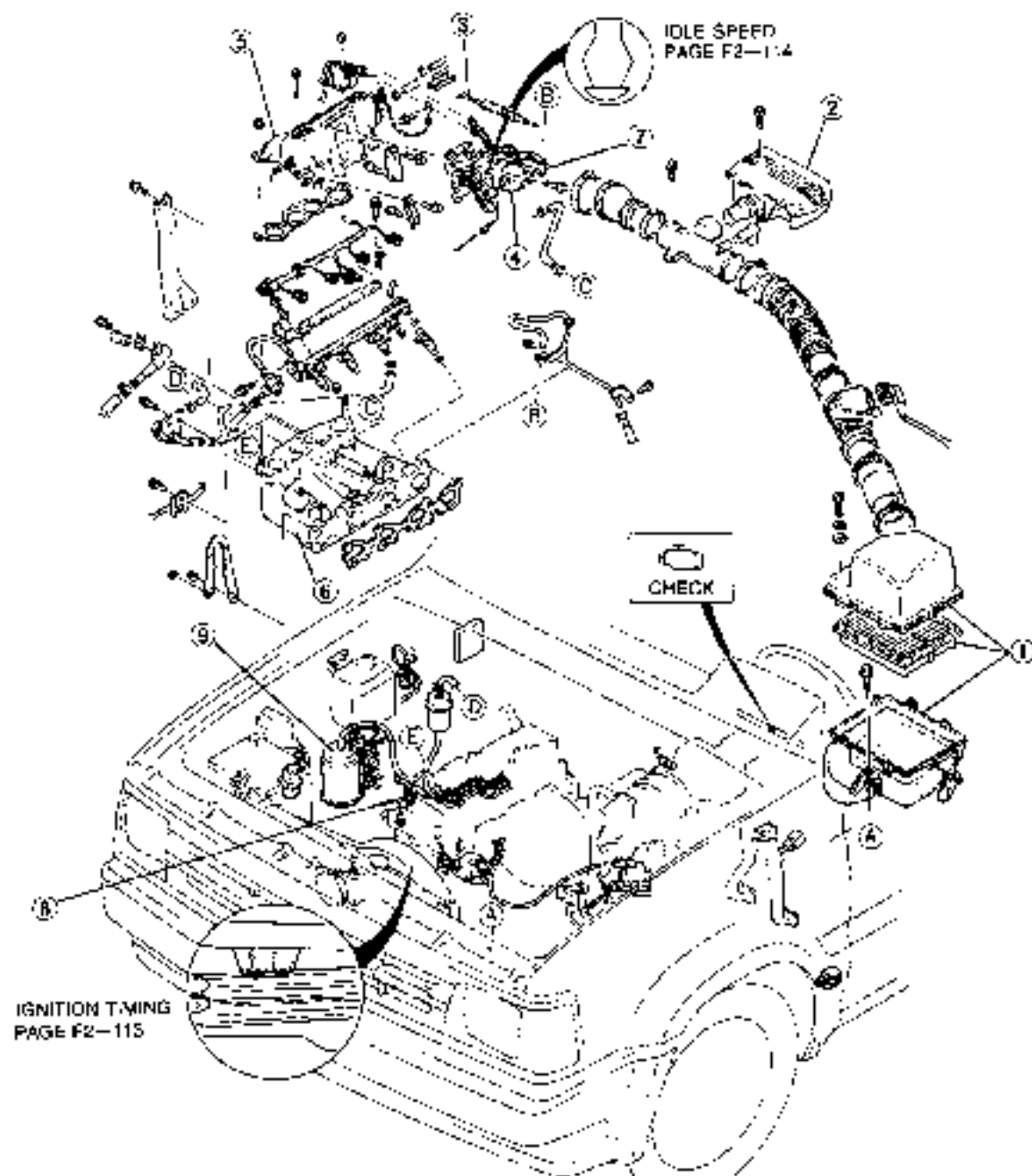
a) When the MIL comes ON, inspect, adjust, and replace the engine control system and parts. (Refer to Scheduled Maintenance)

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)

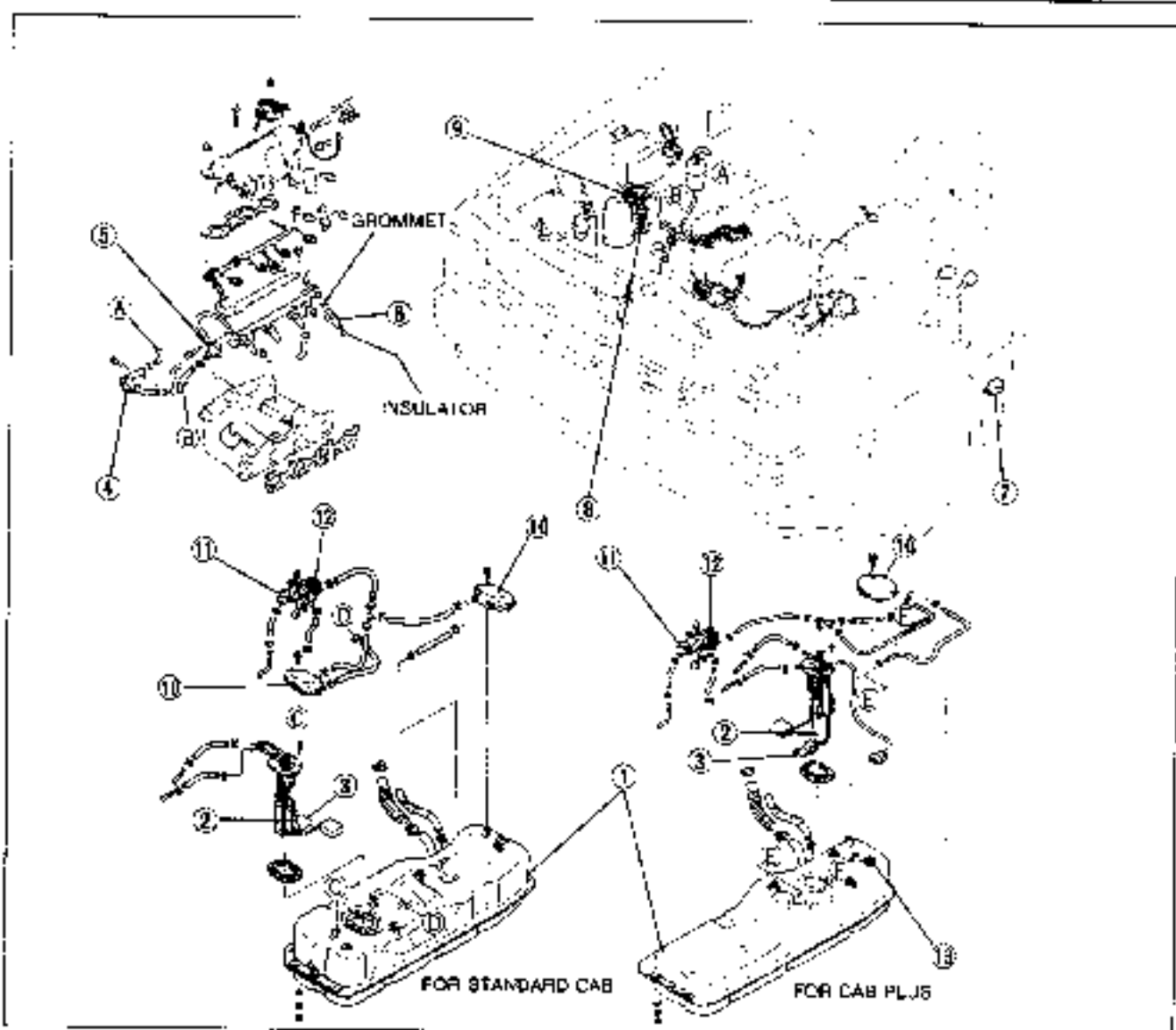
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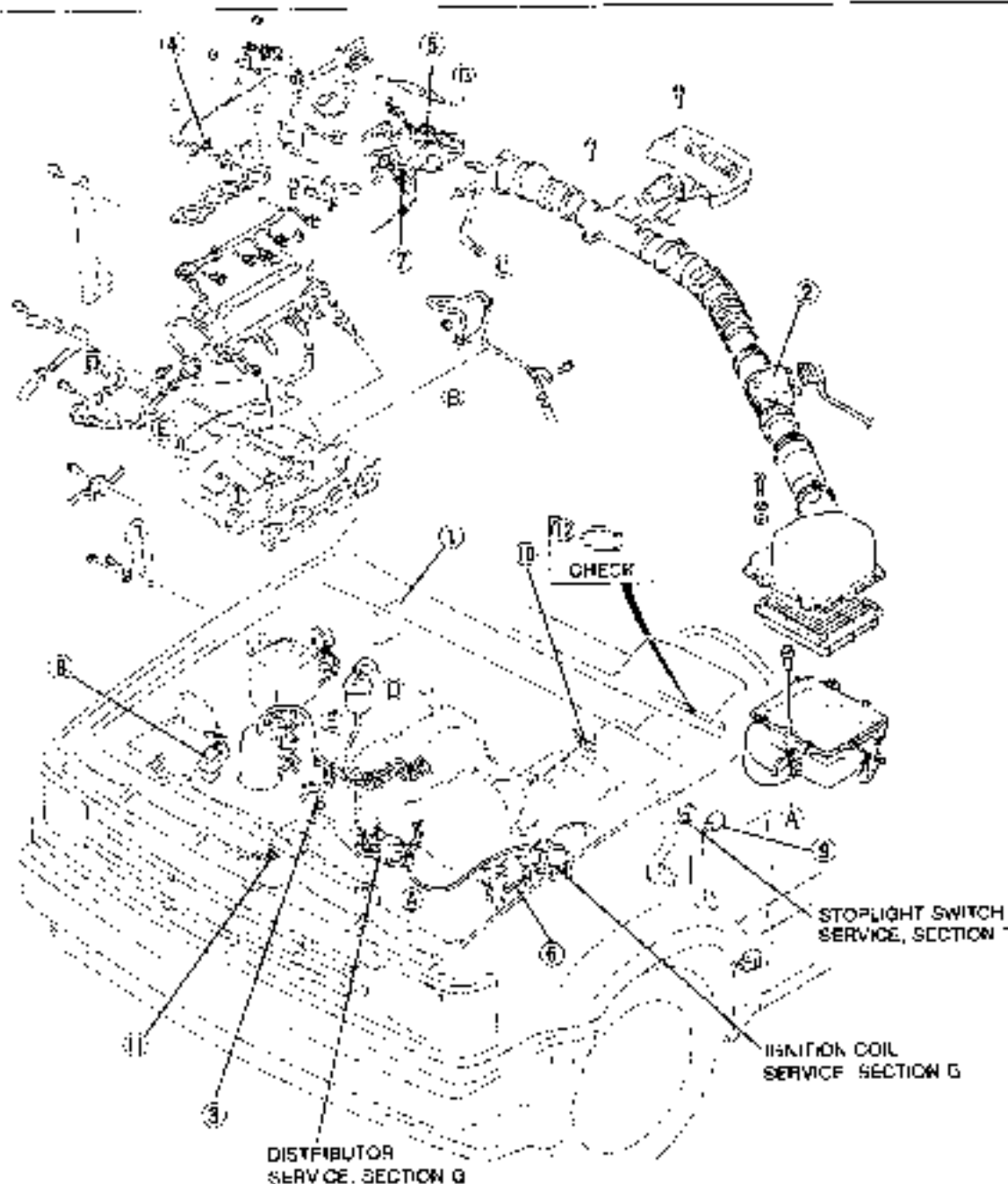
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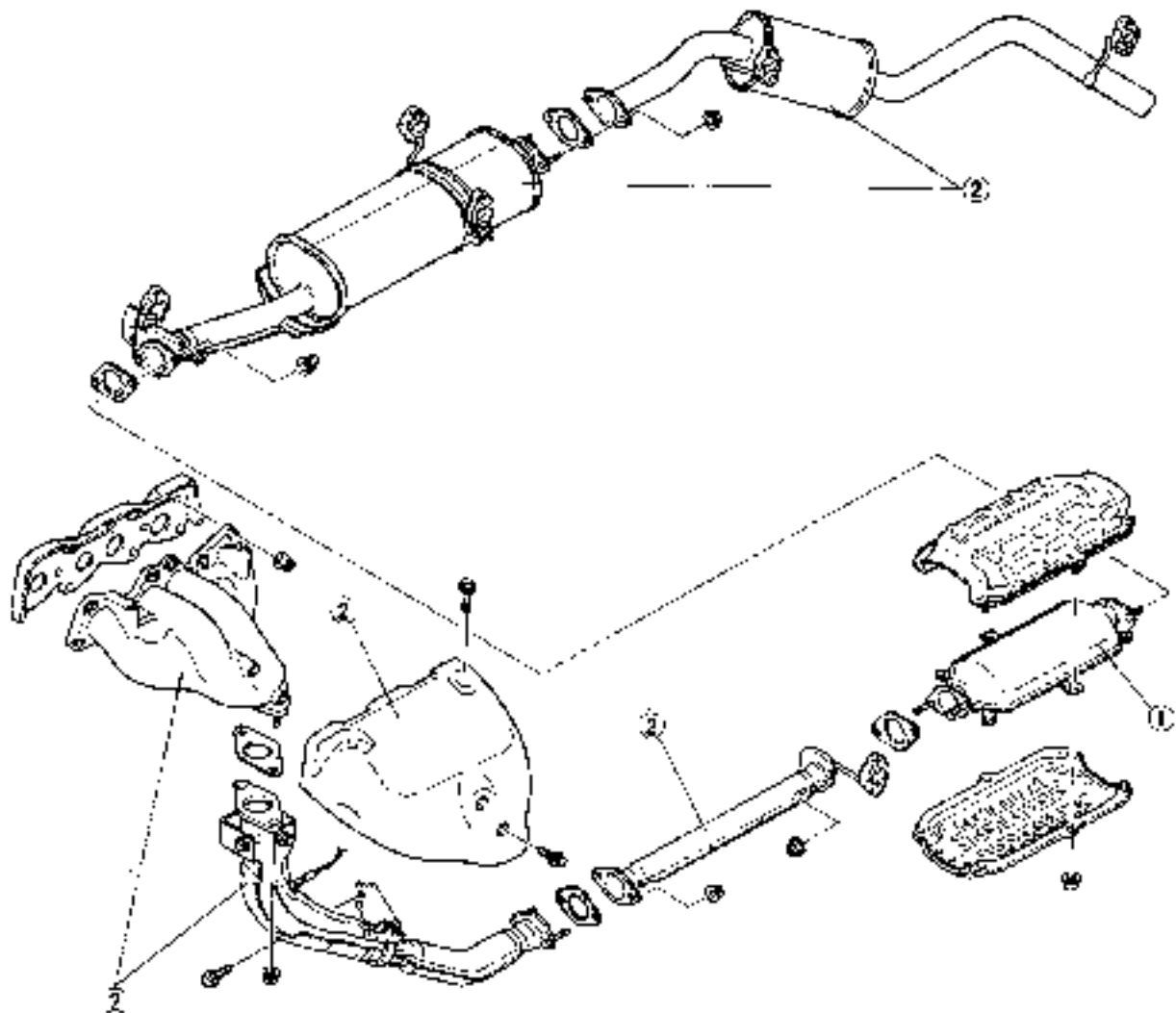
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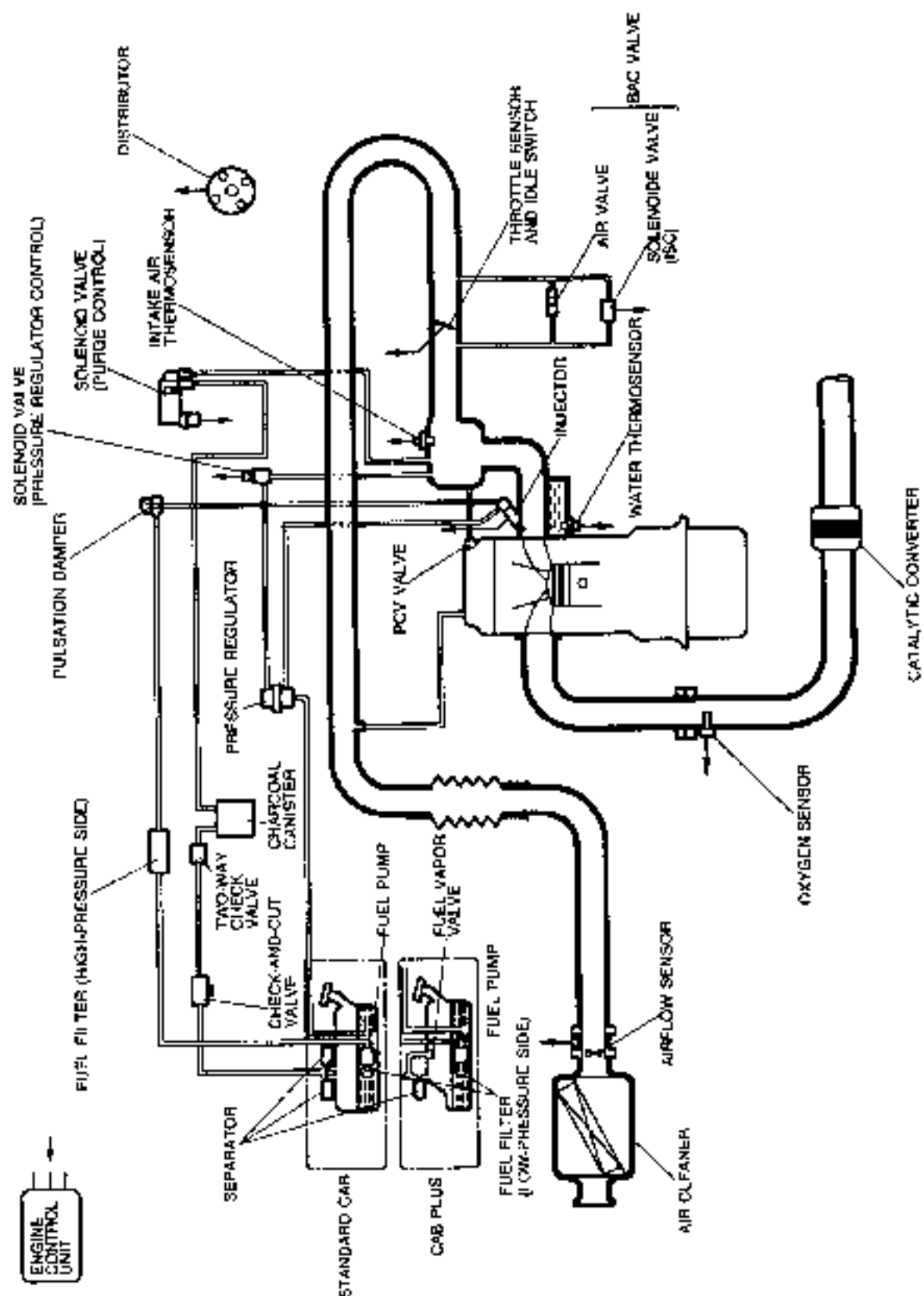
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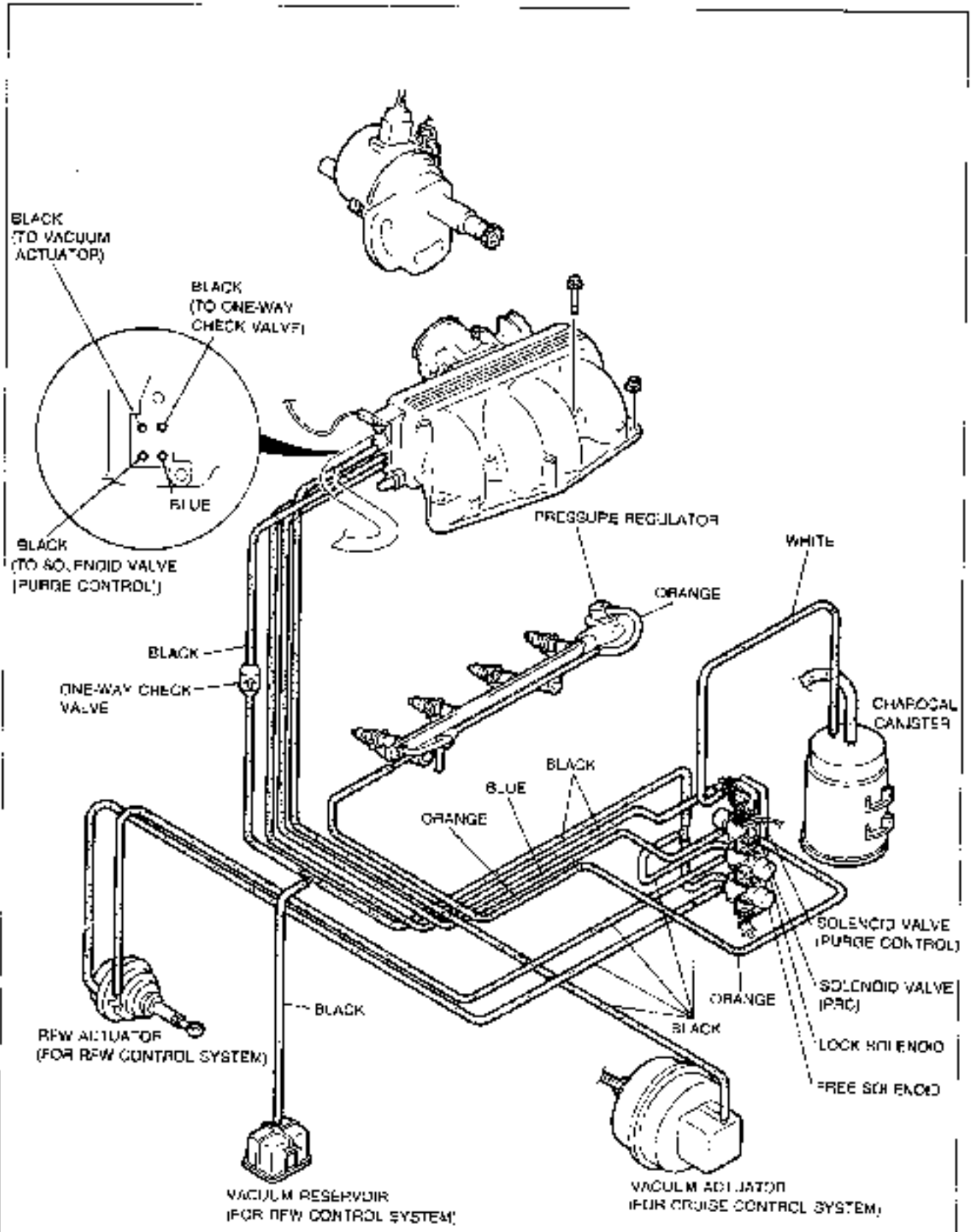
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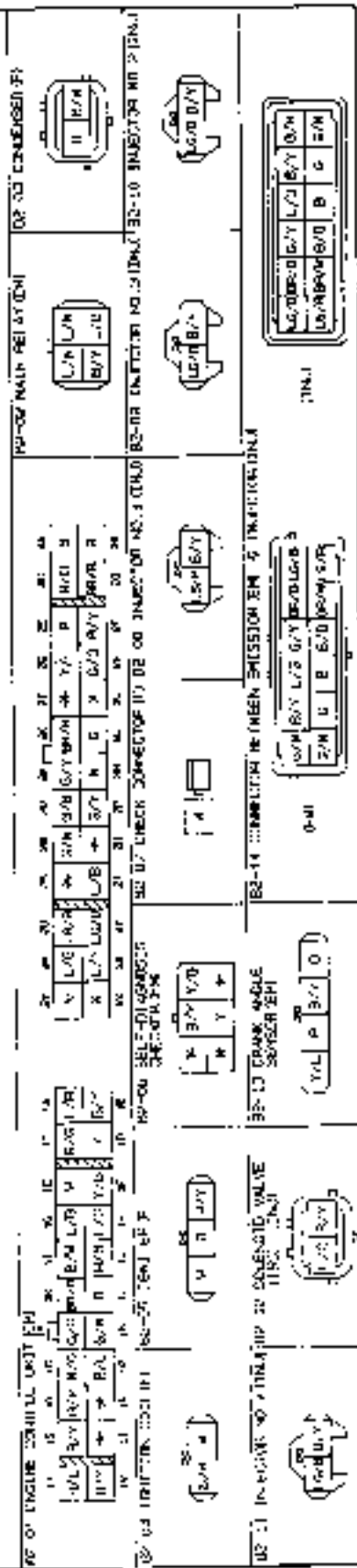
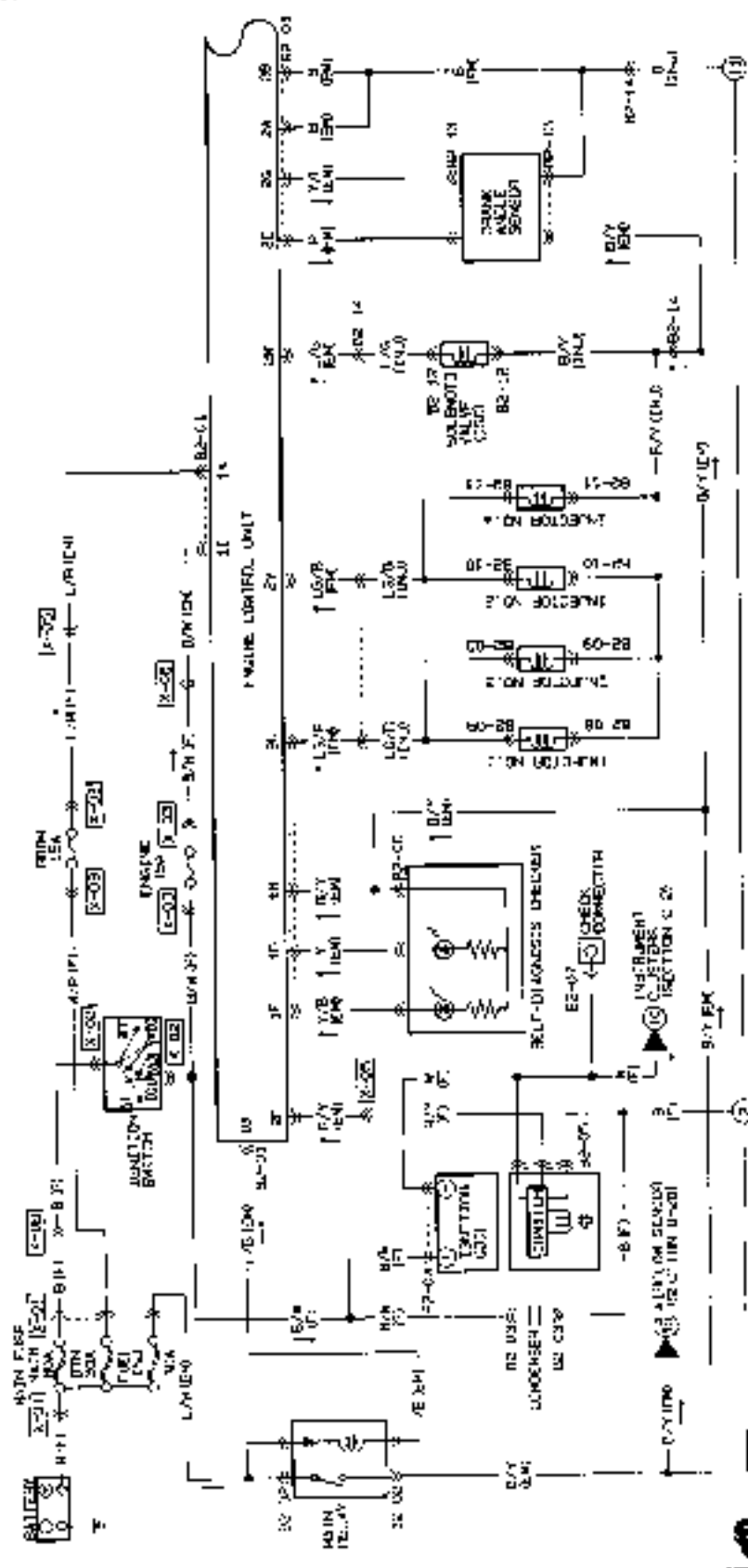
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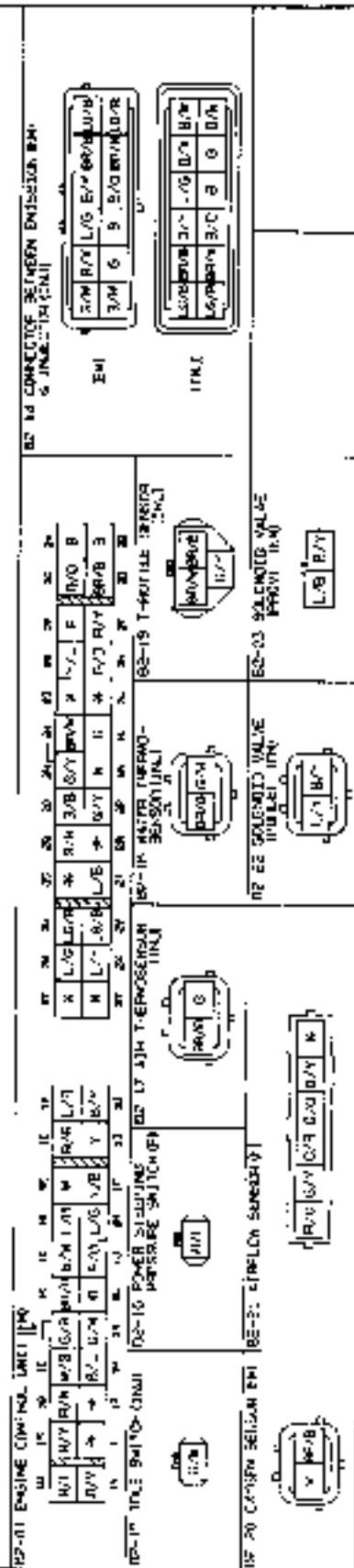
VACUUM HOSE ROUTING DIAGRAM



IGNITION SYSTEM ■ ENGINE CONTROL SYSTEM

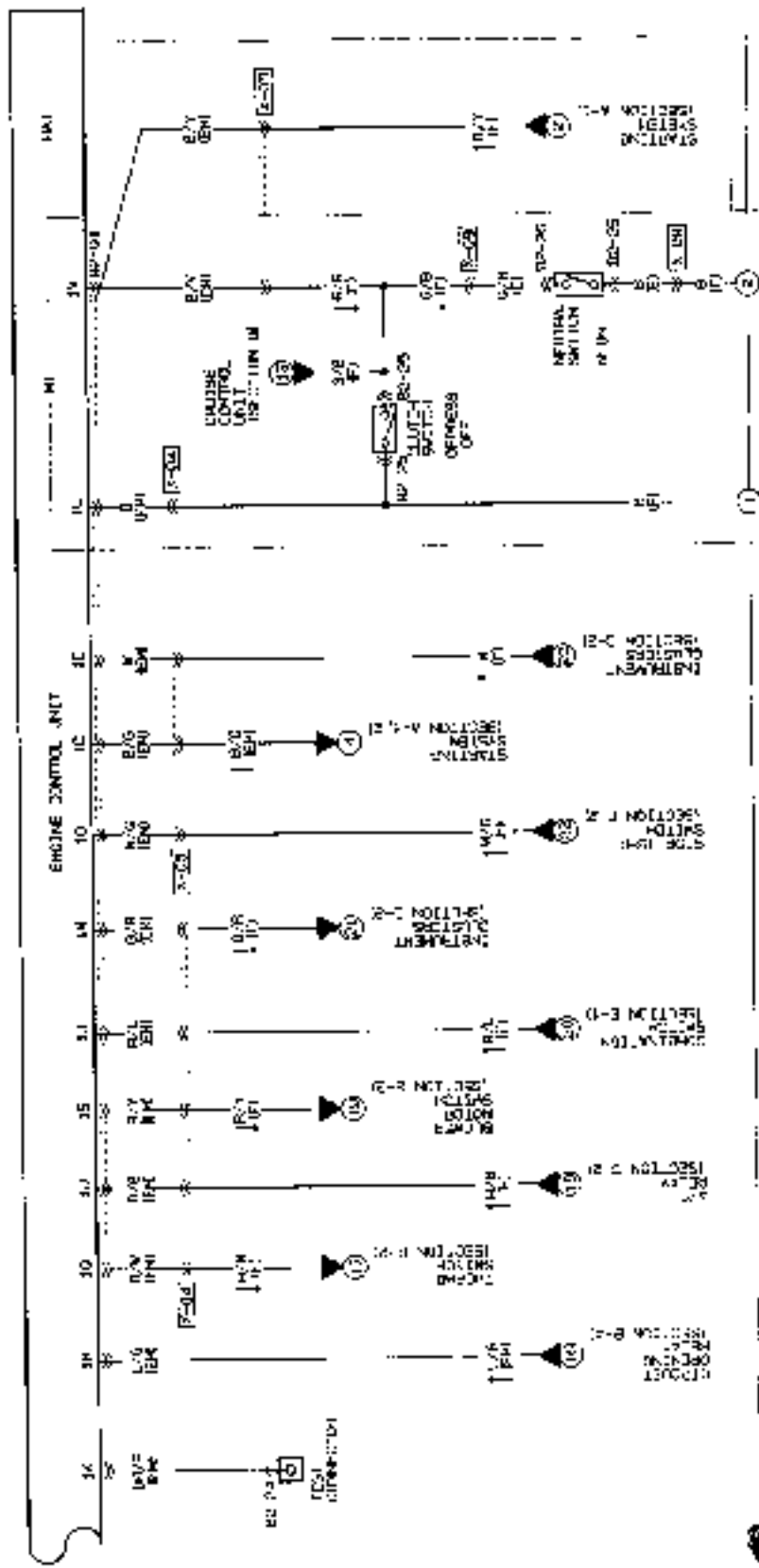


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2. 2L: EGI • ENGINE CONTROL SYSTEM

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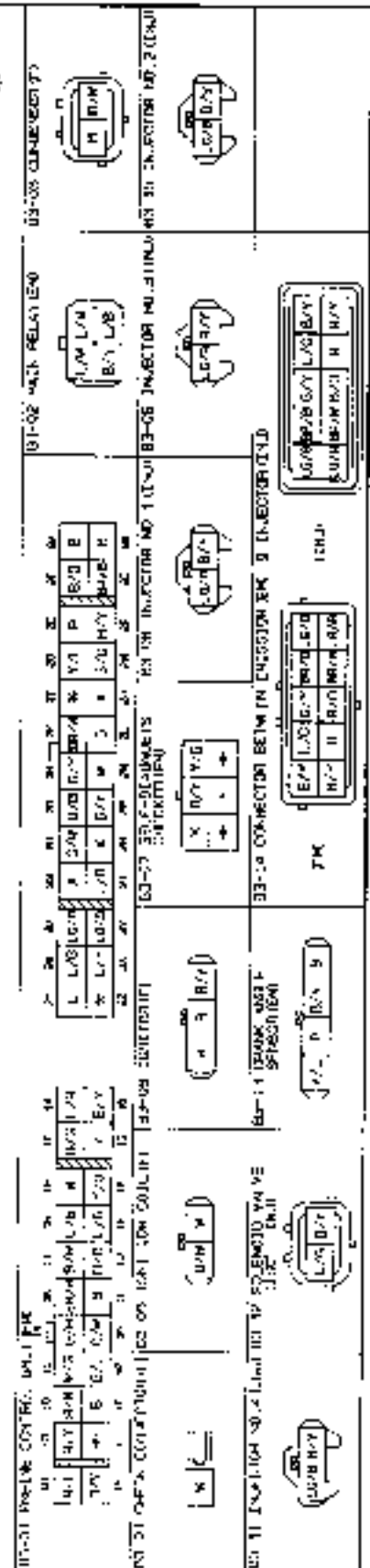
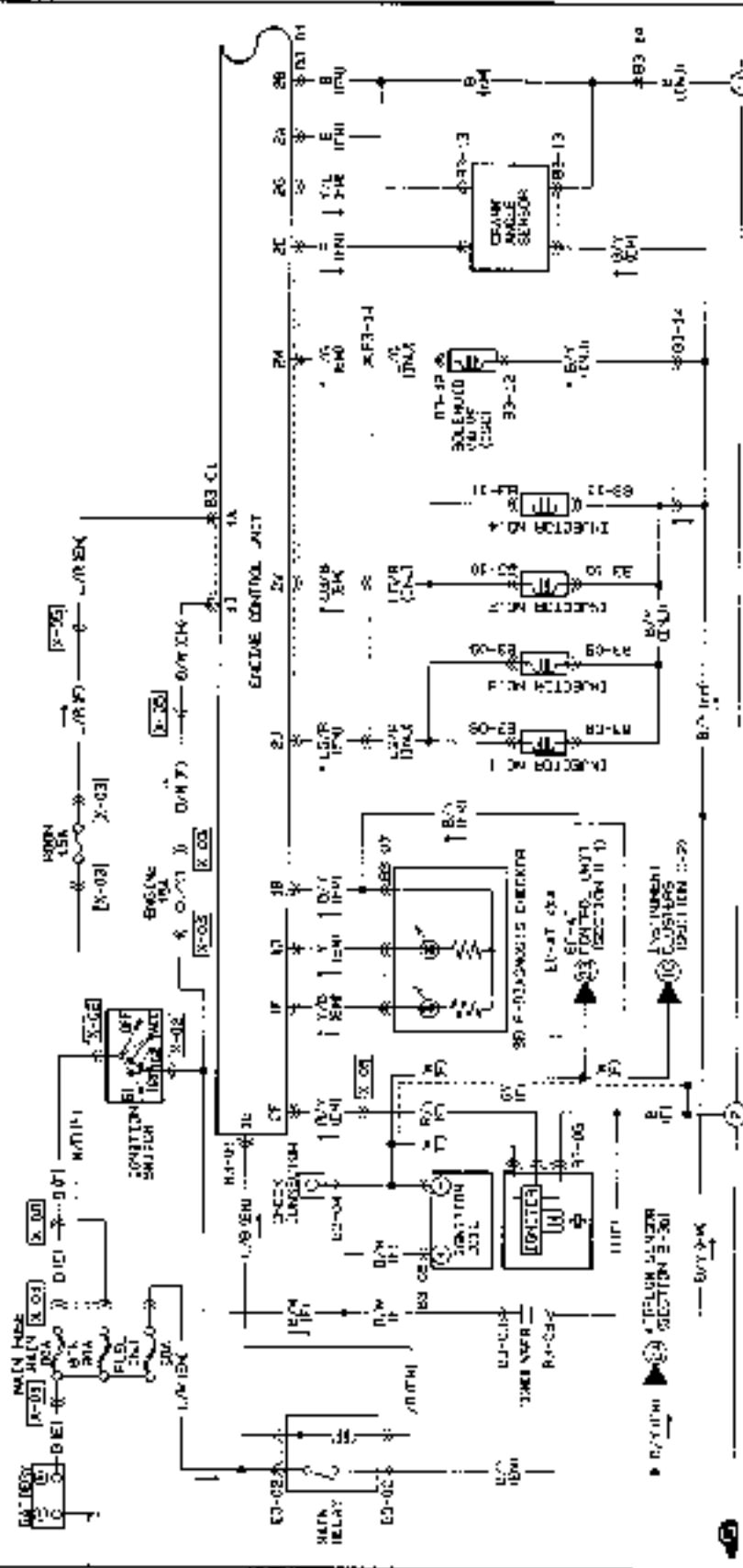
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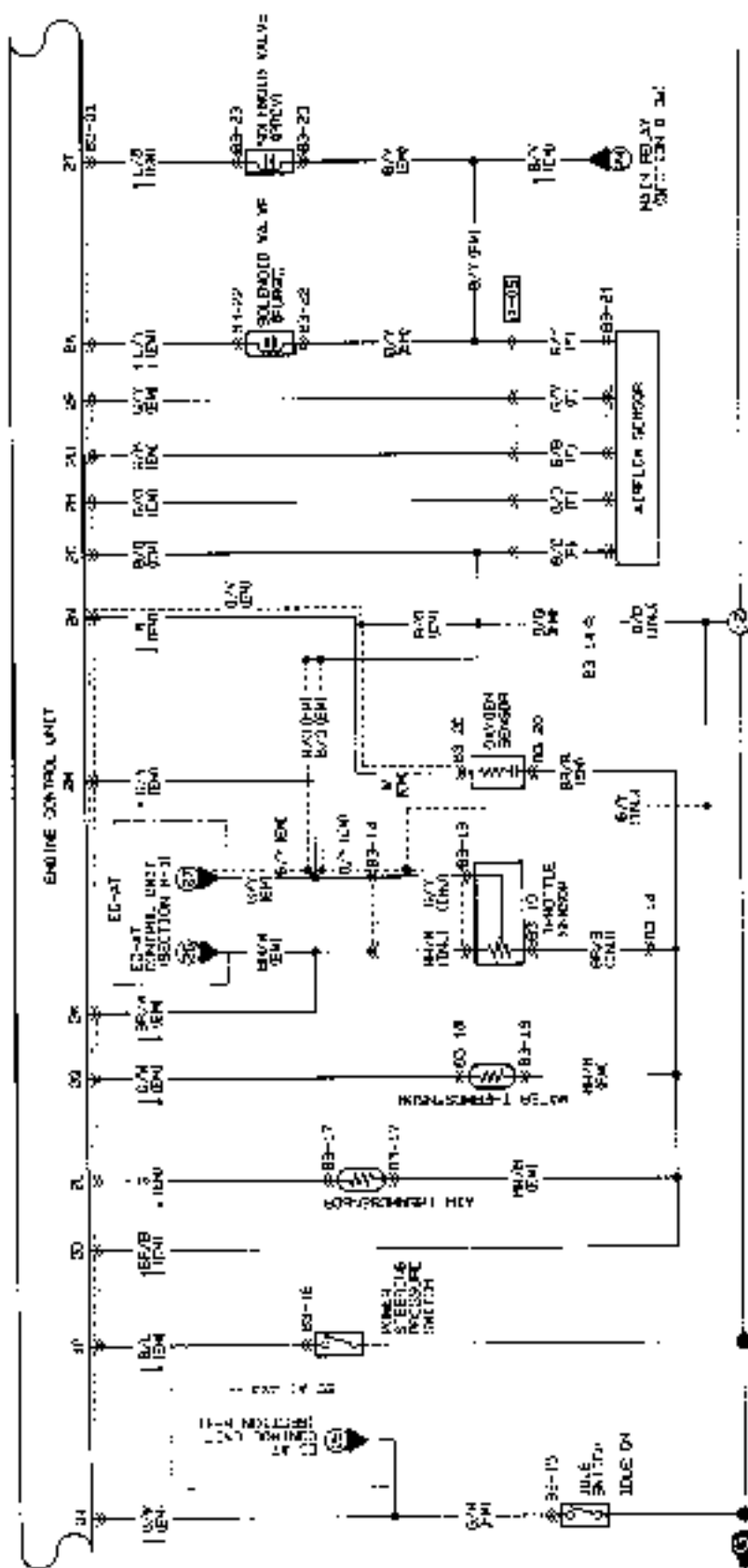
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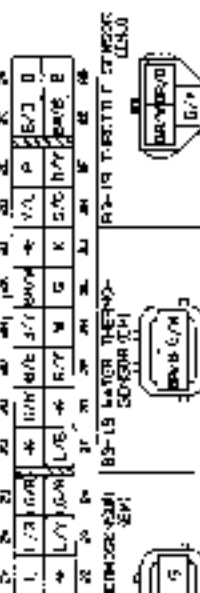
2.5L ■ ENGINE CONTROL SYSTEM



33-34 CONNECTION BETWEEN SECTION 34 & SECTION 33



33-34 CONNECTION BETWEEN SECTION 34 & SECTION 33



33-34 CONNECTION BETWEEN SECTION 34 & SECTION 33

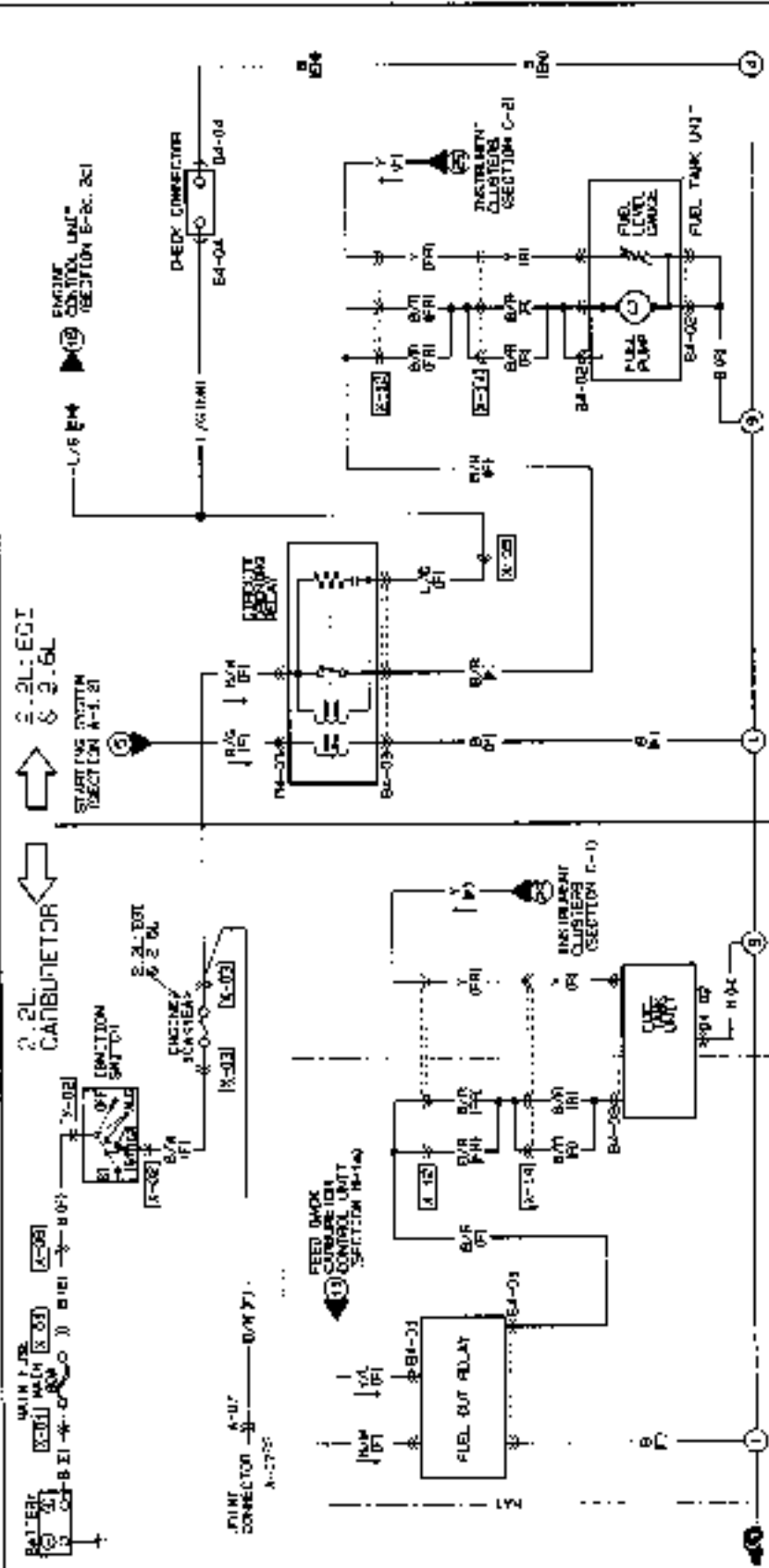


33-34 CONNECTION BETWEEN SECTION 34 & SECTION 33



—FUEL CONTR. SYSTEM

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SPECIFICATIONS

Item		Specification	
Idle speed ¹⁾	rpm	M/T, 730—770; A/T, 750—790 (P range)	
Ignition timing ¹⁾	BTDC	G6: 4—6°, F2: 5—7°	
Throttle body			
Type		Round draft (1 barrel)	
Throat diameter	mm (in)	No.1 No.2	G6: 55 (2.2) F2: 50 (2.0)
Fuel pump			
Type		Impeller (in-tank)	
Output pressure	kPa (kg/cm ² , psi)	44—589 (4.5—6.0, 64—85)	
Fuel filter			
Type	Low-pressure side High-pressure side	Nylon netting Paper element	
Pressure regulator			
Type		Diaphragm	
Regulating pressure	kPa (kg/cm ² , psi)	265—314 (2.7—3.2, 38—46)	
Injector			
Type		High-orifice	
Type of cone		Voltage	
Resistance	Ω	12—16 (at 20°C, 68°F)	
Volume		G6: 14—88 cc (4.51—5.43 cu in)/15 sec. F2: 50—62 cc (3.05—3.78 cu in)/15 sec.	
SAC valve (solenoid valve [idle speed control])			
Solenoid resistance	Ω	7.7—9.3 (at 23°C, 73°F)	
Solenoid valve (Purge control)			
Solenoid resistance	Ω	30—34 (at 20°C, 68°F)	
Water thermometer			
Resistance	<Ω	-20°C (-4°F)	14.5—17.8
		20°C (68°F)	2.2—2.7
		80°C (176°F)	0.28—0.35
Intake air thermometer			
Resistance	<Ω	25°C (77°F)	29.7—36.3
		85°C (185°F)	3.3—3.7
Circuit opening relay			
Resistance	Ω	ST4—E1	21—43
		B—Fc	106—276
		R—Fp	∞
Fuel tank			
Capacity	liters (US gal, imp gal)	55 (14.8, 12.3)	
Air cleaner			
Flament type		Dry	
Accelerator cable			
Free play	mm (in)	1—3 (0.039—0.118)	
Fuel			
Specification		Unleaded regular (RON 87 or higher)	

PS-J01-000*

¹⁾ 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 open, supplies bypass air into dynamic chamber	- Engine speed increased to shorten warm-up period - Thermopex type - Installed in BAC valve
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)	- Detects No.1 cylinder TDC; sends signal to engine control unit - Detects engine speed; sends signal to engine	For determining fuel injection timing
Dynamic chamber	Interconnects all cylinders	
Engine control unit	Detects following: - Engine speed - No.1 piston TDC - Intake air amount - Engine coolant temperature - Ignition ON signal - Throttle valve opening angle - Throttle valve fully closed - Air/fuel ratio (Oxygen concentration) - In-gear condition - Intake air temperature - Atmospheric pressure - A/C operation - P/S operation - F/L operation - Cranking signal - Test signal (idle speed, malfunction mode No.) - Braking signal Controls operation of the following: - Fuel injection system - Idle speed control - Pressure regulator control system - Purge control system - Anti-sag function - Monitor function - Burn-off system - Ignition timing control system - Fuel pump - A/C (cut off) - Main relay control	- Ne-Signal - G-signal - Airflow sensor - Water thermometer - Ignition switch - Throttle sensor - Idle switch - Oxygen sensor - Neutral and clutch switches - Intake air thermometer (on dynamic chamber) - Atmospheric pressure sensor (in ECU) - A/C switch - P/S pressure switch - Headlight and power switches - Ignition switch (START position) - Test connector - Stoplight switch - Injector - Solenoid valve (Idle speed control) - Solenoid valve (Pressure regulator control) - Solenoid valve (Purge control) - Self-Diagnosis Checker and MI - Monitor lamp (Self-Diagnosis Checker) - Airflow sensor - Igniter - Circuit opening relay - A/C relay - Main relay

Component		Function	Remarks
Fuel filter		Filters particles from fuel	
Fuel pump		Provides fuel to injectors	- Operates while engine running - Installed in fuel tank
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	- Controlled by signals from engine control unit - High-ohm injector - Two port injector nozzle (G6)
Intake air thermosensor		Detects intake air temperature, sends signal to engine control unit	Installed on dynamic chamber
Main relay		Supplies electric current to injectors and engine control unit	
MIL (Malfunction indicator lamp)		(For Federal and Canada) Lamp illuminates to indicate the maintenance schedule for the emission control system	Every 60,000 and 80,000 miles (Federal) or 90,000 and 130,000 km (Canada)
		(For California) Lamp illuminates when input device malfunctions	Test connector not grounded
		(For California) Lamp 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	- Controlled by duty signal from engine control unit - With integrated air valve - Controls idle-up
	Pressure regulator control	Controls vacuum to pressure regulator	Cuts vacuum passage when high
	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	

2000F2-002

TROUBLESHOOTING GUIDE

RELATIONSHIP CHART

INPUT DEVICES	TEST CONNECTOR	X	X	X	O	X	X	X	X	X	O
	IGNITION SWITCH (ON POSITION)	X	X	X	X	X	X	X	O	X	X
	IGNITION SWITCH (START POSITION)	O	O	X	O	X	O	O	X	X	O
	HEADLIGHT AND BLOWER SWITCH	X	X	X	O	X	X	X	X	X	X
	P/S PRESSURE SWITCH	X	X	X	O	X	X	X	X	X	X
	A/C SWITCH	X	X	X	O	X	X	O	X	X	X
	NEUTRAL AND CLUTCH SWITCH	O	X	X	O	O	X	O	X	X	X
	STOPLIGHT SWITCH	O	X	X	X	X	X	X	X	X	X
	IDLE SWITCH	O	X	X	O	O	O	X	X	X	O
	ATMOSPHERIC PRESSURE SENSOR	O	X	X	O P2 X G6	X	X	X	X	X	X
	THROTTLE SENSOR	O	X	X	X	X	O	O	X	X	X
	INTAKE AIR THERMOSENSOR	O	X	X	X	X	O	X	X	X	X
	AIRFLOW SENSOR	O	X	X	O	O	X	X	O	X	O
	OXYGEN SENSOR	O	X	X	X	O	X	X	X	X	X
	WATER THERMOSENSOR	O	X	X	O	O	O	X	O	X	O
	DISTRIBUTOR	(No-SIGNAL)	O	O	X	O	O	O	X	O	O
		(G-SIGNAL)	X	O	X	X	X	X	X	X	X
	OUTPUT DEVICES										
	INJECTOR	FUEL INJECTION AMOUNT									
		FUEL INJECTION TIMING									
	BAC VALVE	AIR VALVE									
		ISC VALVE									
	SOLENOID VALVE (PURGE CONTROL)										
	SOLENOID VALVE (PRESSURE REGULATOR CONTROL)										
	A/C RELAY (A/C CUT-OFF)										
	AIRFLOW SENSOR (BURN-OFF)										
	CIRCUIT OPENING RELAY (FUEL PUMP CONTROL)										
	IGNITER (IGNITION TIMING CONTROL)										

ENGINE CONTROL OPERATION CHART

Input Devices and Engine Conditions

ENGINE CONDITIONS	APPROXIMATE TIME BASED ON 10-15°C or 50-60°F (MISFIRE)	DISTRIBUTOR		WATER THERMISTOR	SENSORS				ATMOSPHERIC PRESSURE SENSOR (ON ECU)
		(G-SIGNAL)	(N-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 cool low to high voltage (0-0.9V)	Low volume airflow low to high voltage (2.1-3.6V)		Closed throttle low voltage (0.3-0.7V)	
COLD DRIVEAWAY —PART THROTTLE • COLD AIR • COLD COOLANT	Two minutes								
WARM DRIVEAWAY —PART THROTTLE • WARM AIR • WARM COOLANT	Three minutes			Warm medium voltage (Approx 0.7V and dropping)	Sensor warm high voltage (0.9V)	Moderate volume airflow low to medium voltage (3.0V)		Part throttle medium voltage (1-3.5V)	Sends voltage signal to ECU that varies with altitude (approx. 4V at sea level)
HOT CRUISE • WARM AIR • WARM COOLANT		Sends No. 1 cylinder TDC signal to ECU	Sends engine speed signal to ECU		Sensor hot switching from high voltage (0.9V) to low voltage (0.1V)	Moderate to strong volume of airflow (3.0V)	Cool to warm medium voltage (1.4-2.6V)		
HOT ACCELERATION —80% THROTTLE									
HOT ACCELERATION —WIDE OPEN THROTTLE	More than four minutes			Hot low voltage (approx. 0.4V)	High voltage (0.9V)	Strong volume of airflow (4.0V)		Wide open throttle high voltage (approx. 4.0V)	
DECELERATION —CLOSED THROTTLE					Low voltage (0V)				
HOT COLD IDLE —EXTENDED					Switching from high to low voltage (0.9V to 0.1V)	Low volume of airflow (2.4V)		Closed 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	HEADLIGHT SWITCH	BLOWER SWITCH	IGNITION SWITCH		TEST CONNECTOR
							START POSITION	ON POSITION	
Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Signal has no effect on ECU	Sends signal to ECU (approx. 12V)	Signal has no effect on ECU	Signal has no effect on ECU
Low voltage signal to ECU (below 1.5V)	Brake pedal depressed, sends signal to ECU (approx. 12V)	If neutral low voltage signal to ECU (approx. 0V)							
High voltage signal to ECU (battery voltage)	No signal sent to ECU (below 1.5V)	Driving in any gear, high voltage signal to ECU (battery voltage)	A/C switch ON, sends signal to ECU (battery voltage)	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)	Sends signal to ECU (battery voltage)	Connector not grounded, high voltage signal to ECU (battery voltage)
			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 (below 1.5V)	Brake pedal depressed, sends signal to ECU (approx. 12V)	If neutral, low voltage signal to ECU (approx. 0V)							Low voltage signal to ECU when connector grounded (below 1.5V)
OFF	ON	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF

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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 (exhaust temperature 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	Ten minutes								
WARM DRIVEAWAY —PART THROTTLE • WARM AIR • WARM COOLANT	Three minutes					Operates (Only valves large gas amount change)	OFF (Vacuum to pressure regulator)	OFF (A/C ON)	
HOT CRUISE • WARM AIR • WARM COOLANT		Rich and lean	2-group		Small amount of bypass air				OFF
HOT ACCELERATION —60% THROTTLE									
HOT ACCELERATION —WIDE OPEN THROTTLE		Rich						ON (A/C CUT)	
DECELERATION —CLOSED THROTTLE	More than four minutes			Closed					
HOT CURB IDLE EXTENDED						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 need			OFF	OFF	OFF	ON (Burn-off)

CIRCUIT OPENING RELAY	MAIN RELAY	IGNITER
OFF		
ON (Engine speed above 50 rpm)		
	ON	Operation
OFF	OFF	OFF

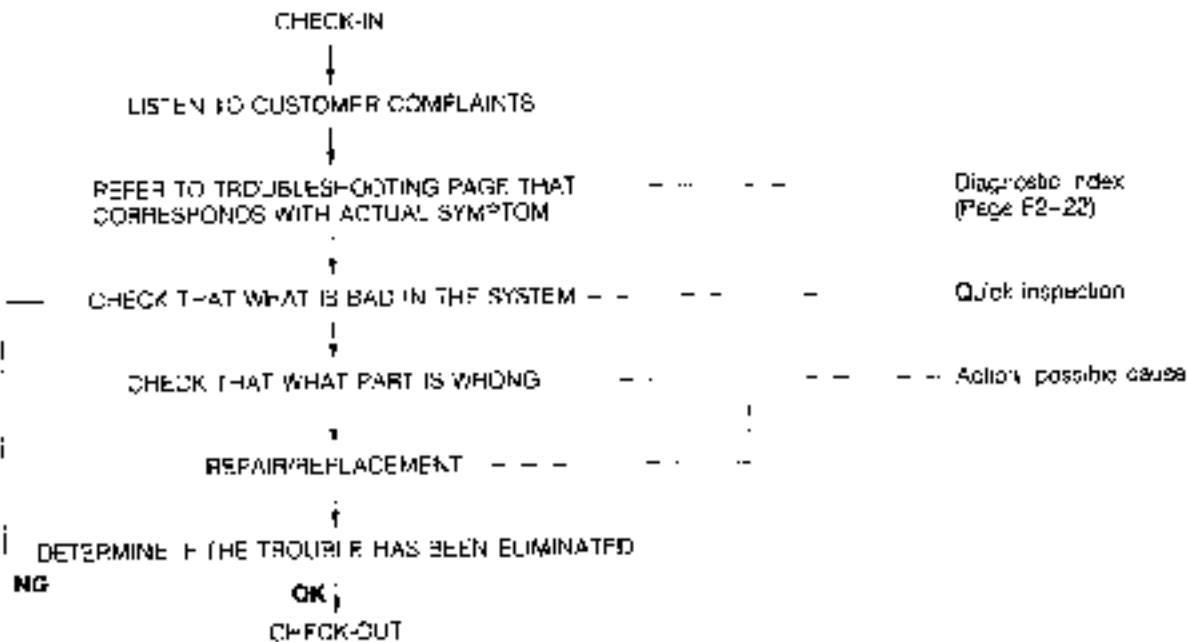
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HOW TO USE THIS SECTION

Introduction

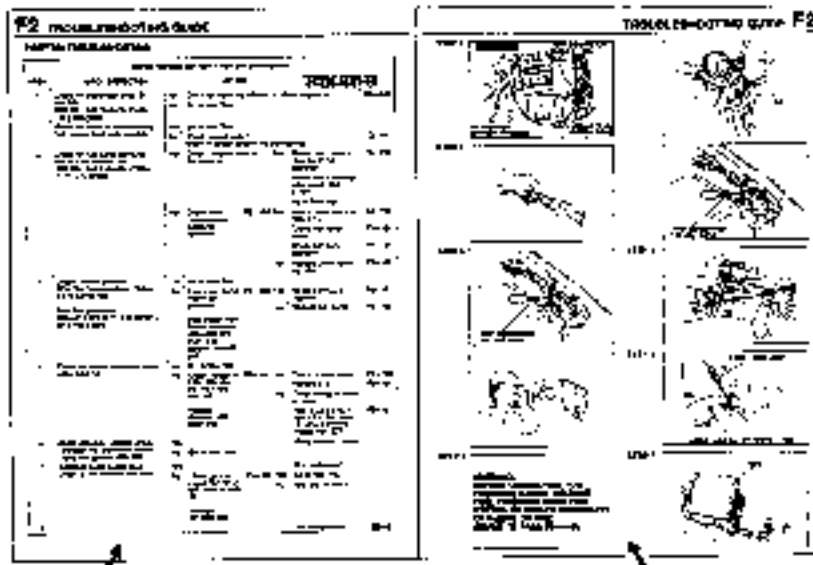
Most of the fuel and emission control system is electronically controlled. Thus, it is sometimes difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a drivability complaint.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

Work flow



SMXKF2-011

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 described with SST (IGN ON, Test connection between terminals grounded)	Yes: Check for failure by referring to check sequence No: Go to Step 2	F2-127
2	Check for spark by observing spark plug lead wire in running	Yes: Go to Step 3 No: Check ignition system (Refer to ground system troubleshooting)	Check
3	Check oil and pump operation (Refer to fuel system)	Yes: Check if the pump is No: Check if the pump is Yes: Check if the pump is No: Check if the pump is	F2-159 F2-159 F2-159 F2-159

STEP:

This shows the order of troubleshooting. Proceed with troubleshooting by steps.

QUICK INSPECTION:

This describes an easy inspection necessary to determine the malfunction of parts quickly.

ACTION:

This recommends the appropriate action to take as a result (Yes or No) of the QUICK INSPECTION. How to perform the action is shown on the reference page.

POSSIBLE CAUSE AND DETAILED INSPECTION:

This shows the possible point of malfunction. The detailed inspection is shown on the reference page.

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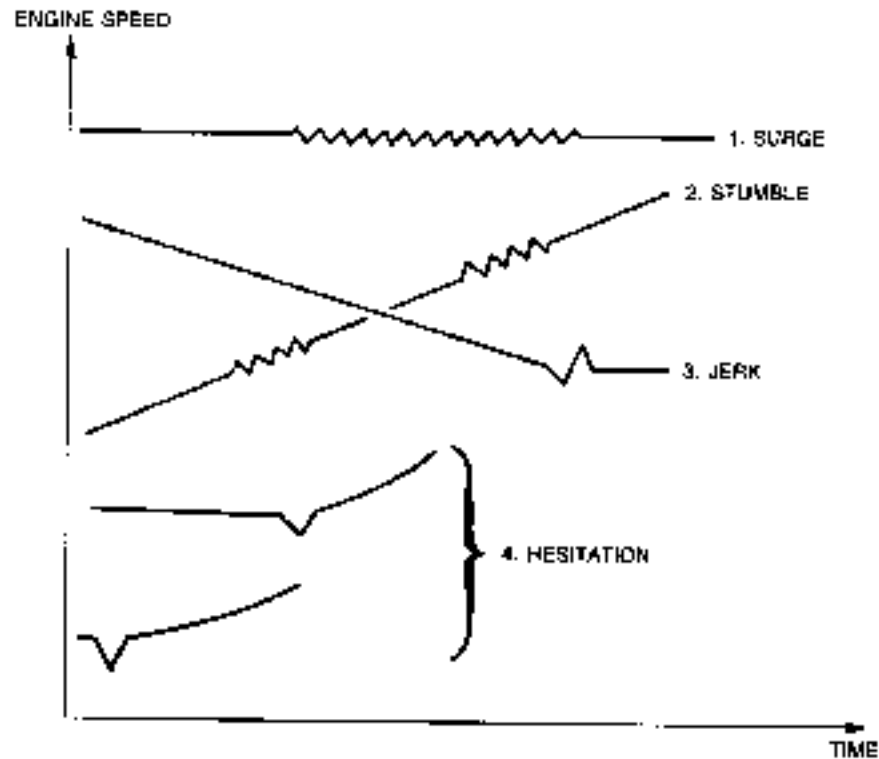
DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEMS	REMARKS	PAGE
1	No cranks	Refer to Section G	
2	Cranks normally but won't start	No combustion	F2-28
3	Cranks normally but hard to start (Always)		F2-30
4	Cranks normally but hard to start (Only when engine is cold)		F2-34
5	Cranks normally but hard to start (Only when engine is warm)		F2-36
6	Cranks normally but hard to start (Only after heat soak)		F2-38
7	Cranks normally but won't start (Intermittent)	No combustion	F2-40
8	Rough idle (Always)		F2-42
9	Rough idle (Only when engine is cold)		F2-46
10	Rough idle (Only when engine is warm)		F2-48
11	Rough idle (Only after heat soak)		F2-52
12	Rough idle just after starting		F2-56
13	Low idle speed (When A/C, P/S, 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		F2-88
28	Lack of power		F2-92
29	Bucking at high speed		F2-96
30	Bucking on deceleration		F2-98
31	Poor fuel economy		F2-100
32	High oil consumption/White exhaust smoke		F2-102
33	Aftersmoke on deceleration		F2-104
34	Rotten egg smell		F2-108
35	Gasoline fumes		F2-108
36	MIL always ON	(Federal and Canada) Odometer does not indicate emission system parts replacement time, but MIL is ON (California) Engine operation is OK but MIL is ON	F2-110
37	MIL never ON	(Federal and Canada) Emission system parts replacement time has come, but MIL never ON (California) Self-diagnosis checker indicates malfunction code No., but MIL never ON	F2-112
SR	A/C does not work		F2-114

BLC-7-095

Description of Drivability

- (1) SURGE: Continuous soft jerking during cruise.
- (2) STUMBLE: Mild jerking during acceleration.
- (3) JERK: Shock occurring when the accelerator pedal is depressed just after deceleration.
- (4) HESITATION: Flat spot occurring just after the accelerator pedal is depressed.



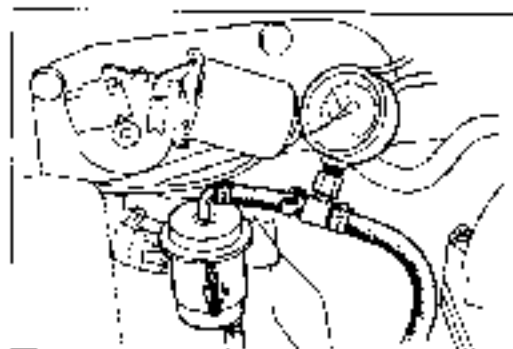
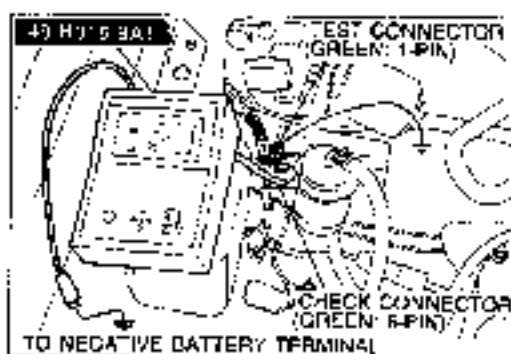
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SYMPTOM TROUBLESHOOTING

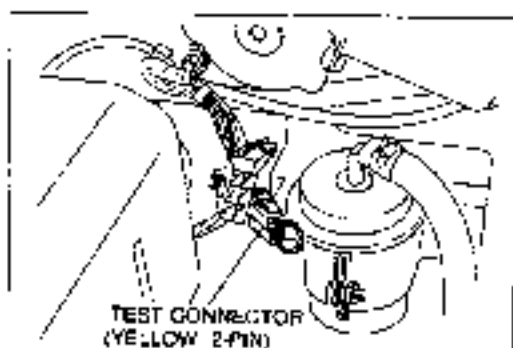
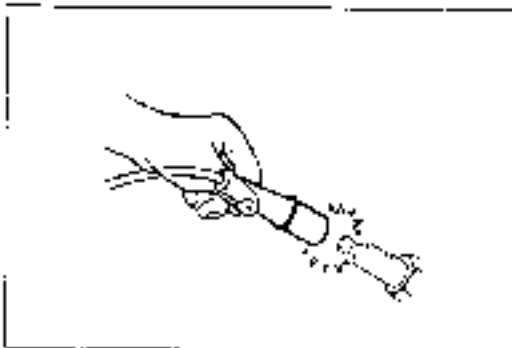
Crankes normally but won't start (No combustion)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
	Check for malfunction code (D2) with SST (IGN ON. Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to check sequence		F2-123		
		No	Go to Next Step				
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	Check circuit opening relay circuit (IGN START)		
		No	Check circuit opening relay switching operation	F2-153	Yes	Check circuit opening relay circuit	F2-153
				No	Replace circuit opening relay	F2-153	
4	Check fuel line pressure (IGN ON. Test connector (Yellow 2-pin) connected) Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm ² , 38—45 psi)	Yes	Go to Next Step				
		No	Check fuel pump maximum pressure Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm ² , 64—85 psi)	F2-150	Yes	Replace pressure regulator	F2-155
				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 Voltage: Approx. 12V (IGN ON)	F2-175	Yes	Check throttle sensor	F2-181
				No	Replace FCL	F2-175	
				No	Check wiring for short or open	F2-175	
No	Repair ground circuit from ECU (2A) terminal (Check terminal voltage with SST)						
6	Substitute a well known ECU. Check if the condition improves	Yes	ECU malfunction				
		No	Check ground circuit from ECU (2B) terminal with SST Voltage: 0V (IGN ON)	F2-175	Yes	Go to Next Step	Section B2
				No	Repair ground circuit		
Low compression						Section B2	

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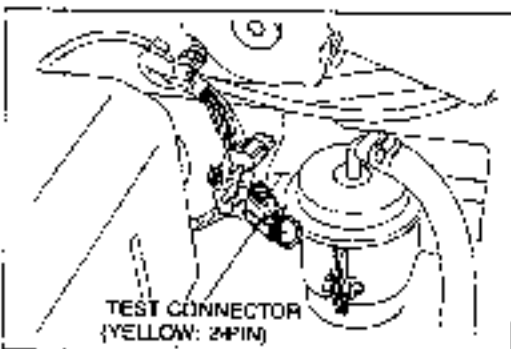
STEP 1



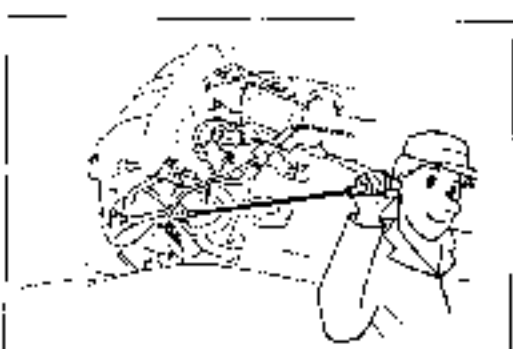
STEP 2



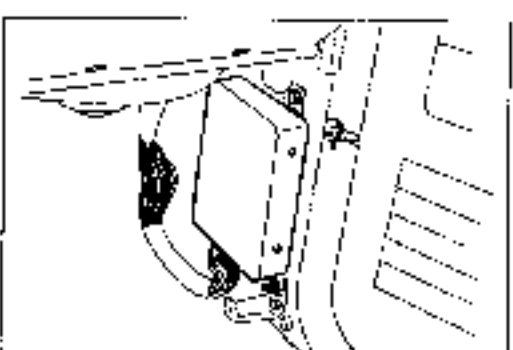
STEP 3



STEP 5



STEP 6

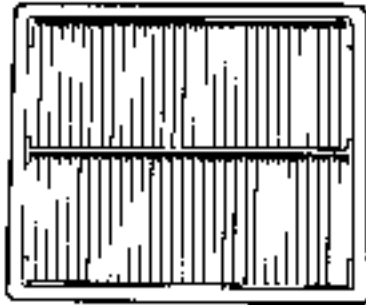


STEP 4

WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

Crank normally but hard to start (Always)							
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check if vacuum hoses and the air hoses are connected correctly	Yes	Go to Next Step				
		No	Connect correctly				
2	Check air cleaner element for clogging	Yes	Go to Next Step				
		No	Clean air cleaner element				
3	Check ignition timing at idle after warm up Ignition timing: BTOC 4—6° (G6) 5—7° (F2) [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step				
		No	Adjust ignition timing				
4	Disconnect high tension lead of each cylinder at idle Check if engine condition changes	Yes	Go to Next Step				
		No	Check ignition system (Refer to ignition system troubleshooting (Misfire))	Section G	Yes	Replace injector (If Step 3 OK)	F2-156
					No	Check spark plug	Section G
						Check high-tension lead	Section G
5	Check for injector operating sound at idle	Yes	Go to Next Step				
		No	Check resistance at injector harness connector (EMLN-01) Terminals Resistance: B/Y—(0.6Ω) B/Y—(0.6Ω)	F2-157	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) Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm ² , 38—46 psi)	Yes	Go to Next Step				
		No	Check if fuel filter has been replaced according to maintenance schedule Check fuel pump maximum pressure Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm ² , 64—85 psi)	F2-150	Yes	Check fuel line for clogging	
					No	Replace fuel filter	F2-149
					Yes	Replace pressure regulator	F2-155
				No	Replace fuel pump	F2-152	

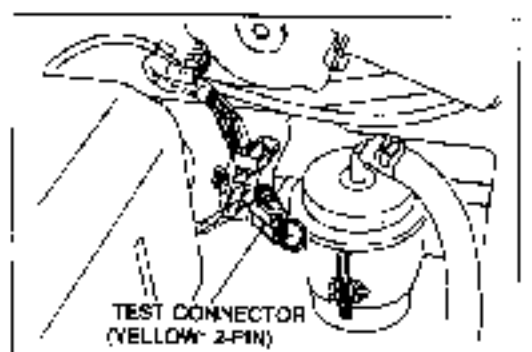
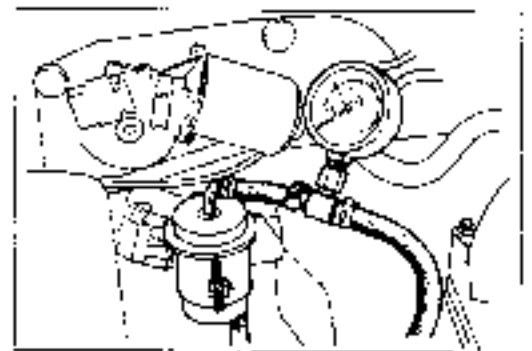
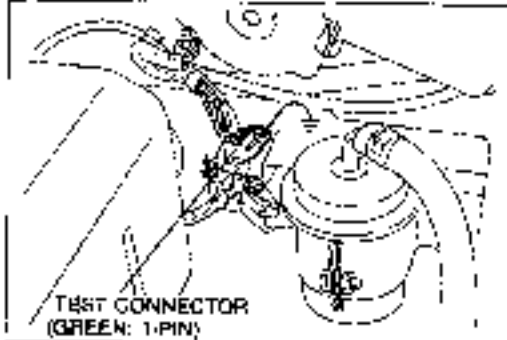
STEP 2



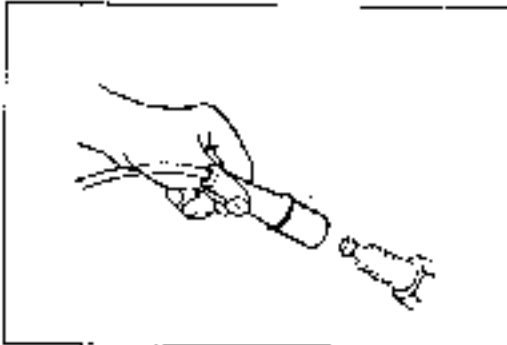
STEP 6

WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)

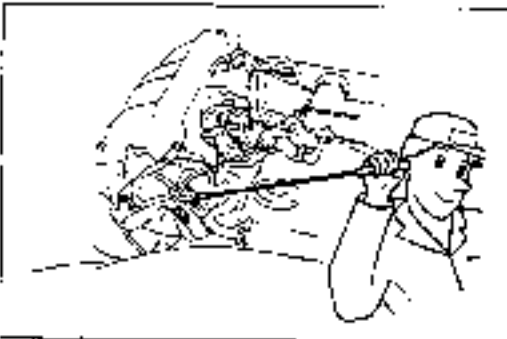
STEP 3



STEP 4



STEP 5



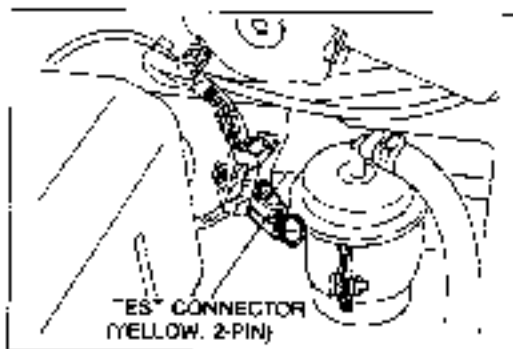
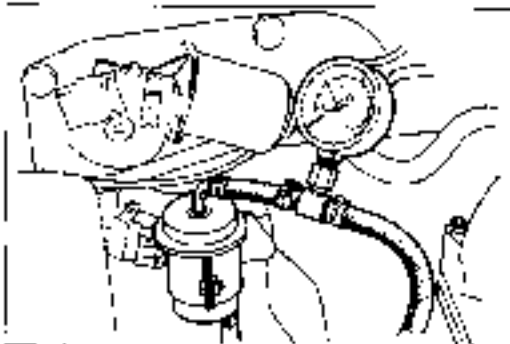
Crankes normally but hard to start (Always) (Cont'd)

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 ² , 21 psi)	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	F2-150	No	Replace fuel pump	F2-152
			Check pressure regulator pres sure drop	F2-154	Yes	Check injector fuel leakage	F2-157
					No	Replace pressure regulator	F2-155
B						Check compression	Section B2

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STEP 7

WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)

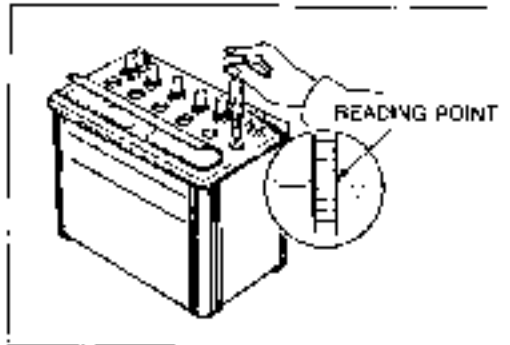


Crank normally but hard to start (Only when engine is cold)

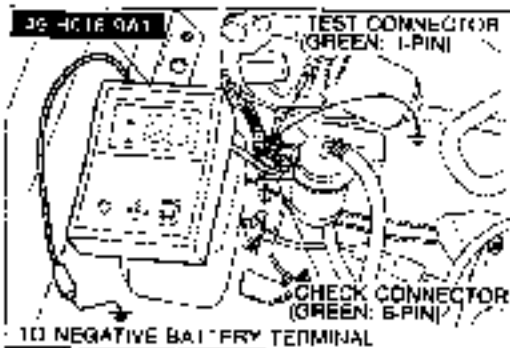
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
	Check specific gravity of battery using a hydrometer Specific gravity: Above 1.200	Yes	Go to Next Step		
		No	Recharge battery	Section G	
2	Check for malfunction code (09) (26) with SST [IGN ON, Test connector (Green: 1 pin) grounded]	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 condition changes	Yes	Go to Next Step		
			Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	
			Check spark plug	Section G	
			Check high-tension lead	Section G	
4	Check fuel line pressure (IGN ON, Test connector (Yellow: 2 pin) connected) Fuel line pressure: 285—314 kPa (2.7—3.2 kg/cm², 38—46 psi)	No	Go to Next Step		
			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
			Check fuel pump maximum pressure	F2-150	Yes
				No	Replace pressure regulator
5	Disconnect ISC valve connector when engine is cold Check if idle speed decreases during warm up	Yes	Go to Next Step		
				Check if BAC valve (air valve) opens when cold	
				F2-142	
6	Check voltage at ECU (10) terminal with SST Voltage: Approx. 10V (while cranking)	Yes	Go to Next Step		
			Check starter interlock switch	Section G	Yes
				No	Check related wiring
				No	Replace switch
7	Check voltage at ECU (20) terminal with SST Voltage: Approx. 2.5V (IGN ON, Engine coolant temperature 20°C (68°F))	Yes	Go to Next Step		
				Check water thermosensor	
				F2-179	
8				Check compression	Section B2

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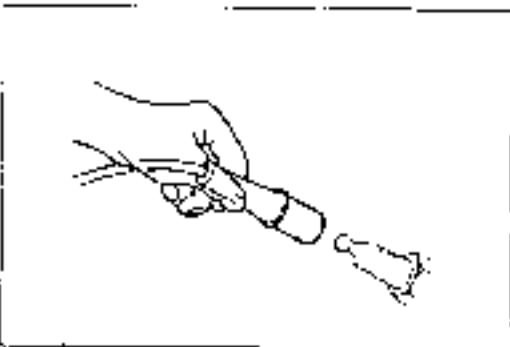
STEP 1



STEP 2

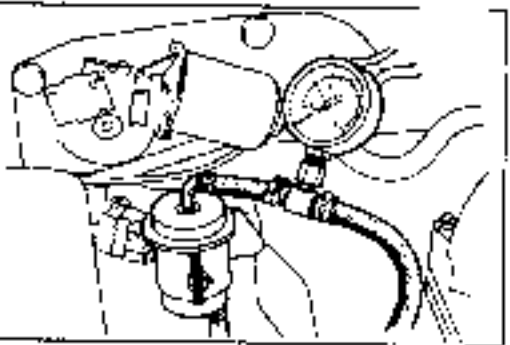


STEP 3

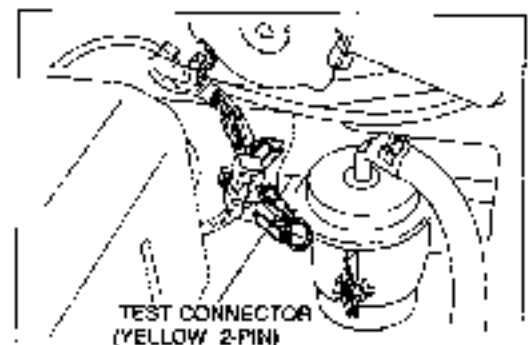


STEP 4

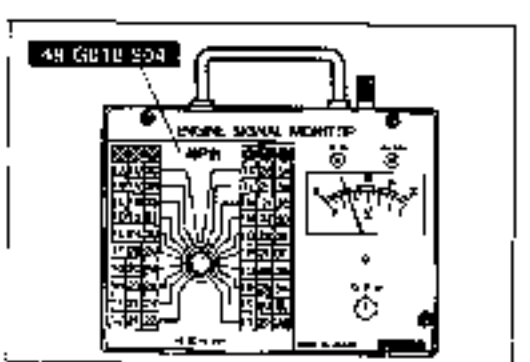
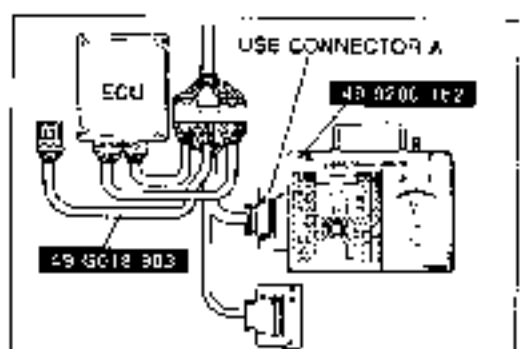
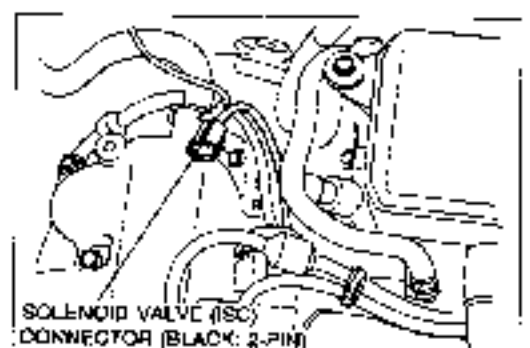
WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



STEP 5



STEP 6



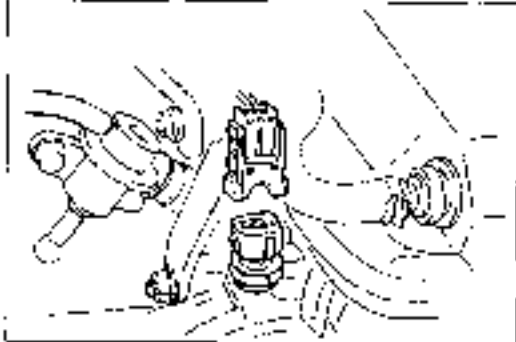
Crankes normally but hard to start (Only when engine is warm)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SBT [IGN ON. Test connector (Green 1 pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next Step				
2	Disconnect water temperature sensor connector Check if condition improves	Yes	Check water temperature sensor 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	Repair condition of water temperature sensor connector		
		No	Go to Next Step				
3	Operate fuel pump [IGN ON. Test connector (Yellow, 2-pin) grounded] Turn ignition switch OFF and observe fuel pressure for 5 minutes Fuel pressure: More than 147 kPa (1.5 kg/cm ² , 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
4					ECU malfunction		

10-1063 008

STEP 1

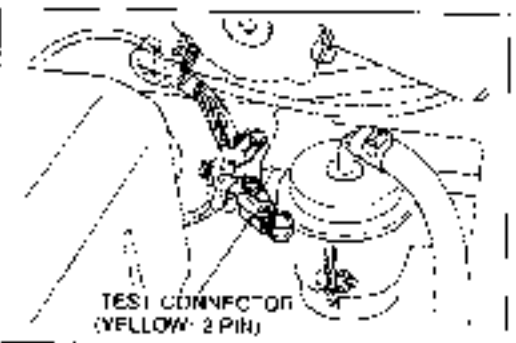
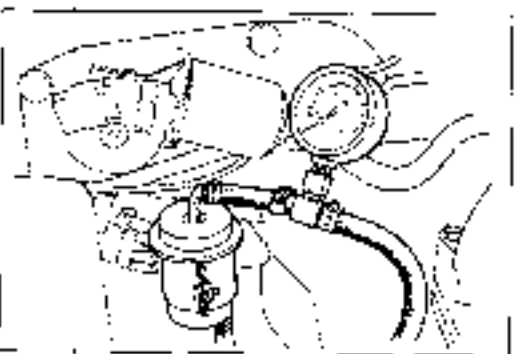


STEP 2



STEP 3

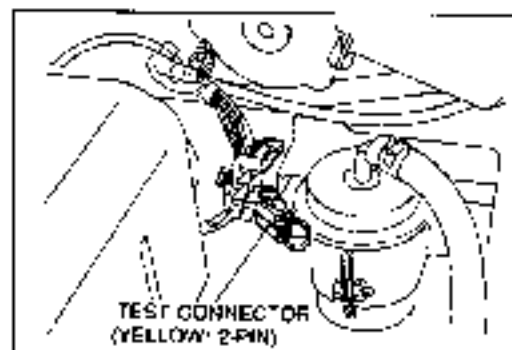
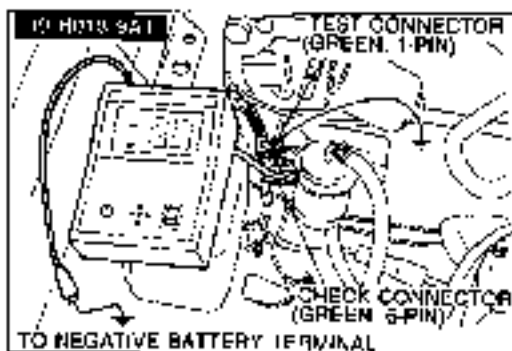
WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



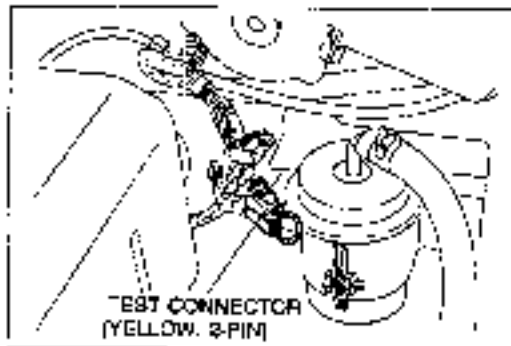
Cranked normally but hard to start (Only after heat soak)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [IGN ON, Test connector (Green, 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122		
		No	Go to Next 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 temperature sensor	F2-179		
				Check intake air thermometer	F2-180		
				Check solenoid valve (P70)	F2-160		
				ECU malfunction (Check (2T) terminal voltage)	F2-173		
		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 ² , 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

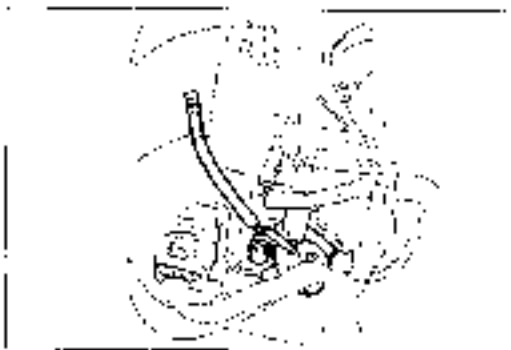
STEP 1



STEP 2

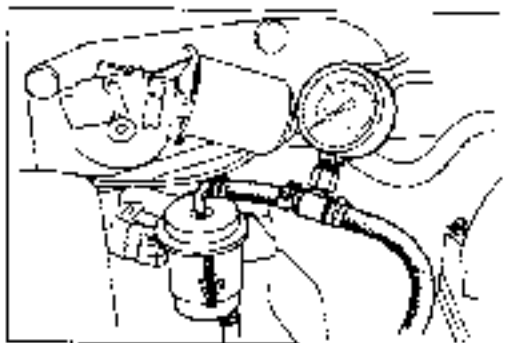


STEP 3



STEP 4

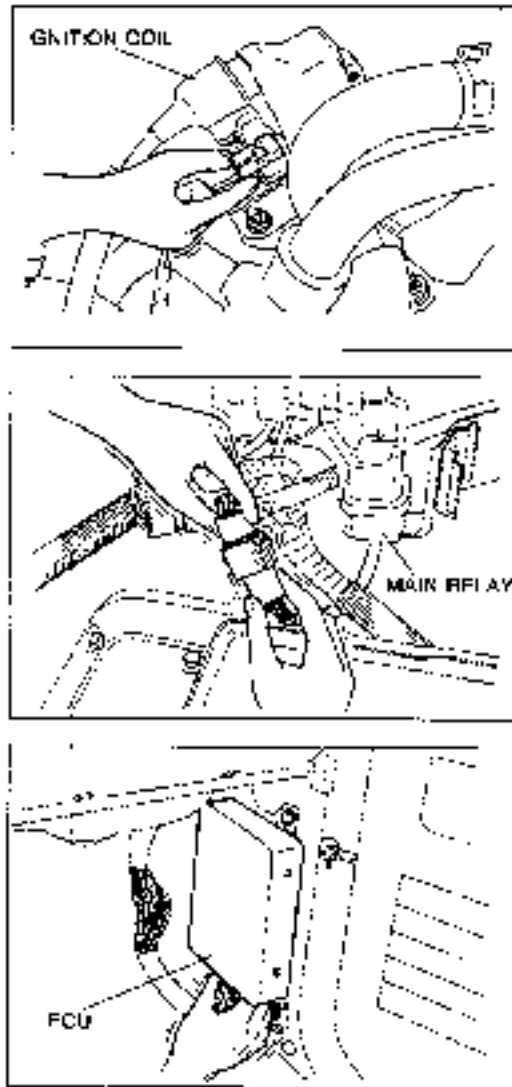
WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)



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 at the connector. Repair or replace the wiring.
		No	Go to troubleshooting "Crankes normally but hard to start (Always)". F2-30

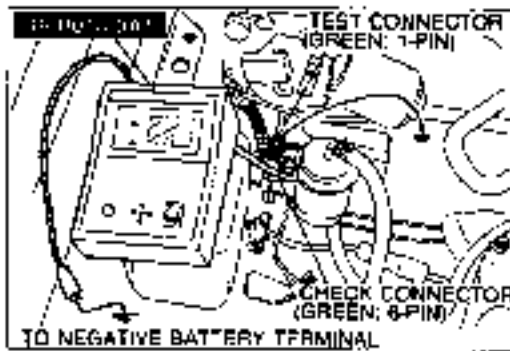
13UDF2 096

STEP 1

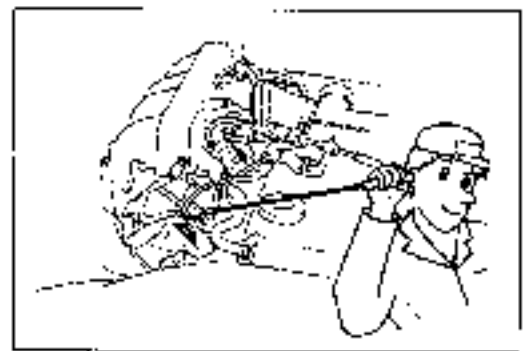


Rough Idle (Always)					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IGN ON. Test connector (Green: 1 pin) grounded]	Yes	Check for cause by referring to the check sequence		F2-122
		No	"00" flashing F2-175	Yes Replace ECU	F2-175
			Check voltage at ECU (20) terminal with SST Voltage: 0V (IG ON) "00" Go to Next Step	No Fix or ground circuit	
2	Check ignition at idle after warm up Ignition timing: 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 OK)	F2-158
				No Check spark plug	Section G
				Check high-tension wire	Section G
				Check distributor cap	Section G
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 (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-UT) Terminals Resistance (BY) (UGB) 5—8Ω (BY) (UGM)	Yes Check wiring short or open	
				No Check injector resistance Check wiring short or open	F2-157
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 ² , 38—45 psi)	Yes	Go to Next Step		
		No	Check for fuel leakage		
			Substitute a good fuel filter and retest	Yes Replace fuel filter	F2-148
			Check fuel pump maximum pressure Fuel pump maximum pressure: 441—586 kPa (4.5—6.0 kg/cm ² , 64—85 psi)	Yes Replace pressure regulator	F2-155
				No Replace fuel pump	F2-152
7	Check intake manifold vacuum at idle Vacuum: 500—540 mmHg (19.7—21.3 inHg)	Yes	Go to Next Step		
		No	Check for air leaks F2-197	Yes Intake air system components damaged: Vacuum and intake air hoses loose or damaged Bolt or nut loose Gaskets damaged	F2-197
				No Check throttle valve closing condition	F2-138

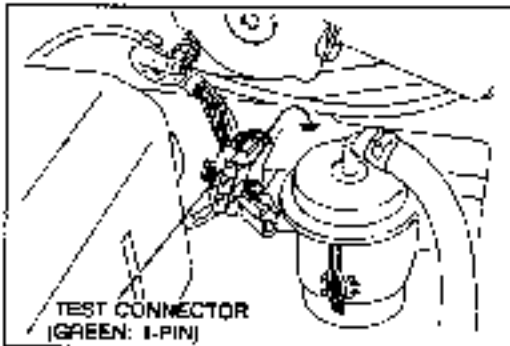
STEP 1



STEP 5

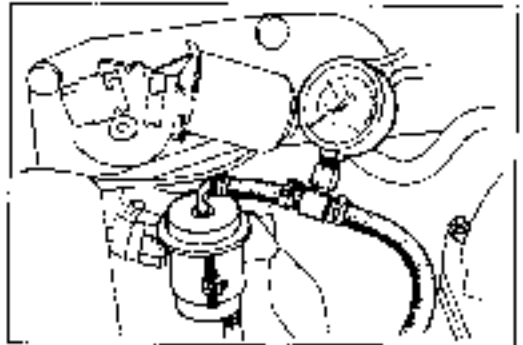
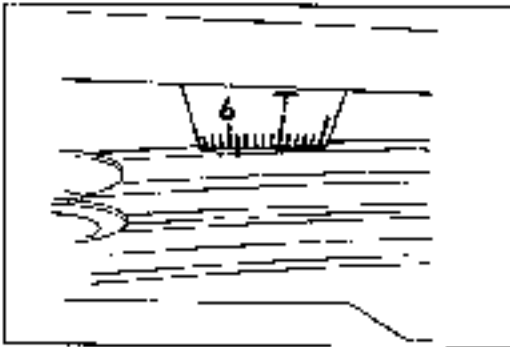


STEP 2

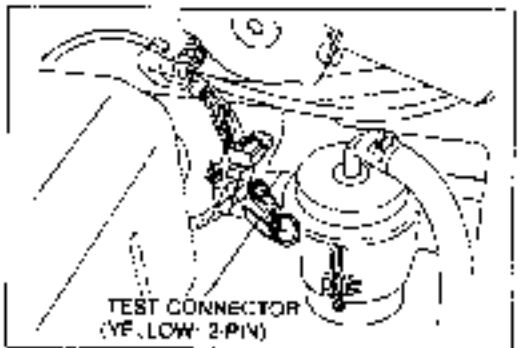
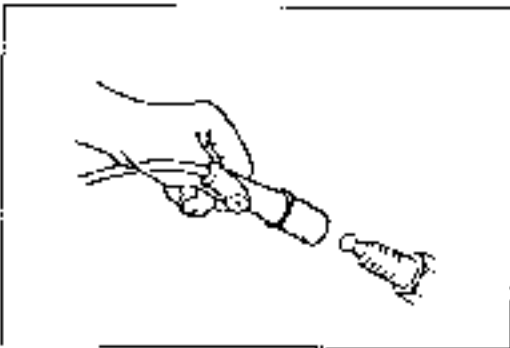


STEP 6

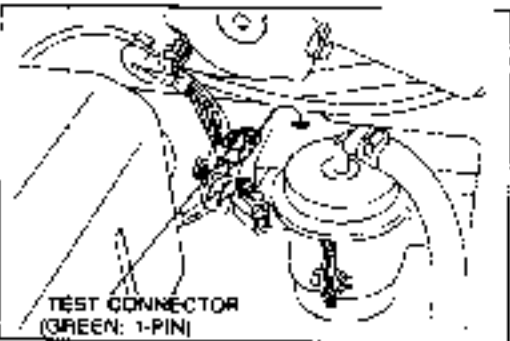
WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



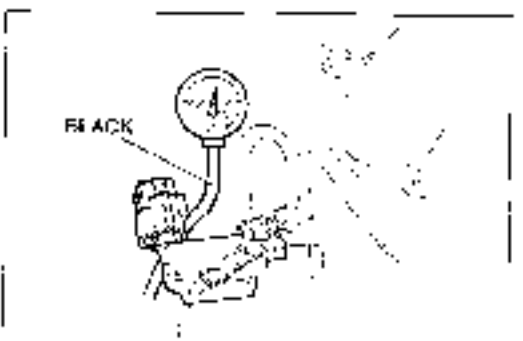
STEP 3



STEP 4



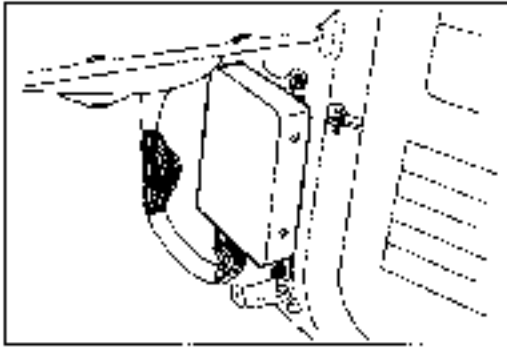
STEP 7



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	Yes	Go to Next Step
				No	Poor ground circuit
9					Check compression Section 82

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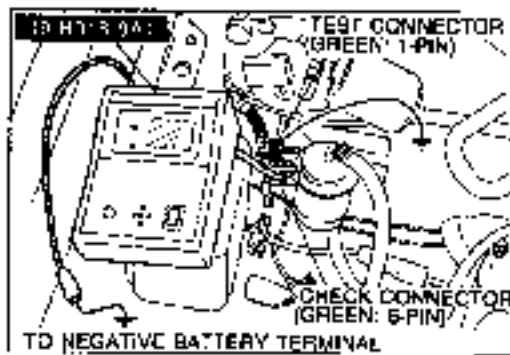
STEP 8



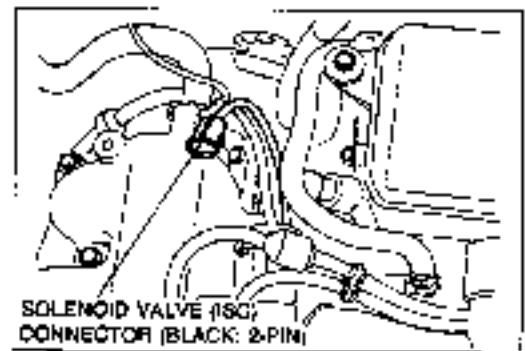
Rough Idle (Only when engine is cold)									
STEP	QUICK INSPECTION		ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION			
1	Check for malfunction code with SST [IGN ON. Test connector (Green 1-pin) grounded]	Yes	Check for cause by referring to check sequence			F2-122			
		No	Go to Next Step						
2	Check ignition 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 (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 (Mutlue)]	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 (E/M INJ 01):	F2-157	Yes	Check wiring short or open			F2-157
						No	Injector malfunction (Check resistance)		
							Wiring short or open		
			Terminals	Resistance					
			[B/Y]—[L/GF]	6—8Ω					
			[B/Y]—[L/GF]						
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

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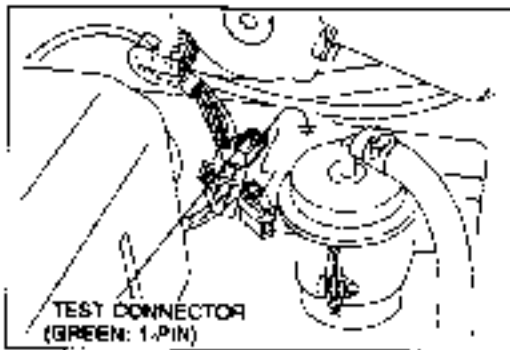
STEP 1



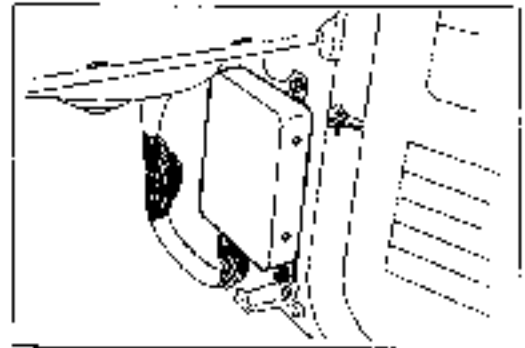
STEP 5



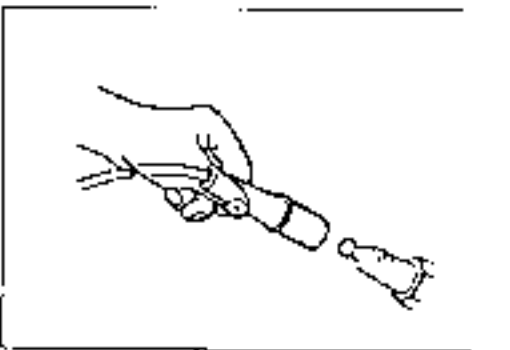
STEP 2



STEP 7



STEP 3



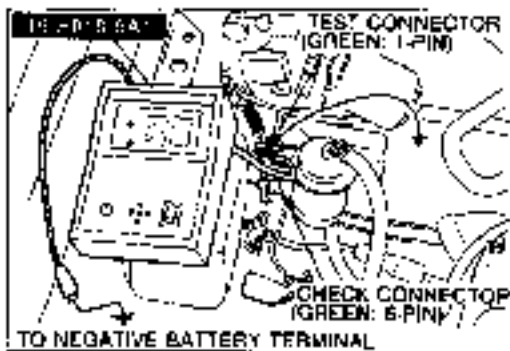
STEP 4



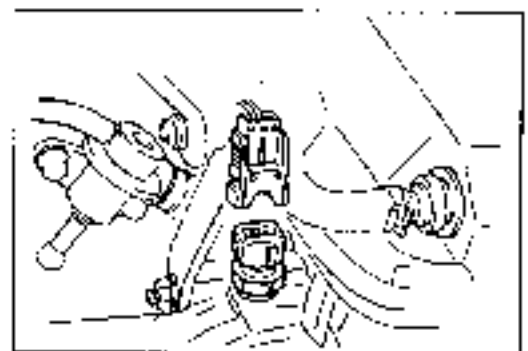
Rough idle (Only when engine is warm)

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 OK, 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 SC valve	F2-142		
5	Disconnect water thermosensor connector Check if condition improves	Yes	Check water thermosensor connector condition as follows: 1. Shake connector and check if condition changes 2. Check condition of terminal (burned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor	F2-179	
				No	Poor contact of water thermosensor connector		
6	Disconnect high-tension lead of each cylinder at idle Check if engine condition changes	No	Go to Next Step				
		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							

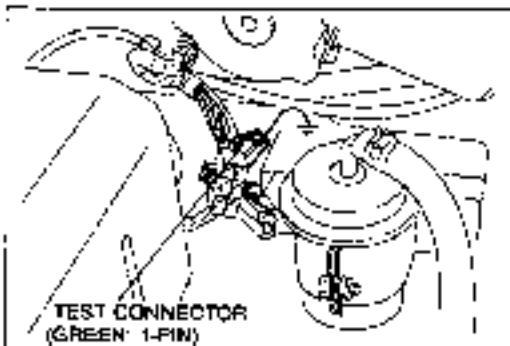
STEP 1



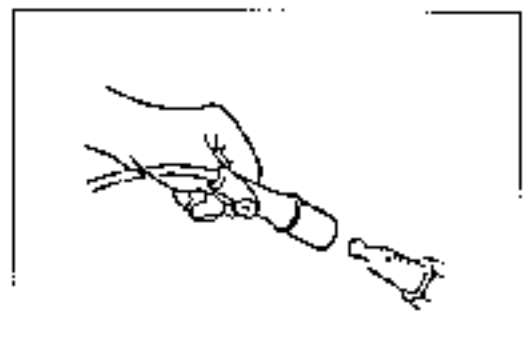
STEP 5



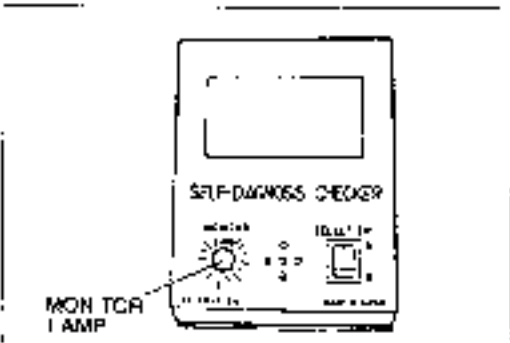
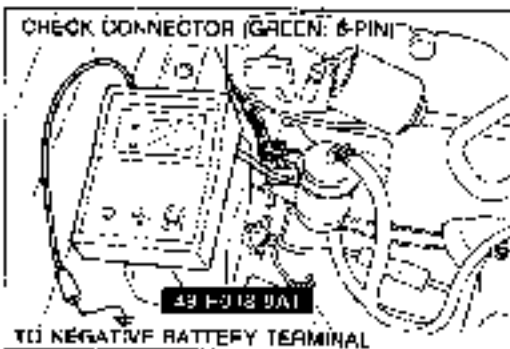
STEP 2



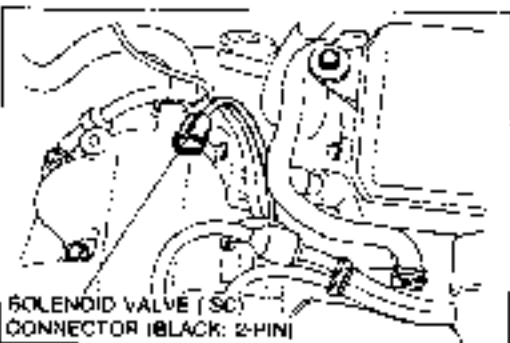
STEP 6



STEP 3



STEP 4



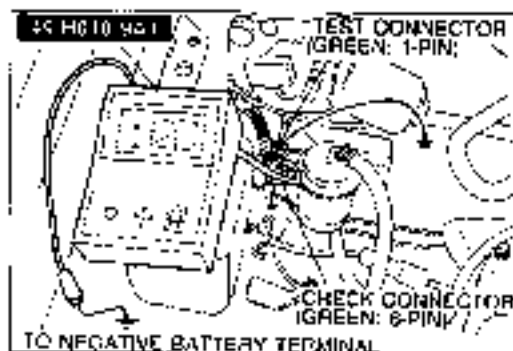
Rough Idle (Only when engine is warm) (Cont'd)						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
7	Check for injector operating sound at idle	Yes	Go to Next Step			
		No	Check resistance at injector harness connector (E.M.NJ-01)	F2-157	Yes	Check wiring short or open
				No	Check injector resistance	F2-157
					Check wiring short or open	
		Terminals	Resistance			
		(BY)-LGN	6-8Ω			
		(BY)-LGR				
8	Check for air leaks by listening for sucking noise	Yes	Go to Next Step			
		No			Intake air system components damaged	F2-187
					Vacuum and intake air hoses loose or damaged	
					Bots or nuts loose	
					Gaskets damaged	
9				Check compression	Section 82	

2H, KP2-007

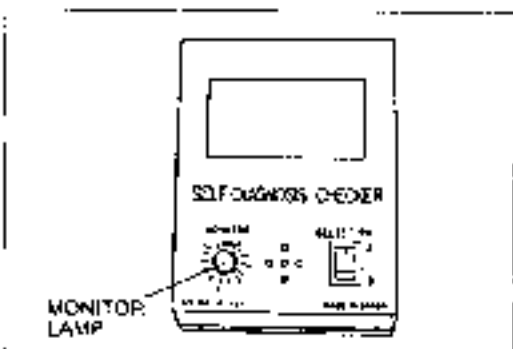
STEP 7

Rough Idle (Only after heat soak)							
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 switches with SST Neutral switch Clutch switch (IGN ON Test connector (Green 1-pin) grounded)	Yes	Go to Next Step				
		No	Check for cause by referring to check sequence		F2-134		
3	Check for flashing of SST 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	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 5 minutes Fuel pressure: More than 147 kPa (1.5 kg/cm², 21 psi)	Yes	Go to Next Step				
		No	Check fuel pump pressure drop	F2-150	No	Replace fuel pump malfunction	F2-152
			Check pressure regulator pressure drop	F2-150	Yes	Check injector fuel leakage	F2-157
					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 (Vefire))	Section G	Yes	Replace injector (If step 4 OK)	F2-155
					No	Check spark plug	Section G
						Check high-tension lead	Section G
						Check distributor cap	Section G

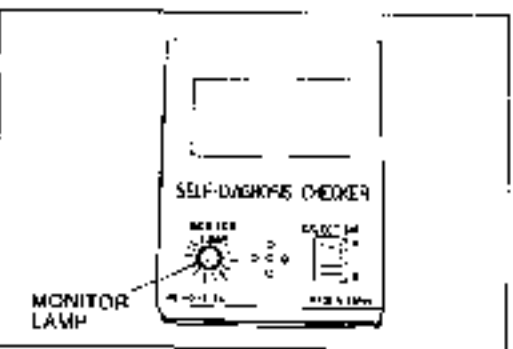
STEP 1



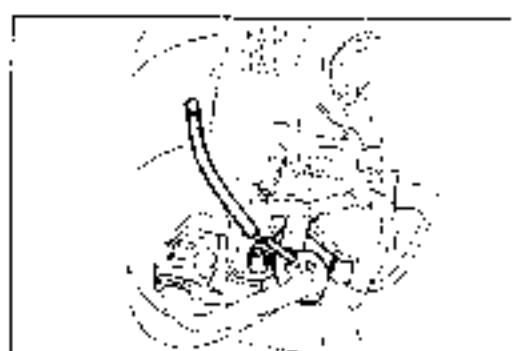
STEP 2



STEP 3

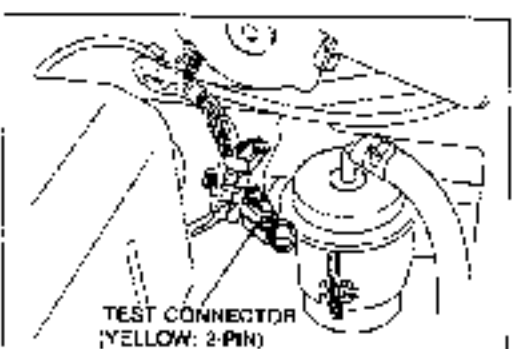
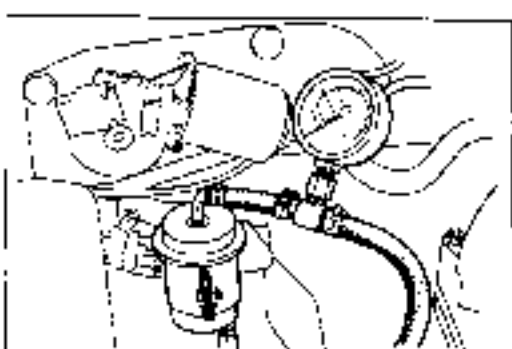


STEP 4

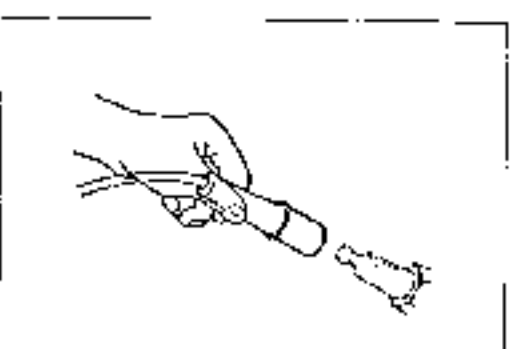


STEP 5

WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



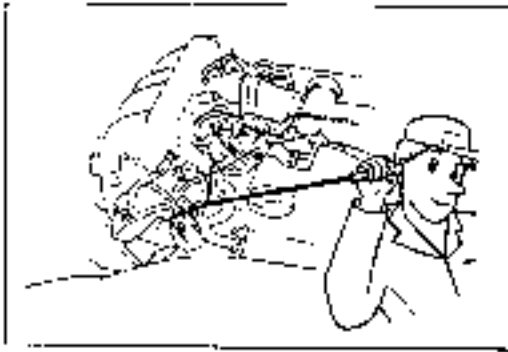
STEP 6



Rough Idle (Only after heat soak) (Cont'd)					
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
7	Check for injector operating sound at idle	Yes	Go to Next Step		
		No	Check resistance of injector harness connector (EMINJ-01)	F2-157	Yes: Check wiring short or open
			Terminals Resistance		No: Check injector resistance
			(A7)-(LG#) 8-80		Check wiring short or open
8	Change lue to specified grade	Yes	Poor fuel quality		
		No	Go to Next Step		
9	Check if condition improves				
			ECU malfunction		

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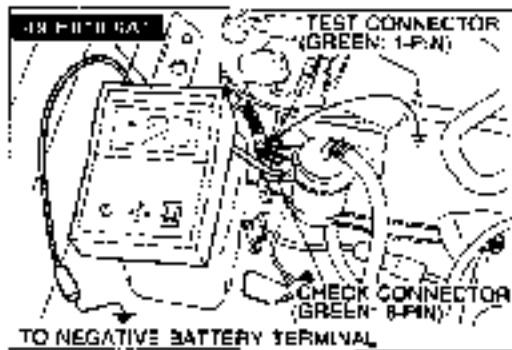
STEP 7



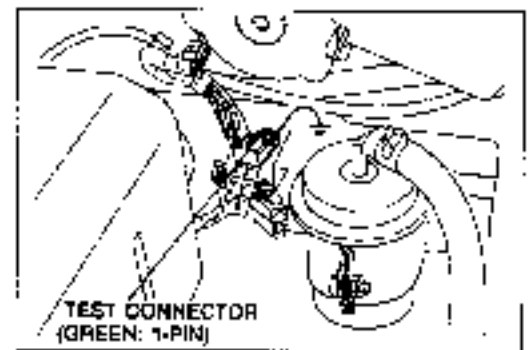
Rough idle just after starting						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code with SST [IGN ON, Test connector (Green, 1-pin) grounded]	Yes	Check for cause by referring to check sequence			F2-122
		No	Go to Next Step			
2	Check idle switch with SST [IGN ON, Test connector (Green, 1-pin) grounded]	Yes	Go to Next Step			
		No	Check for cause by referring to check sequence			F2-124
3	Check ignition timing at idle after warm up Ignition timing: BTDC 4—6° (Q5) 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			
		No	Try to adjust idle speed	F2-118	Yes	Idle speed (misadjustment)
				No	Check accelerator cable free play	F2-139
					Check ISO valve (Stuck closed)	F2-142
5	Substitute a well-known ECU Check if condition improves	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	

2BU00-E-006

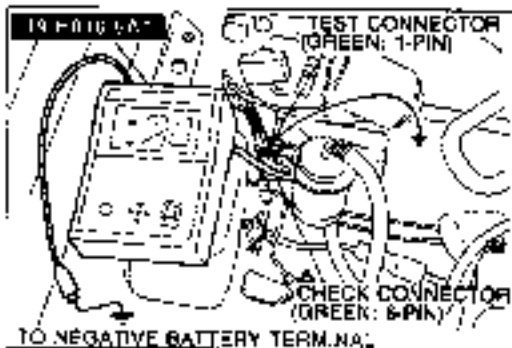
STEP 1



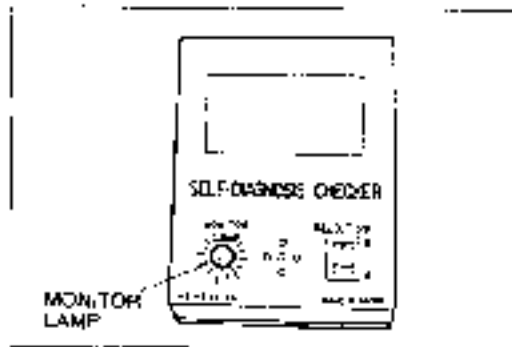
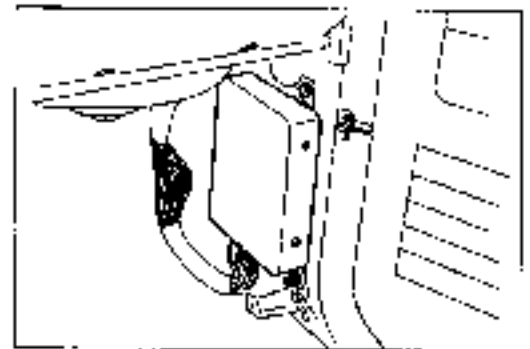
STEP 4



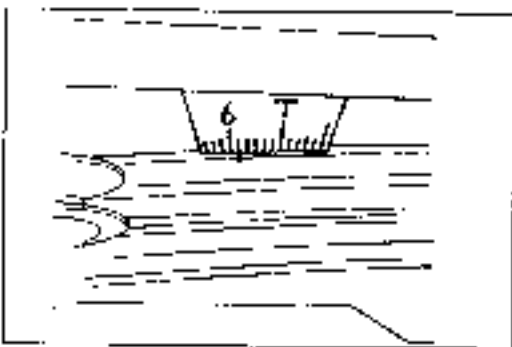
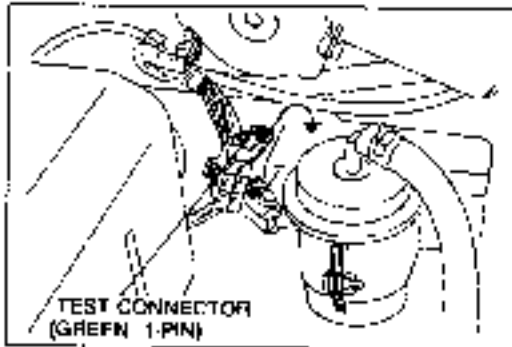
STEP 2



STEP 5



STEP 3



Low idle speed (When A/C, P/S, E/L is ON)

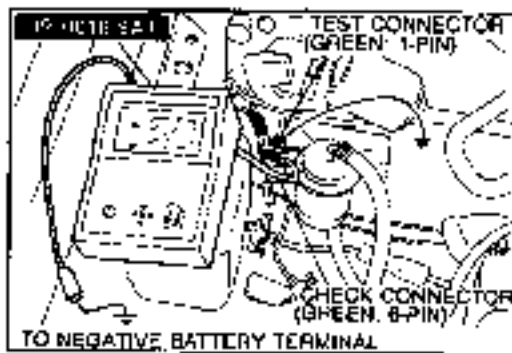
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction with SST (IGN ON, test connector (Green: 1-pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122
		No	Go to Next Step	
2	Disconnect IBC valve connector at idle Check if the condition does not change	Yes	Go to Next Step	
		No		Check coolant level F2-116 Check engine oil F2-116
3	Check switches with SST Idle switch Neutral switch Clutch switch (IGN ON, Test connector (Green: 1-pin) grounded)	Yes	Go to Next Step	
		No	Check for cause by referring to check sequence	F2-134
4	Check continuity between test connector (Green: 1-pin) and ground		Wiring short to ground	

28U0F2-040

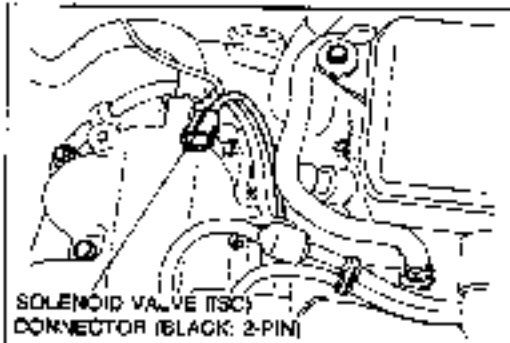
Note:

In case of low idle speed with A/C ON, if the problem cannot be solved by the above steps, it may be an A/C compressor malfunction. (Refer to Section U.)

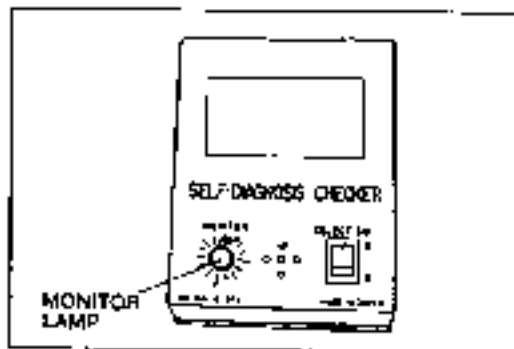
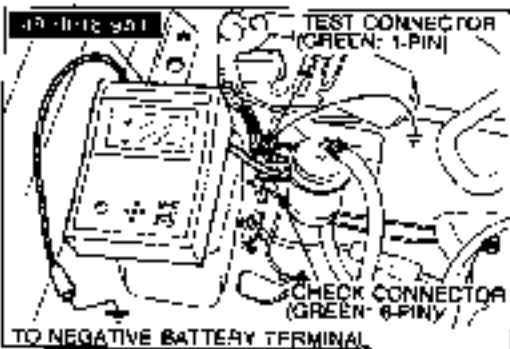
STEP 1



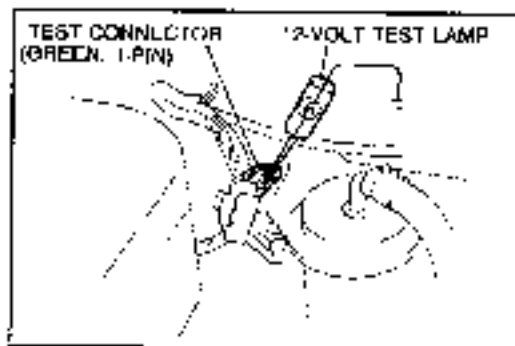
STEP 2



STEP 3



STEP 4



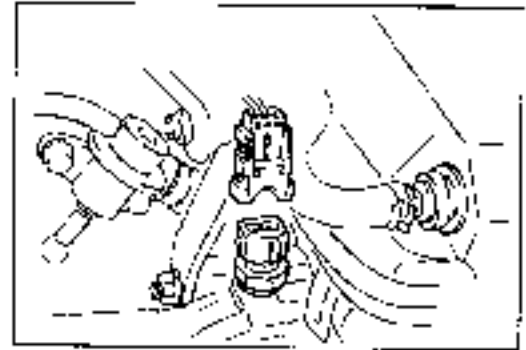
High idle speed after warm up				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST (IGN ON, Test connector (Green: 1 pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122
		No	Go to Next Step	
2	Check ignition timing at idle after warm up: Ignition timing: BTDG 4-5° (G6) 5-7° (F2) (Test connector (Green: 1 pin) grounded)	Yes	Go to Next Step	
		No	Adjust ignition timing	F2-117
3	Check if throttle valve is fully closed when accelerator released	Yes	Go to Next Step	
		No	Check if throttle linkage is correctly installed and operates freely	F2-137
4	Check idle speed after warm up 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 F2-142
		No	Try to adjust idle speed	F2-118
			Yes	Idle speed misadjustment
			No	Go to Next Step
5	Disconnect ISC valve connector at idle when engine is cold. Check if idle speed decreases during warm up.	Yes	Go to Next Step	
		No		Check air valve F2-142
6	Disconnect water thermosensor connector and check if condition improves	Yes	Check water thermosensor connector condition as follows: 1. Shake connector and check if condition changes. 2. Check condition of terminal (burned or damaged). 3. Connect a good terminal to harness side connector and check for looseness.	Yes: Check water thermosensor F2-179 No: Poor contact of water thermosensor connector
		No	Go to Next Step	
7				ECU malfunction

28U/F2-000

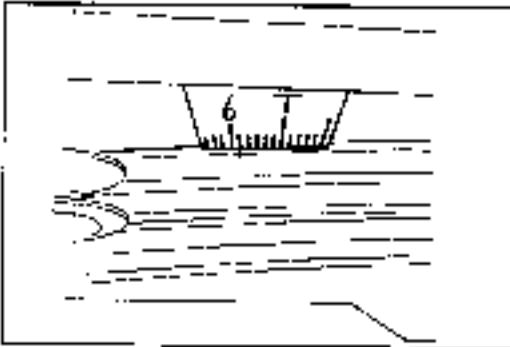
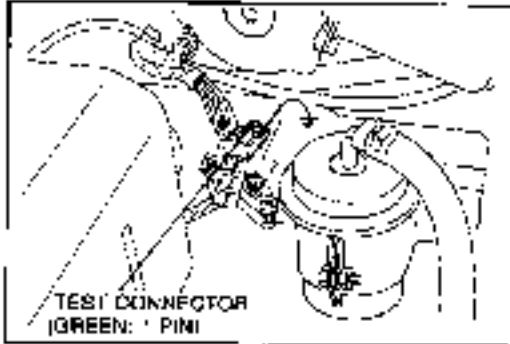
STEP 1



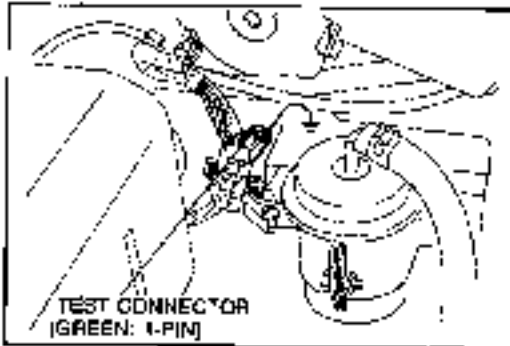
STEP 6



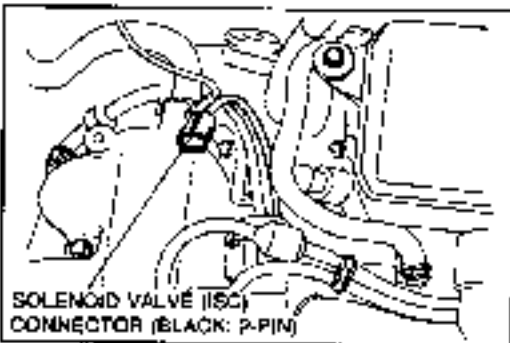
STEP 2



STEP 4



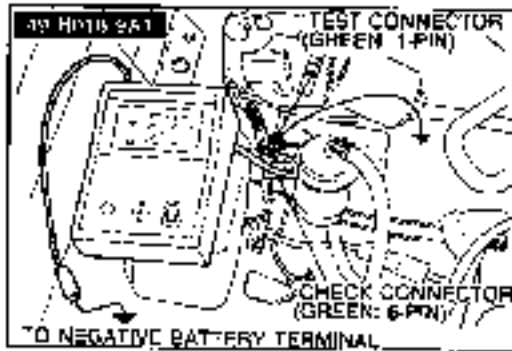
STEP 5



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 lighting of SST 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
3	Check intake manifold vacuum at idle Vacuum: G8 500—540 mmHg (19.7—21.3 inHg) F2 510—550 mmHg (20.1—21.7 inHg)	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 Bulls or nuts loose Gaskets damaged
					No	Check throttle body
						Check PCV valve
4	Pinch PCV hose Check if condition improves	Yes	Go to Next Step			
		No	Go to Next Step			
5	Check fuel line pressure (IGN ON, Test connector (Yellow: 2 pin) connected) Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm ² , 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	F2-144	Yes	Replace pressure regulator
				No	Replace fuel pump	F2-152
			Fuel pump maximum pressure: 441—568 kPa (4.5—6.0 kg/cm ² , 64—86 psi)			
6			ECU malfunction			

28J0-2-310

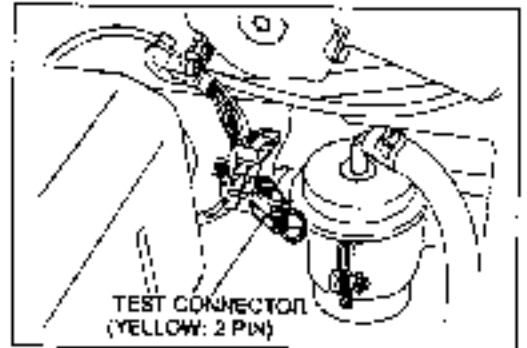
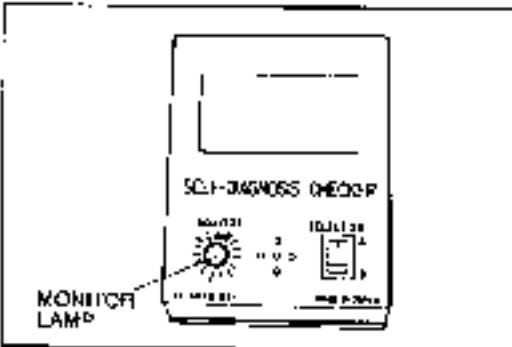
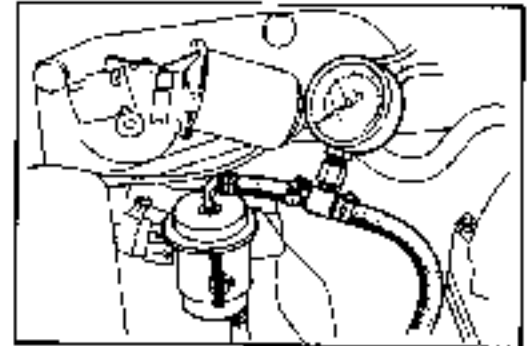
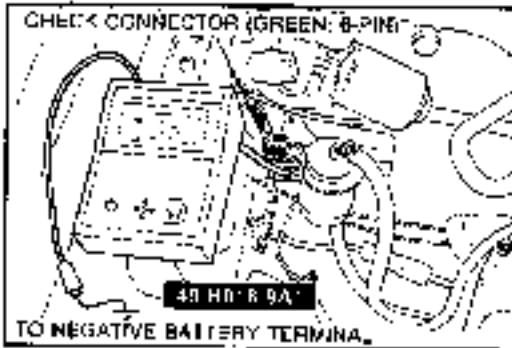
STEP 1



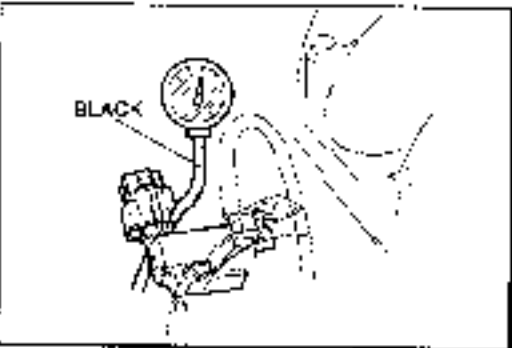
STEP 5

WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

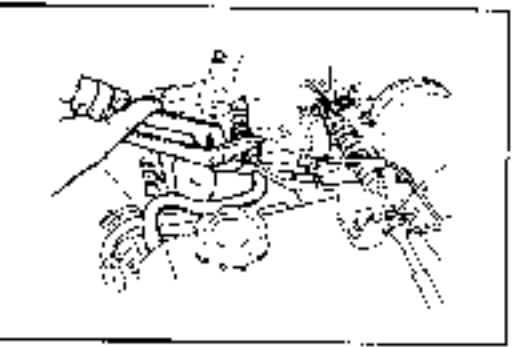
STEP 2



STEP 3



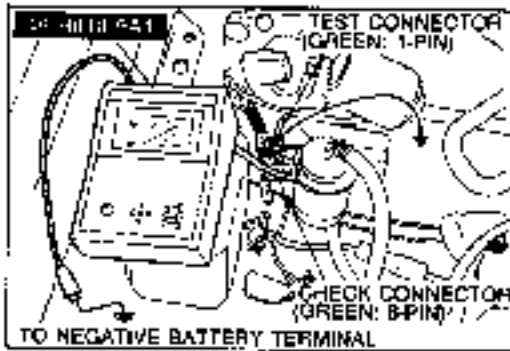
STEP 4



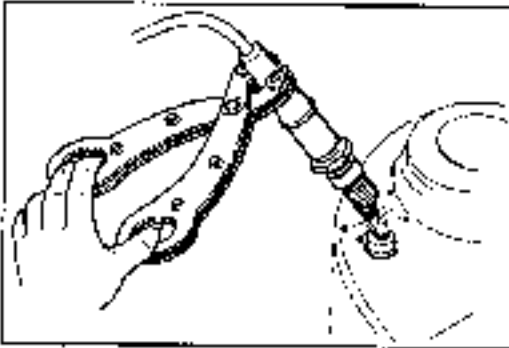
Engine start at idle (Always)					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST (IGN ON, Test connector (Green, 1-pin) grounded)	Yes	Check for cause by referring to the check sequence		F2-122
		No	Go to Next Step		
2	Check if strong blue 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 ² , 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 No	Check fuel line for clogging Replace fuel filter F2-148
			Check fuel pump maximum pressure	F2-144 Yes No	Replace pressure regulator F2-155 Replace fuel pump F2-152
			Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm ² , 64—85 psi)		
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	

13UJ2-2318

STEP 1

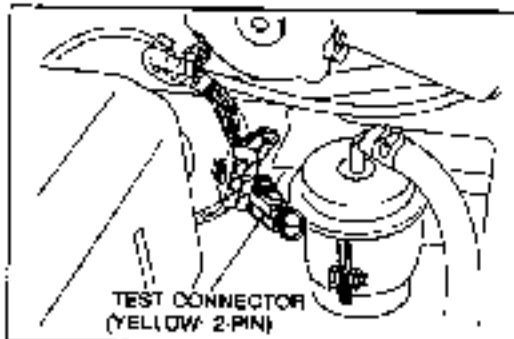
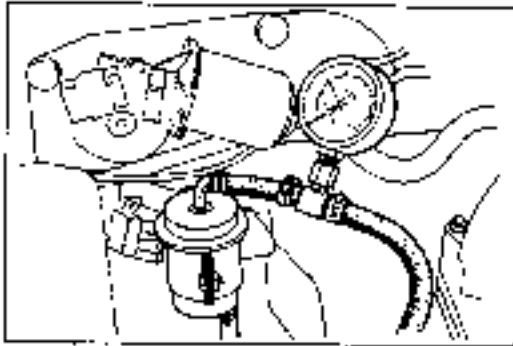


STEP 2



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)

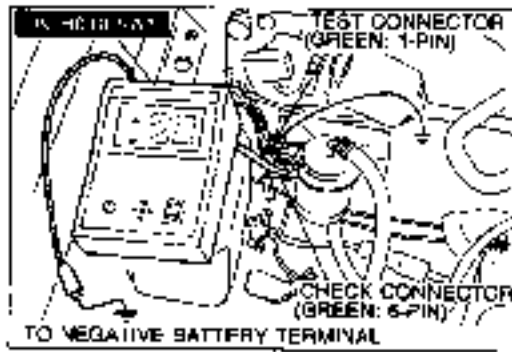


Engine stall at idle (Only when engine is cold)

STEP	QUICK INSPECTION		ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SST [IGN ON. Test connector (Green: 1-5 n) grounded.]	Yes	Check for cause by referring to check sequence	F2-122	
		No	Go to Next Step		
2				Check RAD valve (air valve)	F2-142
3				ECU malfunction	

13UJF2-019

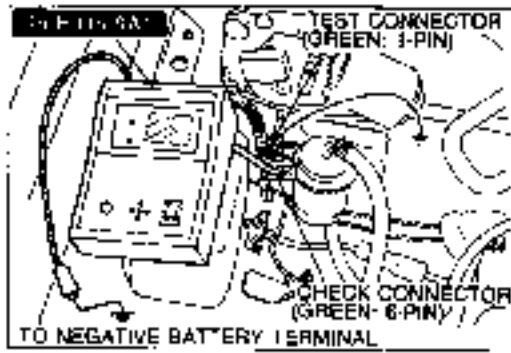
STEP 1



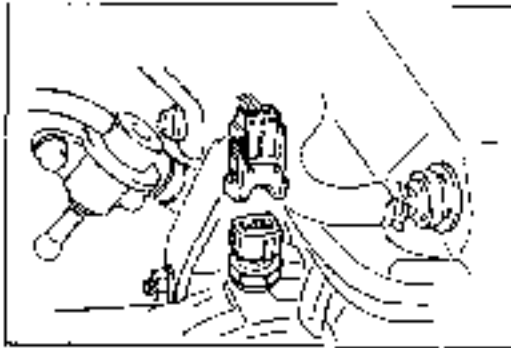
Engine stall at idle (Only when engine is warm)					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction code with SS* (IGN ON, Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to check sequence		F2-122
		No	Go to Next Step		
2	Disconnect 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 (turned or damaged) 3. Connect a good terminal to harness side connector and check for looseness	Yes	Check water thermosensor
		No		Poor contact of water thermosensor connector	
		No	Go to Next Step		
3	ECU malfunction				

18U0F2-030

STEP 1



STEP 2



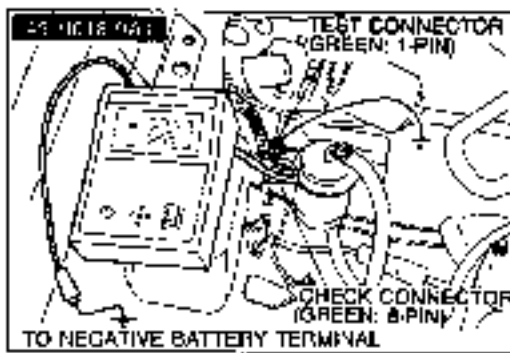
Engine stall at idle (When A/C, P/S, E/L is ON)			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST (IGN ON, Test connector (Green, 1-pin) grounded)	Yes	Check for cause by referring to check sequence F2-122
		No	Go to Next Step
2	Check switches 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 F2-134
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 F2-142 Check engine oil F2-116
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 F2-118
5			ECU malfunction

2810A2-011

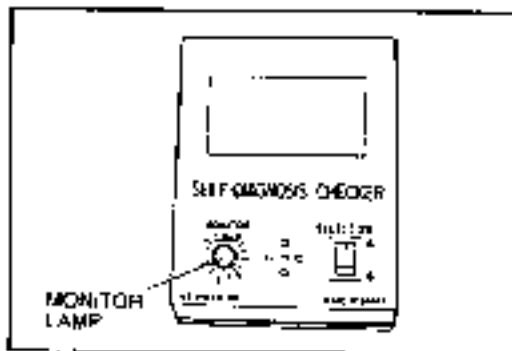
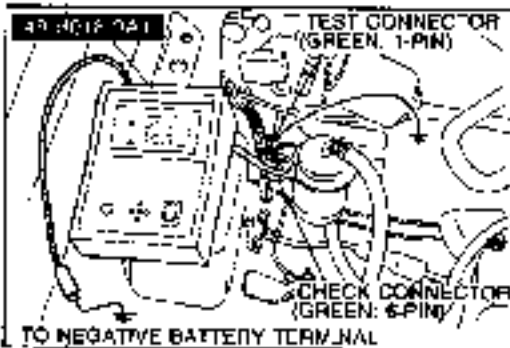
Note:

Engine stalls at idle with A/C ON, if the trouble cannot be fixed after checking above steps, it may be A/C compression malfunction (See Section U).

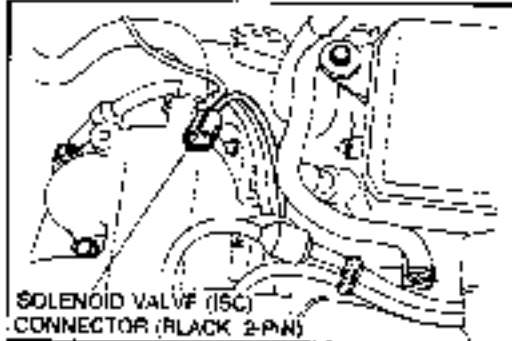
STEP 1



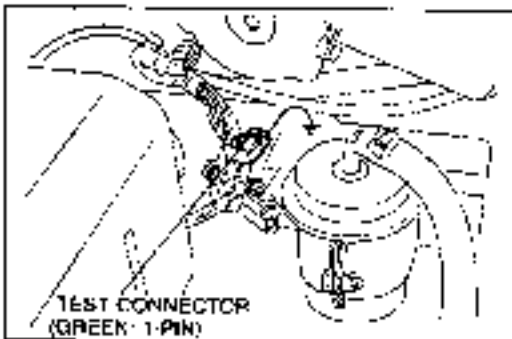
STEP 2



STEP 3



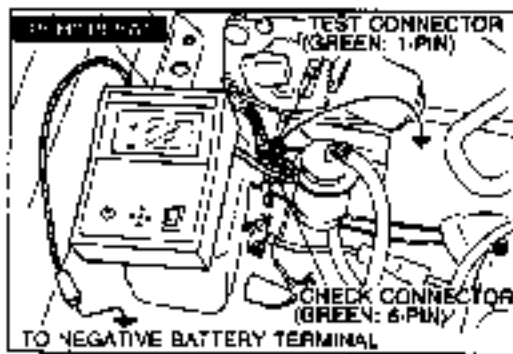
STEP 4



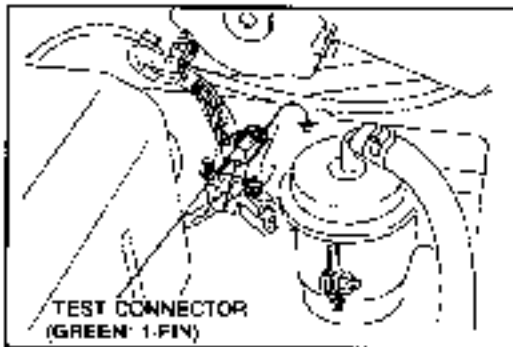
Engine stall during start up						
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for malfunction mode with SST [IGN ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence			F2-122
		No	Go to Next Step			
2	Check idle speed after 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			
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
			Terminal Resistance		No	Check injector resistance
			B/Y—(LGR) B/Y—(LGR)	B—SU		Check wiring
4	Check ignition timing at idle after warm up Ignition timing: BTDC 4—8° (Q6) 5—7° (F2) [Test connector (Green: 1-pin) grounded]	Yes	Go to Next Step			
		No	Adjust ignition timing			
5			ECU malfunction			

20J07-010

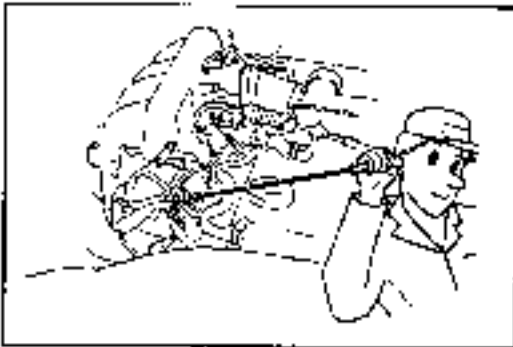
STEP 1



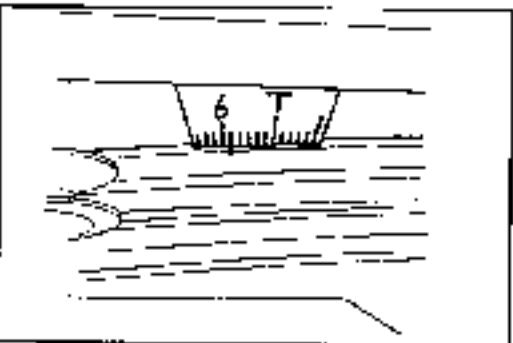
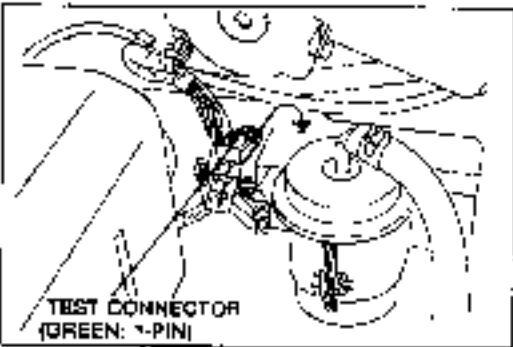
STEP 2



STEP 3

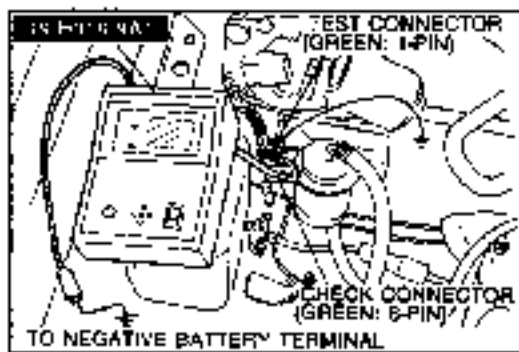


STEP 4

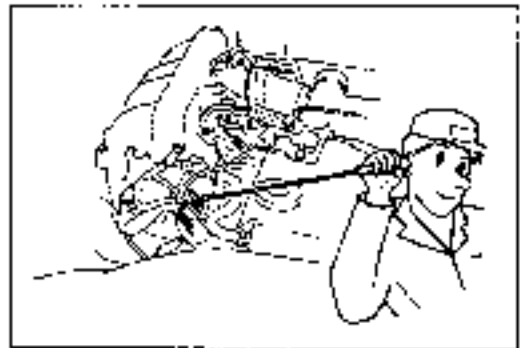


Engine stall on deceleration					
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST [G ON, Test connector (Green: 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122
		No	Go to Next Step		
2	Check idle switch and stoplight 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 Monitor lamp: Flashes more than 8 times/10 seconds at 2,000—3,000 rpm (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 Fuel cut: after warm up Above 1,800 rpm (G6) Above 1,900 rpm (F2)	Yes	Go to Next Step		
		No	Check water thermometer	F2-179	Yes: Replace ECU F2-175 No: Replace water thermometer F2-179

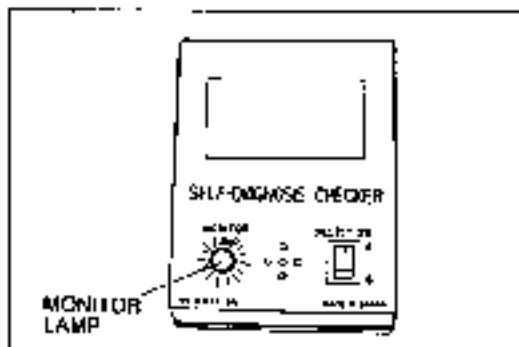
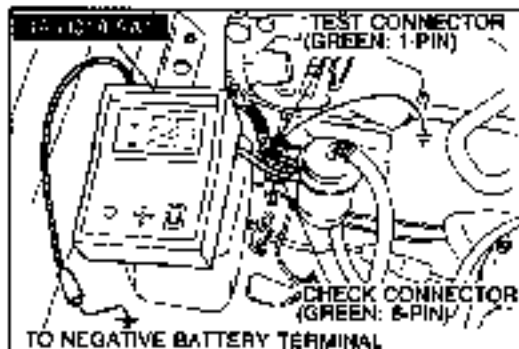
STEP 1



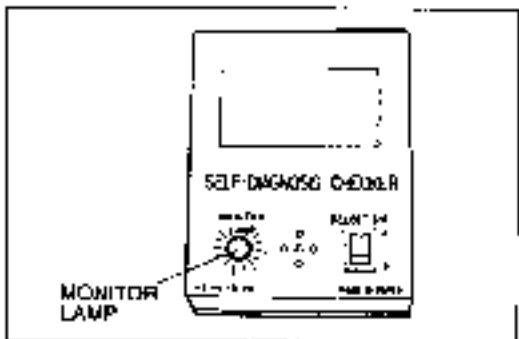
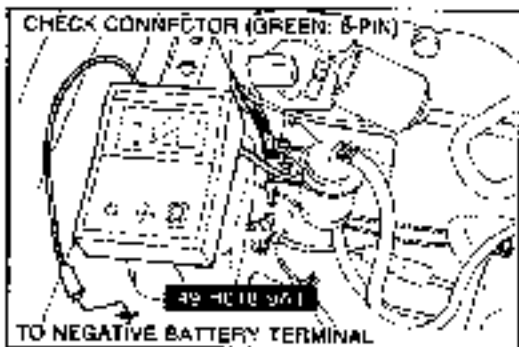
STEP 4



STEP 2



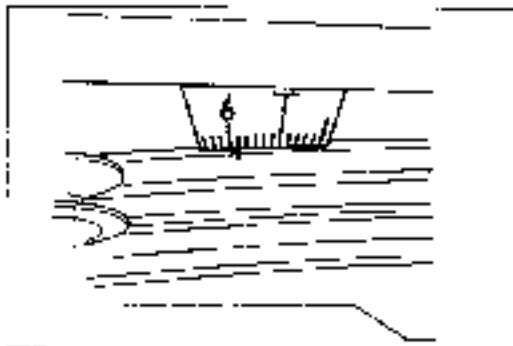
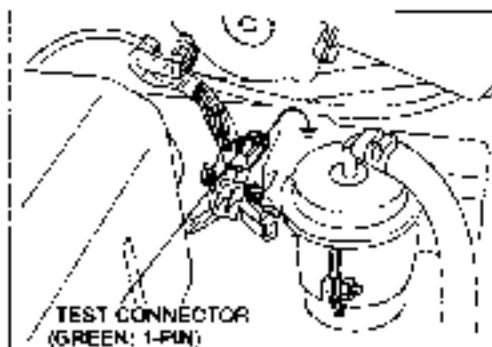
STEP 3



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	
		No	Adjust idle speed (if possible)	F2-117
6	Check ignition timing at idle after warm up Ignition timing: BTDC 4—8° (GB) 3—7° (F2) [Test connector (Green: 1-pin) not grounded]	Yes	Go to Next Step	
		No	Adjust ignition timing	F2-117
7			Check ISC valve	F2-142

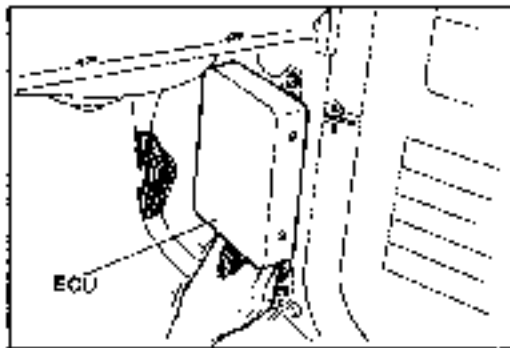
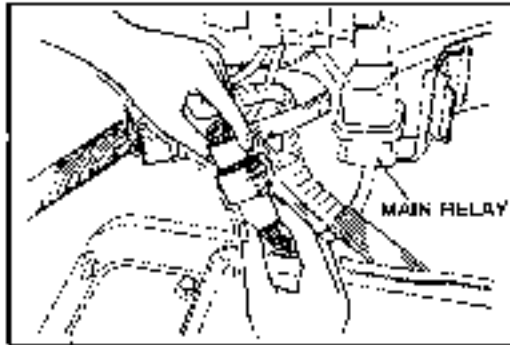
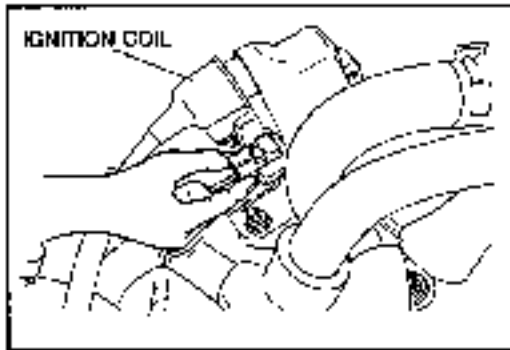
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STEP 5
6

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

15J0F2-008

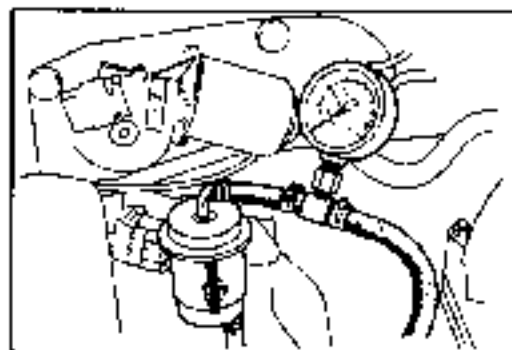
STEP 1



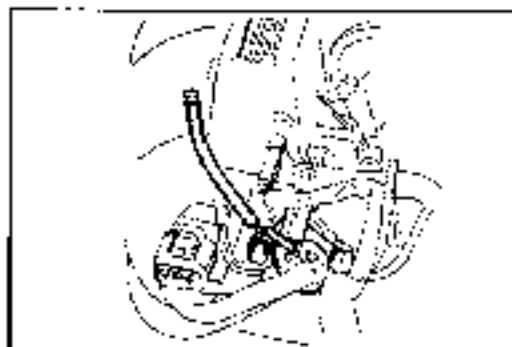
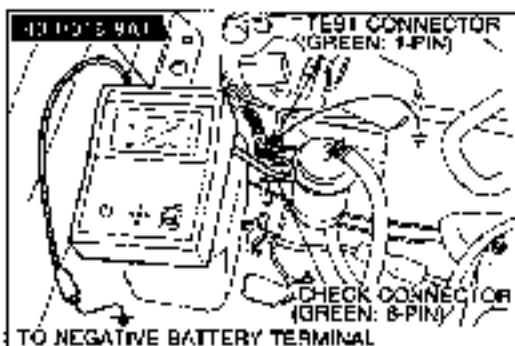
Hesitates/Stumbles on acceleration				
QUICK	INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction code with SST. (IGN ON Test connector (Green: 1-p) grounded)	Yes	Check for cause by referring to check sequence F2-122	
		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 255—314 kPa 2.7—3.2 kg/cm ² , 38—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 F2-137	
		No	Go to Next Step	
6	Substitute a well-known ECU. Check if condition improves	Yes	ECU malfunction	
		No	Check airflow sensor	F2-179
			Check throttle body	F2-138
7	Check other systems		Check spark plug	Section G
			Check timing	Section H

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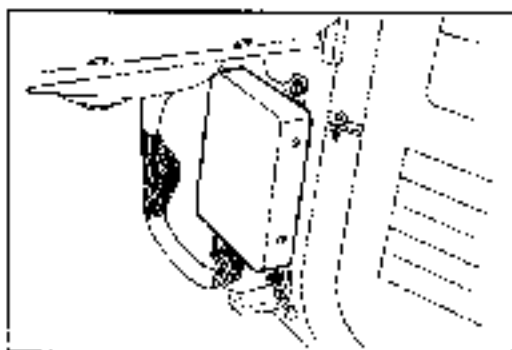
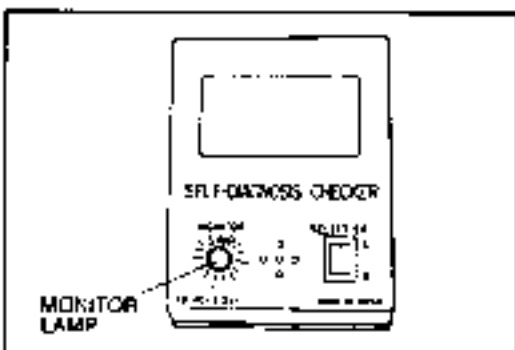
STEP 1



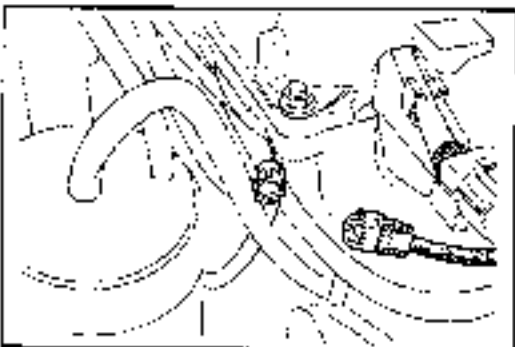
STEP 2



STEP 5



STEP 3



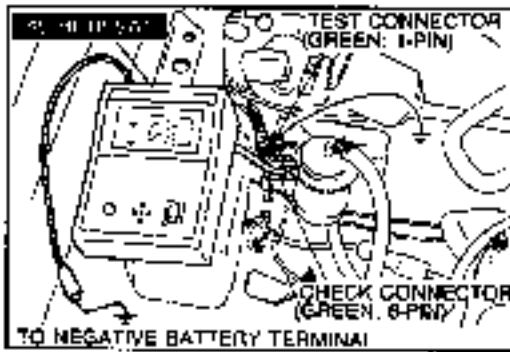
STEP 4

WARNING
 BEFORE CONNECTING FUEL
 PRESSURE GAUGE, RELEASE
 FUEL PRESSURE FROM FUEL
 SYSTEM TO REDUCE POSSIBILITY
 OF INJURY OR FIRE
 (REFER TO PAGE F2-144)

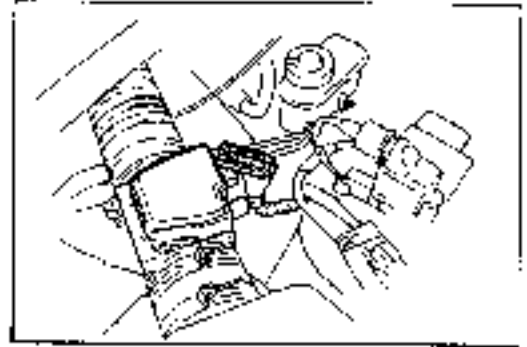
Hesitates at steady speed						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction code with SST [IGN ON Test connector (Green: 1-5V) grounded]	Yes	Check for cause by referring to check sequence F2-122			
		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	Check for air leaks with throttle valve open by listening for sucking noise	Yes	Go to Next Step			
		No			Intake air system components damaged F2-137 Vacuum and intake air hoses loose or damaged Nuts or bolts loose Gasket damaged	
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/cm², 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	F2-149
				No	Replace fuel filter	
					Replace pressure regulator	
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 F2-179 Check throttle body F2-138 Check throttle sensor F2-181	
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			ECU malfunction			

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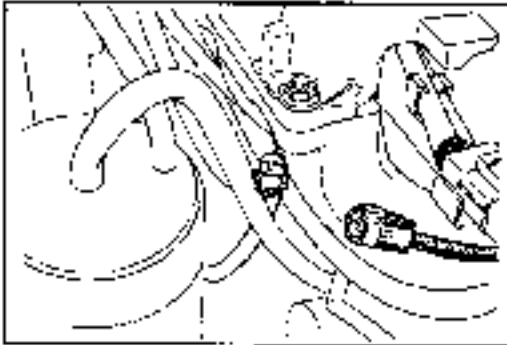
STEP 1



STEP 5

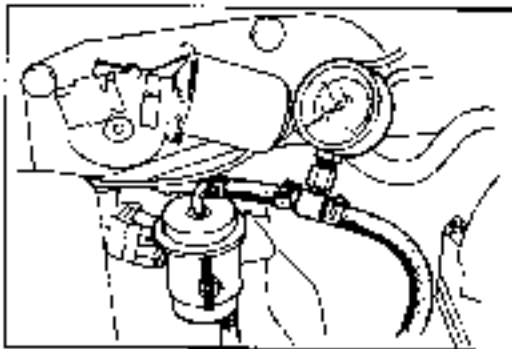


STEP 2



STEP 4

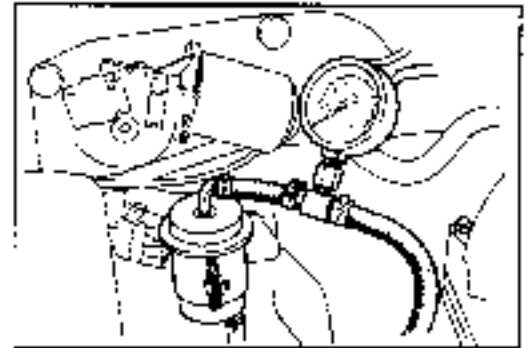
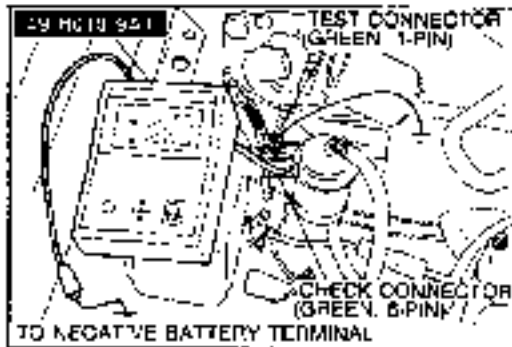
WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)



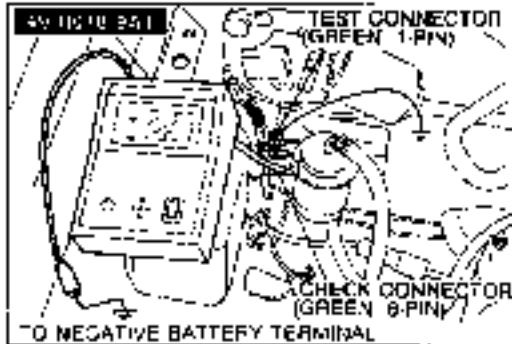
Jerking on acceleration				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Run engine at 2,000 rpm for 20 seconds and stop it. Check for malfunction cable with SST [IGN ON, Test connector (Green 1 pin) grounded]	Yes	Check for cause by referring to check sequence	F2-122
		No	Go 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)	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 F2-137
				Vacuum and intake air hoses loose or damaged
				Belt or pulley loose
				Gaskets disintegrated
		No	Go to Next Step	
6	Substitute a well-known ECU. Check if condition improves	Yes		ECU malfunction
		No		Check airflow sensor F2-179
				Check throttle body F2-138
				Check spark plug Section G
7	Check other systems			Clutch slipping Section H

20JH-F4-40

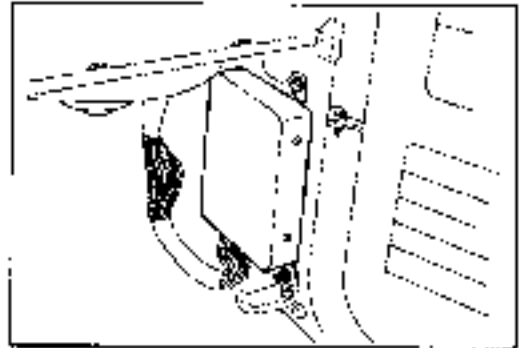
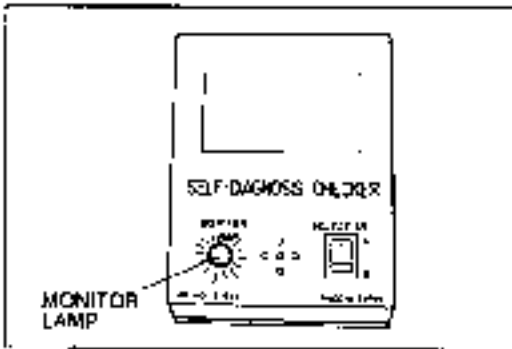
STEP 1



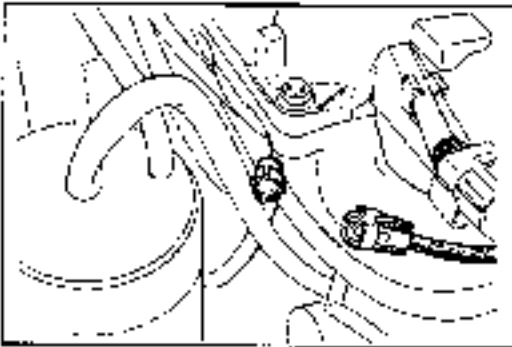
STEP 2



STEP 6



STEP 3



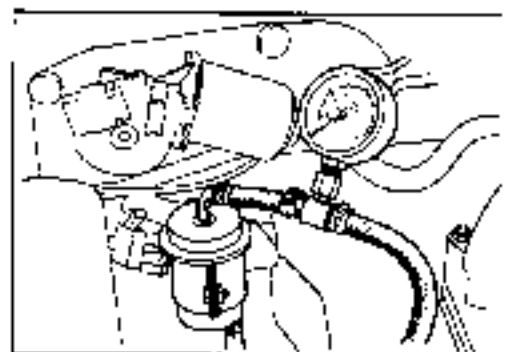
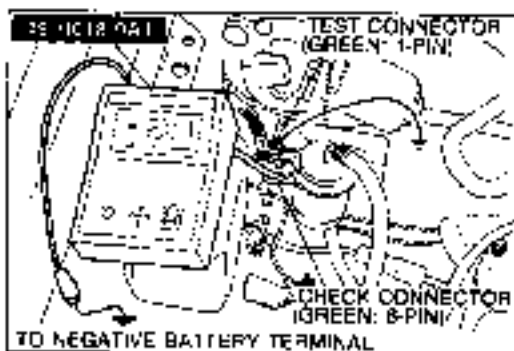
STEP 4

WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)

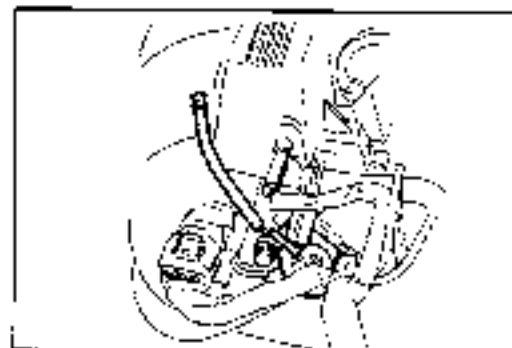
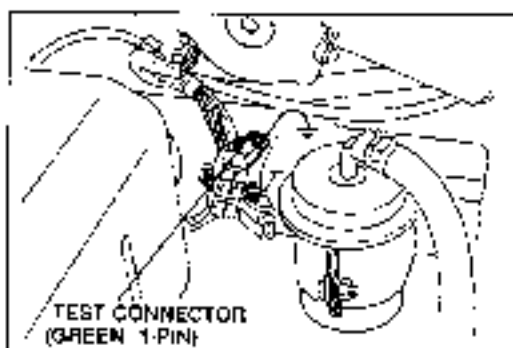
Knocking							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check malfunction code with SST [IGN ON, Test connector (Green 1-pin) grounded]	Yes	Check for cause by referring to the check sequence			F2-122	
		No	Go to Step 2				
2	Check ignition timing at idle after warm up 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 ² , 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	F2-149
					No	Replace fuel pump	F2-152
			Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm ² , 64—85 psi)				
6					Check airflow sensor	F2-179	
7					Check spark plug	Section G	
8	Change fuel to specified grade Check if condition improves	Yes	Poor fuel quality				
		No	Go to Next Step				
9	Check cooling system				Thermostat		
					Radiator		
10					ECU malfunction		

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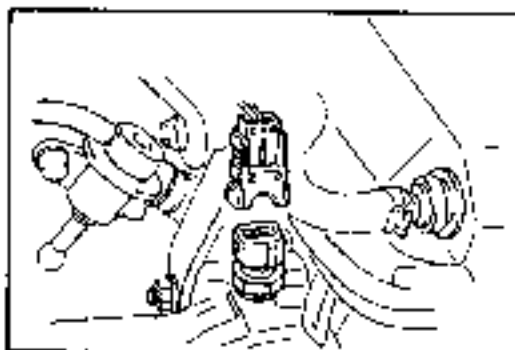
STEP 1



STEP 2



STEP 3

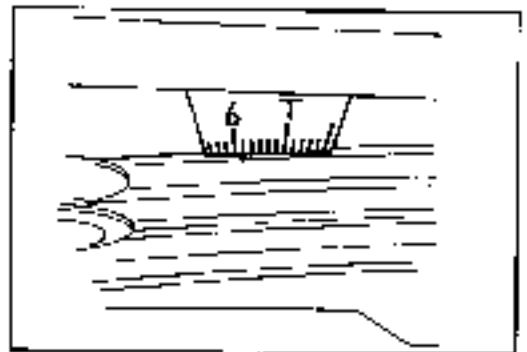
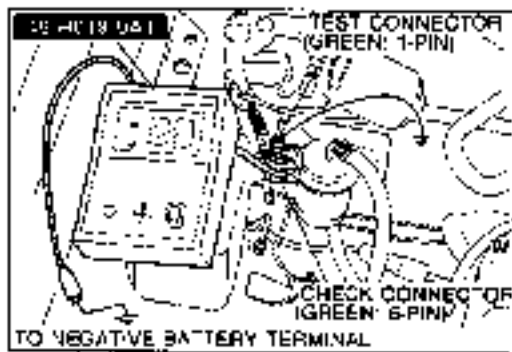


STEP 5

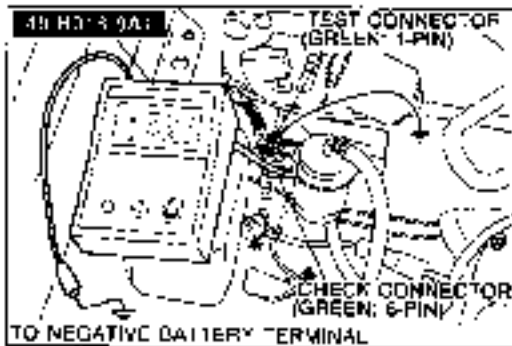
WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)

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 at idle. Check if engine condition changes [ISC valve connector disconnected]	Yes	Go to Next Step							
		No	Check ignition system (Refer to ignition system troubleshooting (M start))	Section G	Yes	Replace injector		F2-158		
					No	Check spark plug		Section G		
						Check high-tension		Section G		
4	Check ignition 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					F2-117		
		No	Adjust ignition timing							
5	Check for air leaks by listening for sucking noises	Yes						Intake air system components damaged		F2-137
								Vacuum and air intake hoses loose or damaged		
6	Observe fuel line pressure while accelerating from idle Fuel line pressure: Keeps 285—314 kPa (2.7—3.2 kg/cm ² , 38—46 psi) [Vacuum hose to pressure regulator disconnected]							Nuts or bolts loose		
								Gasket damaged		
		No	Go to Next Step							
				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

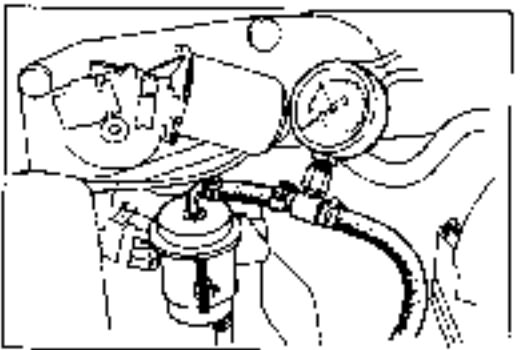
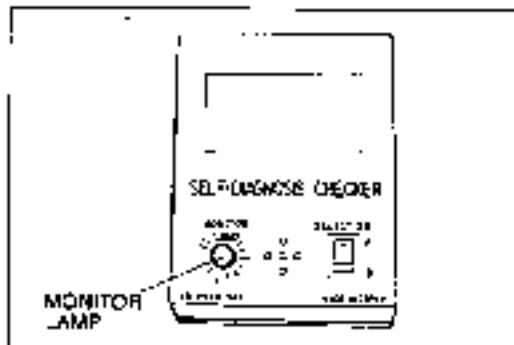


STEP 2

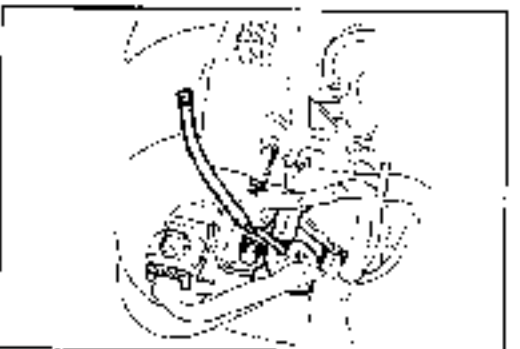
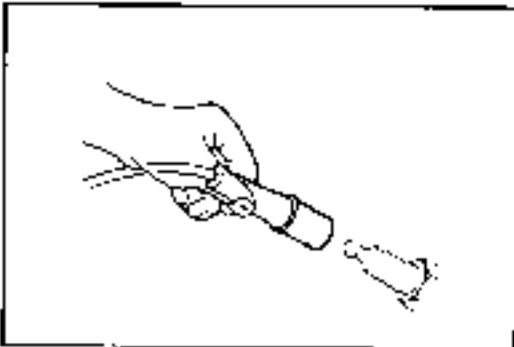


STEP 6

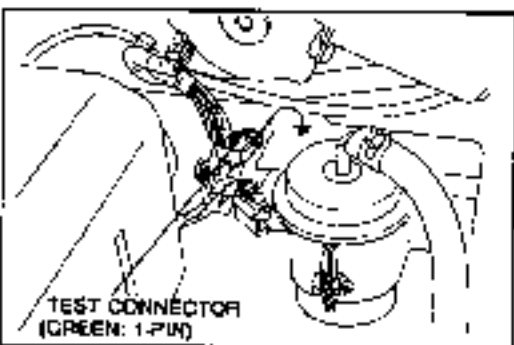
WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



STEP 3



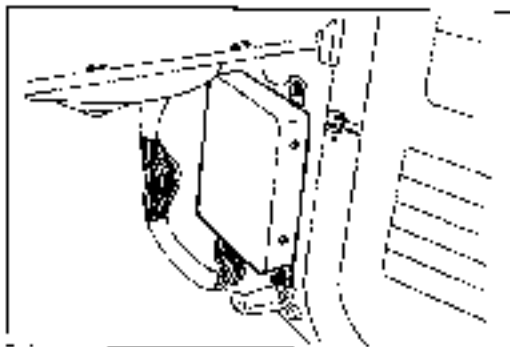
STEP 4



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	
						Check throttle body	F2-138	
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		

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STEP 9

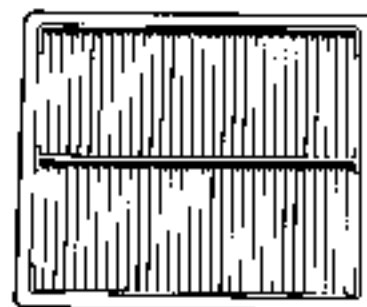


Lack of power						
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check for malfunction code and (only high-altitude) with SST [IGN ON, Test connector (Green 1-pin) grounded]	Yes	Check for cause by referring to check sequence		F2-122	
		No	Go to Step 2 (High-altitude) Go to Step 3 (Others)			
2	Check ignition timing at idle after warm up Ignition timing: BTDC 4—6° (G6) 5—7° (F2) [Test connector (Green 1-pin) grounded]	Yes	Go to Next Step		F2-117	
		No	Adjust ignition timing			
3	Disconnect ISC valve connector and the high-tension lead of each cylinder. Check if condition changes	Yes	Go to Next Step			
		No	Check ignition system [Refer to ignition system troubleshooting (Misfire)]	Section G	Yes	Replace injector (if step 4 OK) F2-156
					No	Check high-tension lead Section G
						Check distributor cap Section G
						Check spark plug Section G
4	Check for injector operating sound at idle	Yes	Go to Next Step			
		No	Check resistance at injector harness connector (E-MINJ-C1) Terminals Resistance (B/T)-(L/G) 8—8Ω (B/T)-(L/G)	F2-157	Yes	Check wiring short or open
					No	Check injector resistance F2-157
						Check wiring short or open
5	Check air cleaner element for clogging	Yes	Go to Next Step			
		No	Clean air cleaner element			
6	Check for air leaks by listening for sucking noises • At idle • When throttle valve is open	Yes			F2-137	
					Intake air system	
					Components damaged	
					Vacuum and air intake hoses loose or damaged	
					Nuts or bolts loose	
					Gasket damaged	

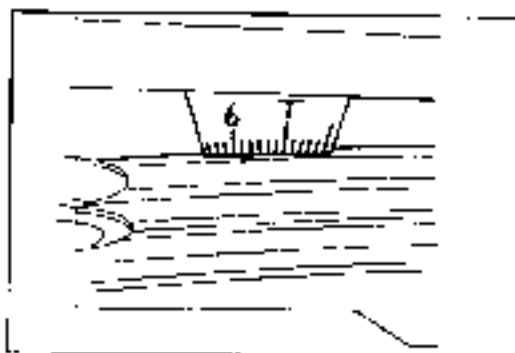
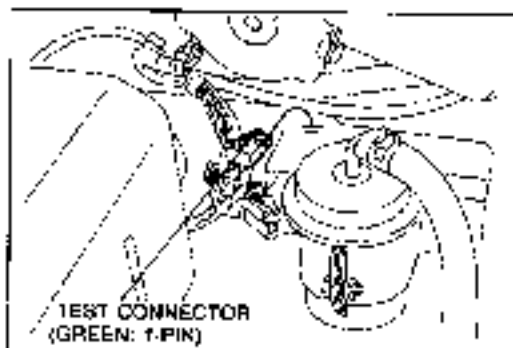
STEP 1



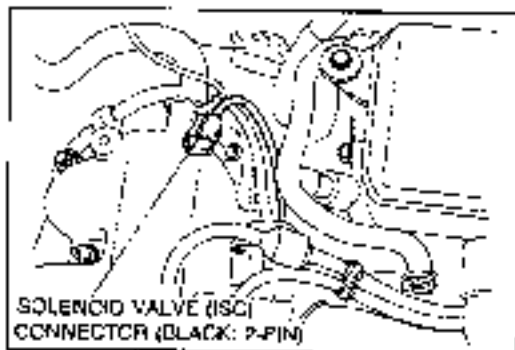
STEP 5



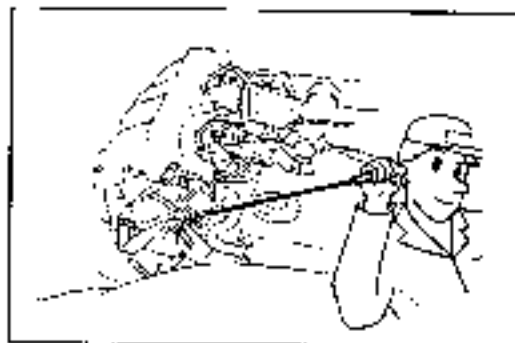
STEP 2



STEP 3



STEP 4

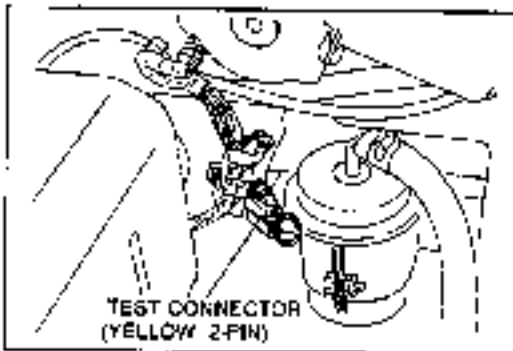
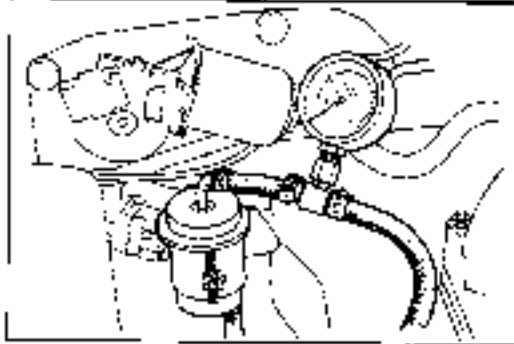


Lack of power (Cont'd)							
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION			
7	Check fuel line pressure (IGN ON. Test connector (Yellow 2-pin) connected) Fuel line pressure: 265—314 kPa (2.7—3.2 kg/cm ² , 38—46 psi)	Yes	Go to Next Step				
		No	Check for fuel leakage				
			Substitute a good fuel filter and retest	Yes	Repair fuel filter	F2-149	
			Check fuel pump maximum pressure	F2-150	Yes	Replace pressure regulator	F2-155
				No	Replace fuel pump	F2-152	
	Fuel pump maximum pressure: 441—588 kPa (4.5—6.0 kg/cm ² , 64—85 psi)						
8	Check fuel line pressure at idle Fuel line pressure: 216—264 kPa (2.2—2.7 kg/cm ² , 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				
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			

SBL/C 2-018

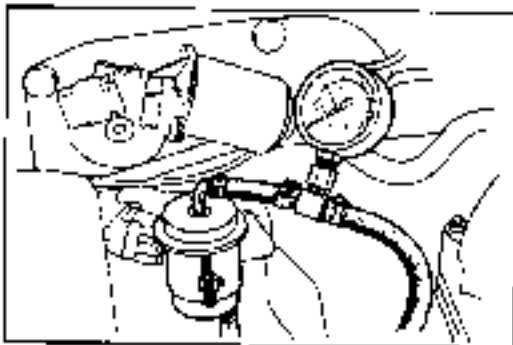
STEP 7

WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)

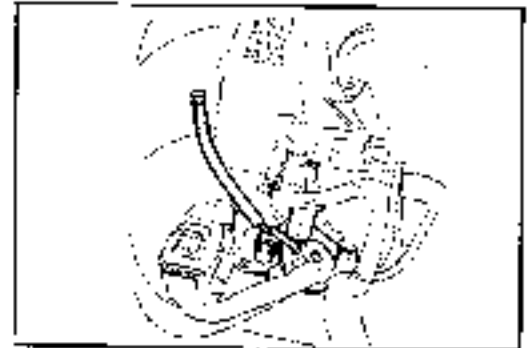


STEP 8

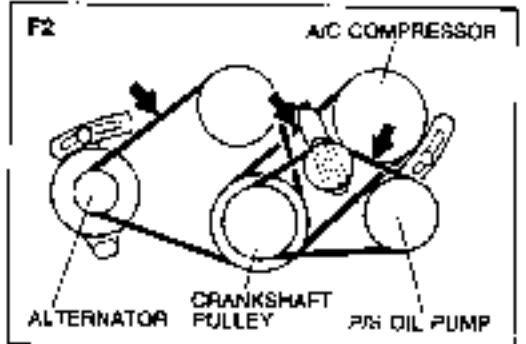
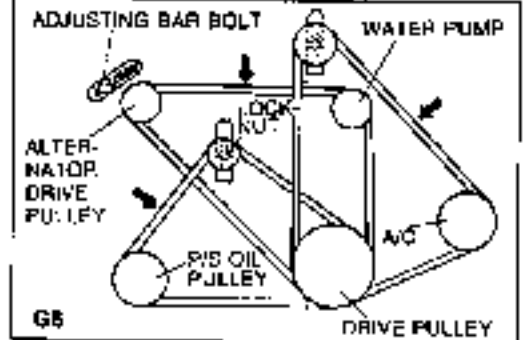
WARNING
BEFORE CONNECTING FUEL
PRESSURE GAUGE, RELEASE
FUEL PRESSURE FROM FUEL
SYSTEM TO REDUCE POSSIBILITY
OF INJURY OR FIRE
(REFER TO PAGE F2-144)



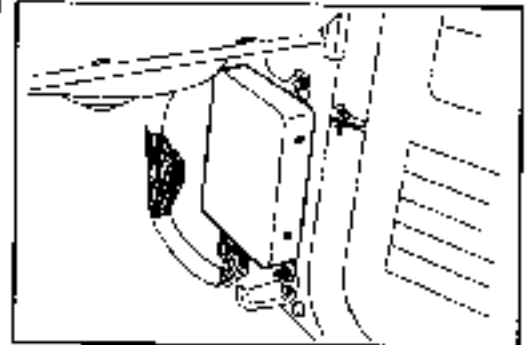
STEP 9



STEP 11



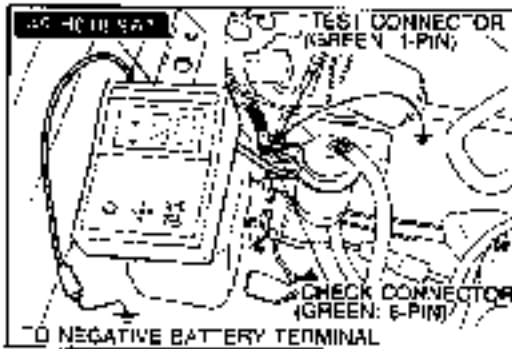
STEP 13



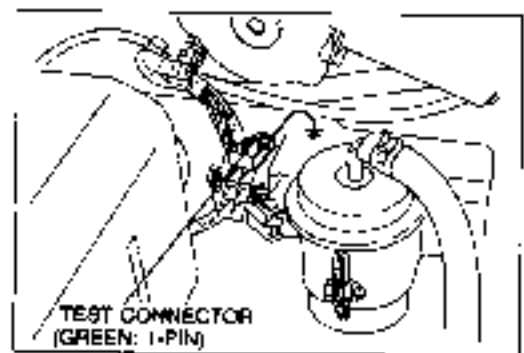
Bucking at high speed				
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	Run engine at 2,000 rpm for more than 20 seconds. Check for malfunction code with SST. (IGN ON, Test connector (Green, 1-pin) grounded)	Yes	Check for cause by referring to check sequence	F2-122
		No	Go to Next Step	
2	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. Fuel line pressure: Keeps 265—314 kPa (2.7—3.2 kg/cm², 39—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	
		Yes	Check fuel line for clogging	
		No	Replace fuel filter	
			Replace pressure regulator	F2-155
4	Check for air leaks by listening sucking noise	Yes	Go to Next Step	
		No		
			Intake air system components damaged	F2-137
			Vacuum and air intake hoses loose or damaged	
			Nuts or bolts loose	
			Gasket damaged	
5	Check ignition timing 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	F2-117
6	Gradually open throttle valve from idle check if engine speed increases smoothly	Yes	Go to Next Step	
		No		
			Check airflow sensor	F2-179
7			Check spark plug	Section G
8			ECU malfunction	

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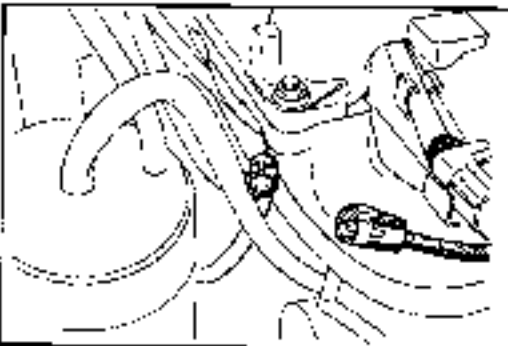
STEP 1



STEP 5

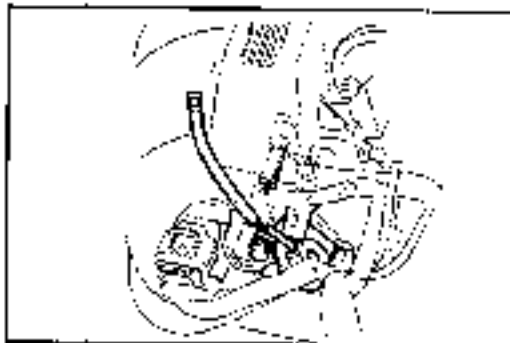
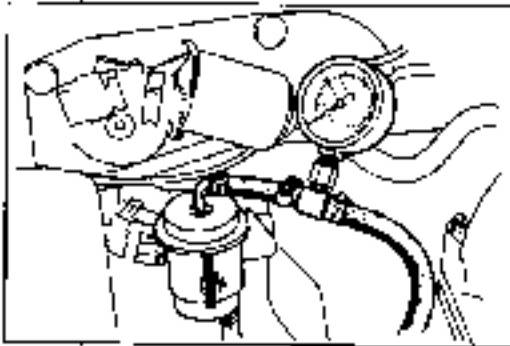


STEP 2



STEP 3

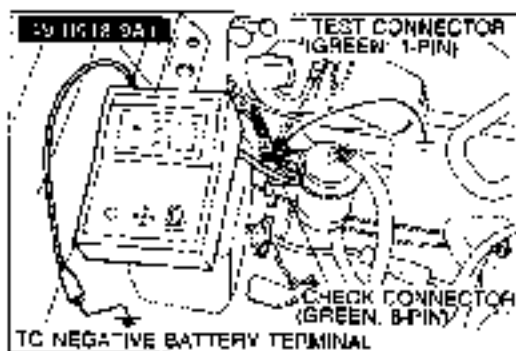
WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)



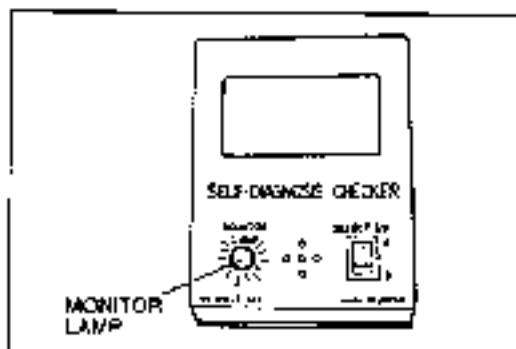
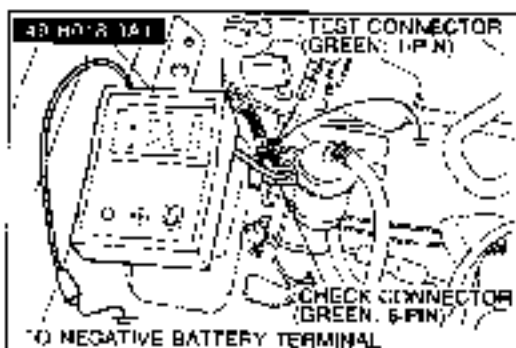
Bucking on deceleration			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for malfunction code with SST [IGN ON, Test connector (Green 1-pin) grounded]	Yes No	Check for cause by referring to the check sequence Go to Next Step
2	Check switches with SST [IGN ON, Test connector (Green 1-pin) grounded] • Idle switch • Stoplight switch	Yes No	Go to Next Step Check for cause by referring to the check sequence
3	Substitute a well-known ECU Check if condition improves	Yes No	ECU malfunction Check throttle sensor Go to Next Step
4			Check spark plug
5			Check clutch slipping
6			Check compression between cylinders

16U0P24C0

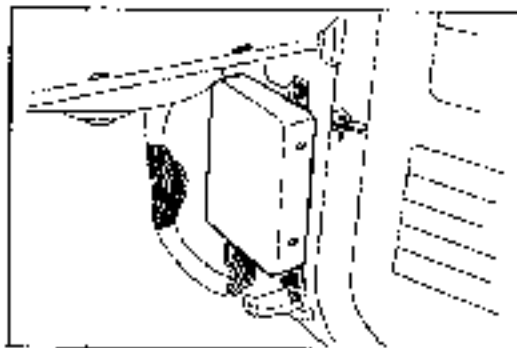
STEP 1



STEP 2



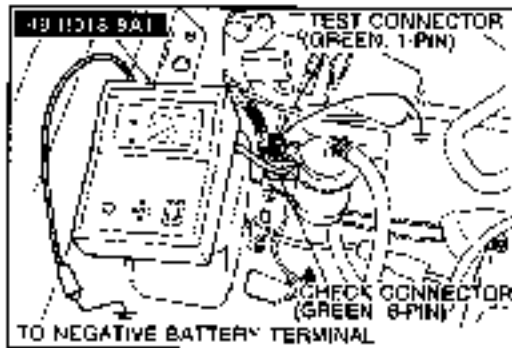
STEP 3



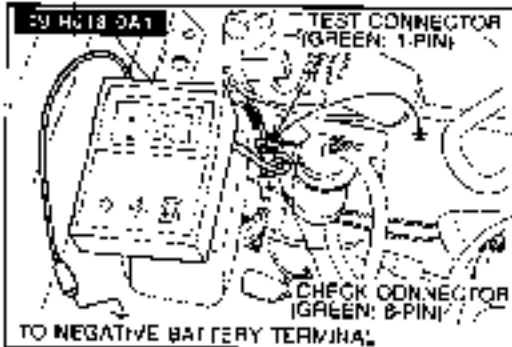
Poor fuel economy							
STEP	QUICK INSPECTION	ACTION			POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Run the engine at 2,000 rpm for more than 20 seconds after warm up and stop. 1 Check for malfunction code with SST (IGN ON, Test connector (Green: 1-pin) grounded).	Yes	Check for cause by referring to check 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			F2-134	
		No	Check for cause by referring to check sequence				
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			F2-183	
		No	Replace oxygen sensor				
4	Check fuel line pressure at idle. Fuel line pressure: 194—255 kPa (2.0—2.6 kg/cm ² , 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 opened valve (PRC)	F2-160	
				ECU malfunction (Check (2T) terminal voltage)	F2-175		
5	Check for fuel cut operation during deceleration. Fuel cut: after warm up Above 1,600 rpm (G6) Above 1,900 rpm (F2)	No	Check water temperature sensor	F2-179	Yes	Replace ECU	F2-175
				No	Replace water temperature sensor	F2-179	
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			F2-117	
		No	Adjust ignition timing				
7	Check other systems				Clutch slipping	Section H	
					Brake	Section P	
					Tire air pressure	Section Q	

800922-012

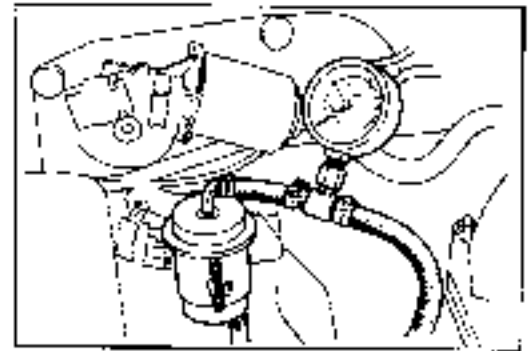
STEP 1



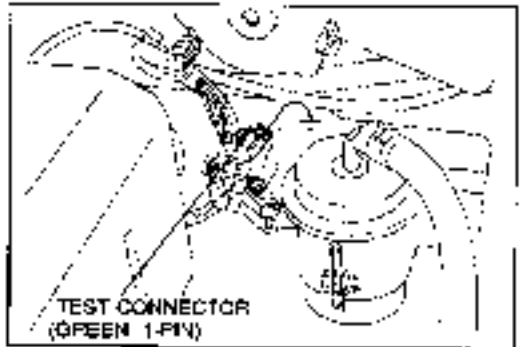
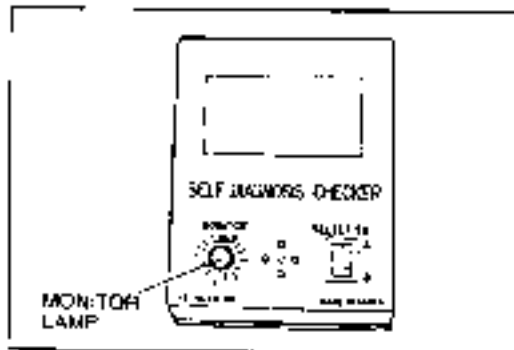
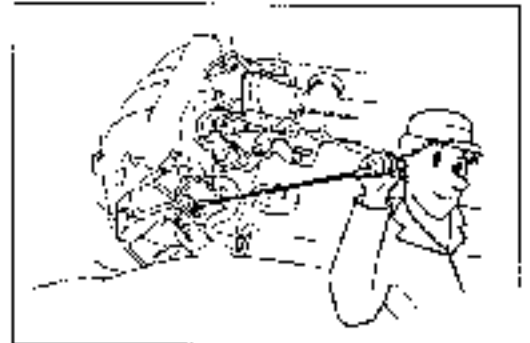
STEP 2



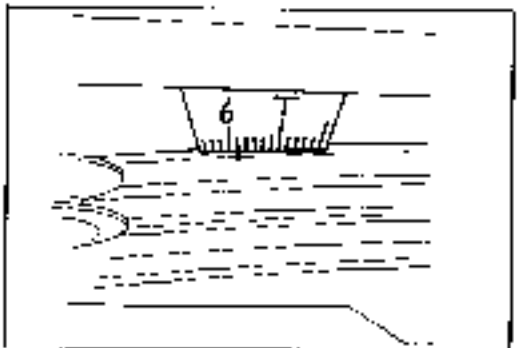
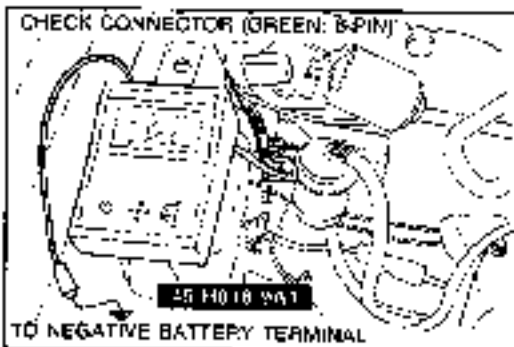
STEP 5



STEP 6



STEP 3



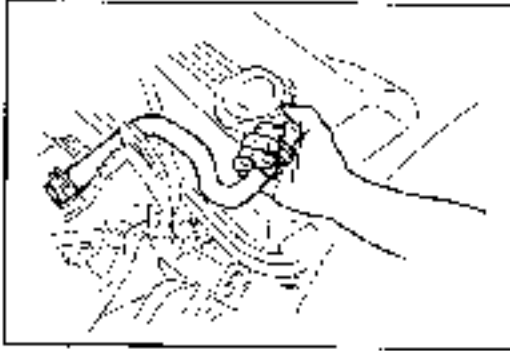
STEP 4

WARNING
BEFORE CONNECTING FUEL PRESSURE GAUGE, RELEASE FUEL PRESSURE FROM FUEL SYSTEM TO REDUCE POSSIBILITY OF INJURY OR FIRE (REFER TO PAGE F2-144)

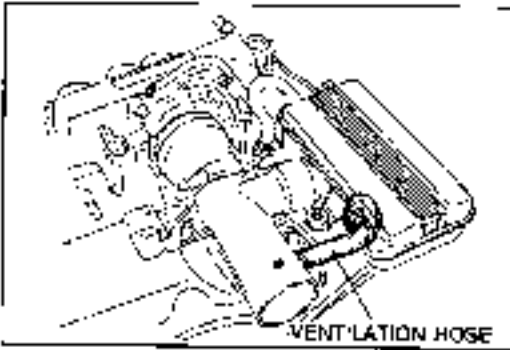
High oil consumption/White exhaust smoke						
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check for oil leak from engine	Yes	Repair or replace			
		No	Go to Next Step			
2	Disconnect PCV valve from engine Check if vacuum is full at idle	Yes	Go to Next Step			
		No	Check PCV valve	F2-103	Yes	PCV hose clogging
				No	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					

13J012-034

STEP 2



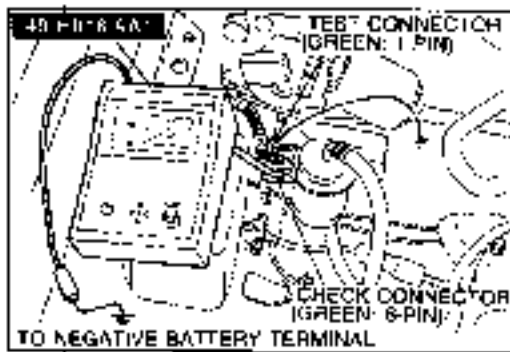
STEP 3



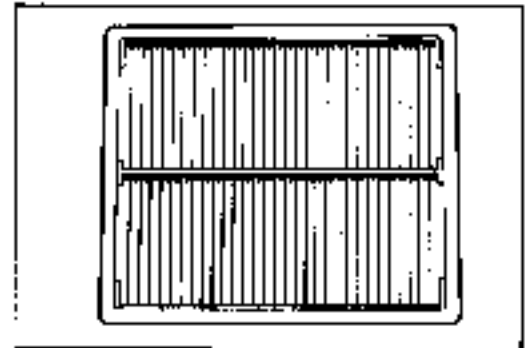
Afterburn on deceleration							
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check malfunction code with SST (IGN ON, Test connector (Green 1-pin) grounded)	Yes	Check for cause by referring to the check sequence			F2-122	
		No	Go to Next Step				
2	Check idle switch with SST (IGN ON, Test connector (Green 1-pin) grounded)	Yes	Go to Next Step				
		No	Check for cause by referring to the check sequence			F2-134	
3	Check ignition timing at idle after warm up 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 ² , 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
			No	Replace pressure regulator			F2-155
7						Check compression	Section B2
						Check valve timing	Section B2

PRL0122-010

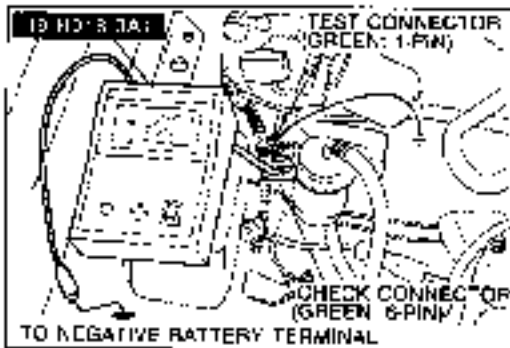
STEP 1



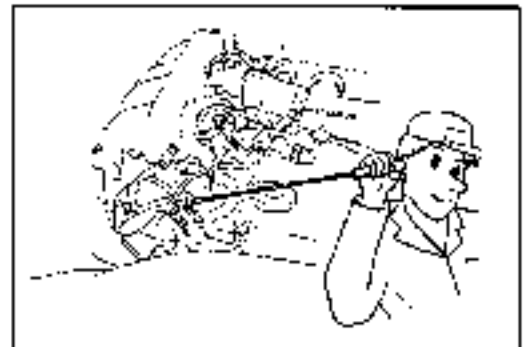
STEP 4



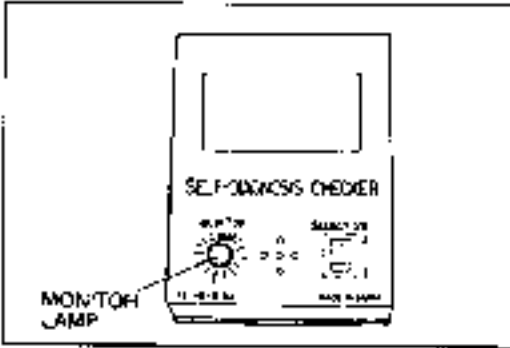
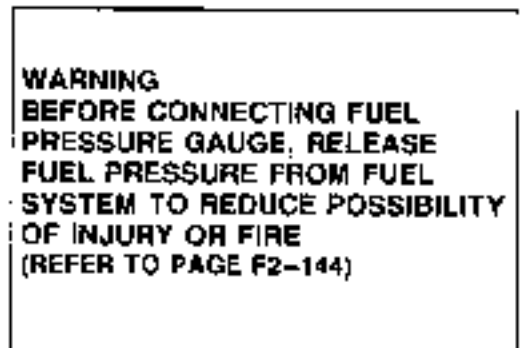
STEP 2



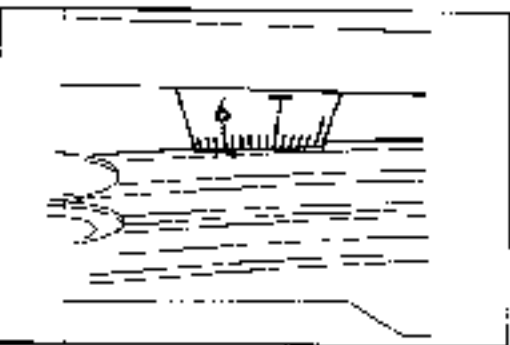
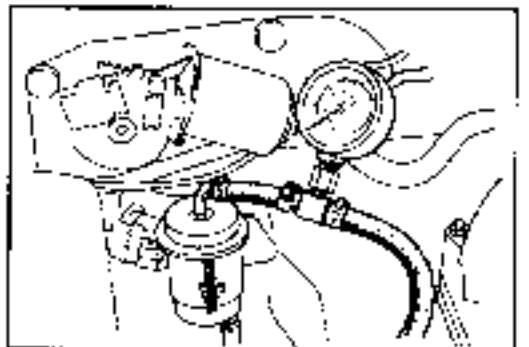
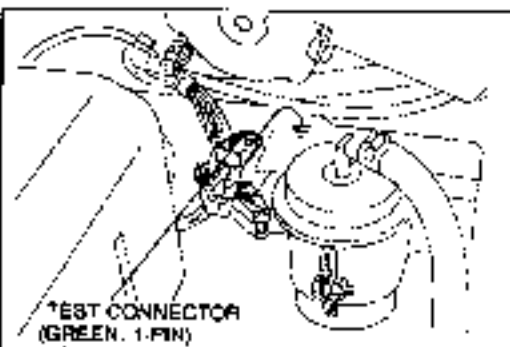
STEP 5



STEP 6



STEP 3



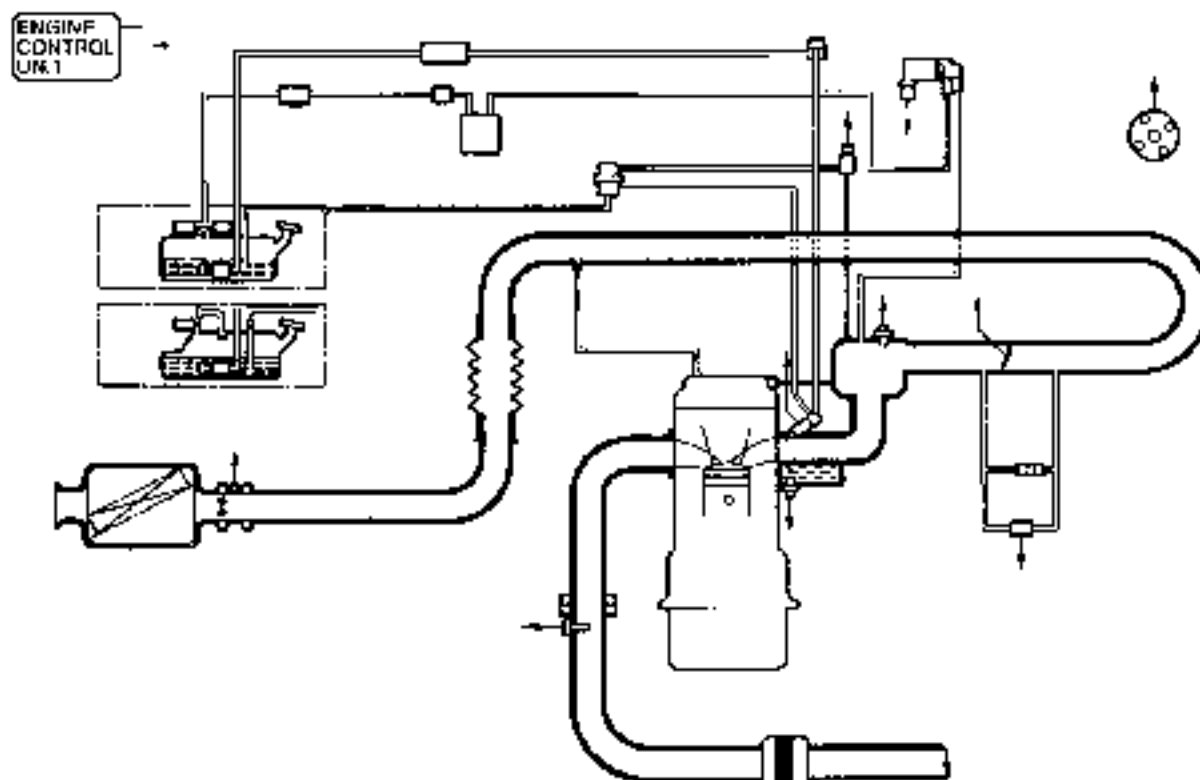
Rotten egg smell			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Change fuel to specified grade Check if condition improves		Poor fuel quality

9M-JO-2-06-0

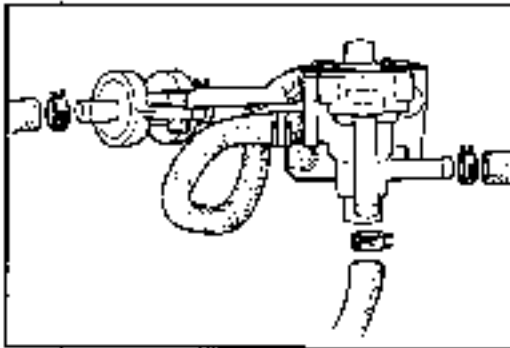
Gasoline fumes			
STEP	QUICK INSPECTION	ACTION	POSSIBLE CAUSE AND DETAILED INSPECTION
1	Check for leaks	Yes: Replace No: Go to Next Step	
2	Check if fumes are emitted from check-and-cut valve	Yes: Check check-and-cut valve No: Go to Next Step	F2-166 Yes: Check two-way check valve Purge line clogging 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 hoses (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

2010F2 949

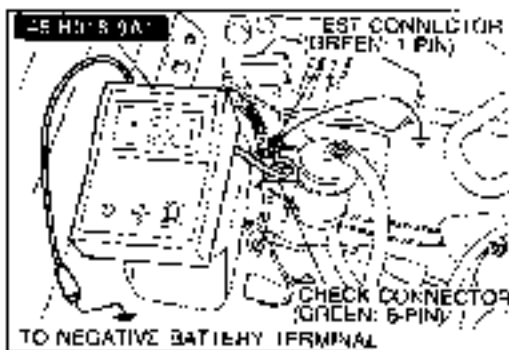
STEP 1



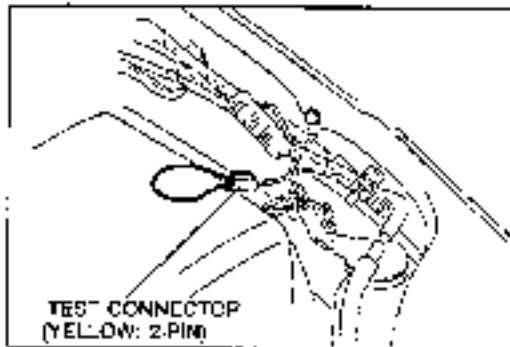
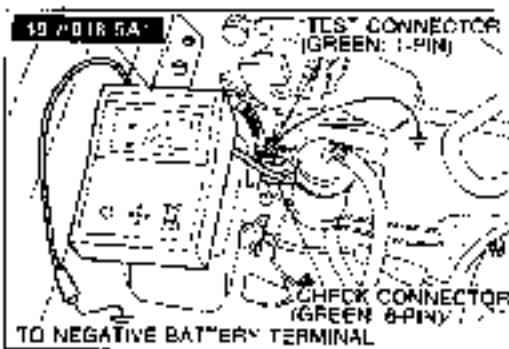
STEP 2



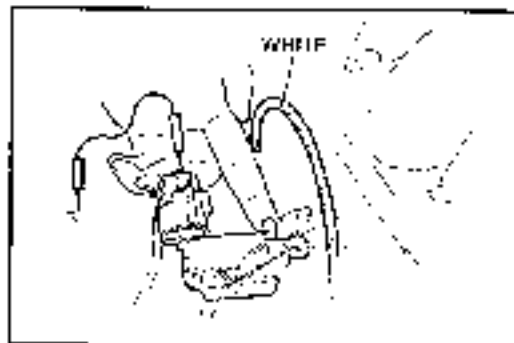
STEP 3



STEP 4



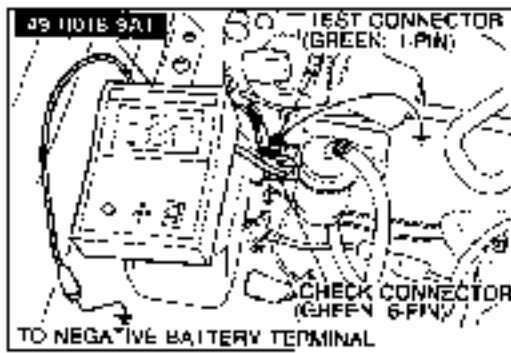
STEP 5



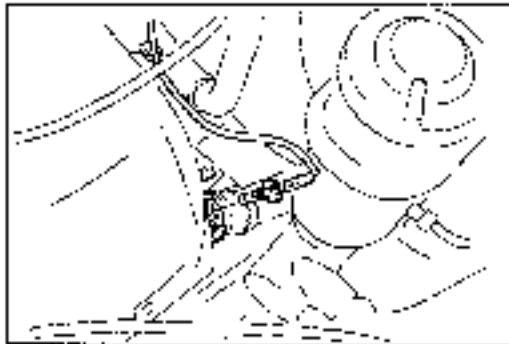
MIL always ON					
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION
1	(California) Check for malfunction code with SST [IGN ON, Test connector (Green: 1-pin) grounded]		"88" Replace ECU "00" Wiring between ECU (-E) terminal and MIL short to ground		
2	(Federal and Canada) Check if emission system parts replacement time has come Emission system parts replace- ment 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

1BJ0F2 037

STEP 1



STEP 2



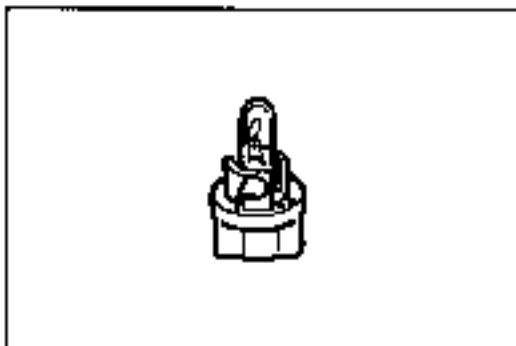
MIL never ON					
STEP	QUICK INSPECTION	ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION	
1	Check if other indicator lamps illuminate	Yes	Go to Next Step		
		No	Check power supply circuit to combination meter		Section T
2	Check bulb of the MIL	Yes (California only) Ground ECU (11F) terminal Check if MIL 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



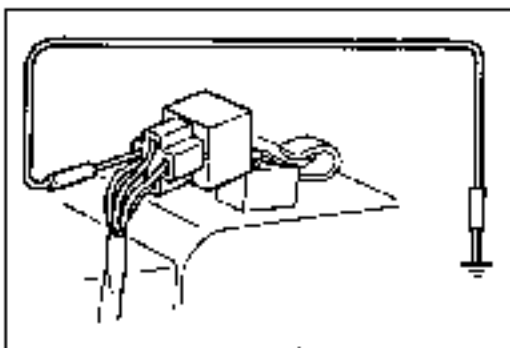
STEP 2

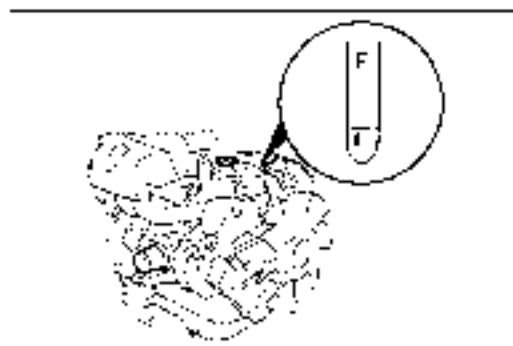


A/C does not work							
STEP	QUICK INSPECTION		ACTION		POSSIBLE CAUSE AND DETAILED INSPECTION		
1	Check if condenser fan operates when grounding A/C relay terminal wire (LW) (IGN ON)	Yes	Check voltage at ECU (1Q) terminal with SST. Voltage at idle after warm up: 0V (A/C and blower switches ON)	F2-175	Yes	ECU malfunction (Check (1Q) terminal voltage)	F2-175
						Wiring between ECU (1Q) and A/C relay open	
				No	A/C system malfunction	Section U	
		No	Check A/C system				Section U

1BU04-2C39

STEP 1





9M1XFP2-057

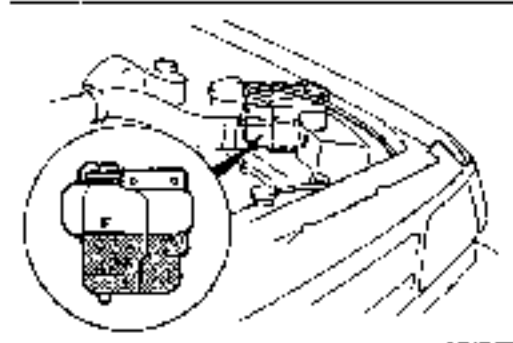
ENGINE TUNE-UP

BASIC INSPECTION

Engine Oil

Check the engine oil level and condition with the oil level gauge.

Add or change the oil if necessary.



9M1J3P2-056

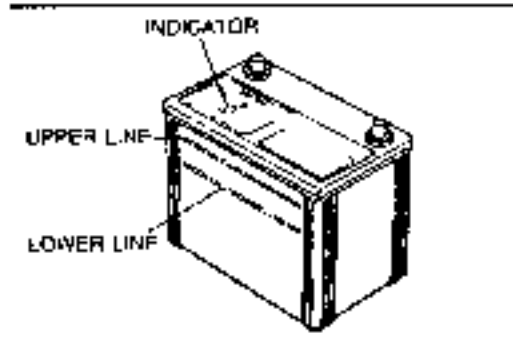
Coolant Level (Cold engine)

Warning

a) Never remove the radiator cap while the engine is hot.

b) Wrap a thick cloth around the cap while carefully removing it.

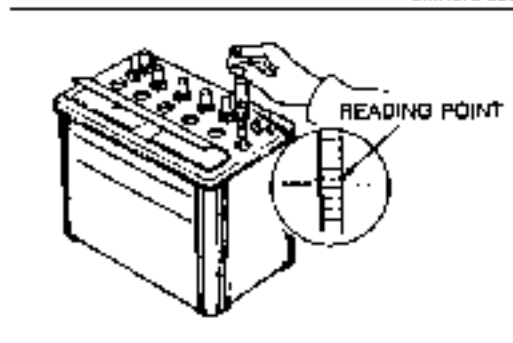
1. Check that the coolant level is near the radiator inlet port.
2. Check that the level in the coolant reservoir is between the FULL and LOW marks.
Add coolant if necessary.



9M110F2-059

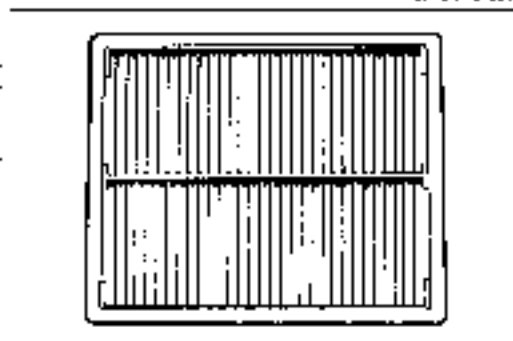
Battery

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.



9M100F2-060

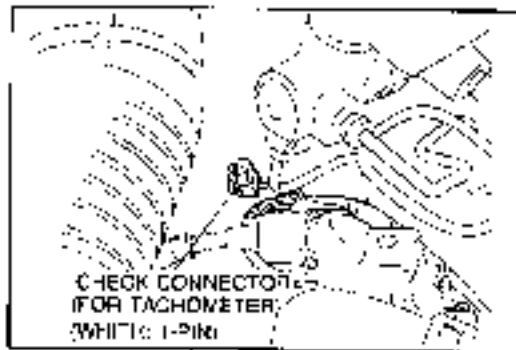
3. Check the specific gravity by using a hydrometer. If the specific gravity reading is **1.200 or less**, recharge the battery. (Refer to Section G.)



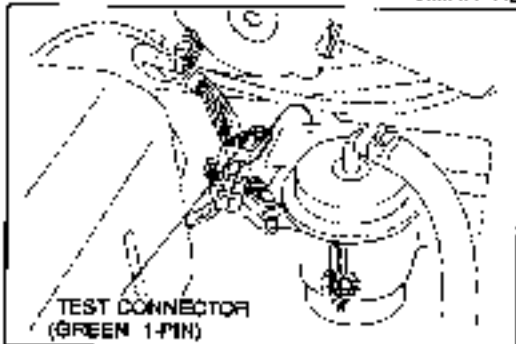
9M1J0F2-061

Air Cleaner Element

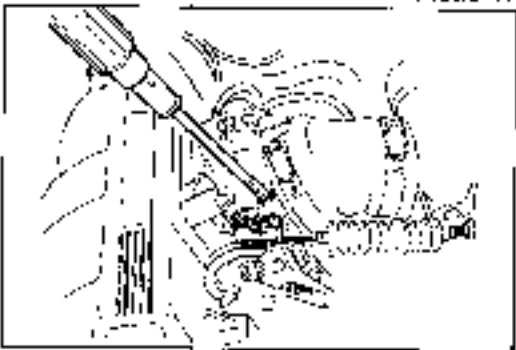
Visually check the air cleaner element for excessive dirt, damage, or oil. Clean or replace it if necessary.



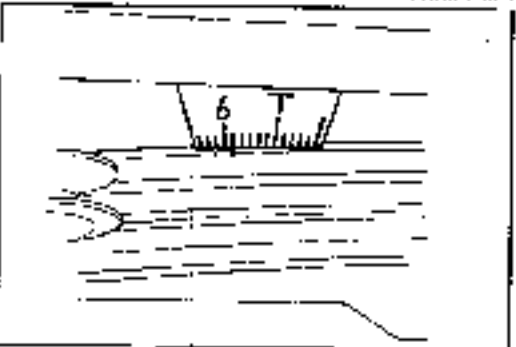
9M, XF2-122



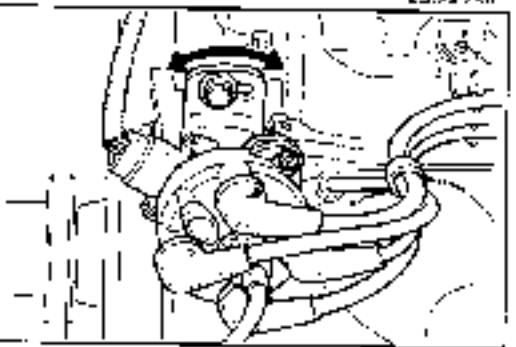
9P, UF2-127



9R, XF2-129



9S, UF2-131



9T, 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)

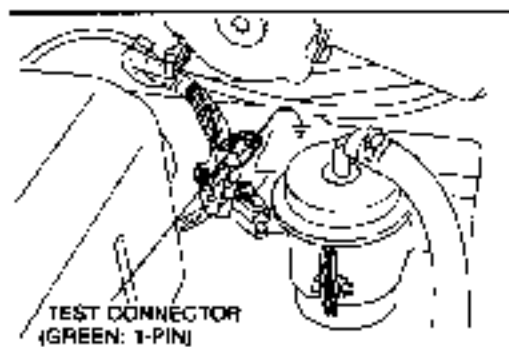
5. Check if the timing mark (Yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

Ignition timing: 4—6° BTDC (G6)
5—7° BTDC (F2)

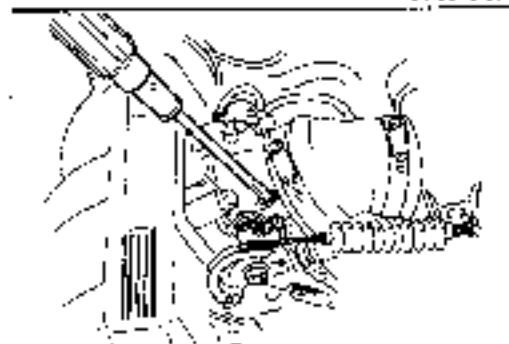
6. If the marks are not aligned, loosen the distributor lock bolts, and turn the distributor to make the adjustment.
7. Tighten the distributor lock bolts to the specified torque.

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

8. Remove the jumper wire.



9WUJF2C67



9ELNEF2 022

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.

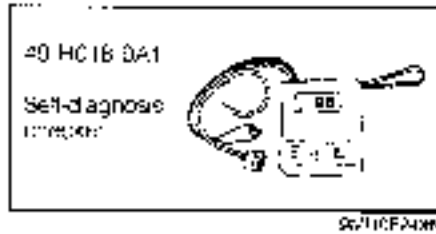
Idle speed: 730—770 rpm (M/T)
750—790 rpm (A/T, P range)

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

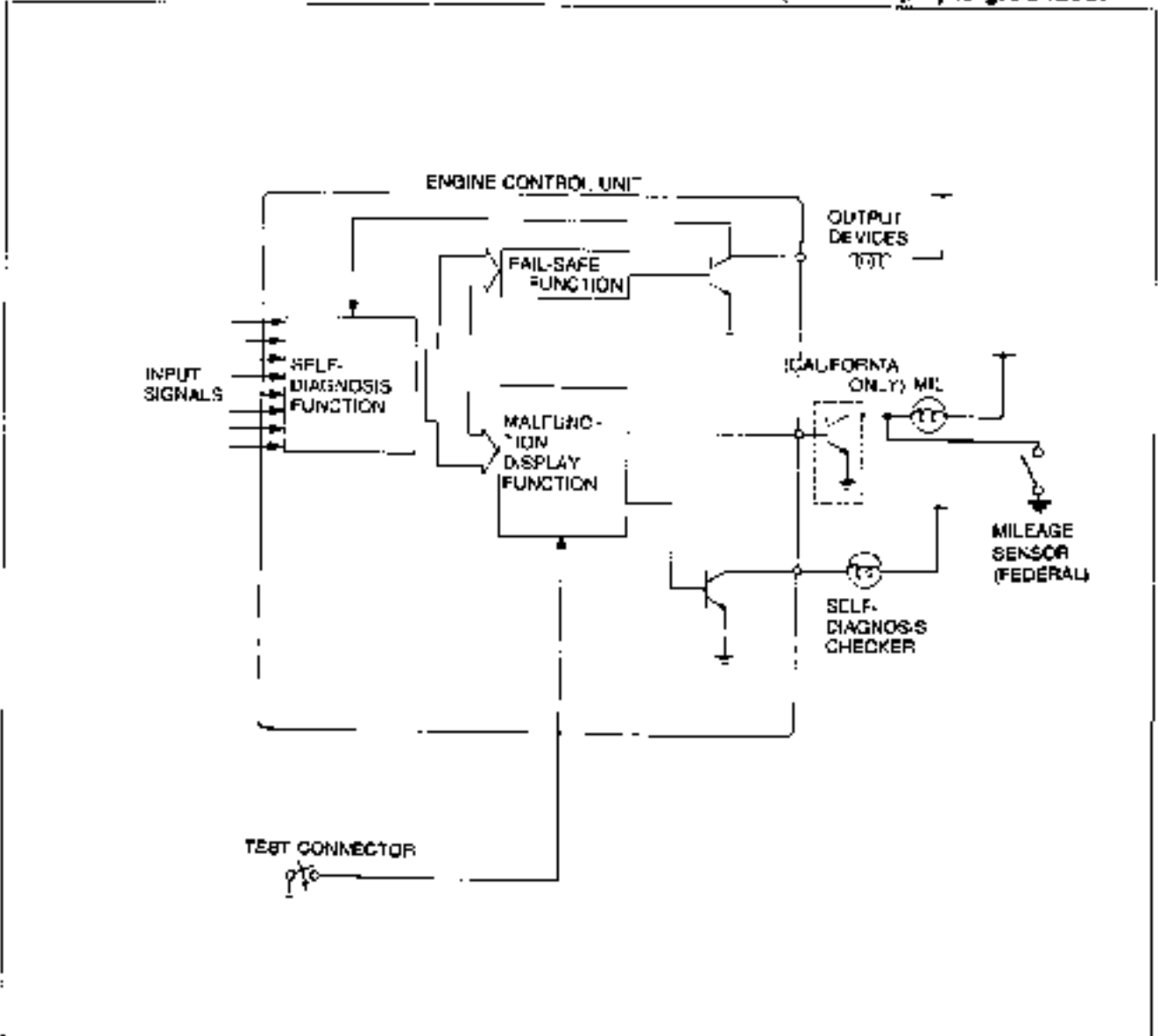


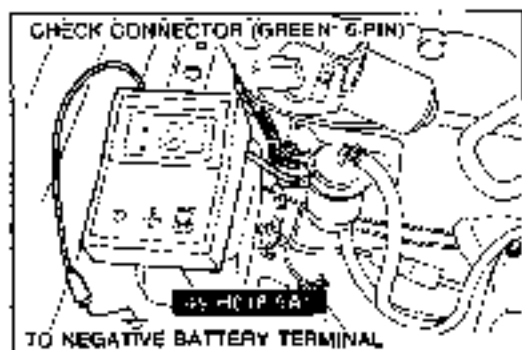
When troubles occur in the main input devices or output devices, check for the cause using the **SST**. Failures of each input and output device are indicated and retrieved from the engine control unit as malfunction code numbers.

Note

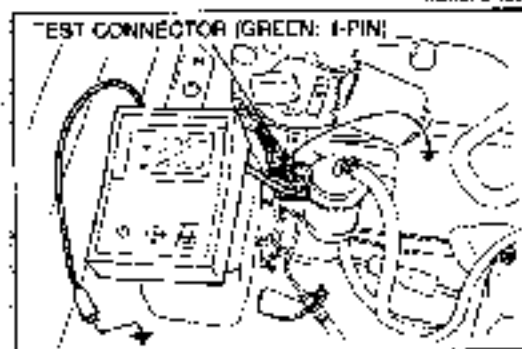
The engine control unit constantly checks for malfunction of the input devices.

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.

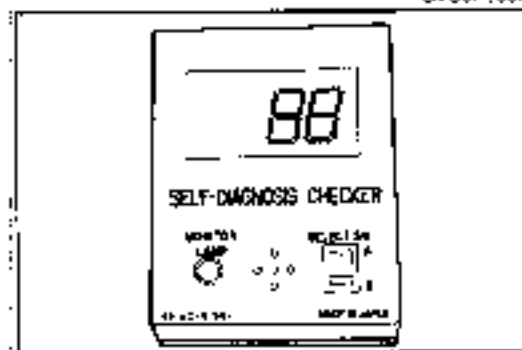




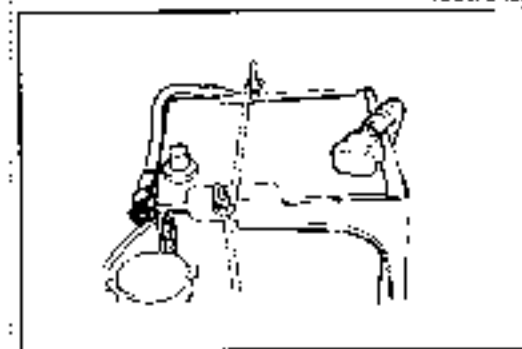
REL CF2 120



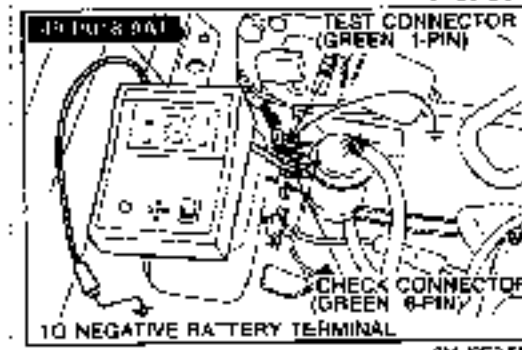
95-101P-5A



1ELUCF2 103



95-101P-5A



95-101P-5A

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 **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.

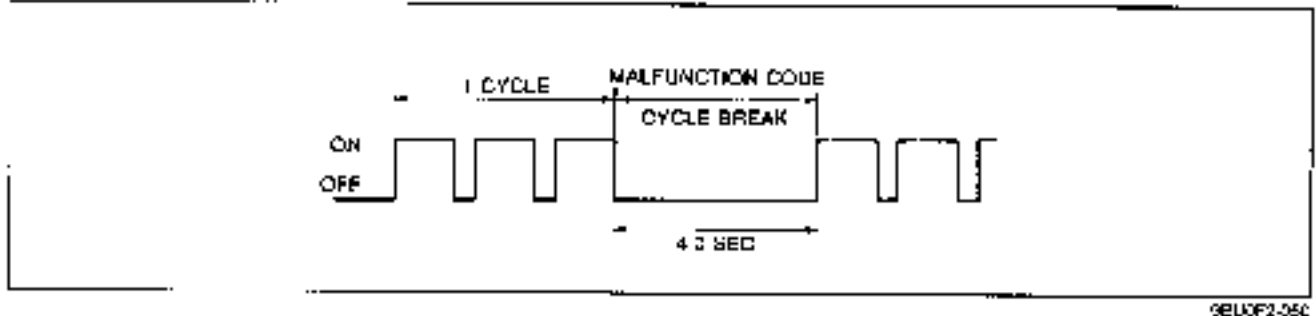
PRINCIPLE OF CODE CYCLE

Malfunction codes are determined as shown below

861104A-0-7

1. Code cycle break

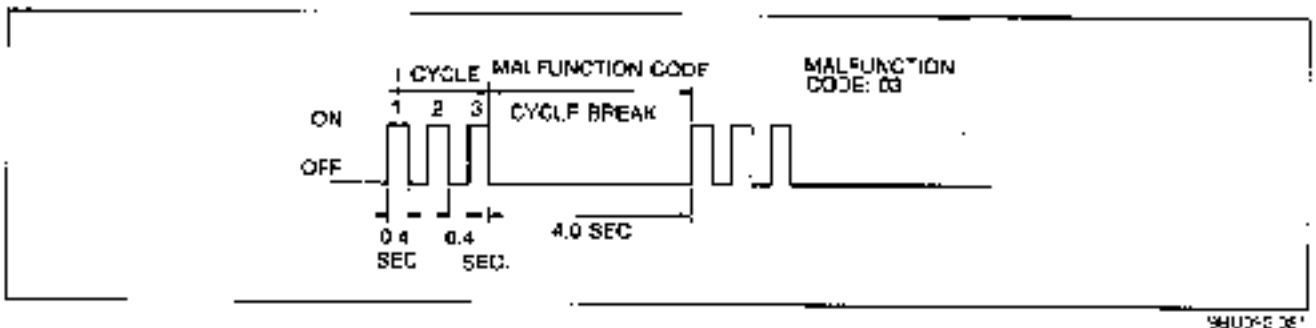
The time between malfunction code cycles is 4.0 sec (the time the MIL (California only) and the buzzer are off).



98U0F2-052

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.

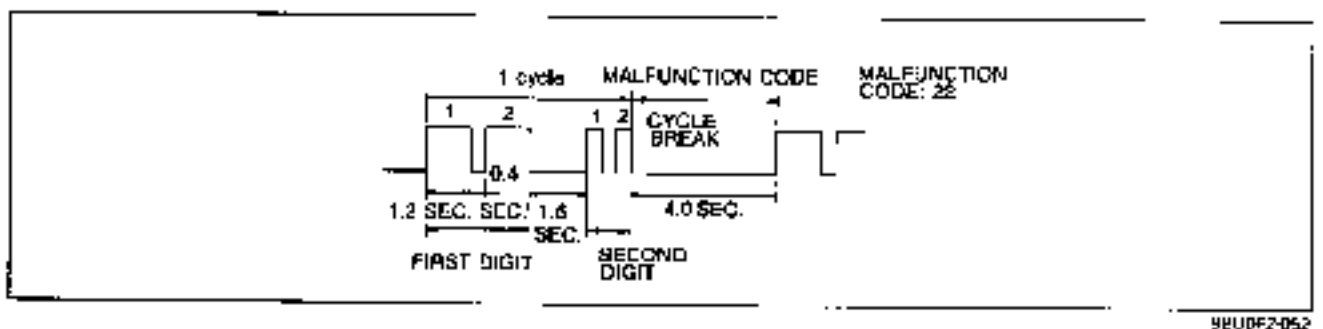


98U0F2-051

3. First digit of malfunction code (tens position)

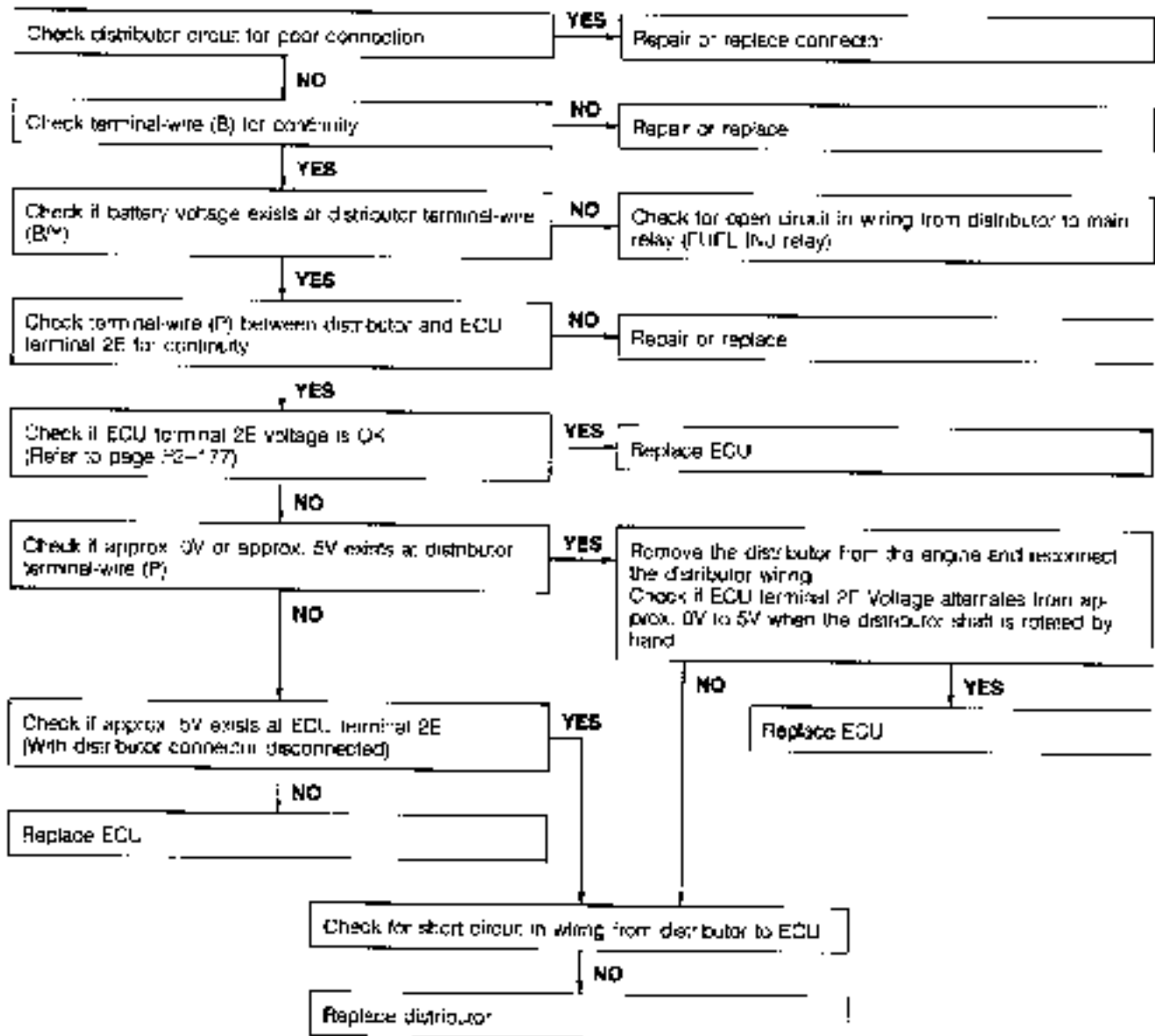
The digit in the tens position of the malfunction code represents the number of times the MIL (California only) and the buzzer are on 1.2 sec during one cycle.

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.



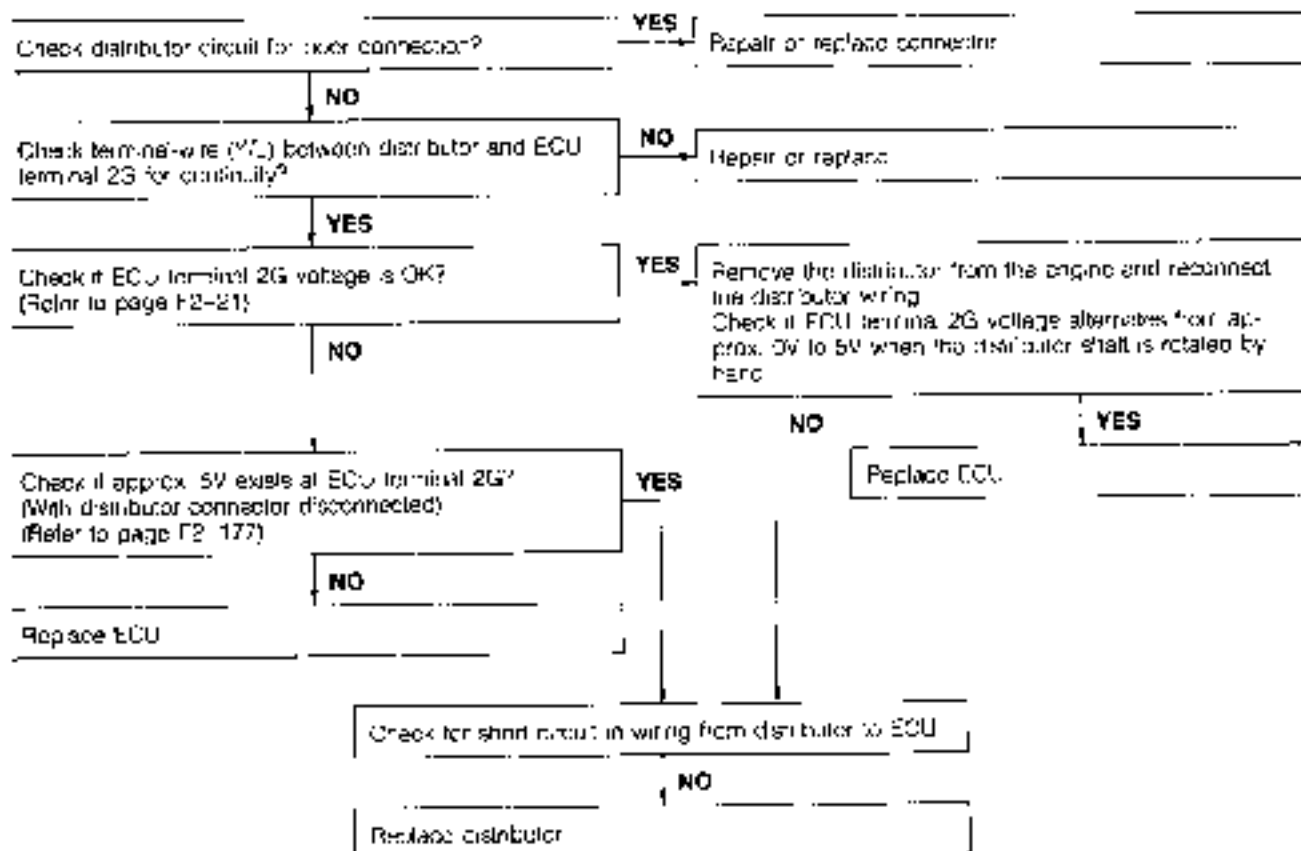
98U0F2-052

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**

18LUF2-101

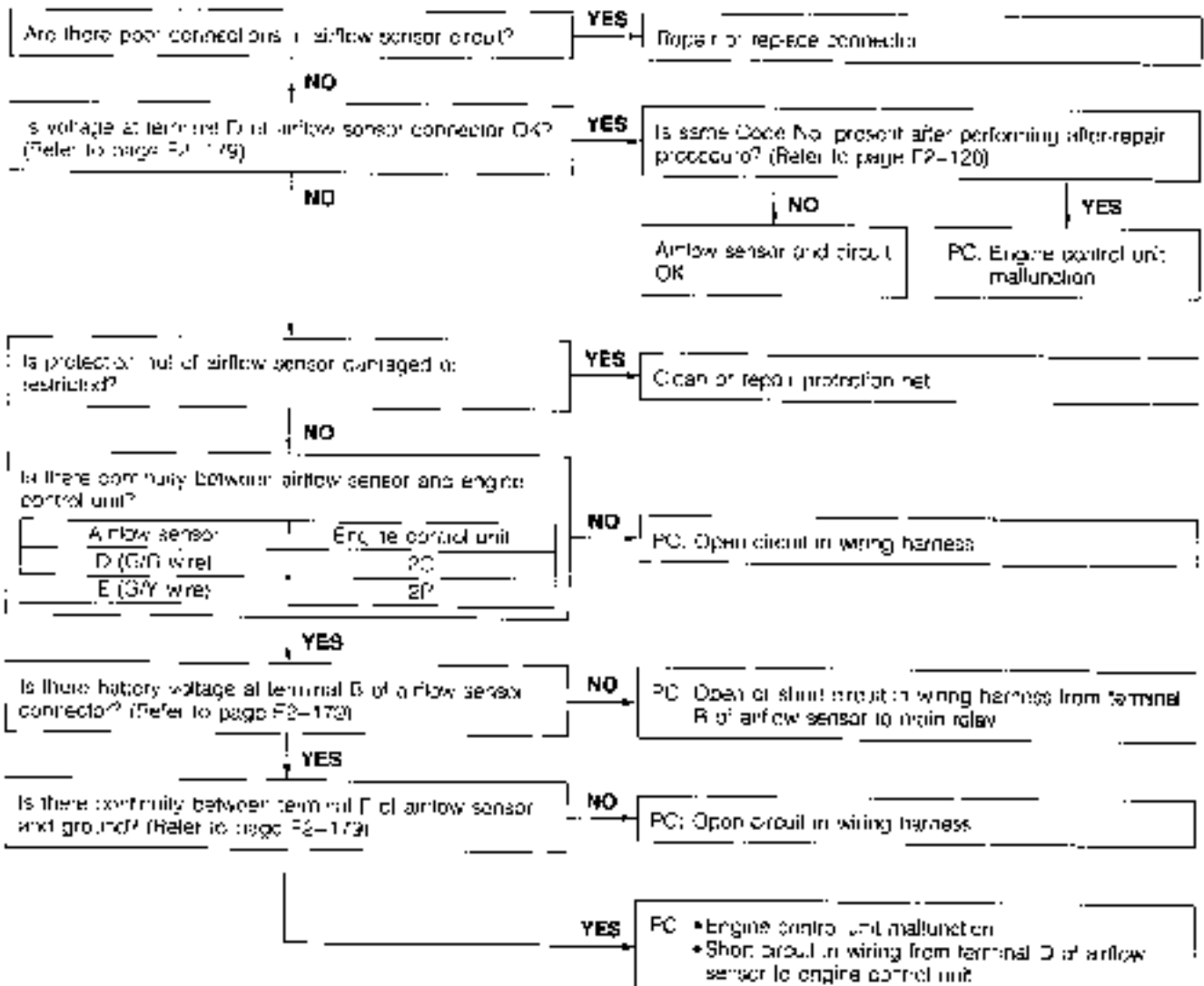
Code No.03 (Distributor G-signal)



18-04-2-102

Code No.08 (Airflow sensor)

PC: Possible Cause



2000-2-034

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
60°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

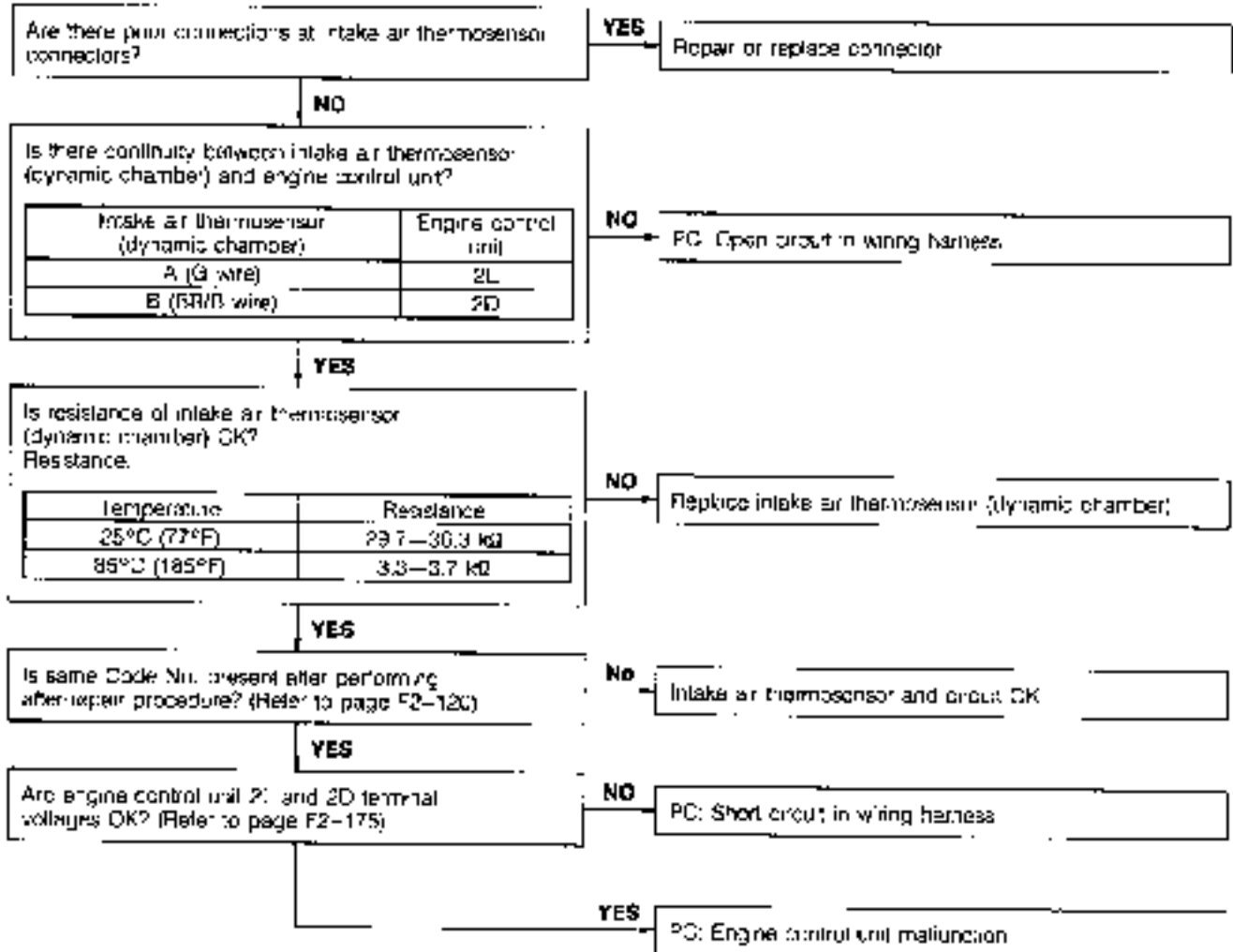
YES

PC: Engine control unit malfunction

13UDF2-041

No.11 Code (Intake air thermosensor)

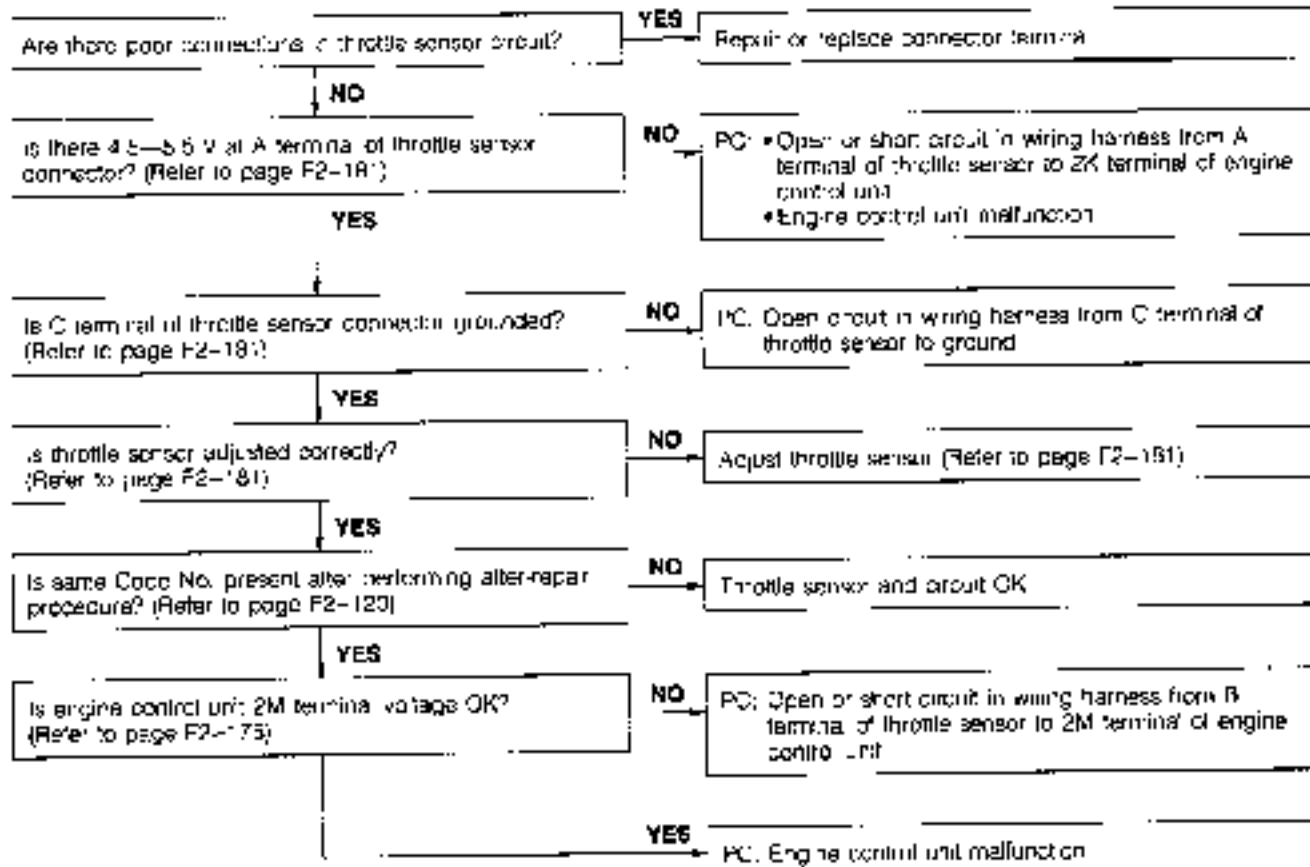
PC: Possible Cause



13UJF2-047

Code No.12 (Throttle sensor)

PC: Possible cause



13UDF2-0A3

Code No.14 (Atmospheric pressure sensor in ECU)

Replace ECU

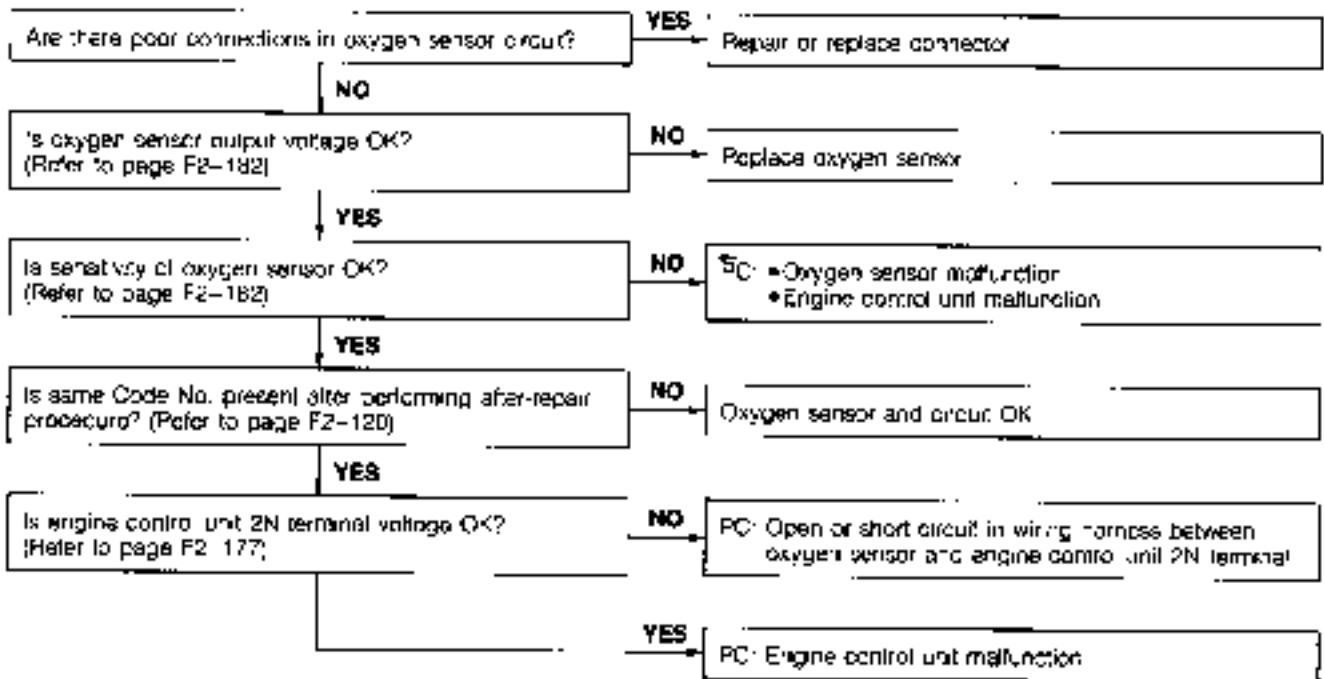
JBR1072-053

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.)



280UR-2025

Code No.17 (Oxygen sensor—inversion)

PC: Possible Cause

Warm up engine and run it at 2,500 - 3,000 rpm for three minutes.
Does monitor lamp of Self-Diagnosis Checker illuminate at idle?

NO

PC: • Air leak in vacuum hoses or emission component
• Contaminated oxygen sensor
• Insufficient fuel injection

YES

Are spark plugs clean?

NO

Clean or replace spark plugs

YES

Is oxygen sensor voltage OK? (Refer to page F2-152)

NO

PC: Oxygen sensor malfunction

YES

Is same Code No. present after performing after-repair procedure? (Refer to page F2-120)

NO

Feedback system OK

YES

Is engine control unit 2N terminal voltage OK? (Refer to page F2-177)

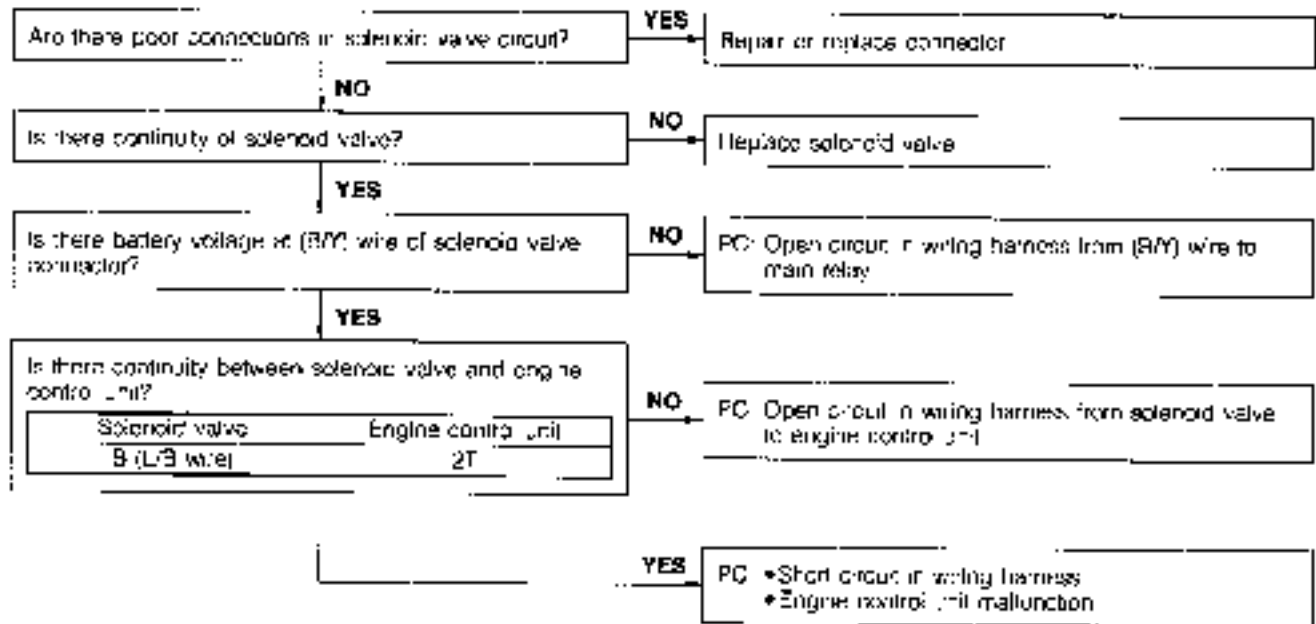
NO

PC: Open or short circuit in wiring harness between oxygen sensor and engine control unit 2N terminal

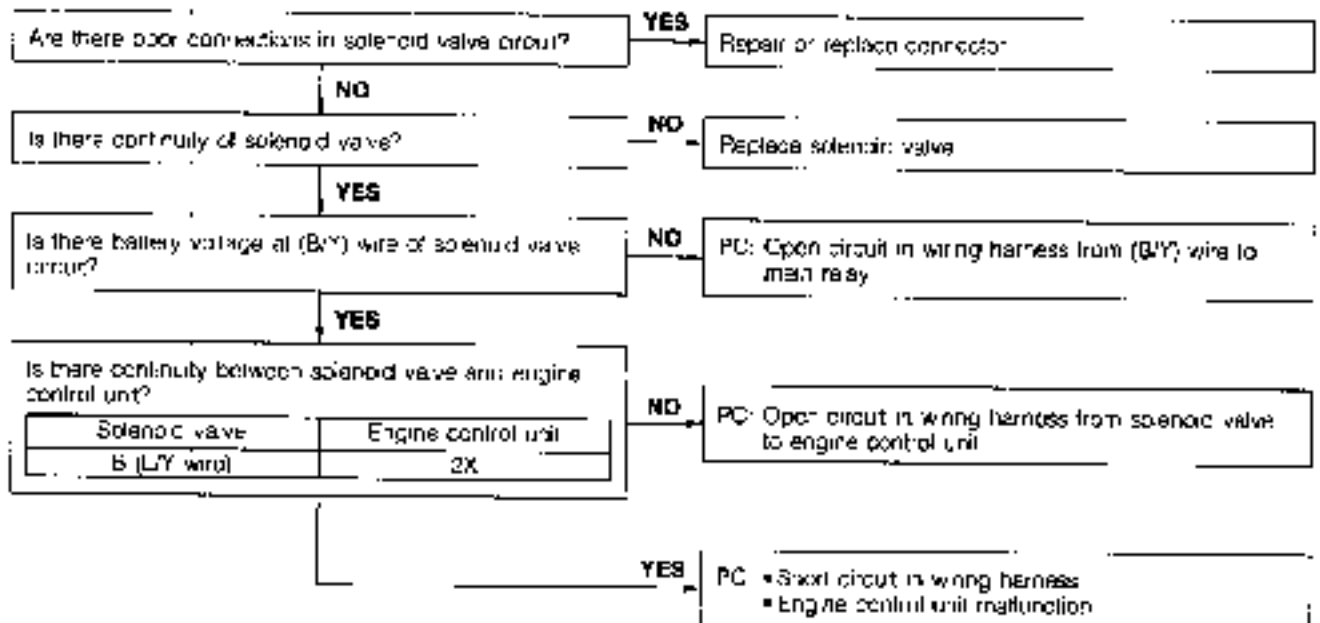
YES

PC: Engine control unit malfunction

2EUDF2 CP5

Code No.25 (Solenoid valve—Pressure regulator control)**PC: Possible Cause**

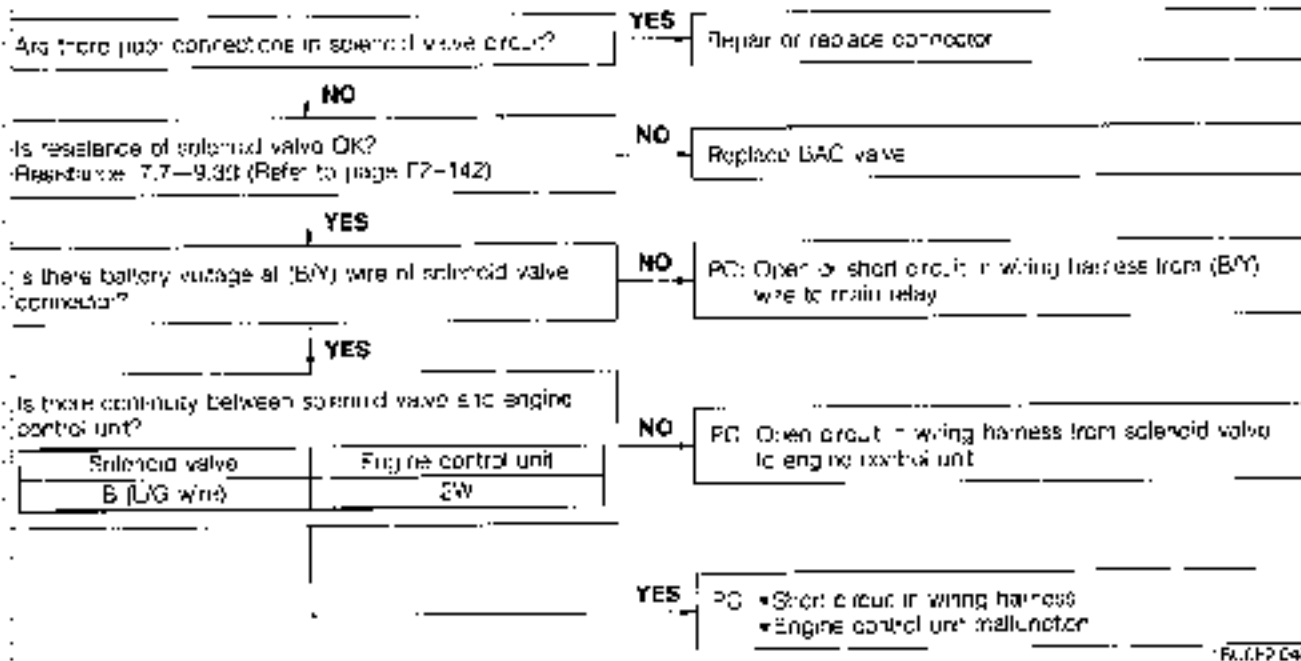
JBL/PA/052

Code No.26 (Solenoid valve—Purge control)

JBL/PA/052

Code No.34 (Solenoid valve—Idle speed control (ISC))

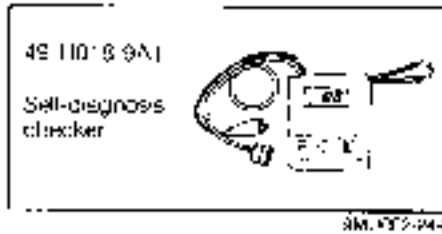
PC: Possible Cause



F2-137 C48

SWITCH MONITOR FUNCTION

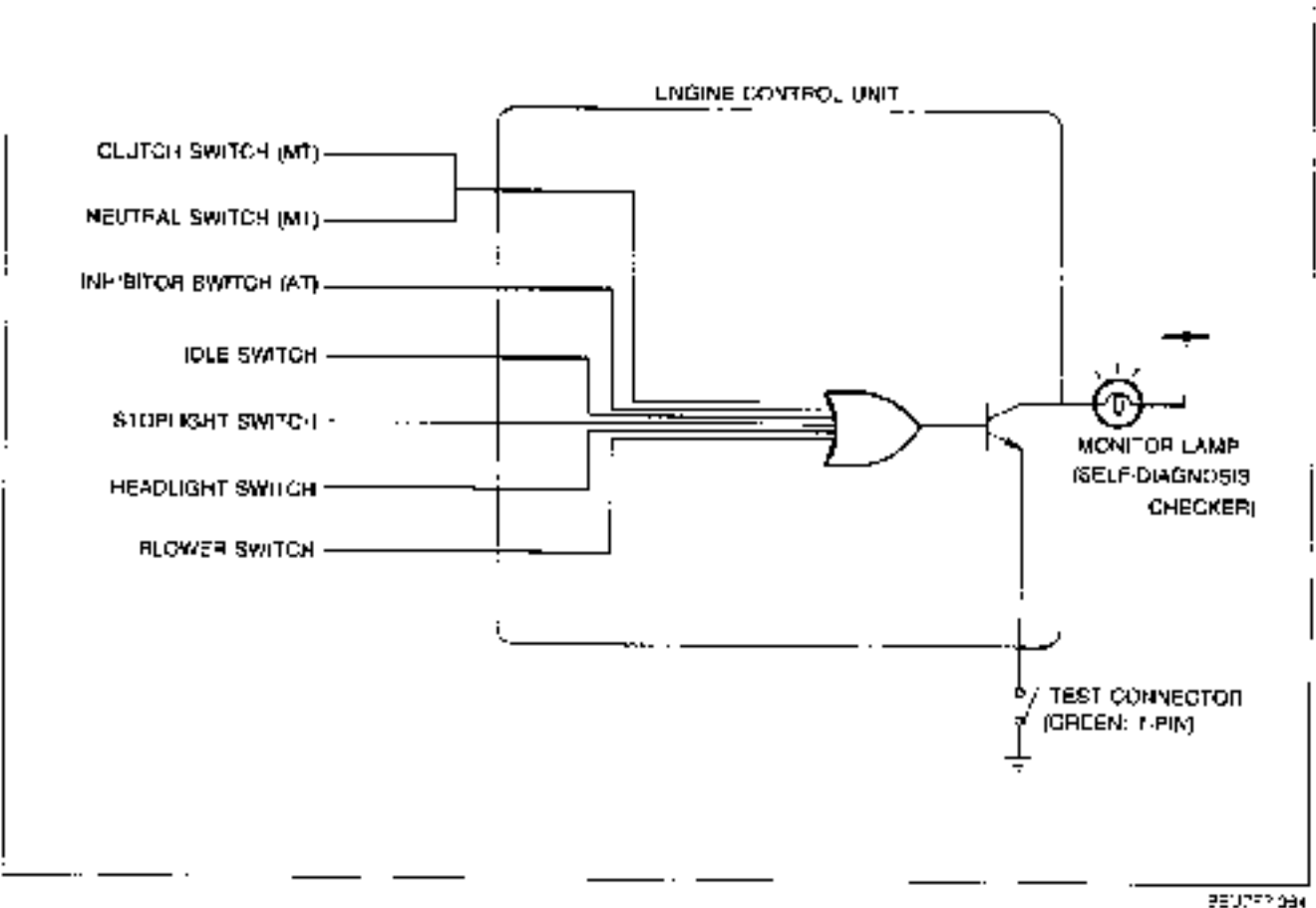
PREPARATION SST



Individual switches can be monitored by the SST.

Note

The test connector must be grounded and the ignition switch ON (engine stopped).



95U77-094

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 light ON
Blower switch		ON	OFF	Blower motor ON

95U77-2459

CHECK CONNECTOR (GREEN: 6-PIN)



88U04A-054

TEST CONNECTOR (GREEN: 1-PIN)



88U04A-055

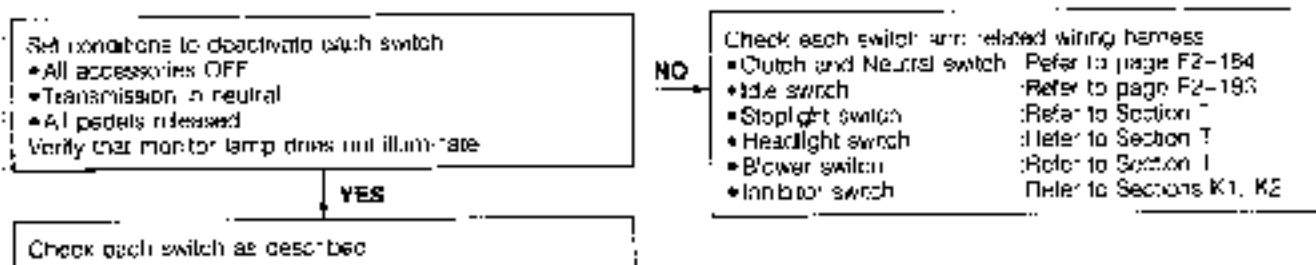
INSPECTION PROCEDURE

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

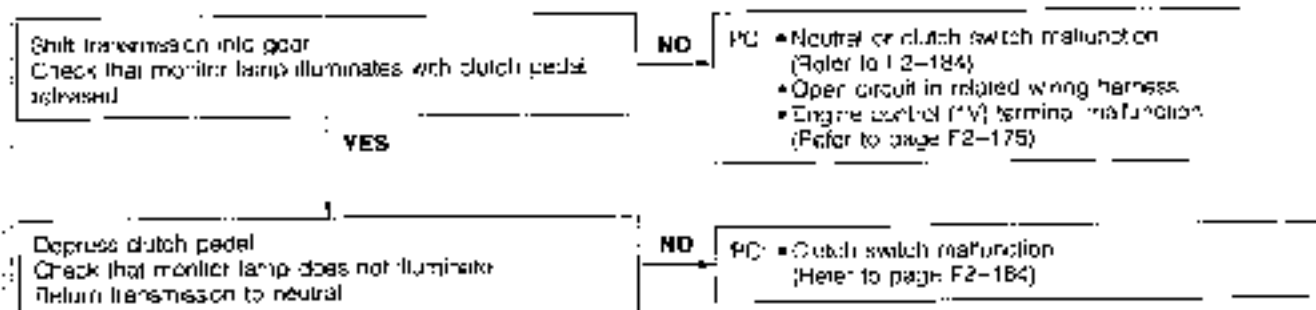
- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

Procedure



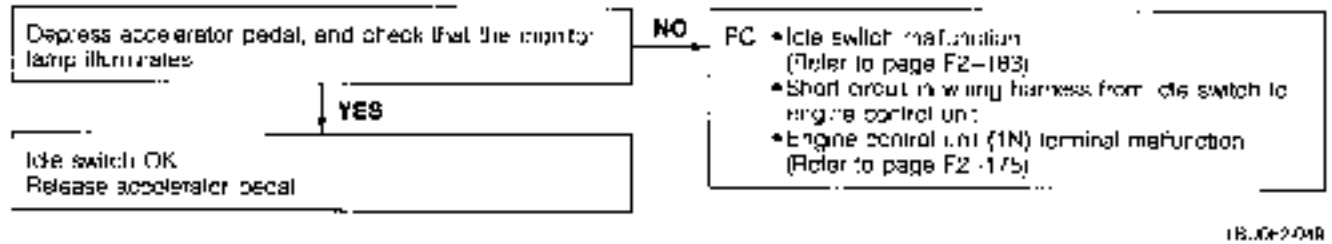
29J0F2-027

Neutral and Clutch switch (M/T)

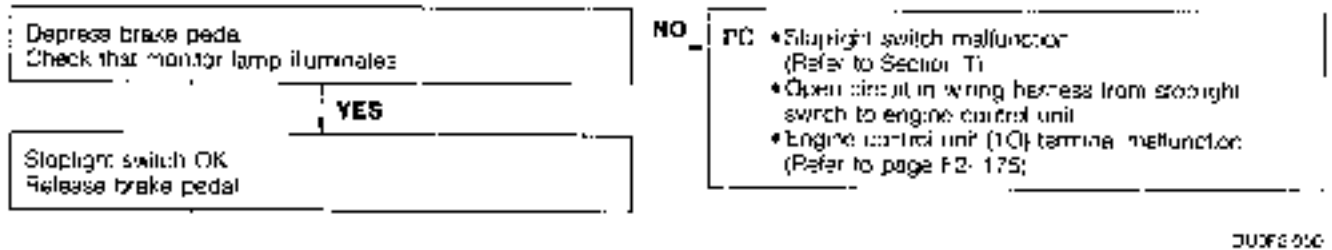


10L07X048

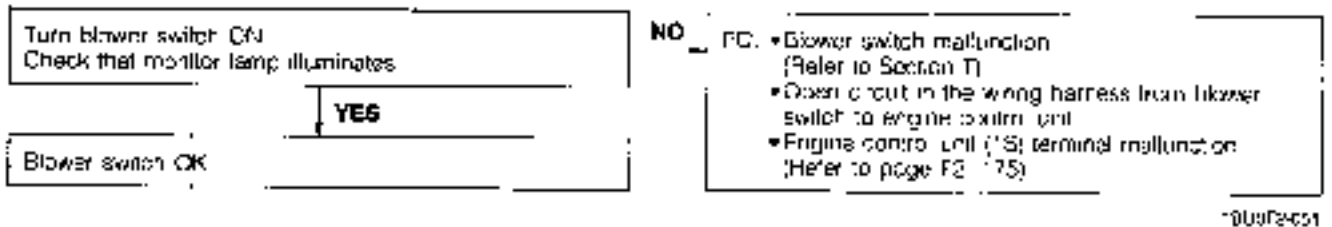
Idle switch



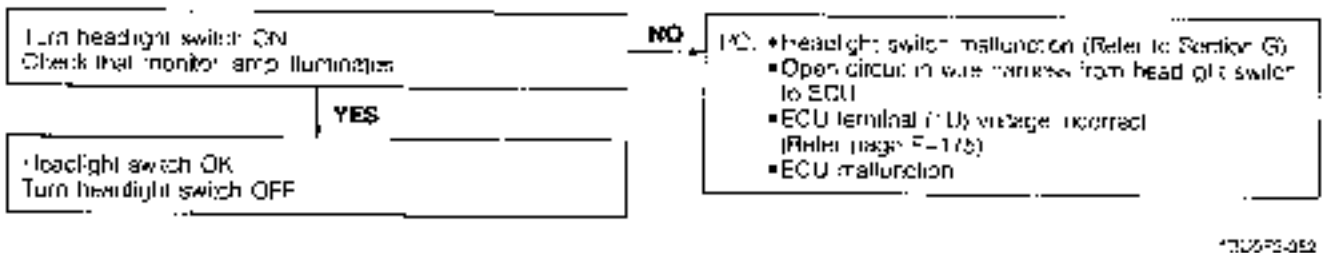
Stoplight switch



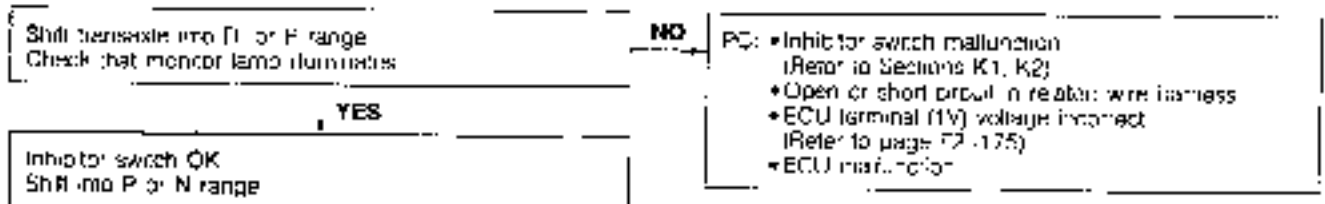
Blower switch



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

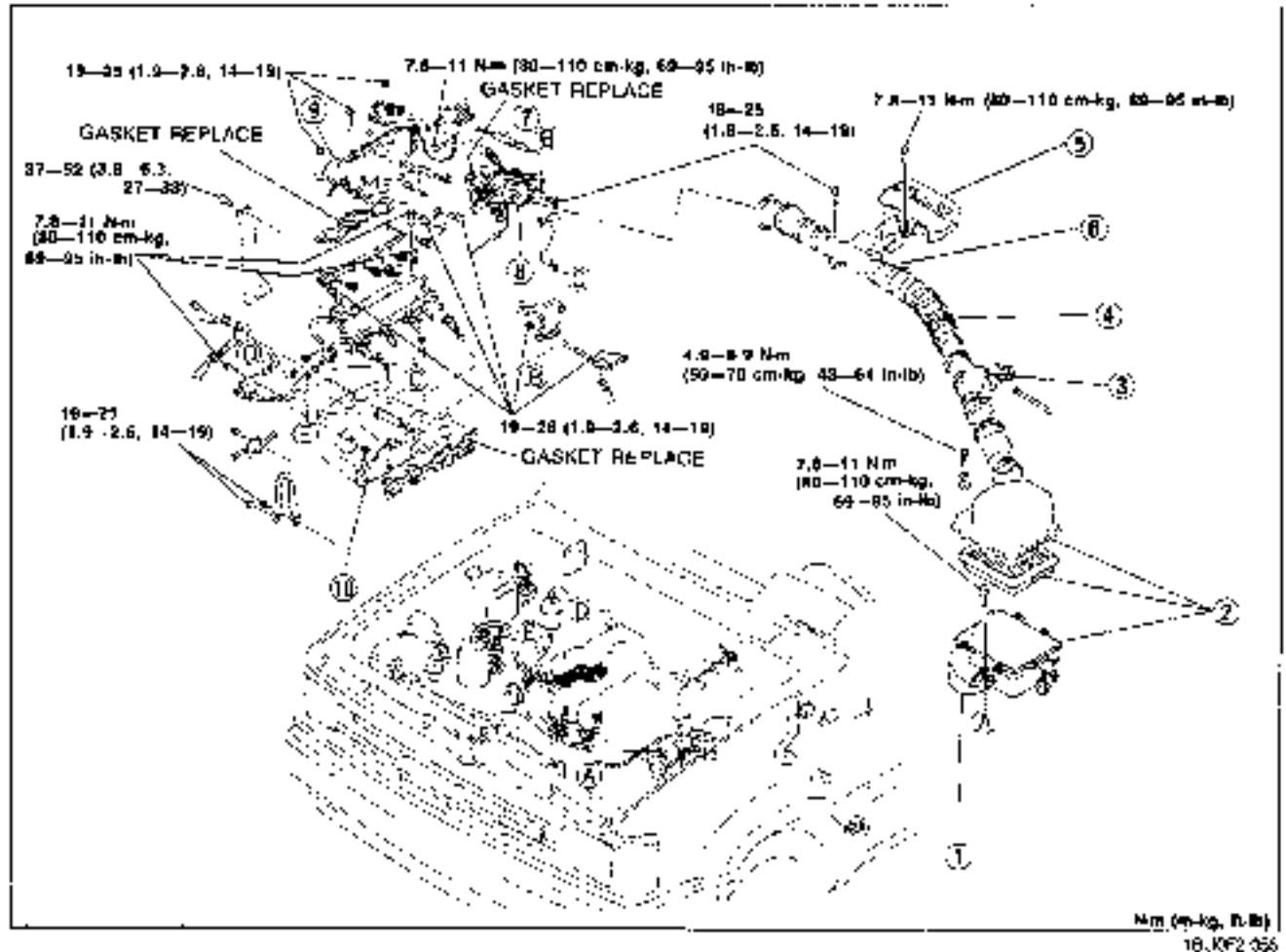
Headlight switch OK
Turn OFF headlight switch

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.



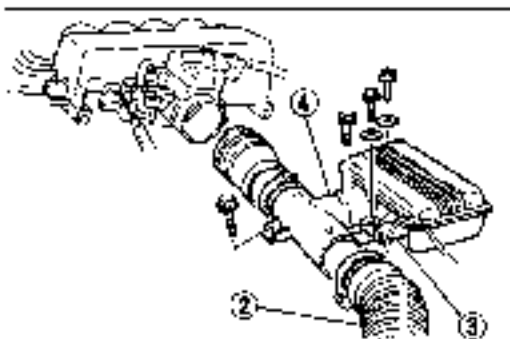
Inspection

1. Check for air leaks by listening for sucking noises.
2. Visually check the components for damage and replace if necessary.

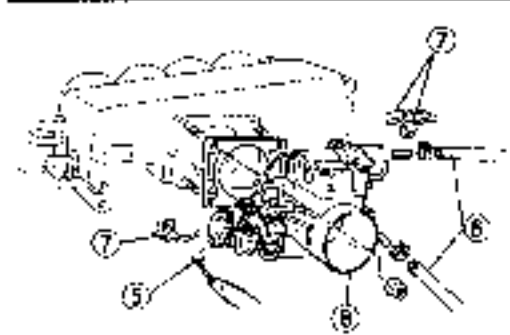
1. Air duct Inspect for damage	5. Resonance chamber (G6) Inspect for damage	9. Dynamic chamber Inspect for damage
2. Air cleaner Inspect for excessive dirt, damage, or oil	6. Air pipe Inspect for damage	Removal and Installation .. page F2-139
3. Airflow sensor Inspection and Replacement page F2-179	7. 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

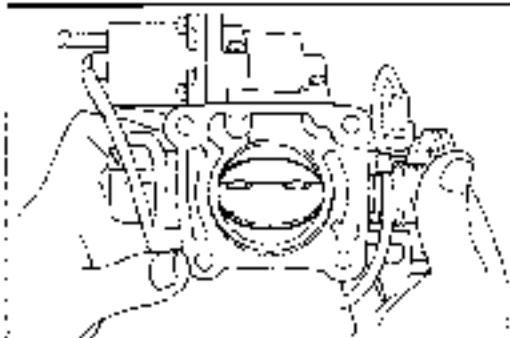
- a) The air cleaner must be replaced at the intervals outlined in the maintenance schedule.
- b) Never drive the vehicle without the air cleaner element, otherwise, damage to the airflow sensor (hot wire) will occur.
- c) Never use an oil permeated air cleaner element, otherwise, contamination of the hot wire will occur.



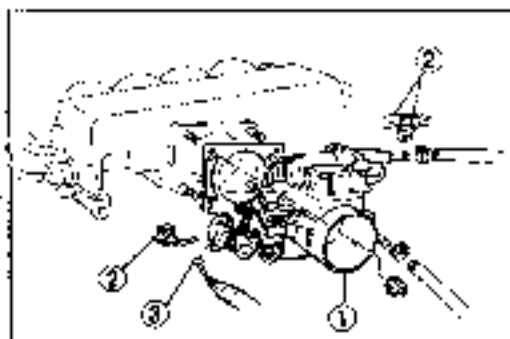
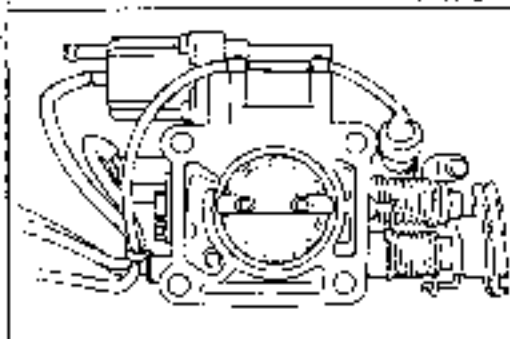
2BU3F2 C29



CBUOF2-050



CBUOF2-051



CBUOF2-052

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.

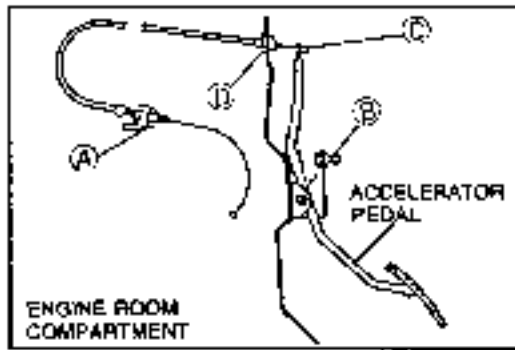
Note

- Use a new gasket.

Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

2. Connect the connectors.
3. Install the accelerator cable.

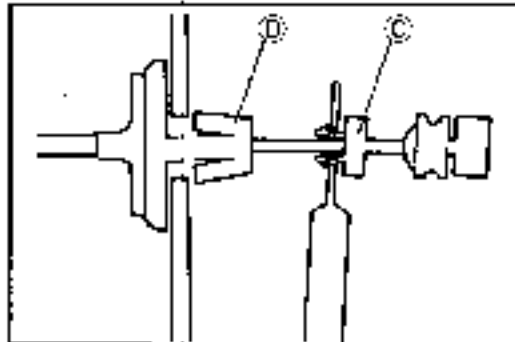


9MJC02-107

ACCELERATOR CABLE

Inspection

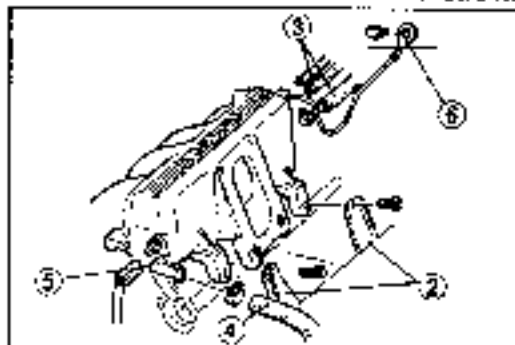
1. Check deflection of the cable. If deflection exceeds 1—3mm (0.039—0.118 in), adjust it by turning nuts A.
2. Depress the accelerator pedal to the floor and check that the throttle valve opens fully. Adjust with bolt B if necessary.



9MJC02-108

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 lops of stay (C) and remove the accelerator cable from the pedal arm.
4. Compress the lops 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.



11U04-2-103

DYNAMIC CHAMBER

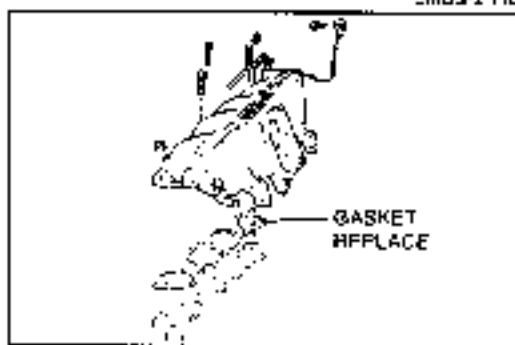
Removal

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.



9MJC02-110

7. Remove the injector harness bracket.
8. Remove the dynamic chamber.



9MJC02-111

Installation

Install in the reverse order of removal.

Note

Use a new gasket.

Tightening torque

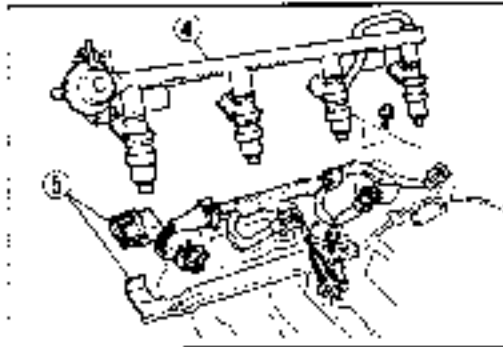
Dynamic chamber and dynamic chamber bracket:
19—25 Nm (1.9—2.6 m·kg, 14—19 ft·lb)

Ground wire:

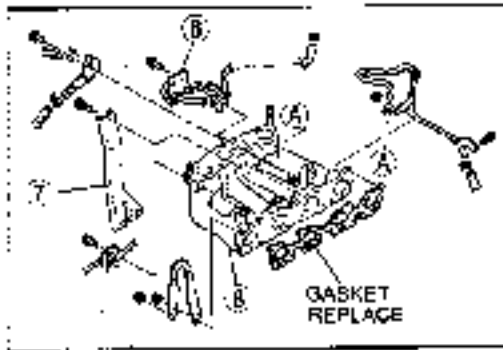
7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)



1DL0F2 067



9VL0F2 113



9VL0F2 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:

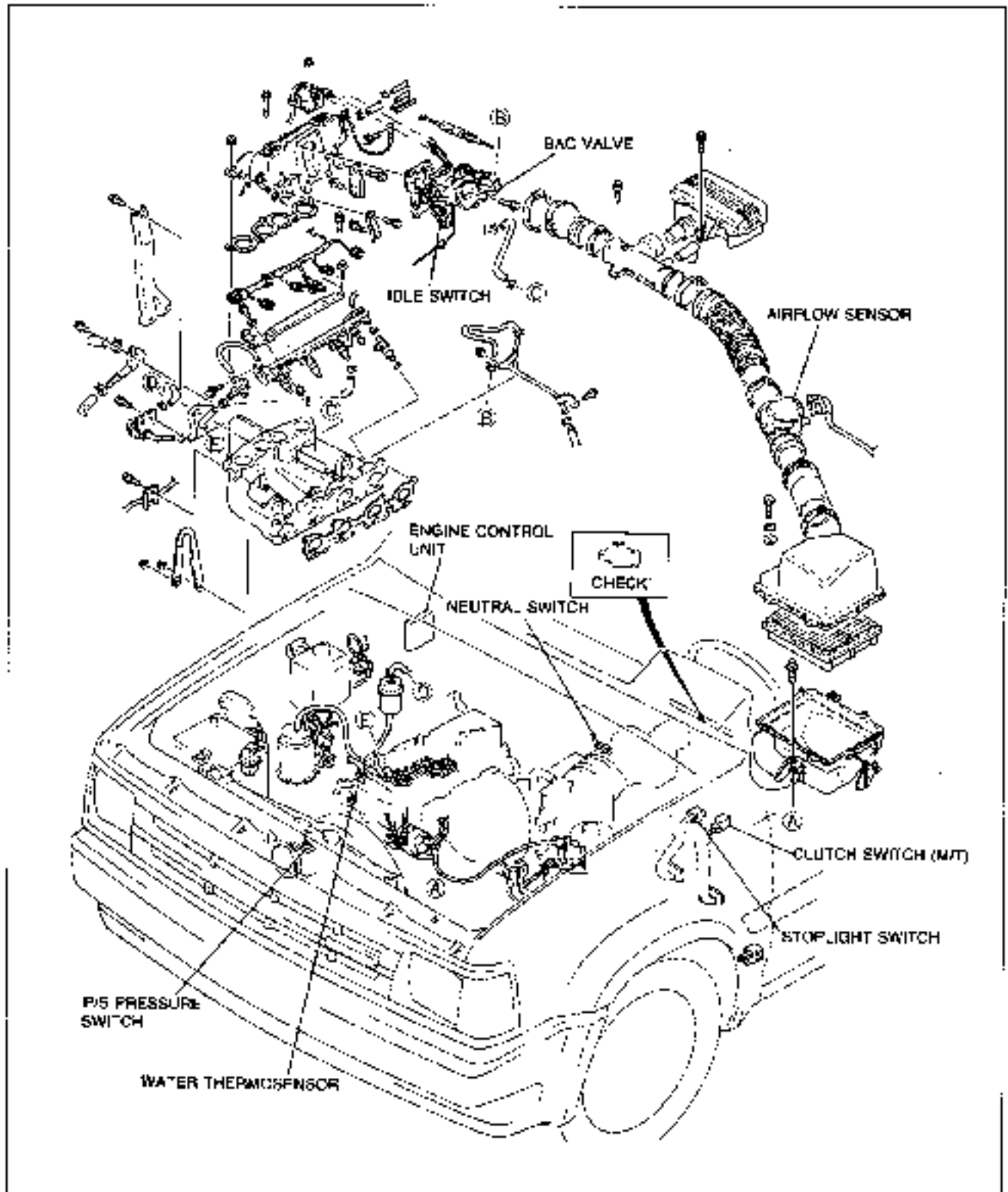
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Pulsation damper and injector harness bracket:

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

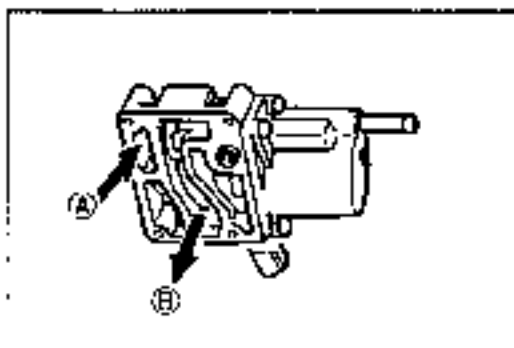
IDLE SPEED CONTROL (ISC) SYSTEM

DESCRIPTION

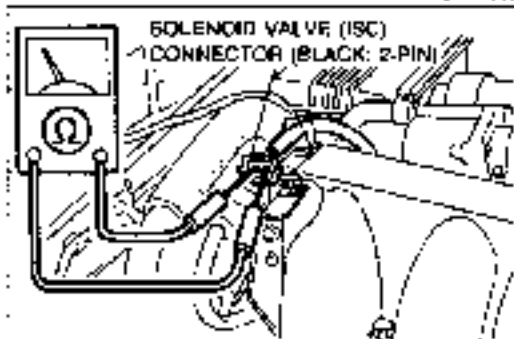


3MJC02-115

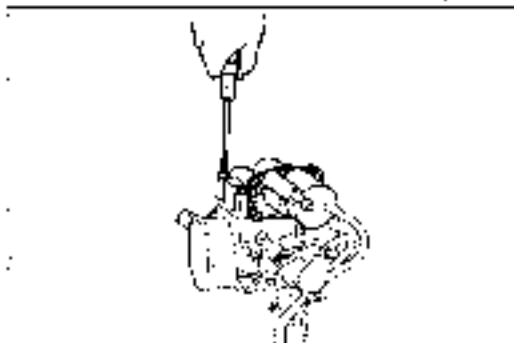
To improve idle smoothness, the ISC system controls the intake air amount by regulating the bypass air amount that passes through the throttle body. This system consists of the BAC valve and the control system. The BAC valve consists of the air valve that functions only when the engine is cold and the solenoid valve (ISC) that works throughout the entire engine speed range.



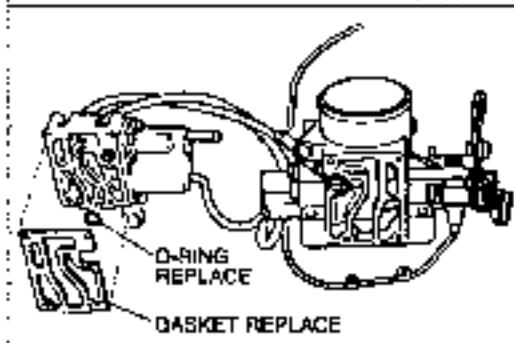
RUCF2-056



RVA,CF2-117



BVLCF2-119



BVLCF2-120

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.

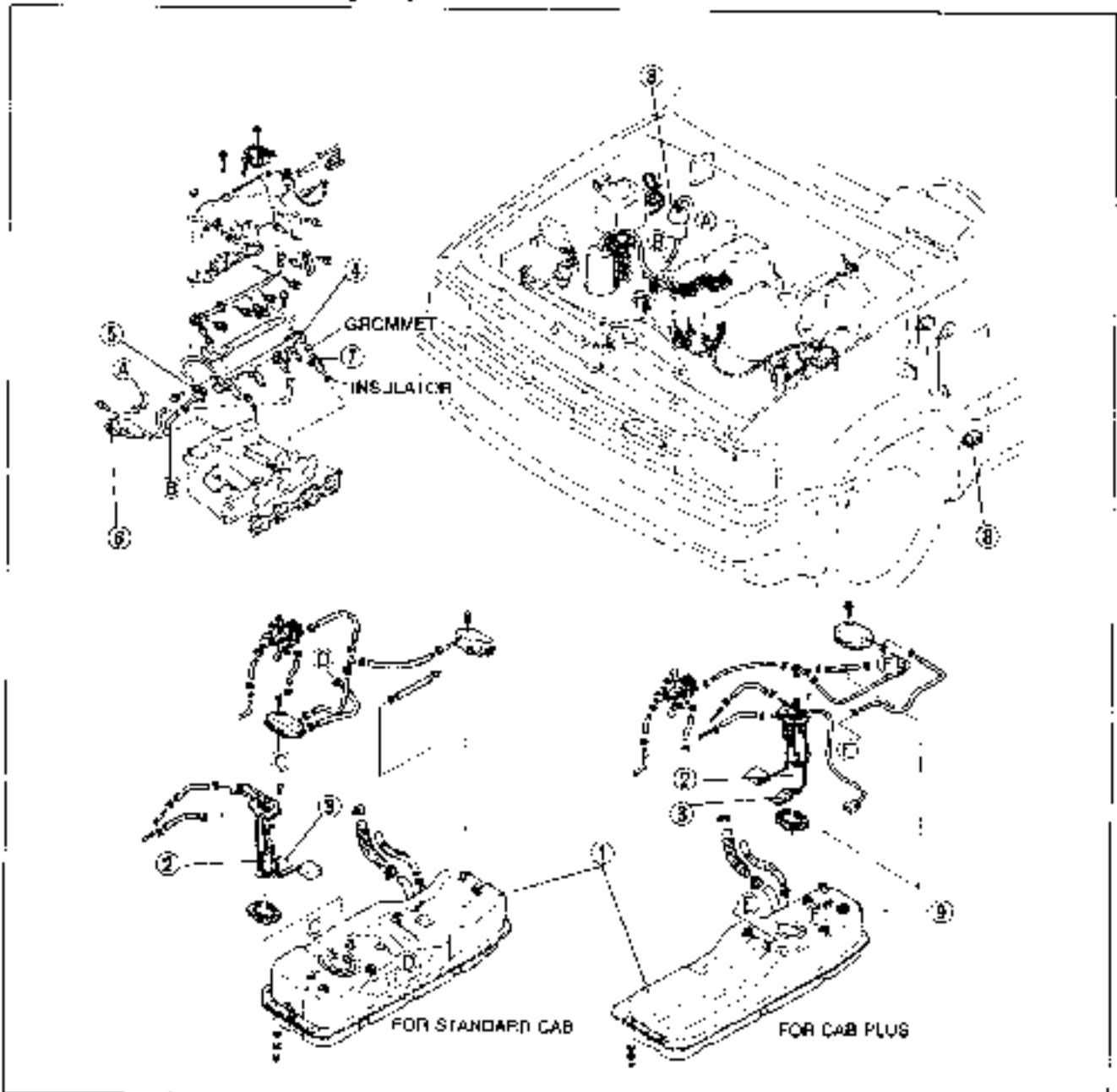
Tightening torque:

2.6—3.4 Nm (25—35 cm·kg, 22—30 in·lb)

FUEL SYSTEM

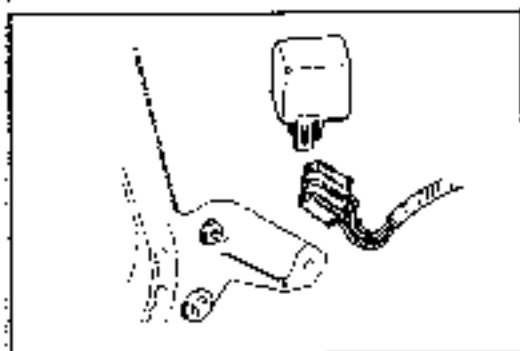
STRUCTURAL VIEW

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.

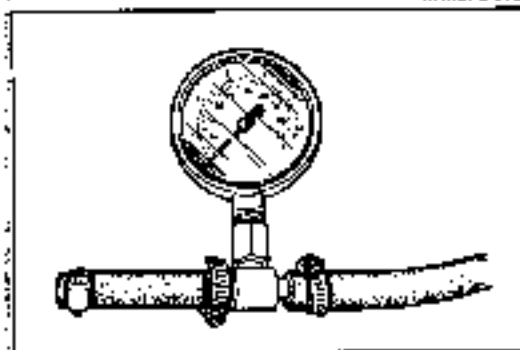


2B10F2-050

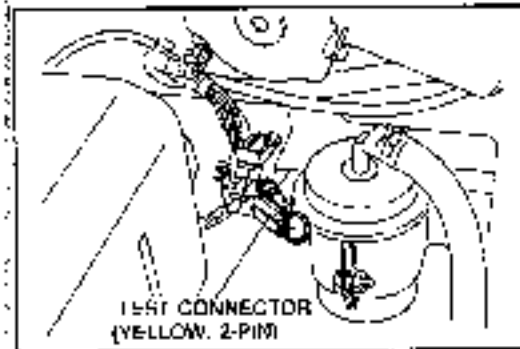
1. Fuel tank	3. Fuel filter	7. Injector
Removal..... page F2-147	Replacement..... page F2-149	Removal..... page F2-156
Installation..... page F2-149	4. Delivery pipe	Inspection..... page F2-157
2. Fuel pump	5. Pressure regulator	Installation..... page F2-156
Inspection..... page F2-150	Inspection..... page F2-154	8. Circuit opening relay
Replacement..... page F2-152	Replacement..... page F2-155	Inspection, Removal, and
	6. Pulsation damper	Installation..... page F2-153
	Inspection, Removal, and	9. Fuel vapor valve
	Installation..... page F2-155	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.

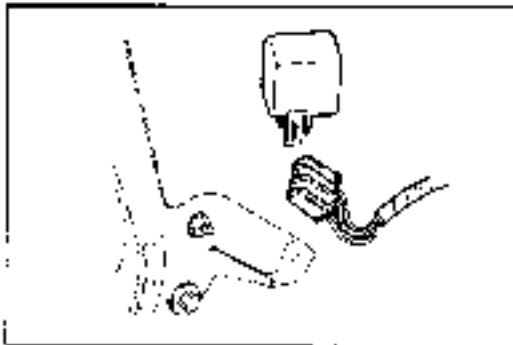
Caution

Install hose clamps to secure the fuel pressure gauge to the fuel filter and the fuel main hose to prevent fuel leakage.

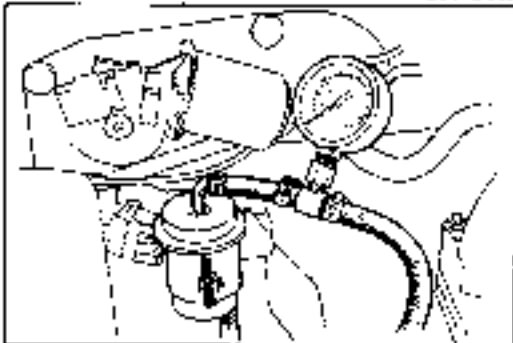
Priming Fuel System

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.

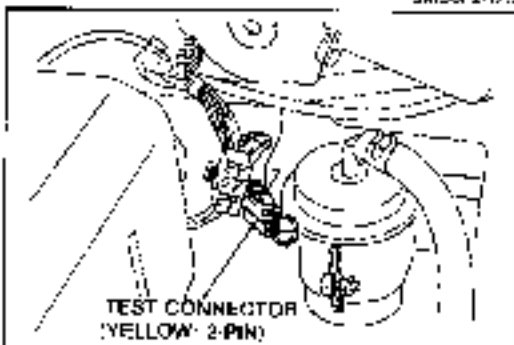
1. Connect the terminals of the test connector (Yellow, 2-pin) with a jumper wire.
2. Turn the ignition switch ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper w.c.



1BUCF2-060



3MJC2-125



9MJC2-126

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.

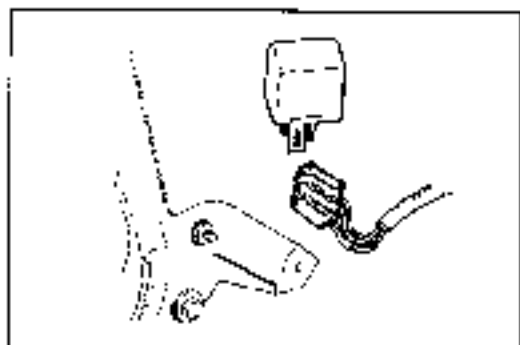
4. Connect the terminals of the test connector (Yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON for **10 seconds** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 minutes**.

Fuel pressure:

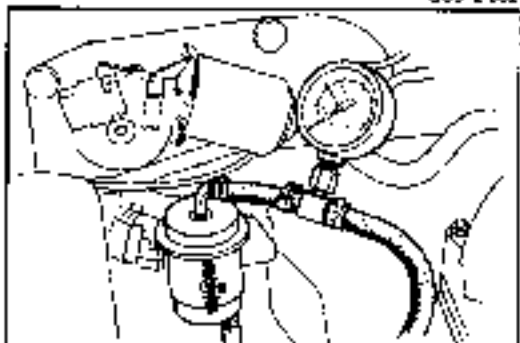
More than 147 kPa (1.5 kg/cm², 21 psi)

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.)

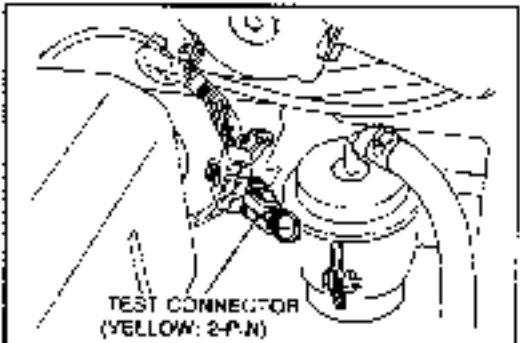
1BUCF2-061



BU012-062



BU012-062



BU012-062

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:

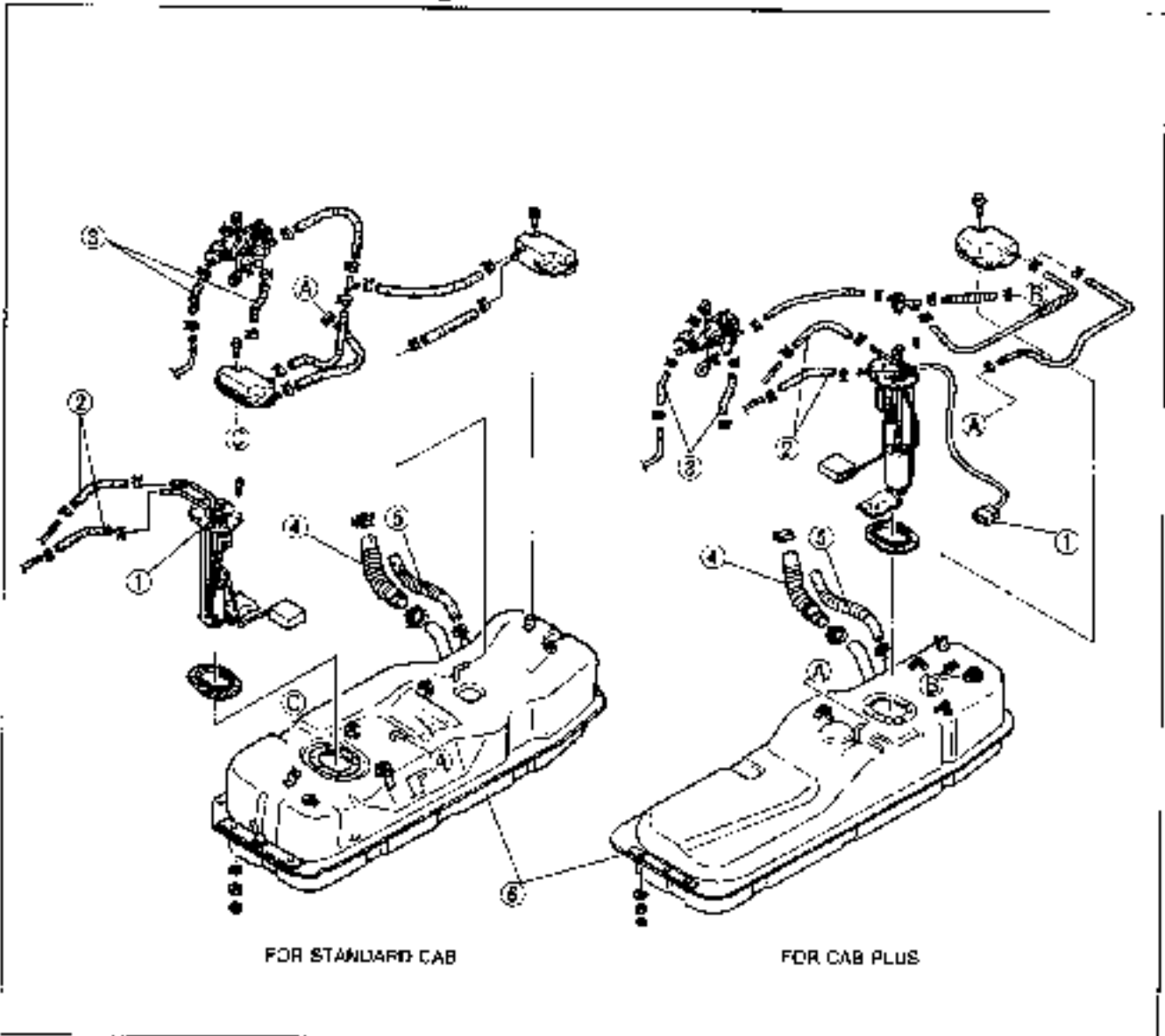
265—314 kPa (2.7—3.2 kg/cm², 38—46 psi)

- 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
2. Fuel hoses
3. Evaporative hoses
4. Fuel filter hose

5. Breather hose
6. Fuel tank

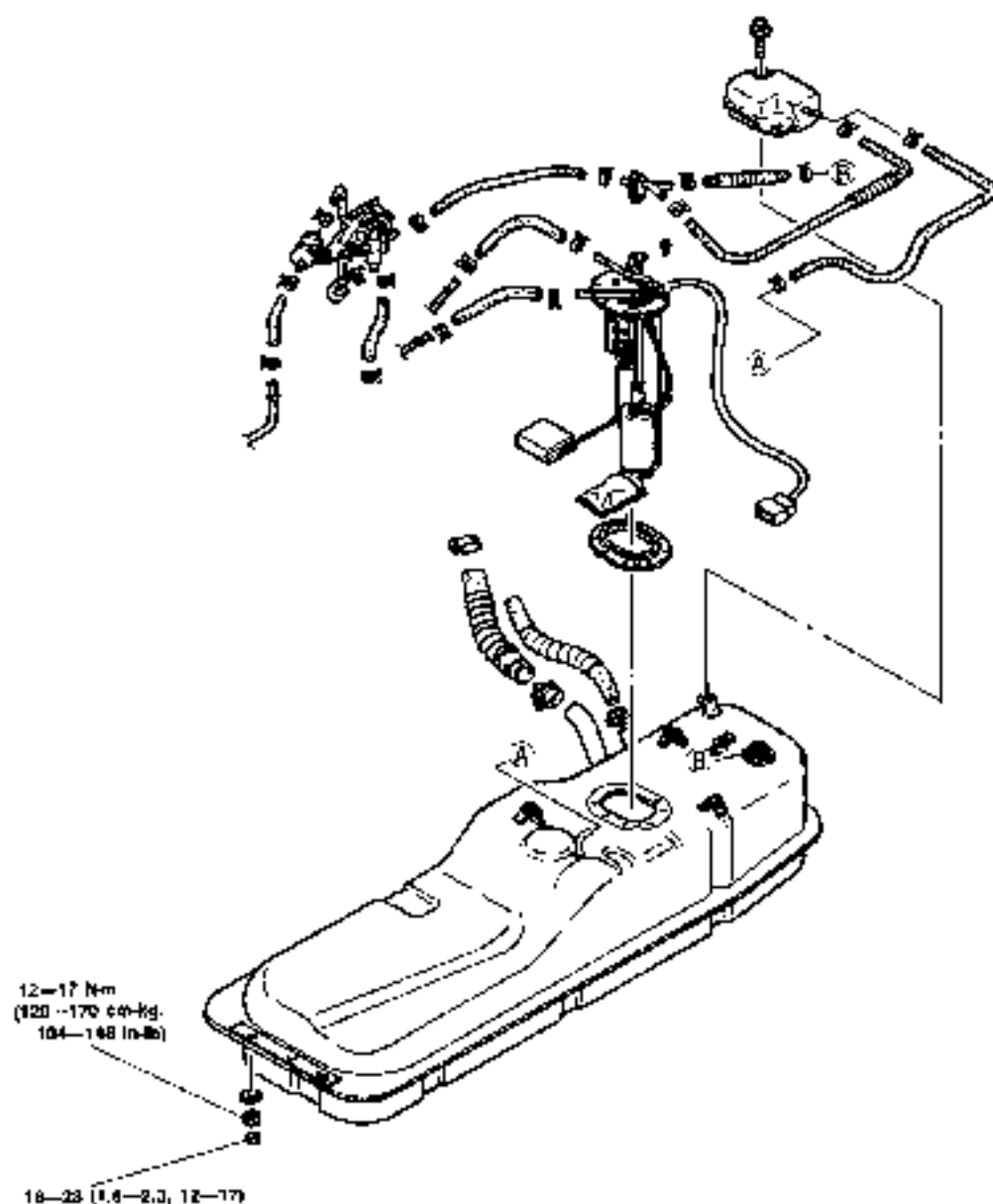
Inspect for cracks and corrosion.
Repair or replace if necessary.

Warning

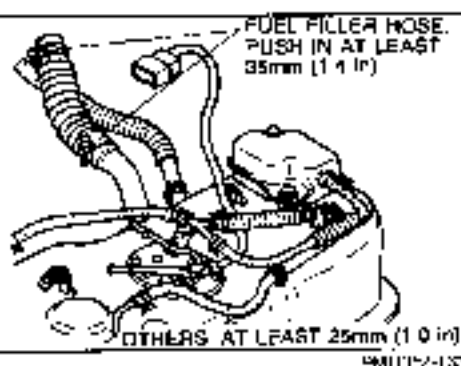
Before repairing the fuel tank, clean it thoroughly with steam to remove all explosive gas.

Installation

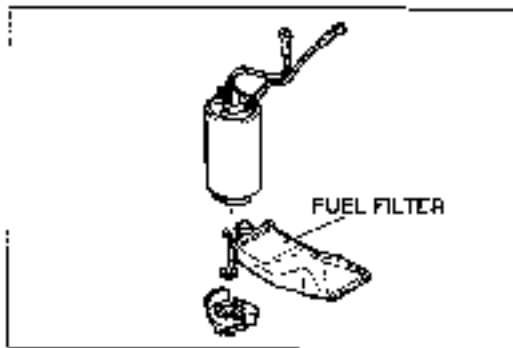
Install in the reverse order of removal, referring to **Installation Note**.

Torque Specifications

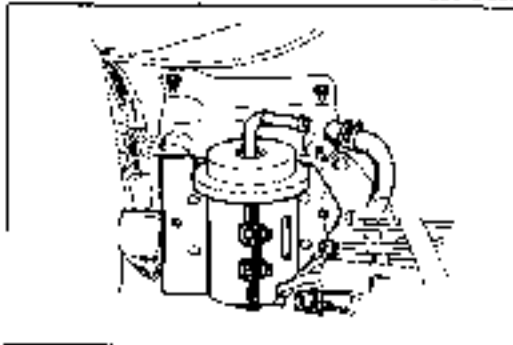
18-23 (1.6-2.3, 12-17)
9MU7P-132

**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 065



5MUJF2 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.

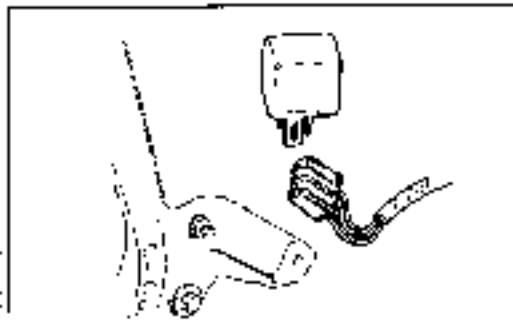
Warning

Always work away from sparks or open flames.

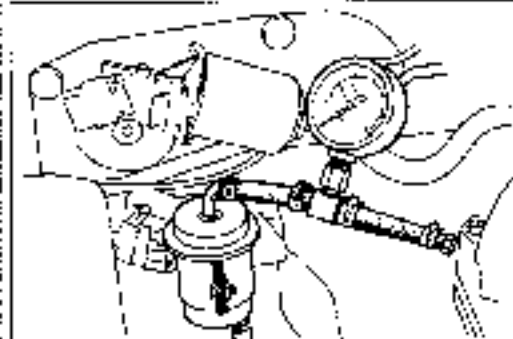
1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and bracket.
3. Install in the reverse order of removal.

Note

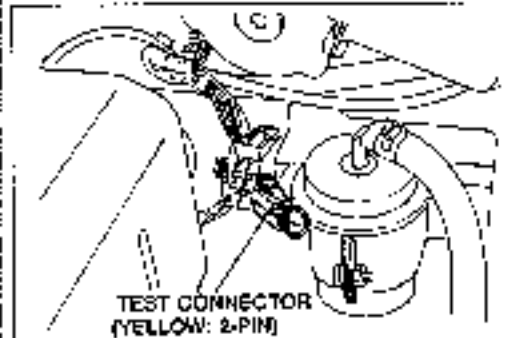
When installing the filter, push the fuel hoses fully onto the fuel filter.



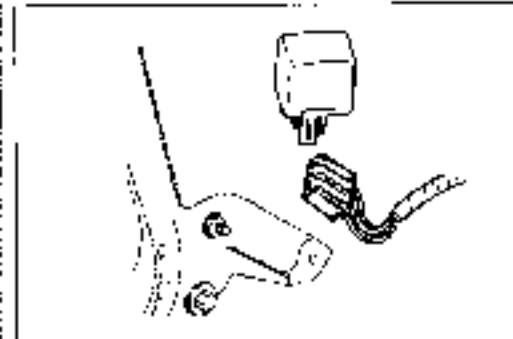
1BU0F24066



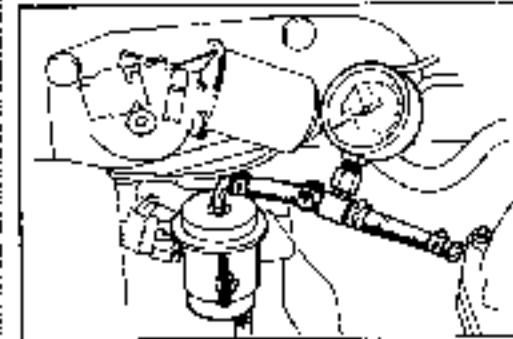
9WUCF2133



9BU0F24064



1BU0F24067



9WUCF2141

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:

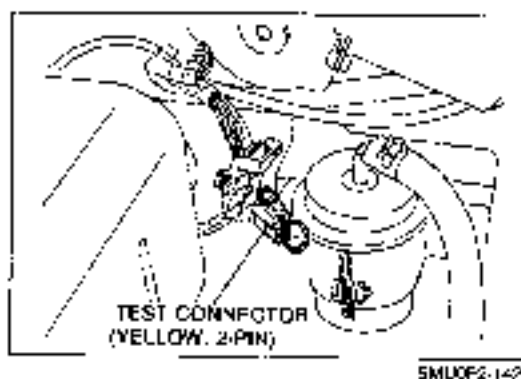
More than 343 kPa (3.5 kg/cm², 50 psi)

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.

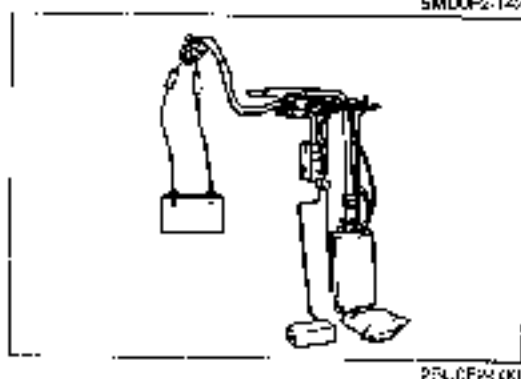


4. Connect the terminals of the test connector (yellow: 2-pin) with a jumper wire.
5. Turn the ignition switch ON to operate the fuel pump.
6. Measure the fuel pump maximum pressure.

Fuel pump maximum pressure:

441—589 kPa (4.5—6.0 kg/cm², 64—85 psi)

7. Turn the ignition switch OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.



Fuel pump operation

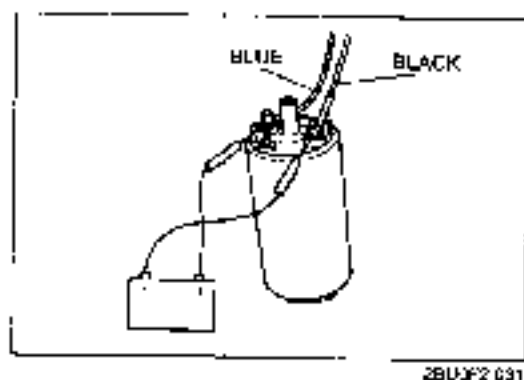
Only when fuel pump operating sound is not heard from fuel filler port (with IGN ON and test connector [yellow: 2-pin] connected) and circuit opening relay is normal.

1. Remove the fuel pump and fuel tank gauge unit. (Refer to page F2-152.)
2. Apply battery voltage to the fuel pump connector terminal wire (B/R) and ground terminal wire (B).

Check that the fuel pump operates.

Operates — Check wiring between circuit opening relay and fuel pump connector and between fuel pump connector and ground for open or short circuit.

Does not operate—Go to next step



3. Apply battery voltage and a ground to the fuel pump terminals and check if the fuel pump operates.

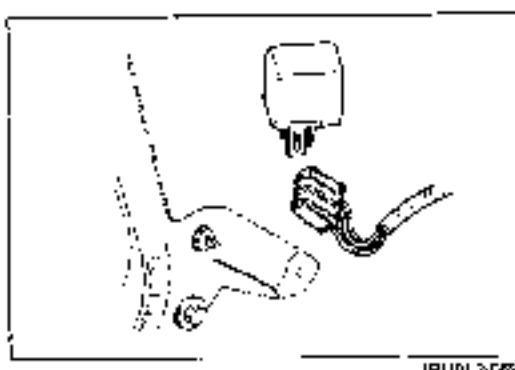
Operates — Check wiring between fuel pump connector and fuel pump for open or short circuit.

Does not operate—Replace fuel pump

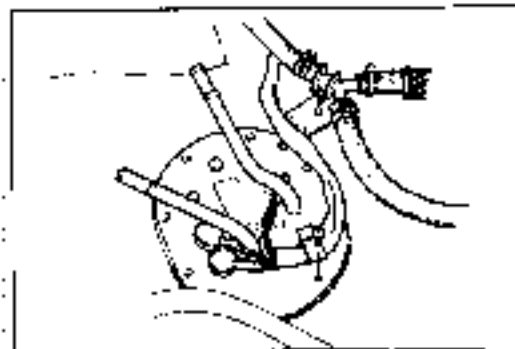
Replacement

Warning

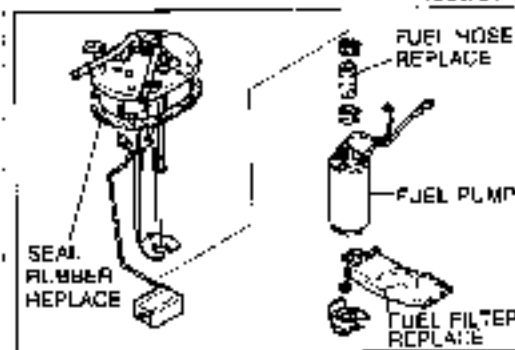
- Before performing the following procedures, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F2-144.)
- When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.



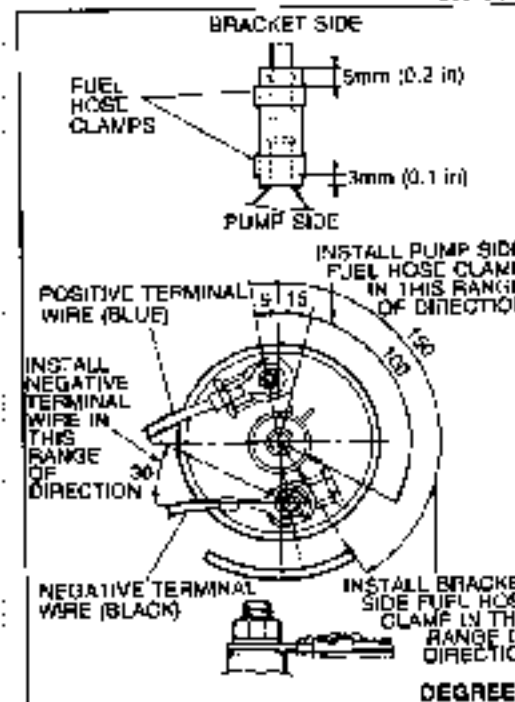
ISUD12-009



ISUD12-010



ISUD12-011



ISUD12-012

- 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 N·m
(12—20 cm·kg, 10—17 in·lb)

Negative terminal (Black)....2.3—3.4 N·m
(23—33 cm·kg, 20—29 in·lb)

Fuel hose

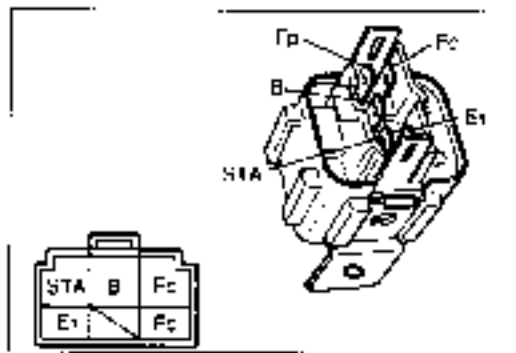
- Use a new fuel hose.
- Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.
- Install clamps as shown.

Fuel pump

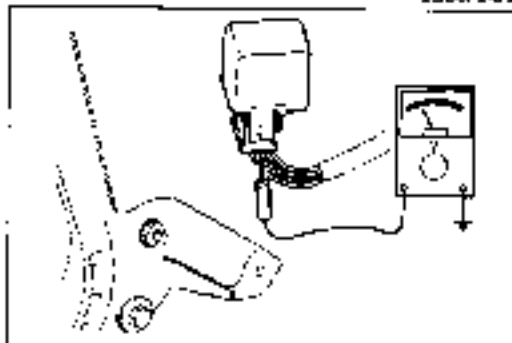
Install the fuel pump to the bracket correctly.

Seal rubber

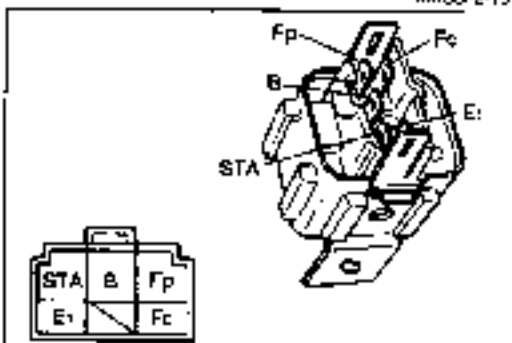
Use a new seal rubber.



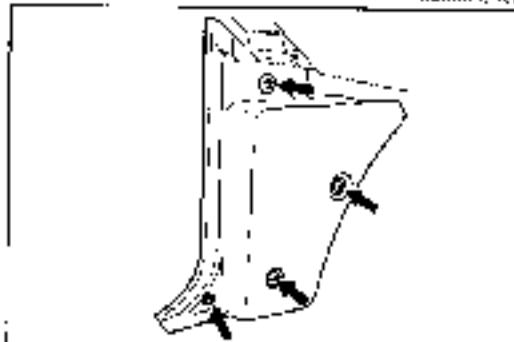
2BU0F2-032



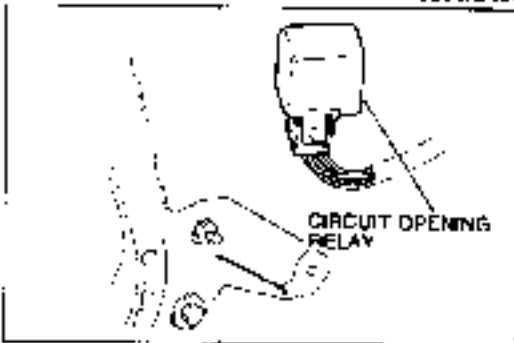
HMJ03 2-151



3MJOE2-122



80U0F2-001



F6J0F2-092

CIRCUIT OPENING RELAY**Inspection****Switching operation**

Apply battery voltage and a ground to the terminals below and check the circuit opening relay operation as described.

12V	Grounded	Correct result
STA	E1	B-Fp Continuity
B	Fc	Fp, Battery voltage

If not as specified, replace the circuit opening relay.

Relay circuit

Check voltage between the terminals and a ground with a voltmeter.

Condition	Terminal	Fp	Fc	B	STA	E1
Ignition switch: ON		0V	12V	12V	0V	0V
Ignition switch: START		12V	0V	12V	12V	0V
At idle		12V	0V	12V	0V	0V

If not as specified, check the related wiring harness.

Resistance

Check resistance between the terminals using an ohmmeter.

Between terminals	Resistance (Ω)
STA-E1	21-43
B-Fc	105-1,226
B-Fp	∞

If not as specified, replace the circuit opening relay.

Removal

1. Remove the front side trim on the driver's side.

2. Remove the circuit opening relay.

Installation

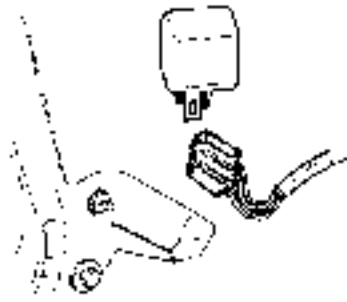
Install in the reverse order of removal.

PRESSURE REGULATOR

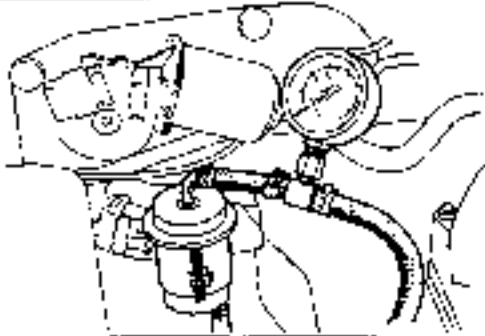
Inspection
Fuel line pressure

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.)



19U0F2-072



20U0F2-082

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:

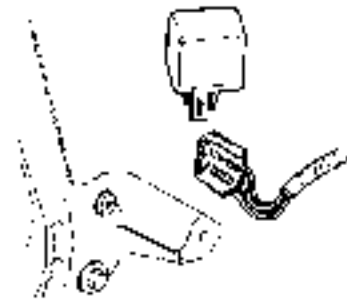
196—255 kPa (2.0—2.6 kg/cm², 28—37 psi)

Fuel pressure drop

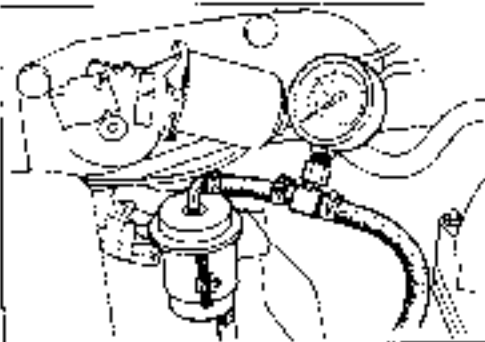
Only if fuel system pressure drop is not as specified and fuel pump pressure drop is as specified.

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.)

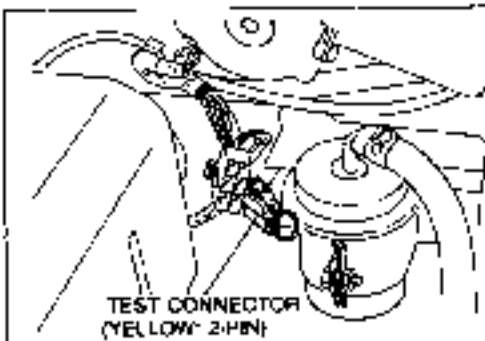


19U0F2-073



20U0F2-077

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.



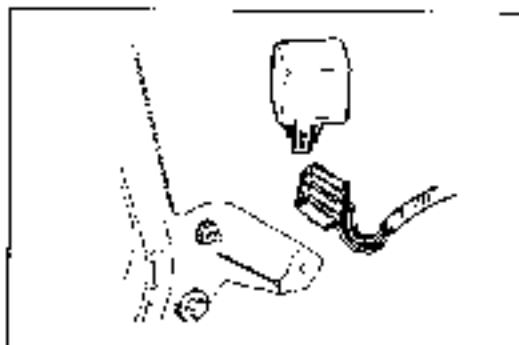
20U0F2-050

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.

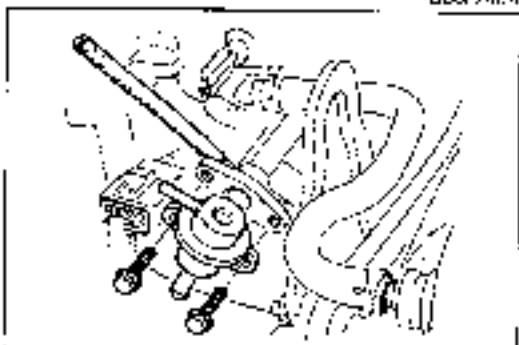
Fuel pressure:

More than 147 kPa (1.5 kg/cm², 21 psi)

9. If as specified, replace the pressure regulator.



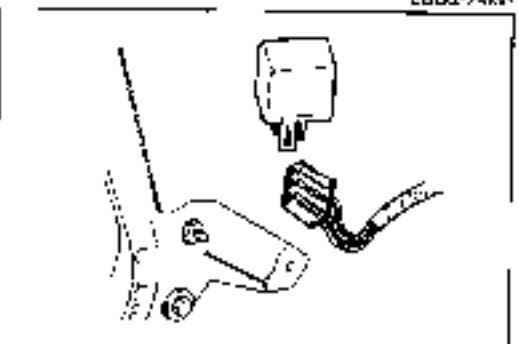
BU0F2-024



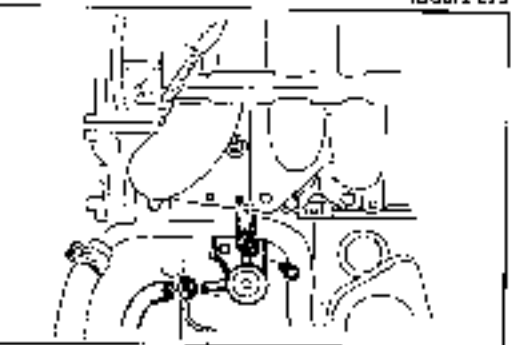
2VL1:F2-181



2BU0F2-133



1BU0F2-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.

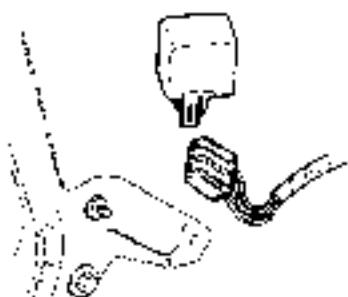
Tightening torque:

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.



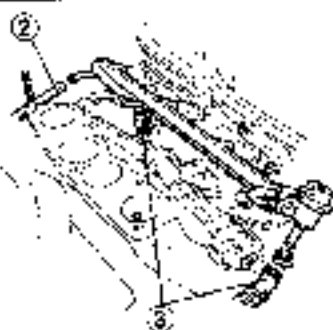
15LDF2076

1. Remove the dynamic chamber. (Refer to page F2-139.)



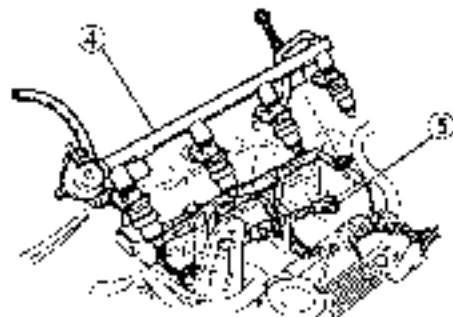
18U0F2477

2. Disconnect the vacuum hose.
3. Disconnect the fuel hoses



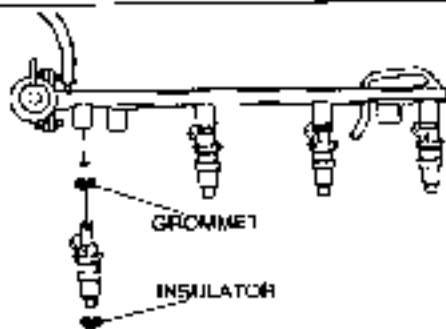
96U0F24156

4. Remove the delivery pipe with the pressure regulator.
5. Disconnect the injector connectors

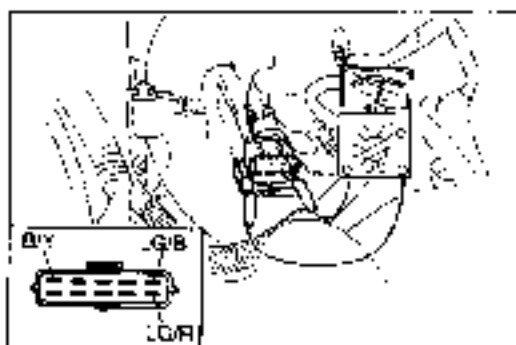


EMU0F2165

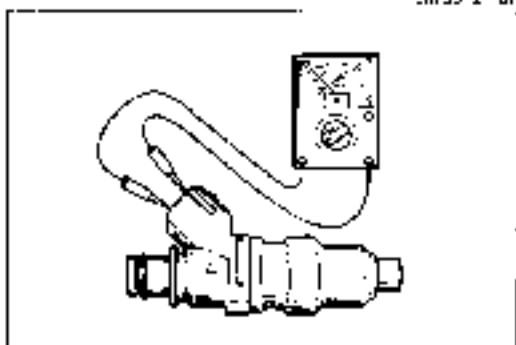
6. Remove the grommets, injectors, and insulators



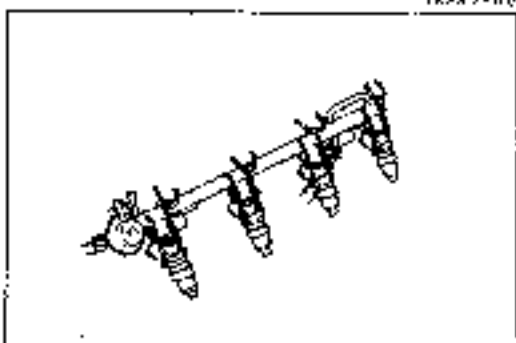
96U0F2166



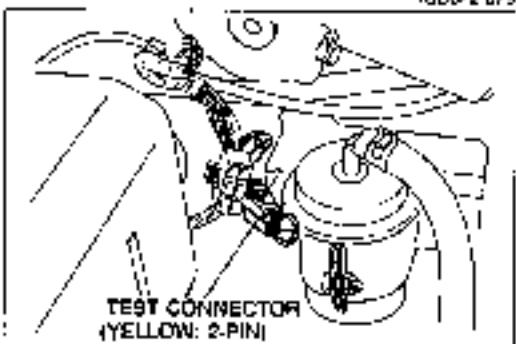
9MUDF2-167



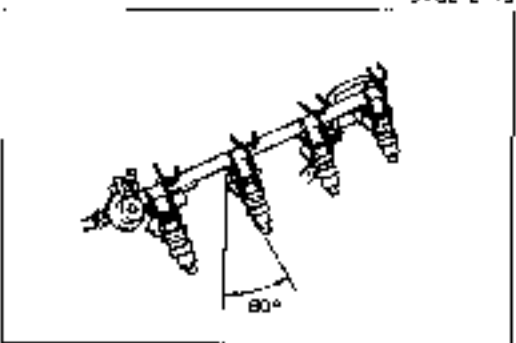
9LXEF2-118



9ULXF2-079



9VUCF2-173



9VLCF2-171

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.

Injection injector	Terminals	Resistance
No. 1 and/or 2	(B/Y)-(G/P)	6-8Ω
No. 3 and/or 4	(B/Y)-(LG/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.

Fuel leakage test

1. Remove the injectors and the delivery pipe. (Refer to page F2-156.)
2. Affix the injectors to the delivery pipe with wire.

Caution

Affix the injectors firmly to the delivery pipe so that no movement of the injectors is possible.

Warning

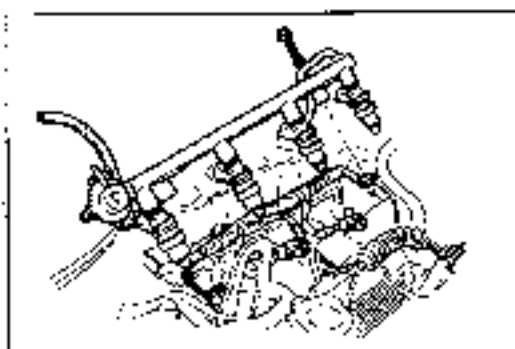
Be extremely careful when working with fuel. Always work away from sparks or open flames.

3. Connect the terminals of the test connector (Yellow; 2-pin) with a jumper wire. Turn the ignition switch ON **for 10 seconds**.
4. Turn the ignition switch OFF and clean the nozzles.
5. Turn the ignition switch ON.

6. Tilt the injectors **approx. 60 degrees** and check that no fuel leaks from the injector nozzles.
7. If fuel leaks from an injector, replace it.

Note

After 1 minute a drop of fuel from the injector is acceptable.



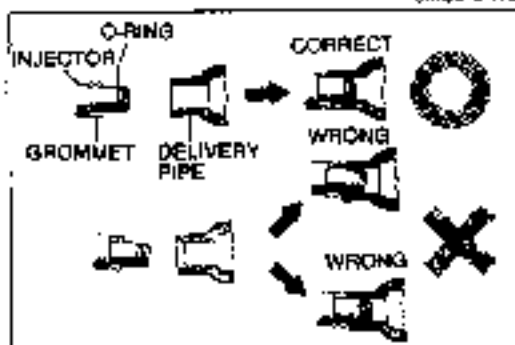
9MU0F2-172

Installation

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

Tightening torque**Delivery pipe:**

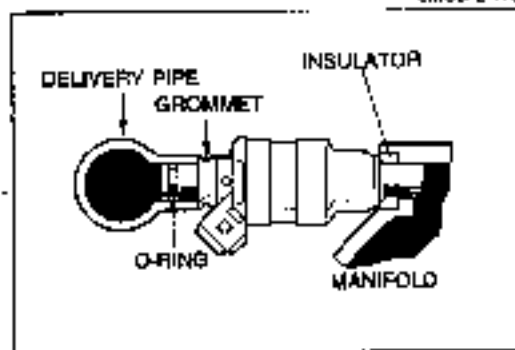
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



9MU0F2-173

Installation note

1. Use new injector O-rings
2. Apply a small amount of engine oil to the O-rings before installing

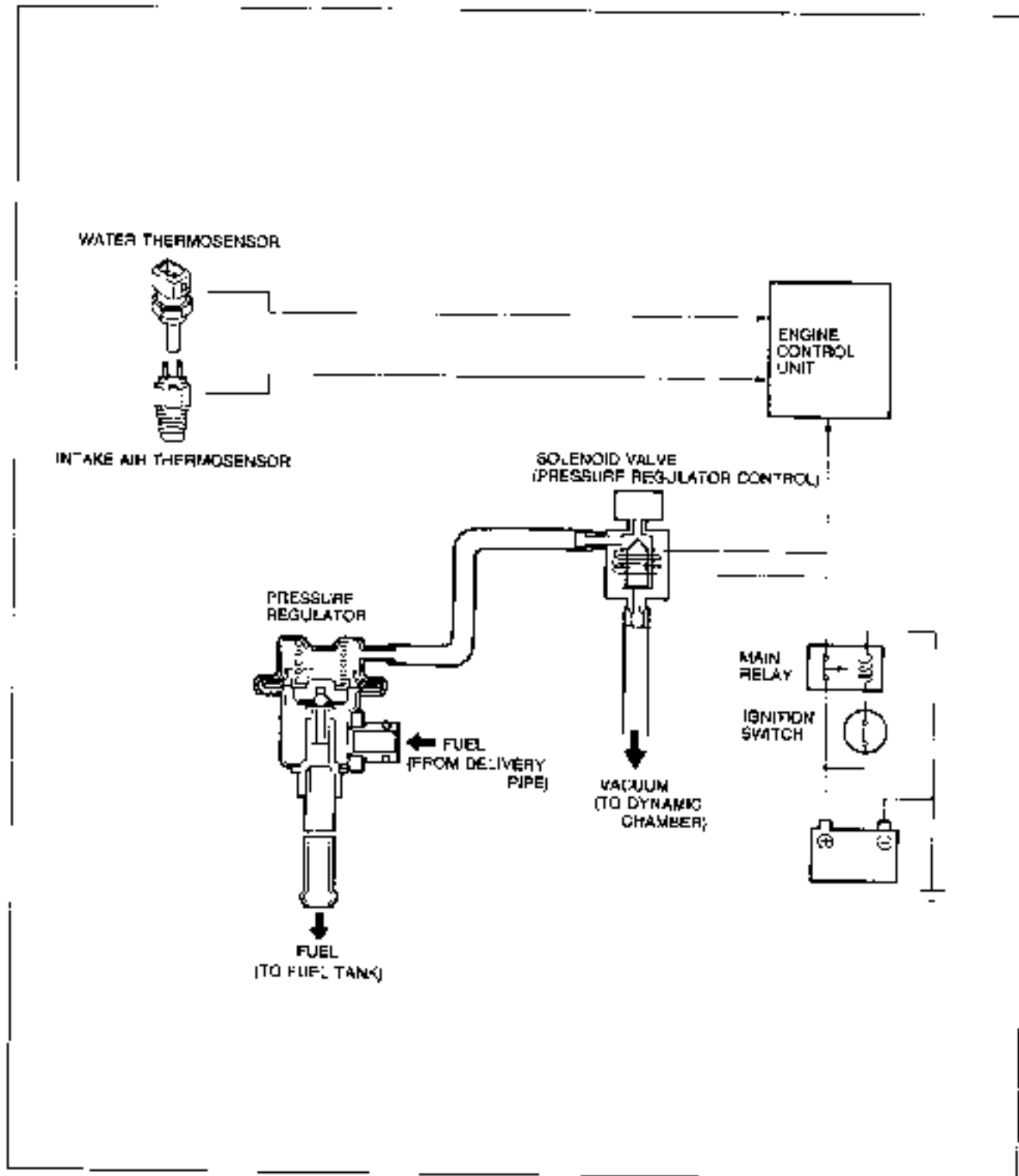


9MU0F2-174

3. Install the injectors and the injector insulators.

PRESSURE REGULATOR CONTROL (PRC) SYSTEM

DESCRIPTION



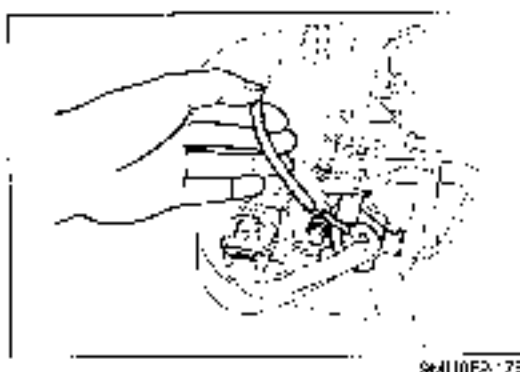
12U12F2-080

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/cm², 41 psi)**.

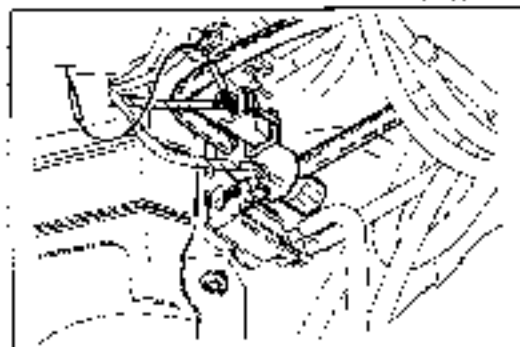
Specified time: Approx. 120 seconds

Operating condition: Coolant temperature — above 90°C (194°F)

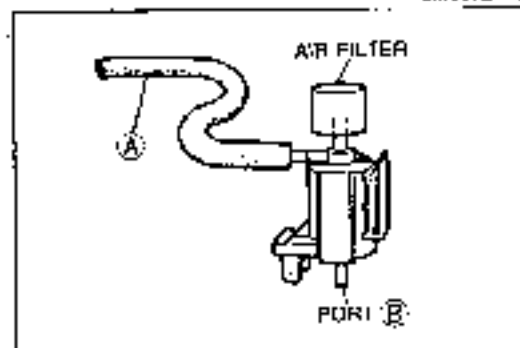
Intake air temperature — above 75°C (167°F)—G6, 65°C (149°F)—F2



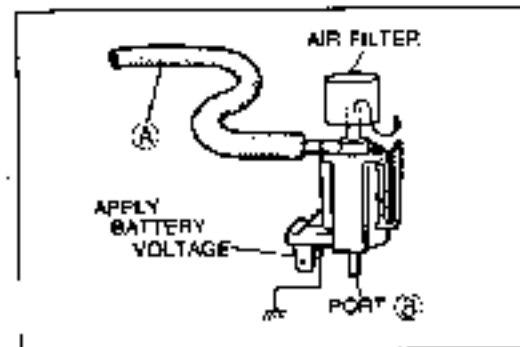
941J0F2-79



EMU0F2-177



941J0F2-78



2B1J0F2-034

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

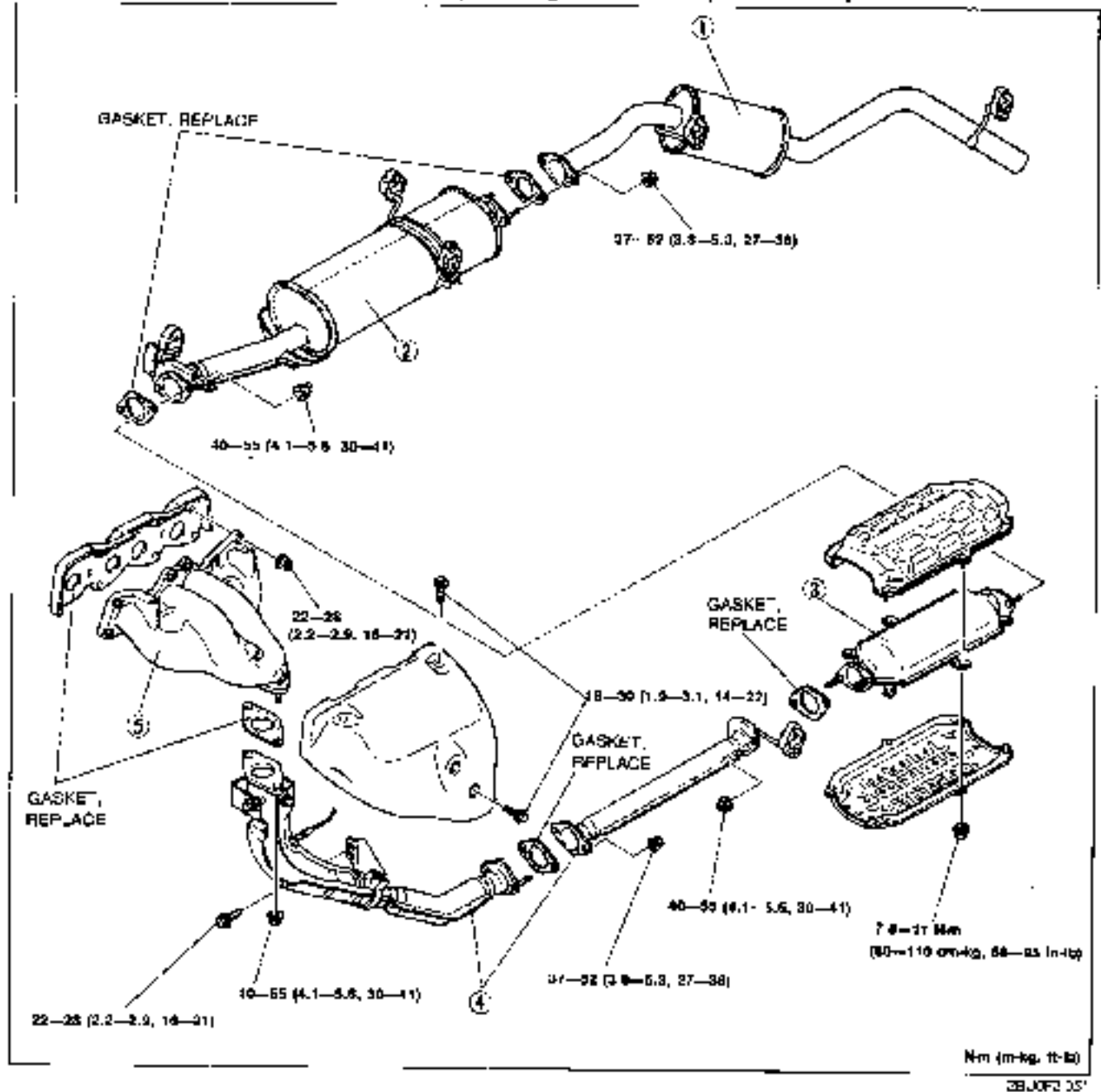
COMPONENTS

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

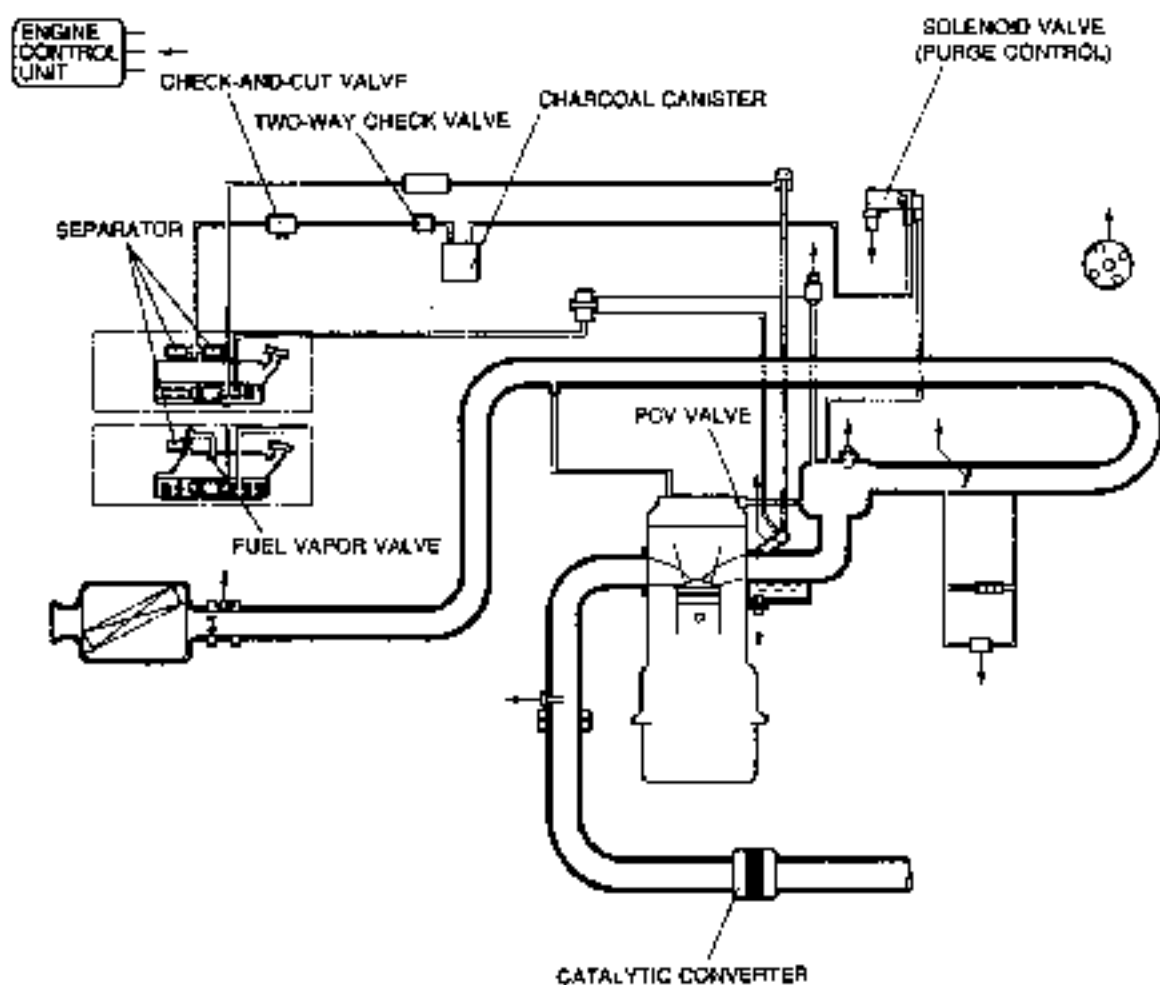
F2 OUTLINE OF EMISSION CONTROL SYSTEM

OUTLINE OF EMISSION CONTROL SYSTEM

STRUCTURAL VIEW

To reduce CO, HC, and NO_x emissions, the following systems are employed.

1. Positive crankcase ventilation (PCV) system
2. Evaporative emission control system
3. Catalytic converter



9401J0F2-81

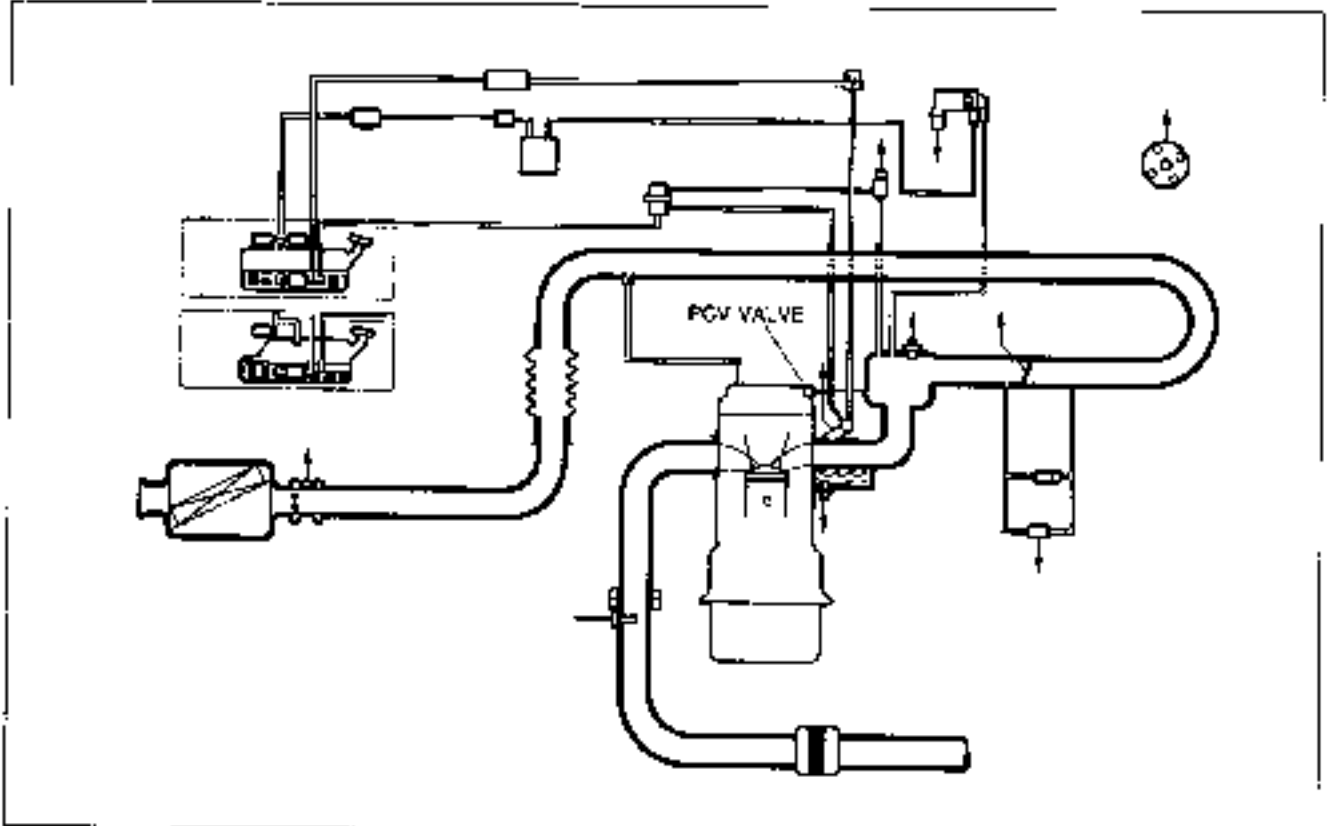
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

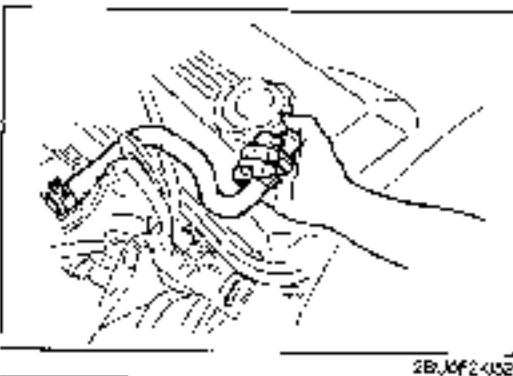
The PCV valve is operated by the intake manifold vacuum.

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.



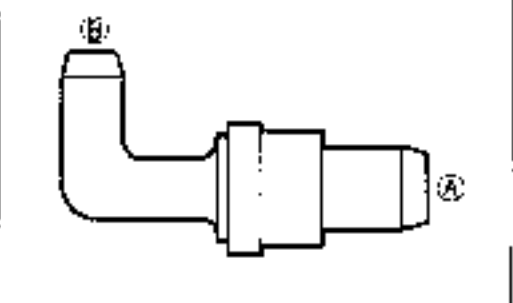
9MUDF2-182



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.

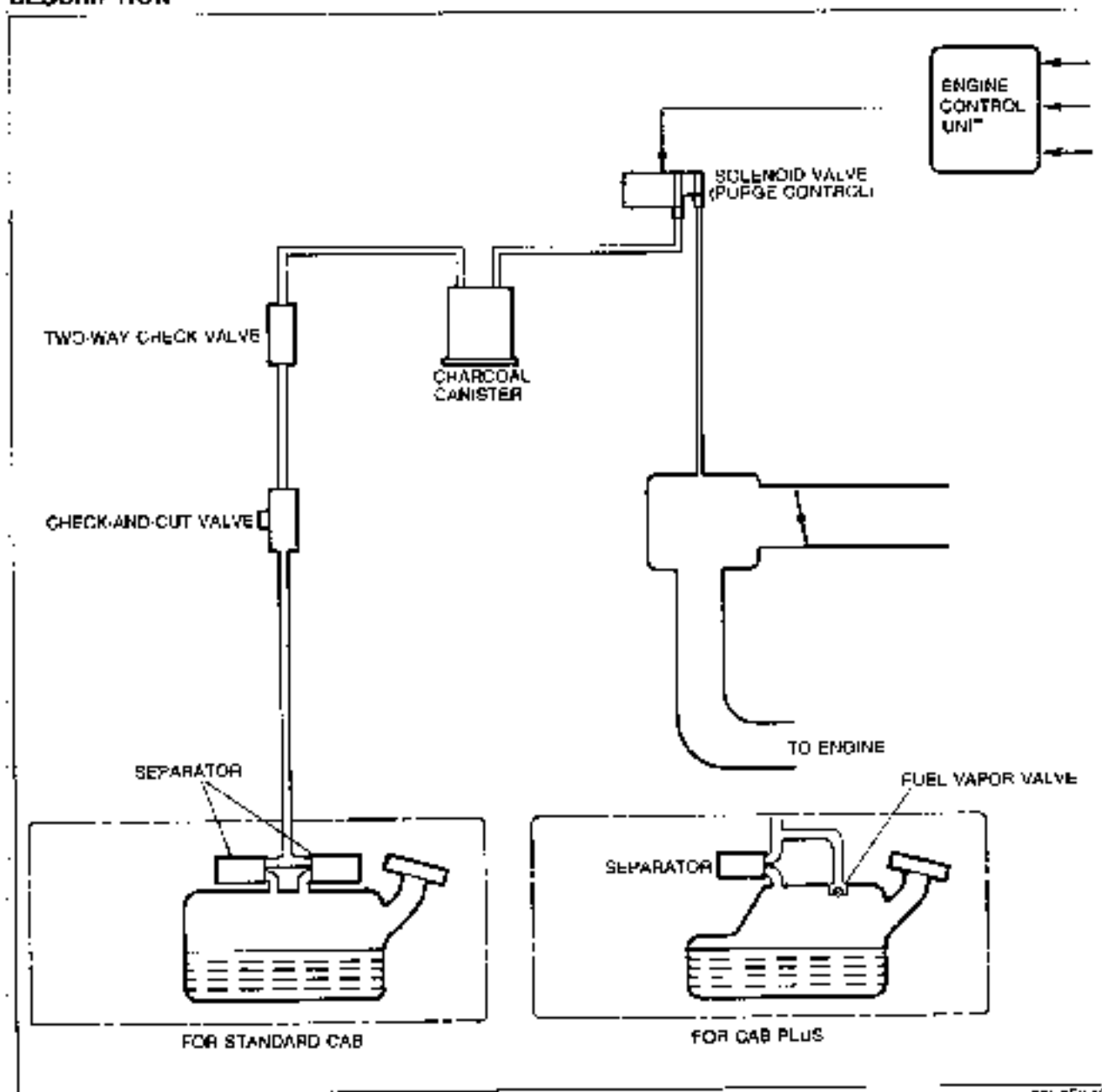


9MUDF2-184

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



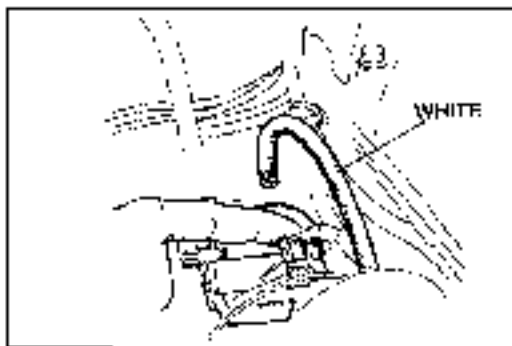
3BL072-100

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.

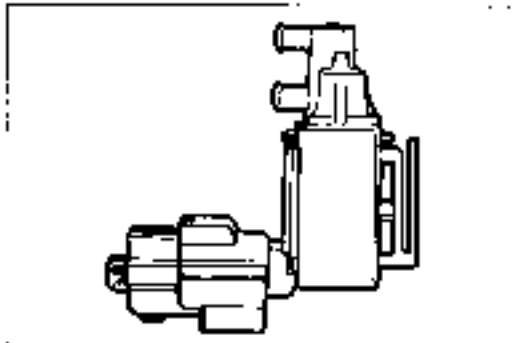
Operation

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.

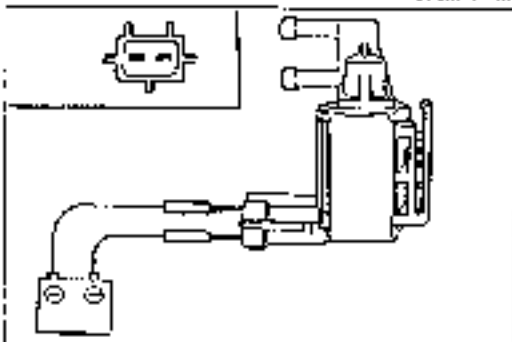
- (1) After warm up
- (2) Driving in gear
- (3) Accelerator pedal depressed (idle switch OFF)
- (4) Oxygen sensor functioning normally



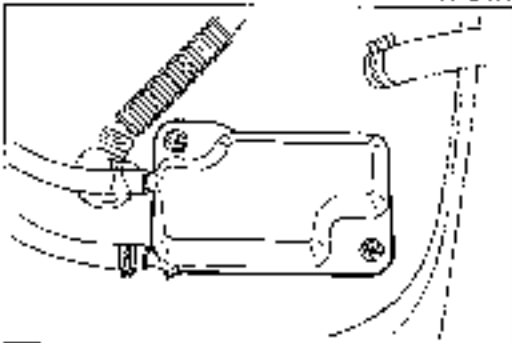
3MJC03-136



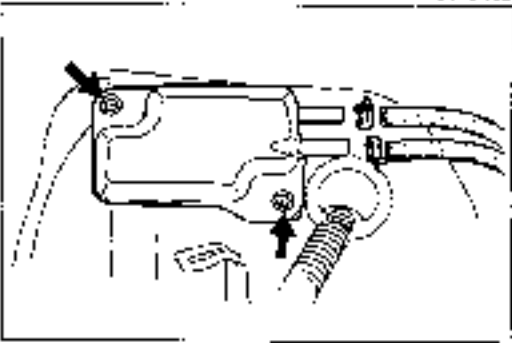
9VLC05-187



9MXX2-100



1407-1982



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.

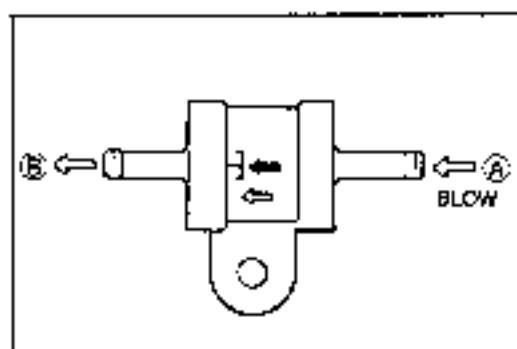
3. Disconnect the solenoid valve connector and connect **12V** and a ground to the terminals of the solenoid valve.
4. Check that the air flows through the valve.
5. If not as specified, replace the solenoid valve.

SEPARATOR**Inspection**

1. Remove the fuel tank. (Refer to page F2-147.)
2. Visually check the separator for damage, replace it if necessary.

Replacement

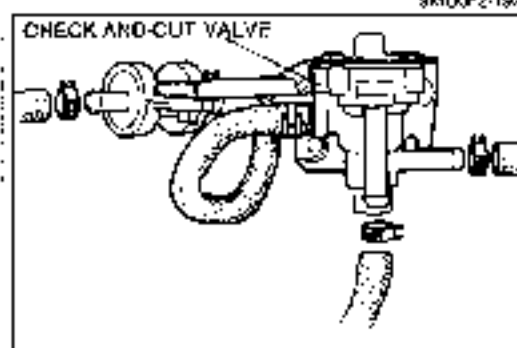
1. Remove the fuel tank. (Refer to page F2-147.)
2. Disconnect the fuel hoses.
3. Remove the separator.
4. Install in the reverse order of removal.



9MUKF2-156

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.



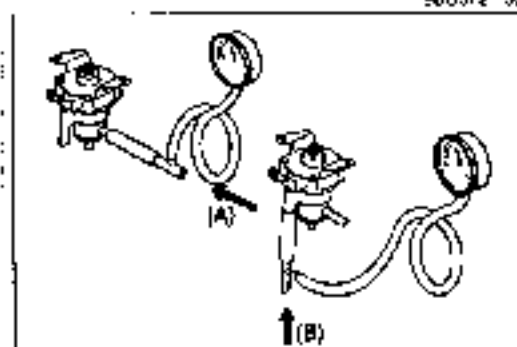
9DU9F2-108

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.



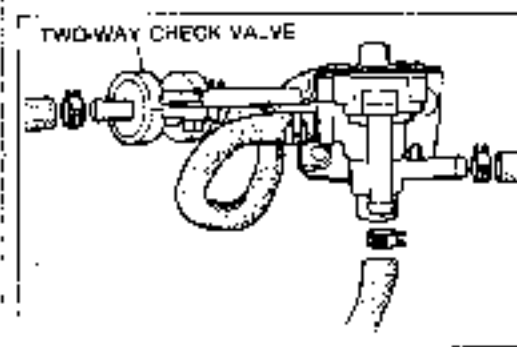
9B-06F2-107

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/cm², 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/cm², 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.



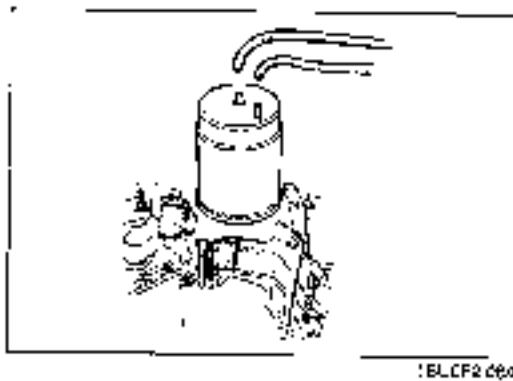
9B-06F2-108

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.



:ELCF2.dwg

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.

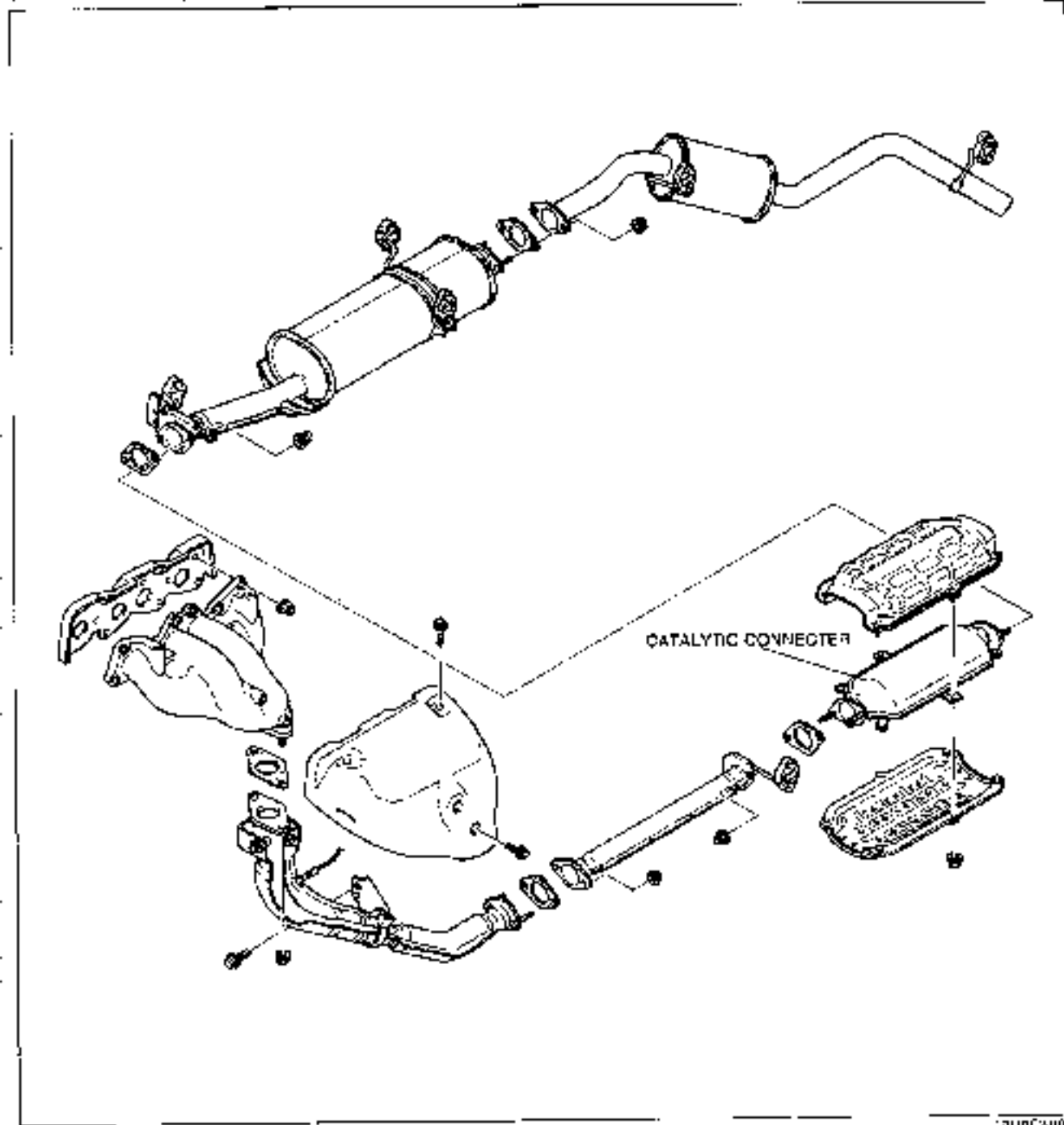
FUEL VAPOR VALVE

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 F2-16.)

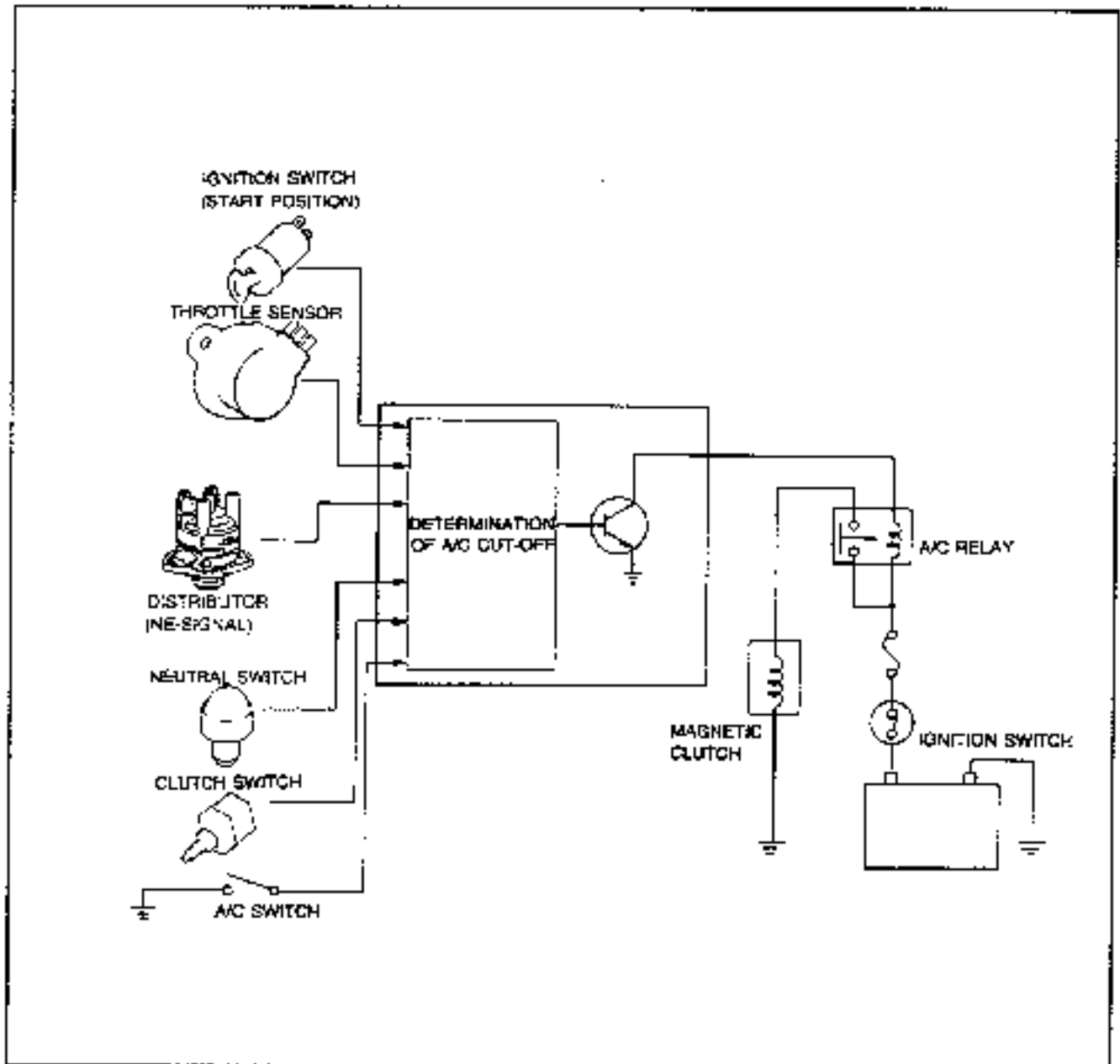
Note

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.

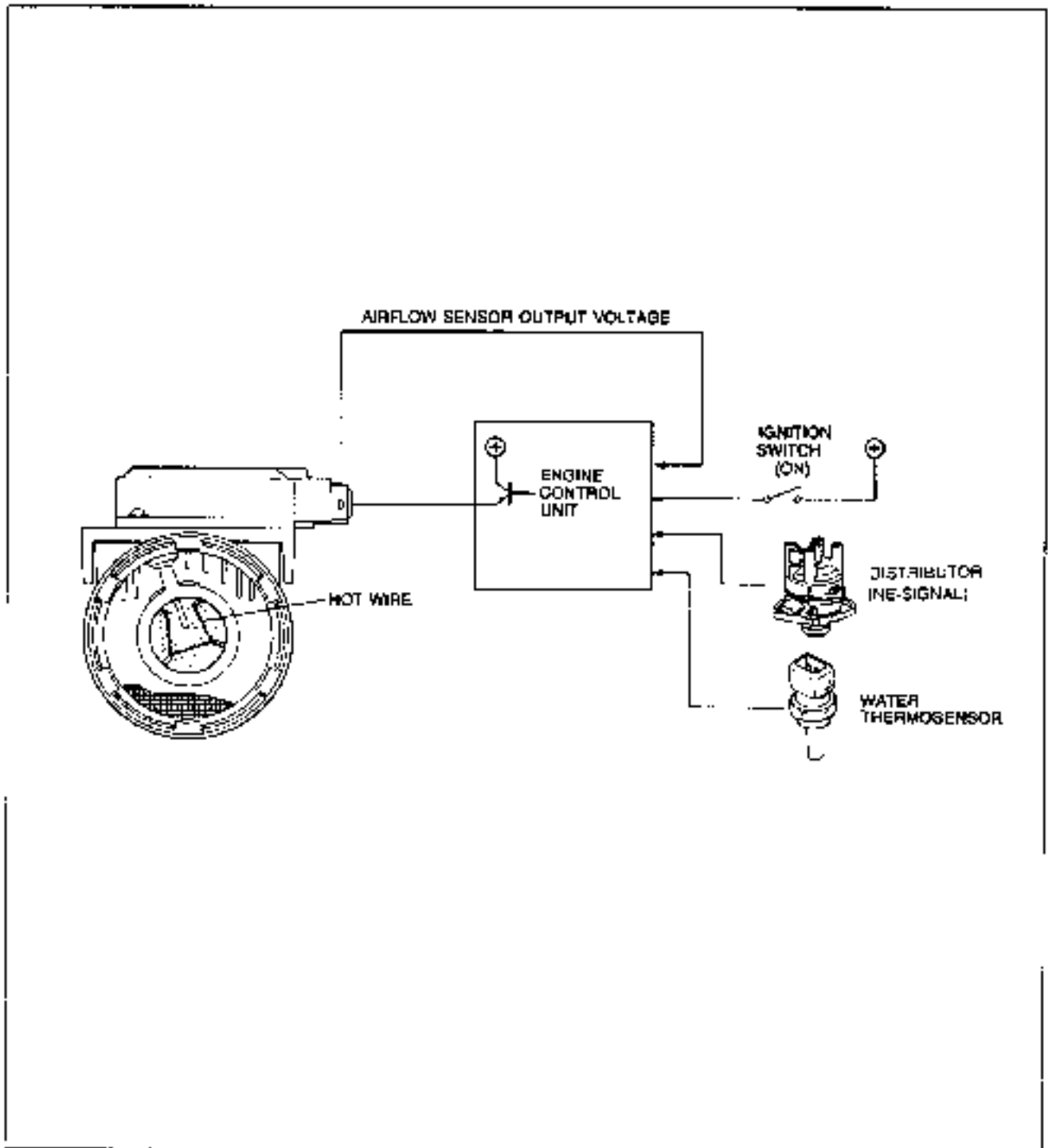
Control	Condition	Cut-off period
Throttle valve opening	More than half throttle	Approx. 10 sec
Transmission	Except Neutral	
Clutch pedal	Released	

**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



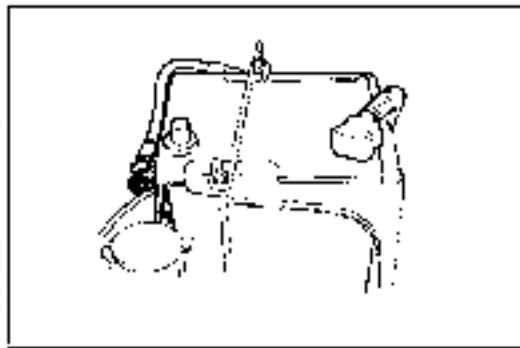
96/10F2-201

The air flow 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.

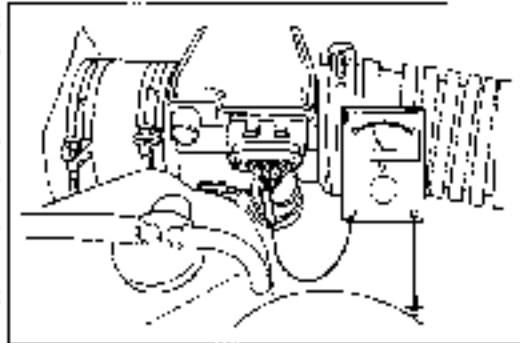
Operation

Burn-off occurs after the engine has been stopped (ignition switch OFF), and the following conditions are met.

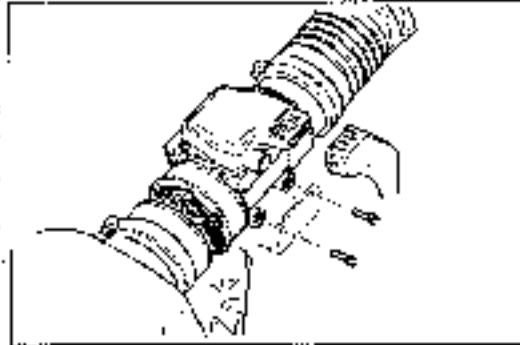
- Engine has run at **more than 1,500 rpm for 5 seconds** after warm-up
- More than the prescribed amount of intake air has passed through the air flow sensor since the previous burn-off operation.



29UD-F2-036



13LDF-7-087



BJOK 2-030

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.

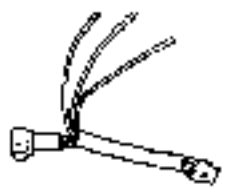
Approx. 8—12V momentarily 2—5 seconds after ignition switch OFF.

6. If as specified, replace the airflow sensor.
7. If not as specified, check the voltage at the engine control unit (2P), (2Q), and (11) terminals (Refer to page F2-177.) and the related wiring harness.

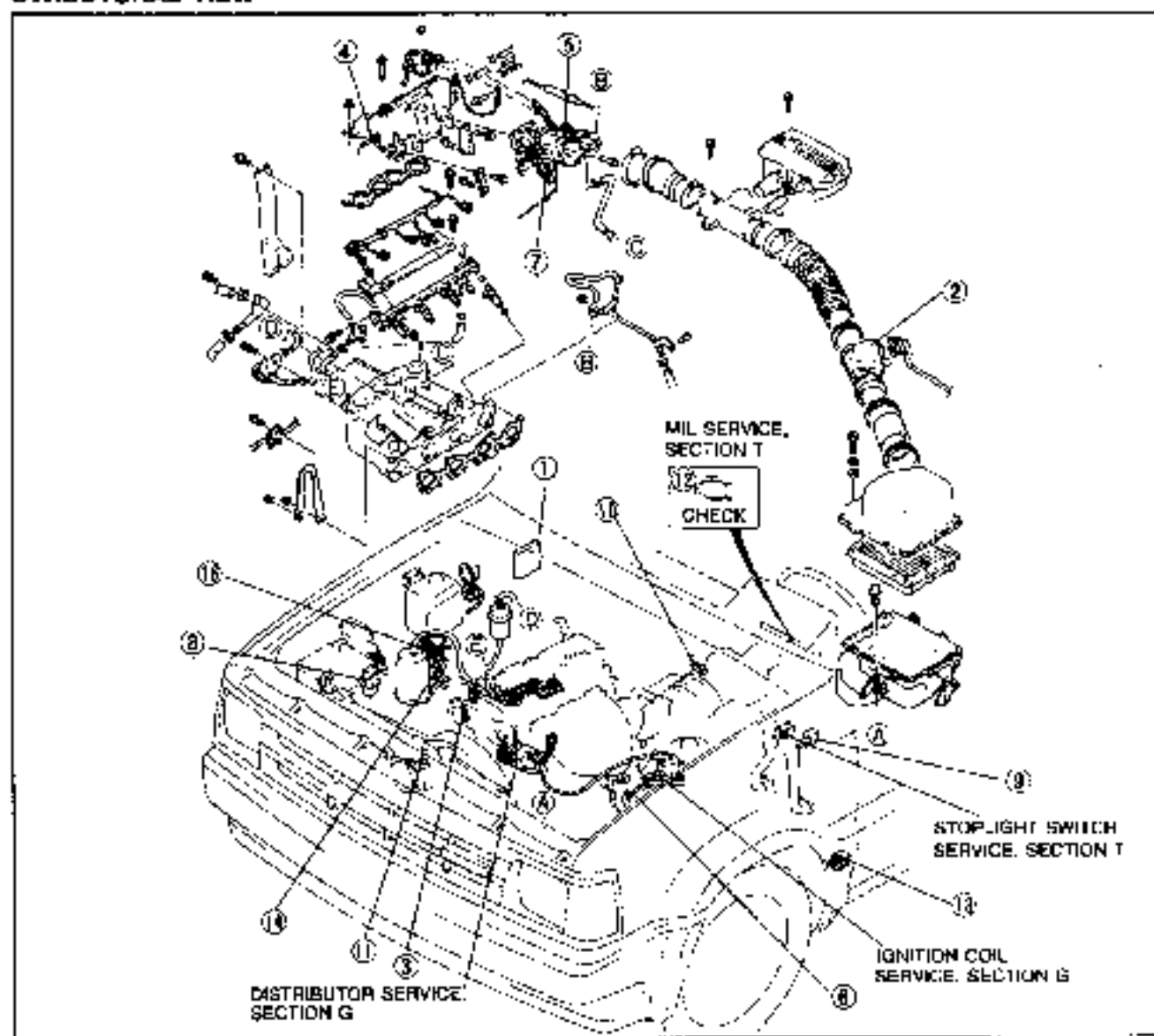
CONTROL SYSTEM

PREPARATION

SST

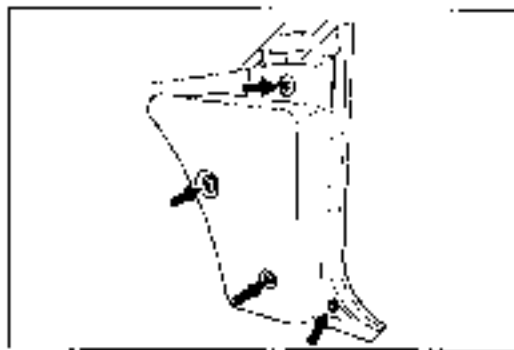
49 9200 102 Engine signal monitor 	49 G018 903 Adaptor harness 	49 G018 901 Adaptor harness 
49 G018 9A1 Self-diagnosis checker 	49 G018 904 Sheet 	OBUD2-075

STRUCTURAL VIEW

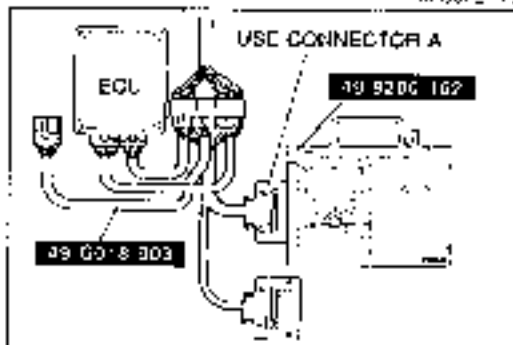


16J067-001

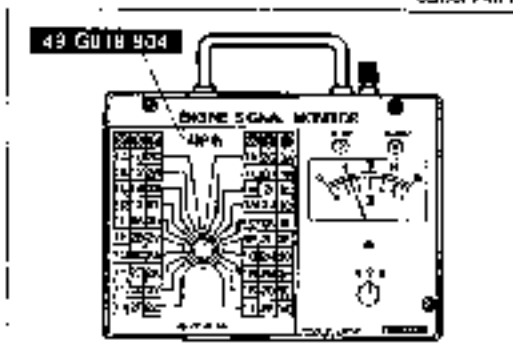
1. Engine control unit Inspection page F2-175	6. Oxygen sensor Inspection .. page F2-182 Replacement page F2-182	11. P/S pressure switch Inspection and Replacement page F2-185
2. Airflow sensor Inspection and Replacement page F2-179	7. Idle switch Inspection page F2-183	12. Malfunction indicator lamp (MIL) How to reset MIL page F2-187
3. Water thermometer Removal and Inspection page F2-179 Installation page F2-180	8. Main relay Inspection page F2-184	13. Circuit opening relay Inspection, Removal, and Installation ... page F2-183
4. Intake air thermosensor Inspection and Replacement page F2-180	9. Clutch switch Inspection and Replacement page F2-184	14. Solenoid valve (PRC) Inspection .. page F2-180
5. Throttle sensor Inspection and Adjustment page F2-181 Replacement page F2-182	10. Neutral switch Inspection and Replacement page F2-184	15. Solenoid valve (Purge control) Inspection page F2-185



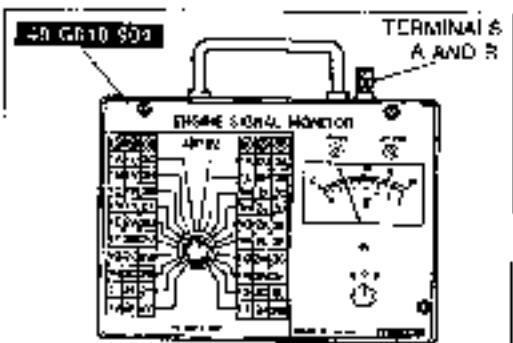
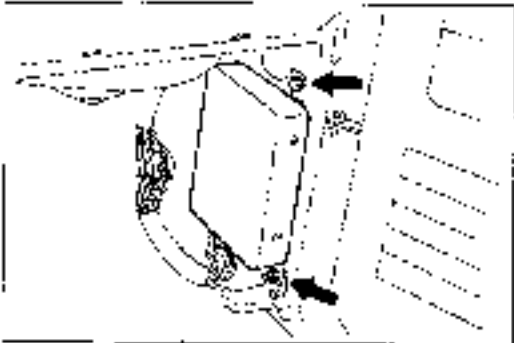
5F10F2-15



GBUCF2-077



12UCF2-080



5M13F2-15

ENGINE CONTROL UNIT**Inspection**

1. Remove the front side trim on the passenger's side.
2. Connect the **SST** to the engine control unit.
3. Place the **SST (Sheet)** on the **Engine Signal Monitor**.
4. Measure the voltage at each terminal.
(Refer to pages F2-176 to F2-178.)
5. If any ECU terminal voltage is incorrect, check the related input or output devices and wiring. If no problem is found, replace the ECU. (Refer to above.)

Caution

Never apply voltage to SST terminals A and B.

Terminal voltage

Vb: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
1A		—	Battery	Constant	Vb	For back-up
1B	○		Main relay	Ignition switch OFF	0V	
				Ignition switch ON	Vb	
				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)	Vb	
				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	Vb	
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)	Vb	
				Lamp illuminates	Below 2.5V	
				Lamp not illuminate	Vb	
1F		○	Self-Diagnosis checker (Code number)	For 3 seconds after ignition switch OFF → ON (Buzzer sounds)	Below 2.5V	With Self-Diagnosis Checker
				After 3 seconds (Buzzer does not sound)	Vb	
				Buzzer sounds	Below 2.5V	
				Buzzer not sounds	Vb	
1G		○	Main relay	Ignition switch OFF	Vb	
				During turn off (airflow sensor)	0V	
				Ignition switch ON	0V	
1H		○	Circuit opening relay	Ignition switch ON	Vb	
				During cranking or at idle	Below 2.5V	
1I	○		Ignition switch (ON position)	Ignition switch OFF	0V	
				Ignition switch ON	Vb	
1J		○	A/C relay	Ignition switch ON	Vb	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)	Vb	
				After 10 seconds	Below 2.5V	
				For 5 seconds after cranking with A/C switch ON (A/C does not operate)	Vb	
				After 5 seconds (A/C operates)	Below 2.5V	
				A/C switch ON at idle	Below 2.5V	
				A/C switch OFF at idle	Vb	
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) Open (A/T)	Ignition switch ON	0V	
				Ignition switch ON	Vb	
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	Vb	
1O	○		Stoplight switch	Brake pedal released	0V	Ignition switch ON
				Brake pedal depressed	Vb	
1P	○		PS pressure switch	Ignition switch ON	Vb	
				PS ON (at idle)	0V	
				PS OFF (at idle)	Vb	
1Q	○		A/C switch	A/C switch ON (Ignition switch ON)	Below 2.5V	Blower motor ON
				A/C switch OFF (Ignition switch ON)	Vb	

Terminal voltage

Vs: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
1H	○		Ground (ECAT)	Ignition switch ON	0V	For GS
			Oper (M/T, FAT)	Ignition switch ON	Vs	
1S	○		Bower switch	Bower OFF	Vs	Ignition switch ON
				Bower ON	Below 1.5V	
1I						
1U	○		Headlight switch	Headlight ON	Vs	
				Headlight OFF	Below 1.5V	
1V	○		Neutral or clutch switch (inhibitor switch)	Neutral or clutch pedal (depressed (P or N ranges))	0V	Ignition switch ON
				Other condition	Vs	
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
				Idle	Approx. 3.0V	
2G	○		Distributor	Ignition switch ON	0 or 5V	G-Signal
				Idle	Approx. 1.2V	
2H		○	Airflow sensor (Burkhill)	Just after ignition switch OFF	0V	Burn off functions momentarily
				Burn off (2-5 seconds after ignition switch OFF) (Refer to page F2-174)	8-12V	
2I	—	—				
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)	0.9-2.6V	
2P	○		Airflow sensor (Ground)	Increase engine speed (After warm up)	2-5V	
				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 Int condition, Coolant Temp. above 80°C (194°F) Intake air temp. above 75°C (167°F)
				For 120 seconds after starting	Below 2.5V	
2U		○	Injector G6 (No. 3, 4) F2 (No. 1, 3)	Ignition switch ON	Vs	Other conditions
				Idle	Vs	
					Vs	Engine Sigma Monitor Green and red lights flash

Terminal voltage

V_B: Battery voltage

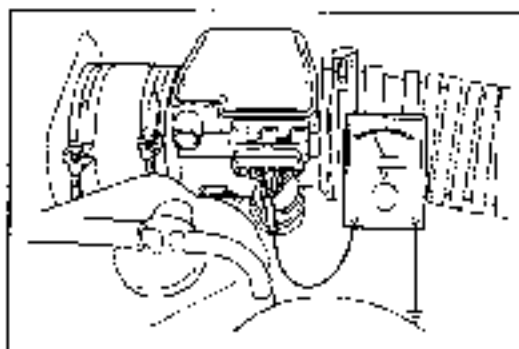
Terminal	Input	Output	Connection to	Test condition	Voltage	Remarks
2V		○	Injector G6 (No.1, 2) F2 (No.2, 4)	Ignition switch ON	V _B	Engine Signal Monitor. Green and red lights flash
				Idle	V _B	
2W		○	Solenoid valve (Idle speed control)	Ignition switch ON	Approx. 1 V	Engine signal monitor. Green and red lights flash
				Idle	Approx. 10V	
2X		○	Solenoid valve (Purge control)	Ignition switch ON	V _B	Engine signal monitor. Green and red lights flash
				Idle	V _B	
				Driving in gear	5 ~ 1.6V*	
2Y		○	HAT control unit	Ignition switch ON	V _B	For G6 HAT
				Accelerator for pedal fully depressed	0V	
2V		○	EC-AT control unit	At sea level	V _B	For G6 EC-AT Ignition switch ON
				At high altitude (800 m [2,624 ft])	0V	
2Z	—	—	—	—	—	—

2B30F2-007

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

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70UJF2-035

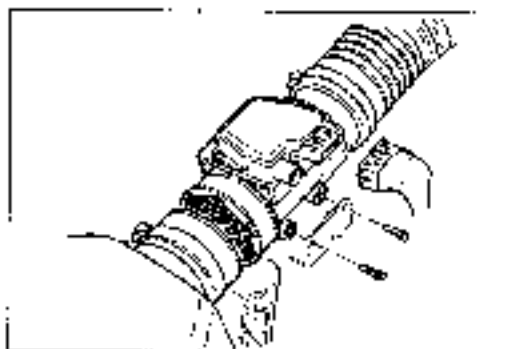
AIRFLOW SENSOR**Inspection**

1. Remove the rubber boot from the airflow sensor connector.
2. Check terminal voltages with a voltmeter.

Terminal wire	Condition	Ignition switch ON	Engine running
B/Y (Power supply)		Battery voltage	
G/O (Burn-off)		0V	
G/B (Airflow mass)		1.0—2.0V	1.0—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 airflow sensor.

16JUL2-031



94JUL2-215

Replacement

1. Disconnect the connector.
2. Loosen the air hose clamps.
3. Remove the bolts.
4. Remove and replace the airflow sensor.

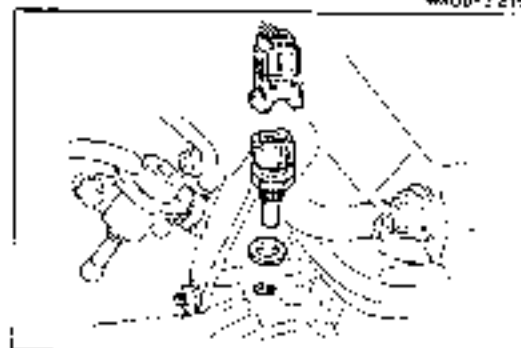
Caution

Install the airflow sensor with the arrow on the sensor aligned with airflow direction.

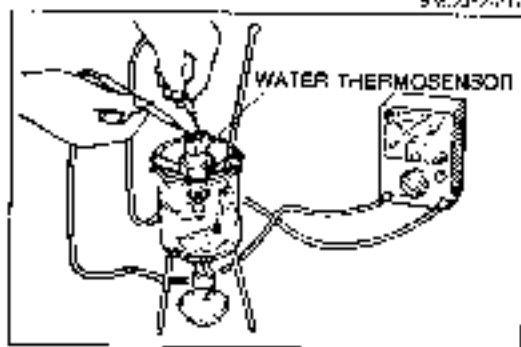
5. Tighten the hose clamps.
6. Reconnect the connector to the sensor.

WATER THERMOSENSOR**Removal**

1. Disconnect the water thermosensor connector.
2. Remove the water thermosensor.



94JUL2-217



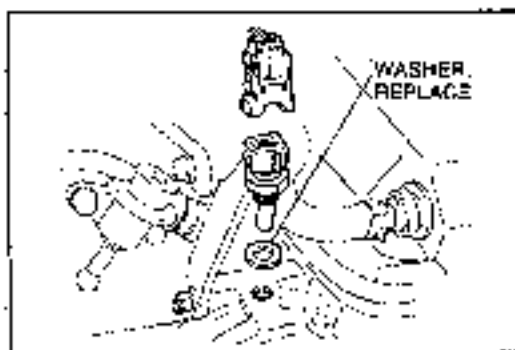
94JUL2-218

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.



9MUCF2 212

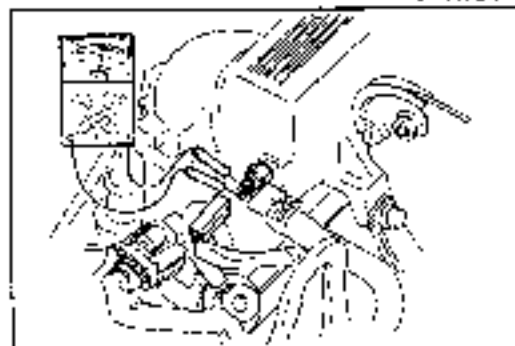
Installation

1. Install the water thermosensor and a new washer.

Tightening torque:

25—29 N·m (2.6—3.0 m·kg, 18—22 ft·lb)

2. Connect the water thermosensor connector.



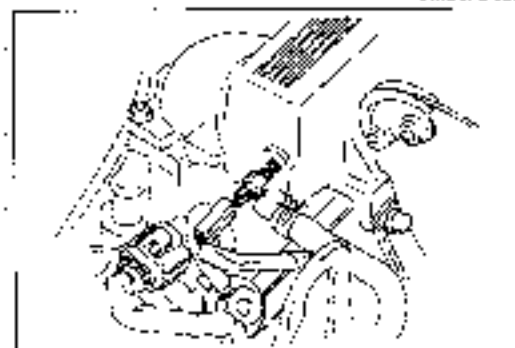
9MUCF2 220

INTAKE AIR THERMOSENSOR (IN DYNAMIC CHAMBER)**Inspection**

1. Disconnect the intake air thermosensor connector.
2. Connect an ohmmeter to the sensor terminals.
3. Check resistance of the sensor.

Temperature	Resistance
25°C (77°F)	29.7—36.3 kΩ
85°C (185°F)	3.3—3.7 kΩ

4. If not as specified, replace the intake air thermosensor.



9MUCF2 221

Replacement

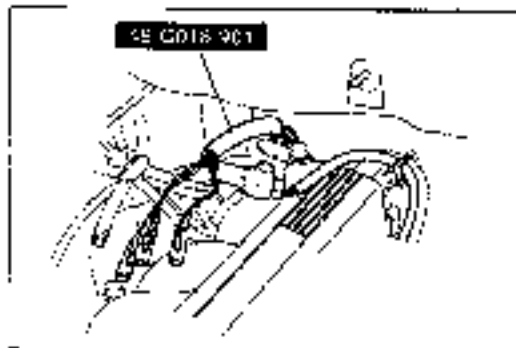
1. Disconnect the intake air thermosensor connector.
2. Remove the sensor.
3. Install the sensor.

Note

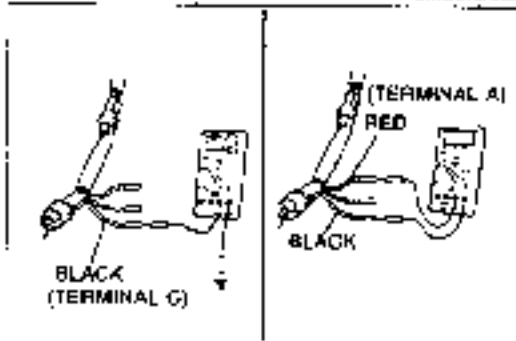
When installing the sensor, tighten to the specified torque.

Tightening torque:

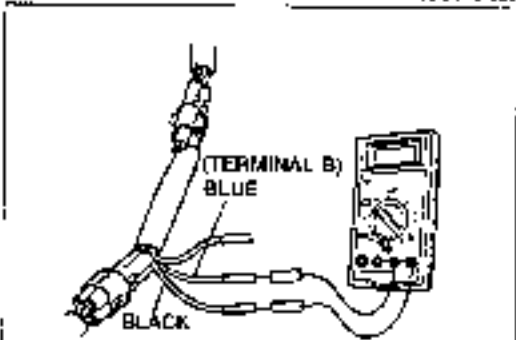
8.9—8.8 N·m (70—80 cm·kg, 61—78 in·lb)



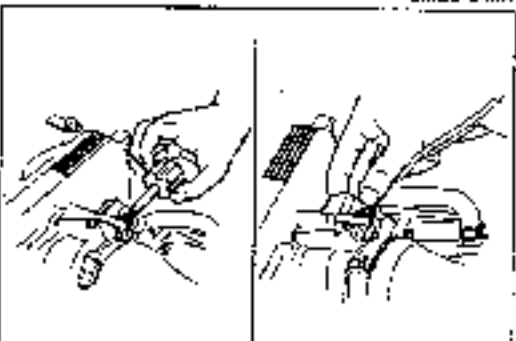
9AUDF3-222



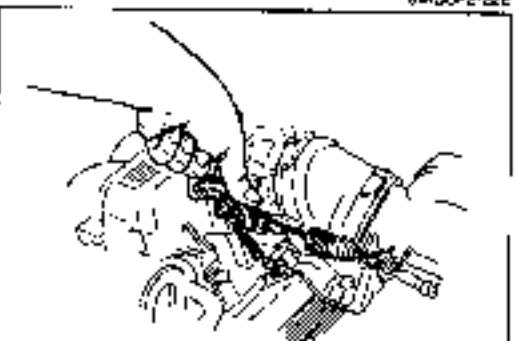
2BUDF2-230



9MUD3-224



9MUD3-226



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.

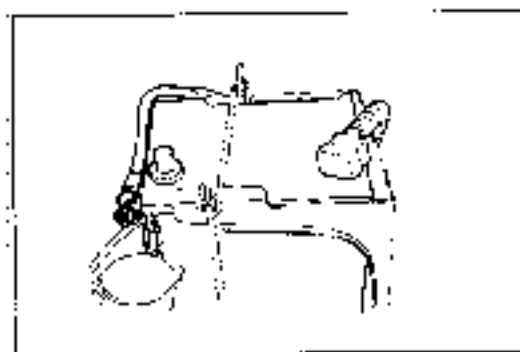
RED wire voltage (V)	BLUE wire voltage (V)	RED wire voltage (V)	BLUE wire voltage (V)
4.50—4.59	0.37—0.54	5.10—5.19	0.47—0.61
4.60—4.69	0.38—0.55	5.20—5.29	0.43—0.62
4.70—4.79	0.30—0.56	5.30—5.39	0.44—0.63
4.80—4.89	0.40—0.57	5.40—5.49	0.44—0.64
4.90—4.99	0.40—0.58	5.50	0.44—0.66
5.00—5.09	0.4—0.60		

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—4.95
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		



9MUC2-2-227

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.

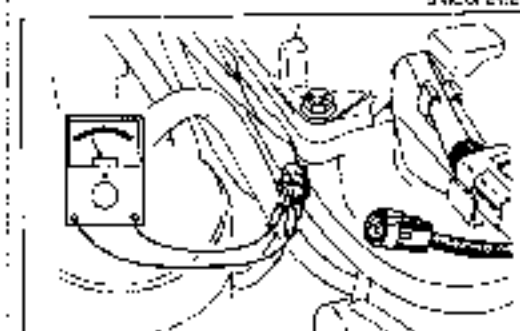


9MUC2-2-228

OXYGEN SENSOR

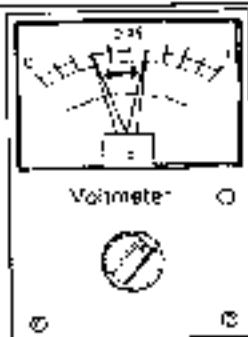
Inspection of Terminal Voltage

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**.



9MUC2-2-229

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.



9MUC2-2-230

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

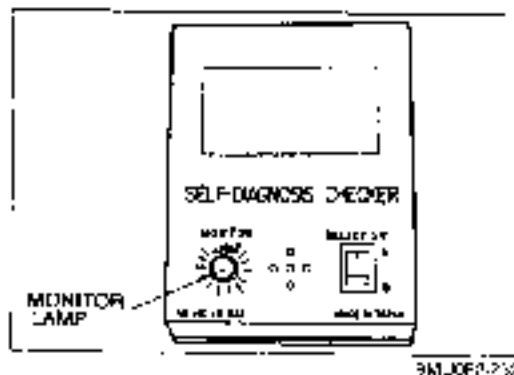
Do not ground the test connector (Green: 1-pin) during inspecting the oxygen sensor sensitivity.

CHECK CONNECTOR (GREEN: 6-PIN)



TO NEGATIVE BATTERY TERMINAL

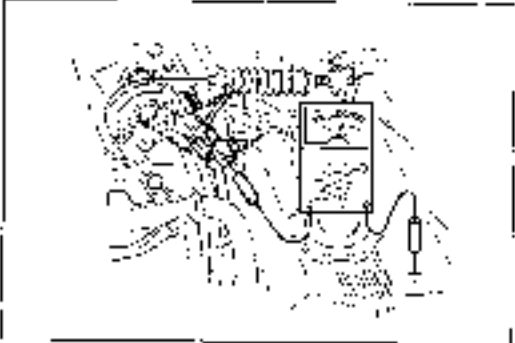
9MUC2-2-231



9KJJOFA210



6M1102250



75LCH7003

3. 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

1. Disconnect the oxygen sensor connector.
2. Remove the oxygen sensor.
3. Install and tighten the oxygen sensor to specified torque.

Tightening torque:

29—49 N·m (3—5 m·kg, 22—36 ft·lb)

4. Connect the oxygen sensor connector.

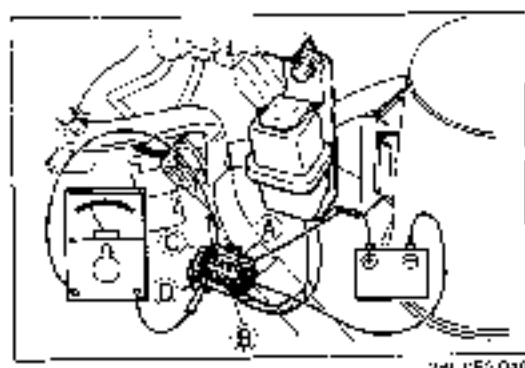
IDLE SWITCH

Inspection

1. Disconnect the idle switch connector.
2. Check continuity between the switch and a ground.

Throttle valve	Continuity
Fully closed	Yes
Open	No

3. 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.

Vs: Battery voltage

Terminals	Operation	Vs not applied	Vs 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

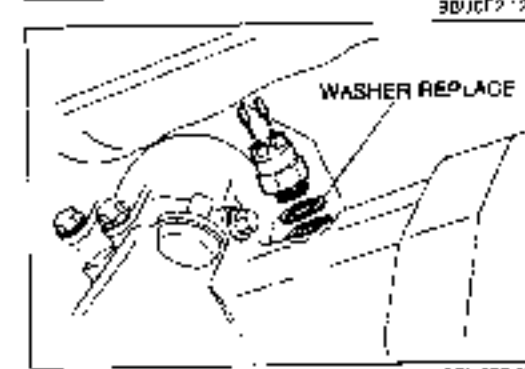
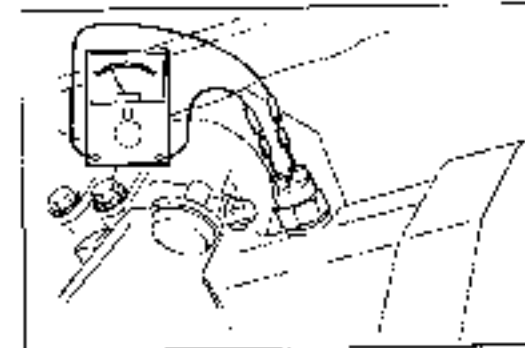
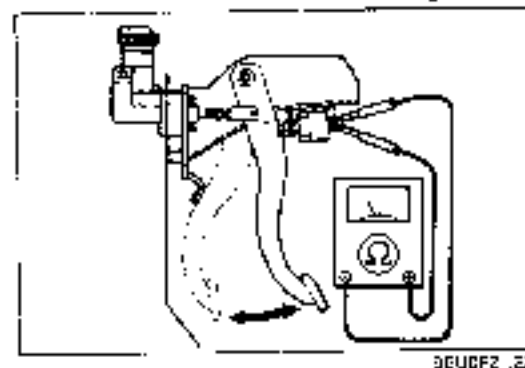
4. If not as specified, replace the neutral switch.

Replacement

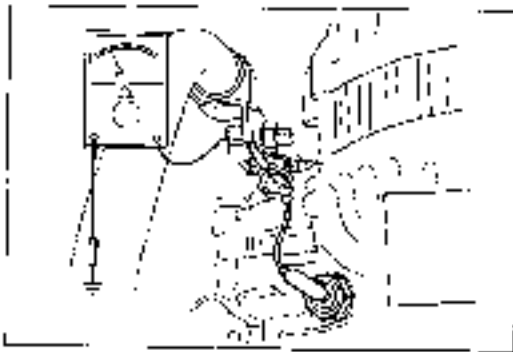
Replace the neutral switch as shown in the figure.

Tightening torque:

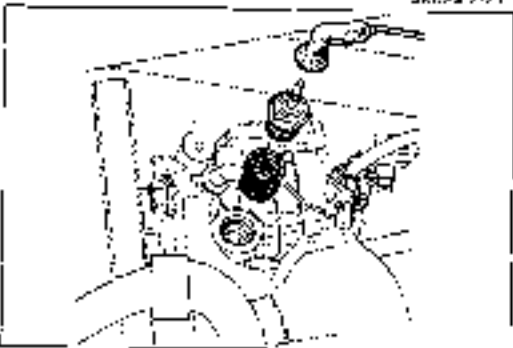
39—59 Nm (4—6 m·kg, 29—43 ft·lb)



WASHER REPLACE



91M-002-2-01



09112F2-085

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.

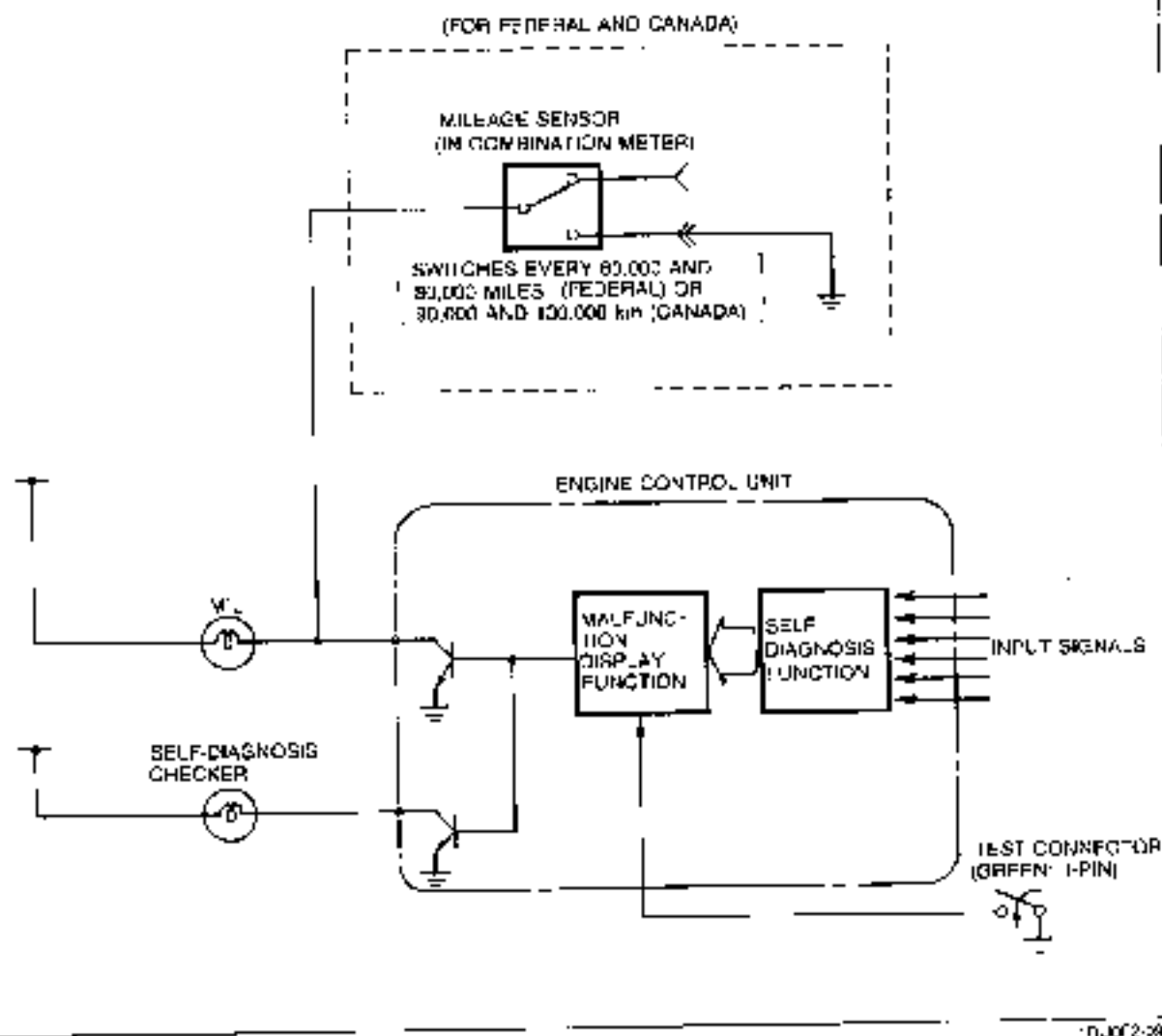
Replacement

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

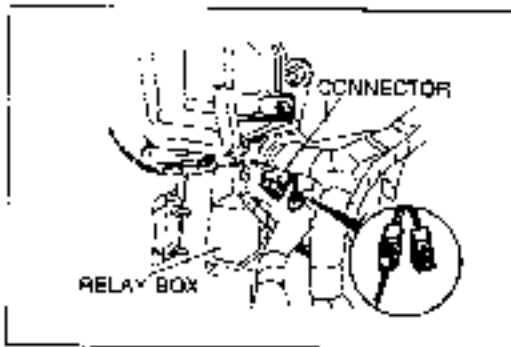
- When the MIL comes on, replace the specified emission control system part. (Refer to Scheduled Maintenance.)
- After replacing the specified emission control system part, reset the MIL. (Refer to page F2-167.)

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.)



3BU0F2-25

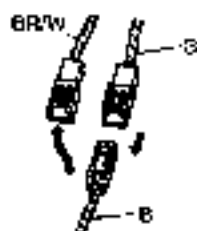
How To Reset the MIL (For Federal and Canada)

To reset the MIL, change the connection of the connector as shown in the figure.

EVERY 60,000 MILES
OR 96,000 km



EVERY 80,000 MILES
OR 130,000 km



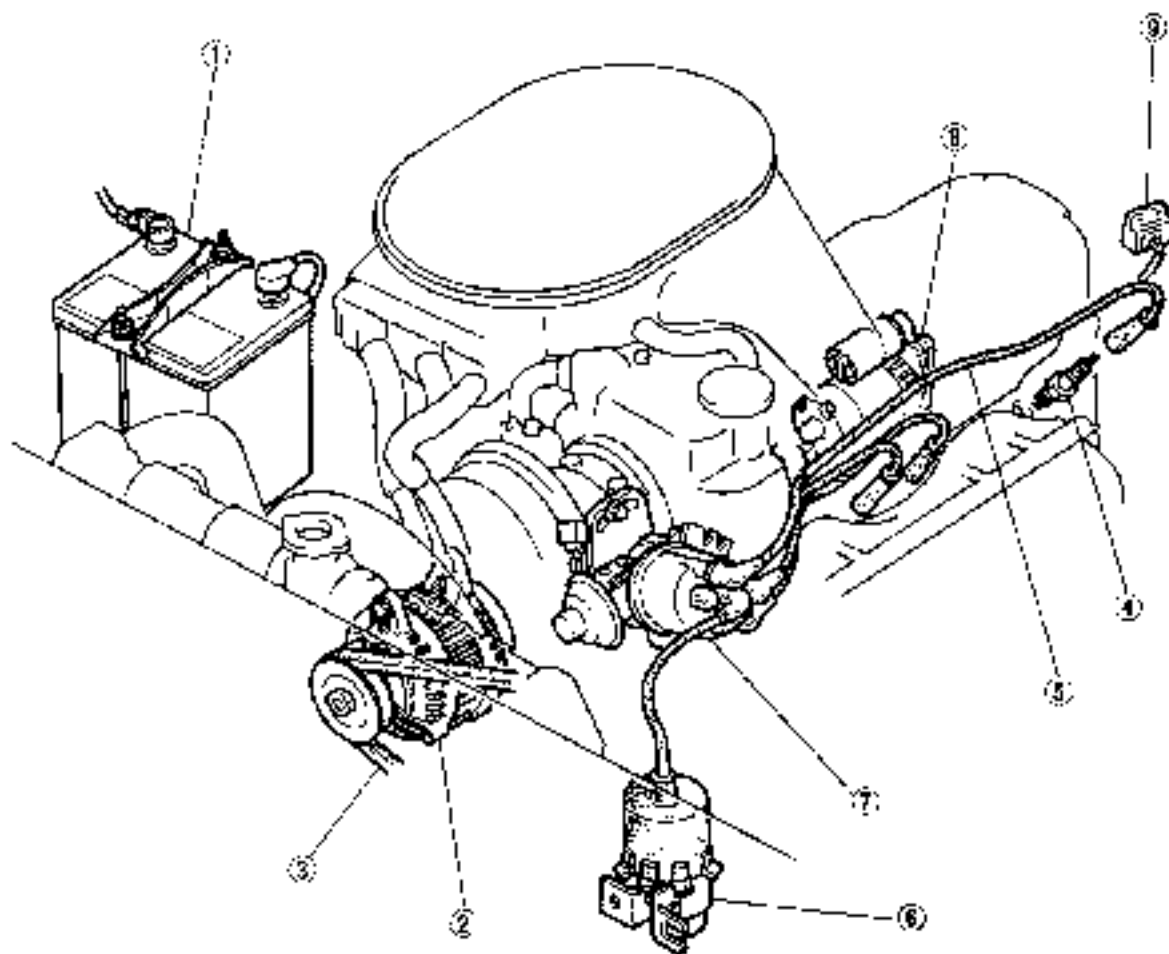
ENGINE ELECTRICAL SYSTEM

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28-60240*

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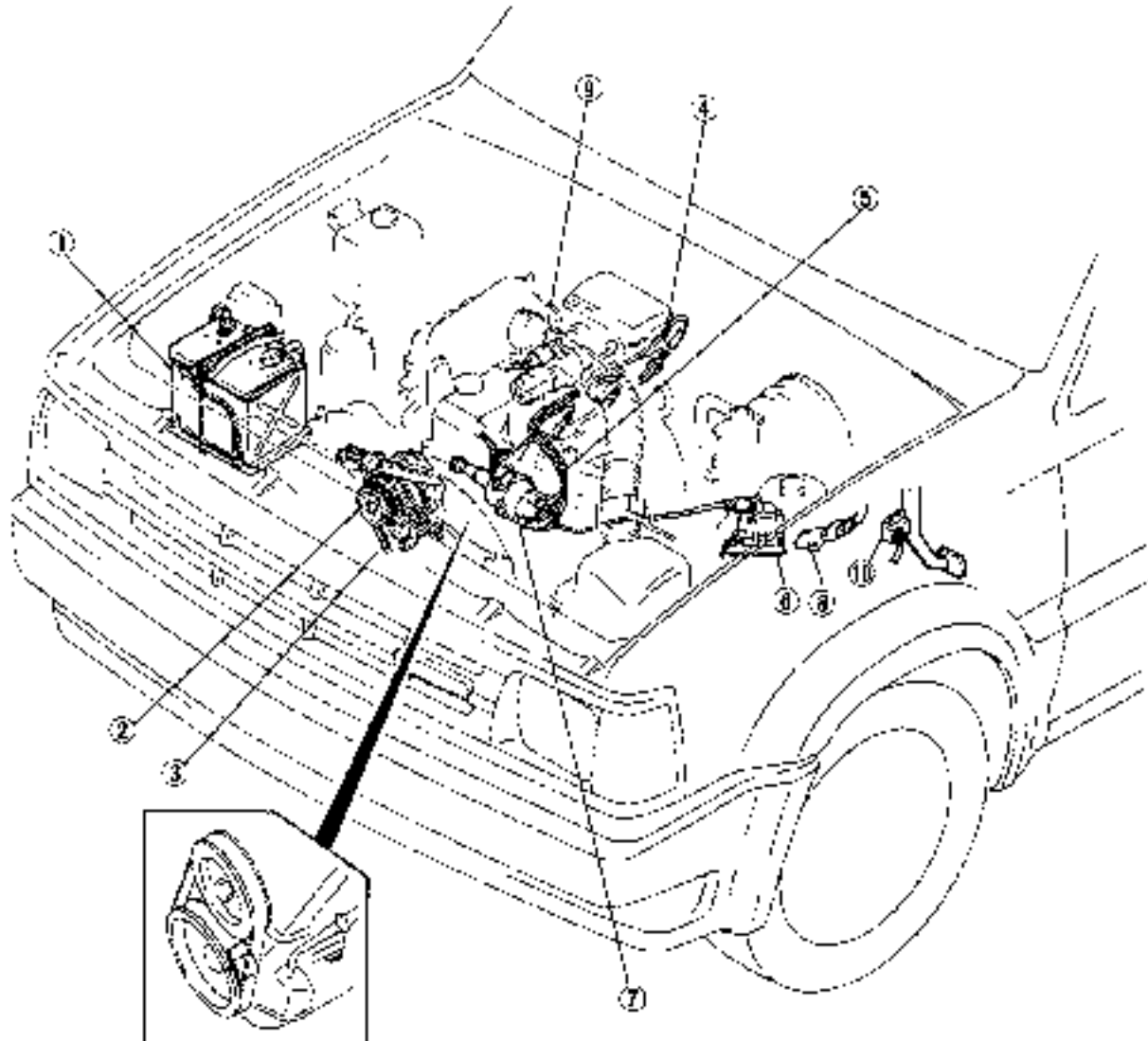
F2 CARBURETOR



*90037-000

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F2 EGI, Q6



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FL003X-000

OUTLINE

SPECIFICATIONS

Item		Engine	F2 Carburetor	F2 EGI	G6	
Battery	Voltage	V	12 Negative ground			
	Type and capacity (20-hour rate)		60D20P 75D26W Maintenance-free	50D20R (U.S.A.) 75D26R (Canada) Maintenance-free	60D20R 80D26R Maintenance-free	
Dark current ¹		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)			
Starter	Drive belt deflection mm (in) 38 N (10 kg 22 lb)	New	7-8 (0.28-0.31)	10-12 (0.39-0.47)		
		Used	8-9 (0.31-0.35)	11-12 (0.43-0.51)		
	Type		Non-reduction (M/T) Cosial reduction (A/T)	Reduction		
	Output		12-0.95 (M/T) 12-1.4 (A/T)	12-1.2 (M/T) 12-1.4 (A/T)		
	Brush length, mm (in)	Standard	17.0 (0.669) (M/T) 17.5 (0.689) (A/T)	16.0 (0.630) (M/T) 17.0 (0.669) (A/T)		
Minimum		11.5 (0.453) (M/T) 10.0 (0.394) (A/T)	9.0 (0.354) (M/T) 11.5 (0.453) (A/T)			
Distributor	Type		Fully transistorized (HEI)	Electronic spark advances (Photo-diode type)		
	Centrifugal spark advance (Crank angle/Engine speed) degree/rpm		0-1,000			
			11.0-2,500			
			11.0-3,000 16.0-4,400			
Vacuum spark advance (Crank angle/Vacuum) degree/inch (inHg)		3-100 (3.9) 19.0-260 (10.2)				
Ignition timing		5-7° (1st connector grounded) (1st connector grounded)				
Spark plug	Type	NGK	BP45CS ^{1,2} BP45ES	RPR45ES-11 ^{1,2} BPR45ES-11	ZFR45F-11 ^{1,2} ZFR45F-11	
		IPPCNDESO	W10EXR-U ^{1,2} W20EXR-U	W16EXR-U11 ^{1,2} W20EXR-U11	KJ16CR-11 ^{1,2} KJ20CR-11	
	Plug gap	mm (in)	0.75-0.85 (0.028-0.033)	1.0-1.1 (0.039-0.043)		
	Firing order		1-2-4-3			

2B00R2-002

¹ Dark current is the constant flow of current while the ignition switch is OFF.
(i.e. Engine control unit, Audio, etc.)

² Standard plug

TROUBLESHOOTING GUIDE

Problem	Page
Will not crank	G-9
Discharged battery	G-9
Crank slowly	G-9

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

18JUGX-004

Discharged battery

* Numbers show checking order.

Condition	Related parts	Battery	Alternator	V-belt
Vehicle not started for extended period		1		
Electrical load	Heavy use		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

18JUGX-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

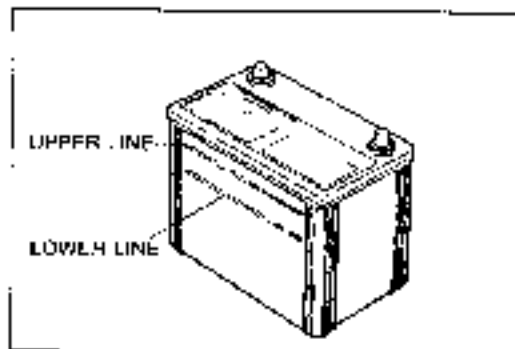
Misfire

No spark Weak spark

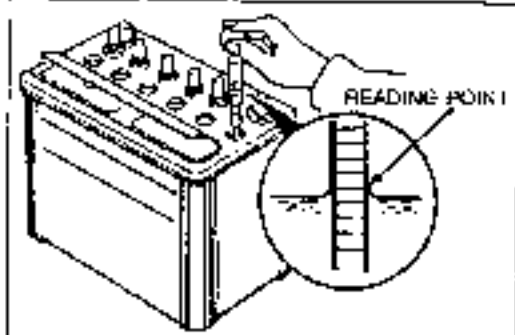
ReferRefer to Ignition
System
Troubleshooting**Page**

G-21

16U03X-006



CDUGX-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%

3B, 0X1X-009

BATTERY

PRECAUTION (F2 Carburetor)

After reconnecting the positive battery terminal, be sure that the charcoal canister is in the lowest position in its bracket.

INSPECTION**Terminal and cable**

1. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat them with grease after tightening the terminal.
2. Inspect for corroded or frayed battery cables.
3. Check the rubber protector on the positive terminal for proper coverage.

Electrolyte Level

1. Check whether or not the electrolyte level lies between the "UPPER LEVEL" and the "LOWER LEVEL" lines.
2. If low, add distilled water to the "UPPER LEVEL" line. Do not overfill.

Specific Gravity

1. Measure the specific gravity with a hydrometer.
2. If the specific gravity reading is less than specified, recharge the battery.

Specification: 1.27—1.29 (at 20°C [68°F])

RECHARGING

Battery	Slow charge (A)	Quick charge (A)
60D25R	Under 5	Max. 20
75D25R	Under 6.5	
90D26R		

Slow Charging

It is not necessary to remove the vent caps to perform a slow charge.

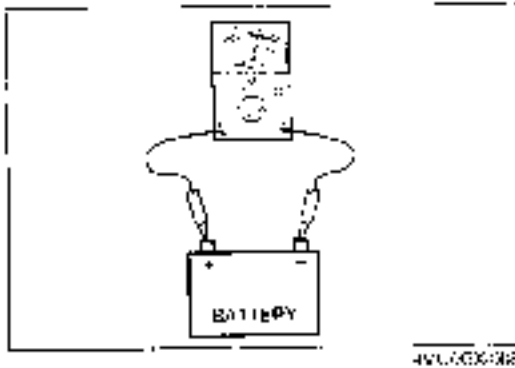
Quick Charging

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.

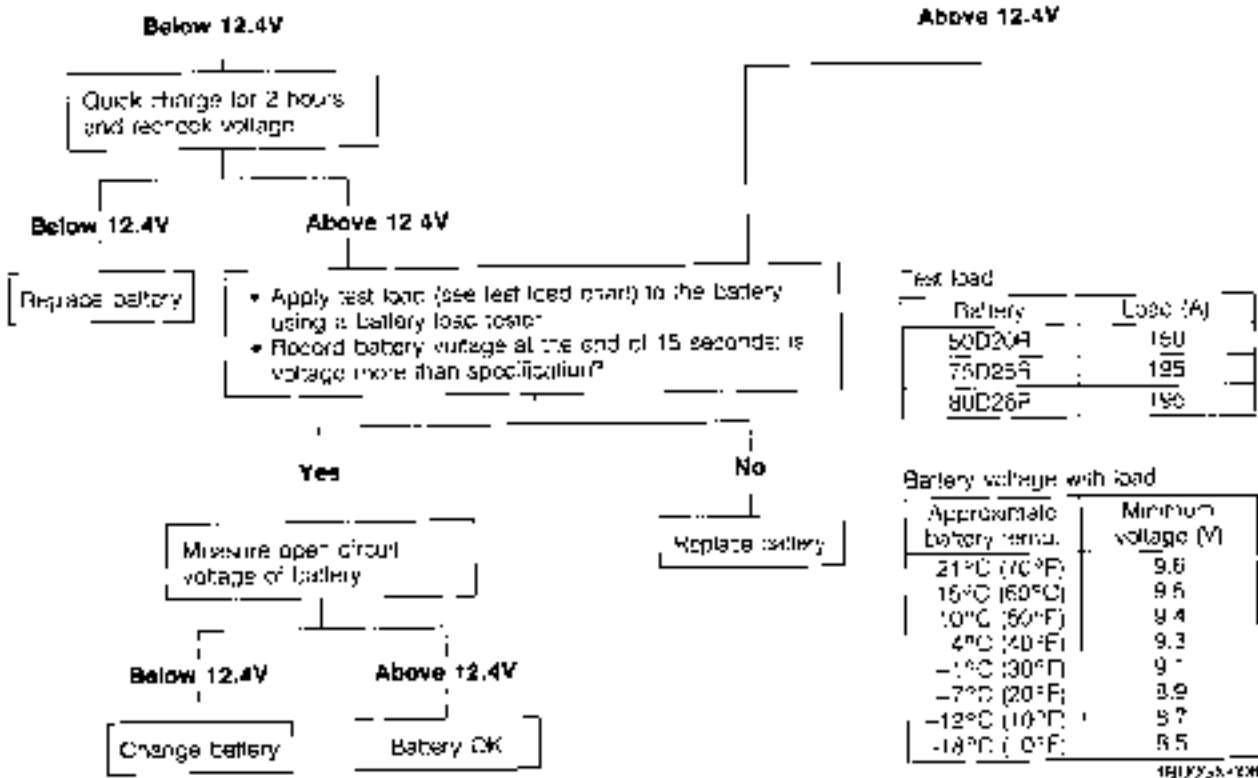
04J06X D60

**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.



ALTERNATOR

PREPARATION BST

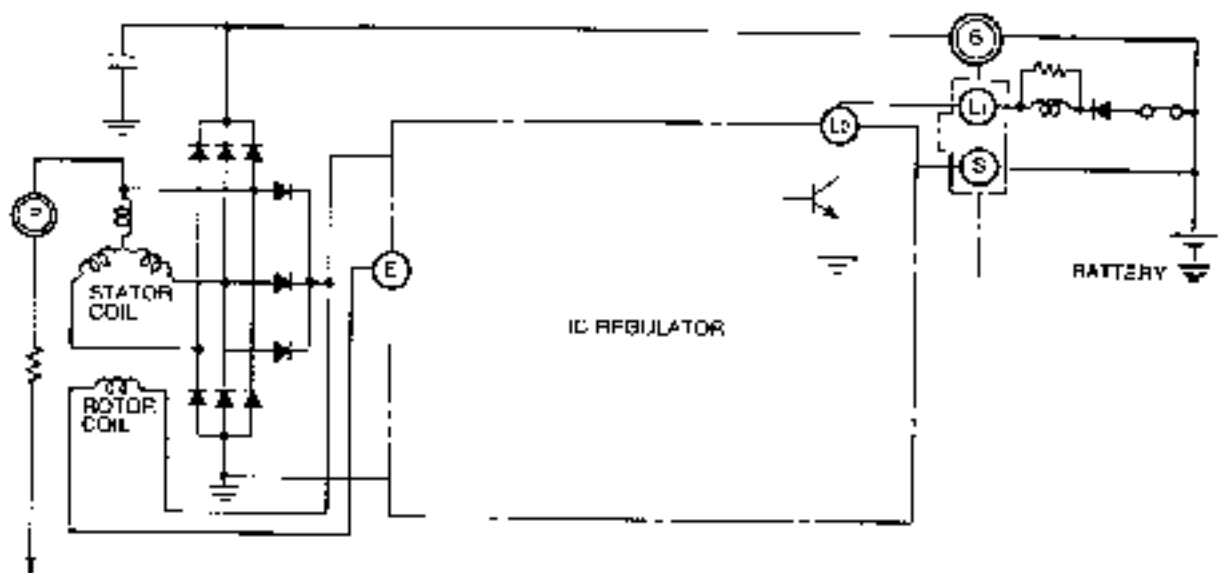
4D 52UD 020

Tension gauge,
ribbed belt

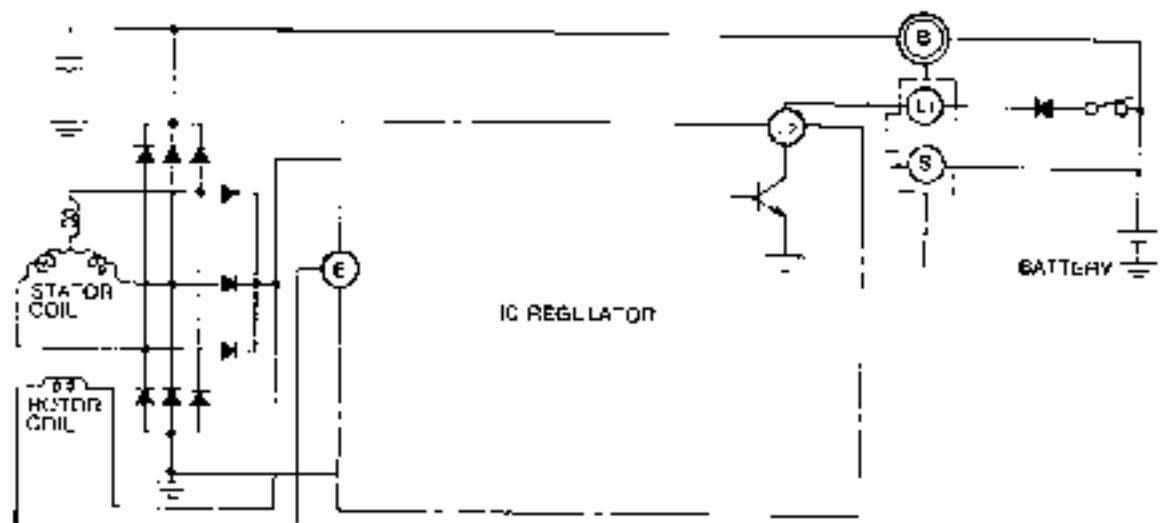


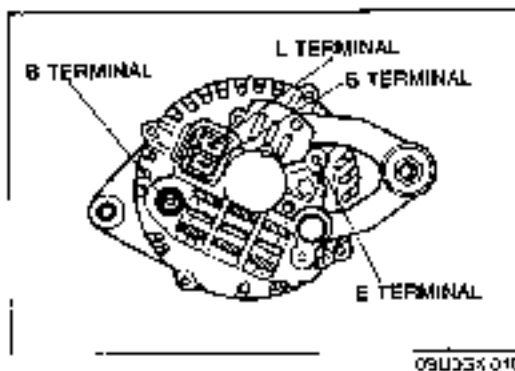
2-79337 002

F2 CARBURETOR, F2 EGI



06



**Caution**

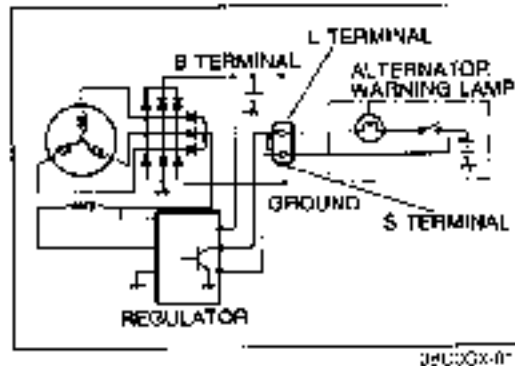
- a) Be sure the battery connections are not reversed, because this will damage the rectifier.
- b) Do not use high-voltage testers such as a megger, because they will damage the rectifier.
- c) Remember that battery voltage is always applied to the alternator B terminal.
- d) Do not ground the L terminal 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.

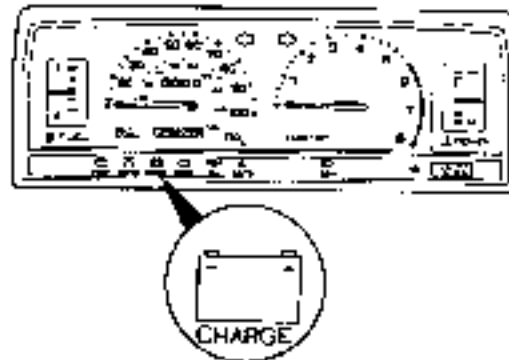
1. S circuit open
2. No voltage output
3. Field circuit open
4. B circuit open
5. Voltage output too high



TROUBLESHOOTING

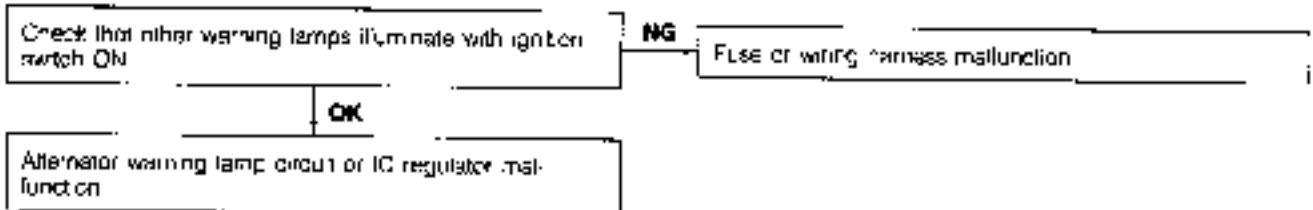
Preliminary Check

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.



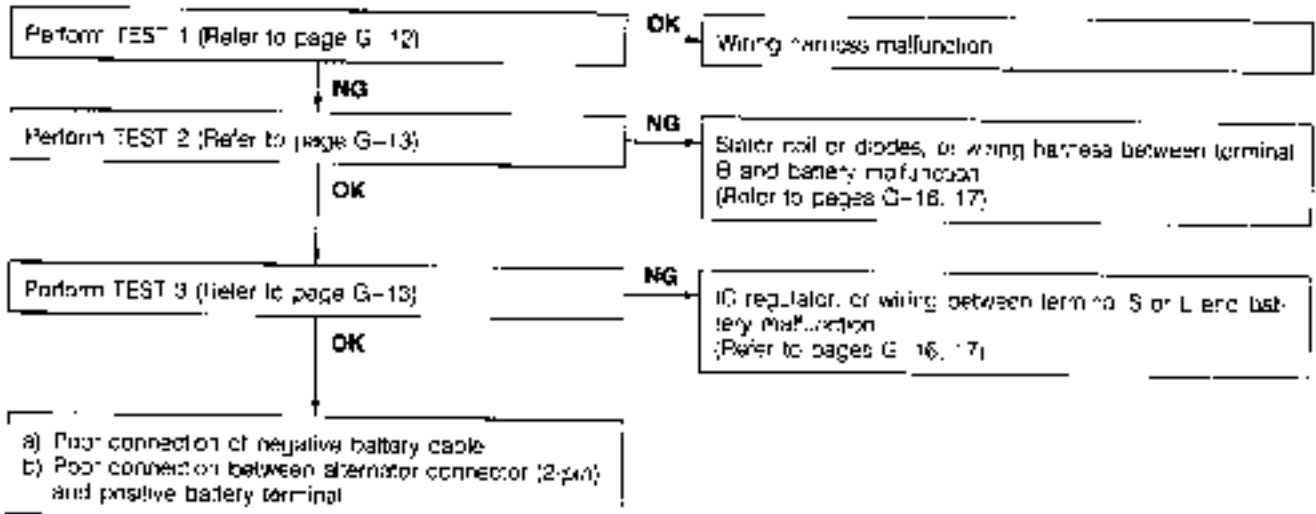
9M10554-11

1. Alternator warning lamp will not illuminate



09J05X-012

2. Alternator warning light illuminates when engine running



18U00xx-002

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

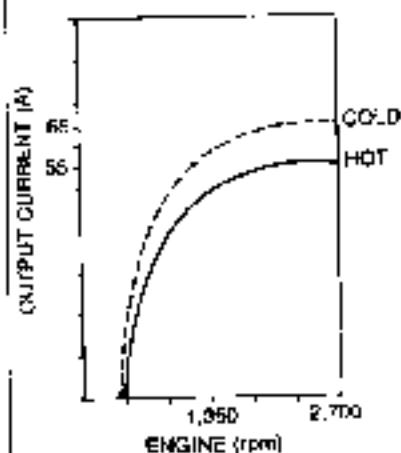
1. Connect an ammeter (75A min.) between the terminal B wire and terminal B.
2. Turn all headlights and accessories on and depress the brake pedal.
3. Start the engine and check that output current is as specified at 2,500—3,000 rpm.

Output current: 55A or more.....F2 carburetor, F2 EGI
60A or more.....G6

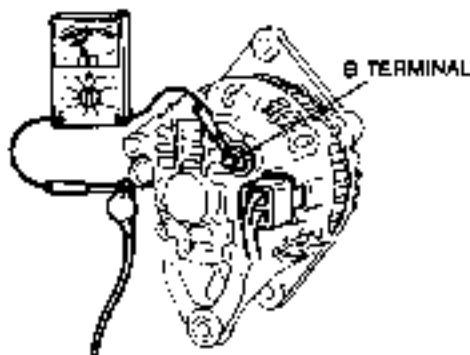
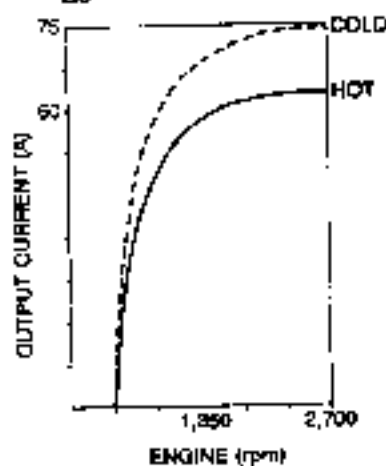
Caution

Do not ground terminal B.

F2 CARBURETOR, F2 EGI



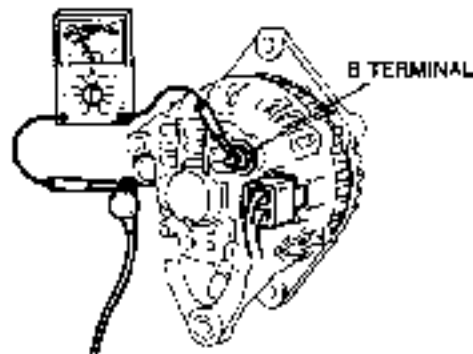
G6



181005A-L14

TEST 2

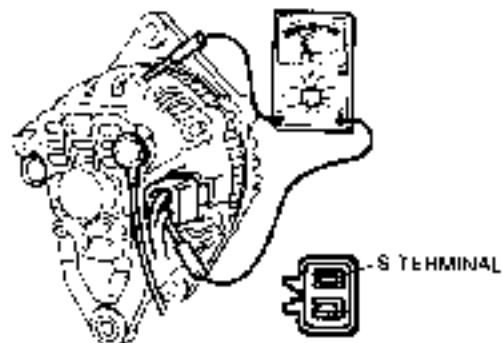
1. Turn all electric loads off and release the brake pedal
2. Start the engine and check that output current is **5A or more** at **2,500—3,000 rpm**.



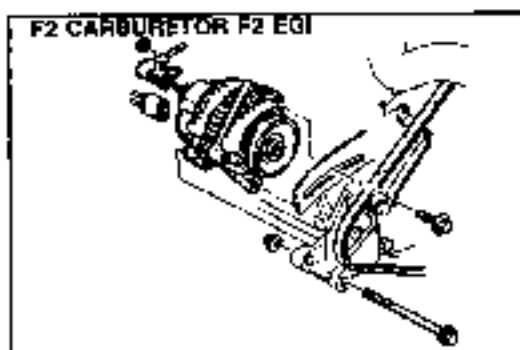
DIA, FOX 010

TEST 3

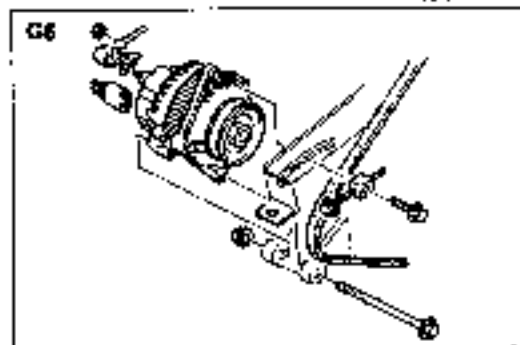
1. Turn all electric loads off and release the brake pedal
2. Start the engine and check that output voltage between terminal L or S and ground is within specification at **2,500—3,000 rpm**

Voltage: 14.1—14.7V

DELMEX-016



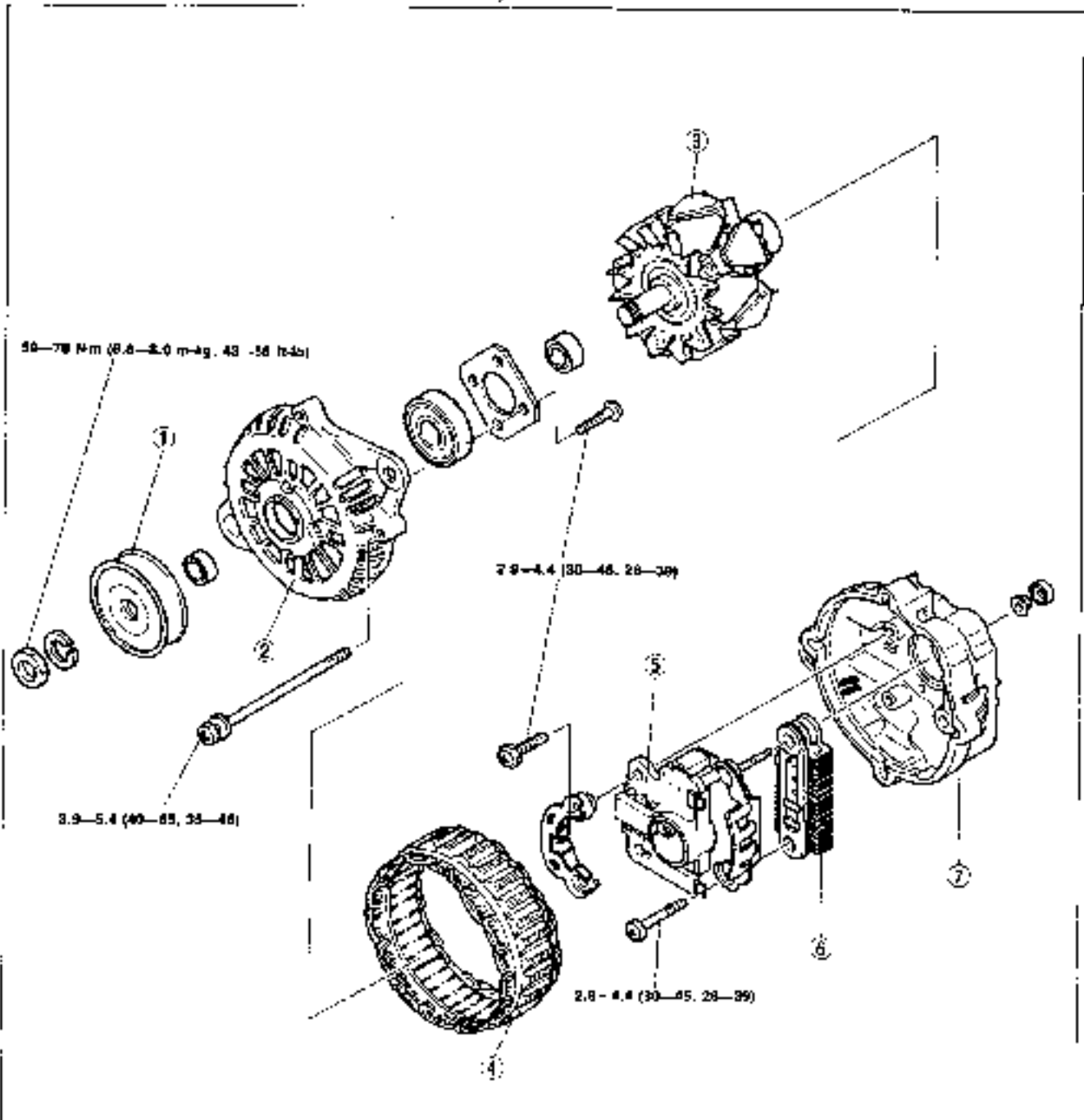
82AUG7X-215

**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

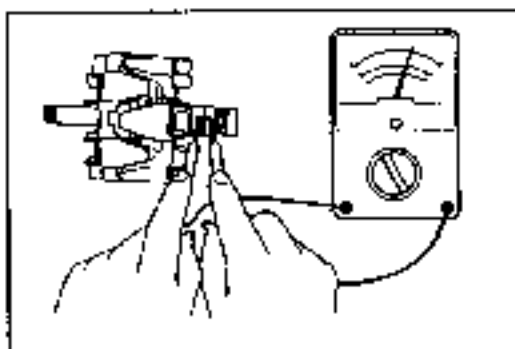
1. Disassemble in the order shown in the figure
2. Assemble in the reverse order of disassembly



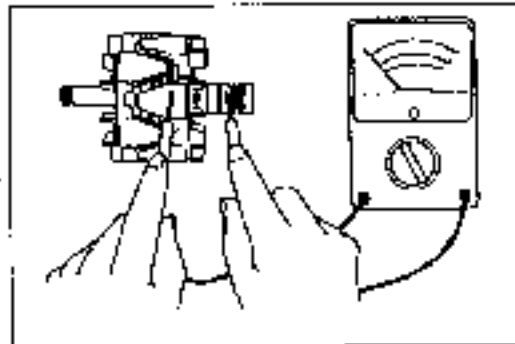
1. Pulley
2. Front bracket:
Inspection..... page G-16
3. Rotor:
Inspection..... page G-16
4. Stator:
Inspection..... page G-16

5. Brush holder assembly:
Inspection..... page G-17
6. Rectifier:
Inspection..... page G-17
7. Rear bracket:

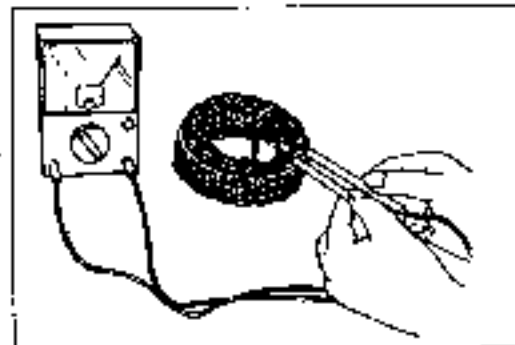
Nm (m-kg, ft-lb)
25000000



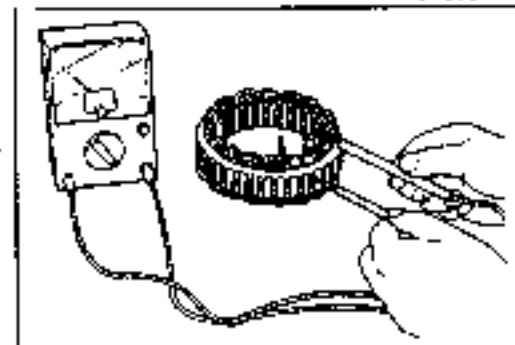
0ELUGX-018



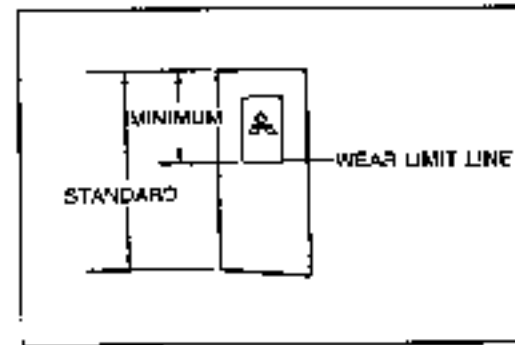
0MLUGX-029



0MLUGX-030



0VLOGX-031



0FA00X-019

INSPECTION**Rotor****1. Wiring damage**

- (1) Check the resistance between the slip rings by using an ohmmeter.

Specification: Approx. 3.5—4.5Ω [at 20°C (68°F)]

- (2) If it is not within specification, replace the rotor.

2. Ground of the field coil

- (1) Check for continuity between the slip ring and the core by using an ohmmeter.
- (2) Replace the rotor if there is continuity.

3. Slip ring surface

If the slip ring surface is rough, use a lathe or fine sandpaper to repair it.

Stator**1. Wiring damage**

- (1) Check for continuity between the stator coil leads by using an ohmmeter.
- (2) Replace the stator if there is no continuity.

2. Ground of the stator coil

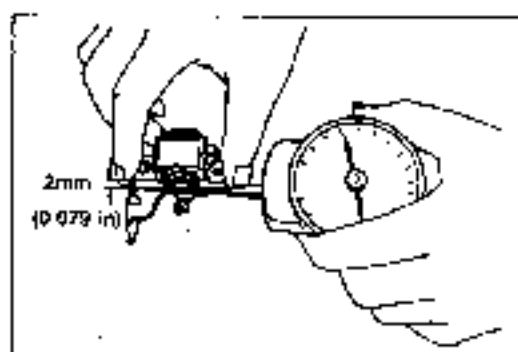
- (1) Check for continuity between the stator coil leads and the core by using a circuit tester.
- (2) Replace the stator if there is continuity.

Brush

If the brushes are worn almost to or beyond the limit, replace them.

Standard: 21.5mm (0.846 in)

Minimum: 8.0mm (0.315 in)



QDUJGX-320

Brush Spring

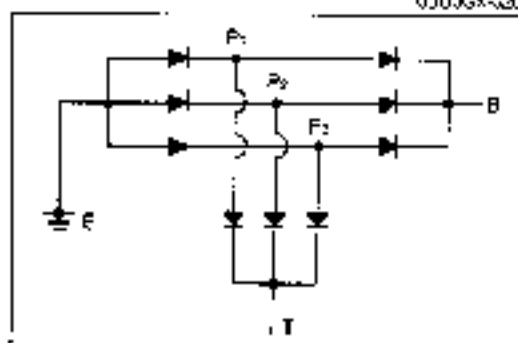
1. Measure the force of the brush spring by using a spring pressure gauge.
2. Replace the spring if necessary.

Standard force: 3.1—4.3 N (320—440 g, 11.2—15.5 oz)

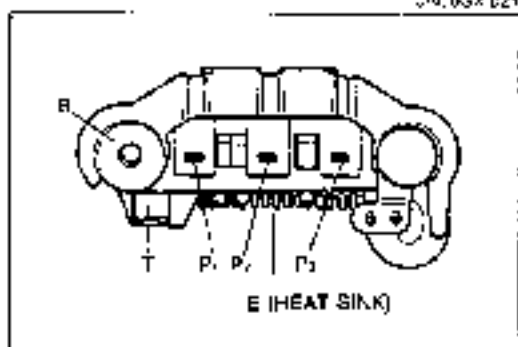
Minimum: 1.8—2.4 N (160—240 g, 5.6—8.5 oz)

Note

Read the spring pressure gauge at the brush tip projection of 2mm (0.079 in).



QVJGGX-021



SELDGX-025

Rectifier

1. Check for continuity of the diodes by using an ohmmeter.

Negative (Back)	Positive (Red)	Continuity
E		Yes
B	P ₁ , F ₂ , P ₃	No
		No
	E	No
P ₁ , F ₂ , P ₃	B	Yes
	T	Yes

2. Replace the rectifier.

INSTALLATION

Note

When installing the alternator, tighten the bolts to the specified torque.

Install in the reverse order of removal.

Tightening torque

- Bolt ①: 31—46 N·m (3.2—4.7 m·kg, 23—34 ft·lb)
 Bolt ②: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)
 Nut ③: 4.9—6.9 N·m (0.5—0.7 m·kg, 43—61 in·lb)
 Bolt ④: 19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)
 Bolt ⑤: 37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)
 Nut ⑥: 4.9—6.9 N·m (0.5—0.7 m·kg, 43—61 in·lb)

V-BELT TENSION

Adjustment

- 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)

Belt	F2 (Carburetor, FGI)	G6
Alternator	New: 401—540	New: 549—638
	(50—55, 113.0—121.0)	(56—65, 123.2—143.0)
	Used: 392—401	Used: 461—519
	(40—50, 88.0—110.0)	(47—56, 103.4—123.2)
		Limit: 275 (30, 61.5)

Deflection

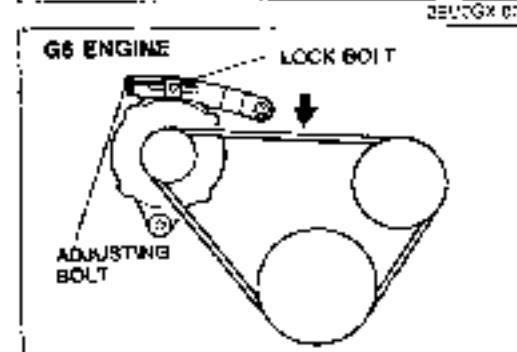
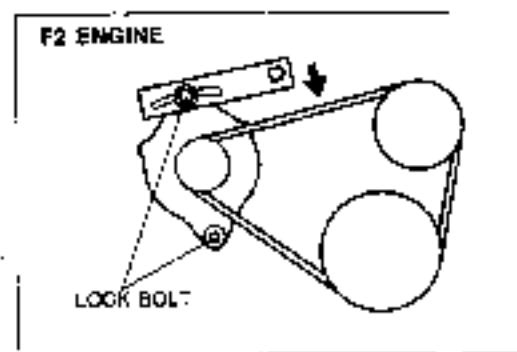
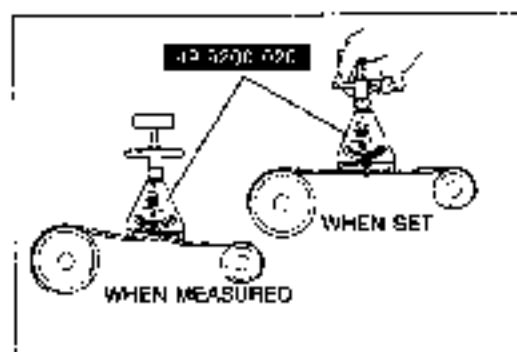
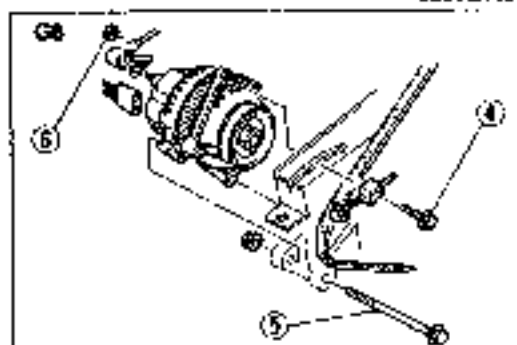
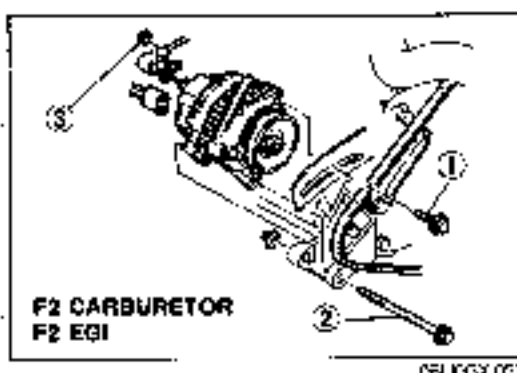
Note

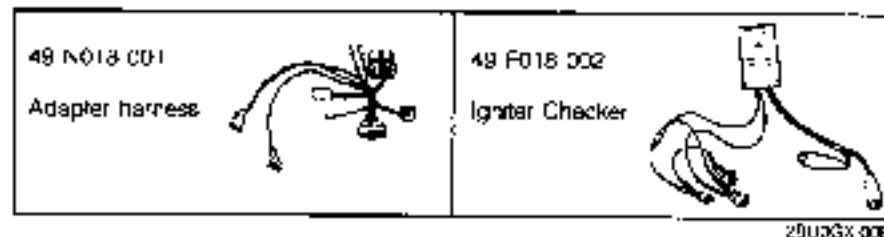
- Check the drive belt deflection by applying moderate pressure midway between the pulleys shown in the figure.
- A belt is considered "new" if it has been used on a running engine for less than five minutes. Set the deflection accordingly.
- Check the belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped.

mm (in) (35 N (7.0 kg, 22 lb))

Belt	F2 (Carburetor, FGI)	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
	(0.21—0.35)	(0.43—0.51)
		Limit: 16 (0.63)

- Tighten all bolts and recheck the tension.



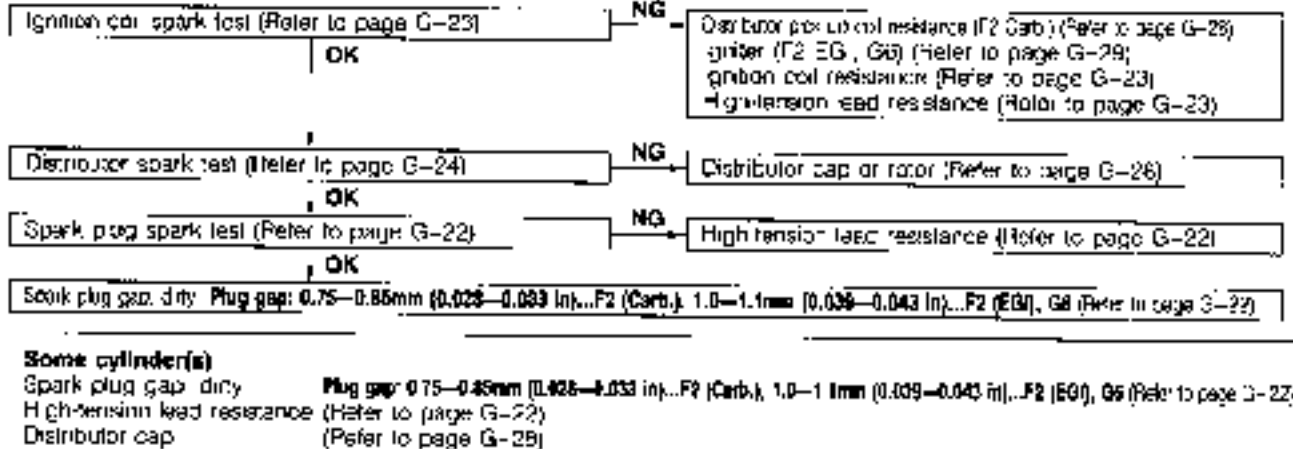
IGNITION SYSTEM**PREPARATION****SST**

TROUBLESHOOTING

MISFIRE (NO SPARK, WEAK SPARK)

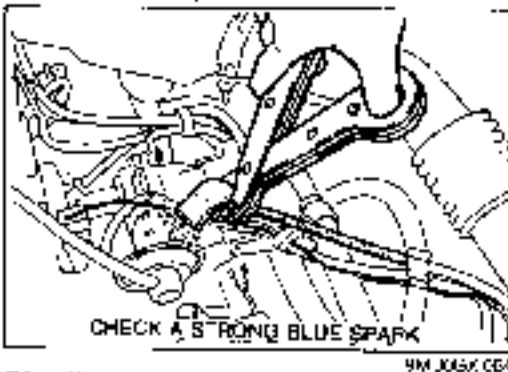
All cylinders

Note: When check spark test, hold lead with insulated pliers approx. 5–10mm (0.20–0.39 in) from a ground or cap.



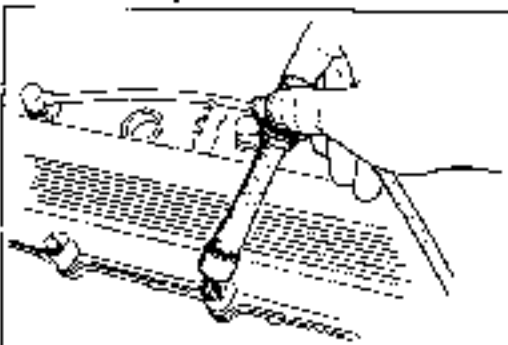
18UJ3X C-2

Ignition coil spark test



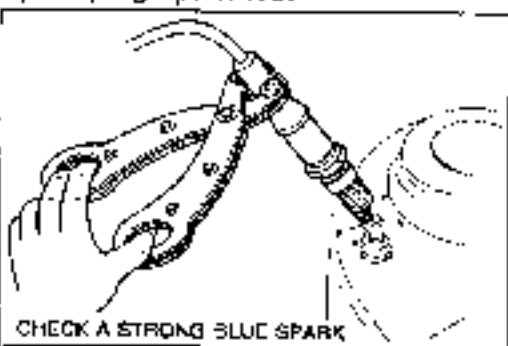
9M J06X C64

Distributor spark test



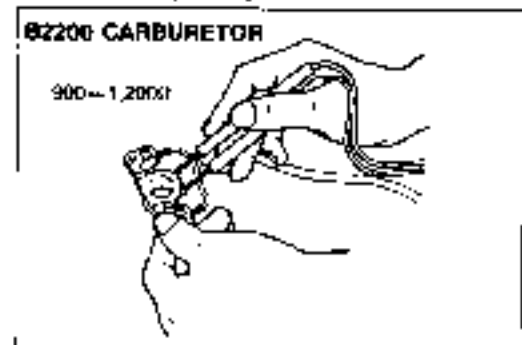
9M J06X C65

Spark plug spark test



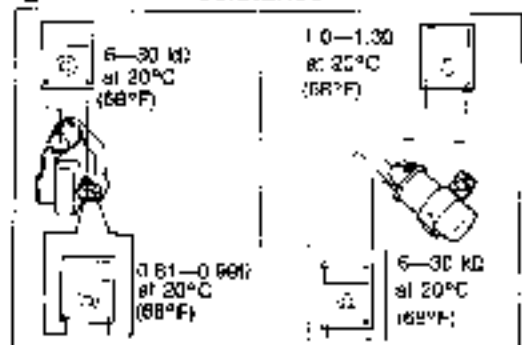
9M J06X C66

Distributor pickup coil resistance



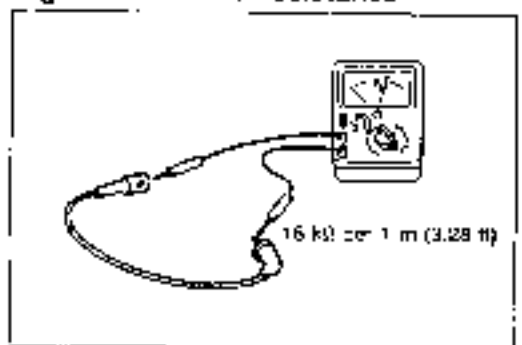
9M J06X C67

Ignition coil resistance

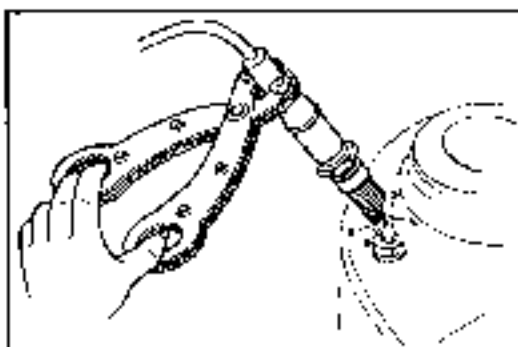


9M J06X C68

High-tension lead resistance



9M J06X C69

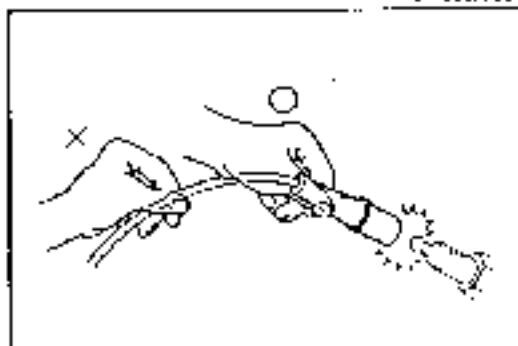


9MUGG3-031

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.



9MUGG3-032

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)

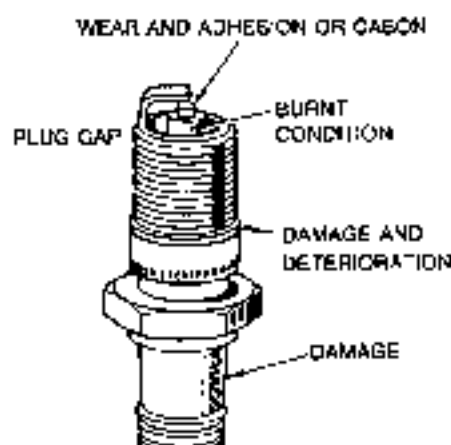
INSPECTION

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

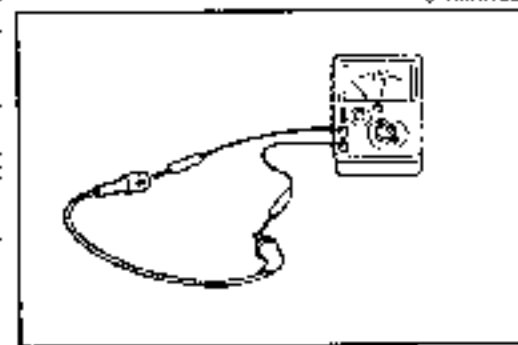


9MUGG3-033

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



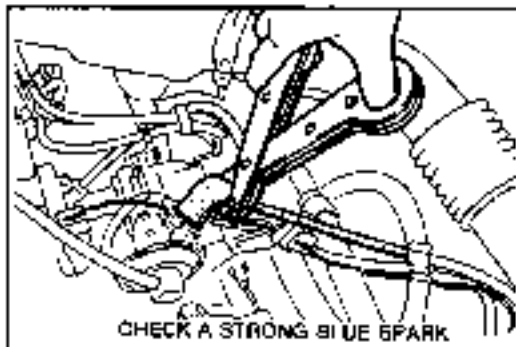
03J03X-G26

HIGH-TENSION LEADS

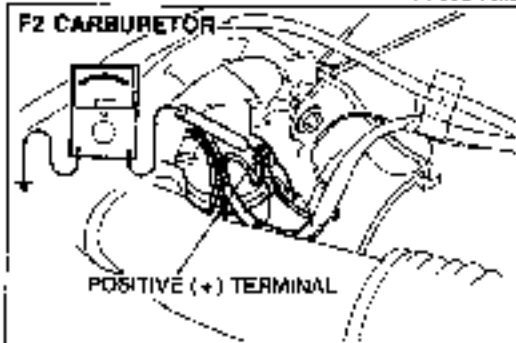
INSPECTION

Use an ohmmeter to measure the resistance

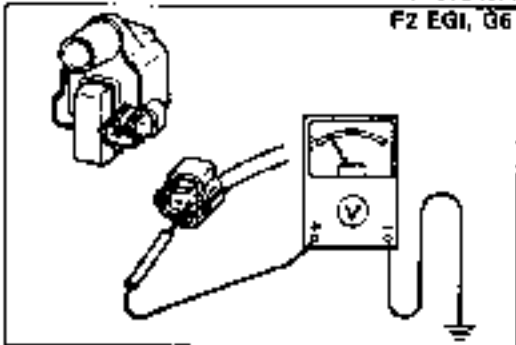
Resistance: 16 kΩ per 1 m (3.28 ft)



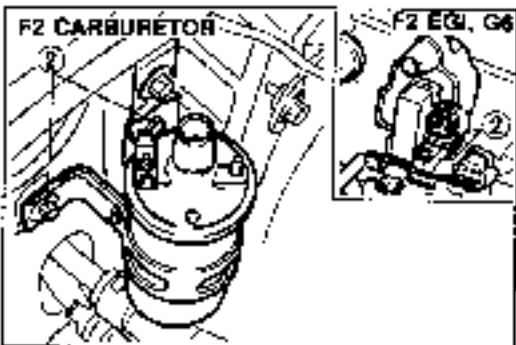
9K1J00X G13



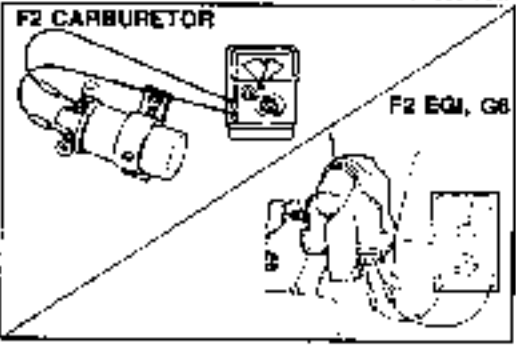
9P1U5GX-071



F2 EGI, G6



0H1U5GX-028



0H1U5GX-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 insulator bolts.
3. Install in the reverse order of removal.

INSPECTION

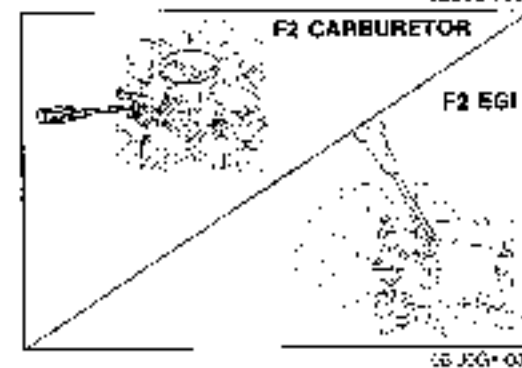
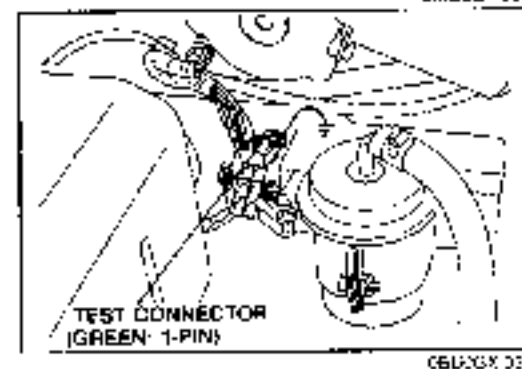
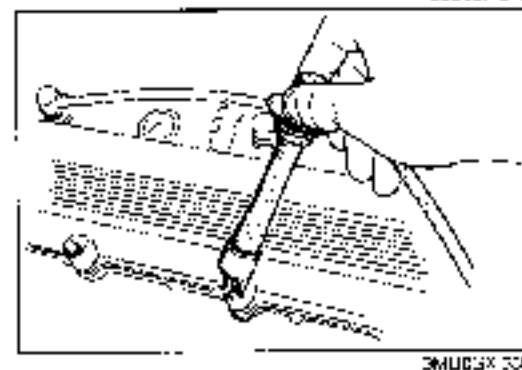
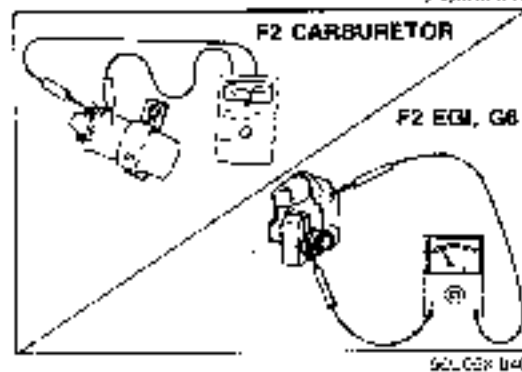
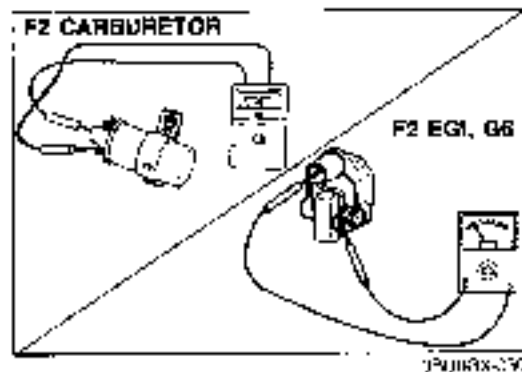
Primary Coil

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).

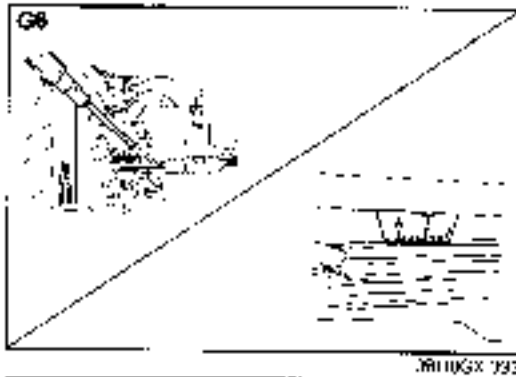
4. Check the idle speed, set it to the specified speed if necessary.

Idle speed:

(RPM)

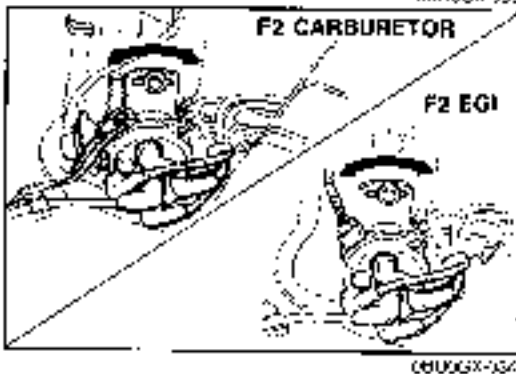
	F2 Carburetor	F2 EGI	G6
MT	800—850	730—770	730—770
AT	1800 ±5	750—790	750—790

(MT: Neutral, AT: 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)**

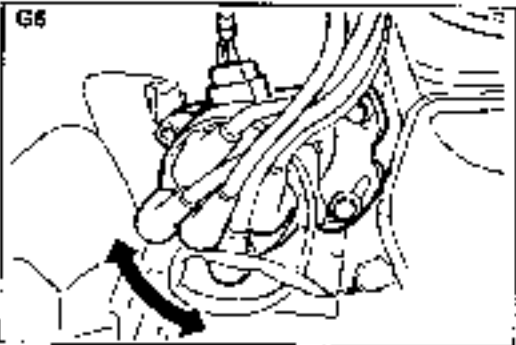


- 6 If the mark is not aligned, loosen the distributor lock nut or bolts and turn the distributor housing to make the adjustment.
- 7 Tighten the distributor lock nut or bolts to specified torque.

Tightening torque:

19—25 Nm (1.9—2.6 m·kg, 14—19 ft·lb)

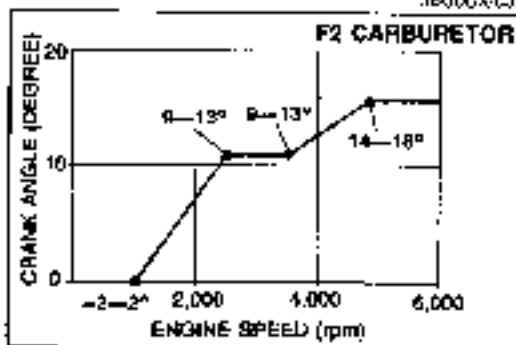
8. Disconnect the jumper wire from the test connector (F2 EGI, G6)

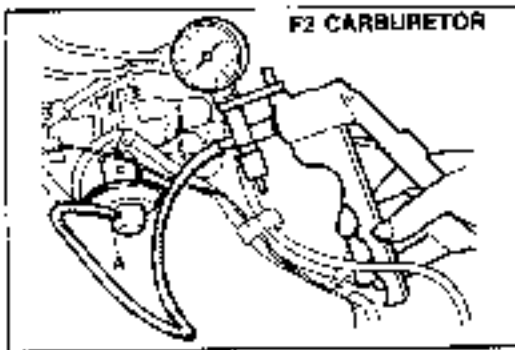


SPARK ADVANCE CONTROL

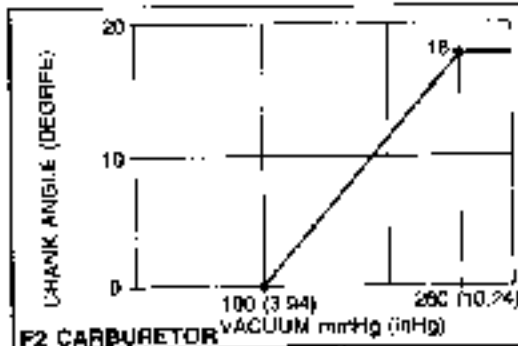
Centrifugal (F2 Carburetor only)

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

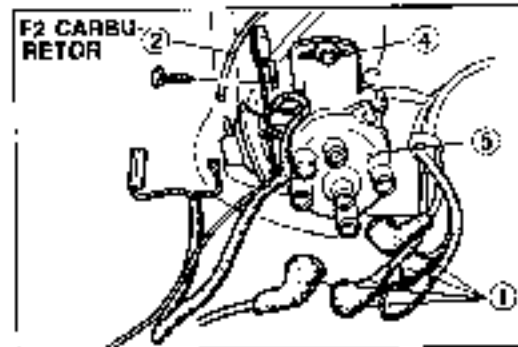




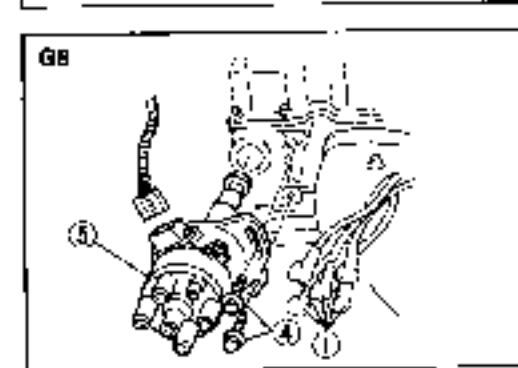
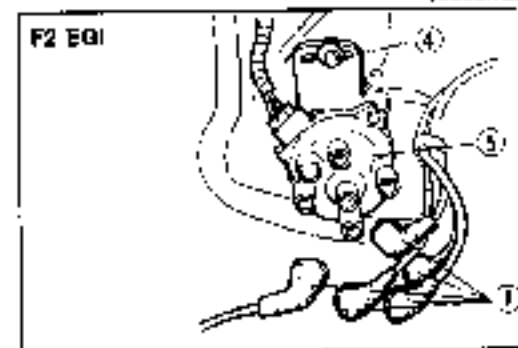
CHRYSLER 036



CHRYSLER 037



CHRYSLER 038

**Vacuum (F2 Carburetor only)**

1. Warm up the engine to operating temperature.
2. Check that the idle speed and ignition timing are correct.
3. Disconnect the vacuum hoses from the vacuum control, and plug the ends of the hoses.
4. Run the engine at idle.
5. Attach a vacuum pump to the control A and check by using the timing light while applying vacuum.

Electronic Advance Inspection (F2 EGI, G6)

1. Verify that the ignition timing advances with engine acceleration.

REMOVAL

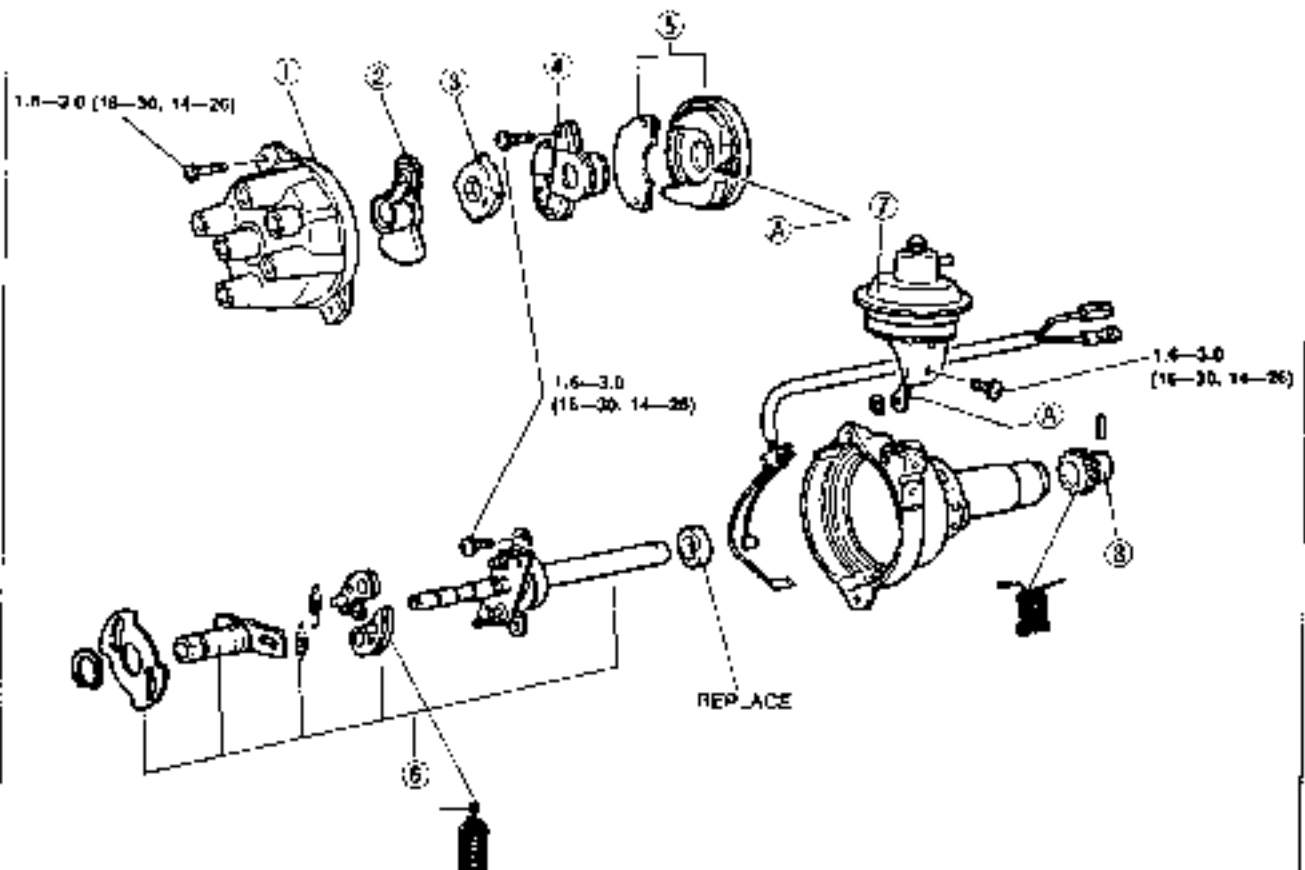
1. Remove the high-tension leads.
2. Disconnect the vacuum hose (F2 carburetor only) and wiring.
3. Turn the crankshaft so that No. 1 cylinder is at top dead center of compression.
4. Loosen the distributor locknut or bolts.
5. Remove the distributor.

Note

Do not turn the crankshaft after the distributor has been removed.

DISASSEMBLY AND ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly

P2 CARBURETOR

14.9 cm (5.9 in)

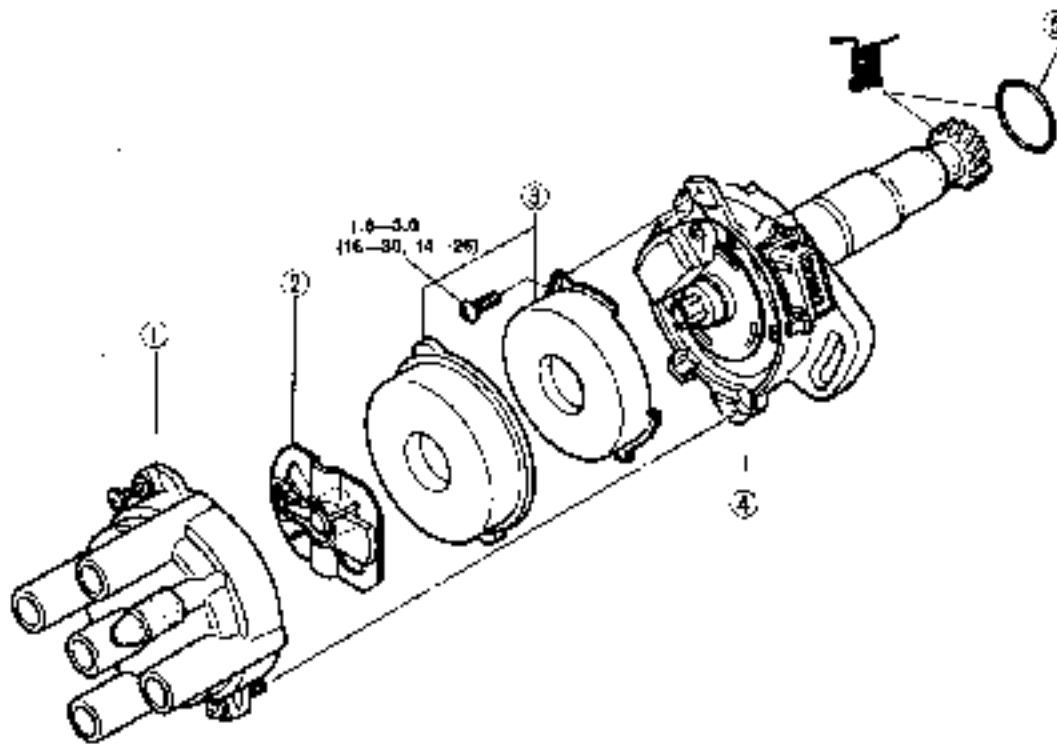
6BU06X-031

1. Cap
2. Rotor
3. Reluctor

4. Pickup coil with igniter
5. Breaker
6. Governor set

7. Vacuum control unit
8. Driven gear

F2 EGI, G6

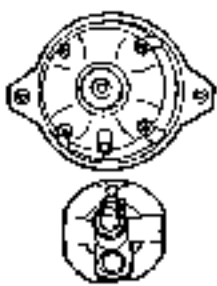


N·m (cm·kg, in·lb)
DRIK03X-038

- 1. Cap
- 2. Rotor
- 3. Cover

- 4. Crank angle sensor
- 5. O-ring

F2 EGI, G6



F2 CARBURETOR



DRIK03X-040

INSPECTION**Cap and Rotor**

- 1. Check for corrosion, damage, and cracks.
- 2. Replace if necessary.

Pickup Coil with Igniter (F2 Carburetor only)

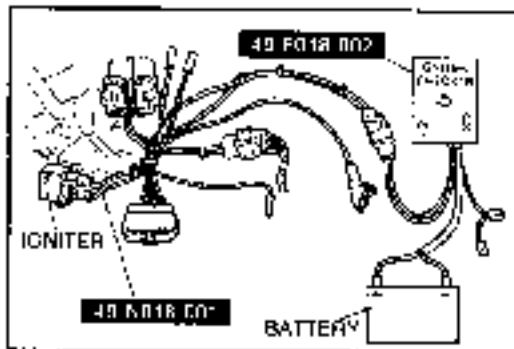
- 1. Connect an ohmmeter to the pickup coil.
- 2. Measure the resistance.

Resistance: 900—1,200Ω

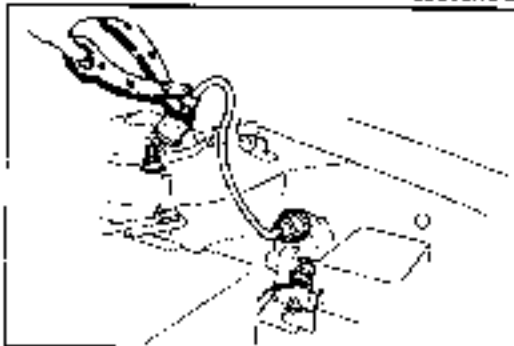
- 3. If it is not within specification, replace it.



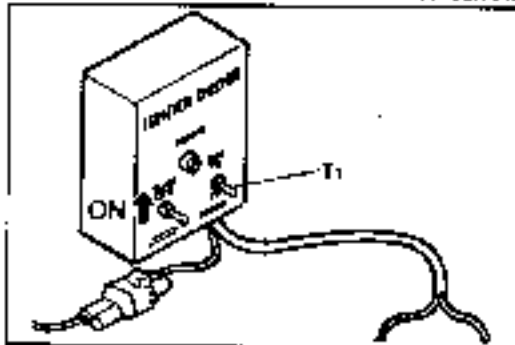
DRIK03X-041



28LCEX-042



50A00X-040



55A00X-072

IGNITER (F2 EG4, G6)

1. Disconnect the igniter connector.
2. Connect the **SST** between the igniter and the wiring harness.
3. Connect the connector (4-pin) of the **SST (Igniter Checker)** to the adapter harness.
4. Connect the power leads of the **SST (Igniter Checker)** to the battery.

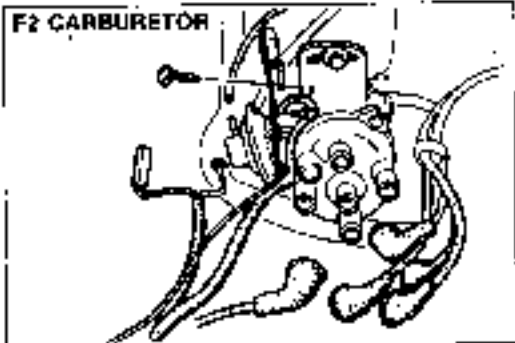
5. Turn the ignition switch ON.
6. Disconnect the high-tension coil lead from the distributor and hold it **5—10mm (0.20—0.39in)** from a ground.

Caution

Hold the SW2 ON for no longer than one second.

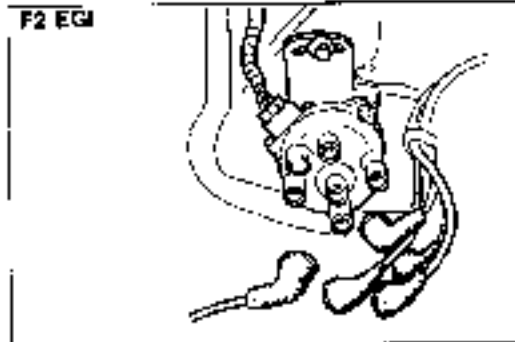
7. Flip the SW2 ON and OFF, and verify that strong blue sparks are discharged from the high-tension lead.

F2 CARBURETOR



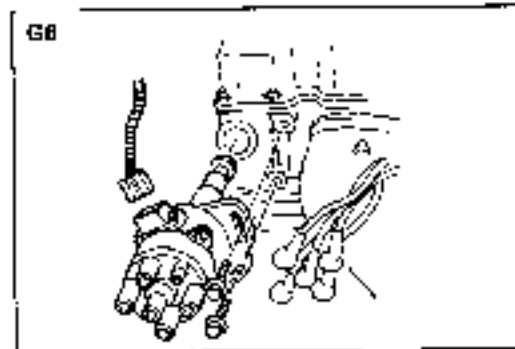
18J0G4013

F2 EGI



95LCEK055

G6



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.

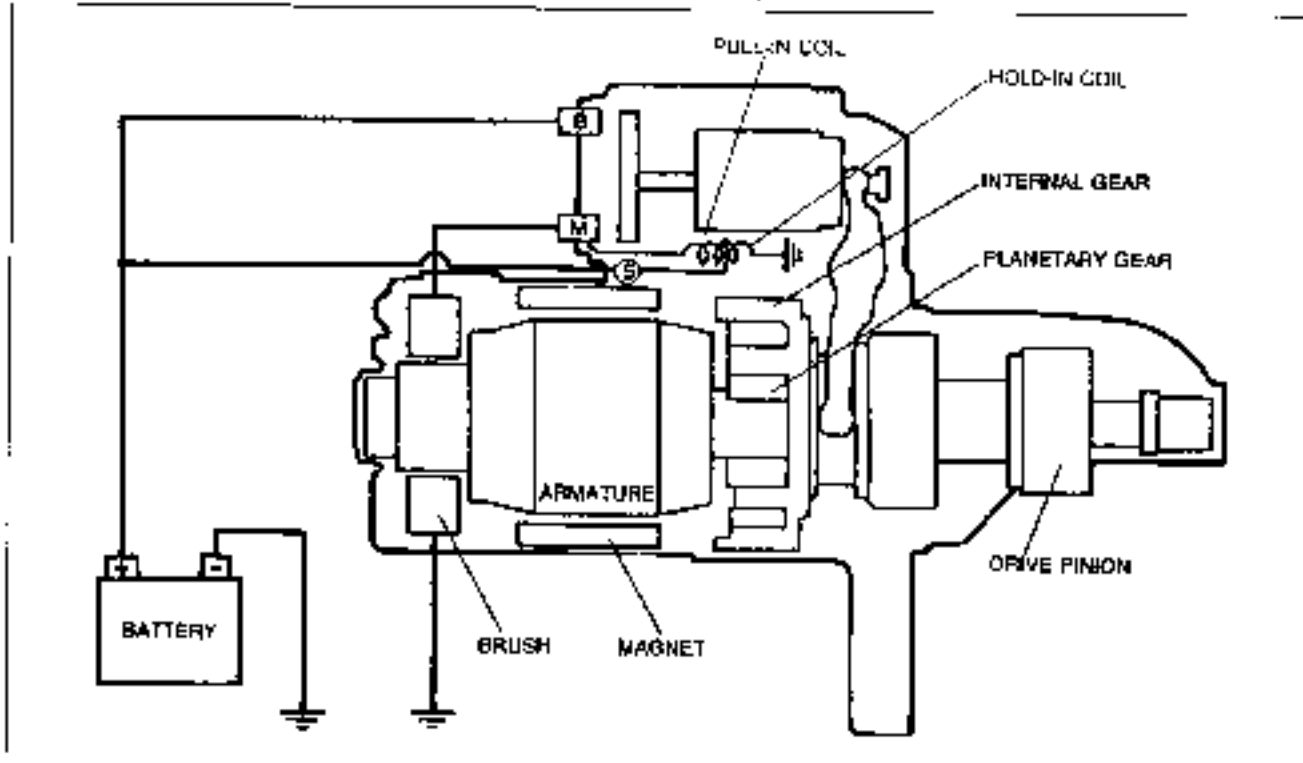
Torque specification:

19—25 Nm (1.9—2.6 m·kg, 14—19 ft·lb)

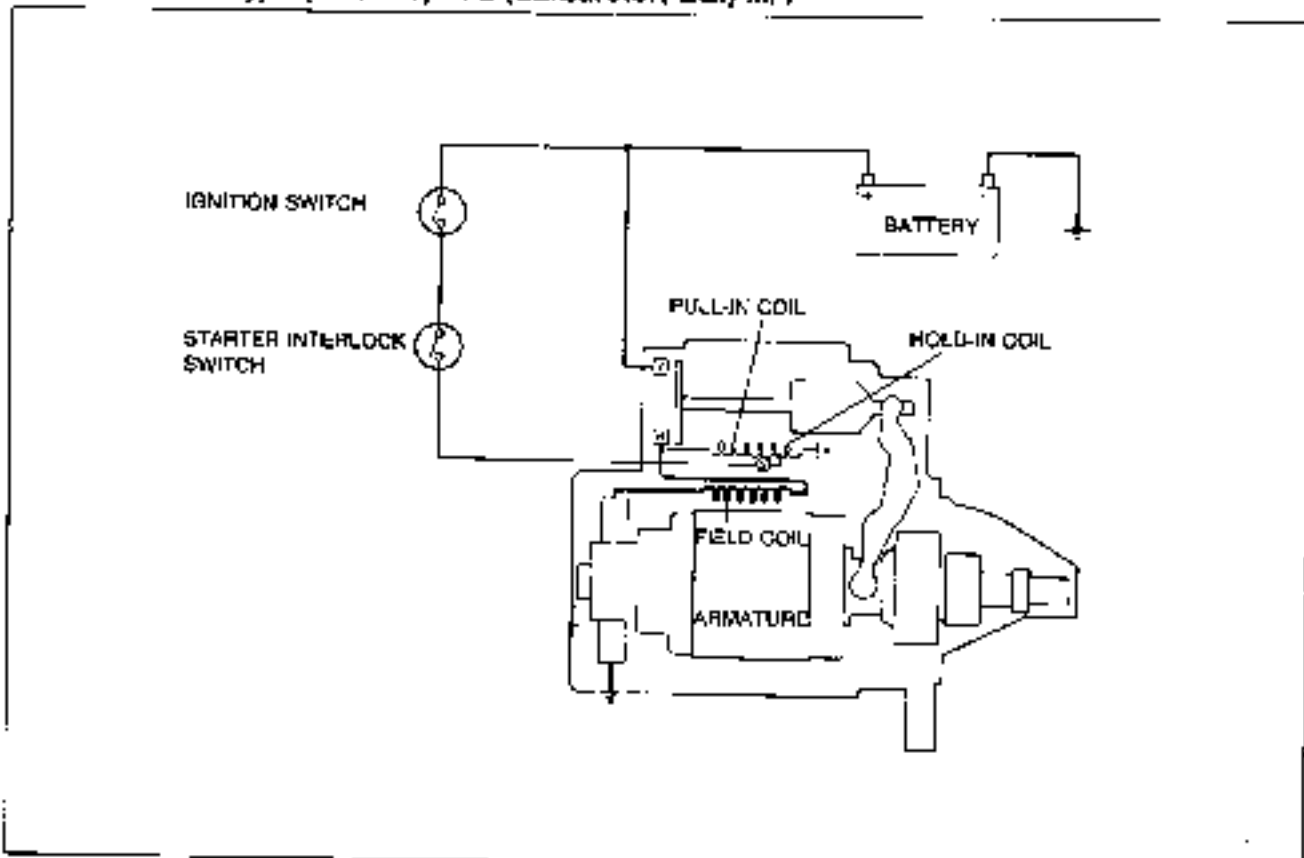
STARTING SYSTEM

STARTER

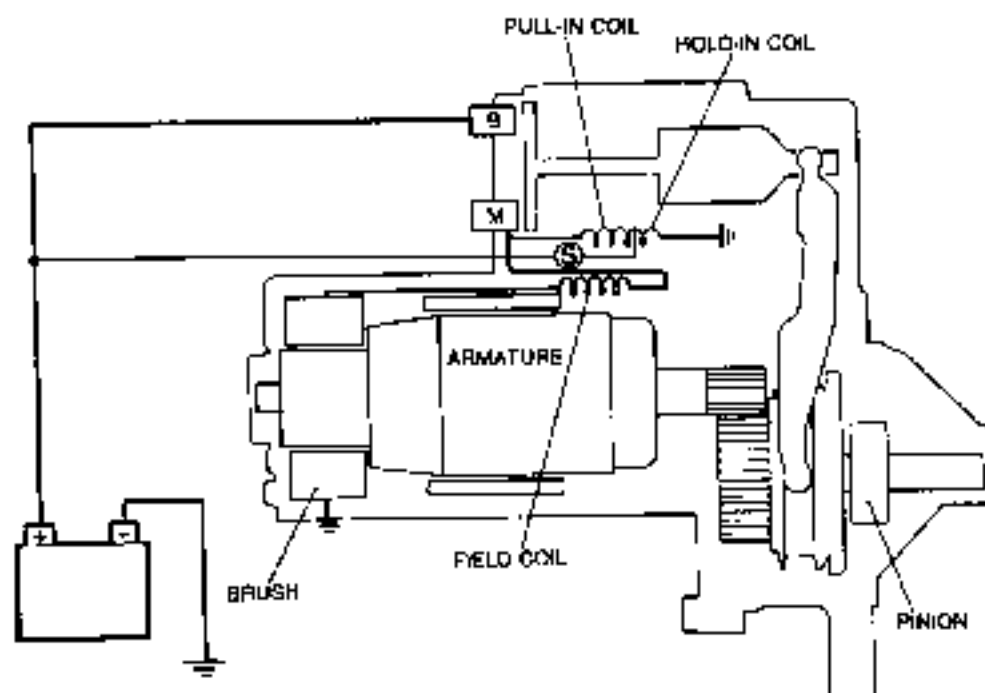
Coaxial Reduction Type (1.4 kW)—F2 (Carburetor, EGI) A/T



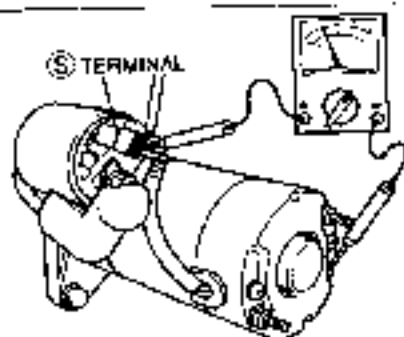
Non-Reduction Type (0.85 kW)—F2 (Carburetor, EGI) M/T



Reduction Type (1.2 kW)—G6 M/T, (1.4 kW)—G6 A/T



03U32X-04E

**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.

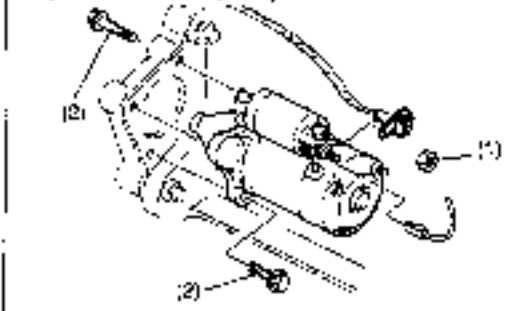
Caution

If the magnetic switch is hot, it may not function even though the voltage is standard voltage or more.

Note

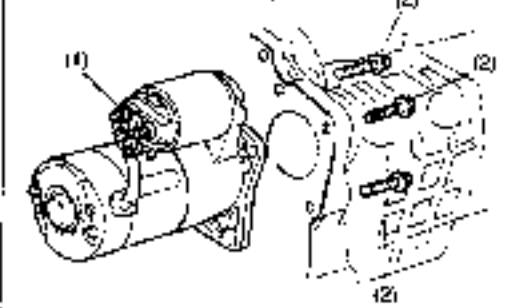
The cranking speed is greatly affected by the viscosity of the engine oil.

F2 (CARBURETOR, EGI) M/T



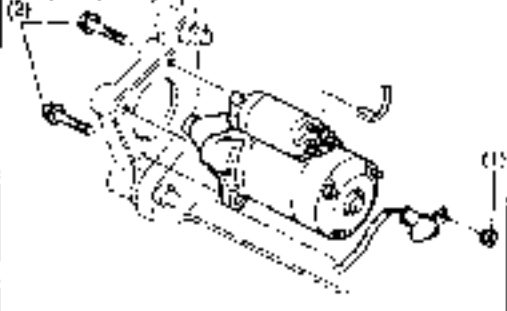
09U10QX-032

F2 (CARBURETOR, EGI) A/T



09U10QX-030

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 N·m (90—130 cm·kg, 78—113 in·lb)

Bolt (2):

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

G6—M/T, A/T

Nut (1):

9.8—12 N·m (100—120 cm·kg, 87—104 in·lb)

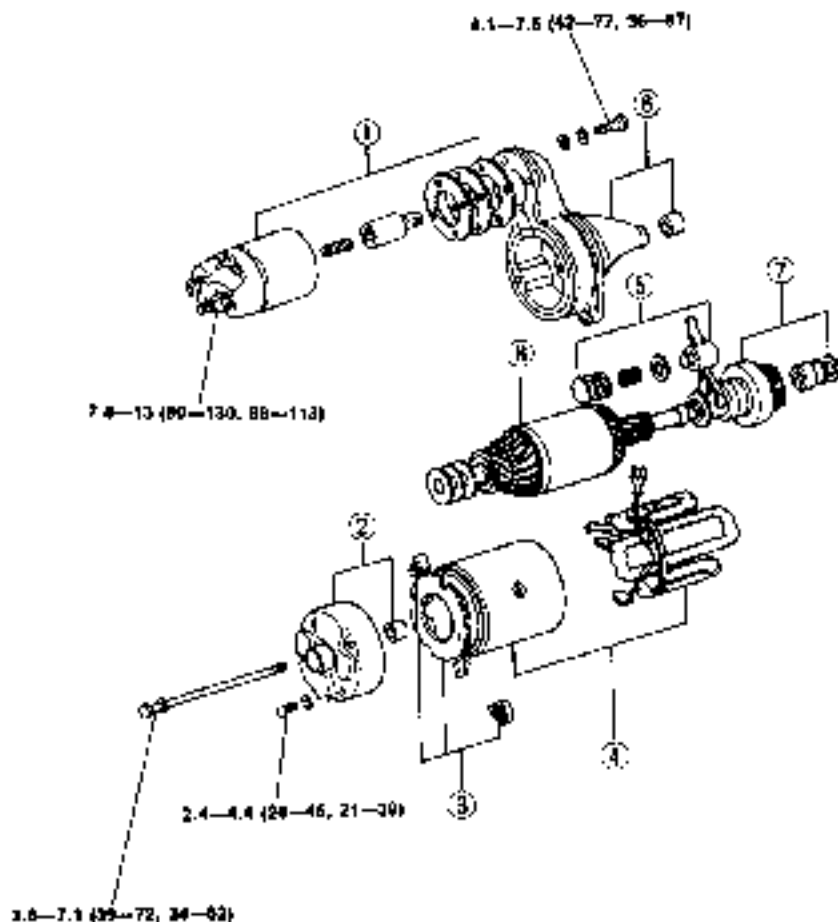
Bolt (2):

37—52 N·m (3.8—5.3 m·kg, 27—38 ft·lb)

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)



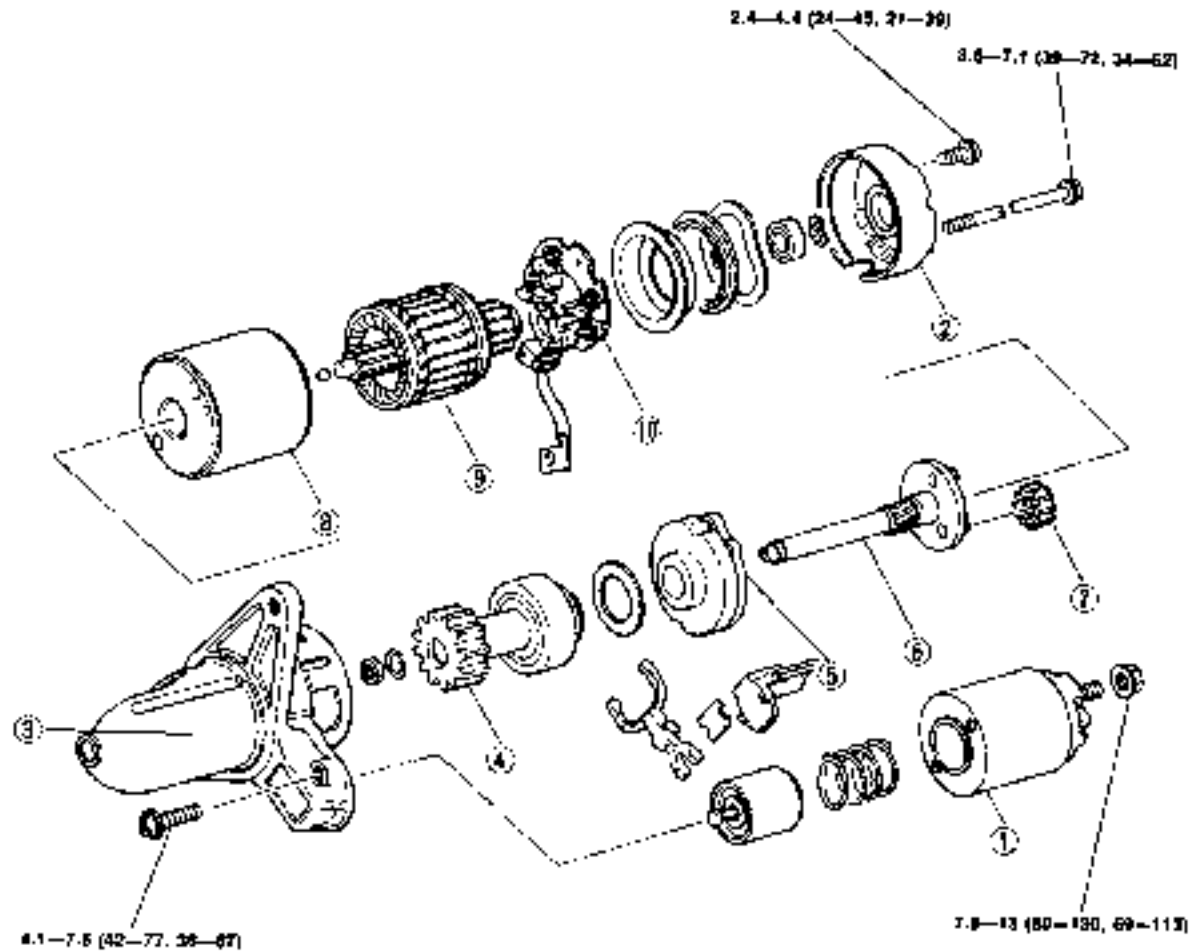
N.m (cm-lb, in-lb)

1B-J03X014

1. Magnetic switch	
Inspection.....	 page G-38
2. Rear housing	
3. Brush holder assembly	
Inspection.....	 page G-39
4. Field coil	
Inspection.....	 page G-38

5. Lever	
6. Front cover	
7. Drive pinion	
8. Armature	
Inspection.....	 page G-37

F2 (CARBURETOR, EGI) A/T
(COAXIAL REDUCTION TYPE 1.4 kW)



mm (cm-in, in-lb)

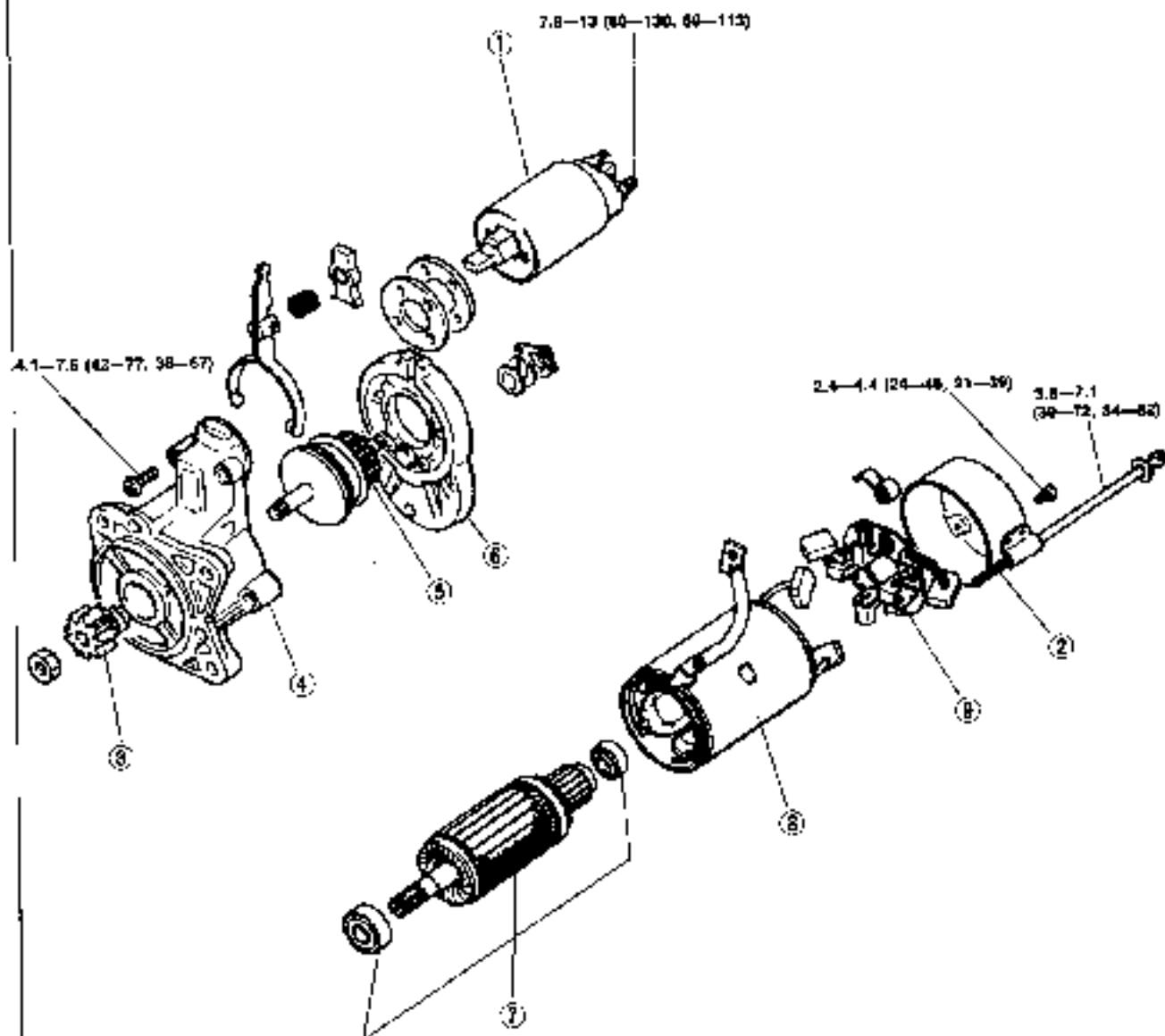
10J009X-C15

- 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

G5 (M/T, A/T)

(REDUCTION TYPE M/T 1.2 kW, A/T 1.4 kW)

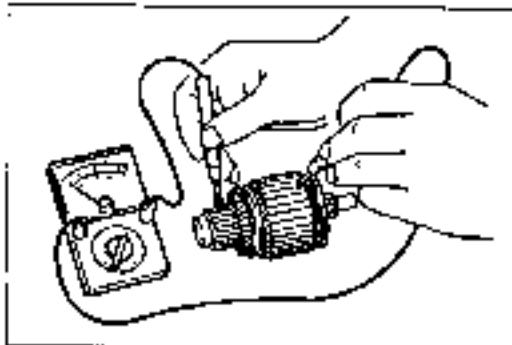


Nps (cm-kg, in-lb)

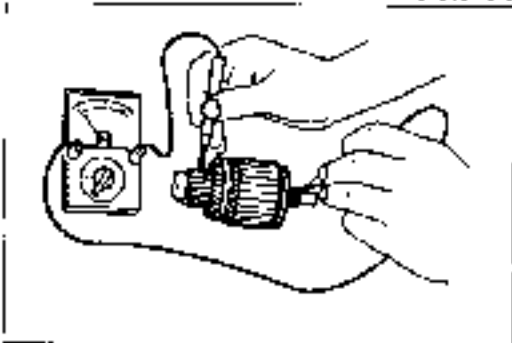
1/11/0000015

- 1 Magnetic switch
Inspection..... page G-38
2. Rear housing
3. Drive pinion
- 4 Front cover
5. Reduction gear
6. Center bracket

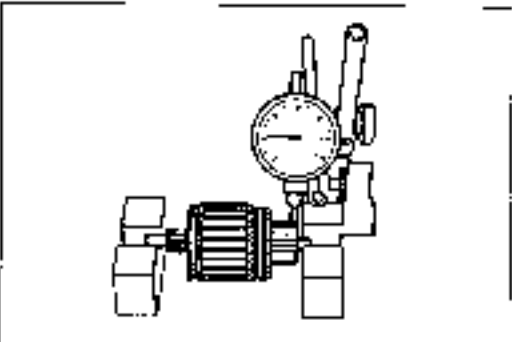
- 7 Armature
Inspection..... page G-37
8. Field coil
Inspection..... page G-38
- 9 Brush holder assembly
Inspection..... page G-39



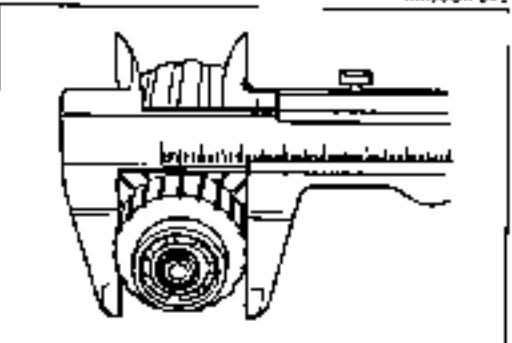
67U036-040



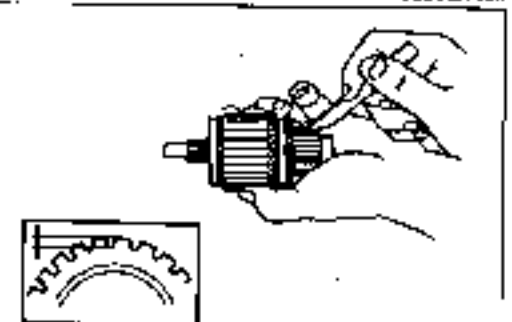
67U036-042



08U06X-055



08U06X-056



08U06X-057

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 3mm (0.118 in) 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.

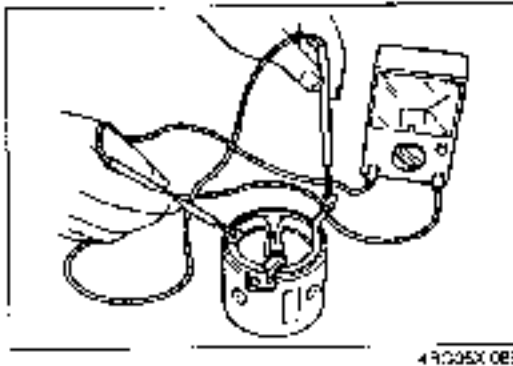
Engine	F2 (Carburetor, EGI) A/T	F2 (Carburetor, EGI) A/T	G6 M/T	G6 A/T
Grind limit mm (in)	31.4 (1.24)	28.8 (1.13)	27.4 (1.08)	31.4 (1.24)

6. Segment groove depth

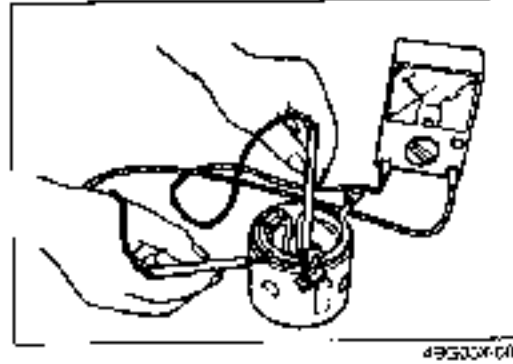
If the depth of the mold between segments is limit depth or less, undercut the grooves by standard depth.

Standard depth: 0.5—0.8mm (0.020—0.031 in)

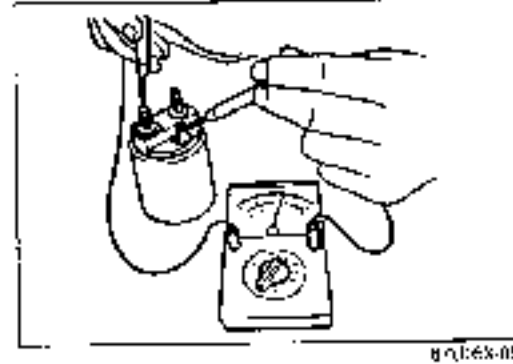
Limit depth: 0.2mm (0.008 in)

**Field Coil****1. Wiring damage**

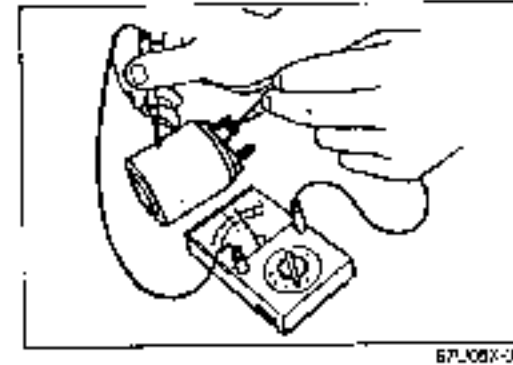
- (1) Check for continuity between the connector and brushes by using a circuit tester.
- (2) Replace the yoke assembly if there is no continuity.

**2. Ground of the field coil**

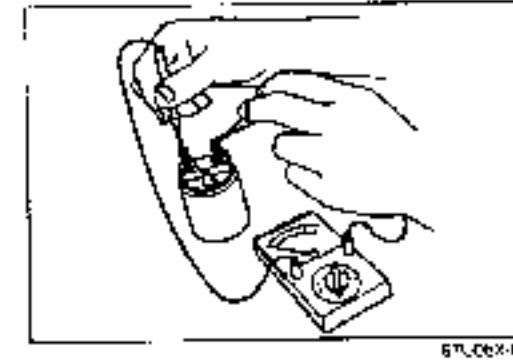
- (1) Check for continuity between the connector and yoke by using a circuit tester.
 - (2) Repair or replace the yoke assembly if there is continuity.
- 3. Installation of the field coil**
Replace the yoke assembly if the field coil is loose.

**Magnetic Switch****1. Wiring damage (S terminal - M terminal)**

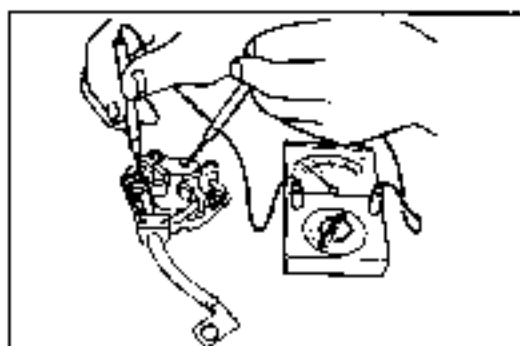
Check for continuity between the S terminal and the M terminal with a circuit tester. Replace the magnetic switch if there is no continuity.

**2. Wiring damage (S terminal - body)**

Check for continuity between the S terminal and the body with a circuit tester. Replace the magnetic switch if there is no continuity.

**3. Ground of magnetic switch**

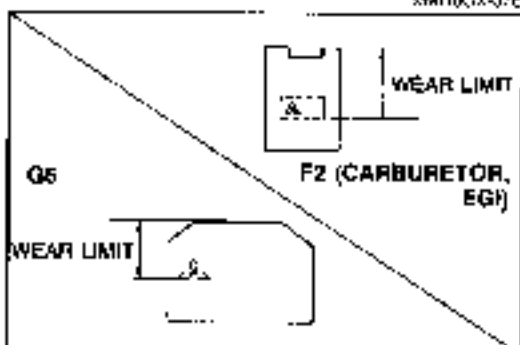
Check for continuity between the V and S terminals with a circuit tester. Replace the magnetic switch if there is continuity.



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-051

Brush

If the brushes are worn beyond the wear limit or if the wear is near the limit, replace the brushes.

Type	F2 (Carburetor, EGI) M/T	F2 (Carburetor, EGI) A/T	G6 M/T	G6 A/T
Standard mm (in)	17.0 (0.669)	17.5 (0.689)	16.0 (0.630)	17.0 (0.669)
Minimum mm (in)	11.5 (0.453)	10.0 (0.394)	9.0 (0.354)	11.5 (0.453)

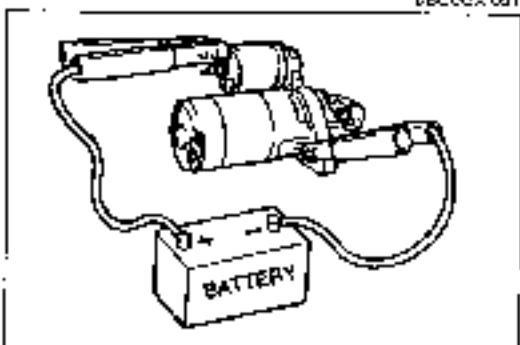
CHECKING OPERATION

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.

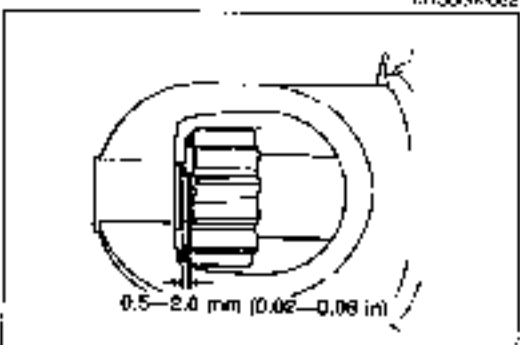


CRJ03X-062

Measure the pinion gap while the pinion is pulled out.

Specification: 0.5—2.0mm (0.02—0.08 in)

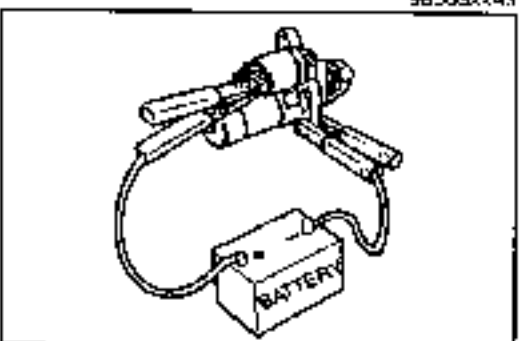
Adjust the pinion gap with an adjust washer (drive housing front cover—magnetic switch) if it is not within specification.



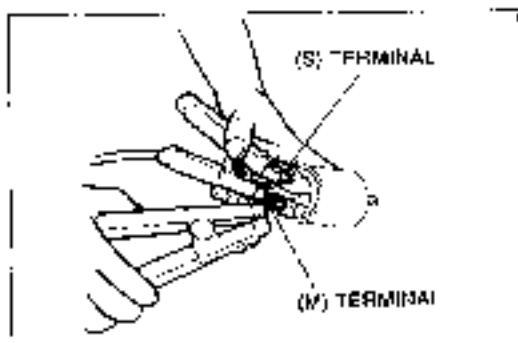
9B-J0GX-043

Return test [F2 (Carburetor, EGI) A/T and G6 (M/T, A/T)]

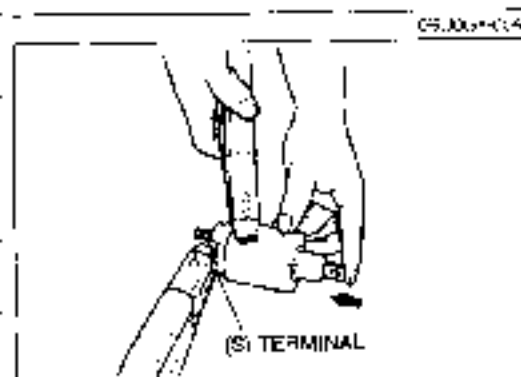
1. Disconnect the motor wire from the M terminal, and then connect the battery power to the M terminal and ground the body.
2. Pull out the overrunning clutch with a screwdriver. Check that the overrunning clutch returns to its original position when released.



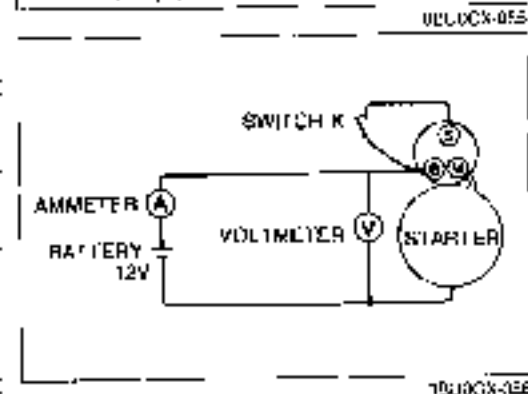
CB-J0GX-051

**Pull-In Test [F2 (Carburetor, EGI) M/T]**

1. Connect the positive battery terminal to the magnetic switch (S) terminal.
2. Ground the magnetic switch (M) terminal.
3. Make sure the plunger is pulled into the switch.

**Hold-In Test [F2 (Carburetor, EGI) M/T]**

1. Connect the positive battery terminal to the magnetic switch (S) terminal.
2. Ground the magnetic switch body.
3. Push the plunger into the switch.
4. Make sure the plunger stays in the in position.

**No-Load Test**

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

Note

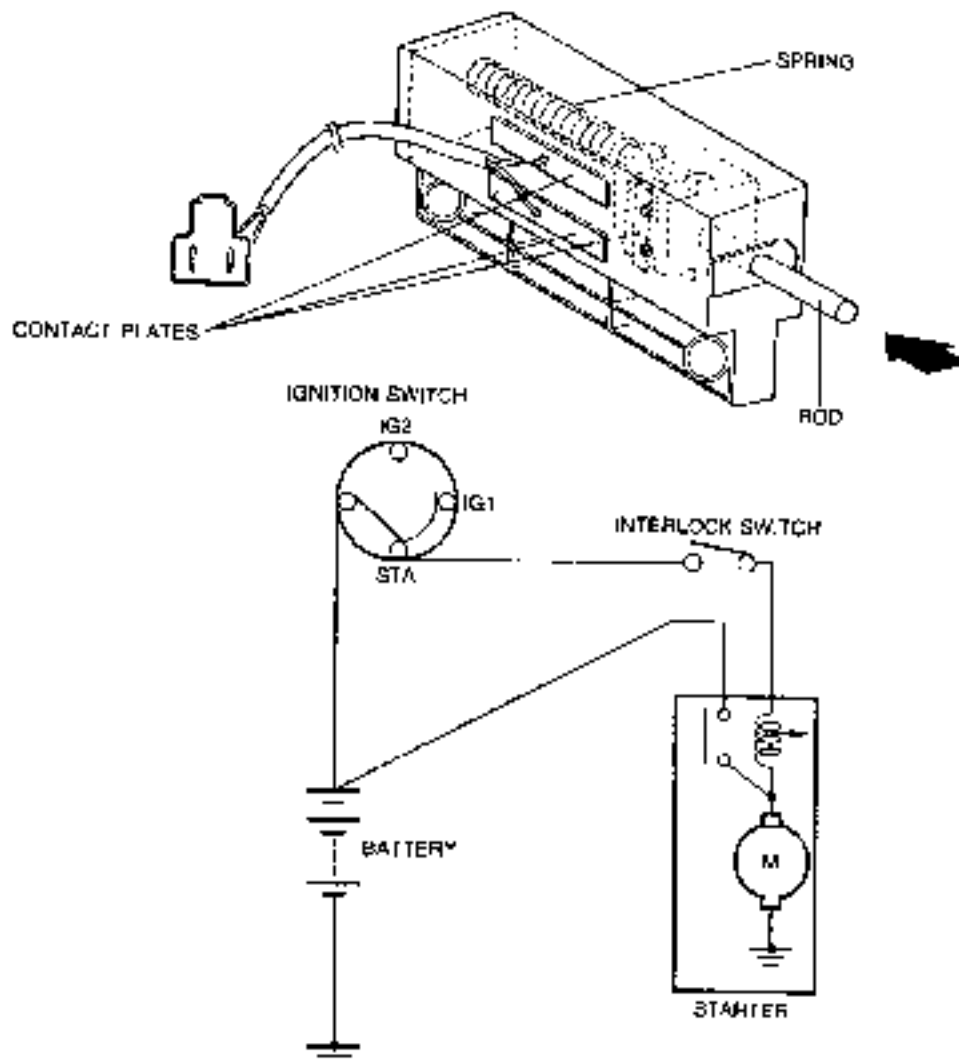
Use heavy gauge wires and tighten each terminal fully.

2. Close switch K to run the starter.
3. Check for the following:

Engine	[F2 (Carburetor, LCI) M/T]	[F2 (Carburetor, EGI) A/T]	GE M/T	GE A/T
Type (kW)	0.95	1.4	1.2	1.4
Voltage (V)	11.5	11.0	11.5	11.5
Current (A)	60 max	90 max	90 max	100 max
Gear 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".

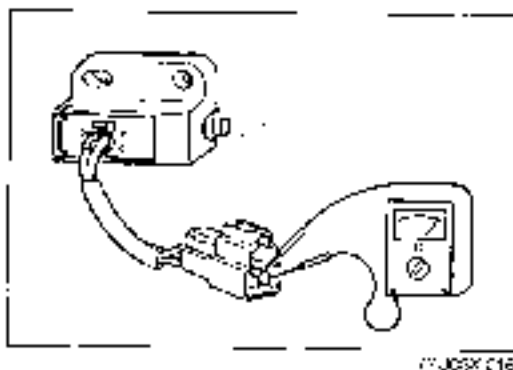
STARTER INTERLOCK SYSTEM (M/T)



AV-10A-075

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.



77-065X-016

INTERLOCK SWITCH Inspection

1. Disconnect the interlock switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

State	Continuity
Depressed	Yes
Released	No

4. Replace the switch, if necessary.

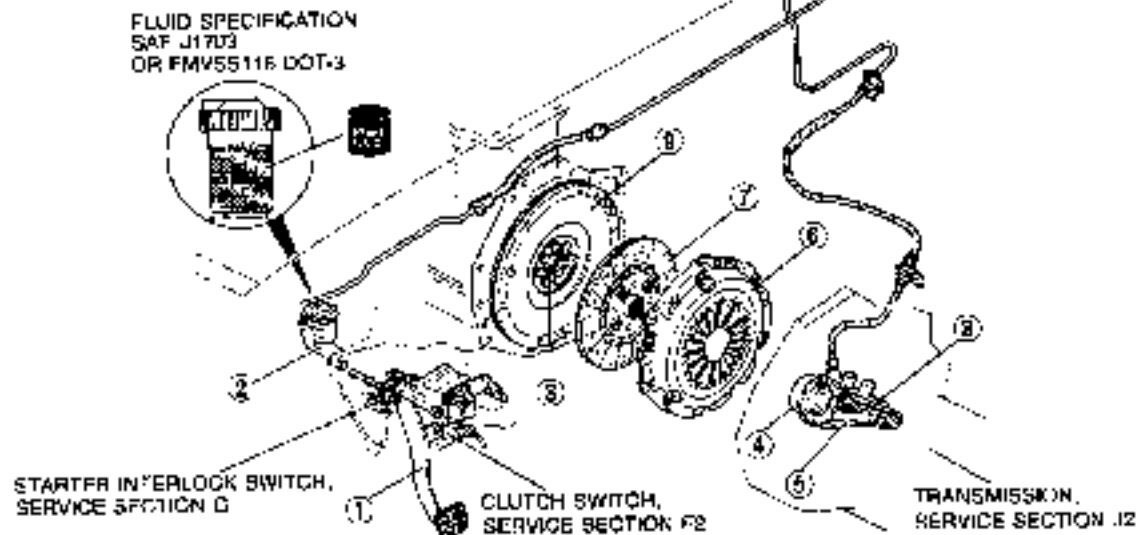
CLUTCH

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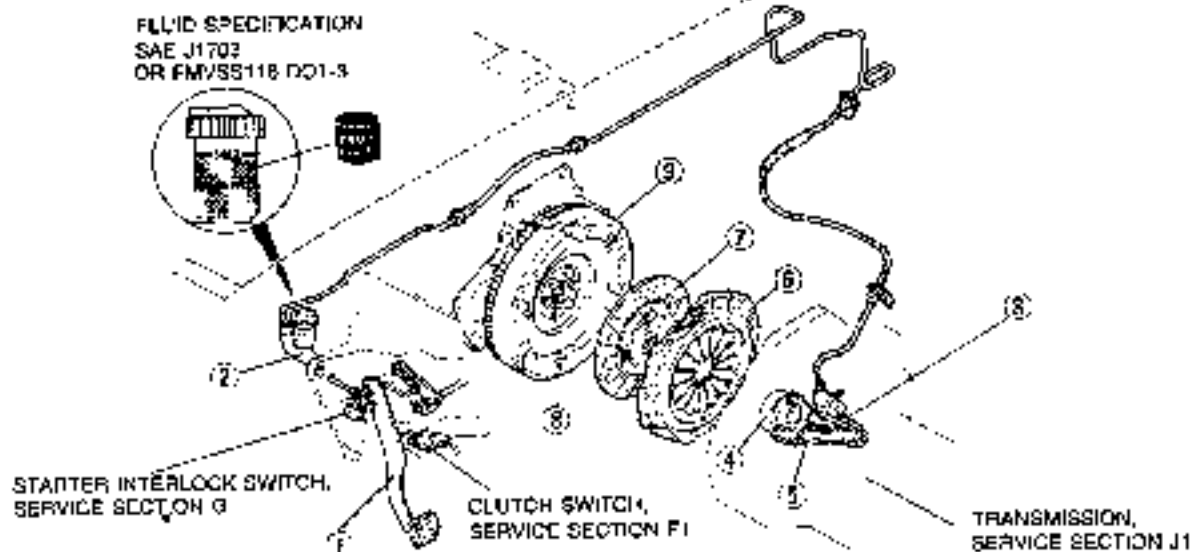
29.1000 (01)

INDEX

B2600i



B2200



219, UHX-002

1. Clutch pedal Adjustment page H- 5 Removal, Inspection and Installation page H- 6	4. Release bearing Removal and Installation page H-16 Inspection page H-18	7. Clutch disc Removal and Installation page H-16 Inspection page H-18
2. Clutch master cylinder Removal and Installation page H- 8 Overhaul page H-10 Air bleeding page H- 9	5. Release fork Removal and Installation page H-16	8. Pilot bearing B2200 Section B1 B2600i Section B2
3. Clutch release cylinder Removal and Installation page H-12 Overhaul page H-13 Air bleeding page H- 9	6. Clutch cover Removal and Installation page H-16 Inspection page H-16	9. Flywheel Removal and Installation page H-16 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)
	Pressure plate			
	Thickness	mm (in)	0.5 (0.14)	4.1 (0.16)
Clutch pedal	Type		Suspension	
	Ratio		6.0	
	Full stroke	mm (in)	135 (5.32)	
	Height	mm (in)	191-201 (7.52-7.91)	181-191 (7.13-7.52)
Master cylinder inner diameter		mm (in)	12.87 (0.507)	
Release cylinder inner diameter		mm (in)	19.05 (0.750)	
Clutch fluid			SAE J1703 or FMVSS110 DOT-5	

30K104K421

H

TROUBLESHOOTING 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 retard 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 loose	Replace	H-16
	Pressure plate damaged or excessive retard	Replace	H-16
	Flywheel surface hardened or damaged	Repair or replace	H-16
	Loose or worn engine mount	Tighten or replace	—
Clutch pedal sticking	Pedal 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

201-0110-002

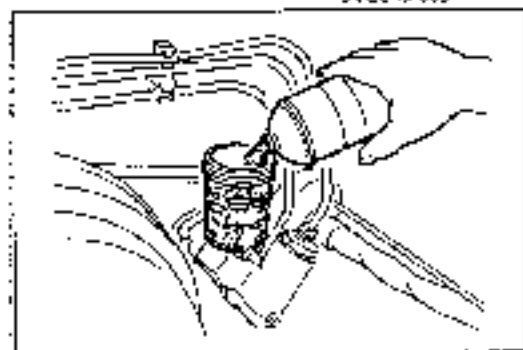
CLUTCH FLUID

PREPARATION

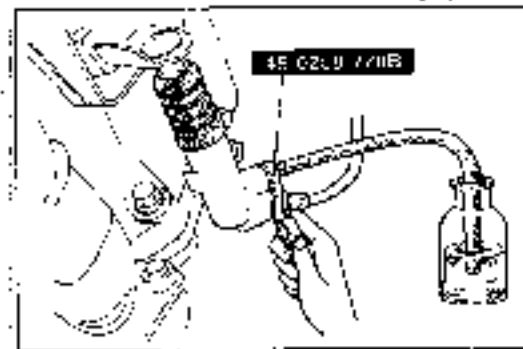
SST



3AVLCHX-005



3AVLCHX-006



3BLCBX-005

REPLACEMENT

Note

The fluid in the reserve tank must be maintained at the 3/4 level or higher during replacement.

Caution

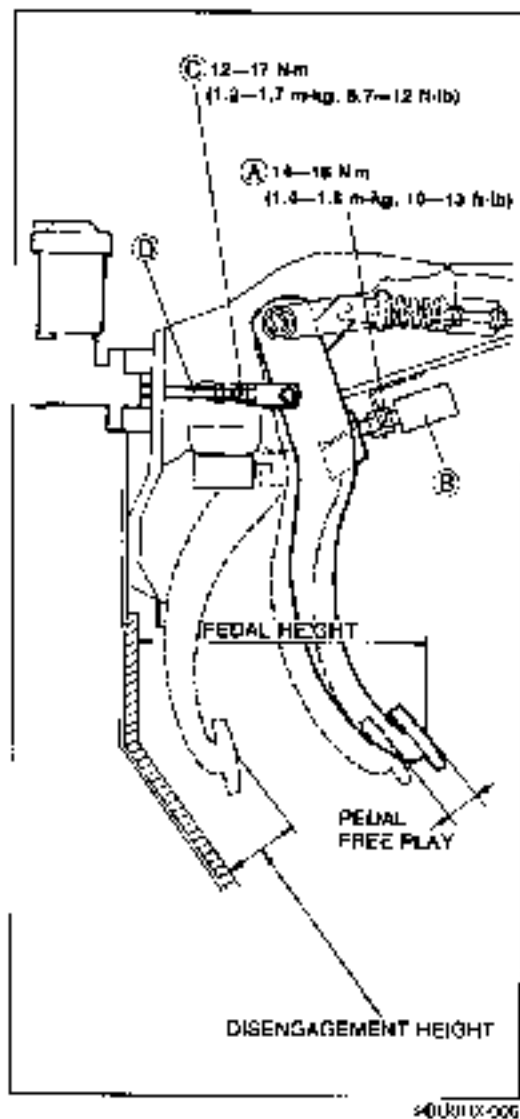
- a) Be careful not to spill clutch fluid on a painted surface. If this should happen, wash it off immediately.
- b) Do not mix different brands of clutch fluid.
- c) Do not reuse the clutch fluid which was drained out.

1. Draw the fluid from the reserve tank with a suction pump.
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
3. Place the other end of the vinyl hose in a container.
4. Slowly pump the clutch pedal several times.
5. With the clutch pedal depressed, loosen the bleeder screw with the **SST** to let fluid escape. Close the bleeder screw with the **SST**.
6. Repeat Steps 4 and 5 until only clean fluid is seen.
7. Tighten the bleeder screw.

Tightening torque:

5.9—6.9 N·m (60—70 cm·kg, 52—61 in·lb)

8. Add fluid to the MAX mark.
9. Check for correct clutch operation.



CLUTCH PEDAL

ADJUSTMENT

Clutch Pedal Height

Inspection

Measure the distance from the upper surface of the pedal pad to the carpet.

Pedal height

B2600i: 191–201mm (7.52–7.91 in)

B2200: 181–191mm (7.13–7.52 in)
(With carpet)

If necessary, adjust the pedal height.

Adjustment

1. Loosen locknut (A) and turn clutch switch (B) until the height is correct.
2. Tighten locknut (A).

Tightening torque:

14–18 N·m (1.4–1.8 m·kg, 10–13 ft·lb)

3. After the adjustment, inspect the pedal free play.

Clutch Pedal Free Play

Inspection

Depress the clutch pedal by hand until clutch resistance is felt.

Pedal free play: 0.6–3.0mm (0.02–0.12 in)

Total pedal free play: 5–13mm (0.20–0.51 in)

If necessary, adjust the pedal free play.

Adjustment

1. Loosen locknut (C) and turn push rod (D) until pedal free play is correct.
2. Check that the disengagement height from the upper surface of the pedal height to the carpet is correct when the pedal is fully depressed.

Minimum disengagement height

B2600i: 71mm (2.80 in)

B2200: 65mm (2.60 in)
(With carpet)

3. Tighten locknut (C).

Tightening torque:

12–17 N·m (1.2–1.7 m·kg, 8.7–12 ft·lb)

4. After adjustment, inspect the pedal height.

REMOVAL, INSPECTION, AND INSTALLATION

Remove in the order shown in the figure.

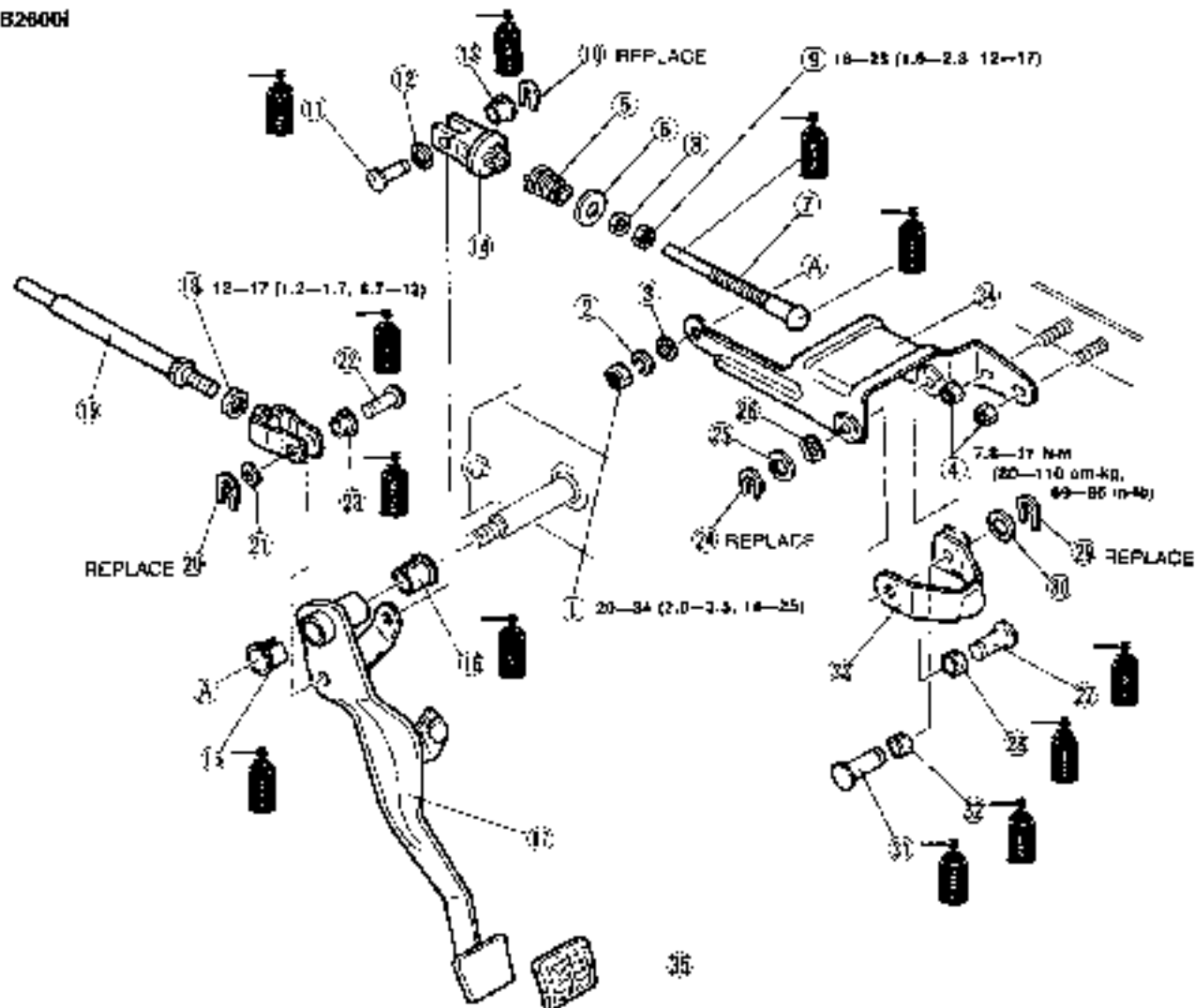
Inspect all parts and repair or replace as necessary.

Install in the reverse order of removal.

Note

Apply white grease to the bushings and pins when installing.

B260001

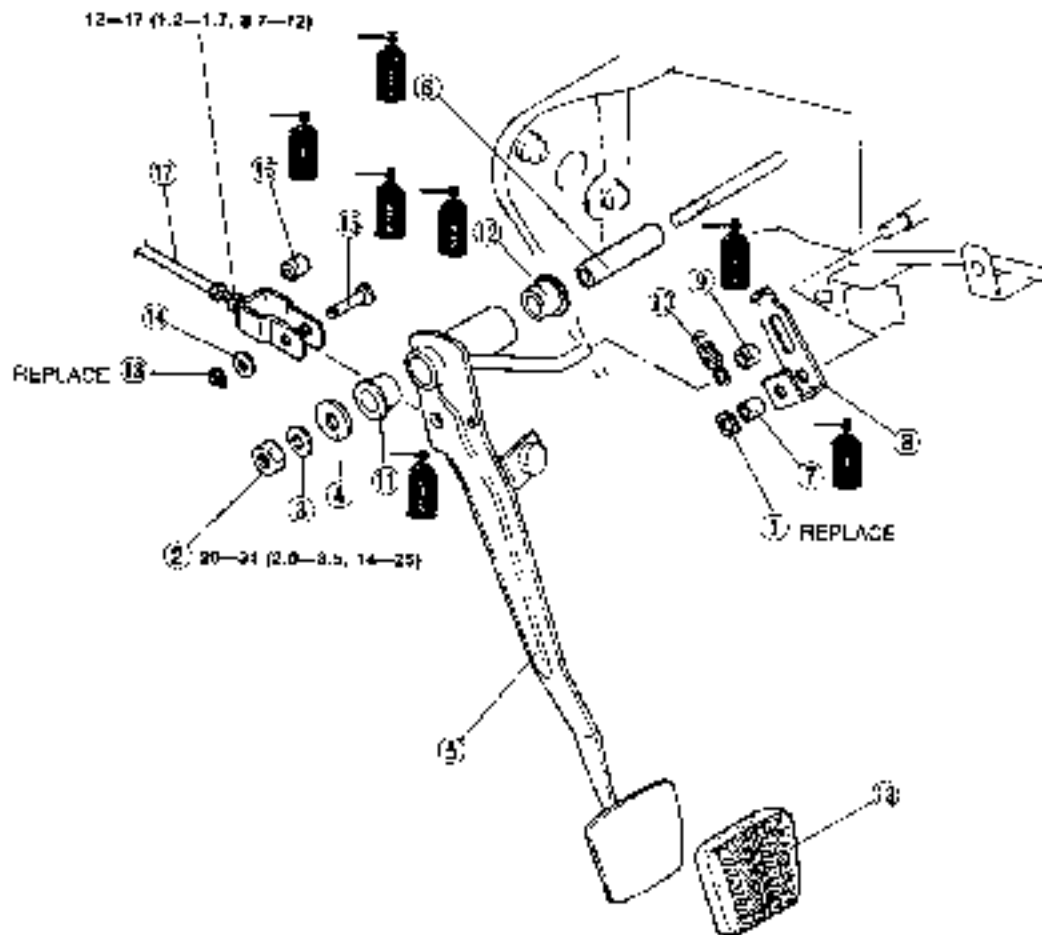


Nm (m·kg, ft·lb)

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	28. Bushing
5. Assist spring	Adjustment ... page H-5	Inspect for wear
Adjustment. page H-5	18. Nut	29. Clip
6. Spring seat	19. Push rod	30. Spacer
7. Clutch pedal rod	Inspect for damage or	31. Pin
8. Assist spring pin	bending	32. Bushing
9. Locknut	20. Clip	33. Assist lever
10. Clip	21. Wave washer	34. Assist bracket
11. Pin	22. Pin	35. Pedal pad
12. Spacer	23. Bushing	Inspect for wear or
13. Bushing	24. Clip	damage

B2200



N·m (m·kg, ft·lb)
CRU-X 032

1. Clip	8. Clutch assist lever	16. Spacer
2. Nut	9. Assist lever bushing	17. Push rod
3. Washer	10. Spring	Inspect for damage or bending
4. Spacer	11. Bushing	18. Pedal pad
5. Clutch pedal	12. Bushing	Inspect for wear or damage
Adjustment.....	13. Clip	
6. Spacer	14. Spacer	
7. Bushing	15. Pin	

Adjustment (B2600i)**Assist spring**

1. Turn the assist spring nut until the spring length is correct.

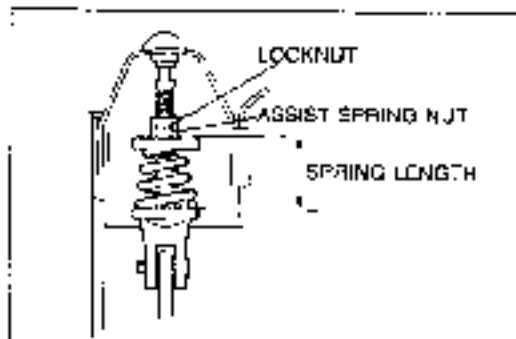
Standard spring length:
36.5—37.5mm (1.44—1.48 in)

2. Tighten the locknut.

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

Clutch pedal height and free play

Refer to page H-5.



DAI-GH-X 010

CLUTCH MASTER CYLINDER

PREPARATION

SST

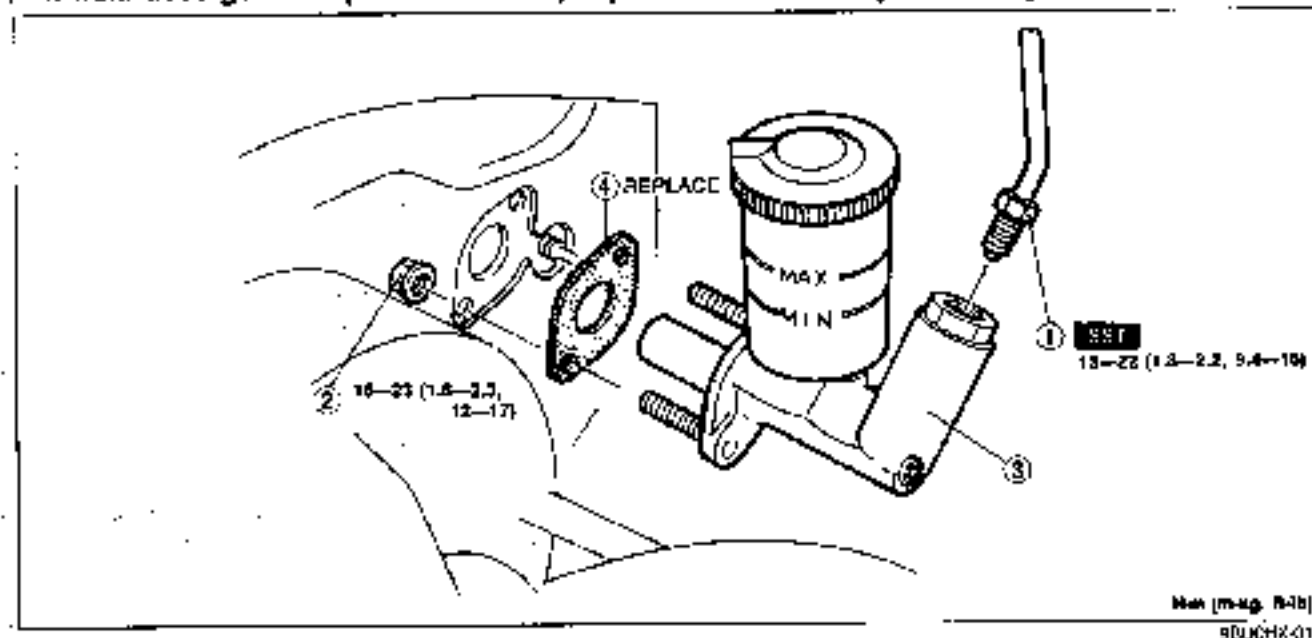


REMOVAL AND INSTALLATION

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

Removal page H- 8

Installation page H- 9

2. Nut

3. Clutch master cylinder

Overhaul page H-10

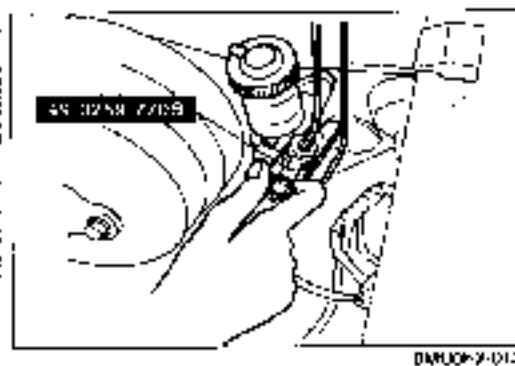
Check for fluid leakage

from the cylinder bore.

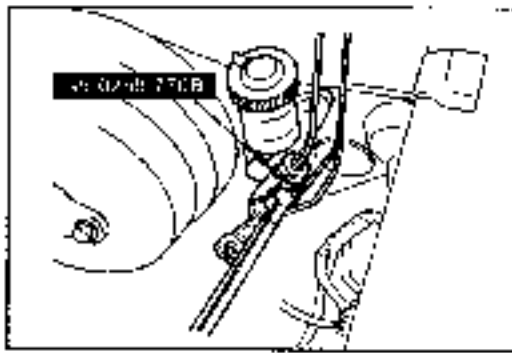
AIR BLEEDING

..... page H- 9

4. Gasket

**Removal note****Clutch pipe**

Disconnect the clutch pipe with the SST.



1BLCHX 022

Installation note**Clutch pipe**

Tighten the clutch pipe with the **SST**.

Tightening torque:

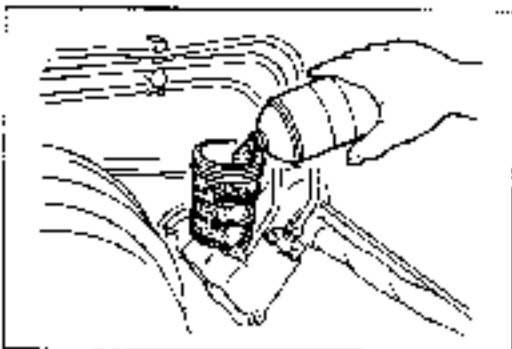
13—22 Nm (1.3—2.2 m·kg, 9.4—16 ft·lb)

Air Bleeding

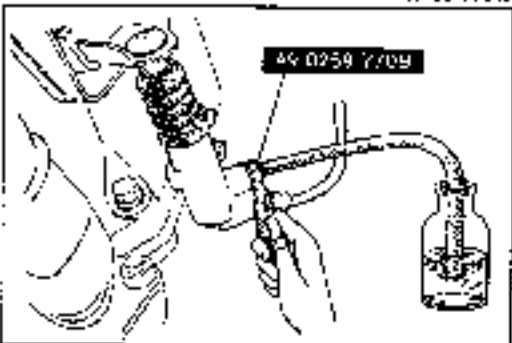
After installation, bleed the clutch system.
(Refer to below.)

Inspection and Adjustment**Clutch pedal height and free play**

Refer to page H-5



8MU34K049



9MU0HX 0-2

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

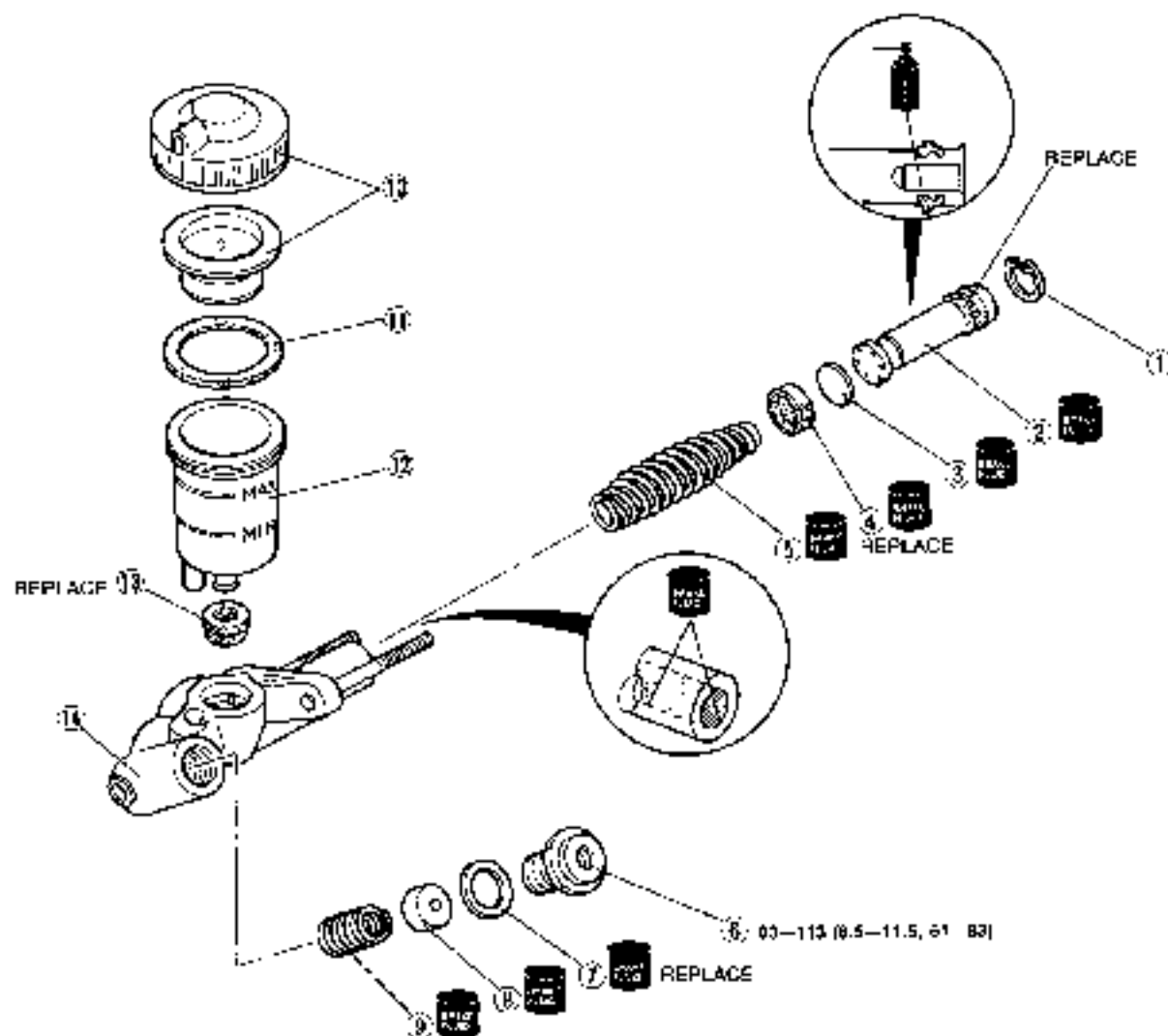
Disassemble in the order shown in the figure, referring to **Disassembly note**.

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.

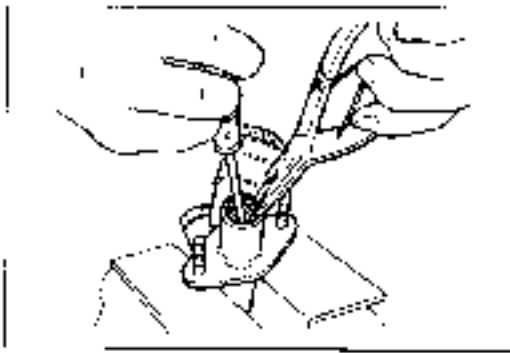


Nm (m·kg, ft·lb)
150/100/100

1. Snap ring
Removal..... page H-11
Installation..... page H-12
2. Piston and secondary cup assembly
Removal..... page H-11
Inspect for wear, scoring, or cracks..... page H-11
Installation..... page H-11

3. Scraper
4. Primary cup
5. Return spring
6. Joint bolt
7. Packing
8. One-way valve piston
Removal..... page H-11
9. Return spring

10. Tank cap baffle
11. Packing
12. Reserve tank
13. Bushing
14. Master cylinder body
Inspect cylinder bore for scoring or corrosion



9BAUDHX-018

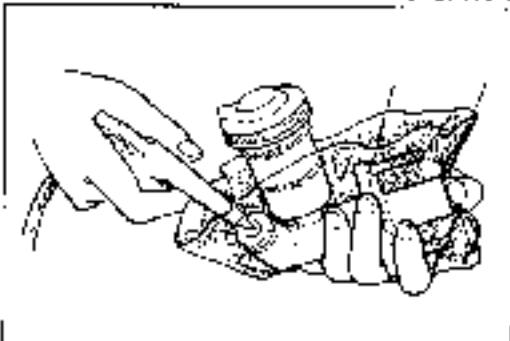
Disassembly note

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.



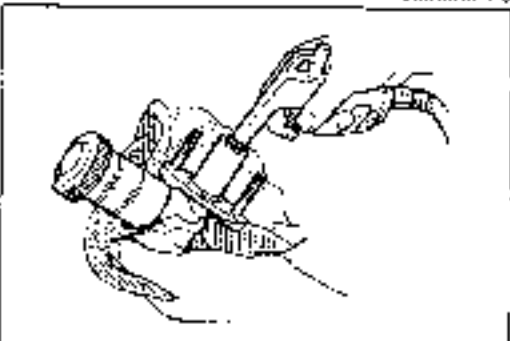
9BAUDHX-019

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.



9BAUD-04-097

One-way valve piston and return spring

Caution

Hold a rag over the master cylinder to prevent the piston and spring from jumping out.

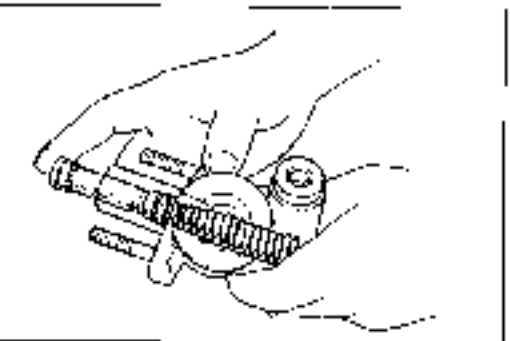
Remove the piston by applying compressed air through the cylinder bore.

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.

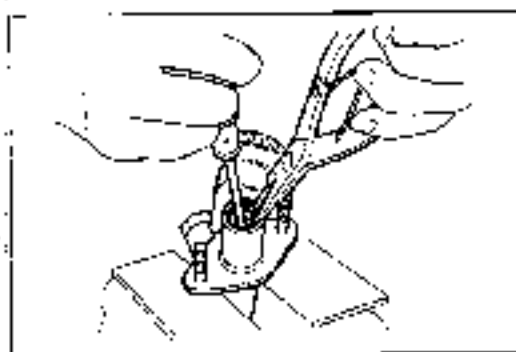
9BAUD-04-097



9BAUDHX-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-J0-X-C23

Snap ring**Note**

Do not damage the push rod contact surface of the piston.

While pressing the piston, install the snap ring.

CLUTCH RELEASE CYLINDER**PREPARATION****SST**

49 0259 770B

Wrench, flare nut



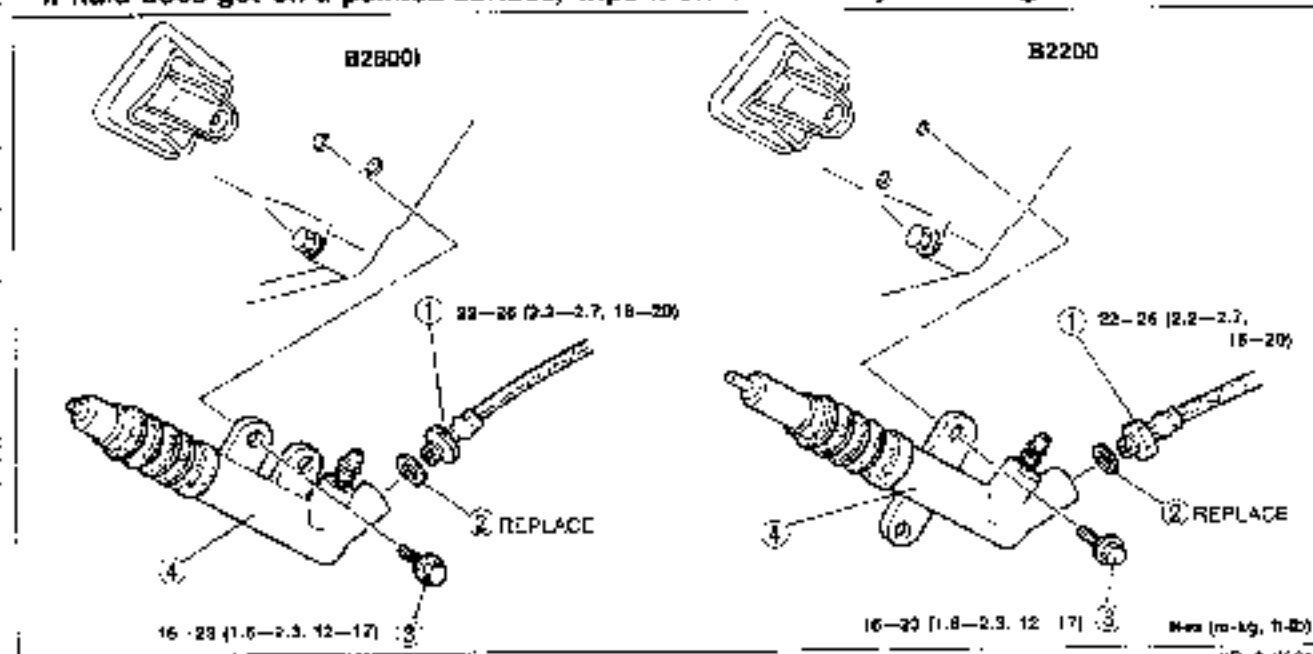
9M-U1-B-C24

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

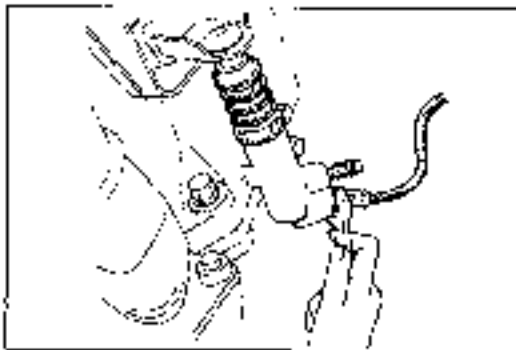
Installation page H-13

2. Packing**3. Bolt****4. Clutch release cylinder**

Remove boot and check for fluid leakage

Overhaul page H-13

AIR BLEEDING page H-9

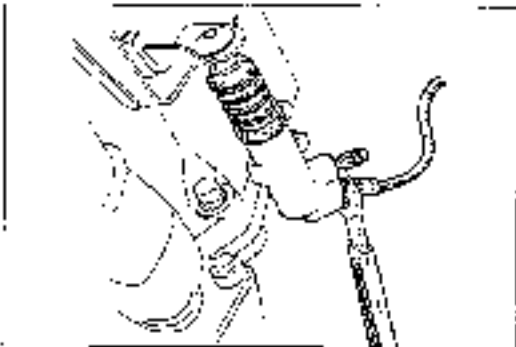


PBLC-X-016

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



PBLC-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.

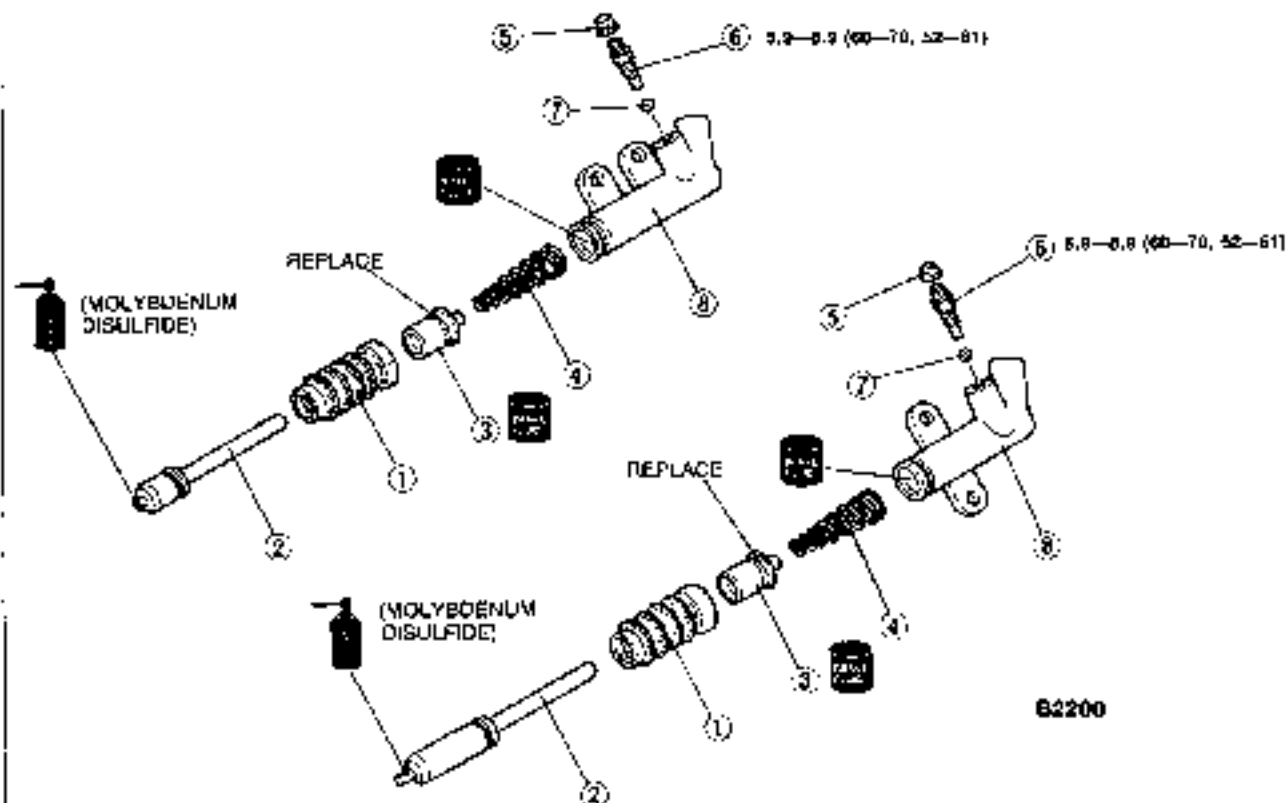
Assemble in the reverse order of disassembly.

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.

2014-01-005

B2600



B2200

Nm (cm·kg, in·lb)
98.0 (10.0, 8.0)

1. Boot
2. Push rod
3. Piston and cup assembly
Removal page H-14
Inspect for wear, scoring,
or cracks

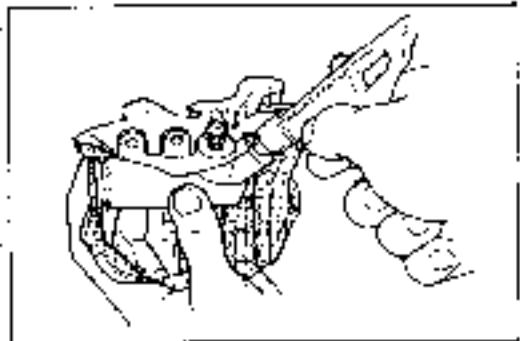
4. Spring
5. Bleeder cap
6. Bleeder screw
7. Steel ball

8. Release cylinder body
Inspect cylinder bore for
scoring or corrosion

Disassembly note**Piston and cup assembly****Caution**

Hold a rag over the release cylinder to prevent the piston and cup assembly from jumping out.

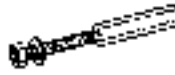
Remove the piston and cup assembly by applying compressed air through the flexible hose installation hole.



98.0 (10.0, 8.0)

CLUTCH UNIT

PREPARATION
SST

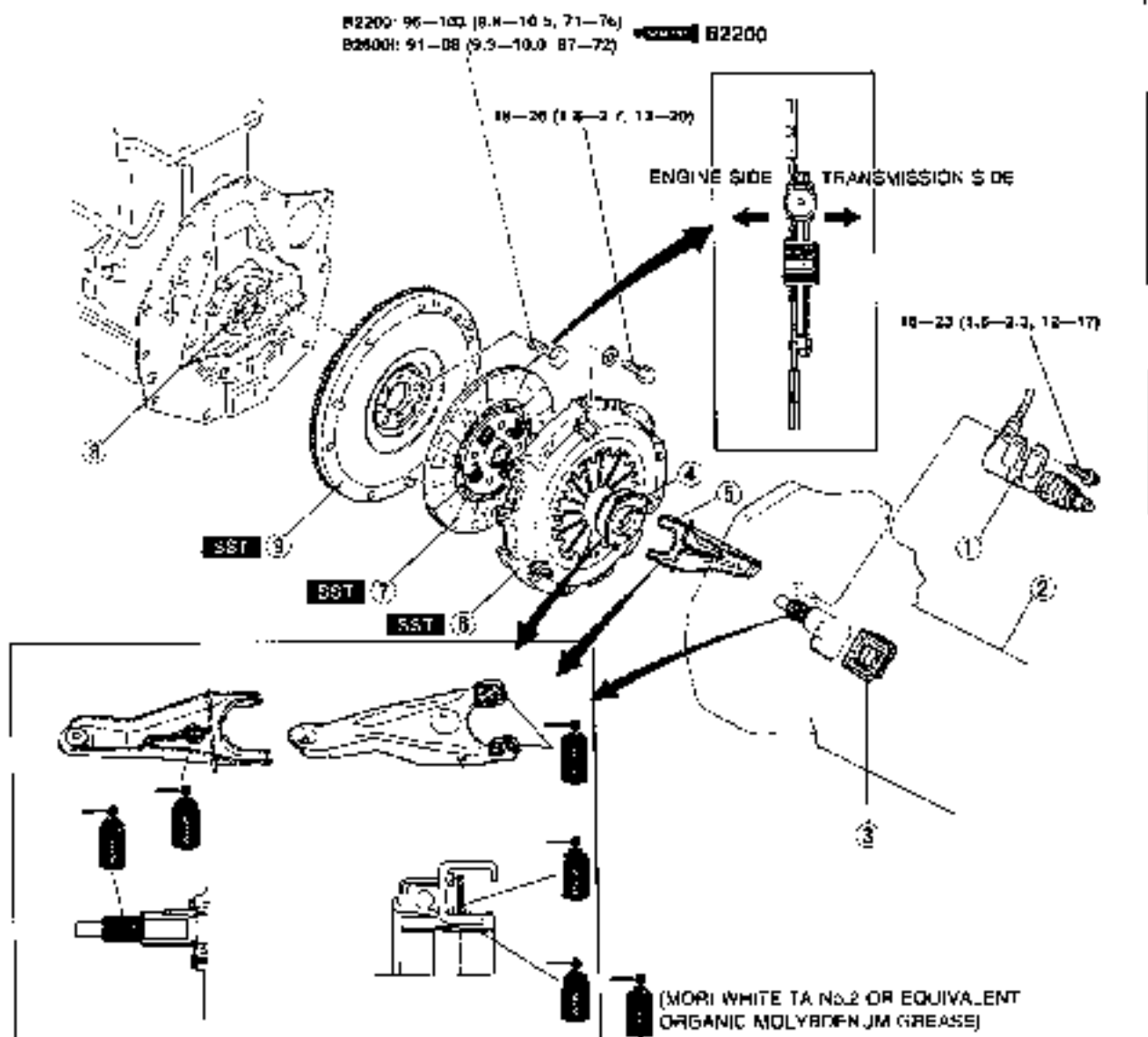
49 E011 1A0 Brake sel. ring gear 	49 E011 103 Shaft (Part of 49 E011 1A0) 	49 E011 104 Collar (Part of 49 E011 1A0) 
49 E011 105 Stopper (Part of 49 E011 1A0) 	49 SFC1 310A Center bolt, clutch disc 	2910HX-004

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.

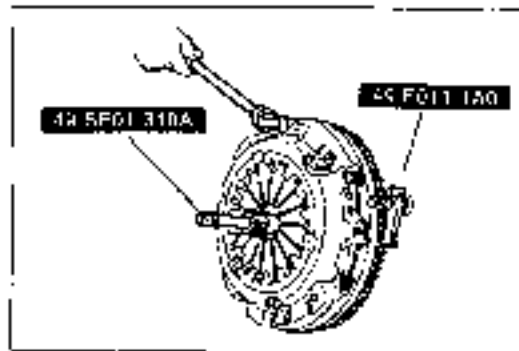


Item (en-kg, ft-lb)
20,000-5,000

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

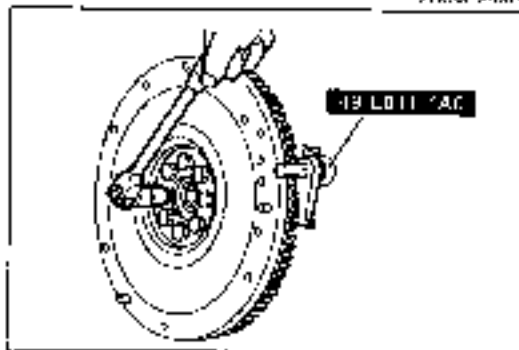
8. Pilot bearing
B2200..... Section B1
B2600..... Section B2
9. Flywheel
Removal..... page H-17
Inspection..... page H-19
Installation..... page H-17



2FA-GE-1017

Removal note**Clutch cover and disc**

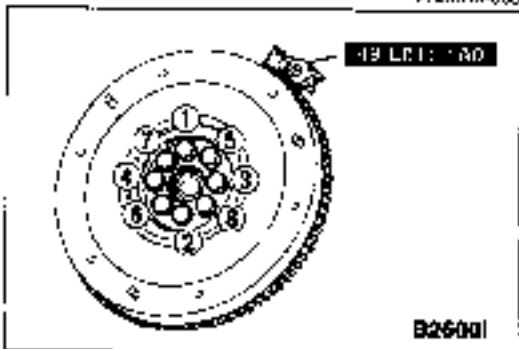
1. Install the **SST** or equivalent.
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released. Then remove the clutch cover and disc.



2FA-LHX-006

Flywheel

1. Hold the flywheel with the **SST** or equivalent.
2. Remove the flywheel.



B2600

2BL0HX-006

Installation note**Flywheel**

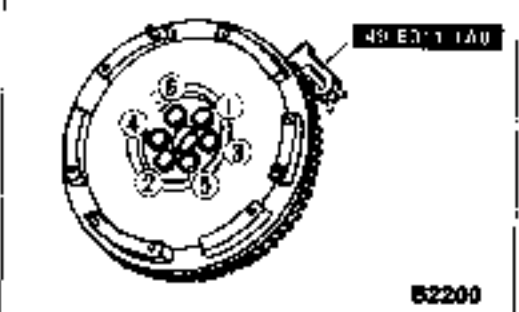
1. Remove any old sealant from the bolts and bolt holes. If old sealant can not be removed from the bolt, replace it (B2200).
2. Apply sealant to the bolt threads. (B2200)
3. Install the flywheel and **SST** or equivalent.
4. Tighten the bolts in the pattern shown.

Tightening torque

B2600: 91—98 N·m (9.3—10.0 m·kg, 67—72 ft·lb)

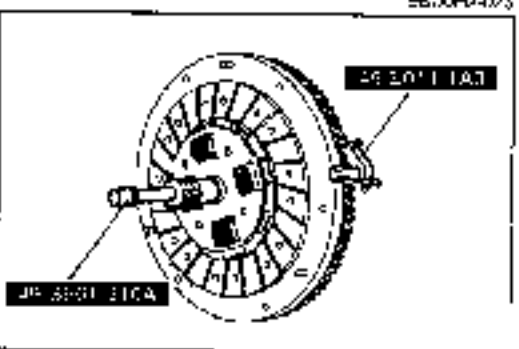
Tightening torque

B2200: 96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



B2200

56-LHX-073

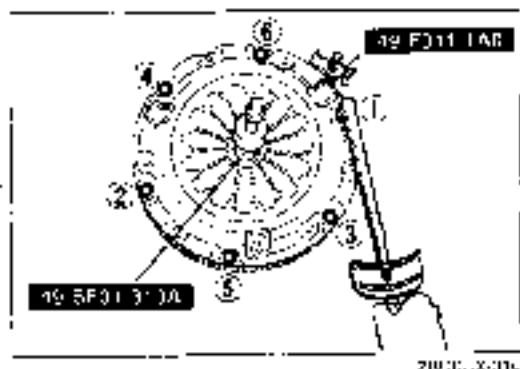


3DUC-W-024

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 N·m (1.8—2.7 m·kg, 13—20 ft·lb)

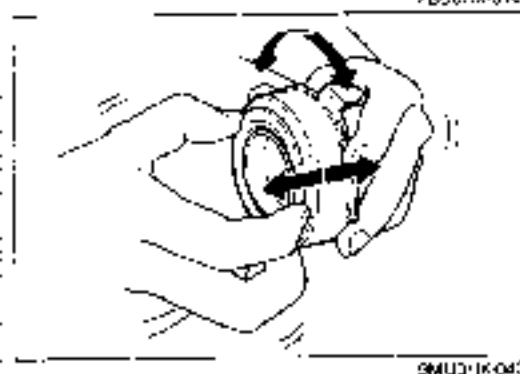
RELEASE BEARING

INSPECTION

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.

Note

The clutch release bearing is a sealed bearing and must not be washed in solvent.



CLUTCH COVER

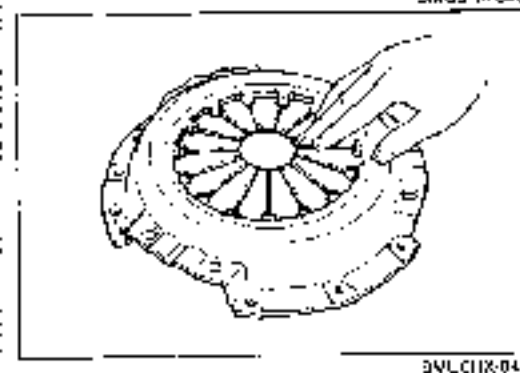
INSPECTION

1. Inspect the contact surface of the clutch disc for scoring, cracks, or burning, repair or replace as necessary.

Note

Minor scoring or burning should be removed with emery paper.

2. Inspect the contact surface of the clutch release bearing for wear or cracks. If there is wear or cracks, replace the clutch cover.



CLUTCH DISC

INSPECTION

1. Inspect the lining surface for burning or oil contamination. Replace it if it is badly burned or oil soaked.

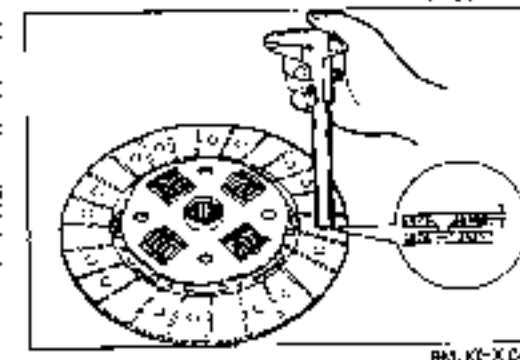
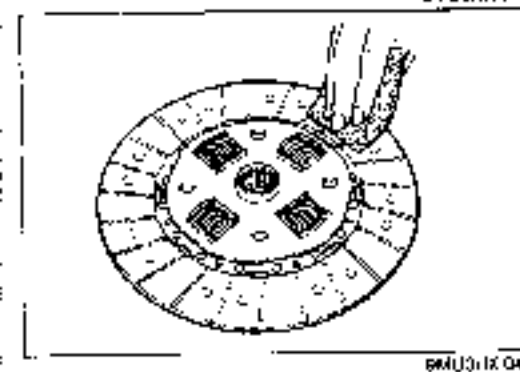
Note

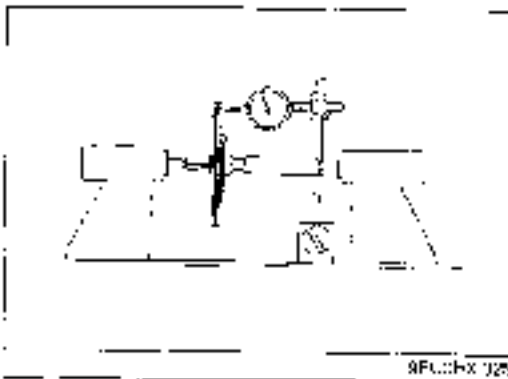
Use sandpaper if the trouble is minor.

2. Inspect for loose facing rivets or torsion springs. Replace the clutch disc if any are loose.

3. Measure the thickness of the lining at a rivet head on both sides with vernier calipers. Replace it if less than minimum.

Minimum thickness: 0.3mm (0.012 in)





4. Measure the clutch disc runout with a dial indicator. Replace the clutch disc if runout is excessive.

Maximum runout

B2600i: 1.0mm (0.039 in)

B2200 : 0.7mm (0.028 in)

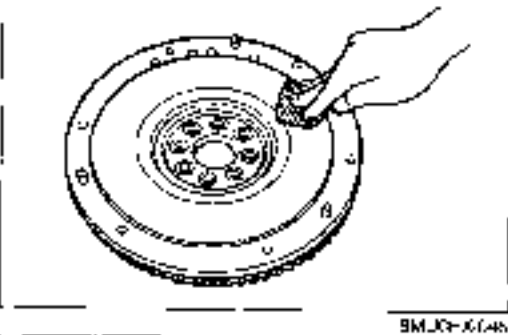
FLYWHEEL

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.

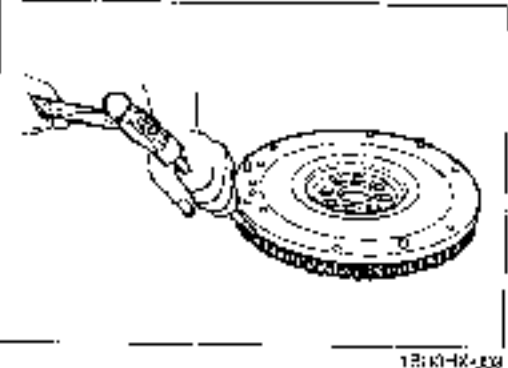


2. Inspect the ring gear teeth for wear or damage. If necessary, replace the ring gear as follows:

- (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.

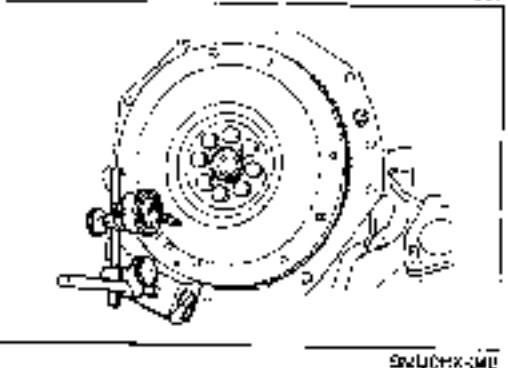
Note

The beveled side of the ring gear must face the engine side.



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)

INDEX	J1- 2
OUTLINE	J1- 3
SPECIFICATIONS.....	J1- 3
STRUCTURAL VIEW.....	J1- 4
POWER FLOW.....	J1- 5
TROUBLESHOOTING GUIDE	J1- 6
TRANSMISSION OIL	J1- 7
INSPECTION.....	J1- 7
REPLACEMENT.....	J1- 7
TRANSMISSION	J1- 8
PREPARATION.....	J1- 8
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DISASSEMBLY.....	J1-10
INSPECTION.....	J1-17
ASSEMBLY.....	J1-19

2BU001 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)

REAR DIFFERENTIAL SERVICE, SECTION M

NEUTRAL SWITCH SERVICE,
SECTION F1REAR AXLE SERVICE,
SECTION MPROPELLER SHAFT
SERVICE, SECTION LBACKUP LIGHT SWITCH SERVICE,
SECTION T

FRONT AXLE SERVICE, SECTION M

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

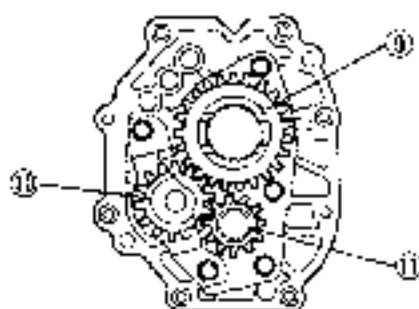
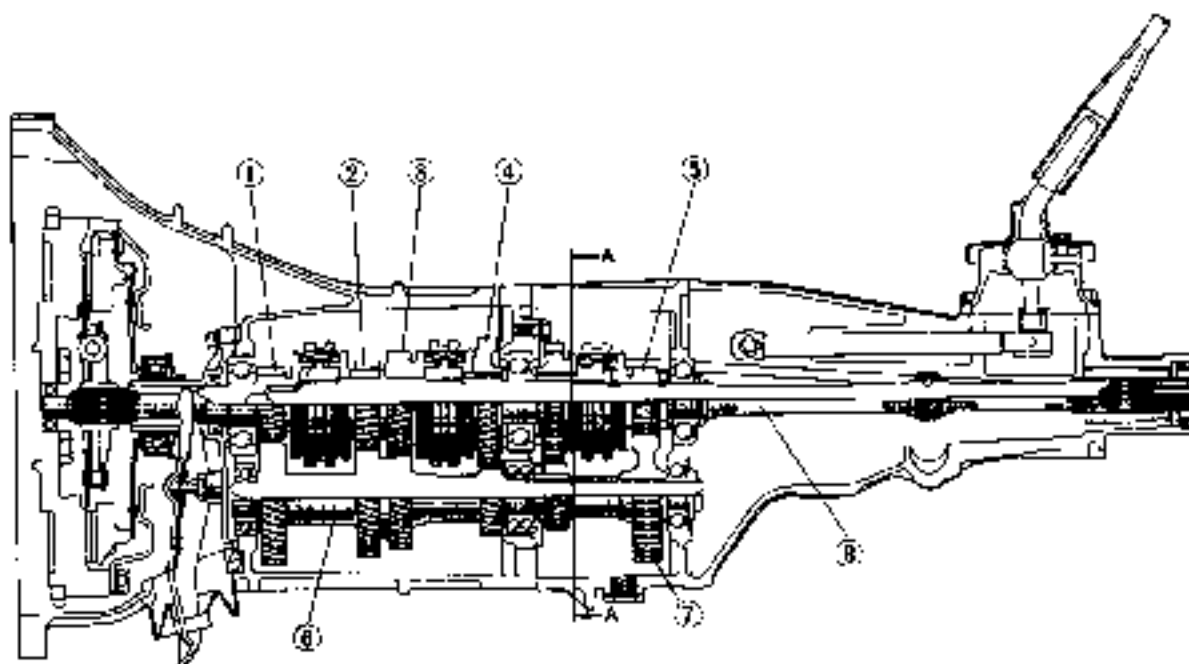
SPECIFICATIONS

Model/Transmission		B2200
Item		M5M-D
Synchronization mechanism		Forward: Synchronizer Reverse: Constantmesh
Shift type		5-speed, four shift
Shift pattern		
Gear ratio	1st	3.622
	2nd	2.186
	3rd	1.410
	4th	1.000
	5th	0.838
	Reverse	3.493
Oil	Grade	API service GL-4 or GL-5
	Viscosity	All-season
		Above 10°C (50°F)
	Capacity	2.0 (2.1, 1.8)

PS-6J1-002

J1

STRUCTURAL VIEW



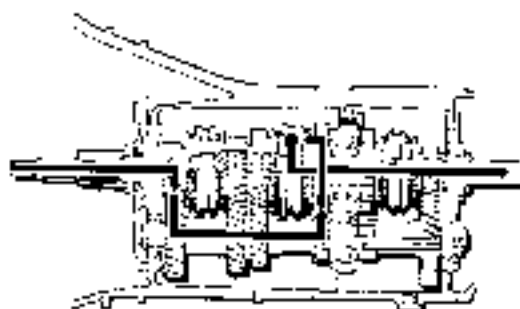
VIEW A—A

GMJ21X 024

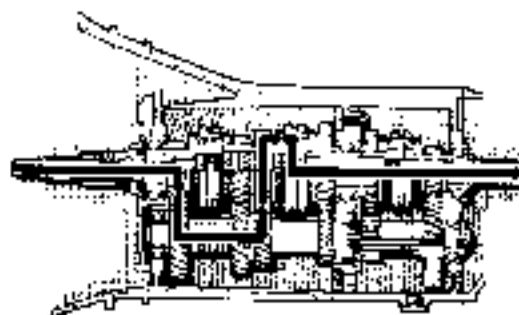
- 1 Main drive gear (4th gear)
- 2 3rd gear
- 3 2nd gear
- 4 1st gear
- 5 5th gear
- 6 Countershaft

- 7 Counter 5th gear
- 8 Mainshaft
- 9 Reverse gear
- 10 Reverse idler gear
- 11 Counter reverse gear

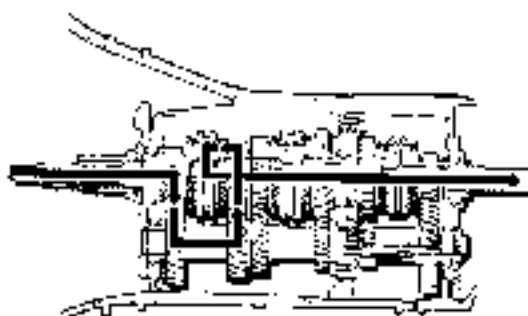
POWER FLOW



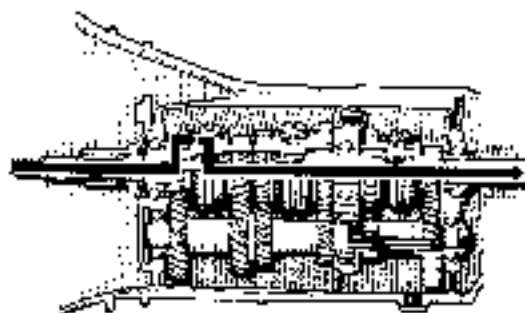
1ST



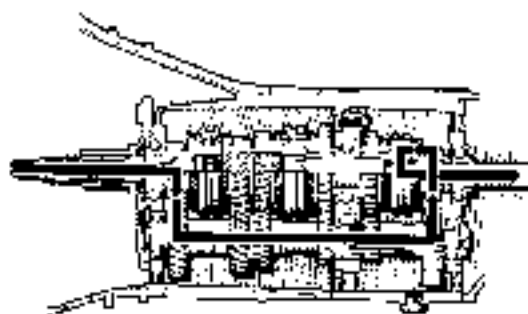
2ND



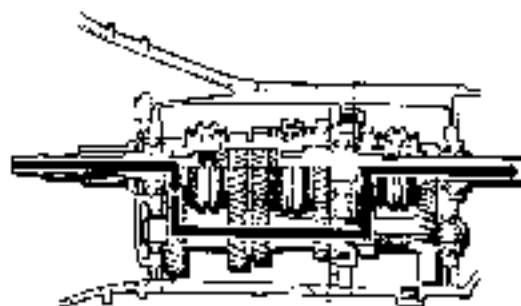
3RD



4TH



5TH



REVERSE

J1

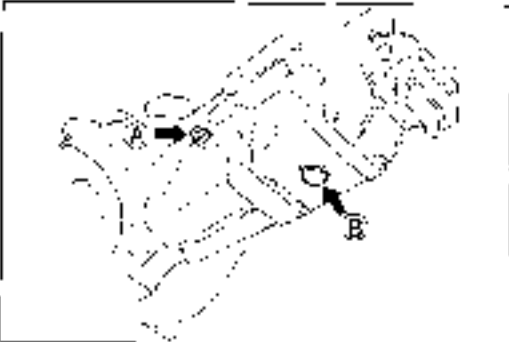
TROUBLESHOOTING GUIDE

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	Insufficient oil	Add oil	J1-7
	Deterioration of oil quality	Replace with oil of specified quality	J1-7
	Worn synchronizer ring	Replace	J1-18
	Worn synchronizer cone of gear	Replace	J1-18
	Poor contact of synchronizer ring and gear cone	Replace	J1-18
	Excessive longitudinal play of gears	Replace	J1-17
	Worn bearing	Replace	J1-18
	Improper disengagement of clutch	Refer to Section H	—
Jumps out of gear	Weak or broken ball spring	Replace	J1-17
	Weak or shift fork end spring	Replace	J1-17
	Worn shift fork	Replace	J1-17
	Worn clutch hub	Replace	J1-17
	Worn clutch hub sleeve	Replace	J1-18
	Worn gears	Replace	J1-17
	Excessive gear backlash	Replace	—
	Worn bearing	Replace	J1-18
	Incorrect installation of base engine mounts or transmission mounts	Tighten	J1-9

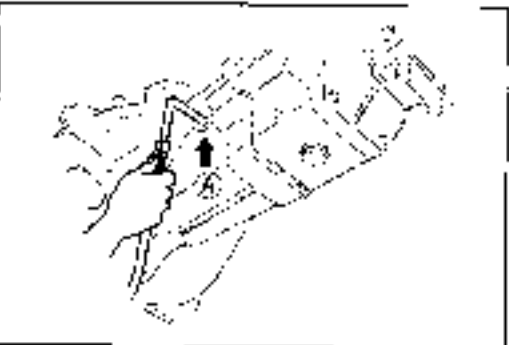
280001-004



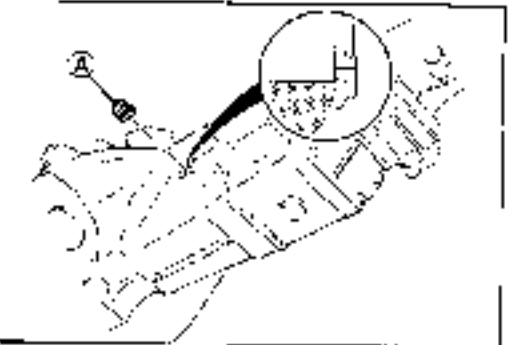
9B-301-026



9B-301-026



9B-301-026



9B-301-026

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 N·m (2.5–4.0 m·kg, 18–29 ft·lb)

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 N·m (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)

7. Install plug (A).

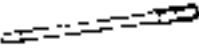
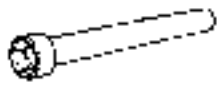
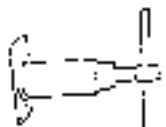
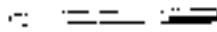
Tightening torque

(A): 25–39 N·m (2.5–4.0 m·kg, 18–29 ft·lb)

TRANSMISSION

PREPARATION

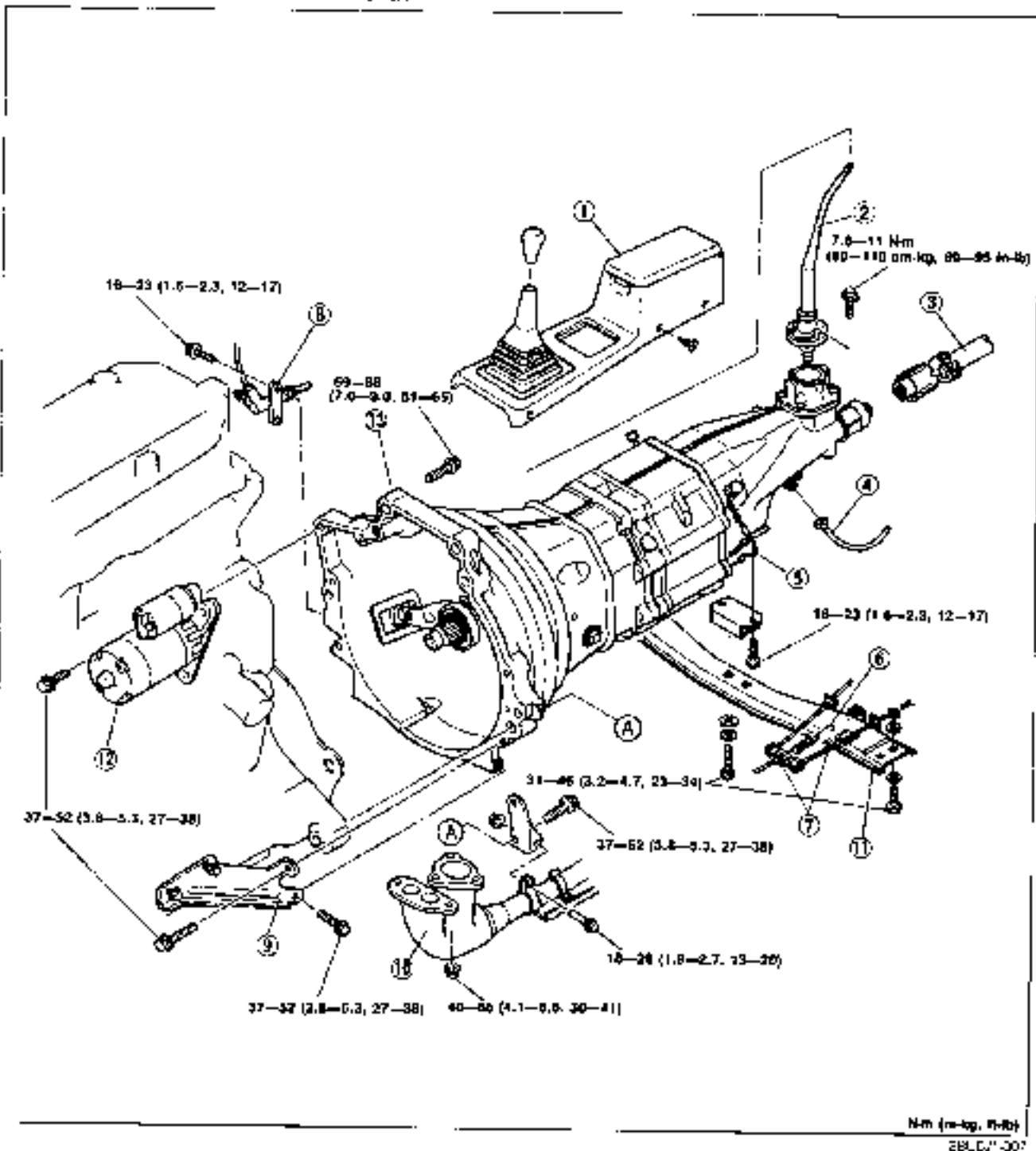
SST

49 0838 425C Puller set, bearing 	49 0520 330 Installn. transmission bearing 	49 0526 145 Pulley, for pulley boss 
49 0259 440 Holder, main shaft 	49 0852 350 Guide, shift fork 	4B 1243 465A Wrench, main- shaft locknut 
49 H07 101 Hook 	4B 077C 520 Puller, bearing 	49 0305 430 Main drive shaft pusher 
49 0180 321A Installer, bearing 	49 0187 451A Guide, interlock pin assembly 	

2FUDH-006

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.



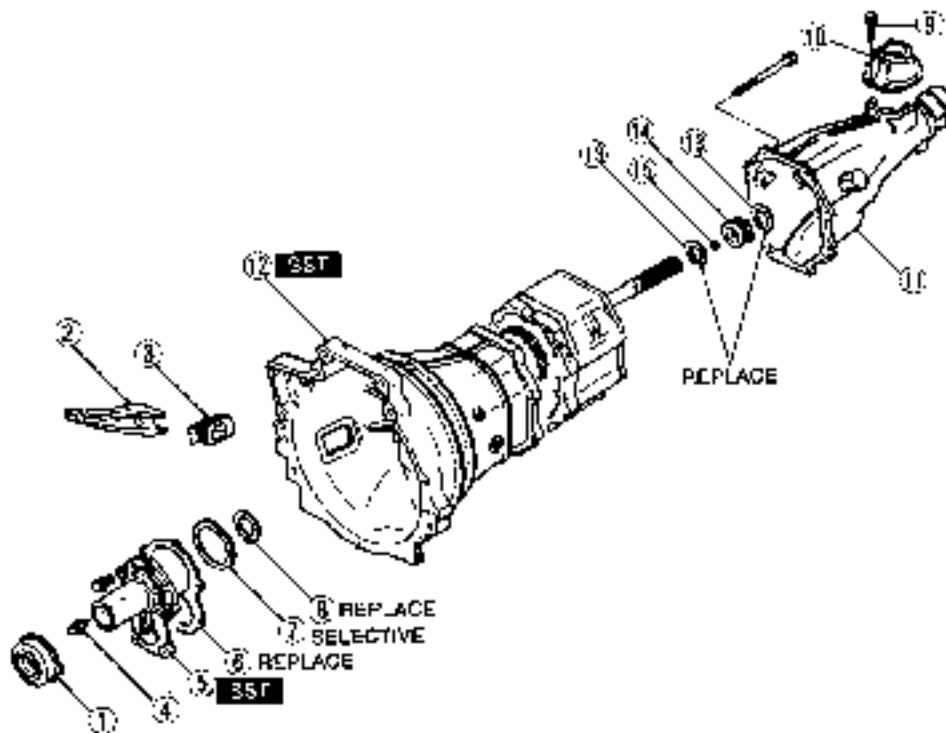
1. Console	5. Wiring harness	11. Transmission crossmember
2. Gearshift lever	6. Return spring	12. Starter
3. Propeller shaft	7. Parking brake cables	13. Transmission
Service Section L	8. Clutch release cylinder	Disassembly ... page J1-10
4. Speedometer cable	9. Gusset plate	Inspection page J1-17
Service Section T	10. Exhaust pipe	Assembly page J1-19

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**



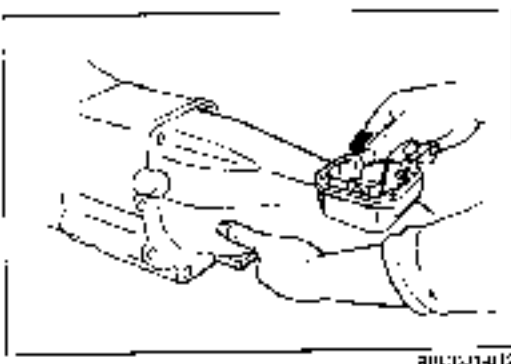
PART 10-008

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

Disassembly note
Extension housing

1. Move the control rod end to the neutral position
2. Turn it and remove the extension housing



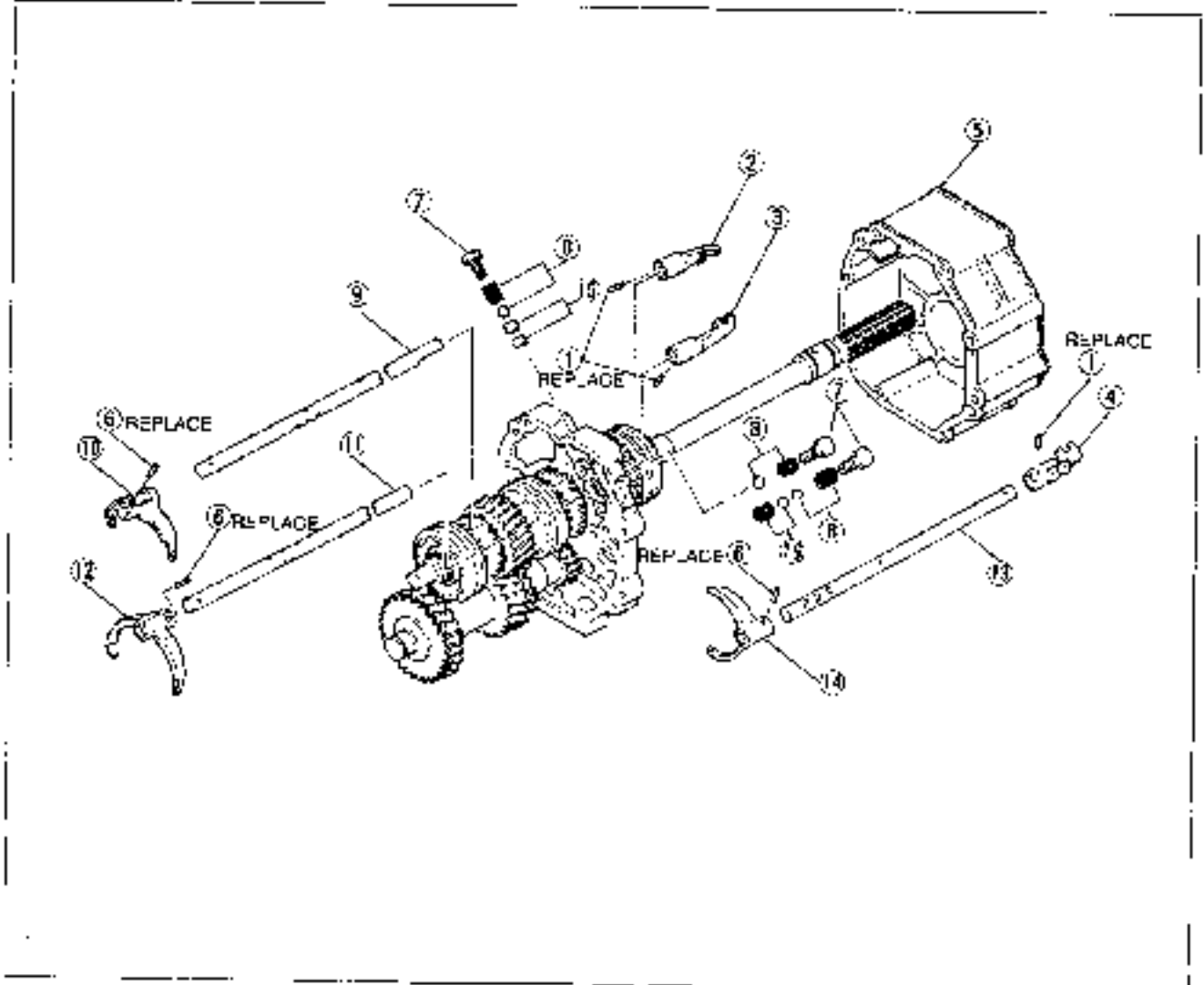
RECCV1-012

**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.

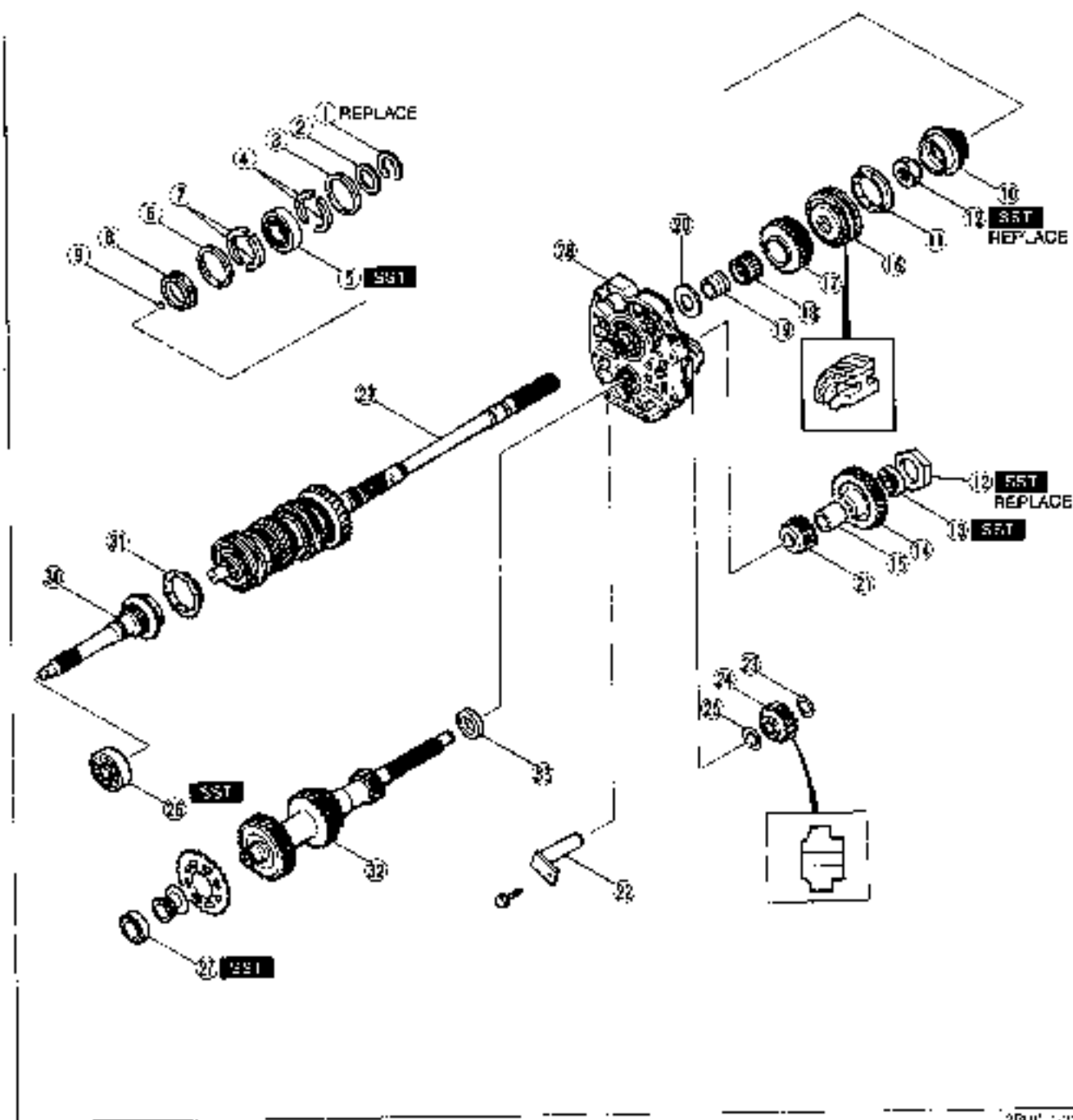


1. Roll pins
2. Shift rod end (1st/2nd)
3. Shift rod end (3rd/4th)
4. Shift rod end (5th/reverse)
5. Intermediate housing
6. Roll pins
7. Cap pins
8. Springs and balls

9. Shift rod (1st/2nd)
10. Shift fork (1st/2nd)
11. Shift rod (2nd/4th)
12. Shift fork (3rd/4th)
13. Shift rod (5th/reverse)
14. Shift fork (5th/reverse)
15. Interlock pins

790327 (M)

Main and Countershaft parts

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

29902-1-210

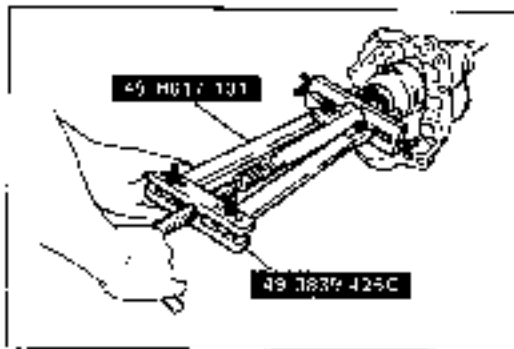
1. Snap ring
2. Washer
3. Retaining ring
4. C washers
5. Ball bearing
6. Retaining ring
7. C washers
8. Thrust lock washer
9. Ball

10. 5th gear
11. Synchronizer ring
12. Locknut
13. Ball bearing
14. Counter gear
15. Spacer
16. Clutch h.b. assembly (5th/reverse)

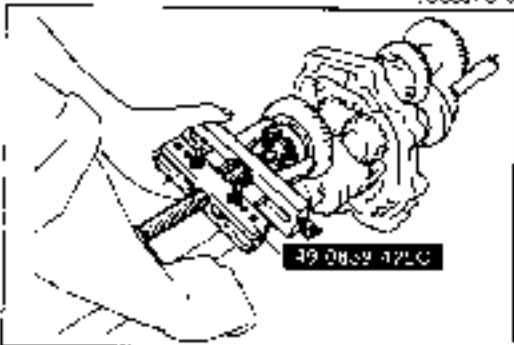
Removal page J1-14

Removal page J1-13

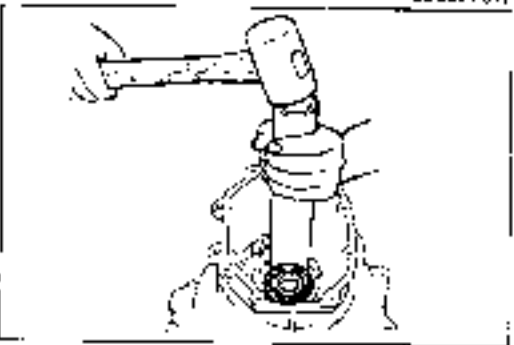
17. Reverse gear	27. Ball bearing (front)
18. Needle bearing	Removal..... page J1-13
19. Inner race	28. Bearing housing assembly
20. Washer	Removal..... page J1-14
21. Counter reverse gear	29. Mainshaft and gear assembly
22. Reverse idle gear shaft	30. Main drive gear
23. Washer	31. Synchronizer ring
24. Reverse idle gear	32. Countershaft gear
25. Washer	33. Spacer
26. Ball bearing	
Removal.....	page J1-13



46J011-016



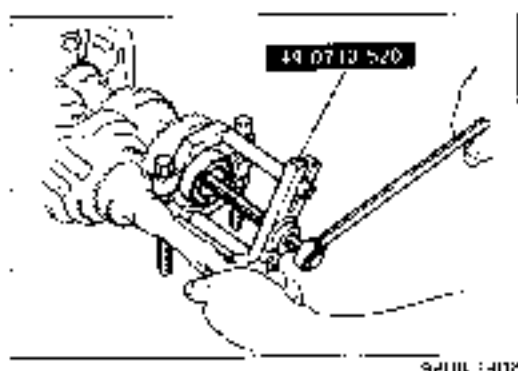
3B-C-1-017



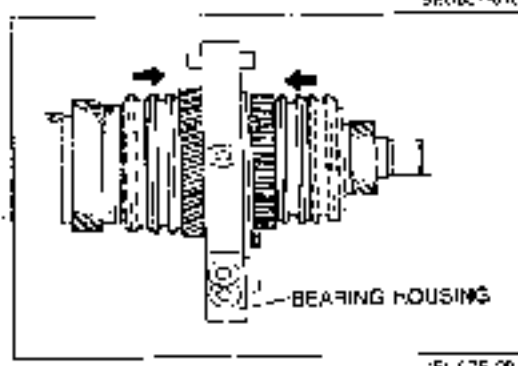
4A037E-004

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.

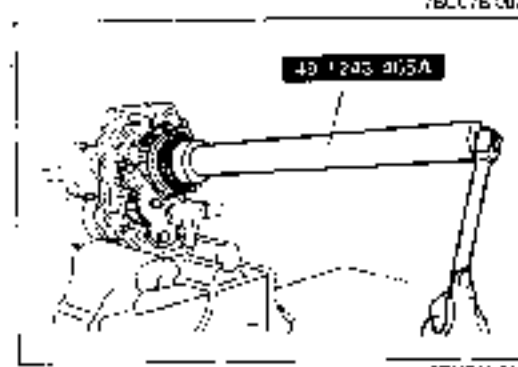


4. Remove the countershaft front bearing with the **SST**.



Locknut

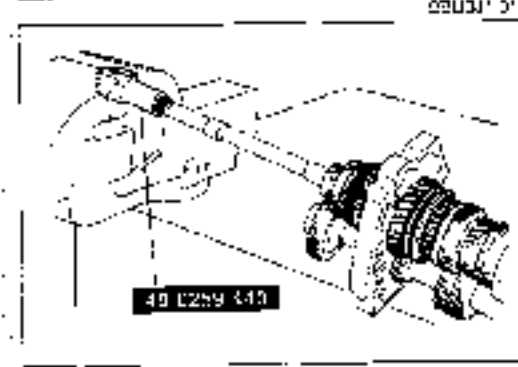
1. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition.
2. Use a suitable tool to uncrimp the tabs of the locknut for 5th/reverse clutch hub.



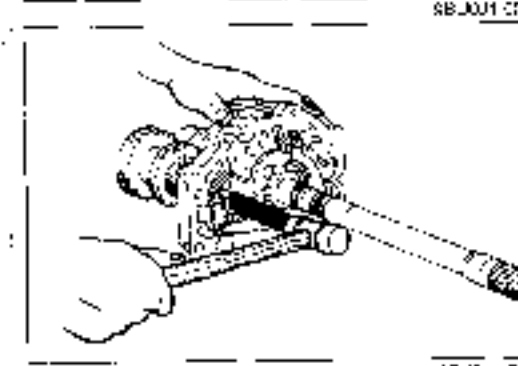
3. Locknut for 5th/reverse clutch hub
 - (1) Secure the bearing housing in a vise.
 - (2) Remove the locknut with the **SST**.

Caution

- a) Do not reuse the locknut after it has been removed.
- b) Use pads in the vise.



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

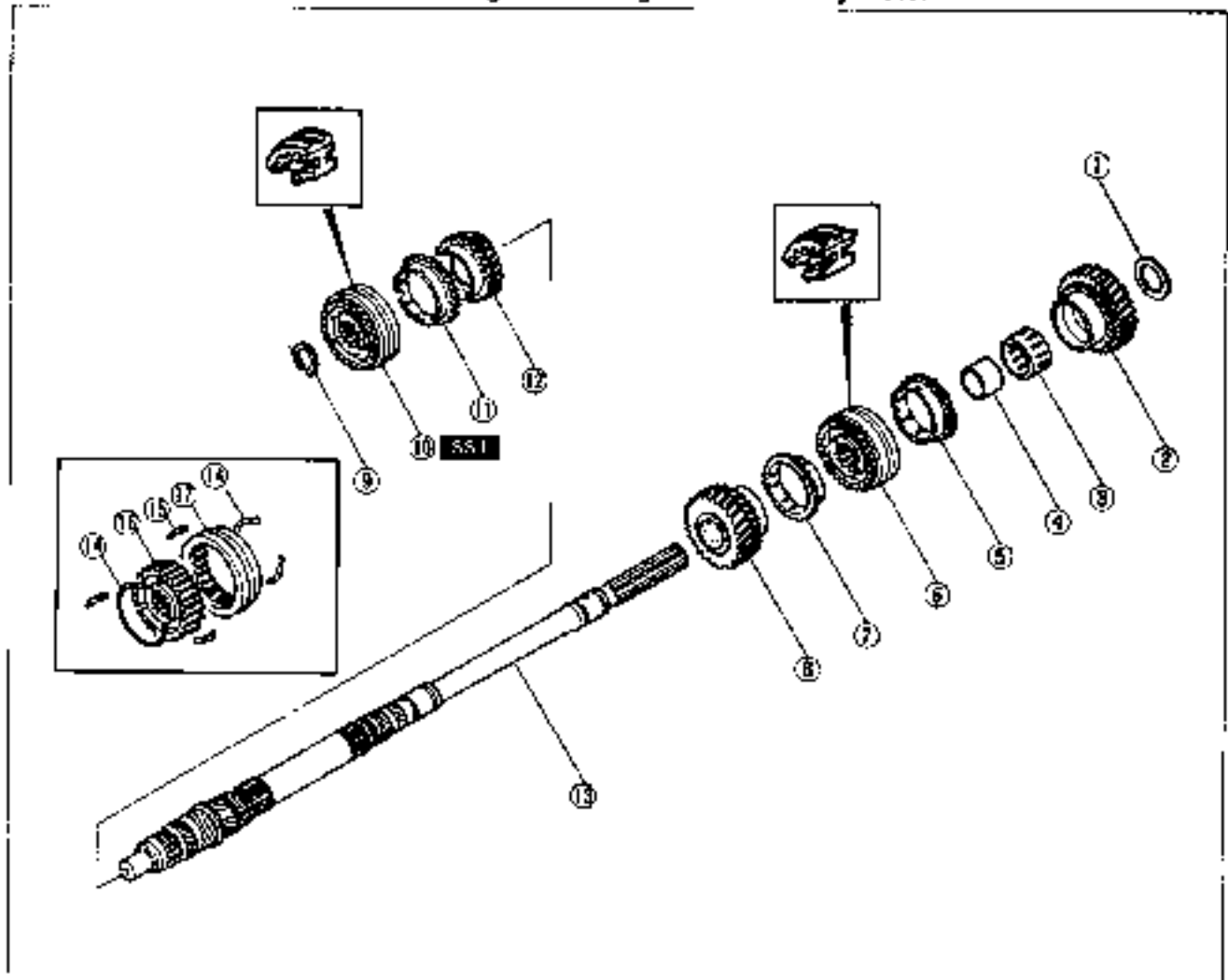
1. Remove the bearing housing by lightly tapping the countershaft with a copper hammer
2. Remove the spacer.

Note

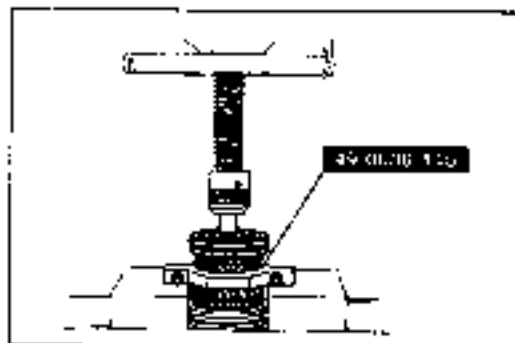
If bearing housing roller bearing is replaced, replace the spacer as a set.

Mainshaft Parts

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



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 L1-15	16. Clutch hub
6. Clutch hub assembly (1st/2nd)	11. Synchronizer ring (3rd)	17. Clutch hub sleeve

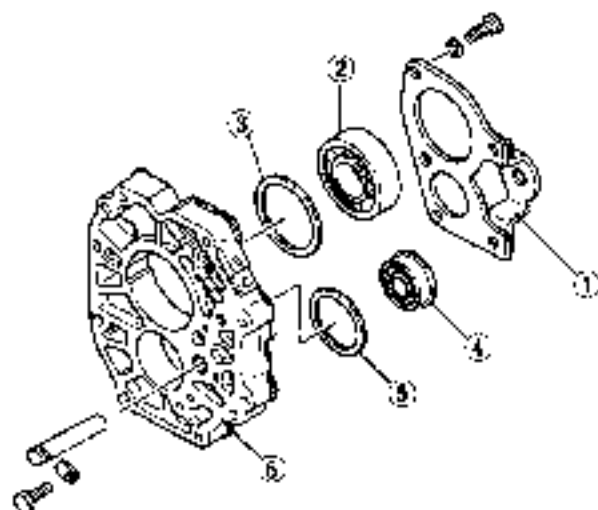
**Disassembly note****Clutch hub assembly (3rd/4th)**

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

PARKING

Bearing Housing Parts

Disassemble in the order shown in the figure



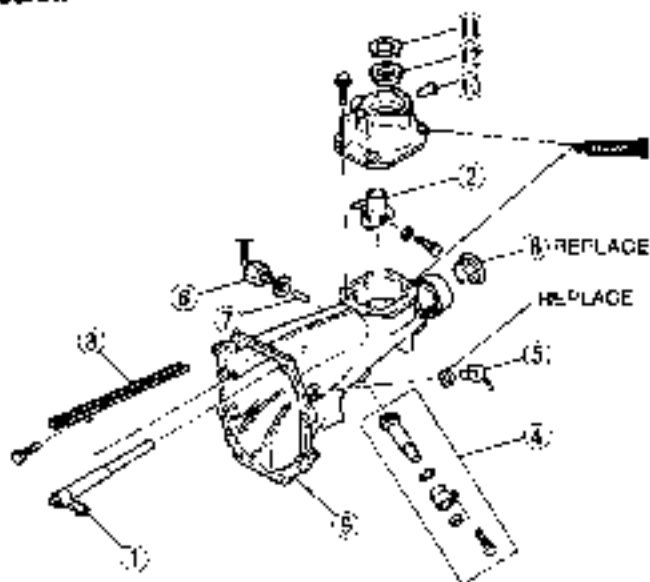
28J3110-2

- 1. Bearing cover
- 2. Ball bearing
- 3. Adjustment shim

- 4. Roller bearing
- 5. Adjustment shim
- 6. Bearing housing

Extension Housing Parts

Disassemble in the order shown in the figure.

5-SPEED TRANSMISSION

28J3110-4

- 1. Control lever
- 2. Control rod end
- 3. Oil passage
- 4. Speedometer driven gear
- 5. Backup light switch

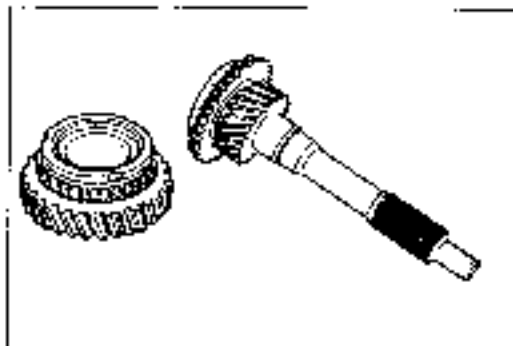
- 6. Neutral switch
- 7. Pin
- 8. O-ring seal
- Do not remove if not necessary

- 9. Extension housing
- 10. Pin
- 11. Wave washer
- 12. Bushing

INSPECTION

Inspect all parts, and repair or replace as necessary.

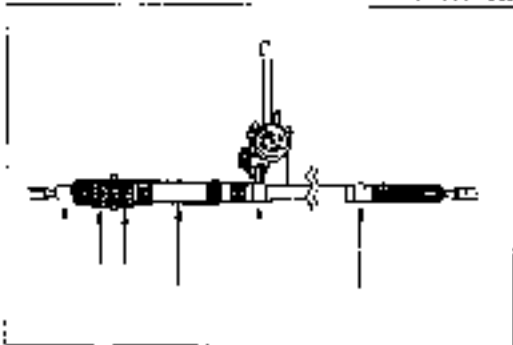
9MUDLX054



9MUDLX055

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.



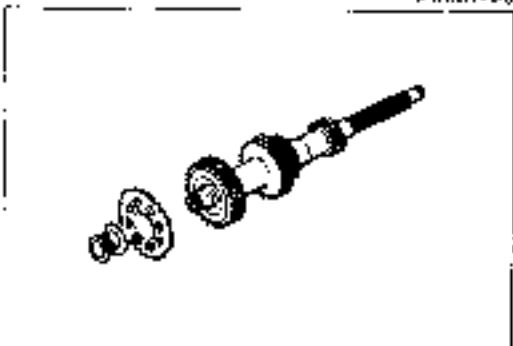
9MUDLX056

Mainshaft

1. Measure the mainshaft runout.

Maximum: 0.03mm (0.0012 in)

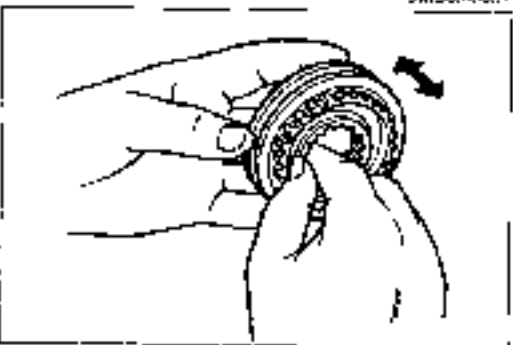
2. Inspect splines for damage or wear.



9MUDLX057

Countershaft

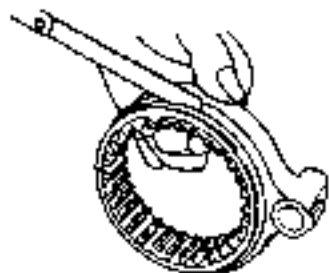
1. Inspect gear teeth for damage, wear, cracks.
2. Inspect splines for damage or wear.



9MUDLX058

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.



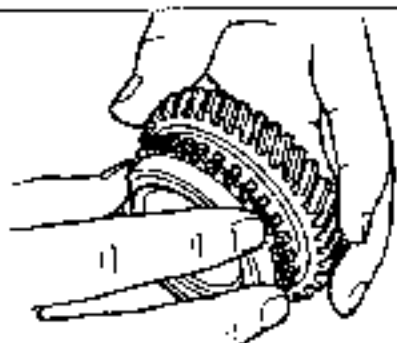
4. Measure the clearance between hub sleeve and release fork.

Standard clearance:

0.2—0.3mm (0.008—0.012 in)

Maximum: 0.5mm (0.020 in)

9K15.12.12.050



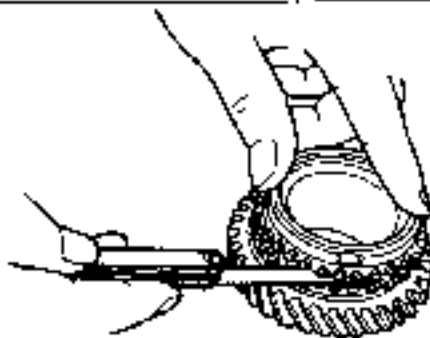
5K100X.05

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.



3B06.1.006

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.



5K100X.05

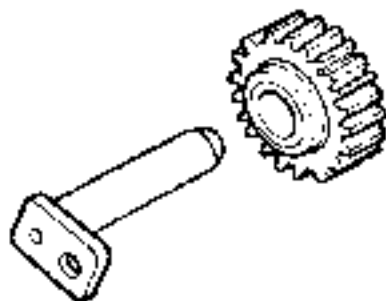
Reverse idler gear and shaft

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)

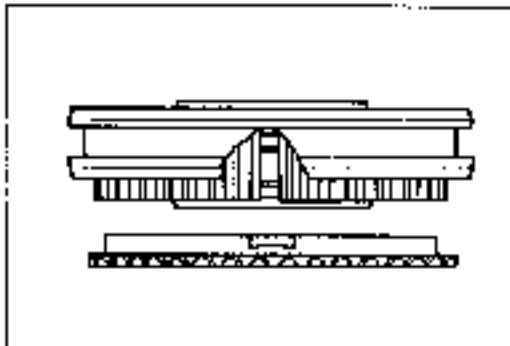


5K100X.05

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.

J50111-047



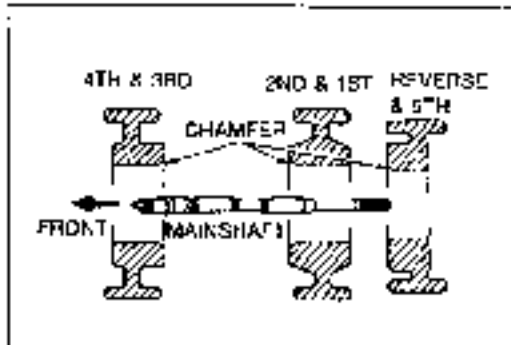
15-011-002

Assembly procedure**Caution**

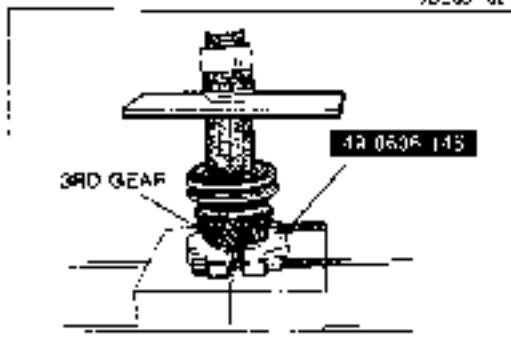
Align the synchronizer ring grooves with the clutch hub keys during installation.

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.

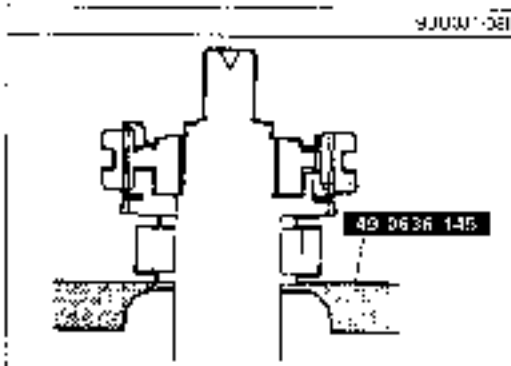


50-01-021



9J0011-021

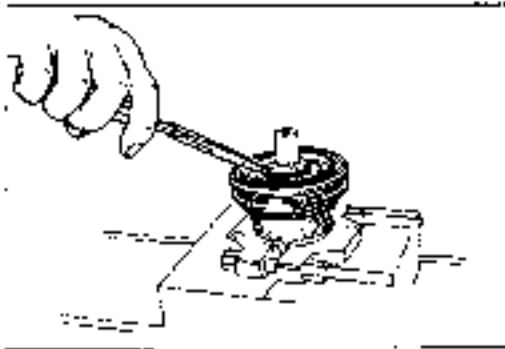
1. Place the 3rd gear and synchronizer ring on the mainshaft.
2. Press on the clutch hub assembly (3rd/4th) by using a suitable pipe and the SST.



4P3129-021

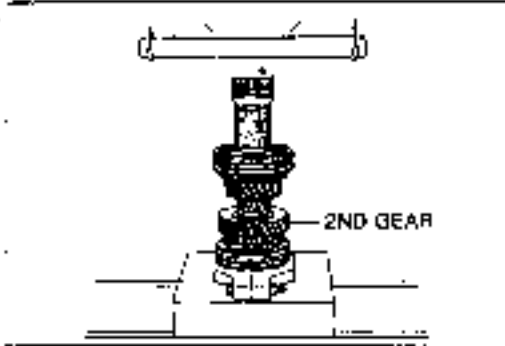
Caution

In pressing on the assembly, be sure to align the synchronizer ring and clutch hub (3rd/4th) grooves.



48301/2409

3. Insert the snap ring by using snap ring pliers.

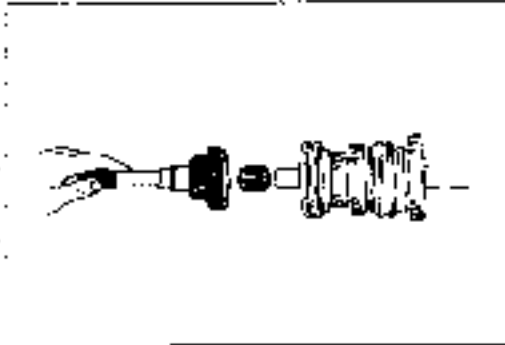


49007/1000

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).

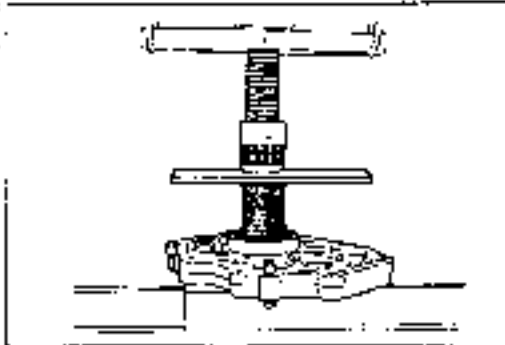
Caution

Same as the caution for Step 2.



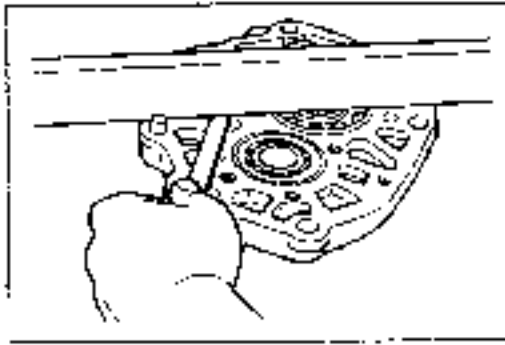
82027/3017

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.



82007/3019

6. Press the ball bearing and roller bearing into the bearing housing along with adjustment shims using a suitable piece of pipe.



48302/2400

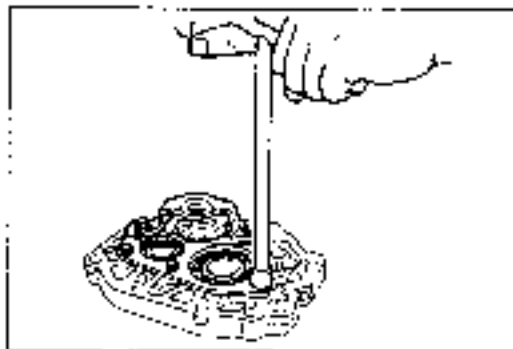
7. Measure the clearance between the ball bearing and the bearing housing.
If the clearance is not within the standard, adjust it by using an adjustment shim(s).

Standard clearance:

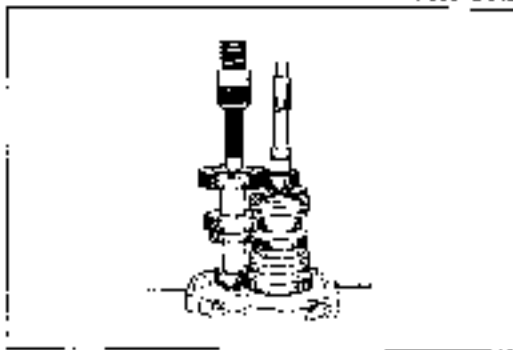
$0 \pm 0.05\text{mm}$ ($0 \pm 0.002\text{ in}$)

Adjustment shim:

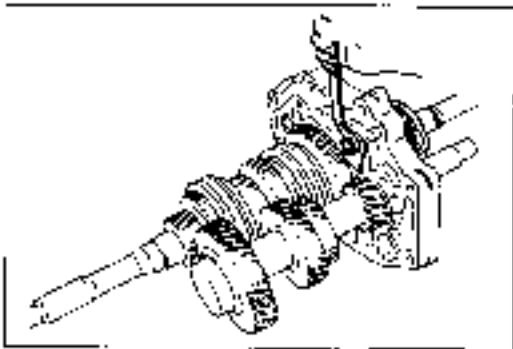
0.1mm (0.004 in), 0.3mm (0.012 in)



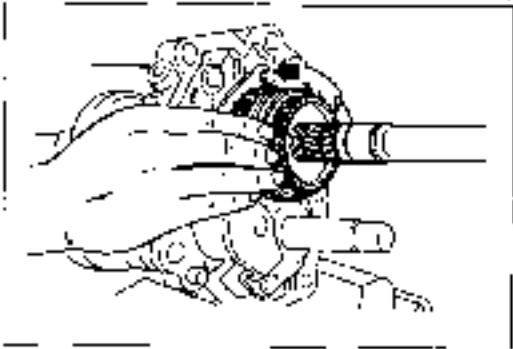
F4U073-019



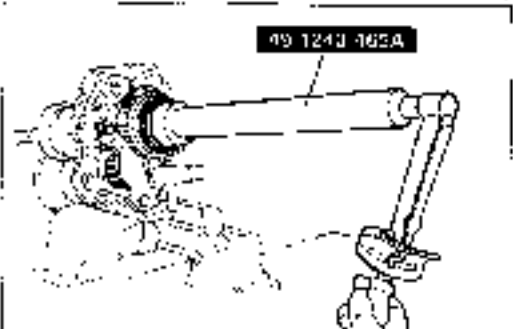
95LGP-029



26LGP-019



26LGP-019



26LGP-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)

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.

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).

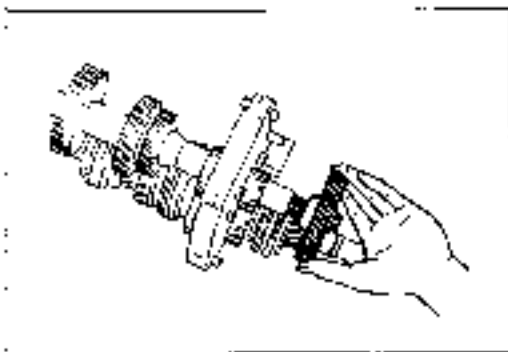
- *1. Secure the bearing housing in a vise installed the pads.
*2. Slide the clutch hub sleeves onto 1st and reverse gears to lock the mainshaft.

13. (1) Install the clutch hub assembly (5th/reverse), and tighten a new locknut with the SST.

Tightening torque:

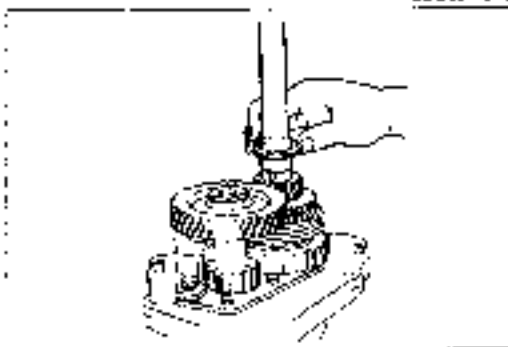
128—206 Nm (13—21 m·kg, 94—152 ft·lb)

- (2) Use a chisel to crimp the locknut.



SBLO-1019

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.

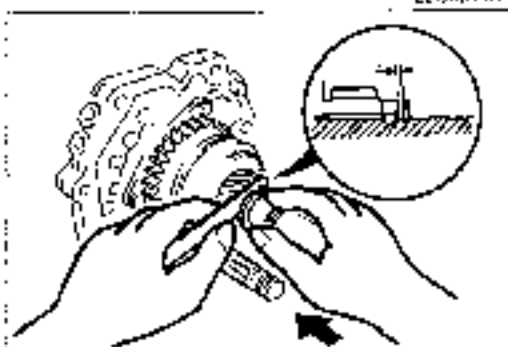


2BLO-114-19

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.



74UB-1020

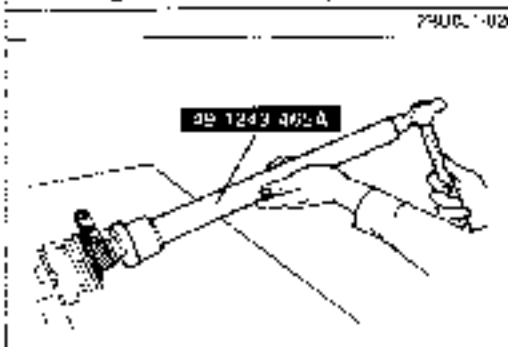
16. While pushing the C-washers toward the 5th gear side, measure the clearance between the thrust lock washer and C-washers.
- If the clearance is not as specified select the proper thrust lock washer.

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.

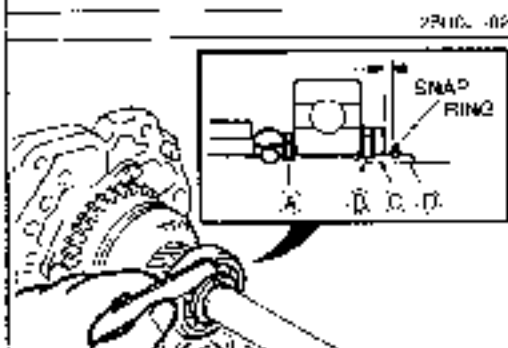


23UB-1021

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.



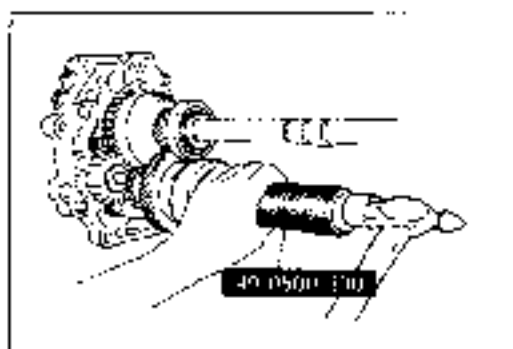
2BLO-1022

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

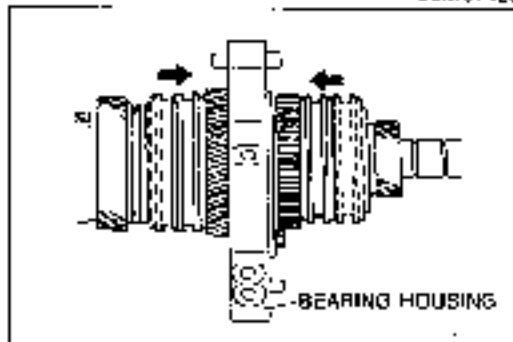
C washer thickness:

2.9mm (0.114 in), 3.0mm (0.118 in),
3.1mm (0.122 in), 3.2mm (0.126 in)



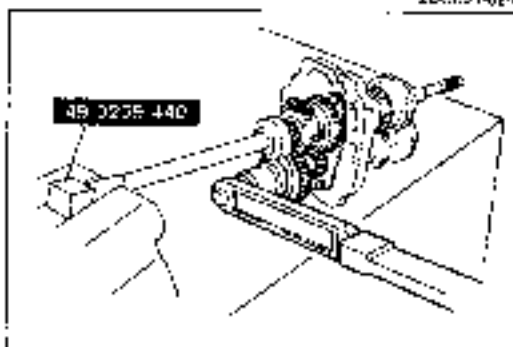
2911AH-023

22. Drive on the ball bearing to the countershaft with the **SST**.



2ELCJ-1-024

23. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in a double-engaged condition.



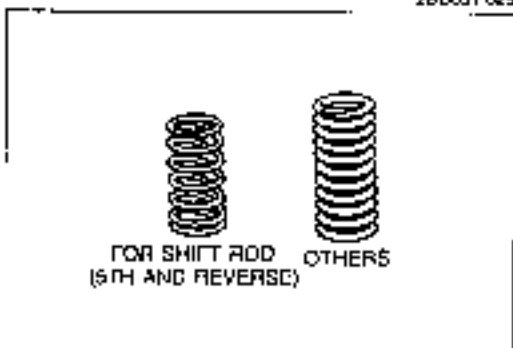
2BU0J1-025

24. (1) Install the **SST** on the mainshaft, and place them securely in a vise.
(2) Tighten the countershaft rear bearing new locknut

Tightening torque:

118—157 N·m (12—16 m·kg, 87—116 ft·lb)

(3) Use a chisel to crimp the locknut.

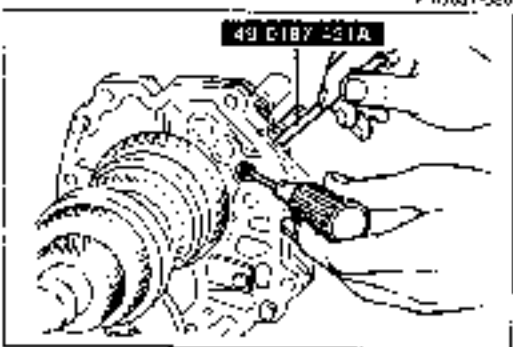


F410W1-026

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.



2ELCJ-1-027

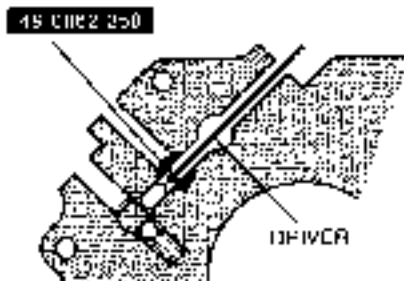
26. Press the spring and ball (5th/reverse) with the **SST** and a flat-tipped screwdriver to install the shift rod



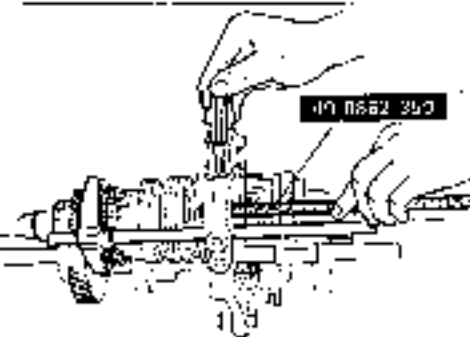
27. Install the shift fork and rod (5th/reverse) to the bearing housing.



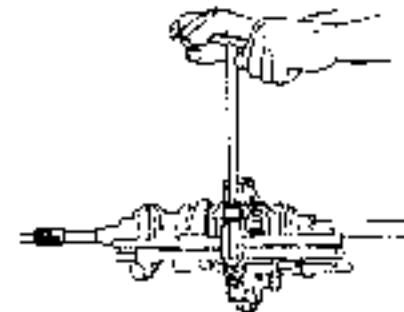
28. Position the interlock pin into the bearing housing with the SST.



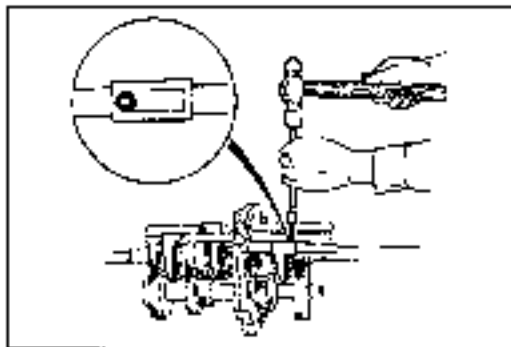
29. Check to be sure that the interlock pin fits correctly.



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.

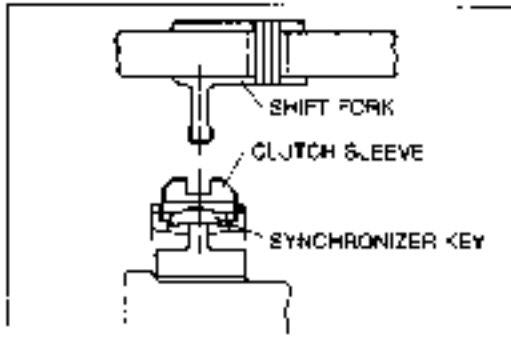


2BU01-028

32. Install the new roll pins into each shift fork.

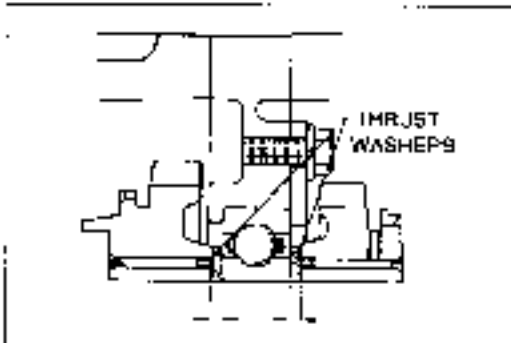
Caution

The roll pin should be installed so that the groove of the pin faces as shown in the figure.



2BL0J1-034

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.



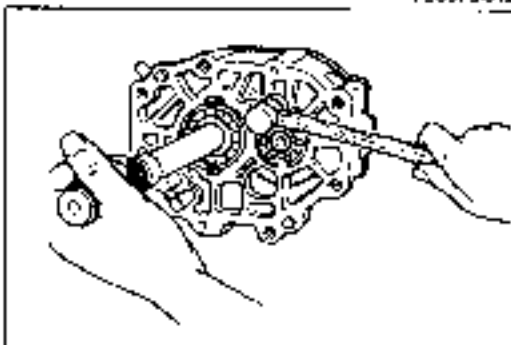
72U573-012

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)	

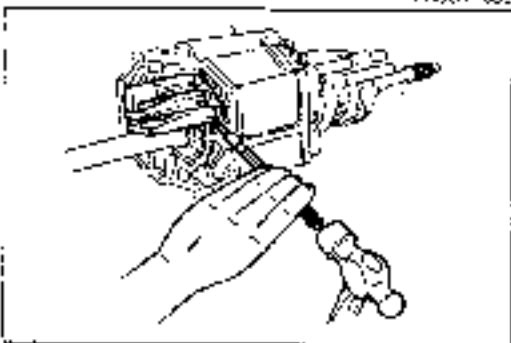
Caution

The total thicknesses of both front and rear thrust washers should be 5.9mm (0.2323 in) or 6.0mm (0.2362 in).



2BU01-035

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.

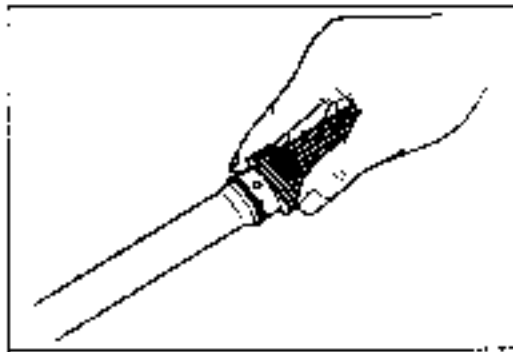


2BU01-037

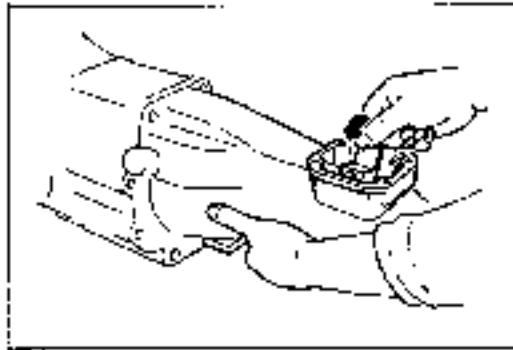
36. Install the shift rod end on each shift rod.

Caution

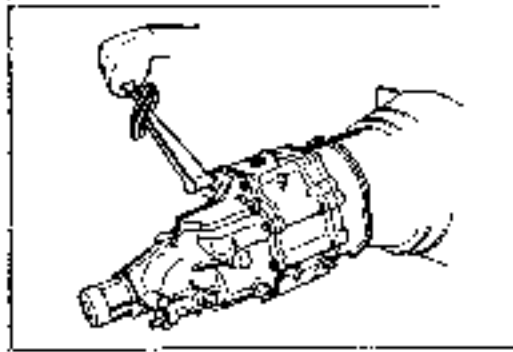
The roll pin should be installed so that the groove of the pin faces toward the front.



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 bolts.

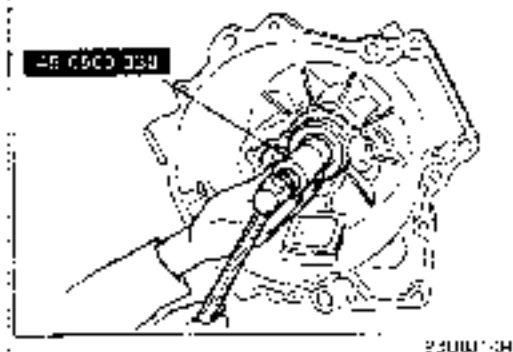
Tightening torque:

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:

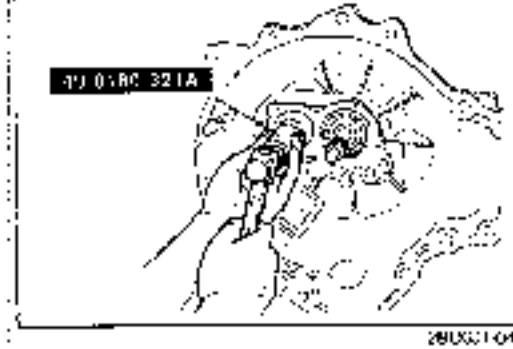
18–26 N·m (1.8–2.7 m·kg, 13–20 ft·lb)



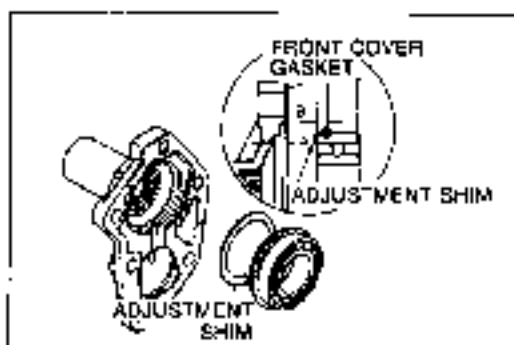
43. Install the ball bearing (main drive gear) with the **SST**, and secure it with the new snap ring.

Caution

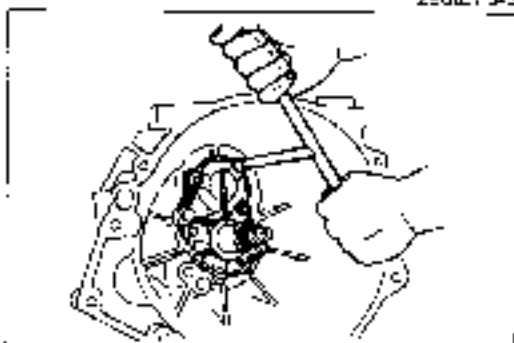
At this time, the synchronizer ring groove of the main drive gear should be aligned with the synchronizer key.



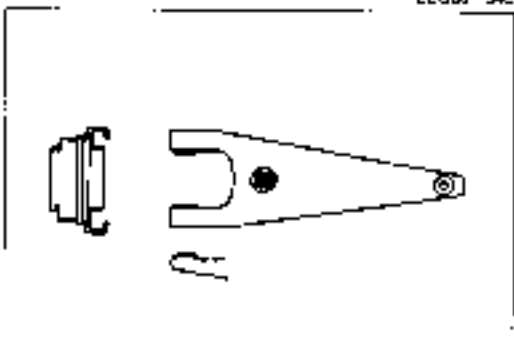
44. Install the ball bearing (countershaft) with the **SST**, and secure it with the new snap ring.



ZEUGJ-343



ZEUGJ-345



ZEUGJ-344

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)

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.

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)

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DEUGJ2 001

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TRANSMISSION

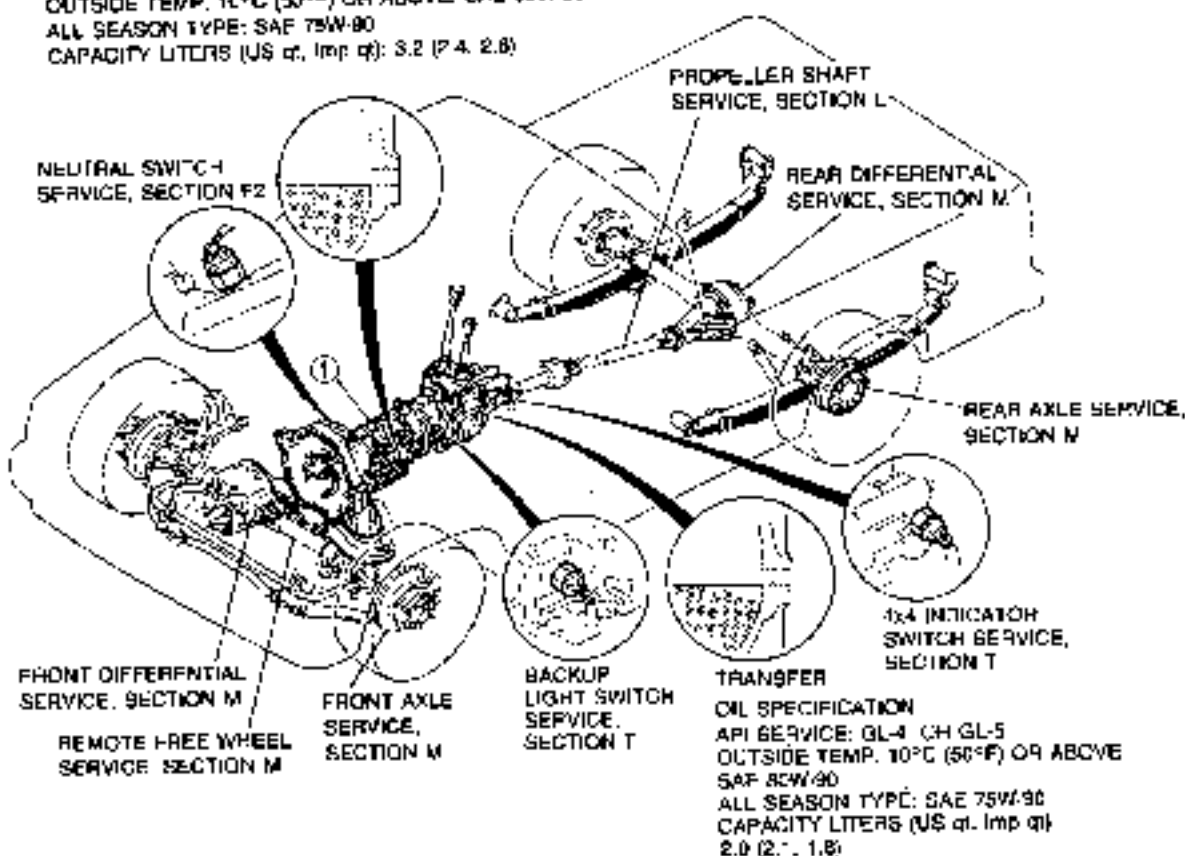
OIL SPECIFICATION

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)



1BJ002-0011

1. Transmission

Removal	page J2 - 8
Disassembly	page J2 - 9
Inspection	page J2-21
Assembly	page J2-24
Installation	page J2 - 8

OUTLINE

SPECIFICATIONS

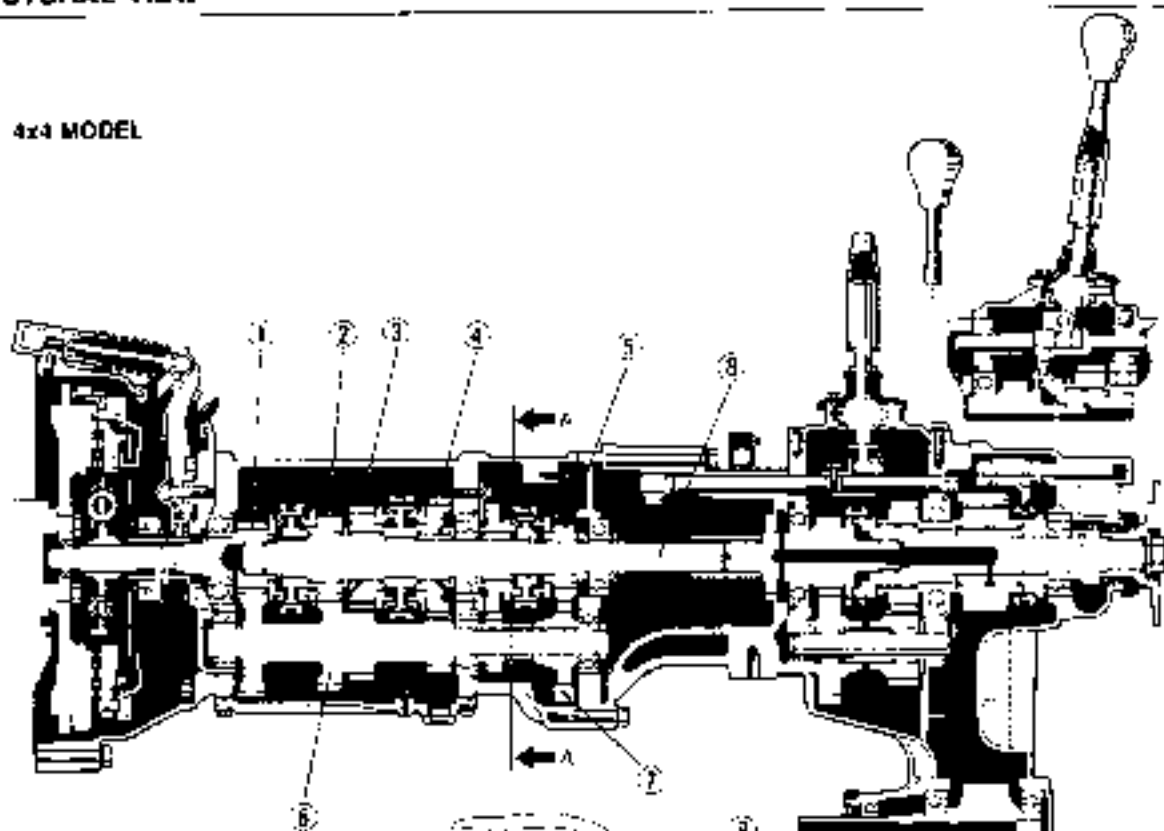
Item		Model	B2B00	
			R5M-D 4x2	R5MX-D 4x4
Synchronesh™ system	Transmission		Forward: Synchronesh Reverse: Synchronesh	
	Transfer case		-	Constant-mesh
Shift type	Transmission			
	Transfer case		-	
Gear ratio	Transmission	1st	3.730	
		2nd	2.158	
		3rd	1.390	
		4th	1.000	
		5th	0.816	
		Reverse	3.521	
	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	2.8 (3.0, 2.6)	3.2 (3.4, 2.6)
		Transfer case	-	2.0 (2.1, 1.8)

09BUB.2-002

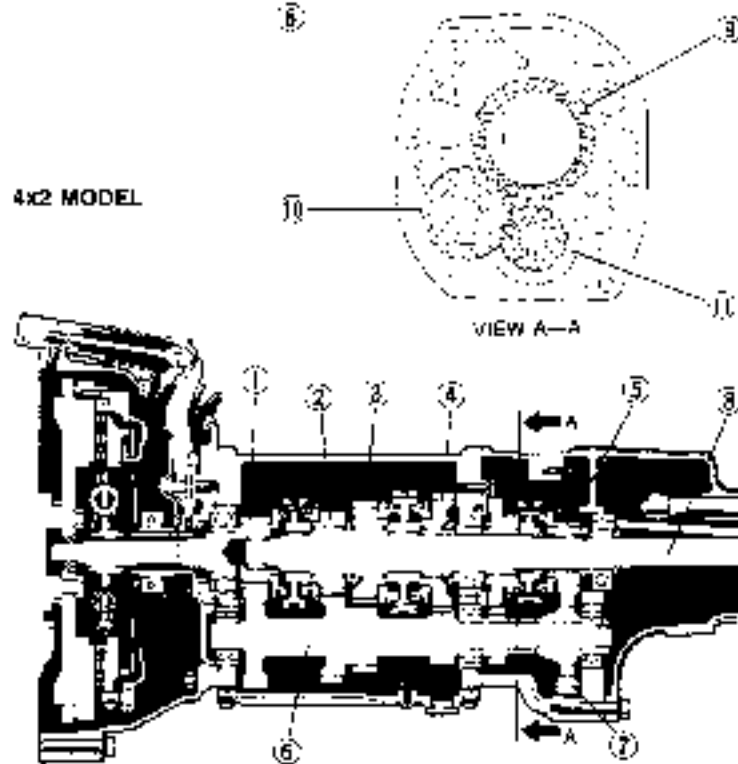
J2

STRUCTURAL VIEW

4x4 MODEL



4x2 MODEL

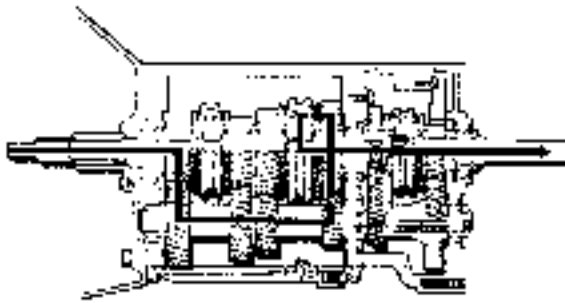


GELJ002 0004

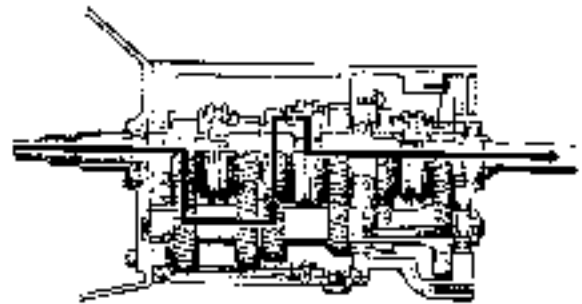
1. Main drive gear (4th gear)
2. 3rd gear
3. 2nd gear
4. 1st gear
5. 5th gear
6. Countershaft

7. Counter 5th gear
8. Mainshaft
9. Reverse gear
10. Reverse idler gear
11. Counter reverse gear

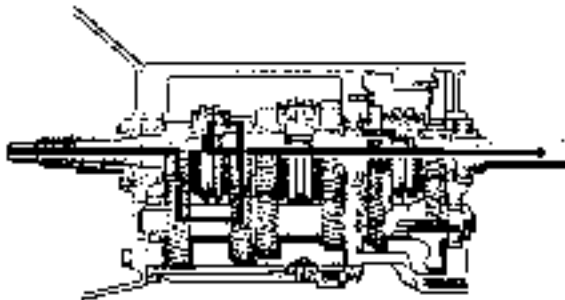
POWERFLOW



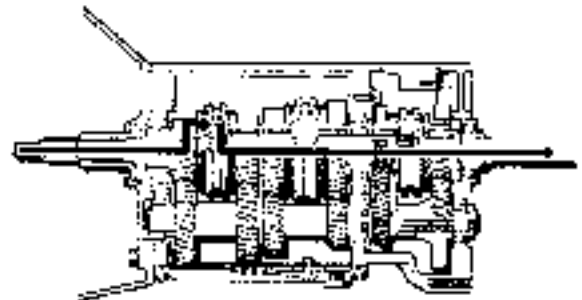
1ST



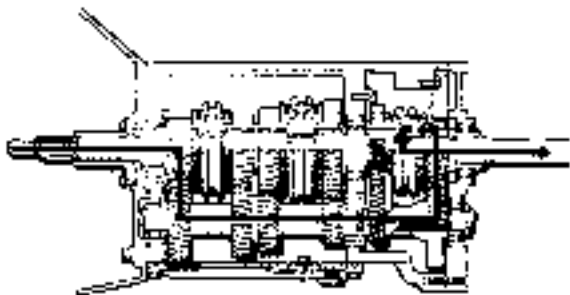
2ND



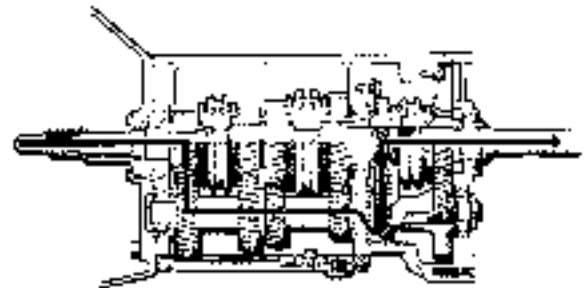
3RD



4TH



5TH



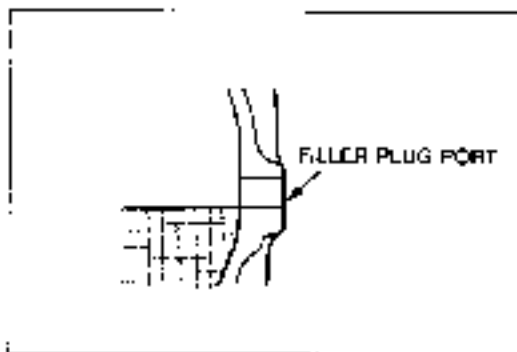
REVERSE

TROUBLESHOOTING GUIDE

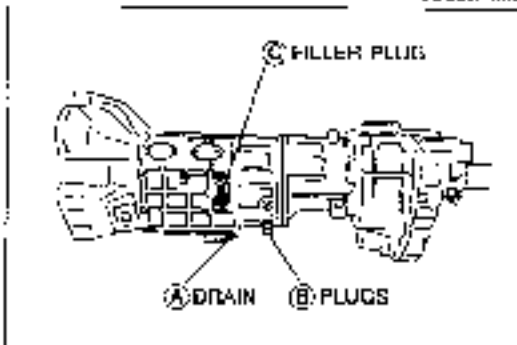
TRANSMISSION

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	Replace	—
Difficult to shift	Damaged gear teeth	Replace	J2- 21
	Insufficient oil	Add oil	J2- 7
	Deterioration of oil quality	Replace with oil of specified quality	J2- 3
	Wear or play of control lever and/or shift rod	Replace	J2- 21
	Worn synchronizer ring	Replace	J2-22
	Worn synchronizer cone of gear	Replace	J2- 22
	Flare contact of synchronizer ring and gear cone	Replace	J2-22
	Excessive longitudinal play of gears	Replace	J2- 21
	Worn bearing	Replace	J2-22
Jumps out of gear	Improper disengagement of clutch	Refer to Section H	—
	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

OBL012 006



35L6J2-003



2241L2-005

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:

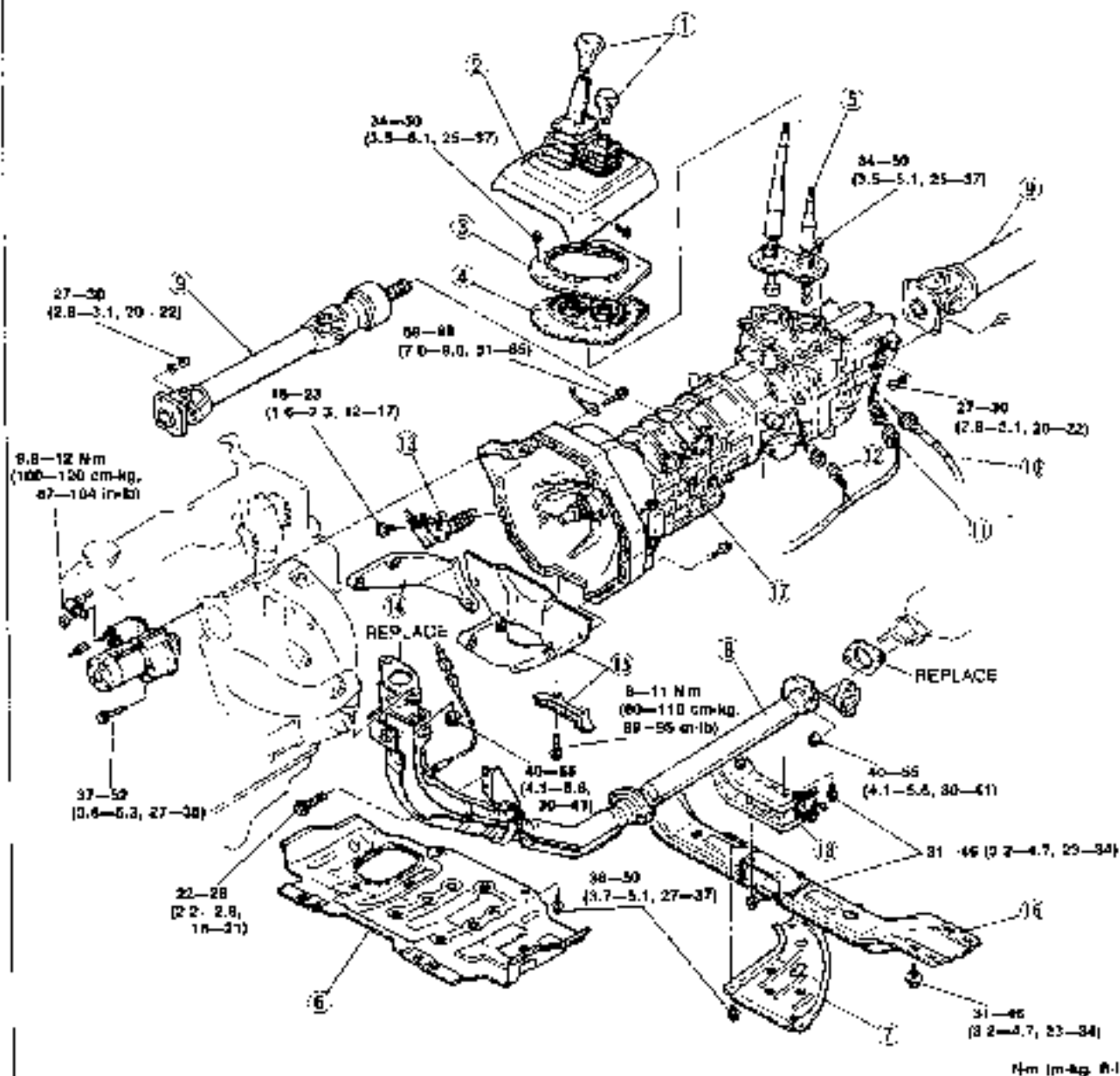
25—39 N·m (2.5—4.0 m·kg, 18—29 ft·lb)

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.

95/022 CAS



N·m (m·kg, ft·lb)

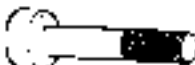
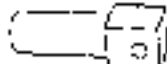
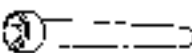
SU/KUPC12

1. Shift lever knobs	8. Exhaust pipe	15. Undercover
2. Console box	9. Front and rear propeller shafts	(Lower M/T approx. 20mm, 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

49 0029 425C Pulver seal bearing		49 0600 330 Insulator, transmission bearing		49 0635 145 Pulver seal pulley lens	
49 3120 440 Holder, mainshaft		49 F017 101 Holder, synchronizer ring		49 0662 350 Guide, shift fork	
49 1243 465A Wrench, mainshaft, output		49 H017 101 Hook		49 0710 520 Pulver bearing	
49 F401 330B Insulator seal bearing		49 F401 331 Body (Part of 49 F401 330B)		49 F401 335A Attachment A (Part of 49 F401 330B)	
49 F401 337A Attachment C (Part of 49 F401 330B)		49 U027 003 Insulator, oil seal		REPAIRING	

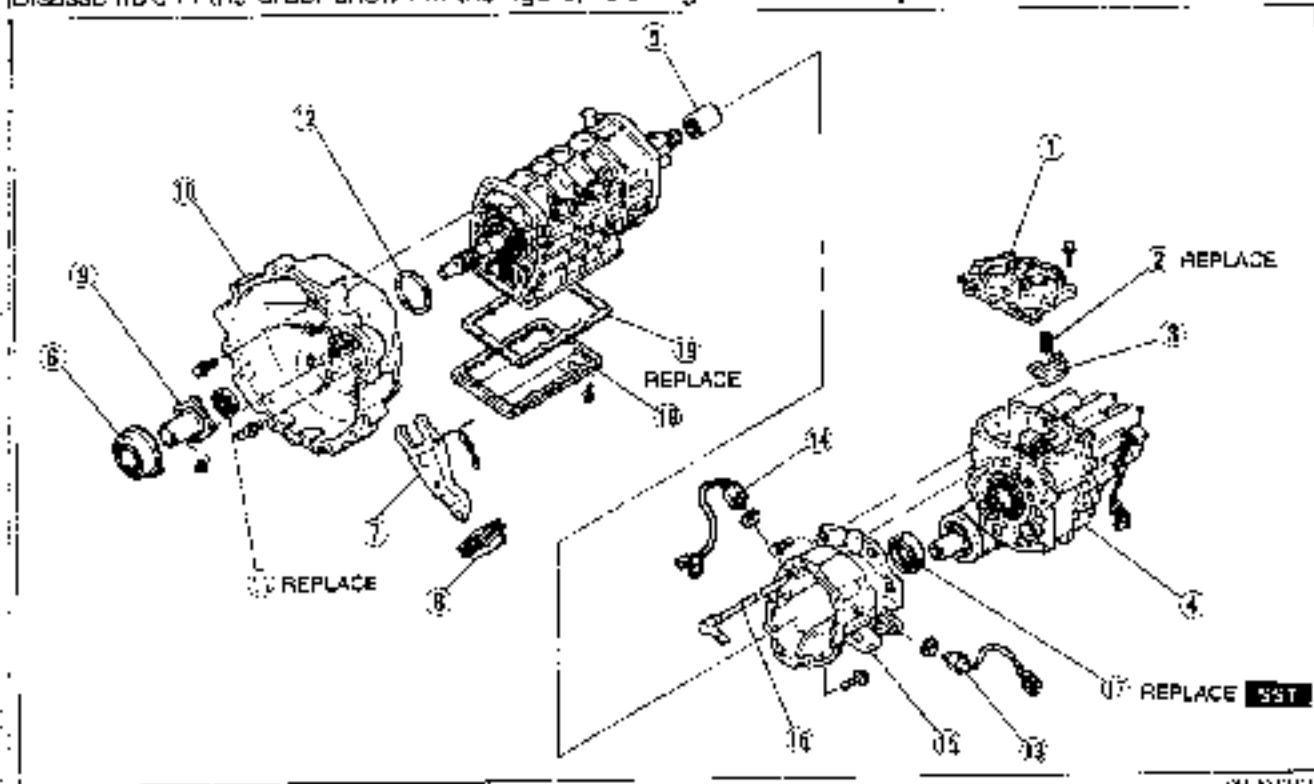
DISASSEMBLY

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.

08JUL2409

Transfer Case, Clutch Housing, and Extension Housing (4x4)

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

08J00240-01

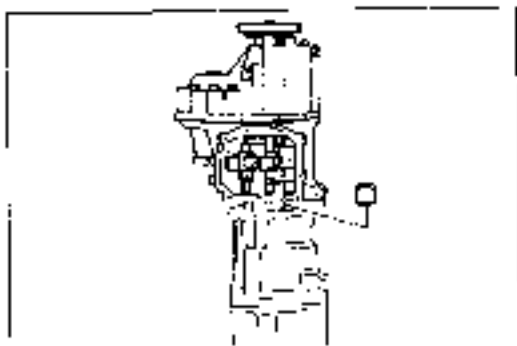
1. Control cover assembly
2. Roll pin
3. Control lever end
4. Transfer case
Removal page J2-10
5. Input shaft
6. Release bearing

7. Release fork
8. Back
9. Front cover
10. Clutch housing
11. Oil seal
12. Adjusting shim
13. Backup light SW

14. Neutral SW
15. Extension housing
Removal page J2-10
16. Control rod
17. Oil seal
18. Undercover
19. Gasket

Disassembly note**Transfer case**

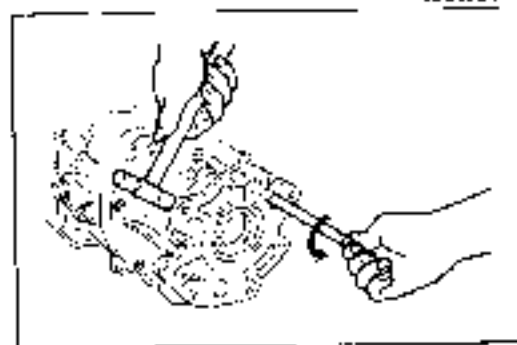
Set the transmission in a vertical position. Lift the transfer case off vertically to prevent damaging the control rod.



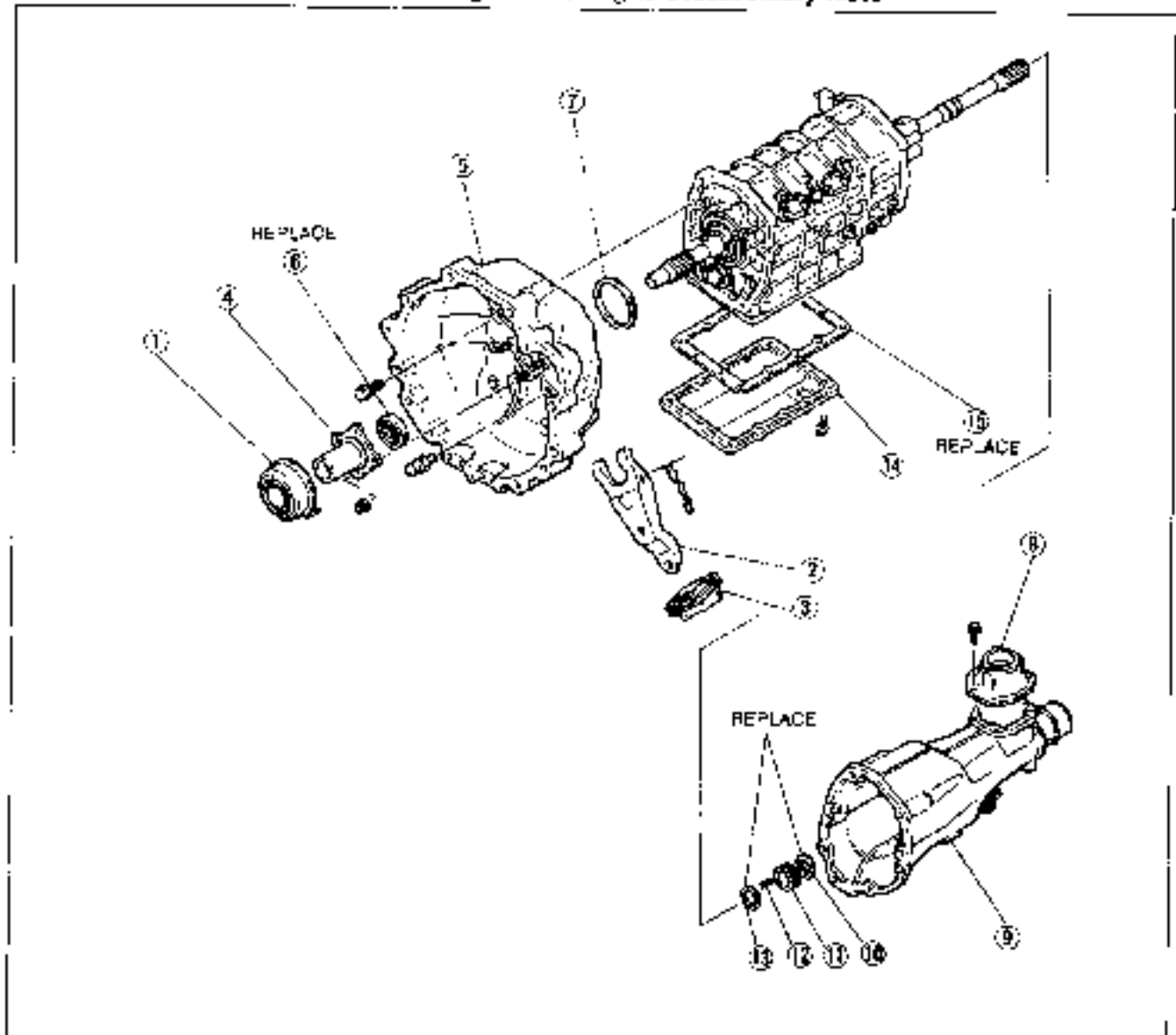
CBU0201

Extension housing

Turn the control rod in the direction of the arrow, and remove the extension housing.



TBU0740-2

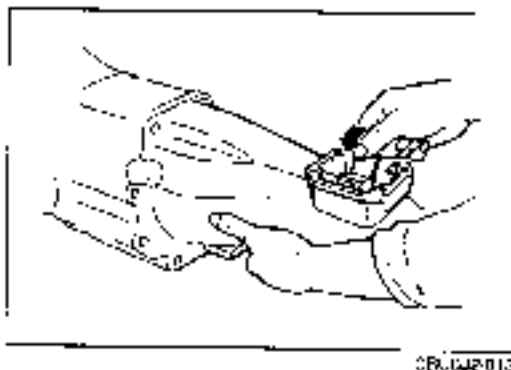
Clutch Housing and Extension Housing (4x2)Disassemble in the order shown in the figure, referring to **Disassembly Note**

1. Release bearing
2. Release fork
3. Boot
4. Front cover
5. Clutch housing
6. Oil seal

7. Adjusting shim
8. Control cover assembly
9. Extension housing
10. Snap ring
11. Speedometer drive gear

12. Key
13. Snap ring
14. Oil pan
15. Gasket

38011, 24012



CBUW2013

**Disassembly note
Extension Housing**

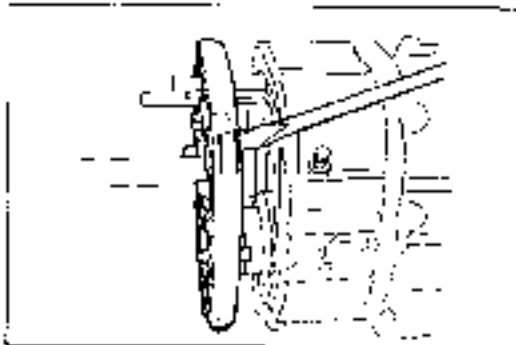
1. Move the control rod end to the neutral position.
2. Push the control rod to the left, and remove the extension housing.

Disassemble in the order shown in the figure, referring to **Disassembly Note**

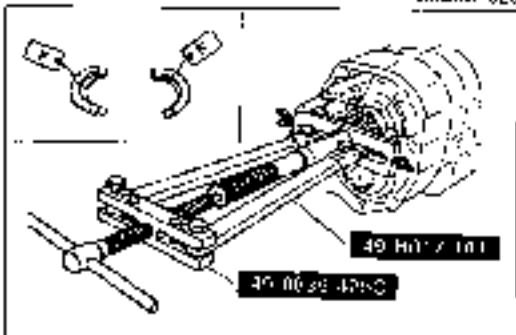


1. 5th/Reverse shift rod end Installation..... page J2-35	16. Set bolt and washer	30. Interlock pin
2. 3rd/4th shift rod end Installation..... page J2-35	17. Center housing Removal..... page J2-14 Installation..... page J2-33	31. 1st/2nd shift rod Removal..... page J2-15 Installation..... page J2-32
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

90J002-016



CMU002-025



6ML002-026

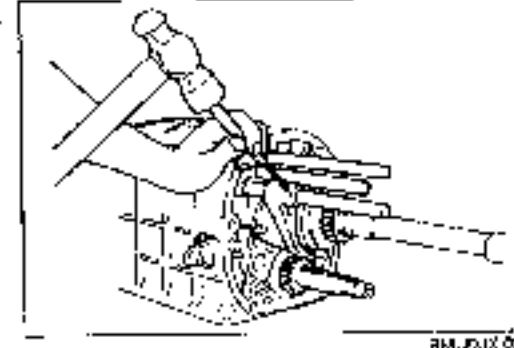
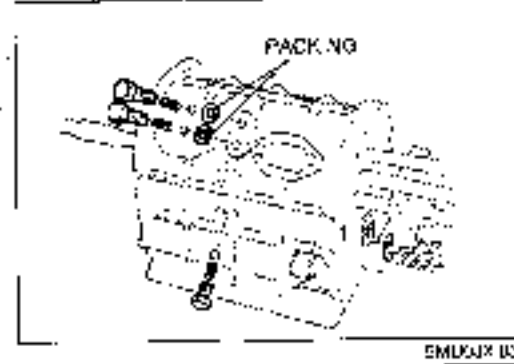
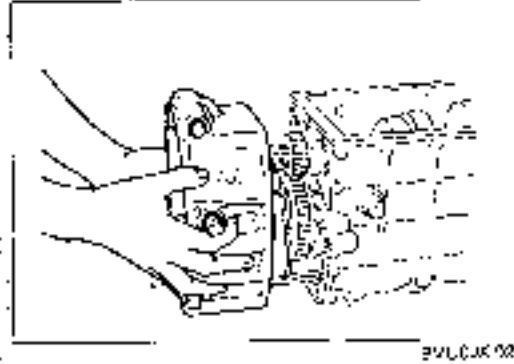
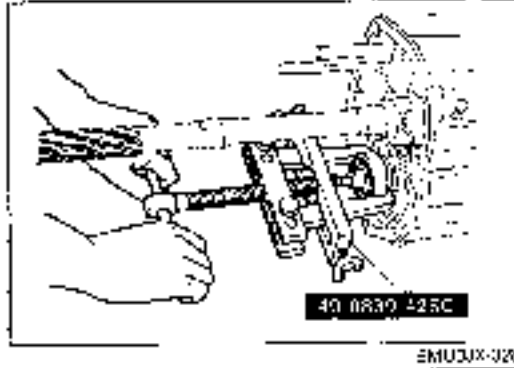
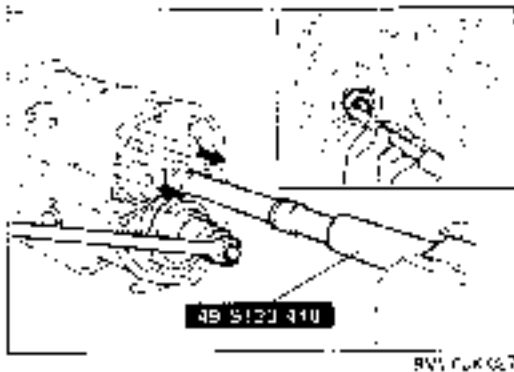
Disassembly note**Bearing housing**

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 SS7.



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.

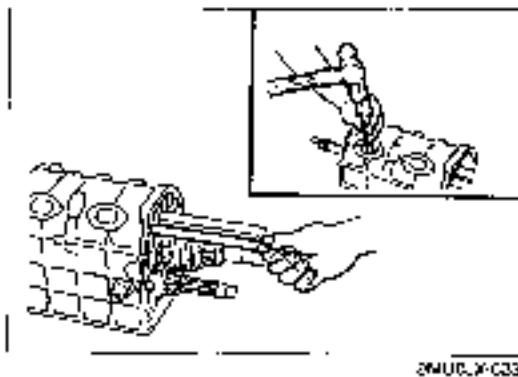
3. Hold the mainshaft with the SST and a vise.
4. Remove the locknut.
5. Remove the countershaft rear bearing with the SST.

Center housing

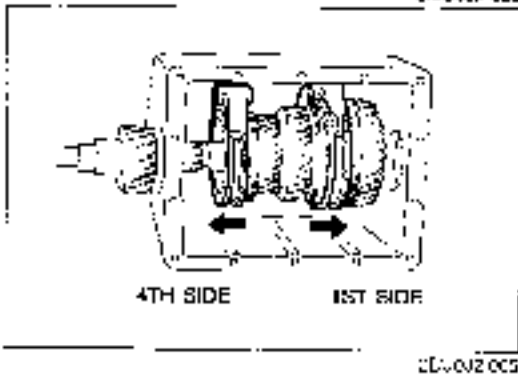
1. Remove the cap screws from the center housing.
2. Remove the center housing. If necessary, tap the housing with a plastic hammer.

5th/reverse shift rod

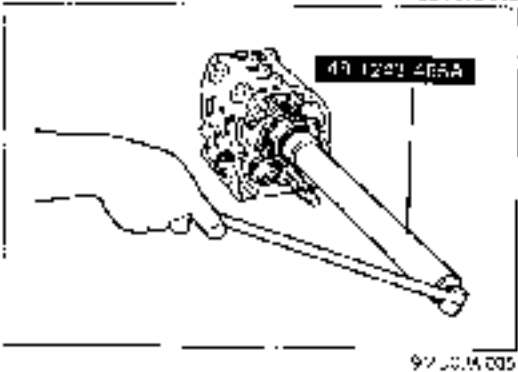
1. Remove the packing and three cap plugs, then the detent balls and springs.
2. Drive the rod pin from the 5th/Reverse shift fork. Slide the 5th/reverse shift rod out of the transmission case.

**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.

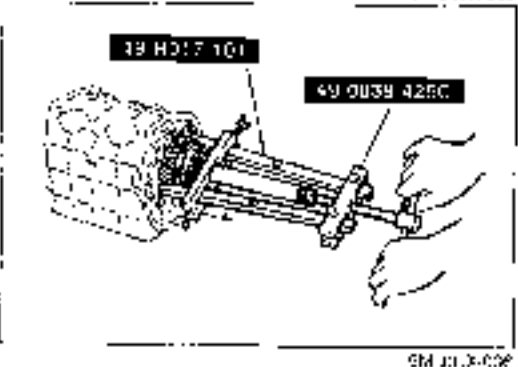
**5th/Reverse clutch hub assembly**

1. Unclamp the tab of the locknut.
2. Shift into 1st gear and 4th gear to lock the rotation of the mainshaft.

**Caution**

Do not reuse the locknut.

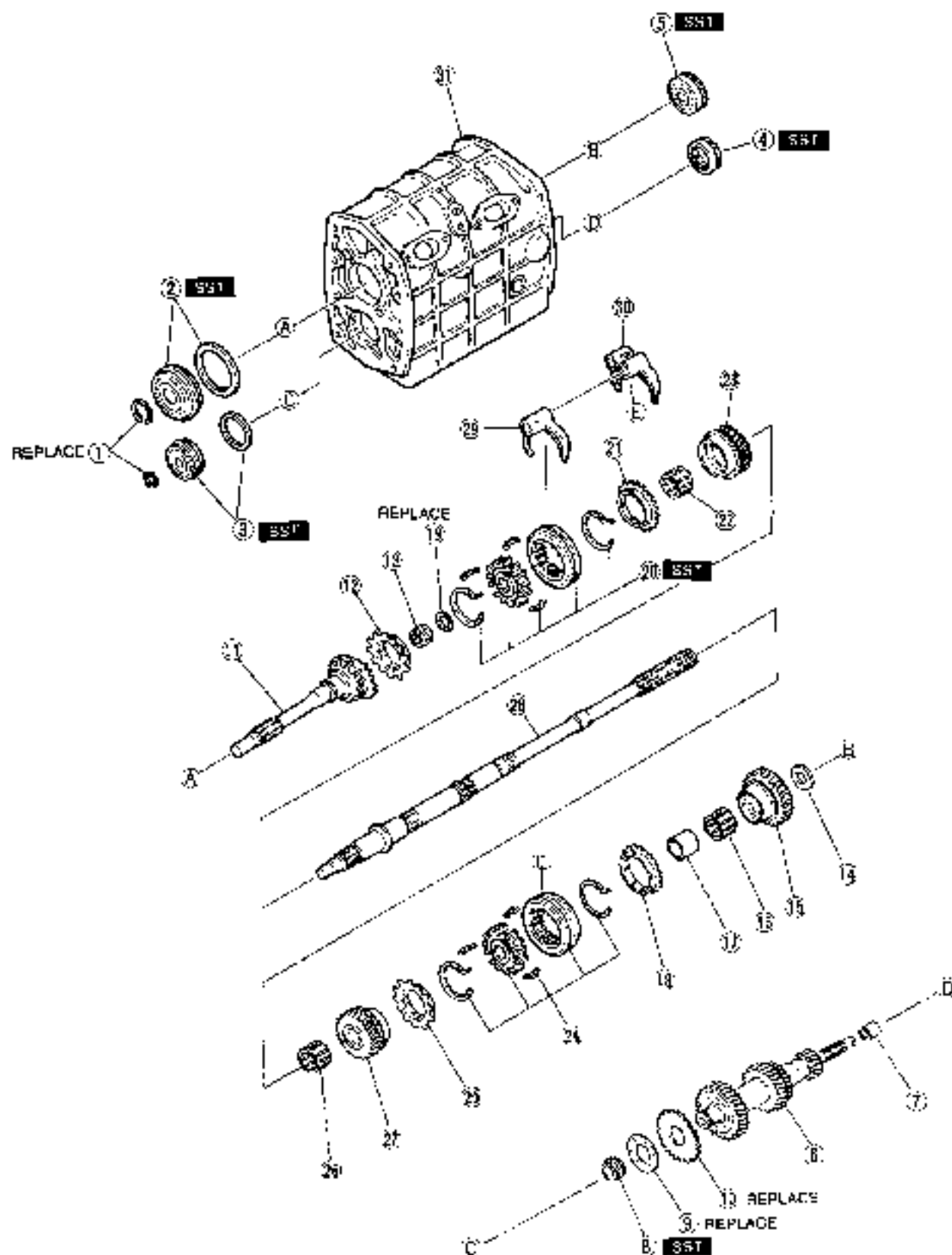
3. Remove the locknut with the **SST**.



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

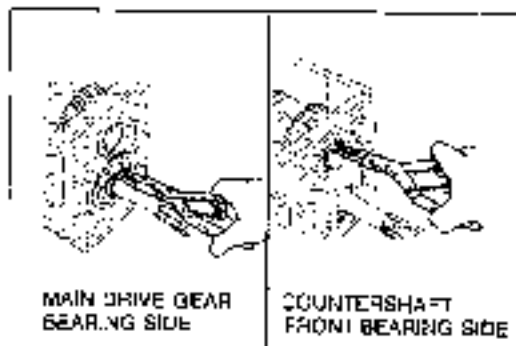
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



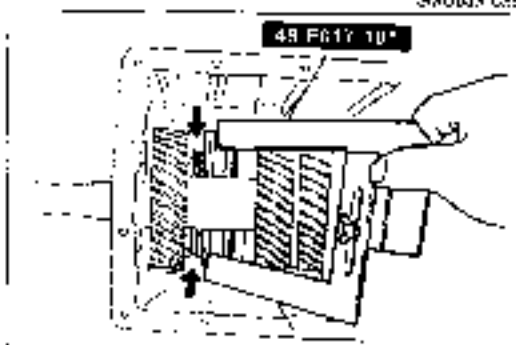
3VUUG.XC37

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
	15. 1st gear Inspection page J2-21	28. Mainshaft Removal page J2-19 Inspection page J2-21 Installation page J2-26
	16. Bearing	29. 3rd/4th shift fork
	17. Inner race	30. 1st/2nd shift fork
	18. Synchronizer ring (1st) Inspection page J2-22	31. Transmission case Installation page J2-26
	19. Snap ring Removal page J2-17	
	20. Clutch hub assembly (3rd/4th) Removal page J2-19 Inspection page J2-22	

PS10J2-006



39A00J2-039



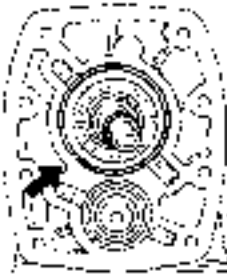
39A00J2-040

Disassembly note**Snap ring****Caution****Do not reuse the snap ring.**

Remove the snap rings.

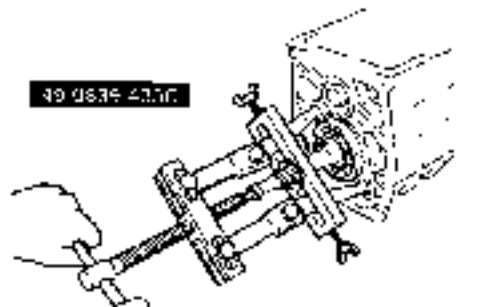
Main drive gear bearing

1. Install the SST between the 4th gear synchronizer ring and synchronism gear on the main drive gear.



2. Turn the bearing snap rings so that the ends are **90°** to the case grooves.

SM100UX 041



- 3 Remove the main drive gear bearing with the **SST**.

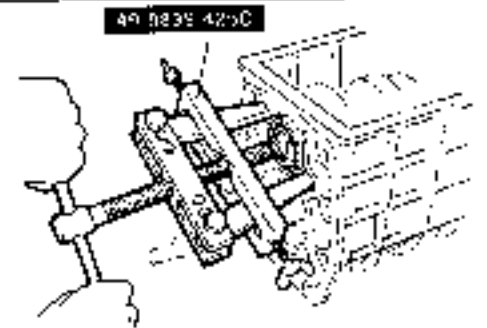
SM100UX 042



Countershaft front bearing

1. Turn the bearing snap rings so that the ends are **90°** to the case grooves

SM100UX 043

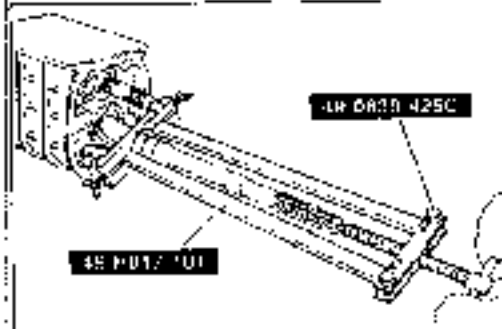


Note

Replace the countershaft front bearing and countershaft front spacer as one assembly.

2. Remove the countershaft front bearing with the **SST**.

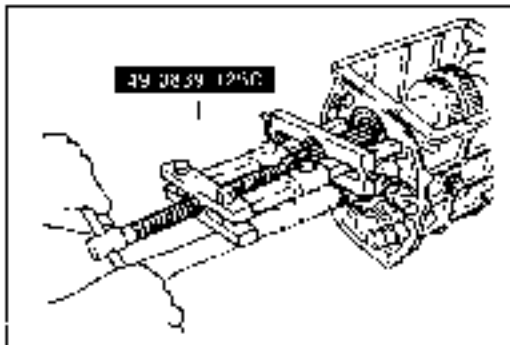
SM100UX 044



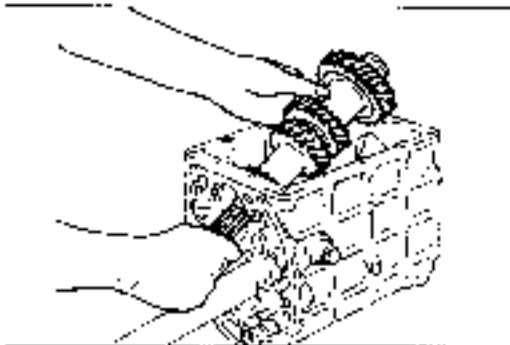
SM100UX 045

Mainshaft front bearing

Remove the mainshaft front bearing with the **SST**



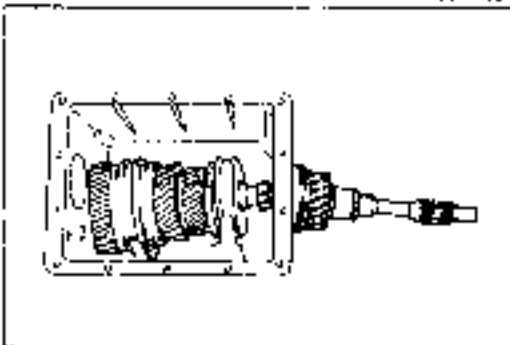
DWLJX-048



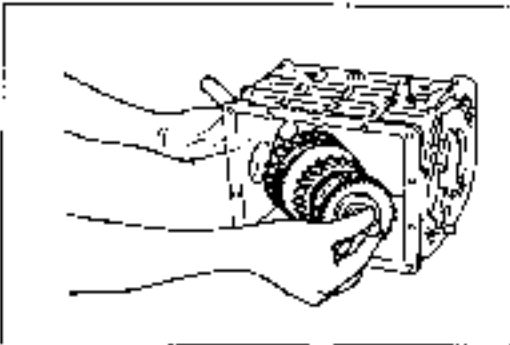
771070-937

Countershaft

1. Remove the countershaft center bearing with the **SST**.
2. Remove the countershaft



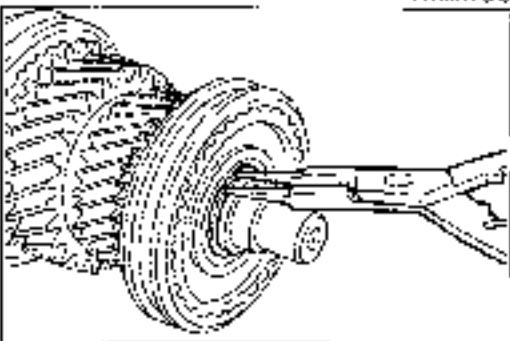
94UN3A-67



771070-058

Mainshaft and gear assembly

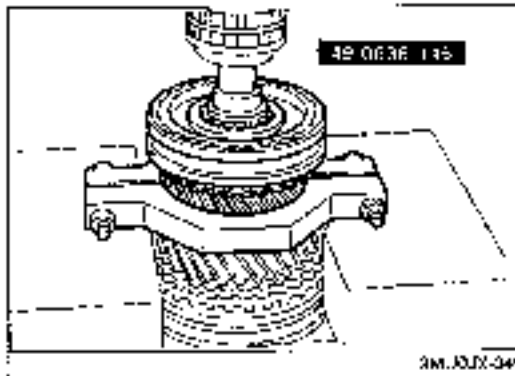
1. Remove the main drive gear from the transmission case.
2. Remove the mainshaft and gear assembly from the transmission case.



DWLJX-048

3rd/4th clutch hub assembly**Caution****Do not reuse the snap ring.**

1. Remove the snap ring from the front of the mainshaft.

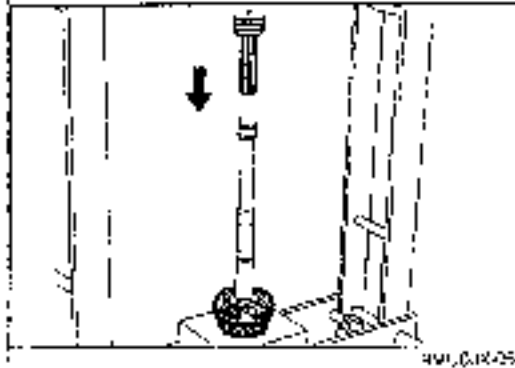


2. Position the **SST** between 2nd and 3rd gears

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.

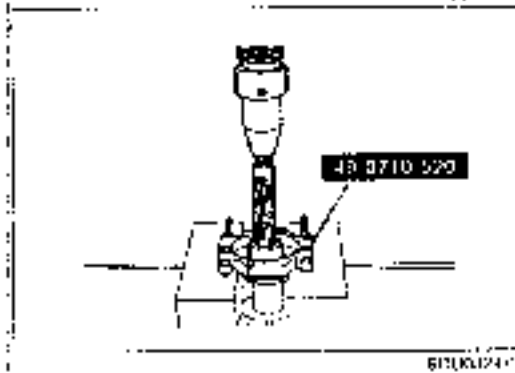


1st/2nd clutch hub assembly

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



Countershaft center bearing inner race

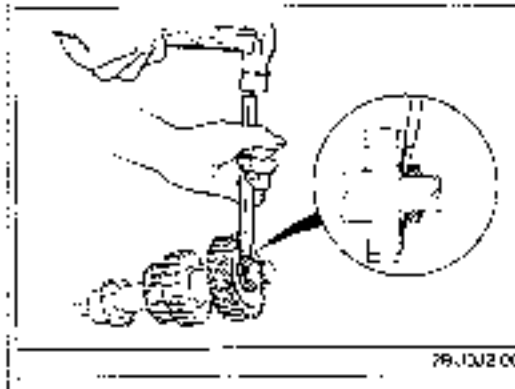
Caution

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**

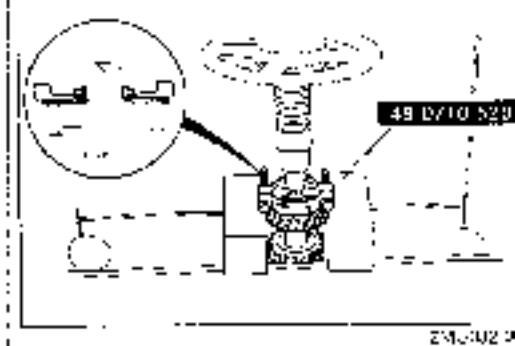


Countershaft front bearing spacer

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.



2. Position the **SST** under countershaft front bearing spacer

Caution

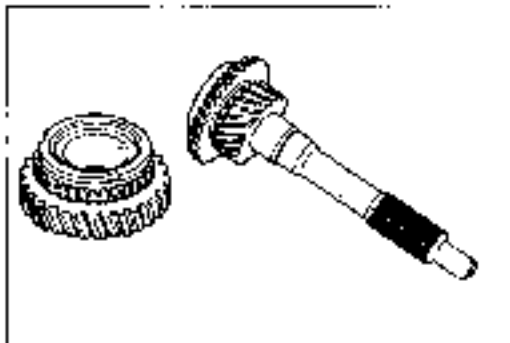
Hold the countershaft with one hand so that it does not fall.

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.

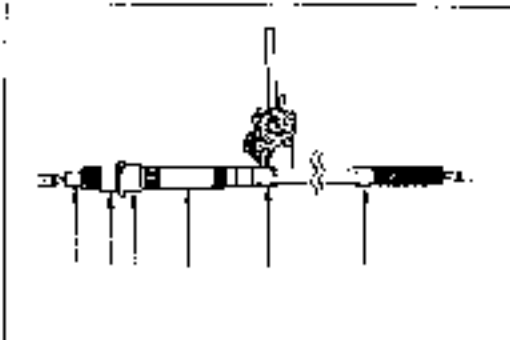
24J0-XX-064



9MUB-XX-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.



9KUB-XX-056

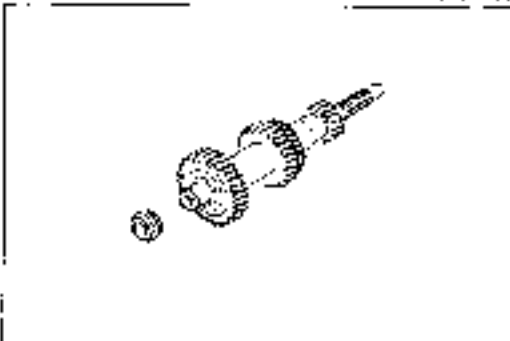
Mainshaft

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).

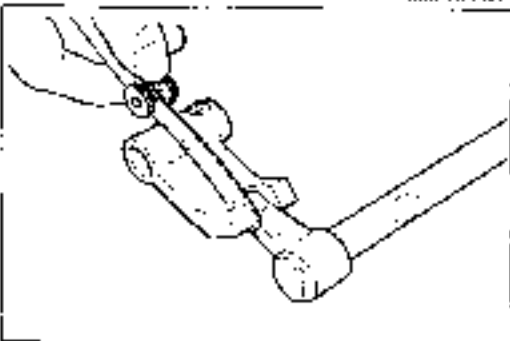
Maximum: 0.15mm (0.006 in)



9MUB-XX-057

Countershaft

1. Inspect gear teeth for damage, wear, cracks.
2. Inspect splines for damage or wear.

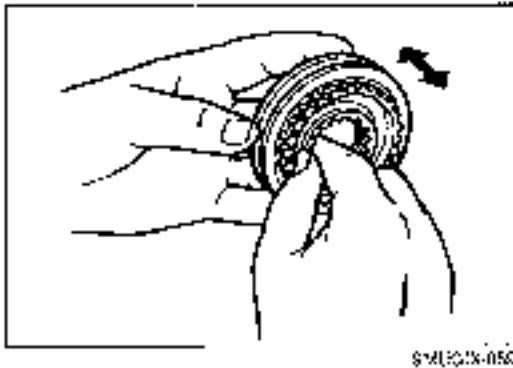


9MUB-XX-058

Control lever and shift rod

Measure the clearance between the control lever and the gate of the shift rod.

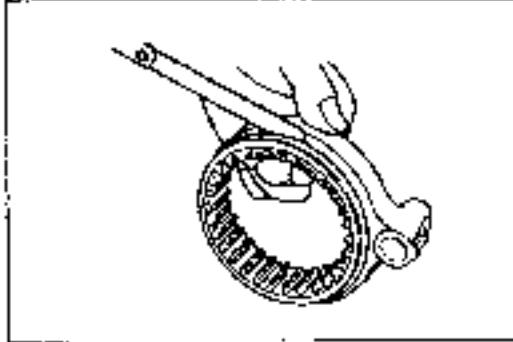
Clearance: 0.8mm (0.032 in) max.



SAL 201X-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.

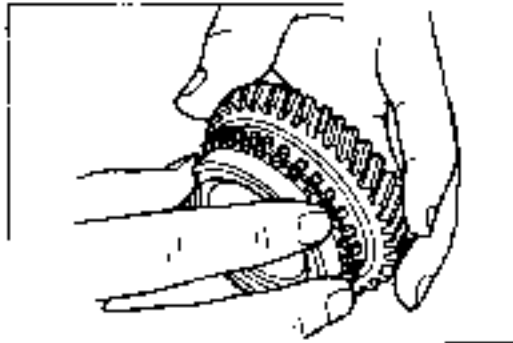


DMJ 007-060

4. Measure the clearance between hub sleeve and release fork.

Standard clearance:

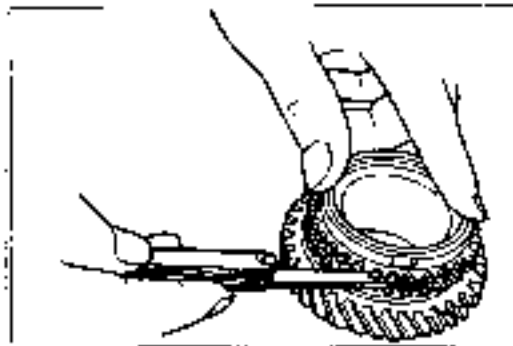
0.2—0.3mm (0.008—0.012 in)

Maximum: 0.5mm (0.020 in)

SAL 201X-061

Synchronizer ring

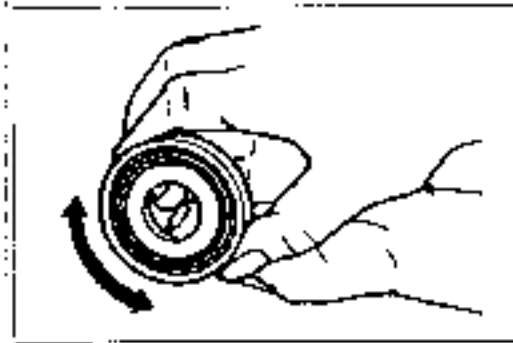
1. Inspect individual synchronizer ring teeth for damage, wear, cracks.
2. Inspect taper surface for wear or cracks.



TBL 006-000

Note**Set the synchronizer ring squarely in the gear; then measure around the circumference.**

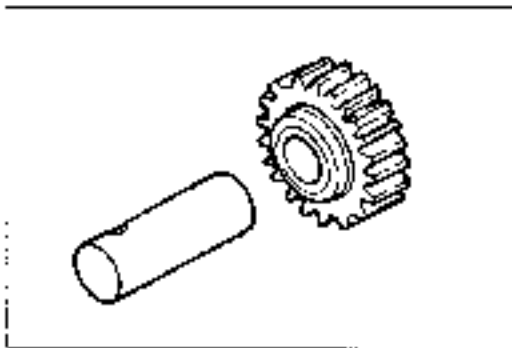
3. Measure the clearance between synchronizer ring and flank surface of gear.

Standard clearance: 1.5mm (0.059 in)**Minimum:** 0.8mm (0.032 in)

SAL 201X-061

Bearing

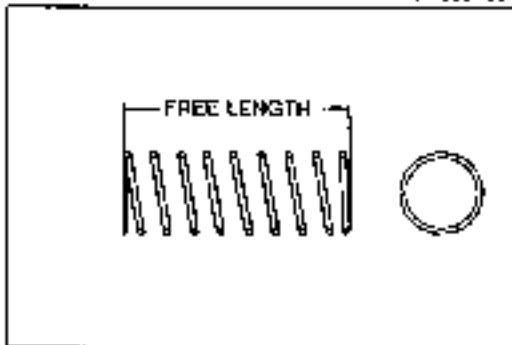
Inspect for damage or rough rotation.



99A-000X-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-000X-063

Springs

Measure the free length of spring.

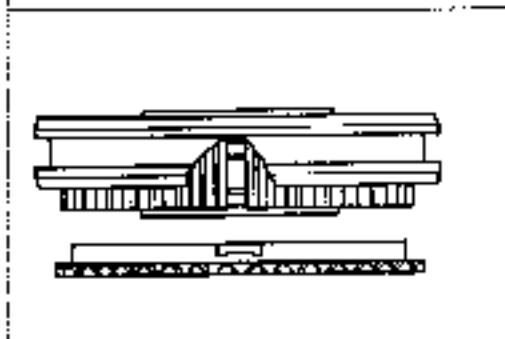
Standard free length**Detent ball spring: 22.5mm (0.886 in)**

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.

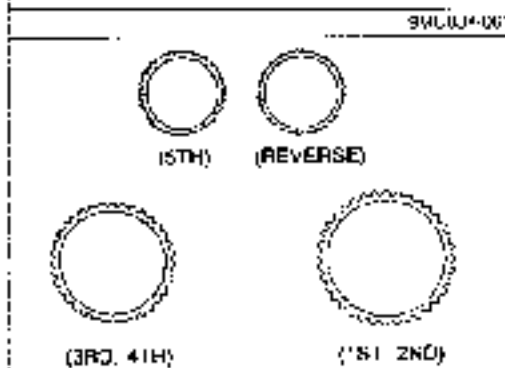
J2UJUX-013



Clutch hub

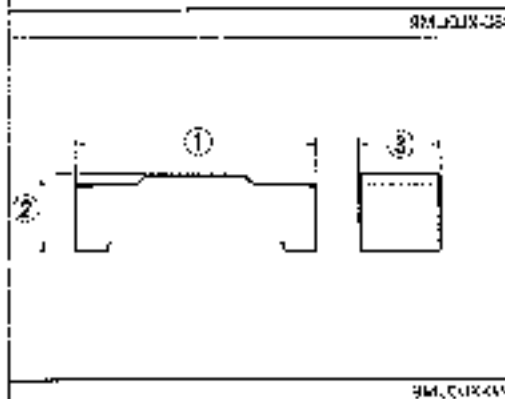
Caution

Align the synchronizer ring grooves with the clutch hub keys during installation.



Note

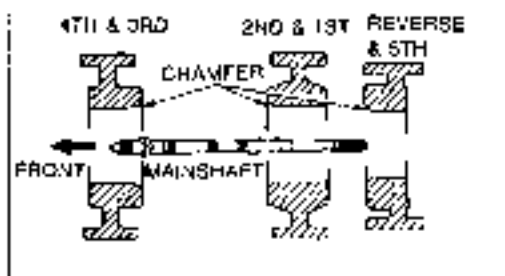
- The synchronizer rings all have the same basic shape. Carefully note these distinguishing features.
 - 5th and Reverse synchronizer rings are the smallest.
 - 5th has notches in the teeth.
 - 4th and 3rd are the next larger and are exactly the same.
 - 2nd and 1st are the biggest and are exactly the same.
- 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)	6 (0.236)
3rd, 4th 5th and Rev.	17 (0.669)	4.25 (0.167)	5 (0.197)

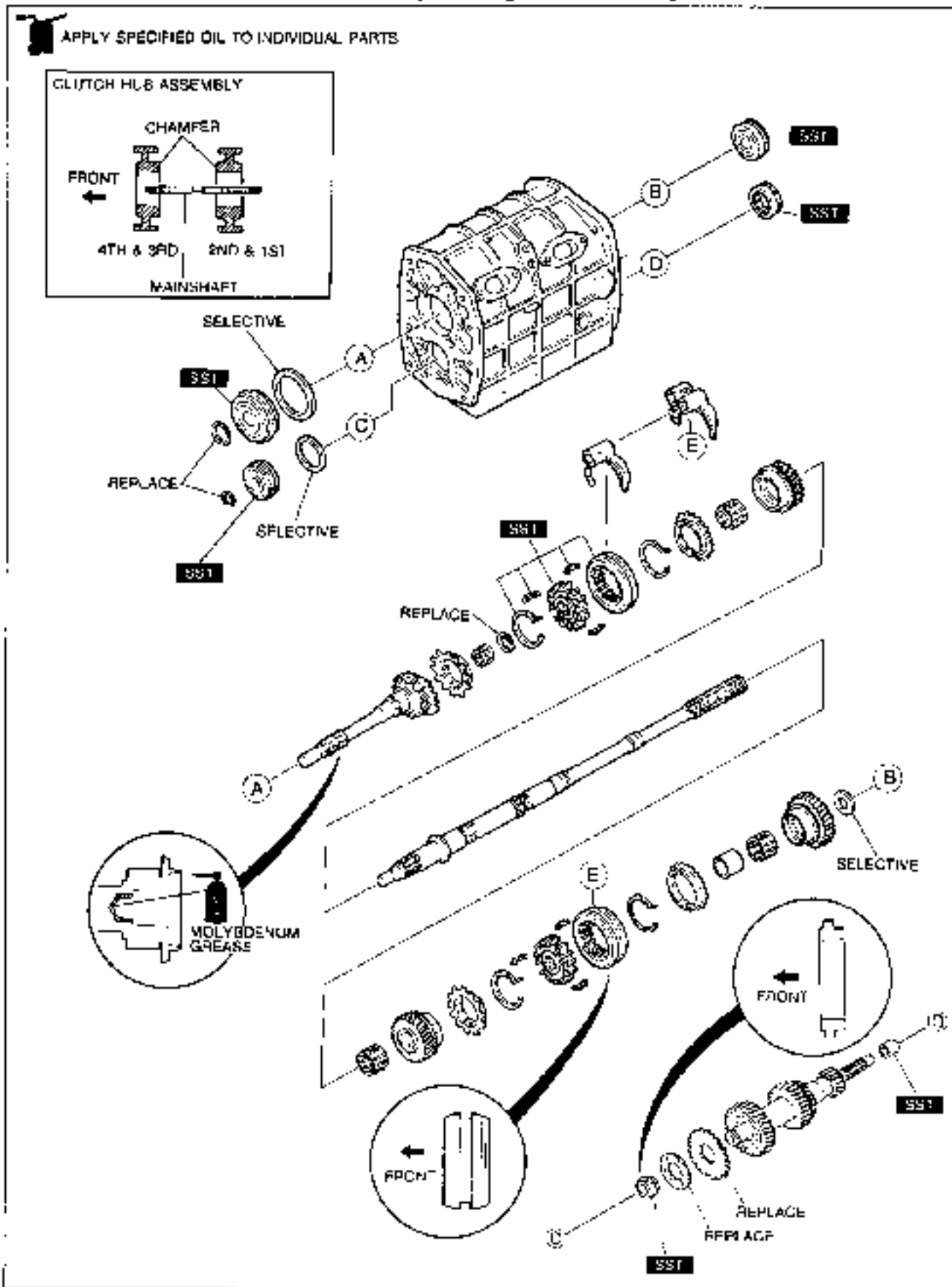


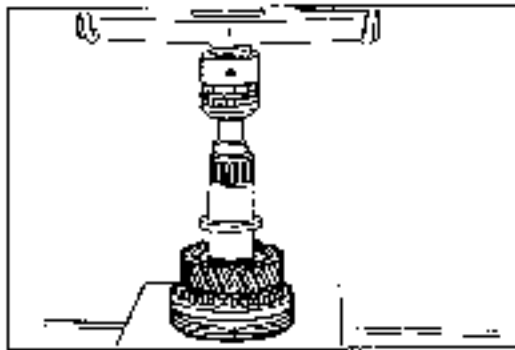
- Press each clutch hub assembly onto the mainshaft in the proper direction.

- Install the clutch hubs with the chamfers of the inner gear teeth as shown.

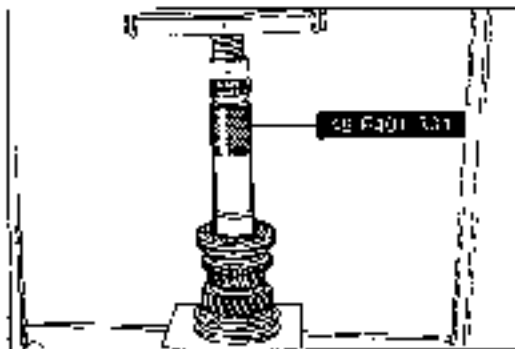
Mainshaft

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

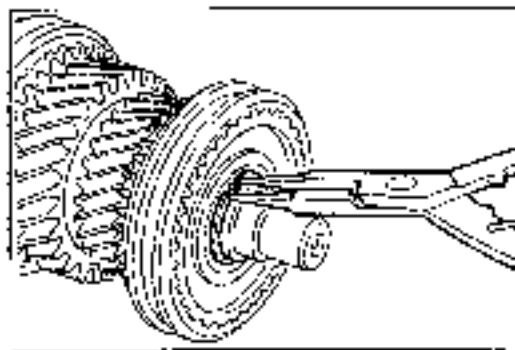


**Assembly note****Mainshaft**

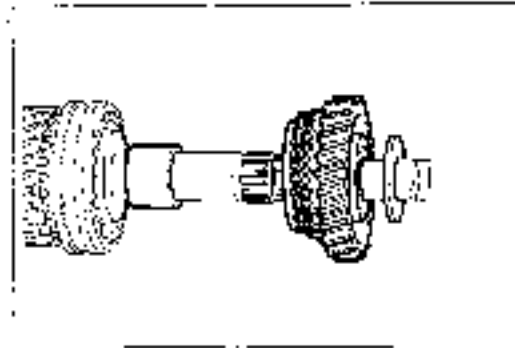
1. Set the 2nd gear and the 1st/2nd clutch hub assembly on the mainshaft, then press in the mainshaft.



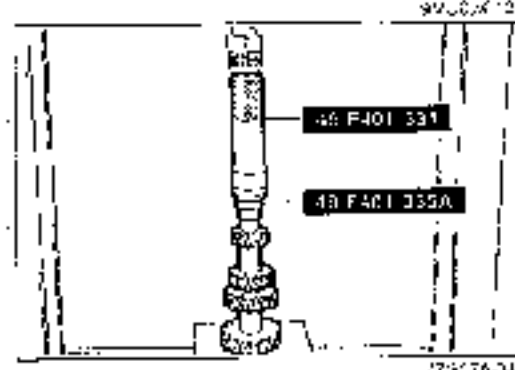
2. Set the 3rd gear, needle bearing, and 3rd/4th clutch hub assembly on the mainshaft, then press on the 3rd/4th clutch hub assembly with the **SST**.



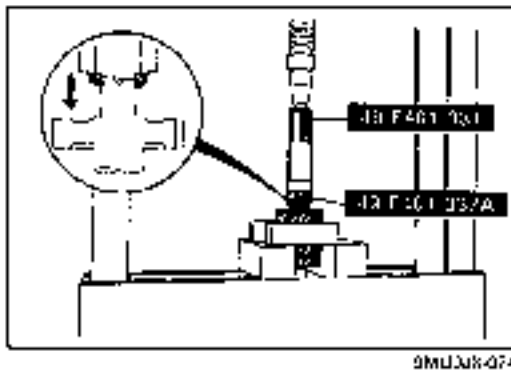
3. Install a new snap ring on the front of the mainshaft.



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**.



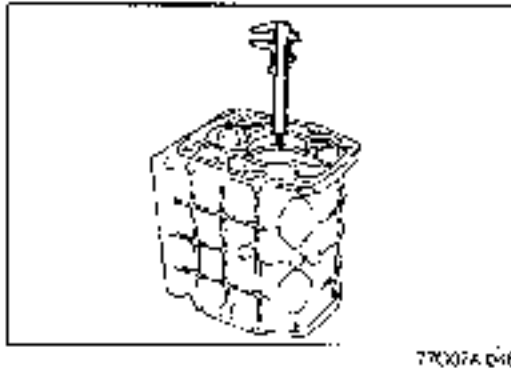
9MUJ08-074

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.

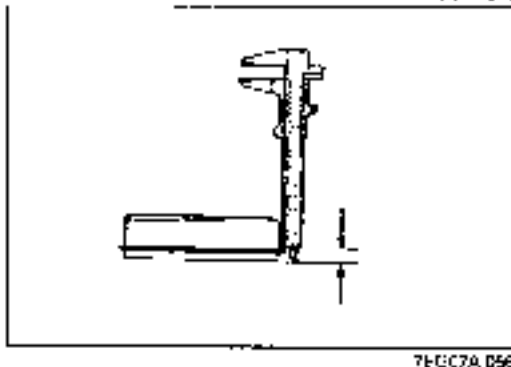


77X07A-046

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

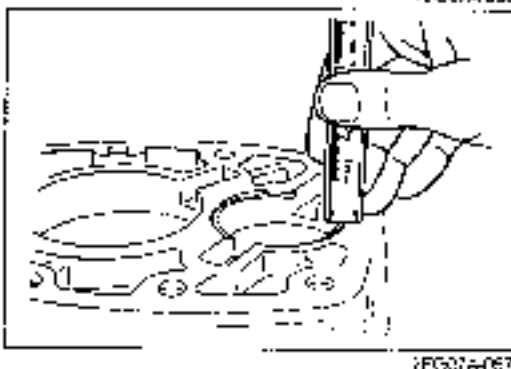
2. Measure the mainshaft bearing height. The difference between the two measurements indicates the required thickness of the adjustment shim.

Standard thrust play:

0—0.1mm (0—0.004 in)

Adjustment shim thickness:

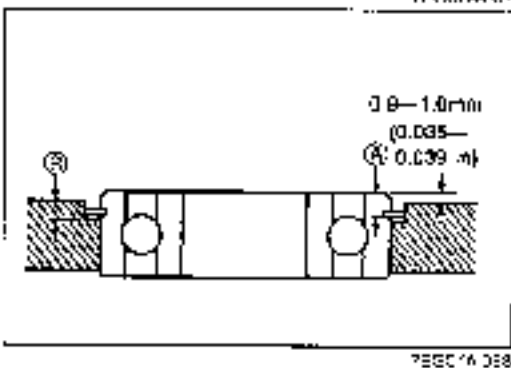
0.1mm (0.004 in), 0.3mm (0.012 in)



7FEC7A-067

Countershaft front bearing

1. Measure depth B of the countershaft front bearing bore in the transmission case.



7FEC7A-068

2. Measure the countershaft front bearing snap ring height A.
3. Choose an adjustment shim that will allow the difference between the two measurements to be equal to the standard bearing height.

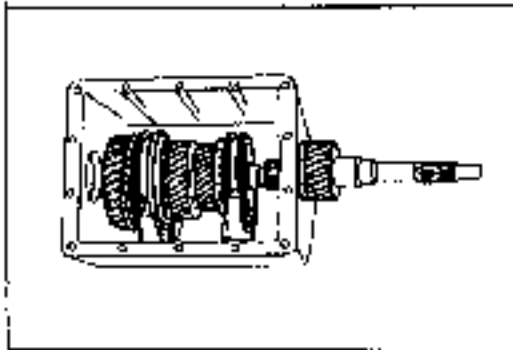
$$A - B + \text{Adjustment shim(s)} = 0.9 - 1.0\text{mm} (0.035 - 0.039 \text{ in})$$

Standard bearing height on installing:

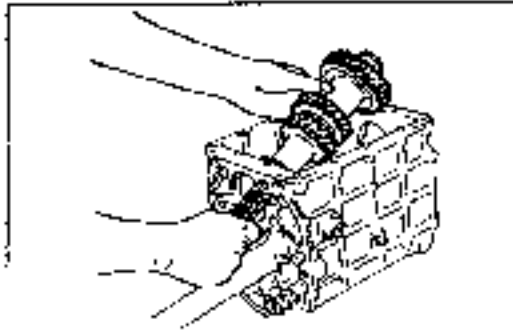
0.9—1.0mm (0.035—0.039 in)

Adjustment shim thickness:

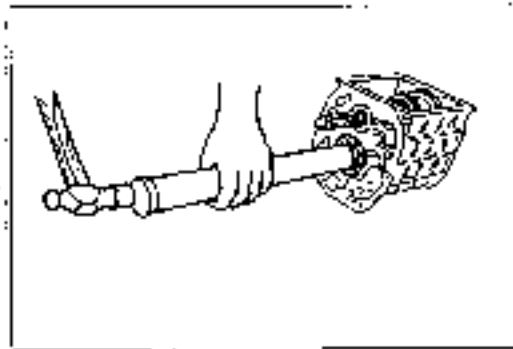
0.1mm (0.004 in), 0.3mm (0.012 in)



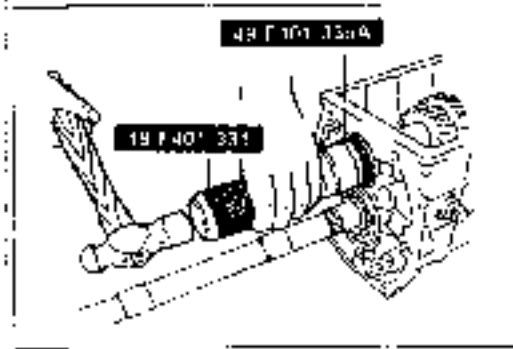
BMJ00K-279



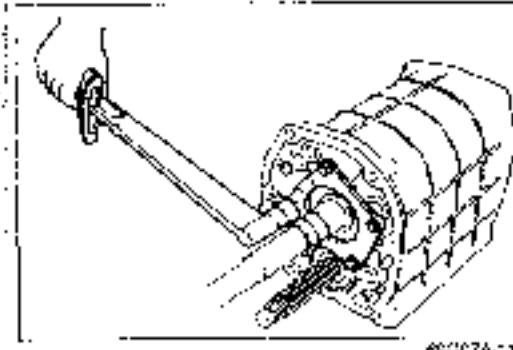
BMJ00K-075



7EG07A-051



7EG07A-051



66Q07A-117

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

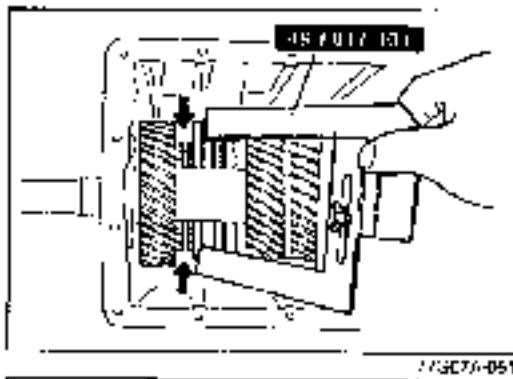
1. Install the correct shim onto the rear of the mainshaft as determined by "Measurement of Bearing Thrust Play".
2. Drive on the mainshaft bearing with a suitable pipe.

3. Drive the countershaft center bearing onto the rear of the countershaft with the **SST**.

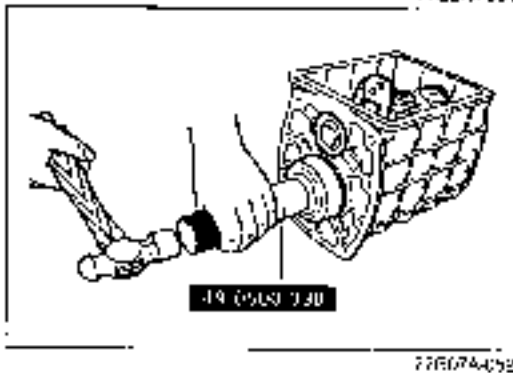
4. Install the bearing cover.

Tightening torque:

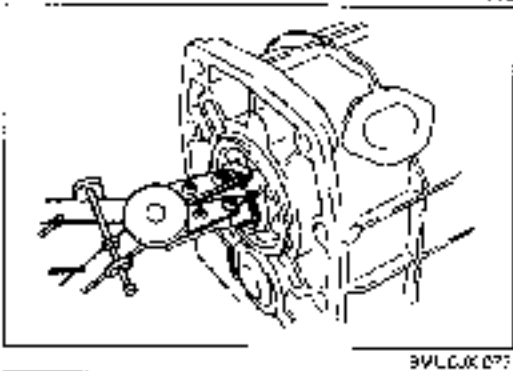
18—26 Nm (1.6—2.7 m·kg, 13—20 ft·lb)



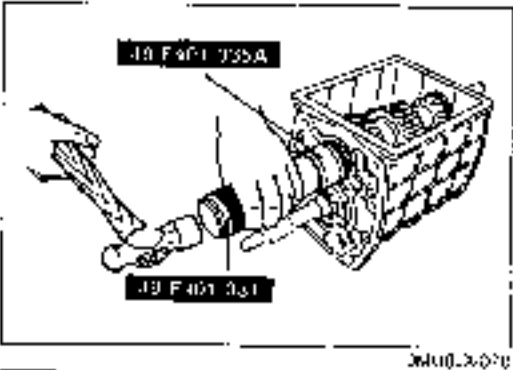
5. Install the **SST** between the 4th synchronizer ring and synchronesh gear or the main drive gear



6. Drive on the main drive gear bearing with the **SST**.



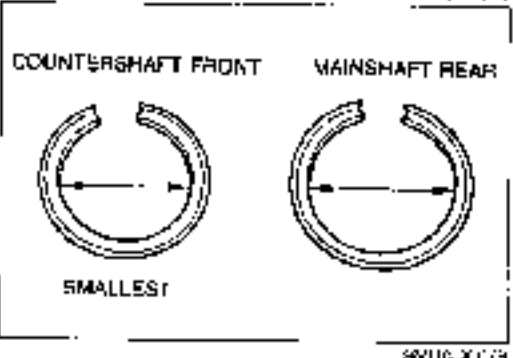
7. Install a new snap ring to secure the main drive gear bearing



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**



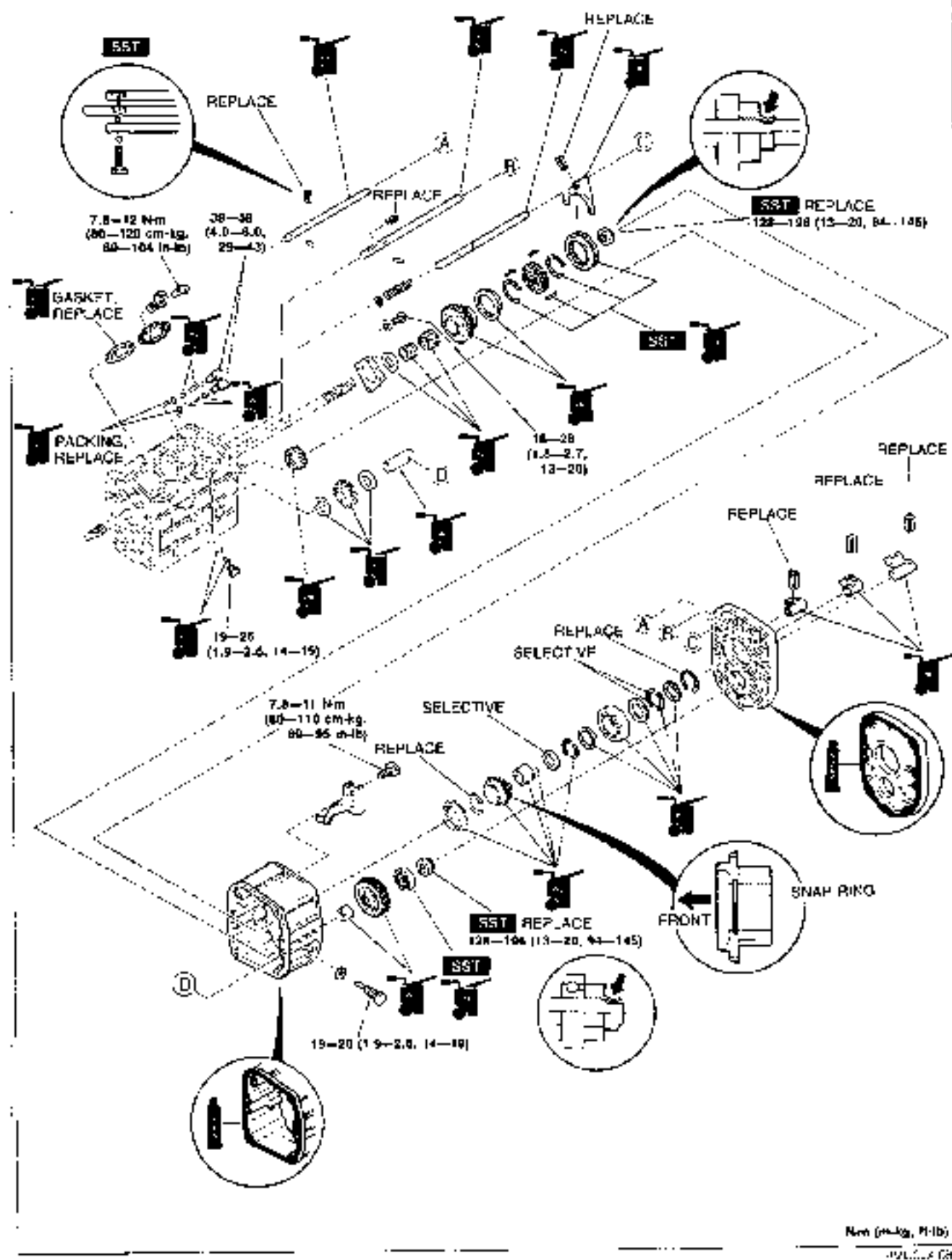
Note

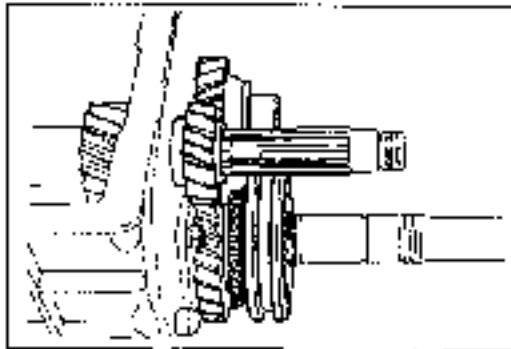
Do not confuse the front and rear bearing snap rings. The countershaft front snap ring is smallest.

10. Install a new snap ring to secure the countershaft front bearing.

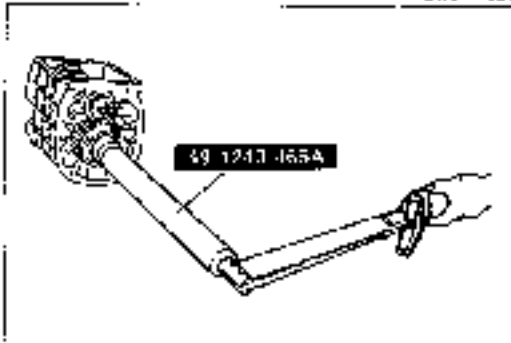
5th/Reverse Gear and Housing Parts

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

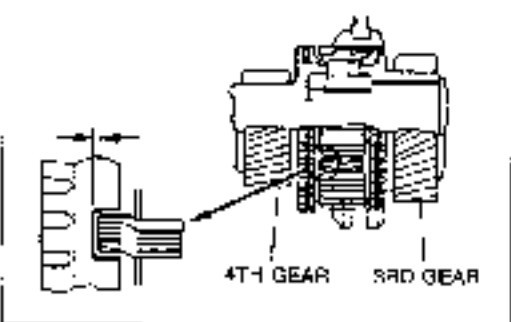




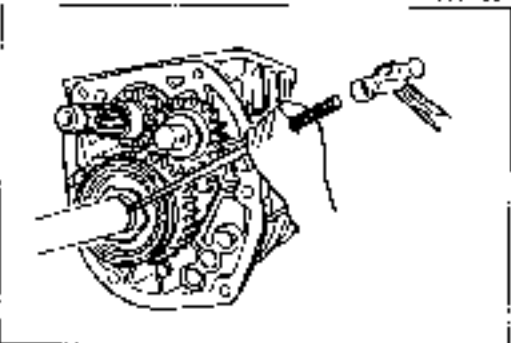
7EGC7A-064



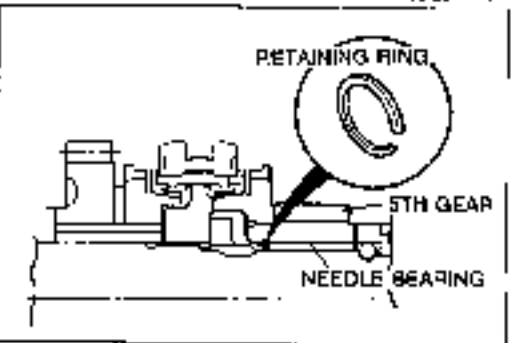
7EGC7A-065



3M/CJ4001



69G07A-104



69VUC-X-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 race, 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 N·m (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.

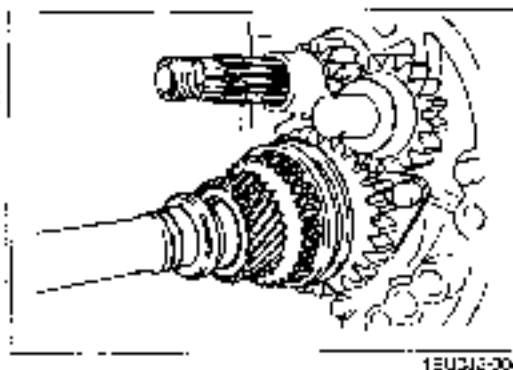
Available thrust washer thickness:

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

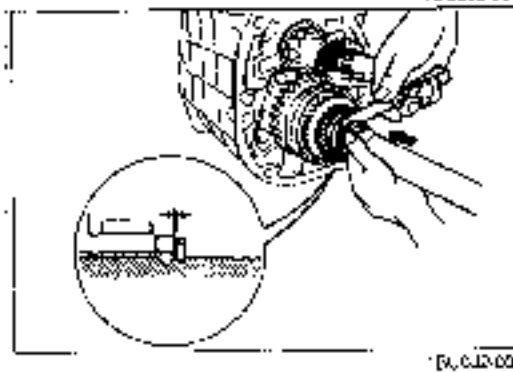
1. Install the retaining ring to the 5th gear.



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.



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:

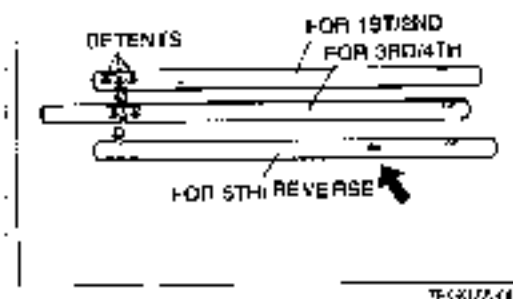
- 6.2mm (0.244 in), 6.3mm (0.248 in)
- 6.4mm (0.252 in), 6.5mm (0.256 in)
- 6.6mm (0.260 in), 6.7mm (0.264 in)

Shift fork and rod**Note**

A simple way to identify the shift rods is as follows:

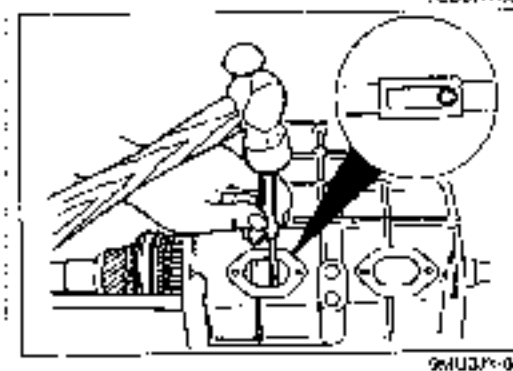
- The 3rd/4th shift rod is the longest.
- The 5th/Reverse shift rod has an extra hole for the shift fork at the rear of the rod.

When installing the shift rods, set the detents toward the ball side.

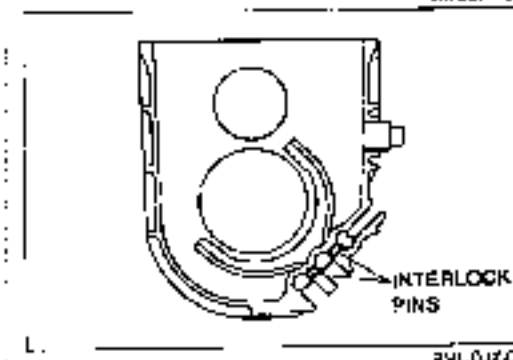
**Caution**

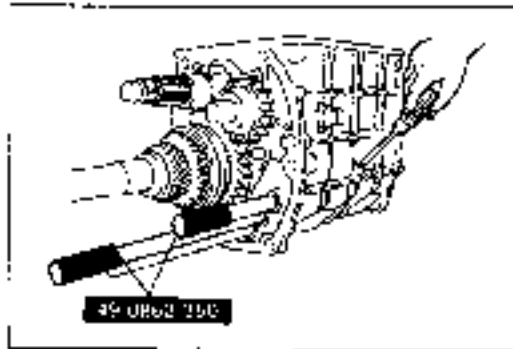
The roll pin must be installed with the split as shown.

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.

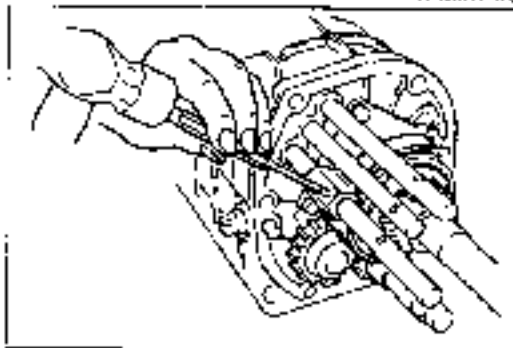
**Note**

The interlock pins must be installed as shown.

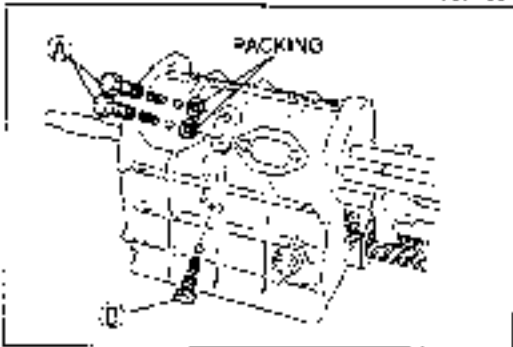




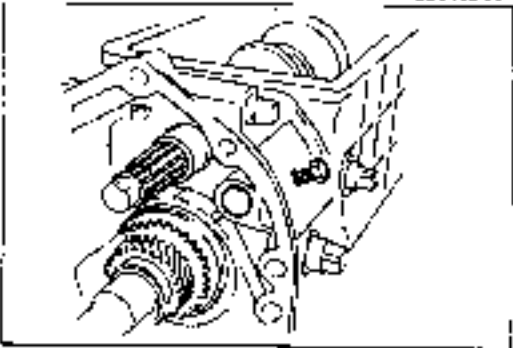
7F03TA110



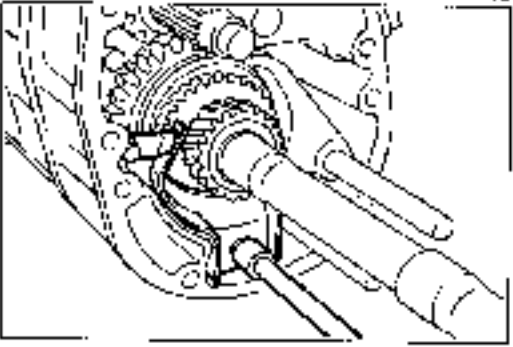
9MJAUX-587



29U02-007



2BU02-002



84MLCUX-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 detent 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.

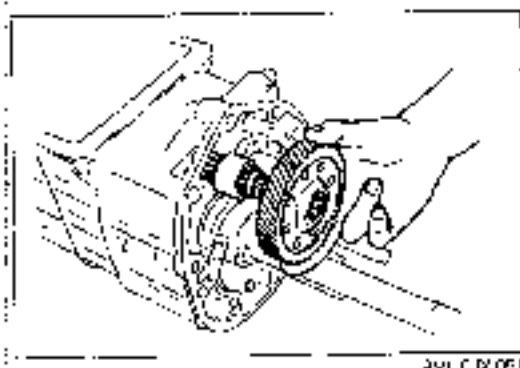
Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

3. Install the oil guide.

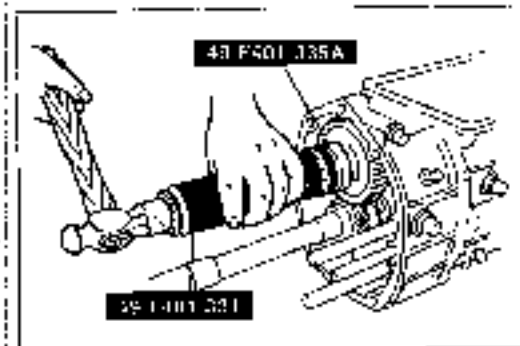
Tightening torque:

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



3VLCR001

4. Install the spacer and counter 5th gear.



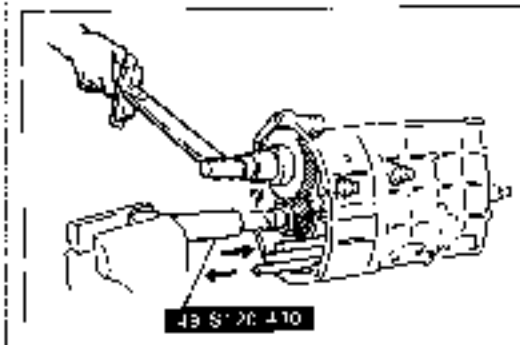
J1677A-001

Rear Bearing

1. Drive on the countershaft rear bearing with the SST.

Note

Use the protective plates to prevent damage to the SST.



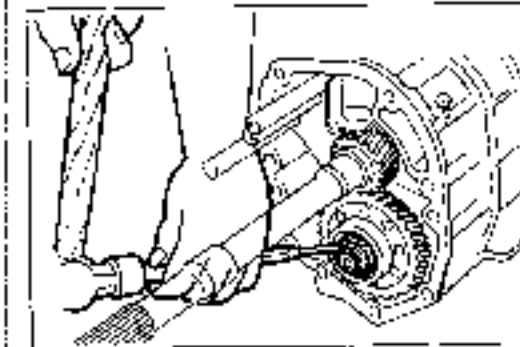
3VLCR002

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.

Tightening torque:

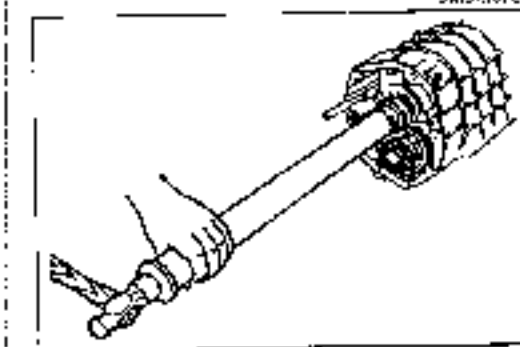
128—196 N·m (13—20 m·kg, 94—145 ft·lb)

5. Slide the locknut into the countershaft groove.

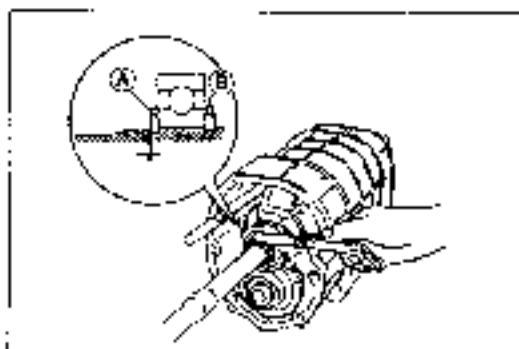


3VLCR003

6. Drive on the mainshaft rear bearing with a suitable pipe, fully seating it against the front C washers.



201_K112-008



95LJ007-004

7. Install the C-washers and hold them in place with the retaining ring.

Note

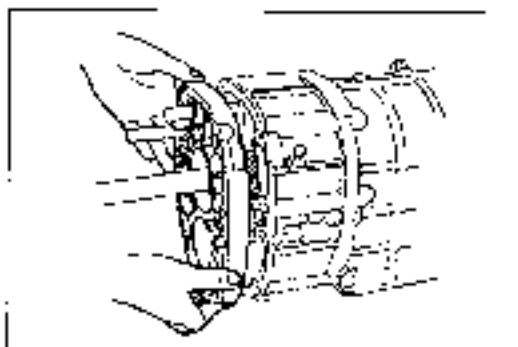
- a) If the points A and B as shown in the figure, are not pressed together tightly, the measurement will be incorrect.
- b) If the C-washers will not fit into the rear mainshaft groove, select the proper thickness C-washers.
- c) Ensure both C-washers at this position are the same thickness.

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:

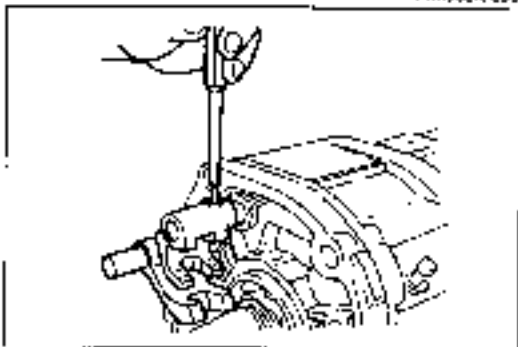
2.9mm (0.114 in), 3.0mm (0.118 in),
3.1mm (0.122 in), 3.2mm (0.126 in)



95LJ008-005

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.



95LJ009-001

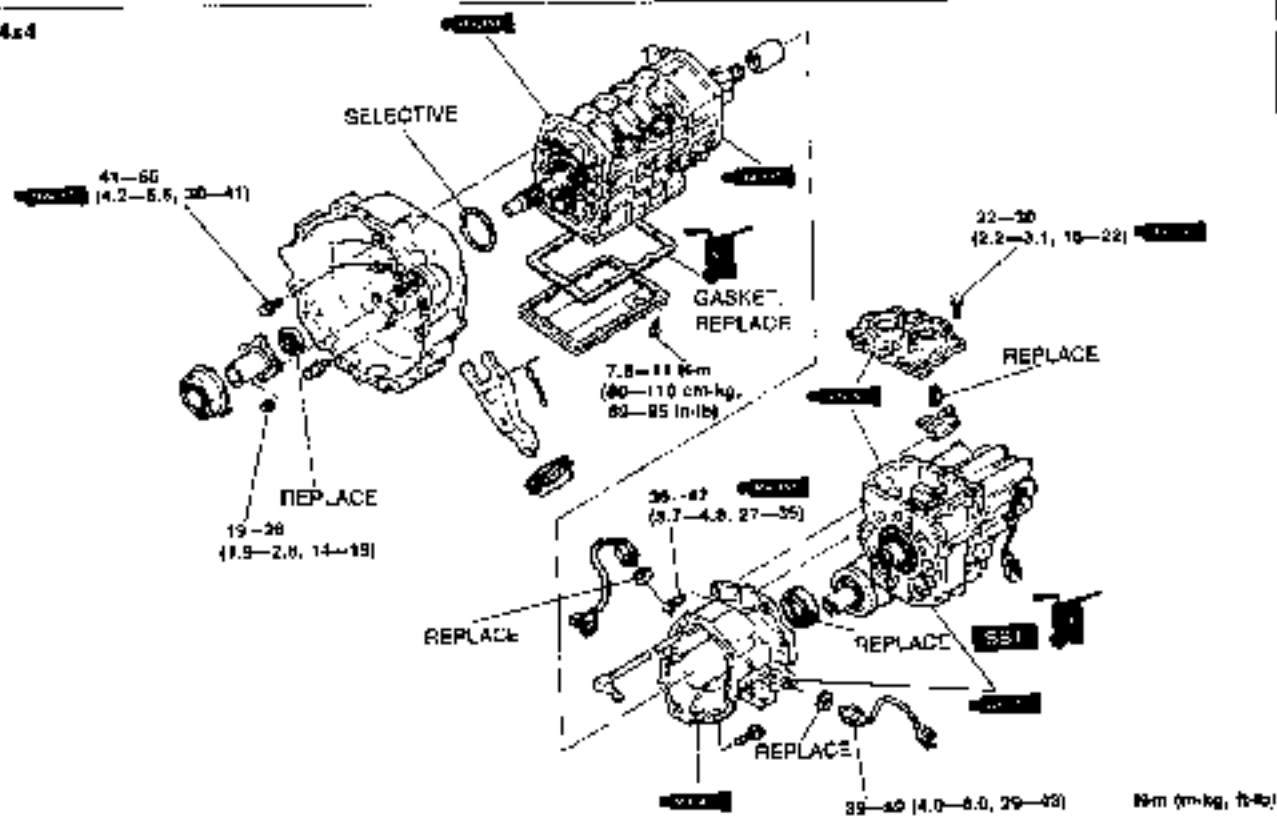
Shift rod end

Install the shift rod ends onto the proper shift rods, and secure them with new roll pins.

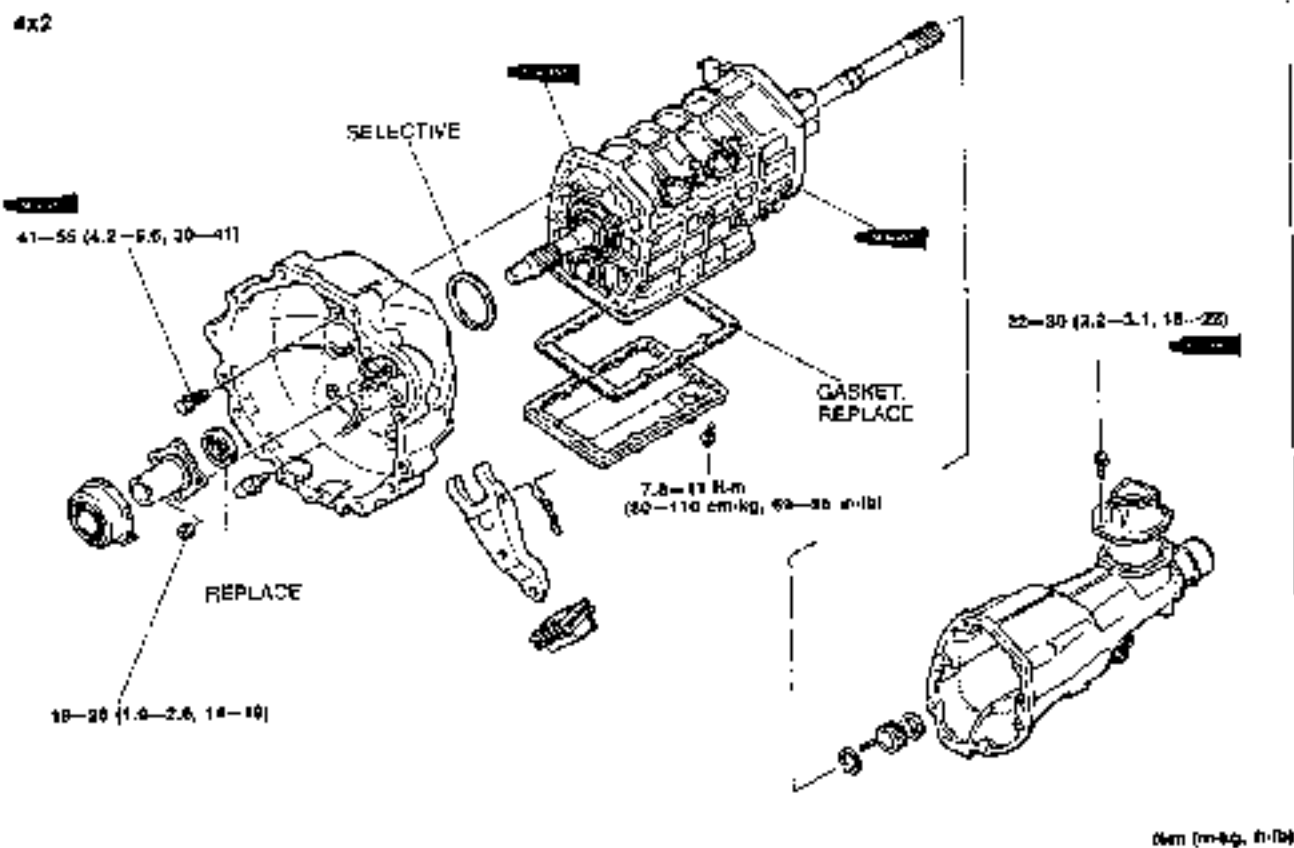
Transfer Case, Clutch Housing and Extension Housing

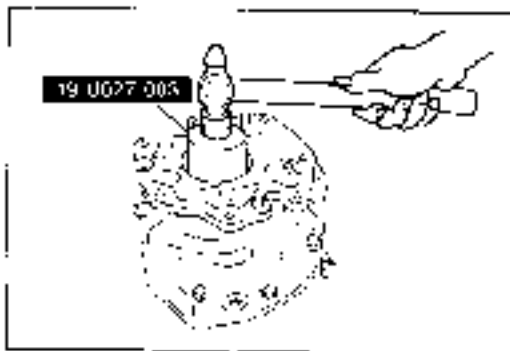
Assemble in the reverse order of disassembly, referring to the Assembly Note.

4x4

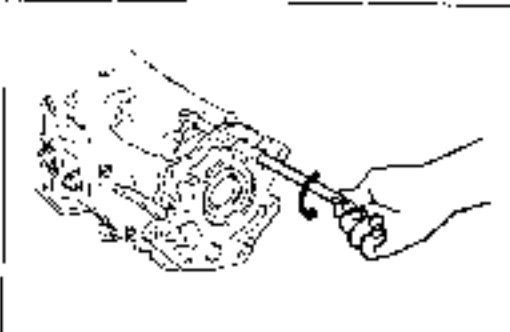


4x2

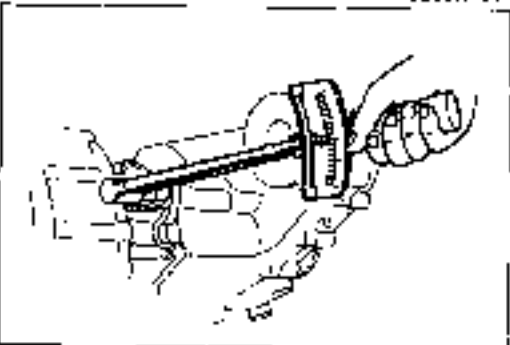




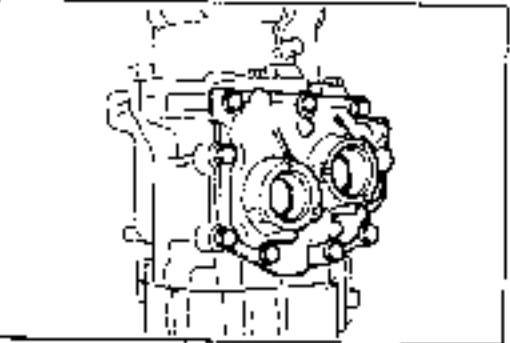
CB-J002-015



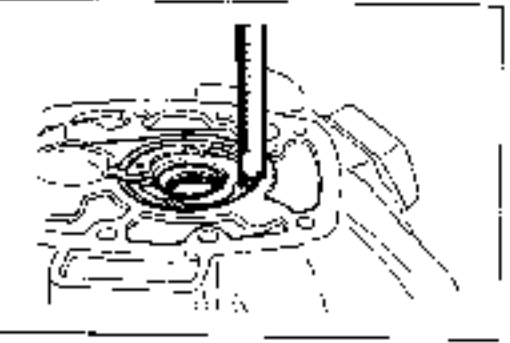
82U07A-244



82U07A-244



82U07A-244



82U07A-244

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)

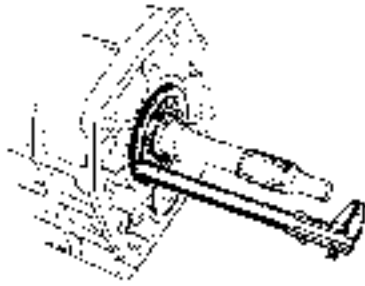
4. Secure the control lever end with a new roll pin.
5. Coat the contacting surfaces of the control case assembly and transfer case with sealant.
6. Install the control case assembly to the transfer case.
7. Apply sealant to the threads of the bolts, and tighten.

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.



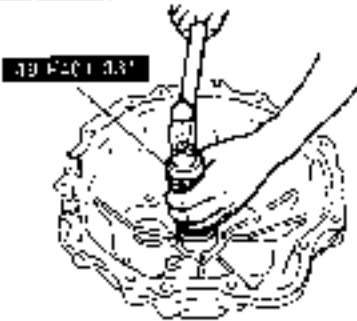
2. Measure the main drive gear bearing height.
The difference between the two measurements indicates the required thickness of the adjusting shim.

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)

JBK000052



CELCJ7C10

3. Apply oil to the new oil seal lip, and with the **SST** to install it to the clutch housing.

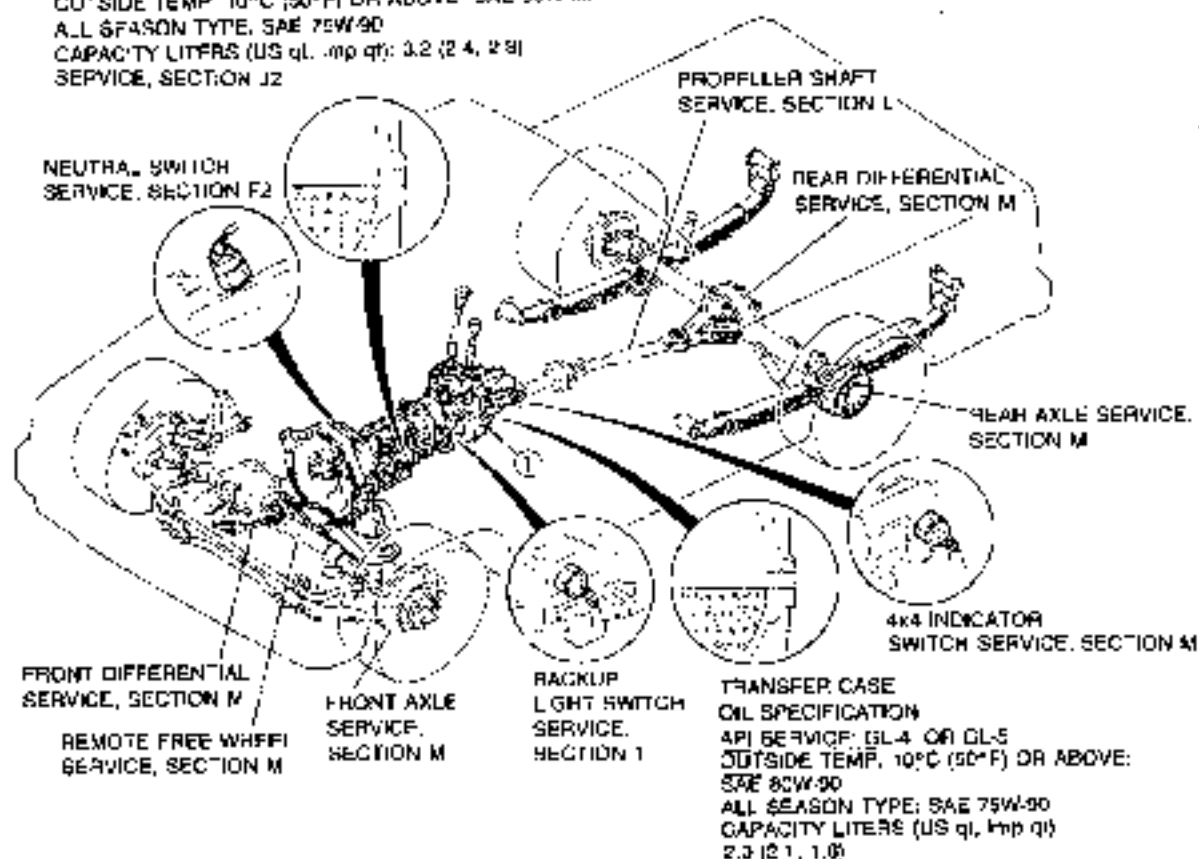
MANUAL TRANSMISSION (TRANSFER CASE)

INDEX	J3- 2
OUTLINE	J3- 3
SPECIFICATIONS.....	J3- 3
STRUCTURAL VIEW.....	J3- 4
POWERFLOW (TRANSFER)	J3- 5
TROUBLESHOOTING GUIDE	J3- 6
TRANSFER CASE	J3- 6
TRANSFER CASE OIL	J3- 7
INSPECTION	J3- 7
REPLACEMENT.....	J3- 7
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DISASSEMBLY	J3- 9
INSPECTION	J3-15
ASSEMBLY	J3-18

TABLE J3-001

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



08UGJ402

1. Transfer case		
Disassembly		page J3-9
Inspection		page J3-15
Assembly		page J3-18

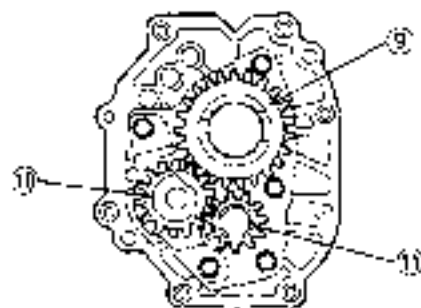
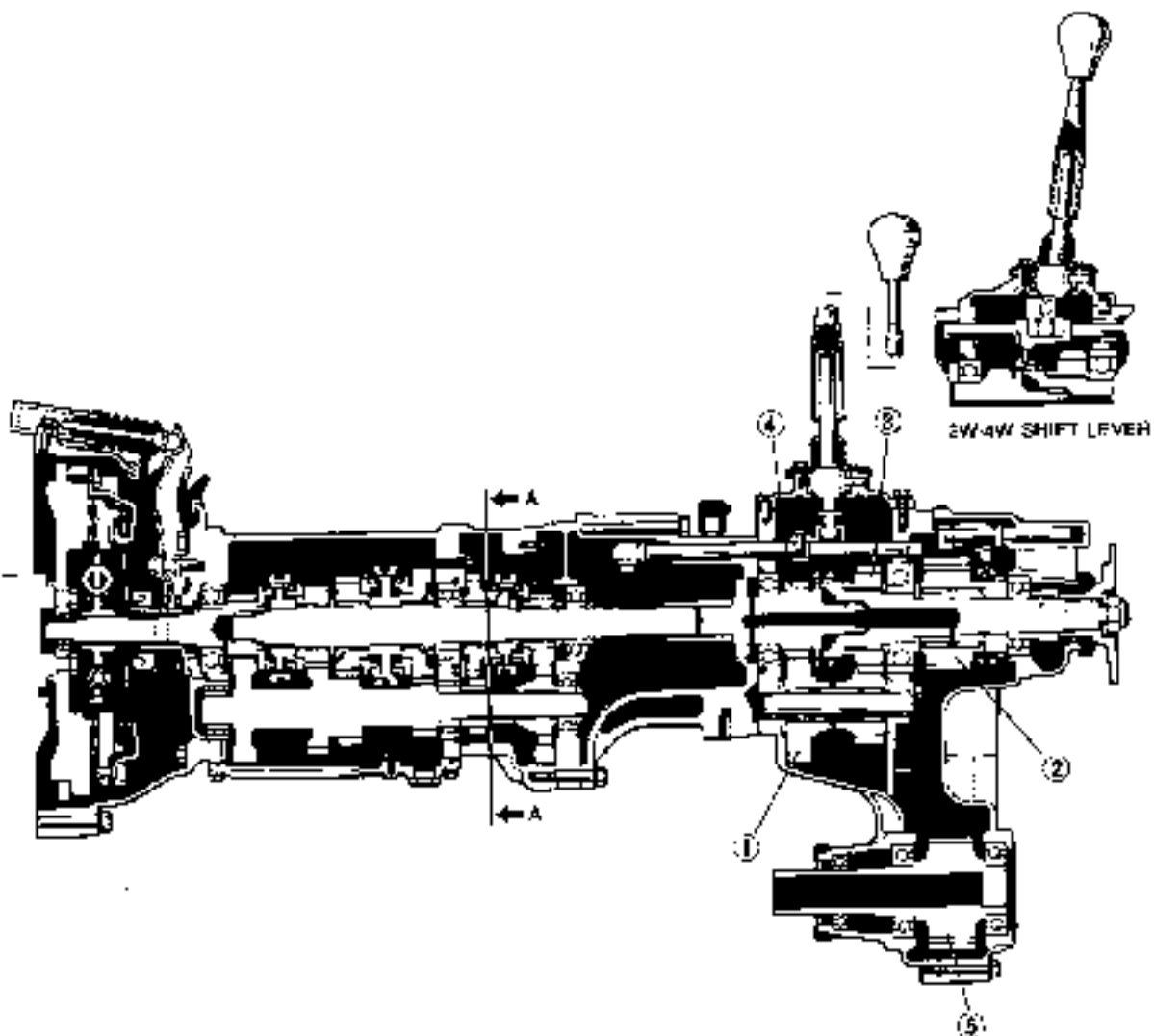
OUTLINE

SPECIFICATIONS

		Model	B2500I
Item			RSUX-D
			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)

08111,3-000

STRUCTURAL VIEW



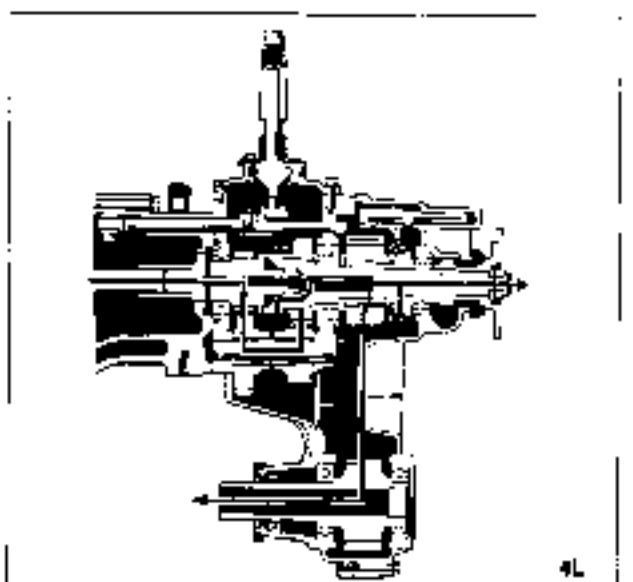
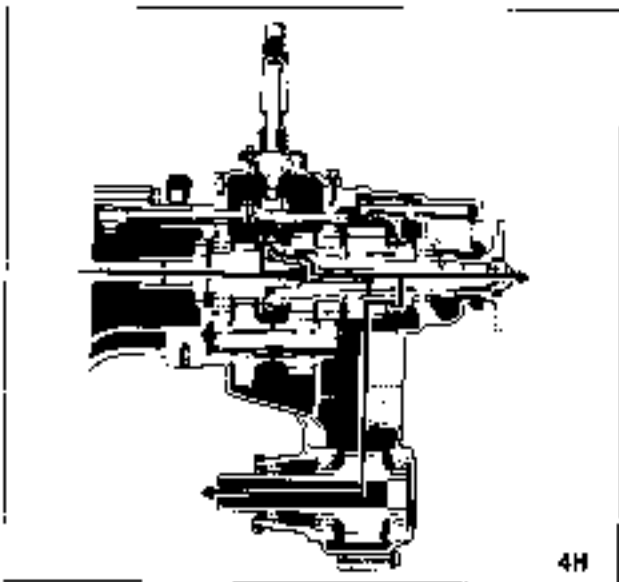
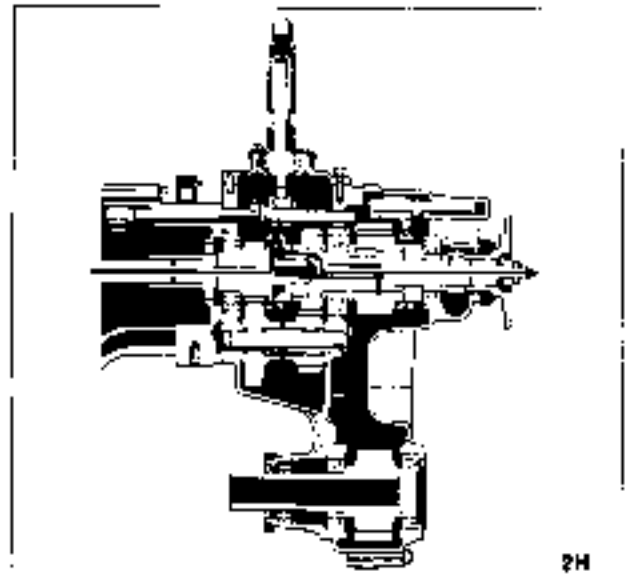
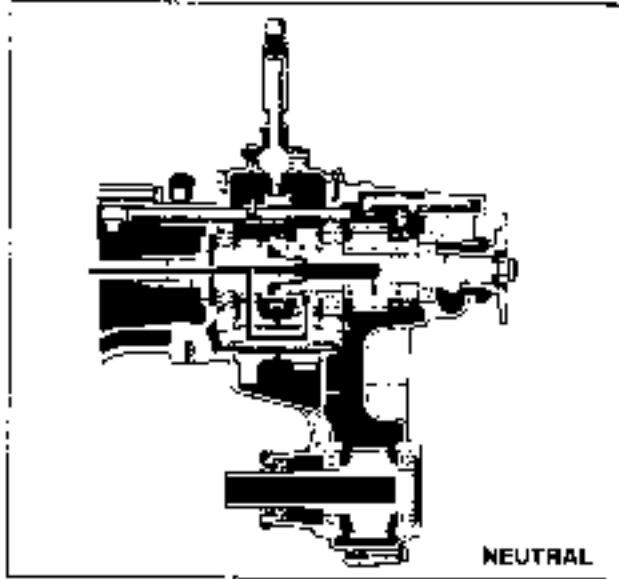
VIEW A-A

09-03-04

1. Counter gear
2. Front drive sprocket
3. Low gear

4. Input gear
5. Drive sprocket

POWERFLOW (TRANSFER)



J3

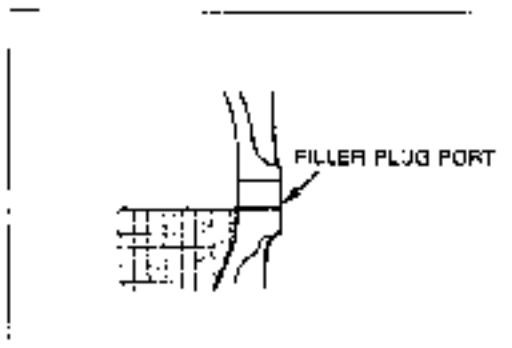
©2003 GM

TROUBLESHOOTING GUIDE

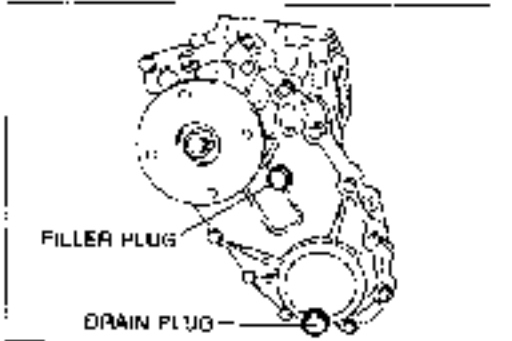
TRANSFER CASE

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	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	—
	Worn bearing	Adjust or replace	J3-16
Jumps out of gear	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-3-005



DMF, DJS, DPK



NB, DJS, DZ7

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, install 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.

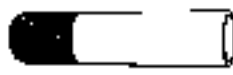
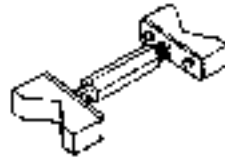
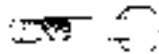
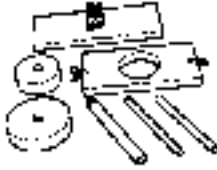
Tightening torque:

39—59 N·m (4.0—6.0 m·kg, 29—43 ft·lb)

TRANSFER CASE

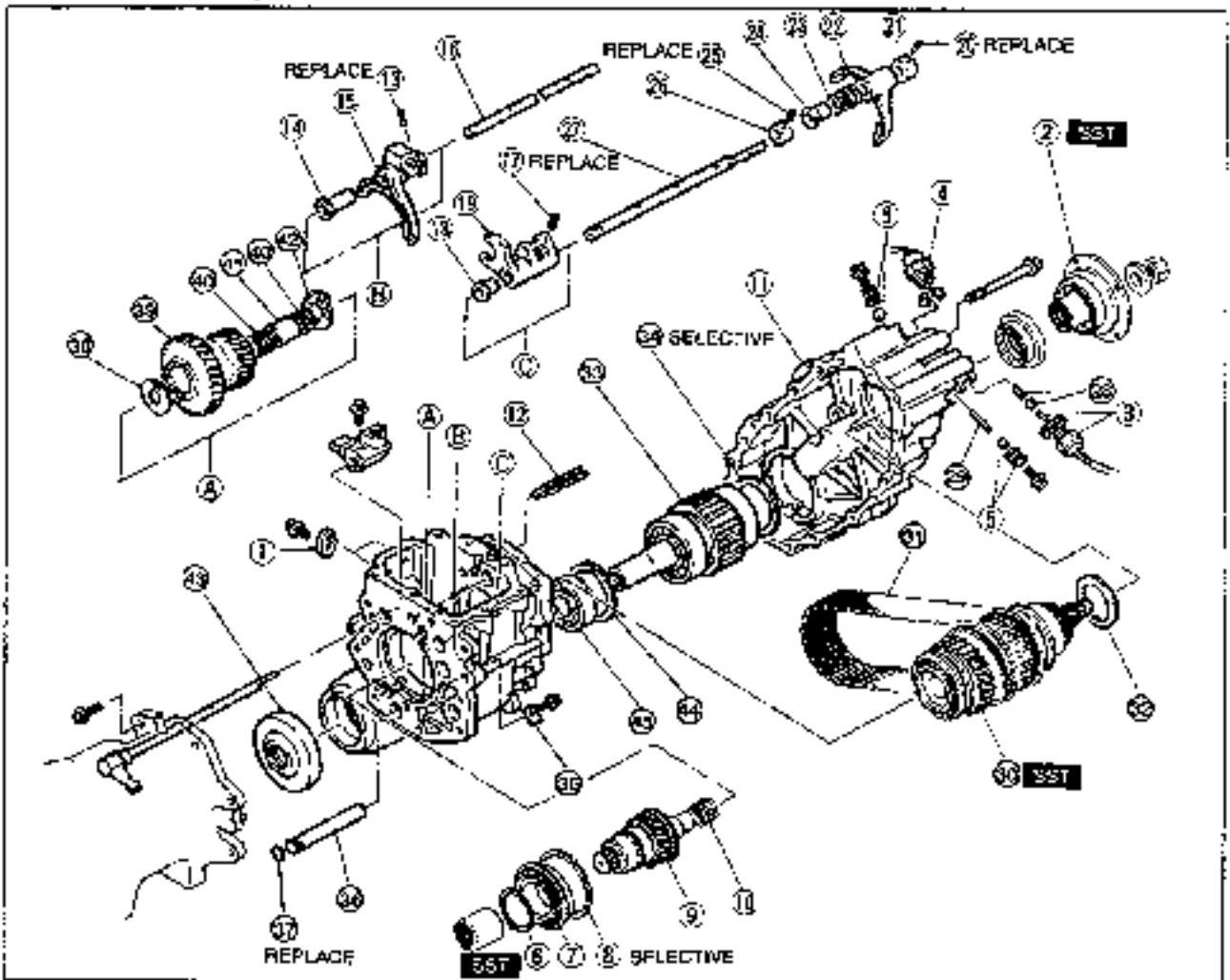
PREPARATION

SST

49 S120 710 Holder, coupling flange 	49 0B39 425U Pulcr set, bearing 	49 G030 370 Removing plate 
49 F40 331 Body 	49 D727 415 Installer, bearing 	49 S231 385 Chain expansion tool 
49 0500 330 Installer, bearing 	49 11017 350 Gauge set, shim socket 	SB1012 025

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

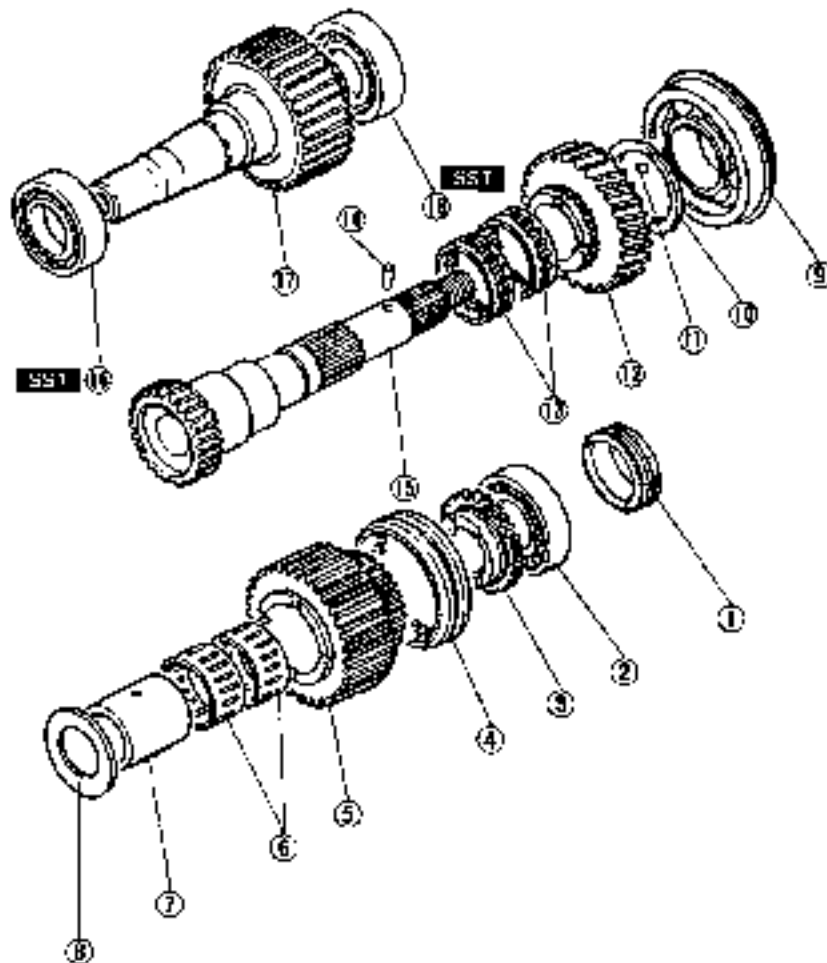
C0000-0-000

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 rod	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

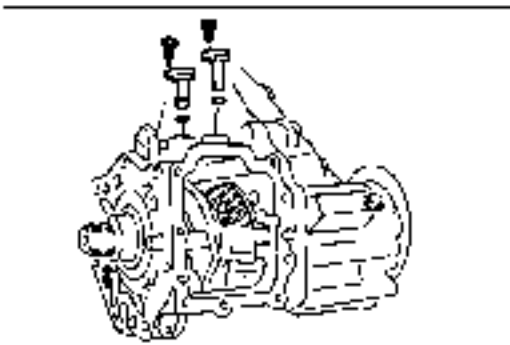


APPLY INDIVIDUAL PARTS TO SPECIFIED OIL

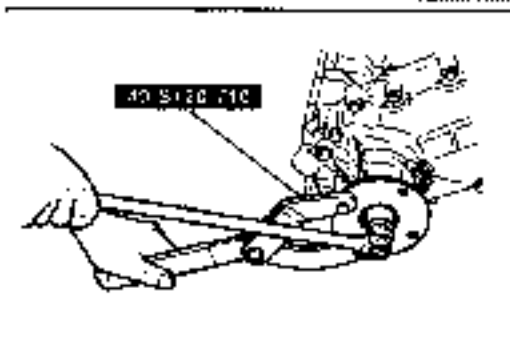


1. Speedometer drive gear	7. Spacer	13. Needle bearing
2. Bearing	8. Thrust washer	14. Roll pin
3. 2W-4W clutch hub	9. Bearing	15. Output shaft
4. 2W-4W hub sleeve	10. Thrust lock washer	16. Bearing
5. Drive sprocket	11. Steel ball	17. Front drive sprocket
6. Needle bearing	12. Low gear	

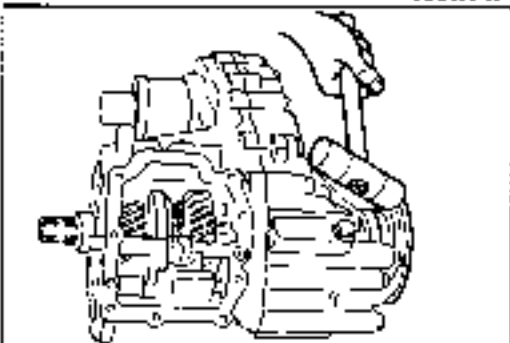
1000000-001



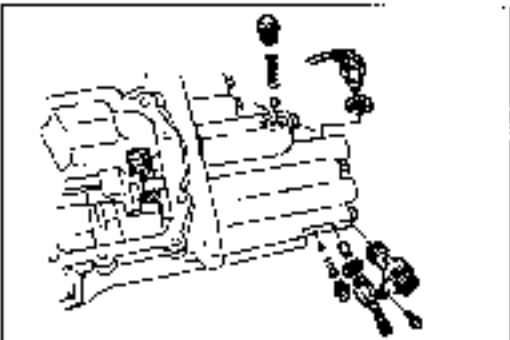
1B.015-002



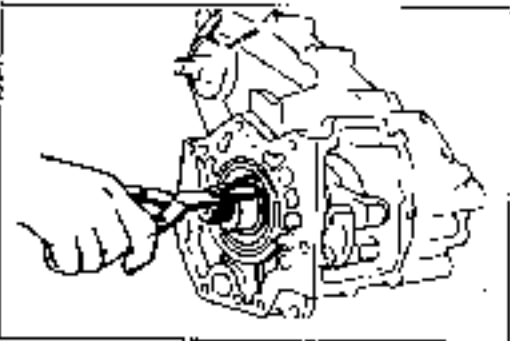
81X.016-027



7BU074-07



0B.015-010



7BU074-073

Disassembly procedure

1. Remove the stopper pins

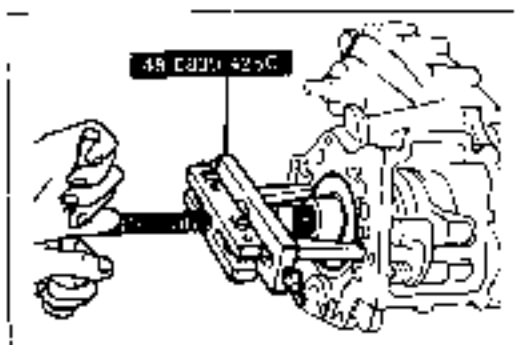
2. Hold the companion flange with the **SST** and remove the companion flange nut.

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.

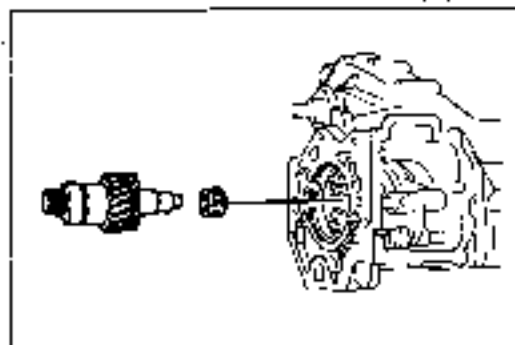
5. Remove the speedometer driven gear.

6. Remove the snap ring



SRV02429

7. Remove the bearing with the SST

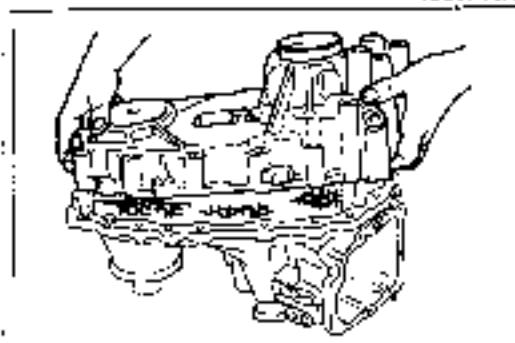


7BLCA/C75

8. Remove the input shaft gear and bearing

Note

For removal, position the flat section of the gear toward the countershaft gear.

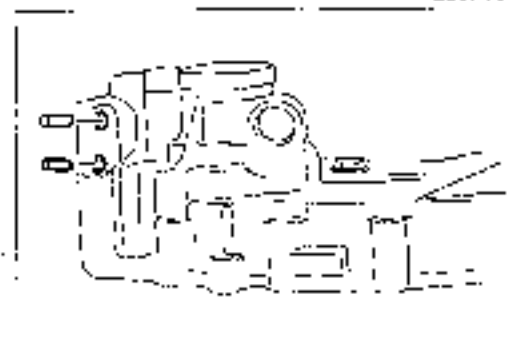


7BJ07A/C75

9. Using a plastic hammer, separate the chain cover from the transfer case, and remove the chain cover

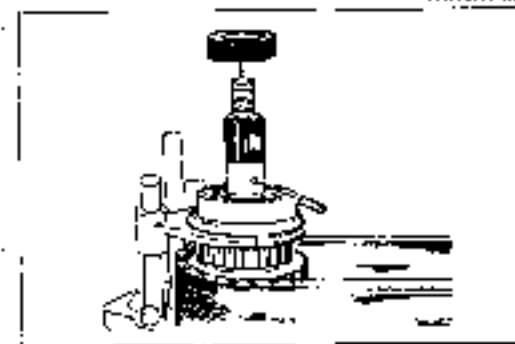
Caution

Lift off the chain cover vertically to prevent damaging the shift rods.



7BJ07A/C82

10. Remove the pin and interlock pin from the chain cover by using a magnet.

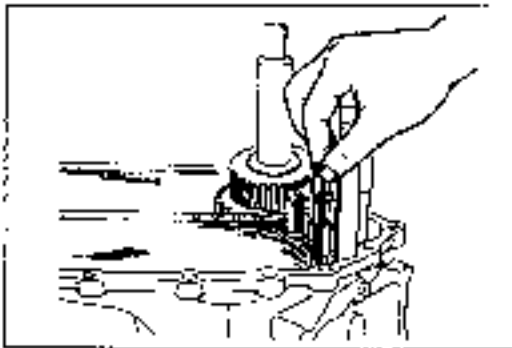


7BJ07A/C87

11. Remove the speedometer drive gear from the output shaft.
12. Remove the knock pin and bearing

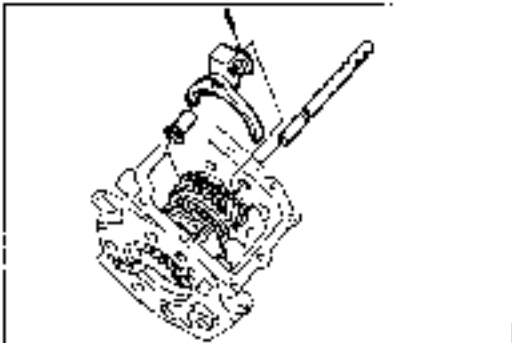
Note

If the bearing is difficult to remove, use a small pry bar to pry it off.



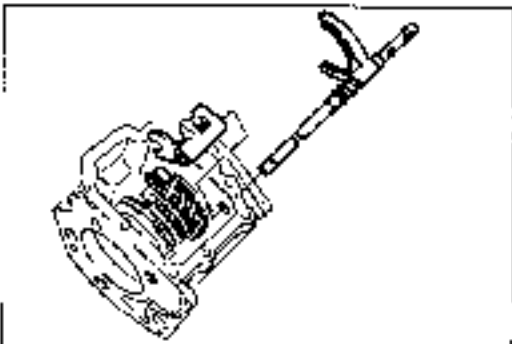
75L C7A, C7B

13. Remove the oil passage by lightly tapping it with a plastic hammer.



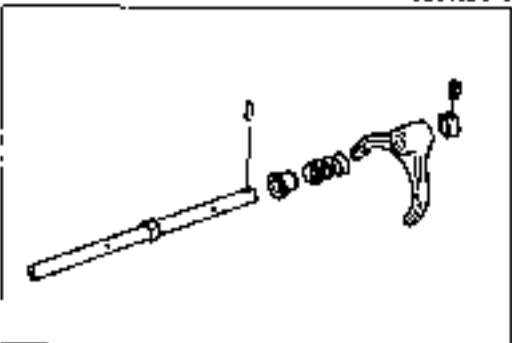
6A10U2 C54

14. Tap out the roll pin and remove the H-L shift rod, spacer, and shift fork.



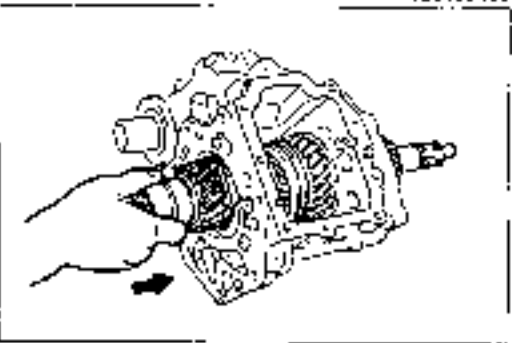
89L C2-079

15. Tap out the roll pin, and remove the 2W-4W shift rod as assembly, spacer, and 2W-4W shift end.



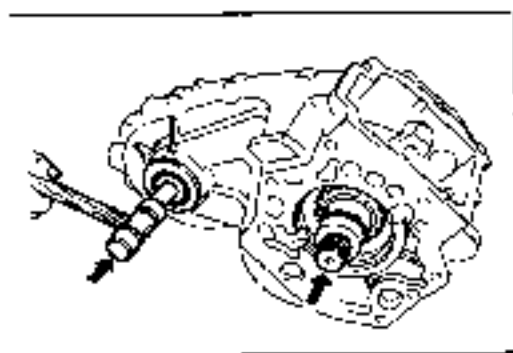
89L C3-030

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.

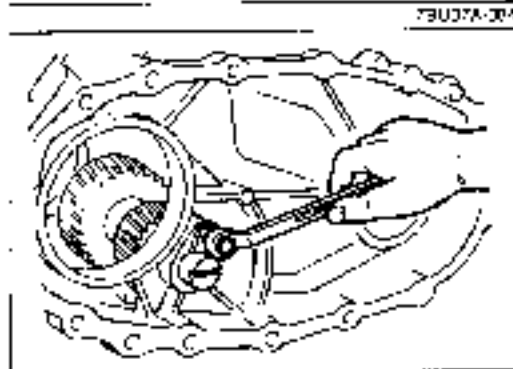


76L C7A, C83

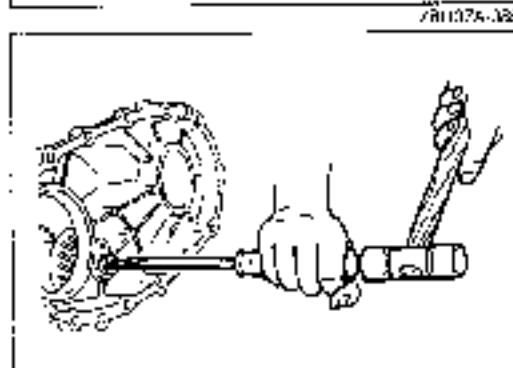
17. Set the input shaft gear on the output shaft.



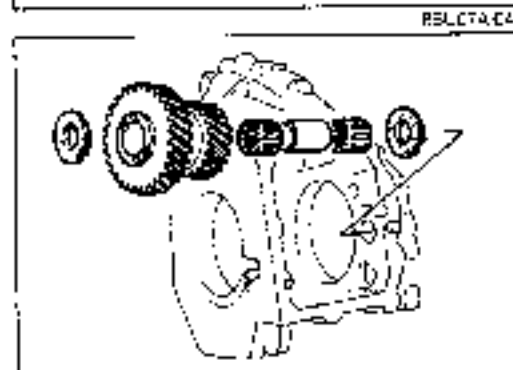
18. Remove the output shaft and the front drive sprocket from the transfer case housing by lightly tapping the input shaft gear and the front drive sprocket with a plastic hammer.
19. Remove the input shaft gear from the transfer case housing.



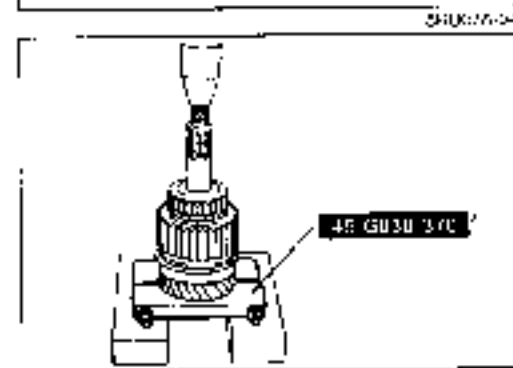
20. Remove the lock plate.



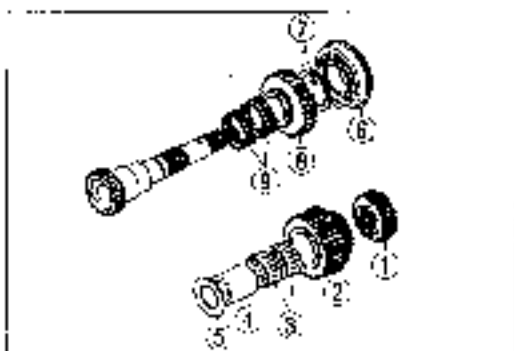
21. Tap out the countershaft with a screwdriver and hammer.



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.

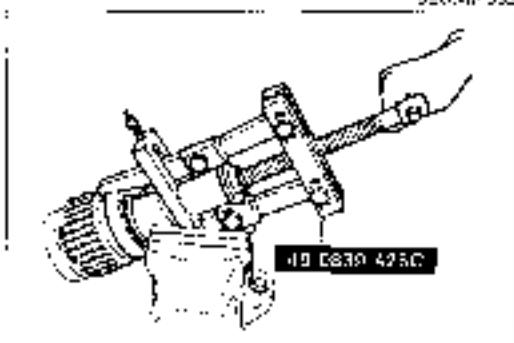


25. Press the output shaft assembly with the SST.



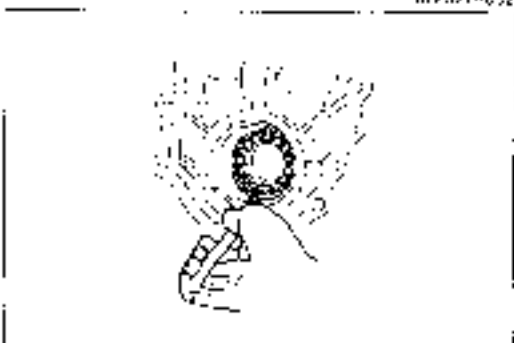
92U317 332

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



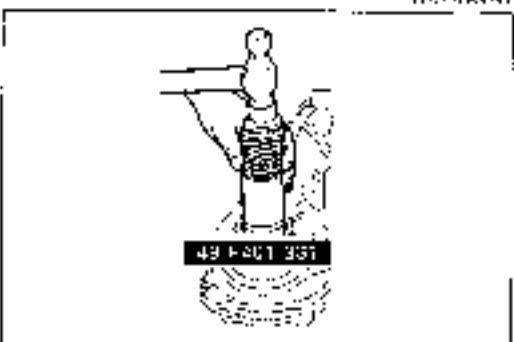
09J015072

27. Remove the bearings from both sides of the front drive sprocket with the **SST**.



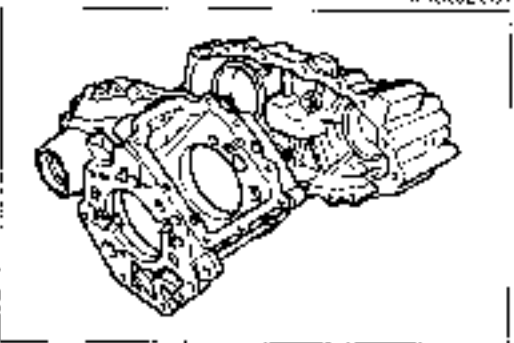
28J04490

28. Remove the oil seals.
29. Remove the snap ring.



14J022031

30. Press out the front sprocket bearing with the **SST**.

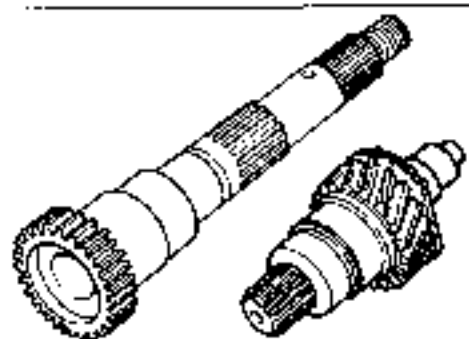


24J014 244

INSPECTION

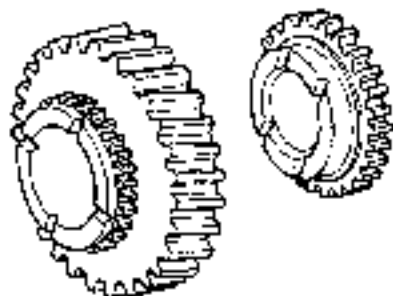
Inspect each of the items listed below.
Repair or replace if necessary.

1. Transfer case housing and oil cover for cracks, damage or damaged mating surfaces.



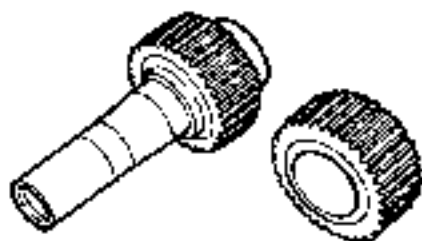
791107A-064

2. Input shaft gear and output shaft for wear, damage, or damaged teeth.
3. Input shaft gear and output shaft for clogged oil passages.



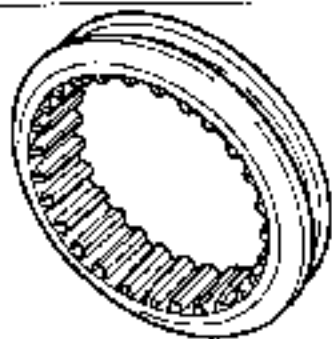
791107A-025

4. Low gear and 2W-4W clutch hub for wear, damage, or damaged teeth.



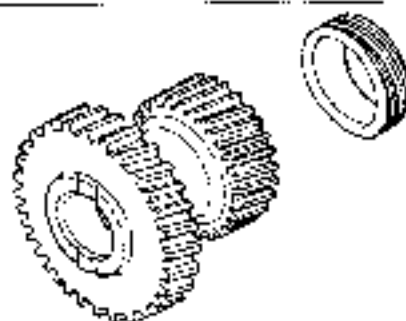
66C07X-4W7

5. Drive sprocket and front drive sprocket for wear, damage, or damaged teeth.



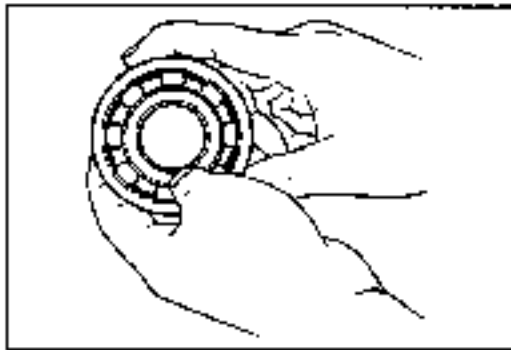
75A-07A-016

6. Hub sleeve splines for wear or damage.
7. Hub sleeve groove for wear or damage.



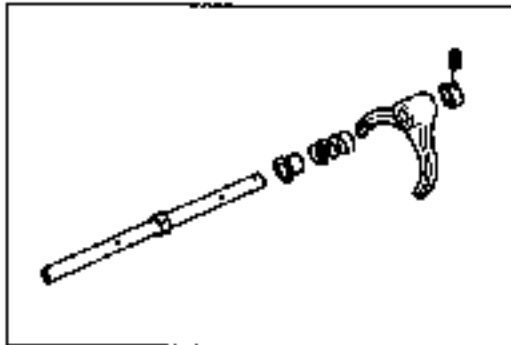
891107A-034

8. Counter gear, countershaft, and speedometer drive gear for wear or damaged teeth.



AF3076073

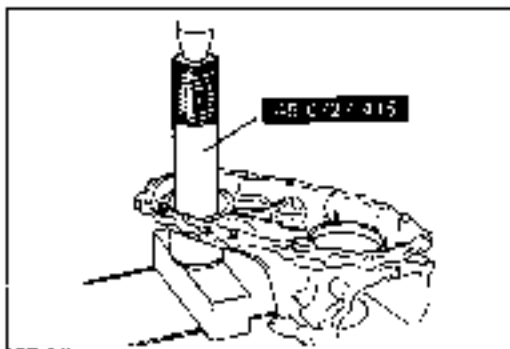
9. Bearings for rough operation or noise while turning



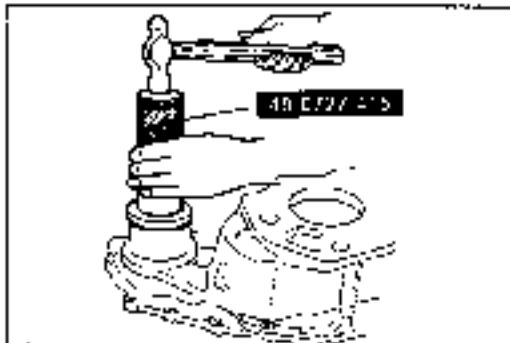
7DU07A 035

10. Shift fork or shift rod for wear or damage.

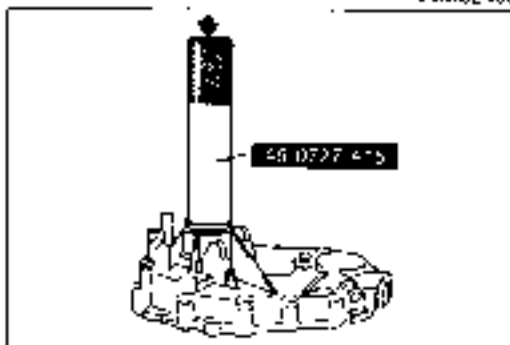
11. Shift spring for weakening.



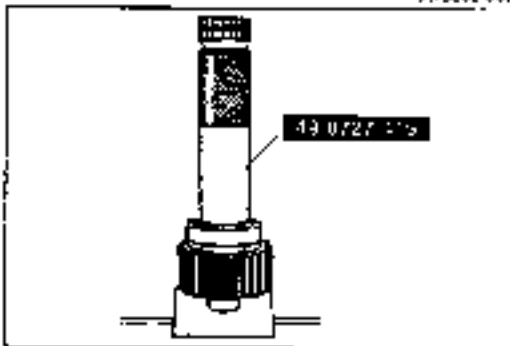
13U342-006



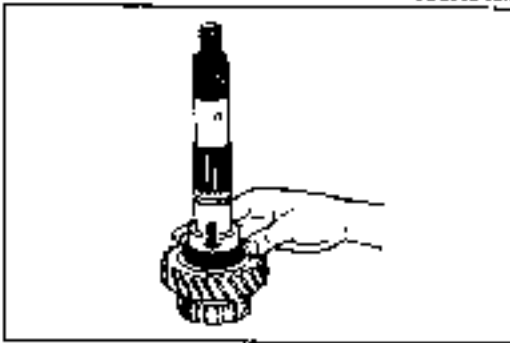
09U342-006



98 0002 097



30U3-200F



7ELC7A-100

Assembly procedure

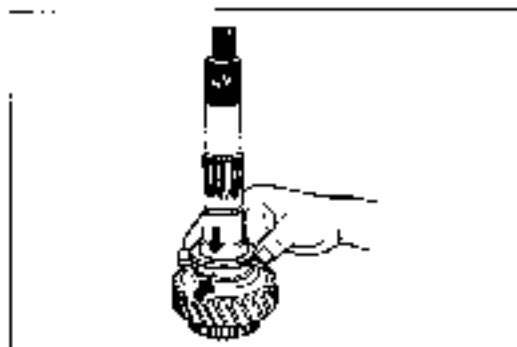
1. Press the bearing into the transfer case housing with the **SST**.
2. Install the snap ring to secure the bearing

3. Apply oil to the new oil seal lip, and install the oil seal into the transfer case housing with the **SST**.

4. Apply oil to the new oil seal lip, and install the oil seal into the chain cover with the **SST**.

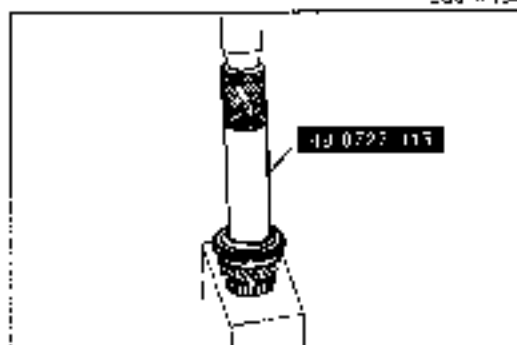
5. Press the bearings onto both sides of the front drive sprocket with the **SST**. Press the bearings on until they stop.

6. Install the low gear on the output shaft. Put oil on the needle bearings, and set the gear on the shaft.



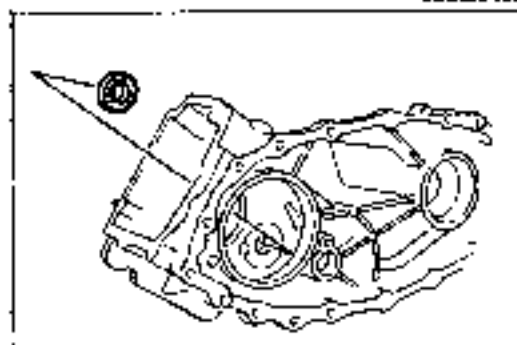
TBL076-104

7. Set the steel ball in the shaft, and install the thrust lock washer.



JBL072-115

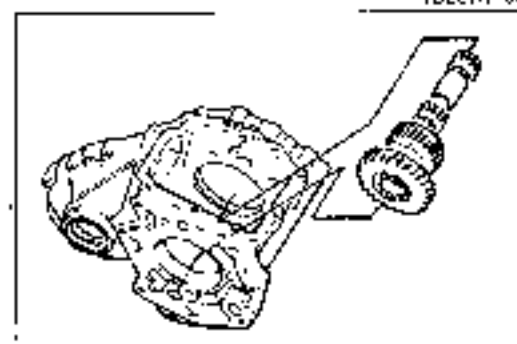
8. Press the bearing onto the output shaft with the **SST**.



TBL073-126

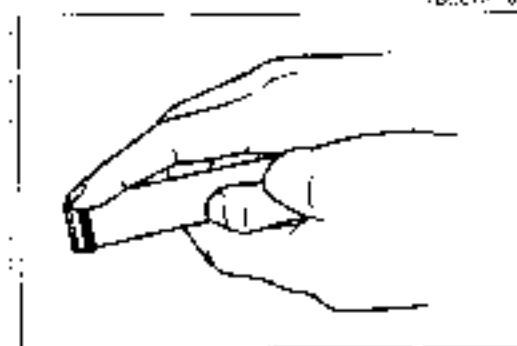
9. Install the counter gear as follows.

- (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.



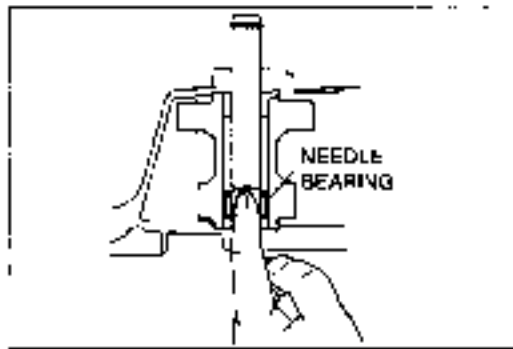
JBL073-126

- (2) Applying oil to the needle bearings, install them and the spacer into the counter gear.
- (3) Install the counter gear into the housing.

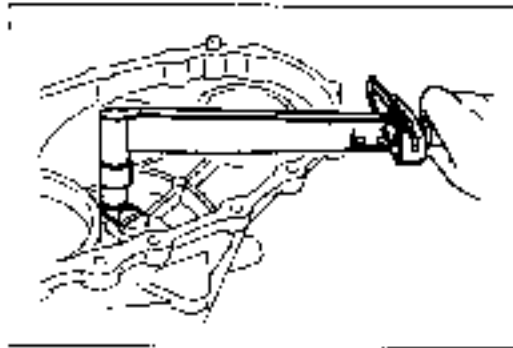


TBL076-104

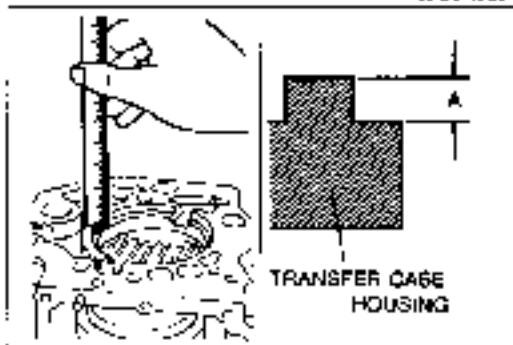
- (4) Apply oil to the new O-ring, and install it on the countershaft.



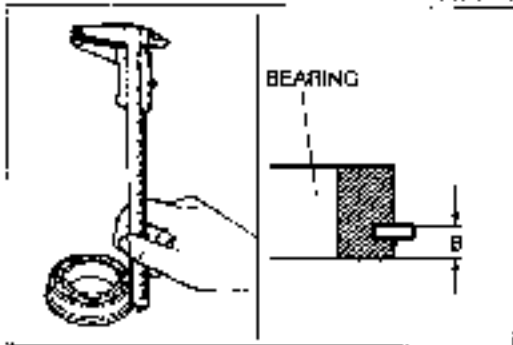
7B.07A, 129



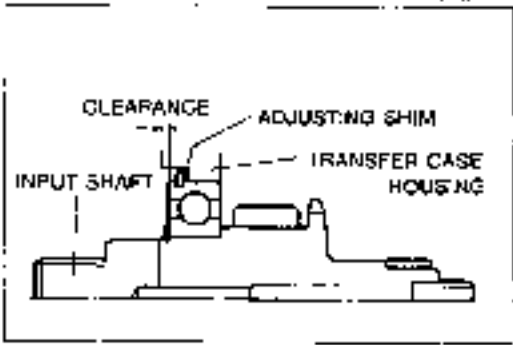
C6607X, 38



7B.08A, 113



7B.09A, 114



7B.10, 3 034

- (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.

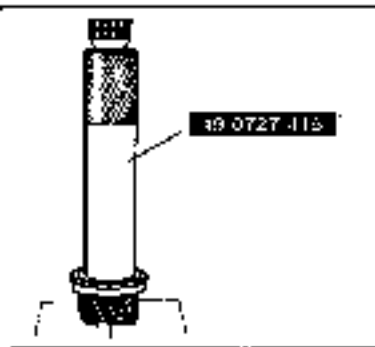
$$\text{Difference (Clearance)} = A - B$$

- (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)



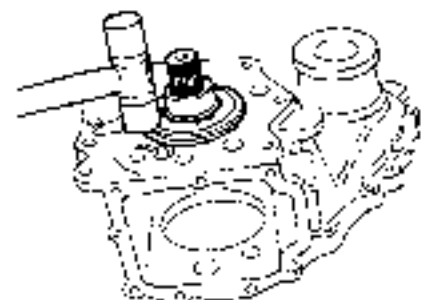
98J3J2-040

- (5) Press the bearing onto the input shaft gear with the **SST**.



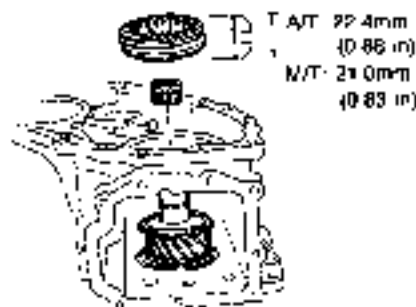
75-0099-116

- (6) Install the snap ring.



78-0076-115

- (7) Install the input shaft assembly into the housing by lightly tapping the outer race of the bearing with a plastic hammer.

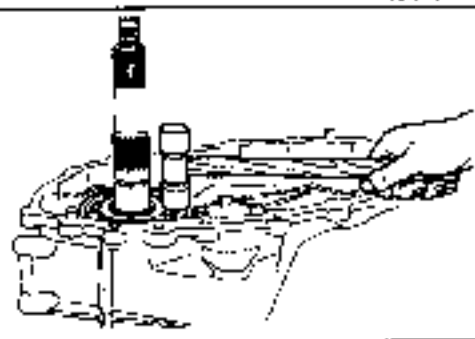


61A-6200-119

11. Install the needle bearing and H-L hub sleeve onto the input shaft.

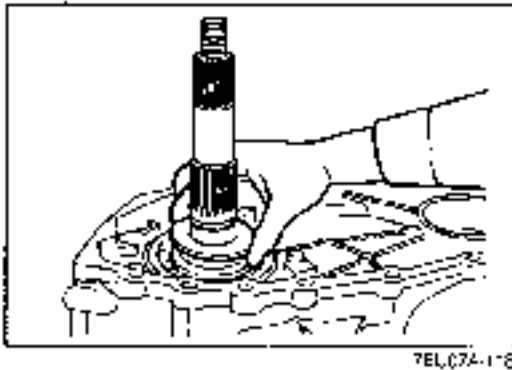
Note

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).

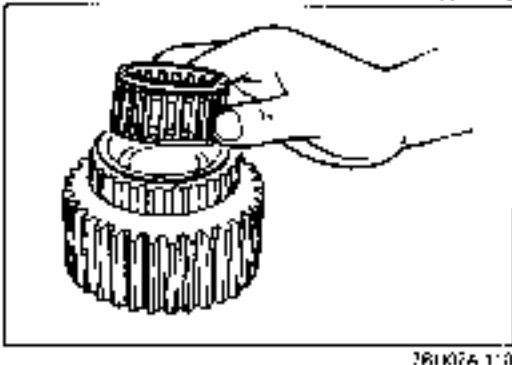


78-0076-117

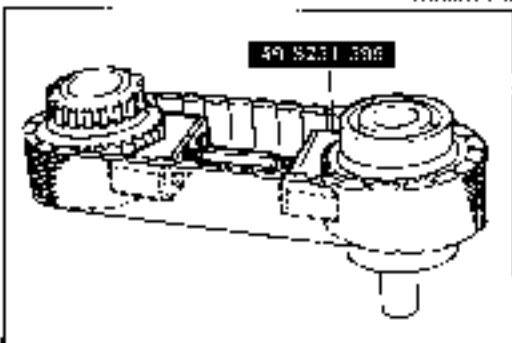
12. Install the output shaft into the housing by lightly tapping the outer race of the bearing with a plastic hammer.



13. Set the thrust washer on the output shaft.



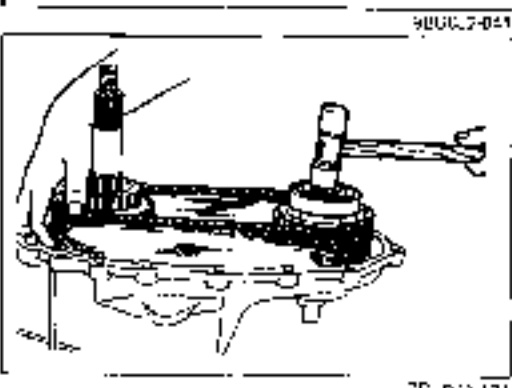
14. Apply oil to the needle bearings, and install them onto the drive sprocket along with the spacer.



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.

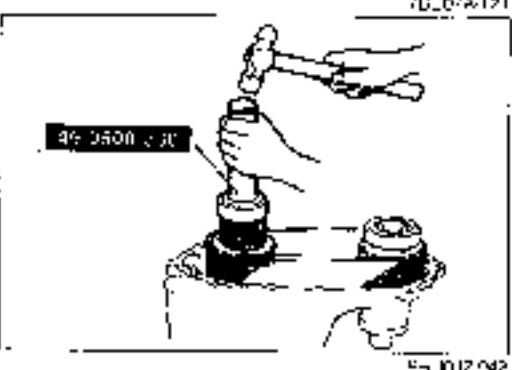
Note

Do not overtighten the chain expansion tool.

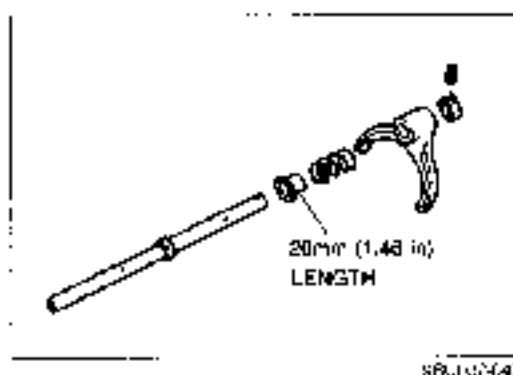


16. Install the front drive sprocket assembly into the housing by lightly tapping it with a plastic hammer, keeping the chain horizontal.

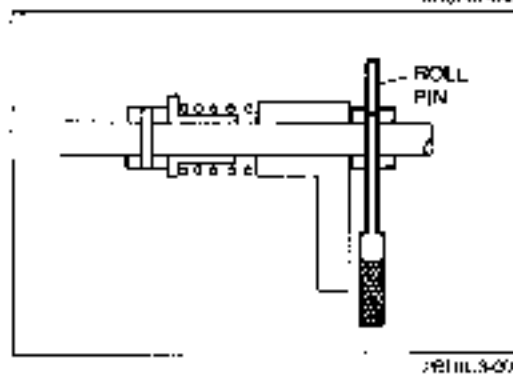
17. After installation, verify that the chain rotates smoothly.



18. Tap in the 2W-4W clutch hub with the **SST**.



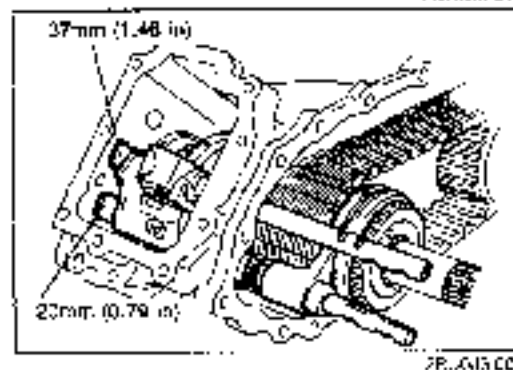
19. Install the 2W-4W shift fork onto the shift rod as follows.
- (1) Slide the retainer onto the shift rod, and secure it with the new roll pin.
 - (2) Install the spacer (20mm, 0.79 in), spring, 2W-4W shift fork, and the other retainer.



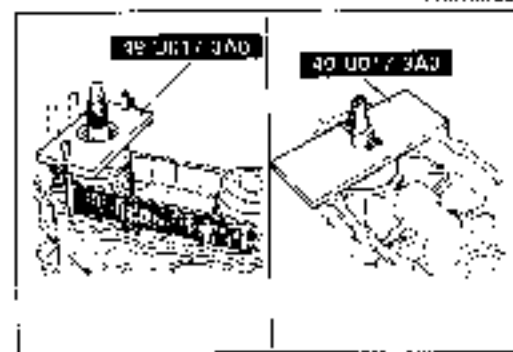
- (3) Secure the retainer with the new roll pin.

Note

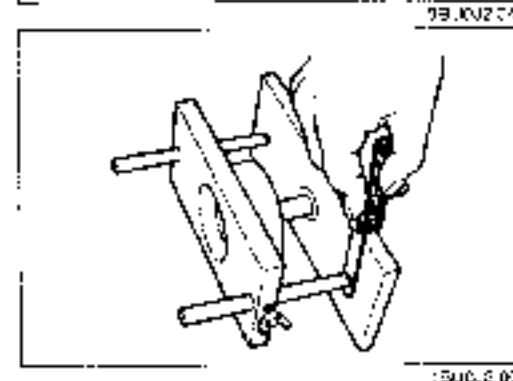
Use a pin punch as a guide when the roll pin is lapped in.



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.

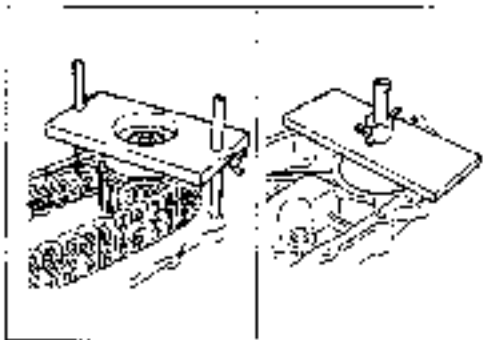


27. Put the two pieces of the gauge set together and measure the clearance.
28. Select the proper adjusting shim to adjust the clearance.

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)		



7FJ023-406

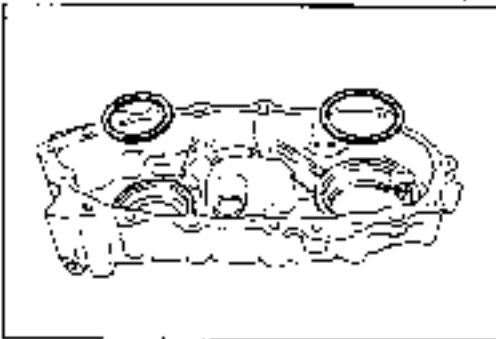
29. Select the proper adjusting shim for the front drive sprocket bearing in the same way as for the output shaft side.

Standard clearance: 0—0.1 mm (0—0.004 in)

Adjusting shim thickness:

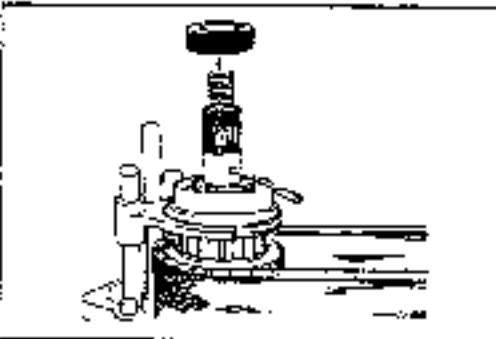
mm (in)

0.5 (0.020)	0.6 (0.024)	0.7 (0.028)
0.8 (0.031)	0.9 (0.035)	1.0 (0.039)
1.1 (0.043)	1.2 (0.047)	



7B107A-126

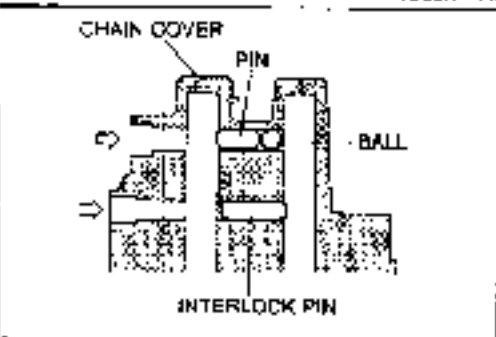
30. Apply grease to the adjusting shims selected, and place them in the chain cover.



7BLC7A-125

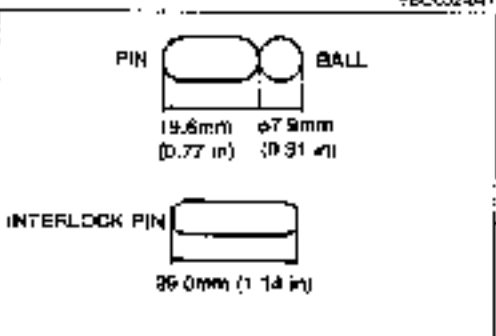
31. Install the knock pin into the output shaft, and install the speedometer drive gear.

32. Install the oil passage into the case.



9BLCJ2-047

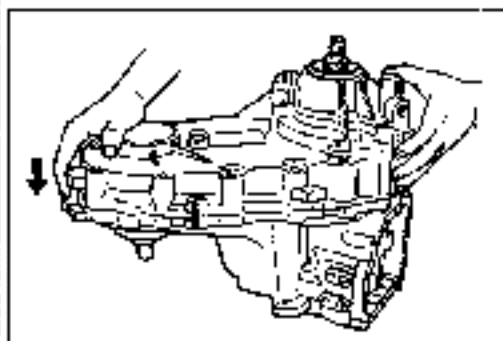
33. Apply grease to the ball pin, and interlock pin, and install them into the chain cover.



7BLC7A-127

Note

The pins are different, as shown in the figure.

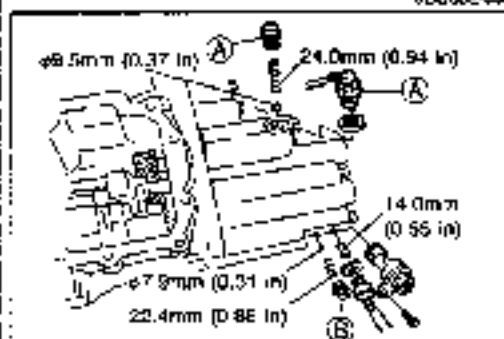


34. Apply sealant to the mating surface of the chain cover, and set the cover on the housing.

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:

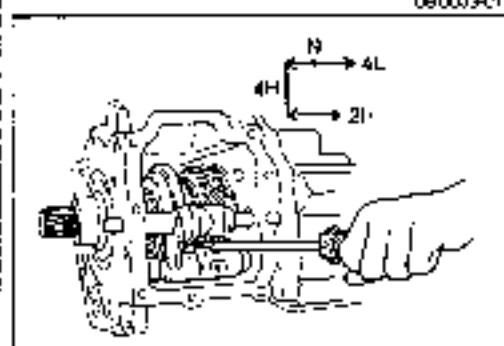
A: 28–41 N·m (2.9–4.2 m·kg, 21–30 ft·lb)

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.

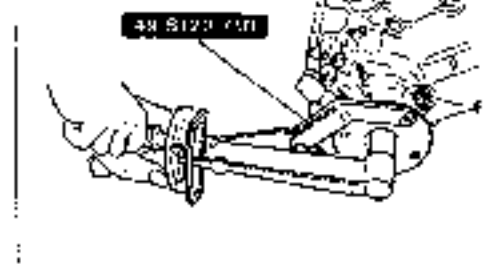
Tightening torque:

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:

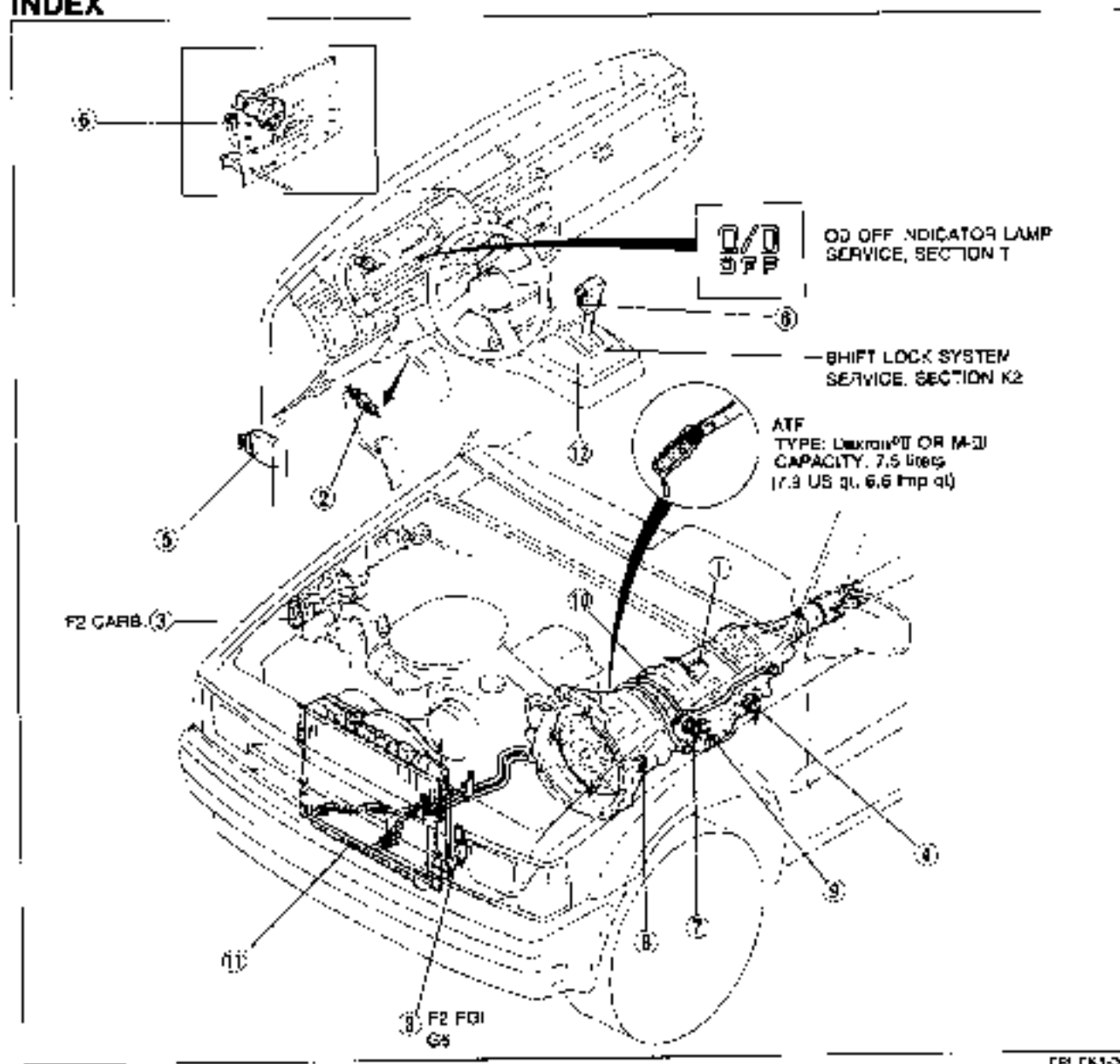
128–177 N·m (13–18 m·kg, 94–130 ft·lb)

AUTOMATIC TRANSMISSION

(Hydraulically-Controlled)

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CB_LK1-002

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OUTLINE

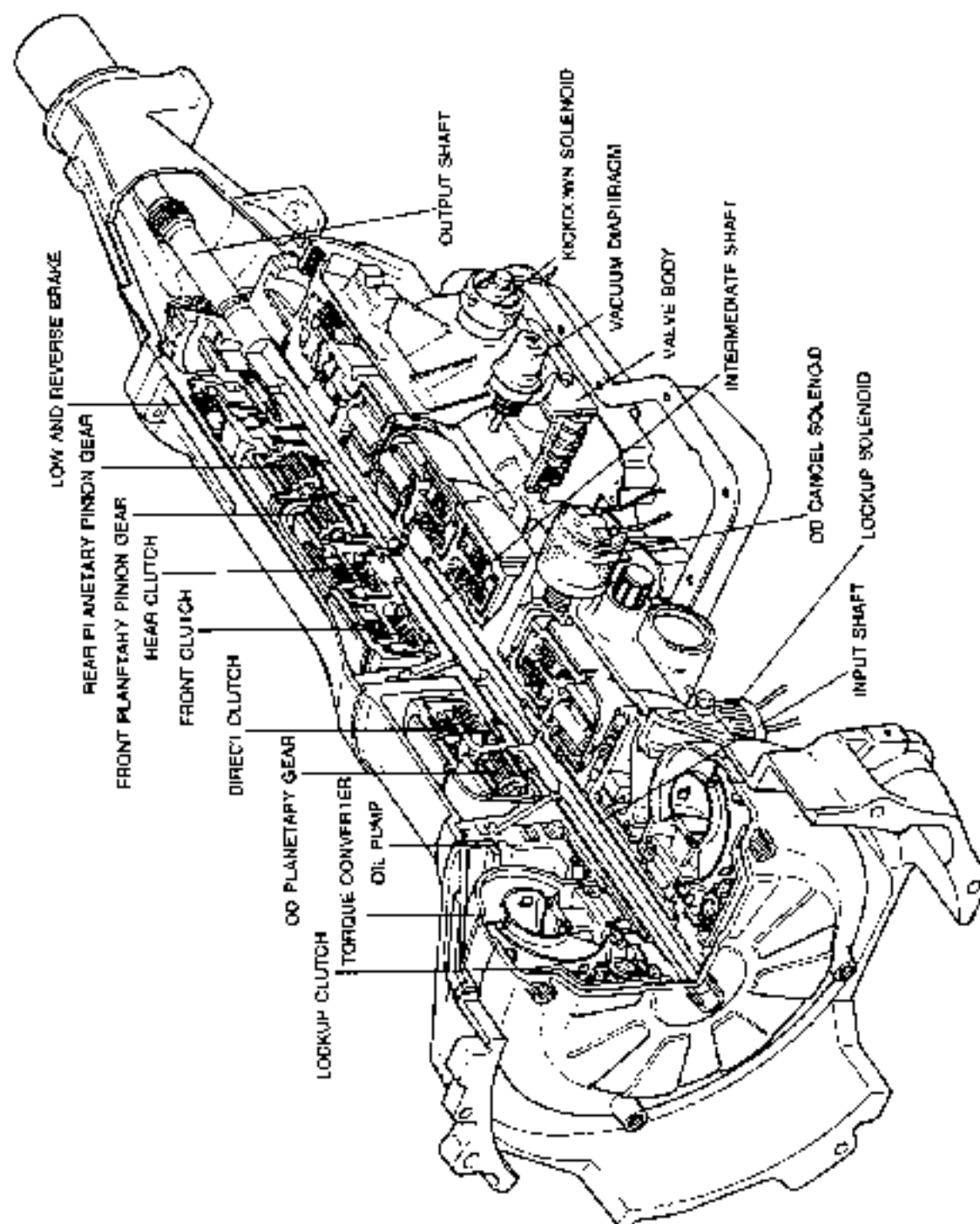
SPECIFICATIONS

Item	Transmission/Engine		N44-HL	
			F2	G6
Torque converter stall torque ratio			1.900	
Gear ratio	1st		2.84:1	
	2nd		1.94*	
	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)	Oil band servo		63/43 (2.36/1.57)	62/36 (2.30/1.42)
	2nd band servo		72/44 (2.83/1.73)	63/55 (3.10/2.21)
Automatic transmission fluid (ATF)	Type	Dexron®II or M-III		
	Capacity liters (US qt. Imp qt)	Total	7.5 (7.0, 6.6)	
		On gear	4.0 (4.2, 3.5)	

FBLCK-100*

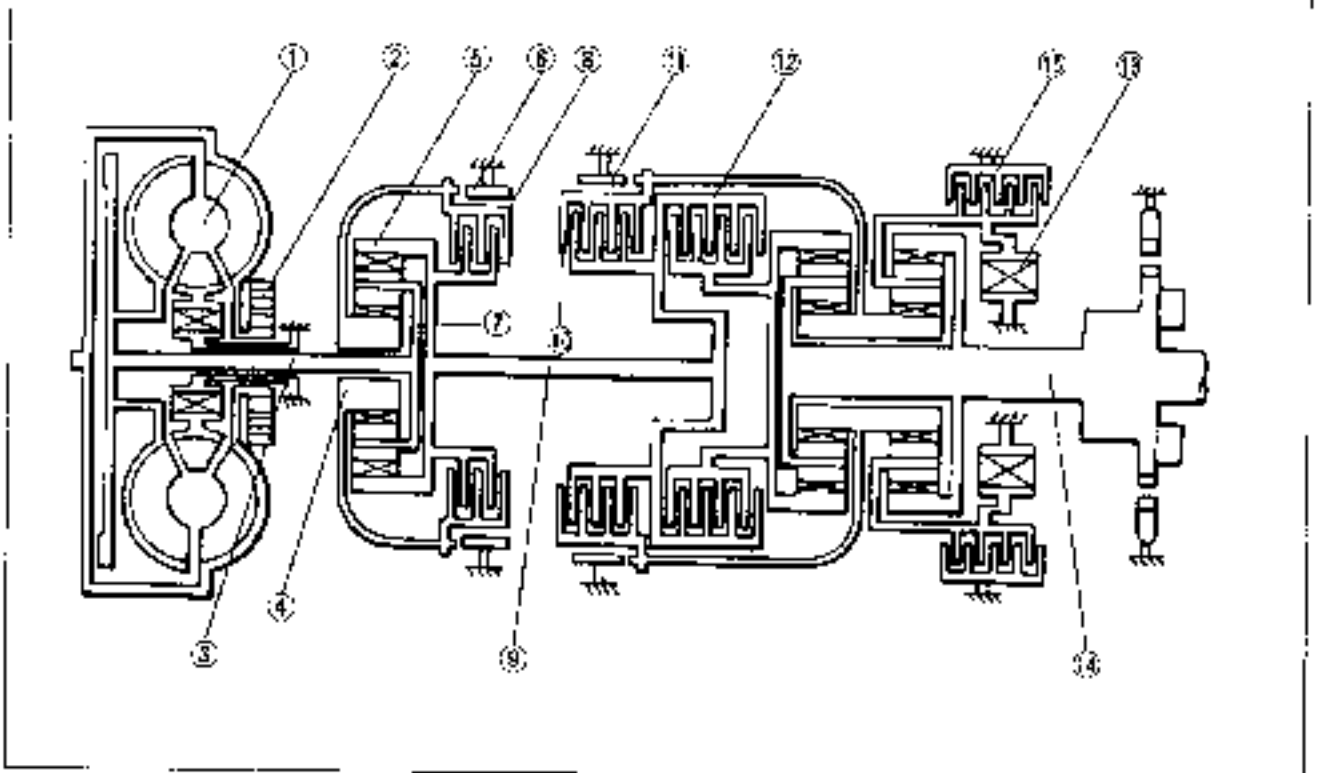
K1

STRUCTURAL VIEW



97 UN 28-404

POWER FLOW DIAGRAM



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

98A103-2-002

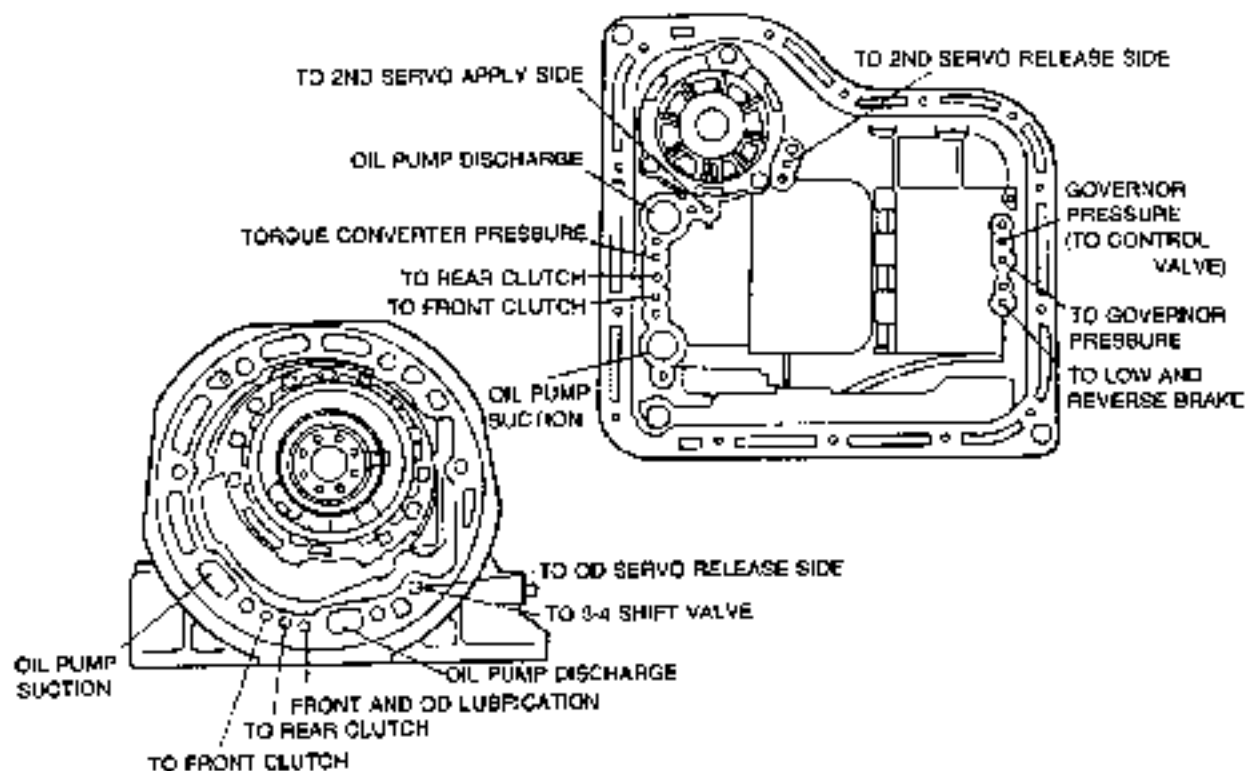
OPERATION OF COMPONENTS

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	○	○	○		○			○	

② Operates although the band servo remain deactivated because of the larger release pressure side area. Brake band does not operate.

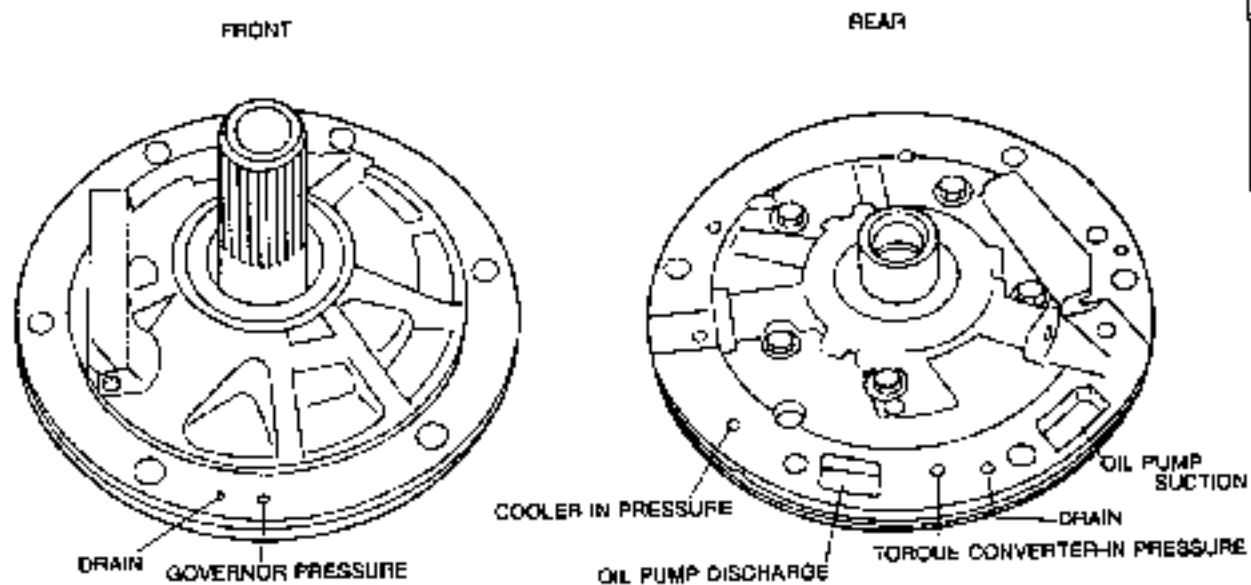
98A103-2-005

FLUID PASSAGE LOCATIONS Transmission Case



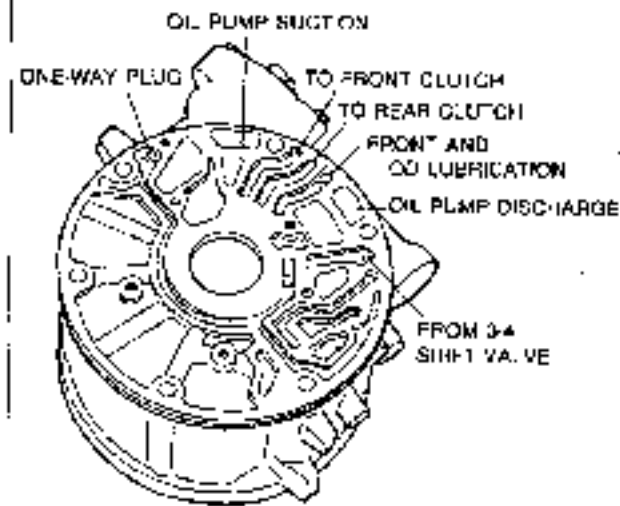
9M-JDK2-006

Oil Pump



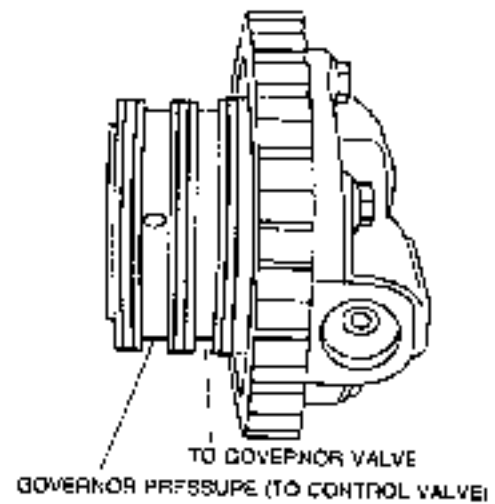
9M-J42-007

OD Case



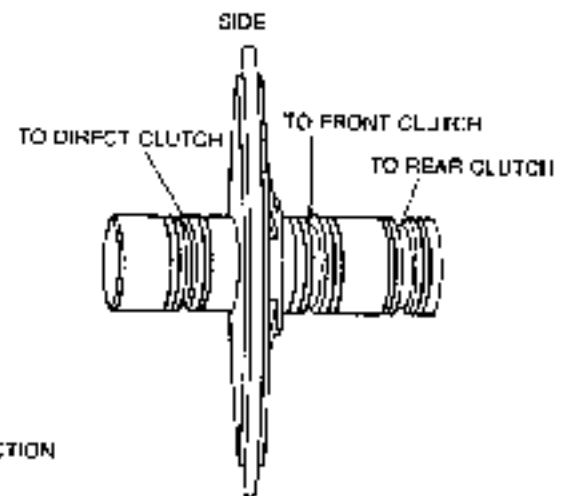
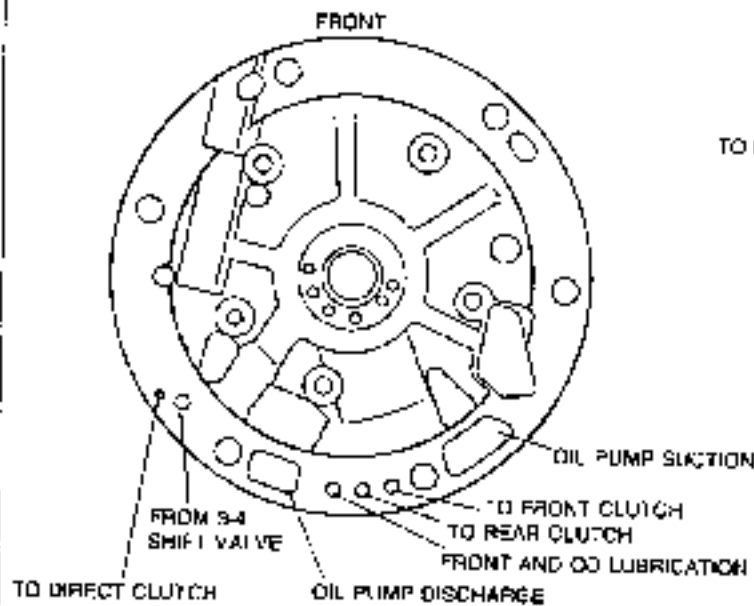
9VUBK2-008

Parking Gear (Oil Distributor)



9M-CK2-009

Drum Support



9VUBK2-010

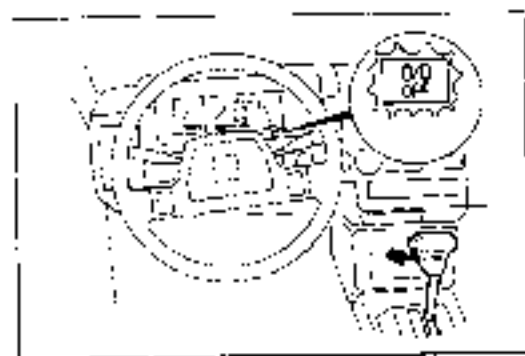
TROUBLESHOOTING

GENERAL NOTE

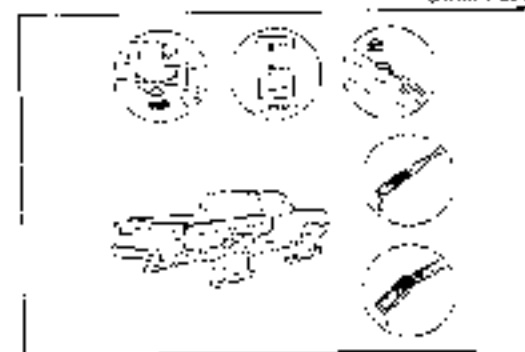
A problem with the automatic transmission may be caused by the engine or the transmission powertrain, hydraulic control system, or the electronic control system.

When troubleshooting, from these points, which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

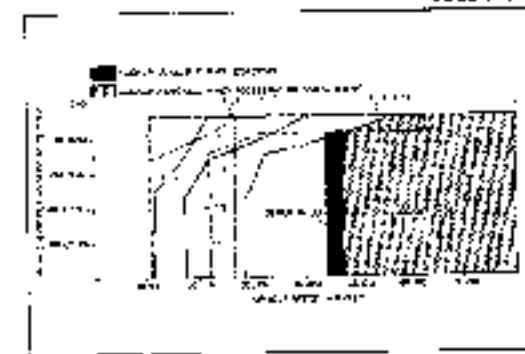
3M2J0K2011

**Step 1: Electrical System Inspection**

Check the electrical system. (Refer to page K1-13.)

**Step 2: Mechanical System Test**

Check the engine stall speed, time lag, line pressure, and governor pressure. (Refer to page K1-14.)

**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.

3B0J0KX027

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 it 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.

9M50-02-01.9

		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	K1-28	K1-28	K1-29	K1-107	K1-111	K1-120, 21	K1-59	K1-62	K1-61	K1-65	K1-64	K1-6	K1-64	K1-50	K1-50	K1-49	K1-56	K1-71	K1-75	K1-81	K1-60	K1-87	K1-83	K1-84, 81	K1-95	
Item		X A/F leak and condition	X Shift mechanism	Engaging idc speed arc condition	Inhibitor switch and wiring	Kickdown switch, kickdown scaled air line	Ignition switch and starter	OD OFF switch	ON cancel solenoid	Kickdown solenoid	vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	X OD band screw	X 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	2nd brake band	Line and reverse brake	One-way clutch	Planetary gear	Parking gear	
Adjustment		X	X	X	X	X	X	X	X	X	X																						
Electrical System Inspection						X		X	X	X																							
Mechanical System Test																																	
Road Test																																	
Engine starts	Engine does not start in N or P range		2	3	1																												
	Engine starts in ranges other than N, and P ranges		1	2																													
Accelerating	Vehicle does not move in D range (moves in L, E, and R ranges)		1									2	2																				
	Vehicle does not move in forward ranges (moves in P range)		1	2								3	4																				
	Extremely poor acceleration																	5															
	Vehicle does not move in R range (moves in forward range)		1	2								3	4																				
	Extremely poor acceleration																																
	Vehicle does not move in any range		1	2								3	4																				
	Slippage felt when accelerating		1	2							6	3	4																				
	Vehicle moves in N range		1										2																				
	Excessive creep				1																												
	No creep at all		1	2	3																												
	Low max. speed and poor acceleration		1	2	6								3	4	5																		

Item	ON VEHICLE										OFF VEHICLE									
	Inspection point and reference page		Preliminary		Electronic control system		Hydraulic control system						Powertrain							
			K1-30	K1-32	Section F	K1-25	Section G	K1-26	K1-27	K1-28	K1-29	K1-107	K1-14	K1-23	K1-24	K1-25	K1-26	K1-27	K1-28	K1-29
			ATF level and condition	Shift mechanism	Engine rpm speed and condition	Ignition switch and wiring	Kickdown switch, Kickdown sensor, and wiring	Ignition switch and sensor	OD OFF switch	OD 2-range solenoid	Lockup solenoid	Vacuum diaphragm and pump	Engine stall system	Line and governor pressure	Control valve body	Governor valve	OD servo valve	2nd band servo	Accumulator	Transmission air check
Does not shift from 1st to 2nd	1																			
Does not shift from 2nd to 3rd	1																			
Does not shift from 3rd to OD	1																			
Lockup does not occur in OD																				
Does not shift from OD to 3rd	1																			
Does not shift from 3rd to 2nd or from OD to 2nd	1																			
Does not shift from 2nd to 1st or from 3rd to 1st	1																			
Does not kickdown when accelerator depressed in 3rd within kickdown range																				
Does not kickdown when accelerator depressed in OD within kickdown range																				
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																		

		ON VEHICLE										OFF VEHICLE																			
Inspection point and reference page		Pre- liminary		Electronic control system					Hydraulic control system					Powertrain																	
		K1-32	K1-127	Section F1	K1-25	K1-26,27	Section G	K1-28	K1-29	K1-107	K1-14	K1-20,21	K1-35	K1-92	K1-61	K1-66	K1-64	K1-3	K1-34	K1-59	K1-60	K1-49	K1-53	K1-71	K1-70	K1-87	K1-83	K1-54,84	K1-85		
		A.T. 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 current solenoid	Lockup solenoid	Vacuum diaphragm and piping	Engine stall speed	Line and governor pressure	Control valve body	Governor valve	OD hand servo	2nd band servo	Actuator	Transmission filter check	UD control valve	Lockup control valve	Oil pump	Torque converter	Direct clutch	Front clutch	Rear clutch	OD brake band	2nd brake band	Low and reverse brake	One-way clutch	Planetary gear	Parking gear
Shift shock	Excessive 1st to 2nd range shift shock		1							2		3	4												5						
	Excessive 1st to 2nd shift shock	1								2	3							6	5							6					
	Excessive 2nd to 3rd shift shock								1		2	3				4			5	6					4						
	Excessive 3rd to OD shift shock								1		2	3						5						4							
	Vehicle brakes when shifted from 1st to 2nd	1										2																3	4		
	Vehicle brakes when shifted from 2nd to 3rd	1											3		2														3		
Shift point	Vehicle brakes when shifted from 3rd to OD	1											3		2									4							
	Shift shock felt when accelerator released and deceleration occurs	1		3					2		4	5	6			7															
	Excessively large 2nd to 1st shock in 1 range	1							2	3	4	5																6			
	Excessively high 1st to 2nd, 2nd to 3rd, and 3rd to OD shift points	1		3					2		4	5	6																		
	Excessively high OD in 3rd, 3rd to 2nd, and 2nd to 1st shift points	1		3					2		4	5	6																		
	Kickdown operates or engine overruns when depressing pedal in 3rd beyond kickdown vehicle speed limit	1	2									3	4	5									6								
Shift sequence	Kickdown operates or engine overruns when depressing pedal in OD beyond kickdown vehicle speed limit	1	2									3	4	5										6							
	Shifts directly from 1st to 3rd												2	3				4							5						
	Shifts directly from 1st to OD												2	3				4							5						
	Shifts from 2nd to 1st, or 2nd to 3rd in 2 range	1									2	3																			
Shift sequence	Shifts from 1st to 2nd, or 2nd to 3rd in 1 range	1										2																			

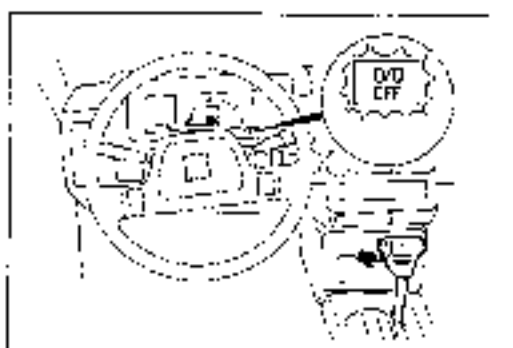
		ON VEHICLE										OFF VEHICLE																				
Inspection point and reference page		Pre-liminary		Electronic control system				Hydraulic control system						Powertrain																		
		K1-33	K1-127	Section 11	K1-26	K1-27	Section 13	K1-28	K1-29	K1-30	K1-107	K1-14	K1-18/22	K1-38	K1-82	K1-81	K1-88	K1-84	K1-6	K1-61	K1-50	K1-50	K1-23	K1-56	K1-71	K1-76	K1-67	K1-68	K1-67	K1-63	K1-63/64	K1-86
		ATF level and condition	Shift mechanism	Engine idle speed and condition	Inhibitor switch and wiring	Maximum each solenoid stroke and wiring	Inhibitor switch and wiring	OD OFF switch	OD cancel solenoid	Lockup solenoid	Vac. unit capillary 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
Slipping	Little shift shock or excessive slippage while 1st to 2nd shifting	1	2							3		4	5	6		7																
	Little shift shock or excessive slippage while 2nd to 3rd shifting	1	2							3		4	5	6		7								(6)								
	Little shift shock or excessive slippage while 3rd to OD shifting	1	2							3		4	5	6		7										(8)						
	No shift shock or engine overruns when shifting 1st to 2nd	1	2	4						3	5	6				7				(3)							(8)					
	Engine overruns or slips when shifting OD to 3rd	1								2		3	4			5			6				(7)	(8)		(9)						
Noise	Engine overruns or slips when shifting 3rd to 2nd	1								2		3				4			5						(8)		(7)					
	Transmission noisy in P and N ranges	1										2										(3)										
	Transmission noisy in O, 2, 1, and R ranges											2										(4)				(3)				(9)	(6)	
Others	No engine braking in 1 range	1										2	3						4										(2)			
	Vehicle moves in P range or parking gear not disengaged when P range disengaged	1																													(2)	
	Transmission overheats		4									5	6	2	3	7						(1)	(5)	(8)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
	White smoke discharged from exhaust while running	1									2	3	4	5		8						(2)	(10)	(7)	(8)	(9)	(13)	(14)	(15)	(16)		
	Abnormal odor from oil level gauge pipe	1																				(8)	(9)	(12)	(3)	(4)	(13)	(14)	(15)	(16)		
	Transmission shifts to OD over when OD OFF switch depressed							1	2										(3)													
Vehicle surges in OD																																

091, APR 1 1997

ELECTRICAL SYSTEM INSPECTION

In this inspection, the function of the electrical control system (inhibition of OD and lockup) and components are checked.

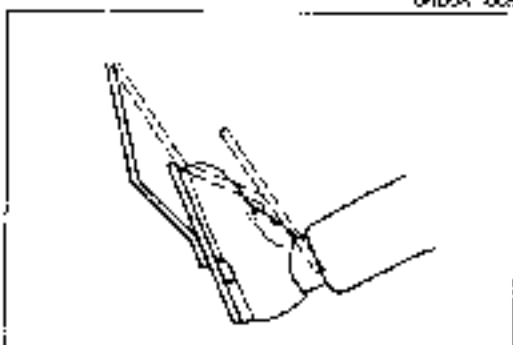
0K1JCK2-01E



0K1JCK1-00B

OD OFF SWITCH FUNCTION

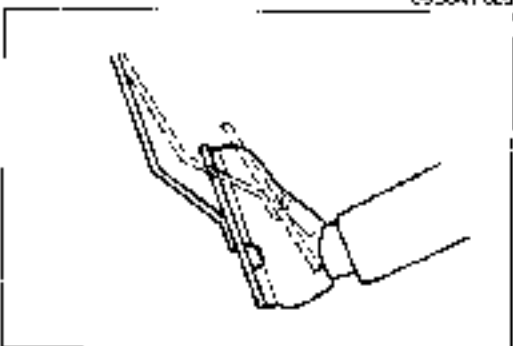
1. Drive the vehicle in D range.
2. Check that OD and lockup are provided.
3. Depress the OD OFF switch, and check that OD and lockup operations are canceled.
4. If not correct, check the OD OFF switch, OD cancel solenoid and lockup solenoid.
(Refer to pages K1-28, 29.)



0K1JCK1-00C

KICKDOWN AND 4-3 SWITCH FUNCTION**Kickdown Switch Function**

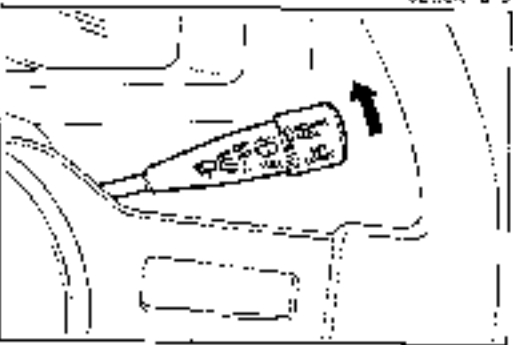
1. Drive the vehicle in D range.
2. Depress the accelerator pedal 7/8 or more, and check the kickdown.
3. If it is not correct, check the kickdown switch, kickdown solenoid and kickdown relay.
(Refer to pages K1-26, 27.)



0K1JCK1-00D

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 it is not correct, check the 4-3 switch.
(Refer to page K1-26.)



0K1JCK1-00E

CRUISE CONTROL SWITCH FUNCTION

1. Turn the main cruise control switch ON.
2. Drive the vehicle in OD below 100 km/h (62 mph) and above 40 km/h (25 mph) in D range.
3. Set the cruise control for operation.
4. Depress the SET switch, and check that the OD is canceled.
5. Accelerate to OD, turn the RESUME switch, and check that the OD is canceled.
6. If not correct, check the cruise control operation.
(Refer to Section T.)

MECHANICAL SYSTEM TEST

PREPARATION

SST

49 C376 400A Gauge set, oil pressure 	49 HC75 435 Adapter oil pressure gauge 	49 H019 002 Adapter 
49 B019 901 Gauge, oil pressure 		12-2041-004

STALL TEST

This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

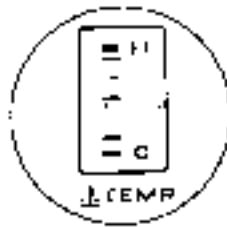
Preparation

1. Check the engine coolant, engine oil, and ATF levels before testing.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (60—70°C, 140—158°F).
3. Engage the parking brake and use wheel chocks at front and rear of the wheels.

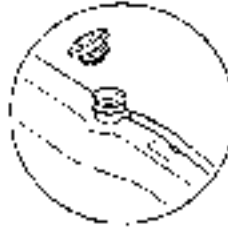
ENGAGE PARKING BRAKE



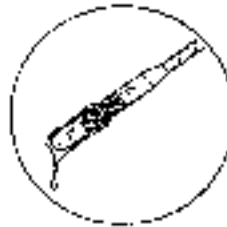
WARM UP ENGINE



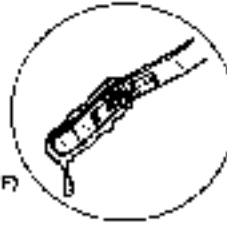
COOLANT LEVEL



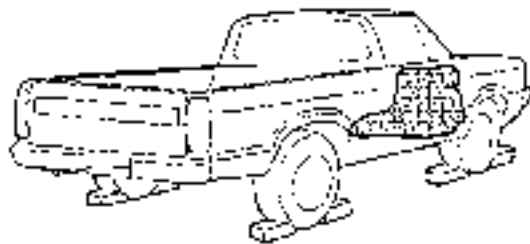
ENGINE OIL LEVEL



ATF LEVEL

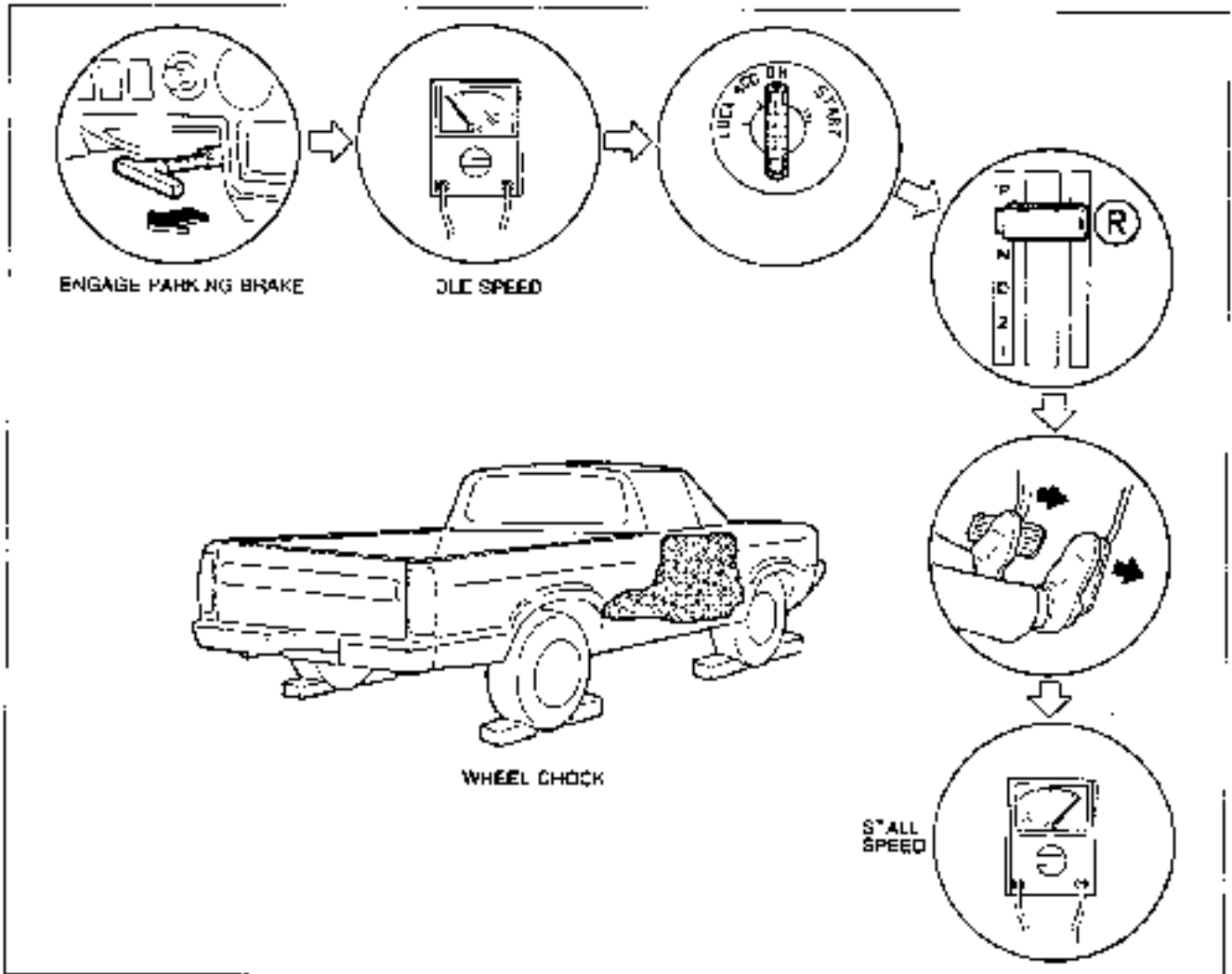


WHEEL CHOCK



TEMPERATURE
60—70°C (140—158°F)

Procedure



2PL/0K1-1002

1. Connect a tachometer to the engine.
2. Start the engine and check the idle speed in P range. (Refer to Section H: 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

0003K1 014

Evaluation of Stall Test

Condition		Possible cause
Above specification	In all ranges	Insufficient inn. pressure Worn oil pump Oil leakage from oil pump, control valve, and/or transmission case Stuck pressure regulator valve Direct clutch slipping
	In D, 2, and 1 ranges	Rear clutch slipping
	In D range only	One-way clutch slipping
	In 2 range only	Brake band slipping
	In R range only	Low and reverse brake slipping
		Front clutch slipping
		Perform road test to determine if this is caused by low and reverse brake or front clutch, as follows: a) Effective engine braking in 1 range.....Front clutch b) No engine braking in 1 range.....Low and reverse brake
Within specification	All shift control elements within transmission are functioning normally	
Below specification	Engine out of tune	
	One-way clutch slipping with torque converter	

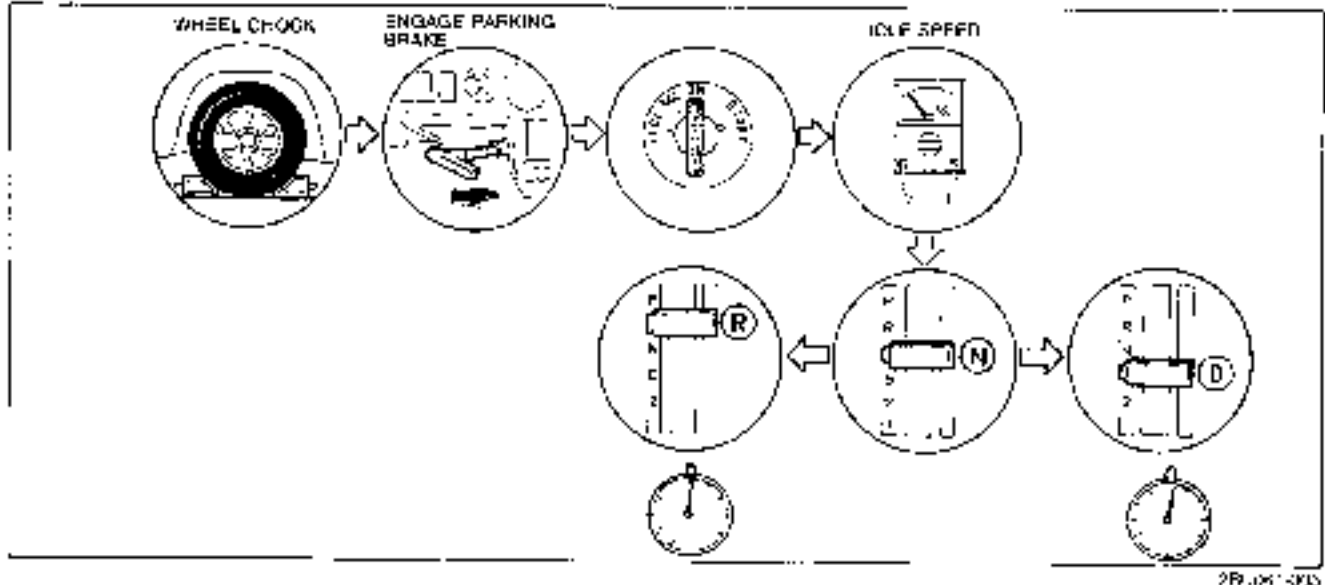
0M, 0M2 027

TIME LAG TEST

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step measures this time lag for checking condition of the front, rear, and one-way clutch, low and reverse brake, and orifice check valve.

Preparation

Perform the preparation procedure shown in STALL TEST. (Refer to page K1-14.)

Procedure

1. Start the engine and check the idle speed in P range. (Refer to Sections F1, F2.)

Idle speed

F2 Carb. : 800—850 (800 ± 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 slipping
		Front clutch slipping
	Less than specification	Stuck orifice check valve Excessive line pressure

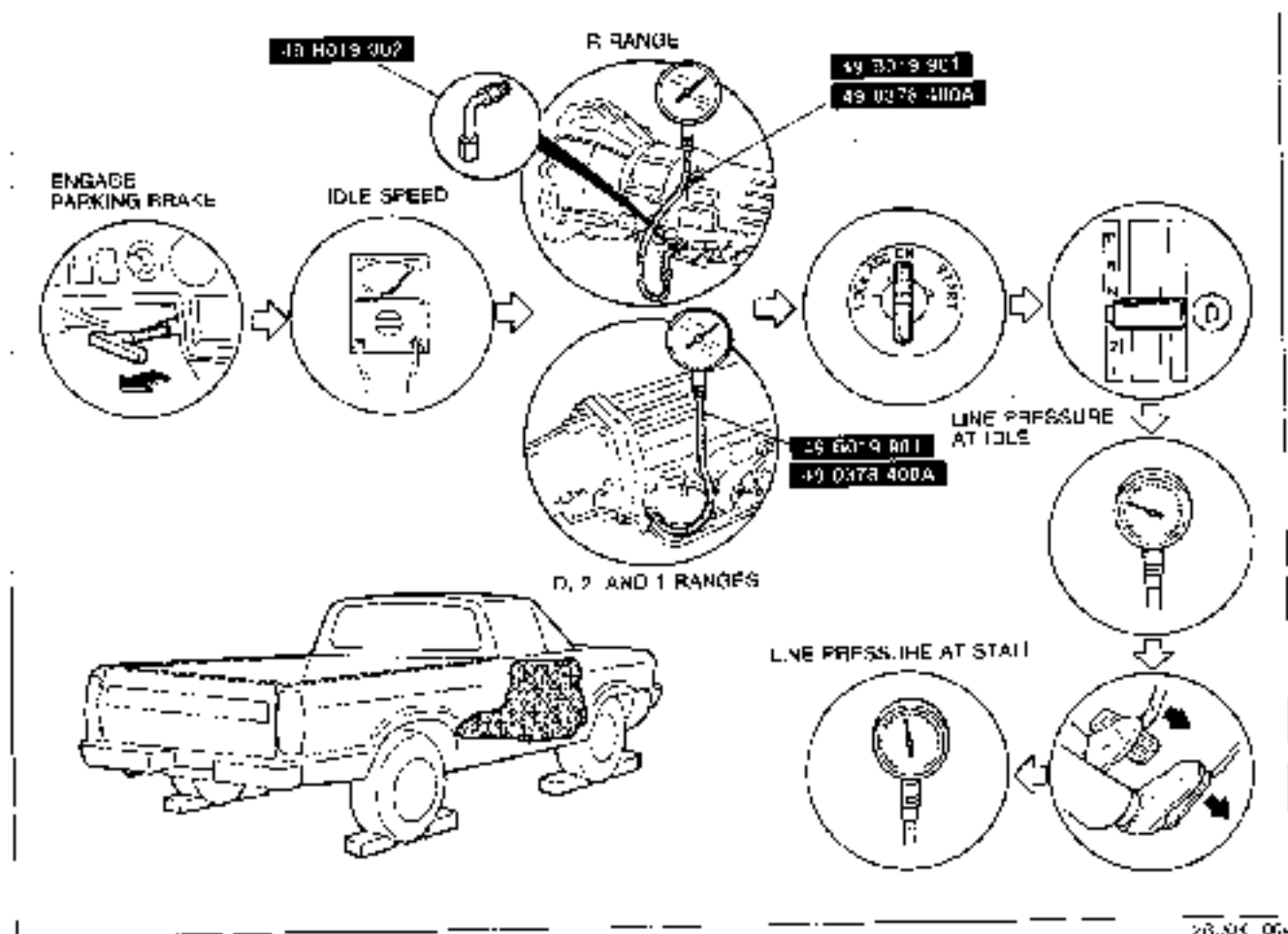
LINE PRESSURE TEST

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 ² , 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—166)	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)

PELCK 017

Evaluation of Line Pressure Test

Condition		Possible cause
Below standard	In all ranges	Worn oil pump
		Fluid leakage from the oil pump, control valve, or transmission case
		Stuck pressure regulator valve
		Fluid leakage from the direct clutch and/or 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

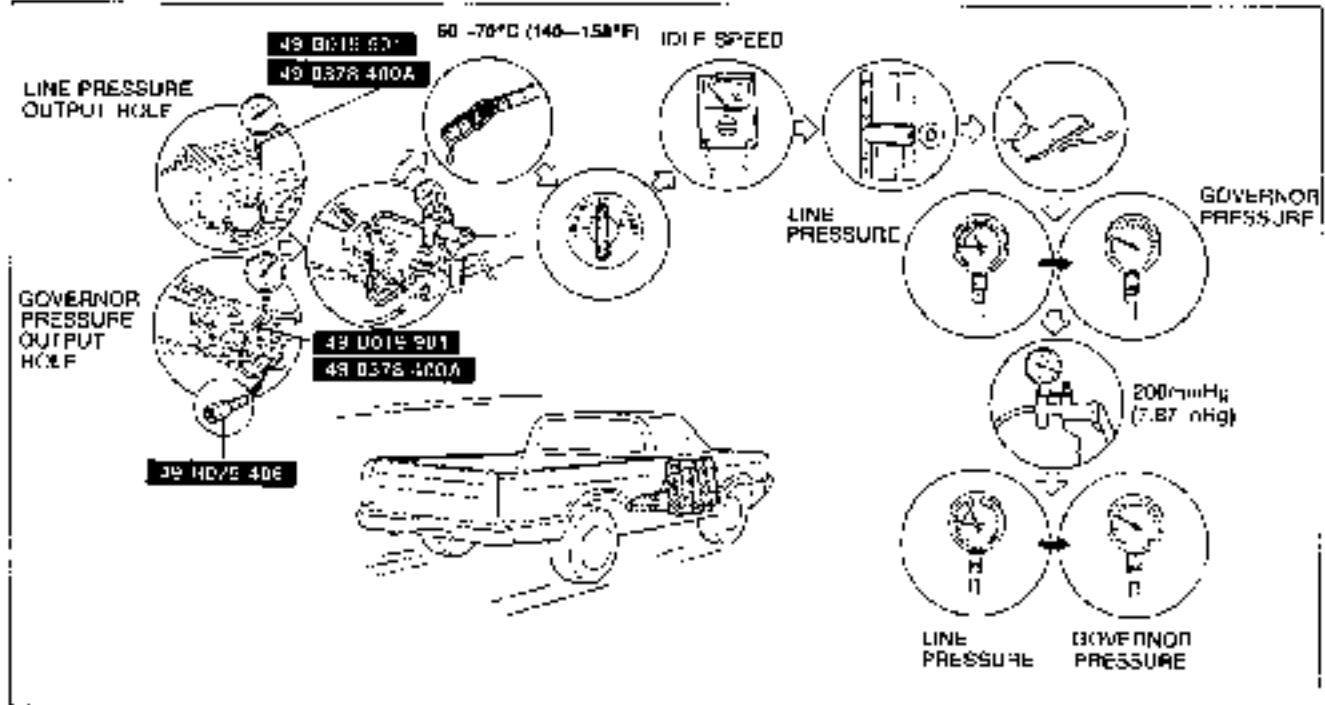
9VJ0K2 032

LINE PRESSURE CUTBACK POINT TEST

This test checks line pressure cutback point for checking of the hydraulic components.

Preparation

1. Connect the **SST** to the line pressure output hole and the governor pressure output hole.
2. Place the **SST** inside the vehicle.
3. Disconnect the hose and plug it to the vacuum diaphragm.
4. Connect a vacuum pump to the vacuum diaphragm and place the pump inside the vehicle.
5. Start the engine and warm up the ATF; then check the ATF level.

Procedure

25J0K11-09

1. Start the engine and check the idle speed in P range.

Idle speed

F2 Carb. : 800—850 (800 $\pm$ 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 ² , psi)		
	F2 EGI	F2 Carb.	G6
Atmospheric pressure	108—167 (1.1—1.7, 16—24)	137—198 (1.4—2.0, 20—28)	128—166 (1.3—1.9, 19—24)
200 (7.87)	89—118 (0.9—1.2, 9—17)	69—128 (0.7—1.3, 10—18)	78—127 (0.8—1.4, 11—20)

34J0K11-02

Evaluation of Cutback Point Test

Condition	Possible cause
Not within specification	Missing diaphragm nut, too tight, incorrect, or both. Stuck valve in control valve.

34J0K11-02

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

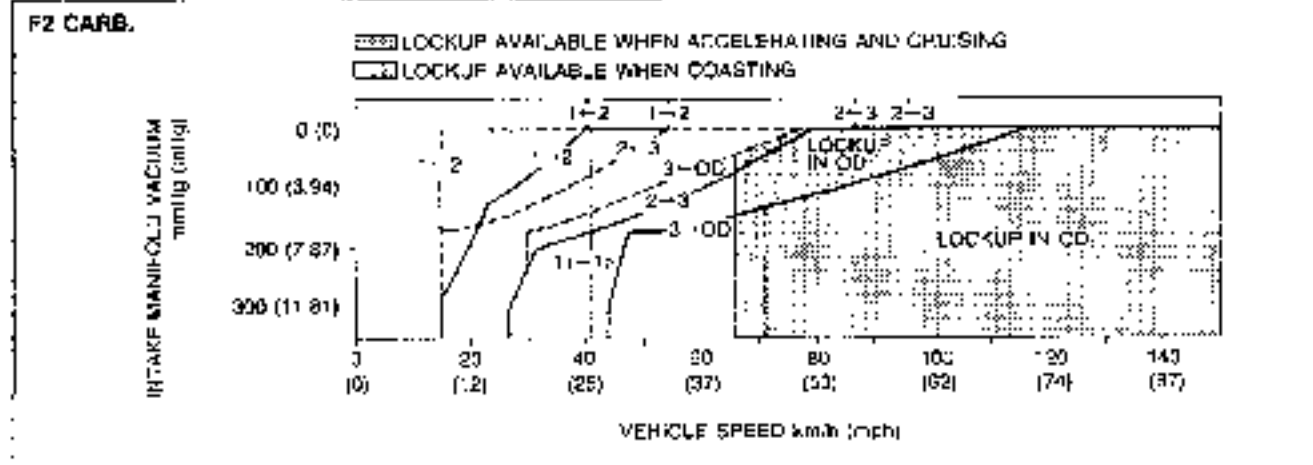
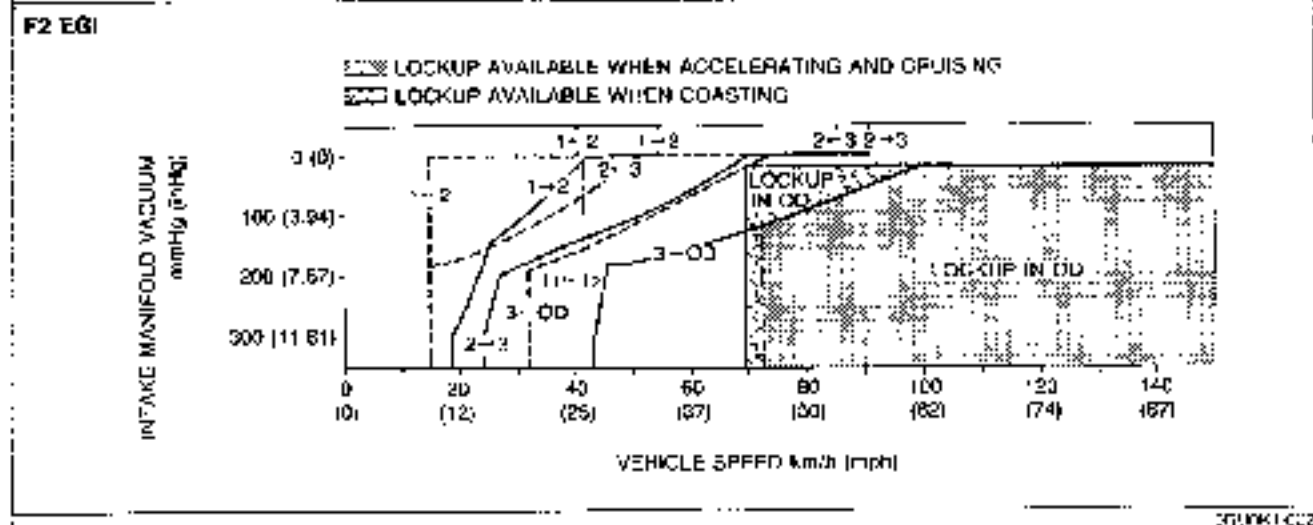
Perform the test at normal ATF operating temperature (60—70°C, 140—158°F).

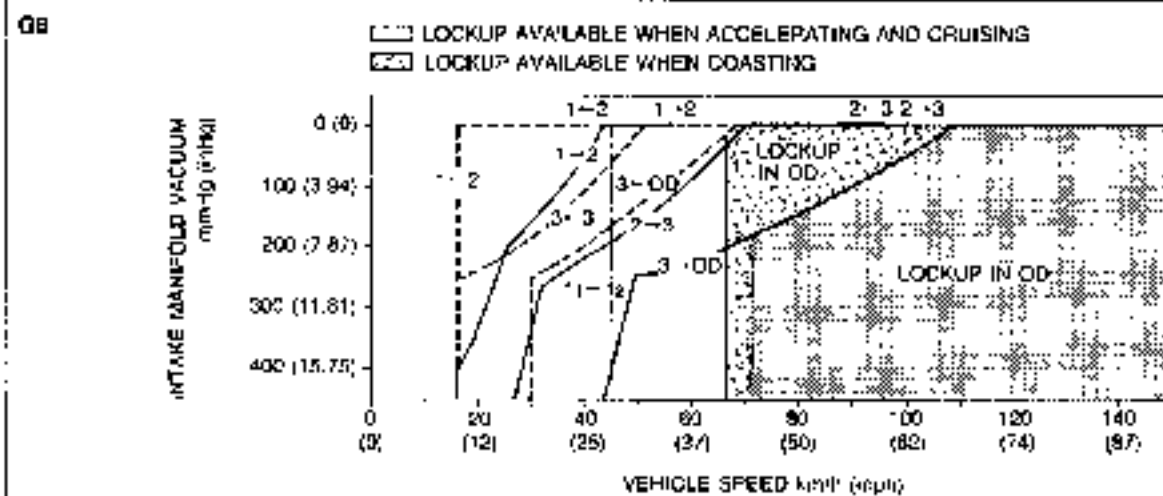
D-RANGE TEST**Shift Point, Shift Pattern, and Shift Shock**

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

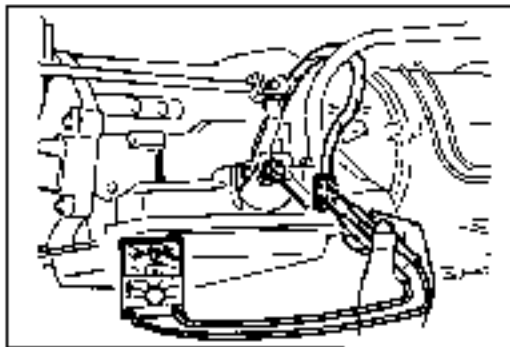
1. Shift into P range on a gentle slope, release the brake, and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at maximum of 4 km/h (2.5 mph) on a level surface, and check that the vehicle stops.

AWC000000

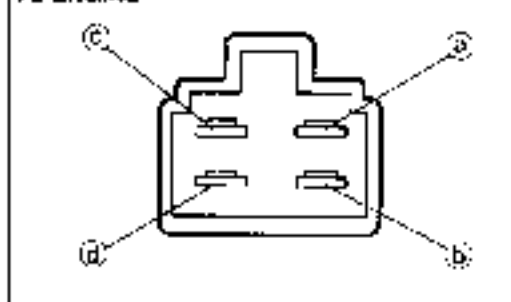
Vehicle speed at gearshift table

Range	Throttle condition (Manifold vacuum)	Shifting	Vehicle speed km/h (mph)		
			F2 EQI	F2 Carb.	GB
D	Fully opened	D ₁ → D ₂	51—57 (32—35)	52—58 (32—36)	53—59 (33—37)
		D ₂ → D ₃	93—98 (58—61)	88—94 (55—58)	97—103 (60—64)
		OD → D ₃	Above 54 (52)	Above 83 (51)	Above 91 (56)
		D ₃ → D ₄	64—90 (52—56)	83—89 (51—55)	91—97 (56—60)
		D ₄ → D ₅	37—43 (23—27)	38—44 (24—27)	37—43 (23—27)
	Half throttle 200 mmHg (7.37 inHg)	D ₁ → D ₂	16—22 (10—14)	20—28 (12—18)	23—29 (14—18)
		D ₂ → D ₃	26—35 (16—22)	24—30 (15—19)	40—46 (25—29)
		D ₃ → OD	43—48 (27—30)	42—40 (26—30)	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 ₃	26—32 (16—20)	20—35 (18—22)	36—42 (22—26)
		D ₃ → D ₄	12—18 (7—11)	12—18 (7—11)	25—31 (16—19)
		D ₄ → D ₅	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
	Fully closed	D ₁ → D ₂	12—18 (7—11)	16—22 (10—14)	13—19 (8—12)
		D ₂ → D ₃	24—30 (15—19)	21—27 (13—17)	24—30 (15—19)
		D ₃ → OD	41—47 (25—29)	40—46 (25—29)	40—46 (25—29)
		OD → D ₃	26—32 (16—20)	26—35 (18—22)	27—33 (17—20)
		D ₃ → D ₂	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
		D ₄ → D ₃	12—18 (7—11)	12—18 (7—11)	13—19 (8—12)
I	..	D ₅ → I	36—44 (24—27)	36—44 (24—27)	41—47 (25—29)

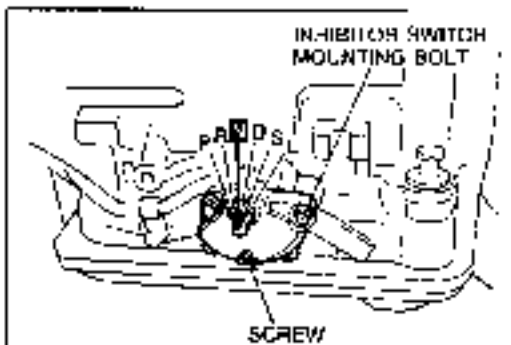
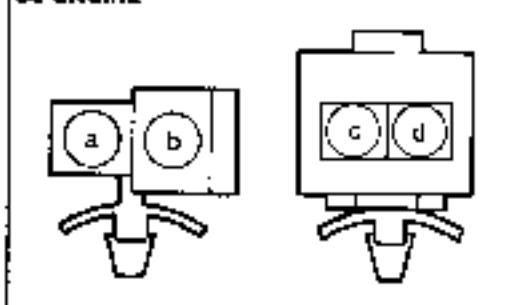
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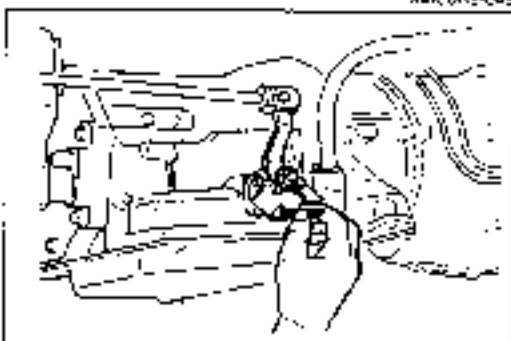
COL001-024

F2 ENGINE

-BUCK1-005

G6 ENGINE

HWA-0034-005



DNL00-01012

ELECTRONIC SYSTEM COMPONENTS**INHIBITOR SWITCH****Inspection****Operation**

1. Check that the starter operate with the ignition switch at START position and the selector in the P and in the N range only, and that it does not operate in any other position.
2. Check that the backup lights illuminate when shifted to the R range with the ignition switch ON.
3. Check the inhibitor switch if it is not as specified.

Continuity

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the control linkage from the manual shaft.
3. Disconnect the inhibitor switch connector.
4. Check continuity of the terminals as shown.

Position	Connector terminal			
	a	b	c	d
P	○	○		
R			○	○
N	○	○		
D, 1, 2				

○ indicates continuity

5. If not correct, adjust the inhibitor switch.
6. If correct, check or adjust the selector lever and control linkage.

Adjustment

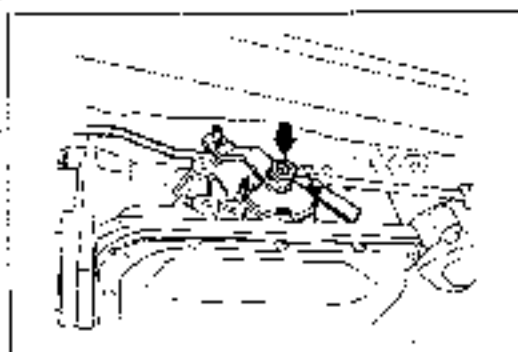
1. Move the manual shaft to N position.
2. Loosen the inhibitor switch mounting bolts.
3. Remove the screw on the switch body and move the inhibitor switch so that the screw hole is aligned with the small hole inside the switch. Check their alignment by inserting an **approx. 2.0mm (0.079 in)** diameter pin through the holes.

4. Tighten the mounting bolts and remove the pin.

Tightening torque:

4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)

5. Install and tighten the screw in the switch body.
6. Check the continuity of the inhibitor switch.
7. If not correct, replace the inhibitor switch.

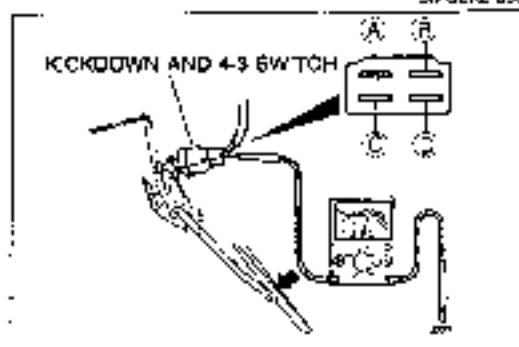


9MUGK2-050

8. Connect the control linkage.

Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



9MUGK1-007

KICKDOWN AND 4-3 SWITCH

Inspection

Kickdown switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal ③ (YG).

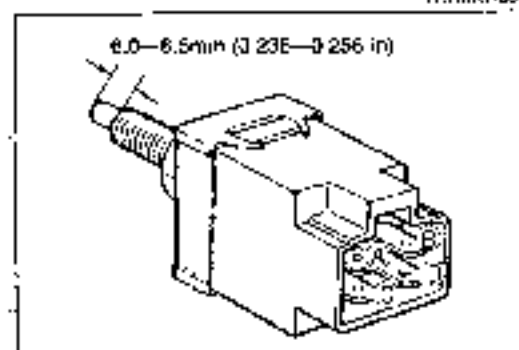
V_B: Battery voltage

Terminal voltage	Depressed
V _B	7.0—8.5 (FuR)
0V	0.9—7.8

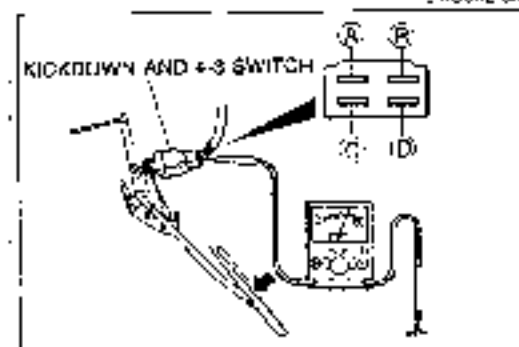
3. If not correct, check the continuity between terminals.

Kickdown switch continuity

1. Disconnect the connector.
2. Check the continuity between terminals ③ and ④ when the tip of the switch is depressed **8.0—8.5mm (0.236—0.256 in)**.
3. If not correct, replace the switch.
4. If correct, adjust the switch.



9MUGK2-049



9MUGK1-005

4-3 switch terminal voltage

1. Turn the ignition switch ON.
2. Check the voltage of terminal ① (GB).

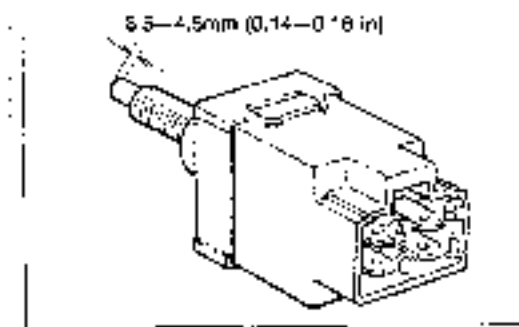
V_B: Battery voltage

Terminal voltage	Depressed
V _B	6.8—5.5
0V	0.8—5.6

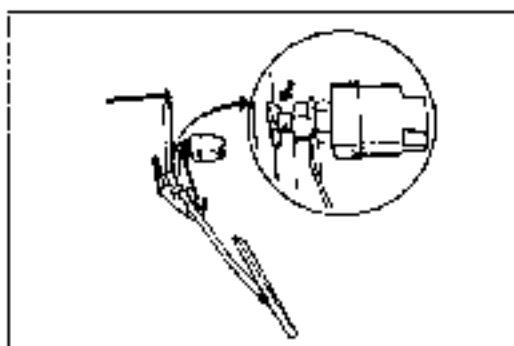
3. If not correct, check the continuity between terminals.

4-3 switch continuity

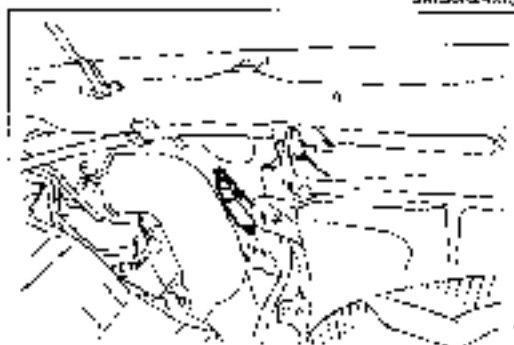
1. Disconnect the connector.
2. Check the continuity between terminals ① and ② when the tip of the switch is depressed **3.5—4.5mm (0.14—0.18 in)**.
3. If not correct, replace the switch.
4. If correct, adjust the switch.



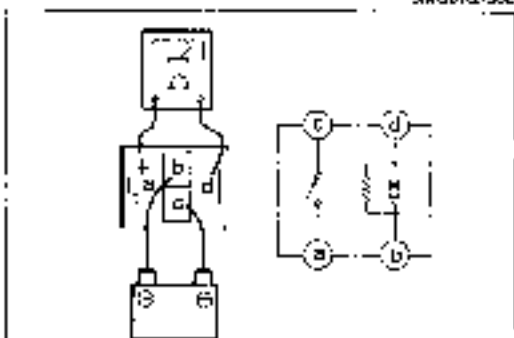
9MUGK1-034



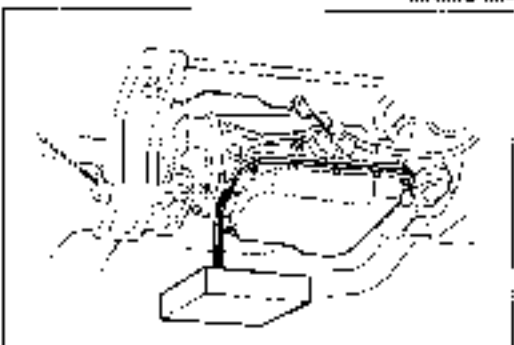
9M,JKK2-066



9M,JKK2-066



9M,JKK2-066



9M,C4-7-055



9M,JKK2-066

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)

6. Reconnect the connector.
7. Depress the accelerator pedal fully and verify that the kickdown switch clicks at the fully depressed position.

KICKDOWN RELAY**Inspection**

1. Remove the kickdown relay.
2. Connect a battery and an ohmmeter as shown.
3. First check that there is continuity, then disconnect the battery and check that there is no continuity.
4. If not correct, replace the relay.

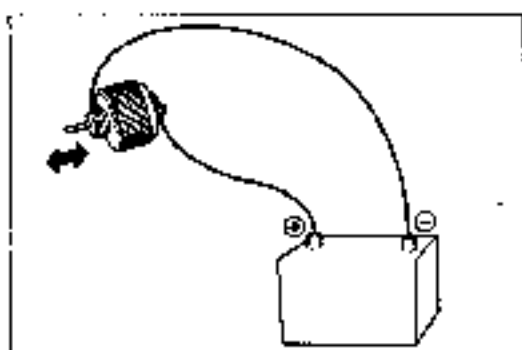
KICKDOWN SOLENOID**Inspection**

1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts and drain **approx. 1.0 liter (1.1 US qt, 0.9 Imp qt)** of ATF.
3. Tighten the oil pan mounting bolts.

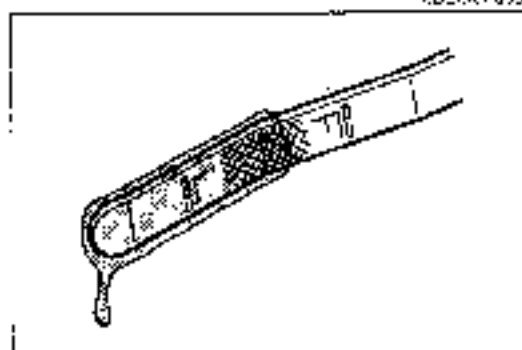
Tightening torque:

5.9—7.8 Nm (60—80 cm·kg, 52—69 in·lb)

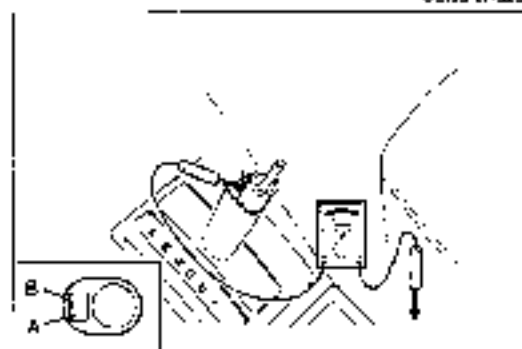
4. Remove the kickdown solenoid.



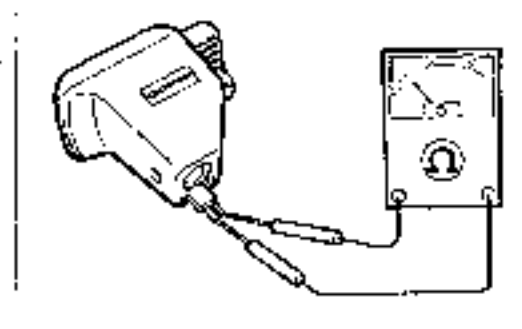
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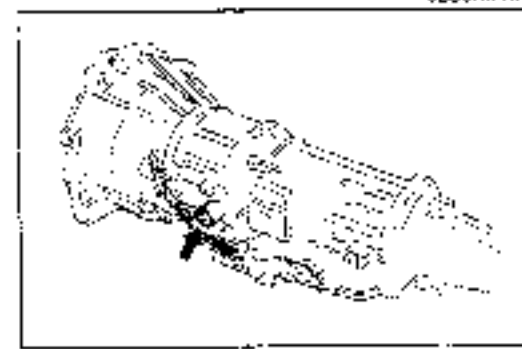
03UDK1-023



2AUK1-010



8DLCKK-001



05UJX1-026

5. Apply battery voltage to the kickdown solenoid and verify that the kickdown solenoid clicks.
6. If not correct, replace the kickdown solenoid.
7. Apply the ATF to the new O-ring and install it to the solenoid; then install the kickdown solenoid.

8. Add ATF to the correct level. (Refer to page K1-33.)

OD OFF SWITCH

Inspection

Terminal voltage

1. Remove the selector lever knob.
2. Turn the ignition switch ON.
3. Check the voltage between terminal A and ground, and between terminal B and ground.

Vb: Battery voltage

Terminal	Terminal voltage
A and ground	0V
B and ground	Vb

4. If correct, check continuity between the terminals.
5. If not correct, check the wiring harness.

Continuity

1. Check continuity of the terminals.

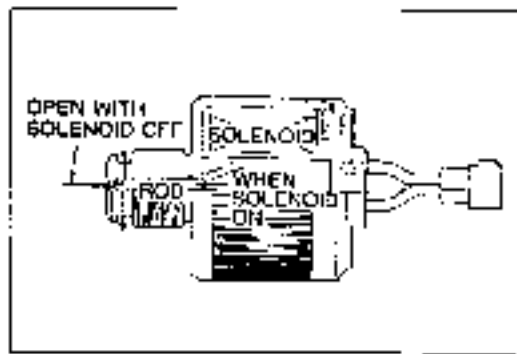
Continuity	Switch
Yes	Proper
No	Decreased

2. If not correct, replace the selector lever knob.

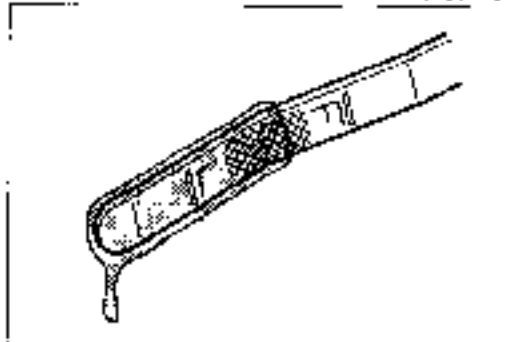
OD CANCEL SOLENOID

Inspection

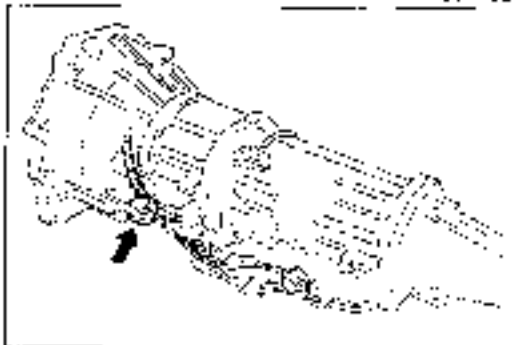
1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF as described in KICKDOWN SOLENOID section. (Refer to page K1-27.)
3. Remove the OD cancel solenoid.



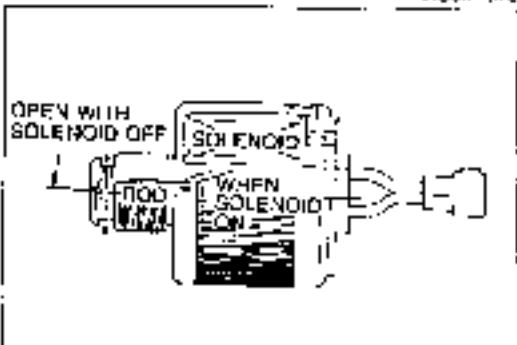
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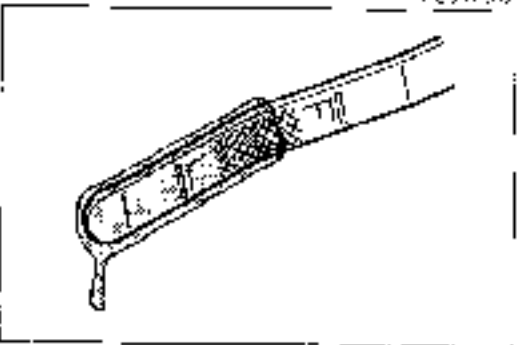
310741-02



310741-03



310741-04



310741-05

4. Apply battery voltage to the solenoid and verify operation of the solenoid.

Note

The oil passage should close when current is applied and open when it is cut off.

5. If not correct, replace the OD cancel solenoid.
6. Apply the ATF to the new O-ring and install it to the solenoid, then install the OD cancel solenoid.

7. Add ATF to the correct level. (Refer to page K1-33.)

LOCKUP SOLENOID

Inspection

1. Jack up the vehicle and support it with safety stands.
2. Drain the ATF as described in KICKDOWN SOLENOID section. (Refer to page K1-27.)
3. Remove the lockup solenoid.

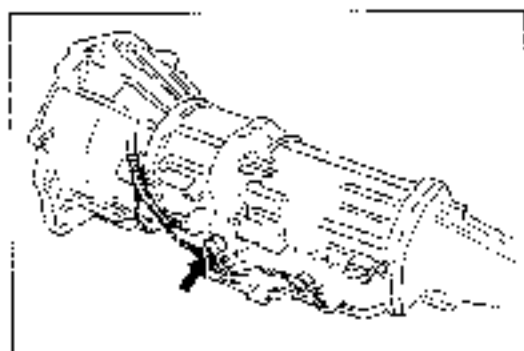
4. Apply battery voltage to the solenoid and verify operation of the solenoid.

Note

The oil passage should close when current is applied and open when it is cut off.

5. If not correct, replace the lockup solenoid.
6. Apply the ATF to the new O-ring and install it to the solenoid; then install the lockup solenoid.

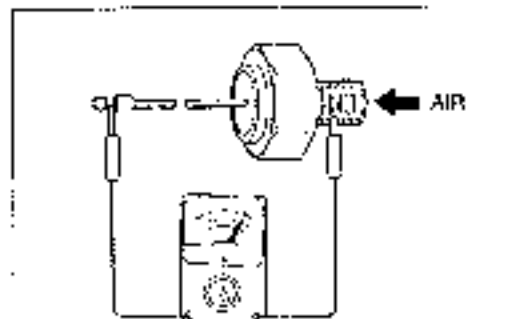
7. Add ATF to the correct level. (Refer to page K1-33.)



CSLCK1 C33

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.

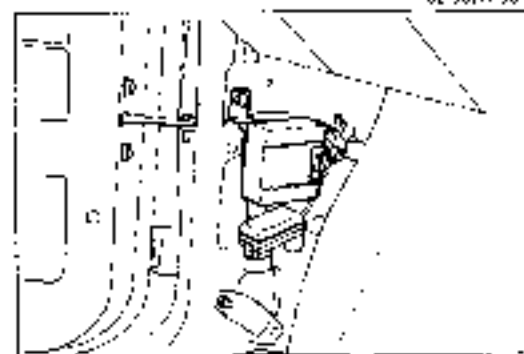


CSLCK1 C33

4. Use air pressure to verify operation of the switch.

Continuity	Pressure
Yes	Less than 49 kPa (0.5 kg/cm ² , 7.1 psi)
No	More than 294 kPa (3.0 kg/cm ² , 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.)

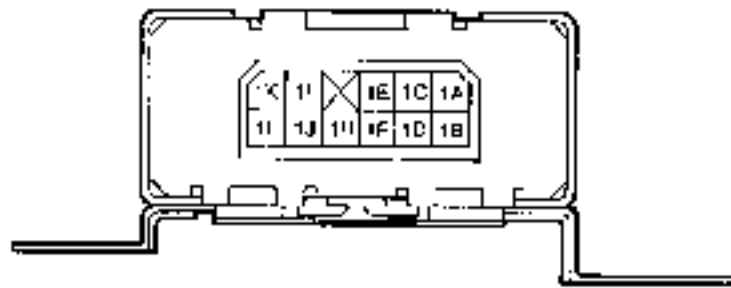


CSLCK1 C33

4AT CONTROL UNIT**Inspection**

1. Turn the IG switch OFF, and make sure the control unit F terminal is grounded.
2. Turn ON the IG switch, and make sure the E terminal voltage is battery voltage.

F2 engine

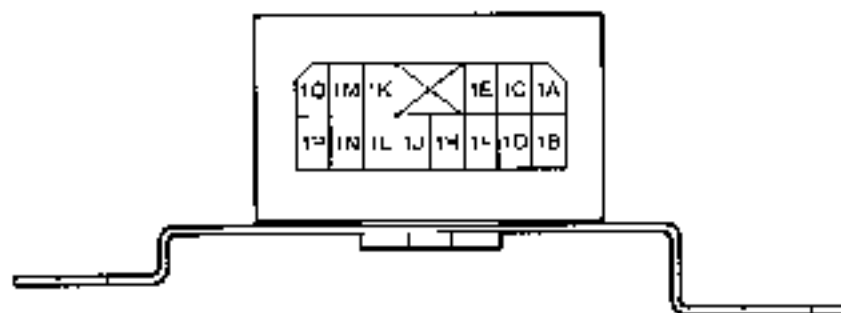


Vs: Battery voltage

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 unit	Vs Below 1.5V	Normal conditions Set or Resume switch ON on vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle cruise control operation)
1G (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)
1H (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			

BLOCK1-014

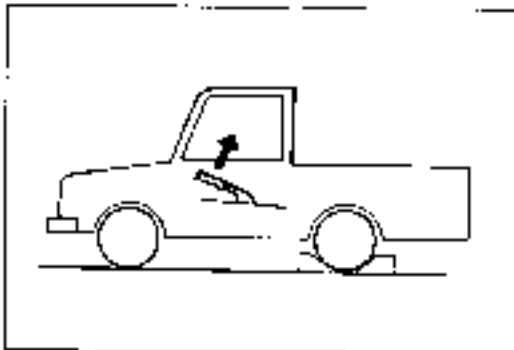
G6 engine



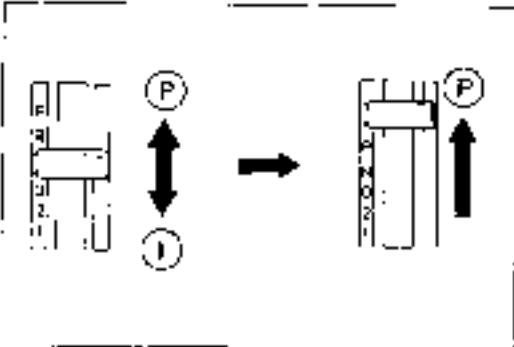
VB: Battery voltage

Terminal	Connected to	Voltage	Condition
1A (Battery power)	Battery	VB	Ignition switch ON
		0V	Ignition switch OFF
1B (Ground)	Battery ground	0V	Constant
1C (Input)	OD OFF switch	VB	OD OFF switch depressed (ON). •OD not available
		0V	OD OFF switch released (OFF). •OD available
1D			
1L (Input)	4/3 switch	VB	Switch ON. •Throttle opening (80—100)
		0V	Switch OFF. •Other than conditions above
1T (Input)	Oil pressure switch	VB	Switch OFF. •1st, 2nd, and 3rd gear positions in forward ranges •P, R, and N ranges
		0V	Switch ON. •OD gear position
1H (Input)	Engine control unit	VB	2Y terminal of engine control unit voltage VB •Normal condition
		0V	2Y terminal of engine control unit voltage 0V •Throttle fully open position
1J			
1J (Input)	Cruise control unit	VB	Normal conditions
		Below 1.5V	Set or Resume switch ON, or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle: cruise control operation)
1K (Output)	OD cancel solenoid	VB	Solenoid OFF. •OD gear position
		Below 1.5V	Solenoid ON. •1st, 2nd, and 3rd gear positions in forward ranges •P, R, and N ranges
1L (Input)	Speed sensor	1.5—7V	During driving
		Approx. 7V or below 1.5V	Vehicle stopped
1M (Input)	Kickdown relay	VB	Kickdown relay OFF. •Other than conditions below
		Below 1.5V	Kickdown relay ON. •Kickdown switch ON (throttle opening more than 7/8)
1N (Output)	Lockup solenoid	VB	Solenoid OFF. •Non-lockup
		Below 1.5V	Solenoid ON. •Lockup

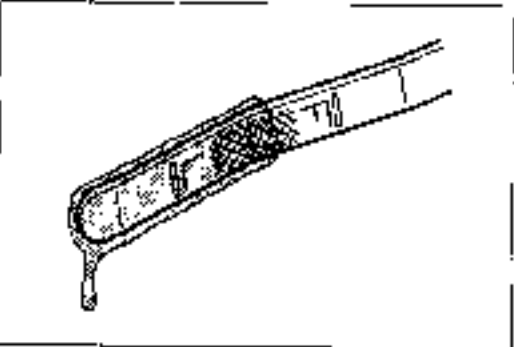
2H00K1-015



BUCK1 009



79000C-125



910-K092



79000C-125

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 **80—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

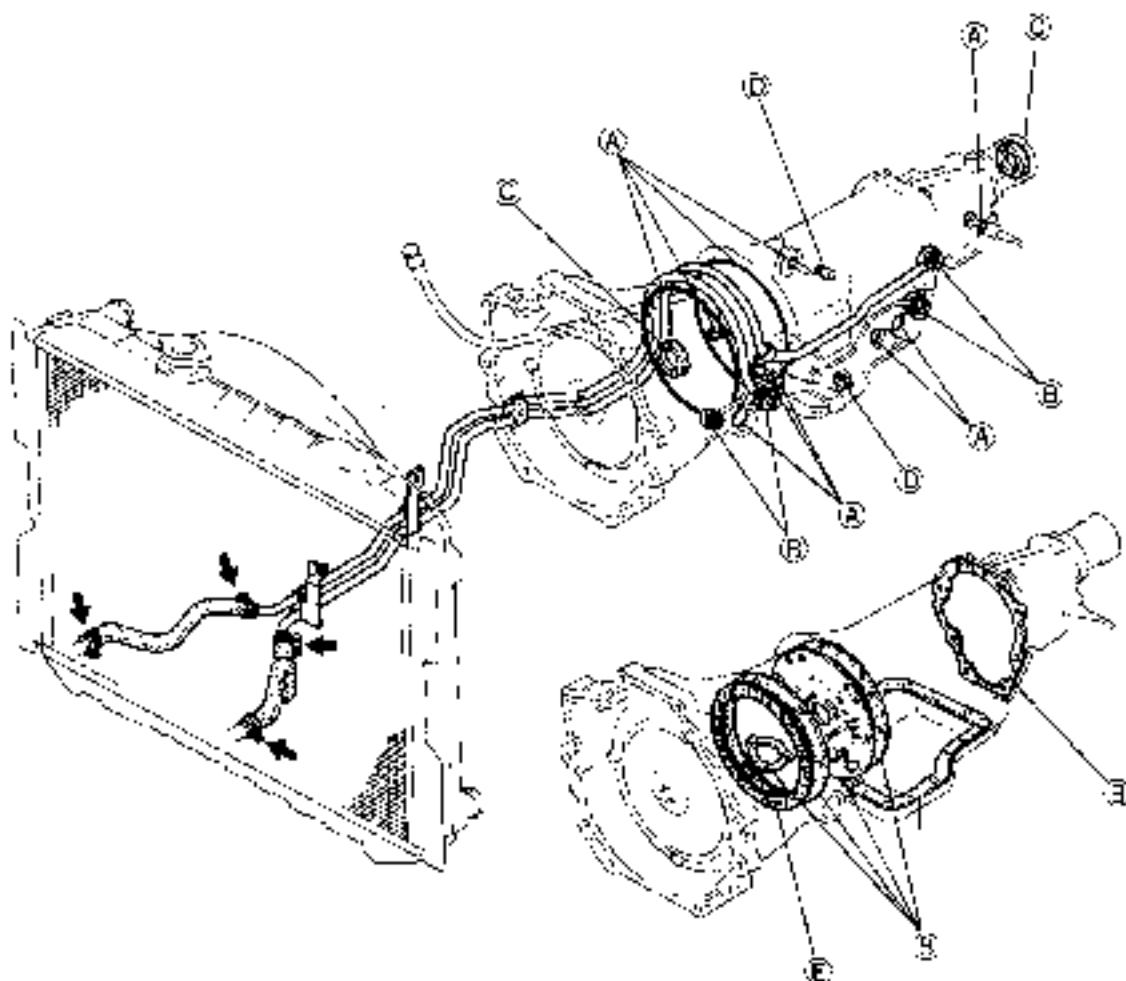
Determine whether or not the automatic transmission should be disassembled by observing the condition of the ATF carefully.

If the ATF is muddy and varnished, it indicates burned drive plates.

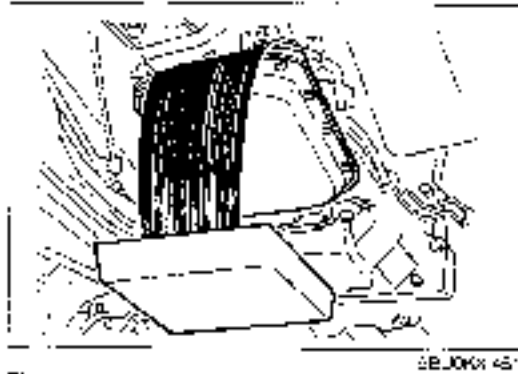
Fluid leaks

Check for fluid leaks of the transmission as shown below; repair or replace as necessary.

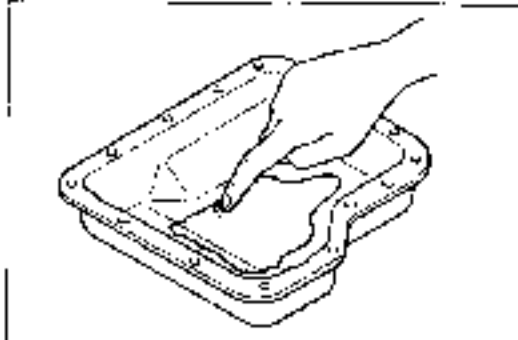
1. Gaskets, O-ring, and plugs
2. Oil hoses, oil pipes, and connections
3. Oil cooler



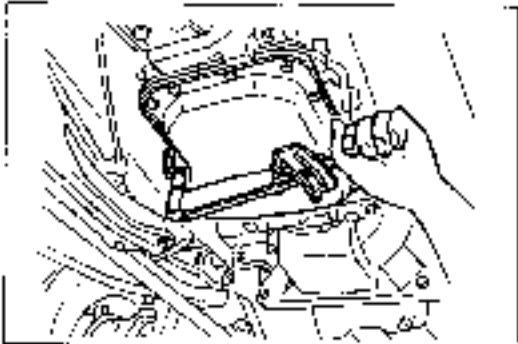
- A O-RING
- B GASKET
- C OIL SEAL
- D PLUG
- E OTHERS



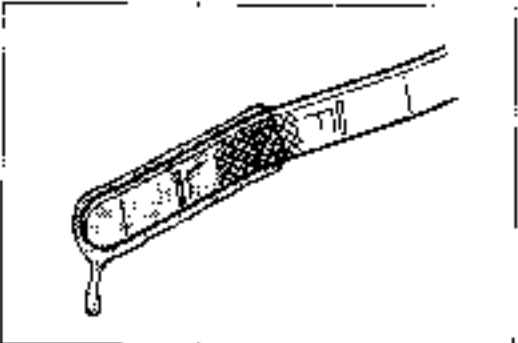
88J04X 451



88J04X 452



88J04X 453



88J04X 454

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 N·m (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.)

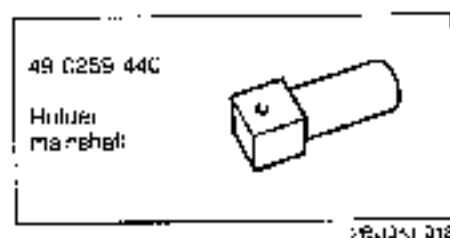
Specified ATF: Dexron[®] II or M-III

TRANSMISSION

TRANSMISSION UNIT (REMOVAL AND INSTALLATION)

Preparation

SST

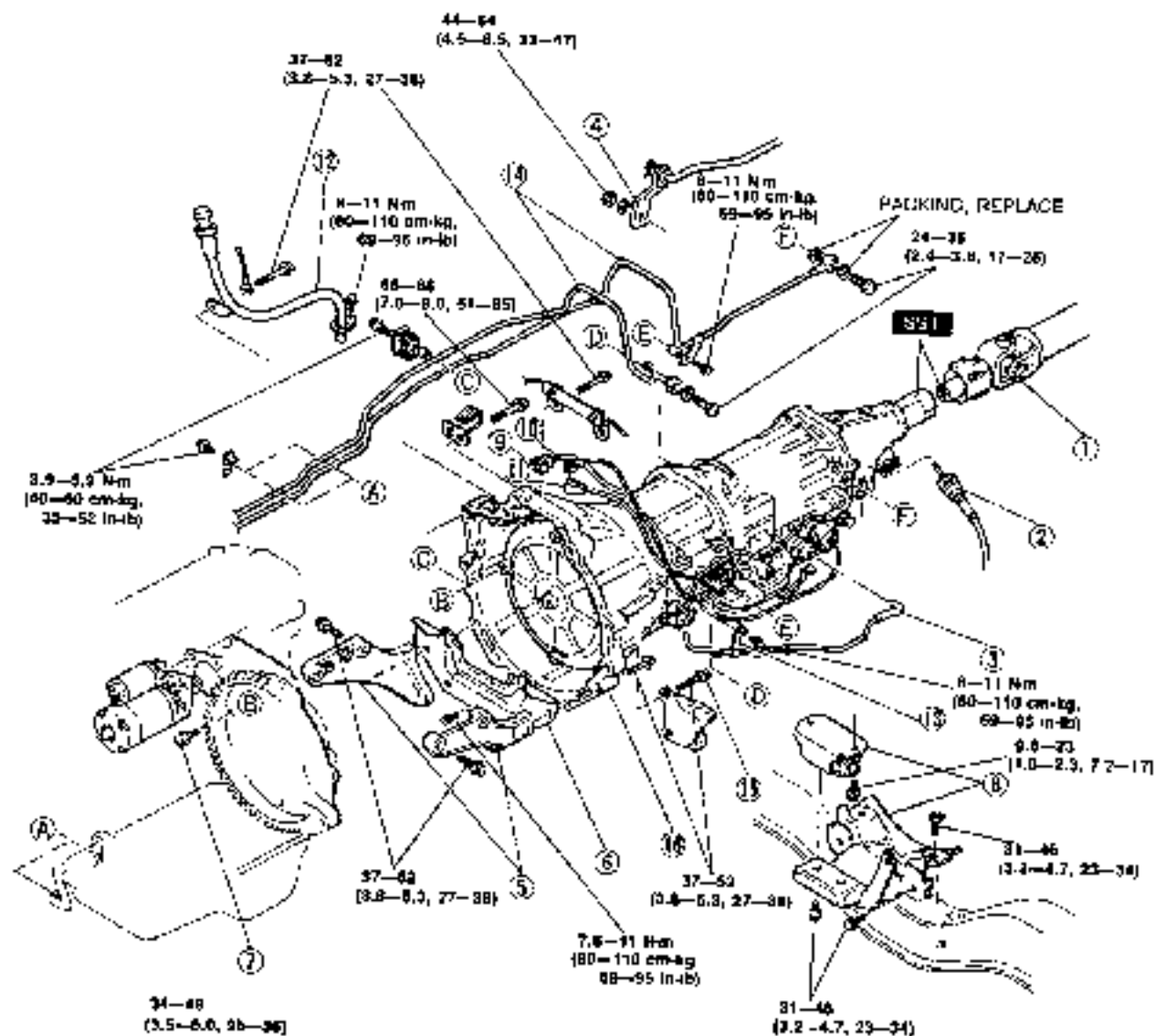


1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Drain the ATF into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.

Caution

Do not turn the transmission over before removing the oil pan.

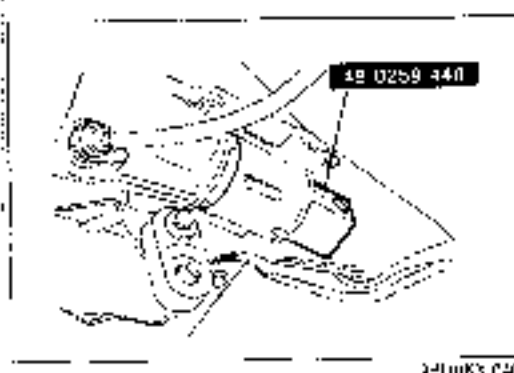
5. After removal, remove the oil pan to check condition of the transmission.
6. Install in the order shown in the figure, referring to **Installation Note**.
7. Fill the transmission with the specified amount and type of the ATF after installation.
8. Warm up the engine, and inspect for oil leakage and transmission operation.



MI-11 (Rev. 10-29-65, 4-1-67)

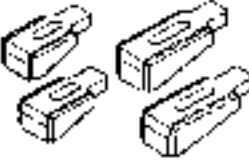
2410K'-3 4

1. Propeller shaft Removal..... page K1-38	7. Torque converter attaching bolt Installation... page K1-126	11. OD cancel solenoid connector
2. Speedometer cable	8. Mission mount bracket (A/V lower 30mm (* 2 in))	12. Level gauge pipe
3. Vacuum hose	9. Inhibitor SW connector	13. Vacuum pipe bracket
4. Shift lever	10. Kickdown solenoid connector	14. Oil cooler pipe
5. Gusset plate		15. Mission mount ball
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**

49 0107 550A Engine stand 	49 0319 UA04 Transmission hanger 	49 HC75 435Q Body (Part of 49 0319 CA04) 
49 0019 000 Holder (Part of 49 0319 UA04) 	49 0375 390 Pulley oil pump 	1E0541 010

Precaution**General notes:**

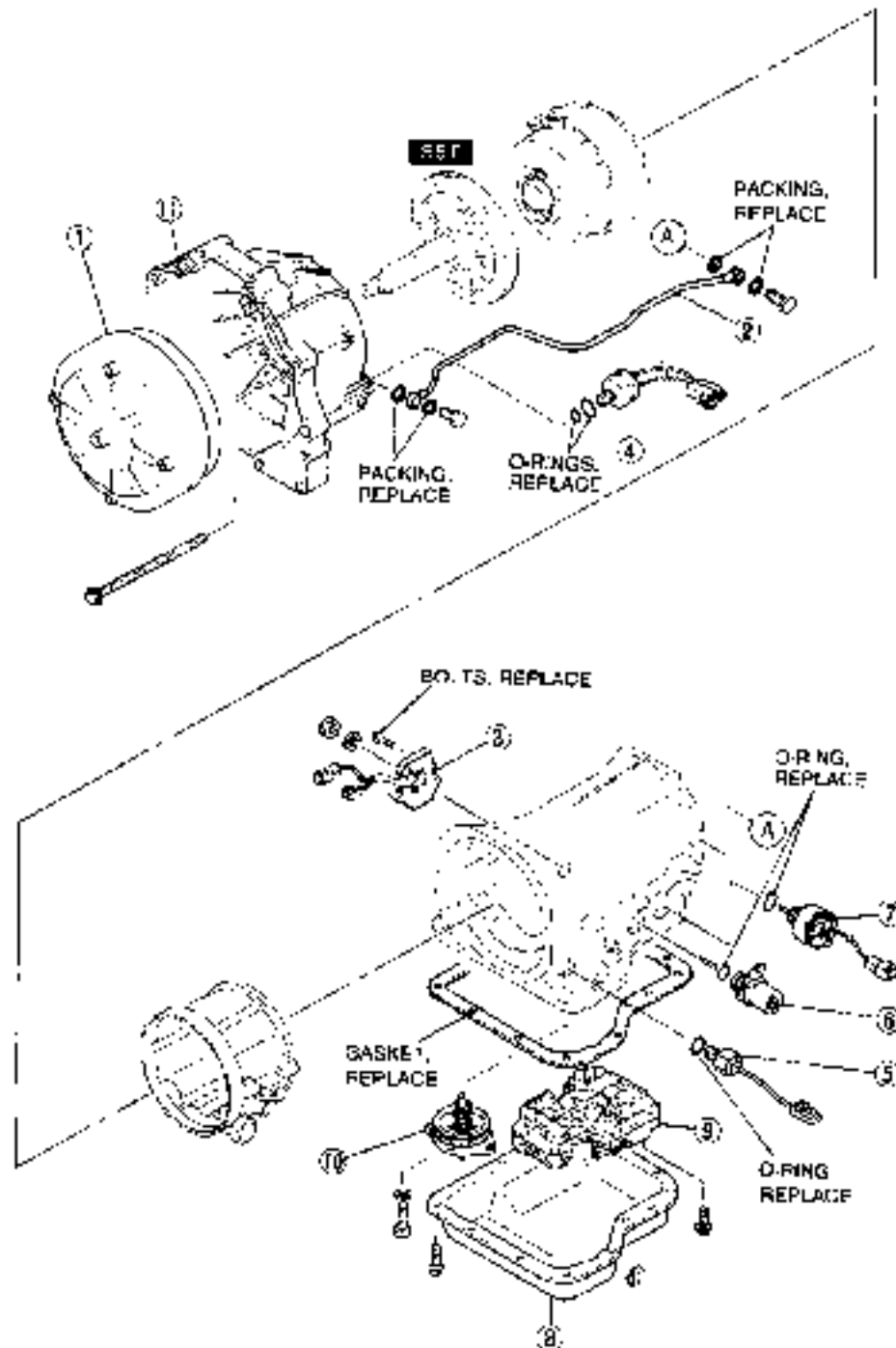
1. Disassemble transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light alloy case joints.
4. Never use rags during disassembly; they may leave particles that can clog fluid passages.
5. Several parts resemble one another. Organize them so they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when a clutch or brake band is burned, or when the ATF has degenerated.

Cleaning notes:

1. Clean the transmission exterior thoroughly with steam or cleaning solvents, or both, before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

9MJC62 C33

Components



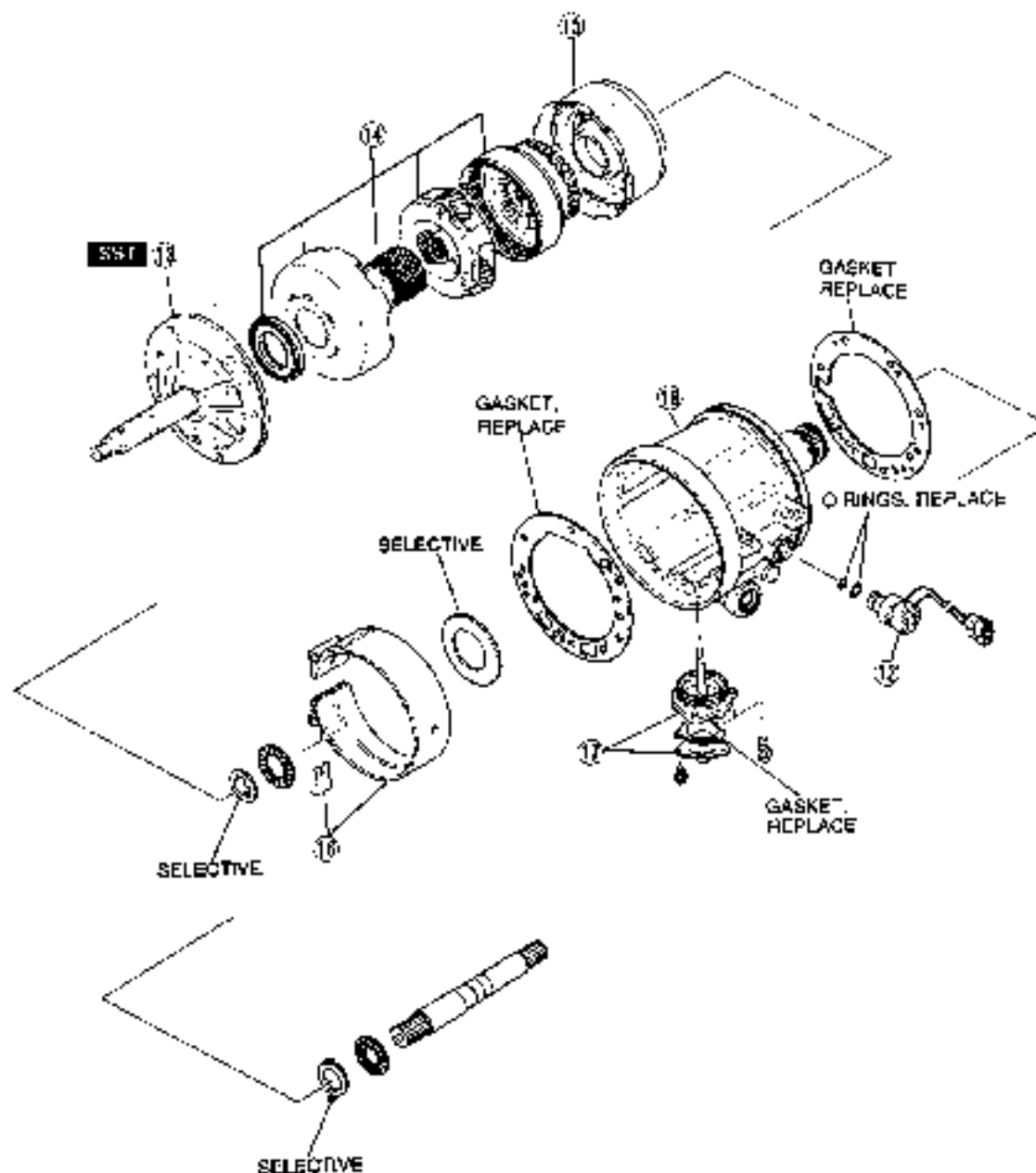
1. Torque converter
Inspection ... page K1-49
2. Governor pressure pipe
3. Inhibitor switch
Inspection ... page K1-25
Adjustment ... page K1-25
4. Lockup solenoid (G6 engine)
Inspection ... page K1-31

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

*30000001

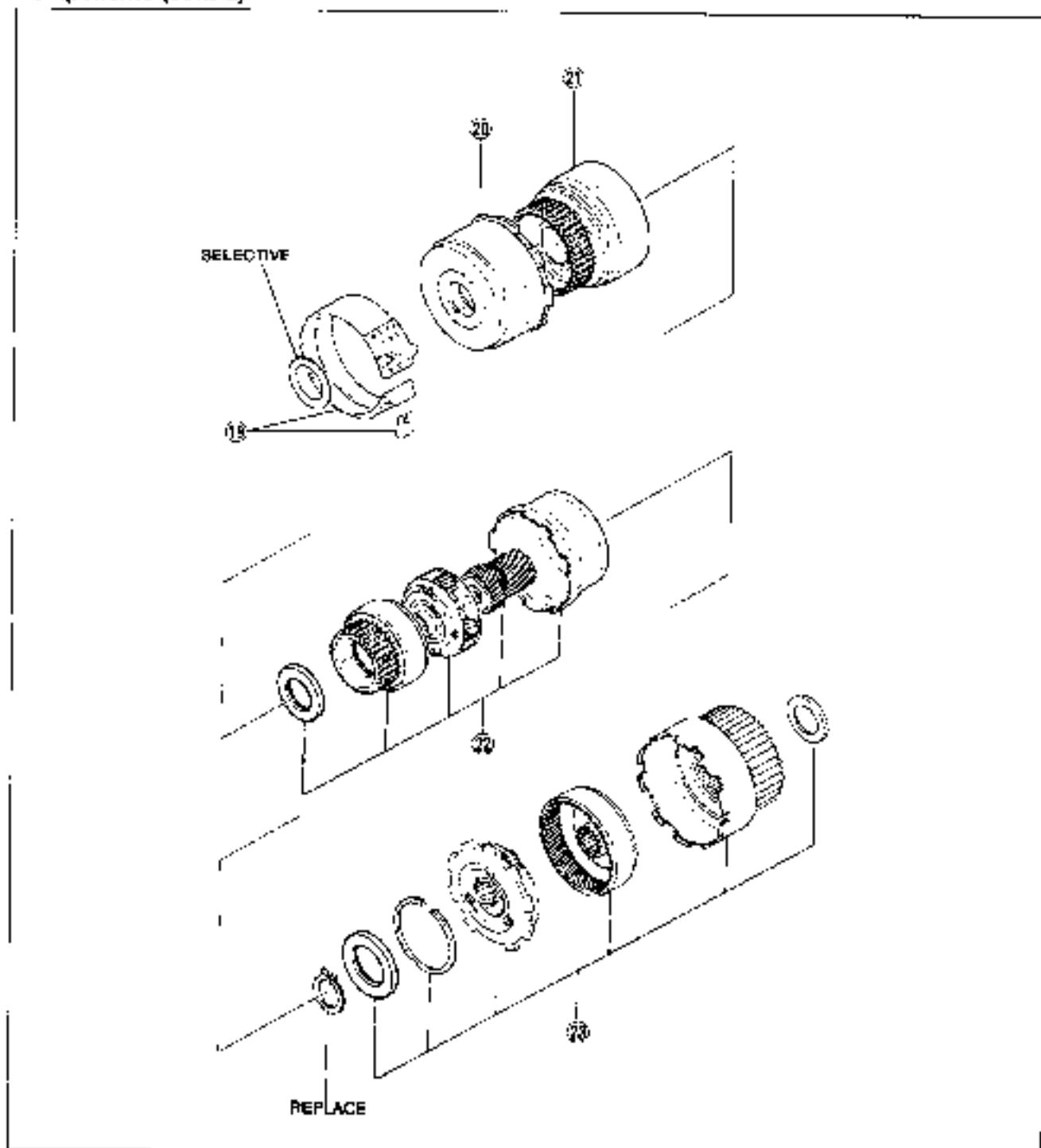
Components (cont'd)



CEUOV' (39)

12. OD cancel solenoid Inspection page K1-27	15. Direct clutch Disassembly, and Inspection page K1-55 Assembly page K1-59	18. Drum support, accumulator, and OD case Disassembly, and Inspection ... page K1-64 Assembly page K1- 65
13. Oil pump Disassembly, and Inspection page K1-50 Assembly page K1-52	16. OD brake band and band strut	
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	17. OD band servo and cover Disassembly, and Inspection page K1- 61 Assembly page K1- 62	

Components (cont'd)



3800K1-039

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

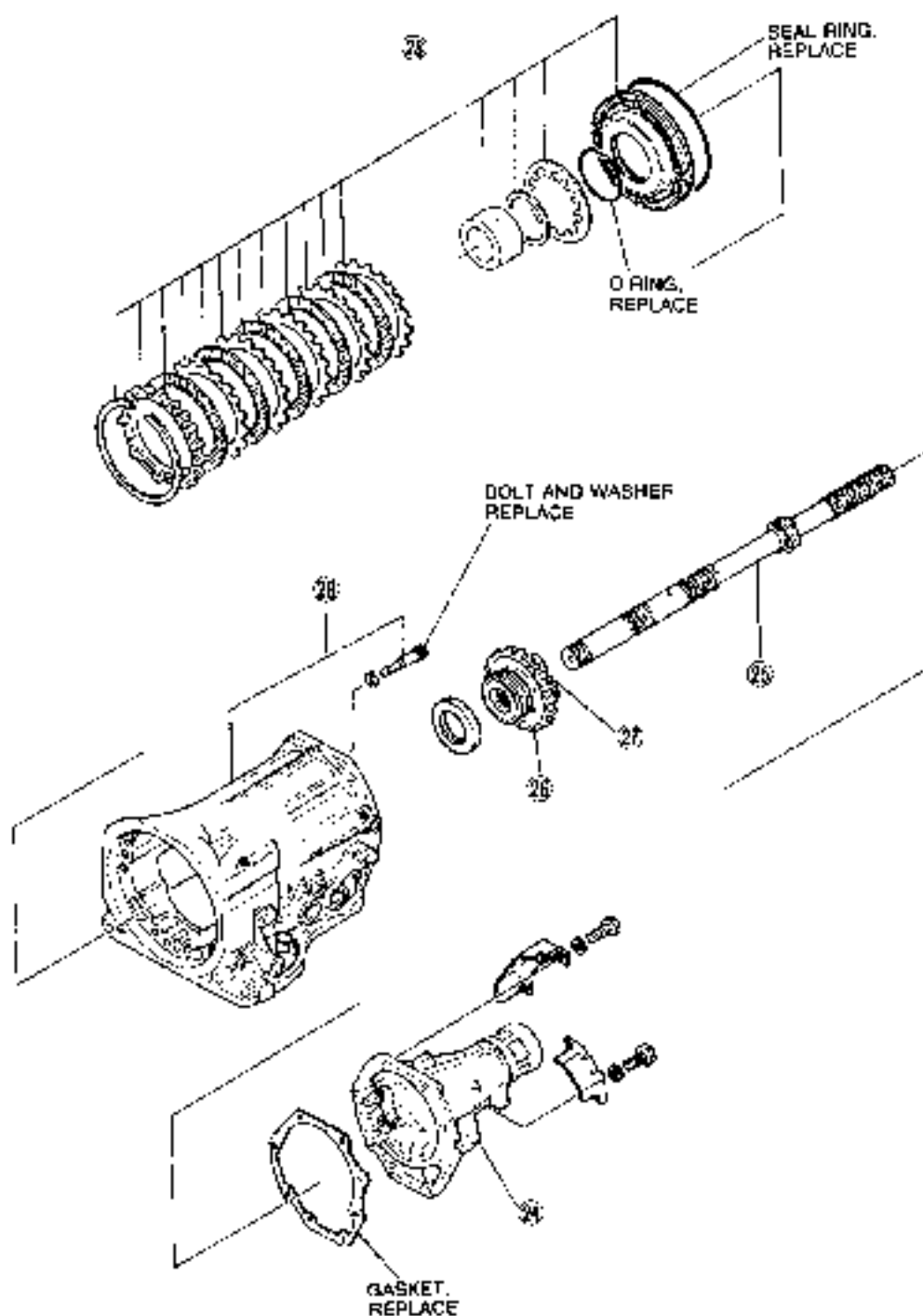
23. Rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch)

Disassembly, and

Inspection page K1-83

Assembly page K1-86

Components (cont'd)



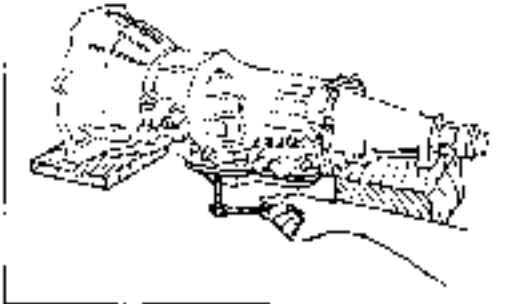
CDLCK1-040

24. Extension housing
Disassembly, and
Inspection page K1-95
Assembly page K1-96

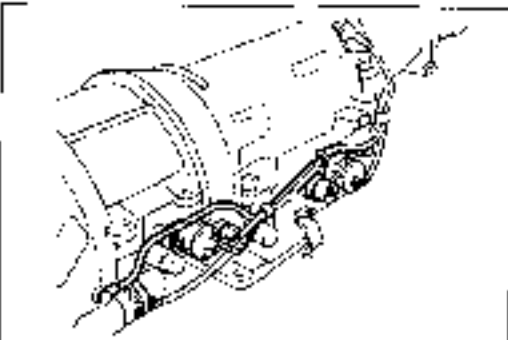
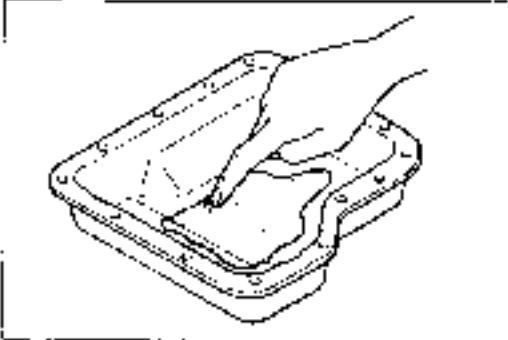
25. Output shaft
26. Parking gear

27. Governor
Disassembly, and
Inspection page K1-92
Assembly page K1-93

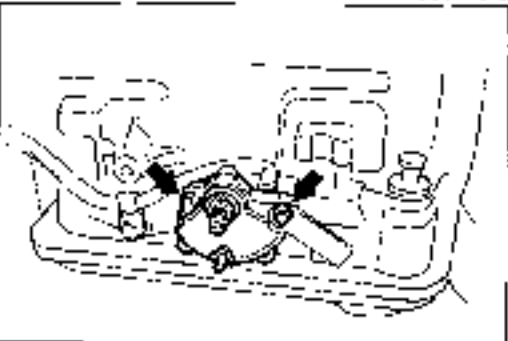
28. Low and reverse brake
Disassembly, and
Inspection page K1-87
Assembly page K1-90



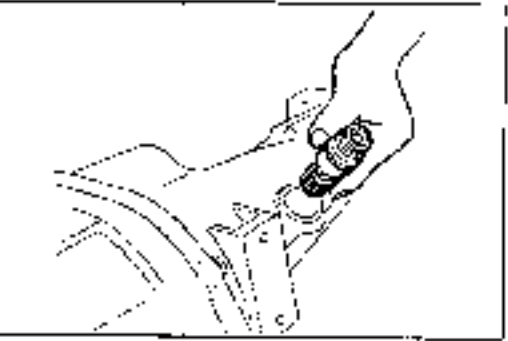
9M JK2 082



700K1 012



8M JK2 090



9M JK2 101

Procedure

Caution

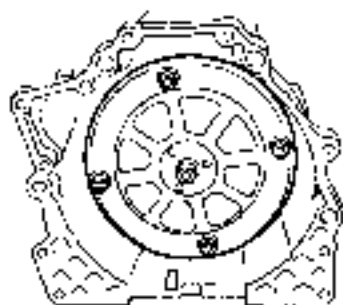
Keep the transmission oil pan down so that any foreign material will remain in the pan.

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.



3K1UCK2-092

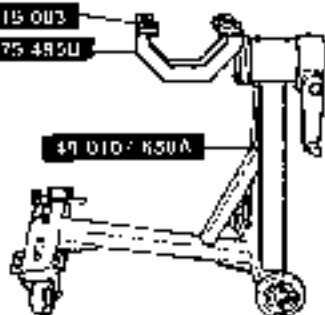
Caution

Be careful not to spill the ATF when removing the torque converter.

8. Remove the torque converter.

49 UD15 003
10 H075 485U

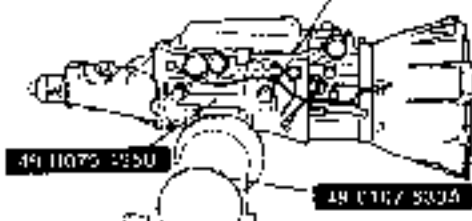
49 D107 850A



QWL0K2-093

9. Assemble the SST as shown.

49 UD15 003



49 H075 485U

49 D107 850A

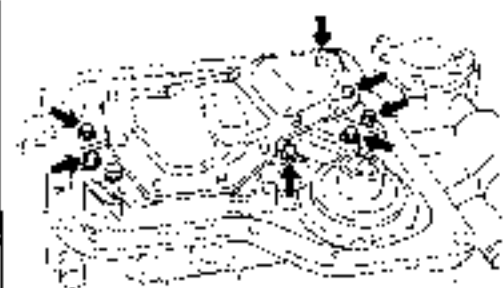
QWL0K2-095

10. Mount the transmission onto the SST.
11. Remove the oil pan and gasket.

Note

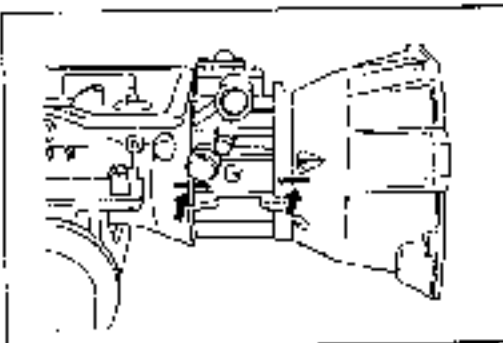
Neatly arrange bolts of different lengths for proper reassembly.

12. Remove the control valve body as shown in the figure.

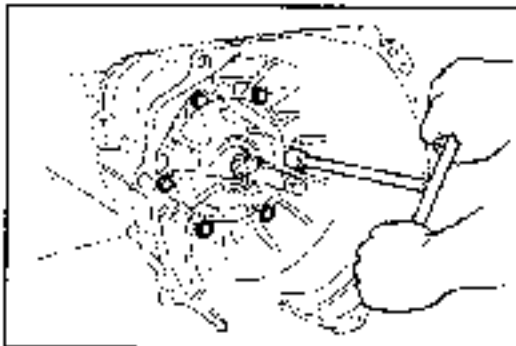


GMU0K2-097

13. Mark the converter housing, OD case, and transmission case for proper reassembly.

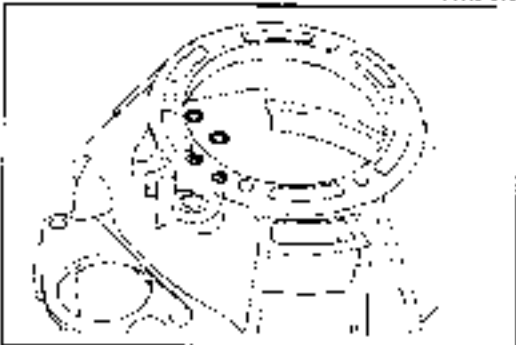


BMU0K2-008



RMU0K2-099

14. Remove the converter housing from the OD case.



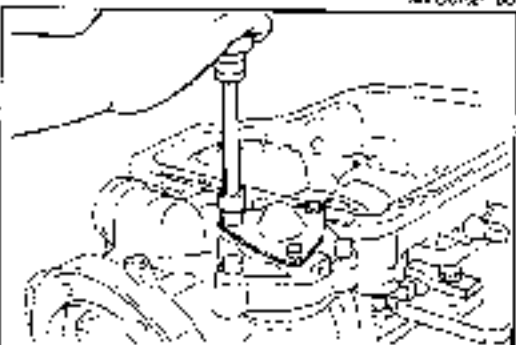
RMU0K2-100

15. Remove the O-rings from the converter housing.

Caution

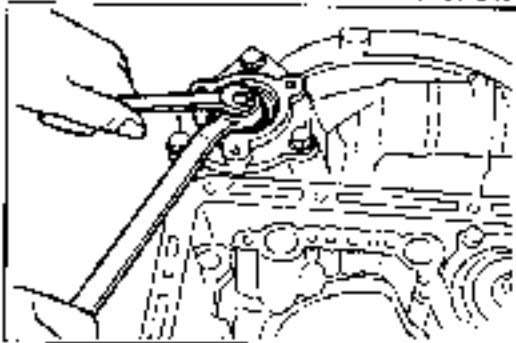
Do not damage the converter housing.

16. Clean the sealing compound from the converter housing.



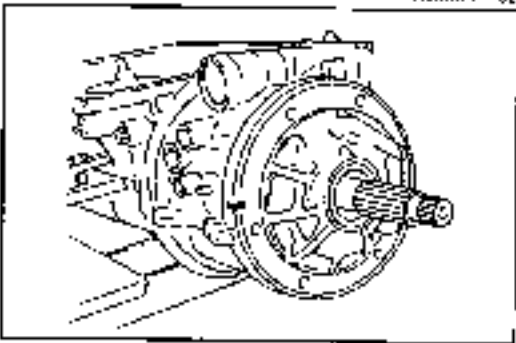
RMU0K2-101

17. Remove the OD band servo cover and gasket.



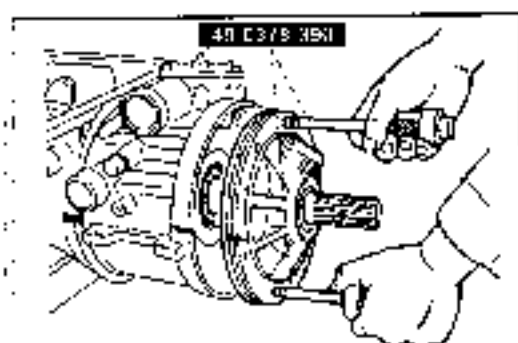
RMU0K2-102

18. Loosen the OD band servo locknut and tighten the piston stem.



RMU0K2-103

19. Mark the OD case and oil pump for proper reassembly.



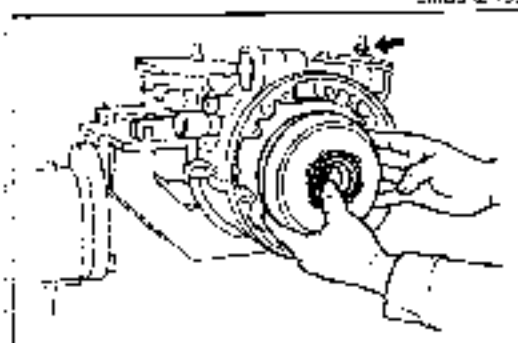
BMJ3-2 105

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.



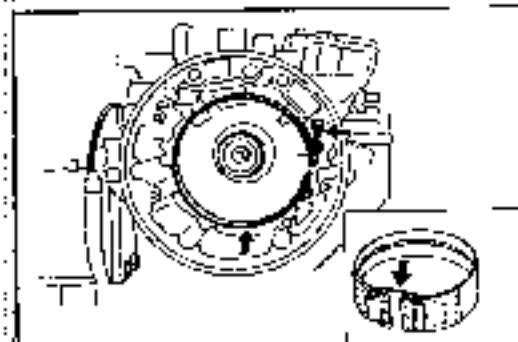
BMJ3-2 106

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.

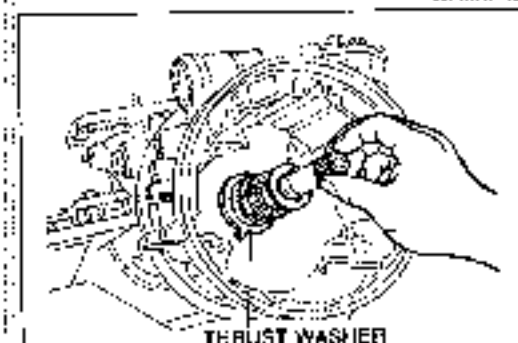
23. Remove the OD brake band and band strut



BMJ3-2 107

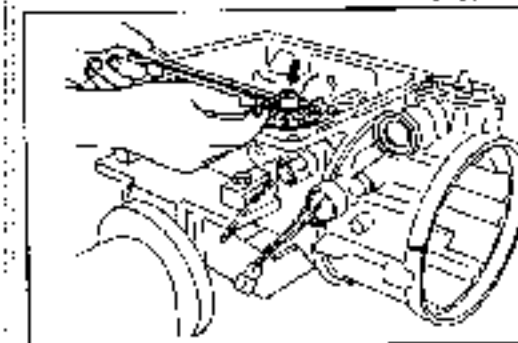
24. Remove the bearing races, bearing, and thrust washer. Inspect the following parts and repair or replace as necessary. Remove the intermediate shaft.

- 1) Bearing
Inspect for damage or rough rotation
- 2) Bearing race
Inspect bearing surface for scoring or scratches

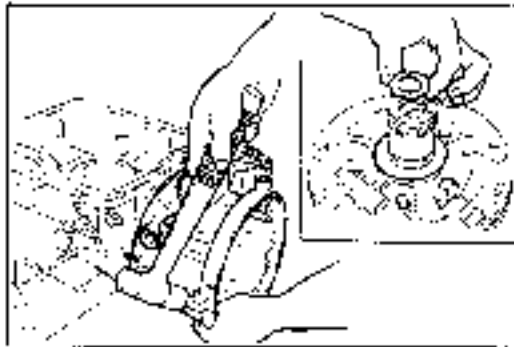


BMJ3-2 108

25. Loosen the 2nd band servo locknut and tighten the piston stem



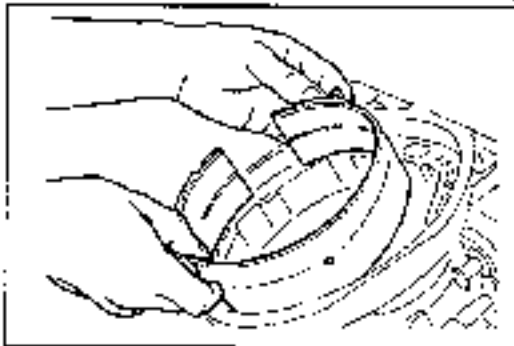
BMJ3-2 109



SM11002-112

Caution**Do not lose the bearing race.**

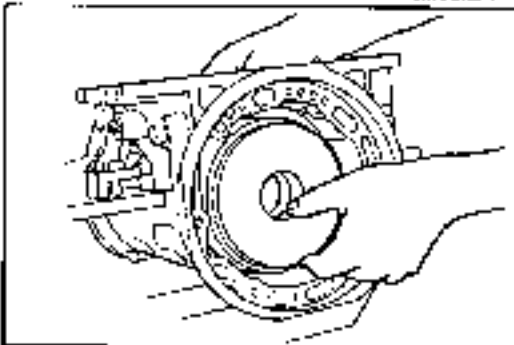
26. Separate the drum support, accumulator and OD case from the transmission case by tapping it lightly with a plastic hammer. Remove the gasket.
27. Remove the bearing race and thrust washer from the drum support, accumulator and OD case.



SM11002-113

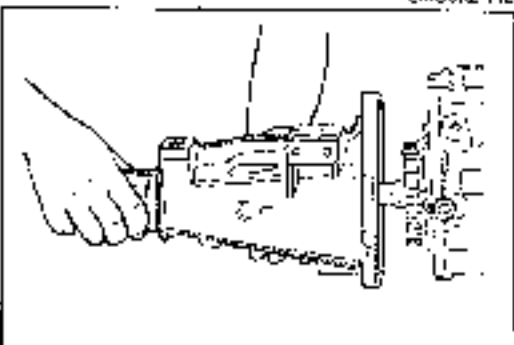
Caution**To prevent the brake lining from cracking or peeling, do not stretch the 2nd band brake. Secure it with a wire clip.**

28. Loosen the piston stem of the 2nd band servo. Remove the 2nd brake band and band strut.



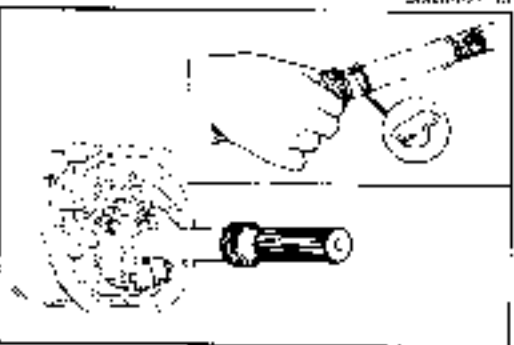
SM11002-114

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.



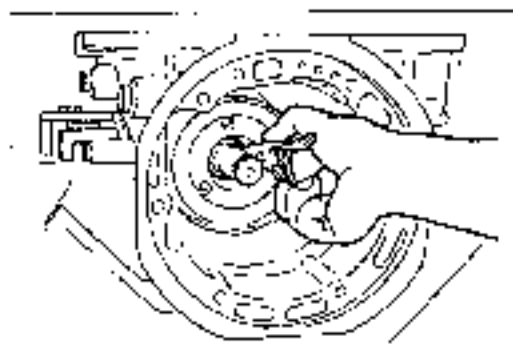
SM11002-115

30. Remove the extension housing and gasket.



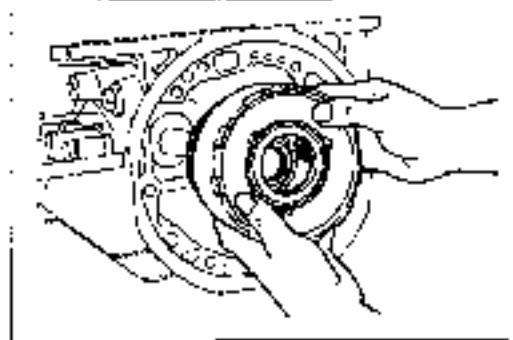
SM11002-116

31. Remove the rear snap ring and speedometer drive gear.
32. Remove the key and front snap ring.



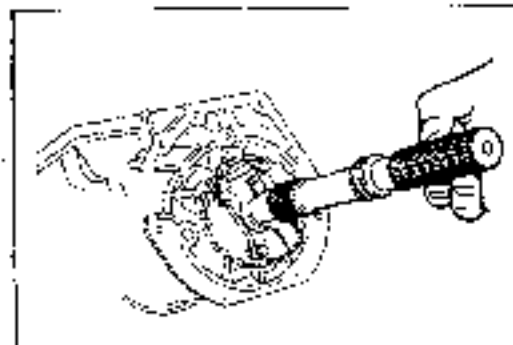
SMU0K2-115

33. Remove the snap ring from the output shaft with snap ring pliers.



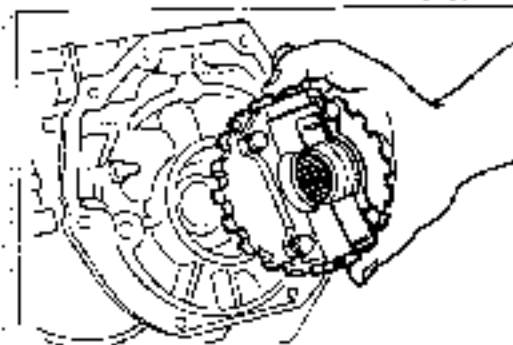
SMU0K2-116

34. Remove the rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch)



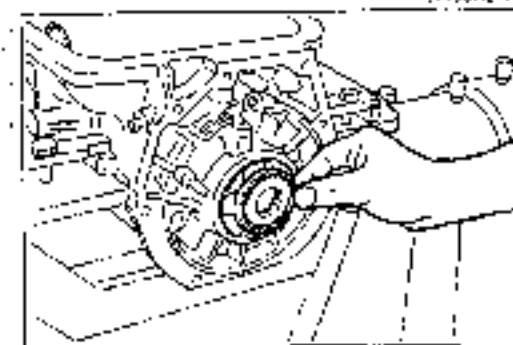
SMU0K2-117

35. Pull out the output shaft.



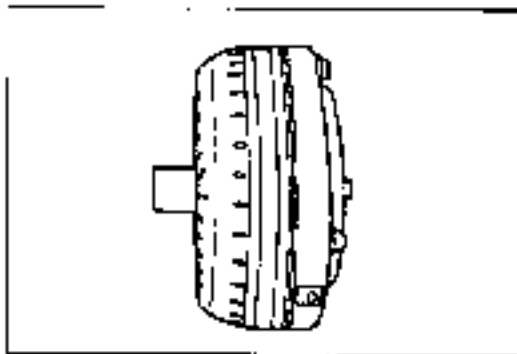
SMU0K2-118

36. Remove the governor valve and parking gear as a unit.

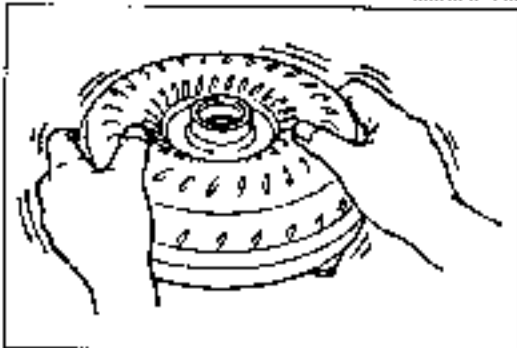


SMU0K2-119

37. Remove the bearing.
Inspect the following parts and repair or replace as necessary.
Bearing
Inspect for damage or rough rotation



9M110K2-119



1300K3-116

TORQUE CONVERTER**Inspection**

1. Check the outside of the converter for damage and cracks, and replace the torque converter if there is any problem.
2. Check for rust on the pilot hub or on the boss, and remove it completely if there is any.

Washing inside the converter

1. Drain any ATF remaining in the converter.
2. Pour in solvent (0.5 liter, 0.5 US qt, 0.4 Imp qt).
3. Shake the converter to clean the inside. Pour out the solvent.
4. Pour in ATF.
5. Shake the converter to clean the inside. Pour out the ATF.

**OIL PUMP
Preparation
SST**

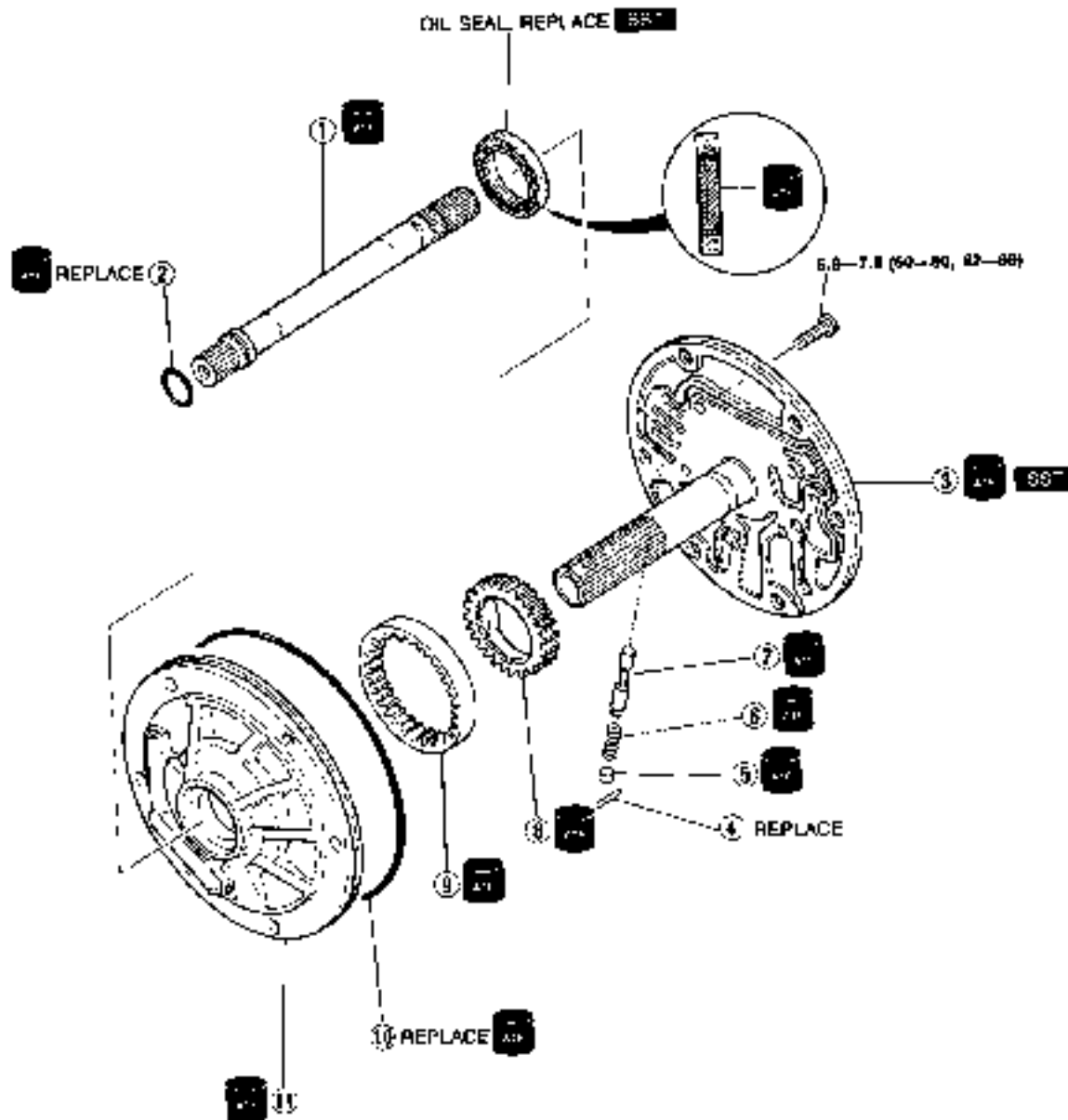
49 S019 040 Set centering tool 	49 S019 001 Holder (Part of 49 S019 040) 	49 SC19 002 Shaft (Part of 49 S019 040)
49 S019 003 Stand (Part of 49 S019 040) 	49 SC19 004 Pin (Part of 49 S019 040) 	49 G030 795 Insulator, Oil seal
49 G030 796 Body (Part of 49 G030 795) 	49 G030 797 Handle (Part of 49 G030 795) 	

9M10K2-121

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

2. O-ring

3. Oil pump cover

Inspection ... page K1-51

4. Roll pin

5. Plug

6. Spring

Inspection ... page K1-52

7. Lockup control valve

Inspect for sticking, scoring,
or scratches

8. Inner gear

Removal ... page K1-51

Inspection ... page K1-51

9. Outer gear

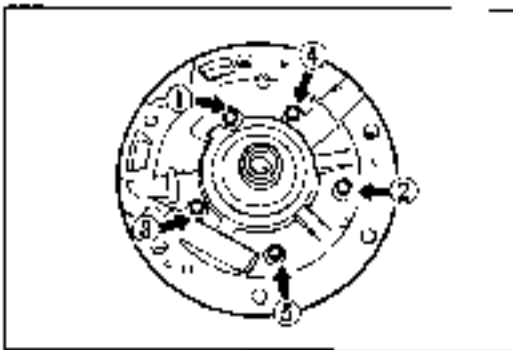
Removal ... page K1-51

Inspection ... page K1-52

10. O-ring

11. Oil pump housing

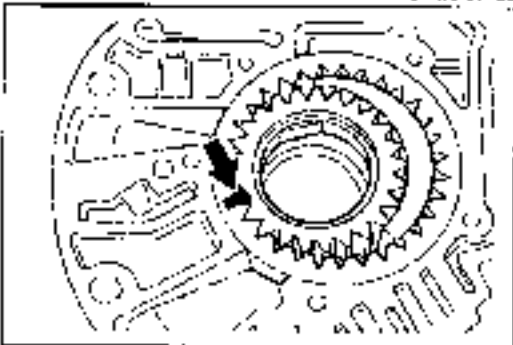
Inspection ... page K1-51



9M/J0K2 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.

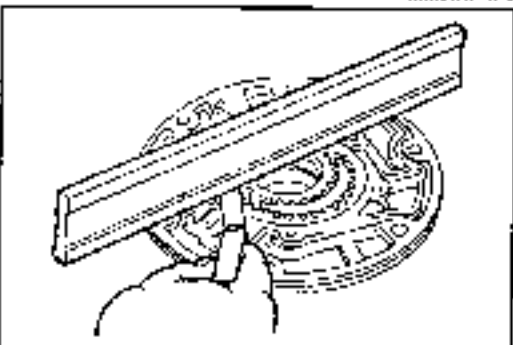


9M/J0K2 124

Inner gear and outer gear**Caution**

Do not use a punch to mark the gears.

Mark the inner and outer gear positions, and remove the gears from the housing.



9M/J0K2 126

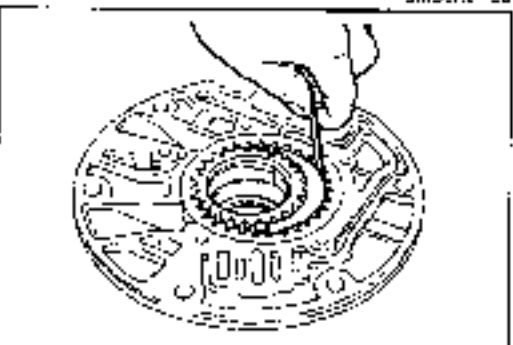
Inspection**Clearance**

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)



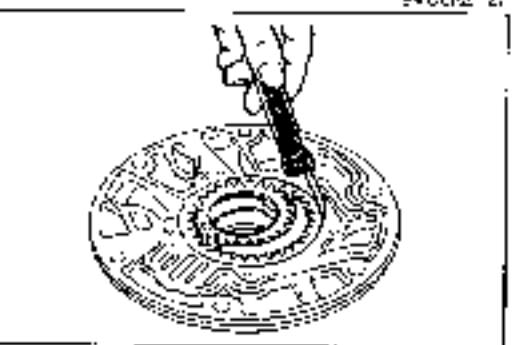
9M/J0K2 127

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/J0K2 128

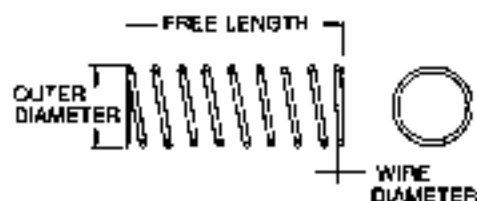
3. Measure the side clearance between the outer gear flange and housing.

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.



09110-K1-044

Spring

1. Measure the spring specifications.

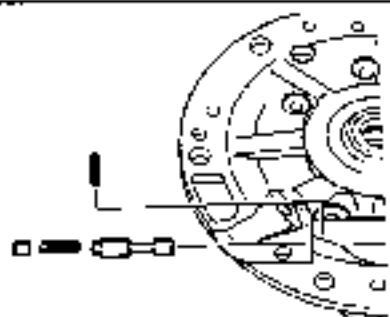
Specifications

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)
3G		5.5 (0.217)	24.7 (0.972)	15.5	0.7 (0.028)

2. If not within specification, replace the spring.

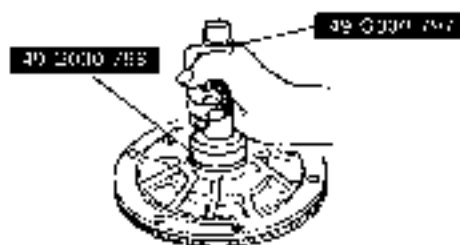
Assembly procedure

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.



19U0K-015

3. Apply ATF to a new O-ring, and install it with the SST.

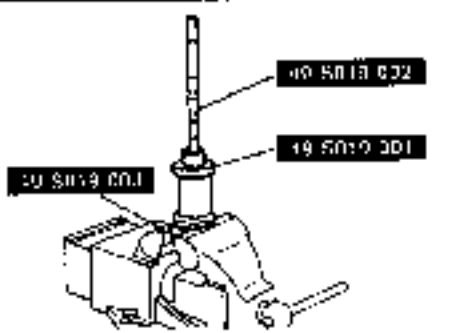


24L0K2-131

Note

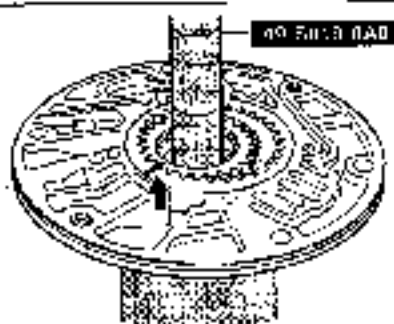
Use protective plates to prevent damaging the SST.

4. Assemble the SST and secure it in a vice.

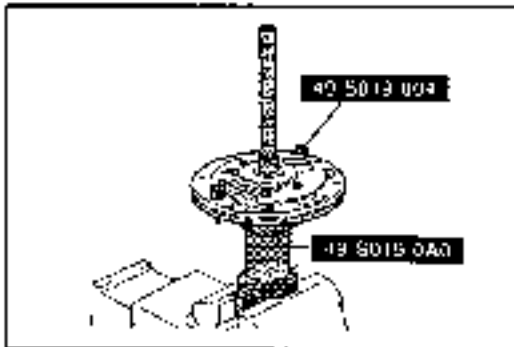


9MU0K2-137

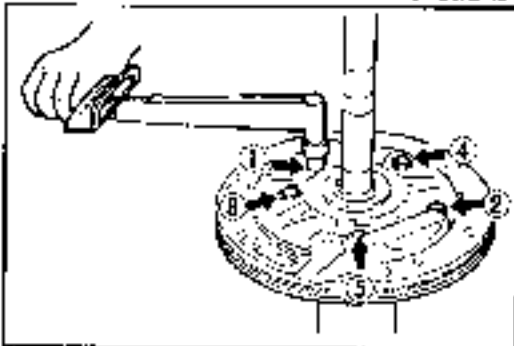
5. Apply ATF to the new O-ring, and place it on the pump cover.
6. Set the pump housing on the SST.
7. Apply ATF to the inner and outer gears, and install them in the pump housing with their matching marks toward the pump cover.



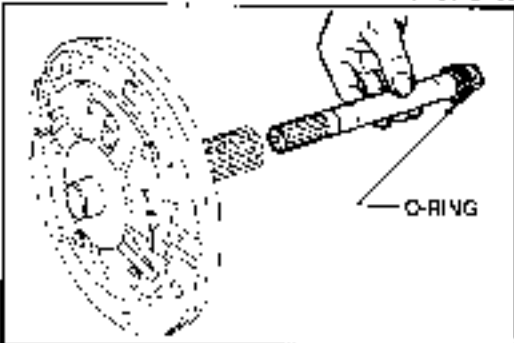
9MU0K2-138



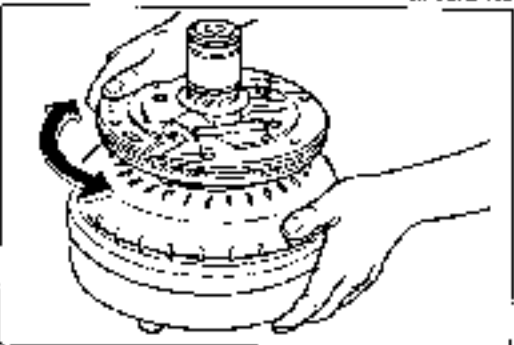
SMJ0K2-134



SMJ0K2-135



SMJ0K2-136



SMJ0K2-137

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.

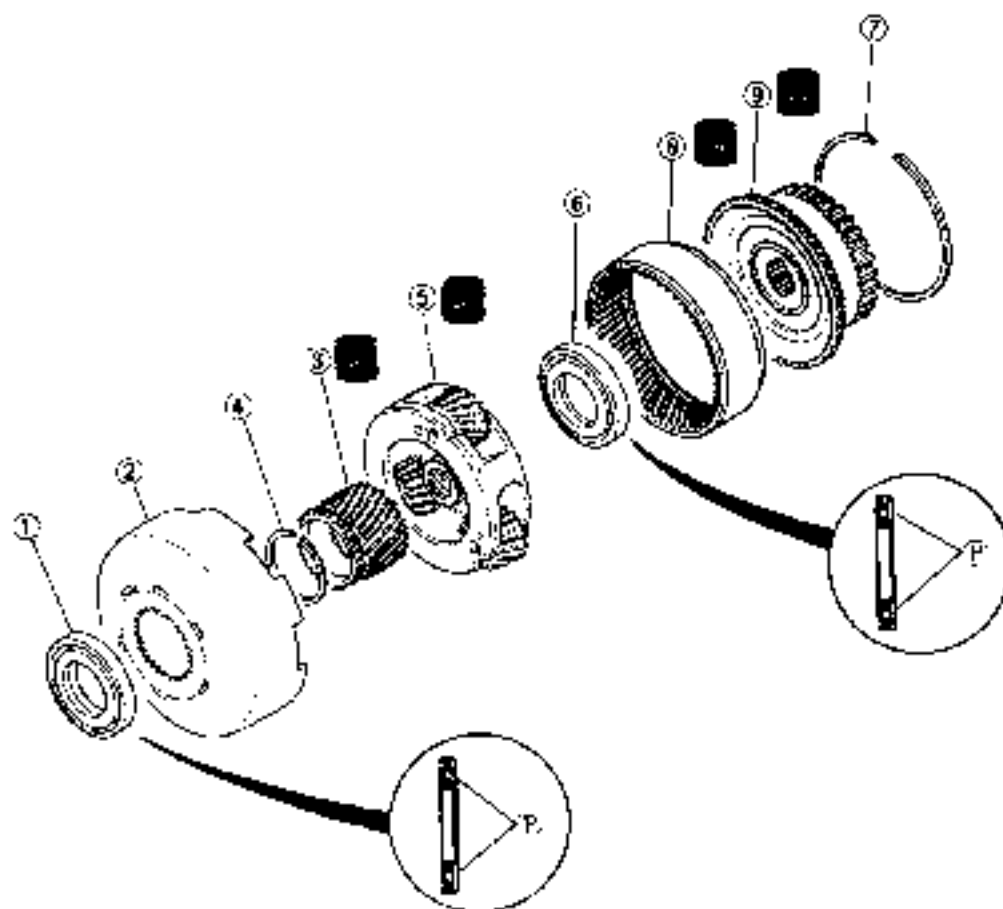
OD CONNECTING SHELL AND OD PLANETARY GEAR UNIT (OD SUN GEAR, OD PLANETARY PINION CARRIER, OD CLUTCH HUB)

Disassembly and Inspection

Disassemble in the order shown in the figure.

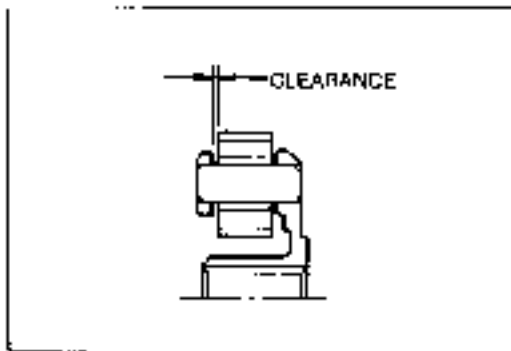
Inspect all parts, and repair or replace as necessary.

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



HEUCK 010

1. Bearing Inspect for damage or rough rotation	5. OD planetary pinion carrier Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears. Inspection page K1-55	7. Snap ring
2. OD connecting shell		8. Internal gear Inspect individual gear teeth for damage, wear, or cracks
3. Sun gear Inspect individual gear teeth for damage, wear, or cracks	6. Bearing Inspect for damage or rough rotation	9. OD clutch hub
4. Snap ring		



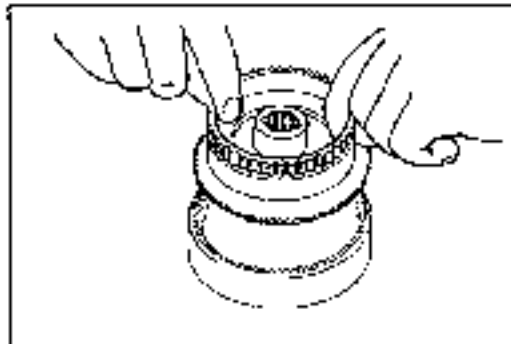
9VLCX2-298

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)**

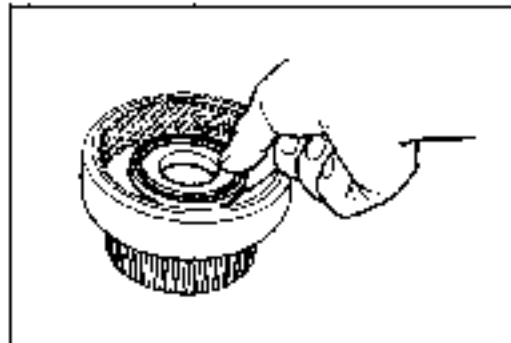
2. If not within specification, replace the planetary pinion carrier.



CBLCX1 C17

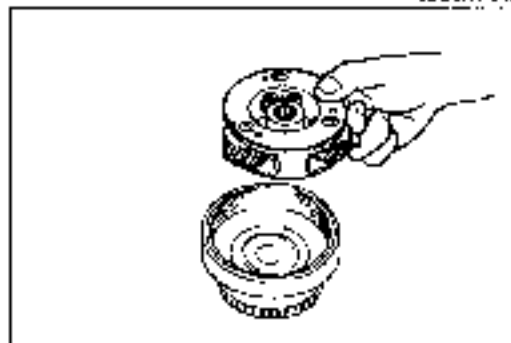
Assembly procedure

1. Apply ATF to the OD clutch hub and internal gear, and assemble them with the snap ring.



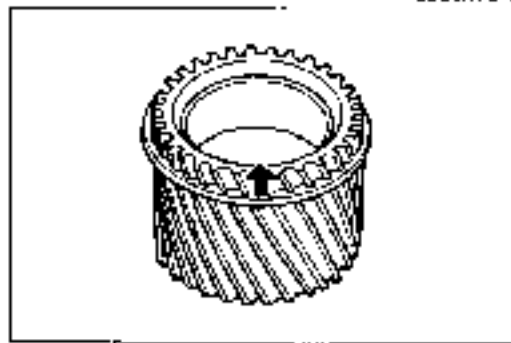
CBLCX1 C45

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)

CBLCX1 C46

3. Apply ATF to the OD planetary pinion carrier, and install it into the internal gear.



9EUCX1-047

Note**Pay close attention to the front and rear directions of the sun gear. The grooved side (arrow) is the front.**

4. Install the snap ring onto the sun gear.

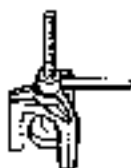


GBLCK1 C48

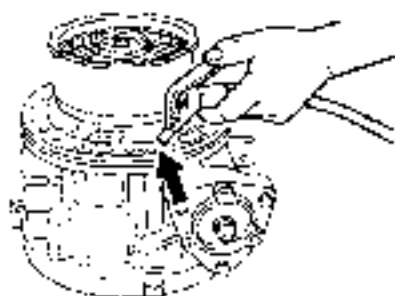
5. Apply ATF to the sun gear, and install it into the OD planetary pinion carrier.

DIRECT CLUTCH Preparation SST

49-0378-375

Compressor,
clutch spring

3MLOCK2-138



3MLOCK2-138

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/cm², 57 psi) max.

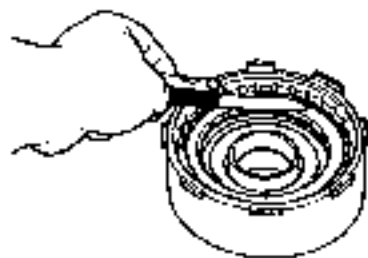
2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace as necessary when assembling.

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.



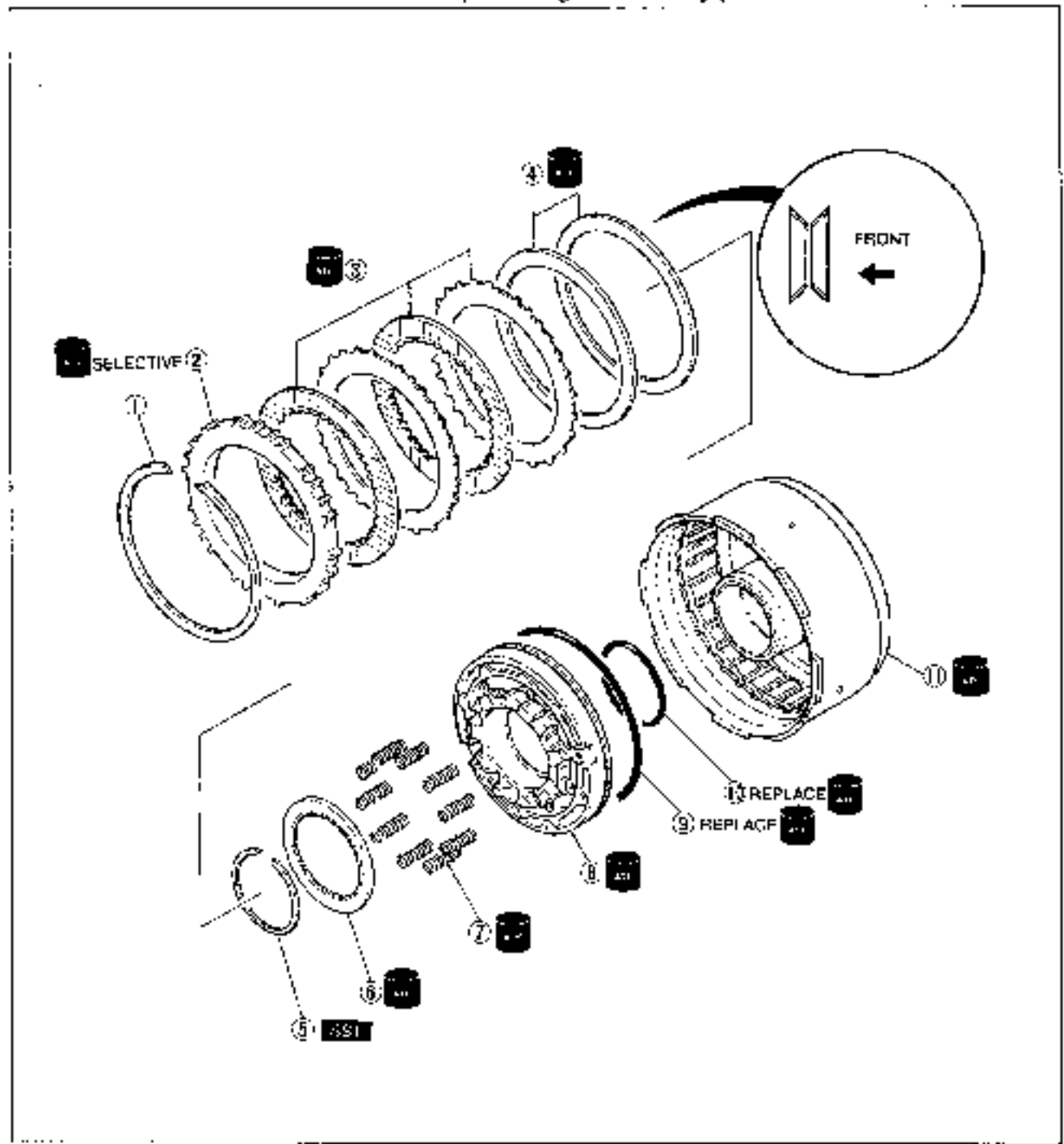
4MLOCK2-91

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	Inspection page K1-58	
5. Snap ring	Removal page K1-58	
Removal page K1-58	Inspection page K1-58	

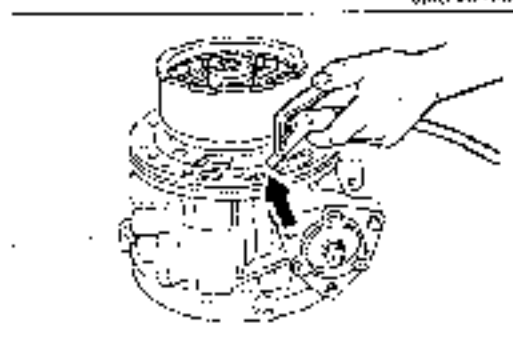
18JJK1C15



35L0K2 142

Disassembly note**Snap ring****Caution****Do not damage the snap ring.**

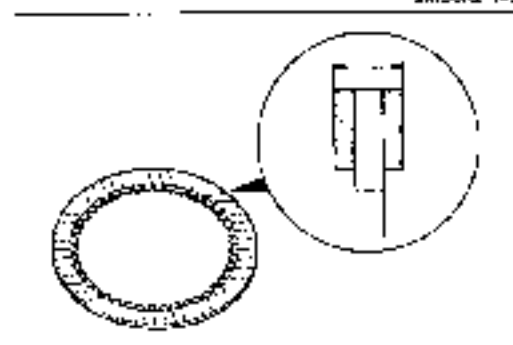
- 1 Compress the spring with the **SST**, then remove the snap ring with snap ring pliers.
- 2 Remove the spring retainer and spring.



35L0K2 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/cm², 57 psi) max.

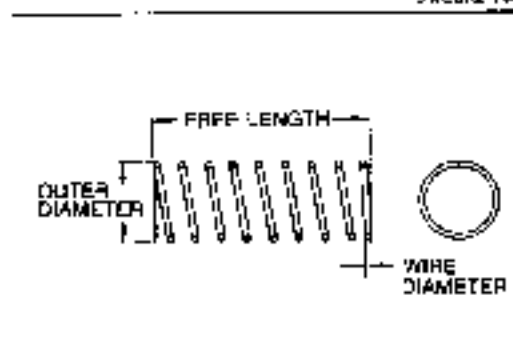
35L0K2 144

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.



35L0K2 145

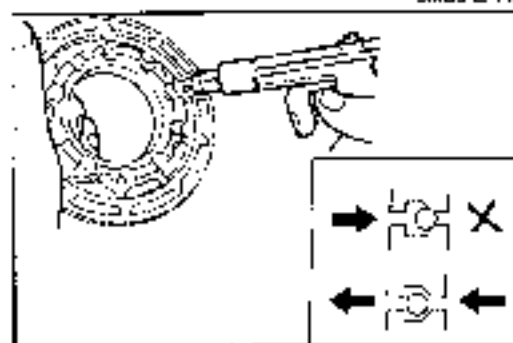
Return spring

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.



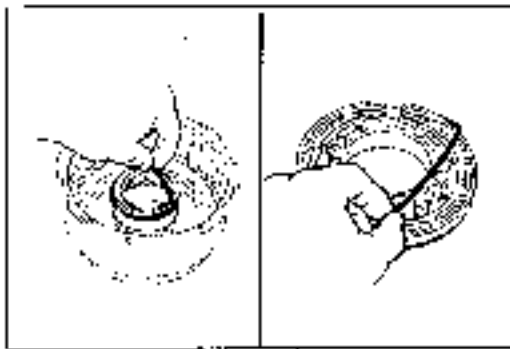
35L0K2 146

Clutch piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

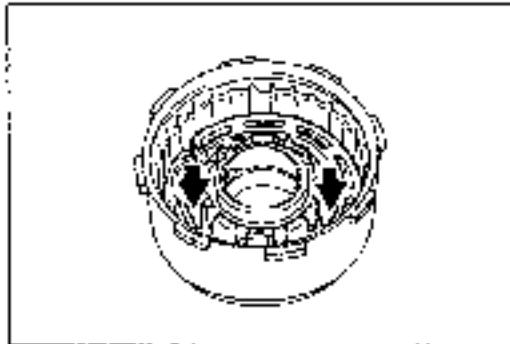
3. If not correct, replace the clutch piston.



2M1.CK1-10-8

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.



2M1.CK2-14-8

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.

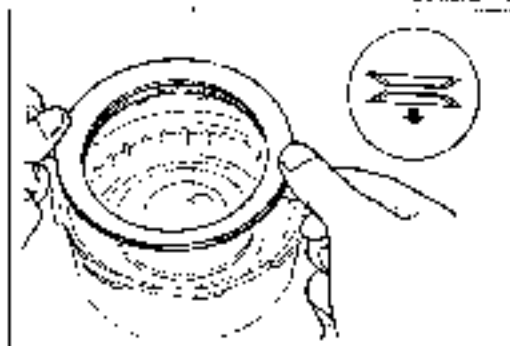


2M1.CK2-14-8

Caution

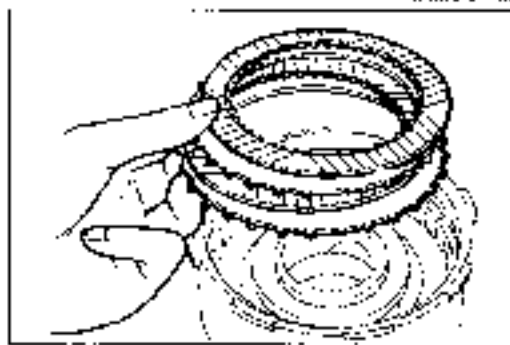
- a) Do not overexpand the snap ring when installing.
- b) Do not align the snap ring end-gap with the spring retainer stop.

5. Install the springs and spring retainer and compress them with the SST.
6. Install the snap ring.



2M1.CK3-50

7. Install the dished plates as shown.



2M1.CK3-51

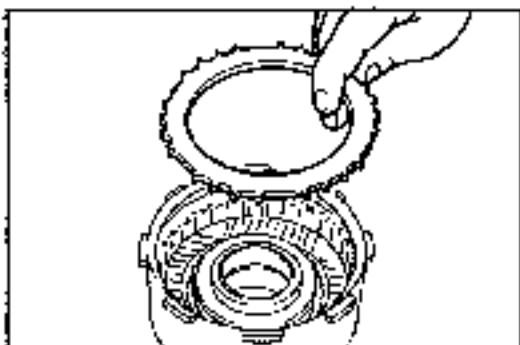
Caution

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

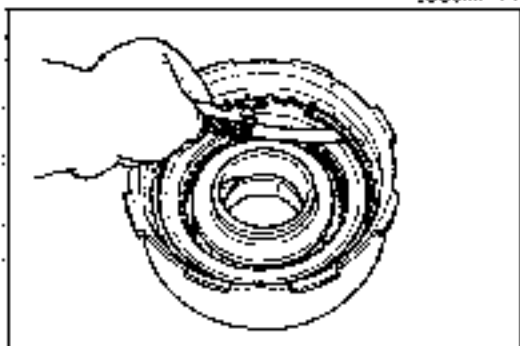
Align the flat portion of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.

- 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)

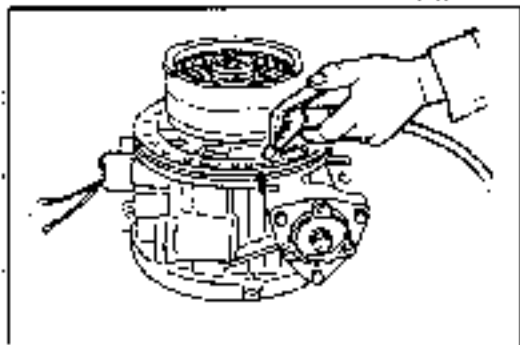
Retaining plate sizes

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

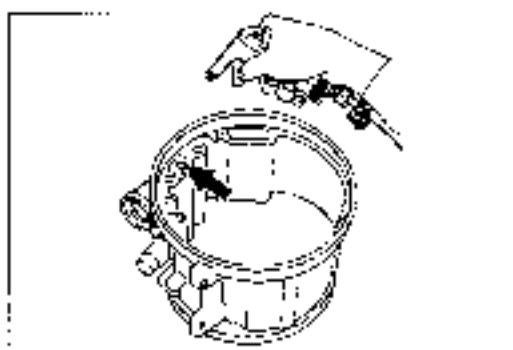
Apply air for no more than three(3) seconds.



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/cm², 67 psi) max.



97U247-430

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/cm², 57 psi) max.

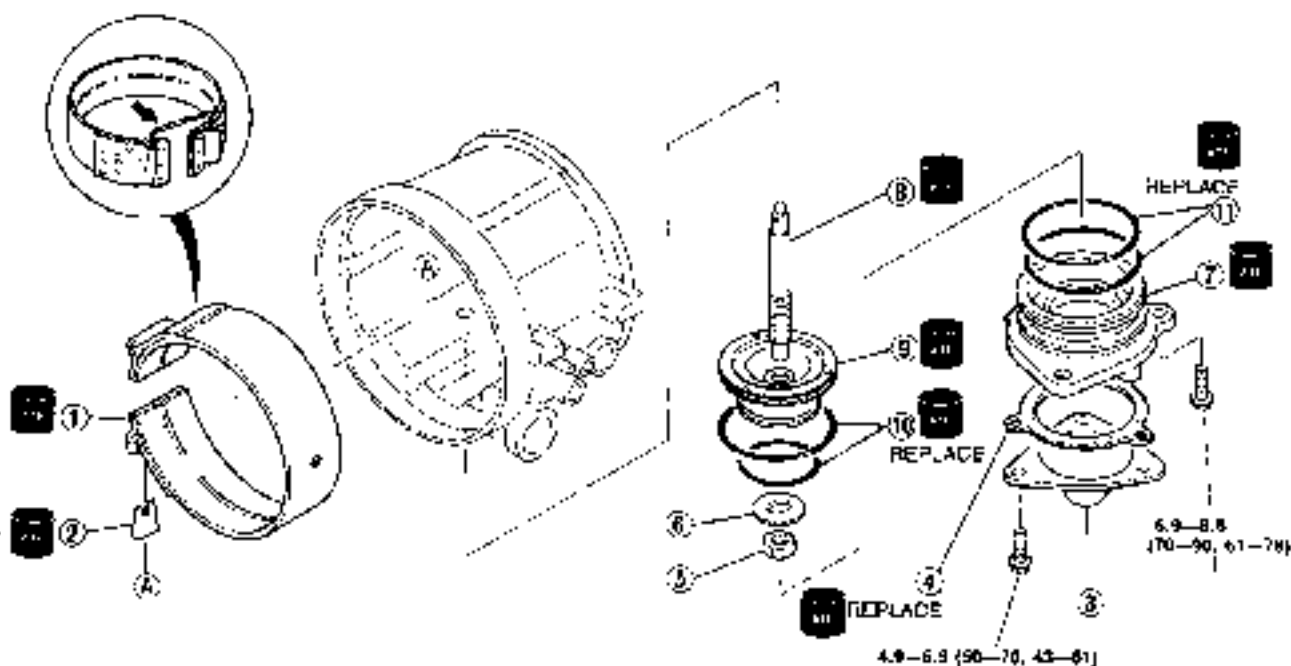
2. Verify that the piston stem moves to the brake band.
If not, the seal rings or the oil seal may be damaged or the piston assembly may be sticking.
Inspect them, and replace as necessary when assembling.

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**.



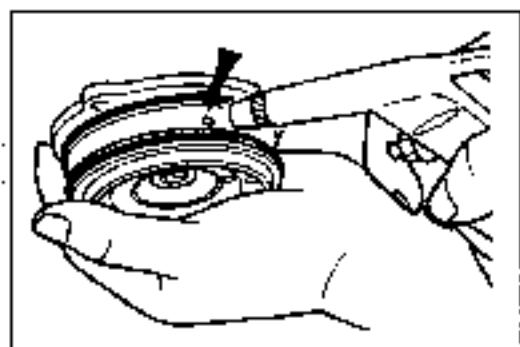
N/m (cm·kg, in·lb)

18.0K1-070

1. Brake band
Inspect for wear or burring
2. Band strut
3. OD band servo cover
4. Gasket

5. Nut
6. Washer
7. Body
8. Piston stem

9. Piston assembly
Removal..... page K1-62
10. Seal rings
11. O-rings

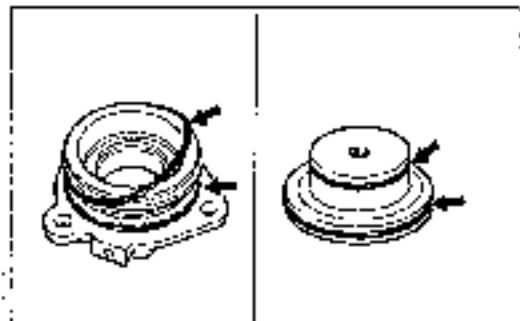


9M1J0K2-52

Disassembly note**Piston assembly**

Remove the piston assembly from the body by applying compressed air through the oil passage hole.

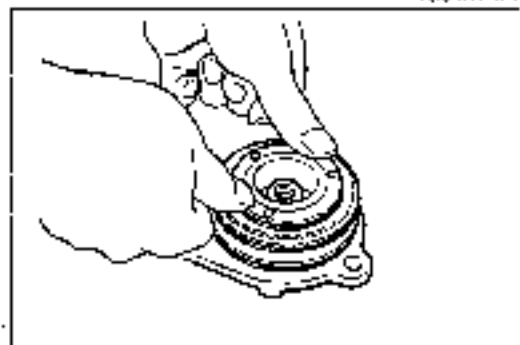
Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.



1B1J0K1-021

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.



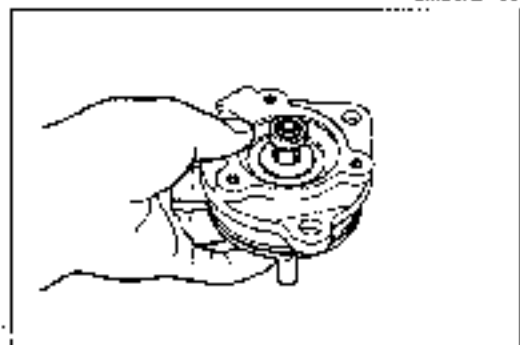
9M1J0K2-55

3. Apply ATF to the piston assembly and body.

Caution

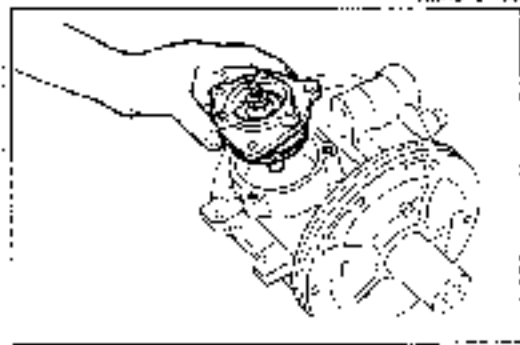
Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.

4. Press the piston assembly in the body



5M1J0K2-96

5. Apply ATF to the piston stem and washer, and install them into the body.
6. Loosely tighten the nut

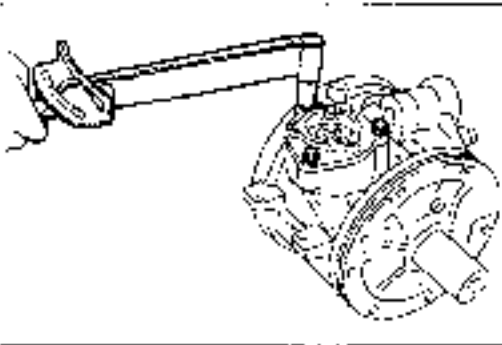


9M1J0K2-97

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

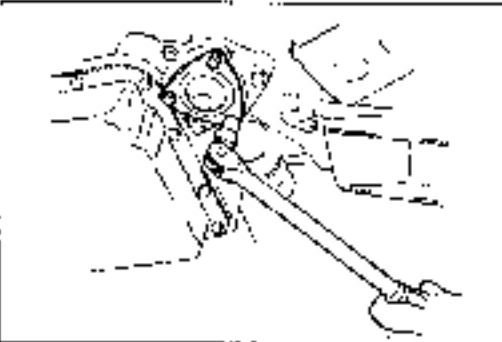


151041-009

9. Install and tighten the bolts.

Tightening torque:

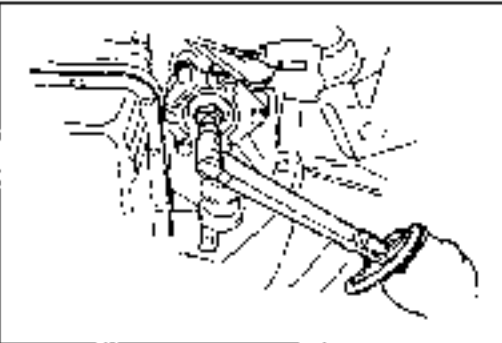
9.8—14.7 N·m (1.0—1.5 m·kg, 7.2—10.8 ft·lb)



9M1002-109

On-vehicle Adjustment

1. Remove the OD band servo cover and gasket.



1D100K-102

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

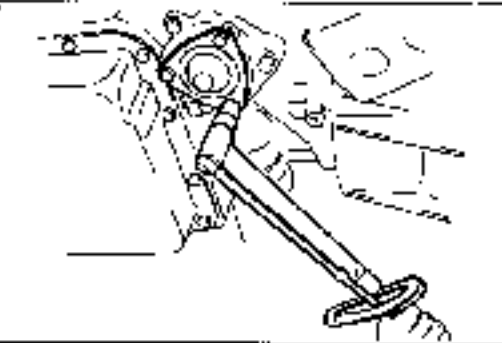
Stem: 2 turns

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



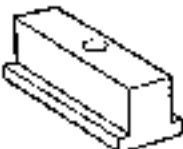
9M1002-121

Tightening torque:

4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)

DRUM SUPPORT, ACCUMULATOR, AND OD CASE

Preparation
SST

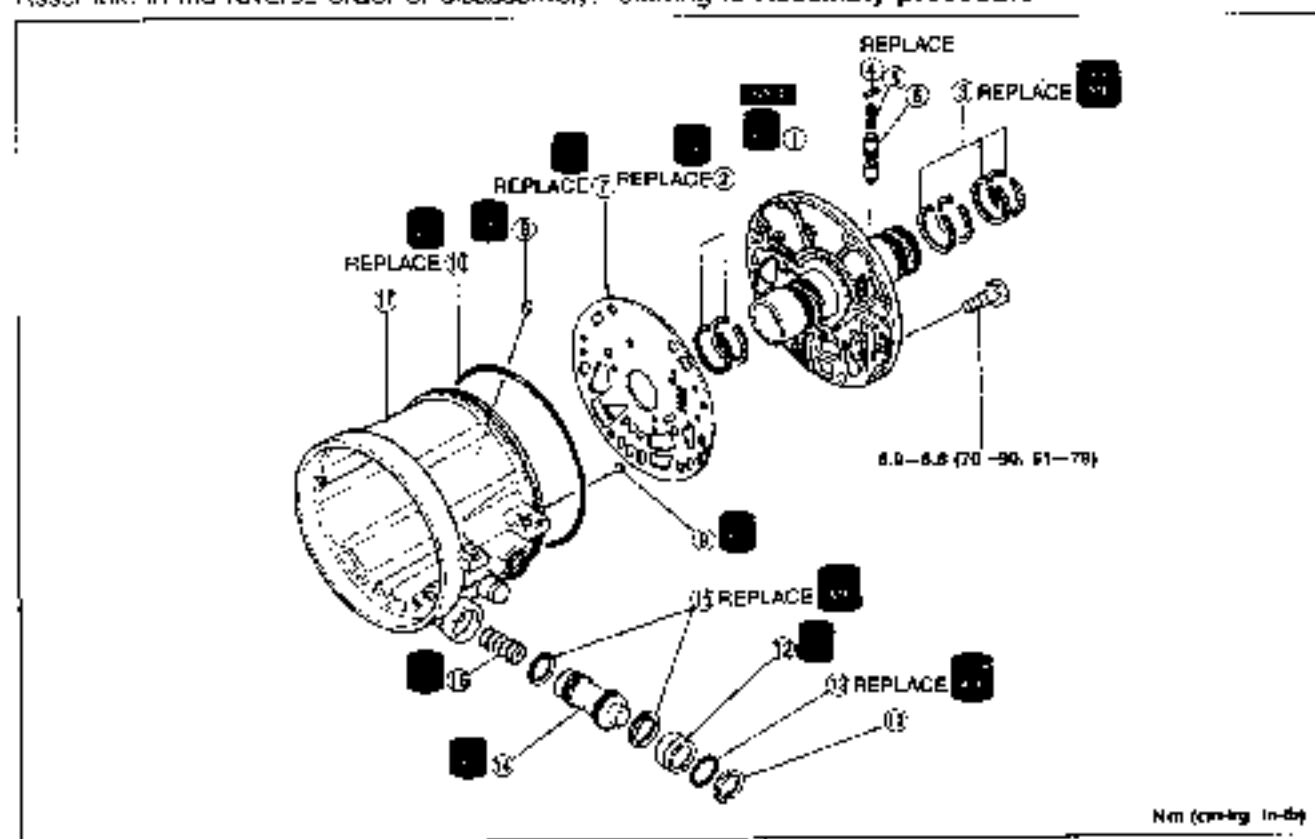
49 S01B 0A0 Sst, centering tool 	49 S019 C01 Holder (Part of 49 S019 CA0) 	49 S019 D02 Shet (Part of 49 S019 DA0) 
49 S019 C03 Stand (Part of 49 S019 CA0) 	49 S019 004 Pin (Part of 49 S019 DA0) 	

3MUK12-237

Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

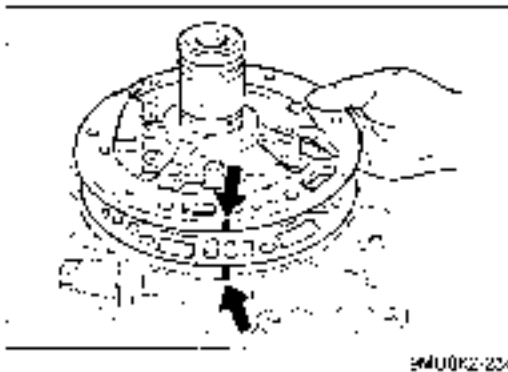
Inspect all parts and repair or replace as necessary.

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

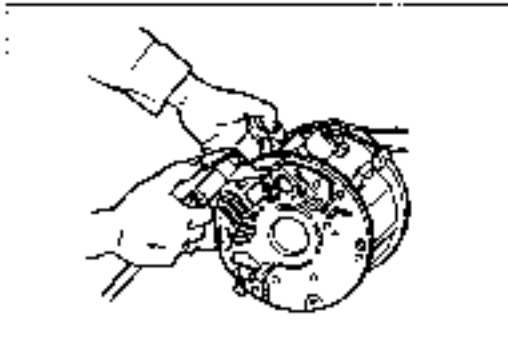
Nim (cm-kg In-lb)

1BUK1-237

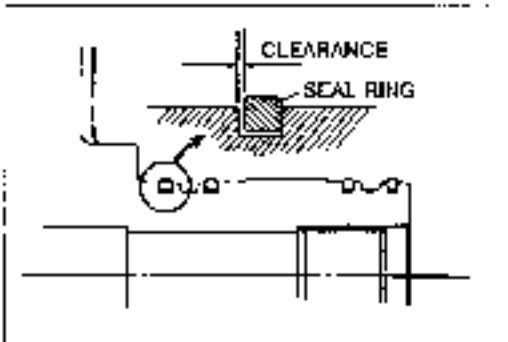
1. Drum support Removal..... page K1-65 Inspection..... page K1-65	6. OD cancel valve Inspect for sticking, scoring, or scratches	12. Accumulator plug Removal..... page K1-65
2. Seal rings	7. Gasket	13. O-ring
3. Seal rings	8. One-way valve	14. Accumulator piston
4. Roll pin	9. Steel ball	15. Seal rings
5. Spring Inspection..... page K1-65	10. Seal ring	16. Spring Inspection..... page K1-65
	11. Snap ring	17. OD case



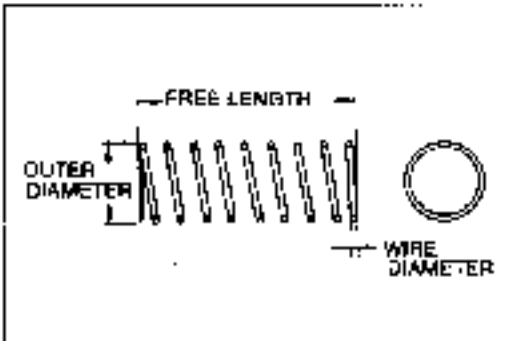
9MUDK2-234



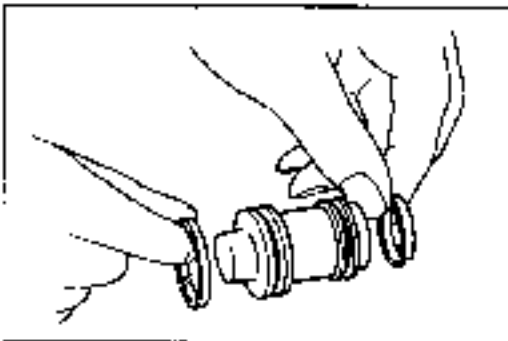
9MUDK3-235



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/cm², 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.

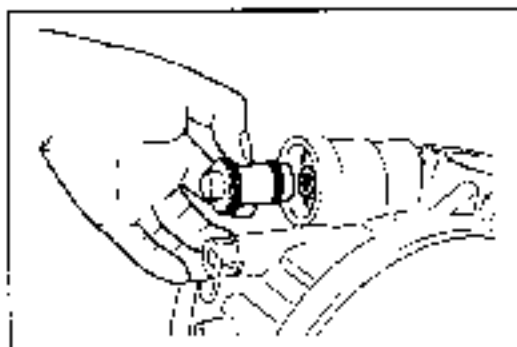
Specifications

Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Spring				
OD cancel	4.95 (0.195)	23.0 (0.906)	14.8	0.05 (0.020)
Accumulator	4.65 (0.183)	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.

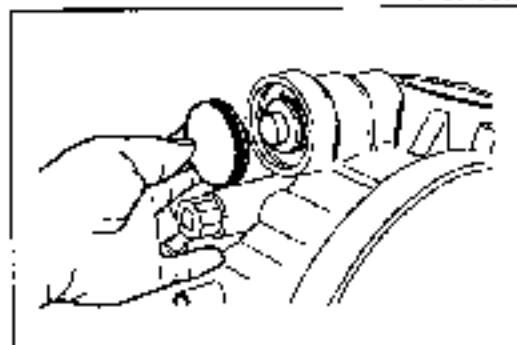


9MUKK2-239

Caution

Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.

2. Apply ATF to the spring and accumulator piston, and install them into the OD case.



9MUKK2-240

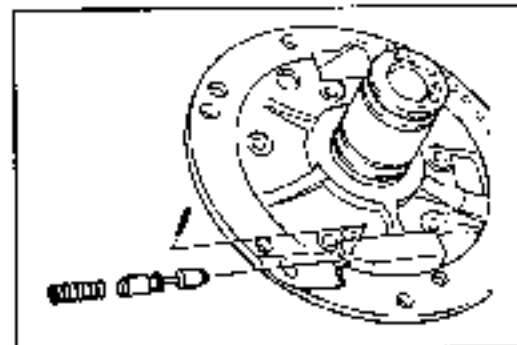
3. Apply ATF to a new O-ring, and install it on the accumulator plug.
4. Install the accumulator plug and snap ring.

Caution

Apply air for no more than three(3) seconds.

5. Check the accumulator operation by applying compressed air through the oil passage.

Air pressure: 392 kPa (4.0kg/cm², 57 psi) max.

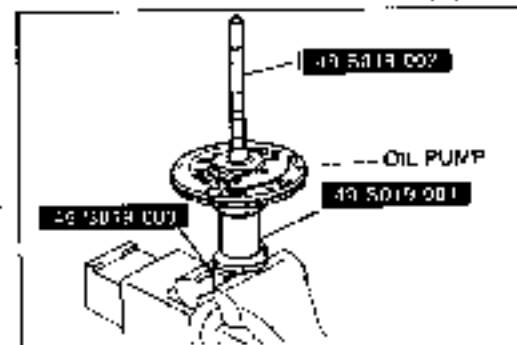


9MUKK2-241

6. Apply ATF to the OD cancel valve and spring, and install it into the drum support.
7. Tap in a new roll pin.

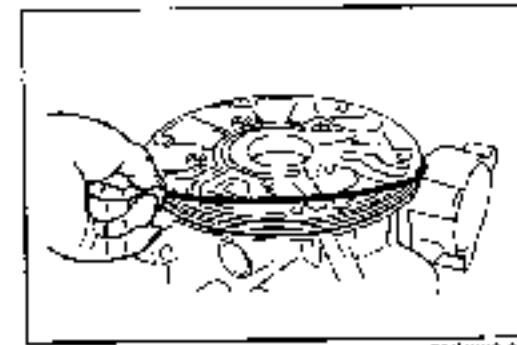
Note

Use protective plates to prevent damaging the SST.



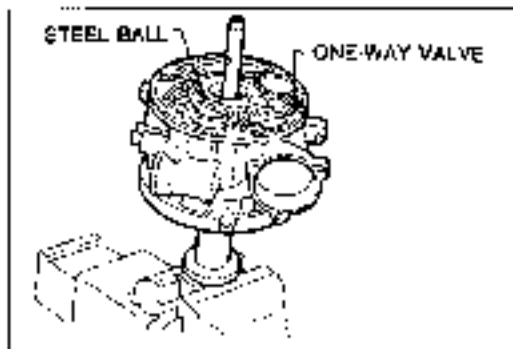
9MUKK2-242

8. Set the oil pump onto the SST.

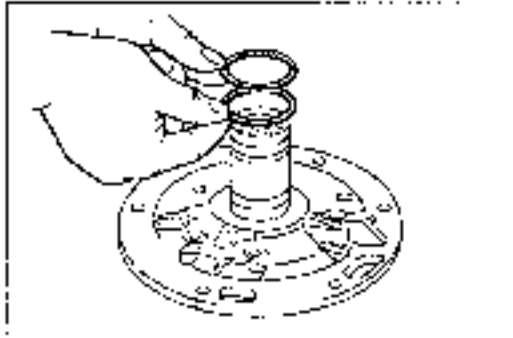


9MUKK2-243

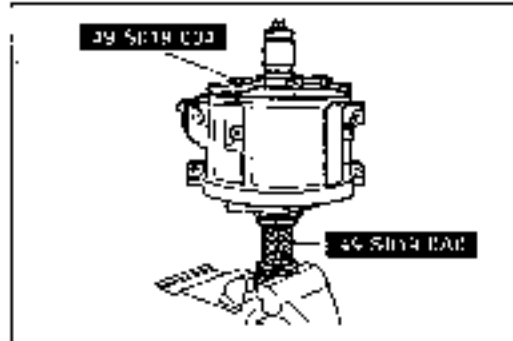
9. Apply ATF to a new seal ring, and install it onto the drum support.



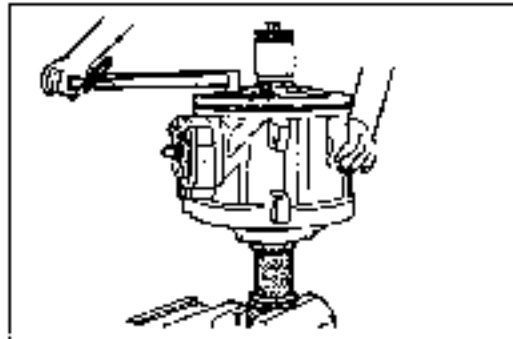
3M10K2-244



9M10K2-245



9M10K2-246



TBO07C-201

10. Apply ATF to the OD case, and mount it onto the oil pump.
11. Install the steel ball and the one-way valve.

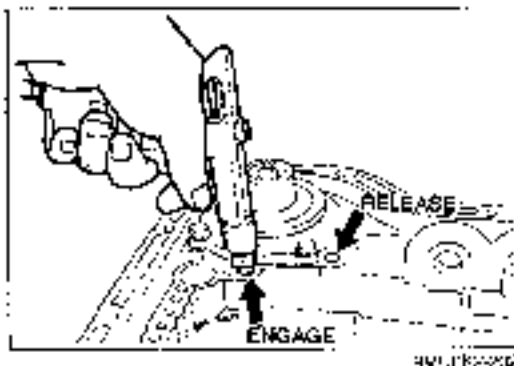
12. Apply ATF to the new seal rings, and install them onto the drum support.

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 oil passage as shown.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

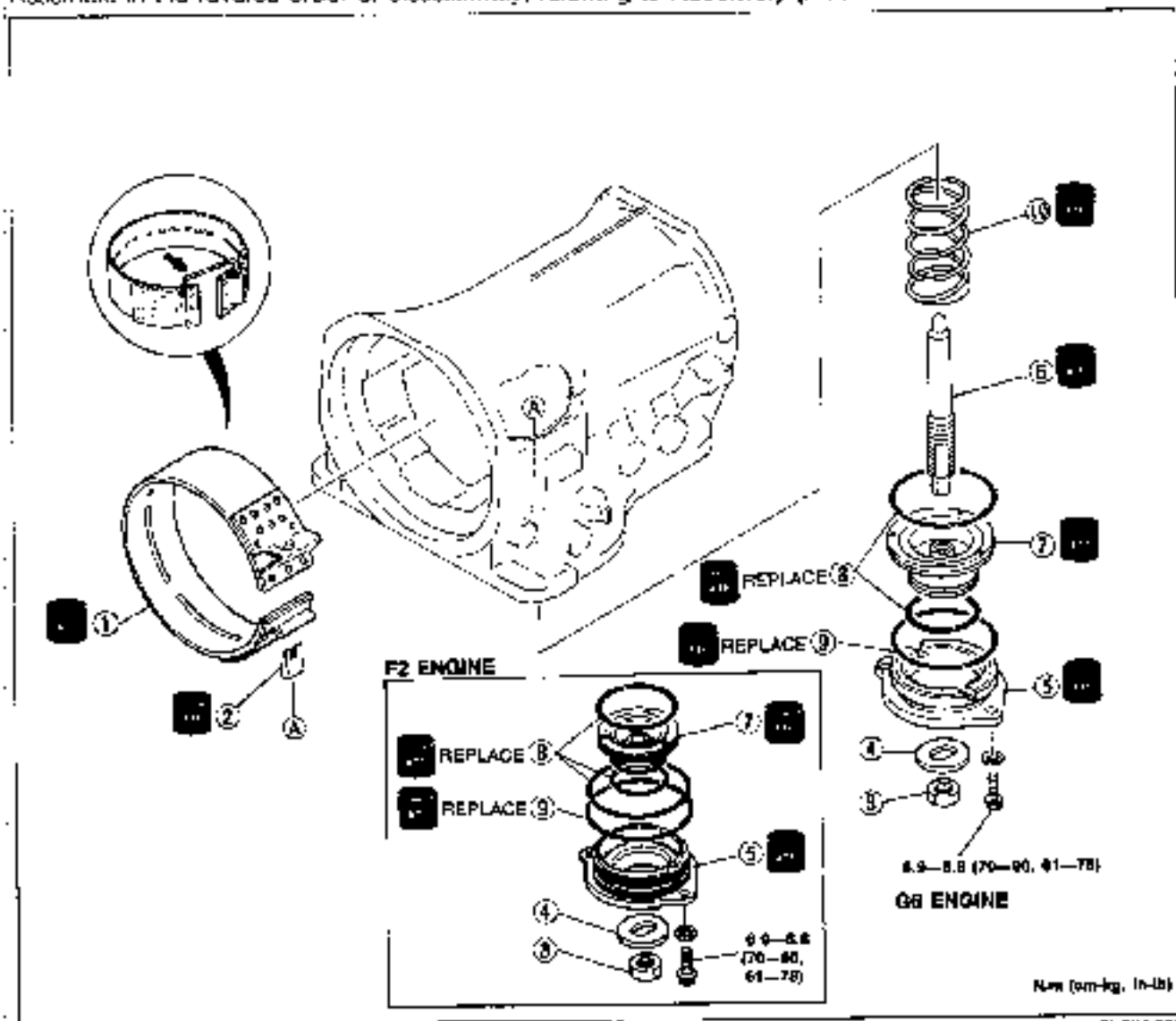
2. Verify that the piston stem moves to the brake band. If not, the seal rings or the oil seal may be damaged or the piston assembly may be sticking. Inspect them, and replace as necessary when assembling.

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**.

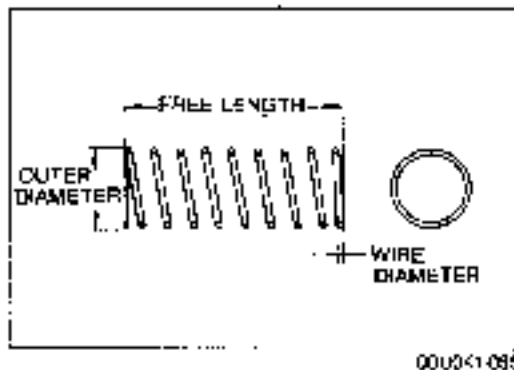


1. Brake band
Inspect for wear or burning
2. Band strut
3. Nut

4. Washer
5. Body
6. Piston stem
7. Piston assembly

8. O-ring
9. O-ring
10. Return spring

Inspection page K1-69

**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 (1.422)	3.5 (0.138)

2. If not within specification, replace the return spring.

Assembly procedure**Note**

Install the O-rings with the swelling surface outward.

1. Apply ATF to the O-rings, and install them onto the piston assembly.
2. Apply ATF to a new O-ring, and install it onto the piston assembly.

3. Apply ATF to the piston assembly and body.

Caution

Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.

4. Press the piston assembly into the body.

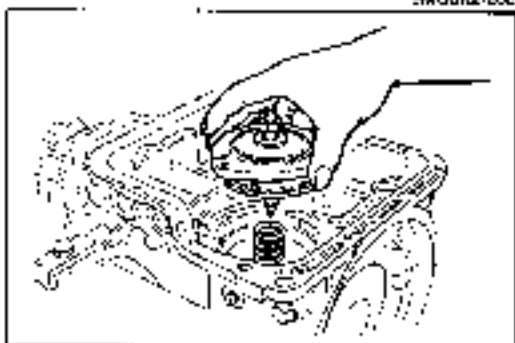
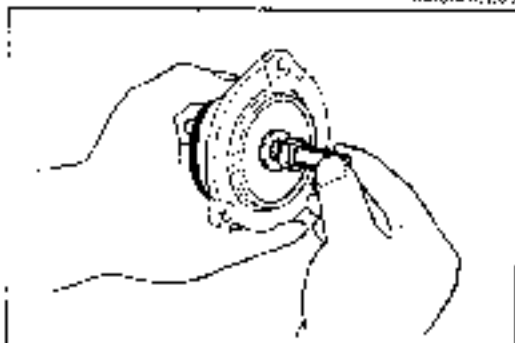
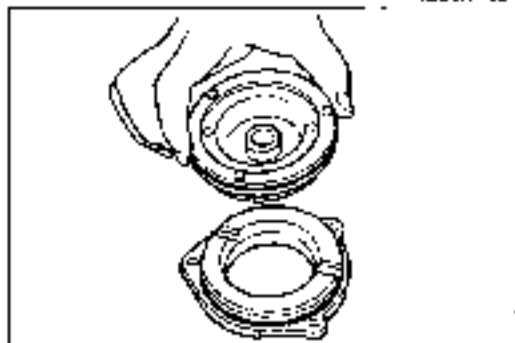
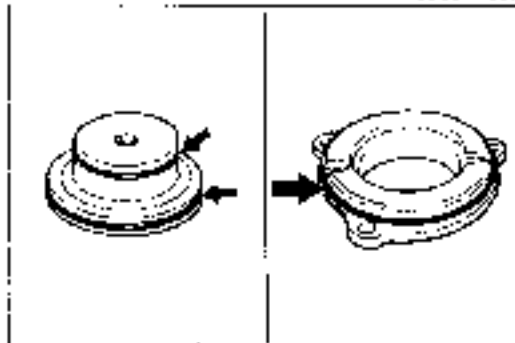
5. Apply ATF to the piston stem and washer, and install them into the body.
6. Loosely tighten the nut.

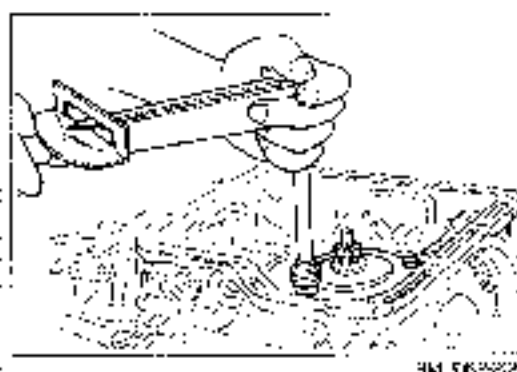
7. Apply ATF to the return spring, and install it into the transmission case.

Caution

Apply even pressure to the outside edge of the body to avoid damaging the O-ring when installing.

8. Install the piston assembly.



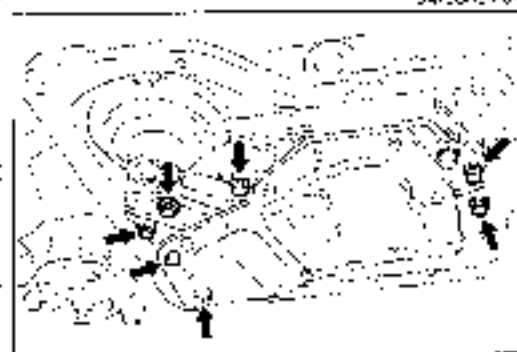


9A1-J0K2-0004

9. Install and tighten the bolts.

Tightening torque:

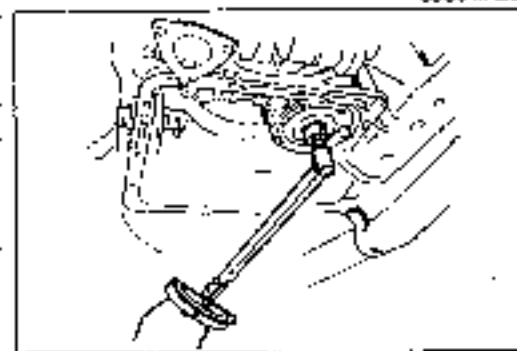
6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



9A1-J0K2-0002

On-vehicle Adjustment

1. Remove the valve body assembly



9A1-J0K2-0001

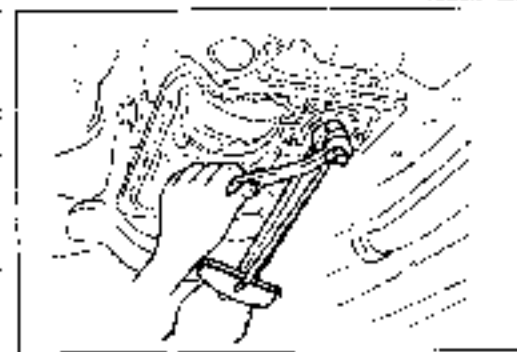
2. Loosen the locknut and lighten the piston stem.

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

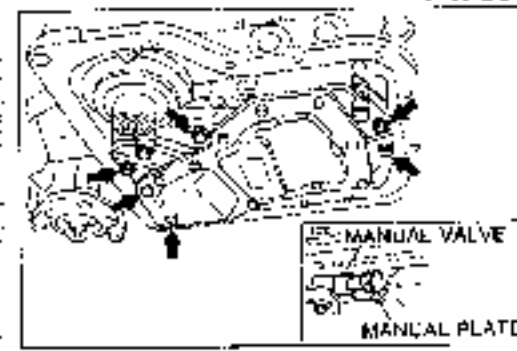


9A1-J0K2-0001

4. Hold the stem and tighten the locknut.

Tightening torque:

15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)

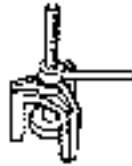


9A1-J0K2-0003

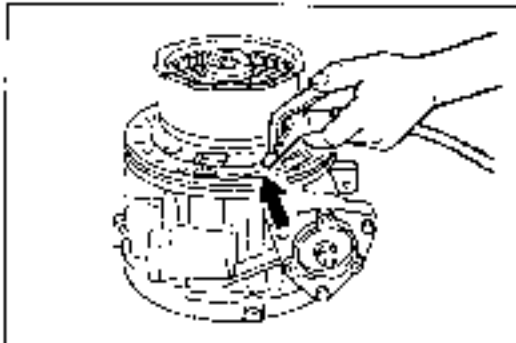
5. Install the valve body assembly.

FRONT CLUTCH Preparation SST

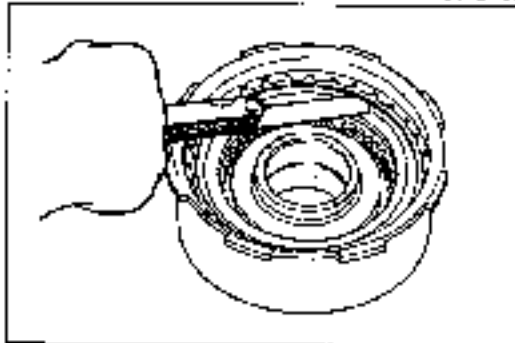
49-0376-375

Compressor
clutch spring

9MU042-155



9MU042-156



0EU341-358

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/cm², 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)

Q6 engine: 0.9—1.1mm (0.035—0.043 in)

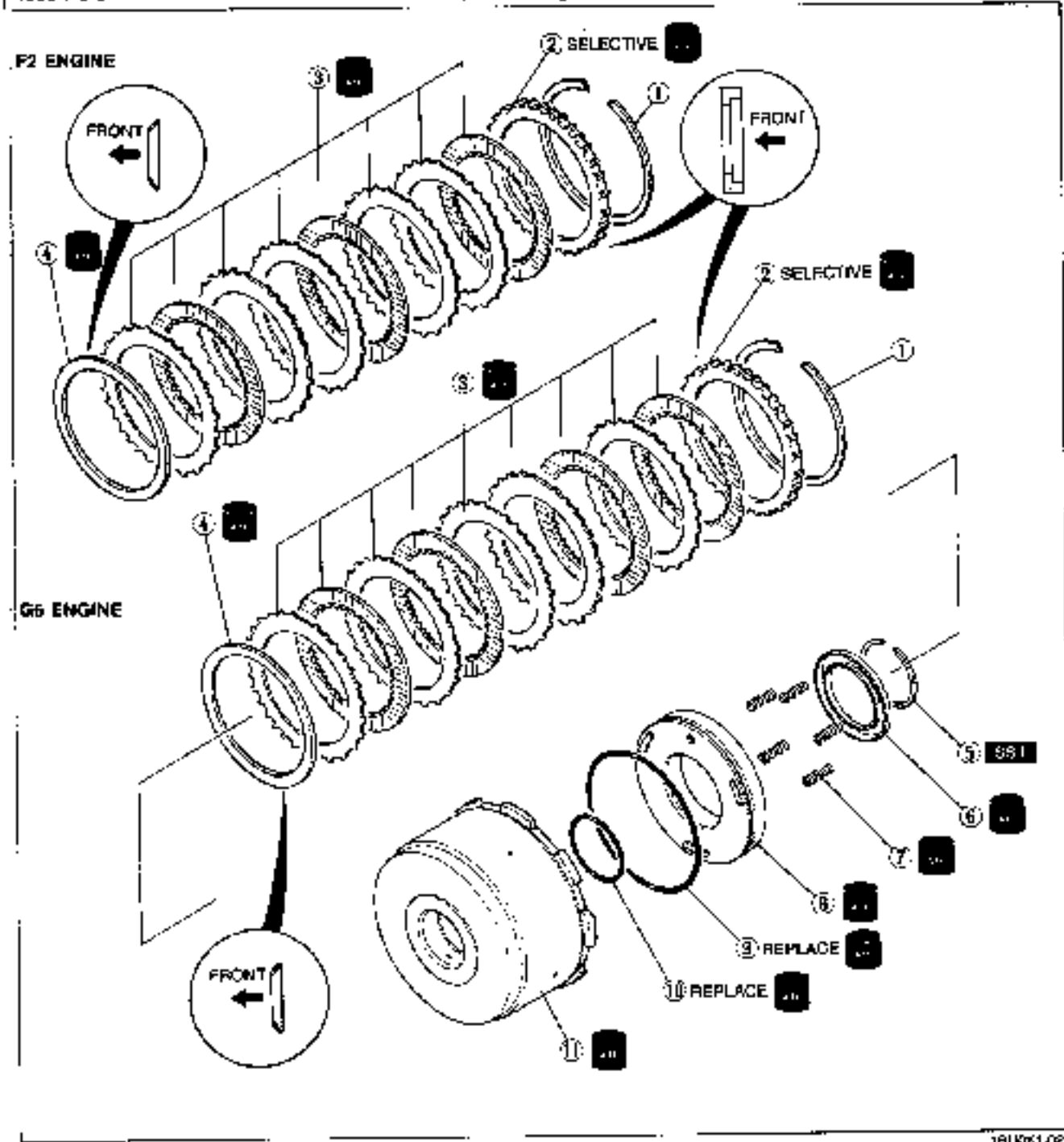
Select and install the correct retaining plate when assembling.

Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

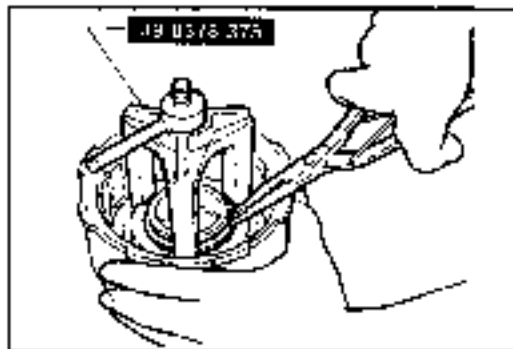
Inspect all parts, and repair or replace as necessary.

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



1A110K1-023

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	

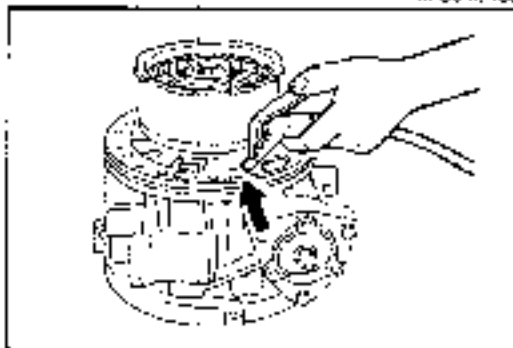


9M,OK2-158

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.

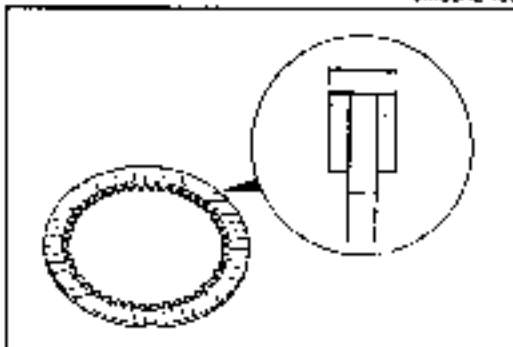


9M,OK2-160

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/cm², 57 psi) max.



9M,OK2-157

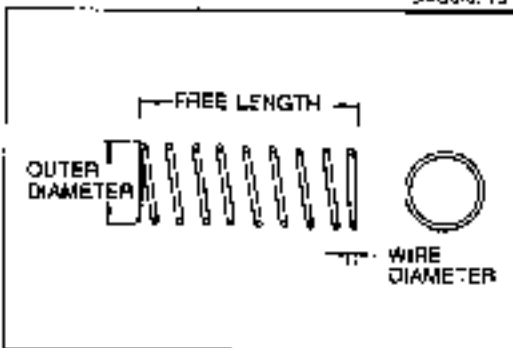
Inspection**Drive plate**

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

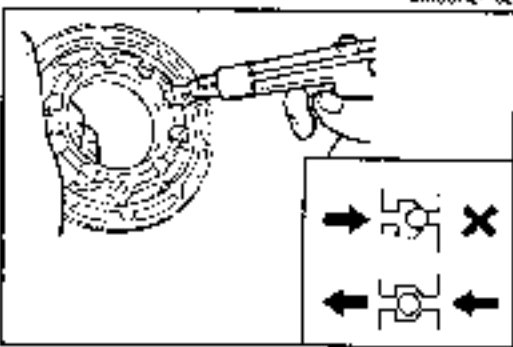
Return spring

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.



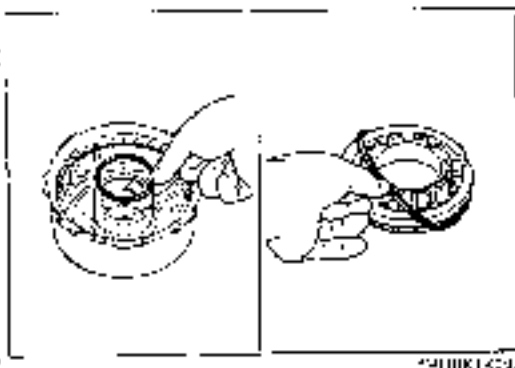
9M,OK2-163

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/cm², 57 psi) max.

3. If not correct, replace the clutch piston.



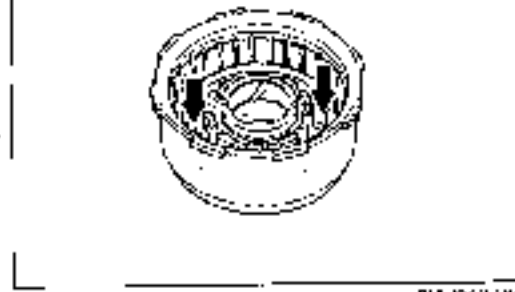
J200K1401

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.

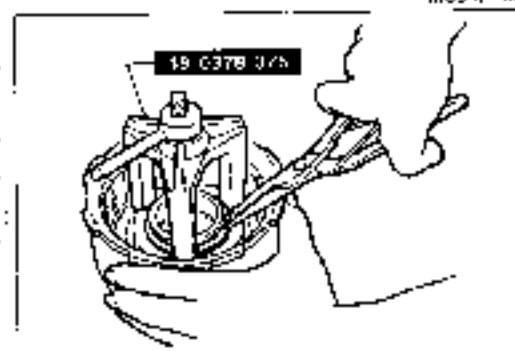
Caution

Apply even pressure to the outside edge of the piston to avoid damaging the seal rings when installing.



J200K21105

3. Apply ATF to the inside of the front clutch drum.
4. Install the piston in the front clutch drum.

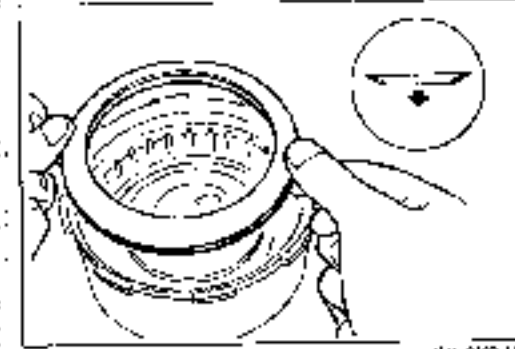


J200K21195

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.



J200K2167

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

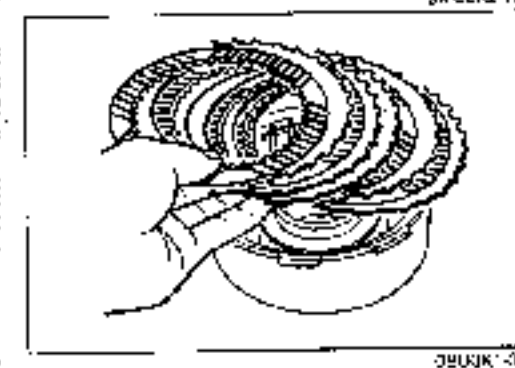
Installation order (F2 engine):

Driven-Drive-Driven-Drive-Drive-Driven-Drive-Drive

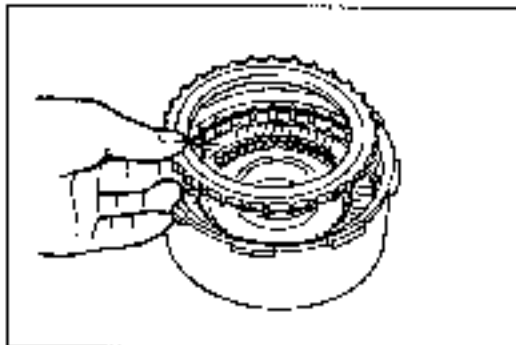
Installation order (G6 engine):

Driven-Drive-Driven-Drive-Driven-Driven-Drive-Driven-Drive

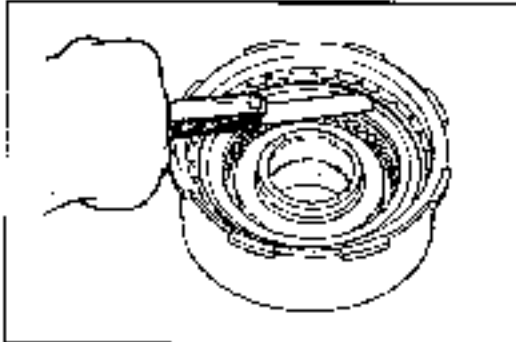
8. Apply ATF to the drive plates and driven plates and install them into the front clutch drum.



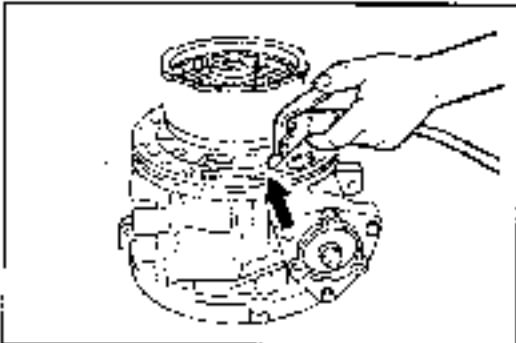
J200K1458



SMU0K2-169



BSLCK1-069



BVLCK2-171

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.

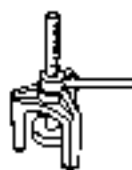
- 12 Install the front clutch onto the drum support along with the seals. Apply compressed air through the oil passage and check the clutch operation.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

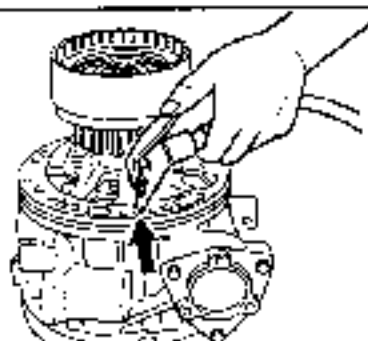
REAR CLUTCH

Preparation
AST

1/49 DS/8 3/6

Compressor,
Clutch spring

SMJ0K2-178



SMU0K2-172



JBL0K1-060

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/cm², 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.

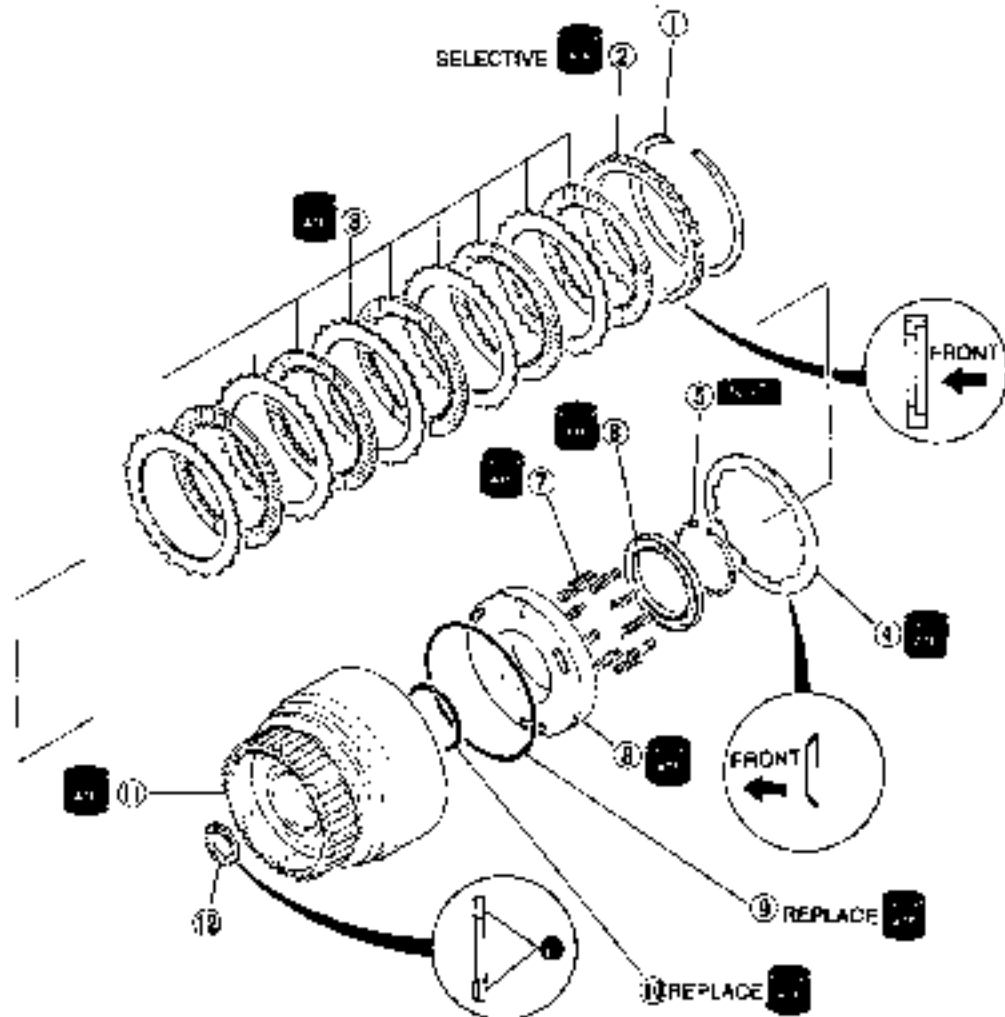
Clearance: 0.6—1.0mm (0.031—0.039 in)

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**.

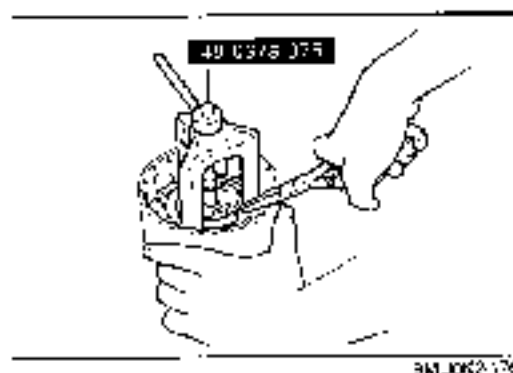


2944001-002

1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
Inspect for wear or burning
Inspection page K1-78
4. Dishes plate
5. Snap ring
Removal page K1-78

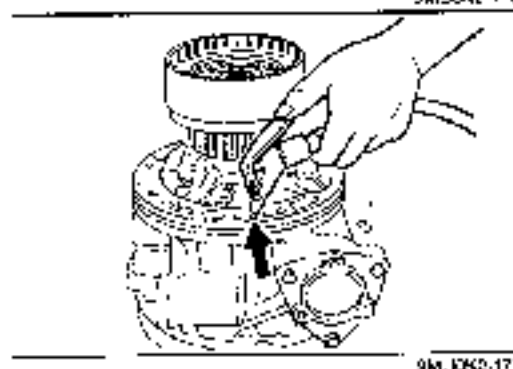
6. Spring retainer
7. Return spring
Inspection page K1-78
8. Clutch piston
Inspect balls for sticking by
shaking, piston
Removal page K1-78
Inspection page K1-78

9. Seal ring
10. O-ring
11. Rear clutch drum
12. Bearing
Inspect for damage or
rough rotation

**Disassembly note****Snap ring****Caution**

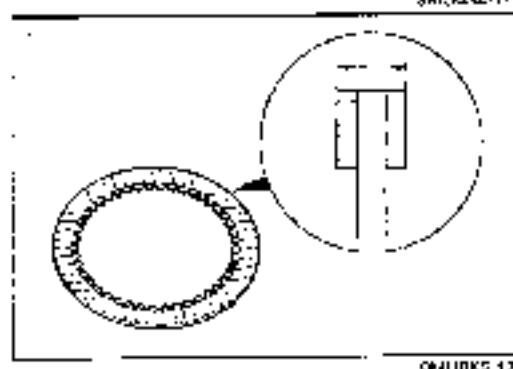
Do not damage the snap ring.

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/cm², 57 psi) max.

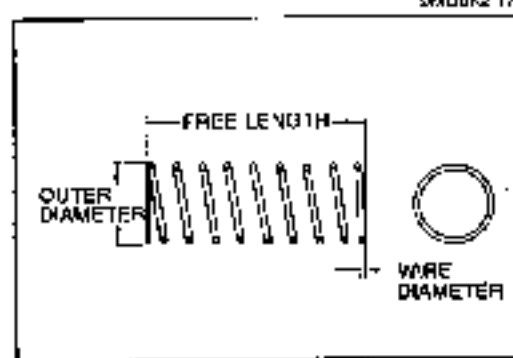
**Inspection****Drive plate**

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.

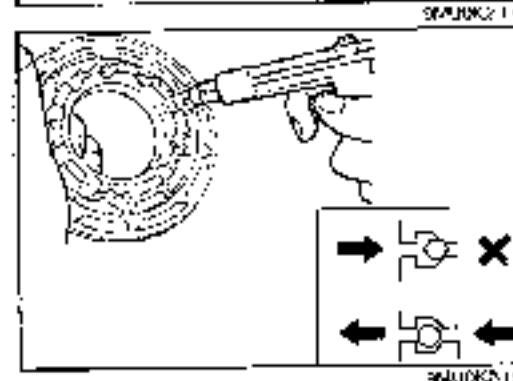
**Return spring**

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)

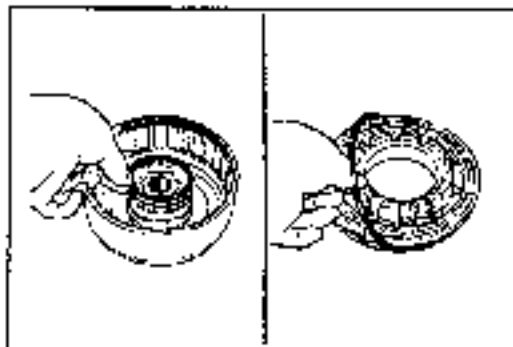
2. If not within specification, replace the return spring.

**Clutch piston**

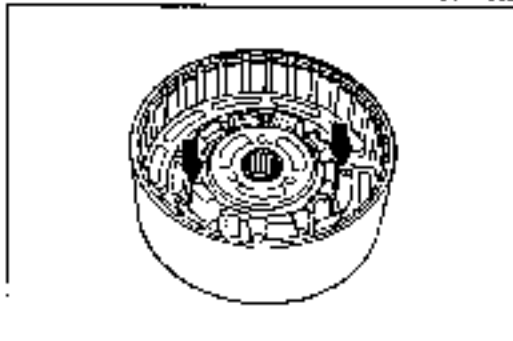
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

Air pressure: 392 kPa (4.0 kg/cm², 57psi) max.

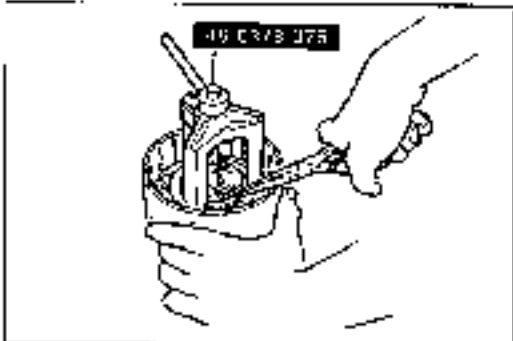
3. If not correct, replace the clutch piston.



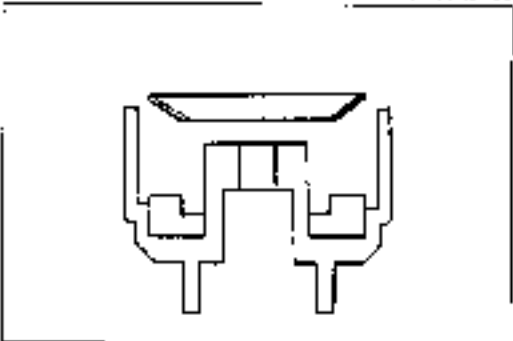
19U0K1-032



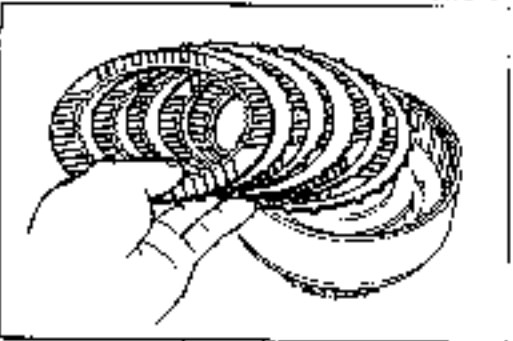
3MUBK2-132



3MUBK2-133



3MUBK2-134



3MUBK2-135

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

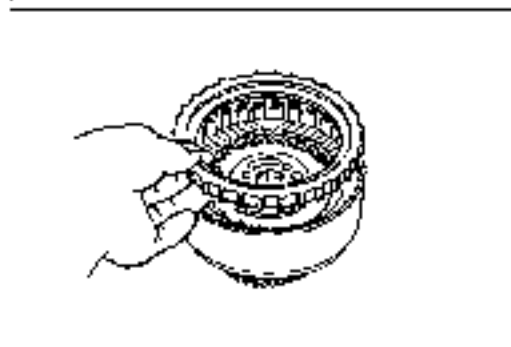
Align the flats of the drive plates with the lubrication hole of the clutch drum, then set them into the drum.

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.



05MJA0K2 186

Caution

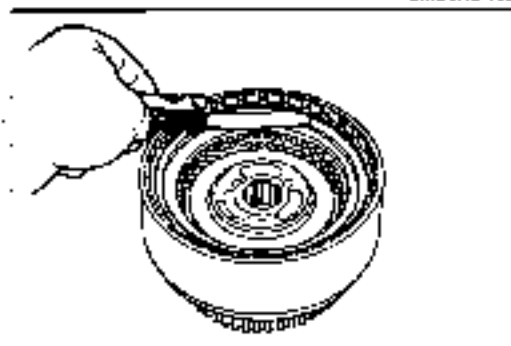
Align the flats of the retaining plate with the lubrication hole of the clutch drum, then set it into the drum.

9. Install the retaining plate with the stop facing upward.

Caution

Do not deform the snap ring.

10. Install the snap ring.



05BJAK1 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)

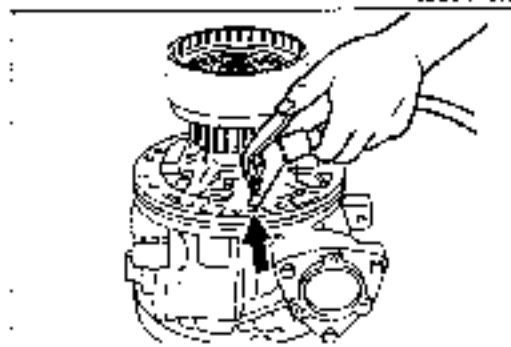
Retaining plate sizes

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

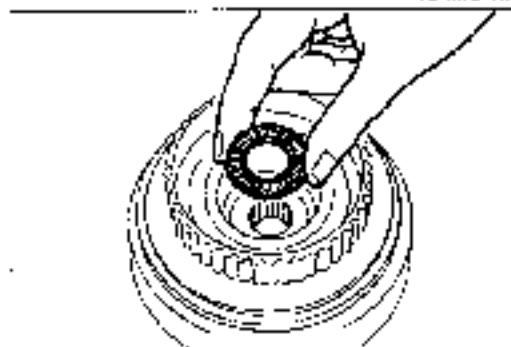
Apply air for no more than three(3) seconds.



05BJAK2 188

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/cm², 57 psi) max.



05BJAK1 149

13. Apply petroleum jelly to the bearing race, and install it onto the rear clutch drum.

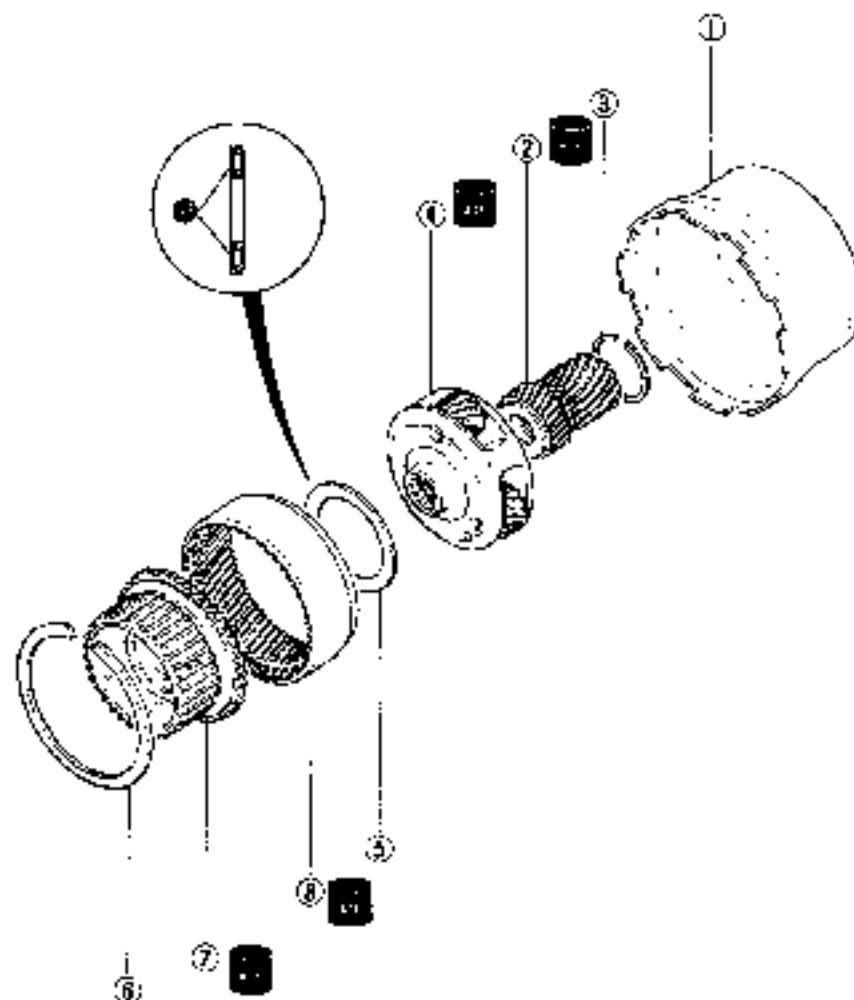
Bearing race outer diameter: 51.5mm (2.028 in)

**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.

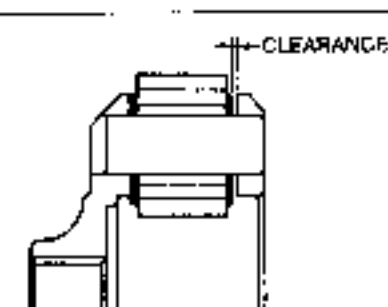
Inspect all parts, and repair or replace as necessary.

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



13UD-41-033

1. Connecting shell	5. Bearing
2. Front sun gear	Inspect for damage or rough rotation
Inspect individual gear teeth for damage, wear, or cracks	6. Snap ring
3. Snap ring	7. Rear clutch hub
4. Front planetary pinion carrier	8. Internal gear
Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears	Inspect individual gear teeth for damage, wear or cracks
Inspection..... page K1-80	

**Inspection****Front planetary pinion carrier**

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

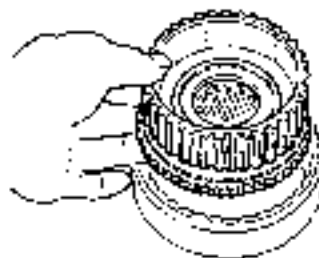
Clearance

Standard : 0.2—0.7mm (0.008—0.028 in)

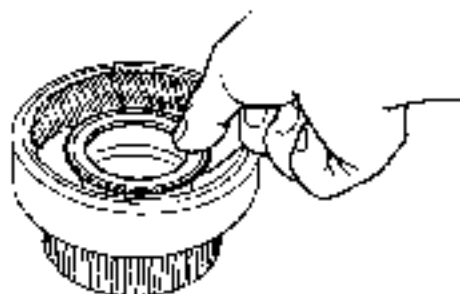
Maximum: 0.8mm (0.031 in)

2. If not within specification, replace the planetary pinion carrier.

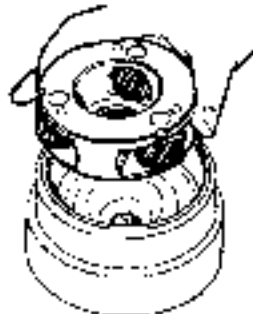
9MUCK2-257



13JUK1-084



06JQ41-064



06LCK-065



09JUK1-086

Assembly procedure

1. Apply ATF to the rear clutch hub and internal gear, and assemble them with the snap ring.

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)

3. Apply ATF to the front planetary pinion carrier, and install it into the internal gear.

Note

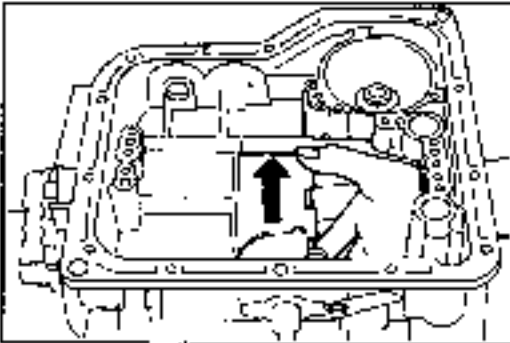
Pay close attention to the front and rear directions of the sun gear. The grooved side (arrow) is the front.

4. Install the snap ring onto the sun gear.



0160-10K1-062

5. Apply ATF to the sun gear, and install it into the front planetary pinion carrier.



6MUC07-063

**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.

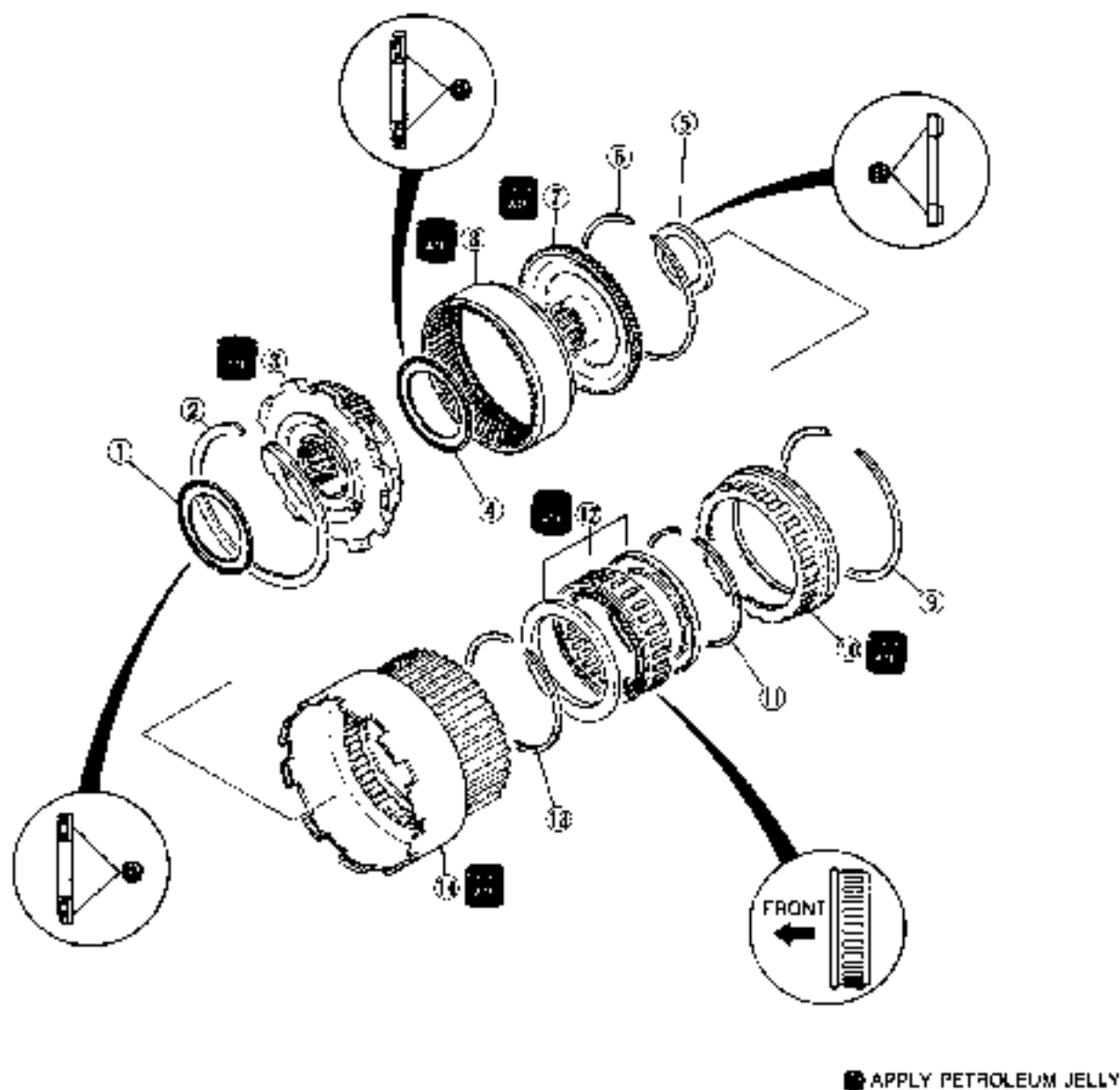
If not, replace the one-way clutch

Disassembly and Inspection

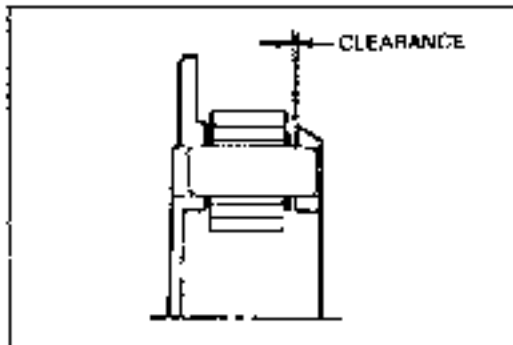
Disassemble in the order shown in the figure.

Inspect all parts, and repair or replace as necessary.

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



1. Bearing Inspect for damage or rough rotation	4. Bearing Inspect for damage or rough rotation	8. Internal gear Inspect individual gear's teeth for damage, wear, or cracks
2. Snap ring	5. Bearing Inspect for damage or rough rotation	9. Snap ring
3. Rear planetary pinion carrier Inspect individual gear's teeth for damage, wear, or cracks, and rotation of pinion gears Inspection page K1-85	6. Snap ring	10. One-way clutch outer race
	7. Drive flange Inspect individual gear's teeth for damage, wear, or cracks	11. Snap ring
		12. One-way clutch
		13. Snap ring
		14. Connecting drum



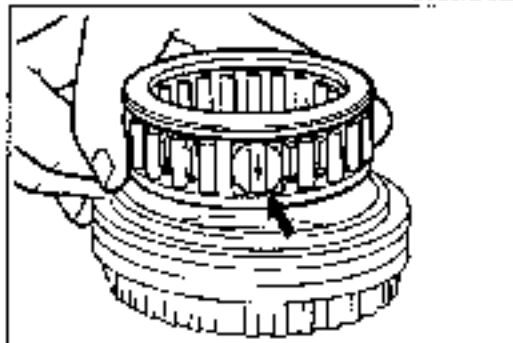
3VLEK2 256

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.

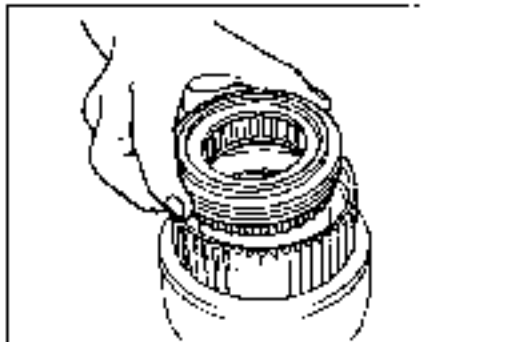


1EUDK1 036

Assembly procedure**Caution**

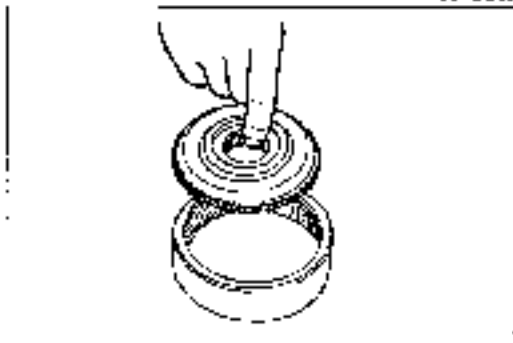
Install the side indicated by an arrow in the figure toward the front when inserting the one-way clutch into the one-way clutch outer race.

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.



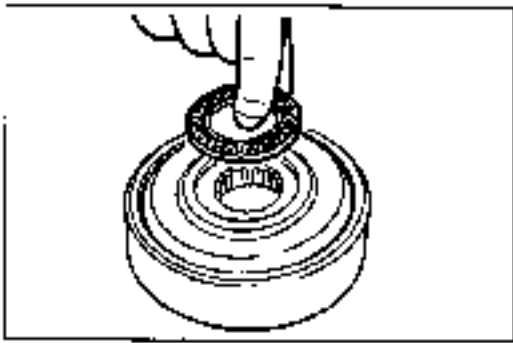
HK1J0K2 269

3. Apply ATF to the connecting drum, and install it into the one-way clutch outer race.
4. Install the snap ring.



2VLEK2 256

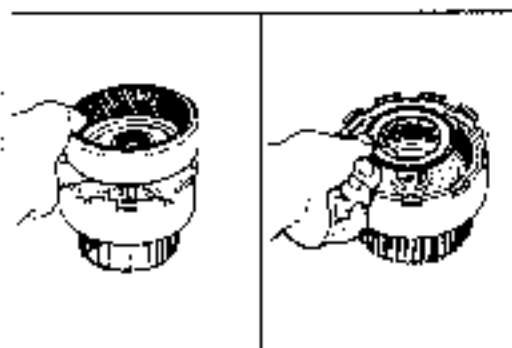
5. Apply ATF to the drive flange and internal gear, and install it into the internal gear.
6. Install the snap ring.



3VLEK2 256

7. Apply petroleum jelly to the bearing, and install it onto the drive flange.

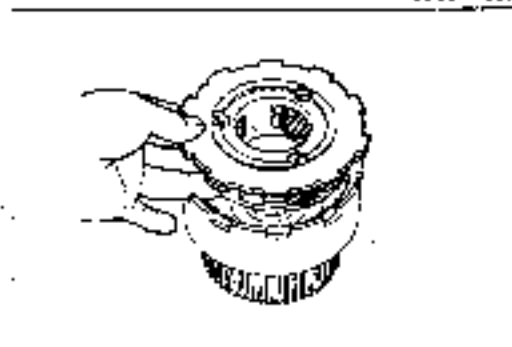
Bearing outer diameter: 47.0mm (1.850 in)



09U0K1-026

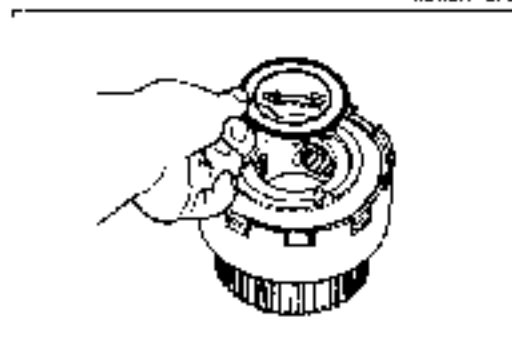
8. Install the internal gear and the drive flange into the connecting drum.
9. Apply petroleum jelly to the bearing, and install it into the drive flange with the black surface facing upward.

Bearing outer diameter: 70.0mm (2.756 in)



09U0K1-070

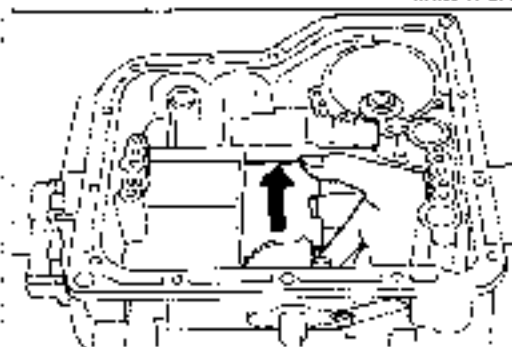
10. Apply ATF to the rear planetary pinion carrier, and install it into the connecting drum.
11. Install the snap ring.



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)

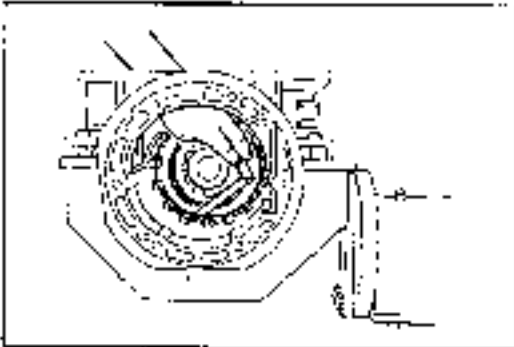
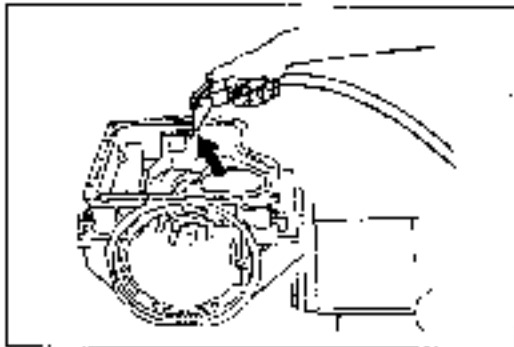
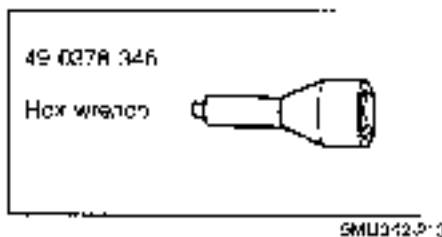


09U0K1-077

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/cm², 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)

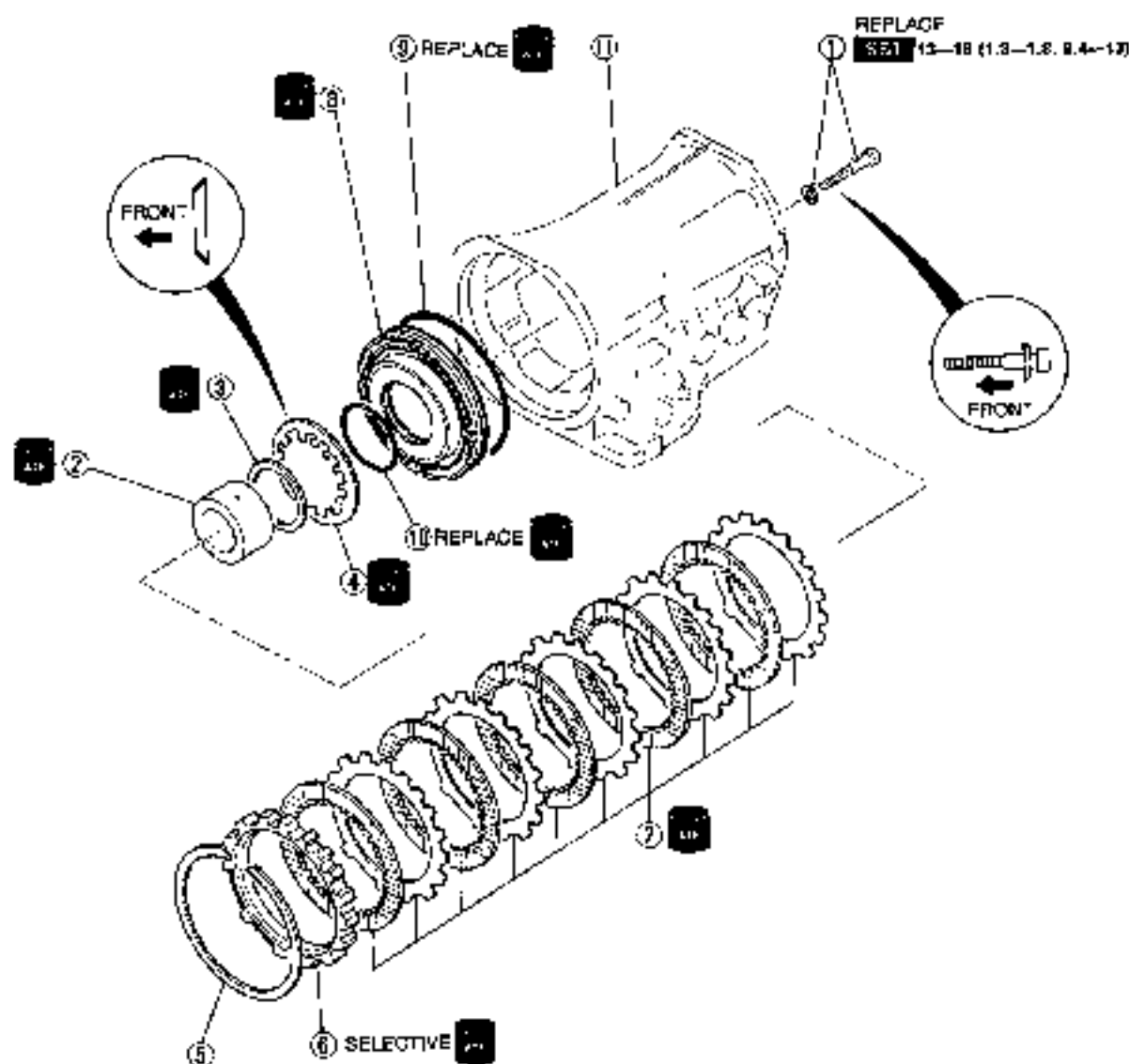
Select and install the correct retaining plate when assembling

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**.



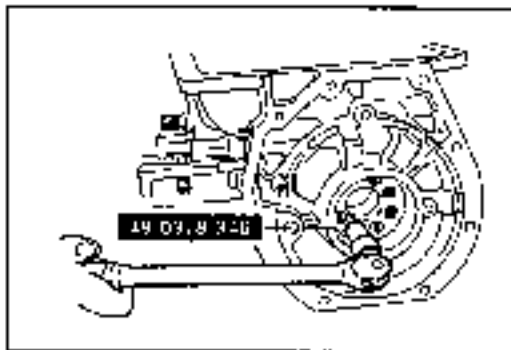
N·m (w·kg, ft·lb)

1307X1407

1. Allen 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

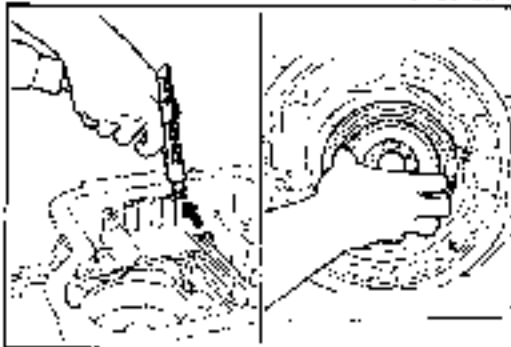
9. Seal ring
10. O-ring
11. Transmission case



BAYLON2817

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.

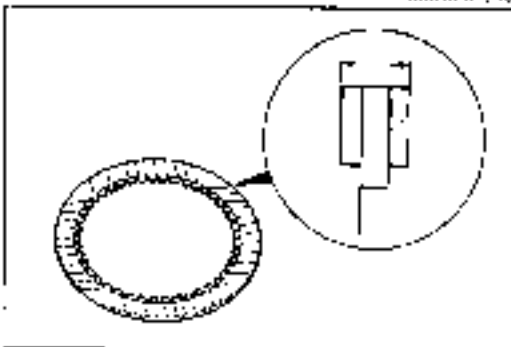


SM11012-218

Low and reverse brake piston

Remove the piston by applying compressed air through the oil passage.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.



CSUCK1044

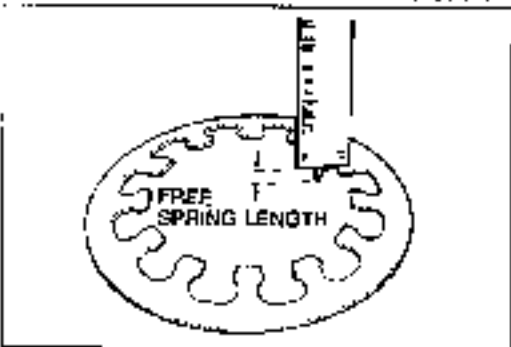
Inspection**Drive plate**

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.



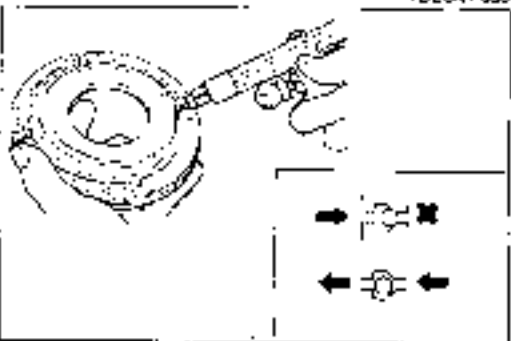
1BLOK1036

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.



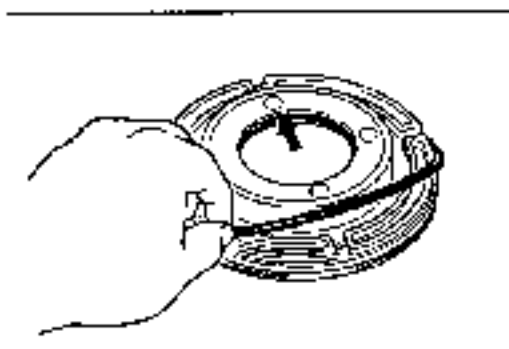
SM10K2-22

Clutch piston

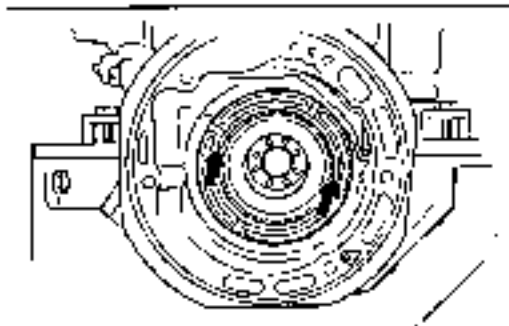
1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

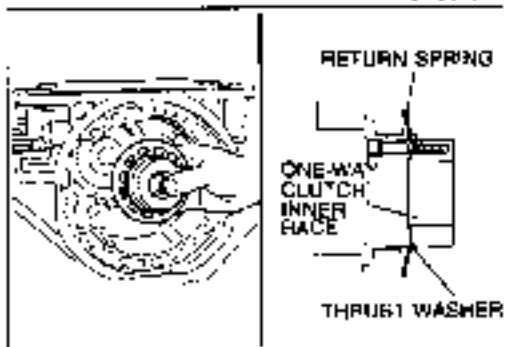
3. If not correct, replace the clutch piston.



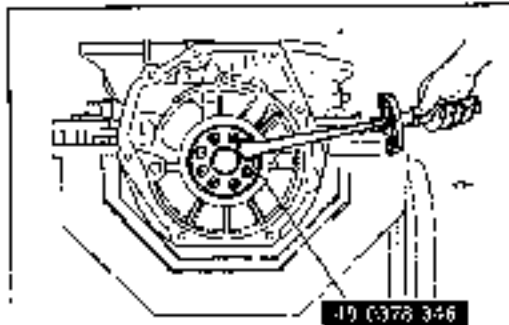
1BL0K1-039



9VLC02-223



9VLC02-224



1BL0K1-040



9VLC02-225

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.

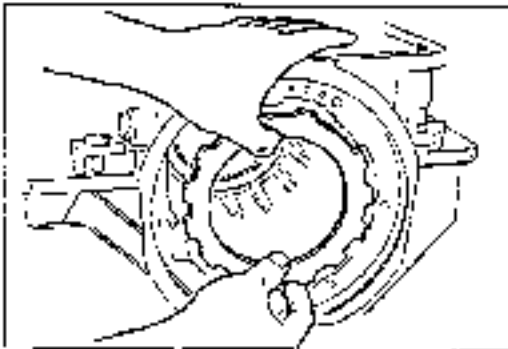
Tightening torque:

13—18 N·m (1.3—1.8 m·kg, 9.4—13 ft·lb)

Note**Installation order:**

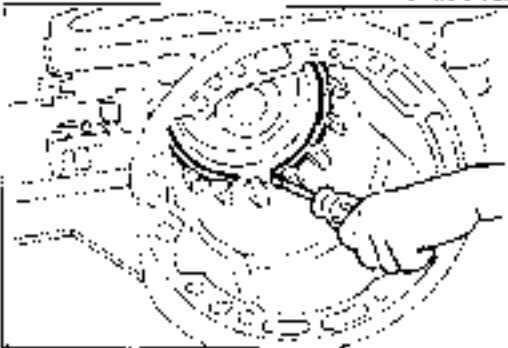
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

8. Apply ATF to the driven plates and driver plates and install them into the transmission case.



BMJ0K2 227

9. Install the retaining plate.

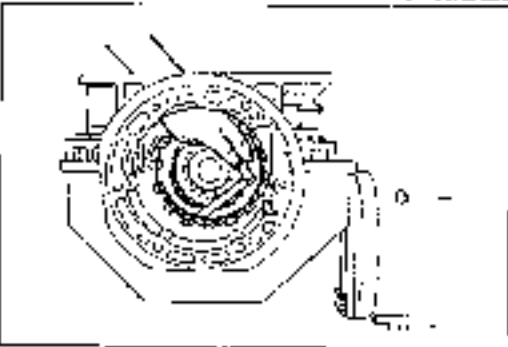


BMJ0K2 228

Caution

Do not deform the snap ring.

10. Install the snap ring with a screwdriver.



BMJ0K2 229

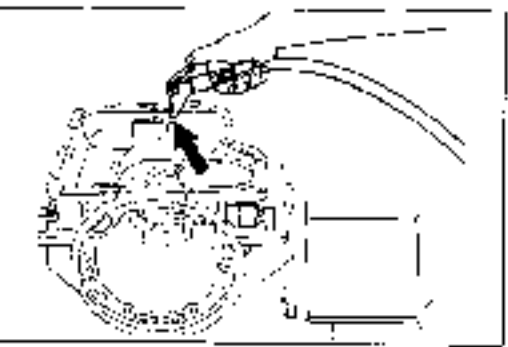
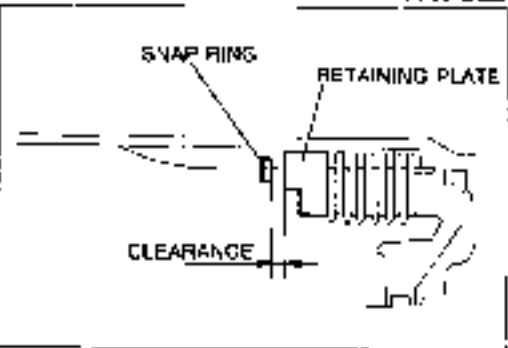
11. Measure the clearance between the snap ring and the retaining plate with a feeler gauge. If not within specification, adjust the clearance by installing the proper retaining plate.

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)



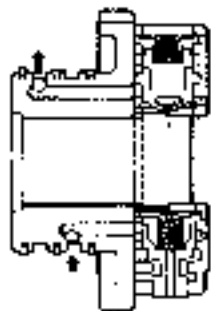
BMJ0K2 231

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/cm², 57 psi) max.



RMUCK2-492

GOVERNOR Preinspection Governor valve operation

Caution

The compressed air must be less than 500 kPa (5.0 kg/cm², 71 psi) and should not be applied for more than five(5) seconds.

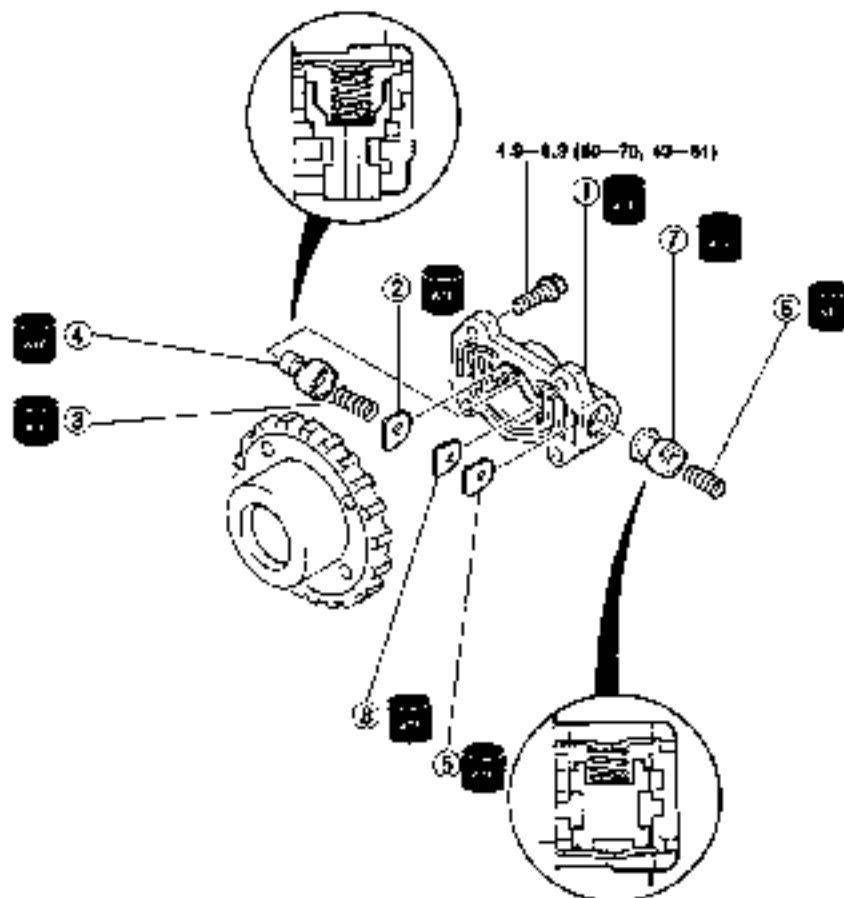
Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown.

Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

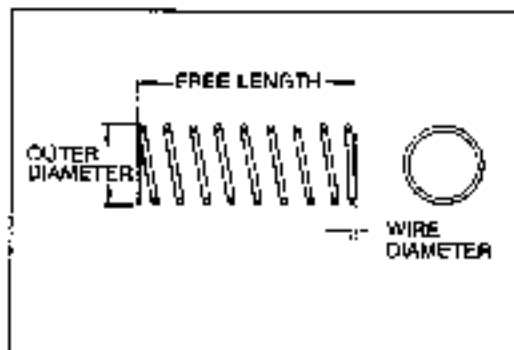
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



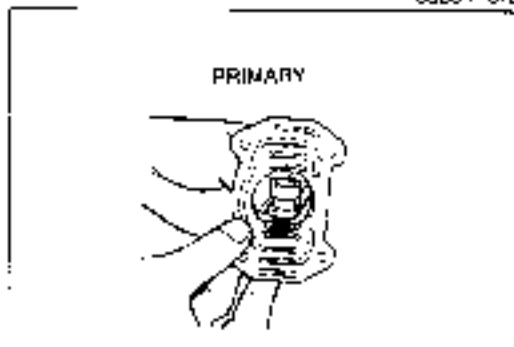
Unit (cm-lb, in-lb)

Unit (cm-lb, in-lb)

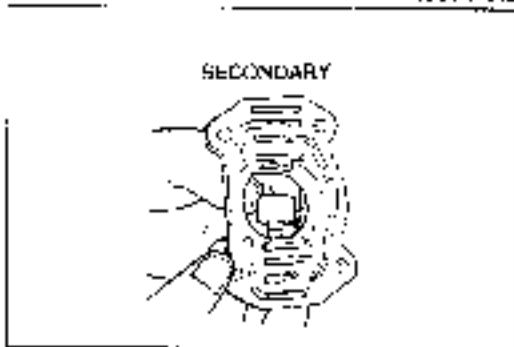
1. Governor valve body Inspect for damage or scoring	4. Secondary governor valve Inspect for sticking, scoring or scratches	7. Primary governor valve Inspect for sticking, scoring or scratches
2. Retainer plate	5. Retainer plate	8. Retainer plate
3. Secondary governor spring Inspection page K1-93	6. Primary governor spring Inspection page K1-93	



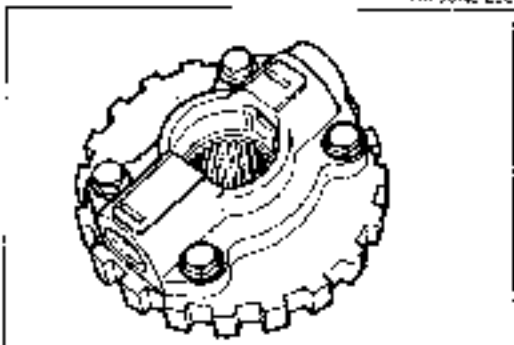
00J04-076



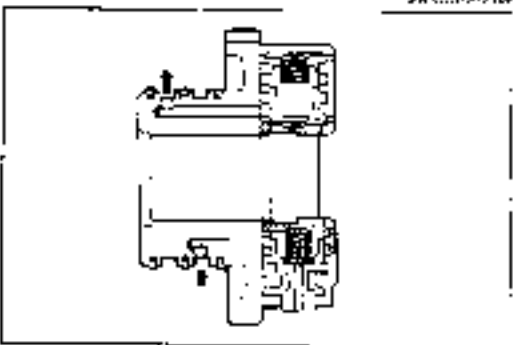
18U0K1-043



9M J0K2-255



2MUCR2-269



2MUCR3-424

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 Cali	9.0 (0.354)	21.7 (0.854)	10.0	0.9 (0.031)
	F2 EGI	9.2 (0.362)	26.2 (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.

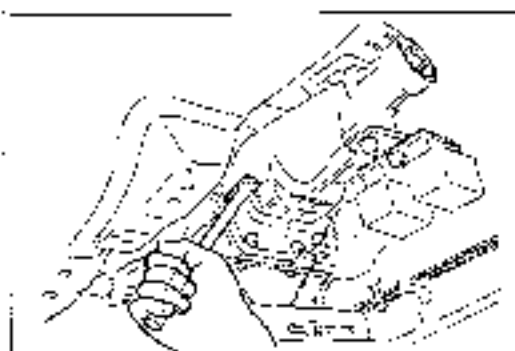
Tightening torque:

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/cm², 71 psi) and should not be applied for more than five(5) seconds.

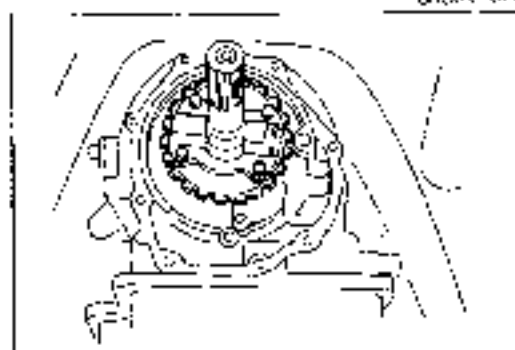
4. Check that the valves move slightly, and that a vibrating sound is heard when compressed air is applied as shown in the figure.



U8AUC1-077

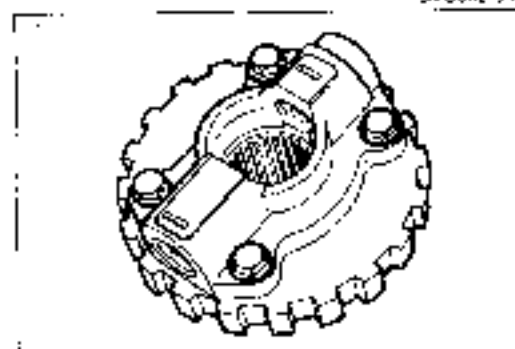
On-vehicle Removal

1. Remove the extension housing. (Refer to page K1-95.)
2. Remove the speedometer drive gear.



9VUCR2-911

3. Remove the governor and parking gear.
4. Separate the governor from the parking gear.



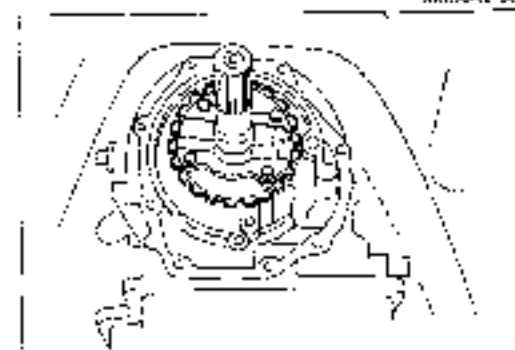
9K1KAC2-507

On-vehicle Installation

1. Install the governor onto the parking gear.

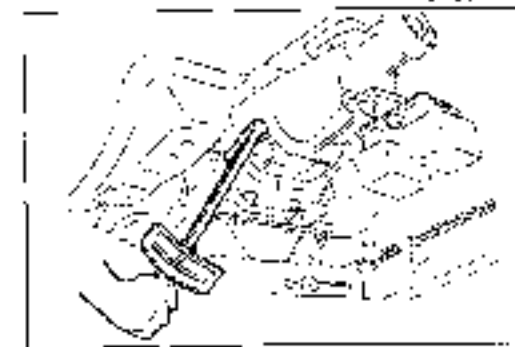
Tightening torque:

4.9—6.8 Nm (50—70 cm·kg, 43—61 in·lb)



9VUCR2-902

2. Install the governor and parking gear onto the output shaft, and secure it with a new snap ring.



CBUCR1-747A

3. Install the speedometer drive gear.
4. Install the extension housing. (Refer to page K1-95.)

EXTENSION HOUSING AND PARKING MECHANISM

Disassembly and Inspection

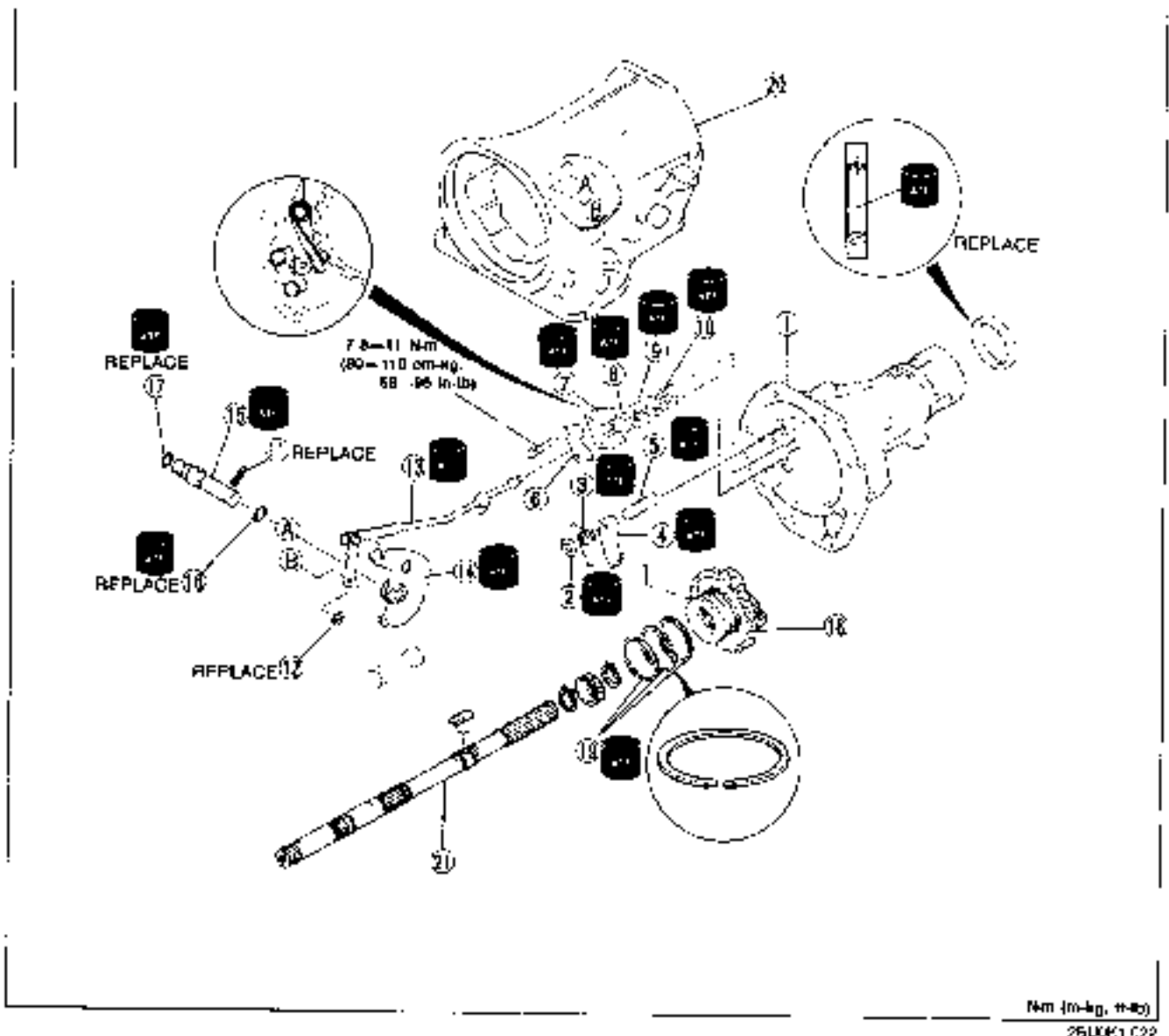
Caution

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.

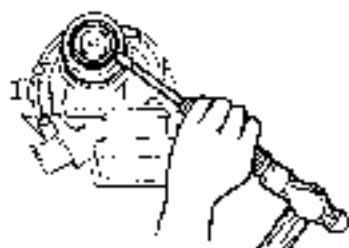
Assemble in the reverse order of disassembly, referring to **Assembly procedure**.



1. Extension housing
 2. Dowel spacer
 3. Return spring
 4. Parking pawl
 5. Pawl shaft
 6. Retainer plate
 7. Actuator support
 8. Steel ball
 9. Retainer
 10. Spring
- Inspection page K1-96

11. Roll pin
12. Retaining ring
13. Parking rod
14. Manual plate
15. Manual shaft
16. O ring
17. O-ring

18. Parking gear
 19. Seal rings
 20. Transmission case
 21. Output shaft
- Inspection page K1-96
- Inspect individual gear teeth for damage or wear and condition of spring
- Inspect splines for damage or wear



SMU11349-276

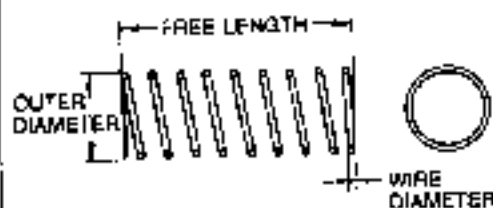
Disassembly note

Oil seal

Caution

Do not remove the seal unless necessary.

Remove the oil seal with a screwdriver.



SMU06E-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	3.7 (0.126)

2. If not within specification, replace the spring.

Oil distributor

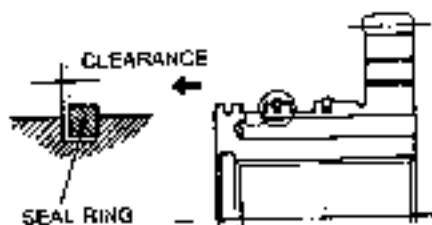
1. Measure the clearance between the seal rings and the grooves.

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.



SBJ070X-024

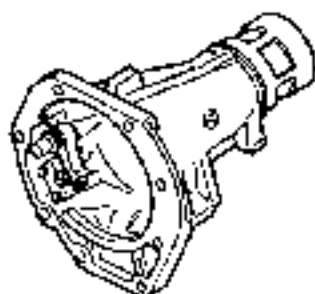
Assembly procedure

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.

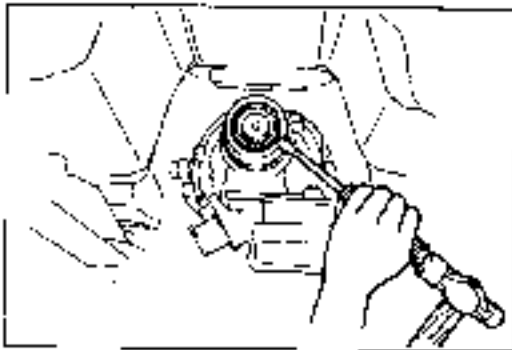
Tightening torque:

7.8—11 Nm (80—110 cm·kg, 69—95 in·lb)

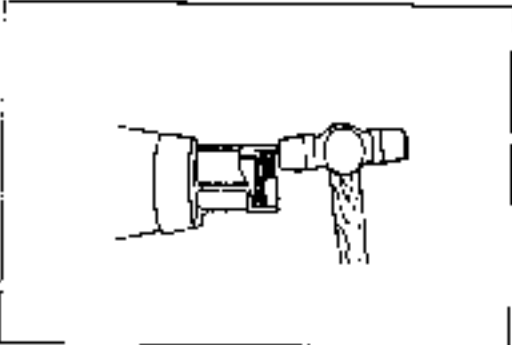
5. Apply ATF to the pawl shaft, and install it into the extension housing.
6. Apply ATF to the parking pawl and return spring, and install them into the extension housing.
7. Apply ATF to the dowel spacer, and install it into the extension housing.



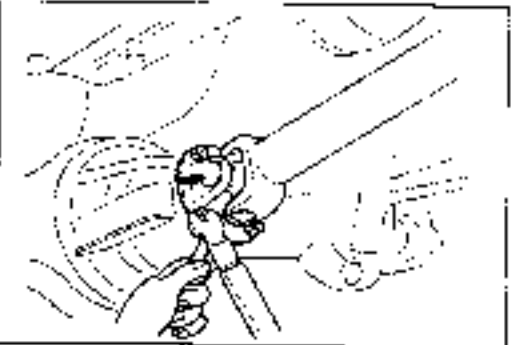
SMU3472-283



9M1.560-362



5BLCKX-065



3VLCX2-241

OIL SEAL**On-vehicle Replacement**

1. Remove the propeller shaft. (Refer to Section L.)
2. Pry the oil seal from the extension housing.
3. Coat the new oil seal lip with ATF.
4. Install the oil seal squarely into the extension housing with a plastic hammer.
5. Install the propeller shaft. (Refer to Section L.)

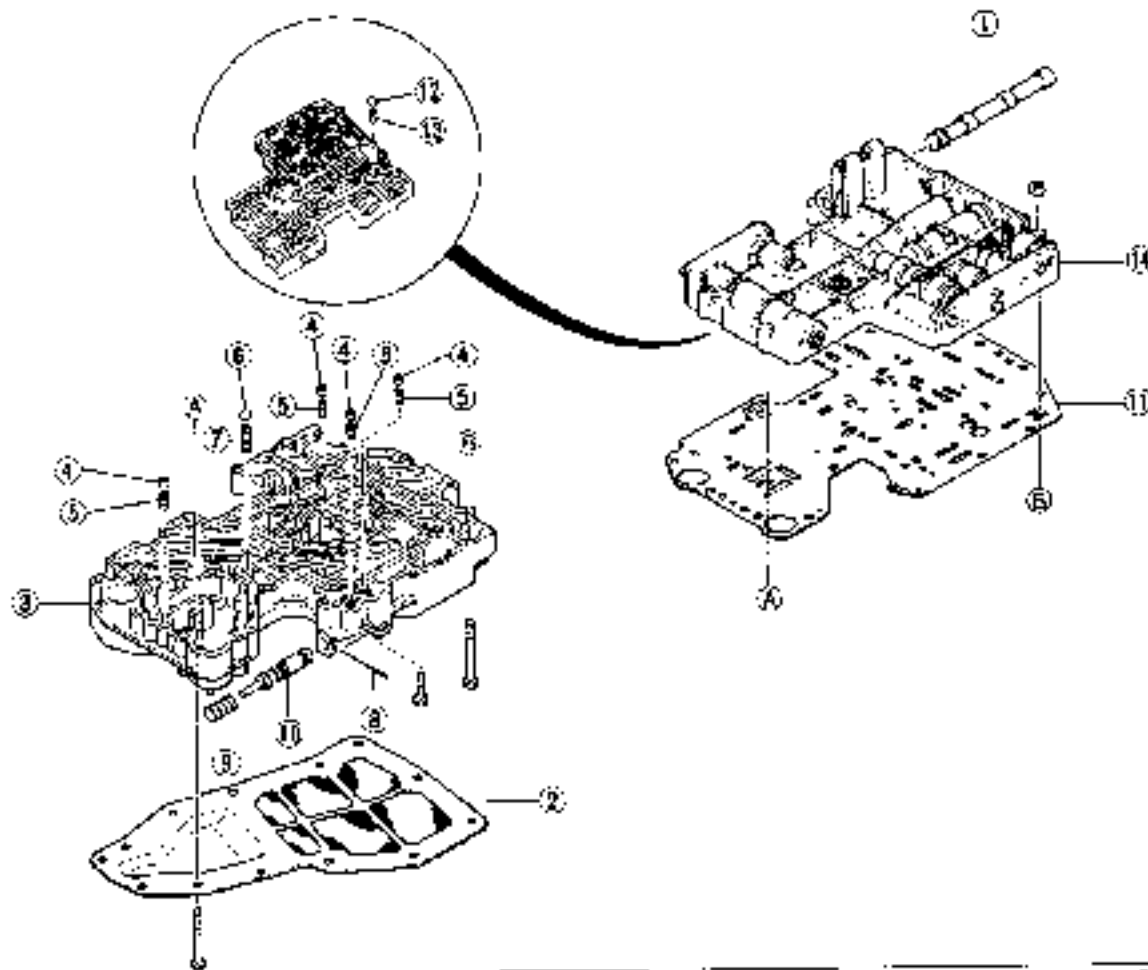
CONTROL VALVE BODY Disassembly and Inspection

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.

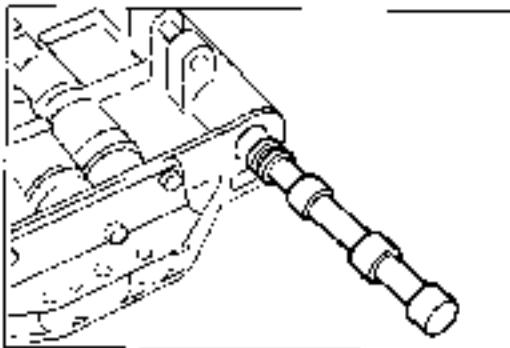
APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



7200K-10/2

- Manual valve
Inspect for sticking, scoring, or scratches
- Oil strainer
Inspect for clogging or damage
- Lower valve body
Inspect for damage or scoring
- Orifice check valve
- Orifice check spring
Inspection page K1-100
- Throttle relief ball
- Throttle relief spring
Inspection page K1-100
- Roll pin

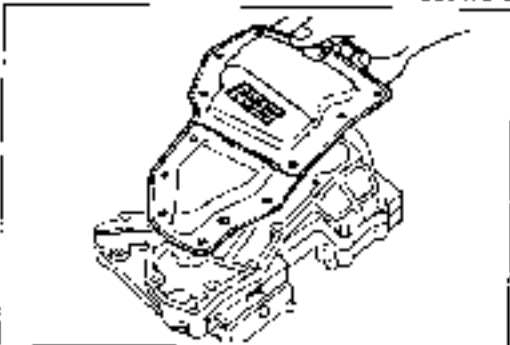
- 3-2 timing spring
Inspection page K1-100
- 3-2 timing valve
Inspect for sticking and scoring
- Separate plate
Inspect fluid passage for clogging or damage
- Orifice check valve
- Orifice check spring (F2 engine)
Inspection page K1-100
- Upper valve body
Disassembly and Inspection page K1-101
Assembly page K1-102



BLOCK1 DAE

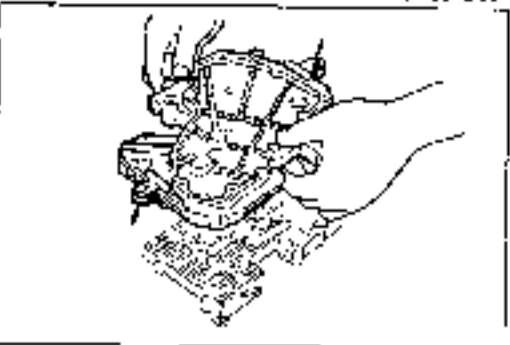
Disassembly Procedure

1. Remove the manual valve.



9MUDK2 307

2. Remove the oil strainer.

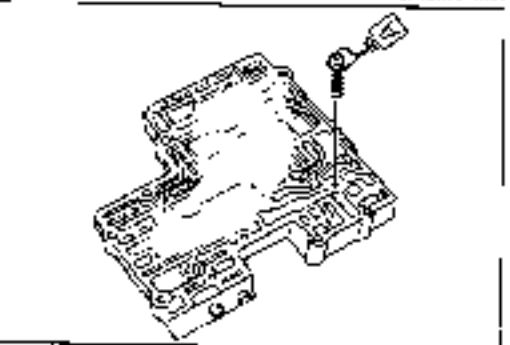


9MUDK2 306

3. Hold the lower valve body and separate plate together with a large clip.

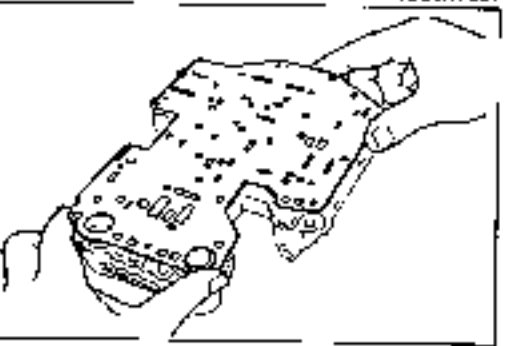
4. Remove the bolts.

5. Remove the lower valve body.



CELOCK1 EB1

6. Remove the orifice check valve and spring (F2 engine) from the upper valve body.



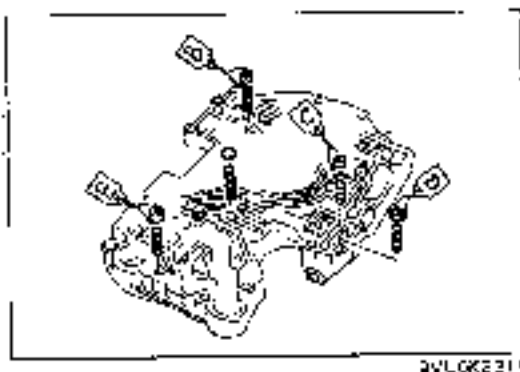
9MUDK2 310

7. Remove the holding clip.

Caution

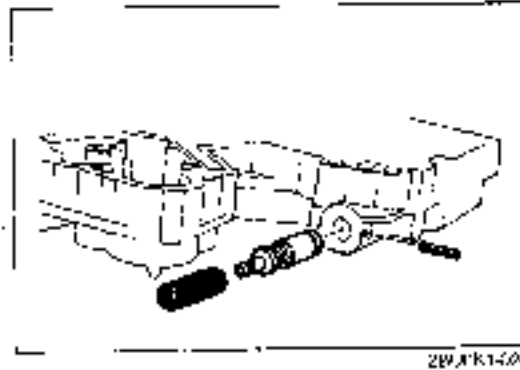
Remove the separate plate gently to avoid losing the orifice check valves and springs and the throttle relief ball and spring in the valve body.

8. Remove the separate plate.

**Note**

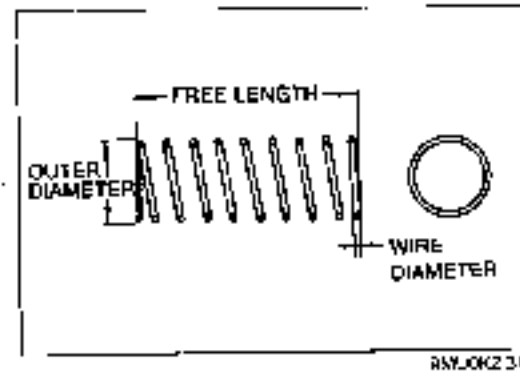
Tag the orifice check valves as shown for proper reassembly.

- 9 Remove the orifice check valves, throttle relief ball, and springs.



10. Remove the roll pin.

11. Remove the 3-2 timing valve and spring.

**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 relief		5.5 (0.216)	28.2 (1.055)	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)

1RL0K-247

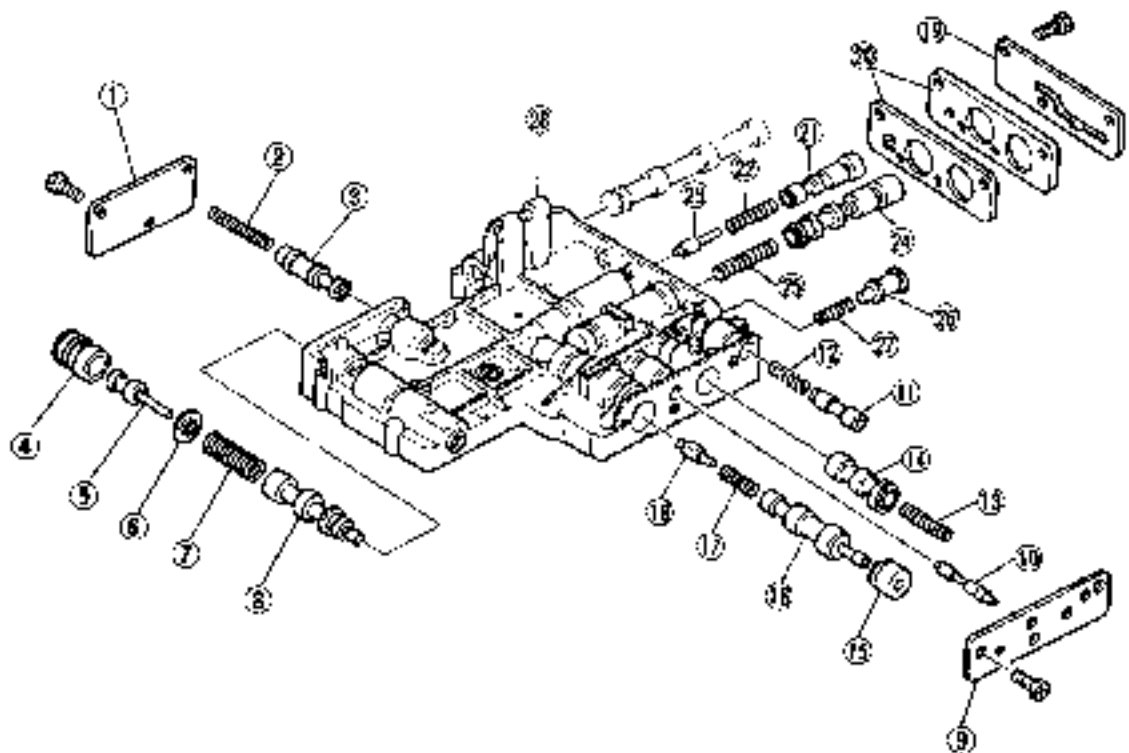
UPPER VALVE BODY**Disassembly and Inspection**

Disassemble in the order shown in the figure.

Inspect all parts, and repair or replace as necessary.

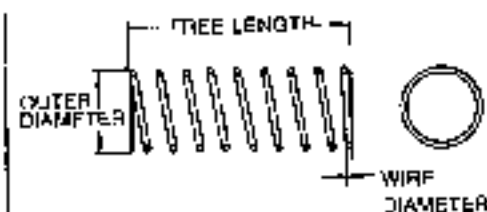


APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



16B-CK1 083

1. Side plate D	11. Downshift valve	20. Separators (G6 engine)
2. Second lock spring	Inspect for sticking, scoring, or scratches	21. 2-3 shift valve
3. Second lock valve	Inspect for sticking, scoring, or scratches	22. 2-3 shift spring
4. Pressure regulator sleeve	Inspect for sticking, scoring, or scratches	23. 2-3 shift plug
5. Pressure regulator plug	Inspect for sticking, scoring, or scratches	24. 1-2 shift valve
6. Pressure regulator valve	Inspect for sticking, scoring, or scratches	25. 1-2 shift spring
7. Pressure regulator spring	Inspect for sticking, scoring, or scratches	26. Pressure modifier valve
8. Pressure regulator valve	Inspect for sticking, scoring, or scratches	27. Pressure modifier spring
9. Side plate B	Inspect for sticking, scoring, or scratches	28. Upper valve body
10. Vacuum throttle valve	Inspect for sticking, scoring, or scratches	
	12. Downshift spring	
	Inspect for sticking, scoring, or scratches	
	13. Throttle backup spring	
	Inspect for sticking, scoring, or scratches	
	14. Throttle backup valve	
	Inspect for sticking, scoring, or scratches	
	15. 3-4 shift sleeve	
	Inspect for sticking, scoring, or scratches	
	16. 3-4 shift valve	
	Inspect for sticking, scoring, or scratches	
	17. 3-4 shift spring	
	Inspect for sticking, scoring, or scratches	
	18. 3-4 shift plug	
	Inspect for sticking, scoring, or scratches	
	19. Side plate A	



9VU0K2-316

Inspection

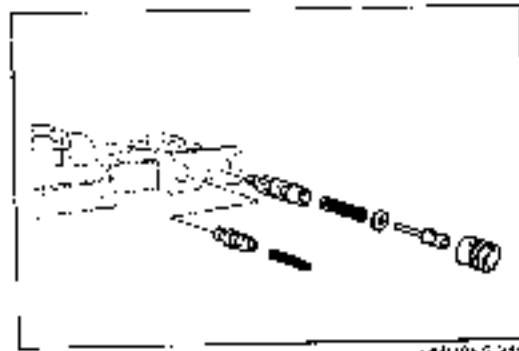
1. Measure the springs specifications.
2. If not within specification, replace the spring(s).

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)	10.0	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)

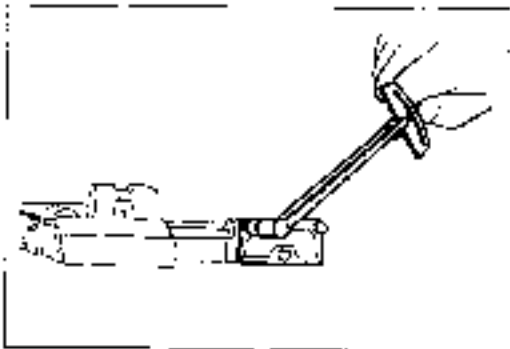
9BU0K1-354

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.



9VU0K2-318

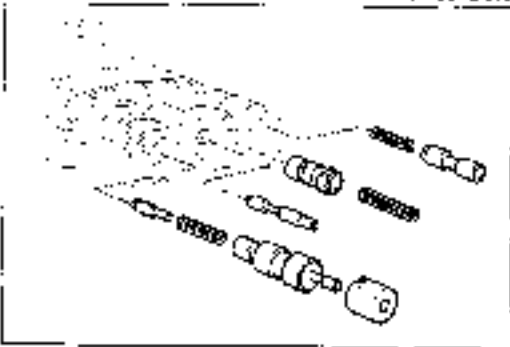


9M_U042-312

3. Install side plate D in position where it will not interfere with the set plate.
4. Tighten the installation bolts.

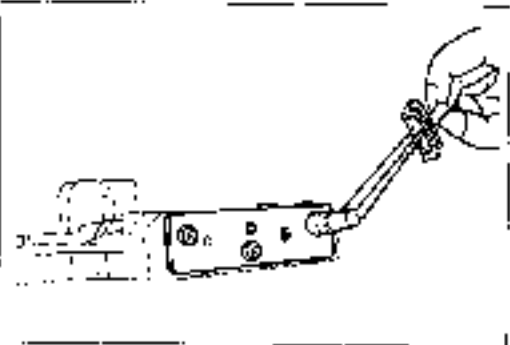
Tightening torque:

2.5—3.4 N·m (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.

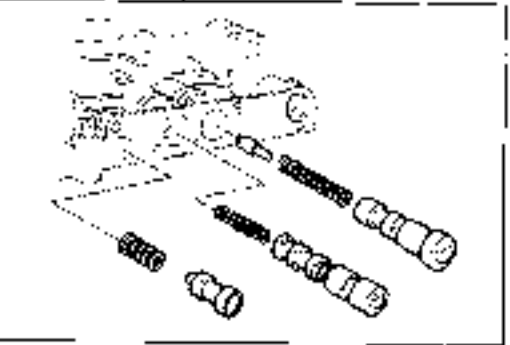


9M_U042-321

10. Tighten the installation bolts.

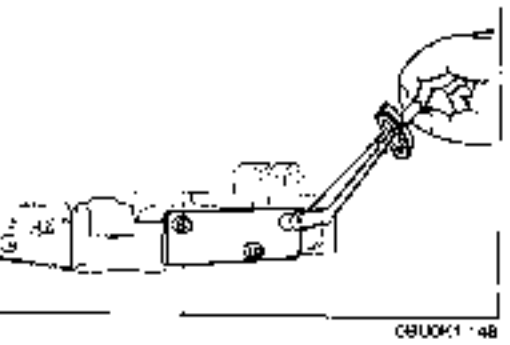
Tightening torque:

2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)



3B_U042-325

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.



CB_U041-48

14. Install the separators (G6 engine) and side plate A so that it will not interfere with the set plate.
15. Tighten the installation bolts.

Tightening torque:

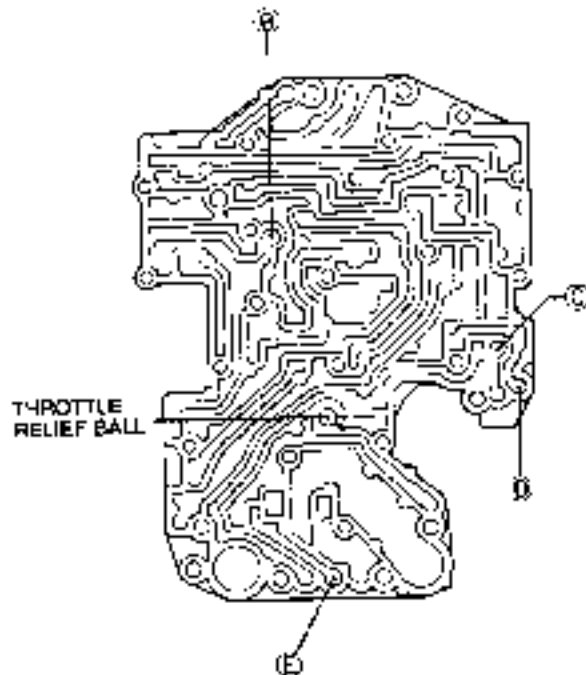
2.5—3.4 N·m (25—35 cm·kg, 22—30 in·lb)

CONTROL VALVE BODY

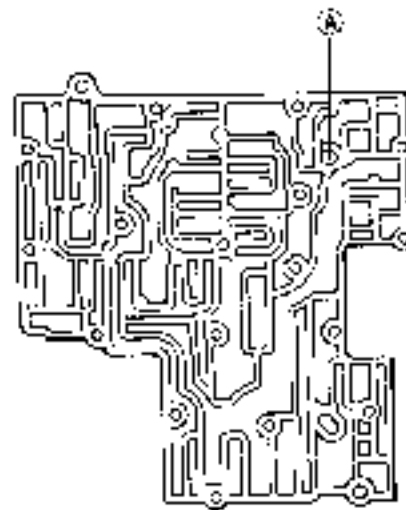
Assembly

Drill check valve location

LOWER VALVE BODY SIDE



UPPER VALVE BODY SIDE

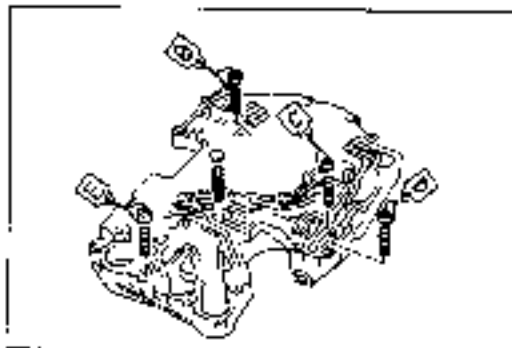


6A10K2 224

Orifice check valve specifications

			Y diameter		mm (in)
			F2 engine	G8 engine	
Upper valve body side	(A)			φ 2.0 (0.079)	
	(B)			φ 1.5 (0.059)	
Lower valve body side	(C)		φ 1.3		φ 1.7 (0.067)
	(D)		φ 2.0		φ 2.2 (0.087)
	(E)			φ 2.0 (0.079)	

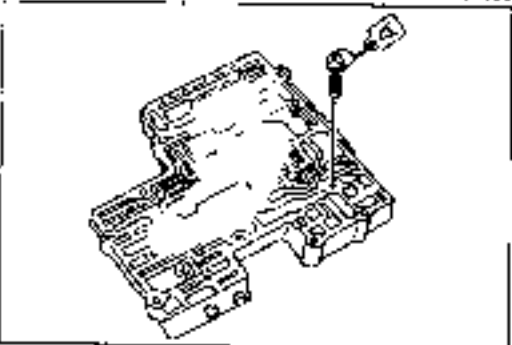
6A10K1 085



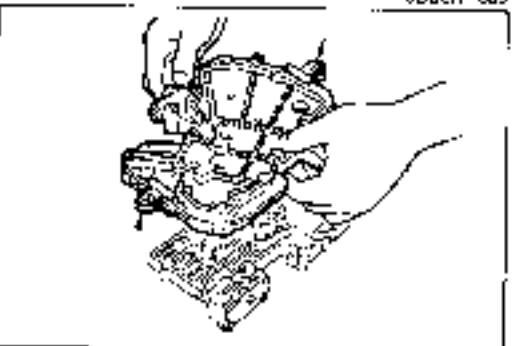
10J0K1-04H



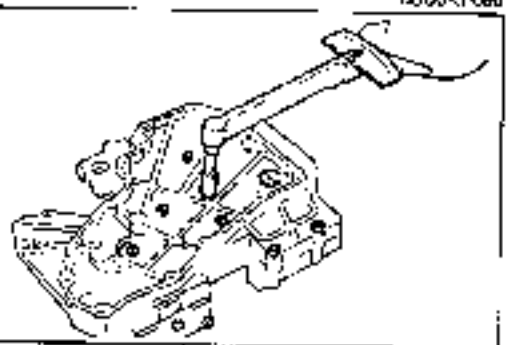
08U0K1-050



08U0K1-060



08U0K1-080



08U0K1-081

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

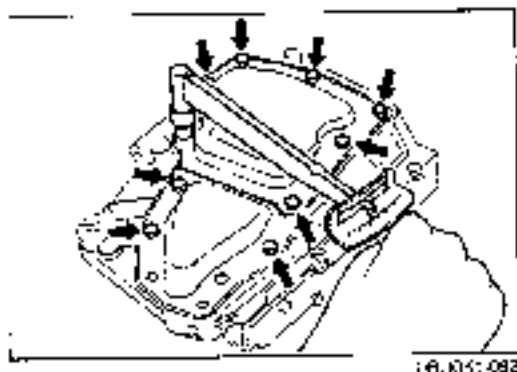
Be sure the orifice check valve and throttle relief ball are properly inserted. (Refer to page K1-104.)

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)

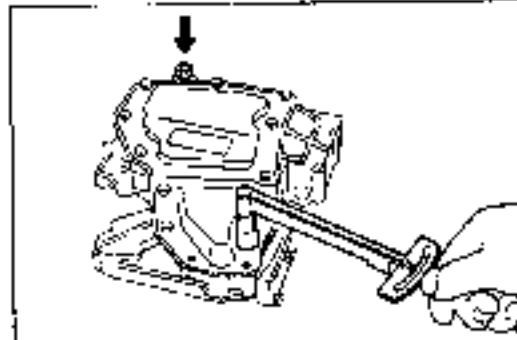


7. Install the oil strainer.

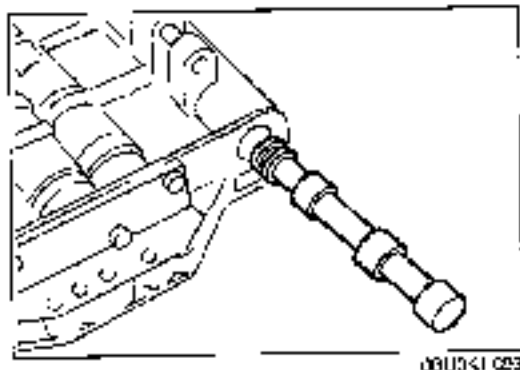
Tightening torque

Bolt: 2.9—3.9 N·m (30—40 cm·kg, 25—35 in·lb)

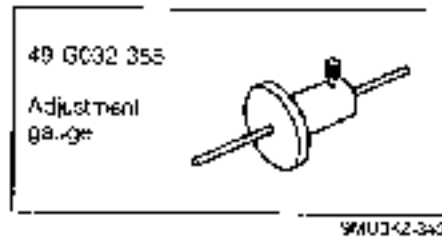
Nut: 4.9—6.9 N·m (50—70 cm·kg, 43—61 in·lb)



8. Insert the manual valve into the lower valve body

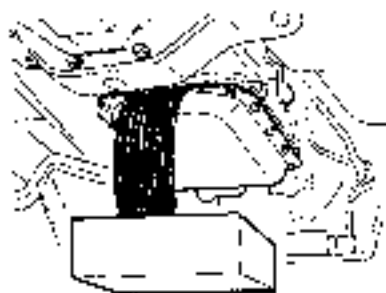


00U041 023

VACUUM DIAPHRAGM**Preparation****SST****General note**

Excessive shift shock and improper shifting often indicate a vacuum diaphragm malfunction.

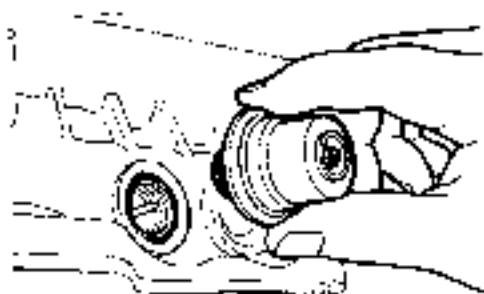
9740342-345



9WU0K2-347

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.



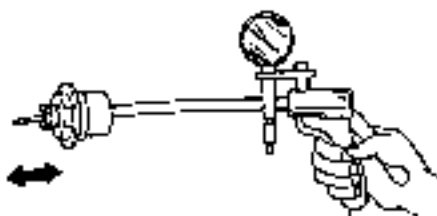
9WU0K2-348

3. Disconnect the vacuum hose.

Caution

When removing the vacuum diaphragm, do not drop the vacuum diaphragm rod into the oil pan.

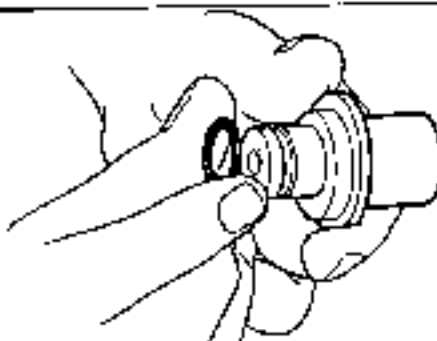
4. Remove the vacuum diaphragm, O-ring, and vacuum diaphragm rod.



9WU0K2-349

Inspection

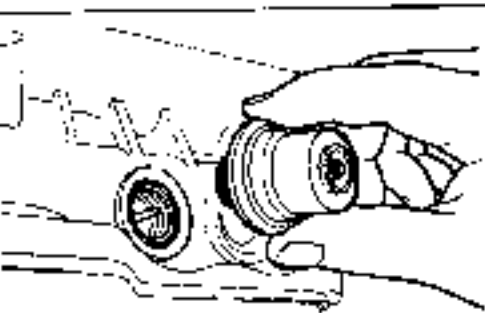
1. Check that the vacuum diaphragm rod moves when vacuum is applied to the vacuum diaphragm.
2. If not correct, replace the vacuum diaphragm.



9WU0K2-350

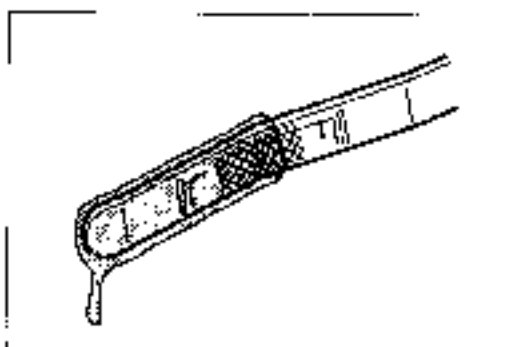
On-vehicle Installation

1. Apply ATF to a new O-ring, and install it onto the vacuum diaphragm.

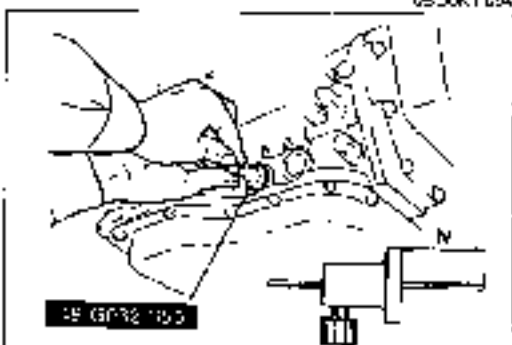


9WU0K2-351

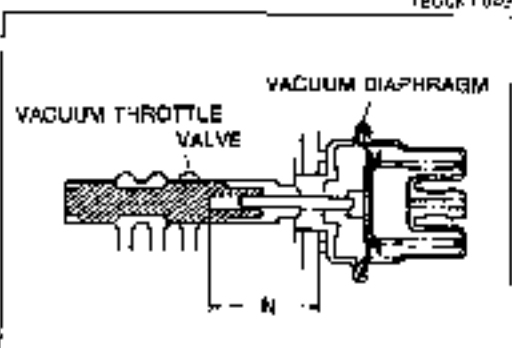
2. Apply ATF to the vacuum diaphragm rod and vacuum diaphragm, and install them into the transmission case.
3. Connect the vacuum hose.



USJOK1-094



TEUCK1-049



95JOKX-008

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

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 25.55mm (1.0060 in.)	29.0mm (1.14 in.)
25.55–25.90mm (1.0066–1.0197 in.)	29.5mm (1.16 in.)
25.90–26.40mm (1.0197–1.0394 in.)	29.75mm (1.17 in.)
26.40–26.65mm (1.0394–1.0492 in.)	30.0mm (1.18 in.)
26.65–27.15mm (1.0492–1.0689 in.)	30.5mm (1.20 in.)
27.15mm (1.0689 in.) or over	31.0mm (1.22 in.)

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

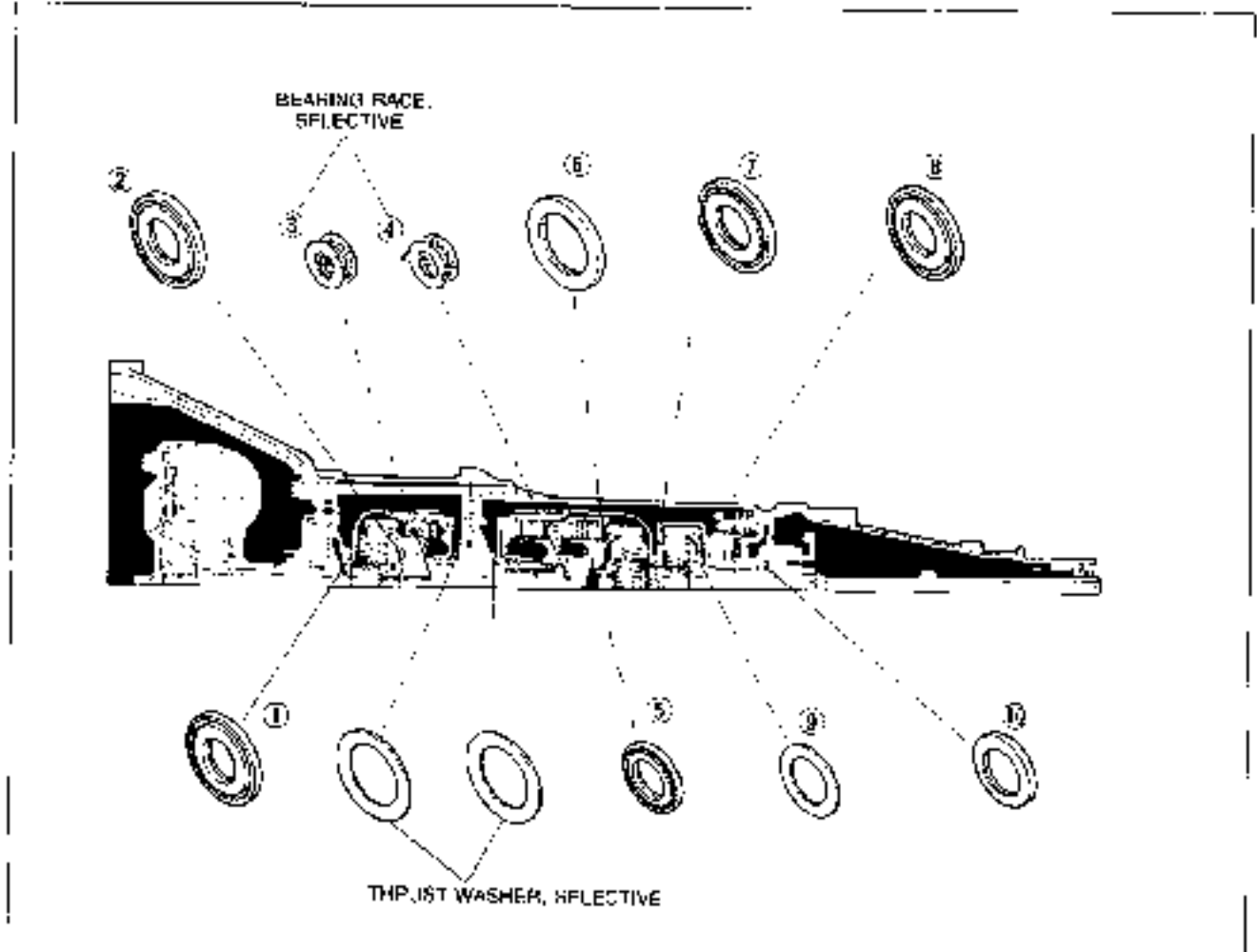
49 C107 380 A Engine stand		49 U019 0ACA Transmission hanger		49 H075 495E Body (Part of 49 U019 0ACA)	
49 U019 003 Holder (Part of 49 U019 0ACA)		49 G03P 35E Adjustment gauge		15-0001-050	

Precaution

1. If the drive plates or brake bands are replaced with new ones, soak the new ones in ATF for at least two hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings, and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with the new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

8901042-330

Thrust Washer, Bearing, and Race Location



SMUK7-157

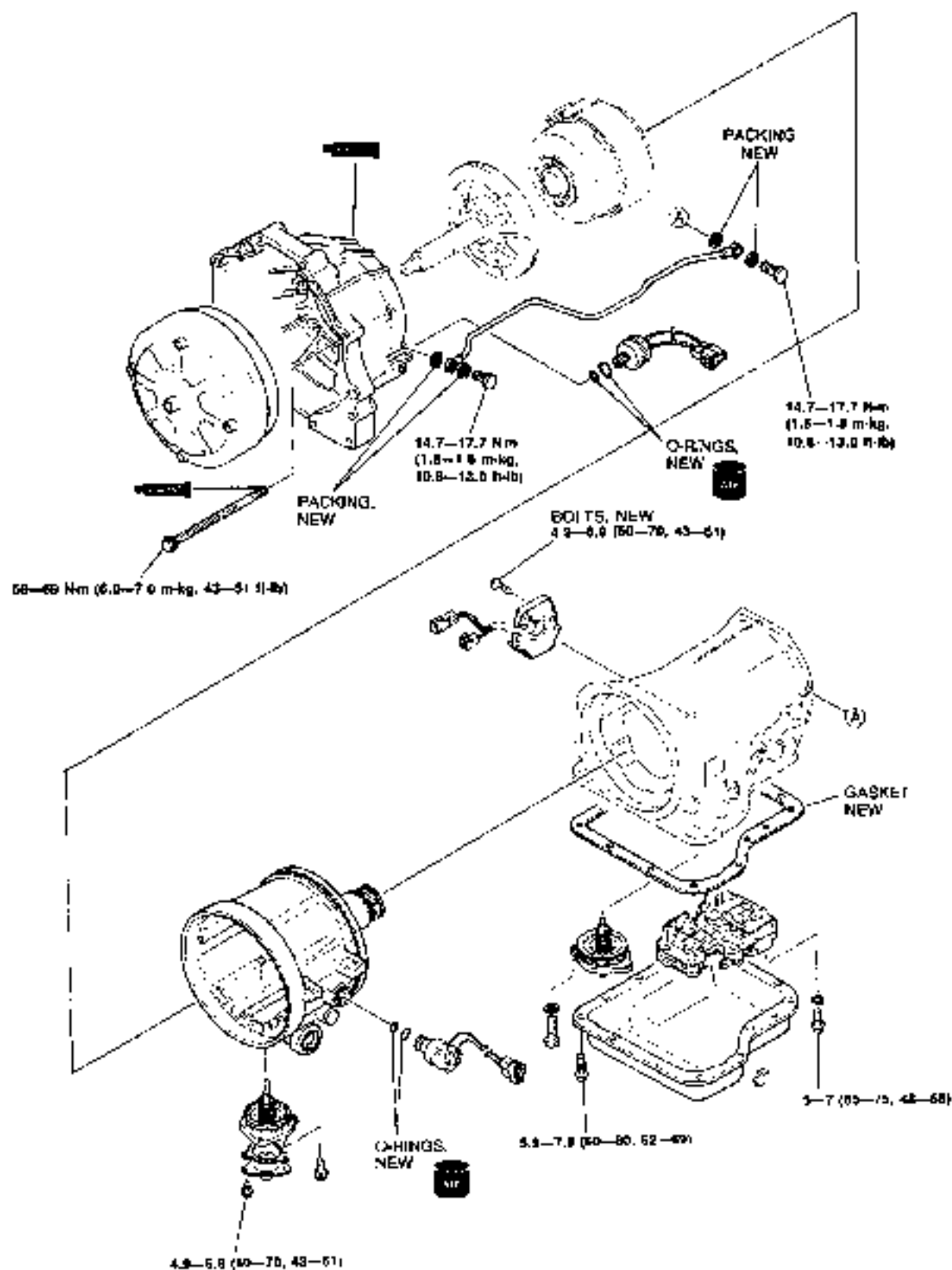
Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in.)	70.0 (2.750)	70.0 (2.756)	35.0 (1.378)	35.0 (1.378)	53.0 (2.087)	70.0 (2.756)
Race	mm (in.)	—	—	33.0 (1.299)	33.0 (1.299)	—	—

		7	8	9	10
Bearing	mm (in.)	70.0 (2.750)	70.0 (2.756)	47.0 (1.850)	53.0 (2.087)
Race	mm (in.)	—	—	—	—

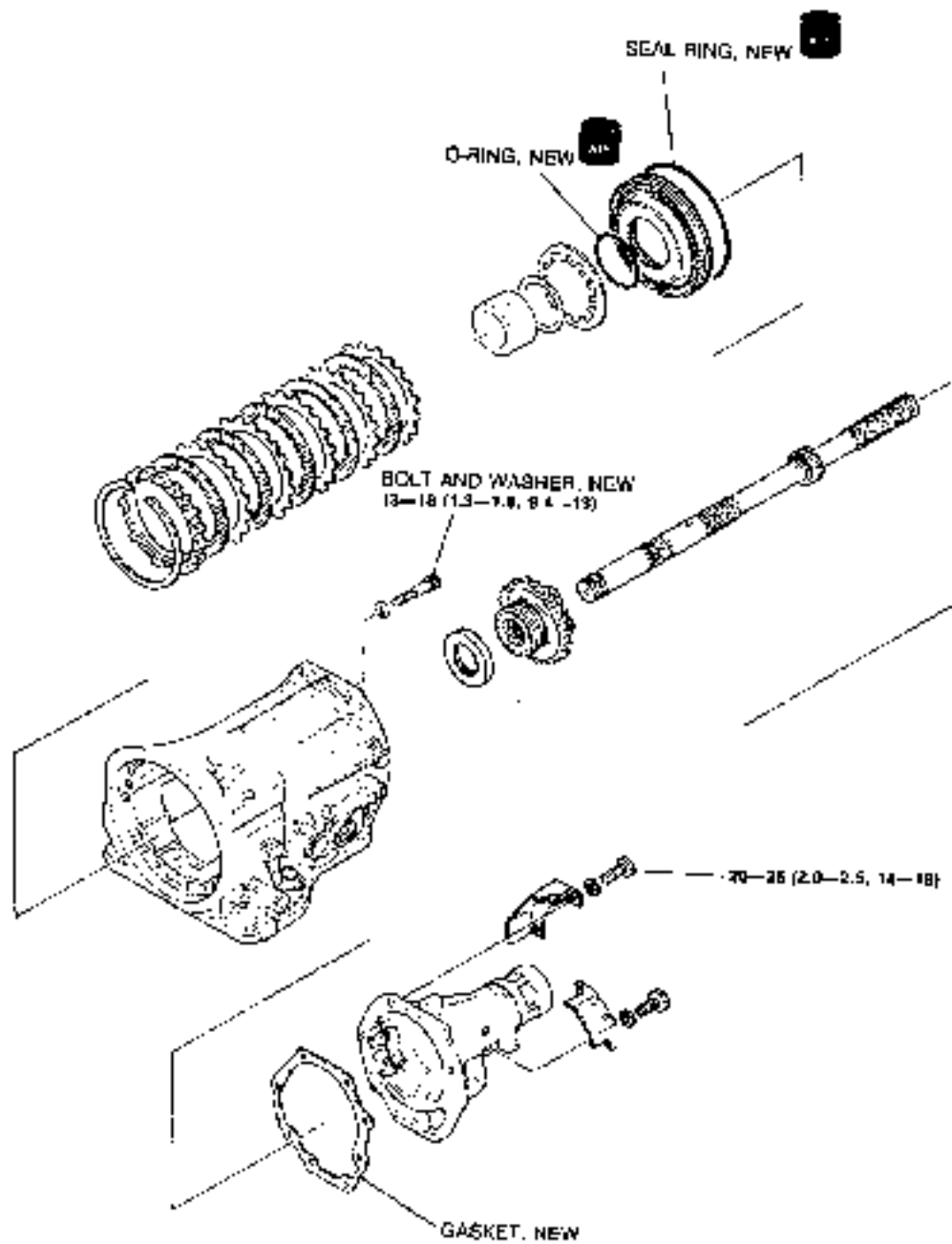
CSL071106

Torque specifications



New (cm·kg, ft·lb)
974J002-063

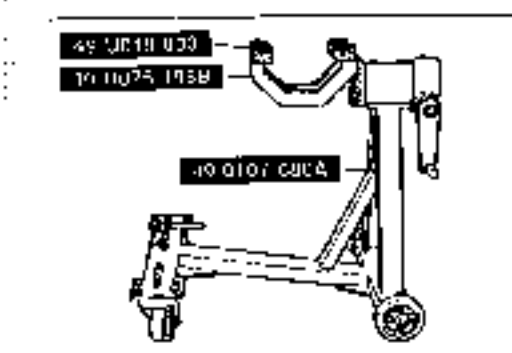
Torque specifications (cont'd)



Nm (m-Ag, ft-lb)

EM-1000-435

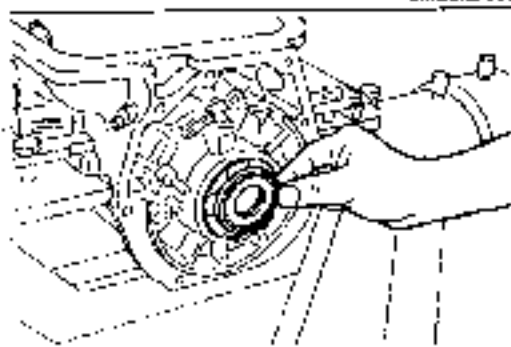
K1-113



SMJ0K1 35C

Procedure

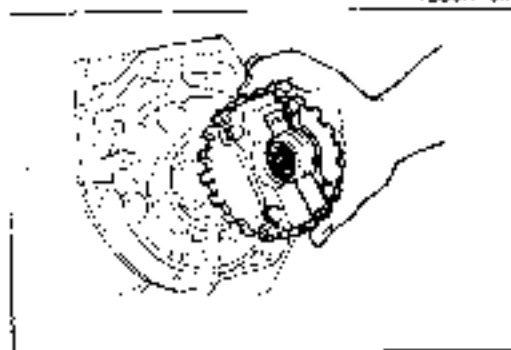
1. Assemble the **SST** as shown.
2. Mount the transmission case onto the **SST**.



TBL0K1 05

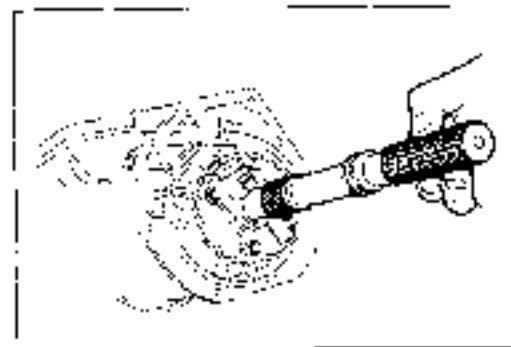
3. Apply petroleum jelly to the bearing, and install it into the rear of the transmission case shown in the figure.

Bearing outer diameter: 63.0mm (2.087 in)



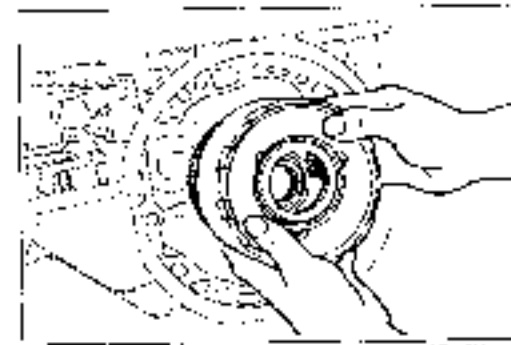
CRJ0K1 03B

4. Install the oil distributor in the transmission case.



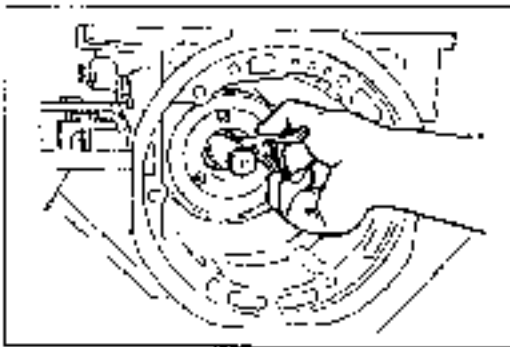
DBJ0K1 04A

5. Insert the output shaft.

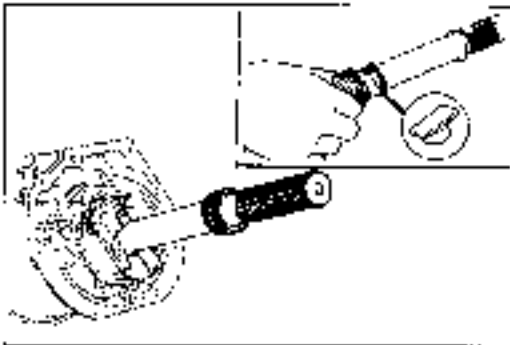


CRJ0K1 100

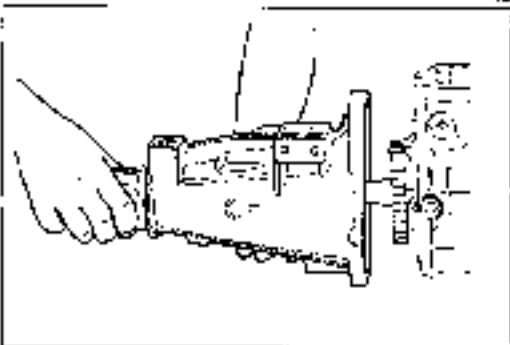
6. Install the rear planetary gear unit (connecting drum, rear planetary on carrier and one-way clutch) in the low and reverse brake side.



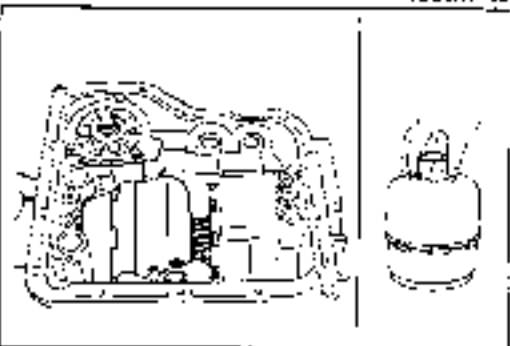
08UD-K1-101



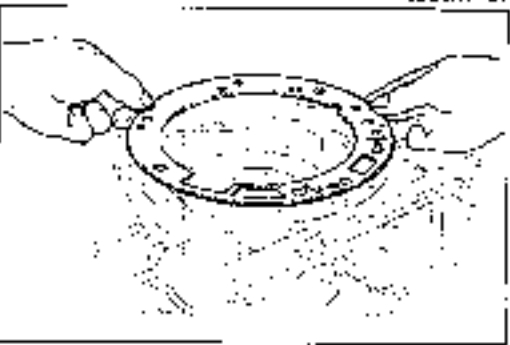
08UD-K1-102



08UD-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)

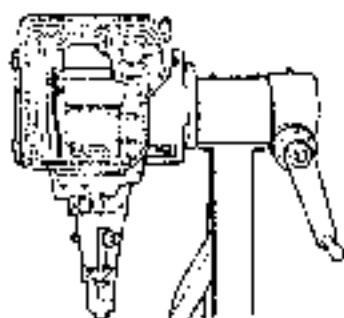
11. Check that the output shaft is locked with the manual lever in P range.

Caution

**Be very careful to avoid incorrect assembly of the many similar bearings and races.
(Refer to page K1-116.)**

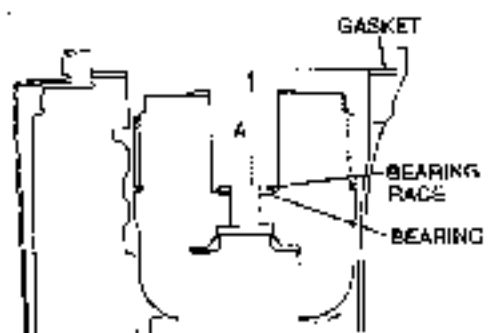
12. Install the front clutch, rear clutch, rear clutch hub, front planetary carrier, connecting shell, internal gear, sun gear, bearing, and bearing races as a unit into the transmission case.

13. Set a new gasket into the front of the case.



CEBCK1-05

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.



SEBCKX-086

- (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.

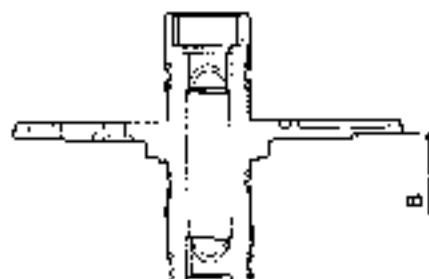
Total end play: 0.25—0.50mm (0.0098—0.0197 in)

- (5) Adjust the total end play by selecting the proper bearing race.

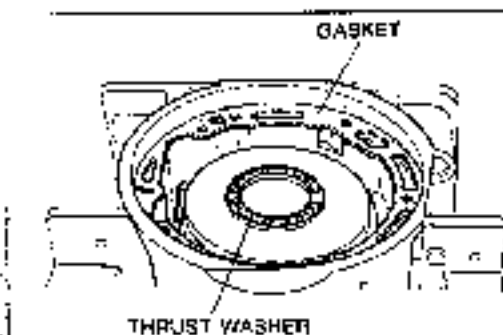
Bearing race sizes

mm (in)

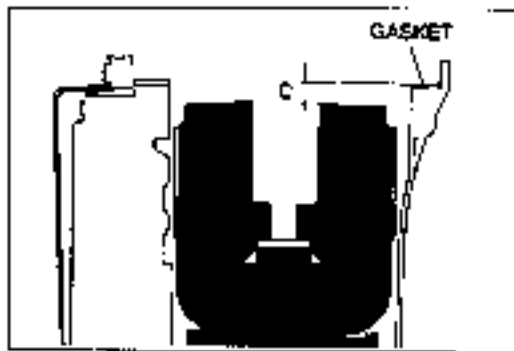
1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)



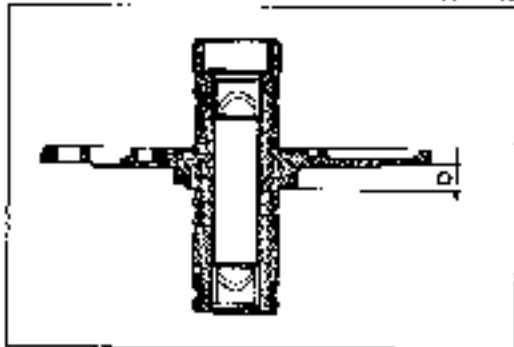
15. Check and adjust the front clutch end play.
- (1) Set the bearing race and bearing in position.



CEBCK1-017



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.

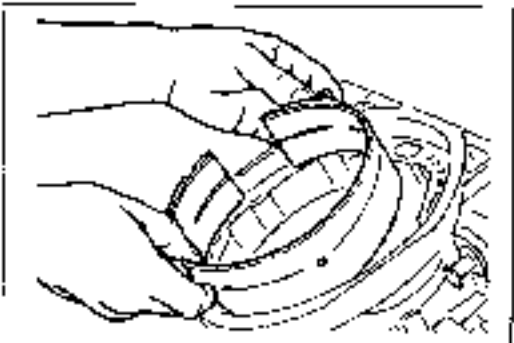
Front clutch end play: 0.5—0.8mm (0.020—0.031 in)

- (4) Adjust the front clutch end play by selecting the proper thrust washer.

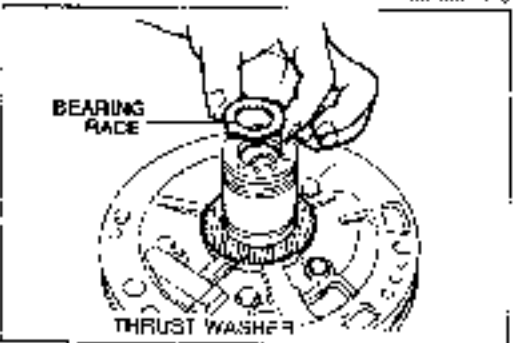
Thrust washer sizes

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



CBUOK1-1-52

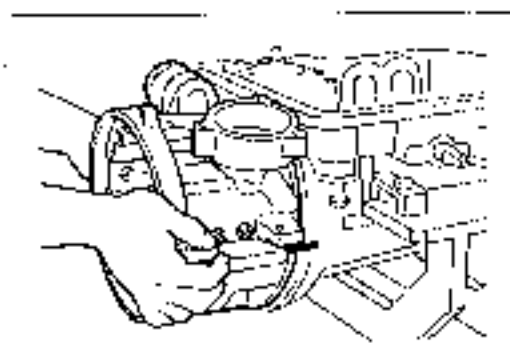
16. Set the 2nd brake band and strut in position.
17. Tighten the piston stem lightly.

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)



09J0K1-111

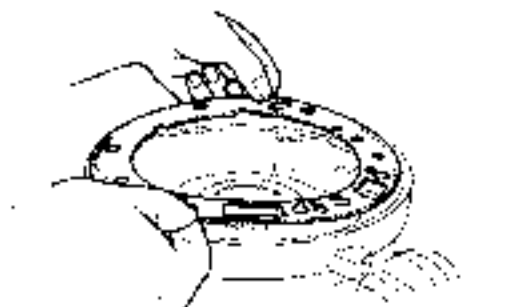
Note

a) Align the marks of the transmission case and OD case. Tap lightly with a plastic hammer to avoid damaging the seal rings when installing.

b) Install two bolts for alignment.

19. Check that the bearing race is atop the front clutch and that the bearing is on the bottom of the front clutch hole, then mount the OD case.

20. Set a new gasket in place.



09J0K1-112

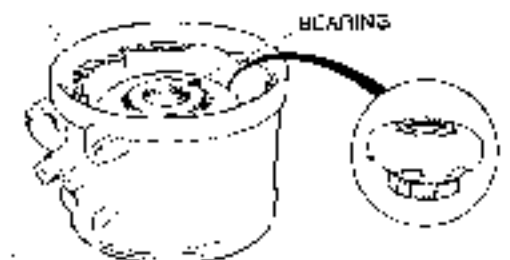
Note

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.



09J0K1-113

- (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: $T = E - H - 0.1\text{mm (0.004 in)}$

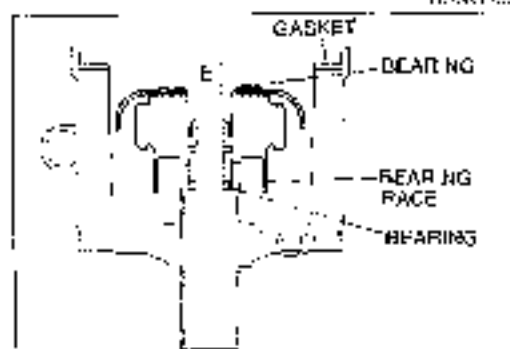
T : Total end play

E : The distance between the oil pump mounting surface (including the oil pump gasket) and the connecting shell bearing surface.

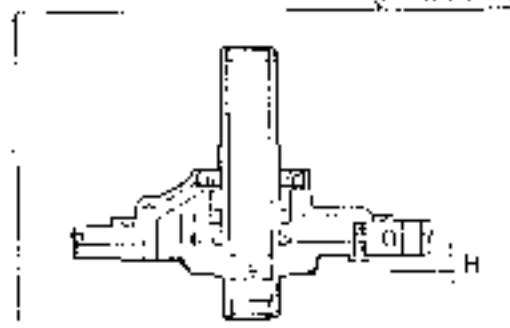
H : The distance between the oil pump side connecting shell bearing contact surface and the oil pump gasket contact surface.

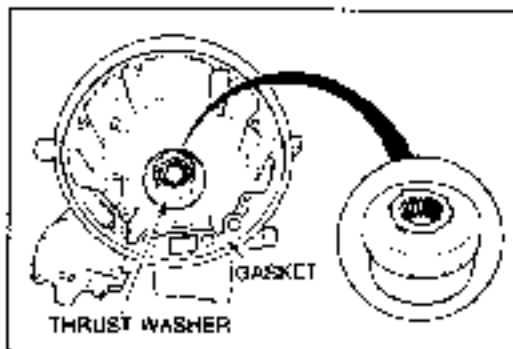
0.1: The compression amount of a new gasket.

Total end play: 0.25—0.50mm (0.0098—0.0197 in)

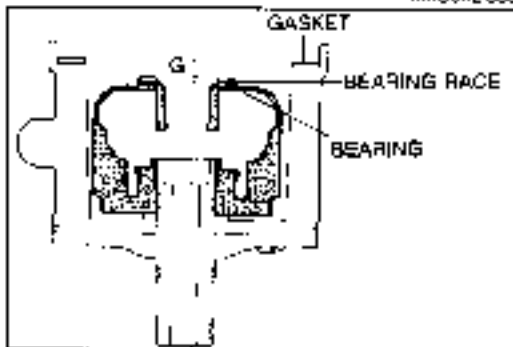


09J0K1-114

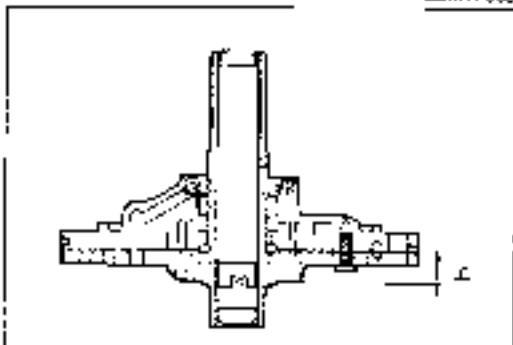




SMU002-000



BLACK-053



CBJ0K1-115

- (6) Adjust the total end play by selecting the proper bearing race.

Bearing race sizes

mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)

Note

Do not install the planetary pinion carrier at this time.

22. Check and adjust the direct clutch end play.
(1) Install the bearing race in the OD case.

Note

Install the bearing with the black surface toward the oil pump cover side.

- (2) Install the direct clutch, sun gear, connecting shell, and bearings in the OD case.
(3) Measure distances G and H with a straight edge and vernier calipers.
(4) Calculate the direct clutch end play by using the formula below.

Formula: $T = G - H - 0.1\text{mm (0.004 in)}$

T : Total end play

G : The distance between the oil pump mounting surface (including the oil pump gasket) and the connecting shell bearing surface.

H : The distance between the oil pump side connecting shell bearing contact surface and the oil pump gasket contact surface.

0.1 : The compression amount of a new gasket.

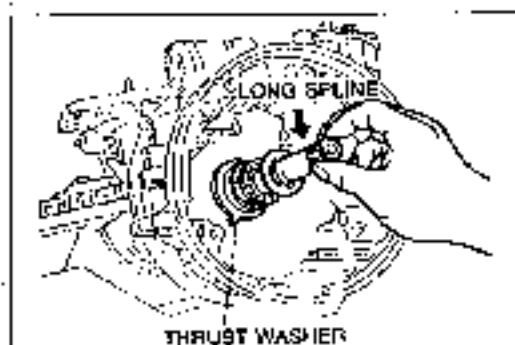
Total end play: 0.5—0.8mm (0.020—0.031 in)

- (5) Adjust the direct clutch end play by selecting the proper thrust washer.

Thrust washer sizes

mm (in)

1.3 (0.051)	1.5 (0.059)	1.7 (0.067)
1.9 (0.075)	2.1 (0.083)	2.3 (0.091)
2.5 (0.099)	2.7 (0.106)	



18AJJK1-16

Caution

The end with the long spline is the front.

Long spline: 23.0mm (0.906 in)

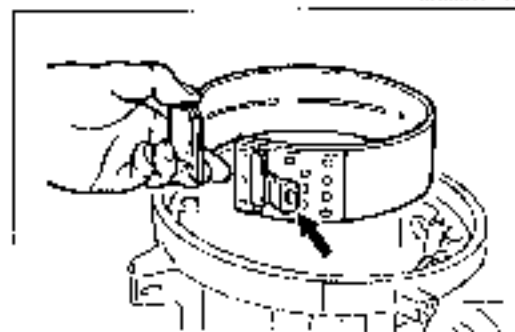
Short spline: 18.8mm (0.742 in)

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.

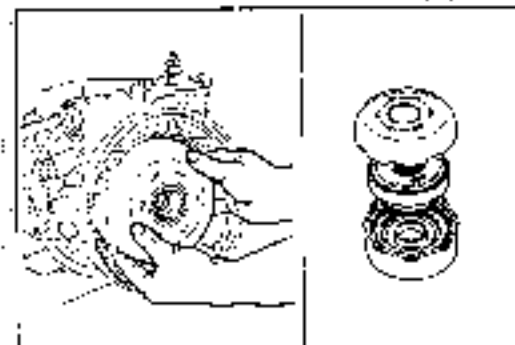
Bearing outer diameter: 35.0mm (1.318 in)

Bearing race outer diameter: 33.0mm (1.299 in)

26. Install the OD brake band and band strut



18AJJK1-17



18AJJK1-054

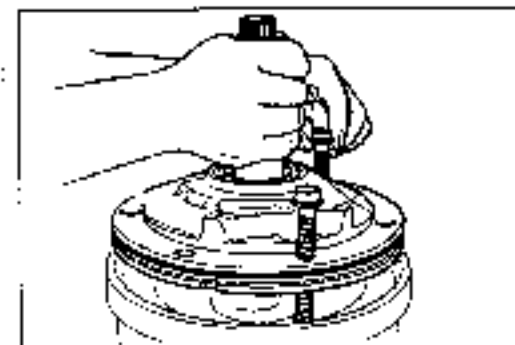
27. Install the direct clutch assembly.
28. Apply petroleum jelly to the bearing and install it onto the OD connecting shell with the black surface facing upward.

Bearing outer diameter: 70.0mm (2.756 in)

Caution

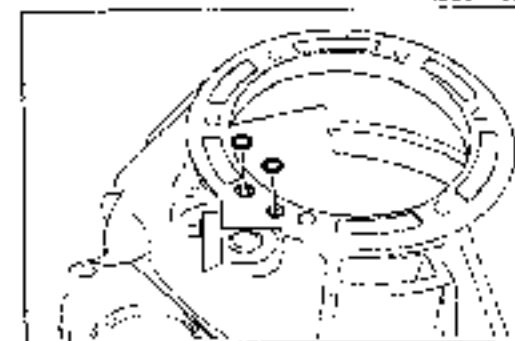
- a) Do not damage the seal rings or O-ring.
- b) Do not use a hammer, plastic or otherwise, to install the oil pump.

29. Install the oil pump assembly into the transmission case using two converter housing bolts as guide

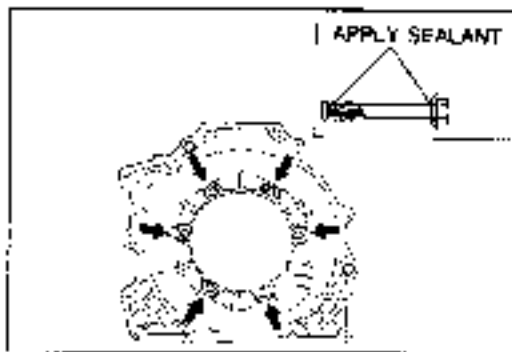


18AJJK1-055

30. Coat the contact surfaces of the converter housing and transmission case with sealant
31. Install new O-rings



18AJJK1-056

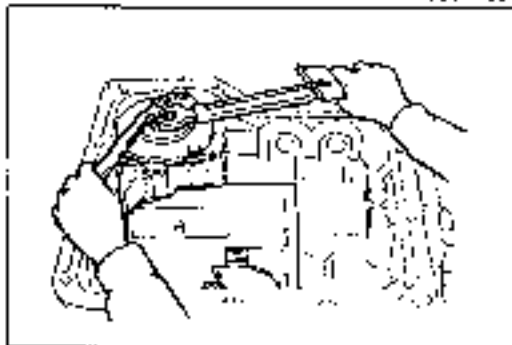


17U0K1057

32. Remove the converter housing bolts used as guide. Apply sealant to the bolts.
33. Install the converter housing onto the transmission case, and tighten bolts evenly in a crisscross pattern.

Tightening torque:

59—69 N·m (6.0—7.0 m·kg, 43—51 ft·lb)



1B10K1058

34. Apply ATF to the piston stem.
35. Adjust the 2nd brake band.
- (1) Loosen the locknut and tighten the piston stem.

Tightening torque:

11.8—14.7 N·m (1.2—1.5 m·kg, 8.7—10.8 ft·lb)

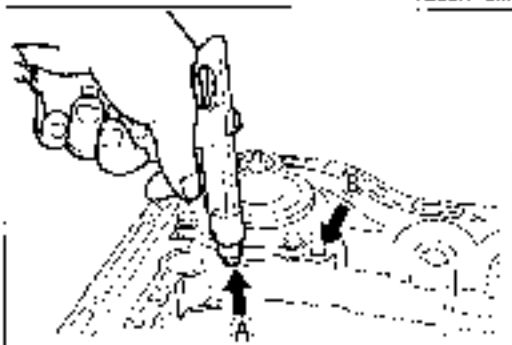
- (2) Loosen the stem the number of turns shown below.

Stem: 3 turns

- (3) Hold the stem and tighten the locknut.

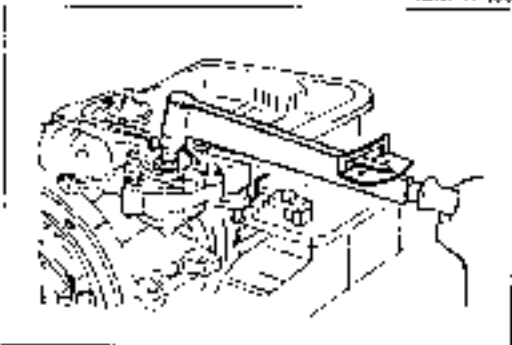
Tightening torque:

15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)

Caution**Apply air for no more than three(3) seconds.**

1B10K1060

36. Check the servo piston operation by applying compressed air through the ϕ passages of the 2nd band servo.

A: Engage**B: Release****Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.**

17U0K1061

37. Apply ATF to the piston stem.
- Adjust the OD brake band.
- (1) Loosen the locknut and tighten the piston stem.

Tightening torque:

7—10 N·m (70—100 cm·kg, 61—87 in·lb)

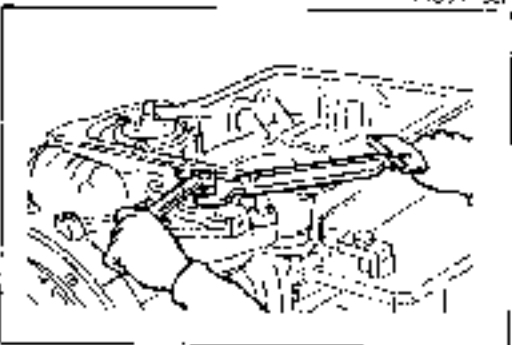
- (2) Loosen the stem the number of turns shown below.

Stem: 2 turns

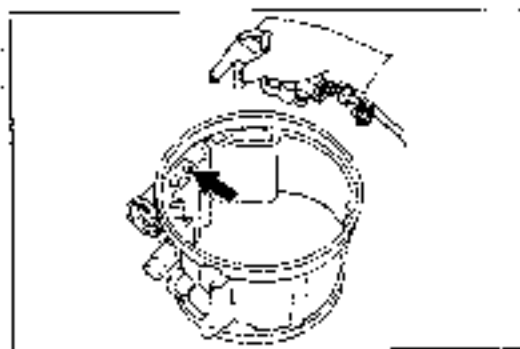
- (3) Hold the stem and tighten the locknut.

Tightening torque:

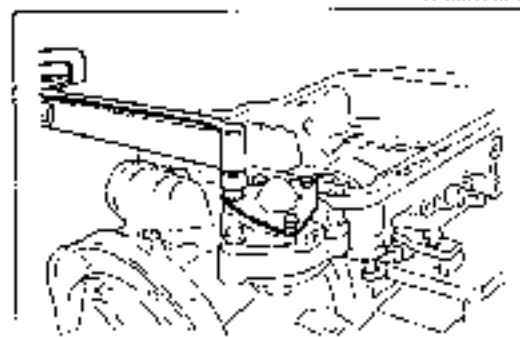
15—39 N·m (1.5—4.0 m·kg, 11—29 ft·lb)



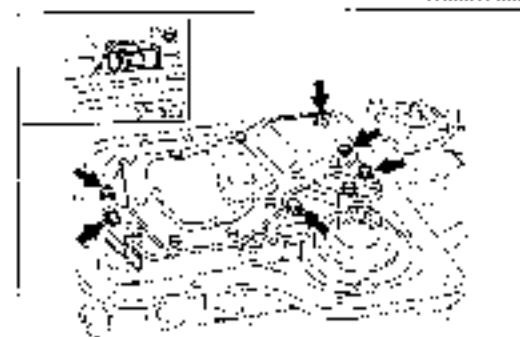
SML0420EP



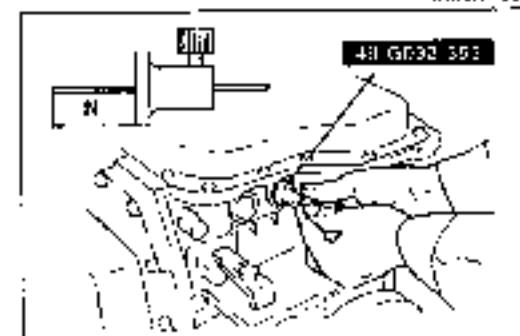
1FLCK1-061



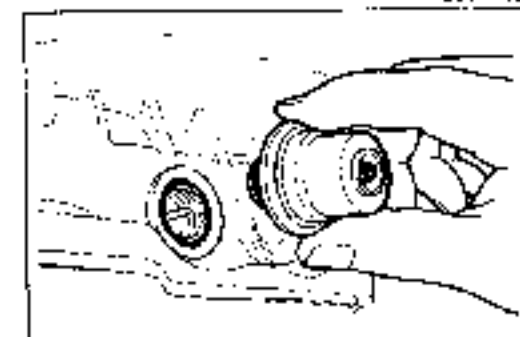
1FLCK1-062



1FLCK1-063



1FLCK1-064



1FLCK1-065

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/cm², 57 psi) max.

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)

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.

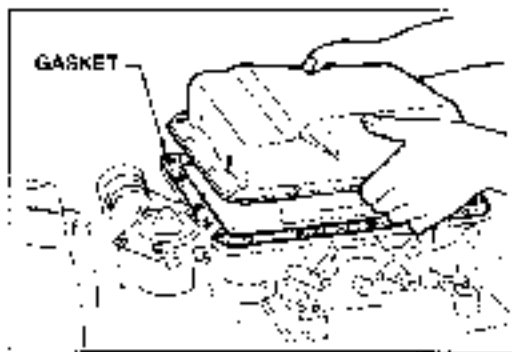
Tightening torque:

5—7 N·m (55—75 cm·kg, 48—65 in·lb)

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.

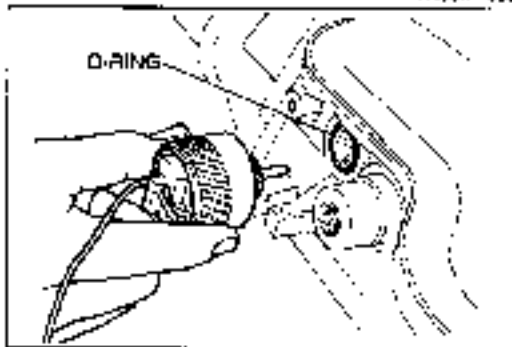
Dimension N	Applicable diaphragm rod
Below 25.65mm (1.0099 in)	25.0mm (1.14 in)
25.65—25.90mm (1.0099—1.0197 in)	25.5mm (1.16 in)
25.90—26.40mm (1.0197—1.0394 in)	26.75mm (1.17 in)
26.40—26.65mm (1.0394—1.0492 in)	28.0mm (1.15 in)
26.65—27.15mm (1.0492—1.0693 in)	30.5mm (1.20 in)
27.15mm (1.0693 in) 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.



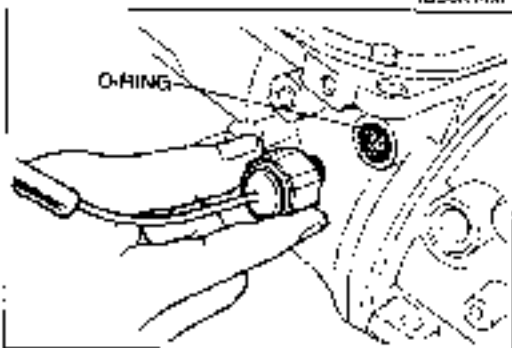
1P4J0K1-095

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)**

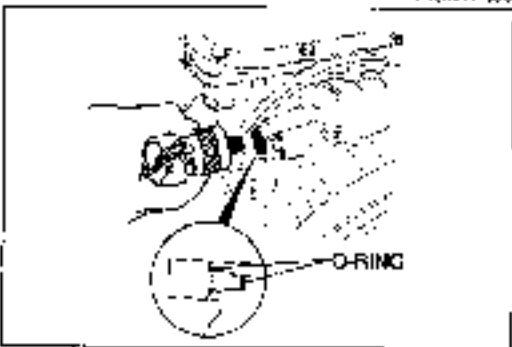
1B4J0K1-067

48. Apply ATF to a new O-ring and install it to the transmission case.
49. Install the downshift solenoid.



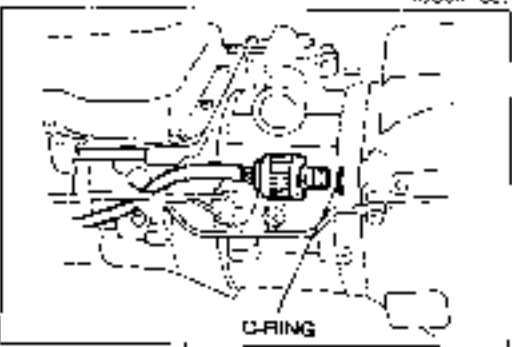
1B4J0K1-068

50. Apply ATF to a new O-ring and install it into the transmission case.
51. Install the transmission oil pressure switch.



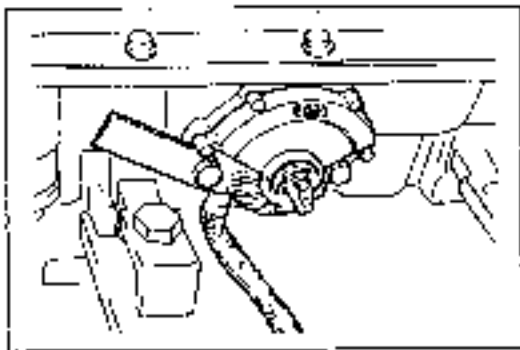
1B4J0K1-069

52. Apply ATF to the new O-rings and install them into the transmission case.
53. Install the OD cancel solenoid.



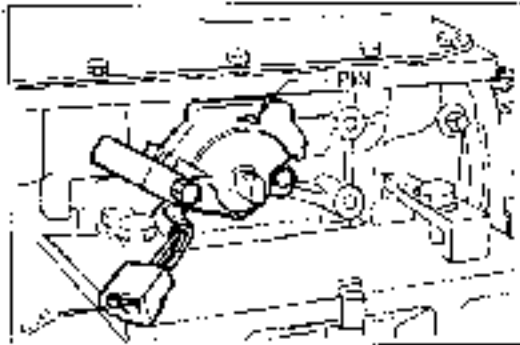
1B4J0K1-070

54. Apply ATF to the new O-rings and install them into the transmission case.
55. Install the lockup solenoid (G6 engine).



23UCK-025

- 56 Rotate the manual shaft fully reward, then return it two (2) notches to the N position.



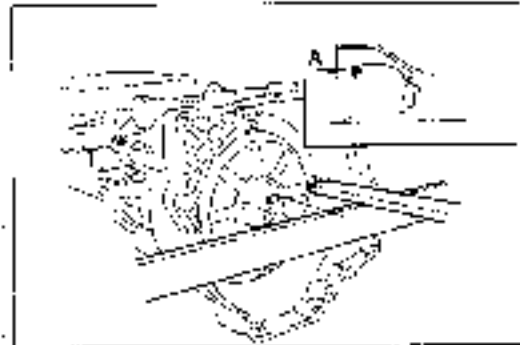
25A,CK1-C25

- 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.

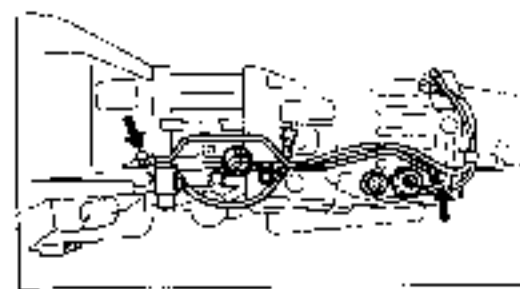


26UCK1-C72

- 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.



23UCK1-073

- 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)

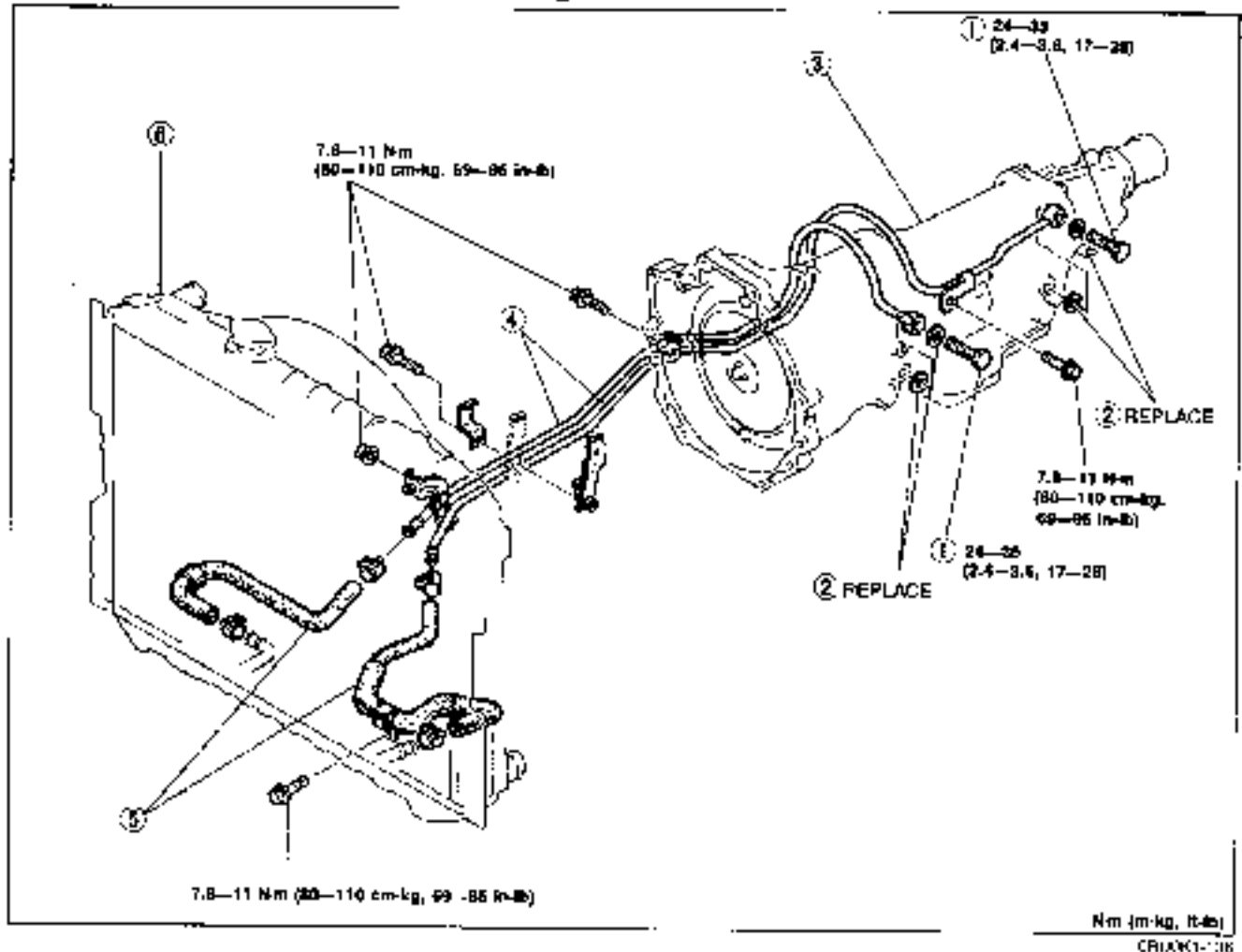
OIL COOLER

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

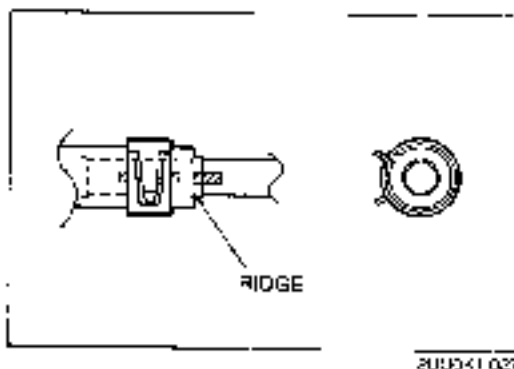
5. Oil hose
Inspect for damage or cracks

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.

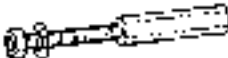
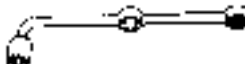
1. Align the marks, and slide the oil cooler hoses onto the oil cooler pipes until it contacts the ridge.
2. Install the hose clamps as shown and tighten them as specified.
3. Verify that the hose clamps do not interfere with other parts.



DRIVE PLATE

Preparation

SST

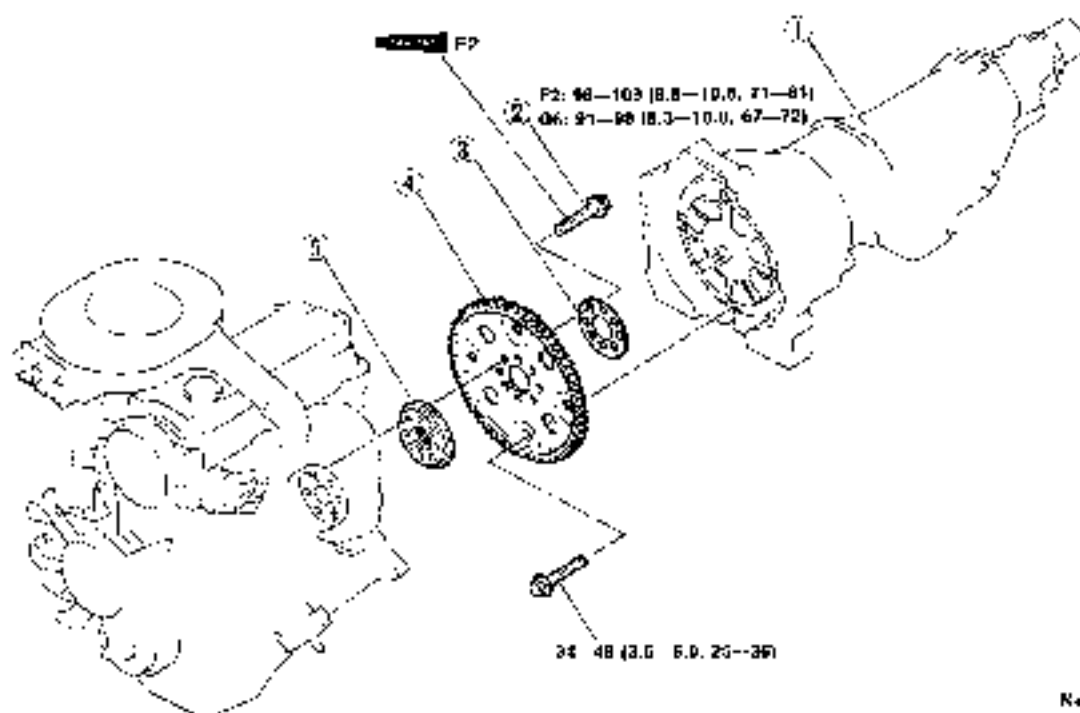
49 E011 1A0 Brake sel. ring gear		49 E011 103 Shaft (Part of 49 E011 1A0)		49 E011 104 Collar (Part of 49 E011 1A0)	
49 E011 105 Stopper (Part of 49 E011 1A0)		49 0077 435 Special wrench		JIS-JK1-038	

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**.

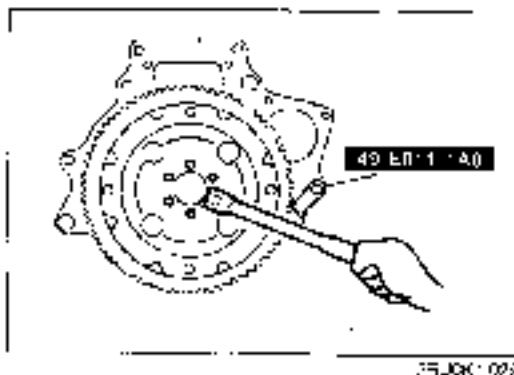


Ref (m-kg, h-kg)

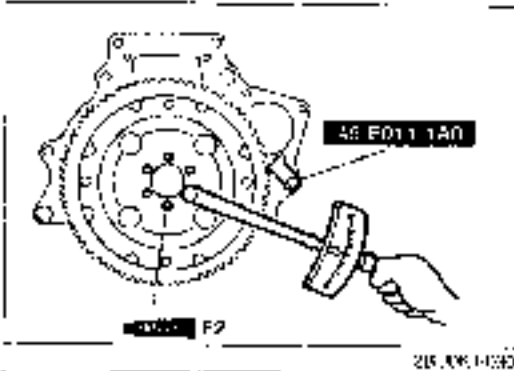
GLUCK 1-92

1. Transmission
Removal page K1-36
Installation page K1-36
2. Bolts
3. Backing plate

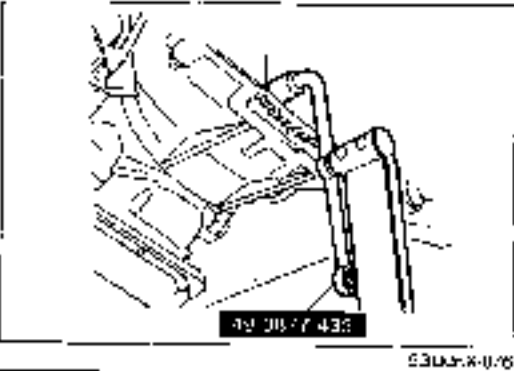
4. Drive plate
Inspect for cracks and ring gear for wear or damage
5. Adapter



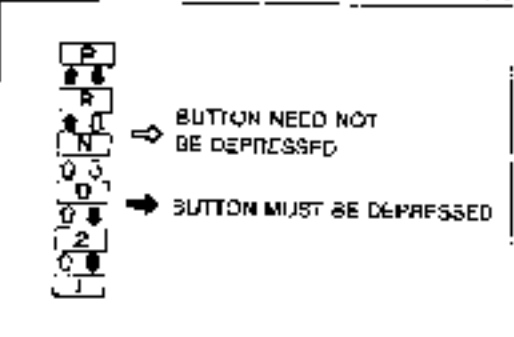
35J0K1029



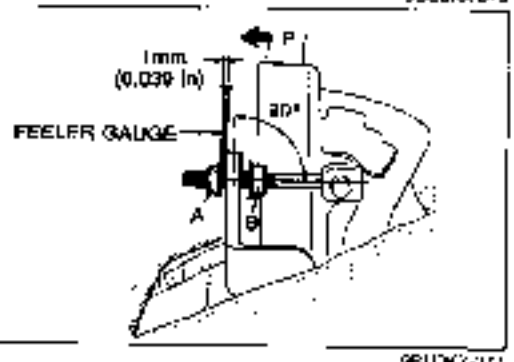
25J0K1030



63J0K1076



33J0K1075



26J0K1077

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

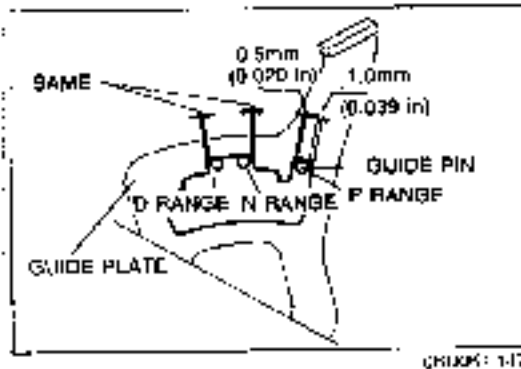
1. Shift the selector lever to P range.
2. Loosen locknuts A and B so that they are both at least 1mm (0.039 in) away from the adjustment lever.
3. Shift the transmission to P range by moving the manual shaft of the transmission.
4. With the link at 90° to the lever, adjust the clearance between the 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 1-18

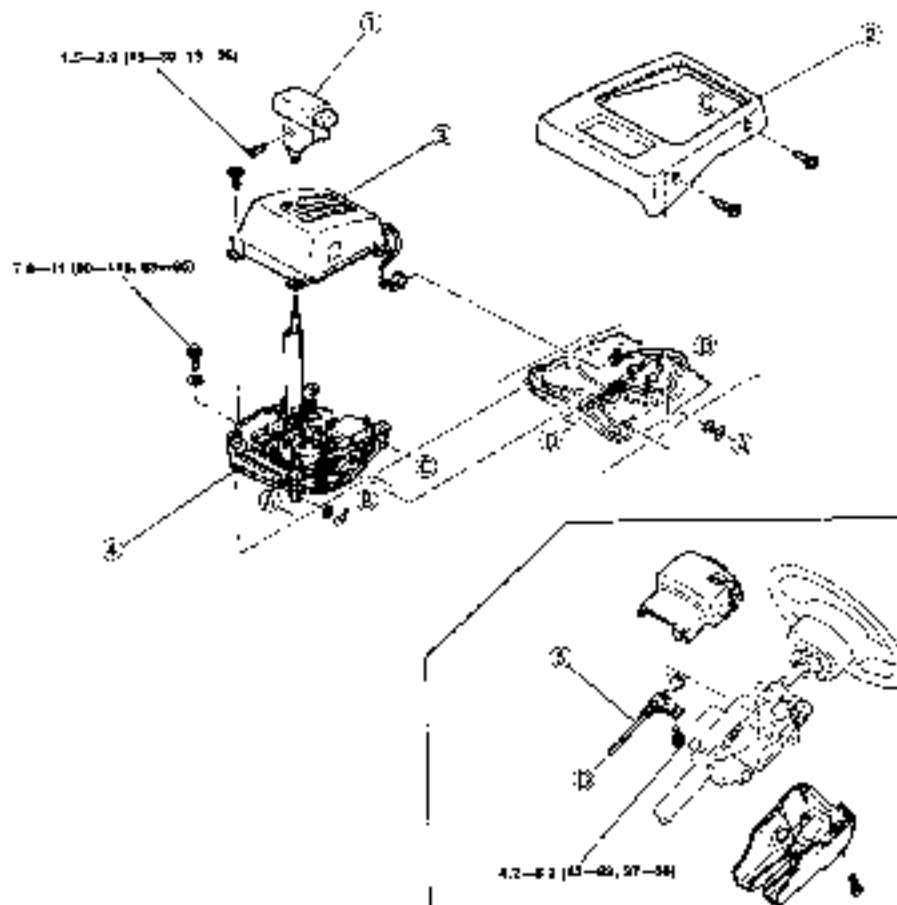
REMOVAL AND INSTALLATION

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**.



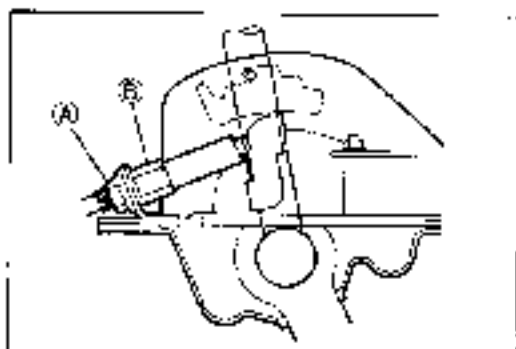
N.m (cm-kg, in-lb)

GROUP 1-19

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

DSJ0K1-145



DSJ0K1-145

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

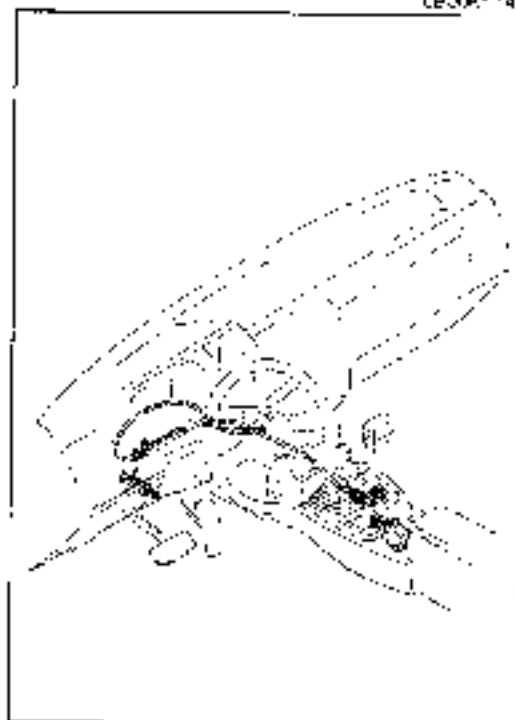
Do not remove the interlock cable if not necessary.

1. Remove the instrument panel (Refer to Section S.)
2. Remove the interlock cable.

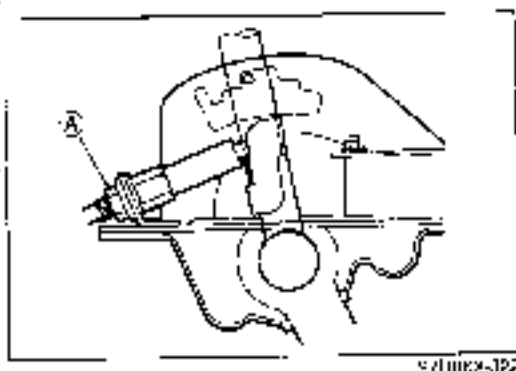
Installation Note

Interlock cable

1. Install the interlock cable.
2. Install the instrument panel. (Refer to Section S.)



DSJ0K1-130

**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

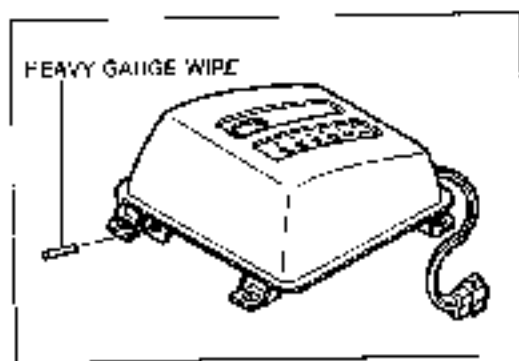
Do not kink the cable.

3. Install the cable and tighter locknut (A).

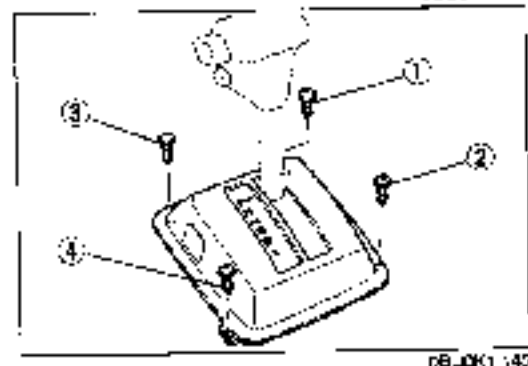
Tightening torque:

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.)

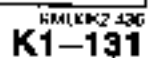
**Indicator panel**

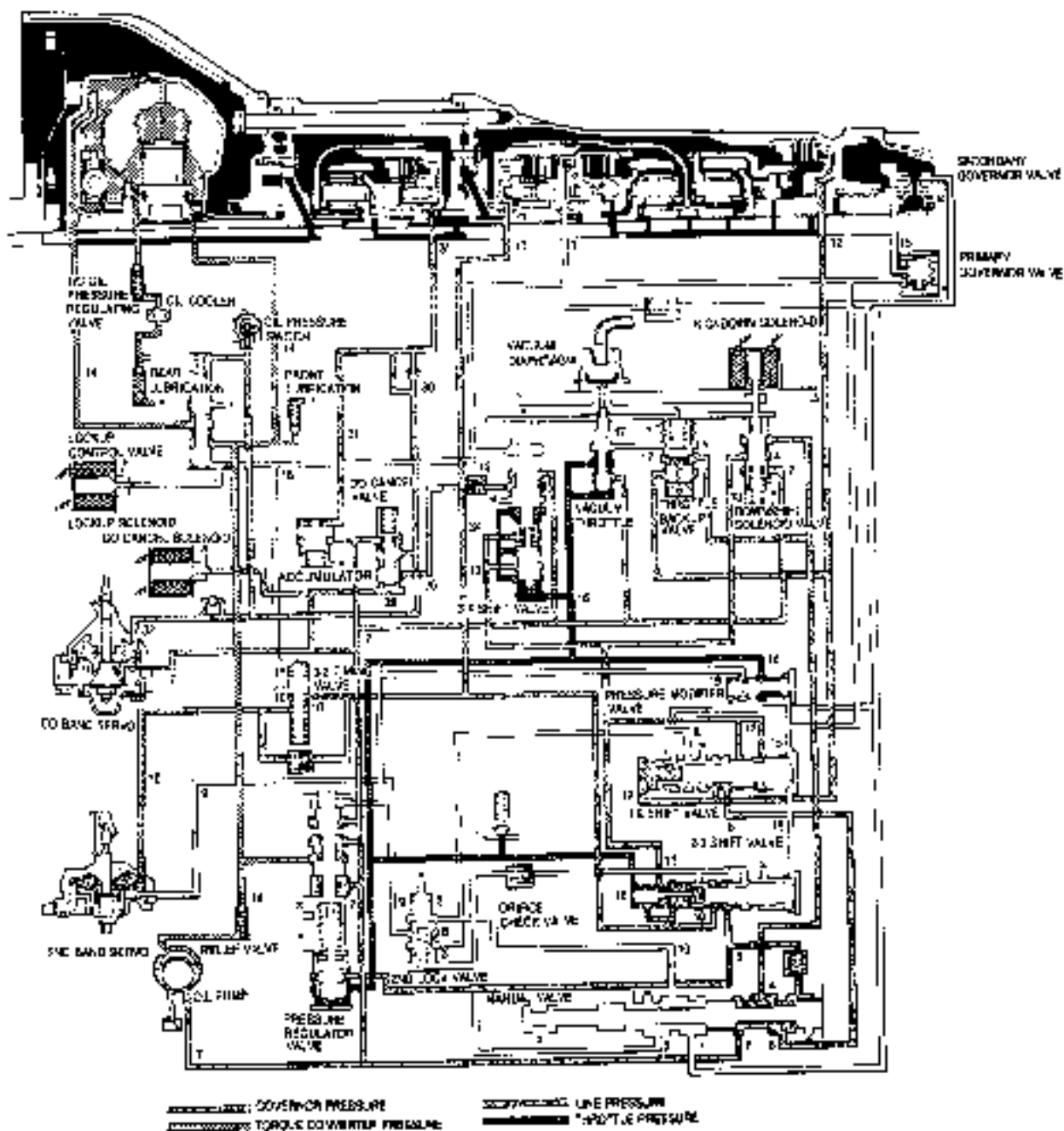
1. Temporarily install the indicator panel.
2. Align the alignment grooves in the slider with the holes in the indicator panel. Install suitable heavy-gauge wire to hold the slider.



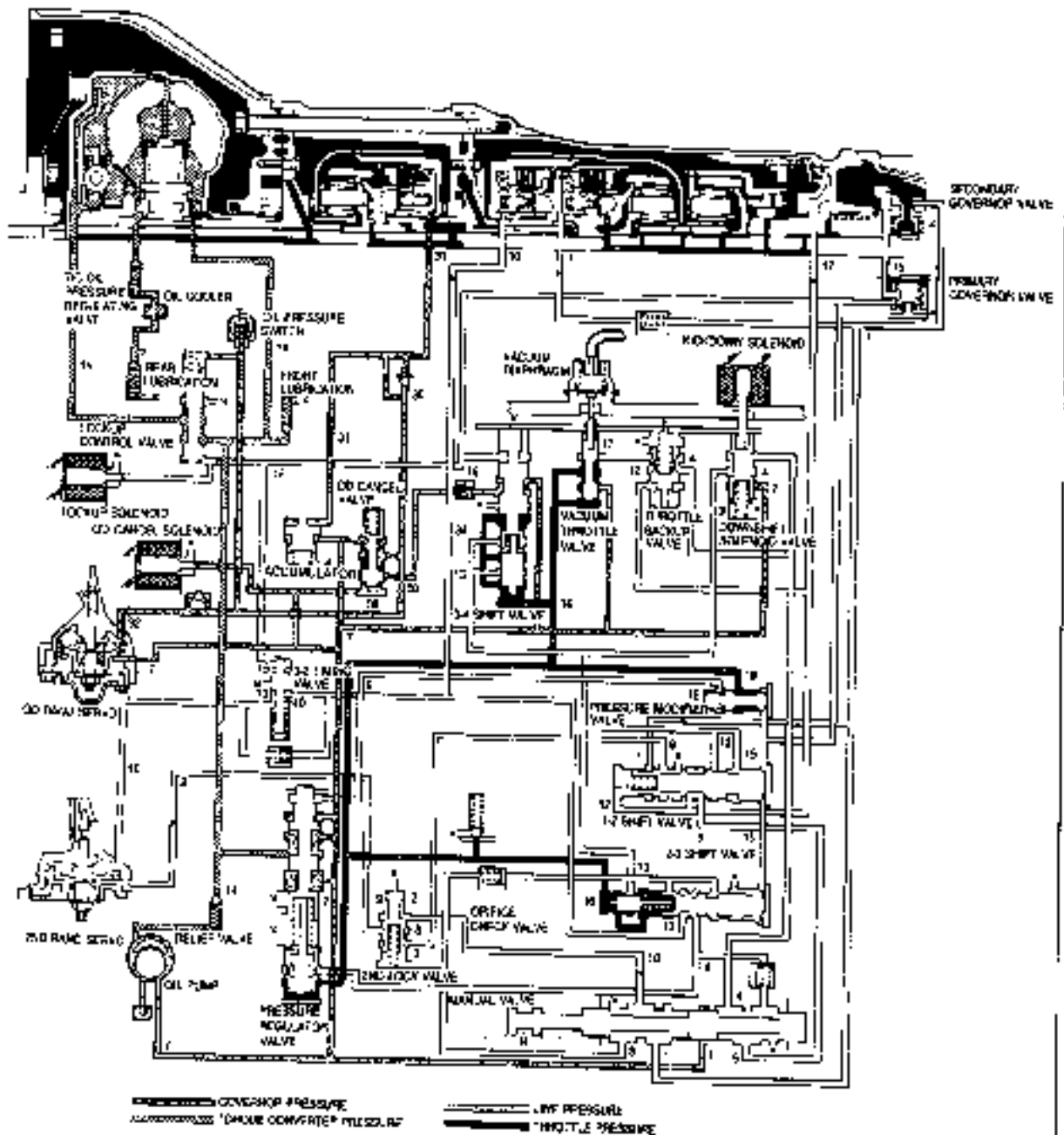
3. Tighten the indicator screws in the order shown in the figure.

P RANGE

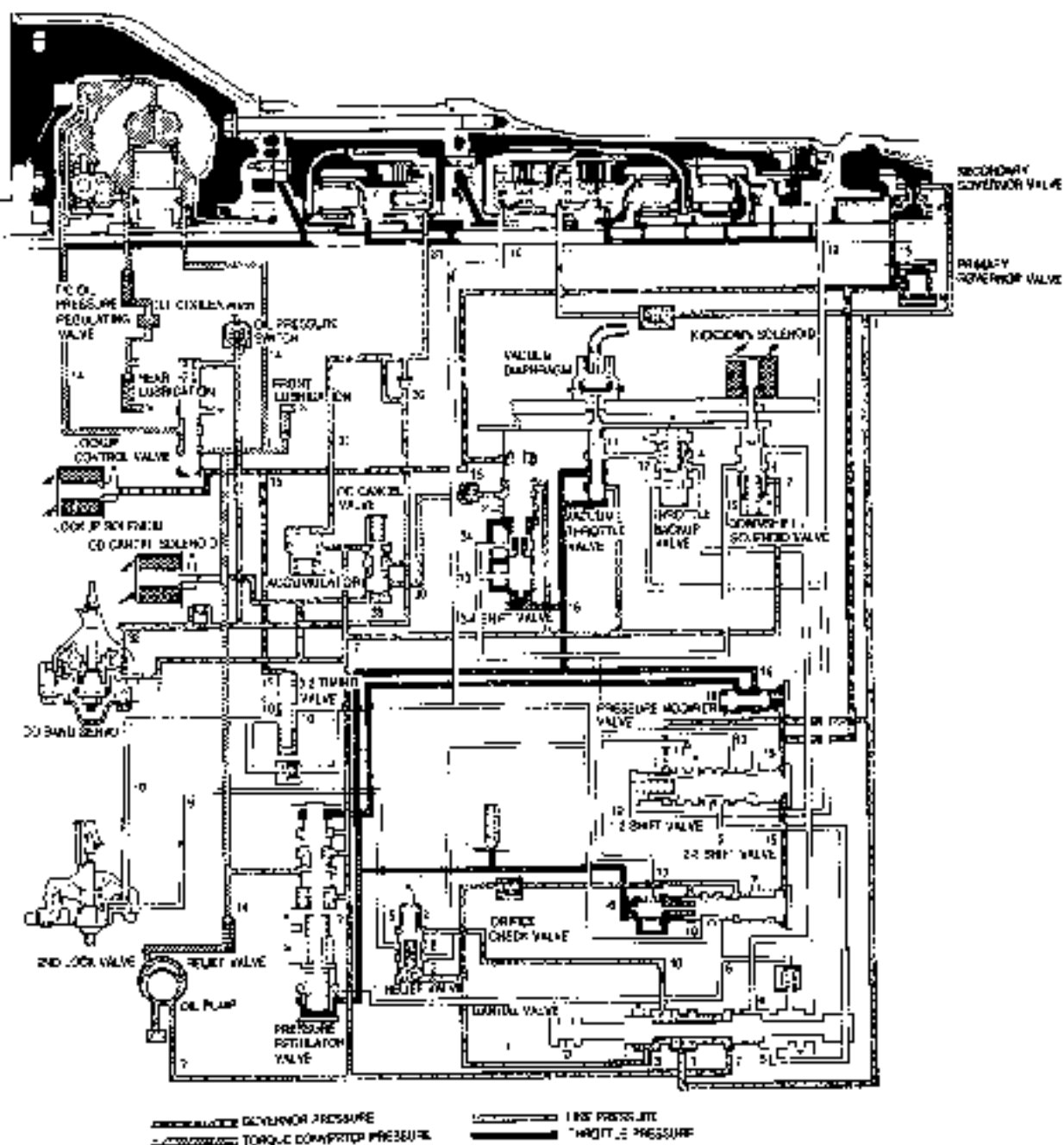




N RANGE



D RANGE; 1ST GEAR



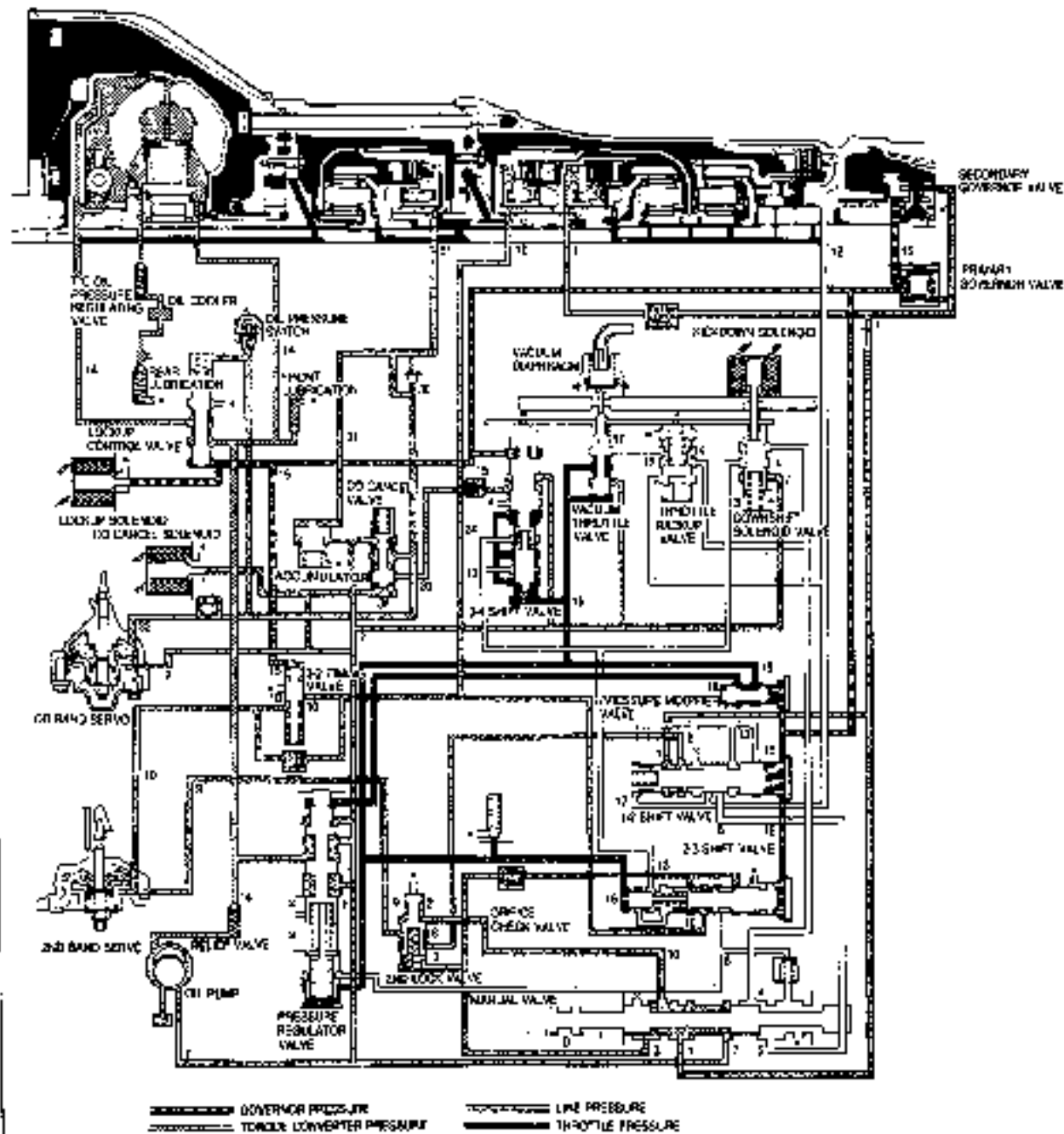
This schematic diagram illustrates the hydraulic system for a Caterpillar 3408 engine. The system is composed of several key components and their interconnections:

- Primary Governor Valve:** Located at the top right, it controls the main hydraulic pressure.
- Secondary Governor Valve:** Positioned below the primary valve, it provides a secondary pressure source.
- Pressure Modifying Valve:** A complex valve assembly in the lower right section that adjusts system pressure.
- Throttle Actuator Valve:** Controls the engine's throttle position.
- Downshift Solenoid Valve:** Manages the downshift function.
- Accumulator:** A gas-charged device used to store hydraulic energy and dampen pressure fluctuations.
- Lockup Solenoid and Lockup Control Valve:** Components for the transmission's lockup mechanism.
- Oil Cooler and Oil Pressure Sensor:** Part of the engine's lubrication system.
- Oil Pump:** The primary source of hydraulic oil for the system.
- Relief Valve:** Protects the system from overpressure.
- Pressure Regulator Valve:** Maintains a constant pressure level.
- Check Valve:** Allows fluid flow in one direction only.
- Shift Valves (1-2, 2-3, 3-4):** Control the engagement of different gears.
- Manual Valve:** Allows for manual operation of the system.
- 2nd Lock Valve:** Controls a secondary locking function.
- 2nd Shift Servo and 2nd Shift Servo Valve:** Components for the second gear shift.
- 1st Shift Servo and 1st Shift Servo Valve:** Components for the first gear shift.

The diagram uses different line styles to represent various types of hydraulic pressure:

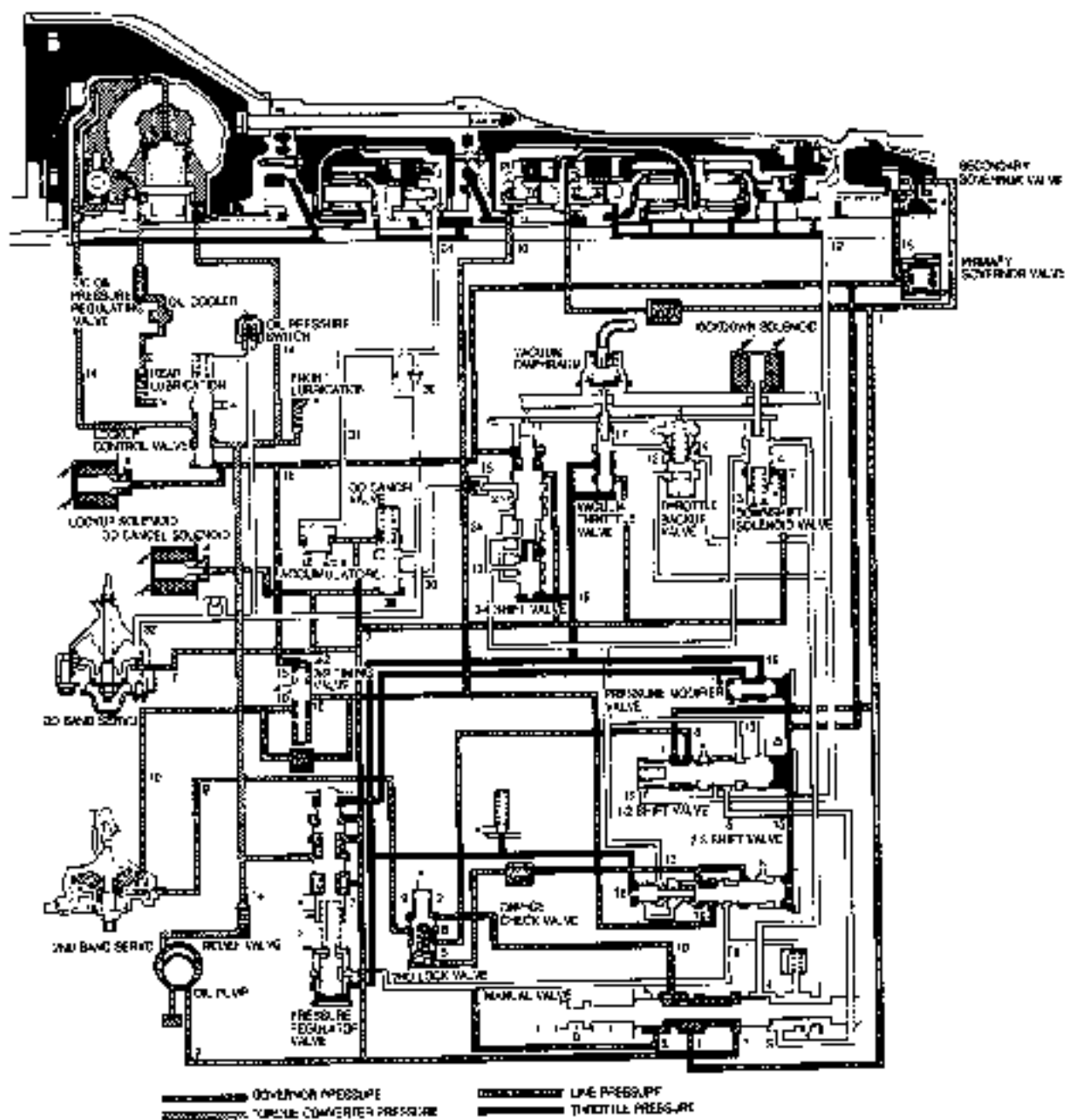
- GOVERNOR PRESSURE:** Represented by a solid line.
- LINE PRESSURE:** Represented by a line with diagonal hatching.
- THROTTLE CONTROL PRESSURE:** Represented by a line with cross-hatching.
- INHOIST PRESSURE:** Represented by a thick solid line.

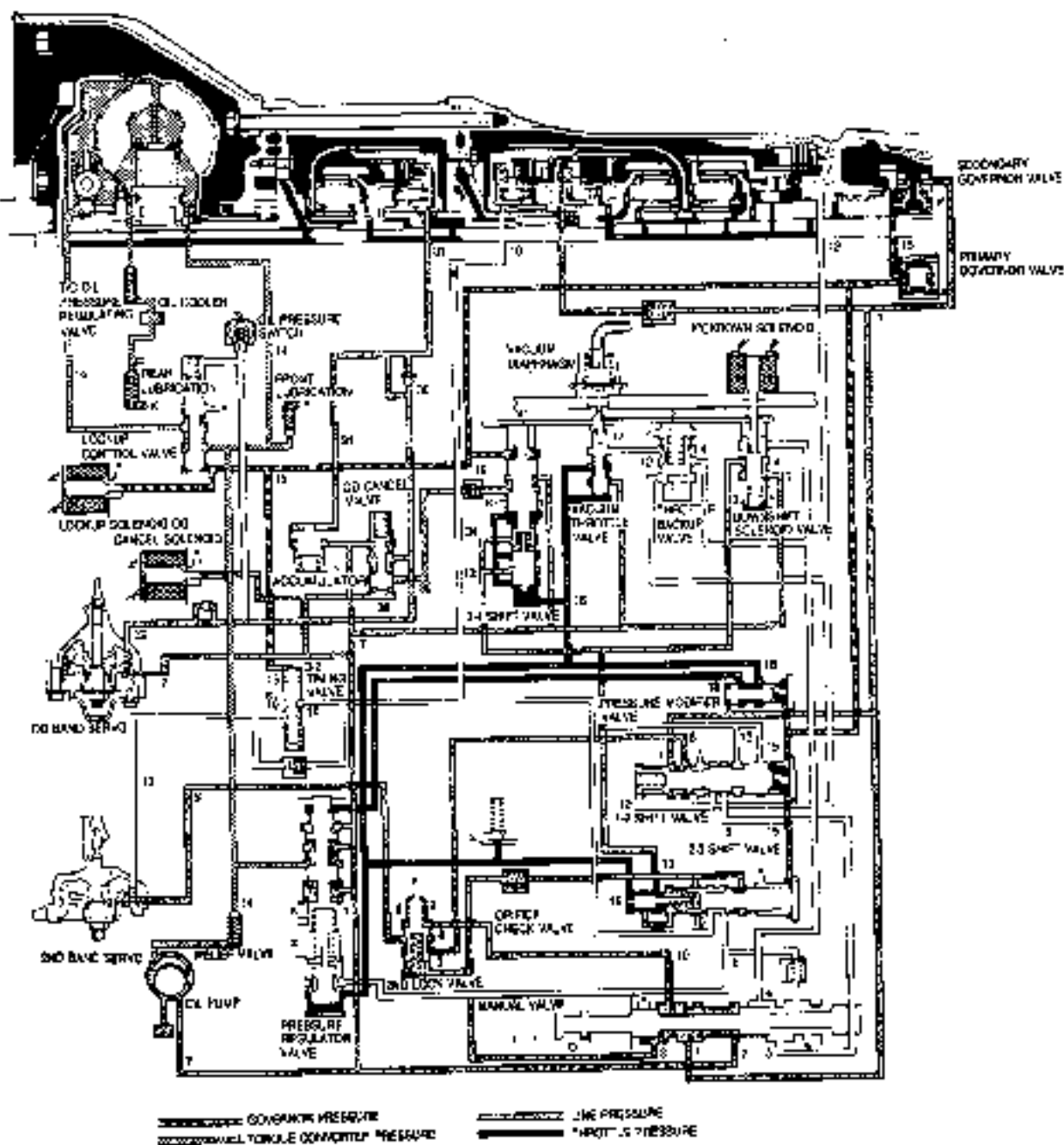
D RANGE; 3RD GEAR



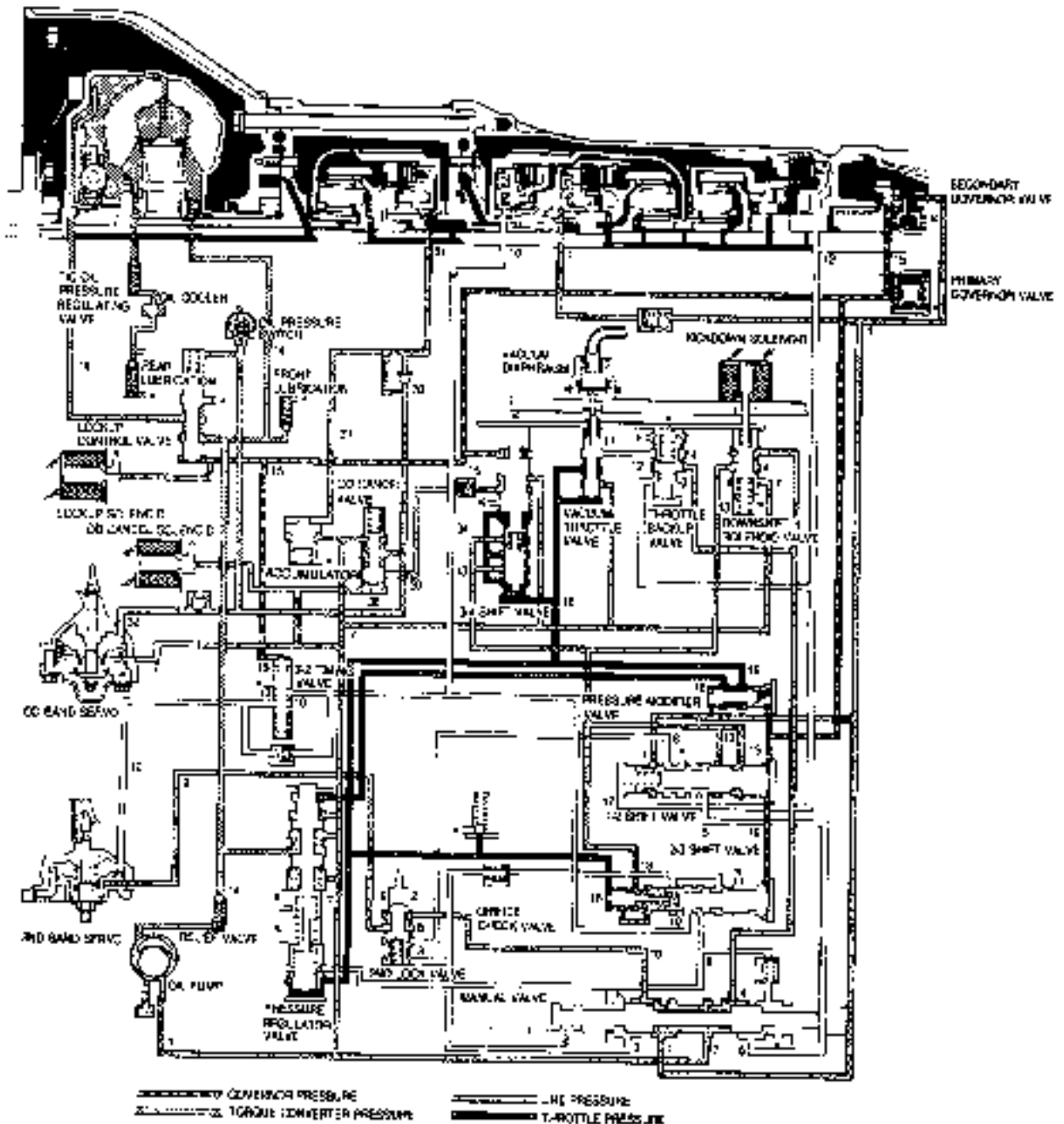
HYDRAULIC

3 RANGE; OD. LOCKUP OFF

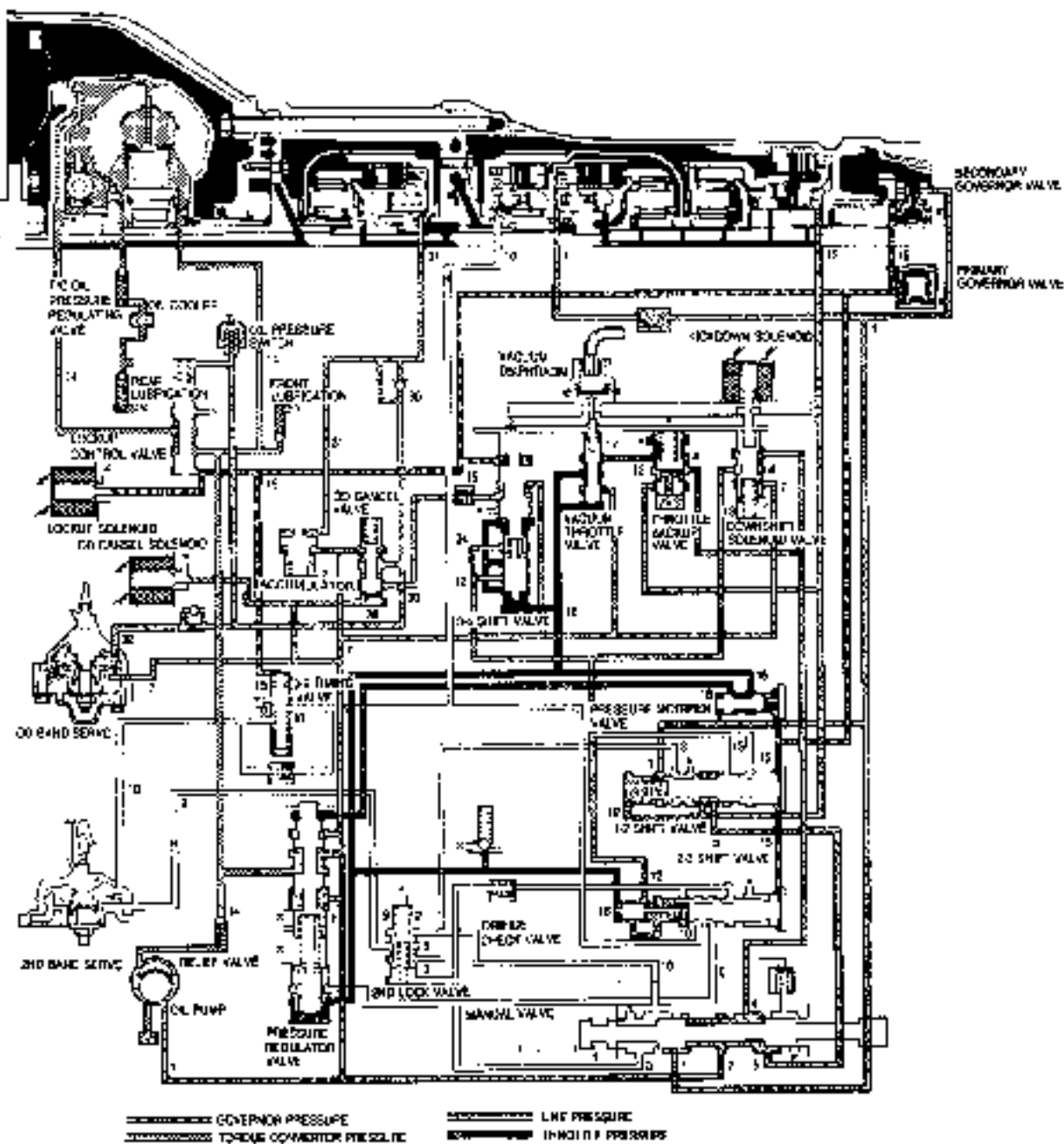




2 RANGE



1 RANGE; 1ST GEAR



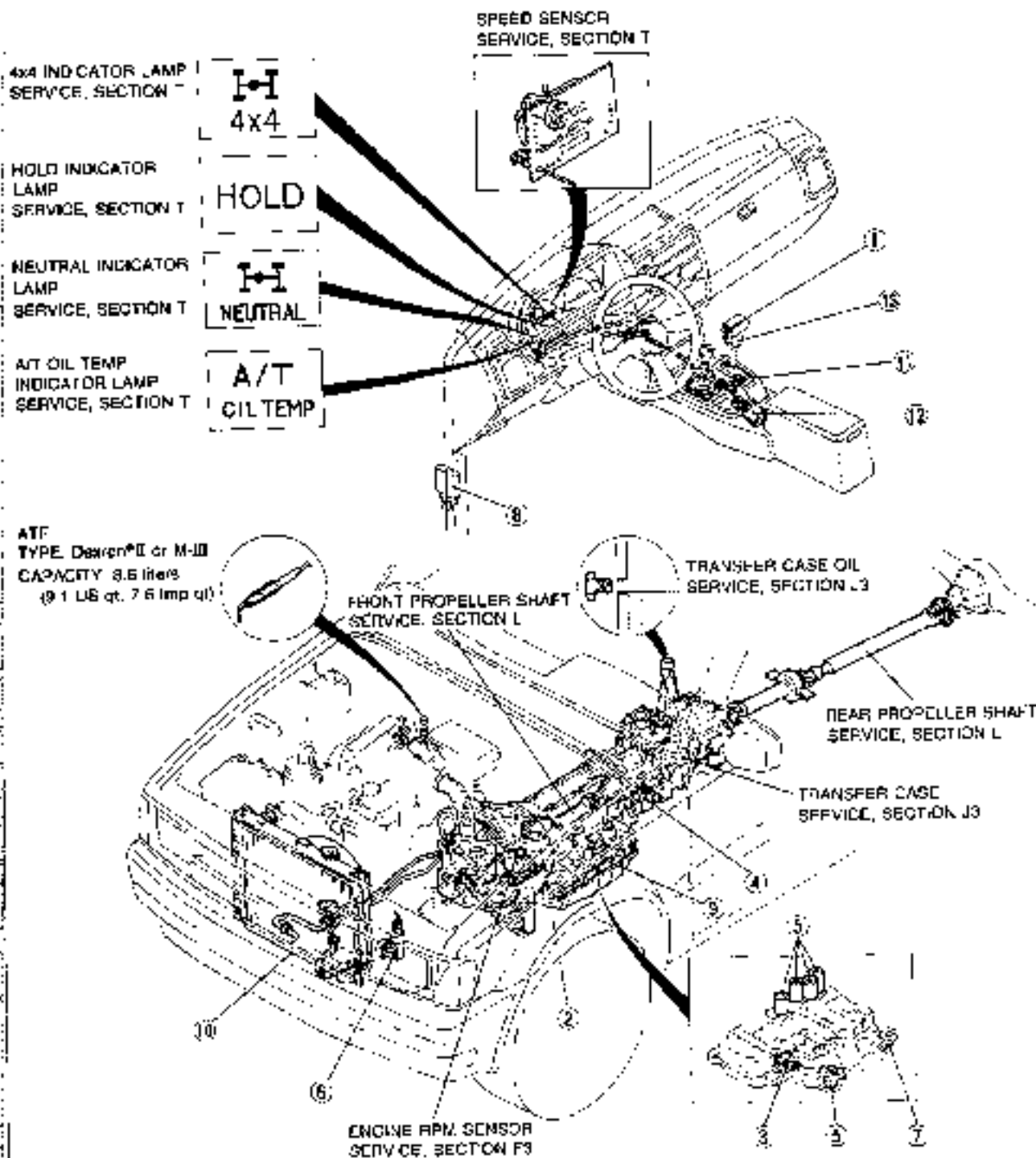
[illegible]

AUTOMATIC TRANSMISSION (Electronically-Controlled)

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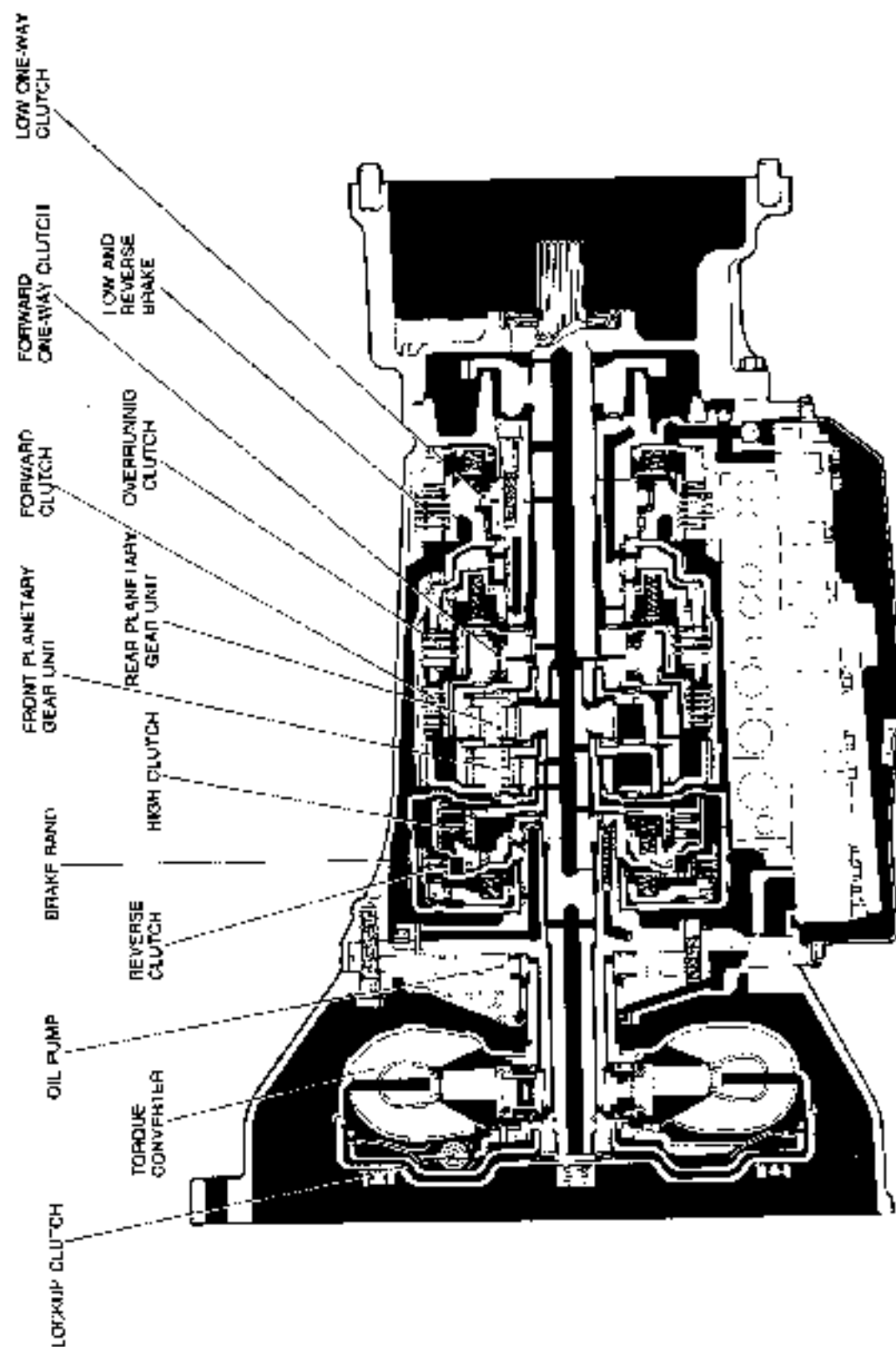
OUTLINE

SPECIFICATIONS

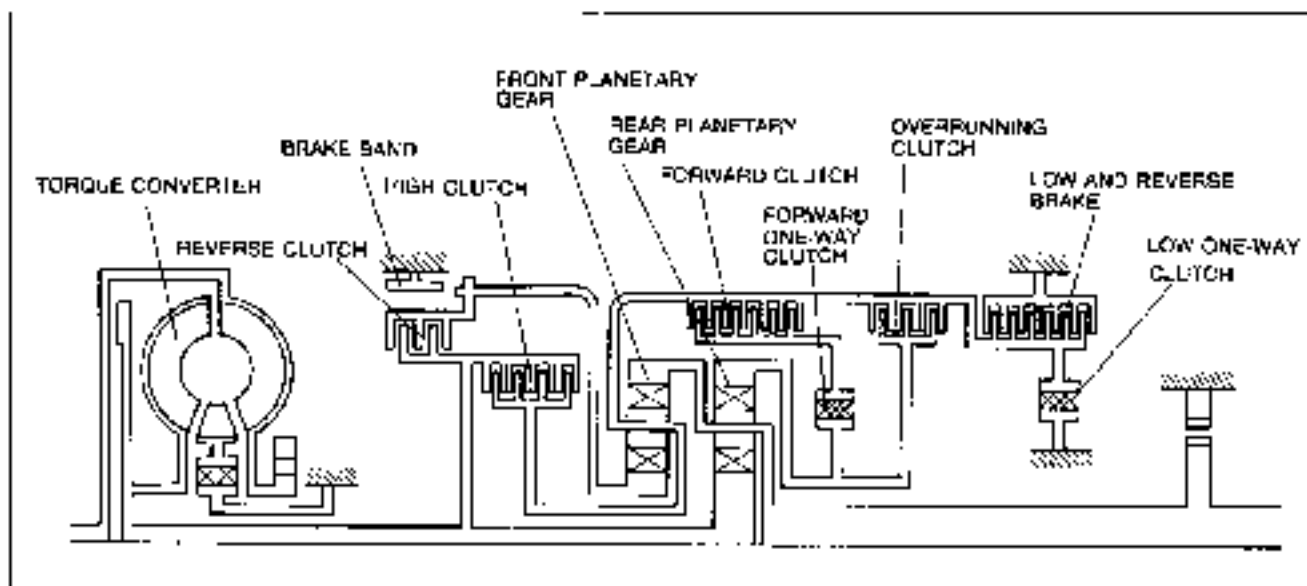
Item	Transmission	R4AX-EL
Torque converter stall torque ratio		2.000
Gear ratio	1st	2.786
	2nd	1.546
	3rd	1.000
	OD (4th)	0.694
	Reverse	2.273
Number of driver/driven plates	Reverse clutch	2/2
	High clutch	4/7
	Forward clutch	0/0
	Overrunning clutch	3/5
	Low and reverse brake	0/0
Automatic transmission fluid (ATF)	Type	Dexron® II or M-III
	Capacity	6.6 (9.1 L)
	Total oil pan	4.0 (4.2 L)

2017-2018

CROSS-SECTIONAL VIEW



POWER FLOW DIAGRAM



SMJCK1 036

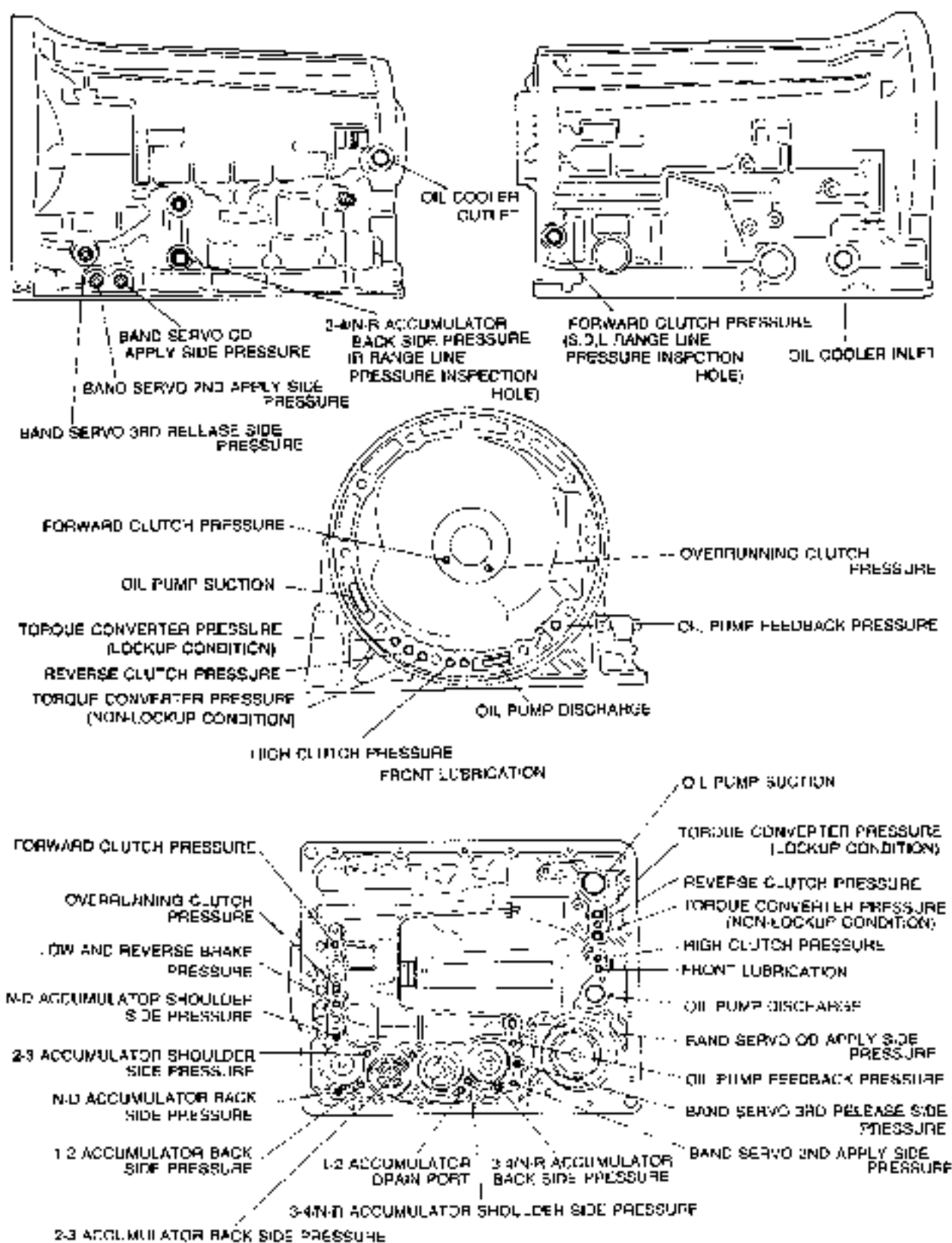
OPERATION OF COMPONENTS

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				
ECONOMY/POWER	P	Reverse	○									○
	R	Reverse	○									○
	N	—										
	D	1st			○	●				●	●	
		2nd			○	○	○			●		
		3rd		○	○	○	○ ¹⁾	○		●		
		OD		○	○	○	○ ²⁾	○	○	●		
	S	1st			○	★				●	●	
		2nd			○	○	○			●		
		3rd		○	○	○	○ ³⁾	○		●		
HOLD	L	1st			○	○				●		○
		2nd			○	○	○			●		
	D	2nd			○	○	○			●		
		3rd		○	○	○	○ ⁴⁾	○		●		
	S	2nd			○	○	○			●		
		3rd		○	○	○	○ ⁵⁾	○		●		
	L	1st			○	○				●		○
		2nd			○	○	○			●		

SMJCK1 036

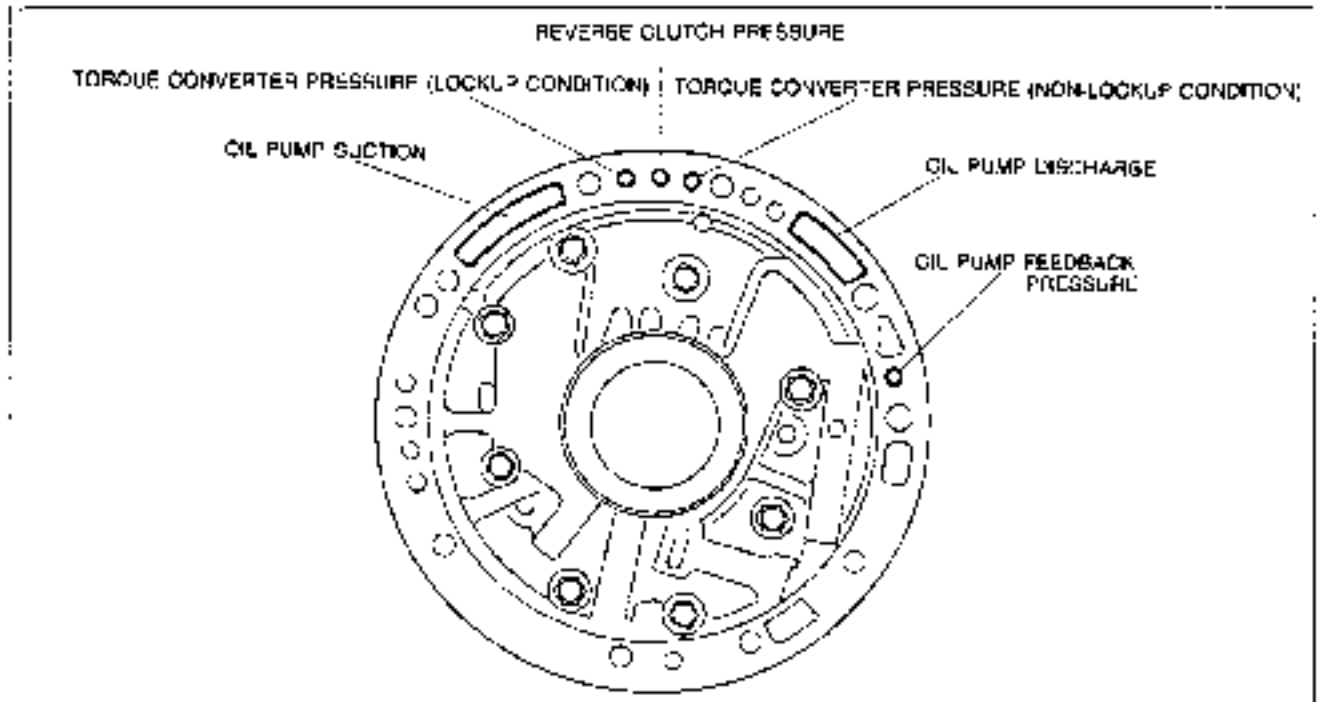
- ¹⁾ Hydraulic pressure is applied to both 2nd applied side and 3rd released side of band servo piston. However, because the area of the 3rd released side is larger than the 2nd applied side, the brake band does not operate.
- ²⁾ Hydraulic pressure is applied to OD applied side, plus condition ¹⁾ above. Brake band is applied.
- : Operates
- ¹⁾ : Operates when throttle opening is less than 1/8. Engine braking effect available
- ★ : Operates when throttle opening is less than 1/8. Engine braking effect not available
- ²⁾ : 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.
- : 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
- ³⁾ : Operates but does not transmit power.
- : Operates during acceleration and cruising.

FLUID PASSAGE LOCATION Transmission Case



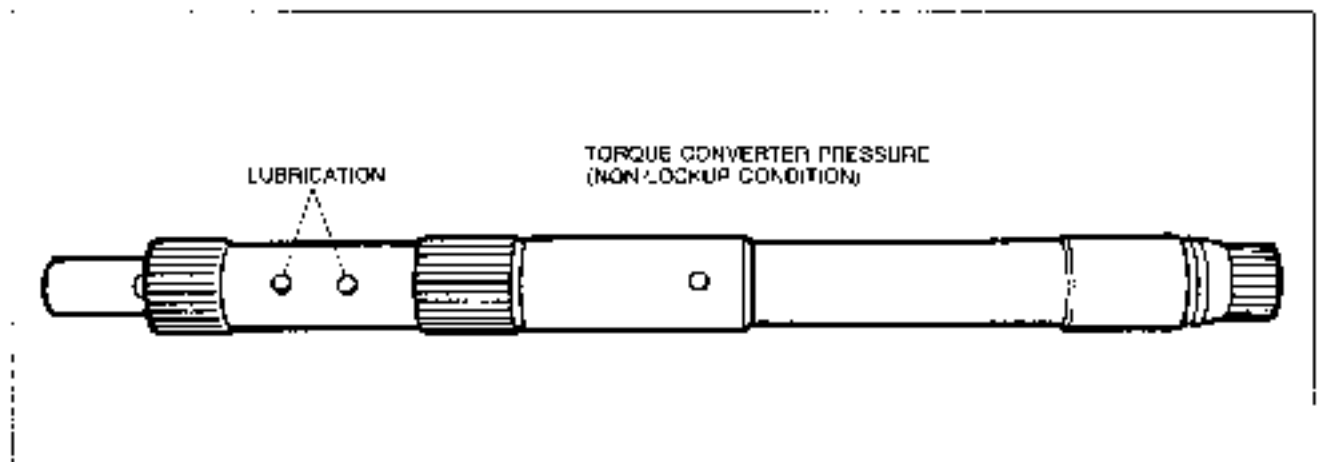
94-157-100

Oil Pump



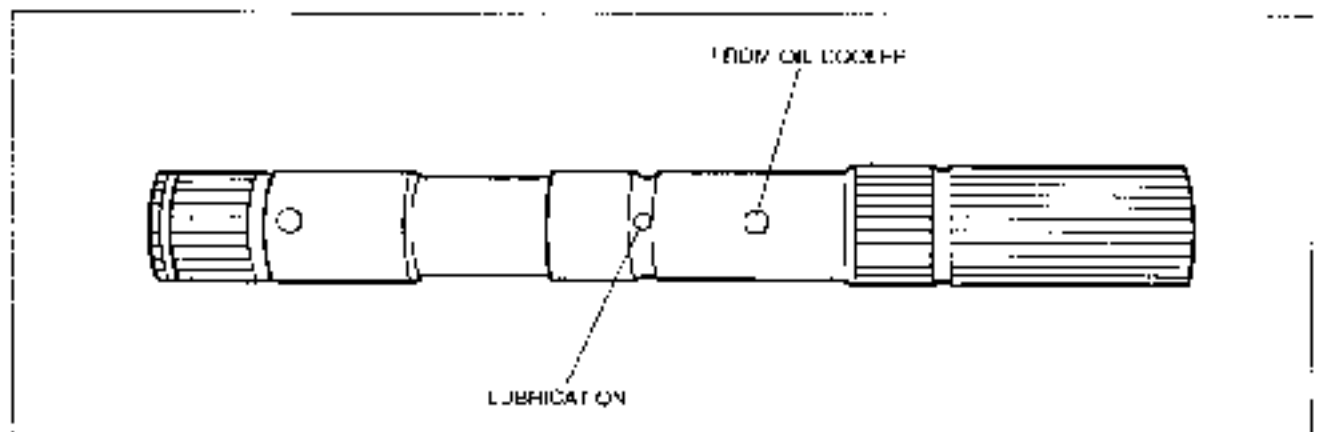
SMUOK1-009

Input Shaft



SMUOK1-009

Output Shaft



SMUOK1-010

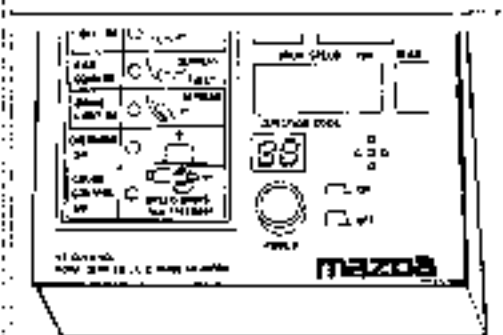
TROUBLESHOOTING

GENERAL NOTES

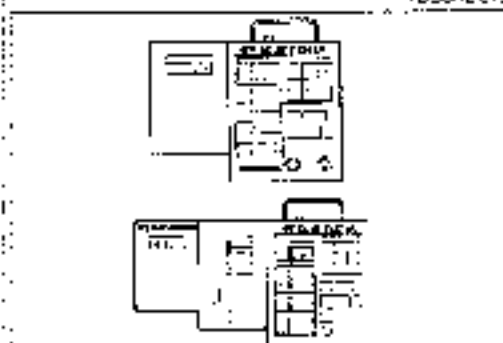
A problem with the EC-AT may be caused by the engine, the EC-AT powertrain, the hydraulic control system, or the electronic control system.

When troubleshooting, therefore, begin from these points, which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

BOOK 311



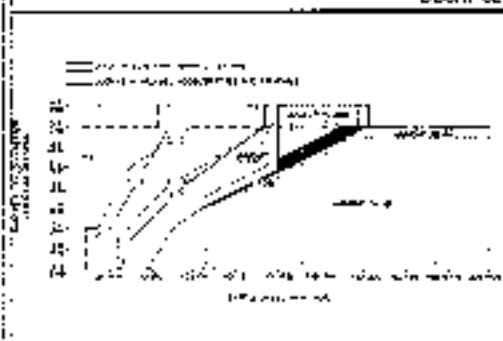
BOOK2019



BOOK42450



BOOK7081



BOOK2080

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.)

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.)

Step 3: Mechanical System Test

Check the engine stall speed, time lag, and line pressure. (Refer to page K2-23.)

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.

- 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 "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 these signals.
- 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**.
- 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.

1811K2-013

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	Section T	Section F2	Section F2	Section F2	K2-17	K2-36	Section G	K2-38	K2-39	K2-36	K2-38	K2-38	K2-27	K2-103	K2-50	K2-59	K2-60	K2-59	K2-61	K2-68	K2-65	K2-71	K2-85	K2-82	K2-86	K2-85	K2-83	K2-76	K2-89	
ATT level and condition		x																																	
Starter relay and cable linkage		x																																	
Idle speed in engine mode		x																																	
Ignitor switch and starter																																			
Inhibitor switch																																			
Hand switch																																			
Cruise control switch																																			
Antilock pressure sensor																																			
Idle switch																																			
Throttle sensor																																			
Speed sensor																																			
ATP sensor																																			
Engine rpm sensor																																			
Shift solenoid A																																			
Shift solenoid B																																			
Line pressure sensor																																			
Braking sensor																																			
Lockup solenoid																																			
Overriding clutch solenoid																																			
Line pressure																																			
Control valve body																																			
NP accumulator																																			
1-2 accumulator																																			
2-3 accumulator																																			
3-4/N-R accumulator																																			
Oil pump																																			
Torque converter																																			
Reverse clutch																																			
High clutch																																			
Forward clutch																																			
Forward and low clutch																																			
Overrunning clutch																																			
Low one-way clutch																																			
Low and reverse brake																																			
Brake band and limit stop																																			
Parking mechanism																																			

Item		Inspection point and reference page	ON VEHICLE															OFF VEHICLE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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			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	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38	K2-38

[illegible]

25.9K-34

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.

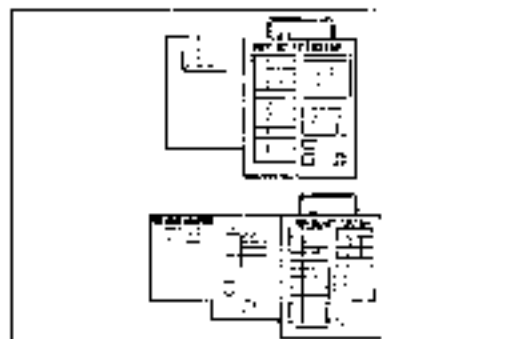
Malfunctions or intermittent malfunctions are stored in the EC-AT control unit to later be output as malfunction codes.

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		
84	LINE PRESSURE SOLENOID		

014,0001-015



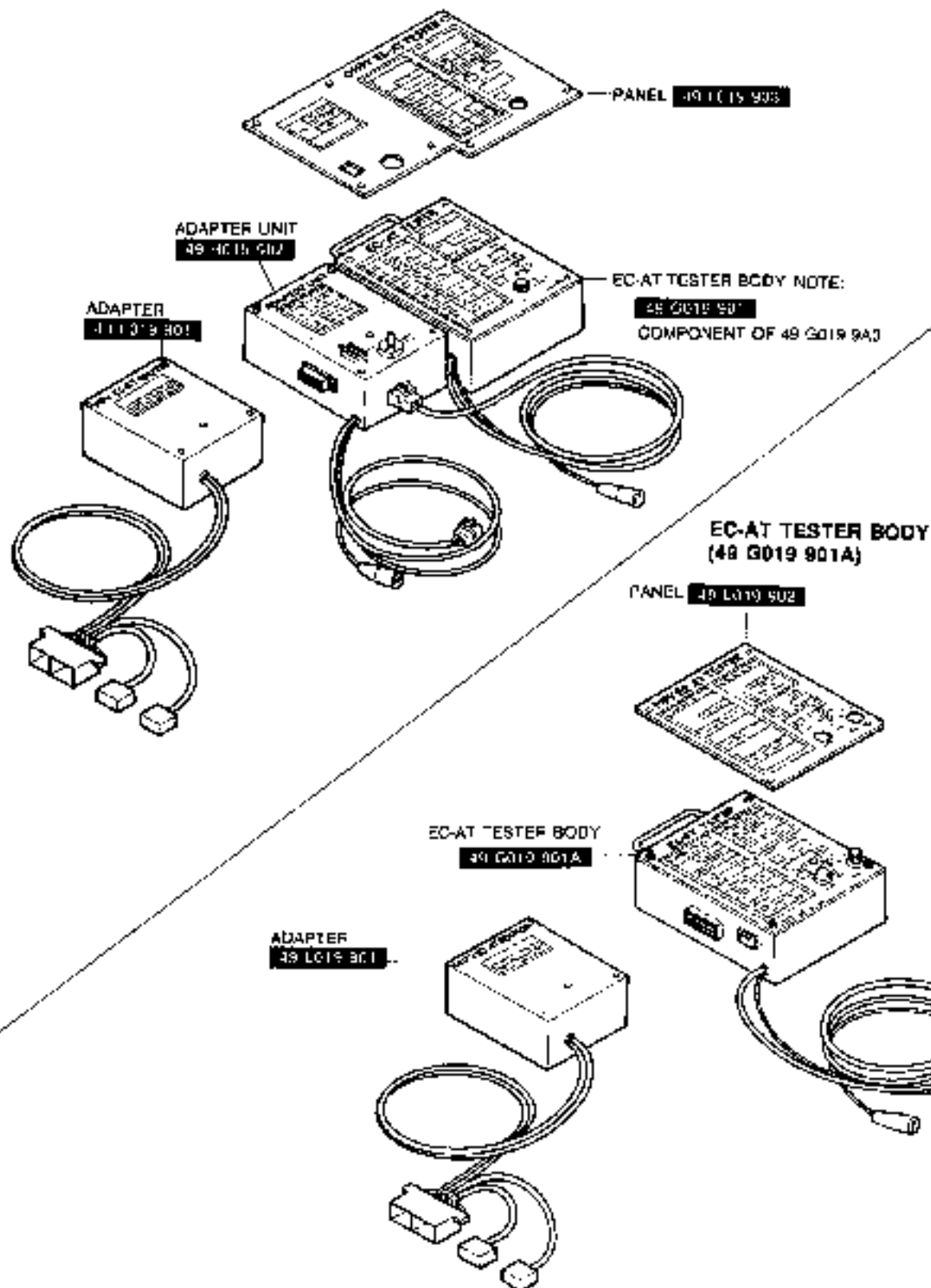
1E0076-005

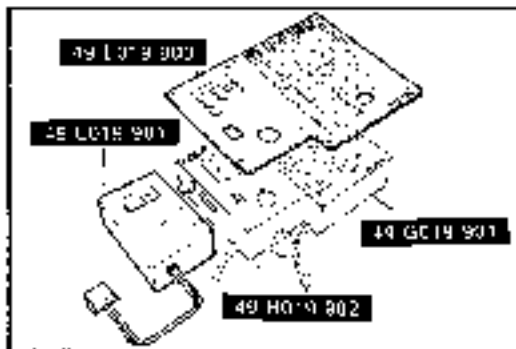
EC-AT TESTER

The previous **EC-AT Tester** can be used along with the **Adapter** (49 L019 901).

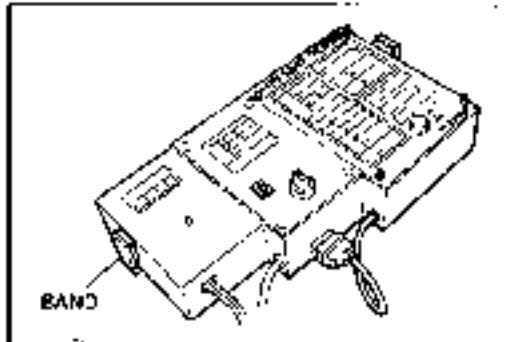
Components

EC-AT TESTER BODY (49 G019 901) AND ADAPTER UNIT (49 H019 902)

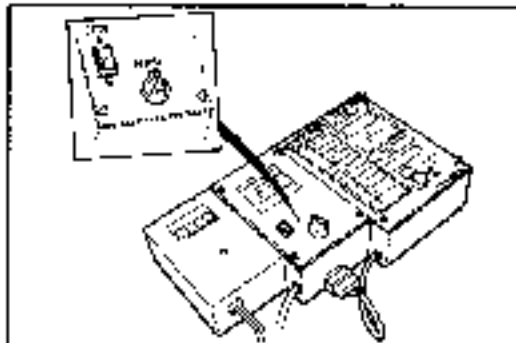




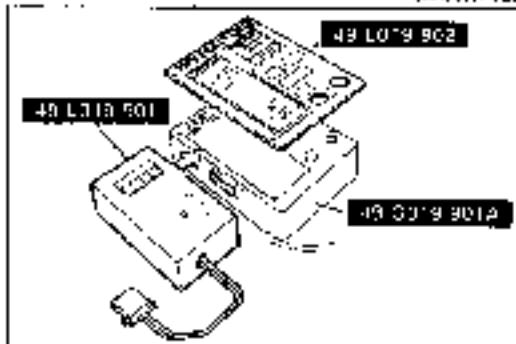
CBUCK1-015



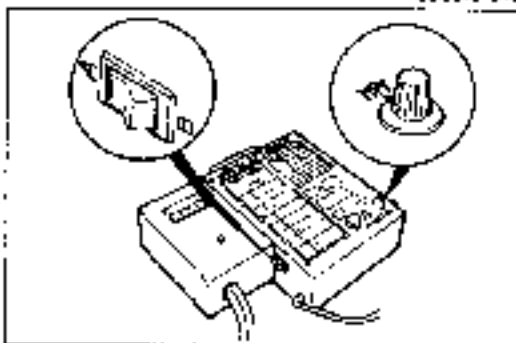
BMUCK1-021



BMUCK1-022



CBUCK1-016



BMUCK1-024

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 902) 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.

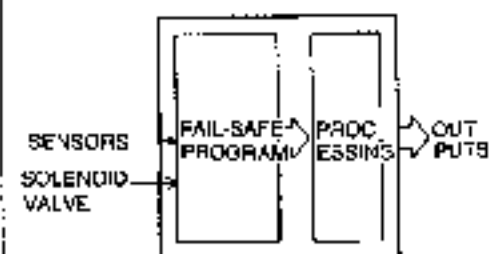
06 → 4 SEC PERIOD →
 62 → 4 SEC PERIOD →
 64 → 4 SEC PERIOD →
 REPEATS ABOVE

9M-1041-005

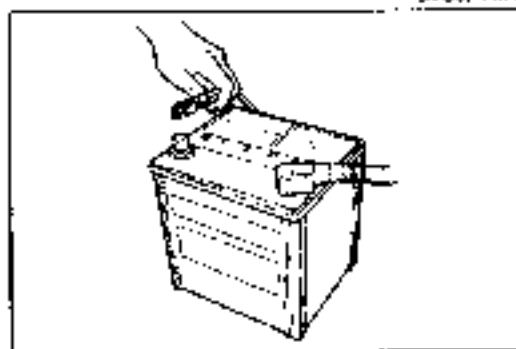
CHECK CONNECTOR NOT GROUNDED



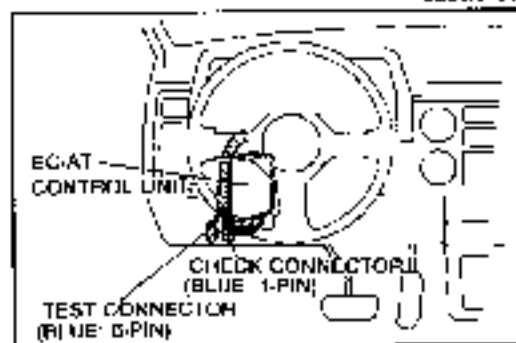
9M-1041-005



9M-1041-005



2B-1012-005



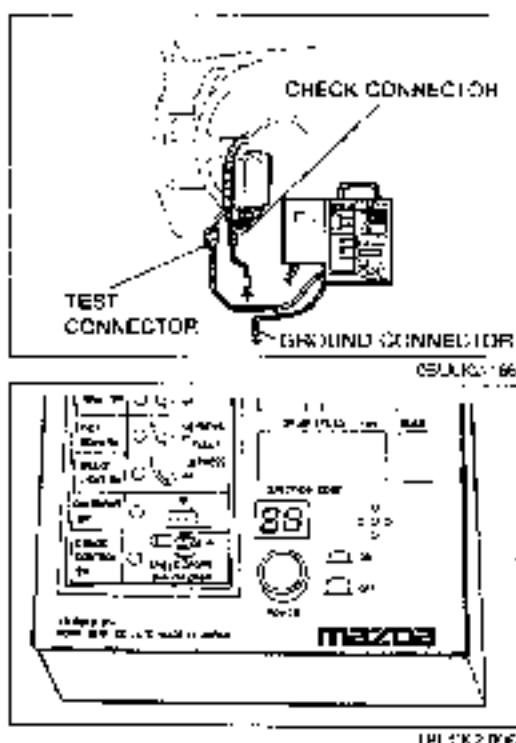
9M-1041-005

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

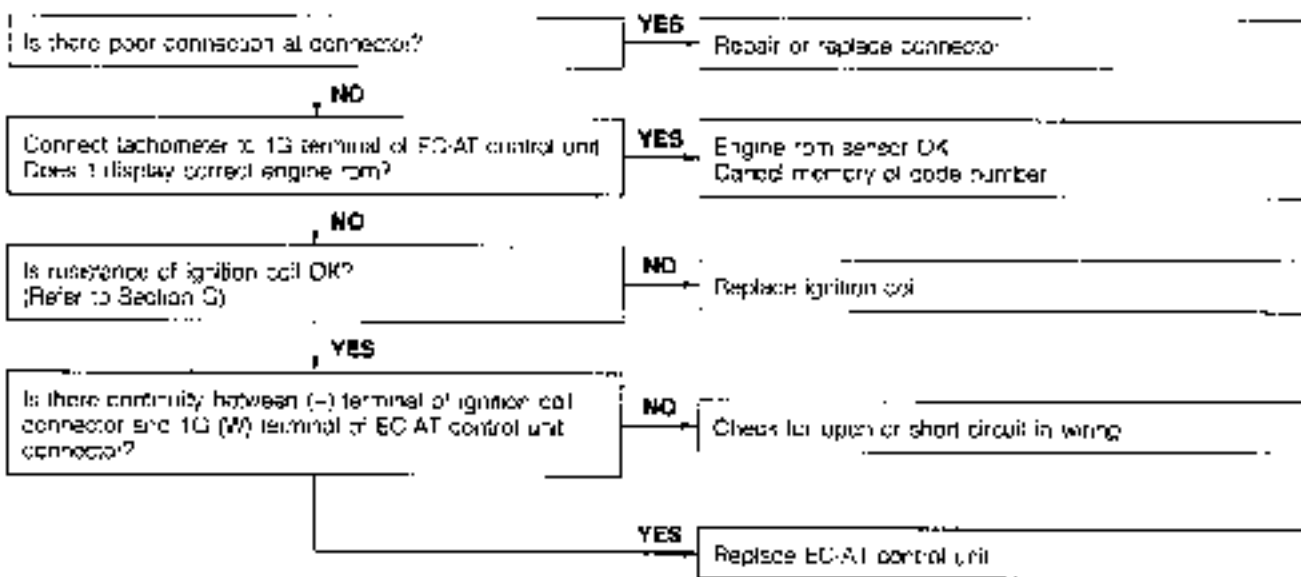
1. Locate the check connector, and test connector.



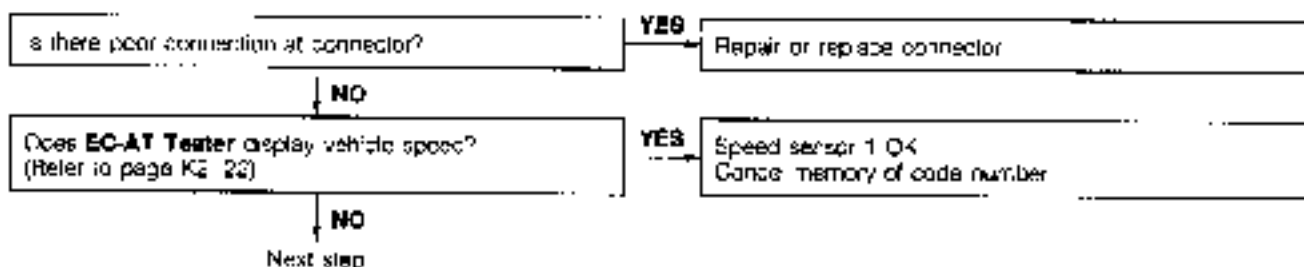
2. Connect the 6-pin connector of the **EC-AT Tester** to the test connector (Blue: 6-pin).
3. Ground the ground connector of the **EC-AT Tester**.
4. Ground the check connector (Blue: 1-pin).
5. Turn the ignition switch ON.
6. Check that "88" flashes on the digital display and that the buzzer sounds 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.

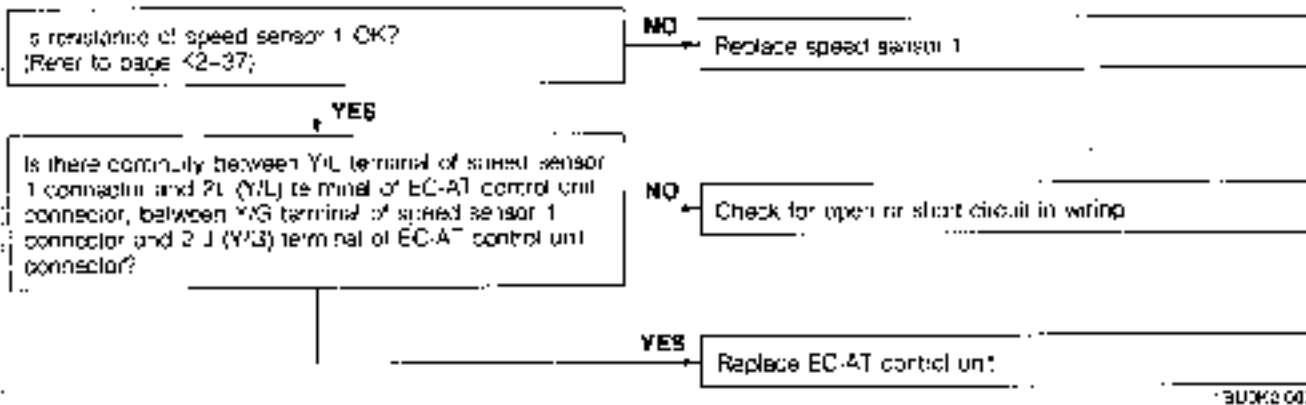
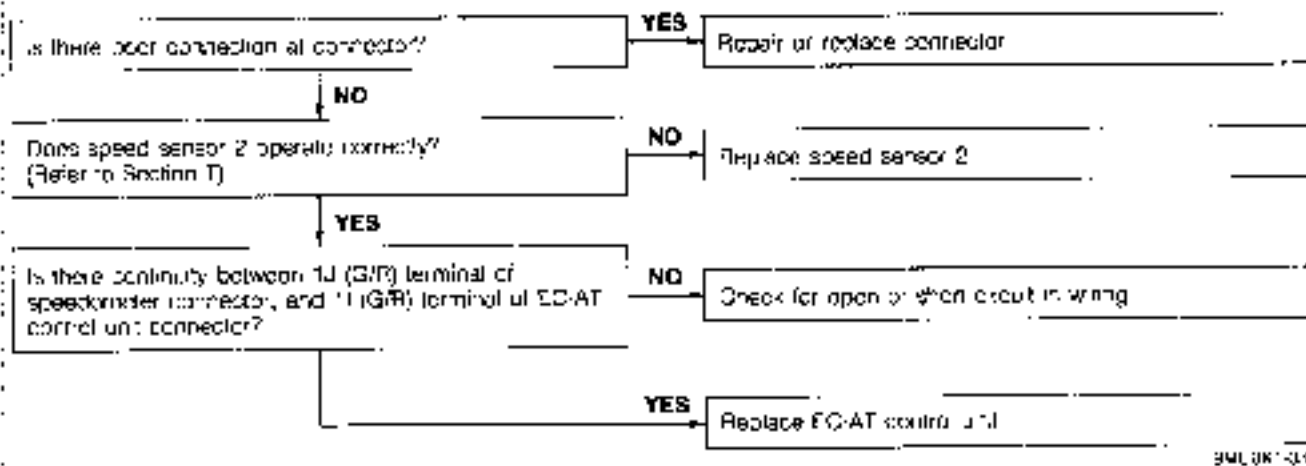
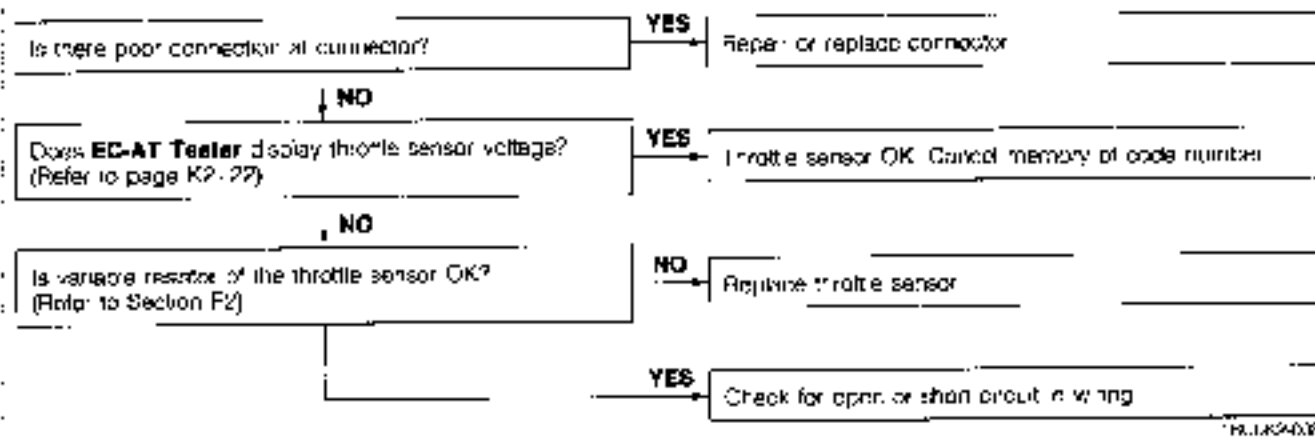
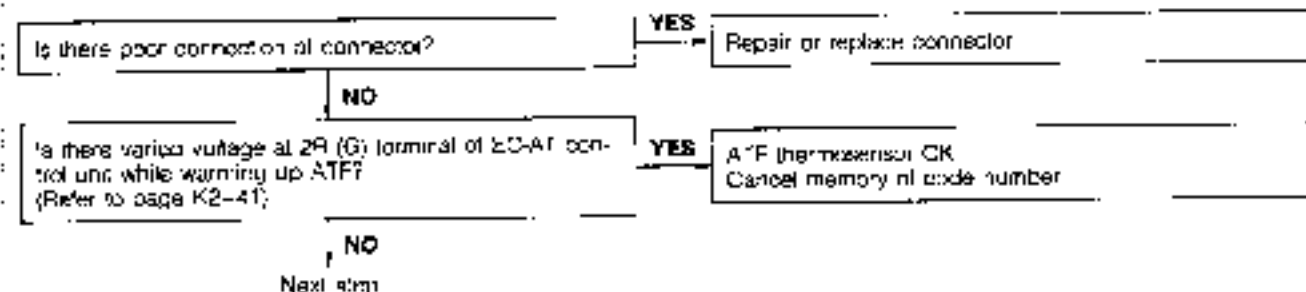
Note

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)**

Is there continuity between G terminal of ATF thermosensor connector and 25 (G) terminal of EC-AT control unit connector and between Y/L terminal of ATF thermosensor connector and 21 (Y/L) terminal of EC-AT control unit connector?

NO

Check for open or short circuit in wiring

YES

Does ATF thermosensor operate correctly? (Refer to page K2-36)

NO

Replace ATF thermosensor

YES

Replace EC-AT control unit

19JUK2-009

No.60, 61, or 62 Code Display (Shift Solenoid A, Shift Solenoid B, or Overrunning Clutch Solenoid)

Is there poor connection at connector?

YES

Repair or replace

NO

Is there 20—40Ω between terminals of solenoid connector and ground? (Refer to page K2-38)

NO

Is there poor connection at connector in transmission?

YES

Repair or replace connector

NO

Replace solenoid

Is there continuity between terminals 1D (BR/W), 1B (BR/Y), or 1C (BR/B) of the EC-AT control unit connector and ground? (Refer to page K2-40)

NO

Open circuit in wiring

YES

Solenoid and circuit OK
Cancel memory of code number

19JUK2-010

No.63 Code Display (Lockup Solenoid)

Is there poor connection at connector?

YES

Repair or replace

NO

Is there 10—20Ω between terminals of lockup solenoid connector and ground? (Refer to page K2-38)

NO

Is there poor connection at connector in transmission?

YES

Repair or replace connector

NO

Replace solenoid

Is there continuity between the 1M (BR/B) terminal of EC-AT control unit connector and ground? (Refer to page K2-40)

NO

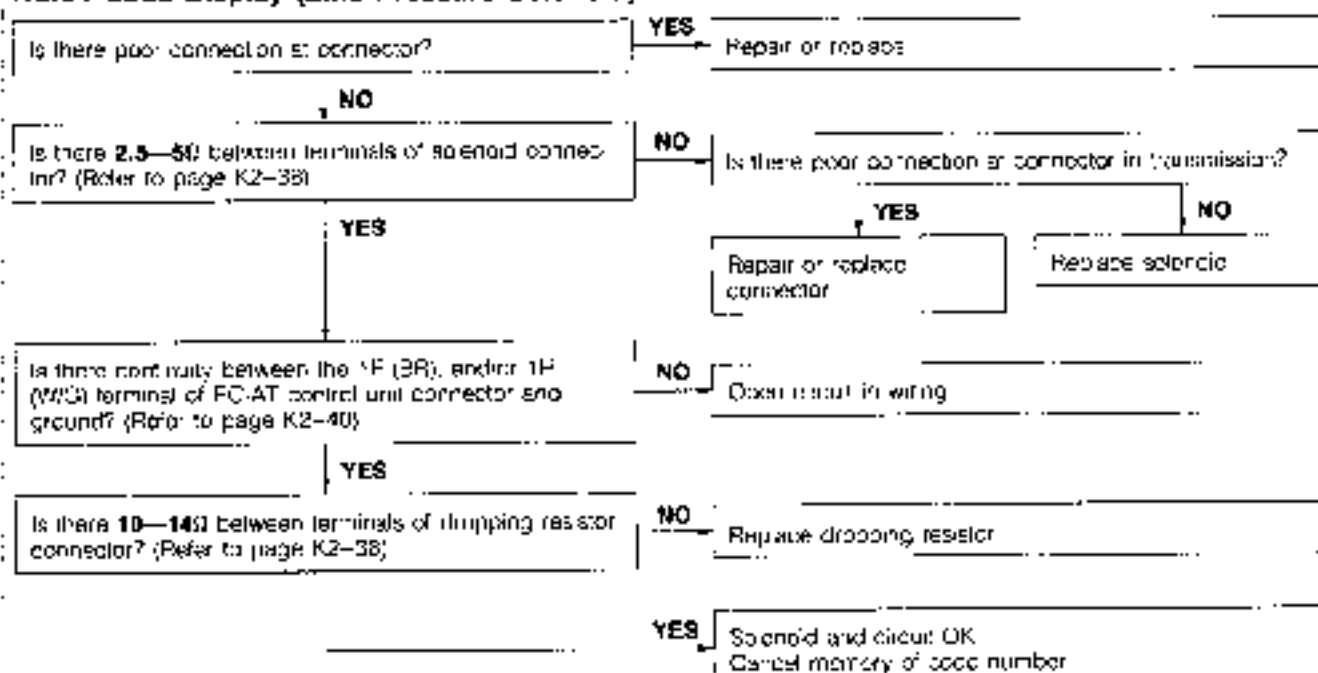
Open circuit in wiring

YES

Solenoid and circuit OK
Cancel memory of code number

19JUK2-011

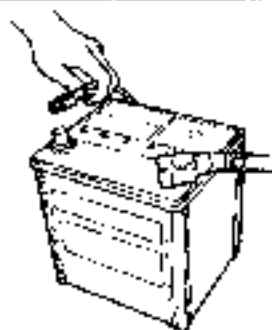
No.64 Code Display (Line Pressure Solenoid)



15LCK2C12

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.



23U0K9-006

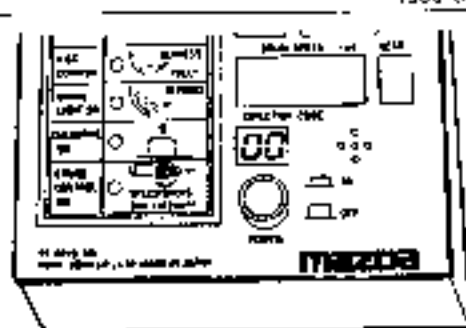
DRIVE AT 50 km/h (31 mph)

KICKDOWN

STOP THE VEHICLE

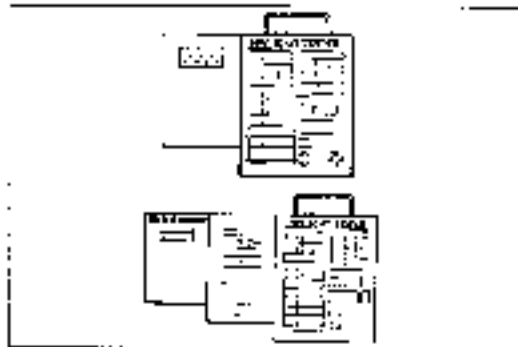
3. Drive the vehicle at 50 km/h (31 mph), then depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.

7950-10-004

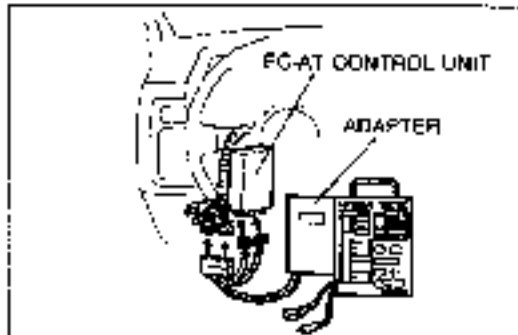


5MUDK1-404

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.



9VLEK1-041



18_K102-010

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	
Input (Light)					
INHIBITOR SW	P, N	ON	Other ranges	Inhibitor switch or wiring	
		OFF	P or N range		
	D	ON	D range		
		OFF	Other ranges		
	S	ON	S range		
		OFF	Other ranges		
	L	ON	L range		
		OFF	Other ranges		
		R	ON		R range
			OFF		Other ranges
MODE SW		Not used			
HOLD SW		ON	Hold switch depressed	Hold switch or wiring	
		OFF	Hold switch released		
ATF THERMOSENSOR		ON	ATF temperature above 40°C (104°F)	ATF thermosensor or wiring	
		OFF	ATF temperature below 40°C (104°F)		
IDLE SW		ON	Throttle valve fully closed	Idle switch (in throttle sensor) or wiring	
		OFF	Throttle valve open		
ATMOSPHERIC PRESSURE SENSOR		ON	Atmospheric pressure below 679 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 $\geq$ 40 km/h (25 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)		
Input (Digital display)				
*THROTTLE SENSOR	ECU/AT control unit terminal voltage	Constant		*Throttle sensor or wiring
*VEHICLE SPEED	Vehicle speed sensor (electronic speed sensor 1 signal)	Constant		Speed sensor 1 or wiring
*ENGINE RPM		Not used		—
Output (Light)				
*SIGNALING	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

49 C379 400A Gauge set, oil pressure 	49 HD19 C02 Adaptor 	49 B019 901 Gauge, oil pressure 

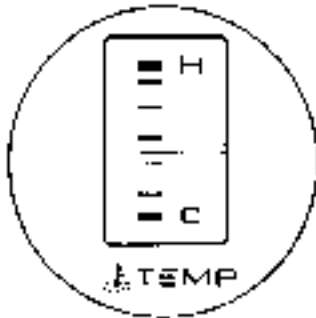
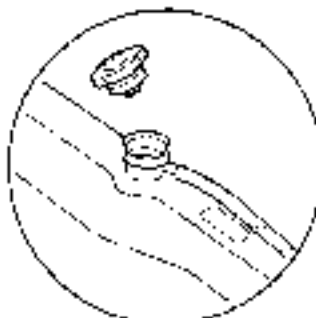
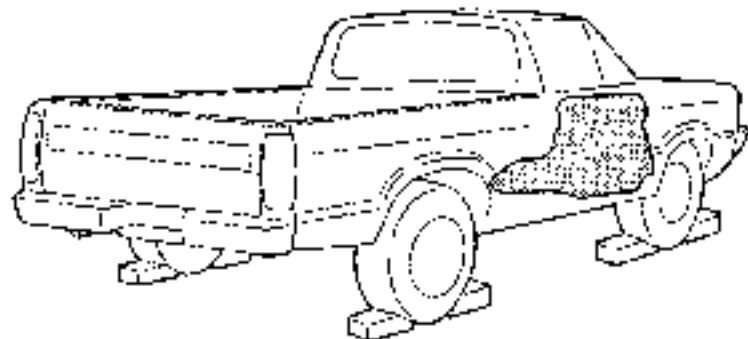
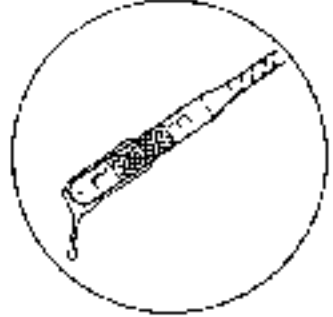
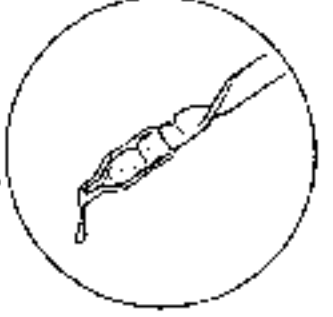
10-000-0012

STALL TEST

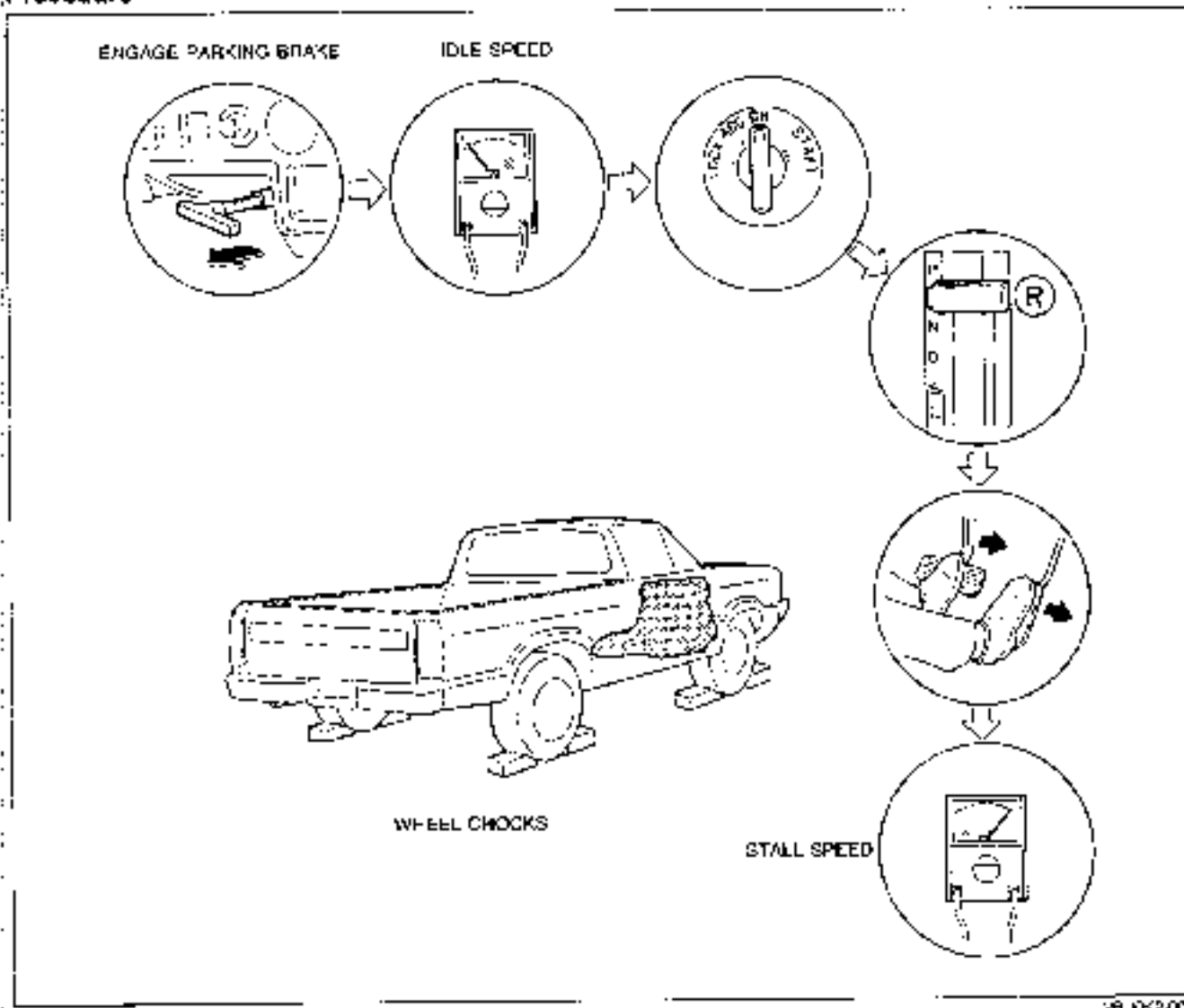
This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

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.

ENGAGE PARKING BRAKE 	WARM UP ENGINE 	COOLANT LEVEL 
 WHEEL CHOCKS TEMPERATURE: 60—70°C (140—158°F)		ENGINE OIL LEVEL  AIR LEVEL 

Procedure



1. Connect a tachometer to the engine.
2. Start the engine and check the idle speed in P range. (Refer to Section F2.)

Idle speed: 750—790 rpm

3. Shift the selector lever to R range.

Caution

Step 4 must be performed within 5 seconds to prevent possible transmission damage.

4. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right foot.

Caution

Step 5 must be performed within 5 seconds to prevent possible transmission damage.

5. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.

Caution

Idling for at least one minute is to cool the ATF and to prevent deterioration of the fluid.

6. Move the selector lever to N range and let the engine idle for at least one minute.

Caution

Be sure to allow sufficient cooling time between each stall test.

- 7 Perform the stall test for the following ranges in the same manner.
- (1) D range
 - (2) S range
 - (3) L range

Engine stall speed: 2,300—2,500 rpm

9MJC61-047

Evaluation of Stall Test

Condition		Possible cause
Above specification	In all ranges	Insufficient line pressure Worn oil pump Oil leakage from oil pump, control valve, and/or transmission case Stuck pressure regulator valve
	In D and S ranges	Forward clutch slipping Forward one-way clutch slipping Low one-way clutch spring
	In R range	Low and reverse brake slipping Reverse clutch slipping Perform road test to determine whether problem is low and reverse brake or reverse clutch a) Engine brake applied in L range 1st ...Reverse clutch b) Engine brake not applied in L range 1st ...Low and reverse brake
Within specification		All shift control elements within transmission are functioning normally
Below specification		Engine not in time
		One-way clutch slipping within torque converter

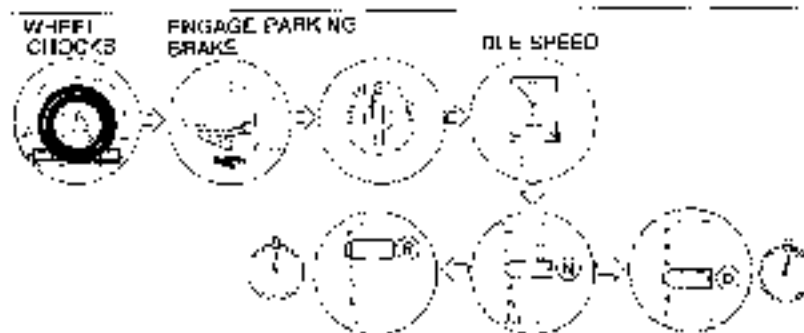
9MJC61-048

TIME LAG TEST

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step measures this time lag for checking conditions of the N-D, 1-2, and 3-4/N-R accumulators; forward, reverse, and one-way clutches, brake band and low and reverse brake.

Preparation

Perform the preparation procedure shown in the STALL TEST. (Refer to page K2-23.)

Procedure

2B-JOK7-00H

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

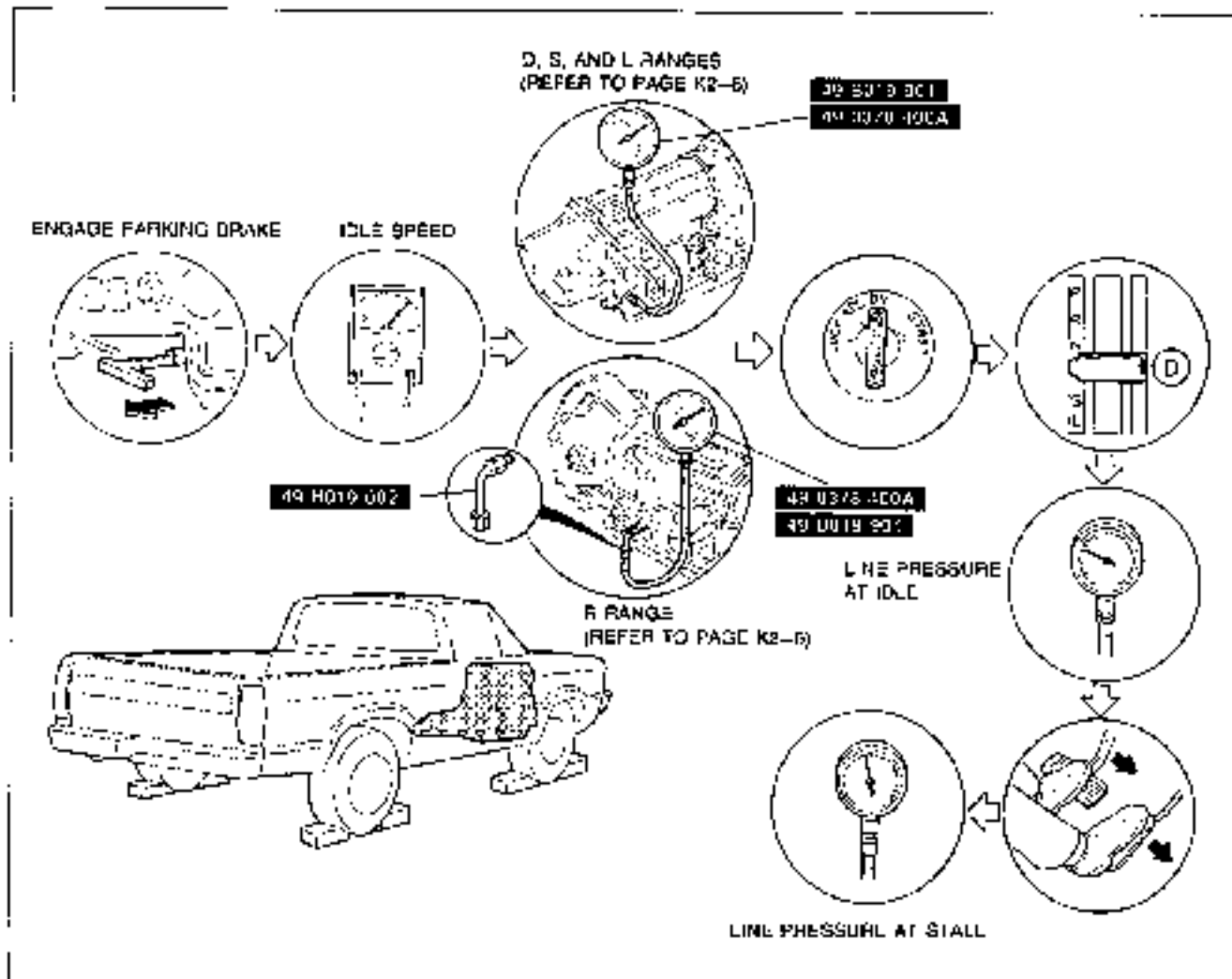
9M-JOK1-02U

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

2000K2-006

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 stall speed for each range in the same manner.

Specified line pressure:

Range	Line pressure kPa (kg/cm ² , psi)	
	Idle	Stall
D, S, L	432—471 (4.4—4.8, 63—68)	1,040—1,119 (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)

GBJ0K2 C33

7. Install new plugs in the inspection ports.

Tightening torque: 4.9—9.8 N·m (50—100 cm·kg, 43—87 in·lb)

Evaluation of Line Pressure Test

Condition		Possible cause
When idling	Low pressure in every range	Worn oil pump Damaged control piston (in oil pump) Pressure regulator valve or plug sticking Damaged pressure regulator valve spring Fluid leaking between oil strainer and pressure regulator valve
	Low pressure in forward ranges	Fluid leaking from hydraulic circuit of forward clutch
	Low pressure in D and S ranges (fluid mode only)	Fluid leaking from hydraulic circuit of band servo 2nd apply side
	Low pressure in R range only	Fluid leaking from hydraulic circuit of reverse clutch
	Low pressure in R and L ranges only	Fluid leaking from hydraulic circuit of low and reverse brake
	Higher than specification	Throttle sensor out of adjustment Damaged fluid thermometer 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

SMU0K1 050

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**

1. 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.

2. Accelerate the vehicle with half- and full-throttle opening.
3. 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).

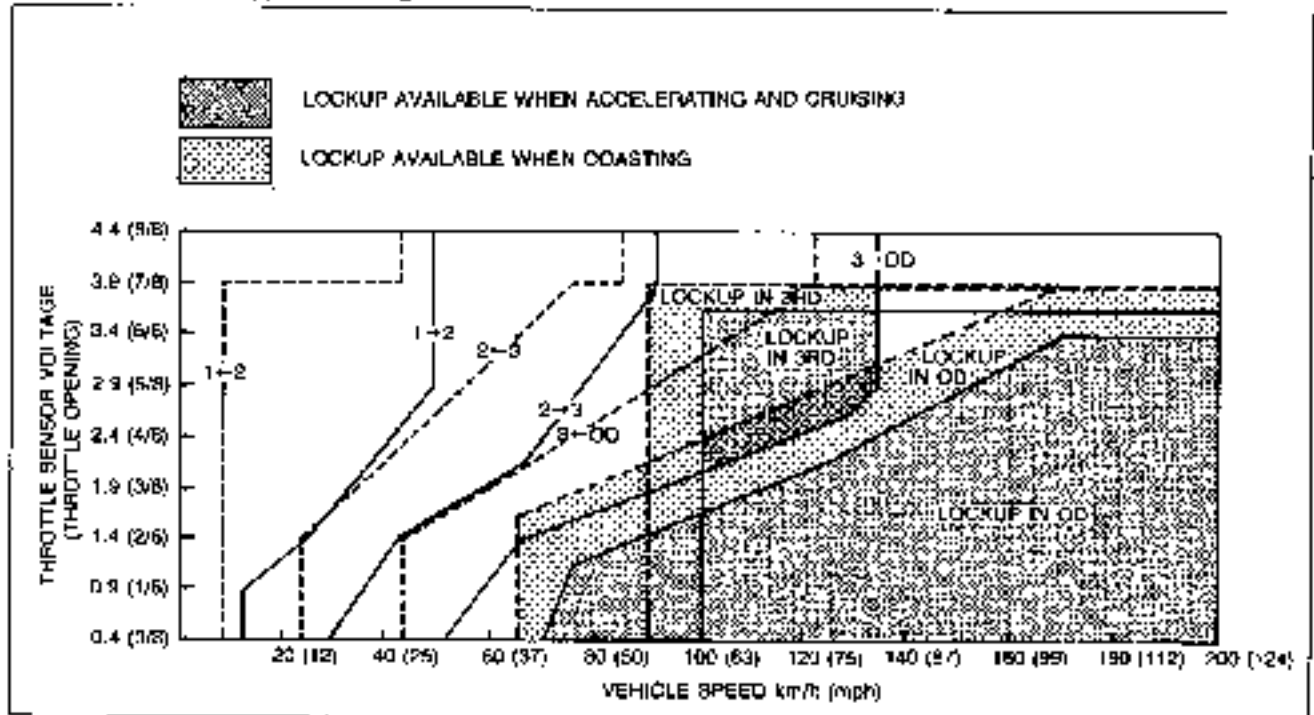
c) There is no overdrive when the cruise control is operating and there is an 8 km/h (13 mph) difference between the preset cruise speed and vehicle speed, or SET or RESUME switch is ON.

d) There is no overdrive when ATF temperature is below 40°C (104°F).

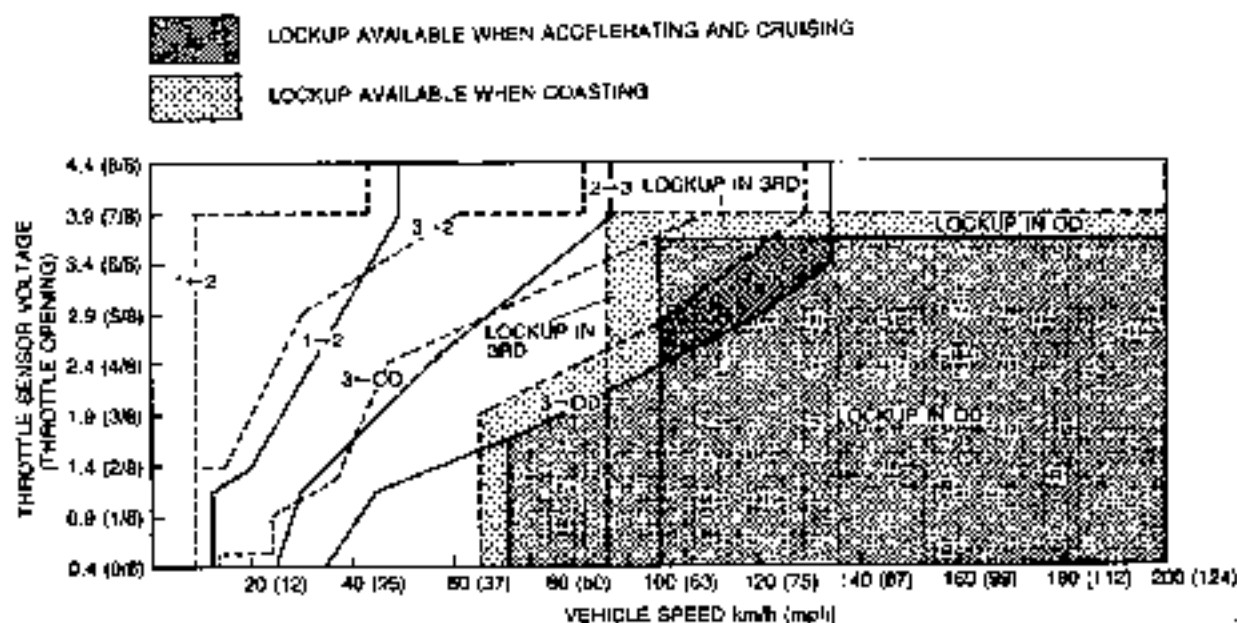
e) There is no lockup when the accelerator pedal is fully closed (Idle switch ON) while driving the vehicle below 120 km/h (74 mph).

4. Check the upshifts for shift shock or slippage in the same manner.

5. While driving in OD, shift the selector lever to S range and check that OD-3 downshift immediately occurs.

D range (Economy) shift diagram

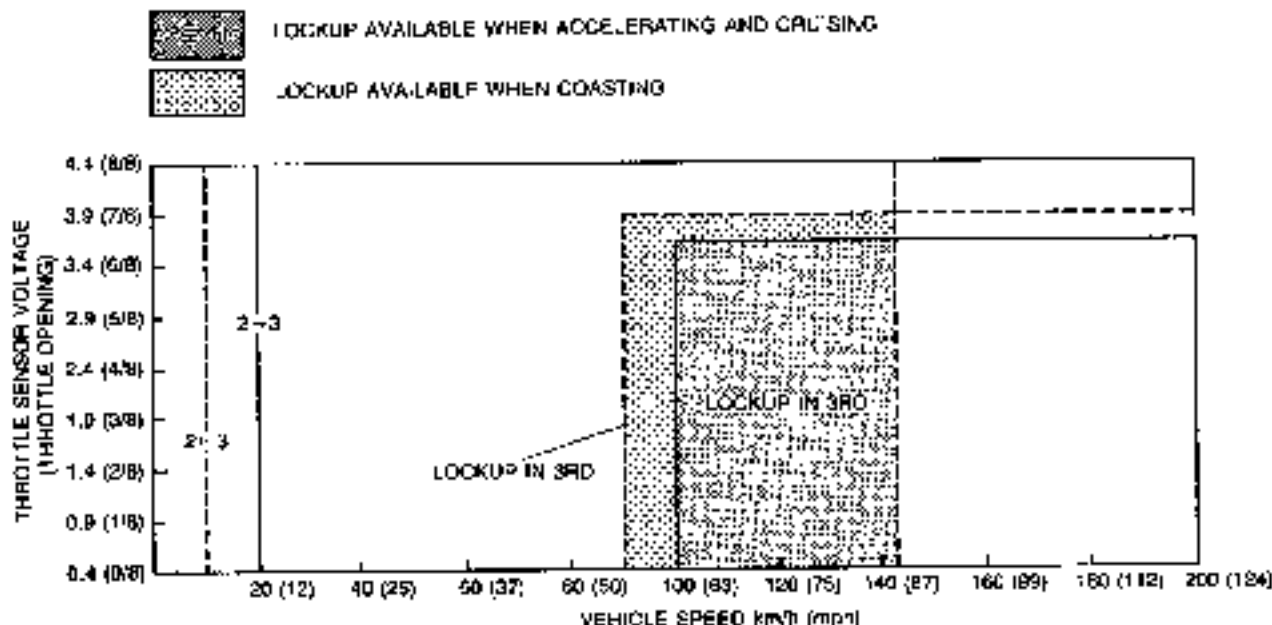
D range (Power) shift diagram



CELOCK752

6. Select the Hold mode.
7. Accelerate the vehicle; check 2-3 up- and downshifts and lockup and that no 1st or OD is obtained. The 2-3 shift points are as shown in the D range (Hold) shift diagram.
8. Decelerate the vehicle and check that engine braking effect is felt in 3rd and 2nd gears when throttle opening less than 1/8.

D range (Hold) shift diagram



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 stopping)		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

RMU341-036

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.)

R3J3-020-A

RANGE TEST

Shift Pattern

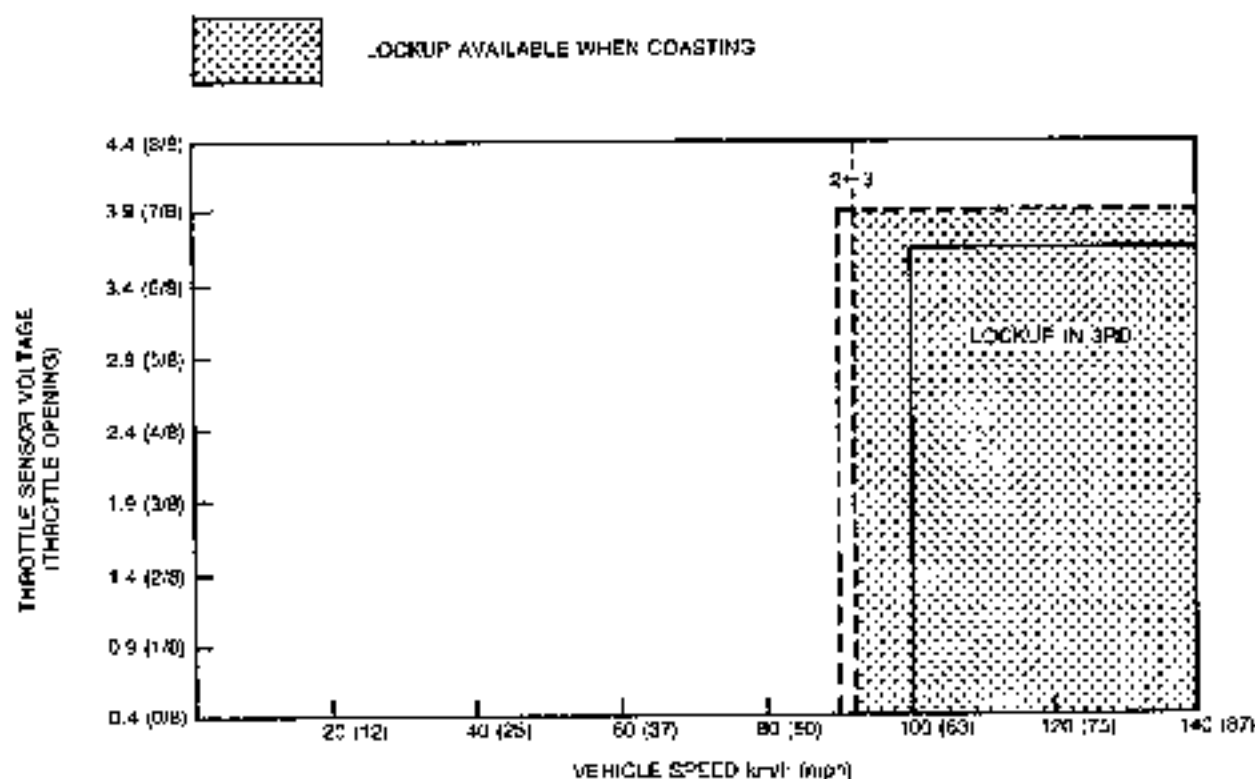
1. Shift the selector lever to S range.
2. Accelerate the vehicle, check that 1-2 and 2-3 up- and downshifts, and lockup are obtained and that no OD is obtained.
3. Decelerate the vehicle and check that engine braking effect is felt in only 3rd and 2nd gear when throttle opening less than 1/8.

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.
3. While driving in S range (Economy mode) and 3rd gear, select the Hold mode and check that 3rd gear is held until the 3-2 downshift point is achieved as shown in the S range (Hold) shift diagram.
5. Accelerate the vehicle in S range (Hold mode) and check that 2nd gear is held.
6. Decelerate the vehicle and check that engine braking effect is felt when throttle opening less than 1/8.

S range (Hold) shift diagram

CBLCR2 C34



74337C-475

Noise and Vibration

1. Drive the vehicle in 2nd gear (Hold mode) and check for abnormal noise or vibration.

Note

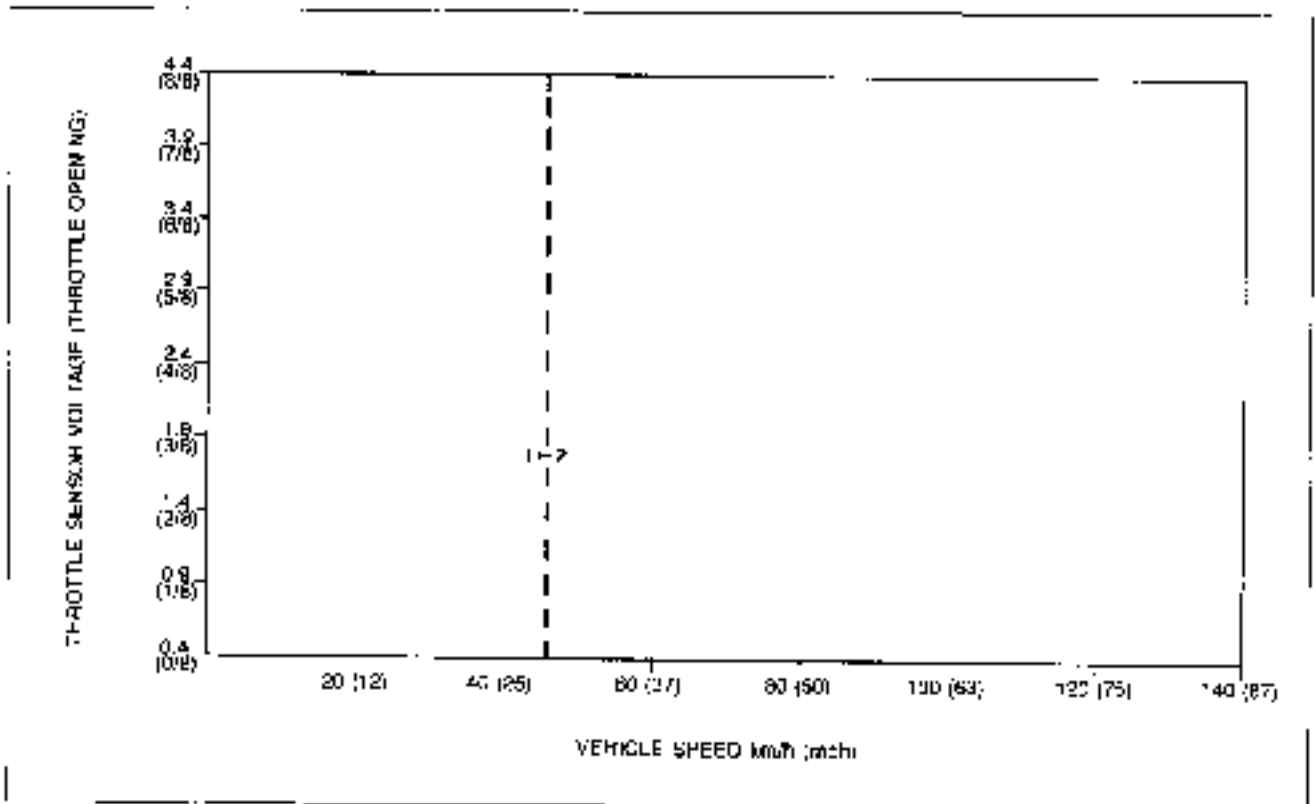
Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check for the cause with extreme care.

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, over-drive, or lock-up 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

09U1K2-006

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.

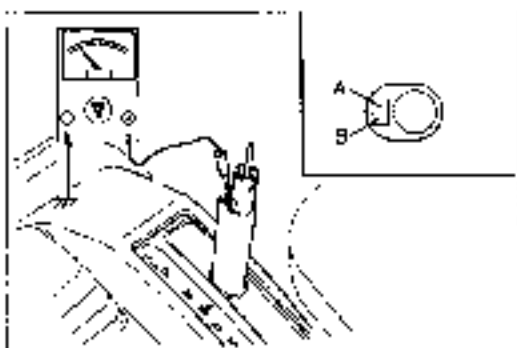
P RANGE TEST

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.

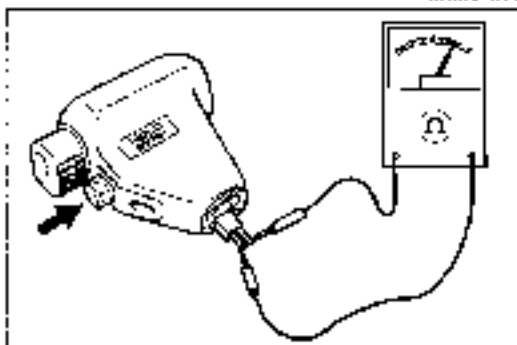
Vehicle Speed at Shiftpoint Table

Mode	Range	Throttle condition (Throttle sensor voltage)	SHIF	Vehicle speed km/h (mph)		
Normal (Power)	D	Fully opened (4.4 volt)	D ₁ → D ₂	47-51 (29-32)		
			U ₂ → U ₂	87-95 (54-59)		
			D ₂ → OD	20-139 (80-86)		
		Half throttle (1.6-2.2 volt)	U ₁ → D ₁	39-43 (24-27)		
			D ₂ → D ₃	66-72 (41-45)		
			Lockup ON (D ₃)	96-104 (60-64)		
			D ₃ → OD	111-119 (69-74)		
			Lockup ON (OD)	125-136 (78-84)		
			Lockup OFF (OD)	96-104 (60-64)		
			OD → D ₃	71-79 (44-49)		
			Lockup OFF (U ₂)	88-94 (55-58)		
			D ₃ → D ₂	42-48 (26-30)		
	Kickdown	OD → D ₃	24-134 (17-83)			
		OD → D ₂	51-89 (30-55)			
		OD → D ₁	41-45 (25-28)			
	S	Fully opened (4.4 volt)	D ₃ → D ₂	81-89 (50-55)		
			D ₂ → D ₁	41-45 (25-28)		
			D ₃ → D ₁	41-45 (25-28)		
		Half throttle (1.6-2.2 volt)	D ₁ → D ₂	47-51 (29-32)		
			D ₂ → D ₂	87-95 (54-59)		
			D ₃ → OD	129-139 (80-86)		
			D ₁ → D ₂	30-34 (19-21)		
			D ₂ → D ₁	52-58 (32-36)		
			D ₃ → OD	96-104 (60-84)		
Lockup ON (OD)			96-104 (60-64)			
Lockup OFF (OD)			51-59 (30-35)			
OD → D ₂			43-51 (27-32)			
Kickdown	D ₂ → D ₁	22-28 (14-17)				
	OD → D ₃	124-134 (77-83)				
	OD → U ₂	81-99 (50-55)				
Normal	Fully opened (4.4 volt)	OD → D ₁	41-45 (25-28)			
		D ₂ → D ₂	81-89 (50-55)			
		D ₁ → D ₁	41-45 (25-28)			
		U ₂ → D ₁	41-45 (25-28)			
		S ₁ → S ₂	47-51 (29-32)			
	Half throttle (1.6-2.2 volt)	S ₂ → S ₁	87-95 (54-59)			
		S ₂ → S ₂	62-68 (39-42)			
		S ₁ → S ₁	41-45 (25-28)			
		S ₁ → S ₂	38-43 (24-27)			
		S ₂ → S ₂	66-72 (41-45)			
Normal	Fully opened (4.4 volt)	L ₁ → L ₂	47-51 (29-32)			
		L ₂ → L ₁	41-45 (25-28)			
	Half throttle (1.6-2.2 volt)	L ₁ → L ₁	38-43 (24-27)			
		U ₂ → U ₂	10-22 (11-14)			
	HOLD	D	U ₂ → U ₂	7-13 (4-8)		
			OD → OD	138-148 (85-92)		
		S	Fully closed (0.4 volt)	S ₂ → S ₂	88-96 (55-60)	
				L ₂ → L ₂	44-48 (27-30)	

1EUSK2-3



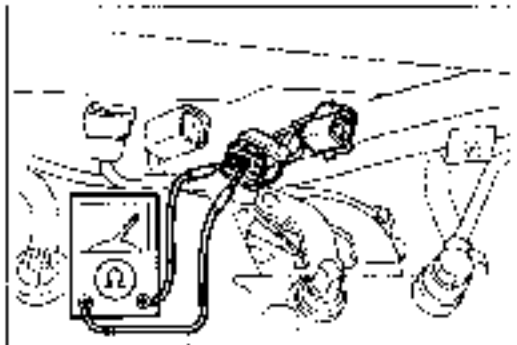
98LJ1K2-010



98LJ1K2-011



98LJ1K2-012



98LJ1K2-013

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	OV
B and ground	Vs

4. If correct, check continuity between the terminals.
5. If not correct, check the wiring harness

Continuity

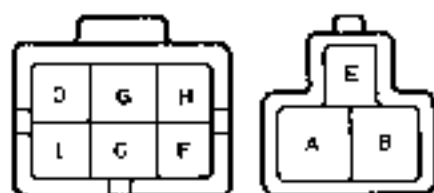
1. Check continuity of the terminals.

Continuity	Switch
Yes	Released
No	Depression

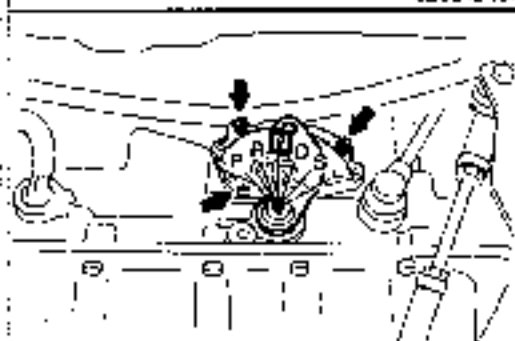
2. If not correct, replace the selector lever knob
3. If not correct, replace the change knob as an assembly.

INHIBITOR SWITCH**Inspection****Operation**

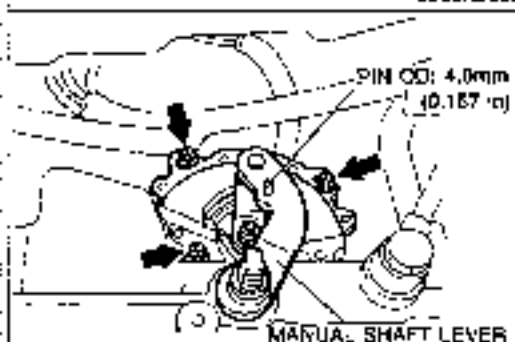
1. Check that the starter operates with the ignition switch at START position and the selector lever in P and N range only and that it does not operate in any other position.
2. Check that the back-up lights illuminate when shifted to the R range with the ignition switch in the ON position.
3. Check the inhibitor switch if it is not as specified.



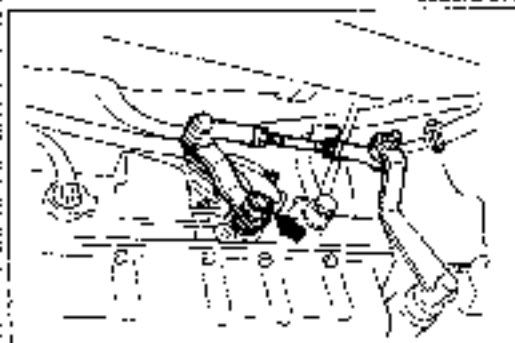
09UJ2-167



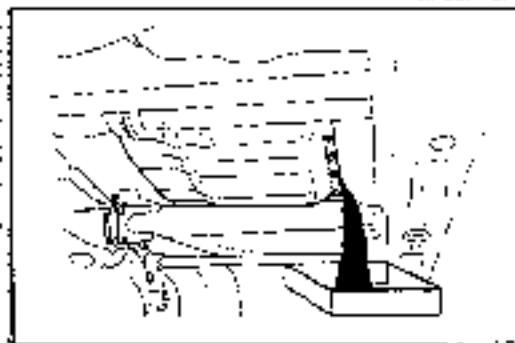
2BL0K2-039



2BL0K2-011



0VLC01-071



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	○—○		○—○			○—○			
D			○—○				○—○		
S			○—○					○—○	
L			○—○						○—○

○—○ Indicates continuity

5. If not correct, adjust the inhibitor switch.
6. If correct, check or adjust the selector lever.
(Refer to page K2-149.)

Adjustment

1. Move the manual shaft to N position.
2. Loosen the inhibitor switch mounting bolts.
3. Align the holes of the inhibitor switch and the manual shaft lever by inserting a an **approx. 4.0mm (0.157 in)** O.D. pin.
4. Tighten the mounting bolts.

Tightening torque:

2.5—3.9 N·m (25—40 cm·kg, 22—35 in·lb)

5. Recheck the continuity of the inhibitor switch.
6. If not correct, replace the inhibitor switch.

7. Connect the control linkage.

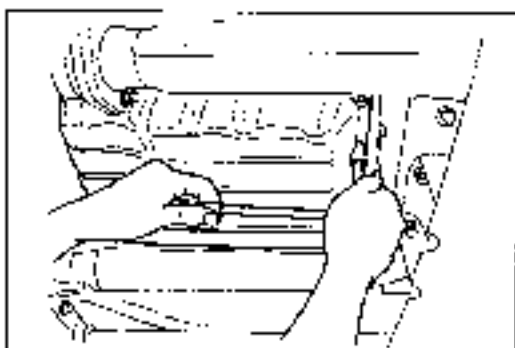
Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)

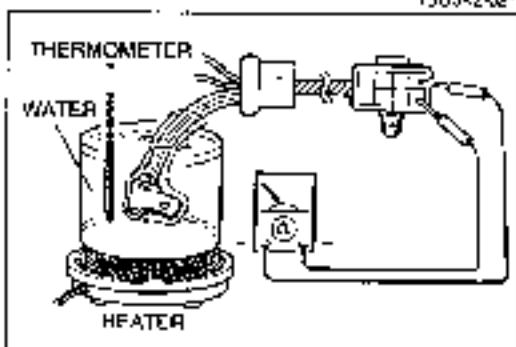
ATF THERMOSENSOR

Inspection

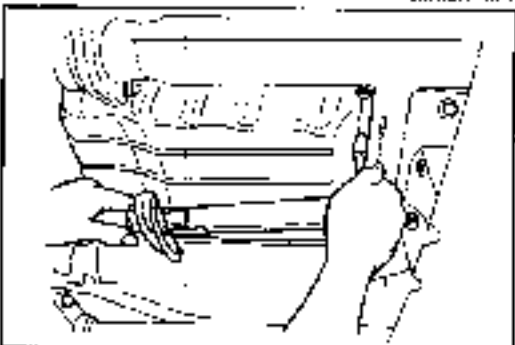
1. Jack up the vehicle and support it with safety stands.
2. Loosen the oil pan mounting bolts, and drain the ATF into a suitable container.



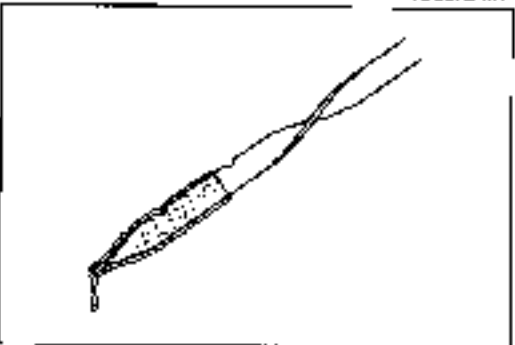
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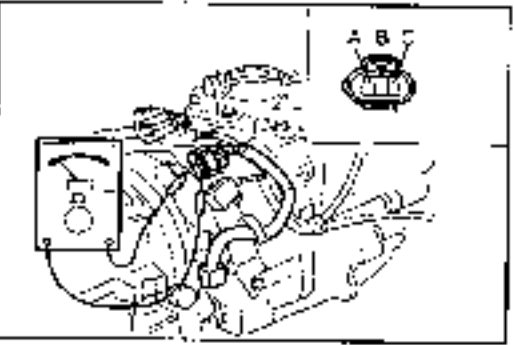
09A110K-0124



1BUCK2-092



1ELUC-02-025



09A110K-0124

3. Remove the oil pan.
4. Remove the control valve body and solenoid connector. (Refer to page K2-124.)

5. Place the ATF thermosensor in water with a thermometer as shown and heat the water gradually.
6. Measure the resistance between the terminals. If necessary, replace the ATF thermosensor.

Water temperature	Resistance
20°C (68°F)	Approx. 2.5 kΩ
80°C (176°F)	Approx. 0.3 kΩ

7. Install the solenoid connector and control valve body. (Refer to page K2-126.)
8. Install the oil pan.

Tightening torque:

4.9–7.8 N·m (50–80 cm·kg, 43–69 in·lb)

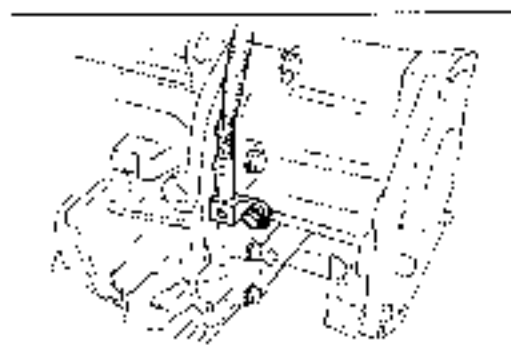
9. Pour in ATF, and with the engine idling, check the ATF level and check for leaks. (Refer to page K2-42.)

SPEED SENSOR 1

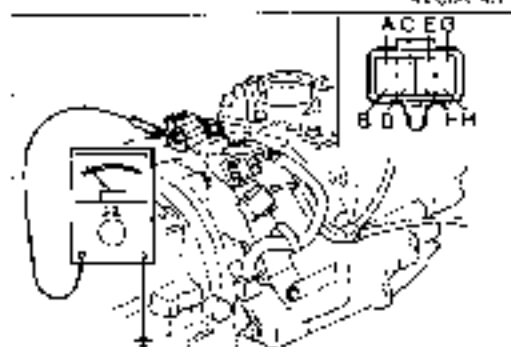
Inspection

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the connector.
3. Measure the resistance between the terminals.

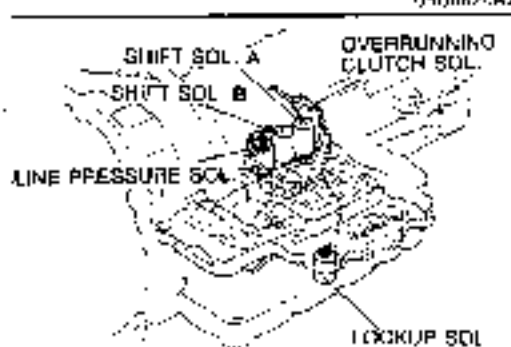
Terminal	Resistance
A and B	304–516Ω
B and C	∞
A and C	∞



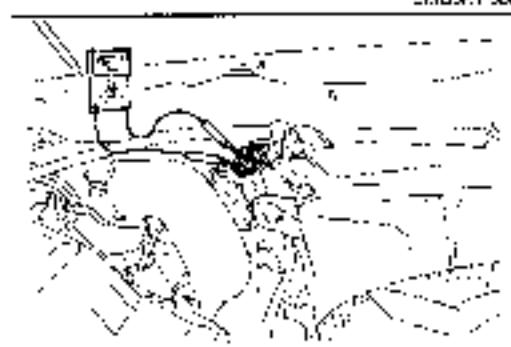
9VUJKA-479



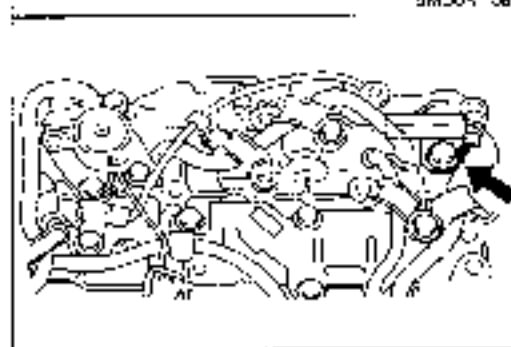
9H1JMK-342



9H1JMK-386



9H1JMK-381



13LJKA-574

4. If not correct, replace the speed sensor 1.

Tightening torque:

4.9—5.9 Nm (50—70 cm·kg, 43—61 in·lb)

SOLENOID VALVES

Inspection

1. Jack up the vehicle and support it with safety stands.
2. Disconnect the connector.
3. Measure the resistance between the terminals.

Note

a) Terminal A: ATF thermoswitch

b) Terminal G, H: ATF thermosensor

Terminal	Connected to	Resistance
B	Shift solenoid A	20—40Ω
C	Shift solenoid B	20—40Ω
D	Overrunning clutch solenoid	20—40Ω
E	Line pressure solenoid	2.5—5Ω
F	Lockup solenoid	10—20Ω

4. If not correct, replace the solenoid or assembly

Note

If shift solenoid A, shift solenoid B, overrunning clutch solenoid, or line pressure solenoid is not correct, replace as an assembly.

DROPPING RESISTOR

Inspection

1. Disconnect the dropping resistor connector.
2. Measure the resistance of the terminals

Resistance: 10—14Ω

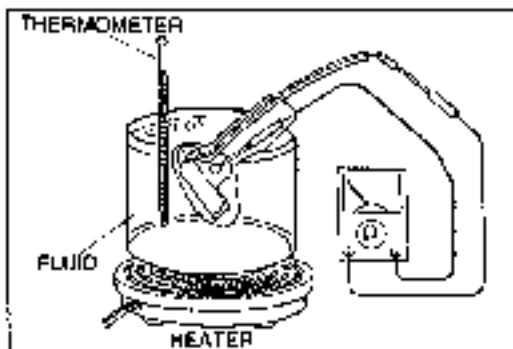
3. If not correct, replace the dropping resistor.

ATF THERMOSWITCH

Inspection

1. Drain the ATF. (Refer to ATF thermosensor inspection: page K2-36 Steps 1—3.)
2. Disconnect the connector and remove the ATF thermoswitch.
3. Place the ATF thermoswitch in fluid with a thermometer shown and heat the fluid gradually.
4. Measure the continuity between terminal and bracket.

Fluid temperature	Continuity
Above 150°C (302°F)	Yes
Below 143°C (293°F)	No

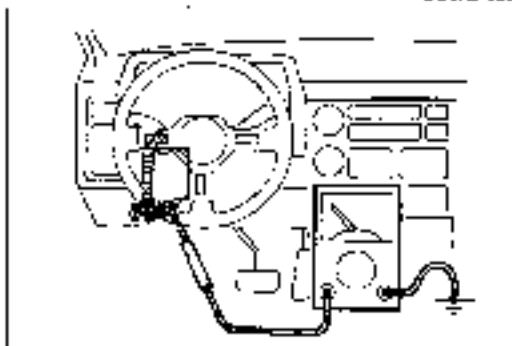


*BUCK2 025

5. If not correct, replace the ATF thermoswitch.
6. Install the ATF thermoswitch and connect the connector.

Tightening torque:**6.9—8.8 N·m (70—90 cm·kg, 51—78 in·lb)**

7. Add ATF to the correct level. (Refer to ATF thermosensor inspection: page K2-36, Steps 8, 9.)



9K2JCK1-0H7

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	1O	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

9K2JCF1-052

V_B: Battery voltage

Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	- terminal		
1A (Memory power)	Battery	1A	Ground	V _B	Constant
1B (Output)	Shift solenoid B	1B		V _B	Solenoid ON in following condition • 1st and 2nd gear positions
1C	—	—		0V	Solenoid OFF in following condition • 3rd and OD gear positions
1D (Output)	Shift solenoid A	1D	Ground	V _B	Solenoid ON in following condition • 1st and OD gear positions
1E (Input)	Inhibitor switch (R range)	1E		0V	Solenoid OFF in following condition • 2nd and 3rd gear positions
1F (Output)	Line pressure solenoid	1F		V _B	R range
				0V	Other ranges
				1.7—4.5V	Accelerator pedal depressed (After ATF warm, engine stopped)
				Below 1.5V	Accelerator pedal fully released (After ATF warm, engine stopped)
1G (Input)	Engine rpm sensor*	1G		Above 1V (AC)	Engine running
				Below 0.5V (AC)	Engine stopped
1H (Output)	Drooping resistor	1H		V _B	Accelerator pedal fully released (After ATF warm, engine stopped)
				Below 1.5V	Accelerator pedal depressed (After ATF warm, engine stopped)
1I (Input)	Speed sensor 2	1I		Approx. 2—3V	While driving
				0V or 4.5—5.5V	Vehicle stopped
1J (Ground)	—	1J		0V	Constant
1K (Output)	Hold indicator	1K		V _B	Power or Economy mode
				0V	Hold mode
1L (Ground)	—	1L		0V	Constant
1M (Output)	Lockup solenoid	1M	2L	V _B	Solenoid ON, Lockup
				Below 1.5V	Solenoid OFF, Non-lockup
1N (Battery power)	Battery	1N		V _B	Ignition switch ON
				0V	Ignition switch OFF
1O (Output)	Overrunning clutch solenoid	1O		V _B	Solenoid ON in following condition • D range (Engine stopped)
				0V	Solenoid OFF in following condition • Except D range (Engine stopped)
1P (Battery power)	Battery	1P		V _B	Ignition switch ON
				0V	Ignition switch OFF
2A (Input)	Throttle sensor	2A		4.5—5.5V	Ignition switch ON
				0V	Ignition switch OFF
2B (Input)	Inhibitor switch (D range)	2B	Ground	V _B	D range
				0V	Other ranges
2C	—	—	Ground	V _B	Except P or N ranges
2D (Input)	Inhibitor switch (N and P ranges)	2D		0V	P or N range
				Below 7V	P or N range and engine crank

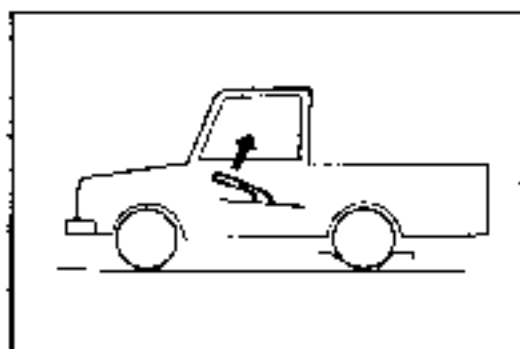
* Checked with AC range

Vb: Battery voltage

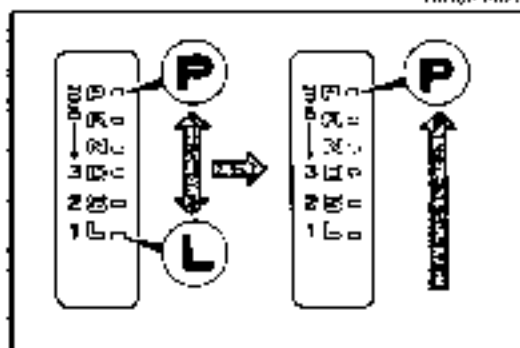
Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	- terminal		
2F (Input)	Cruise control unit	2E	Ground	Above 6V	Normal condition
2F	—	—	—	Below +1.5V	Set or Resume switch ON or vehicle speed 8 km/h (5 mph) lower than preset speed (Driving vehicle cruise control operation)
2G	Engine control unit	2G	Ground	Above 6V	Normal condition
2H	—	—	—	Below +5V	Atmospheric pressure below 679 mm Hg (26.73 inHg) which is approximately at 1 500 m (4 921 ft)
2I (Input)	Hold switch	2I	Ground	Above 6V	Switch released
				0V	Switch depressed
2J (Input)	Speed sensor	2J		Above +V (AC)	Vehicle speed above 25 km/h (16 mph)
				Approx. 0V (AC)	Vehicle stopped
2K (Input)	EC-AT check connector	2K		Above 6V	Normal
2L (Ground)	Ground (For sensors)	2L		0V	Check connector grounded
2M (Input)	Idle switch	2M		0V	Constant
				Vb	Idle switch OFF (Throttle valve open)
				0V	Idle switch ON (Throttle valve fully closed)
				Vb	Normal (With EC-AT tester)
2N (Output)	EC-AT tester (Malfunction code)	2N		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)
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

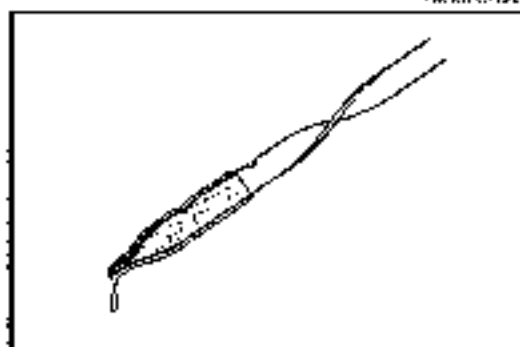
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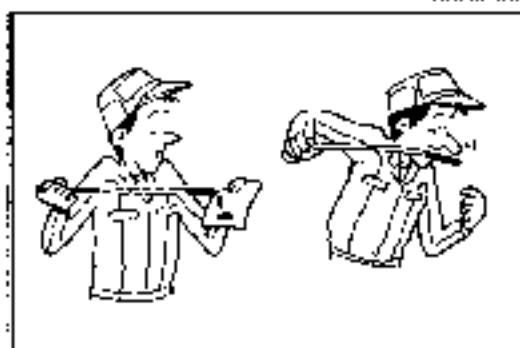
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-R1062-010



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[®] II or M-III

Condition

1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

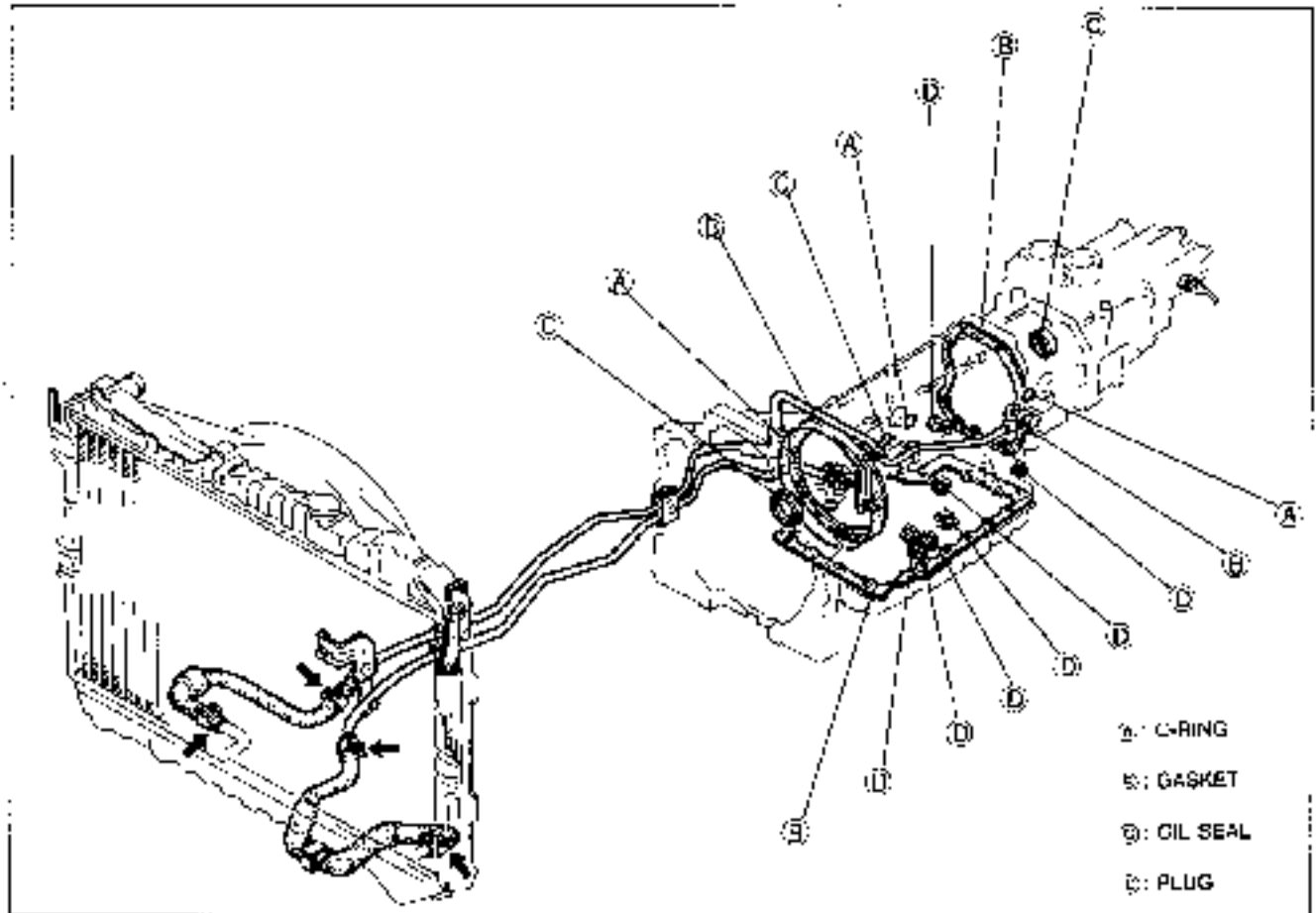
Note

- a) Determine whether or not the automatic transmission should be disassembled by observing the condition of the ATF carefully.
- b) If the ATF is muddy and varnished, it indicates burned drive plates.

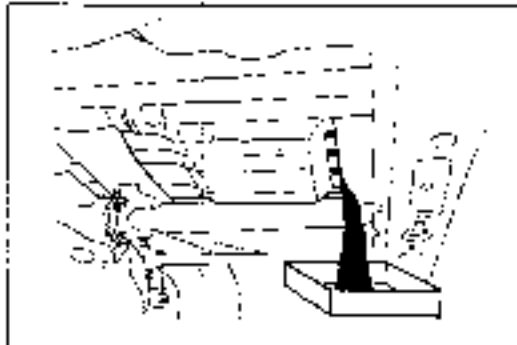
Fluid leaks

Check for fluid leaks of the transmission as shown below, repair or replace if necessary.

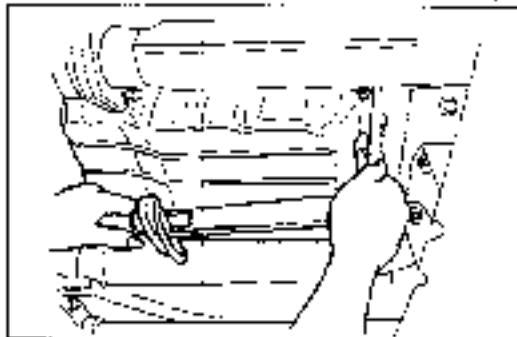
1. Gaskets, O-rings, and plugs
2. Oil hoses and oil pipes, and connections
3. Oil cooler(s)



SM1001-067



23113-2-3-4



PB-2002-010

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

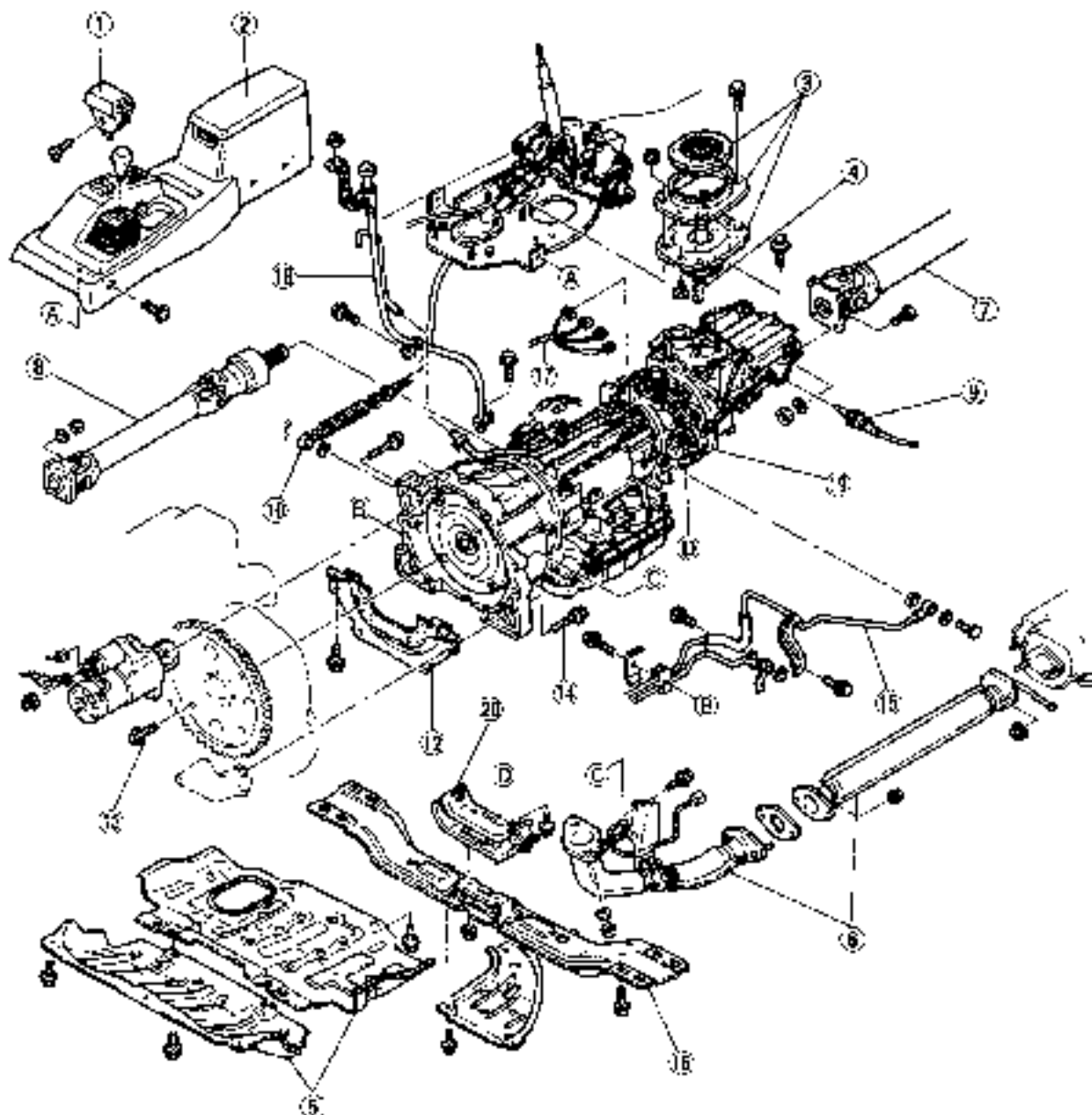
TRANSMISSION UNIT (REMOVAL)

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

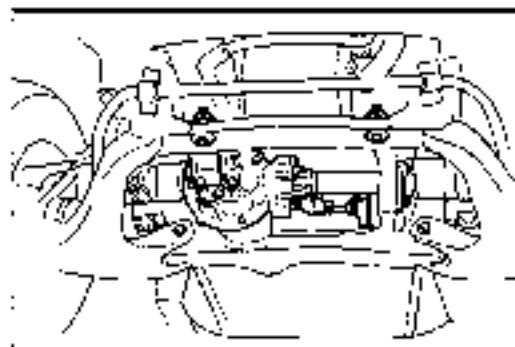
Do not turn the transmission over before removing the oil pan.

4. After removal, remove the oil pan to check condition of the transmission



1. Selector knob	12. Under cover
2. Console box	13. Torque converter installation bolt
3. Insulator plate and boot	Removal Note. page K2-46
4. 4x4 shift lever	14. Transmission installation bolt
5. Under cover	15. O' pipe connector and bracket
6. Exhaust pipe	16. Cross member
7. Rear propeller shaft	Removal Note. page K2-46
Service. Section L	17. Connectors
8. Front propeller shaft	18. Oil level gauge and pipe
Service. Section L	19. Automatic transmission
9. Speedometer cable	20. Transmission mount
10. Selector cable	
11. No.2 cross member	
Removal Note. page K2-46	

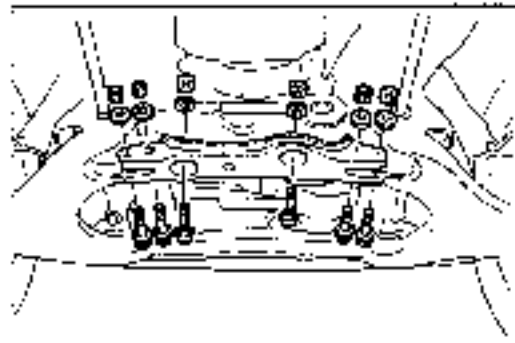
28JOK2017



08UUK2-050

Removal note No.2 cross member

1. Loosen the differential mounting bolts.



08UUK2-061

2. Remove the cross member.

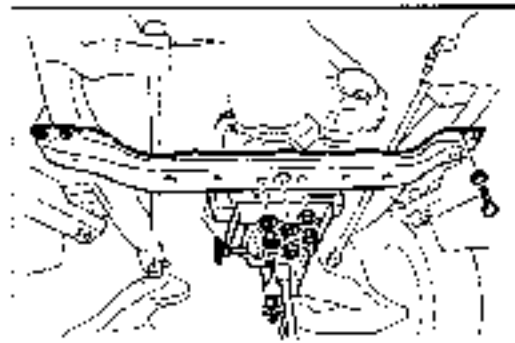


08UUK2-062

Torque converter installation bolts

1. Hold the drive plate with the screwdriver.

2. Remove the torque converter installation bolts.



08UUK2-054

Cross member

1. Support the transmission with the transmission jack.

2. Remove the cross member.

TRANSMISSION UNIT (DISASSEMBLY)

Preparation

SST

49 0107 600A Engine stand 	49 UD19 0A04 Transmission hanger 	49 H075 405B Body (Part of 49 UD19 0A04) 
49 0019 003 Holder (Part of 49 UD19 0A04) 	49 0070 090 Pulley oil pump 	78J0K2 015

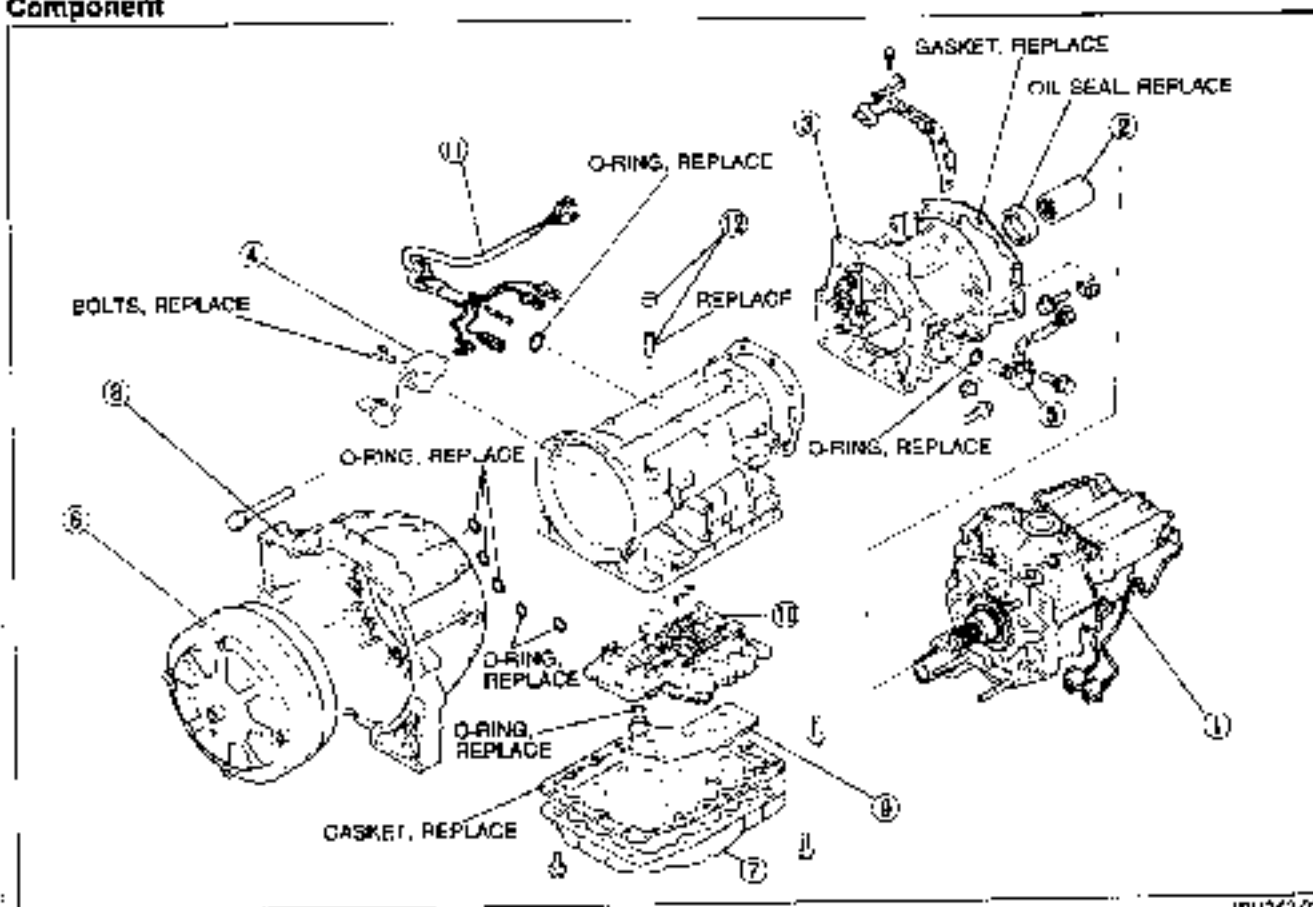
Precaution**General Notes:**

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

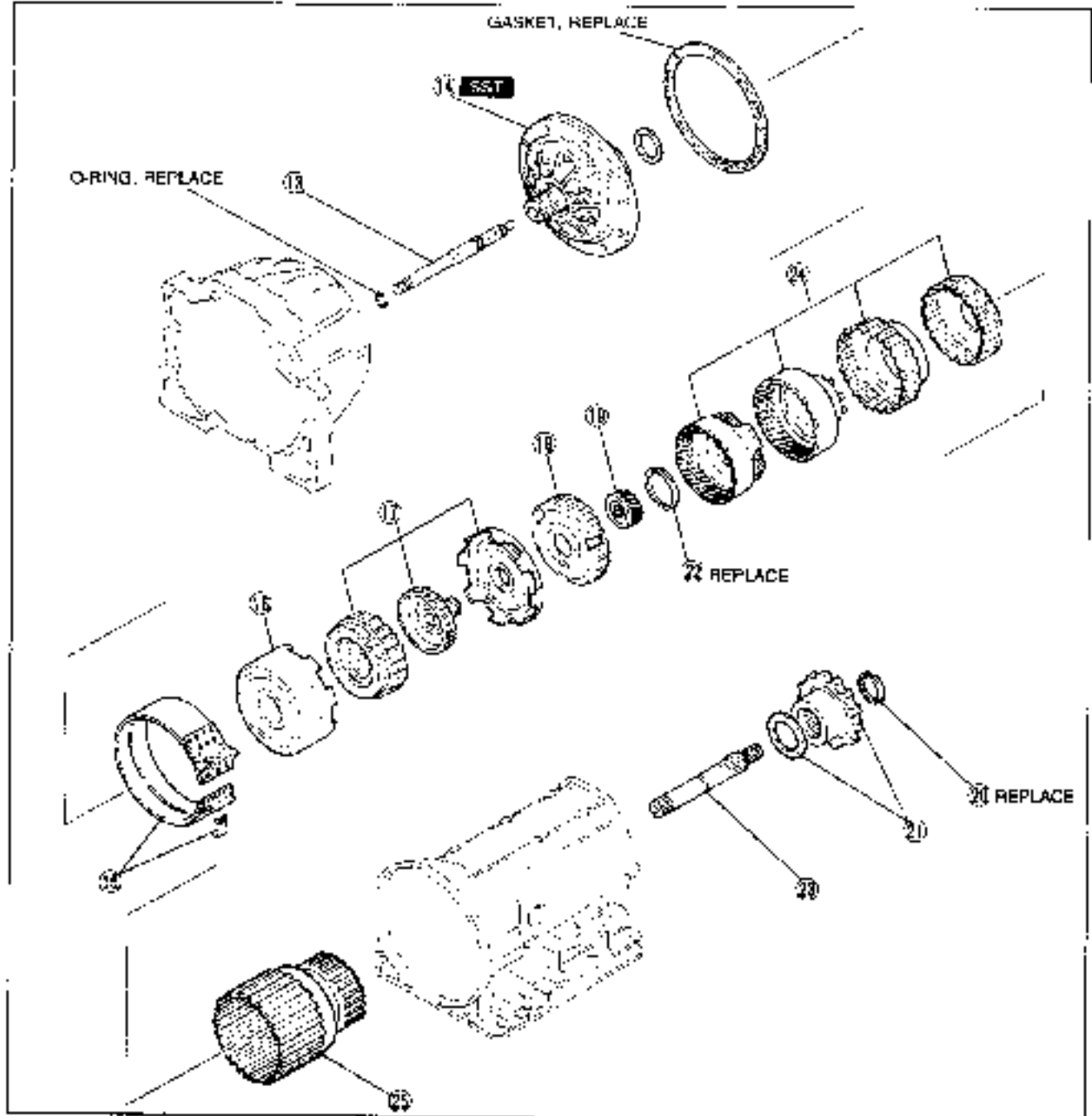
18U342-031

1. Transfer case
2. Input sleeve
3. Adaptor case
Disassembly and Inspection page K2- 99
Assembly page K2-100
4. Inhibitor switch
Inspection ... page K2- 36
Adjustment ... page K2- 36

5. Speed sensor 1
Inspection page K2-38
6. Torque converter
Inspection page K2-58
7. Oil pan
8. Converter housing
9. Oil strainer

10. Control valve body
Disassembly and Inspection page K2-105
Assembly page K2-123
11. Solenoid valve connectors
12. Anchor end bolt and nut

Components (cont'd)

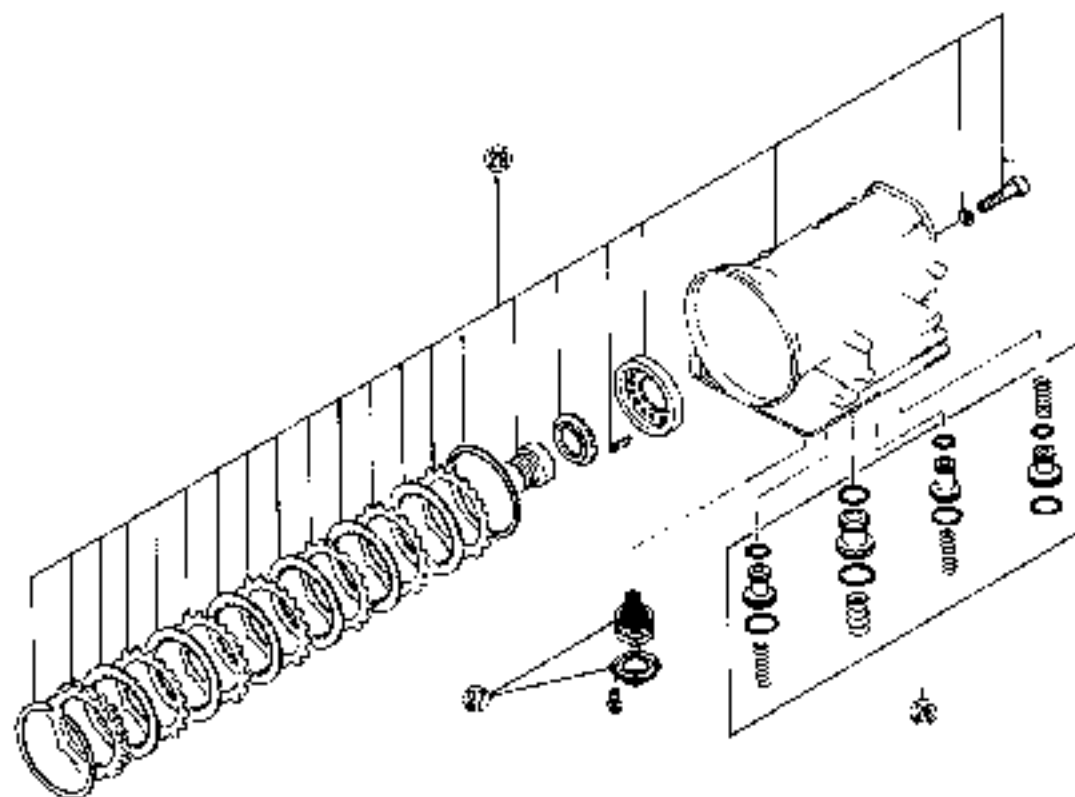


191042402

13. Input shaft
 14. Oil pump
 Disassembly and Inspection page K2-61
 Assembly page K2-63
 15. Brake band and strut
 16. Reverse clutch
 Disassembly and Inspection page K2-66
 Assembly page K2-68
 17. High clutch and front sun gear
 Disassembly and Inspection page K2-72
 Assembly page K2-74
 18. Front planetary carrier
 19. Rear sun gear

20. Snap ring
 21. Parking gear and bearing
 22. Snap ring
 23. Output shaft
 24. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
 Disassembly and Inspection page K2-82
 Assembly page K2-83
 25. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)
 Disassembly and Inspection page K2-86
 Assembly page K2-88

Components (cont'd)

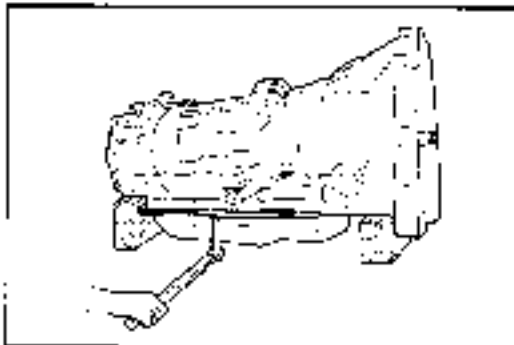


26. Accumulator spring and piston
 Disassembly and Inspection page K2-59
 Assembly page K2-60

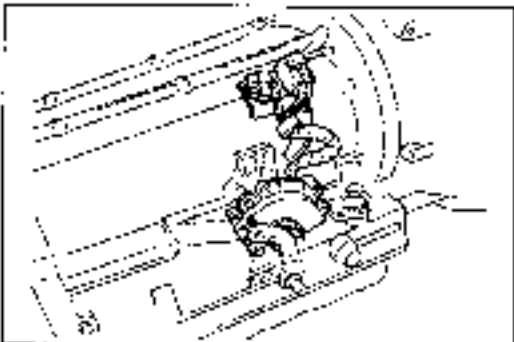
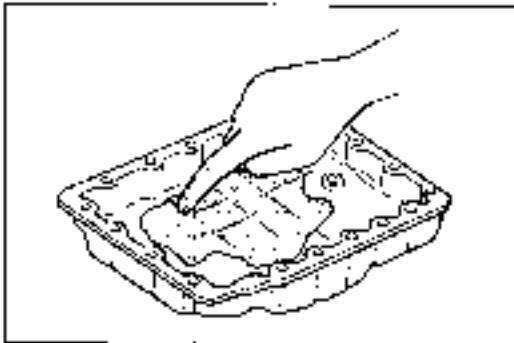
27. Sand servo
 Disassembly and Inspection page K2-76
 Assembly page K2-79

28. Low and reverse brake piston and spring
 Disassembly and Inspection page K2-95
 Assembly page K2-96

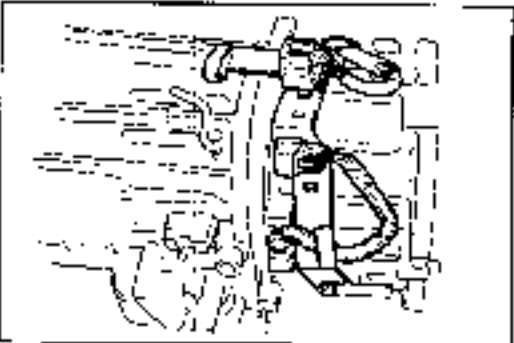
R1002-033



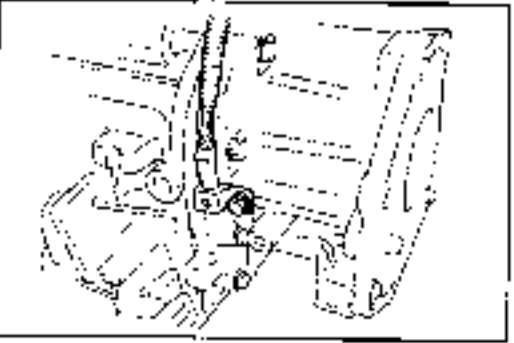
18JJK2-065



J9UJK2-055



J9UJK2-061



J9UJK2-061

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.

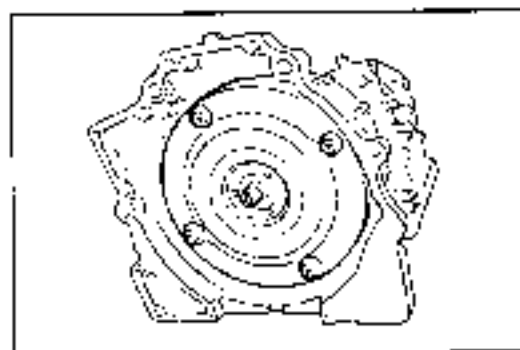
- 5 Remove the connector bracket from the transmission case.
- 6 Remove the inhibitor switch.

- 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.

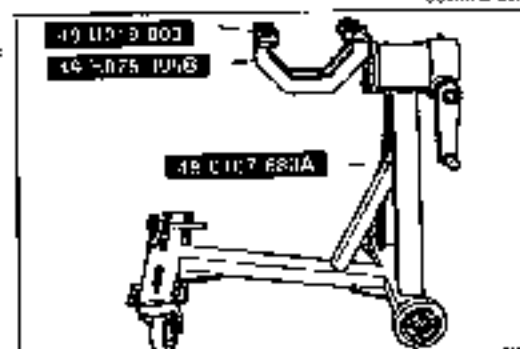


09BU0K2-007

Note

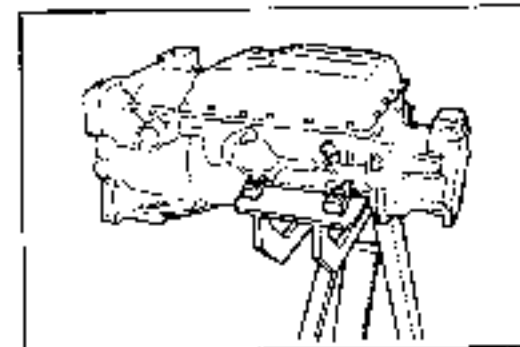
Be careful not to spill the ATF when removing the torque converter.

11. Remove the torque converter



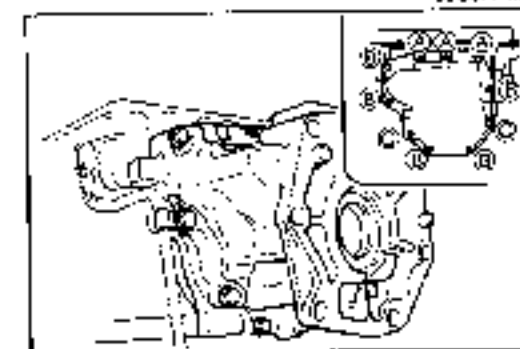
09BU0K2-063

12. Assemble the **SST** as shown.



09BU0K2-064

13. Mount the transmission to the **SST**.
14. Remove the oil pan.



09BU0K2-065

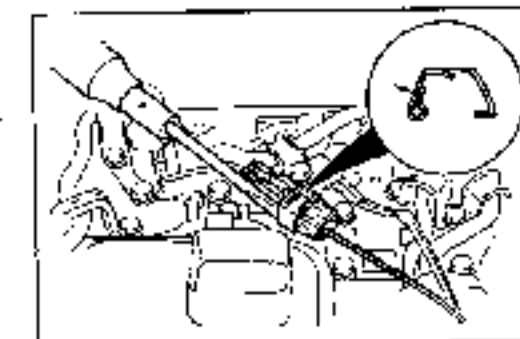
15. Remove the adapter case and gasket.

Bolt length (Measured from below the head)

- (A): 30mm (1.181 in)
- (B): 45mm (1.772 in)
- (C): 50mm (1.969 in)

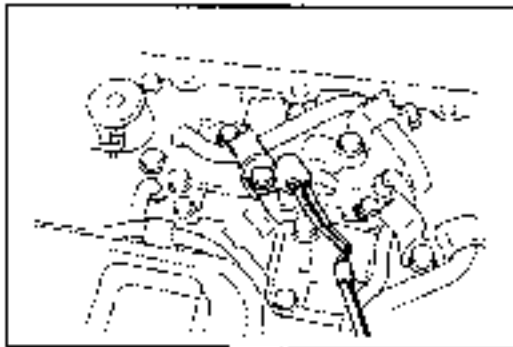
Caution

Do not damage the harness or connector.



10PR0K2-066

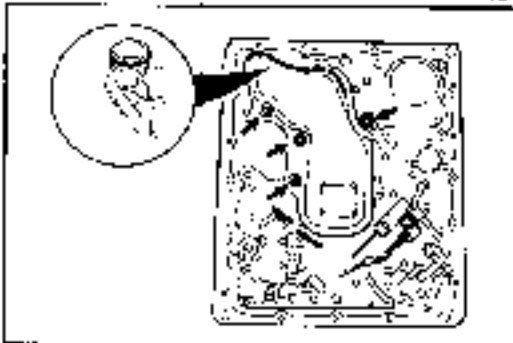
16. Remove the clip.
17. Disconnect the lock-up solenoid connector.



2B-DKCA-02

18. Disconnect the ATF thermosensor.

Bolt length (Measured from below the head):
45mm (1.772 in)



RRJ-CE2-008

19. Remove the oil strainer.

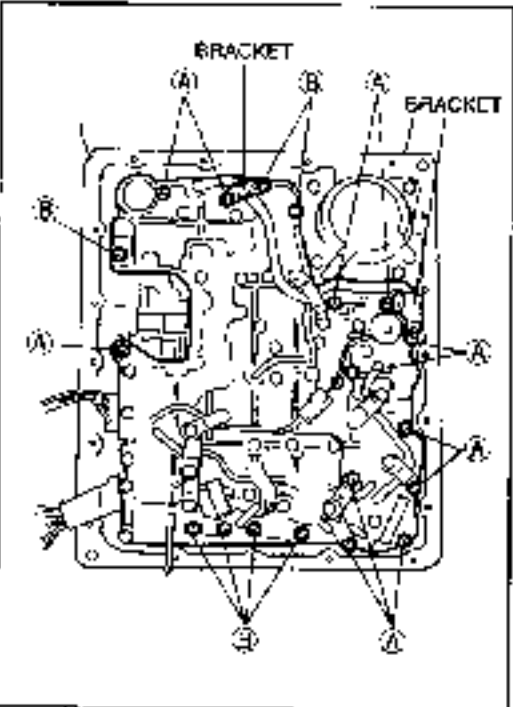
Bolt length (Measured from below the head):
50mm (1.969 in)

20. Remove the O ring from the oil strainer.



CBLOK2-069

21. Separate the aileroid harness from the harness clip.



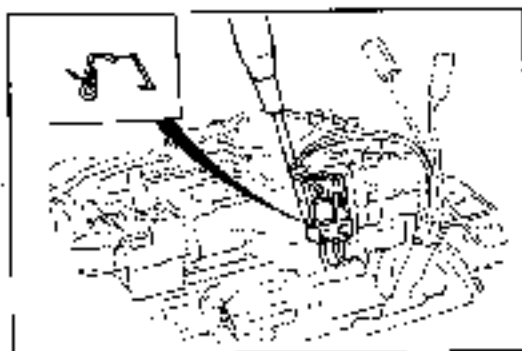
1-BUOK2-035

22. Remove the bolts (A) and (B), and brackets shown in the figure.

Bolt length (Measured from below the head)

(A): 33mm (1.299 in)

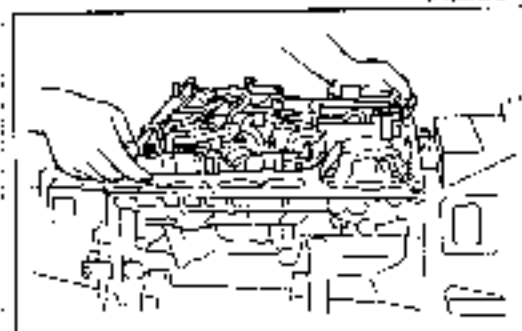
(B): 45mm (1.772 in)



05L0K2-071

Caution**Do not damage the harness or connector.**

- 23 Remove the clip.
- 24 Disconnect the solenoid connectors.



05UEK2-072

Caution**Do not remove the control valve body unless you also remove the oil pipes.**

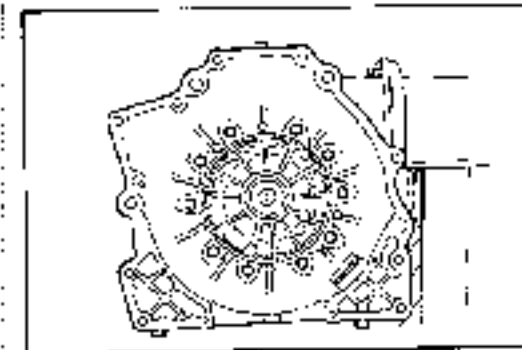
- 25 Remove the control valve body.



05L0K2-073

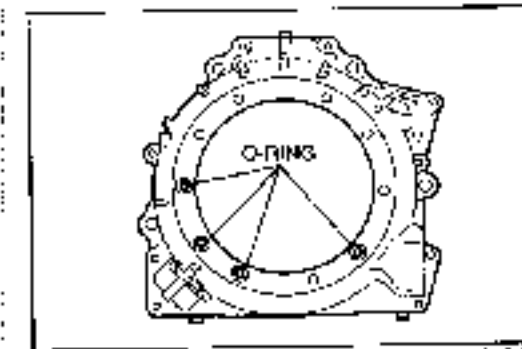
Caution**Do not damage the solenoid connector.**

- 26 Remove the solenoid connector from the transmission case.
- 27 Remove the O-ring from the solenoid connector.



05UEK2-074

- 28 Remove the converter housing from the transmission case.



05J0K2-075

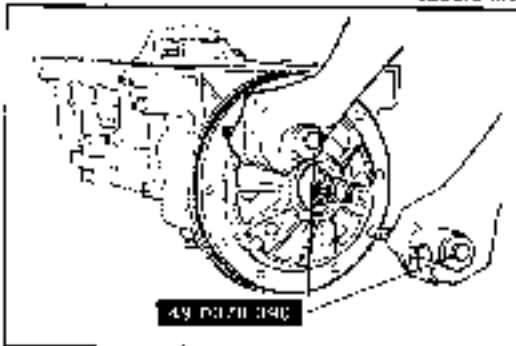
- 29 Remove the O-rings from the converter housing.

Caution**Do not damage the converter housing.**

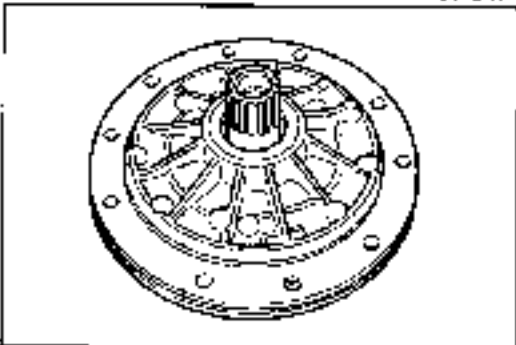
- 30 Clean the sealing compound from the converter housing.



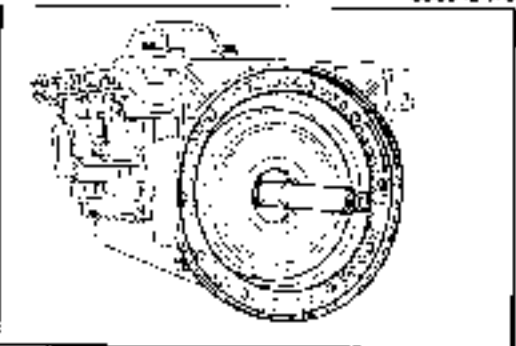
08U0K2-076



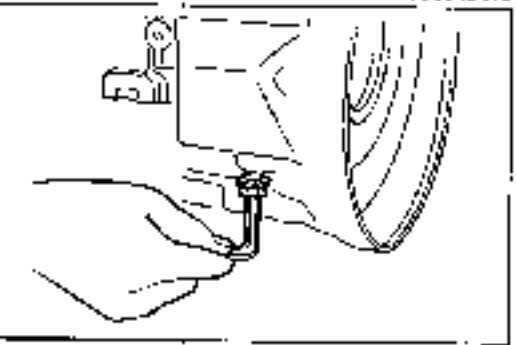
08U0K2-077



08U0K2-078



08U0K2-079



08L0K2-080

Procedure

Caution

Keep the transmission oil-pan down so that any foreign material will remain in the pan.

1. Remove the transfer case. (Refer to Section J2.)
2. Place the transmission on wooden blocks under the converter housing and the extension housing.
3. Remove the oil pan and gasket.
Examine any material found in the pan or on the magnet to determine the condition of the transmission.
Clutch facing material Drive plate and brake band wear
Steel (magnet)..... Bearing, gear, and driven plate wear
Aluminum (nonmagnetic)... Bushings or cast aluminum parts wear
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.

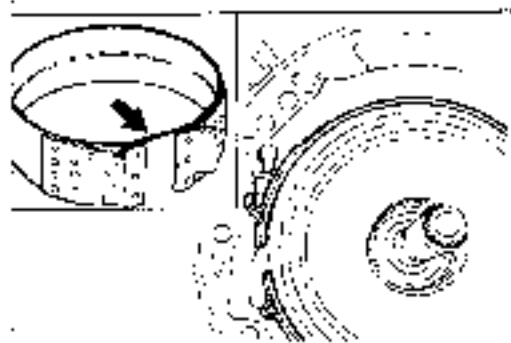
5. Remove the connector bracket from the transmission case.
6. Remove the inhibitor switch.

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.

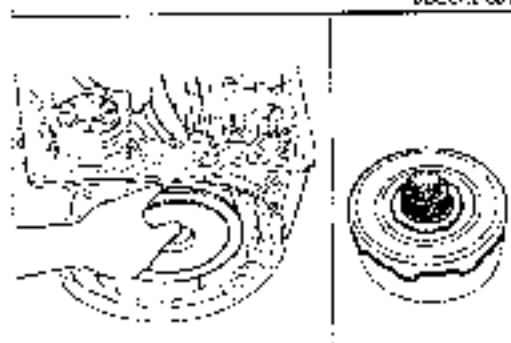


DBLCK2-081

Caution

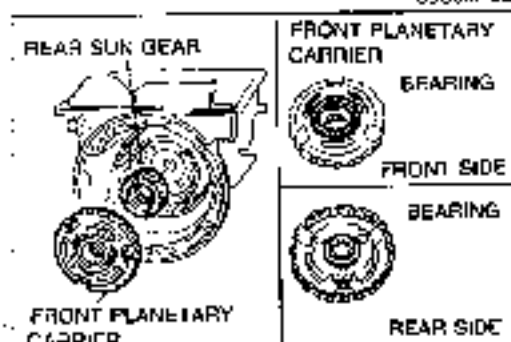
To prevent the brake facing from cracking or peeling, do not stretch the brake band. Secure it with a wire clip.

40. Remove the brake band and the band strut.



03J0362-052

41. Remove the reverse clutch, high clutch, and the front sun gear from the transmission case as an assembly.



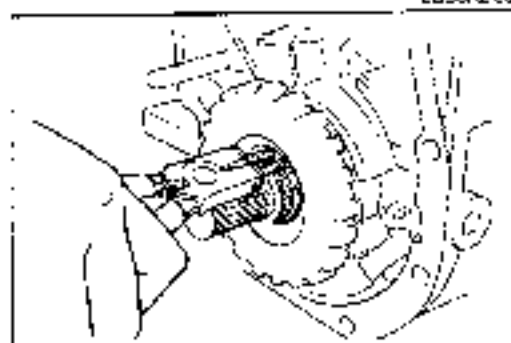
CEJCK2-083

42. Remove the front planetary carrier, bearings, and the rear sun gear.

Inspect the following parts, and repair or replace as necessary.

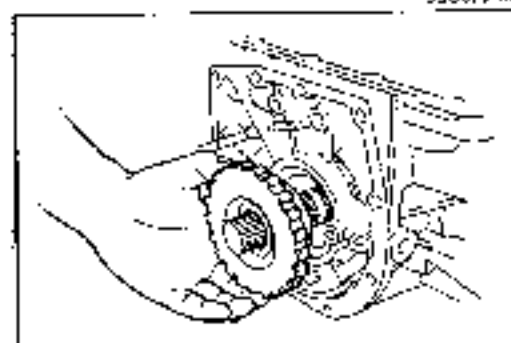
- 1) Front planetary carrier
Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears
- 2) Rear sun gear
Inspect individual gear teeth for damage, wear, or cracks
- 3) Bearing
Inspect for damage or rough rotation

43. Remove the snap ring (rear) from the output shaft.

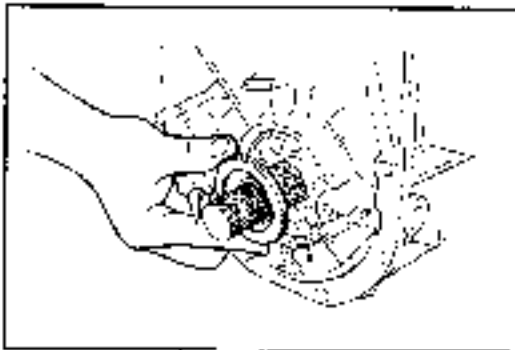


08U02-084

44. Remove the parking gear.

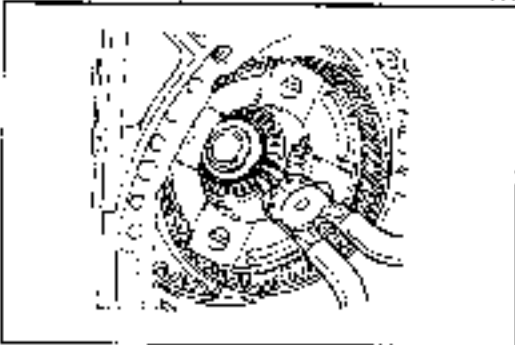


08U02-085



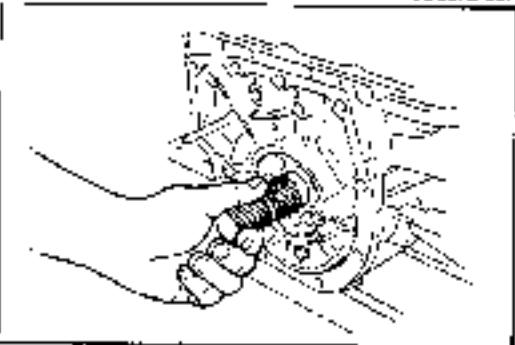
0FLXK2-086

45. Remove the bearing behind the transmission case.



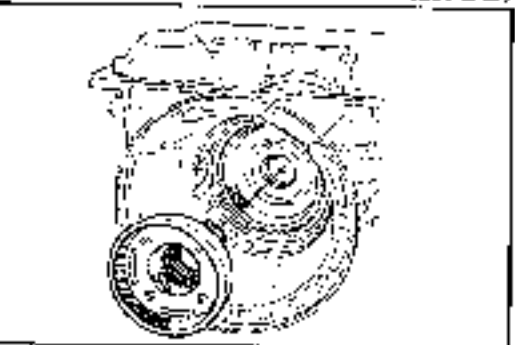
0BLCR2-087

46. While pushing the output shaft forward slightly, and remove the snap ring (front) from the output shaft.



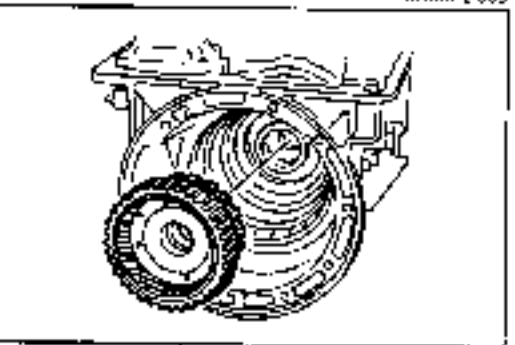
0BLD-02-089

47. Pull out the output shaft.



0FLXK2-089

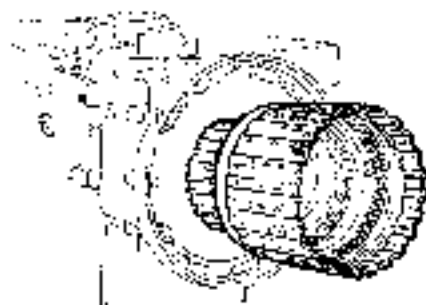
48. Remove the front internal gear (with rear planetary carrier).



0BJD-02-090

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.

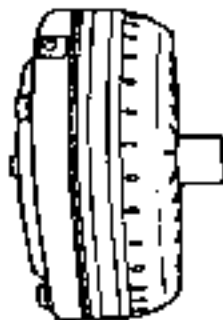


S60002-09

TORQUE CONVERTER

Inspection

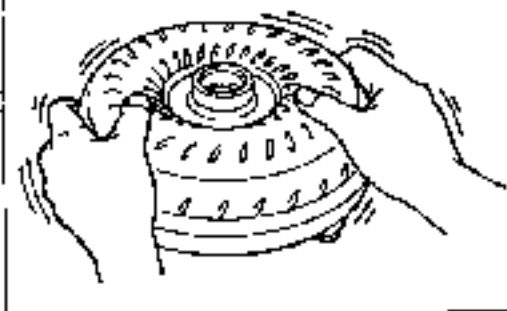
1. Check the outside of the converter for damage and cracks, and replace the torque converter if there is any problem.
2. Check for rust on the pilot hub on the boss, and remove it completely if there is any.



S60006-133

Washing inside the converter

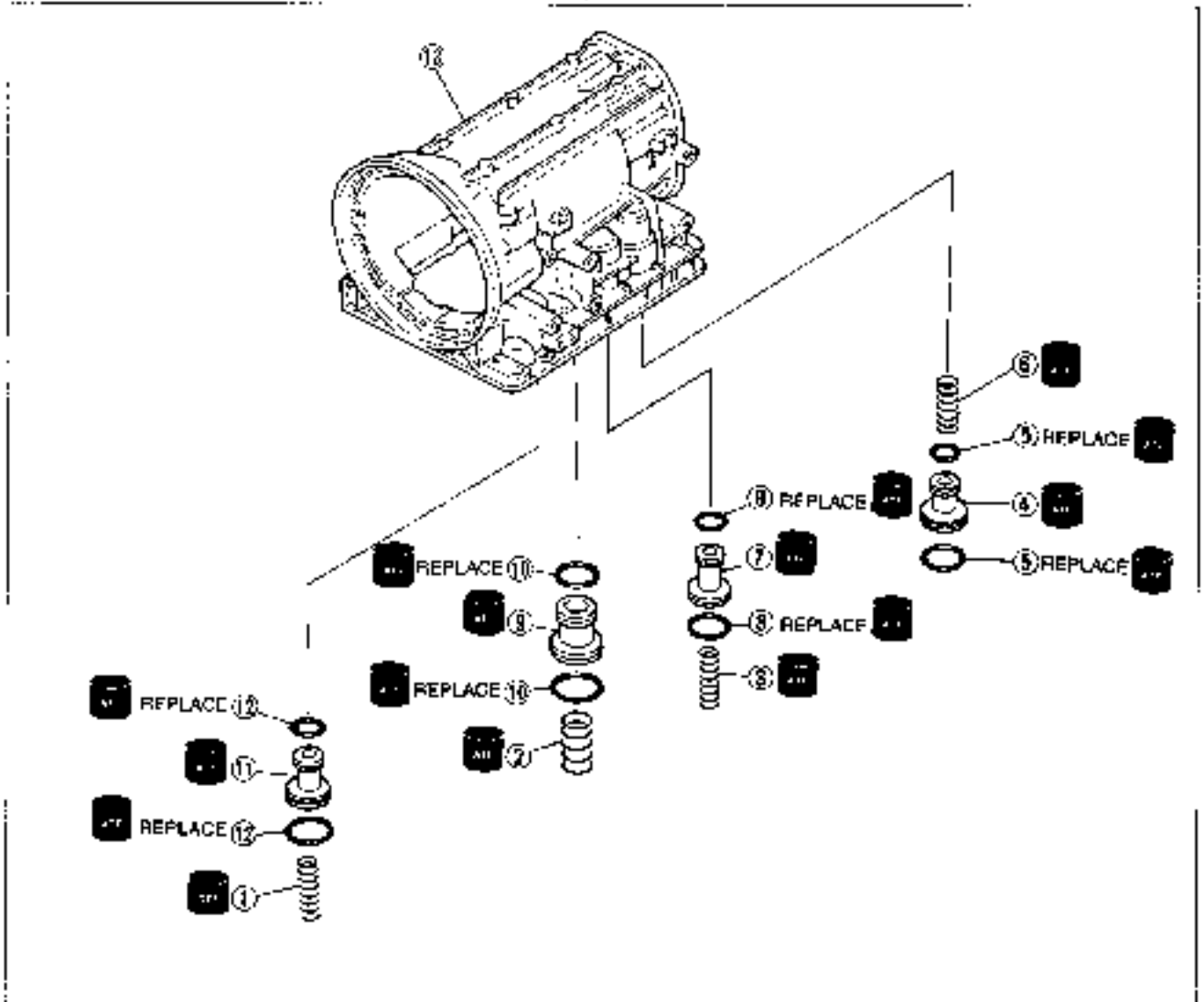
1. Drain any ATF remaining in the converter.
2. Pour in solvent (0.5 liter, 0.5 US qt, 0.4 Imp qt).
3. Shake the converter to clean the inside. Pour out the solvent.
4. Pour in ATF.
5. Shake the converter to clean the inside. Pour out the ATF.



S60006-135

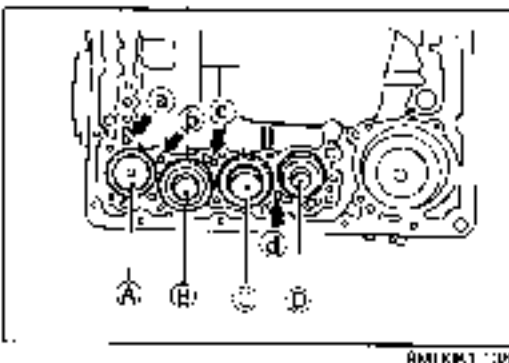
ACCUMULATORS**Disassembly and Inspection**

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 Inspection page K2-60	4. N-D accumulator piston	9. 1-2 accumulator piston
2. 1-2 accumulator spring Inspection page K2-60	5. O-rings	10. O-rings
3. 2-3 accumulator spring Inspection page K2-60	6. N-D accumulator spring 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

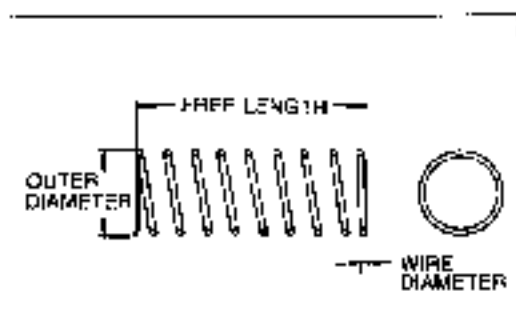


AM1K1-135

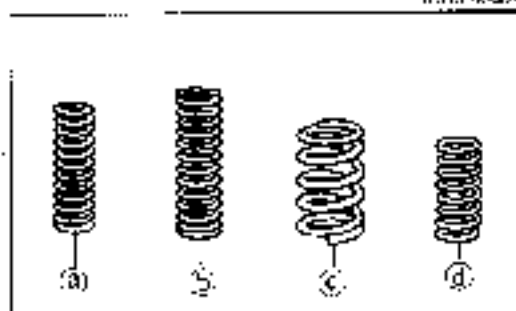
Disassembly note**Accumulator piston**

Remove the accumulator pistons, and springs from transmission case by applying compressed air through the oil passage as shown in the figure.

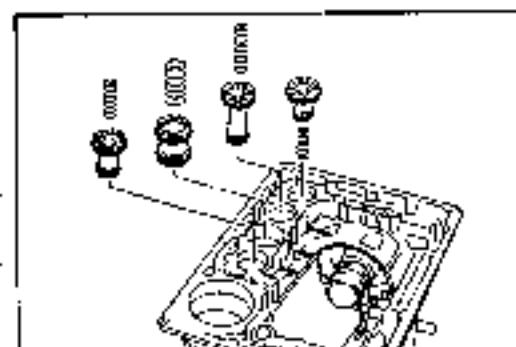
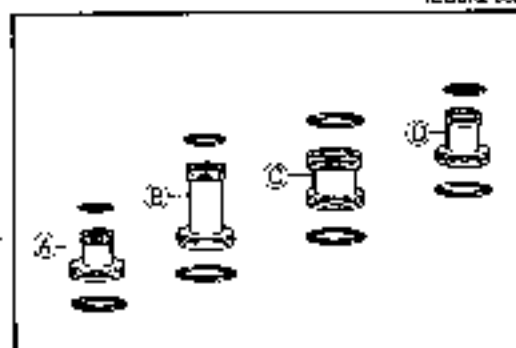
Accumulator	Item	Location	Oil passage
N-D accumulator		A	a
2-3 accumulator		B	b
1-2 accumulator		C	c
3-4/N-R accumulators		D	d



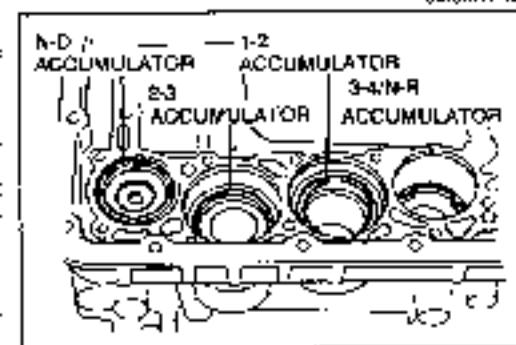
1BUDK2-037



1BUDK2-038



34UDK1-132



34UDK1-142

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)	56.4 (2.220)	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 mm (in)	Small mm (in)	Large mm (in)	Small mm (in)
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

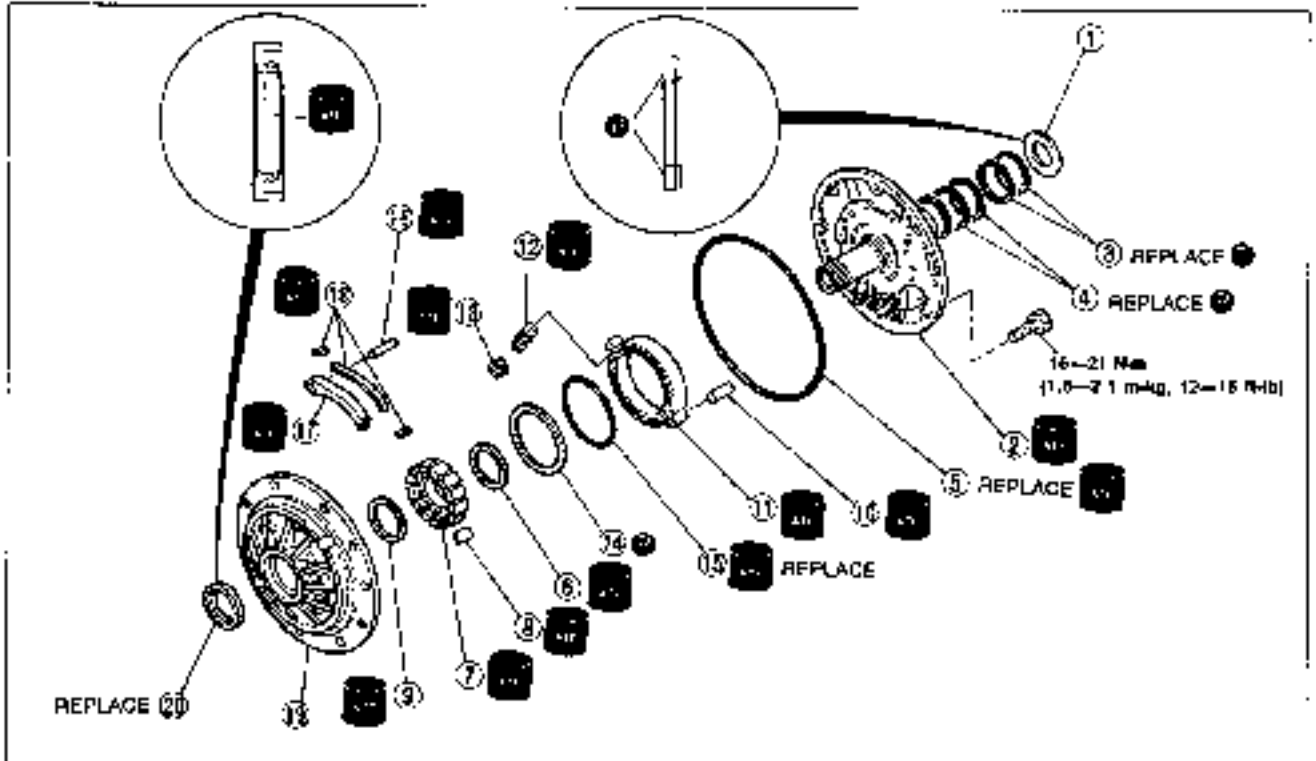
49 G030 795 Installer, or SST		49 G03C 796 Belly (Parts of 49 G030 795)		49 G03C 797 Handle (Parts of 49 G03C 795)	

SM1134-086

Disassembly and Inspection

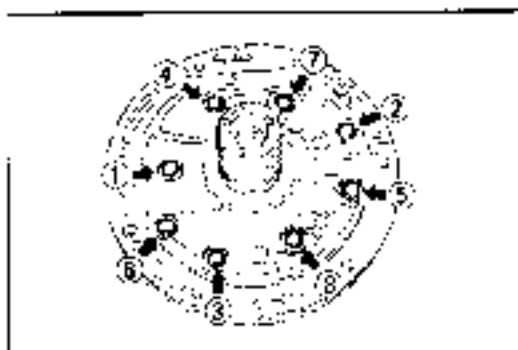
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.

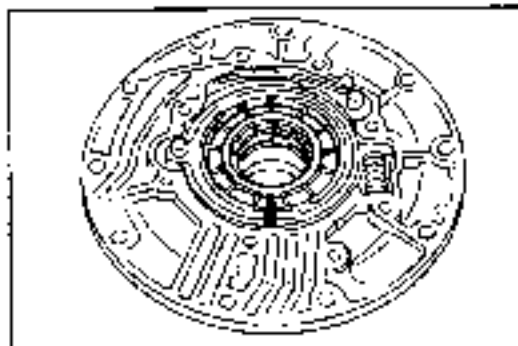


DCK2-109

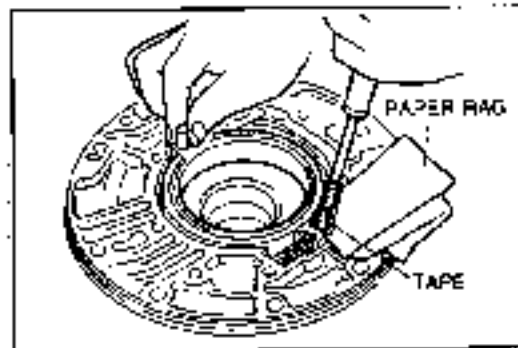
1. Bearing Inspect for damage or rough rotation	11. Cam ring Disassembly Note page K2-62 Inspection..... page K2-63
2. Oil pump cover Disassembly Note page K2-62 Inspection..... page K2-62	12. Spring Inspection..... page K2-63
3. Seal ring (small diameter)	13. Spring seal
4. Seal ring (large diameter)	14. Friction ring
5. Seal ring	15. O-Ring
6. Vane ring	16. Pivot pin
7. Rotor Disassembly Note page K2-62 Inspection page K2-63	17. Control piston Inspection page K2-63
8. Vane Inspection..... page K2-63	18. Side seal
9. Vane ring	19. Oil pump housing Inspection..... page K2-63
10. Pivot pin Disassembly Note page K2-62	20. Oil seal



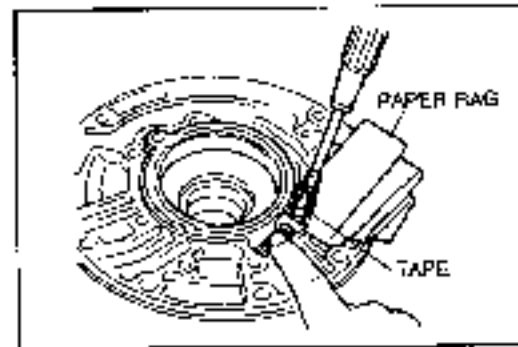
BOLT 1-12



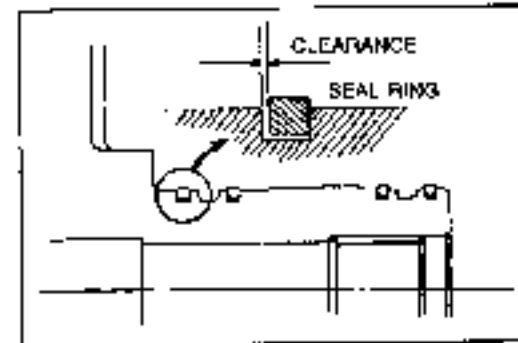
BOLT 1-13



SMUTIK-116



SMUTIK-115



SMUTIK-117

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.

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.

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.

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

Inspection**Oil pump cover**

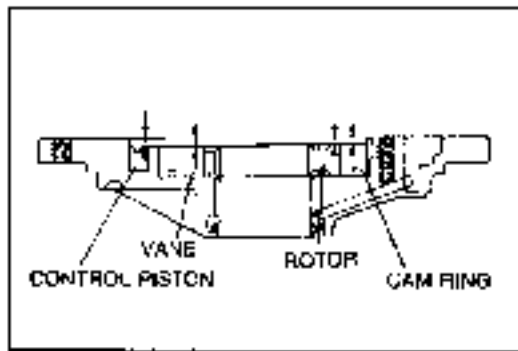
1. Apply petroleum jelly to new seal ring
2. Measure the clearance between the seal ring and the ring groove

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.



SMK K2-136

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.

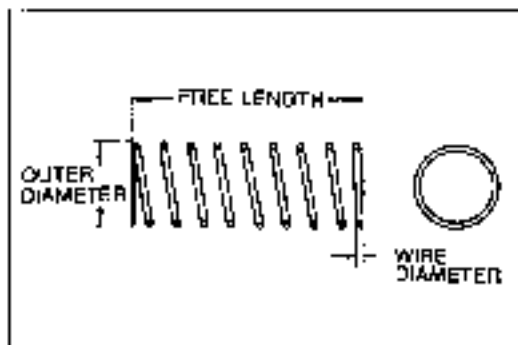
1. Install the cam ring vanes, rotor and control piston.
2. Measure the clearance between the end of the oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences.

Clearance

mm (in)

Part	Clearance	Standard	Maximum
Cam ring		0.010—0.024 (0.0004—0.009)	0.030 (0.0012)
Rotor, vane, control piston		0.030—0.044 (0.0012—0.0017)	0.050 (0.0020)

3. If not within specification, replace the oil pump as an assembly.



FMUK K2-457

Cam ring spring

1. Measure the spring specification.

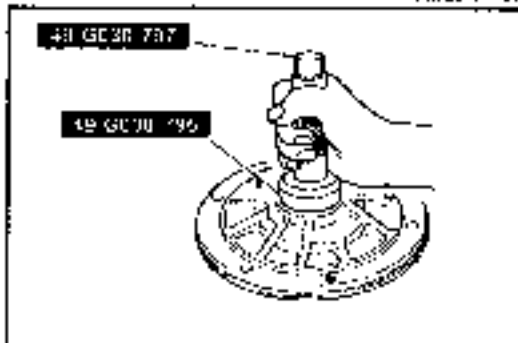
Specification

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)

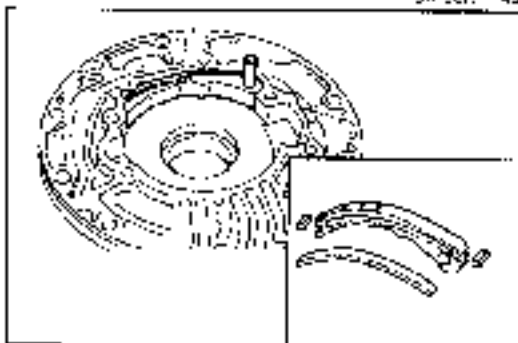
2. If not correct, replace the cam ring spring.

Assembly

1. Apply ATF to the new oil seal. Install the oil seal with the SST

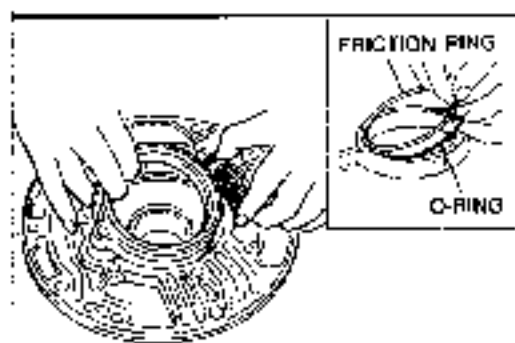


SMK K2-145

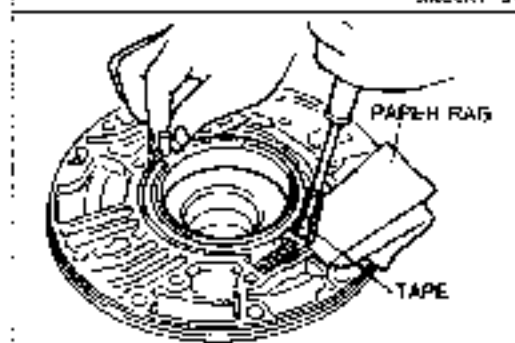


SMK K2-146

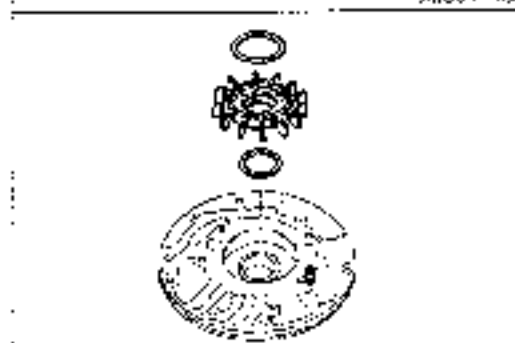
2. Apply ATF to side seal, and install them on the control piston with the black surface facing toward the control piston.
3. Install the control piston and pivot pin.



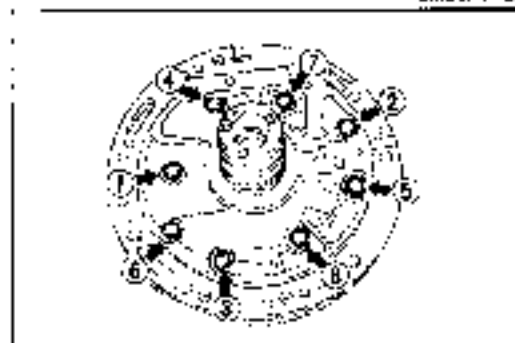
SMUCK1-151



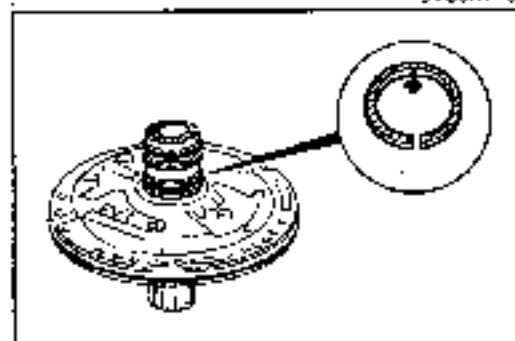
SMUCK1-152



SMUCK1-153



SMUCK1-154



SMUCK1-155

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.

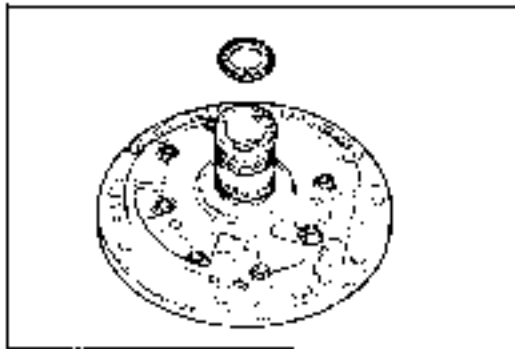
Note

- 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



SMU061-157

13. Apply petroleum jelly to the bearing, and set it on the oil pump.

Bearing outer diameter: 47.0mm (1.850 in)

REVERSE CLUTCH Preparation SST

49 G019 0A7A

Compressor set,
return spring



49 G019 025

Body B
(Part of
49 G019 0A7A)



49 G019 020

Plate
(Part of
49 G019 0A7A)



ZEL342-077

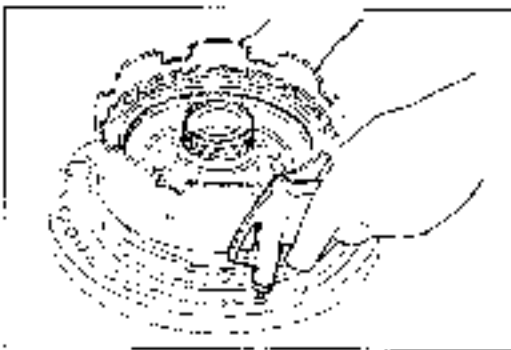
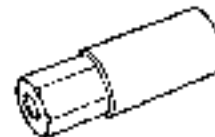
49 G019 027

Attachment A
(Part of
49 G019 0A7A)



49 G019 029

Nut
(Part of
49 G019 0A7A)



SMU061-158

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/cm², 57 psi) max.

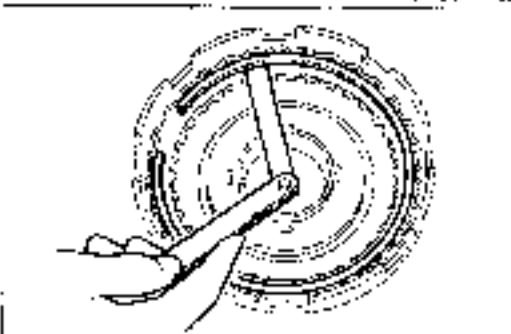
2. Verify that the retaining plate moves to the snap ring. If not, the O ring or the oil seal may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.

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)

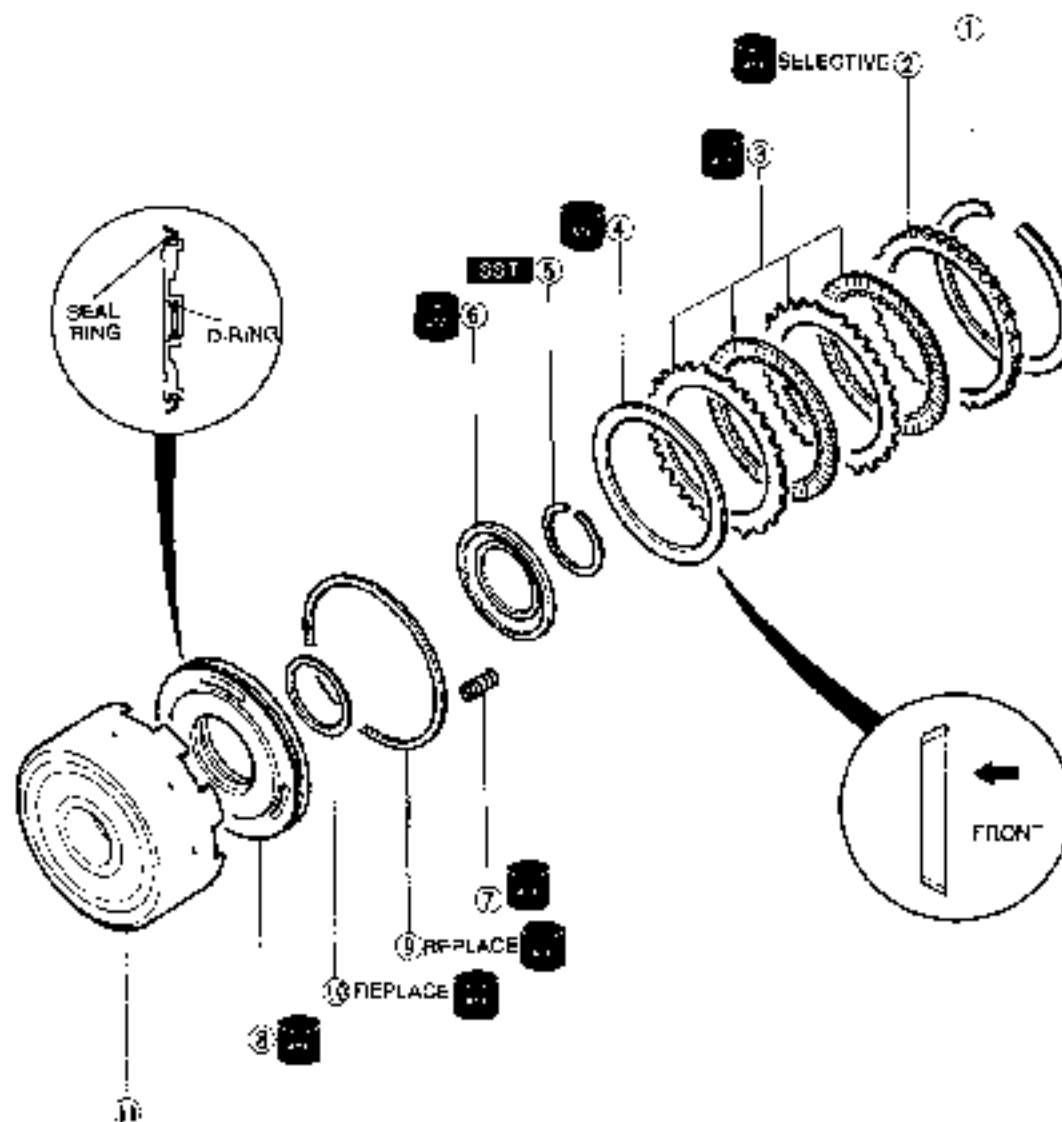
Select the correct retaining plate when assembling.



SMU061-160

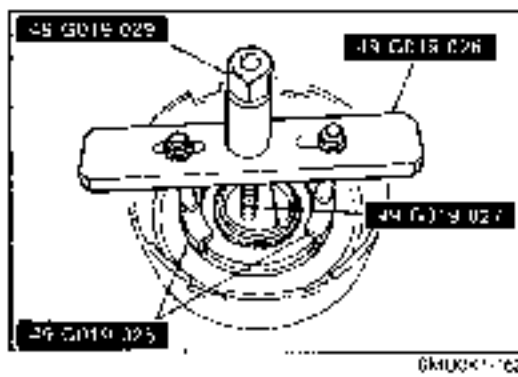
Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**.
Inspect all parts and repair or replace as necessary.



299,000-000

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. Dished plate	Inspection..... page K2-67
5. Snap ring	9. Seal ring
Disassembly Note..... page K2-67	10. O-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/cm², 57 psi) max.



Inspection

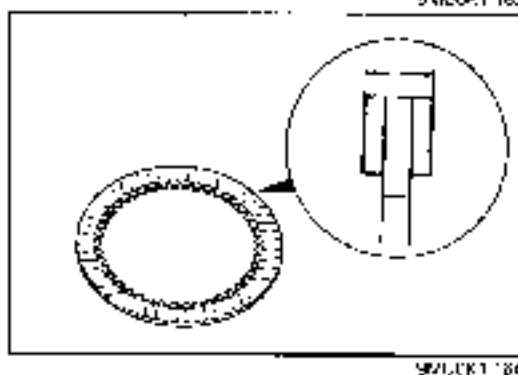
Drive plates

- 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.



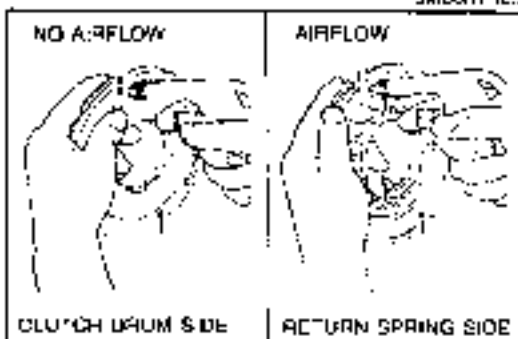
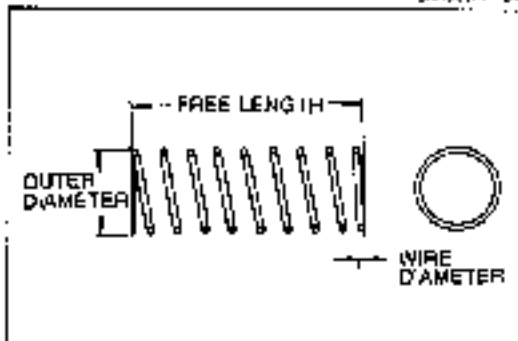
Return spring

- Measure the spring specifications.

Specification

Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
11.6 (0.461)	19.69 (0.775)	4.0	1.5 (0.061)

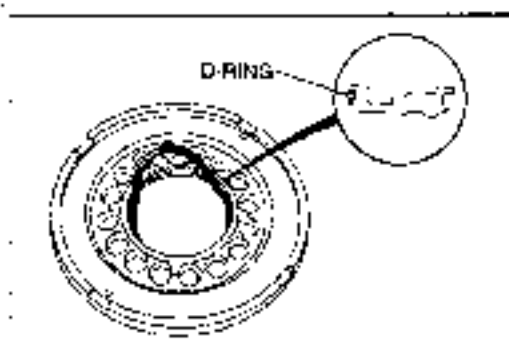
- If not within specification, replace the return spring.



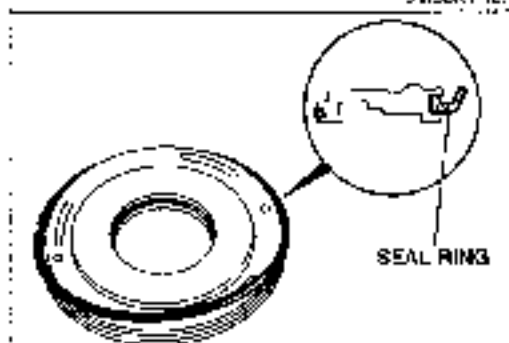
Clutch piston

- 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.

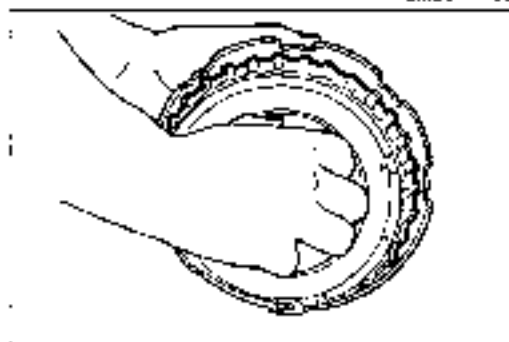
Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.



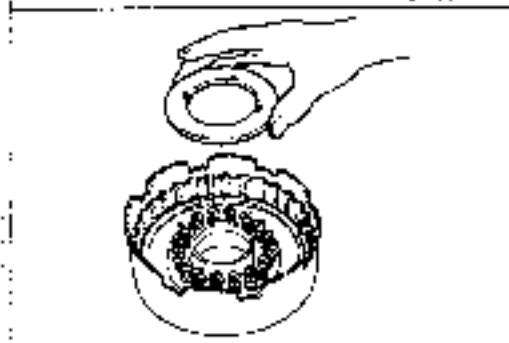
SMJJK1 1E7



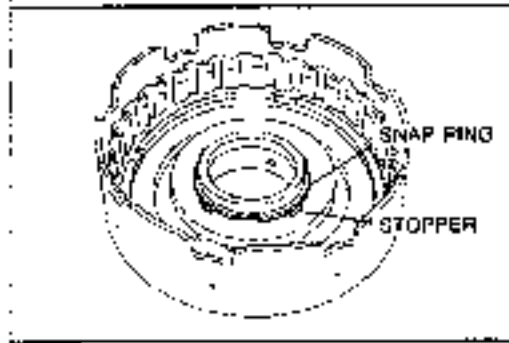
SMJJK1 1E8



SMJJK1 1E9



SMJJK1 1F0



SMJJK1 1F1

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.

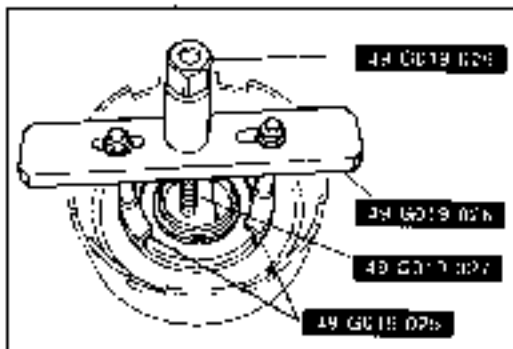
5. Install the return springs and spring retainer.

Caution

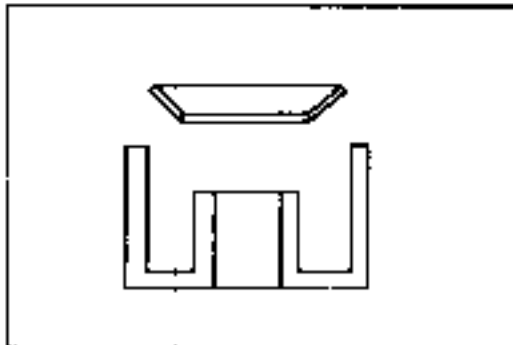
a) Depress the spring retainer only enough to install the snap ring.

b) Do not overexpand the snap ring when installing.

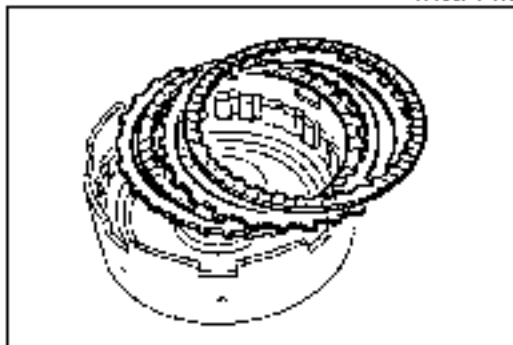
c) Do not align the snap ring end-gap with the spring retainer.



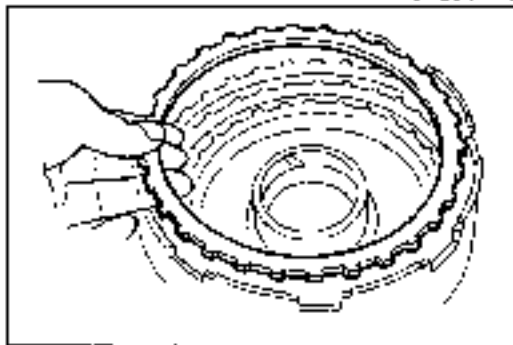
9MJJK1 188



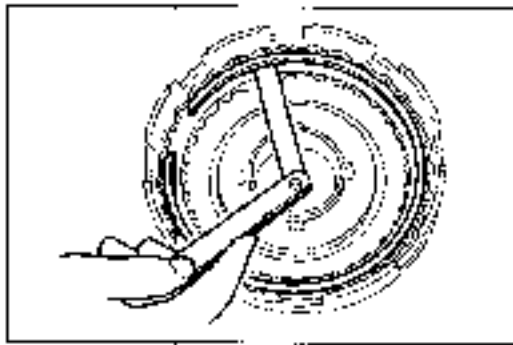
9MJJK1 172



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.

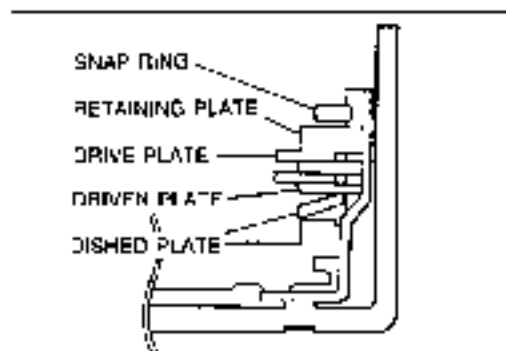
Standard clearance:

0.50—1.20mm (0.020—0.047 in)

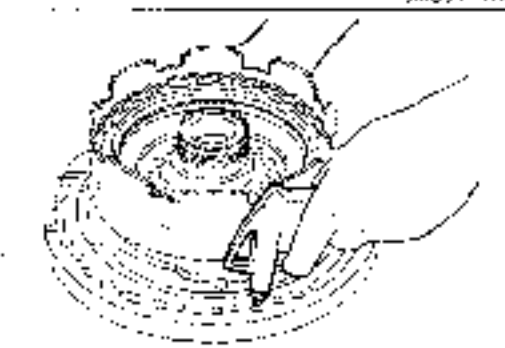
Retaining plate sizes

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)	



9M1361-176



9M1361-177

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.

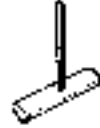
13. Install the reverse clutch on to the oil pump along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

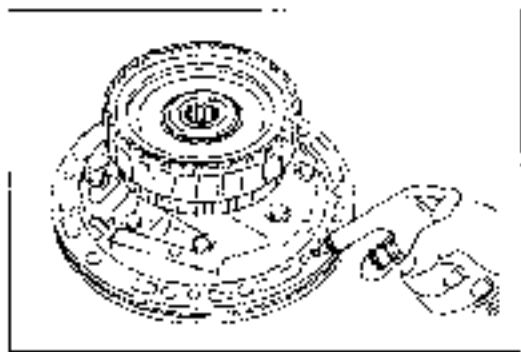
Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

HIGH CLUTCH AND FRONT SUN GEAR

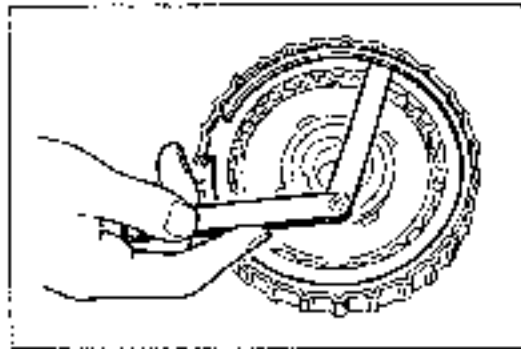
Preparation

SST

49 G019 0A7A Compressor set, return spring 	40 G019 025 Body B (Part of 49 G019 0A7A) 	49 G019 026 Plate (Part of 49 G019 0A7A) 
49 G019 027 Attachment A (Part of 49 G019 0A7A) 	40 G010 029 Nut (Part of 49 G019 0A7A) 	2B-J0K2 026



BNAUCK-1179



BNAUCK-1180

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/cm², 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

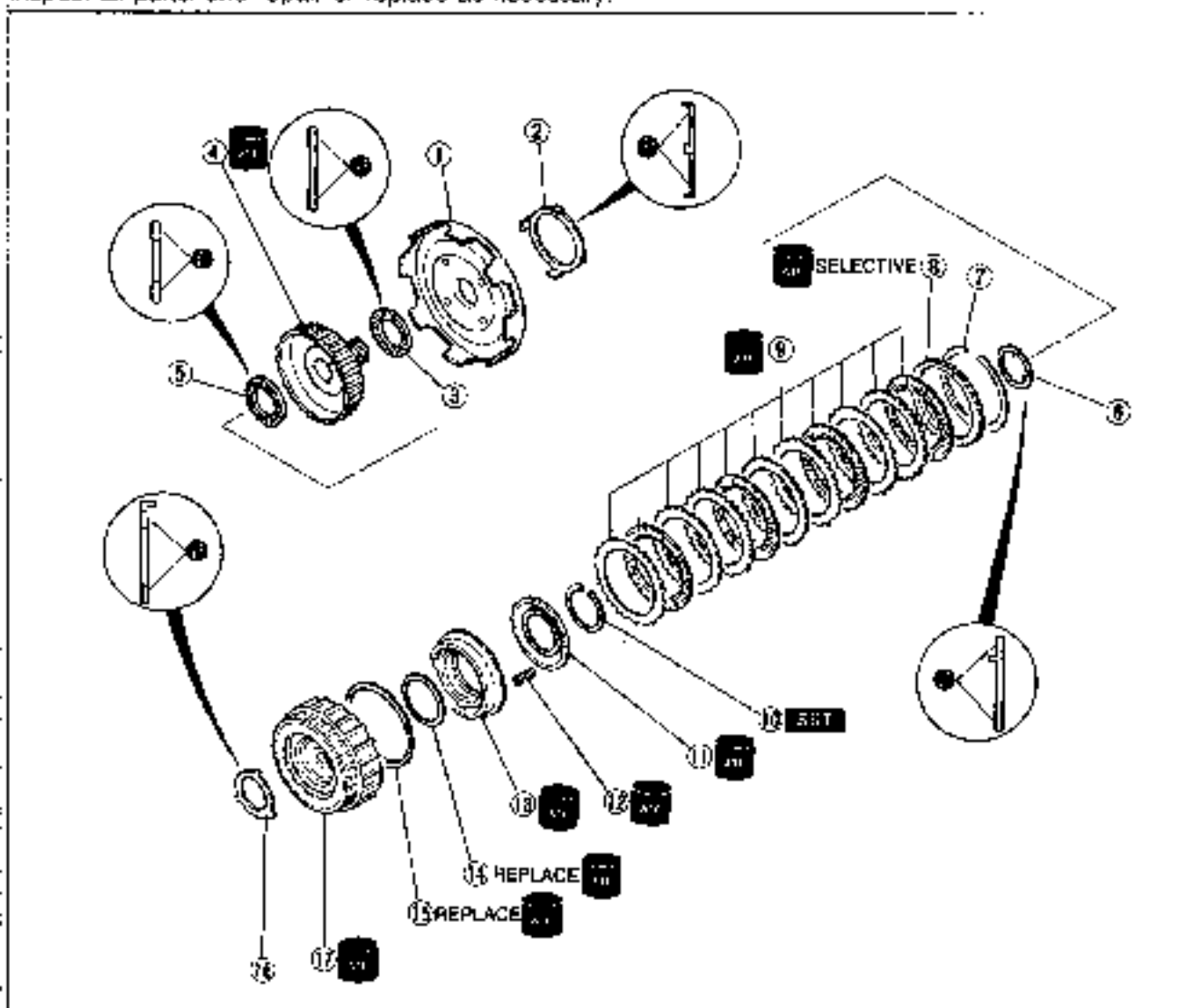
Measure the clearance between the retaining plate and the snap ring.

Standard clearance: 1.5—3.0mm (0.071—0.118 in)

Select and install the correct retaining plate when assembling.

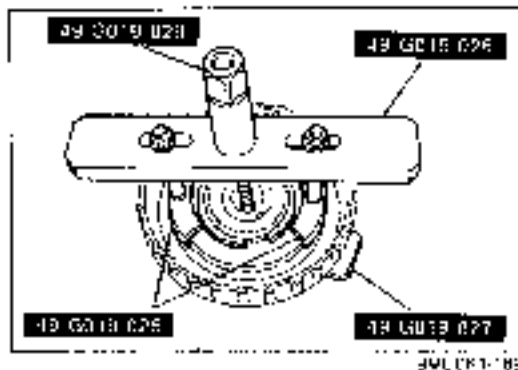
Disassembly and Inspection

Disassemble in the order shown in the figure, referring to **Disassembly Note**
 Inspect all parts, and repair or replace as necessary.

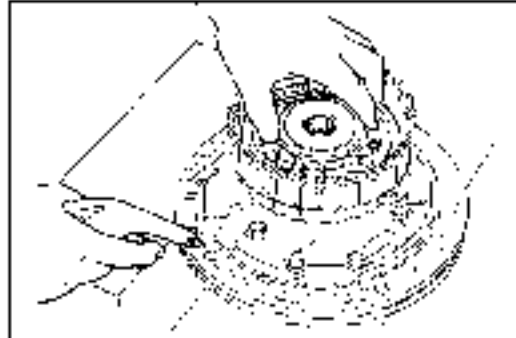


16. KKK2 641

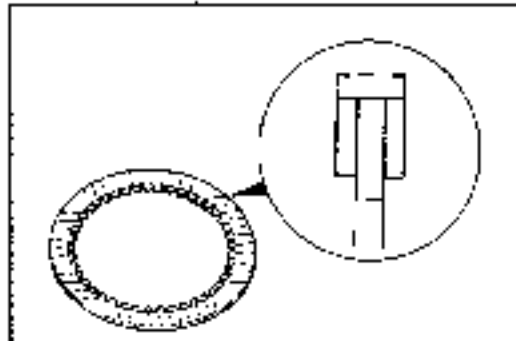
1. Front sun gear Inspect individual gear teeth for damage, wear, or cracks 2. Bearing race Inspect bearing surface for scoring or scratches 3. Bearing Inspect for damage or rough rotation 4. High clutch hub 5. Bearing Inspect for damage or rough rotation 6. Bearing race Inspect bearing surface for scoring or scratches 7. Snap ring 8. Retaining plate 9. Drive plates and driver plates Inspect for wear or burning Inspection... page K2-73	10. Snap ring Inspect for fracture or wear Disassembly Note page K2-73 11. Spring retainer Inspect for deformation or wear 12. Return spring Inspection... page K2-73 13. Clutch piston Inspect balls for sticking by shaking the piston Disassembly Note page K2-73 Inspection... page K2-73 14. D-ring 15. D-ring 16. Bearing race Inspect bearing surface for scoring or scratches 17. High clutch drum



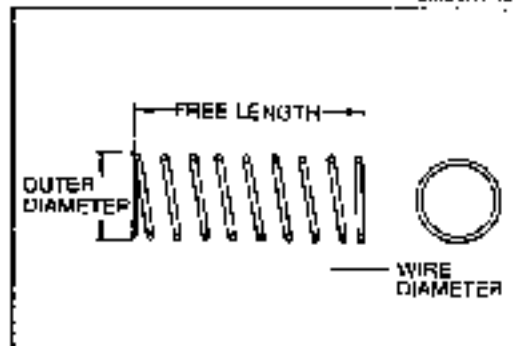
JUL0K1-182



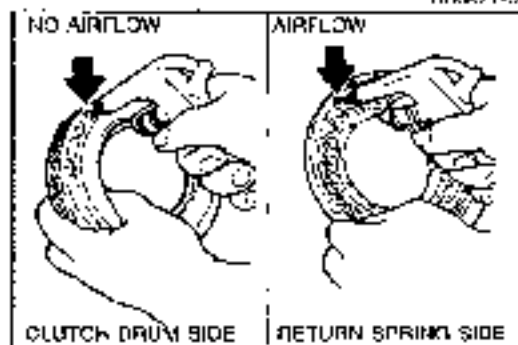
JUL0K1-183



JUL0K1-184



JUL0K1-185



JUL0K1-186

Disassembly note**Snap ring****Caution**

- a) Depress the spring retainer only enough to remove the snap ring.
- b) Do not damage the snap ring.

1. Compress the spring with the SST, then remove the snap ring with snap ring pliers.
2. Remove the spring retainer and spring.

Piston

1. Install the high clutch onto the oil pump along with the seal rings.
2. Remove the piston by applying compressed air through the oil passage.

Air pressure: 392 kPa (4.0 kg/cm², 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

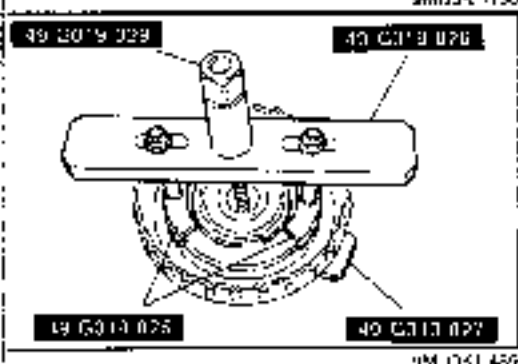
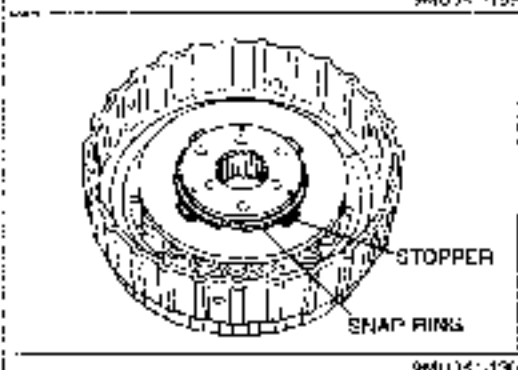
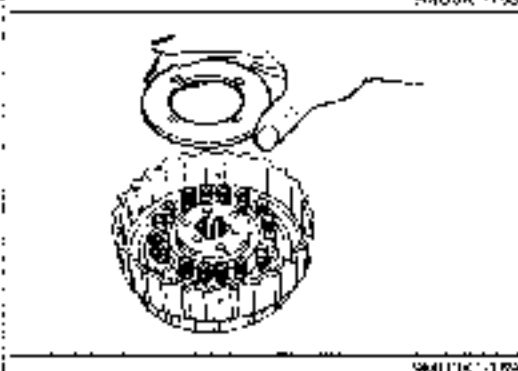
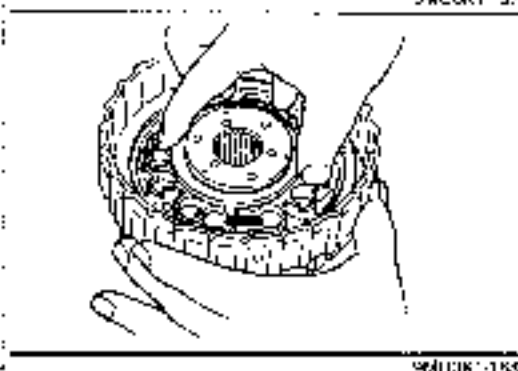
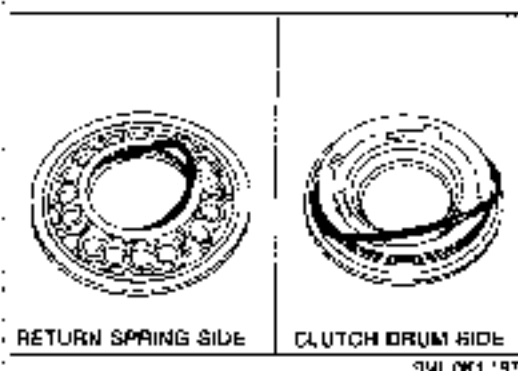
Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
11.6 (0.457)	22.1 (0.870)	6.0	1.3 (0.051)

2. If not within specification, replace the return spring.

Clutch piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

Air pressure: 392 kPa (4.0 kg/cm², 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.

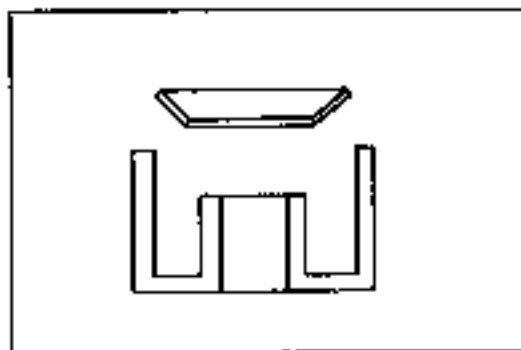
3. Install the clutch piston in the high clutch drum by turning it evenly and gradually.

4. Install the return springs and spring retainer.

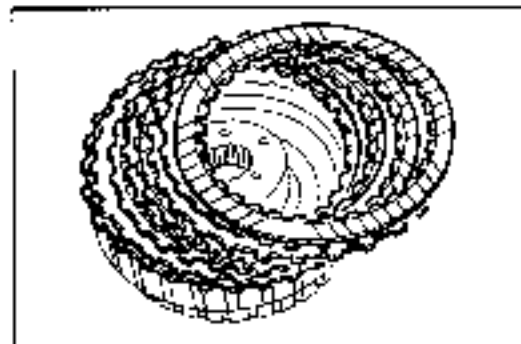
Caution

- a) Depress the spring retainer only enough to install the snap ring.
- b) Do not over expand the snap ring when installing.
- c) Do not align the snap ring end-gap with the spring retainer stop.

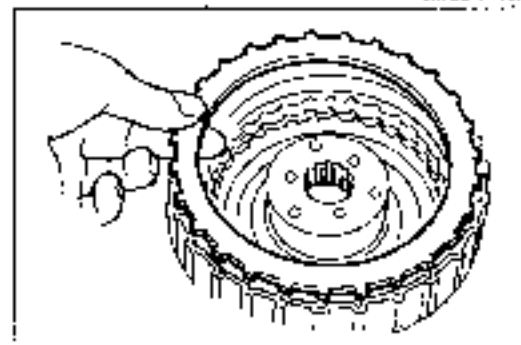
5. Install the snap ring while compressing the springs with the SST.



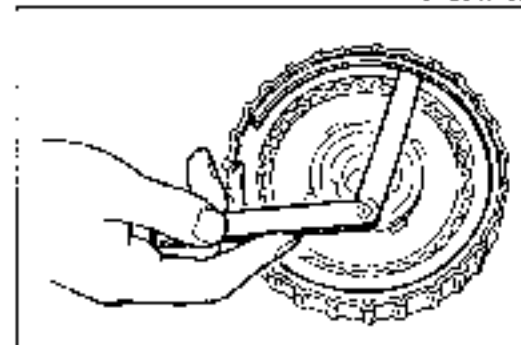
3MJC<1 131



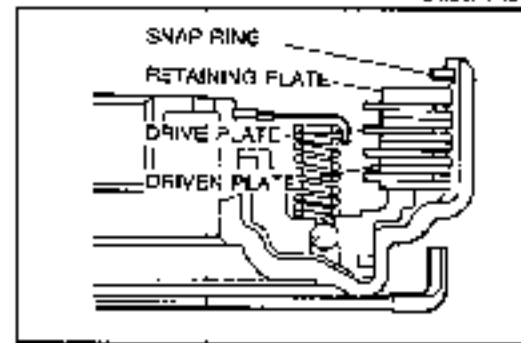
3MJC<1 132



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-Drive-Driven-Drive-Driven-Drive-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)

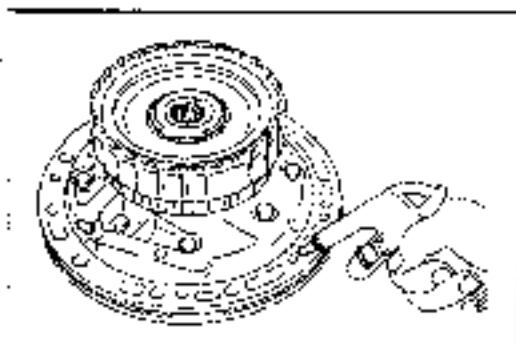
11. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates. Adjust the clearance by installing the correct retaining plate.

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)

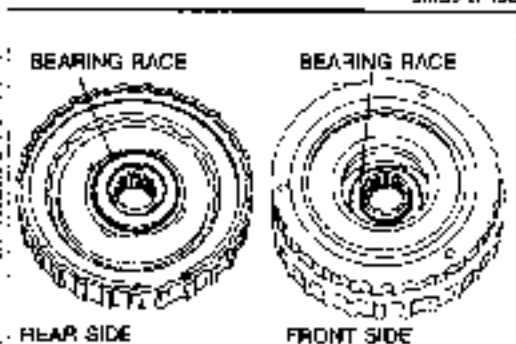


SMUCKY-196

Caution**Apply air for no more than 3 seconds.**

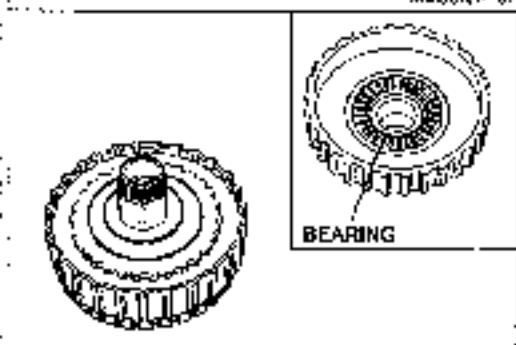
12. Install the high clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.



SMUCKY-197

13. Apply petroleum jelly to the bearing races and install them in the high clutch as shown

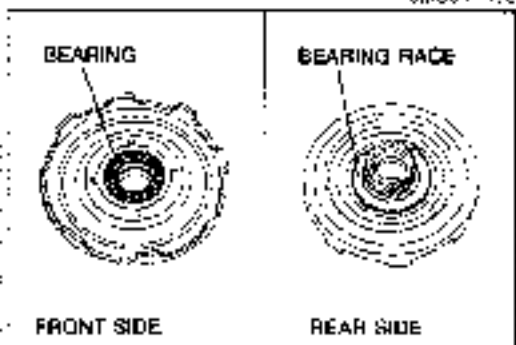
Bearing race outer diameter**Front side: 43.5mm (1.713 in)****Rear side : 51.5mm (2.028 in)**

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

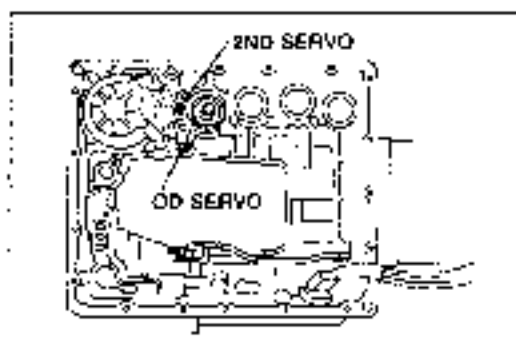
Front sun gear

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



3VULCK-120

BAND SERVO**Preinspection****Band servo**

1. Apply compressed air to the oil passage as shown.

Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.

2. Verify that the piston stem moves to the brake band.

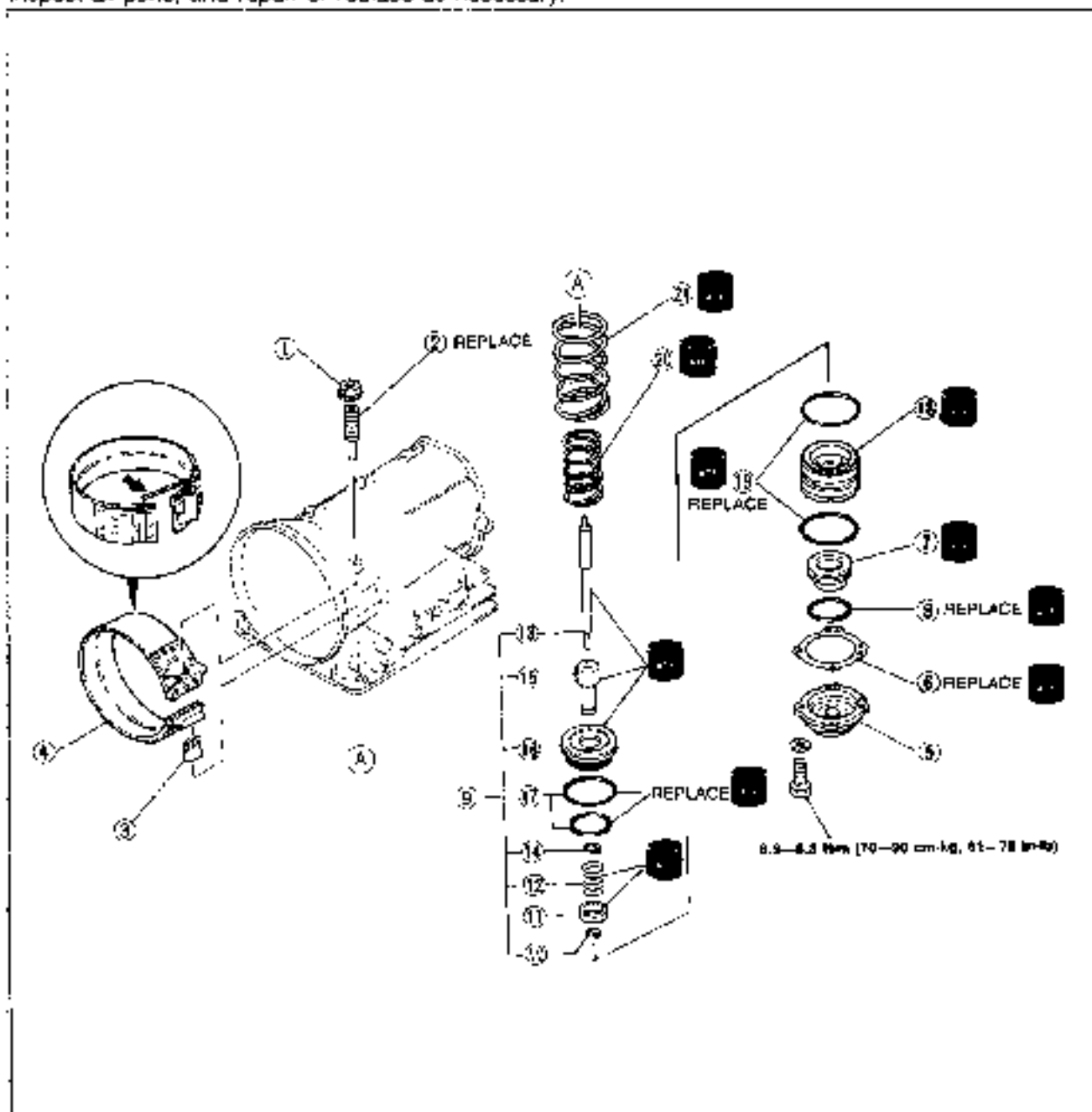
If not, the D-ring or the oil seal may be damaged or fluid may be sticking at the piston assembly.

Inspect them, and replace when assembling.

Disassembly and Inspection

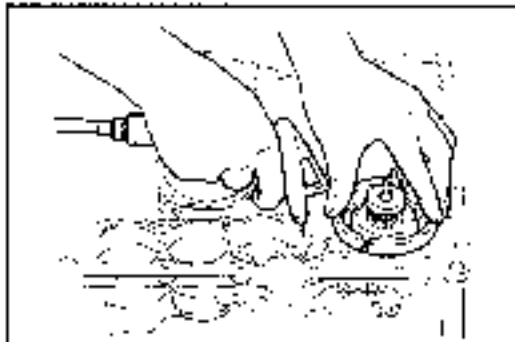
Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Inspect all parts, and repair or replace as necessary.



3VULCK1-79

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
4. Brake band	12. Return spring C	 page K2-79
5. Band servo retainer	13. Piston stem	19. O-ring
6. Gasket	14. Retaining ring (large)	20. Return spring B
7. OD band servo piston	15. Servo cushion retainer	Inspection page K2-79
Disassembly Note	16. Band servo piston	21. Return spring A
..... page K2-79		Inspection page K2-79
8. O-ring		1810K2 C43



SMUCK 301

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.

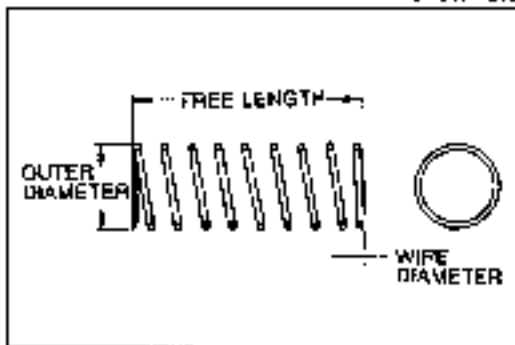
Air pressure: 392 kPa (4.0 kg/cm², 57 psi) max.



SMUCK 202

OD band servo piston

- Block one oil hole 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.
- Remove the O-ring from the OD band servo piston.



1810K2 044

Inspection**Return spring**

- Measure the spring specifications.

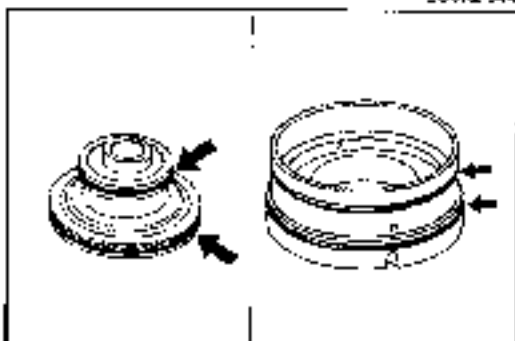
Specifications

	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)

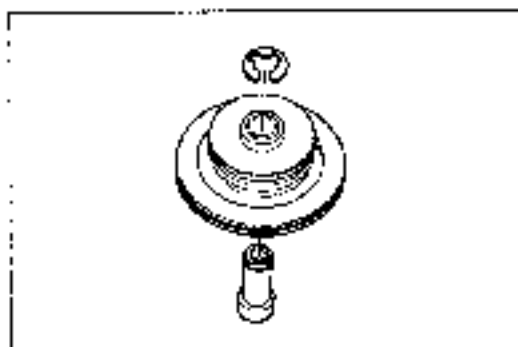
- If not within specification, replace the return spring.

Assembly

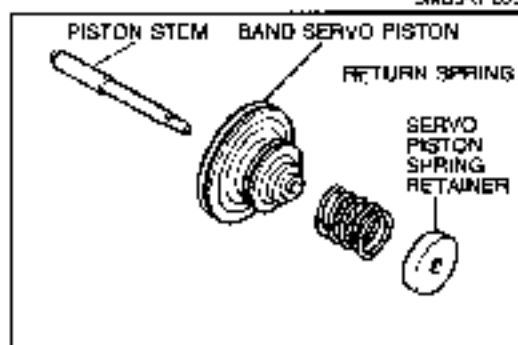
- Apply ATF to the new O-rings and install them onto the servo piston retainer.
- Apply ATF to the new O-rings and install them onto the band servo piston.



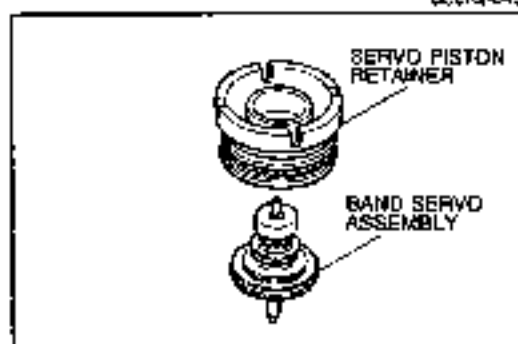
SMUCK 204



9MUK1 205



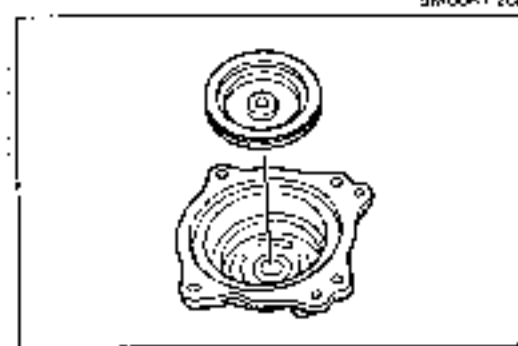
-BLUK2-045



12UBK2-046



9MUK1 208



9MUK1-209

Caution**Do not deform the retaining ring.**

3. Apply ATF to the servo cushion spring retainer, and retaining ring, and assemble them in the band servo piston.

Caution**Do not deform the retaining ring.**

4. Apply ATF to the piston stem return spring, and spring retainer, and assemble them in the band servo piston.
5. Install the retaining ring.

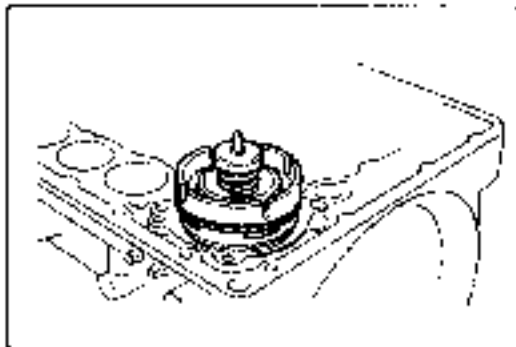
Caution**Apply even pressure to the perimeter of the piston to avoid damaging the O-rings and D-rings when installing.**

6. Apply ATF to the band servo piston, and install it onto the servo piston retainer.

7. Apply ATF to the new D-ring, and install it onto the OD band servo piston.

Caution**Apply even pressure to the perimeter of the piston to avoid damaging the D-ring when installing.**

8. Apply ATF to the OD band servo piston, and install it into the band servo retainer.



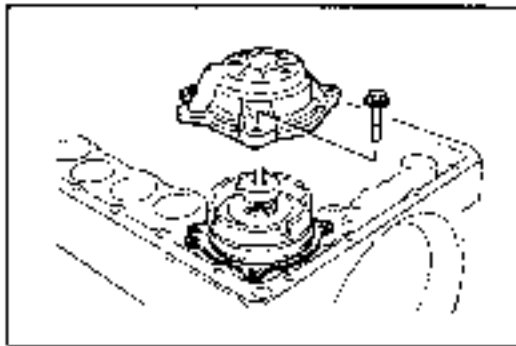
EMUD4-210

9. Install return springs A and B.

Caution

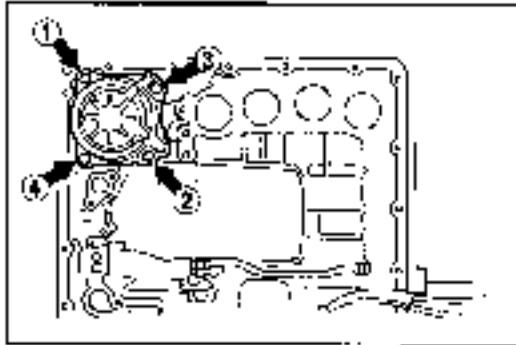
Apply even pressure to the perimeter of the body to avoid damaging the O-rings when installing.

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.

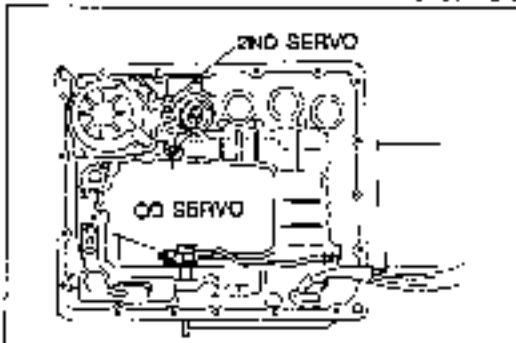


9VUUK1-212

12. Tighten the bolts evenly and gradually in the order shown.

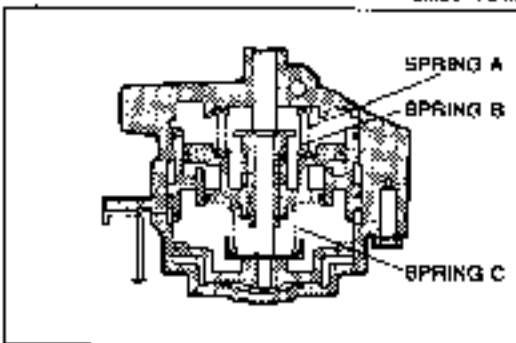
Tightening torque:

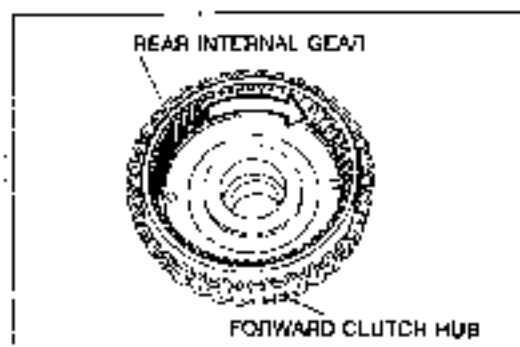
6.9—8.8 N·m (70—90 cm·kg, 51—78 in·lb)



9MJO41-213

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

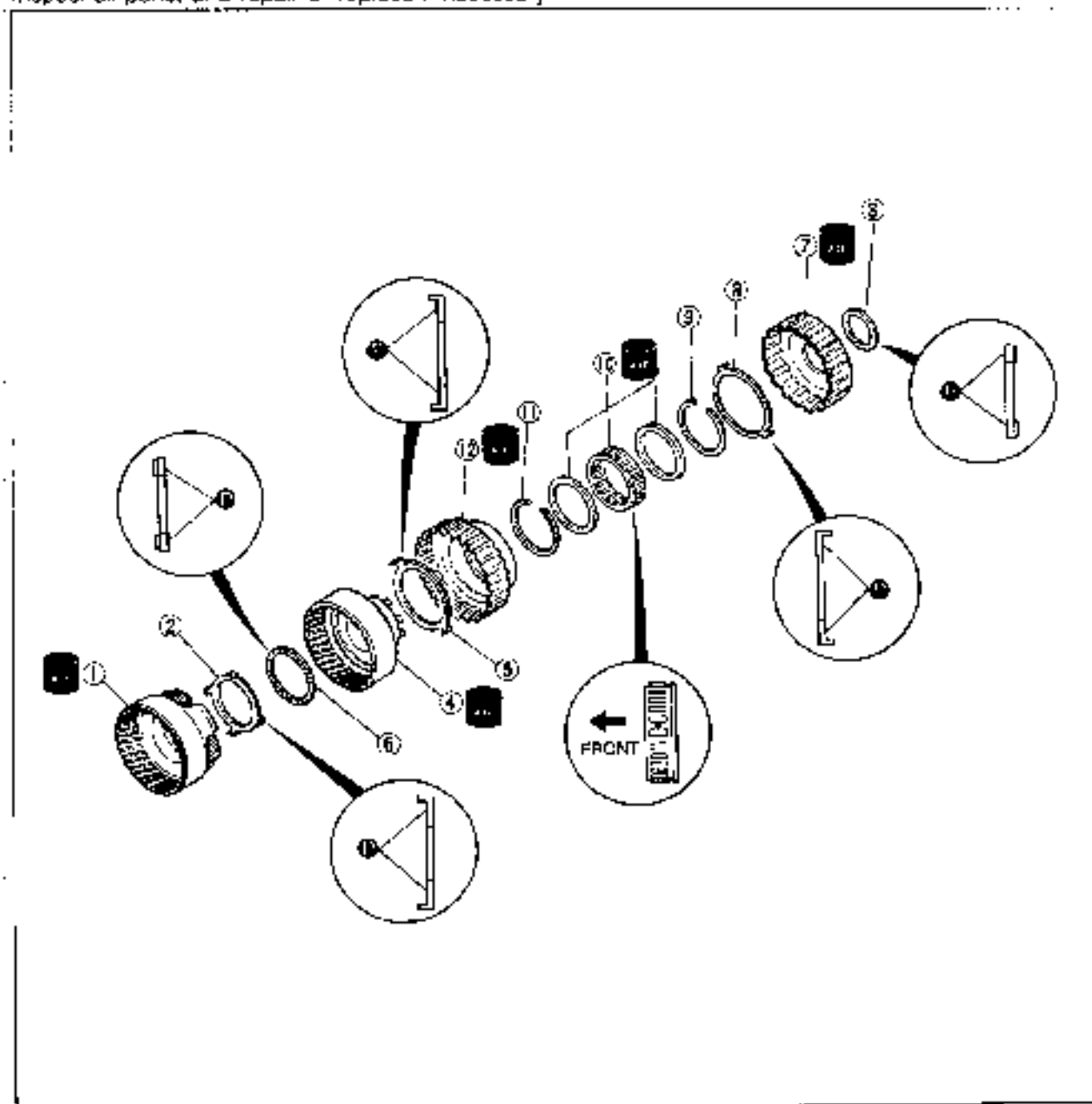
While holding the forward clutch hub, check that the rear internal gear rotates smoothly when turned clockwise and lock when turned counterclockwise.

If not, replace the one-way clutch.

Disassembly and Inspection

Disassemble in the order shown in the figure.

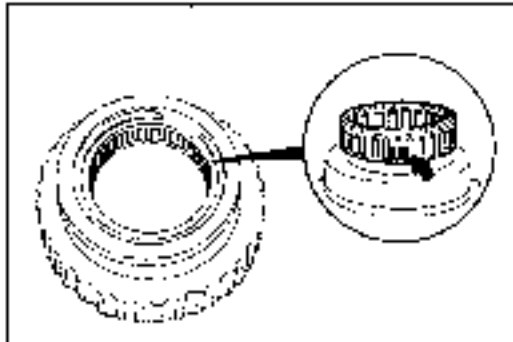
Inspect all parts, and repair or replace if necessary.



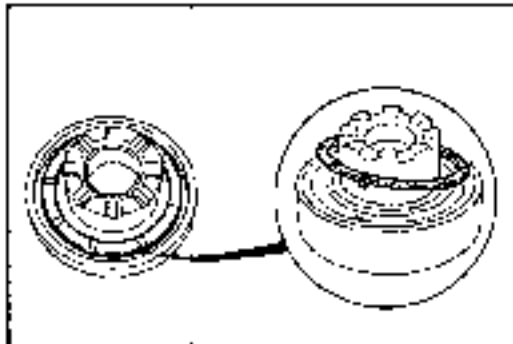
SMUJ41-433

1. Front internal gear (with rear planetary carrier) Inspect individual gear teeth for damage, wear, or cracks, and rotation of pinion gears	3. Bearing Inspect for damage or rough rotation	6. Bearing Inspect for damage or rough rotation
2. Bearing race Inspect for bearing surface scoring or scratches	4. Rear internal gear Inspect individual gear teeth for damage, wear, or cracks	7. Overrunning clutch hub
	5. Thrust washer	8. Thrust washer
		9. Snap ring
		10. Forward one-way clutch Inspection ... page K2-82
		11. Snap ring
		12. Forward clutch hub

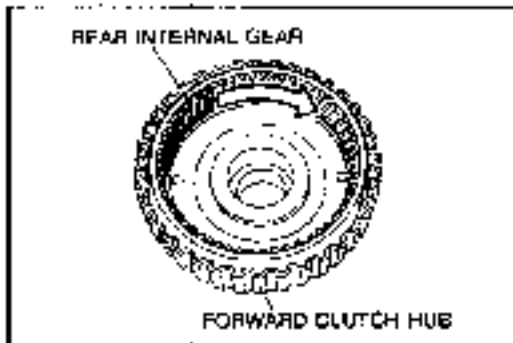
10J0K2-047



BMUCK1-2'5



BMUCK1-2'6



BMUCK1-2'7



BMUCK1-2'8

Assembly

Caution

- Do not deform the snap ring.
- 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.

- Install the snap ring into the forward clutch hub.
- 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.

- Apply petroleum jelly to the thrust washer and set it on the rear internal gear.

- Apply ATF to the rear internal gear, and install it in the forward clutch hub by turning it evenly and gradually.

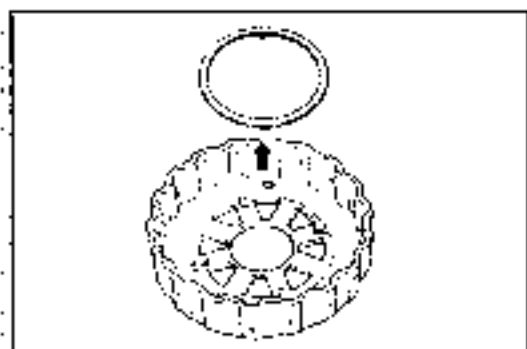
Note

If it turns counterclockwise, the one-way clutch is installed upside down.

- 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.

- Apply petroleum jelly to the bearing, and install it on the rear internal gear.

Bearing outer diameter: 78.0mm (3.071 in)

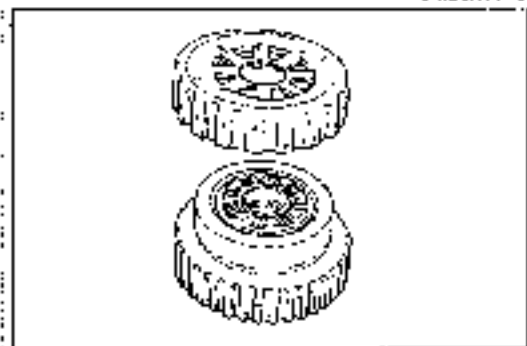


GMJOK1 219

Note

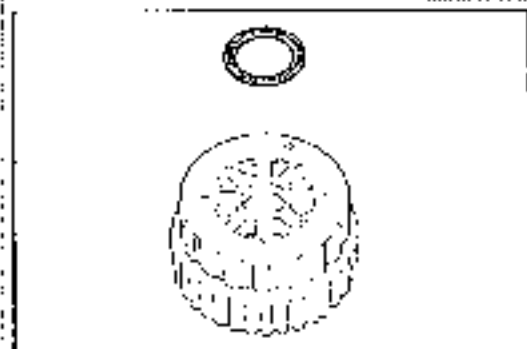
Be sure the locating tabs of the thrust washer are set into the holes in the overrunning clutch hub.

7. Apply petroleum jelly to the thrust washer, and set it in the overrunning clutch hub.



GMJOK1 220

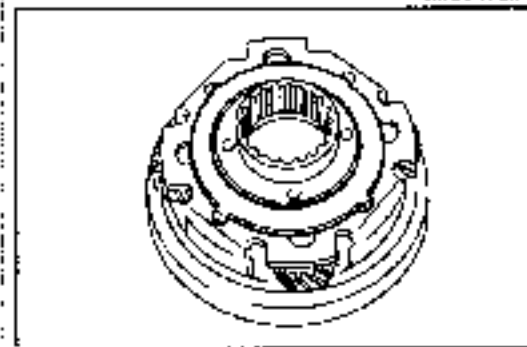
8. Set the overrunning clutch hub on the rear internal gear.



GMJOK1 221

9. Apply petroleum jelly to the bearing, and set it on the overrunning clutch hub.

Bearing outer diameter: 59.0mm (2.322 in)

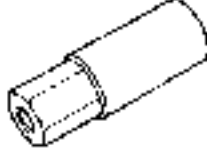


GMJOK1 222

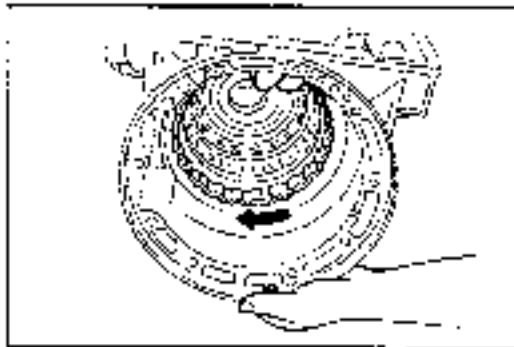
10. Apply petroleum jelly to the bearing race, and set it on the front internal gear.

Bearing race outer diameter: 75.0mm (2.953 in)

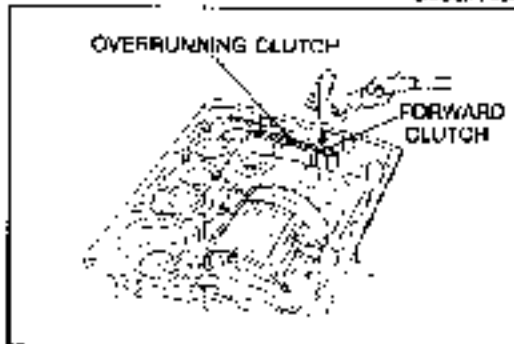
FORWARD CLUTCH DRUM**(FORWARD CLUTCH, OVERRUNNING CLUTCH, LOW ONE-WAY CLUTCH)****Preparation****SST**

49 G019 0A7A Compressor set, return spring		49 G019 025 Body B (Part of 49 G019 0A7A)		49 G019 026 Plate (Part of 49 G019 0A7A)	
49 G019 027 Attachment A (Part of 49 G019 0A7A)		49 G019 029 Nut (Part of 49 G019 0A7A)		49 G019 001 Bolts	

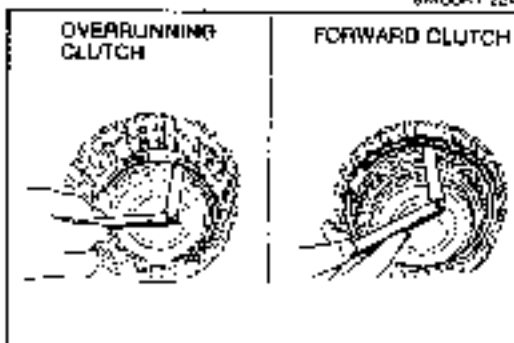
7000K2 029



8MU0K1-494



8MU0K1-254



02L0K2-105

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/cm², 57 psi) max.

2. Verify that the retaining plates move toward the snap ring. If not, the O-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

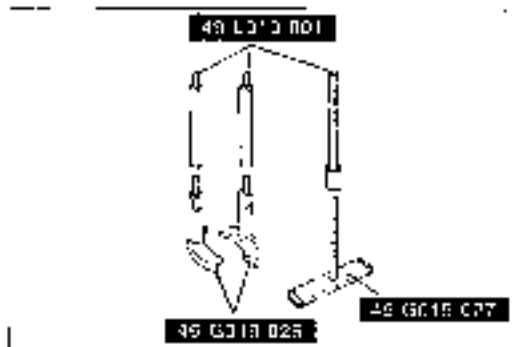
Forward clutch : 0.45—2.06mm (0.018—0.081 in)

Overrunning clutch: 1.0—2.0mm (0.039—0.079 in)

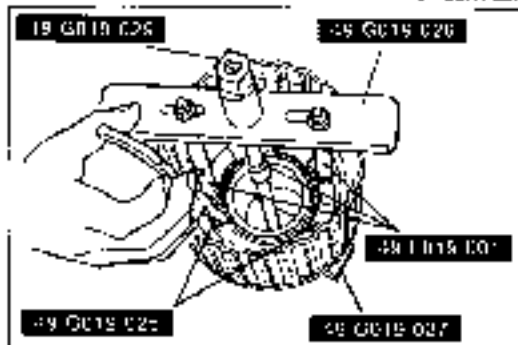
Select the correct retaining plate when assembling if not within specification.

1. Snap ring	13. Forward clutch piston
2. Snap ring	Disassembly Note page K2-87
3. Retaining plate	14. Seal ring
4. Drive plates and driven plates	15. D-ring
Inspect for wear or burning	16. Overrunning clutch piston
Inspection page K2-86	Inspect balls for sticking by shaking piston
5. Dished plate	Disassembly Note page K2-87
6. Snap ring	Inspection page K2-88
7. Retaining plate	17. Seal ring
8. Drive plates and driven plates	18. D-ring
Inspect for wear or burning	19. Snap ring
Inspection page K2-86	20. Side plate
9. Dished plate	21. Low one-way clutch
10. Snap ring	Inspection page K2-85
Disassembly Note page K2-87	22. Snap ring
11. Spring retainer	23. Bearing (radial bearing)
12. Return spring	Inspect for damage or rough rotation
Inspection page K2-88	24. Forward clutch drum
	Inspection page K2-88

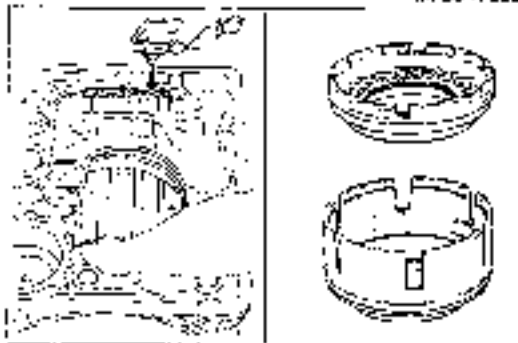
23UD-K2-038



9VLEK1 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.

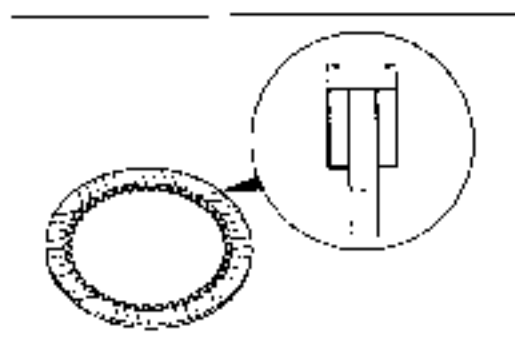
2. Compress the springs with the SST, then remove the snap ring with snap ring pliers.
3. Remove the spring retainer and springs.

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/cm², 57 psi) max.

3. Remove the overrunning clutch piston from the forward clutch piston.



9M5JOK1-290

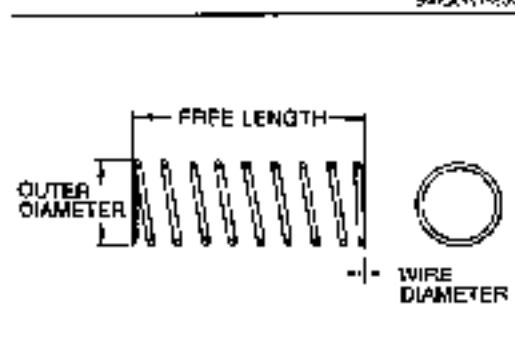
Inspection Drive plates

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



9M5JOK1-291

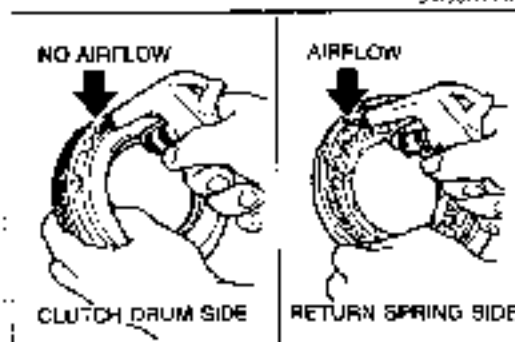
Return spring

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.

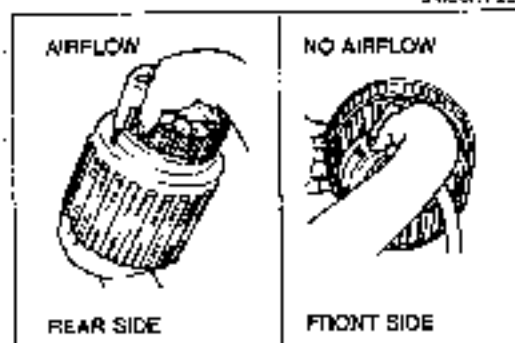


9M5JOK1-292

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/cm², 57 psi) max.

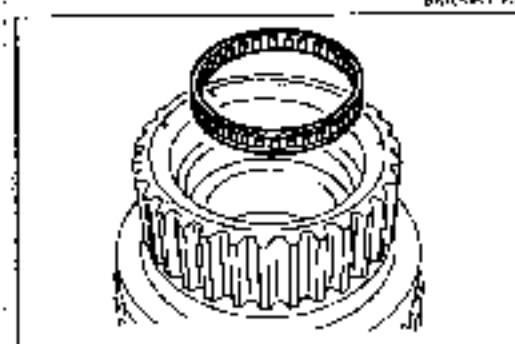


9M5JOK1-293

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/cm², 57 psi) max.



9M5JOK1-294

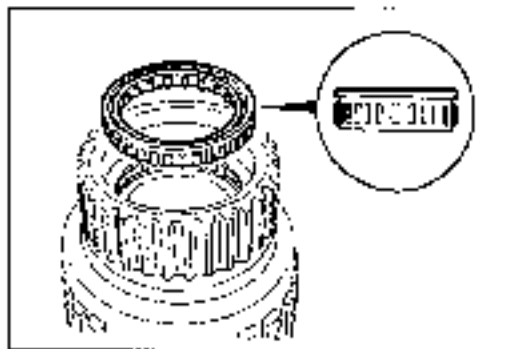
Assembly

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.

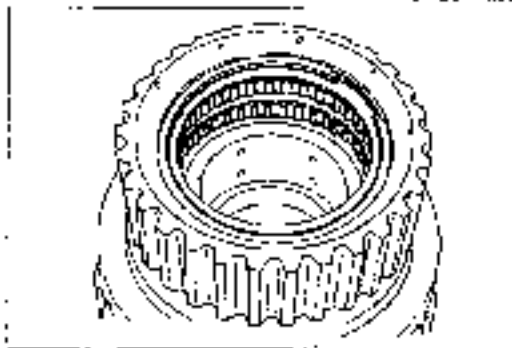


39500K1-225

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.

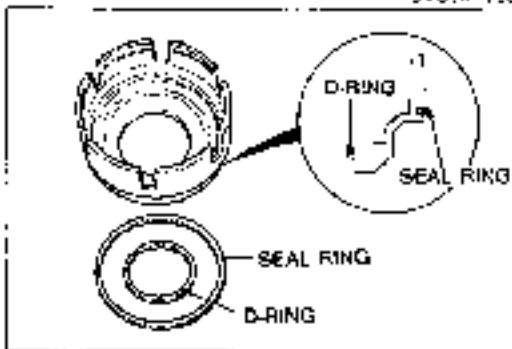


39500K1-233

Caution

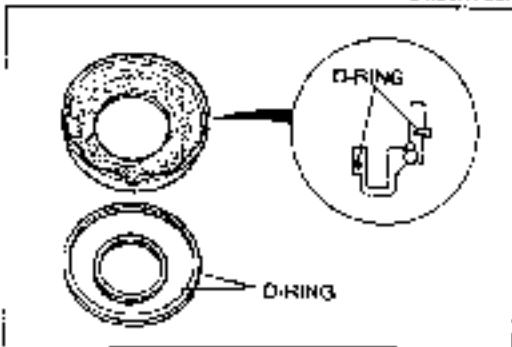
Do not deform the snap ring.

4. Apply ATF to the side plate and snap ring, and install them into the forward clutch drum.



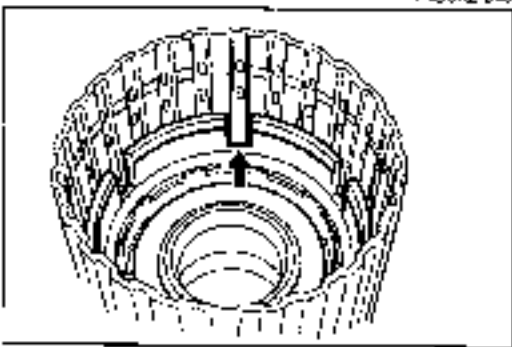
39500K1-237

5. Apply ATF to the new D-ring and seal ring, and install them into the forward clutch as shown.



1-900K2-049

6. Apply ATF to the new D-ring and install them into the overrunning clutch piston as shown.



39500K1-239

Caution

Apply even pressure to the perimeter of the piston to avoid damaging the seal ring, and D-ring when installing.

7. Apply ATF to the inner surface of the forward clutch drum and overrunning clutch piston.
8. Install the overrunning clutch piston in the forward clutch drum by turning it evenly and gradually. Align the notches in forward clutch piston with the grooves in forward clutch drum.



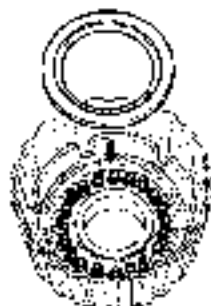
9M1JCK-240

Caution

Apply even pressure to the perimeter of the piston to avoid damaging the D-ring and the seal ring when installing.

- 9 Apply ATF to the inner surface of the forward clutch piston and overrunning clutch piston.
- 10 Install the overrunning clutch piston in the forward clutch piston by turning it evenly and gradually

11. Install the springs and spring retainer.

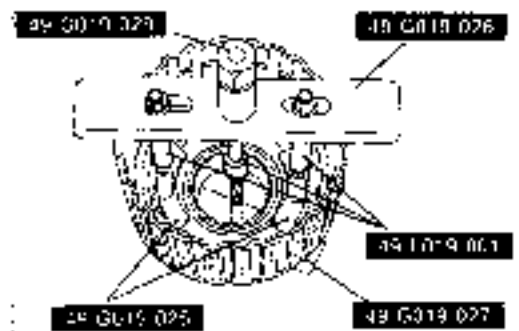


9M1JCK-241

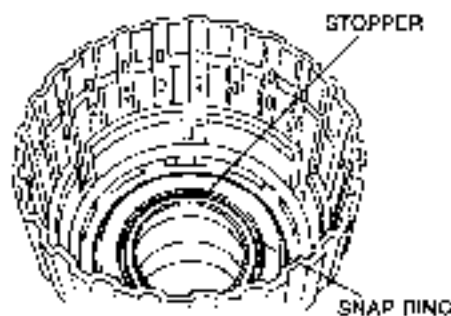
Caution

- 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.



9M1JCK-242



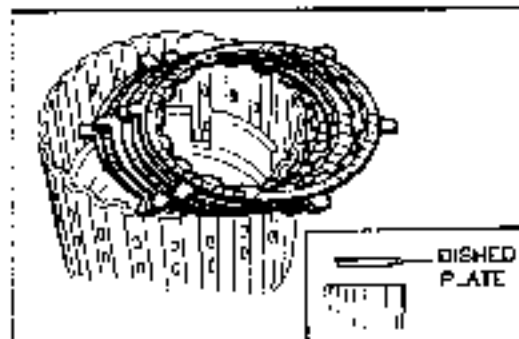
13. Install the dished plate as shown

Note

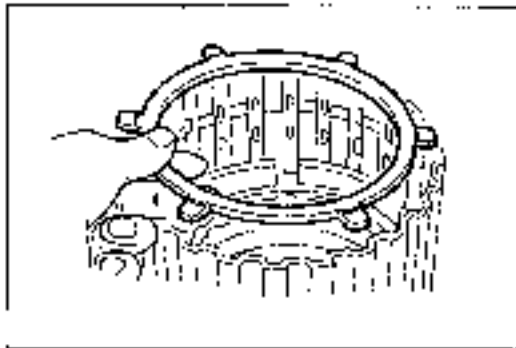
Installation order:

Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive

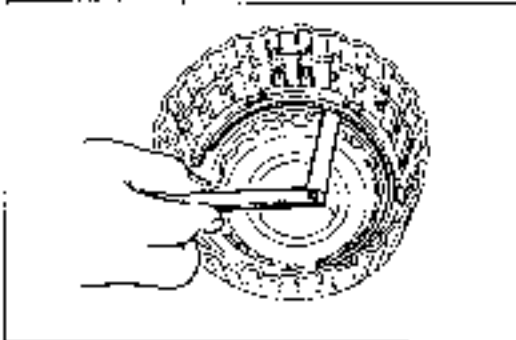
- 14 Apply ATF to the drive plates and driven plates and install them into the forward clutch piston.



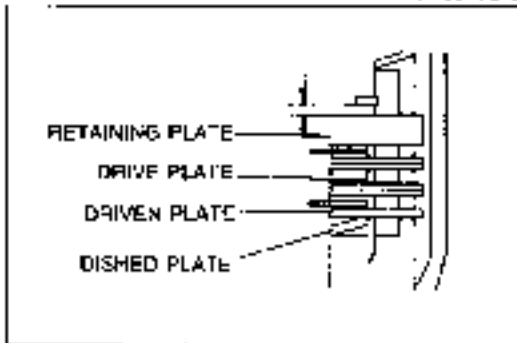
9M1JCK-242



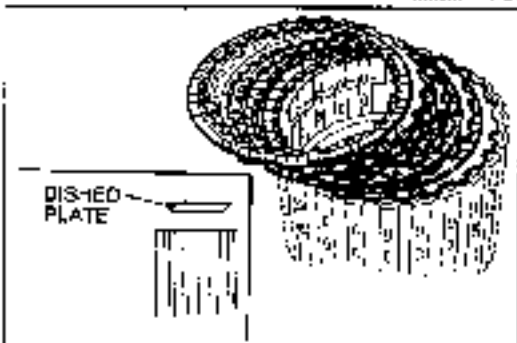
SMJOK1-244



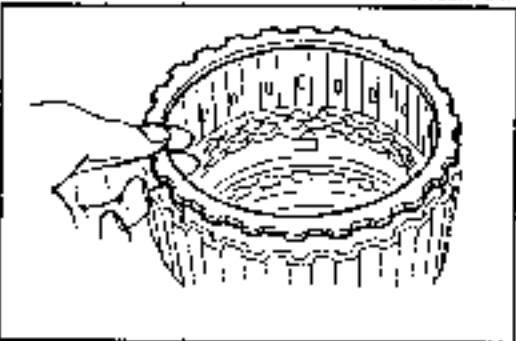
SMJOK1-245



SMJOK1-246



SMJOK1-247



SMJOK1-248

15. Install the retaining plate.

Caution

Do not deform the snap ring.

16. Install the snap ring.

17. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

Standard clearance: 1.0—2.0mm (0.039—0.079 in)

Retaining plate sizes

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	

18. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, drive plates and driven plates. Adjust the clearance by installing the correct retaining plate.

Standard clearance: 1.0—1.4mm (0.039—0.055 in)

Retaining plate sizes

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	

19. Install the dished plate as shown.

Note

Installation order:

Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

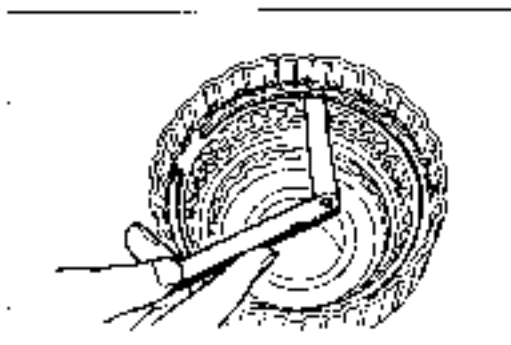
20. Apply ATF to the drive plates and driven plates, and install them into the forward clutch drum.

21. Install the retaining plate.

Caution

Do not deform the snap ring.

22. Install the snap ring.



9M/LCK1-249

23. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not within specification, adjust the clearance by installing the correct retaining plate.

Standard clearance: 0.45—2.05mm (0.018—0.081 in)

Retaining plate sizes

mm (in)

4.0 (0.157)	4.2 (0.165)	4.4 (0.173)	4.6 (0.181)
4.8 (0.189)	5.0 (0.197)	5.2 (0.205)	

24. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dish 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

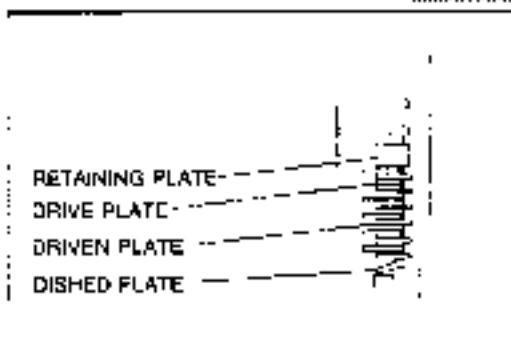
mm (in)

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)	

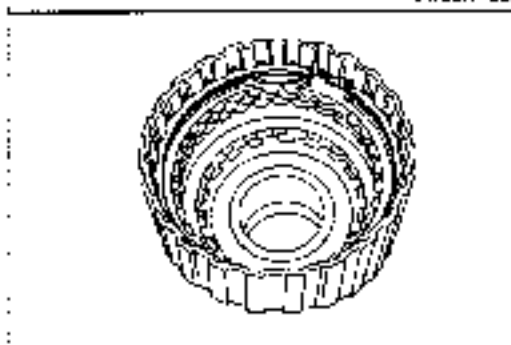
Caution

Do not deform the snap rings.

25. Install the snap ring

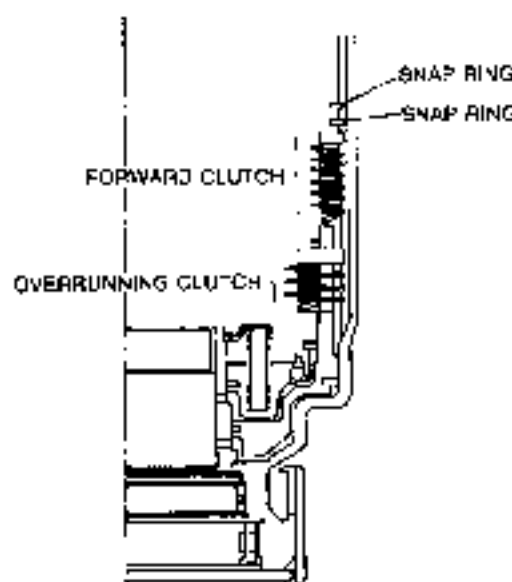


9M/LCK1-250

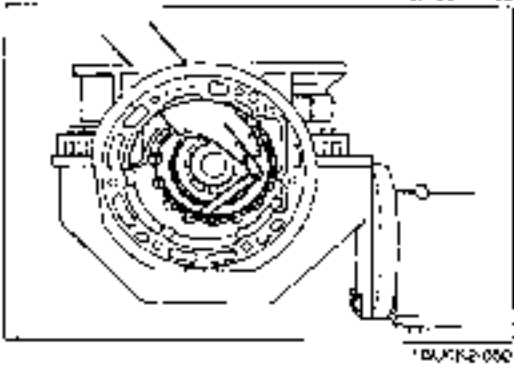
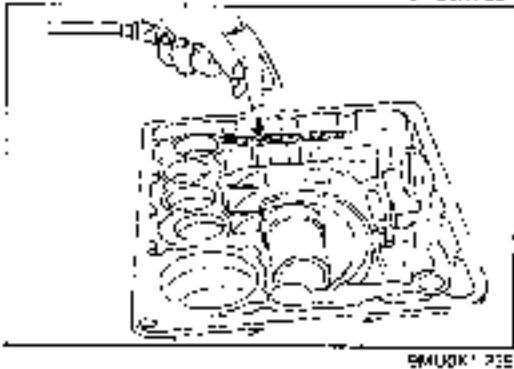
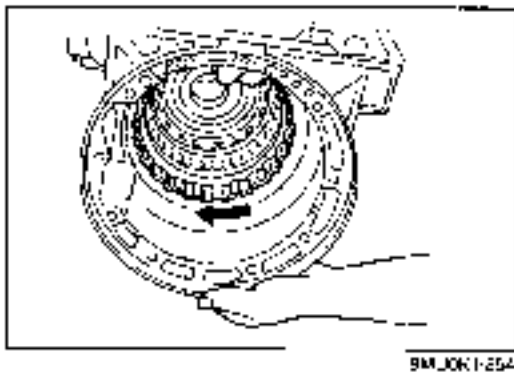
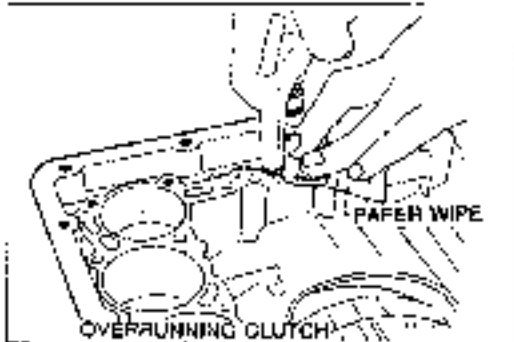
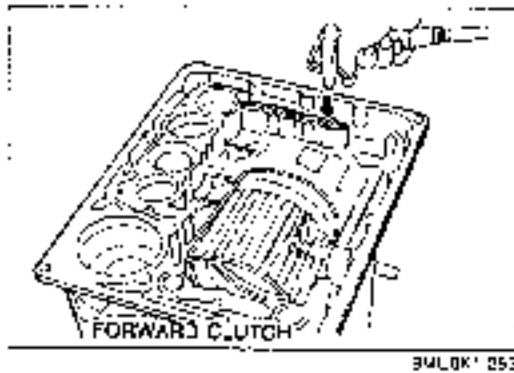


9M/LCK1-251

Installation of proper assembly



9M/LCK1-252

**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/cm², 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/cm², 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

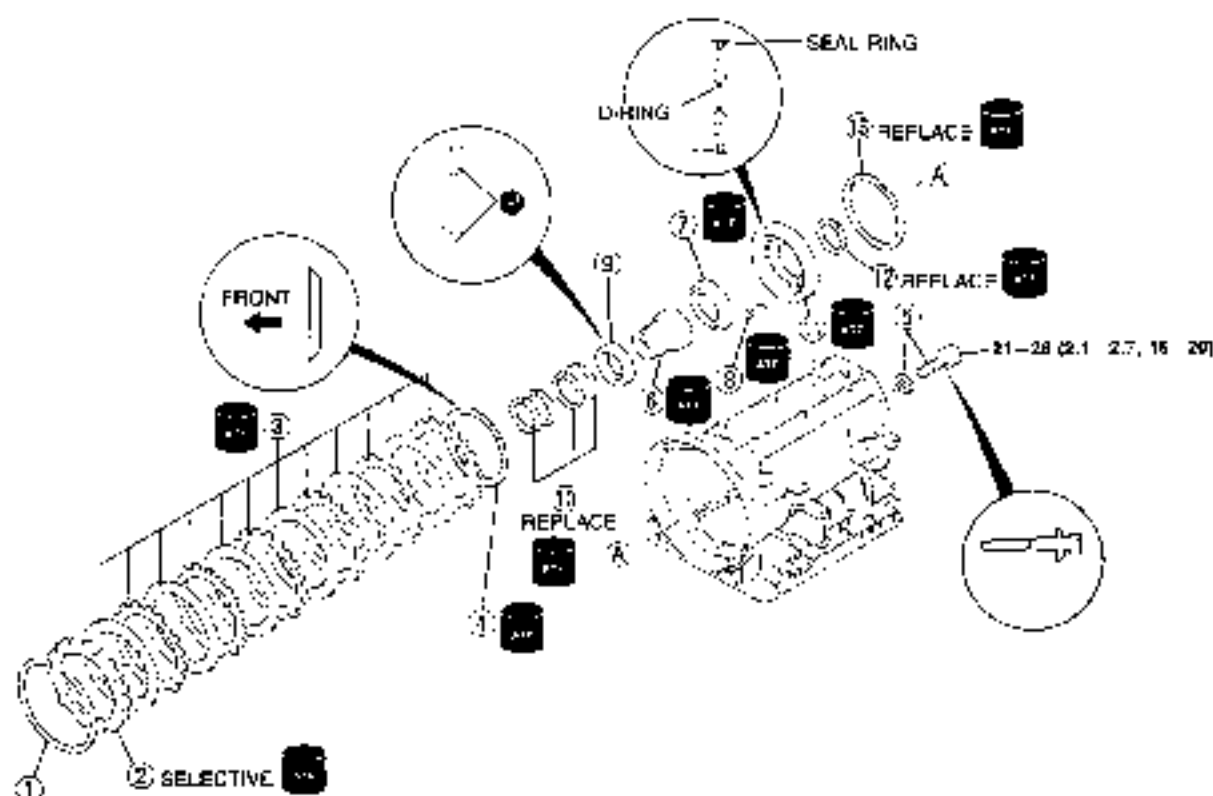
Measure the clearance between the retaining plate and the snap ring to the forward clutch and the overrunning clutch.

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

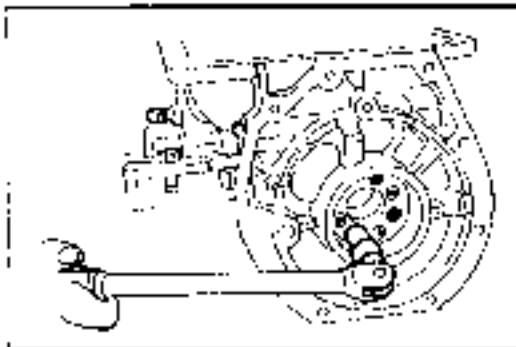
Disassemble in the order shown in the figure, referring to **Disassembly Note**.
Inspect all parts, and repair or replace if necessary.



Non (m-lg, n-lb)
PICKS 95:

1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
Inspect for damage or burning
Inspection page K2-95
4. Allen head bolts and washers
5. Low pre-way clutch inner race
Disassembly Note page K2-95
Inspection page K2-96
- 6 Spring retainer

7. Return spring
Inspection..... page K2-95
8. Bearing
Inspect for damage or rough rotation
9. Seal rings
10. Low and reverse brake piston
Inspect balls for sticking by shaking piston
Disassembly Note page K2-95
Inspection. page K2-95
- * 1. O-ring
- * 2. Seal ring



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.

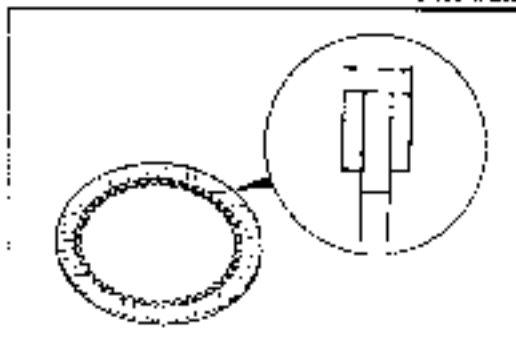


9MJD41-238

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/cm², 57 psi) max.



9MJD41-250

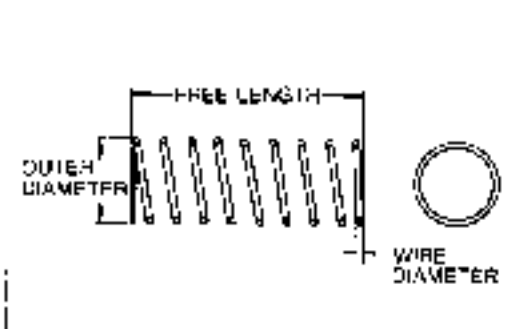
Inspection**Drive plates**

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.



9MJD41-251

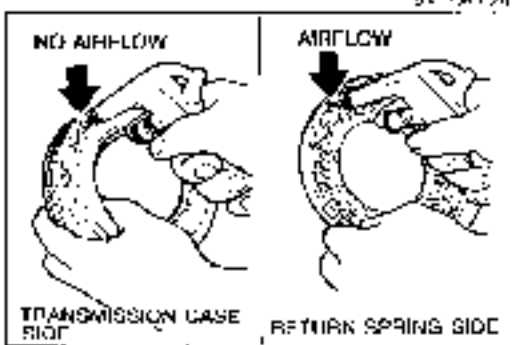
Return spring

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.

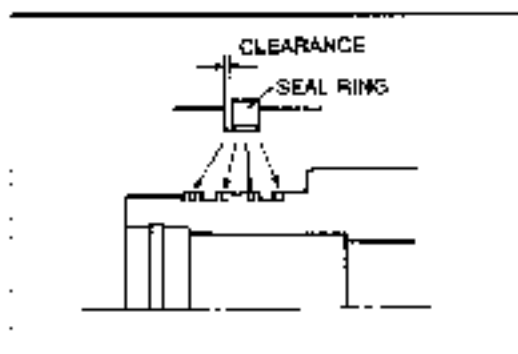


9MJD41-252

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/cm², 57 psi) max.



9MUDK1-263

Low one-way clutch inner race

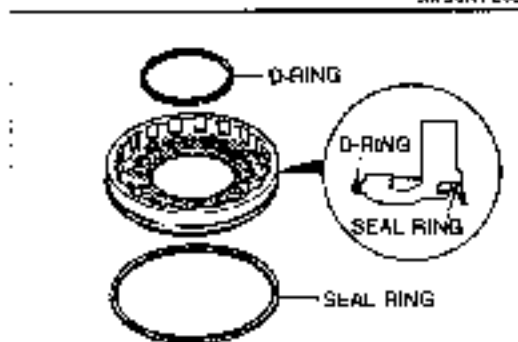
1. Apply petroleum jelly to a new seal ring and install the seal ring.
2. Measure the clearance between the seal ring and the ring groove.

Standard clearance:

0.10—0.25mm (0.0039—0.0098 in)

Maximum clearance: 0.25mm (0.0098 in)

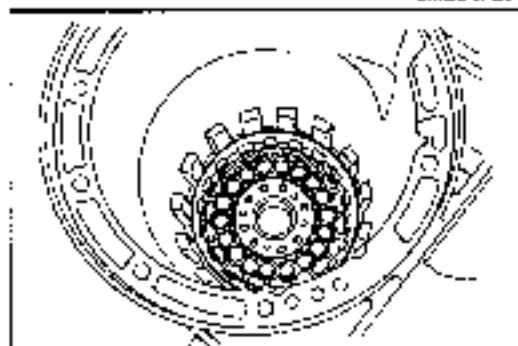
3. If not within specification, replace the low one-way clutch inner race.



9MUDK1-264

Assembly

1. Apply ATF to the new D ring and seal ring and install them to the low and reverse brake piston.

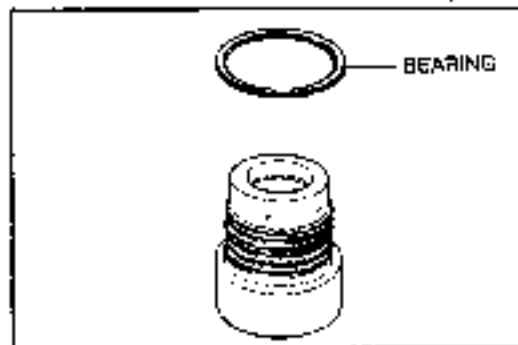


9MUDK1-285

Caution

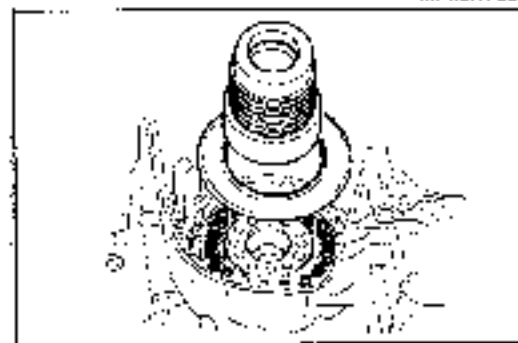
Apply even pressure to the perimeter of the brake piston to avoid damaging the D-ring and seal ring when installing.

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.



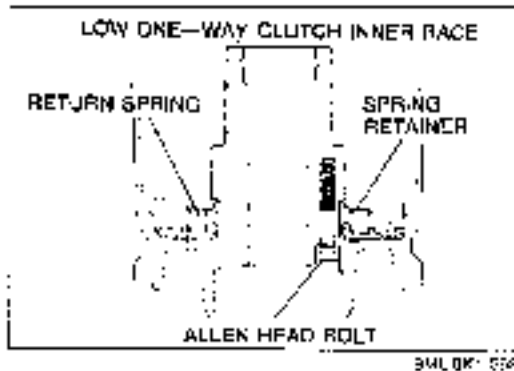
9MUDK1-286

4. Apply petroleum jelly to the bearing, and install it on the low one-way clutch inner race.

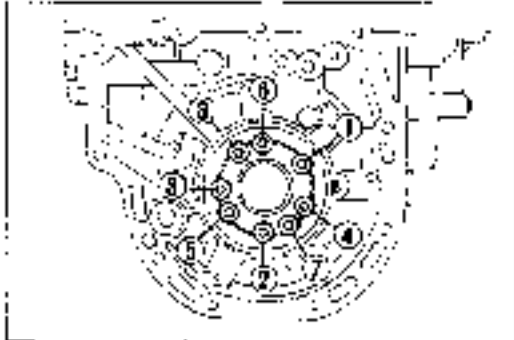
Bearing outer diameter: 78.0mm (3.071 in)

9MUDK1-287

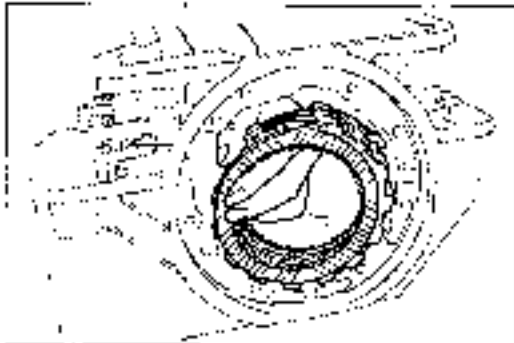
5. Assemble the return spring, spring retainer and low one-way clutch inner race to the low and reverse brake piston.



SMU0K1056



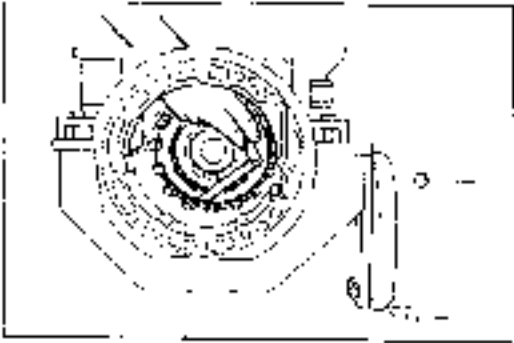
SMU0K1060



SMU0K1070



SMU0K1071



SMU0K1072

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.

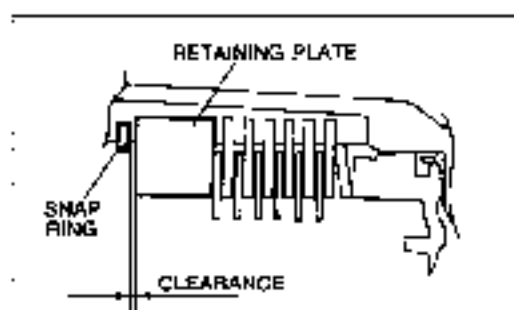
11. Measure the clearance between the retaining plate and the snap ring with a feeler gauge. If not with a specification, adjust the clearance by installing the correct retaining plate.

Standard clearance: 0.7—2.3mm (0.028—0.091 in)

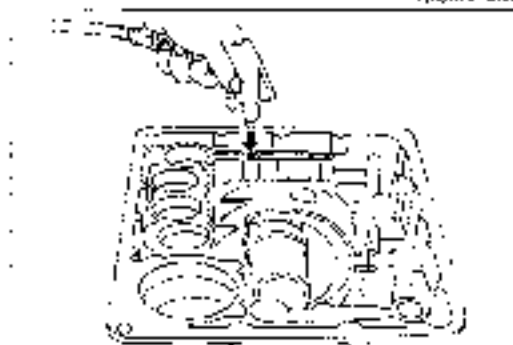
Retaining plate sizes

mm (in)

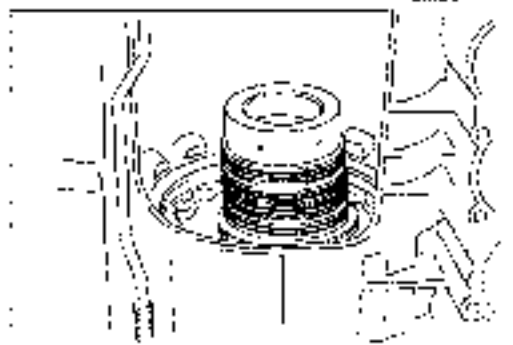
9.0 (0.354)	9.2 (0.362)	9.4 (0.370)
9.6 (0.378)	9.8 (0.386)	10.0 (0.394)



1BUCK-053



EMUCK1-273



BUUCK1-275

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/cm², 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.

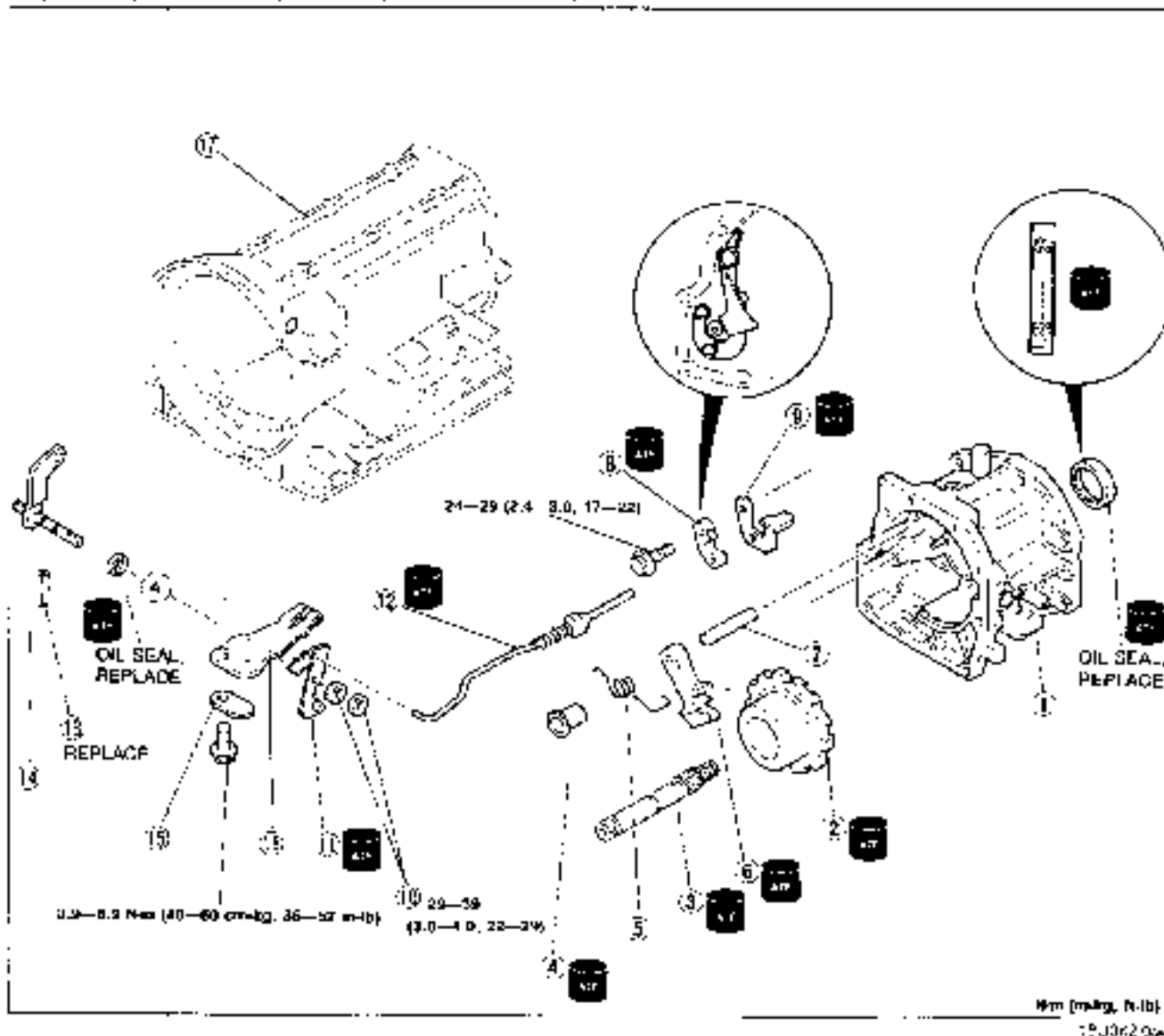
ADAPTER CASE AND PARKING MECHANISM

Disassembly and Inspection

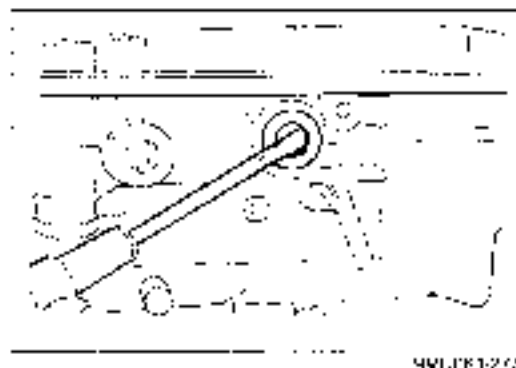
Caution

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.



1. Adapter case	11. Manual plate
2. Parking gear Inspect individual gear teeth for damage or wear and rough rotation of bearing	12. Parking rod
3. Output shaft Inspect splines for damage or wear	13. Roll pin
4. Parking pawl spacer	14. Manual shaft
5. Return spring	15. Spacer
6. Parking pawl	16. Detent spring Inspect for fracture or wear
7. Parking pawl shaft	17. Transmission case Inspection
8. Parking actuator	a) Damage or wear of oil seal Disassembly page K2-100
9. Parking rod guide	b) Damage or rough rotation of inner bearing
10. Locknuts	

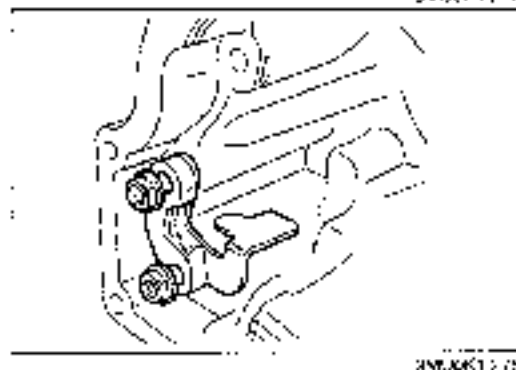
**Disassembly note**

Oil seal (Transmission side)

Caution

Do not remove the seal unless necessary.

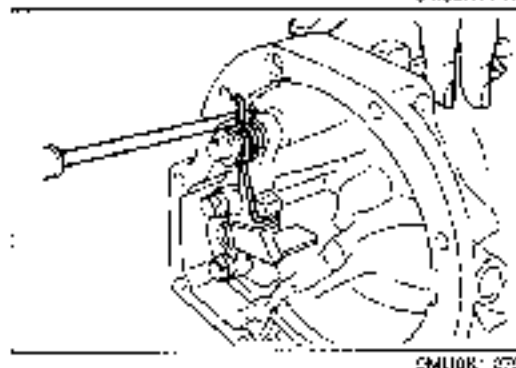
Remove the oil seal with a screwdriver

**Assembly****Extension housing**

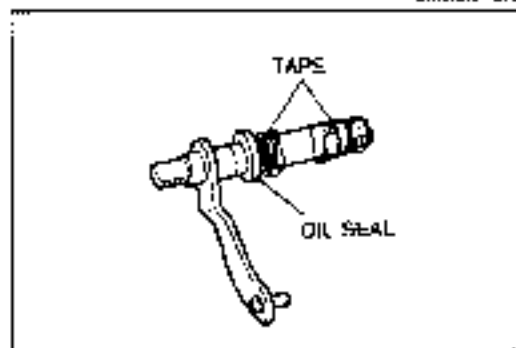
1. Apply ATF to the parking rod guide and parking actuator, and install them in the extension housing.

Tightening torque:

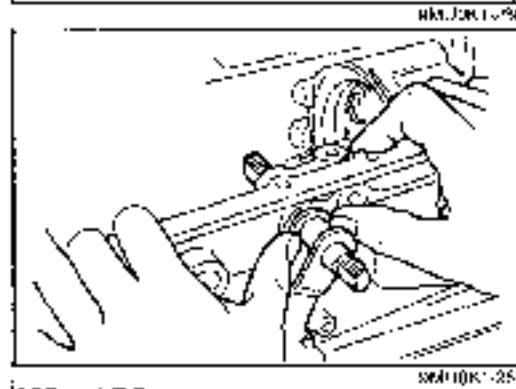
24—29 N·m (2.4—3.0 m·kg, 17—22 ft·lb)



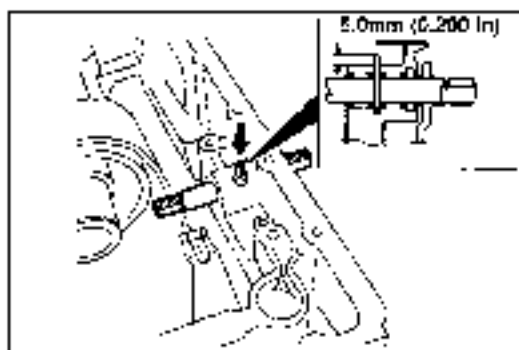
2. Apply ATF to the parking pawl shaft and install it in the extension housing.
3. Apply ATF to the parking pawl, return spring and spacer, and install them in the extension housing.

**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.

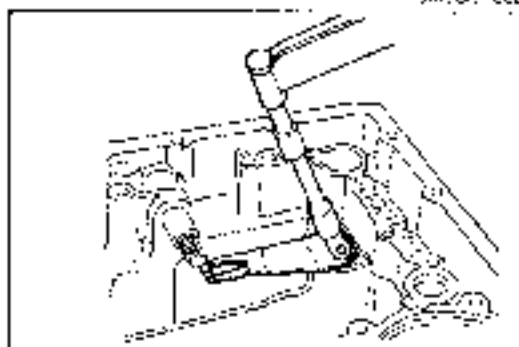


3. Apply ATF to the bearing in the transmission case.
4. Install the manual shaft into the transmission case.
5. Push the oil seal squarely into the transmission case.
6. Remove the tape.



9M_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.

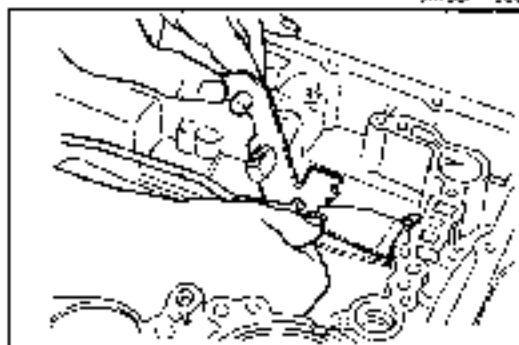


9M_A0K-1-202

8. Install the detent spring and spacer.

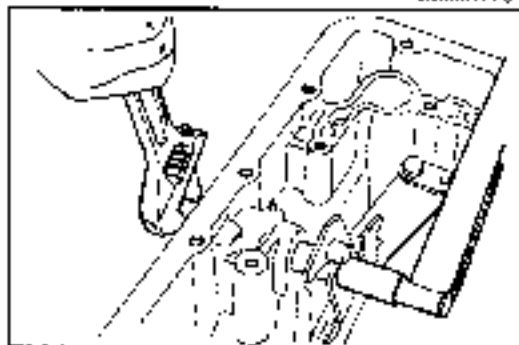
Tightening torque:

3.9—5.9 N·m (40—60 cm·kg, 35—52 in·lb)



06WJ0K1-204

9. Install the manual plate and parking rod.

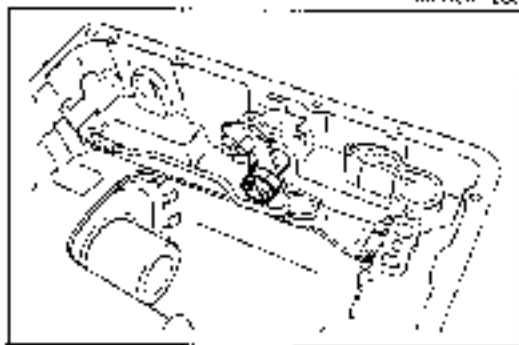


S0VJ0K1-206

10. Tighten the locknuts

Tightening torque:

29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



S0VJ0K1-206

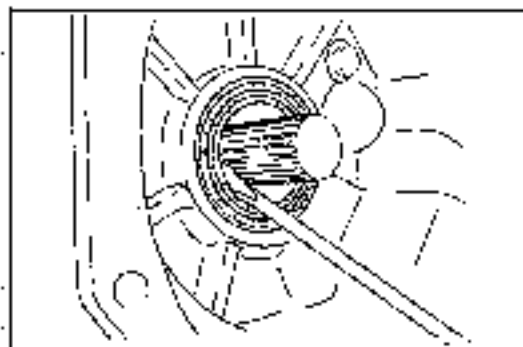
11. Check the parking mechanism operation.

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

Following **SSTs** used for 4WD model.

49 U027 003 Installer, oil seal 	49 G030 795 Installer, oil seal 	49 G030 797 Handle (Part of 49 G030 795) 

CMU0K1-09F

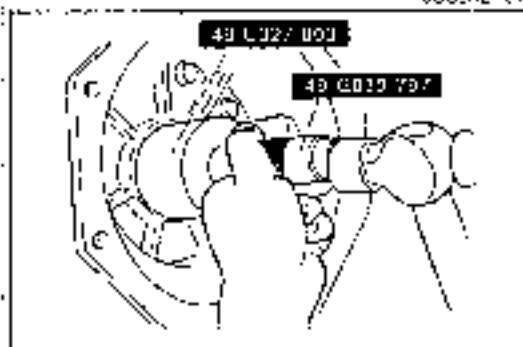
**Inspection**

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

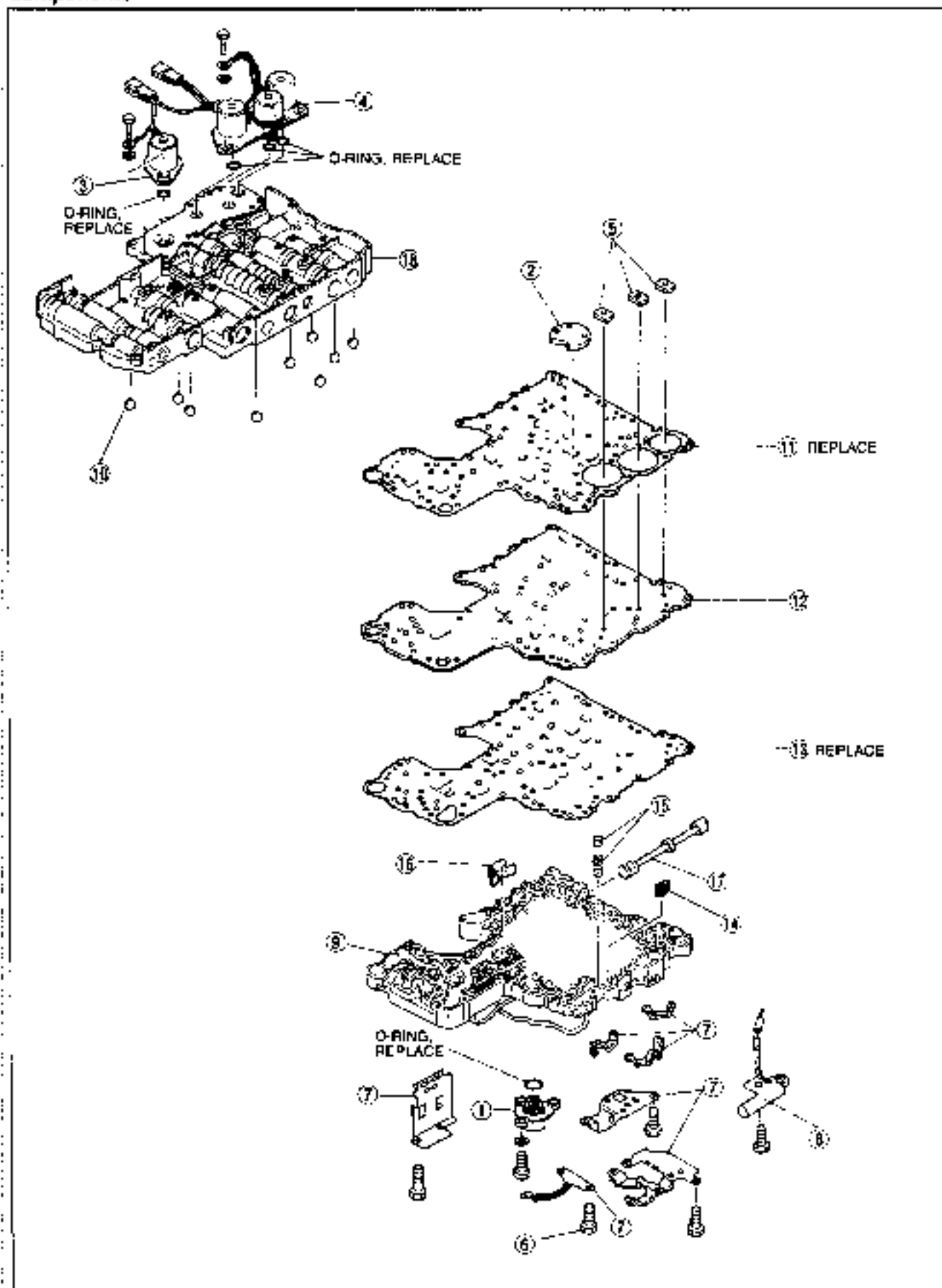
CONTROL VALVE BODY (DISASSEMBLY AND INSPECTION)
Disassembly and Inspection**Caution**

- 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.

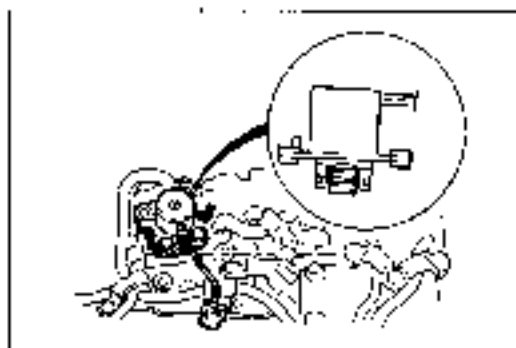
GB10002-02

Components

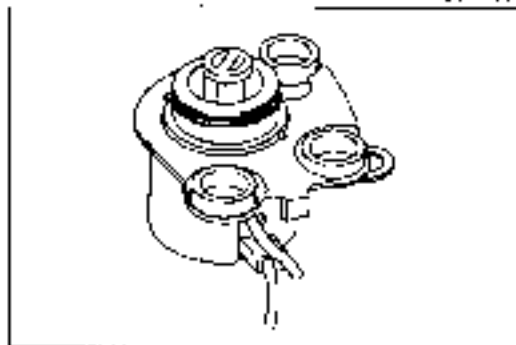


1. Lockup solenoid Inspect filter for clogging or damage Inspection..... page K2- 38 2. Side plate 3. Line pressure solenoid Inspect filter for clogging or damage Inspection..... page K2- 38 4. Overrunning clutch solenoid, shift solenoid A and shift solenoid B Inspect filter for clogging or damage Inspection..... page K2- 38 5. Support plate 6. Retaining bolts and nuts Installation position..... page K2-150 7. Brackets Installation position..... page K2- 119 8. ATF thermoswitch Inspection..... page K2- 38	9. Lower valve body Disassembly and Inspection .. page K2-116 Installation..... page K2-117 10. Steel ball Installation position..... page K2-119 11. Upper gasket 12. Separate plate Inspect fluid passages for clogging or damage 13. Lower gasket 14. Accumulator filter Inspect for clogging or damage 15. Orifice check valve and spring 16. Pilot filter Inspect for clogging or damage 17. Manual valve Inspect for sticking, scoring, or scratches 18. Upper valve body Disassembly and Inspection .. page K2-105 Assembly..... page K2- 111

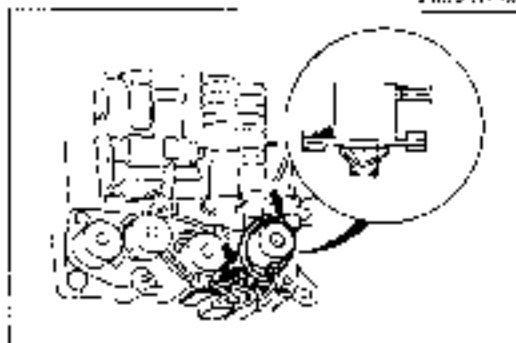
2FALLKAC22



9M1J041-227



9M1J041-200



9M1J041-205

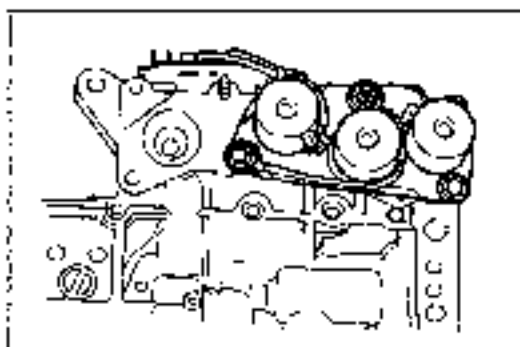
Procedure

1. Remove the lockup solenoid and side plate.

2. Remove the O-ring from the lockup solenoid.

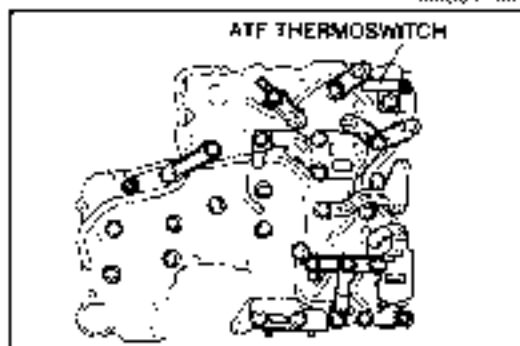
3. Remove the line pressure solenoid.

4. Remove the O-ring from the line pressure solenoid.



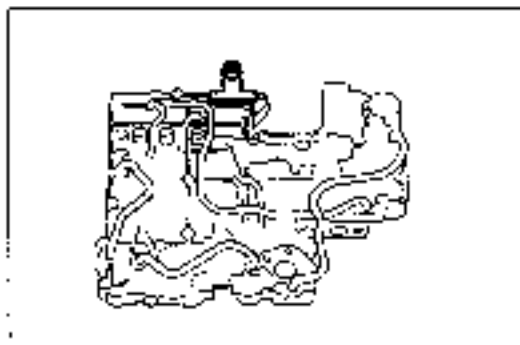
9MUCR1004

5. Remove the solenoids.
6. Remove the O-rings from the solenoids.



06R1142-110

7. Remove the support plate
8. Remove the bolts, nuts, brackets, and ATF thermoswitch

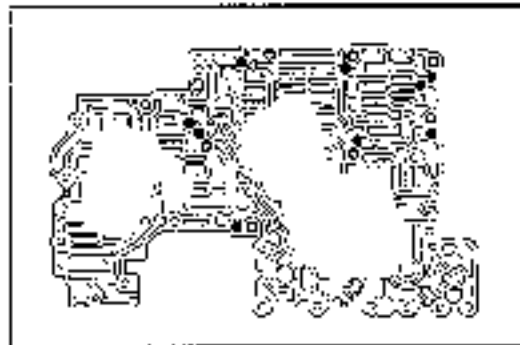


9MUCR1006

Caution

- a) Do not scratch the lower valve body.
- b) Be careful not to drop the pilot filter, orifice check valve or spring.

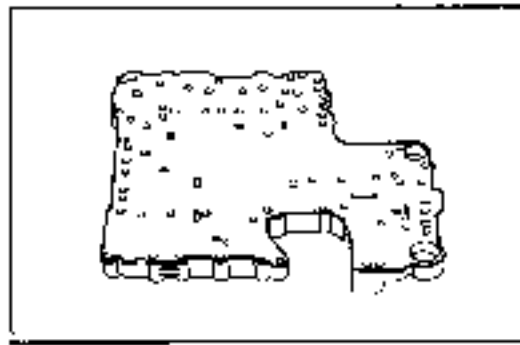
9. Hold the lower valve body, lower and upper gaskets and separate plate with a large clip.
10. Separate the lower valve body from the upper valve body



9VLCR1007

Caution**Do not drop or lose the steel balls.**

11. Remove the steel balls from the upper valve body.

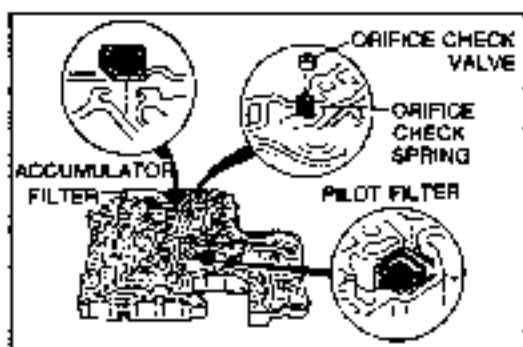


9VLCR1008

12. Face the lower valve body downward, and remove the holding clip.

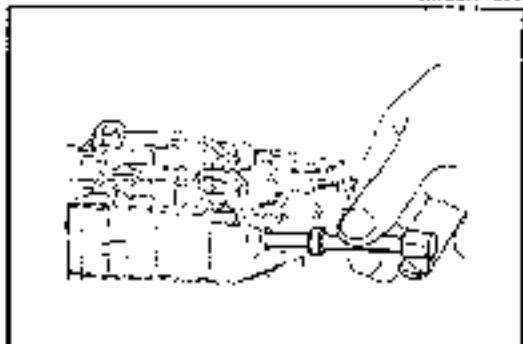
Caution**Do not lose the pilot filter, orifice check valve or spring.**

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

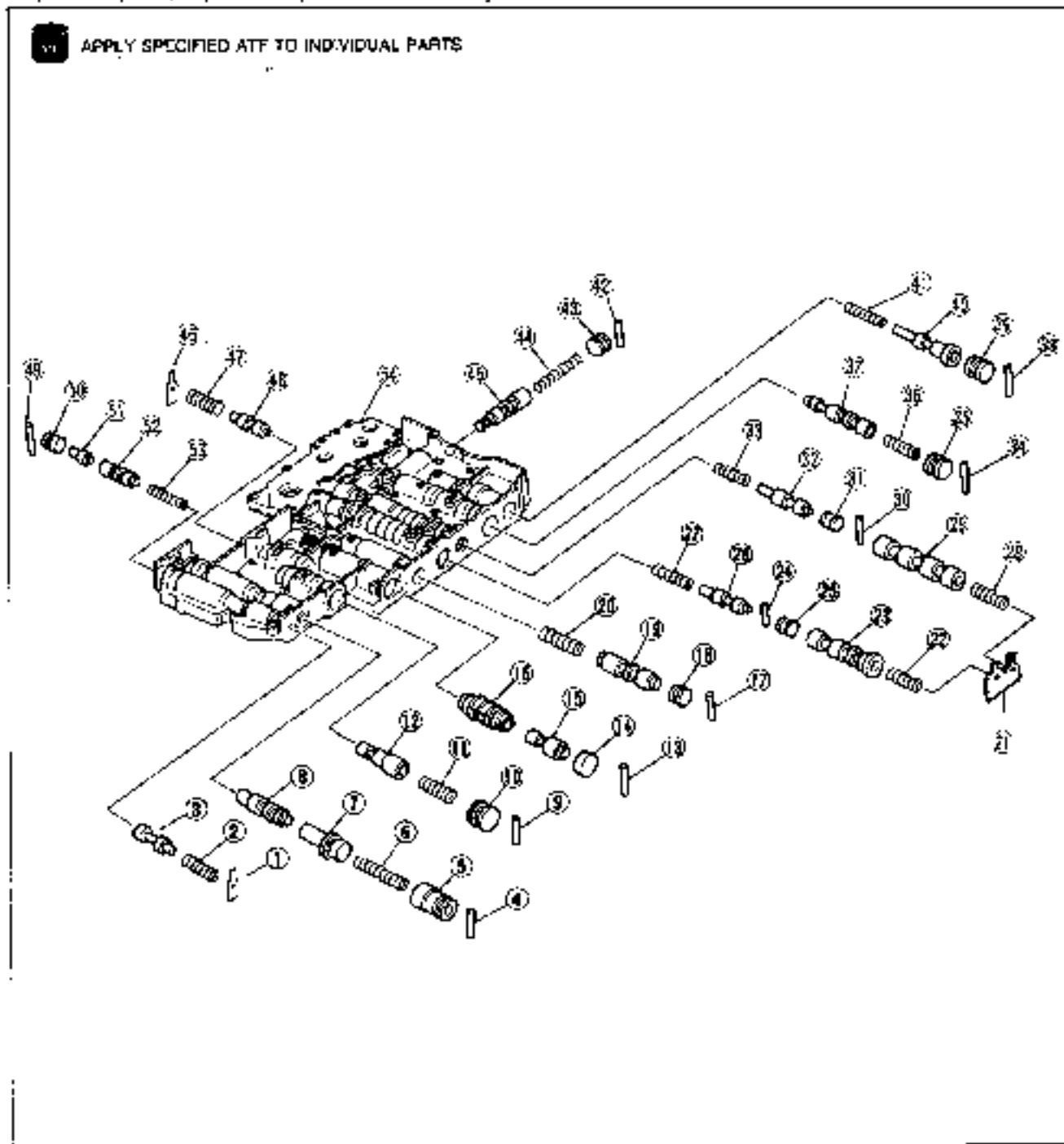
Disassembly and Inspection

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**.

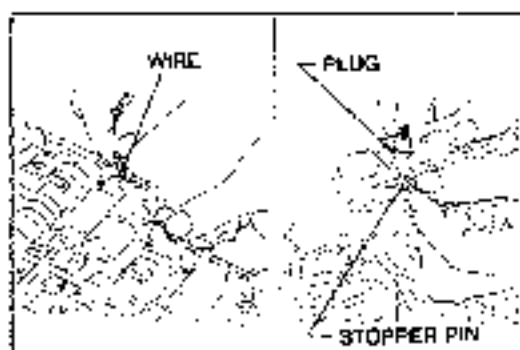
Inspect all parts, repair or replace as necessary.



09J0K2-70

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	

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9M1J0K1-3-13

Disassembly note**Stopper pin****Caution**

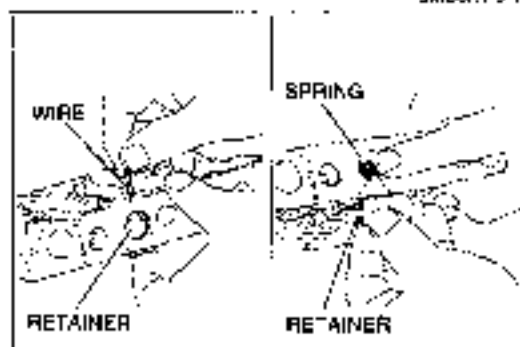
Do not use a magnet to hold the pin.

1. Push the stopper pin part way out with a wire.
2. Depress and hold the plug or sleeve with a finger to prevent the valve from jumping out.
3. Remove the stopper pin, and remove the valve and internal parts.

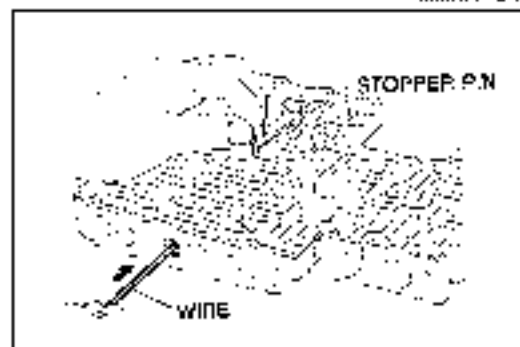
Retainer**Caution**

Do not use a magnet to hold the retainer.

1. Push the retainer part way out with a wire.
2. Hold the inside parts with a finger to prevent the valve from popping out.
3. Remove the retainer, the valve, and the internal parts.



9M1J0K1-3-13



9M1J0K1-3-14

4-2 sequence valve and 4-2 relay valve**Caution**

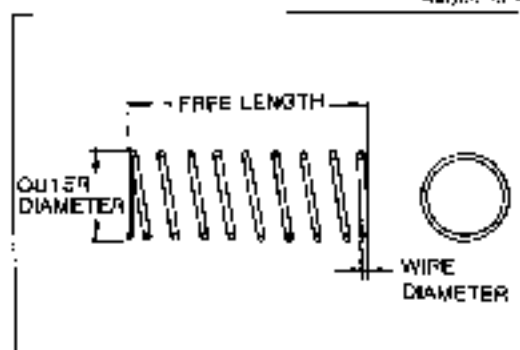
a) Removal may be difficult.

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 very tape wrapped **1.5mm (0.060 in)** thick around the diameter rod to prevent the valve from popping out.
3. Remove the stopper pin, the valve, and the internal parts.

Inspection

1. Measure the spring specifications.
2. If not within specification, replace the spring(s).



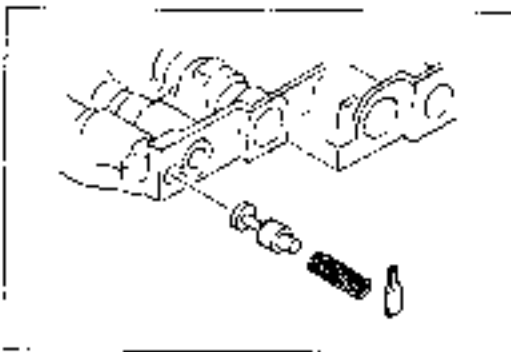
9M1J0K1-3-15

Spring	Item	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Torque converter relief valve		9.0 (0.354)	38.0 (1.496)	12.7	1.4 (0.055)
Pressure regulator valve		14.0 (0.551)	44.0 (1.732)	7.9	1.4 (0.055)
Pressure modifier valve*	A	6.8 (0.268)	31.95 (1.258)	15.0	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)

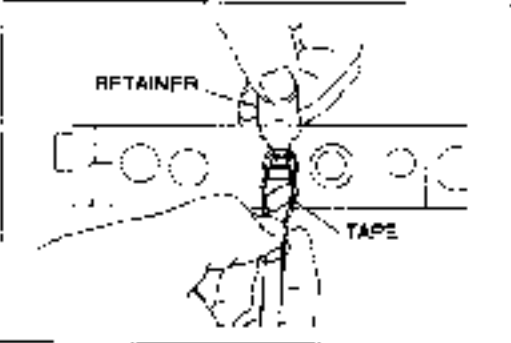
* Either A, B or C type spring is installed at shipment. Only A type spring is available for replacement.

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 (0.024)
Overrunning clutch reducing valve		7.0 (0.276)	32.6 (0.984)	12.6	0.85 (0.033)
Shuttle shift valve S		6.5 (0.217)	43.0 (1.693)	22.2	0.95 (0.033)
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)

29L3K2-J30



DSLCK2-13



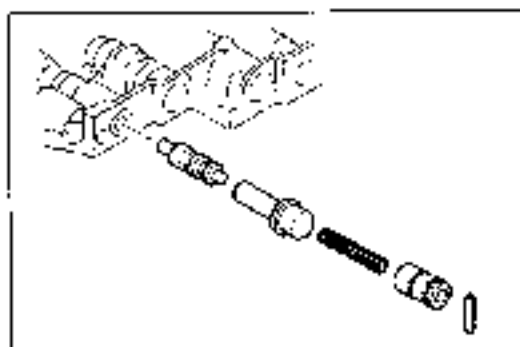
29L3K2-114

Assembly Procedure

Caution

- Before assembly, make sure all parts are thoroughly clean.
- Apply ATF to all parts and bores.
- Note the proper direction of the valve and internal parts.
- Do not reuse any parts that have been dropped.
- Do not scratch the valve or valve body.
- Wrap a screwdriver or rod with tape before using it to insert a valve.

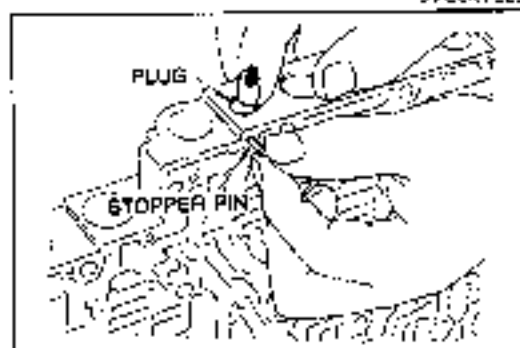
- Insert the torque converter relief valve and spring.
- Install the retainer while compressing the spring.



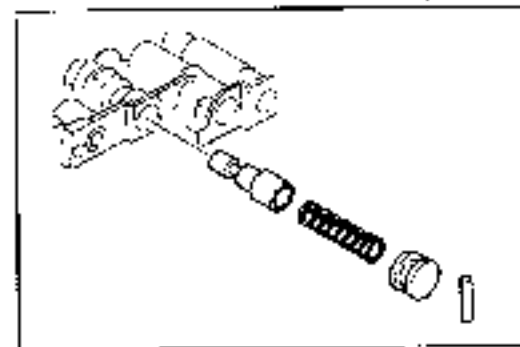
3. Insert the pressure regulator valve, plug, spring, and sleeve.

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.

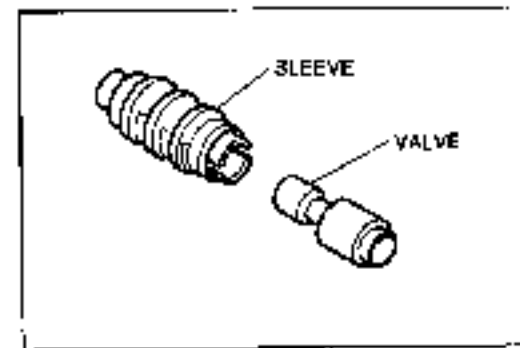


4. Insert the stopper pin while pushing the sleeve.



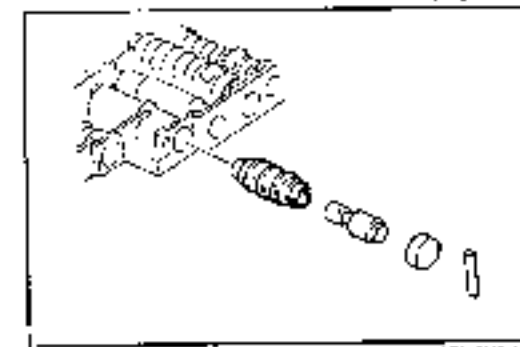
5. Insert the pressure modifier valve, spring, and plug.

6. Insert the stopper pin while pushing the sleeve.



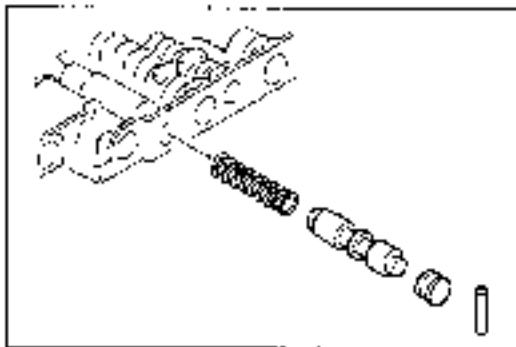
Note

Align the notch of the sleeve with the plug and insert the stopper pin while pushing the plug.



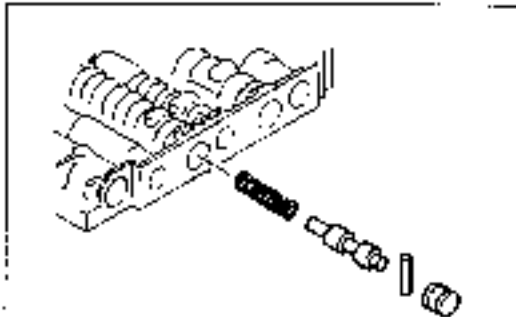
7. Insert the accumulator control valve, sleeve, and plug.

8. Insert the stopper pin while pushing the plug.



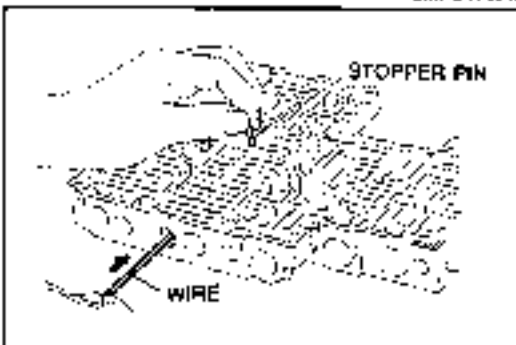
9M10K1-323

9. Insert the shuttle valve D, spring, and plug.
10. Insert the stopper pin while pushing the plug.



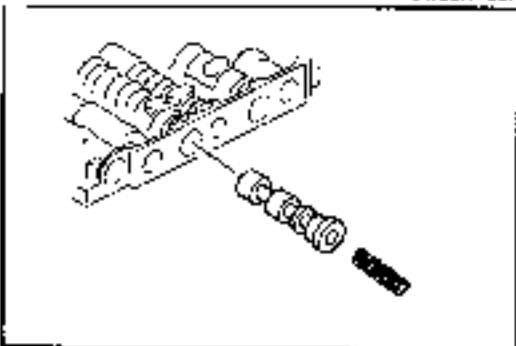
9M10K1-326

11. Insert the 4-2 sequence valve, spring, and plug.



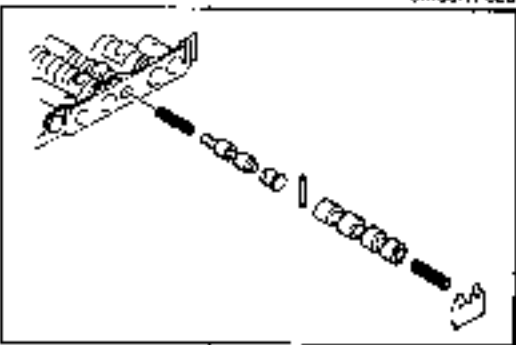
9M10K1-327

12. Push in the plug with a vinyl tape wrapped **1.5mm (0.060 in)** diameter rod.
13. Insert the stopper pin.



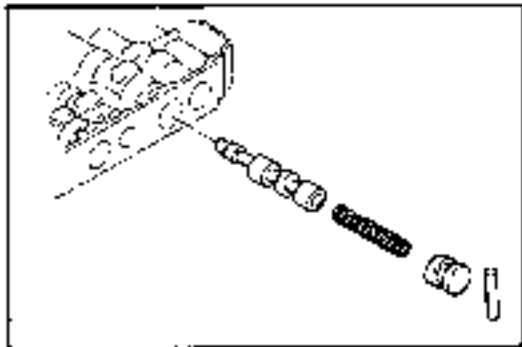
9M10K1-328

14. Insert the shift valve B.
15. Insert the spring.



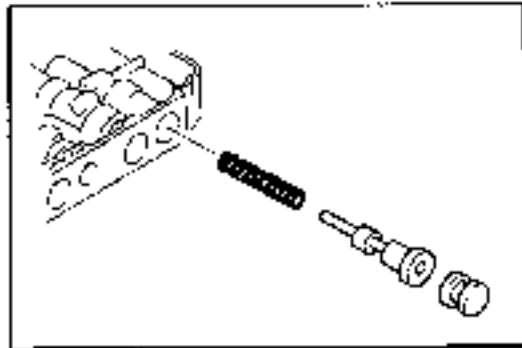
9M10K1-329

16. Insert the 4-2 relay valve and spring.
17. Insert the stopper pin while pushing the plug.
18. Insert the shift valve A and spring.
19. Insert the retainer while compressing the spring.



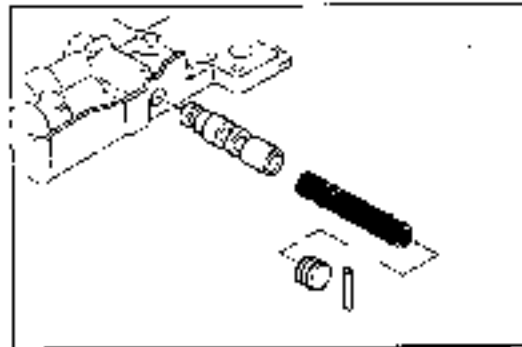
9MUJKT-300

20. Insert the overrunning clutch control valve, spring, and plug.
21. Insert the stopper pin while pushing the plug.



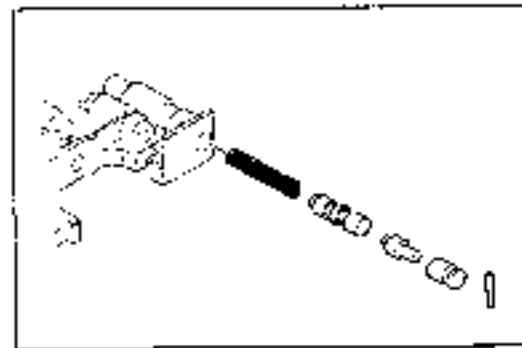
9MUJKT-301

22. Insert the overrunning clutch reducing valve, spring, and plug.
23. Insert the stopper pin while pushing the plug.



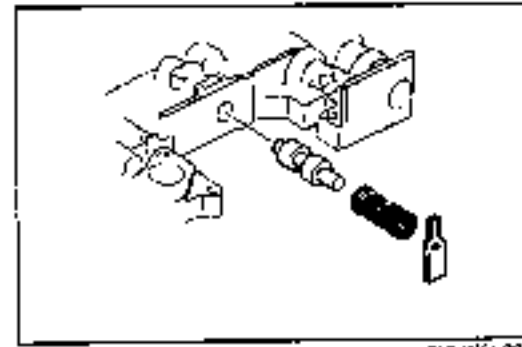
9MUJKT-302

24. Insert the shuttle shift valve S, spring, and plug.
25. Insert the stopper pin while pushing the plug.



9MUJKT-303

26. Insert the lockup control valve, spring, plug, and sleeve.
27. Insert the stopper pin while pushing the sleeve.



9MUJKT-304

28. Insert the pilot valve and spring.
29. Insert the retainer while pushing the spring.

MEMO

LOWER VALVE BODY

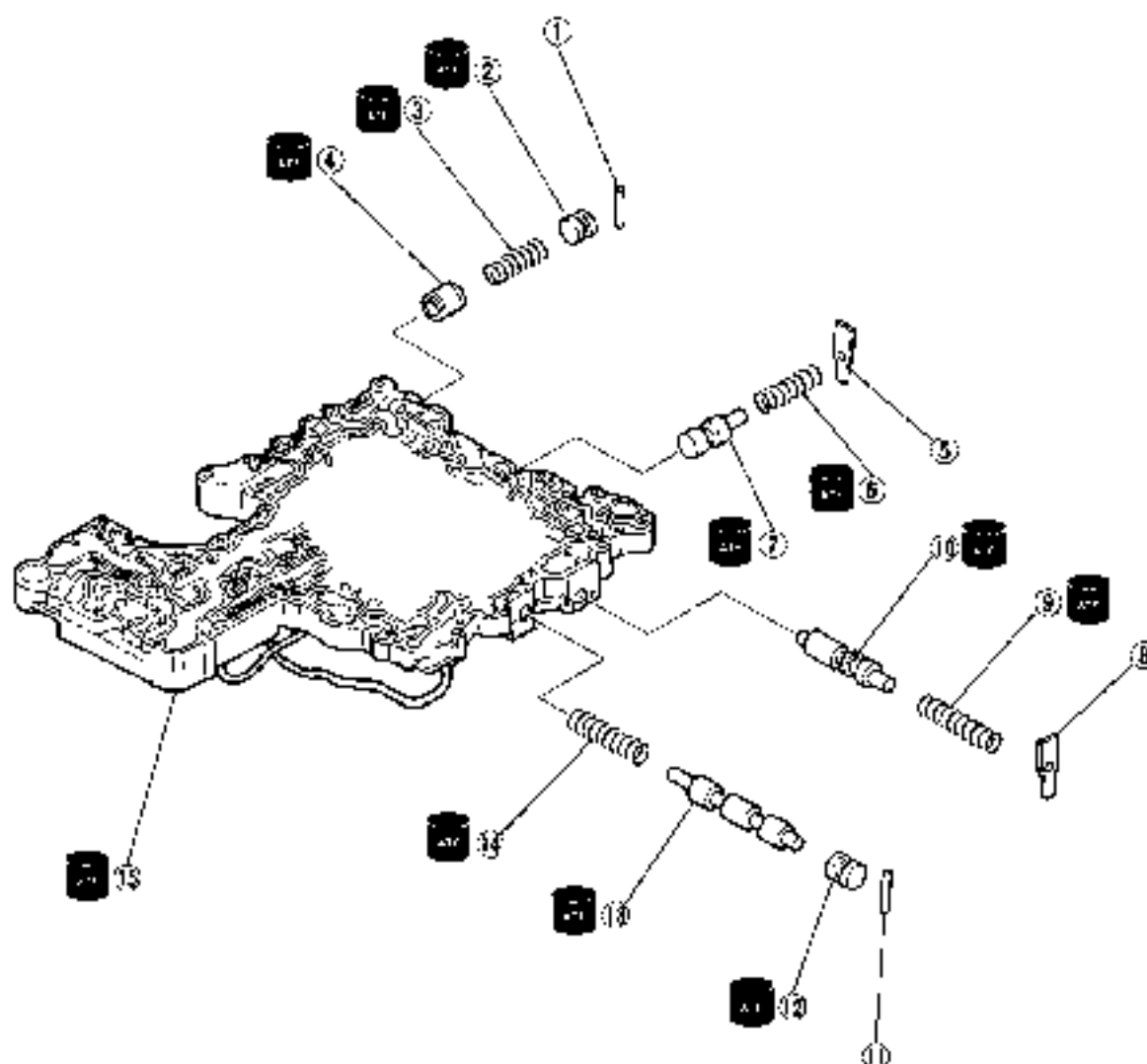
Disassembly and Inspection

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.

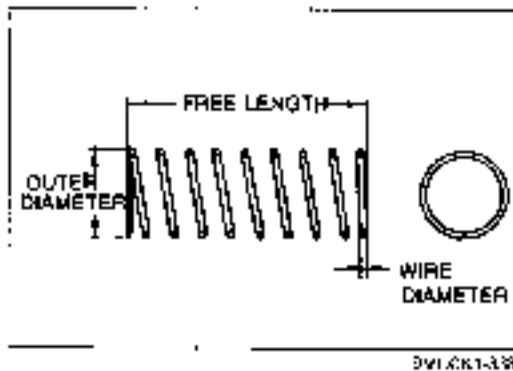
Disassemble in the order shown in the figure.

Inspect all parts; repair or replace as necessary.



1. Stopper pin Disassembly Note page K2-110	9. 3-2 timing spring Inspection page K2-117
2. Modifier accumulator plug	10. 3-2 timing valve Inspect for sticking, scoring or scratches
3. Modifier accumulator spring Inspection page K2-117	11. Stopper pin Disassembly Note page K2-110
4. Modifier accumulator valve Inspect for sticking, scoring or scratches	12. Servo charger plug
5. Retainer	13. Servo charger valve Inspect for sticking, scoring or scratches
6. 1st reducing spring Inspection page K2-117	14. Servo charger spring Inspection page K2-110
7. 1st reducing valve Inspect for sticking, scoring or scratches	15. Lower valve body Inspect for damage or scoring
8. Retainer Disassembly Note page K2-110	

10J0K2-069



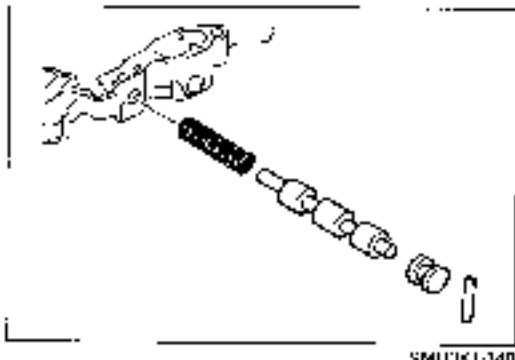
9V16K1-338

Inspection

1. Measure the spring specifications
2. 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				
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)

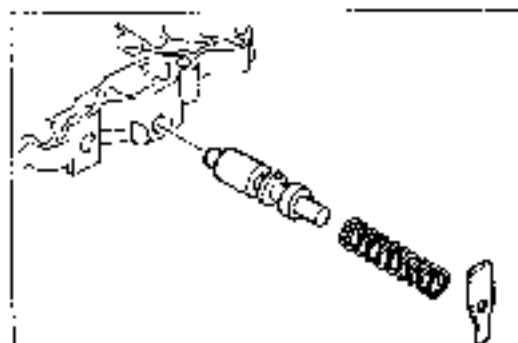
10J0K2-069



9M0J01-340

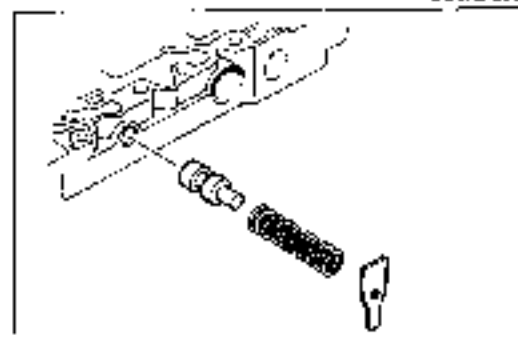
Installation

1. Insert the servo charger valve, spring, and plug.
2. Insert the stopper pin while pushing the plug.



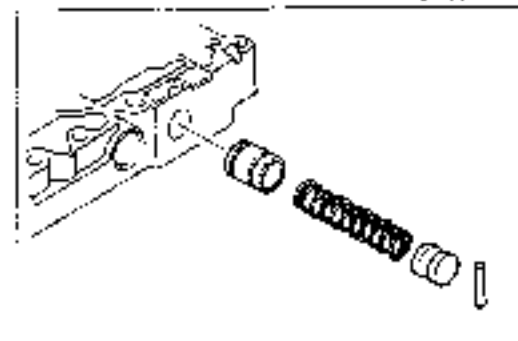
BLOCK 2 D86

3. Insert the 3-2 timing valve and spring.
4. Insert the retainer while compressing the spring.



BLOCK 1 D42

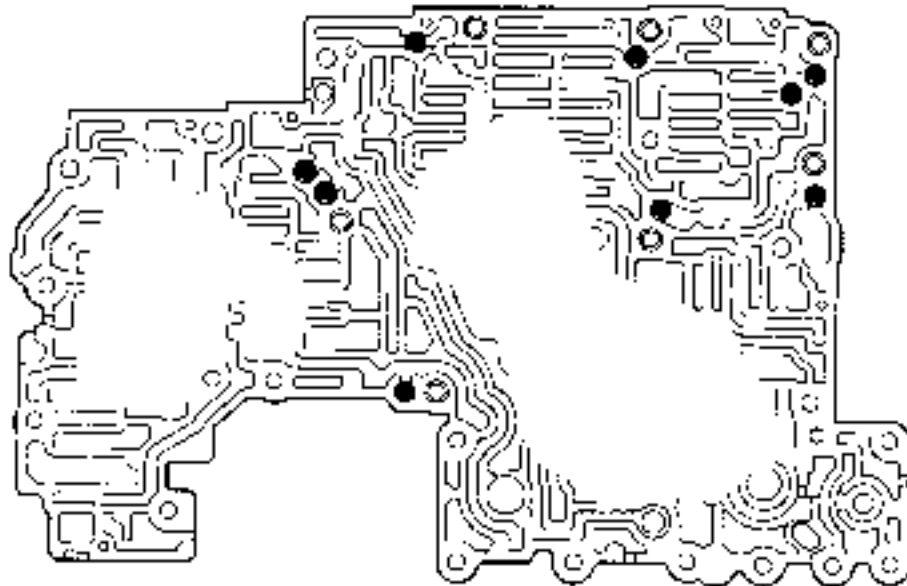
5. Insert the 1st reducing valve and spring.
6. Insert the retainer while compressing the spring.



BLOCK 1 345

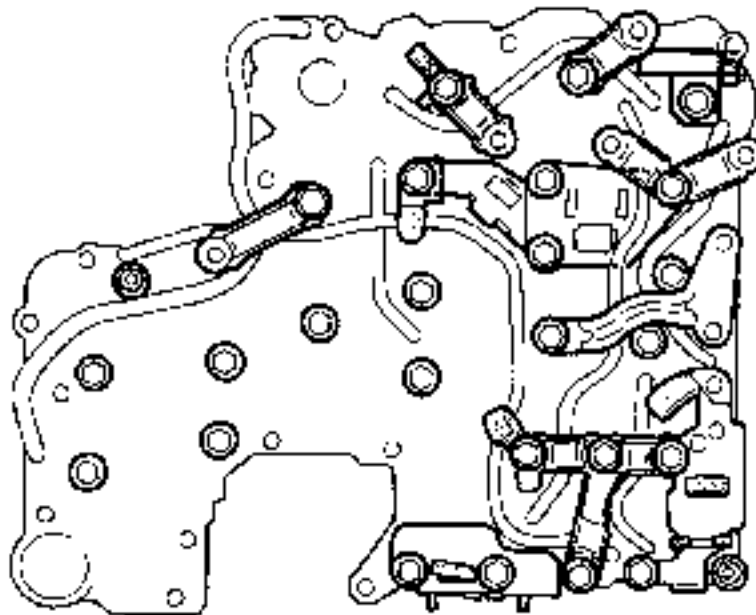
7. Insert the modifier accumulator valve, spring, and plug.
8. Insert the stopper pin while pushing the plug.

Steel ball installation positions

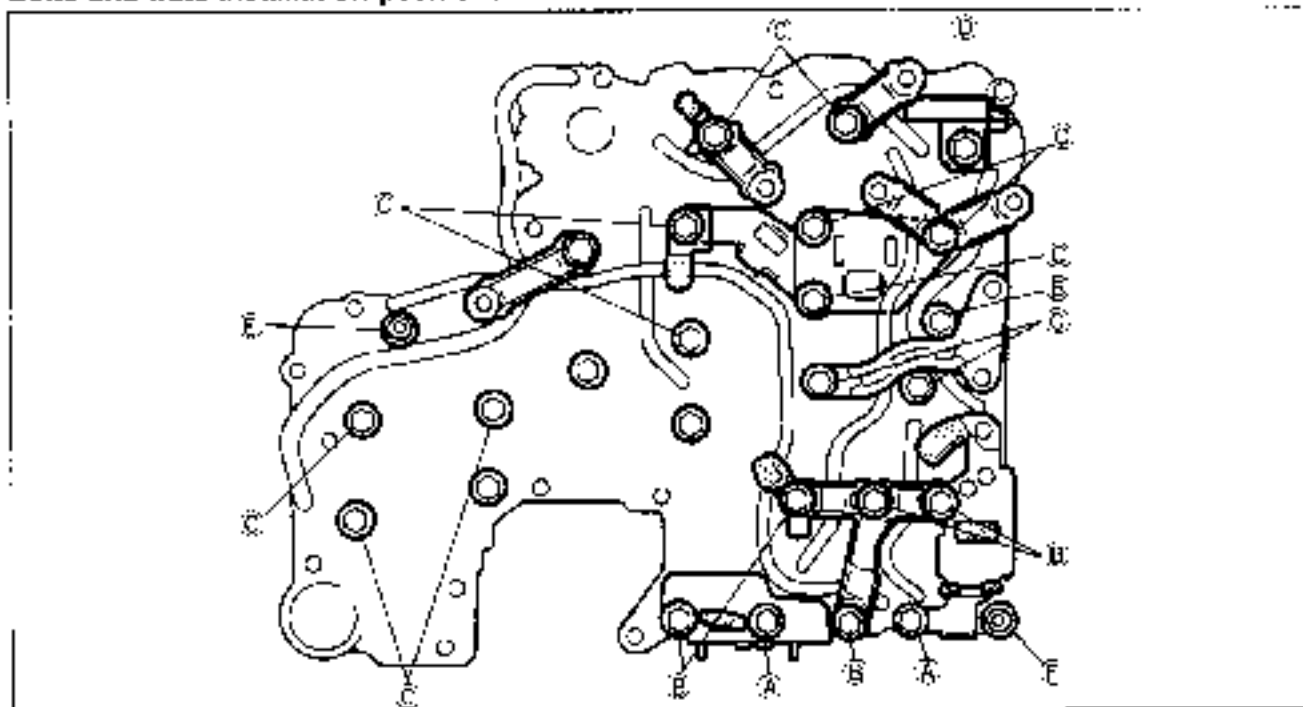


KATLY9K1-244

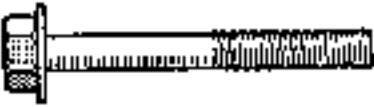
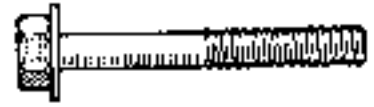
Bracket installation positions

SMCJOK1-345
K2-119

Bolts and nuts installation positions



9MJK1-346

Identification letter	Bolts and nuts	Length mm (in)	Torque specification N·m (cm·kg, in·lb)
A		65 (2.559)	6.5—8.5 (70—90, 61—76)
B		50 (1.969)	
C		35 (1.398)	
D		27 (1.063)	
E		55 (2.165)	
F		40 (2.559)	
G		10 (2.559)	

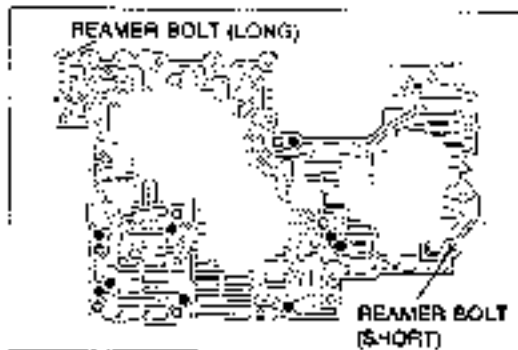
36UJK2-120

CONTROL VALVE BODY (ASSEMBLY)

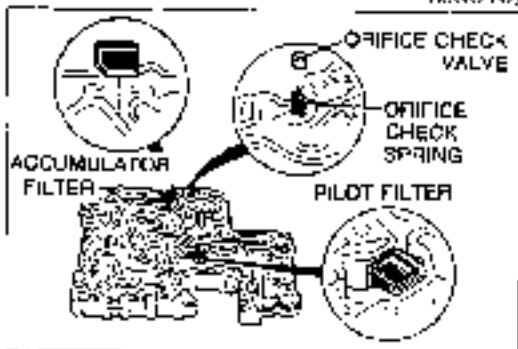
Caution

- a) Before assembly, make sure all parts are perfectly clean.
- b) Apply ATF to all parts.
Do not reuse the gasket or O-ring.

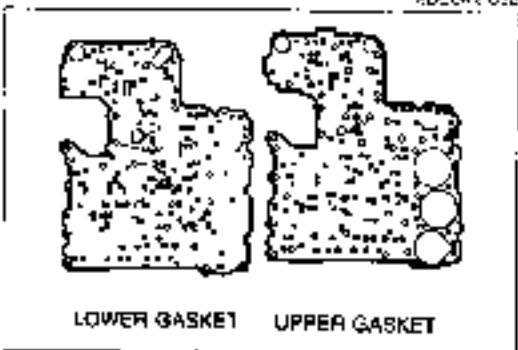
9MUD41.316



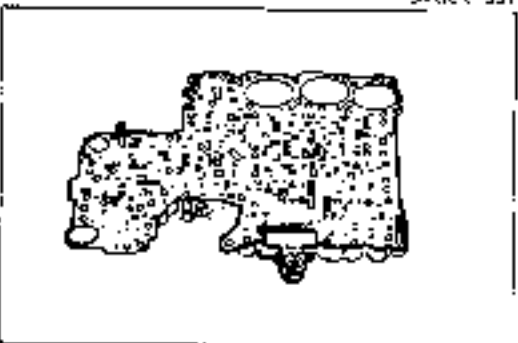
BLOCK 183



BLOCK 203



BLOCK 351

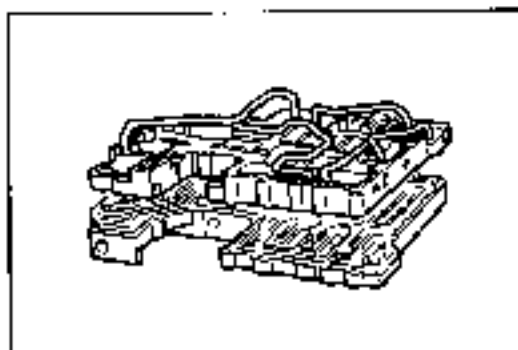
**Procedure**

1. Install the steel balls and reamer bolts into their proper positions of the upper valve body.
(Refer to page K2-121 for installation positions.)

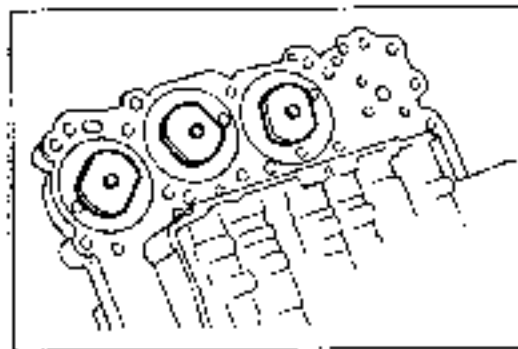
2. Install the pilot filter, accumulator filter, and orifice check valve and spring into their proper positions in the lower valve body.

Caution

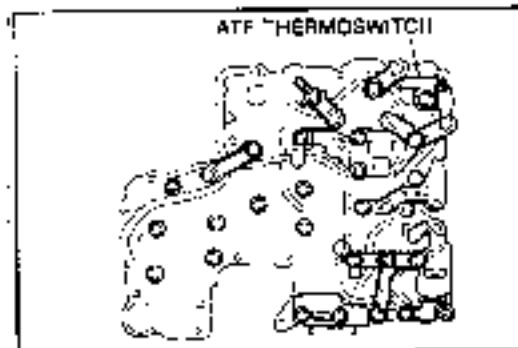
- a) Do not mixup the upper and lower gaskets.
 - b) Do not scratch the lower valve body.
3. Install a new gasket and the separate plate onto the lower valve body and hold both them with a large clip.



4. Set the lower valve body onto the upper valve body.
5. Remove a holding clip.



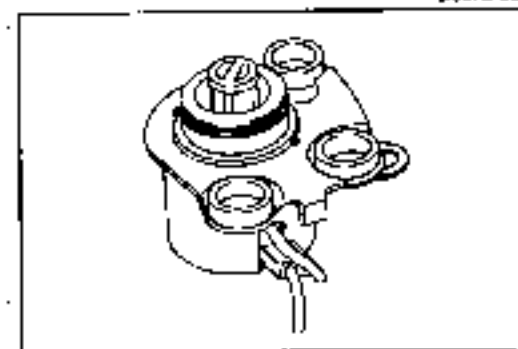
6. The support plate locations are as shown.



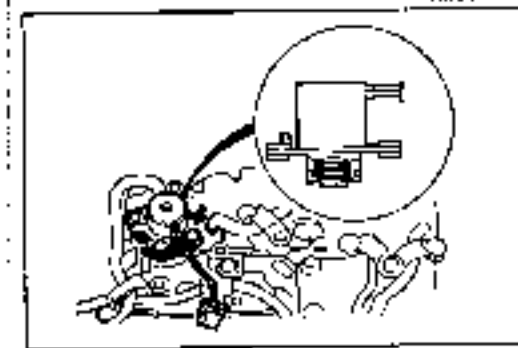
7. Install the bolts, nuts, support plates, ATF thermoswitch, and brackets in their proper positions. (Refer to page K2-122 for installation positions.) Tighten the fasteners evenly and gradually.

Tightening torque:

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



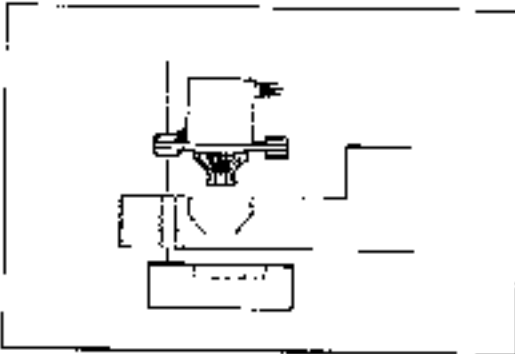
8. Install a new O-ring onto the lockup solenoid.



9. Install the lockup solenoid and side plate to the control valve body assembly.

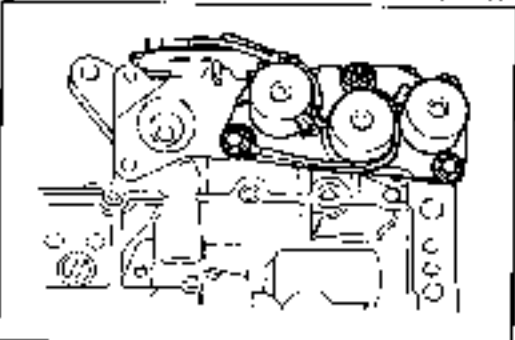
Tightening torque:

9.8—13 N·m (1.0—1.3 m·kg, 87—113 in·lb)



9MLCK1-357

10. The side plate installation are as shown.



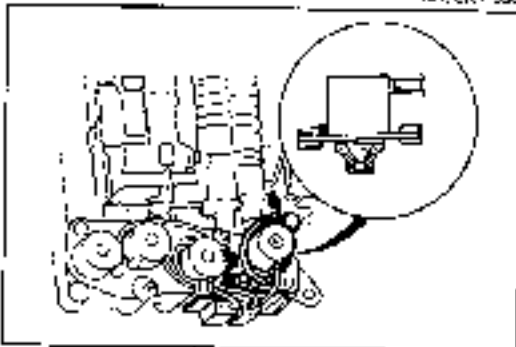
4MLCK1-358

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)



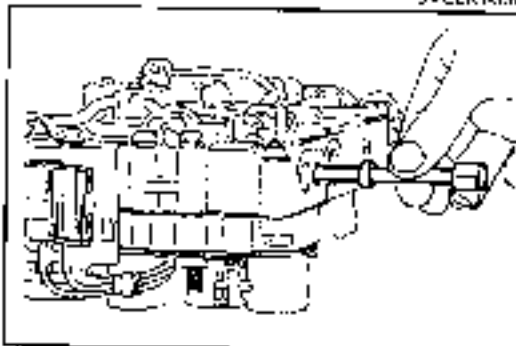
9MLCK1-359

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)

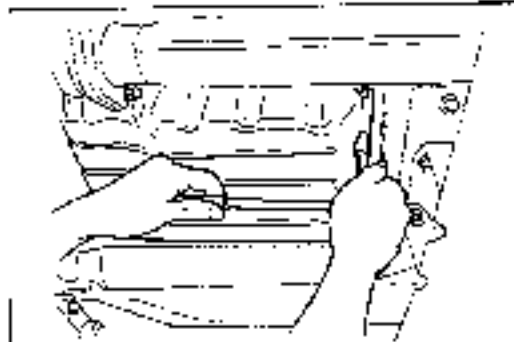


6MLCK1-360

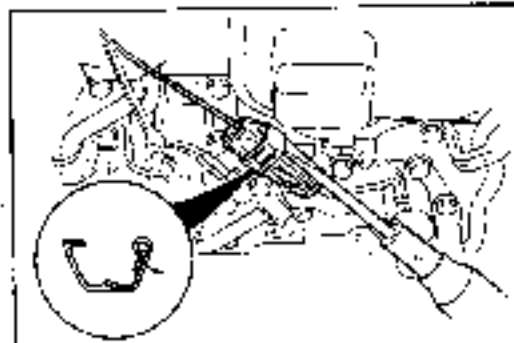
15. Insert the manual valve.



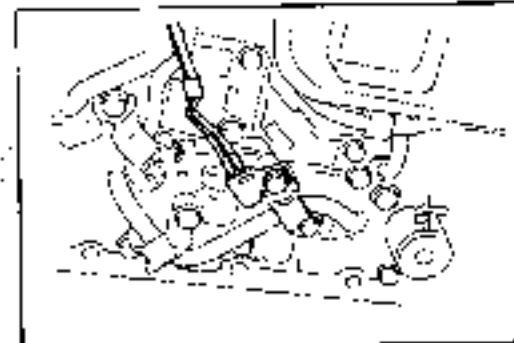
9WUOK1-201



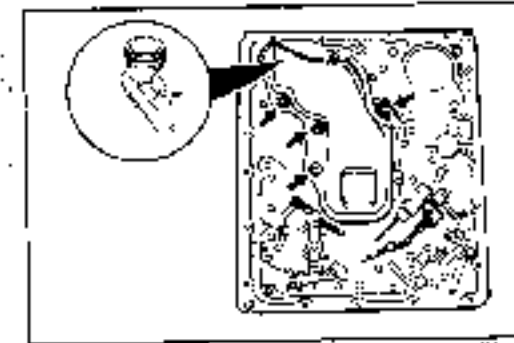
9WUOK1-202



1B10K2-172



02U0K2-175



2K10K1-205

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.

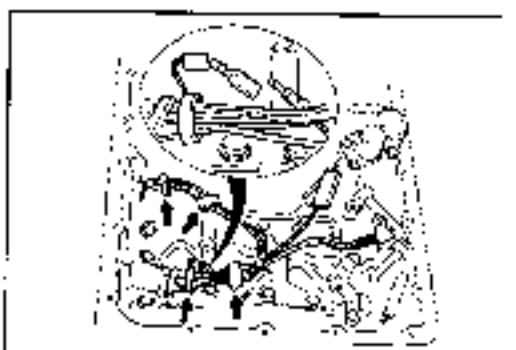
6. Remove the clip.

Caution**Do not damage the harness.**

7. Disconnect the lockup solenoid connector.

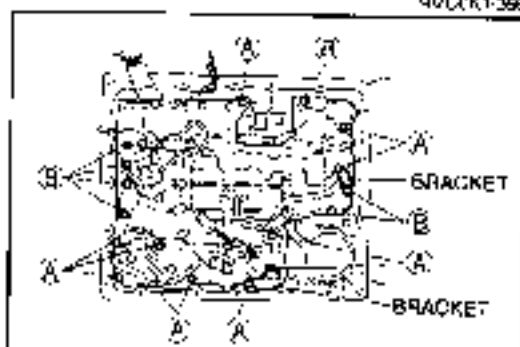
8. Disconnect the ATF thermosensor.

9. Remove the oil strainer.
10. Remove the O-ring from the oil strainer.



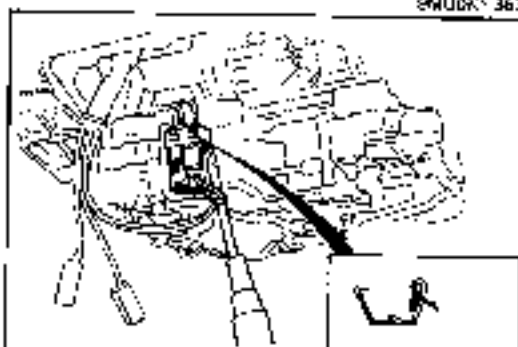
90UDCK1-366

11. Separate the harness of the solenoid connectors from the harness clip.



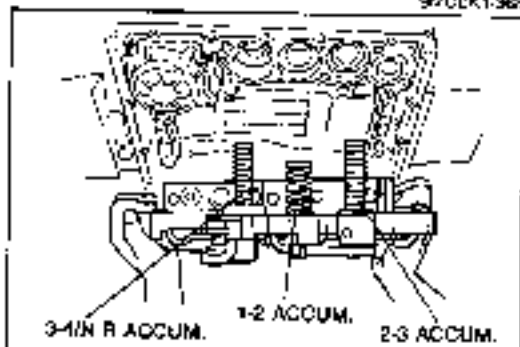
90UDCK1-367

12. Remove the (A) and (B) bolts and bracket shown in the figure



90UDCK1-368

13. Remove the clip.
14. Separate the solenoid connectors.



90UDCK1-369

Caution

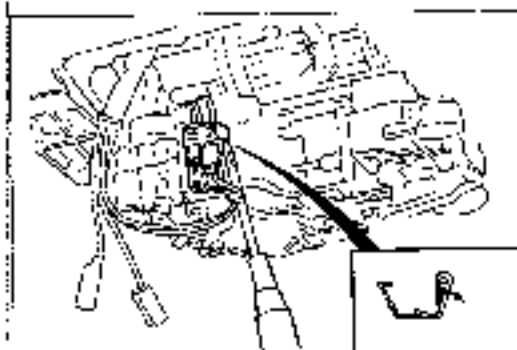
- a) Do not damage the oil pipes.
b) Do not drop the springs.

15. Remove the control valve body assembly and accumulator springs.



90UDCK1-370

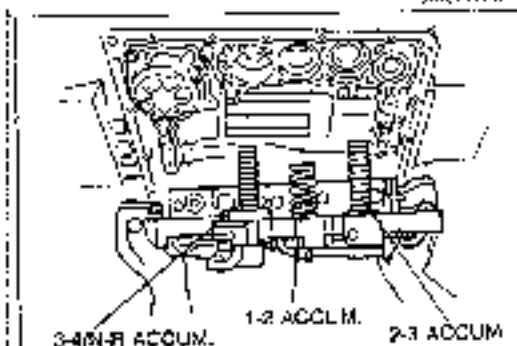
16. If necessary, remove the solenoid connector from the transmission case.



9M14K1371

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.



9M14K1372

4. Set the accumulator springs into the control valve body as shown.

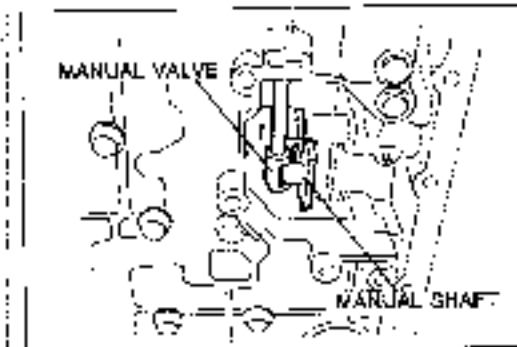
Spring specifications

(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 (0.800)	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)

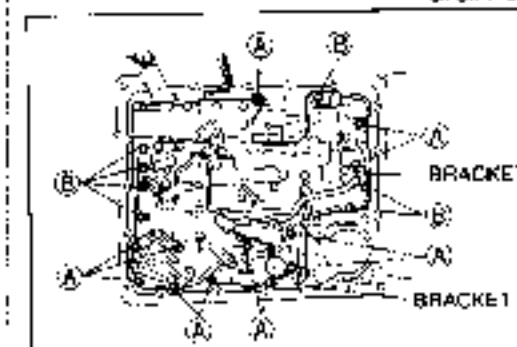
Note

- a) Verify that the manual valve and manual shaft are assembled correctly.
- b) Verify that the accumulator springs are installed correctly.



9M14K1373

5. Set the control valve into the transmission case and secure it.



10M14K1374

6. Install the control valve mounting bolts and brackets as shown.

Bolt length (Measured from below the head)

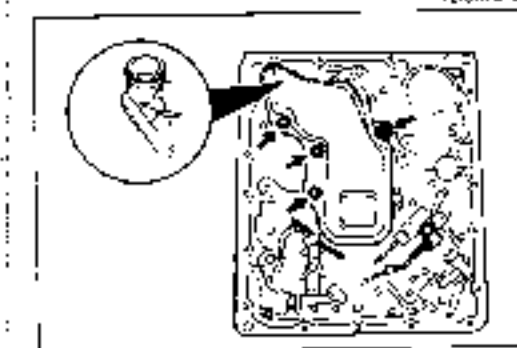
- (A): 33mm (1.299 in)
(B): 45mm (1.772 in)

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.

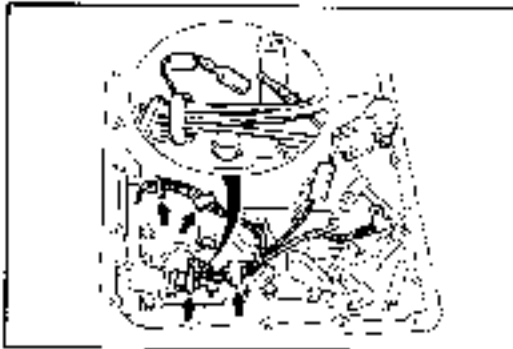


9M14K1375

Bolt length (Measured from below the head):
50mm (1.969 in)

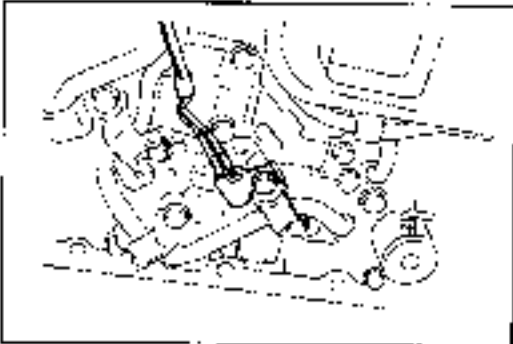
Tightening torque:

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)



9PULCK1575

12. Mount the harness of the solenoid connectors with the harness clip.



130JCK2-062

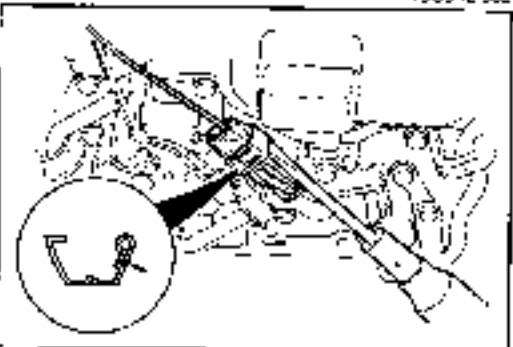
11. Install the ATF thermosensor.

Tightening torque:

6.9—8.8 N·m (70—90 cm·kg, 61—78 in·lb)

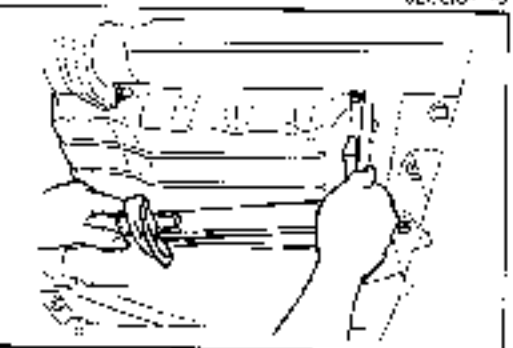
Bolt length (Measured from below the head):

33mm (1.299 in)



00LCKA175

12. Connect the lockup solenoid connector.
13. Install the clip.

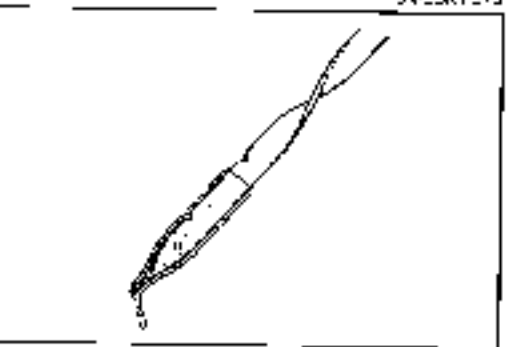


3PULCK1574

14. Set the magnet into the oil pan.
15. Install the oil pan along with a new gasket.

Tightening torque:

4.9—7.8 N·m (50—80 cm·kg, 43—69 in·lb)

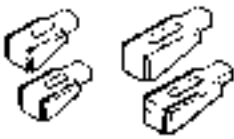


13LJCK2062

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

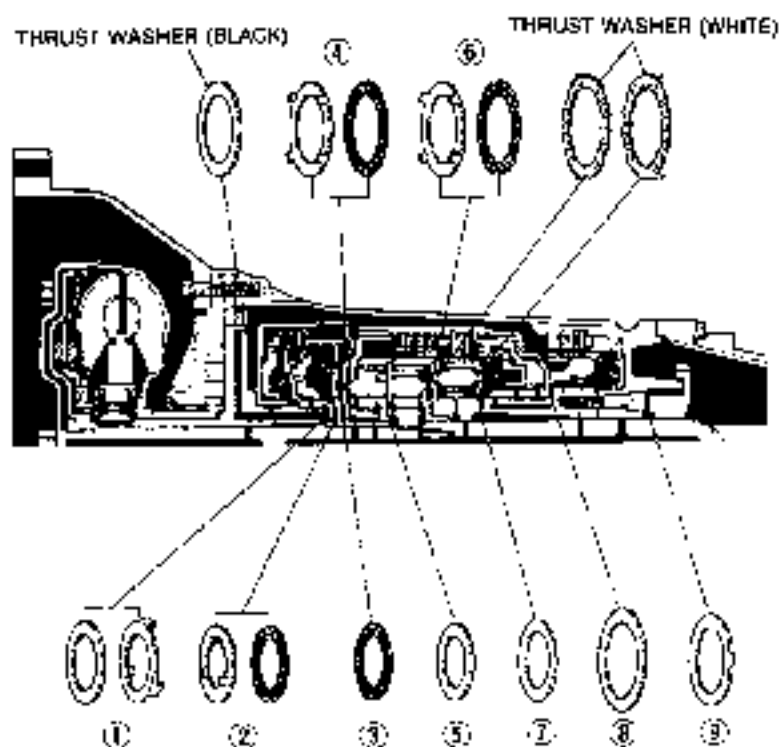
49 C107 6B0A Engine stand		49 U019 0A0A Transmission hanger		49 H075 495B Body (Part of 49 U019 0A0A)	
49 U019 0C07 Hode (Part of 49 U019 0A0A)					

29L0K2-003

Precaution

1. If the drive plates or brake band is replaced with new ones, soak in ATF for at least 2 hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

Thrust washer, bearing, and race locations



9MUD0K1-082

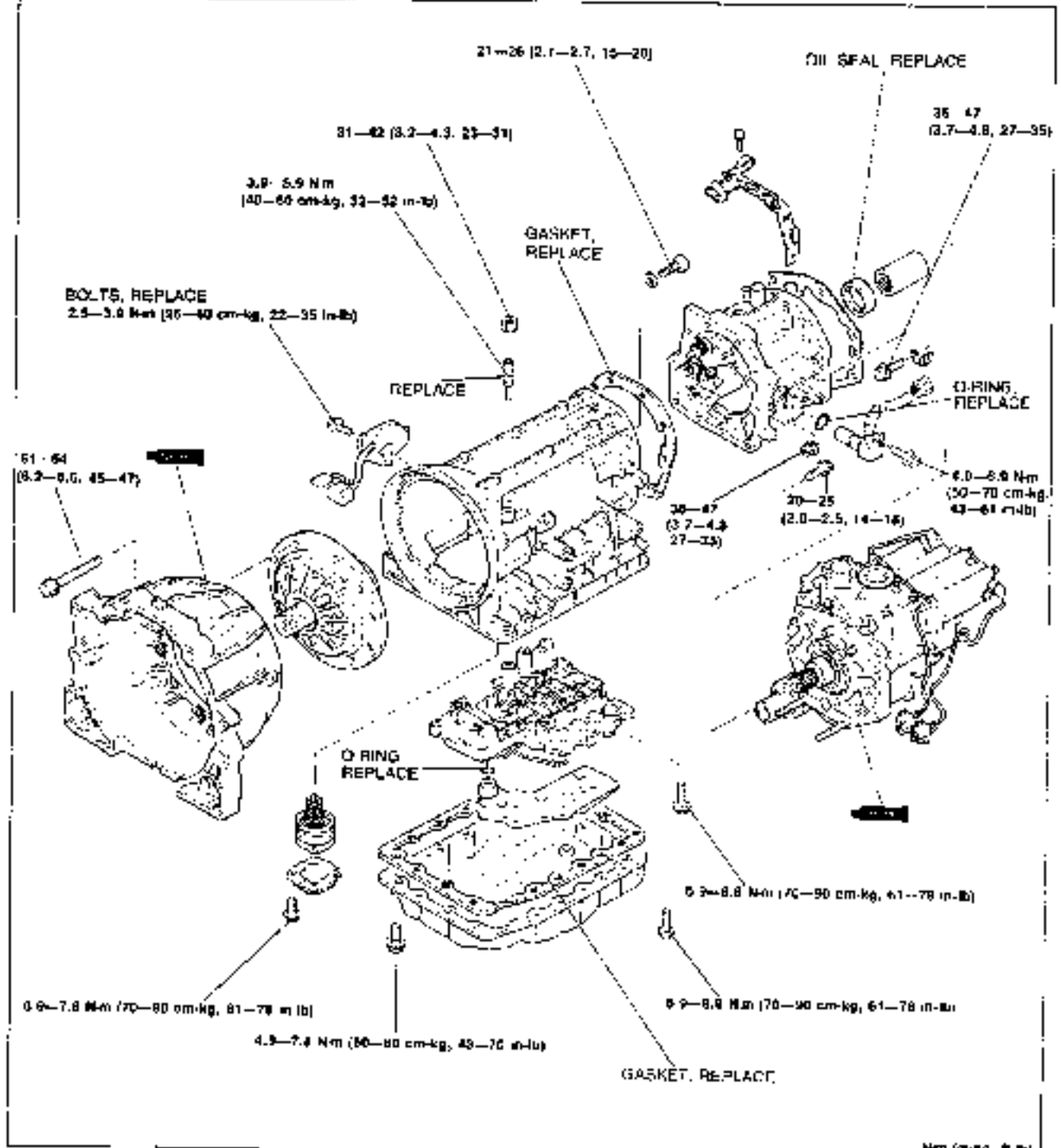
Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm (in)	47.0 (1.850)	53.0 (2.087)	63.0 (2.487)	70.0 (3.071)	53.0 (2.087)	79.0 (3.071)
Race	mm (in)	43.5 (1.713)	51.5 (2.028)	—	70.0 (2.753)	—	75.0 (2.953)

		7	8	9
Bearing	mm (in)	59.0 (2.323)	75.1 (3.075)	64.0 (2.520)
Race	mm (in)	—	—	—

SMUCK: 359

Torque specifications



Nm (m-kg, ft-lb)

SMUCK: 359

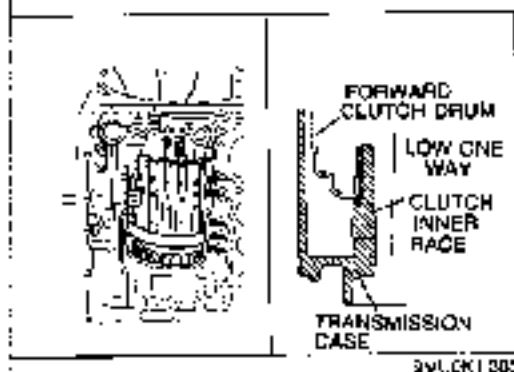
K2-129

Procedure

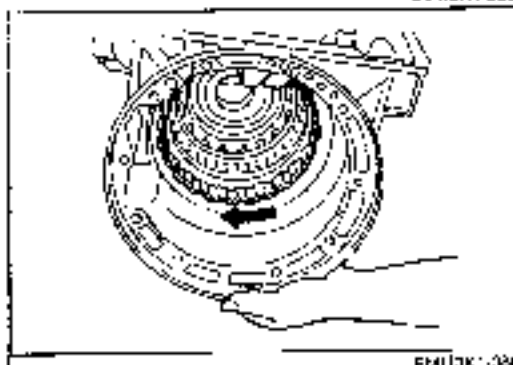
Caution

Do not damage the seal ring on the low one-way clutch inner race.

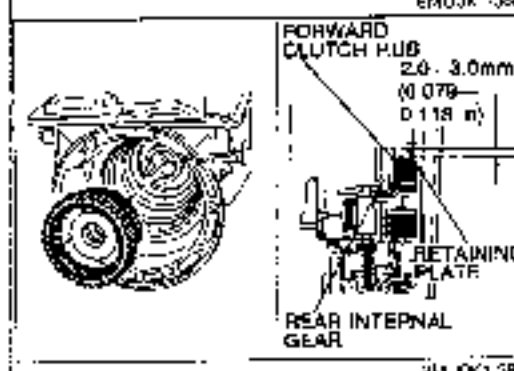
1. Install the forward clutch drum while slowly turning it clockwise until its hub passes fully over the clutch inner race.



2. Verify that the forward clutch assembly will turn only clockwise.

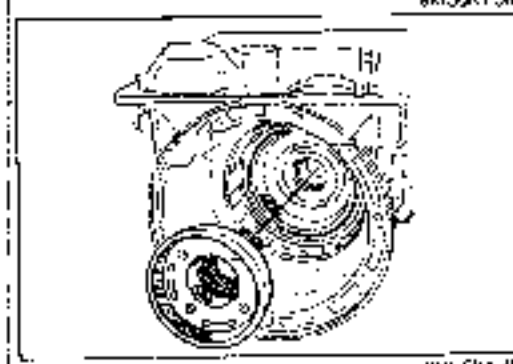


3. Install the rear internal gear, forward clutch hub, and over-running clutch hub in the forward clutch assembly.
4. Measure the height difference between forward clutch retaining plate and top of the forward clutch drum.

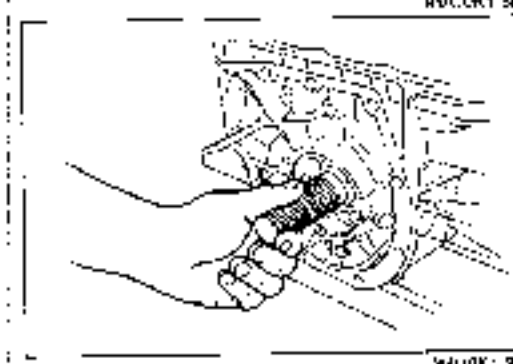


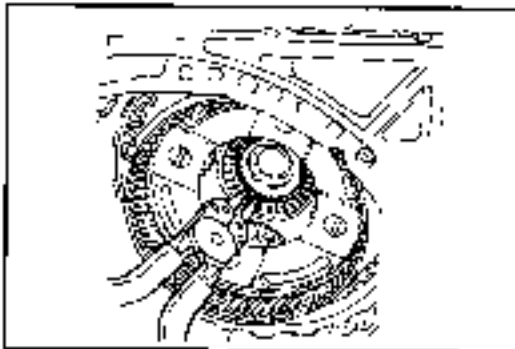
Height: Approx. 2.0—3.0mm (0.079—0.118 in)

5. Install the front internal gear and rear planetary carrier into the forward clutch assembly.



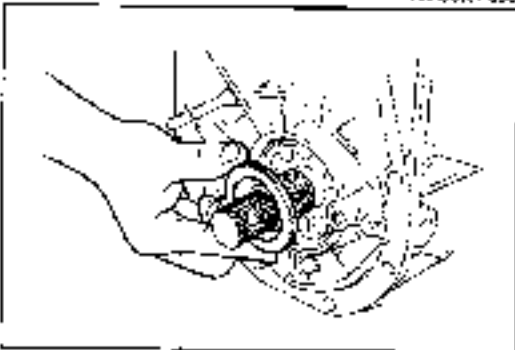
6. Insert the output shaft.





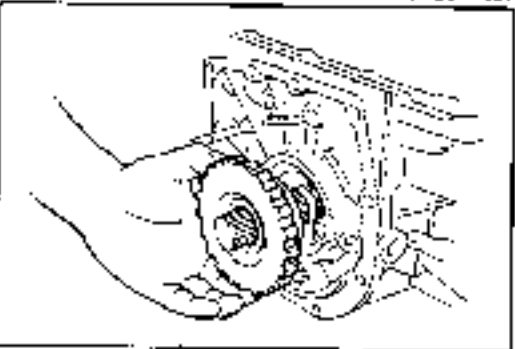
9MUCK1330

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.



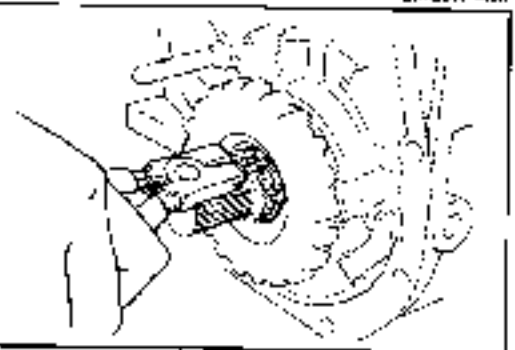
9MUCK1381

8. Apply petroleum jelly to the bearing and install it to the transmission case with the black surface facing toward the rear.



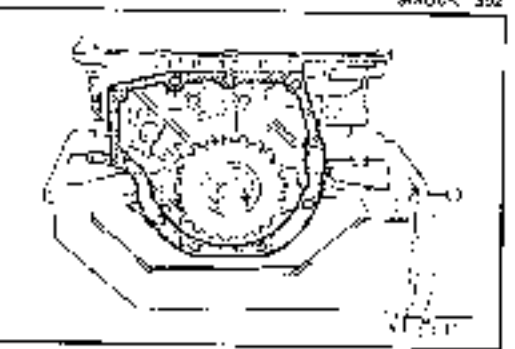
6MU0K1406

9. Install the parking gear.



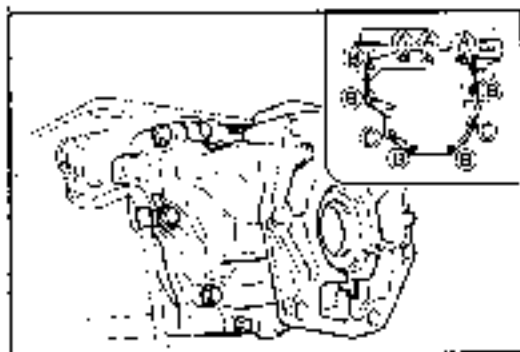
9MUCK1392

10. Pull the output shaft back slightly, and install a new snap ring on it. Verify that the output shaft will not move forward.



0300K2124

11. Install the new gasket.



241.2142-034

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:

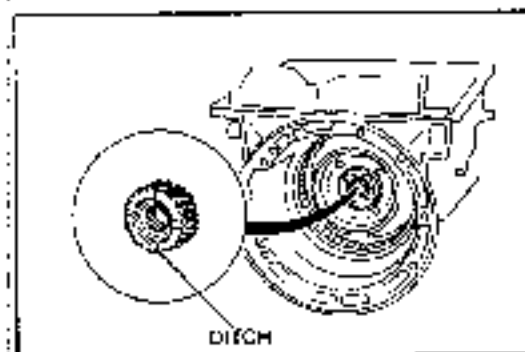
20—25 N·m (2.0—2.5 m·kg, 14—18 ft·lb)

13. Install the O-ring onto the speedometer driven gear

14. Install the speedometer driven gear into the extension housing.

Tightening torque:

4.9—5.9 N·m (50—70 cm·kg, 43—61 in·lb)

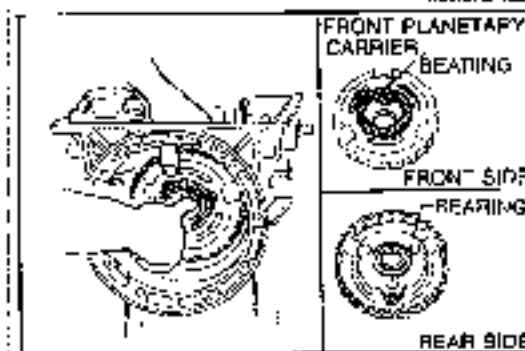


0211K2-126

Caution

Be sure the oil grooves of the rear sun gear face forward as shown.

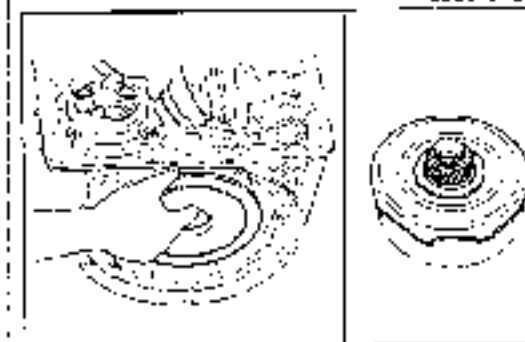
15. Install the rear sun gear into the front internal gear.



08.2047-127

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.



08.2047-128

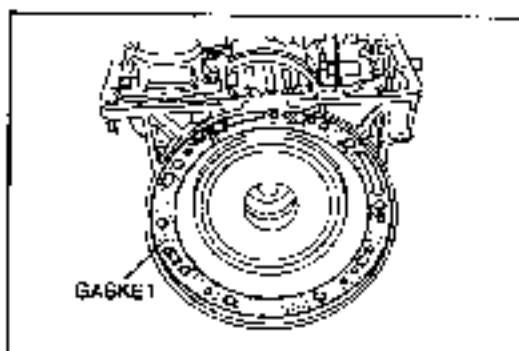
18. The reverse clutch, high clutch, and front sun gear. Install into the transmission case as an assembly.

Caution

When any parts listed in the following table is replaced, total end play or reverse clutch end play must be adjusted.

Part name	Item	Total end play	Reverse end play
Transmission case		○	○
Low one-way clutch inner race		○○	○○
Overrunning clutch hub		○○○○	○○○○
Rear internal gear		○○○○	○○○○
Rear planetary carrier		○○○○	○○○○
Rear sun gear		○○○○	○○○○
Front planetary carrier		○○○○	○○○○
Front sun gear		○○○○	○○○○
High clutch hub		○○○○	○○○○
High clutch drum		○○○○	○○○○
Oil pump cover		○	○
Reverse clutch drum		○	○

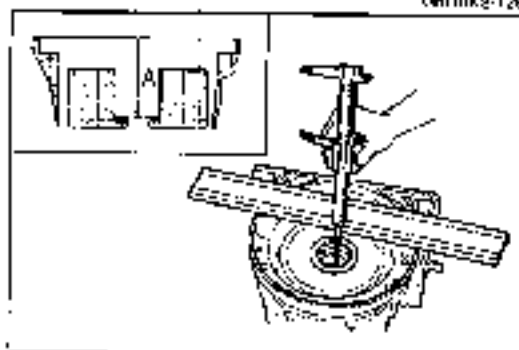
3YLCK1-399



06110K2-128

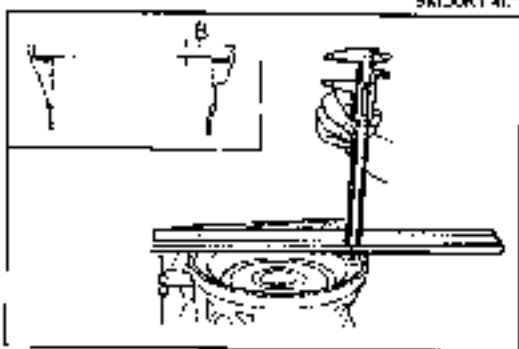
19. Adjust total end play

- (1) Install the oil pump gasket.



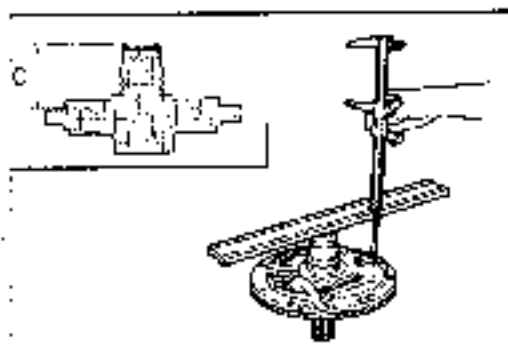
3YLCK1-417

- (2) Measure height A with vernier calipers and a straight edge.

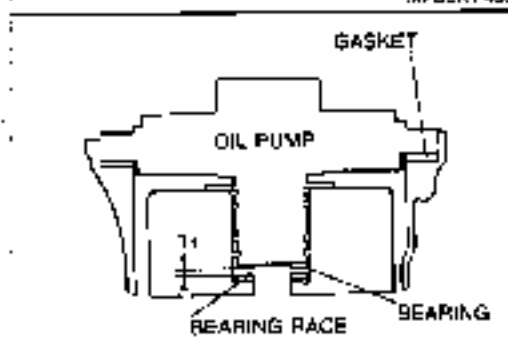


3YLCK1-422

- (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)

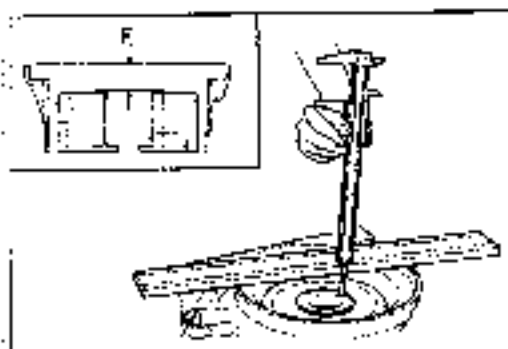
- (7) If the total end play is not within specification, adjust it by selecting and installing the proper bearing race.

Bearing race size

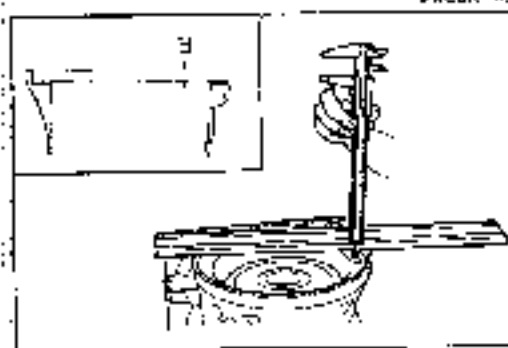
mm (in)

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

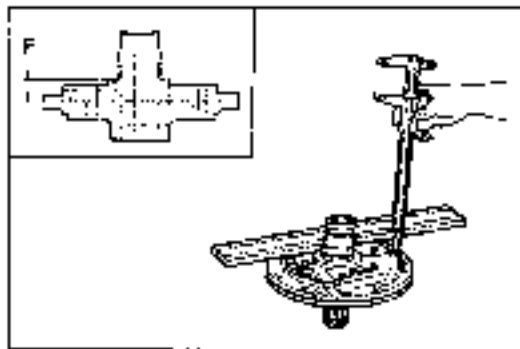


SMUCK 437

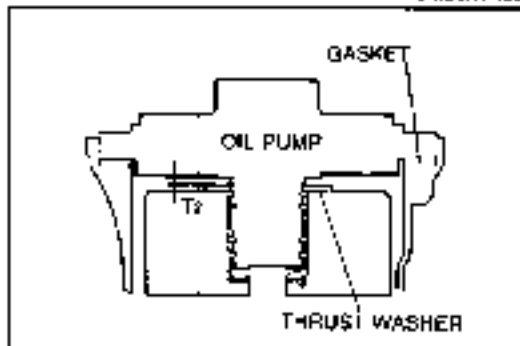
20. Adjust reverse clutch end play.

- (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.



3M,OK1402



3M,OK1403

- (4) Measure height F with vernier calipers and a straight edge.
- (5) Calculate the reverse clutch end play by using the formula below.

$$\text{Formula: } T2 = E - B - F - 0.1\text{mm } (0.0039 \text{ in})$$

- 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

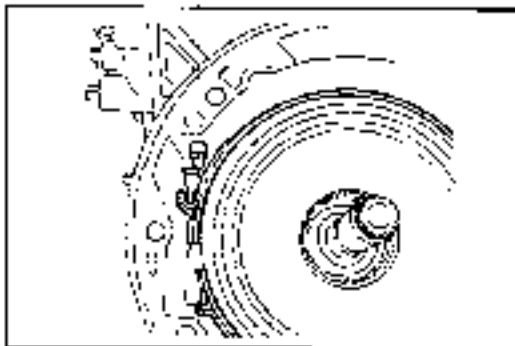
Reverse clutch end play specification:
0.55—0.90mm (0.022—0.035 in)

- (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

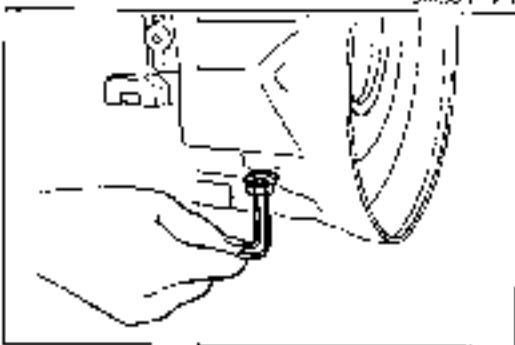
mm (in)			
0.7 (0.028)	0.9 (0.035)	1.1 (0.043)	1.3 (0.051)
1.5 (0.059)	1.7 (0.067)	1.9 (0.075)	

3M,OK1410



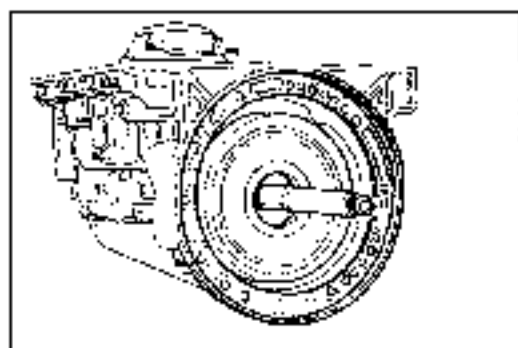
3M,OK1411

21. Apply ATF to the brake band and band strut, and install them into the transmission.



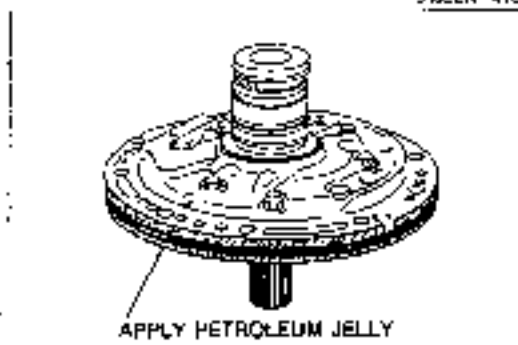
3M,OK1412

22. Install a new anchor and bolt.



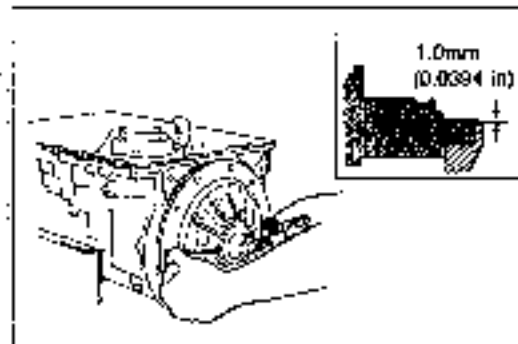
RM. K2-413

23. Apply ATF to the input shaft, and install it into the transmission case



RM. K2-414

24. Apply petroleum jelly to the oil pump assembly as shown.



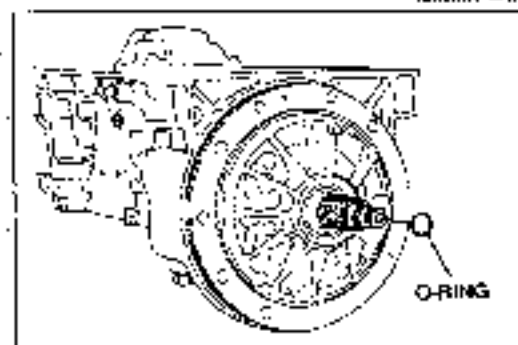
RM. K2-415

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.

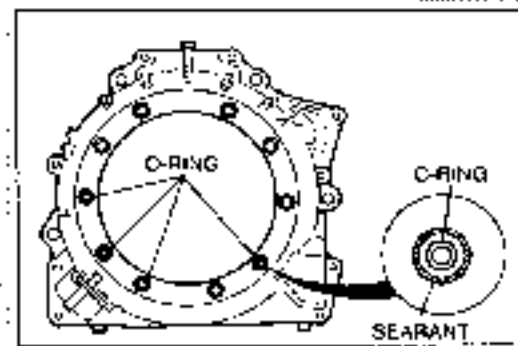
25. Turn the transmission as shown.
Install the oil pump assembly into the transmission case by using two converter housing bolts as a guide.
Measure the height difference between top of the transmission case and oil pump as shown

Height: Approx. 1.0mm (0.039 in)



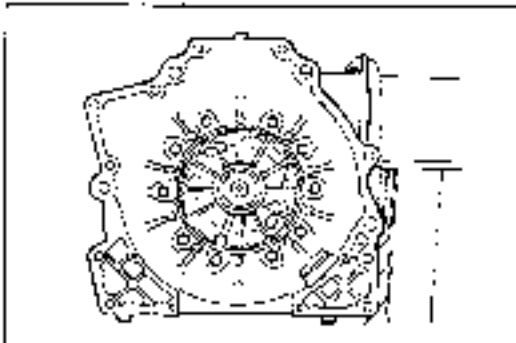
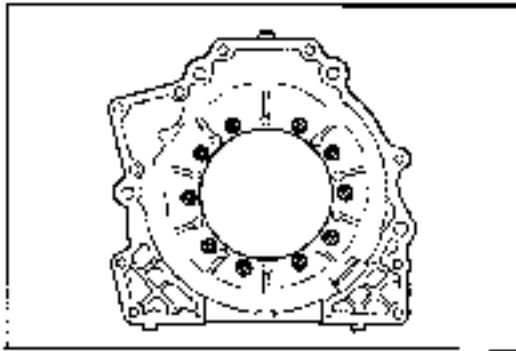
RM. K2-416

26. Apply ATF to a new O-ring, and install it onto the output shaft.

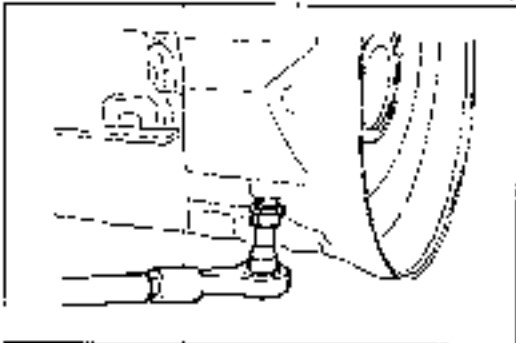


RM. K2-417

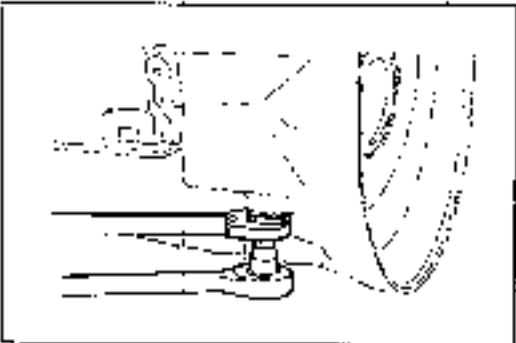
27. Apply ATF to the new O-rings, and install them into the converter housing, as shown.
28. Apply sealant lightly, as shown.



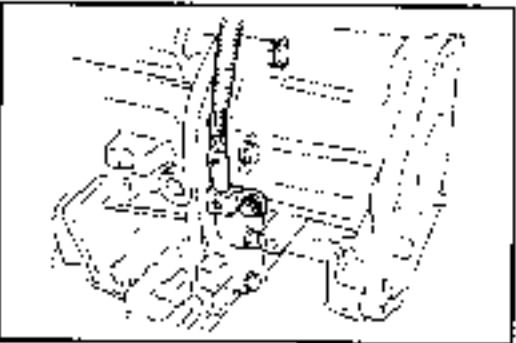
OMLICK-418



JWJOKT-419



RMJOK-420



WKTJOKT-421

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)

31. Adjust the brake band.
(1) Tighten the anchor and bolt with the hex wrench.

Tightening torque:

3.9—5.9 Nm (40—60 cm·kg, 35—52 in·lb)

- (2) Loosen the anchor and bolt 2.5 turns

- (3) Install the locknut

- (4) Tighten the anchor and bolt with the hex wrench and tighten the locknut.

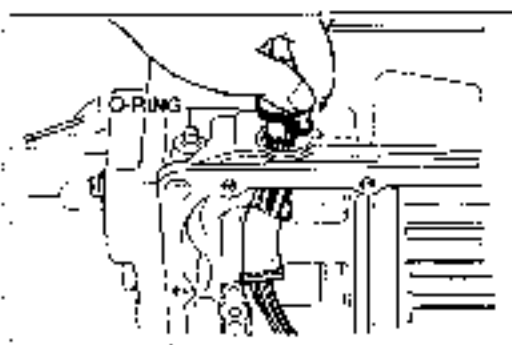
Tightening torque:

31—42 Nm (3.2—4.3 m·kg, 23—31 ft·lb)

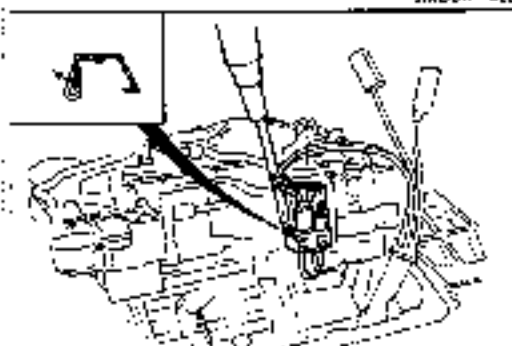
32. Apply ATF to a new O-ring, and install it onto the speed sensor 1.
33. Mount the speed sensor 1 into the extensor housing.

Tightening torque:

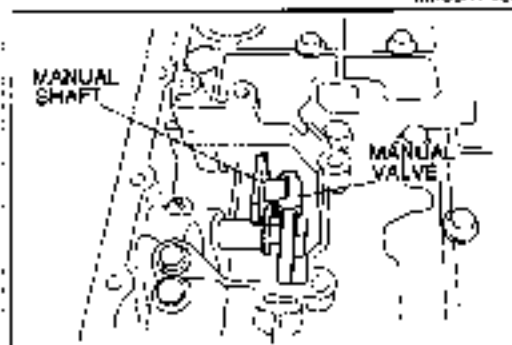
4.9—6.9 Nm (50—70 cm·kg, 43—61 in·lb)



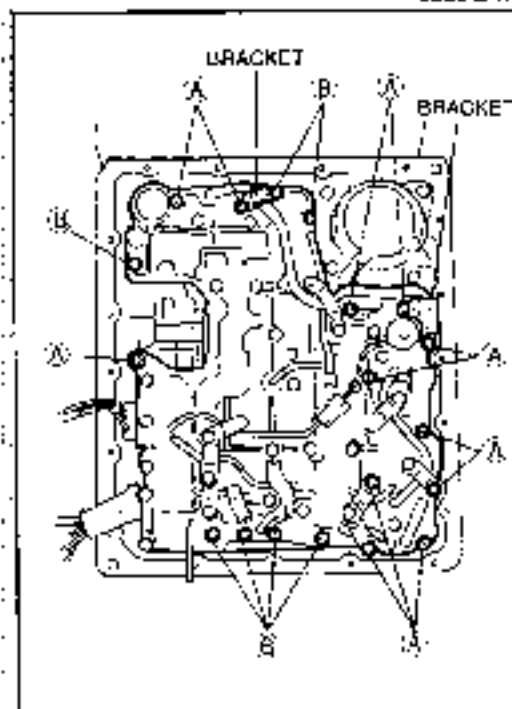
5ML0K1-422



BMU0K1-423



CBJ0K2-176



BU0K2-067

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

36. Connect the solenoid connector to the solenoids.

37. Install the clip

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.

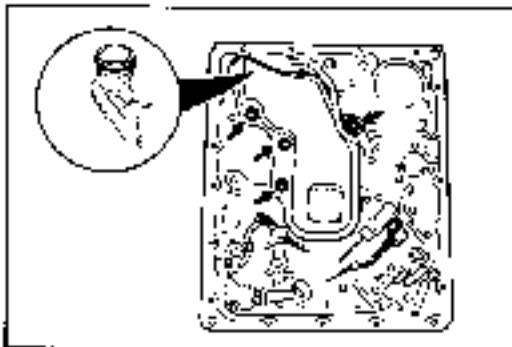
Bolt length (Measured from below the head)

(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)

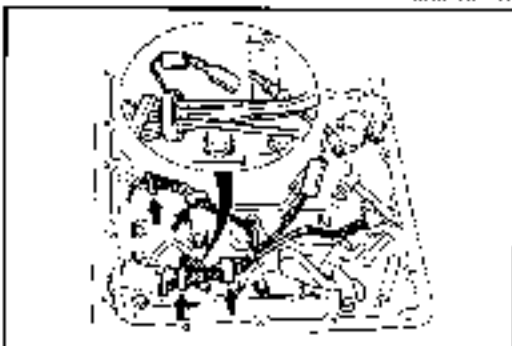


DAJOK1 17

39. Apply ATF to a new O-ring, and install it onto the oil strainer.
40. Install the oil strainer.

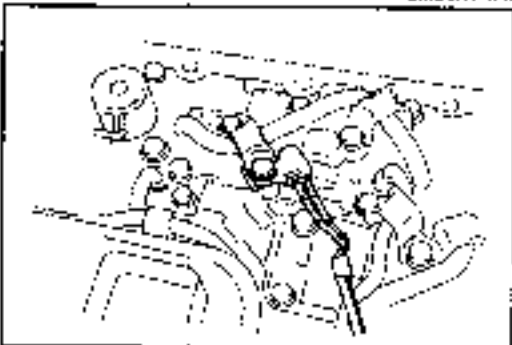
Bolt length (Measured from below the head):
50mm (1.969 in)

Tightening torque:
6.9—8.8 N·m (70—90 cm·kg, 61—75 in·lb)



SMJOK1 429

41. Mount the solenoid harness with the clips.

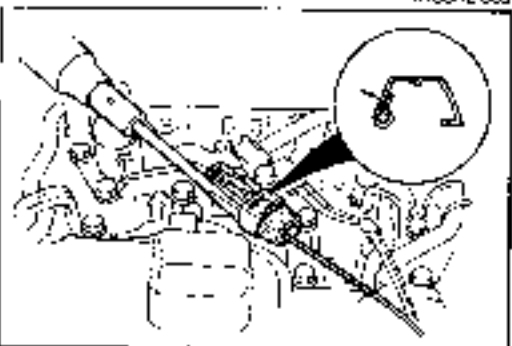


1A-JOK2 06U

42. Install the ATF thermosensor as shown in the figure.

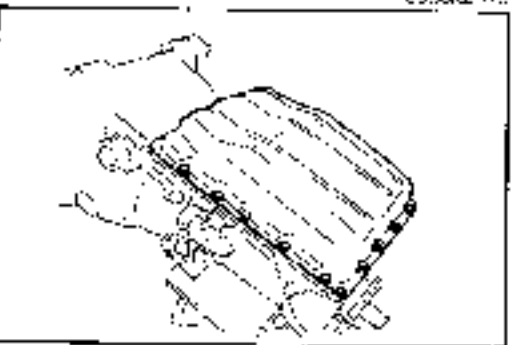
Bolt length (Measured from below the head):
45mm (1.772 in)

Tightening torque:
6.9—8.8 N·m (70—90 cm·kg, 61—75 in·lb)



CB-JOK2 17B

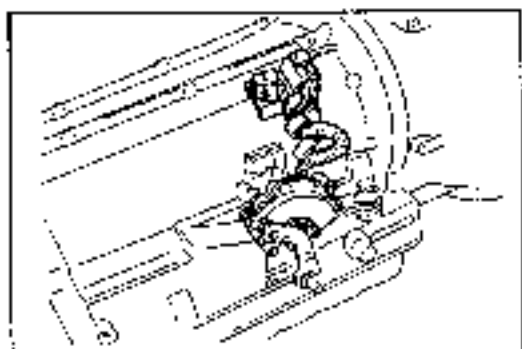
43. Connect the lockup solenoid connector.
44. Install the clip.



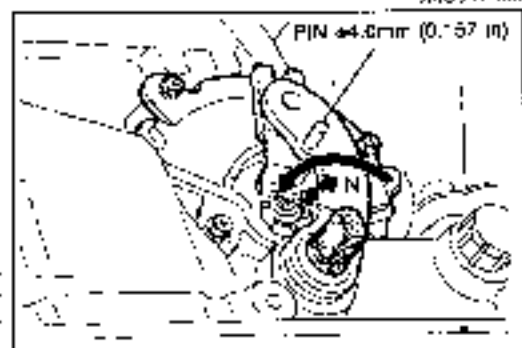
SMJOK1 429

45. Set the magnet into the oil pan.
46. Install the oil pan along with the new gasket.

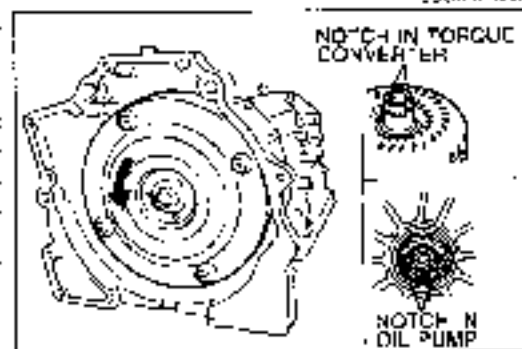
Tightening torque:
4.9—7.8 N·m (50—80 cm·kg, 43—70 in·lb)



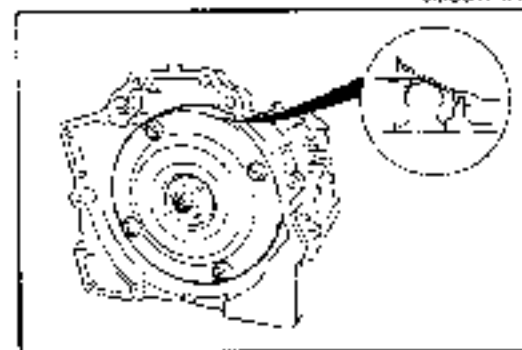
SMU741-010



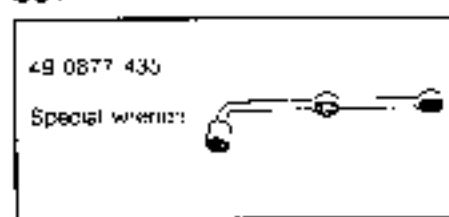
28U0K2410



BMJKN1-059



BU0K2470

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)

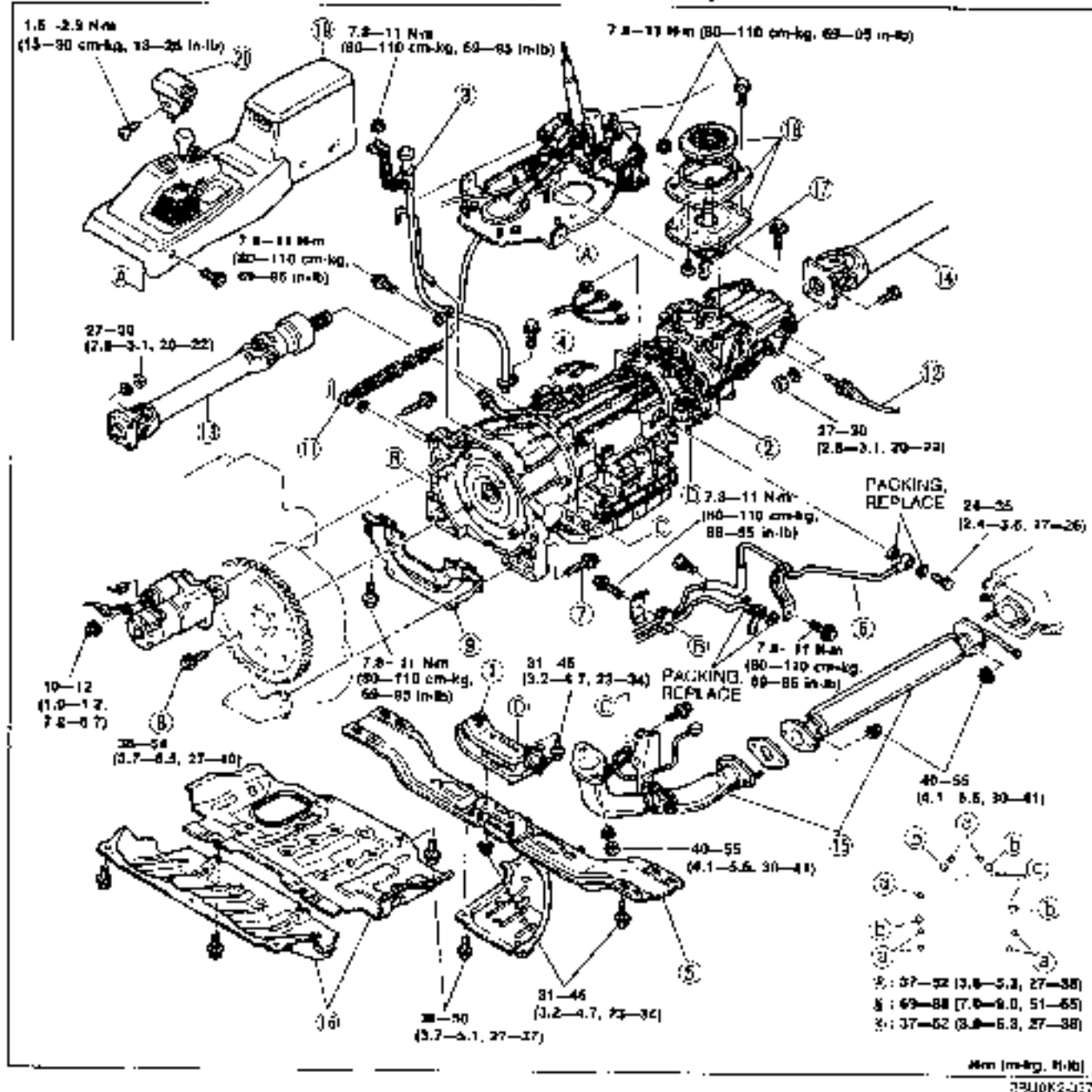
- (7) Remove the pin.

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.

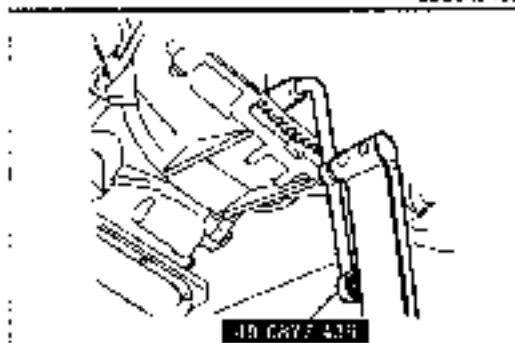


1. Transmission mount
2. Automatic transmission
3. Oil level gauge and pipe
4. Connectors
5. Cross member
6. Oil pipe connector and bracket
7. Transmission installation bolt
8. Torque converter installation bolt
Installation Note page K2-144
9. Under cover
10. No.2 cross member
11. Selector cable

12. Speedometer cable
13. Front propeller shaft
Service Section L
14. Rear propeller shaft
Service Section L
15. Exhaust pipe
16. Under cover
17. 4x4 shift lever
18. Insulator plate and boot
19. Console box
20. Selector knob



JBUCK2-133



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 N·m (3.6—5.0 m·kg, 25—36 ft·lb)

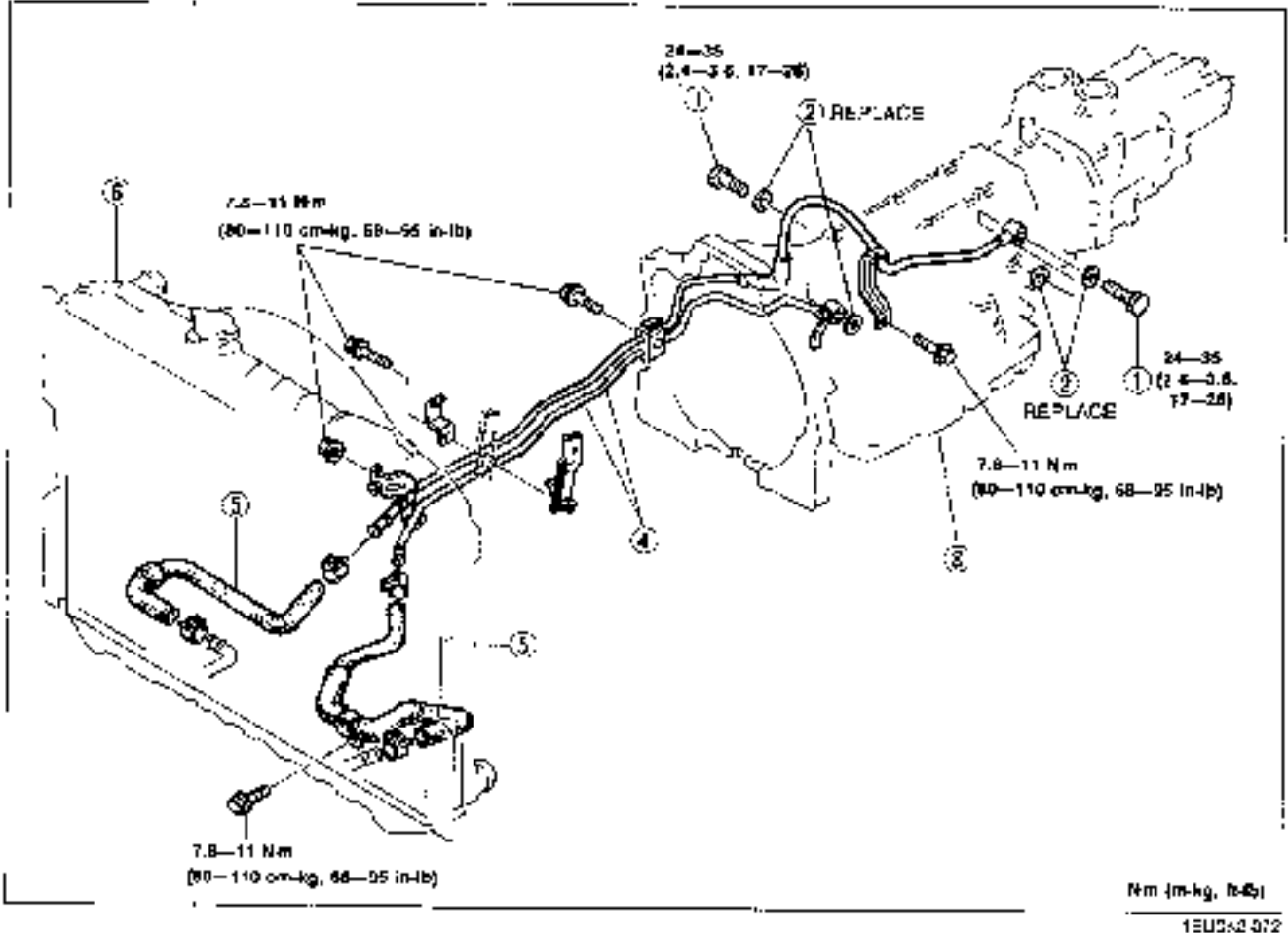
OIL COOLER

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

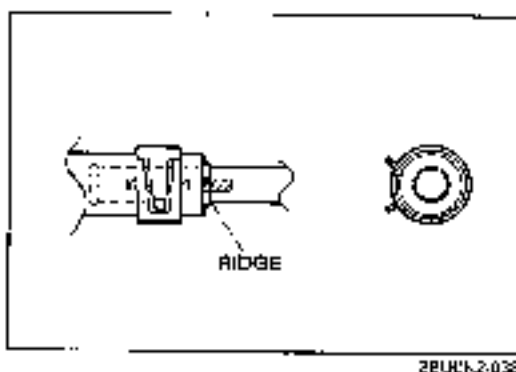
6. Radiator

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.

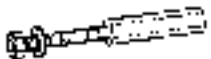
1. Align the marks, and slide the oil cooler hoses onto the oil cooler pipes until it contacts the ridge.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.



DRIVE PLATE

Preparation

SST

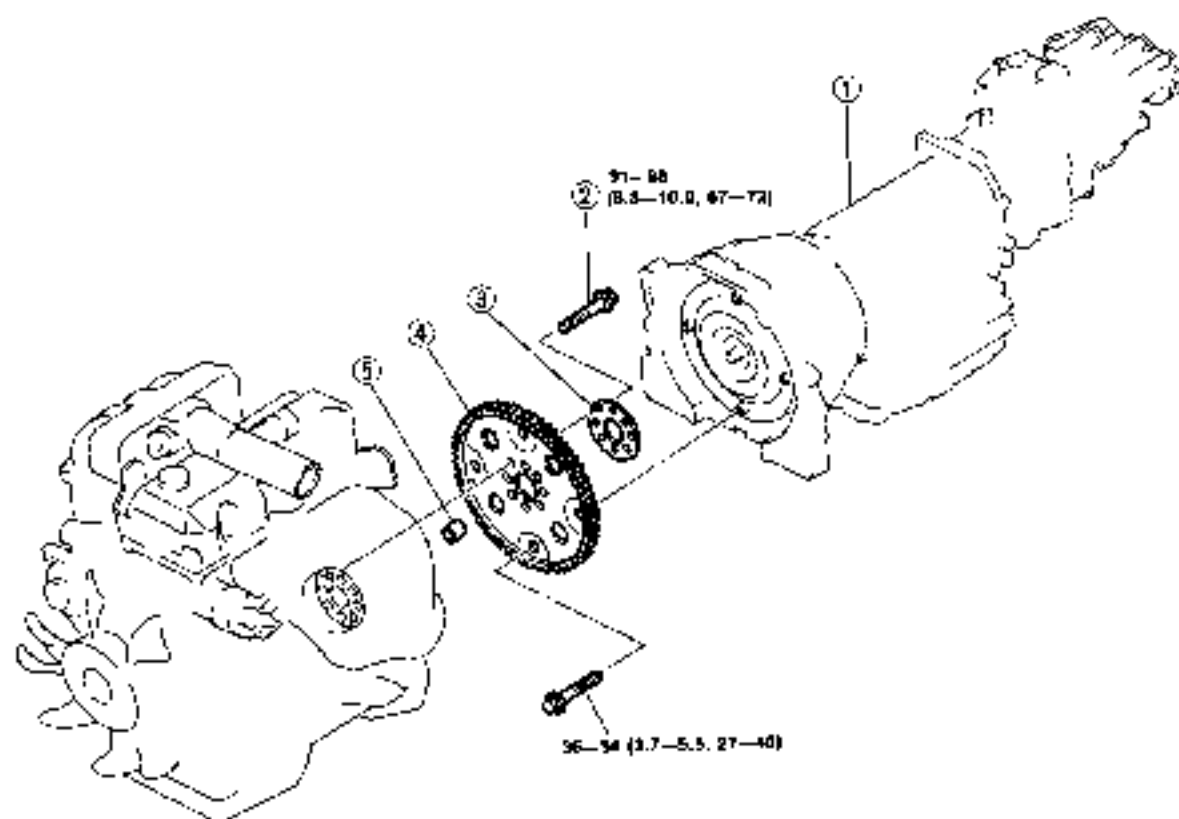
49 ED11 1A0 Brake ext. ring gear 	49 ED11 103 Shaft (Part of 49 ED11 1A0) 	49 ED11 104 Collar (Part of 49 ED11 1A0) 
49 ED11 105 Slopper (Part of 49 ED11 1A0) 	2810424030	

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**.



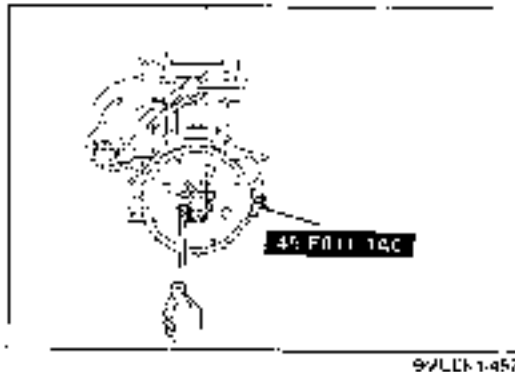
N·m (m·kg, ft·lb)

2810424030

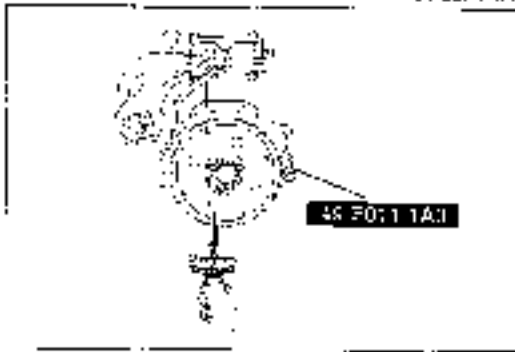
1. Transmission
 - Removal..... page K2- 45
 - Installation..... , page K2- 141
2. Bolts
 - Removal Note below
 - Installation Note below

3. Backing plate
4. Drive plate
 - Inspect for cracks and ring gear for wear or damage
5. Adapter

289L002 Cvt



9/LLK-1457



1E...K040/1

Removal Note

Bolts

1. Remove the drive plate using the **SST** or equivalent.

Installation Note

Bolts

1. Assemble the adapter, drive plate and backing plate.
2. Install the **SST** or equivalent and tighten the bolts diagonally and evenly.

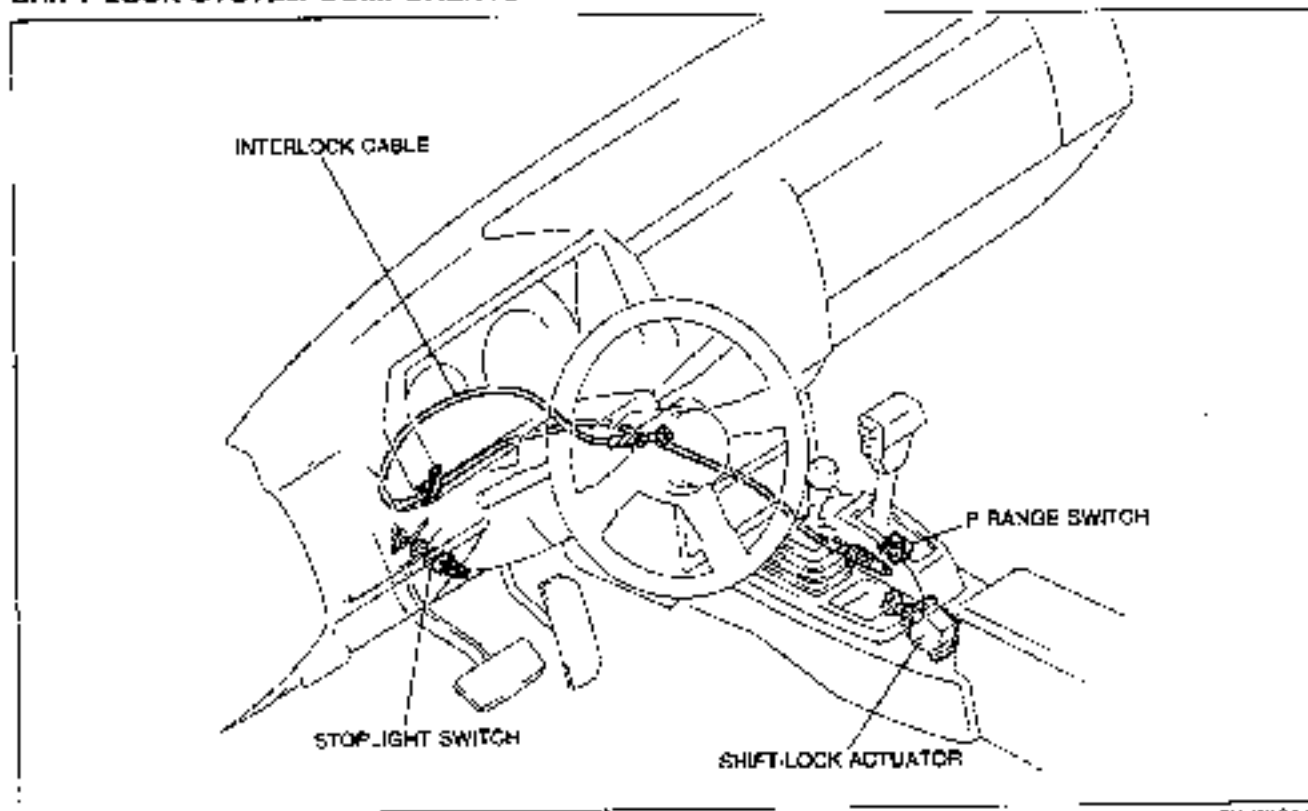
Tightening torque:

81—98 N·m (8.3—10.0 m·kg, 67—72 ft·lb)

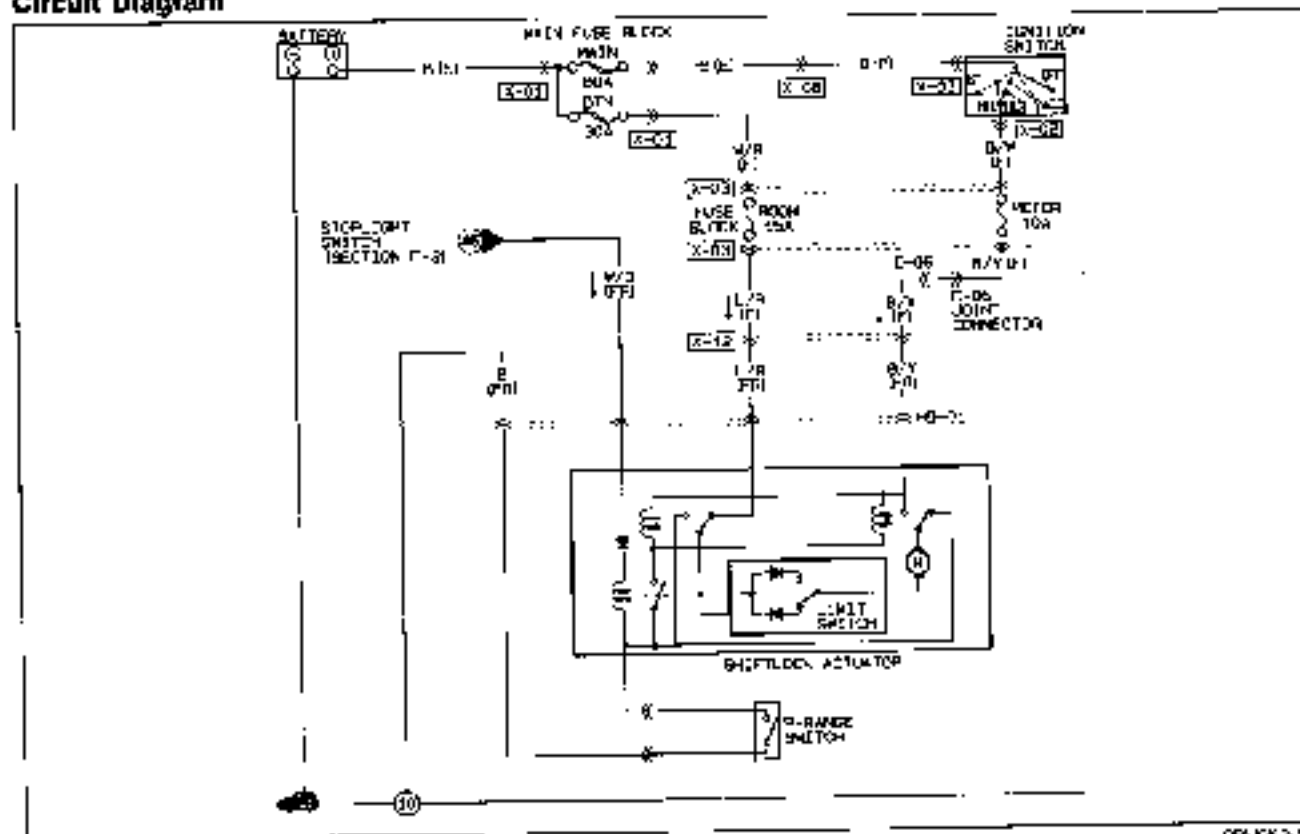
3. Install the transmission. (Refer to page K2-141)

SHIFT MECHANISM

SHIFT-LOCK SYSTEM COMPONENTS



DLJOK2-40

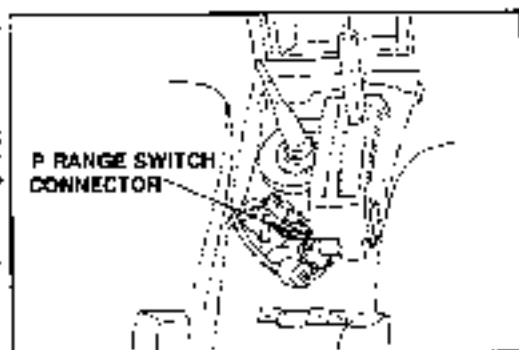
TROUBLESHOOTING
Circuit Diagram

OBUK2-41

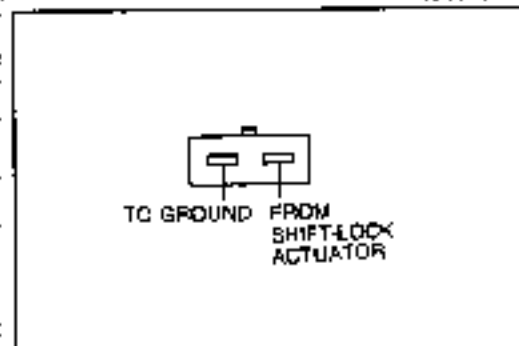
Diagnosis chart

Problem	Possible Cause	Action	Page
Selector lever cannot be moved from P range with brake pedal depressed and ignition switch ON	HOOM 15A fuse not installed or burned	Install or replace	K2-146
	Ignition system malfunction		
	• Wire harness broken	Repair or replace	K2-146
	• Poor connection	Connect firmly	K2-146
	• VETER 10A fuse burned	Replace	K2-146
	Ignition switch malfunction	Inspect and replace	Section T
	Stoplight switch remains OFF	Inspect and replace	Section T
	Stoplight system malfunction		
	• Wire harness broken	Repair or replace	K2-146
	• Poor connection	Connect firmly	K2-146
	• STOP 15A fuse burned	Replace	K2-146
	P range switch remains OFF	Inspect and replace	K2-148
	P range switch system malfunction		
	• Wire harness broken (Poor ground)	Repair or replace	K2-146
	• Poor connection	Connect firmly	K2-146
	Shift-lock actuator malfunction	Inspect and replace	K2-148
	• Wire harness broken	Repair wiring harness	K2-146
	• 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	HOOM 15A fuse burned	Replace	K2-146
	Stoplight switch remains ON	Inspect and replace	Section I
	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	HOOM 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		
	• Disconnected	Inspect and replace	K2-151, 152
	• 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		
	• Disconnected	Inspect and replace	K2-151, 152
	• Kinked		
	• Stuck		
	• Spring damaged		
	Key cylinder malfunction	Replace	Section N

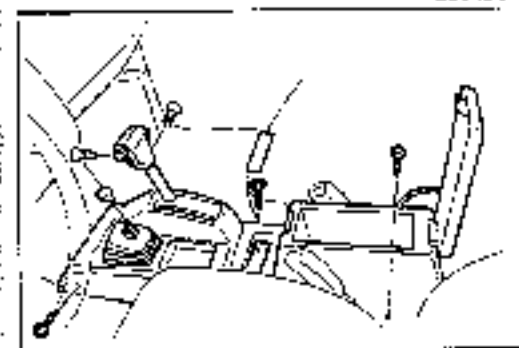
23110K2-042



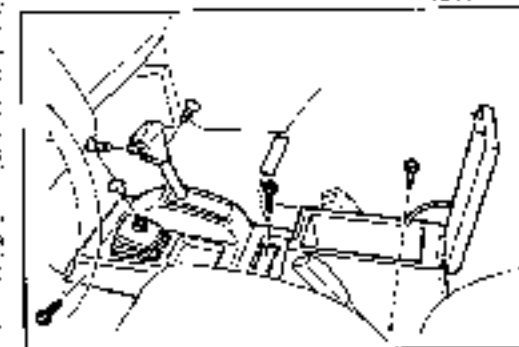
JBUK2-143



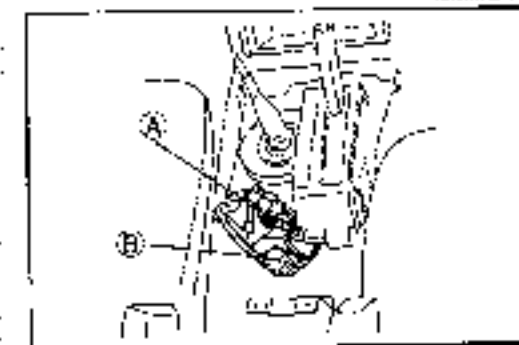
BJK2-076



JBUK2-145



JBUK2-146



JBUK2-147

P RANGE SWITCH**Inspection****Continuity**

1. Disconnect the negative battery cable.
2. Remove the selector knob, and then remove the console.
3. Disconnect the P range switch connector.

4. Check continuity of the terminals

Range	Selector lever release button	Continuity
P	Released	Yes
	Depressed	No
R, N, D, S, L	—	No

5. If not as specified, replace the P range switch.
(Refer to page K2-152.)

6. Install the console.
7. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

Tightening torque:

1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)

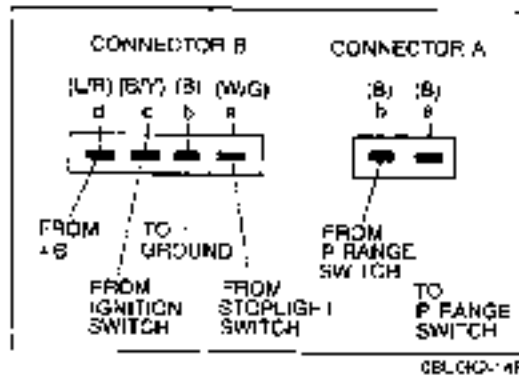
8. Connect the negative battery cable.
9. Check for correct operation of the shift-lock system.

SHIFT-LOCK ACTUATOR**Inspection****Terminal voltage and continuity**

1. Remove the selector knob, and then remove the console.

Caution

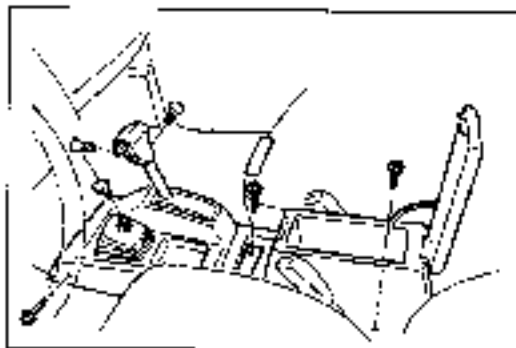
Disconnect connector B to check continuity between terminal b (harness side) and a ground.



2. Turn the ignition switch ON, and check terminal voltages and continuity, referring to the chart below.
3. If not as specified, repair the wire harness and/or shift-lock actuator.

				V _B : Battery voltage
Connector	Terminal	Terminal connected to	Condition	Measurement value
A	a	A-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 _B
B	b (harness side)	Body	Constant	0Ω
B	c	B-b	Ignition switch ON	V _B
B	d	A-b	Ignition switch OFF	V _B

27JJKF2-043



00U3-2 119

4. Install the console.
5. Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

Tightening torque:

1.5—2.9 N·m (15—30 cm·kg, 13—26 in·lb)

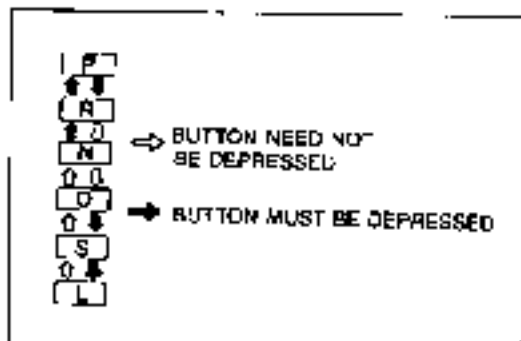
6. Check for correct operation of the shift-lock system.

SELECTOR LEVER

Inspection

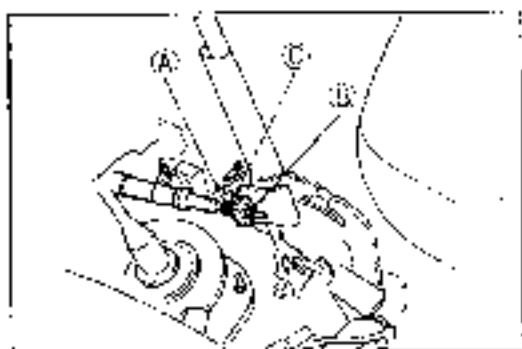
Caution

Shift the selector lever from P range to other ranges with ignition switch ON and brake pedal depressed.

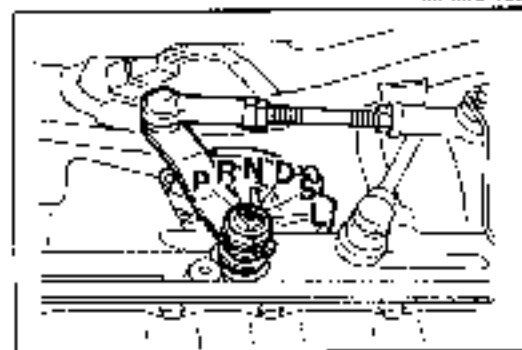


97LCKK3-004

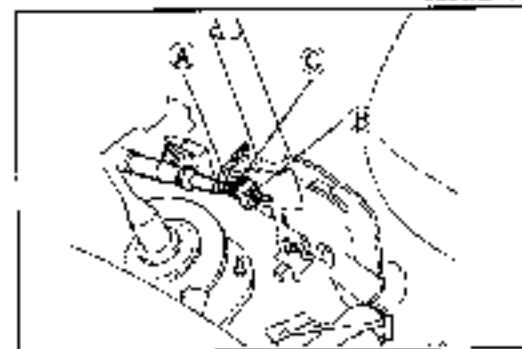
1. Check that the selector lever can only be shifted as shown in the figure.
2. Make sure there is a click at each range when shifted from P → L range.
3. Check that the positions of the selector lever and the indicator are aligned.
4. Check that the button returns smoothly when pushed to shift.



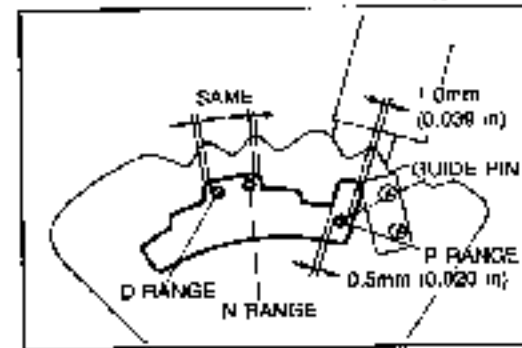
JB10K2-130



CBJ0K2-131



CB10K2-132



CBJ0K2-133

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), (B), and lock bolt (C).

- 4 Shift the manual shift 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)

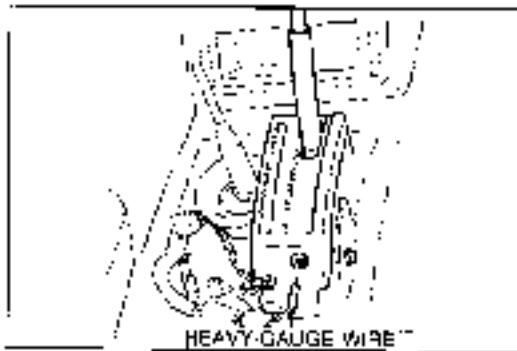
- 8 Check the lever so that the clearance between the guide plate and the guide pin in P range with the push rod lightly depressed is as shown.
- 9 Move the selector lever to N and D ranges and verify that there is the same clearance between the guide plate and guide pin.
- 10 If not as specified, readjust the lever.
- 11 Install the console
- 12 Clean and apply locking compound to the selector knob screws threads. Tighten the screws.

Tightening torque:

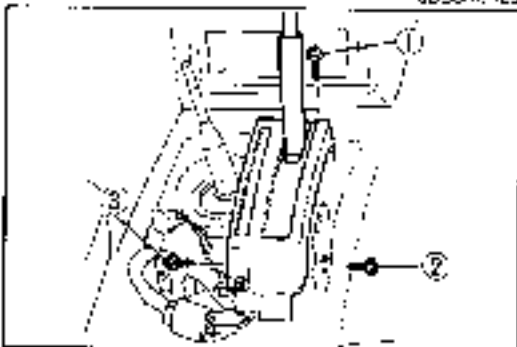
1.5—2.9 Nm (15—30 cm·kg, 13—26 in·lb)

- 13 Check for correct operation of the shift-lock system

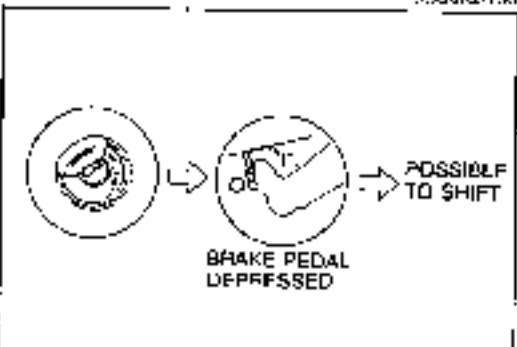
DEJ0K2-134



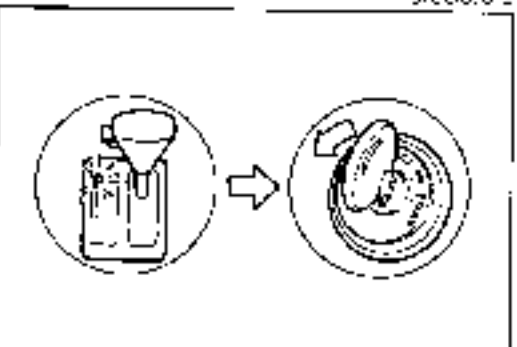
CBJ0K2-125



DBU0K2-156



9A/CCK2-318



47 A05X-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:

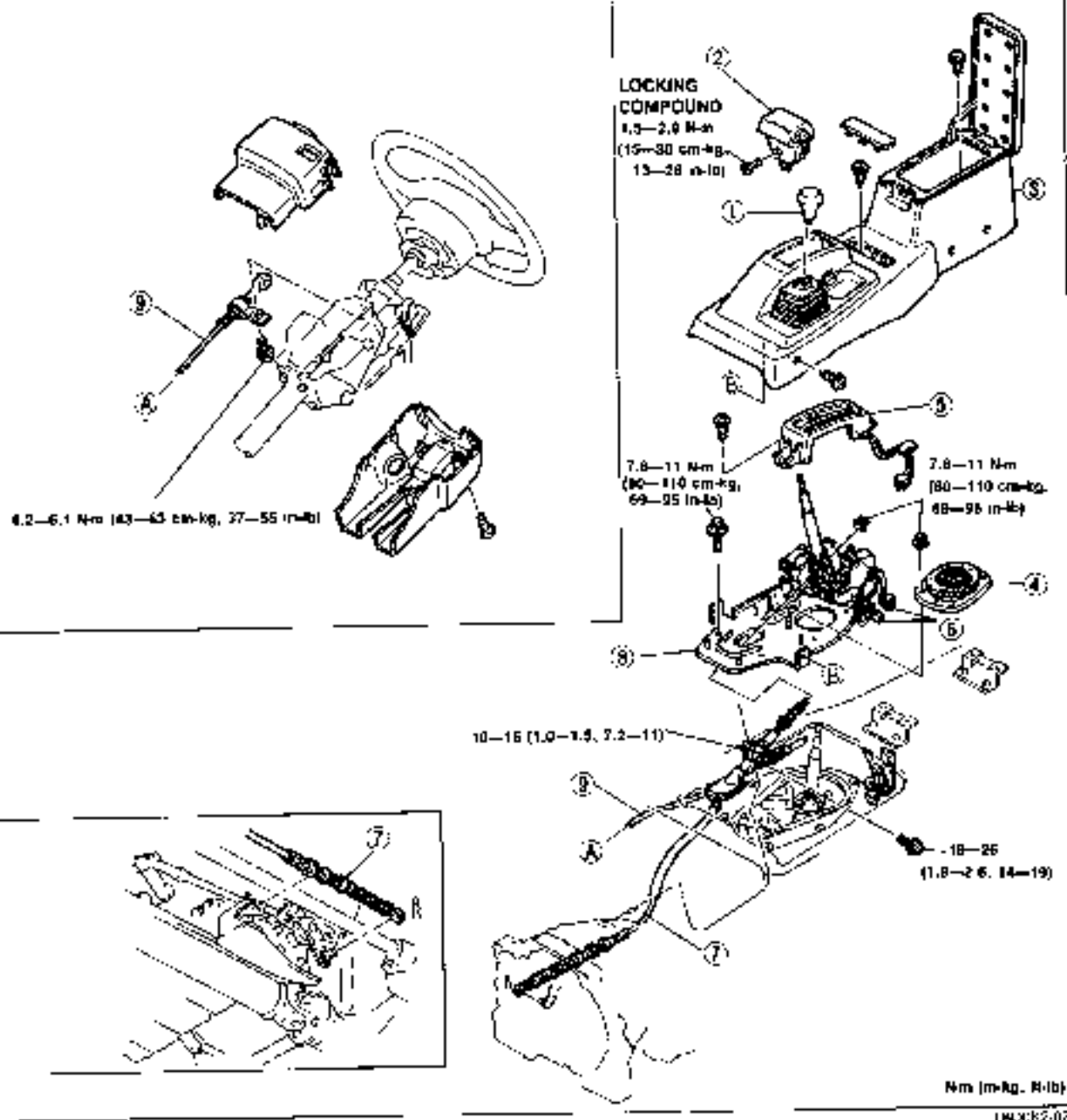
1.5—2.9 Nm (15—30 cm·kg, 13—26 in·lb)

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.

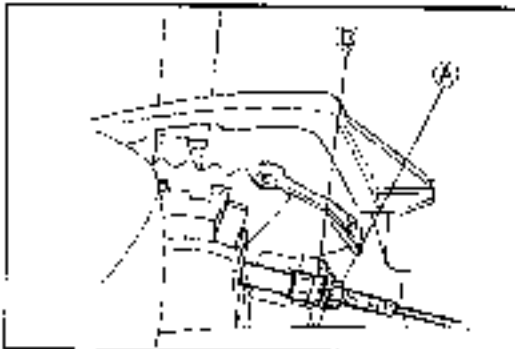
REMOVAL, INSPECTION, AND INSTALLATION

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



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.

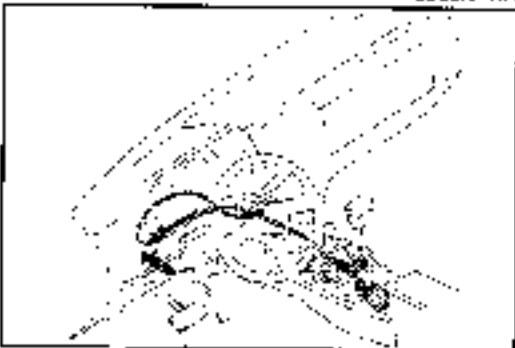
2. Separate the cable from the selector lever.

Interlock cable

Note

Do not remove the interlock cable if not necessary.

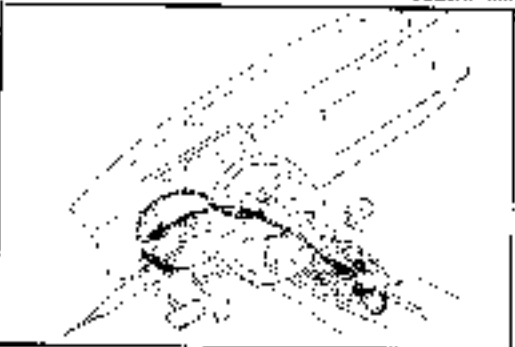
1. Remove the instrument panel. (Refer to Section S.)
2. Remove the interlock cable.



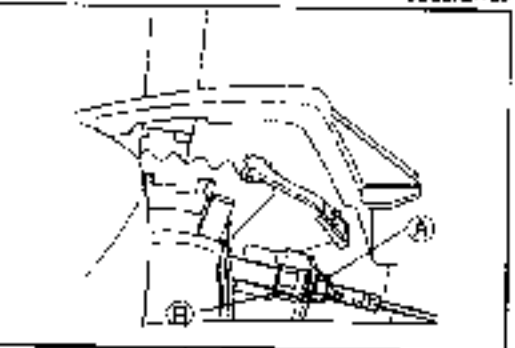
03LCK2-160

Installation Note Interlock cable

1. Install the interlock cable.
2. Install the instrument panel. (Refer to Section S.)



03LCK2-160



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

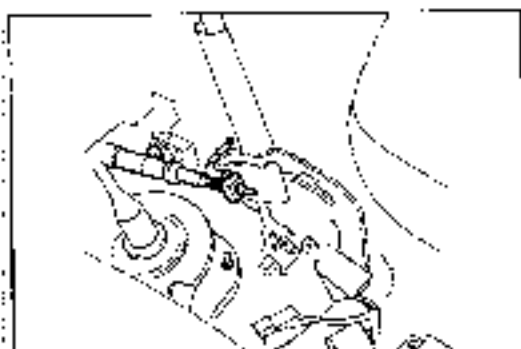
Do not kink the cable.

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)

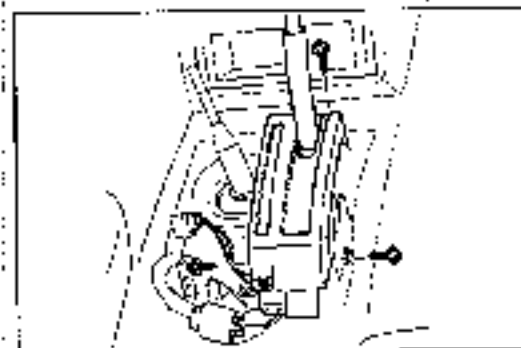
4. Check shift-lock system operation.



JH10K2-125

Selector cable

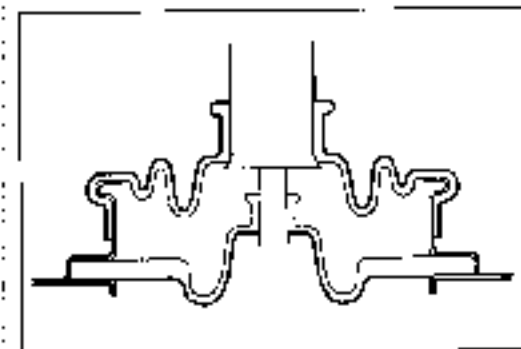
1. Install the selector cable as shown in the figure.
2. Adjust the lever position. (Refer to page K2-154.)



JH10K2-079

Indicator panel

1. Install the indicator panel.
2. Adjust the indicator panel. (Refer to page K2-151.)

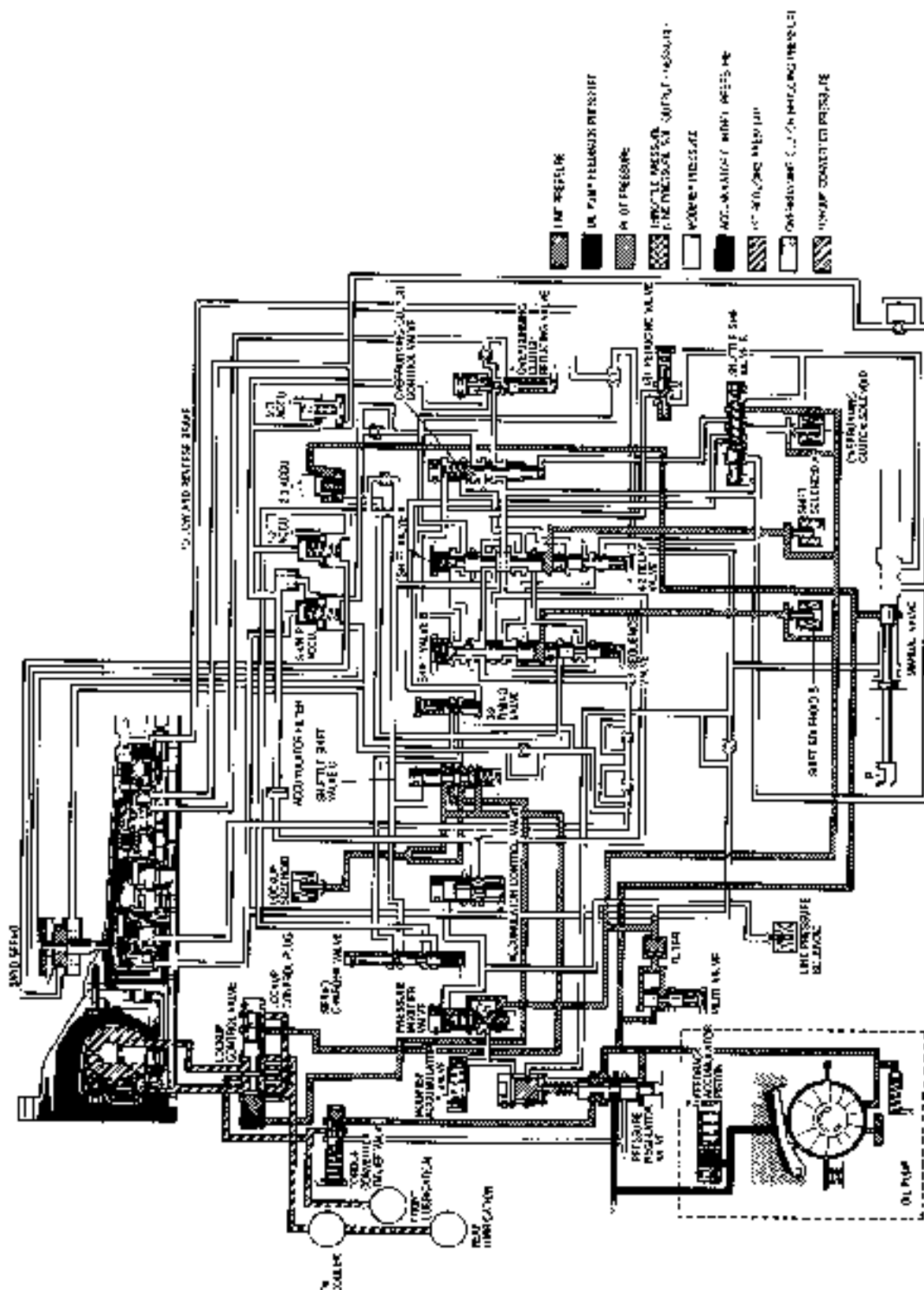


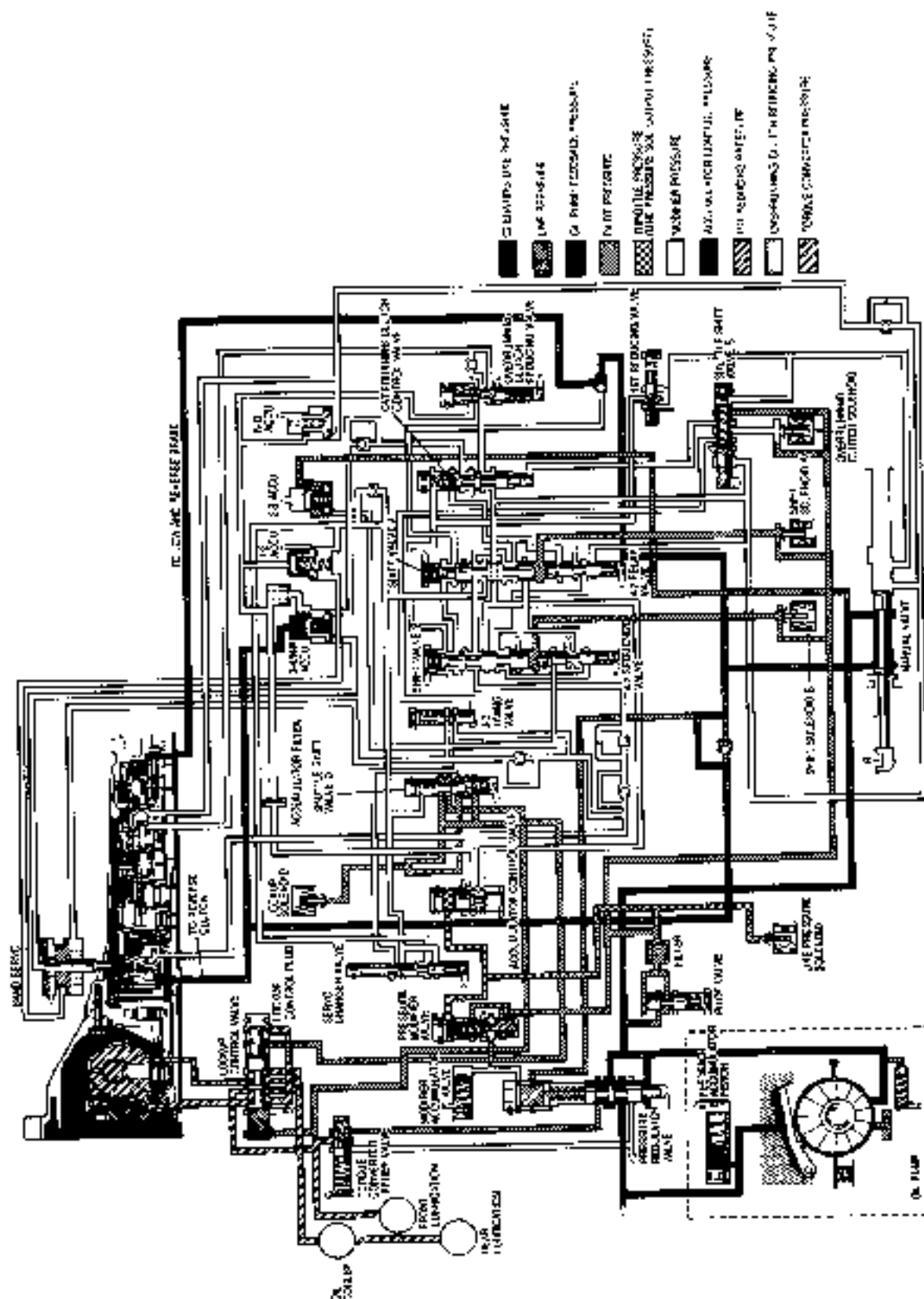
JH10K2-156

Insulator panel and boot

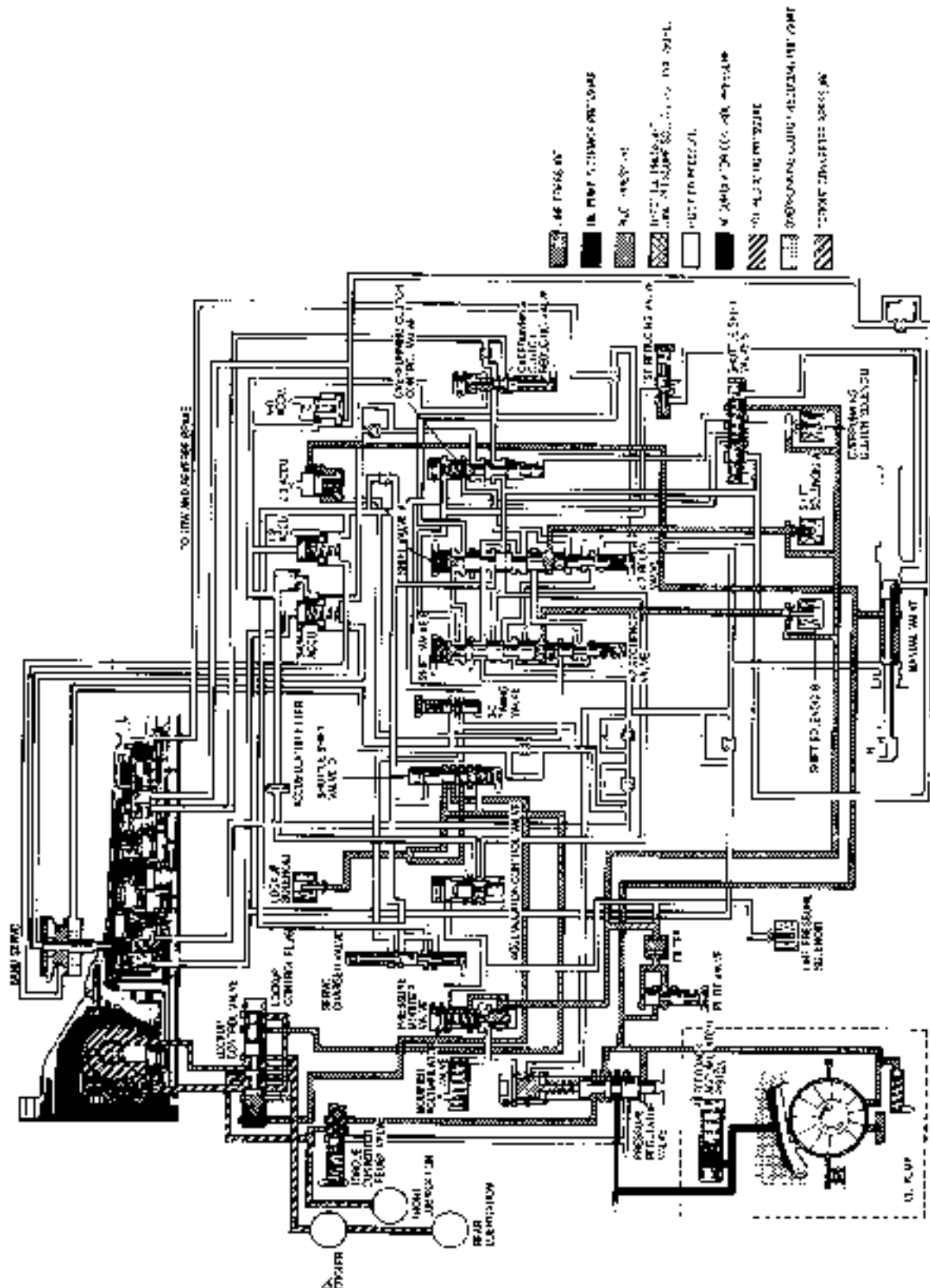
1. Install the insulator panel and boot as shown in the figure.

P RANGE





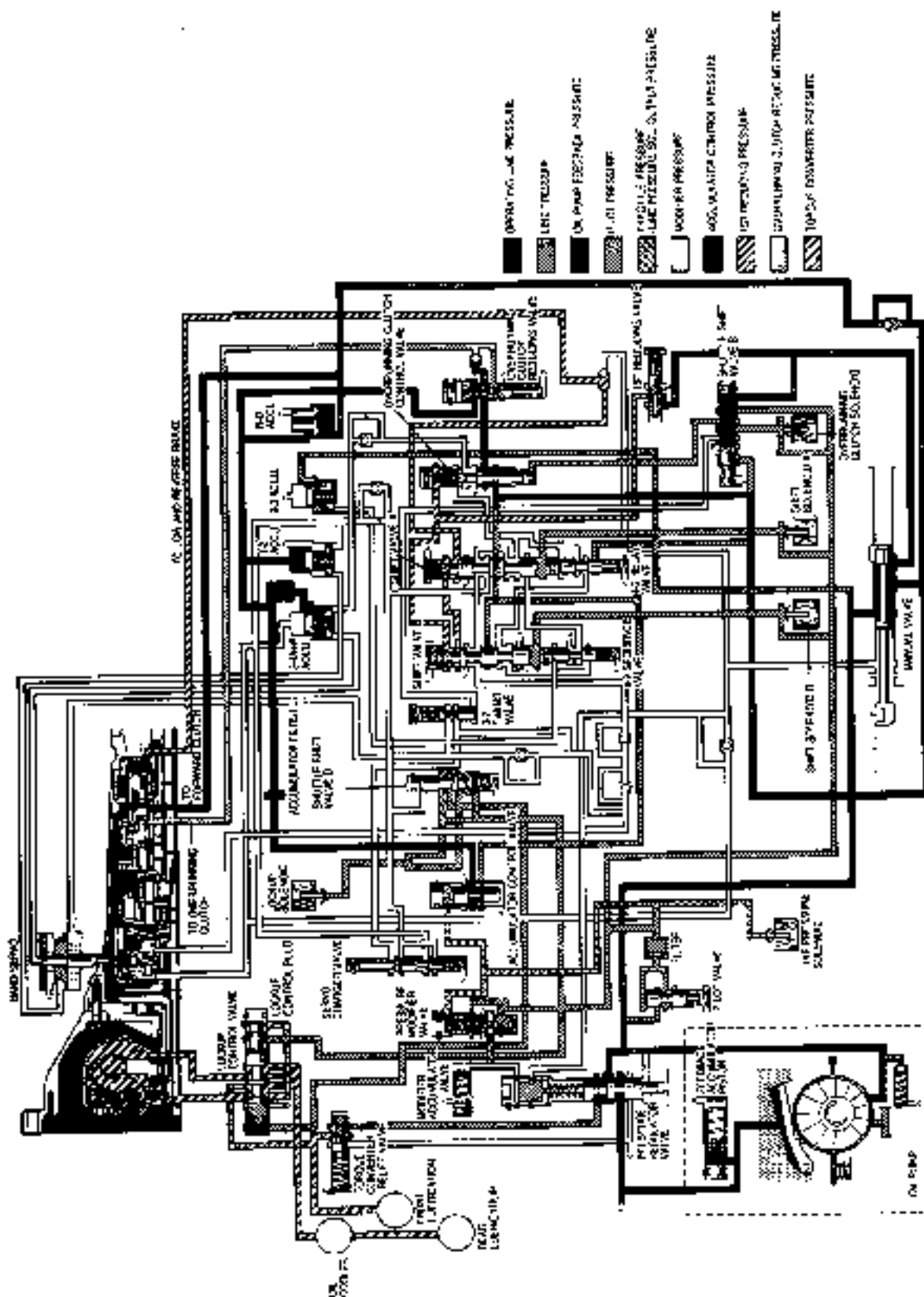
N RANGE



[illegible]

[illegible]

L RANGE: 1ST GEAR



[illegible]

AUTOMATIC TRANSMISSION (TRANSFER CASE)

INDEX K3- 2
OUTLINE K3- 3
SPECIFICATION K3- 3

0311070 001

INDEX

4x4
INDICATOR
LAMP
SERVICE,
SECTION T



HOLD
INDICATOR
LAMP
SERVICE,
SECTION T

HOLD

NEUTRAL
INDICATOR
LAMP
SERVICE,
SECTION T



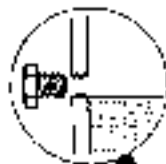
A/T OIL
TEMP
INDICATOR
LAMP
SERVICE,
SECTION T

A/T
OIL TEMP

AUTOMATIC TRANSMISSION FLUID
SERVICE,
SECTION K2



TRANSFER CASE OIL SERVICE,
SECTION J3



TRANSFER CASE SERVICE, SECTION J3



AUTOMATIC TRANSMISSION SERVICE, SECTION K2

OUTLINE

SPECIFICATIONS

Engine/Transmission			B2600i
Item			R4AX-EL
			4x4
Synchronmesh 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)

12UJ-K3.00:

PROPELLER SHAFT

OUTLINE	L- 2
SPECIFICATIONS (4x2)	L- 2
SPECIFICATIONS (4x4)	L- 3
TROUBLESHOOTING GUIDE	L- 4
PROPELLER SHAFT	L- 4
PREPARATION	L- 4
REMOVAL AND INSTALLATION	L- 5
OVERHAUL	L- 8
LUBRICATION	L-15

J2110 2-0001

OUTLINE

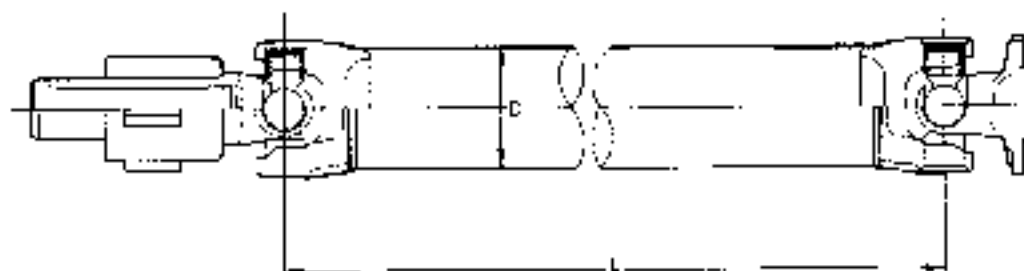
SPECIFICATIONS (4x2)

Model/Transmission		B2200			
		Short bed		Long bed	
		M/T	A/T	M/T	A/T
Length	L	671.5 (26.44)	1,385 (53.74)	671.5 (26.44)	623.5 (24.56)
	L ₁	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 ₁	65 (2.56)	—	65 (2.56)	65 (2.56)

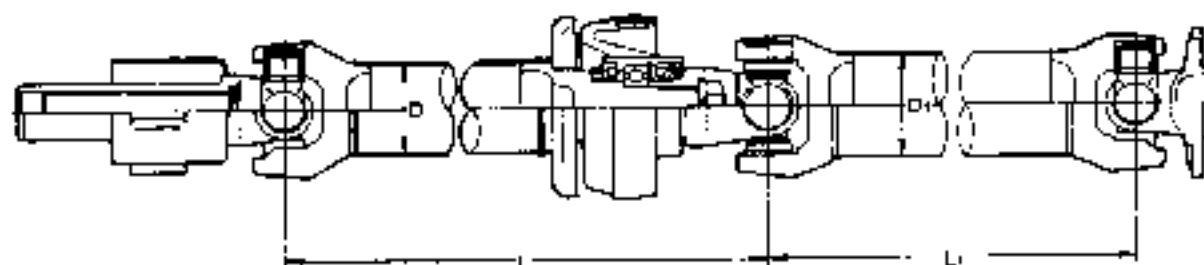
Model/Transmission		B2600I			
		Short bed		Long bed	
		M/T	A/T	M/T	A/T
Length	L	660.5 (26.36)	1,370 (53.94)	669.5 (26.36)	623.5 (24.56)
	L ₁	745 (29.33)	—	969 (38.15)	969 (38.15)
Outer diameter	D	65 (2.56)	75 (2.95)	65 (2.60)	65 (2.56)
	D ₁	65 (2.56)	—	65 (2.60)	65 (2.56)

OB-20-L-002

SHORT BED A/T



EXCEPT SHORT BED A/T



SPECIFICATIONS (4x4)

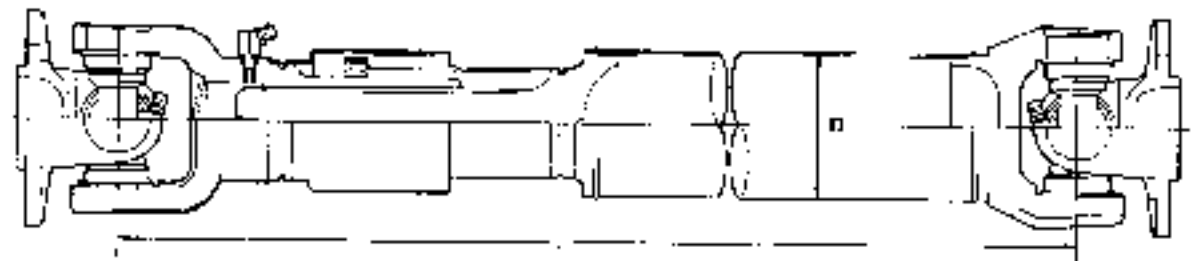
Model/Transmission			B26D01							
			Short bed				Long bed			
			Front propeller shaft		Rear propeller shaft		Front propeller shaft		Rear propeller shaft	
			M/T	A/T	M/T	A/T	M/T	A/T	M/T	A/T
Length	mm (in)	-	470 (18.50)		1,313 (51.69)		470 (18.50)		543 (21.34)	
			-		-		-		990 (38.98)	
Outer diameter	mm (in)	φ	57 (2.24)		75 (2.95)		57 (2.24)		75 (2.95)	
			-		-		-		-	

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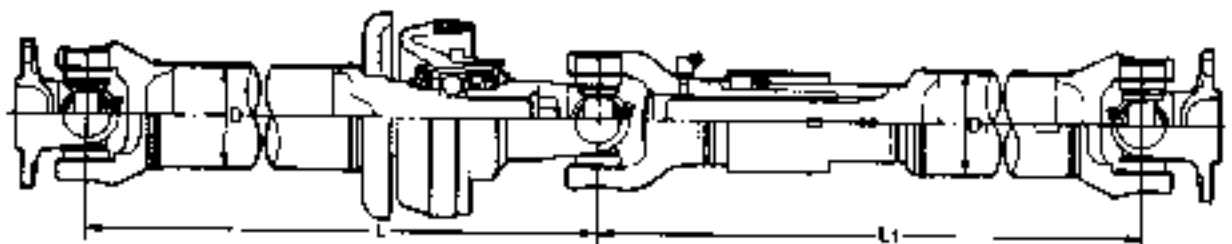
FRONT PROPELLER SHAFT (SHORT AND LONG BED)



REAR PROPELLER SHAFT (SHORT BED)



REAR PROPELLER SHAFT (LONG BED)



L TROUBLESHOOTING GUIDE, PROPELLER SHAFT

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Deflection	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	—
	Faulty assembly of yoke of center bearing	Repair	L-8
Abnormal noise	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	—

2R00X-001

PROPELLER SHAFT

PREPARATION SST

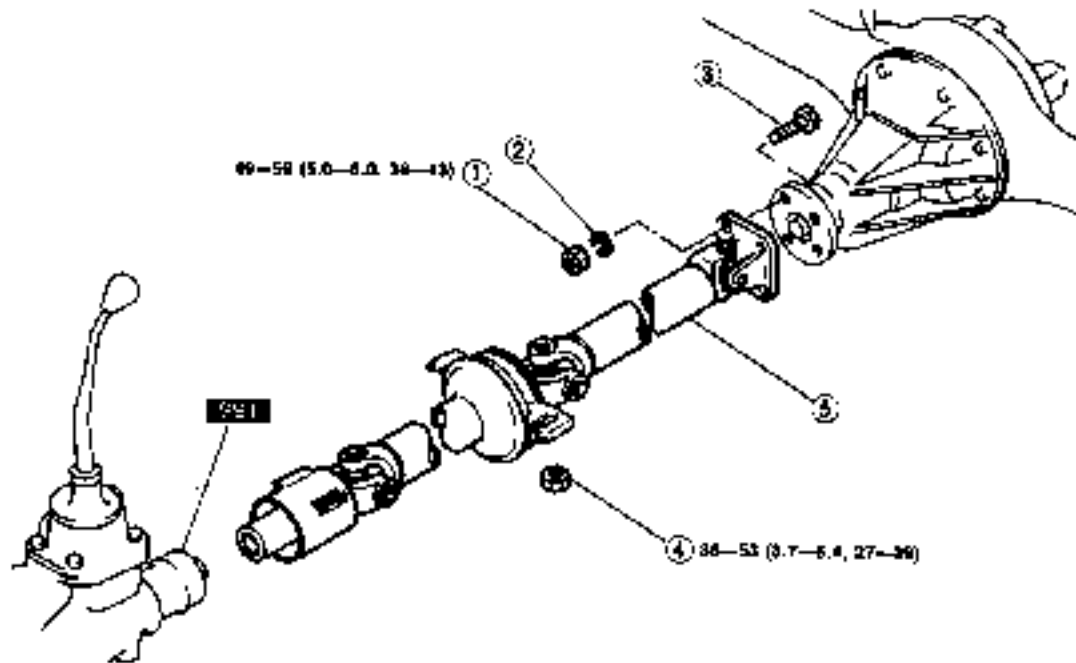
49 0259 440 Holder, main shaft		49 0839 425C Puller set bearing		49 0635 145 Puller, for pulley base	
49 B025 0A0 Installer, dust seal		49 B025 001 Body (Part of 49 B025 0A0)		49 HC25 001 Installer, bearing	
49 HC25 102 Installer, bearing		49 HC25 002 Installer, dust seal		49 HC25 004 Installer, bearing	
49 F401 331 Body		49 HC25 003 Installer, bearing		49 J1033 101 Remover, bearing	
49 S120 44C Holder, main shaft					

2R00X-010

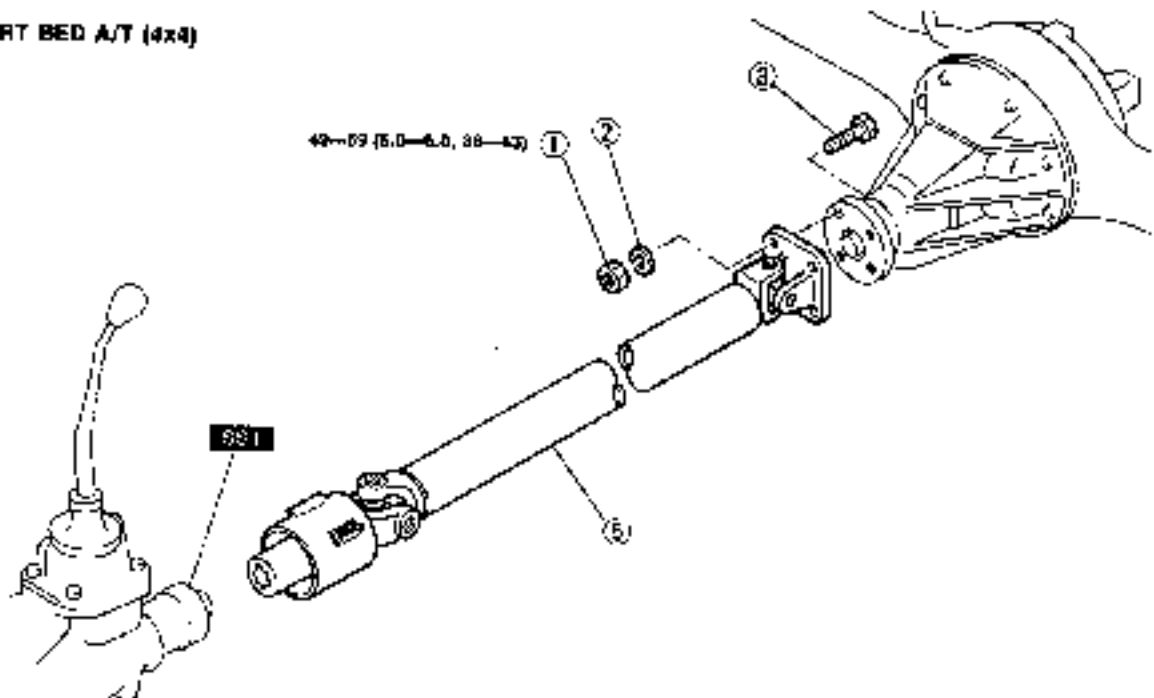
REMOVAL AND INSTALLATION

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)



1. Nut
2. Lock washer
3. Bolt
4. Nut

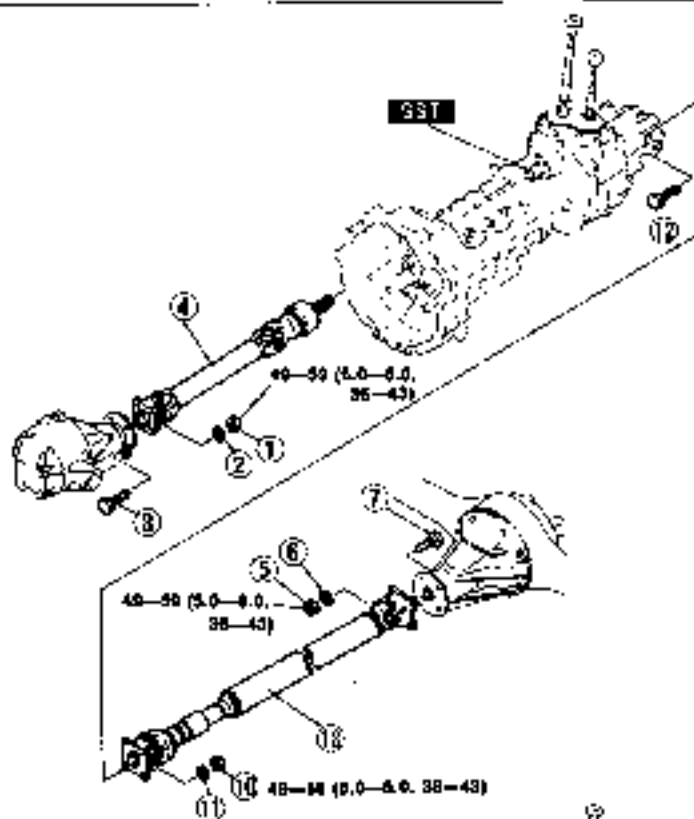
5. Propeller shaft

Removal..... page I-7
Installation..... page I-7

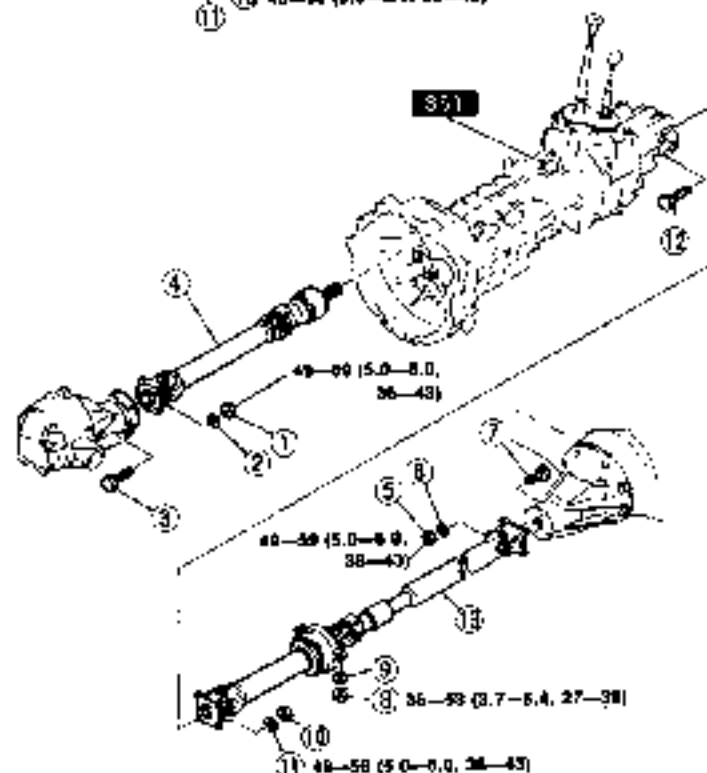
Nm (m-kg, ft-lb)
*BUCGX-001

PROPELLER SHAFT

SHORT BED (4x4)



LONG BED (4x4)

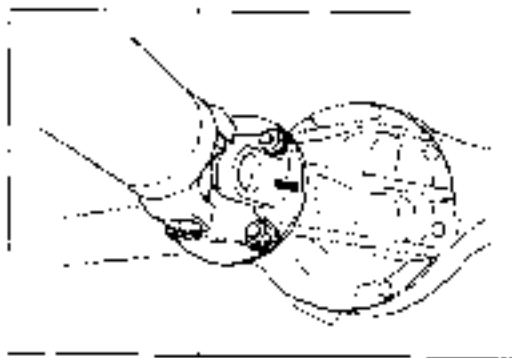


Item (mm-lb) (in-lb)
BLU-100

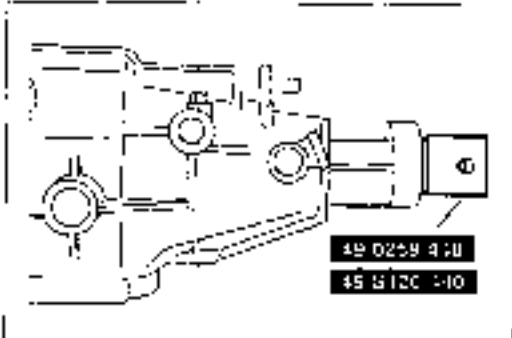
1. Nut
 2. Lock washer
 3. Bolt
 4. Front propeller shaft
- Removal page L-7
Installation page L-7

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

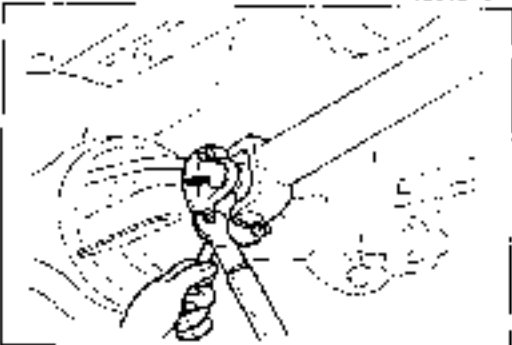


83 JULY 008

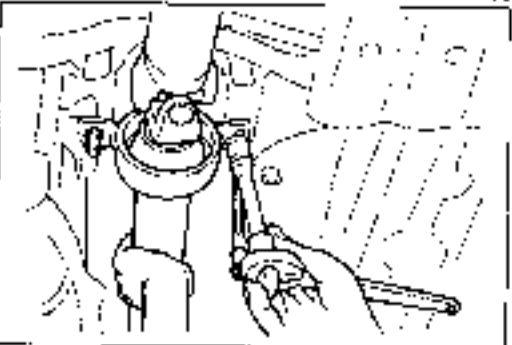


49 0259 440
49 S120 440

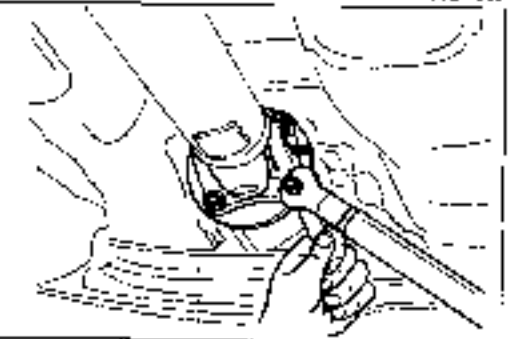
0806LY 011



251A3 4-1X/2



28JULY 029



2ELCLX-000

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.

(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

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)

2. Install the center bearing support assembly.

Tightening torque:

36—53 N·m (3.7—5.4 m·kg, 27—39 ft·lb)

3. Align the marks, and install the front propeller shaft.

Tightening torque:

49—59 N·m (5.0—6.0 m·kg, 36—43 ft·lb)

4. Check that there is no abnormal noise or vibration when driving the vehicle.

OVERHAUL

Disassemble in the order shown in the figure, referring to **Disassembly note**.

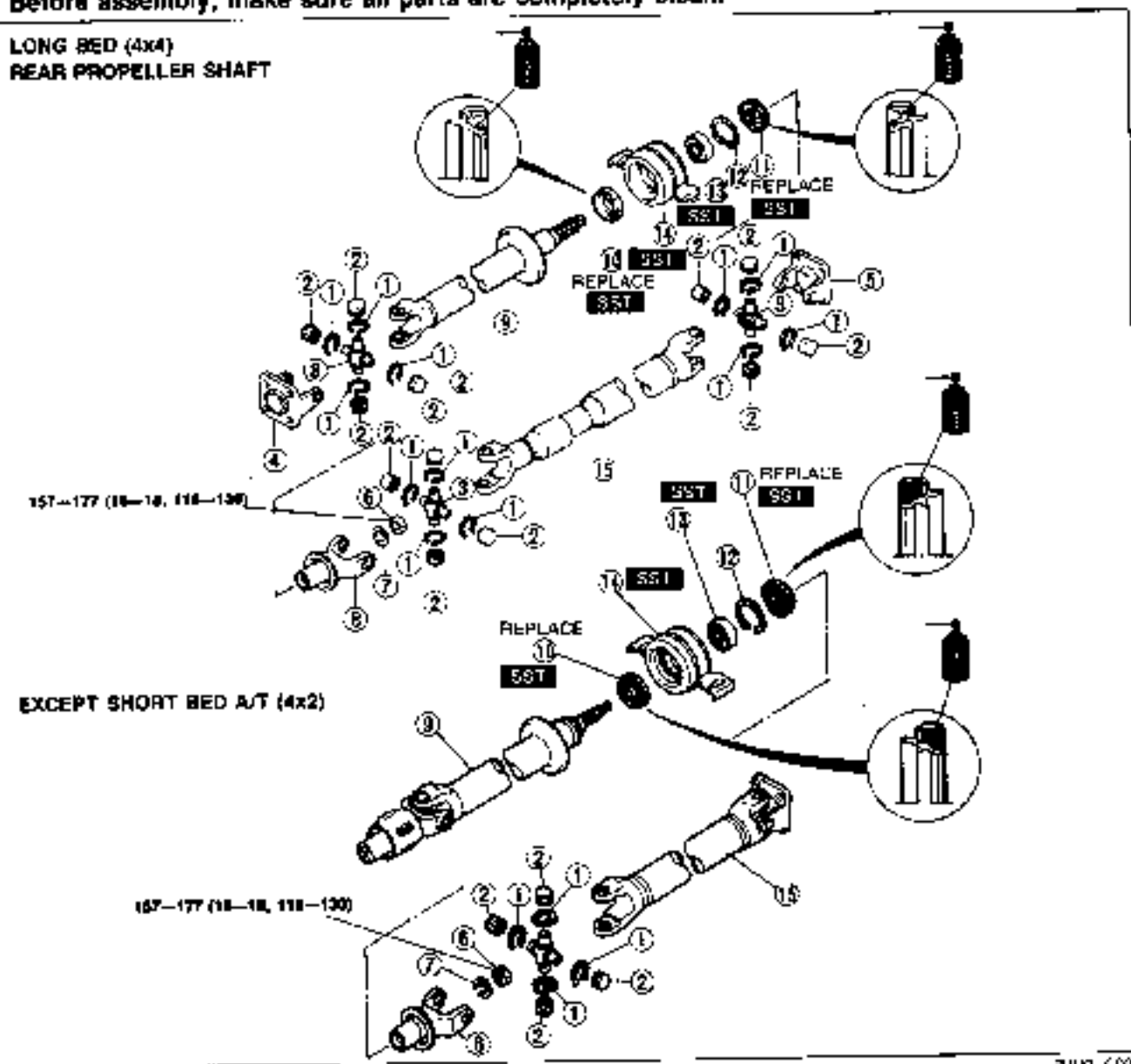
Inspect all parts and repair or replace as necessary.

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

Caution

Before assembly, make sure all parts are completely clean.

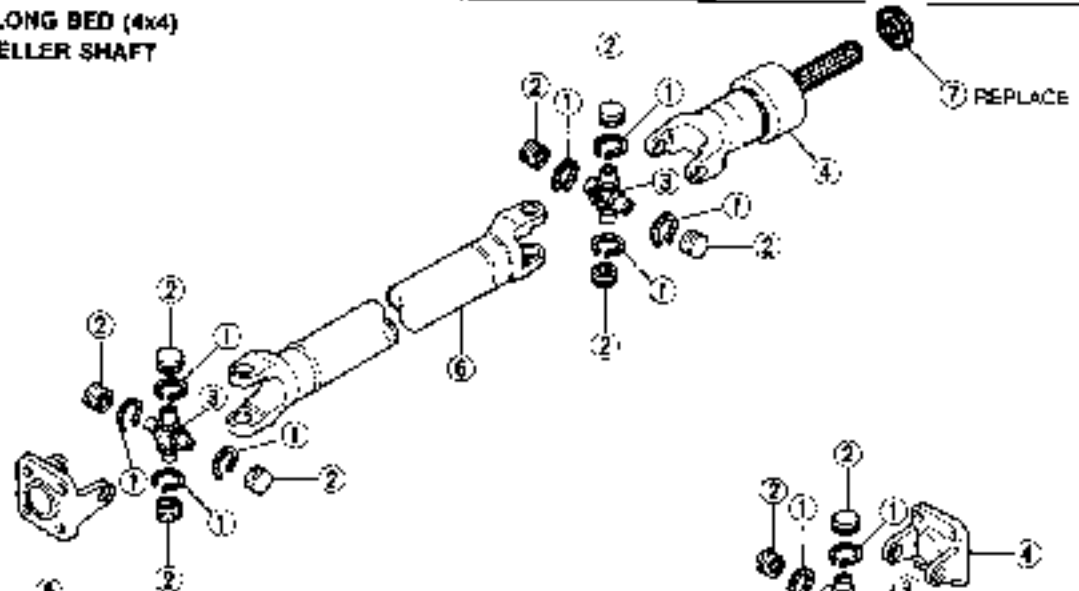
**LONG BED (4x4)
REAR PROPELLER SHAFT**



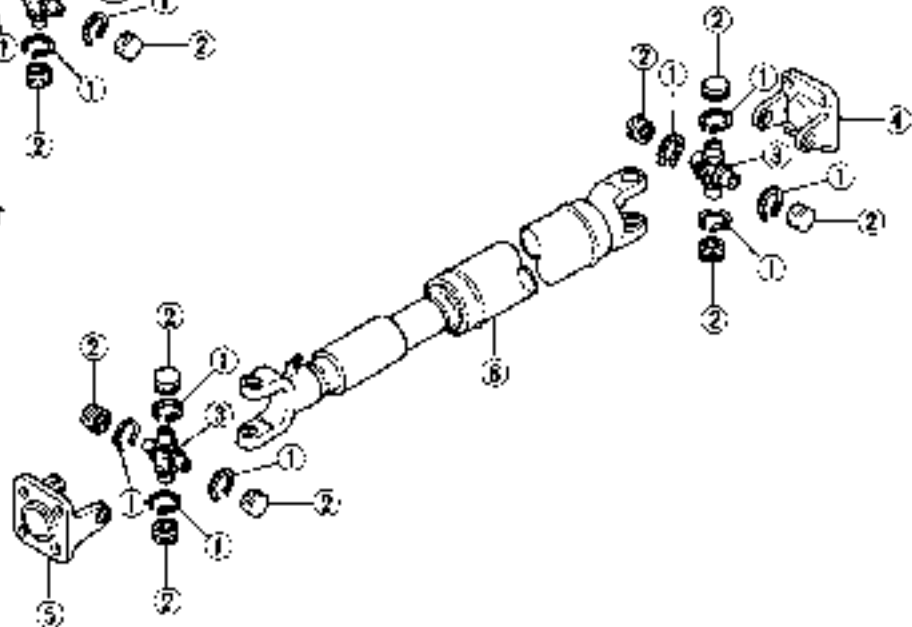
PJ003_K 004

1. Snap ring	7. Lock washer	12. Snap ring
2. Bearing cup	8. Center yoke	13. Bearing
Inspect for damage or rough rotation	Removal	Removal
	page L-9	page L-11
	Installation	Inspection
	page L-4	page L-12
		Installation
		page L-12
3. Spider	9. Front propeller shaft	14. Center bearing support assembly
Removal	Inspection	Removal
page L-9	page L-11	page L-11
Installation	10. Front dust seal	Installation
page L-14	Removal	page L-13
	page L-13	
4. Front yoke	11. Rear dust seal	15. Rear propeller shaft
Removal	Removal	Inspection
page L-9	page L-11	page L-11
Installation	Installation	
page L-14	page L-12	
5. Rear yoke		
6. Locknut		

SHORT AND LONG BED (4x4) FRONT PROPELLER SHAFT

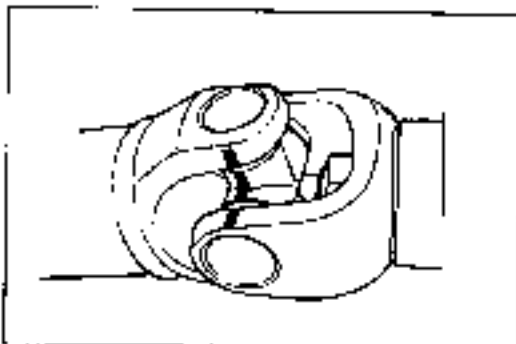


SHORT BED (4x4) REAR PROPELLER SHAFT



1. Snap ring
2. Bearing cup
Inspect for damage or rough rotation
3. Spider
Removal..... page L- 9
Installation..... page L-14
4. Front yoke
Removal..... page L- 9
Inspect splines for damage, wear or cracks
Installation..... page L-14

5. Rear yoke
Removal..... page L- 9
Installation..... page L-14
6. Propeller shaft
Inspection..... page L-11
7. Oil seal
Installation..... page L-14



28JULX-006

Disassembly note

Snap ring, spider, front yoke, rear yoke, center yoke

Note

Use pads in the vice to prevent damage to the propeller shaft.

1. Place the propeller shaft in a vice.

Note

If the propeller shaft, spider, and yoke are not correctly combined when assembled, vibration may result.

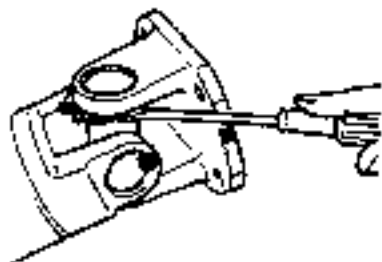
2. Align the marks on the propeller shaft, spider, and yoke

PROPELLER SHAFT

Note

The snap rings cannot be reused.

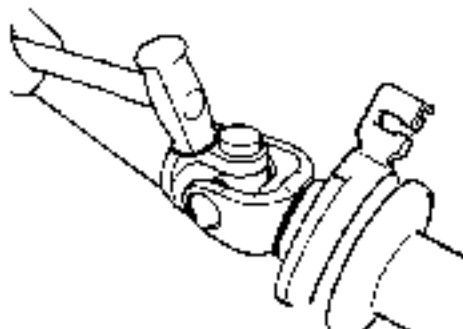
3. Remove all snap-rings with a flat-tip flat tipped screwdriver.



3P333JX014

4. Remove the bearings on the propeller shaft side by lightly tapping with a hammer.

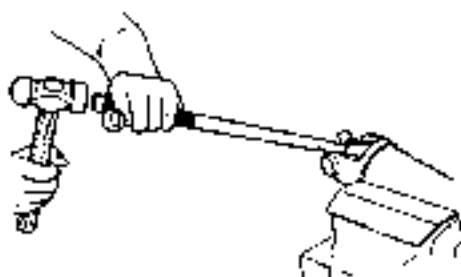
5. Remove the bearings and spider by lightly tapping the spider.



7BLCBX016

6. Remove the bearings as shown.

7. Remove the spider.

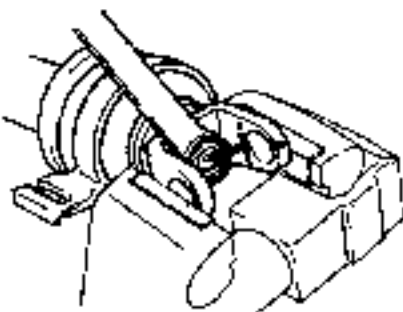


2BLGK007

Locknut

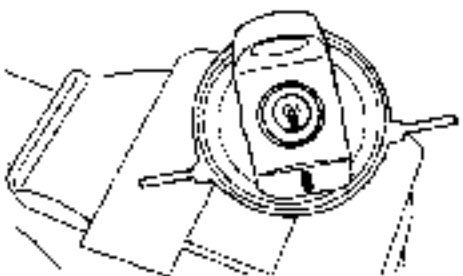
1. Align the marks on the yoke and shaft.

2. Remove the locknut.

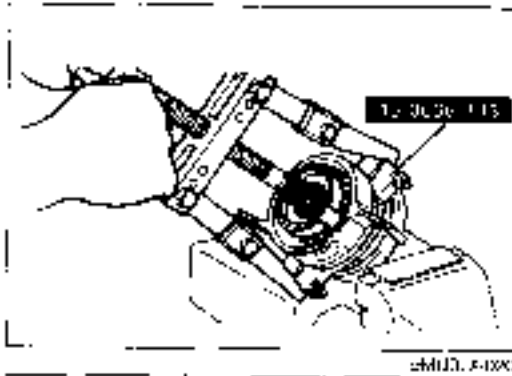


13JULY906

3. Align the marks on the yoke and propeller shaft.

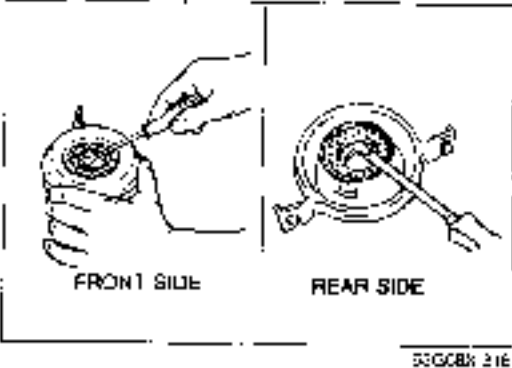


60700 X-026



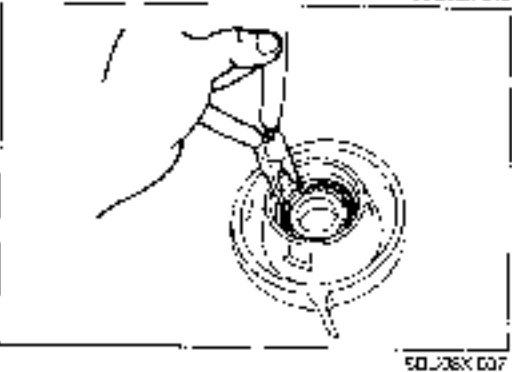
Center bearing support assembly

Remove the center bearing support assembly with the **SST**.



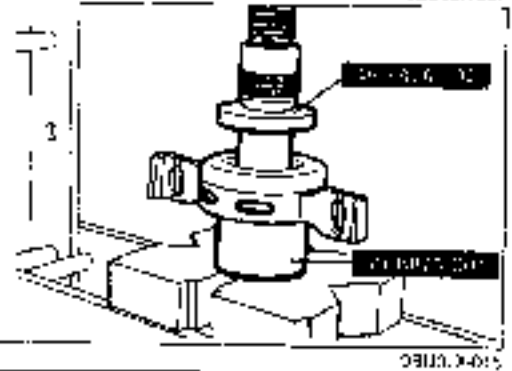
Dust seal

Remove the dust seals as shown.

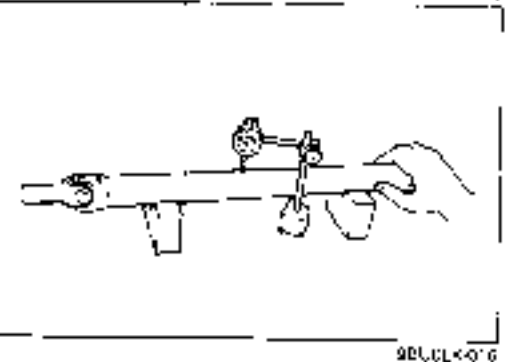


Bearing

1. Remove the snap-ring with snap-ring pliers.



2. Press the bearing from the support assembly toward front side with the **SST**.



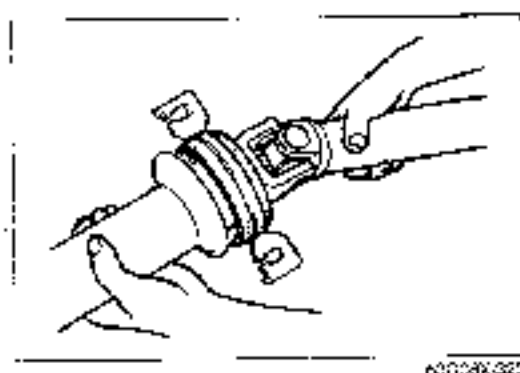
Inspection

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)

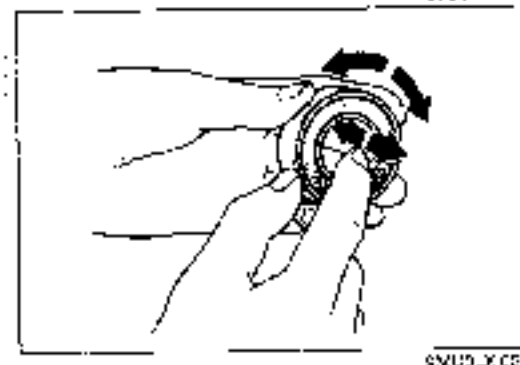
PROPELLER SHAFT



2. Axial and perpendicular backlash of the universal joint

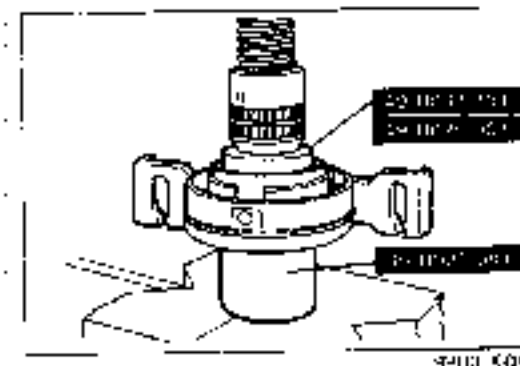
Backlash limit: 0.05mm (0.0020 in)

3. Condition of universal joint operation



Bearing

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.



Assembly note

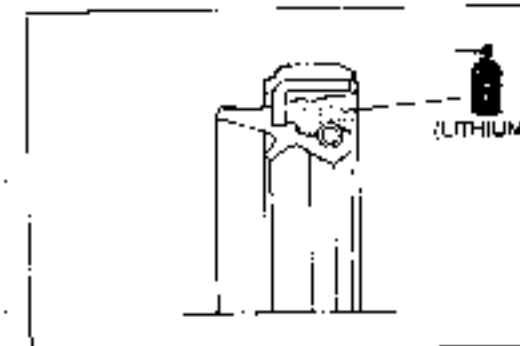
Bearing

1. Install the bearing into the bearing support assembly from the rear side with the **SST**.

B2200 : 49 H033 101

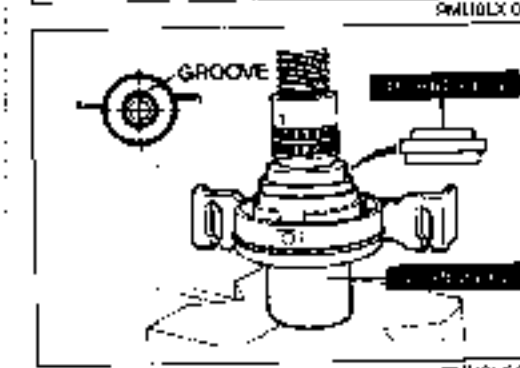
B2600i : 49 H025 001

2. Install the snap-ring with the snap-ring pliers.



Rear dust seal

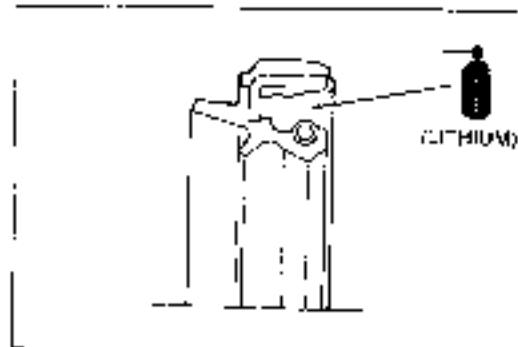
1. Before installing a new rear dust seal into the bearing support assembly, apply lithium based grease to the shaded area.



Note

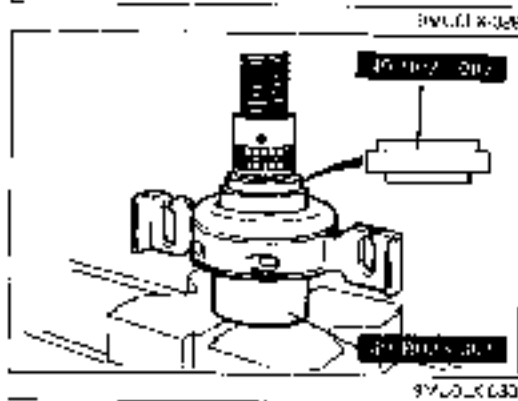
The air bleed groove of the rear dust seal must be installed as shown.

2. Install the rear dust seal into the support assembly from the rear side with the **SST** as shown in the figure.

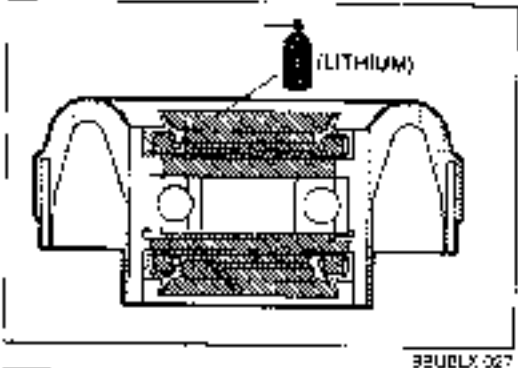


Front dust seal

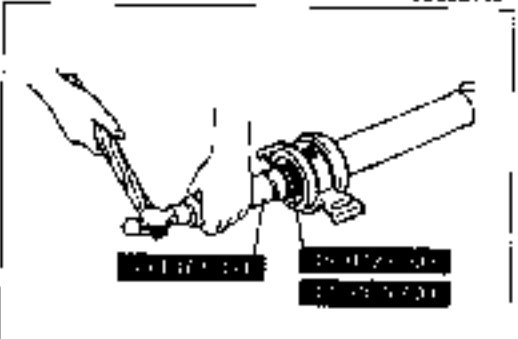
1. Before installing a new front dust seal into the bearing support assembly, apply lithium based grease to the shaded area.



2. Install the front dust seal into the support assembly from the front side with the **SST** as shown in the figure.



3. Apply lithium based grease to the area indicated by the oblique lines.

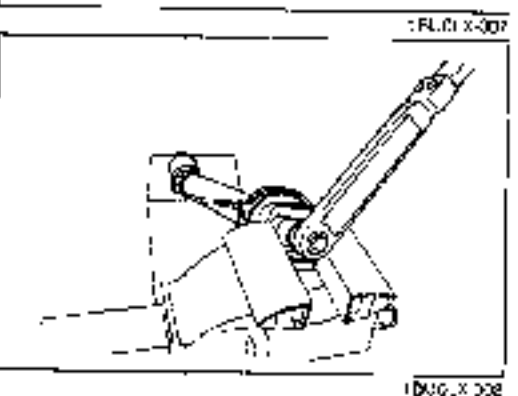


Center bearing support assembly

1. Install the center bearing support assembly with the **SST**.

B2200 : 49 H025 003

B2600i: 49 H025 004

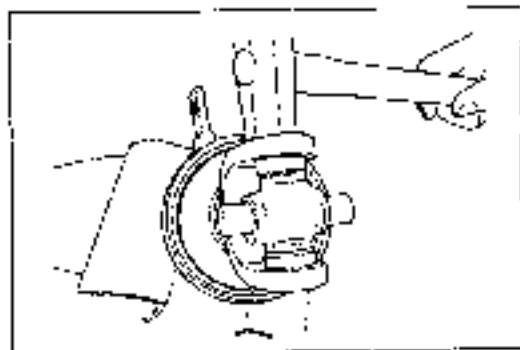


2. Align the matching marks on the yoke and shaft.
3. Install the center yoke.

Tightening torque:

157—177 N·m (16—18 m·kg, 116—130 ft·lb)

PROPELLER SHAFT



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

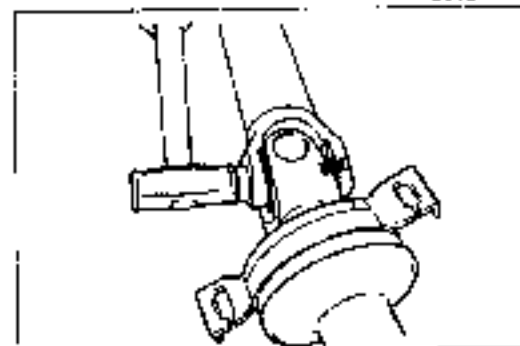
Align the propeller shaft and spider matching marks.

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.



Snap rings

Note

- a) The snap rings cannot be reused.
- b) All 4 snap rings must be the same thickness.
- c) Make sure that each snap ring fits correctly into the groove.
- d) Select the snap rings so that the universal joint starting torque will be as specified.

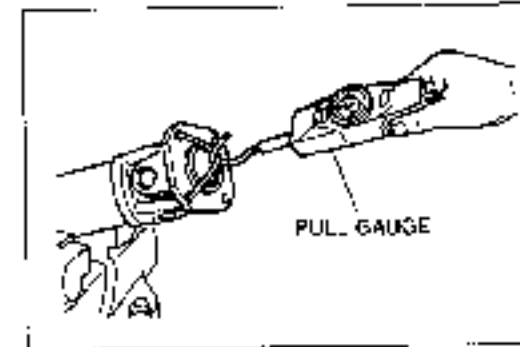
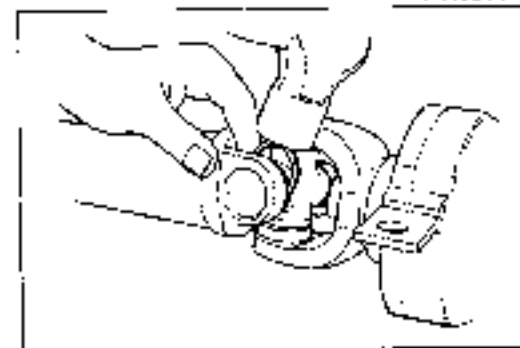
1. Install new snap rings.

Starting torque:

0.294—0.784 N·m (3—8 cm·kg, 2.6—8.8 in·lb)

Snap-ring thicknesses:

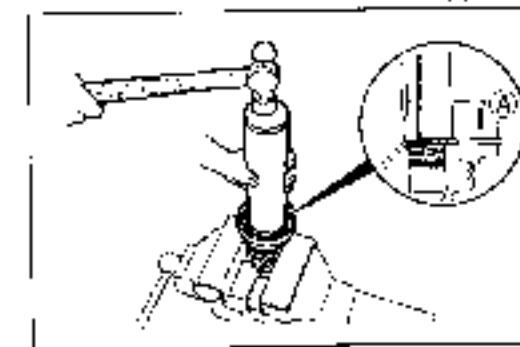
mm (in)			
1.45 (0.0571)	1.48 (0.0583)	1.51 (0.0594)	1.54 (0.0605)
1.57 (0.0618)	1.60 (0.0630)	1.63 (0.0642)	



Oil seal

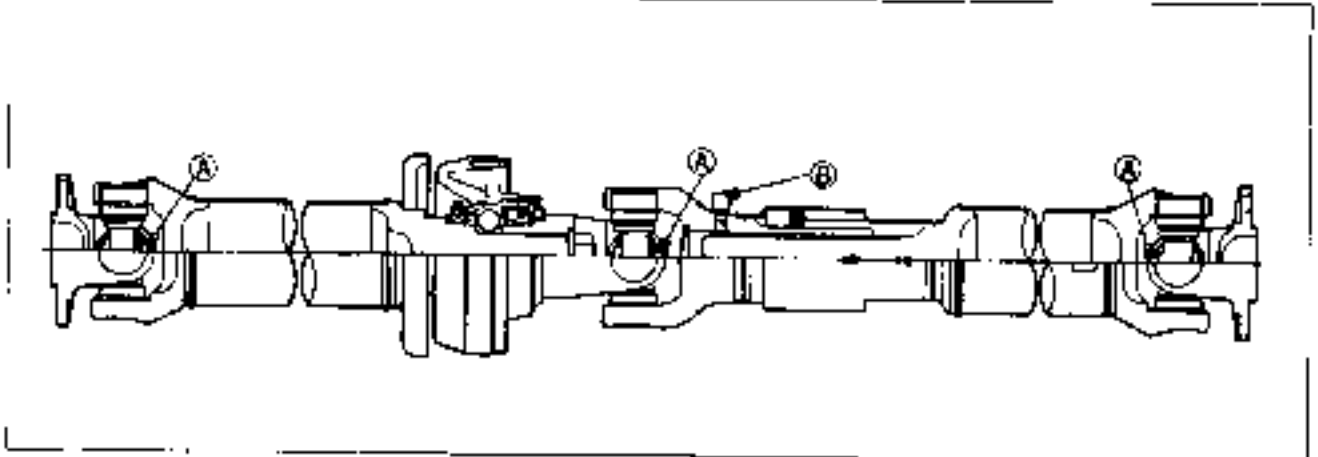
Tap the new oil seal with a suitable pipe until depth (A) (between oil seal and front yoke) reaches as specified.

Depth (A): 1.7—2.3mm (0.067—0.091 in)



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.



UDU0LY-029

Lubricant

For fitting **A** Lithium based grease
 For fitting **B** Disulphide molybdenum grease

Scheduled lubrication of propeller shaft

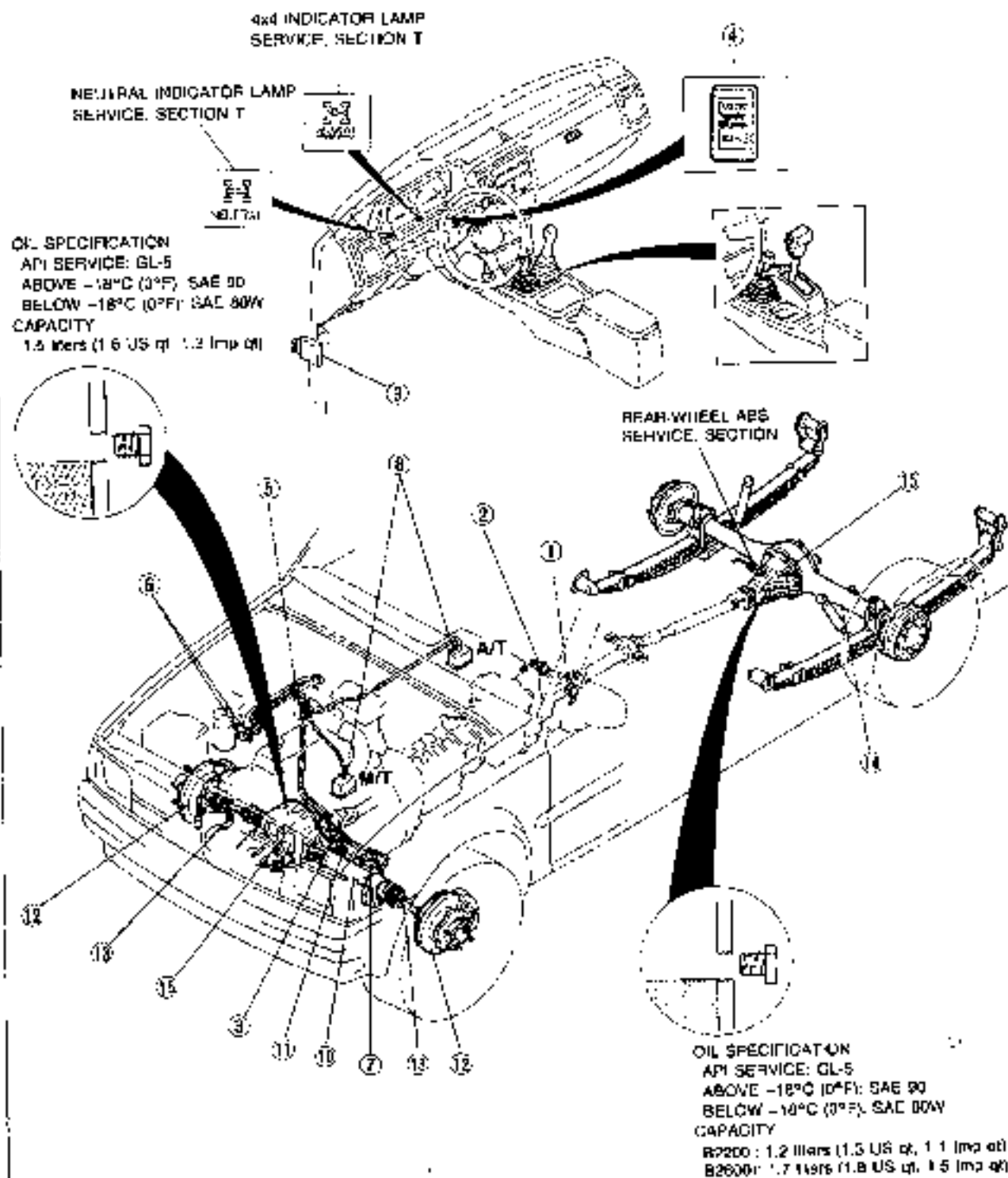
Number of months or km (miles), whichever comes first	
Every 15 months, or 24,000 km (15,000 miles)	

FRONT AND REAR AXLES

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CSL001X-001

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

FDL00M4-000

FRONT AXLE

Problem	Possible Cause	Remedy	Page
Steering wheel vibration	Improperly adjusted wheel bearing play Worn or damaged wheel bearing	Adjust Replace	V-22, 31 M-25
Steering wheel pulls or one-sided braking	Improperly adjusted wheel bearing play Worn or damaged wheel bearing	Adjust Replace	M-29, 31 M-25
Excessive steering wheel play	Improperly adjusted wheel bearing play	Adjust	M-29, 31
Abnormal noise	Bent axle casing	Replace	—
	Bent output shaft	Replace	M-13
	Worn or damaged wheel bearing	Replace	M-23
	Worn output shaft spline	Replace	M-13
	Insufficient grease in joint or spline of drive shaft	Repack or replace	M-37
	Excessive backlash on spline of drive shaft worn joint of drive shaft	Replace	M-37
Grease leakage from boot	Damaged or broken boot	Replace	M-38
	Faulty boot band	Replace	M-38
	Excessive grease	Replace	M-37
Oil leakage	Cracked axle casing	Replace	—

DFL00M4-000

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 axle 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
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	M-51
	Clogged air breather	Repair	—
	Poorly tightened differential carrier	Tighten or repair	M-57
	Worn or damaged oil seal	Replace	M-51

28LDMX-004

REAR AXLE

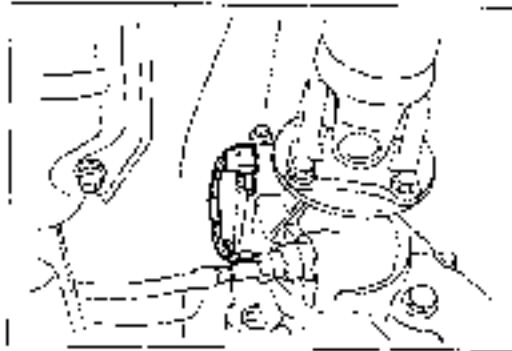
Problem	Possible Cause	Remedy	Page
Abnormal noise	Bent axle casing	Replace	—
	Bent axle shaft	Replace	V-46
	Worn or damaged wheel bearing	Replace	V-46
	Loose bearing locknut	Tighten	M-48
	Worn axle shaft spline	Replace	M-46
Oil leakage	Worn or damaged oil seal	Replace	M-46
	Cracked axle casing	Replace	—

28LDMX-005

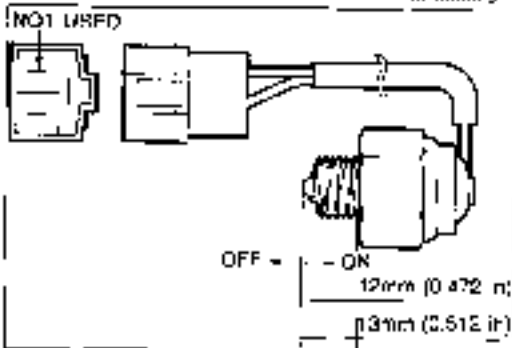
REAR DIFFERENTIAL

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 axle 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
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	M-51
	Clogged air breather	Repair	—
	Poorly tightened differential carrier	Tighten or repair	V-57
	Worn or damaged oil seal	Replace	M-51

28LDMX-005



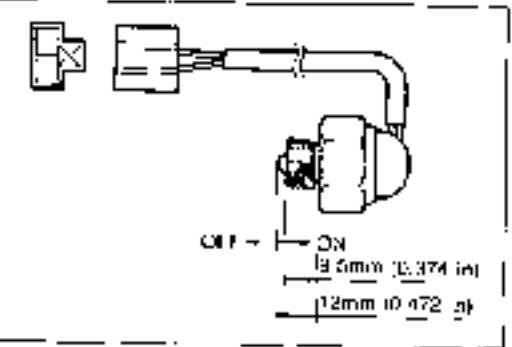
RFW MECH 37



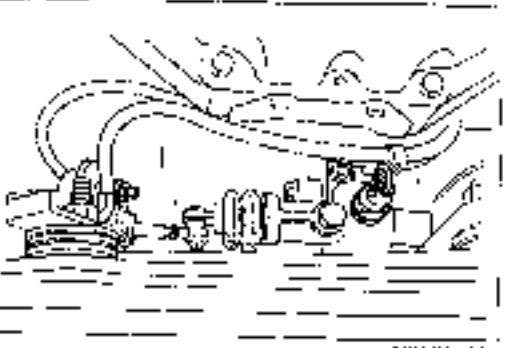
RFW SW 37



RFW SW 37



RFW SW 37



RFW SW 37

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.

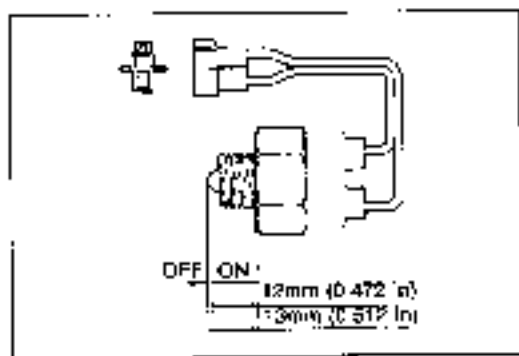
Continuity	Switch
Yes	Depressed
No	Released

5. If not correct, replace the switch.

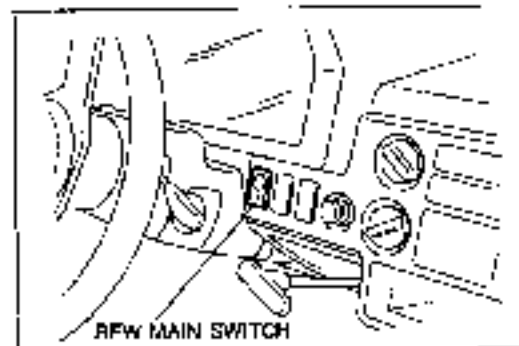
RFW SWITCH

Inspection

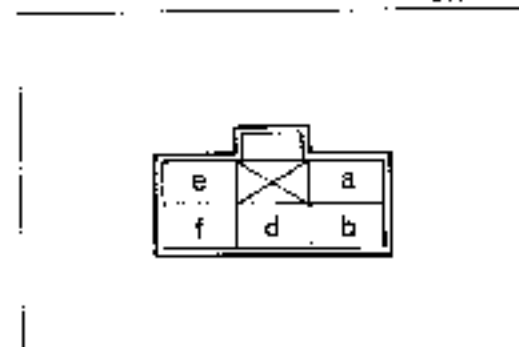
1. Disconnect the negative battery terminal.
2. Jack up the vehicle and support it with safety stands.
3. Disconnect the RFW switch connector and remove the switch.



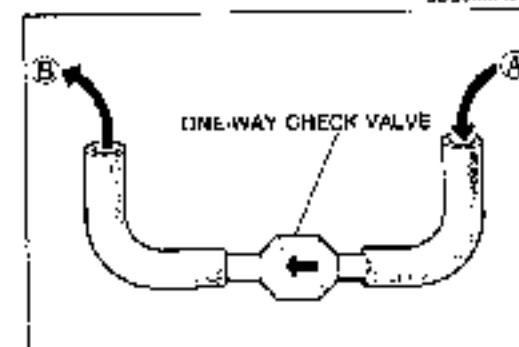
08J0VX-077



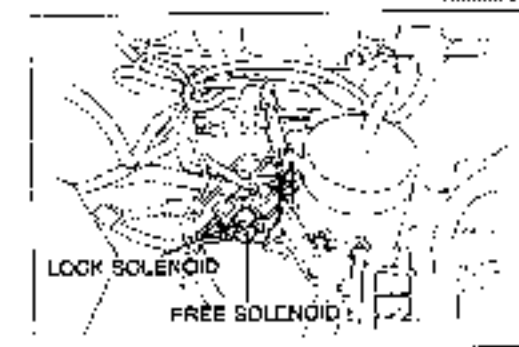
16L0MX-004



08J0VX-077



16L0MX-004



08J0VX-077

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.

Switch	Terminal
Depressed	a, b, c, d, e, f
Released	a, b, c, d, e, f

○—○ indicates continuity

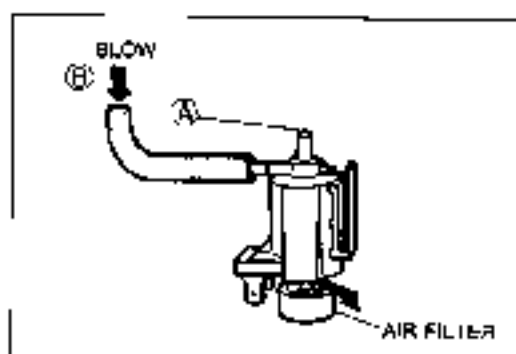
3. If not correct, replace the RFW main switch and LOCK indicator lamp.

ONE-WAY CHECK VALVE Inspection

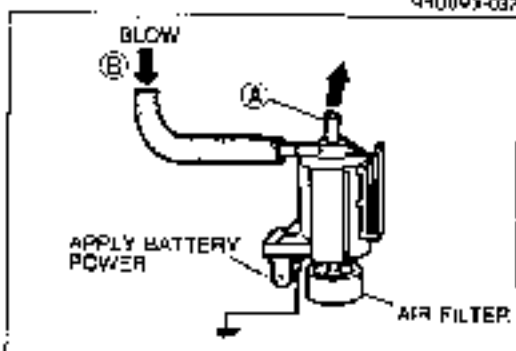
1. Remove the one-way check valve.
2. Blow through (A) and check that air flows from (B).
3. Blow through (B) and check that air does not flow from (A).
4. If not correct, replace the one-way check valve.

LOCK AND FREE SOLENOID VALVES Inspection

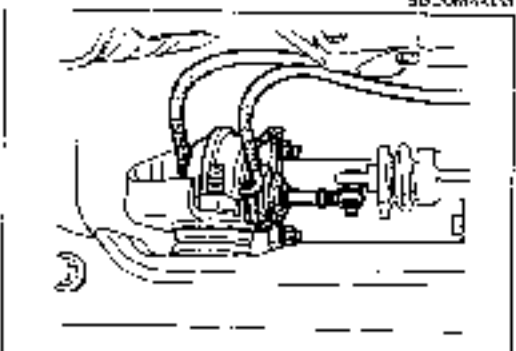
1. Disconnect the vacuum hoses and the connector from each solenoid valve.



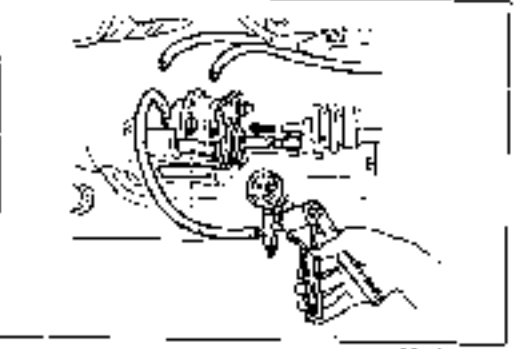
99U0W-032



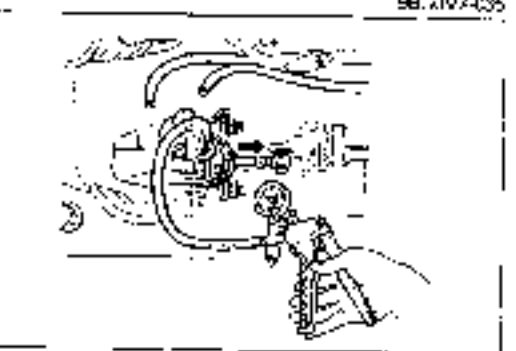
99J0M4-033



99U0M4-034



99J0M4-035



99U0W-036

2. Blow through each valve from port (B).
3. Check that air flows from the air filter.

4. Connect 12V and a ground to the terminals of each valve.
5. Blow through each valve from port (B).
6. Check that air flows from port (A).
7. If not correct, replace the solenoid valve(s).

ACTUATOR Inspection

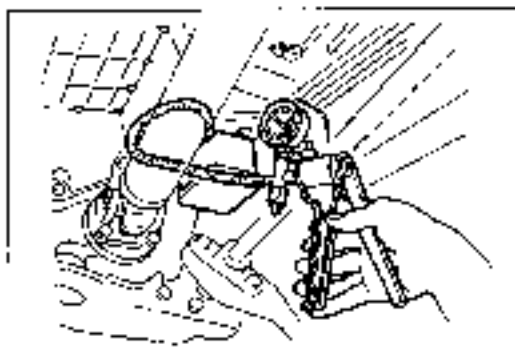
1. Jack up the vehicle and support it with safety stands.
2. Disconnect the vacuum hoses from the actuator.

3. Connect a vacuum pump tester to the actuator (free side) as shown.
4. Apply 200 mmHg (7.87 inHg) vacuum, and verify that the rod moves toward the left (driver side).
5. Disconnect the vacuum pump.

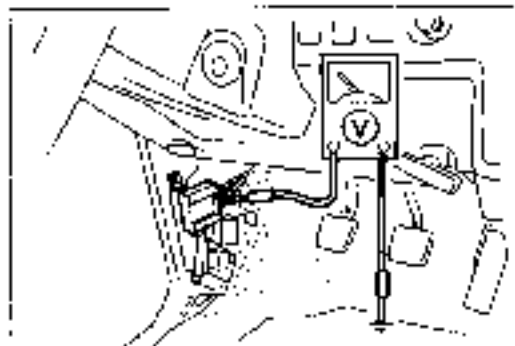
6. Connect the vacuum pump to the actuator (lock side) as shown.
7. Apply 250 mmHg (7.87 inHg) vacuum, and check that the rod moves toward the right (passenger side).
8. If not correct, replace the actuator.

Tightening torque:

16—23 Nm (1.6—2.3 m·kg, 12—17 ft·lb)

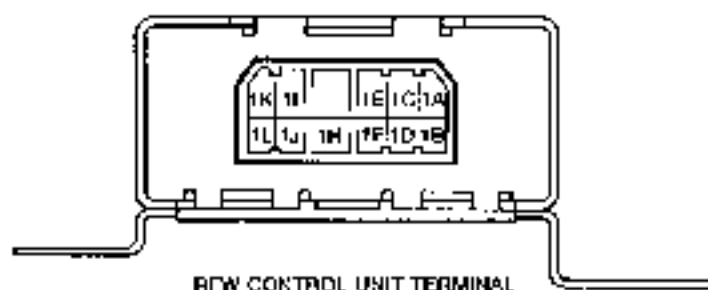
**VACUUM RESERVOIR****Inspection**

- 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.

**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



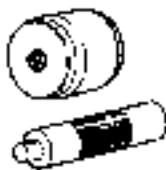
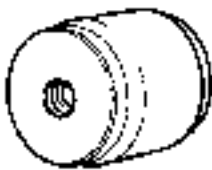
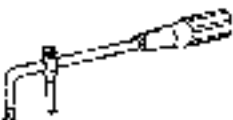
V_B: Battery voltage

Terminal	Connected to	Voltage	Condition
1A (Output)	Lock solenoid	V _B	Solenoid OFF • RFW unit "Free"
		Below 0.5V	Solenoid ON • RFW unit "Lock"
1B (Ground)	Body	Below 0.5V	—
1C (Output)	Free solenoid	V _B	Solenoid OFF • RFW unit "Lock"
		Below 0.5V	Solenoid ON • RFW unit "Free"
1D	—	—	—
1E (Output)	4x4 indicator lamp	V _B	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 _B	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 _B	Ignition switch ON
		Below 0.5V	Ignition switch OFF
1I (Input)	RFW main switch	V _B	RFW main switch released (OFF)
		Below 1.5V	RFW main switch depressed (ON)
1J (Input)	RFW switch	V _B	RFW switch OFF • RFW unit "Free"
		Below 0.5V	RFW switch ON • RFW unit "Lock"
1K (Input)	4x4 indicator switch	V _B	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 _B	Neutral switch OFF • Transfer case lever 2H, 4H, or 4L
		Below 0.5V	Neutral switch ON • Transfer case lever N

28JOMX-006

REMOTE FREE WHEEL (RFW) MECHANISM

RFW UNIT
Preparation
SST

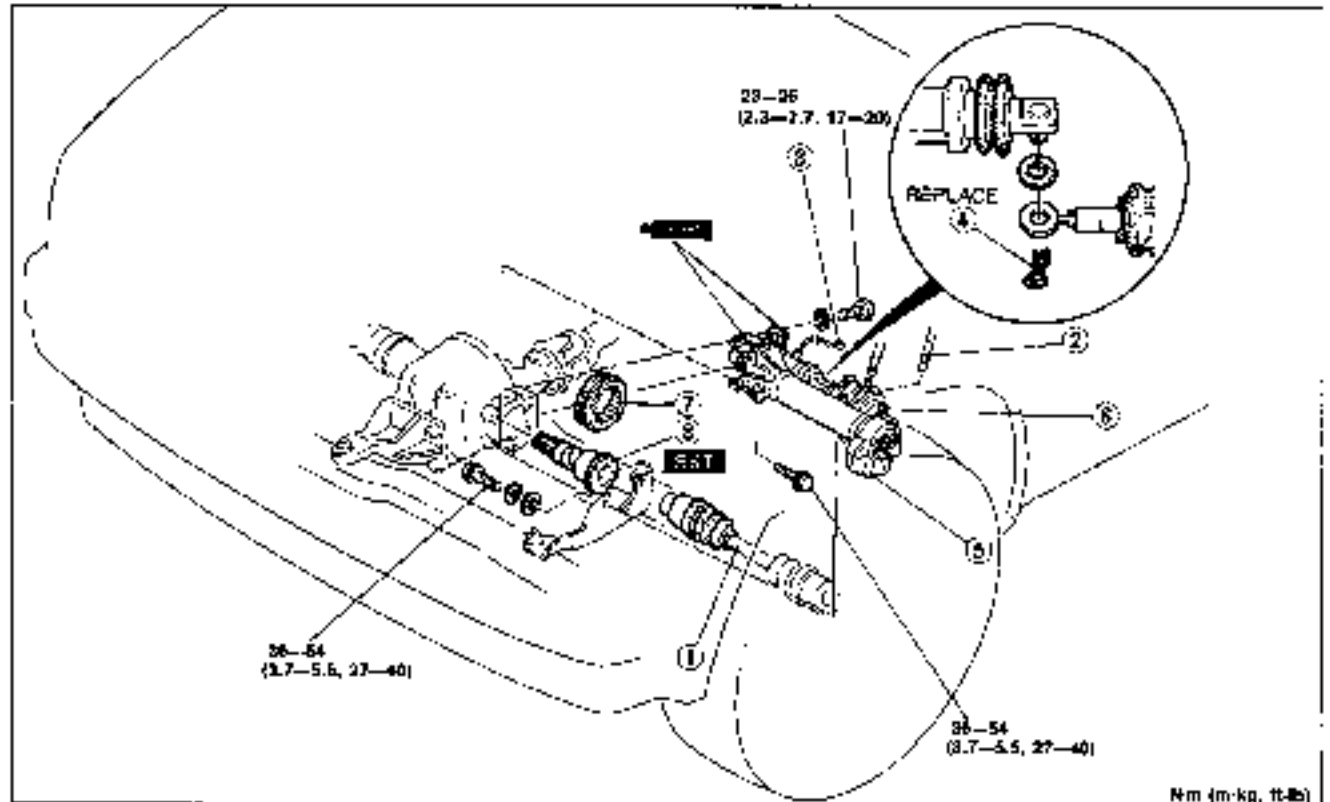
49 0813 215A Puller, tapered dowel 	49 0710 520 Puller, bearing 	49 W027 0A0 Installer set, oil seal 
49 W027 001 Body (Part of 49 W027 0A0) 	49 U027 004 Remover, oil seal 	49 M005 795 Body 
49 U027 005 Installer bearing 	49 U027 006 Installer, bearing 	49 U027 007 Installer, oil seal 

1B01M00007

Joint Shaft Assembly Removal and Installation

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.



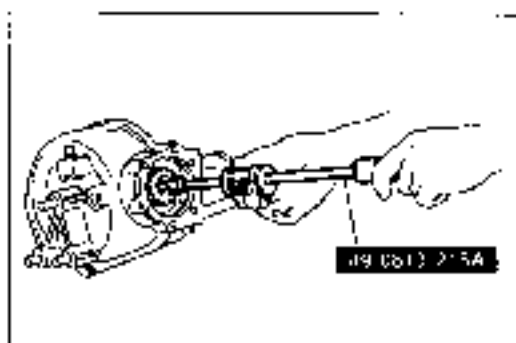
Nm (m·kg, ft·lb)

24U2VJ-000

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**

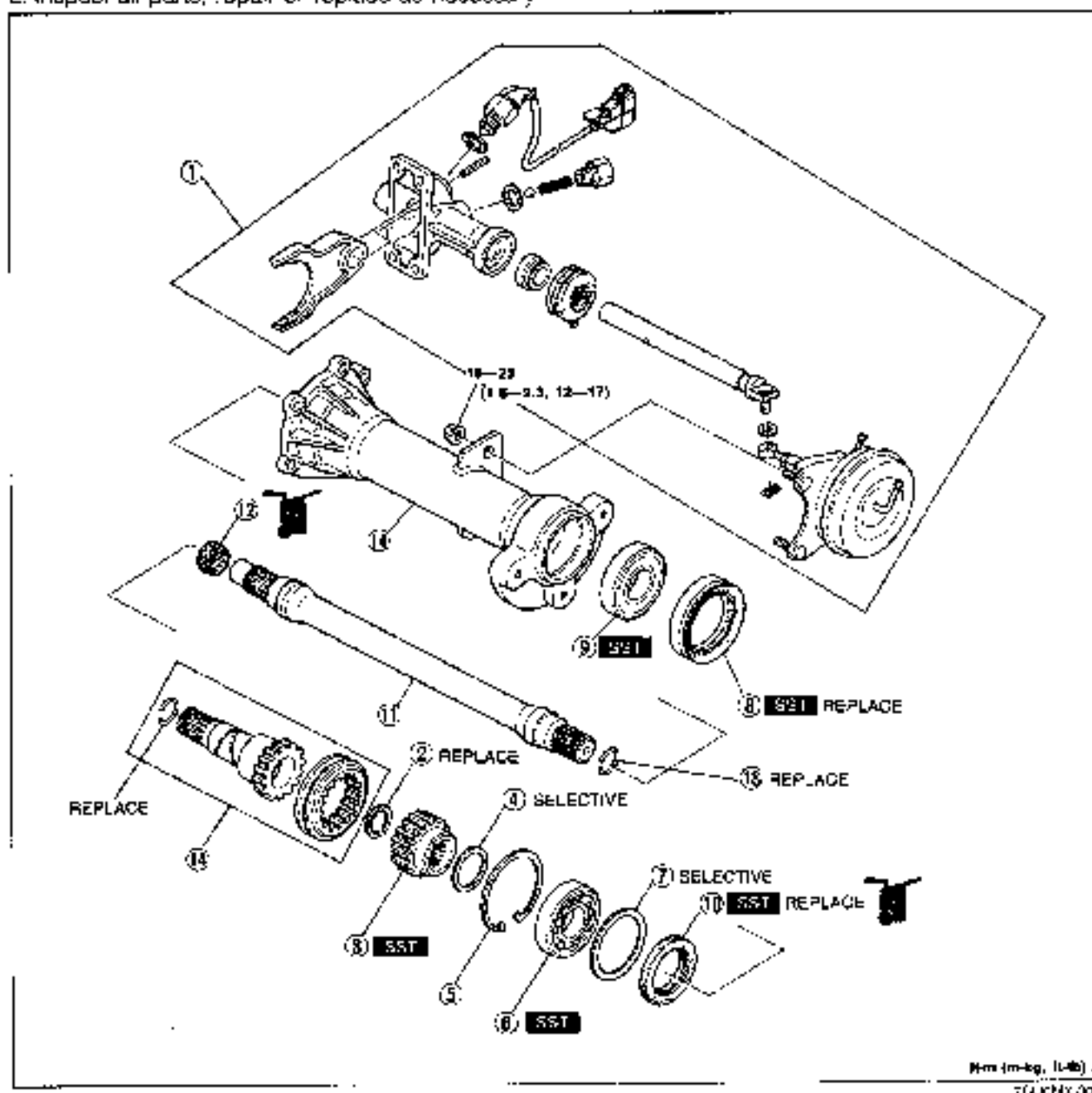


19 0813 2-5A

32000101 045

Disassembly and Inspection

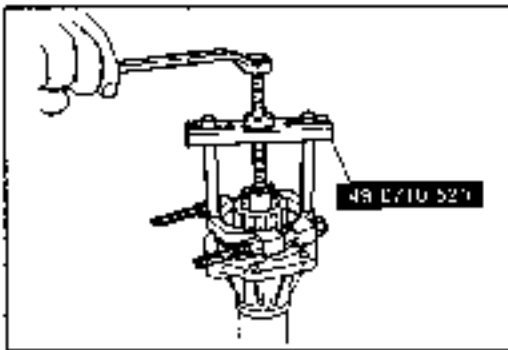
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**
2. Inspect all parts, repair or replace as necessary



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

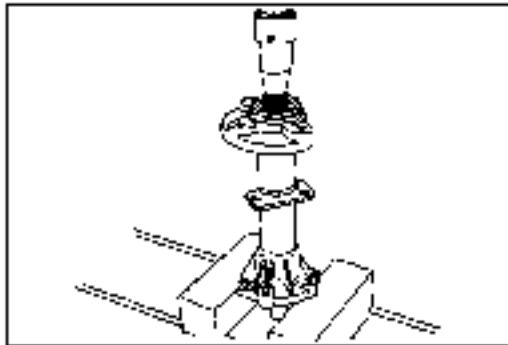


9FJCMX-044

Disassembly note

Remote free wheel hub

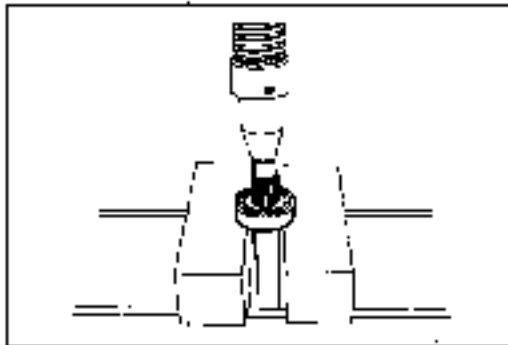
Remove the remote free wheel hub with the SST



9FJCMX-045

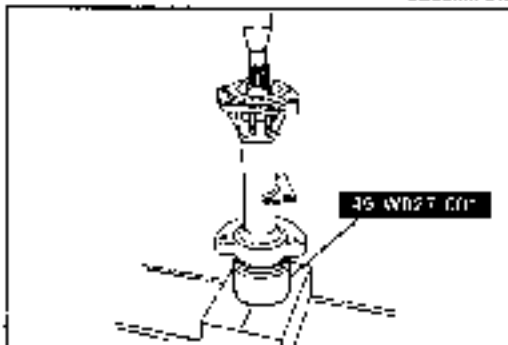
Ball bearing

1. Remove the ball bearing and the joint shaft with a press.



9FJCMX-046

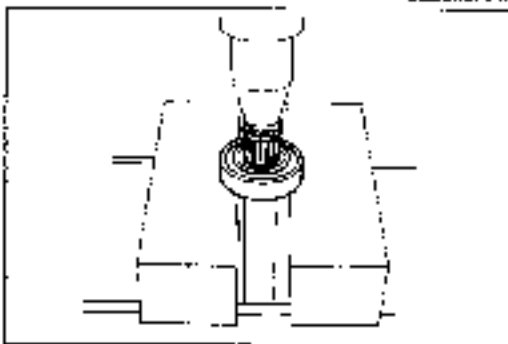
2. Remove the ball bearing with a press.



9ELCKX-048

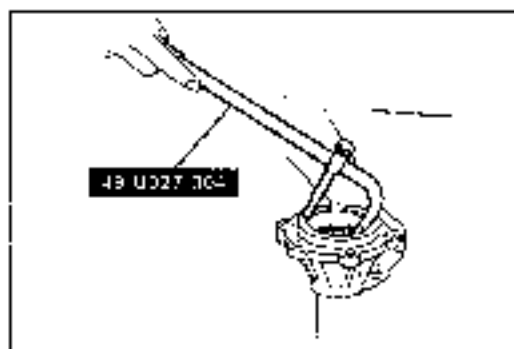
Bearing

1. Remove the dust seal and bearing with the SST.

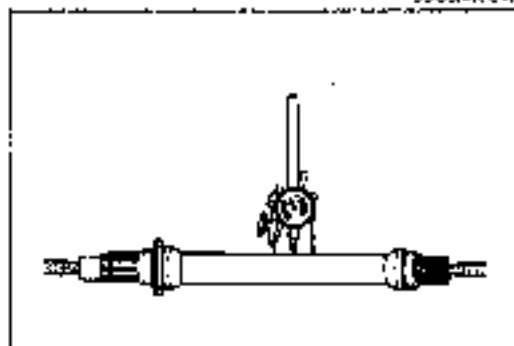


9FJCMX-049

2. Remove the bearing with a press.

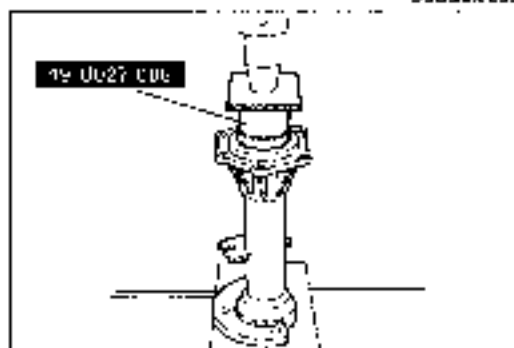
**Oil seal**

Remove the oil seal with the SST.

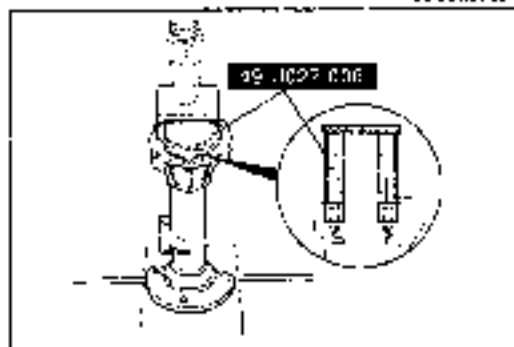
**Inspection**

Measure the joint shaft runout.

Maximum runout: 0.03mm (0.0012 in)

**Assembly**

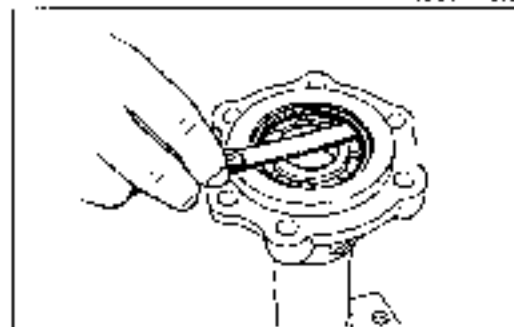
1. Apply front differential oil to a new oil seal.
2. Install a new oil seal with the SST.



3. Install the removal shim(s), the ball bearing with the SST.
4. Install the retaining ring.

Note

The number of shims must not exceed two.

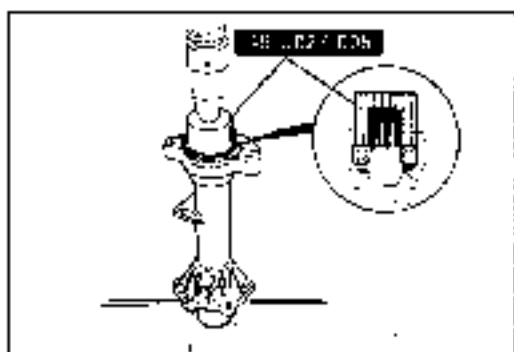


5. Measure the clearance between the ball bearing and the retaining ring.
If clearance is not as specified, adjust by adding or removing shims.

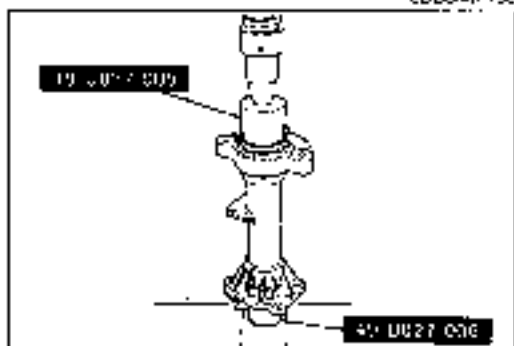
Maximum clearance: 0.15mm (0.0059 in)

Available shim thickness:

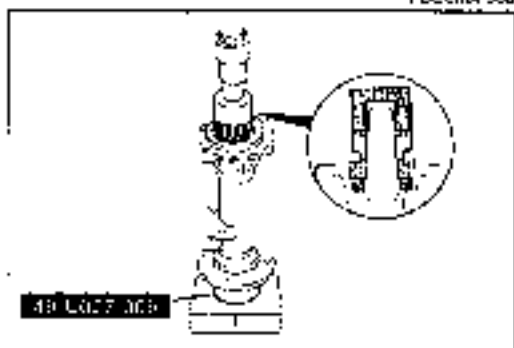
0.15mm (0.0059 in), 0.30mm (0.0118 in),
0.35mm (0.0138 in), 0.40mm (0.0157 in),
0.50mm (0.0197 in)



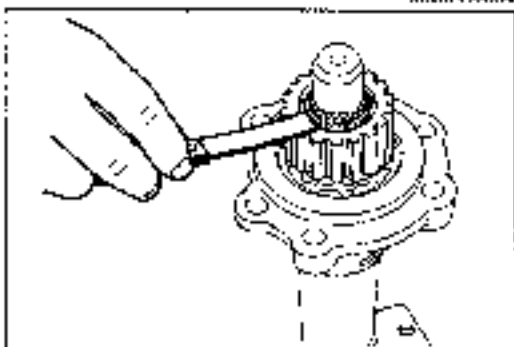
98JOMX-15C



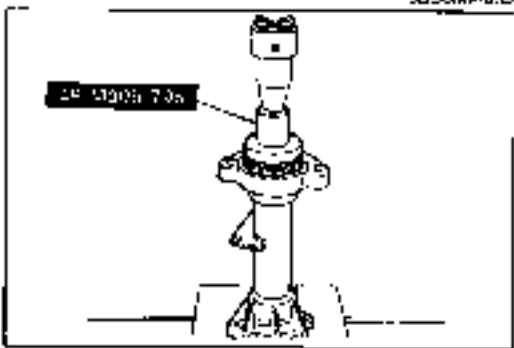
98JOMX-20B



98JOMX-20C



98JOMX-015



98JOMX-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)

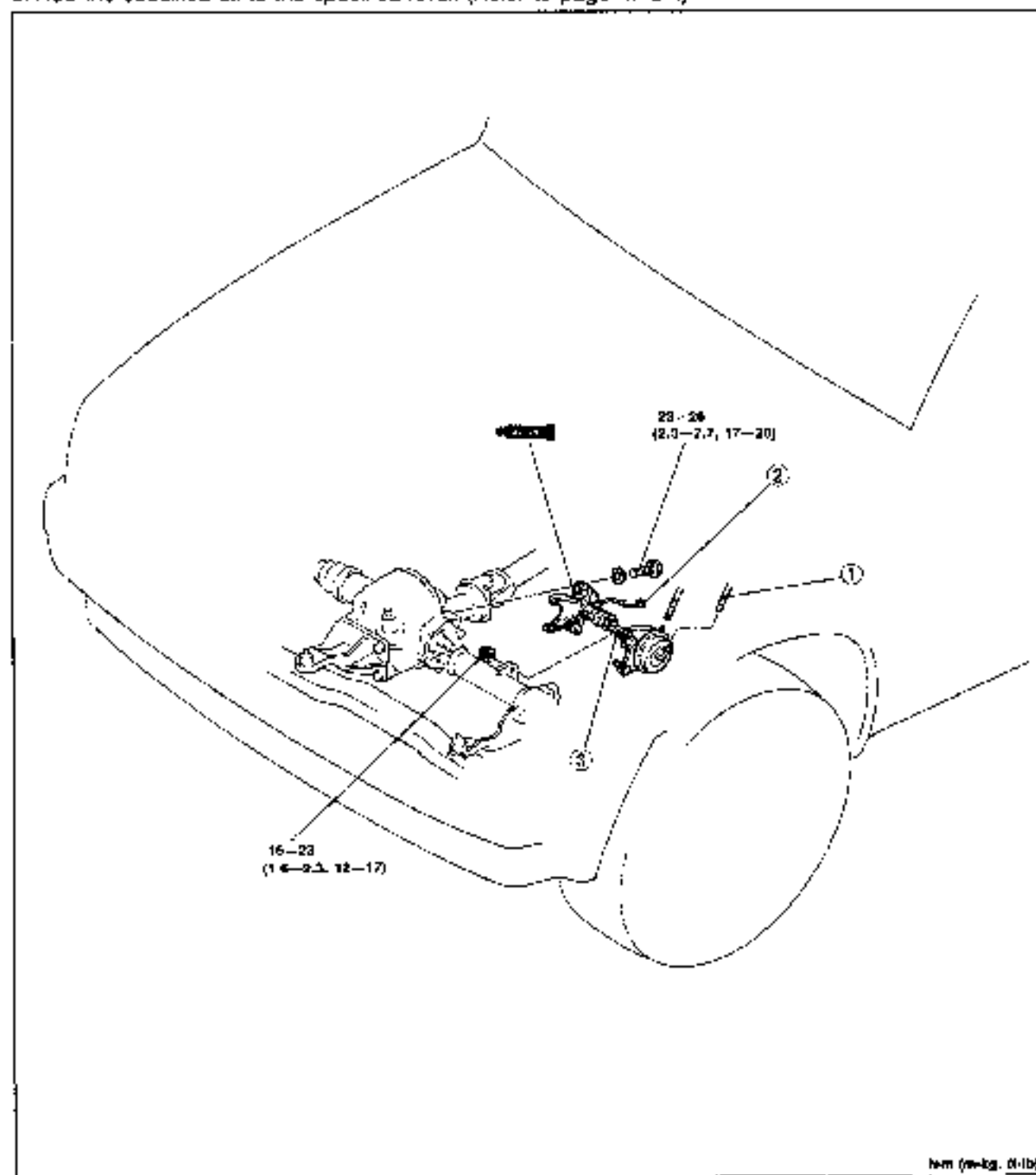
13. Install the new dust seal with the **SST**.

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 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.)



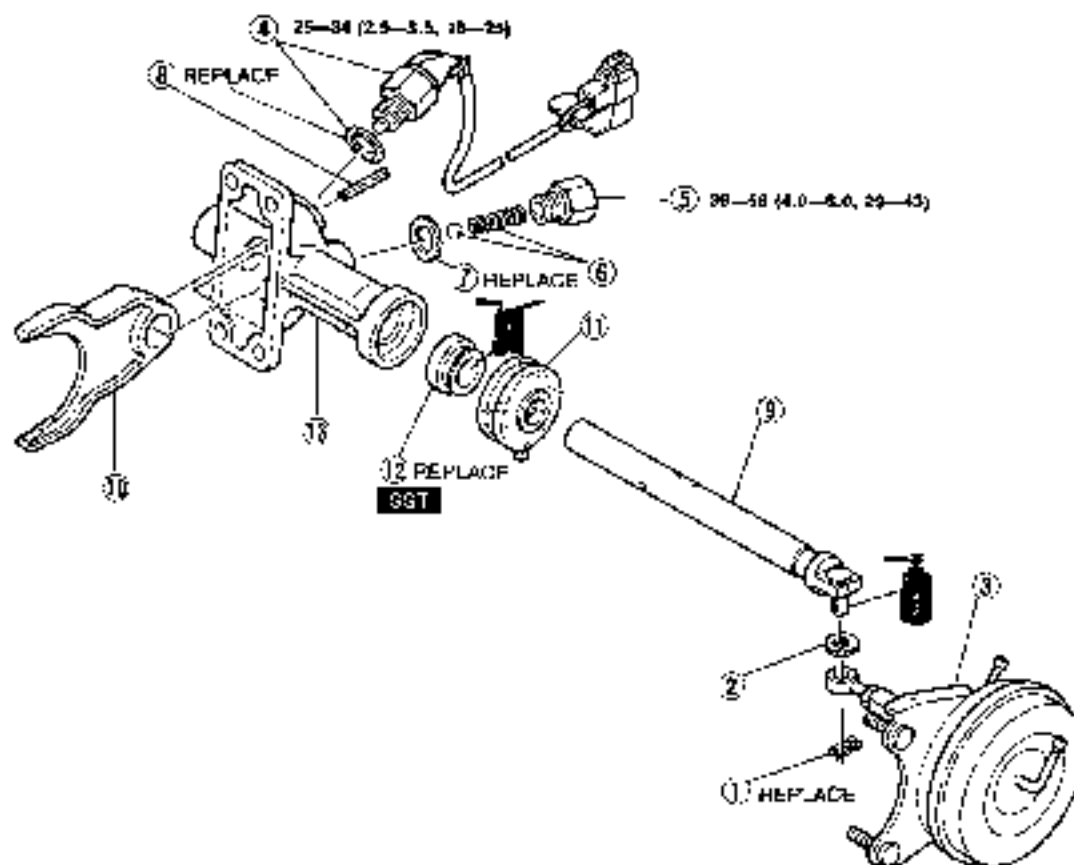
Item (mm-lb, ft-lb)
28JOMR-510

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 parts, repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

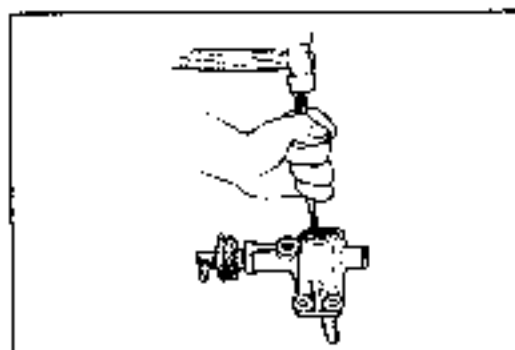


M-19 (M-19, M-19)
28UOMX-01

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	
5. Spring cap	12. Oil seal
6. Spring and ball	Assembly Note ... page M-20
7. Washer	13. Control box
8. Roll pin	Inspect for damage
Disassembly Note page M-20	
Assembly Note page M-20	

M

REMOTE FREE WHEEL (RFW) MECHANISM

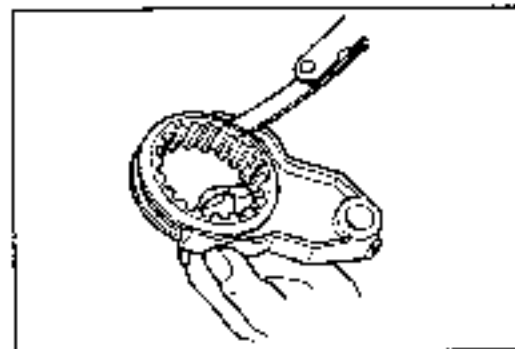


93U0VX-039

Disassembly note

Roll pin

Remove the roll pin as shown in the figure.



93U0VX-012

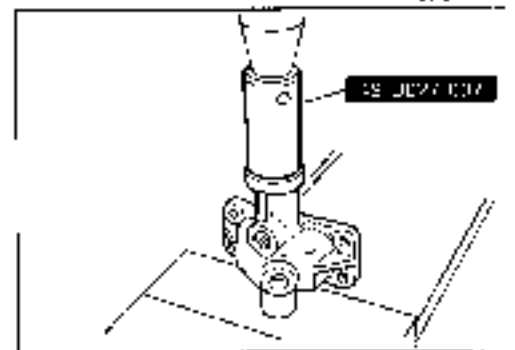
Inspection

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)

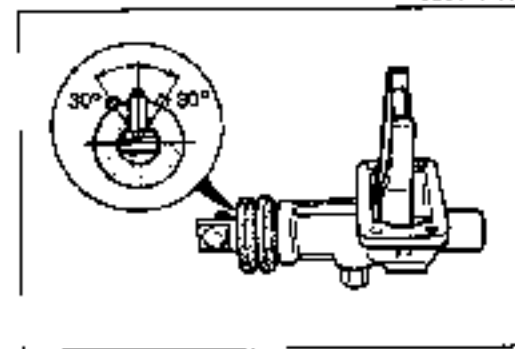


93U0KX-081

Assembly note

Oil seal

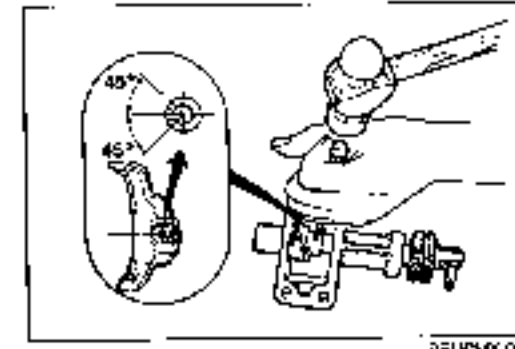
Install a new oil seal with the SST.



93U0MX-060

Boot

Install the boot as shown in the figure.



93U0MX-062

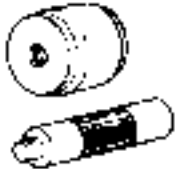
Roll pin

Install a new roll pin as shown in the figure.

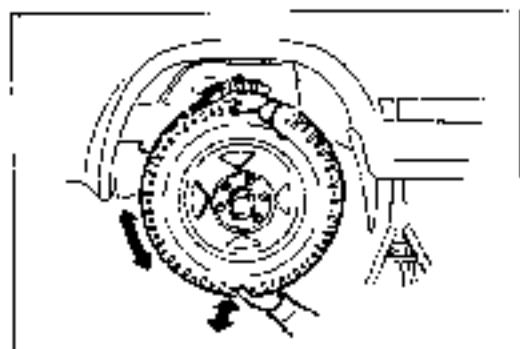
FRONT AXLE (4x4)

PREPARATION

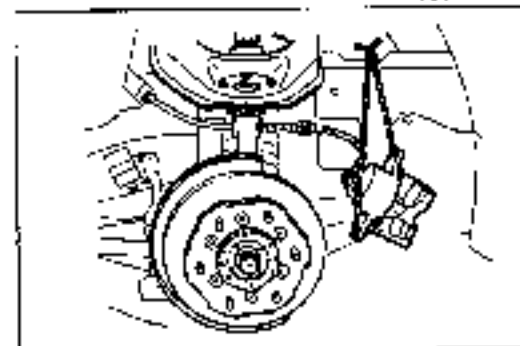
SST

49 B231 635 Wrench front hub locknut 	49 U112 850C Puller, ball joint 	49 D727 575 Puller, ball joint 
49 S231 66D Puller, needle bearing 	49 U033 101 Installer, bearing 	49 W027 0A0 Installer set oil seal 
49 W027 0D1 Body (part of 49 W027 0A0) 	49 F027 0A1 Installer set, bearing 	49 F027 007 Attachment 72 (Part of 49 F027 0A1) 
49 F027 005 Attachment 62 (Part of 49 F027 0A1) 		

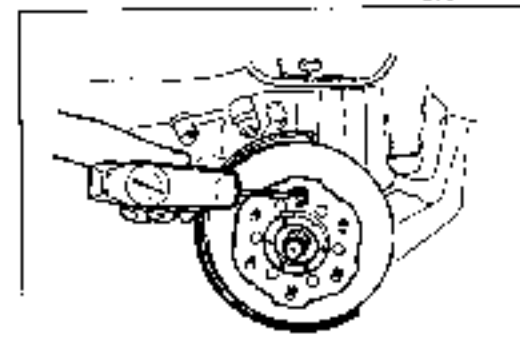
90J0947-004



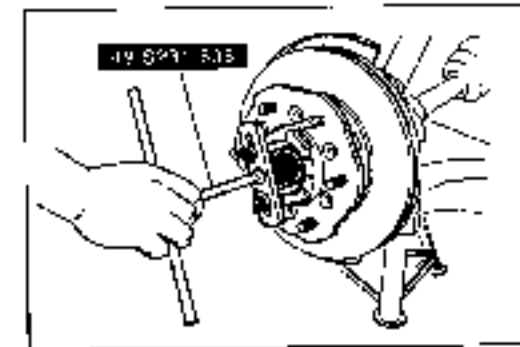
80JUMX-066



28U39XC-3



28U39XC-3



80JUMX-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

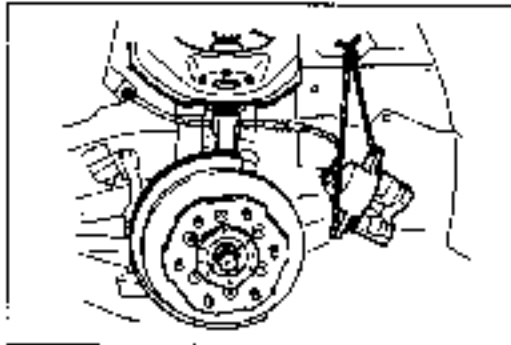
1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the wheel and tire.
3. Remove the disc brake caliper assembly, and use a rope to suspend it.
4. Remove the drive flange.
5. Remove the snap ring and spacer.
6. Remove the set bolts and bearing set plate.
7. Tighten the 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

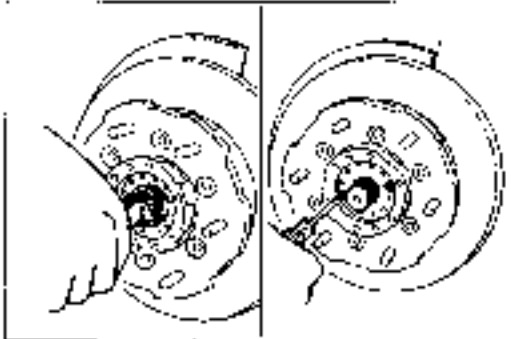
Frictional force plus:

6—12 N (0.6—1.2 kg, 1.3—2.6 lb)

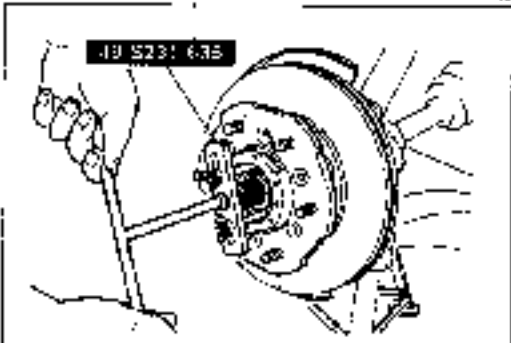
10. Tighten the locknut until the preload reaches the specified preload with the SST.



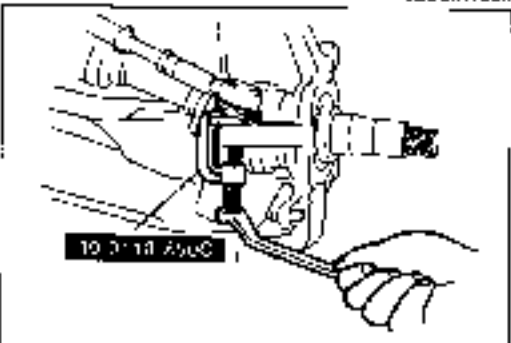
9B J0M7X-067



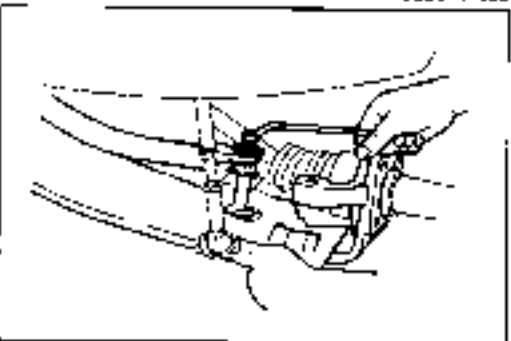
9C026X-023



9E000X-068



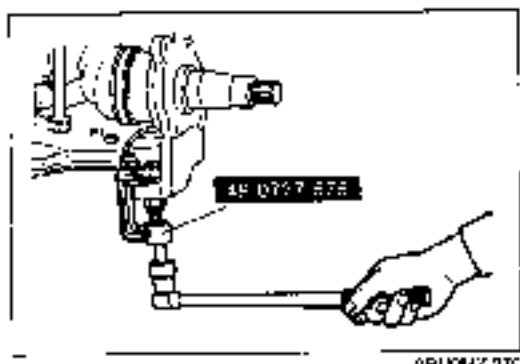
20J04X-058



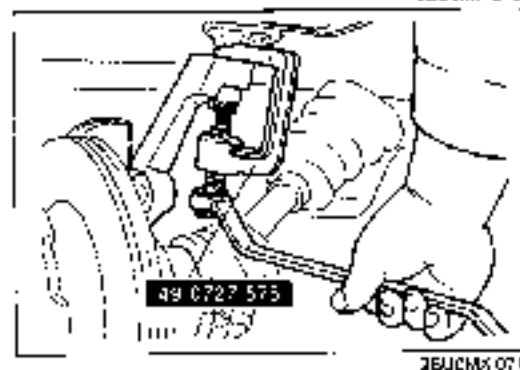
7E000X-019

REMOVAL

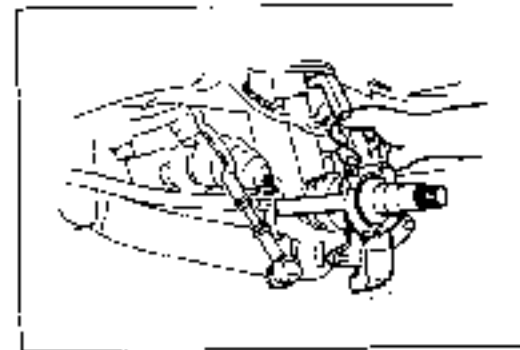
1. Jack up the front of the vehicle, and support it with safety stands.
 2. Remove the wheel and tire.
 3. Remove the drive flange.
 4. Remove the caliper assembly, and use a rope to suspend it.
 5. Remove the snap ring and spacer.
 6. Remove the set bolts and bearing set plate.
 7. Remove the bearing 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.



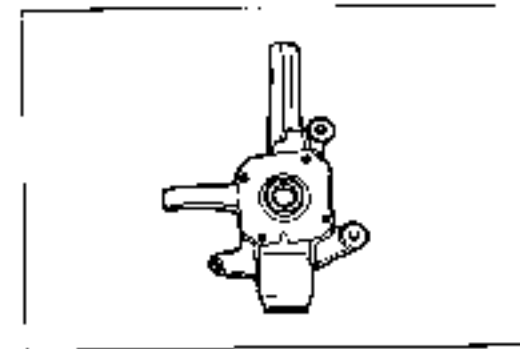
12. Support the lower arm with a jack.
13. After removing the lower arm ball joint nut, separate the knuckle from the lower arm with the **SST**.



14. After removing the upper arm ball joint nut, separate the knuckle from the upper arm with the **SST**.



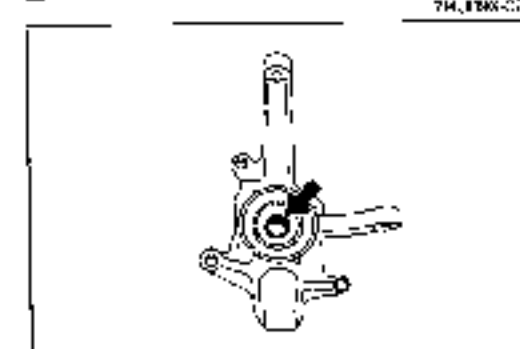
15. Lower the lower arm, and remove the knuckle.



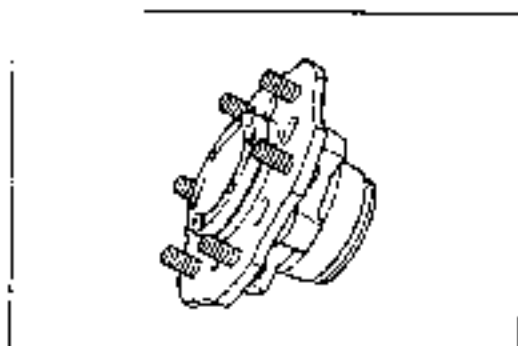
INSPECTION

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.

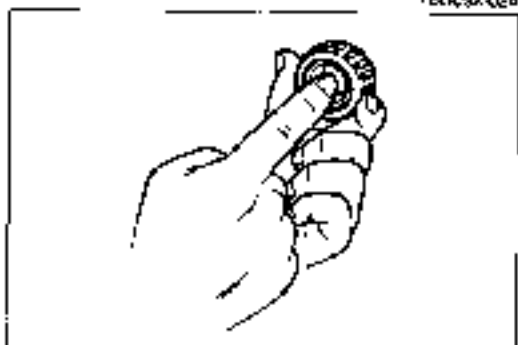


3. Wear and damage of needle bearing



7ELR5X-C2a

4. Cracks and damage to hub.

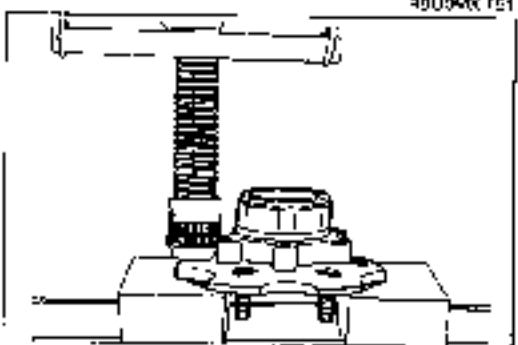


45U04X-151

Caution

If replacement is necessary, replace the bearing inner and outer races as a set.

5. Wear and seizure of bearings



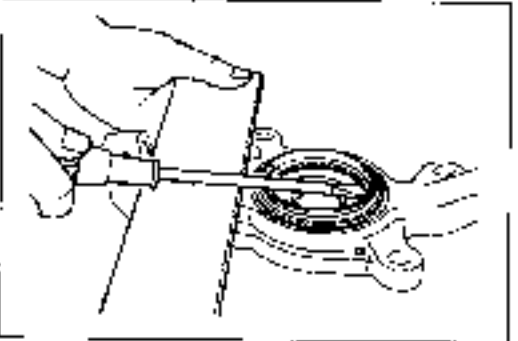
9BL0M2-150

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.

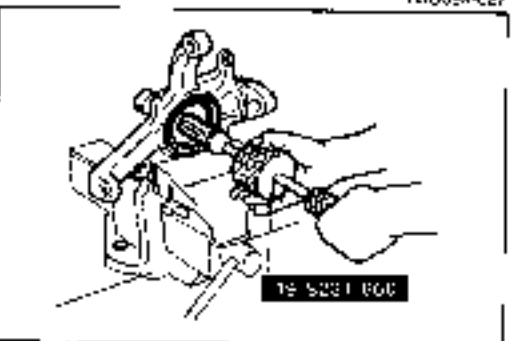


78UX5X-C27

DISASSEMBLY

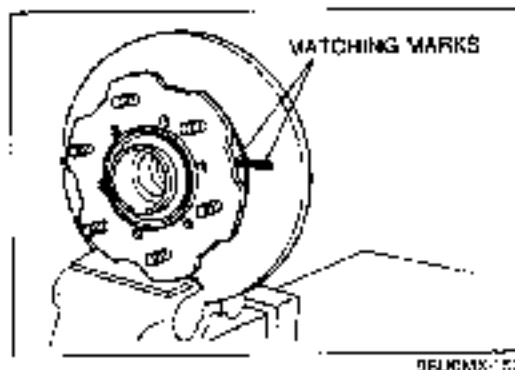
Knuckle

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.



481H0M2-072

3. Remove the needle bearing from the knuckle with the SST.

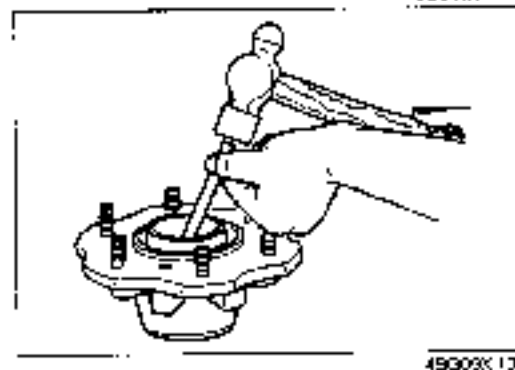


Disc Plate and Wheel Hub

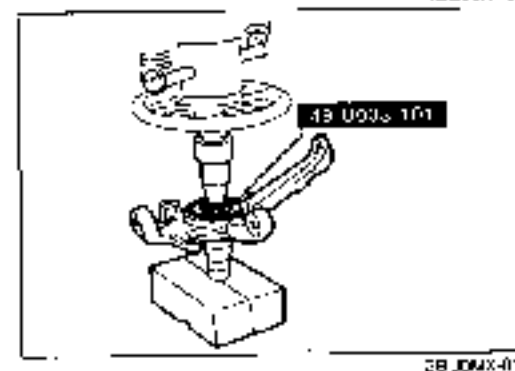
Caution

Secure the disc plate in a copper-lined vise.

After making matching marks on the disc plate and wheel hub, remove the bolts and disassemble the plate and hub.



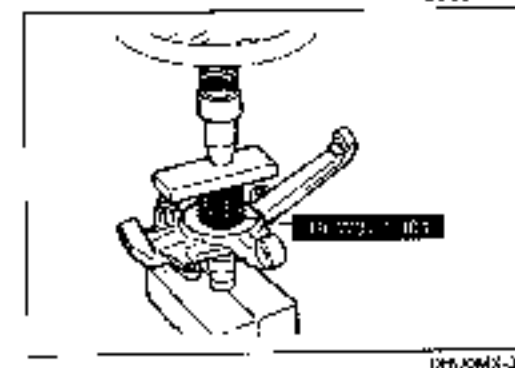
2. Remove the oil seal, and take out the bearing inner race.
3. Using a suitable bar, remove the bearing outer race by lightly tapping with a hammer.



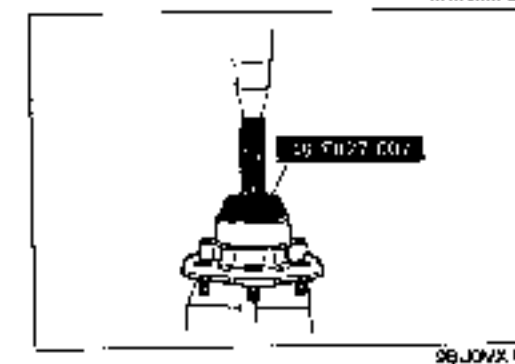
ASSEMBLY

Knuckle

1. Install a new needle bearing with the **SST**.

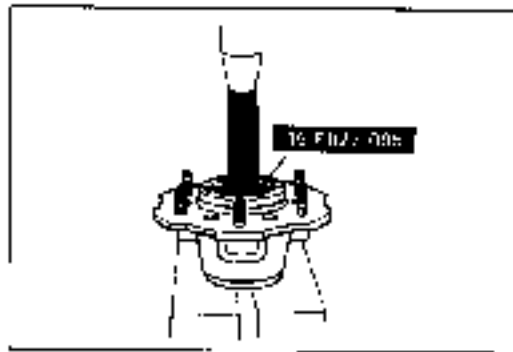


2. After installing the inner bearing into the hub, press in the new oil seal with the **SST**.
3. Apply lithium based grease to the oil seal lip.

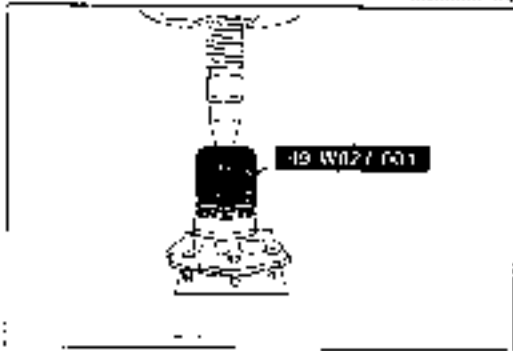


Disc Plate and Wheel Hub

1. Press in the outer side bearing outer race with the **SST**.



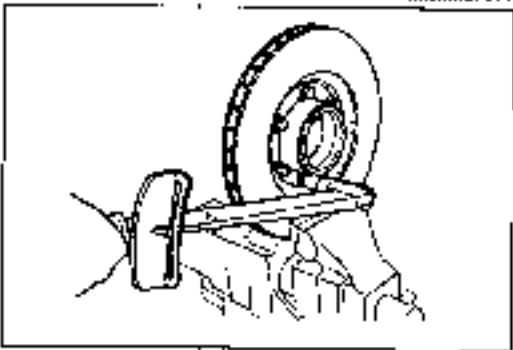
2. Press fit the inner side bearing outer race with the **SST**.



Caution

Press in the oil seal until it is flush with the hub end surface.

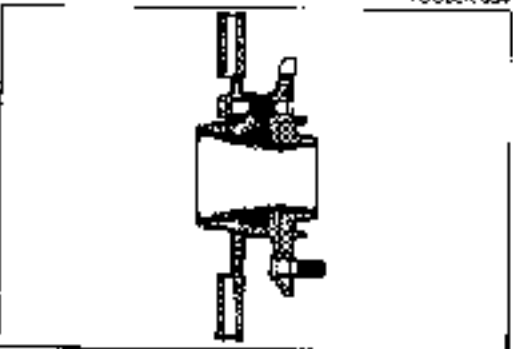
3. Press fit the new oil seal with the **SST**.
4. Apply lithium based grease to the oil seal lip.



5. Align the matching marks of the wheel hub and the disc plate, and tighten the mounting bolts.

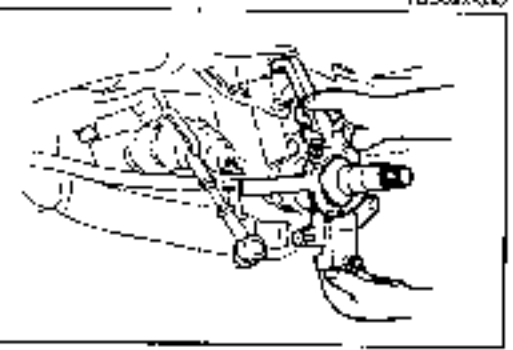
Tightening torque:

54—59 N·m (5.5—7.0 m·kg, 40—51 ft·lb)



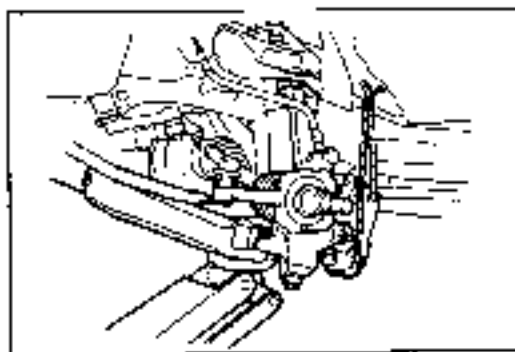
6. Apply grease (lithium base, NLGI No.2) to the area indicated by oblique lines.

7. Install the outer bearing race and washer in the hub.



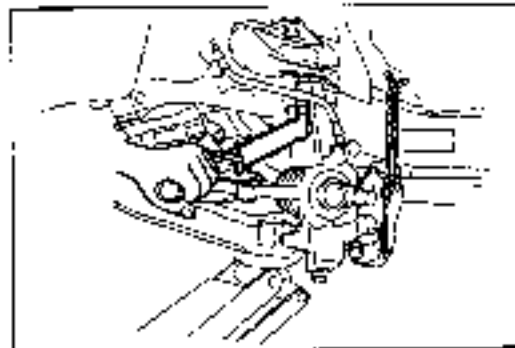
INSTALLATION

1. Insert the front axle drive shaft into the knuckle, and install the nut for the lower arm ball joint; tighten it by hand.



2P10080X-007

2. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



1BLCMX-01

3. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

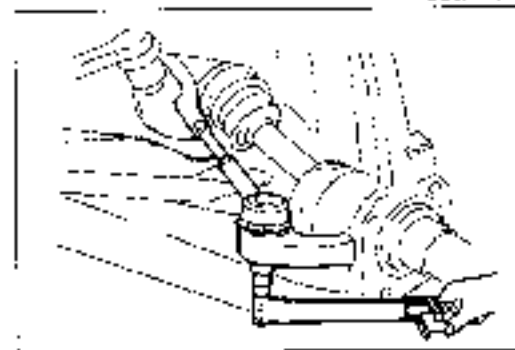
Tightening torque

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)

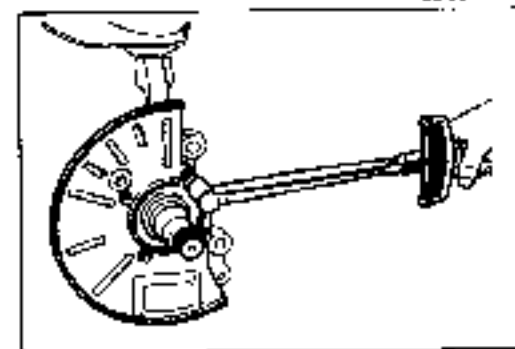


2B10047-060

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)

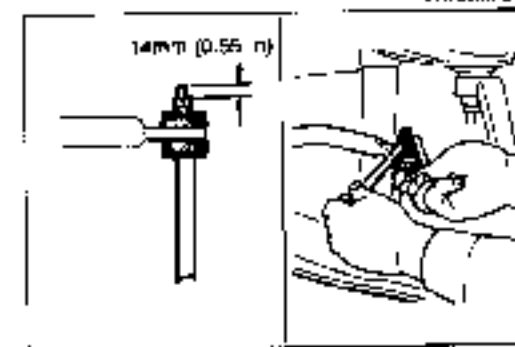


2P10080X-016

5. Install the dust cover to the knuckle.

Tightening torque:

19—26 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



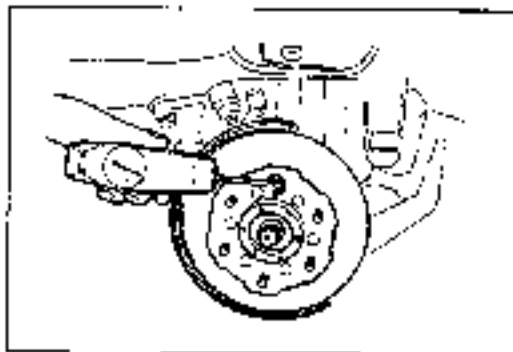
2P10080X-017

6. After loosely installing the lower mount of the shock absorber, install the stabilizer.

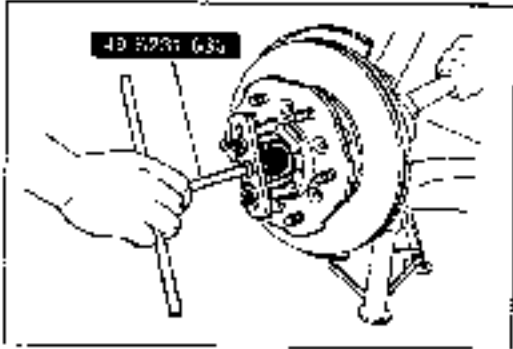
Tightening torque

Stabilizer:

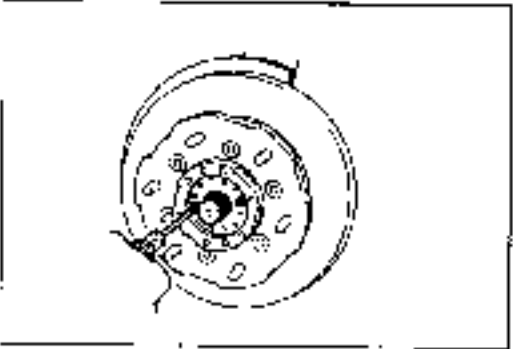
31—46 N·m (3.2—4.7 m·kg, 33—34 ft·lb)



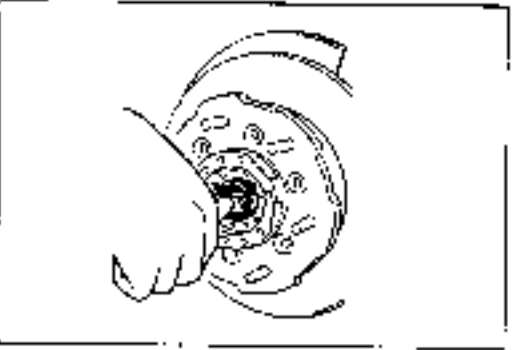
2UD0VX-018



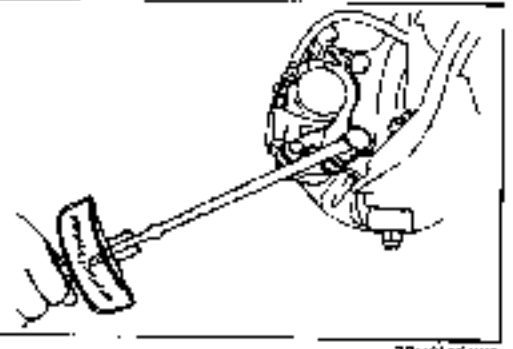
9FUCMX-079



2EUCAB-019



20JOMX-020



2BU0MX-021

7 After installing the hub and disc plate, adjust the bearing preload.

- (1) Tighten the lock nut; then turn the hub and plate 2 or 3 times to 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:

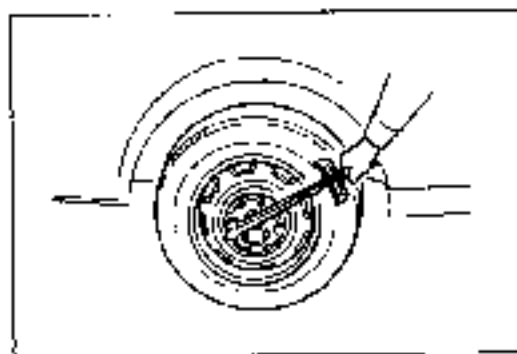
5—7 Nm (50—70 cm·kg, 43—61 in·lb)

- (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-002

9. Install the wheel and drive flange.

Tightening torque

Styled wheel lug nut:

118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)

Standard wheel lug nut:

88—116 N·m (9.0—12.0 m·kg, 65—87 ft·lb)

Drive flange:

29—34 N·m (3.0—3.5 m·kg, 22—25 ft·lb)

10. Lower the vehicle.

11. Tighten the lower mount of the shock absorber to the specified torque with the vehicle unladen.

Tightening torque:

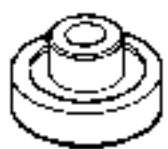
55—80 N·m (5.6—8.2 m·kg, 41—59 ft·lb)

12. Check the steering angle and toe-in and adjust if necessary.
(Refer to Section R.)

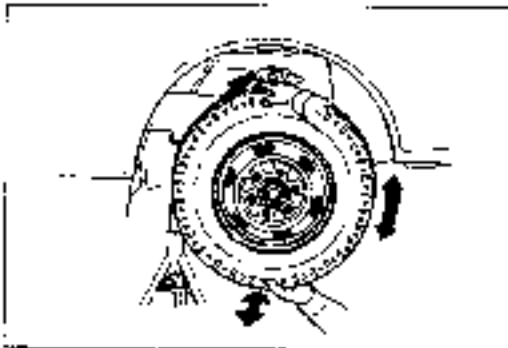
FRONT AXLE (4x2)

PREPARATION

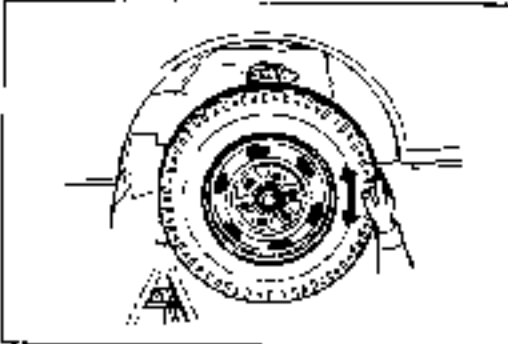
SST

49 C116 650C Puller, ball joint 	49 0727 575 Puller, ball joint 	49 B025 0A0 Installer, dust seal 
49 B025 001 Body (Part of 49 B025 0A0) 	49 G030 757 Handle (Part of 49 B025 0A0) 	49 LC27 002 Installer, oil seal 
49 H033 1C1 Bearing remover 		

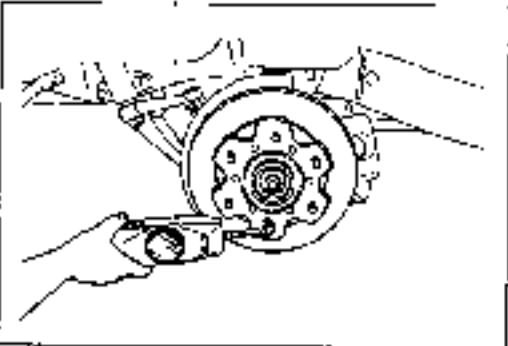
1FL0MX06E



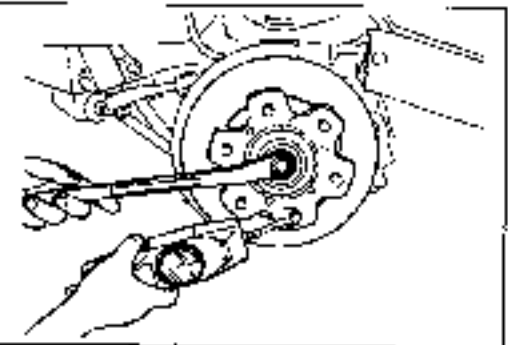
53JOMX 082



4EG12X 012



95UCMX 156



2BUOMX 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:

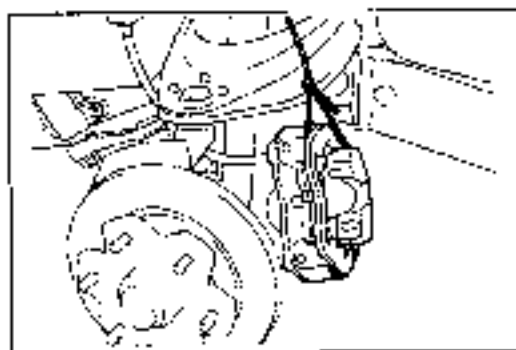
20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)

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.

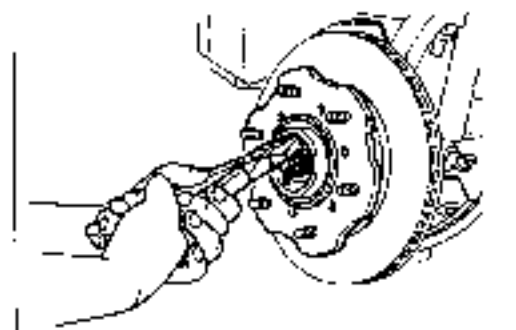
Preload

Frictional force plus:

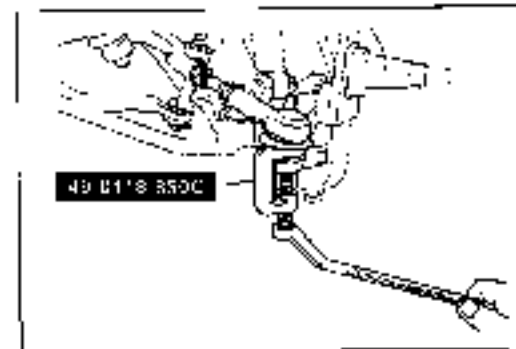
6—11 N (0.6—1.1 kg, 1.3—2.4 lb)



SEBU00X-132

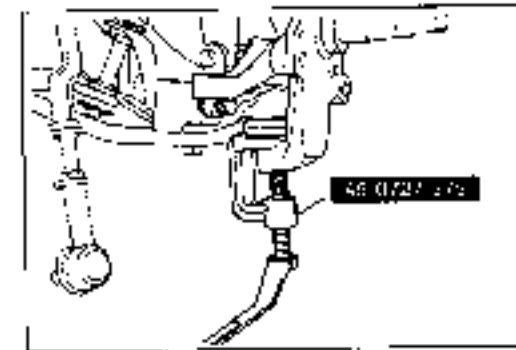


SEBU00X-011



49 0118 350C

SEBU00X-051



48 0127 172

SEBU00X-084



49 0127 072

SEBU00X-005

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.

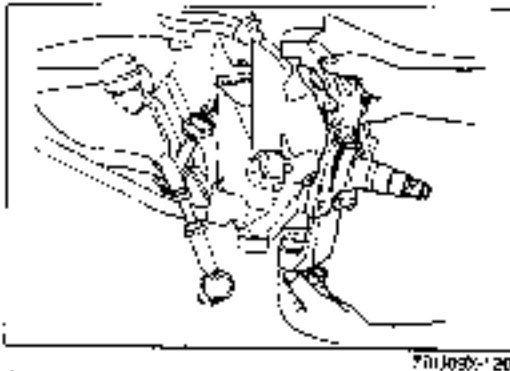
7. After removing the tie rod end nut, with the **SST** to separate the tie rod end from the knuckle.

Note

If removal is difficult, lightly tap the ball joint coupling of the knuckle with a hammer.

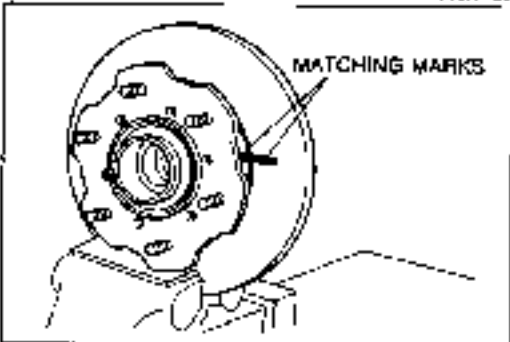
8. After removing the nut of the lower arm ball joint, with the **SST** to separate the knuckle from the lower arm.
9. Reinstall the lower arm ball joint nut, and tighten it by hand.

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.



700J030-1-20

12. After removing the nut of the lower arm ball joint, remove the knuckle.



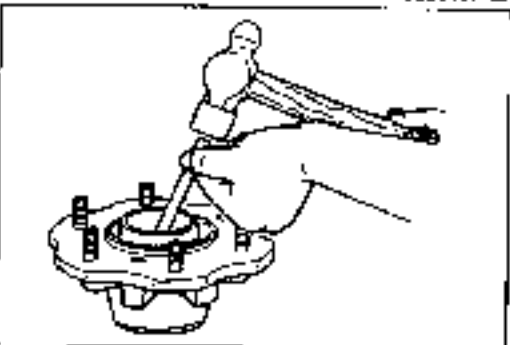
98U090-1-50

DISASSEMBLY

Caution

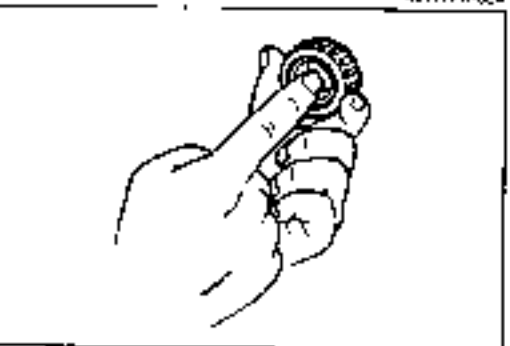
- a) Secure the disc plate in a copper-lined vise.
- b) If necessary, use a press to remove the wheel lug bolts.

1. Make matching marks on the disc plate and the wheel hub; then remove the bolts and disassemble the plate and hub.



4ER12X-020

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.



08U06X-000

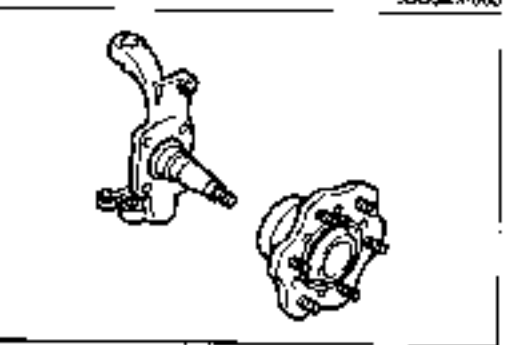
INSPECTION

Inspect for the following problems, and replace any faulty parts.

Caution

If replacement is necessary, replace the bearing inner and outer races as a set.

1. Wear, damage, or seizure of bearing
2. Crack and damage to hub
3. Crack and damage to knuckle spindle and wear and rust on the oil seal friction surface
4. Damage to knuckle and knuckle arm
5. Deformation of dust cover
6. Deformation of hub cap
7. Wear and damage to wheel lug bolts



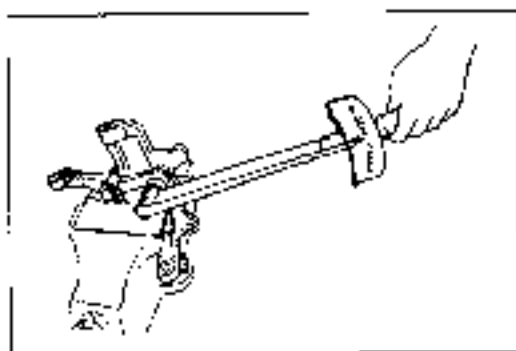
2BL0MX-002

ASSEMBLY

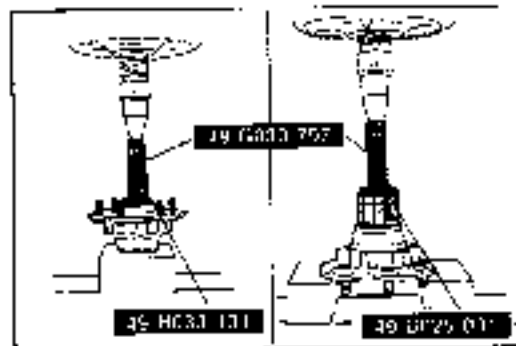
1. Secure the knuckle in a vise, and install the knuckle arm.

Knuckle arm**Tightening torque:**

79—100 N·m (8.1—10.2 m·kg, 59—74 ft·lb)



57110X-016

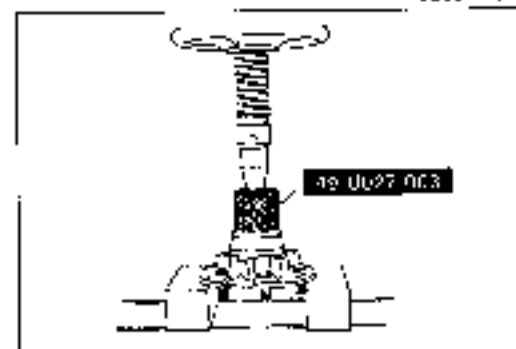


96U30X-086

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.

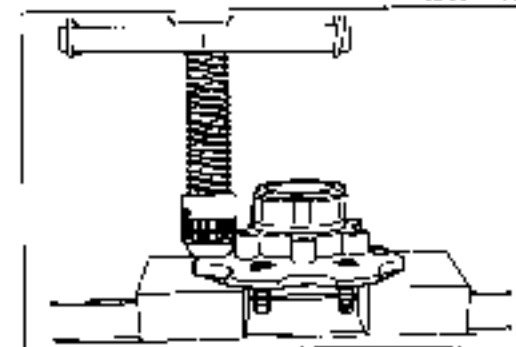


CBU0MX-037

4. Press fit the new oil seal onto the hub with the SST.
5. Apply lithium based grease to the lip.

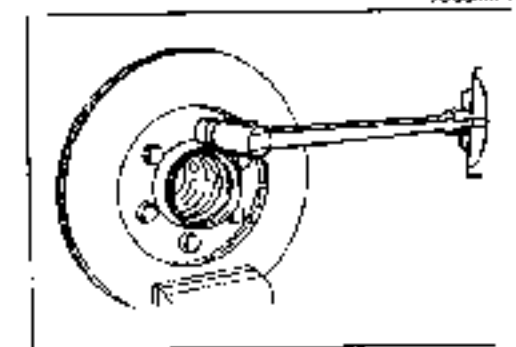
Caution

Do not reuse wheel lug bolts once they have been removed.



90J04X-160

6. Use a press to press new wheel lug bolts into the wheel hub.

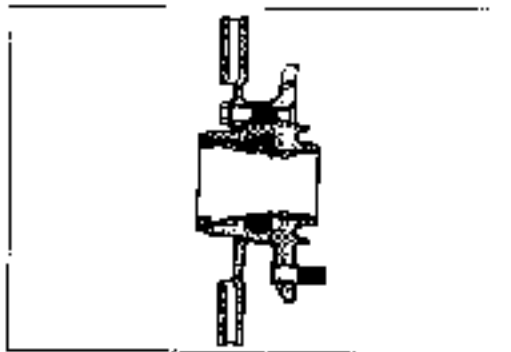


70J06X-451

7. Align the matching marks of the wheel hub and disc plate, assemble them, and tighten the mounting bolts.

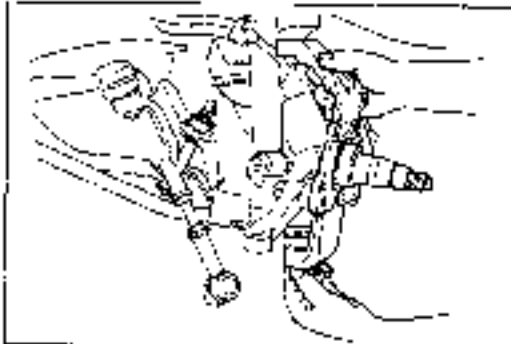
Tightening torque:

54—59 N·m (5.5—7.0 m·kg, 40—51 ft·lb)



3D024X E1

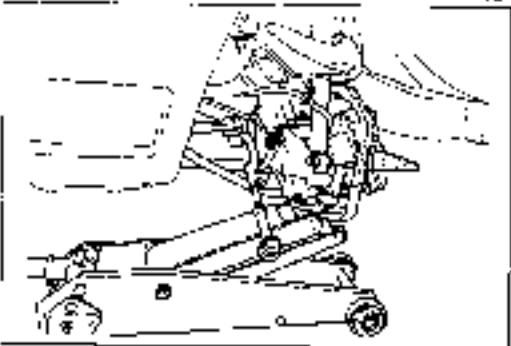
6. Apply lithium based grease to the areas indicated by shaded lines.
9. Install the outer bearing and washer in the hub



5B109X C2

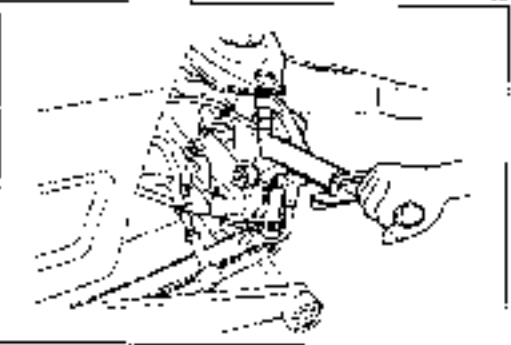
INSTALLATION

1. Install the knuckle to the lower arm.
2. Install the nut for the lower arm ball joint, and tighten it by hand.



5B109X C22

3. Jack up the lower arm so that the upper arm ball joint is connected to the knuckle.



1B109X 015

4. After tightening the upper and lower arm ball joint nuts, secure them with new cotter pins.

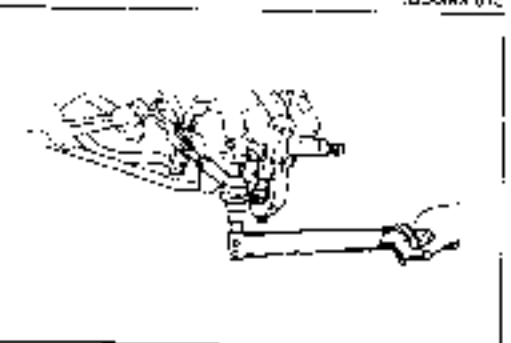
Tightening torque

Upper arm ball joint nut:

29—51 N·m (3.0—5.2 m·kg, 22—38 ft·lb)

Lower arm ball joint nut:

118—157 N·m (12—16 m·kg, 87—116 ft·lb)

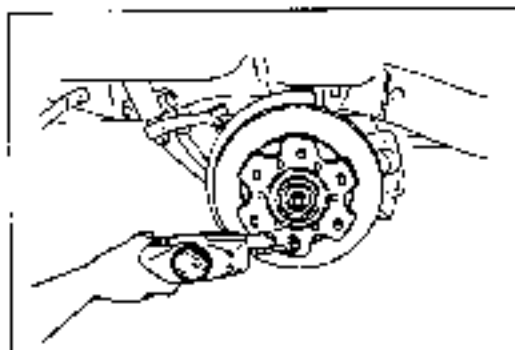


3D024X C24

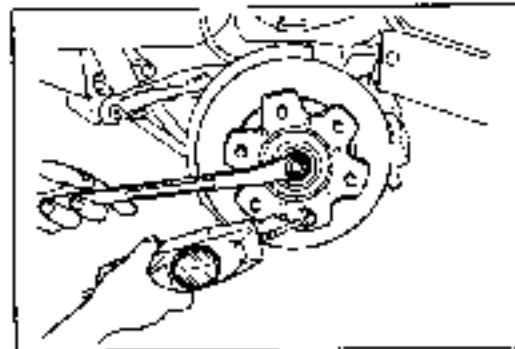
5. Tighten the tie rod and knuckle arm, and secure with a new cotter pin.

Tightening torque:

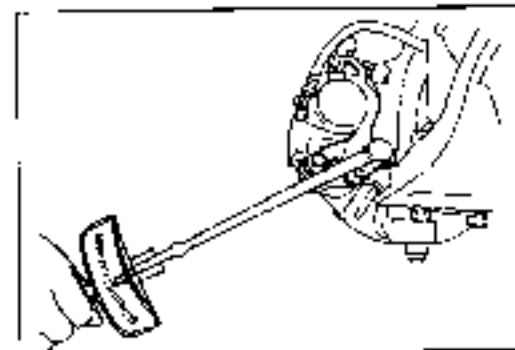
44—59 N·m (4.5—6.0 m·kg, 33—43 ft·lb)



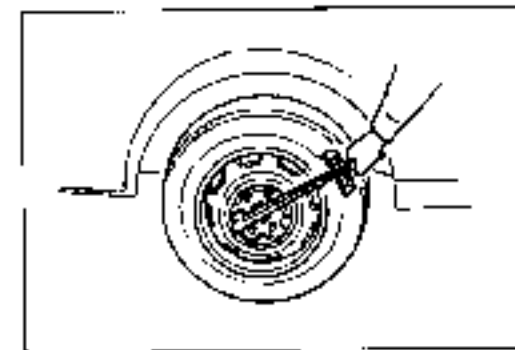
2EJ00MX-029



2EJ00MX-029



rB_00MX-029



1B_00MX-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 N·m (2.0–3.0 m·kg, 14–22 ft·lb)

- (2) Loosen the locknut so they can be turned by hand.
- (3) Attach a pull scale to a wheel lug bolt, and measure the frictional force.
- (4) Tighten the locknut until the reading (initial turning torque) reaches the specified preload. Then insert the set cover, and secure it with a new cotter pin.

Preload

Frictional force plus:

6–11 N (0.6–1.1 kg, 1.3–2.4 lb)

7. Reinstall the caliper assembly:

Tightening torque:

88–106 N·m (9.0–11.0 m·kg, 65–80 ft·lb)

8. Mount the wheel and tire.

Tightening torque

Standard wheel lug nut:

88–118 N·m (9.0–12.0 m·kg, 65–87 ft·lb)

Styled wheel lug nut:

118–147 N·m (12.0–15.0 m·kg, 87–108 ft·lb)

9. Lower the vehicle.

10. Check the steering angle and toe-in and adjust if necessary. (Refer to Section R.)

FRONT AXLE DRIVE SHAFT (4x4)

PREPARATION

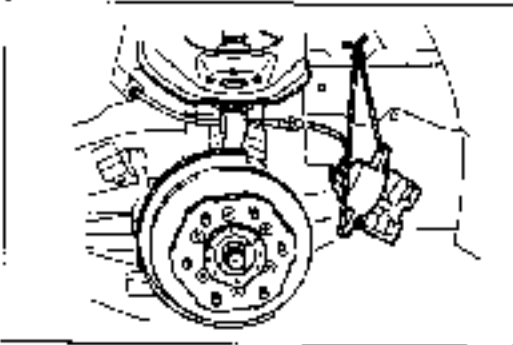
SST

49 U025-001

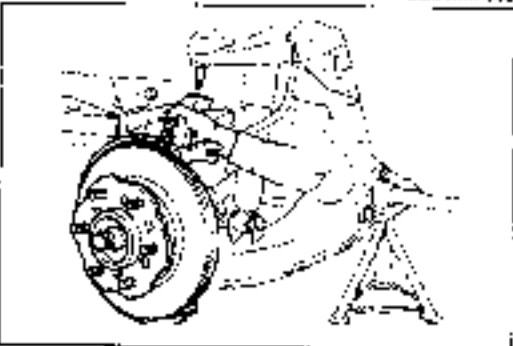
Grease (oil, protection)



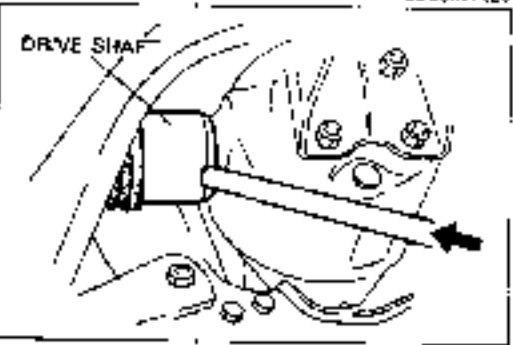
23U3MX-064



2BL0MX-085



2BL0MX-086



2BL0MX-087

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.

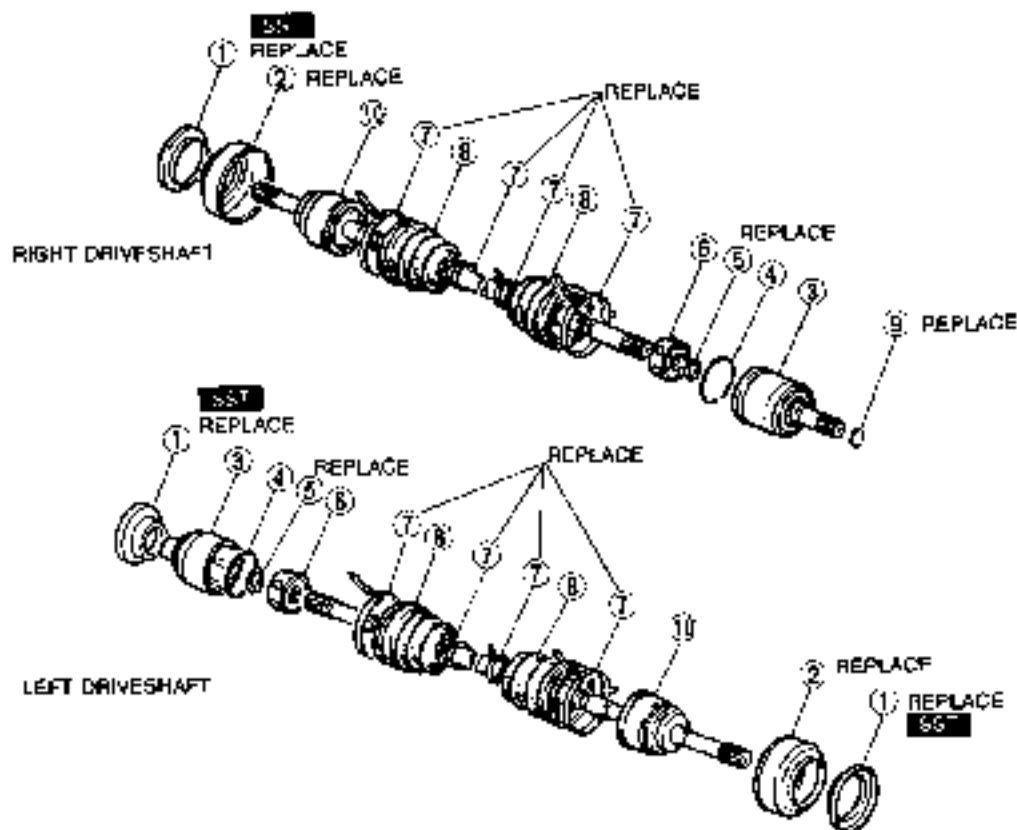
13. Remove the front-axle drive shaft.

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.

731109X-032

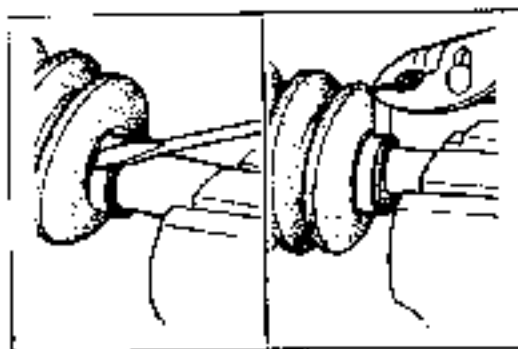


DELUMK-16K

1. Dust cover
2. Boot protector
3. Outer ring
4. Clip

5. Snap ring
6. Balls, inner ring and cage
7. Boot band
8. Boot

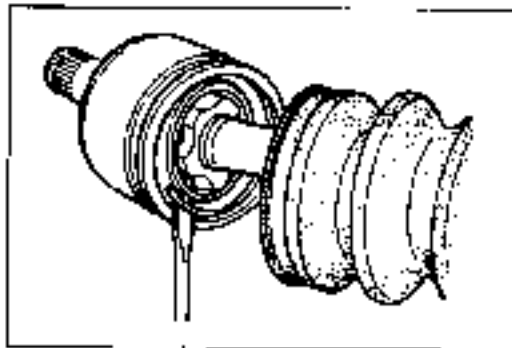
9. Clip
10. Shaft and ball joint assembly



75AUC6X-41K

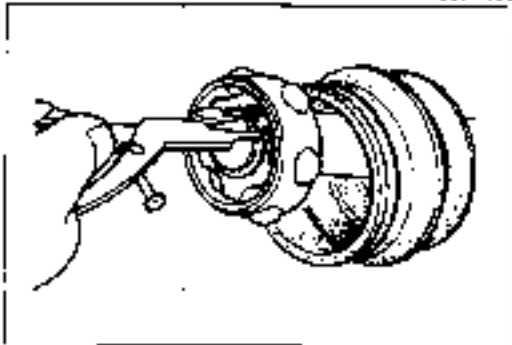
Removal of Differential Side Boot

- Pry up the locking clip with a screwdriver, and remove the band with pliers.
- Slide the boot along the shaft to expose the joint.



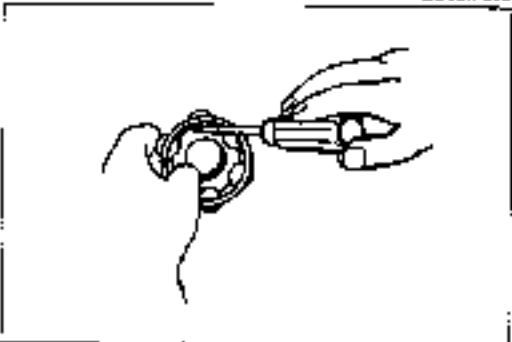
7RJ09X-195

3 Remove the clip with a screwdriver.



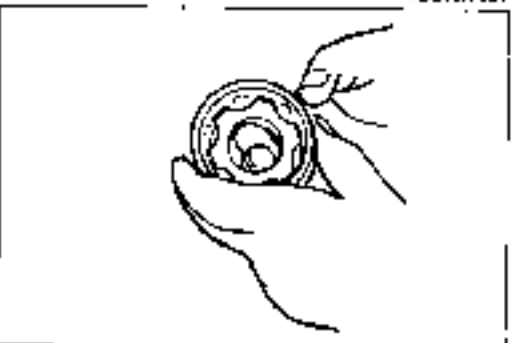
7DJ09X-036

4 Remove the snap ring with snap ring pliers



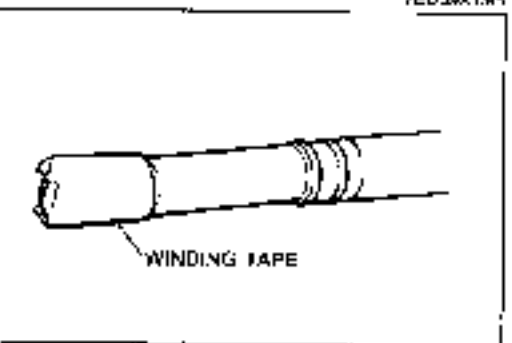
7EL09X-067

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.



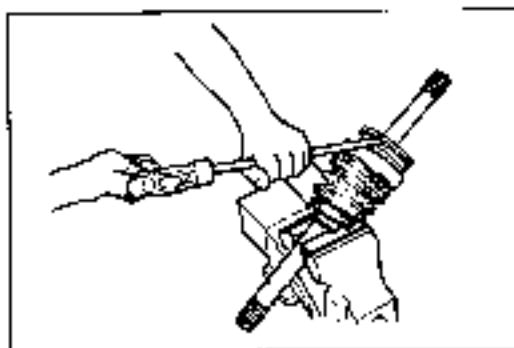
7EU09X-083

7 Turn the cage about 30 degrees, and separate it from the inner ring.



7BJ09X-090

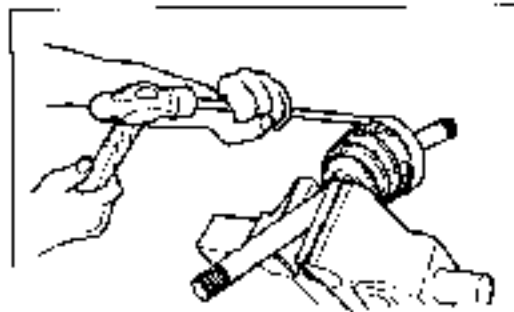
8 Wrap the spline of the shaft with tape to prevent damaging the boot, and remove the boot.



78UC09X-106

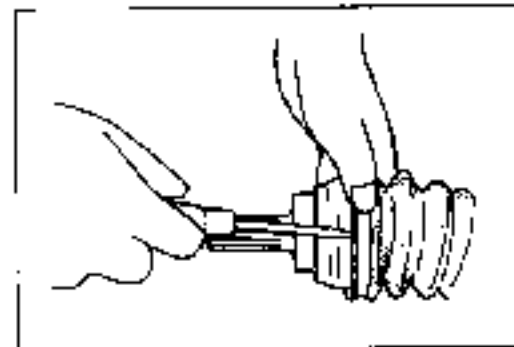
Removal of Wheel Side Boot

1. Remove the dust cover by using a suitable round bar and hammer.



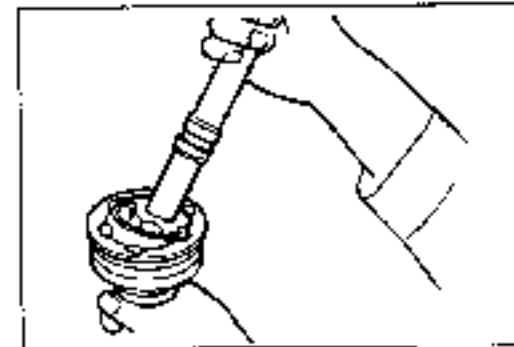
78UC09X-106

2. Remove the boot protector by using a suitable round bar and hammer.



78UC09X-104

3. Pry up the locking clip with a screwdriver, and remove the band with pliers.

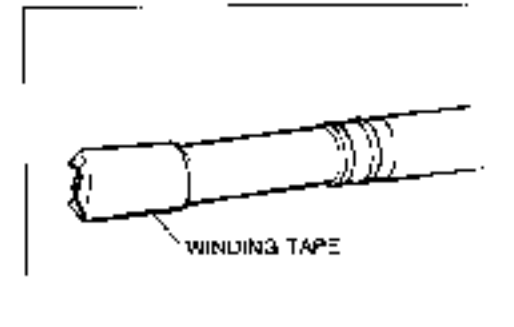


67UC05X-059

INSPECTION

Inspect for the following problems, and replace any faulty parts.

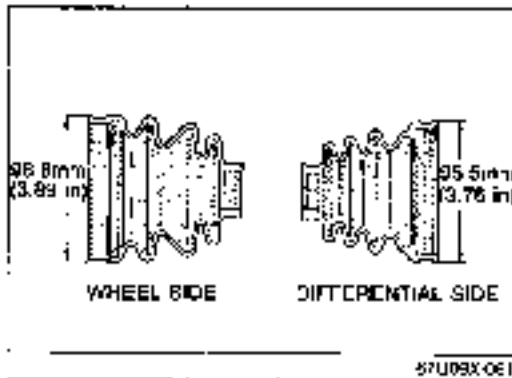
1. Bending, twisting and damage of the shaft
2. Wear on the shaft splines
3. Wear, excessive play, corrosion and damage to the joint on the differential side
4. Excessive play, wear, corrosion, and damage to the joint on the wheel side



78UC09X-106

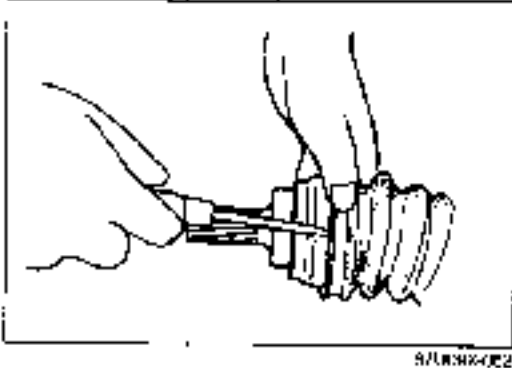
ASSEMBLY**Installation of Differential Side Boot**

1. Wrap the splines on the wheel side of the shaft, and install the boot and a new boot band.

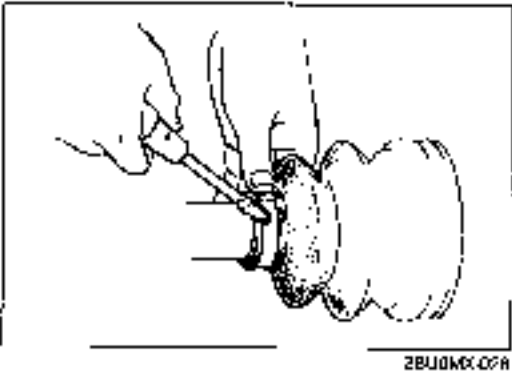


Caution

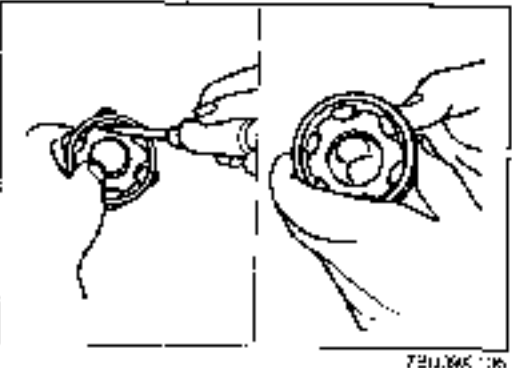
The wheel side and differential side boots are different, as shown.



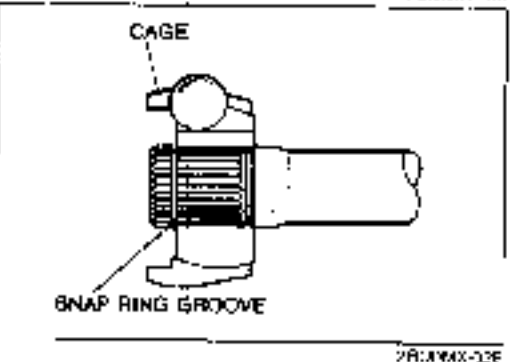
2. Fold the band back over itself while pulling on the end of the clip with pliers.
Lock the end of the band by bending the locking clip



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.



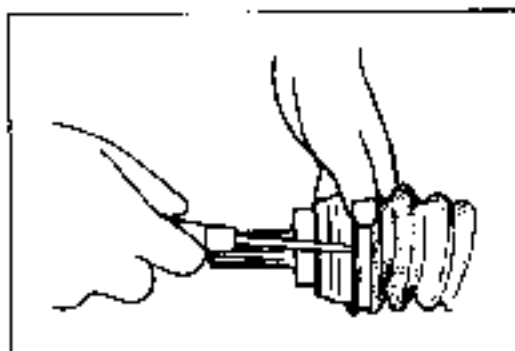
5. Assemble the cage, inner race, and balls in the following order.
 - a) Insert the inner race into the cage, and turn the cage approximately 30° with respect to the inner race.
 - b) Fit the balls through the cage into the ball groove of the inner race.
 - c) Fill the inside of the ball joint assembly 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

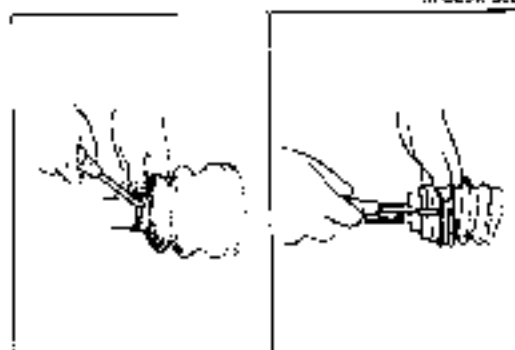
Caution

Install the cage with the big end facing the snap ring groove. If reversely installed, the drive shaft may become disengaged.



57U09X-066

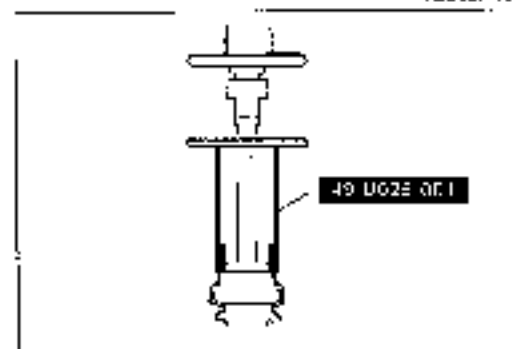
8. Fit the differential side boot onto the outer race and the boot groove of the shaft.
9. Secure the boot with a new boot band.



79J08X-108

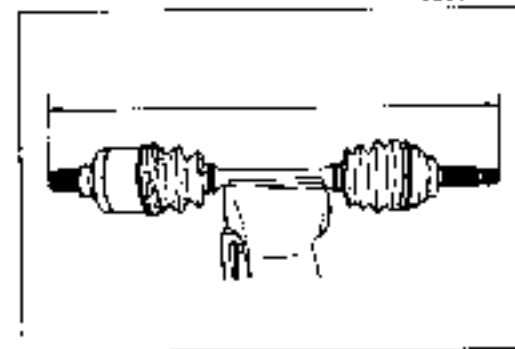
Installation of Wheel Side Boot

1. Fit the wheel side boot onto the ball joint assembly and the boot groove of the shaft.
2. Secure the boot with a new boot band.



09U09X-034

3. Press fit the new dust cover in a press with the **SST**.

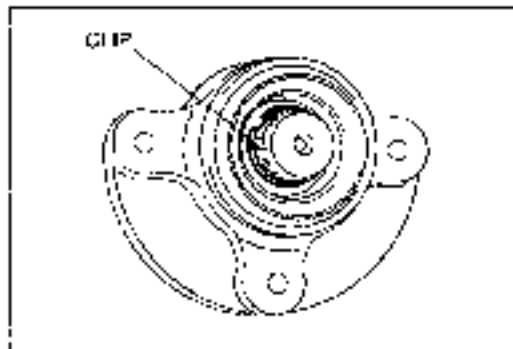


29L06X-060

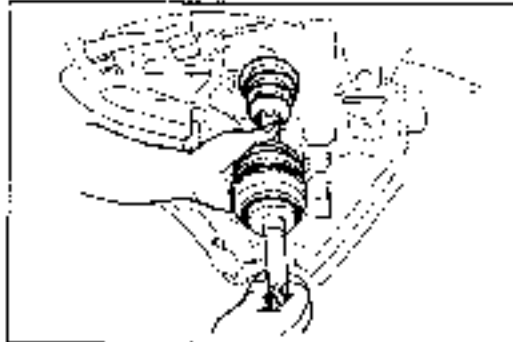
Standard length

Right side: 622mm (24.49 in)

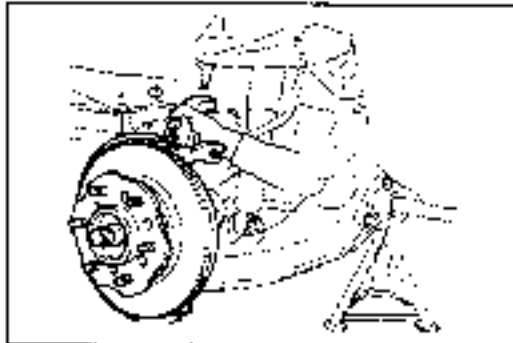
Left side : 554mm (21.81 in)



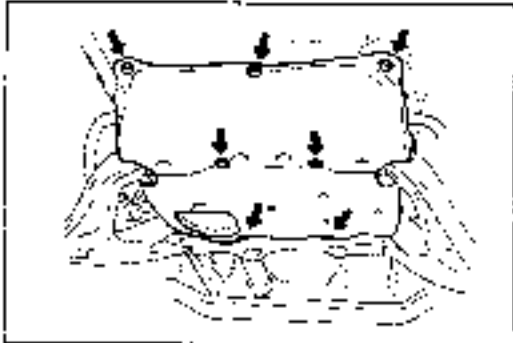
8FC060-0007



8FC060-0008



25 J0M0-0001



8A0M0-0001

INSTALLATION

1. Replace the clip of the output shaft and the front axle drive shaft with a new one.
2. Coat the oil seal of the differential with transmission oil.

3. Install the front axle drive shaft.

Caution

- a) Do not damage the oil seal of the differential.
- b) After installation, pull the front axle drive shaft outward to make sure it does not come out.

4. Install the knuckle and hub to the front axle drive shaft and ball joints. (Refer to pages M-28, 29.)
5. Install the spacer and a new snap ring.
6. Install the lower mount of the shock absorber and loosely tighten the bolt.
7. Install the stabilizer. (Refer to page M-28.)
8. Install the tie rod end. (Refer to pages M-28, 29.)
9. Install the caliper assembly, knuckle arm, wheel and drive flange. (Refer to page M-29.)

10. Apply sealant to the drive flange and install it.
11. Install the engine undercoiler.

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:

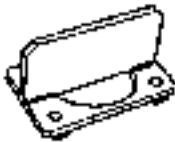
55—80 Nm (5.6—8.2 m·kg, 41—59 ft·lb)

14. Check the steering angle and toe-in and adjust if necessary. (Refer to Section B.)

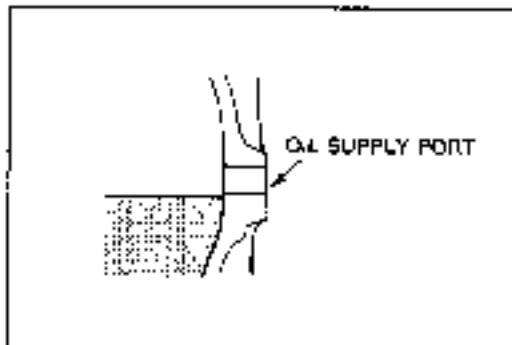
REAR AXLE (4x4 AND 4x2)

PREPARATION

SST

4B 0603 635A Wrench, rear shaft bearing out 	49 S120 645A Holder, rear shaft 	49 S120 520A Puller, rear axle shaft bearing 
49 S120 523A Attachment (Part of 49 S120 520A) 	49 U027 003 Installer, oil seal 	49 F027 004 Attachment for bearing #62 
49 H025 001 Bearing installer 	49 S120 748 Attachment 	49 G030 797 Handle 
49 0259 770B Wrench, flare nut 		

219J0MK-032



9810144087

ON-VEHICLE MAINTENANCE

Rear Axle Oil

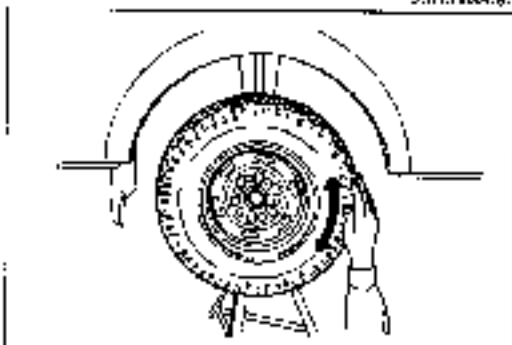
Inspection

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)

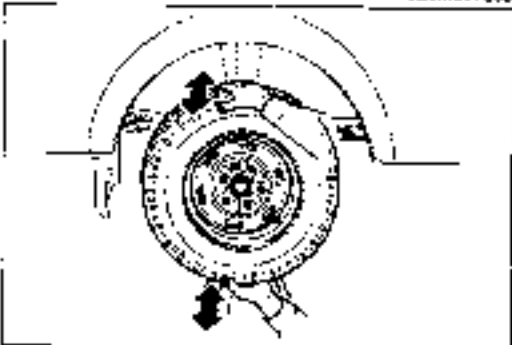


9810144087

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.

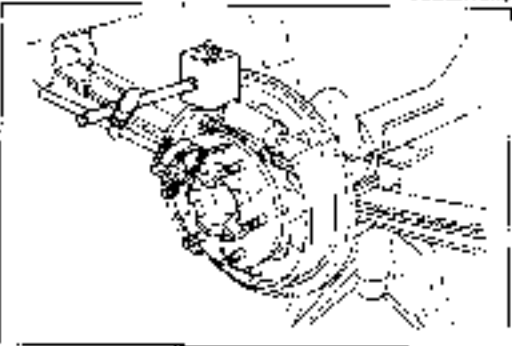


9810144087

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)



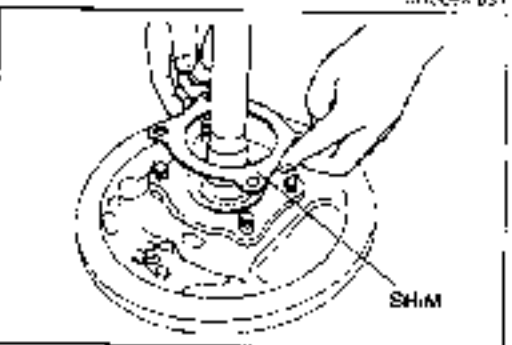
9810144087

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)



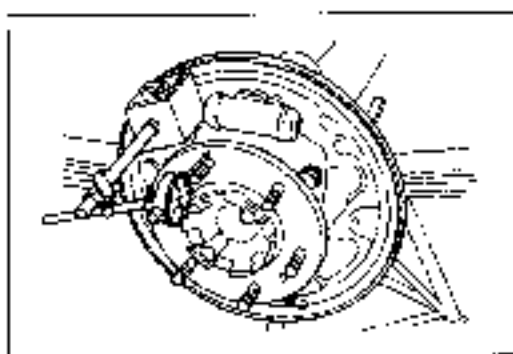
9810144087

- (2) If bearing play is not within specifications, remove the axle and adjust by using selectable shims.

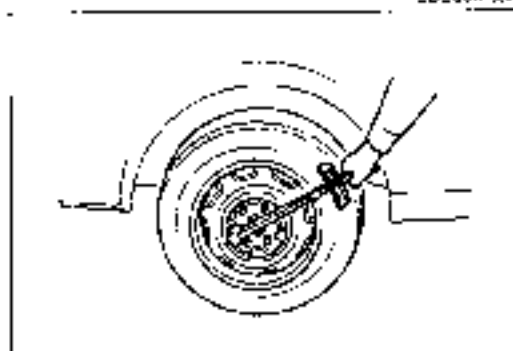
Shim

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)

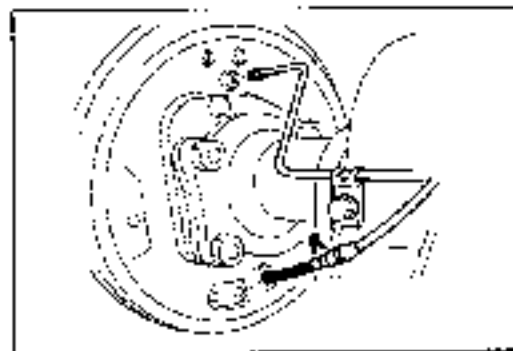
- (3) After making the adjustment, reinstall the brake drum and tire. (Refer to page M-49)



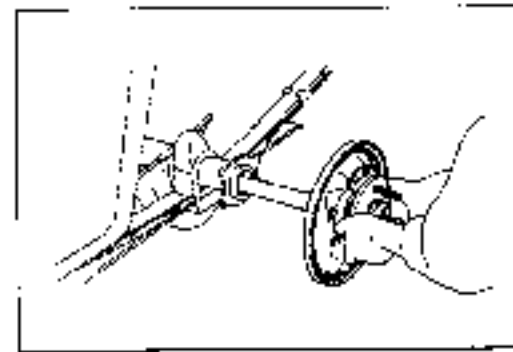
59L09X-001



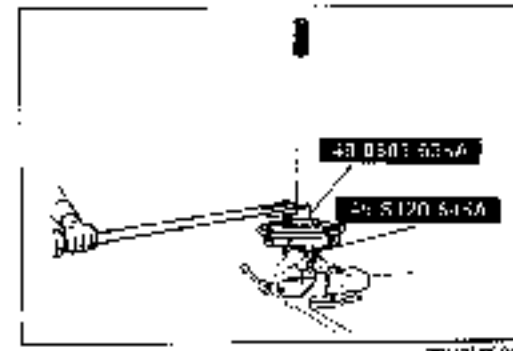
59L09X-004



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.

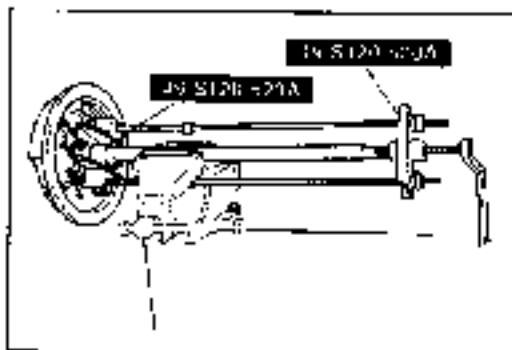
6. If the oil seal in the axle casing is cracked or damaged, replace it.

DISASSEMBLY

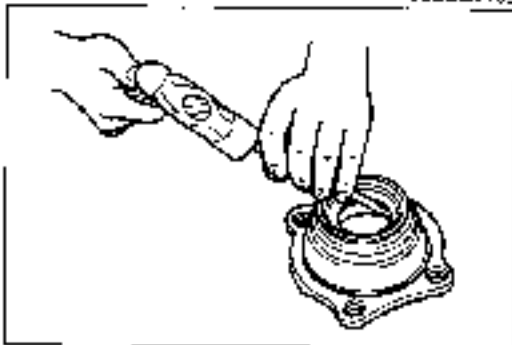
1. Remove the lockwasher.
2. Attach the SST as shown, and remove the bearing locknut from the rear axle shaft.

Caution

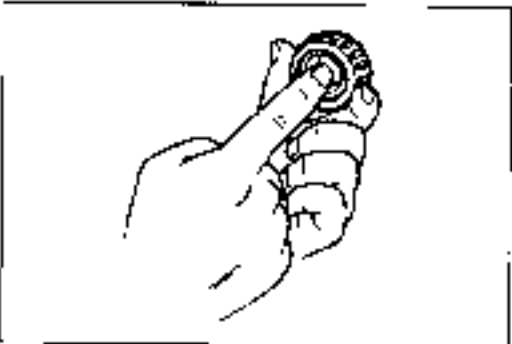
Be careful when removing or installing the bearing locknuts for the left wheels because they are left threaded (tightened by turning counterclockwise).



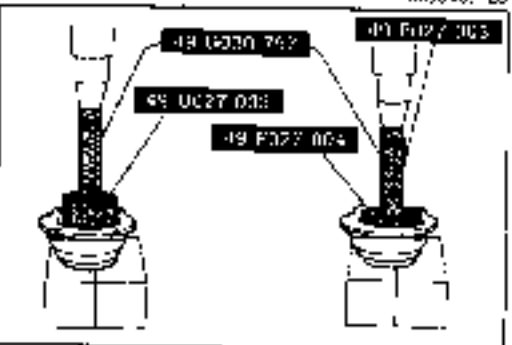
98U9KX-102



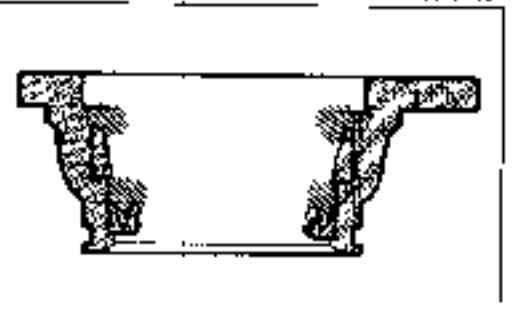
79J00X-019



98U9KX-103



98U9KX-104



98U9KX-106

2. Remove the bearing and bearing housing assembly with the SST.

Caution

Secure the rear axle shaft in a vise in which copper plates are used.

3. After removing the bearing and oil seal from the rear wheel hub, tap lightly with a suitable round bar to force out the outer race.

INSPECTION

Inspect for the following problems, and replace any faulty parts.

1. Wear, damage, and seizure of bearing

Caution

a) If the bearing is replaced, be sure to adjust the bearing play in the axial direction.

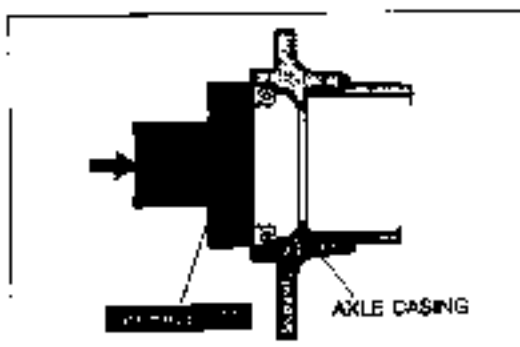
b) Replace the bearing inner and outer races as a set.

2. Cracks and damage on wheel hub
3. Bends and cracks on axle shaft.

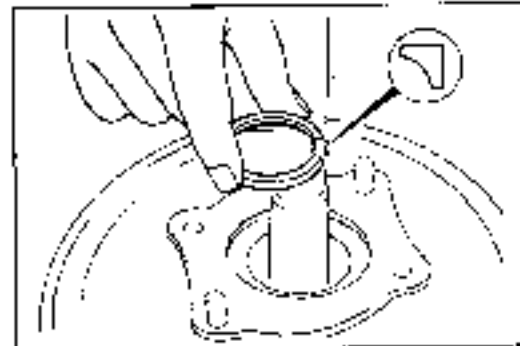
ASSEMBLY

1. Press fit the new oil seal with the SST
2. Press fit the bearing inner race with the SST

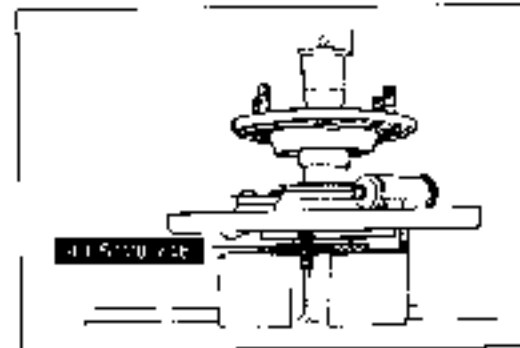
3. Liberally coat with lithium based grease the places indicated by oblique lines in the figure



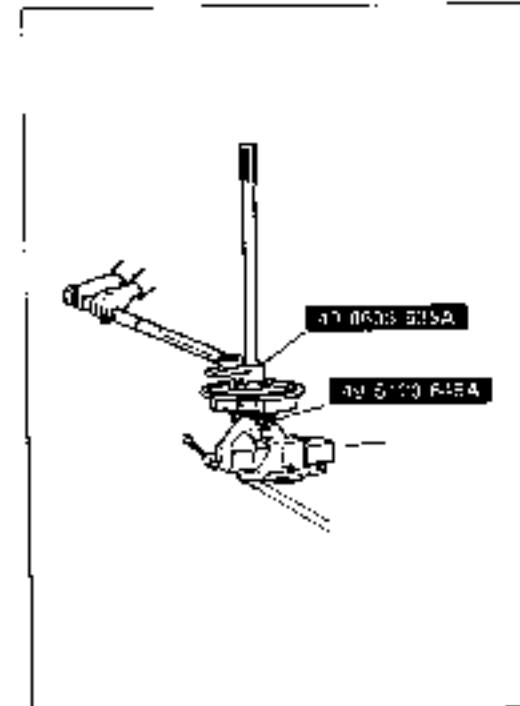
35L 04X-006



79U029-076



99J04X-136



29L 04X-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 lock nut to the axle shaft.
9. Using the **SST** to tighten the bearing lock nut, 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 lock nut to the specified torque.

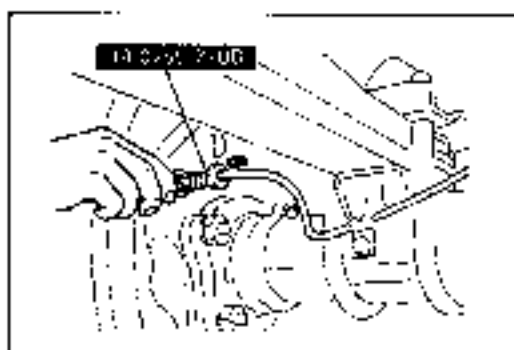
Tightening torque:

196—294 N·m (20—30 m·kg, 145—217 ft·lb)

Caution

The torque wrench must be attached perpendicular to the rear shaft bearing nut wrench (49 0603 635A).

12. Align the lock washer claws to the locknut notches and crimp the lock washer.



2B J044X-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:

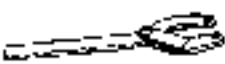
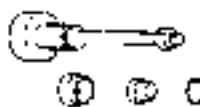
98—118 N·m (10—12 m·kg, 72—87 ft·lb)

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.)

DIFFERENTIAL (FRONT AND REAR)

PREPARATION

SST

49 5120 710 Hook, Coupling tongs 	49 0839 4250 Puller set, bearing 	49 U027 003 Installer, oil seal 
49 V001 795 Installer, oil seal 	49 G030 795 Installer, oil seal 	49 G030 795 Body (Part of 49 G030 795) 
49 MC05 561 Hanger, Diff. carrier 	49 0107 680A Engine stand 	49 0836 145 Puller for pulley boss 
49 H027 002 Remover, bearing 	49 F401 331 Body 	49 U071 525 Installer, bearing 
49 F027 0A1 Installer set, bearing 	49 F027 005 Attachment ø62 (Part of 49 F027 0A1) 	49 F027 007 Attachment ø72 (Part of 49 F027 0A1) 
49 F027 004 Attachment ø60 (Part of 49 F027 0A1) 	49 F027 003 Handle (Part of 49 F027 0A1) 	49 0259 720 Wrench, diff. side bearing adjust nut 
49 0720 570 Gauge body pinion height 	49 8531 585 Pinion mock 	49 D6E0 555 Gauge block 
49 0305 555 Gauge block 	49 U027 001 Collar 	49 U027 001 Collar 

49 G260 338

Attachment E

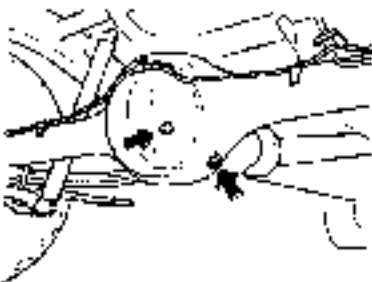


28J06X-037

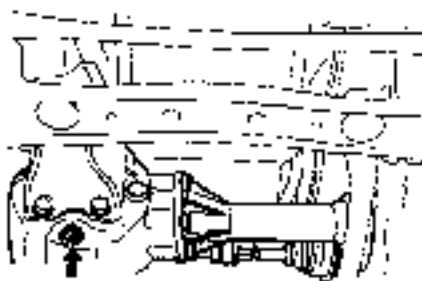
FILLER PLUG



28J06X-028



28J06X-039



28J06X-040



28J06X-041

ON-VEHICLE MAINTENANCE

Differential Oil

Inspection

1. Remove the filler plug.
2. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
3. Install the filler plug.

Tightening torque:

39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)

Replacement

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install the drain plug and a new washer.

Tightening torque:

39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)

5. Add the specified oil from the filler plug until the level reaches the bottom of the plug hole. (Refer to page M-4.)
6. Install the filler plug and a new washer.

Tightening torque:

39—54 N·m (4.0—5.5 m·kg, 29—40 ft·lb)

Oil Seals

Replacement

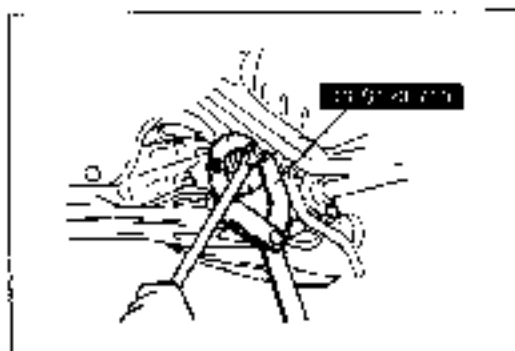
(Companion flange and differential right side oil seal)

1. Jack up the vehicle, and support it with safety stands.
2. Drain the differential gear oil.

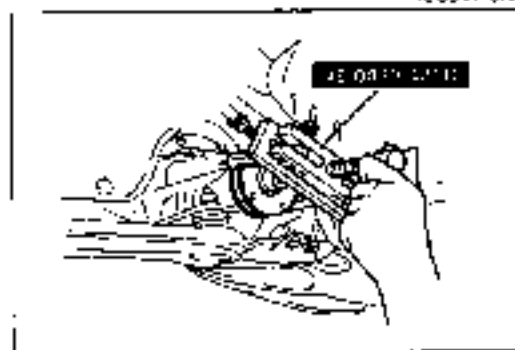
3. Remove the propeller shaft. (Refer to Section L.)
4. Before loosening the locknut, measure the rotation starting torque of the drive pinion (within the range of the drive pinion and ring gear backlash).

Note

Make a notation of this torque, and tighten the locknut to set this value during installation.



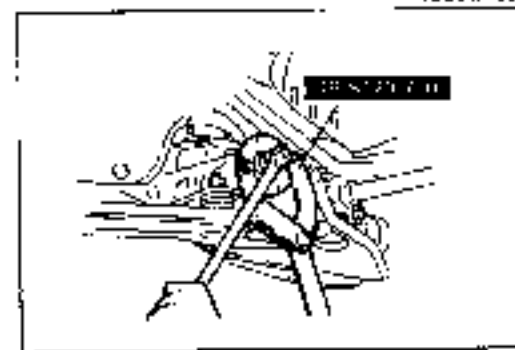
1BUDMX-022



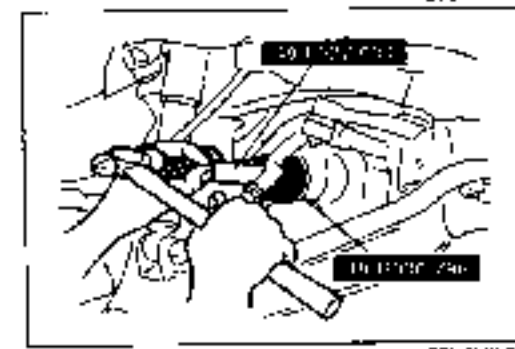
1BUDMX-023



1BUDMX-024



2BUDMX-021



2BUDMX-025

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.

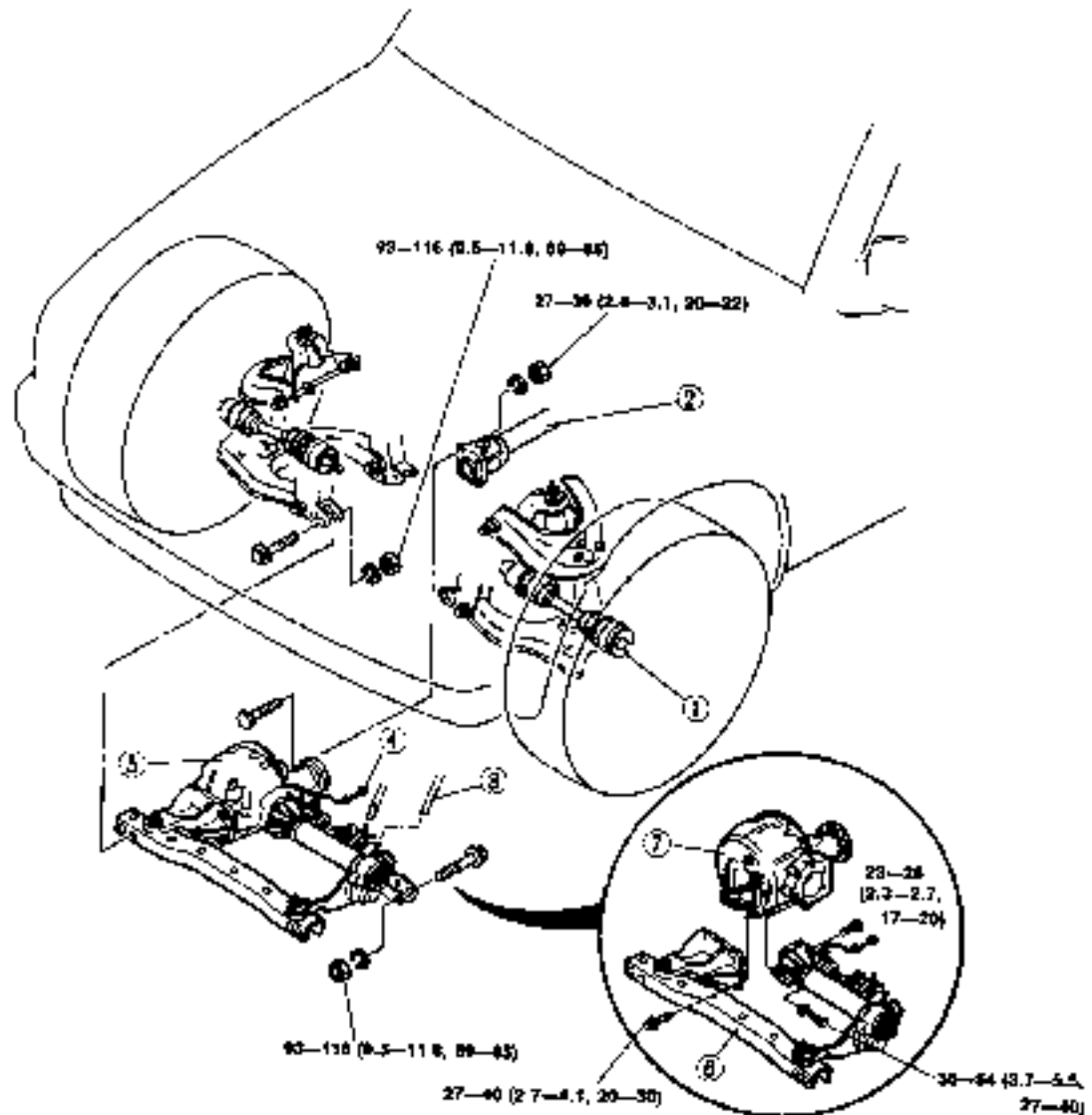
9. Install and tighten the locknut using the **SST** to get the specified starting torque recorded in Step 4.
10. Install the propeller shaft.
11. Pour the differential oil until the specified level.
(Refer to page M-51.)

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**.



Note (m-fig. 11.1b)
25L/CMD/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

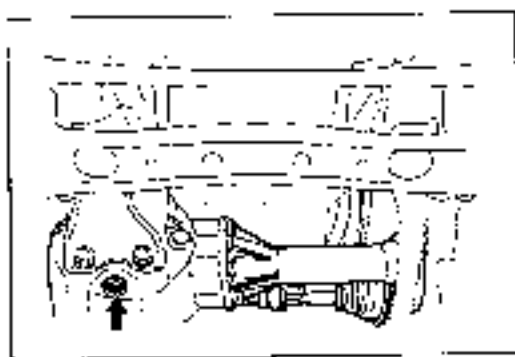
Service.....	... Section L

3. Vacuum hose**4. RFW switch connector****5. Front differential and joint shaft assembly**

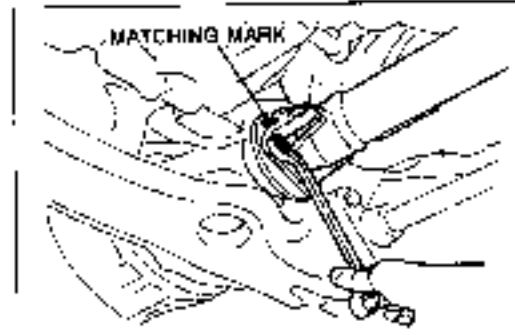
Removal Note.....	... page M-54
Inspection	... page M-61
Installation Note.....	... page M-54

6. Joint shaft assembly and cross member**7. Front differential**

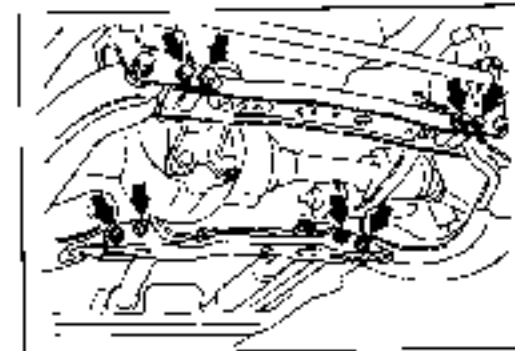
Disassembly.....	... page M-57
Inspection	... page M-61
Assembly	... page M-61



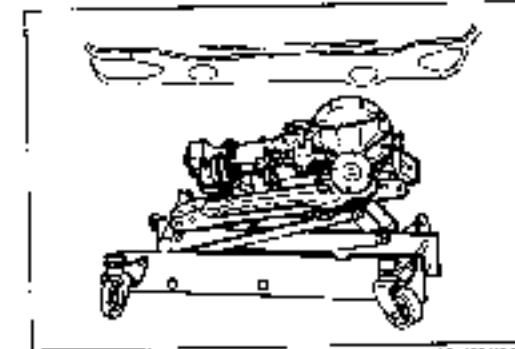
CB-DMX-024



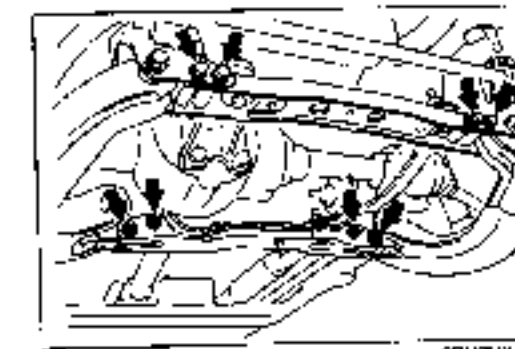
78J02K-007



7EUD3X-000



5H112AK-004



58UDMX-115

Removal note

1. Jack up the front of the vehicle, and support it with safety stands.
2. Remove the engine undercoiler.
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.

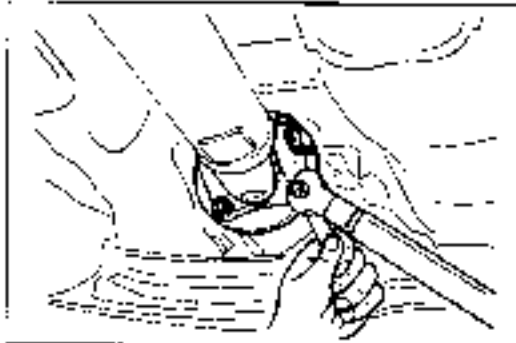
9. Remove the front differential and joint shaft assembly from the vehicle by using the transmission jack.

Installation note

1. Set the differential on the transmission jack.
2. Install the front differential and AFW assembly.

Tightening torque:

93—116 N·m (9.5—11.8 m·kg, 69—86 ft·lb)

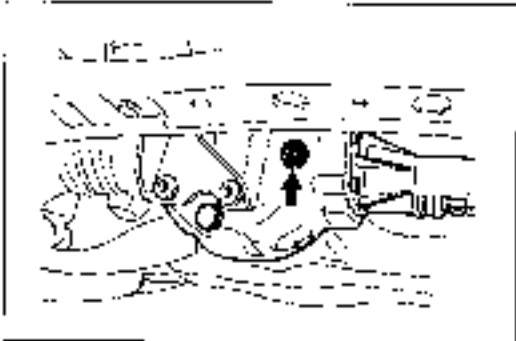


99UJ4K 113

3. Install the propeller shaft (Refer to Section L.)

Tightening torque:

27—30 Nm (2.8—3.1 m·kg, 20—22 ft·lb)



99UJ4K 087

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)

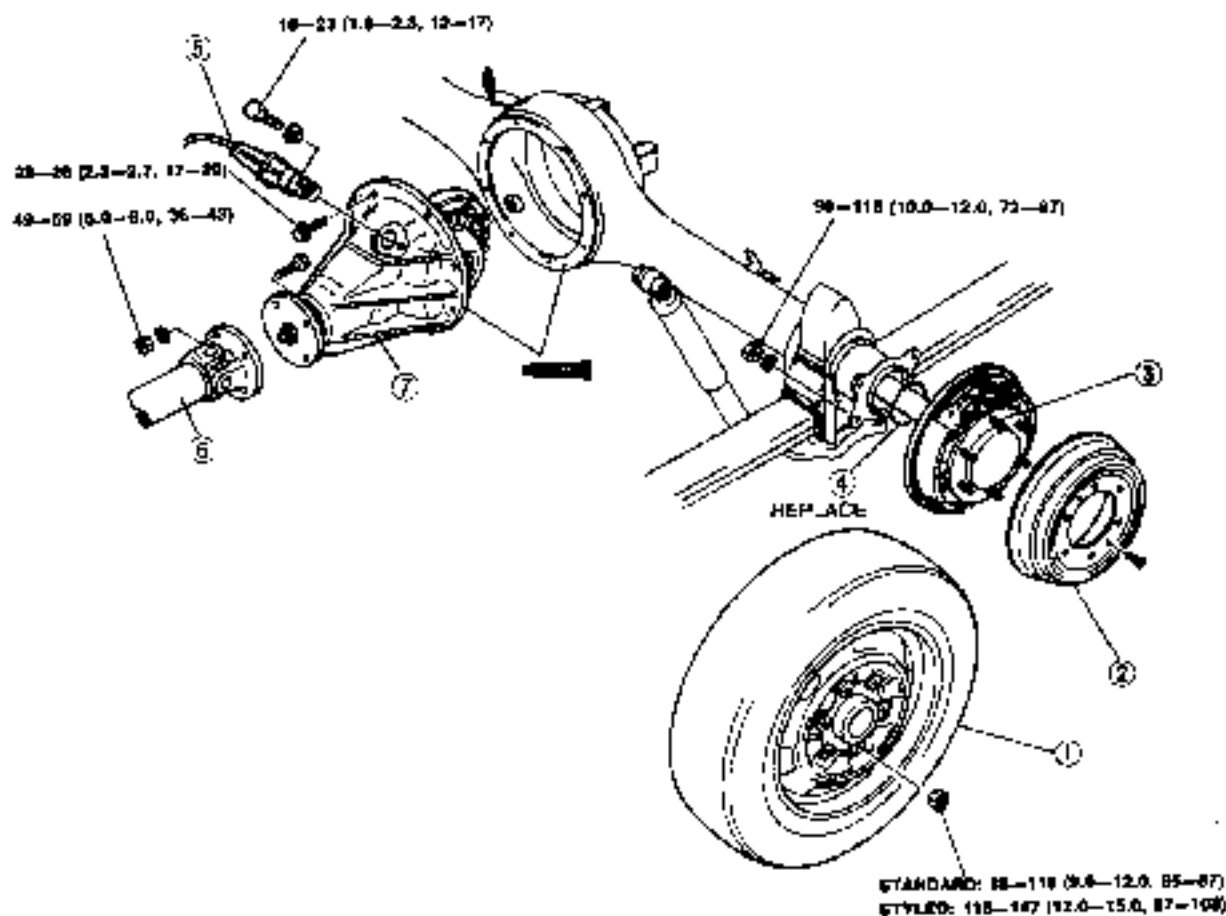
1. Jack up the rear of the vehicle, and support it with safety stands.
2. Drain the rear axle oil.
3. Remove each part in the numbered sequence shown.
4. Pour the rear axle oil until the specific level. (Refer to page M-51.)
5. Install in the reverse order of removal.

Rear Differential (4x4 and 4x2)

The B2600 rear differential is P-size.

The B2700 rear differential is M-size.

Because the construction of these two parts is the same, their disassemblies, inspection, and reassemblies will be explained together.



N-m (m-kp, ft-lb)
2FA-CM01-04E

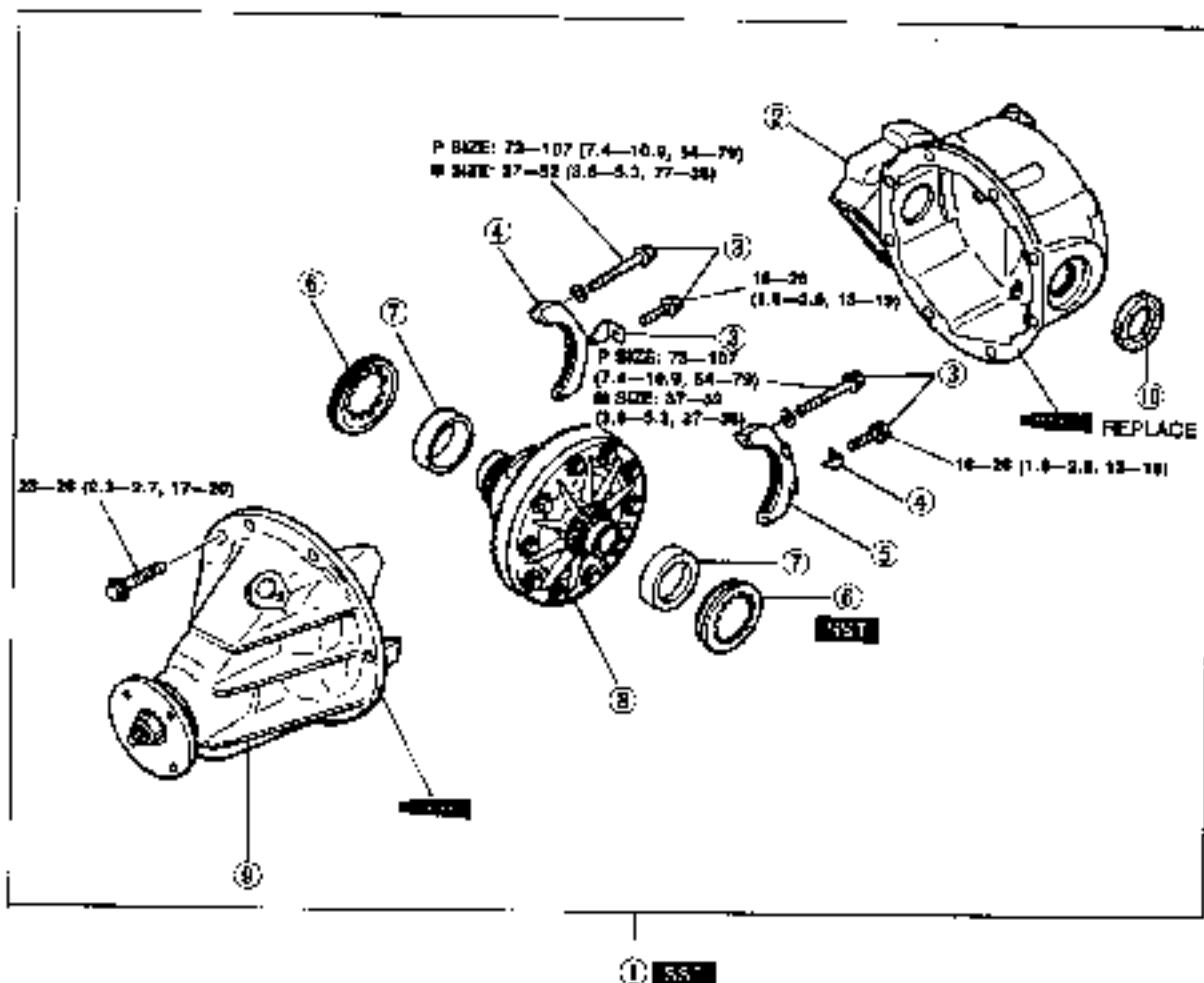
1. Wheel and tire (left and right)
2. Brake drum (left and right; Refer to Section P)
3. Rear axle shaft assembly (left and right)
4. O-ring
5. Rear-wheel ABS sensor

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)

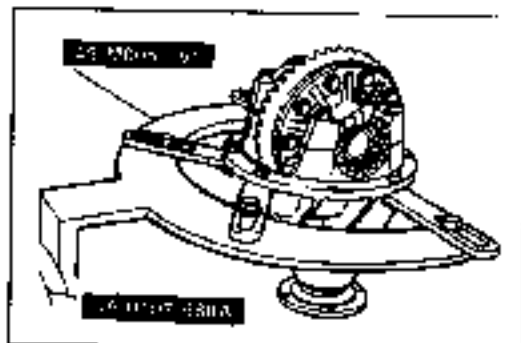
Disassemble each part in the numbered sequence shown in the figure, referring to **Disassembly Note**.



1. Differential
Disassembly
Note below
2. Differential casing
(Front differential)

3. Bolts
4. Lock plates
5. Bearing caps
Disassembly
Note page M-58

6. Adjustment screws
7. Bearing outer races
8. Differential gear assembly
9. Differential casing and drive
pin-on assembly
10. Oil seal

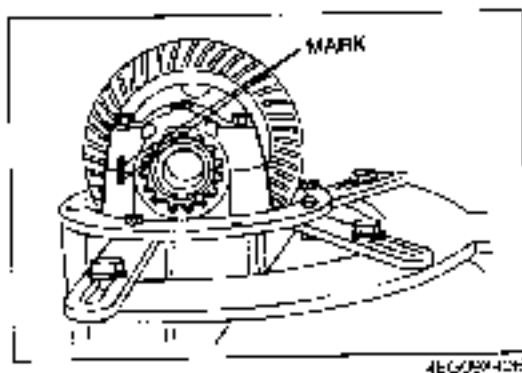


2BL0M4-047

Disassembly note Differential

Mount the differential gear assembly on the **SST**.

DIFFERENTIAL (FRONT AND REAR)



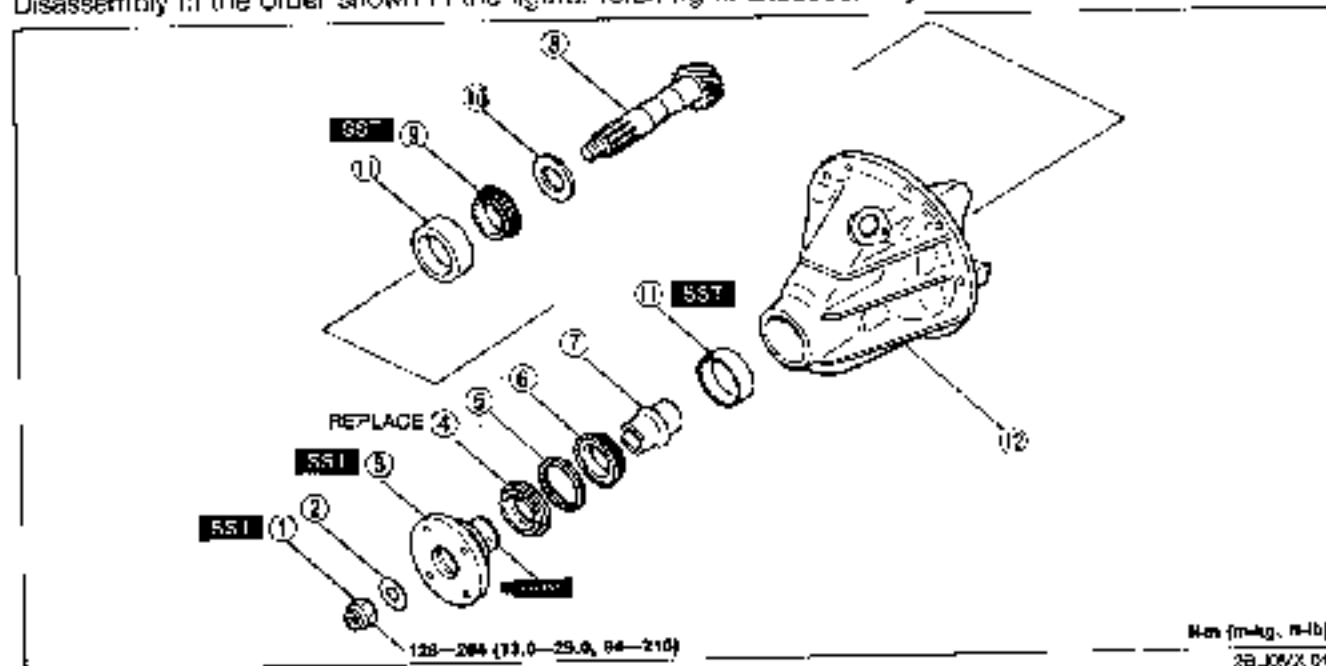
Bearing Caps

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**.



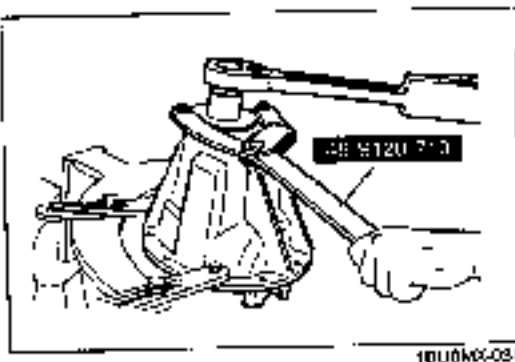
- 1 Locknut
Disassembly note..... below
- 2 Washer
- 3 Companion flange
Disassembly note page M-59
- 4 Oil seal
- 5 Spacer
- 6 Front bearing
Disassembly note page M-59

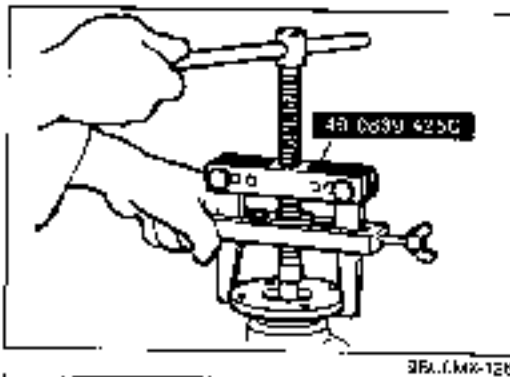
7. Collapsible spacer
8. Drive pinion
9. Rear bearing
Disassembly note page M-59
10. Spacer
11. Bearing outer races
Disassembly note page M-59
12. Differential casing

Disassembly note

Locking

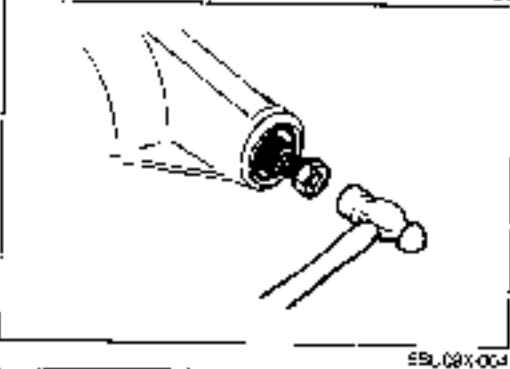
Locknut
Hold the companion flange with the **SST**, and remove the locknut.





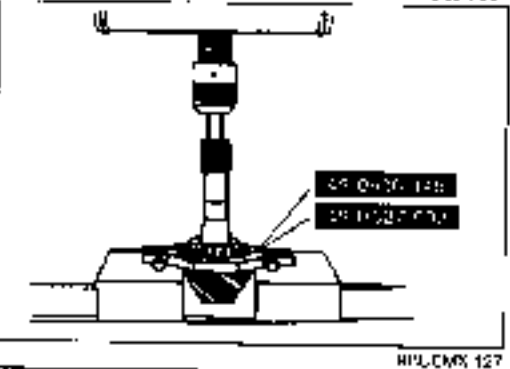
Companion flange

Pull the companion flange off with the **SST**.



Front bearing

The front bearing can be pushed out by attaching a miscellaneous (unused) locknut to the drive pinion, then gently tapping it with a copper hammer.



Rear bearing

The rear bearing can be pulled off with the **SST**.

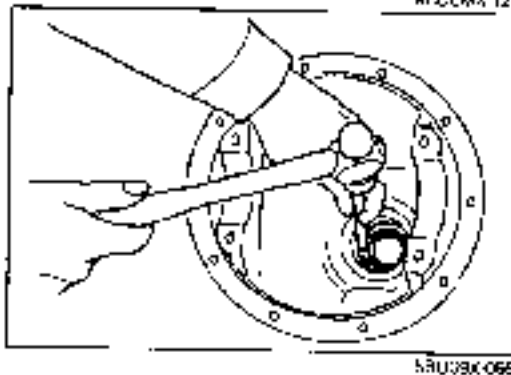
M-size front differential

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.



Bearing outer races

Remove the bearing outer races by using the two grooves in the carrier and tapping the outer races alternately.

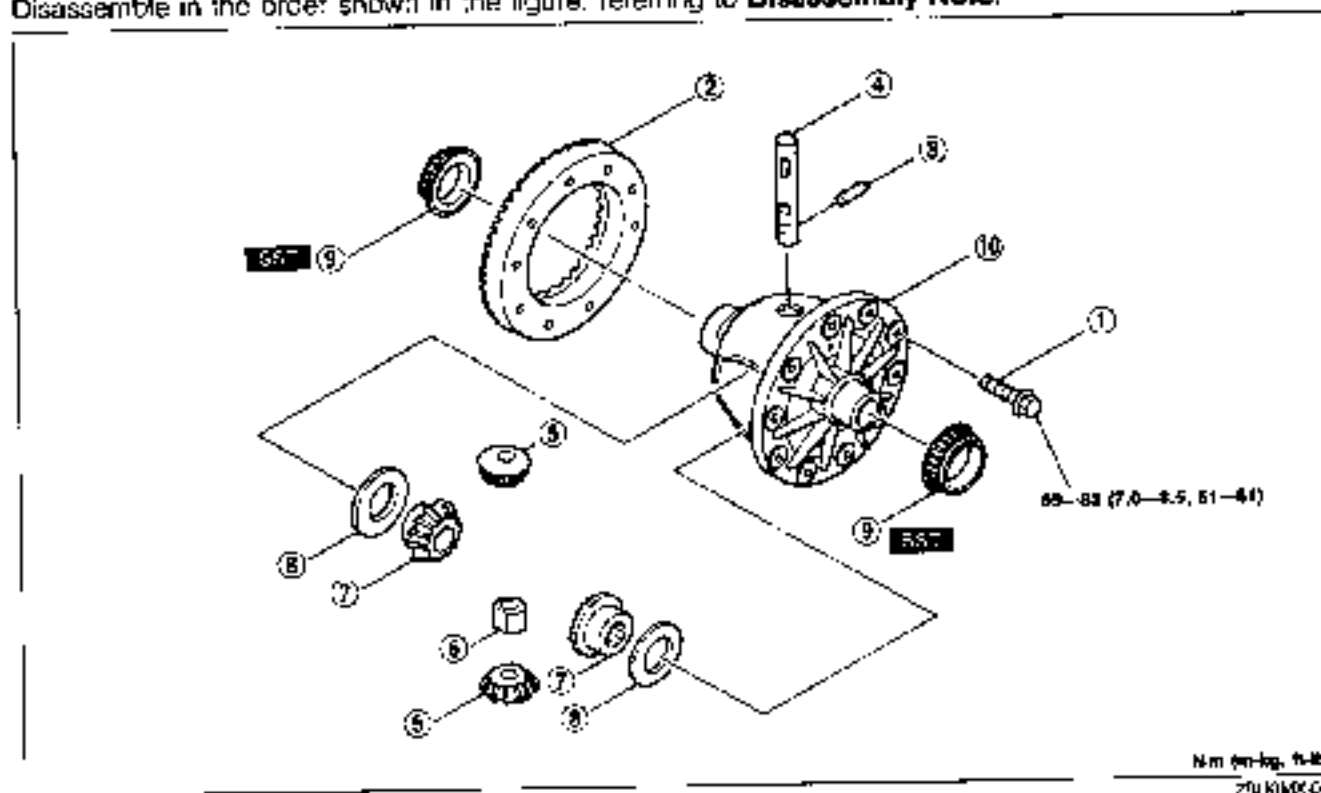
Note

Mark or otherwise distinguish between the front and rear outer races so that they are not mixed at the time of reassembly.

DISASSEMBLY

Differential Gear Assembly

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



N·m (m·kg, ft·lb)

29JUM000-043

1. Bol
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

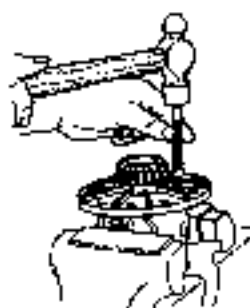
Disassembly Note below

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.



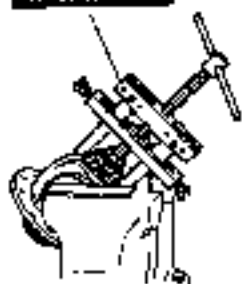
10JUM000-033

Side bearings

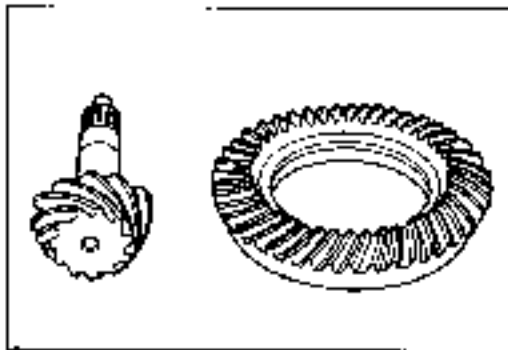
Using parts in the SST, remove the side bearings from the gear case.

Caution

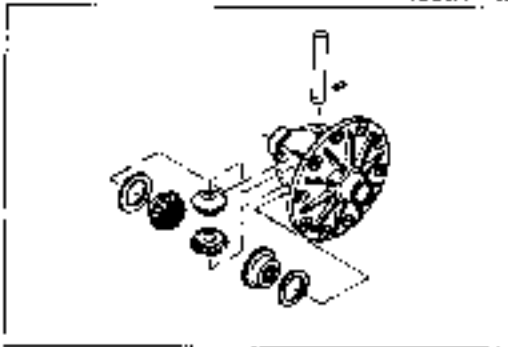
Identify the left bearing so that it can later be reinstalled in the same position.



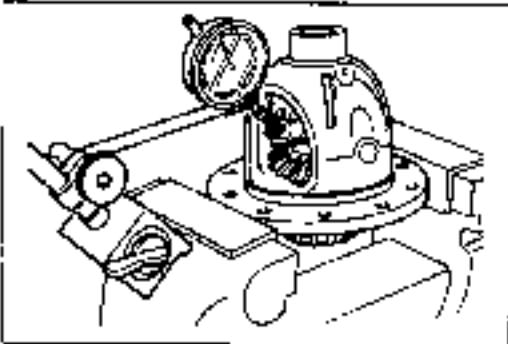
BBJ0000-129



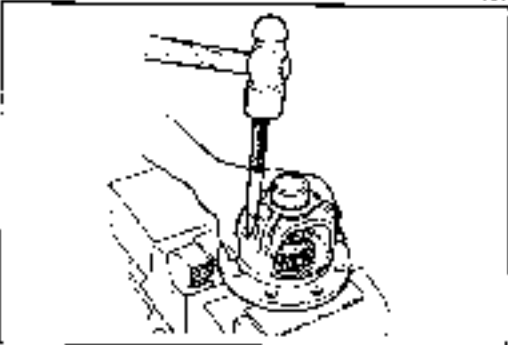
9BUDMX-130



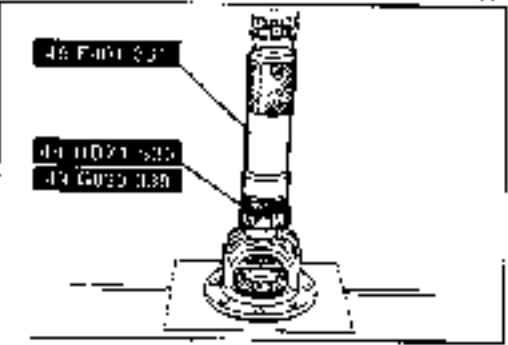
4F9DMX-134



2FLDMX-135



2BUDMX-136



2BUDMX-137

INSPECTION (4x4 AND 4x2)

Inspect for the following problems, and replace any faulty parts.

1. Poor meshing, wear, and damage of the ring gear or drive pinion

Note

If a problem is found, replace the ring gear and the drive pinion as a set.

2. Seizure, wear, rough rotation, and abnormal noise of bearing
3. Wear and damage of side gear, pinion gear, pinion shaft, and thrust washer
4. Cracked or worn differential carrier; wear at contact point of bearing
5. Cracked gear case; worn sliding parts
6. Damaged or worn contact surface of companion flange oil seal

ASSEMBLY (4x4 AND 4x2)

1. Adjust the backlash of the side gears and pinion gear as follows.
 - (1) Set a dial gauge against the pinion gear as shown.
 - (2) Secure one of the side gears.
 - (3) Move the pinion gear, and measure the backlash at the end of it.

Standard backlash: 0—0.1mm (0—0.004 in)

- (4) If the backlash exceeds the standard, use the selectable thrust washers for adjustment.

Identification mark	Washer thickness mm (in)
0	2.00 (0.0787)
05	2.05 (0.0807)
1	2.10 (0.0827)
15	2.15 (0.0846)
2	2.20 (0.0866)

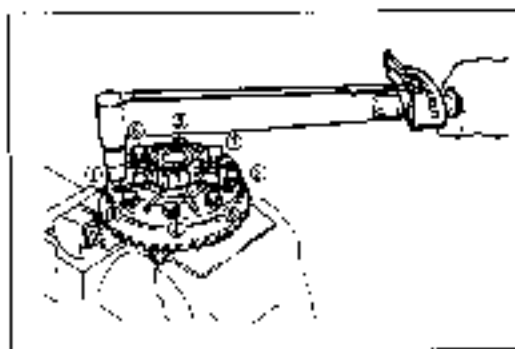
2. Assemble the side gears, thrust washer, thrust block, pinion gears, pinion shaft, and a new knock pin. After installing a new knock pin, make a crimp so that it cannot come out of the gear case.
3. Press the side bearings onto the gear case with the SST.

M-size differential: 49 G030 338 and 49 F401 331

P-size differential: 49 UB71 525

Caution

Bearings must be reassembled to the original positions if bearing reused.

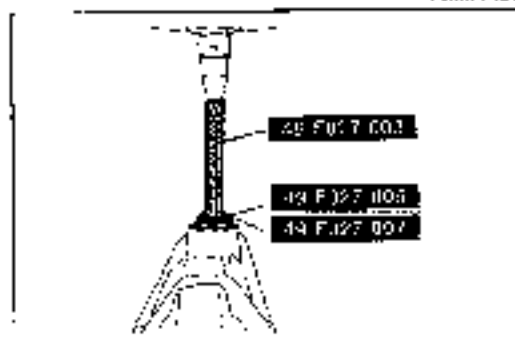


FLUORX-101

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)



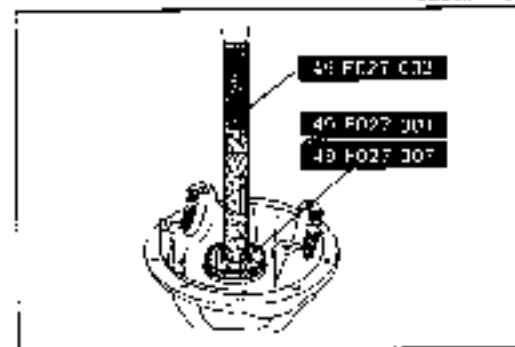
EBUDMX-100

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



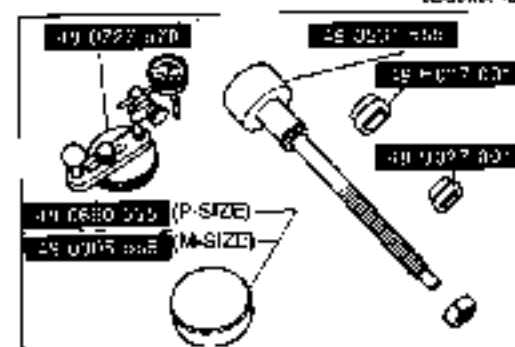
3EUDMX-134

6. Press fit the ring gear side bearing outer races with the **SST**.

4x4 M-size front differential: 49 F027 007

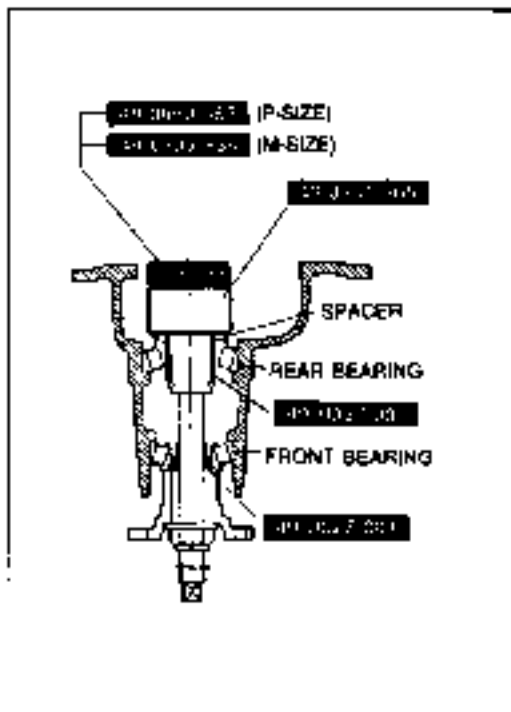
4x4 P-size rear differential: 49 F027 004

4x2 M-size differential: 49 F027 004

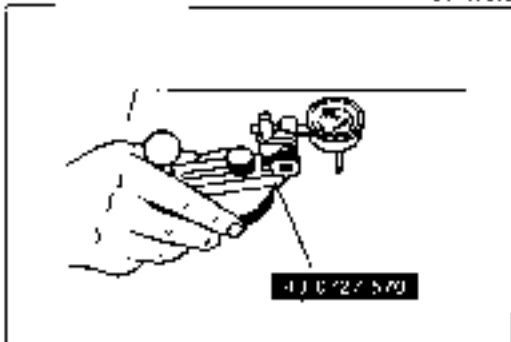


5EUDMX-135

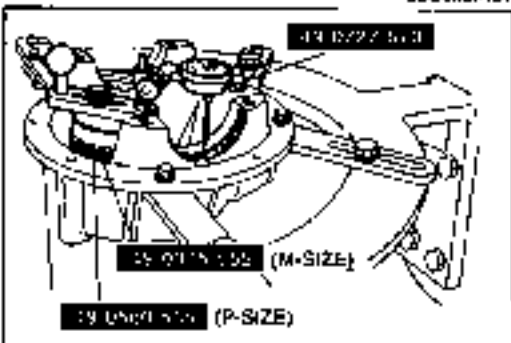
7. Adjust the pinion as follows with the **SST**.



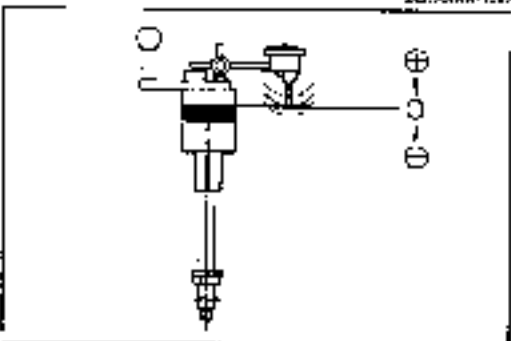
7HUBMX-063



SELOMX-137



SELOMX-138



98U5MX-139

8. Fit the spacer, rear bearing, and **SST**. Secure the collar with the O-ring. Then install this to the carrier.
9. Attach the front bearing, **SST**, companion flange, washer, and nut to the drive pinion model.

Note

- a) Use the same spacer and nut that were removed at disassembly.
 - b) Install the spacer selected for the pinion height adjustment, being careful that the installation direction is correct.
 - c) Be sure to install collars in the correct positions and facing in the correct directions.
10. Tighten the nut so that the drive pinion model can be turned by hand.

11. Place the **SST** on the surface plate, and set the dial indicator to zero.

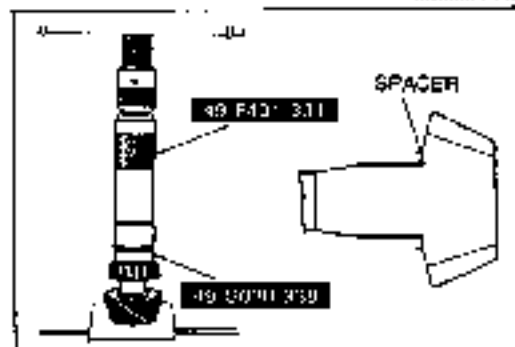
12. Place the **SST**.
13. Place the feeler of the dial indicator so that it contacts where the side bearing is installed in the carrier. Measure the lowest position on both the left and right sides.

14. Add the two (left and right) values obtained by the measurements taken in step 8, and divide the total by 2.

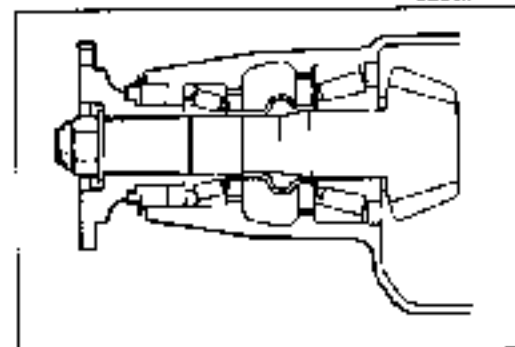
Standard: 0mm (0 in)

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)	25	3.35mm (0.1319 in)
17	3.17mm (0.1248 in)	28	3.38mm (0.1331 in)
20	3.20mm (0.1260 in)	31	3.41mm (0.1343 in)
23	3.23mm (0.1271 in)	34	3.44mm (0.1354 in)
26	3.26mm (0.1283 in)	37	3.47mm (0.1366 in)

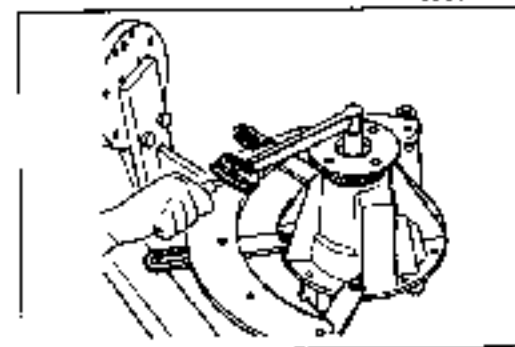
9B.XMX-140



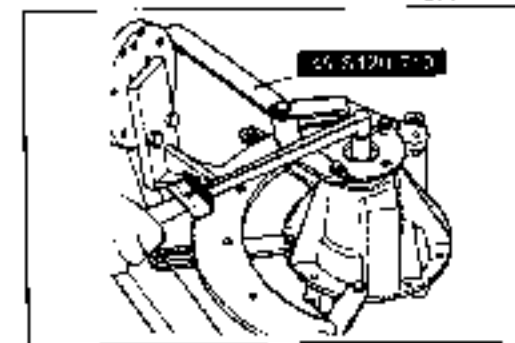
9B.XMX-141



9B.XMX-142



2H.XMX-154



1B.CMX-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 with in 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)

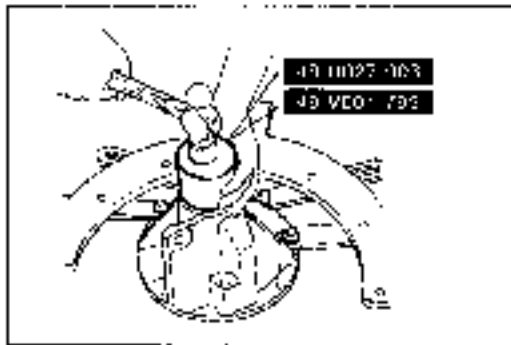
P-size:

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-143

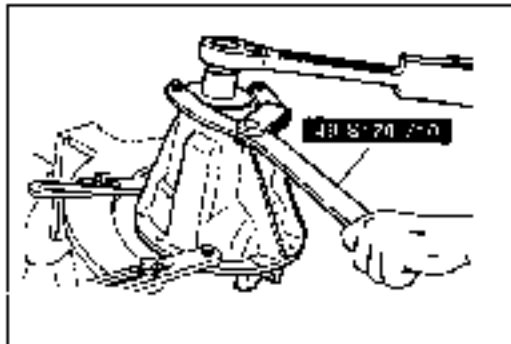
(5) Tap the new oil seal into the carrier with the **SST**

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.

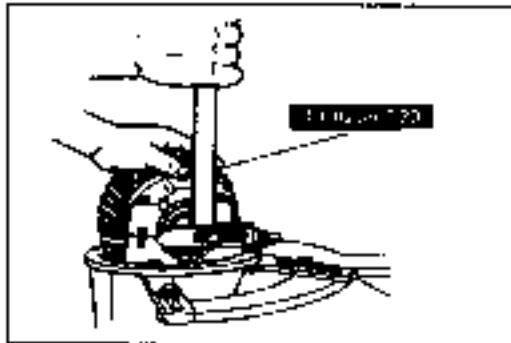


3BU0MX-145

(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.

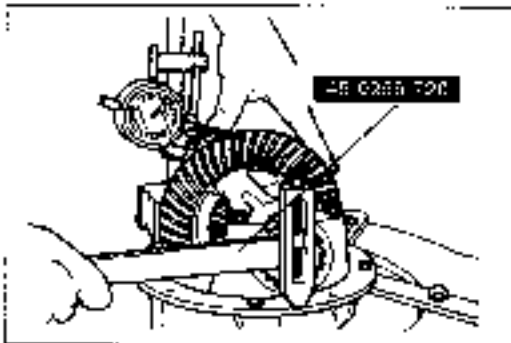


2BU0MX-255

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.



9BU0MX-147

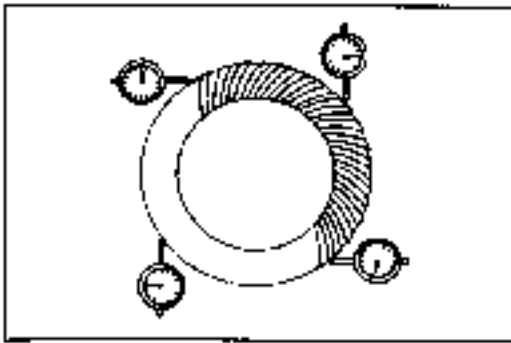
20. Adjust the drive pinion and ring gear backlash and the side bearing preload as follows.

- (1) Mark the ring gear at four points at approximately 90° intervals on the ring gear, and mount a dial indicator to the carrier so that the feeler comes in contact at a 90° angle with one of the ring gear teeth.
- (2) Turn both bearing adjusters equally until the backlash is within specifications with the **SST**.

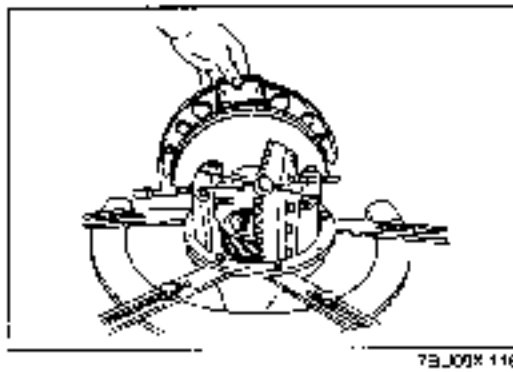
Standard backlash:

0.09—0.11mm (0.0035—0.0043 in)

- (3) Check the backlash at the three other marked points, and make sure the minimum backlash is more than **0.05mm (0.002 in)** and the difference in the value of the maximum and minimum backlashes is less than **0.07mm (0.0028 in)**



4E339X-084



- (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:

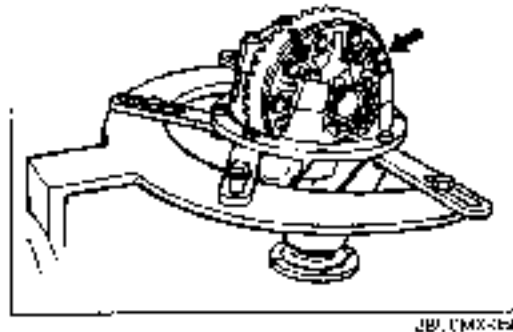
185.43—185.50mm (7.3004—7.3031 in)

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:

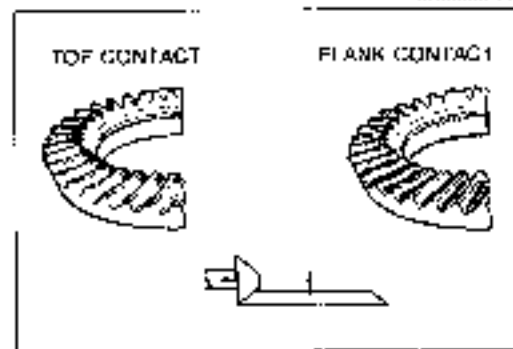
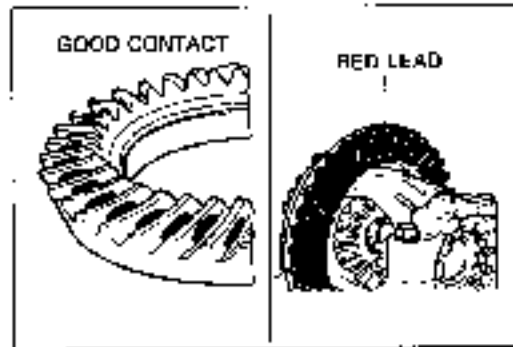
37—52 Nm (3.8—5.3 m·kg, 27—38 ft·lb)

P-size differential:

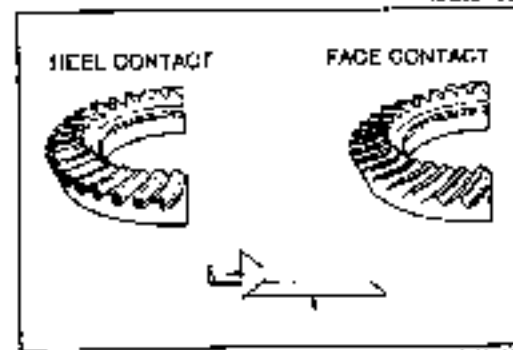
73—107 Nm (7.4—10.9 m·kg, 54—79 ft·lb)

- 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.

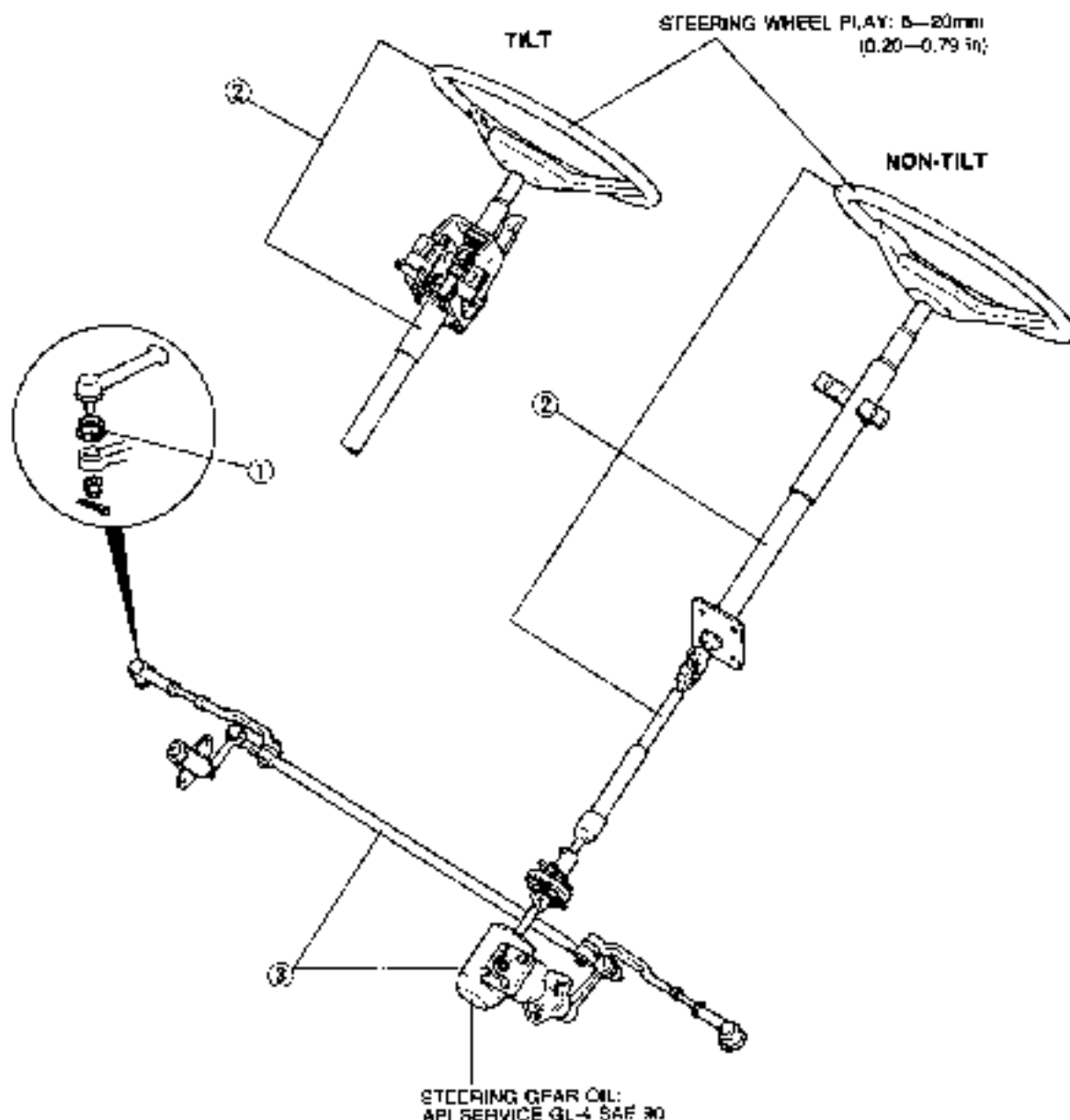
STEERING SYSTEM

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18U3YK-001

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B2200 MANUAL STEERING

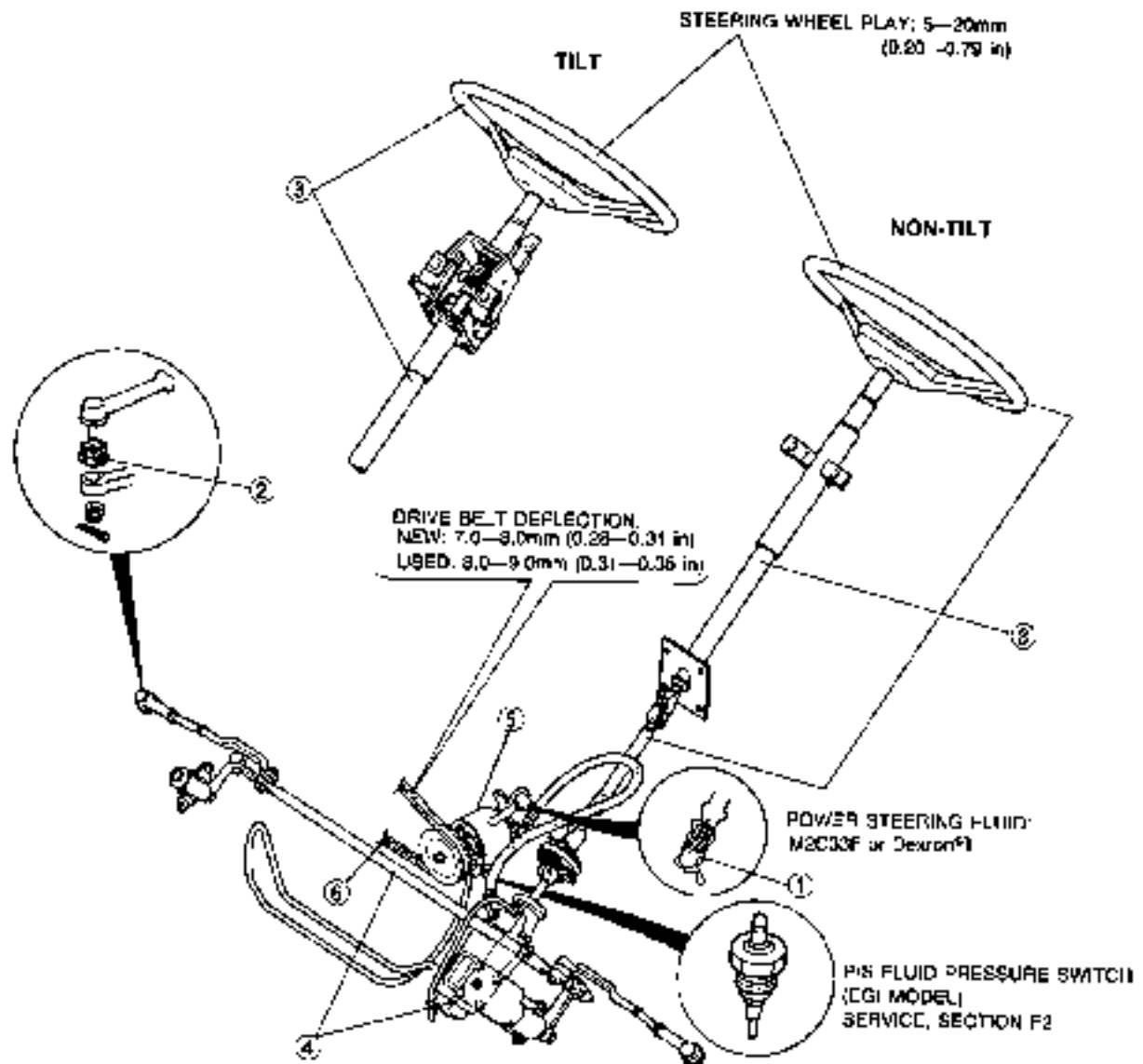


3600A-1012

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2. Steering wheel and column
On-vehicle inspection page N- 9
Removal and installation page N-10
Inspection page N- 1*

3. Steering gear and linkage
On-vehicle inspection page N-12
Removal, inspection, and
Installation page N-12
Disassembly, inspection, and
Assembly page N-14

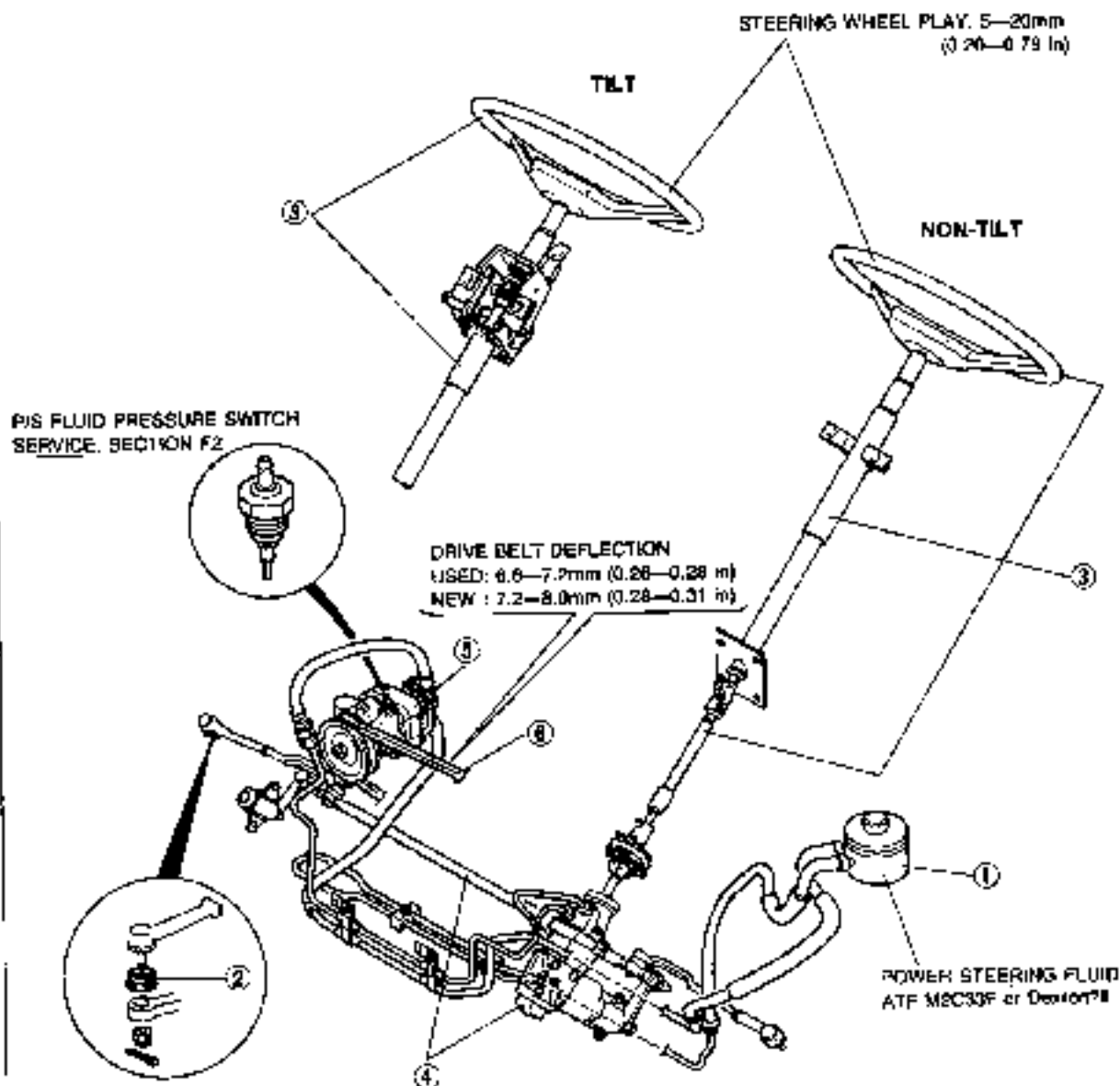
B2200 POWER STEERING



1. Power steering fluid	4. Steering gear and linkage
On-vehicle inspection.....	Removal, Inspection, and
page N-21	Installation.....
2. Boot	Disassembly, Inspection, and
Replacement.....	Assembly.....
page N-7	page N-26
3. Steering wheel and column	5. Oil pump
On-vehicle inspection.....	Removal and Installation.....
page N-24	Disassembly, Inspection, and
Removal and Installation.....	Assembly.....
page N-10	page N-32
Inspection.....	6. Drive belt
page N-11	Inspection and Adjustment.....
	page N-35

1903N6-000

B2600 POWER STEERING



11500HX-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. On 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

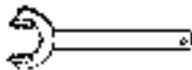
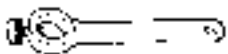
Item		Model	82200		82600
			Manual	Power	Power
Steering wheel	Outer diameter	mm (in)	380 (14.96)		
	Lock-to-look	turns	4.6	3.5	
Steering shaft and joint	Shell type		Collapsible, non tilt or tilt		
	Joint type		Cross-joint and rubber coupling		
	Tilt stroke	mm (in)	55 (2.18)		
Steering gear	Type		Ball nut		
	Gear ratio		21 : 25 : 1	17.5 : 1	
Oil	Type		API service GL-4 SAE 90	API SAE 68 or Dexron [®]	
	Capacity*	liters (US qt, Imp qt)	0.34 (0.36, 0.30)	0.50 (0.53, 0.42)	1.20 (1.27, 1.00)
Power steering	Assist. type		Engine speed sensing		

* Power steering: complete system

219A00X-001

MANUAL STEERING

PREPARATION

49 1243 785 Instaler, dust boot		49 0118 650C Puller ball joint		49 0223 805E Puller, pitman arm	
49 1391 680 Wrench, locknut		49 0139 585A Adjust. wrench		49 0180 510B Attachment, steering worm bearing preload measurement	

219A00X-029

N

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Steering "heavy"	Poor lubrication oil or foreign material in steering ball joints	Lubricate or replace	N-7
	Poor lubrication oil 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
	Incorrect tire pressures	Adjust	Section G
Steering wheel effort uneven	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-12 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 Replace 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 M 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. 10-6-005

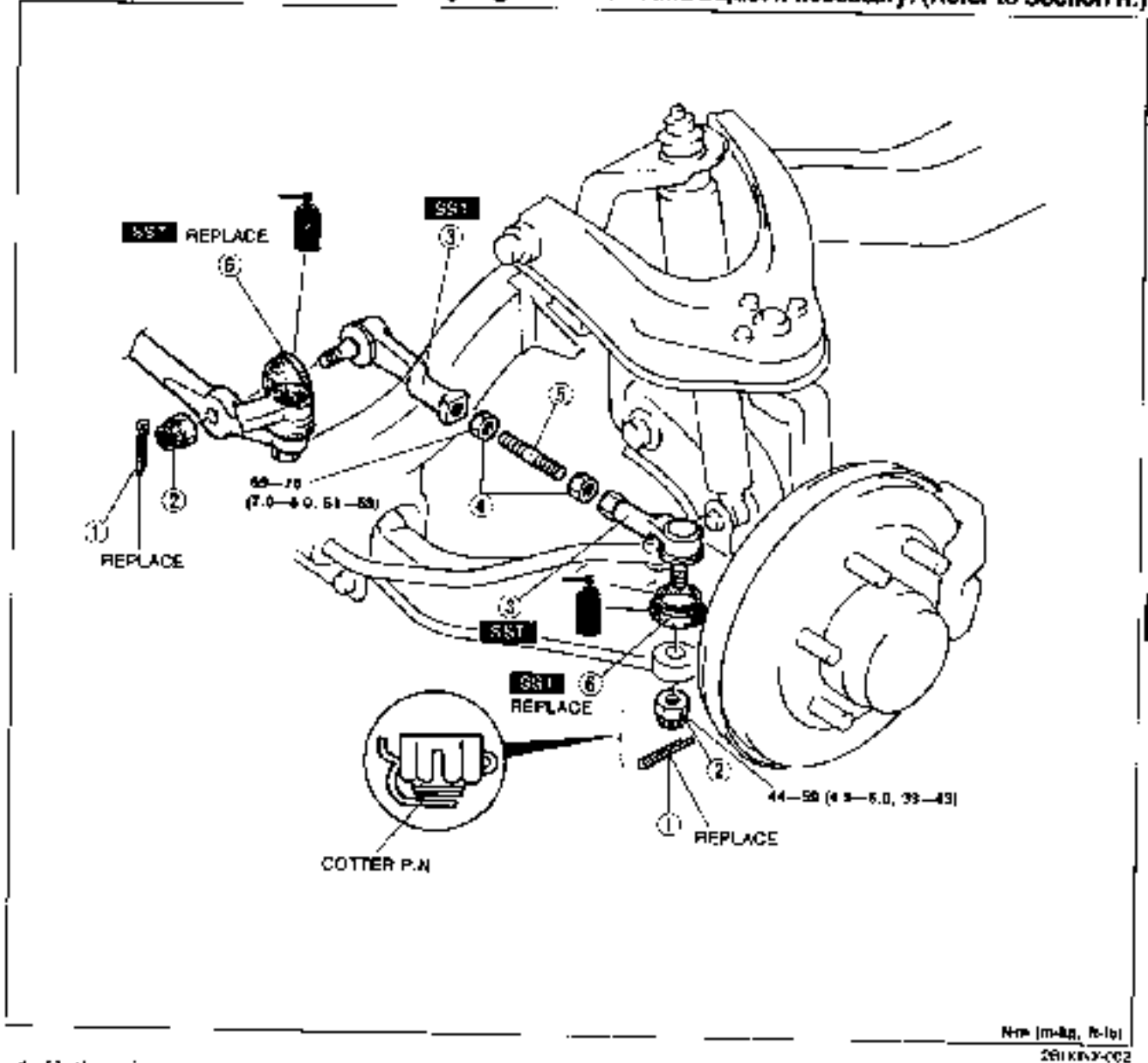
BOOT**Replacement**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove the ball joint boot in the order shown in the figure, referring to **Removal Note**.
5. Install a new boot in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel.

Tighten torque: Non-styled wheel 88—118 N·m (9—12 m·kg, 65—87 ft·lb)
Styled wheel 118—147 N·m (12—15 m·kg, 87—108 ft·lb)

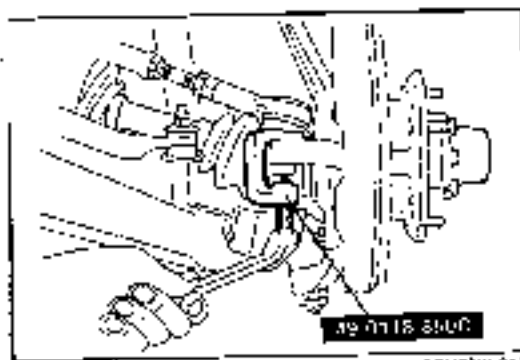
Note

After replacement, check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)

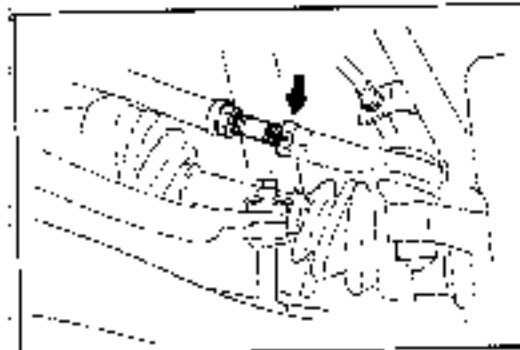


1. Cotter pin
2. Nut
3. Ball joint (inner or outer)
Removal Note page N-8
4. Locknut

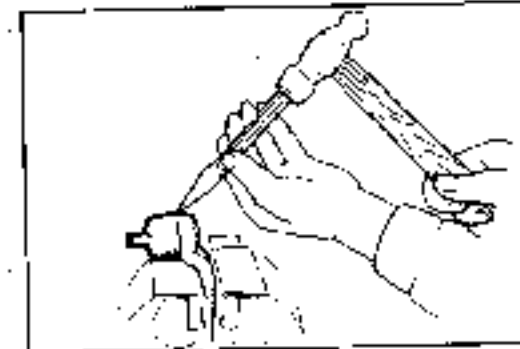
5. Tie rod
6. Ball joint boot (inner or outer)
Removal Note page N-8
Installation Note page N-8



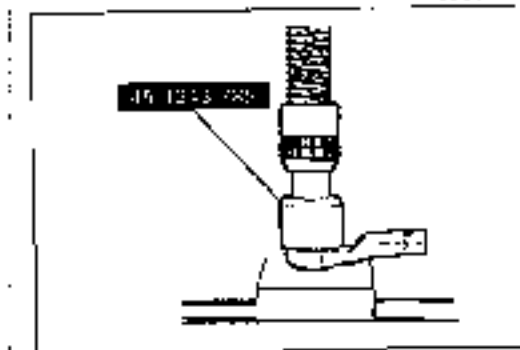
92UCNX-010



92UCNX-030



92UCNX-012



92UCNX-008

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)

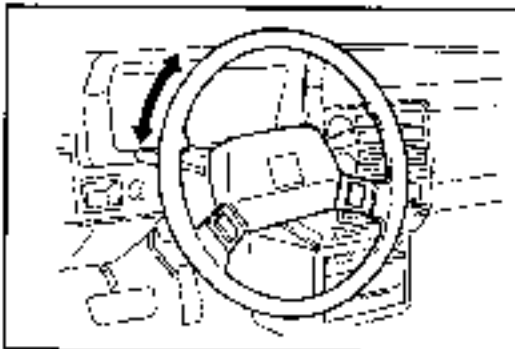
Secure the ball joint in a vise. Place a chisel against the boot and hold it at the angle shown. Remove the boot by tapping with a hammer.

Caution

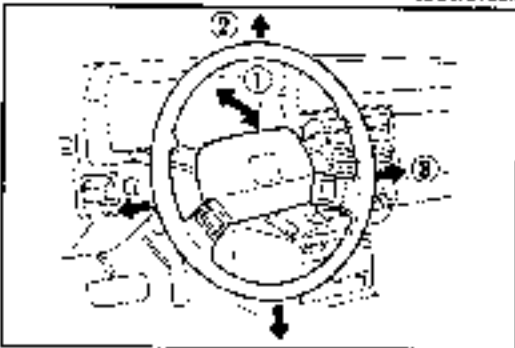
Be careful not to scar the area where the boot attaches to the ball joint.

Installation note**Ball joint boot (inner or outer)**

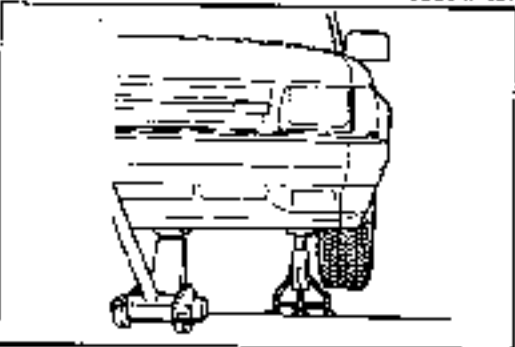
1. Wipe away the grease on ball stud.
2. Put a small amount of grease (lithium base, NLGI No.2) into the new boot and set it onto the ball joint. Press the boot onto the ball joint with the SST.
3. Wipe away any grease that has been expelled from the boot.



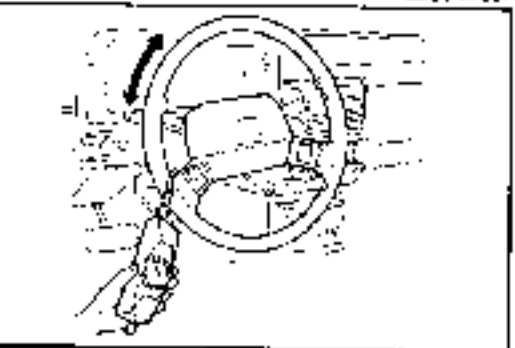
9BUC0N0-030



9BUC0N0-031



9BUC0N0-007



9BUC0N0-012

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)

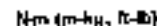
[during one turn of the steering wheel]

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.

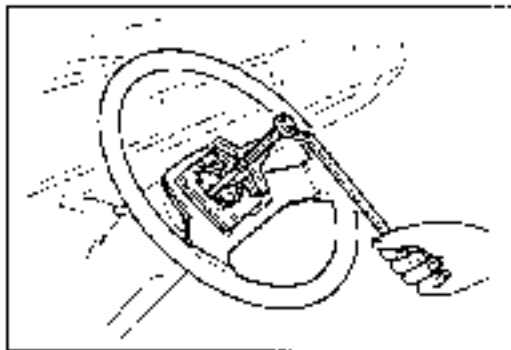
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



210104X/43X

1. Horn cover
2. Locknut
3. Steering wheel
- Removal Note page N-11
4. Screws
5. Column cover
6. Combination switch connectors
7. Bolt (A/T)
8. Key-interlock cable (A/T)
9. Combination switch
10. Bolt
11. Nuts
12. Bolts
13. Steering shaft assembly
- Inspection page N-11

14. Bearing
15. Dust cover
16. Bolts
17. Steering lock assembly
 Removal Note page N-11
 Inspection..... page N-11
 Installation Note..... page N-11
18. Bolt
19. Intermediate shaft
 Inspection page N-11
20. Bolt
21. Rubber coupling
 Inspection..... page N-11



83JUNX-034

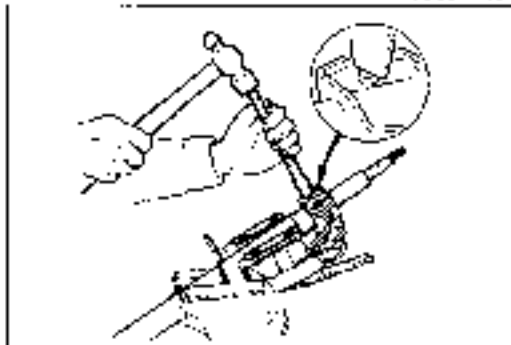
Removal note

Steering wheel

Remove the steering wheel with a suitable puller.

Caution

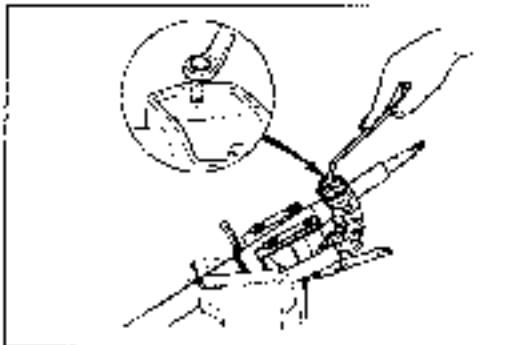
Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.



85LCNX-006

Steering lock assembly

Use a chisel to make a groove in the head of each steering lock installation bolts. Remove the bolts with a screwdriver; then remove the steering lock assembly.

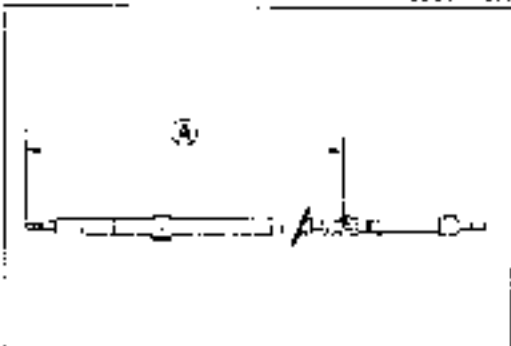


89JUNX-005

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.



85JUNX-007

Inspection

Check for the following and repair or replace as necessary.

1. Dimensions of steering shaft

Standard dimensions (A):

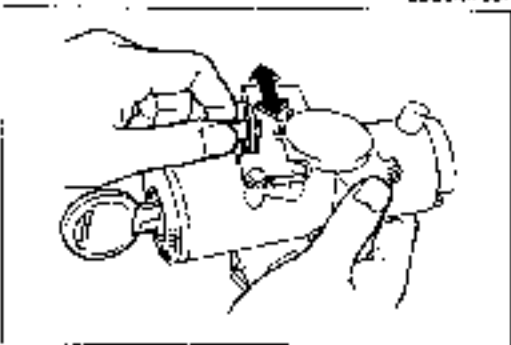
$833.8 \pm 1.0\text{mm}$ ($32.8 \pm 0.04\text{ in}$)

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



89JUNX-008

Steering wheel

With the wheel into straight-ahead position



L: 22mm (0.87 in)

2DUCR-009

STEERING GEAR AND LINKAGE

On-vehicle Inspection

Steering gear oil level

1. Remove the oil filler port plug.
2. Prepare a simple wire dipstick.
3. Insert the dipstick through the oil filler port.
4. Pull out the dipstick and measure the L dimension. Add the specified gear oil if necessary.

Standard L dimension: 22mm (0.87 in)

Specified gear oil: API service GL-4 SAE 90

5. Install the oil filler port plug.

Removal, Inspection, and Installation

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Install the wheel.

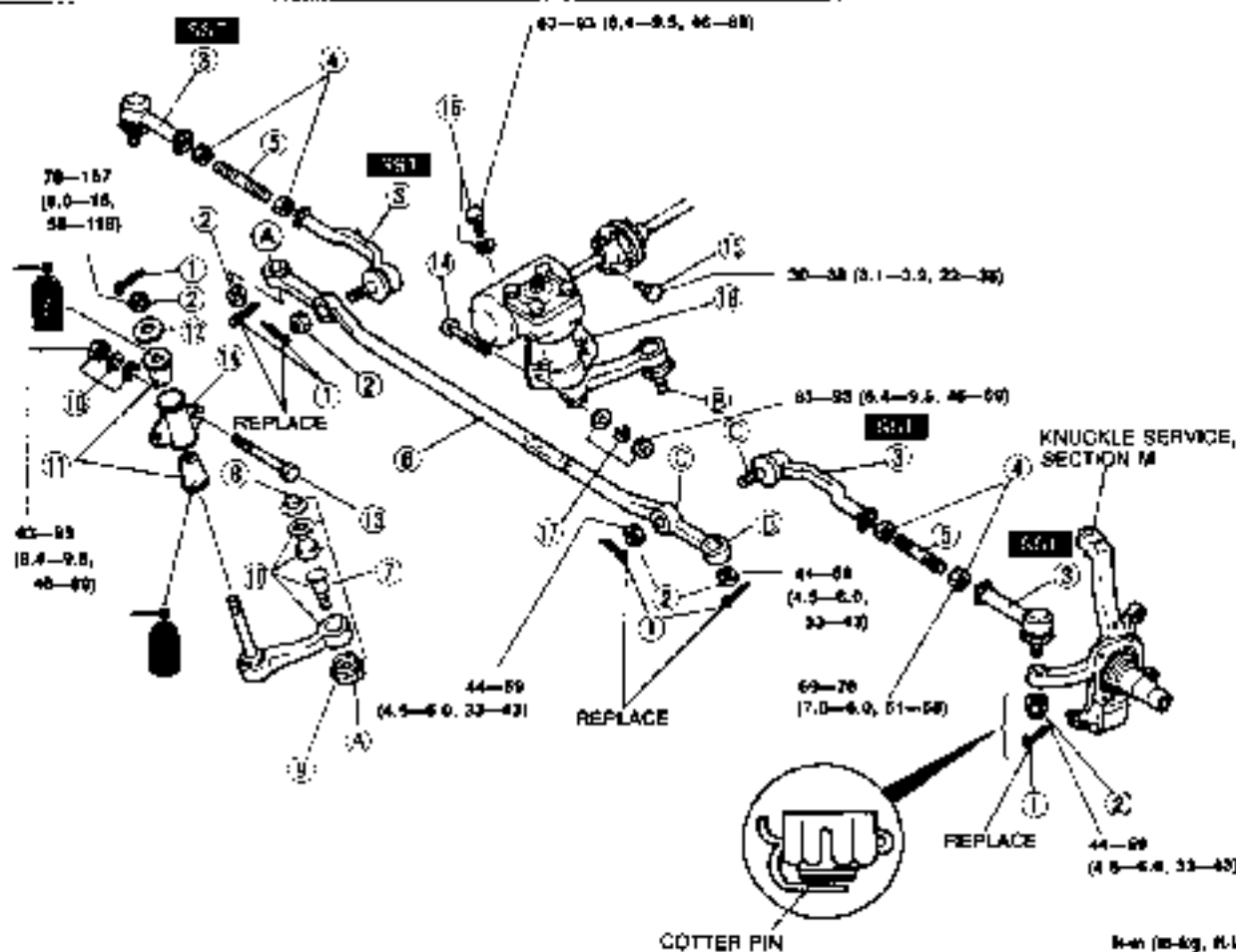
Tightening torque: Non-styled wheel 88—118 N·m (9—12 m·kg, 65—87 ft·lb)

Styled wheel 118—147 N·m (12—15 m·kg, 87—108 ft·lb)

7. Inspect all parts and repair or replace as necessary.

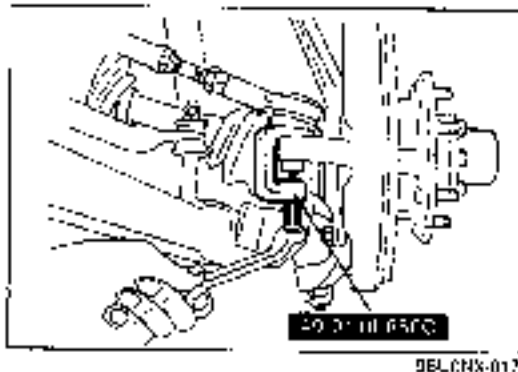
Note

After installation, check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)



1. Cotter pin
2. Nut
3. Ball joint
 - Removal Note..... page N-8, 13
 - Check for damage or poor operation
4. Locknut
5. Tie rod
6. Center link
 - Check for damage or cracks
7. Idler arm assembly
 - Check for damage or poor operation
8. Idler cap
9. Ball joint dust seal
10. Idler arm
11. Washer
12. Rubber bushing
 - Check for wear or damage
13. Bolts, nuts, and washers
14. Idler arm bracket
15. Bolt
16. Bolt and washer
17. Bolts, nuts, and washers
18. Steering gear assembly
 - Disassembly, Inspection, and Assembly... page N-14

28UONX011



Removal note

Ball joint, pitman arm, and idler arm

With the **SST**, separate the ball joint from the knuckle and from the center link (A—B), the pitman arm from the center link (C—D), and the idler arm from the center link (E—F).

Disassembly, Inspection, and Assembly

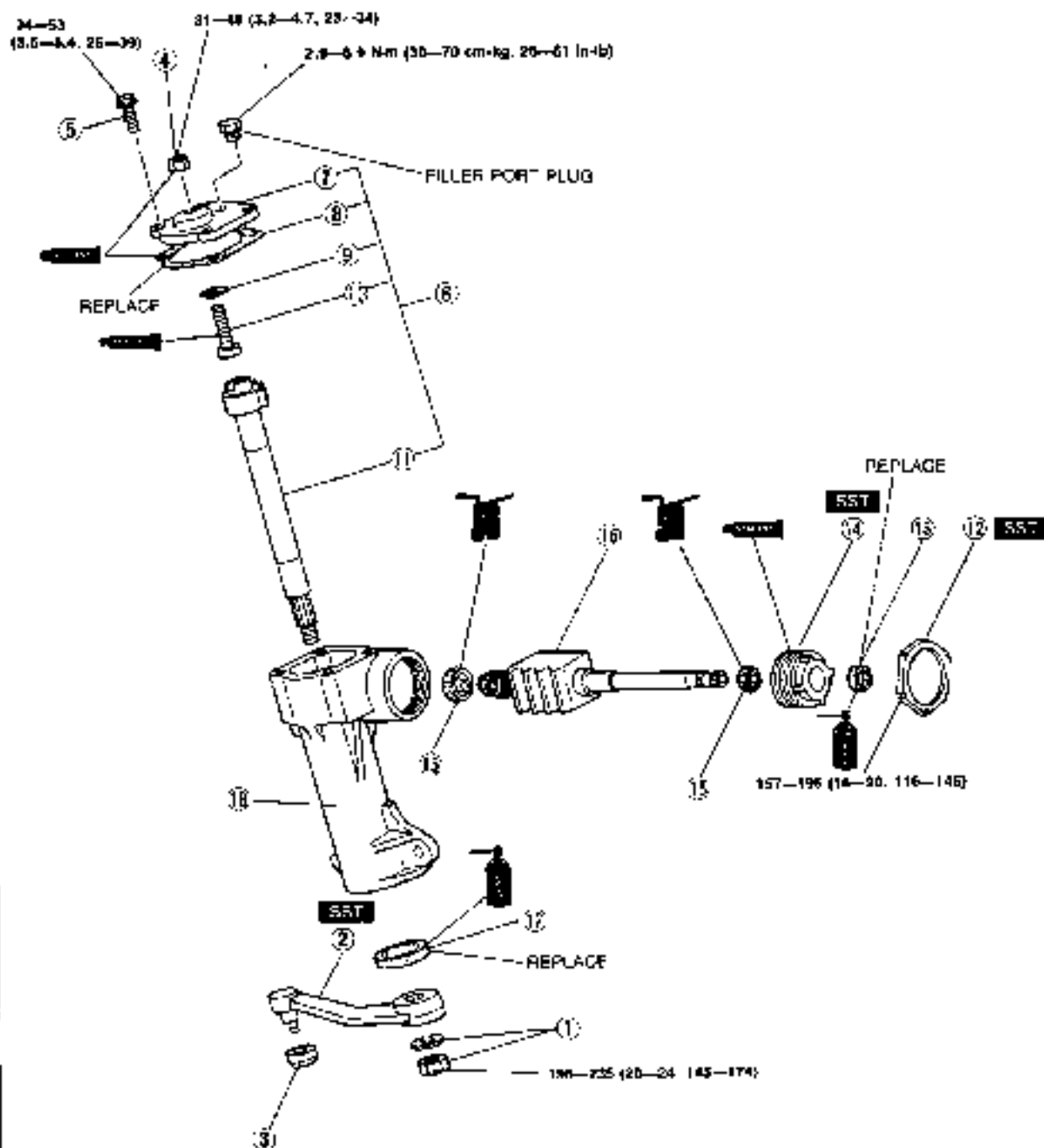
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
3. Inspect all parts and repair or replace as necessary.

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))

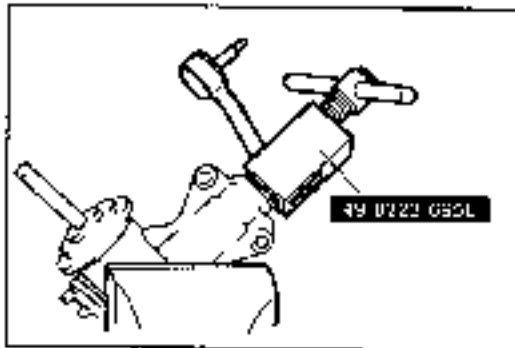


N-14 (m-kg, ft-lb)

CM, ENR/12

1. Nut and washer
2. Pitman arm
Disassembly Note below
Check for damage or cracks
3. Dust boot
Check for wear or damage
4. Locknut
5. Bolts
6. Sector shaft assembly
Disassembly Note below
Assembly Note page N-16
7. Side cover
8. Gasket
9. Adjustment shim
10. Adjusting screw
11. Sector shaft
Check for damage or deformation
12. Locknut
Disassembly Note below
13. Oil seal
14. Adjusting nut
Disassembly Note page N-16
15. Bearing
Check for sticking, abnormal noise, or poor operation
16. Worm ball nut assembly
Check for poor rotation or play in axial direction
17. Oil seal
18. Gear housing
Check for damage or deformation

2EUDAK-312

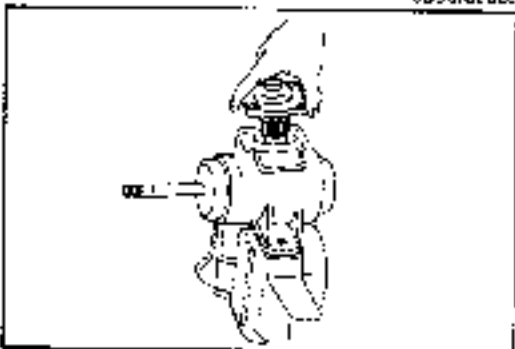


2EUDAK-320

Disassembly note

Pitman arm

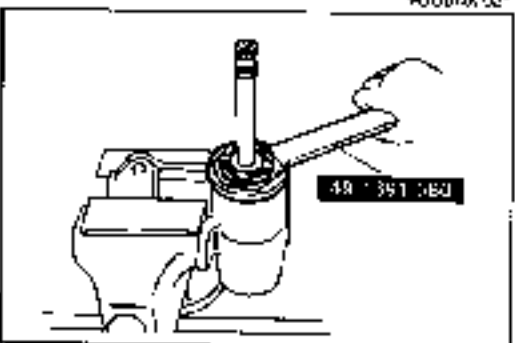
Separate the pitman arm from the gear box with the **SST**.



2EUDAK-321

Sector shaft assembly

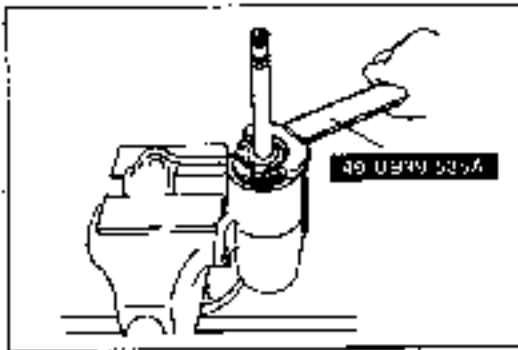
1. Set the sector shaft in the center position.
2. Tap the lower portion of the sector shaft with a plastic hammer to loosen the shaft.
3. Lift the sector shaft assembly out of the gear housing.



2EUDAK-322

Locknut

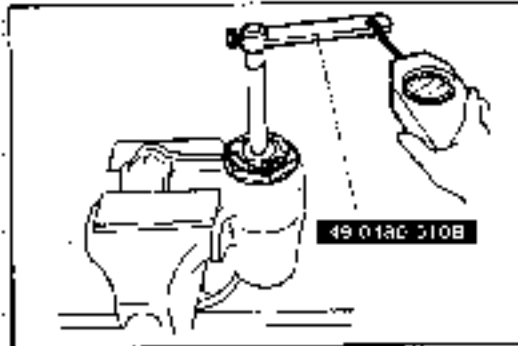
Remove the locknut with the **SST**.



98LJCN4-022

Adjusting nut

Remove the adjusting nut with the **SST**.



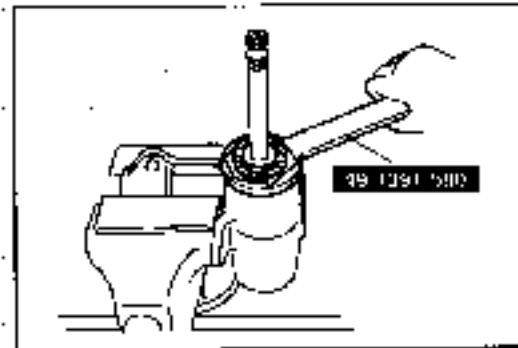
98LJCN4-024

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)

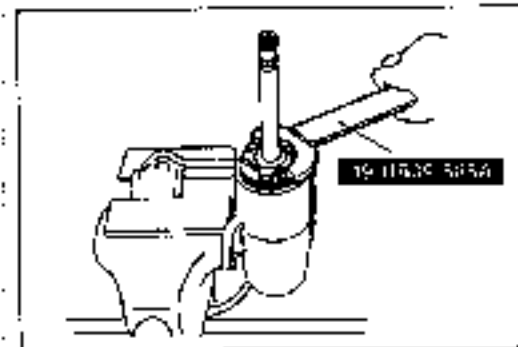
Pull scale reading: 3–6 N (0.3–0.6 kg, 0.7–1.3 lb)



98LJCN4-025

Adjustment

1. Loosen the locknut with the **SST**.



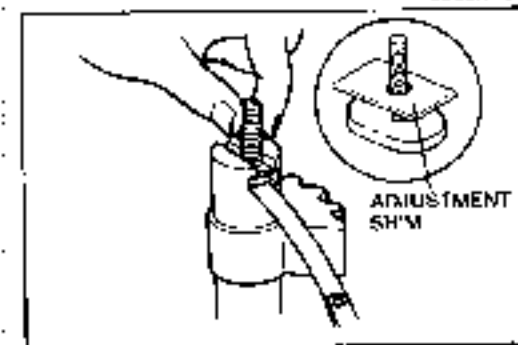
98LJCN4-026

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)



98LJCN4-027

Sector shaft assembly

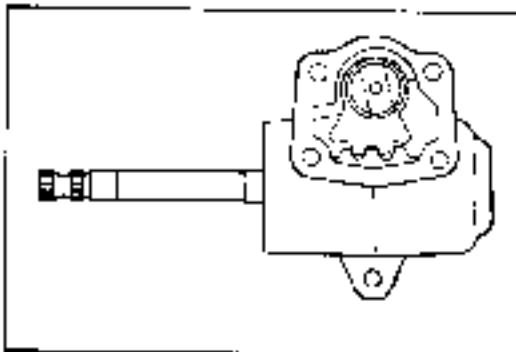
1. Set the adjusting screw and the adjustment shim in the T groove.
2. Measure the clearance in the axial direction.
3. If the clearance exceeds specification, adjust it with available adjustment shims supplied in the adjustment shim kit.

Clearance in axial direction:

0–0.1mm (0–0.004 in)

Available adjustment shims:

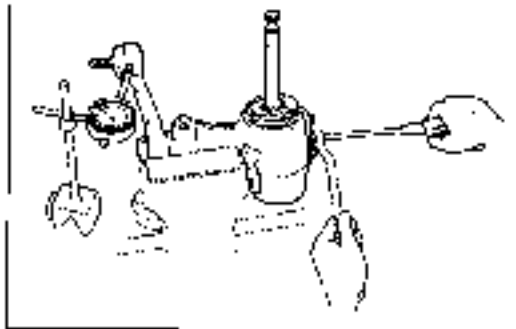
1.97mm (0.077 in), 2.00mm (0.079 in),
2.03mm (0.079 in), 2.06mm (0.081 in),
2.09mm (0.082 in)



93U2NX-028

4. After making the clearance adjustment, install the sector shaft assembly so that the sector shaft and the ball nut are centered.
5. Check the worm shaft preload.

Worm shaft preload (after sector shaft installed)
Pull scale reading: 8—11 N (0.6—1.1 kg, 1.3—2.4 lb)



93U2NX-028

Steering gear backlash

Turn the adjusting screw to adjust the steering gear backlash.

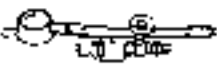
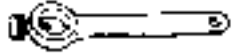
Note

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 H032 671 Adaptor, power steering gauge 	49 B032 302 Adaptor, power steering gauge 	49 018 850C Pulser, ball joint 
49 0223 695E Pulser, pinion arm 	49 0183 610B Attachment steering worm bearing preload measuring 	49 W023 525A Adjust. wrench 

LEJOND-011

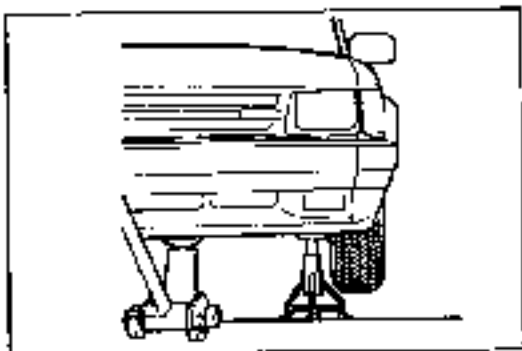
TROUBLESHOOTING GUIDE

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
	Insufficient 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 bolt	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 Irregularly 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 absorbers 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 Irregularly worn tires Malfunctioning shock absorber Loose shock absorber mounting bolts Cracked or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Replace Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten Replace Replace Adjust	N-24 N-24 N-7 Section R — Section Q Section Q Section Q Section R Section R Section R Section R Section M 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/greasy 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

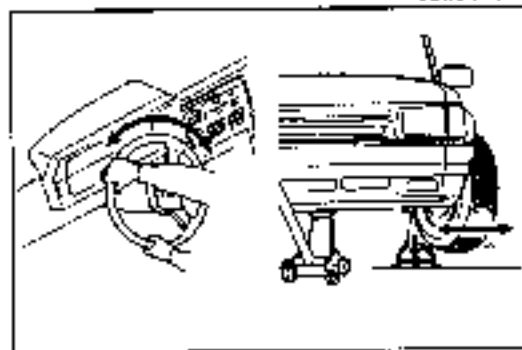
29,00X 314



JBL104X-015

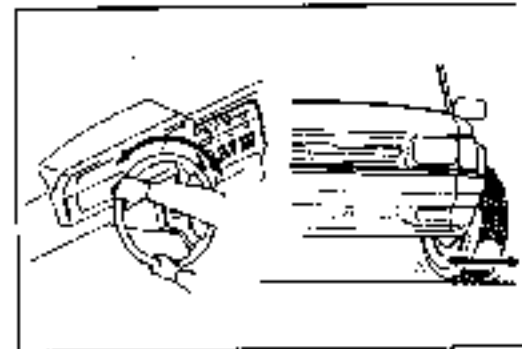
AIR BLEEDING

1. Jack up the front of the vehicle and support it with safety stands.



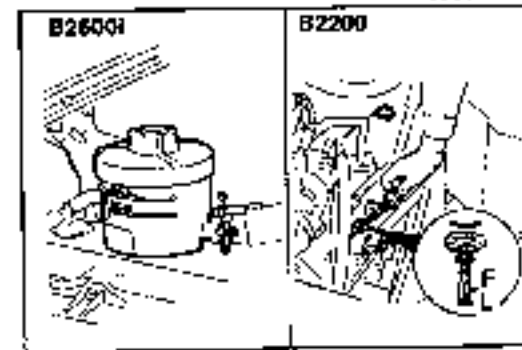
6SL-2X-015

2. Check the fluid and add some if necessary. Turn the steering wheel fully left and right several times.



96U0NX-067

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.



98U0NX-088

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.

B2800I



B2200



2JUDN00-5

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[®] 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.

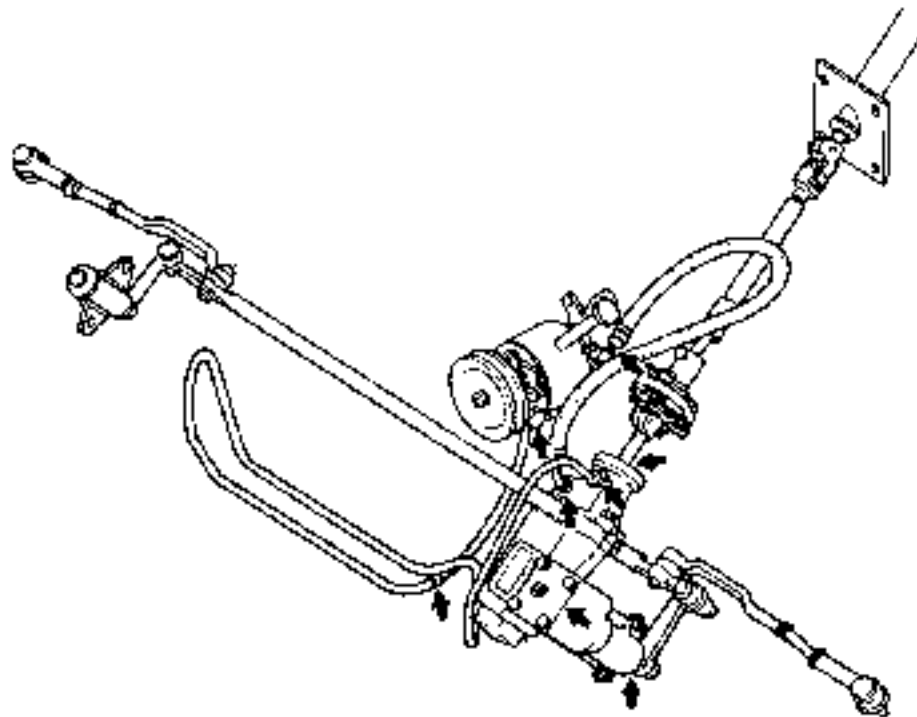
Caution

To prevent damage to the steering system, do not keep the steering wheel in the fully turned position for more than 15 seconds.

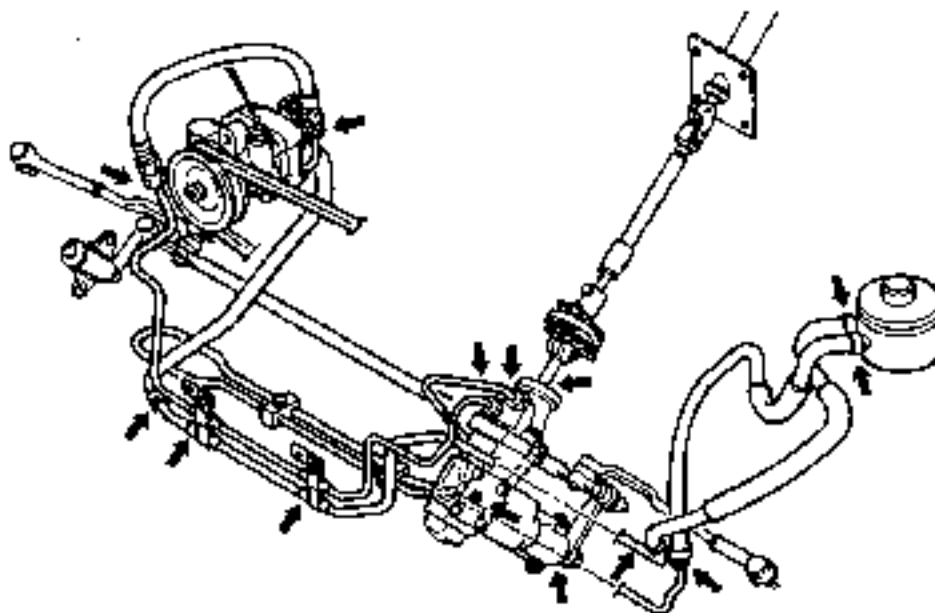
Note

The points where fluid leakage may occur are indicated by arrows in the figure.

B2200



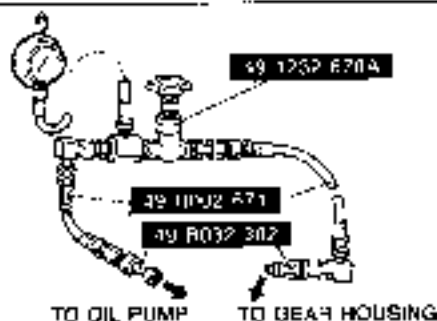
B26001

**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

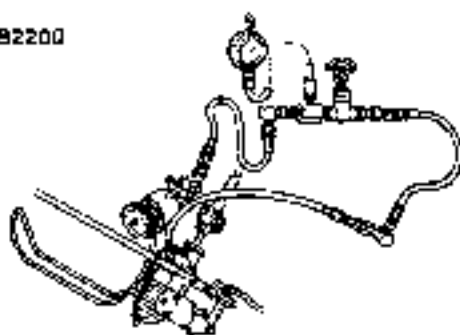
2. Disconnect the high-pressure hose of the oil pump side, and attach the SST.

Note

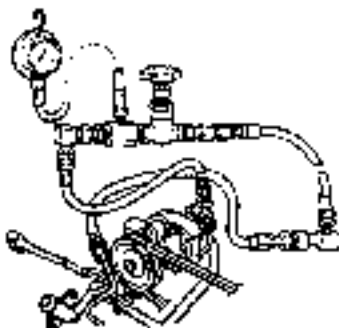
Before disconnecting the hose, mark the connections for proper reinstallation.

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).

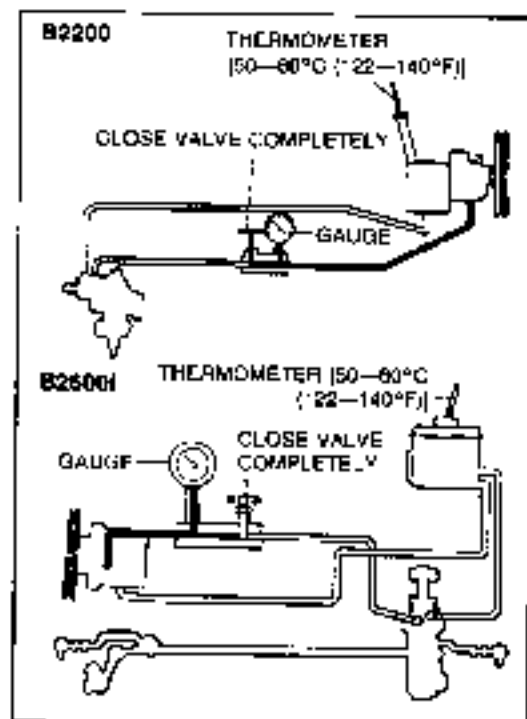
B2200



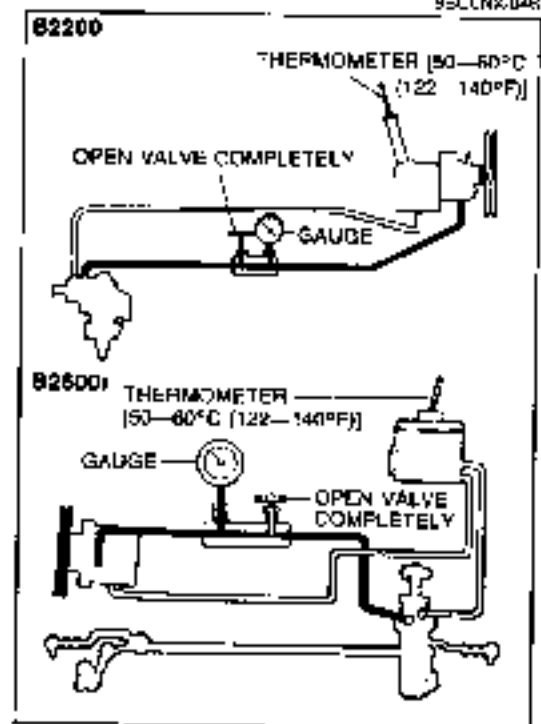
B2600



08U04K-010



9ELCNX.046



9EUDNX.047

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/cm², 1,244—1,351 psi)
(B2600i) 9,320—9,810 kPa
(95—100 kg/cm², 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.

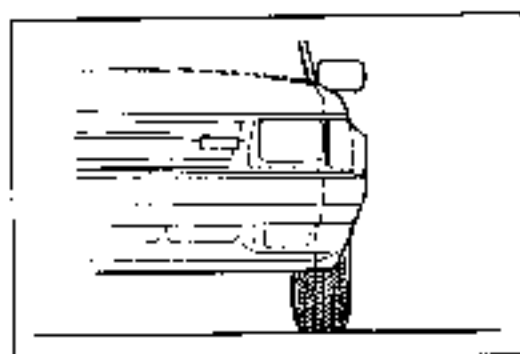
6. Open the gauge valve fully again and increase the engine speed to **1,000—1,500 rpm**.
7. Turn the steering wheel fully to the left and right and measure the fluid pressure generated by the gear housing. If the pressure is below specification, replace the gear housing assembly.

Gear housing fluid pressure:

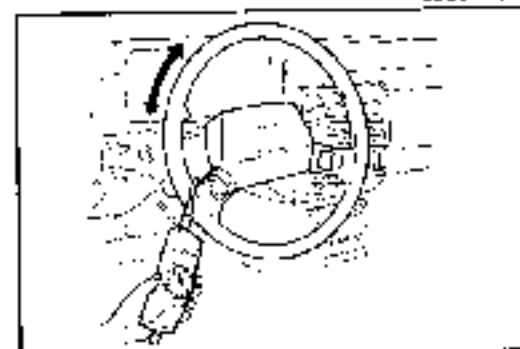
- (B2200) 8,584—9,320 kPa
(87.5—95 kg/cm², 1,244—1,351 psi)
(B2600i) 9,320—9,810 kPa
(95—100 kg/cm², 1,351—1,422 psi)

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.



28JUNX4119



28JUNX4116

STEERING WHEEL AND COLUMN**On-vehicle Inspection****Steering wheel effort**

1. With the vehicle on a hard level surface, move the steering wheel to put the wheels in the straight-ahead position.
2. Start the engine and warm the power steering fluid to 50–60°C (122–140°F).

3. Attach a pull scale to the outer circumference of the steering wheel. Then, starting with the wheels in the straight-ahead position, check the steering effort required to turn the steering wheel to the left and right.

**Steering wheel effort: 40 N (4.1 kg, 9 lb) or less
[during one turn of the steering wheel]**

4. If the measured value exceeds specification, check the following: fluid level, air in system, fluid leakage at hose or connections, function of oil pump and steering gear box, and tire pressures.

STEERING GEAR AND LINKAGE**Removal, Inspection, and Installation**

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal.
6. Install the wheel.

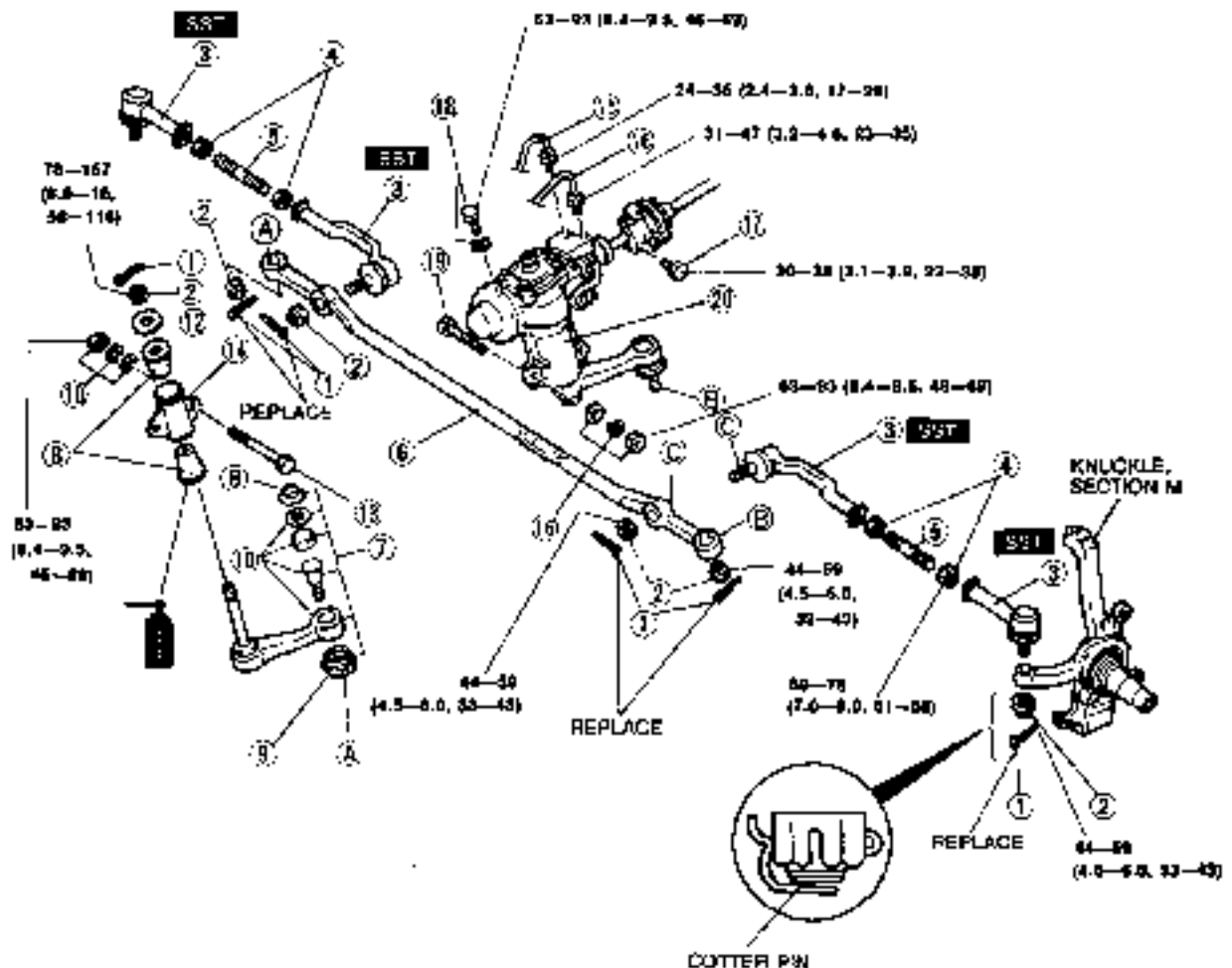
**Tightening torque: Non-styled wheel 88–118 N·m (8–12 m·kg, 65–87 ft·lb)
Styled wheel 118–147 N·m (12–15 m·kg, 87–108 ft·lb)**

7. Inspect all parts and repair or replace as necessary.

Note

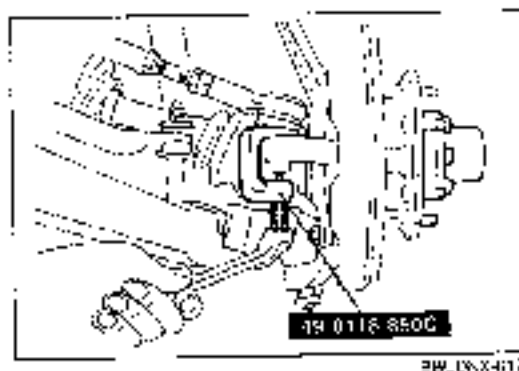
- a) The power steering fluid will leak out when the return pipe and/or the pressure pipe is disconnected. Prepare a suitable container for it to drain into.
- b) After installation: (1) Bleed air from the power steering system. (2) Check the power steering fluid level and add fluid if necessary. (3) Check the system for fluid leakage. (4) Check the turning angle and toe-in and adjust if necessary. (Refer to Section R.)

28JUNX4117



Nm (in-lb)
2200ND OR R

1. Cotter pin	11. Washer
2. Nut	12. Rubber bushing
3. Ball joint	Check for wear or damage
Removal Note page N-26	13. Bolts, nuts, and washers
Check for damage or poor operation	14. Idler arm bracket
4. Locknut	15. Pressure pipe
5. Tie rod	16. Return pipe
6. Center link	17. Bolt
Check for damage or cracks	18. Bolt and washer
7. Idler arm assembly	19. Bolts, washers, and nuts
Check for damage or poor operation	20. Steering gear assembly
8. Idler cap	Disassembly, Inspection, and
9. Ball joint dust seal	Assembly page N-26
10. Idler arm	

**Removal note****Ball joint, pitman arm and idler arm**

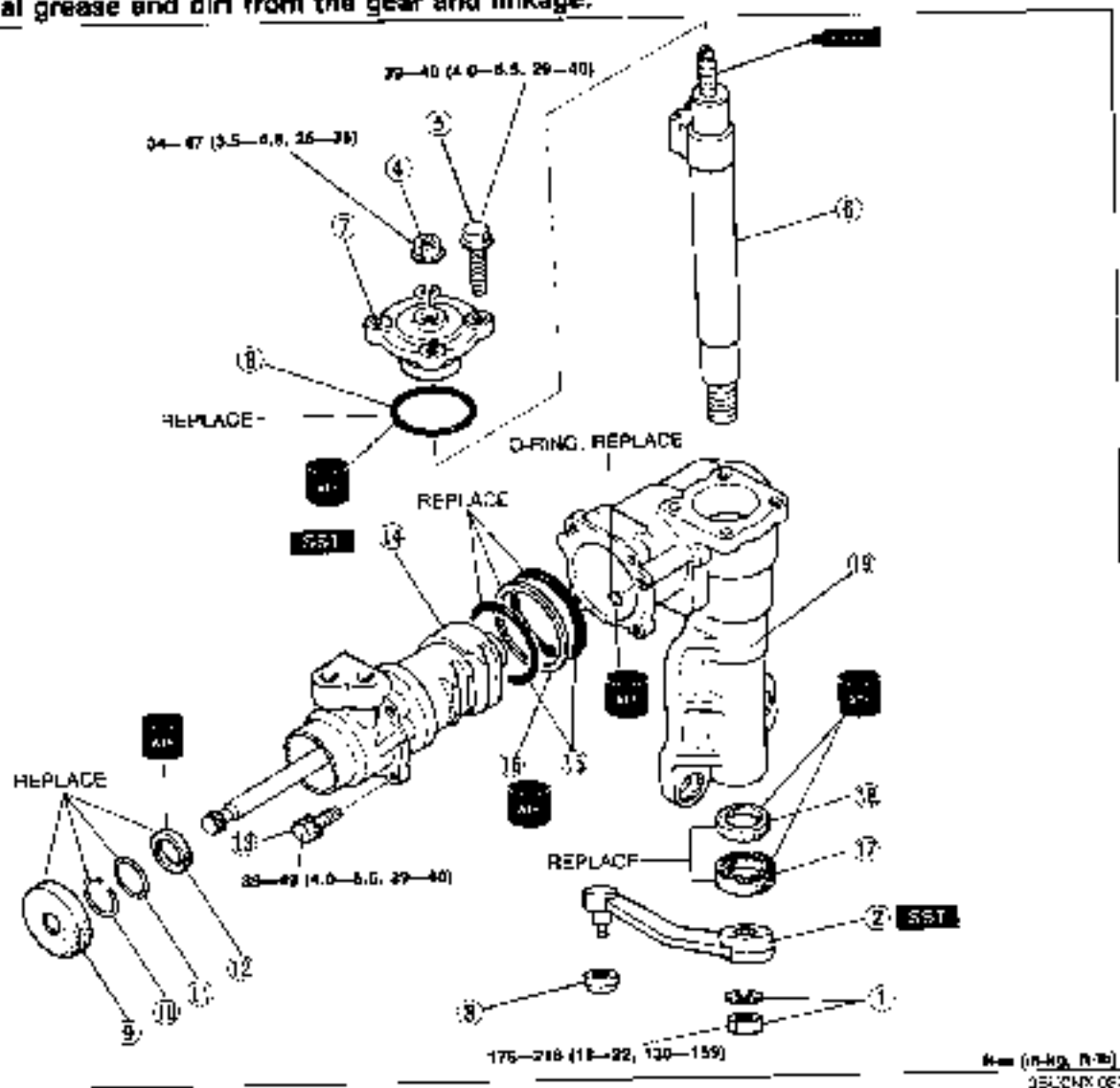
With the **SST**, separate the ball joint from the knuckle and from the center link (C-C), the pitman arm from the center link (B-B), and the idler arm from the center link (A-A).

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.

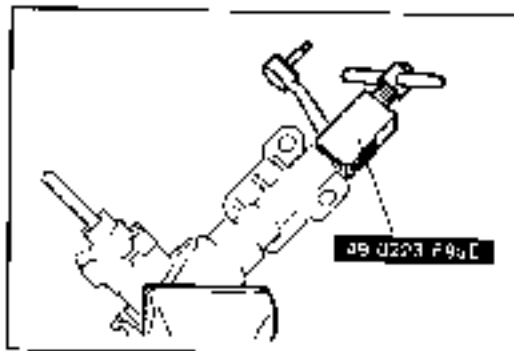
Caution

- 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
2. Pitman arm
Disassembly Note below
Check for damage or cracks
3. Dust boot
Check for wear or damage
4. Locknut
Loosen; remove after removing sector shaft
5. Bolts
6. Sector shaft
Disassembly Note below
Check for damage or deformation
7. Side cover
8. O-ring
9. Dust cover
10. Snap ring
11. Washer
12. O' seal
13. Bolts
14. Valve and piston assembly
Assembly Note below
Check for cracks or deformation
15. O-ring
16. Piston seal ring
17. Dust cover
18. Oil seal
19. Gear housing
Check for cracks or deformation

2400CNX075

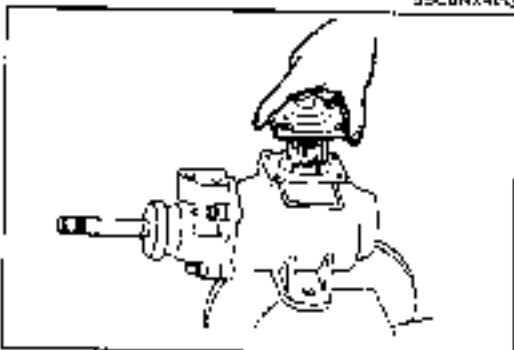


2400CNX-053

Disassembly note

Pitman arm

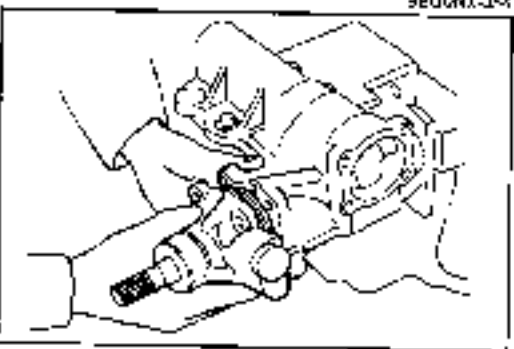
Separate the pitman arm from the gear housing with the **SST**.



2400CNX-054

Sector shaft

1. Loosen the locknut.
2. Remove the side cover attaching bolts.
3. Set the sector shaft in the center position.
4. Tap the lower portion of the sector shaft with a plastic hammer to loosen the shaft.
5. Lift the sector shaft out of the gear housing.



2400CNX-055

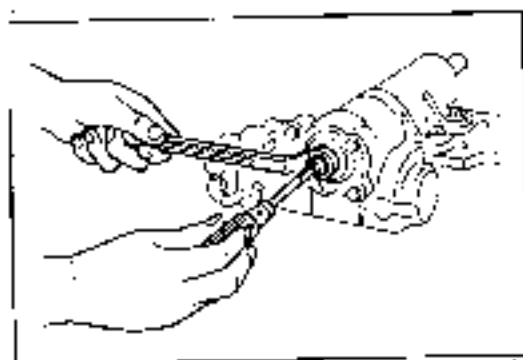
Assembly note

Valve and piston assembly

Insert the valve and piston assembly into the gear housing.

Caution

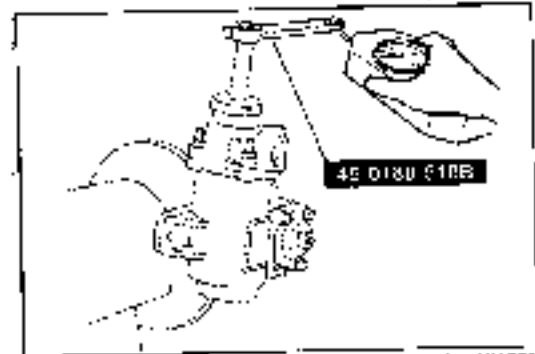
- a) Do not scratch the piston seal ring and new O-ring against the housing.
- b) Insert the piston while slightly turning it to the left and right to prevent damage of the new O-ring and the new seal ring.

**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**

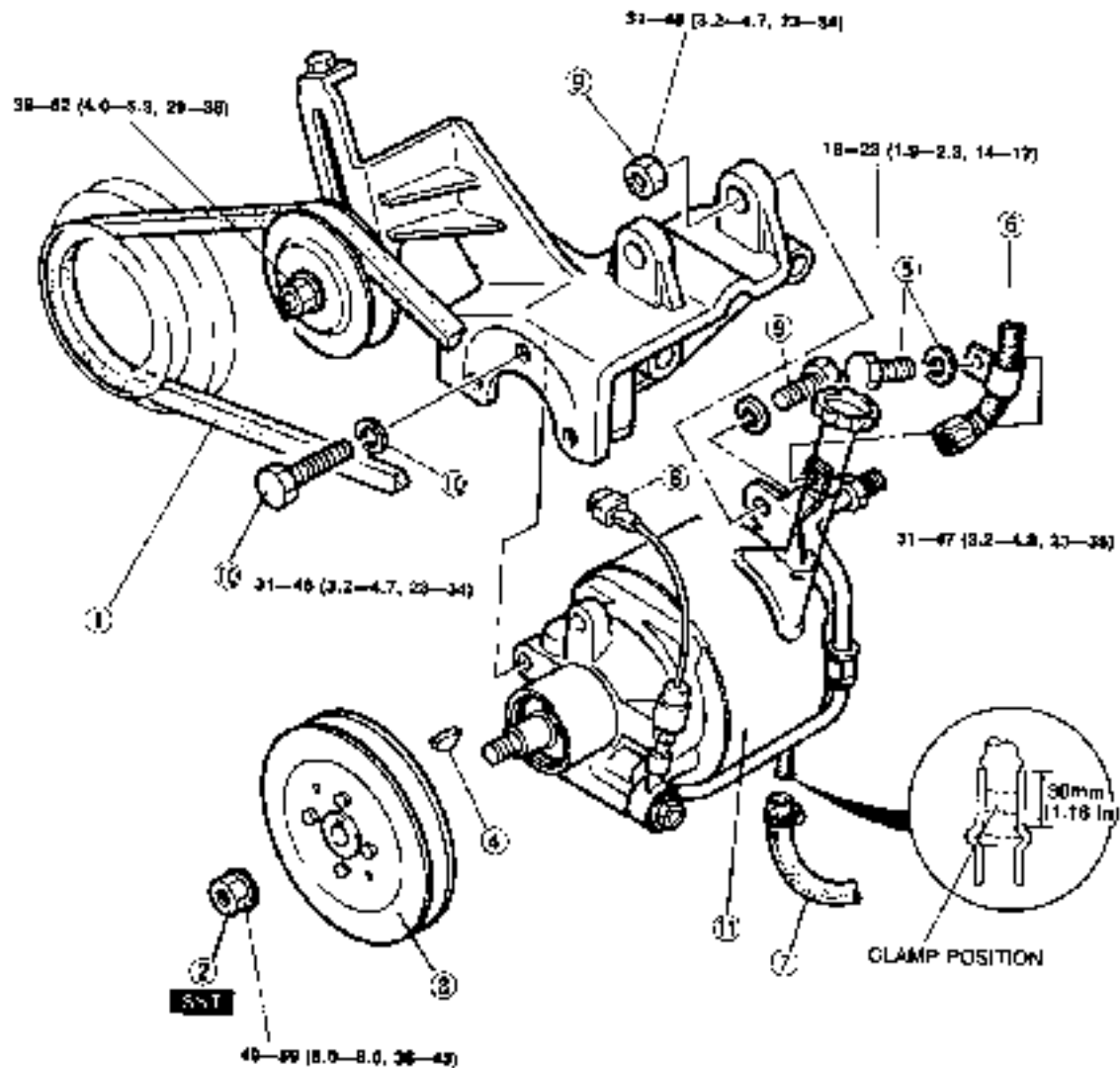
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Inspect all parts and repair or replace as necessary.

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

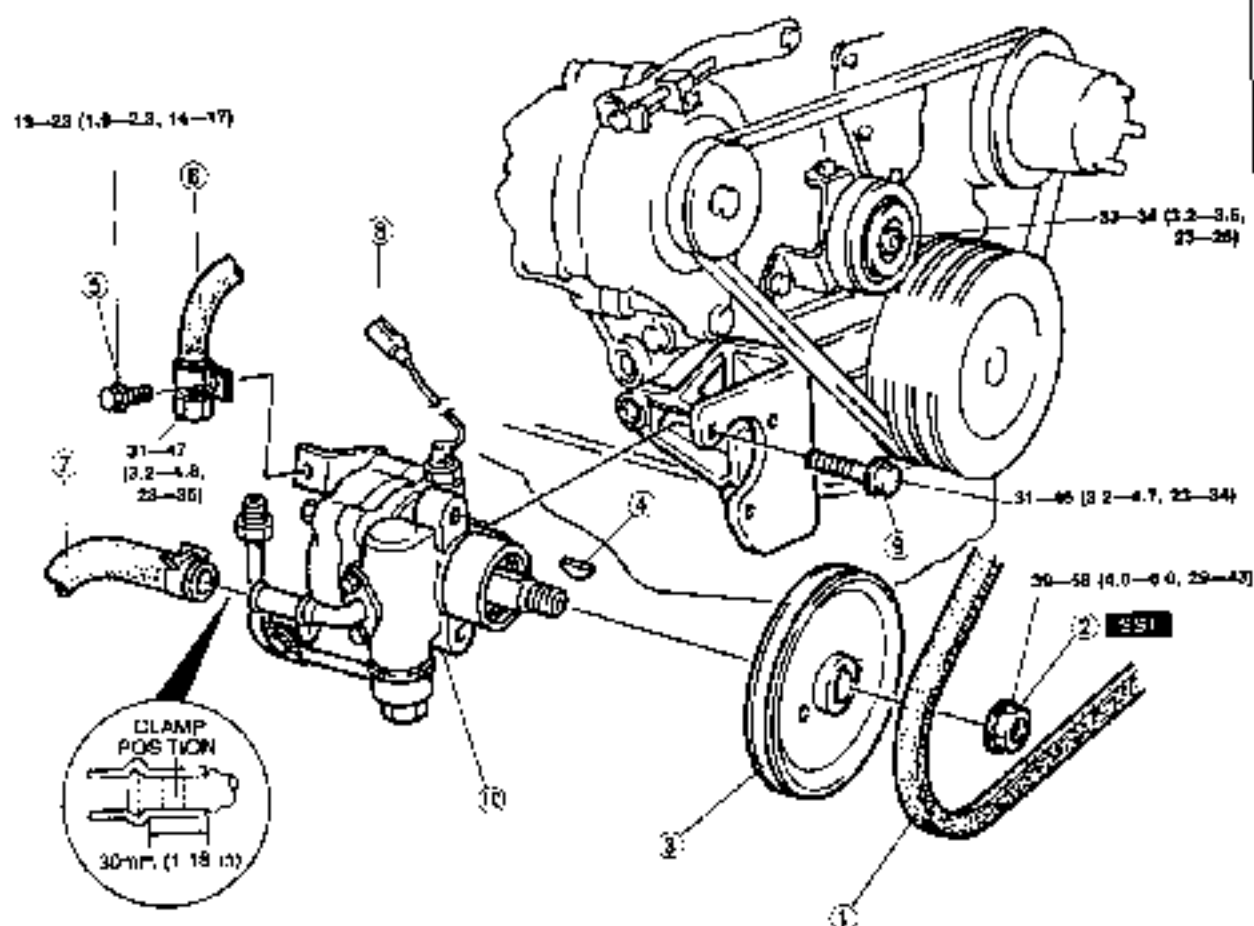
B2200



Rev (m-kg, ft-lb)
28U00X.022

1. Drive belt	6. Pressure hose
Removal Note page N-31	7. Return hose
Inspection and adjustment..... page N-35	8. Fluid pressure switch coupler (EGI model)
Check for damage or wear	9. Bolt, washer, and nut
2. Locknut	10. Bolts and washers
Removal Note page N-31	11. Oil pump assembly
3. Oil pump pulley	Check for damage or deformation
4. Key	Disassembly, Inspection,
5. Bolt and washer	and Assembly page N-32

B2800i

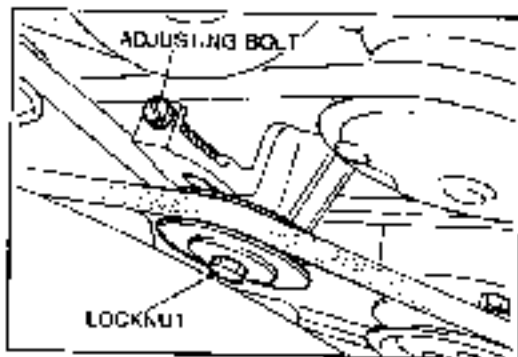


Nets (m-lng, R-46)

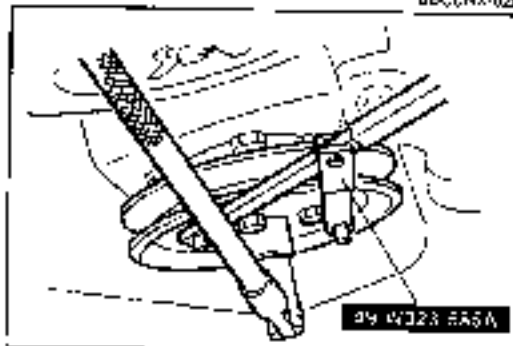
2BUJ0NX-029

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



DEL CHX-026



24-4323 SASSA

CHUJHX-029

Removal note**Drive belt**

Loosen the idler pulley locknut, and turn the adjusting bolt to loosen the oil pump drive belt.

Locknut

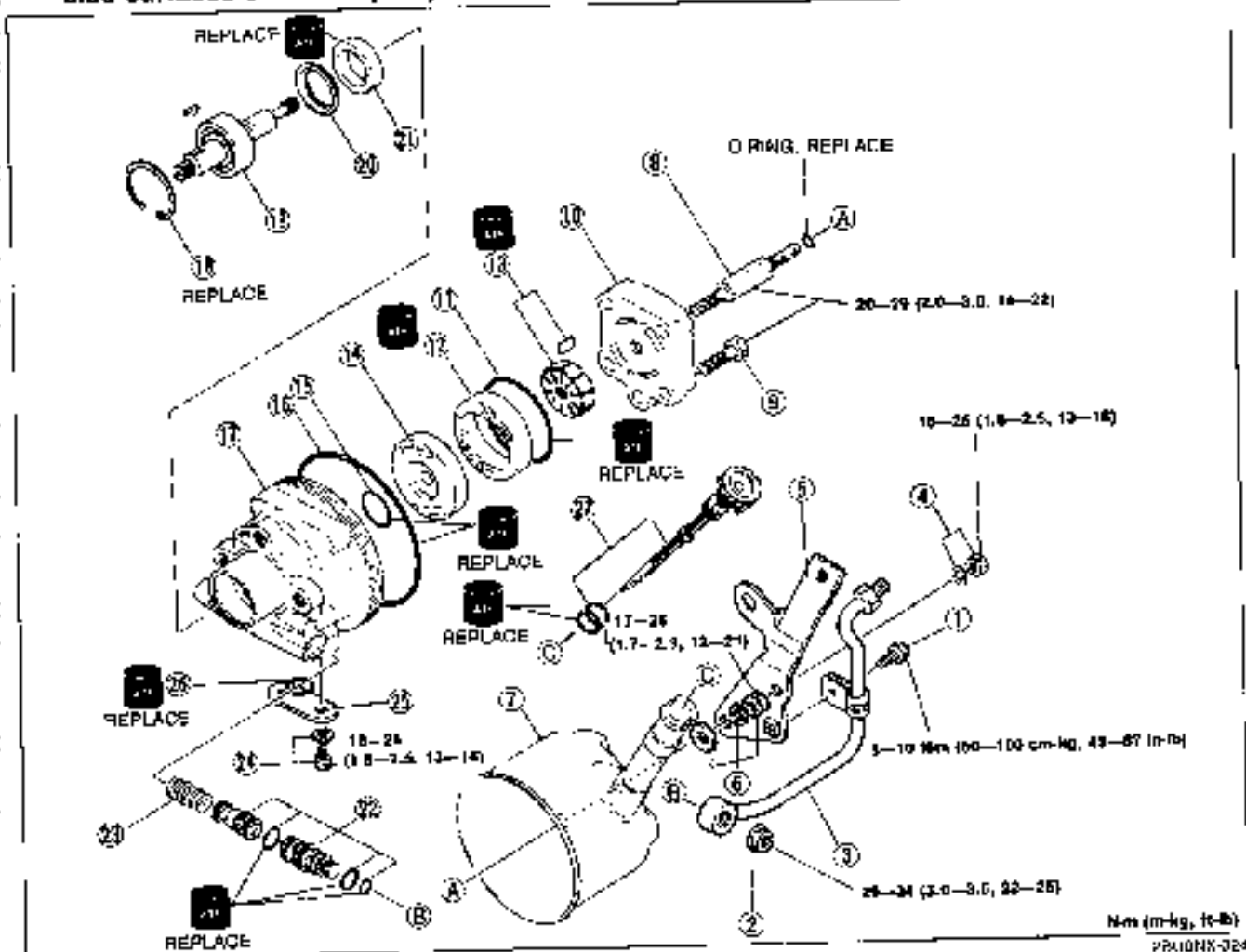
Remove the oil pump pulley locknut while holding the pulley with the SST.

Disassembly, Inspection, and Assembly (B2200)

1. The following procedure is for replacement of O-ring and oil seal and bearing. Replace the pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

Note

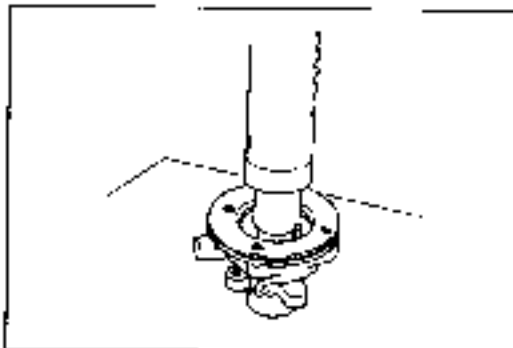
- a) To prevent the entry of dirt, disassemble and assemble in a clean area.
- b) Before disassembly, plug the pipe installation hole; then remove all oil and dirt from the outside surfaces of the oil pump.



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

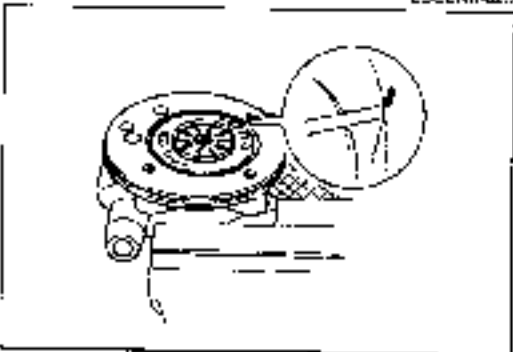
20. Retaining ring
21. Oil seal
Assembly Note
..... page N-33
22. Control valve and O-ring
Inspect for damage
23. Spring
24. Bolts and washers
25. Connector
26. O-ring
27. Level gauge and O-ring



25LECN8-025

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.



25LECN8-026

Vanes

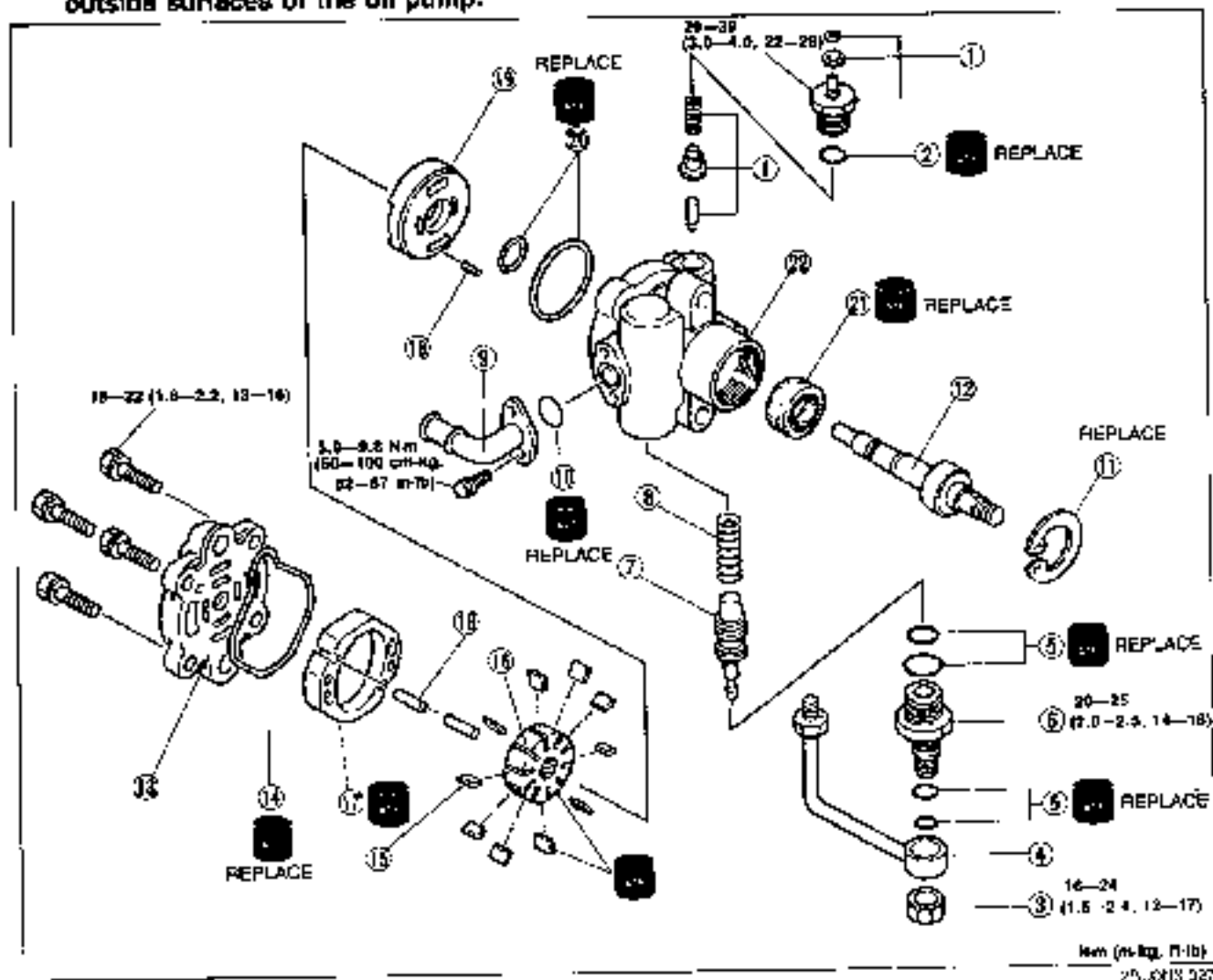
As shown, attach the vanes to the rotor so that the rounded end contacts the cam.

Disassembly, Inspection, and Assembly (B2600i)

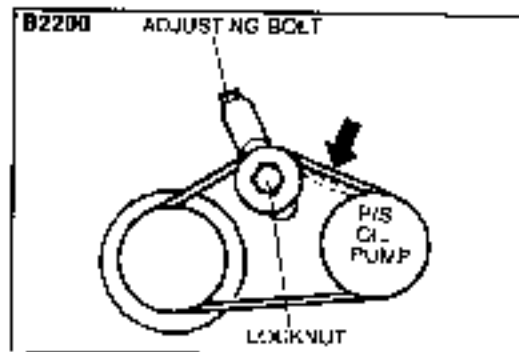
1. The following procedure is for replacement of O-ring and oil seal and bearing. Replace the pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Assemble in the reverse order of disassembly.

Note

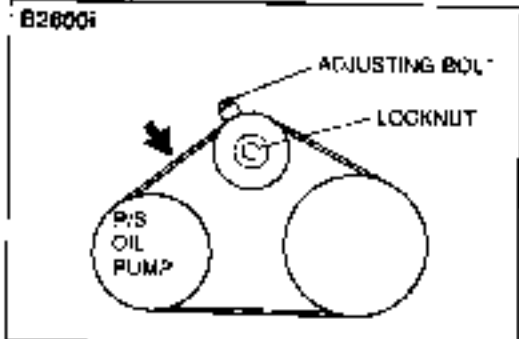
- a) In order to prevent the entry of dirt, disassemble and assemble in a clean area.
- b) Before disassembly, plug the pipe installation hole, and then remove all oil and dirt from the outside surfaces of the oil pump.



1. Pressure switch	12. Bearing and shaft assembly Inspect for wear or damage	17. Cam ring Inspect for wear or damage
2. O-ring	13. Rear body Inspect for damage	18. Pin
3. Nut	14. Oil seal	19. Front side plate
4. Connector	15. Vanes Inspect for wear or damage	20. O-ring
5. O-ring	16. Rotor Inspect for wear or damage	21. Oil seal
6. Connector bolt		22. Front body Inspect for damage
7. Control valve assembly Inspect for damage		
8. Spring Inspect for deterioration		
9. Suction pipe		
10. O-ring		
11. Snap ring		



3BUDNKA32



3BUDNKA32E

DRIVE BELT**Inspection and Adjustment****Inspection**

Check that the drive belt deflection (tension) is within specification.

Deflection

(Depressed with 98N [10 kg, 22 lb] force)

mm (in)

	New	Used
B2200	7.0–8.0 (0.28–0.31)	8.0–9.0 (0.31–0.35)
B2600i	6.6–7.2 (0.26–0.28)	7.2–8.0 (0.28–0.31)

Tension

N (kg, lb)

	New	Used
B2200	245–294 (25–30, 55–68)	198–245 (20–25, 44–55)
B2600i	412–471 (42–48, 92.4–105.6)	353–402 (36–41, 79.2–90.2)

Note

Belt tension can be measured among any pulleys.

Adjustment

1. Loosen the lower pulley locknut.
2. Adjust the deflection (tension) by turning the adjusting bolt.
3. Tighten the locknut to the specified torque.

Tightening torque

B2200 : 39–52 N·m (4.0–5.3 m·kg, 29–38 ft·lb)

B2600i : 33–34 N·m (3.2–3.5 m·kg, 23–25 ft·lb)

3BUDNKA32E

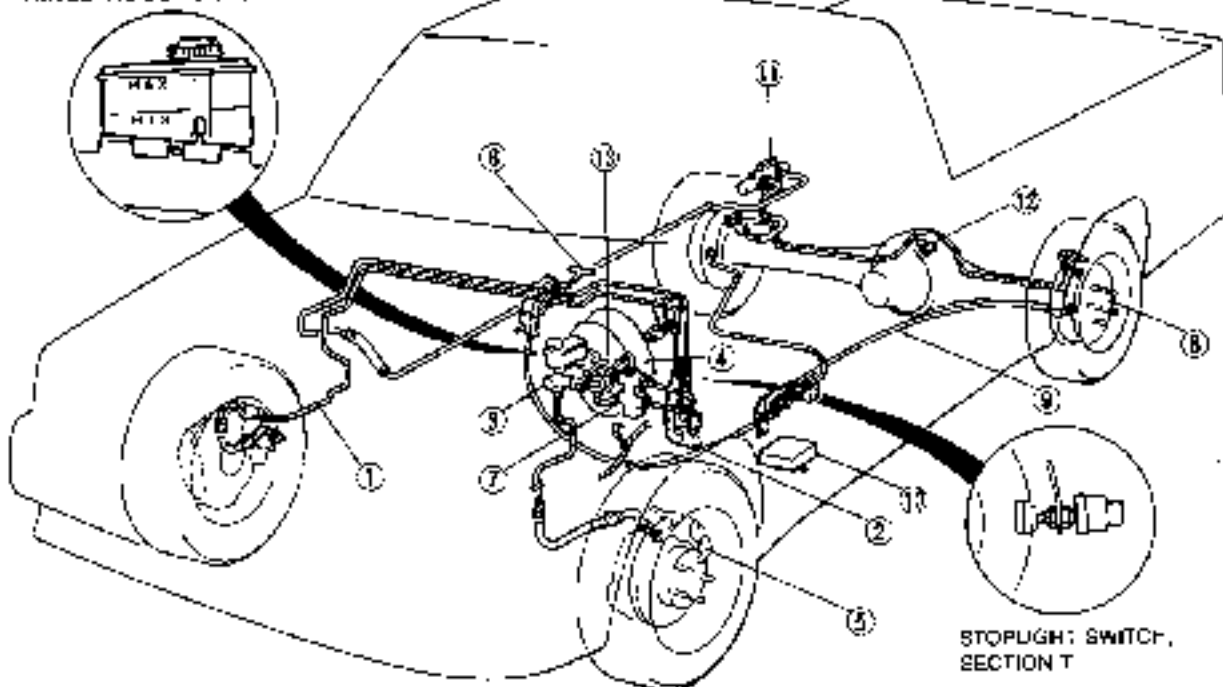
BRAKING SYSTEM

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FLUID SPECIFICATION
FMVSS 118 DOT-3 or SAE J1703



3ELCPX-022

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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	
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Inspection (caliper)	page P-22	
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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 × 4		4 × 2	
		Suspended		Suspended	
Brake pedal	Type				
	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)	53.34 (2.125)			
	Pad dimensions (area x thickness) mm ² (cm ² x in)	4,800 × 10.0 (7.44 × 0.39)			
	Disc plate dimensions mm (in) (outer diameter x thickness)	272 × 22 (10.7 × 0.87)		256 × 20 (10.1 × 0.79)	
Rear drum brake	Type	Curved		Leading trailing	
	Wheel cylinder inner diameter mm (in)	17.46 (0.688)		13.05 (0.516)	
	Lining dimensions mm (in) (width x length x thickness)	② 53 × 243 × 5 (2.1 × 9.6 × 0.20) ③ 56 × 250 × 5 (2.2 × 9.8 × 0.20)		45 × 251 × 6.3 (1.77 × 10.0 × 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)	127 + 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			
	Operation system	Stick type			

② ③ ④

② Primary

③ Secondary

P

CONVENTIONAL BRAKE SYSTEM

PREPARATION

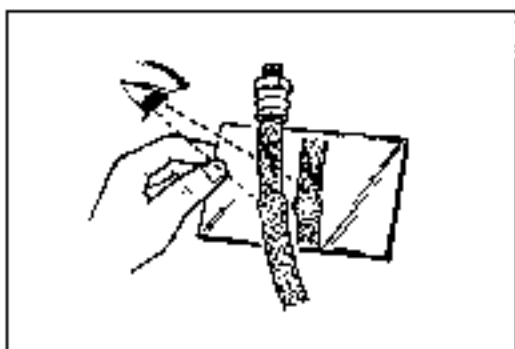
49 0256 770B Wrench, flare nut		49 0043 001 Adjust gauge		49 0221 000C Expand tool, disc brake	

25X,CPX,002

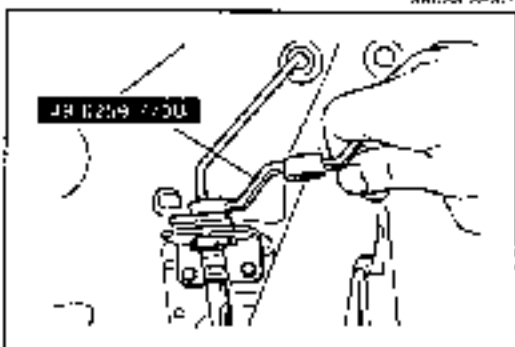
TROUBLESHOOTING GUIDE

Problem	Possible cause	Remedy	Page
Poor braking	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 Replace	P-5 P-19,23,27 P-19,23,27 P-19,23,27 P-21 P-9 P-15 P-15 P-15 P-30
Brakes pull to one side	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
Brakes do not release	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
Pedal goes too far (too much pedal stroke)	Air in system Improperly adjusted pedal play Worn pad or lining	Bleed air Adjust Replace	P-6 P-7 P-19,23,27
Abnormal noise or vibration during braking	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 Insufficient 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 —

R,JPX,004



SMJGPX-007



SMJ10FX-006

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

Removal and Installation

1. Loosen or tighten the flare nut with the SST.

Flare nut tightening torque:

13—22 N·m (1.3—2.2 m·kg, 9.4—16 ft·lb)

2. When connecting the flexible hose, do not overtighten or twist it.
3. After installation:
 - (1) Check that the hose does not contact other parts when the vehicle bounces or when the steering wheel is turned fully right or left.
 - (2) Bleed the air from the brake system.

Air-Bleeding

Air-bleeding locations are as follows:

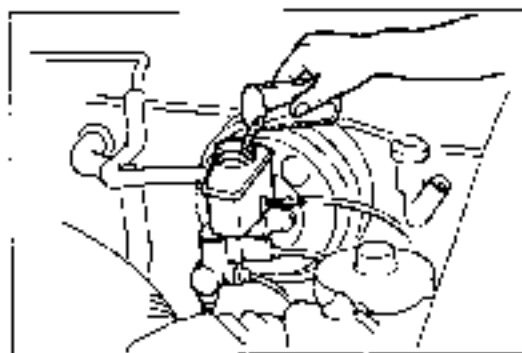
Removed part			Air-bleeding locations		
			Front		Rear
			Right	Left	Left
Master cylinder			*	*	*
Wheel cylinder or caliper	Front	Right	*	*	
		Left	*	*	
	Rear	Right			*
		Left			*
Hydraulic unit					*
Proportioning bypass valve (PBV)			*	*	*

* : Indicates locations where air bleeding is necessary

SMJGPX-076

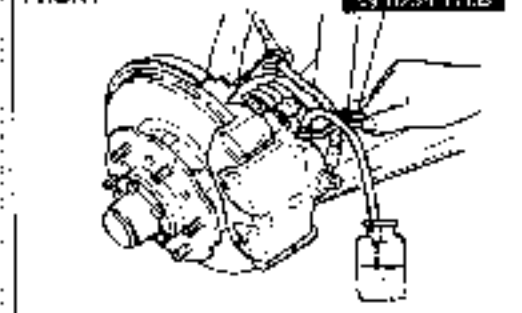
Note

- 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.



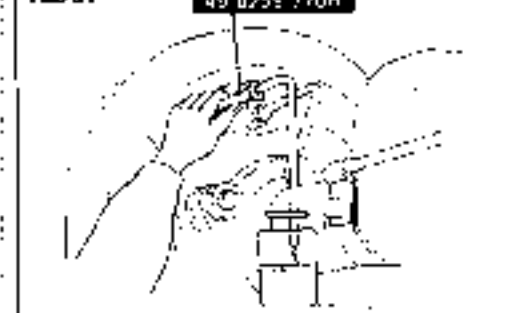
9VLEP6C13

FRONT

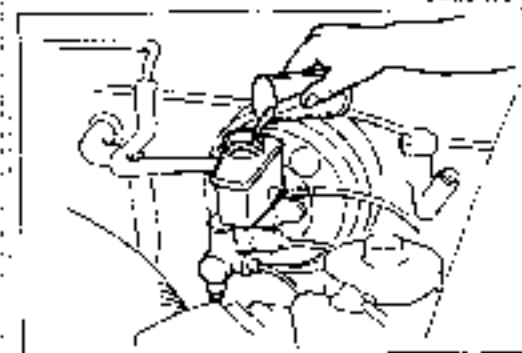


2E4,0196C01

REAR



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.

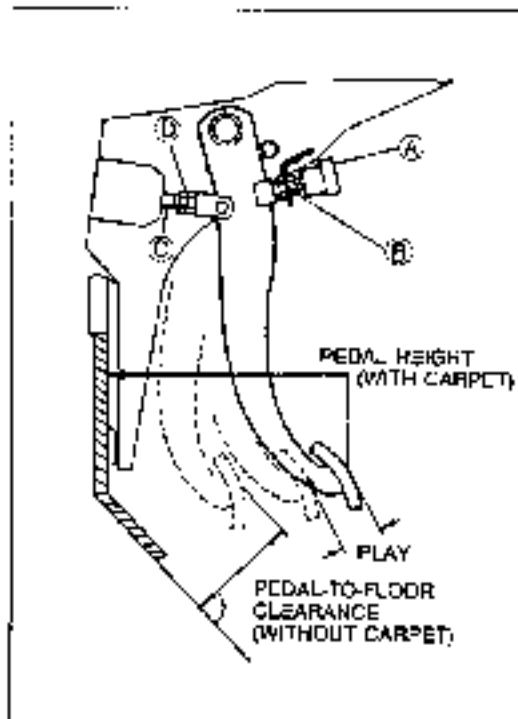
Caution

- 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.

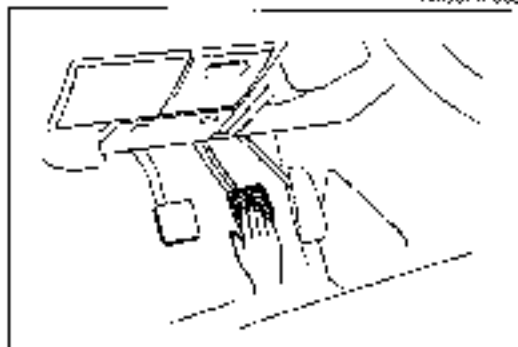
7. After bleeding the air, add brake fluid to the reserve tank up to the specified level.

Bleeder screw tightening torque

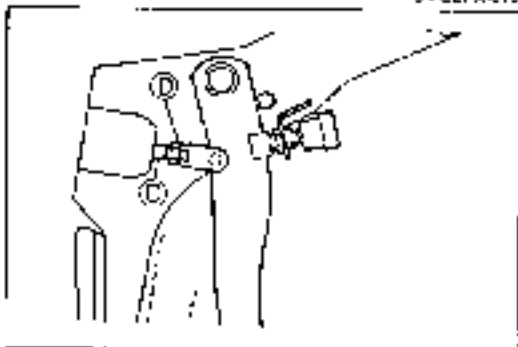
Front: 6—9 N·m (60—90 cm·kg, 52—78 in·lb)
 Rear : 6—7 N·m (60—70 cm·kg, 52—61 in·lb)



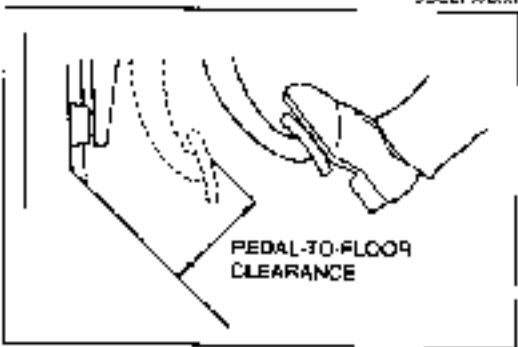
201J0FX-003



90LCPX-015



90LCPX-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 (E).
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

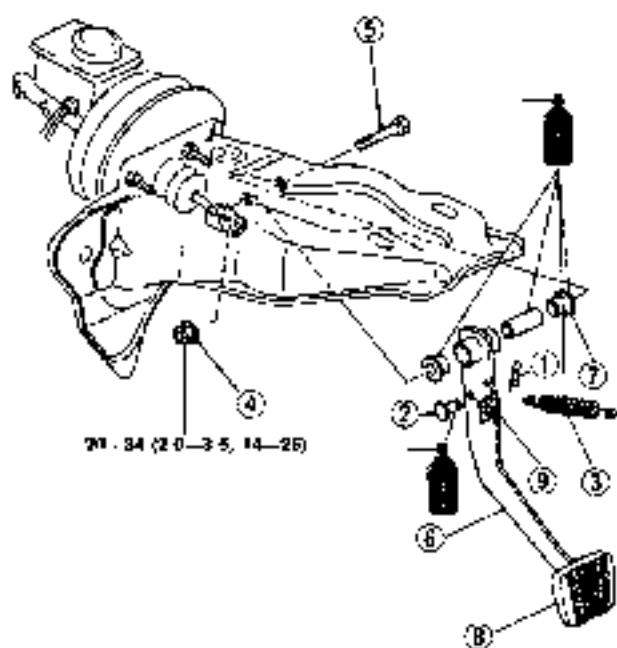
Removal, Installation, and Inspection

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.

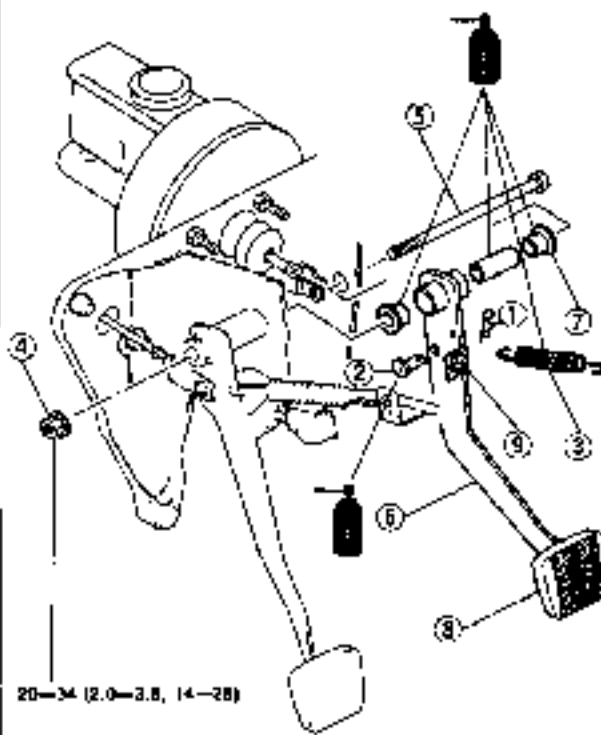
Caution

Apply grease to the inner surface of the bushing and to the contact surfaces of the clevis pin and spring.

4x4



4x2



Nm (m·kg, ft·lb)

23072X-134

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

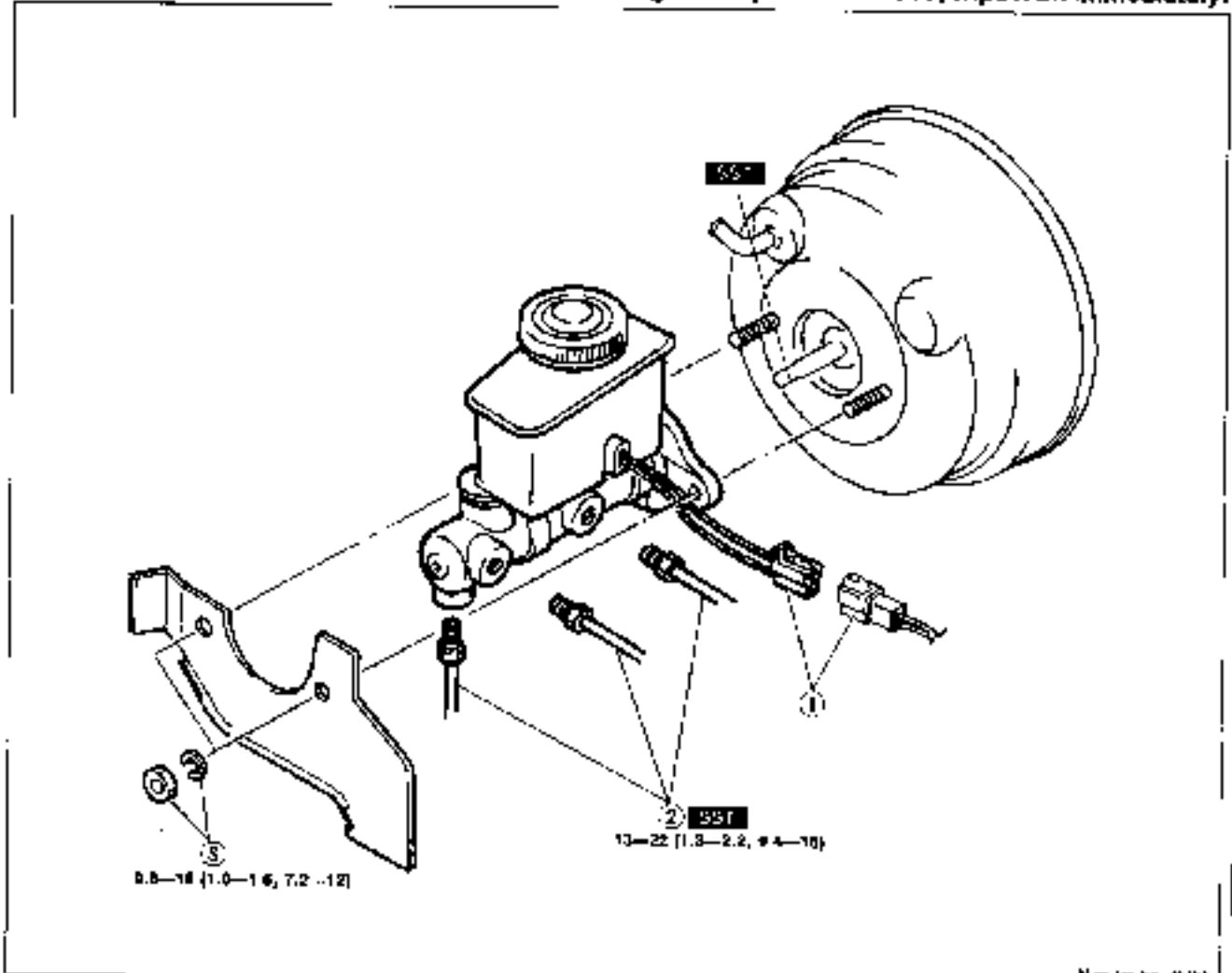
MASTER CYLINDER

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.

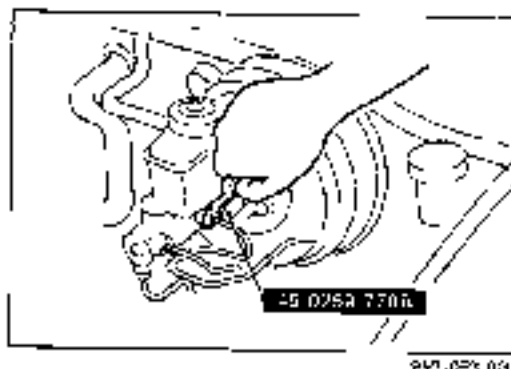
Caution

Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.



N·m (m·kg, ft·lb)
2B, CPX 004

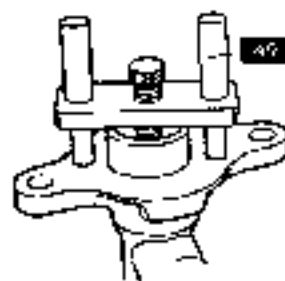
1. Fluid level sensor coupler
2. Brake pipe
Removal Note ... below
3. Nuts and washers
4. Reserve tank and master cylinder
Installation Note ... page P-10
5. Proportioning bypass valve bracket



Removal note

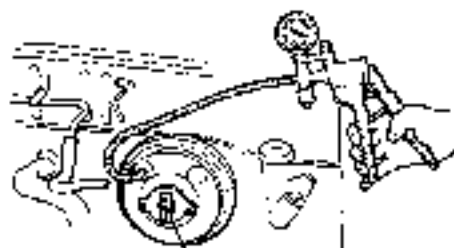
Brake pipe

Disconnect the brake pipe from/to the master cylinder with the SST.



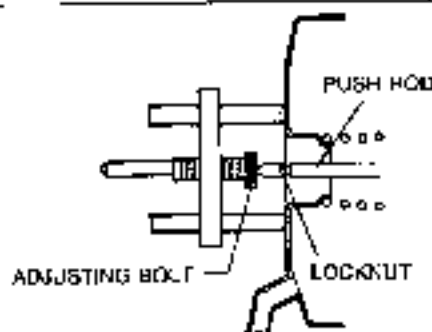
49 F043 001

20U3PX 005

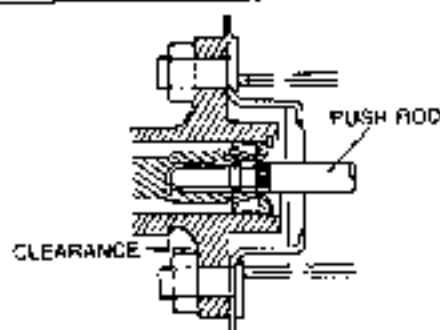


49 F043 001

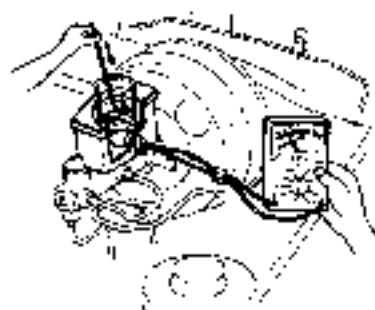
8MJ0PK 022



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18U7PX 007



29U0PX 007

Installation note**Reserve tank and master cylinder****Push rod clearance**

Check the clearance between the push rod of the power brake unit and the piston of the master cylinder.

1. Place the **SST** 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

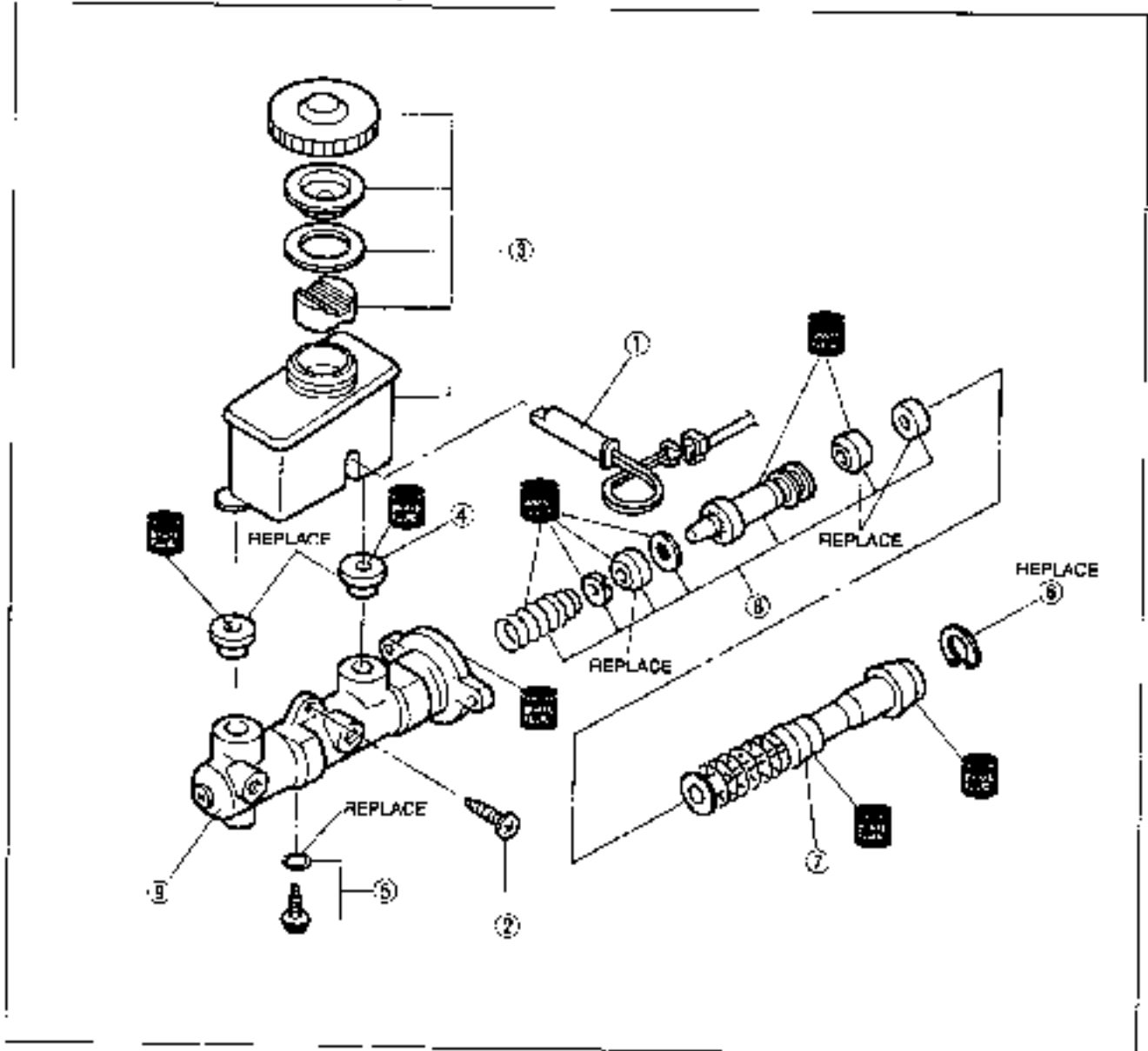
1. Disconnect the fluid level sensor connector.
2. Fill the reservoir with brake fluid up to the specified level.
3. Connect a circuit tester to the connector.
4. Check for continuity when the float is moved up and down.
5. The sensor is good if there is continuity when the float is below the "MIN" mark, 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**.

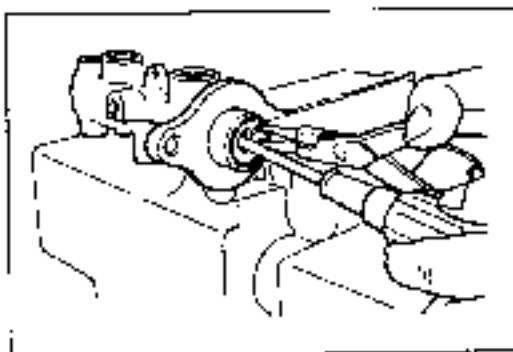
Caution

- 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.



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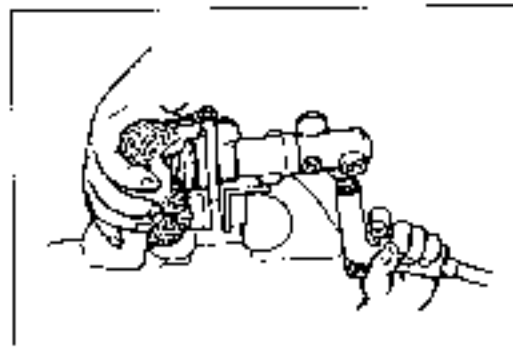
1. Fluid level sensor	7. Primary piston assembly
2. Screw	Inspect for abnormal wear, rust, or damage
3. Reserve tank assembly	8. Secondary piston assembly
Inspect for damage or deformation	Disassembly Note..... page P-12
4. Bushings	Inspect for abnormal wear, rust, or damage
5. Stopper screw and O-ring	9. Cylinder
Assembly Note..... page P-12	Inspect for abnormal wear, rust, or damage
6. Snap ring	
Disassembly Note..... page P-12	



UMT-1179-007

Disassembly note**Snap ring**

Push the piston in to remove or install the snap ring with snap ring pliers.



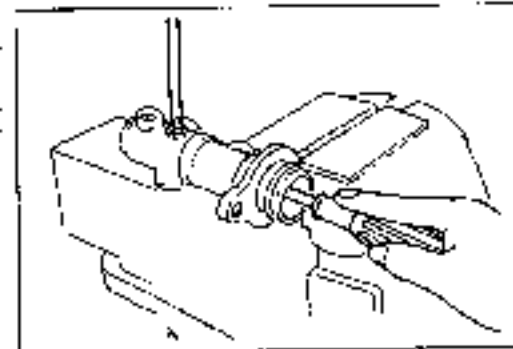
BVLCPX-028

Secondary piston assembly

Remove the secondary piston assembly by gradually blowing compressed air into the cylinder.

Caution

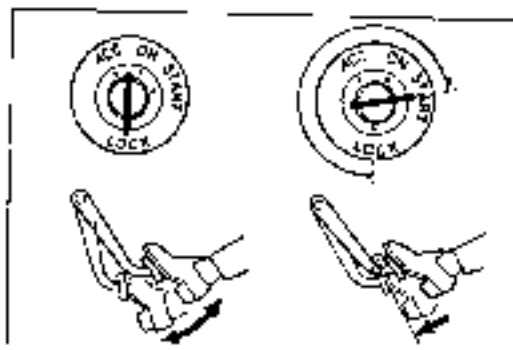
Use a rag to catch the secondary piston assembly.



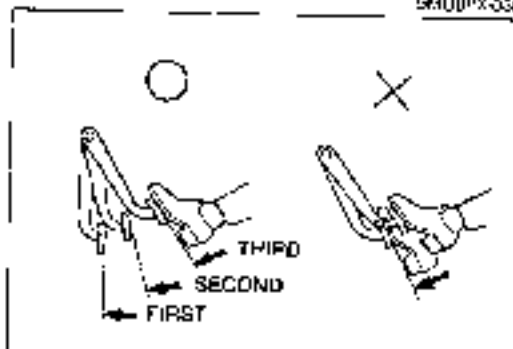
26UCFX-009

Assembly note**Stopper screw and O-ring**

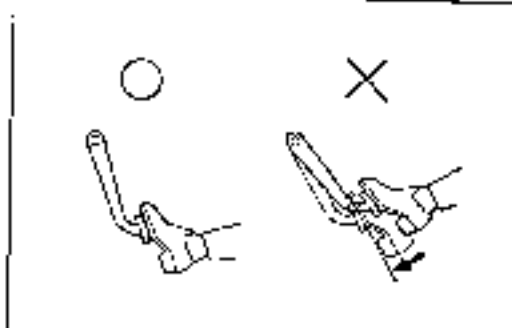
1. Push the primary piston assembly in fully.
2. Install and tighten the stopper screw and new O-ring.
3. Push and release the piston to verify that it is held by the stopper screw.



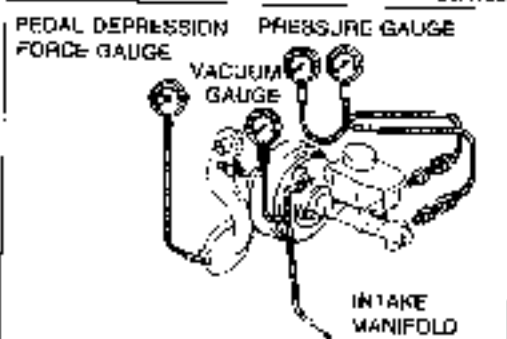
SHUOPX-030



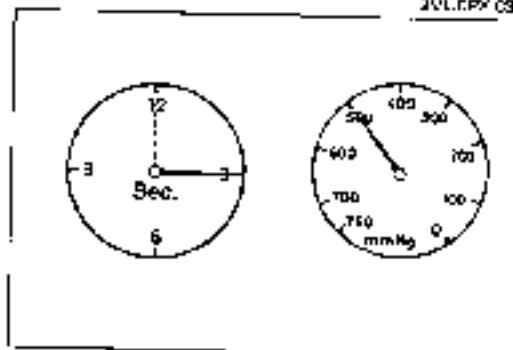
WMUGFX-031



RMUGFX-032



2VLDPX-033



SHUOPX-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.

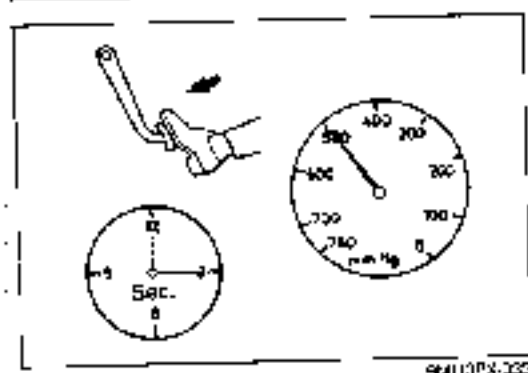
Note

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.

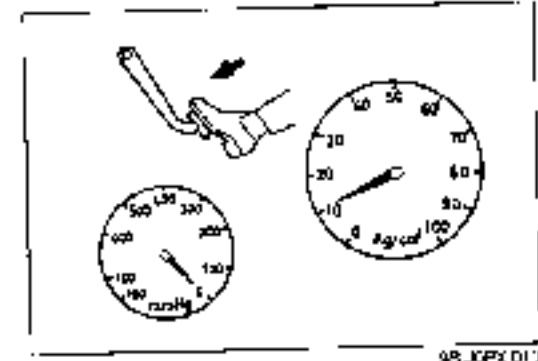
**Loaded condition**

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

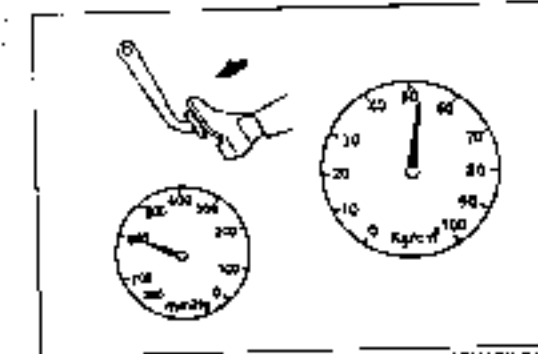
1. If with the engine stopped (vacuum **0 mmHg**) the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	1,952 kPa (20.0 kg/cm ² , 284 psi) min...Tandem 1,070 kPa (11.0 kg/cm ² , 156 psi) min...Single



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.

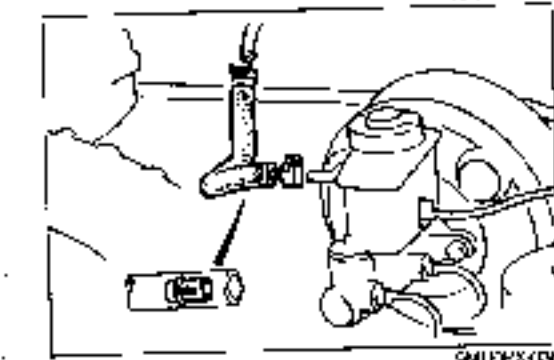
Pedal force	Fluid pressure
147 N (15 kg, 33 lb)	5,890 kPa (60.0 kg/cm ² , 853 psi) min...Tandem 5,390 kPa (55.0 kg/cm ² , 782 psi) min...Single

**Inspection of check valve****Note**

The check valve is pressed into the vacuum hose. There is an arrow on the hose to indicate direction of hose installation.

Inspection

1. Disconnect the vacuum hose from the engine.
2. Apply suction and pressure to the hose from the engine side. Check that air flows only toward the engine. If the air passes in both directions or not at all, replace the check valve (along with the hose).

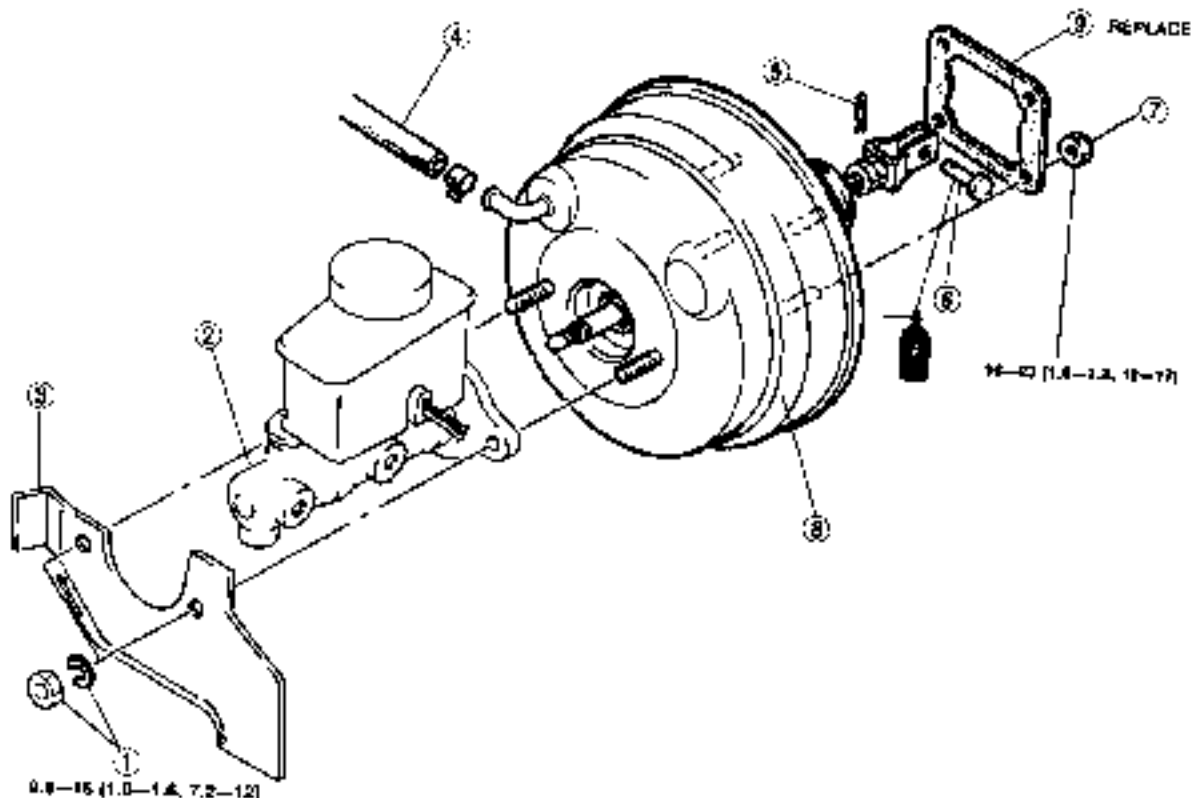


Removal and Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.
3. Take the following steps after installation.
 - (1) Check and adjust the push rod and piston clearance. (Refer to page P-10.)
 - (2) Add fluid and bleed the air. (Refer to page P-5.)
 - (3) Check all parts for fluid leakage.
 - (4) Make an on-vehicle check of the unit. (Refer to page P-13.)
 - (5) Check that the vacuum hose does not contact other parts.

Caution

Apply sealant to the gasket contact surface.



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 (m·kg, ft·lb)
2FAJCPX-01C

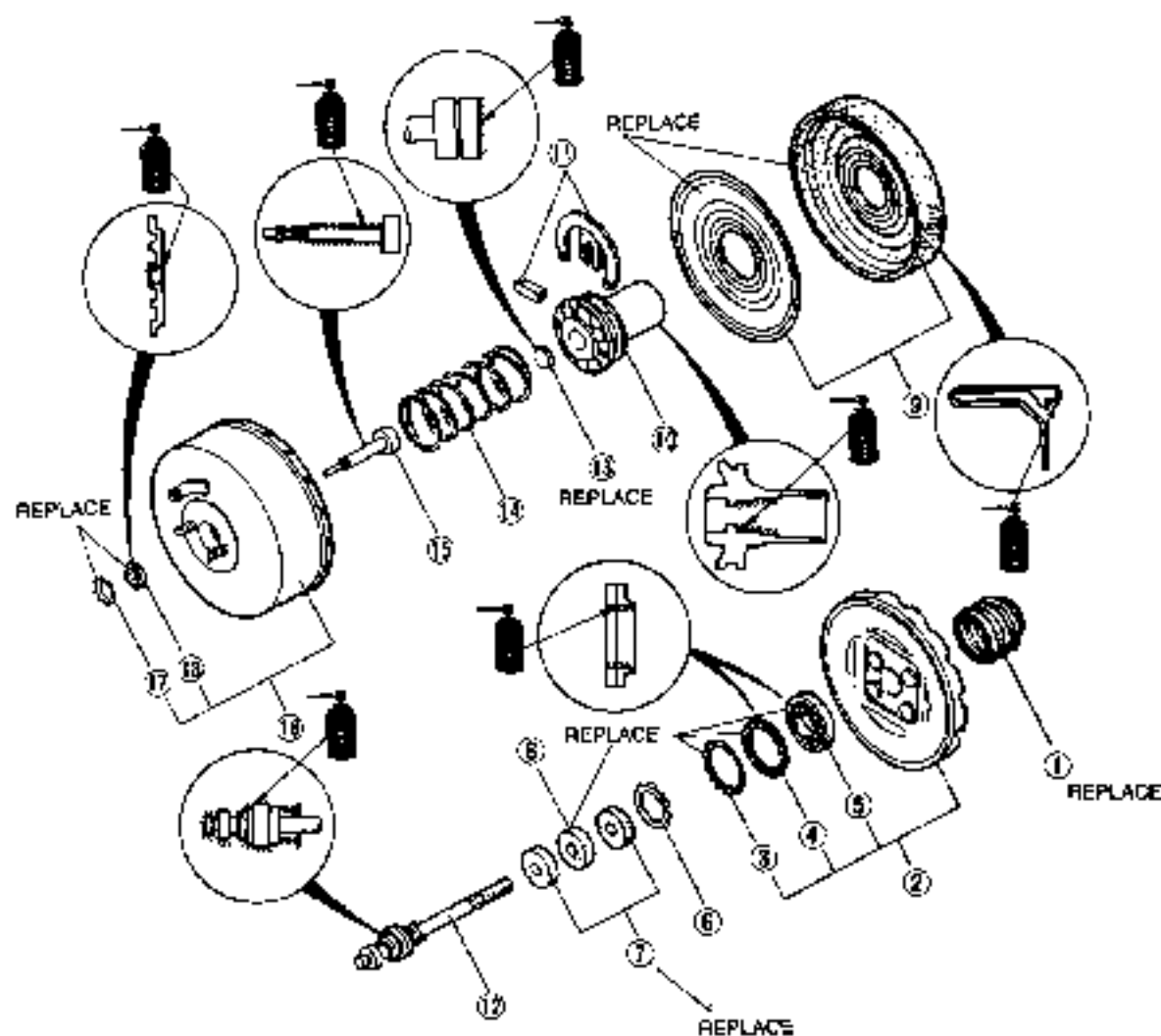
Disassembly and Inspection (Single diaphragm, 4x2)

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.



291117X-011

1. Dust boot

2. Rear shell assembly

Disassembly Note..... page P-17

Inspect for scratches, scores, pits, dents,
or other damage

3. Retainer

4. Bearing

5. Dust seal

6. Retainer

7. Air filter

8. Air silencer

9. Diaphragm and plate

Inspect for cuts or other damage

10. Power piston assembly

inspect for cracks, distortion, chipping,
or damaged seats

11. Retainer key

Disassembly Note..... page P-17

12. Valve rod and plunger assembly

13. Reaction disc

Inspect for deterioration

14. Spring

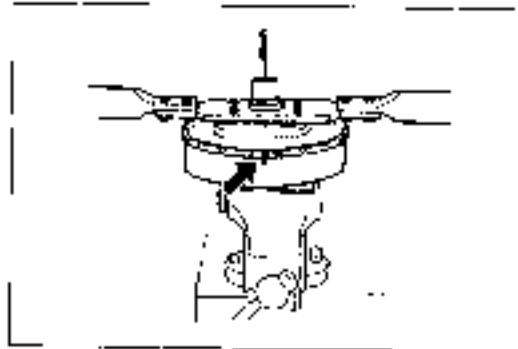
15. Push rod

16. Front shell assembly

Inspect for scratches, scores, pits, dents,
or other damage

17. Retainer

18. Seal



2B J2P2-026

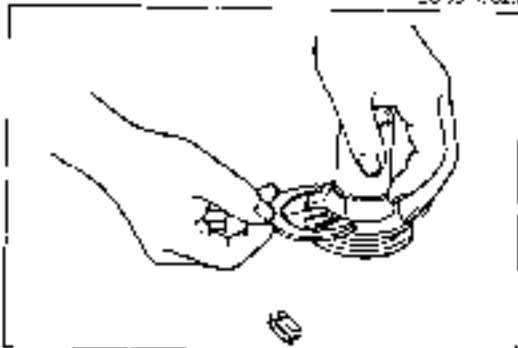
Disassembly note

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.



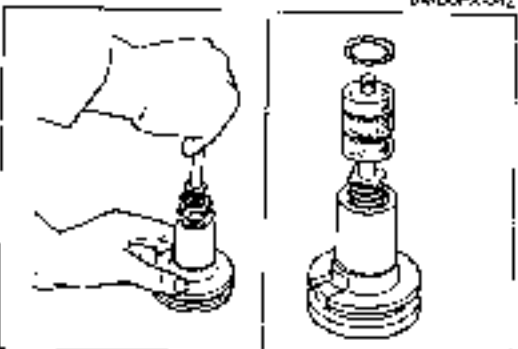
UMUOPX-042

Retainer key

Press the valve rod in to remove the valve retainer key. Remove the valve rod and plunger assembly.

Caution

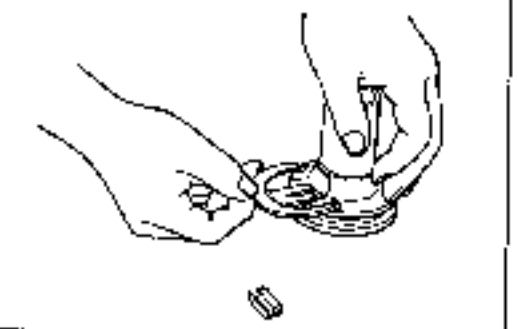
The valve rod and plunger must be serviced as an assembly.



2B J2P2-022

Assembly (4x2)

1. Install the valve rod and plunger assembly.
2. Install the new air filter and silencer.
3. Install a new retainer.

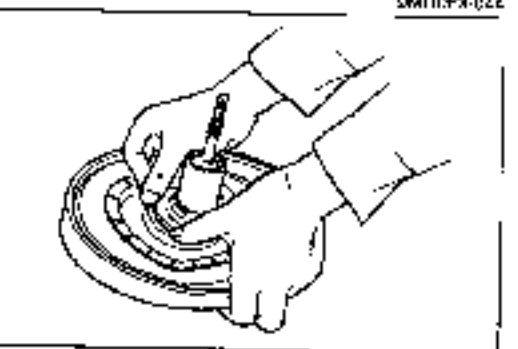


SMUOPX-024

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.



OB J2P2-020

5. Connect the new diaphragm to the power piston and new plate.

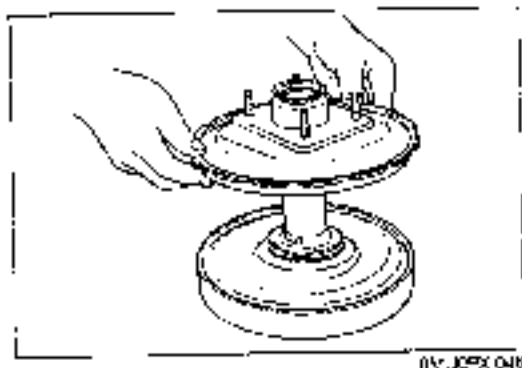
Caution

Make certain the diaphragm is well seated in the groove.

6. Assemble the rear shell assembly.

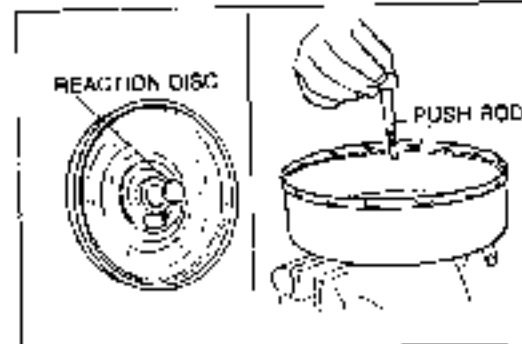
Caution

Carefully guide the tube end of the power piston through the seal in the rear shell.



84VJCPX-046

7. Push the reaction disc into the power piston with the push rod.

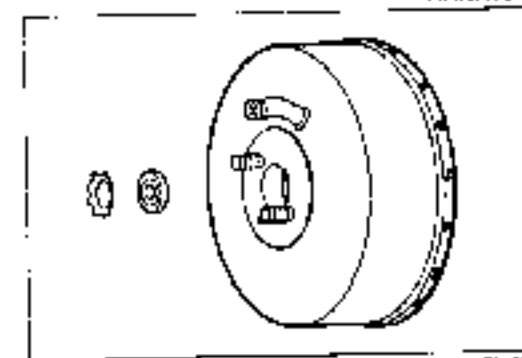


84VJCPX-047

8. Put the new dust seal and new retainer into the front shell.

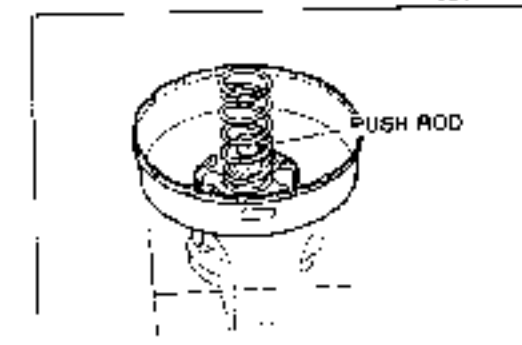
Caution

Place the front shell assembly in a vise to complete the following operations.



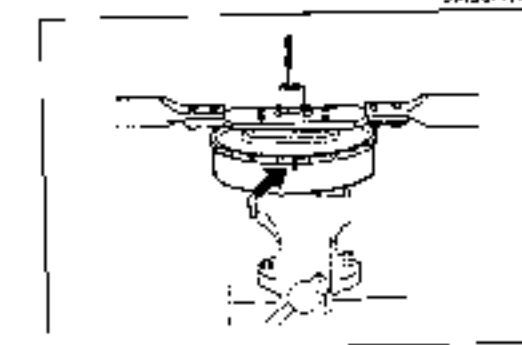
85VJCPX-051

9. Install the push rod.
10. Install the return spring.

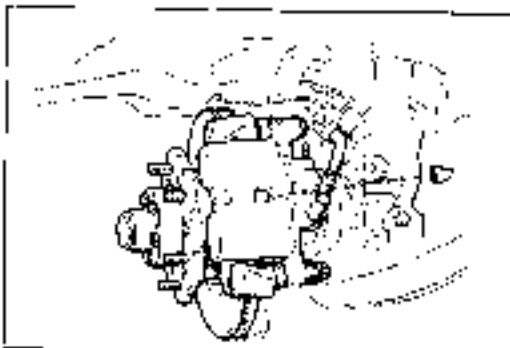


84VJCPX-048

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.



84VJCPX-050



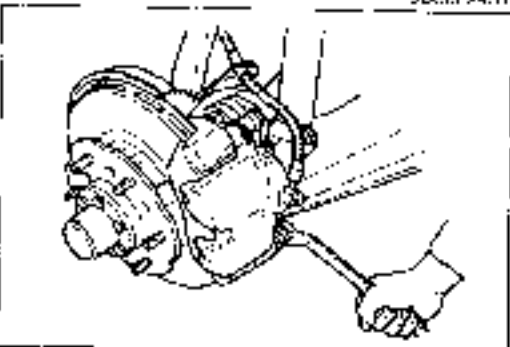
9ELJ0FX-417

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)**.



9MUDFX-036

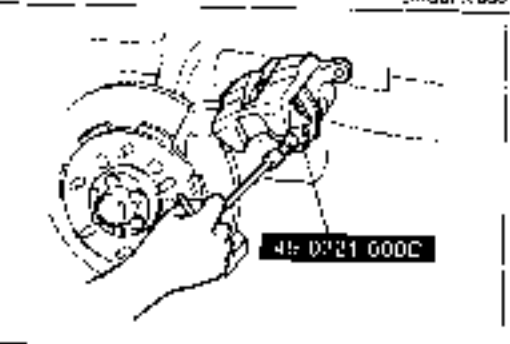
Replacement

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.



9ELJ0FX-010

7. Lower the caliper assembly onto the mounting support.
8. Tighten the lock bolt to the specified torque.

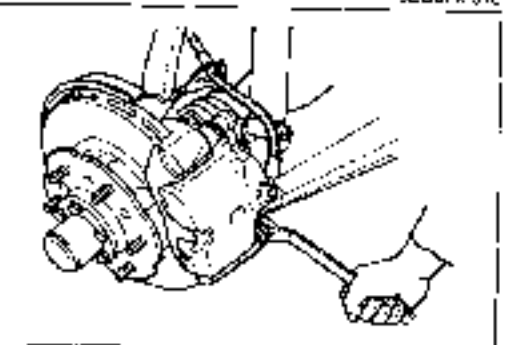
Tightening torque:

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.



9ELJ0FX-010

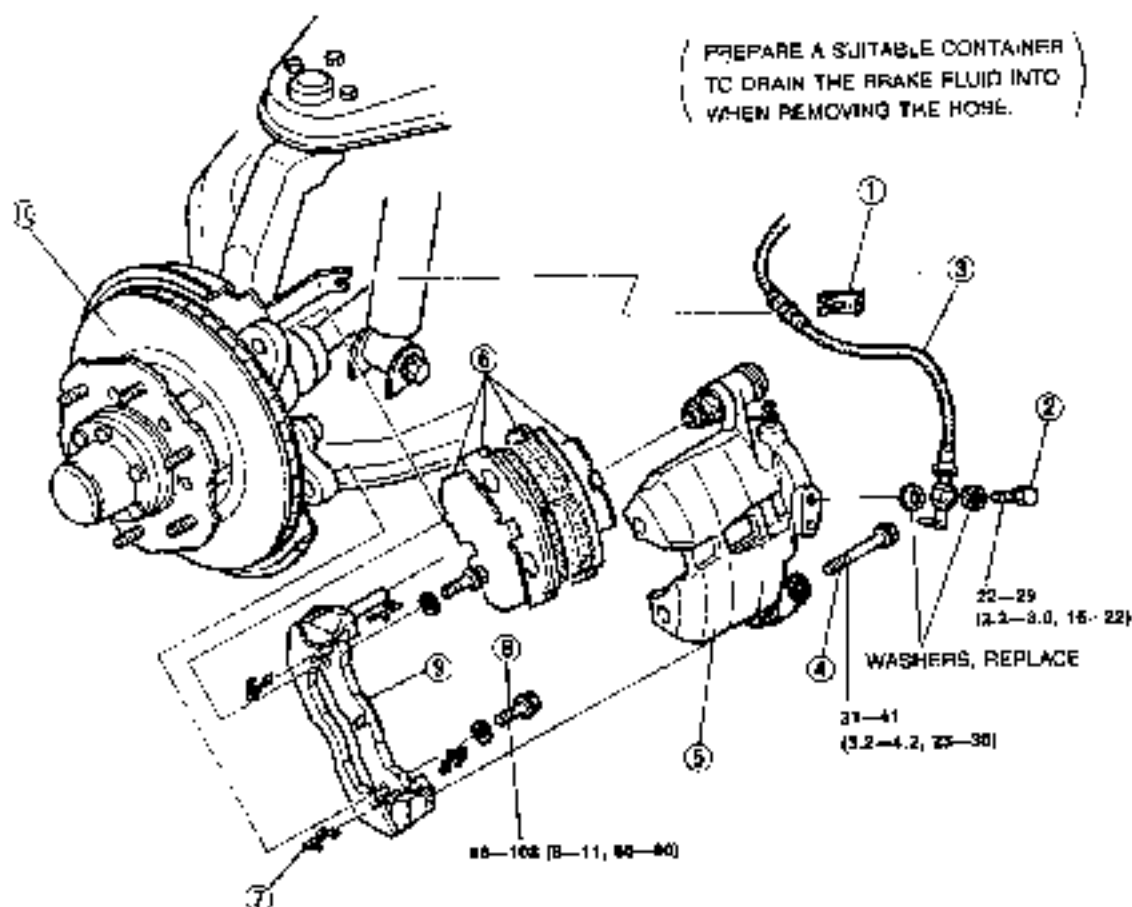
10. Lower the vehicle.

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.

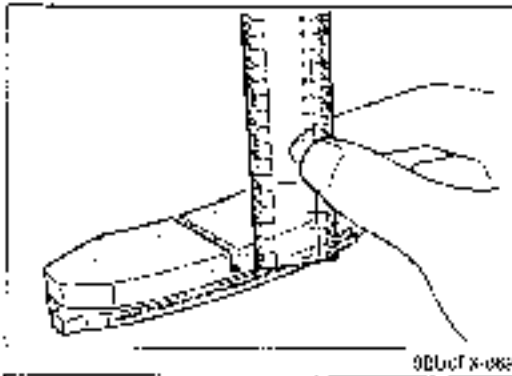
Tightening torque: Non-styled wheel.... 85—118 Nm (9—12 m·kg, 65—87 ft·lb)
Styled wheel 116—147 Nm (12—15 m·kg, 87—108 ft·lb)

7. Lower the vehicle.



Nm (m·kg, ft·lb)
230J2X43

1. Clip	6. Disc pack	
2. Bolt	Inspection.....	page P-21
3. Brake hose	7. Shim	
4. Lock bolts	8. Bolt	
5. Brake caliper assembly	9. Mounting support	
Disassembly.....	10. Disc plate	
Assembly.....	Removal and Installation.....	Section M
	Inspection.....	page P-21



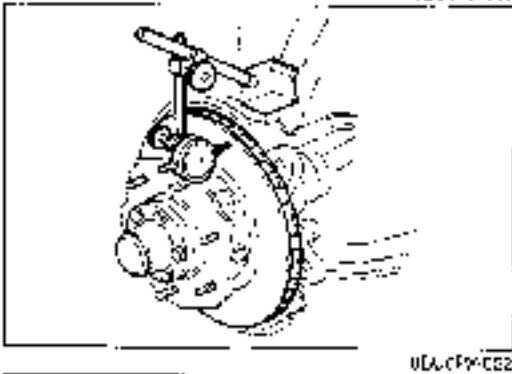
Inspection

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.



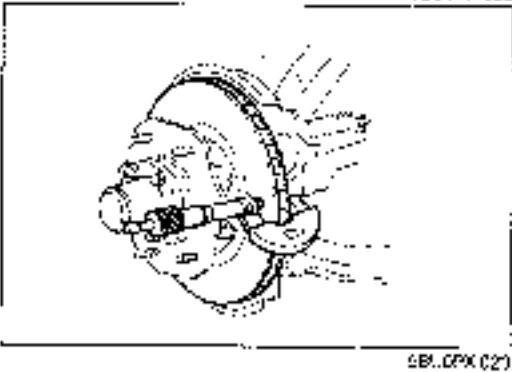
Disc plate

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.



2. Wear or damage

Thickness

4x4 model

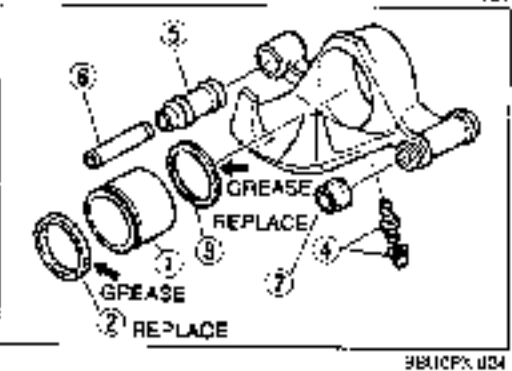
Standard value: 22mm (0.87 in)

Minimum: 20mm (0.79 in)

4x2 model

Standard value: 20mm (0.79 in)

Minimum: 18mm (0.71 in)



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

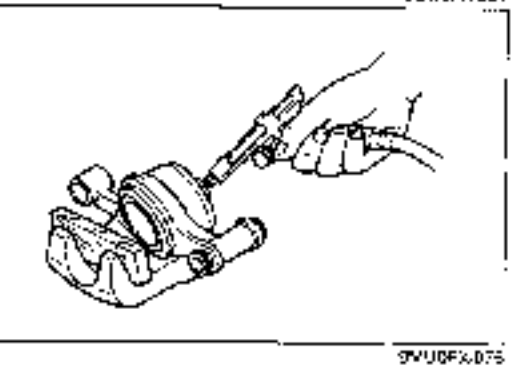
Disassembly note

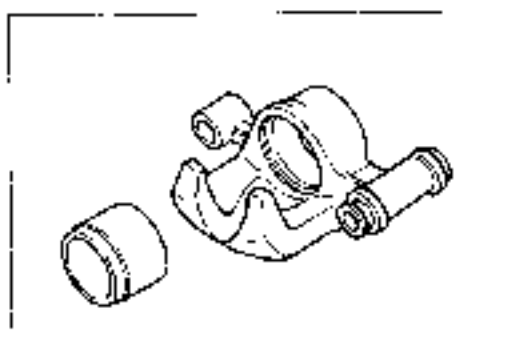
Piston

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.



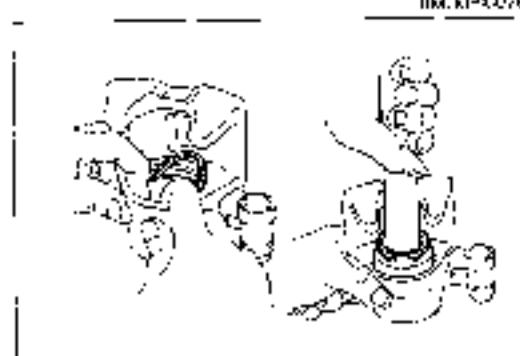


HM-KD-0076

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



25A-0019-026

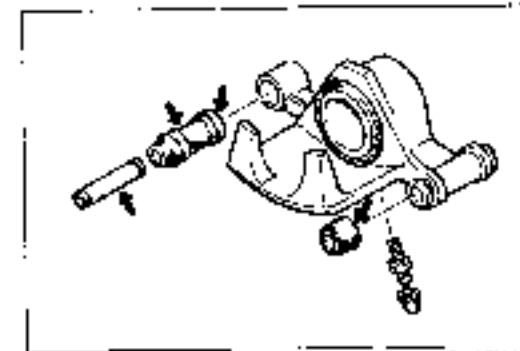
Assembly (Caliper)

1. Coat a new piston seal with the grease supplied in the seal kit; then install it in the caliper.



25A-0019-027

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.



25A-0019-025

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 N·m (12—16 m·kg, 87—107 ft·lb)

Styled wheel 118–147 Nm (12–15 m-kg, 87–108 ft-lb)

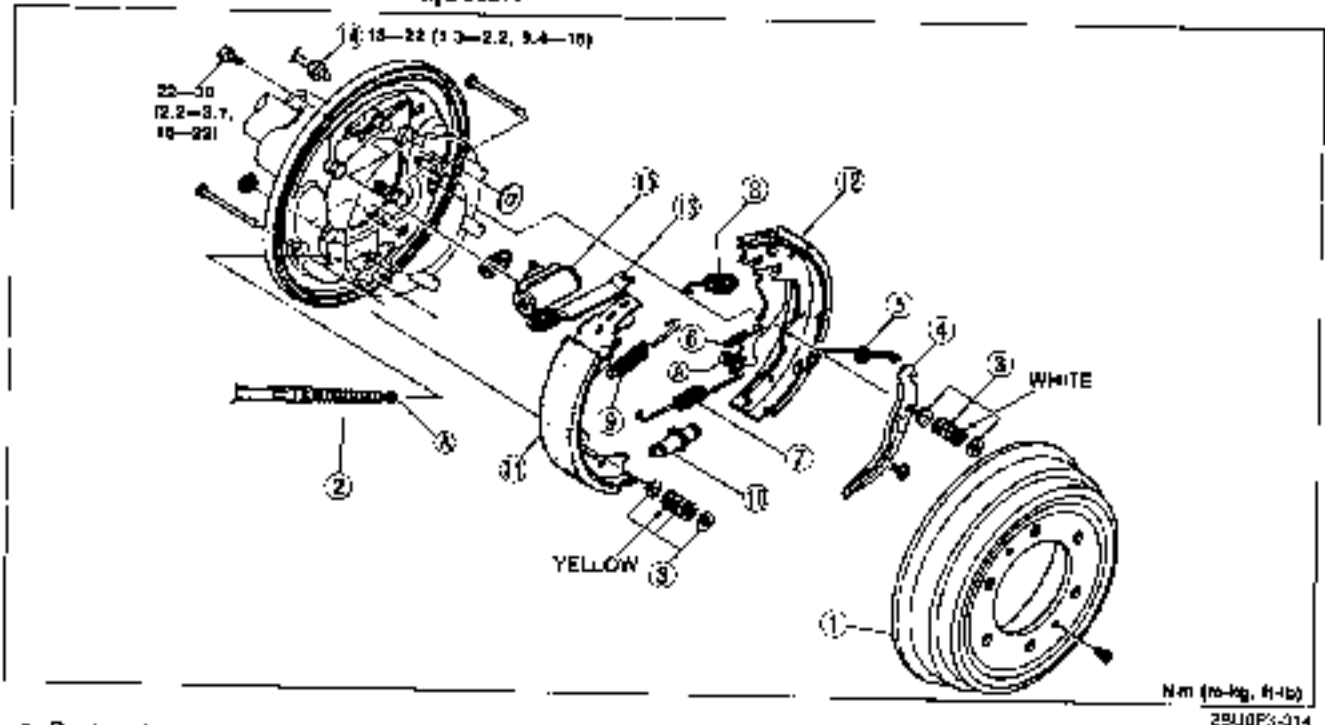
9. Adjust the parking lever stroke. (Refer to page P-31.)

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

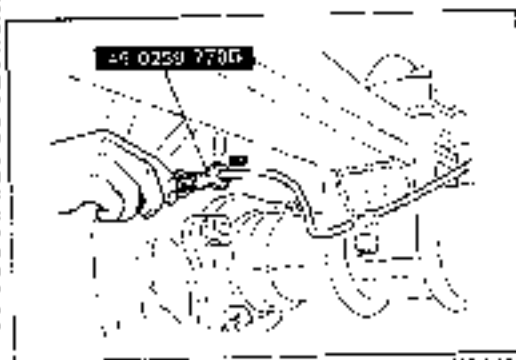
Caution

Primary side Yellow
Secondary side White

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



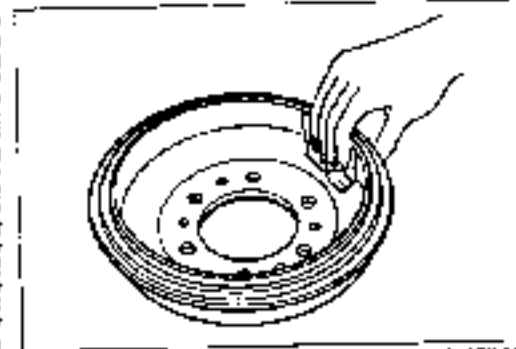
BM10PX-361

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)



BM10PX-052

Inspection

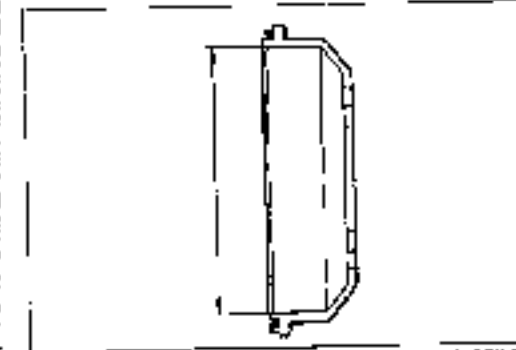
Check for the following and repair or replace parts as necessary.

Brake drum

1. Scratches, uneven or abnormal wear inside drum

Note

Repair if the problem is minor.



BM10PX-053

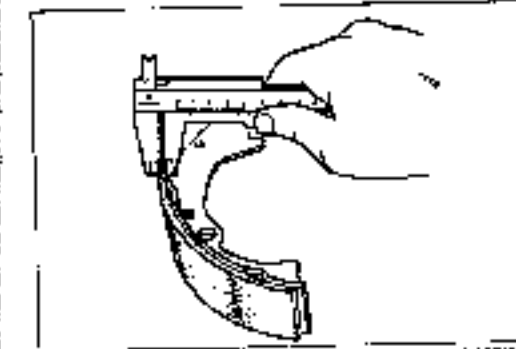
2. Drum inner diameter

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.



BM10PX-054

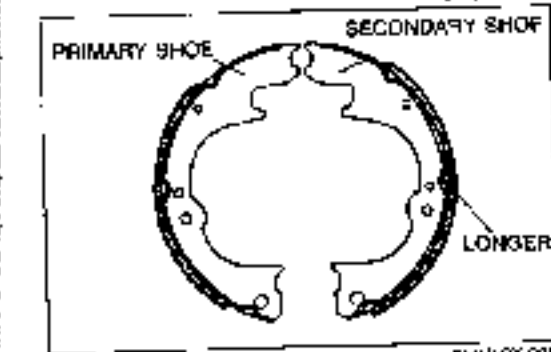
Brake shoe

1. Peeling, cracking, or extremely uneven wear of lining
2. Lining wear

Thickness: 1.0mm (0.04 in) min.

Caution

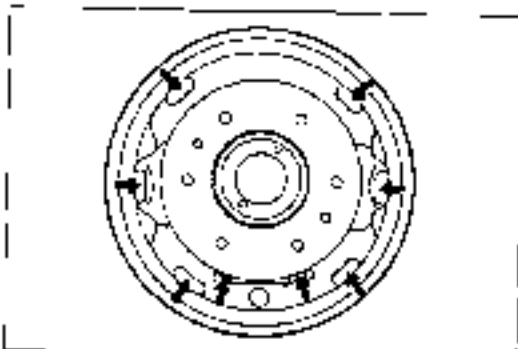
When replacing the shoe assembly, replace as a set and with shoes of the same quality.



BM10PX-055

Installation note**Brake shoe**

When installing the brake shoes, be careful not to confuse the primary and secondary shoes.



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



IL H.)

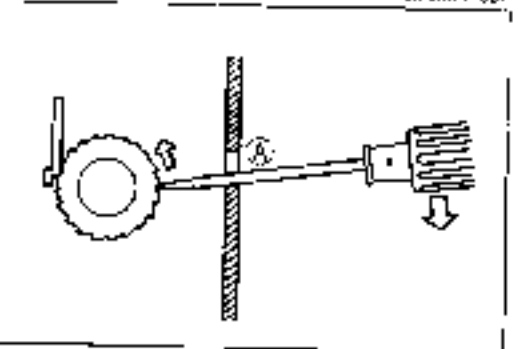
9V.L.PA-107

Adjustment of brake shoes

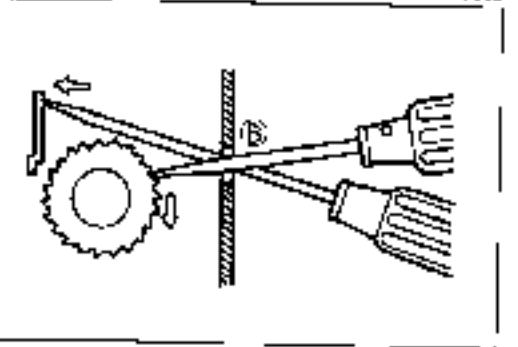
The rear brakes are self-adjusting and require a manual adjustment only after the brake shoes have been replaced or when the operating lever has been moved during some other service operation.

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.LDPX-088



8D.LDPX-049

Disassembly, Assembly, and Inspection (Wheel cylinder)

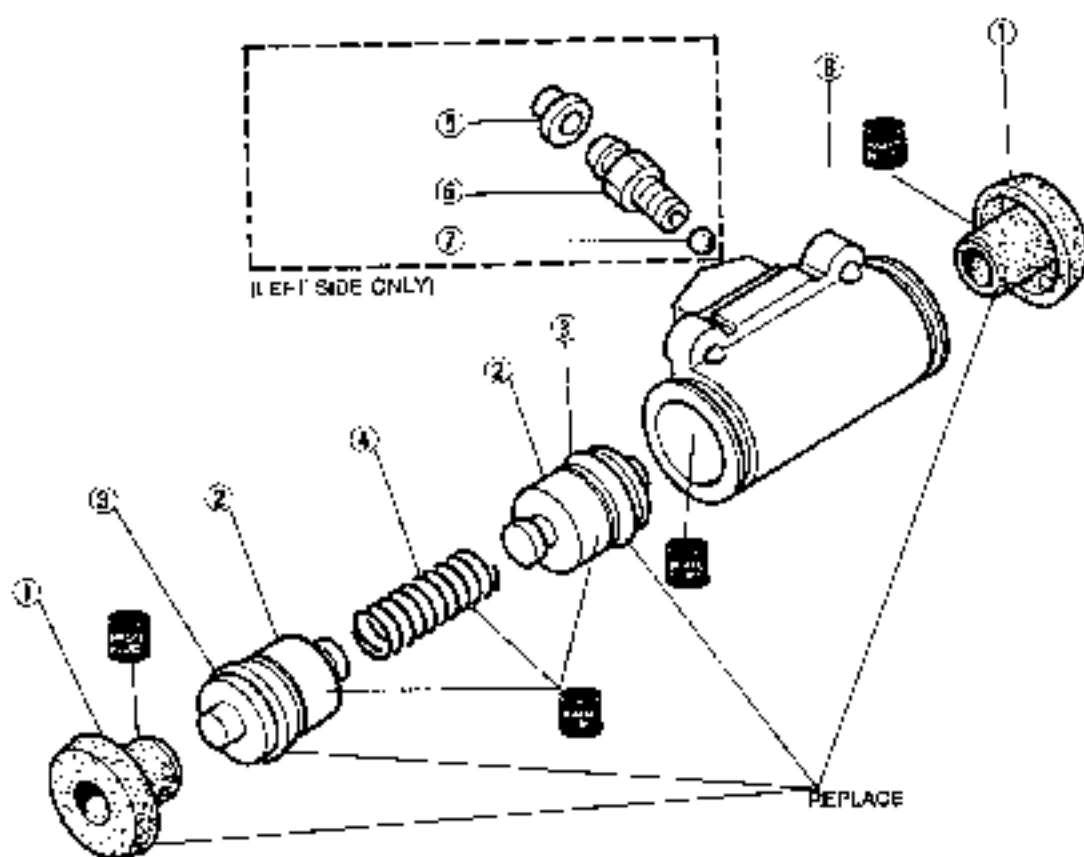
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

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.



BUCP0006

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.

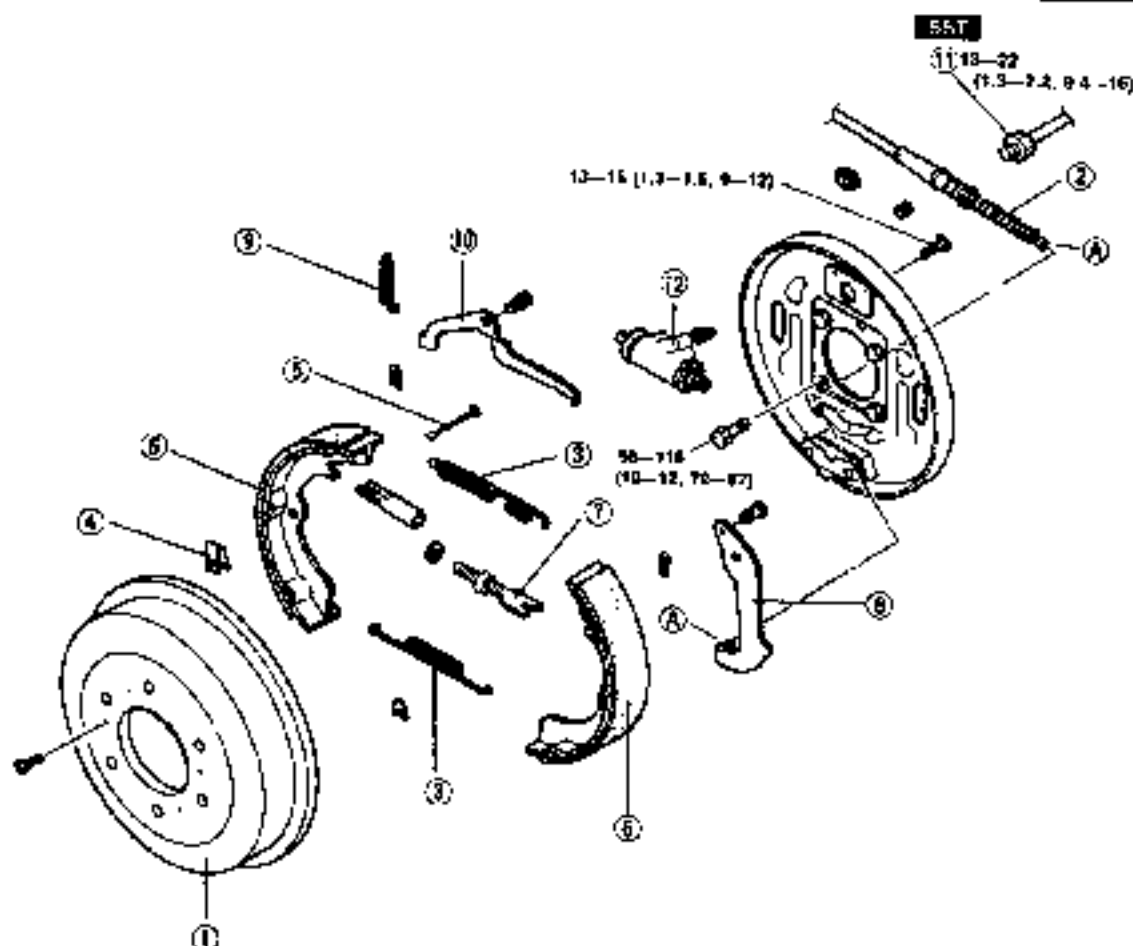
Tightening torque: Non-styled wheel 88—118 Nm (9—12 m·kg, 65—87 ft·lb)

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.

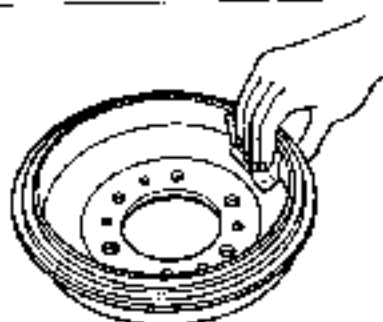


Nm (m·kg, ft·lb)
28KX0901.15

1. Brake drum
Inspection..... page P-28
2. Parking brake cable
3. Return spring
4. Brake shoe spring
5. Brake shoe pin

6. Brake shoe
Inspection..... page P-26
Brake shoe
adjustment .. page P-28
7. Adjust screw
8. Operating lever

9. Pawl lever return spring
10. Pawl lever
11. Brake pipe
Removal Note .. page P- 24
12. Wheel cylinder assembly
Disassembly, Assembly
and Inspection
..... page P-29



36LX1X42A

Inspection

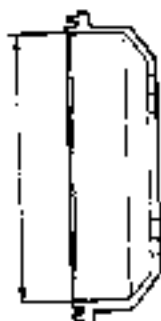
Inspect for the following problems, and repair or replace any faulty parts.

Brake drum

1. Scratches and uneven or abnormal wear inside the drum.

Note

Repair if the problem is minor.



43311X66A

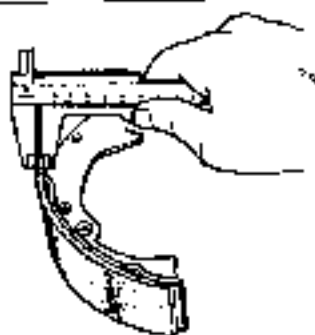
2. Drum inner diameter

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.



HFA,CPX,C29

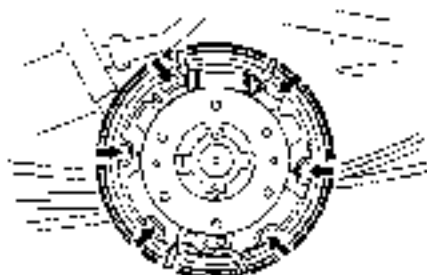
Brake shoe

1. Peeling, cracks, and extremely uneven wear of the lining
2. Wear of the lining.

Thickness limit: 1.0mm (0.04 in)

Caution

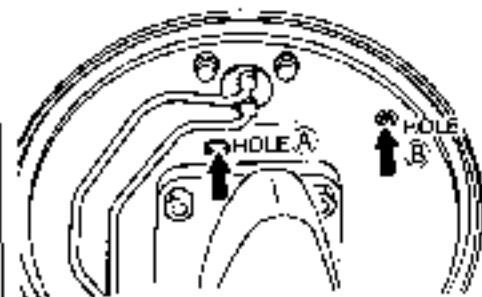
When replacing the shoe assembly, replace it as a set and with an assembly of the same quality.



65J11X637

Grease points

Before installation, apply grease to the wheel cylinder and anchor sliding parts (→), the projections of the backing plate (→).

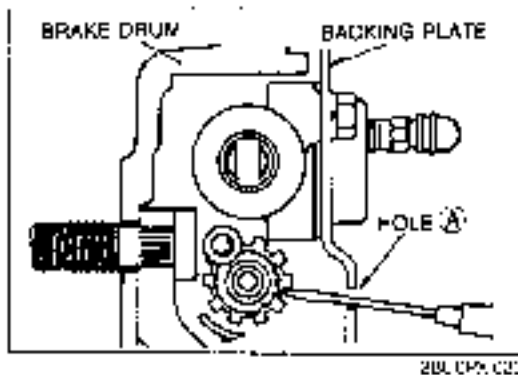


78J11X4170

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)

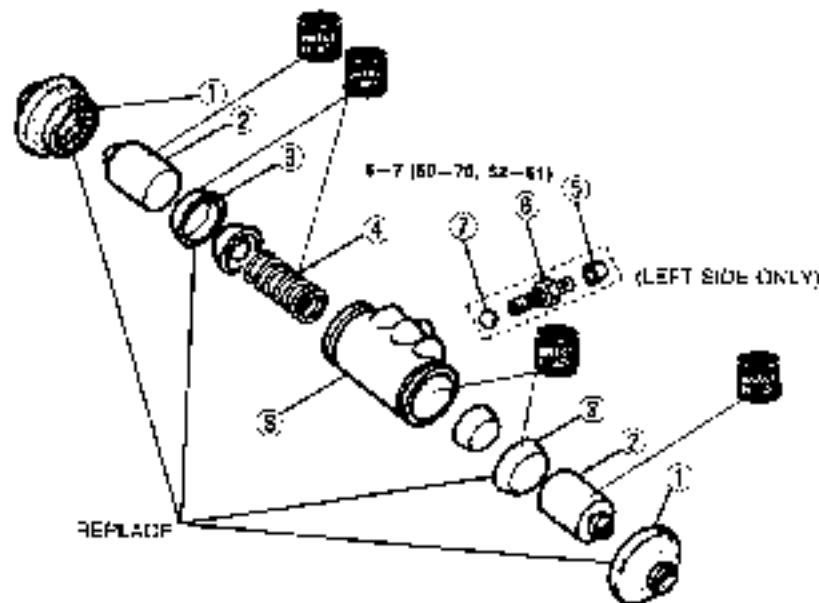
1. Disassemble in the order shown in the figure.
2. Inspect all components and parts. Replace parts if necessary.
3. Assemble in the reverse order of disassembly.

Note

- a) Use a new boot set.
- b) Apply brake fluid to the points shown in the figure.

Caution

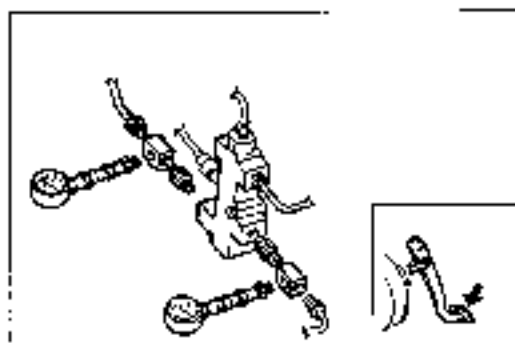
Do not allow foreign material to enter, and do not scratch the inside of the cylinder or the outer surface of the pistons.



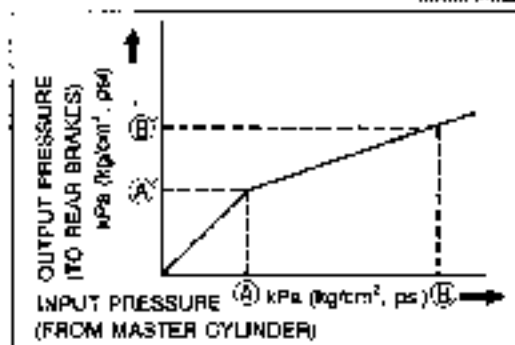
1. Dust boot
2. Piston
Inspect for wear of contact surface
3. Piston rubber cup
4. Spring
Inspect for wear or breaks

5. Rubber cap
6. Bleeder screw
7. Steel ball
8. Wheel cylinder
Inspect for wear, rust, or damage

95 N (20-kg, 44-lb)
500 N (110-lb)



08U0PX-022



08U0PX-022

PROPORTIONING BYPASS VALVE (PBV)**Function Check**

As shown in the figure, connect two pressure gauges (9,810 kPa [100 kg/cm², 1,422 psi]) depress the brake pedal, and measure the fluid pressure of the master cylinder and the fluid pressure to the rear brakes.

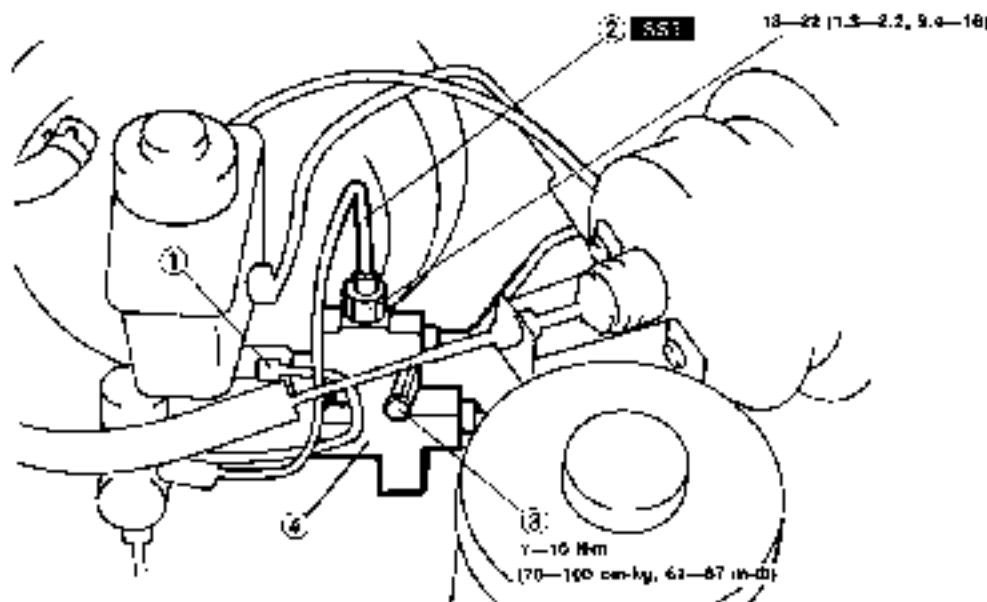
A	Fluid pressure kPa (kg/cm ² , psi)		
	A	B	B'
3,826 (39,555)	3,826 ± 294 (39 ± 3.0, 555 ± 43)	7,945 (80, 1,138)	8,180 ± 294 (83 ± 3.0, 996 ± 43)

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.)



9.4 m (in-lb, ft-lb)
78U0PX-022

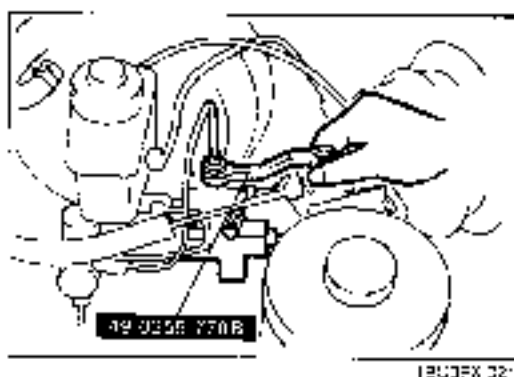
1. Pressure differential switch coupler

2. Brake pipes

Removal Note page P-31

3. Ball

4. Proportioning bypass valve



Removal note

Brake pipes

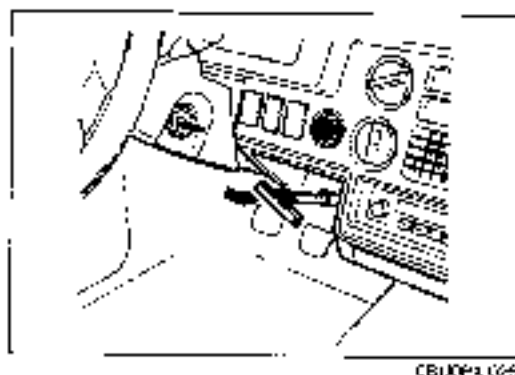
Disconnect or connect the brake pipes from/to the proportioning bypass valve with the **SST**.

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 on or on lining Hardening of lining surface or poor contact	Adjust Repair or replace Clean or replace Grind or replace	P-31 P-33,34 P-23,27 P-23,27

13UJFK 022



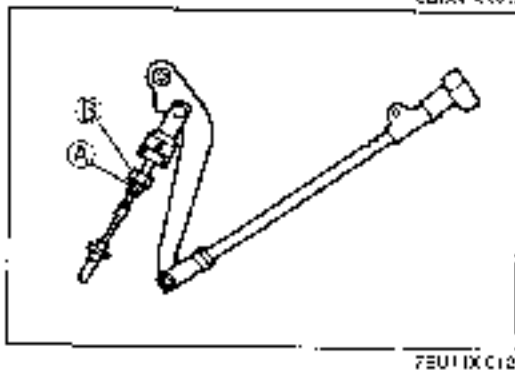
PARKING BRAKE LEVER

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



Adjustment

- Before adjustment, depress the brake pedal several times while the vehicle is moving in reverse.
- Loosen locknut (A) and turn the adjusting nut (B) so that the stroke is within the above range.
- After adjustment, tighten locknut (A).

Tightening torque:

7—10 N·m (0.7—1.0 m·kg, 5—7 ft·lb)

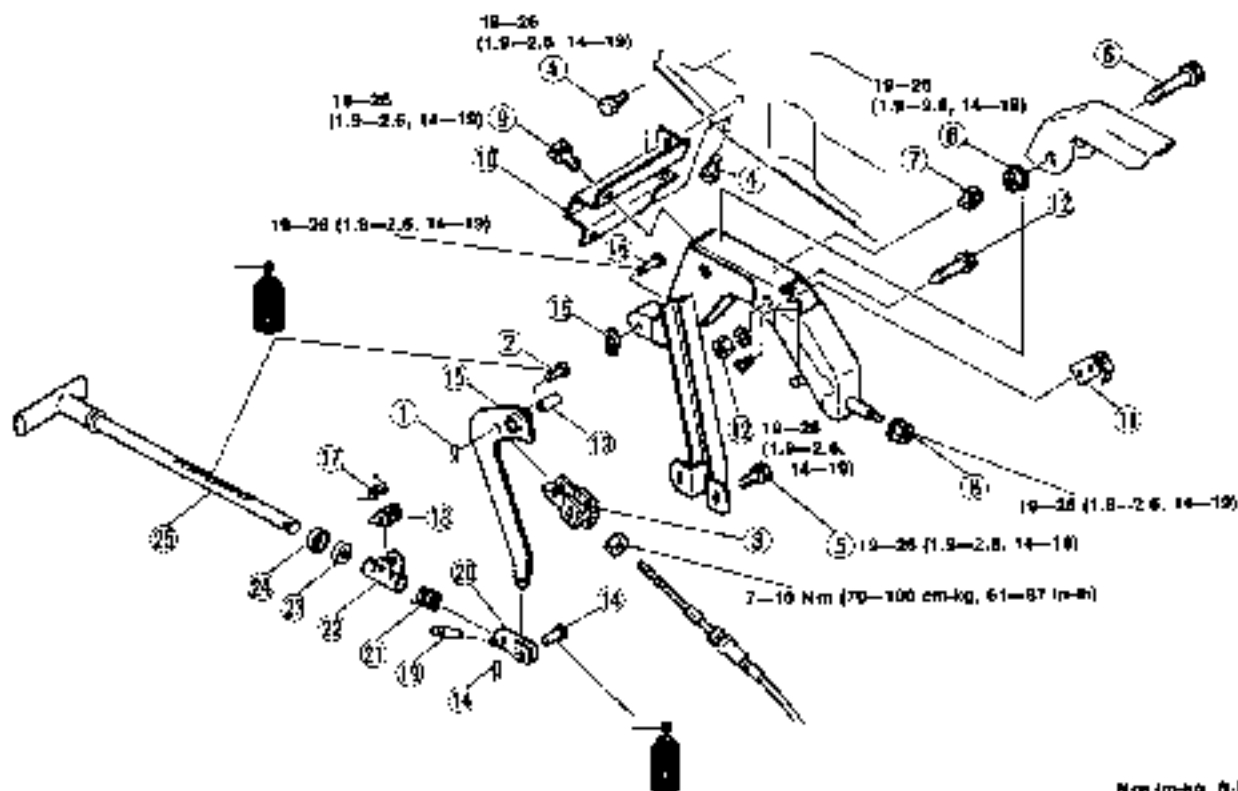
- Make sure that the parking brake warning light illuminates when the brake lever is pulled one notch.

Caution

Be sure that the brakes are not dragging.

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.)

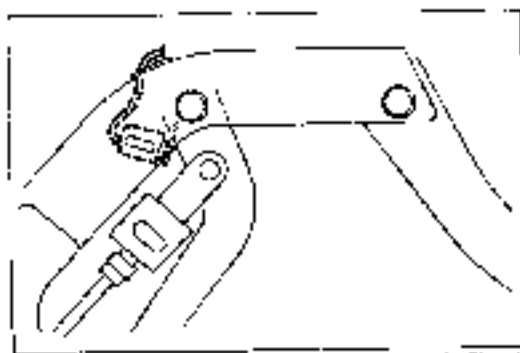


Nm (m·kg, ft·lb)
2200FX-II?

1. Clip	11. Parking-brake switch	20. Fork pin
2. Joint pin	Installation Note..... below	21. Spring
3. Parking cable connector		Inspect for weakness or breakage
4. Bolt	12. Bolt and nut	
5. Bolt	13. Pin	22. Guide
6. Bolt and nut	14. Clip and joint pin	23. Scooper
7. Harness band connector	15. Lever	24. Stopper seat
8. Nut	16. Pin and clip	25. Rod
9. Bolt	17. Spring	
10. Bracket	18. Ratchet pawl	Inspect sector and ratchet pawl for wear or damage
	19. Stopper	

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.

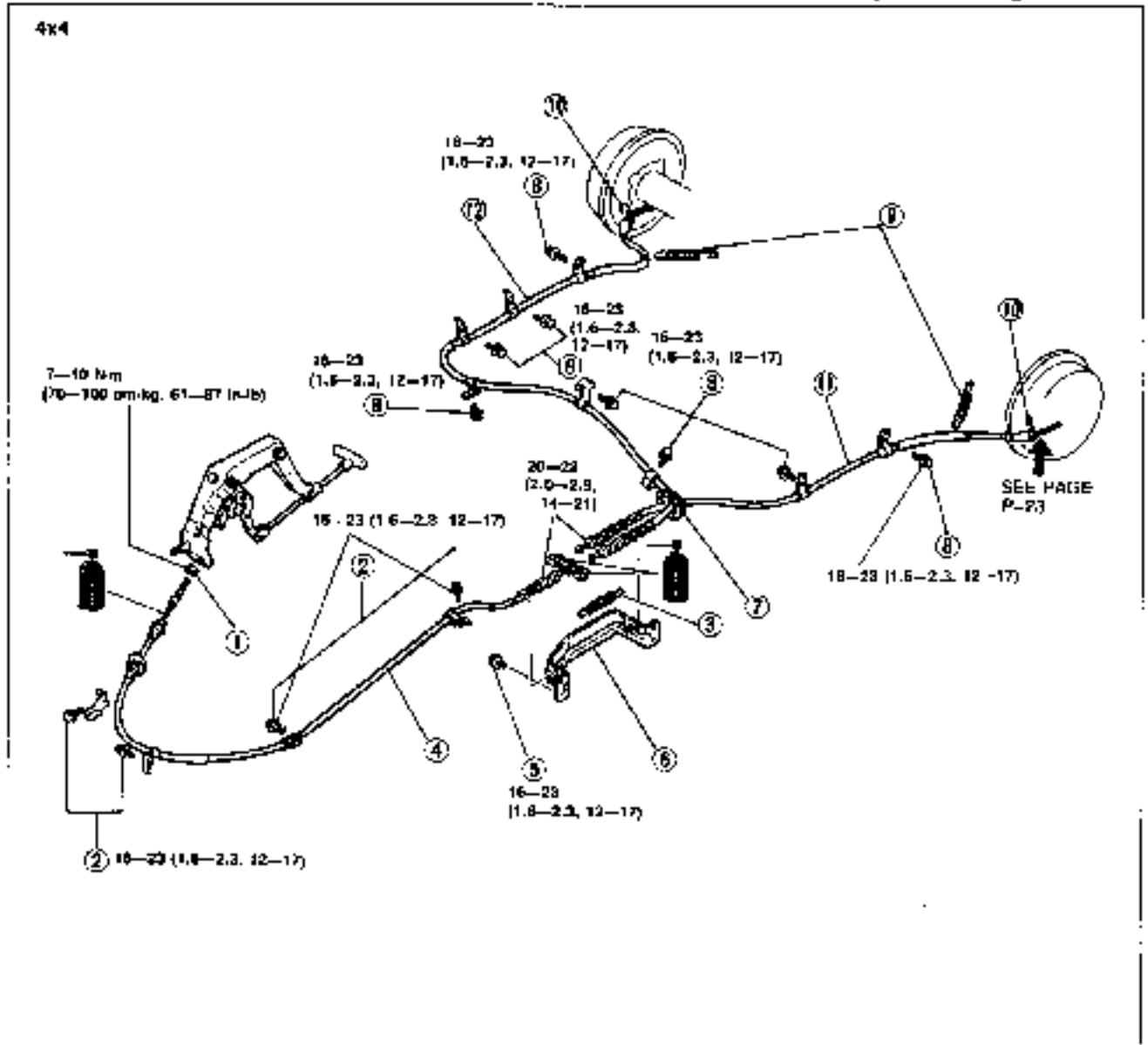


2200FX-II

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.

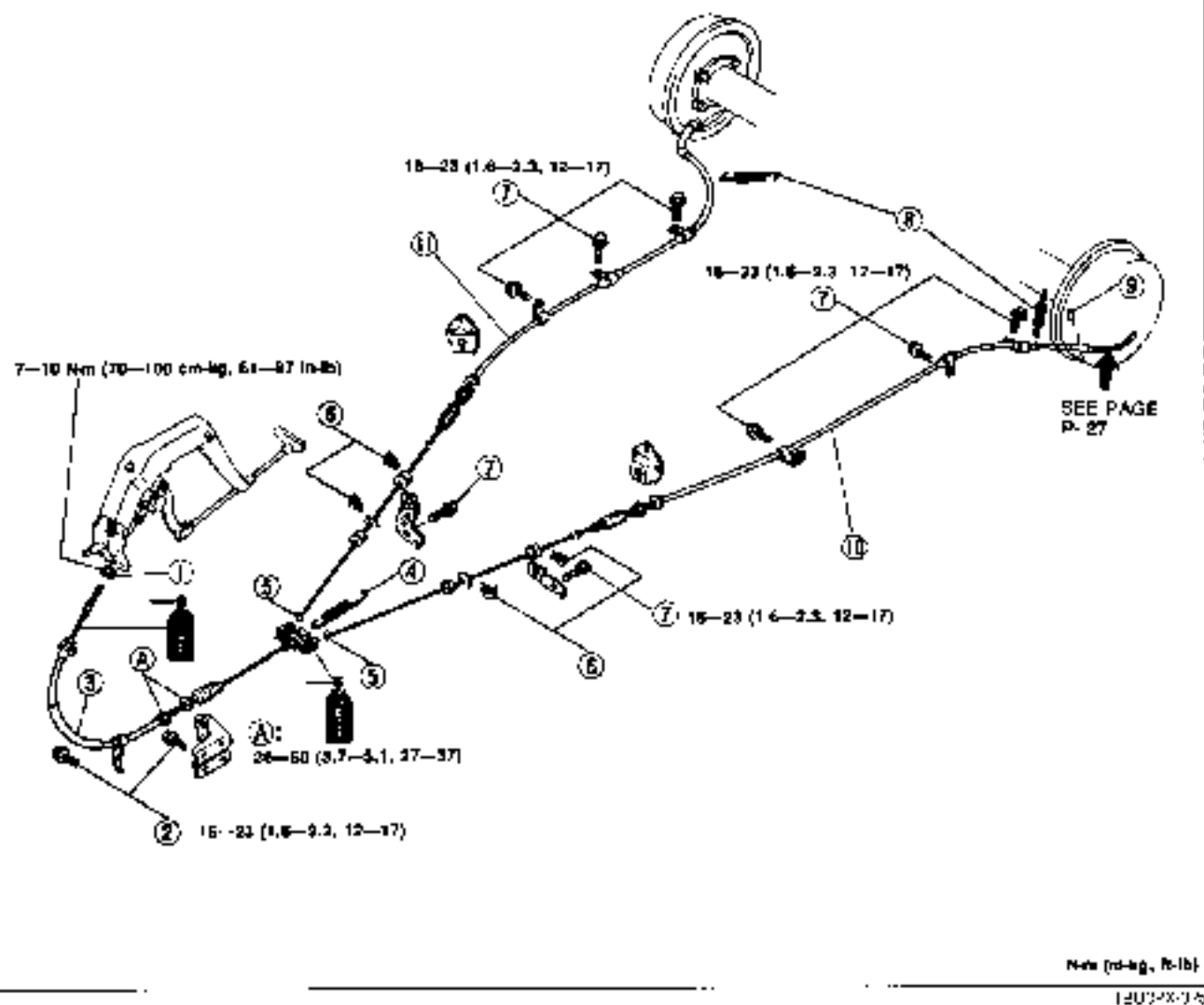


Nm (1a-b, 11-b)

1. Nut
2. Bolt
3. Spring
4. Front brake cable
5. Bolt
6. Bracket
7. Grinnel
8. Bol
9. Spring
10. Clip
11. Rear cable, (left)
12. Rear cable, (right)

PARKING BRAKE SYSTEM

442



1. Nut
2. Bolt
3. Front brake cable
4. Spring
5. Brake cable connector
6. Clip

7. Bolt
8. Spring
9. Clip
10. Rear cable (left)
- * 11. Rear cable (right)

REAR-WHEEL ANTI-LOCK BRAKE SYSTEM (REAR-WHEEL ABS)

PREPARATION

SST

19 3259 7708

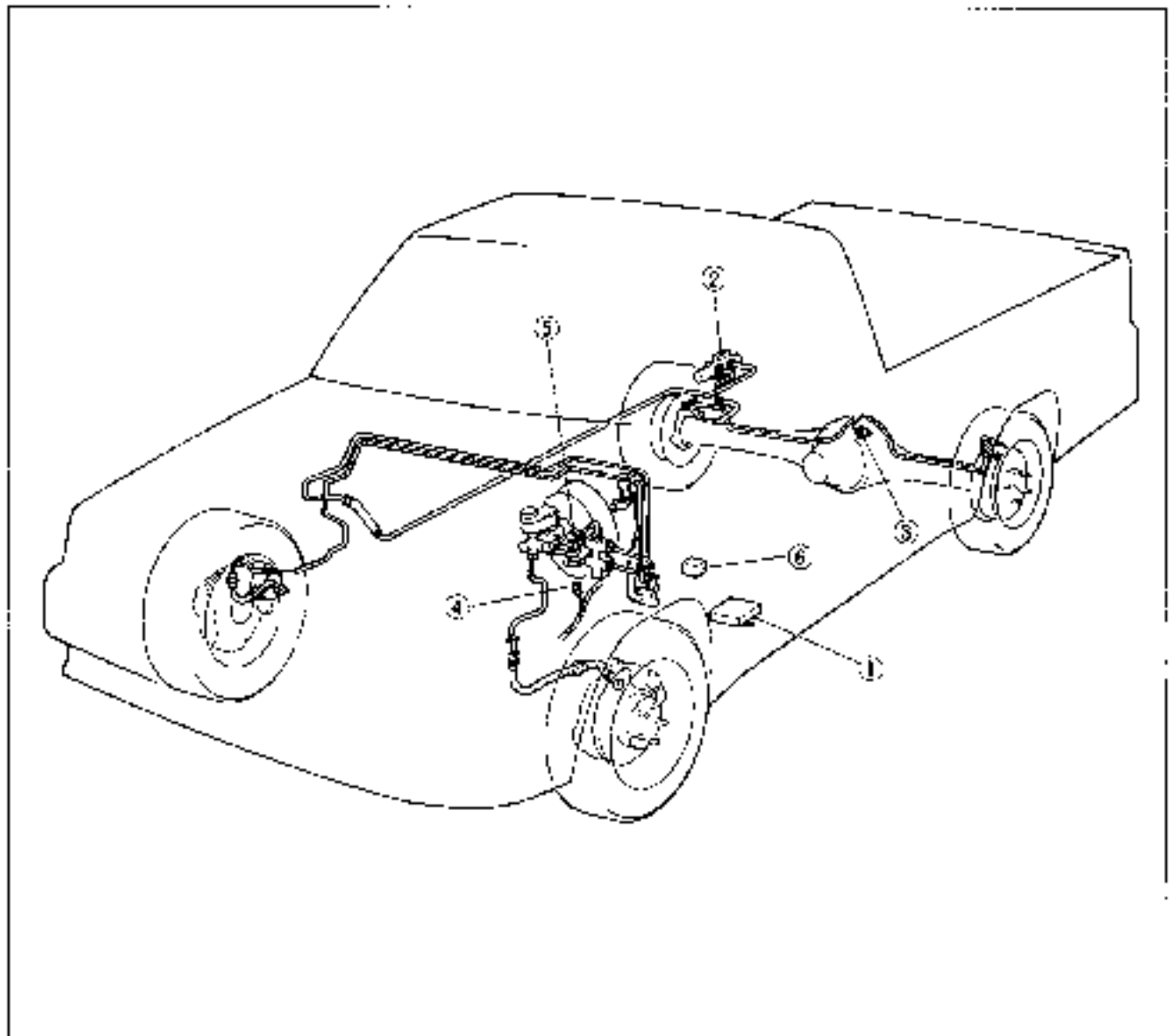
Wrench flare nut



DMJ3FX.021

DESCRIPTION

The Rear wheel Anti lock Brake System (Rear-wheel ABS) is equipped on all B2200 and B2500i. The ABS control unit senses the drop in rear wheel speed and modulates hydraulic pressure to the rear brakes, inhibiting lockup.



1B1J6FX.016

1. Control Unit
2. Hydraulic unit (Solenoid valves)
3. Speed sensor

4. ABS check connector
5. Pressure differential switch
6. ABS fuse

TROUBLESHOOTING GUIDE

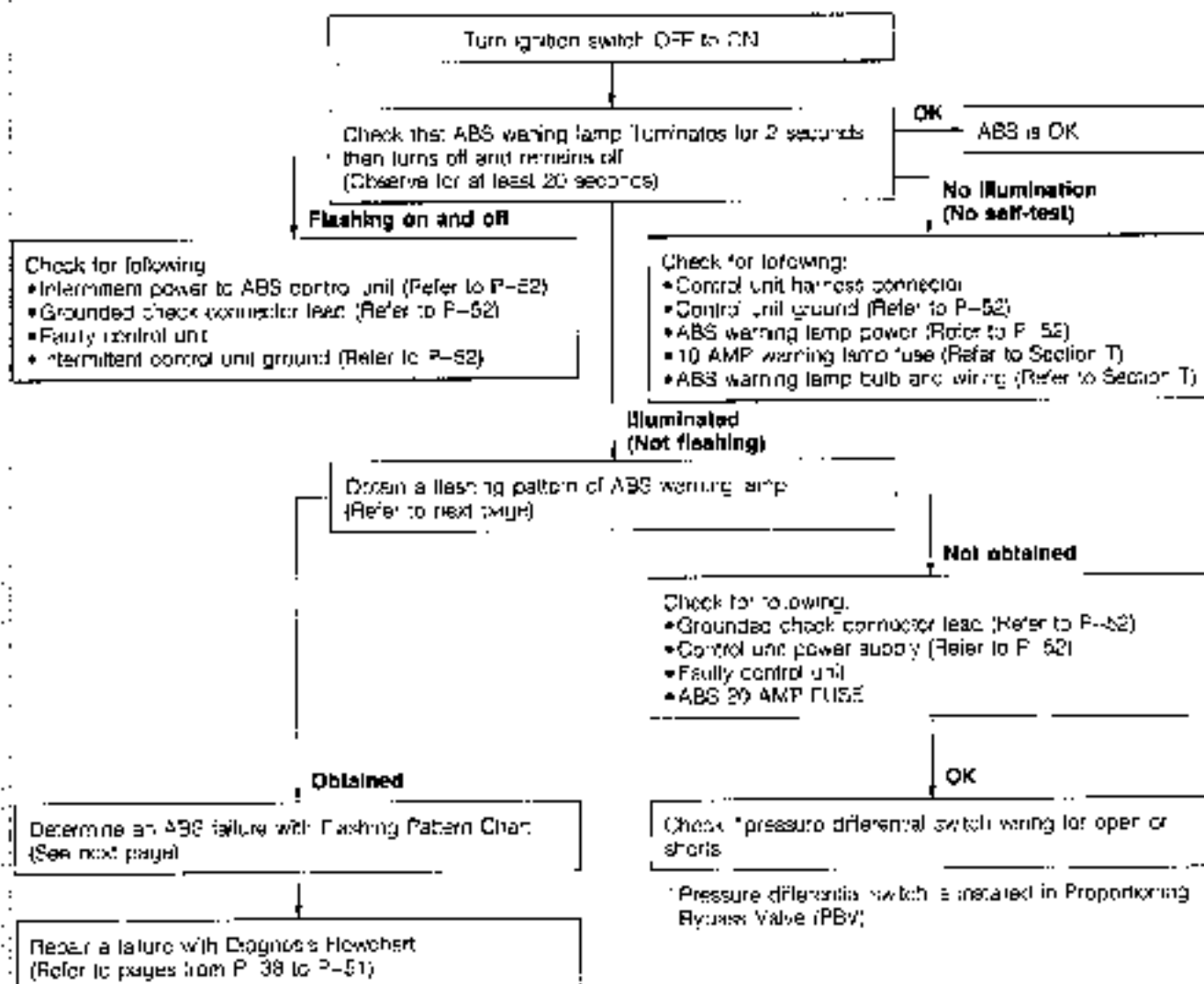
Outline

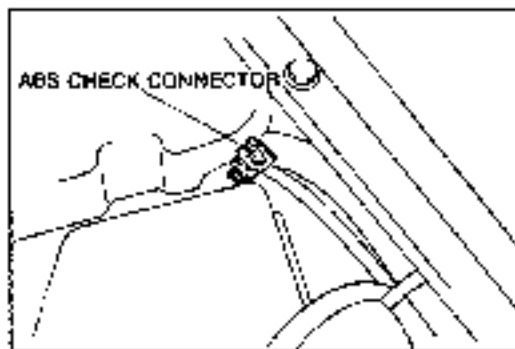
The Rear-wheel ABS is composed of electrical components, mechanical components (hydraulic unit), and the components of the standard brake system.

Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the self-diagnosis function within the ABS control unit. And malfunctions are indicated by the warning lamp in the instrument panel. The location of a malfunction is indicated by the technician obtaining a flashing pattern of the ABS warning lamp. The self-diagnosis and indication functions must be used when diagnosing malfunctions of the ABS.

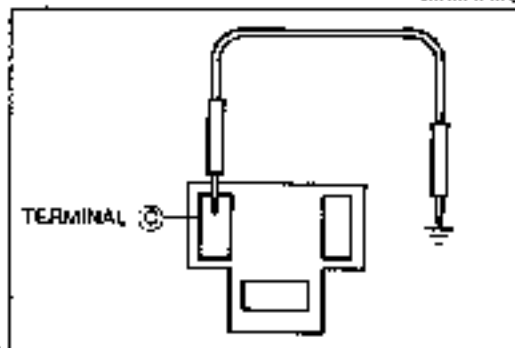
יח. מרזב

Troubleshooting Main Flowchart

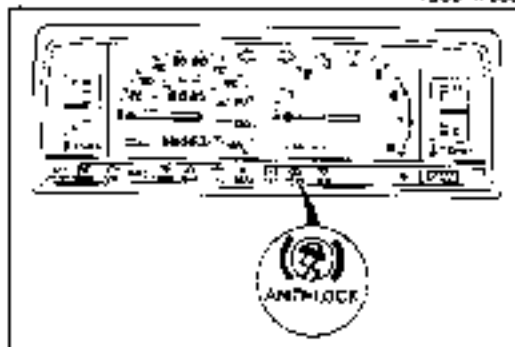
[illegible]



78X10FX-020



15U07X-030



18J07X-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.

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

Fig. 000000-100

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.

ABS-1	(1 flash should not occur)

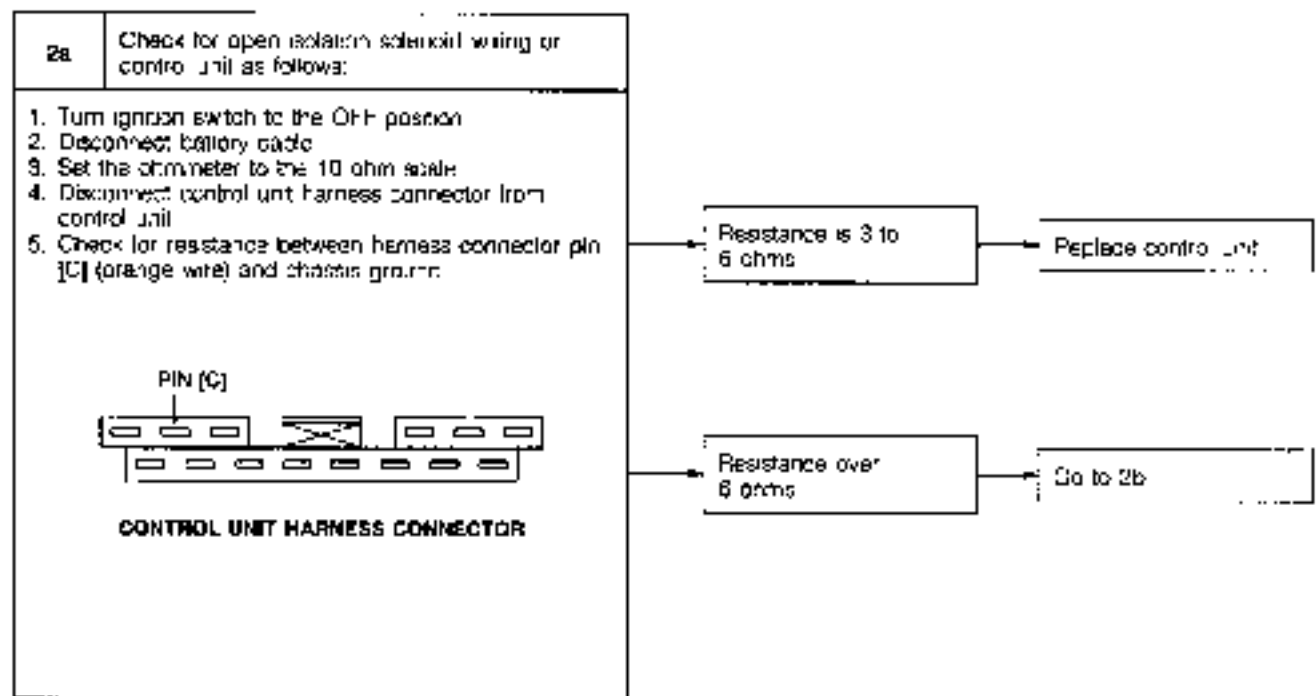
After repeated attempts to take the flashing pattern, 1 flash is still obtained

Check for following:

- Intermittent power to control unit (Refer to page P-52)
- Grounded check connector lead (Refer to page P-52)
- Faulty control unit ground (Refer to page P-52)

ISLCPK03*

ABS-2	Open isolation solenoid circuit



CUJ04K035

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)

ISOLATION
SOLENOID PIN

GROUND PIN

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

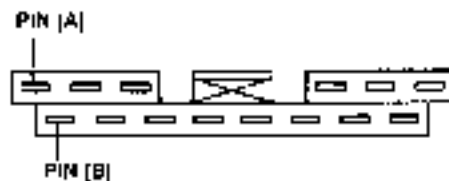
Replace hydraulic unit

1 VULCPX 025

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



CONTROL UNIT HARNESS CONNECTOR

Resistance is 1 to 3 ohms

Replace control unit

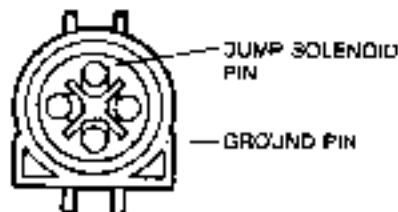
Resistance greater than 3 ohms

Go to Test 3b

OBJOPX-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)



SOLENOID VALVE CONNECTOR

Resistance is 1 to 3 ohms

Repair open dump solenoid wire, from valve to control unit. Check for loose or dirty connector pins.

Resistance greater than 3 ohms

Replace hydraulic unit

OBJOPX-036

ABS-4

Solenoid valve switch closed

4a

Check for closed solenoid valve switch as follows

1. Disconnect solenoid valve harness connector from valve connector
2. Place ohmmeter on the 20k ohm scale
3. Check resistance between valve connector switch pin (orange wire) and valve body

SWITCH PIN



SOLENOID VALVE CONNECTOR

Resistance greater than 10k ohms

Go to Test 4b

Resistance less than 10k ohms

Replace hydraulic unit

16U137X 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)

SWITCH PIN



GROUND PIN

SOLENOID VALVE CONNECTOR

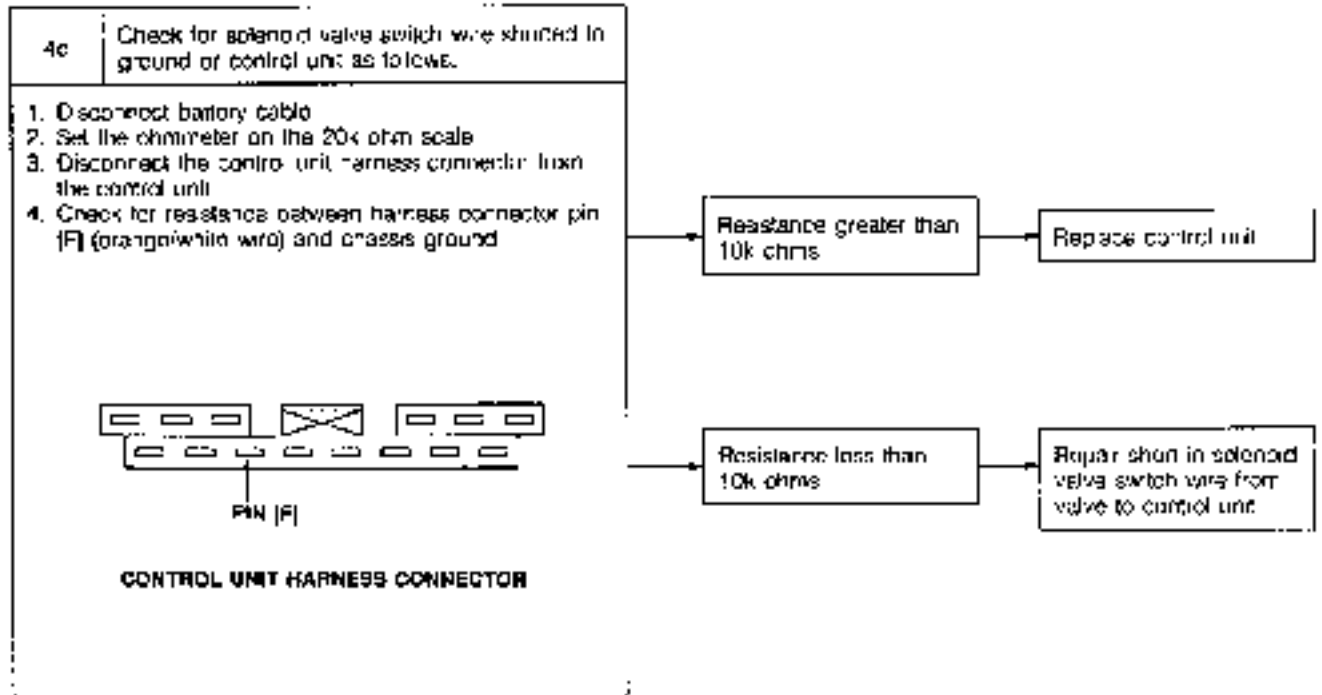
Resistance greater than 10k ohms

Go to Test 4c

Resistance less than 10k ohms

Replace hydraulic unit

16U137X 028



00U0PX-24C

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)

5a

For 4x2 vehicles or 4x4 vehicles for which the problem was initiated in 4x2 mode

Go to test 5b

For 4x4 vehicles for which the problem was initiated in 4x4 mode only

Go to test 5c

16C07X-03B

5b

Check for mechanical problems in rear brake system as follows:

1. Disconnect the control unit harness connector from the control unit to deactivate the ABS
2. Drive the vehicle (in 4x2 mode)
3. Make normal stops in a safe area to determine the condition of the rear brake system

Rear brakes are grabby or tend to lock-up easily

Repair brake system and retest

Rear brakes are satisfactory for normal braking

Replace hydraulic unit

16U07X-01C

5c

Check for missing signal from Remote Freewheel (RFW) switch to control unit as follows:

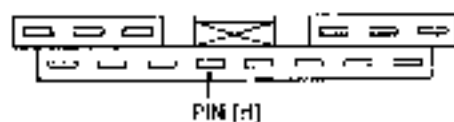
1. Disconnect battery cable
2. Disconnect the control unit harness connector from the control unit
3. Turn the Remote Freewheel (RFW) switch on
4. Check continuity between pin (H) (red/blue wire) and chassis ground

Continuity

Remote Freewheel (RFW) switch is OK

No continuity

Repair Remote Freewheel (RFW) switch
Refer to Section M for procedures



CONTROL UNIT HARNESS CONNECTOR

16J07X-03E

ABS-6 (Green sensor signal rapidly cuts in and out condition only occurs while driving)

6a Check for erratic speed sensor signal and loose wire connections as follows:

1. Turn ignition off.
2. Disconnect battery cable.
3. Set ohmmeter on the 2,000 ohm scale.
4. Check resistance between pin (Q) (blue wire) and pin (L) (green wire) of the harness connector while shaking the harness from sensor to control unit.



Constant reading of 1,000 to 2,000 ohms

Go to Test 6b

Reading is erratic

Repair loose connection in speed sensor leads. Check for dirty or loose pins, frayed or shorted connectors.

18U0PX-041

6b Check for metal chips on speed sensor magnet pole piece as follows:

Remove the sensor from the differential and inspect for a build-up of metal chips on sensor magnetic pole.

No metal chips are present

Go to Test 6c

Metal chips are present

Drain and clean differential. Check the sensor rotor for broken or chipped teeth.

08UJ0PX-042

6c Check for erratic or low speed sensor output on control unit:

1. Locate the ABS check connector (blue, 3-pins).

Note

The ABS check connector is located in the left in the engine compartment (Refer to page P-37).

2. Position vehicle on a hoist and raise the rear wheels to clear the floor.
3. Start the engine and turn the wheels at 6 km/h (5 mph).
4. Place voltmeter on the 2000 mV AC scale.
5. Measure voltage at the two pins (blue and green wires) of the check connector.

Voltage greater than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) and steady

Replace control unit

Voltage less than 210 mV RMS (At 3 mph) 350 mV RMS (At 5 mph) or erratic

Go to Test 6d

18U0PX-033

6d Check for sensor rotor damage as follows:

1. Remove sensor from carrier.
2. Rotate sensor rotor and check for damage to teeth.

Teeth are intact and no visible lateral runout is observed

Replace speed sensor and recheck output

Teeth are damaged or lateral runout of sensor rotor is visible

Replace the sensor rotor (Refer to page P-55)

18U0PX-034

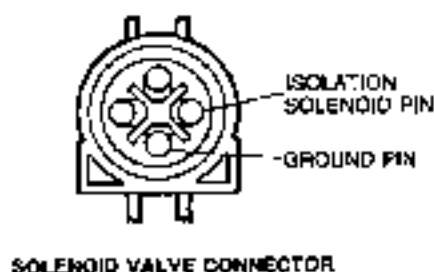
ABS-7

Filtered 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



Resistance is 3 to 6 ohms

Go to Test 7b

Resistance is less than 3 ohms

Replace hydraulic unit

28U00FX 012

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



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

28U00FX 048

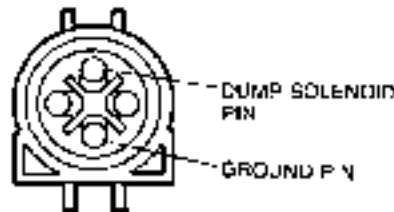
ABS-B

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

Resistance is 1 to 3 ohms

Go to Test 8b

Resistance is less than 1 ohm

Replace hydraulic unit

PS107K-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

PIN (A)



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

09U07K-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

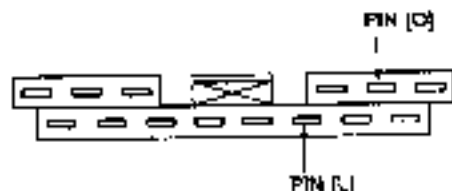
Replace speed sensor

JBU0PX-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 [L] (green wire) and [O] (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

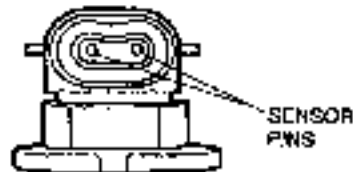
1BU0PX-042

AB5-10

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 ohms scale
4. Measure the resistance at the two sensor pins



SPEED SENSOR CONNECTOR

Resistance less than 1,000 ohms

Replace speed sensor

Resistance is 1,000 to 2,500 ohms

Go to Test 10b

CEBOPX-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] (blue wire) of the harness connector to chassis ground



CONTROL UNIT HARNESS CONNECTOR

Resistance less than 20k ohms

Repair short to ground in sensor harness lead to control unit. Check for frayed wires or shorted connectors

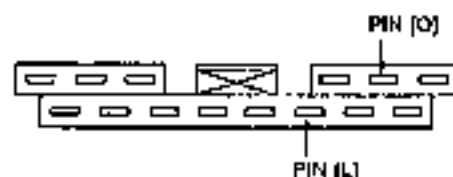
Resistance is greater than 20k ohms

Go to Test 10c

CEBOPX-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 ohms scale
5. Measure the resistance from pin [L] (green wire) to pin [O] (blue wire) of the harness connector



CONTROL UNIT HARNESS CONNECTOR

Resistance less than 20k ohms

Repair short between the speed sensor circuits. Check for frayed wires or shorted connectors

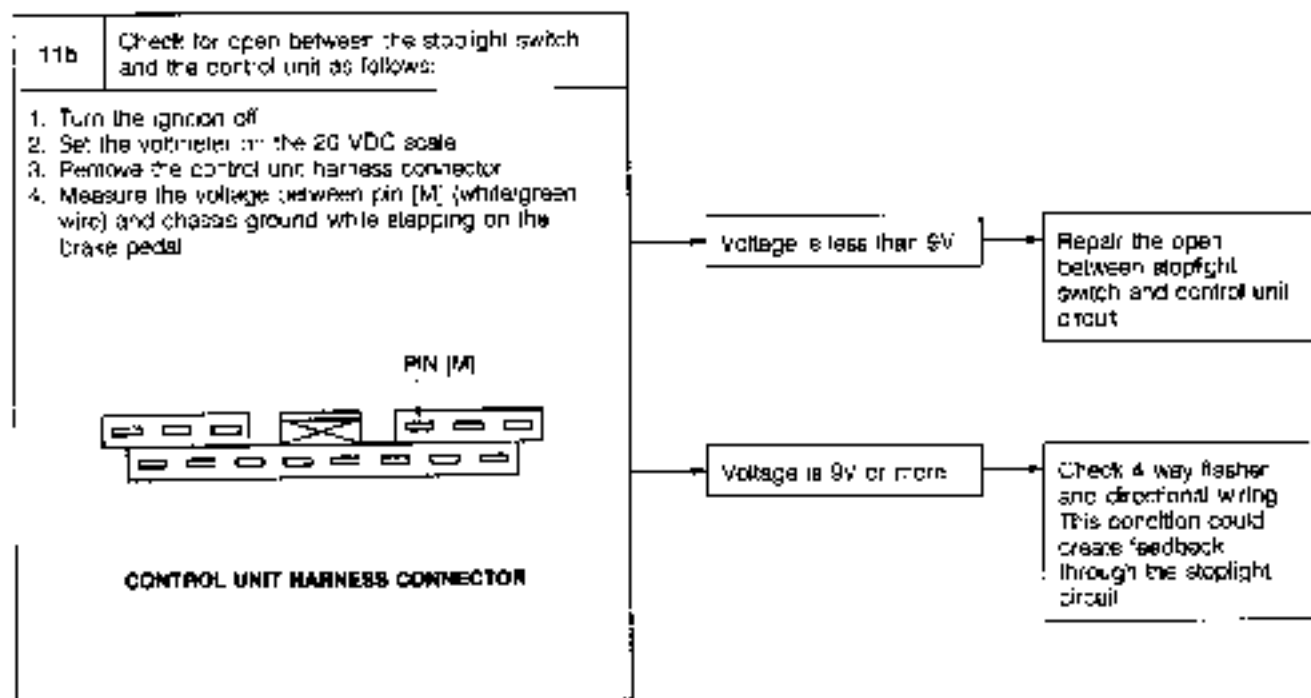
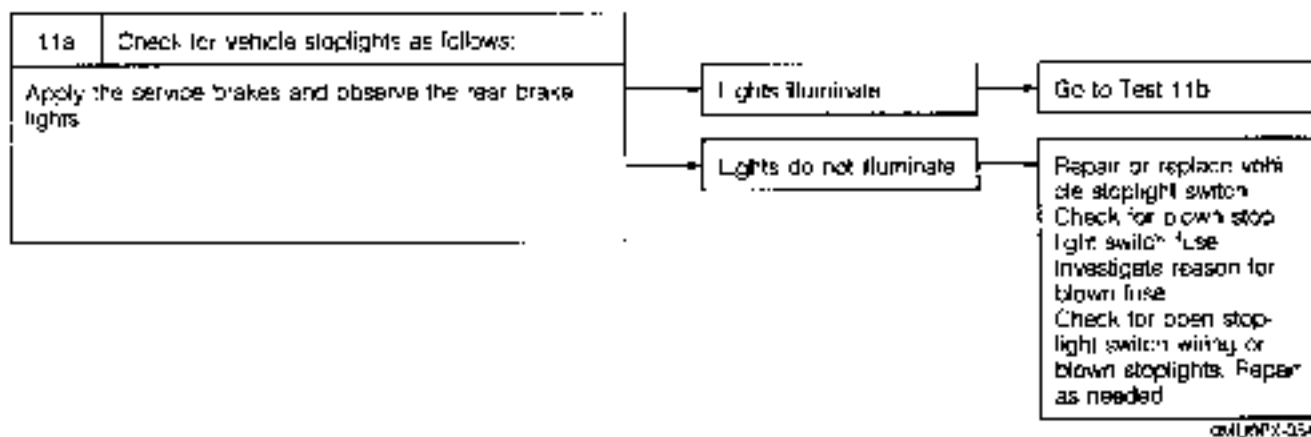
Resistance greater than 20k ohms

Replace control unit

FBJOPX-044
P-49

ABS-11

Stoplight switch always closed or stoplight switch circuit defective (Condition indicated only when driving above 88 km/h (55 mph))



ABS-12	(12 flashes should not occur)

After repeated attempts to take the flashing pattern, 12 flashes are still obtained	Replace control unit

CMUCPX-058

ABS-13	Control unit speed circuit phase lock loop failure detected during control unit self-test

	Replace control unit

DMUCPX-057

ABS-14	Control unit program check sum failure detected during self test

	Replace control unit

DMUCPX-060

ABS-15	Control unit RAM failure detected during self-test

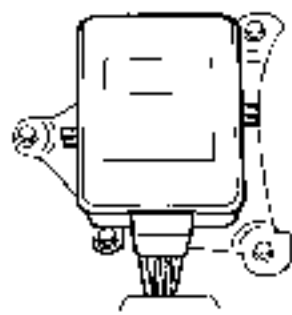
	Replace control unit

DMUCPX-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

CMUCPX-063



10U074066

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.

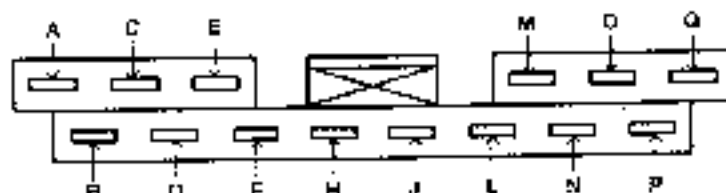
Va: Battery voltage

Tester connection () indicates wire color	Measured item	Remark	Resistance (Battery cable off)	Voltage (IG switch ON)
L (G) - G (L)	Speed sensor	—	Approx. 4 kΩ	—
P (L/W) - Ground	Battery	—	∞	Va
N (R) - Ground	Pressure differential switch (PBS)	Parking sw. ON	1Ω	Va
		Parking sw. OFF	540Ω	
L (G) - Ground	Speed sensor	—	∞	—
H (R/L) - Ground	RFW control unit (4x4 only)	4x2 mode	∞	—
		4x4 mode	0Ω	
F (O/W) - Ground	Pressure switch (Hydraulic unit)	—	∞	—
D (LU) - Ground	Warning alarm	—	Approx. 23Ω	Va
B (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
O (L/W) - Ground	Battery	—	∞	Va
O (L) - Ground	Speed sensor	—	∞	—
M (W/G) - Ground	Staight switch	Switch ON	Approx. 1.0Ω	Va
		Switch OFF		0V
E (Y) - Ground	Check connector	—	∞	0V
U (U) - Ground	Isolation solenoid	—	3-5Ω	0V
A (O/L) - Ground	Dump solenoid	—	1-3Ω	0V
L (B) - Ground	Ground	—	Continually	—

2B-J0P(X) 023

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

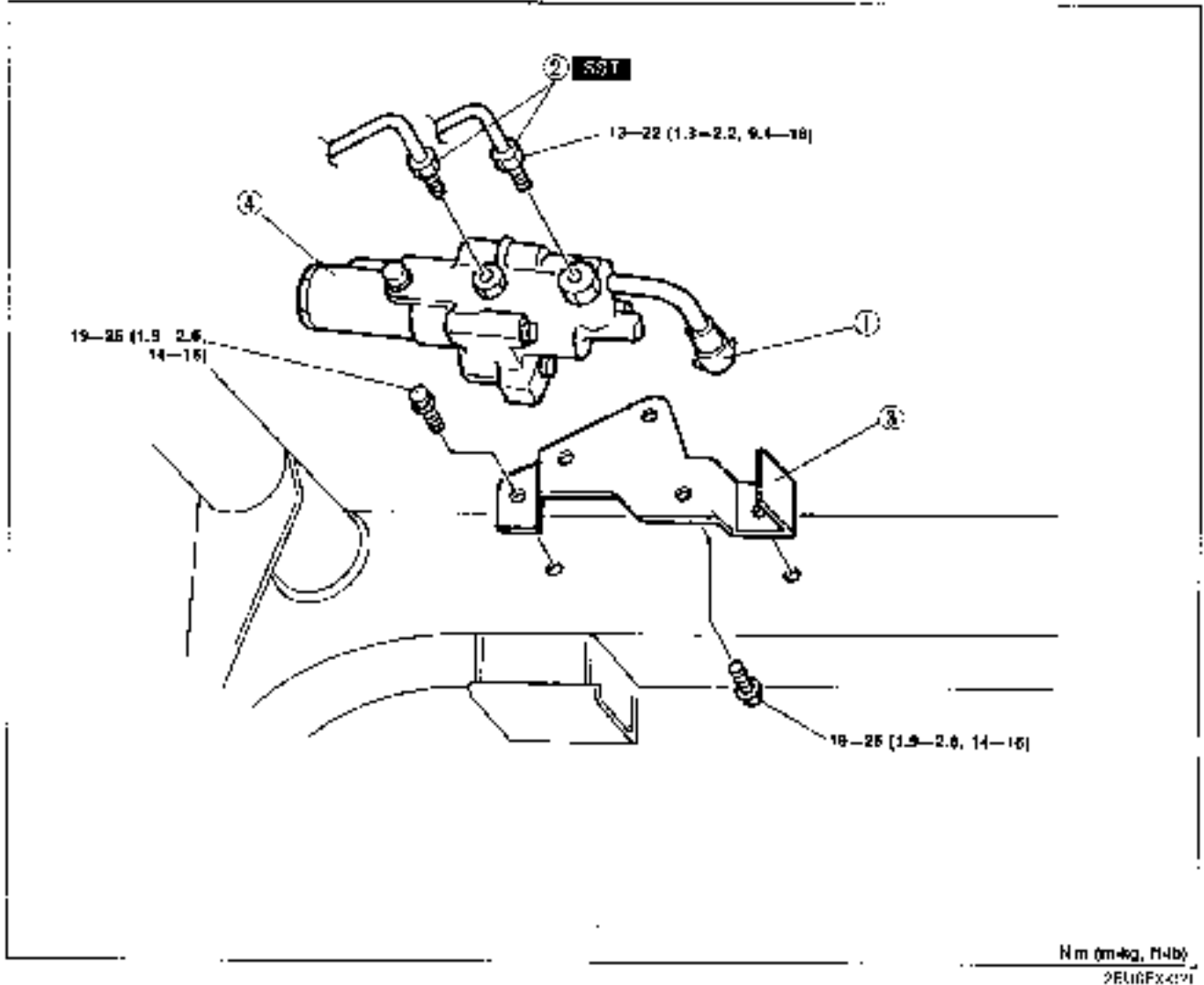
HYDRAULIC UNIT

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.



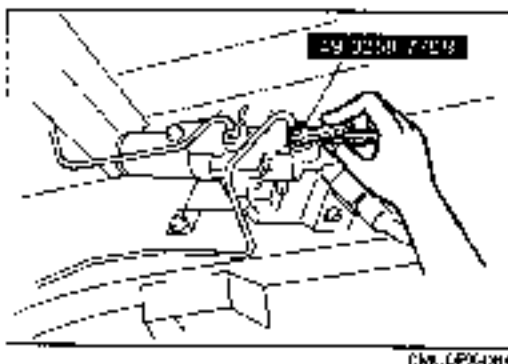
1. Harness coupler

2. Brake pipe

Removal Note ... below

3. Hydraulic unit bracket

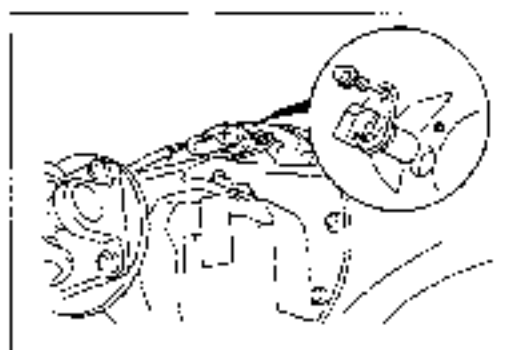
4. Hydraulic unit



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.

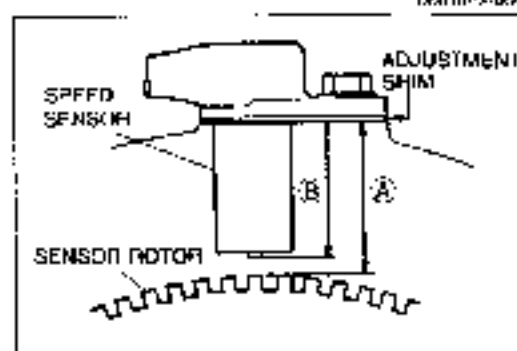


O-RING

DWLDPX 086

Inspection**Sensor O-ring**

1. Check the sensor O-ring for damage and replace if necessary.



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

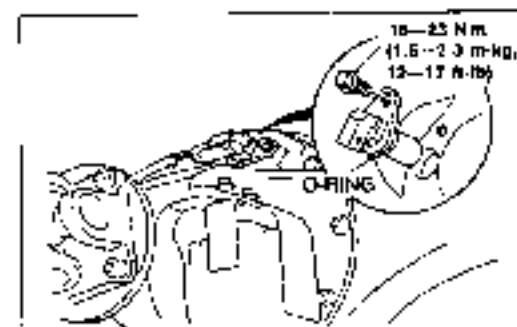
B2600: 0.5—1.2mm (0.020—0.047 in)

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 088



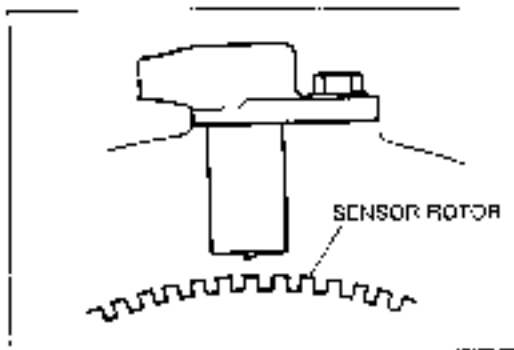
DWLDPX 089

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)

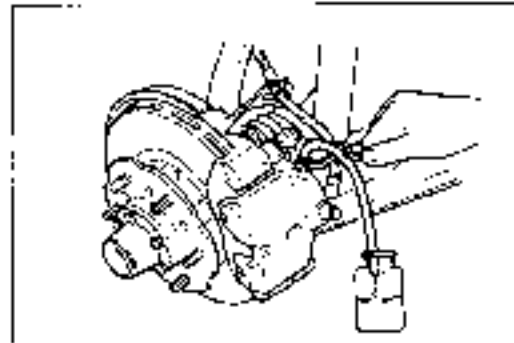


GMJ06X2476

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.)



GMJ06X3071

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.



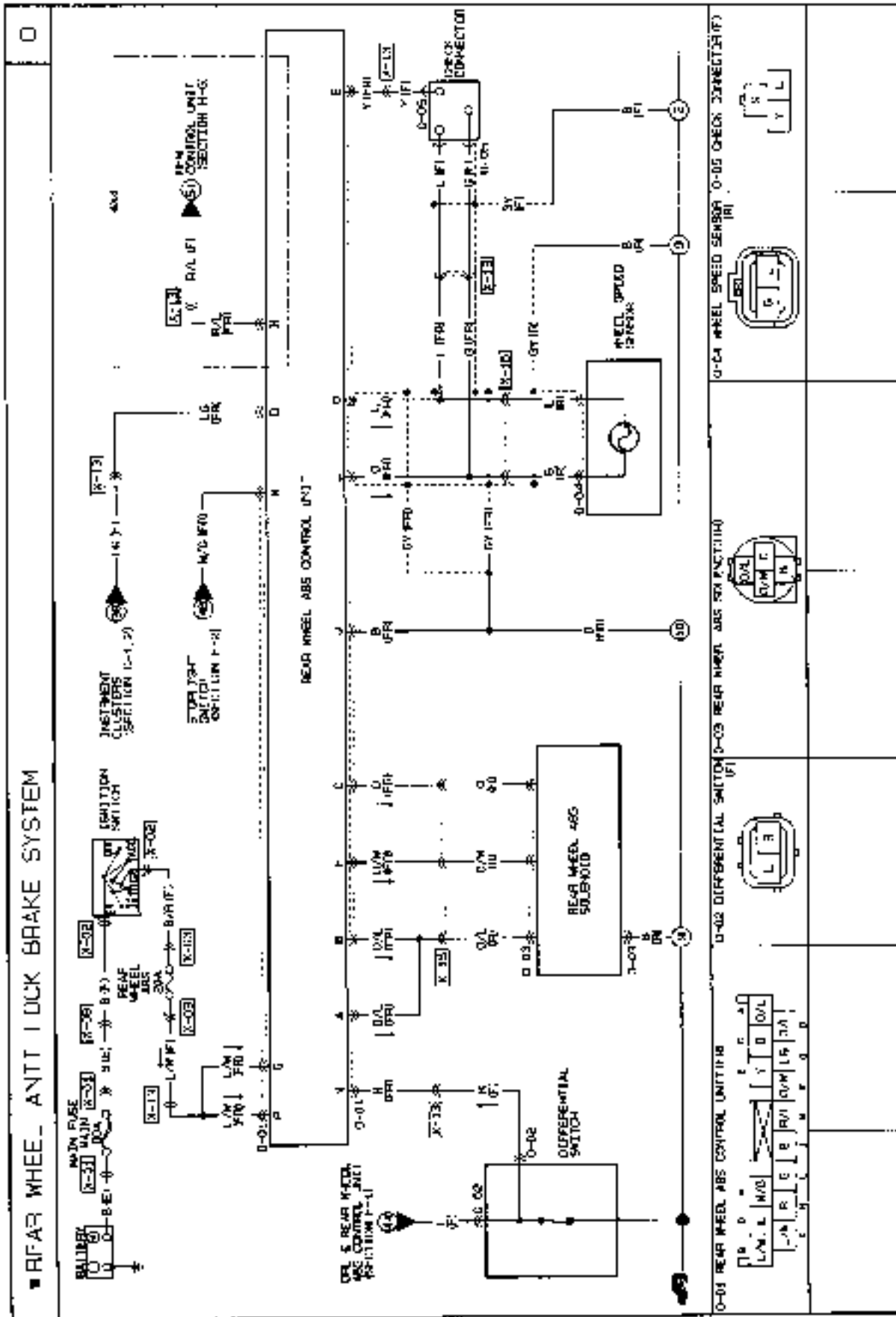
GMJ06X2474

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

OUTLINE	Q- 2
SPECIFICATIONS.....	Q- 2
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WHEELS AND TIRES	Q- 3
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NOTES REGARDING TIRE REPLACEMENT.....	Q- 3
INSPECTION AND ADJUSTMENT.....	Q- 3
REMOVAL AND INSTALLATION.....	Q- 4
TIRE ROTATION	Q- 5
WHEEL BALANCE ADJUSTMENT	Q- 5

999-1000-1001

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)			
	Type	Stylo or Non-styled			
Tires	Size	P210/75R15 P235/75R15	T155/80D16	P205/75H14	T145/80D16
	Air pressure kPa (kgf/cm ² , psi)	Front	190 (2.0, 28)	180 (1.8, 26)	415 (4.2, 60)
		Rear	210 (2.2, 31)	240 (2.5, 35)	

23000X001

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 Sections E1, E2 Sections 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 Stuck 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

12000X 001

WHEELS AND TIRES

SPECIAL NOTES ABOUT WHEELS AND TIRES

Do not use wheels or tires other than the specified types.

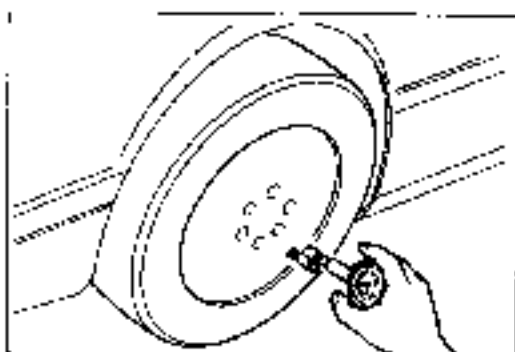
EBLCCX-003

NOTES REGARDING TIRE REPLACEMENT

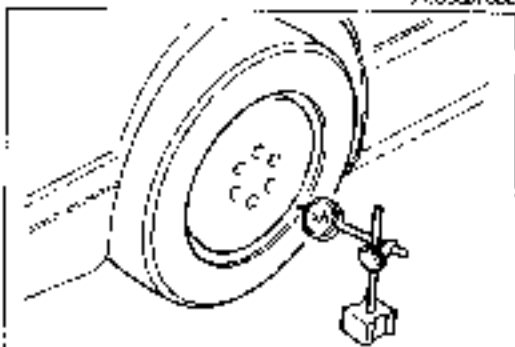
Note the following points when tires are to be removed from or mounted onto the wheels.

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/cm², 35.55—42.66 psi). Check to be sure that the bead is seated correctly onto the rim and that there are no air leaks. Then reduce the pressure to the specified level.

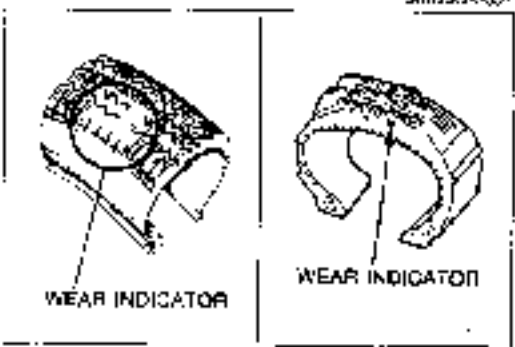
GBLCCX-004



9MUDCX-006



9MUDCX-007



6MUDCX-008

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

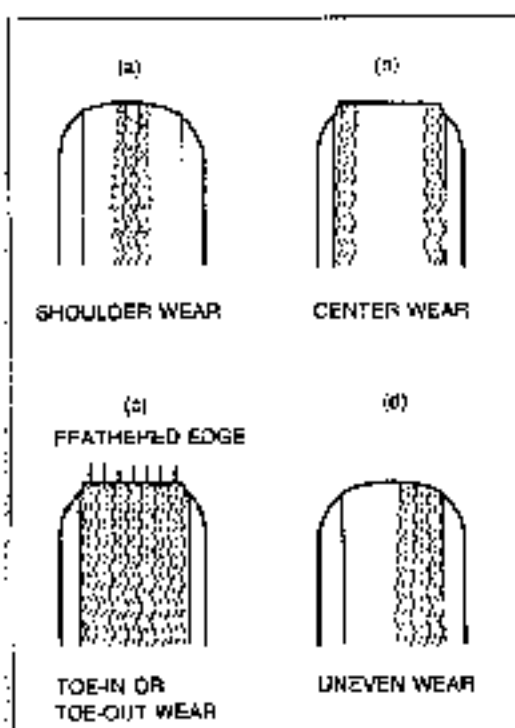
Remaining tread

Ordinary tires: 1.6mm (0.063 in) min.

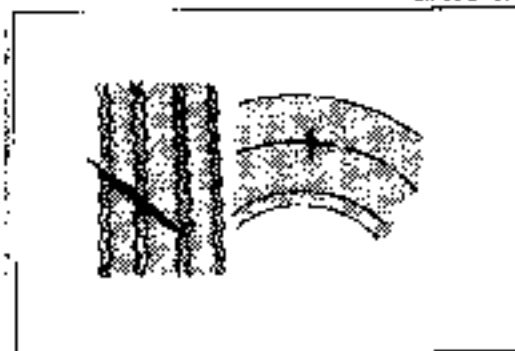
(Tire should be replaced if wear indicators are exposed.)

Snow tires: 50% of tread

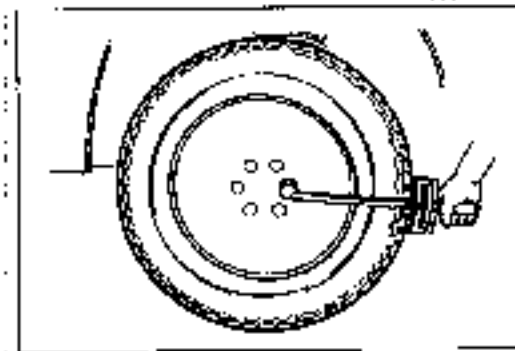
(Tire should be replaced if wear indicators are exposed.)



EMUDUX-009



W9L-12X-004



25LCCX-002

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)	• Inflation (both sides worn) • Incorrect camber (one side worn) • Hard cornering • Lack of rotation	• Measure and adjust pressure • Repair or replace axle and suspension parts • Reduce speed • Rotate tires
(b)	• Overinflation • Lack of rotation	• Measure and adjust pressure • Rotate tires
(c)	• Incorrect toe-in	• Adjust toe-in
(d)	• Incorrect camber or caster • Malfunctioning suspension • Unbalanced wheel • Out-of-round brake drum or disc • Other mechanical conditions • Lack of rotation	• Repair or replace axle and suspension parts • Repair or replace • Balance or replace • Correct or replace • Rotate tires

4. Cracks, damage, or foreign matter (such as metal pieces, nails, and stones) in the tire and cracks, deformation, and damage to the wheel
5. Loose wheel lug nut(s)
6. Air leaking from valve stem

REMOVAL AND INSTALLATION

Tighten the lug nuts to the specified torque in a crisscross fashion.

Tightening torque**Non-styled wheel:**

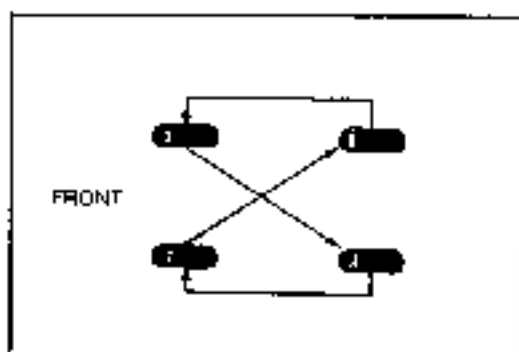
88—118 N·m (9.0—12.0 m·kg, 65—87 ft·lb)

Styled wheel:

118—147 N·m (12.0—15.0 m·kg, 87—108 ft·lb)

Caution

- a) The wheel-to-hub contact surfaces must be clean.
- b) Never apply oil to the nuts, bolts, or wheels; doing so might cause looseness or seizure of the lug nuts.



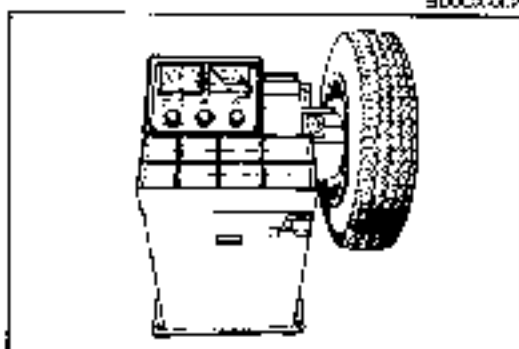
BU00X-007

TIRE ROTATION

To prolong tire life and assure uniform tire wear, rotate the tires every 8000 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.)

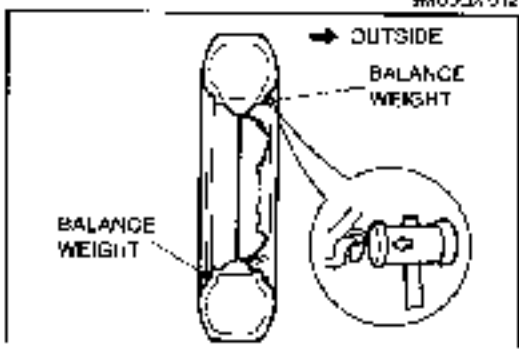


9MU00X-012

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)



09113QX-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.

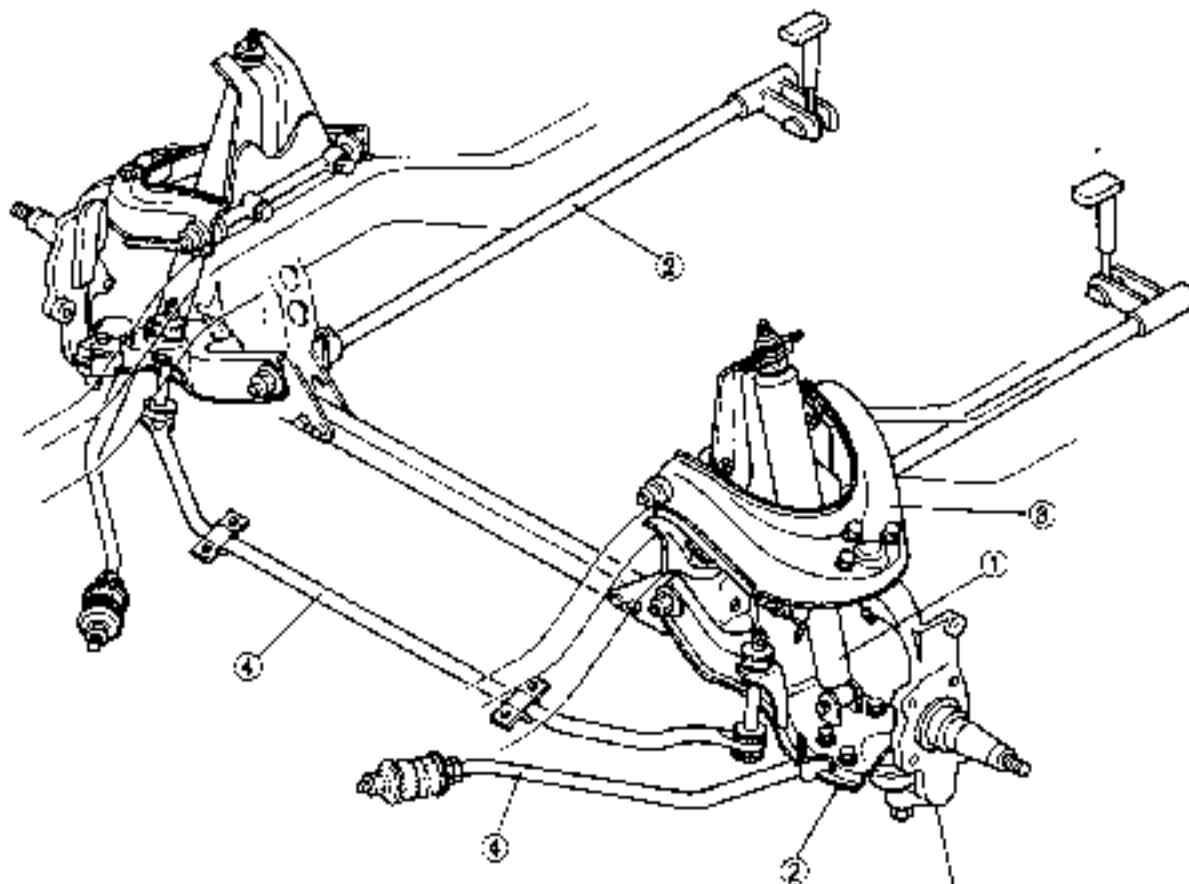
SUSPENSION

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LOWER ARM (4x4)	R-16
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25LCPAL001

INDEX

FRONT SUSPENSION (4x2)



FRONT WHEEL ALIGNMENT

TOTAL TOE-IN: $3 \pm 3\text{mm}$ (0.12 in. $\pm$ 0.18 in.)MAXIMUM STEERING ANGLE: $35^{\circ}00' \pm 2^{\circ}$ (INNER) $33^{\circ}00' \pm 2^{\circ}$ (OUTER)CAMBER ANGLE: $0^{\circ}45' \pm \frac{1}{2}^{\circ}$ 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

SOLUCRY 002

1. Shock absorber

Removal, inspection, and
installation page R-10

2. Torsion bar spring and lower arm

Removal page R-11
Inspection page R-13
Installation page R-13

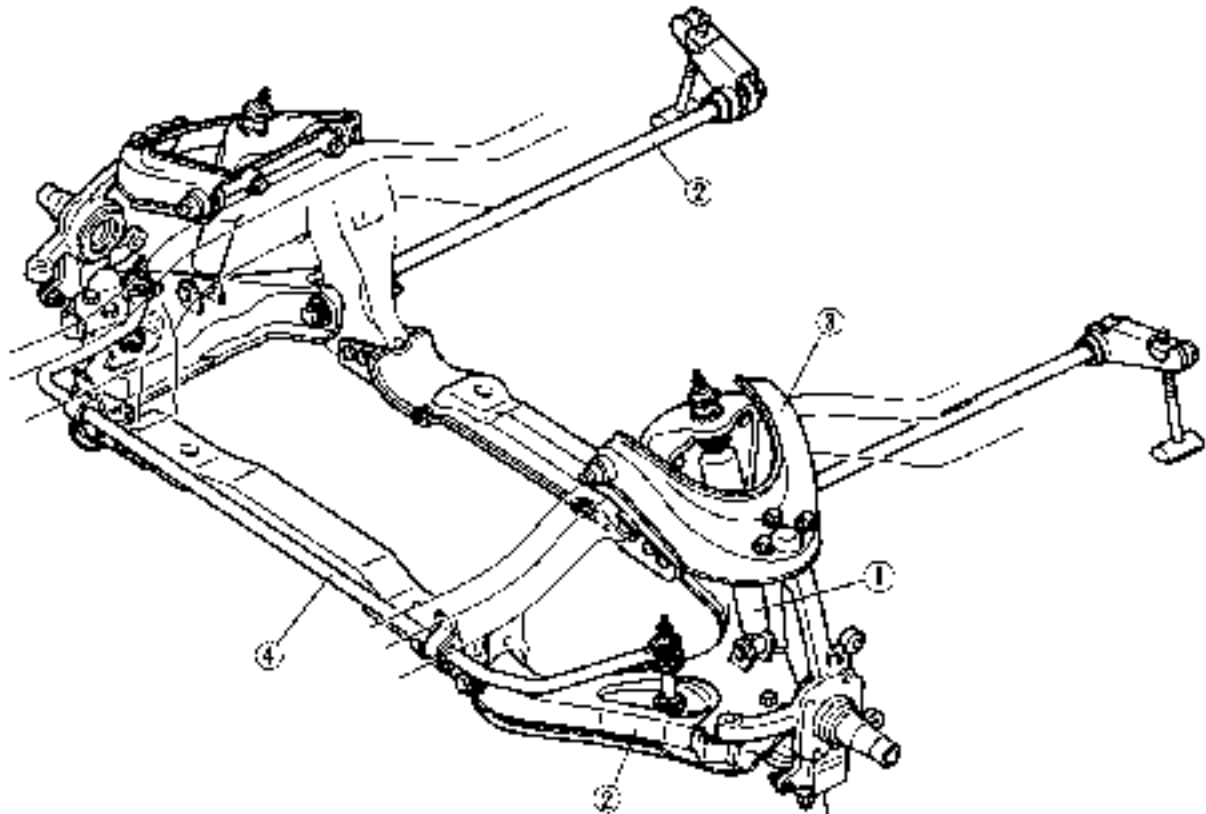
3. Upper arm

Removal and installation page R-21
Inspection page R-23

4. Stabilizer and tension rod

Removal and inspection page R-24
Installation page R-25

FRONT SUSPENSION (4x4)



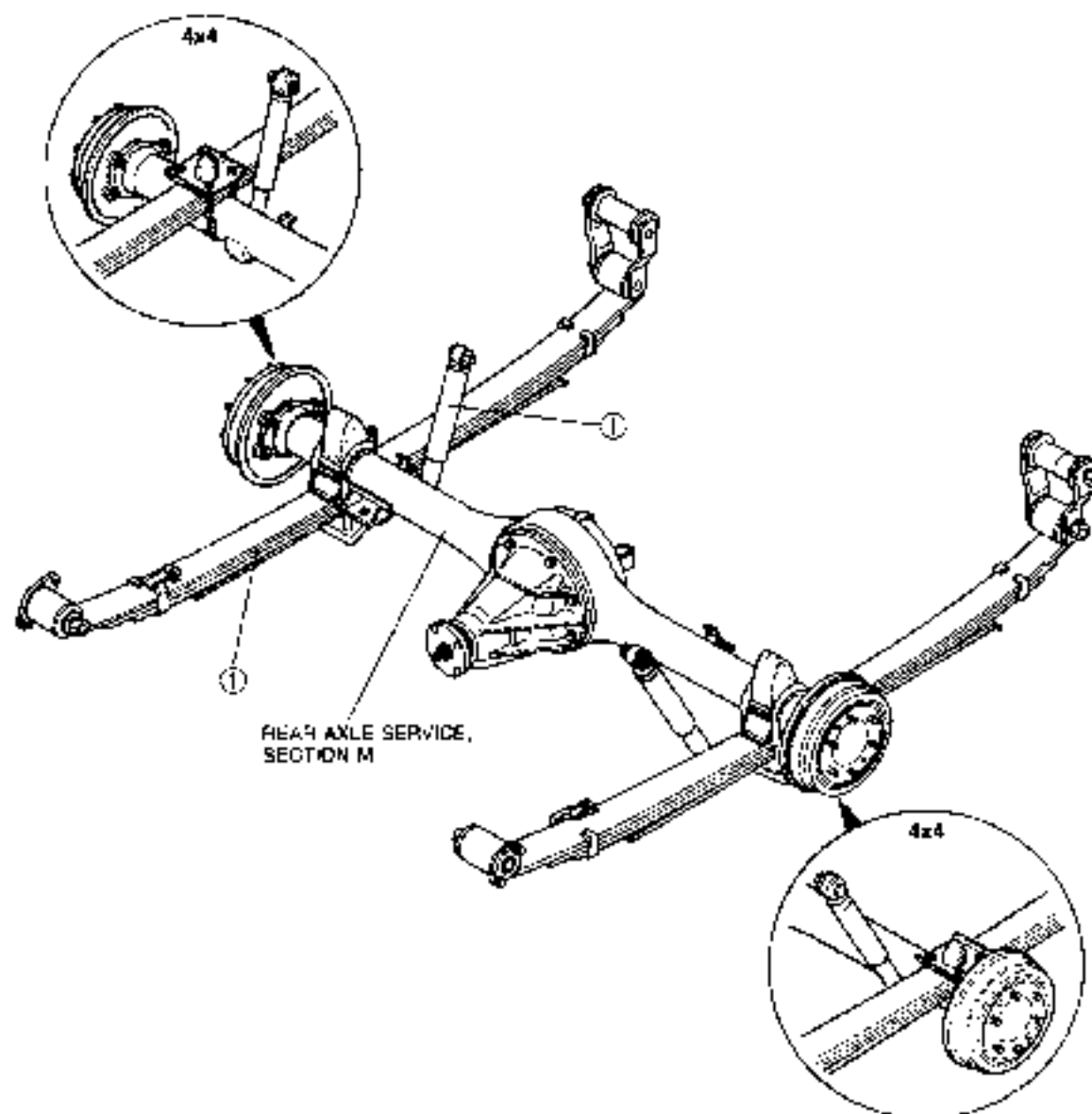
FRONT WHEEL ALIGNMENT

TOTAL TOE-IN: $3 \pm 3\text{mm}$ (0.12" to 0.12" in, 18" = 18")MAXIMUM STEERING ANGLE: $33^{\circ}30' \pm 2^{\circ}$ (INNER)
 $33^{\circ}00' \pm 2^{\circ}$ (OUTER)CAMBER ANGLE: $1^{\circ}00' \pm \frac{5}{16}^{\circ}$ CASTER ANGLE: $2^{\circ}00' \pm 45'$ KINGPIN ANGLE: $10^{\circ}20'$ KNUCKLE ASSEMBLY SERVICE,
SECTION M

1 Shock absorber			
Removal, Inspection and			
Installation.....	page R-10		
2 Torsion bar spring and lower arm			
Removal.....	page R-16		
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Installation.....	page R-18		
3. Upper arm			
Removal and Installation.....	page R-21		
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4 Stabilizer			
Removal and Inspection.....	page R-26		
Installation.....	page R-27		

29A11R00-001

REAR SUSPENSION (4x2 and 4x4)



2500FX CH

1. Shock absorber and test springs

Removal and inspection ... page R-28

Installation ... page R-30

OUTLINE

SPECIFICATIONS

Item		Model	4x2	4x4
Front Suspension				
Suspension type			Double wishbone	
			Torsion bar spring	
Springs	Type			
	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 ± 20)	1,825 ± 255 (186 ± 25, 409 ± 57)
		Compressed	245 ± 59 (25 ± 6, 56 ± 13)	530 ± 98 (54 ± 10, 119 ± 22)
	Turning angle		35°00' ± 2°	33°30' ± 2°
Front wheel alignment (*Unladen condition)	Total lean	mm (in)	3 ± 3 (0.12 ± 0.12)	
	Camber angle	degree	18 ± 18°	
	Caster angle		0°45' ± 3°	1°00' ± 3°
	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)
Rear Suspension				
Suspension type			Leaf spring	
			Semi-elliptical spring	
Springs	Type			
	Dimensions (length x width x thickness)	mm (in)	1,566 x 60 x 7 (61.66 x 2.36 x 0.28) 1,102 x 60 x 6 (43.37 x 2.36 x 0.24) 366 x 60 x 6 (38.03 x 2.36 x 0.24) 790 x 60 x 14 (31.10 x 2.36 x 0.55)	1,422 x 60 x 9 (55.98 x 2.36 x 0.35) 579 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 (25.16 x 2.36 x 0.47)
Shock absorbers	Type		Cylindrical double-acting	
	Damping force N (kg, lb) at 0.3 m/s	Extended	687 ± 108 (70 ± 11, 154 ± 24)	1,079 ± 167 (110 ± 17, 242 ± 37)
		Compressed	471 ± 98 (48 ± 10, 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, 26 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 adjust front wheel alignment Problem related to steering system Problem related to wheels and tires	Replace Replace Replace Adjust — —	R-11, 16 R-24, 26 R-10, 28 R-7 Section N Section Q
"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, 26 R-7 Section N Section Q

280218-005

WHEEL ALIGNMENT

PRE-INSPECTION

1. Check the tire inflations and set to the recommended pressure if necessary.
2. Inspect the front wheel bearing play and correct if necessary.
3. Inspect the wheel and tire runout.
4. Inspect the ball joints and steering linkage for any excessive looseness.
5. The vehicle must be on level ground and have no luggage or passenger load.
6. The difference in height between the left and right sides from the center of the wheel to the fender brim must not exceed **10mm (0.39 in.)**.

J2430-K-003

FRONT WHEEL ALIGNMENT

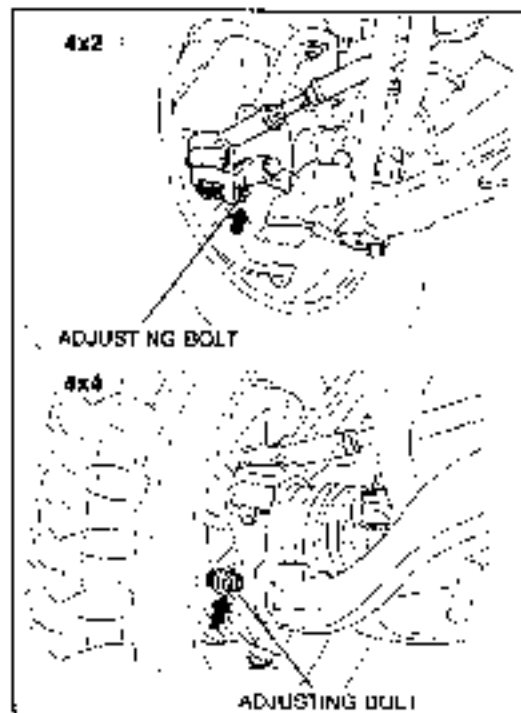
Specifications

Item			Specifications	
			4x2	4x4
Front wheel alignment (*1: Inflation)	Total laser	mm (in)	3 ± 3 (0" $\pm$ 0" $\pm$ 2)	
		degree	$10' \pm 10'$	
	Maximum steering angle	Inner	$35^{\circ}00' \pm 2^{\circ}$	$33^{\circ}30' \pm 2^{\circ}$
		Outer	$33^{\circ}00' \pm 2^{\circ}$	$30^{\circ}00' \pm 2^{\circ}$
	Camber angle		$0^{\circ}45' \pm 2'$	$1^{\circ}00' \pm 2'$
	Caster angle		M/S: $0^{\circ}30' \pm 45'$ P/S: $+50' \pm 45'$	$2^{\circ}00' \pm 45'$
	Kingpin angle		$8^{\circ}15'$	$10^{\circ}20'$

M/S: Manual steering P/S: Power steering

J2430-K-003

** Fuel tank full; radiator coolant and engine oil at specified level and spare tire, jack, and tools in designated location.



J2430-K-003

Adjustment

Maximum steering angle

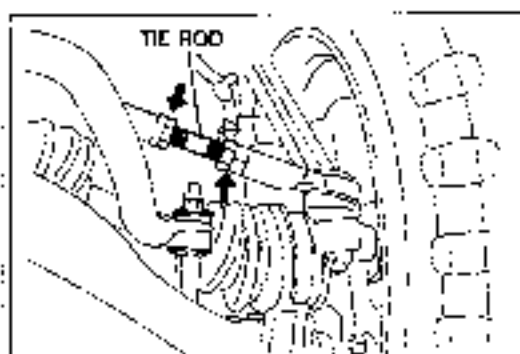
Adjust the turning angle as follows.

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)



2003RXC51

Total toe-in

To adjust the toe-in, loosen the left and right tie rod locknuts, and turn each tie rod an equal amount.

Locknut tightening torque:

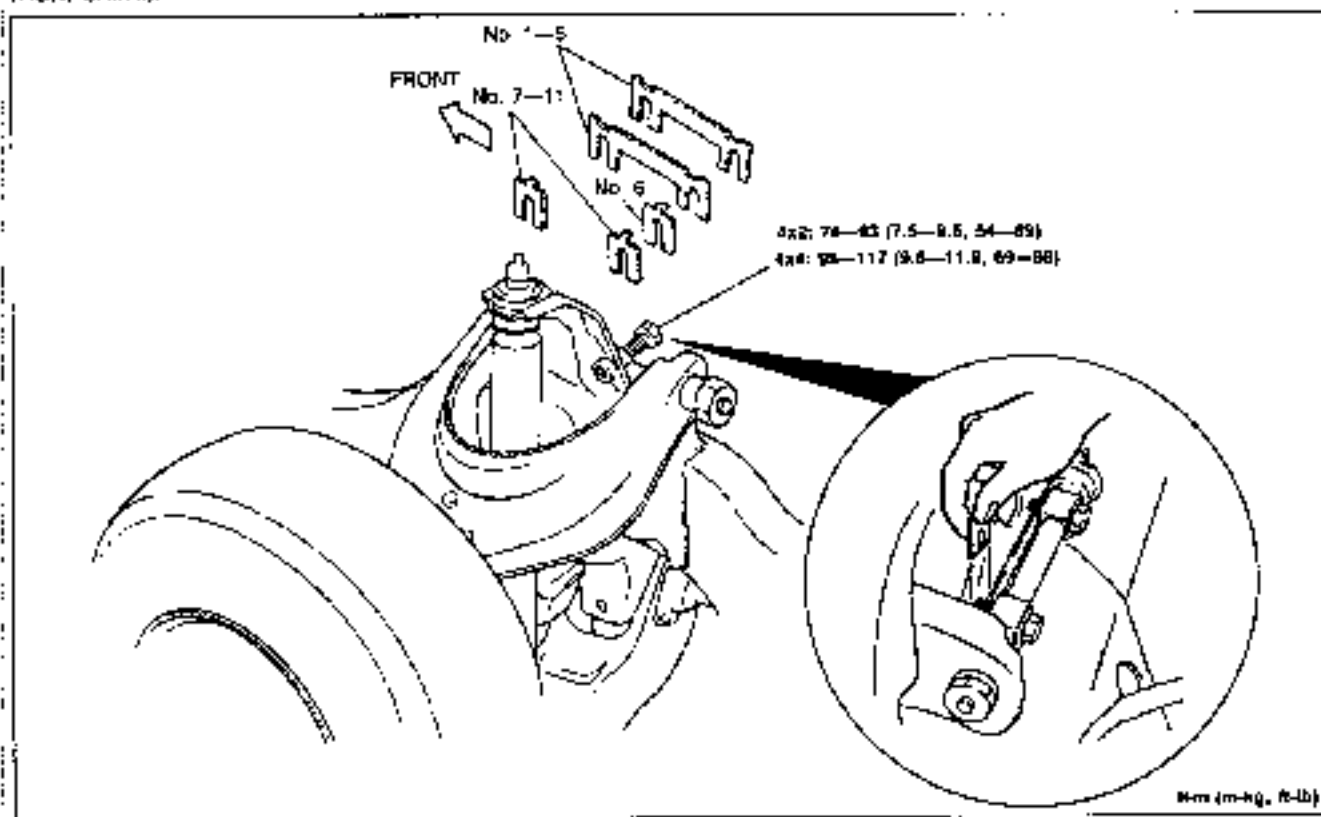
69—78 N·m (7.0—8.0 m·kg, 51—58 ft·lb)

Note

- a) The left and right tie rods are both right threaded. To increase the toe-in, turn the right tie rod toward the front of the vehicle, and turn the left tie rod by the same amount toward the rear.
- b) One turn of the tie rod (both sides) changes the toe-in by about 30mm (1.18 in).

Camber and caster

To adjust the camber and caster angles, loosen the bolts of the upper arm shaft and insert or remove adjustment shims.



N·m (m·kg, ft·lb)

1B JORX-017

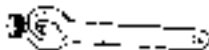
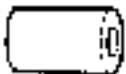
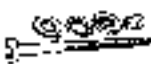
No.	Thickness mm (in)	No.	Thickness mm (in)
1	1.0 (0.004)	7	1.0 (0.004)
2	1.5 (0.063)	8	1.6 (0.063)
3	2.0 (0.079)	9	2.0 (0.079)
4	3.2 (0.126)	10	3.2 (0.126)
5	4.0 (0.157)	11	4.0 (0.157)
6	2.0 (0.079)		

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

49 0777 575 Puller, ball joint 	49 S120 755 Installer, dust boot 	49 0180 510B Attachment, pre-cad measurement 
49 L034 2A0 Lower arm pushing pulser & installer 	49 U034 201 Shaft (Part of 49 U034 2A0) 	49 U034 202 Support block (Part of 49 U034 2A0) 
49 J034 203 Installo: (Part of 49 J034 2A0) 	49 WC34 305 Bearing (Part of 49 U034 2A0) 	49 UR39 615 Bushing puller and installer set 
49 JB39 616 Shaft set (Part of 49 JB39 615) 	49 UB39 617 Support block (Part of 49 UB39 615) 	49 UR39 618 Attachment A (Part of 49 UB39 615) 
49 UB39 619 Attachment B (Part of 49 UB39 615) 	49 U034 204 Installer, dust boot 	

55A000017

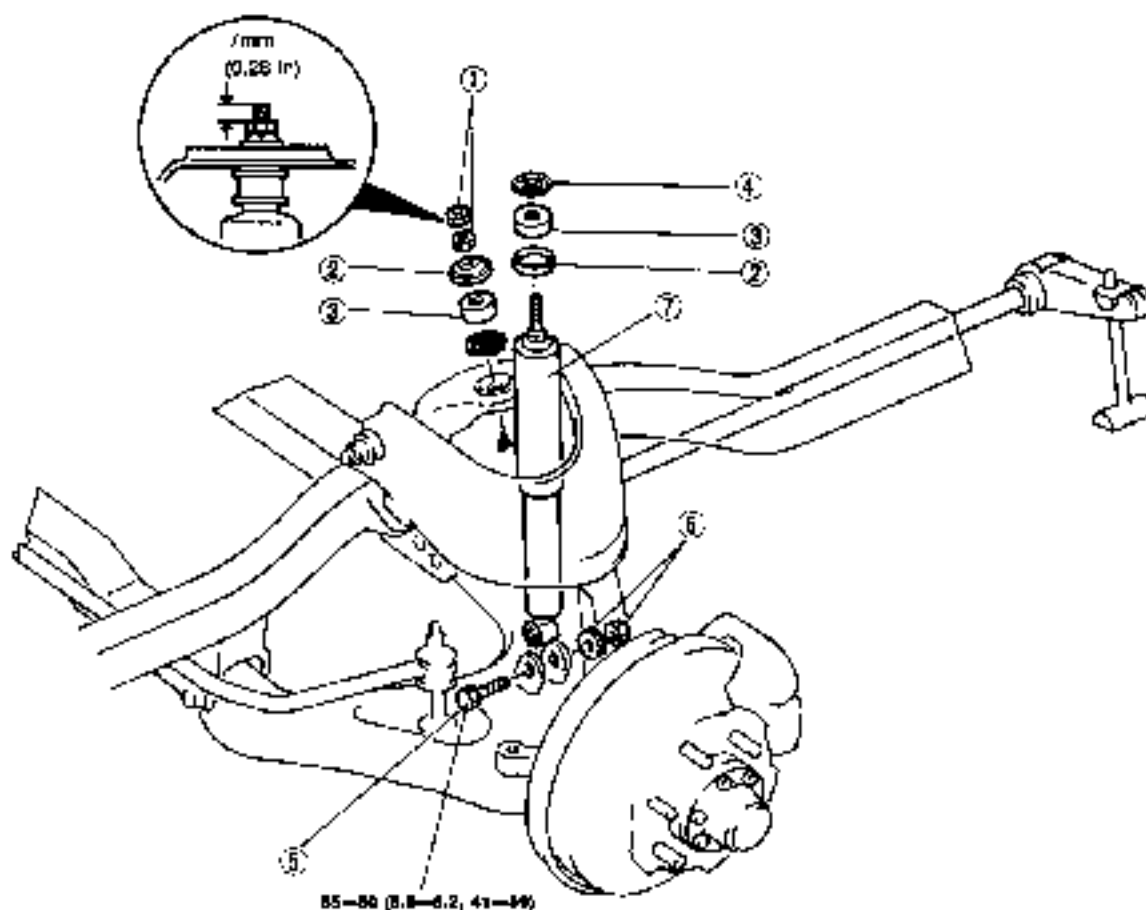
SHOCK ABSORBER (4x2 AND 4x4)**Removal, Inspection and Installation**

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



85-88 (8.8-9.2, 41-44)

Man (88-89, 8-15)
2000x 052

1. Nuts
2. Retainers
3. Bushings

Check for damage or deterioration

4. Retainer

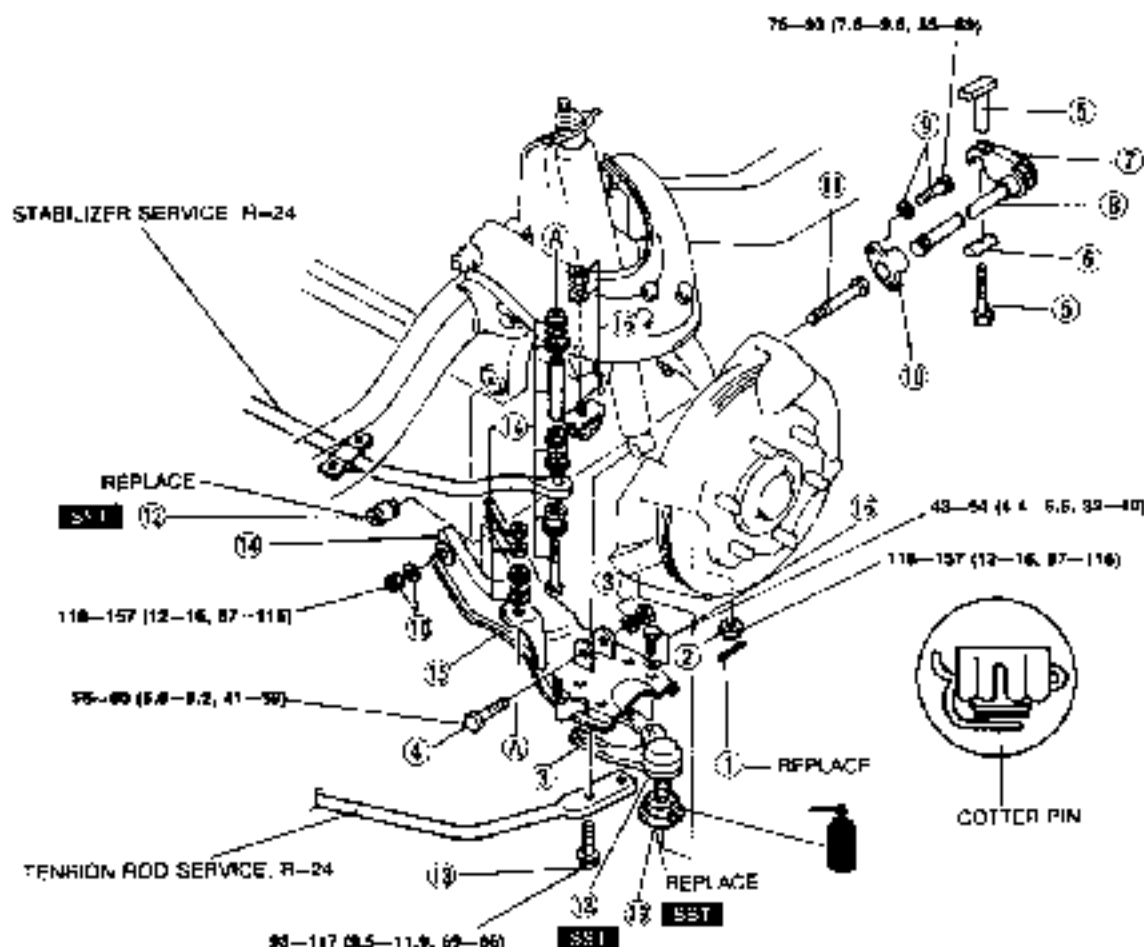
5. Bolt
6. Washer and nut
7. Shock absorber

Check for oil leakage, poor operation, damage, or deterioration

TORSION BAR SPRING AND LOWER ARM (4x2)

Removal

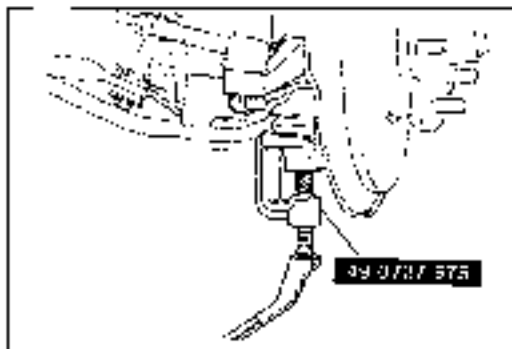
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.



R-11 (R-12, R-13)

2010/10/10

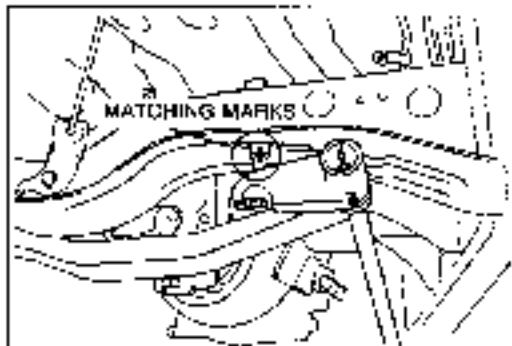
1. Cotter pin	11. Lower arm spindle, washer and nut
2. Nut	12. Rubber bushing
3. Lower arm ball joint, Knuckle arm	Removal and installation page R-12
Removal Note..... page R-12	13. Tension rod ball
4. Bolt, washer, and nut (shock absorber)	14. Bolts, bushings, retainers, spacer, and nuts (stabilizer)
5. Anchor bolt	15. Lower arm
Removal Note..... page R-12	Inspection..... page R-13
6. Anchor swivel	16. Bound bumper, washer and nut
7. Anchor arm	17. Bolts and washer (ball joint)
Inspection..... page R-13	18. Lower arm ball joint
8. Torsion bar spring	Inspection..... page R-13
Removal Note..... page R-12	19. Lower arm ball joint boot
Inspection..... page R-10	Removal Note..... page R-12
9. Bolts and washers	
10. Torque plate	
Inspection..... page R-13	



95LCRX-020

Removal note**Lower arm ball joint/Knuckle arm**

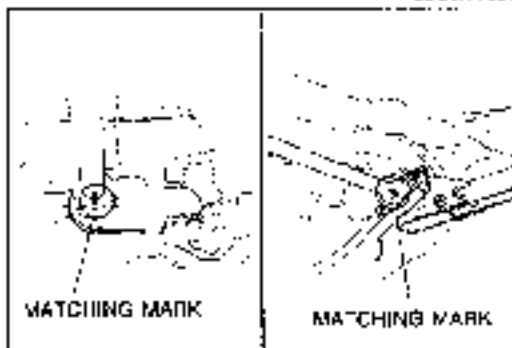
Separate the ball joint from the knuckle arm with the SST.



95LCRX-021

Anchor bolt

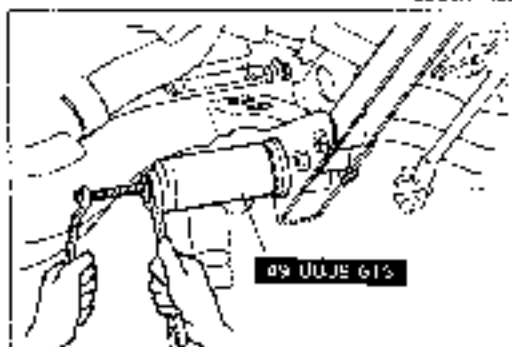
Mark the anchor bolt and swivel for reference during reassembly.



95LCRX-022

Torsion bar spring

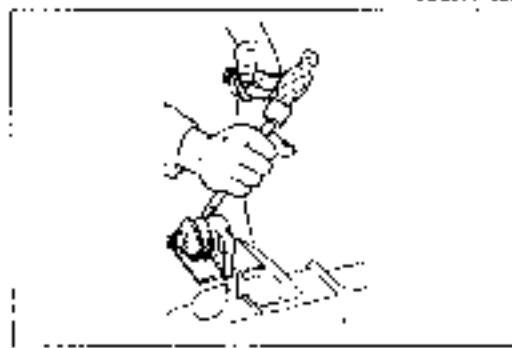
Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



95LCRX-023

Rubber bushing

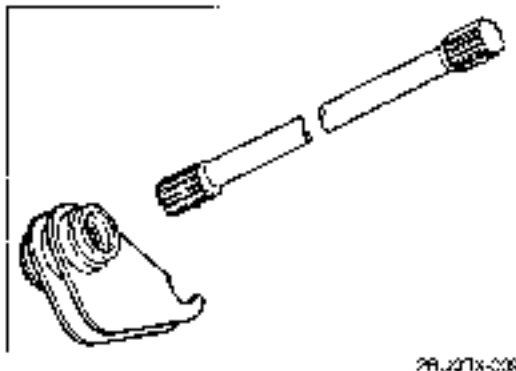
Remove the rubber bushing from the body with the SST. Install the new bushing into the body with the same SST.



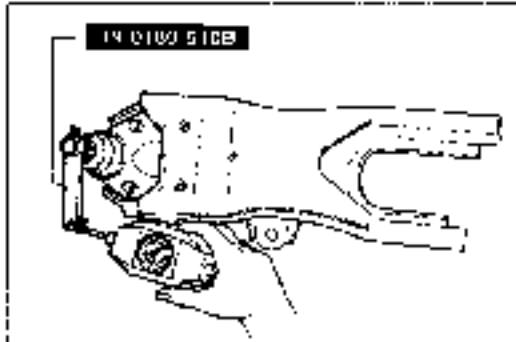
95LCRX-024

Lower arm ball joint boot

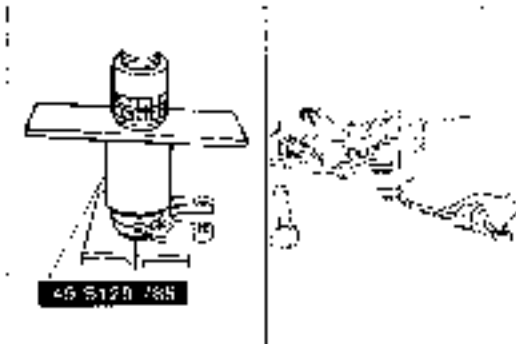
1. Secure the lower arm in a vise protected with brass pads.
2. Use a chisel to remove the boot.



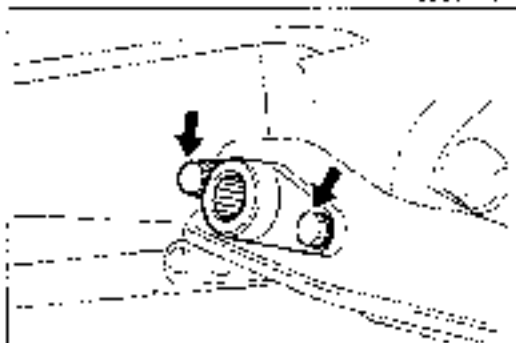
28J07X-009



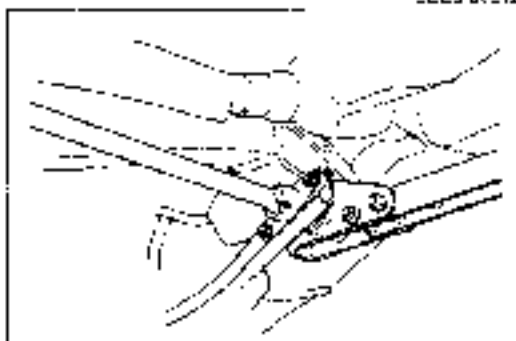
28J07X-010



28J07X-011



28J07X-012



28J07X-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:

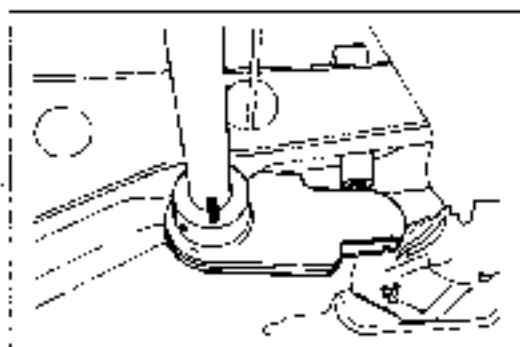
76—93 Nm (7.6—9.5 m·kg, 55—69 ft·lb)

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.

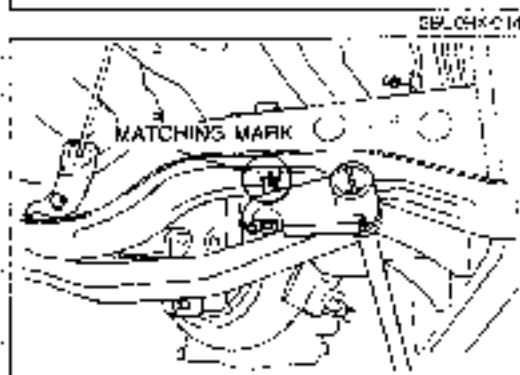
Yellow: Left bar, White: Right bar



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.

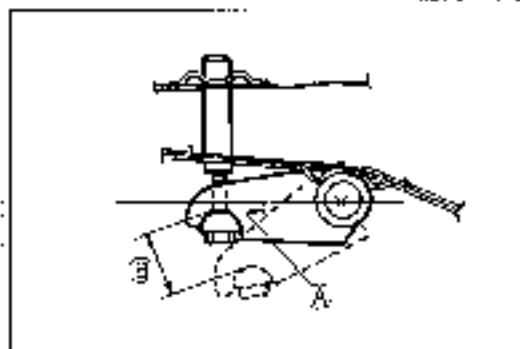


10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.

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 $\textcircled{B}$.

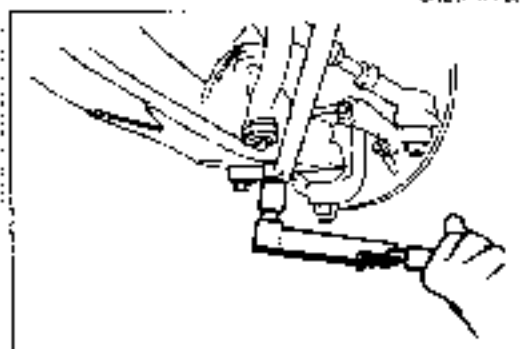


Amount $\textcircled{B}$:

B2200		B2600i
M/T	A/T	M/T and A/T
$45 \pm 1\text{mm}$ ($1.77 \pm 0.04\text{ in}$)	$50 \pm 1\text{mm}$ ($1.97 \pm 0.04\text{ in}$)	$54.5 \pm 1\text{mm}$ ($2.15 \pm 0.04\text{ in}$)

M/T: Manual transmission

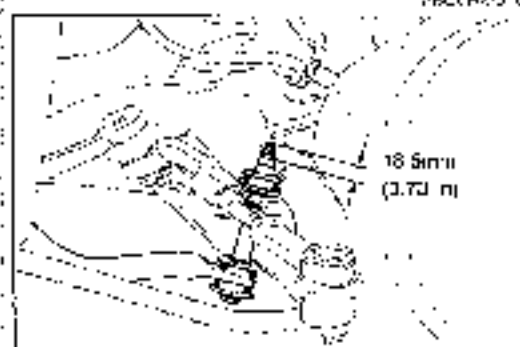
A/T: Automatic transmission



11. Install the tension rod bolt.

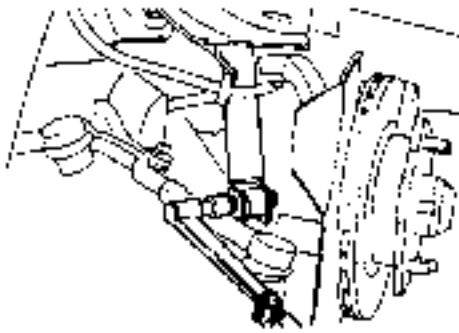
Tightening torque:

93—117 N·m (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.



28J034X D-5

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.

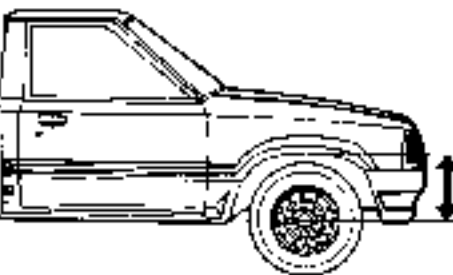
Tightening torque:

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)



28J034X D-2

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 brim.

	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:

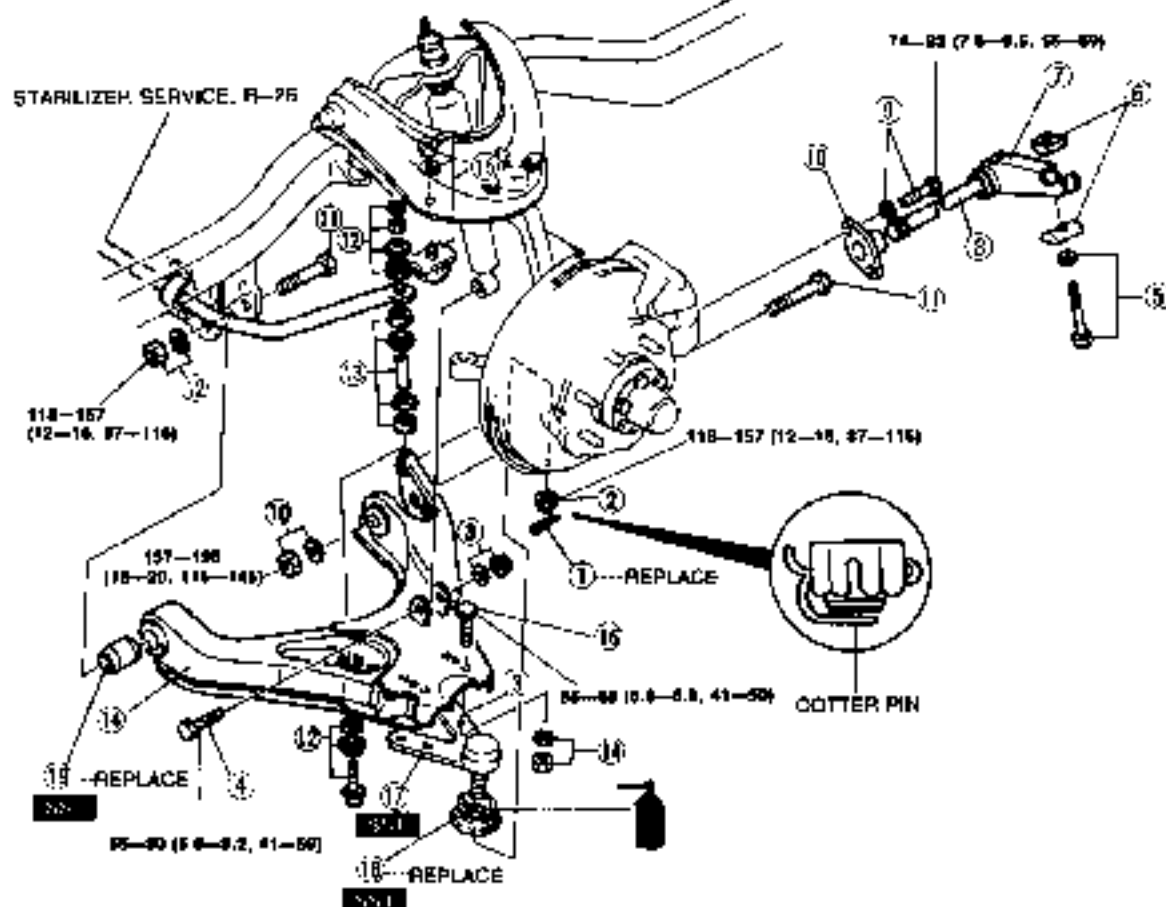
10mm (0.39 in) max.

19. Inspect front wheel alignment and adjust it as necessary.

TORSION BAR SPRING AND LOWER ARM (4x4)

Removal

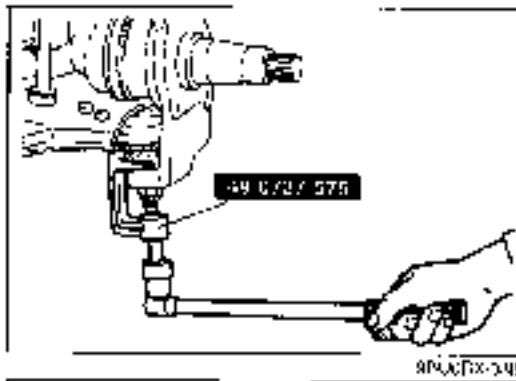
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.



Nm (m·kg, ft·lb)

2BU0R4 029

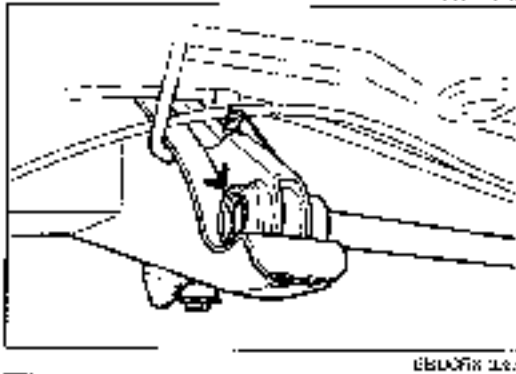
1. Cotter pin	
2. Nut	
3. Lower arm ball joint, Knuckle arm	
Removal Note	page R-17
4. Bolt, washer and nut (Shock absorber)	
5. Anchor bolt and washer	
6. Anchor swivel	
7. Anchor arm	
Removal Note	page R-17
Inspection	page R-18
8. Torsion bar spring	
Removal Note	page R-17
Inspection	page R-18
9. Bolts and washers	
10. Torque plate	
Inspection	page R-18
11. Lower arm spindle (rear), washer and nut	
12. Lower arm spindle (front), washer and nut	
13. Bolt, bushings, retainers, spacer and nuts (stabilizer)	
14. Lower arm	
Inspection	page R-18
15. Sound bumper, washer, and nut	
16. Bolts, washers and nuts	
17. Lower arm ball joint	
Inspection	page R-18
18. Lower arm ball joint bush	
Removal Note	page R-17
19. Lower arm bushing	
Removal Note	page R-18



Removal note

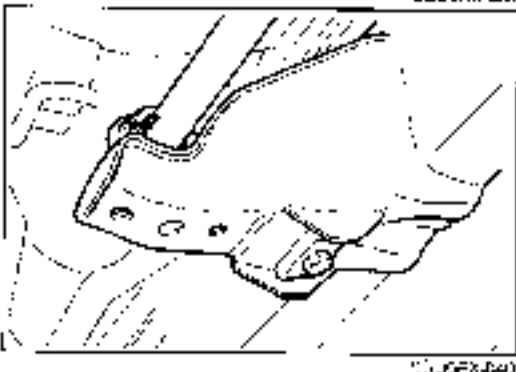
Lower arm ball joint/Knuckle arm

Separate the ball joint from the knuckle arm with the **SST**.



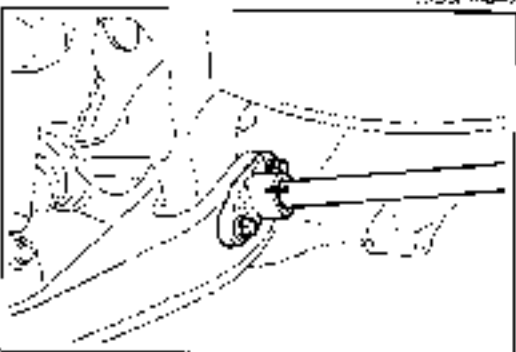
Anchor arm

Mark the anchor arm and body for reference during reassembly.



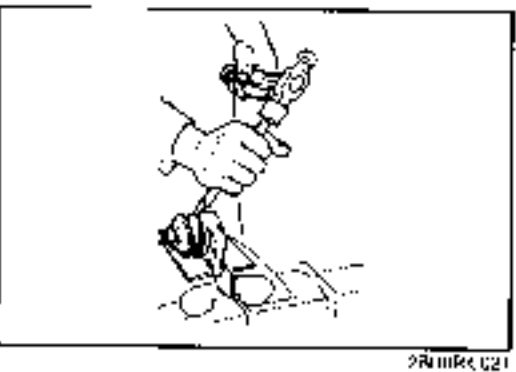
Torsion bar spring

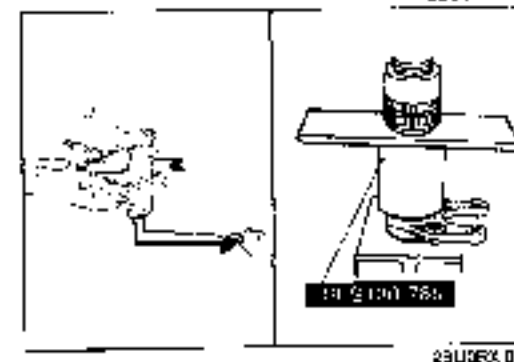
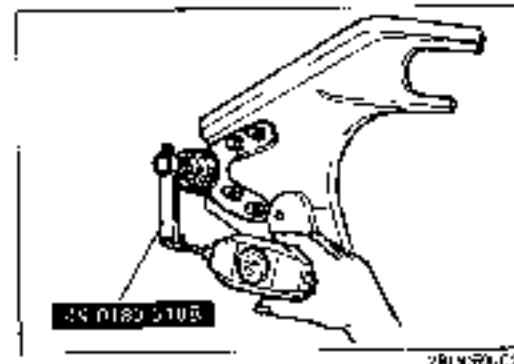
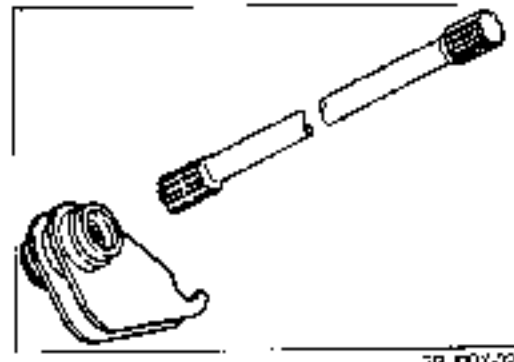
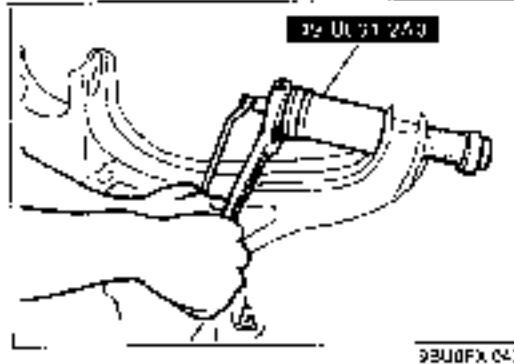
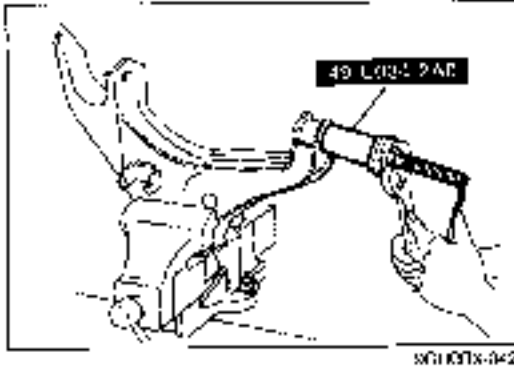
Mark the torsion bar spring and anchor arm and the torsion bar spring and torque plate for reference during reassembly.



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)

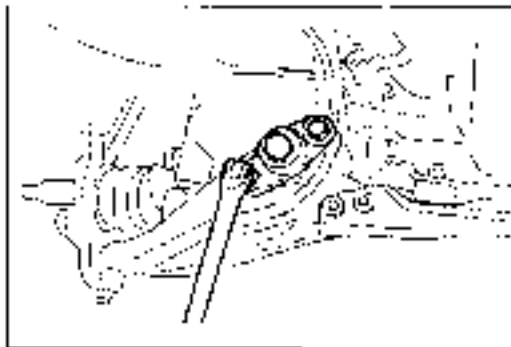
Installation

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)

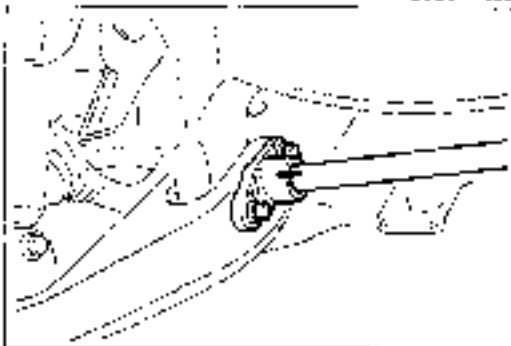


28J0R1-005

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)



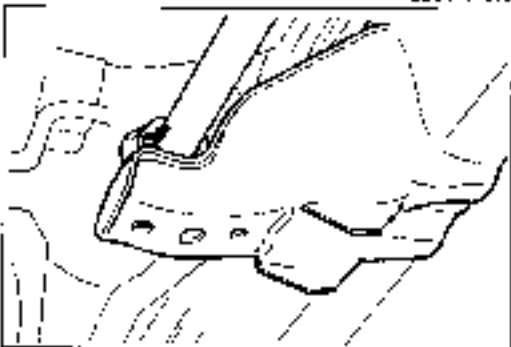
28U7X1-006

8. Align the marks made during removal, and connect the torsion bar spring into the torque plate.

Caution

- Coat the serrations of the torsion bar with grease.
- Before installation, check the identification color on the end of torsion bar spring.

Yellow: Left bar, White: Right bar

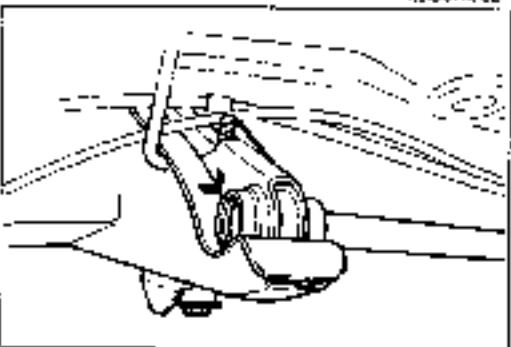


28U0K1-007

9. Align the marks made during removal, and install the anchor arm onto the torsion bar spring.

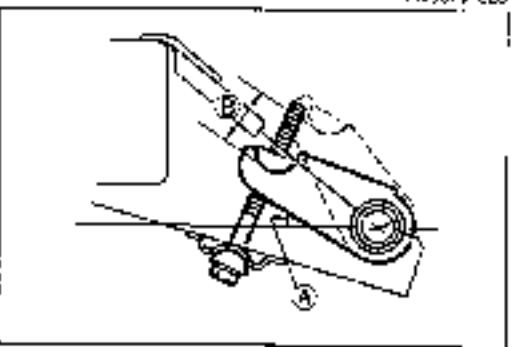
Caution

Coat the serrations of the torsion bar with grease.



28J10P7-008

10. Install the anchor bolt, and tighten it until the marks made during removal are aligned.



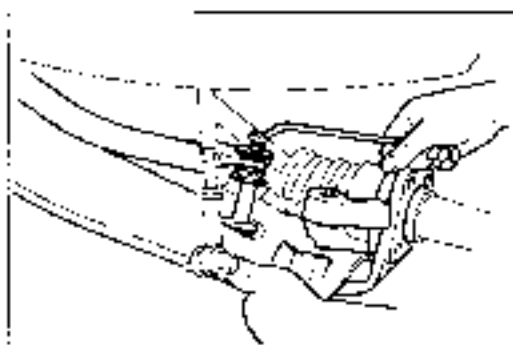
DELCPK-009

Note

If the anchor bolt was not marked during removal, install it as follows:

- Lower the front suspension until the upper arm contacts the rebound stopper.
- Install the anchor arm so that the angle (A) is 47°.
- Install the anchor bolt and tighten it by the amount (B).

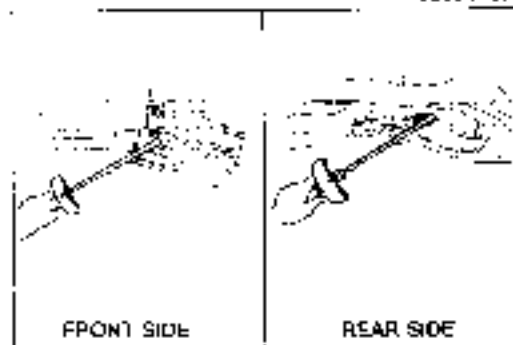
Amount (B): 40mm (1.57 in)



2BL1R2-006



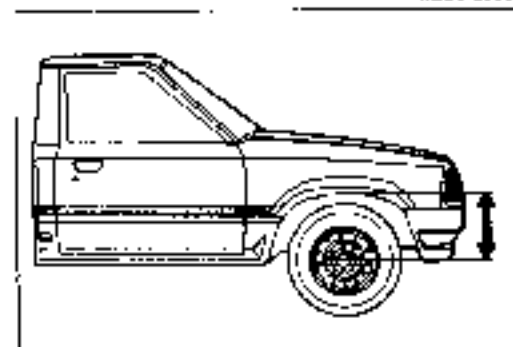
2BL1R2-006



FRONT SIDE

REAR SIDE

2BL1R2-006



2BL1R2-006

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 trim.

Distance: 502mm (19.8 in)

- (3) If the difference between the left and right is within the specification, adjust the necessary anchor bolt.

Vehicle height left/right difference:**10mm (0.39 in) max.**

18. Inspect front wheel alignment and adjust it as necessary.

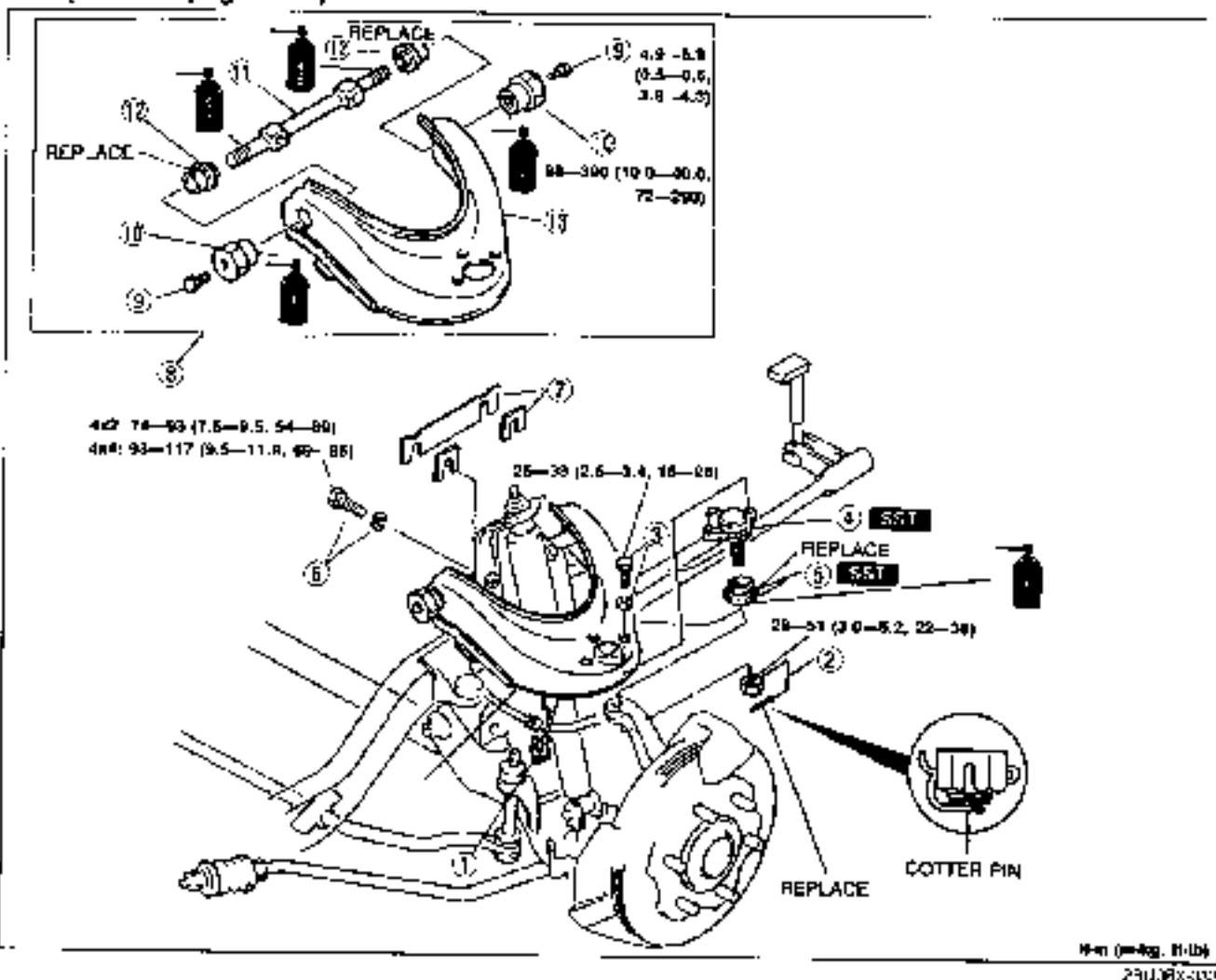
UPPER ARM (4x2 AND 4x4)

Removal and Installation

1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal, referring to **Installation Note**.

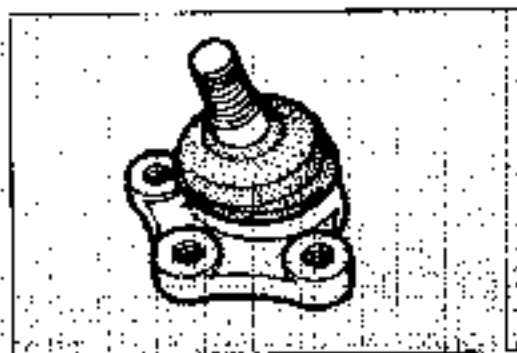
Note

- a) During removal, note the number, amount and position of the adjustment shims so that they are reinstalled in the correct positions.
- b) After installation, check the wheel alignment and adjust it if necessary.
(Refer to page R-7.)



1. Clip	8. Adjustment shims
2. Cotter pin and nut	9. Upper arm assembly
3. Upper arm ball joint, Knuckle arm	10. Plug
Removal Note..... page R-22	11. Threaded bushing
4. Bolts and washers	Removal Note..... page R-22
5. Upper arm ball joint	Installation Note..... page R-22
Removal Note..... page R-22	12. Upper arm shaft
Inspection..... page R-23	Installation Note..... page R-22
6. Upper arm ball joint boot	Inspection..... page R-23
Removal Note..... page R-22	13. Dust seal
Installation Note..... page R-23	14. Upper arm
7. Bolts and washers	Inspection..... page R-23

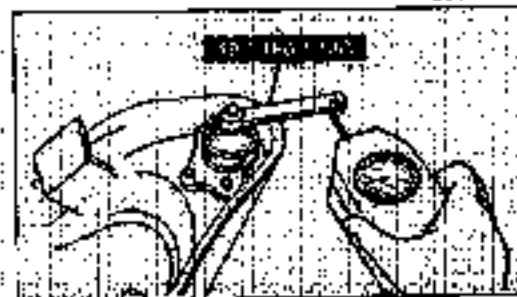
R FRONT SUSPENSION (DOUBLE WISHBONE)



Inspection

Check for the following and repair or replace parts as necessary:

1. Cracking, damage, and bending of upper arm and upper arm shaft.
2. Damage and poor operation of upper arm ball joint.



3. Upper arm ball joint preload.

Attach the **SST** to the ball stud, and measure the preload with a pull scale.

Caution

Measure the preload after first rocking the ball joint stud 3 or 4 times.

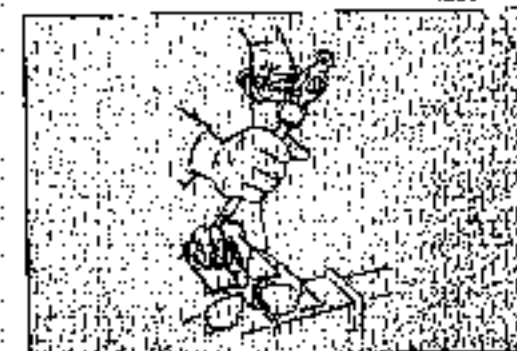
Pull scale reading: 20—34 N (2.0—3.5 kg, 4.4—7.7 lb)
(While ball stud is rotating)



Removal note

Upper arm ball joint/Knuckle arm

Using the **SST**, separate the upper arm ball joint from the knuckle arm.

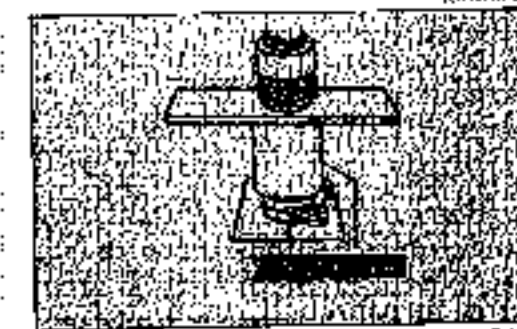


Upper arm ball joint boot

1. Secure the upper arm in a vise.
2. Use a chisel as shown to remove the upper arm ball joint boot.

Note

Use protective plates in the jaws of the vise to prevent damage to the part secured.



Upper arm ball joint boot

1. Liberally coat the new boot with grease, and use the **SST** to press it on.

FRONT SUSPENSION (DOUBLE WISHBONE) **R**

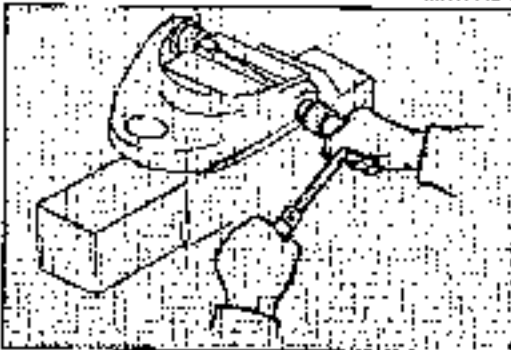


Inspection

Verify that the upper arm shaft turns smoothly.

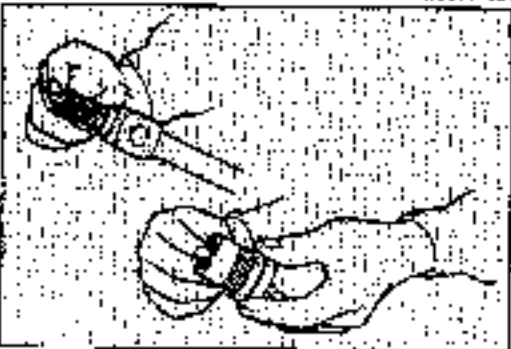
Caution

If the upper arm shaft cannot be turned smoothly, replace the upper arm and/or threaded bushings.



Threaded bushing

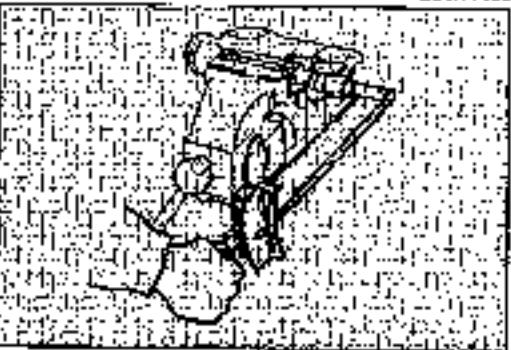
1. Secure the upper arm shaft in a vise.
2. Alternately loosen the threaded bushings in steps.
3. Remove the threaded bushings.



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)

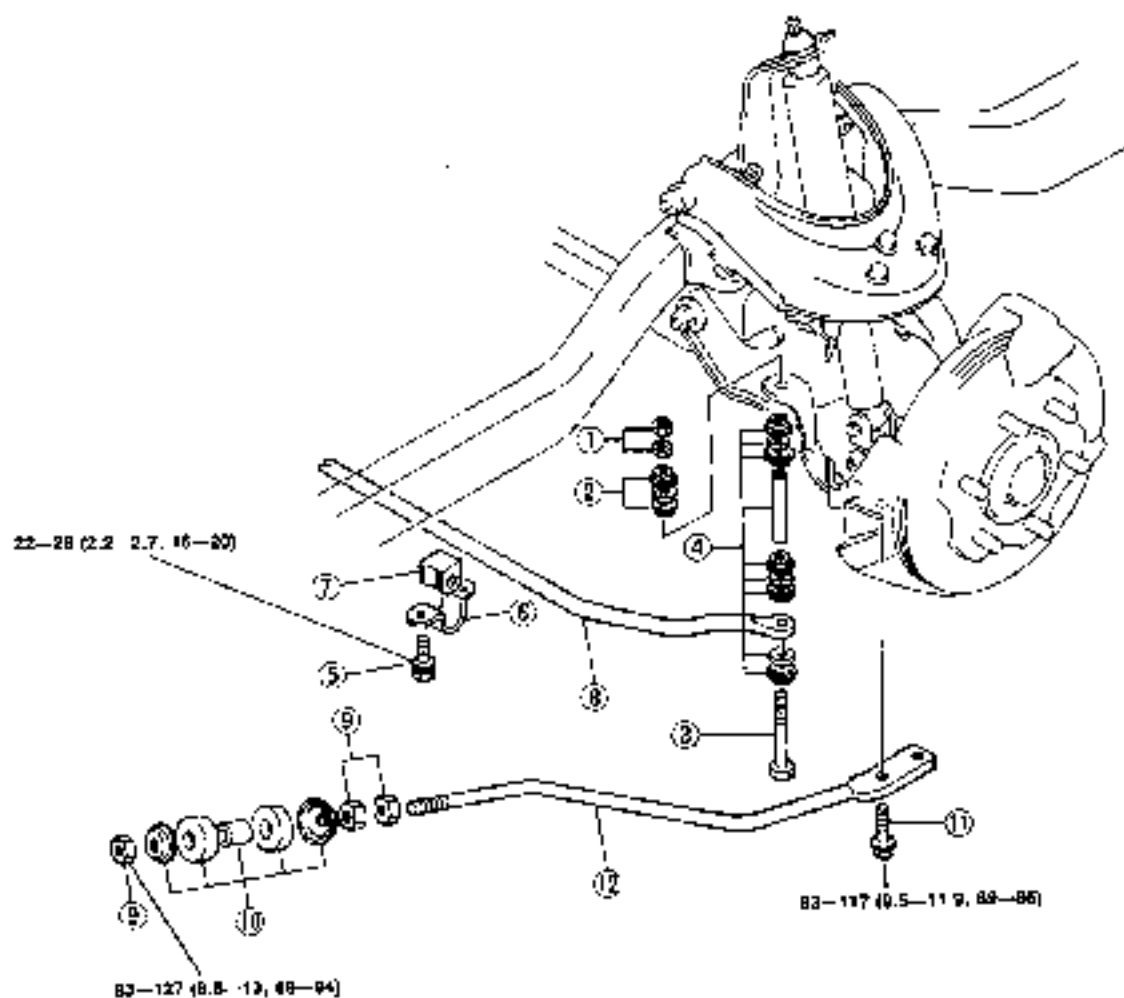
Caution

If the specified tightening torque cannot be obtained, replace the upper arm and/or threaded bushings.

STABILIZER AND TENSION ROD (4x2)

Removal and Inspection

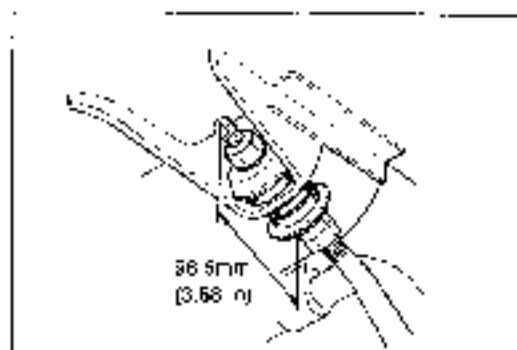
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure.
5. Inspect the stabilizer and tension rod components and repair or replace as necessary.



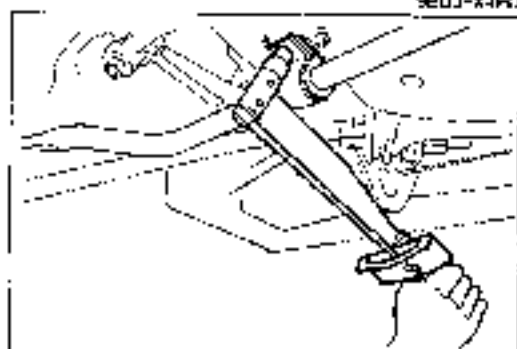
Nuts (Metric, 11-16)

220376-000

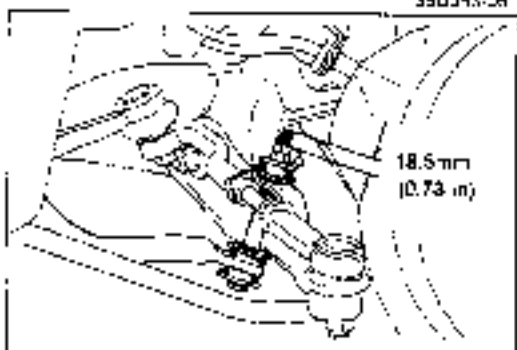
1. Nuts	8. Stabilizer bar
2. Retainers	Check for bending, cracking, deterioration or damage
3. Bolt	9. Nuts
4. Bushings, retainers and spacer	10. Bushings and retainers
Check the bushings for wear or deterioration	Check bushings for wear or deterioration
5. Bolts	11. Bolt
6. Stabilizer bracket	12. Tension rod
7. Bushing	Check for bending, cracking, deterioration or damage
Check for wear or deterioration	



9EUDFX-060



93UDFX-021



95UDFX-03E

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.

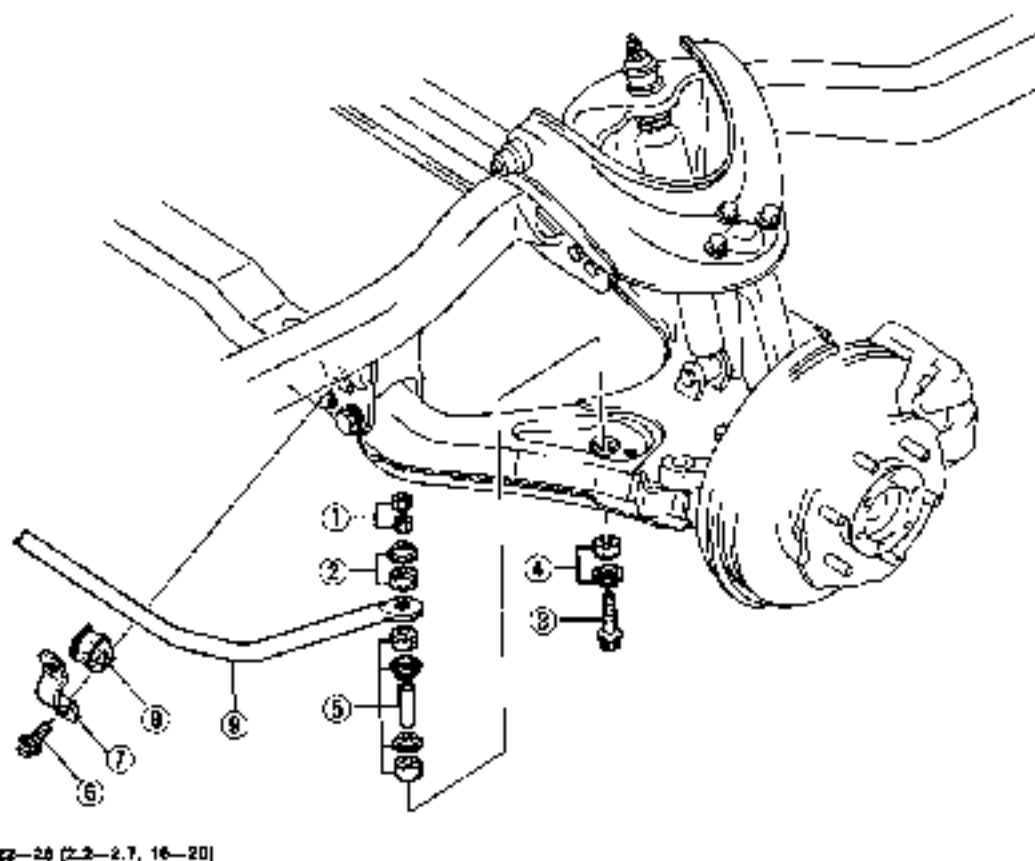
3. Install the stabilizer bolt.

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**

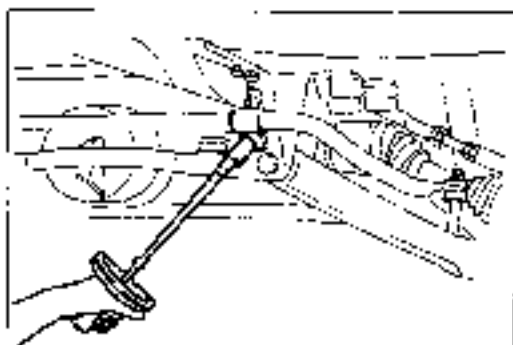
1. Loosen the wheel lug nuts.
2. Jack up the front of the vehicle and support it with safety stands.
3. Remove the wheel.
4. Remove in the order shown in the figure.
5. Inspect the stabilizer components and repair or replace as necessary.



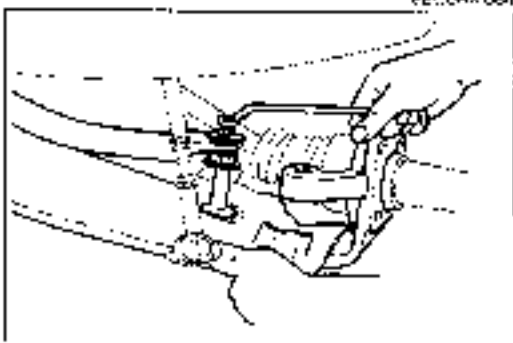
N·m (m·kg, ft·lb)

2BUN000040

1. Nuts	5. Retainers, bushings, and spacer Check bushings for wear or deterioration
2. Retainer and bushing Check bushing for wear or deterioration	6. Bolts
3. Bolt	7. Stabilizer bracket
4. Retainer and bushing Check bushing for wear or deterioration	8. Bushing Check for wear or deterioration
	9. Stabilizer bar Check for cracking, bending, deterioration or damage



8BA-04X-064



29J0R041

Installation

1. Install the stabilizer bushing and bracket, and tighten the bolts to the specified torque.

Tightening torque:

22–26 N·m (2.2–2.7 m·kg, 16–20 ft·lb)

Caution

- a) Install so that the bushing seam faces forward.
- b) Lower the vehicle, and then tighten once again to the specified torque with the vehicle in the unladen condition.

2. Install the stabilizer bolt.

Tighten the nuts so that **18.5mm (0.73 in)** of thread is exposed at the end of the bolt.

3. After installation, check the caster angle (Refer to page R-7.)

REAR SUSPENSION (LEAF SPRING)

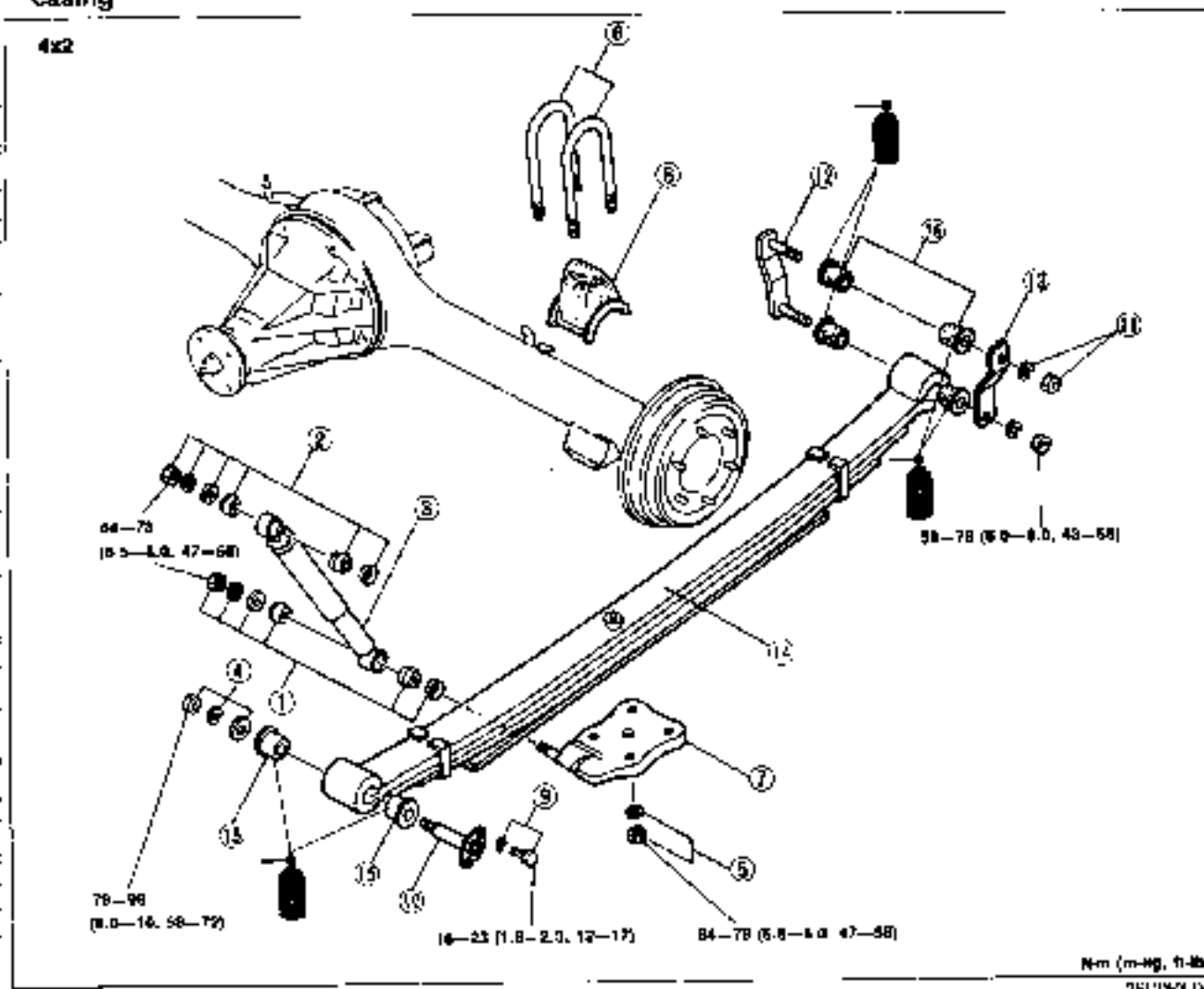
SHOCK ABSORBER AND LEAF SPRINGS (4x2 AND 4x4)

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.



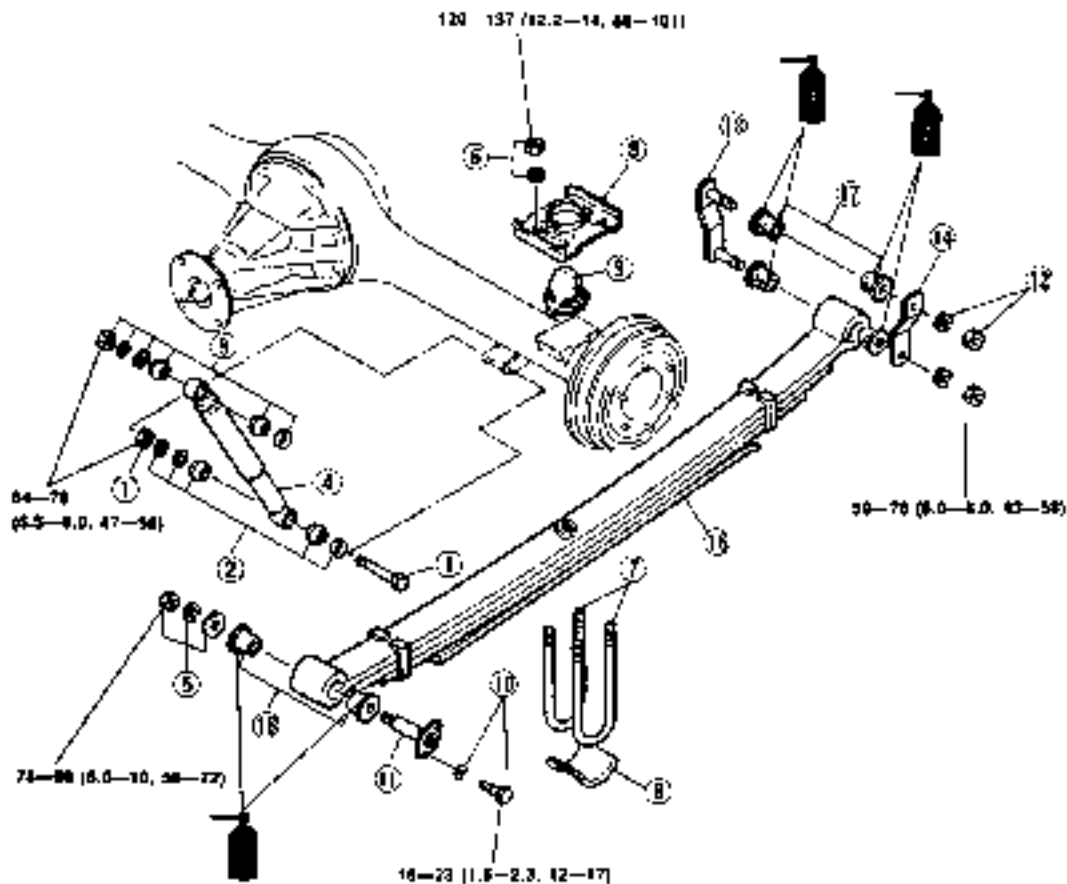
N-m (m-Hg, ft-lb)

250047 0A7

1. Nut, washers, retainer, and bushings
Check bushings for wear or deterioration
2. Nut, washers, retainer, and bushings
Check bushings for wear or deterioration
3. Shock absorber
Check for oil leakage or poor operation
4. Nut and washers
5. Nuts and washers
6. U-bolts
7. Spring clamp
8. Stopper rubber
Check for damage or deterioration

9. Bolts and washers
10. Spring pin
11. Nuts and washers
12. Shackle pin
13. Shackle plate
14. Leaf spring assembly
Disassembly page R-31
Assembly page R-31
Check for weakness or damage
15. Leaf spring bushings
Removal Note page H-30
Check for wear or deterioration

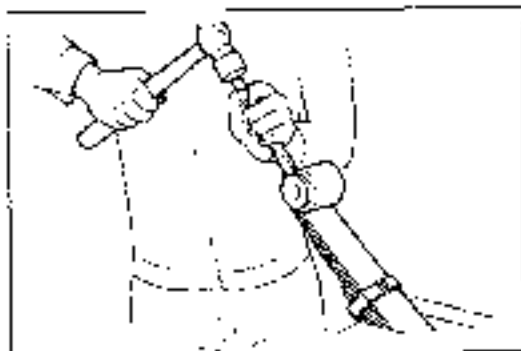
4x4



1. Bolt and nut
2. Washers, retainer, and bushings
Check bushings for wear or deterioration
3. Nut, washers, retainer, and bushings
Check the bushing for wear or deterioration
4. Shock absorber
Check for oil leakage or poor operating
5. Nut and washers
6. Nut and washer
7. U-bolts
8. Set plates
9. Spring clamp
10. Stopper rubber
Check for wear or deterioration

11. Bolt and washer
12. Spring pin
13. Nut and washer
14. Shackle pin
15. Shackle plate
16. Leaf spring assembly
Disassembly page R-31
Assembly page R-31
Check for weakness or damage
17. Leaf spring bushing
Removal Note page R-30
Check for wear or deterioration

28UCRX-040



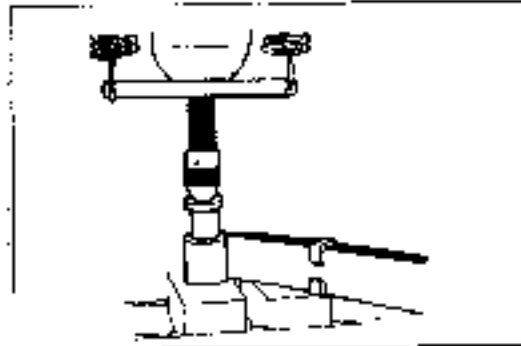
2J00764-08-1

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.



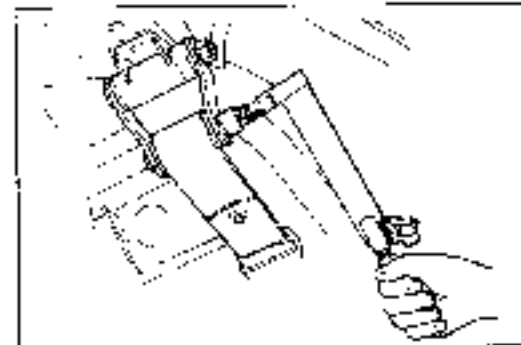
2F6L08X-04-1

Installation:

Apply rubber grease to the bushing outer surface and press the new bushings in with a suitable round bar.

Installation

1. Lift the leaf spring assembly into place.
2. Wipe away the grease on the shackle pin and shackle plate.
3. Install the shackle pin and shackle plate, and loosely tighten the shackle mounting nut.
4. Lift the front of the spring assembly.
5. Wipe away grease on the spring pin.
6. Install the spring pin and tighten the mounting nuts of shackle pin and spring pin to the specified torques.



2B0019-04-5

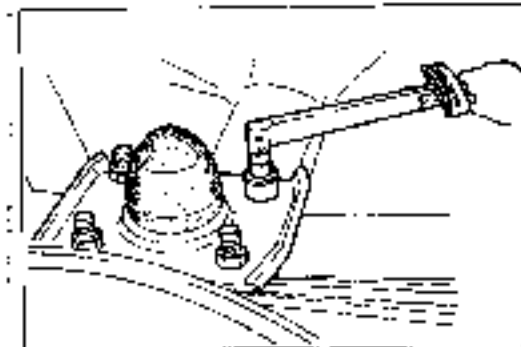
Tightening torque**Shackle pin:**

59—76 N·m (6.0—8.0 m·kg, 43—58 ft·lb)

Spring pin:

78—98 N·m (8.0—10.0 m·kg, 58—72 ft·lb)

7. Wipe away any grease that has been expelled from the shackle pin, shackle plate and spring pin.
8. Install the U-bolts, set plates and stopper rubber. Tighten the U-bolt mounting nuts to the specified torque.



2U039X-04-5

Tightening torque

4x2: 64—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)

4x4:

120—137 N·m (12.2—14.0 m·kg, 88—101 ft·lb)

Caution

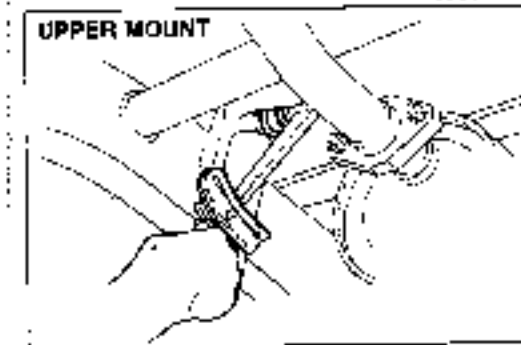
Retighten the nuts to the specified torque after lowering the vehicle (unladen condition).

9. Tighten the shock absorber mounting nuts to the specified torque.

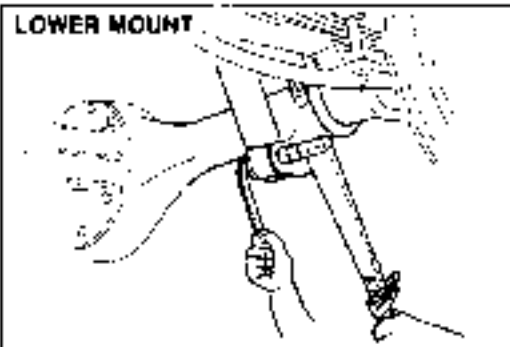
(4x2 and 4x4 Upper mount)

Tightening torque:

64—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)



1110RX-015

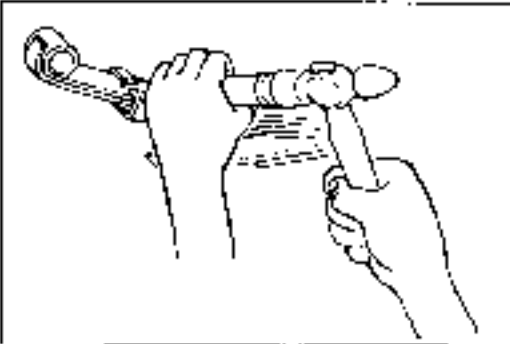


79J0H4 016

(4x2 and 4x4 Lower mount)

Tightening torque:

84—78 N·m (6.5—8.0 m·kg, 47—58 ft·lb)



79J0H4 017

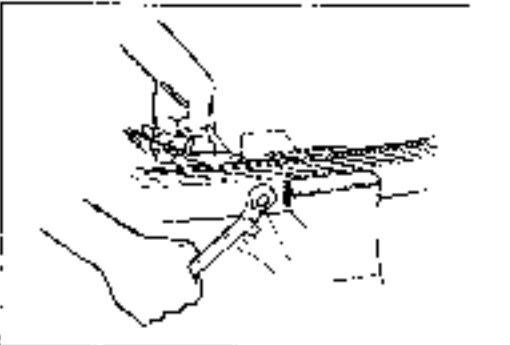
Leaf spring assembly

Disassembly

1. Secure the leaf spring assembly in a vise.

Note

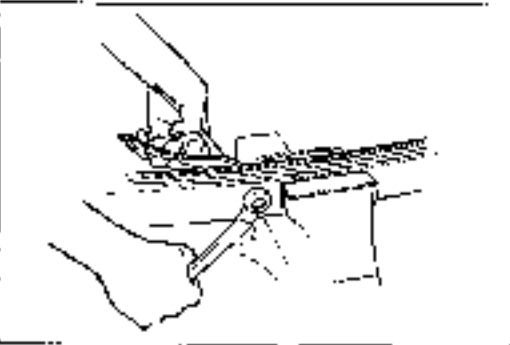
Use protective plates in the jaws of the vise to prevent damage to the part secured.



79J0H4 018

2. Uncrimp the clip.

3. Remove the center bolt.



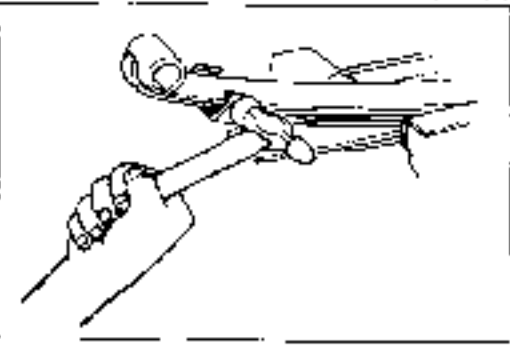
79J0H4 019

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)



79J0H4 020

3. Crimp the clip.

Caution

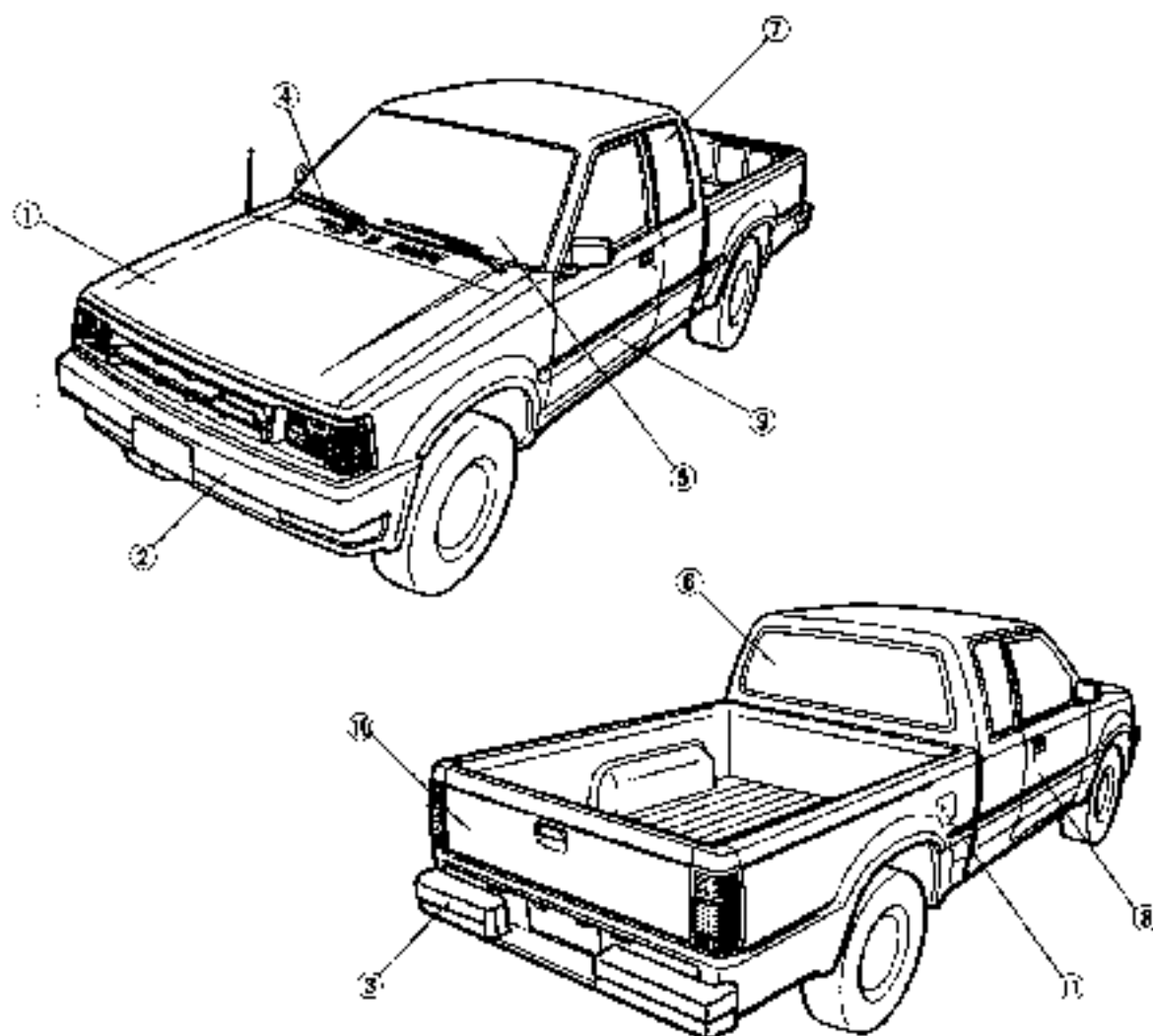
Do not allow any gap between the clip and the springs.

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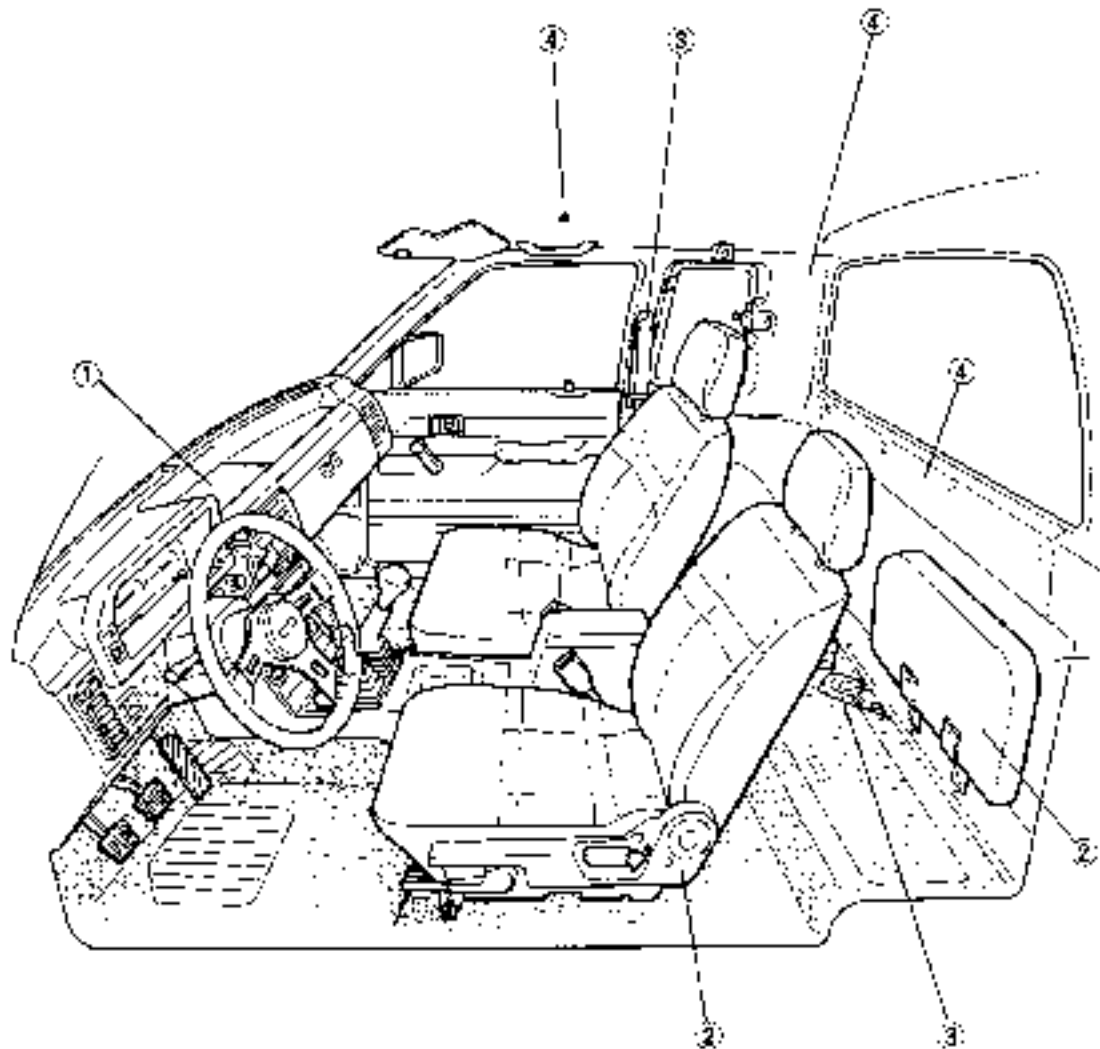
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25 J05X U02

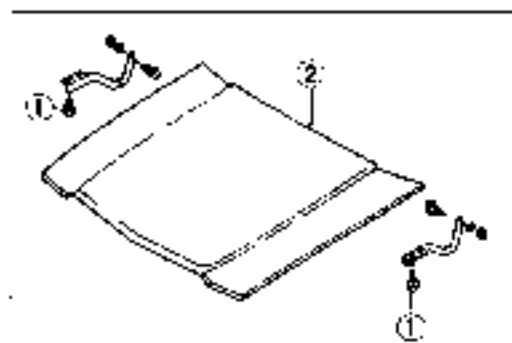
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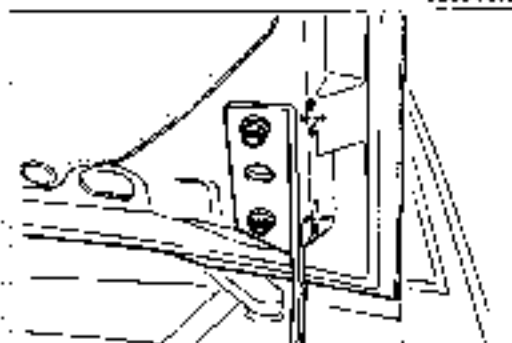
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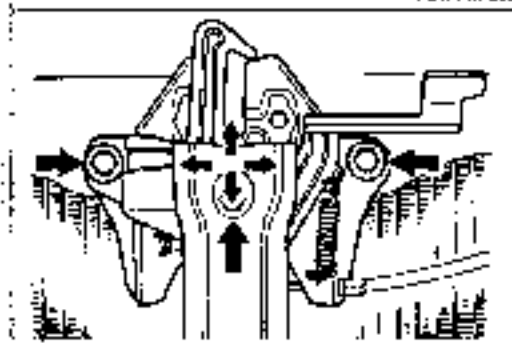
20026X G3



19J08C002



75L14X003



F8J084405

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.

2. Adjust the hood lock after the hood has been aligned. The lock can be moved up and down and side to side. Align it with the striker on the hood by loosening the attaching bolts and nut.

Tightening torque:

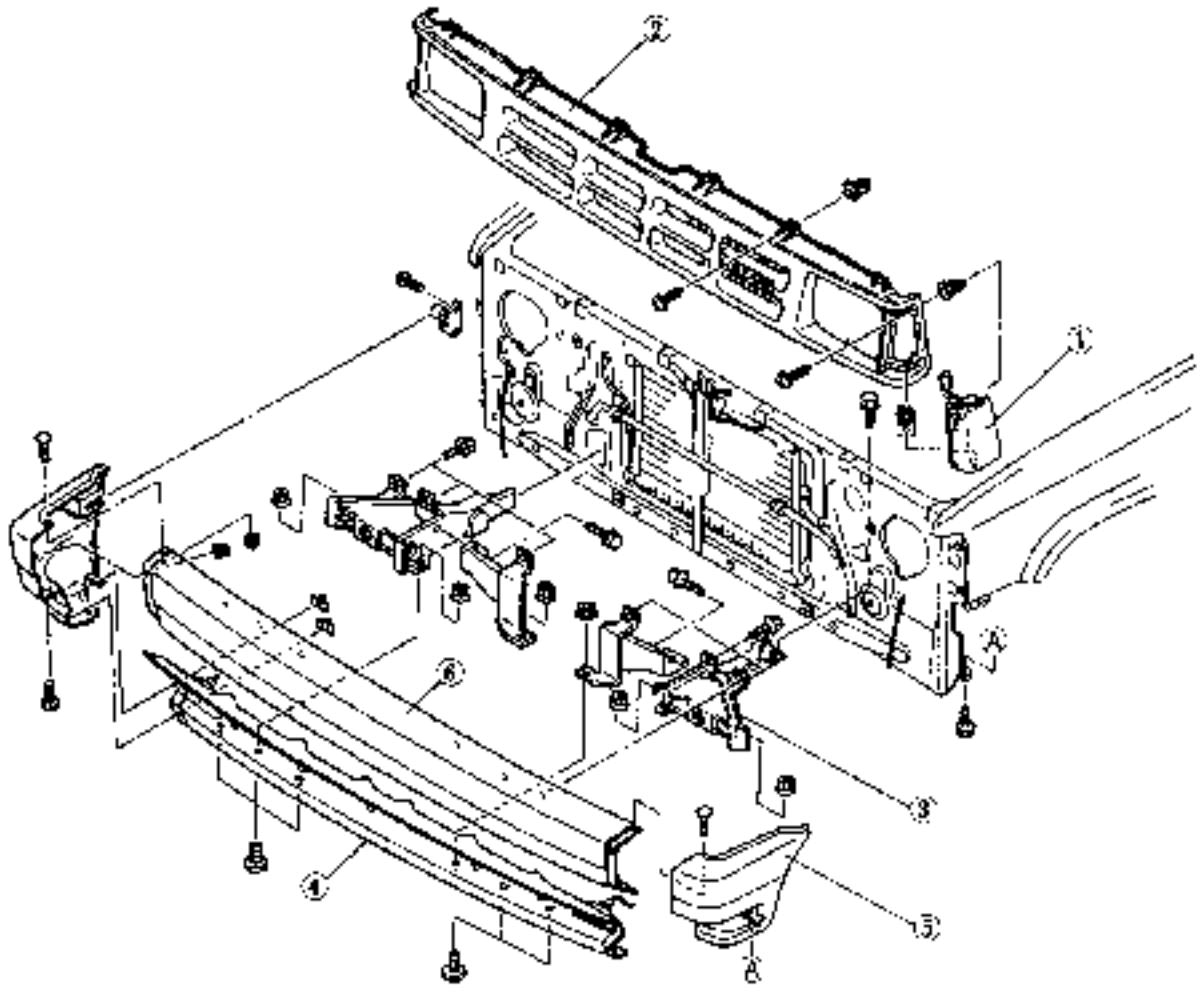
Bolt ... 7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

Nut 8.8—13 N·m (0.9—1.3 m·kg, 6.5—9.4 ft·lb)

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

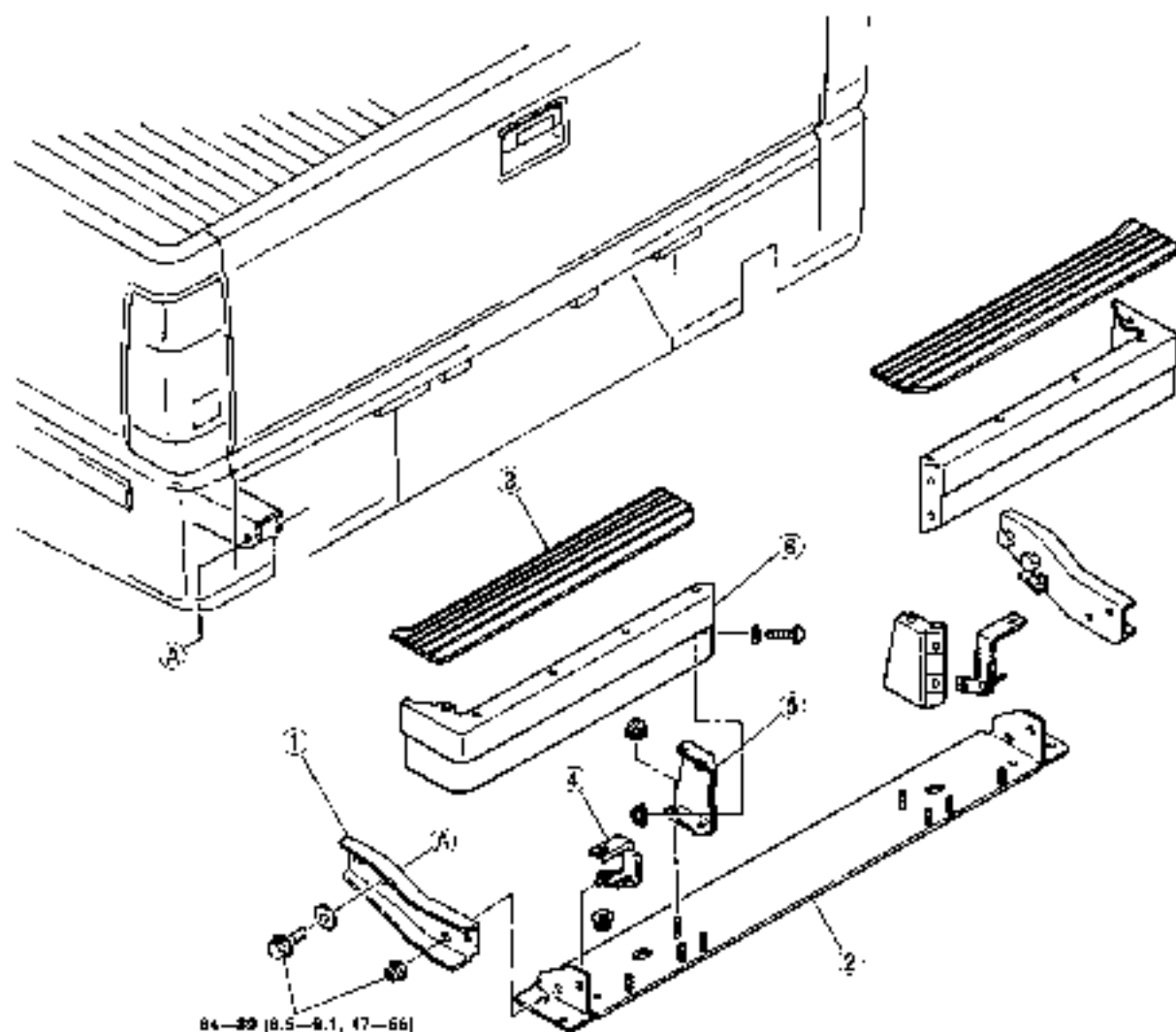
4. Bumper skin
5. Bumper sides
6. Bumper face

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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)

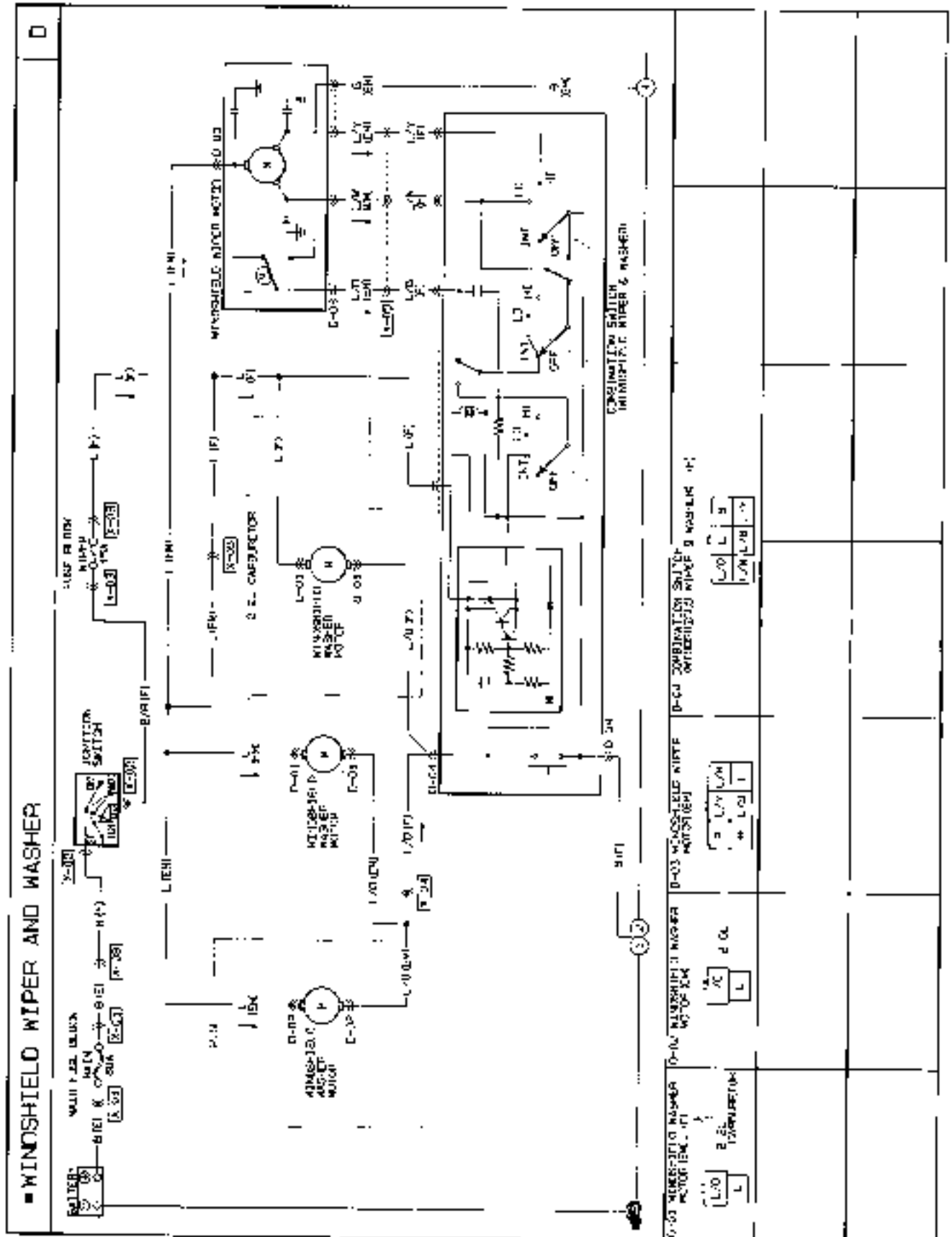
*3.05% 9/14

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



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

28UUGX-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

28UUGX-006

Flow No. 3	Symptom	Intermittent operation of wiper is not possible (Low operation is possible)

Possible cause

- Damaged wiper switch
- Damaged intermittent wiper relay

Remedy

- Check wiper switch (Refer to page S-10)

28UUGX-007

Flow No. 4	Symptom	One touch operation of wiper is not possible

Possible cause

- Damaged wiper switch

Remedy

- Check wiper switch (Refer to page S-10)

28UUGX-008

Flow No. 5	Symptom	Wiper continues Hi operation after wiper switch is turned OFF

Possible cause

- Damaged wiper switch

Remedy

- Check wiper switch (Refer to page S-10)

28UUGX-009

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

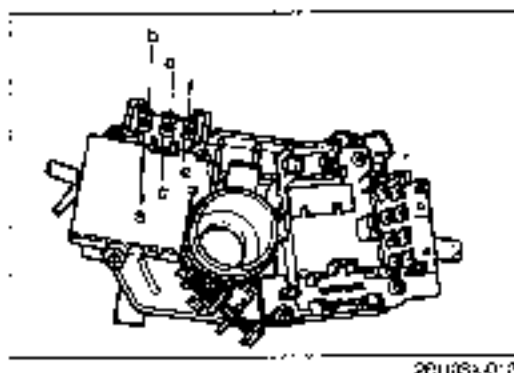
Possible cause

- Damaged washer switch

Remedy

- Check washer switch (Refer to page S-10)

220U6X-011



28U029X-0-2

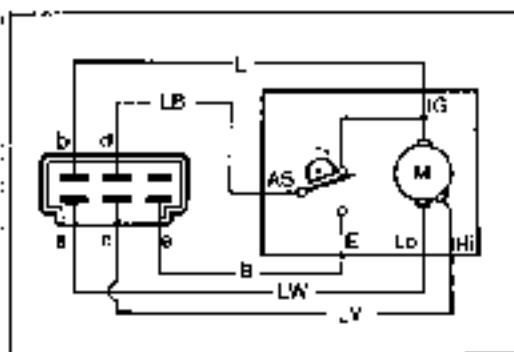
WIPER AND WASHER SWITCH**Inspection**

1. Check for continuity between terminals by using an ohmmeter

Positions		Terminal		a	b	c	d	e	f
		One touch							
Wiper switch	OFF	ON		○					○
		OFF					○		○
	INT		○					○	
	I (Low)		○	•	•			○	
	II (High)		○	○					
Washer switch ON				○			○		

○—○ Indicates continuity

2. If not as specified, replace the combination switch



28U030X-0-2

WIPER MOTOR**Inspection**

1. Check for continuity between terminals by using an ohmmeter

Terminals	Continuity	Note
b-a	Conductive	—
a-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

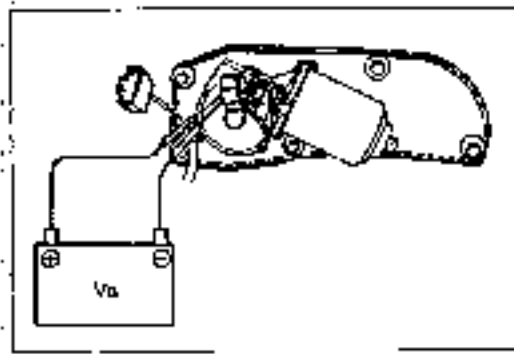
V_B: Battery voltage

Terminal		Operation speed
V _B	Ground	—
b	a	Low
	c	High

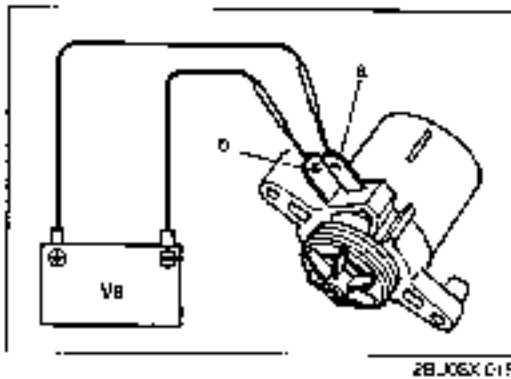
3. Check for continuity between the b and d terminals and between the d and e terminals while operating the motor in low speed.

Terminals	Continuity
b-a	Nonconductive most of the time, and becomes conductive once per turn
d-e	Conductive most of the time, b/c becomes nonconductive once per turn

4. If not as specified, replace the wiper motor.



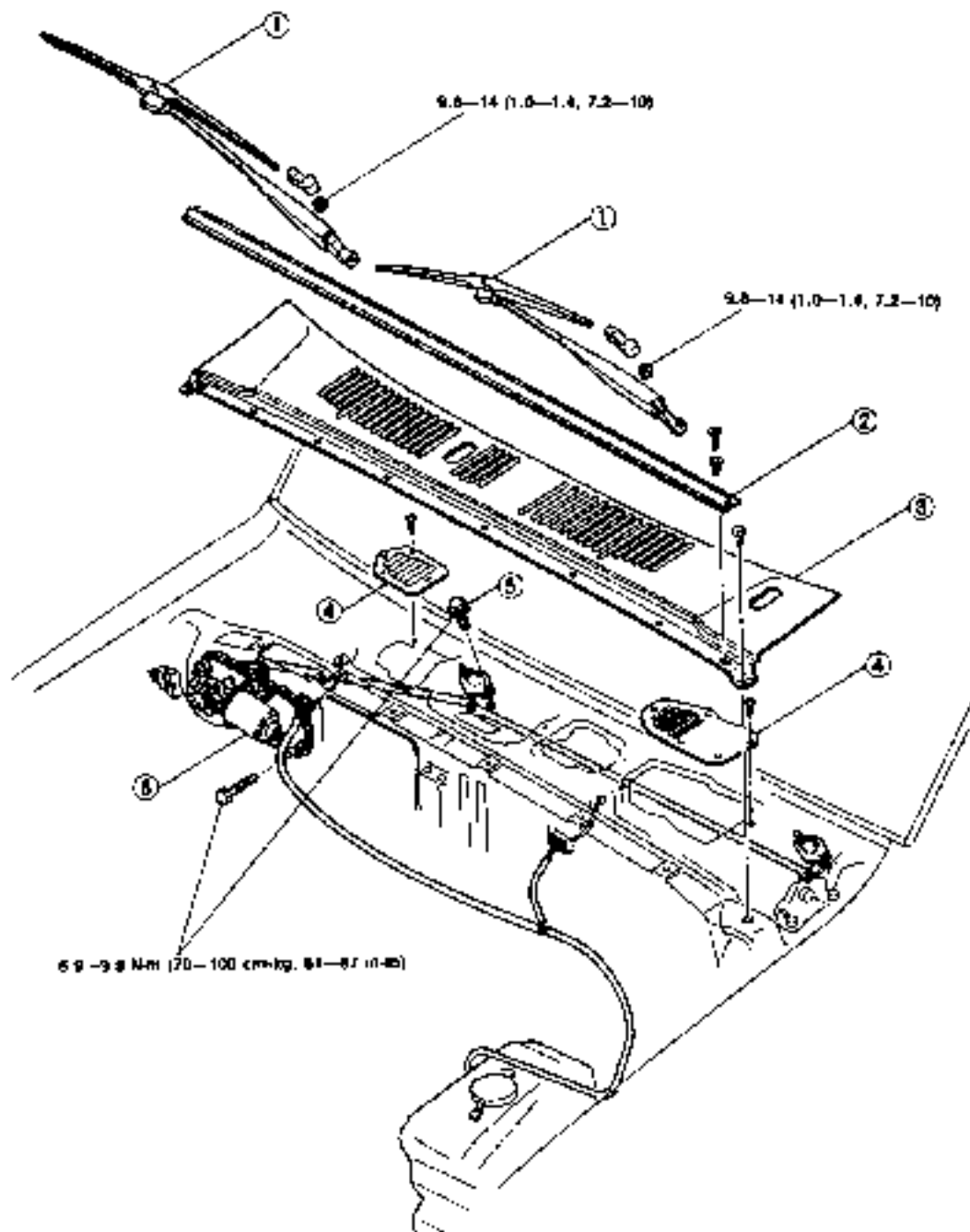
28U030X-0-4

**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**.

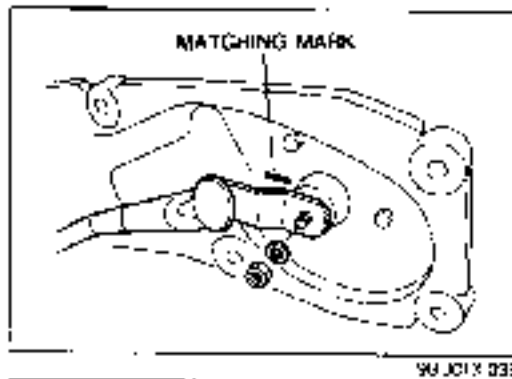


Nm (m·kg, ft·lb)

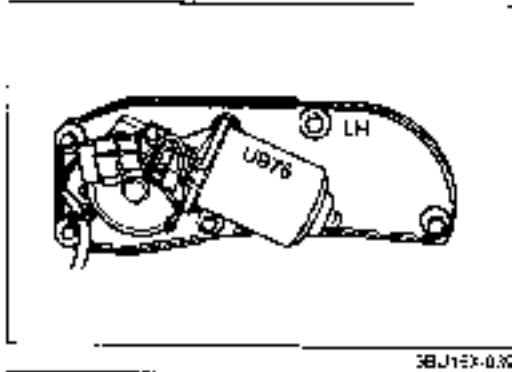
23076-016

1. Wiper arms and wiper blades
2. Seal rubber
3. Cow/ grille

4. Seal covers
5. Bolt
6. Wiper motor and link assembly

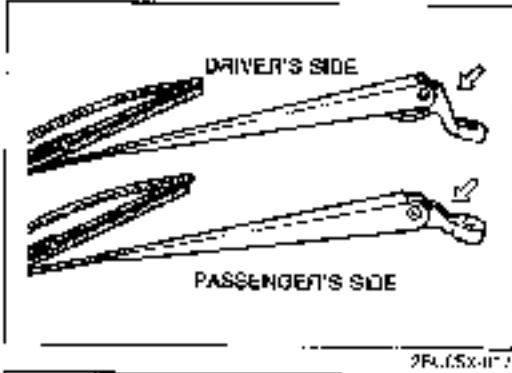
**Removal and Installation Note**

- Make matching marks on the wiper motor when removing the wiper link assembly from it.
- 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°.

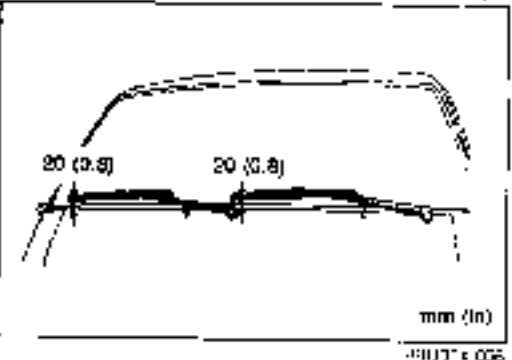
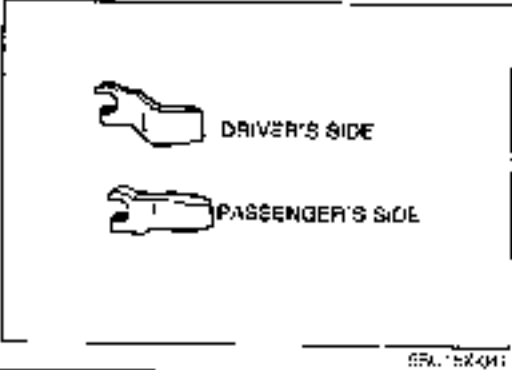


- The wiper motor used is per specifications. When replacing the wiper motor, note the identification numbers.

Identification number	Specification
LH (on the bracket)	Without cold-area version
LH + UB76 (on the bracket) + (on the motor)	Cold-area version



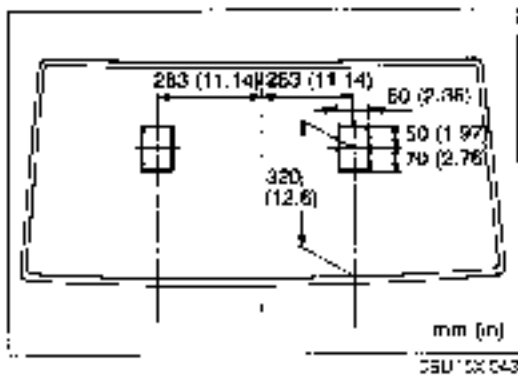
- The shape of the wiper arm and cap on the driver's side is different from ones on the passenger's side. When reinstalling the wiper arms, install them in the correct positions.

**ADJUSTMENT**
Arm Height

Adjust the arm height as shown in the figure, and tighten the arm to the specified torque.

Tightening torque:

9.8—14 N·m (1.0—1.4 m·kg, 7.2—10 ft·lb)

**Washer Spray**

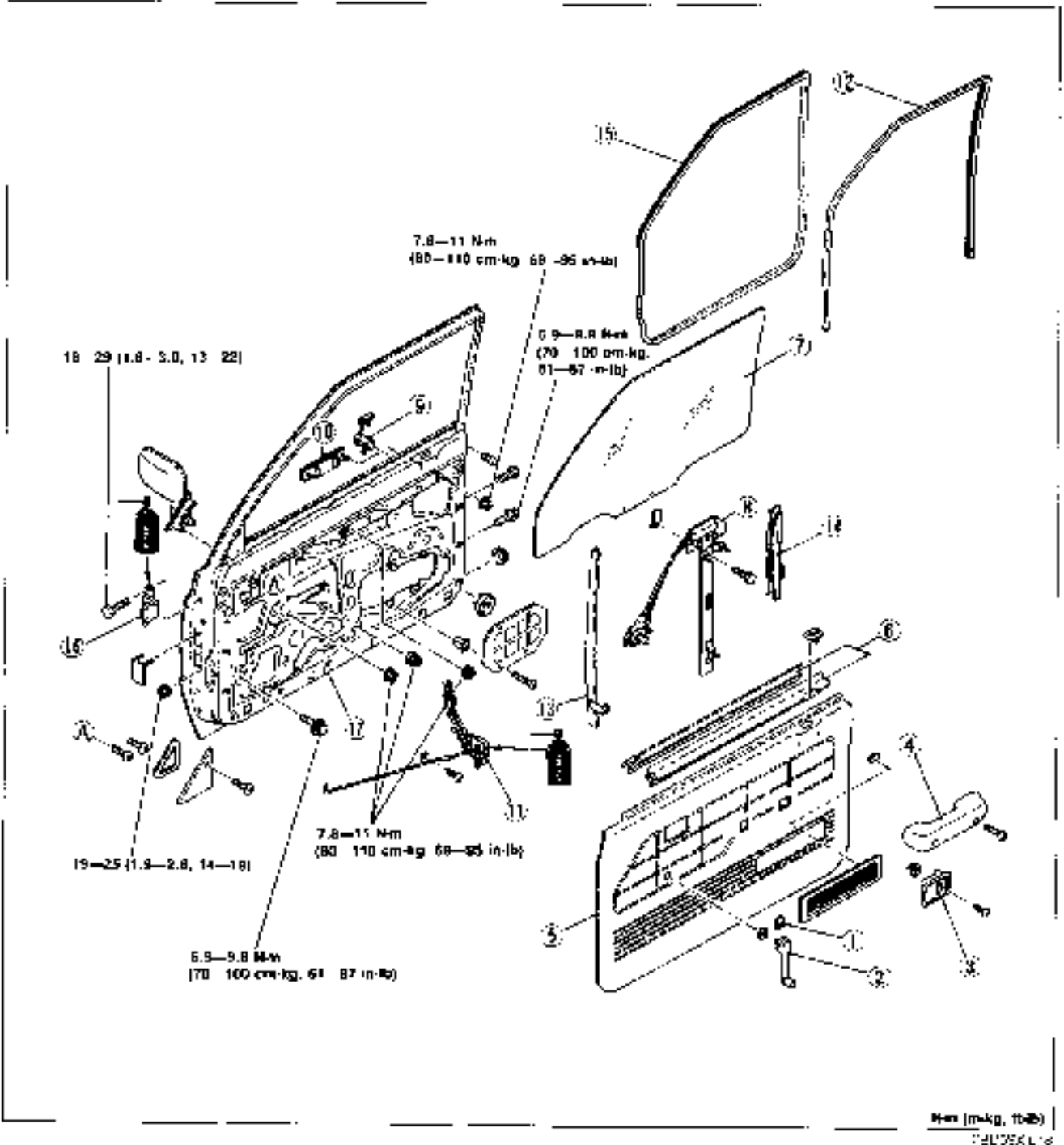
Adjust the aim of the washer spray nozzle by inserting a needle or similar object into the hole of the nozzle and bending it to adjust.

DOOR

STRUCTURAL VIEW

Note

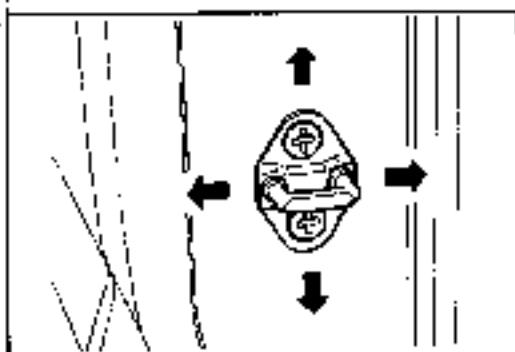
Refer to page S-16 for door lock striker adjustment.



1. Snap ring
2. Regulator handle
3. Inner handle
4. Armrest
5. Door trim
6. Weatherstrip (inner and outer)

7. Door glass
8. Regulator assembly
9. Key cylinder
10. Outer handle
11. Door lock
12. Glass run channel

13. Glass guide A
 14. Glass guide B
 15. Weatherstrip
 16. Door hinge
 17. Door
- Adjustment: page S-16



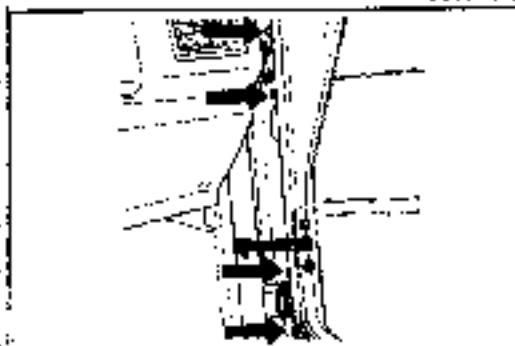
10005X-006

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—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



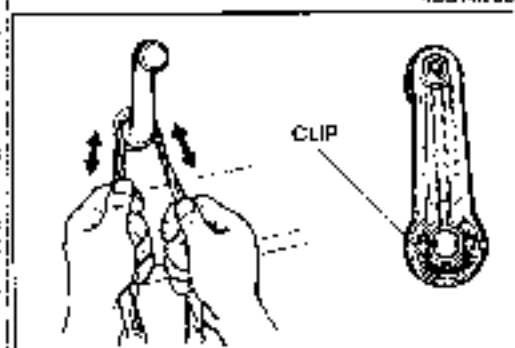
45G14X-023

Door Hinge

1. If looseness is found when the door is opened, tighten the door hinge mounting bolts (arrows).
2. Align the door and body by loosening the door hinge mounting bolts.

Note

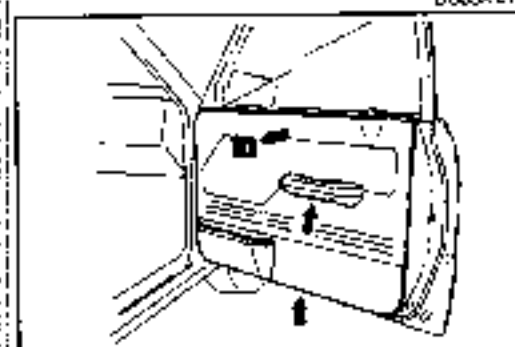
If noise is heard from the checker when the door is opened, apply grease to the checker cam.



0006X-010

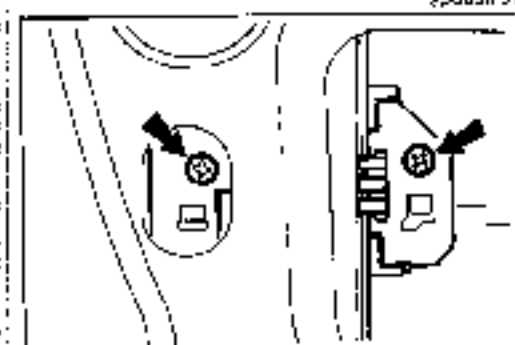
REMOVAL AND INSTALLATION**Window Regulator**

1. Remove the regulator handle installation clip with a rag as shown in the figure.



23U05X-017

2. Remove door handle, armrest, and door trim.



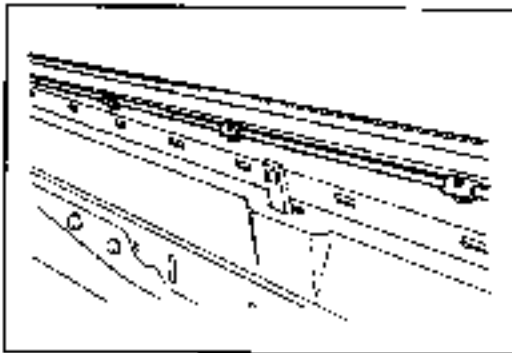
98U12X-018

3. Remove door screen.

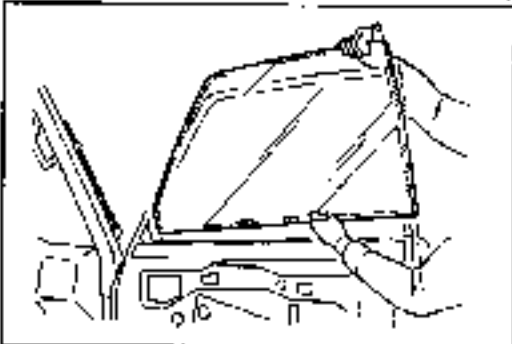
Note

Remove the door screen carefully so that it may be reused.

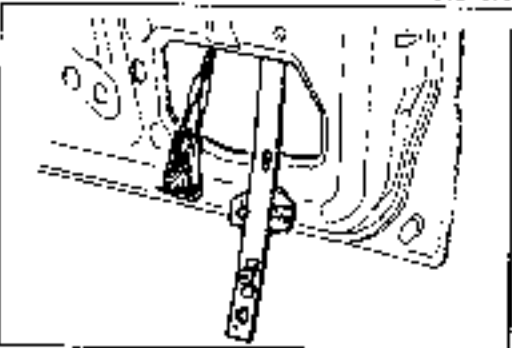
4. Position the door glass mounting screw so that it can be removed from the access hole.
5. Remove the door glass mounting screws.



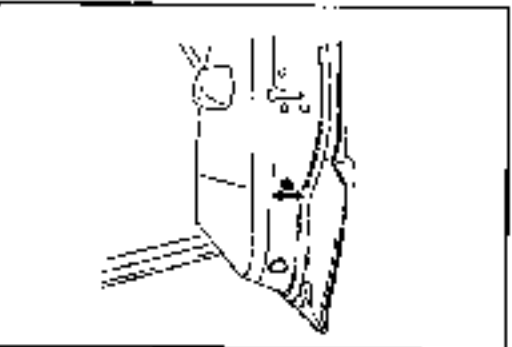
9EL05X-015



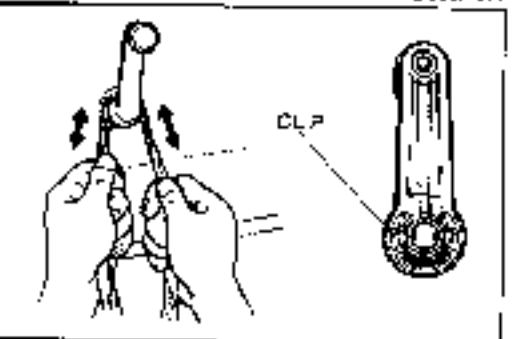
9P05X-070



0E10X-021



1B106X-011



1B106X-012

- 6 Remove the weatherstrips (inner and outer).
- 7 Remove the glass guide mounting bolt.

- 8 Remove the door glass upward.

- 9 Remove the mounting bolts, and remove the window regulator from the access hole.

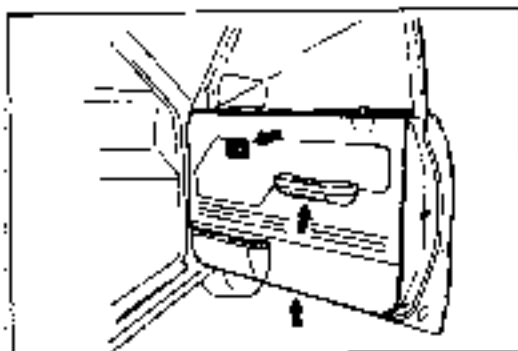
Install in the reverse order of removal, referring to the installation note.

Note

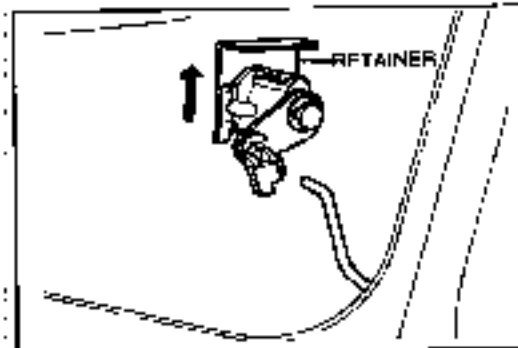
After installing the window regulator, adjust it so that the door glass moves up and down smoothly.

Door Lock

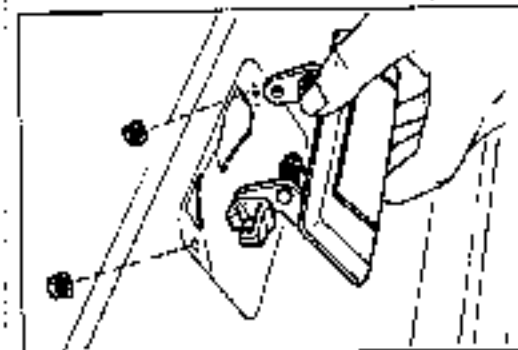
- 1 Raise the door glass all the way.
- 2 Remove the regulator handle installation clip with a rag as shown in the figure.



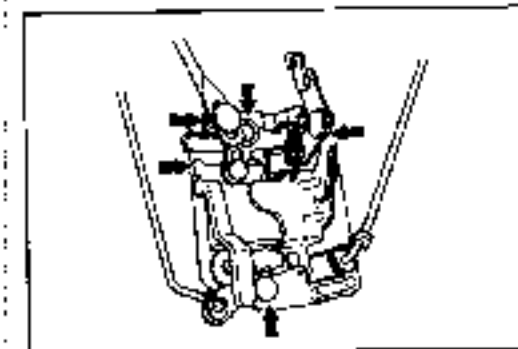
95L05X-024



95L05X-025



95L05X-026



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.

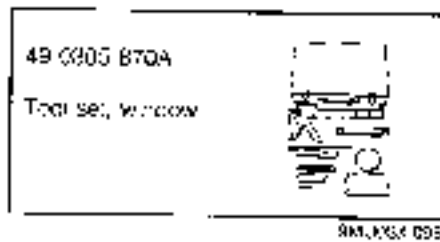
Note

- 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

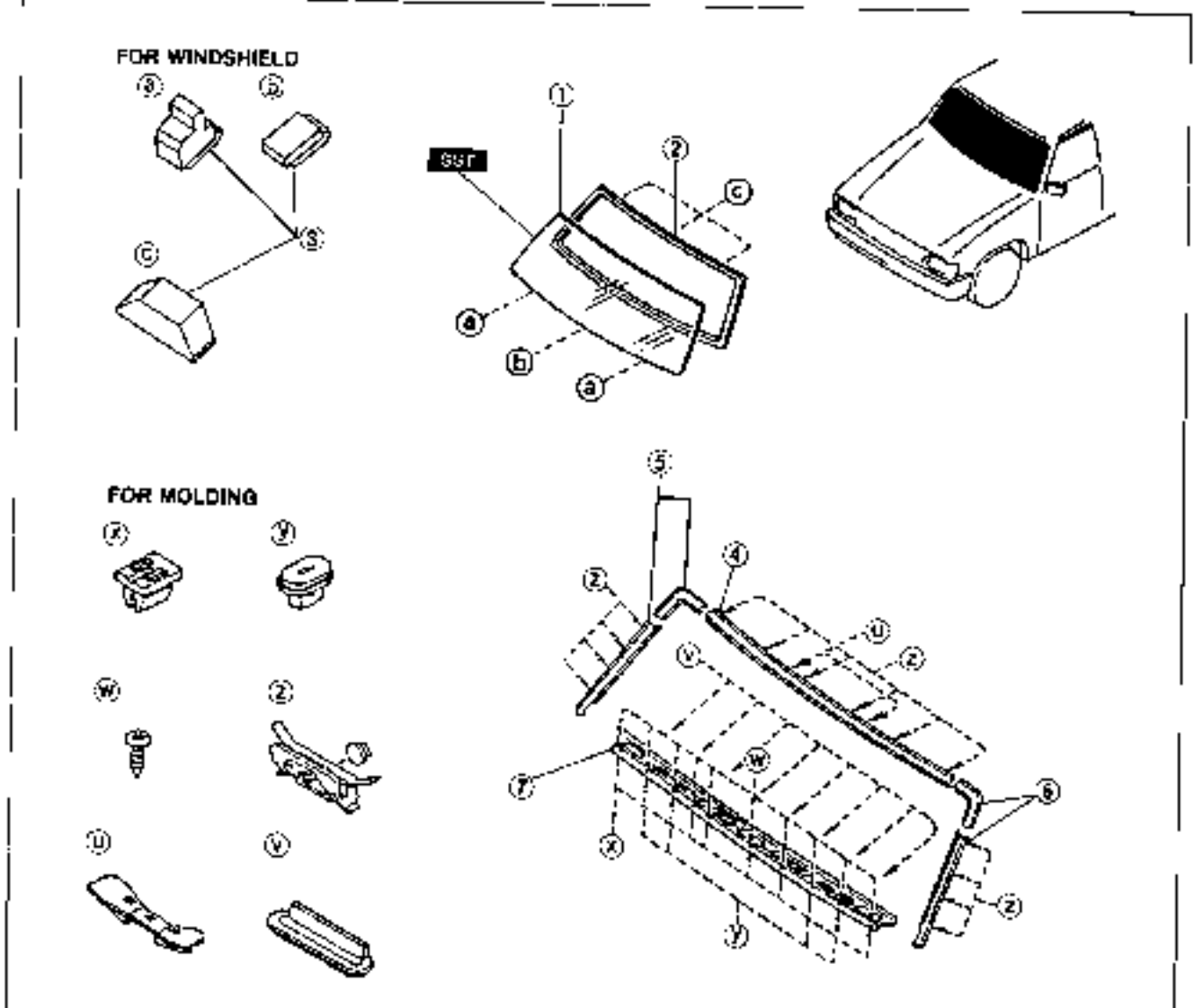
SST



Note

Use SST (49 0305 870A) to remove and install the windshield.

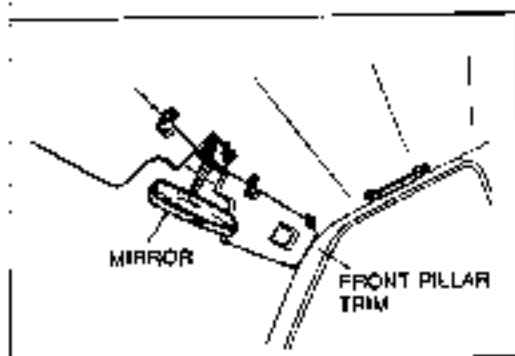
Structural View



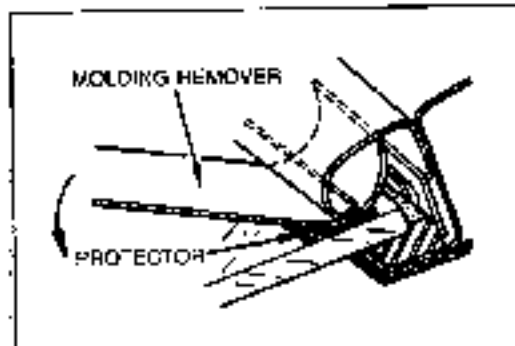
1. Windshield
2. Dam
3. Spacers
4. Molding (upper)

5. Molding (right side)
6. Molding (left side)
7. Molding (lower)

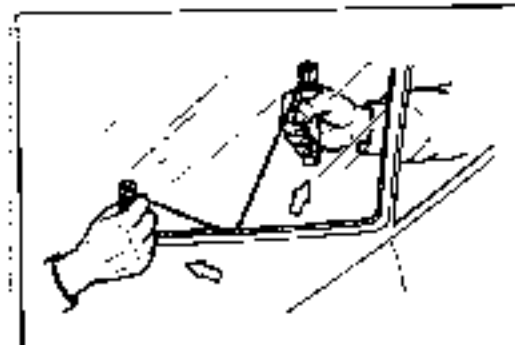
12U252X-014



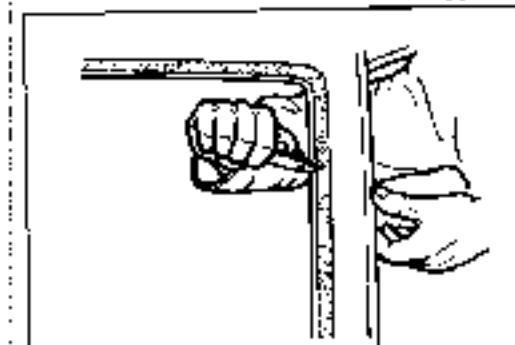
29U359-011 R



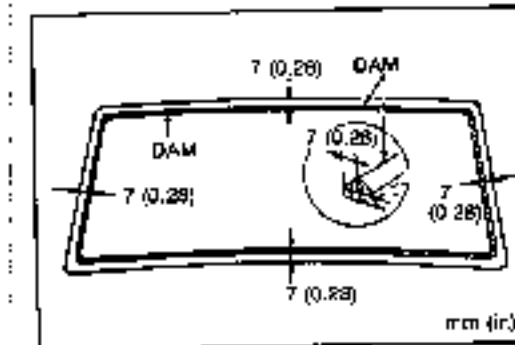
29U359-011 R



78J143-011



12U359-011



94K1254-002

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.

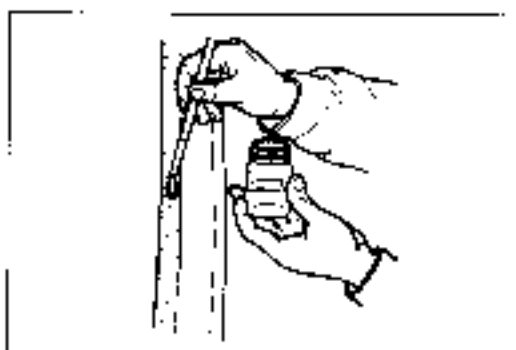
INSTALLATION

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.

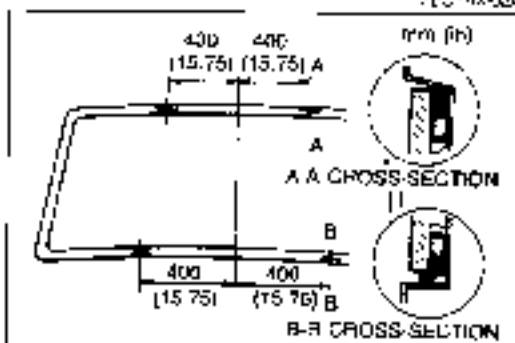
2. Bond the new dam to the glass with a bonding agent. Position it with its outer edge 7mm (0.28 in) from the glass edge and the lip facing outward.

Caution

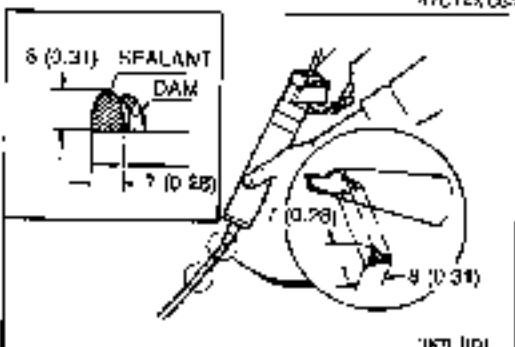
Securely bond the dam so that it is straight and firmly in place.



7E014X-034

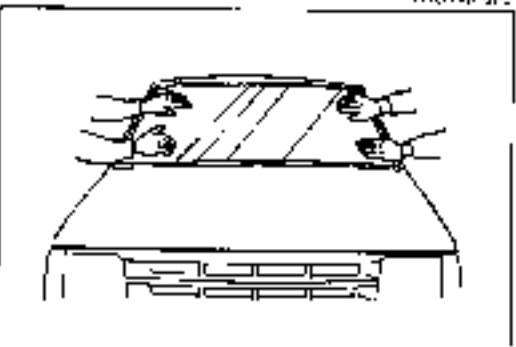


47L14X-064

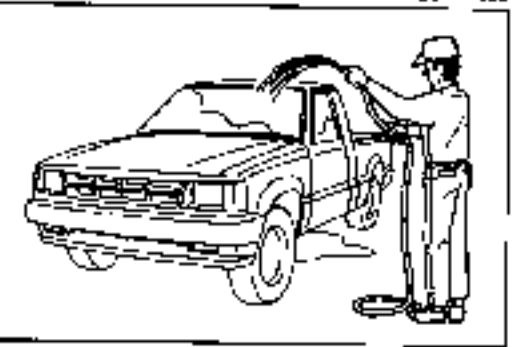


1K01100

7A014X-015



7E014X-026



3B100X-053

3. Apply a thin coat of primer to the bonding area of the body and glass, and **allow 30 minutes** for it to dry. Keep the area free of dirt. Do not touch the surface. If primer gets on the hands, remove it immediately.

4. Bond the spacers to the body as shown.

Caution

Use the proper spacers for the upper and lower sections.

5. Insert the molding clips on their points. Replace any defective clips with new ones.

6. Prepare the nozzle of the sealant gun so that it has a flange that can run along the edge of the glass, and a V from which the sealant can flow. Once the primer is dry, apply the sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a ridge of sealant **8mm (0.31 in)** high.

Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.

7. Lift the glass into place. Push it in lightly toward the vehicle to compress the sealant.

Caution

Open the windows to prevent the glass from being pushed out by air pressure if a door is closed.

8. Use a spatula to smooth away any sealant that oozes out. Add more sealant to any points of poor contact.
9. Allow the sealant to harden without disturbing it. This will require **5 hours at 20°C (68°F)** and **another 24 hours at 5°C (41°F)**.

10. After installing the front window glass, make a water leak test.

11. Clip in the molding. Reinstall the interior mirror and pillar trim.

BACK WINDOW GLASS

PREPARATION

SST

49 0259 866A

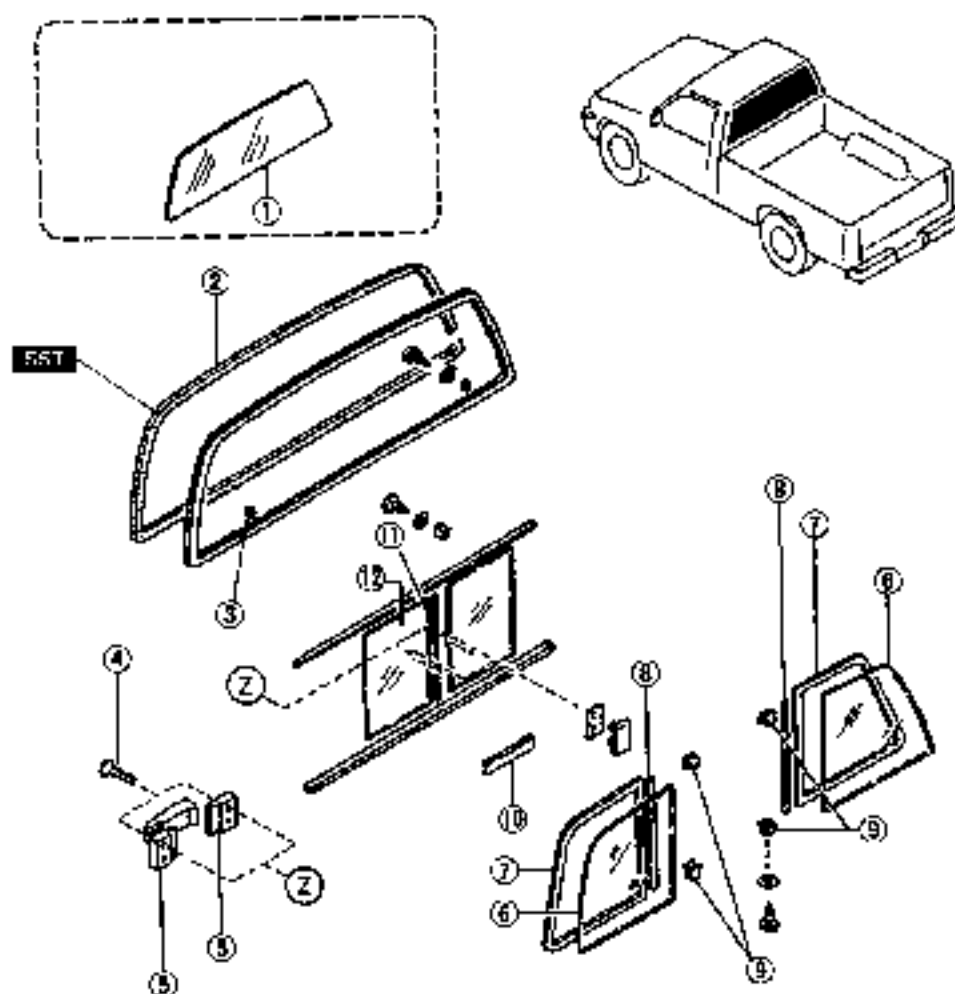
Inserting tool,
sea, pusher &
pade

SST 06X 025

Note

Use SST (49 0259 866A) to remove and install the back window glass.

Structural View

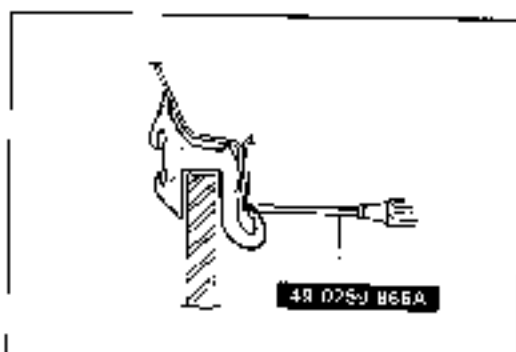


15U23X 017

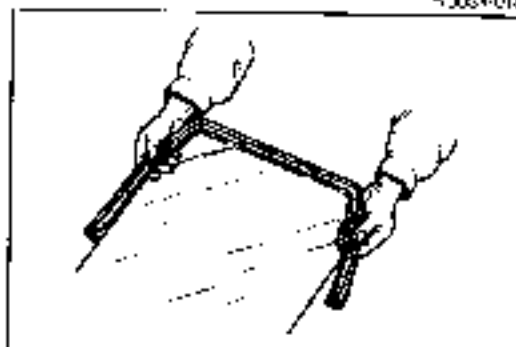
- 1 Back window glass
- 2 Weatherstrip
- 3 Spacer
- 4 Screw

- 5 Spacers
- 6 Back window glass (side)
- 7 Weatherstrip
- 8 Weatherstrip

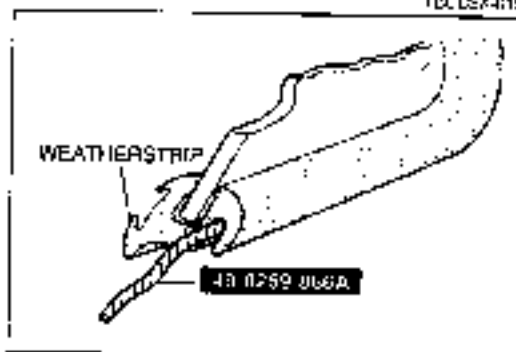
- 9 Rubber seals
- 10 Drain valve
- 11 Weatherstrip (slide glass)
- 12 Slide glass



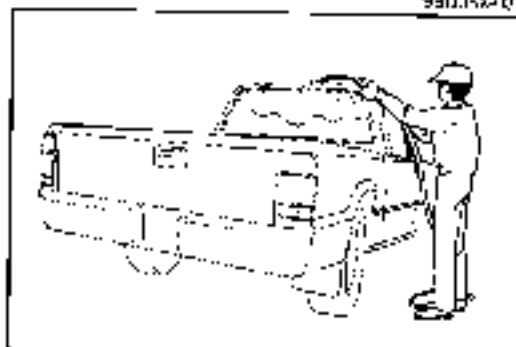
12LCSX-018



12LCSX-010



93J036-017



06LCSX-038

REMOVAL

1. Use the **SST** to push out the inner lip of the weatherstrip along the edge of the back window from inside the vehicle 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.

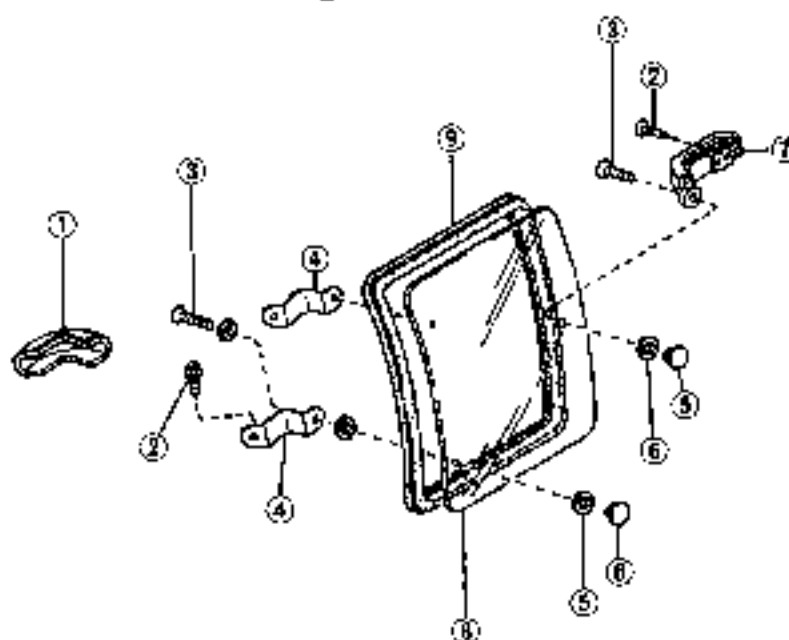
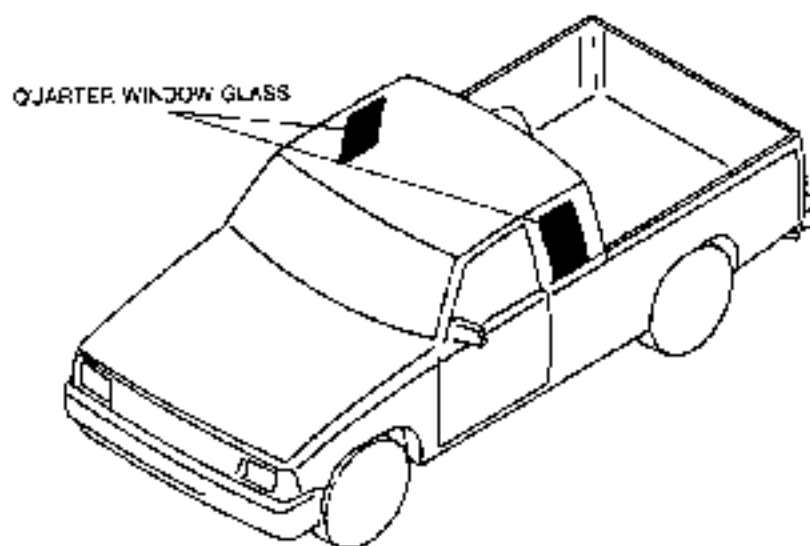
2. Apply liquid soap to the groove of the weatherstrip.
3. Fit a string **4mm (0.16 in)** in diameter to the groove of the weatherstrip as shown.
4. Place the back window glass and weatherstrip assembly into position on the body flange.
5. Pull the **SST** to place the inner lip over the flange.

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

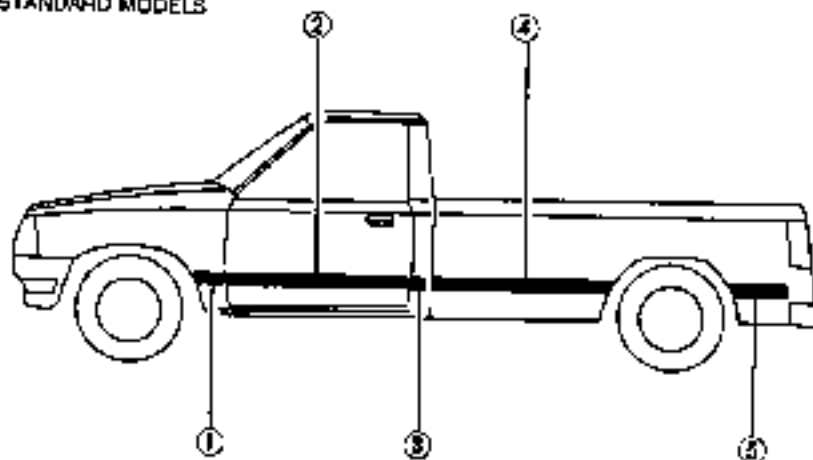
1. Hinge cover
2. Screws
3. Bolts
4. Hinges (lower and upper)

5. Glass clamp nuts
6. Washers
7. Quarter window lock
8. Quarter window glass
9. Weatherstrip

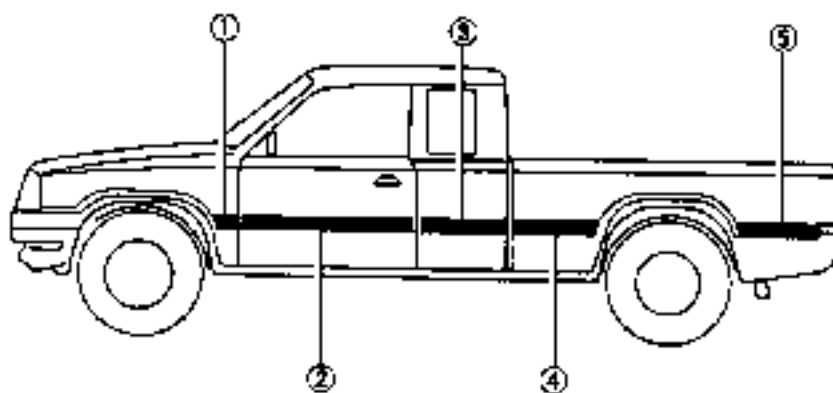
SIDE PROTECTOR

STRUCTURAL VIEW

STANDARD MODELS



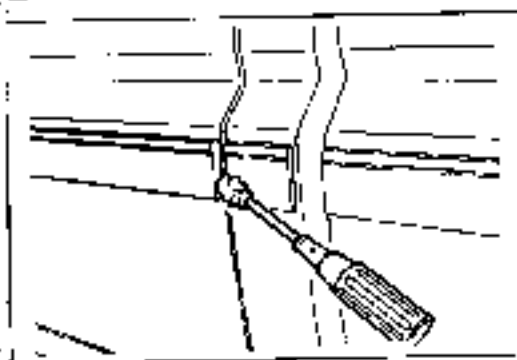
CAB PLUS MODELS



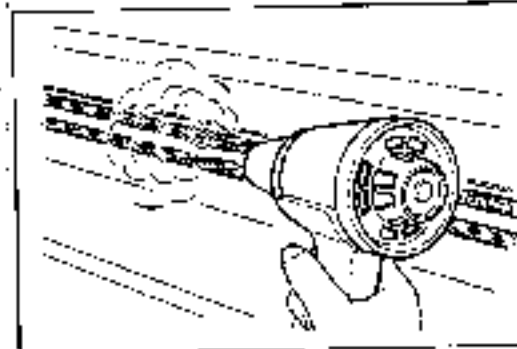
1. Side protector A
2. Side protector B
3. Side protector C

4. Side protector D
5. Side protector E

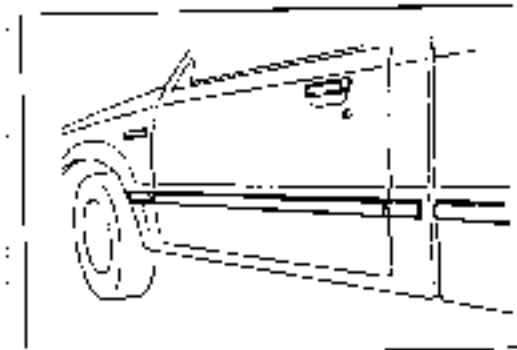
33U25X1240



1.2EJ33X 011



7.91J14X 035



6BU00K 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.

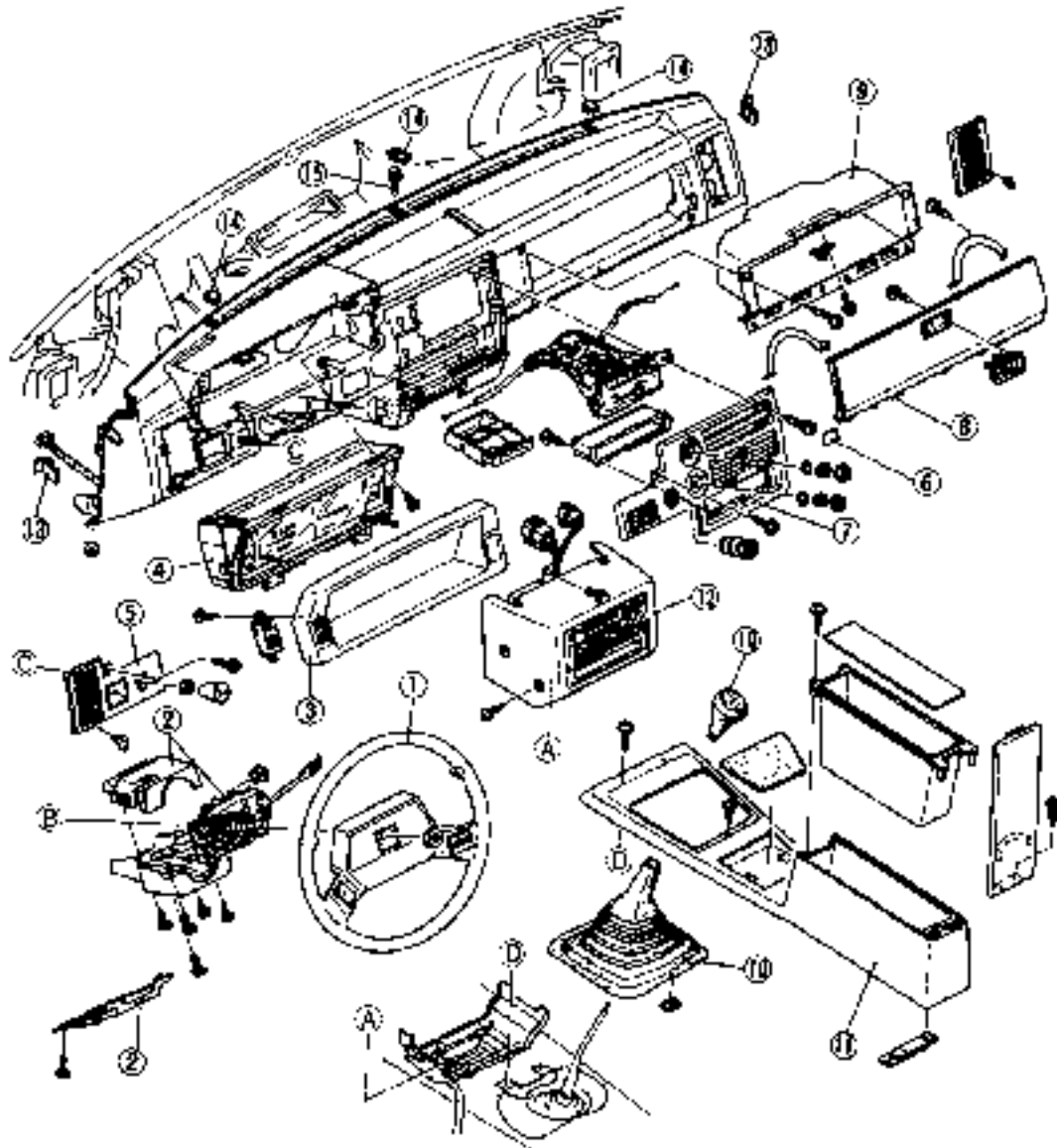
Note

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

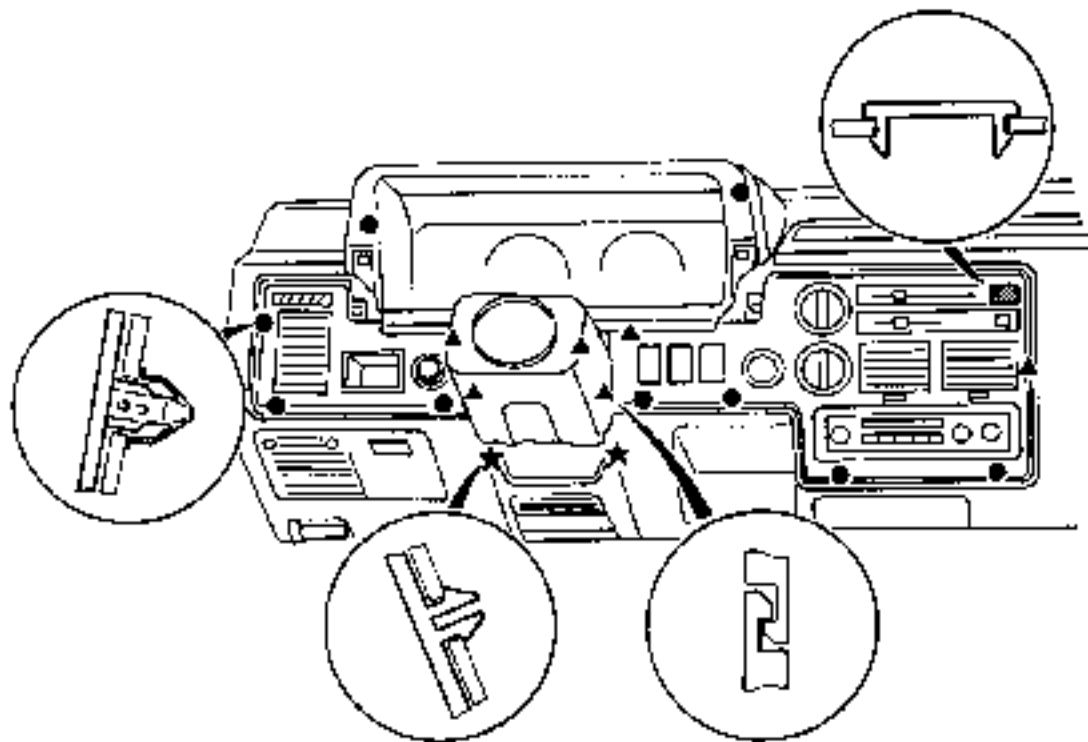
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure
3. Install in the reverse order of removal



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	

18U057-02

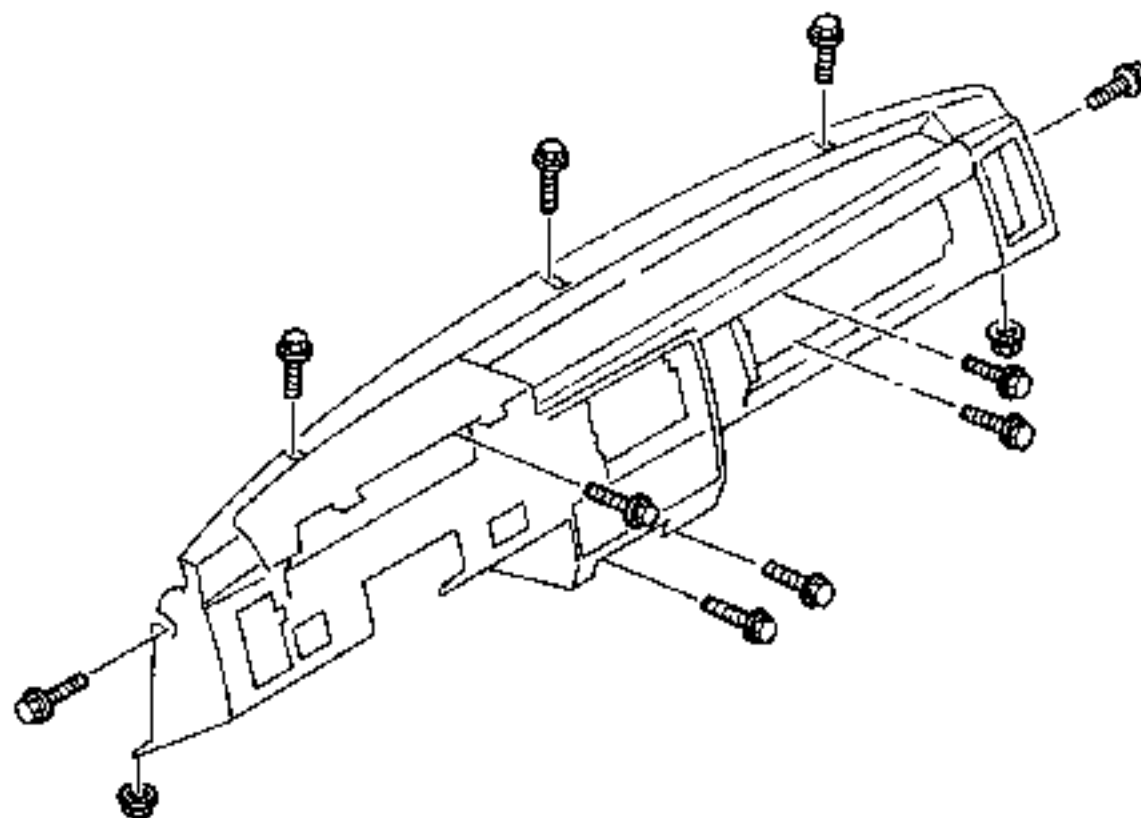
INTERLOCK OF INSTRUMENT PANEL



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)

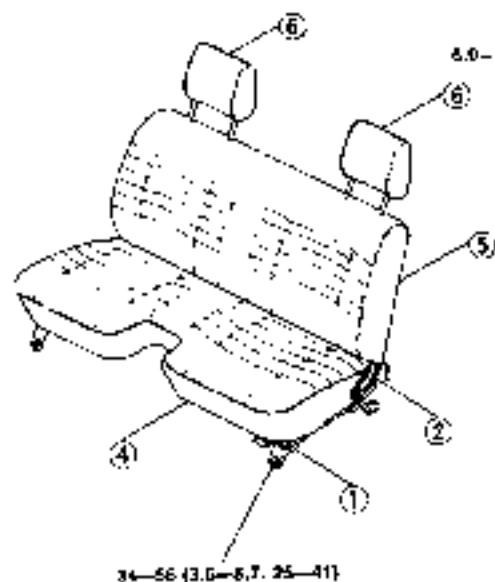
53U14X-03E

As shown, the instrument panel is mounted by 10 bolts and 2 nuts.

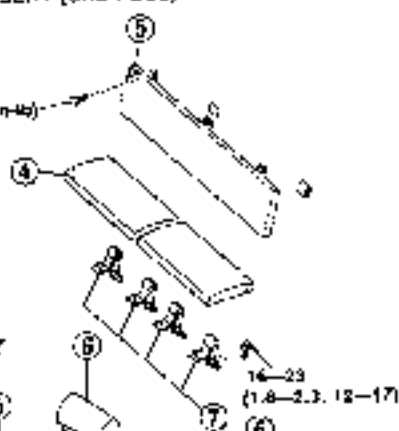
SEATS

STRUCTURAL VIEW

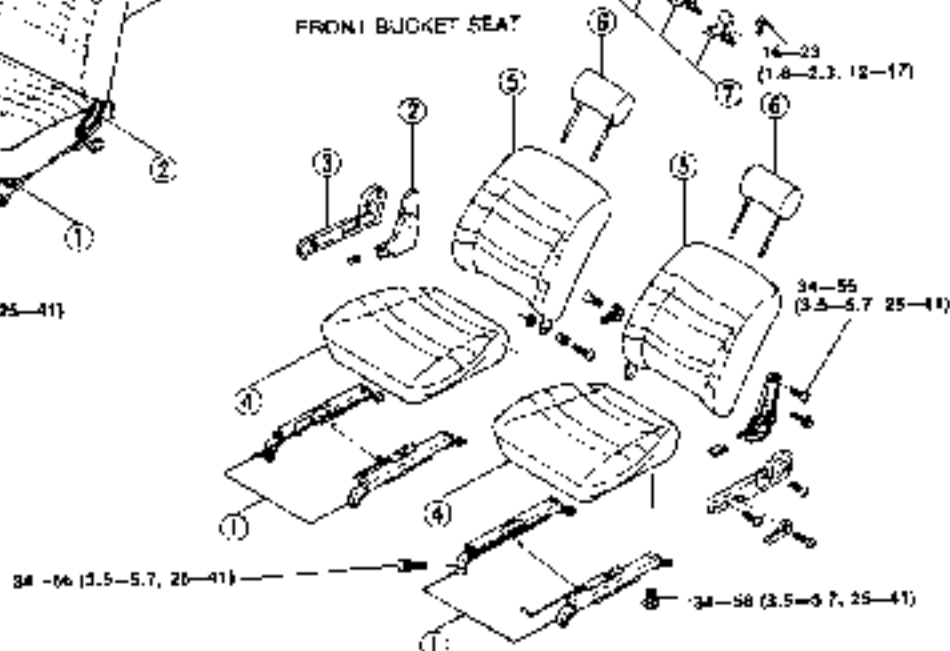
FRONT BENCH SEAT



REAR SEAT (CAB PLUS)



FRONT BUCKET SEAT



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

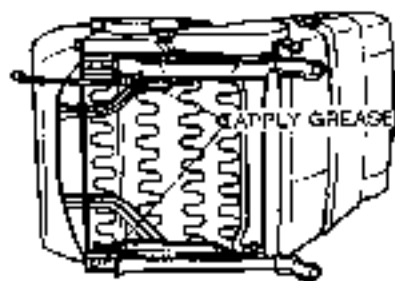
Ref. 58-027

1. Adjuster(s)
Inspection Described below
2. Reclining knuckle
3. Knuckle cover

4. Seat cushion(s)
5. Seat back(s)
6. Headrests
7. Seat cushion hinges

INSPECTION

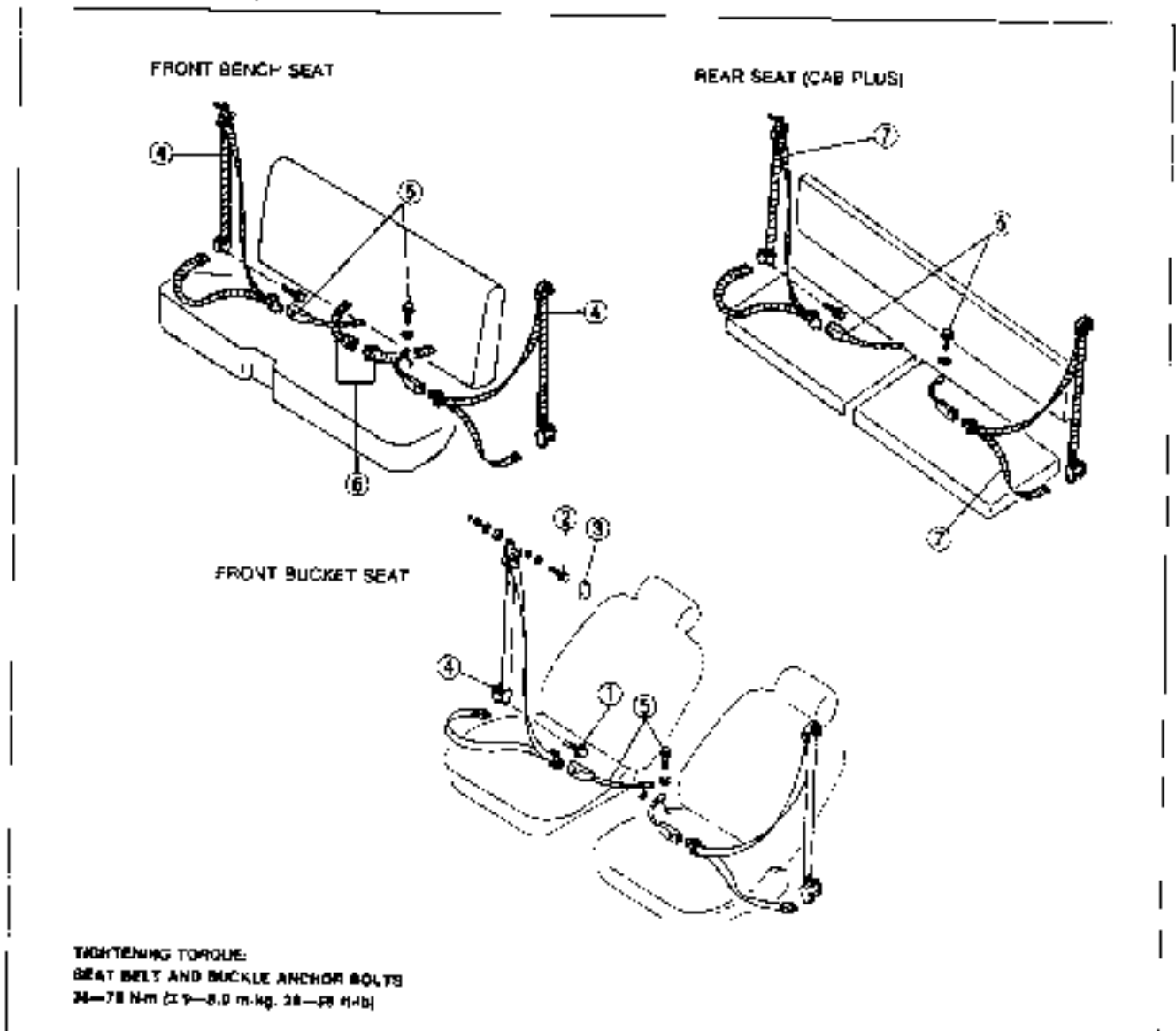
1. Make sure the seat adjuster lever and reclining knuckle move smoothly. Apply grease to the moving parts.
2. Check the adjuster lever for wear.
3. Check the front seat mounting bolts for looseness.



70114K040

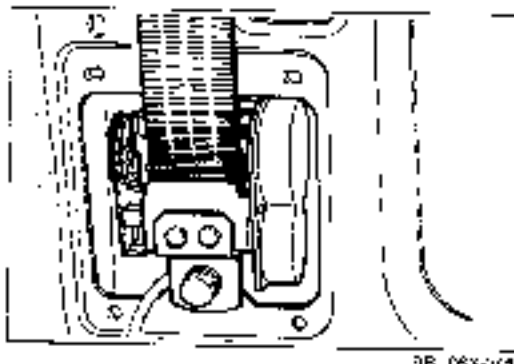
SEAT BELTS

STRUCTURAL VIEW



SPU052 03A

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



AB...06X-000

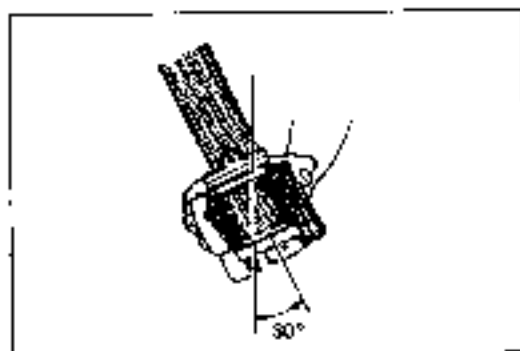
INSPECTION

Caution

Do not disassemble the buckle and retractor assembly.

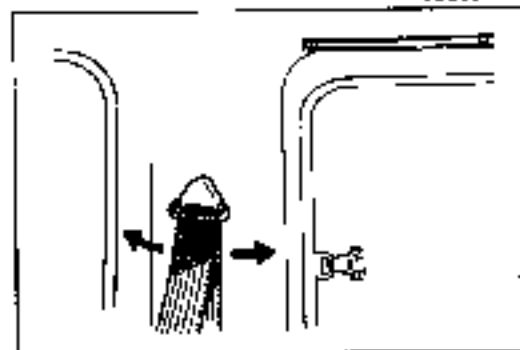
Emergency Locking Retractor (ELR)

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.



39L0584046

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.



39U0584047

Shoulder Anchor

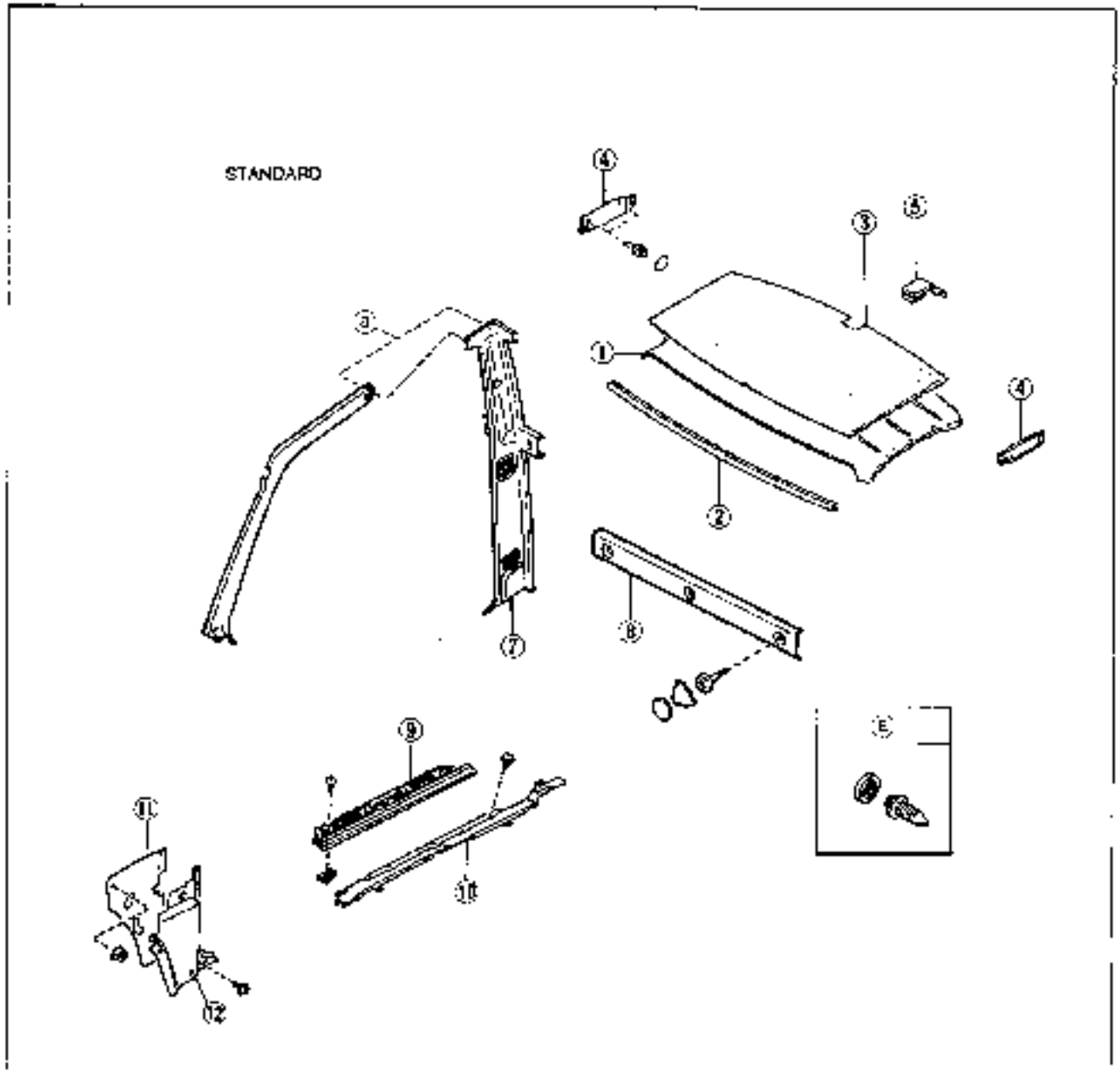
Make sure the anchor works in the circumferential direction with the shoulder anchor bolt tightened.

Webbing

Inspect the webbing for scars, tears, and wear and for deformation of the fittings.

HEADLINER AND TRIM

STRUCTURAL VIEW

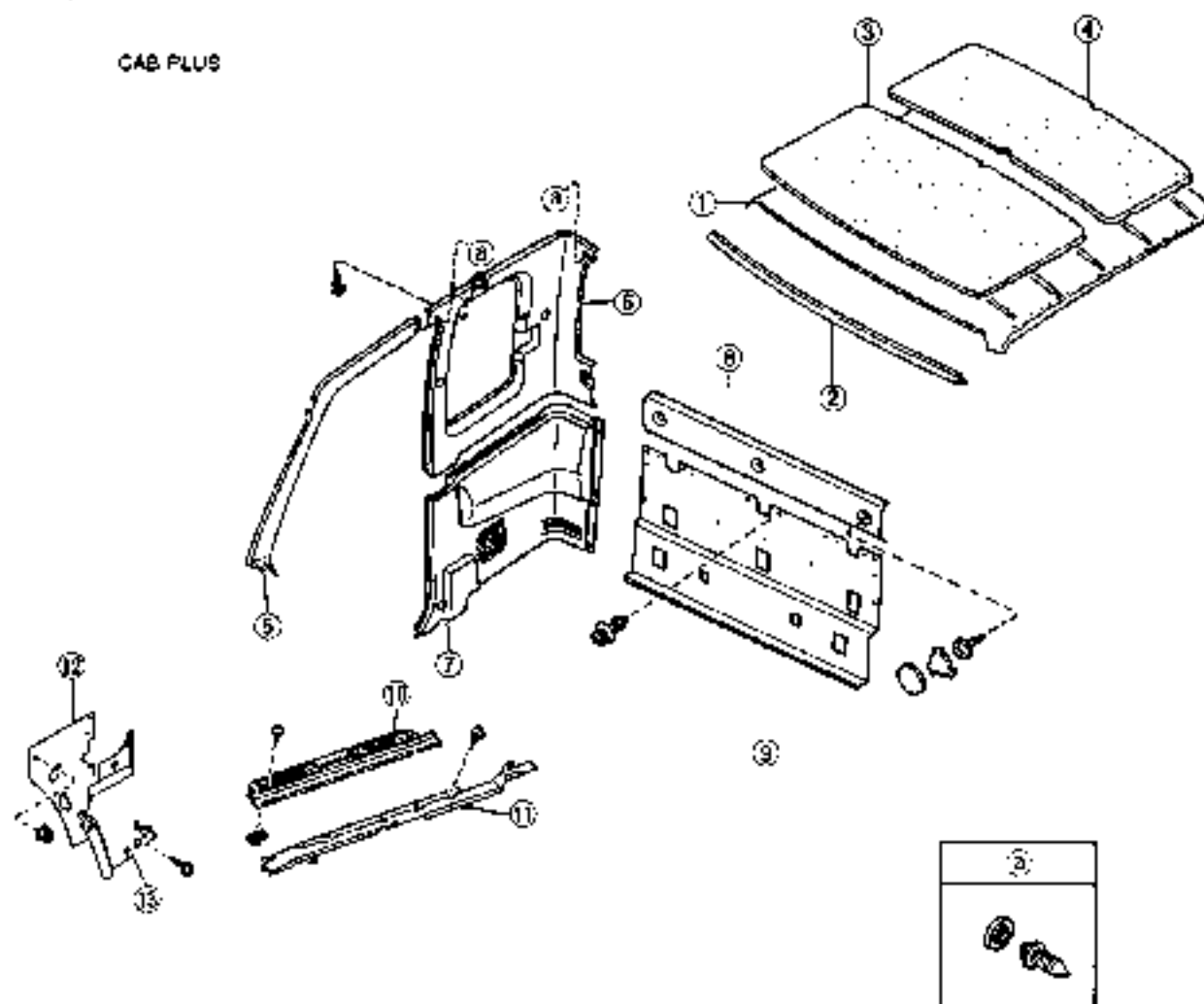


1. Headliner	
Removal.....	page S-35
Installation.....	page S-35
2. Fixing plate	
3. Front roof insulator	
4. Top side garnish	
5. Headliner bracket	

- | |
|-----------------------|
| 6. Front pillar trim |
| 7. B pillar trim |
| 8. Back upper garnish |
| 9. Front scull plate |
| 10. Wiring cover |
| 11. Cowl insulator |
| 12. Front side trim |

2010000000

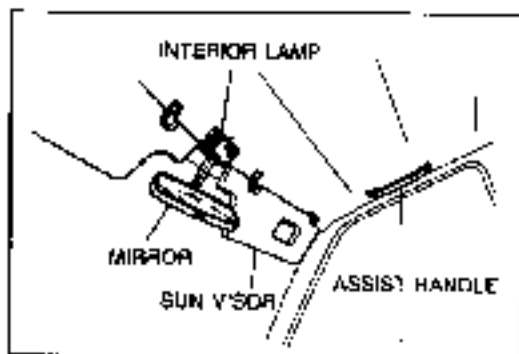
CAB PLUS



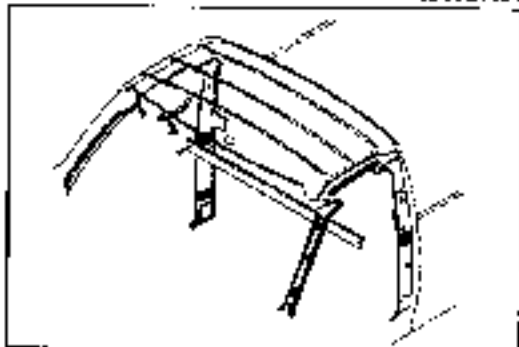
REBUSY 021

1. Headliner
 Removal..... page S-35
 Installation..... page S-35
2. Fixing plate
3. Front roof insulator
4. Rear roof insulator
5. Front pillar trim
6. Back pillar trim (upper)

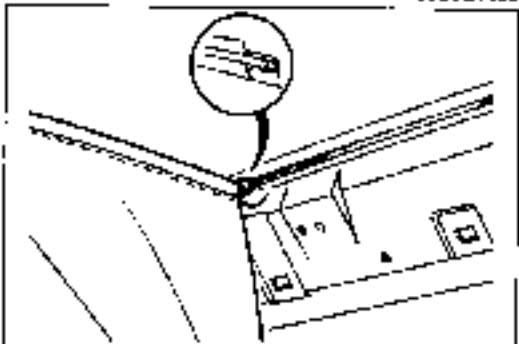
7. Back pillar trim (lower)
8. Back upper trim
9. Backpanel trim
10. Front scuff plate
11. Wiring cover
12. Cow insulator
13. Front side trim



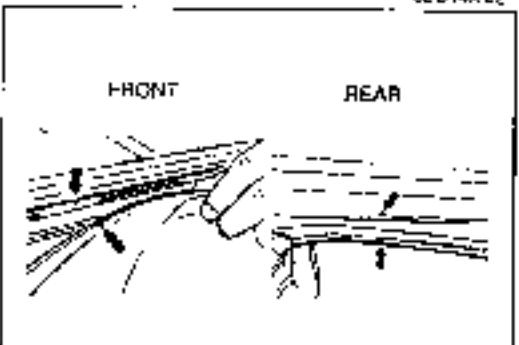
8BU03X 064



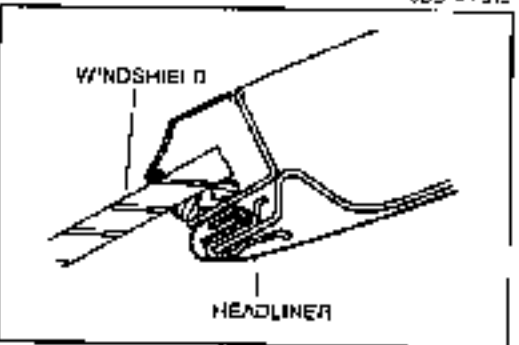
8BU03X 050



8BU14X 021



08J14X 016



8BU14X 016

REMOVAL

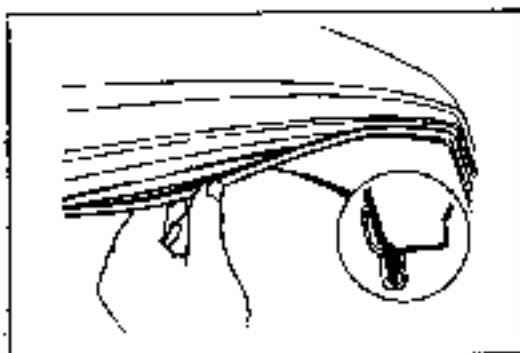
Remove these items in order:

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

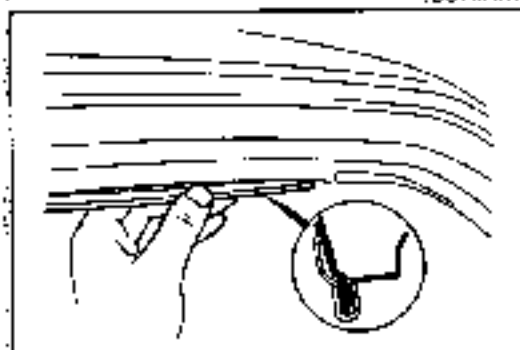
Install in the reverse order of removal, noting the following points:

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 to their respective positions in successive order, beginning from the front
3. Align the centering mark on the headliner to the body mark.
4. Insert the front of the Headliner to the inserting point of the body.



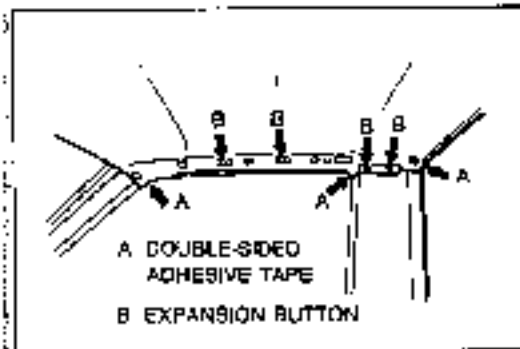
WBJ14X-017

5. Insert the rear of the headliner to the body flange.



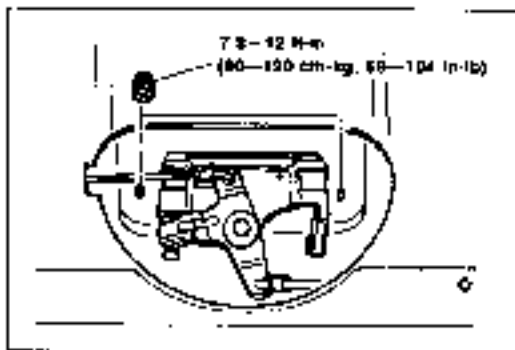
RSL 14X-018

6. Pull the headliner from both sides to remove any looseness, and insert both sides of the headliner to the body flange.

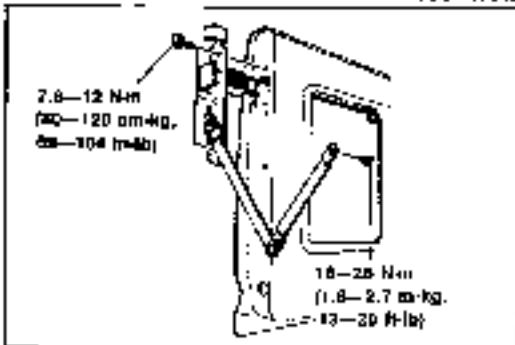


RSL 14X-019

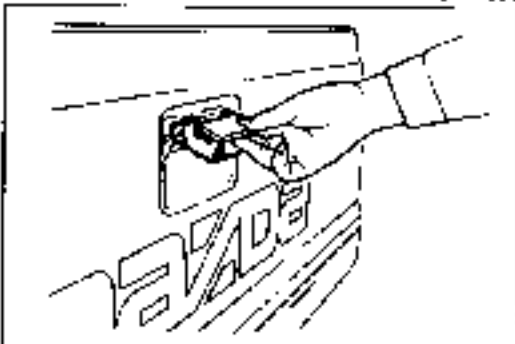
7. Apply double-sided adhesive tape between the headliner and the body flange.
8. Push in the expansion buttons.



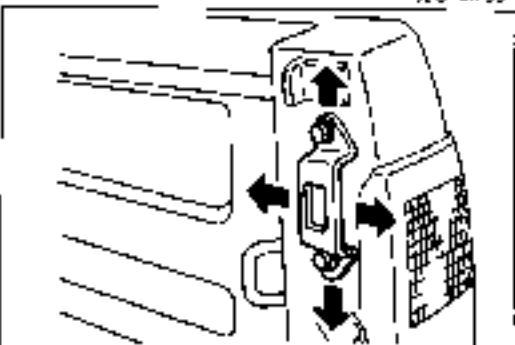
50U14X049



50U14X050



50U14X051



50U14X052

TAILGATE

DISASSEMBLY

Remove these items in order.

1. Cover
2. Nuts attaching the tailgate lock
3. Disconnect rods from tailgate lock and remove lock.

4. Bolts and latch guide, latch, and rod

5. Handle

ASSEMBLY

Assemble the tailgate in the reverse order of disassembly.

ADJUSTMENT

1. Loosen the two bolts.
2. Move the striker forward or backward to adjust.
3. After adjustment is made, tighten the bolts.

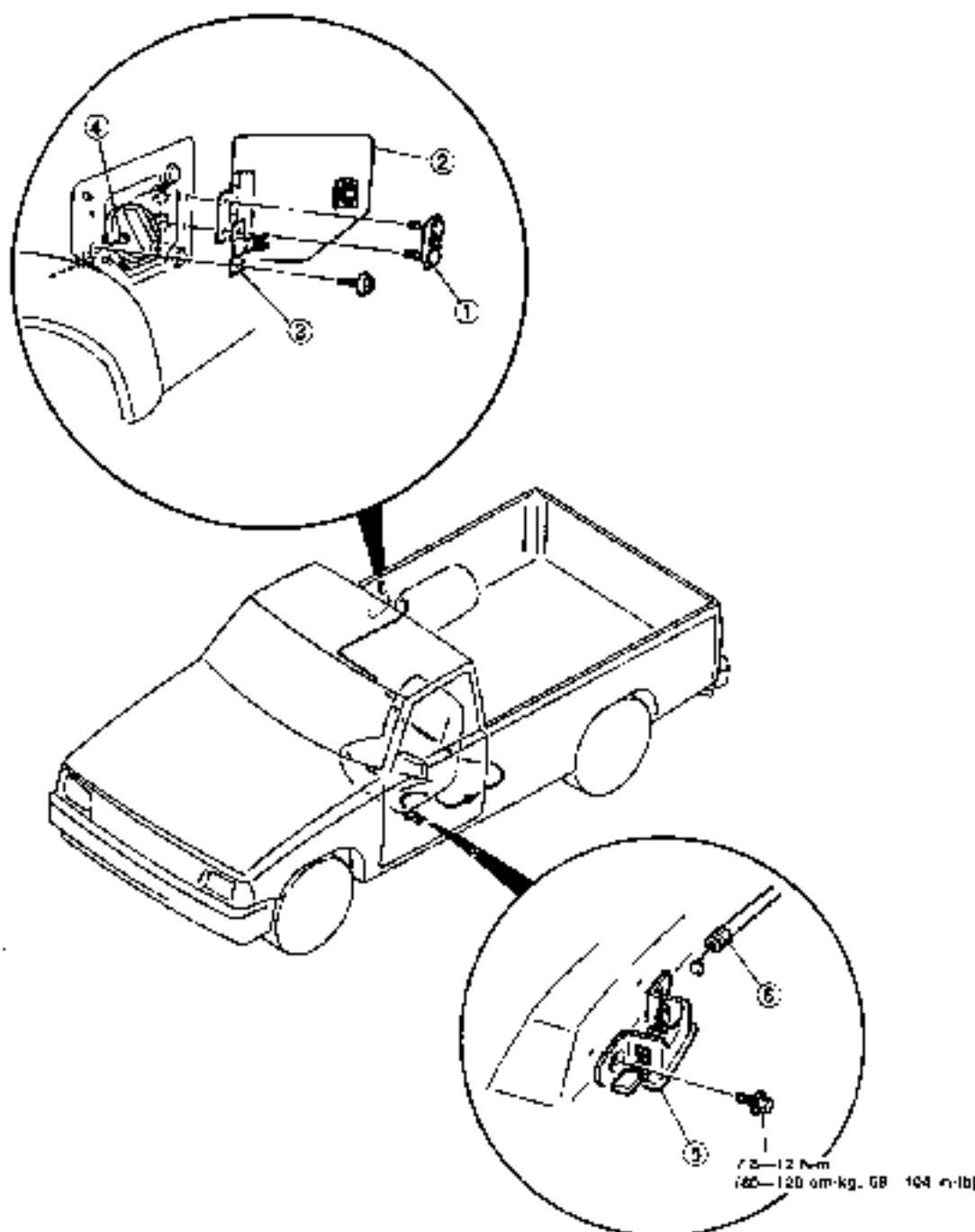
Tightening torque:

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

FUEL LID REMOTE RELEASE

REMOVAL AND INSTALLATION

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



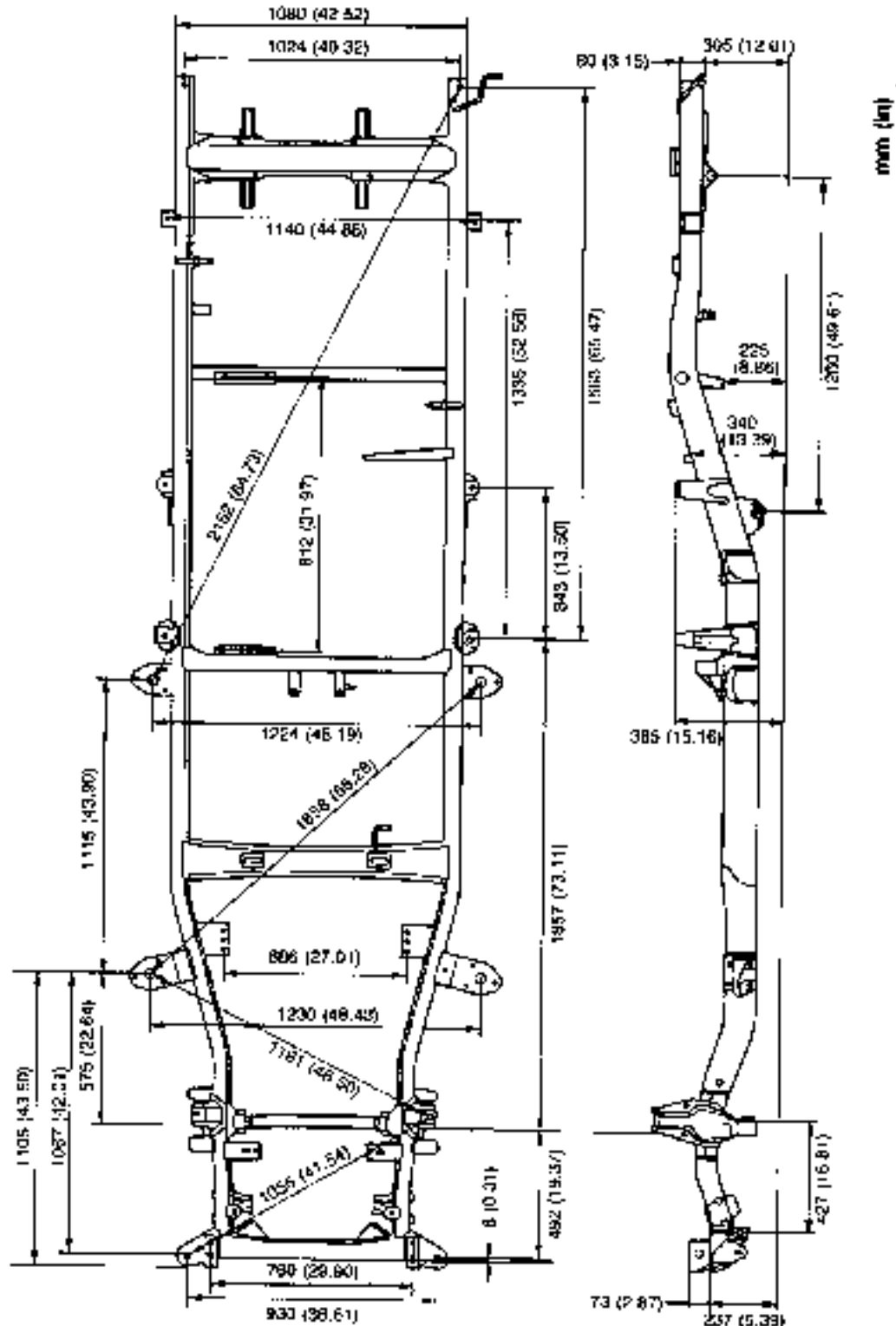
1. Lift spring
2. Fuel lid
3. Lock plate

4. Release wire (Fuel lid side)
5. Fuel lid opener
6. Release wire (Opener side)

BODY DIMENSIONS

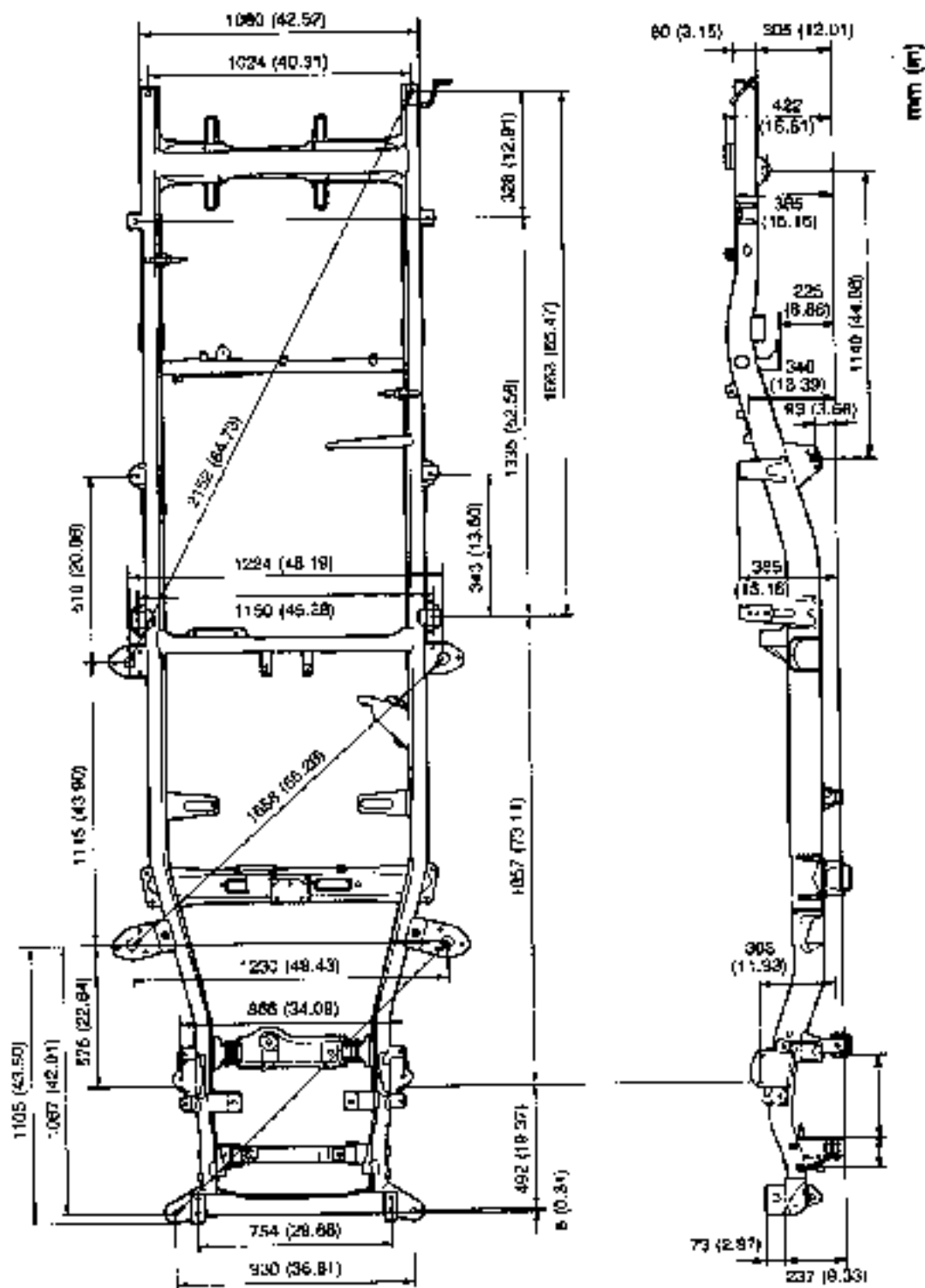
(Short Bed)

4x2 MODEL (STANDARD)

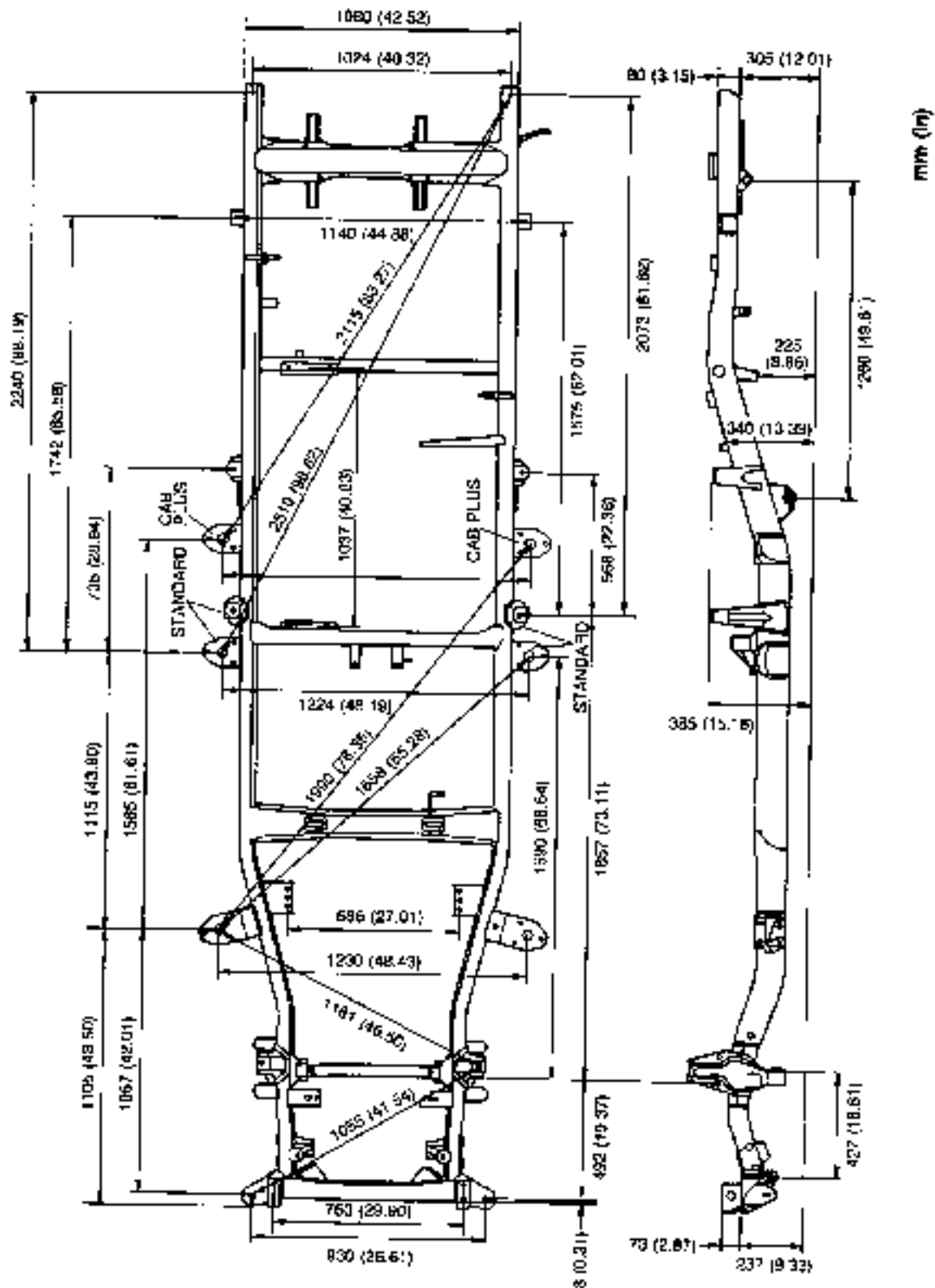


(Short Bed)

4x4 MODEL (STANDARD)

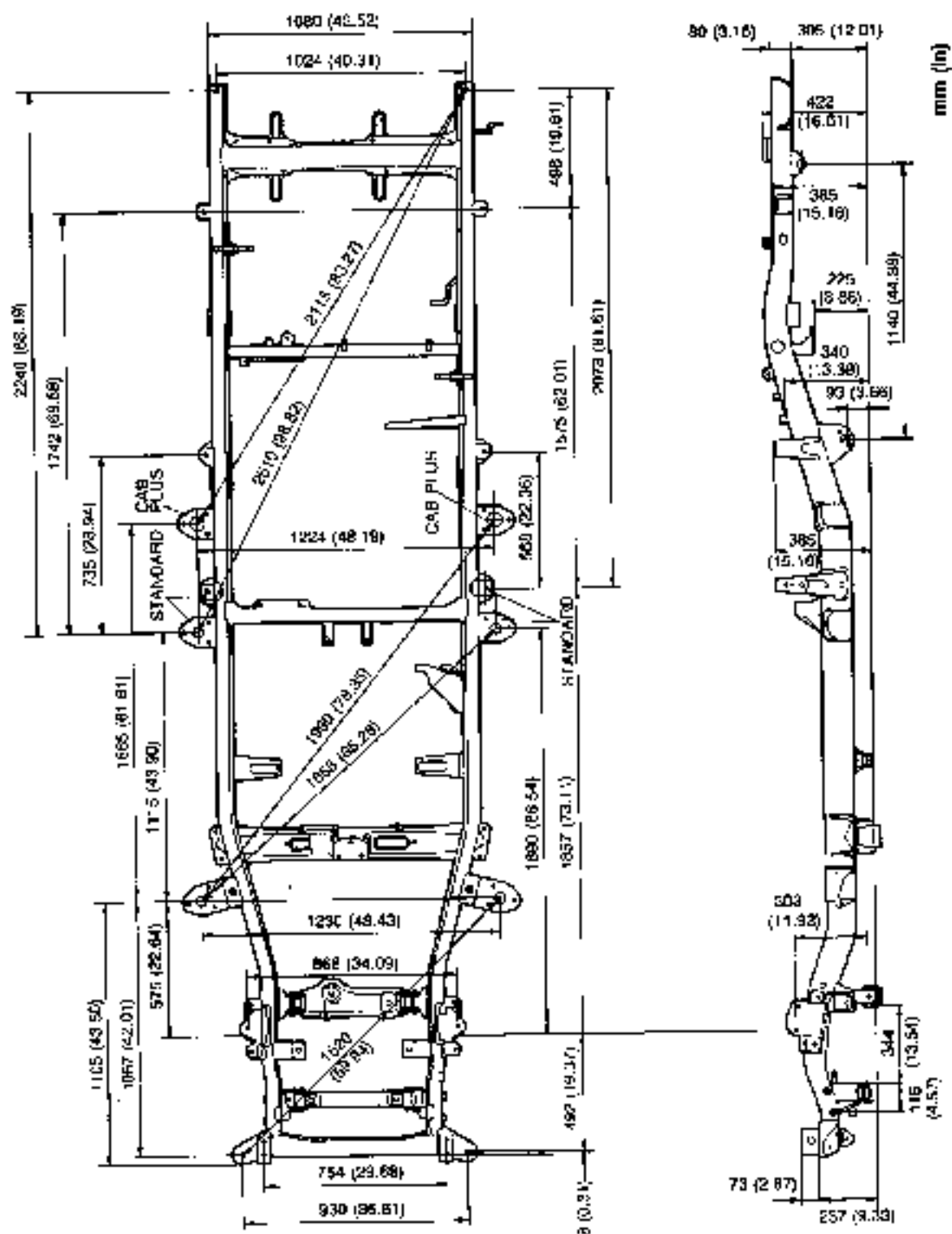


4x2 MODEL (STANDARD, CAB PLUS)



[Long Bed]

4x4 MODEL (STANDARD, CAB PLUS)



SBL 05X-025

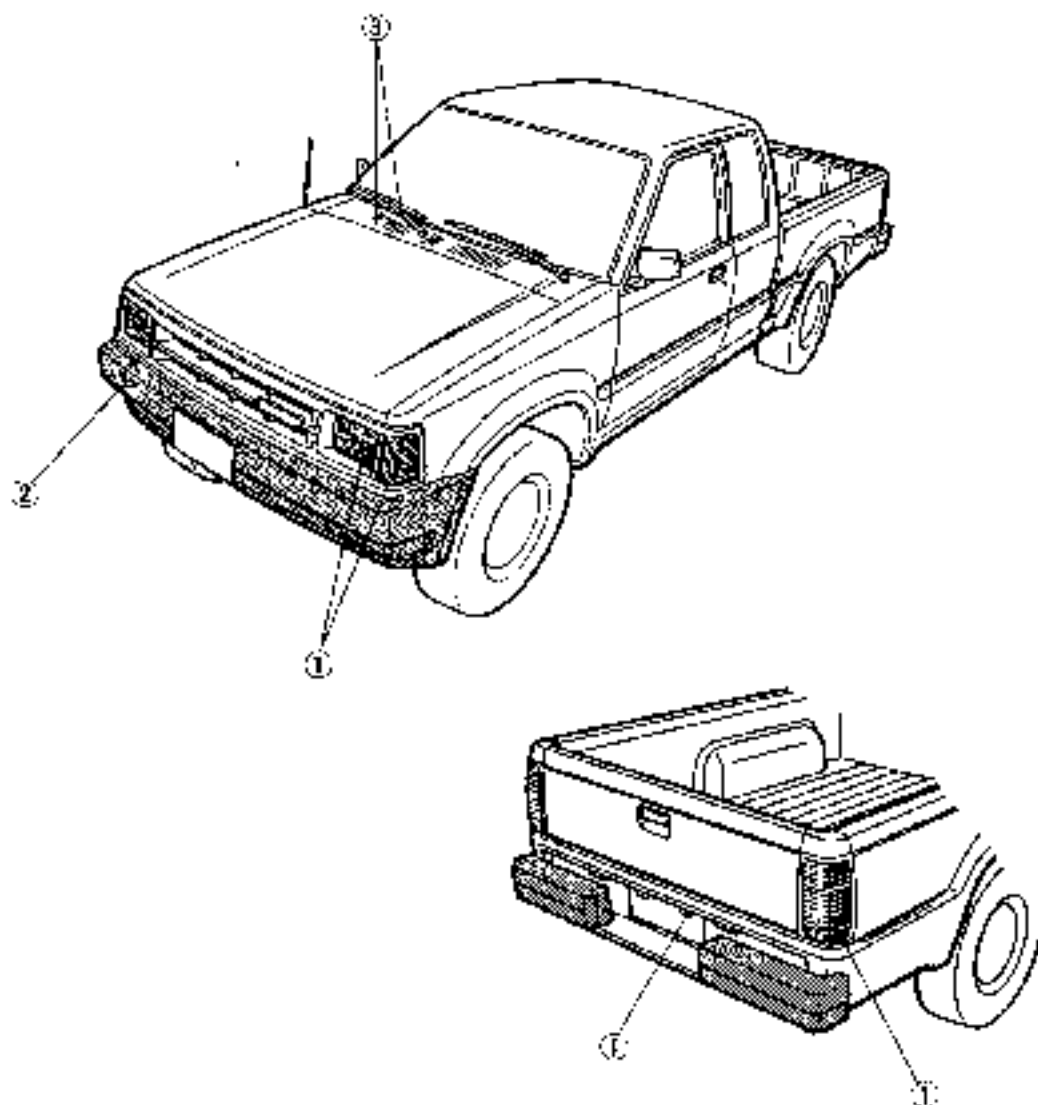
Before beginning any service procedure, refer to Section T of this manual for airbag system warnings and cautions.

BODY ELECTRICAL SYSTEM

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PANEL LAMP CONTROL SWITCH ...	T-10	HORN RELAY.....	T-36
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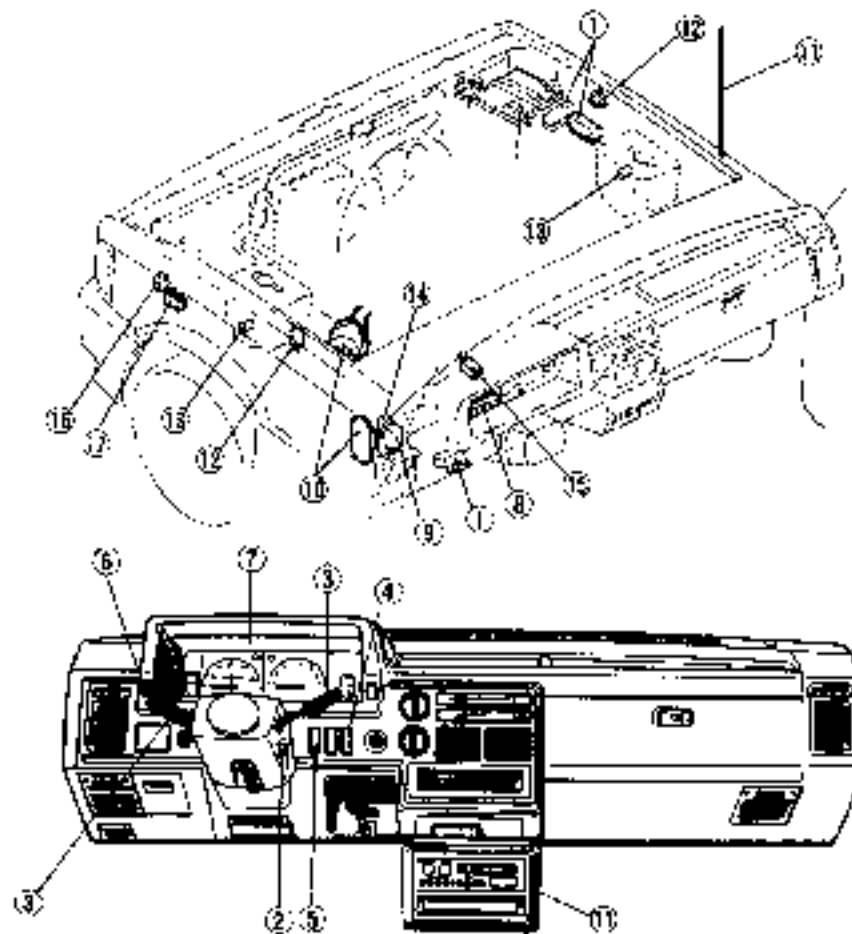
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30.107X.002

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2. Horn
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2R, 01X 002

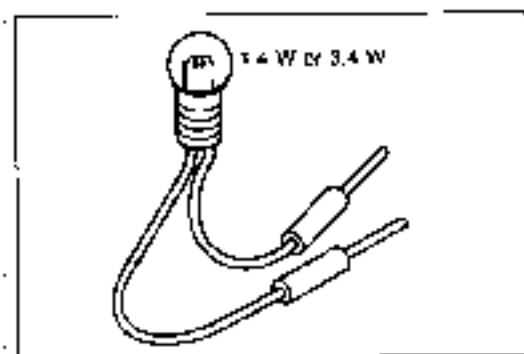
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2. Ignition key switch	page T- 9	10. Cruise control system	
3. Combination switch	page T- 9	Structural view	page T- 37
4. Cruise control main switch	page T-10	Troubleshooting	page T- 39
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INTRODUCTION

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.

EBL007X-001



EPN 15X-020

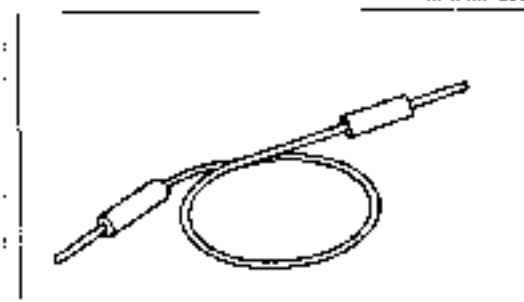
ELECTRICAL TROUBLESHOOTING TOOLS

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.



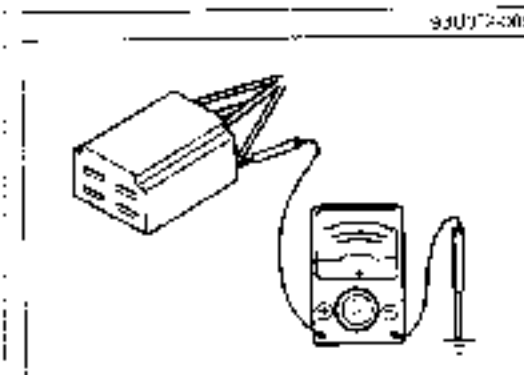
93U072-005

Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and verifying the condition of ground connections.

Caution

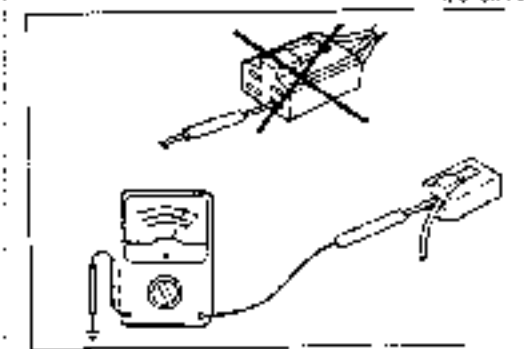
Do not connect the jumper wire between the power source line and the body ground because this may cause burning or other damage to the harnesses.



93U072-006

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.



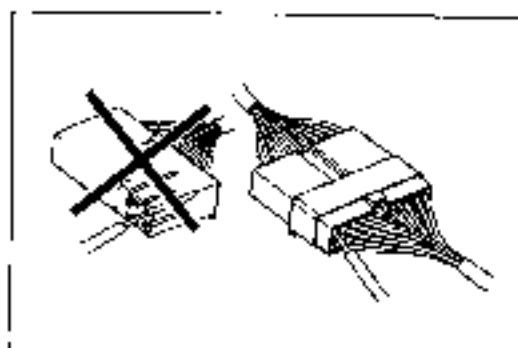
EQU0A007

Ohmmeter

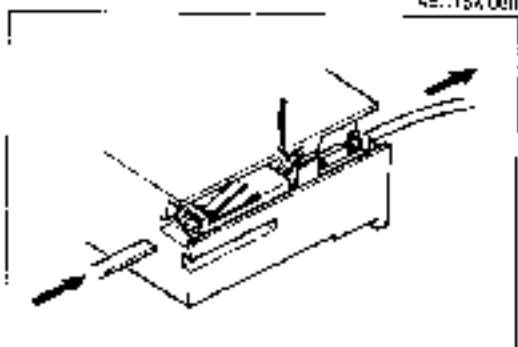
The ohmmeter is used to measure the resistance between two points in a circuit and to check for continuity and diagnosis of short circuits.

Caution

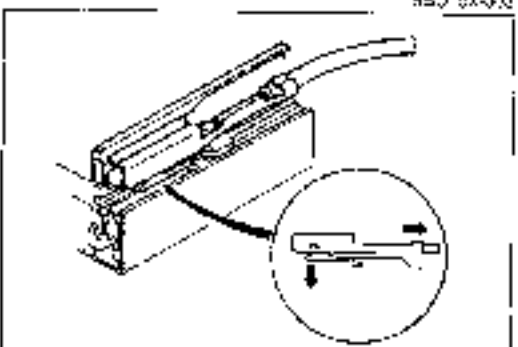
Do not attempt to connect the ohmmeter to any circuit to which voltage is applied because this may burn or otherwise damage the ohmmeter.



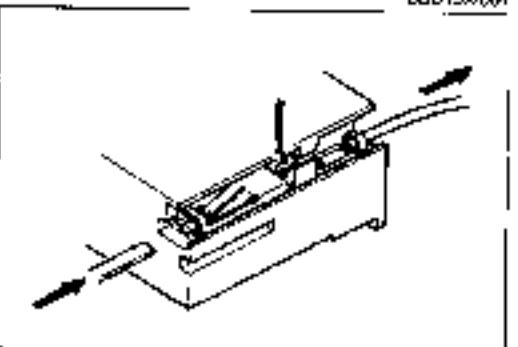
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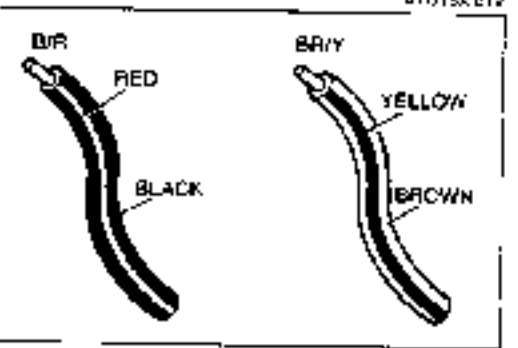
5B015X 000



6B015X 000



47015X 010



47015X 000

Inspection note

When checking the continuity or voltage with a circuit tester, insertion of the test probe into the receptacle connector may open the fitting to the connector and result in poor contact. Therefore, make sure the test probe is inserted from the wire harness side.

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.

< Female Type No.2 >

< Male Type >

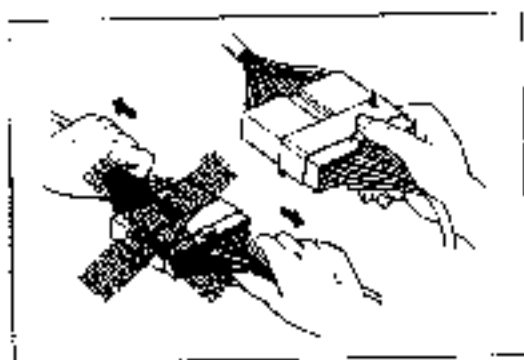
Same as the female type.

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.

CODE	COLOR
B	BLACK
BR	BROWN
G	GREEN
-	BLUE
LB	LIGHT BLUE
LG	LIGHT GREEN
O	ORANGE
R	RED
Y	YELLOW
W	WHITE

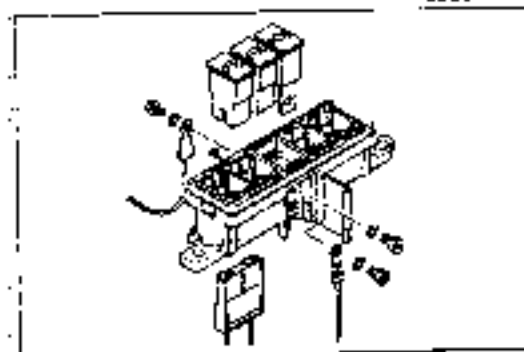


EBL07X-004

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.



29H10TX-005

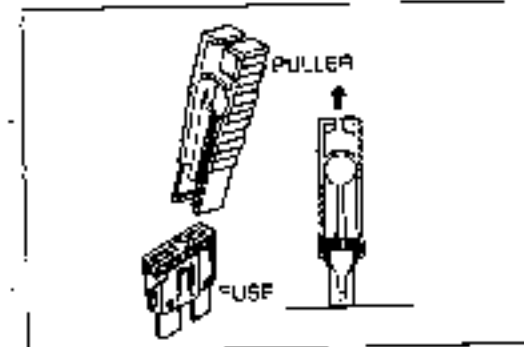
Replacement of Fuses

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

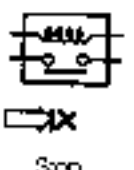
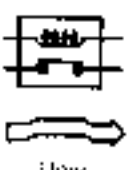
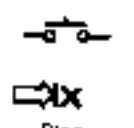
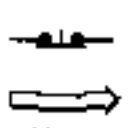
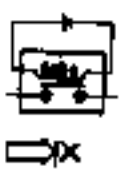
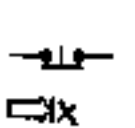
- Be sure the battery (-) terminal is disconnected before replacing a fuse.
- When replacing a fuse, use the supplied fuse puller.



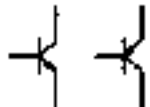
ELECTRICAL SYMBOLS

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)	 Stop	 Flow	 Stop	 Flow
In operation (power supply)	 Flow	 Stop	 Flow	 Stop

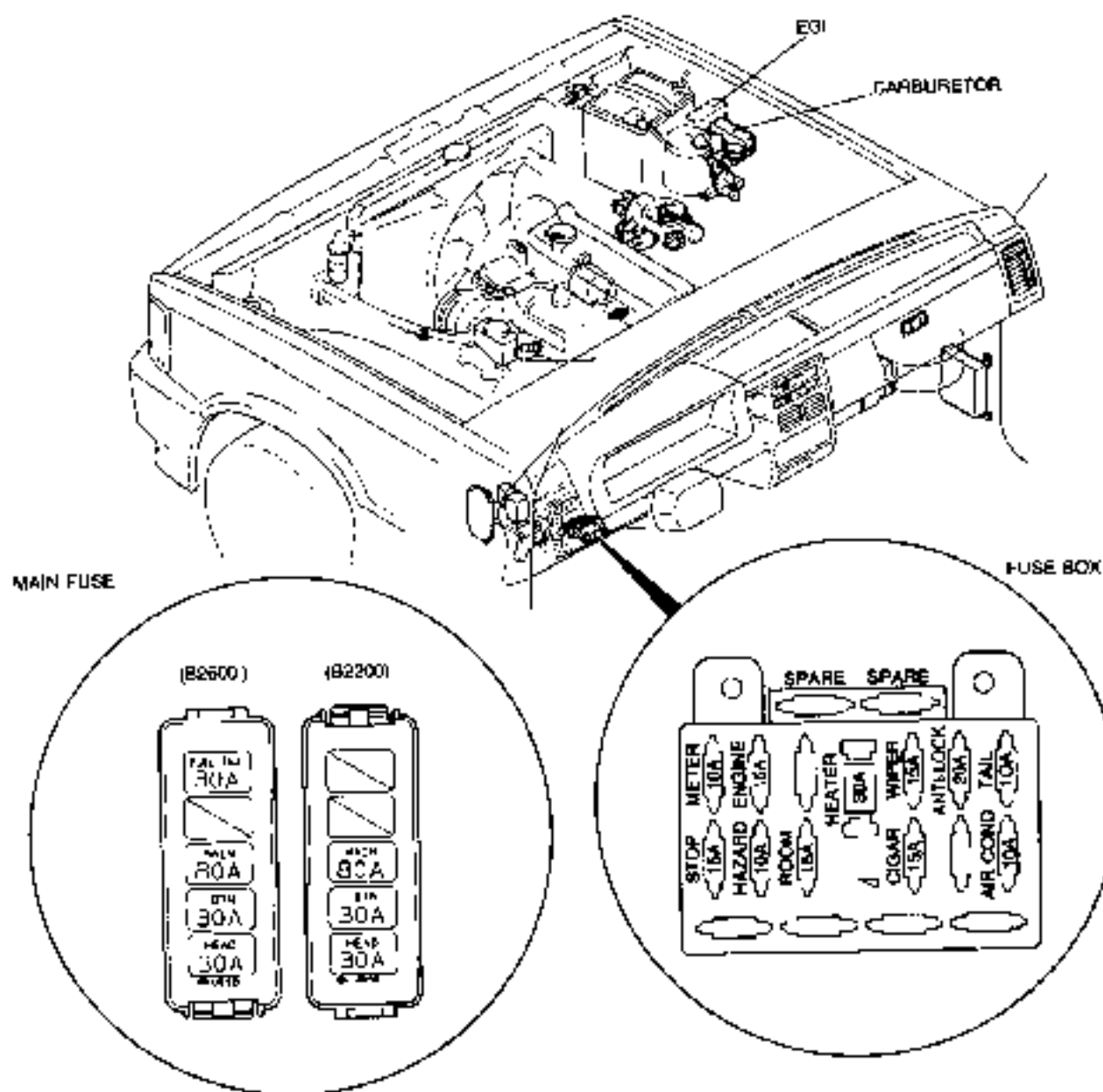
Other Electrical Symbols

			
BATTERY	BODY GROUND	FUSE	FUSIBLE LINK
			
MOTOR	COIL/RELENOID	RESISTOR	VARIABLE RESISTOR
			
THERMISTER	DIODE	CONDENSER	LIGHT
			
TRANSISTOR	SPEAKER	CIGARETTE LIGHTER	HEATER

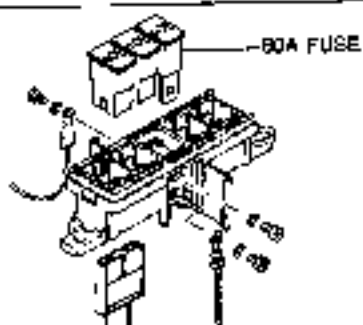
©2005 GM Corp.

MAIN FUSE AND FUSE BOX

STRUCTURAL VIEW



671.107X-306

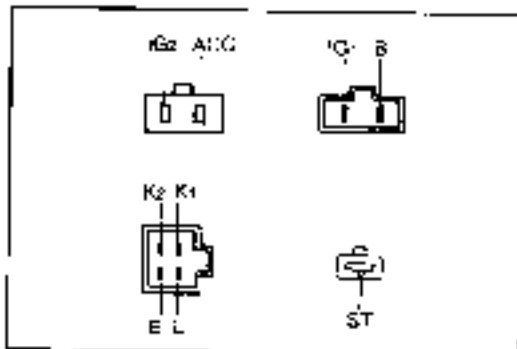


671.107X-307

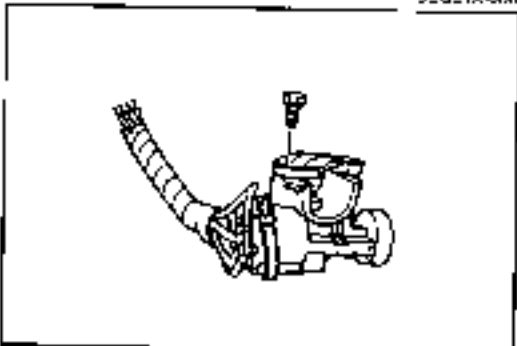
REPLACEMENT OF MAIN FUSE

Disconnect the negative battery cable.
30A fuse. Pull out and push in a new one.
80A fuse:

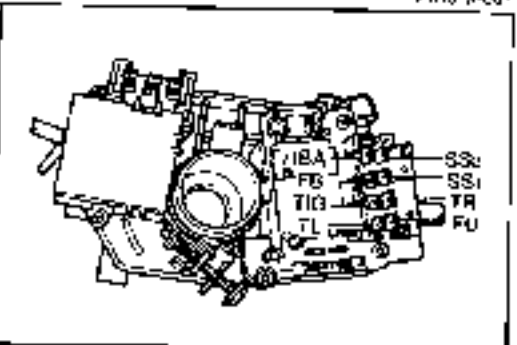
1. Remove the main fuse box.
2. Open the cover.
3. Remove the terminal
4. Pull out the old fuse and push in a new one.



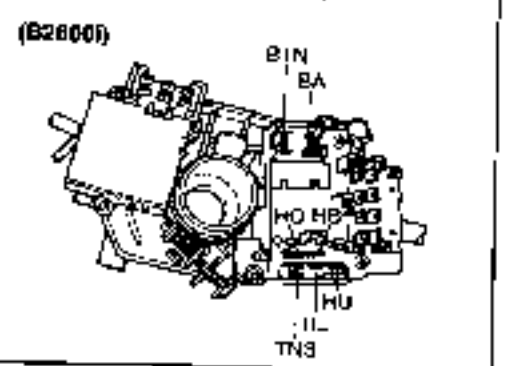
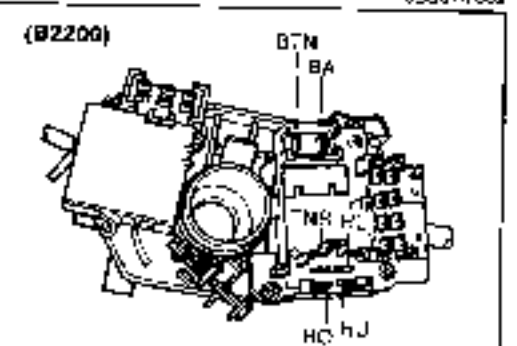
99U2TX.000



99U2TX.000



99U2TX.000



99U2TX.000

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	FG	HBA	FB	SS1	SS2
Hazard								
Left								
OFF								
Right								
ON								

○ — ○ Indicates continuity

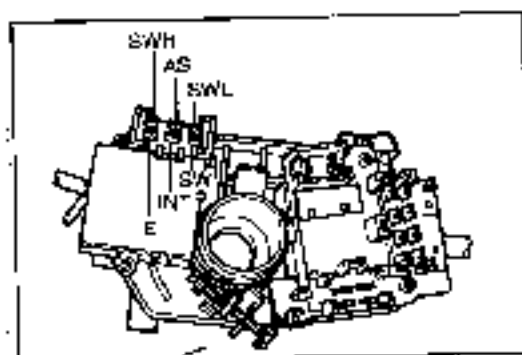
Light, dimmer, and passing switch

Terminal	B7N	NS	B4	HI	HU	H3
Position						
Tail, parking						
Headlight						
Low beam						
High beam						
Passing						
Tail, parking						

○ — ○ Indicates continuity

SWITCHES

Windshield wiper and washer switch



9810TX C11

Position	Terminal					
	One touch	AS	SWL	SWH	INT	E SW
OFF	ON					
Wiper switch	OFF					
N						
I (Low)						
II (High)						
Washer switch ON						

○—○: Indicates continuity

Cruise control switch

Switch	Terminal		
	CO	RE	E
SET/COAST			
RESUME/ACCEL			

○—○: Indicates continuity

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	h
Neutral						
OFF						
ON						

○—○: Indicates continuity

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					

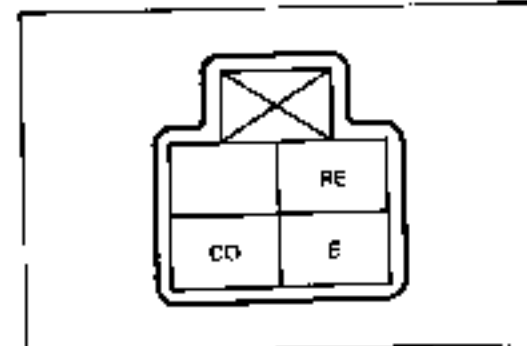
○—○: Indicates continuity

Illumination lamp

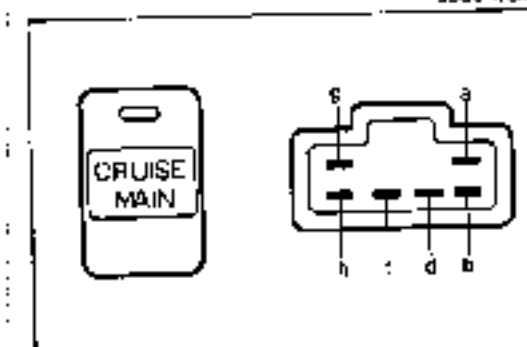
PANEL LAMP CONTROL SWITCH

Inspection

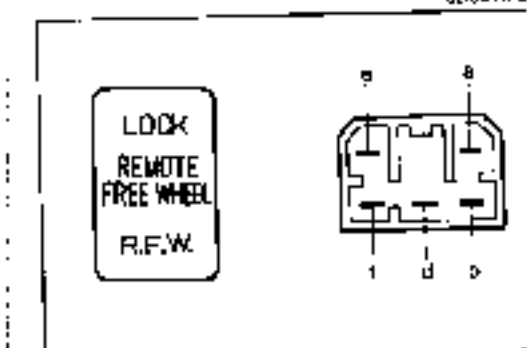
1. Connect battery voltage to terminal (b) and ground terminal (a).
2. Connect a 3.4W bulb to terminal (c).
3. Verify that the brightness of the bulb changes when the control is turned.



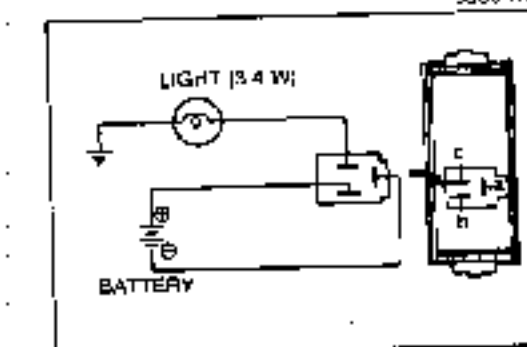
9810TX K04



9810TX C06



9810TX K04

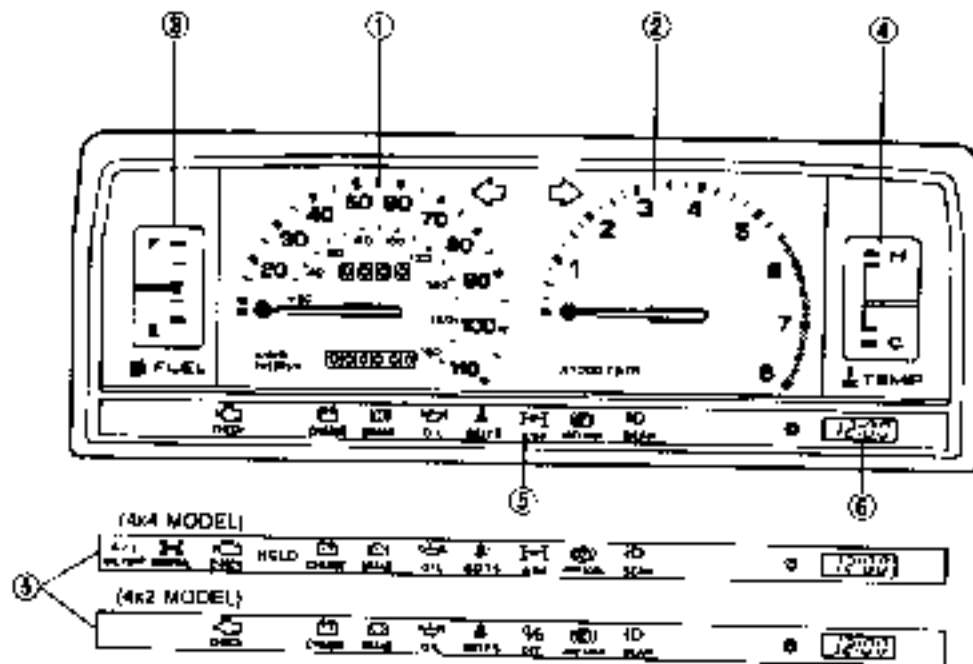


2910TX C07

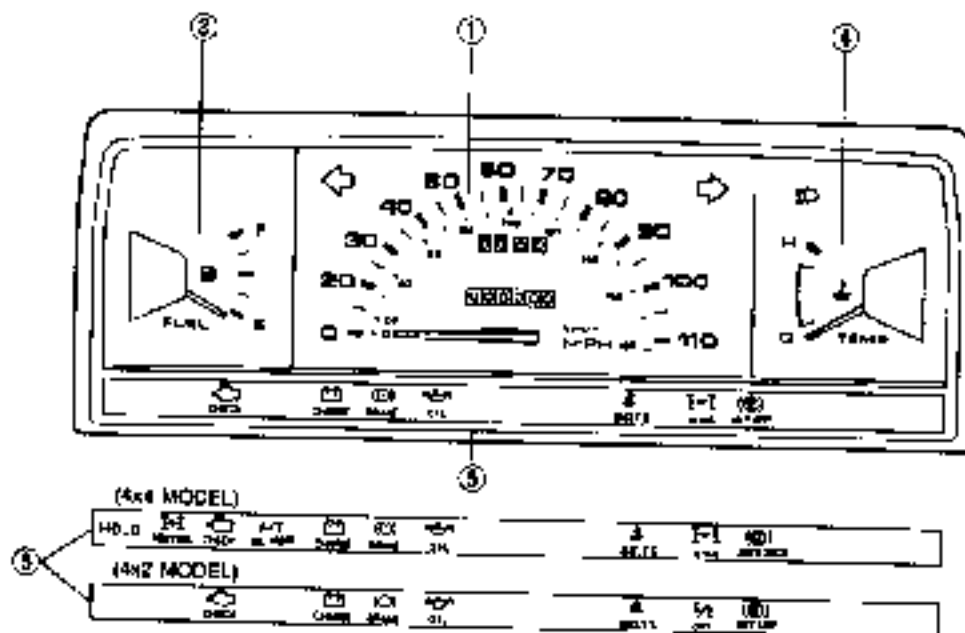
METER

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

ORJ07X 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 Faulty tachometer Faulty wiring	Replace fuse and check for short Check or replace tachometer Repair as necessary	— T-12 —
Fuel gauge does not work	METER fuse blown Faulty fuel gauge Faulty fuel tank unit Faulty ground or wiring	Replace fuse and check for short Check fuel gauge Check fuel tank unit Repair as necessary	— T-13 T-13 —
Water temperature gauge does not work	METER fuse blown Faulty water temperature gauge Faulty water temperature gauge unit Faulty wiring	Replace fuse and check for short Check water temperature gauge Check water temperature gauge unit Repair as necessary	— T-14 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-012

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	4,500 - 5,150
6,000	5,420 - 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

a) If significant fluctuation occurs or the speedometer does not move, remove the speedometer cable. If the cable is normal, replace the speedometer assembly.

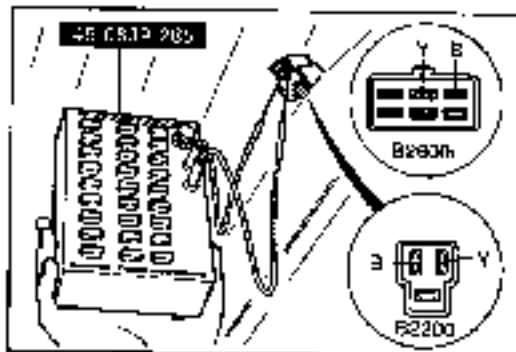
b) Tire wear and improper inflation will increase speedometer error.

Tachometer

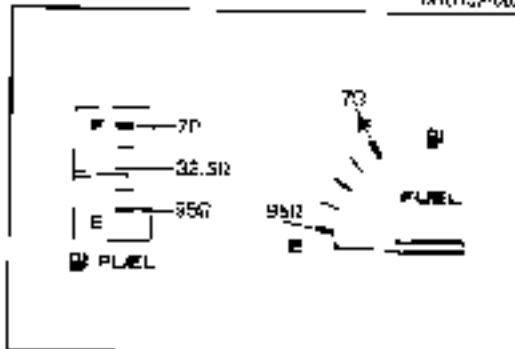
Compare the tester and tachometer indications. If significant error is noted, replace the tachometer.

Caution

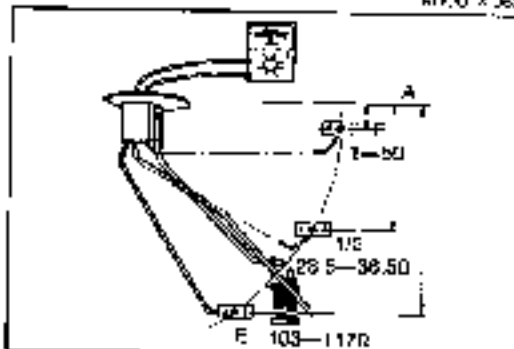
When removing or installing the tachometer, be careful not to drop it or subject it to sharp impact.



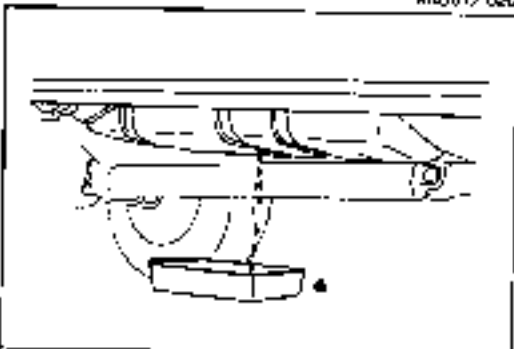
88U157-002



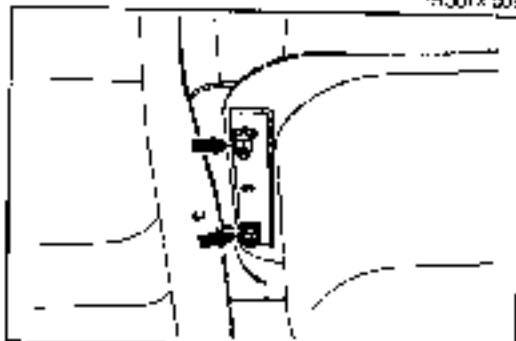
88U157-002



88U157-002



88U157-002



4E 0512 205

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 (7.42 in)	263 ± 2.5mm (10.24 ± 0.1 in)
Cap PL's		61 ± 2.5mm (2.58 ± 0.1 in)	181mm (7.13 in)	253.5 ± 2.5mm (10.37 ± 0.1 in)

Note

To inspect the fuel tank unit, remove the fuel tank.

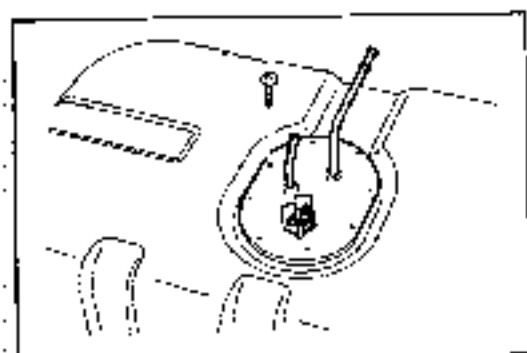
Removal

1. Jack up the vehicle, and support it with safety stands (rigid racks).
2. Open the filler cap.
3. Drain the fuel.

Warning

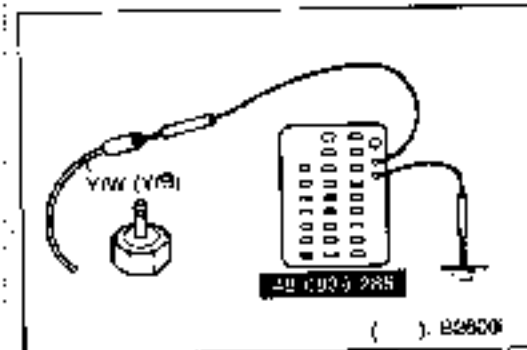
When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.

4. Disconnect the main fuel hose, fuel return hose and evaporation hoses from the fuel tank.
5. Remove the fixing bolts (arrows) and fuel tank.

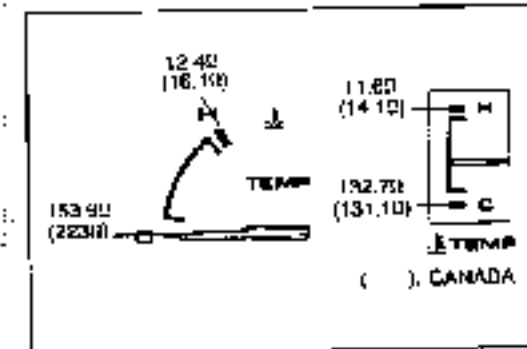


EBL15X-063

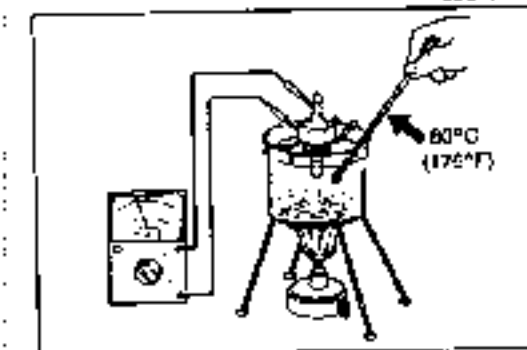
6. Remove the fuel tank unit.
7. Insta. in the reverse order of removal.



JBU07X-076



SDU15X-022



7BU16X-034

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.

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.

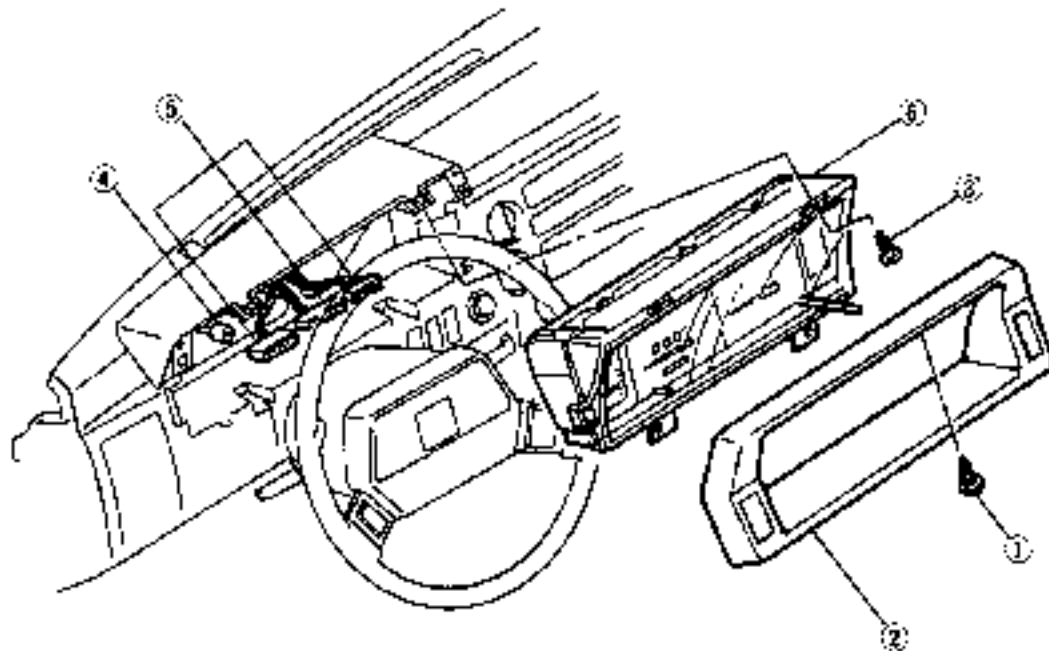
Water Temperature Gauge Unit

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

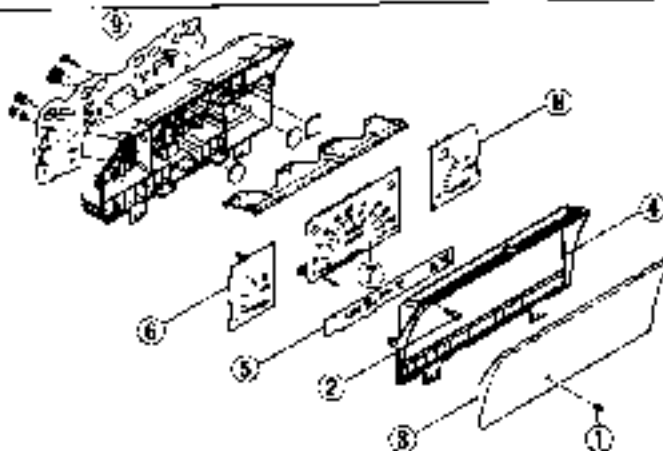
DELATX1022

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.

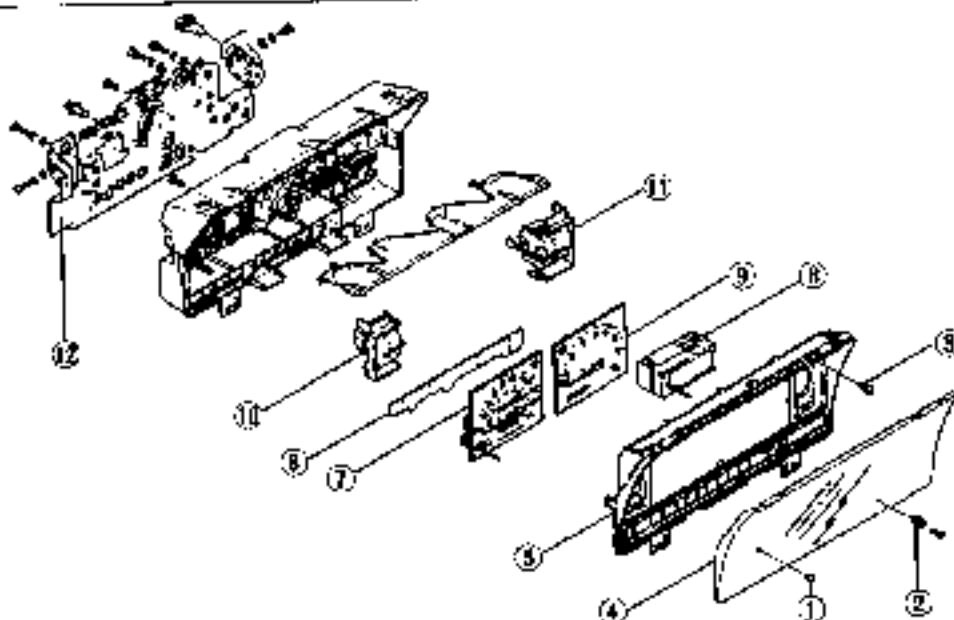


GBLCTX-009

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

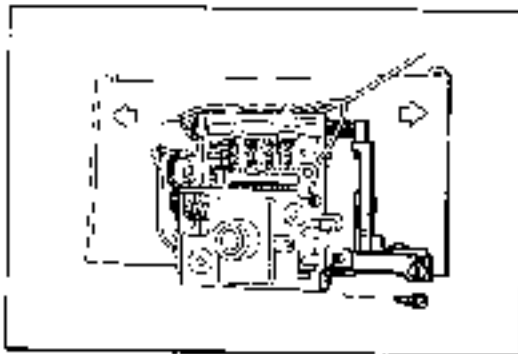


GBLCTX-010

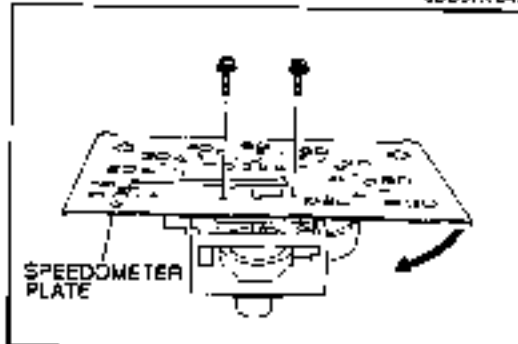
1. Trip meter knob
2. Clock adjusting knob
3. Screw
4. Front lens
5. Window plate
6. Warning plate

7. Speedometer
8. Digital clock
9. Tachometer
10. Fuel gauge
11. Water temperature gauge
12. Printed circuit board

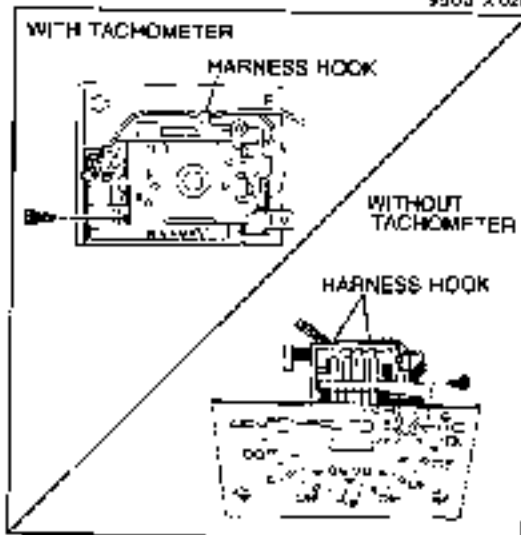
Disassembly / Assembly page T-17



60J0TX C43



95U3TX 026



08U3TX 048

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.

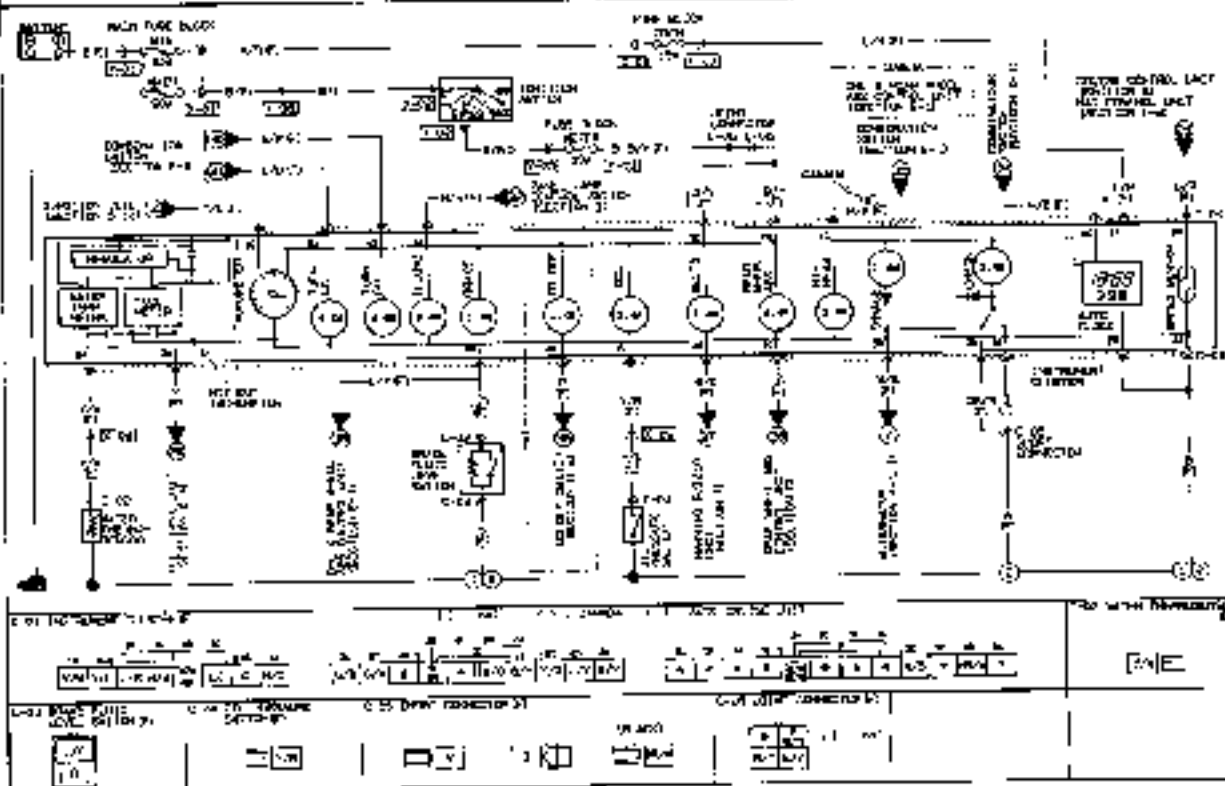
Caution

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

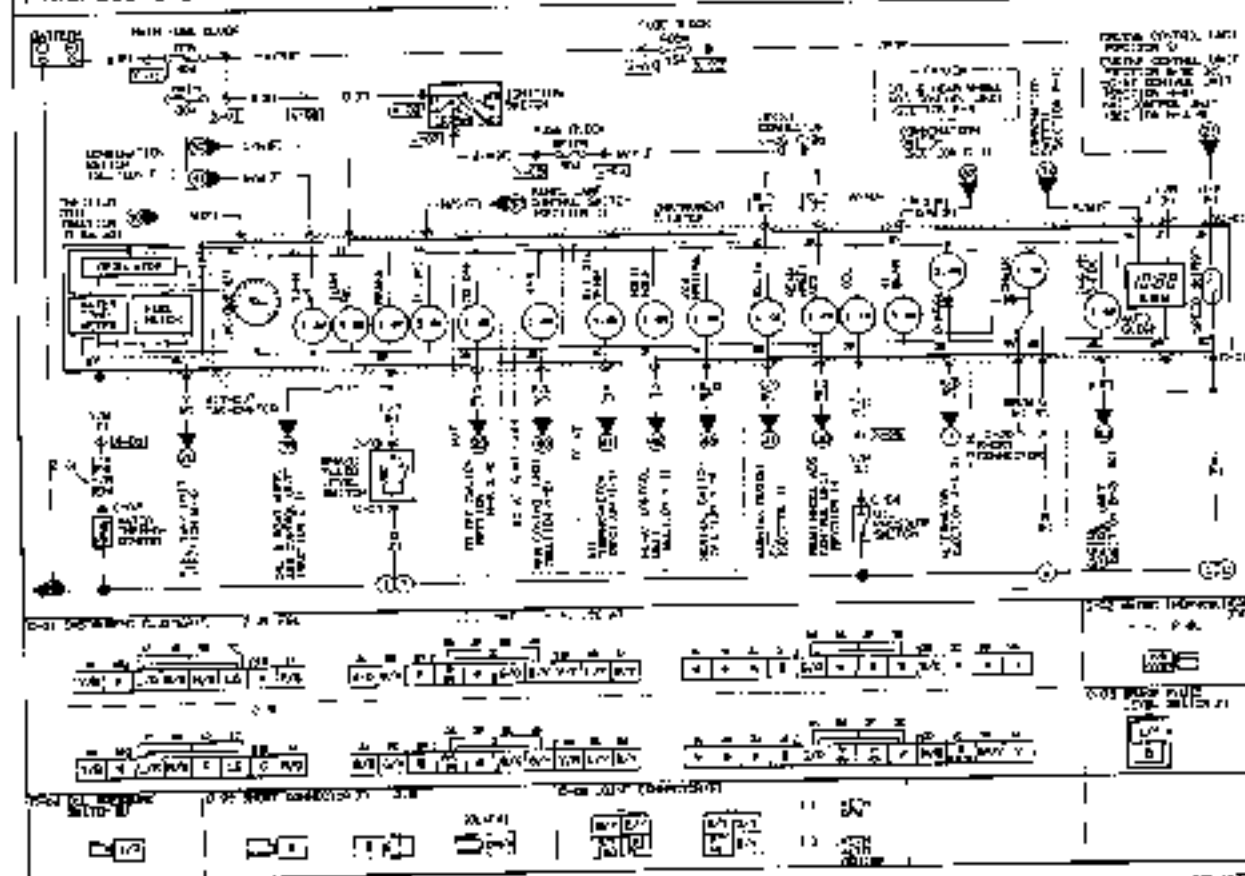
2.2L CARBURETOR • INSTRUMENT CLUSTER

C-1

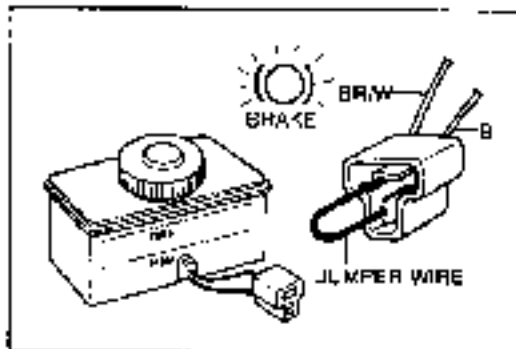


2.2L EFI & 2.6L • INSTRUMENT CLUSTER

C-2



09JUTX-002



WARNING LIGHTS AND SENDER UNITS

INSPECTION OF CIRCUIT AND PARTS

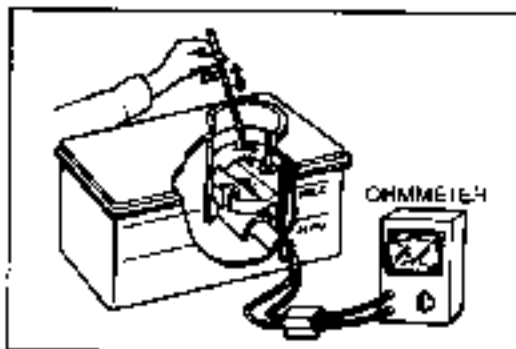
Brake System Warning Light

1. Disconnect the connector from the brake fluid level sensor.
2. Connect a jumper wire between BRW 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.

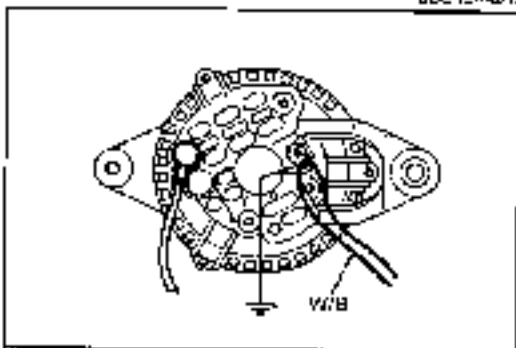


Brake Fluid Level Sensor

Connect an ohmmeter to the terminals of the brake fluid level sensor connector.

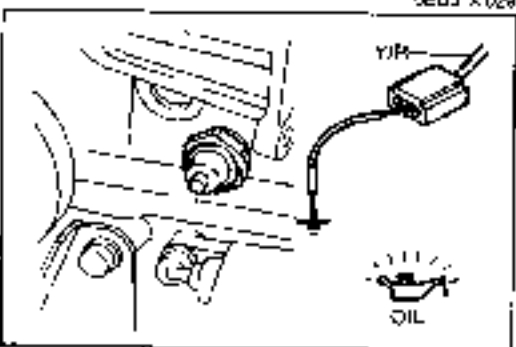
Check for continuity when the float is moved up and down. The sensor is good if there is continuity when the float is below the MIN mark and if there is none when the float is above the MAX mark.

If the sensor does not pass this test, replace it.



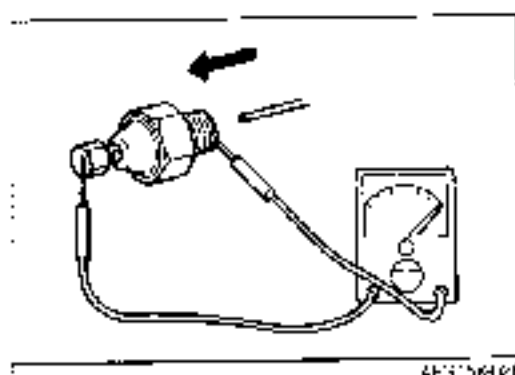
Alternator Warning Light

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.

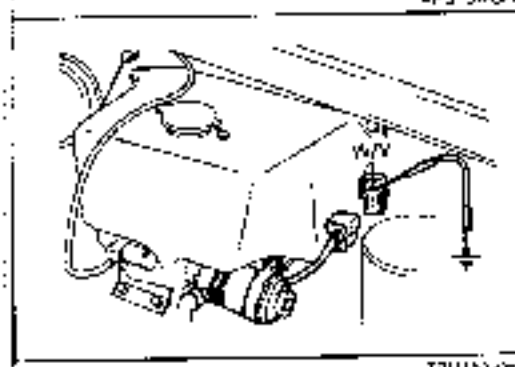


Engine Oil Pressure Warning Light

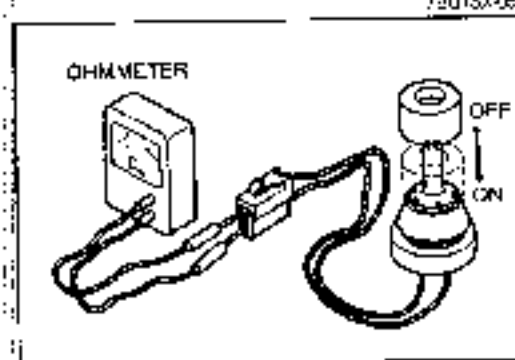
1. Disconnect the connector from the oil pressure switch.
2. Start the engine and connect the connector terminal Y/R to a body ground with a jumper wire.
3. Make sure the oil pressure warning light illuminates.

**Engine Oil Pressure Switch**

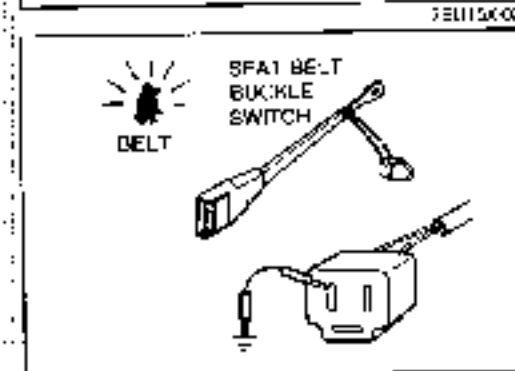
1. Remove the engine oil pressure switch.
2. With an ohmmeter attached as shown in the figure, use a wire to press the engine oil pressure switch inward. The switch is normal if there is no continuity when it is pressed in and if there is continuity when it is returned.
3. If the switch is not normal, replace it.

**Washer Fluid Warning Light**

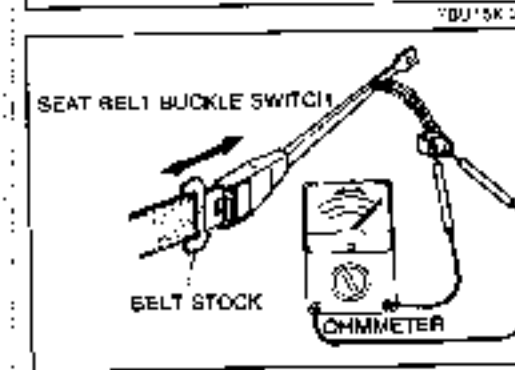
1. Disconnect the connector from the washer fluid level sensor.
2. Start the engine and with a jumper wire connect the connector terminal W/F to a body ground.
3. Make sure the washer fluid warning light illuminates.

**Washer Fluid Level Sensor**

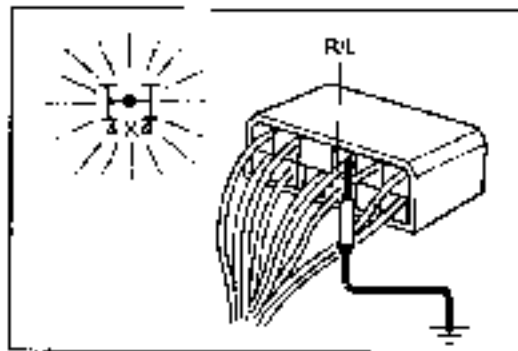
1. Connect the sensor connector to an ohmmeter.
2. Move the sensor float up and down.
3. Make sure there is continuity when the float is at the lowest point.

**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.

**Buckle Switch (driver's belt)**

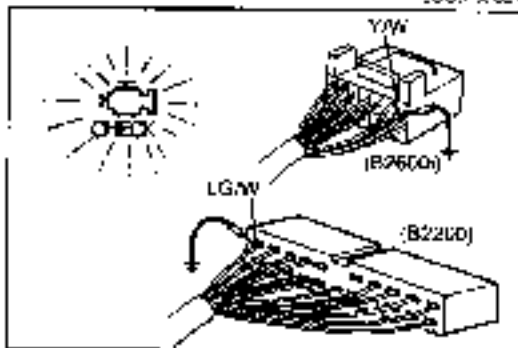
- Insert the seat belt stock into the buckle, and use an ohmmeter to check for continuity of the switch.
- Belt inserted...no continuity
Belt not inserted...continuity



98U01X C21

4x4 Indicator Light (4x4 model)

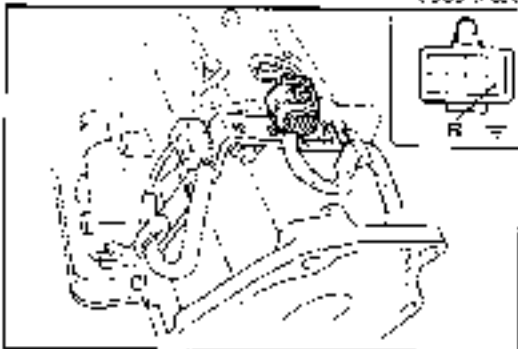
1. Disconnect the RFW control unit connector.
2. Connect the R/L wire terminal to a body ground.
3. Turn the IG switch to ON and verify that the indicator light illuminates.
4. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and RFW control unit.



98U01X C22

Malfunction Indicator Light (for California and Federal)

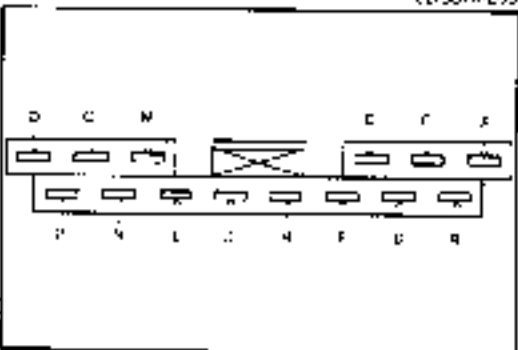
1. Connect the LG/W wire terminal of the FB control unit (B2200) or Y/W wire terminal of the EGI control unit (B2600) to a body ground.
2. Start the engine and check that the warning light illuminates.
3. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and FB control unit (B2200) or EGI control unit (B2600).



98J01X C23

A/T Oil Temperature Warning Light

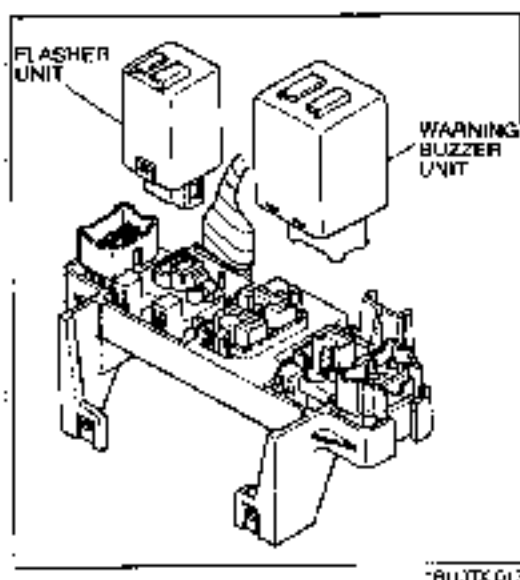
1. Disconnect the connector from the ATF thermoswitch.
2. Connect the connector terminal R to a body ground.
3. Start the engine and check that the warning light illuminates.
4. If there is no illumination, check the meter fuse, bulb, and wiring harness between the meter and ATF thermoswitch.



98J01X C24

ABS Warning Light

1. Disconnect the connector from the ABS control unit.
2. Connect the connector terminal LG to a body ground.
3. Start the engine and check that the warning light illuminates.
4. If there is no illumination, check that the meter fuse, bulb, and wiring harness between the meter and ABS control unit.



WARNING BUZZER

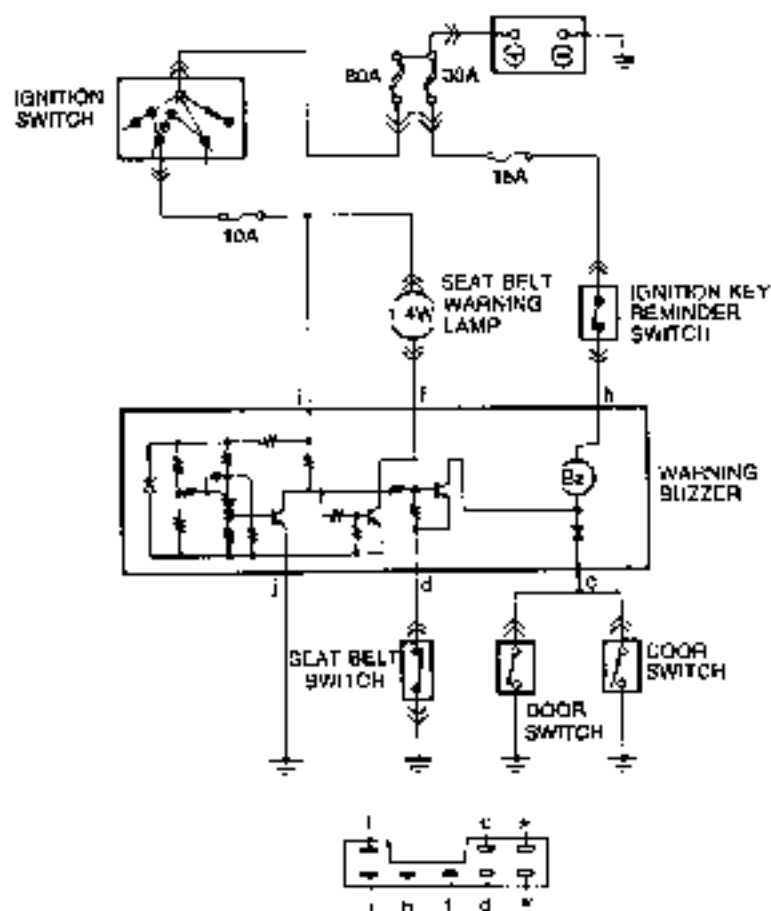
ON-VEHICLE INSPECTION

The warning buzzer system detects certain conditions and warns the driver about them.

The warnings are described below.

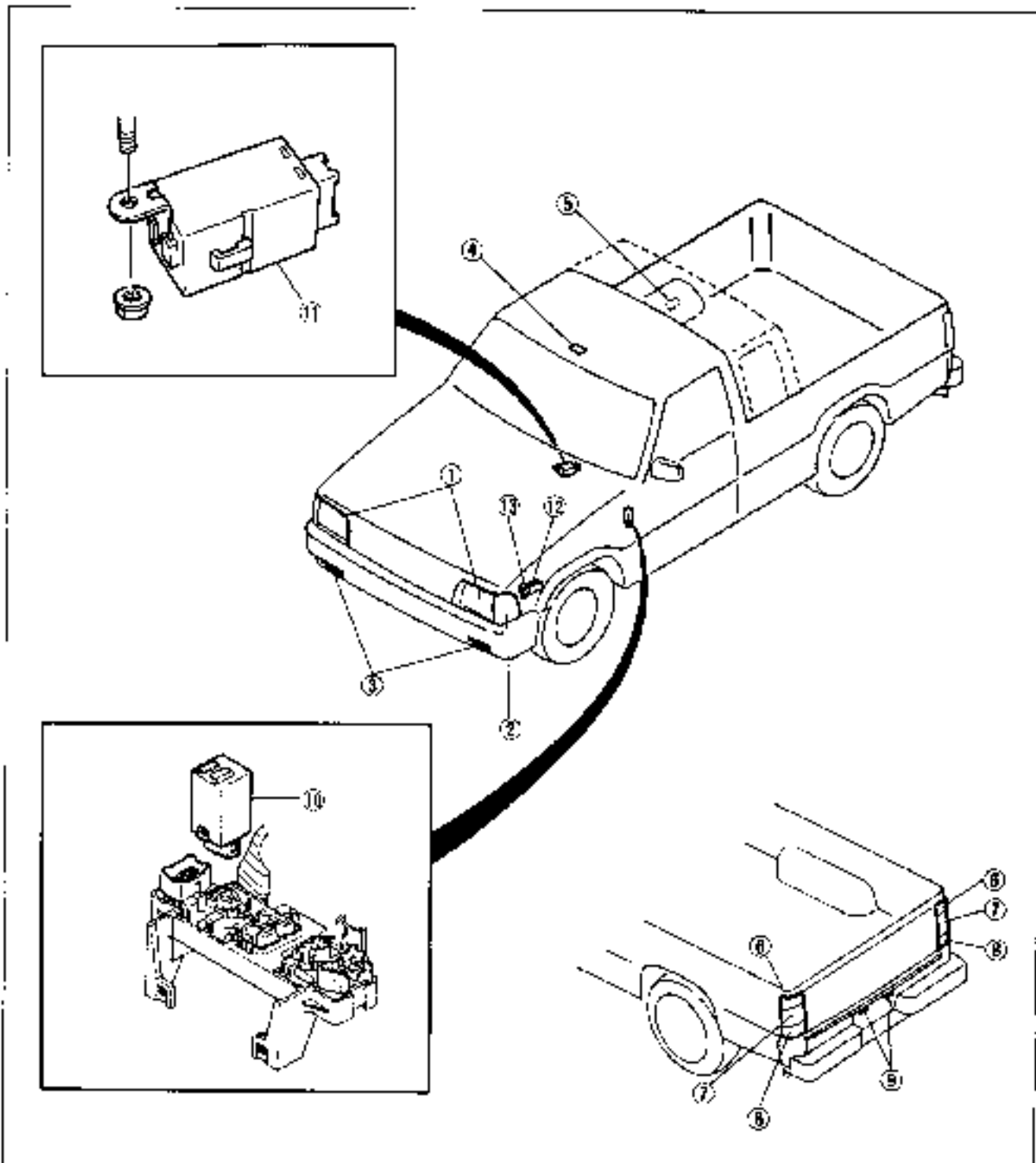
Item	Activation Condition
Seat belt not fastened	(1) Ignition key at ON (2) Seat belt timer functioning (seat belt not fastened after ignition key set to ON)
Ignition key left in ignition	(1) Ignition key at LOCK Ignition key reminder switch ON (ignition key not removed) (2) Door open (door switch ON)

CIRCUIT DIAGRAM



LIGHT AND LAMP

STRUCTURAL VIEW

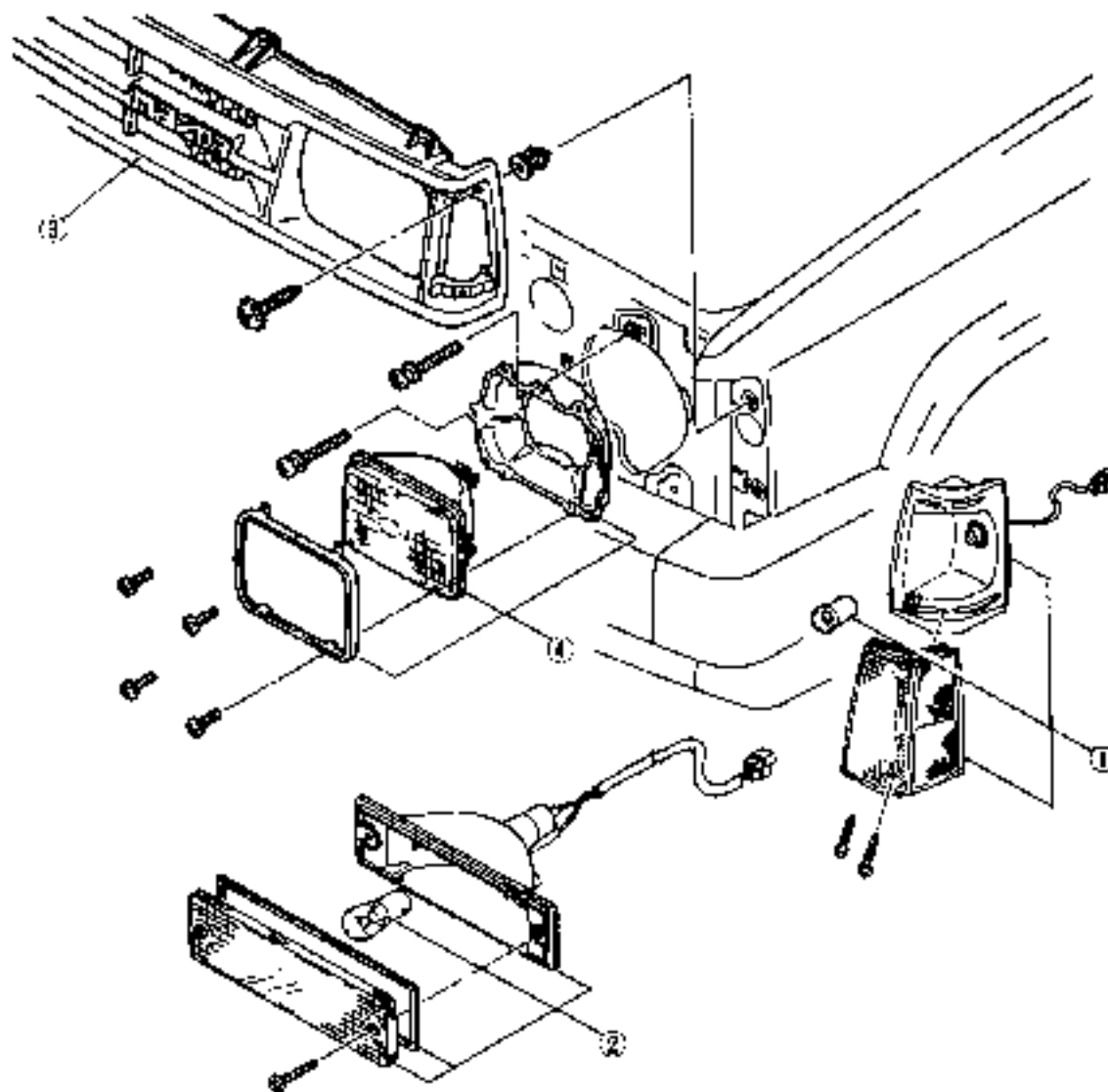


25L11-K017

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.



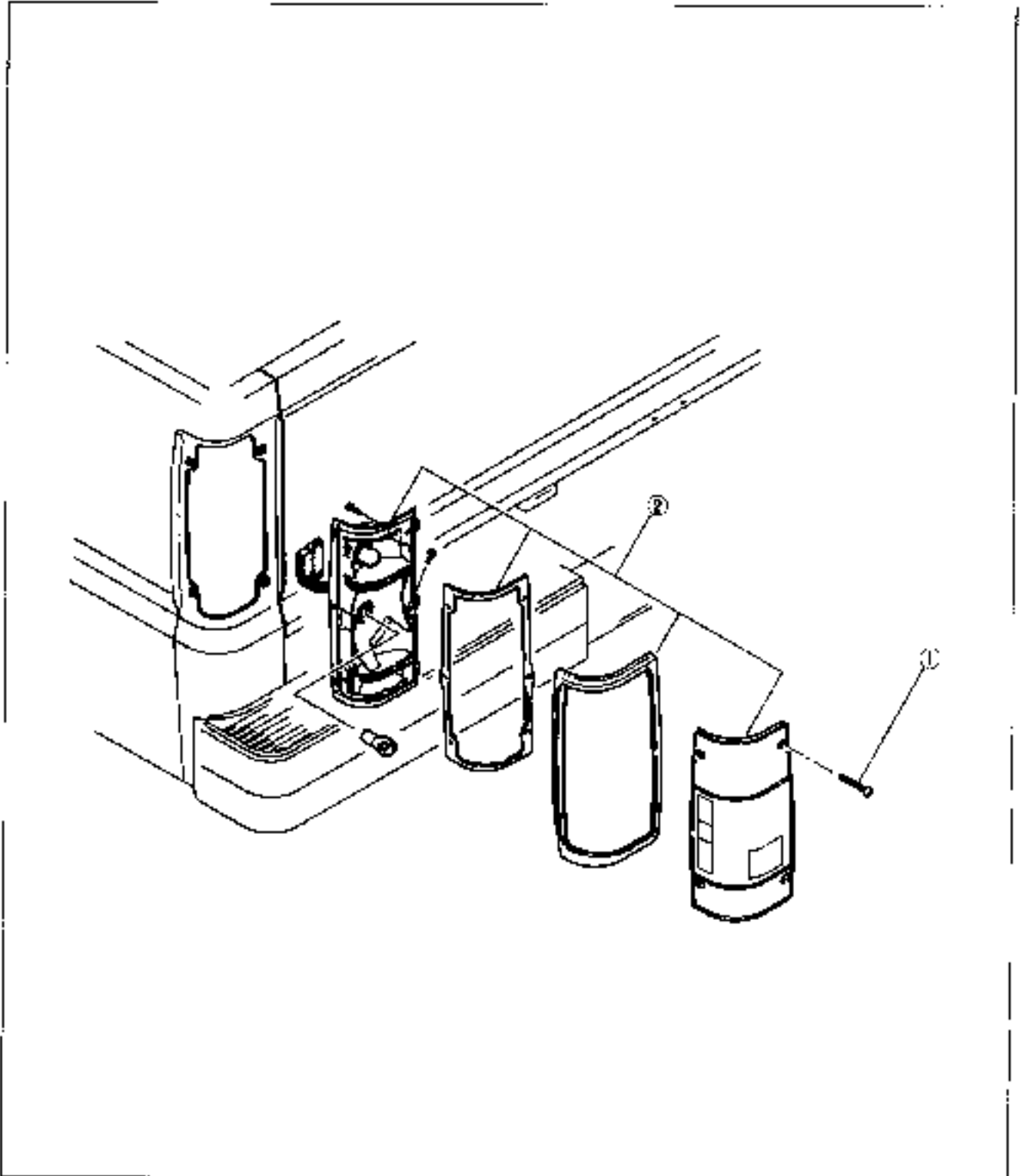
1. Front combination light
2. Turn and hazard light

3. Radiator grille
4. Headlight

2FA.DTX-012

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.



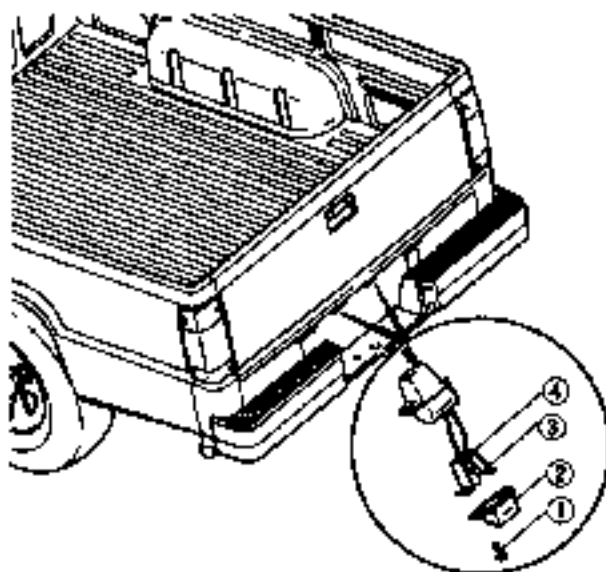
1. Screw
2. Rear combination light assembly

251074-01A

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.



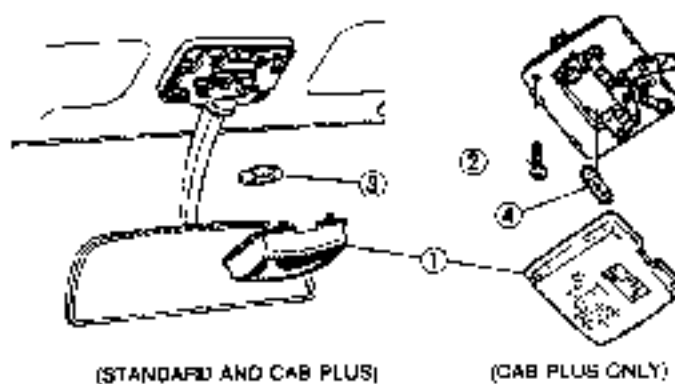
24J01X C15

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 C15

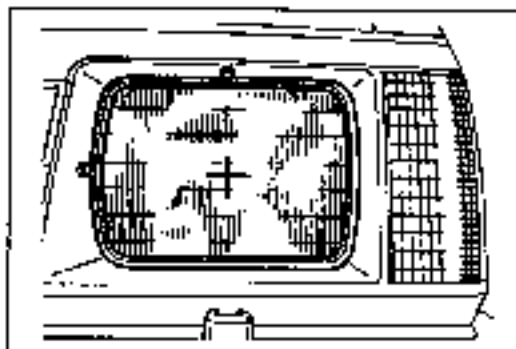
1. Lens
2. Screw

3. Bulb (10W)
4. Bulb (10W)

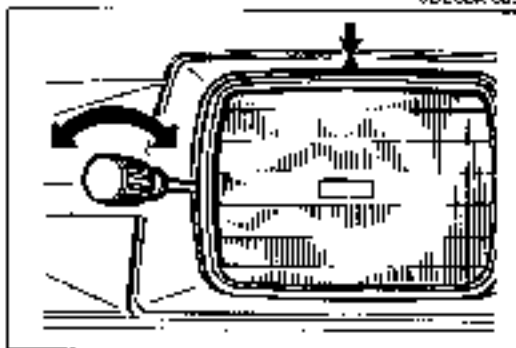
Specifications

Light bulb	Wattage (w)	SAE trade number
Headlight	55/55	6052
	85/35	16062
Front parking and side marker lights	8	67
Turn and hazard signal lights	27	1156
Peer turn signal lights	27	1156
Stop and tail light	27/8	1157
Back up light	27	1156
License plate lights	6	—
Interior lamp	10	—

ZEUSTX 01/7



0DA-033X-003



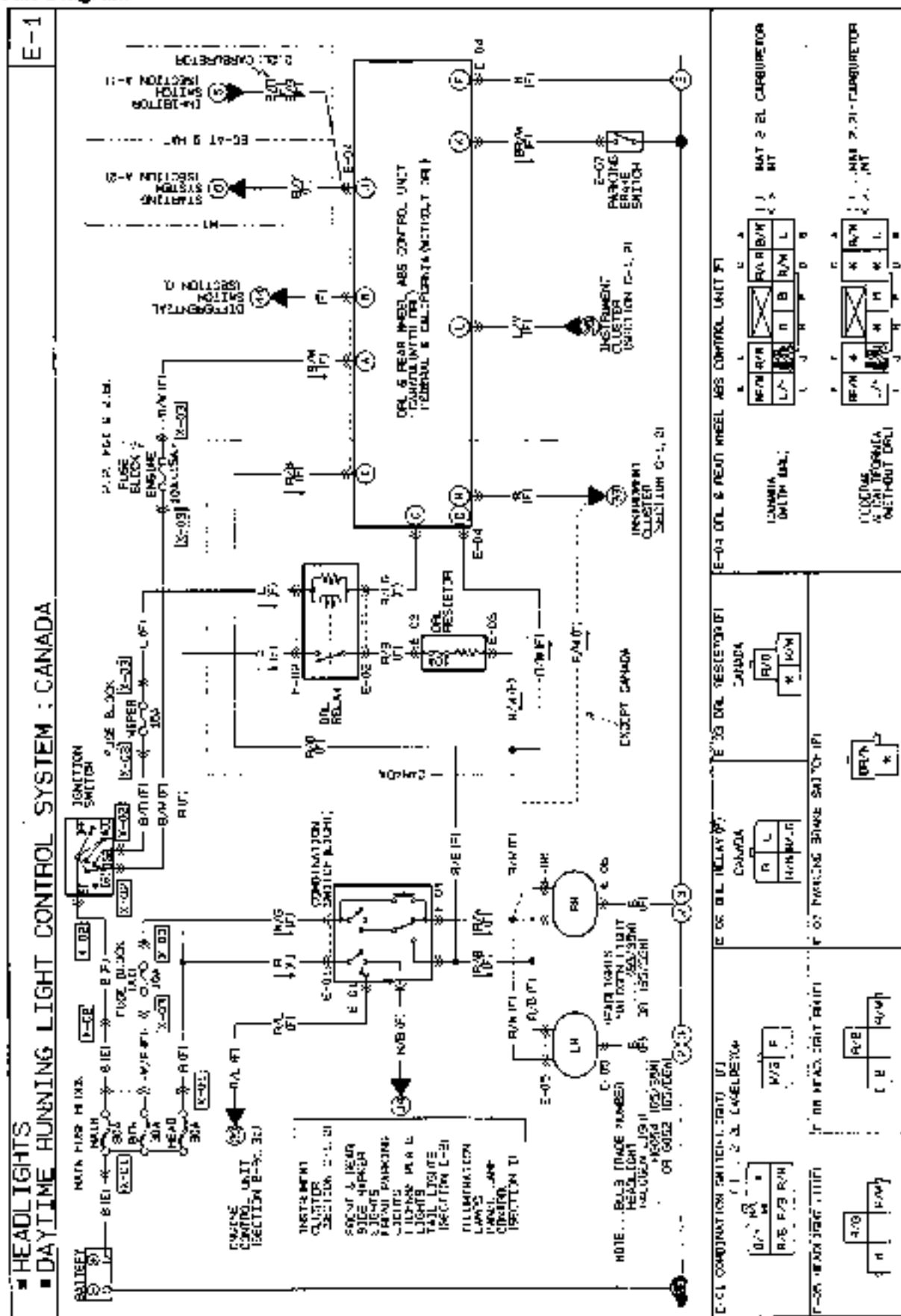
0DU35X-010

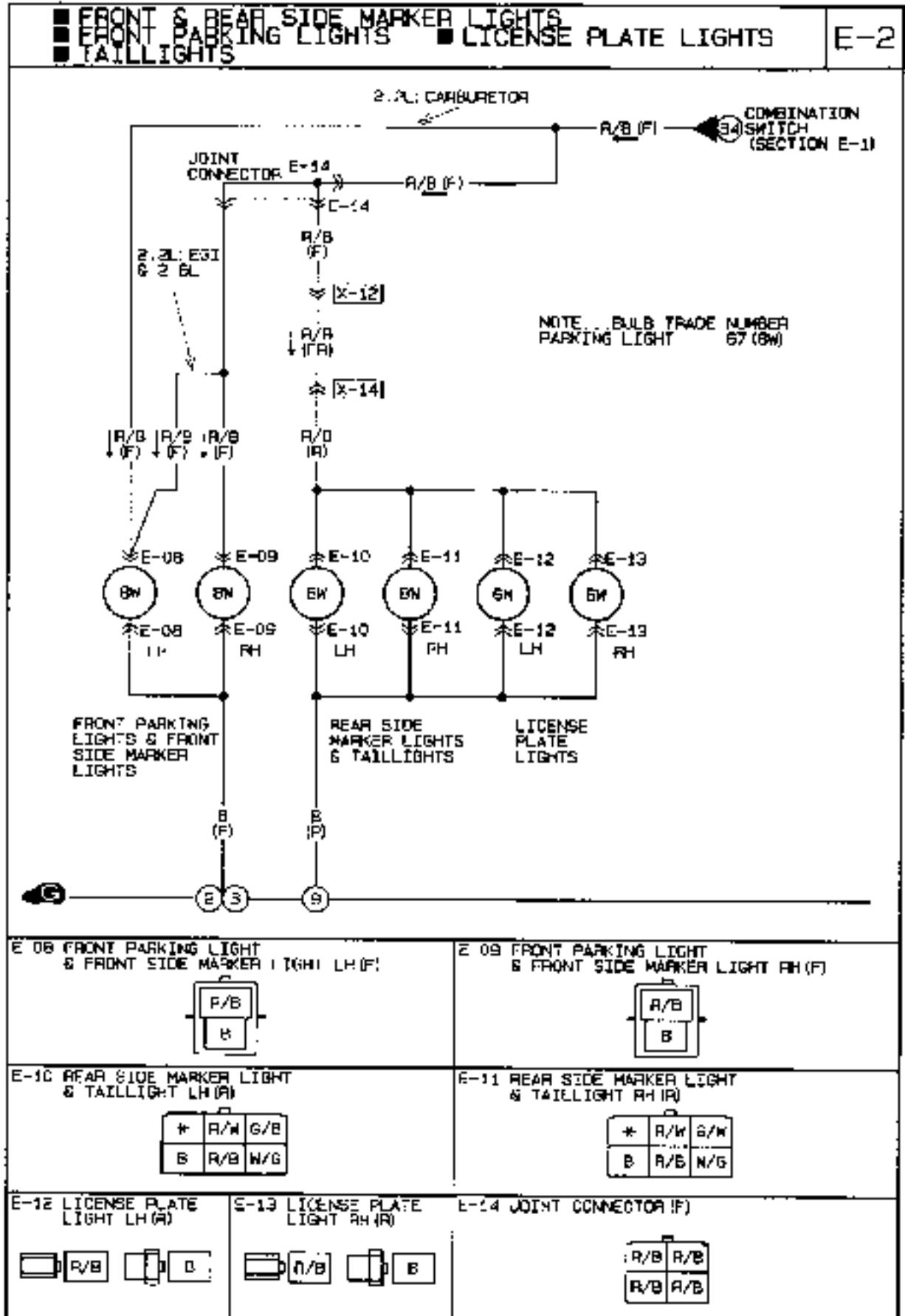
ADJUSTMENT

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.

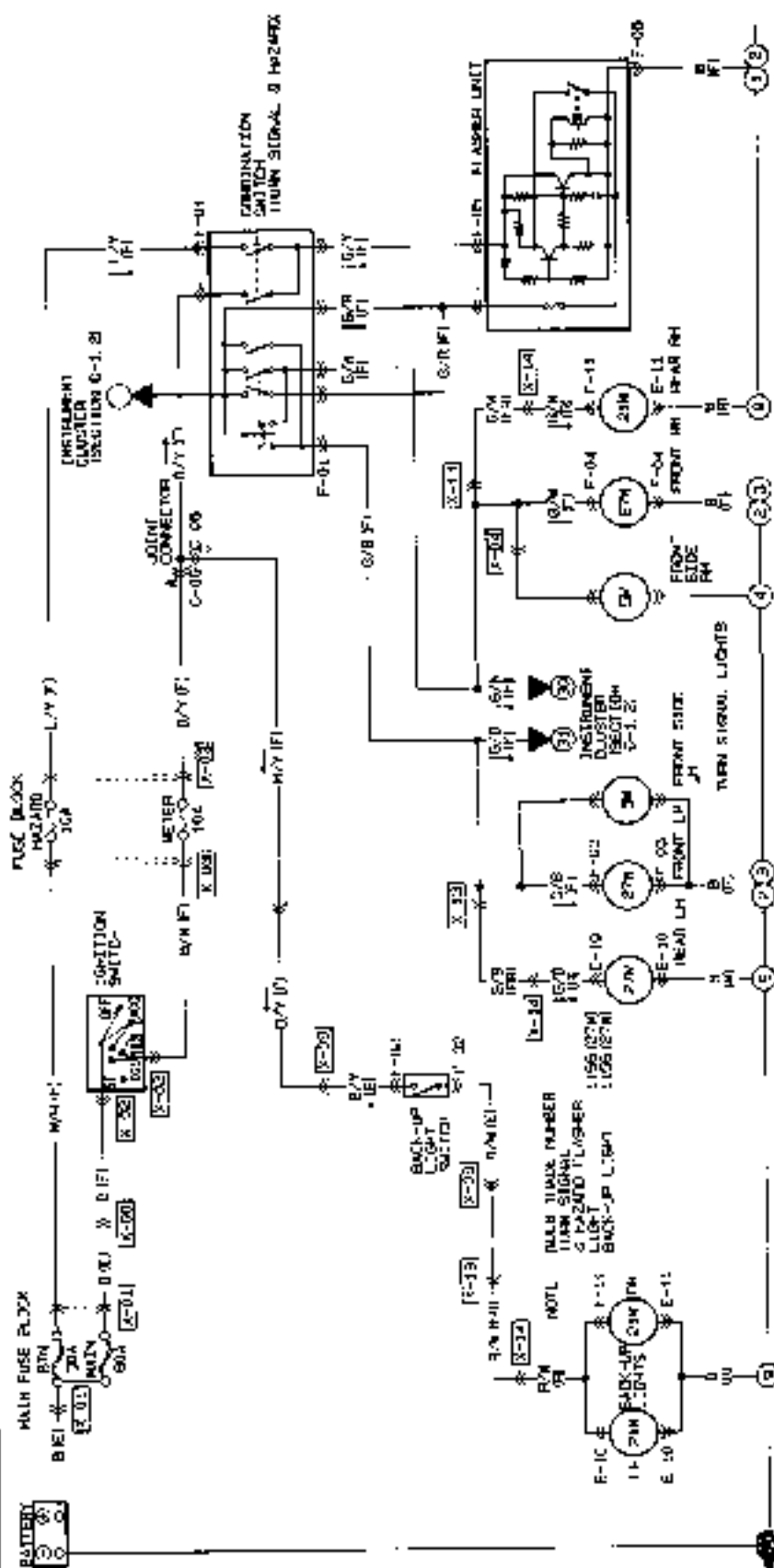
4. Adjust the headlights to meet state regulations.
To adjust, turn the two adjusting screws until the headlight is properly aimed.

TROUBLESHOOTING
Circuit Diagram

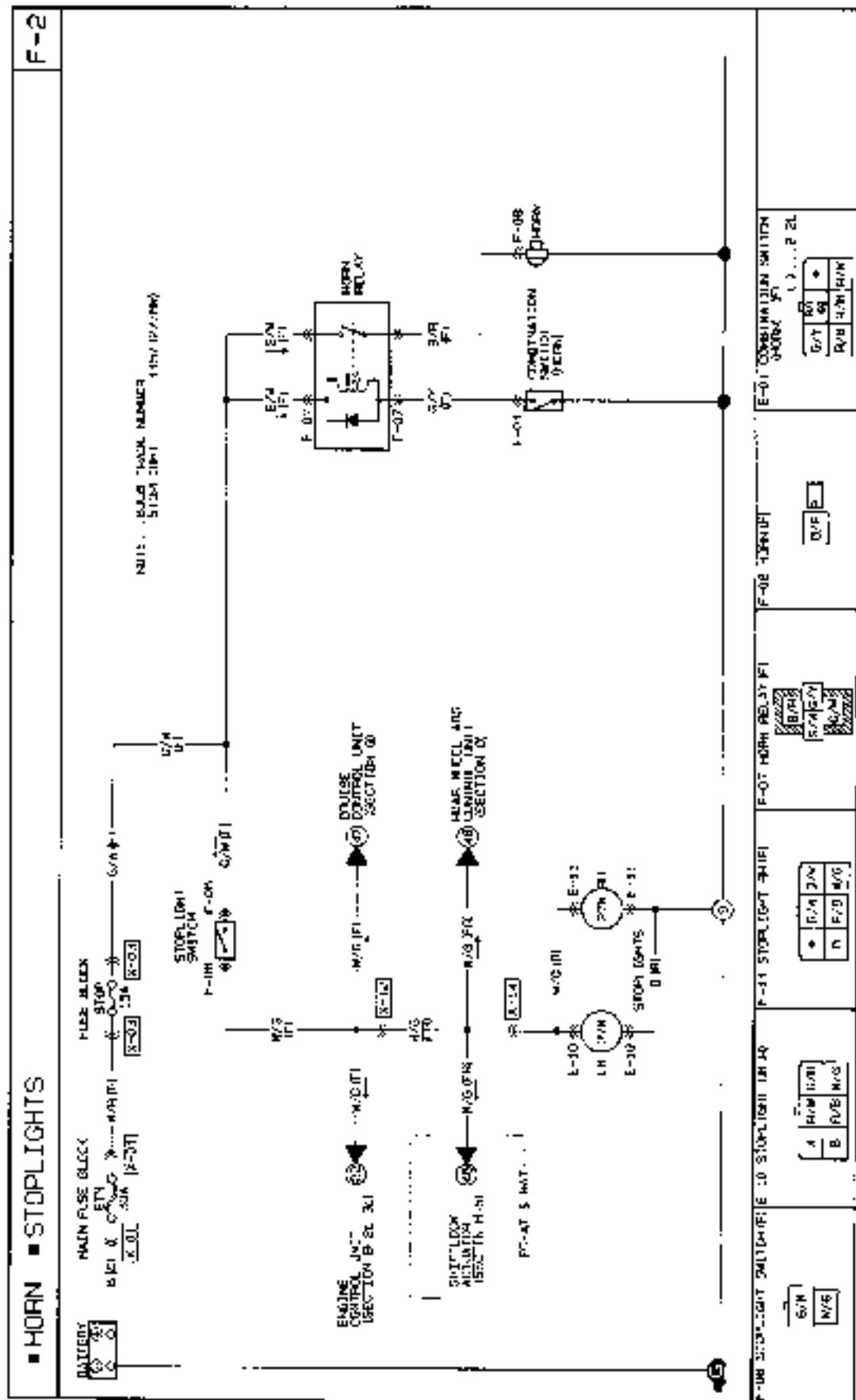


■ BACK-UP LIGHTS ■ TURN SIGNAL & HAZARD FLASHER LIGHTS

F-1



F-01 COMBINATION SWITCH (12V) BACK-UP LIGHT SWITCH (12V)	F-02 BACK-UP LIGHT SWITCH (12V)	F-03 FRONT TURN SIGNAL LIGHT (12V)	F-04 FRONT TURN SIGNAL LIGHT (12V)
F-05 FLASHER UNIT (12V)	F-06 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-07 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-08 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-09 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-10 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-11 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-12 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-13 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-14 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-15 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-16 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-17 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-18 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-19 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-20 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-21 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-22 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-23 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-24 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-25 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-26 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-27 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-28 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-29 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-30 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-31 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-32 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-33 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-34 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-35 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-36 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-37 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-38 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-39 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-40 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-41 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-42 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-43 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-44 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-45 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-46 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-47 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-48 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-49 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-50 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-51 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-52 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-53 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-54 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-55 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-56 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-57 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-58 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-59 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-60 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-61 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-62 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-63 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-64 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-65 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-66 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-67 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-68 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-69 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-70 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-71 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-72 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-73 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-74 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-75 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-76 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-77 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-78 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-79 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-80 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-81 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-82 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-83 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-84 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-85 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-86 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-87 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-88 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-89 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-90 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-91 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-92 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-93 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-94 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-95 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-96 FRONT SIDE TURN SIGNAL LIGHT (12V)
F-97 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-98 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-99 FRONT SIDE TURN SIGNAL LIGHT (12V)	F-100 FRONT SIDE TURN SIGNAL LIGHT (12V)



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.

2R-07X-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.

2R-07X-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

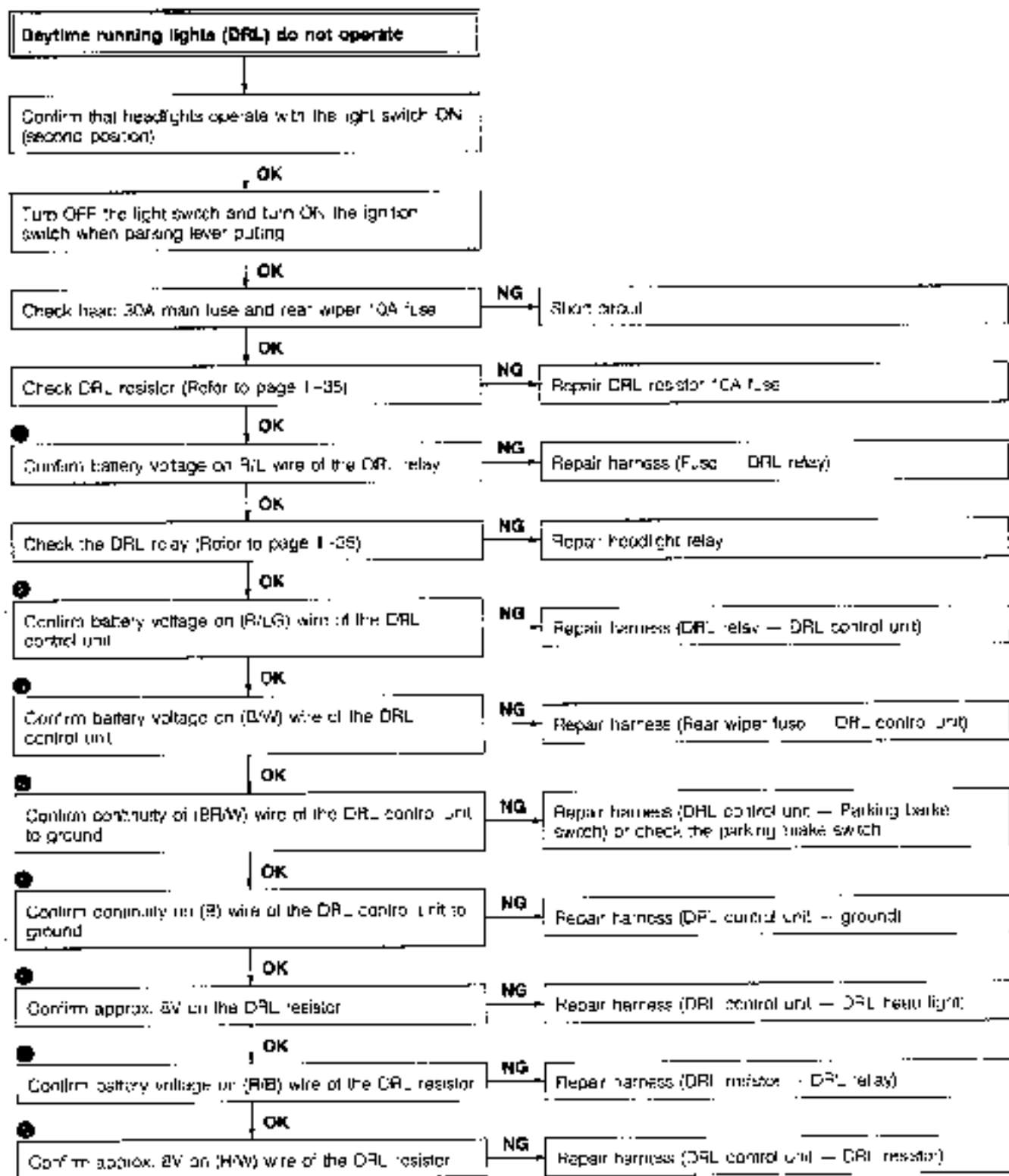
- Burned out ROOM 15A fuse block.
- Damaged interior lamp switch.
- Damaged door switch.
- Burnt bulb.
- No continuity of wiring switch.
- Loose or corroded connector.

Remedy

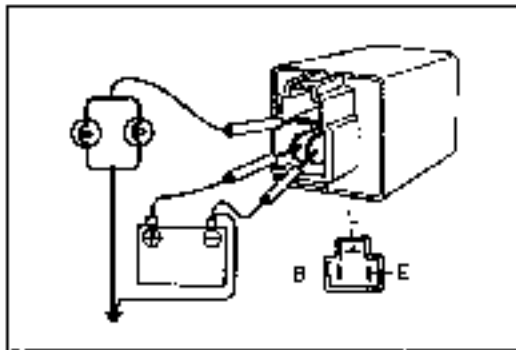
- Replace ROOM 15A fuse block.
- Check interior lamp switch.
- Check door switch.
- Replace bulb.
- Repair wiring harness.

20LCTK-022

(Canada)



PB-GTX-023



2BLU7A-024

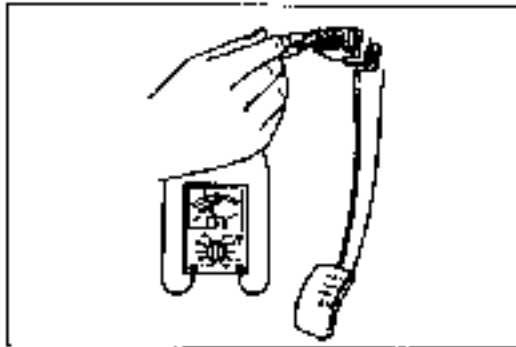
INSPECTION

Flasher Unit

1. Apply battery voltage to the B terminal of the unit, and connect the E terminal to the ground.
2. Confirm that the two paralleled lights come on when connected between the L terminal and the ground.

Caution

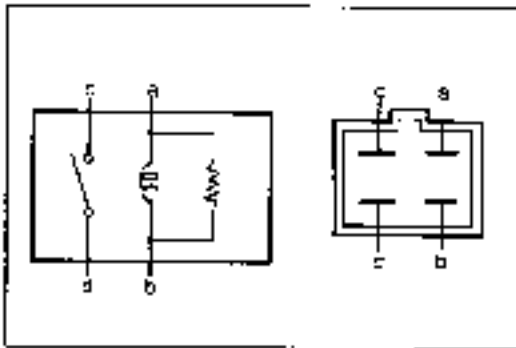
Do not reverse the polarity of the electrical source to the terminal.



2BLU7A-041

Stoplight Switch

1. Disconnect the 2-pin connector from the switch.
2. Confirm the conductivity between the two terminals of the stoplight switch.



2BLU7A-025

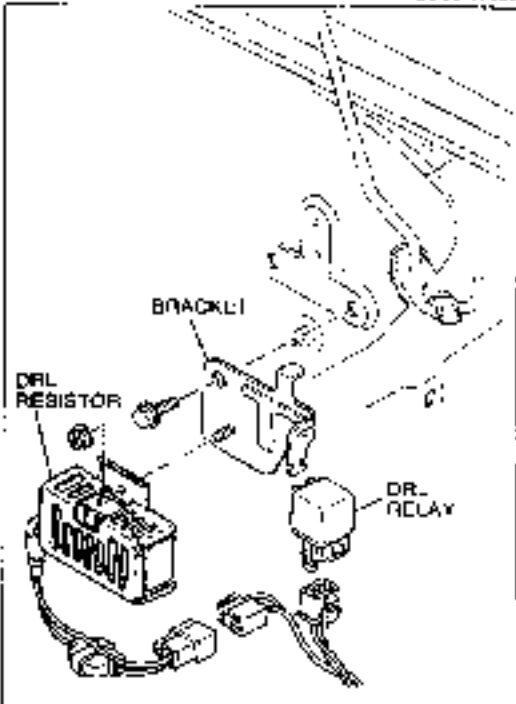
DRL Relay (Canada)

1. Disconnect the DRL relay connector and remove the relay.
2. Check for continuity between terminals of the relay.

Va: Battery voltage

Connecting to					
Va	Ground	a	b	c	d
—	—	○	○	—	—
a	b	—	—	○	○

○—○: Indicates continuity



2BLU7A-042

DRL Resistor (Canada)

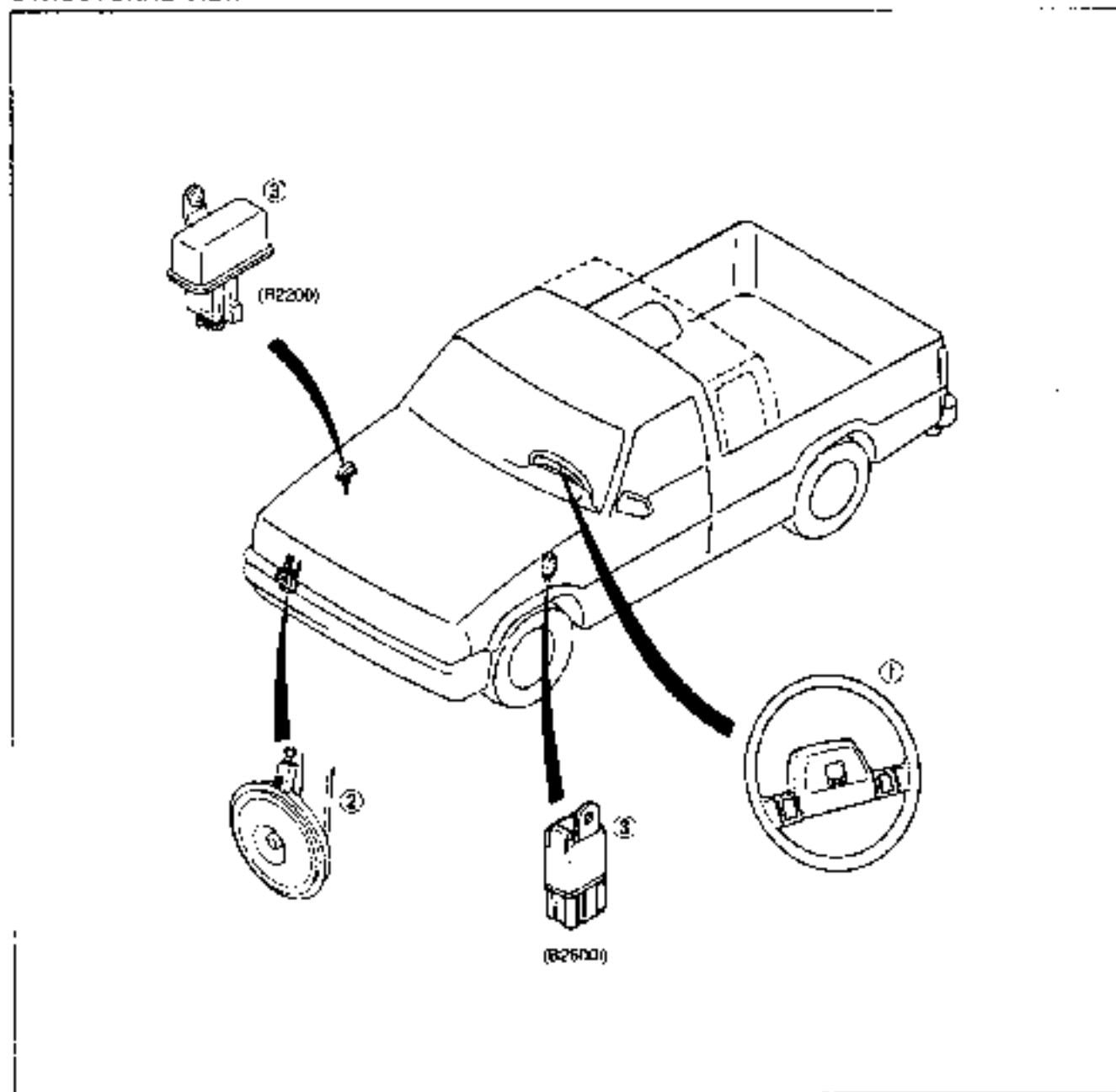
Confirm that 10A fuse is not burnt out.

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.

HORN

STRUCTURAL VIEW



78J18X-026

1. Horn switch

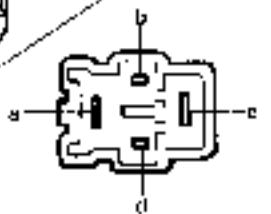
2. Horn

3. Horn relay

(B2200)



(B2800)



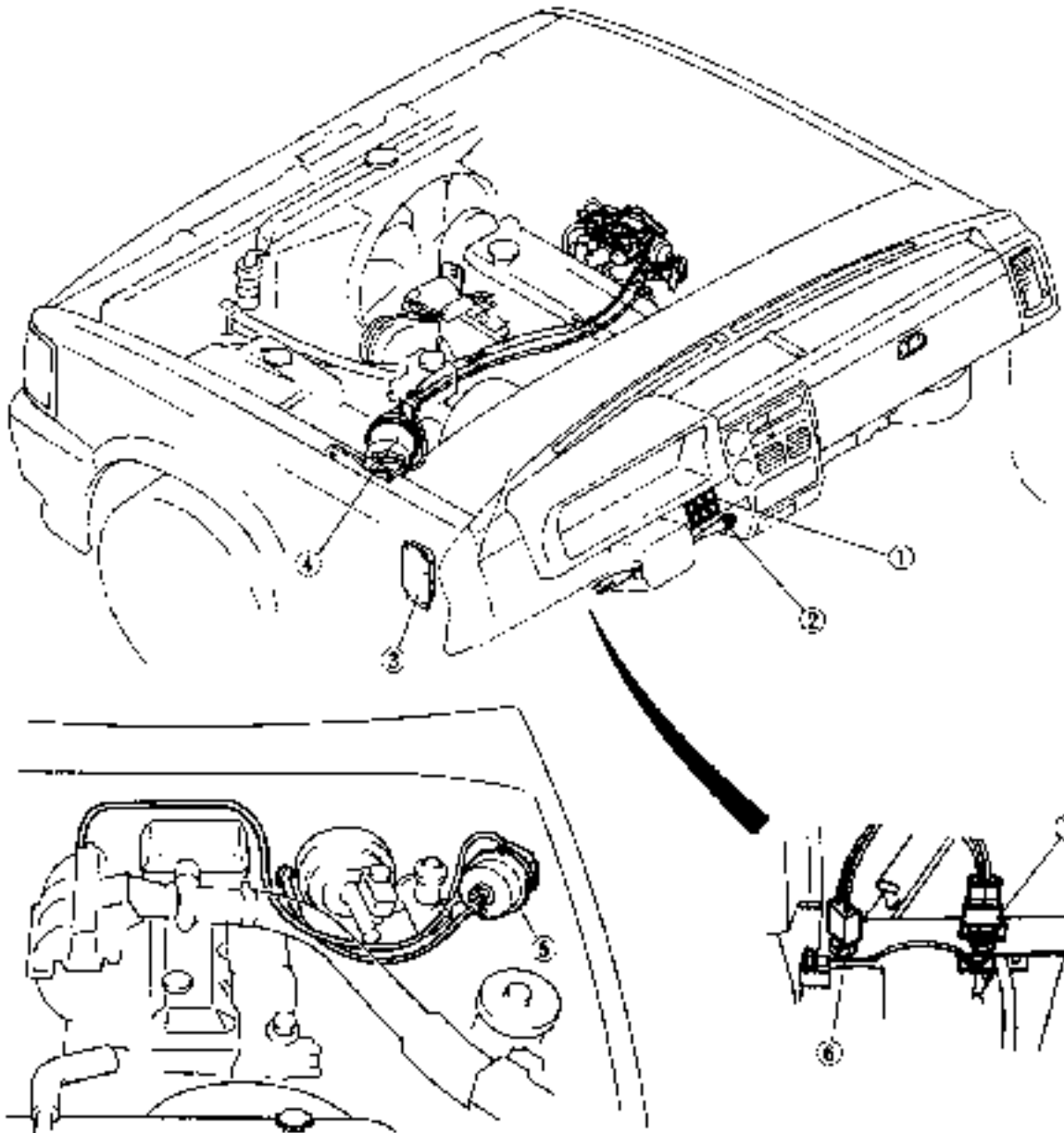
78J18X-026

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



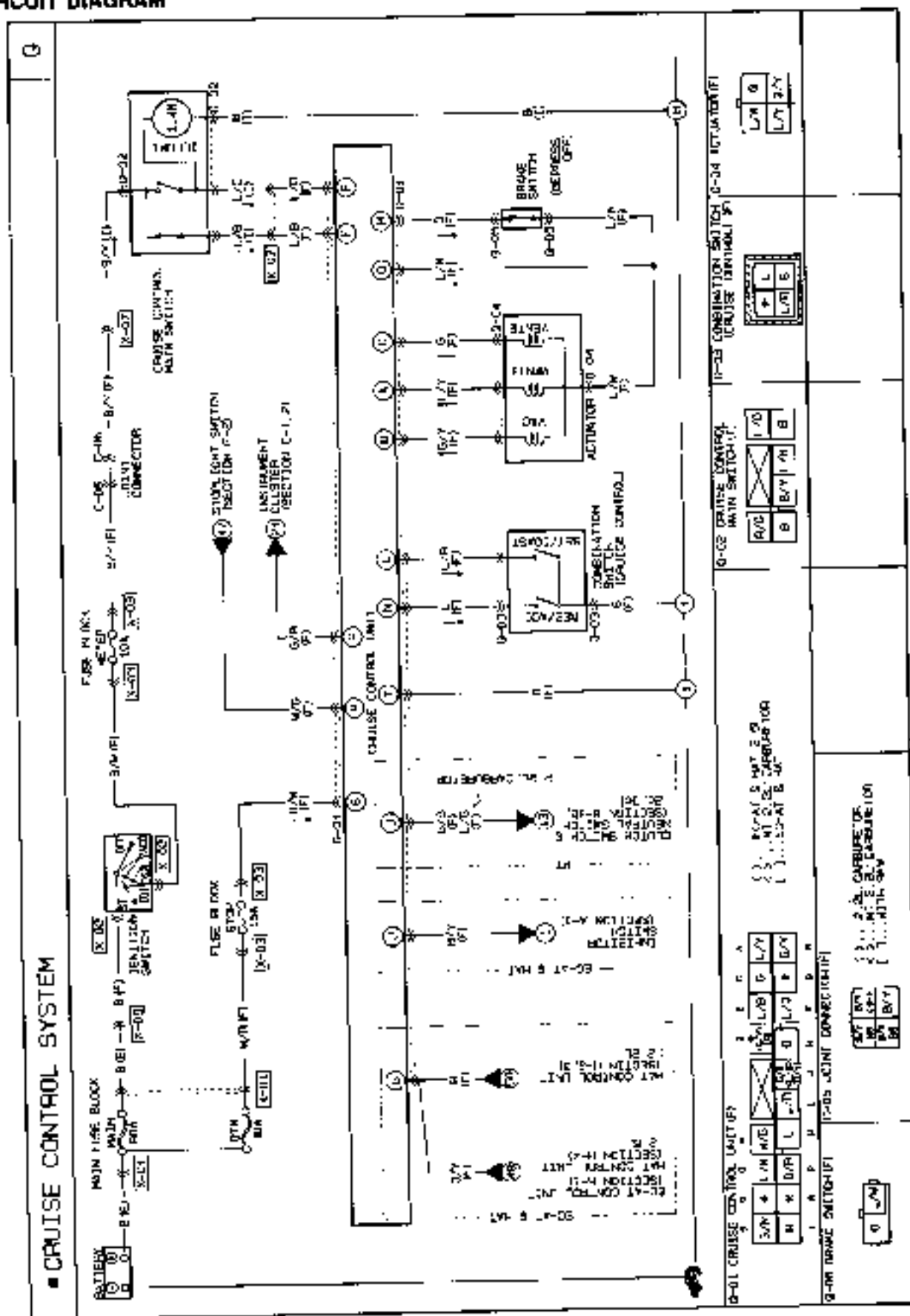
- 1. Main switch
- 2. Control switch
- 3. Control unit

- 4. Actuator (B2200)
- 5. Actuator (B2600)
- 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.)

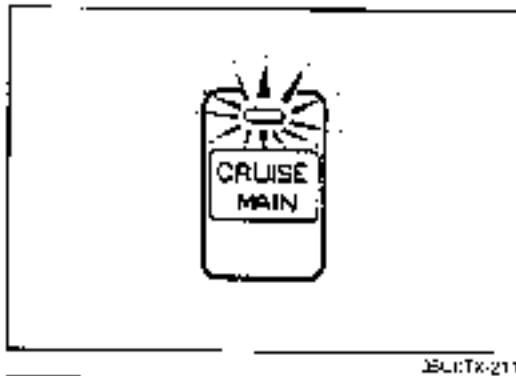
Note

- Before troubleshooting of the system, verify the following items:

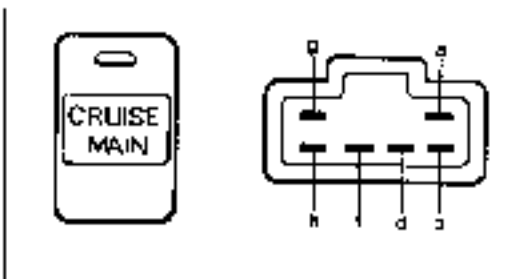
1. Is system being correctly used by customer?
2. Is fuse OK?

Check the fuse. If the fuse is burned, replace it. Check the wire harness for a short circuit.

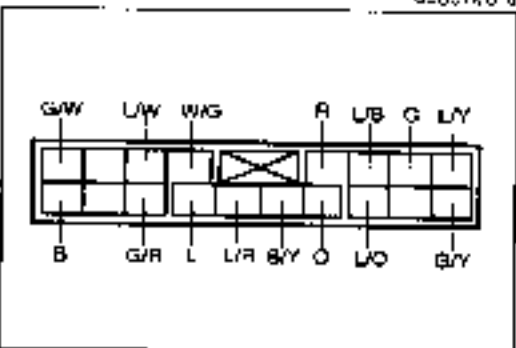
CSU007X-230



2BU07X-211



2BU07X-076



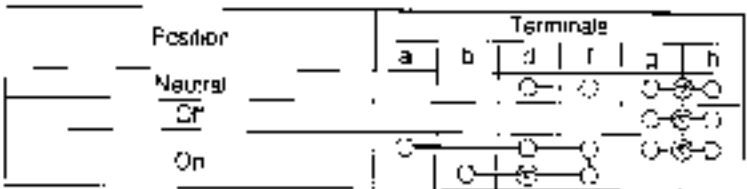
2BU07X-046

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.

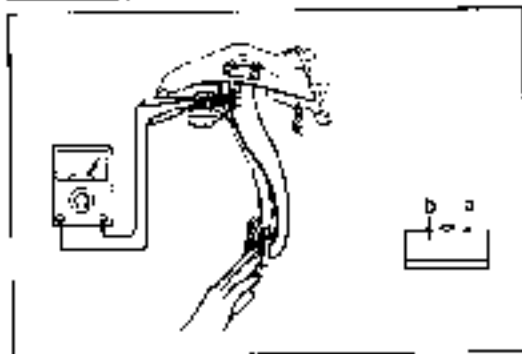
Va: Battery voltage

Terminal	Wire color	Connected to	Test condition	Specification	Action
a	(L/V)	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	Repair wire (L/B)
			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)

Vb: Battery voltage

Terminal	Wire color	Connected to	Test condition	Specification	Action
g	(R)	ECAT control unit	Ignition switch OFF	0V	Check ECAT control unit (Refer to section F)
			Ignition switch ON	Vb	
h	(O)	Stoplight switch (For cruise)	Brake pedal depressed	0V	Check stoplight switch (Refer to page T-40)
			Brake pedal released	9V	
i	(B/Y)	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	
j	(L/R)	Cruise control switch (Set/Coast switch)	Main switch ON	Vb	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	Vb	Check stoplight switch (Refer to page T-41)
			Brake pedal released	0V	
n	(L)	Cruise control switch (Resume/Coast switch)	Main switch ON	Vb	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 lines	Cycles 0.1-5V	Check speed sensor (Refer to page T-48)
s	(G/W)	Battery	Constant	Vb	Repair wire
t	(B)	Ground	Constant	0V	Repair wire

26U8TX C27



26U8TX C18

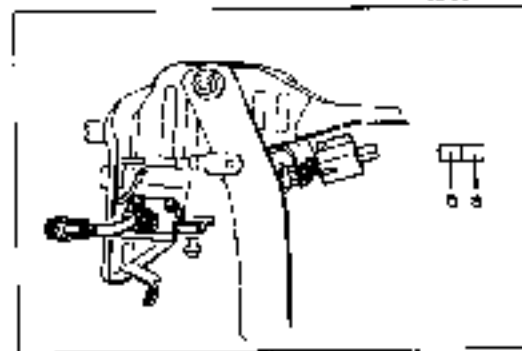
Step 4 — Inspection of stoplight switch (For cruise)

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)



26U7X 010

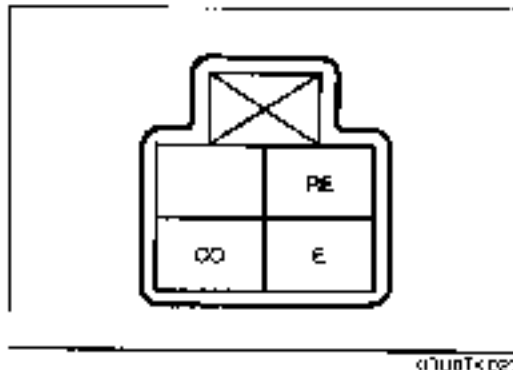
**Step 5 — Inspection of inhibitor switch
(Refer to Section K1.)****— Inspection of clutch switch**

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).



Step 6 — Inspection of cruise control switch

1. Disconnect the combination switch connector.
2. Check continuity between terminals of the combination switch connector.

Switch	Terminal		
	CO	RE	E
SET/COAST	○	—	○
RESUME/ACCEL	—	○	○

○ — ○: Indicates continuity

3. If not as specified, replace the cruise control switch.
4. If the switch is OK, repair the wire harness. (Cruise control switch — Control unit)

Step 7 — Inspection of stoplight switch

1. Disconnect the stoplight switch.
2. Check continuity between terminals of the switch.

Pedal position	Terminal	
	a	b
Pedal released	○	○
Pedal depressed	—	—

○ — ○: Indicates continuity

3. If not as specified, replace the stoplight switch.
4. If the switch is OK, repair the wire harness. (Cruise control unit — Stoplight switch)

Step 8 — Inspection of actuator

1. Measure the actuator solenoid resistance using an ohmmeter.

Check terminals	Resistance (Ω)	
	B2200	02600
c-a	60	55
c-b	23	23
c-c	90	30

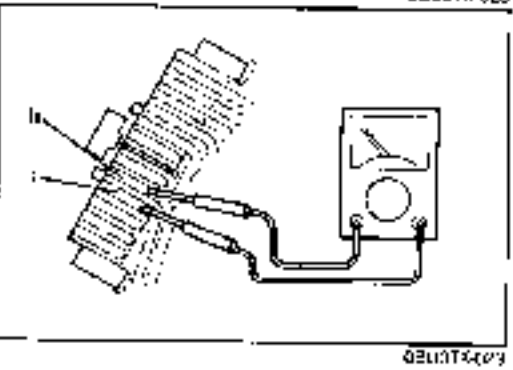
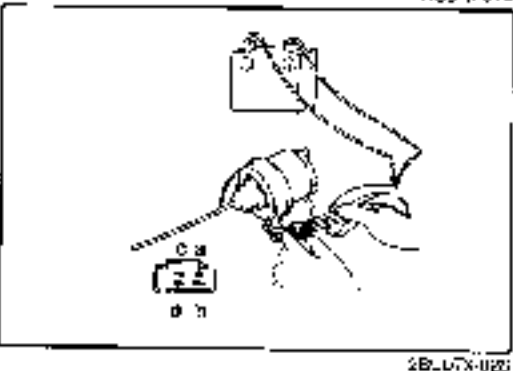
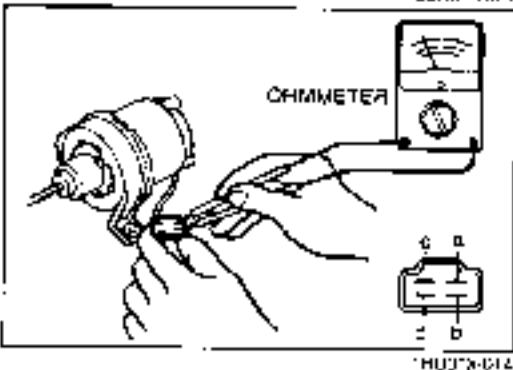
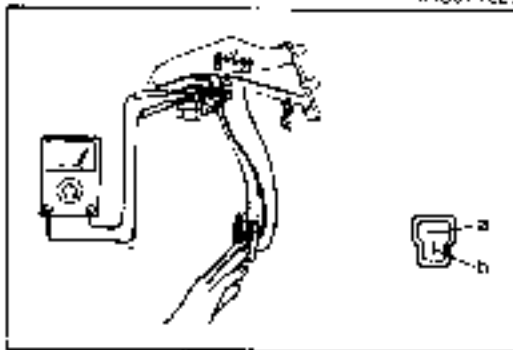
2. If not as specified, replace the actuator.
3. If continuity is OK, go to Step 8-4.
4. Disconnect the actuator cable from the accelerator pedal.
5. Run the engine at idle speed.
6. Apply battery voltage to the following terminals, and check actuator operation.

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

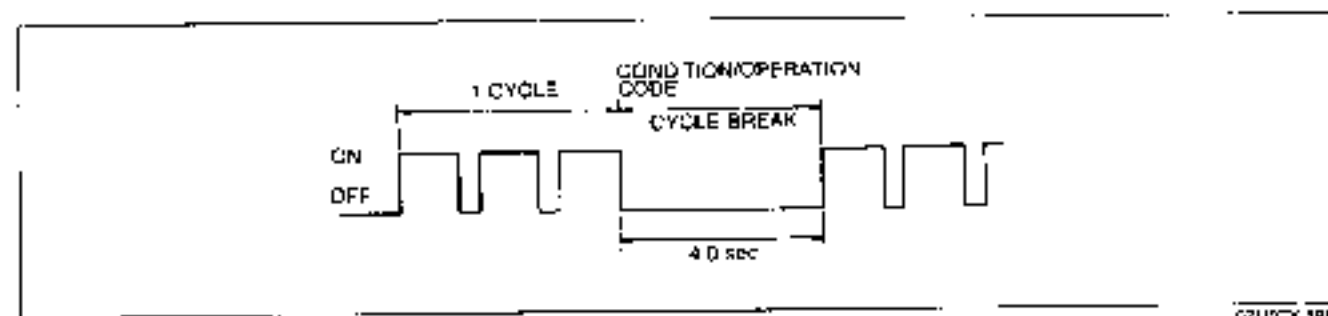
Principle of Code Cycle

Condition and operation codes are determined by flashing of the test light connected to the control unit as shown below.

00UJTX-43

1. Code cycle break

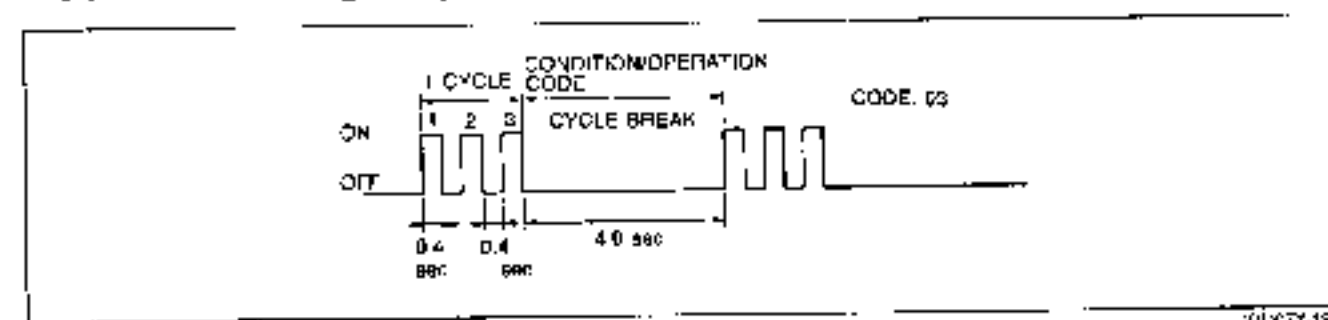
The time between condition/operation code cycles is 4.0 seconds (the time the lamp is off).



97UJTX-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.

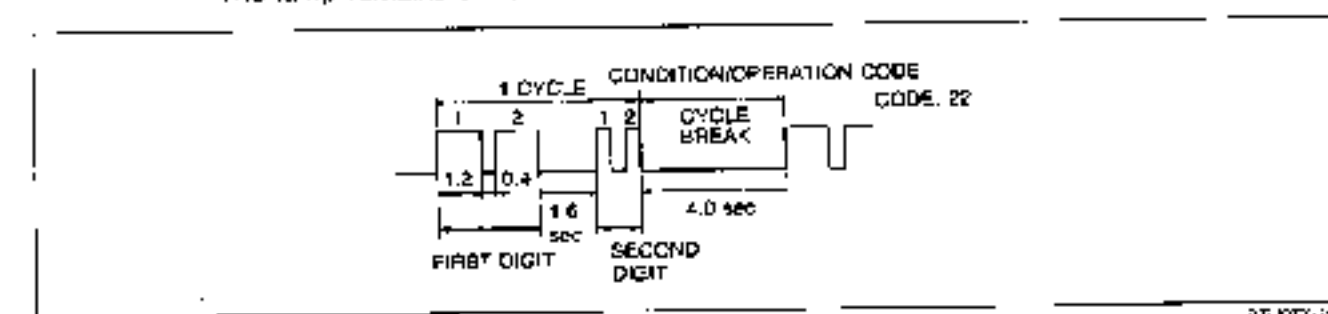


97UJTX-188

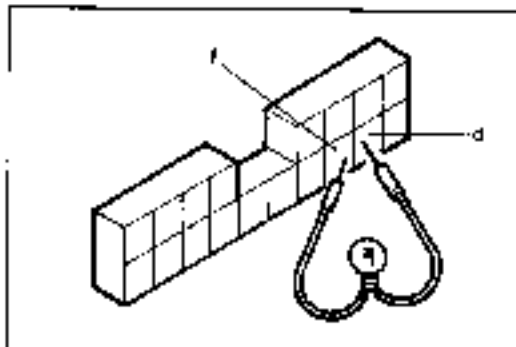
3. First digit of condition/operation code (tens position)

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.



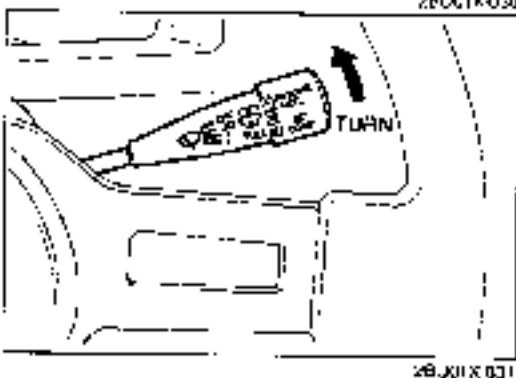
97UJTX-188

**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**

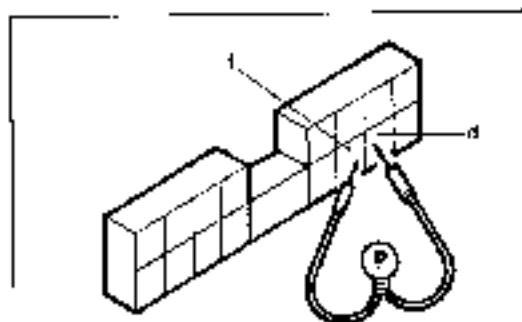
The test light will flash if a malfunction is present.

Pattern of output signal (Test light)	Code No.	Possible Cause	Action
ON OFF ON OFF ON OFF	01	Defective wiring (Actuator—Cruise control unit, Stoplight switch—Cruise control unit) Defective actuator Defective stoplight switch (For cruise)	Repair harness Inspect actuator (Refer to page T-41) Inspect stoplight switch (Refer to page T-34)
ON OFF ON OFF ON OFF	06	STOP fuse blown Defective wiring (Fuse — Cruise control unit)	Replace fuse Repair harness
ON OFF ON OFF ON OFF	07	Both stoplight switches (for vehicle and cruise) are ON simultaneously	Inspect stoplight switches (Refer to pages T-34 and T-35)
ON OFF ON OFF ON OFF	11	Defective SET/COAST, or RESUME/ACCEL switch	Inspect cruise control switch (Refer to page T-41)
ON OFF ON OFF ON OFF	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.

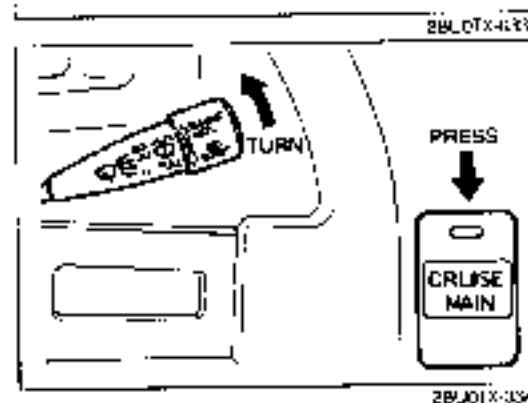
28LX1K032

**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**

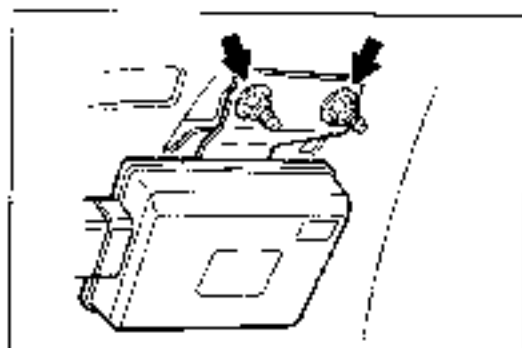
The test light will flash if the system is operating correctly. If the light fails to flash, inspect the system as shown.

Note

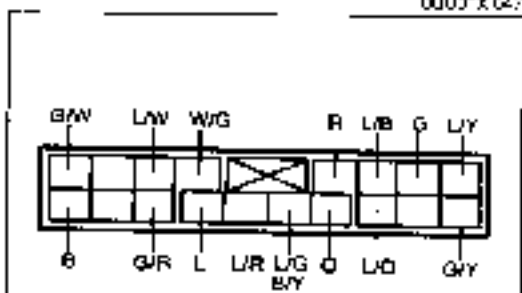
Shift the selector lever to D or R range before performing the inspection. (For ATX)

Procedure	Pattern of output signal (Test light)	Code No.	Action to inspect
Press SET/COAST switch	ON OFF	21	Inspect cruise control switch (Refer to page T-41)
Press RESUME/ACCEL switch	ON OFF	22	Inspect cruise control switch (Refer to page T-41)
Depress brake pedal	ON OFF	31	Inspect stoplight switches (Refer to page T-34 and T-35)
Turn ignition switch to ON and shift the selector lever to P or N range (For ATX). Depress clutch pedal (For MTX).	ON OFF	35	Inspect inhibitor switch (Refer to Section K) or clutch switch (Refer to Section F)
Drive vehicle above 40 km/h (25 mph)	ON OFF	37	Inspect speed sensor or wire harness

28UJ1TX-025



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.

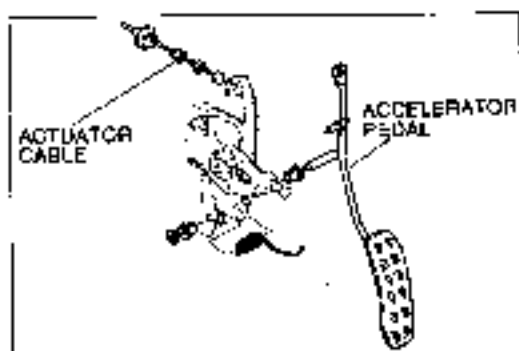
Note

When checking f terminal, disconnect the EGI control unit connector.

V_B: Battery voltage

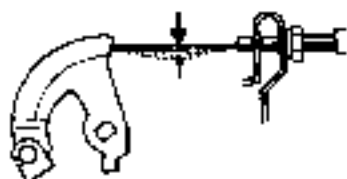
Terminal	Wire color	Connected to	Test condition	Specification	Action
a	(L/W)	Actuator	Main switch OFF	0V	Check actuator (Refer to page T-47)
			Main switch ON	9V	
b	(G/Y)	Actuator	Main switch OFF	0V	
			Main switch ON	9V	
c	(G)	Actuator	Main switch OFF	0V	Check main switch (Refer to page T-47)
			Main switch ON	9V	
e	(L/B)	Main switch	Main switch OFF	0V	
			Main switch ON	9V	
f	(L/O)	Main switch	Main switch OFF	0V	Check main switch (Refer to page T-47)
			Main switch ON	9V	
g	(R)	ECU control unit or FIAT control unit	Ignition switch OFF	0V	Check ECU control unit (Refer to section F)
			Ignition switch ON	V _B	
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 _B	Check cruise control switch (Refer to page T-47)
			While turning set switch Main switch ON	0V	
			Main switch OFF	0V	
			Main switch ON	9V	
m	(W/G)	Stoplight switch	Brake pedal depressed	0V	Check stoplight switch (Refer to page T-41)
			Brake pedal released	9V	
n	(L)	Cruise control switch (Resume/Accel switch)	Main switch ON	V _B	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	
			Main switch OFF	0V	
			Main switch ON	9V	
p	(G/R)	Speed sensor	While rotating rear tires	Cycles 0-5V	Check speed sensor (Refer to page T-48)
s	(G/W)	Battery	Constant	V _B	Repair wire
t	(B)	Ground	Constant	0V	Repair wire

28007X 408

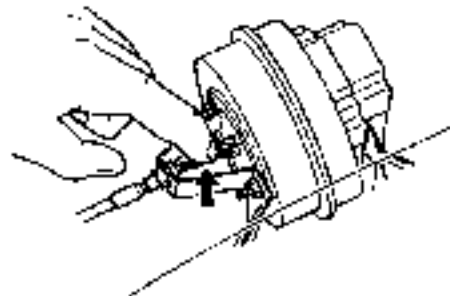


09U10TX-263

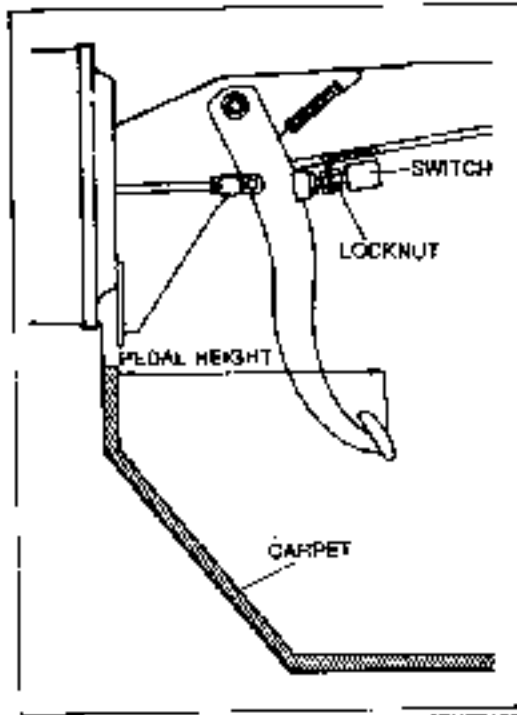
(B2200)



(B2600i)



09U10TX-601



09U10TX-097

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.

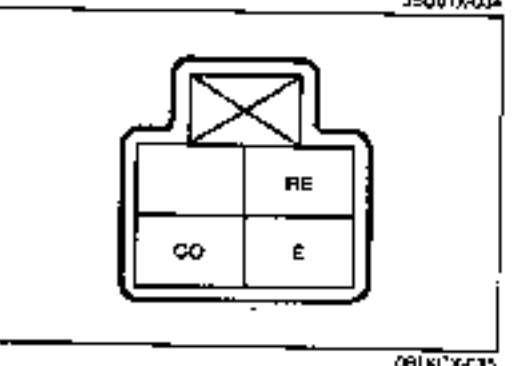
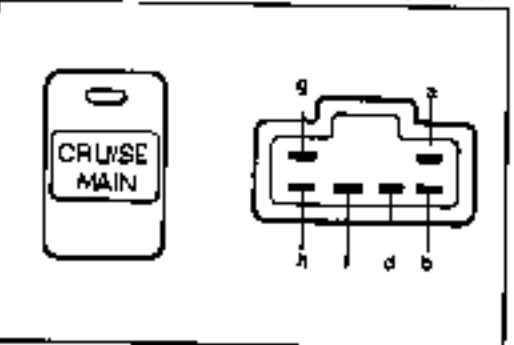
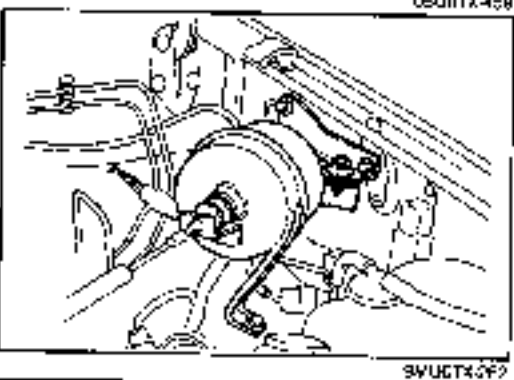
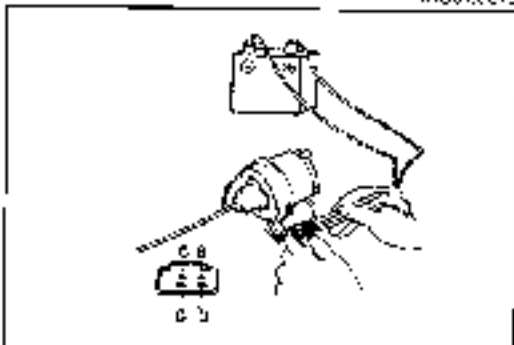
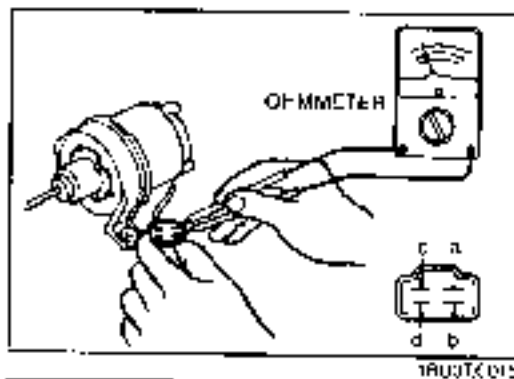
Clutch pedal height

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)



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	Pul
2	Ground	—	Power	Ground	Hold
3	Ground	—	Power	—	Extend
4	—	—	—	—	Release

6. If not as specified, replace the actuator.

Removal

1. Disconnect the accelerator cable and vacuum hose from the actuator.
2. Remove the bolt and nuts and the actuator.

Installation

Install in the reverse order of removal.

CRUISE CONTROL MAIN SWITCH

Inspection

1. Check continuity between terminals of the cruise control main switch.

Position	Terminal					
	a	b	d	l	g	h
Neutral	—	—	—	—	—	—
Off	—	—	—	—	—	—
On	—	—	—	—	—	—

○—○: Indicates continuity

2. If not as specified, replace the cruise control main switch.

CRUISE CONTROL SWITCH

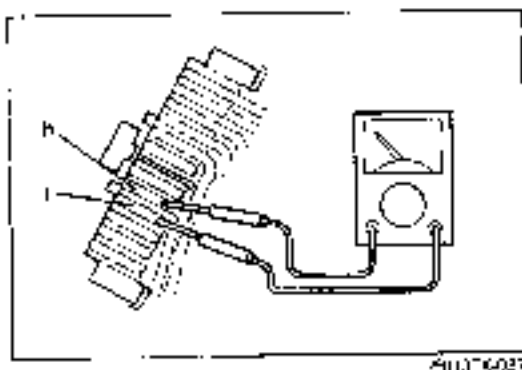
Inspection

1. Disconnect the combination switch connector.
2. Check continuity between terminals of the combination switch connector.

Switch	Terminal		
	CO	RE	E
SET/COAST	—	—	—
RESUME/ACCEL	—	—	—

○—○: Indicates continuity

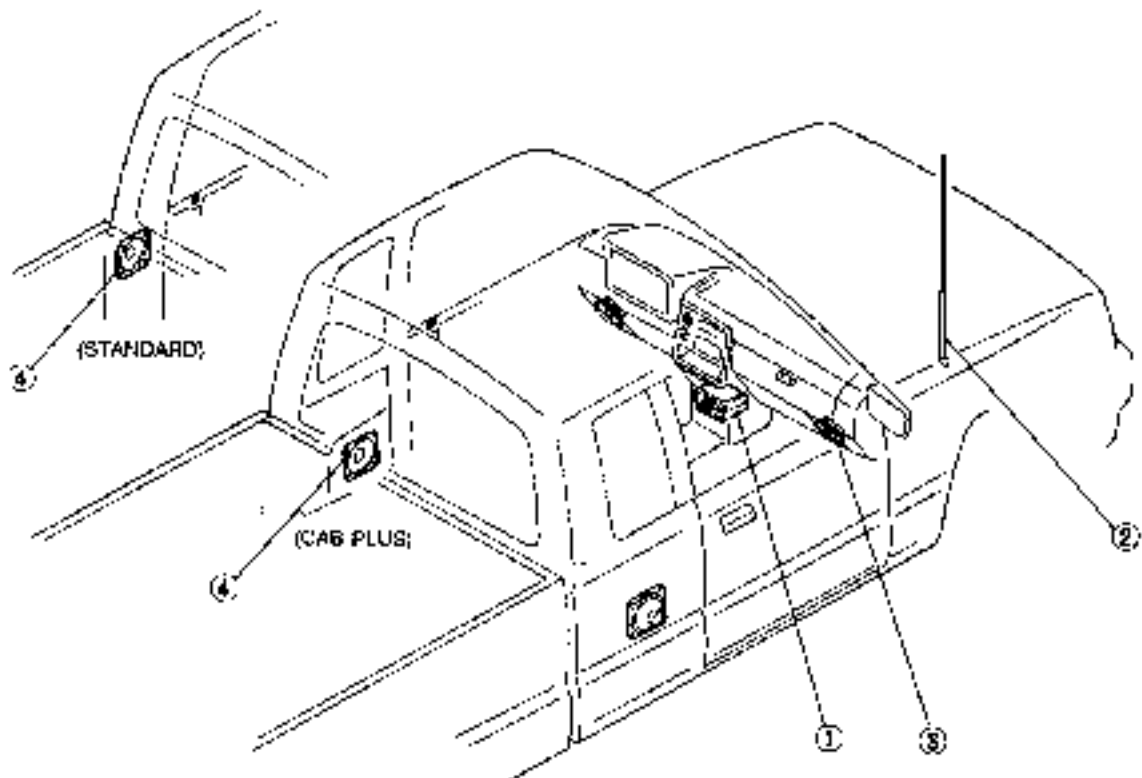
3. If not as specified, replace the cruise control switch.

**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

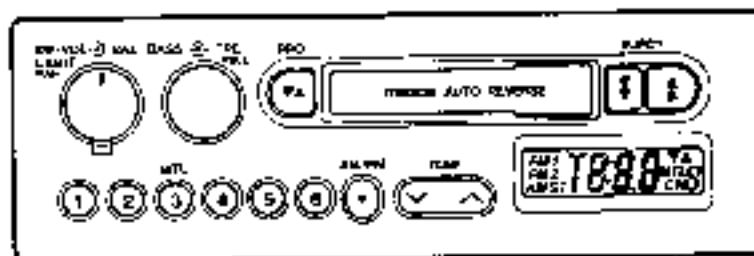
3. Front speaker
4. Rear speaker

02U07X.C35

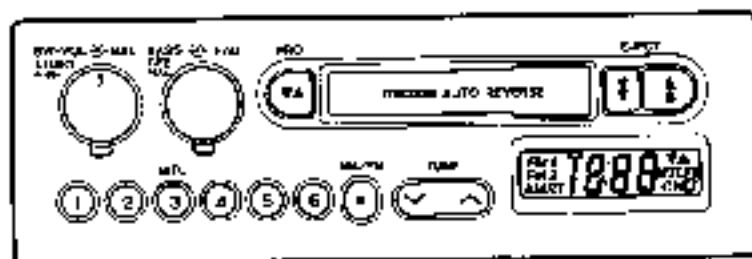
OUTLINE OF AUDIO

Front view

AM-FM RADIO, CASSETTE TAPE PLAYER

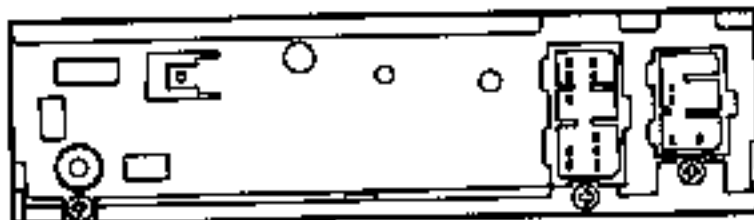


AM-FM RADIO, CASSETTE TAPE PLAYER



00007X030

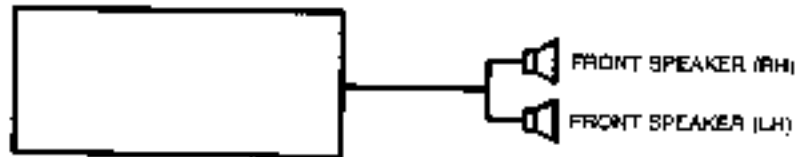
Rear view



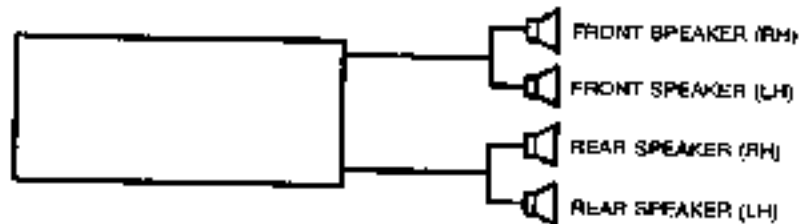
00007X030

SYSTEM

AM-FM RADIO, CASSETTE TAPE PLAYER



AM-FM RADIO, CASSETTE TAPE PLAYER



00U0TX-039

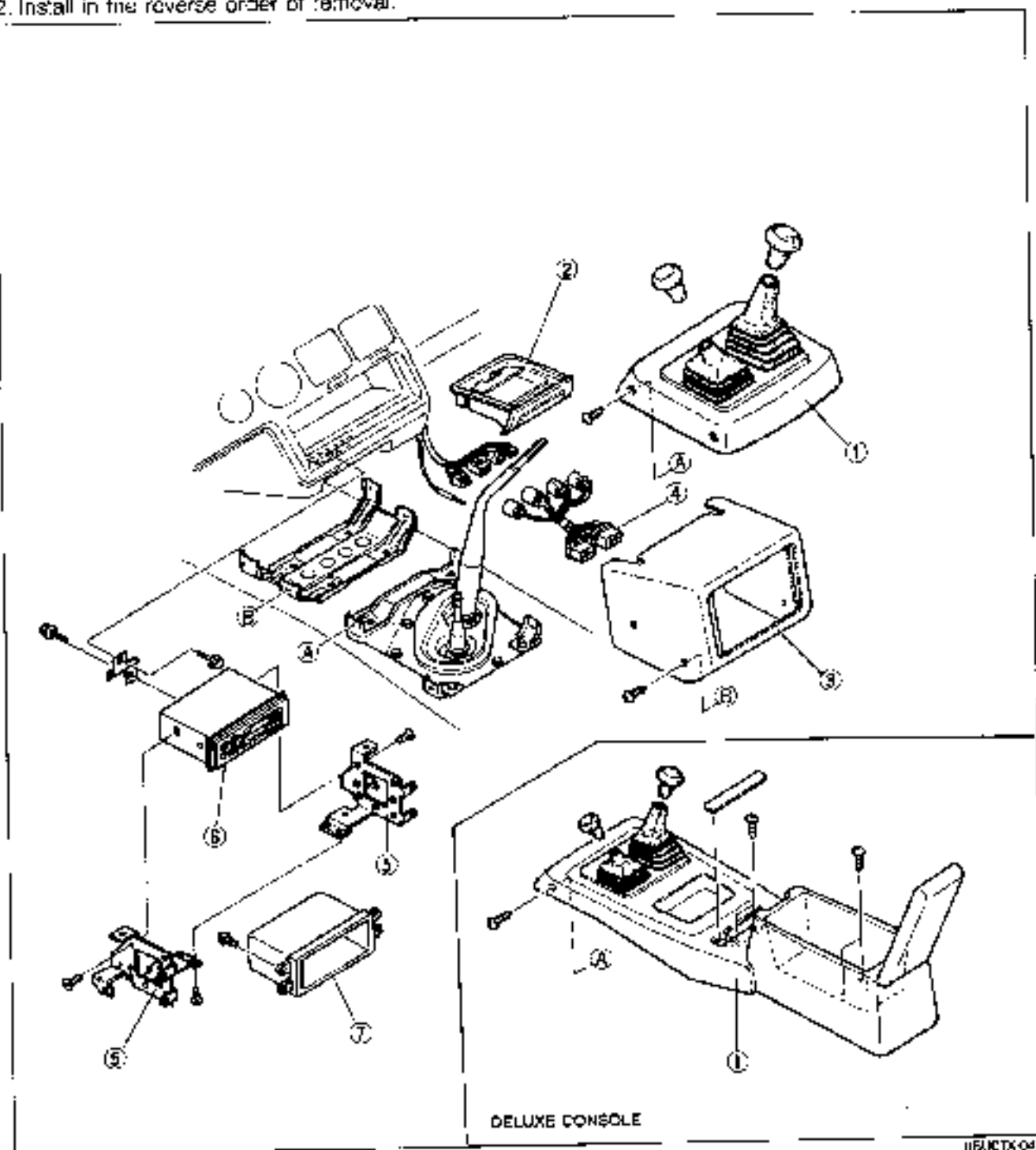
REMOVAL AND INSTALLATION

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

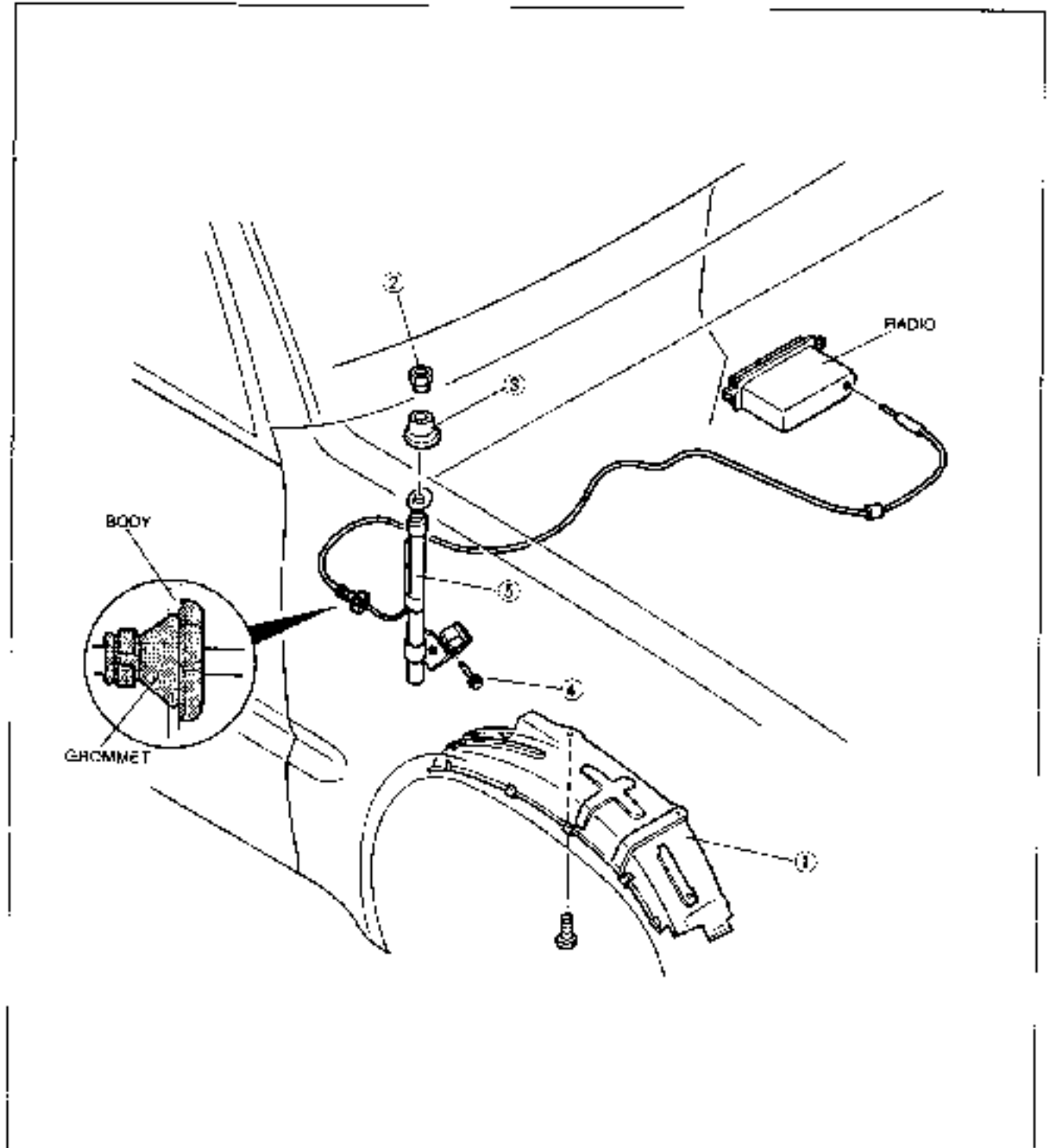
7. Stereo ornament

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

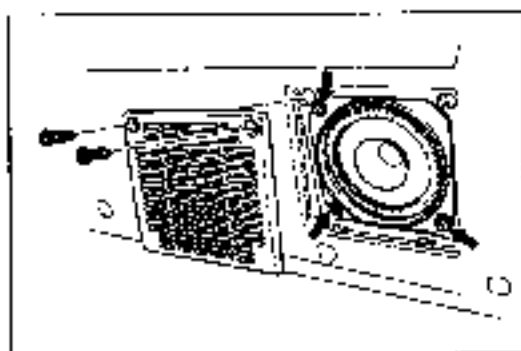


1. Mud guard
2. Mounting nut

3. Mounting insulator
4. Mounting bolt

- ## 5. Antenna assembly

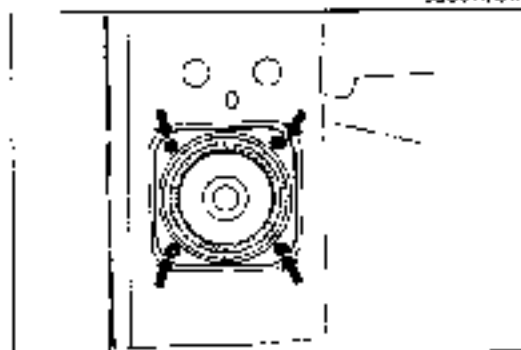
SECRET



98UJTX-049

Front Speaker

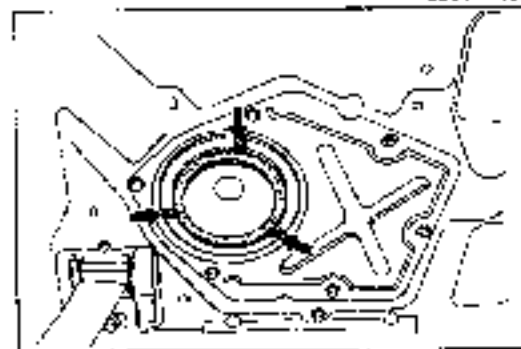
1. Remove the screws and the speaker grille.
2. Remove the screws and disconnect the connector; then remove the speaker.
3. Install in the reverse order of removal.



21UUTX-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.

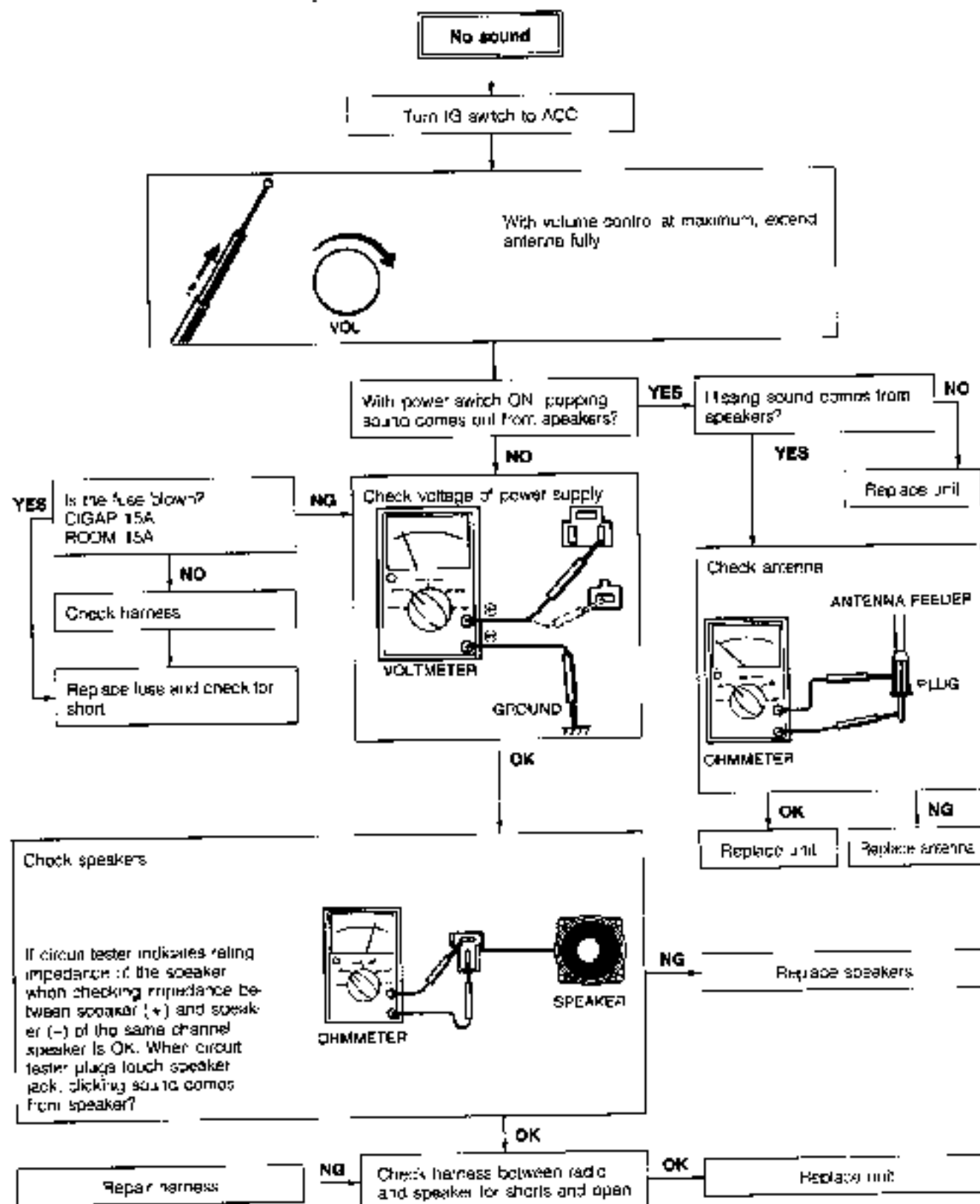


2B,0TX-B40

Cab plus

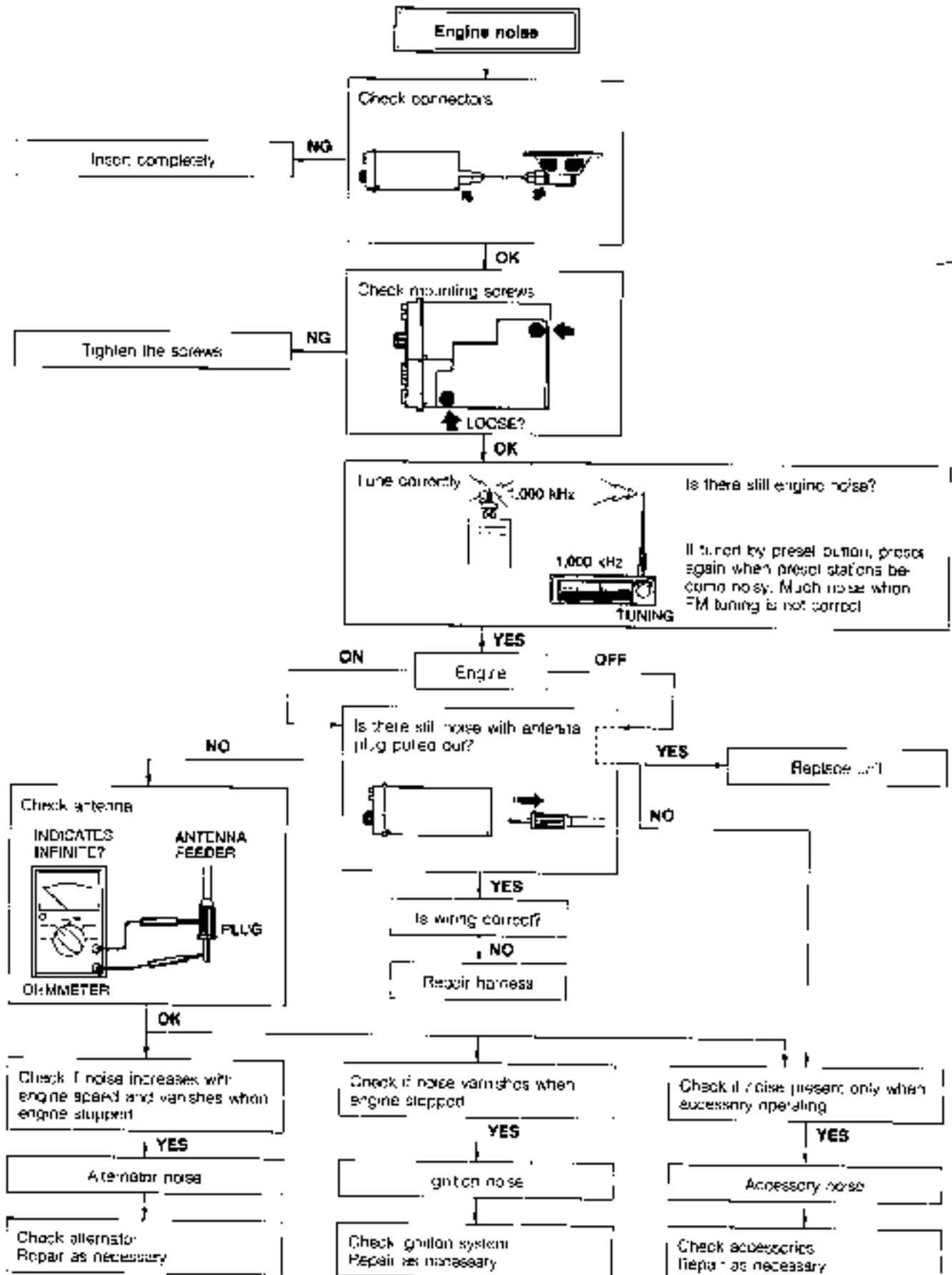
1. Remove the seat belt upper anchor bolt. (Refer to page S-31.)
2. Remove the quarter window glass. (Refer to page S-24.)
3. Remove the back upper garnish, B pillar upper trim, and B pillar lower trim. (Refer to page S-34.)
4. Remove the screws and disconnect the connector; then remove the speaker.
5. Install in the reverse order of removal.

RADIO



CS-101X-442

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

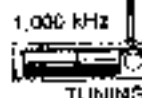
NG

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

Is propagation cause of poor tone quality?

OK

NO

Replace unit

Check antenna and lead in for broken contacts

INDICATES INFINITE?

ANTENNA FEEDER

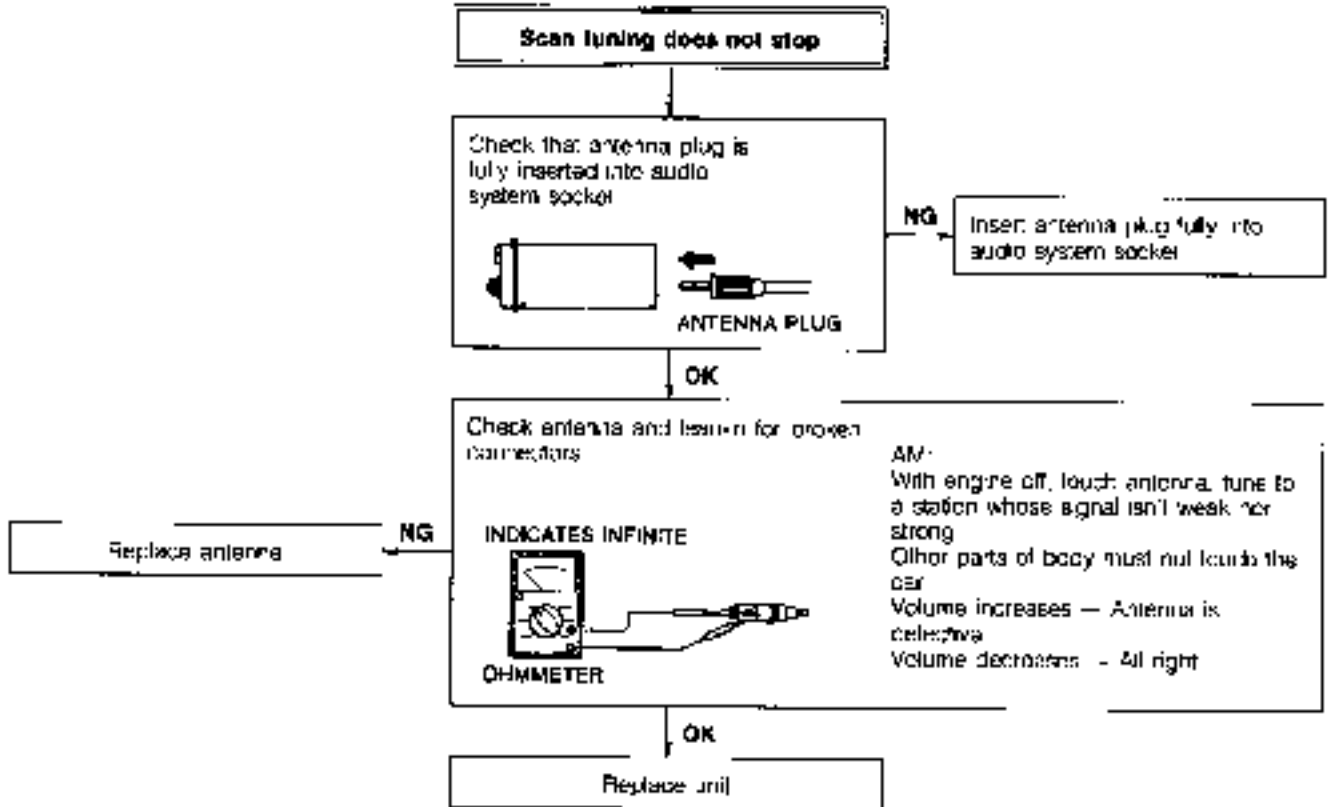
PLUG



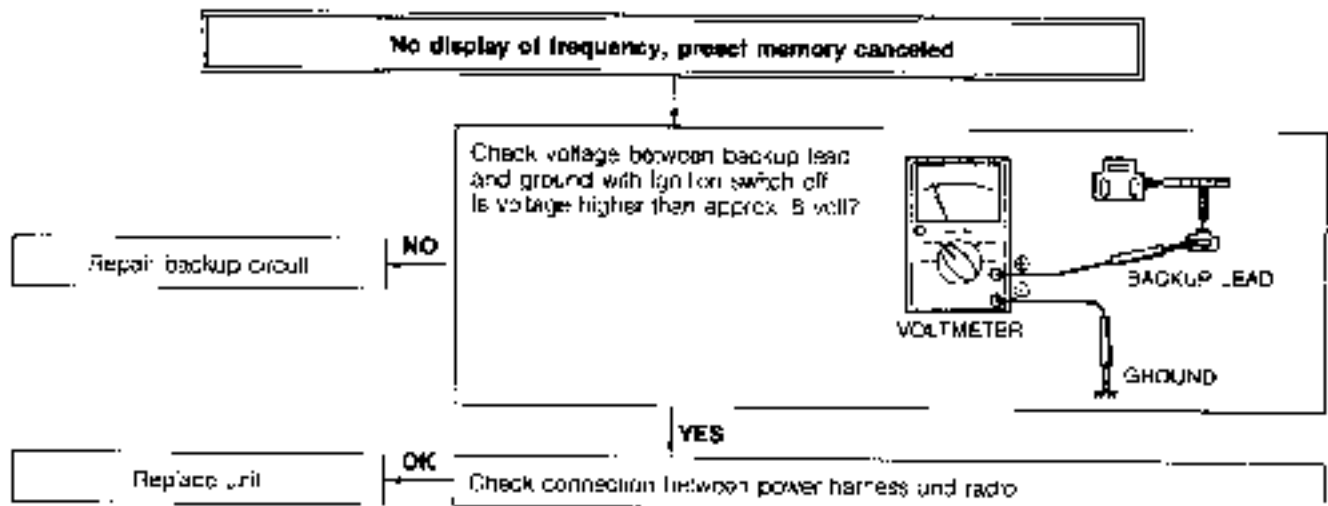
AM:
With engine off touch antenna and tune to a station whose signal is neither weak nor strong. Other parts of body must not touch the car.
Volume increase — Antenna is defective
Volume decrease — All right

CEJ57X 243

RADIO



1.81012x-014

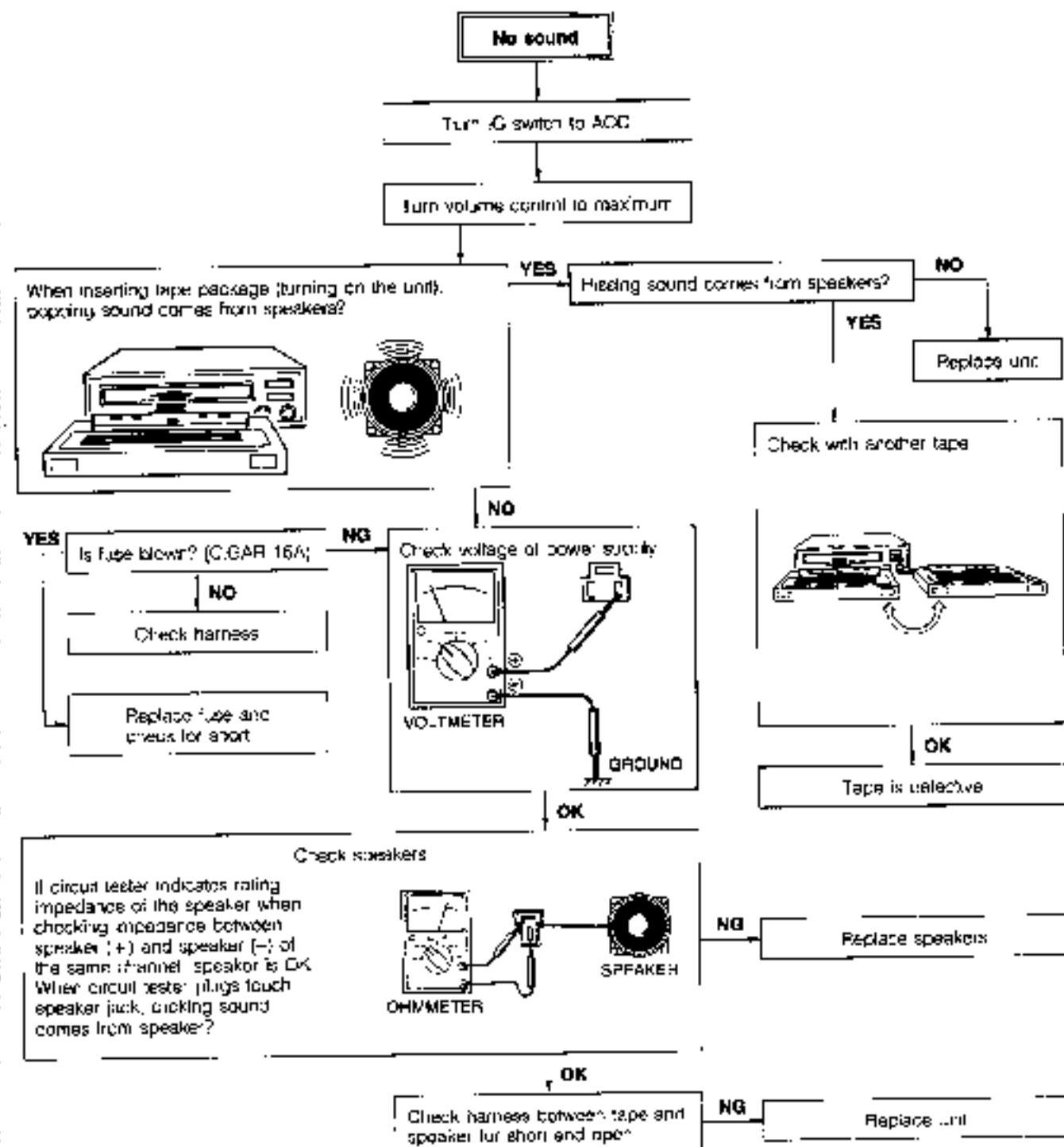


Note

When battery is discharged or radio is disconnected from battery for or during repair, all memory is canceled. Preset stations must be reset.

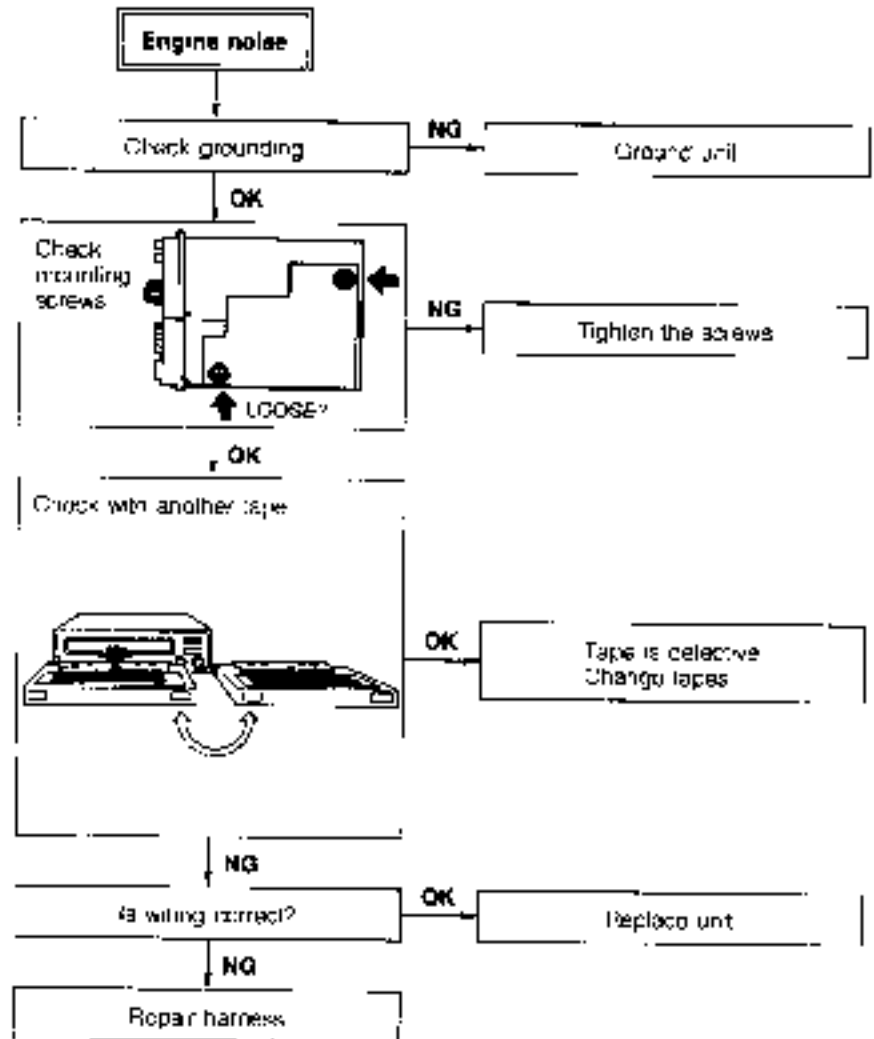
96013x-124

CASSETTE DECK



TJ015K-05-1

CASSETTE DECK



95UCTX-050

CASSETTE DECK

Poor tone quality

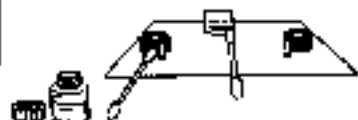
Clean head, capstan, and pinch roller

NG

Check head, capstan, and pinch roller for oxide and dirt buildup

OK

Use Alltop Head cleaner or equivalent



Check with another tape

Tape is defective
Change tapes

OK

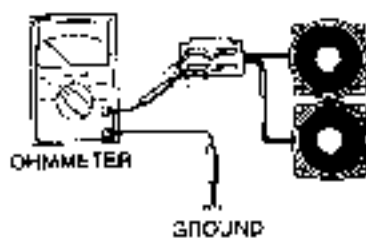


NG

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

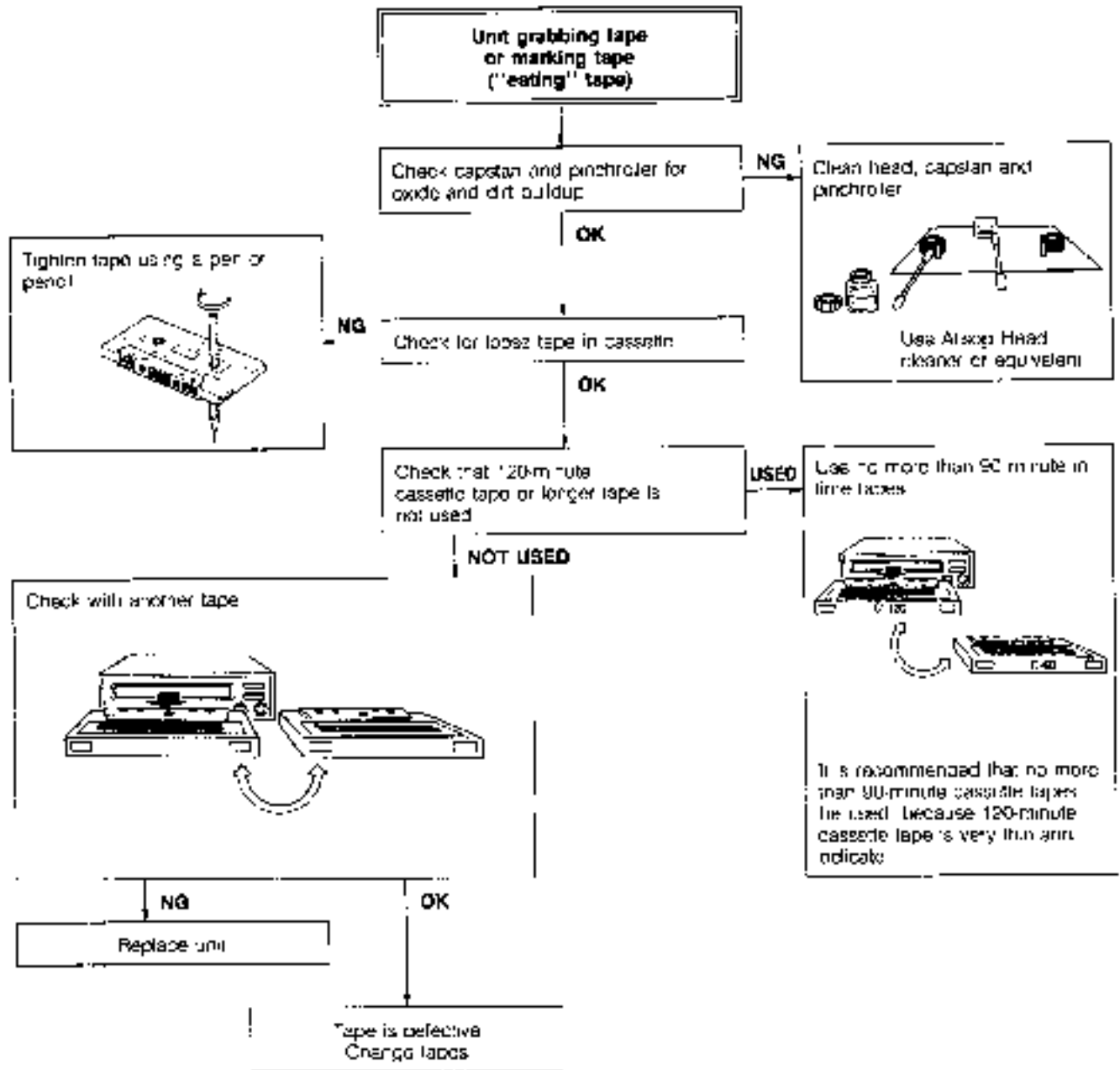


OK

Replace unit

92U31X-053

CASSETTE DECK



DELTA DEC

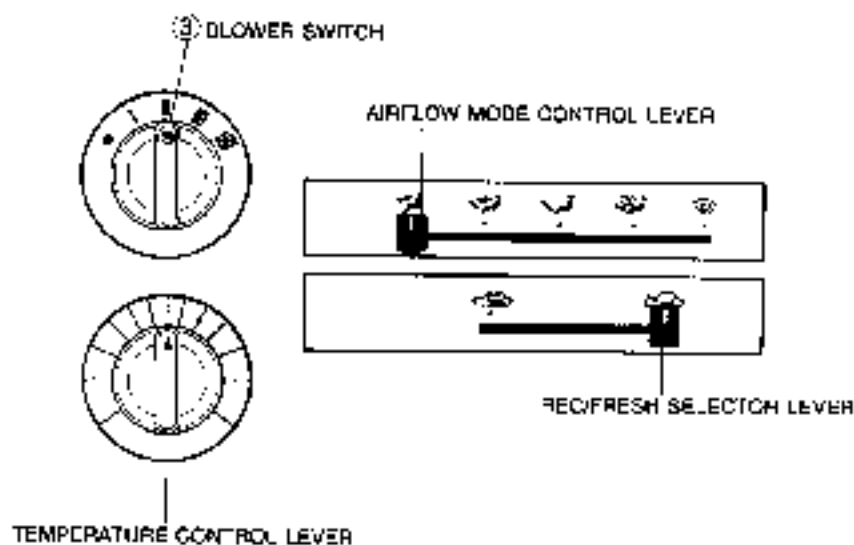
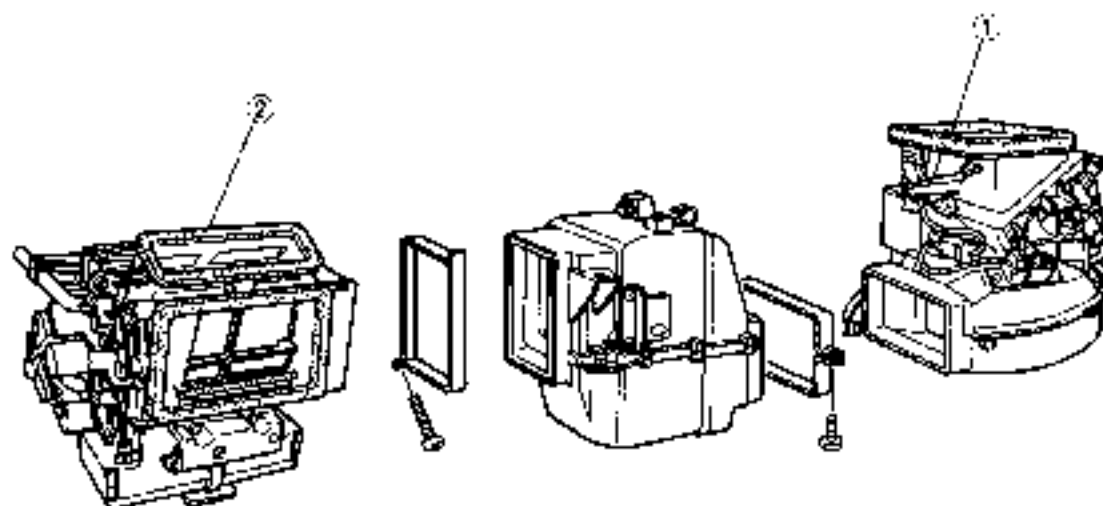
HEATER AND AIR CONDITIONER SYSTEMS

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S, L, X, X4711

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HEATER AND SWITCHES

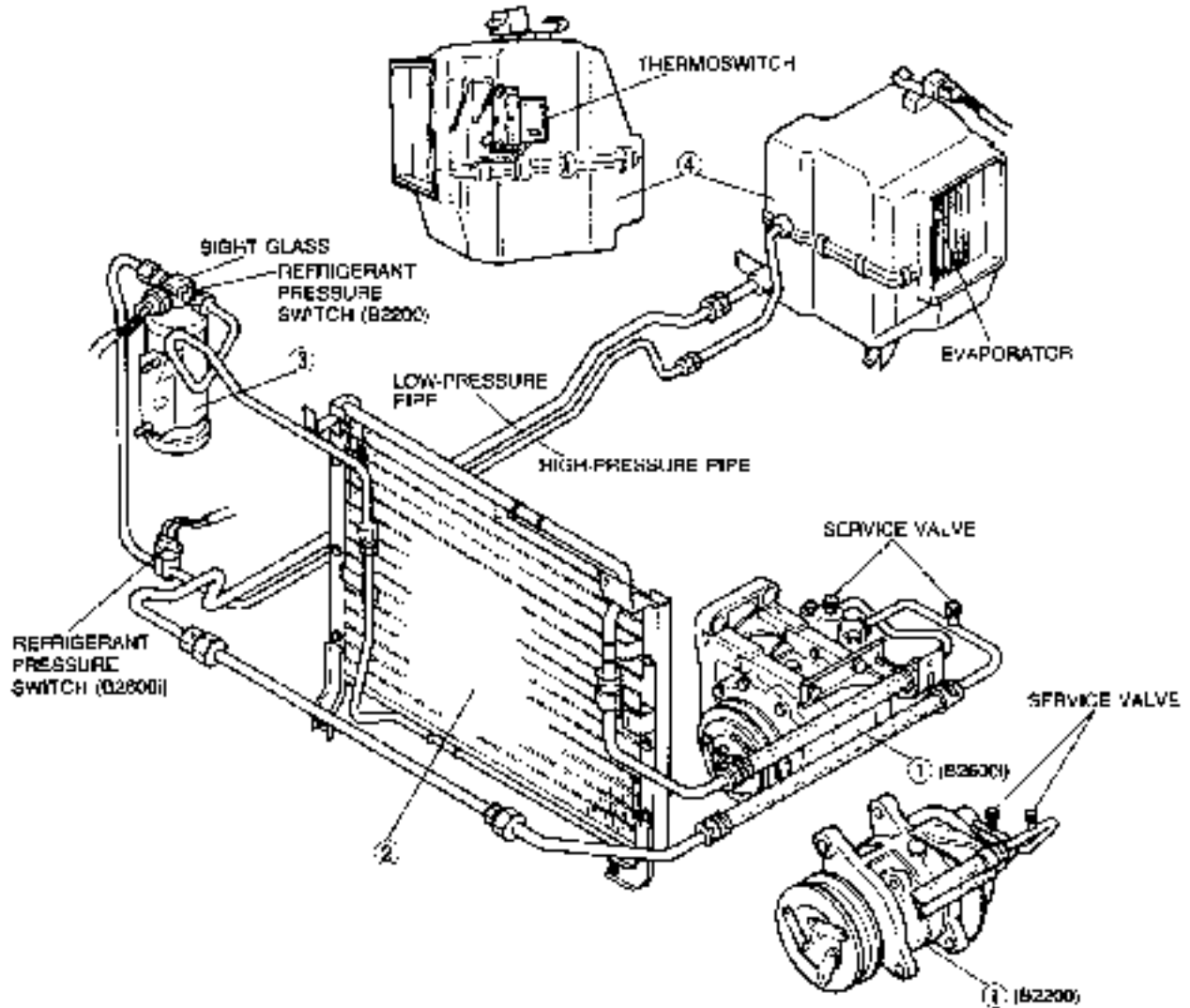


1. Blower unit
 Removal and Installation page U-21
 Disassembly and Assembly page U-21
 Inspection page U-21
2. Heater unit
 Removal and Installation page U-23
 Disassembly and Assembly page U-23

3. Control switch panel
 Removal and Installation page U-19
 Inspection page U-20
 Adjustment page U-20

15101A-002

AIR CONDITIONER



35000-7-202

1. Compressor	
On-vehicle inspection.....	page U-33
Removal.....	page U-34
Installation.....	page U-41
Disassembly.....	page U-34
Assembly.....	page U-39
2. Condenser	
Removal.....	page U-43
Installation.....	page U-44
Inspection.....	page U-43

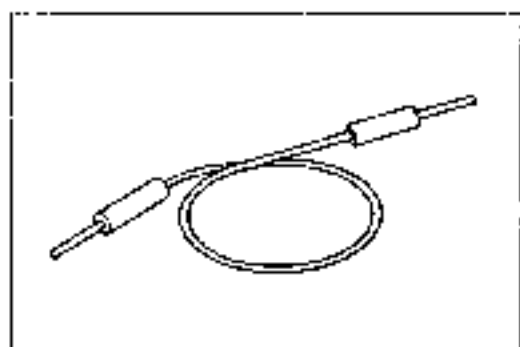
3. Receiver/drier	
On-vehicle inspection.....	page U-45
Removal and Installation.....	page U-45
4. Cooling unit	
Removal.....	page U-31
Installation.....	page U-32
Disassembly and Assembly.....	page U-31
Inspection.....	page U-32

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

6R3XJ41M



9M1XKJ-006

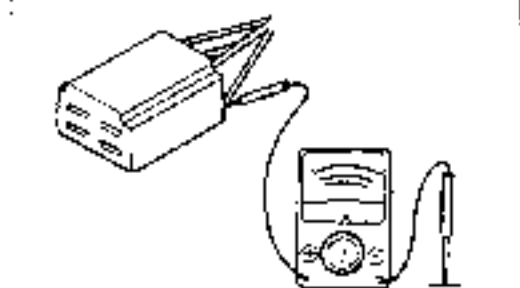
ELECTRICAL TROUBLESHOOTING TOOLS

Jumper Wire

The jumper wire is used for testing by short-circuiting switch terminals and to verify the condition of ground connections.

Caution

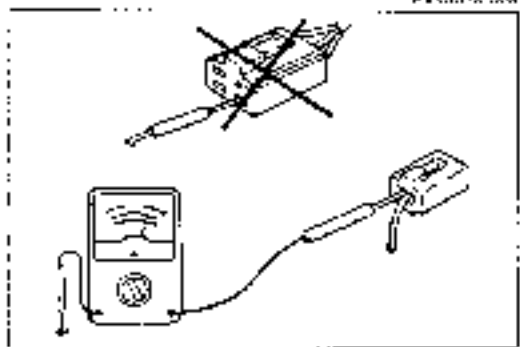
Do not connect the jumper wire between a power source and a body ground. This may cause burning or other damage to harnesses and electronic components.



9M1XKJ-006

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.



9M1XKJ-015

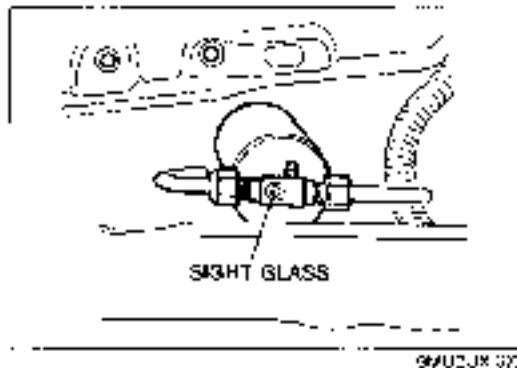
Ohmmeter

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

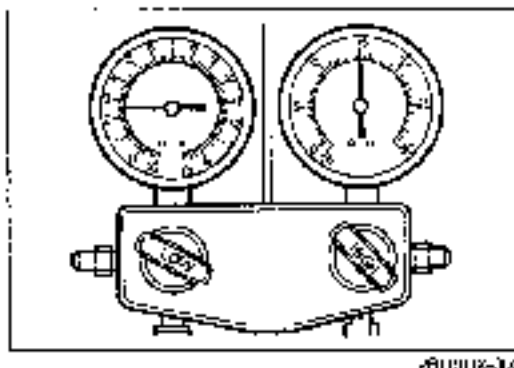


Step 1 Checking refrigerant charge

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

5MU03JX 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:

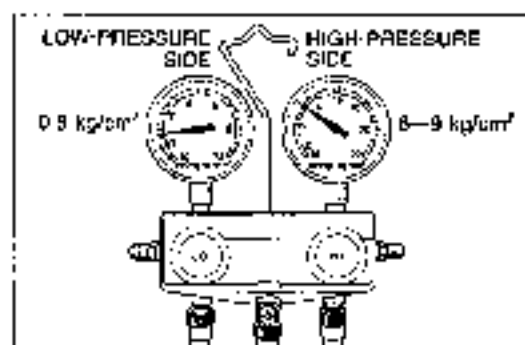
98—167 kPa (1.0—1.7 kg/cm², 14—24 psi)

High pressure:

1,030—1,275 kPa (10.5—13.0 kg/cm², 149—185 psi)

U

4. If the pressure is not as specified, refer to the following items and check the system.



SB-100-2 (01)

Case 1**Measured pressure****Low pressure:**Below 78 kPa (0.8 kg/cm², 11 psi)**High pressure:**785—883 kPa (8—9 kg/cm², 114—128 psi)**Possible cause**

Insufficient refrigerant

Condition

- Outlet air from vents not cold
- Bubbles seen in sight glass

Step 1

1. Check for oil stains on the pipes, hoses and other parts.
2. If oil staining is found at the connection of pipes or hoses, replace the O ring; then, evacuate, charge, and test the system.
3. If oil staining is not found, go to Step 2.

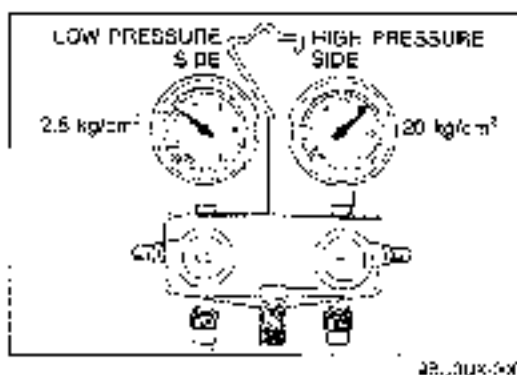
Step 2

1. Check for leakage from connections with a gas leak tester.
 - Inlet and outlet of condenser
 - Inlet and outlet of receiver/drier
 - Inlet and outlet of compressor
 - Sight glass
 - Inlet and outlet of cooling unit
2. If leakage is evident, go to Step 3.
3. If leakage cannot be found, charge the system until it is filled with specified amount of refrigerant by checking the sight glass. (System OK, but refrigerant leaked gradually over time.)

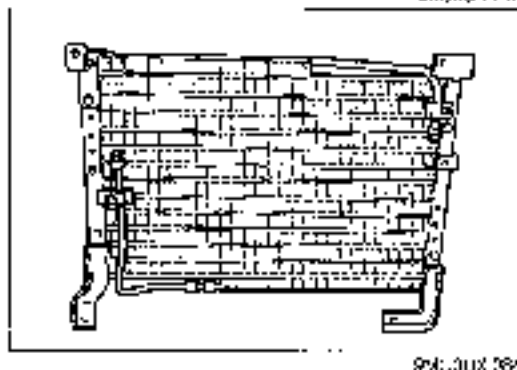
Step 3

1. Check tightening torque of the connection where leak was detected.
2. If the connection is loose, tighten the connection, then, evacuate, charge, and test the system.
3. If the connection is properly tightened, replace the O-ring; then, evacuate, charge, and test the system.

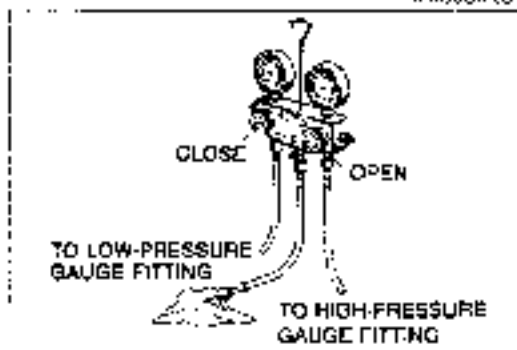
2BA10113-004



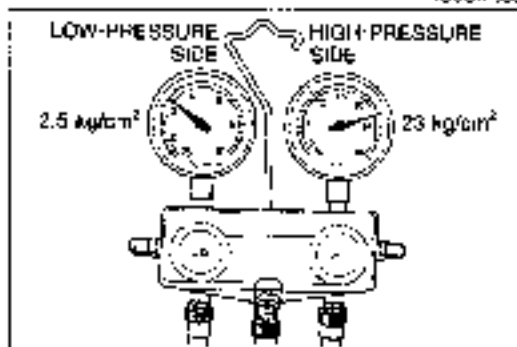
28_000X-000



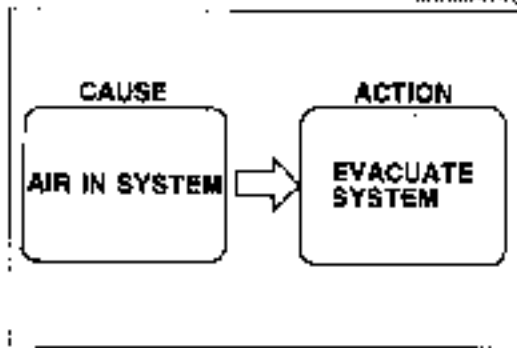
29_000X-000



29_000X-000



28_000X-000



28_000X-000

Case 2**Measured pressure****Low pressure:**

Above 245 kPa (2.5 kg/cm², 36 psi)

High pressure:

Above 1,962 kPa (20 kg/cm², 284 psi)

Possible cause

Excessive refrigerant or insufficient condenser cooling

Condition

Insufficient cooling

Step 1

1. Check the condenser for bent fins or damage. Repair or replace if necessary.
2. If the condenser is OK, go to Step 2.

Step 2

1. Recover the excessive refrigerant from the system using a recommended CFC recovery device or equivalent. (Refer to page U-25.)

Warning

Always wear gloves and eye protection when handling the refrigerant.

2. Verify that the refrigerant pressure is normal.

Case 3**Measured pressure****Low pressure:**

Above 245 kPa (2.5 kg/cm², 36 psi)

High pressure:

Above 2,256 kPa (23 kg/cm², 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

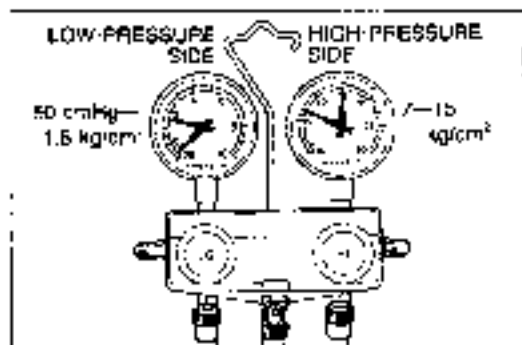
Charge the system with refrigerant. (Refer to page U-26.)

Step 4

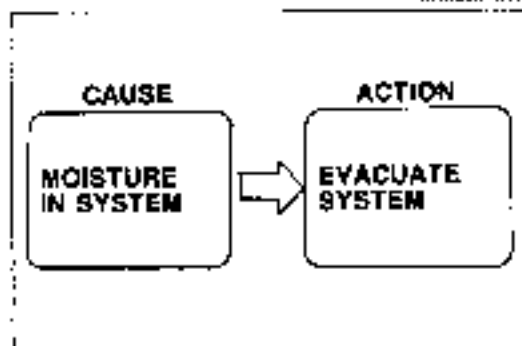
After charging, check the refrigerant pressure. (Refer to page U-30.)

Step 5

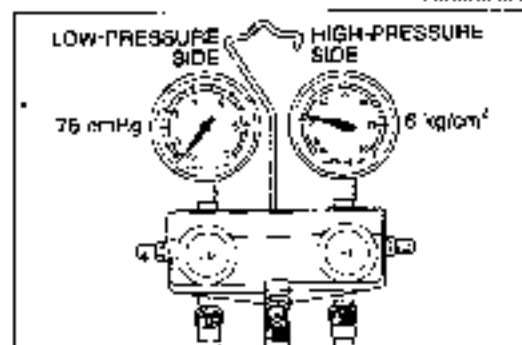
If low and high pressures are still too high, replace the receiver/drier.



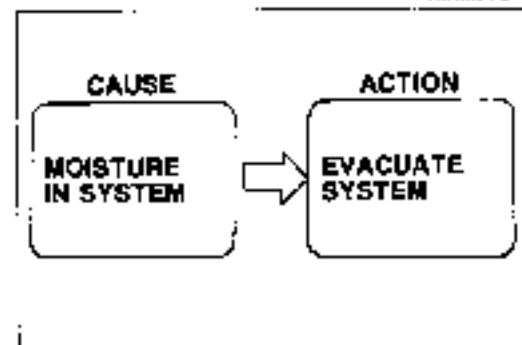
RFA.C...X-019



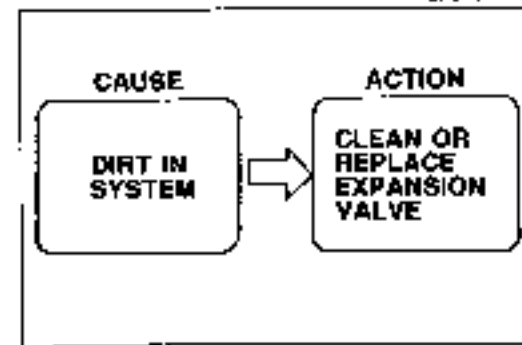
281000X-007



981010X-014



291010X-000



291010X-000

Case 4**Measured pressure**

Low pressure: 50 cmHg (2.0 inHg) of Vacuum
—147 kPa (1.5 kg/cm², 21 psi)

High pressure:

887—1,472 kPa (7—15 kg/cm², 100—213 psi)

Possible cause

Moisture in system

Condition

Intermittent cooling

(Moisture in refrigeration system freezes in expansion valve and causes temporary blocking. After time, ice melts and condition returns to normal.)

Step 1

Discharge the refrigeration system. (Refer to page U-25.)

Step 2

Evacuate the system to remove all air and moisture from the system. (Refer to page U-26.)

Step 3

Charge the system with refrigerant. (Refer to page U-26.)

Step 4

After charging, check the refrigerant pressure. (Refer to page U-30.)

Step 5

If low and high pressures are not normal, replace the receiver/drier. (Normal pressure: Refer to page U-5.)

Case 5**Measured pressure****Low pressure:**

76 cmHg (3.0 inHg) Vacuum

High pressure:

Below 589 kPa (6 kg/cm², 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)

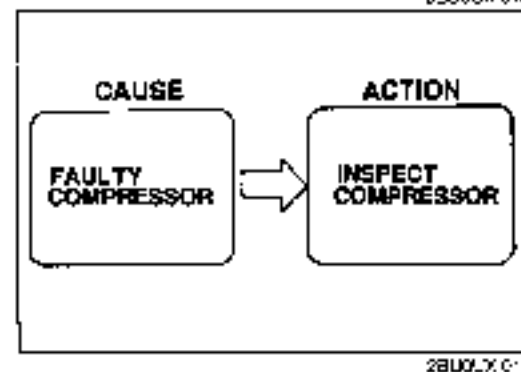
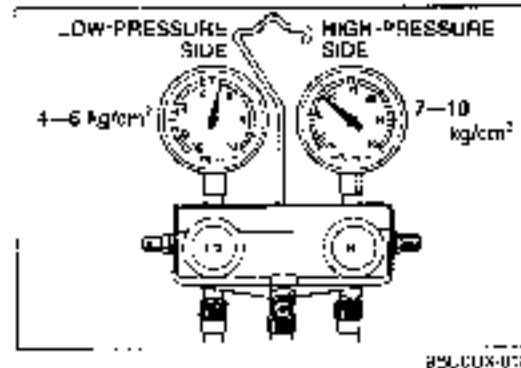
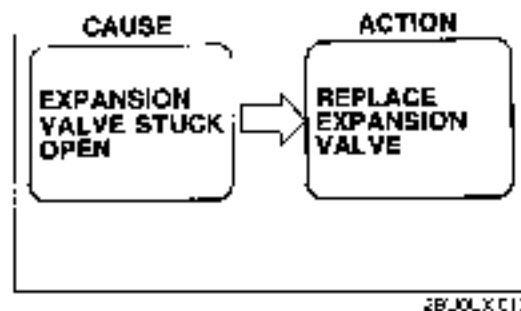
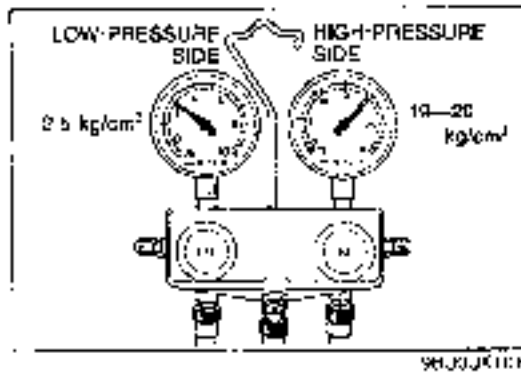
If cause is moisture, refer to "Moisture in system."

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.

**Case 6****Measured pressure****Low pressure:**Above 245 kPa (2.5 kg/cm², 36 psi)**High pressure:**1,864—1,962 kPa (19—20 kg/cm², 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/cm², 57—85 psi)**High pressure:**687—981 kPa (7—10 kg/cm², 100—142 psi)**Possible cause**

Faulty compressor

Condition

No cooling

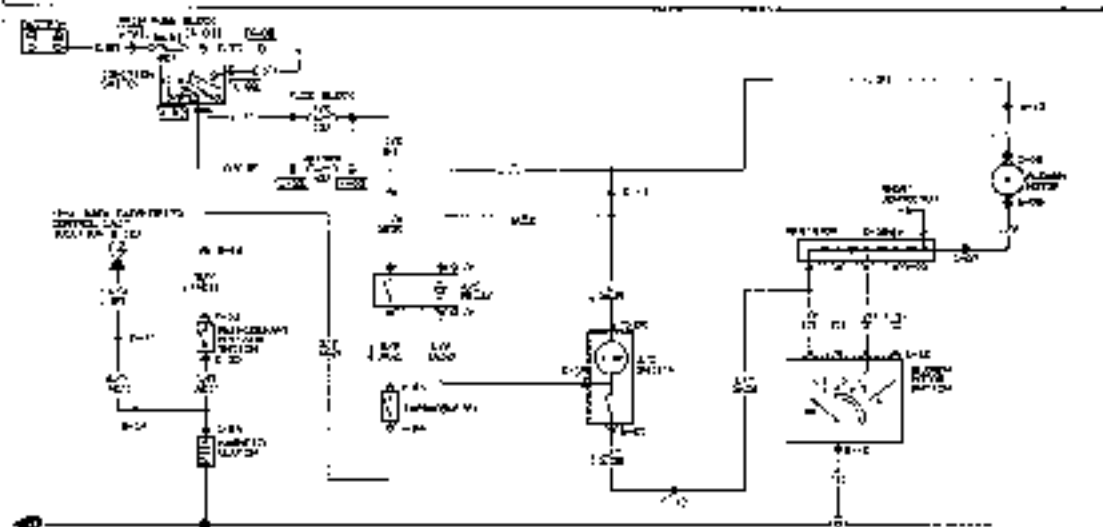
1. Run the engine at a first idle.
2. Check that the magnetic clutch is ON when the A/C switch and blower switch are ON.
3. If the magnetic clutch remains OFF, refer to "Magnetic clutch does not operate," page U-13.
4. If the magnetic clutch is ON, inspect the compressor. (Refer to page U-33.)

Symptom: Blower motor does not operate

Circuit diagram

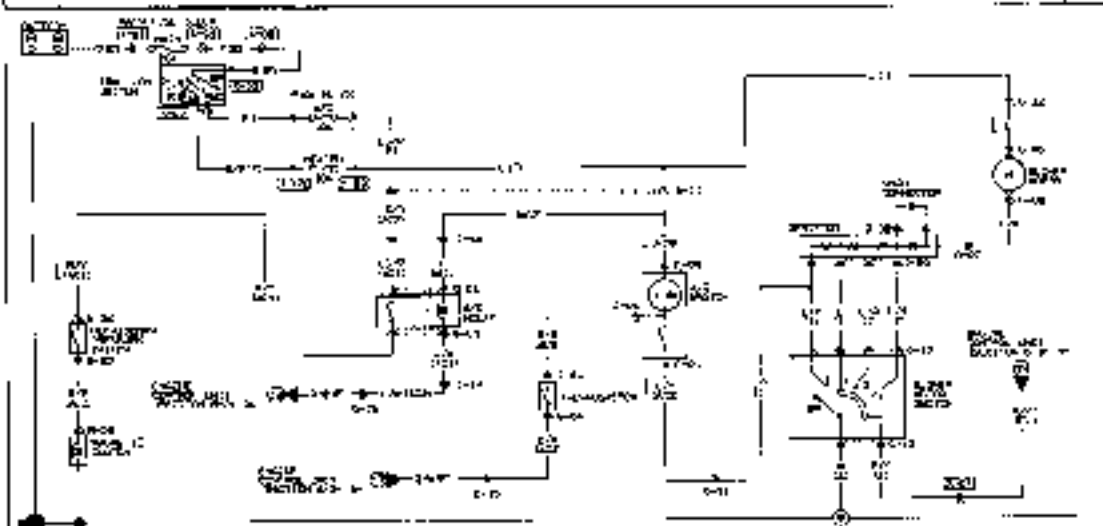
P.1 - CARRIERATOR - HEATER & AIR CONDITIONER

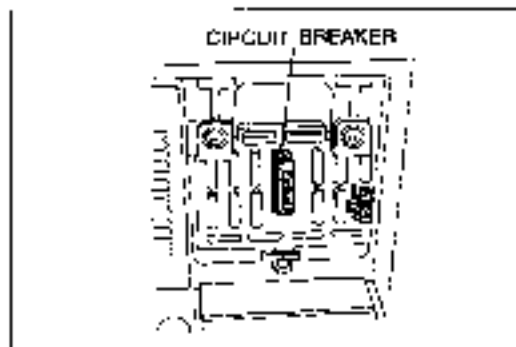
G-1



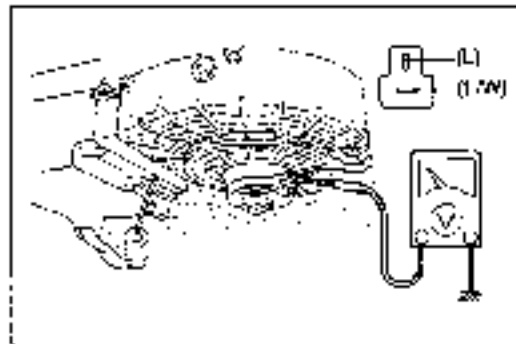
P.2 - FGI & P.61 - HEATED & AIR CONDITIONER

G-2

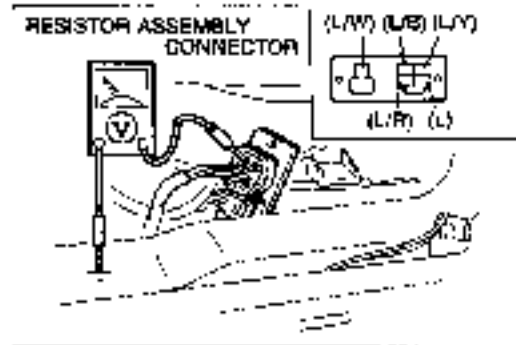




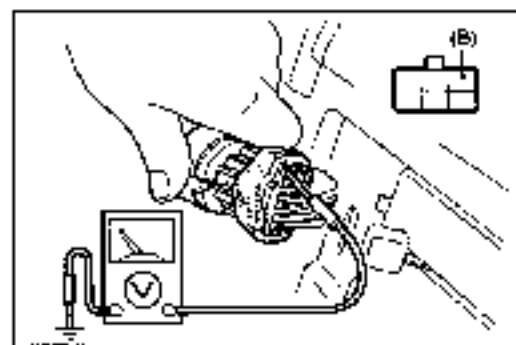
28UJJK012



28UJJK013



28UJJK014



28UJJK015

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_B: Battery voltage

Wire	Voltage	Action
(L)	V _B	Next, check wire (L/W)
	0V	Repair wiring harness (Circuit breaker—Blower motor)
(1/W)	V _B	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_B: Battery voltage

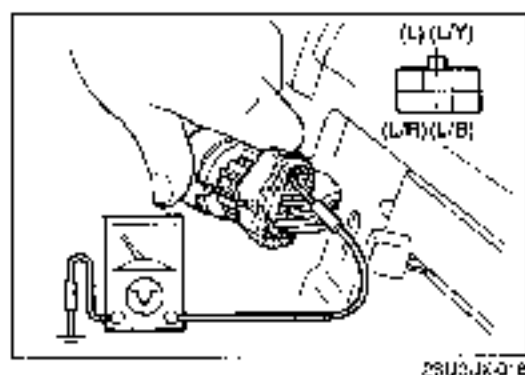
Wire	Voltage	Action
(L/W)	V _B	Next, check wire (L/R)
	0V	Repair wiring harness (Blower motor—Resistor assembly)
(L/B)	V _B	Next, check wire (L/R)
	0V	Replace resistor assembly
(L/R)	V _B	Next, check wire (L)
	0V	Replace resistor assembly
(L)	V _B	Next, check wire (L/Y)
	0V	Replace resistor assembly
(1/Y)	V _B	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_B: Battery voltage

Wire	Voltage	Action
(B)	0V	Go to Step 5
	V _B	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.

V_B: Battery voltage

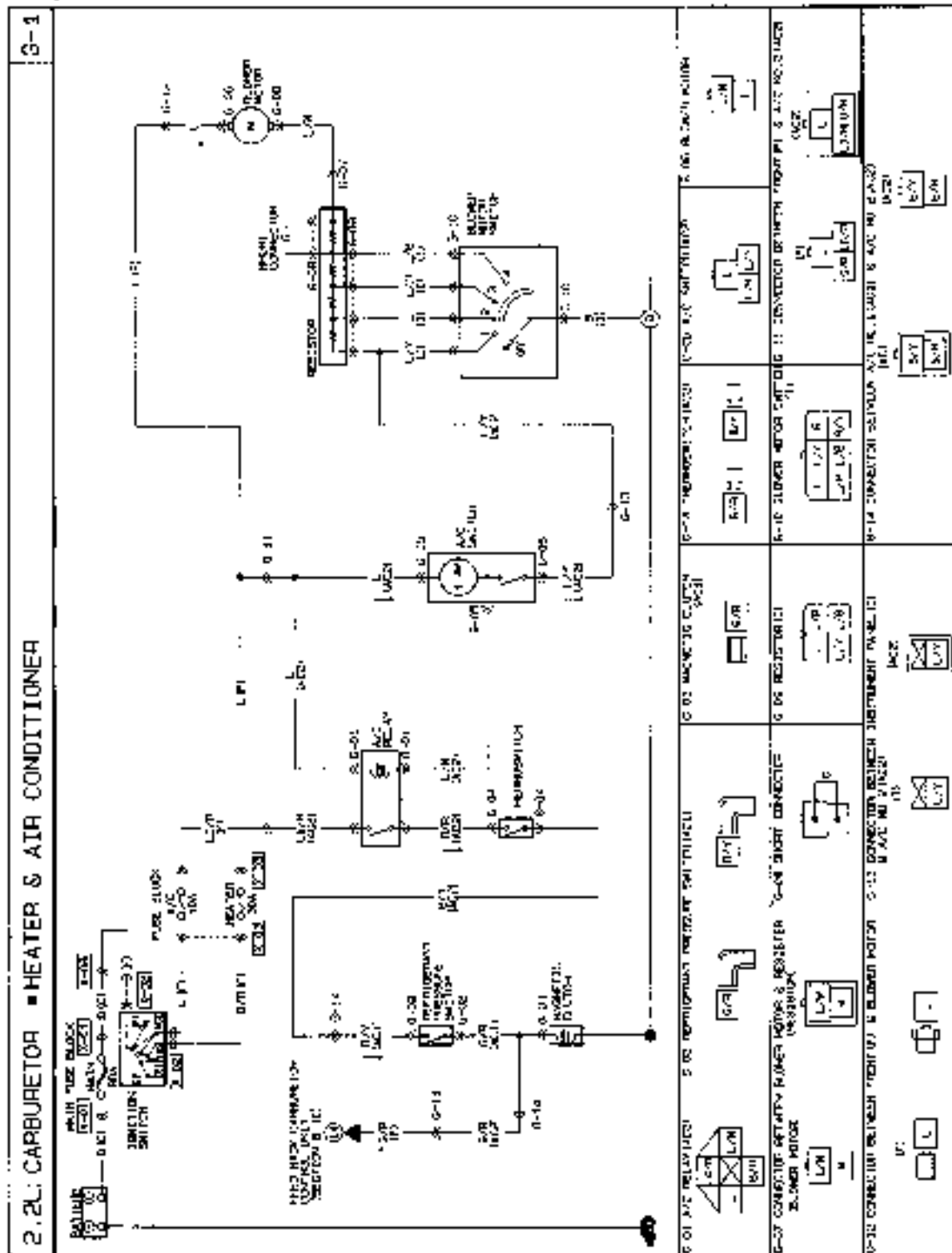
Wire	Voltage	Action
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V _B	Next, check wire (L/R)
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V _B	Next, check wire (L)
(L)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V _B	Next, check wire (L/R)
(L/R)	0V	Repair wiring harness (Resistor assembly—Blower switch)
	V _B	Replace blower switch

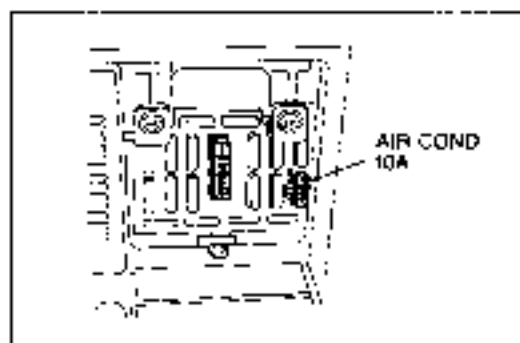
Symptom: Magnetic clutch does not operate

Note

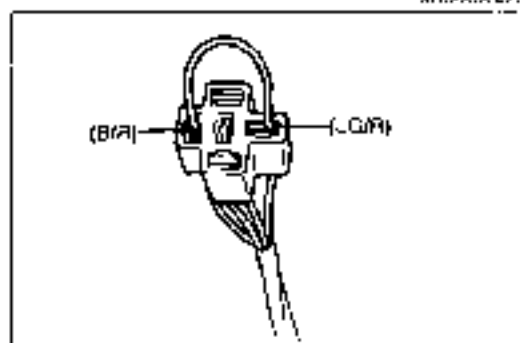
If the blower motor also does not operate, see "Blower motor does not operate", page U-10.

(B2200 Carb.)
Circuit diagram

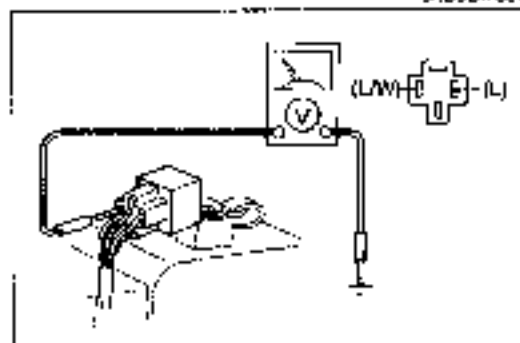




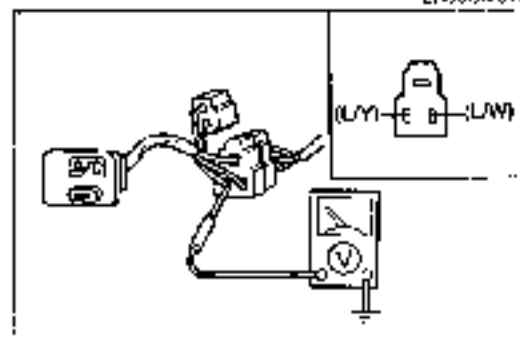
9R-J00JC29



9R-J00JC27



29U-0LX-C17



29U-0JX-C10

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.

V_B: Battery voltage

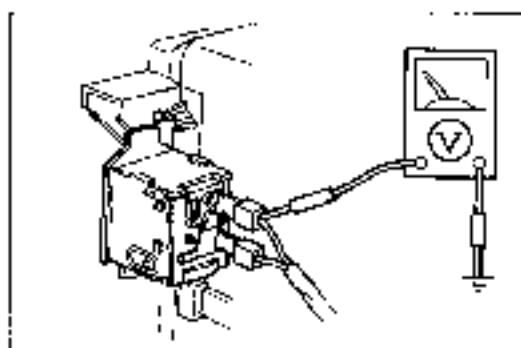
Wire	Voltage	Action
(L)	VB	Next check wire (L/W)
	0V	Repair wiring harness (Circuit breaker—A/C relay)
(L/W)	VB	Go to Step 4
	0V	Replace A/C relay

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.

V_B: Battery voltage

Wire	Voltage	Action
(L/W)	VB	Next check wire (L/W)
	0V	Repair wiring harness (A/C relay—A/C switch)
(B/R)	VB	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch



9RLJUX-019

Step 5

1. Turn the ignition switch ON.
2. Measure the voltage at the terminal-wires of the thermostat connector.

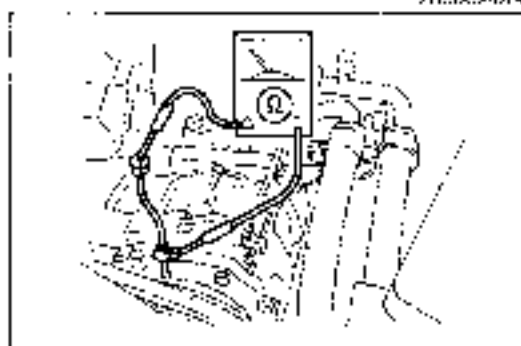
V_b: Battery voltage

Wire	Voltage	Action
(B/R)	V _b	Next, check wire (B/Y)
	0V	Repair wiring harness (A/C fuse—A/C relay—Thermost switch)
(B/Y)	V _b	Disconnect jumper wire and go to Step 6
	0V	Replace thermostat

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

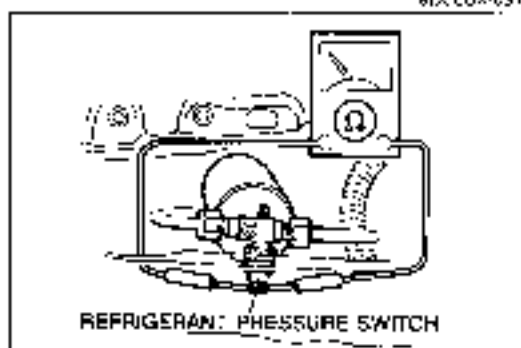
Note**Set the ohmmeter to the x1000 range.**

9PLCUX-031

Step 7

Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Repair wiring harness (Thermost switch—Refrigerant pressure switch—Magnetic clutch)
No	Reconnect connector and go to step 8

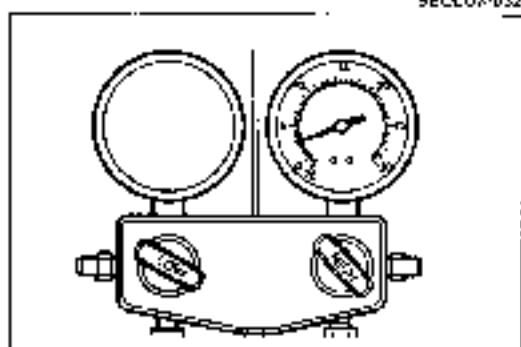


9RLCUX-032

Step 8

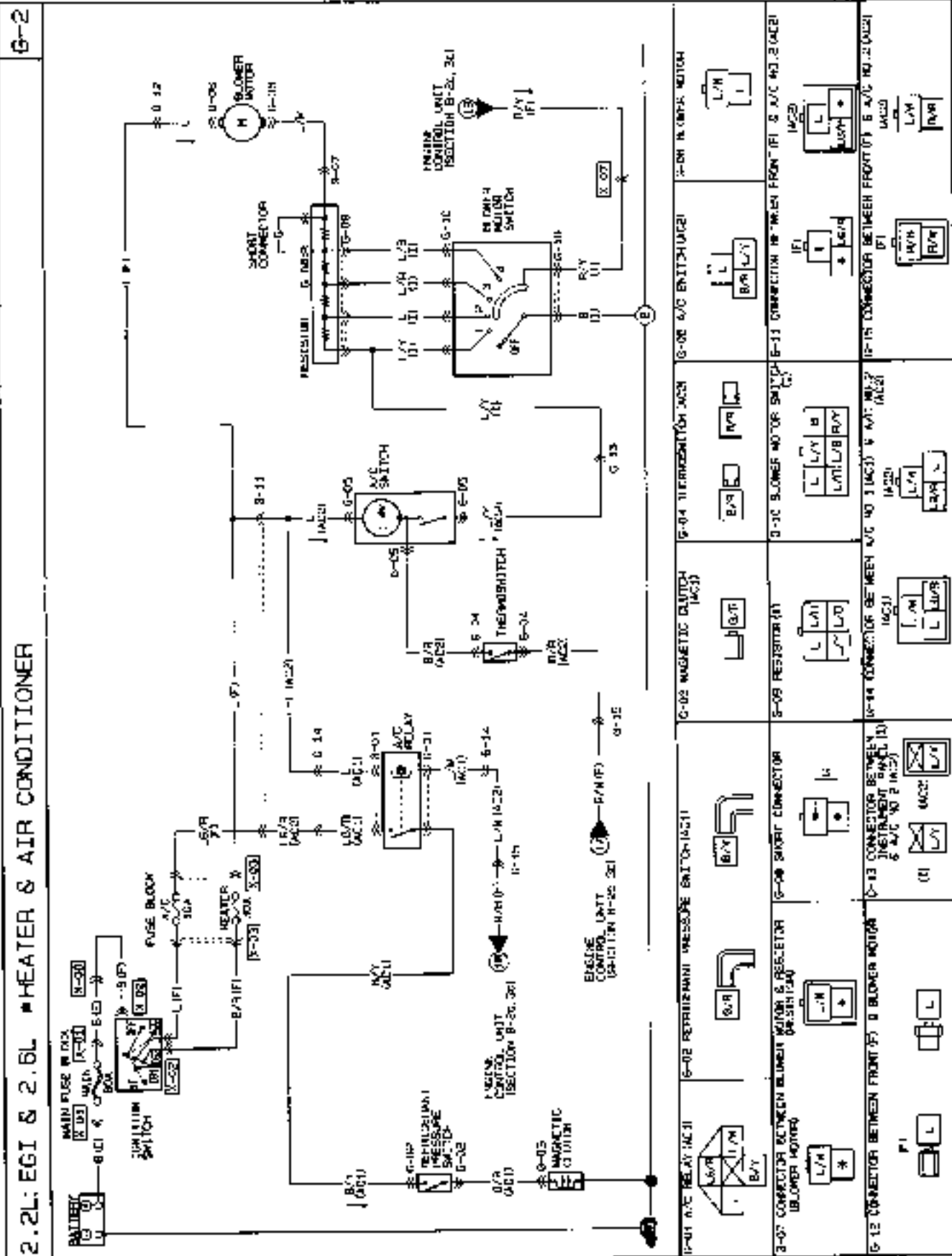
1. Connect the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

Pressure	Action
More than 2.8 kg/cm ²	Replace refrigerant pressure switch
Less than 2.8 kg/cm ²	Check the refrigerant system (Refer to page U-5.)

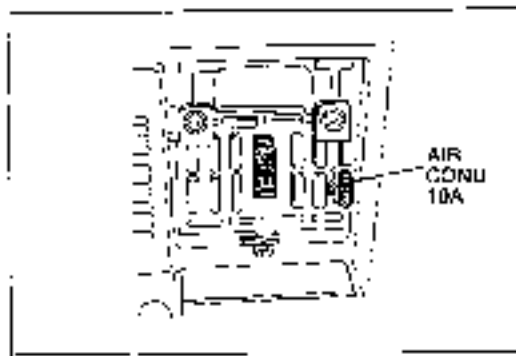


9BLJUX-059

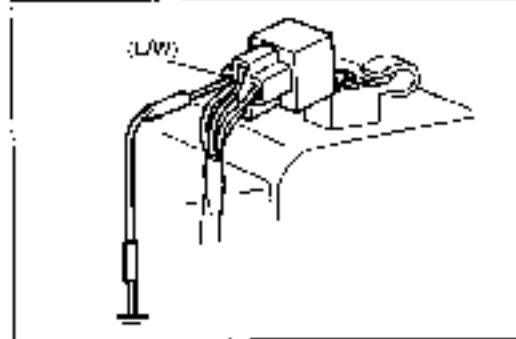
(B2600I and B2200 EGI)
Circuit diagram



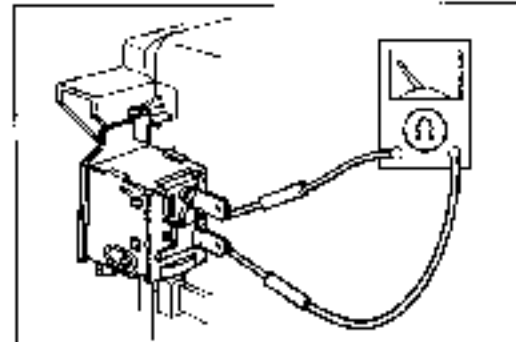
©1990 GM Corp.



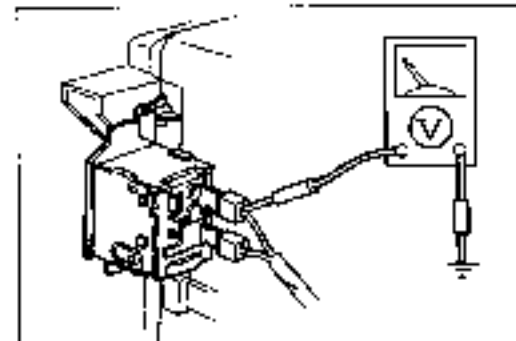
2ELCUX 026



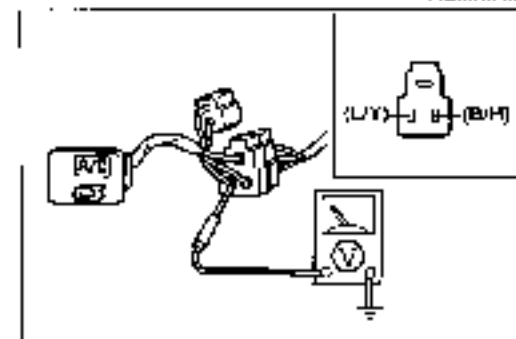
2ELCUX 035



2ELCUX 036



2ELCUX 037



2ELCUX 038

Step 1

- 1 Check the fuse.

Fuse	Ampere	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	Replace 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_B: Battery voltage

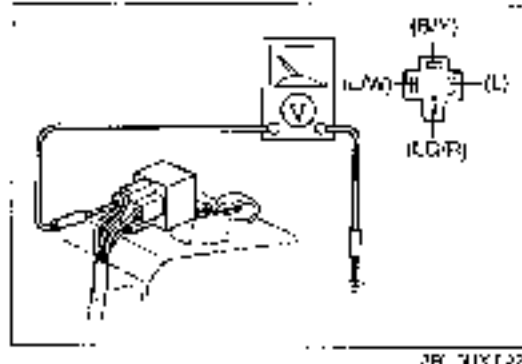
Wire	Voltage	Action
(B/R)	V _B	Go to Step 5
	0V	Engine control unit trouble (Refer to Section F2)

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_B: Battery voltage

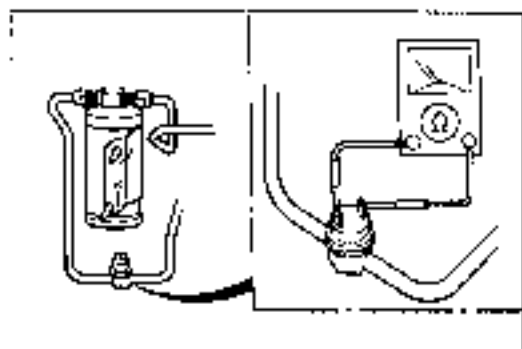
Wire	Voltage	Action
(B/R)	V _B	Next, check wire (L/Y)
	0V	Repair wiring harness (Thermostat—A/C switch)
(L/Y)	V _B	Repair wiring harness (A/C switch—Blower switch)
	0V	Replace A/C switch

**Step 6**

1. Run the engine at idle.
2. Turn the blower switch and A/C switch ON.
3. Measure the voltage of terminal-wires of the A/C relay connector.

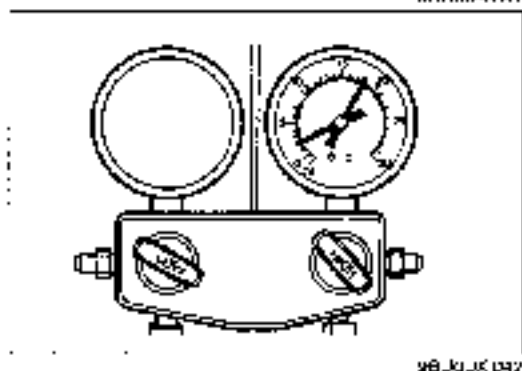
Vb: Battery voltage

Wire	Voltage	Action
(L/W)	Vb	Go to Step 3
(L)	0V	Next, check wire (L)
	Vb	Next, check wire (L/G/R)
	0V	Repair wiring harness (Circuit breaker - A/C relay)
(L/G/R)	Vb	Next, check wire (B/V)
	0V	Repair wiring harness (A/C fuse - A/C relay)
(B/V)	Vb	Go to Step 7
	0V	Replace A/C relay

**Step 7**

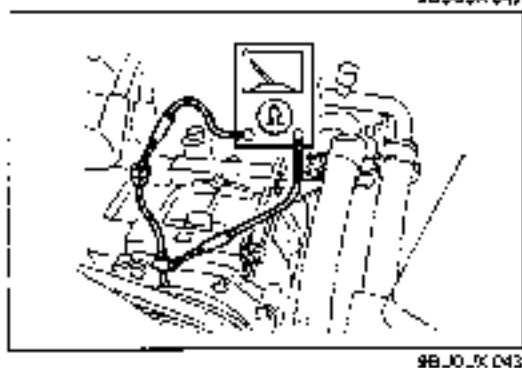
Check for continuity between terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Go to Step 9
No	Go to Step 8

**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 ² and less than 18 kg/cm ²	Replace refrigerant pressure switch
More than 1.5 kg/cm ² or less than 2.1 kg/cm ²	Check refrigerant system (Refer to page U-61)

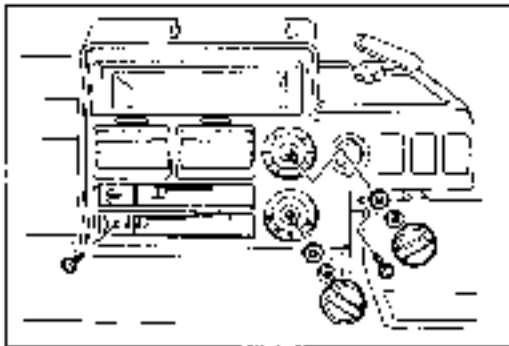
**Step 9**

1. Disconnect the magnetic clutch connector.
2. Check for continuity between the terminal-wire of the magnetic clutch and a ground.

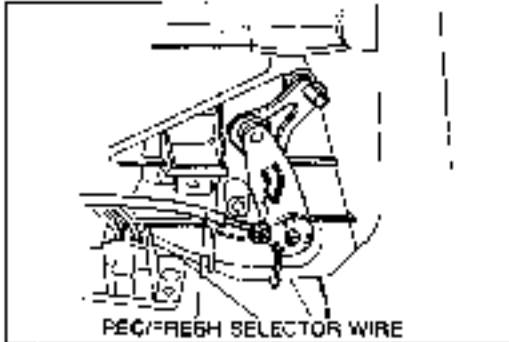
Continuity	Action
Yes	Repair wiring harness (A/C relay - Refrigerant pressure switch - Magnetic clutch)
No	Replace magnetic clutch

Note

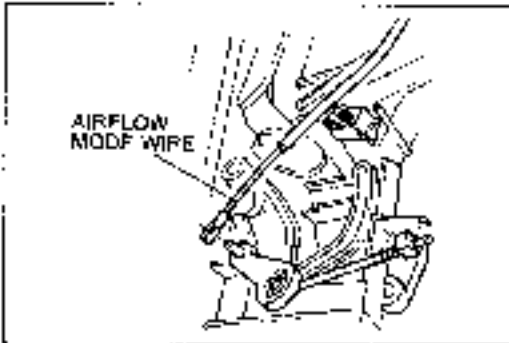
Set the ohmmeter to the x1000 range.



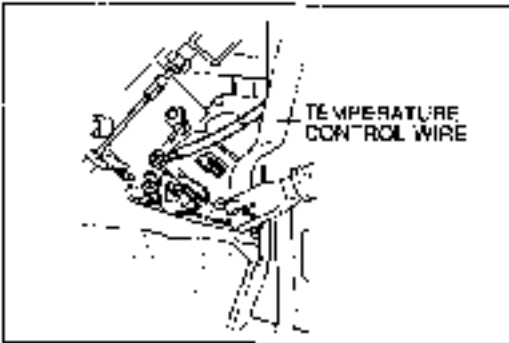
1BUDXX664



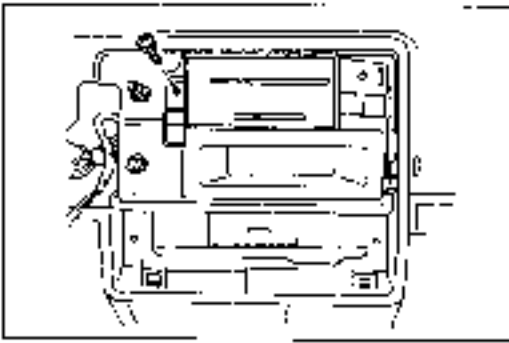
6BUDXX645



9FLGX444



9EUDXX647

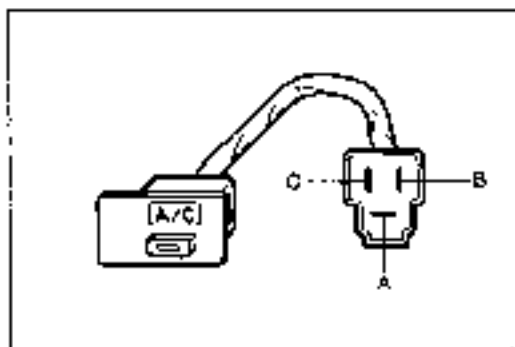


1EFLGX603

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.



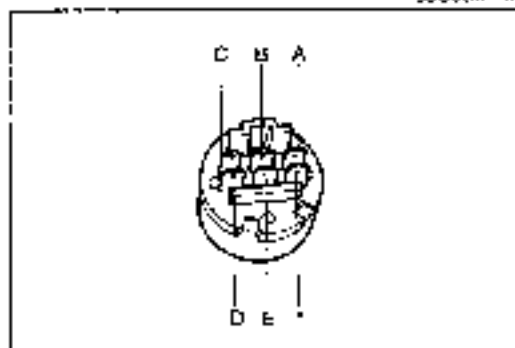
93J001X-144

INSPECTION**A/C Switch**

Check for continuity between terminals of the switch with an ohmmeter.

Switch position \ Terminal	A	B	C
A/C switch ON	○-----○	○-----○	○-----○
A/C switch OFF	○-----○	○-----○	

○-----○: Indicates continuity



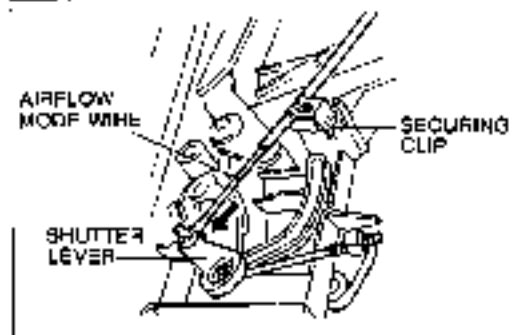
93J001X-050

Blower Switch

Check for continuity between terminals of the switch with an ohmmeter.

Switch position \ Terminal	A	B	C	D	E
1	○-----○	○-----○			
2	○-----○		○-----○		
3	○-----○			○-----○	
4	○-----○			○-----○	○-----○

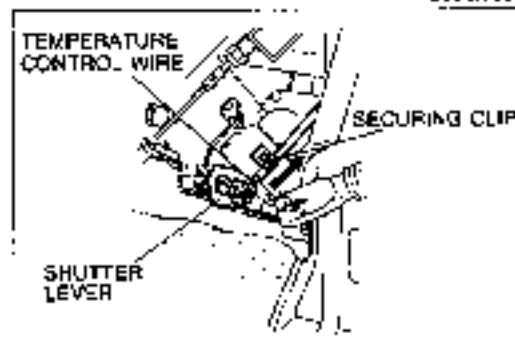
○-----○: Indicates continuity



93J001X-006

ADJUSTMENT**Airflow Mode Wire**

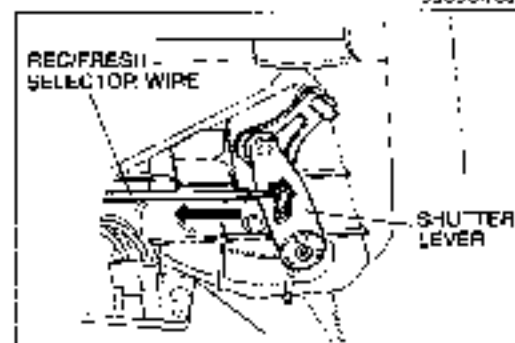
1. Set the airflow mode control lever to DEFROST ().
2. With the shutter lever on the heater unit pushed fully downward (direction of arrow), install the airflow mode wire.
3. Attach the securing clip.
4. Turn the blower switch to 4, and make sure no air leaks from the center and floor-area outlets.



93J001X-052

Temperature Control Wire

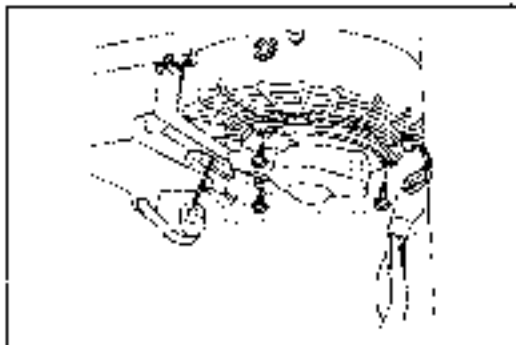
1. Set the temperature control lever to COLD.
2. With the shutter lever on the heater unit pushed fully upward (direction of arrow), install the temperature control wire.
3. Attach the securing clip.
4. Make sure the temperature control lever moves fully from COLD to HOT.



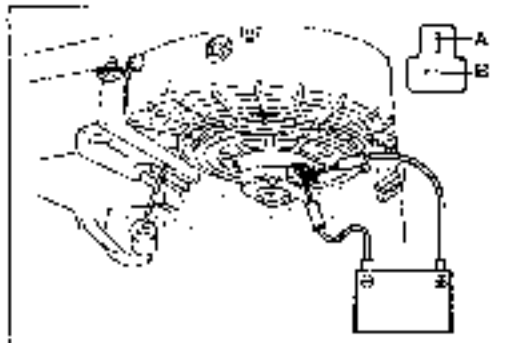
93J001X-007

REC/FRESH Selector Wire

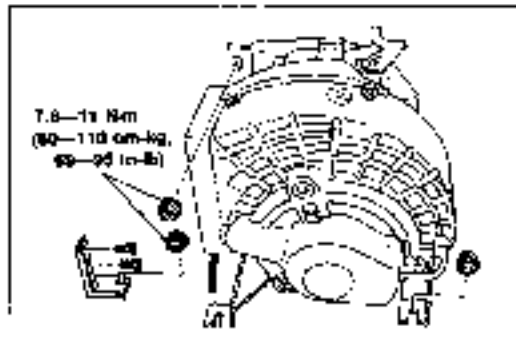
1. Set the REC/FRESH selector lever to RECIRC.
2. With the shutter lever on the blower unit pushed fully forward (direction of arrow), install the REC/FRESH selector wire.
3. Make sure the REC/FRESH selector lever moves fully from RECIRC to FRESH.



1BL3UX 008



2BU6UX 025



03J0UX 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

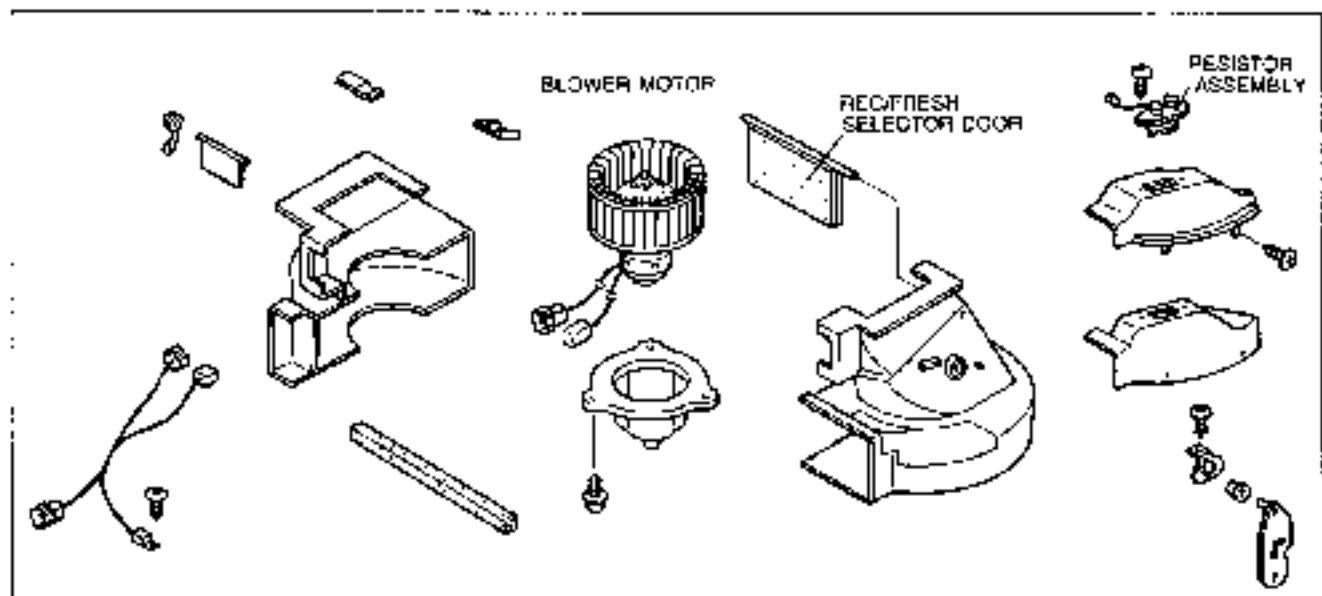
1. Remove the blower motor. (Refer to above.)
2. Remove the seal plate and nuts.
3. Remove the blower unit.

Installation

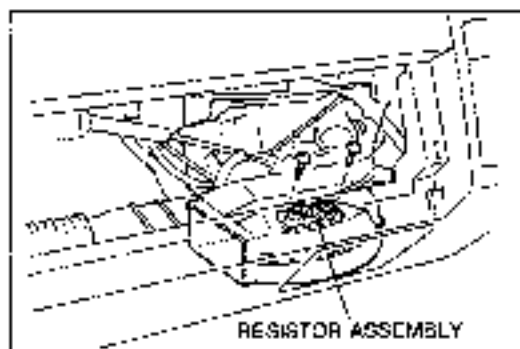
Install in the reverse order of removal.

Disassembly and Assembly

Disassemble and assemble as shown.



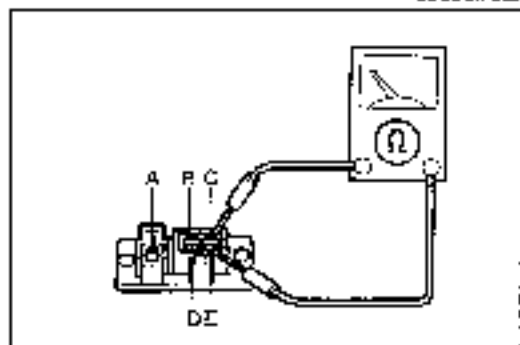
3BU6UX 057



9ELCUX-055

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.



9BLCLUX-056

Inspection

Check for continuity between terminals of the resistor assembly.

Terminal	A	B	C	D	E
Continuity	○	○	○	○	○

○—○ Indicates continuity

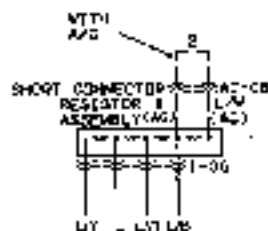
Note

Set the ohmmeter to the x1000 range.

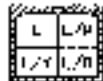
If not as specified, replace the resistor assembly

Installation

Install in the reverse order of removal.



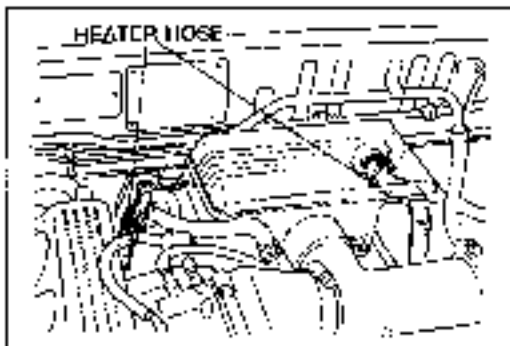
I-06 RESISTOR ASSEMBLY (1)



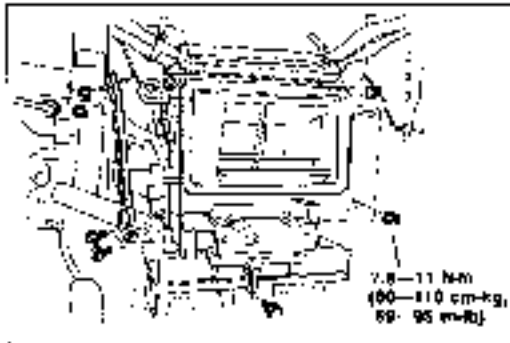
AC-GB SHORT CONNECTOR WITH A/C



9BLCLUX-057



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.

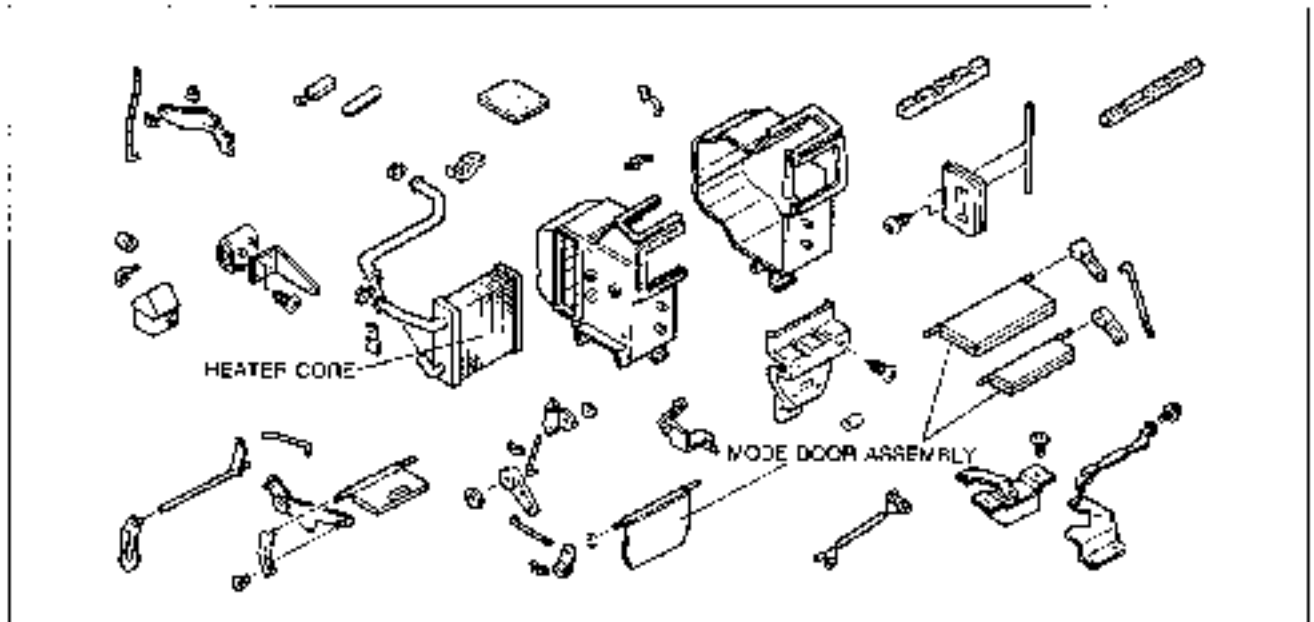
3. Remove the instrument panel. (Refer to page S-23.)
4. Remove the nuts and bolts; then remove the heater unit.

Installation

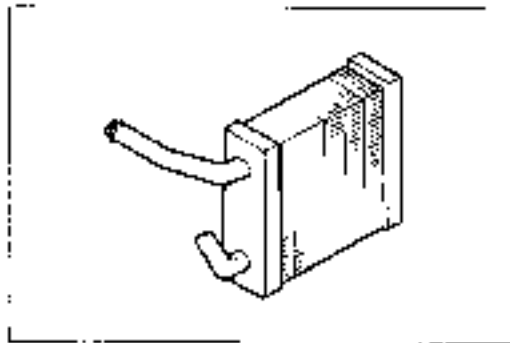
Install in the reverse order of removal.

Disassembly and Assembly

Disassemble and assemble as shown.



0B10UX-060



0B10UX-059

HEATER CORE Inspection

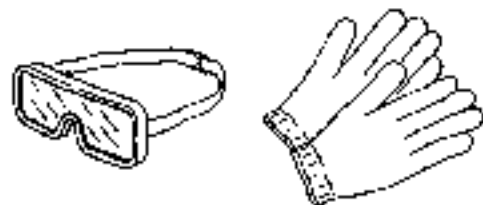
Check for the following and repair or replace parts as necessary:

1. Cracks, damage, or water leakage.
2. Bent fins.
3. Distorted or bent inlet or outlet.

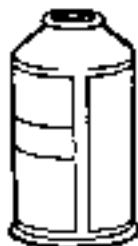
REFRIGERANT SYSTEM

SAFETY PRECAUTION

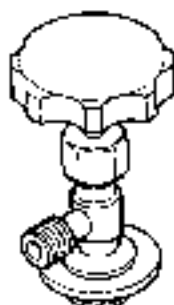
1. R-12 liquid refrigerant is highly volatile. A drop of it on the skin could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. If the refrigerant splashes into the eyes, wash them with clear water immediately. Always wear goggles or glasses to protect the eyes.
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.



3BL00X-055



3BL00X-024



3BL00X-024



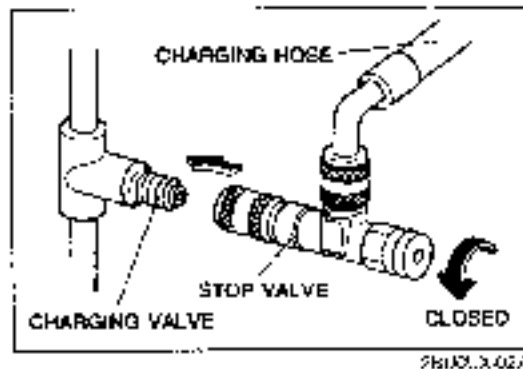
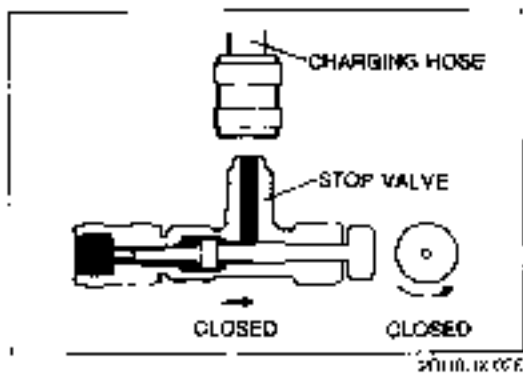
3BL00X-024



3BL00X-024

REFRIGERANT CONTAINER SERVICE VALVE

1. Turn the handle fully counterclockwise before connecting the valve to the refrigerant container.
2. Turn the outlet valve counterclockwise until it reaches its highest position.
3. Turn the outlet valve fully clockwise by hand. Connect the center hose to the valve fitting.
4. Turn the handle clockwise to puncture the sealed can.
5. Turn the handle fully counterclockwise to fill the center hose. Do not open the high- or low-pressure manual valves.
6. Loosen the hose nut connected to the center fitting of the manifold gauge. Allow air to escape, then retighten the nut.



REFRIGERANT SYSTEM OPERATION PROCEDURE Manifold gauge set/stop valve installation

Caution

- Connect all charging hoses via stop valves to avoid venting the refrigerant remaining in the hoses into the atmosphere.
- Do not disconnect the stop valve from the charging hose when there is refrigerant remaining in the hose.

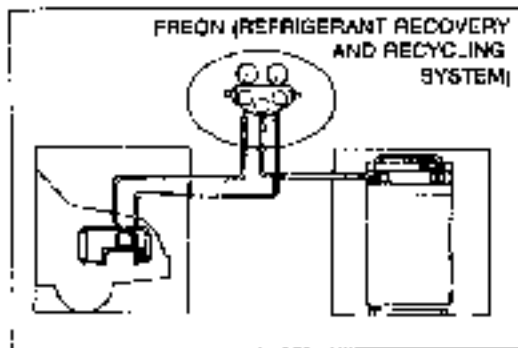
- Turn the knob counterclockwise to close the stop valve.
- Install the stop valve to the end of the charging hose of the manifold gauge set.

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.

- Connect high- and low-pressure side charging hoses and stop valves to the refrigerant system service valves.

28J0UX-F48

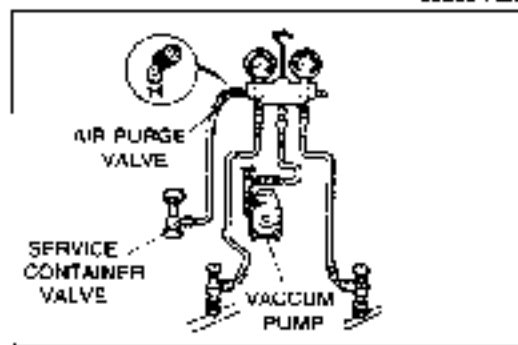


Refrigerant recovery operation

Remove the refrigerant from the refrigerant system by using a freon (refrigerant) recovery and recycling system.

Caution

- Never vent the refrigerant into the atmosphere.
- When using a freon recovery and recycling system, follow the operation instructions provided by the equipment manufacturer.



Evacuation/airtightness test

- Connect the manifold gauge set and stop valves to the refrigerant system service valves.
- Connect the center hose of the manifold gauge set to the vacuum pump inlet.
- Prepare as follows according to the charging method.

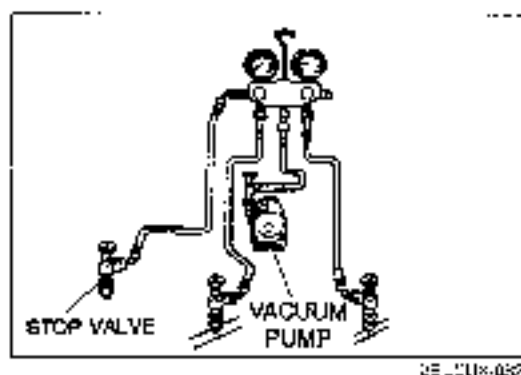
Charging from service container

Connect the charging hose and service container valve to the manifold gauge set air purge valve.

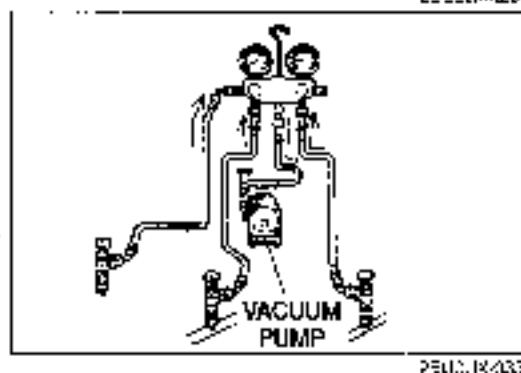
Caution

- 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.

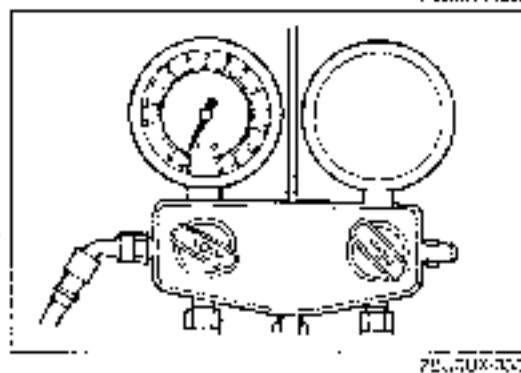
25.421X-031



25.421X-032



25.421X-033



25.421X-034

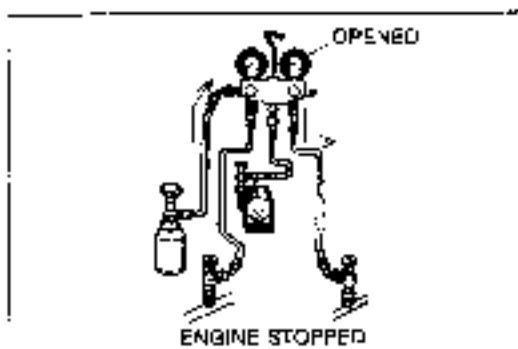
Charging from freon recovery and recycling system

Connect the charging hose and stop valve to the manifold gauge set air purge valve.

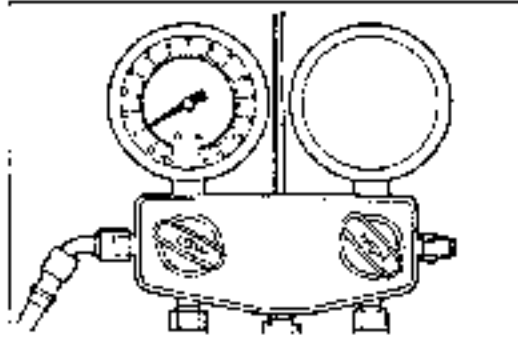
Caution

- a) Connect the charging hose to the air purge valve via its tap pin side.
- b) Do not disconnect the charging hose or stop valve until the charging operation is completed.
- c) Do not open the stop valve when 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.



28J9JL07.004



28J9JL07.005

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).

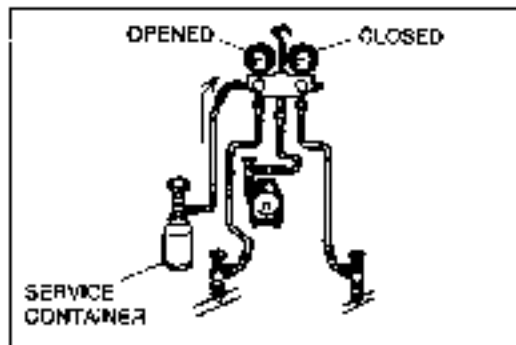
3. Open the high-pressure side valve of the manifold gauge set. Charge the system until the low-pressure side gauge indicates 98.1 kPa (1 kg/cm², 14.22 psi).
4. Close the high-pressure side valve.
5. Check for leaks at the system piping joints by using a gas leak tester.

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 an well-ventilated but still air area because it is affected by moving air.

28J9JL07.006



28J9JL07.007



28J9JL07.008

Initial charging from service container

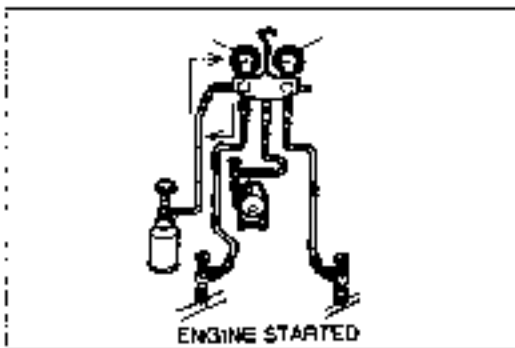
1. Carry out the system evacuation, airtightness test and leak test.
2. Start the engine and actuate the A/C compressor.

Caution

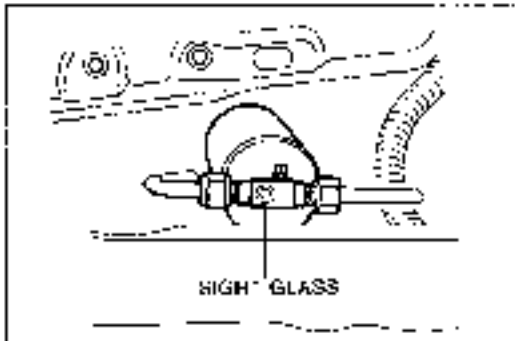
- a) Do not turn the service container upside down while charging when the engine is running.
- b) Do not open the high-pressure side valve while the engine is running.

3. Open the low-pressure side valve of the manifold gauge set and charge the system to specification.

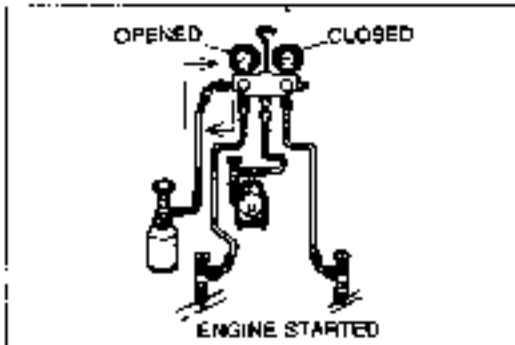
Specified total refrigerant amount: 800 g (28.24 oz)



25LCLX-C39



25LCLX-C40



25JULX-C41

4. Close the low-pressure side valve.
5. Stop the engine.
6. Close the stop valves and the service container valve.

Caution

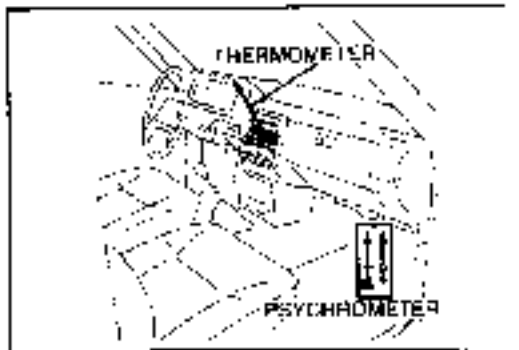
Do not disconnect the stop valves or the service container valve from the charging hoses when there is refrigerant remaining in the hoses.

Refilling

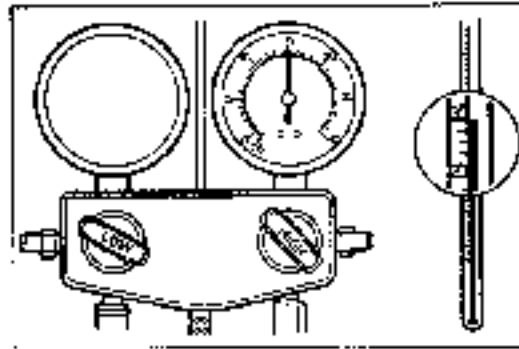
Caution

- 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.



9DUXXA-075



9DUJX-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:

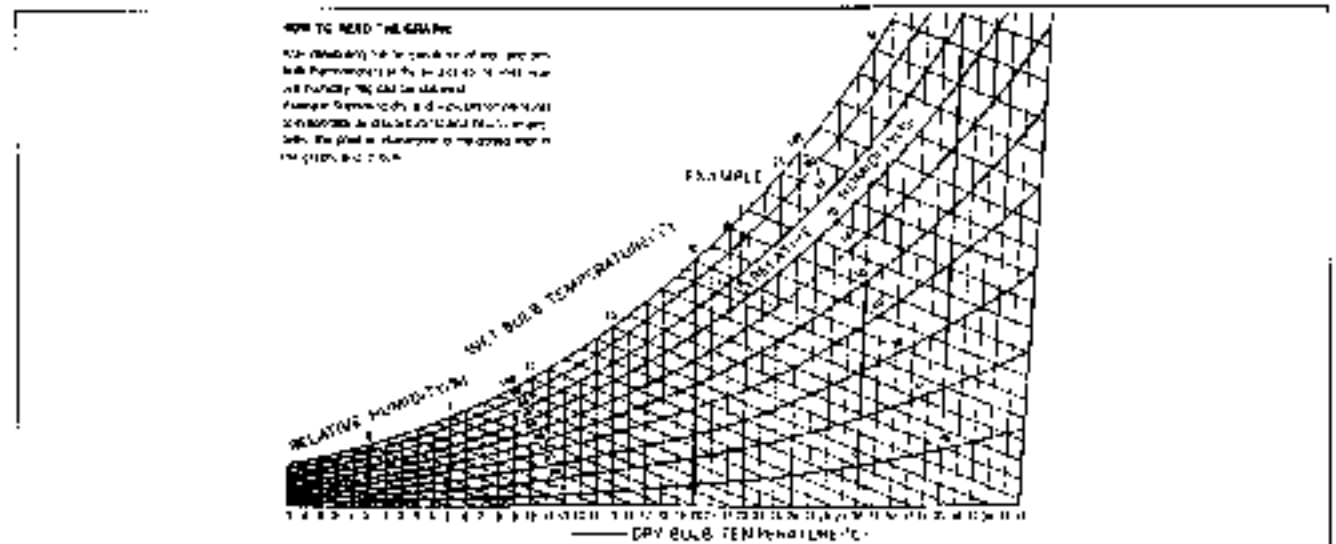
1,373—1,521 kPa (14.0—15.5 kg/cm², 199—220 psi)

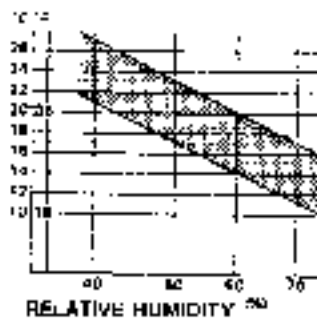
Note

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.

9DU16X-100



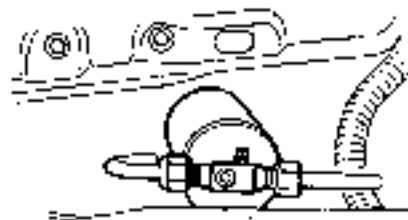
TEMPERATURE DIFFERENCE
BETWEEN INLET AND OUTLET

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.

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.

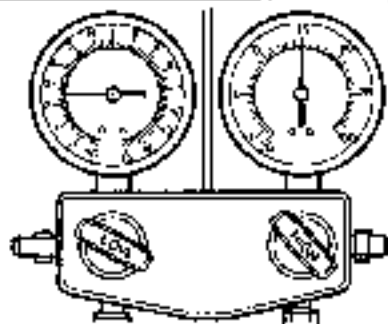


SIGHT GLASS

98UJEX-077

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

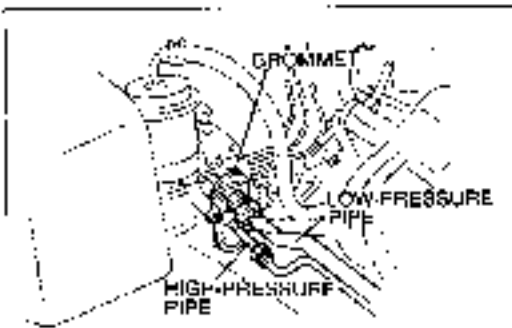


98UJEX-078

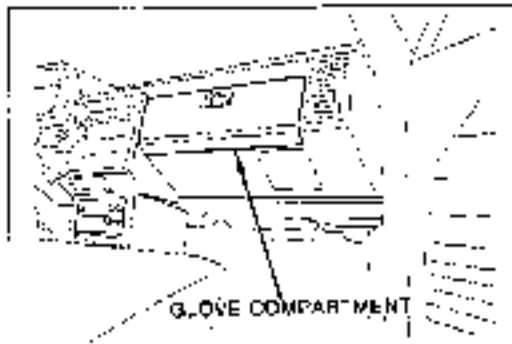
CHECKING REFRIGERANT PRESSURE

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

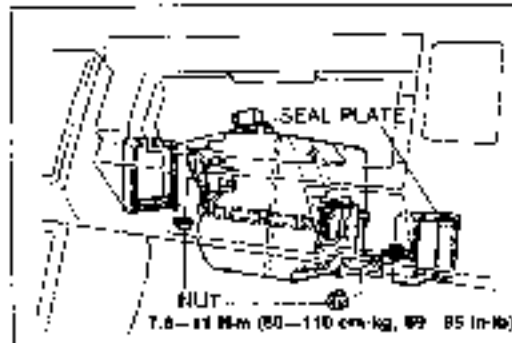
Specified pressure at 25°C (77°F)**Low pressure:**98—167 kPa (1.0—1.7 kg/cm², 14—24 psi)**High pressure:**1,030—1,275 kPa (10.5—13.0 kg/cm², 149—185 psi)



98L0UX-015



98L0UX-030



93L0UX-031

COOLING UNIT

Removal

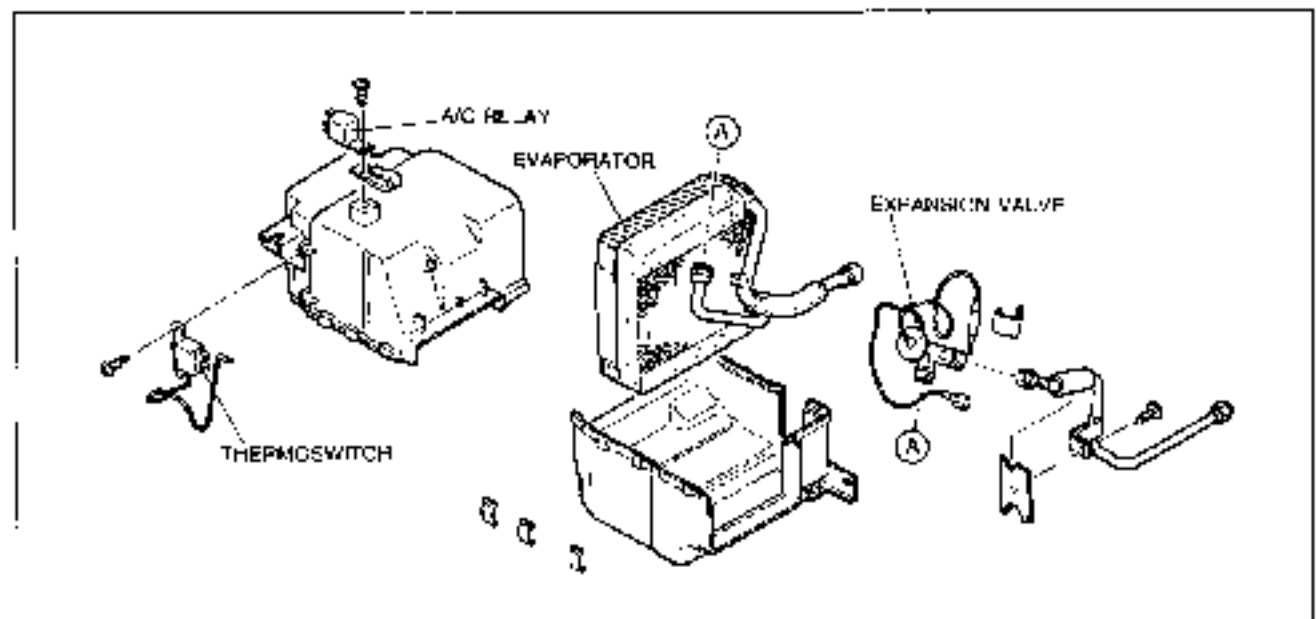
1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the refrigerant system. (Refer to page U-25.)
3. Disconnect the low-pressure pipe from the cooling unit outlet fitting.
4. Disconnect the high-pressure pipe from the cooling unit inlet fitting.
5. Remove the grommet.

6. Remove the glove compartment. (Refer to page G-23.)

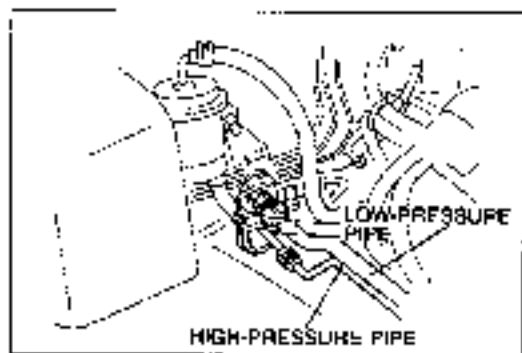
7. Disconnect the A/C wire harness.
8. Remove the seal plates.
9. Remove the nuts and disconnect the drain hose; then remove the cooling unit.

Disassembly and Assembly

Disassemble and assemble as shown.



98L0UX-032

**Installation**

Install in the reverse order of the removal, noting the following.

Note

- Adjust and position the cooling unit so that its connections match those of the heater unit and the blower unit.
- If the evaporator is replaced, add compressor oil to the compressor.

Compressor oil: 50 cc (3.05 cu in)

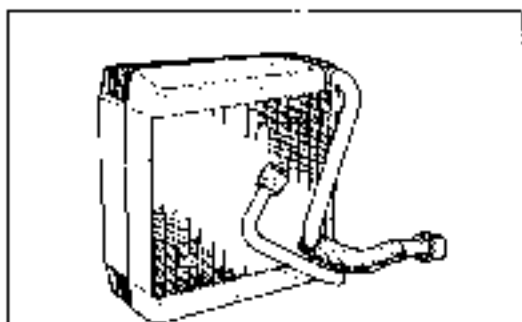
Tightening torque

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)

**EVAPORATOR****Inspection**

- Check the evaporator fins for blockage. If the fins are clogged, clean them by compressed air.
- Check the fittings for cracks or other damage.
- Replace the evaporator if necessary.

Caution

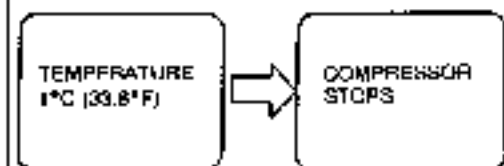
Never use water to clean the evaporator.

THERMOSWITCH**Inspection**

- Remove the glove compartment. (Refer to page S-23.)
- Run the engine at idle speed and set the air conditioning to maximum cooling.
- Block the air inlet of the blower unit with a thick piece of paper to hasten evaporator cooling.
- After a few minutes, check that the compressor stops.

Note

The compressor stops when the temperature at the evaporator becomes 1°C (33.8°F).

**Removal**

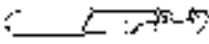
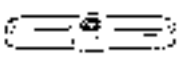
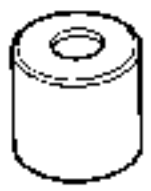
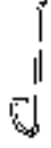
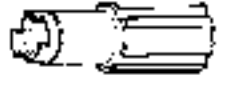
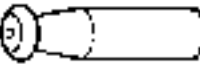
- Remove the cooling unit. (Refer to page U-31.)
- Disassemble the cooling unit and remove the thermoswitch. (Refer to page U-31.)

Installation

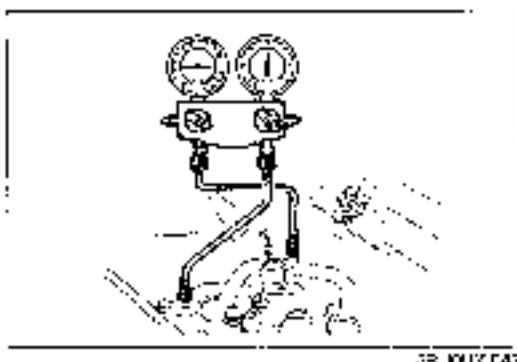
Install in the reverse order of removal.

90UJ00X-506

PREPARATION SST

0000-41-0809-01 Holder, clutch 	0000-41-0810-75 Remover & installer, seal seat 	0000-41-0804-57 Universal Pulver Body 
0000-41-0804-51 Universal Pulver Adapter 	0000-41-0810-76 Remover, ast. pulley & clutch 	0000-41-0810-77 Clutch Pilot 
0000-41-0808-32 Pulver, clutch plate 	0000-41-0804-43 Installer, clutch rotor bearing 	0000-41-0810-59 Clutch Rotor Driver 
0000-41-0808-10 Shaft Protector Pilot 	0000-41-0804-12 Remover, O ring 	0000-41-0812-11 Remover & installer, seal 
0000-41-0812-13 Protector, seal sleeve 		

300,861



2B-J01X-D43

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.

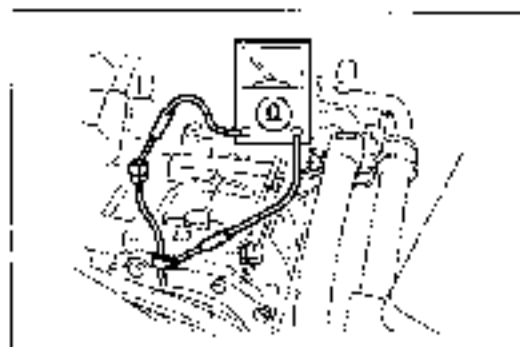


FIGURE 2

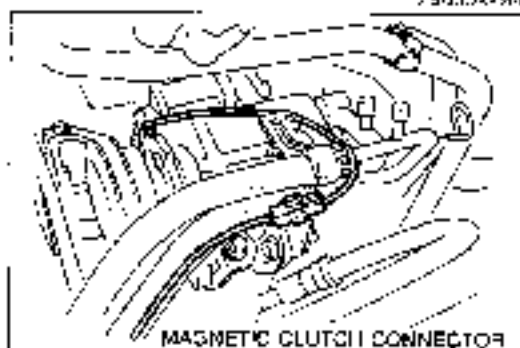


FIGURE 3

B2200



B2800i

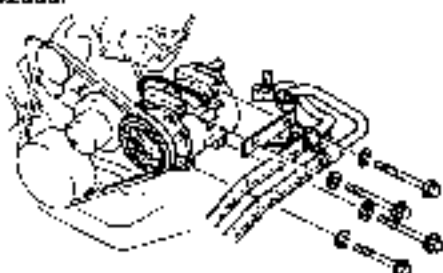


FIGURE 4

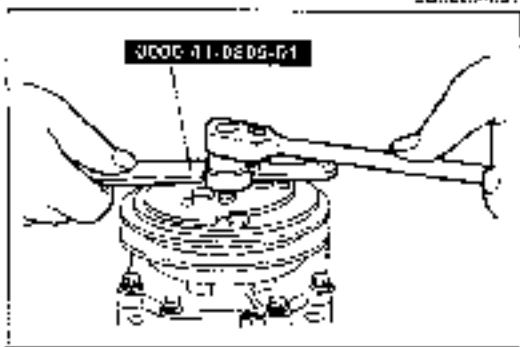


FIGURE 5

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 Ω at 20°C (68°F)

If any of the above is not satisfactory, replace the magnetic clutch.

Removal

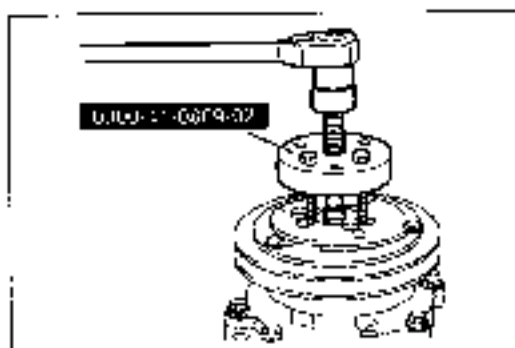
1. Disconnect the negative battery cable.
2. Disconnect the magnetic clutch connector.

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.

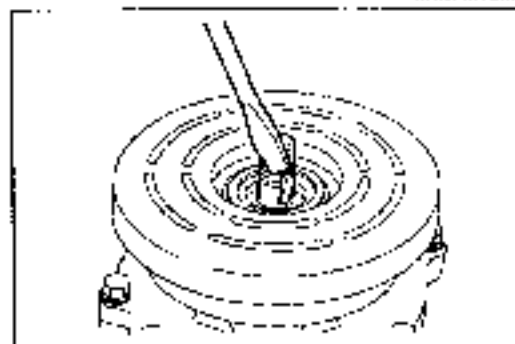
Disassembly and Assembly

Magnetic Clutch removal

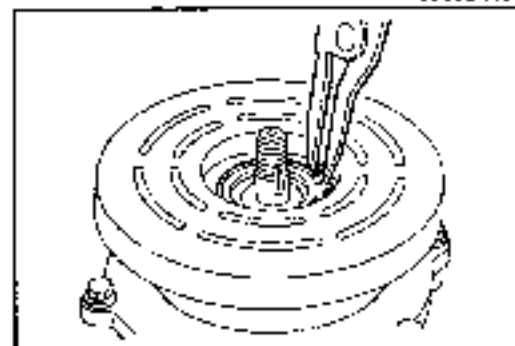
1. Insert the two pins of the **SST** into any two threaded holes of the clutch front plate. Hold the clutch plate stationary, and remove the nut.



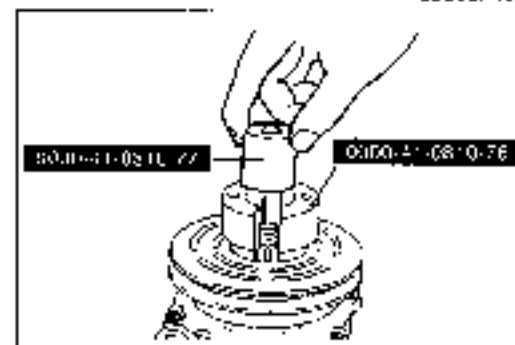
98UJ01-00063



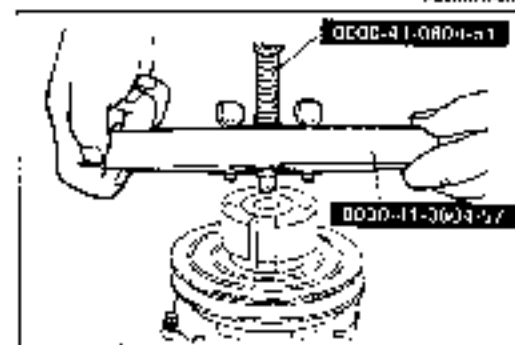
0000-11-0019-02



0000-11-0019-02



0100-11-0019-02



0100-11-0019-02

2. Remove the clutch front plate with the **SST**. Align the puller center bolt to compressor shaft. Hand tighten the three puller bolts into the threaded holes. Turn the center bolt clockwise until the front plate is loosened.

3. Remove the shaft key by lightly tapping it loose with a screwdriver and hammer.

Note

Steps 1 thru 3 must be performed before servicing either the shaft seal or clutch assembly.

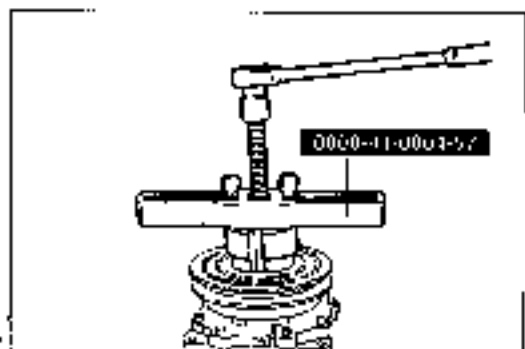
4. Remove the external front housing snap ring with snap-ring pliers.

Note

Some compressors may have two snap rings in front, one on front housing and the other securing the clutch bearing. Remove both snap rings.

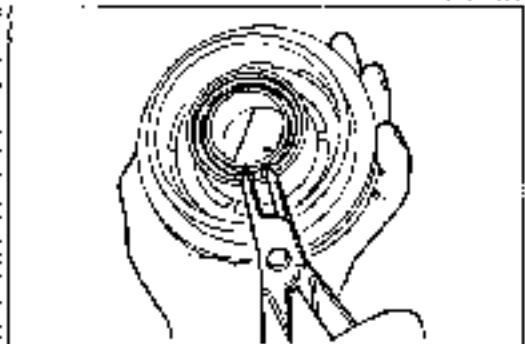
5. Remove the rotor pulley assembly.
 - (1) Insert the tip of the **SST** pulser jaws into the snap ring groove.
 - (2) Place the **SST** over the shaft.

- (3) Place the **SST** handle onto the puller jaws.
- (4) Finger tighten the securing bolts into the puller jaws.



SRIJNIX-350

- (5) Hold the **SST** handle stationary and turn the puller center bolt clockwise until the rotor pulley is free.



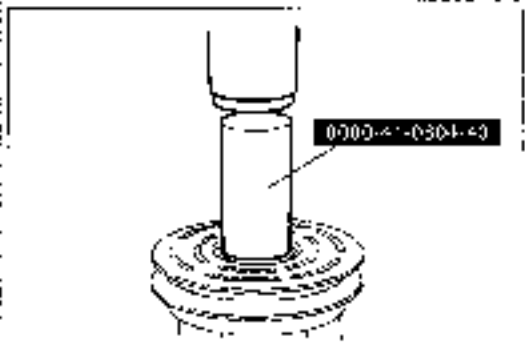
RSLCLX-045

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.



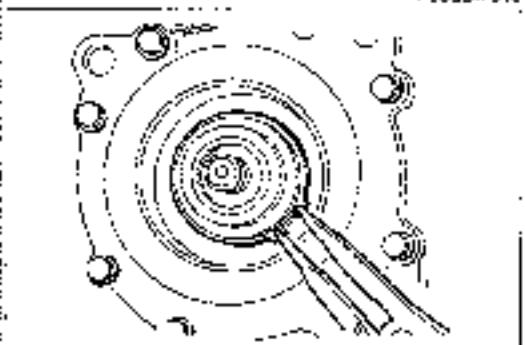
74U3JX-046

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.



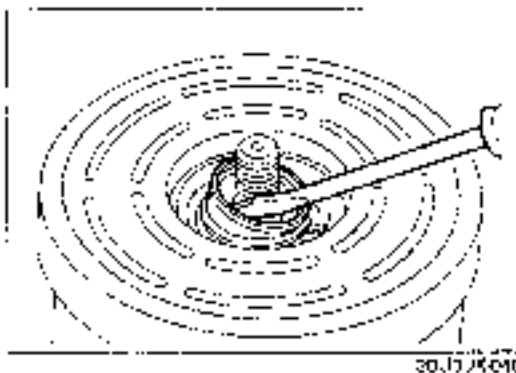
28...J14047

Field Coil Removal

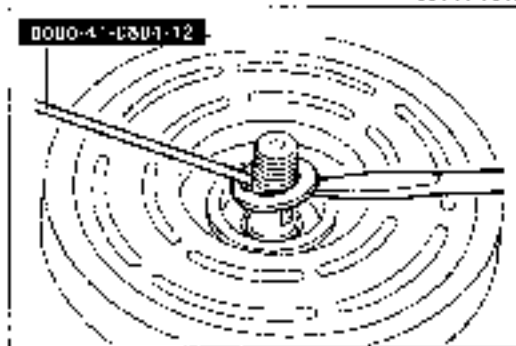
1. Remove the magnetic clutch. (Refer to page U-34.)
2. Remove the field coil.
 - (1) Remove the coil lead wire from the clip atop the compressor front housing.
 - (2) Remove the snap-ring and field coil using snap-ring pliers.
3. Install the new field coil in the reverse order of removal.

Note

The coil flange protrusion must match the hole in the front housing to prevent coil movement and to correctly locate the lead wire.

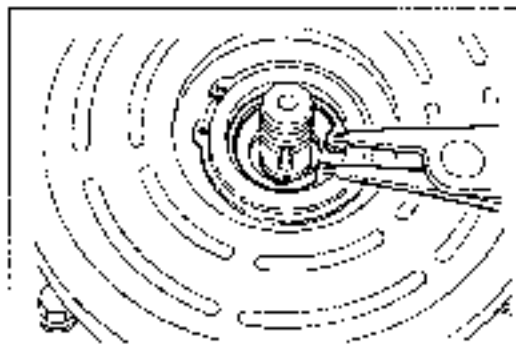


30.17.04.016

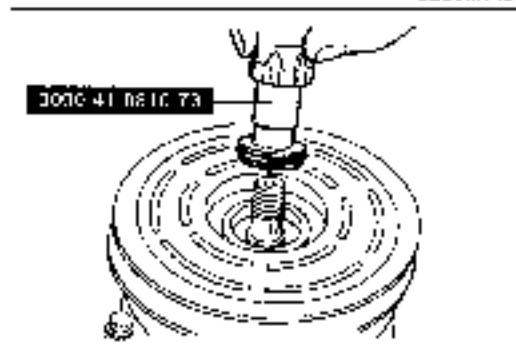


0000-41-0301-12

27.01.01.1.01

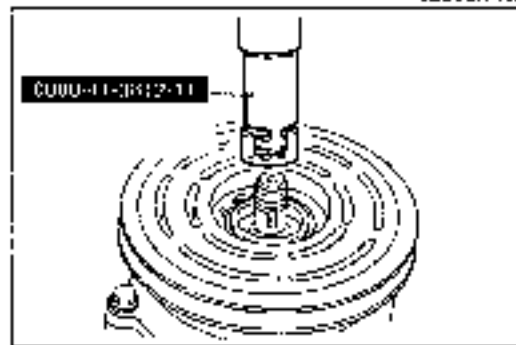


13.05.01.014



0000-41-0310-73

30.03.01.003



0000-41-0312-11

30.03.01.003

Shaft seal

1. Follow Steps 1 thru 3 of the magnetic clutch disassembly. (Refer to pages U-34 and U-35.)

Note

Shaft seal replacement should be done on the bench. Never use any old parts of the shaft seal assembly. Replace the complete seal assembly.

2. Pry out the felt ring with a screwdriver, being careful not to damage the shaft housing.

3. Remove the clutch shims. Use the **SST** and a small screwdriver as shown to prevent the shim from binding on shaft.

4. Remove the shaft seal seat retaining snap ring with snap-ring pliers

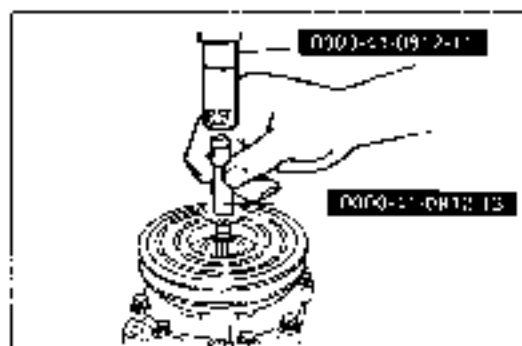
5. Remove the shaft seal seat with the **SST**

6. Insert the **SST** against the seal assembly. Press down against the seal spring and twist the tool until feeling it engage in the slots of the seal cage. Lift out the seal assembly.

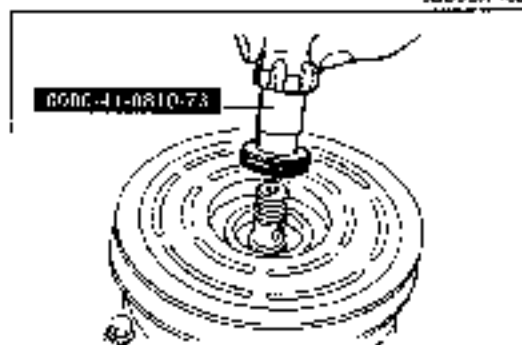
Shaft Seal Replacement

1. Clean the seal cavity thoroughly.
 - (1) Clean thoroughly with a "lint-free" or synthetic cloth and clean refrigerant oil. Then blow out with dry compressed air.
 - (2) Make sure all foreign substances are thoroughly removed.

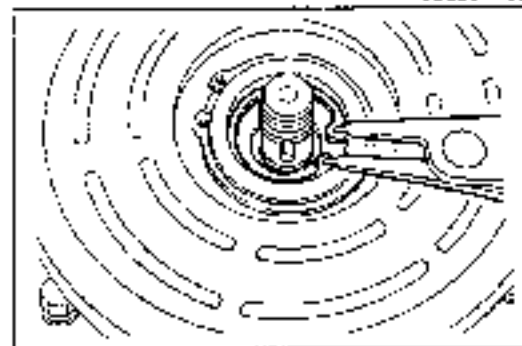
2FLCUX-049



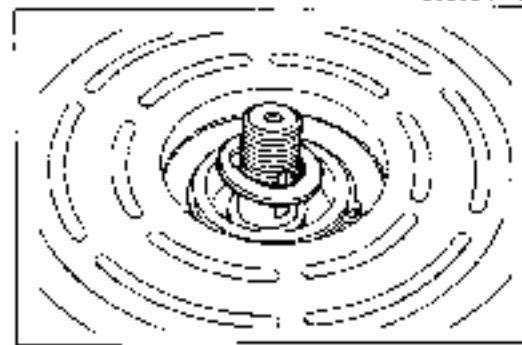
9BLJUX-100



9BLJUX-100



9BLJUX-110



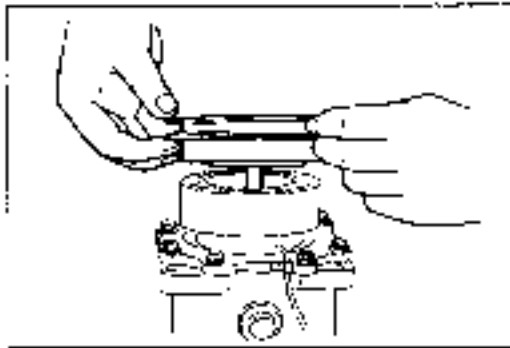
9BLJUX-050

2. Insert the **SST** over the compressor shaft.
3. Do not touch the new seal lip surfaces. Dip the mating surfaces in clean refrigerant oil before proceeding.
4. Engage the slots of the **SST** to the new seal cage, then insert the seal assembly firmly into place in the compressor seal cavity. Twist the tool in the opposite direction to disengage it from the seal cage. Remove the **SST**.

5. Place the new seal seat onto the **SST**. Coat the seat and O ring with clean refrigerant oil and install them into the cavity. Press the seal tightly against the seat; 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.

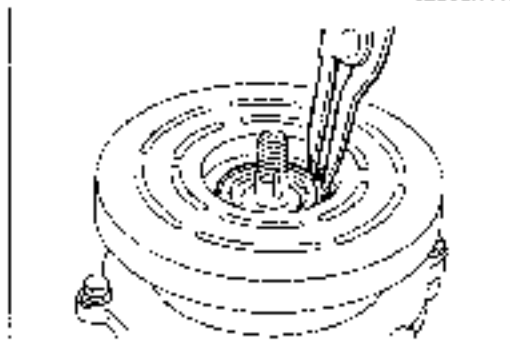
7. Install the clutch spacer shims that were removed.
8. Tap a new felt ring into place.
9. Install the clutch front plate as outlined in the magnetic clutch assembly. (Refer to page U-39.)



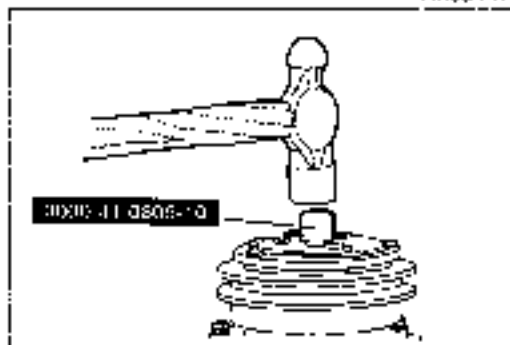
1BUCJX 017



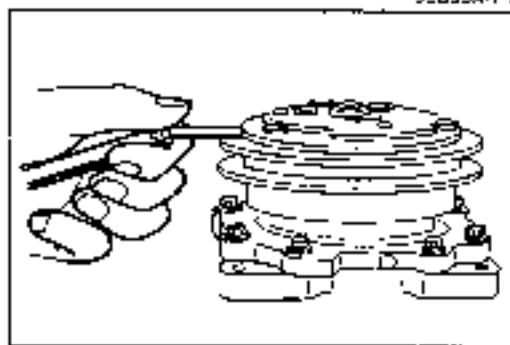
9BUCJX 113



4BUCJX 114



9BUCJX 115



9BUCJX 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:

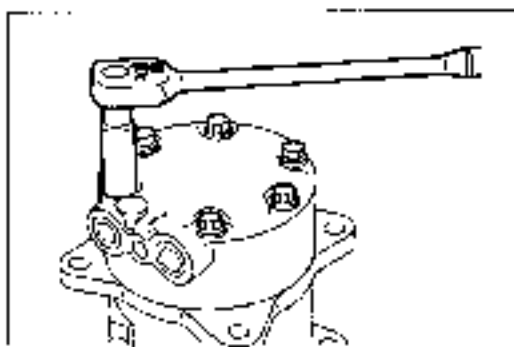
34—44 N·m (3.6—4.6 m·kg, 25—33 ft·lb)

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

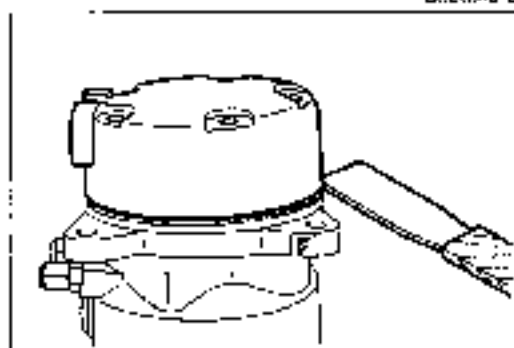
The air gap is determined by the spacer shims. When installing a new clutch assembly, try the original shims first. When installing a new clutch onto a compressor that previously did not have a clutch, use the .040, .020, and .005 shims from the clutch accessory kit. If the air gap does not meet the specification in Step 6, add or subtract shims by repeating Steps 4 and 5.



BUJ01X-0 8

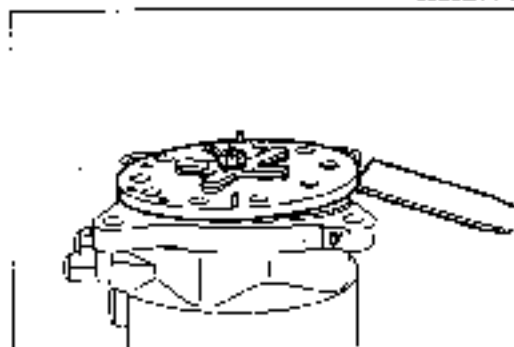
Disassembly**Cylinder head and valve plate**

1. Remove the cylinder head bolts.



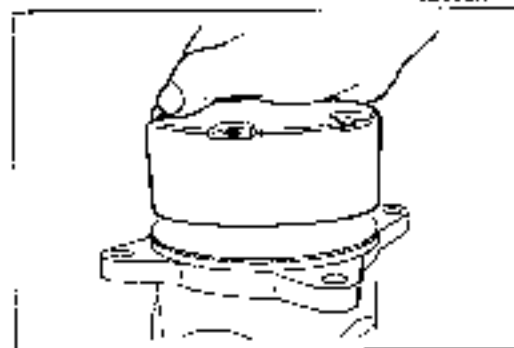
BUJ01X-1 8

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.



BUJ01X-2 8

3. Position the gasket scraper between the outside edge of the valve plate and the cylinder block and lightly tap the valve plate loose. Inspect the reed valves and discharge retainer. Discard assembly if any portion is damaged.



BUJ01X-013

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

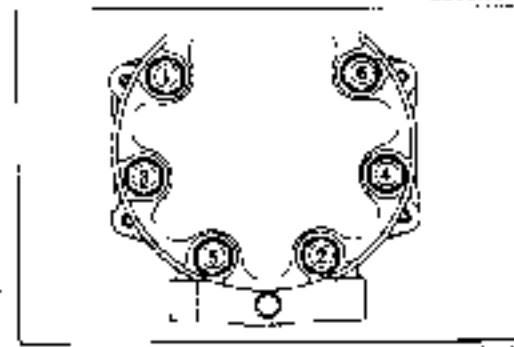
1. Inspect the valve plate for damage and remove all old gasket material.

(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.



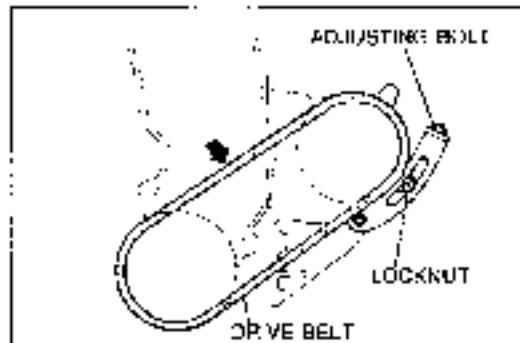
BUJ01X-121

Tightening torque:

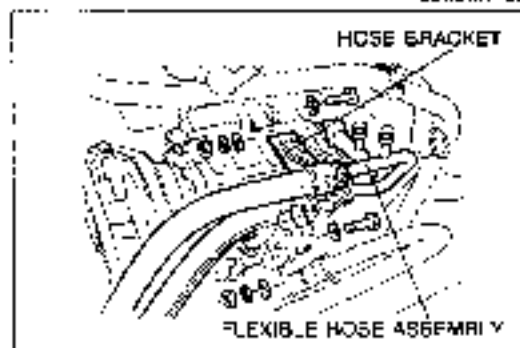
29—39 N·m (3.0—4.0 m·kg, 22—29 ft·lb)



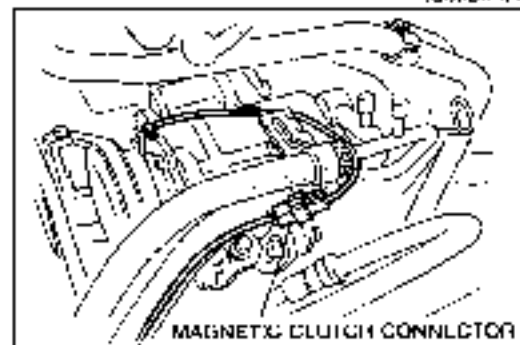
SEUCUR-122



SEUCUR-123



SEUCUR-124



SEUCUR-125

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 N·m (4.0—5.5 m·kg, 29—40 ft·lb)

6. Install the hose bracket.

7. Connect the flexible hose assembly to the compressor.

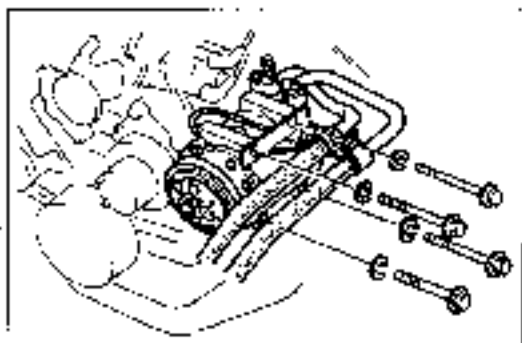
Tightening torque:

39—44 N·m (4.0—4.5 m·kg, 29—33 ft·lb)

8. Connect the magnetic clutch connector.

9. Connect the negative battery cable.

10. Evacuate, charge, and test the system
(Refer to page U-25.)



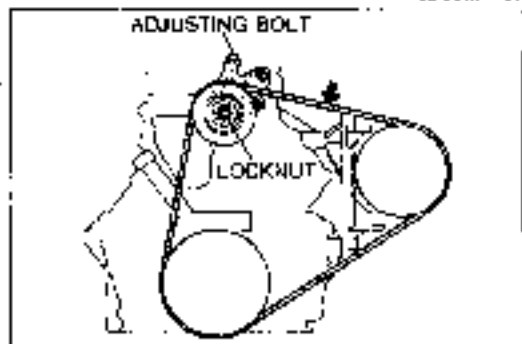
6B00017-136

Installation (B2600I)

1. Install the compressor and tighten the bolts.

Tightening torque:

20—29 N·m (2.0—3.0 m·kg, 14—22 ft·lb)



3B000127

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

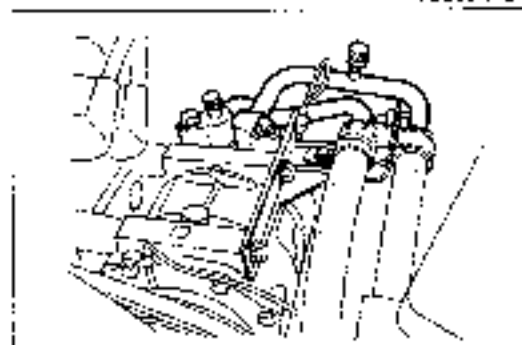
New belt : 559—638 N (57—65 kg, 125.4—143.0 lb)

Used belt: 471—549 N (48—56 kg, 105.6—123.2 lb)

Note

Belt tension can be measured among any pulleys.

4. Connect the low- and high-pressure pipes to the compressor.



3B000138

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)



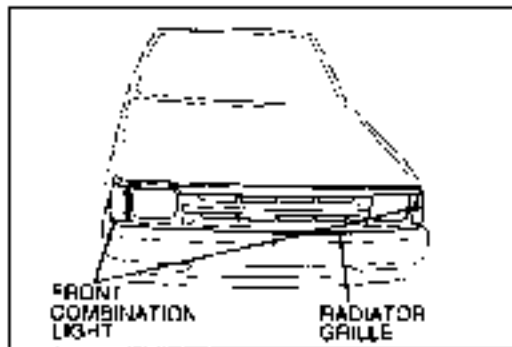
2F000454

5. Connect the magnetic clutch connector.

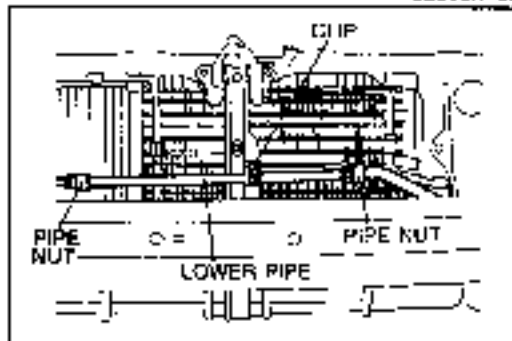
6. Connect the negative battery cable.

7. Evacuate, charge, and test the system.

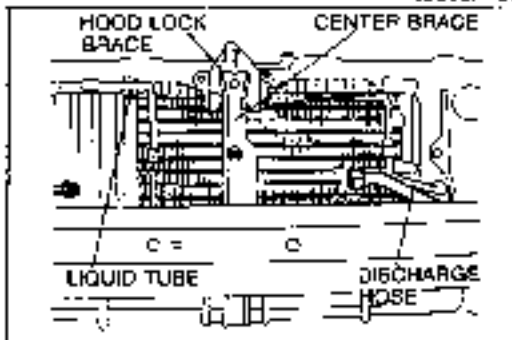
(Refer to page U-25.)



8BJULX-130



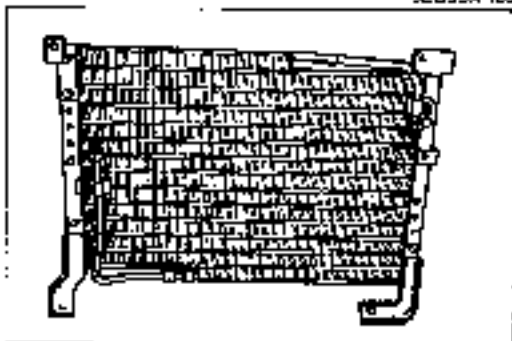
8BJULX-131



8BJULX-132



8BJULX-133



8BJULX-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.

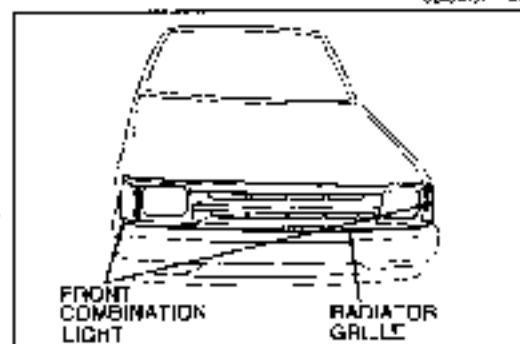
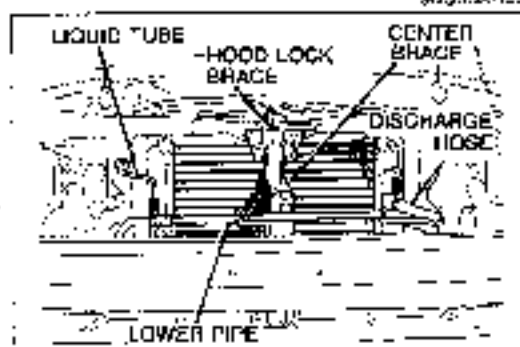
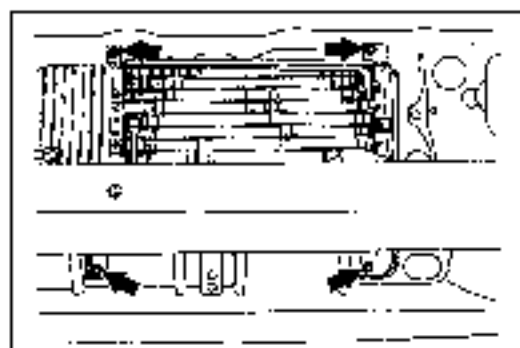
5. Remove the center brace and the hood lock brace.
6. Disconnect the discharge hose and the liquid tube.

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.



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.

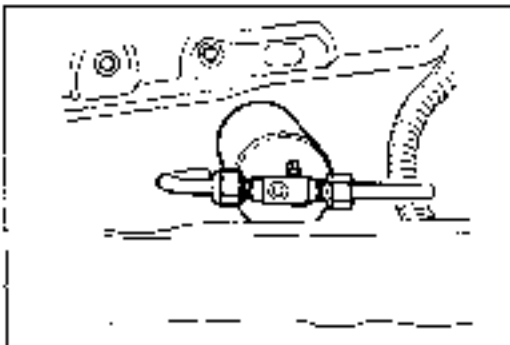
Installation note

Add compressor oil to the compressor if the condenser was replaced.

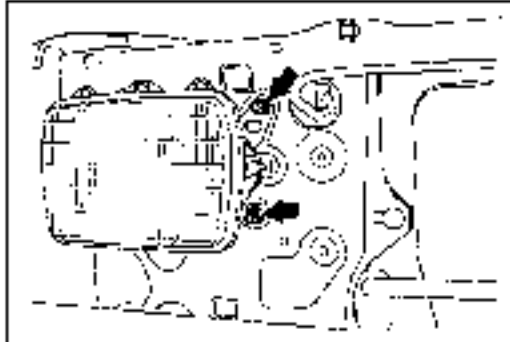
Add: 25—30 cc (1.5—1.8 cu in)

4. Install the radiator grille and the front combination lights.

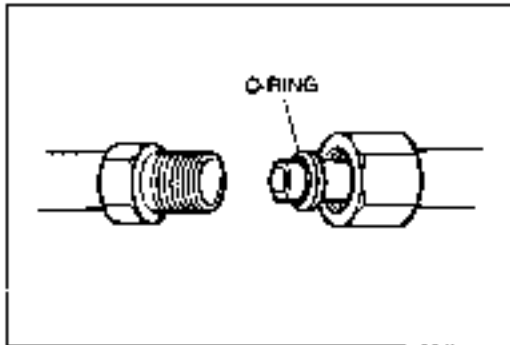
5. Evacuate, charge, and test the system.
(Refer to page U-25.)



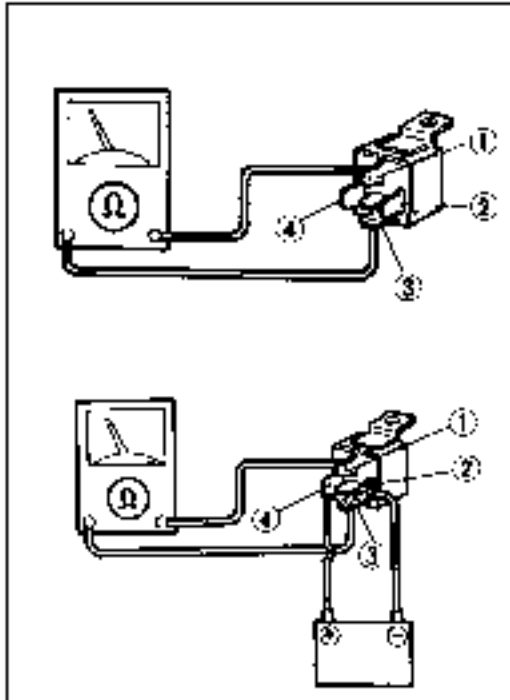
5BU00LX '98



5BU00LX '98



5BU00LX '98



5DU00LX '98

RECEIVER/DRIER**On-vehicle Inspection**

Check for leakage at the pipe fittings with a gas leak tester. If leakage is found, check and replace the receiver/drier or piping.

Removal

1. Discharge the refrigeration system. (Refer to page U-25.)
2. Remove the radiator grille. (Refer to page S-5.)
3. Remove the receiver/drier mounting nuts.
4. Disconnect the liquid hose and liquid pipe.

Note

Immediately plug the open fittings to keep moisture out of the system.

5. Remove the receiver/drier.

Installation

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

Installation note

- a) Apply new compressor oil to the O-rings before connecting the fittings.
- b) Do not apply compressor oil to the fittings.
- c) If the receiver/drier is replaced, add compressor oil.

Compressor oil: 15—20 cc (0.9—1.2 cu in)

Tightening torque

Liquid pipe and hose:

12—15 N·m (1.2—1.5 m·kg, 98—120 in·lb)

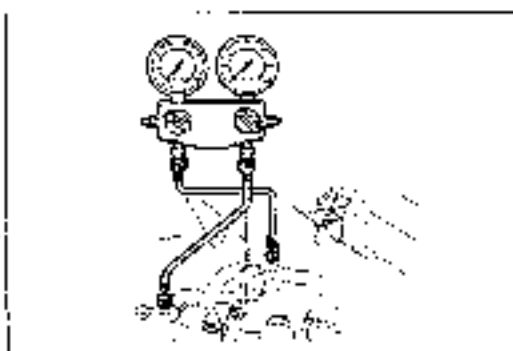
A/C RELAY**Inspection**

1. Disconnect the A/C relay from the cooling unit.
2. Check for continuity between terminals 1 and 3 of the relay with an ohmmeter.

Continuity	Action
No	Go to Step 3
Yes	Replace relay

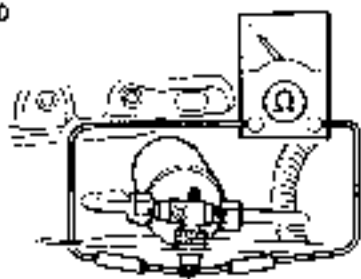
3. Apply +2V to terminal 4 and ground terminal 2. Check for continuity between terminals 3 and 4 with an ohmmeter.

Continuity	Action
Yes	Relay OK
No	Replace relay



S910UX-42

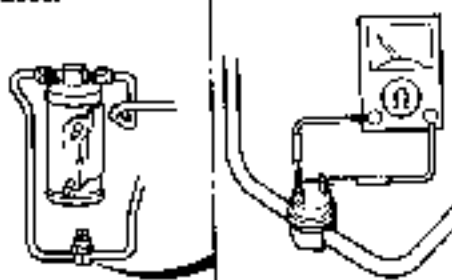
B2200



REFRIGERANT PRESSURE SWITCH

B94CUX-144

B2600i



29U0UX-145

REFRIGERANT PRESSURE SWITCH**Inspection**

1. Install the manifold gauge set. (Refer to page U-25.)
2. Measure the refrigerant pressure.

(B2200)

Pressure	Action
More than 2.8 kg/cm ²	Go to Step 3
Less than 2.8 kg/cm ²	Charge with refrigerant; then go to Step 3

(B2600i)

Pressure	Action
More than 18 kg/cm ²	Discharge refrigerant system; then go to Step 3
More than 2.1 kg/cm ² and less than 16 kg/cm ²	Go to Step 3
Less than 2.1 kg/cm ²	Charge with refrigerant; then go to Step 3

3. Check for continuity between the terminals of the refrigerant pressure switch.

Continuity	Action
Yes	Refrigerant pressure switch OK
No	Replace refrigerant pressure switch

TECHNICAL DATA

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(PS, IF CX-400)

A. MEASUREMENTS

Item			Short bed	Long bed	Cab plus
Overall length			4 510 (147.6) 4 640 (152.3)*	4 920 (160.1) 5 050 (165.8)*	
Overall width	mm (in)	4x2	1 670 (55.1)		
		4x4	1 705 (56.1)		
		4x2	1 555 (51.1)		
Overall height	mm (in)	4x4	1 690 (55.5)		
		4x2	2 760 (90.7)		
Wheelbase	mm (in)	4x4	2 985 (98.1)		
		4x2	3 000 (98.4)		
Tread	mm (in)	4x2	Front: 1 400 (45.8) Rear: 1 410 (46.0)		
		4x4	Front: 1 440 (47.2) Rear: 1 430 (46.8)		

* with rear step bumper

B1. ENGINE (B2200)

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 ² , psi)-rpm)	Standard		1.197 (12.2, 173/200)	
	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	0; Maintenance-free
			EX	0; Maintenance-free
Cylinder head				
Height		mm (in)	81.95—92.05 (3.226—3.624)	
Distortion		mm (in)	0.15 (0.006) max.	
Grinding		mm (in)	0.20 (0.008) max.	
Valve and valve guide				
Valve head diameter	mm (in)	IN	43.5—44.1 (1.728—1.736)	
		EX	35.9—36.5 (1.413—1.421)	
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)
	mm (in)	EX	Standard	111.69 (4.3972)
			Minimum	111.29 (4.3816)
Valve stem diameter	mm (in)	IN	8.330—8.045 (0.328—0.3167)	
		EX	8.025—8.040 (0.316—0.3165)	
Guide inner diameter	mm (in)	IN	8.27—8.09 (0.3177—0.3185)	
		EX	8.27—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)	19—19.5 (0.752—0.772)	

Item		Engine		F2
Valve seat				
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)		IN	Standard	43.5 (1.831)
			Maximum	43.0 (1.890)
		EX	Standard	43.5 (1.831)
			Maximum	43.0 (1.890)
Valve spring				
Free length		IN	Outer	Standard 52.0 (2.047)
				Minimum 50.4 (1.984)
			Inner	Standard 44.0 (1.732)
				Minimum 42.7 (1.681)
		EX	Outer	Standard 52.0 (2.047)
				Minimum 50.4 (1.984)
			Inner	Standard 44.0 (1.732)
				Minimum 42.7 (1.681)
Out-of-square		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)
Camshaft				
Camlobe height		IN	Standard	38.056 (1.4984)
			Minimum	37.856 (1.4906)
		EX	Standard	38.056 (1.4984)
			Minimum	37.856 (1.4906)
Journal diameter		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		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		0.16 (0.006)
Camshaft runout		mm (in)	0.03 (0.0012) max.	
Camshaft end play		mm (in)	Standard	0.05—0.15 (0.0031—0.0053)
			Maximum	0.20 (0.008)
Rocker arm and rocker arm shaft				
Rocker arm inner diameter		mm (in)	16.000—16.027 (0.6300—0.6310)	
Rocker arm shaft diameter		mm (in)	15.986—16.024 (0.6294—0.6293)	
Rocker arm-to-shaft clearance		mm (in)	Standard	0.016—0.051 (0.0006—0.0024)
			Maximum	0.10 (0.004)
Cylinder block				
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—3.4063)
Cylinder bore taper		mm (in)	0.019 (0.0007) max.	
Cylinder bore out-of-round		mm (in)	0.010 (0.0004) max.	

Item		Engine	F2	
Piston				
Piston parameter (Measured at 90° to pin bore axis and 10° from 0.708 in; below oil ring groove)	mm (in)	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)	
Piston ring				
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)	
Piston pin				
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—3,300)	
Connecting rod				
Length (Center to center)	mm (in)		155.45—155.55 (6.1236—6.1242)	
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)	
Crankshaft				
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	59.683—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	59.107—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	50.690—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)	
Crankpin taper	mm (in)		0.05 (0.0020) max.	
Crankpin out of round	mm (in)		0.003 (0.00012)	
Main bearing				
Main journal bearing oil clearance	mm (in)	Standard	0.025—0.043 (0.0010—0.0017)	
		No. 1, 2, 4, 5	0.031—0.049 (0.0012—0.0019)	
		No. 3	0.031—0.049 (0.0012—0.0019)	
	Maximum		0.08 (0.0031)	
Available undersize bearing	mm (in)		0.25 (0.010), 0.50 (0.020), 0.75 (0.030)	
Crankpin bearing				
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
Thrust bearing			
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—1.132)
		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)
Timing belt			
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			Pintool
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 ² , psi) (atm)	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 ATDC	50°
	EX	Open BTDC	55°
		Close ATDC	15°
Valve clearance	mm (in)	N	0; Maintenance-free
		EX	0; Maintenance-free
Cylinder head			
Height	mm (in)		88.95—90.05 (3.541—3.545)
Distortion	mm (in)		0.15 (0.006) max.
Grinding	mm (in)		0.20 (0.008) max.
Valve and valve guide			
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 (4.4357)
		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—0.050 (0.0010—0.0024)
		EX	0.030—0.065 (0.0012—0.0026)
		Maximum	0.20 (0.008)
Guide projection (Height "A")		mm (in)	23.5—24.2 (0.925—0.953)

TD

Item		Engine	Q6
Valve seat			
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)	IN	Standard	49.0 (1.929)
		Maximum	49.5 (1.949)
	EX	Standard	49.0 (1.929)
		Maximum	49.5 (1.949)
Valve spring			
Free length	IN	Standard	50.05 (1.970)
		Minimum	49.85 (1.963)
	EX	Standard	50.05 (1.970)
		Minimum	49.85 (1.963)
Out of square		mm (in)	1.75 (0.069) max.
Setting load/height	N (kg) (lb/ft) (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)
Camshaft			
Camshaft height	IN	Standard	41.711 (1.6423)
		Minimum	41.514 (1.6344)
	EX	Standard	41.985 (1.6531)
		Minimum	41.788 (1.6452)
Journal diameter	mm (in)	Front and Rear (No. 1, 5)	29.940—29.965 (1.1788—1.1797)
		Center (No. 2, 3, 4)	29.940—29.935 (1.1776—1.1785)
		Out of round	Maximum
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)	Standard	0.02—0.15 (0.0008—0.0059)
		Maximum	0.20 (0.008)
Rocker arm and rocker arm shaft			
Rocker arm inner diameter		mm (in)	21.000—21.035 (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)
Cylinder block			
Height		mm (in)	318.5 (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.
Piston			
Piston diameter measured at 90° to pin bore axis and 16.0mm (0.706 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
Piston ring			
Thickness	mm (in)	Top	1.47 - 1.49 (0.058 - 0.059)
		Second	1.47 - 1.49 (0.058 - 0.059)
End gap measured in cylinder	mm (in)	Top	0.20 - 0.35 (0.008 - 0.014)
		Second	0.25 - 0.40 (0.010 - 0.016)
		Oil (rail)	0.20 - 0.70 (0.008 - 0.028)
		Maximum	1.0 (0.039)
Ring groove width in piston	mm (in)	Top	1.52 - 1.54 (0.0598 - 0.0600)
		Second	1.52 - 1.54 (0.0598 - 0.0600)
		Oil	1.02 - 1.04 (0.0398 - 0.041)
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)
Piston pin			
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 - 0.001)
Pressure force	N (kg, lb)		4,905 - 14,715 (500 - 1,500 / 100 - 3,300)
Connecting rod and connecting rod bearing			
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 - 2.1266)
Big end width	mm (in)		25.838 - 25.890 (1.0174 - 1.0194)
Connecting rod size clearance	mm (in)	Standard	0.1 - 0.262 (0.0043 - 0.0103)
		Maximum	0.30 (0.012)
Crankshaft			
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 (2.3430 - 2.3417)
		0.75 (0.030) undersize	59.187 - 59.205 (2.3332 - 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
Main bearing			
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)
Crankpin bearing			
Crankpin bearing oil clearance	mm (in)	Standard	0.027 - 0.037 (0.0011 - 0.0016)
		Maximum	0.10 (0.0039)
Available undersize bearing		mm (in)	0.25 (0.010), 0.50 (0.020), 0.75 (0.030)
Thrust bearing (center main bearing)			
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	26.22 - 26.25 (1.031 - 1.033)

Item		Engine	G6
Balance shaft			
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	
Oil pump				
Type			Trochoid gear	
Regulating pressure		kPa (kg/cm ² , psi)	294—392 (3.0—4.0, 43—57)	392—491 (4.0—5.0, 57—71)
Oil pressure	kPa (kg/cm ² , psi)	1,000 rpm	147—245 (1.5—2.6, 21—35)	108—206 (1.1—2.1, 16—30)
		3,000 rpm	294—392 (3.0—4.0, 43—57)	304—402 (3.1—4.1, 44—58)
Inner rotor built up to outer rotor clearance		Standard	0.041—0.084 (0.0017—0.0033)	
	mm (in)	Maximum	0.15 (0.0071)	
Outer rotor to body clearance	mm (in)	Standard	0.080—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)	
Oil filter				
Type			Full flow, paper element	
Relief pressure differential		kPa (kg/cm ² , psi)	78—118 (0.8—1.2, 11—17)	
Oil cooler				
Type			Water cooled, 3 stage	
Oil pressure switch				
Activation pressure		kPa (kg/cm ² , psi)	2—25 (0.02—0.25, 0.28—3.60)	29 (0.3—4.3)
Engine oil				
Capacity	liters (US qt, imp qt)	Total (dry engine)	4.6 (4.9, 4.0)	5.5 (5.8, 4.8)
		Oil pan	3.9 (4.1, 3.4)	4.5 (4.8, 4.0)
		Oil filter	0.22 (0.23, 0.19)	
Grade			API Service 30 Energy Conserving II (EC II)	
Viscosity number	Above -25°C (-13°F)		SAE 10W-30	
	Below 0°C (32°F)		SAE 5W-30	

E. COOLING SYSTEM

Item		Engine	F2	G6
Cooling method			Water-cooled, forced circulation	
Water pump				
Type			Centrifugal, timing belt driven	Centrifugal
Impeller diameter		mm (in)	70 (2.76)	52 (2.44)
Number of impeller blades			5	
Speed ratio			1 : 1.05	1 : 1.3
Water seal type			Unitized mechanical seal	
Thermostat				
Type			Wax	Wax, Two stage
Start to open		°C (°F)	86.5 (188–193)	Main : 86 ± 2 (188–193) Sub : 83.5 (182–188)
Full open		°C (°F)	150 (312)	
Lift		mm (in)	5.5 (0.23) min.	Main : 8.0 (0.31) min. Sub : 1.5 (0.06) min.
Radiator				
Type			Corrugated fin	
Cap opening valve pressure		kPa (kg/cm ² , psi)	74 (1.03 (0.73–1.05) ± 1.15)	
Cooling circuit checking pressure		kPa (kg/cm ² , psi)	103 (1.05, 1b)	
Cooling fan				
Type			Thermo-modulated	
Switching temperature OFF → ON	M/T	°C (°F)	55–65 (131–152)...linear	70–90 (158–194)...linear
	A/C		65–76 (152–167)...linear	—
Number of blades	M/T		7	8
	A/C		8	—
Outer diameter	M/T	mm (in)	360 (14.2)	410 (16.1)
	A/C		470 (18.5)	—
Coolant				
Capacity		liters (US qt, Imp qt)	With heater : 7.5 (7.0, 8.6) Without heater : 7.0 (6.4, 8.2)	6.8 (7.2, 8.0)

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 ² , psi)		26—32 (0.26—0.33, 3.7—4.7)	
	Feeding capacity	cc (cu in)/min		560 (52.5)	
Carburetor	Type	Down-draft (2-barrel, 2-stage, autochoke)			
	Throat diameter	Primary	mm (in)	30 (1.181)	
		Secondary	mm (in)	34 (1.330)	
	Venturi diameter	Primary	mm (in)	24.5 × 15 × 8 (0.966 × 0.591 × 0.315)	
		Secondary	mm (in)	31 × 16 (1.220 × 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)	0.52 (0.0206)	
		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)	1.00 (0.0394)	
		No.2	mm (in)	2.50 (0.0984)	
	Fuel level	High	mm (in)	11.6—12.5 (0.457—0.492)	
		Low	mm (in)	46.0—47.3 (1.811—1.866)	
	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 clearance	mm (in)	2.35—2.75 (0.093—0.108)	
		Unladder 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	Filter type	B-metal, automatic			
	Element type	Wet			
Accelerator cable	Deflection		mm (in)	1—3 (0.04—0.12)	
Idle speed			rpm	800—850 (800 rpm in neutral in P range)	
Idle mixture	Duty	Inspection	° (in)	20—70 (22—75)	
		Adjustment	° (in)	27—45 (30—50)	
Idle up	Automatic transmission	Adjustment speed	rpm	920—970	
	Automatic	Adjustment speed	rpm	1000—1500	
Dashpot	Adjustment speed		rpm	1000—2100	
Idle switch	Adjustment speed		rpm	1000—1200	
Idle compensator	Operating temperature		°C (°F)	63—71 (145—160)	
High-altitude compensator	Starts to open (Altitude above sea level)		m (ft)	520 (1,640)	

Transmission			Manual	Automatic
EGR control valve	1st	Starts to open mmHg (inHg)	40—60 (1.57—2.35)	
		Fully open mmHg (inHg)	110—130 (4.33—5.11)	
No.1 air control valve	Starts to open	mmHg (inHg)	300—400 (11.8—15.7)	
No.2 air control valve	Starts to open	mmHg (inHg)	50—90 (1.97—3.54)	
Water thermostat	Opened	°C (°F)	More than 46—54 (114.8—129.2)	
Water thermometer	Opened	At radiator °C (°F)	More than 15—19 (59—66.2)	
Water thermometer 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 purge control valve	Starts to open	mmHg (inHg)	90—110 (3.54—4.33)	
No.3 purge control valve	Starts to open	mmHg (inHg)	65—106 (2.50—4.17)	
Intake air thermometer 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 ¹	rpm	M/T: 730-770 A/I: 750-790			
Ignition timing ¹	BTDC	G6 4-6° F2 5-7°			
Throttle body					
Type		Horizontal draft (2-bank)			
Throat diameter	mm (in.)	No. 1 No. 2	G6	40 (1.6) 48 (1.9)	F2 50 (2.0)
Fuel pump					
Type		Impeller (in-tank)			
Output pressure	kPa (kg/cm ² , psi)	441-589 (4.5-6.0, 64-85)			
Fuel filter					
Type	Low-pressure side High-pressure side	Nylon element Paper element			
Pressure regulator					
Type		Diaphragm			
Regulating pressure	kPa (kg/cm ² , psi)	235-314 (2.7-3.2, 38-48)			
Injector					
Type		High-ohmic			
Type of drive		Voltage			
Resistance	Ω	12-16 (at 23°C, 73°F)			
BAG valve (solenoid valve (idle speed control))					
Solenoid resistance	Ω	7.7-9.3 (at 23°C, 73°F)			
BAG valve (air valve)					
Opening temperature	°C (°F)	Below 50 (122)			
Solenoid valve (Purge control)					
Solenoid resistance	Ω	30-34 (at 20°C, 68°F)			
Water thermosensor					
Resistance	$\times 10$	-20°C (-4°F)	14.5-17.9		
		20°C (68°F)	2.2-2.7		
		80°C (176°F)	0.26-0.35		
Intake air thermosensor					
Resistance	$\times 10$	25°C (77°F)	29.7-30.3		
		95°C (195°F)	3.3-3.7		
Circuit opening relay					
Resistance	Ω	STA - E1	21-43		
		B - Fc	109-226		
		B - Fv	∞		
Fuel tank					
Capacity	liters (U.S. gal, Imp. gal)	56 (14.8, 12.3)			
Air cleaner					
Element type		Dry			
Accelerator cable					
Free play	mm (in.)	1-3 (0.039-0.118)			
Fuel					
Specification		Unleaded regular (RON 87 or higher)			

¹ Test connector grounded

G. ENGINE ELECTRICAL SYSTEM

Item		Engine	F2 Carburetor	F2 EGI	G6	
Battery	Voltage	V	12, Negative ground			
	Type and capacity	(20-hour rate)	50D20R 75D26R Maintenance-free	50D20R 75D26R Maintenance-free	50D20R 80D26R Maintenance-free	
Dark current*		mA	MAX. 20.0			
Alternator	Type		A.C.			
	Output	V-A	12-55		12-60	
	Regulator type		Transistorized (built-in IC regulator)			
	Regulated voltage	V	14.1—14.7			
	Brush length	Standard	21.5 (0.845)			
		mm (in)	Minimum	8.0 (0.315)		
	Drive belt deflection	New	7-8 (0.28—0.31)		10-12 (0.39—0.47)	
	mm (in) @ 110 kg (24 lb)	Used	8—9 (0.31—0.35)		11—13 (0.43—0.51)	
Starter	Type		Non-reduction (M/T) Crossed-reduction (A/T)		Reduction	
	Output	V kW	12-0.96 (M/T) 12-1.4 (A/T)		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)		16.0 (0.630) (M/T) 17.0 (0.669) (A/T)	
		mm (in)	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-CI)		Electronic spark advance (Photo-diode type)
Centrifugal spark advance (Crank angle/engine speed)			0/1,000			
			11.0/2,500			
		degrees/rpm	11.0/3,500 13.0/4,400			
	Vacuum spark advance (Crank angle/vacuum)	degrees/mmHg (inHg)	0/100 (2.9) 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-11 BPR6ES-11	ZFR5T-11 ZFR6T-11	
		NPX/HHNHSO	W16EXH-J W20EXR-J	W16EXR-L-11 W20EXR-L-11	KJ16CR-11 KJ20CR-11	
	Plug gap	mm (in)	0.75—0.85 (0.028—0.033)		1.0—1.1 (0.039—0.043)	
	Plug 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	
Clutch pedal				
Type			Suspended	
Pedal rest			8.0	
Full stroke		mm (in)	35 (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)
Flywheel				
Runout limit		mm (in)	0.2 (0.008)	
Clutch disc				
Type			Single dry disc	
Runout limit		mm (in)	1.0 (0.039)	0.7 (0.028)
Wear limit		mm (in)	0.3 (0.012) from rivet head	
Outer diameter		mm (in)	250 (9.84)	225 (8.96)
Inner diameter		mm (in)	160 (6.30)	150 (5.91)
Facing thickness		mm (in)	3.5 (0.14)	
		Flywheel side Pressure plate side	3.5 (0.14)	4.1 (0.16)
Clutch cover				
Type			Diaphragm spring	
Set load		N (kg, lb)	5,194 (560, 1,232)	4,807 (490, 1,078)

J1. MANUAL TRANSMISSION (B2200)

Item			Transmission	M5M-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
Oil	Reverse			3.403
	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				6.4 (0.252), 6.5 (0.256), 6.6 (0.260), 6.7 (0.264)
			mm (in)	
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)

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 (3.4, 2.8)
	Grade		API Service GL-4 or GL-5	
	Viscosity	Above 10°C (50°F) All seasons	SAE 90W-80 SAE 75W-80	
Mainshaft runout limit			0.03 (0.0012)	
Reverse idler 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-80 SAE 75W-80	
Input-shaft gear bearing end play			0—0.1 (0—0.004)	
Input-shaft gear bearing adjust shim			0.7 (0.028), 0.8 (0.032), 0.9 (0.035), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047)	
Output-shaft rear bearing end play			0—0.1 (0—0.004)	
Output-shaft bearing adjusting shim			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 (0.062), 1.7 (0.067)	
Front-drive sprocket bearing end play			0—0.1 (0—0.004)	
Front-drive sprocket rear bearing adjusting shim			0.5 (0.020), 0.6 (0.024), 0.7 (0.028), 0.8 (0.032), 0.9 (0.035), 1.0 (0.039), 1.1 (0.043), 1.2 (0.047)	

K1. AUTOMATIC TRANSMISSION (HYDRAULICALLY-CONTROLLED)

Transmission/Engine			NAA-HL			
Item			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	Total	7.5 (7.9, 6.6)			
	Filters (US qt, Imp qt)	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			
		D and 1 ranges	294—392 (3.0, 4.0, 4.3, 5.7)			
Line pressure kPa (kg/cm ² , psi)	At idle	2 range	589—1,148 (6.0—11.7, 85—166)			
		R range	520—657 (5.3—6.7, 75—95)			
		D and 1 ranges	932—1,128 (9.5—11.5, 135—164)			
	At stall	2 range	981—1,177 (10.0—12.0, 142—172)			
		R range	1,736—1,823 (17.7—19.6, 252—279)			
		D and 1 ranges	932—1,128 (9.5—11.5, 135—164)			
Governor pressure kPa (kg/cm ² , 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—510 (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 (1/87 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)	
	Body clearance	mm (in)	Standard	0.02—0.04 (0.0008—0.0016)		
			Maximum	0.08 (0.0031)		
Oil pump	Tip clearance	mm (in)	Standard	0.14—0.21 (0.0055—0.0083)		
			Maximum	0.25 (0.0098)		
	Side clearance	mm (in)	Standard	0.06—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/driven 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)		
	Relaxing 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)		
	Bearing race size		mm (in)	1.3 (0.051), 1.5 (0.059), 1.7 (0.067), 1.9 (0.075), 2.1 (0.083), 2.3 (0.091), 2.5 (0.098), 2.7 (0.106)		
OD planetary gear unit	Pinion clearance	mm (in)	Standard	0.2—0.7 (0.0079—0.028)		
			Maximum	0.8 (0.031)		
	Total end play		mm (in)	0.25—0.50 (0.010—0.020)		
Bearing race size		mm (in)	1.2 (0.047), 1.4 (0.055), 1.6 (0.063), 1.8 (0.071), 2.0 (0.079), 2.2 (0.087)			

Item	Transmission/Engine		N4A-HL		
			F2 EGI	F2 Carb.	G6
Front clutch	Number of drive/driven plates		3/5		
	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), 5.2 (0.205), 5.4 (0.213), 5.6 (0.220), 5.8 (0.228), 6.0 (0.236)		
	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 (0.009—0.019)		
	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)		
Front planetary gear	Pinion clearance mm (in)		0.2—0.7 (0.008—0.028)		
			0.8 (0.031)		
Rear planetary gear	Pinion clearance mm (in)		0.2—0.7 (0.008—0.028)		
			0.8 (0.031)		
Parking gear (or. distrib. box)	Seal ring and groove clearance mm (in)		0.04—0.16 (0.0016—0.0063)		
			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 (0.280)	26.0 (1.024)	18.0	0.8 (0.031)
		G6	7.4 (0.291)	29.8 (1.173)	13.5	0.9 (0.035)
	3-4 shft	F2 EGI	7.2 (0.283)	28.1 (1.106)	12.0	0.8 (0.031)
		F2 Carb.	7.3 (0.287)	25.24 (0.994)	13.0	0.9 (0.035)
		G6	6.6 (0.260)	30.3 (1.193)	14.6	0.8 (0.031)
	2-3 shft	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 shft		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 (1.052)	16.0	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	0.8 (0.031)	

Spring			Item	Outer dia. mm (in)	Free length mm (in)	No. of coil	Wire dia. mm (in)
Governor valve	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	2ND	F2					
		G6					
Direct, front, and rear clutches				8.0 (0.315)	30.5 (1.20)	14.5	1.3 (0.051)
Low and reverse brake				—	5.9—6.2 (0.232—0.246)	—	—
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 ₁ →D ₂	51—57 (32—35)	52—58 (32—36)	50—59 (31—37)
		D ₂ →D ₃	53—59 (56—61)	58—64 (55—59)	57—63 (50—64)
		OD→D ₂	Above 84 (52)	Above 83 (51)	Above 81 (56)
		D ₃ →D ₄	84—90 (62—66)	83—89 (61—65)	81—87 (66—69)
		D ₄ →C ₁	37—43 (23—27)	38—44 (24—27)	37—43 (23—27)
	Half throttle 200 mmHg (7.5 inHg)	D ₁ →D ₂	16—22 (10—14)	20—26 (12—16)	23—29 (14—18)
		D ₂ →D ₃	29—33 (18—22)	24—30 (15—18)	20—26 (25—29)
		D ₃ →OD	43—49 (27—30)	42—48 (26—30)	64—70 (40—43)
		Lockup ON (ON)	58—74 (42—46)	70—76 (43—47)	68—74 (42—40)
		Lockup OFF (OFF)	53—59 (39—43)	66—72 (41—45)	63—69 (39—43)
	Fully closed	OD→D ₁	28—32 (16—20)	29—35 (18—22)	30—42 (22—28)
		D ₂ →D ₃	12—16 (7—11)	12—16 (7—11)	25—31 (16—19)
		D ₃ →D ₁	12—16 (7—11)	12—16 (7—11)	13—19 (8—12)
		D ₁ →D ₂	12—16 (7—11)	16—22 (10—14)	13—19 (8—12)
		D ₂ →D ₃	24—30 (15—19)	21—27 (13—17)	24—30 (15—19)
		D ₃ →OD	41—47 (25—29)	40—46 (25—29)	40—46 (25—29)
1	—	OD→D ₁	26—32 (16—20)	29—35 (18—22)	27—33 (17—20)
		D ₂ →D ₃	12—16 (7—11)	12—16 (7—11)	13—19 (8—12)
		D ₃ →D ₁	12—16 (7—11)	12—16 (7—11)	13—19 (8—12)
		1→1 ₁	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	Total	8.8 (9.1, 7.6)
	liters (US qt, Imp qt)	Oil pan	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 ² , 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—92)
	At stall	D, S and L ranges	1,040—1,118 (10.6—11.4, 151—162)
		R range	1,452—1,530 (14.8—15.5, 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)
	Hearing 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)
	Sprocket 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)	15.6	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	8.95 (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	0.85 (0.033)
	Shuttle shift valve S	5.5 (0.217)	43.0 (1.693)	22.2	0.85 (0.033)
	Pilot valve	0.1 (0.0039)	25.7 (1.012)	8.3	1.1 (0.043)
Lower control valve body	Lockup control valve	13.0 (0.512)	18.5 (0.728)	3.5	0.75 (0.030)
	Modifier accumulator piston	9.8 (0.386)	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)
Oil pump	3-2 timing valve	5.75 (0.226)	20.55 (0.809)	7.5	0.75 (0.030)
	Cam ring	13.7 (0.539)	39.6 (1.567)	7.8	2.3 (0.091)
Accumulator	N/O accumulator piston	18.0 (0.709)	43.0 (1.693)	12.3	2.3 (0.091)
	1-2 accumulator piston	29.3 (1.154)	45.0 (1.772)	3.6	4.0 (0.157)
	2-3 accumulator piston	20.0 (0.787)	65.0 (2.598)	11.4	3.5 (0.138)
	3-4/N-R accumulator piston	17.5 (0.689)	55.4 (2.298)	12.3	2.3 (0.091)
Reverse clutch	Return	11.6 (0.457)	19.69 (0.775)	4.0	1.3 (0.051)
	High clutch	11.6 (0.457)	22.10 (0.870)	6.0	1.3 (0.051)
Forward & overrunning clutch	Return	9.7 (0.382)	35.8 (1.409)	10.3	1.3 (0.051)
Low BRC reverse brake	Return	11.6 (0.457)	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 ₁ →D ₂	47–51 (29–32)
			D ₂ →D ₃	87–95 (54–59)
			D ₃ →OD	129–139 (80–86)
		Half throttle (1.5–2.2 volt)	D ₁ →D ₂	39–43 (24–27)
			D ₂ →D ₃	66–72 (41–45)
			Lockup ON (D ₃)	96–104 (60–64)
			D ₂ →OD	111–119 (69–74)
			Lockup ON (OD)	128–136 (79–84)
			Lockup OFF (OD)	96–104 (60–64)
			OD→D ₃	71–75 (44–46)
			Lockup OFF (D ₃)	86–94 (53–58)
			D ₃ →D ₂	42–46 (26–30)
		Kickdown	OD→D ₃	124–134 (77–83)
			OD→D ₂	81–89 (50–55)
			OD→D ₁	41–45 (25–28)
			D ₃ →D ₂	81–89 (50–55)
			D ₃ →D ₁	41–45 (25–28)
			D ₂ →D ₁	41–45 (25–28)
			D ₁ →D ₂	47–51 (29–32)
Normal (Economy)		Fully opened (4.4 volt)	D ₂ →D ₃	87–95 (54–59)
			D ₃ →OD	129–139 (80–86)
			D ₁ →D ₂	30–34 (19–21)
		Half throttle (1.0–2.2 volt)	D ₂ →D ₃	52–58 (32–36)
			D ₁ →OD	56–104 (60–64)
			Lockup ON (OD)	96–104 (60–64)
			Lockup OFF (OD)	81–89 (50–55)
			OD→D ₃	43–51 (27–32)
			D ₃ →D ₂	22–28 (14–17)
		Kickdown	OD→D ₃	124–134 (77–83)
			OD→D ₂	81–89 (50–55)
			OD→D ₁	41–45 (25–28)
			D ₃ →D ₂	81–89 (50–55)
			D ₃ →D ₁	41–45 (25–28)
			D ₂ →D ₁	41–45 (25–28)
Normal	S	Fully opened (4.4 volt)	S ₁ →S ₂	47–51 (29–32)
			S ₂ →S ₃	87–95 (54–59)
			S ₃ →S ₄	82–88 (51–55)
		Half throttle (1.5–2.2 volt)	S ₁ →S ₂	41–45 (25–28)
			S ₂ →S ₃	39–43 (24–27)
			S ₃ →S ₄	66–72 (41–45)
Normal	L	Fully opened (4.4 volt)	L ₁ →L ₂	47–51 (29–32)
		Half throttle (1.5–2.2 volt)	L ₂ →L ₁	41–45 (25–28)
			L ₁ →L ₃	30–43 (24–27)
HOLD	D	Fully closed (0.4 volt)	D ₂ →D ₁	18–22 (11–14)
			D ₃ →D ₂	7–13 (4–8)
			OD→D ₃	32–140 (86–92)
			S ₂ →S ₁	58–96 (36–60)
			L ₂ →L ₁	44–48 (27–30)

L. PROPELLER SHAFT

Item		Front propeller shaft	Rear propeller shaft
Starting torque adjustment snap ring	mm (in)	± 45 (0.0571), ± 48 (0.0583), 1.51 (0.0594), ± 54 (0.0606), 1.57 (0.0618), ± 60 (0.0630), 1.63 (0.0642)	
Runout limit	mm (in)		0.4 (0.016)
Starting torque of universal	Nm (cm-kg, in-lb)	0.294	0.784 (3.0—8.0, 2.6—6.9)

M. FRONT AND REAR AXLES

(4x4)

Engine/Transmission			62600	
Item			M/T	A/T
Front axle				
Bearing play axia. direction			0 (0)	
Bearing preload (without oil seal load)	Push scale reading	N (kg, lb)	5—12 (0.6 1.2 1.3 2.0)	
Front differential				
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 (59°F)	SAE 90	
		Below +15°C (59°F)	SAE 80W	
	Amount	liters (US qt, Imp qt)		1.5 (1.6, 1.3)
Drive pinion preload			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 0.35 (0.0025)	
	Allowable variation		Less than 0.37 (0.0028)	
Pinion height adjustment spacer			14 sizes from 3.08 (0.1213) to 3.47 (0.1366) in increments of 0.05 (0.0012)	
L dimension between bearing caps			185.43—186.50 (7.3004—7.3031)	
Side gear and pinion gear backlash			0—0.1 (0—0.004)	
Backlash adjustment washer			2.00 (0.0787), 2.05 (0.0807), 2.10 (0.0827), 2.15 (0.0846), 2.20 (0.0866)	
Rear axle				
Axle casing			Bump type	
Axle shaft support			Semifloating type	
Bearing play axial direction	When both shafts are installed		0.05—0.25 (0.002—0.010)	
	When one axle shaft is installed		0.65—0.95 (0.026 0.037)	
Rear differential				
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 (59°F)	SAE 90	
		Below +15°C (59°F)	SAE 80W	
	Amount	liters (US qt, Imp qt)		1.7 (1.8, 1.5)

Engine/Transmission		B2600I	
Item		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	Standard	0.05—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)	204.43—204.50 (8.0484—8.0512)	
Side gear and pinion gear backlash	mm (in)	0—0.1 (0—0.004)	
Backlash adjustment washer	mm (in)	2.00 (0.0787), 2.05 (0.0807), 2.10 (0.0827), 2.15 (0.0846), 2.20 (0.0866)	

(4x2)

Engine/Transmission			B2200		B2600I	
Item			M/T	A/T	M/T	A/T
Front axle						
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)			
Rear axle						
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 axle shaft is installed	mm (in)	0.65—0.95 (0.026—0.037)			
Differential						
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	Above +15°C (59°F)	SAE 90			
		Below +12°C (54°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	Standard	mm (in)	0.00—0.11 (0.0033—0.0043)			
	Minimum		More than 0.05 (0.0020)			
	Allowable variation		Less than 0.07 (0.0028)			
Pinion height adjustment spacer		mm (in)	14 sizes from 3.08 (0.1213) to 3.47 (0.1366) in increments of 0.03 (0.0012)			
Dimension between bearing caps		mm (in)	185.43—185.50 (7.3004—7.3331)		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

Engine/Type			B2200		B2600I	
Item			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 ¹	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-clip 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 GL-4 SAE 90	ATF M2C33F or Dextron®II		
	Capacity ²	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 ² , psi)		5,584-9,320 (57.5-95, 1.244-1.261)	9,320-9,810 (95-100, 1.351-1.422)	
Oil pump drive belt	Deflection ³	New	—	7.0-8.0 (0.28-0.31)	6.6-7.2 (0.26-0.28)	
		Used		8.0-9.0 (0.31-0.35)	7.2-8.0 (0.28-0.31)	
	Tension	New	—	245-284 (25-30, 55-65)	412-471 (42-46, 82.4-105.8)	
				196-245 (20-25, 44-55)	353-402 (36-41, 78.2-90.2)	
		Used				

¹ Manual steering, measured with wheels off ground. Power steering, measured with wheels on ground.

² Power steering, complete system.

P. BRAKING SYSTEM

Item		Model		4x4	4x2
Brake type				Front disc, Rear drum	
Brake pedal	mm (in)	Height (with pedal)		180 (7.09)	7.28 (28.66)
		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)			
Master cylinder and reserve tank					
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.)		0.6 (0.17, 0.14)	
Front brake (disc)					
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)	
Rear brake (drum)					
Type				Duoservo	Leading-trailing
Shoe clearance adjustment				Self-adjusting	
Thickness of lining	mm (in)	Standard	5.0 (0.20)		6.0 (0.25)
		Wear limit	1.0 (0.04)		
Diameter of drum	mm (in)	Standard	260.0 (10.24)		
		Wear limit	261.5 (10.30)		
Wheel cylinder bore		mm (in)		17.46 (0.688)	19.05 (0.750)
Clearance between piston and bore	mm (in)	Standard	0.040—0.125 (0.002—0.005)		
		Wear limit	0.15 (0.006)		
Parking brake					
Type				Stick type	
Parking lever notches				7—12 notches	
When lever is pulled at 196 N (20 kg, 44 lb)					
Power brake unit					
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 ² , psi)	More than 1.982 (20, 284)		More than 1.078 (11, 156)	
		at 0 mmHg (0 mmHg)		at 0 mmHg (0 mmHg)	
		More than 5.886 (60, 853)		More than 5.390 (55, 782)	
		at 500 mmHg (19.7 mmHg)		at 500 mmHg (19.7 mmHg)	
Rear wheel hydraulic control system					
Type				Rear-wheel Anti-lock Brake System (Rear-wheel ABS)	
Brake fluid					
Grade				FVWS 115 DOT-3 or SAE J1703	

Q. WHEELS AND TIRES

Item		Model	4x4		4x2	
			Standard	Temporary	Standard	Temporary
Wheels	Size		15 x 6JJ	16 x 4T	14 x 5 1/2JJ	16 x 4T
	Offset	mm (in)	30 (1.18)	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 ² , 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 imbalance at rim edge (on one side)		g (oz)	10 (0.35)			

R. SUSPENSION

Item		Model	4x2	4x4
Front Suspension				
Suspension			Double wishbone	
			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)	22 (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	55°00' ± 2°	33°30' ± 2°
		Outer	33°00' ± 2°	35°00' ± 2°
	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)	
		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'
	Kingpin angle		8°15'	10°20'
	Caster trail	mm (in)	4.4 (0.17)	12 (0.47)
Rear Suspension				
Suspension			Rigid axle	
			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 0.24)
			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 (31.10 x 2.36 x 0.55)	639 x 60 x 12 (25.16 x 2.36 x 0.47)
Shock absorbers	Type		Cylindrical, double-acting	
	Damping force N (kg, lb) at 0.3 m/s	Extended	687 ± 108 (70 ± 11, 154 ± 24)	1,079 ± 167 (110 ± 17, 242 ± 37)
		Compressed	471 ± 88 (48 ± 10, 106 ± 22)	441 ± 88 (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 (6062)
	Halogen	60/35 (-H0054)
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)
Indicator and warning lights		
Alternator		1.4
Brake		1.4
Cruise (kill)		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
Huxd		1.4
4x4		1.4
Anti-lock		1.4
Illumination lights		
A/C switch		1.4
Ashtray		3.4
Bower		3.4
A/C selector		3.4
Heater		3.4
Meter		3.4
Audio		1.4
RF/M 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 minimum pressure	kPa (kg/cm ² , 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-kp	ft-lb	Nm	m-kp	ft-lb	Nm	m-kp	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	6.4-9.5	46-69
14 (0.551)	1.5 (0.059)	—	—	—	75-103	7.7-10.5	56-76	102-137	10-14	75-101
16 (0.630)	1.5 (0.059)	—	—	—	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	231-312	417-564	43-58	307-416
24 (0.945)	1.5 (0.059)	—	—	—	475-548	41-58	298-403	538-726	55-74	396-530

SPECIAL TOOLS

GENERAL INFORMATION ST- 2
ENGINE ST- 3
CLUTCH AND MANUAL TRANSMISSION ... ST- 4
AUTOMATIC TRANSMISSION ST- 6
DIFFERENTIAL ST- 6
PROPELLER SHAFT ST- 7
FRONT AND REAR AXLES ST- 7
BRAKING SYSTEM ST- 9
STEERING SYSTEM AND SUSPENSION ... ST- 9
AIR CONDITIONER SYSTEM ST-10
CHECKER AND OTHER EQUIPMENT ST-11

29051X-001

GENERAL INFORMATION

The letters A and B in the priority column indicate the degree of importance of each tool.

A.....Indispensable

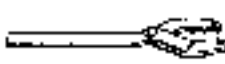
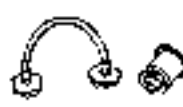
The tools ranked A in this list are indispensable for performing operations satisfactorily, easily, safely, and efficiently. It is, therefore, advisable that all service shops have these tools.

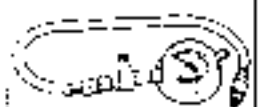
B.....Selective

The tools in this list are not as necessary as tools ranked A, but all service shops should have these tools to perform repairs more easily and more efficiently.

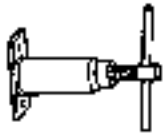
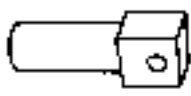
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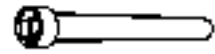
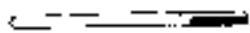
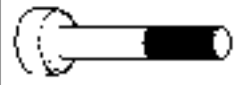
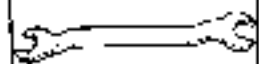
ENGINE

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 E011 1A0 Brake set, ring gear	A	
49 0636 100A Arm, valve spring lifter	A	
49 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	

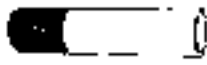
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L012 0A0 Installer set, valve seal & valve guide	A	
49 L011 2A0 Replacer set, balance shaft bushing (GC)	A	
49 L010 1A0 Hanger set, engine stand	A	
49 H011 101A Lock tool, crankshaft	A	 P/N 170011
49 U249 C10A Remover & installer, valve guide (G5)	A	
49 0221 251A Remover & installer, valve guide (F2)	A	
49 C187 280 Gauge oil pressure	A	
—	—	—

CLUTCH AND MANUAL TRANSMISSION

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 430 Main drive shaft pusher	A	
49 0710 520 Pulley 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 0638 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 Installation bearing (4x4)	A	
49 5231 395 Chain expansion tool (4x4)	A	
49 0259 770B Wrench, flare nut	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 11017 340A Guide set, worm bevel (4x4)	A	
4B G030 370 Removing plate (4x4)	A	
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AUTOMATIC TRANSMISSION

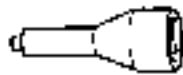
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 11019 0A0A Transmission hanger	A	
4B G07B 390 Pulver. oil pump	A	
4B G019 025 Body B (EC-AT)	A	
4B L01B 001 Bolts (EC-AT)	A	

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 355 Adjust. gauge (except EC-A1)	B	

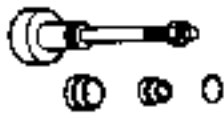
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AUTOMATIC TRANSMISSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 003 Installer, oil seal (EC-AT)	A	
49 0378 375 Compressor clutch spring (except EC-AT)	A	
49 0378 400A Gauge set, oil pressure	A	
49 H019 002 Adapter	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0378 346 Hex-head wrench (except EC-AT)	A	
49 H075 405 Adapter (except EC-AT)	A	
49 5019 0A0 Self centering tool (except EC-AT)	A	
49 B019 001 Gauge, oil pressure	A	

DIFFERENTIAL

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H027 001 Collar	A	
49 0030 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 0030 338 Attachment E	A	

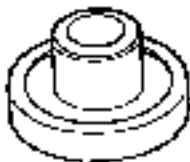
DIFFERENTIAL (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 555 Gauge block	A	
49 U027 001 Collar	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0727 570 Gauge body, pinion height	A	
49 0259 720 Adjustment wrench, side bearing	B	

PROPELLER SHAFT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 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	
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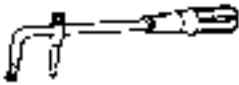
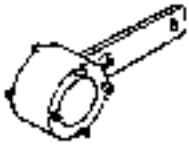
FRONT AND REAR AXLES

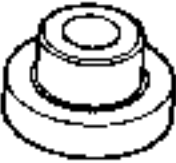
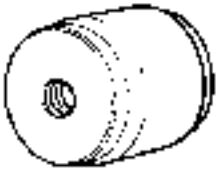
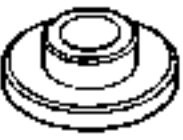
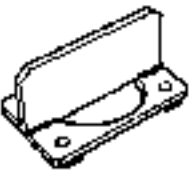
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 006 Installer, bearing (4x4)	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 004 Attachment φ80	A	

ST

FRONT AND REAR AXLES (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U027 005 Installer, bearing (4x4)	A	
49 D513 210A Puller, tubular lower	A	
49 U027 007 Installer, oil seal (4x4)	A	
49 U027 004 Remover, oil seal (4x4)	A	
49 F027 007 Attachment $\phi 72$	A	
49 0803 635A Wrench, ear shaft bearing nut	A	
49 3120 520A Puller, rear axle shaft bearing	A	
49 C118 950C Puller, ball joint	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 S231 635 Wrench, locknut (4x4)	A	
49 0727 575 Puller, ball joint	A	
49 U033 101 Installer, bearing (4x4)	A	
49 F027 005 Attachment $\phi 52$	A	
49 W027 001 Installer, oil seal	A	
49 3120 74B Attachment	A	
49 MC05 795 Installer, oil seal (4x4)	A	
49 3120 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 UU25 001 Installer, protector (4x4)	A	

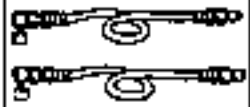
BRAKING SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F043 001 Adjust gauge	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0221 600C Disc brake expand tool	B	

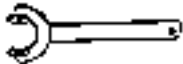
STEERING SYSTEM AND SUSPENSION

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0223 695E Puller, pitman arm	A	
49 1391 580 Wrench, 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 H002 E/1 Adapter	A	
49 0118 850C Puller ball joint	A	
49 U034 240 Lower arm bushing puller and installer	A	

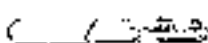
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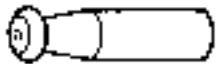
STEERING SYSTEM AND SUSPENSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0180 510B Preload measuring attachment	B	
40 J639 685 Adjust wrench	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U839 615 Bushings puller and installer set	A	
49 1243 785 Installer, dust boot (Upper arm & outer ball joint)	A	

AIR CONDITIONER SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0809-01 Hanger, clutch	A	
0000-41-0804-07 Universal puller body	A	
0000-41-0804-51 Universal puller arbor	A	
0000-41-0810-77 Clutch pilot	A	
0000-41-0809-02 Puller, clutch plate	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
0000-41-0810-73 Remover & installer, seal seal	A	
0000-41-0810-76 Removal set, pulley & clutch	A	
0000-41-0812-11 Remover & installer, seal	A	
000-41-0812-13 Protector, seal sleeve	A	
0000-41-0809-10 Protector shaft pin	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	

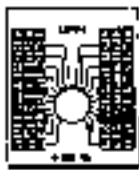
CHECKER AND OTHER EQUIPMENT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H015 9A1 Checker, Self-diagnose	A	
49 0005 870A Tool set, window	A	
49 G015 901 Adapter harness (Throttle sensor)	A	
49 G019 901A EC-A1 tester	A	
49 G018 002 Igniter checker	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 866A Inserting tool, seal pusher & blade	B	
49 G019 901 EC-A1 tester	A	
49 H019 902 Adapter unit		
49 N018 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	
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